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electronic engineers master catalog

VOLUME 2

INCORPORATED

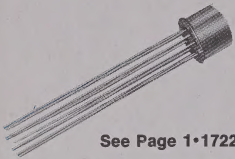
INDUSTRIAL PRODUCTS SELECTION GUIDE

ALL HI-G PRODUCTS ARE
ADVANCED RESEARCH
CENTER DESIGNED

MINIATURE SEALED INDUSTRIAL RELAYS

Reduces Maintenance and Service Cost

The smallest physical size industrial relays available, providing the ultimate in reliable switching capability. Hermetic sealing prevents contamination — assures long life, trouble-free operation — sharply reduces maintenance and service cost. Ideal for data processing, communications, machine control, remote station, and power and low-level switching. . . in any environment containing dust, moisture, corrosive or explosive materials.



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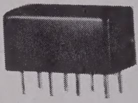

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TO-5 SERIES

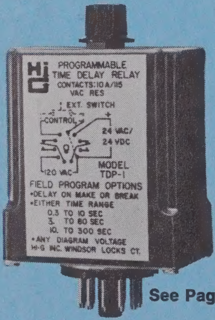
Hermetically sealed DPDT relays with switching capabilities from Dry Circuit to 1 ampere at coil sensitivities from 90 MW. available with and without internal diode coil suppression.

½ SIZE CRYSTAL CAN RELAYS

High speed hermetically sealed DPDT relays with switching capabilities from Dry Circuit to 2 amperes, at coil sensitivity of 350 MW.

TIME DELAY RELAYS

Series TD features CMOS digital circuitry; DPDT contacts — 10 amps resistive; no "false" operation on delay on make mode.



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MODEL TDP-1 PROGRAMMABLE

Easy to select for delay on make or break; 24VDC, 24VAC, or 120VAC; and for an adjustable delay range of 0.3 to 10, 3 to 80, or 10 to 300 seconds. Ideal for R & D and low volume production.

MODEL TDO & TDR

Conventional adjustable and fixed, single mode and voltage timers at competitive prices. See Page 1•1723

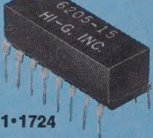
IN-LINE TIMER

HI-G, INC.
MODEL-6400
TIMER

See Page 1•1724

Low cost, series connected. Model 6400 has fixed delays of 1, 5, 10, 30 and 60 sec., inputs of 12, 24 or 48 VDC and ½ amp inductive output. Other options available.

DIP PACKAGE TIMER



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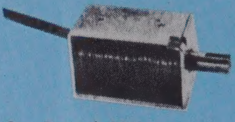
No external components required for these Series 6200 & 6300 timers. Model 6200 for DELAY-ON-MAKE, 6300 for interval (one shot) applications. Choose from 5, 12, 24 or 48 VDC inputs. Use Model MCG-5 for 5 VDC master clear generator function.

INTERCHANGEABLE SOLENOIDS



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Low Cost Box Frame solenoid design are completely INTERCHANGEABLE wit popular industry standard sizes.

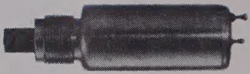
NEW "S" SERIES SOLENOIDS

See Page 1•1712

Unique Low Cost Standard Options fea ture 8 sizes in 2,304 combinations o voltage, duty cycle, clevis, pushrod shock dampener, and return spring.

Special Design Engineer's Solenoid Ki offering.

TUBULAR SOLENOIDS



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Standard and Custom designs are avail able utilizing the latest technology, ma terials, and manufacturing techniques fo built in long-life performance.

CUSTOM SOLENOIDS

See Page 1•1713

A custom commercial high speed prin head solenoid for Dot Matrix impac printers.

Hi-G, INCORPORATED
580 Spring Street
Windsor Locks, Connecticut 06096
Tel: (203) 623-2481

MILITARY PRODUCTS SELECTION GUIDE

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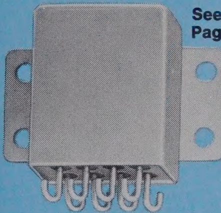
DAYTON OHIO
ENGINEERING ASSOCIATES

POWER RELAYS



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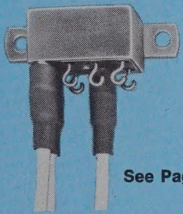
Power switching up to 10 Amperes in accordance with Mil-R-5757/23-/28. Available in a full range of coil resistances and mounting configurations to provide versatility of this Qualified product.

RADIO FREQUENCY RELAYS



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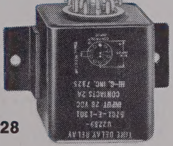
A complete line of RF switching devices with 200 watt handling capabilities at coil sensitivities of 250 MW. RF VSWR characteristics of 1.1:1 to 500 MHz in cable impedances of 50 - 75 - 95 ohms.

DELAY ON RELEASE TIMERS



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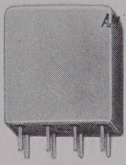
Series 5600/5700 offers 2, 5 and 10 amp contacts, one or two pole, delays to 300 seconds, temperature ranges −55°C to +85°C or +125°C and are hermetically sealed.

SENSORS

See Page 1•1729

Series 1300 for voltage, 1400 for phase and 7000 for frequency. Available with solid state or relay output; military or commercial applications/packaging.

CRYSTAL CAN RELAYS



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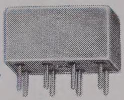
Reliable switching in a full size crystal can relay qualified to Mil-R-5757/10. Coil sensitivity of 250 MW. and contact ratings from low level to 2.0 ampere.

1/2 SIZE CRYSTAL CAN RELAY



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A long established relay design providing reliability and switch performance to the qualified standards of Mil-R-5757/9 — Dry Circuit to 2 Amperes at switching sensitivities of 250 MW.

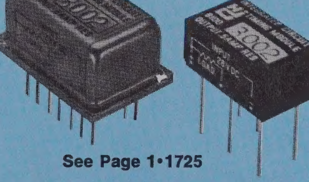
INTERVAL TIMER

4622-A-5001
TIME DELAY RELAY
INPUT 28 VDC
CONTACTS 4A
HI-G, INC.
7145

See Page 1•1728

Series 4600/4700/4800 offer one shot function for 10 milliseconds to 100 seconds in relay or solid state output. Factory fixed or field adjustable. Hermetically sealed, AC or DC inputs and temperatures to 125°C.

THICK FILM HYBRID TIMERS



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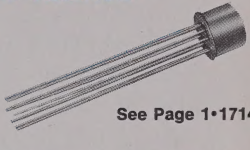
Delay on operate solid state output in 5, 12 and 24 VDC inputs 0.3″ wide x 0.1″ grid pin spacing. Model 6100 is epoxy and 6150 hermetically sealed. Delays are set but field trimmable.

1/5 SIZE CRYSTAL CAN RELAYS

See Page 1•1717

The ultimate in relay design, size and capability — Dry Circuit to 2 Amperes in a package capable of withstanding today's environmental stresses — Qualified to Mil-R-5757/37.

TO-5 RELAYS



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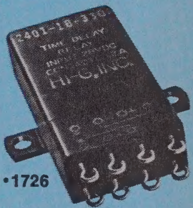
The fully qualified TO-5 series with switching capabilities from Dry Circuit to 1 Ampere at coil sensitivities from 60 MW. Qualified to Mil-R-5757/38-/40-/69-/70.

DELAY ON OPERATE TIMERS



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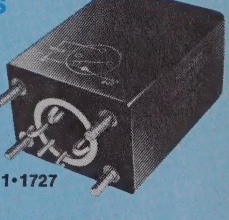
Series 2400-Crystal can (1.5″ max.) factory fixed to 120 seconds, to DPDT, 2 amp contacts and temperatures −55°C to +125°C.

VERSATILE DELAY ON OPERATE TIMERS



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For loads to 10 amps delays to 300 sec. AC or DC input, up to 4 PDT output. Series 1600 factory set; 1700 resistor adjustable with termperatures to 125°C.

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how to use eem 75 76

This issue of EEM is the largest, most complete catalog ever published in the electronics field. The two volumes contain more than 5,000 pages of up-to-date information. New features have been added and you may find it helpful to scan this page as a guide to the easy use of EEM.

1. INDEX OF MANUFACTURERS' CATALOG PAGES

When you need data from particular manufacturers, just look them up alphabetically in the index beginning on page 3 (green pages). More than 700 manufacturers have catalog pages in EEM, and easy reference is given for all these pages in two-number figures. The first number in bold type indicates the volume (1 or 2); the second, the page number. Example: **1**•141 means Vol. 1, page 141.

2. PRODUCT INDEX AND DIRECTORY

All products are indexed by basic type. Each product shows three groups of manufacturers:

1. **Boldface** listings with page references tell you that this manufacturer's catalog pages are right at hand in the white pages.
2. * the asterisk means that this manufacturer has catalog pages in the white section but not on this particular product.
3. Lightface listings, unmarked, means that the manufacturer has submitted a data sheet to verify that they do manufacture this product, but no further data is available in EEM.

New feature You'll find a handy Product Index and Directory in each volume. All product designations are in both volumes, but page references are given only for those products in that volume; you are referred to the other volume when the catalog pages are there.

New feature The letter "D" preceding the listing tells you that the product is available from distributors.

New feature The letter "M" preceding the listing tells you that the product is available in military specifications.

3. TRADE MARK DIRECTORY

If you have just a trade mark, this directory gives you the product it signifies and who makes it. We've black edgemarked the section for easy location. Beginning on page 2•301 (green pages), there are more than 2500 manufacturers' trade marks listed. Once you have the product and manufacturer, look in the Manufacturers and Sales Offices Directory for complete name and address.

4. MANUFACTURERS' CATALOG PAGES

Here is the greatest collection of detailed catalog pages on electronic products available anywhere. The section is indexed by product category, alphabetically. Manufacturers' catalog pages appear in each product category in alphabetical order. There is a handy guide to the product category in each volume of EEM on the page facing page 1. The great number of catalog pages were divided into the two volumes to facilitate handling.

5. MANUFACTURERS/SALES OFFICES DIRECTORY

Here is all the data on where they are — addresses and phone numbers of main offices, branch offices, local representatives, local distributors plus local contact names and phone numbers.

NEW DATA — Additional data included this year:

a. Minimum order accepted
b. Federal Supply Code (FSC) number
c. Qualified Parts List (QPL) number
d. Individual contacts by name for price data, application information, customer service
e. Free literature offerings
f. Summary of categories of products manufactured by each company
h. Corporate logos or trade marks for easy location of manufacturers. Manufacturers with catalog pages in EEM are indicated by **boldface** listings and page number references.

6. DISTRIBUTOR'S DIRECTORY

Yellow pages, black edgemarked for easy location, contain a geographic listing of electronic distributors offering name, address, phone number and sales manager. This section is to be found in Volume 2 following Manufacturers/Sales Offices Directory.

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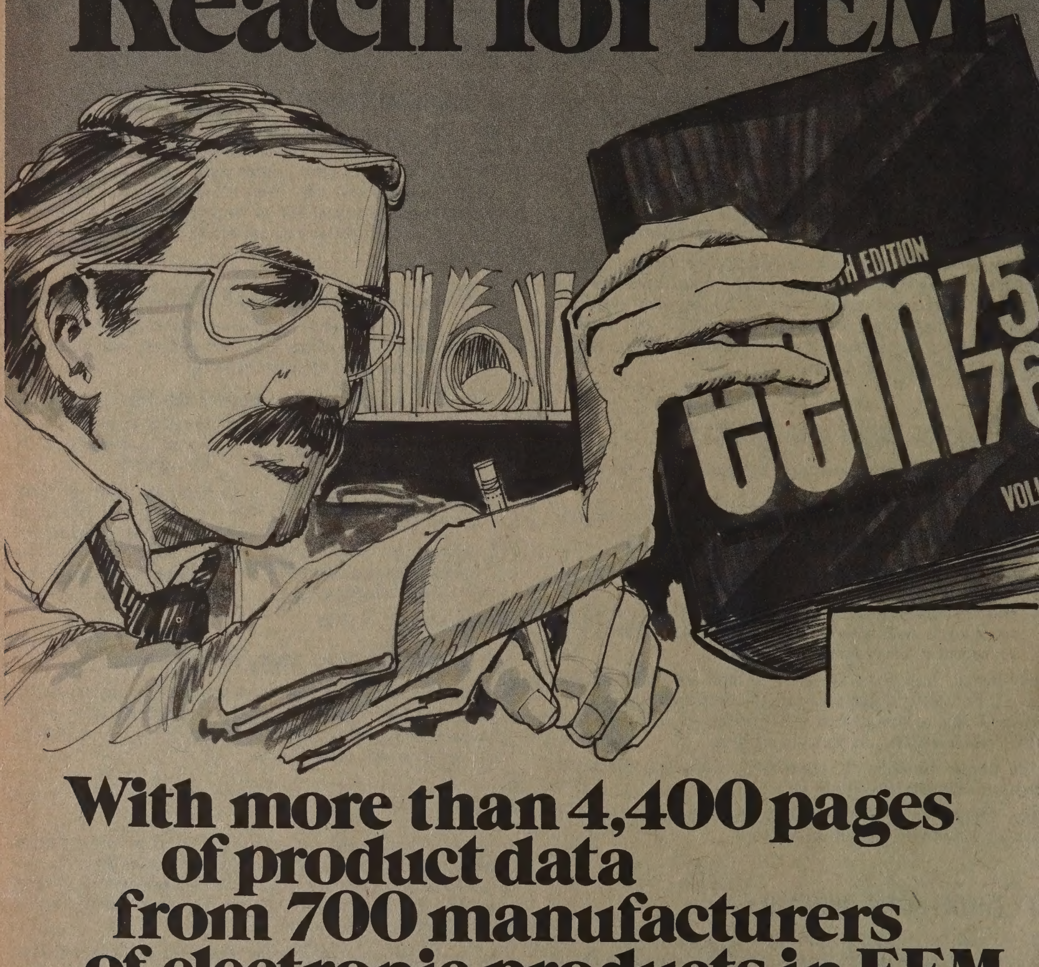

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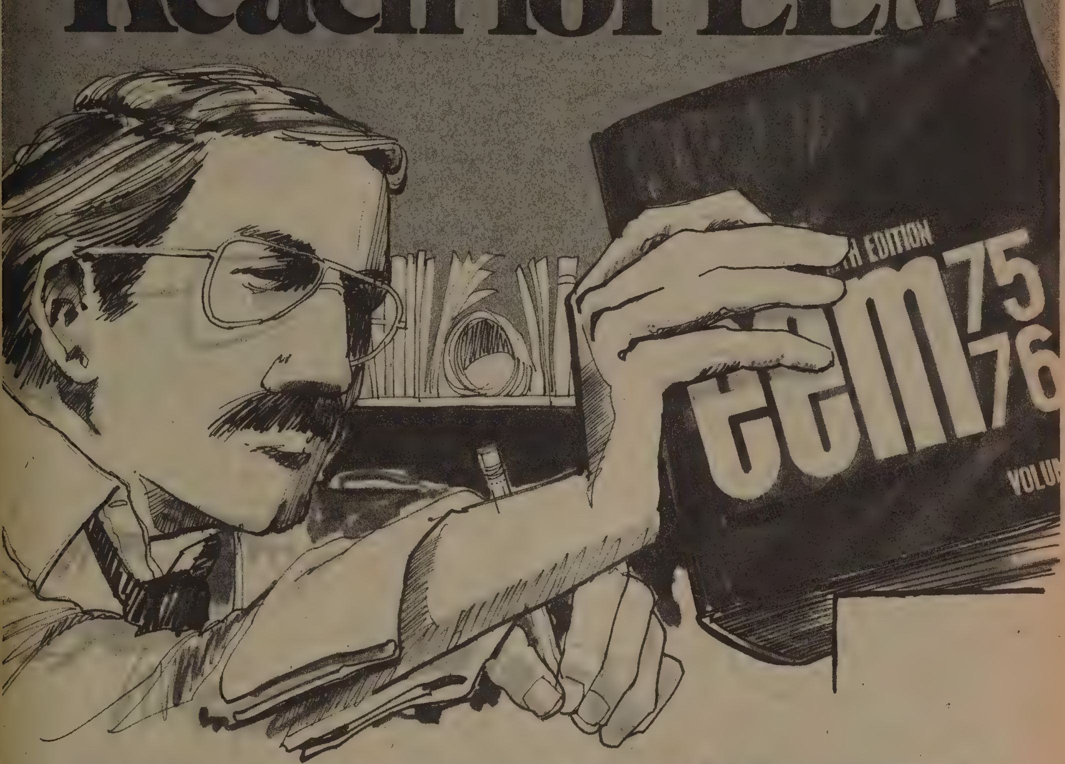

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The Product Index and Directory is designed to help locate manufacturers of specific types of electronic products. Products are listed alphabetically with many helpful cross references. The product categories are arranged in the following manner: general product type, specific description. For example, Microwave Generators is listed under Generators, Microwave; Solid State Lamps are found under Lamps, Solid State.

After each Product heading is an alphabetical listing of manufacturers who make that product. Those manufacturers appearing in boldface type with volume and page numbers have catalog data in the white pages of EEM. The volume number appears first, before the bullet, the page number is listed after it. Manufacturers who make the product but who may not have it listed among their catalog pages are in boldface with an asterisk. Manufacturers listed in lightface make the product but have not provided any catalog pages. Those manufacturers marketing the product through distributors have a "D" to the left of their names. Those who manufacture it to meet military specifications have an "M."

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D Adre Co., Milwaukee, Wisc.
D Eraser Co., Syracuse, N.Y.
Neuses, P.K., Rolling Meadows, Ill.
D Techni-Tool, Plymouth Meeting, Pa.

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D Atlee Corp., Woburn, Mass.
Burdette Buss Bars, Cherry Hill, N.J.
M Bussco Engrg., El Segundo, Cal.
M Chem Aero, Wilmington, Cal.
Cutler-Hammer, Milwaukee, Wisc.
Elco, Willow Grove, Pa.
D GTE Sylvania Inc., Waltham, Mass.
GTI Corporation, Pittsburgh, Pa.
D Lear Siegler, Santa Monica, Calif.
Methode Elctrns., Chicago, Ill.
M Reynolds Metals Co., Richmond, VA.
M Rogers Corp., Rogers, Conn.
Seastrom Mfg. Co. Inc., Glendale, Cal.
Standard Logic Inc., Santa Ana, Cal.
Stanford Applied Engrg., Santa Ana, Cal.

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DM Keystone Elctrns. Corp., New York, N.Y. p. 2•714
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D Thermalloy, Dallas, Tex .... p. 1•1877,1878
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D Daburn Electronics & Cable Corp., Bronx, N.Y. *
Elctrn. Molding Corp., Woonsocket, R.I. ....*
Abacus Elctrns. Corp., Dobbs Ferry, N.Y.
D Accessories for Electronics, Bayside, N.Y.
Acme Model Engrg. Co., Ridgefield, N.J.

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*Company has information in white pages but not on this product

Bushings, Glass, Plastic, Metal, Rubber, Etc. (cont'd)

D Adalet Mfg. Co., Cleveland, Ohio
DM Aimsco Inc., Seattle, Wash.
Anchor Plastics, Long Island City, N.Y.
M Atlantic Optical Moulding Co., Dudley, Mass.
M Atlas Fibre Co., Chicago, Ill.
Auburn Mfg., Middletown, Conn.
Auto-Swage Products Inc., Shelton, Conn.
M Avid Electronics Corp., Baldwin, Pl., N.Y.
Birnbach Co., Freeport, N.Y.
M Bunting, Brass & Bronze Co., Toledo, Ohio
Cadillac Plastic & Chemical, Detroit, Mich.
Carbone Lorraine Industries Corp., Boonton, N.J.
M Ceramaseal, New Lebanon Center, N.Y.
M Chemplast, Wayne, N.J.
Cherry Rivet & Boots Nut Divs., Santa Ana, Calif.
M Cleveland Mica Co., Lakewood, Ohio
Corning Glass Works, Corning, N.Y.
Corning Glass Works, Television Prods. Div., Corning, N.Y.
Delbert Blinn. Co., Pomona, Calif.
D Deutsch Fastener Corp., Los Angeles, Cal.
Dixon Corp., Bristol, R.I.
Dura Plastics N.Y., Westport, Conn.
Emporium Specialties Co., Austin, Pa.
D Gries Reproducer Co., New Rochelle, N.Y.
M Groov-Pin Corp., Ridgefield, N.J.
D Heyman Mfg. Co., Kenilworth, N.J.
D ICO/Rally Corp., Palo Alto, Cal.
M Instru-Lec Corp., Mt. Vernon, N.Y.
M Laminated Fabricators, San Bruno, Calif.
M Lapp Insulator Div., Interpace Corp., LeRoy, N.Y.
Lear Siegler, Santa Monica, Calif.
M Moldtronics, Downers Grove, Ill.
MPB Corp., Keene, N.H.
Ohio Carbon Co., Cleveland, Ohio
D Penn Fibre & Specialty, Phila., Pa.
Precision Paper Tube Co., Wheeling, Ill.
D Pure Carbon Co., St. Marys, Pa.
Pylon Co., Attleboro, Mass.
Resdel Corp., Rio Grande, N.J.
Seastrom Mfg. Co. Inc., Glendale, Cal.
Sterling Instr., New Hyde Pk., NY
DM Stock Drive Prods., New Hyde Pk., N.Y.
D Uniroyal, New York, N.Y.
M U.S. Terminals, Cincinnati, Ohio
Vernay Laboratories, Yellow Springs, Ohio
M Woven Elctrns., Mauldin, S. C. .... *

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Able Cable Div., Barrington, Ill.
Acesso-Wire, Garnersville, N.Y.
Action Labs Inc., Minneapolis, Minn.
M Adams-Russell Co., Waltham, Mass.
M Aircraft & Elex Spcltys, Plainfield, Ind
American Electric Cable Co., Holyoke, Mass.
AMF Electical Prods., Alexandria, Va.
American Microwave Inds., Waltham, Mass.
D Anixter-Mark, Skokie, Ill.
M Ansley Elctrns. Corp., Los Angeles, Cal.
Arco Wire & Cable, N. Hollywood, Cal.
Arenberg Ultrasonic Lab Inc., Jamaica Plain, Mass.
M Ashman Industries (1966) Ltd., Greensville Dundas, Ont., Can.
Astro Products Co., S. Burlington, , Vt.
Beman Mfg., New Cumberland, Pa.
Boston Insulated Wire & Cable Co., Dorchester, Mass.
Cable Systems & Assembly Co., Everett, Mass.
California Avionics Labs., Palo Alto, Calif.
Caltron Industries, Berkeley, Cal.
Circuit Assembly Corp., Costa Mesa, Ca.
Climatronics Corp., Hauppauge, N.Y.
Collins Radio, Dallas, Tex.
Control Products Corp., Chicago, Ill.
Cross Electronics Inc., Warrendale, Pa.
D Electrovert, Mt. Vernon, N.Y.
Everett/Charles, Pomona, Cal.
M Glenair, Glendale, Cal.
D Great Western Aviation, Denver, Colo.
Gulton Inds., Buena Park, Cal.
Hughes Aircraft Co, Culver City, Cal.
D ICO/Rally Corp., Palo Alto, Cal.
Icore Int'l., Sunnyvale, , Cal.
D International Data Sciences, Providence, R.I.
M International Identifications, Timonium, Md.
ITI Electronics, Clifton, N.J.
Jettron Prods., Hanover, N.J.
DM Kings Electronics, Tuckahoe, N.Y.
Lehighton Electronics, Lehighton, Pa
D Linemaster Switch Corp., Woodstock, Conn.
D Malco, A Microdot Co., Chicago, Ill.
M Manger Elec. Co., Stamford, Conn.
D Masterite Corporation, Torrance, Cal.
M Mercury Electronics Corp., York, Pa.
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Mid-West Metal Prods., Kansas City, Kans.
Morey Corp., Downers Grove, Ill.
D N T-T/Peerless, Leominister, Mass.
D Paraplegics Mfg., Bensenville, Ill.
Ronor Systems, Cheshire, Conn.
Standard Logic Inc., Santa Ana, Cal.
M Storm Products Co., Inglewood, Ca.
D Switchcraft, Chicago, Ill.
M Teledyne Aerospace Systems, Fairmont, Minn.
Templine, Gardena, Cal.
D Thomas & Betts Co., Elizabeth, N.J.
Times Wire & Cable, Wallingford, Conn.
Trompeter Electronics, Chatsworth, Cal.
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Waterbury Pressed Metal Co., Waterbury, Conn.
D Workman Electronic Prods., Sarasota, Fla.

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D Victor Wire & Cable Corp., Los Angeles, Cal. ... *
Acesso-Wire, Garnersville, N.Y.
American Electric Cable Co., Holyoke, Mass.
DM Arco Wire & Cable, N. Hollywood, Cal.
D Beman Mfg., New Cumberland, Pa.
D Birnbach Co., Freeport, N.Y.
Boston Insulated Wire & Cable Co., Dorchester, Mass.
Cable Systems & Assembly Co., Everett, Mass.
Caltron Industries, Berkeley, Cal.
D Cole-Flex Corp., W. Babylon, N.Y.
D Custom Cable Co., Oceanside, N.Y.
D Dracon Industries, Chatsworth, Cal.
D Ev-Game Inc., Freeport, N.Y.
General Elec., Bridgeport, Conn.
Gotham Audio Corp., New York, N.Y.
D Herald Electronics, Chicago, Ill.
Judd Wire Div., Burlington, Mass.
Lenz Electric Mfg. Co., Chicago, Ill.
D Manhattan Elec. Cable Corp., Rye, N.Y.
Mil Spec Wire & Cable Corp., Freeport, N.Y.
D Norelcom Electronics, Farmingdale, N.Y.
D N T-T/Peerless, Leominister, Mass.
Okonite Co., Ramsey, N.J.
D Pace Wire & Cable Corp., Oceanside, N.Y.
D Pacific Electricord Co., Gardena, Cal.
D Philmore Mfg. Co. Inc., Inwood, N.Y.
D Recoton Corp., Long Island City, N.Y.
D Rye Inds., Mamaroneck, N.Y.
Saxton Prods., Congers, N.Y.
Times Wire & Cable, Wallingford, Conn.
TRW/Holyoke Wire & Cable, South Hadley, Mass.
D Vidaire Electronics Mfg., Freeport, N.Y.
D Wallace S. K. Assocs., Tampa, Fla.
D Workman Electronic Prods., Sarasota, Fla.

Cable, Battery Booster

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D Arco Wire & Cable, N. Hollywood, Cal.
D Custom Cable-Co., Oceanside, N.Y.
D Essex International, Sycamore, Ill.
D Manhattan Elec. Cable Corp., Rye, N.Y.
Mil Spec Wire & Cable Corp., Freeport, N.Y.
Motorola Comms. Div., Schaumburg, Ill.
Prestolite Wire Division, Port Huron, Mich.

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General Radio Co., Concord, Mass. .... *
Heath Co., Benton Harbor, Mich. .... *
National Wire & Cable Corp., Los Angeles, Cal. *
Standard Wire & Cable Co., Los Angeles, Cal. *
M Addington Labs, Santa Clara, Cal.
AEL, Colmar, Pa.
AEL Communications Corp., Sub. of Amer. Elctrn. Labs. Inc., Lansdale, Pa.
American Electric Cable Co., Holyoke, Mass.
D The Anaconda Co., Greenwich, Conn.
Andrew Antenna Co. Ltd., Whitby, Ont., Can.
Andrew Corp., Orland Park, Ill.
D Antenna Corp. of America, Burlington, Iowa
DM Arco Wire & Cable, N. Hollywood, Cal.
DM Astrolab, Rahway, N.J.
Astro Products Co., S. Burlington, , Vt.
Birnbach Co., Freeport, N.Y.
D Blonder-Tongue Labs., Old Bridge, N.J.
Boston Insulated Wire & Cable Co., Dorchester, Mass.
Brand-Rex Co., Willimantic, Conn.
M Cablewave Systems Inc., North Haven, Conn.
Caltron Industries, Berkeley, Cal.
D CCS Hatfield Wire & Cable Group, Cranford, N.J.

D = Product sold through distributor   M = Product meets MIL spec

D Channel Master Div. Avnet, Ellenville, N.Y.
D Cole-Flex Corp., W. Babylon, N.Y.
Copperweld Bimetallics, Glassport, PA
D Custom Cable Co., Oceanside, N.Y.
M Eagle-Picher Industries, Joplin, Mo.
D Finney Co., Bedford, Ohio
D Great Western Aviation, Denver, Colo.
Gulton Inds., Buena Park, Cal.
Hughes Aircraft Co, Culver City, Cal.
D Jersey Specialty Co., Wayne, N.J.
M Judd Wire Div., Burlington, Mass.
Lenz Electric Mfg. Co., Chicago, Ill.
Leviton Mfg. Co., Little Neck, N.Y.
D Malco, A Microdot Co., Chicago, Ill.
DM Manhattan Elec. Cable Corp., Rye, N.Y.
Mil Spec Wire & Cable Corp., Freeport, N.Y.
Motorola Comms. Div., Schaumburg, Ill.
Narda Microwave Corp., Plainview, N.Y.
D New-Tronics Corp., Brookpark, Ohio
D Norelcom Electronics, Farmingdale, N.Y.
Okonite Co., Ramsey, N.J.
Pasternack Enterprises, Huntington Beach, Cal.
M Precision Tube, No. Wales, Pa.
Raychem Corp., Menlo Park, Cal.
D Rye Inds., Mamaroneck, N.Y.
Saxton Prods., Congers, N.Y.
M Storm Products Co., Inglewood, Ca.
D Superior Cable Div., Hickory, N.C.
D Times Wire & Cable, Wallingford, Conn.
Trompeter Electronics, Chatsworth, Cal.
TRW/Holyoke Wire & Cable, South Hadley, Mass.
Weinschel Engrg. Co., Gaithersburg, Md.
D Workman Electronic Prods., Sarasota, Fla.
D Zippertubing Co., Los Angeles, Calif.

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D Victor Wire & Cable Corp., Los Angeles, Cal. ... *
Acesso-Wire, Garnersville, N.Y.
American Electric Cable Co., Holyoke, Mass.
The Anaconda Co., Greenwich, Conn.
D Ansley Elctrns. Corp., Los Angeles, Cal.
DM Arco Wire & Cable, N. Hollywood, Cal.
Boston Insulated Wire & Cable Co., Dorchester, Mass.
D Brand-Rex Co., Willimantic, Conn.
CCS Hatfield Wire & Cable Group, Cranford, N.J.
Cerro Wire & Cable Co., New Haven, Conn.
D Custom Cable Co., Oceanside, N.Y.
General Elec., Bridgeport, Conn.
Gulton Inds., Buena Park, Cal.
D Manhattan Elec. Cable Corp., Rye, N.Y.
Mil Spec Wire & Cable Corp., Freeport, N.Y.
Okonite Co., Ramsey, N.J.
Raychem Corp., Menlo Park, Cal.
M Thermax Wire Corp., Flushing, N.Y.
TRW/Holyoke Wire & Cable, South Hadley, Mass.
Wireflex Incorporated, Bourbon, Ind.

Cable, Flat

D Columbia Elctrn. Cables, New Bedford, Mass. p. 2•1911
D Consolidated Wire & Assoc. Corps., Chicago, Ill. p. 2•1955
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D GC Electronics, Rockford, Ill. .... *
Standard Wire & Cable Co., Los Angeles, Cal. *
Amp Inc., Harrisburg, Pa.
The Anaconda Co., Greenwich, Conn.
D Ansley Elctrns. Corp., Los Angeles, Cal.
DM Arco Wire & Cable, N. Hollywood, Cal.
Assembled Products Co., St. Albans, Vt.
Boston Insulated Wire & Cable Co., Dorchester, Mass.
Brand-Rex Co., Willimantic, Conn.
D Burndy Corporation, Norwalk, , Conn.
D Channel Master Div. Avnet, Ellenville, N.Y.
Circuit Assembly Corp., Costa Mesa, Ca.
D Custom Cable Co., Oceanside, N.Y.
M International Identifications, Timonium, Md.
Jermyn, San Francisco, Cal.
D Jersey Specialty Co., Wayne, N.J.
Magnet Wire Inc., New York, NY
DM Manhattan Elec. Cable Corp., Rye, N.Y.
Methode Elctrns., Chicago, Ill.
Mil Spec Wire & Cable Corp., Freeport, N.Y.
Mupac Corp., Brockton, Mass.
D Norelcom Electronics, Farmingdale, N.Y.
Okonite Co., Ramsey, N.J.
Phoenix Wire, S. Hero, Vt.
Raychem Corp., Menlo Park, Cal.
M Rogers Corp., Rogers, Conn.
Rye Inds., Mamaroneck, N.Y.
DM Saxton Prods., Congers, N.Y.
DM Storm Products Co., Inglewood, Ca.
TRW/Holyoke Wire & Cable, South Hadley, Mass.
D Zippertubing Co., Los Angeles, Calif.

Cable, Heater

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Standard Wire & Cable Co., Los Angeles, Cal. *
Acme Elec. Heating Corp., Hialeah, Fla.
The Anaconda Co., Greenwich, Conn.
M Arco Wire & Cable, N. Hollywood, Cal.
M ARI Inds., Franklin Pk., Ill.
Birnbach Co., Freeport, N.Y.
D Cox & Co., New York, N.Y.
D Custom Cable Co., Oceanside, N.Y.
D Essex International, Sycamore, Ill.
General Elec., Bridgeport, Conn.
GTE Sylvania Inc., Newark, N.J.
Leviton Mfg. Co., Little Neck, N.Y.
D Manhattan Elec. Cable Corp., Rye, N.Y.
Mil Spec Wire & Cable Corp., Freeport, N.Y.
Okonite Co., Ramsey, N.J.
D Thermax Wire Corp., Flushing, N.Y.
Wireflex Incorporated, Bourbon, Ind.

Cable, High Temperature (Over 125° C)

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Standard Wire & Cable Co., Los Angeles, Cal. *
The Anaconda Co., Greenwich, Conn.
M Arco Wire & Cable, N. Hollywood, Cal.
DM Astrolab, Rahway, N.J.
Boston Insulated Wire & Cable Co., Dorchester, Mass.
D Brand-Rex Co., Willimantic, Conn.
Caltron Industries, Berkeley, Cal.
Cerro Wire & Cable Co., New Haven, Conn.
D Custom Cable Co., Oceanside, N.Y.
General Elec., Bridgeport, Conn.
Gulton Inds., Buena Park, Cal.
Hughes Aircraft Co, Culver City, Cal.
Icore Int'l., Sunnyvale, , Cal.
M Kaman Sciences Corp., Colorado Springs, Colo.
D Malco, A Microdot Co., Chicago, Ill.
D Manhattan Elec. Cable Corp., Rye, N.Y.
Masterite Corporation, Torrance, Cal.
Mil Spec Wire & Cable Corp., Freeport, N.Y.
D Norelcom Electronics, Farmingdale, N.Y.
Okonite Co., Ramsey, N.J.
M Phoenix Wire, S. Hero, Vt.
Raychem Corp., Menlo Park, Cal.
M Reynolds Metals Co., Richmond, VA.
M Storm Products Co., Inglewood, Ca.
DM Thermax Wire Corp., Flushing, N.Y.
Westinghouse Elec. Corp., Elmira, N.Y.
Wireflex Incorporated, Bourbon, Ind.

Cable, High Voltage (1,000 Volts & Over)

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Amp Inc., Harrisburg, Pa.
D The Anaconda Co., Greenwich, Conn.
M Arco Wire & Cable, N. Hollywood, Cal.
D Boston Insulated Wire & Cable Co., Dorchester, Mass.
D CCS Hatfield Wire & Cable Group, Cranford, N.J.
D Custom Cable Co., Oceanside, N.Y.
Dielectric Sciences, Burlington, Mass
Estes Engrg. Co., Port Angeles, Wash.
General Elec., Bridgeport, Conn.
Gulton Inds., Buena Park, Cal.
M Judd Wire Div., Burlington, Mass.
Lenz Electric Mfg. Co., Chicago, Ill.
D Manhattan Elec. Cable Corp., Rye, N.Y.
Megavolt, New York, N.Y.
Mil Spec Wire & Cable Corp., Freeport, N.Y.
D Norelcom Electronics, Farmingdale, N.Y.
Okonite Co., Ramsey, N.J.
Prestolite Wire Division, Port Huron, Mich.
Raychem Corp., Menlo Park, Cal.
M Reynolds Metals Co., Richmond, VA.
DM Saxton Prods., Congers, N.Y.
Simmonds Precision, Norwich, N.Y.
Times Wire & Cable, Wallingford, Conn.
Torr Labs., Los Angeles, Cal.
TRW/Holyoke Wire & Cable, South Hadley, Mass.
Voltek Inc., Beverly Hills, Cal.

Cable, Intercommunication & Sound System—See Cable, Audio

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Acesso-Wire, Garnersville, N.Y.
M Addington Labs, Santa Clara, Cal.
M American Electric Cable Co., Holyoke, Mass.
M Arco Wire & Cable, N. Hollywood, Cal.
Boston Insulated Wire & Cable Co., Dorchester, Mass.
D Brand-Rex Co., Willimantic, Conn.

M Judd Wire Div., Burlington, Mass.
D Manhattan Elec. Cable Corp., Rye, N.Y.
Mil Spec Wire & Cable Corp., Freeport, N.Y.
D Norelcom Electronics, Farmingdale, N.Y.
Raychem Corp., Menlo Park, Cal.
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Times Wire & Cable, Wallingford, Conn.

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D **Consolidated Wire & Assoc. Corps., Chicago, Ill. p. 2•1941**
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D **Victor Wire & Cable Corp., Los Angeles, Cal. p. 2•2066**
DM **Whitmor Wire & Cable, No. Hollywood, Cal. p. 2•2072**
M **Woven Elctrns., Mauldin, S. C. p. 2•2068-2071**
D **GC Electronics, Rockford, Ill. .... ***
Hughes Aircraft Co., Connecting Devices, Newport Beach, Cal. .... *
Standard Wire & Cable Co., Los Angeles, Cal. *
D **3M Company, St. Paul, Minn. ....***
Acesso-Wire, Garnersville, N.Y.
M Addington Labs, Santa Clara, Cal.
American Electric Cable Co., Holyoke, Mass.
M Arco Wire & Cable, N. Hollywood, Cal.
DM Astrolab, Rahway, N.J.
Birnbach Co., Freeport, N.Y.
D Boston Insulated Wire & Cable Co., Dorchester, Mass.
Brand-Rex Co., Willimantic, Conn.
Cablewave Systems Inc., North Haven, Conn.
CCS Hatfield Wire & Cable Group, Cranford, N.J.
Gotham Audio Corp., New York, N.Y.
M Judd Wire Div., Burlington, Mass.
M Kaman Sciences Corp., Colorado Springs, Colo.
Lenz Electric Mfg. Co., Chicago, Ill.
D Manhattan Elec. Cable Corp., Rye, N.Y.
Mil Spec Wire & Cable Corp., Freeport, N.Y.
Okonite Co., Ramsey, N.J.
D Pace Wire & Cable Corp., Oceanside, N.Y.
D Pacific Electricord Co., Gardena, Cal.
Raychem Corp., Menlo Park, Cal.
D Rye Inds., Mamaroneck, N.Y.
D Superior Cable Div., Hickory, N.C.
D Thermax Wire Corp., Flushing, N.Y.
Times Wire & Cable, Wallingford, Conn.
TRW/Holyoke Wire & Cable, South Hadley, Mass.

Cable, Microphone

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Standard Wire & Cable Co., Los Angeles, Cal. *
D **Victor Wire & Cable Corp., Los Angeles, Cal. ... ***
Acesso-Wire, Garnersville, N.Y.
American Electric Cable Co., Holyoke, Mass.
M Arco Wire & Cable, N. Hollywood, Cal.
D Birnbach Co., Freeport, N.Y.
Boston Insulated Wire & Cable Co., Dorchester, Mass.
D Cole-Flex Corp., W. Babylon, N.Y.
D Custom Cable Co., Oceanside, N.Y.
D Essex International, Sycamore, Ill.
General Elec., Bridgeport, Conn.
D Gotham Audio Corp., New York, N.Y.
D Jersey Specialty Co., Wayne, N.J.
Judd Wire Div., Burlington, Mass.
Lenz Electric Mfg. Co., Chicago, Ill.
D Manhattan Elec. Cable Corp., Rye, N.Y.
Mil Spec Wire & Cable Corp., Freeport, N.Y.
Motorola Comms. Div., Schaumburg, Ill.
D Pace Wire & Cable Corp., Oceanside, N.Y.
D Rye Inds., Mamaroneck, N.Y.
Saxton Prods., Congers, N.Y.
Times Wire & Cable, Wallingford, Conn.
D Vidaire Electronics Mfg., Freeport, N.Y.
D Workman Electronic Prods., Sarasota, Fla.

Cable, Multiconductor

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D **Consolidated Wire & Assoc. Corps., Chicago, Ill. p. 2•1938,1943,1944,1946,1948,1949,1957**
D **Daburn Electronics & Cable Corp., Bronx, N.Y. p. 2•1981,1986,1987**
DM **Dearborn Wire & Cable Co., Rosemont, Ill. p. 2•1993**
Hughes Aircraft Co., Connecting Devices, Newport Beach, Cal. .... p. 2•2022
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National Wire & Cable Corp., Los Angeles, Cal. p. 2•2028-2042
M **Rowe Industries, Toledo, Ohio p. 2•2052,2053**
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D **Smith Inc., Herman H., Brooklyn, N.Y. p. 2•879**
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Standard Wire & Cable Co., Los Angeles, Cal. p. 2•2058,2059
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Victor Wire & Cable Corp., Los Angeles, Cal. p. 2•2066,2067
DM **Whitmor Wire & Cable, No. Hollywood, Cal. p. 2•2072**
M **Woven Elctrns., Mauldin, S. C. p. 2•2068-2071**
D **GC Electronics, Rockford, Ill. .... ***
Acesso-Wire, Garnersville, N.Y.
M American Electric Cable Co., Holyoke, Mass.
D The Anaconda Co., Greenwich, Conn.
D Ansley Elctrns. Corp., Los Angeles, Cal.
M Arco Wire & Cable, N. Hollywood, Cal.
Beman Mfg., New Cumberland, Pa.
D Birnbach Co., Freeport, N.Y.
D Boston Insulated Wire & Cable Co., Dorchester, Mass.
Brand-Rex Co., Willimantic, Conn.
D Cable Systems & Assembly Co., Everett, Mass.
Caltron Industries, Berkeley, Cal.
D CCS Hatfield Wire & Cable Group, Cranford, N.J.
Cerro Wire & Cable Co., New Haven, Conn.
D Channel Master Div. Avnet, Ellenville, N.Y.
D Cole-Flex Corp., W. Babylon, N.Y.
D Custom Cable Co., Oceanside, N.Y.
D Essex International, Sycamore, Ill.
General Elec., Bridgeport, Conn.
Gordon, Claud S. Co., Richmond, Ill.
Gotham Audio Corp., New York, N.Y.
GTE Automatic Electric Inc., Northlake, Ill.
Gulton Inds., Buena Park, Cal.
Jermyn, San Francisco, Cal.
M Judd Wire Div., Burlington, Mass.
Lenz Electric Mfg. Co., Chicago, Ill.
Leviton Mfg. Co., Little Neck, N.Y.
Magnet Wire Inc., New York, NY
D Malco, A Microdot Co., Chicago, Ill.
DM Manhattan Elec. Cable Corp., Rye, N.Y.
Mil Spec Wire & Cable Corp., Freeport, N.Y.
Motorola Comms. Div., Schaumburg, Ill.
D Norelcom Electronics, Farmingdale, N.Y.
Okonite Co., Ramsey, N.J.
D Pace Wire & Cable Corp., Oceanside, N.Y.
D Pacific Electricord Co., Gardena, Cal.
Phoenix Wire, S. Hero, Vt.
Raychem Corp., Menlo Park, Cal.
M Reynolds Metals Co., Richmond, VA.
Rockland Insulated Wire & Cable, Haverstraw, N.Y.
Rogers Corp., Rogers, Conn.
D Rye Inds., Mamaroneck, N.Y.
Saxton Prods., Congers, N.Y.
M Storm Products Co., Inglewood, Ca.
D Superior Cable Div., Hickory, N.C.
M Teledyne Aerospace Systems, Fairmont, Minn.
Telrex Labs., Asbury Park, N.J.
DM Thermax Wire Corp., Flushing, N.Y.
Thermo Elec. Co., Saddle Brook, N.J.
D Times Wire & Cable, Wallingford, Conn.
TRW/Holyoke Wire & Cable, South Hadley, Mass.
D Zippertubing Co., Los Angeles, Calif.

Cable, Power

M **Amphenol Connector Div., SAMS Opers., Chatsworth, Cal. ....p. 2•460,461**
D **Belden Corp., Richmond, Ind. ...p. 2•1882-1909**
D **Cimco Wire & Cable, Allendale, N.J. p. 2•1910,2023**
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D **Consolidated Wire & Assoc. Corps., Chicago, Ill. p. 2•1957**
D **Daburn Electronics & Cable Corp., Bronx, N.Y. p. 2•1988**
DM **Dearborn Wire & Cable Co., Rosemont, Ill. p. 2•1993**
National Wire & Cable Corp., Los Angeles, Cal. p. 2•2030,2032
DM **Rowe Industries, Toledo, Ohio p. 2•2052,2053**
D **Victor Wire & Cable Corp., Los Angeles, Cal. p. 2•2066**
DM **Whitmor Wire & Cable, No. Hollywood, Cal. p. 2•2072**
M **Woven Elctrns., Mauldin, S. C. p. 2•2068-2071**
D **Alpha Wire Corp., Elizabeth, N.J. .... ***
D **GC Electronics, Rockford, Ill. .... ***
Standard Wire & Cable Co., Los Angeles, Cal. ■
American Electric Cable Co., Holyoke, Mass.
D The Anaconda Co., Greenwich, Conn.
M Anchor Specialty Mfg. Inc., Teterboro, N.J.
M Arco Wire & Cable, N. Hollywood, Cal.
D Birnbach Co., Freeport, N.Y.
D Boston Insulated Wire & Cable Co., Dorchester, Mass.
D CCS Hatfield Wire & Cable Group, Cranford, N.J.
Cerro Wire & Cable Co., New Haven, Conn.
D Custom Cable Co., Oceanside, N.Y.
D Essex International, Sycamore, Ill.
General Elec., Bridgeport, Conn.
Gulton Inds., Buena Park, Cal.
Leviton Mfg. Co., Little Neck, N.Y.
D Linemaster Switch Corp., Woodstock, Conn.
D Manhattan Elec. Cable Corp., Rye, N.Y.
Mil Spec Wire & Cable Corp., Freeport, N.Y.
Okonite Co., Ramsey, N.J.
D Pace Wire & Cable Corp., Oceanside, N.Y.
D Pacific Electricord Co., Gardena, Cal.
Raychem Corp., Menlo Park, Cal.
M Reynolds Metals Co., Richmond, VA.
Willco Sales, Mineola, N.Y.
D Workman Electronic Prods., Sarasota, Fla.

Cable, Retractile—See Cords, Retractile

Cable Retractors

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Mil Spec Wire & Cable Corp., Freeport, N.Y.
Morey Corp., Downers Grove, Ill.

Cable, Ribbon—See Cable, Flat

Cable, Rotator Antenna—See Cable, Multiconductor

Cable, Shielded

D **Alpha Wire Corp., Elizabeth, N.J. p. 2•1835,1841,1846-1852,1854,1855**
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D **Belden Corp., Richmond, Ind. ...p. 2•1882-1909**
DM **Cimco Wire & Cable, Allendale, N.J. p. 2•1910,2023**
D **Columbia Elctrn. Cables, New Bedford, Mass. p. 2•1911**
DM **Consolidated Wire & Assoc. Corps., Chicago, Ill. p. 2•1938,1942,1946**
DM **Daburn Electronics & Cable Corp., Bronx, N.Y. p. 2•1979,1981,1983,1987**
DM **Dearborn Wire & Cable Co., Rosemont, Ill. p. 2•1993**
DM **Markel, L. Frank & Sons, Norristown, Pa. p. 2•2024,2025**
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M **Perfection Mica Co., Bensenville, Ill. p. 2•1257,2055**
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D **Spectra-Strip Corp., Garden Grove, Cal. p. 2•2056**
Standard Wire & Cable Co., Los Angeles, Cal. p. 2•2059
D **3M Company, St. Paul, Minn. p. 2•1034-1055**

DM Uniform Tubes, Collegeville, Pa. ....p. 2•2064
M Victor Wire & Cable Corp., Los Angeles, Cal. p. 2•2066
DM Whitmor Wire & Cable, No. Hollywood, Cal. p. 2•2072
M Woven Elctrns., Mauldin, S. C. p. 2•2068-2071
D Augat Inc., Attleboro, Mass .... *
D GC Electronics, Rockford, Ill. .... *
M McGraw-Edison Co., Manchester, N.H. .... *
Acesso-Wire, Garnersville, N.Y.
M Addington Labs, Santa Clara, Cal.
M Aircraft & Elex Spcltys, Plainfield, Ind
M American Electric Cable Co., Holyoke, Mass.
D The Anaconda Co., Greenwich, Conn.
M Arco Wire & Cable, N. Hollywood, Cal.
DM Astrolab, Rahway, N.J.
D Birnbach Co., Freeport, N.Y.
D Boston Insulated Wire & Cable Co., Dorchester, Mass.
D Brand-Rex Co., Willimantic, Conn.
Cable Systems & Assembly Co., Everett, Mass.
Caltron Industries, Berkeley, Cal.
D CCS Hatfield Wire & Cable Group, Cranford, N.J.
Cerro Wire & Cable Co., New Haven, Conn.
D Channel Master Div. Avnet, Ellenville, N.Y.
M Co-Operative Inds., Chester, N.J.
D Cole-Flex Corp., W. Babylon, N.Y.
D Custom Cable Co., Oceanside, N.Y.
D Dracon Industries, Chatsworth, Cal.
D Estes Engrg. Co., Port Angeles, Wash.
General Elec., Bridgeport, Conn.
M Glenair, Glendale, Cal.
Gordon, Claud S. Co., Richmond, Ill.
Gotham Audio Corp., New York, N.Y.
Gulton Inds., Buena Park, Cal.
Icore Int'l., Sunnyvale, , Cal.
D Jersey Specialty Co., Wayne, N.J.
M Judd Wire Div., Burlington, Mass.
Lenz Electric Mfg. Co., Chicago, Ill.
M Lundy Elctrns. & Sys., Glen Head, N.Y.
D Malco, A Microdot Co., Chicago, Ill.
DM Manhattan Elec. Cable Corp., Rye, N.Y.
Megavolt, New York, N.Y.
Mil Spec Wire & Cable Corp., Freeport, N.Y.
Motorola Comms. Div., Schaumburg, Ill.
D Norelcom Electronics, Farmingdale, N.Y.
Okonite Co., Ramsey, N.J.
D Pace Wire & Cable Corp., Oceanside, N.Y.
D Pacific Electricord Co., Gardena, Cal.
M Precision Tube, No. Wales, Pa.
Raychem Corp., Menlo Park, Cal.
M Reynolds Metals Co., Richmond, VA.
Rockland Insulated Wire & Cable, Haverstraw, N.Y.
Saxton Prods., Congers, N.Y.
M Storm Products Co., Inglewood, Ca.
D Superior Cable Div., Hickory, N.C.
M Teledyne Aerospace Systems, Fairmont, Minn.
Thermo Elec. Co., Saddle Brook, N.J.
Times Wire & Cable, Wallingford, Conn.
Trompeter Electronics, Chatsworth, Cal.
TRW/Holyoke Wire & Cable, South Hadley, Mass.
D Zippertubing Co., Los Angeles, Calif.

Cable, Telephone

D Alpha Wire Corp., Elizabeth, N.J. ...... p. 2•1849
Amphenol Cadre Div., Endicott, N.Y. p. 2•460,461
D Belden Corp., Richmond, Ind. ...p. 2•1882-1909
D Columbia Elctrn. Cables, New Bedford, Mass. p. 2•1911
D Consolidated Wire & Assoc. Corps., Chicago, Ill. p. 2•1945
Dearborn Wire & Cable Co., Rosemont, Ill. p. 2•1993
Shigoto Inds., Ltd., New York, N.Y. p. 1•2276
M Woven Elctrns., Mauldin, S. C. p. 2•2068-2071
D Daburn Electronics & Cable Corp., Bronx, N.Y. *
Standard Wire & Cable Co., Los Angeles, Cal. *
D 3M Company, St. Paul, Minn. .... *
Victor Wire & Cable Corp., Los Angeles, Cal. ... *
Acesso-Wire, Garnersville, N.Y.
D The Anaconda Co., Greenwich, Conn.
M Arco Wire & Cable, N. Hollywood, Cal.
D Birnbach Co., Freeport, N.Y.
Brand-Rex Co., Willimantic, Conn.
D CCS Hatfield Wire & Cable Group, Cranford, N.J.
D Custom Cable Co., Oceanside, N.Y.
GTE Automatic Electric Inc., Northlake, Ill.
Lenz Electric Mfg. Co., Chicago, Ill.
D Manhattan Elec. Cable Corp., Rye, N.Y.
Mil Spec Wire & Cable Corp., Freeport, N.Y.
Okonite Co., Ramsey, N.J.
D Pace Wire & Cable Corp., Oceanside, N.Y.
D Pacific Electricord Co., Gardena, Cal.
Saxton Prods., Congers, N.Y.
D Superior Cable Div., Hickory, N.C.
TRW/Holyoke Wire & Cable, South Hadley, Mass.

Cable, TFE Insulated

D Alpha Wire Corp., Elizabeth, N.J. p. 2•1852,1880
Belden Corp., Richmond, Ind. p. 2•1882-1888,1890-1909
DM Cimco Wire & Cable, Allendale, N.J. p. 2•1910,2023
D Columbia Elctrn. Cables, New Bedford, Mass. p. 2•1911
DM Consolidated Wire & Assoc. Corps., Chicago, Ill. p. 2•1935,1936,1952,1953
DM Daburn Electronics & Cable Corp., Bronx, N.Y. p. 2•1980,1981,1984
DM Dearborn Wire & Cable Co., Rosemont, Ill. p. 2•1993
DM Markel, L. Frank & Sons, Norristown, Pa. p. 2•2024,2025
National Wire & Cable Corp., Los Angeles, Cal. p. 2•2039
DM Uniform Tubes, Collegeville, Pa. ....p. 2•2064
M Victor Wire & Cable Corp., Los Angeles, Cal. p. 2•2066
M Woven Elctrns., Mauldin, S. C. p. 2•2068-2071
Standard Wire & Cable Co., Los Angeles, Cal. *
M Addington Labs, Santa Clara, Cal.
The Anaconda Co., Greenwich, Conn.
M Arco Wire & Cable, N. Hollywood, Cal.
D Astrolab, Rahway, N.J.
Boston Insulated Wire & Cable Co., Dorchester, Mass.
Caltron Industries, Berkeley, Cal.
Cerro Wire & Cable Co., New Haven, Conn.
D Custom Cable Co., Oceanside, N.Y.
Magnet Wire Inc., New York, NY
DM Manhattan Elec. Cable Corp., Rye, N.Y.
Mil Spec Wire & Cable Corp., Freeport, N.Y.
D Norelcom Electronics, Farmingdale, N.Y.
M Phoenix Wire, S. Hero, Vt.
DM Thermax Wire Corp., Flushing, N.Y.
Thermo Elec. Co., Saddle Brook, N.J.

Cable, Transmission Line

D Belden Corp., Richmond, Ind. ...p. 2•1882-1909
D Columbia Elctrn. Cables, New Bedford, Mass. p. 2•1911
D Consolidated Wire & Assoc. Corps., Chicago, Ill. p. 2•1954,1955
Dearborn Wire & Cable Co., Rosemont, Ill. p. 2•1993
Hughes Aircraft Co., Connecting Devices, Newport Beach, Cal. .... p. 2•2022
DM Markel, L. Frank & Sons, Norristown, Pa. p. 2•2024,2025
National Wire & Cable Corp., Los Angeles, Cal. p. 2•2037,2038
DM Rowe Industries, Toledo, Ohio p. 2•2052,2053
D Spectra-Strip Corp., Garden Grove, Cal. p. 2•2056
DM Uniform Tubes, Collegeville, Pa. ....p. 2•2064
M Woven Elctrns., Mauldin, S. C. p. 2•2068-2071
DM Alpha Wire Corp., Elizabeth, N.J. .... *
M Amphenol RF Div., Danbury, Conn. .... *
Standard Wire & Cable Co., Los Angeles, Cal. *
Victor Wire & Cable Corp., Los Angeles, Cal. ... *
M Addington Labs, Santa Clara, Cal.
D The Anaconda Co., Greenwich, Conn.
Andrew Corp., Orland Park, Ill.
Ansley Elctrns. Corp., Los Angeles, Cal.
M Arco Wire & Cable, N. Hollywood, Cal.
DM Astrolab, Rahway, N.J.
Birnbach Co., Freeport, N.Y.
Brand-Rex Co., Willimantic, Conn.
DM Cablewave Systems Inc., North Haven, Conn.
D CCS Hatfield Wire & Cable Group, Cranford, N.J.
D Jerrold Electronics Corp., Horsham, Pa.
D Jersey Specialty Co., Wayne, N.J.
M Kaman Sciences Corp., Colorado Springs, Colo.
D Malco, A Microdot Co., Chicago, Ill.
DM Manhattan Elec. Cable Corp., Rye, N.Y.
Mil Spec Wire & Cable Corp., Freeport, N.Y.
Motorola Comms. Div., Schaumburg, Ill.
Okonite Co., Ramsey, N.J.
D Pace Wire & Cable Corp., Oceanside, N.Y.
D Pacific Electricord Co., Gardena, Cal.
Precision Tube, No. Wales, Pa.
M Reynolds Metals Co., Richmond, VA.
Saxton Prods., Congers, N.Y.
D Times Wire & Cable, Wallingford, Conn.
TRW/Holyoke Wire & Cable, South Hadley, Mass.

Cable, Triaxial

D Belden Corp., Richmond, Ind. ...p. 2•1882-1909
D Cimco Wire & Cable, Allendale, N.J. p. 2•1910,2023
D Columbia Elctrn. Cables, New Bedford, Mass. p. 2•1911
D Consolidated Wire & Assoc. Corps., Chicago, Ill. p. 2•1961
DM Dearborn Wire & Cable Co., Rosemont, Ill. p. 2•1993
DM Markel, L. Frank & Sons, Norristown, Pa. p. 2•2024,2025
National Wire & Cable Corp., Los Angeles, Cal. p. 2•2047
DM Rowe Industries, Toledo, Ohio p. 2•2052,2053
DM Whitmor Wire & Cable, No. Hollywood, Cal. p. 2•2072
DM Daburn Electronics & Cable Corp., Bronx, N.Y. *
Standard Wire & Cable Co., Los Angeles, Cal. *
Victor Wire & Cable Corp., Los Angeles, Cal. ... *
M Woven Elctrns., Mauldin, S. C. .... *
M Arco Wire & Cable, N. Hollywood, Cal.
D Boston Insulated Wire & Cable Co., Dorchester, Mass.
Brand-Rex Co., Willimantic, Conn.
Caltron Industries, Berkeley, Cal.
Gulton Inds., Buena Park, Cal.
M Judd Wire Div., Burlington, Mass.
M Kaman Sciences Corp., Colorado Springs, Colo.
D Manhattan Elec. Cable Corp., Rye, N.Y.
Mil Spec Wire & Cable Corp., Freeport, N.Y.
Precision Tube, No. Wales, Pa.
Raychem Corp., Menlo Park, Cal.
M Thermax Wire Corp., Flushing, N.Y.
Times Wire & Cable, Wallingford, Conn.
Trompeter Electronics, Chatsworth, Cal.
TRW/Holyoke Wire & Cable, South Hadley, Mass.

Cable, TV (Including Camera)

AMP Capitron Div./AMP Inc., Elizabethtown, Pa. ....p. 2•450,451
Belden Corp., Richmond, Ind. ...p. 2•1882-1909
D Columbia Elctrn. Cables, New Bedford, Mass. p. 2•1911
D Consolidated Wire & Assoc. Corps., Chicago, Ill. p. 2•1947,1954,1955
National Wire & Cable Corp., Los Angeles, Cal. p. 2•2047
DM Rowe Industries, Toledo, Ohio p. 2•2052,2053
Shigoto Inds., Ltd., New York, N.Y. p. 1•2276
DM Uniform Tubes, Collegeville, Pa. ....p. 2•2064
DM Whitmor Wire & Cable, No. Hollywood, Cal. p. 2•2072
D Alpha Wire Corp., Elizabeth, N.J. .... *
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3M Company, St. Paul, Minn. .... *
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General Elec., Bridgeport, Conn.
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D Jersey Specialty Co., Wayne, N.J.
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D Malco, A Microdot Co., Chicago, Ill.
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American Electric Cable Co., Holyoke, Mass.
The Anaconda Co., Greenwich, Conn.

M Arco Wire & Cable, N. Hollywood, Cal.
Boston Insulated Wire & Cable Co., Dorchester, Mass.
D Brand-Rex Co., Willimantic, Conn.
Cable Systems & Assembly Co., Everett, Mass.
D Custom Cable Co., Oceanside, N.Y.
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Gulton Inds., Buena Park, Cal.
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Magnet Wire Inc., New York, NY
D Manhattan Elec. Cable Corp., Rye, N.Y.
Mil Spec Wire & Cable Corp., Freeport, N.Y.
Motorola Comms. Div., Schaumburg, Ill.
D Norelcom Electronics, Farmingdale, N.Y.
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D Protectowire Co., Hanover, Mass.
Raychem Corp., Menlo Park, Cal.
Saxton Prods., Congers, N.Y.
M Storm Products Co., Inglewood, Ca.
DM Thermax Wire Corp., Flushing, N.Y.
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D Baknor Industries Ltd., Port Credit, Ont.
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D Cornell-Dubilier Electronics, Newark, N.J.
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D Film Capacitors, Passaic, N.J.
Filtron Company, Westbury, N.Y.
GTJ/Tensor Electronics, San Diego, Cal.
Industrial Condenser Corp., Chicago, Ill.
ITT Jennings, Monrovia, Cal.
D Mepco/Electra, Morristown, N.J.
Motorola Comms. Div., Schaumburg, Ill.
Nichicon America Corp., Chicago, Ill.
Panasonic, Ind'l. Elctrn. Comps., New York, N.Y.
D Siemens Corp., Iselin, N.J.
D Sprague Elec. Co., No. Adams, Mass.
Triac Electronics, New York, N.Y.
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American Lava Corp., Chattanooga, Tenn.
Bell Industries, Electronic Components Div., Burbank, Cal.
Burr-Brown, Tucson, Ariz.
D Centralab, Milwaukee, Wisc.
Emcon Div., San Diego, Cal.
GTJ/Tensor Electronics, San Diego, Cal.
Hybrex, Tucson, Ariz.
ITT Jennings, Monrovia, Cal.
DM JFD Electronics Components Corp., Bklyn., N.Y.
D Mepco/Electra, Morristown, N.J.
D Motorola Semiconductor Prods., Phoenix, Ariz.
Murata Mfg. Co. Ltd., Kyoto, Japan
D NCI, W. Palm Beach, Fla.
Panasonic, Ind'l. Elctrn. Comps., New York, N.Y.
Polyflon Corp., New Rochelle, N.Y.
Radio Materials Co., Chicago, Ill.
M San Fernando Elec. Mfg., San Fernando, Cal.
D Soshin Elec. Co., Tokyo, Japan
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DM Cal-R, Santa Monica, Cal.
D Cambridge Thermionic Corp., Cambridge, Mass.
D Centralab, Milwaukee, Wisc.
D Constanta Co. of Can., Montreal, Can.
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D Emcon Div., San Diego, Cal.
GTJ/Tensor Electronics, San Diego, Cal.
ITT Jennings, Monrovia, Cal.
DM JFD Electronics Components Corp., Bklyn., N.Y.
D KD Components, Santa Ana, Cal.
DM Mepco/Electra, Morristown, N.J.
Murata Mfg. Co. Ltd., Kyoto, Japan
Nichicon America Corp., Chicago, Ill.
D Norelcom Electronics, Farmingdale, N.Y.
D Nucleonic Prods., Canoga Pk., Cal.
Panasonic, Ind'l. Elctrn. Comps., New York, N.Y.
D Radio Materials Co., Chicago, Ill.
DM San Fernando Elec. Mfg., San Fernando, Cal.
D Siemens Corp., Iselin, N.J.
DM Sprague Elec. Co., No. Adams, Mass.
Stettner-Trush Inc., Cazenovia, N.Y.
TDK Electronics Co., Ltd., Chiyoda-ku, Tokyo 101, Japan
TDK Elctrns. Corp., Long Island City, N.Y.
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American Lava Corp., Chattanooga, Tenn.
D Baknor Industries Ltd., Port Credit, Ont.
D Centralab, Milwaukee, Wisc.
D Cornell-Dubilier Electronics, Newark, N.J.
Dilectron, Monrovia, Cal.
DM JFD Electronics Components Corp., Bklyn., N.Y.
Kahgan Electronics Corp., Hempstead, NY
D M.I.A.L. U.S.A., Nutley, N.J.
Motorola Comms. Div., Schaumburg, Ill.
Murata Mfg. Co. Ltd., Kyoto, Japan
Nichicon America Corp., Chicago, Ill.
D Norelcom Electronics, Farmingdale, N.Y.
D Nucleonic Prods., Canoga Pk., Cal.
Panasonic, Ind'l. Elctrn. Comps., New York, N.Y.
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D Sprague Elec. Co., No. Adams, Mass.
Stettner-Trush Inc., Cazenovia, N.Y.
TDK Electronics Co., Ltd., Chiyoda-ku, Tokyo 101, Japan
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D Cornell-Dubilier Electronics, Newark, N.J.
Electro Sci. Inds., Portland, Ore.
Film Capacitors, Passaic, N.J.
Nichicon America Corp., Chicago, Ill.
RCA Electronic Comps., Harrison, N.J.
Rhode & Schwarz Sls., Fairfield, N.J.
D San Fernando Elec. Mfg., San Fernando, Cal.
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D Baknor Industries Ltd., Port Credit, Ont.
D Callins Capacitors, Greenfield, Tenn.
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Filtron Company, Westbury, N.Y.
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D Industrial Condenser Corp., Chicago, Ill.
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D Norelcom Electronics, Farmingdale, N.Y.
Panasonic, Ind'l. Elctrn. Comps., New York, N.Y.
D Philmore Mfg. Co. Inc., Inwood, N.Y.
Presin Co., Shelton, Conn.
D Siemens Corp., Iselin, N.J.
DM Sprague Elec. Co., No. Adams, Mass.
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D **Spectrum Control, Fairview, Pa. .... ***

M **USCC/Centralab, Elec. Div., Los Angeles, Cal. ***
M Active & Passive Components, Syosset, N.Y.
D Acushnet Capacitor Co., New Bedford, Mass.
Captor Corp., Tipp City, Ohio
D Centralab, Milwaukee, Wisc.
Chicago Condenser Corp., Chicago, Ill.
D Cornell-Dubilier Electronics, Newark, N.J.
M Dearborn Elctrns. Div., Longwood, Fla.
M DynaMagnetic Engrg, Santa Ana, Cal.
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Genisco Technology Corp., Compton, Cal.
ITT Jennings, Monrovia, Cal.
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Motorola Comms. Div., Schaumburg, Ill.
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M RtroN Corp., Skokie, Ill.
San Fernando Elec. Mfg., San Fernando, Cal.
DM Sprague Elec. Co., No. Adams, Mass.
Standard Condenser Corp., Chicago, Ill.
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Interelectronics Corp., Congers, N.Y. .... *
Shigoto Inds., Ltd., New York, N.Y. .... *
DM **TRW Capacitor Div., Ogallala, Neb. .... ***
M Active & Passive Components, Syosset, N.Y.
DM Acushnet Capacitor Co., New Bedford, Mass.
Amp Inc., Harrisburg, Pa.
D Baknor Industries Ltd., Port Credit, Ont.
D Balco Capacitors, Orange, N.J.
D Callins Capacitors, Greenfield, Tenn.
Captor Corp., Tipp City, Ohio
D Centralab, Milwaukee, Wisc.
Chicago Condenser Corp., Chicago, Ill.
Condenser Products Corp., Brooksville, Fla.
DM Cornell-Dubilier Electronics, Newark, N.J.
M Dearborn Elctrns. Div., Longwood, Fla.
D Electro-Science Labs., Pennsauken, N. J.
Elctrn. Concepts, Eatontown, N.J.
Elmag Corp., Newark, N.J.
Engineered Components Co., San Luis Obispo, Cal.
Film Capacitors, Passaic, N.J.

*Company has information in white pages but not on this product

Filtron Company, Westbury, N.Y.
D Industrial Condenser Corp., Chicago, Ill.
M International Importers, Chicago, Ill.
ITT Jennings, Monrovia, Cal.
Mepco/Electra, Morristown, N.J.
M.I.A.L. U.S.A., Nutley, N.J.
Motorola Comms. Div., Schaumburg, Ill.
Nichicon America Corp., Chicago, Ill.
D Norelcom Electronics, Farmingdale, N.Y.
D Paktron Div., Vienna, Va.
Panasonic, Ind'l. Elctrn. Comps., New York, N.Y.
DM Plastic Capacitors, Chicago, Ill.
DM San Fernando Elec. Mfg., San Fernando, Cal.
D Siemens Corp., Iselin, N.J.
DM Sprague Elec. Co., No. Adams, Mass.
Standard Condenser Corp., Chicago, Ill.
Stettner-Trush Inc., Cazenovia, N.Y.
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M **USCC/Centralab, Elec. Div., Los Angeles, Cal.** *
M Active & Passive Components, Syosset, N.Y.
D Acushnet Capacitor Co., New Bedford, Mass.
D Baknor Industries Ltd., Port Credit, Ont.
D Callins Capacitors, Greenfield, Tenn.
D Centralab, Milwaukee, Wisc.
D Cornell-Dubilier Electronics, Newark, N.J.
M Dearborn Elctrns. Div., Longwood, Fla.
Dilectron, Monrovia, Cal.
Elmag Corp., Newark, N.J.
Film Capacitors, Passaic, N.J.
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GTJ/Tensor Electronics, San Diego, Cal.
Hilton Industries Inc., Glen Falls, N.Y.
D Industrial Condenser Corp., Chicago, Ill.
ITT Jennings, Monrovia, Cal.
DM JFD Electronics Components Corp., Bklyn., N.Y.
Murata Mfg. Co. Ltd., Kyoto, Japan
National Electronic Supply, Garden Grove, Cal.
Nichicon America Corp., Chicago, Ill.
D Norelcom Electronics, Farmingdale, N.Y.
Panasonic, Ind'l. Elctrn. Comps., New York, N.Y.
D Radio Materials Co., Chicago, Ill.
DM San Fernando Elec. Mfg., San Fernando, Cal.
D Siemens Corp., Iselin, N.J.
Soshin Elec. Co., Tokyo, Japan
DM Sprague Elec. Co., No. Adams, Mass.
Standard Condenser Corp., Chicago, Ill.
D Tansitor Elctrns., Bennington, Vt.
TDK Electronics Co., Ltd., Chiyoda-ku, Tokyo 101, Japan
TDK Elctrns. Corp., Long Island City, N.Y.
United Chemicon, Syracuse, N.Y.
D United Mineral & Chem. Corp., New York, N.Y.
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Interelectronics Corp., Congers, N.Y. .... *
Semtech Corp., Newbury Park, Cal. .... *
TRW Capacitor Div., Ogallala, Neb. .... *
M **USCC/Centralab, Elec. Div., Los Angeles, Cal.** *
Wesco Electrical Co., Greenfield, Mass. .... *
Amp Inc., Harrisburg, Pa.
D Balco Capacitors, Orange, N.J.
Bell Industries, Electronic Components Div., Burbank, Cal.
D Callins Capacitors, Greenfield, Tenn.
D Centralab, Milwaukee, Wisc.
Chicago Condenser Corp., Chicago, Ill.
Condenser Products Corp., Brooksville, Fla.
Cornell-Dubilier Electronics, Newark, N.J.
M Dearborn Elctrns. Div., Longwood, Fla.
Elmag Corp., Newark, N.J.
Film Capacitors, Passaic, N.J.
Filtron Company, Westbury, N.Y.
ITT Jennings, Monrovia, Cal.
DM JFD Electronics Components Corp., Bklyn., N.Y.
D KD Components, Santa Ana, Cal.
Murata Mfg. Co. Ltd., Kyoto, Japan
D Norelcom Electronics, Farmingdale, N.Y.
Panasonic, Ind'l. Elctrn. Comps., New York, N.Y.
M Plastic Capacitors, Chicago, Ill.
Polyflon Corp., New Rochelle, N.Y.
DM San Fernando Elec. Mfg., San Fernando, Cal.
Simmonds Precision, Norwich, N.Y.
Soshin Elec. Co., Tokyo, Japan
M Sprague Elec. Co., No. Adams, Mass.
Viclan, San Diego, Cal.

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Semtech Corp., Newbury Park, Cal. .... *
Shigoto Inds., Ltd., New York, N.Y. .... *
Wesco Electrical Co., Greenfield, Mass. .... *
D Acushnet Capacitor Co., New Bedford, Mass.
Aerovox Inds., New Bedford, Mass.
Amp Inc., Harrisburg, Pa.
D Balco Capacitors, Orange, N.J.
D Centralab, Milwaukee, Wisc.
Chicago Condenser Corp., Chicago, Ill.
Condenser Products Corp., Brooksville, Fla.
D Cornell-Dubilier Electronics, Newark, N.J.
M Dearborn Elctrns. Div., Longwood, Fla.
Dilectron, Monrovia, Cal.
Elctrn. Concepts, Eatontown, N.J.
Elmag Corp., Newark, N.J.
D Epic, New York, N.Y.
Film Capacitors, Passaic, N.J.
Filtron Company, Westbury, N.Y.
GTJ/Tensor Electronics, San Diego, Cal.
Hughes Aircraft Co, Culver City, Cal.
D Industrial Condenser Corp., Chicago, Ill.
ITT Jennings, Monrovia, Cal.
D KD Components, Santa Ana, Cal.
M Lapp Insulator Div., Interpace Corp., LeRoy, N.Y.
Maxwell Labs., San Diego, Calif.
M.I.A.L. U.S.A., Nutley, N.J.
Murata Mfg. Co. Ltd., Kyoto, Japan
Nichicon America Corp., Chicago, Ill.
D Nucleonic Prods., Canoga Pk., Cal.
Panasonic, Ind'l. Elctrn. Comps., New York, N.Y.
DM Plastic Capacitors, Chicago, Ill.
Polyflon Corp., New Rochelle, N.Y.
D Radio Materials Co., Chicago, Ill.
Rhode & Schwarz Sls., Fairfield, N.J.
DM San Fernando Elec. Mfg., San Fernando, Cal.
D Siemens Corp., Iselin, N.J.
Simmonds Precision, Norwich, N.Y.
Sprague Elec. Co., No. Adams, Mass.
Standard Condenser Corp., Chicago, Ill.
TDK Electronics Co., Ltd., Chiyoda-ku, Tokyo 101, Japan
TDK Elctrns. Corp., Long Island City, N.Y.

D United Mineral & Chem. Corp., New York, N.Y.
Viclan, San Diego, Cal.

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Nytronics Comps. Group Inc., Darlington, S.C. *
Sprague Products Co., No. Adams, Mass. .... *
TRW Capacitor Div., Ogallala, Neb. .... *
M **USCC/Centralab, Elec. Div., Los Angeles, Cal.** *
Chicago Condenser Corp., Chicago, Ill.
Electro Sci. Inds., Portland, Ore.
Film Capacitors, Passaic, N.J.
Nichicon America Corp., Chicago, Ill.
Rhode & Schwarz Sls., Fairfield, N.J.
Rutherford Research Prods. Co., Rutherford, N.J.
Sprague Elec. Co., No. Adams, Mass.
Standard Condenser Corp., Chicago, Ill.
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DM Acushnet Capacitor Co., New Bedford, Mass.
DM Cornell-Dubilier Electronics, Newark, N.J.
Kahgan Electronics Corp., Hempstead, NY
Materials for Elctrns., Jamaica, N.Y.
Morey Corp., Downers Grove, Ill.
Motorola Comms. Div., Schaumburg, Ill.
National Electronic Supply, Garden Grove, Cal.
Nichicon America Corp., Chicago, Ill.
D Norelcom Electronics, Farmingdale, N.Y.
D Nucleonic Prods., Canoga Pk., Cal.
Simmonds Precision, Norwich, N.Y.
Soshin Elec. Co., Tokyo, Japan
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Semtech Corp., Newbury Park, Cal. .... *
Shigoto Inds., Ltd., New York, N.Y. .... *
Spectrum Control, Fairview, Pa. .... *
Dilectron, Monrovia, Cal.
D Emcon Div., San Diego, Cal.
GTJ/Tensor Electronics, San Diego, Cal.
ITT Jennings, Monrovia, Cal.
DM JFD Electronics Components Corp., Bklyn., N.Y.
D KD Components, Santa Ana, Cal.
Mepco/Electra, Morristown, N.J.
Motorola Comms. Div., Schaumburg, Ill.
National Electronic Supply, Garden Grove, Cal.
DM Sprague Elec. Co., No. Adams, Mass.
D United Mineral & Chem. Corp., New York, N.Y.
Viclan, San Diego, Cal.

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Shigoto Inds., Ltd., New York, N.Y. .... *
DM Acushnet Capacitor Co., New Bedford, Mass.
D Baknor Industries Ltd., Port Credit, Ont.
D Balco Capacitors, Orange, N.J.
D Callins Capacitors, Greenfield, Tenn.
Condenser Products Corp., Brooksville, Fla.
D Cornell-Dubilier Electronics, Newark, N.J.
M Dearborn Elctrns. Div., Longwood, Fla.
Elctrn. Concepts, Eatontown, N.J.
Elmag Corp., Newark, N.J.
Film Capacitors, Passaic, N.J.
Filtron Company, Westbury, N.Y.
Genisco Technology Corp., Compton, Cal.
D Industrial Condenser Corp., Chicago, Ill.
M International Importers, Chicago, Ill.
ITT Jennings, Monrovia, Cal.
ITT Semiconductors-Capacitors, No. Andover, Mass.
D Lectro Magnetics, Los Angeles, Cal.
Maxwell Labs., San Diego, Calif.
M.I.A.L. U.S.A., Nutley, N.J.
Motorola Comms. Div., Schaumburg, Ill.
National Electronic Supply, Garden Grove, Cal.
Nichicon America Corp., Chicago, Ill.
D Nucleonic Prods., Canoga Pk., Cal.
D Paktron Div., Vienna, Va.
Panasonic, Ind'l. Elctrn. Comps., New York, N.Y.
DM Plastic Capacitors, Chicago, Ill.
Presin Co., Shelton, Conn.
DM San Fernando Elec. Mfg., San Fernando, Cal.
D Siemens Corp., Iselin, N.J.
DM Sprague Elec. Co., No. Adams, Mass.
Standard Condenser Corp., Chicago, Ill.
Stettner-Trush Inc., Cazenovia, N.Y.
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D **Midwec Div., Scottsbluff, Neb.** .... *
Shigoto Inds., Ltd., New York, N.Y. .... *
M Active & Passive Components, Syosset, N.Y.
DM Acushnet Capacitor Co., New Bedford, Mass.
D Balco Capacitors, Orange, N.J.
D Callins Capacitors, Greenfield, Tenn.
Captor Corp., Tipp City, Ohio
Chicago Condenser Corp., Chicago, Ill.
Condenser Products Corp., Brooksville, Fla.
D Cornell-Dubilier Electronics, Newark, N.J.
M Dearborn Elctrns. Div., Longwood, Fla.
Elctrn. Concepts, Eatontown, N.J.
Elmag Corp., Newark, N.J.
M Engineered Components Co., San Luis Obispo, Cal.
Film Capacitors, Passaic, N.J.
Filtron Company, Westbury, N.Y.
D Industrial Condenser Corp., Chicago, Ill.
M International Importers, Chicago, Ill.
ITT Jennings, Monrovia, Cal.
ITT Semiconductors-Capacitors, No. Andover, Mass.
D Lectro Magnetics, Los Angeles, Cal.
Motorola Comms. Div., Schaumburg, Ill.
National Electronic Supply, Garden Grove, Cal.
Nichicon America Corp., Chicago, Ill.
D Nucleonic Prods., Canoga Pk., Cal.
D Paktron Div., Vienna, Va.
Panasonic, Ind'l. Elctrn. Comps., New York, N.Y.
DM Plastic Capacitors, Chicago, Ill.
Polyflon Corp., New Rochelle, N.Y.
Presin Co., Shelton, Conn.
DM San Fernando Elec. Mfg., San Fernando, Cal.
D Siemens Corp., Iselin, N.J.
D Soshin Elec. Co., Tokyo, Japan
DM Sprague Elec. Co., No. Adams, Mass.
Standard Condenser Corp., Chicago, Ill.
Stettner-Trush Inc., Cazenovia, N.Y.
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D Baknor Industries Ltd., Port Credit, Ont.
Chicago Condenser Corp., Chicago, Ill.

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Condenser Products Corp., Brooksville, Fla.
D Cornell-Dubilier Electronics, Newark, N.J.
M Dearborn Elctrns. Div., Longwood, Fla.
Elmag Corp., Newark, N.J.
Film Capacitors, Passaic, N.J.
Filtron Company, Westbury, N.Y.
D Industrial Condenser Corp., Chicago, Ill.
ITT Jennings, Monrovia, Cal.
Maxwell Labs., San Diego, Calif.
National Electronic Supply, Garden Grove, Cal.
Nichicon America Corp., Chicago, Ill.
DM Plastic Capacitors, Chicago, Ill.
San Fernando Elec. Mfg., San Fernando, Cal.
DM Sprague Elec. Co., No. Adams, Mass.
D United Mineral & Chem. Corp., New York, N.Y.

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Wesco Electrical Co., Greenfield, Mass. *
D Acushnet Capacitor Co., New Bedford, Mass.
Aerovox Inds., New Bedford, Mass.
Chicago Condenser Corp., Chicago, Ill.
Condenser Products Corp., Brooksville, Fla.
D Cornell-Dubilier Electronics, Newark, N.J.
M Dearborn Elctrns. Div., Longwood, Fla.
Elmag Corp., Newark, N.J.
Film Capacitors, Passaic, N.J.
Filtron Company, Westbury, N.Y.
Genisco Technology Corp., Compton, Cal.
D Industrial Condenser Corp., Chicago, Ill.
ITT Jennings, Monrovia, Cal.
Maxwell Labs., San Diego, Calif.
Motorola Comms. Div., Schaumburg, Ill.
National Electronic Supply, Garden Grove, Cal.
Nichicon America Corp., Chicago, Ill.
D Norelcom Electronics, Farmingdale, N.Y.
Panasonic, Ind'l. Elctrn. Comps., New York, N.Y.
M Plastic Capacitors, Chicago, Ill.
DM San Fernando Elec. Mfg., San Fernando, Cal.
DM Sprague Elec. Co., No. Adams, Mass.
Standard Condenser Corp., Chicago, Ill.
United Mineral & Chem. Corp., New York, N.Y.

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Inter-Tech. Grp., Irvington-on-Hudson, N.Y. *
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DM Sprague Products Co., No. Adams, Mass. *
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DM Acushnet Capacitor Co., New Bedford, Mass.
Aerovox Inds., New Bedford, Mass.
Chicago Condenser Corp., Chicago, Ill.
D Cornell-Dubilier Electronics, Newark, N.J.
M Dearborn Elctrns. Div., Longwood, Fla.
Elmag Corp., Newark, N.J.
Film Capacitors, Passaic, N.J.
Filtron Company, Westbury, N.Y.
D Industrial Condenser Corp., Chicago, Ill.
ITT Jennings, Monrovia, Cal.
Motorola Comms. Div., Schaumburg, Ill.
Nichicon America Corp., Chicago, Ill.
Panasonic, Ind'l. Elctrn. Comps., New York, N.Y.
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Shigoto Inds., Ltd., New York, N.Y. *
D Sprague Products Co., No. Adams, Mass. *
TRW Capacitor Div., Ogallala, Neb. *
Aerovox Inds., New Bedford, Mass.
Amglo Corp., Rosemont, Ill.
D Baknor Industries Ltd., Port Credit, Ont.
Condenser Products Corp., Brooksville, Fla.
Elmag Corp., Newark, N.J.
Film Capacitors, Passaic, N.J.
D Industrial Condenser Corp., Chicago, Ill.
M International Importers, Chicago, Ill.
ITT Jennings, Monrovia, Cal.
Maxwell Labs., San Diego, Calif.
Nichicon America Corp., Chicago, Ill.
Panasonic, Ind'l. Elctrn. Comps., New York, N.Y.
Plastic Capacitors, Chicago, Ill.
D Siemens Corp., Iselin, N.J.
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Potter Co., Wesson, Miss. *
Shigoto Inds., Ltd., New York, N.Y. *
D TRW Capacitor Div., Ogallala, Neb. *
M Wesco Electrical Co., Greenfield, Mass. *
D Acushnet Capacitor Co., New Bedford, Mass.
D Baknor Industries Ltd., Port Credit, Ont.
D Balco Capacitors, Orange, N.J.
D Callins Capacitors, Greenfield, Tenn.
Condenser Products Corp., Brooksville, Fla.
D Cornell-Dubilier Electronics, Newark, N.J.
M Dearborn Elctrns. Div., Longwood, Fla.
Elctrn. Concepts, Eatontown, N.J.
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Film Capacitors, Passaic, N.J.
Filtron Company, Westbury, N.Y.
D Industrial Condenser Corp., Chicago, Ill.
ITT Jennings, Monrovia, Cal.
D Mepco/Electra, Morristown, N.J.
M.I.A.L. U.S.A., Nutley, N.J.
D Nucleonic Prods., Canoga Pk., Cal.
D Paktron Div., Vienna, Va.
Panasonic, Ind'l. Elctrn. Comps., New York, N.Y.
D San Fernando Elec. Mfg., San Fernando, Cal.
D Siemens Corp., Iselin, N.J.
Soshin Elec. Co., Tokyo, Japan
D Sprague Elec. Co., No. Adams, Mass.
Standard Condenser Corp., Chicago, Ill.
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International Comps Corp., Melville, N.Y. *
D Midwec Div., Scottsbluff, Neb. *
D Nytronics Comps. Group Inc., Darlington, S.C. *
Potter Co., Wesson, Miss. *
Shigoto Inds., Ltd., New York, N.Y. *
M Active & Passive Components, Syosset, N.Y.
DM Acushnet Capacitor Co., New Bedford, Mass.
D Baknor Industries Ltd., Port Credit, Ont.
D Balco Capacitors, Orange, N.J.
D Callins Capacitors, Greenfield, Tenn.
Captor Corp., Tipp City, Ohio
Condenser Products Corp., Brooksville, Fla.
D Cornell-Dubilier Electronics, Newark, N.J.
M Dearborn Elctrns. Div., Longwood, Fla.
Elctrn. Concepts, Eatontown, N.J.
Elmag Corp., Newark, N.J.
Engineered Components Co., San Luis Obispo, Cal.
Film Capacitors, Passaic, N.J.
Filtron Company, Westbury, N.Y.
D Industrial Condenser Corp., Chicago, Ill.
ITT Jennings, Monrovia, Cal.
ITT Semiconductors-Capacitors, No. Andover, Mass.
Mepco/Electra, Morristown, N.J.
D Nucleonic Prods., Canoga Pk., Cal.
D Paktron Div., Vienna, Va.
Panasonic, Ind'l. Elctrn. Comps., New York, N.Y.
D San Fernando Elec. Mfg., San Fernando, Cal.
D Siemens Corp., Iselin, N.J.
DM Sprague Elec. Co., No. Adams, Mass.
Standard Condenser Corp., Chicago, Ill.
Stettner-Trush Inc., Cazenovia, N.Y.
United Mineral & Chem. Corp., New York, N.Y.

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D Acushnet Capacitor Co., New Bedford, Mass.
Aerovox Inds., New Bedford, Mass.
D Baknor Industries Ltd., Port Credit, Ont.

Chicago Condenser Corp., Chicago, Ill.
Condenser Products Corp., Brooksville, Fla.
Cornell-Dubilier Electronics, Newark, N.J.
Elmag Corp., Newark, N.J.
M Engineered Components Co., San Luis Obispo, Cal.
D Film Capacitors, Passaic, N.J.
Filtron Company, Westbury, N.Y.
ITT Jennings, Monrovia, Cal.
D Nucleonic Prods., Canoga Pk., Cal.
D Paktron Div., Vienna, Va.
Panasonic, Ind'l. Elctrn. Comps., New York, N.Y.
D Plastic Capacitors, Chicago, Ill.
D Siemens Corp., Iselin, N.J.
D Sprague Elec. Co., No. Adams, Mass.
Standard Condenser Corp., Chicago, Ill.
Stettner-Trush Inc., Cazenovia, N.Y.
United Mineral & Chem. Corp., New York, N.Y.

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M **Wesco Electrical Co., Greenfield, Mass. p. 2•336**
Interelectronics Corp., Congers, N.Y. .... *
Shigoto Inds., Ltd., New York, N.Y. .... *
M Active & Passive Components, Syosset, N.Y.
D Acushnet Capacitor Co., New Bedford, Mass.
D Baknor Industries Ltd., Port Credit, Ont.
D Balco Capacitors, Orange, N.J.
D Callins Capacitors, Greenfield, Tenn.
D Centralab, Milwaukee, Wisc.
Chicago Condenser Corp., Chicago, Ill.
Condenser Products Corp., Brooksville, Fla.
M Dearborn Elctrns. Div., Longwood, Fla.
Elctrn. Concepts, Eatontown, N.J.
Elmag Corp., Newark, N.J.
Engineered Components Co., San Luis Obispo, Cal.
Film Capacitors, Passaic, N.J.
Filtron Company, Westbury, N.Y.
Industrial Condenser Corp., Chicago, Ill.
ITT Jennings, Monrovia, Cal.
D Mepco/Electra, Morristown, N.J.
D M.I.A.L. U.S.A., Nutley, N.J.
D Nucleonic Prods., Canoga Pk., Cal.
Panasonic, Ind'l. Elctrn. Comps., New York, N.Y.
DM Plastic Capacitors, Chicago, Ill.
Presin Co., Shelton, Conn.
DM San Fernando Elec. Mfg., San Fernando, Cal.
D Siemens Corp., Iselin, N.J.
Sprague Elec. Co., No. Adams, Mass.
Standard Condenser Corp., Chicago, Ill.
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M Active & Passive Components, Syosset, N.Y.
D Acushnet Capacitor Co., New Bedford, Mass.
Elmag Corp., Newark, N.J.
D Film Capacitors, Passaic, N.J.
Filtron Company, Westbury, N.Y.
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DM JFD Electronics Components Corp., Bklyn., N.Y.

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Engineered Components Co., San Luis Obispo, Cal.
Filtron Company, Westbury, N.Y.
ITT Jennings, Monrovia, Cal.
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USCC/Centralab, Elec. Div., Los Angeles, Cal. *
Amp Inc., Harrisburg, Pa.
D Balco Capacitors, Orange, N.J.
Condenser Products Corp., Brooksville, Fla.
Cornell-Dubilier Electronics, Newark, N.J.
Engineered Components Co., San Luis Obispo, Cal.
Film Capacitors, Passaic, N.J.
Filtron Company, Westbury, N.Y.
ITT Jennings, Monrovia, Cal.
Maxwell Labs., San Diego, Calif.
Nichicon America Corp., Chicago, Ill.
D Nucleonic Prods., Canoga Pk., Cal.
M Plastic Capacitors, Chicago, Ill.
San Fernando Elec. Mfg., San Fernando, Cal.
Simmonds Precision, Norwich, N.Y.
Soshin Elec. Co., Tokyo, Japan
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Capacitors, Fixed, Silvered Mica

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DM Acushnet Capacitor Co., New Bedford, Mass.
DM Cornell-Dubilier Electronics, Newark, N.J.
Kahgan Electronics Corp., Hempstead, NY
Materials for Elctrns., Jamaica, N.Y.
Motorola Comms. Div., Schaumburg, Ill.
National Electronic Supply, Garden Grove, Cal.
Nichicon America Corp., Chicago, Ill.
D Soshin Elec. Co., Tokyo, Japan
D Sprague Elec. Co., No. Adams, Mass.
D United Mineral & Chem. Corp., New York, N.Y.

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D Baknor Industries Ltd., Port Credit, Ont.
DM Callins Capacitors, Greenfield, Tenn.
D Cornell-Dubilier Electronics, Newark, N.J.
Filtron Company, Westbury, N.Y.
Hilton Industries Inc., Glen Falls, N.Y.
M International Importers, Chicago, Ill.
D ITT Semiconductor, West Palm Beach, Fla.
ITT Semiconductors-Capacitors, No. Andover, Mass.
Kahgan Electronics Corp., Hempstead, NY
D M.I.A.L. U.S.A., Nutley, N.J.
Motorola Comms. Div., Schaumburg, Ill.
National Electronic Supply, Garden Grove, Cal.
D NCI, W. Palm Beach, Fla.
D Norelcom Electronics, Farmingdale, N.Y.
Panasonic, Ind'l. Elctrn. Comps., New York, N.Y.
DM Siemens Corp., Iselin, N.J.
DM Sprague Elec. Co., No. Adams, Mass.
D Tansitor Elctrns., Bennington, Vt.
Union Carbide Corp., New York, N.Y.
United Chemicon, Syracuse, N.Y.
D United Mineral & Chem. Corp., New York, N.Y.

Capacitors, Fixed, TFE

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D Balco Capacitors, Orange, N.J.
Condenser Products Corp., Brooksville, Fla.
M Dearborn Elctrns. Div., Longwood, Fla.
Film Capacitors, Passaic, N.J.
Filtron Company, Westbury, N.Y.
Polyflon Corp., New Rochelle, N.Y.
San Fernando Elec. Mfg., San Fernando, Cal.
Sprague Elec. Co., No. Adams, Mass.

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M **F-Dyne Elctrns., Bridgeport, Conn. p. 2•130-133**
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D **Sprague Products Co., No. Adams, Mass. .... ***
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M Dearborn Elctrns. Div., Longwood, Fla.
Film Capacitors, Passaic, N.J.
Filtron Company, Westbury, N.Y.
Polyflon Corp., New Rochelle, N.Y.
San Fernando Elec. Mfg., San Fernando, Cal.
Sprague Elec. Co., No. Adams, Mass.

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Interelectronics Corp., Congers, N.Y. .... *
Nytronics Comps. Group Inc., Darlington, S.C. *
Semtech Corp., Newbury Park, Cal. .... *
Shigoto Inds., Ltd., New York, N.Y. .... *
TRW Capacitor Div., Ogallala, Neb. .... *
D Balco Capacitors, Orange, N.J.
D Cambridge Thermionic Corp., Cambridge, Mass.
D Centralab, Milwaukee, Wisc.
D Cornell-Dubilier Electronics, Newark, N.J.
Dilectron, Monrovia, Cal.
Engineered Components Co., San Luis Obispo, Cal.
ITT Jennings, Monrovia, Cal.
Motorola Comms. Div., Schaumburg, Ill.
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D PRD Elctrns., Syosset, N.Y.
M Premier Microwave, Port Chester, N.Y.
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- M Mallinckrodt, St. Louis, Mo.
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- D Uniroyal, New York, N.Y.
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- Baker, J.T. Chemical Co., Phillipsburg, N.J.
- M Chemplast, Wayne, N.J.
- Conversion Chem. Corp., Rockville, Conn.
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- Fidelity Chem. Prods. Corp., Newark, N.J.
- Gates, Geo. W. & Co., Franklin Sq., N.Y.
- Kandu Corporation, Arvada, Colo.
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- Adtool Corp., Montreal W P Q, Can.
- M Allied Chemical Corp., Morristown, N.J.
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- D Kenco Alloy & Chemical Co., Addison, Ill.
- D London Chemical Co., Bensenville, Ill.
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Bacon Inds., Watertown, Mass.
Chomerics, Woburn, Mass.
Corning Glass Works, Corning, N.Y.
DM Dynaloy, Hanover, N.J.
E.I. DuPont de Nemours & Co., Wilmington, Del.
Electro Mats. Corp. Amer., Mamaroneck, N.Y.
D Electro-Science Labs., Pennsauken, N. J.
Emerson & Cuming, Canton, Mass.
Epoxy Technology, Watertown, Mass.
Evaporated Coatings, Huntingdon Valley, Pa.
Formulated Resins Inc., Greenville, R.I.
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D Krylon, Norristown, Pa.
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Materials Resch. Corp., Orangeburg, N.Y.
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Packaged Resins Div., Watertown, Mass.
Photocircuits Div., Kollmorgen Corp., Glen Cove, N.Y.
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SermeTel Teleflex Inc., Limerick, Pa
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DM Tech Spray, Amarillo, Tex.
D Techni-Tool, Plymouth Meeting, Pa.
D Technical Wire Products, Cranford, N.J.
Thin Film Services, Gile, Wisc.
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N L Inds., New York, N. Y.
D Optics International, Tenafly, N.J.
Oriel Corp. of America, Stamford, Conn.
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Humiseal Div., Woodside, N.Y. .... *
DM Conap, Allegany, N.Y.
D Dolph, John C. Co., Monmouth Junction, N.J.
Dow Chemical Co., Midland, Mich.
Formulated Resins Inc., Greenville, R.I.
Miller-Stephenson Chem. Co., Danbury, Conn.
N L Inds., New York, N. Y.
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Air Prods. & Chems., Allentown, Pa.
D Aremco Prods., Ossining, N.Y.
Astrodyne, Wilmington, Mass.
D Chemtronics, Hauppauge, N.Y.
Chomerics, Woburn, Mass.
Dolph, John C. Co., Monmouth Junction, N.J.
Dow Corning, Midland, Mich.
D Dynaloy, Hanover, N.J.
E.I. DuPont de Nemours & Co., Wilmington, Del.
Electro Mats. Corp. Amer., Mamaroneck, N.Y.
D Electro-Science Labs., Pennsauken, N. J.
Emerson & Cuming, Canton, Mass.
Epoxy Technology, Watertown, Mass.
Formulated Resins Inc., Greenville, R.I.
D General Elec. Co., Waterford, N.Y.
M Hardman Inc., Belleville, N.J.
Int'l. Elctrn. Resch., Burbank, Cal.
M Isochem Resins Co., Lincoln, R.I.
Jermyn, San Francisco, Cal.
D Krylon, Norristown, Pa.
DM LPS Research Labs, Los Angeles, Cal.
M MacDonald & Co., Glendale, Calif.

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National Beryllia Corp., Haskell, N.J.
Packaged Resins Div., Watertown, Mass.
Randolph Prods. Co., Carlstadt, N.J.
SermeTel Teleflex Inc., Limerick, Pa
DM Stock Drive Prods., New Hyde Pk., N.Y.
SWS Silicones, Adrian, Mich.
DM Tech Spray, Amarillo, Tex.
D Technical Wire Products, Cranford, N.J.
Union Carbide, Chemicals & Plastics, New York, N.Y.
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M Chemplast, Wayne, N.J.
D Chemtronics, Hauppauge, N.Y.
DM Conap, Allegany, N.Y.
Coors Porcelain Co., Golden, Colo.
D Dolph, John C. Co., Monmouth Junction, N.J.
Dow Chemical Co., Midland, Mich.
Dow Corning, Midland, Mich.
E.I. DuPont de Nemours & Co., Wilmington, Del.
Electro Mats. Corp. Amer., Mamaroneck, N.Y.
D Electro-Science Labs., Pennsauken, N. J.
Emerson & Cuming, Canton, Mass.
Epoxy Technology, Watertown, Mass.
Evaporated Coatings, Huntingdon Valley, Pa.
Formulated Resins Inc., Greenville, R.I.
D General Elec. Co., Waterford, N.Y.
M Hardman Inc., Belleville, N.J.
Hightemp Resins, Stamford, Conn.
Int'l. Elctrn. Resch., Burbank, Cal.
M Isochem Resins Co., Lincoln, R.I.
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Mann, Henry Inc., Huntingdon Valley, Pa.
Materials Resch. Corp., Orangeburg, N.Y.
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DM Sterling, Sewickley, Pa.
SWS Silicones, Adrian, Mich.
DM Tech Spray, Amarillo, Tex.
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American Lava Corp., Chattanooga, Tenn.
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Communications Technology Corp., Los Angeles, Cal.
DM Conap, Allegany, N.Y.
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Dolph, John C. Co., Monmouth Junction, N.J.
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Eastman Chem. Prods., Kingsport, Tenn.
E.I. DuPont de Nemours & Co., Wilmington, Del.
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Fidelity Chem. Prods. Corp., Newark, N.J.
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D Kenco Alloy & Chemical Co., Addison, Ill.
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D Merix Chem. Co., Chicago, Ill.
Micro Line Div. Bausch & Lomb, Jamestown, N.Y.
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N L Inds., New York, N. Y.
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M Dietz Design, Belton, Mo.
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Bulova Watch Co., Freq Controls Div., Woodside, N.Y. .... *
D GC Electronics, Rockford, Ill. .... *
D Microtran Co., Valley Stream, N.Y. .... *
Annis R B Co., Indianapolis, Ind.
Anro Elex Inds. Ltd., Downsview, Ont, Can.
Coil Specialty Co., Boalsburg, Pa.
M Electronic Transformer Corp., Paterson, N.J.
Elma Engineering, Palo Alto, Cal.
LDJ Electronics, Troy, Mich.
Mag-Con, New Brighton, Minn.
Morey Corp., Downers Grove, Ill.
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D Waldom Electronics, Chicago, Ill. .... *
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Anro Elex Inds. Ltd., Downsview, Ont, Can.
A. P. W. Co., Rockaway, N. J.
D Electronic Coil Corp., Plainville, Conn.
M Electronic Transformer Corp., Paterson, N.J.
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D Altec Div., Anaheim, Calif.
American Magnetics Corp., Carterville, Ill.
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Elma Engineering, Palo Alto, Cal.
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Morey Corp., Downers Grove, Ill.
Ogallala Elctrns., Ogallala, Neb.
M Osborne Transformer Corp., Detroit, Mich.
Permaluster, Burbank, Calif.
D Stancor/Essex International, Chicago, Ill.
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Walker Scientific, Worcester, Mass.

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D Bell Industries, Compton, Cal. ..... p. 2•370-379
M Bourns Pacific Magnetic Corp., Romoland, Cal. p. 2•381
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M CELCO, Mahwah, N.J. .... p. 1•631
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DM Microtran Co., Valley Stream, N.Y. ... p. 2•1761
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DM Torotel Inc., Grandview, Mo. .... p. 2•430-439
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Allen Avionics, Mineola, N.Y. .... *
Biometrics Instrument Corp., Garland, Tex. ..... *
Bulova Watch Co., Freq Controls Div., Woodside, N.Y. .... *
Chesterfield Prods. Inc., Saddle Brook, N.J. .... *
Data Delay Devices, Clifton, N.J. .... *
M ESC Elctrns. Corp., Palisades Pk., N.J. .... *
K.G.S. Elctrns., Pasadena, Cal. .... *
Millen Mfg. Co. Inc., James, Malden, Mass. .... *
D Nytronics Comps. Group Inc., Darlington, S.C. *
Pico Elctrns. Inc., Mount Vernon, N.Y. .... *
M Sterling Transformer Corp., Brooklyn, N.Y. ..... *
M Torwico Elctrns., Lakewood, N.J. .... *
D Waldom Electronics, Chicago, Ill. .... *
D Altec Div., Anaheim, Calif.
American Magnetics Corp., Carterville, Ill.
M American Trans-Coil Corp., Richmond Hill, N.Y.
Anro Elex Inds. Ltd., Downsview, Ont, Can.
Automatic Coil, New Hyde Pk., N.Y.
Bicron Elctrns. Co., Canaan, Conn.
M Caddell Coil Corp., Poultney, Vt.
D Cambridge Thermionic Corp., Cambridge, Mass.
Coil-Craft Inc., Bronxville, N.Y.
Coilcraft, Cary, Ill.
Coil Specialty Co., Boalsburg, Pa.
Cramer Coil, Grafton, Wisc.
M Dietz Design, Belton, Mo.
D Dormeyer Industries, Chicago, Ill.
Electro-Pacific, Goleta, Calif.
Electrocom Inds., S. Bend, Ind.
M Electronic Transformer Corp., Paterson, N.J.
Elma Engineering, Palo Alto, Cal.
EWC, Kenilworth, N.J.
Ferrodyne Corp., Venice, Calif.
General Instr. Corp., Automatic Mfg. Div., Chicopee, Mass
M Genisco Tech. Corp., Compton, Cal.
Icore Int'l., Sunnyvale, , Cal.
J.D.N. Electronics Inc., Gillette, N.J.
M Lenox-Fugle Elctrns., S. Plainfield, N.J.
Morey Corp., Downers Grove, Ill.
Phoenix Transformer Co., Phoenix, Ariz.
M San Fernando Elec. Mfg., San Fernando, Cal.
M Syscon Int'l., So. Bend, Ind.
TDK Electronics Co., Ltd., Chiyoda-ku, Tokyo 101, Japan
TDK Elctrns. Corp., Long Island City, N.Y.
Torelco Inc., Irvington, N.J.
Tranex Inc., Mountain View, Cal.
D TRW/UTC Transformers, New York, N.Y.
U.S. Elctrns., Long Branch, N.J.

Coils, Hybrid & Repeater

Aladdin Elctrns., Nashville, Tenn. p. 2•1729,1730
Caddel-Burns Mfg. Co., Mineola, N. Y. p. 2•382-385
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Bulova Watch Co., Freq Controls Div., Woodside, N.Y. .... *
Chesterfield Prods. Inc., Saddle Brook, N.J. .... *
Computer Comps., Jamaica, N.Y. .... *
D Altec Div., Anaheim, Calif.
American Magnetics Corp., Carterville, Ill.
M American Trans-Coil Corp., Richmond Hill, N.Y.
Anro Elex Inds. Ltd., Downsview, Ont, Can.
Cardinal Control Co., Kensington, Conn.
Coil-Craft Inc., Bronxville, N.Y.
M Dietz Design, Belton, Mo.
M Electronic Transformer Corp., Paterson, N.J.
EWC, Kenilworth, N.J.
D ITI Electronics, Clifton, N.J.
Morey Corp., Downers Grove, Ill.
Phoenix Transformer Co., Phoenix, Ariz.
D TRW/UTC Transformers, New York, N.Y.
DM United Prods. Co., New Hyde Pk., N.Y.
U.S. Elctrns., Long Branch, N.J.

Coils, I-F

M Aladdin Elctrns., Nashville, Tenn. p. 2•1729,1730
D Bell Industries, Compton, Cal. ..... p. 2•370-379
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Vari-L Co., Denver, Colo. .... p. 2•442,443
Bel Fuse, Jersey City, N.J. .... *
Bulova Watch Co., Freq Controls Div., Woodside, N.Y. .... *
Computer Comps., Jamaica, N.Y. .... *
D Microtran Co., Valley Stream, N.Y. .... *
Millen Mfg. Co. Inc., James, Malden, Mass. .... *
Nytronics Comps. Group Inc., Darlington, S.C. *
Shigoto Inds., Ltd., New York, N.Y. .... *
M Torotel Inc., Grandview, Mo. .... *
M Torwico Elctrns., Lakewood, N.J. .... *
M American Trans-Coil Corp., Richmond Hill, N.Y.
Anro Elex Inds. Ltd., Downsview, Ont, Can.
Automatic Coil, New Hyde Pk., N.Y.
Bicron Elctrns. Co., Canaan, Conn.
M Caddell Coil Corp., Poultney, Vt.
D Cambridge Thermionic Corp., Cambridge, Mass.
Coil-Craft Inc., Bronxville, N.Y.
Coilcraft, Cary, Ill.
Coil Specialty Co., Boalsburg, Pa.
D Components Specialties, Hempstead, N.Y.
M Dietz Design, Belton, Mo.
EWC, Kenilworth, N.J.
General Instr. Corp., Automatic Mfg. Div., Chicopee, Mass
Hytronics Corp., Pinellas Park, Fla.
J.D.N. Electronics Inc., Gillette, N.J.
Morey Corp., Downers Grove, Ill.
M Piconics Inc., Tyngsboro, Mass.
QTron Corp., Santa Ana, Cal.
DM San Fernando Elec. Mfg., San Fernando, Cal.
M Syscon Int'l., So. Bend, Ind.
TDK Elctrns. Corp., Long Island City, N.Y.
DM Thordarson Meissner, Mt. Carmel, Ill.
DM United Prods. Co., New Hyde Pk., N.Y.
U.S. Elctrns., Long Branch, N.J.
D Workman Electronic Prods., Sarasota, Fla.

Coils, Metallized Glass

Bulova Watch Co., Freq Controls Div., Woodside, N.Y. .... *
M American Trans-Coil Corp., Richmond Hill, N.Y.
Anro Elex Inds. Ltd., Downsview, Ont, Can.
GTE Sylvania Inc., Danvers, Mass.
DM JFD Electronics Components Corp., Bklyn., N.Y.
Morey Corp., Downers Grove, Ill.
DM United Prods. Co., New Hyde Pk., N.Y.

Coils, Molded
Airco Elctrns., Bradford, Pa. p. 2•368,369,1408,1409
DM **Airco Elctrns., Nogales, Ariz. p. 2•368,369,1408,1409**
M **Aladdin Elctrns., Nashville, Tenn. p. 2•1729,1730**
DM **Bell Industries, Compton, Cal. p. 2•370-379**
CELCO, Mahwah, N.J. p. 1•631
D **Dale Elctrns., Yankton, S.D. p. 2•1452**
DM **Delevan Div., Coil Prods., E. Aurora, N.Y. p. 2•388**
Douglas Randall Div., Pawcatuck, Conn. p. 2•1734
Endicott Coil Co., Binghamton, N.Y. p. 2•396
M **Freed Transformer Co., Brooklyn, N.Y. p. 1•716,717; p. 2•1738-1747**
M **Hisonic, Olathe, Kan. p. 2•1755**
Magnetico, Holtsville, N.Y. p. 2•1770
Millen Mfg. Co. Inc., James, Malden, Mass. p. 2•1252
M **Rowe Industries, Toledo, Ohio p. 2•796,797**
DM **Torotel Inc., Grandview, Mo. p. 2•431-439**
Biometrics Instrument Corp., Garland, Tex. *
Bulova Watch Co., Freq Controls Div., Woodside, N.Y. *
Coto-Coil Co., Providence, R.I. *
D **Elctrn. Molding Corp., Woonsocket, R.I.** *
M **ESC Elctrns. Corp., Palisades Pk., N.J.** *
M **Kappa Networks, Carteret, N.J.** *
K.G.S. Elctrns., Pasadena, Cal. *
D **Nytronics Comps. Group Inc., Darlington, S.C.** *
M American Trans-Coil Corp., Richmond Hill, N.Y.
Anro Elex Inds. Ltd., Downsview, Ont, Can.
Coilcraft, Cary, Ill.
M Component Specialties, Temple City, Cal.
Cosmo Plastics Co., Cleveland, Ohio
D Dormeyer Industries, Chicago, Ill.
Electro-Pacific, Goleta, Calif.
EWC, Kenilworth, N.J.
Filtron Company, Westbury, N.Y.
M Genisco Tech. Corp., Compton, Cal.
M Gowanda Electronics Corp., Gowanda, N.Y.
M JB Elctrn, Transformers, Chicago, Ill
M Kates Scientific Instrs., Newton, Mass.
Montevideo Technology Inc., Edina, Minn.
Morey Corp., Downers Grove, Ill.
Pulse Engrg., San Diego, Cal
M Schott Corp., Minneapolis, Minn.
Singer Co., Schiller Park, Ill.
TDK Electronics Co., Ltd., Chiyoda-ku, Tokyo 101, Japan
TDK Elctrns. Corp., Long Island City, N.Y.
Torelco Inc., Irvington, N.J.
D United Mineral & Chem. Corp., New York, N.Y.
DM United Prods. Co., New Hyde Pk., N.Y.
U.S. Elctrns., Long Branch, N.J.

Coils, Oscillator
D **Bell Industries, Compton, Cal. p. 2•370-379**
Caddel-Burns Mfg. Co., Mineola, N. Y. p. 2•382-385
M **Hisonic, Olathe, Kan. p. 2•1755**
Magnetico, Holtsville, N.Y. p. 2•1770
North Hills Elctrns., Glen Cove, N.Y. p. 2•399
Solid State Electronics Corp., Sepulveda, Cal. p. 1•126
DM **Torotel Inc., Grandview, Mo. p. 2•430-439**
Vari-L Co., Denver, Colo. p. 2•442,443
American Time Products, Bulova Watch, Woodside, N.Y. *
Bulova Watch Co., Freq Controls Div., Woodside, N.Y. *
M American Trans-Coil Corp., Richmond Hill, N.Y.
Anro Elex Inds. Ltd., Downsview, Ont, Can.
Arenberg Ultrasonic Lab Inc., Jamaica Plain, Mass.
Coil-Craft Inc., Bronxville, N.Y.
Coil Specialty Co., Boalsburg, Pa.
EWC, Kenilworth, N.J.
J.D.N. Electronics Inc., Gillette, N.J.
Morey Corp., Downers Grove, Ill.
TDK Electronics Co., Ltd., Chiyoda-ku, Tokyo 101, Japan
D Workman Electronic Prods., Sarasota, Fla.

Coils, Relay
D **Bell Industries, Compton, Cal. p. 2•370-379**
Coto-Coil Co., Providence, R.I. p. 1•1618-1623
D **Dale Electronics Inc., Columbus, Neb. p. 2•1452**
Dale Elctrns., Yankton, S.D. p. 2•1452
Dia-Netics Inc., Northridge, Cal. p. 2•422
Douglas Randall Div., Pawcatuck, Conn. p. 2•1734
El-Rad Mfg. Co., Chicago, Ill p. 2•1773,1774
Endicott Coil Co., Binghamton, N.Y. p. 2•396
Kilovac Corp., Santa Barbara, Cal. p. 1•1747
Liberty Controls, Shorewood, Ill. p. 1•1762
Solid State Electronics Corp., Sepulveda, Cal. p. 1•126
Bulova Watch Co., Freq Controls Div., Woodside, N.Y. *
Computer Comps., Jamaica, N.Y. *
D **GC Electronics, Rockford, Ill.** *
Kappa Networks, Carteret, N.J. *
Regdon Corp., Brookfield, Ill *
Shigoto Inds., Ltd., New York, N.Y. *
American Magnetics Corp., Carterville, Ill.
M American Trans-Coil Corp., Richmond Hill, N.Y.
Anro Elex Inds. Ltd., Downsview, Ont, Can.
A. P. W. Co., Rockaway, N. J.
Artisan Elctrns. Corp., Parsippany, N.J.
Cardinal Control Co., Kensington, Conn.
Coil Specialty Co., Boalsburg, Pa.
Component Specialties, Temple City, Cal.
Custom Coil & Transformer Co., Zanesville, Ohio
D Dormeyer Industries, Chicago, Ill.
D Electronic Coil Corp., Plainville, Conn.
M Genisco Tech. Corp., Compton, Cal.
Guardian California, Torrance, Cal.
JDN Electronics, Gillette, N.J.
Morey Corp., Downers Grove, Ill.
QTron Corp., Santa Ana, Cal.
Relay Service Co., Chicago, Ill.
M San Fernando Elec. Mfg., San Fernando, Cal.
Struthers-Dunn, Pitman, N.J.
DM United Prods. Co., New Hyde Pk., N.Y.
U.S. Elctrns., Long Branch, N.J.

Coils, R-F
Airco Elctrns., Bradford, Pa. p. 2•368,369,1408,1409
DM **Airco Elctrns., Nogales, Ariz. p. 2•368,369,1408,1409**
M **Aladdin Elctrns., Nashville, Tenn. p. 2•1729,1730**
D **Bell Industries, Compton, Cal. p. 2•370-379**
Caddel-Burns Mfg. Co., Mineola, N. Y. p. 2•382-385
D **Dale Electronics Inc., Columbus, Neb. p. 2•1452**
Dale Elctrns., Yankton, S.D. p. 2•1452
DM **Delevan Div., Coil Prods., E. Aurora, N.Y. p. 2•388**
El-Rad Mfg. Co., Chicago, Ill p. 2•1773,1774
M **Hisonic, Olathe, Kan. p. 2•1755**
Magnetico, Holtsville, N.Y. p. 2•1770
Millen Mfg. Co. Inc., James, Malden, Mass. p. 2•1252
North Hills Elctrns., Glen Cove, N.Y. p. 2•399
D **Nytronics Comps. Group Inc., Darlington, S.C. p. 2•400-421**
M **RF Interonics, Bay Shore, N.Y. p. 1•572,573**
DM **Torotel Inc., Grandview, Mo. p. 2•430,431**
Vari-L Co., Denver, Colo. p. 2•442,443
Bel Fuse, Jersey City, N.J. *
Biometrics Instrument Corp., Garland, Tex. *
Bulova Watch Co., Freq Controls Div., Woodside, N.Y. *
Computer Comps., Jamaica, N.Y. *
Data Delay Devices, Clifton, N.J. *
D **GC Electronics, Rockford, Ill.** *
Kappa Networks, Carteret, N.J. *
D **McGraw-Edison Co., Manchester, N.H.** *
Shigoto Inds., Ltd., New York, N.Y. *
M American Trans-Coil Corp., Richmond Hill, N.Y.
Anro Elex Inds. Ltd., Downsview, Ont, Can.
Automatic Coil, New Hyde Pk., N.Y.
D Barker & Williamson, Bristol, Pa.
Bicron Elctrns. Co., Canaan, Conn.
D Cambridge Thermionic Corp., Cambridge, Mass.
Coil-Craft Inc., Bronxville, N.Y.
Coilcraft, Cary, Ill.
Coil Specialty Co., Boalsburg, Pa.
Collins Radio, Dallas, Tex.
Cramer Coil, Grafton, Wisc.
M Dietz Design, Belton, Mo.
Elma Engineering, Palo Alto, Cal.
EWC, Kenilworth, N.J.
General Instr. Corp., Automatic Mfg. Div., Chicopee, Mass
Genisco Technology Corp., Compton, Cal.
M Genisco Tech. Corp., Compton, Cal.
M Gowanda Electronics Corp., Gowanda, N.Y.
D Helix Spring Corp., Long Island City, N.Y.
Hughes Aircraft Co, Culver City, Cal.
Hytronics Corp., Pinellas Park, Fla.
JDN Electronics, Gillette, N.J.
M J.D.N. Electronics Inc., Gillette, N.J.
M Lenox-Fugle Elctrns., S. Plainfield, N.J.
Morey Corp., Downers Grove, Ill.
D Norelcom Electronics, Farmingdale, N.Y.
M Piconics Inc., Tyngsboro, Mass.
QTron Corp., Santa Ana, Cal.
Rutherford Research Prods. Co., Rutherford, N.J.
DM San Fernando Elec. Mfg., San Fernando, Cal.
Stanford Applied Engineering, Santa Clara, Cal.
Superex Electronics Corp., Yonkers, N.Y.
M Syscon Int'l., So. Bend, Ind.
TDK Electronics Co., Ltd., Chiyoda-ku, Tokyo 101, Japan
TDK Elctrns. Corp., Long Island City, N.Y.
DM United Prods. Co., New Hyde Pk., N.Y.
U.S. Elctrns., Long Branch, N.J.
D Workman Electronic Prods., Sarasota, Fla.

Coils, Saturable Reactor
Abacus Controls Inc., Somerville, N.J. p. 2•1731
Aladdin Elctrns., Nashville, Tenn. p. 2•1729,1730
M **Bourns Pacific Magnetic Corp., Romoland, Cal. p. 2•381**
Caddel-Burns Mfg. Co., Mineola, N. Y. p. 2•382-385
Dale Elctrns., Yankton, S.D. p. 2•1452
M **Freed Transformer Co., Brooklyn, N.Y. p. 1•716,717; p. 2•1738-1747**
M **Hisonic, Olathe, Kan. p. 2•1755**
M **Industrial Control Co., Farmingdale, N.Y. p. 1•1916,1917**
Neshaminy Transformer, Furlong, Pa. p. 2•1775,1776
NWL Transformers, Trenton, N.J. p. 2•1772
Vari-L Co., Denver, Colo. p. 2•442,443
Biometrics Instrument Corp., Garland, Tex. *
Bulova Watch Co., Freq Controls Div., Woodside, N.Y. *
M **Del Electronics Corp., Mt. Vernon, N.Y.** *
Electrocube Inc., San Gabriel, Cal. *
General Magnetics, Bloomfield, N.J. *
K.G.S. Elctrns., Pasadena, Cal. *
DM **Microtran Co., Valley Stream, N.Y.** *
D **Nytronics Comps. Group Inc., Darlington, S.C.** *
M **Sterling Transformer Corp., Brooklyn, N.Y.** *
M **Torotel Inc., Grandview, Mo.** *
M **Torwico Elctrns., Lakewood, N.J.** *
D Altec Div., Anaheim, Calif.
American Magnetics Corp., Carterville, Ill.
M American Trans-Coil Corp., Richmond Hill, N.Y.
Anro Elex Inds. Ltd., Downsview, Ont, Can.
Bicron Elctrns. Co., Canaan, Conn.
Coilcraft, Cary, Ill.
Cross Electronics Inc., Warrendale, Pa.
M Dietz Design, Belton, Mo.
Electro-Pacific, Goleta, Calif.
Electrocom Inds., S. Bend, Ind.
M Electronic Transformer Corp., Paterson, N.J.
Elma Engineering, Palo Alto, Cal.
EWC, Kenilworth, N.J.
Ferrodyne Corp., Venice, Calif.
Genisco Technology Corp., Compton, Cal.
Mag-Con, New Brighton, Minn.
Morey Corp., Downers Grove, Ill.
M Osborne Transformer Corp., Detroit, Mich.
Phoenix Transformer Co., Phoenix, Ariz.
M Polyphase Instr. Co., Bridgeport, Pa.
RtroN Corp., Skokie, Ill.
D Stancor/Essex International, Chicago, Ill.
TDK Electronics Co., Ltd., Chiyoda-ku, Tokyo 101, Japan
Tohoku Metal Inds., Ltd., Tokyo, Japan
Torelco Inc., Irvington, N.J.
D TRW/UTC Transformers, New York, N.Y.
DM United Prods. Co., New Hyde Pk., N.Y.

Coils, Shielded
Airco Elctrns., Bradford, Pa. p. 2•368,369,1408,1409
DM **Airco Elctrns., Nogales, Ariz. p. 2•368,369,1408,1409**
DM **Bell Industries, Compton, Cal. p. 2•370-379**
Caddel-Burns Mfg. Co., Mineola, N. Y. p. 2•382-385
CELCO, Mahwah, N.J. p. 1•631
D **Dale Elctrns., Yankton, S.D. p. 2•1452**
DM **Delevan Div., Coil Prods., E. Aurora, N.Y. p. 2•388**
M **Hisonic, Olathe, Kan. p. 2•1755**
Magnetico, Holtsville, N.Y. p. 2•1770
North Hills Elctrns., Glen Cove, N.Y. p. 2•399
NWL Transformers, Trenton, N.J. p. 2•1772
Nytronics Comps. Group Inc., Darlington, S.C. p. 2•400-421
DM **Torotel Inc., Grandview, Mo. p. 2•430,432-439**
American Time Products, Bulova Watch, Woodside, N.Y. *
Biometrics Instrument Corp., Garland, Tex. *
Bulova Watch Co., Freq Controls Div., Woodside, N.Y. *

Computer Comps., Jamaica, N.Y. .... *
Data Delay Devices, Clifton, N.J. .... *
Kappa Networks, Carteret, N.J. .... *
Millen Mfg. Co. Inc., James, Malden, Mass. .... *
M **Torwico Elctrns., Lakewood, N.J.** .... *
M American Trans-Coil Corp., Richmond Hill, N.Y.
Anro Elex Inds. Ltd., Downsview, Ont, Can.
Automatic Coil, New Hyde Pk., N.Y.
Coil-Craft Inc., Bronxville, N.Y.
Coil Specialty Co., Boalsburg, Pa.
M Dietz Design, Belton, Mo.
M Electronic Transformer Corp., Paterson, N.J.
Elma Engineering, Palo Alto, Cal.
EWC, Kenilworth, N.J.
Filtron Company, Westbury, N.Y.
Gowanda Electronics Corp., Gowanda, N.Y.
M JB Elctrn, Transformers, Chicago, Ill
M J.D.N. Electronics Inc., Gillette, N.J.
M Lenox-Fugle Elctrns., S. Plainfield, N.J.
Montevideo Technology Inc., Edina, Minn.
Morey Corp., Downers Grove, Ill.
M Piconics Inc., Tyngsboro, Mass.
QTron Corp., Santa Ana, Cal.
M Syscon Int'l., So. Bend, Ind.
TDK Electronics Co., Ltd., Chiyoda-ku, Tokyo 101, Japan
DM United Prods. Co., New Hyde Pk., N.Y.

Coils, Solenoid

DM **Airco Elctrns., Nogales, Ariz.** p. 2•368,369,1408,1409
D **Bell Industries, Compton, Cal.** ..... p. 2•370-379
D **Dale Electronics Inc., Columbus, Neb.** p. 2•1452
Dale Elctrns., Yankton, S.D. .... p. 2•1452
Delevan Div., Coil Prods., E. Aurora, N.Y. p. 2•388
Dia-Netics Inc., Northridge, Cal. .... p. 2•422
Douglas Randall Div., Pawcatuck, Conn. p. 2•1734
Endicott Coil Co., Binghamton, N.Y. .... p. 2•396
Liberty Controls, Shorewood, Ill. p. 1•1760,1761
Magnetico, Holtsville, N.Y. .... p. 2•1770
North Hills Elctrns., Glen Cove, N.Y. ... p. 2•399
NWL Transformers, Trenton, N.J. ..... p. 2•1772
American Time Products, Bulova Watch, Woodside, N.Y. .... *
Bulova Watch Co., Freq Controls Div., Woodside, N.Y. .... *
Computer Comps., Jamaica, N.Y. .... *
Coto-Coil Co., Providence, R.I. .... *
M **ESC Elctrns. Corp., Palisades Pk., N.J.** .... *
M **Kappa Networks, Carteret, N.J.** .... *
Nytronics Comps. Group Inc., Darlington, S.C. *
D **Ohmite Mfg. Co., Skokie, Ill.** .... *
Regdon Corp., Brookfield, Ill .... *
Shigoto Inds., Ltd., New York, N.Y. .... *
M **Torwico Elctrns., Lakewood, N.J.** .... *
Advanced Kinetics, Costa Mesa, Calif.
American Magnetics Corp., Carterville, Ill.
American Magnetics, Oak Ridge, Tenn.
M American Trans-Coil Corp., Richmond Hill, N.Y.
Anro Elex Inds. Ltd., Downsview, Ont, Can.
A. P. W. Co., Rockaway, N. J.
Artisan Elctrns. Corp., Parsippany, N.J.
Automatic Coil, New Hyde Pk., N.Y.
Bicron Elctrns. Co., Canaan, Conn.
Cardinal Control Co., Kensington, Conn.
Coil Specialty Co., Boalsburg, Pa.
M Component Specialties, Temple City, Cal.
Cramer Coil, Grafton, Wisc.
Custom Coil & Transformer Co., Zanesville, Ohio
M Dietz Design, Belton, Mo.
D Dormeyer Industries, Chicago, Ill.
Electrocom Inds., S. Bend, Ind.
D Electronic Coil Corp., Plainville, Conn.
M Electronic Transformer Corp., Paterson, N.J.
Elma Engineering, Palo Alto, Cal.
Filtron Company, Westbury, N.Y.
General Instr. Corp., Automatic Mfg. Div., Chicopee, Mass
M Genisco Tech. Corp., Compton, Cal.
JDN Electronics, Gillette, N.J.
J.D.N. Electronics Inc., Gillette, N.J.
D JPI, Santa Monica, Cal.
LDJ Electronics, Troy, Mich.
M Lisk, G.W. Co., Clifton Springs, N.Y.
Mag-Con, New Brighton, Minn.
Magnos, Incorporated, Harvard, Mass.
Montevideo Technology Inc., Edina, Minn.
Morey Corp., Downers Grove, Ill.
D NAMCO CONTROLS, Cleveland, Ohio
Phoenix Transformer Co., Phoenix, Ariz.
M Piconics Inc., Tyngsboro, Mass.
QTron Corp., Santa Ana, Cal.
M San Fernando Elec. Mfg., San Fernando, Cal.
Singer Co., Schiller Park, Ill.
DM United Prods. Co., New Hyde Pk., N.Y.
U.S. Elctrns., Long Branch, N.J.
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Boston Insulated Wire & Cable Co., Dorchester, Mass.
D Cablewave Systems Inc., North Haven, Conn.
M Detoronics Corp., S. El Monte, Cal.
Dynatron Co., Los Angeles, Cal.
D Ev-Game Inc., Freeport, N.Y.
DM Excel Products Co., New Brunswick, N.J.
M Glenair, Glendale, Cal.
Hypertronics Corp., Stow, Mass.
Industrial Electronic Hardware, New York, N.Y.
M Jettron Prods., Hanover, N.J.
Lemo USA, Berkeley, Cal.
D Malco, A Microdot Co., Chicago, Ill.
Maury Microwave Corp., Cucamonga, Calif.
M Microlab/FXR, Livingston, N.J.
Narda Microwave Corp., Plainview, N.Y.
National Connector, Minneapolis, Minn.
D Recoton Corp., Long Island City, N.Y.
Reynolds Inds., Marina Del Rey, Cal.
Rhode & Schwarz Sls., Fairfield, N.J.
D Rye Inds., Mamaroneck, N.Y.
D Showa Musen Kogyo Co., Ltd., Shinagawa-Ku Tokyo, Japan
Sola Electric, Elk Grove Village, Ill.
DM Solitron/Microwave, Port Salerno, Fla.
M Specialty Connector Corp., Indianapolis, Ind.
Stanford Applied Engrg., Santa Ana, Cal.
D Switchcraft, Chicago, Ill.
Trompeter Electronics, Chatsworth, Cal.
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D Workman Electronic Prods., Sarasota, Fla.

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D Smith Inc., Herman H., Brooklyn, N.Y. .... *
D Control Data Corp., Westlake Village, Cal.
Douglas Electronics, San Leandro, Cal.
DM Dynatech Corp., Santa Ana, Cal.
DM Excel Products Co., New Brunswick, N.J.
GTE Automatic Electric Inc., Northlake, Ill.
Hypertronics Corp., Stow, Mass.
Industrial Electronic Hardware, New York, N.Y.
Methode Elctrns., Chicago, Ill.
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D Showa Musen Kogyo Co., Ltd., Shinagawa-Ku Tokyo, Japan
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D Wadsworth Electric Mfg. Co., Covington, Ky.
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D Amatom Electronic Hardware, New Haven, Conn. .... p. 2•457
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D Augat Inc., Attleboro, Mass .... *
D Daburn Electronics & Cable Corp., Bronx, N.Y. *
D GC Electronics, Rockford, Ill. .... *
General Radio Co., Concord, Mass. .... *

D Molex Inc., Lisle, Ill. *
Shigoto Inds., Ltd., New York, N.Y. *
DM Smith Inc., Herman H., Brooklyn, N.Y. *
Abacus Elctrns. Corp., Dobbs Ferry, N.Y.
D Accessories for Electronics, Bayside, N.Y.
Acesso-Wire, Garnersville, N.Y.
Amp Inc., Harrisburg, Pa.
DM AMP Special Industries, Valley Forge, Pa.
M Armel Electronics, N. Bergen, N.J.
DM Associated Engrg. & Mfg. Corp., Upper Montclair, N.J.
DM Astrolab, Rahway, N.J.
Autosplice/Dv Gen Staple, New York City, N.Y.
DM Avibank Mfg. Inc., Burbank, Calif.
M Avid Electronics Corp., Baldwin, Pl., N.Y.
Bead Elctrns., Bridgeport, Conn.
D Beman Mfg., New Cumberland, Pa.
D Blonder-Tongue Labs., Old Bridge, N.J.
D Burndy Corporation, Norwalk, , Conn.
Ceramaseal, New Lebanon Center, N.Y.
D Circuit Assembly Corp., Costa Mesa, Ca.
Control Data Corp., Westlake Village, Cal.
M Detoronics Corp., S. El Monte, Cal.
Doran Mfg. Co., Cincinnati, Ohio
DM Dynatech Corp., Santa Ana, Cal.
Emporium Specialties Co., Austin, Pa.
D Excel Products Co., New Brunswick, N.J.
D Hoffman Industrial Prods., Farmingdale, N.Y.
Hollingsworth Solderless Terminal, Phoenixville, Pa.
Hypertronics Corp., Stow, Mass.
I-T-E Electrical Components Grp., E. Farmingdale, N.Y.
DM ICO/Rally Corp., Palo Alto, Cal.
Icore Int'l., Sunnyvale, , Cal.
ITT Holub Industries, Sycamore, Ill.
D Javex Elctrns., Cherry Valley, Cal.
DM Kings Electronics, Tuckahoe, N.Y.
DM Kulka Elec. Corp., Mt. Vernon, N.Y.
Lemo USA, Berkeley, Cal.
Magnum Elec. Corp., Erie, Mich.
D Malco, A Microdot Co., Chicago, Ill.
M Mark Eyelet & Stamping, Wolcott, Conn.
Methode Elctrns., Chicago, Ill.
D Modpak, Waltham, Mass.
D National Connector, Minneapolis, Minn.
D N T-T/Peerless, Leominister, Mass.
D Program Data Co., Carson, Cal.
D Robinson-Nugent, New Albany, Ind.
D Showa Musen Kogyo Co., Ltd., Shinagawa-Ku Tokyo, Japan
Sjoberg, C. & Son, Cranston, R.I.
M Specialty Connector Corp., Indianapolis, Ind.
D Technical Wire Products, Cranford, N.J.
D Teledyne Penn-Union Elec., Edinboro, Pa.
D Thomas & Betts Co., Elizabeth, N.J.
D Underwriters Safety, Chicago, Ill.
DM U.S. Components, Bronx, N.Y.
Winchester Elctrns., Oakville, Conn.
D Workman Electronic Prods., Sarasota, Fla.
D Zierick Mfg. Corp., Mt. Kisco, N.Y.

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D Amphenol Sales Div., Broadview, Ill. p. 2•460,461
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D ITT Cannon Electric, Santa Ana, Cal. p. 2•687-693
D National Tel-Tronics, Meadville, Pa. p. 2•720
M Rowe Industries, Toledo, Ohio p. 2•796,797
D Sealectro Corp., Mamaroneck, N.Y. p. 2•807-810
D Smith Inc., Herman H., Brooklyn, N.Y. p. 2•818
D Trimm, Libertyville, Ill. p. 2•895
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D GC Electronics, Rockford, Ill. *
DM Keystone Elctrns. Corp., New York, N.Y. *
Shigoto Inds., Ltd., New York, N.Y. *
M Armel Electronics, N. Bergen, N.J.
Barker Prods. Co., Saugus, Mass.
D Ev-Game Inc., Freeport, N.Y.
D Elco, Willow Grove, Pa.
Industrial Electronic Hardware, New York, N.Y.
DM Kings Electronics, Tuckahoe, N.Y.
Lemo USA, Berkeley, Cal.
D Molex Products, Downers Grove, Ill.
D N.T-T/Peerless, Leominister, Mass.
D Philmore Mfg. Co. Inc., Inwood, N.Y.
Rye Inds., Mamaroneck, N.Y.
DM Saxton Prods., Congers, N.Y.
D Switchcraft, Chicago, Ill.
Trompeter Electronics, Chatsworth, Cal.
D Workman Electronic Prods., Sarasota, Fla.

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Connector Corp., Chicago, Ill. p. 2•657-659
M ITT Cannon Electric, Santa Ana, Cal. p. 2•687-693
M Rowe Industries, Toledo, Ohio p. 2•796,797
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D TRW/Cinch Connectors, Elk Grove Village, Ill. p. 2•896,897
D Vernitron Elec. Comps., Laconia, N.H. p. 2•1062
D Waldom Electronics, Chicago, Ill. p. 2•1070-1074
D GC Electronics, Rockford, Ill. *
DM Keystone Elctrns. Corp., New York, N.Y. *
Shigoto Inds., Ltd., New York, N.Y. *
AMP Special Industries, Valley Forge, Pa.
Beman Mfg., New Cumberland, Pa.
Birnbach Co., Freeport, N.Y.
M Detoronics Corp., S. El Monte, Cal.
D Eby Co., Hugh H., Philadelphia, Pa.
Gulton Inds., Buena Park, Cal.
Icore Int'l., Sunnyvale, , Cal.
Industrial Electronic Hardware, New York, N.Y.
Ronor Systems, Cheshire, Conn.
Sjoberg, C. & Son, Cranston, R.I.
D Workman Electronic Prods., Sarasota, Fla.
D Zierick Mfg. Corp., Mt. Kisco, N.Y.

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AirBorn, Addison, Tex. p. 2•452-455
Amphenol Ind'l. Div., Chicago, Ill. p. 2•460,461
DM Amphenol RF Div., Danbury, Conn. p. 2•460,461
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D Arco Electronics Inc., Great Neck, N.Y. p. 2•619
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D Positronic Inds., Springfield, Mo. p. 2•788
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DM Sealectro Corp., Mamaroneck, N.Y. p. 2•805,807-810
D Smith Inc., Herman H., Brooklyn, N.Y. p. 2•849
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D Arrow-Hart, Hartford, Conn. *
D Augat Inc., Attleboro, Mass *
D GC Electronics, Rockford, Ill. *
D Molex Inc., Lisle, Ill. *
Square D Co., Milwaukee, Wisc. *
AMP Special Industries, Valley Forge, Pa.
American Microwave Inds., Waltham, Mass.
D Antenna Corp. of America, Burlington, Iowa
M Armel Electronics, N. Bergen, N.J.
D Astrolab, Rahway, N.J.
Boston Insulated Wire & Cable Co., Dorchester, Mass.
Caton Connector Corp., Great Neck, N.Y.
Control Data Corp., Westlake Village, Cal.
Gulton Inds., Buena Park, Cal.
Hypertronics Corp., Stow, Mass.
I-T-E Electrical Components Grp., E. Farmingdale, N.Y.
D Ideal Industries Inc., Sycamore, Ill.
Industrial Electronic Hardware, New York, N.Y.
Interdyne, Van Nuys, Cal.
Jettron Prods., Hanover, N.J.
DM Kings Electronics, Tuckahoe, N.Y.
Lemo USA, Berkeley, Cal.
D Malco, A Microdot Co., Chicago, Ill.
Motorola Comms. Div., Schaumburg, Ill.
D Preformed Line Products Co., Cleveland, Ohio
Robinson-Nugent, New Albany, Ind.
Ronor Systems, Cheshire, Conn.
Saxton Prods., Congers, N.Y.
DM Solitron/Microwave, Port Salerno, Fla.
D Teledyne Penn-Union Elec., Edinboro, Pa.
DM Texas Instruments, Attleboro, Mass.
Trompeter Electronics, Chatsworth, Cal.
DM U.S. Components, Bronx, N.Y.
DM Viking Inds., Chatsworth, Cal.

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AirBorn, Addison, Tex. p. 2•452-455
DM Amphenol Connector Div., Broadview, Ill. p. 2•460,461
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D Amphenol Sales Div., Broadview, Ill. p. 2•460,461
D Bendix Corp., The, Sidney, N.Y. p. 2•641
D Concord Elctrns., New York, N.Y. p. 2•654,655
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DM AMP Special Industries, Valley Forge, Pa.
M Armel Electronics, N. Bergen, N.J.
DM Astrolab, Rahway, N.J.
Autosplice/Dv Gen Staple, New York City, N.Y.
D Burndy Corporation, Norwalk, , Conn.
D Circuit Assembly Corp., Costa Mesa, Ca.
D Control Data Corp., Westlake Village, Cal.
DM Dynatech Corp., Santa Ana, Cal.
D Eby Co., Hugh H., Philadelphia, Pa.
D Elco, Willow Grove, Pa.
DM Excel Products Co., New Brunswick, N.J.
Gulton Inds., Buena Park, Cal.
M Hermetic Seal Corp., Rosemead, Cal.
M Hypertronics Corp., Stow, Mass.
Industrial Electronic Hardware, New York, N.Y.
DM Kings Electronics, Tuckahoe, N.Y.
D Malco, A Microdot Co., Chicago, Ill.
Methode Elctrns., Chicago, Ill.
D Molex Products, Downers Grove, Ill.
Mupac Corp., Brockton, Mass.
D National Connector, Minneapolis, Minn.
Ronor Systems, Cheshire, Conn.
Saxton Prods., Congers, N.Y.
Stanford Applied Engineering, Santa Clara, Cal.
Stanford Applied Engrg., Santa Ana, Cal.
Trompeter Electronics, Chatsworth, Cal.
U.S. Components, Bronx, N.Y.
M U.S. Terminals, Cincinnati, Ohio
Winchester Elctrns., Oakville, Conn.

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M Amphenol Connector Div., SAMS Opers., Chatsworth, Cal. p. 2•460,461
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M Detoronics Corp., S. El Monte, Cal.
Gulton Inds., Buena Park, Cal.
M Hermetic Seal Corp., Rosemead, Cal.
Hypertronics Corp., Stow, Mass.
Lemo USA, Berkeley, Cal.
M Stanford Applied Engineering, Santa Clara, Cal.
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D **Bendix Corp., The, Sidney, N.Y.** .... p. 2•642
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M **ITT Cannon Electric, Santa Ana, Cal.** p. 2•687-693
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D **Elctrn. Molding Corp., Woonsocket, R.I.** p. 2•676-679
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D **Johnson Co., E.F., Waseca, Minn.** .... *
Acesso-Wire, Garnersville, N.Y.
Amp Inc., Harrisburg, Pa.
AMP Special Industries, Valley Forge, Pa.
D Ansley Elctrns. Corp., Los Angeles, Cal.
M Armel Electronics, N. Bergen, N.J.
Autosplice/Dv Gen Staple, New York City, N.Y.
D Burndy Corporation, Norwalk, , Conn.
D Control Data Corp., Westlake Village, Cal.
DM Dynatech Corp., Santa Ana, Cal.
Gary Mfg., New Brunswick, N.J.
D IFE Div., Rumford, R.I.
Industrial Electronic Hardware, New York, N.Y.
Interdyne, Van Nuys, Cal.
DM Kings Electronics, Tuckahoe, N.Y.
Lemo USA, Berkeley, Cal.
D Malco, A Microdot Co., Chicago, Ill.
Methode Elctrns., Chicago, Ill.
Mupac Corp., Brockton, Mass.
National Connector, Minneapolis, Minn.
D Program Data Co., Carson, Cal.
Stanford Applied Engrg., Santa Ana, Cal.
M Star Tron Corp., Providence, R.I.
D Technical Wire Products, Cranford, N.J.

Connectors, Heavy Duty, Power

AMP Capitron Div./AMP Inc., Elizabethtown, Pa. .... p. 2•450,451
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M **Amphenol Connector Div., SAMS Opers., Chatsworth, Cal.** .... p. 2•460,461
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D **Molex Inc., Lisle, Ill.** .... *
Square D Co., Milwaukee, Wisc. .... *
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M APM-Hexseal, Englewood, N.J.
M Armel Electronics, N. Bergen, N.J.
DM Associated Engrg. & Mfg. Corp., Upper Montclair, N.J.
D Burndy Corporation, Norwalk, , Conn.
Control Data Corp., Westlake Village, Cal.
M Detoronics Corp., S. El Monte, Cal.
D Elco, Willow Grove, Pa.
Gulton Inds., Buena Park, Cal.
Hypertronics Corp., Stow, Mass.
I-T-E Electrical Components Grp., E. Farmingdale, N.Y.
Lemo USA, Berkeley, Cal.
D Preformed Line Products Co., Cleveland, Ohio
D Teledyne Penn-Union Elec., Edinboro, Pa.
D Underwriters Safety, Chicago, Ill.
D U.S. Components, Bronx, N.Y.

Connectors, Hermetically Sealed, Pressurized & Waterproof

M **Amphenol Connector Div., Broadview, Ill.** p. 2•460,461
M **Amphenol Connector Div., SAMS Opers., Chatsworth, Cal.** ....p. 2•460,461
D **Amphenol Sales Div., Broadview, Ill.** p. 2•460,461
DM **Arco Electronics Inc., Great Neck, N.Y.** p. 2•619
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D **Omni Spectra, Farmington, Mich.** .... p. 2•725
M **Rowe Industries, Toledo, Ohio** ..... p. 2•796,797
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M **Alberox Corp., New Bedford, Mass.** .... *
AMP Capitron Div./AMP Inc., Elizabethtown, Pa. .... *
DM **Amphenol RF Div., Danbury, Conn.** .... *
M Addington Labs, Santa Clara, Cal.
American Microwave Inds., Waltham, Mass.
DM Astrolab, Rahway, N.J.
D Cablewave Systems Inc., North Haven, Conn.
Caton Connector Corp., Great Neck, N.Y.
M Co-Operative Inds., Chester, N.J.
M Connector Inds. of America, Cincinnati, Ohio
M Detoronics Corp., S. El Monte, Cal.
Elco, Willow Grove, Pa.
M Elctrn. Seals, Van Nuys, Cal.
Fusite Div./Emerson Elec., Cincinnati, Ohio
M Glenair, Glendale, Cal.
Gulton Inds., Buena Park, Cal.
M Hermetic Seal Corp., Rosemead, Cal.
Hypertronics Corp., Stow, Mass.
D Ideal Industries Inc., Sycamore, Ill.
DM Kings Electronics, Tuckahoe, N.Y.
D Malco, A Microdot Co., Chicago, Ill.
Simmonds Precision, Norwich, N.Y.
DM Solitron/Microwave, Port Salerno, Fla.
M Specialty Connector Corp., Indianapolis, Ind
Stanford Applied Engrg., Santa Ana, Cal.
D U.S. Components, Bronx, N.Y.

Connectors, High-Voltage (1,000 Volts & Over)

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M **Amphenol Connector Div., SAMS Opers., Chatsworth, Cal.** ....p. 2•460,461
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DM **Amphenol RF Div., Danbury, Conn.** p. 2•460,461
D **Amphenol Sales Div., Broadview, Ill.** p. 2•460,461
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D Malco, A Microdot Co., Chicago, Ill.
M Mark Eyelet & Stamping, Wolcott, Conn.
Methode Elctrns., Chicago, Ill.
D Molex Products, Downers Grove, Ill.
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D National Connector, Minneapolis, Minn.
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D Switchcraft, Chicago, Ill.
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DM Texas Instruments, Attleboro, Mass.
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D Cambridge Thermionic Corp., Cambridge, Mass.
DM Excel Products Co., New Brunswick, N.J.
Hypertronics Corp., Stow, Mass.
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Mac Panel Co., High Pt., N.C.
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Amp Inc., Harrisburg, Pa.
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D Ansley Elctrns. Corp., Los Angeles, Cal.
M Armel Electronics, N. Bergen, N.J.
M Art Wire & Stamping Co., Cedar Knolls, N.J.
DM Associated Engrg. & Mfg. Corp., Upper Montclair, N.J.
DM Astrolab, Rahway, N.J.
Autosplice/Dv Gen Staple, New York City, N.Y.
Bead Elctrns., Bridgeport, Conn.
Birnbach Co., Freeport, N.Y.
Burdette Buss Bars, Cherry Hill, N.J.
D Burndy Corporation, Norwalk, , Conn.
D Cambridge Thermionic Corp., Cambridge, Mass.
D Circuit-Stik, Torrance, Cal.
Components Corp., Denville, N.J.
D Control Data Corp., Westlake Village, Cal.
Control Products Div., Union, N.J.
Douglas Electronics, San Leandro, Cal.
DM Dynatech Corp., Santa Ana, Cal.
D Eby Co., Hugh H., Philadelphia, Pa.
D Elco, Willow Grove, Pa.
DM Excel Products Co., New Brunswick, N.J.
Gary Mfg., New Brunswick, N.J.
Hathaway Industries Inc., Tulsa, Okla.
Hypertronics Corp., Stow, Mass.
Industrial Electronic Hardware, New York, N.Y.
D Jolo Industries, Garden Grove, Cal.
DM Kings Electronics, Tuckahoe, N.Y.
D Malco, A Microdot Co., Chicago, Ill.
D Masterite Corporation, Torrance, Cal.
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Mupac Corp., Brockton, Mass.
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DM Kings Electronics, Tuckahoe, N.Y.
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Technical Mat'l., Mamaroneck, N.Y.
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D Accessories for Electronics, Bayside, N.Y.
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M Glenair, Glendale, Cal.
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DM Dynatech Corp., Santa Ana, Cal.
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Western Electronic Systems, Palo Alto, Cal.

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Auto-Swage Products Inc., Shelton, Conn.
Autosplice/Dv Gen Staple, New York City, N.Y.
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Beman Mfg., New Cumberland, Pa.
Braun Co., St. Petersburg, Fla.
D Burndy Corporation, Norwalk, , Conn.
Cal-Metex Corp., Inglewood, Cal.
Carbone Lorraine Industries Corp., Boonton, N.J.
D Circuit Assembly Corp., Costa Mesa, Ca.
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DM Metex Corp., Edison, N.J.
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D National Connector, Minneapolis, Minn.
Ohio Carbon Co., Cleveland, Ohio
D Ostby & Barton Co., Providence, R.I.

Philips Elmet Corp., Lewiston, Me.
Plessey Inc., Melville, N.Y.
Pylon Co., Attleboro, Mass.
DM Servometer Corp., Cedar Grove, N.J.
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Stackpole Carbon Co., St. Marys, Pa.
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E.I. DuPont de Nemours & Co., Wilmington, Del.
D General Elec. Co., Waterford, N.Y.
D Heeger Inc., Los Angeles, Cal.
LMB Heeger, Los Angeles, Cal.
D Miller-Stephenson Chem. Co., Danbury, Conn.
SWS Silicones, Adrian, Mich.
Triac Electronics, New York, N.Y.
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D GC Electronics, Rockford, Ill. .... *
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DM Amrad Corporation, Paris, Tex.
Birnbach Co., Freeport, N.Y.
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DM Amrad Corporation, Paris, Tex.
D Birnbach Co., Freeport, N.Y.
M Chemplast, Wayne, N.J.
D Cole-Flex Corp., W. Babylon, N.Y.
Communications Technology Corp., Los Angeles, Cal.
M Gudebrod Bros. Silk Co., Philadelphia, Pa.
DM ICO/Rally Corp., Palo Alto, Cal.
Mann, Henry Inc., Huntingdon Valley, Pa.
M Newman Corp., M. M., Marblehead, Mass.
D Norelcom Electronics, Farmingdale, N.Y.
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M Arco Wire & Cable, N. Hollywood, Cal.
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D Birnbach Co., Freeport, N.Y.
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Excel Specialty Corp., Chicago, Ill.
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D Manhattan Elec. Cable Corp., Rye, N.Y.
Morey Corp., Downers Grove, Ill.
D Pacific Electricord Co., Gardena, Cal.
DM Saxton Prods., Congers, N.Y.
M Storm Products Co., Inglewood, Ca.
Triac Electronics, New York, N.Y.
TRW/Holyoke Wire & Cable, South Hadley, Mass.
Universal Security Instrs., Baltimore, Md.
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DM Systron Donner, Concord, Cal. .... *
D Vector Electronic Co., Sylmar, Cal. .... *
Amp Inc., Harrisburg, Pa.
D AMP Special Industries, Valley Forge, Pa.
D Barker Prods. Co., Saugus, Mass.
D Beman Mfg., New Cumberland, Pa.
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D Cable Systems & Assembly Co., Everett, Mass.
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Conrac Corp., Westminister, Cal.
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Excel Specialty Corp., Chicago, Ill.
GTE Lenkurt Inc., San Carlos, Calif.
Mac Panel Co., High Pt., N.C.
D Malco, A Microdot Co., Chicago, Ill.
Manger Elec. Co., Stamford, Conn.
Morey Corp., Downers Grove, Ill.
D Philmore Mfg. Co. Inc., Inwood, N.Y.
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Standard Wire & Cable Co., Los Angeles, Cal. *
D Birnbach Co., Freeport, N.Y.
Boston Insulated Wire & Cable Co., Dorchester, Mass.
Morey Corp., Downers Grove, Ill.
D N T-T/Peerless, Leominister, Mass.
Russell Inds., Lynbrook, N.Y.
Rye Inds., Mamaroneck, N.Y.
DM Saxton Prods., Congers, N.Y.
M Storm Products Co., Inglewood, Ca.
D Superior Cable Div., Hickory, N.C.
TRW/Holyoke Wire & Cable, South Hadley, Mass.

Cords, Speaker Extension—See Cable, Audio

Cords, Twin Lead—See Cable, Multiconductor

Cores, Ceramic
Arnold Engineering Co., Marengo, Ill. p. 2•1212,1213
American Lava Corp., Chattanooga, Tenn.
Centralab, Milwaukee, Wisc.
Ceramic Magnetics, Fairfield, N.J.
Diamonite Products Div., Shreve, Ohio
Honeywell, Minneapolis, Minn.
M Kawecki Beryico Inds., New York, NY
Lockheed Elctrns. Co., Watchung, N.J.
D Mepco/Electra, Morristown, N.J.
National Beryllia Corp., Haskell, N.J.
Permag Corp., Jamaica, N.Y.
D Plessey Ceramic Div., Frenchtown, N.J.
Quartzite Processing, Malden, Mass.
Star Porcelain Co., Trenton, N.J.
DM United Prods. Co., New Hyde Pk., N.Y.

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D Fair-Rite Prods. Corp., Wallkill, N.Y. p. 2•1215
D Ferroxcube Corp., Saugerties, N.Y. p. 2•1218-1225
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Allen-Bradley Co., Milwaukee, Wisc. ....*
Ampex Corp., Redwood City, Cal.
Ceramic Magnetics, Fairfield, N.J.
Electrical Plastics Corp., Long Branch, N.J.
Ferronics, East Rochester, N.Y.
Fuji Electrochemical Co., Tokyo, Japan
D Indiana General, Keasbey, N.J.
Lockheed Elctrns. Co., Watchung, N.J.
M Magnetics, Butler, Pa.
Murata Mfg. Co. Ltd., Kyoto, Japan
Permag Corp., Jamaica, N.Y.
D Siemens Corp., Iselin, N.J.
Stackpole Carbon Co., St. Mary's, Pa.
TDK Electronics Co., Ltd., Chiyoda-ku, Tokyo 101, Japan
TDK Elctrns. Corp., Long Island City, N.Y.
Tohoku Metal Inds., Ltd., Tokyo, Japan
United Mineral & Chem. Corp., New York, N.Y.
DM United Prods. Co., New Hyde Pk., N.Y.

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D Indiana General, Keasbey, N.J.
Lockheed Elctrns. Co., Watchung, N.J.
Magnetic Metals Co., Camden, N.J.
Magnetics, Butler, Pa.
Murata Mfg. Co. Ltd., Kyoto, Japan
Permag Corp., Jamaica, N.Y.
D Siemens Corp., Iselin, N.J.
Stackpole Carbon Co., St. Mary's, Pa.
TDK Electronics Co., Ltd., Chiyoda-ku, Tokyo 101, Japan
TDK Elctrns. Corp., Long Island City, N.Y.
Tohoku Metal Inds., Ltd., Tokyo, Japan
United Mineral & Chem. Corp., New York, N.Y.
DM United Prods. Co., New Hyde Pk., N.Y.

Cores, Magnetic, Ferrite, Slug
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Ceramic Magnetics, Fairfield, N.J.
Ferronics, East Rochester, N.Y.
D Indiana General, Keasbey, N.J.
M Magnetics, Butler, Pa.
Murata Mfg. Co. Ltd., Kyoto, Japan
Permag Corp., Jamaica, N.Y.
Stackpole Carbon Co., St. Mary's, Pa.
TDK Elctrns. Corp., Long Island City, N.Y.
Tohoku Metal Inds., Ltd., Tokyo, Japan
United Mineral & Chem. Corp., New York, N.Y.
DM United Prods. Co., New Hyde Pk., N.Y.

Cores, Magnetic, Ferrite, Toroid
Arnold Engineering Co., Marengo, Ill. p. 2•1212,1213
Fair-Rite Prods. Corp., Wallkill, N.Y. p. 2•1215
D Ferroxcube Corp., Saugerties, N.Y. p. 2•1218-1225
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Allen-Bradley Co., Milwaukee, Wisc. ....*
Ampex Corp., Redwood City, Cal.
Ceramic Magnetics, Fairfield, N.J.
Electronic Memories & Magnetics Corp., Hawthorne, Cal.
Fabri-Tek, Minneapolis, Minn.
Ferronics, East Rochester, N.Y.
Fuji Electrochemical Co., Tokyo, Japan
D Indiana General, Keasbey, N.J.
Lockheed Elctrns. Co., Watchung, N.J.
Magnetic Metals Co., Camden, N.J.
M Magnetics, Butler, Pa.
Murata Mfg. Co. Ltd., Kyoto, Japan
Permag Corp., Jamaica, N.Y.
D Siemens Corp., Iselin, N.J.
Stackpole Carbon Co., St. Mary's, Pa.
TDK Electronics Co., Ltd., Chiyoda-ku, Tokyo 101, Japan
TDK Elctrns. Corp., Long Island City, N.Y.
Tohoku Metal Inds., Ltd., Tokyo, Japan
United Mineral & Chem. Corp., New York, N.Y.
DM United Prods. Co., New Hyde Pk., N.Y.

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Allen-Bradley Co., Milwaukee, Wisc. ....*
Advance Ross Elctrns. Corp., Chicago, Ill.
Ceramic Magnetics, Fairfield, N.J.
Ferronics, East Rochester, N.Y.
Fuji Electrochemical Co., Tokyo, Japan
D Indiana General, Keasbey, N.J.
TDK Electronics Co., Ltd., Chiyoda-ku, Tokyo 101, Japan
TDK Elctrns. Corp., Long Island City, N.Y.
Tohoku Metal Inds., Ltd., Tokyo, Japan

United Mineral & Chem. Corp., New York, N.Y.
DM United Prods. Co., New Hyde Pk., N.Y.

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Arnold Engineering Co., Marengo, Ill. p. 2•1212,1213
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Fuji Electrochemical Co., Tokyo, Japan
Magnetic Metals Co., Camden, N.J.
M Magnetics, Butler, Pa.
Permag Corp., Jamaica, N.Y.
DM United Prods. Co., New Hyde Pk., N.Y.

Cores, Magnetic, Nickel-Iron, EL, EE, F & Ring Laminations

Arnold Engineering Co., Marengo, Ill. p. 2•1212,1213
Hutchinson Industrial Corp., Hutchinson, Minn. p. 1•1542,1543
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SGL Elctronics, Westville, N.J. ....p. 2•1254
Barker Elec. Sls., Ship Bottom, NJ
Fuji Electrochemical Co., Tokyo, Japan
Magnetic Metals Co., Camden, N.J.
M Magnetics, Butler, Pa.
Permag Corp., Jamaica, N.Y.
Tohoku Metal Inds., Ltd., Tokyo, Japan
DM United Prods. Co., New Hyde Pk., N.Y.

Cores, Magnetic, Nickel-Iron, Toroid

Arnold Engineering Co., Marengo, Ill. p. 2•1212,1213
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Dynacor, Rockville, Md.
Magnetic Metals Co., Camden, N.J.
M Magnetics, Butler, Pa.
Permag Corp., Jamaica, N.Y.
DM United Prods. Co., New Hyde Pk., N.Y.

Cores, Magnetic, Powdered Iron, Pot/Cup

Arnold Engineering Co., Marengo, Ill. p. 2•1212,1213
Cortec, Newport Beach, Cal.
Fuji Electrochemical Co., Tokyo, Japan
Pyroferric - N. Y., Bronx, N.Y.
Tohoku Metal Inds., Ltd., Tokyo, Japan
DM United Prods. Co., New Hyde Pk., N.Y.

Cores, Magnetic, Powdered Iron, Slug

Arnold Engineering Co., Marengo, Ill. p. 2•1212,1213
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M Analog Devices, Resistor Pdt., Rochester, NY
Cortec, Newport Beach, Cal.
Pyroferric - N. Y., Bronx, N.Y.
Tohoku Metal Inds., Ltd., Tokyo, Japan
DM United Prods. Co., New Hyde Pk., N.Y.
D Workman Electronic Prods., Sarasota, Fla.

Cores, Magnetic, Powdered Iron, Toroid

Arnold Engineering Co., Marengo, Ill. p. 2•1212,1213
Cortec, Newport Beach, Cal.
Pyroferric - N. Y., Bronx, N.Y.
Tohoku Metal Inds., Ltd., Tokyo, Japan
DM United Prods. Co., New Hyde Pk., N.Y.

Cores, Magnetic, Powdered Permalloy, Toroid

Arnold Engineering Co., Marengo, Ill. p. 2•1212,1213
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Cores, Magnetic, Silicon "C"

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Magnetic Metals Co., Camden, N.J.
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Cores, Magnetic, Silicon EI, EE & F, Laminations

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Cores, Magnetic, Silicon, Toroid

Arnold Engineering Co., Marengo, Ill. p. 2•1212,1213
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Lundy Elctrns. & Sys., Glen Head, N.Y.
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M Groov-Pin Corp., Ridgefield, N.J.
D Heli-Coil Prods., Danbury, Conn.
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M Paneloc Corp., Collinsville, Conn.
M Penn Engrg. & Mfg. Corp., Doylestown, Pa.
D Penn Fibre & Specialty, Phila., Pa.
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DM Simmons Fastener Corp., Albany, N.Y.
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D TRW/Cinch-Monadnock, An Elctrn. Comps., City of Industry, Cal.
Universal Security Instrs., Baltimore, Md.
D USM Corp., Shelton, Conn.
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M Lorch Devices Inc., Englewood, N.J.
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Hughes Aircraft Co, Culver City, Cal.
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Daco Instr. Co., Milford, Conn.
M Ideal Precision Meter Co., Brooklyn, N. Y.
M IMC Magnetics Corp., Maywood, Cal.
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M Chemplast, Wayne, N.J.
M Cleveland Mica Co., Lakewood, Ohio
D Cole-Flex Corp., W. Babylon, N.Y.
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D Dixon Corp., Bristol, R.I.
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DM Stevens Prods., E. Orange, N.J.
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AEL, Colmar, Pa.
M Aertech Industries, Sunnyvale, Cal.
M Airtron, Morris Plains, N.J.
Amplica Inc., Westlake Village, Cal.
California Microwave, Sunnyvale, Cal.
M Cir-Q-Tel, Kensington, Md.
E & M Laboratories, Westlake Village, Cal.
Hughes Aircraft Co, Culver City, Cal.
M Hughes Aircraft Co., Torrance, Cal.
Hughes Aircraft Co, Fullerton, Cal.
M Lorch Devices Inc., Englewood, N.J.
M Merrimac Inds., West Caldwell, N.J.
M Microlab/FXR, Livingston, N.J.
Microwave Assocs., Burlington, Mass.
Microwave Prods., Chatsworth, Cal.
M Norsal Industries, Brentwood, N.Y.
D PRD Elctrns., Syosset, N.Y.
M Premier Microwave, Port Chester, N.Y.
Sivers Lab, Corona del Mar, Cal.
Special Microwave Devices Oper., Waltham, Mass.
TDK Electronics Co., Ltd., Chiyoda-ku, Tokyo 101, Japan
M Teledyne Microwave, Mountain View, Cal.
M Trak Microwave Corporation, Tampa, Fla.
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D Barker Prods. Co., Saugus, Mass.
Birnbach Co., Freeport, N.Y.
D Blonder-Tongue Labs., Old Bridge, N.J.
D Ev-Game Inc., Freeport, N.Y.
Methode Elctrns., Chicago, Ill.
D N T-T/Peerless, Leominister, Mass.
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D Raytheon Co., Burlington, Mass. .... *
D Smith Inc., Herman H., Brooklyn, N.Y. .... *
Abacus Elctrns. Corp., Dobbs Ferry, N.Y.
DM Aimsco Inc., Seattle, Wash.
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PIC Design Division, Ridgefield, Conn.
D Vemaline Prods. Co., Wyckoff, N.J.

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Acheson Colloids Co., Port Huron, Mich.
Atomergic Chemetals Co., Carle Place, N.Y.
Brooks Co. Inc., Winfield, Woburn, Mass.
D Caig Labs., Westbury, N.Y.
Centralab Semiconductor, El Monte, Cal.
M Chemplast, Wayne, N.J.
D Chemtronics, Hauppauge, N.Y.
D Cole-Flex Corp., W. Babylon, N.Y.
D CVC Products, Rochester, N.Y.
Dow Corning, Midland, Mich.
Edwards High Vacuum, Grand Island, N.Y.
E.I. DuPont de Nemours & Co., Wilmington, Del.
Formulated Resins Inc., Greenville, R.I.
D General Elec. Co., Waterford, N.Y.
Hughes Aircraft Co, Culver City, Cal.
DM LPS Research Labs, Los Angeles, Cal.
M MacDonald & Co., Glendale, Calif.
D Merix Chem. Co., Chicago, Ill.
D Miller-Stephenson Chem. Co., Danbury, Conn.
D Norelcom Electronics, Farmingdale, N.Y.
M Nye, William F., New Bedford, Mass.
D Quietrole Co., Spartenburg, S.C.
D Ram Chems., Gardena, Calif.
SermeTel Teleflex Inc., Limerick, Pa
DM Shannon Luminous Mat'ls., Hollywood, Cal.
SWS Silicones, Adrian, Mich.
DM Tech Spray, Amarillo, Tex.
Techni-Tool, Plymouth Meeting, Pa.
Union Carbide, Chemicals & Plastics, New York, N.Y.
D Workman Electronic Prods., Sarasota, Fla.
X-Acto, Long Island City, N.Y.

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Elma Engineering, Palo Alto, Cal.
LDJ Electronics, Troy, Mich.
Magnos, Incorporated, Harvard, Mass.
Permag Corp., Jamaica, N.Y.
Sensitive Research Instrs., Mt. Vernon, N. Y.
D Shester Engineering Co., Culver City, Cal.
Varian Assocs., Palo Alto, Cal.
Varian Palo Alto Microwave Tube Div., Palo Alto, Cal.
Walker Scientific, Worcester, Mass.

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Shigoto Inds., Ltd., New York, N.Y. .... *
Weston Instrs., Newark, N.J. .... *
Barker Elec. Sls., Ship Bottom, NJ
Ceramic Magnetics, Fairfield, N.J.
M Edmund Scientific Co., Barrington, N.J.
Ferronics, East Rochester, N.Y.
General Magnetic Co., Detroit, Mich.
M Hamilton Technology, Lancaster, Pa.
Hoskins Mfg. Co., Detroit, Mich.
D Indiana General/Div. Emm Corp., Valparaiso, Ind.
D Moody Tools, Providence, R.I.
Murata Mfg. Co. Ltd., Kyoto, Japan
Nucleonic Prods., Canoga Pk., Cal.
Ogallala Elctrns., Ogallala, Neb.
Permag Corp., Jamaica, N.Y.
M Permanent Magnet Co., Indianapolis, Ind.
R-Columbia Products, Highland Park, Ill.
D Reed Switch Dev. Co., Greenwich, Conn.
Rol-a-chart Div., Diamond Springs, Cal.
Sel-Rex Co. Div. Oxy Metal Industries Corp., Nutley, N.J.
D Shester Engineering Co., Culver City, Cal.
Stackpole Carbon Company, Kane, Pa.
TDK Electronics Co., Ltd., Chiyoda-ku, Tokyo 101, Japan
TDK Elctrns. Corp., Long Island City, N.Y.
3M Co., St. Paul, Minn.
Tohoku Metal Inds., Ltd., Tokyo, Japan
Varian Assocs., Palo Alto, Cal.
Varian Electron Tube & Device Grp., San Carlos, Cal.
Varian Palo Alto Microwave Tube Div., Palo Alto, Cal.

Magnets, Superconducting
Advanced Kinetics, Costa Mesa, Calif.
American Magnetics, Oak Ridge, Tenn.
Elma Engineering, Palo Alto, Cal.
Oxford Instr. Corp., Annapolis, Md.
Permag Corp., Jamaica, N.Y.
Varian Assocs., Palo Alto, Cal.

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Materials, Graphite
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D Aremco Prods., Ossining, N.Y.
M Atlantic Research Coropration, Alexandria, Va
Atomergic Chemetals Co., Carle Place, N.Y.
Ohio Carbon Co., Cleveland, Ohio
Stackpole Carbon Co., St. Marys, Pa.
Ultra Carbon Corp., Bay City, Mich.
D Union Carbide Corp., New York, N.Y.

Materials, Magnetic—See Shields, Magnetic

Materials, Self-Lubricating
Carborundum Co., Niagara Falls, N.Y. .... *
Acheson Colloids Co., Port Huron, Mich.
Atomergic Chemetals Co., Carle Place, N.Y.
Cadillac Plastic & Chemical, Detroit, Mich.
Carbone Lorraine Industries Corp., Boonton, N.J.
M Chemplast, Wayne, N.J.
D Dixon Corp., Bristol, R.I.
E.I. DuPont de Nemours & Co., Wilmington, Del.
Hughes Aircraft Co, Culver City, Cal.
M Isochem Resins Co., Lincoln, R.I.
Materials Resch. Corp., Orangeburg, N.Y.
Ohio Carbon Co., Cleveland, Ohio
D Pure Carbon Co., St. Marys, Pa.
Rogers Corp., Rogers, Conn.

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M Ad-Vance Magnetics, Rochester, Ind. p. 2•1210
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Adre Co., Milwaukee, Wisc.
D Alpha Metals, Jersey City, N.J.
M Armco Steel Corp., Middletown, Ohio
Atomergic Chemetals Co., Carle Place, N.Y.
M Bram Metallurgical-Chem. Co., Phila., Pa.
Engelhard Minerals & Chem., Murray Hill, N.J.
Fansteel Inc., N Chicago, Ill.
General Electric Co., Cleveland, Ohio
Gliddon Metals, Cleveland, Ohio
M Hamilton Technology, Lancaster, Pa.
Handy & Harman, New York, N.Y.
M Kawecki Beryico Inds., New York, NY
Leico Inds., New York, N.Y.
M Magnetics, Butler, Pa.
Materials Resch. Corp., Orangeburg, N.Y.
NL Industries, New York, N.Y.
Philips Elmet Corp., Lewiston, Me.
M Reynolds Metals Co., Richmond, VA.
Ulvac Corp., Fairfield, Conn.
D United Mineral & Chem. Corp., New York, N.Y.

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Alpha Metals, Jersey City, N.J.
Atomergic Chemetals Co., Carle Place, N.Y.
Baker, J.T. Chemical Co., Phillipsburg, N.J.
Dow Chemical Co., Midland, Mich.
Gliddon Metals, Cleveland, Ohio
GTE Sylvania, Towanda, Pa.
Handy & Harman, New York, N.Y.
Int'l. Elctrn. Resch., Burbank, Cal.
M Kawecki Beryico Inds., New York, NY
Leico Inds., New York, N.Y.
M Mallinckrodt, St. Louis, Mo.
Materials Resch. Corp., Orangeburg, N.Y.
Philadelphia Quartz Co., Valley Forge, Pa.
Plessey Inc., Melville, N.Y.
RCA Solid State Div., Somerville, N.J.
D United Mineral & Chem. Corp., New York, N.Y.

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Metals, Clad
M Advanced Materials Systems, Atteboro, Mass.
D Alpha Metals, Jersey City, N.J.
Atomergic Chemetals Co., Carle Place, N.Y.
M Bram Metallurgical-Chem. Co., Phila., Pa.
Copperweld Bimetallics, Glassport, PA
E.I. DuPont de Nemours & Co., Wilmington, Del.
Engelhard Minerals & Chem., Murray Hill, N.J.
GTE Sylvania Inc., Newark, N.J.
Handy & Harman, New York, N.Y.
Plessey Inc., Melville, N.Y.
M Reynolds Metals Co., Richmond, VA.
Tech Materials Inc., Lincoln, R.I.
Texas Instruments, Attleboro, Mass.
Wall A. T. Co., Warwick, R.I.

Metals, High Purity
Alpha Metals, Jersey City, N.J.
D Aremco Prods., Ossining, N.Y.
Atomergic Chemetals Co., Carle Place, N.Y.
M Bram Metallurgical-Chem. Co., Phila., Pa.
M Eagle-Picher Industries, Joplin, Mo.
Engelhard Minerals & Chem., Murray Hill, N.J.
Gliddon Metals, Cleveland, Ohio
GTE Sylvania Inc., Newark, N.J.
M Kawecki Beryico Inds., New York, NY
Leico Inds., New York, N.Y.
Materials Resch. Corp., Orangeburg, N.Y.
NL Industries, New York, N.Y.
Nucleonic Prods., Canoga Pk., Cal.
Plessey Inc., Melville, N.Y.
Ulvac Corp., Fairfield, Conn.
D United Mineral & Chem. Corp., New York, N.Y.
Wilkinson Co., Westlake Village, Cal.

Metals, Precious
Acheson Colloids Co., Port Huron, Mich.
M Advanced Materials Systems, Atteboro, Mass.
Alpha Metals, Jersey City, N.J.
D Aremco Prods., Ossining, N.Y.
Atomergic Chemetals Co., Carle Place, N.Y.
Auric Corp., Newark, N.J.
M Bram Metallurgical-Chem. Co., Phila., Pa.
E.I. DuPont de Nemours & Co., Wilmington, Del.
D Electro-Science Labs., Pennsauken, N. J.
Engelhard Minerals & Chem., Murray Hill, N.J.
Gte Sylvania, Belmont, Cal.
Handy & Harman, New York, N.Y.
M Kawecki Beryico Inds., New York, NY
Leico Inds., New York, N.Y.
Materials for Elctrns., Jamaica, N.Y.
Materials Resch. Corp., Orangeburg, N.Y.
Plessey Inc., Melville, N.Y.
Sel-Rex Co. Div. Oxy Metal Industries Corp., Nutley, N.J.
Tech Materials Inc., Lincoln, R.I.
D United Mineral & Chem. Corp., New York, N.Y.
United Refining & Smelting Co., Franklin Park, Ill.
Wall A. T. Co., Warwick, R.I.
Wilkinson Co., Westlake Village, Cal.
D Williams Precious Metal Div., Buffalo, N.Y.

Metals, Rare
Alpha Metals, Jersey City, N.J.
D Aremco Prods., Ossining, N.Y.
DM Associated Engrg. & Mfg. Corp., Upper Montclair, N.J.
Atomergic Chemetals Co., Carle Place, N.Y.
M Bram Metallurgical-Chem. Co., Phila., Pa.
Dow Chemical Co., Midland, Mich.
M Kawecki Beryico Inds., New York, NY
Leico Inds., New York, N.Y.
Materials for Elctrns., Jamaica, N.Y.
Materials Resch. Corp., Orangeburg, N.Y.
Sel-Rex Co. Div. Oxy Metal Industries Corp., Nutley, N.J.
D United Mineral & Chem. Corp., New York, N.Y.

Metals, Refractory
D Aremco Prods., Ossining, N.Y.
Atomergic Chemetals Co., Carle Place, N.Y.
M Bram Metallurgical-Chem. Co., Phila., Pa.
Fansteel Inc., N Chicago, Ill.
General Electric Co., Cleveland, Ohio
GTE Sylvania, Towanda, Pa.
M Kawecki Beryico Inds., New York, NY
Leico Inds., New York, N.Y.
Materials Resch. Corp., Orangeburg, N.Y.
Philips Elmet Corp., Lewiston, Me.
D United Mineral & Chem. Corp., New York, N.Y.
United Refining & Smelting Co., Franklin Park, Ill.

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M Aertech Industries, Sunnyvale, Cal.
American Microwave Inds., Waltham, Mass.
Avantek, Santa Clara, Cal.
M Bendix Corp, Towson, Md.
Fairchild Semiconductor, Mountain View, Cal.
Fuji Electrochemical Co., Tokyo, Japan
HRB-Singer, State College, Pa.
Microwave Assocs., Burlington, Mass.
Narda Microwave Corp., Plainview, N.Y.
DM Plessey Semiconductors, Santa Ana, Cal.
Scientific Research Corp., Tampa, Fla.
M Trak Microwave Corporation, Tampa, Fla.
D TRW Semiconductor, Lawndale, Cal.
Varian Electron Tube & Device Grp., San Carlos, Cal.

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Coax Devices Inc., Chelsea, Mass.
M Lorch Devices Inc., Englewood, N.J.
Maury Microwave Corp., Cucamonga, Calif.
M Merrimac Inds., West Caldwell, N.J.
M Microlab/FXR, Livingston, N.J.
M Norsal Industries, Brentwood, N.Y.
D PRD Elctrns., Syosset, N.Y.
M Premier Microwave, Port Chester, N.Y.
Rhode & Schwarz Sls., Fairfield, N.J.
Weinschel Engrg. Co., Gaithersburg, Md.

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M Aertech Industries, Sunnyvale, Cal.
D Ailtech, Farmingdale, N. Y.
M Airtron, Morris Plains, N.J.
M Cincinnati Elctrns. Corp., Cincinnati, Ohio
Dynalab Corp., Van Nuys, Cal.
Environmental Communications Inc., Costa Mesa, Cal.
M Hughes Aircraft Co., Torrance, Cal.
M Lorch Elctrns. Corp., Englewood, N.J.
M Lorch Devices Inc., Englewood, N.J.
M Merrimac Inds., West Caldwell, N.J.
M Microlab/FXR, Livingston, N.J.
Microphase Corp., Cos Cob, Conn.
Microwave Assocs., Burlington, Mass.
DM Miteg Inc., Hauppauge, N.Y.
Mu-Del Elctrns., Silver Spring, Md.
Spectra Sonics, Ogden, Utah
M Technical Research & Mfg., Manchester, N.H.
M Transco Prods., Venice, Cal.
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M Watkins-Johnson Co., Palo Alto, Cal.

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M Aertech Industries, Sunnyvale, Cal.
D Ailtech, Farmingdale, N. Y.
Aircom, Union, N.H.
M Airtron, Morris Plains, N.J.
American Microwave Inds., Waltham, Mass.
DM Anaren Microwave, Syracuse, N.Y.
Coax Devices Inc., Chelsea, Mass.
Collins Radio, Dallas, Tex.
Engelmann Microwave, Montville, N.J.
Environmental Communications Inc., Costa Mesa, Cal.
Frequency Engrg. Labs., Farmingdale, N.J.
HRB-Singer, State College, Pa.
Hughes Aircraft Co, Culver City, Cal.
M Hughes Aircraft Co., Torrance, Cal.
M Lorch Elctrns. Corp., Englewood, N.J.
M Lorch Devices Inc., Englewood, N.J.
M Merrimac Inds., West Caldwell, N.J.
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D Microwave Development Labs., Needham Hgts., Mass.
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M Norsal Industries, Brentwood, N.Y.
D PRD Elctrns., Syosset, N.Y.
M Premier Microwave, Port Chester, N.Y.
R L C Elctrns., Mt. Kisco, N.Y.
M Technical Research & Mfg., Manchester, N.H.
M Transco Prods., Venice, Cal.
D TRG., Woburn, Mass.
Varian Assocs., Palo Alto, Cal.
Varian Electron Tube & Device Grp., San Carlos, Cal.
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M Watkins-Johnson Co., Palo Alto, Cal.
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D Ailtech, Farmingdale, N. Y.
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DM Anaren Microwave, Syracuse, N.Y.
C-COR Elctrns., State College, Pa.
D Channel Master Div. Avnet, Ellenville, N.Y.
Elcom Systems, Deer Pk., N.Y.
Engelmann Microwave, Montville, N.J.
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M Bowmar/TIC, Newbury Park, Calif.
Centralab, Milwaukee, Wisc.
M Litton Systems, Mt. Vernon, N.Y.
M Maurey Instrument Corp., Chicago, Ill.
PIC Design Division, Ridgefield, Conn.
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D A E G Telefunken, Englewood Clfs., N.J.
Angstrohm Precision, Hagerstown, Md.
M Betatronix, Hauppauge, N.Y.
M Bowmar/TIC, Newbury Park, Calif.
D Centralab, Milwaukee, Wisc.
M Columbia Components, Hempstead, N.Y.
DM CTS Corp., Elkart, Ind.
D Electro-Techniques, Oceanside, Cal.
M Humphrey, San Diego, Calif.
M Litton Systems, Mt. Vernon, N.Y.
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M Betatronix, Hauppauge, N.Y.
M Bowmar/TIC, Newbury Park, Calif.
D CTS Corp., Elkart, Ind.
D Electro-Techniques, Oceanside, Cal.
M Litton Systems, Mt. Vernon, N.Y.
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D Mepco/Electra, Morristown, N.J.
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M Bowmar/TIC, Newbury Park, Calif.
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M CTS Corp., Elkart, Ind.
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M Maurey Instrument Corp., Chicago, Ill.
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Conrac Corp., Duarte, Cal.
D CTS Corp., Elkart, Ind.
D Electro-Techniques, Oceanside, Cal.
M Humphrey, San Diego, Calif.
M Litton Systems, Mt. Vernon, N.Y.
DM Maurey Instrument Corp., Chicago, Ill.
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DM Weston Comps. Div., Archbald, Pa.
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M Angstrohm Precision, Hagerstown, Md.
M Astro Elctrns., Fullerton, Calif.
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M Betatronix, Hauppauge, N.Y.
M Bowmar/TIC, Newbury Park, Calif.
D Centralab, Milwaukee, Wisc.
D Components Specialties, Hempstead, N.Y.
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DM CTS Corp., Elkart, Ind.
D Electro-Techniques, Oceanside, Cal.
M Humphrey, San Diego, Calif.
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Environmental Communications Inc., Costa Mesa, Cal.
Frequency Engrg. Labs., Farmingdale, N.J.
M Lorch Elctrns. Corp., Englewood, N.J.
M Lorch Devices Inc., Englewood, N.J.
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M Microdynamics, So. El Monte, Cal.
M Microlab/FXR, Livingston, N.J.
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DM Scanbe Canoga Industries, El Monte, Cal.
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Corning Glass Works, Corning, N.Y.
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General Electric Co., Cleveland, Ohio
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M Electronic Transformer Corp., Paterson, N.J.
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M Osborne Transformer Corp., Detroit, Mich.
M Polyphase Instr. Co., Bridgeport, Pa.
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Samarius, Derby, Conn.
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M International Importers, Chicago, Ill.
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D TRW/IRC Fixed Resistors, Burlington, Iowa
D United Mineral & Chem. Corp., New York, N.Y.
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D Cutler-Hammer Shallcross, Selma, N.C.
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D Mepco/Electra, Morristown, N.J.
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M Analog Devices, Resistor Pdt., Rochester, NY
DM Angstrohm Precision, Hagerstown, Md.
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Dale Elctrns. Canada, Ltd., Scarborough, Ont., Can. .... p. 2•1452
M KRL Electronics, Manchester, N.H. p. 2•1498,1499
Mini-Systems, North Attleboro, Mass. p. 2•1502
D Pyrofilm Resistor Co., Whippany, N.J. p. 2•1526-1528
M RCL Electronics Div., Irvington, N.J. p. 2•1530-1542
Resistors, Chicago, Ill. .... p. 2•1544,1545
Tel Labs, Manchester, N.H. ..... p. 2•1688-1691
DM TRW/IRC Resistors, Philadelphia, Pa. p. 2•1564,1565,1567
M Victoreen Instrument Div., Cleveland, Ohio p. 2•1581
M Vishay Resistive Systems Grp., Malvern, Pa. p. 2•1571
M Analog Devices, Norwood, Mass. .... *
D E-Systems, Huntington, Ind. .... *
General Radio Co., Concord, Mass. .... *
D McGraw-Edison Co., Manchester, N.H. .... *
M Analog Devices, Resistor Pdt., Rochester, NY
Angstrohm Precision, Hagerstown, Md.
Beman Mfg., New Cumberland, Pa.
D Carbone Lorraine Industries Corp., Boonton, N.J.
D Constanta Co. of Can., Montreal, Can.
Elctrn. Precision Comps. Corp., Mt. Vernon, N.Y.
General Resistance, Mt. Vernon, N.Y.
D Mepco/Electra, Morristown, N.J.
Metavac, Flushing, N.Y.
Mills Resistor Co., Los Alamitos, Cal.
Resistance Prods., Harrisburg, Pa.
TRW/IRC Fixed Resistors, Burlington, Iowa
Viclan, San Diego, Cal.
Welwyn Canada Div., London, Ont., Can.

Resistors, High Megohm (Over 22 Megohms)

Allen-Bradley Co., Milwaukee, Wisc. p. 2•1410-1417
Caddock Electronics, Riverside, Cal. p. 1•884-887; p. 2•1430,1431,1433-1435
CTS of Berne, Berne, Ind. .... p. 2•1421-1426
D Dale Electronics Inc., Columbus, Neb. p. 2•1452
D Dale Electronics, Norfolk, Nebr. ....p. 2•1452
Dale Elctrns. Canada, Ltd., Scarborough, Ont., Can. .... p. 2•1452
International Comps Corp., Melville, N.Y. p. 2•193
M KRL Electronics, Manchester, N.H. p. 2•1498,1499
Mini-Systems, North Attleboro, Mass. p. 2•1502
New England Instr., Natick, Mass. p. 2•1670,1671
D Pyrofilm Resistor Co., Whippany, N.J. p. 2•1526-1528
M RCL Electronics Div., Irvington, N.J. p. 2•1530-1542
M Ross Engineering Corp., Campbell, Cal. p. 1•1807
DM TRW/IRC Resistors, Philadelphia, Pa. p. 2•1563,1564
M Victoreen Instrument Div., Cleveland, Ohio p. 2•1572-1581
Airco Elctrns., Niagara Falls, N.Y. .... *
M Analog Devices, Norwood, Mass. .... *
Beman Mfg., New Cumberland, Pa.
D Carbone Lorraine Industries Corp., Boonton, N.J.
Centralab, Milwaukee, Wisc.
D Constanta Co. of Can., Montreal, Can.
CTS Corp., Elkart, Ind.
Electra/Midland Corp., Mineral Wells, Tex.
Elctrn. Precision Comps. Corp., Mt. Vernon, N.Y.
Eltec Instruments Inc., Daytona Beach, Fla.
Kelvin, Van Nuys, Cal.
DM Mepco/Electra, Morristown, N.J.
Panasonic, Ind'l. Elctrn. Comps., New York, N.Y.
Penn Airborne Prods., Southampton, Pa.
Resistance Prods., Harrisburg, Pa.
Sensitive Research Instrs., Mt. Vernon, N. Y.
Stackpole Carbon Co., St. Mary's, Pa.
TRW/IRC Fixed Resistors, Burlington, Iowa
D United Mineral & Chem. Corp., New York, N.Y.
Viclan, San Diego, Cal.
Welwyn Canada Div., London, Ont., Can.

Resistors, High Temperature (Over 125 C)

D Beckman Instrs., Fullerton, Cal. p. 2•1418,1419
D Caddock Electronics, Riverside, Cal. p. 1•884-887; p. 2•1428-1443
Carborundum Co., Niagara Falls, N.Y. p. 2•1445
D Corning Glass Works, Corning, N.Y. p. 2•1449
Dale Electronics Inc., Columbus, Neb. p. 2•1452
Dale Electronics, Norfolk, Nebr. ....p. 2•1452
Dale Elctrns. Canada, Ltd., Scarborough, Ont., Can. .... p. 2•1452
Gamble, Charles T. Inds., Riverside, N.J. p. 2•1493
M Hybrid Systems Corp., Burlington, Mass. p. 1•890
M KRL Electronics, Manchester, N.H. p. 2•1498,1499
DM Milwaukee Resistor Corp., Milwaukee, Wisc. p. 2•1500,1501
Mini-Systems, North Attleboro, Mass. p. 2•1502
New England Instr., Natick, Mass. p. 2•1669-1671
D Omtronics Mftg., Omaha, Neb. p. 2•1516-1525
D Pyrofilm Resistor Co., Whippany, N.J. p. 2•1526-1528
D RCL Electronics Div., Irvington, N.J. p. 2•1530-1542
Tel Labs, Manchester, N.H. ..... p. 2•1688-1691
DM TRW/IRC Resistors, Philadelphia, Pa. p. 2•1554,1563,1565,1566
M Victoreen Instrument Div., Cleveland, Ohio p. 2•1572-1579
M Analog Devices, Norwood, Mass. .... *
D E-Systems, Huntington, Ind. .... *
D McGraw-Edison Co., Manchester, N.H. .... *
D Ohmite Mfg. Co., Skokie, Ill. .... *
C-F Electronics, Van Nuys, Cal.
Centralab, Milwaukee, Wisc.
D Constanta Co. of Can., Montreal, Can.
D Cutler-Hammer Shallcross, Selma, N.C.
Electra/Midland Corp., Mineral Wells, Tex.
Elctrn. Precision Comps. Corp., Mt. Vernon, N.Y.
Eltec Instruments Inc., Daytona Beach, Fla.
Gentron Corp., Milwaukee, Wisc.
Kelvin, Van Nuys, Cal.
D Marstan Resistor, Orange, N.J.
DM Mepco/Electra, Morristown, N.J.
Mills Resistor Co., Los Alamitos, Cal.
Ohio Carbon Co., Cleveland, Ohio
Panasonic, Ind'l. Elctrn. Comps., New York, N.Y.
RCA Parts & Accessories, Deptford, N.J.
Resistance Prods., Harrisburg, Pa.
TRW/IRC Fixed Resistors, Burlington, Iowa
D United Mineral & Chem. Corp., New York, N.Y.
Viclan, San Diego, Cal.
Welwyn Canada Div., London, Ont., Can.

Resistors, High Voltage (1,000 Volts & Over)

Airco Elctrns., Niagara Falls, N.Y. p. 2•368,369,1408,1409
Caddock Electronics, Riverside, Cal. p. 2•1433,1434,1438
Carborundum Co., Niagara Falls, N.Y. p. 2•1445
Clarostat Mfg. Co., Dover, N.H. ....p. 2•1627
CTS of Berne, Berne, Ind. .... p. 2•1421-1426
D Dale Electronics Inc., Columbus, Neb. p. 2•1452
D Dale Electronics, Norfolk, Nebr. ....p. 2•1452
Dale Elctrns. Canada, Ltd., Scarborough, Ont., Can. .... p. 2•1452
M Electro Impulse, Red Bank, N.J. p. 1•492,662-666
Gamble, Charles T. Inds., Riverside, N.J. p. 2•1494,1495
Milwaukee Resistor Corp., Milwaukee, Wisc. p. 2•1500
Mini-Systems, North Attleboro, Mass. p. 2•1502
D Pyrofilm Resistor Co., Whippany, N.J. p. 2•1526-1528
M RCL Electronics Div., Irvington, N.J. p. 2•1530-1542
M Ross Engineering Corp., Campbell, Cal. p. 1•1807
DM TRW/IRC Resistors, Philadelphia, Pa. p. 2•1563,1564,1567
M Victoreen Instrument Div., Cleveland, Ohio p. 2•1572-1581
M Vishay Resistive Systems Grp., Malvern, Pa. p. 2•1571
Allen-Bradley Co., Milwaukee, Wisc. .... *
M Analog Devices, Norwood, Mass. .... *
Kilovolt Corp., Hackensack, N.J. .... *
Square D Co., Milwaukee, Wisc. .... *
D Beman Mfg., New Cumberland, Pa.
Centralab, Milwaukee, Wisc.
D Constanta Co. of Can., Montreal, Can.
CTS Corp., Elkart, Ind.
Elctrn. Precision Comps. Corp., Mt. Vernon, N.Y.
Gentron Corp., Milwaukee, Wisc.
Julie Research Lab., New York, N.Y.
DM Mepco/Electra, Morristown, N.J.
D Oneida Electronics Mfg., Meadville, Pa.
Panasonic, Ind'l. Elctrn. Comps., New York, N.Y.
RCA Parts & Accessories, Deptford, N.J.
Resistance Prods., Harrisburg, Pa.
Sensitive Research Instrs., Mt. Vernon, N. Y.
TRW/IRC Fixed Resistors, Burlington, Iowa
D United Mineral & Chem. Corp., New York, N.Y.
D Ward Leonard Elec. Co. Inc., Mt. Vernon, N.Y.
Welwyn Canada Div., London, Ont., Can.
D Workman Electronic Prods., Sarasota, Fla.

Resistors, Hot Molded

D Allen-Bradley Co., Milwaukee, Wisc. p. 2•1410-1417
International Comps Corp., Melville, N.Y. p. 2•193
M KRL Electronics, Manchester, N.H. p. 2•1498,1499
D Omtronics Mftg., Omaha, Neb. p. 2•1516-1525
DM TRW/IRC Resistors, Philadelphia, Pa. p. 2•1552,1566
D Ohmite Mfg. Co., Skokie, Ill. .... *
Shigoto Inds., Ltd., New York, N.Y. .... *
DM Angstrohm Precision, Hagerstown, Md.
Centralab, Milwaukee, Wisc.
Kelvin, Van Nuys, Cal.
Panasonic, Ind'l. Elctrn. Comps., New York, N.Y.

Resistors, Integral Heat Dissipator

D Caddock Electronics, Riverside, Cal. p. 1•884-887; p. 2•1428-1443
M Dale Electronics Inc., Columbus, Neb. p. 2•1452
Dale Electronics, Norfolk, Nebr. ....p. 2•1452
Dale Elctrns. Canada, Ltd., Scarborough, Ont., Can. .... p. 2•1452
Gamble, Charles T. Inds., Riverside, N.J. p. 2•1493
Milwaukee Resistor Corp., Milwaukee, Wisc. p. 2•1501
D Omtronics Mftg., Omaha, Neb. p. 2•1516-1525
M RCL Electronics Div., Irvington, N.J. p. 2•1530-1542

*Company has information in white pages but not on this product

Tel Labs, Manchester, N.H. ..... p. 2•1688-1691
Elctrn. Precision Comps. Corp., Mt. Vernon, N.Y.
Gentron Corp., Milwaukee, Wisc.
Kelvin, Van Nuys, Cal.
Welwyn Canada Div., London, Ont., Can.

Resistors, Low Temperature Coefficient

Airco Elctrns., Bradford, Pa. p. 2•368,369,1408,1409
Airco Elctrns., Niagara Falls, N.Y. p. 2•368,369,1408,1409
D Allen-Bradley Co., Milwaukee, Wisc. p. 2•1410-1417
D Beckman Instrs., Fullerton, Cal. p. 2•1418,1419
D Caddock Electronics, Riverside, Cal. p. 1•884-887; p. 2•1428-1443
Consolidated Resistance Co. of America, Yonkers, N.Y. .... p. 2•1427
DM Corning Glass Works, Corning, N.Y. p. 2•1449
CTS of Berne, Berne, Ind. .... p. 2•1421-1426
D Dale Electronics Inc., Columbus, Neb. p. 2•1452
D Dale Electronics, Norfolk, Nebr. ....p. 2•1452
Dale Elctrns. Canada, Ltd., Scarborough, Ont., Can. .... p. 2•1452
D E-Systems, Huntington, Ind. .... p. 2•1486
Gamble, Charles T. Inds., Riverside, N.J. p. 2•1492,1493
M KRL Electronics, Manchester, N.H. p. 2•1498,1499
Milwaukee Resistor Corp., Milwaukee, Wisc. p. 2•1500,1501
Mini-Systems, North Attleboro, Mass. p. 2•1502
New England Instr., Natick, Mass. p. 2•1666,1670,1671
D Omtronics Mftg., Omaha, Neb. p. 2•1516-1525
DM Pyrofilm Resistor Co., Whippany, N.J. p. 2•1526-1528
DM RCL Electronics Div., Irvington, N.J. p. 2•1530-1542
M Resistors, Chicago, Ill. .... p. 2•1544,1545
Tal Labs, Manchester, N.H. ..... p. 2•1688-1691
DM TRW/IRC Resistors, Philadelphia, Pa. p. 2•1556-1558
M Victoreen Instrument Div., Cleveland, Ohio p. 2•1572-1579
M Vishay Resistive Systems Grp., Malvern, Pa. p. 2•1571
M Analog Devices, Norwood, Mass. .... *
CW Industries, Warminster, Pa. .... *
International Comps Corp., Melville, N.Y. .... *
D McGraw-Edison Co., Manchester, N.H. .... *
Nytronics Comps. Group Inc., Darlington, S.C. *
D Ohmite Mfg. Co., Skokie, Ill. .... *
D Wagner Elec., Livingston, N.J. .... *
M Analog Devices, Resistor Pdt., Rochester, NY
Angstrohm Precision, Hagerstown, Md.
C-F Electronics, Van Nuys, Cal.
D Constanta Co. of Can., Montreal, Can.
Cox & Co., New York, N.Y.
DM CTS Corp., Elkart, Ind.
D Cutler-Hammer Shallcross, Selma, N.C.
Electra/Midland Corp., Mineral Wells, Tex.
Electro Mats. Corp. Amer., Mamaroneck, N.Y.
Electro Sci. Inds., Portland, Ore.
Elctrn. Precision Comps. Corp., Mt. Vernon, N.Y.
Eltec Instruments Inc., Daytona Beach, Fla.
Environmental Communications Inc., Costa Mesa, Cal.
General Resistance, Mt. Vernon, N.Y.
Gentron Corp., Milwaukee, Wisc.
Guildline Instrs., Larchmont, N.Y.
M Jordan Electric Co., Van Nuys, Cal.
Julie Research Lab., New York, N.Y.
Kelvin, Van Nuys, Cal.
D Marstan Resistor, Orange, N.J.
D Mepco/Electra, Morristown, N.J.
Metavac, Flushing, N.Y.
Mills Resistor Co., Los Alamitos, Cal.
M Precision Resistor Co., Hillside, N.J.
Stettner-Trush Inc., Cazenovia, N.Y.
TRW/IRC Fixed Resistors, Burlington, Iowa
D United Mineral & Chem. Corp., New York, N.Y.
M Vermont Precision Resistor Co., Stowe, Vt.
Viclan, San Diego, Cal.
D Ward Leonard Elec. Co. Inc., Mt. Vernon, N.Y.
Welwyn Canada Div., London, Ont., Can.
D Workman Electronic Prods., Sarasota, Fla.

Resistors, Metal Glazed

D Beckman Instrs., Fullerton, Cal. p. 2•1418,1419
D Caddock Electronics, Riverside, Cal. p. 1•884-887; p. 2•1428-1443
International Comps Corp., Melville, N.Y. p. 2•193
Mini-Systems, North Attleboro, Mass. p. 2•1502
DM TRW/IRC Resistors, Philadelphia, Pa. p. 2•1554,1555,1564
M Victoreen Instrument Div., Cleveland, Ohio p. 2•1572-1579
Airco Elctrns., Bradford, Pa. .... *
M Analog Devices, Norwood, Mass. .... *
Shigoto Inds., Ltd., New York, N.Y. .... *
D Wagner Elec., Livingston, N.J. .... *
Centralab, Milwaukee, Wisc.
Electro Mats. Corp. Amer., Mamaroneck, N.Y.
D Electro-Science Labs., Pennsauken, N. J.
Panasonic, Ind'l. Elctrn. Comps., New York, N.Y.
Resistance Prods., Harrisburg, Pa.
Sel-Rex Co. Div. Oxy Metal Industries Corp., Nutley, N.J.
D United Mineral & Chem. Corp., New York, N.Y.

Resistors, Microwave

Bird Electronic Corp., Solon, Ohio .... p. 1•619
D Caddock Electronics, Riverside, Cal. p. 1•886,887; p. 2•1428-1443
Carborundum Co., Niagara Falls, N.Y. p. 2•1445
M Electro Impulse, Red Bank, N.J. p. 1•492,662-666
Mini-Systems, North Attleboro, Mass. p. 2•1502
D Pyrofilm Resistor Co., Whippany, N.J. p. 2•1526-1528
M RCL Electronics Div., Irvington, N.J. p. 2•1530-1542
M Analog Devices, Norwood, Mass. .... *
General Radio Co., Concord, Mass. .... *
Centralab, Milwaukee, Wisc.
D Constanta Co. of Can., Montreal, Can.
M Electrotec Inc., Dallas, Tex.
Hughes Aircraft Co, Culver City, Cal.
M LRC Inc., Hudson, N.H.
Metavac, Flushing, N.Y.
M Norsal Industries, Brentwood, N.Y.
Weinschel Engrg. Co., Gaithersburg, Md.

Resistors, Negative Temperature Coefficient

D Beckman Instrs., Fullerton, Cal. p. 2•1418,1419
Carborundum Co., Niagara Falls, N.Y. p. 1•2309-2315
Fenwal Elctrns., Framingham, Mass. p. 1•2316
D Gamble, Charles T. Inds., Riverside, N.J. p. 2•1492,1493
Keystone Carbon Co., St. Marys, Pa. p. 1•2317,2318
NL Inds., Muskegon, Mich. .... p. 1•2320
DM Pyrofilm Resistor Co., Whippany, N.J. p. 2•1526-1528
M RCL Electronics Div., Irvington, N.J. p. 2•1530-1542
M Victoreen Instrument Div., Cleveland, Ohio p. 2•1581
M Vishay Resistive Systems Grp., Malvern, Pa. p. 2•1571
M Analog Devices, Norwood, Mass. .... *
DM TRW/IRC Resistors, Philadelphia, Pa. .... *
Beman Mfg., New Cumberland, Pa.
DM Cal-R, Santa Monica, Cal.
D Carbone Lorraine Industries Corp., Boonton, N.J.
Centralab, Milwaukee, Wisc.
D Constanta Co. of Can., Montreal, Can.
Cox & Co., New York, N.Y.
Elctrn. Precision Comps. Corp., Mt. Vernon, N.Y.
Eltec Instruments Inc., Daytona Beach, Fla.
Environmental Communications Inc., Costa Mesa, Cal.
Julie Research Lab., New York, N.Y.
Kelvin, Van Nuys, Cal.
M LRC Inc., Hudson, N.H.
D Mepco/Electra, Morristown, N.J.
Mills Resistor Co., Los Alamitos, Cal.
Panasonic, Ind'l. Elctrn. Comps., New York, N.Y.
Resistance Prods., Harrisburg, Pa.
M Rodan Ind's., Anaheim, Ca.
D Siemens Corp., Iselin, N.J.
TRW/IRC Fixed Resistors, Burlington, Iowa
D United Mineral & Chem. Corp., New York, N.Y.
M Vermont Precision Resistor Co., Stowe, Vt.
D Victory Engrg. Corp., Springfield, N.J.
D Workman Electronic Prods., Sarasota, Fla.

Resistors, Non-Inductive

D Beckman Instrs., Fullerton, Cal. p. 2•1418,1419
D Caddock Electronics, Riverside, Cal. p. 1•886,887; p. 2•1429-1443
Carborundum Co., Niagara Falls, N.Y. p. 2•1445
Consolidated Resistance Co. of America, Yonkers, N.Y. .... p. 2•1427
D Corning Glass Works, Corning, N.Y. p. 2•1449
M Dale Electronics Inc., Columbus, Neb. p. 2•1452
Dale Electronics, Norfolk, Nebr. ....p. 2•1452
Dale Elctrns. Canada, Ltd., Scarborough, Ont., Can. .... p. 2•1452
D E-Systems, Huntington, Ind. ... p. 2•1485-1487
M Electro Impulse, Red Bank, N.J. p. 1•492,662-666
DM Gamble, Charles T. Inds., Riverside, N.J. p. 2•1492-1495
M KRL Electronics, Manchester, N.H. p. 2•1498,1499
Milwaukee Resistor Corp., Milwaukee, Wisc. p. 2•1500,1501
Mini-Systems, North Attleboro, Mass. p. 2•1502
DM Nytronics Comps. Group Inc., Darlington, S.C. p. 2•1504-1507
D Ohmite Mfg. Co., Skokie, Ill. ... p. 2•1508-1515
D Omtronics Mftg., Omaha, Neb. p. 2•1516-1525
DM RCL Electronics Div., Irvington, N.J. p. 2•1530-1542
M Resistors, Chicago, Ill. .... p. 2•1544,1545
Shallco, Smithfield, N.C. .... p. 2•1543
M Tel Labs, Manchester, N.H. ..... p. 2•1688-1691
DM TRW/IRC Resistors, Philadelphia, Pa. p. 2•1556-1558,1565,1567
M Victoreen Instrument Div., Cleveland, Ohio p. 2•1572-1579,1581
M Vishay Resistive Systems Grp., Malvern, Pa. p. 2•1571
M Analog Devices, Norwood, Mass. .... *
D McGraw-Edison Co., Manchester, N.H. .... *
Shigoto Inds., Ltd., New York, N.Y. .... *
Angstrohm Precision, Hagerstown, Md.
Beman Mfg., New Cumberland, Pa.
C-F Electronics, Van Nuys, Cal.
DM Cal-R, Santa Monica, Cal.
D Carbone Lorraine Industries Corp., Boonton, N.J.
D Constanta Co. of Can., Montreal, Can.
DM Cutler-Hammer Shallcross, Selma, N.C.
Electro Sci. Inds., Portland, Ore.
Elctrn. Precision Comps. Corp., Mt. Vernon, N.Y.
D General Resistance, Mt. Vernon, N.Y.
Gentron Corp., Milwaukee, Wisc.
M Jordan Electric Co., Van Nuys, Cal.
Julie Research Lab., New York, N.Y.
Kelvin, Van Nuys, Cal.
M LRC Inc., Hudson, N.H.
D Marstan Resistor, Orange, N.J.
Mills Resistor Co., Los Alamitos, Cal.
M Precision Resistor Co., Hillside, N.J.
Resistance Prods., Harrisburg, Pa.
Samarius, Derby, Conn.
Stackpole Carbon Co., St. Mary's, Pa.
D TRW/IRC Fixed Resistors, Burlington, Iowa
M Vermont Precision Resistor Co., Stowe, Vt.
D Ward Leonard Elec. Co. Inc., Mt. Vernon, N.Y.
Welwyn Canada Div., London, Ont., Can.
D Workman Electronic Prods., Sarasota, Fla.

Resistors, Oil Filled

Consolidated Resistance Co. of America, Yonkers, N.Y. .... p. 2•1427
M Electro Impulse, Red Bank, N.J. p. 1•492,662-666
M KRL Electronics, Manchester, N.H. p. 2•1498,1499
Tel Labs, Manchester, N.H. ..... p. 2•1688-1691
Vishay Resistive Systems Grp., Malvern, Pa. p. 2•1571
D McGraw-Edison Co., Manchester, N.H. .... *
General Resistance, Mt. Vernon, N.Y.
M Julie Research Lab., New York, N.Y.
Kelvin, Van Nuys, Cal.
Mills Resistor Co., Los Alamitos, Cal.

Resistors, Plug-In

Consolidated Resistance Co. of America, Yonkers, N.Y. .... p. 2•1427
CTS of Berne, Berne, Ind. .... p. 2•1421-1426
Dale Electronics Inc., Columbus, Neb. p. 2•1452
Dale Electronics, Norfolk, Nebr. ....p. 2•1452
Dale Elctrns. Canada, Ltd., Scarborough, Ont., Can. .... p. 2•1452
Gamble, Charles T. Inds., Riverside, N.J. p. 2•1494,1495
M KRL Electronics, Manchester, N.H. p. 2•1498,1499
Shallco, Smithfield, N.C. .... p. 2•1543
Tel Labs, Manchester, N.H. ..... p. 2•1688-1691
M Analog Devices, Norwood, Mass. .... *

D **McGraw-Edison Co., Manchester, N.H. .... ***
D CTS Corp., Elkart, Ind.
Jordan Electric Co., Van Nuys, Cal.
Julie Research Lab., New York, N.Y.
Mills Resistor Co., Los Alamitos, Cal.
Pulse Engrg., San Diego, Cal
TRW/IRC Fixed Resistors, Burlington, Iowa
Welwyn Canada Div., London, Ont., Can.

Resistors, Positive Temperature Coefficient

Allen-Bradley Co., Milwaukee, Wisc. p. 2•1410-1417
D **Beckman Instrs., Fullerton, Cal. p. 2•1418,1419**
Consolidated Resistance Co. of America, Yonkers, N.Y. .... p. 2•1427
D **Corning Glass Works, Corning, N.Y. p. 2•1449**
D **E-Systems, Huntington, Ind. ... p. 2•1485-1488**
D **Gamble, Charles T. Inds., Riverside, N.J. p. 2•1492-1495**
Keystone Carbon Co., St. Marys, Pa. p. 1•2317,2318
M **KRL Electronics, Manchester, N.H. p. 2•1498,1499**
NL Inds., Muskegon, Mich. ......p. 1•2322,2323
DM **Pyrofilm Resistor Co., Whippany, N.J. p. 2•1526-1528**
DM **RCL Electronics Div., Irvington, N.J. p. 2•1530-1542**
Tel Labs, Manchester, N.H. ..... p. 2•1688-1691
DM **TRW/IRC Resistors, Philadelphia, Pa. p. 2•1566**
M **Victoreen Instrument Div., Cleveland, Ohio p. 2•1572-1579**
M **Vishay Resistive Systems Grp., Malvern, Pa. p. 2•1571**
M **Analog Devices, Norwood, Mass. .... ***
D **McGraw-Edison Co., Manchester, N.H. .... ***
Angstrohm Precision, Hagerstown, Md.
C-F Electronics, Van Nuys, Cal.
DM Cal-R, Santa Monica, Cal.
Centralab, Milwaukee, Wisc.
D Constanta Co. of Can., Montreal, Can.
Cox & Co., New York, N.Y.
D Elctrn. Precision Comps. Corp., Mt. Vernon, N.Y.
Environmental Communications Inc., Costa Mesa, Cal.
General Resistance, Mt. Vernon, N.Y.
Jordan Electric Co., Van Nuys, Cal.
Kelvin, Van Nuys, Cal.
M LRC Inc., Hudson, N.H.
DM Marstan Resistor, Orange, N.J.
D Mepco/Electra, Morristown, N.J.
Mills Resistor Co., Los Alamitos, Cal.
Murata Corporation of America, Elmsford, N.Y.
Panasonic, Ind'l. Elctrn. Comps., New York, N.Y.
Precision Resistor Co., Hillside, N.J.
DM Rodan Ind's., Anaheim, Ca.
D Siemens Corp., Iselin, N.J.
TRW/IRC Fixed Resistors, Burlington, Iowa
M Vermont Precision Resistor Co., Stowe, Vt.
D Workman Electronic Prods., Sarasota, Fla.

Resistors, Power (2 Watts & Over)

Airco Elctrns., Bradford, Pa. p. 2•368,369,1408,1409
Airco Elctrns., Niagara Falls, N.Y. p. 2•368,369,1408,1409
Allen-Bradley Co., Milwaukee, Wisc. p. 2•1410-1417
Caddock Electronics, Riverside, Cal. p. 2•1430-1432,1434-1438
Carborundum Co., Niagara Falls, N.Y. p. 2•1445
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M Accessories for Electronics, Bayside, N.Y.
Amp Inc., Harrisburg, Pa.
M Armel Electronics, N. Bergen, N.J.
M Art Wire & Stamping Co., Cedar Knolls, N.J.
Auto-Swage Products Inc., Shelton, Conn.
Autosplice/Dv Gen Staple, New York City, N.Y.
Bead Elctrns., Bridgeport, Conn.
Birnbach Co., Freeport, N.Y.
D Burndy Corporation, Norwalk, , Conn.
Ceramaseal, New Lebanon Center, N.Y.
DM D-Cemco, Burbank, Calif.
D Elco, Willow Grove, Pa.
Emporium Specialties Co., Austin, Pa.
DM Excel Products Co., New Brunswick, N.J.
Gary Mfg., New Brunswick, N.J.
M General Mfg. Co., Glendale, Calif.
D Goe Engrg. Co., City of Industry, Calif.
M I-T-E Electrical Components Grp., E. Farmingdale, N.Y.
D Javex Elctrns., Cherry Valley, Cal.
DM Kulka Elec. Corp., Mt. Vernon, N.Y.
D Malco, A Microdot Co., Chicago, Ill.
Mark Eyelet & Stamping, Wolcott, Conn.
D Molex Products, Downers Grove, Ill.
D National Connector, Minneapolis, Minn.
D N T-T/Peerless, Leominister, Mass.
D Precision Metal Prods. Co., Stoneham, Mass.
Pylon Co., Attleboro, Mass.
Sjoberg, C. & Son, Cranston, R.I.
D Teledyne Penn-Union Elec., Edinboro, Pa.
DM United Prods. Co., New Hyde Pk., N.Y.
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M Accessories for Electronics, Bayside, N.Y.
Amp Inc., Harrisburg, Pa.
D AMP Special Industries, Valley Forge, Pa.
M Art Wire & Stamping Co., Cedar Knolls, N.J.
DM Associated Engrg. & Mfg. Corp., Upper Montclair, N.J.
Auto-Swage Products Inc., Shelton, Conn.
Autosplice/Dv Gen Staple, New York City, N.Y.
M Avid Electronics Corp., Baldwin, Pl., N.Y.
Bead Elctrns., Bridgeport, Conn.
D Beman Mfg., New Cumberland, Pa.
Birnbach Co., Freeport, N.Y.
D Burndy Corporation, Norwalk, , Conn.
D Cambridge Thermionic Corp., Cambridge, Mass.
D Circon Corp., Santa Barbara, Cal.
DM D-Cemco, Burbank, Calif.
Doran Mfg. Co., Cincinnati, Ohio
D Elco, Willow Grove, Pa.
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DM Excel Products Co., New Brunswick, N.J.
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D Goe Engrg. Co., City of Industry, Calif.
Hughes Aircraft Co, Culver City, Cal.
DM Kulka Elec. Corp., Mt. Vernon, N.Y.
Magnum Elec. Corp., Erie, Mich.
D Malco, A Microdot Co., Chicago, Ill.
Methode Elctrns., Chicago, Ill.
D Molex Products, Downers Grove, Ill.
D National Connector, Minneapolis, Minn.
Penn Engrg. & Mfg. Corp., Doylestown, Pa.
Precision Metal Prods. Co., Stoneham, Mass.
Raychem Corp., Menlo Park, Cal.
Sjoberg, C. & Son, Cranston, R.I.
Stanford Applied Engrg., Santa Ana, Cal.
M U.S. Terminals, Cincinnati, Ohio
D Zierick Mfg. Corp., Mt. Kisco, N.Y.

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Square D Co., Milwaukee, Wisc. .... *
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M Art Wire & Stamping Co., Cedar Knolls, N.J.
Auto-Swage Products Inc., Shelton, Conn.
Autosplice/Dv Gen Staple, New York City, N.Y.
D Beman Mfg., New Cumberland, Pa.
Birnbach Co., Freeport, N.Y.
D Burndy Corporation, Norwalk, , Conn.
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D Circon Corp., Santa Barbara, Cal.
Doran Mfg. Co., Cincinnati, Ohio
E & L Instruments, Derby, Conn.
D Elco, Willow Grove, Pa.
Emporium Specialties Co., Austin, Pa.
DM Excel Products Co., New Brunswick, N.J.
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D Hoffman Industrial Prods., Farmingdale, N.Y.
Hollingsworth Solderless Terminal, Phoenixville, Pa.
I-T-E Electrical Components Grp., E. Farmingdale, N.Y.
D Ideal Industries Inc., Sycamore, Ill.
D Javex Elctrns., Cherry Valley, Cal.
DM Kulka Elec. Corp., Mt. Vernon, N.Y.
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D National Connector, Minneapolis, Minn.
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D Teledyne Penn-Union Elec., Edinboro, Pa.
D Thomas & Betts Co., Elizabeth, N.J.
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M Armel Electronics, N. Bergen, N.J.
M Art Wire & Stamping Co., Cedar Knolls, N.J.
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M Avid Electronics Corp., Baldwin, Pl., N.Y.
Birnbach Co., Freeport, N.Y.
D Cambridge Thermionic Corp., Cambridge, Mass.
Ceramaseal, New Lebanon Center, N.Y.
D Circon Corp., Santa Barbara, Cal.
DM D-Cemco, Burbank, Calif.
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D Elco, Willow Grove, Pa.
Emporium Specialties Co., Austin, Pa.
DM Excel Products Co., New Brunswick, N.J.
Gary Mfg., New Brunswick, N.J.
M General Mfg. Co., Glendale, Calif.
D Goe Engrg. Co., City of Industry, Calif.
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M Hermetic Seal Corp., Rosemead, Cal.
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D Precision Metal Prods. Co., Stoneham, Mass.
Sjoberg, C. & Son, Cranston, R.I.
Sterling Instr., New Hyde Pk., NY
DM United Prods. Co., New Hyde Pk., N.Y.
M U.S. Terminals, Cincinnati, Ohio
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M Armel Electronics, N. Bergen, N.J.
M Art Wire & Stamping Co., Cedar Knolls, N.J.
M Avid Electronics Corp., Baldwin, Pl., N.Y.
D Cambridge Thermionic Corp., Cambridge, Mass.
DM D-Cemco, Burbank, Calif.
D Eaton Corporation, Cleveland, Ohio
DM Excel Products Co., New Brunswick, N.J.
Gary Mfg., New Brunswick, N.J.
M General Mfg. Co., Glendale, Calif.
Magnum Elec. Corp., Erie, Mich.
Penn Engrg. & Mfg. Corp., Doylestown, Pa.
Precision Metal Prods. Co., Stoneham, Mass.
Sterling Instr., New Hyde Pk., NY
M U.S. Terminals, Cincinnati, Ohio
D Zierick Mfg. Corp., Mt. Kisco, N.Y.

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Abacus Elctrns. Corp., Dobbs Ferry, N.Y.
M Accessories for Electronics, Bayside, N.Y.
M Armel Electronics, N. Bergen, N.J.
Auto-Swage Products Inc., Shelton, Conn.
M Avid Electronics Corp., Baldwin, Pl., N.Y.
Bead Elctrns., Bridgeport, Conn.
D Cambridge Thermionic Corp., Cambridge, Mass.
DM D-Cemco, Burbank, Calif.
DM Excel Products Co., New Brunswick, N.J.
Gary Mfg., New Brunswick, N.J.
M General Mfg. Co., Glendale, Calif.
DM Kulka Elec. Corp., Mt. Vernon, N.Y.
D Precision Metal Prods. Co., Stoneham, Mass.
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D **Smith Inc., Herman H., Brooklyn, N.Y.** .... *
Amp Inc., Harrisburg, Pa.
D AMP Special Industries, Valley Forge, Pa.
M Art Wire & Stamping Co., Cedar Knolls, N.J.
Auto-Swage Products Inc., Shelton, Conn.
Autosplice/Dv Gen Staple, New York City, N.Y.
M Avid Electronics Corp., Baldwin, Pl., N.Y.
Bead Elctrns., Bridgeport, Conn.
Bussco Engrg., El Segundo, Cal.
D Cambridge Thermionic Corp., Cambridge, Mass.
Emporium Specialties Co., Austin, Pa.
DM Excel Products Co., New Brunswick, N.J.
Gary Mfg., New Brunswick, N.J.
General Mfg. Co., Glendale, Calif.
D IFE Div., Rumford, R.I.
Methode Elctrns., Chicago, Ill.
Mupac Corp., Brockton, Mass.
D N T-T/Peerless, Leominster, Mass.
D O. K. Machine & Tool Corp., Bronx, N.Y.
D Robinson-Nugent, New Albany, Ind.
M U.S. Terminals, Cincinnati, Ohio
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M Airtron, Morris Plains, N.J.
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D Antenna Corp. of America, Burlington, Iowa
D Astrolab, Rahway, N.J.
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D Barker & Williamson, Bristol, Pa.
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Coaxial Dynamics, Cleveland, Ohio
M Coleman Microwave Co., Lebanon, N.J.
Collins Radio, Dallas, Tex.
Elcom Systems, Deer Pk., N.Y.
Engelmann Microwave, Montville, N.J.
Excel Product Co., New Brunswick, N.J.
D Javex Elctrns., Cherry Valley, Cal.
DM Kings Electronics, Tuckahoe, N.Y.
Maury Microwave Corp., Cucamonga, Calif.
M Microlab/FXR, Livingston, N.J.
Microwave Development Labs., Needham Hgts., Mass.
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R L C Elctrns., Mt. Kisco, N.Y.
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M Manger Elec. Co., Stamford, Conn.
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M Merrimac Inds., West Caldwell, N.J.
Metavac, Flushing, N.Y.
M Microlab/FXR, Livingston, N.J.
Microwave Assocs., Burlington, Mass.
D Microwave Development Labs., Needham Hgts., Mass.
Narda Microwave Corp., Plainview, N.Y.
D PRD Elctrns., Syosset, N.Y.
M Premier Microwave, Port Chester, N.Y.
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M Transco Prods., Venice, Cal.
D TRG,, Woburn, Mass.
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Jensen Tools & Alloys, Phoenix, Ariz.
D Klein, Mathias & Sons, Chicago, Ill.
Mac Panel Co., High Pt., N.C.
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D Hunter Tools, El Monte, Calif
D Molex Products, Downers Grove, Ill.
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M OPT Inds. Inc., Phillipsburg, N.J.
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Stanford Applied Engineering, Santa Clara, Cal.
TDK Electronics Co., Ltd., Chiyoda-ku, Tokyo 101, Japan
TDK Elctrns. Corp., Long Island City, N.Y.
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M Electronic Transformer Corp., Paterson, N.J.
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Mag-Con, New Brighton, Minn.
M OPT Inds. Inc., Phillipsburg, N.J.
Phoenix Transformer Co., Phoenix, Ariz.
M Polyphase Instr. Co., Bridgeport, Pa.
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M Magnetic Circuit Elements, Monterey, Cal.
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M OPT Inds. Inc., Phillipsburg, N.J.
M Osborne Transformer Corp., Detroit, Mich.
Perkin-Elmer Corp., Norwalk, Conn.
M Peschel Instrs., Cape Coral, Fla.
Phoenix Transformer Co., Phoenix, Ariz.
M Polyphase Instr. Co., Bridgeport, Pa.
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M Schott Corp., Minneapolis, Minn.
Shester Engineering Co., Culver City, Cal.
Sola Electric, Elk Grove Village, Ill.
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DM Thordarson Meissner, Mt. Carmel, Ill.
Torelco Inc., Irvington, N.J.
Tranex Inc., Mountain View, Cal.
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M Dietz Design, Belton, Mo.
D Dormeyer Industries, Chicago, Ill.
Electrocom Inds., S. Bend, Ind.
M Electronic Transformer Corp., Paterson, N.J.
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Perkin-Elmer Corp., Norwalk, Conn.
Phoenix Transformer Co., Phoenix, Ariz.
M Piconics Inc., Tyngsboro, Mass.
M Polyphase Instr. Co., Bridgeport, Pa.
Pulse Engrg., San Diego, Cal
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Stanford Applied Engineering, Santa Clara, Cal.
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DM Thordarson Meissner, Mt. Carmel, Ill.
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M EWC, Kenilworth, N.J.
Ferrodyne Corp., Venice, Calif.
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M JB Elctrn, Transformers, Chicago, Ill
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D Shester Engineering Co., Culver City, Cal.
D Stancor/Essex International, Chicago, Ill.
TDC, Div. Freq. Technology Inc., Littleton, Mass.
DM Thordarson Meissner, Mt. Carmel, Ill.
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D Amperex Elctronic Corp., Slatersville, R.I. p. 1•2350,2351
DM Industrial Elctrn. Engrs., Van Nuys, Cal. p. 2•1160
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D Refac Elctrns./Pinlites, Fairfield, N.J. p. 2•1185
D Amperex Electronic Corp., Hicksville, N.Y. ...... *
Inter-Tech. Grp., Irvington-on-Hudson, N.Y. ... *
DM Systron-Donner, Sunnyvale, Cal. .... *
D Wagner Elec., Livingston, N.J. .... *
D A E G Telefunken, Englewood Clfs., N.J.
Amperex Electronic Corp., Slatersville, R.I.
D Apollo Corp., Kawasaki, Japan
DM Burroughs Corp., Plainfield, N.J.
Clinton Elctrns. Corp., Rockford, Ill.
DuMont Electron Tubes & Devices Corp., Clifton, N.J.
GTE Sylvania Inc., Waltham, Mass.
Litton Inds., San Carlos, Calif.
Major Data Corp., Costa Mesa, Cal.
Panasonic, Ind'l. Elctrn. Comps., New York, N.Y.
RCA Electronic Comps., Harrison, N.J.
D RCA, Ind'l. Tube Div., Lancaster, Pa.
Thomson-CSF Electron Tubes Inc., New York, N.Y.
Thor Elctrns. Corp., Elizabeth, N.J.
United Page Inc., Paterson, N.J.
Varian Assocs., Palo Alto, Cal.
Varian Electron Tube & Device Grp., San Carlos, Cal.
D Vector General, Woodland Hills, Cal.
M Watkins-Johnson Co., Palo Alto, Cal.
D Westinghouse Elec. Corp., Elmira, N.Y.

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Tubing, Ceramic

Omega Engrg., Stamford, Conn. p. 1•2324-2327
American Lava Corp., Chattanooga, Tenn.
D Aremco Prods., Ossining, N.Y.
Centralab, Milwaukee, Wisc.
Coors Porcelain Co., Golden, Colo.
Corning Glass Works, Corning, N.Y.
Diamonite Products Div., Shreve, Ohio
General Electric Co., Cleveland, Ohio
Gte Sylvania, Belmont, Cal.
National Beryllia Corp., Haskell, N.J.
DM Nat'l Ceramic Co., Trenton, N.J.
D Plessey Ceramic Div., Frenchtown, N.J.
Quartzite Processing, Malden, Mass.
Star Porcelain Co., Trenton, N.J.

Tubing, Fiberglass

D Dearborn Wire & Cable Co., Rosemont, Ill. p. 2•1993
DM Markel, L. Frank & Sons, Norristown, Pa. p. 2•1272,1273
DM Varflex Corp., Rome, N.Y. .... p. 2•1274,1275
D Alpha Wire Corp., Elizabeth, N.J. .... *
D Brand-Rex Co., Willimantic, Conn.
Cadillac Plastic & Chemical, Detroit, Mich.
Central Plastics Dists., Chicago, Ill.
DM ICO/Rally Corp., Palo Alto, Cal.
Mil Spec Wire & Cable Corp., Freeport, N.Y.
Precision Paper Tube Co., Wheeling, Ill.
SGL Graphics, Warminster, Pa.
M SHAKESPEARE, Columbia, S.C.

Tubing, Glass

Dearborn Wire & Cable Co., Rosemont, Ill. p. 2•1993
Amersil, Hillside, N.J.
Corning Glass Works, Corning, N.Y.
Corning Glass Works, Television Prods. Div., Corning, N.Y.
Esco Products, Oak Ridge, NJ
General Electric Co., Cleveland, Ohio
M GTI Corporation, Pittsburgh, Pa.
Sargent Welch Sci. Co., Skokie, Ill.

Tubing, Heat Shrinkable-Also See Caps, Forms & Tapes, Heat Shrinkable

D Alpha Wire Corp., Elizabeth, N.J. p. 2•1863-1869
D Cimco Wire & Cable, Allendale, N.J. p. 2•1910,2023
DM Daburn Electronics & Cable Corp., Bronx, N.Y. p. 2•1974-1978
DM Dearborn Wire & Cable Co., Rosemont, Ill. p. 2•1993
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D GC Electronics, Rockford, Ill. .... *
National Wire & Cable Corp., Los Angeles, Cal. *
DM Amrad Corporation, Paris, Tex.
D AMP Special Industries, Valley Forge, Pa.
Anchor Plastics, Long Island City, N.Y.
Automatic Die Cutting Mch, New York, N.Y.
D Birnbach Co., Freeport, N.Y.
M Brady Co., W. H., Milwaukee, Wis.
Brand Dielectrics, N. Windham, Conn.
D Burlington Opers. Div., Burlington, Mass.
Cadillac Plastic & Chemical, Detroit, Mich.
Central Plastics Dists., Chicago, Ill.
M Chemplast, Wayne, N.J.
Chomerics, Woburn, Mass.
D Cole-Flex Corp., W. Babylon, N.Y.
Emerson & Cuming, Canton, Mass.
Gries Reproducer Co., New Rochelle, N.Y.
DM ICO/Rally Corp., Palo Alto, Cal.
M International Identifications, Timonium, Md.
Mil Spec Wire & Cable Corp., Freeport, N.Y.
DM Newman Corp., M. M., Marblehead, Mass.
D Norelcom Electronics, Farmingdale, N.Y.
Penntube Plastics, Clifton Heights, Pa.
Precision Paper Tube Co., Wheeling, Ill.
Raychem Corp., Menlo Park, Cal.
Russell Inds., Lynbrook, N.Y.
M Storm Products Co., Inglewood, Ca.
D Thomas & Betts Co., Elizabeth, N.J.
3M Co., St. Paul, Minn.
Union Carbide, Chicago, Ill.
DM Zeus Ind'l. Prods., Raritan, N.J.

Tubing, Metal

DM Uniform Tubes, Collegeville, Pa. .... *
M Bram Metallurgical-Chem. Co., Phila., Pa.
M Co-Operative Inds., Chester, N.J.
Dow Chemical Co., Midland, Mich.
Icore Int'l., Sunnyvale, , Cal.
M ITT-Higbie Mfg. Co., Rochester, Mich.
K & S Engineering, Chicago, ILL.
M Kawecki Beryico Inds., New York, NY
Lear Siegler, Santa Monica, Calif.
Leico Inds., New York, N.Y.
NL Industries, New York, N.Y.
Okonite Co., Ramsey, N.J.
M Reynolds Metals Co., Richmond, VA.
D Rohn Mfg., Peoria, Ill.
Wall A. T. Co., Warwick, R.I.
Wilkinson Co., Westlake Village, Cal.

Tubing, Plastic-Also See Tubing, Spaghetti

DM Alpha Wire Corp., Elizabeth, N.J. p. 2•1862,1875,1879

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D Bivar, Santa Ana, Cal. .... p. 2•1266
DM Cimco Wire & Cable, Allendale, N.J. p. 2•1910,2023
DM Daburn Electronics & Cable Corp., Bronx, N.Y. p. 2•1973,1992
DM Dearborn Wire & Cable Co., Rosemont, Ill. p. 2•1993
DM Markel, L. Frank & Sons, Norristown, Pa. p. 2•1272,1273
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D GC Electronics, Rockford, Ill. .... *
National Wire & Cable Corp., Los Angeles, Cal. *
Abesto Corp., Bloomfield, N.J.
Ace Plastic Co., Jamacia, N.Y.
Acme Model Engrg. Co., Ridgefield, N.J.
Airmatic/Beckett-Harcum, Wilmington, Ohio
Anchor Plastics, Long Island City, N.Y.
D Birnbach Co., Freeport, N.Y.
D Blum, Julius & Co., Carlstadt, N.J.
Brand Dielectrics, N. Windham, Conn.
D Brand-Rex Co., Willimantic, Conn.
D Burlington Opers. Div., Burlington, Mass.
Cadillac Plastic & Chemical, Detroit, Mich.
Central Plastics Dists., Chicago, Ill.
M Chemplast, Wayne, N.J.
M Co-Operative Inds., Chester, N.J.
D Cole-Flex Corp., W. Babylon, N.Y.
Communications Technology Corp., Los Angeles, Cal.
Dow Chemical Co., Midland, Mich.
D ICO/Rally Corp., Palo Alto, Cal.
International Identifications, Timonium, Md.
Mil Spec Wire & Cable Corp., Freeport, N.Y.
DM Newman Corp., M. M., Marblehead, Mass.
Norelcom Electronics, Farmingdale, N.Y.
NVF Co., Yorklyn, Del.
Okonite Co., Ramsey, N.J.
D Penn Fibre & Specialty, Phila., Pa.
Penntube Plastics, Clifton Heights, Pa.
M Phoenix Wire, S. Hero, Vt.
Precision Paper Tube Co., Wheeling, Ill.
Resdel Corp., Rio Grande, N.J.
D Rye Inds., Mamaroneck, N.Y.
DM Stevens Prods., E. Orange, N.J.
Synthane Taylor Corp., Valley Forge, Pa.
3M Co., St. Paul, Minn.
DM Transcon Mfg. Co., Dallas, Tex.
Union Carbide, Chicago, Ill.
D Uniroyal, New York, N.Y.
DM Zeus Ind'l. Prods., Raritan, N.J.
DM Zippertubing Co., Los Angeles, Calif.

Tubing, Spaghetti

DM Alpha Wire Corp., Elizabeth, N.J. p. 2•1876,1877
DM Cimco Wire & Cable, Allendale, N.J. p. 2•1910,2023
DM Daburn Electronics & Cable Corp., Bronx, N.Y. p. 2•1973
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D Smith Inc., Herman H., Brooklyn, N.Y. p. 2•876
DM Varflex Corp., Rome, N.Y. .... p. 2•1274,1275
D GC Electronics, Rockford, Ill. .... *
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Birnbach Co., Freeport, N.Y.
Brand Dielectrics, N. Windham, Conn.
D Brand-Rex Co., Willimantic, Conn.
Cadillac Plastic & Chemical, Detroit, Mich.
Central Plastics Dists., Chicago, Ill.
M Chemplast, Wayne, N.J.
D Cole-Flex Corp., W. Babylon, N.Y.
DM ICO/Rally Corp., Palo Alto, Cal.
International Identifications, Timonium, Md.
Mil Spec Wire & Cable Corp., Freeport, N.Y.
DM Newman Corp., M. M., Marblehead, Mass.
Penntube Plastics, Clifton Heights, Pa.
M Phoenix Wire, S. Hero, Vt.
D Transcon Mfg. Co., Dallas, Tex.
DM Zeus Ind'l. Prods., Raritan, N.J.
DM Zippertubing Co., Los Angeles, Calif.

Tubing, Spiral Wrap

D Alpha Wire Corp., Elizabeth, N.J. ...... p. 2•1878
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DM Markel, L. Frank & Sons, Norristown, Pa. p. 2•1272,1273
D Panduit Corp., Tinley Park, Ill. p. 2•2048-2051
DM Amrad Corporation, Paris, Tex.
Amp Inc., Harrisburg, Pa.
D AMP Special Industries, Valley Forge, Pa.
D Birnbach Co., Freeport, N.Y.
Central Plastics Dists., Chicago, Ill.
M Chemplast, Wayne, N.J.
M Co-Operative Inds., Chester, N.J.
D Cole-Flex Corp., W. Babylon, N.Y.
D Electrovert, Mt. Vernon, N.Y.
D ICO/Rally Corp., Palo Alto, Cal.
Icore Int'l., Sunnyvale, , Cal.
D Jonesville Paper Tube Corp., Jonesville, Mich.
Mil Spec Wire & Cable Corp., Freeport, N.Y.
DM Newman Corp., M. M., Marblehead, Mass.
NVF Co., Yorklyn, Del.
Paramount Industries, Ft. Wayne, Ind.
Penntube Plastics, Clifton Heights, Pa.
Precision Paper Tube Co., Wheeling, Ill.
DM Transcon Mfg. Co., Dallas, Tex.
D Zeus Ind'l. Prods., Raritan, N.J.
DM Zippertubing Co., Los Angeles, Calif.

Tubing, Waveguide

M Uniform Tubes, Collegeville, Pa. ....p. 2•2065
Systron-Donner Microwave Div., Van Nuys, Cal. .... *
M Airtron, Morris Plains, N.J.
M The Anaconda Company Brass Division, Waterbury, Conn.
M Co-Operative Inds., Chester, N.J.
Corning Glass Works, Television Prods. Div., Corning, N.Y.
Maury Microwave Corp., Cucamonga, Calif.
D Microwave Development Labs., Needham Hgts., Mass.
M Premier Microwave, Port Chester, N.Y.
TRG,, Woburn, Mass.
Wall A. T. Co., Warwick, R.I.
Waveline, W. Caldwell, N.J.

Tubing, Zipper

D Alpha Wire Corp., Elizabeth, N.J. p. 2•1872-1874,1880
D Daburn Electronics & Cable Corp., Bronx, N.Y. *
Brand Dielectrics, N. Windham, Conn.
Cal-Metex Corp., Inglewood, Cal.
DM ICO/Rally Corp., Palo Alto, Cal.
International Identifications, Timonium, Md.
Mil Spec Wire & Cable Corp., Freeport, N.Y.
DM Zippertubing Co., Los Angeles, Calif.

Tuners, A-M/F-M—See Volume 1

Tuners, Microwave—See Volume 1

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Tweezers, Hand & Vacuum

D GC Electronics, Rockford, Ill. .... *
D Jonard Industries Corp., Tuckahoe, N.Y. .... *
D Adtool Corp., Montreal W P Q, Can.
M Air-Vac Engrg. Co., Milford, Conn.
D Circon Corp., Santa Barbara, Cal.
Clauss Cutlery Co., Fremont, Ohio
Janel, Stirling, N.J.
M MacDonald & Co., Glendale, Calif.
Mann, Henry Inc., Huntingdon Valley, Pa.
National Camera Inc., Englewood, Colo.
D Orbit Inds., San Luis Obispo, Calif.
D Precision Elec. Co., Kezar Falls, Me.
D Techni-Tool, Plymouth Meeting, Pa.
D Telvac Instr. Co., Van Nuys, Cal.
D Vigor Co., New York, N.Y.
X-Acto, Long Island City, N.Y.

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Viewing Hoods, Cathode Ray Tube

Hewlett-Packard Co., Palo Alto, Cal.
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Wave Soldering Equipment—See Volume 1

Waveguide-Coax Adapters

Amphenol RF Div., Danbury, Conn. p. 2•460,461
Arra Inc., Bay Shore, N.Y. .... p. 2•1278,1279
Rental Electronics, Lexington, Mass. p. 1•792-795
Systron-Donner Microwave Div., Van Nuys, Cal. .... *
Aircom, Union, N.H.
M Airtron, Morris Plains, N.J.
Alford Mfg. Co., Winchester, Mass.
American Microwave Inds., Waltham, Mass.
Andrew Corp., Orland Park, Ill.
DM Astrolab, Rahway, N.J.
Cablewave Systems Inc., North Haven, Conn.
Coax Devices Inc., Chelsea, Mass.
Hewlett-Packard Co., Palo Alto, Cal.
Hughes Aircraft Co, Fullerton, Cal.
Maury Microwave Corp., Cucamonga, Calif.
M Microlab/FXR, Livingston, N.J.
Microwave Assocs., Burlington, Mass.
D Microwave Development Labs., Needham Hgts., Mass.
Narda Microwave Corp., Plainview, N.Y.
M Nurad, Baltimore, Md.
Polyflon Corp., New Rochelle, N.Y.
D PRD Elctrns., Syosset, N.Y.
M Premier Microwave, Port Chester, N.Y.
Reeve Electronics, Chicago, Ill.
R L C Elctrns., Mt. Kisco, N.Y.
Sivers Lab, Corona del Mar, Cal.
M Transco Prods., Venice, Cal.
UTE Microwave, Asbury Park, N.J.
Waveline, W. Caldwell, N.J.

Waveguides

Amphenol RF Div., Danbury, Conn. p. 2•460,461
Arra Inc., Bay Shore, N.Y. .... p. 2•1278,1279
M Electro Impulse, Red Bank, N.J. p. 1•492,662-666
M Uniform Tubes, Collegeville, Pa. ....p. 2•2065
Bendix, Franklin, Ind. .... *
Systron-Donner Microwave Div., Van Nuys, Cal. .... *
M Adams-Russell Co., Waltham, Mass.
Airtron, Morris Plains, N.J.
Andrew Antenna Co. Ltd., Whitby, Ont., Can.
Andrew Corp., Orland Park, Ill.
M Co-Operative Inds., Chester, N.J.
Corning Glass Works, Television Prods. Div., Corning, N.Y.
Gabriel Elctrns. Inc., Scarborough, Me.
Hughes Aircraft Co, Culver City, Cal.
Maury Microwave Corp., Cucamonga, Calif.
D Microwave Development Labs., Needham Hgts., Mass.
Narda Microwave Corp., Plainview, N.Y.
Polyflon Corp., New Rochelle, N.Y.
M Premier Microwave, Port Chester, N.Y.
Reeve Electronics, Chicago, Ill.

DM Servometer Corp., Cedar Grove, N.J.
Waveline, W. Caldwell, N.J.

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Wire, Airframe
DM **Cimco Wire & Cable, Allendale, N.J. p. 2•1910,2023**
DM **Daburn Electronics & Cable Corp., Bronx, N.Y. p. 2•1980**
DM **Dearborn Wire & Cable Co., Rosemont, Ill. p. 2•1993**
M **Victor Wire & Cable Corp., Los Angeles, Cal. p. 2•2066**
DM **Alpha Wire Corp., Elizabeth, N.J. ....** *
Standard Wire & Cable Co., Los Angeles, Cal. *
Cerro Wire & Cable Co., New Haven, Conn.
Icore Int'l., Sunnyvale, , Cal.
D Manhattan Elec. Cable Corp., Rye, N.Y.
Mil Spec Wire & Cable Corp., Freeport, N.Y.
M Prestolite Wire Division, Port Huron, Mich.
M Storm Products Co., Inglewood, Ca.
M Thermax Wire Corp., Flushing, N.Y.

Wire, Antenna (All Types)
D **Alpha Wire Corp., Elizabeth, N.J. ......p. 2•1858**
D **Belden Corp., Richmond, Ind. ...p. 2•1882-1909**
D **Columbia Elctrn. Cables, New Bedford, Mass. p. 2•1911**
D **Consolidated Wire & Assoc. Corps., Chicago, Ill. p. 2•1961,1968**
D **Dearborn Wire & Cable Co., Rosemont, Ill. p. 2•1993**
D **Daburn Electronics & Cable Corp., Bronx, N.Y.** *
D **GC Electronics, Rockford, Ill. ....** *
Standard Wire & Cable Co., Los Angeles, Cal. *
American Electric Cable Co., Holyoke, Mass.
D Antenna Corp. of America, Burlington, Iowa
M Arco Wire & Cable, N. Hollywood, Cal.
Birnbach Co., Freeport, N.Y.
Copperweld Bimetallics, Glassport, PA
D Hackensack Cable Corp., West Columbia, S.C.
D Jersey Specialty Co., Wayne, N.J.
Leviton Mfg. Co., Little Neck, N.Y.
Mil Spec Wire & Cable Corp., Freeport, N.Y.
D Rohn Mfg., Peoria, Ill.
Saxton Prods., Congers, N.Y.
Times Wire & Cable, Wallingford, Conn.
TRW/Holyoke Wire & Cable, South Hadley, Mass.
D Workman Electronic Prods., Sarasota, Fla.

Wire, Bare, Copper
D **Alpha Wire Corp., Elizabeth, N.J. p. 2•1837,1858**
D **Belden Corp., Richmond, Ind. ...p. 2•1882-1909**
D **Columbia Elctrn. Cables, New Bedford, Mass. p. 2•1911**
D **Consolidated Wire & Assoc. Corps., Chicago, Ill. p. 2•1960**
D **Dearborn Wire & Cable Co., Rosemont, Ill. p. 2•1993**
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DM **Daburn Electronics & Cable Corp., Bronx, N.Y.** *
Shigoto Inds., Ltd., New York, N.Y. .... *
Standard Wire & Cable Co., Los Angeles, Cal. *
D The Anaconda Co., Greenwich, Conn.
D Birnbach Co., Freeport, N.Y.
M Bram Metallurgical-Chem. Co., Phila., Pa.
D CCS Hatfield Wire & Cable Group, Cranford, N.J.
D Custom Cable Co., Oceanside, N.Y.
Gte Sylvania, Belmont, Cal.
M Hamilton Technology, Lancaster, Pa.
Kentucky Electronics, Owensboro, Ky.
Leico Inds., New York, N.Y.
D Manhattan Elec. Cable Corp., Rye, N.Y.
Materials Resch. Corp., Orangeburg, N.Y.
Mil Spec Wire & Cable Corp., Freeport, N.Y.
Molecu-Wire Corp., Farmingdale, N.J.
Nesor Alloy Corp., W. Caldwell, N.J.
Okonite Co., Ramsey, N.J.
D Pace Wire & Cable Corp., Oceanside, N.Y.
Saxton Prods., Congers, N.Y.
TRW/Holyoke Wire & Cable, South Hadley, Mass.
D United Mineral & Chem. Corp., New York, N.Y.
Universal Security Instrs., Baltimore, Md.
DM Viking Wire Co., Danbury, Conn.
Wilkinson Co., Westlake Village, Cal.

Wire, Bare, Nickel
Standard Wire & Cable Co., Los Angeles, Cal. *
The Anaconda Co., Greenwich, Conn.
Atomergic Chemetals Co., Carle Place, N.Y.
M Bram Metallurgical-Chem. Co., Phila., Pa.
Control Products Corp., Chicago, Ill.
GTE Sylvania Inc., Newark, N.J.
M Hamilton Technology, Lancaster, Pa.
Kentucky Electronics, Owensboro, Ky.
Leico Inds., New York, N.Y.
M Magnetics, Butler, Pa.
Materials Resch. Corp., Orangeburg, N.Y.
Mil Spec Wire & Cable Corp., Freeport, N.Y.
Wilkinson Co., Westlake Village, Cal.

Wire, Bare, Nickel-Chrome
D **Consolidated Wire & Assoc. Corps., Chicago, Ill. p. 2•1960**
Omega Engrg., Stamford, Conn. p. 1•2324-2327
The Anaconda Co., Greenwich, Conn.
Atomergic Chemetals Co., Carle Place, N.Y.
M Bram Metallurgical-Chem. Co., Phila., Pa.
Control Products Corp., Chicago, Ill.
D Eaton Corporation, Cleveland, Ohio
Gordon, Claud S. Co., Richmond, Ill.
GTE Sylvania Inc., Newark, N.J.
M Hamilton Technology, Lancaster, Pa.
Hoskins Mfg. Co., Detroit, Mich.
Leico Inds., New York, N.Y.
Materials Resch. Corp., Orangeburg, N.Y.
Mil Spec Wire & Cable Corp., Freeport, N.Y.
Molecu-Wire Corp., Farmingdale, N.J.
Nesor Alloy Corp., W. Caldwell, N.J.

Wire, Braid (Excluding Shielding)
M **Amphenol Connector Div., SAMS Opers., Chatsworth, Cal. ....p. 2•460,461**
D **Belden Corp., Richmond, Ind. ...p. 2•1882-1909**
D **Columbia Elctrn. Cables, New Bedford, Mass. p. 2•1911**
D **Consolidated Wire & Assoc. Corps., Chicago, Ill. p. 2•1964,1966**
D **Dearborn Wire & Cable Co., Rosemont, Ill. p. 2•1993**
DM **Whitmor Wire & Cable, No. Hollywood, Cal. p. 2•2072**
D **Daburn Electronics & Cable Corp., Bronx, N.Y.** *
Standard Wire & Cable Co., Los Angeles, Cal. *
Victor Wire & Cable Corp., Los Angeles, Cal. ... *
M Aircraft & Elex Spcltys, Plainfield, Ind
M Arco Wire & Cable, N. Hollywood, Cal.
Atomergic Chemetals Co., Carle Place, N.Y.
D Birnbach Co., Freeport, N.Y.
M Bram Metallurgical-Chem. Co., Phila., Pa.
Cal-Metex Corp., Inglewood, Cal.
M Co-Operative Inds., Chester, N.J.
M Kates Scientific Instrs., Newton, Mass.
M Lenz Electric Mfg. Co., Chicago, Ill.
D Manhattan Elec. Cable Corp., Rye, N.Y.
DM Metex Corp., Edison, N.J.
Mil Spec Wire & Cable Corp., Freeport, N.Y.
Nat'l-Standard Co., Niles, Mich.
Nesor Alloy Corp., W. Caldwell, N.J.
TRW/Holyoke Wire & Cable, South Hadley, Mass.
Wireflex Incorporated, Bourbon, Ind.
D Zippertubing Co., Los Angeles, Calif.

Wire, Braid (Shielding)—See Braid, Cable

Wire & Cable Ties
D **Daburn Electronics & Cable Corp., Bronx, N.Y. p. 2•1981**
D **ETC Terminal Products, Solon, Ohio p. 2•695-706**
DM **Grayhill Inc., LaGrange, Ill. ....p. 2•2021**
DM **Panduit Corp., Tinley Park, Ill. p. 2•2048-2051**
M **Rowe Industries, Toledo, Ohio ..... p. 2•796,797**
D **Smith Inc., Herman H., Brooklyn, N.Y. p. 2•875,879**
D **3M Company, St. Paul, Minn. p. 2•1034-1055**
D **GC Electronics, Rockford, Ill. ....** *
D **Waldom Electronics, Chicago, Ill. ....** *
Acesso-Wire, Garnersville, N.Y.
DM Amrad Corporation, Paris, Tex.
D AMP Special Industries, Valley Forge, Pa.
Autosplice/Dv Gen Staple, New York City, N.Y.
D Burndy Corporation, Norwalk, , Conn.
Copperweld Bimetallics, Glassport, PA
M Dennison Mfg. Co., Framingham, Mass.
D Electrovert, Mt. Vernon, N.Y.
Heyman Mfg. Co., Kenilworth, N.J.
Hoffman Industrial Prods., Farmingdale, N.Y.
M I-T-E Electrical Components Grp., E. Farmingdale, N.Y.
DM ICO/Rally Corp., Palo Alto, Cal.
D Ideal Industries Inc., Sycamore, Ill.
ITT Holub Industries, Sycamore, Ill.
M Manger Elec. Co., Stamford, Conn.
Norelcom Electronics, Farmingdale, N.Y.
D Preformed Line Products Co., Cleveland, Ohio
DM Simmons Fastener Corp., Albany, N.Y.
DM Transcon Mfg. Co., Dallas, Tex.
DM Tyton Corp., Milwaukee, Wisc.
DM Weckesser Co. Inc., Chicago, Ill.
Whitso, Schiller Park, Ill.
D Workman Electronic Prods., Sarasota, Fla.
D Zippertubing Co., Los Angeles, Calif.

Wire, Ceramic Insulated
Omega Engrg., Stamford, Conn. p. 1•2324-2327
D **Amperex Electronic Corp., Hicksville, N.Y. ......** *
DM **Daburn Electronics & Cable Corp., Bronx, N.Y.** *
Standard Wire & Cable Co., Los Angeles, Cal. *
D Ametek Controls Division, Feasterville, Pa.
M ARI Inds., Franklin Pk., Ill.
Control Products Corp., Chicago, Ill.
Gordon, Claud S. Co., Richmond, Ill.
Gulton Inds., Buena Park, Cal.
Molecu-Wire Corp., Farmingdale, N.J.
Permaluster, Burbank, Calif.

Wire, Clad (All Types)
D **Belden Corp., Richmond, Ind. ...p. 2•1882-1909**
Dearborn Wire & Cable Co., Rosemont, Ill. p. 2•1993
Standard Wire & Cable Co., Los Angeles, Cal. *
M Advanced Materials Systems, Atteboro, Mass.
Copperweld Bimetallics, Glassport, PA
Engelhard Minerals & Chem., Murray Hill, N.J.
Gordon, Claud S. Co., Richmond, Ill.
Handy & Harman, New York, N.Y.
Kentucky Electronics, Owensboro, Ky.
Leviton Mfg. Co., Little Neck, N.Y.
Mil Spec Wire & Cable Corp., Freeport, N.Y.
Texas Instruments, Attleboro, Mass.

Wire, Enamel Insulated—See Wire, Hookup (All-Types)

Wire, Fiberglass Insulated—See Wire, Glass Insulated

Wire, Flame Retardant
D **Alpha Wire Corp., Elizabeth, N.J. p. 2•1836-1840**
D **Belden Corp., Richmond, Ind. ...p. 2•1882-1909**
D **Columbia Elctrn. Cables, New Bedford, Mass. p. 2•1911**
D **Consolidated Wire & Assoc. Corps., Chicago, Ill. p. 2•1935,1963**
D **Daburn Electronics & Cable Corp., Bronx, N.Y. p. 2•1980,1981,1983**
DM **Dearborn Wire & Cable Co., Rosemont, Ill. p. 2•1993**
National Wire & Cable Corp., Los Angeles, Cal. p. 2•2045
Standard Wire & Cable Co., Los Angeles, Cal. *
Victor Wire & Cable Corp., Los Angeles, Cal. ... *
Acesso-Wire, Garnersville, N.Y.
American Electric Cable Co., Holyoke, Mass.
The Anaconda Co., Greenwich, Conn.
M Arco Wire & Cable, N. Hollywood, Cal.
Boston Insulated Wire & Cable Co., Dorchester, Mass.
D Brand-Rex Co., Willimantic, Conn.
Cerro Wire & Cable Co., New Haven, Conn.
Circuit Assembly Corp., Costa Mesa, Ca.
D Custom Cable Co., Oceanside, N.Y.
General Elec., Bridgeport, Conn.
Gulton Inds., Buena Park, Cal.
Icore Int'l., Sunnyvale, , Cal.
D Jersey Specialty Co., Wayne, N.J.
Lenz Electric Mfg. Co., Chicago, Ill.
D Manhattan Elec. Cable Corp., Rye, N.Y.
Mil Spec Wire & Cable Corp., Freeport, N.Y.
Prestolite Wire Division, Port Huron, Mich.
M Thermax Wire Corp., Flushing, N.Y.
Wireflex Incorporated, Bourbon, Ind.

Wire, Flat Strip—See Cable, Flat

Wire, Glass Insulated
D **Belden Corp., Richmond, Ind. ...p. 2•1882-1909**
DM **Daburn Electronics & Cable Corp., Bronx, N.Y. p. 2•1979,1982**
DM **Dearborn Wire & Cable Co., Rosemont, Ill. p. 2•1993**
Omega Engrg., Stamford, Conn. p. 1•2324-2327
Standard Wire & Cable Co., Los Angeles, Cal. *
D The Anaconda Co., Greenwich, Conn.
M Arco Wire & Cable, N. Hollywood, Cal.
Birnbach Co., Freeport, N.Y.
Boston Insulated Wire & Cable Co., Dorchester, Mass.
Brand-Rex Co., Willimantic, Conn.
Cerro Wire & Cable Co., New Haven, Conn.
General Elec., Bridgeport, Conn.
Gordon, Claud S. Co., Richmond, Ill.

Wire, Glass Insulated (cont'd)

GTE Sylvania Inc., Newark, N.J.
Gulton Inds., Buena Park, Cal.
Lenz Electric Mfg. Co., Chicago, Ill.
D Manhattan Elec. Cable Corp., Rye, N.Y.
Mil Spec Wire & Cable Corp., Freeport, N.Y.
Molecu-Wire Corp., Farmingdale, N.J.
TRW/Holyoke Wire & Cable, South Hadley, Mass.
Wireflex Incorporated, Bourbon, Ind.

Wire, Guy

D Columbia Elctrn. Cables, New Bedford, Mass. p. 2•1911
Birnbach Co., Freeport, N.Y.
D Channel Master Div. Avnet, Ellenville, N.Y.
Copperweld Bimetallics, Glassport, PA
D Hackensack Cable Corp., West Columbia, S.C.
Mil Spec Wire & Cable Corp., Freeport, N.Y.
Molecu-Wire Corp., Farmingdale, N.J.
Nat'l-Standard Co., Niles, Mich.
D Rohn Mfg., Peoria, Ill.
DM Saxton Prods., Congers, N.Y.
D Sitco Antennas, Portland, Ore.

Wire, Heater—See Cable, Heater

Wire, High-Temperature (Over 125 C)

D Belden Corp., Richmond, Ind. ...p. 2•1882-1909
DM Cimco Wire & Cable, Allendale, N.J. p. 2•1910,2023
D Columbia Elctrn. Cables, New Bedford, Mass. p. 2•1911
DM Consolidated Wire & Assoc. Corps., Chicago, Ill. p. 2•1935
Daburn Electronics & Cable Corp., Bronx, N.Y. p. 2•1980-1984
D Dearborn Wire & Cable Co., Rosemont, Ill. p. 2•1993
DM Markel, L. Frank & Sons, Norristown, Pa. p. 2•2024,2025
Omega Engrg., Stamford, Conn. p. 1•2324-2327
M Rowe Industries, Toledo, Ohio p. 2•2052,2053
M Woven Elctrns., Mauldin, S. C. p. 2•2068-2071
DM Alpha Wire Corp., Elizabeth, N.J. .... *
National Wire & Cable Corp., Los Angeles, Cal. *
Standard Wire & Cable Co., Los Angeles, Cal. *
Victor Wire & Cable Corp., Los Angeles, Cal. ... *
D The Anaconda Co., Greenwich, Conn.
M Arco Wire & Cable, N. Hollywood, Cal.
M ARI Inds., Franklin Pk., Ill.
Assembled Products Co., St. Albans, Vt.
Atomergic Chemetals Co., Carle Place, N.Y.
D Birnbach Co., Freeport, N.Y.
Boston Insulated Wire & Cable Co., Dorchester, Mass.
M Bram Metallurgical-Chem. Co., Phila., Pa.
D Brand-Rex Co., Willimantic, Conn.
Cerro Wire & Cable Co., New Haven, Conn.
D Custom Cable Co., Oceanside, N.Y.
Essex International, Sycamore, Ill.
General Elec., Bridgeport, Conn.
GTE Sylvania Inc., Newark, N.J.
Gulton Inds., Buena Park, Cal.
Hoskins Mfg. Co., Detroit, Mich.
Icore Int'l., Sunnyvale, , Cal.
M Judd Wire Div., Burlington, Mass.
Kentucky Electronics, Owensboro, Ky.
Leviton Mfg. Co., Little Neck, N.Y.
D Manhattan Elec. Cable Corp., Rye, N.Y.
Mil Spec Wire & Cable Corp., Freeport, N.Y.
Molecu-Wire Corp., Farmingdale, N.J.
D Pace Wire & Cable Corp., Oceanside, N.Y.
Permaluster, Burbank, Calif.
M Phoenix Wire, S. Hero, Vt.
Prestolite Wire Division, Port Huron, Mich.
Raychem Corp., Menlo Park, Cal.
SermeTel Teleflex Inc., Limerick, Pa
M Storm Products Co., Inglewood, Ca.
Templine, Gardena, Cal.
DM Thermax Wire Corp., Flushing, N.Y.
Times Wire & Cable, Wallingford, Conn.
DM Viking Wire Co., Danbury, Conn.
Wilkinson Co., Westlake Village, Cal.
Wireflex Incorporated, Bourbon, Ind.

Wire, High Voltage (1000 Volts & Over)

D Belden Corp., Richmond, Ind. ...p. 2•1882-1909
DM Cimco Wire & Cable, Allendale, N.J. p. 2•1910,2023
D Columbia Elctrn. Cables, New Bedford, Mass. p. 2•1911
DM Consolidated Wire & Assoc. Corps., Chicago, Ill. p. 2•1929,1930,1933,1936,1963
D Daburn Electronics & Cable Corp., Bronx, N.Y. p. 2•1979-1981,1983,1984
DM Dearborn Wire & Cable Co., Rosemont, Ill. p. 2•1993
DM Markel, L. Frank & Sons, Norristown, Pa. p. 2•2024,2025
National Wire & Cable Corp., Los Angeles, Cal. p. 2•2045
M Rowe Industries, Toledo, Ohio p. 2•2052,2053
DM Whitmor Wire & Cable, No. Hollywood, Cal. p. 2•2072
DM Alpha Wire Corp., Elizabeth, N.J. .... *
Standard Wire & Cable Co., Los Angeles, Cal. *
Victor Wire & Cable Corp., Los Angeles, Cal. .... *
Acesso-Wire, Garnersville, N.Y.
D The Anaconda Co., Greenwich, Conn.
M Arco Wire & Cable, N. Hollywood, Cal.
Birnbach Co., Freeport, N.Y.
Boston Insulated Wire & Cable Co., Dorchester, Mass.
Brand-Rex Co., Willimantic, Conn.
D CCS Hatfield Wire & Cable Group, Cranford, N.J.
D Custom Cable Co., Oceanside, N.Y.
Dielectric Sciences, Burlington, Mass
General Elec., Bridgeport, Conn.
Gulton Inds., Buena Park, Cal.
M Judd Wire Div., Burlington, Mass.
Lenz Electric Mfg. Co., Chicago, Ill.
Leviton Mfg. Co., Little Neck, N.Y.
D Manhattan Elec. Cable Corp., Rye, N.Y.
Mil Spec Wire & Cable Corp., Freeport, N.Y.
Okonite Co., Ramsey, N.J.
Prestolite Wire Division, Port Huron, Mich.
Raychem Corp., Menlo Park, Cal.
M Reynolds Metals Co., Richmond, VA.
M Storm Products Co., Inglewood, Ca.
Times Wire & Cable, Wallingford, Conn.
TRW/Holyoke Wire & Cable, South Hadley, Mass.
Wireflex Incorporated, Bourbon, Ind.

Wire, Hookup (All Types)

D Alpha Wire Corp., Elizabeth, N.J. p. 2•1835-1840,1858
D Belden Corp., Richmond, Ind. ...p. 2•1882-1909
DM Cimco Wire & Cable, Allendale, N.J. p. 2•1910,2023
D Columbia Elctrn. Cables, New Bedford, Mass. p. 2•1911
DM Consolidated Wire & Assoc. Corps., Chicago, Ill. p. 2•1934,1935,1937,1958,1964,1967
DM Daburn Electronics & Cable Corp., Bronx, N.Y. p. 2•1979,1980,1982,1983
DM Dearborn Wire & Cable Co., Rosemont, Ill. p. 2•1993
DM Markel, L. Frank & Sons, Norristown, Pa. p. 2•2024,2025
National Wire & Cable Corp., Los Angeles, Cal. p. 2•2043,2045
D Panduit Corp., Tinley Park, Ill. p. 2•2048-2051
D Rowe Industries, Toledo, Ohio ....p. 2•2052
DM Spectra-Strip Corp., Garden Grove, Cal. p. 2•2057
DM Victor Wire & Cable Corp., Los Angeles, Cal. p. 2•2066
DM Whitmor Wire & Cable, No. Hollywood, Cal. p. 2•2072
M Woven Elctrns., Mauldin, S. C. p. 2•2068-2071
D GC Electronics, Rockford, Ill. .... *
Jonard Industries Corp., Tuckahoe, N.Y. .... *
Shigoto Inds., Ltd., New York, N.Y. .... *
Standard Wire & Cable Co., Los Angeles, Cal. *
M American Electric Cable Co., Holyoke, Mass.
M Arco Wire & Cable, N. Hollywood, Cal.
D Birnbach Co., Freeport, N.Y.
Boston Insulated Wire & Cable Co., Dorchester, Mass.
D Brand-Rex Co., Willimantic, Conn.
Cerro Wire & Cable Co., New Haven, Conn.
D Essex International, Sycamore, Ill.
General Elec., Bridgeport, Conn.
Icore Int'l., Sunnyvale, , Cal.
M Judd Wire Div., Burlington, Mass.
Lenz Electric Mfg. Co., Chicago, Ill.
Mil Spec Wire & Cable Corp., Freeport, N.Y.
Motorola Comms. Div., Schaumburg, Ill.
D Norelcom Electronics, Farmingdale, N.Y.
D On-Guard Corp. of America, Carlstadt, NJ
D Pacific Electricord Co., Gardena, Cal.
M Phoenix Wire, S. Hero, Vt.
Prestolite Wire Division, Port Huron, Mich.
Raychem Corp., Menlo Park, Cal.
Rockland Insulated Wire & Cable, Haverstraw, N.Y.
Saxton Prods., Congers, N.Y.
M Storm Products Co., Inglewood, Ca.
D Superior Cable Div., Hickory, N.C.
DM Thermax Wire Corp., Flushing, N.Y.
TRW/Holyoke Wire & Cable, South Hadley, Mass.
Wireflex Incorporated, Bourbon, Ind.
D Workman Electronic Prods., Sarasota, Fla.

Wire, Irradiated

D Belden Corp., Richmond, Ind. ...p. 2•1882-1909
DM Dearborn Wire & Cable Co., Rosemont, Ill. p. 2•1993
D Rowe Industries, Toledo, Ohio ....p. 2•2052
M Woven Elctrns., Mauldin, S. C. p. 2•2068-2071
DM Alpha Wire Corp., Elizabeth, N.J. .... *
DM Daburn Electronics & Cable Corp., Bronx, N.Y. *
Standard Wire & Cable Co., Los Angeles, Cal. *
Acesso-Wire, Garnersville, N.Y.
M American Electric Cable Co., Holyoke, Mass.
M Arco Wire & Cable, N. Hollywood, Cal.
Boston Insulated Wire & Cable Co., Dorchester, Mass.
D Brand-Rex Co., Willimantic, Conn.
Essex International, Sycamore, Ill.
DM Judd Wire Div., Burlington, Mass.
D Manhattan Elec. Cable Corp., Rye, N.Y.
Mil Spec Wire & Cable Corp., Freeport, N.Y.
Permaluster, Burbank, Calif.
Raychem Corp., Menlo Park, Cal.
M Storm Products Co., Inglewood, Ca.

Wire, Lead-In & Ground

D Belden Corp., Richmond, Ind. ...p. 2•1882-1909
D Columbia Elctrn. Cables, New Bedford, Mass. p. 2•1911
D Consolidated Wire & Assoc. Corps., Chicago, Ill. p. 2•1938,1964
D Daburn Electronics & Cable Corp., Bronx, N.Y. p. 2•1979,1980,1982,1983
Dearborn Wire & Cable Co., Rosemont, Ill. p. 2•1993
D Rowe Industries, Toledo, Ohio ....p. 2•2052
M Woven Elctrns., Mauldin, S. C. p. 2•2068-2071
D Alpha Wire Corp., Elizabeth, N.J. .... *
Standard Wire & Cable Co., Los Angeles, Cal. *
M American Electric Cable Co., Holyoke, Mass.
D Antenna Corp. of America, Burlington, Iowa
Birnbach Co., Freeport, N.Y.
Boston Insulated Wire & Cable Co., Dorchester, Mass.
D Brand-Rex Co., Willimantic, Conn.
D Channel Master Div. Avnet, Ellenville, N.Y.
Copperweld Bimetallics, Glassport, PA
Essex International, Sycamore, Ill.
General Electric Co., Cleveland, Ohio
M Judd Wire Div., Burlington, Mass.
Lenz Electric Mfg. Co., Chicago, Ill.
D Manhattan Elec. Cable Corp., Rye, N.Y.
D Pace Wire & Cable Corp., Oceanside, N.Y.
D Pacific Electricord Co., Gardena, Cal.
D Rohn Mfg., Peoria, Ill.
Saxton Prods., Congers, N.Y.
D Superior Cable Div., Hickory, N.C.
TRW/Holyoke Wire & Cable, South Hadley, Mass.

Wire, Litz

D Belden Corp., Richmond, Ind. ...p. 2•1882-1909
Daburn Electronics & Cable Corp., Bronx, N.Y. *
Standard Wire & Cable Co., Los Angeles, Cal. *
M Bram Metallurgical-Chem. Co., Phila., Pa.

Wire, Magnet

D Belden Corp., Richmond, Ind. ...p. 2•1882-1909
Caddel-Burns Mfg. Co., Mineola, N. Y. p. 2•382-385
D Consolidated Wire & Assoc. Corps., Chicago, Ill. p. 2•1959,1960
DM Dearborn Wire & Cable Co., Rosemont, Ill. p. 2•1993
M Daburn Electronics & Cable Corp., Bronx, N.Y. *
Shigoto Inds., Ltd., New York, N.Y. .... *
D Victor Wire & Cable Corp., Los Angeles, Cal. ... *
D The Anaconda Co., Greenwich, Conn.
D Birnbach Co., Freeport, N.Y.
M Bram Metallurgical-Chem. Co., Phila., Pa.
Gulton Inds., Buena Park, Cal.
Mil Spec Wire & Cable Corp., Freeport, N.Y.
Molecu-Wire Corp., Farmingdale, N.J.
Permaluster, Burbank, Calif.
D Philips Elmet Corp., Lewiston, Me.
M Phoenix Wire, S. Hero, Vt.
M Reynolds Metals Co., Richmond, VA.
Saxton Prods., Congers, N.Y.
Texas Instruments, Attleboro, Mass.
Tohoku Metal Inds., Ltd., Tokyo, Japan
DM Viking Wire Co., Danbury, Conn.

Wire Markers (All Types)-Also see Strips Marker & Fanning

D Panduit Corp., Tinley Park, Ill. p. 2•2048-2051
D Alpha Wire Corp., Elizabeth, N.J. .... *
Acesso-Wire, Garnersville, N.Y.
M Brady Co., W. H., Milwaukee, Wis.
Electrovert, Mt. Vernon, N.Y.

D Ideal Industries Inc., Sycamore, Ill.
M Manger Elec. Co., Stamford, Conn.
Markem Corp., Keene, NH
Matthews & Co., Jas. H., Pittsburgh, Pa.
Newman Corp., M. M., Marblehead, Mass.
D Penn Fibre & Specialty, Phila., Pa.
Raychem Corp., Menlo Park, Cal.
M Storm Products Co., Inglewood, Ca.
Tyton Corp., Milwaukee, Wisc.
D Zippertubing Co., Los Angeles, Calif.

Wire, Multiconductor—See Cable, Multiconductor

Wire Nuts
D **Panduit Corp., Tinley Park, Ill. p. 2•2048-2051**
D **Waldom Electronics, Chicago, Ill. p. 1•1070-1074**
Hickok Electrical Instr., Cleveland, Ohio .... *
Shigoto Inds., Ltd., New York, N.Y. .... *
Acesso-Wire, Garnersville, N.Y.
Autosplice/Dv Gen Staple, New York City, N.Y.
I-T-E Electrical Components Grp., E. Farmingdale, N.Y.
D Ideal Industries Inc., Sycamore, Ill.
ITT Holub Industries, Sycamore, Ill.
Universal Security Instrs., Baltimore, Md.

Wire, Plastic Insulated—See Wire Hookup (All Types)

Wire, Plated (All Types)
Daburn Electronics & Cable Corp., Bronx, N.Y. p. 2•1979,1980
D **Alpha Wire Corp., Elizabeth, N.J.** .... *
Standard Wire & Cable Co., Los Angeles, Cal. *
M Advanced Materials Systems, Atteboro, Mass.
M Arco Wire & Cable, N. Hollywood, Cal.
CCS Hatfield Wire & Cable Group, Cranford, N.J.
Kentucky Electronics, Owensboro, Ky.
Nesor Alloy Corp., W. Caldwell, N.J.
Philips Elmet Corp., Lewiston, Me.
Universal Security Instrs., Baltimore, Md.

Wire, Radiation-Resistant
Belden Corp., Richmond, Ind. ...p. 2•1882-1909
D **Daburn Electronics & Cable Corp., Bronx, N.Y. p. 2•1981**
D **Alpha Wire Corp., Elizabeth, N.J.** .... *
Standard Wire & Cable Co., Los Angeles, Cal. *
The Anaconda Co., Greenwich, Conn.
M Arco Wire & Cable, N. Hollywood, Cal.
M ARI Inds., Franklin Pk., Ill.
Boston Insulated Wire & Cable Co., Dorchester, Mass.
Cerro Wire & Cable Co., New Haven, Conn.
General Elec., Bridgeport, Conn.
Gulton Inds., Buena Park, Cal.
Icore Int'l., Sunnyvale, , Cal.
M Judd Wire Div., Burlington, Mass.
D Manhattan Elec. Cable Corp., Rye, N.Y.
DM Metex Corp., Edison, N.J.
Molecu-Wire Corp., Farmingdale, N.J.
Permaluster, Burbank, Calif.
Raychem Corp., Menlo Park, Cal.
Templine, Gardena, Cal.
DM Thermax Wire Corp., Flushing, N.Y.
Times Wire & Cable, Wallingford, Conn.

Wire, Resistance
D **Consolidated Wire & Assoc. Corps., Chicago, Ill. p. 2•1960**
Daburn Electronics & Cable Corp., Bronx, N.Y. *
The Anaconda Co., Greenwich, Conn.
M Arco Wire & Cable, N. Hollywood, Cal.
M Bram Metallurgical-Chem. Co., Phila., Pa.
Cox & Co., New York, N.Y.
Hoskins Mfg. Co., Detroit, Mich.
D Manhattan Elec. Cable Corp., Rye, N.Y.
Wireflex Incorporated, Bourbon, Ind.

Wire, Resistance Thermometer
Omega Engrg., Stamford, Conn. p. 1•2324-2327
M Arco Wire & Cable, N. Hollywood, Cal.
Cox & Co., New York, N.Y.
Engelhard Minerals & Chem., Murray Hill, N.J.
GTE Sylvania Inc., Newark, N.J.
M Kates Scientific Instrs., Newton, Mass.
D Manhattan Elec. Cable Corp., Rye, N.Y.
Materials Resch. Corp., Orangeburg, N.Y.
Molecu-Wire Corp., Farmingdale, N.J.
Templine, Gardena, Cal.

Wire, Ribbon
D **Columbia Elctrn. Cables, New Bedford, Mass. p. 2•1911**
D **Dearborn Wire & Cable Co., Rosemont, Ill. p. 2•1993**
M **Woven Elctrns., Mauldin, S. C. p. 2•2068-2071**
D **Alpha Wire Corp., Elizabeth, N.J.** .... *
Standard Wire & Cable Co., Los Angeles, Cal. *
D **3M Company, St. Paul, Minn.** .... *
American Electric Cable Co., Holyoke, Mass.
M Arco Wire & Cable, N. Hollywood, Cal.
DM Associated Engrg. & Mfg. Corp., Upper Montclair, N.J.
Autosplice/Dv Gen Staple, New York City, N.Y.
M Bram Metallurgical-Chem. Co., Phila., Pa.
Circuit Assembly Corp., Costa Mesa, Ca.
D Custom Cable Co., Oceanside, N.Y.
Engelhard Minerals & Chem., Murray Hill, N.J.
GTE Sylvania, Towanda, Pa.
GTE Sylvania Inc., Newark, N.J.
Hoskins Mfg. Co., Detroit, Mich.
International Identifications, Timonium, Md.
Jermyn, San Francisco, Cal.
M Judd Wire Div., Burlington, Mass.
DM Manhattan Elec. Cable Corp., Rye, N.Y.
Mil Spec Wire & Cable Corp., Freeport, N.Y.
Nesor Alloy Corp., W. Caldwell, N.J.
Permaluster, Burbank, Calif.
Plessey Inc., Melville, N.Y.
Raychem Corp., Menlo Park, Cal.
TRW/Holyoke Wire & Cable, South Hadley, Mass.
Wilkinson Co., Westlake Village, Cal.
D Workman Electronic Prods., Sarasota, Fla.
D Zippertubing Co., Los Angeles, Calif.

Wire, Semiconductor Lead
Daburn Electronics & Cable Corp., Bronx, N.Y. p. 2•1980
D **Alpha Wire Corp., Elizabeth, N.J.** .... *
Standard Wire & Cable Co., Los Angeles, Cal. *
M Art Wire & Stamping Co., Cedar Knolls, N.J.
DM Associated Engrg. & Mfg. Corp., Upper Montclair, N.J.
Engelhard Minerals & Chem., Murray Hill, N.J.
Fansteel Inc., N Chicago, Ill.
Fusite Div./Emerson Elec., Cincinnati, Ohio
General Electric Co., Cleveland, Ohio
GTE Sylvania Inc., Newark, N.J.
M Hadley Components Div., Hadley, Pa.
Molecu-Wire Corp., Farmingdale, N.J.
Nat'l-Standard Co., Niles, Mich.
Nesor Alloy Corp., W. Caldwell, N.J.
Plessey Inc., Melville, N.Y.

Wire, Shielded
D **Alpha Wire Corp., Elizabeth, N.J. p. 2•1836-1840**
D **Belden Corp., Richmond, Ind. ...p. 2•1882-1909**
DM **Cimco Wire & Cable, Allendale, N.J. p. 2•1910,2023**
D **Columbia Elctrn. Cables, New Bedford, Mass. p. 2•1911**
D **Consolidated Wire & Assoc. Corps., Chicago, Ill. p. 2•1929,1930,1934,1935,1938-1942**
DM **Daburn Electronics & Cable Corp., Bronx, N.Y. p. 2•1979,1981,1983**
DM **Dearborn Wire & Cable Co., Rosemont, Ill. p. 2•1993**
DM **Markel, L. Frank & Sons, Norristown, Pa. p. 2•2024,2025**
National Wire & Cable Corp., Los Angeles, Cal. p. 2•2046
M **Perfection Mica Co., Bensenville, Ill. p. 2•1255,2055**
M **Rowe Industries, Toledo, Ohio p. 2•2052,2053**
DM **Whitmor Wire & Cable, No. Hollywood, Cal. p. 2•2072**
M **Woven Elctrns., Mauldin, S. C. p. 2•2068-2071**
Standard Wire & Cable Co., Los Angeles, Cal. *
D **3M Company, St. Paul, Minn.** .... *
DM **Victor Wire & Cable Corp., Los Angeles, Cal.** ... *
Acesso-Wire, Garnersville, N.Y.
M American Electric Cable Co., Holyoke, Mass.
D The Anaconda Co., Greenwich, Conn.
D Anixter-Mark, Skokie, Ill.
M Arco Wire & Cable, N. Hollywood, Cal.
D Birnbach Co., Freeport, N.Y.
Boston Insulated Wire & Cable Co., Dorchester, Mass.
Brand-Rex Co., Willimantic, Conn.
D CCS Hatfield Wire & Cable Group, Cranford, N.J.
Cerro Wire & Cable Co., New Haven, Conn.
M Co-Operative Inds., Chester, N.J.
D Custom Cable Co., Oceanside, N.Y.
Estes Engrg. Co., Port Angeles, Wash.
General Elec., Bridgeport, Conn.
Gulton Inds., Buena Park, Cal.
Icore Int'l., Sunnyvale, , Cal.
D Jersey Specialty Co., Wayne, N.J.
M Judd Wire Div., Burlington, Mass.
Lenz Electric Mfg. Co., Chicago, Ill.
DM Manhattan Elec. Cable Corp., Rye, N.Y.
DM Metex Corp., Edison, N.J.
Mil Spec Wire & Cable Corp., Freeport, N.Y.
Nesor Alloy Corp., W. Caldwell, N.J.
Okonite Co., Ramsey, N.J.
D Pace Wire & Cable Corp., Oceanside, N.Y.
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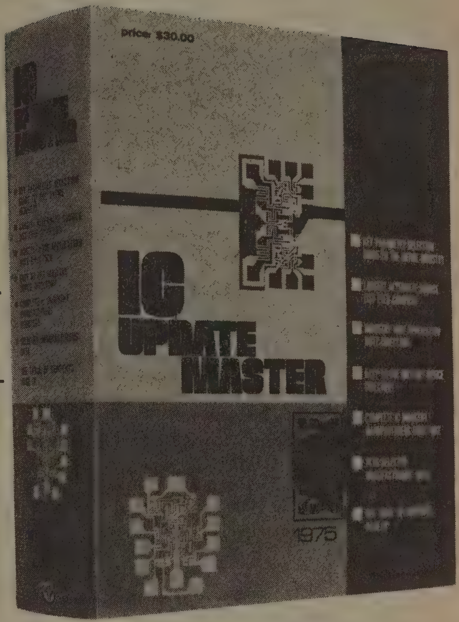

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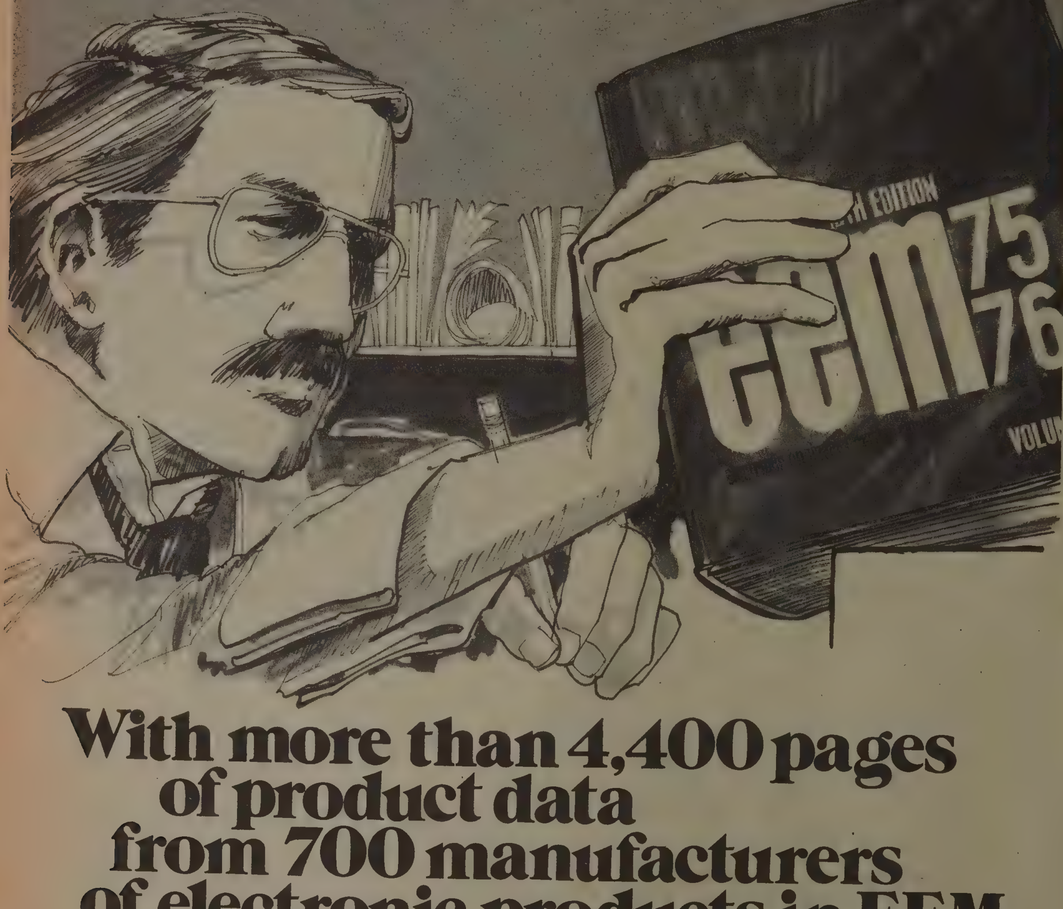

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Abson R - ABS materials - Goodrich Chem. Co., B.F.
Absorbo Mop - sponge mop - Clean Room Prods.
Absorbo-Wipe - urethane foam wiper - Clean Room Prods.
Accellerex - high speed gold process. - Sel-Rex Co. Div. Oxy Metal Industries Corp.
Accelograph - planar accelerometer, visual direct recording - Humphrey, Inc.
ACCESS Process - decapsulation process - Amphenol Connector Div., SAMS Opers.
Access (Std) - control and monitor - Digitech Data Inds., Inc.
ACCESS 100 - selective decapsulation process - Amphenol Cadre Div.
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Accuchart - chart paper - Gould, Inc.
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ACL - Pyro-processing system - Allis-Chalmers
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Acousta-Voicing - sound equalization process - Altec Div.
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AE-16 Rosin - activated rosin core solder - Bow Solder Products
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Agamp - automatic gain adjusting amplifier - GTE Lenkurt Inc.
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Agaswitch - time delay switches - Control Products Div.

Agnicon - silver-nickel contact material - GTE Sylvania Inc.
Agnostick - silver-cadmium oxide contact material - GTE Sylvania Inc.
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AIMSERT - inserts - Aimsco Inc.
Aire-Regulator - temperature humidity chamber - Atlas Electric Devices
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Akrobin - plastic storage bin - Akro-Mils, Inc.
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Alfred - Microwave Test Equipment - Singer Co.
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Alkanex - polyester resin wire enamel varnish - General Elec.
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Allacast System - epoxy potting & encapsulating - Allaco Prods Div.
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AlSiCoat - Ceramic Coatings - American Lava Corp.
AlSiPak - Ceramic packages & Chip Carriers - American Lava Corp.
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Alti-Coder - altitude measurement & readout system - Kollsman Instr. Co.
Alti-Lerter - altitude alerting device - Kollsman Instr. Co.
Alugard - lightning arresters - General Elec. Co.
Alumalytic - capacitors - General Elec. Co.
ALUMA-TRAK - Aluminum Chassis Slides - Zero Mfg. Co.
ALUMEL - thermocouple alloy - Hoskins Mfg. Co.
Alumifoam - foam dielectric - Times Wire & Cable
Aluminax - aluminum shielded coaxial cables - Saxton Prods.
Aluminex - speaker voice coil form - CTS of Paducah, Inc.
Aluminex - speaker bobbins and speakers - CTS Corp.
Alumisol - solid dielectric - Times Wire & Cable
Alumispline - spline dielectric - Times Wire & Cable
ALUMOWELD - Rod, wire and strand - Copperweld Bimetallics
Alumtap - cutting fluid - Brooks Co. Inc., Winfield
AMBICON - automatic level control - Fairchild Sound Equip.
Ambi-Stat - ambient temperature controllers - Honeywell
Ambitrol - constant voltage/current supply - Power Designs, Inc.
Ambroid - liquid cement - Ambroid Co.
American - liquid meters - Singer Co.
American - gas meters, calorimeters and flow meters - Singer Co.
American Beauty - soldering irons, supplies, ultrasonic cleaners - American Elec. Heater
Amersil Fused Silica - opaque fused silica - Amersil, Inc.
Amflex - coaxial cable - Amphenol RF Div.
Aminco-Aire - environmental control source - American Instr. Co.
Amite - digital watches - American Microsystems, Inc.
AMLOC - dryer control - Pall Trinity Micro Corp.
Ampac&T - amplifiers (10V inverter, 10V follower, 10V differential - Analogic Corp.
Ampact - explosive cartridges - Amp Inc.
Amp-Blade - connector - Amp Inc.
Amp-Crimpac - flat packs header - Amp Inc.
Amp-Edge - connectors - Amp Inc.
Ampeez - connectors - Amp Inc.
Amp-Fine-Y-R - splice - Amp Inc.
Amp-Fit - tube fittings - Amp Inc.
Ampillume - indicator lights - Amp Inc.
Amp-In - connectors - Amp Inc.
Amp-Incert - connectors - Amp Inc.
Ampip - post-insulation pod - Amp Inc.
Amp Klip - semiconductor fuses - International Rectifier Corp.
Amplastic - plastic tubing - Amp Inc.
Amp-Leaf - connectors - Amp Inc.
Ampli-Bond - electrical splices & terminals - Amp Inc.
Amplibox - portable public address system - PASO Sound Products Inc.
Ampli-Cycle - power converter - Electric Machinery Mfg. Co.
Ampliducer - straingage transducer incorporating highlevel signal amplifier - West Coast Resch. Corp.
Amplifilm - dielectric material - Amp Inc.
Amplimica - capacitors - Amp Inc.
Ampli-Speed - magnetic drives - Electric Machinery Mfg. Co.
Amplite-End - closed-end splice - Amp Inc.
Amplivar - splices - Amp Inc.
Ampli-Vox - public address systems - Perma Power Div.
Amp-Lok - connectors - Amp Inc.
Ampmodu - interconnection system - Amp Inc.
Amp-O-Lectric - electric machines - Amp Inc.
Ampomator - making machine - Amp Inc.
Amportapower - hydraulic tools - Amp Inc.
Ampower - splices & terminals - Amp Inc.
Amprobe - clamp-on volt/ammeters and strip chart recorders - Amprobe Instr.
Ampseal - connectors - Amp Inc.
Amp Shield - connectors - Amp Inc.
Amp-Sulation - heat shrinkable tubing - Amp Inc.
Amp-Tab - connectors - Amp Inc.
Amp-Tapematic - machines for tape-mounted terminals - Amp Inc.
Amp-Tapetronic - electric machine for applying tape-mounted terminals - Amp Inc.
Amp-Unyt - connectors - Amp Inc.
AMS 6002 - 1024-bit P-channel MOS RAM - Advanced Memory Sys., Inc.
AMS 6003 - 2048-bit P-channel MOS RAM - Advanced Memory Sys., Inc.
AMS 7001 - 1024-bit N-channel MOS RAM - Advanced Memory Sys., Inc.
AMS 7001 Storage Card - High-speed Read/Write Memory Card - Advanced Memory Sys., Inc.
Analogger - analog data logger - NES, Inc.
Analok - A/D conversion circuit - Analog Devices
Analytical Titra-Kit - redox and pH measurements. - Analytical Measurements
Analyzer 2000 series - distortion analyzers - Digitech Data Inds., Inc.
Anniversary - copper tips, iron plated, nickel flashed - Wall-Lenk Mfg. Co.
Antex - solder irons - M M Newman Corp.
Antex - solder irons - Newman Corp., M. M.
"Anti-Static #79" - static eliminator - Merix Chem. Co.
"Anti-Static #79-OL" - static eliminator - Merix Chem. Co.
Anzac - active & passive components - Adams-Russell Co., Inc.
APC-N - precision 7mm connector - Amphenol RF Div.
APC-7 - precision 7mm connector - Amphenol RF Div.
APC-7S - precision 7mm connector - Amphenol RF Div.
Apex - metallic seals - Servotronics, Inc.
Apiezon - oils, greases, waxes - Biddle, James G.
Apilon - ceramic friction material - Delevan Div., American Prec. Inds.
Aqua-Clean - pc board water cleaner - Hollis Engrg., Inc.
Aquadag - conductive/resistive coating - Acheson Colloids Co.
AQUA-SOL - Water soluble soldering fluxes - Kenco Alloy & Chemical Co., Inc.
AR - chemicals - Mallinckrodt, Inc.
Arcolytics - aluminum electrolytic capacitors - Arco Electronics Inc.
Arcom - mobile digital communication system - Atlantic Research Coropration
ARDA - tinning apparatus - Electrovert
Aremcobond - epoxy adhesives - Aremco Prods., Inc.
Aremcolox - machinable ceramics - Aremco Prods., Inc.
Aristocrat - spkr. sys. - Electro-Voice, Inc.
Arkomax - Columnar Alnico Permanet Magnets - Arnold Engineering Co.
ARM - connectors - American Microwave Inds., Inc.
Armaflex - foamed plastic insulation - Armstrong Cork Co.
Armalok - urethane foam insulation - Armstrong Cork Co.
Armco Nitronic 32 - non-magnetic stainless steel for skidwire & power applications - Armco Steel Corp.
Armco Nitronic 33 - low magnetic permability stainless for riser & line pipe - Armco Steel Corp.
Armco Nonoriented Electrical Steels - silicon steels for core applications - Armco Steel Corp.
Armco Oriented Electrical Steels - silicon steels with grain orientation - Armco Steel Corp.
ARMM - micro miniature connectors - American Microwave Inds., Inc.
Armortite - direct burial non-metallic sheath - Okonite Co.
Arnox - Ceramic Permanent Magnets - Arnold Engineering Co.
Aro - resistance welding guns - portable - Falstrom Co.
Aron Alpha - adhesives - Vigor Co.
Arontite - sealants - Vigor Co.
ARSM - sub-miniature connectors - American Microwave Inds., Inc.
ARULAB - ultrasonic test equipment - Arenberg Ultrasonic Lab Inc.
Arval - equip. balancers - Falstrom Co.
A-Scope - interferometer - Varian Assocs.
ASTRO - encapsulated electronics - Astro Products Co.
ASTRO-AIRE - fans - Astro Dynamics
Astro-Brite 135 - color TV picture tube - Westinghouse Elec. Corp.
astro-cobra-flex - semi-rigid flexible cable - Astrolab, Inc.
Astrodome - photoelectric control - General Elec. Co.
ASTROFLO - flow generators and flowmeters - Astro Dynamics
Astrogide - p.c. card guides; guides circuit board - Bivar, Inc.
ASTROLIFT - general cargo lift & Dual parking lift - Astro Dynamics
Astroline - console model wave soldering sys. - Hollis Engrg., Inc.
Astrolite - Drake Mfg. Co.
Astrolok - universal coaxial connector - Astrolab, Inc.
Astroplate - tarnish free finish - Amphenol RF Div.
Astro Super Flex - coaxial cable (precision) - Astrolab, Inc.
Astro/348 - connector - Amphenol Connector Div.
Asymptotic R Calorimeter - Heat Flux sensor - Hy-Cal Engineering
Atlas - technicians service books - LMB Heeger, Inc.
Atom - aluminum electrolytic capacitors - Sprague Elec. Co.
Atom - fire detection system - Kidde, Walter & Co.
Atomiclad II - composite electrical contact rivets - GTE Sylvania Inc.
ATR - Applicable to all products - ATR Electronics, Inc.
ATS*960 - Automated Test System - Texas Instrs. Inc.
Attache Phone - phone in a briefcase - Livermore Data Systems, Inc.
Attenuator-Rated Ferramics - ferrites - Indiana General
Attenuduct - wave guide filter - Filtron Company, Inc.
Audimax - limiter - CBS Laboratories
Audio Baton - audio filter - Blonder-Tongue Labs., Inc.
Audio Hailer - S-168M - Audio Equip. Co., Inc.
AUDIOTEX - home entertainment accessories - GC Electronics
Audio-Verter - paper tape transmitter - Digitronics Corp.

Auric - gold plating solutions - Fidelity Chem. Prods. Corp.
Aurion-X - ion-exchange gold reclamation unit - Sel-Rex Co. Div. Oxy Metal Industries Corp.
Aurobond - gold strike - Sel-Rex Co. Div. Oxy Metal Industries Corp.
Autec - selective gold plating - Viking Inds., Inc.
AUTO-AMP - servo controls - Hills-McCanna Co.
Auto-Answer - automatic telephone answer - Bramco Controls Div.
Autobalance - automatic true rms AC/DC transfer standard - Ballantine Laboratories, Inc.
AUTO-BOOST - automatic low-line voltage booster - Microtran Co., Inc.
Auto-Bridge - automatic limit bridge - Beckman Instrs.
Autodata - data acquisition systems - Vidar Autodata Inc.
Auto-Draft - interactive graphics system - Auto Trol Corp.
Auto-Flow - mark II drafting machine - Keuffel & Esser Co.
AUTO-GAIN - automatic gain amplifier - Ithaco, Inc.
Autohet - automatic heterodyne converter - EIP, Incorporated
Autoline - automatic in-line pc board cleaner - Hollis Engrg., Inc.
Autoloader - system for automatically loading substrate into the sel-rex tf screen printer - Sel-Rex Co. Div. Oxy Metal Industries Corp.
AUTOLOC TM - Lock-in Amplifier - Keithley Instruments Inc.
Automac - press overload control - Cardinal Control Co.
Automagnetic - (magnetic processing system) - RFL Inds.
Automata - card reading equipment - Chatsworth Data Corp.
Automet - automatic weather reporting - E-Systems Inc.
Autometronic - automatic resolution universal counter - Ballantine Laboratories, Inc.
Auto Mod - complete telemetry systems - Autocon Inds., Inc.
Autopin - continuous wire pinning machines - Autosplice/Dv Gen Staple
Autopolar - microwave polarization switch - Teledyne Micronetics
Autoprep - gas chromatograph - Varian Assocs.
Auto-Probe TM - Portable digital multimeter - Keithley Instruments Inc.
AutoRad - x-ray exposure control - Torr Labs.
Auto-Ranger - charge amplifiers - Unholtz-Dickie Corp.
AUTOROTOR-HAM II - Rotor for Amateur Operators - Cornell-Dubilier Electronics
Autosal - lab salinometer - Guildline Instrs., Inc.
AutoScan - Automatic Test Equipment - Addison Div. Muirhead, Inc.
Auto-Snap® - flexible panel switching - Automation Displays Inc.
Autosplice - wire fed splicing equipment - Autosplice/Dv Gen Staple
Autosyn - instruments & systems of remote indications - The Bendix Corp.
Autotab - high production circuit board hardware - Autosplice/Dv Gen Staple
AUTOTAK® - Automatic tachometer indicator - Howell Inst. Inc.
Autotape - positioning system - Cubic Corp.
AUTOTEMP® - automatic temperature indicator - Howell Inst. Inc.
Auto-Ten - automatic attenuator - Fairchild Sound Equip.
AutoTrak - Automatic Test Equipment - Addison Div. Muirhead, Inc.
Autronex - acid type gold electroplating process for ind'l applications. - Sel-Rex Co. Div. Oxy Metal Industries Corp.
Avanti - fluorescent emergency lights - Teledyne Big Beam
AWAC - alumoweld-aluminum power conductors - Copperweld Bimetallics
Axial Flow - valves, regulators and control devices - Singer Co.
Aximax - fan - Rotron, Inc.
Axiohm - axial lead enamel resistors - Ward Leonard Elec. Co. Inc.
A4 - acoustic automatic answer attachment - MI2 Data Systems Inc.

B

B - potentiometers - Bourns, Inc.
Bakelite - plastics products; vinyl, pe, etc. - Union Carbide, Chemicals & Plastics
Balco - resistance alloy - GTE Sylvania Inc.
BAL-CON - stacking connector - Eby Co., Hugh H.
Baldwin - instruments - BLH Elctrns., Inc.
Balladier - microphones - Conrac Corp.
Ballantine - AC voltmeters - Ballantine Laboratories, Inc.
Ball-Lok - quick release pins - Avibank Mfg. Inc.
Ball-Pak - Bearings for disc harrows - Allis-Chalmers
Banc-Lok - inserts - Cherry Rivet & Boots Nut Divs.
Band-o-Code - band marking of insulated wire - Storm Products Co.
BANDOMATIC - installation tooling - Burndy Corporation
Band-Scan - control system - Sequential Information Systems
Bantam - leak detector - Varian Assocs.
BANTAM - miniature round connectors - Burndy Corporation
Bantam Rota-Crimp - crimping tools - Amp Inc.
Ban the Blob - fluorescent ballasts - Jefferson Elec.
Barocel - pressure transducers - Datametrics Inc.
Barratron - transmitting tubes - Litton Inds.
Baseline - thermal relays - Warren G-V Communications
Bazooka - vacuum probes - Air-Vac Engrg. Co.
Bazooka - solder gobbler/iron - Air-Vac Engrg. Co.
BDT - non cyanide gold plating process - Sel-Rex Co. Div. Oxy Metal Industries Corp.
BeaU - connector, barrier terminal strips - Vernitron Elec. Comps.
Beau-Tech Tools - soldering aids - Precision Elec. Co.
Becon - printed circuit connectors - Teledyne Kinetics
BEE Line - communication connectors - Hughes Aircraft Co., Connecting Devices
Beeplites - Drake Mfg. Co.
Behlman - ac power sources - Elin Div.
Beldfoil R - Aluminum/Polyester Shield Material - Belden Corp.
Belgard - burglar alarm - Aqualarm Inc.
Bellco Nameplates - plastic & metal identification plates - Bell Co., Inc.
BELLE KLIPSCH - loudspeaker system - Klipsch & Assocs. Inc.
"Bellowform" - printed circuit connector contact - Continental Connector Corp.
BELT-LINE - Teflon Transistor Sockets - U.S. Terminals
Bemac II - ac generators - Electric Machinery Mfg. Co.
Bemcoil - surface heat exchange material - Bemco, Inc.
Bemol - Lubricants, molybdenum disulfide - Rogers Corp.
Benavac Mark II - hetrodyne processor - Delta-Benco-Cascade LTD.
Benchmaster - bench top test chamber - Tenney Engrg., Inc.
Bench-Model Solderette - wavesoldering equip. - Electrovert
Berg - pliers - Erikson Specialized Tool Co.
BergCon - packaging system - Berg Electronics
BergFlo - plating process - Berg Electronics
BergLance - male pin - Berg Electronics
BergLok - modular interconnection system - Berg Electronics
Bergold - graduated gold plating - Berg Electronics
BergPac - reed relay terminal - Berg Electronics
BergPin - wire wrapping pins - Berg Electronics
BergPost - wire wrapping posts - Berg Electronics
BergStik - straight and right angle headers - Berg Electronics
Berlon - beryllium oxide epoxy resin materials - National Beryllia Corp.
Berlox - pure oxide ceramics, composite systems, ceramic-to-metal assemblies - National Beryllia Corp.
Berlox-strate - pure beryllia substrates - National Beryllia Corp.
Besponder - Tracking Radar Devices - Vega Precision Labs.
BEST - Automotive Speakers, Stereo Kits, & Access. - Oxford Speaker Co.
BET - RF power transistors - Motorola Semiconductor Prods.
Beta - precision CRT displays - Infodex, Inc.
Beveloid - conical involute gears - Invincible Gear Co.
Beyer - earphones, input transformers - Gotham Audio Corp.
Bicronite - epoxy coating process - Bicron Elctrns. Co.
Bicron/Vollmer Gages - contact measuring instrument - Bicron Elctrns. Co.
Bicron X-Ray Gage - non contact measuring instrument - Bicron Elctrns. Co.
Bi-Film - resistance elements - Bourns, Inc.
Biflex - type of speaker - Altec Div.
Big Beam - emergency lights & hand lamps - Teledyne Big Beam
"Big-Bertha" - rotatable antenna support masts - Telrex Labs.
Big Inch - motors - Haydon Switch & Instr., Inc.
Big Look® - panel meters - General Electric Co.
BIMET - clad metals - Handy & Harman
Bimode - solid state diodes - Varian Assocs.
BIMODE - diodes - Varian Electron Tube & Device Grp.
Bimode Diodes - microwave multiplier diodes - Varian Solid State East Beverly Div.
BINA-DEC R - BCD converter - Industrial Elctrn. Engrs.
BINAVERTER - Binary to Decimal Converter - Metric Systems Corp.
BINA-VIEW R - binary-input self-decoding readout - Industrial Elctrn. Engrs.
Biode - silver/silver chloride electrode (af/agcl) - Biocom, Inc.
Biolink - telemetry systems - Biocom, Inc.
Bio-Solv - solubilizers - Beckman Instrs., (AISSD)
Bi-Pac - mechenical switch module - Controls Research Corp.
BIPAX - flexible package - Tra-Con, Inc.
Biplexer - 19.2 bps full-duplex modem - Codex Corp.
Biraco - tubing - Birnbach Co., Inc.
Bi-Scan - electrostatic printer/plotter - Varian Data Machines
Biscuit - blower - Rotron, Inc.
Bistable Amplifier - ultrasensitive solid state relay - Cross Electronics Inc.
BIT - miniature audio transformer - TRW/UTC Transformers
Bit Error 2000 series - rate test sets - Digitech Data Inds., Inc.
BiTran - educational computer - Fabri-Tek, Inc.
B.I.T.S. - Backplane Integrated Test System - Addison Div. Muirhead, Inc.
BITSWITCH - PCB-mounted programming device - Stanford Applied Engineering
Black-Daylite - television receivers - General Elec. Co.
Black-Magic - Unifield low cross talk Transmission Line flat cable - Ansley Elctrns. Corp.
Black-Out - front panel for lighted readout - Info-Lite Corp.
Blendmaster - metering, mixing, dispensing machines - Hull Corp.
BLEND-OHM - screenable resistance paste - Methode Elctrns., Inc.
Blendtrol - digital blending sys. - Foxboro Co.
BLI - instrumentation - Beukers Labs., Inc.
B-Line - potentiometers - Bourns, Inc.
Bloc-Lite - indicators-lighted - LVC Inds. Inc.
Blue Dot - precision coaxial connectors - Maury Microwave Corp.
Blue Dot - flashcubes - flashbulbs - magicubes - GTE Sylvania Inc.
Blue-Point - automotive hand tools - Snap-On-Tools
BLUE RIBBON - electrical connectors - Amphenol Ind'l. Div.
Blue-Streak - Pre Homogenous flat cable - Ansley Elctrns. Corp.
Blue Stuff - cleaner/lubricant - Tech Spray, Inc.
Blue Top - projector lamps - GTE Sylvania Inc.
Bogen-Call - paging sys - Bogen Div.
Bogen-Call Pagemaster - personal, selective paging - Lear Siegler, Inc.
Bogen-Phone - telephone-intercom sys - Bogen Div.
Bomb-Tail - closed-end splice - Amp Inc.
Bondalum - transit cases - Craig Sys. Corp.
Boomerang - sediment corer - Benthos, Inc.
Boots - nuts - Cherry Rivet & Boots Nut Divs.
BOPAC - microwave circuitry & components - Varian Assocs.
BOPAC - microwave circuitry components - Varian Electron Tube & Device Grp.
Bopac - microwave circuitry components - Varian Assocs.
Bord Pak - instrument cases & card guides & racks - Buckeye Stamping Co.
Bostflex - high flexibility industrial cables - Boston Insulated Wire & Cable Co.
Bostgard - high temperature soaking pit cables to 2100°F - Boston Insulated Wire & Cable Co.
Bostrad - fire & radiation resistant elec. cables - Boston Insulated Wire & Cable Co.
Bourns - potentiometers - Bourns, Inc.
Bouyoucos - soil moisture meas. inst. - Beckman Instrs.
Boxer - Airmovers - I M C Magnetics
BOXER - axial fans - IMC Magnetics Corp.
Boyd Bolt - self-retained bolts - Tridair Inds.
BR - relays - Babcock Electronics
Brandenburg - high voltage power supplies - Zi-Tech Div.
Bransonic - ultrasonic cleaner - Branson Cleaning Equip. Co.
Brazaloy - flux - Chemetron Corp.
BRILLO-LOCK - air filters, permanent aluminum - Evans George Corp.
Brimar - cathode raytubes - Inter-Tech. Grp., Inc.
BriteSorb - synthetic magnesium silicate - Philadelphia Quartz Co.
Broad-Band Rated Ferramics - ferrites - Indiana General
Brooksmite - flowmeter - Brooks Instr. Div.
Brown Booster - high-surge voltage regulator - Micron Industries Corp.
Brush - name of recorder line - Gould, Inc.
Bubbitrol - pressure operated control - Autocon Inds., Inc.
Buchanan - terminal blocks, printed circuit board connectors - Control Products Div.

Buddybuzzer - dual alarm system - Tapeswitch Corp. Amer.
Bulk Metal - resistor and potentiometer elements - Vishay Resistive Systems Grp.
Bullet - sealing hub connector - Thomas & Betts Co.
Bullet Blade - Plows - Allis-Chalmers
Bullet-Nose - lugs - Sealectro Corp.
BULLS-EYE - subminiature circular connectors - Hughes Aircraft Co., Connecting Devices
BUSS - fuses & fuseholders - Bussmann Manufacturing
Butterfly - double-break switches - Licon Div.
Butterfly - double-break mechanism - Licon Div.

C

Cabinetrol - motor control - General Elec. Co.
Cable Maker - terminals - Amp Inc.
Cablemaster - cable test equipment - Chatsworth Data Corp.
Cablemaster - cable & harness test equip. - Cablemaster Div.
Cablematic - wire stripping tools - Ripley Co., Inc.
Cable-Rap - plastic spiral wrap - Transcon Mfg. Co.
CADENCE - musical instrument speakers - Utah Electronic Div.
Cadis - computer aided design information sys. - Macrodata
Caeon 27 & 28 - solvent - solvent
Cage-Trol - induction-motor controls - Electric Machinery Mfg. Co.
CALECTRO - experimenter-hobbyist items - GC Electronics
Calfax - speciality fasteners - Tridair Inds.
Cali-Brain - amplitude measuring system (scoper) - Dynascan Corp.
CALICO - monitor oscilloscopes - California Instrs. Co.
Caliper - thickness tester - Branson Cleaning Equip. Co.
CALORIMIXER - Gas Mixing Controls - Cutler-Hammer, Inc.
Calrod - heaters - General Elec. Co.
CAMBI-CARD - circuit boards - Cambridge Thermionic Corp.
CAMBION - electronic components & swagers - Cambridge Thermionic Corp.
Cam-Bolt - spring-lock shelf supports - Simmons Fastener Corp.
Camper - lanterns - Teledyne Big Beam
CAPABLE - computerized logic tester - Computer Automation, Inc.
Caplet - rivets-insulated - Pylon Co., Inc.
Capopad - combination transistor pad & cap - Bivar, Inc.
Caps - cannon authorized plug specialist - ITT Cannon Electric
Cap-Sure - component holders - Industrial Devices
Captain - lighting prods. - Union Carbide
Caravelle II - CB Rig - Fanon/Courier Corp., Subs.
Carbolube - carbon products - Carbone Lorraine Industries Corp.
Cardiline - microphone - Electro-Voice, Inc.
Cardopull - p.c. card ejectors - Bivar, Inc.
Carefree - rechargeable batteries - Eagle-Picher Inds.
CAROUSEL IV & IVA - Inertial navigation system - Delco Electronics Div.
Cartridge Lamps - Drake Mfg. Co.
CartriFile R - magnetic tape and disk systems - Tri-Data Corp.
Cartrol - industrial memory system - Pacific Technology
Cary - spectrophotometers - Varian Assocs.
CASCADE - die-cast coax speakers - Utah Electronic Div.
C-A-S-H - I.C. Packing Harkware - Standard Logic Inc.
CAST - Computerized auto. systems tester - PRD Elctrns., Inc.
Catabond - copperclad laminates - NVF Co.
Catalog #100 - catalog - Workman Electronic Prods., Inc.
CAVEX - Speed Reducers - Eaton Corp.
CAVMATIC - ultrasonic generators - Phillips Mfg. Co.
C-B - coils - Caddel-Burns Mfg. Co., Inc.
CBE - combression bonded encapsulation - Westinghouse Elec. Corp.
CB-Mate - CB wattmeters - Bird Electronic Corp.
CC Enveloped by Q - used on all products - Coil-Craft Inc.
CC-4 - printed circuit board - Photocircuits Div., Kollmorgen Corp.
C-Dek - data entry devices - Mohawk OEM Sales
CDM - Terminal Blocks - Curtis Industries Inc.
CDP - p.a. horn - Electro-Voice, Inc.
CE-CON - card edge connector - Eby Co., Hugh H.
Celcor - ceramic substrates - Corning Glass Works
CELESTA - die-cast coax speakers - Utah Electronic Div.
Cell Mate - battery chargers - Seven Sciences, Inc.
Cell-O-Air - polyethylene dielectric - Superior Cable Div.
Cello-Flex - Electrical insulation - Allis-Chalmers
Celluline R - Tubular TV Lead-In Wire - Belden Corp.
CEM - coaxial magnetron - Varian Assocs.
Cem - coaxial magnetrons - Varian Assocs.
CEM - magnetrons - Varian Electron Tube & Device Grp.
Cemco - switches - Columbus Electric Mfg. Co.
Centaur - fan - Rotron, Inc.
Centigrid - low profile DPDT relay - Teledyne Relays
Centi-Loc - connector - ITT Cannon Electric
Centra-Gap - lamination shape - Thomas & Skinner, Inc.
Centricore - cores - Magnetic Metals Co.
Centrisafe - centrifugal accelerator (centrifuge) - Trio-Tech, Inc. of Calif.
Centrisort - automatic parts handler - Trio-Tech, Inc. of Calif.
Centri-Stak - Multi-stage compressors - Allis-Chalmers
Centrix - Grinding mills - Allis-Chalmers
Centura - wallplates, switches, outlets - Leviton Mfg. Co., Inc.
Centurion SSB Plus - SSB TRansceiver - Fanon/Courier Corp., Subs.
Ceradot - cermet fixed resistor - CTS Corp.
Cerafil - Ceramic Capacitor - AVX Ceramics
Ceralam - Ceramic Capacitor - AVX Ceramics
Ceramabond - ceramic adhesive - Aremco Prods., Inc.
Ceramacast - castable ceramics - Aremco Prods., Inc.
Ceramacoat - ceramic coatings - Aremco Prods., Inc.
Cerama-Dip - potting ceramic - Aremco Prods., Inc.
Cerama-Probe - measuring instr/coatings - Aremco Prods., Inc.
Cerameterm - terminal - Fansteel Inc.
Ceramicon - Ceramic capacitors - Erie Technological Products
Ceramo - thermocouple wire - Thermo Elec. Co., Inc.
Ceramocouple - thermocouple - Thermo Elec. Co., Inc.
CERAMOLITHIC - mfg. process - USCC/Centralab, Elec. Div.
CERAMOLITHIC - ceramic capacitors - Centralab
CeramVac Series - ceramic vacuum relays - Torr Labs.
Ceramvar - controlled expansion alloy - GTE Sylvania Inc.
Ceraseal - Ceramic Capacitor - AVX Ceramics
Ceratrim - cermet trimmers - CTS Corp.
CeraTrolS - ceremet potentiometer - CTS Corp.
Cercor - heat exchangers - Corning Glass Works
Cerma-Cel - steel-housing, ceramic-base thyristor - Hutson Industries
Cermide - variable & fixed resistors (primarily high resistance) - CTS Corp.
Cermolox - ceramic/metal power tubes - RCA, Ind'l. Tube Div.
Cerocup - Ceramic Capacitor - AVX Ceramics
Cerol - Ceramic Capacitor - AVX Ceramics
Certacell - voltage reference - Codi Corporation
Certavolt - voltage ref - Codi Corporation
Certi-Crimp - crimping tools - Amp Inc.
Certi-lok - insertion tools - Amp Inc.
Certimesh - woven wire cloth - Pall Trinity Micro Corp.
Certi-Seal - splice - Amp Inc.
Challenger - amplifiers & sound sys - Bogen Div.
Challenger - Steel Electronic Cabinets (Medium Duty) - Equipto Enclosure Systems
ChA-MP - tool - Amp Inc.
"Champion" - adding-subtracting machines - Victor Comptometer Corp.
Channelite - piezoelectric ceramics - Channel Inds.
Channellight - room construction - Hotpack Corp.
Channeltron - electron multiplier (CEM) - Galileo Electro-Optics Corp.
Channeltron - electron multiplier array (CEMA) - Galileo Electro-Optics Corp.
Charaband - computer line printer - Dataproducts Corp.
Chase - nipples & couplings - Thomas & Betts Co.
CHASSIS-TRAK - Slides & Handles - General Devices Co., Inc.
Check-Lite - Pilot Light Push Button - Adalet Mfg. Co.
Chem-Blanks - photo-etching - Braun Co., Inc.
Chemcor - chemically strengthened glasses - Corning Glass Works
Chemcor - chemically strengthened glasses - Corning Glass Works, Television Prods. Div.
Chemfluor - products of teflon - Chemplast, Inc.
Chem K - high capacitance insulating material - Chem Aero, Inc.
Chemputer - circular chemical computer - Coleman Instr. Div.
Chemtron - reed relays - COSAR Corp.
Cherry - rivets - Cherry Rivet & Boots Nut Divs.
Cherry Lock - rivets - Cherry Rivet & Boots Nut Divs.
Chinalak - varnishes - Dolph, John C. Co.
Chip Stik - Calculator chip w/memory - Western Digital Corp.
ChipStrate&T - solderable chips on standardized substrates - Unitrode Corp.
Chlorothene Nu - chlorinated solvent - Dow Chemical Co.
Chlorothene VG - chlorinated solvent - Dow Chemical Co.
Cho-Nector - elastomer interconnector - Chomerics, Inc.
Cho-Seal - conductive elastomer RFI gasket - Chomerics, Inc.
Cho-Shrink - conductive heat shrinkable plastic - Chomerics, Inc.
Cho-Sil - conductive elastomer RFI gasket - Chomerics, Inc.
Cho-Therm - Electrically isolating, thermally conductive elastomer - Chomerics, Inc.
Chromafilter - filters for display readouts - Panelgraphic Corp.
Chromafuse - display light deffusers - Panelgraphic Corp.
Chromascreen - rear projection screen - Panelgraphic Corp.
Chromatrix - color tv picture tubes - GTE Sylvania Inc.
Chromatrix - color TV picture tubes - GTE Sylvania Inc.
Chroma 80 - video tape - Memorex Corp.
Chroma 90 - video tape - Memorex Corp.
CHROMEL - thermocouple & resistance alloys - Hoskins Mfg. Co.
Chronologger - electronic attendance reporting system - NES, Inc.
Chronos DTM - hand held digital test meter - Advanced Digital Research
Chronotrol - a indicating program controller - Barber-Colman Co.
Cimclad - copper clad laminate - Cincinnati Milacron
CIMRON - digital multimeters - California Instrs. Co.
Cimron - digita multimeters - Calico Div.
Circap - ceramic capacitors - Dilectron
Circa-Tin - immersion tin process - Conversion Chem. Corp.
Circle "B" - motors and timers - Bristol Saybrook Co.
Circuit-Deck - precision cermet switches - Beckman Instrs.
Circuitip - level tips for printed-circuit components - Amp Inc.
Circuitrim R - trimming potentiometer - TRW/IRC Potentiometers
CIRCUIT RYDER - infrared thermometer - Raytek, Inc.
Circuit Zaps - pc prototype material - Bishop Graphics
CIRKITBLOCK: - buildingblock power module - Powercube Corp.
Cirqpil - plug-in circulator - Cir-Q-Tel, Inc.
CJ - cold junction reference source - Omega Engrg., Inc.
CLAREED - switching assemblies - Clare & Co., C.P.
Claspcon - .025" & .045" square wire to crimp terminal connector - Molex Inc.
Classette - tape recorders - Audiotronics
Classic - Motors & Gearmotors - Carter Motor Co.
Classic - cabinets - Par-Metal Prods. Div.
Classic - Intercoms - Fanon/Courier Corp., Subs.
Classic III - CB Rig - Fanon/Courier Corp., Subs.
Clean-N-Dri - detergent - Clean Room Prods.
CLEVELAND - Speed Variator - Eaton Corp.
CLEVELAND - Worm Gear Sets - Eaton Corp.
CLEVELAND - Speed Reducers - Eaton Corp.
CLF - fuses - General Elec. Co.
Climate-Lab - environmental chamber - American Instr. Co.
Clincher - ball valves - Jamesbury Corp.
Cliniflow - blood flowmeters - Carolina Medical Elctrns., Inc.
Clip-AC - Line Voltage Regulator - Tele-Dynamics/Wanlass
Clorinol - A-C capacitors - Sprague Elec. Co.
CLR-2 - Base Antenna - Hy-Gain Electronics Corp.
CMC - directional couplers - Connecticut Microwave Corp.
CMC1200 - elevator control - Cubic Corp.
CMV Teflon - teflon parts - Dixon Corp.
Co/Alr - switches & outlets - Leviton Mfg. Co., Inc.
Coaxiclamp - connectors & splices - Amp Inc.
Coaxicon - connector - Amp Inc.
"Coaxitube" - coaxial cable - Precision Tube
Coaxwitch - Coaxial Switches - Bird Electronic Corp.
Co-Belt - extremely rugged recorders - Genisco Tech. Corp.
Cobra - cb 2-way radios - Dynascan Corp.
Cobreflex - horn - University Sound
Codasyn - frequency synthesizer - Adret Corporation
Codistor I - low voltage regulators - Codi Corporation
Codistor II - high voltage silicon rectifiers - Codi Corporation
Coiltite - wire-wrapping bits & sleeves - O. K. Machine & Tool Corp.
Collimizor R - allignment meter - Materials Resch. Corp.
Color Bright 85 RE - color TV picture tubbes - GTE Sylvania Inc.
Color Bright 85 RE - color tv picture tubes - GTE Sylvania Inc.
Color Bright 85 XR - color tv picture tubes - GTE Sylvania Inc.
Color Bright 85 XR - color TV picture tubes - GTE Sylvania Inc.
Color Cord - cord sets - Pacific Electricord Co.
Color-Keyed - connectors, tools & dies - Thomas & Betts Co.
Color/Matic - color analyser - Lektra Labs., Inc.

Color Screen 85 - color TV picture tubes - GTE Sylvania Inc.
Color Screen 85 - color tv picture tubes - GTE Sylvania Inc.
Colorvue - 50-220 MHZ line of solid state CATV equip - AEL Commumications Corp., Sub. of Amer. Elctrn. Labs. Inc.
Combat - boron nitride - Carborundum Co.
COMPAC - MEDIUM CURRENT BRIDGE RECTIFIER, SILICON - Semtech Corp.
COMPAC SERIES COUNTERS - Electrical and Mechanical Counters - ENM
Compactor - Pressure roll process for material agglomeration - Allis-Chalmers
Com-Pak - power supplies - Lambda Elctrns.
Com-Pak Mark II - power supplies - Lambda Elctrns.
Complimiter - peak limiting amplifier - Spectra Sonics
COMPLOT - digital plotting systems - Houston Instrument
"Comptograph" - calculators - Victor Comptometer Corp.
Comp-U-Kit - electronic modules - Scientific Measurements
Computerminal - data terminal - Wyle Computer Prods., Inc.
Computroller - 3330 type disc controllers - Diva, Inc.
Comstoc - graphic recording paper and film - Keuffel & Esser Co.
ComTran - educational computer - Fabri-Tek, Inc.
Conacure - hardeners (curing agents) for epoxies & polyurthanes - Conap, Inc.
Conapoxy - epoxy base resins & compounds - Conap, Inc.
Conathane - Polyurethane resins & systems - Conap, Inc.
Concentrikit - put together replacement potentiometers (for concentric controls) - CTS Corp.
CONCO-FOAM - 300 ohm twin lead - Consolidated Wire & Assoc. Corps.
CONDOR - propeller fan - IMC Magnetics Corp.
Conducting Twenty/Twenty - conductive epoxy - Allaco Prods Div.
Conducting Twenty/Twenty - epoxy/conductive - Packaged Resins Div.
Condux - electrically conductive elastomers - Hardman Inc.
CO-NETIC - magnetic shielding material - Perfection Mica Co.
ConFlat - flanges - Varian Assocs.
Conflat - sealing flanges - Varian Assocs.
Confuzz - conductive tapes & closures - Technical Wire Products, Inc.
CONHEX - r.f. connector - Sealectro Corp.
CONITEL - digital data acquisition & supervisory system - Leeds & Northrup Co.
Conmax - conductive nickel/silicone - Technical Wire Products, Inc.
Connecto-Blok - wiring system - Thomas & Betts Co.
Conographics - graphic display terminal - Hughes Aircraft Co.
Conographics - graphic display terminal - Hughes Aircraft Co.
Conqueror II - CB Rig - Fanon/Courier Corp., Subs.
Conrad-Missimer Division - manufactures standard environmental test chambers and equipment - Bemco, Inc.
Consil - conductive silver/silicone - Technical Wire Products, Inc.
Consotrol - instruments - Foxboro Co.
CONtac - harness assembly - Berg Electronics
Contempo - console system. - Par-Metal Prods. Div.
Controflex - flexible ribbon - Tapeswitch Corp. Amer.
Controfluxer - Regulator/Filter Device - Advanced Power Inc.
CONTROLPAC - control systems - Eagle Signal
CONTROL PLUS - temp controls; counting & timing controls - MKC Electronics
Converti-Fuse - panelboards, safety switches, switchboards - General Elec. Co.
Cool Glo - light tables - Bishop Graphics
Co-Ord - matrix boards - LVC Inds. Inc.
Copalum - terminals & splices - Amp Inc.
COPEL - resistance alloy - Hoskins Mfg. Co.
Coppergard - shielded coaxials - Superior Cable Div.
"Copperply" - lead wire (copper-coated) - Nat'l-Standard Co.
Copper Sweat - plumbers solder - Bow Solder Products
Copperweld - rod, wire and strand - Copperweld Bimetallics
CopScan - FM Monitor Scanners - Fanon/Courier Corp., Subs.
Copyphone - facsimile transmission systems. - Telautograph Corp.
Cords Limited - cord sets - Essex International, Inc.
Corning - instruments, recorders - Corning Glass Works
Corning - fluidic products - Corning Glass Works, Fluidic Products
Corning - glass optical waveguides - Corning Glass Works, Television Prods. Div.
CORNWALL - loudspeaker system - Klipsch & Assocs. Inc.
Coronol - rubber insulated cable - General Elec.
Corrgard - polyester film - Superior Cable Div.
COS/MOS - complementary symmetry metal-oxide-semiconductor - RCA Solid State Div.
Count Modules - printers - Practical Automation, Inc.
COUPLATE - thick film circuit - Centralab
Couploid - Face couplings - Invincible Gear Co.
Covap R - tungston filaments - Materials Resch. Corp.
COWECO - coil winding equipment - Coil Winding Equip. Co.
CPPC - synchros & servo motors - Clifton Precision
Cradle - telephone type relays - Gould Inc.
Cradleclip - wire cable harness - Electrovert
Craig - film editing equipment - Kalart Victor Corp.
Cramolin - contact cleaner - Caig Labs., Inc.
Cranegard - hookload indicators - Dillon, W.C. & Co.
Crescent - rings, retaining - Waldes Kohinoor, Inc.
Cris-Pic - TV image impressor - Kalart Victor Corp.
Criteria System - IC burnin systems - Reliability Inc.
CRL - electronic components - Centralab
CRL (within a diamond) - electronic components - Centralab
CRONUS - digital electronic stopwatch - Intersil, Inc.
Crop-Trol - temperature controllers - Honeywell
Crossfire - broadband antenna system - Channel Master Div. Avnet
CRT - corona resistant teflon cable - Daburn Electronics & Cable Corp.
CRT-PAC - CATHODE RAY TUBE SILICON HIGH VOLTAGE MULTIPLIER - Semtech Corp.
Cruiser - CB Rig - Fanon/Courier Corp., Subs.
Cryo-Panel - thermal shroud tubing - High Vacuum Equip. Corp.
CryoSource TM - Cryogenic Refrigerators - Sargent Welch Sci. Co.
Cryoterm - noise sources, cryogenic - Maury Microwave Corp.
Cryo-Tip - cryogenic cooling tip - Air Prods. & Chems., Inc.
Crystal-Cap R - polyester film capacitors - General Instr. Corp., Semiconductor Prods Grp.
Crystal Chronetic - motors - Haydon Switch & Instr., Inc.
Crystal Clear - optically clear epoxy adhesive - Allaco Prods Div.
Crystal-Clear - optically clear epoxy adhesive - Packaged Resins Div.
C-Scan - solid state keyboard - Controls Research Corp.
CTC-71 - energized rosin filled core solder - Alpha Metals, Inc.
Cubath - acid copper electroplating process. - Sel-Rex Co. Div. Oxy Metal Industries Corp.
CUBE-PAC: - module assembly package - Powercube Corp.
Cubic - computer tape - Memorex Corp.
Cubitape - Surveying tool - Cubic Corp.
Cubond - copper brazing paste - Gliddon Metals
CuClad - rigid microwave substrate material - 3M Company
CUE-SWITCH R - low-mass, slim-profile, image transparent switch - Industrial Elctrn. Engrs.
Cuflex - flexible pointed circuit material - 3M Company
CUPAC - HIGH CURRENT STUD SILICON RECTIFIER - - Semtech Corp.
Cupron - resistance alloy - GTE Sylvania Inc.
Cupronel - thermocouple alloy - GTE Sylvania Inc.
Cuprox - analytical reagent - Coleman Instr. Div.
Curristor - current sensing resistor - General Resistance, Inc.
Curtis Indachron - low cost elapsed time indicato - Curtis Instrs., Inc.
Curvacore - Transformers - Allis-Chalmers
Cushion Grip - Screwdrivers - Klein, Mathias & Sons, Inc.
Cusil - brazing alloys - Gte Sylvania, Inc.
Custom - Converters - Carter Motor Co.
Custom Vand VII - Pumps - Allis-Chalmers
CV-D - microphone - Electro-Voice, Inc.
C-W - coils - Caddel-Burns Mfg. Co., Inc.
Cycle Log - controller, programmable - Foxboro Co.
CYCL-FLEX - timers counters - Eagle Signal
Cyclohm - fans-blowers - Howard Industries
Cyclonair - blower - Rotron, Inc.
Cyclonome - Pulse Counters & Stepping Motors - Sigma Instruments, Inc.
CYCLOPTIC - Stereoscopic Microscope - American Optical Corp.
Cyclo-Rubber - cyclicized rubber materials - Hardman Inc.
C-21 - pressure sensitive individual wire seals - Hughes Aircraft Co., Connecting Devices

D

DAFAB - Polyester Monofilament fabric - Wire Cloth Enterprises, Inc.
Daflex - vinyl tubings - Daburn Electronics & Cable Corp.
Daflon - teflon tubings - Daburn Electronics & Cable Corp.
Dag - lubricant - Acheson Colloids Co.
Dage - coax connectors - Bendix
DAKA WARE - plastic knobs - Davies Molding Co., Harry
Dalic - selective electroplating - Sifco Metachemical
DAMS - dedicated analytical module system for single purpose spectro- or electro-chemical instrumentation. - Bromberg Engineering
Danameter - digital voltmeter - Dana Labs., Inc.
Dan-L - Relay Socket - DAN-L Inc.
Danner - linear motion & rotary attenvators - Gotham Audio Corp.
Danyon - special formulation vinyl insulation on retractile cords - Daburn Electronics & Cable Corp.
Dapon - resin - FMC Corp.
Daprene - shrinkable neoprene tubing - Daburn Electronics & Cable Corp.
Datab - pressure-sensitive markers (computer printed) - Brady Co., W. H.
Datacel - Optoelectronic Relay - Sigma Instruments, Inc.
DATA CHECK 200H - cable & continuity tester - Data Numerics
DATA CHECK 200S - Cable & continuity tester - Data Numerics
Datacord - magnetic tape transport - American Videonetics Corp.
Datadraft - automated drafting system - Dimensional Systems, Inc.
Datafile - mass memory - Burroughs Corp.
DATA IV/70 - Key-to-disc Systems - Four-Phase Systems
Datakoat - spray coatings - Datak Corp.
Data Krome - optics system - Kollsman Instr. Co.
Data-Lit - numeric & alph numeric displays - Litronix
Datalite - ultra-miniature indicators - Dialight
Datamark - kits for marking elctrn. equip. - Datak Corp.
DATA-MONITOR - annunciators - Tec, Inc.
Datanet - data communications equip. - Honeywell Information Systems
DATA PANEL - backlighted display systems - Tec, Inc.
DATAQUIRE - data acquisition systems - DataGraphics Corp.
Datarama - status display systems - Ferranti-Packard, Ltd. Elec. Div.
Data-Rite - contact - T-Bar Inc.
DATA-SCREEN - data display (crt) terminals - Tec, Inc.
DataScript - data input device for remote projection equipment - Kollsman Instr. Co.
Dataseeker - modem/comm. terminal interface test set - Dataprobe, Inc.
Datasette - digital magnetic tape cassette recorder/reader - Chalco Engrg. Corp.
Dataswitch - reed relay - Wheelock Signals
Datasyn - digital readout system - Data Technology Inc.
Data-Trak - analog programmer - Research, Inc.
Data Transcriber - data acq syst. - Baganoff Assocs., Inc.
Data-Verter - data acquisition, recording, & transmitting equip. - Digitronics Corp.
Data-Voices - voice operated identification computer entry system - Datawest Corp.
DATAWATCH - alarm monitors & signal transmitters - Metrix Instrument Co.
DATAx&T - Data Acquisition Modules - Data Translation
DATOS - instrumentation interfaces - DataGraphics Corp.
Decap - cured epoxy remover - Dynaloy, Inc.
Decitek - Punched tape readers - Decitek
Decitrak - digital control sys. - Theta Instr. Corp.
Decohm - relays - open and hermetically sealed - Davis Elec. Co.
Decora - wallplates, switches outlets - Leviton Mfg. Co., Inc.
DEECEEDUCER - Pressure-To-DC Converter - Solid State Electronics Corp.
Defectometer - ndt - eddy current equipment - Automation Inds.
Deflectron - yokes - CELCO
Degrestil - vapor degrestil - Electrovert
DEI MOTOR GUARD - under voltage monitor - Diversified Electronics Inc.
DeKabox - decade resistors and capacitors - Electro Sci. Inds.
DeKadial - decade dials - Electro Sci. Inds.
DeKapacitor - decade capacitor - Electro Sci. Inds.
DeKapot - decade potentiometers - Electro Sci. Inds.
DeKastat - decade rheostat - Electro Sci. Inds.
DeKavider - decade voltage divider - Electro Sci. Inds.
Dektak - surface elevation measuring equip - Sloan Technology Corp.
DEL-CON - Digital Systems - Delco Electronics Div.

Delmica - capacitor - Del Electronics Corp.
Delphic II - data projectors - Kollsman Instr. Co.
Deltabeston - asbestos-insulated wires - General Elec.
Deltadyne - differential press, ind, switches & gages - Pall Corp.
Deltafilm - film capacitors - Dearborn Elctrns. Div.
DELT ALERT - Ultrasonic Burglar Alarm - Delta Products
Deltaply - fluorocarbon capacitors - Dearborn Elctrns. Div.
Delta-T - digital audio time delay - Gotham Audio Corp.
DELTA-T - Semiconductor Cooling Products - Wakefield Engrg., Inc.
Delta-Tension - self-tensioning tape cartridge - Genisco Tech. Corp.
Deluxe Molded - Drake Mfg. Co.
Demod - demodulator - General Magnetics
Densichron R - Densitometers - Sargent Welch Sci. Co.
Densi-Lux - enlarging meter - Lektra Labs., Inc.
Densi-Meter - color analyzer - Lektra Labs., Inc.
Densi-Timer - automatic enlarging timer - Lektra Labs., Inc.
DENSITOCOLOR - controls, density - Heitz, Inc., Karl
Dentronix - pliers - Mann, Henry Inc.
Depend-a-Bond - solders - Alpha Metals, Inc.
DESCO - plug-in assemblies - Dietz Design, Inc.
Desicote - water-repellent coating compound - Beckman Instrs., (AISSD)
Designers - data sheets - Motorola Semiconductor Prods.
DESIGN III - Desktop CRT Display Terminal - Ann Arbor Terminals, Inc.
DeSolder Well - desoldering station - Hexacon Elec. Co.
De Solv - resin solvent - Ram Chems.
DETECT-A-FIRE - fire detectors - Fenwal, Inc.
DET-O-JET - liquid machine detergent - Alconox Inc.
Dewprobe - dewpoint sensors - Honeywell
D-I - differential ion pump - Perkin-Elmer Ultek Inc.
Diac - rms AC converters - Dana Labs., Inc.
Diactor - voltage regulator - General Elec. Co.
Diagraph - impedance plotter - Rhode & Schwarz Sls.
Dial-A-Gain - voltage amplifiers - Unholtz-Dickie Corp.
Dial-An-Amp - constant current adaptor - General Resistance, Inc.
Dial-An-Ohm - dialable resistance decade - General Resistance, Inc.
Dial-A-Source - dialable current source - General Resistance, Inc.
Dial-a-Temp - variable heat soldering station - Hexacon Elec. Co.
DialaTrol - temperature controllers - Honeywell
Dial-A-Vider - dialable voltage divider - General Resistance, Inc.
Dial-A-Volt - dialable voltage reference - General Resistance, Inc.
Dial & Coder - Automatic Telephone Dialer - Delta Products
Dial-Flo - oven air velocity control - Hotpack Corp.
Dial-O-Verter - data communication equip. - Digitronics Corp.
Diamfile - diamond contact cleaner - Jonard Industries Corp.
Diamond - impregnated wire - Laser Technology, Inc.
Diamond Grip - terminals & splices - Amp Inc.
DIB - dual in-line bridge - Varo Semiconductor, Inc.
Diekut Stik-Ons - drafting aids - Bishop Graphics
Die-Saver - fluidic die protection systems - Corning Glass Works, Fluidic Products
Diffaxial - speaker - University Sound
"Dif Filters" - dual-in-line LC filters --ESC Elctrns. Corp.
Diffraction Horn - tweeter - Electro-Voice, Inc.
Difilm - film dielectric capacitors - Sprague Elec. Co.
Digiac - digital computer trainers - Digiac Corp.
Digibezel - alpha-numeric display - NOBEX Div.
DigiBit - digital logic modules - Tech Serv., Inc.
Digicard - ic packaging - Digitronics Corp.
Digichek - digital logic analyzers - Applied Control Co.
Digicom - digital communication - E-Systems Inc.
Digicom - stepping commutator - General Devices, Inc.
DIGI CORDER - digital cassette terminal memory unit - Intern'l. Computer Prods., Inc.
Digicount - bi-directional counters and displays - Itek Corp. Meas. Sys. Div.
DIGI DECK - digital recording mag. tape deck - Intern'l. Computer Prods., Inc.
Digi Designer - circuit design aid - E & L Instruments, Inc.
Digidial - digital turns-counting dial - Beckman Instrs.
Digi-Drives - control systems - Sequential Information Systems
Digi-Klips - printed circuit connectors - Components Corp.
Digiline - linear measuring systems - Itek Corp. Meas. Sys. Div.
Digi-Lock - control system - Sequential Information Systems
Digilogger - digital data logger - NES, Inc.
Digi-Mark - electronic frequency counter - Chadwick-Helmuth Co., Inc.
DIGIMAX - digital data instrumentation - Leeds & Northrup Co.
Digimite - portable, digital potentiometer - Thermo Elec. Co., Inc.
Digiphase - digital frequency synthesizers - Dana Labs., Inc.
Digiplus - digital logic modules - Tech Serv., Inc.
Digi-Probe - pulse & logic detection & analysis - Automatic Production Systems Inc.
Digiscale - linear measuring system - Itek Corp. Meas. Sys. Div.
Digisec - optical shaft encoders - Itek Corp. Meas. Sys. Div.
Digi-Shaft - shaft/digital converter - Computer Conversions Corp.
DIGISWITCH - digital (thumbwheel) switches - Digitran Co.
DigiTec - Electronic Test and Measurement Equipment - United Systems
Digitemp - controller - Delta Design, Inc.
Digitest - digital multimeter - Schneider Electronics, Inc.
"Digit-Matic" - digital printers - Victor Comptometer Corp.
Digitrak - signal tracking device - Edo Western Corp.
Digitrend - multipoint digital recording system - Doric Sci. Corp.
Digi-Tronic - digital weight indicator - Howe Richardson Scale Co.
Digivac S/G - vacuum readout tube - Wagner Elec.
DIGIVUE R - Display/Memory unit. This is a gas discharge, plasma panel - Owens-Illinois, Inc.
Dilectron - ceramic capacitors - Dilectron
D I Line - double insulated line - UNGAR, Div.
DI-MESA - thyristor construction technique - Hutson Industries
Dimie - capacitors - Dearborn Elctrns. Div.
Di-Min-Ode - 1.5 watt zener diode - General Semiconductor Industries, Inc.
Diode-Lite - led indicator lights - Dialight
Di Pak - dual-in-line packaging sys - Scanbe Canoga Industries
Dip Alarm - solid state audio indicator in dip package - Projects Unlimited, Inc.
DIP-BIT - filters - Cambridge Thermionic Corp.
D-I-P Delay Lines - digital delay module - Pulse Engrg., Inc.
Dip-Dry - drying systems - Allied Chemical Corp.
Dip Flash - solid state load pulser - Projects Unlimited, Inc.
Dip-Lite - digital readout with dual-in-line mounting - Refac Elctrns./Pinlites
Dip-Pak - hot melt peelable plastic coating - Fidelity Chem. Prods. Corp.
Dipstik - high density packaging module - Stanford Applied Engrg., Inc.
DIPSTIK - DIP packaging system - Stanford Applied Engineering
Director - Intercoms - Fanon/Courier Corp., Subs.
DirecTorr R - Direct Drive Vacuum Pump - Sargent Welch Sci. Co.
Directron - selenium rectifiers - Sanford-Miller Corp.
Directweld - DC welded steel tubing - ITT-Higbie Mfg. Co.
Discaps - ceramic capacitors - Radio Materials Co.
Discohm - disc type power resistors - Ward Leonard Elec. Co. Inc.
Disc-R-Kap - resistor capacitor combination - Centralab
Displaducer - inertial angular displacement transducer - Larson Aero Dev.
Displex - cryogenic refrigerator - Air Prods. & Chems., Inc.
Dissopad - wash away spacers - Bivar, Inc.
DISTEC - displacement detecting instruments - Helm Instr. Co.
DI-T - incher - TRW/UTC Transformers
DMS - transient recorder - Zonic Technical Labs.
DNF1100 - noise filter - Burwen Lab. Inc.
DNF1201 - noise filter - Burwen Lab. Inc.
DNF1500 - noise filter - Burwen Lab. Inc.
Dodge - screw thread inserts for plastics - Heli-Coil Prods.
Dolflex - enamels & compounds - Dolph, John C. Co.
Dolphon - epoxy resin compounds, polyester resins - Dolph, John C. Co.
Dolphseal - water repellent - Dolph, John C. Co.
Dolph-Spray - lacquer, enamel, varnish - Dolph, John C. Co.
Donner - inertial systems - Systron-Donner Inertial Div.
Doorbell® - rectifier modules - Unitrode Corp.
DOROIDAL - coils - Cambridge Thermionic Corp.
Do-T - ouncer audio transformer - TRW/UTC Transformers
DOT MicroSTOR - domain tip memory - Cambridge Memories, Inc.
Double/Bubble - package for 2-part epoxies - Hardman Inc.
Double Diamond - glass thermometers and bi-metal thermometers - H-B Instr. Co.
Double-Seal - ball valves - Jamesbury Corp.
Double-Talk - phased mobile antennas - New-Tronics Corp.
Dow Key - coaxial relays & switches - Kilovac Corp.
d/p Cell - transmitter, electronic or pneum - Foxboro Co.
DPR - potting & encapsulating compounds - Hardman Inc.
Dragon - rubber and friction tape - Okonite Co.
Dri-Flo - orifice meters of the metallic bellows type for differential pressure measurement - Singer Co.
Dri-Lok - fluorescent ballasts - Jefferson Elec.
Dri-Mark - pressure sensitive transfers - Meyercord Co.
Dr: Wick - de soldering braid - American Elec. Heater
Dryatrol - pneumatic switching valve - Pall Trinity Micro Corp.
D&S2AMS - digital dedicated analytical module sytem - Bromberg Engineering
DTF - disciplined time/frequency standard model FE-1050A - Frequency Elctrns.
DU - null-balance spectrophotometer - Beckman Instrs., (AISSD)
Dualatch - connectors - Amp Inc.
Dualay - self-supporting aerial cables - Okonite Co.
Dual-Cooled - Transformers - Allis-Chalmers
Dual Hi/Lo Filter - double high pass/low pass filter - Rockland Sys. Corp.
Dual-Lock - spring-lock shelf supports - Simmons Fastener Corp.
Dual-Scan - supervisory control system - GRM Corp.
Dual Source - power supply - Elasco
Dual-Trol - recycling timer - Industrial Timer Corp.
"Dub-L-Loc" - straps-grommets - Budwig Mfg. Co.
Ducter - ohmmeters - Biddle, James G.
Dumont - Electronic tubes - Dutrex Inds., Inc.
Dunco - relays - Struthers-Dunn, Inc.
Duo-Clean - pc board degreaser - Hollis Engrg., Inc.
Duodial - turns-counting dial - Beckman Instrs.
Duofoil R - Aluminum/Polyester/Aluminum Shield - Belden Corp.
Duo-Seal R - Vacuum Pumps - Sargent Welch Sci. Co.
Duostat - power supply - Beckman Instrs., (AISSD)
Duotrol - pressure operated control - Autocon Inds., Inc.
Duo-Tyne - connector - Amp Inc.
Duo-volt - Outdoor Lighting Control - Sigma Instruments, Inc.
Duplex - type of speaker - Altec Div.
Dura-Blue - ion sensitive bulbs of glass electrodes - Beckman Instrs., (AISSD)
Durac - hydrometers - H-B Instr. Co.
Duracell - batteries - Mallory Battery
Dura Clad - transformers - Aladdin Elctrns.
Duracolor - foil shielded coax - Columbia Elctrn. Cables
"Dura-Con" - microminiature connectors - TRW/Cinch Connectors
Duraflex - waveguides & flexible metallic conduit/hose - Co-Operative Inds., Inc.
Durafoam - patented foam tv transmission line - Columbia Elctrn. Cables
Duramic - diaphragms and parts for use with scientific apparatus and equipment - Singer Co.
Duranol II - non-flammable impregnant - Filtron Company, Inc.
Dura-Pac - solid state relays - H-B Instr. Co.
Durasel - rectifier - Alpha Components Corp.
Duratemp - microwave switches - Varian Assocs.
DURATEMP - microwave switches - Varian Electron Tube & Device Grp.
Duratherm - high temperature furnace cable - Boston Insulated Wire & Cable Co.
Duratrak® - contact surface - General Radio Co.
Durawatt - power transistors - National Semiconductor Corp.
Durcon - laboratory sinks and tops - Dullron Co., Inc.
Dur-Cor - hard oxide transparent photoplates for making 1C photomasks - Corning Glass Works, Television Prods. Div.
Durever - soldering iron tips - Precision Elec. Co.
Durotherm - soldering tips - Hexacon Elec. Co.
Dur-X-Thane - extruded polyurethane cable jacket - Whitmor Wire & Cable
Duzall - flux - Chemetron Corp.
DV 5 - microminiature ceramic variable capacitors - JFD Electronics Components Corp.
DW "Multi-Switch" - "multi-switch" switches - Switchcraft, Inc.
Dymax - engineering adhesives - MPB Corp.
Dymograph Balancers - balancing machines - Annis R B Co.
DYNAC - injection molding adaptive control system - Dynisco
Dynaclad - batteries - Exide Power Sys. Div.
Dynacote - accelerator - Radiation Dynamics, Inc.
Dyna-Crimp - hydraulic crimping unit - Amp Inc.
DYNA-CU - magnetic compass transducer sys. - Larson Aero Dev.
Dynacube - miniature generator/alternator - Hamilton Technology, Inc.
Dyna-Flex - triple-tip probe - Dynascan Corp.

DYNAform - coaxial RF switches - Amphenol RF Div.
Dynagen - accelerator - Radiation Dynamics, Inc.
Dynagrip - solder/flux kit - Chemetron Corp.
Dyna-Jet - tube tester - Dynascan Corp.
Dynakit - high fidelity components in kit form - Dynaco Inc.
Dynaload - power supply tester - Transistor Devices
Dynamag - duo-plasmatron ion source - Radiation Dynamics, Inc.
DYNAMATIC - AC & DC Adjustable Speed Drivers - Eaton Corp.
Dyna-Mike - hi-k ceramic capacitor - ITT Jennings
Dynamitron - accelerator - Radiation Dynamics, Inc.
Dyna-Mod - audio/video modulator - Dynair Elctrns. Inc.
Dynamonitor - acceleration voltmeter - Endevco
DYNAMOUNT - automotive speaker system - Jensen Sound Labs.
DYN/AMP - D.C. current metering - Halmar Electronics, Inc.
Dynaphase 28 - dynamic headsets - Stanton Magnetics, Inc.
Dynaphase 40 - dynamic headsets - Stanton Magnetics, Inc.
Dynaphase 50 - dynamic headsets - Stanton Magnetics, Inc.
Dynaphase 60 - dynamic headsets - Stanton Magnetics, Inc.
Dynaphase 65-4C - 4 channel dynamic headset - Stanton Magnetics, Inc.
"Dyna-Q" - loading coils - K-W Engineering Works
Dyna-Race - aluminum ball bearing slides - Grant Hardware Co.
DynaRad 150 - x-ray inspection system - Torr Labs.
Dynasolve - cured plastic removers - Dynaloy, Inc.
Dyna-Switch - overload prevention switches - Dillon, W.C. & Co.
Dynatach - electric tachometers - Electric Tachometer Corp.
DYNATRAC - heterodyne lock-in amplifier - Ithaco, Inc.
Dyna-Trol - furnaces - L & L Special Furnace Co.
Dynatrol® - controls - Automation Prdts.
Dyna-Tune - demodulators - Dynair Elctrns. Inc.
Dynayoke - yokes - CELCO
Dy-Nos-Stick - digital test probe - Nu-Concept Computer Systems, Inc.
Dyteck - commercial/marine temperature monitors - Aerospace Avionics, Inc.

E

E - switches, rotary, cam, power, snap-action - Electro Switch Corp.
EAGLE A - low permeability alloy - Eagle Magnetics Co.
EAGLE "AAA" - high permeability alloy - Eagle Magnetics Co.
Eastobond - hot-melt adhesives - Eastman Chem. Prods.
Easy-Crimp - ratchet hand tools - Hollingsworth Solderless Terminal
EASY-FLO - silver brazing alloy - Handy & Harman
EASYMATCH - RF TUNER - Alford Mfg. Co.
Easypoxy - epoxy adhesive kits - Conap, Inc.
EATON - Precision Gearing - Eaton Corp.
EATON - Power Transmission Equipment - Eaton Corp.
EATON - Fluid Strainers - Eaton Corp.
Eaton Brand - fasteners - Eaton Corporation
EB-CON - edge board connector - Eby Co., Hugh H.
Eccentrix - adjustable shear/alignment pin - Tridair Inds.
ECCO - epoxies, urethanes, etc. - Emerson & Cuming, Inc.
E-CELL devices - Microcoulometers for timing & integrating - Plessey Electro-Products
Echo - Intercoms - Fanon/Courier Corp., Subs.
Echo Gel - encaps. compound - Communications Technology Corp.
Echorder - tape recorder - RIL Elctrns., Inc.
Echordette - tape recorder - RIL Elctrns., Inc.
Eclipse&T S100,S200 - computers - Data General Corp.
Ecliptic - Tachometer Generators - Carter Motor Co.
ECO FUSE - econ limiter fuse - Economy Fuse Div.
Ecoline - mobile air filtration unit - Hollis Engrg., Inc.
Ecolog - environmental data logger - NERA, Inc.
E COM - core Memory System - Standard Memories, Inc.
Econalign; Pow-R-Flex; Simul-Torque - couplings, shaft, rigid & flexible - Metal Bellows Corp.
ECON FUSE - clearsite plug fuse - Economy Fuse Div.
Econistor - inexpensive resistors - General Resistance, Inc.
Econocap - capacitance diodes - Motorola Semiconductor Prods.
Econ-o-Clad - laminates metal clad - Engelhard Minerals & Chem.
Econofire - pastes-thick film microcircuits - Electro Mats. Corp. Amer.
Econoflux - liquid inorganic acid flux - Alpha Metals, Inc.
Econogide - p.c. card guides; guides circuit board - Bivar, Inc.
Econoglo - Drake Mfg. Co.
Econo-Heat - furnaces - Aremco Prods., Inc.
Econo-King - portable oven - Hotpack Corp.
Econo-Lap - thick film lapped substrates - Accumet Engineering Corp.
Econo-Line - automatic plating and/or processing sys. with an economical approach. - Sel-Rex Co. Div. Oxy Metal Industries Corp.
Econoline - plastic low-signal transistors - Sprague Elec. Co.
Econo-Line - rotary switches - Oak Inds. Inc.
Econolite TM - Miniature panel lights - Chicago Switch, Inc.
Econo-Master - furnaces - L & L Special Furnace Co.
Economite TM - Miniature slide switches - Chicago Switch, Inc.
Econo-Polish - substrates .025" with a 1.5m" one side - Accumet Engineering Corp.
Econopot - Off-the-shelf Precision Potentiometer - New England Instr.
Econo-Skan - reflective skanner - Skan-A-Matic Corp.
Econ-o-Tape - laminates metal clad - Engelhard Minerals & Chem.
Eddystone - communications receivers - Marconi Instrs.
Edgecon - edge connectors - Molex Inc.
Edgegard Hood - dust-free work bench - Baker Co., Inc.
EDGE-ON - pc connector - Burndy Corporation
Edge-Pac R - PC connectors - Elfab Corp.
Edison - temperature detectors, fire detectors - Edison, Instr. Div.
Edison U/V - flame safeguard - Edison, Instr. Div.
EDU - Digital Clock - Efratom California, Inc.
EEV - Industrial Tubes - Calvert Elctrns., Inc.
Efcor - electrical fittings. - I-T-E Electrical Components Grp.
EFR - Receiver/Controller LF/ VLF - Efratom California, Inc.
E-GAS - specially prepared sulfur hexacluoride for etching silicon - Matheson Gas Products
e-Gun - evaporation source - Varian Assocs.
80 K Series Hybrids - plug-in logic modules - Struthers-Dunn, Inc.
#800 Dipsert IC Base - dispenses IC's - Solder Removal Co.
#880 Insertic Tool - inserts integrated circuits - Solder Removal Co.
#885 Pul-N-Sertic Tool - inserts & extracts IC's - Solder Removal Co.
EL - thyratrons & gas filled rectifiers - Electrons Co.
Elastic Stop nuts - self-locking nuts - Esna Div.
Elasto-Flex - shock absorbing skids - Craig Sys. Corp.
Electric Lacquer - lacquer - Dolph, John C. Co.
Electricord - wire, cord and cable - Pacific Electricord Co.
Electrifugal - Pumping units - Allis-Chalmers
Electri-Sealed - Sealess pumps - Allis-Chalmers
Electrocolor 111 & 135 - color TV picture tube - Westinghouse Elec. Corp.
Electrocom - solid state commutator - General Devices, Inc.
ELECTROCOM® - Teletypewriter terminal equipment - Electrocom Inds.
Electrocraft - electronic components - GC Electronics
ELECTRO CUT&T - insulation, tape & foam cutters. - Automatic Die Cutting Mch
Electrodag - Conductive/resistive coatings - Acheson Colloids Co.
Electroduct - PVC wiring duct - Electrovert
Electrofeed - vibratory parts feeder - Black & Webster, Inc.
Electrolab - electricity/rotating maches. trainers - Digiac Corp.
Electro-Lap Seal - cable joint and terminal kit - Okonite Co.
Electro-Lift - garage door openers - Perma Power Div.
Electrologic - single & multiple card reader & interface - Meriam Inc.
Electromate - ion measuring instrument - Beckman Instrs., (AISSD)
ELECTROMAX - signalling controller - Leeds & Northrup Co.
Electro Module - packaged clutch & brake - Warner Elec. Brake & Clutch Co.
Electronflo - electroplate fusing sys. - Electrovert
Electronik - temperature recorders & controllers - Honeywell
Electropane R - electrically conducting glass - Libbey Owens-Ford Co.
Electropunch - punch press-electric - Black & Webster, Inc.
Electroscan 30 - electroanalytical system - Beckman Instrs., (AISSD)
Electroset - automatic terminal setter - Black & Webster, Inc.
Electro-Shield - rfi shielding components - Estes Engrg. Co.
Electrostac - Stacic D.C. Adjustable Speed Drivers - WER Industrial
Electrotable - indexing table - Black & Webster, Inc.
Electrotape - surveying tool - Cubic Corp.
ELECTRO TIME - solid state devices - Clare & Co., C.P.
Electro-Ty - calbe tie - Electrovert
Electro-Voice - all electro-voice products - Electro-Voice, Inc.
Electro-Voice - cartridges & needles - Ev-Game Inc.
"Electrowriter" - electronic handwriting - Victor Comptometer Corp.
ELGARD - Uninterruptible Power Source - Elgar Corporation
Eliminator - loudspeaker - Electro-Voice, Inc.
Elin - ac power sources, ac line correctors - Elin Div.
Elin - ac line correctors - Behlman Div., California Instrs.
Elinco - ac and dc sub-fractional and fractional hp motors and generators. - Electric Indicator Co., Inc.
Elipti-Grip - terminals - Thomas & Betts Co.
Ellipt-O-Reel - elliptical waveguide - Gabriel Elctrns. Inc.
ELMCO - coil winding machinery - Elden Mfg. Co.
EL-MENCO - capacitors - Electro Motive Corp.
Elmet - molybdenum and tungsten - Philips Elmet Corp.
"ELMO" TM - exterior light monitor - Doran Mfg. Co.
Elph - digital thermocouple indicator - Thermo Elec. Co., Inc.
Eltex - electronic telex exchange - Frederick Electronics Corp.
EMA iron - microwave absorbing material - Electronautics
EMC - Field intensity analyzer - Singer Instrumentation
EMCOR - Modular Enclosure Systems - Ingersoll Prods.
Emico - electrical meters - Sheller-Globe Corp.
Emlock - miniature connector for flexible cable - Cablewave Systems Inc.
E-Module - ultrasonic generator - Branson Cleaning Equip. Co.
Empco - electromagnetic transducers - Carolina Medical Elctrns., Inc.
"Empirical-Log" - "Empirical-logs" broad band antenna's - Telrex Labs.
Emralon - dry film lubricants - Acheson Colloids Co.
EMS°II - Electronic Message Switcher - Texas Instrs. Inc.
EMT - reverberation units, compressors, turntables, wow & flutter meters, orchestra tuning standard - Gotham Audio Corp.
EMTEL - Seismic/Isoamp/Time & Frequency Standards - Develco
ENCOM - intercom equip. & telephone apparatus - Encom Prods. Co., Inc.
ENDECO - soldering/desoldering tools - Enterprise Development Corp
Endevco - vibration, force and pressure transducers, and signal conditioners - Endevco
Endur-All - Transformers - Allis-Chalmers
Enercon - rotary drives - Control Products Div.
Energized - core solder - Alpha Metals, Inc.
Ener/Pak - Standby power units - Allis-Chalmers
Engaloy - brazing alloys - Engelhard Minerals & Chem.
Engineering Structual Foam - foam resins - General Elec.
Ensolite - pvc sponge mat'l. - Uniroyal, Inc.
Enviro-Bond - compound - Superior Cable Div.
Enviro Vac - thermal control system - High Vacuum Equip. Corp.
E-Pac - UPS System - Instr. & Control Sys., Inc.
EPC - bobbins & cases - Electrical Plastics Corp.
Epibase - silicon power transistors - Motorola Semiconductor Prods.
Epicap - capacitance diodes - Motorola Semiconductor Prods.
Epion TM - ion implanted diodes & rectifiers - Solid State Devices, Inc.
Epocap - epoxy compounds - Hardman Inc.
Epocel - filter cartridge - Pall Trinity Micro Corp.
Epocel - filter medium - Pall Corp.
Epocrete - 2-part epoxy concrete materials - Hardman Inc.
Epocure - epoxy curing agents - Hardman Inc.
Epolast - epoxy compounds - Hardman Inc.
Epolene - polyolefin waxes - Eastman Chem. Prods.
Epomarine - 2-part epoxy compounds for splash zone & underwater application - Hardman Inc.
Eposet - epoxy compounds - Hardman Inc.
Eposolve - solvent for epoxy clean-up - Hardman Inc.
Epo-Tek - epoxies - Epoxy Technology
Epoweld - epoxy compounds - Hardman Inc.
EPOXYCAST - High-Voltage Transformer - TDC, Div. Freq. Technology Inc.
Equipt-Air - Blowers & Fans - Equipto Enclosure Systems
Equipto - Steel Electronic Cabinets (Heavy Duty) - Equipto Enclosure Systems
Equipto - stools, racks, lockers - Equipto
Equiseal - Pump stuffing boxes - Allis-Chalmers
ERDAC III - electronic recording systems. - Macrodyne Inc.

Erickson - couplings - Thomas & Betts Co.
ERSA Tip 1G - soldering iron - Edsyn, Inc.
Ersin - wire rosin cored solder - Multicore Solders
Escon - special relays - Guardian California
Escosil - optical fused quartz & silica - Esco Products
ESlok nuts - commercial self-locking nuts - Esna Div.
ESlok screws/bolts - self-locking externally threaded fasteners - Esna Div.
Estane R - polyurethanes, thermoplastic - Goodrich Chem. Co., B.F.
ETC - Transformers & reactors - Electronic Transformer Corp.
Etch/Path System 100 - semiconductor metal etcher - Qualco
Etch/Path System 200 - semiconductor metal etcher - Qualco
Eternacell® - lithium organic battery - Power Conversion Inc.
Ethafoam - polyethylene foam - Dow Chemical Co.
Ethocel - ethylcellulose resin - Dow Chemical Co.
Ethofil - fiberglass reinforced polyethylene - Fiberfil Div. Dart Ind.
ETS - electronic training systems - Digiac Corp.
E-V - all electro-voice products - Electro-Voice, Inc.
Evanohm - resistance alloy - GTE Sylvania Inc.
Everdur - conduit - The Anaconda Company Brass Division
Eveready - batteries, flashlights, miniature lamps, lanterns. - Union Carbide
Everfast - liquid cement - Ambroid Co.
EVM - loudspeaker - Electro-Voice, Inc.
EXCELLITE - audio-type connectors - Amphenol Ind'l. Div.
Exec and VIP - hand lamps - Teledyne Big Beam
Exec-u-Flite - altimetry systems - Kollsman Instr. Co.
Executive - Intercoms - Fanon/Courier Corp., Subs.
Exetron - Watch - Exetron Corp.
Exide - batteries & chargers - Exide Power Sys. Div.
Exide - maintenance free batteries - Wisco Div.
ExpandaCore 10 - DEC System 10 Add-On - Cambridge Memories, Inc.
ExpandaCore 11 - DEC PDP-11 Add-On - Cambridge Memories, Inc.
ExpandaCore 16 - 16K core memory - Cambridge Memories, Inc.
ExpandaCore 620 - varian 620 Add-On - Cambridge Memories, Inc.
ExpandaCore 8 - 8K core memory - Cambridge Memories, Inc.
ExpandaMac - lockheed MAC 16 Add-On - Cambridge Memories, Inc.
Expandomatic - ph measuring instruments - Beckman Instrs., (AISSD)
Extended Range - heat guns - Sigma Sys. Corp.
Extra - liquid scintillation sample vials - Beckman Instrs., (AISSD)
Extrusol - bar solder - Multicore Solders
E-Z-Code - wire markers - Thomas & Betts Co.
"E-Z-DUO" - cir. breaker "two in one" - Wadsworth Electric Mfg. Co.
Eze-Stik - pressure sensitive label stock - Fitchburg Coated Products
"E-Z-RED - cir. breakers - Wadsworth Electric Mfg. Co.
"E-Z Release" - spring loaded contact - Continental Connector Corp.
E-Z-Trim - potentiometer - Bourns, Inc.
E-1 - display terminal - Information Displays, Inc.

F

FA - fluid adhesives - Bacon Inds.
Fabicon - Automatic image orthicon - Teletron
Fabicon - completely automatic camera tube - Teltron
Fabri-Therm - varnished glass cloth - General Elec.
Faceloid - involute face gears - Invincible Gear Co.
FACT - flexible automatic circuit testing machine - Hughes Aircraft Co.
FACT - flexible automatic circuit tester - Hughes Aircraft Co.
Fairloc - integral fastener - Sterling Instr.
FAIRLOC - rotating component fastening device - Stock Drive Prods.
Fansteel - metals, wire, tubing - Fansteel Inc.
Faria - meter movements panel meters - Faria Meter Corp.
Farm-O-Stat - temperature controllers - Honeywell
FARVAL - Centralized Lubricating Systems - Eaton Corp.
FasBUS - DEC PDP-11 semiconductor Add-On - Cambridge Memories, Inc.
Fas'n-It - white glue - Ambroid Co.
Fast - flux & solder - Lake Chemical Co.
Fastaire - dryers, hand, electric - blowers, portable, electric - Humphrey, Inc.
FASTATCH - switches and variable resistors - Centralab
Fastemp - electronic thermometers - Amprobe Instr.
Fastop - magnetic particle brake/clutch - Lear Siegler, Inc.
Fastin-Faston - connectors - Amp Inc.
Fastline - core memory system - Fabri-Tek, Inc.
Faston - receptacle & tab terminals - Amp Inc.
Fastrak® - marker - General Radio Co.
Fastraps® - wire/cable ties - Grayhill Inc.
F.A.T - fully additive circuitry - Advanced Circuitry
Faylon - mixing consoles & equalizers - Gotham Audio Corp.
Fazeguard - phase failure sensor - Opad Elec. Co., Inc.
Feather - fan - Rotron, Inc.
Featheride - cartridge - Electro-Voice, Inc.
Fedis - front end design information sys. - Macrodata
FENWAL 360 SYSTEM - portable fire suppression system - Fenwal, Inc.
Ferramic - ferrites - Indiana General
FETRON - solid state tube replacements - Teledyne Semiconductor
FFA - fluid flexible adhesives - Bacon Inds.
FFB - friction brake - General-Electro Mechanical
FFC - friction clutch - General-Electro Mechanical
FFRB - fail-safe friction brake - General-Electro Mechanical
Fiberfrax - ceramic fiber products - Carborundum Co.
Fiber-Lite - fiber optic illuminators - Dolan-Jenner Inds., Inc.
Fiberloy - Polymer base materials - Rogers Corp.
Fibertemp - fiber temperature sensor - Trans-Met Engrg.
FI-CORD - recorders, magnetic tape - Heitz, Inc., Karl
Fidelex - metal strippers - Fidelity Chem. Prods. Corp.
Fidelplate - electroless plating solutions - Fidelity Chem. Prods. Corp.
Fieldial - magnetic field regulators - Varian Assocs.
Fieldial - magnetic field regulator - Varian Assocs.
Fieldlab - oxygen gas analyzer - Beckman Instrs., (AISSD)
Filamite - filament wound parts - NVF Co.
Fil-Cap - miniature feed-thru capacitors - Filtron Company, Inc.
Filmatic - polyester film capacitor, self encased - Paktron Div.
Filmatic - computer tape cleaning machine - Udel Manufacturing
Filmbrid - quadrature coupler - Merrimac Inds., Inc.
Filmite - film dielectric capacitors - Sprague Elec. Co.
Film-Met - trimming potentiometer (metal film) - Amphenol Connector Div., Controls Opers.
Filmplate - tape preservation fluid - Udel Manufacturing
Fil-Shield - shielded enclosures - Filtron Company, Inc.
Filtercon - RFI Filters - Erie Technological Products
Filter Flo Diffuser - HEPA filtration module - Weber Tech Products
Fil Therm - thermal fuse - Filtron Company, Inc.
Filtron - principal register trademark - Filtron Company, Inc.
FINCO - Antennas & Accessories - Finney Co.
Fineline - console model wave soldering system - Hollis Engrg., Inc.
FINGRIP - terminal - Burndy Corporation
FIN-PAC - FAMILY OF HIGH VOLTAGE SILICON RECTIFIERS - Semtech Corp.
Fire Away - portable fire extinguishers - Kidde, Walter & Co.
FIREROD - cartridge heater - Watlow Elec. Mfg. Co.
Fire Star - fire-fighting vehicle - Lockheed Aircraft Svc.
Firewall EP, Sr & Firewall III - fire resistant cable-control, power & instrumentation - Cerro Wire & Cable Co.
Firezone - high temperature wire - Cerro Wire & Cable Co.
Firon - pastes-thick film microcircuits - Electro Mats. Corp. Amer.
Five/Ten - electron beam system - Sloan Technology Corp.
5-Way - binding posts - Superior Electric Co.
5x5 R - lightweight pilots' headphones - Telex Communications, Inc.
Flamenol - polyvinyl chloride-insulated wires - General Elec.
Flash Flow Welder - tap welder - Ewald Instrs. Corp.
Flash Front - back lighted dead front panels - Panelgraphic Corp.
Flash Stripper - shielding stripper - Ewald Instrs. Corp.
FLATOHM - resistor - Centralab
Flat Plate - slot array antenna - Rantec Div.
FLATSO - Radial Lead Thick Film Resistor - Pyrofilm Resistor Co., Inc.
Flat Store - Core Memory - Standard Logic Inc.
Flattac - connector system - Elco
Flexaguide - flexible waveguide - Airtron
Flex-A-Plug - plug-in type power take-off devices - General Elec. Co.
Flex'ator - constant force compression spring - Ametek, Hunter Spring Division
Flexcon - connector, test - Air-O-Tronics Prods.
Flexfoam - foam dielectric microphone cable - Columbia Elctrn. Cables
Flexi Glove - vinyl glove - Clean Room Prods.
Flexite - extruded plastic tubings - Markel, L. Frank & Sons
Flexitorch - tig welding - Falstrom Co.
Flexlead - high temperature wire & cable - Markel, L. Frank & Sons
Flexlife - flexible high gloss cable jackets - Columbia Elctrn. Cables
Flexmax Circuits - multilayer flexible printed circuits - Flexprint Div
Flexobond - urethane adhesive - Allaco Prods Div.
Flexobond - urethane adhesive - Packaged Resins Div.
Flexoprene - Neoprene jacketed portable cable - Standard Wire & Cable Co.
Flex-Pak - amplifiers & sound sys - Bogen Div.
Flex-Plate - Driving components for flexible couplings - Allis-Chalmers
Flexprint Circuitry - flexible printed circuits - Flexprint Div
Flexstrip - Flat cable and Jumpers - Ansley Elctrns. Corp.
Flextac - connectors - Hypertronics Corp.
Flextech - extruded mechanical tubings - Markel, L. Frank & Sons
Flextension - special aersol extender - Tech Spray, Inc.
Flex-Tex - Coupling (CAC) - Allis-Chalmers
Flex-Weld - Welding technique for flat conductor cable - Ansley Elctrns. Corp.
Flip-Chip - Logic Module - Digital Equipment Corp.
Flip-Dip - p.c. mounting method - Berg Electronics
Flip Loc - quick detach clamp - Viking Inds., Inc.
Flip-Pak - solid-state controlling device - Gems Sensors Div.
Flipper - wire snips - Clauss Cutlery Co.
Flippy - reversible flexible disk - Information Terminals
FLIP-R - Flip-chip resistor - Mini-Systems, Inc.
Floatrol - float operated control - Autocon Inds., Inc.
Flo Fuse® - automatic stop valve - Marotta Sci. Controls, Inc.
Flotrac - displacement instrumentation - Hull Corp.
Flouroglide - dry lubricants - Chemplast, Inc.
Flowtronic - velocity flowmeters - Datametrics Inc.
Fluid Pisont - Bearings for motor-pump units - Allis-Chalmers
Fluoralloy - solutions and mixes - Beckman Instrs., (AISSD)
Fluor-X - nuclear gauges - Nuclear Resch. Corp.
Flushlite - Drake Mfg. Co.
Flush-Seal Pressure Plugs - socket head plugs - Allen Mfg. Co.
Flying Coil - d c ironless - EEMCO Div.
Foamcone - radar-augmentation device - Teledyne Micronetics
Foamflex - semi-rigid cable - Cablewave Systems Inc.
Foam Wipe - urethane foam wiper - Clean Room Prods.
FOBALLOY - substitute for gold-tin solder - Plessey Inc.
Footrol - foot switches - General Control Co.
Forbon - vulcanized fibre - NVF Co.
Formaldafil - fiberglass reinforced acetal - Fiberfil Div. Dart Ind.
Forum - conference system - Fairchild Sound Equip.
Fotoceram - glass-ceramics - Corning Glass Works, Fluidic Products
Fotoform - glass-ceramics - Corning Glass Works, Fluidic Products
Fotoform - light sensitive glasses - Corning Glass Works
Foundation - panel instrument line - Westinghouse Elec. Corp.
Fox 1 & Fox 2 - computers - Foxboro Co.
FPL - control systems - Sequential Information Systems
Frahm - resonant reed frequency meters, tachometers - Biddle, James G.
FRC Fab-Ri-Cable - woven ribbon cable - Zippertubing Co.
"FREON" - Flourinated Solvents & Refrigerants - E.I. DuPont de Nemours & Co.
FREQMETER - Frequency-To-DC Converter - Solid State Electronics Corp.
FRICTION-AIRE - elementless electric oven - Blue M Electric Co.
Frigichip - thermoelectric cooling modules - Melcor-Materials Elctrn. Prods.
Frigidri - refrigerated dryer - Pall Trinity Micro Corp.
FRK - Miniature Rubidium Frequency Stabled - Efratom California, Inc.
Frost Aid - coolant - Chemtronics, Inc.
"Frost-Off" - de-icer - Merix Chem. Co.
FRT - Rubidium Laboratory Standard - Efratom California, Inc.
Full-View - flowmeter - Brooks Instr. Div.
Fulscope - controller - Taylor Instr. Process Control Div.
Funelet - funnel flanged eyelets - Circon Corp.
Fusa-Fab - tape - General Elec.
Fusa-Flex - tape - General Elec.
Fusa-Flex - putty - General Elec.
Fusa-Mat - tape - General Elec.
Fusecor - glass reinforced vinyl cable filler - Whitmor Wire & Cable

Fuseplug - fused electrical connector - Arco Electronics Inc.
FUSETRON - fuses & fuseholders - Bussmann Manufacturing
Fusionbrazed - brazed steel tubing - ITT-Higbie Mfg. Co.
Fusionweld - AC welded steel tubing - ITT-Higbie Mfg. Co.
Future - ion measuring electrodes - Beckman Instrs., (AISSD)
Fuz-Ion Sealed - metalized polycarbonate capacitors - Dearborn Elctrns. Div.
Fuzz Buttons - electrical contacts - Technical Wire Products, Inc.
FWACO - fasteners - Aimsco Inc.
Fyrindex - fire detector - Kidde, Walter & Co.
Fyrite - Oxygen & Carbon Dioxide Indicator - Bacharach Instrument Co.
Fyr-Lace - lacing tape - Gudebrod Bros. Silk Co., Inc.

G

GaAsLITES - light emitting diodes - Monsanto-Elctrn. Spec. Prods.
GAC - relay armature - General Automatic Corp.
Gammamet - high voltage & current contact - GTE Sylvania Inc.
Gammatrol - nuclear gauges - Nuclear Resch. Corp.
GAP KAP - ceramic capacitor - Centralab
Garalease - mold release agent - Ram Chems.
Garalyst - resin curing catalyst - Ram Chems.
Gardsman - Temperature Controllers, millivoltmeters - Gulton Inds., Inc.
Garox - resin curing catalyst - Ram Chems.
Gas-Pointer - Dual Range Combustible Gas Indicator - Bacharach Instrument Co.
Gates - Rock and ore processing equipment - Allis-Chalmers
GEL/CELL - rechargeable gelled electrolyte bat. - Globe Union, Inc.
Gelyte - lead acid battery - Gould, Inc.
Gemat - tape, glass mat - General Elec.
Gemcor - clutches & brakes - General-Electro Mechanical
Gemlite - Drake Mfg. Co.
GE-Mov - metal oxide varistor - General Elec. Co.
GE-mov varistors - metal oxide varistors - General Elec.
Genal - injection phenolics - General Elec.
Genalex - instruments - General Elec. Co.
GENERATION 70 - low-cost pulse instruments - E-H Resch. Labs., Inc.
Genesolv - fluorinated solvents - Allied Chemical Corp.
Geodolite - measuring instr. - Spectra-Physics, Inc.
Geon R - vinyls - Goodrich Chem. Co., B.F.
Geoprene - neoprene insulated cable - General Elec.
Georgian - speaker system, cabinet - Electro-Voice, Inc.
Geosol TM - Heavy-Wall Solderable Insulation - Belden Corp.
Geotrol - gasoline-resistant wire - General Elec.
GERTSCH - Frequency meters & AC instrumentation - Singer Instrumentation
Giant - general instrument advanced nitride technology - General Instr. Corp.
Giant II - general instrument advanced N-channel tech. Ion-implant - General Instr. Corp.
Giantview - large screen television projector - General TV Network
Giant Voice - public address and warning systems - Altec Div.
Gibsiloy - powder metal composition material - GTE Sylvania Inc.
Giga-Trims - piston air trimmer - Johanson Mfg. Corp.
Gladiator SSB Plus - SSB TRansceiver - Fanon/Courier Corp., Subs.
Glascote - protective coating - Dolph, John C. Co.
GlasGuard - Ceramic Capacitor - AVX Ceramics
Glasply® - fiberglass tubing - SGL Graphics
Glasrod - pultruded rod shapes - Glastic Corp.
Glass Amp - Lead mounted Rectifier - General Instruments Corp.
Glass Amp II - Lead mounted Rectifier - General Instruments Corp.
Glassivated - high-reliability diodes - Motorola Semiconductor Prods.
Gleaner - Harvesters - Allis-Chalmers
Gleaner-Baldwin - Harvesters - Allis-Chalmers
Glennite - piezo ceramic & ferro ceramic materials - Gulton Inds.
GlidCop - dispersion strengthened copper - Gliddon Metals
Glober - igniters, components, elements - Carborundum Co.
Glo-Dot - pilot lights - Industrial Devices
Glo-Lite - Drake Mfg. Co.
Glyptal - paint varnish enamel lacquer - General Elec.
Glyptal - resin adhesive - General Elec.
Gol-Bond - selective gold plating - Braun Co., Inc.
Goldtop - high temperature battery - General Electric
Gold Top - hi temperature batteries - General Elec. Co.
Goodwin - sporting goods - Midland International Corp.
Gozinta - tuner cleaner tool - Workman Electronic Prods., Inc.
GPD - General Purpose Devices (low cost amplifiers in TO-12 packages) - Avantek, Inc.
GP/duroid - Fiber-elastomer materials - Rogers Corp.
GP-612 - Digital Printer - Gulton Inds., Inc.
Graftran, Symbolpoint - programs for upd series digitizer systems - Data Technology Inc.
Granulator - Grinding mill - Allis-Chalmers
Graphallast® - submerged bearing - Graphite Metallizing Corp.
Graphalloy® - bearing, elec brush, or contact - Graphite Metallizing Corp.
Graphilm® - lubricant to 1000°F - Graphite Metallizing Corp.
Graphlon® - submerged bearing - Graphite Metallizing Corp.
Graphmetex® - insulating material - Graphite Metallizing Corp.
Grate-Kiln - Kiln processing system - Allis-Chalmers
Gravitain - filter element - Pall Trinity Micro Corp.
Greencaps - low cost capacitors - Radio Materials Co.
Greenline (FINCO) - MATV & Components - Finney Co.
G.R.I. - hermetically sealed reed switches - Risk Inds, Inc., George
Griplet Connector - terminal - Berg Electronics
GriprinG - rings, retaining - Waldes Kohinoor, Inc.
GROMMES - Hi Fi & Stereo components public address & sound equipment - Precision Electronics, Inc.
Grommet Strip - continuous strip grommeting - Electrovert
Gromstrip - extruded channel - ICO/Rally Corp.
Groundamatic - outlets - Leviton Mfg. Co., Inc.
GR874R - coaxial components - General Radio Co.
GR900® - precision coaxial components - General Radio Co.
Guardette - motor overload protectors - General Elec. Co.
Gude-Dial Cord and Champion-Dial Cord - dial cord - Gudebrod Bros. Silk Co., Inc.
Gude-Glass - lacing tape - Gudebrod Bros. Silk Co., Inc.
Gudelace - lacing tape - Gudebrod Bros. Silk Co., Inc.
Gude-Nylace - lacing tape - Gudebrod Bros. Silk Co., Inc.
Gude-Q - lacing tape - Gudebrod Bros. Silk Co., Inc.
Gude-Space - lacing tape - Gudebrod Bros. Silk Co., Inc.
Gude-Ties - lacing tape - Gudebrod Bros. Silk Co., Inc.
Gyro Flux Gate - remote indicating compass system - The Bendix Corp.
Gyropoise - turntable - Stanton Magnetics, Inc.
GyroSURVEYOR - borehole surveying gyros and systems - Humphrey, Inc.

H

Hailer JR - S-203 - Audio Equip. Co., Inc.
Halltiplier - Watt & Var Transducers - Scientific Columbus
Halltron - Hall Effect Probes & Hall Effect Instrumentation - Ohio Semitronics, Inc.
Ham-Mate - Radio Amateur Wattmeters - Bird Electronic Corp.
Hand-Hole - buried plant enclosure - Superior Cable Div.
Han-D-Mag - audiophile demagnetizers - Annis R B Co.
HANDY FLUX - fluxes for brazing - Handy & Harman
HANDYLab - prepacked devices - Motorola Semiconductor Prods.
Handy-Wrap - wire wrapping tools - Ostby & Barton Co.
Hardset - heat-curing hard rubber compound - Hardman Inc.
Harosyn - brushless synchros - Harowe Servo Controls
Hartlock - Locking & Non-Locking Caps & Connectors - Arrow-Hart, Inc.
HATCORONE - Butyl rubber insulation - CCS Hatfield Wire & Cable Group
HATFLEX - Non-metallic cable - CCS Hatfield Wire & Cable Group
HATLON - Hypalon insulation - CCS Hatfield Wire & Cable Group
HATRON - NBR/PVC jacket (color) - CCS Hatfield Wire & Cable Group
HATVINOL - PVC insulation - CCS Hatfield Wire & Cable Group
Havar - alloy - Hamilton Technology, Inc.
Haysite - fiberglass reinforced plastics - Synthane Taylor Corp.
HC Holtzer - Cabot Motors - Eastern Air Devices Motor Div.
HD - heavy duty detergent cleaner - Clean Room Prods.
HDT - hitemp adhesive - Allaco Prods Div.
HDT - high temp adhesive - Packaged Resins Div.
HeatBank - heat recovery system - Hughes Aircraft Co.
Heat Guard - elec. soldering iron holders - Hexacon Elec. Co.
Heat-Les - air dryer - Pall Trinity Micro Corp.
Heat-Les - desiccant dryer - Pall Corp.
Heat Prober - thermister type electronic thermometer - Wahl, Wm. Corp.
Heatram - power supply dissipator - Power Designs, Inc.
Heatrax - heat shrinkable tubing - ICO/Rally Corp.
Heat-Seal Stik - sealant and pipe thread compound - Lake Chemical Co.
Heat Spy - infrared thermometers - Wahl, Wm. Corp.
Heatzone - high temperature wire - Cerro Wire & Cable Co.
Heetstrip - heating element - Therm-O-Lab Corp.
Heintz & Kaufman - electron tubes - JSH Electronics, Inc.
HELIAX - elliptical waveguide - Andrew Corp.
Heliax - coaxial cable & elliptical waveguides - Andrew Antenna Co. Ltd.
HELIAX - coaxial cable - Andrew Corp.
Heli-Cal - flexible shaft coupling - Helical Prods. Co., Inc.
Helicord - retractile cords - Storm Products Co.
Helidel - delay lines - Beckman Instrs.
Helilube - potentiometer lubricant - Beckman Instrs.
Helipot - precision potentiometers - Beckman Instrs.
Helitrim - trimming potentiometers - Beckman Instrs.
Heli-Tube - spiral tubing - M M Newman Corp.
Heli-Tube - spiral wrap tubing - Newman Corp., M. M.
HELI-WHIP - whip antennas - Anixter-Mark
Helix Design - potentiometers, transducers & delay lines - Beckman Instrs.
HELM-PAK - modular instrument controls & monitors - Helm Instr. Co.
HEP - hobby devices - Motorola Semiconductor Prods.
HERESY - loudspeaker system - Klipsch & Assocs. Inc.
Hermeflex - hermetic rotary seals - Singer Co.
Hermeticool - refrigeration system - Tenney Engrg., Inc.
Hetrocolor - time base corrector - Television Microtime, Inc.
Hexacon - elec. soldering irons - Hexacon Elec. Co.
HEXCLAD - contact mfg. process - Plessey Inc.
Hex Wik - solder remover - Hexacon Elec. Co.
HEYCO - strain relief bushings, insulating bushings & cable clamps - Heyman Mfg. Co.
HGA/Transtech - amplifiers-powerpacks - HGA Elctrns., Inc.
H/I - scientific instruments - Hacker Instrs., Inc.
Hiatt Clips - coaxial cable clips - Electrovert
Hi-Break - electric circuit breakers - General Elec. Co.
Hi-Brite - paints - Shannon Luminous Mat'ls.
Hickory Brand - wire & cable - Superior Cable Div.
HICO - sub-miniature, low inertia, permanent magnet DC motors; gearmotors; & tach generators, fans & blowers. - Horizons International, Inc.
HICO - relays - Hoagland Instr.
Hi-Cor - organic flux filled solder - Alpha Metals, Inc.
Hi-Cyclic - directional control valves - Airmatic/Beckett-Harcum
Hi-Density - Feeders - Allis-Chalmers
Hi-Etch - capacitors - General Elec. Co.
Hi-Ex - fire extinguishing foam - Kidde, Walter & Co.
Hi-Flux - magnetic equipment - Annis R B Co.
Hi Fy - gas chromatographs - Varian Assocs.
Hi-Jul - energy capacitors - Dearborn Elctrns. Div.
HI-KAPS - ceramic capacitor - Centralab
Hi/Lo Filter - high pass/low pass filter - Rockland Sys. Corp.
Hi-Meg - insulator - Dolph, John C. Co.
Hinge-Lock - spring-lock shelf supports - Simmons Fastener Corp.
HI NIL - high noise-immunity logic - Teledyne Semiconductor
Hinjon - lugs - Thomas & Betts Co.
Hipotrode - high voltage sparker electrode - Hipotronics, Inc.
Hi Pow - high power dummy loads - Electronautics
Hippo-clip - clips - Mueller Electric Co.
Hi-Therm - varnish - Dolph, John C. Co.
Hi-Thro - fluoborate plating baths - Allied Chemical Corp.
HI-VO-KAPS - ceramic capacitors - Centralab
Hi-Volt - voltage testers - Industrial Devices
HI-Z - ground fault sensors - Electrons Co.
Hi-Z - voltmeter & accessories - Ross Engineering Corp.
HKP - cutting machine - Porter, H.K., Inc.
HLT - stressed panel fastener - Tridair Inds.
HMC - hybrid microelectronic circuits - AEL, Inc.
Hole-in-the-Head - tamper-proof screws - Pan-L-Fast
Homalite-LR - low reflectance plastic sheet - SGL Homalite
Hometaxial - RCA power trasnsistor technology offering low-charge carrier density at the collector junction for reduced heating effect - RCA Solid State Div.
Homosil - clear fused quartz - Amersil, Inc.
HONEY BEE - Video Audio Tape Motor - Hurst Mfg. Corp.
HOPPER STAKER - swaging machines - Cambridge Thermionic Corp.
Hopstretcher - antenna feed - Gabriel Elctrns. Inc.

Horizon Line - voltmeters & ammeters - General Elec. Co.
Horizon Line® - panel meters - General Electric Co.
Hornet - miniature soldering iron - Hexacon Elec. Co.
Hot Hand - tubing shrinkers - American Elec. Heater
"Hot Line Telephone" - automatic dial telephone - Warren G-V Communications
Hot Shot - dry batteries - Union Carbide
Hot Tip - soldering accessory - Air-O-Tronics Prods.
Howell-Bunger - Hydraulic free discharge regulating valve - Allis-Chalmers
HPI - meters - Assembled Products Co.
HR - heat resistant transfers - Meyercord Co.
Hub-Clamp - fastener - Sterling Instr.
HUBLOC - component fastening device - Stock Drive Prods.
Hub-Lock - fastener - Sterling Instr.
Humidolain - ceramic products - Star Porcelain Co.
Humiseal - coatings - Humiseal Div.
Humistat - relative humidity controller - American Instr. Co.
Humitex - recording chart - Foxboro Co.
Hustler - communication antennas & accessories - New-Tronics Corp.
Hy-A-Sil - silicon rectifiers - Sanford-Miller Corp.
HYBRIDGE - RF BRIDGE - Alford Mfg. Co.
Hybrid Modules - precision resistor divider networks - Pulse Engrg., Inc.
Hy-Bute/60 - butyl gum, for insulation - General Elec. Co.
Hycar R CTBN - reactive liquid polymers - Goodrich Chem. Co., B.F.
HYDENT - compression terminals & splices - Burndy Corporation
HYDRATEMP - Synthetic-rubber insulation - CCS Hatfield Wire & Cable Group
Hydrive - high output amplifiers - Infodex, Inc.
Hydrocone - Crushers - Allis-Chalmers
Hydrofeed - recording lathe - Components Corp.
HYDRO-FLOW FLUID - Soldering leveling & fusing chemical - Kenco Alloy & Chemical Co., Inc.
Hydro-Jet - pc board water cleaner. - Hollis Engrg., Inc.
Hydropress - book pressing machine - A. M. W. Corp.
Hydroset - Crusher mechanism for vertical shaft movement - Allis-Chalmers
Hydrosolv - liquid organic water soluble flux - Alpha Metals, Inc.
Hydro Squeegee - solder leveling/cleaning mach. - Lear Siegler, Inc.
Hydrotector - package r-h inspection sys - American Instr. Co.
"Hye-Que" - antenna connector - Budwig Mfg. Co.
HYFEN - connector contacts - Burndy Corporation
Hy-Fi - gas chromatograph - Varian Assocs.
Hyflux - Alnico 5 magnets - Indiana General/Div. Emm Corp.
Hygrade - fabric base sleevings - Markel, L. Frank & Sons
Hygro-Cel - cup r-h sensor device - American Instr. Co.
Hygro-Champ - clamp r-h measuring device - American Instr. Co.
Hygrodynamics - hygrometer product line - American Instr. Co.
Hygrosensor - relative humidity transducer - American Instr. Co.
Hygrotran - convertors, humidity signal (resistance) - American Instr. Co.
HYJOULE - high energy fault Locators - Associated Research, Inc.
HYLINK - compression splice - Burndy Corporation
HYLOK - connector system - Burndy Corporation
HYLUG - compression terminal - Burndy Corporation
Hyper Sel - rectifier - Alpha Components Corp.
Hypertac - connectors - Hypertronics Corp.
Hypertac - PC and rack & panel connectors - Industrial Electronic Hardware
HYPOINT - leadless ic receptacle - Burndy Corporation
HYPOT - high potential Testers - Associated Research, Inc.
HYPRESS - installation tooling - Burndy Corporation
Hy-Range - CB Transceivers - Hy-Gain Electronics Corp.
HYRING - two piece compression terminations - Burndy Corporation
Hy-Scan - Monitor Receivers - Hy-Gain Electronics Corp.
Hy Seas - VHF marine equipment - Hy-Gain Electronics Corp.
Hy-Therm R - Heat flux sensor - Hy-Cal Engineering
H-Zone - high temperature wire - Cerro Wire & Cable Co.
H-10&T - servicemen's leak detector - General Electric Co.

I

IBR - integrated bridge rectifier - Varo Semiconductor, Inc.
ICEM - magnetrons - Varian Electron Tube & Device Grp.
ICEM - inverted coaxial magnetron - Varian Assocs.
Icem - coaxial magnetrons - Varian Assocs.
Ice-Trol - ambient-compensated temperature controllers - Honeywell
Ickypic II - compound - Communications Technology Corp.
ICPAX - integrated circuit packaging system - Techmar Corp.
Icsotimer - time delay - Instr. & Control Sys., Inc.
Idads - automatic drafting system - Information Displays, Inc.
IDEA - Integrated Diesel Engine Analyzer - PRD Elctrns., Inc.
IDIgraf - display terminal - Information Displays, Inc.
IDIIOM/II - computer controlled display - Information Displays, Inc.
IEE-APOLLO - incandescent, segmented filamentary display - Industrial Elctrn. Engrs.
Imagescope - fiber optic flexible image device - Galileo Electro-Optics Corp.
IMCair - propeller fans/centrifugal blowers - IMC Magnetics Corp.
IMcoder - Incremental Optical Encoder - I M C Magnetics
IMCom - Brushless D-C Motor - I M C Magnetics
IMCool - Tubeaxial Fans - I M C Magnetics
Imidex - polyimide-containing composition - General Elec.
ImLec - electronic components - Inter-Market, Inc.
Imlec - thumbwheel switches - Inter-Market, Inc.
Imlec - indicators, legend displays - Inter-Market, Inc.
Imlec - lamps, pilot lights - Inter-Market, Inc.
Imlec - CCTV equipment - Inter-Market, Inc.
Immersion Gold - immersion plating process. - Sel-Rex Co. Div. Oxy Metal Industries Corp.
IMPAC - COMMERCIAL MEDIUM CURRENT SILICON RECTIFIER - Semtech Corp.
Impac - digital panel meters - Velonex, Display Prods.
"Imperial" - adding machines - Victor Comptometer Corp.
Imperial Line - heavy-duty production - UNGAR, Div.
ImperviTran - environmentalized transformer - Micron Industries Corp.
Incert - edge-mount leadless ceramic pkg. - Metalized Ceramics
Incor - Rare earth magnets - Indiana General/Div. Emm Corp.
Incre-Lock - control systems - Sequential Information Systems
Incusil 10 - brazing alloys - Gte Sylvania, Inc.
Incusil 15 - brazing alloys - Gte Sylvania, Inc.
Indomica - mica - Humiseal Div.
Indox - Ceramic magnets - Indiana General/Div. Emm Corp.
Induct-A-Ring - shaker armature - Unholtz-Dickie Corp.
Inductosyn - transducers - Farrand Controls, Inc.
Inductosyn - encoder - Del Electronics Corp.
Inductrol - induction voltage-regulator - General Elec. Co.
Industrite - abrasion, heat, chem., oil & flame resistant cable - Boston Insulated Wire & Cable Co.
Industrol 812 - digital process control - Research, Inc.
Infinitron - resistance elements - Bourns, Inc.
Infinitron - conductive plastic potentiometer - Bourns, Inc.
Info-Lite - lighted readouts, status indicators & systems - Info-Lite Corp.
INFOTRAK - card-chart recorder - Leeds & Northrup Co.
Infrasil - clear fused quartz - Amersil, Inc.
Insco - electronic instrumentation - Electro-Optical Inds., Inc.
Insertomat - component assembly system - Electrovert
In-Source® - vacuum evaporation system - Applied Materials Inc.
Insta-Lead - precut wire leads - Storm Products Co.
Instamator® - construction estimating calculator - Diversified Electronics Co.
Instant Circuit Boards - instant circuit boards - Circuit-Stik, Inc.
Instant Lettering - dry transfers - Datak Corp.
"Instant Weld"® - alpha cyanoacrylate adhesive - Oneida Electronics Mfg.
Instaplate R - processing equip. for metalphoto R - Metalphoto Corp.
Insta-Test - breakdown testers - Grand Transformers
Insul-Bolt - fastener-insulated - Pylon Co., Inc.
Insulcaps - heat shrinkable caps - Burlington Opers. Div.
Insulcon - glowers - Carborundum Co.
Insulet - rivets-insulated - Pylon Co., Inc.
Insulets - outlet fittings - Thomas & Betts Co.
Insuliner - sleeves - Thomas & Betts Co.
INSULINK - insulated compression splice - Burndy Corporation
Insul-Mate - test adapters - Air-O-Tronics Prods.
Insulsplice - continuous strip insulating equipment - Autosplice/Dv Gen Staple
Insultape - heat shrinkable tape - Burlington Opers. Div.
Insultek - insulating finish - Int'l. Elctrn. Resch.
Insultite - heat shrinkable tubings - Burlington Opers. Div.
Insulube - insulating finish - Int'l. Elctrn. Resch.
INSULUG - insulated compression terminal - Burndy Corporation
Integra - consoles - Par-Metal Prods. Div.
Integra-Test - leak detector - Varian Assocs.
Integrid - integrated cir. P.C. card - Elgin Elctrns., Inc.
Intercap - capacitors - International Comps Corp.
Intercette - digital cassette tape transports - Interdyne
Intercheck - thermal switch - Guildline Instrs., Inc.
Interconnect PABX Telephone Systems - 20 lines & up - Milgo Electronic Corp.
Interface: A - speaker system - Electro-Voice, Inc.
Interface 33 - Styled Modular Instrument Enclosures - Amco Engineering Co.
International Servicemaster - tubes - International Comps Corp.
Interohm - resistors - International Comps Corp.
Interrosper - Tracking Radar Devices - Vega Precision Labs.
Intershake - communication test equipment - Atlantic Research Coropration
Interzone - polyimide insulated wire - Cerro Wire & Cable Co.
INTER-8 - low pickup cabling - Perfection Mica Co.
Intri-Cut - chemical milling process - Chem Aero, Inc.
"Invert-A-Stat" - static inverter - Gould Inc.
"Inverted-Vee" - "balun" fed doublet antenna kit - Telrex Labs.
Inverter-Rated Ferramics - ferrites - Indiana General
Inverto-Tran - ferrite inverter transformer series - Pulse Engrg., Inc.
Invertron - ac power sources - Elin Div.
INVERTRON - ac power sources - California Instrs. Co.
Invertron - AC power sources - Calico Div.
Invertron - ac power supplies - Behlman Div., California Instrs.
Involoid - internal rack generated - Invincible Gear Co.
"Ionflo" - ion deflection measurement - Thermo Sys., Inc.
IPAC - Time Sequencer - Instr. & Control Sys., Inc.
IPT-500 Series - comp. test handler - IPT Corp.
IPT-700 Series - comp. test handler - IPT Corp.
IPT-800 Series - comp. test handler - IPT Corp.
IRD - all products - IRD Mechanalysis, Inc.
Iriditron - gamma radiography machines - Automation Inds.
Iriscorder - Videopupillography - Hamamatsu TV Co., Ltd.
Ironclad - battery plates - Exide Power Sys. Div.
Iron Grip, V-Grip - shelving, racks, bins - Equipto
Irrasil - tape, silicone - General Elec.
Irrathene - irradiated polyethylene - General Elec.
Irricon - tape, semi-conducting - General Elec.
Isobase - accelerometer - Endevco
Isobox - enclosure that isolates an accelerometer from changing ambient conditions. - Endevco
ISO-CURVE - R-T, curve-matched, interchangeable thermistors - Fenwal Elctrns.
Iso-Elastic - temperature compensated alloy - Chatillon John & Sons
Isofilm - electronic capacitors - General Elec. Co.
Iso Fork - tuning fork - Philamon, Inc.
Isoformer - transformer - Elcor Prods. Neotec Elctrns. Inc.
ISO-KAP - ceramic capacitors - Centralab
ISO-LATCH - Iso Thermal Latching Valve - General Valve Corp.
Isolationist - line isolation transformers - CEA
Isolene - liquid cis 1,4 polyisoprene rubber polymer - Hardman Inc.
Iso-Lit - opto isolators (couplers) - Litronix
ISO-OP-AMP - solid state modular isolation operational amp. - Burr-Brown
ISO-PAK - Modular DC/DC Converter Power Supplies - Stevens-Arnold, Inc.
Isopil - plug-in isolator - Cir-Q-Tel, Inc.
Isoply - isolated power supply - Elcor Prods. Neotec Elctrns. Inc.
ISOPODS - electronic packaging system (module) - Hughes Aircraft Co
ISOPOLAR REFERENCE - ultrastable precision reference - Data Precision Corporation
Isorex - transformer - Elcor Prods. Neotec Elctrns. Inc.
Iso-Seal - temperature compensated scale - Chatillon John & Sons
ISOTAB - plastic tab-mount thyristor - Hutson Industries
Isotherm - thermistors - Victory Engrg. Corp.
Isothermal - RF transistors - Motorola Semiconductor Prods.
ISO-TIP - cordless rechargeable soldering iron - Wahl Clipper Corp.

Isovar - power supply automatic current to volatage crossover - Elcor Prods. Neotec Elctrns. Inc.
Isowatt - isolated VERSAWATT type - RCA Solid State Div.
"I" Supply - constant current source - Calex Mfg. Co., Inc.
I&S2 - ion implantation - American Microsystems, Inc.
ITECO - test equipment - Industrial Test Equip.
IVACON - AC Line Conditioner - Deltec Corp.

J

Jackey - folding hex key set - Allen Mfg. Co.
JAICO - relays & blade switches - Jaidinger Mfg. Co., Inc.
Jak-switch TM - Jack adapter switch - Chicago Switch, Inc.
JANETTE - Speed Reducers, Gearmotors - Eastern Air Devices Motor Div.
Janset - knobs - Jan Hardware Mfg. Co.
JAQUET - Speed Indicators - Sticht Co., Inc. Herman H.
Jarecki - hydro mechanical presses - Taylor-Winfield Corp.
JETCAL® - jet engine tester - Howell Inst. Inc.
Jetflow - channel inductors - Ajax Magnethermic Corp.
Jet Flux - liquid flux - Chemetron Corp.
Jet Plater - self-contained plating unit - Sel-Rex Co. Div. Oxy Metal Industries Corp.
Jet Set - self-locking honeycomb panel fastener - Esna Div.
Jet-Temp - thermocouples - General Elec. Co.
Jolta - autolinear coupling - Jan Hardware Mfg. Co.
"Jones" - plugs and sockets - TRW/Cinch Connectors
JotDraft - printed circuit symbols - Datak Corp.
Judco - insulated wire & cable - Judd Wire Div.
Junior Spectrophotometer - low cost uv-visible-spectrophotometer - Coleman Instr. Div.
J–W - Gas Detection Product Logo - Bacharach Instrument Co.

K

Kalar - elastomeric compounds - Hardman Inc.
Kalene - elastomeric compounds - Hardman Inc.
Kalex - polyurethane elastomers - Hardman Inc.
Kamag 14 - generators - Kato Engineering Co.
Kappa - delay lines - Kappa Networks
Kapseal - low friction seal - Minnesota Rubber Co.
KARADIO - Applicable to auto radio sets - ATR Electronics, Inc.
Karak - carbon graphite parts - Ohio Carbon Co.
Karen - precision altitude system - Kollsman Instr. Co.
Kari - float switch - Zi-Tech Div.
Kasil - potassium silicate - Philadelphia Quartz Co.
K-det - Sync Instrument Motor - Hurst Mfg. Corp.
Keenserts - inserts & studs - Tridair Inds.
Keeper - cables for ion measuring electrodes - Beckman Instrs., (AISSD)
Kelox - solid bushing inserts for strong threads in weak materials - Heli-Coil Prods.
Keltip - cryogenic sensor - Degussa Inc.
Kelvin Klamps - four-terminal clamps - Electro Sci. Inds.
Kelvin Klips - four-terminal clips - Electro Sci. Inds.
KEMET - tantalum, ceramic & film capacitors - Union Carbide Corp.
Kemfuze - chemical fuse - Bel Fuse
KEMPURE - inert gas purifiers - Kewaunee Scien. Equip. Corp.
Kenbrite - zinc plating bath - Conversion Chem. Corp.
Kencad - cadmium plating bath - Conversion Chem. Corp.
KENCOR - MAGNETIC DRUM MEMORIES - Kenton Engrg. Corp.
Ken-Rad - radio tubes - General Elec. Co.
Ken-Tel - telephone cables and wires - Okonite Co.
Kentrix - multimeter & meter line & its accs. - Uchida of America Corp.
Kenvert - sealers, acids, dry powders - Conversion Chem. Corp.
KEP - electrical impulse counters - Kessler-Ellis Prods.
KERN - lenses - Heitz, Inc., Karl
KeyNet - key to tape remote data entry - Honeywell Information Systems
Keyplex - disk to tape data entry - Honeywell Information Systems
Keytape - data entry - Honeywell Information Systems
K & H - speaker systems, equalizers - Gotham Audio Corp.
KIFIS - integrated flight instrument system - Kollsman Instr. Co.
Kilo-Pac - Power Supply - Velonex, Instrument Div.
Kilovac - relays & switches - Kilovac Corp.
KILOVOLT STAC - HIGH VOLTAGE SILICON RECTIFIER FOR OIL - Semtech Corp.
Kimfol - polycarbonate film - Schweitzer, Peter J. Div.
Kimfone - polysulphone film - Schweitzer, Peter J. Div.
Kinamatic - machines electric motors & generators - General Elec. Co.
Kinatrol - machines & controls - General Elec. Co.
Kine-Finish - roll-finishing dies - MPB Corp.
Kineform - roll forming dies - MPB Corp.
Kine-Miser - roll-roll-forming and roll-finishing attachments on turning machines - MPB Corp.
Kine-Roller - roll-forming and roll-finishing machines - MPB Corp.
King - floated rate integrated gyros - Singer Co.
Kingsley Wire-Marking Machines - marking machines - Kingsley Mach. Co.
Kink-Loc - lead formations - Radio Materials Co.
KINOPTIK - lenses for image intensifiers, scanners - Heitz, Inc., Karl
KINOPTIK - lenses, collimator - Heitz, Inc., Karl
Kintrac VII - kinetic rate monitoring instruments - Beckman Instrs., (AISSD)
KLEEN-STRIP - self-stripping foil-shielded cables - National Wire & Cable Corp.
Kleentrack - contact cleaner - R-Columbia Products, Inc.
Klein-Buhrke - safety equip - Klein, Mathias & Sons, Inc.
Klein Chicago Grips - a grip to pull cables - Klein, Mathias & Sons, Inc.
Klein Haven Grips - a grip to pull cables - Klein, Mathias & Sons, Inc.
"Klein Kord" - Safety Straps - Klein, Mathias & Sons, Inc.
Klein Spee-D-Nut driver - nutdriver with revolving handle - Klein, Mathias & Sons, Inc.
Klein Speedriver - screwdriver with revolving head - Klein, Mathias & Sons, Inc.
Klipring - rings, retaining - Waldes Kohinoor, Inc.
KLIPSCHORN - loudspeaker system - Klipsch & Assocs. Inc.
Klip Sels - transient surge suppressors - International Rectifier Corp.
Klipsocket TM - lampholders - Chicago Switch, Inc.
"Kliptite" - push-on terminal tabs - Kulka Elec. Corp.
KLIXON - motor controls - Texas Instruments
K & N Level - zinc plating bath - Conversion Chem. Corp.
Knobpot - potentiometer - Bourns, Inc.
Kodacel - plastic film & sheet - Eastman Chem. Prods.
Kontact 60 - aerosol contact cleaner - Jonard Industries Corp.
Kontakt-Chemie - sprays for electronic equipment - Regmo Data Corp.
Kontakt WL - degreaser-washer - Regmo Data Corp.
Kontakt 60 - contact cleaner - Regmo Data Corp.
Kontakt 61 - anti-corrosion lubricator - Regmo Data Corp.
Kon-Tork - Torque proportioning differentials - Allis-Chalmers
Kooler-Krown - heat dissipator - UNITRACK Div.
Korless Electrodes - edm electrodes - Uniform Tubes
Korvex - shrinkable tubing - Chemplast, Inc.
k-Pak - chips carrier - Motorola Semiconductor Prods.
K-Prene - urethane material - Di-Acro
Krak-Stik - sealant and pipe thread compound - Lake Chemical Co.
Kralastic - electroplating chem. - Uniroyal, Inc.
Kreco - communications antennas - Kreckman, Herb Co.
KRESKY-WARD - Furnaces - Zero Mfg. Co.
K-Set - magnetic tape head - Michigan Magnetics
KSR - capacitors - General Elec. Co.
Kwick-Konnect - connectors - Sealectro Corp.
Kwik-Way - water applied decals - Meyercord Co.
Kyread - magnetic tape developer - Kyros Corp.

L

Labpot - potentiometers - Bourns, Inc.
La-Co - fluxes and sealing compounds - Lake Chemical Co.
La-Co Loc - plastic pipe cements - Lake Chemical Co.
Lakin - hickey - Thomas & Betts Co.
Lamicor - polyester fiberglass - NVF Co.
Lamplighter - photoelectric street lighting control - Cardinal Control Co.
Lamtac - connectors - Hypertronics Corp.
Lancelok - terminals - Amp Inc.
Landmark - high fidelity music system - Electro-Voice, Inc.
Landmark - music system - Electro-Voice, Inc.
LA SCALA - loudspeaker system - Klipsch & Assocs. Inc.
Lase-A-Lign - laser alignment autocollimator - Laser Inc.
Laserscribe® - automatic wafer scriber - Quantronix Corp.
Lasertrim® - resistor trimming system - Apollo Lasers Inc.
"Lastec" - wire saws, wire, polishing machines, sieve shakers - Laser Technology, Inc.
Laticrete - coatings, anti-static & conductive - Uniroyal, Inc.
Lauda - constant temperature circ - Brinkmann Instrs., Inc.
Lavolain - ceramic products - Star Porcelain Co.
LC - tuners - JFD Electronics Components Corp.
LCA - low coefficient of expansion adhesives - Bacon Inds.
Leak-Pruf - acid core solder - Alpha Metals, Inc.
LEAK-TEC - liquid leak detecting fluids - American Gas & Chemicals Co., Ltd.
Le Carbone - brushes & contacts - Carbone Lorraine Industries Corp.
Le Carbone-AD - batteries - Carbone Lorraine Industries Corp.
Lectr-AU-Lyte - acid type electroplating process of 80% gold and 20% nickel - Sel-Rex Co. Div. Oxy Metal Industries Corp.
LectroDuct - shielded electrical raceways - Lectro Magnetics, Inc.
Lectrofilm - capacitors - General Elec. Co.
Lectroless AU - electroless gold plating process - Sel-Rex Co. Div. Oxy Metal Industries Corp.
Lectro Line - RFI/EMI power line filters - Lectro Magnetics, Inc.
Lectro-Nic - nickel plating process - Sel-Rex Co. Div. Oxy Metal Industries Corp.
Lectro-Screen - durable, ductile nickel electroformed screens for thick film production - Sel-Rex Co. Div. Oxy Metal Industries Corp.
LectroShield - shielded room & cabinets - Lectro Magnetics, Inc.
LectroVent - shielded air ventilators - Lectro Magnetics, Inc.
L.E.D. - light emitting diode - Packaged Resins Div.
LED - light emitting diode castings sys. - Allaco Prods Div.
LEE-BUS - Bus Bars - Atlee Corp.
LEE-STRIP - Bus Strip - Atlee Corp.
LEE-TAC - Lam. Bus Bar Insulation - Atlee Corp.
Lektra/Lite - diffusion light source - Lektra Labs., Inc.
Lektron - sound lectern - PASO Sound Products Inc.
Lenscote - anti-reflection optical coating - Metavac, Inc.
Leonard - Trash rakes for intake of hydraulic turbines - Allis-Chalmers
Lepak - cap sealing equipment - Lepel High Frequency Labs.
Level-Tek - detection & control sys - Robertshaw Controls Co.
Level-Tel - detection & control sys - Robertshaw Controls Co.
Lev-o-Let - switches, outlets - Leviton Mfg. Co., Inc.
LEVOLIER - switches - McGill Mfg. Co. Inc.
Lev-o-Lock - plugs, connectors - Leviton Mfg. Co., Inc.
LEXAN - polycarbonate resin - General Elec.
LGH - high voltage lead - Amp Inc.
LID - leadless inverted device (micro-semiconductor) - Amperex Electronic Corp.
Life Term - terminals for RFI Filters - Filtron Company, Inc.
Light Conditioning TM - dimmer control - Leviton Mfg. Co., Inc.
LIGHT WATCHMAN - photoelectric controls - Ripley Co., Inc.
Limistor - linear thermistor - Keystone Carbon Co.
Limitamp - motor control - General Elec. Co.
LIMITRON - fast acting fuses - Bussmann Manufacturing
Limitstat - safety thermostat - Hotpack Corp.
Linamatic - book backlining machine - A. M. W. Corp.
LINC Tape - mini computer tape memory system - Computer Operations
LINE - Electro-Mechanical Relays - Line Electric Co. Unit Esterline Corp.
Linebusy - Telephone Comm. System Accessory - Phone-Aid Co.
Line-O-Lite - pilot lights - Industrial Devices
Line Radiator - loudspeaker - Electro-Voice, Inc.
Line Radiator - speaker system - Electro-Voice, Inc.
Line-Volt - voltage testers - Industrial Devices
Link-Lock - spring-lock shelf supports - Simmons Fastener Corp.
Linobate - lithium niobate - Crystal Technology
LiquiFlex - Adjustable speed drives (formerly Accutrol) - Allis-Chalmers
LIQUI-NOX - liquid manual detergent - Alconox Inc.
LIRA - infrared analyzer - Mine Safety Appliances Co.
Lite-Mike - light instrumentation - EG & G, Inc.
Lite-Mike - light meter - EG&G, Inc.
Lite-Panels - Drake Mfg. Co.
Lithocon - silicon storage tube - Princeton Elctrn. Prods.
Littel "Multi-Switch" - "multi-switch" switches - Switchcraft, Inc.
Little Caesar - retention assembly - ITT Cannon Electric
Little Gem - drawers - Equipto
"Little Gem" - foot press - Sjoberg, C. & Son, Inc.
"Little Gem" - flat clips - Sjoberg, C. & Son, Inc.

Little Giant - patch & monitor modules - International Data Sciences

Little Giant - 1 watt microglass regulators - Centralab Semiconductor

"Little Joe" - tools - MacDonald & Co.

Live-Lock - structural panel fastener - Tridair Inds.

Lloyd - lampholders, flourescent - Westmoreland Plastics Co.

LMB - Metal cabinets, etc. - Heeger Inc.

Load-Pak - solid-state controlling device - Gems Sensors Div.

Lo-Cate - tracking & positioning sys. - Beukers Labs., Inc.

Lockit-Socket - Integrated Circuit Sockets - U.S. Terminals

Locktite - connectors - Thomas & Betts Co.

Lo-Cog - d-c motors - Pittman Corp.

LOCOST - automated test systems - Julie Research Lab.

Loc-Trac - Zipper Tubing Track - Alpha Wire Corp.

Lo-Flo - fuel oil meters - Singer Co.

Logan - antenna - Instruments for Industry, Inc.

Logicator - electro magnetic readout - Bowmar Instr. Corp.

Logic Pen - logic probe - Advanced Digital Research

Logic Timer - digital timing instruments - Durgin & Brown, Inc.

LogiTran - educational computer - Fabri-Tek, Inc.

Lokon - locknuts - Allen Mfg. Co.

LONCO COPPERBRITE - copper cleaner - London Chemical Co.

LONCO SEALBRITE - solderable protective coating - London Chemical Co.

LONCO SONIC-SOLE - degreasing & flux removal - London Chemical Co.

LONCOTERGE - flux removal & cleaning & copper cleaner - London Chemical Co.

LONER - SOLDERING INSTRUMENT (IRON) - Edsyn, Inc.

Longhair - record brush - Stanton Magnetics, Inc.

Lorcap - ceramic discs and monolythic capacitors - Arco Electronics Inc.

Lo-Torque - low force limit switch - Denison, R.B., Inc.

Lo-Volt - voltage testers - Industrial Devices

Low-Head - Vibrating and gyratory screens - Allis-Chalmers

Low-Var - capacitors, fixed, ceramic - Republic Elctrns. Corp.

Loxarmor - interlocked armor cables - Okonite Co.

Loxswitch - limit switch - Denison, R.B., Inc.

Lox Thermistor - thermistors - Victory Engrg. Corp.

LPB - lighted pushbutton switch - Unimax Switch Corp.

LPS ESA-100 - rust inhibitor lubricants - LPS Research Labs

LPS instant cold galvanize - rust inhibitor - LPS Research Labs

LPS instant contact cleaner - solvent degreaser - LPS Research Labs

LPS#1 - rust inhibitor lubricants - LPS Research Labs

LPS#2 - rust inhibitor lubricants - LPS Research Labs

LPS#3 - rust inhibitor lubricants - LPS Research Labs

LSHV - high voltage cables - Boston Insulated Wire & Cable Co.

LST - low skin temperature oven - Hotpack Corp.

Lubritrol - Mill lubrication system - Allis-Chalmers

Lug-It - lugs - Thomas & Betts Co.

Lumapac - inverter/ballasts - EWC, Inc.

LumenMeter - light instrumentation - EG & G, Inc.

Lumen Meter - light measuring instrument - EG&G, Inc.

Lumiten - light controlled attenuator - Fairchild Sound Equip.

Lustre-Zinc - zinc chromate plating - Titchener, E.H. & Co.

Lustrocolor, Mark III, IV & V - color TV picture tube - Westinghouse Elec. Corp.

Luxicon - light conduit - Dolan-Jenner Inds., Inc.

LX-CJ - self powered cold junction reference source - Omega Engrg., Inc.

LYREC - tape timers - Gotham Audio Corp.

M

MACHINE MINDERS - energy signature transducers. - Macrodyne Inc.

MACO - a solid state programmable sequence logic control system - Barber-Colman Co.

Mac-16 - digital computer - Lockheed Elctrns. Co.

Magacycler - frequency to voltage converter - Pioneer Magnetics

Magaverter - voltage to frequency converter - Pioneer Magnetics

MAGCENTRIC - magnetic bearings - Cambridge Thermionic Corp.

Magflo - bath magnetic stirrer - Hotpack Corp.

Magic Circle - Electronic Remote Control - A.R.F. Products

MAGIC SERIES - Airborne digital computers - Delco Electronics Div.

Magic tip - screw holding screw driver - Hunter Tools

MAGIC WAND - Electrostatic Neutralizers - Sticht Co., Inc. Herman H.

Magitran - wafer thin loudspeaker systems - Era Acoustics

MAGLOCK - magnetic proximity switches - NAMCO CONTROLS

MAG-MIX - magnetic stirrers - GCA/Precision Scientific

Magmod - magnetic modulator - General Magnetics

Magnacaps - low voltage capacitors - Radio Materials Co.

Magnacord - tape equipment - Telex Communications, Inc.

Magnapak - magnetostrictive spaced lamination transducers - Westinghouse Elec.

Magna-Press - small bench presses - Airmatic/Beckett-Harcum

MAGNAREED - Power Reed - Solid State Electronics Corp.

MAGNATORC - small dc motors - Hansen Mfg. Co.

Magnatrak - ultrasonic cleaning generator - Westinghouse Elec.

Magna-Weigh - dial indicator scales - Howe Richardson Scale Co.

Magneform - metal forming equip. - Maxwell Labs., Inc.

Magne-Gage - plating thickness gauge - American Instr. Co.

Magnemetrics - magnetic measuring instrumentation - Walker Scientific, Inc.

Magnesearch - low magnetic flux densities - RFL Inds.

MAGNESIL - magnetic materials - Magnetics

Magnetic Tweezer - pick-up tool - Orbit Inds.

Magnetreater - de-magnetizer (variable) - RFL Inds.

Magnette - circuit breakers - Heinemann Elec. Co.

Magnion - laboratory magnet systems - Walker Scientific, Inc.

MAGNI-WHIRL - constant temperature baths - Blue M Electric Co.

Magnum&T - high current bridges - Unitrode Corp.

Magolite - lightweight insulating cement - Varian Assocs.

Magolite - insulating cement - Semicon Assoc., Inc.

MAGSENSE - voltage comparator - Pioneer Instrumentation

Magstrip - Terminal Strip - Magnum Elec. Corp.

Magswitch - magnet operated switch - Denison, R.B., Inc.

MAGTECH - d.c. tachometer generators. d. c. torque & servo motors - Magnetic Technology

Magterm - Independent Perimeter Terminals - Magnum Elec. Corp.

Major - fan - Rotron, Inc.

M. A. Miller - replacement phonograph stylii - Pageant/M.A. Miller Co.

Manchex - batteries - Exide Power Sys. Div.

Manix Mfrg - production equip. pliers - Mann, Henry Inc.

Manson - friction tape - Okonite Co.

Manumatic - leak detector - Varian Assocs.

MARK - microwave antennas - Anixter-Mark

Markal Ball Paint Marker - industrial marker - Markal Co.

Markal Dura-Ink & Sharpie - felt tip markers - Markal Co.

Markal Paintstik - paintstik markers (industrial paint in stik form) - Markal Co.

Markal Paper Riter - felt tip pen - Markal Co.

Markal Protective Coating - coating compounds - Markal Co.

Markal Protective Coating - protective coatings - Markal Co.

Markal Slic-Tite with "Teflon" - 4 thread sealants (stik, paste, tape, packing) - Markal Co.

Markal Thermomelt - temperature indicators crayons - Markal Co.

Markal Thermomelt - temperature indicators - Markal Co.

Mark "C" - switches - Cole Instrument Corp.

Mark-El - parts marking service - Acme Model Engrg. Co.

Markette I - flexible disk - Memorex Corp.

MARK I - wave solder mach. - Tech. Devices Co.

MARK II - wire cutter & stripper - Tech. Devices Co.

MARK III - circuit card fixture - Tech. Devices Co.

Mark III - Alpha Numeric Printer - Gulton Inds., Inc.

Mark IV - single cable 5-300 MHz hybrid, integrated push-pull line of solid state 2-way CATV equip - AEL Communications Corp., Sub. of Amer. Elctrn. Labs. Inc.

Mark IV Hammer - impact printing mechanism - Dataproducts Corp.

Mark IX - comp. lead trimmer - Tech. Devices Co.

Marksman - Temperature Recorders - Gulton Inds., Inc.

Mark Ten & Mark Ten "B" - Electronic Ignition Systems - Delta Products

Mark V - dual cable, hybrid, integrated push-pull 5-300 MHz line of solid state 2-way CATV equip - AEL Communications Corp., Sub. of Amer. Elctrn. Labs. Inc.

MARK V - component lead former - Tech. Devices Co.

Mark X - disc packs - Memorex Corp.

MARLOX - metal sheathed thermocouples - Marlin Manufacturing Corp.

Marquis - loudspeaker, enclosures - Electro-Voice, Inc.

Martech - extruded & molded bio-medical prods. - Markel, L. Frank & Sons

Marz R - metals purity grade - Materials Resch. Corp.

MASKCOAT - Plating Stop-off - Western Coating Co.

Masq-Matic - automatic plating sys. for continuous strip IC lead frame plating. - Sel-Rex Co. Div. Oxy Metal Industries Corp.

Masterline - matv equipment - Blonder-Tongue Labs., Inc.

MASTER-MITE - flameless heat gun - Master Appliance Corp.

Master Power - vehicle power converter - Techsonics

Mate-N-Lok - connectors - Amp Inc.

Matri Dot - Printers - Practical Automation, Inc.

Matrix IV - Electronic Cabinetry - Zero Mfg. Co.

Max-C - piston trimmer capacitors - JFD Electronics Components Corp.

Maxeal V and VII - Pumps - Allis-Chalmers

Maxi-Color R - Shielded TV Lead-In Wire - Belden Corp.

Maxipak - closed circuit TV systems - Audiotronics

Maxi Power - vehicle power converter - Techsonics

MAXI-"Q"UBETM - Case B 110 mil chip capacitor - American Technical Ceramics

MazeMaster - Wiring Aide - Addison Div. Muirhead, Inc.

McCully - Crushers and other minerals processing machinery - Allis-Chalmers

M.C. Jones - microwave devices - Bendix

M.C.M. - dow inertia moving coil motors - Electro-Craft Corp.

MC (MC5000) - Digital High Speed Printers - Datalog Div., Litton Sys.

McMOS - complementary MOS logic IC's - Motorola Semiconductor Prods.

MCRT - torque meters & rotary transformers - S. Himmelstein & Co.

MCSIM - Microcontroller simulator - Scientific Micro Sys.

M DAC - miniature digital-to-analog convertor - Analog Devices

MDTL - diode-transistor logic IC's - Motorola Semiconductor Prods.

Measure-Matic - positive displacement pumps - Airmatic/Beckett-Harcum

MEC - custom wire processing - Manger Elec. Co., Inc.

MECL - emitter-coupled logic IC's - Motorola Semiconductor Prods.

MECL 10,000 - emitter-coupled logic IC's - Motorola Semiconductor Prods.

Mec/221 - electronic calculators - Victor Comptometer Corp.

Mec/223 - electronic calculators - Victor Comptometer Corp.

Mec/224 - electronic calculators - Victor Comptometer Corp.

Mec/225 - electronic calculators - Victor Comptometer Corp.

Medallion - car sound, accessories, tools - Midland International Corp.

MEDI-SAFE - Low Leakage Medical Cable - Brand-Rex Co.

Mega-Bias - duplicating equip. & access. - International Electro-Magnetics

Megaflex - tubing, fluorocarbon, flexible - Co-Operative Inds., Inc.

Meg-A-Life II - device and program - Motorola Semiconductor Prods.

Megamemory - large scale memory system - Electronic Memories & Magnetics Corp.

Megason - ultrasonic cleaners, vapor degreasers - Ultrasonic Instrs. Int'l., Inc.

MegaSorb - pumps - Varian Assocs.

Megatrometer - high megohm meter - Penn Airborne Prods.

Megavoice - power megaphone - PASO Sound Products Inc.

MEG-CHEK - megohmmeters - Associated Research, Inc.

Megger - insulation, continuity, earth test instrs. - Biddle, James G.

Megmeter - megohm indicator, insulation tester - Ross Engineering Corp.

MEGOHMER - Insulation Testers - Sticht Co., Inc. Herman H.

Mektherm - Heater circuits - Rogers Corp.

Mektron - Printed circuitry - Rogers Corp.

Melacel - cellulose fiber - Pall Trinity Micro Corp.

Melcor - thermoelectric cooling module - Melcor-Materials Elctrn. Prods.

Meldin - polyimide molded shapes and parts - Dixon Corp.
Memotron - direct view storage tube - Hughes Aircraft Co.
Memotron - direct view storage tube - Hughes Aircraft Co.
Mentor - multimeters, limit testers, ratio trim/test instrs. - Biddle, James G.
Mercutron - keyboard switch module - Mechanical Enterprises, Inc.
Mercutronic Keyboard - computer terminal keyboard - Mechanical Enterprises, Inc.
Merix Anti-Static for Recors - LP records & electronic cleaner - Merix Chem. Co.
Merlon R - polycarbonate - Mobay Chem. Corporation
Mesa - modular semiconductor equipment - Allied Chemical Corp.
Messagefax - transmission of typed or handwritten material - Datalog Div., Litton Sys.
Metalex - shielded frames - Cal-Metex Corp.
Metal Glaze R - cermet element - TRW/IRC Potentiometers
Metal Glaze TM - thick film resistors-proprietary system - TRW/IRC Resistors
Metalonics - cathodes, dispenser. - Philips Elmet Corp.
Metanet - thick-film resistors - Sprague Elec. Co.
Meta 4® - computer systems - Digital Scientific
Met-Bel - vacuum/compressor pumps - Metal Bellows Corp.
Met Coil - multilayer ceramic inductors - Metalized Ceramics
Metfilm - metalized film dielectric capacitors - Sprague Elec. Co.
Met Gold - selective gold plating - Metalized Ceramics
Met-Loc - all metal self locking thread system - Deutsch Fastener Corp.
METOXILITE - HIGH TEMP. BONDED SILICON RECTIFIER - Semtech Corp.
Met Pac - low cost packaging - Metalized Ceramics
Metracorder - magnetic tape recorder (ASC11) - Metra Instruments, Inc.
Metralarm - high speed digital data display & alarm - Metra Instruments, Inc.
Metralogger - data & alarm printer - Metra Instruments, Inc.
Metrascope - bargraph CRT data aquisition display - Metra Instruments, Inc.
Metri-Gap - measuring gages - Lion Precision Corp
Metrion pH Meter - low cost ph meter - Coleman Instr. Div.
Metro Basket - wire material handling baskets - Metropolitan Wire Corp.
Metrobeam - construction laser - Metrologic Instruments, Inc.
"Metro-Coat" - solder coat process - Metropolitan Circuits Inc.
Metrohm - polarograph - Brinkmann Instrs., Inc.
Metso - sodium metasilicate - Philadelphia Quartz Co.
MEZZER - electronic measuring instruments - Castle TV Tuner Service, Inc.
Me-2 - dual-in-line sockets - Scanbe Canoga Industries
MF - Drake Mfg. Co.
MHTL - high-threshold logic IC's - Motorola Semiconductor Prods.
Mica and Indomica - insulation and parts - Industrial Mica Div.
Micaclad - insulation - Electric Machinery Mfg. Co.
Mica Mat - mica paper reconstituted mica - General Elec.
MIC amp R Modules - Thin Film Unit Amplifier - Avantek, Inc.
"Micanite" - micaceous materials - 3M Co.
Micapak - multilayer lamination service - Mica Corporation
Micaply - high pressure laminates - Mica Corporation
Micatemp - high temperature wire - Cerro Wire & Cable Co.
Michigan - loudspeakers - Electro-Voice, Inc.
MiCLAD - Electrical insulation - Allis-Chalmers
Mic-Pac - hi freq hi power transistor package - Microwave Semiconductor Corp.
Micro-Acoustic - audio equalizer - Frazier, Inc.
Micro Bead - thermistor - Victory Engrg. Corp.
Microceram - microminiature ceramic fixed capacitors - JFD Electronics Components Corp.
MICROCHOPPER - Solid State Chopper - Solid State Electronics Corp.
MICROCLAREED - switching assemblies - Clare & Co., C.P.
Micro-Clean - pc board in-line cleaner - Hollis Engrg., Inc.
MicroCoax - miniature semiridge coaxial cable - Uniform Tubes
Microcom - telemetry commutator - General Devices, Inc.
MicroController - bipolar microcomputer - Scientific Micro Sys.
Microdata 1600 - computer - Microdata Corp.
Microdata 32/S - computer - Microdata Corp.
Microdata 3200 - computer - Microdata Corp.
Microdata 400/10 - computer - Microdata Corp.
Microdata 800 - computer - Microdata Corp.
Microdial - digital & concentric dials - Amphenol Connector Div., Controls Opers.
Microflash - flash equipment - EG&G, Inc.
Microflector - reflectors - Microflect Co.
MICROFLEX - timers counters - Eagle Signal
Microfork - tuning fork - Murata Corporation of America
Microfuse - miniature fuses - Littelfuse, Inc.
MICRO-GAP - replacement speakers - Utah Electronic Div.
Micro-gator - Clips - Mueller Electric Co.
Microhex - connectors - Sealectro Corp.
Micro i - miniature inductors - Delevan Div., Coil Prods.
Microlet - microminature eyelet - Circon Corp.
Microloss - microwave absorbent material - Coax Devices Inc.
Micro-Master - microfilm equipment - Keuffel & Esser Co.
Micro Match - monitoring & test equip. - Bendix
Micromatic - polyester & polypropylene film capacitors (axial lead), self encased - Paktron Div.
Micro-Minac - digital computers - Singer Co.
Microminim - Flexible miniature cables - Standard Wire & Cable Co.
Micro-Optic - fiber optic controls - Dolan-Jenner Inds., Inc.
Micropac modules - process interface hardware for micro mini, maxi computers - PCS., Inc.
Micropac OEM - microcomputer based control system for the high volume OEEM - PCS., Inc.
Micropac RT - remote multiplexer for computers - PCS., Inc.
Micropac 80 - microcomputer development system - PCS., Inc.
Micropak - closed circuit TV systems - Audiotronics
Micropin - contact - ITT Cannon Electric
Micropix - cathode ray tubes - Litton Inds.
Micro-Plug - phone plugs - Switchcraft, Inc.
Micropot - precision & trimming potentiometers - Amphenol Connector Div., Controls Opers.
MicroProbe - elec. test instr. - Circon Corp.
Microram - semiconductor memory - Electronic Memories & Magnetics Corp.
MICROREED - Microminiature Reed Relay - Solid State Electronics Corp.
Micro Sentry - voltage relay - Magnetics, Div. of Spang Industries, Inc.
Microsocket - contact - ITT Cannon Electric
Microsource - power supply - Elasco
Microspec - infrared spectrophotometer - Beckman Instrs., (AISSD)
MICROSTAR - Laboratory Microscope - American Optical Corp.
Microstrate - laminates - National Beryllia Corp.
Micro-Synclamps - sub-min. servo clamps - Timber-Top, Inc.
Micro-T - miniature package (transistors) - Motorola Semiconductor Prods.
Microtech - flexible waveguides - Waveline, Inc.
Microtel - microwave radio - GTE Lenkurt Inc.
MICROTEMP - Thermal Cutoff - Micro Devices Corp.
MICROTEMP MULTIPROTECTOR - SENSES HEAT-CURRENT - Micro Devices Corp.
Microthik - keyboards - Refac Elctrns/Wild Rover
MicroTool - small hand tools - Circon Corp.
Microtransmitter - monolithic radio transmitter (1C) - Lithic Systems, Inc.
Microtron - cooking tubes - Litton Inds.
Micro-Vectorbord - Small Hole Perforated Insulating Board - Vector Electronic Co., Inc.
Micro Video - television microscope sys. - Circon Corp.
Micro Video Metrology - television microscopic measuring sys. - Circon Corp.
Micro-Well - ink rollers - Mohawk OEM Sales
Microzone - electrophoreses apparatus - Beckman Instrs., (AISSD)
MIDA - miniature integral diode assemblies - Motorola Semiconductor Prods.
MIDGET - modular integrated digital tester - PRD Elctrns., Inc.
Midgi-Coder - bcd to numeric decoder/driver - Refac Elctrns./Pinlites
Midgi-Counter - decode counter, encoder - Refac Elctrns./Pinlites
Midgi-Dial - dial assy. - Theta Instr. Corp.
Midgi-Lite - digital readout - Refac Elctrns./Pinlites
Midgi-Wedg - Drake Mfg. Co.
Midland - communication, home entertainment - Midland International Corp.
Midway - wall plates - Leviton Mfg. Co., Inc.
Mil-Clamp - coaxial connector cable attachment - Amphenol RF Div.
Mil-Crimp - coaxial connector cable attachment - Amphenol RF Div.
Mil-E-Store - military core memory system - Dataproducts Corp.
Milk-Trol - ambient-compensated temperature controllers - Honeywell
Milliken - igh-speed cameras (16 mm) - Teledyne Camera Sys.
MILLISEC - Ultra High Speed Relays - Stevens-Arnold, Inc.
MilliTorr - ionization gauge - Varian Assocs.
Mil-Loc - mil-std stressed panel fastener - Deutsch Fastener Corp.
MilMaster - electronic micrometers - Electron-Machine Corp.
Milros - mildly activated rosin flux - Alpha Metals, Inc.
Milwaukee Wrot - washers & stampings - Wrought Washer Mfg., Inc.
Mina - ball bearings - MPB Corp.
Mina-Gear - gear-motors - General Elec. Co.
Minapar - plastic bearing retainers - MPB Corp.
Minapure - lubricant - MPB Corp.
Mineac - miniature electronic auto collimator - Barnes Engrg. Co.
Mineon - Drake Mfg. Co.
MineSpot - lighting system - Mine Safety Appliances Co.
Miniature - Relay Socket - DAN-L Inc.
Mini-Aud - audio power amplifier - Dynair Elctrns. Inc.
Mini-Bal - balanced amplifier - Dynair Elctrns. Inc.
MINI BEE - Video Audio Tape Motor - Hurst Mfg. Corp.
Minibreaker - small circuit protectors - Aiken Industries
Minibridge - silicon rectifier - Elctrn. Devices
Mini/Bus - Electrical power distribution systems - Rogers Corp.
MINIBUTTON - digital (thumbwheel) switches - Digitran Co.
Minicam - camera - CBS Laboratories
Mini-Cator - indicator lights - Industrial Devices
MINI-CONSOLE - small plastic instrument enclosure - Techmar Corp.
mini-cubeR - Case A 55 mil chip capacitor - American Technical Ceramics
Mini-Dap - pulse DA - Dynair Elctrns. Inc.
Mini-Dav - video DA - Dynair Elctrns. Inc.
Mini-Davs - syne-mixing video DA - Dynair Elctrns. Inc.
Mini-Dial - dial assy. - Theta Instr. Corp.
Minidisc Package - impatt diodes - Hughes Aircraft Co.
Mini-Fade - 2-input video fader - Dynair Elctrns. Inc.
MINIform - coaxial RF switches - Amphenol RF Div.
Mini-gator - Clips - Mueller Electric Co.
MINI-GUN - heat tool - Raychem Corp.
Minilamp - minature indicator lights - Int'l. Prods. Inc.
MINILEVER - digital (thumbwheel) switches - Digitran Co.
Miniload - Miniature RF Loads - Bird Electronic Corp.
MINILOK - terminal blocks - Burndy Corporation
Mini-Matrix - plugboard switch - NES, Inc.
Mini-mike TM - Miniature slide switches - Chicago Switch, Inc.
MINI-MISER - low-cost stepping motor - Ledex Inc.
Mini Mite - portable potentiometer - Thermo Elec. Co., Inc.
Mini-Mix - mixers, adapters, audio accessories - Switchcraft, Inc.
Mini-Mod - audio-video modulator - Dynair Elctrns. Inc.
Mini-Monitor - Miniature RF Wattmeters - Bird Electronic Corp.
Mini-Mop - video cable equalizer - Dynair Elctrns. Inc.
"Mini-Mounts" - a sys. for prototype circuit assembly (breadboarding) - Christiansen Radio Inc.
Mini-Mov - metal oxide varistor - General Elec. Co.
MiniOhm - miniature resistors - General Resistance, Inc.
Minipak - soldering equip. - Electrovert
Mini-Pre - audio pre-amplifier - Dynair Elctrns. Inc.
Miniprogrammer - programming switches - Cole Instrument Corp.
Mini-Reader - portable rh-temp indicator - American Instr. Co.
MINIREED - Miniature Reed Relay - Solid State Electronics Corp.
Mini-Rote - rotary commutator - Airflyte Elctrns. Co.
MiniSat - low VCE (sat) transistor - PowerTech, Inc.
Mini Sentry - infrared intrusion detector - Laser Systems Corp.
Mini-Seq. - sequential switcher - Dynair Elctrns. Inc.
Minisert - miniature p.c. socket - Berg Electronics
Miniservo - Compact Lab Recorder - Esterline Angus
Mini-Slide - pilot lights & sockets - Industrial Devices
Minisource - power supply - Elasco
Mini-Split - special effects generator - Dynair Elctrns. Inc.
Mini-Spot - Screen Brightness Meter - Photo Research Corp.
MINISTAC - SUB-MINIATURE HIGH VOLTAGE - Semtech Corp.
MINISTIC - SUB-MINIATURE SILICON RECTIFIER - Semtech Corp.
Mini-Store - commercial core memory system - Dataproducts Corp.

MINISWITCH - digital (thumbwheel) switches - Digitran Co.
Mini-Synclamps - min. servo clamps - Timber-Top, Inc.
Mini-System - digital strain recorder - B & F Instrs., Inc.
Mini T - subminiature 5 amp general purpose relay - Teledyne Relays
Minitac - connectors - Hypertronics Corp.
Minit-Cure - epoxy adhesive - Packaged Resins Div.
Minit-Cure - epoxy adhesive - Allaco Prods Div.
Mini-Test - continuity tester - Industrial Devices
Minithin - thin wall teflon wire - Thermax Wire Corp.
Minitron - hermetically sealed miniature inverter - Nova Electric Mfg. Co.
Mini-Twister - wire twisting device - Storm Products Co.
Miniverter - miniaturized frequency changers/inverters - Nova Electric Mfg. Co.
Mini-Volt - voltage testers - Industrial Devices
Mini-Wedge - pilot lights & sockets - Industrial Devices
Mini-3 - 3 input video switcher - Dynair Elctrns. Inc.
Mini-6 - video switcher - Dynair Elctrns. Inc.
MIN-KAPS - ceramic capacitors - Centralab
Minnie - connector - Amphenol Connector Div.
Mirr-Maid - mirror pictures - Thin Film Services
Mirropane R - transparent mirrors - Libbey Owens-Ford Co.
Misco Redline - replacement & specialty speakers - Minneapolis Speaker Co.
Miser - micropower led flasher (1C) - Lithic Systems, Inc.
Missilite - Rectangular Annunciator Light - Illuminated Products Inc.
Mix-Kit - package device for 2-part compounds - Hardman Inc.
MKS Baratron - pressure-vacuum meter - MKS Instrs., Inc.
MLC - multilayer monolytic capacitor - Radio Materials Co.
MMOS - MOS logic IC's - Motorola Semiconductor Prods.
Mobilaxm - back-up alarms - Midwest Electronic Industries
Mobilflash - alternating flasher - Midwest Electronic Industries
Mobilfone R - radio communication equip. - Mobil Electronics, Inc.
Mobilite - L.V. lights - Midwest Electronic Industries
Mobilmatic - remote control - Mobil Electronics, Inc.
Mobilpage - business sound system - Midwest Electronic Industries
Mobiltel - mobile telephone equipment - GTE Lenkurt Inc.
Mobiltemp - remote temp. indicator - Midwest Electronic Industries
Mobiltone R - tone signalling equip. - Mobil Electronics, Inc.
Model AP - Tape/Ticket Printer - ITT General Controls
Model D Decade - digital printer - ITT General Controls
MODEL T - Sync Instrument Motor - Hurst Mfg. Corp.
Model UP - Universal Ticket Printer - ITT General Controls
Modems - medium and high speed data sets - International Communications
Modpak - closed circuit TV systems - Audiotronics
Modscan - data acquisition & control systems - LFE Control System Industries
Moducal® - lightweight fiberglass panels - SGL Graphics
Mod-U-Card - modular plug-in circuit cards - NES, Inc.
Modulair - cabinet panel - Rotron, Inc.
Module-Masq - semi-automatic selective gold plating sys. for sheet & strip. - Sel-Rex Co. Div. Oxy Metal Industries Corp.
Module-Matic - tape controlled plating sys. - Sel-Rex Co. Div. Oxy Metal Industries Corp.
Module-X - modular plating equip. - Sel-Rex Co. Div. Oxy Metal Industries Corp.
Moduline - gas chromatography instruments - Varian Assocs.
Moduline - gas chromatographs - Varian Assocs.
Moduline - rotary switches - Oak Inds. Inc.
Modulite® - sign panels and displays - SGL Graphics
Modul/Matic - color analyzer - Lektra Labs., Inc.
Moduload - RF Loads with integral heat exchangers - Bird Electronic Corp.
MODULOK - terminal blocks - Burndy Corporation
Modu-Mount Cabinetry - electronic enclosures - Honeywell Inc.
Modupac - modular logic circuits - Analogic Corp.
MODUPANEL - rack adapter systems for modular supplies - Systron Donner Trygon Div.
Moduprint - printers - Practical Automation, Inc.
Modutrim - microminiature ceramic variable capacitors - JFD Electronics Components Corp.
MOISTURPUMP - industrial dehumidifiers - Electro Impulse
MOLALLOY - solid lubricant components - Pure Carbon Co., Inc.
Molan - computer control language - Harrel, Inc.
"Mold-Ease Conc. Pcr" - mold lubricant - Merix Chem. Co.
Molded Heat - molded to shpae electrical heater - Sierracin/Thermal Sys.
"Molded-On" - cable end molding - Barker Prods. Co.
Molgard - mold release agent - Ram Chems.
Moli-Spray - Lubricants, molybdenum disulfide aerosol - Rogers Corp.
Molydag - dry film lubricants - Acheson Colloids Co.
Molyspray - molybdenum metallizing wire - Philips Elmet Corp.
Monastrip EP - epoxy stripper - Mona Inds., Inc.
Mono AD - I.C. A/D converter - Precision Monolithics Inc.
Monobeam - infrared analyzers - Beckman Instrs., (AISSD)
Monobloc - Monolithic ceramic capacitors - Erie Technological Products
Monobond - epoxy adhesive - Allaco Prods Div.
Monobond - epoxy adhesive - Packaged Resins Div.
Monoceram - monolythic type ceramic capacitor - San Fernando Elec. Mfg.
Monochip - custom integrated circuit - Interdesign Inc.
Mono CMP - monolithic comparater - Precision Monolithics Inc.
Mono DAC - monolithic D/A converter - Precision Monolithics Inc.
MONO-KAP - ceramic capacitor - Centralab
MONO-KAP TM - ceramic capacitors - USCC/Centralab, Elec. Div.
Monolithic - switch arrays - Refac Elctrns/Wild Rover
Mono OP - monolithic operational amplifier - Precision Monolithics Inc.
"Mono-Pole" - steel antenna supporting mast structures - Telrex Labs.
Monopoxy - single-component epoxy resin adhesive - Hardman Inc.
Monoxor - Carbon Monoxide Detector & Indicator - Bacharach Instrument Co.
Monsanto - Electronic Test and Measurement Equipment - United Systems
Moody - hand tools - Moody Tools, Inc.
Moody Kit - tool sets - Moody Tools, Inc.
MoON-X - high perfection silicon - Monsanto
Mother Trucker - Truck Antenna - Hy-Gain Electronics Corp.
Motogard - motor overtemperature protection system - Power Control Corp.
Motomatic - motor & speed controls - Electro-Craft Corp.
Motopulse - rotary solenoid - Barber Corp.
Mototrol - pressure operated control - Autocon Inds., Inc.
Mounty - hand lamps - Teledyne Big Beam
MPC - precision coaxial connectors - Maury Microwave Corp.
MPF - precision waveguide flanges - Maury Microwave Corp.
MP-System 1000 - modular instrumentation system - McKee-Pedersen Instrs.
Mr. Battery - custom battery designs - Power, Inc.
MRTL - resistor-transistor logic IC's - Motorola Semiconductor Prods.
MSP - miniature surge protector - Joslyn Elctrn. Sys.
MTLC - ultraminiature tuners - JFD Electronics Components Corp.
MTM - magnetic tape memory - Raymond Engrg. Inc.
MTNS - metal thick nitride semiconductor - General Instr. Corp.
MTOS - metal thick oxide semiconductor - General Instr. Corp.
MTTL - transistor-transistor logic IC's - Motorola Semiconductor Prods.
Mu-Caps - capacitors, fixed, ceramic - Republic Elctrns. Corp.
Mucon - capacitors, fixed, ceramic - Republic Elctrns. Corp.
Muffin - fan - Rotron, Inc.
Muffle Module - sound enclosure - Automation Devices, Inc.
Multibit - multi state core for memory applications - Electronic Memories & Magnetics Corp.
Multi-Cell II - silicon high-current rectifiers - Motorola Semiconductor Prods.
Multi-CJ - multi calibration cold junction reference source - Omega Engrg., Inc.
Multi-Coax - coaxial contacts - Amphenol RF Div.
Multicore - solder & chemicals - Multicore Solders
Multidex - rotary switches - Oak Inds. Inc.
Multidial - Turns Counting Dial - Spectrol Electronics Corp.
Multiductor - tripple frequency convertor - Ajax Magnethermic Corp.
Multiflash - flash equipment - EG&G, Inc.
Multiform - glass and glass-ceramic preforms & spacers - Corning Glass Works, Television Prods. Div.
Multimemory - semiconductor memory system - Electronic Memories & Magnetics Corp.
Multi Mite - portable potentiometer - Thermo Elec. Co., Inc.
Multi-Mode Tonotron - direct view storage tube - Hughes Aircraft Co.
Multi-Mode Tonotron - direct view storage tube - Hughes Aircraft Co.
Multi-Pac - Power Supply - Velonex, Instrument Div.
Multi-Pac R - multiple PC boards, sandwiched - Elfab Corp.
Multipak - powder compacting presses - Pentronix
Multipak - closed circuit TV systems - Audiotronics
Multiple Microflash - flash equipment - EG&G, Inc.
Multiplex - Paper making machinery - Allis-Chalmers
Multi-Printer - digital printer - ITT General Controls
Multi-Swage - swaged electronic components - Bead Elctrns.
Multi-Switch - "multi-switch" switches - Switchcraft, Inc.
Multisyn - encoder - Del Electronics Corp.
Multitron - gamma radiography machines - Automation Inds.
Multiwire - circuit board - Photocircuits Div., Kollmorgen Corp.
Multizone R - zone melting apparatus - Materials Resch. Corp.
Musicaster - speaker system - Electro-Voice, Inc.
Musicaster - loudspeaker - Electro-Voice, Inc.
Muxpac&T - Ultra high impedance 8-channel multiplexer - Analogic Corp.
MVM - air variable - JFD Electronics Components Corp.
mW MRTL - resistor-transistor logic IC's - Motorola Semiconductor Prods.
Mycro Z - polished silicon wafers - Siltec Corp.
Mykroy - glass bonded mica - Synthane Taylor Corp.
M2 - memory module - MI2 Data Systems Inc.

N

NAFOAM - low-capacity instrumentation cables - National Wire & Cable Corp.
NAFOIL - Foil-shielded cables - National Wire & Cable Corp.
Namograph - marking machines - Kingsley Mach. Co.
Nanaline - delay line fixed - Bel Fuse
Nanistor - high speed resistors - General Resistance, Inc.
Nanocom - telemetry commutator - General Devices, Inc.
Nanohex - connectors - Sealectro Corp.
Nanologic - data acquisition and timing system - Chronetics, Inc.
Nanomemory - Core memory system - Electronic Memories & Magnetics Corp.
Nanos - fan - Rotron, Inc.
Nano-Skan - reflective skanner - Skan-A-Matic Corp.
Narrow-Caps - capacitors, fixed, ceramic - Republic Elctrns. Corp.
Natite - industrial ceramic materials - Nat'l Ceramic Co.
Navtrak - navigation systems - Edo Western Corp.
NCG - oxy fuel gas welding apparatus - Chemetron Corp.
Needle Finder - needle merchandiser - Ev-Game Inc.
Neg'ator - constant force spring - Ametek, Hunter Spring Division
NELWELD - equipment - Nelson Stud Welding TRW Inc.
NEOFLEX - Neoprene insulated welding cable - CCS Hatfield Wire & Cable Group
Neptune - San Fernando Elec. Mfg.
NETIC - magnetic shielding material - Perfection Mica Co.
Neumann - condenser microphones, disk cutting equip., rumble meters, phase correlation meters - Gotham Audio Corp.
Neutralite - Device for voltage regulators - Allis-Chalmers
Neutronex - neutral noncyanide gold electroplating process. - Sel-Rex Co. Div. Oxy Metal Industries Corp.
Newdamp - balancing fluid - Bacon Inds.
New Easy - cutting machine - Porter, H.K., Inc.
Newtron - digital readout tube - Apollo Corp.
N-GAS - special mixture for chemical vapor deposition of silicon nitride. - Matheson Gas Products
Nial - thermocouple alloy - GTE Sylvania Inc.
Nicad - nickel codimur Botteur - Gould, Inc.
Nickelply - steel wire (nickel-coated) - Nat'l-Standard Co.
Nicoro - brazing alloys - Gte Sylvania, Inc.
Nicoro 80 - brazing alloys - Gte Sylvania, Inc.
Nicusil 3 - brazing alloys - Gte Sylvania, Inc.
Night Lark - power failure lights - Teledyne Big Beam
NiGuard - Ceramic Capacitor - AVX Ceramics
NIMO R - 10 & 64 gun CRT - Industrial Elctrn. Engrs.
Nimpac - Power Supply - Velonex, Instrument Div.
90° Sweep - sweep right angle TNC, N & SMA, SC - Astrolab, Inc.
Nioro - brazing alloys - Gte Sylvania, Inc.

Niromet - controlled expansion alloy - GTE Sylvania Inc.
Niron - controlled expansion alloy - GTE Sylvania Inc.
Ni Span C Alloy 902 - temperature compensated material - Engelhard Minerals & Chem.
Nitrophyl - Cellular hard rubber floats - Rogers Corp.
Nitrox® - reactor system - Applied Materials Inc.
Nixie R - indicator tube - Burroughs Corp.
Nixox - catalyst chamber - Air Prods. & Chems., Inc.
Noals - automatic noise level adjuster - Altec Div.
No Arc - hi voltage insulator - Chemtronics, Inc.
Nobex - components - NOBEX Div.
NoBrush - permanent magnet converters, frequency-generators, & alternators - Georator Corporation
Noisefoe - ear muffs - Mine Safety Appliances Co.
Nokorode - soldering flux - Dunton, M.W. Co.
Nomad - portable cases - B & F Instrs., Inc.
No-Mar - special set screw - PIC Design Division
No-Nik - wire stripper - Clauss Cutlery Co.
Nontact - non-contact temperature sensor - Trans-Met Engrg.
Norac - non-rotating armored cable - Boston Insulated Wire & Cable Co.
Norbatherm - temperature controller - Cross Electronics Inc.
Nordic - high density connector - Viking Inds., Inc.
Normatic - solid state welder control - Square D Co.
Normatype - drytransfer lettering - Keuffel & Esser Co.
Norpak - solid state logic control - Square D Co.
NORPLEX - Industrial Laminated Thermosetting Plastics - Norplex Div.
Norseman - hand tools - Erikson Specialized Tool Co.
Norsman - wire wrap connector - Viking Inds., Inc.
North Seeker - gyro/repeater sys. - Humphrey, Inc.
Noryl - thermoplastic resin - General Elec.
Noryl Resins - phenylene oxide based resins - General Elec.
No-Slip - positive drive belt - PIC Design Division
No-Til - Planters - Allis-Chalmers
Novacon - DC to DC converter - Nova Electric Mfg. Co.
Novadisc® - fixed-head disc - Data General Corp.
Novaerter - frequency changers/inverters - Nova Electric Mfg. Co.
NOVA-1200,1210,1220,800,820,840,2,830 - computers - Data General Corp.
N-S Rocket Wire - high-tensile wire - Nat'l-Standard Co.
Nu Blac - ceramic products - Star Porcelain Co.
Nucor - power components - NUCOR Corp.
Nurl-Loc - Terminals, wire-wrap panels, sockets, test jacks. - Richardson
Nutsert - insert fasteners - Avibank Mfg. Inc.
Nyebar - barrier film - Nye, William F., Inc.
Nyetact - electrical contact lubricant - Nye, William F., Inc.
NYFAB - Nylon monofilament fabric - Wire Cloth Enterprises, Inc.
NyGrip - Nylon Cable Clamp - Weckesser Co. Inc.
Nylafil - fiberglass reinforced nylon - Fiberfil Div. Dart Ind.
NYLET - terminal bushings. - Heyman Mfg. Co.
Nylobond - connectors - Amp Inc.
NYLOCLIP - nylon cable clip - Burndy Corporation
Nylode - talc reinforced nylon - Fiberfil Div. Dart Ind.
Nylox - adhesive composition for nylon, etc. - Hardman Inc.
Nyloy - rod ends with ball bearings - MPB Corp.
Nystagmotrac - optical stimulator - Beckman Instrs., (AISSD)
NYTYE - wire & cable ties - Heyman Mfg. Co.
N-4 - zirconium copper alloy - Nippert Co.

O

Observer - cctv cameras - Blonder-Tongue Labs., Inc.
Odin - edgeboard connnector - Viking Inds., Inc.
O-GAS - special mixture for chemical vapor deposition of silicon dioxide. - Matheson Gas Products
OHFST - clear fused quartz - Amersil, Inc.
Ohiohm - resistors - Ohio Carbon Co.
Ohmega - conductor-resistor laminates - Mica Corporation
Ohm-Free 1035 - thick film conductor ink - Sel-Rex Co. Div. Oxy Metal Industries Corp.
Ohmpath - thick film resistive inks. - Sel-Rex Co. Div. Oxy Metal Industries Corp.
Oildag - lubricant - Acheson Colloids Co.
Oilon PV80 - self lubricating plastic - Cadillac Plastic & Chemical
Oilostatic - oil pressure pipe type cable transmission systems - Okonite Co.
OK - company name - O. K. Machine & Tool Corp.
Okoclad - aluminum sheathed wiring systems - Okonite Co.
Okocord - portable cord and flexible cable - Okonite Co.
Okoflex - instrument control tubing - Okonite Co.
Okoguard - high-voltage cable - Okonite Co.
Okolene - (polyethylene) insulated wire - Okonite Co.
Okometal - fatigue-resistant alloyed lead sheaths - Okonite Co.
Okonite - wire, cable, tape, rubber & cement splice roller - Okonite Co.
Okoprene - cable & wire protective coverings - Okonite Co.
Okoseal - chemical resistant cable and wire - Okonite Co.
Okosheath - covering for lead-sheathed cable - Okonite Co.
Okotherm - high temperature cable - Okonite Co.
Olympic Series - CATV systems & equipment - C-COR Elctrns.
OMAG, MULTISCOPE - magnifiers, microscopes - Heitz, Inc., Karl
Omega - data reduction sys. - Beckman Instrs., (AISSD)
Omega - Metallic seals - Servotronics, Inc.
Omegaclad - insulated wire - Omega Engrg., Inc.
Omegalok - compression fitting - Omega Engrg., Inc.
Omegatite - thermocouple insulators - Omega Engrg., Inc.
OMI - electronic components - Omtronics Mftg., Inc.
Ommi-Coat - nuclear gauges - Nuclear Resch. Corp.
Omnephase - AC phase controls - Omnetics, Inc.
Omnetime - solid state timers - Omnetics, Inc.
Omni-Amp - thermocouple amplifiers & transmitters - Omega Engrg., Inc.
OMNICLOSURE - electronic enclosures - Techmar Corp.
Omnicorder - miniature recorder - Edison, Instr. Div.
Omnidaptor - universal 45 RPM adaptor - Aldshir Mfg.
OMNIFEROUS® - real-time FFT analyzers - Nicolet Scientific Corp.
Omni-Glow - pilot lights - Industrial Devices
OMNIGRAPHIC - graphic recorders - Houston Instrument
Omniguard - monitor - Edison, Instr. Div.
Omni-II - deposit control master - Sloan Technology Corp.
Omni-Lert - programmable indicator lights - Industrial Devices
Omniprox - proximity sensors - Scientific Technology
OMNISCRIBE TM - strip chart recorders - Houston Instrument
Omnisort - document sorting system - E-Systems Inc.
Omni-Spra - special aerosol extender - Tech Spray, Inc.
OmniTester - automatic circuit test set - Automatic Production Systems Inc.
OMNY-BUS - laminar bus bar - Methode Elctrns., Inc.
OMNY-PAC - printed circuits/I. C. applications - Methode Elctrns., Inc.
#1 Gun - portable electric heat gun - Burlington Opers. Div.
1+1 - two tone selective call system - Bramco Controls Div.
1420 LINEAR TESTER - bench top IC tester for linear IC's - Sitek, Inc.
"On The Ball" - aerospace chemical - Merix Chem. Co.
O-Pac - power packs - Opad Elec. Co., Inc.
"Open-Aire" - stero headphones - Sennheiser Elctrn. Corp.
Operational Filter - multifunction variable filter - Rockland Sys. Corp.
Optach - shaft encoder - H H Controls Co., Inc.
Optecon - optical incremental encoders - Data Technology Inc.
Opticator - electroluminescent readout - Bowmar Instr. Corp.
Opti-Coder - encoder - Sequential Information Systems
OPTIMA - electronic enclosures - Optima Enclosures
Option Blocks - individual/dual terminators resistor networks pull up/pull down interface resistor networks - Pulse Engrg., Inc.
Opti-Scan - encoder - Sequential Information Systems
Opti-Sensor - pick off - Sequential Information Systems
Optivue Plus - CRT lifetime warranty - Channel Master Div. Avnet
Opto-Hybrids - hybrid microcircuit subsystem combining photovoltaic sensor, current amplifier, level detector and dtl/ttl output amplifier - Centralab Semiconductor
Optoline - pc board assembly director - Hollis Engrg., Inc.
Optosafe - safety curtains & spatial volume sensor - Scientific Technology
Optosil - clear fused quartz - Amersil, Inc.
Optoswitch - led photoelectric controls - Scientific Technology
Orange Drop - radial lead film capacitors - Sprague Elec. Co.
OraSorb - carbon filter for plating baths. - Sel-Rex Co. Div. Oxy Metal Industries Corp.
Orcon Switch - pushbutton switches - Switchcraft, Inc.
Original Bright Gold - cyanide gold plating process - Sel-Rex Co. Div. Oxy Metal Industries Corp.
Orthomode - hybrid mixers - Varian Assocs.
ORTHOMODE - hybrid mixers - Varian Electron Tube & Device Grp.
Orthomode Mixers - microwave rf mixers - Varian Solid State East Beverly Div.
ORTHONOL - magnetic materials - Magnetics
Orthonull® - balance finder - General Radio Co.
Orthosil - special lamination material - Thomas & Skinner, Inc.
Orthospan Mixers - microwave mixers - Varian Solid State East Beverly Div.
Orthostar - Double Balanced Mixer - Aertech Industries
Oryx - subminiature soldering irons - Telvac Instr. Co.
OSCIDUCER - Pressure-To-Frequency Converter - Solid State Electronics Corp.
Osha-Spec - safety products - Cadillac Plastic & Chemical
OSM - omni spectra miniature - Omni Spectra
OSSM - omni spectra sub-miniature - Omni Spectra
OTA - operational transconductance amplifier - RCA Solid State Div.
Outdoorsman - battery-operated lanterns - Teledyne Big Beam
Ovalite - pilot lights - Industrial Devices
Overlay - RCA's high-frequency RF technology - RCA Solid State Div.
Oversewing Machine - book binding sewer - A. M. W. Corp.
Oxytron - complete pre-plate sys. for printed circuit production. - Sel-Rex Co. Div. Oxy Metal Industries Corp.
Oyltite-Stik - sealant and pipe thread compound - Lake Chemical Co.

P

Pacecom - computer cables - Pace Wire & Cable Corp.
Pace/pak - modular hydrid circuits - International Rectifier Corp.
Pacer - mercury-vapor photo printers - Chemcut Corp.
Pacers - temperature compensated reference diodes - Centralab Semiconductor
Pachydyne&T - R. F. power supply - Applied Materials Inc.
Page-All - Telephones - Fanon/Courier Corp., Subs.
Pageant - replacement phonograph stylii - Pageant/M.A. Miller Co.
Pagemaster - paging sys - Bogen Div.
Pak-Drives - control systems - Sequential Information Systems
Pak-Rak - storage rack - test rack or shipping container - UNITRACK Div.
Pak Series - 4 to 12kw electron beam power supplies - Sloan Technology Corp.
Pak-X-Trac - DIP desoldering tool - Nu-Concept Computer Systems, Inc.
Palco - brazing alloys - Gte Sylvania, Inc.
Pall - filters - Pall Trinity Micro Corp.
Palladex II - palladium plating process - Sel-Rex Co. Div. Oxy Metal Industries Corp.
PallCell - filter medium - Pall Corp.
Pall-Flo - valve - Pall Trinity Micro Corp.
Pallmatic - drain valve - Pall Trinity Micro Corp.
Paloro - brazing alloys - Gte Sylvania, Inc.
PAMCO - electro-mechanical assembly service - Paraplegics Mfg.
Panalyzer - x-ray spectrochemical analyzer - Panametrics Inc.
Panaplex R - panel display - Burroughs Corp.
Pan-A-Trol - control panels - General Elec. Co.
Panavox - Ceiling &/or Wall Loud Speaker - Wilder Engrg. Prods, Inc.
Pancake - Overfloor raceways systems - Wiremold Co.
Panduct (R) - Plastic Wiring Duct - Panduit Corp.
Panel Mite - standard size thumbwheel switch - Tech Labs., Inc.
Paneltone 87D - metal display panels - Panelgraphic Corp.
Panhandle - carrier equipment - GTE Lenkurt Inc.
Pan-L-Clad - plastic-metal laminated panels - Photo Chemical Prods. Cal.
Pan-Term (R) - Solderless Terminals - Panduit Corp.
Panther - rubber, friction and plastic tapes - Okonite Co.
Pan-Ty (R) - Cable Ties - Panduit Corp.
Paper Riter - felt tip marker - Lake Chemical Co.
Paraformer - Line Conditioner - Tele-Dynamics/Wanlass
PATCH-OHM - resistor block - Cambridge Thermionic Corp.
PATHE ELECTRONIC - cameras, motion picture 16mm and double-super 8mm - Heitz, Inc., Karl
Patinate - lead plating process - Conversion Chem. Corp.
Patrician - deluxe spkr. sys. - Electro-Voice, Inc.
PDC - solid state & incandescent display sys. - Precision Dynamics Corp.
PDP - Programmable Data Processor - Digital Equipment Corp.

PDQ - Modular edgeboard connector - Stanford Applied Engineering
PEAC - photo-electronic auto collimator - Barnes Engrg. Co.
Peaklite - indicator light - Penn Keystone Corp.
Peaklok - transient voltmeter - Pioneer Instrumentation
Peak-N-Notch - active band pass/stop filter - Radiation Devices Co.
Peak Shock Annunciator - an instrument for indicating that specific preset response accelerations have been exceeded - Engdahl Enterprises
Peak Shock Recorder - an instrument for sensing & recording response spectrum - Engdahl Enterprises
PEC (within a diamond) - thick film circuits - Centralab
PEDALINE - Footswitches - Line Electric Co. Unit Esterline Corp.
PED-A-VAC - low cost desoldering equipment - Pace Inc.
Pee-Wee - Clips - Mueller Electric Co.
Pegi - Insulating cable cleats - Adalet Mfg. Co.
Pelaspan Pac - protective packaging foam - Dow Chemical Co.
Pelican - Hydraulic Flow Control Gates - Allis-Chalmers
Pem - self-clinching fasteners - Penn Engrg. & Mfg. Corp.
PemFlex - self-locking fasteners - Penn Engrg. & Mfg. Corp.
PemHex - self-clinching, self-locking fasteners - Penn Engrg. & Mfg. Corp.
PemSert - self-clinching flush fasteners - Penn Engrg. & Mfg. Corp.
Pem-Serter - automated press - Penn Engrg. & Mfg. Corp.
Penfile - burnisher cleaner - Jonard Industries Corp.
"Pennlon" - molecular reinforced polyolefin - Dixon Corp.
Pentaflow - premium grade miniature fans - Pamotor, Inc.
PEP-AST - analog storage terminal - Princeton Elctrn. Prods.
PEP-VID - video image differentiator - Princeton Elctrn. Prods.
PEP-400 - image storage & scan conversion terminal - Princeton Elctrn. Prods.
PEP-402 - image storage & scan conversion terminal - Princeton Elctrn. Prods.
PERFAB - Perlon monofilament fabric - Wire Cloth Enterprises, Inc.
Perfect Pair - matched emitter/sensor optohybrid assembly - Centralab Semiconductor
PERI-APOLLAR - lenses - Heitz, Inc., Karl
Perma Brush - rotating switch - General Devices, Inc.
Perma-Cell - rechargeable batteries - General Elec. Co.
Permafoam - shielded foam transmission line - Columbia Elctrn. Cables
PERMALENE EP - Ethylene propylene rubber insulation - CCS Hatfield Wire & Cable Group
PERMALENE PE - High-molecular weight insulation - CCS Hatfield Wire & Cable Group
PERMALENE XP - Corss-linked polyethylene insulation - CCS Hatfield Wire & Cable Group
Permalex - electrical apparatus - General Elec. Co.
Permaline - cable jacketing material - Columbia Elctrn. Cables
Permaline - seismic base slip tables - Unholtz-Dickie Corp.
Permanode - platinized tentalum anodes. - Sel-Rex Co. Div. Oxy Metal Industries Corp.
PERMAPRENE - Neoprene jacket - CCS Hatfield Wire & Cable Group
Perma-Probe - leak detector sniffer probe - Varian Assocs.
Perma-Resin - resin coating systems - Photo Chemical Prods. Cal.
Perma-Shield - pressure-sensitive wire markers - Brady Co., W. H.
PERMA–TORQ - coil forms - Cambridge Thermionic Corp.
Permohm R - Uniform Web Lead-In Wire - Belden Corp.
Permopad - permanent p.c. component spacers - Bivar, Inc.
Pestilyzer - measuring instruments - Varian Assocs.
Petrosorb - adsorbent filled cartridge - Pall Trinity Micro Corp.
Petrosorb - filter housing - Pall Trinity Micro Corp.
P-F - plastic fabricated dust bellows - Gagne Assocs., Inc.
Phantom Power - neumann simplex power supply for condenser microphones - Gotham Audio Corp.
Phase/AMP - SCR power control - Halmar Electronics, Inc.
Phazor - phase measuring equip. - Industrial Test Equip.
Phenolite - laminated plastics - NVF Co.
Phenoweld - phenolic adhesives for nylon, etc. - Hardman Inc.
Phi-Deck - cassette tape transport - Individualized Instruct. Inc.
Phonalert - Telephone Comm. System Accessory - Phone-Aid Co.
Phosroc - high temperature wire - Cerro Wire & Cable Co.
Photact - photographic papers and films - Keuffel & Esser Co.
Photo Etch - printed circuit set - Datak Corp.
Photofluorometer - photoelectric fluorometer - Coleman Instr. Div.
Photoforming - chemical milling - Hamilton Technology, Inc.
Photo-Lux - back illuminated panels - Photo Chemical Prods. Cal.
PHOTOMOD - photocell coupler - Clairex Elctrns. Inc.
Photo-Optic - photoelectric controls - Dolan-Jenner Inds., Inc.
Photorepeater - automatic sys-electro-mechanical-optical - GCA/David W. Mann
Picabond - communications splice - Amp Inc.
PICOCLAREED - switching assemblies - Clare & Co., C.P.
Picofuse - miniature fuses - Littelfuse, Inc.
Picomin - microminiature vibration transducer - Endevco
PICOMM - coordinate measuring machine - Potter Instr. Co.
Pico-Pac - Power Supply - Velonex, Instrument Div.
PICOREED - switching assemblies - Clare & Co., C.P.
Picotrim - capacitors - Voltronics Corp.
Pidg - terminals & splices - Amp Inc.
Piezite - ceramic crystal - Endevco
Piggy - wire connectors - Thomas & Betts Co.
PIL - miniature pulse transformer - TRW/UTC Transformers
Pin Bar® - solderless bus bar - Lear Siegler
PINCOMM - pin compatible core memory - Standard Memories, Inc.
Pinlite - micro-miniature lamps - Refac Elctrns./Pinlites
Pin Saver - pin straightener, connector - Air-O-Tronics Prods.
Pintofile - instrument systems terminal - XINCOM Corp.
Pipetite Paste & Stik - sealants & pipe thread compound - Lake Chemical Co.
Pipix - fiber optic crt's - Litton Inds.
Pistoncap - trimmer capacitors - Sprague-Goodman Electronics, Inc.
Pitmo - d-c motors - Pittman Corp.
Pitran - pressure sensitive transistors - Stow Labs., Inc.
Pittman - d-c motors - Pittman Corp.
Pixie - force transducer - Endevco
PIXIEPOT(R) - 10-turn potentiometer - Duncan Electronics, Inc.
Placovar - alloy - Hamilton Technology, Inc.
Planar Coax - microelectronic interconnection and packaging technique - Bunker-Ramo Corp.
Planetgear - counters - Haydon Switch & Instr., Inc.
Plaqohm - placque type power resistors - Ward Leonard Elec. Co. Inc.
Plaslode - talc reinforced polypropylene - Fiberfil Div. Dart Ind.
Plaslube - lubricated thermoplastics - Fiberfil Div. Dart Ind.
Plasma-Lux/Plasmalux - digital readouts - Cherry Electrical Prods. Corp.
Plasma-Power - laser power supplies - Crestronics Inc.
Plasti-Bond - terminals - Amp Inc.
Plasti-Cal - top-laminated transfers - Meyercord Co.
Plastic-Pack - Concave backing material - Allis-Chalmers
"Plastiform" - flexible magnets - 3M Co.
Plasti-Grip - terminals & splices - Amp Inc.
Plastilease - mold release agent - Ram Chems.
PLASTI-PAK - plastic packaging material - Centralab
Plasto-Joint Stik - pipe thread compound - Lake Chemical Co.
Platanex III - platinum plating process - Sel-Rex Co. Div. Oxy Metal Industries Corp.
Platanium Anodes - platinum plated titanium anodes - Sel-Rex Co. Div. Oxy Metal Industries Corp.
Plazma-Beam - zone refining equip. - Materials Resch. Corp.
Plenco - phenolic molding compounds - Plastics Engrg. Co.
Plesa - passivated diodes - Varian Solid State East Beverly Div.
Plike - wire stripping plier - Hunter Tools
Plug-In Analyzers - spectrum analyzers - Nelson Ross Elctrns.
Plugmold - Multioutlet Systems - Wiremold Co.
Plug-N-Probe - probe, test - Air-O-Tronics Prods.
Plug Stat - temp sw - Control Prods., Inc.
Plumbicon - TV camera tubes - Amperex Elctronic Corp.
Plusistor - positive temperature coefficient thermistors - Victory Engrg. Corp.
PLYCON - harness systems - Methode Elctrns., Inc.
PLYO-DUCT - flat, flexible cable - Methode Elctrns., Inc.
PMB - magnetic brake - General-Electro Mechanical
PMC - magnetic clutch - General-Electro Mechanical
PMI - phono accessories & parts - Pageant/M.A. Miller Co.
Pneu-Therm - pneumatic-temp tranducers - Dynamic Controls Corp.
PNR - control cable - Cerro Wire & Cable Co.
PNRX-90 - control cable - Cerro Wire & Cable Co.
Pocket Magnetometers - gauss meters - Annis R B Co.
Pogo Contact - connectors (contacts-spring loaded) - Pylon Co., Inc.
Poke-Home - crimp contacts - Amphenol Connector Div.
POKE-HOME - removable contact connector - Amphenol Ind'l. Div.
POLARFLEX 10 - Hot-Melt strippable coating - Western Coating Co.
PolarHex - positive polarization means for coupling connectors - Hughes Aircraft Co., Connecting Devices
"Polarizing Screwlocks" - locking device for rack & panel connector - Continental Connector Corp.
Polar Path - gyro magnetic compass system - The Bendix Corp.
Polasheet - conductive gasketing - Cal-Metex Corp.
Polastrip - conductive gasketing - Cal-Metex Corp.
Policefax - transmission of fingerprints - Datalog Div., Litton Sys.
POL-LAR - formed capacitor covers - Precision Paper Tube Co.
Poly-C - capacitor - General Elec. Co.
Polycarbafil - fiberglass reinforced polycarbonate - Fiberfil Div. Dart Ind.
Polychip - copper-plated teflon chip capacitor - Polyflon Corp.
Polycycle - motor-generators - General Elec. Co.
Poly-Dimensional - Styled Small Instrument Enclosures - Amco Engineering Co.
Polydyne - speed drives - General Elec. Co.
Polyguide - clad laminates - Burlington Opers. Div.
Poly-Lok - polyethylene compound - Superior Cable Div.
Polynoid - linear induction motor - Skinner Polynoid Div.
Poly-Planar - plastic wafer-thin loudspeakers - Era Acoustics
Poly-Planar - plastic wafer-thin loudspeakers - Magitran Co.
Poly Q - liquid scintillation sample vials - Beckman Instrs., (AISSD)
Polyrad - Cross-Linked Polyethylene Insulated Wire - Brand-Rex Co.
Polyscin - polycrystalline scintillation phosphor - Harshaw Chemical Co.
Polyseal - motors, insulation, coils, windings - General Elec. Co.
Polyskop - sweep test sys. - Rhode & Schwarz Sls.
Poly-Sonic - outdoor speakers - Era Acoustics
Poly-Sonic - outdoor speakers - Magitran Co.
Poly-T - injection moldable thermoset - Fiberfil Div. Dart Ind.
Polytran - polycrystalline optical material - Harshaw Chemical Co.
Polyvolt - lighting controls - General Elec. Co.
"Pop" Rivets - blind fasteners - USM Corp.
Poron - Porous plastic materials - Rogers Corp.
Porta/Flex - vapor degreaser, portable - Gagne Assocs., Inc.
Portalarm - portable security alarms - Scientific Technology
Portametric - portable measuring instrument - Electro Sci. Inds.
PORTA-PEAK - portable strain gage measuring instruments - Helm Instr. Co.
Portatemp - portable hand held digital T/C pyrometer - Trans-Met Engrg.
Porta-Test - leak detector - Varian Assocs.
Porta-Trace - portable light boxes - Gagne Assocs., Inc.
Portionator - epoxy dispenser - Glenmarc Mfg. Inc.
Posi-Ground - voltage leakage elimination in soldering irons - Hexacon Elec. Co.
Posistor - positive Temp Coeff. resistor - Murata Corporation of America
Positerm - Flexible circuit cable assemblies - Rogers Corp.
Postirol - forced oil injection systems - Electrovert
Postlite - Drake Mfg. Co.
Powerblock Power System - high current darlington - PowerTech, Inc.
Power Commander - battery charger - RIL Elctrns., Inc.
Power-Crater - Engines - Allis-Chalmers
Power-Dyne - torque wrench - Raymond Engrg. Inc.
POWERFET - 2 watt fet amplifier - Teledyne-Crystalonics
Powerflex - Electronic Switching & Controlling Systems - Sigma Instruments, Inc.
Powerformer - dry type transformer - Jefferson Elec.
Power-Glas - glassivation of junctions - General Elec.
Power Glas - glass passivated thyristors - General Elec. Co.
Powergrip - belts - Uniroyal, Inc.
Powerhouse - utility searchlights - Teledyne Big Beam
Powerhouse - hand lamps - Teledyne Big Beam

Power-Line - p.a. amplifier - University Sound
Powerline - power line filters - Filtron Company, Inc.
Power Mark + - circuit breakers - General Elec. Co.
Power Mov - power metal oxide varistor - General Elec. Co.
POWER-O-MATIC 60 - ovens and control - Blue M Electric Co.
POWER-O-MATIC 70 - ovens and control - Blue M Electric Co.
POWER-O-MATIC 80 - ovens, furnaces & control - Blue M Electric Co.
Powerpac - hi freq hi power transistor package - Microwave Semiconductor Corp.
Power-Plus - Amplifiers - Fanon/Courier Corp., Subs.
Power Point - plug in cart. - Electro-Voice, Inc.
Powerstat - variable transformers - Superior Electric Co.
Power-Style - switchboards - Square D Co.
POWERSWITCH - solid state relay - Fenwal, Inc.
Powertherm - SCR bridge rectifier - Gentron Corp.
Powertron - a.c. power supplies - Industrial Test Equip.
PowerUp-15 - fast charge battery - General Electric
Power/Vac - circuit interrupters - General Elec. Co.
Power Verter - dc to dc inverter - Alpha Components Corp.
Pow-R-Disc - flat-pack power rectifiers & power SCR's - Westinghouse Elec. Corp.
POXYLUBE - Dry-Film Lubricants - General Devices Co., Inc.
PRAM tm - Programmable Random Access Memory - Harris Semiconductor
PRECO - bobbin lugger - Precision Paper Tube Co.
Preenx - heater cable & cord - General Elec.
"Premax" - communication antennas & accessories - Premax Prods. Div.
"Premax" - ground rods - Premax Prods. Div.
Pre-Met - plating solution filter - Sel-Rex Co. Div. Oxy Metal Industries Corp.
Prep-Lap - seam welders - Taylor-Winfield Corp.
Pres-Bond - gasketing tapes - Press-On Prods.
Pre-Sembly - etched circuits - Analog Devices
Pres-Loc - pres to open or close - Deutsch Fastener Corp.
Pres-Mount - double coated adhesive foam tape - Press-On Prods.
Pres-Pak - pressure sensitive adhesive coated corrugated - Press-On Prods.
Pressfax & Pressfax DRR - Transmission of newspaper/magazine pages - Datalog Div., Litton Sys.
PRESS-FIT - teflon-insulated terminals - Sealectro Corp.
Presslite - Illuminated Pushbutton Switch - Illuminated Products Inc.
Pressuretrol - pressure controllers - Honeywell
PRESTEST - Indicating Light with Test Circuit - Cutler-Hammer, Inc.
Prime' - Centralab semiconductor high reliability program - Centralab Semiconductor
Primewire - premium alum. welding wire - Chemetron Corp.
Princess Line - micro-precision production - UNGAR, Div.
Princeton 801 - graphic computer terminal - Princeton Elctrn. Prods.
Printact - printed contact - Printact Relay Div.
PRINTACT - Printed Contact Relay - Executone, Printact Relay Div.
Print N Mark - component marking & printing equip. - GTI Corporation
Printweigh - weight printer - Toledo Scale
Pritchard Photometer - Photometer - Photo Research Corp.
Probeye - infra-red imaging system - Hughes Aircraft Co.
Probeye - infra-red imaging system - Hughes Aircraft Co.
Probotrol - liquid contact probe - Autocon Inds., Inc.
Process 87-D - marking & finishing panel process - Panelgraphic Corp.
Professional - transistor & diode test equipment - Components Corp.
Profil - fiberglass reinforced polypropylene - Fiberfil Div. Dart Ind.
Pro-Grip - Propionate Cable Clamps - Weckesser Co. Inc.
Proloid - radar-augmentation device - Teledyne Micronetics
Pro-Med - acupuncture equip. - Jaesic Industries Co.
Prong-Lock - rings, retaining - Waldes Kohinoor, Inc.
Propellon - coolant - LMB Heeger, Inc.
Propellon - Coolants - Heeger Inc.
Propimax - fan - Rotron, Inc.
Proportionall - heat input control - Hotpack Corp.
Protectocoats - solderability protection - Alpha Metals, Inc.
Protectoswitch - operator safety device for punch presses - Black & Webster, Inc.
Protistor - fuses - Carbone Lorraine Industries Corp.
Protonex - gold electroplating process that defies metallic contamination. - Sel-Rex Co. Div. Oxy Metal Industries Corp.
Prototypes by Kotokast - experimental molded parts - Minnesota Rubber Co.
Proxagard - presence sensing equipment - Gordon Engineering Corp.
Proxiswitch - (capacitance proximity devices) - Photobell Co., Inc.
Proxswitch - proximity switch - Denison, R.B., Inc.
P/S ALLOY - laboratory clamps - GCA/Precision Scientific
PSB - Drake Mfg. Co.
P*-Shooter (*Polymer) - polymeric sealant applicator gun - Hardman Inc.
PSI - captive screw, low cost - Tridair Inds.
PSS - pss filter medium - Pall Corp.
PSS - filter media - Pall Trinity Micro Corp.
PTM - filters, dryers - Pall Trinity Micro Corp.
PTM-66 - color analyzer - Lektra Labs., Inc.
Pull-Thru - contact insertion tool - Hughes Aircraft Co., Connecting Devices
Pulscript - printing demandmeters - General Elec. Co.
Pulsecurity - Wireless Remote Alarm - A.R.F. Products
Pulse-Dot - soldering equip. - Circon Corp.
Pulselector - Resonant Reed Device - A.R.F. Products
Pulsender - Mechanical Pulser - A.R.F. Products
Pulse-Rated Toroids - ferrites - Indiana General
Pulsignal - Electronic Remote Control - A.R.F. Products
Pulsistor - power thermistors - Victory Engrg. Corp.
Pultec - equalizers, filters and amplifiers - Pulse Techniques, Inc.
Puppets - PC circuit layout & design system - Bishop Graphics
PUREBIDE - ceramic graphite - Pure Carbon Co., Inc.
PUREBON - mechanical carbon - Pure Carbon Co., Inc.
Push-Penny - plugs - Thomas & Betts Co.
PV - female receptacles - Berg Electronics
PVB - potentiometric voltmeter bridge - Electro Sci. Inds.
PVCA - Vinyl Insulated Aluminum Strip - Brand-Rex Co.
PVZ - capacitors - General Elec. Co.
Pwrpac&T - power supplies - Analogic Corp.
PYGMY - connector - Bendix Corp., The
Pyranol - capacitor and dielectric material - General Elec. Co.
Pyranol Transformer - electric transformer - General Elec. Co.
Pyr-AU-Bond - gold electroplating process developed for wire & eutectic bonding & leaded glass semi-conductor devices. - Sel-Rex Co. Div. Oxy Metal Industries Corp.
Pyrex - borosilicate glasses - Corning Glass Works
Pyrex - borosilicate glasses and products - Corning Glass Works, Television Prods. Div.
Pyrobond-PT-333 - silicon carbide graphite conversion - Ultra Carbon Corp.
Pyroceram - glass-ceramics - Corning Glass Works
Pyroceram - glass-ceramic sealing compounds - Corning Glass Works, Television Prods. Div.
Pyrocon - surface temperature pyrometer - Alnor Instrument Co.
Pyromark - refractory coatings - Tempil Div.
Pyromatic - solid-state temp control - Alnor Instrument Co.
Pyro Panel - infrared heat panel - Research, Inc.
Pyro-Tech - pyrolytic coated graphite - Ultra Carbon Corp.
Pyrotest - Hand Held Potentiometer - Gulton Inds., Inc.
Pyrotroller - electronic temp control - Alnor Instrument Co.
PZT - piezoelectric ceramics - Vernitron Piezoelectric Div.
P-10 Low - Loss - linear solenoid - Barber Corp.

Q

QC - mic connector - Electro-Voice, Inc.
QCC - Quick Custom Cable - Alpha Wire Corp.
Q Compound - encaps. compound - Communications Technology Corp.
QHT - transformers - General Elec. Co.
QO - molded case circuit breakers - Square D Co.
Q-PEX - alkaline etchant - Conversion Chem. Corp.
QR - rotary fastener - Tridair Inds.
QSR - electronic capacitors - General Elec. Co.
QT-Synclamps - 1/4 turn servo clamps - Timber-Top, Inc.
Quad - logs on printed material & decals on components - CVC Products, Inc.
Quadco - controls - Quadrastat Controls Corp.
Quad-O-Dyn - hydraulic seal - Minnesota Rubber Co.
Quad-O-Stat - hydraulic seal - Minnesota Rubber Co.
Quadradar - surveillance and precision approach radar - ITT Gilfillan Div. of ITT
Quadra-Powr - valve actuator - Jamesbury Corp.
Quad-X - hydraulic seal - Minnesota Rubber Co.
QUALICOMP - electronic components - International Importers
Qualifier 901 - Digital IC Tester - Fairchild Sys. Technology
Quantachron - time based programmer - Matrix Corp.
QuantaLatch - transient recorder - QuantaLog, Inc.
Quantum - broadband antenna system - Channel Master Div. Avnet
QUANTUM L - computer tape - Memorex Corp.
QUARTZQ - coil dope - Millen Mfg. Co. Inc., James
Quat 2 - biocidal-fungicidal cleaner - Clean Room Prods.
Quencharc - capacitor resistor rc network - Paktron Div.
Quick Connect - thermal relays - Warren G-V Communications
Quick-Crimp - crimp terminals & connectors - I-T-E Electrical Components Grp.
Quick-E-Poles - Divided, vertical multioutlet assemblies - Wiremold Co.
Quickey - low profile keyboard - Chomerics, Inc.
Quick-Lock - spring-lock shelf supports - Simmons Fastener Corp.
Quick-Scan - control/measuring instrs. - Taylor Instr. Process Control Div.
Quick-Set - thermo-regulators - H-B Instr. Co.
"QUIET" - Ultra Low Noise Mixer - RHG Elctrns. Lab.
Quik/Bus - Power distribution conductors - Rogers Corp.
Quik-Change - indicator lights - Industrial Devices
Quik-Circuits - printed circuit board hobby line - Circuit-Stik, Inc.
QUIK-E - D.C. voltage calibrator - Pioneer Instrumentation
QUIK/PIK - small parts storage - Akro-Mils, Inc.
Quik-Wrap - wire wrapping & unwrapping tools - Jonard Industries Corp.
Quso - micro-fine silica - Philadelphia Quartz Co.
QWIK-TY - connector strain releif - Glenair, Inc.

R

RA-CON - right angle connector - Eby Co., Hugh H.
Radax - spkr. cone design - Electro-Voice, Inc.
R.A.D.I. - random accers digital ndication - Westronics
RADIAX - slotted coaxial cable - Andrew Corp.
Radiax - radiating coaxial cable - Andrew Antenna Co. Ltd.
Radiflex 300 - x-ray inspection system - Torr Labs.
Radifluor 360 - x-ray inspection system - Torr Labs.
Radi-Flux R - Heat Flow Calibration - Hy-Cal Engineering
"Radiodyne" - receivers, towers etc. - Western Coil & Elec. Co.
RADIOHM - variable resistor - Centralab
Rainbow - Color Changing cap presslite switch - Illuminated Products Inc.
Raisedlay - laminates metal clad - Engelhard Minerals & Chem.
Rally Rap - spirally cut tubing - ICO/Rally Corp.
Ramanel - polyester enamel - Ram Chems.
Ramaset - epoxy enamel - Ram Chems.
RAMCON - rotary actuators - Hills-McCanna Co.
Ramdom Data Telecom - data acq - Baganoff Assocs., Inc.
Ramor-IC - DIP desoldering and extraction tool - Solder Removal Co.
Ram-Pac Power Sources - DC-DC converters - Reliability Inc.
RamRod - zener diodes - Motorola Semiconductor Prods.
Range Rider - modem test sets, printers, analysers - International Data Sciences
Rapid-Syn - steppers, drivers, pulse sources & preset indexers - Computer Devices of Calif.
RATIOHMIC RESISTANCE - high accuracy resistance measurements - Data Precision Corporation
Ratiometric Ohms - ohms converters - Dana Labs., Inc.
Raycarl - cold heading process - Camcar Screw & Mfg.
Raycorder - digital magnetic tape recorder - Raymond Engrg. Inc.
RAYLAY - Light Controlled Relay - Solid State Electronics Corp.
Raymaster - all light source equipment - Gates, Geo. W. & Co., Inc.
Raymer - tuners-amplifiers-receivers for background music & general purpose - Trutone Elctrns., Inc.
RAYNGER - infrared thermometer - Raytek, Inc.
RAYOTUBE - temperature detector (radiation-type) - Leeds & Northrup Co.
RAYOVIN - hook-up wire - Raychem Corp.
Raysistor - Optoelectronic Devices - Raytheon Co.
Reactalloy - pastes-hydrogen firing - Electro Mats. Corp. Amer.
Reactospeed - variable speed motor control - Autocon Inds., Inc.
Reactrol - regulator - General Elec. Co.
Reality - data base management system - Microdata Corp.

Real Time I, II, III - microprogrammable array transform processor - Datawest Corp.
Rebel 23 Plus - CB Rig - Fanon/Courier Corp., Subs.
Recipromatic® - counter - General Radio Co.
RE-CIRK-IT - circuit breakers - Heinemann Elec. Co.
Re-Coil - induction heater accessory - Miller, L.C. Co.
Rectodyne - power supplies - Christie Elec.
Redball - CB Rig - Fanon/Courier Corp., Subs.
Red Cap - Monolithic dipped ceramic capacitors - Erie Technological Products
Reddi-Wrap - precut wire for wire wrapping - Storm Products Co.
Reddy - lugs & taps - Thomas & Betts Co.
Redhead - light-emitting diodes - Motorola Semiconductor Prods.
Redi-Bar® - cultured Quartz Bar - P. R. Hoffman Co.
REDI LINE - Motor-generator to 1000 watts - Applied Motors Inc.
"RED LIGHTNING" - #72 "Red Lightning" Soft Solder Liquid Flux - Superior Flux & Mfg. Co.
Red Line - thermal relays - Warren G-V Communications
Red-Lit - discrete led lamps - Litronix
"RED MARVEL" - #74 "Red Marvel" Soft Solder Liquid Flux - Superior Flux & Mfg. Co.
Red Top - thermo-regulator - H-B Instr. Co.
REEDAC - solid state relay - Gordos/Grisby-Barton
Reedlays - relay - Computer Comps.
Reevelec - heating equipment - Reeve Electronics, Inc.
Ref Bloc R - Precise ambient reference junction, thermocouples - Hy-Cal Engineering
Ref Cel R - Multi-channel reference system temp. - Hy-Cal Engineering
Reflectin-Lead - solder plating bath - Conversion Chem. Corp.
Reflectoscope - ndt - ultrasonic equipment - Automation Inds.
ReFLEX - battery charging system - Christie Elec.
Refractosyn - angle detector - H H Controls Co., Inc.
Regadyne - all AC adjustable speed drives - Control Products Corp.
Regal - numbering machines - Bostitch
Regency - loudspeaker, enclosures - Electro-Voice, Inc.
Regent - Motors & Gearmotors - Carter Motor Co.
Regulimit - adjustable safety thermostat - Hotpack Corp.
Regu/Tran - Combined regulator and transformer unit - Allis-Chalmers
Regutron - speed controls - Electric Machinery Mfg. Co.
Reliabraze - copper brazing powder - Alpha Metals, Inc.
RELI-ACON - printed circuit connectors - Methode Elctrns., Inc.
Reliacor - activated rosin flux - Alpha Metals, Inc.
Reliafoam - rosin foam fluxes - Alpha Metals, Inc.
Relialab - environmental rooms - Tenney Engrg., Inc.
RELI-ALOK - ejector/lock component - Methode Elctrns., Inc.
Reliance - regulators for controlling the flow and pressure of gas - Singer Co.
RELI-APAC - backplane wiring systems - Methode Elctrns., Inc.
RELI-APLANE - backpanel/connector system - Methode Elctrns., Inc.
RELI-APLUG - plug-in header - Methode Elctrns., Inc.
Relieros - activated rosin flux - Alpha Metals, Inc.
Reliasolv - grade cleaners - Alpha Metals, Inc.
Reliatemp - environmental rooms - Tenney Engrg., Inc.
Rely-Ohm - Hybrid Resistor System - Engelhard Minerals & Chem.
Remove-A-Pad - temporary spacers-dissolving type - Dynaloy, Inc.
RESINITE - impregnated coil forms - Precision Paper Tube Co.
Resiston - potentiometers - Bourns, Inc.
Resist-O-Stat - decade/resistor - General Resistance, Inc.
Resistox - oxidation resistant copper powder - Gliddon Metals
Resi/Tran - Pad mounted transformers - Allis-Chalmers
Re-Tip - soldering iron tip cleaner - Solder Removal Co.
REVERBERTRON - artificial reverberation device - Fairchild Sound Equip.
Rever-Synclamps - reverse servo clamps - Timber-Top, Inc.
Revmaster - motor speed controls - Opad Elec. Co., Inc.
RFI, MICRO-FILTER - for RFI/EMC filters - RF Interonics
Rhenex - rhenium plating process. - Sel-Rex Co. Div. Oxy Metal Industries Corp.
Rhino-Hide - cable - Pacific Electricord Co.
Rhodex - rhodium plating process - Sel-Rex Co. Div. Oxy Metal Industries Corp.
Ribflex - ribbon wound power resistors - Ward Leonard Elec. Co. Inc.
Rigimesh - sintered woven wire cloth - Pall Trinity Micro Corp.
Rigimesh - filter medium - Pall Corp.
RIM - Research Instrument Module System - Princeton Applied Resch. Corp.
Ring-Gun - assembly tool - Waldes Kohinoor, Inc.
Ring-Jector - assembly tool - Waldes Kohinoor, Inc.
Ring-Mount - assembly tool - Waldes Kohinoor, Inc.
Ring-O-Mat - assembly tool - Waldes Kohinoor, Inc.
Ripl-Flo - Vibrating screens - Allis-Chalmers
Ripple Round - anodes - Alpha Metals, Inc.
Rippleweld - lead attach process for filmatic R capacitors - Paktron Div.
Rivet-Loc - terminals - Sealectro Corp.
ROBOT - cameras, recorders, lenses, filters, programmer/timers - Heitz, Inc., Karl
ROBOT - x-ray cameras, remote controls, digital counter, oscilloscope cameras - Heitz, Inc., Karl
Robotec - electronic overload protection - Power Designs, Inc.
Rock-A-Lite - lighted rocker switch - Leecraft Mfg. Co., Inc.
Rockcyl - Grinding mill - Allis-Chalmers
ROCKETTE - Rocker Operated Switches - Cutler-Hammer, Inc.
Rock-Wipe Switch - switches - Cherry Electrical Prods. Corp.
Rodar - controlled expansion alloy - GTE Sylvania Inc.
Rodpeb - Grinding mills - Allis-Chalmers
Ro-Flo - Compressors and vacuum pumps - Allis-Chalmers
Rol-a-chart Magnets - Permanent & Flexible Plastic Magnets - Rol-a-chart Div.
Roll-Mark - automatic application system - Meyercord Co.
Roll 'N Measure - tapeless measuring device - Klein, Mathias & Sons, Inc.
Rollpin - self-locking spring pins - Esna Div.
Rolltemp - roll temperature sensor - Trans-Met Engrg.
Rolltronic - Roll Temperature Control System - Trans-Met Engrg.
Rolm - 1601 Ruggednova - Rolm Corp.
Rolox - 2-part epoxy compounds - Hardman Inc.
Rol-Pak - rings, retaining - Waldes Kohinoor, Inc.
Roly-Poly - round wafer-thin replacement speakers - Magitran Co.
Roly-Poly - replacement round speakers - Era Acoustics
Rom-Simulator - Microcontroller simulator - Scientific Micro Sys.
Rosite R, GCD & TA - inorganic cold molded parts - Rostone Corp.
Rosite 2150 - melamine, cold molded, arc quenching - Rostone Corp.
Rosite 3250 & 3550 - glass reinforced polyester, non-tracking - Rostone Corp.
Rosite 3450 - glass reinf. polyester, corrosion resistant - Rostone Corp.
Rota-Crimp - crimping tools - Amp Inc.
Rotaswitch - shaft encoder - Disc Instruments, Inc.
Roto-Cone - Valves - Allis-Chalmers
Roto-Lock - Spring-lock shelf supports - Simmons Fastener Corp.
Roto-Netic - stepping motor - Heinemann Elec. Co.
Rotopulser - rotary pulse transducer - Dynapar Corp.
Rotosil - opaque fused silica - Amersil, Inc.
Roto-Tellite - indicator light - Master Specialties Co.
Rotovalve - Hydraulic flow control valve - Allis-Chalmers
Rotran - Rotary Generator - Inland Motor Div. Kollmorgan
RP E Z Kleen Air Filter - air filter - Research Prods. Corp.
RP Industrial Filter - air filter - Research Prods. Corp.
RP MV EZ Kleen Air Filter - air filter - Research Prods. Corp.
RT - stripping solutions - Allied Chemical Corp.
RT/duroid - Fiber-reinforced plastic material - Rogers Corp.
RT, Hybridisc,ULR - ceramic capacitors - Dilectron
Rubbon - fluxless solder - Chemetron Corp.
Rubicon - bridges, potentiometers, colorimeters - Penn Airborne Prods.
RUF-NEK - waterproof seismic connectors - Hughes Aircraft Co., Connecting Devices
Ruggednova - 1602 Ruggednova - Rolm Corp.
Rulon - reinforced teflon for bearings and seals - Dixon Corp.
Rush - wire strippers - Eraser Co.
Rustrak - Miniature Graphic Recorders - Gulton Inds., Inc.
Ruthenex - ruthenium electroplating process. - Sel-Rex Co. Div. Oxy Metal Industries Corp.
Rx Gears - high precision instrument gears - Instru-Lec Corp.
R620/L-100 - ruggedized computer - Varian Data Machines

S

Saber-Champ - blade probe rh measuring device - American Instr. Co.
Sabre - instrumentation recorder/reproducers - Sangamo Electric Co.
Sabre Tooth - connectors - Thomas & Betts Co.
Safe-Pak - solid-state controlling device - Gems Sensors Div.
"Safe-T" - Bullpins - Klein, Mathias & Sons, Inc.
Safe-T-Klip - test clip - Industrial Devices
Safe-T-Kord - test cord - Industrial Devices
Safe-Tran - Pad mounted transformers - Allis-Chalmers
Safety White - fluorescent ballasts - Jefferson Elec.
SAF-T-PLUG - wall-mounted power supply - Dynamic Instr. Corp.
Sa-Fuse - electrical controls - Electric Machinery Mfg. Co.
Sali - Insulating bushings - Adalet Mfg. Co.
Sal-Met - flux - LMB Heeger, Inc.
Salmet - Flux - Heeger Inc.
Sam - aircraft S&B radio - Brelonix, Inc.
Samguard - security - Aerolite Elexs Corp.
Sampac&T - Sample and holds (fast acquisition, buffered and high speed - Analogic Corp.
Sam R - monitoring SSB/AM receiver - Brelonix, Inc.
SAN-DEL - instrument cleaning systems - M. P. Odell Co.
Sans-A-Fuse - fusing device - Workman Electronic Prods., Inc.
SAR - silicon avalanche rectifier - Varo Semiconductor, Inc.
Sara-Sonic - ultrasonic cleaners - Sara Scientific Co.
Sara "7" - detergent - Sara Scientific Co.
Sat II - microfilm reader - Information Handling Services
Satintone 87D - metal display panels - Panelgraphic Corp.
Saucer - fan - Rotron, Inc.
SBE - Tw0-Way Communications - Linear Systems, Inc.
SBG - chemicals - Mallinckrodt, Inc.
SCA - transistors - Semicoa, Inc.
Scalar - patented antenna feed horn - TRG,
Scanatron - facsimile - Victor Comptometer Corp.
Scanfare - FM Monitor Scanners - Fanon/Courier Corp., Subs.
Scope-Mate - portable oscilloscope camera - Vu-data Corp.
SCOPE–MOBILE - Cart, oscilloscope, wheeled - Tektronix, Inc.
SCORESTRATES - ceramic substrate - Centralab
"Scotch" - electrical insulating tapes - 3M Co.
Scotch - P.C. board masking tapes - 3M Company
"Scotchcast" - electrical insulating resins - 3M Co.
Scotchflex - cable/connector system - 3M Company
"Scotchtite" - tubings - 3M Co.
SCREW LAUNCHER - screw holding drivers - Vaco Products Co.
SCR-Rated - PM DC Motors - Indiana Gen'l. Div.
S-D77 - programmable controllers - Struthers-Dunn, Inc.
Sea-Air - marine SSB radio telephone - Brelonix, Inc.
Sealcor - aluminum rod - Chemetron Corp.
Sealdbin, Sealdtank, Sealdrum - containers, storage - Uniroyal, Inc.
SEALECTROBOARD - cordless program board - Sealectro Corp.
Sealectrocard - static card readers - Sealectro Corp.
Sealectroswitch - programming switches - Sealectro Corp.
Sealflex - insulation - Electric Machinery Mfg. Co.
SEALINK - sealed splice - Burndy Corporation
Sealox - microcircuit packages, silicon - National Beryllia Corp.
Seal-Pac - transformer - General Elec. Co.
SEAL-STOP - STOP-OFF FOR ELECTROPLATING - Seal-Peel, Inc.
Sea Scanar - sonar system - Honeywell
SeaSpace - oceanography apparatus - Exide Power Sys. Div.
Secre/Data - data scrambler - Com/Tech Systems Inc.
Secre/Fax - facsimile scrambler - Com/Tech Systems Inc.
Secre/Vox - voice scrambler - Com/Tech Systems Inc.
Se-Cur-It - wood glue - Ambroid Co.
SE/duroid - Resin bonded fibrous material - Rogers Corp.
SEED TM - Shield Effectiveness Evaluation Device - Belden Corp.
SE Eyelets - eyelets - USM Corp.
Seico - thermocouples - Syscon Int'l., Inc.
Seico - surface temperature sensors - Syscon Int'l., Inc.
Seico - portable pyrometers - Syscon Int'l., Inc.
"Selec-Pak" - IF band-pass filter - General Instr. Corp., Automatic Mfg. Div.
SELECTASHAFT - rotary switches - Centralab
Select-a-Wave - wavesoldering equipment - Electrovert
Selection - specific ion electrodes - Beckman Instrs., (AISSD)
SELECTOFRAME - lead frame - Plessey Inc.
Selectrol - float operated control - Autocon Inds., Inc.
Selectronic - data terminal - Anderson Jacobson
Select-Talk - Telephones - Fanon/Courier Corp., Subs.
SELF-LOC-K - removable, crimp contacts - AirBorn, Inc.
Self-Scan R - panel display - Burroughs Corp.
Selistor - arc suppressor - Eastern Delta Corp.

Sellectric TM - wiring devices - Leviton Mfg. Co., Inc.
Sel-Masq - semi-automatic selective strip electroplating machine - Sel-Rex Co. Div. Oxy Metal Industries Corp.
Sel-Rex-Bright Rhodium - rhodium plating process - Sel-Rex Co. Div. Oxy Metal Industries Corp.
Sel-Rex Pur-A-Gold - gold electroplating process for semi-conductor applications. - Sel-Rex Co. Div. Oxy Metal Industries Corp.
Sel-Rex Rhodium Sulfate - rhodium plating process - Sel-Rex Co. Div. Oxy Metal Industries Corp.
Sembo - dispenser cathodes - Semicon Assoc., Inc.
Semiac - semiconductor variac - Alpha Components Corp.
Semi/Dyne - Traveling Wabe Tube Amplifiers - LOGIMETRICS INC.
Semitung - tungsten powder - Semicon Assoc., Inc.
Semitung - tungsten materials - Varian Assocs.
SEMPAC - MOLDED SILICON RECTIFIER - Semtech Corp.
Sensable R - Heat Flow Gage - Hy-Cal Engineering
Sensaire - temperature transmitter - Taylor Instr. Process Control Div.
Sensall - level sensing systems - National Sonics
Sensco - industrial radiation pyrometers - Electro-Optical Inds., Inc.
Sensiflex - sensitive pressure switches and equip. for fluidics - Gagne Assocs., Inc.
Sensimatic - accounting machine - Burroughs Corp.
Sensimeter R - Readout system, temp. meas. - Hy-Cal Engineering
Sens-Pak - solid-state controlling device - Gems Sensors Div.
Sentinel - fan - Rotron, Inc.
Sentriline - Filter-Couplers, RF - Bird Electronic Corp.
Sentronic - load cells - Thwing-Albert Instr. Co.
Sentry - loudspeaker - Electro-Voice, Inc.
Sentry Master - hotel TV theft alarm - Channel Master Div. Avnet
Seo-Grip - Nylon Cable Clamp - Weckesser Co. Inc.
Serdex - Humidity Indicators & Recorders - Bacharach Instrument Co.
Serdex Modules - serial data exchange circuits - Analog Devices
SerenDIP - SPST solid state relay - Teledyne Relays
SERIES 200 - Modular CRT Display Terminal - Ann Arbor Terminals, Inc.
Series 3 - graphics display terminal - Vector General, Inc.
Series 6000 - tape drive - Microdata Corp.
Series 8000 - disc drive - Microdata Corp.
SermaBond - cement type coatings - SermeTel Teleflex Inc.
SermaLon - fluorocarbon filled coating material - SermeTel Teleflex Inc.
SermaLoy - diffusion coatings - SermeTel Teleflex Inc.
SermaLube - dry film lubrication coatings - SermeTel Teleflex Inc.
SermaSeal - inorganic sealant coatings - SermeTel Teleflex Inc.
SermeTel W - inorganic corrosion resistant coatings - SermeTel Teleflex Inc.
SERVO-CAP - hi current ceramic capacitors - USCC/Centralab, Elec. Div.
Servocap - ceramic capacitor - Centralab
Servo-Linear - speaker system - Electro-Voice, Inc.
Servospeed - electronic motor speed control - Electro-Devices, Inc.
Serv-Rite - thermocouples & T/C wire - Gordon, Claud S. Co.
Setchell Carlson - video monitors, uhf/vhf receivers - Audiotronics
"7MAG" - aerospace chemical coating - Merix Chem. Co.
71-1 T.D. - circuit card fixture - Tech. Devices Co.
SF/duroid - Electrical insulating materials - Rogers Corp.
SFR - selectable fixed resistor - Bourns, Inc.
SGL Waber - outlet strips; wheeled carriers - SGL Waber Electric
SHADOWEIGHT - tone arm - V-M Corporation
Shawnee - solid state counter - Automatic Timing & Controls Co.
Shawnee - solid state timer - Automatic Timing & Controls Co.
Shearite - hand tools - Amp Inc.
Shieldflex - shielding materials - Magnetic Metals Co.
Shield-Kon - grounding sheath connectors - Thomas & Betts Co.
Shieldmu - shielding materials - Magnetic Metals Co.
Shield-Stripp - hand tool for stripping braided coax shielding - Gagne Assocs., Inc.
Sho Rate - flowmeter - Brooks Instr. Div.
"Shorewall" - sheet piling - Overly-Hautz Co.
Short Stop - electronic motor brake - Ambi-Tech Inds. Inc.
Shrinkdown - heat shriknable tubings - Markel, L. Frank & Sons
Shure Squeezer - tool - Thomas & Betts Co.
Shure-Stake - tool - Thomas & Betts Co.
Sidicon - silicon vidicon tube - Teltron
Signaflo - Transmission Line flat cable - Ansley Elctrns. Corp.
SIGNALEX - Electro-Mechanical Digital Readouts - Staver Co., Inc.
Signal Kicker - antennas - Turner Div.
"Signalock" - Frequency Locking System - LOGIMETRICS INC.
SigNet - signal network cables - Superior Cable Div.
Silastic - Adhesive/sealant - Dow Corning
Sil-Bond - selective silver plating - Braun Co., Inc.
Sil-Clad - insulation - Electric Machinery Mfg. Co.
Silco-Flex - Motor and generator insulation - Allis-Chalmers
Silcoro 60 - brazing alloys - Gte Sylvania, Inc.
SILENT PAGER - WAITRESS PAGING SYSTEM - Baumker Mfg. Co.
Silfared - infrared filter - Metavac, Inc.
Silflex - silicone sleeving - Varflex Corp.
Silflo - brazing alloys - Chemetron Corp.
SIL-FOS - silver brazing alloy - Handy & Harman
Silgar - tube - Alpha Components Corp.
Silicane - low cost silicone substitute - Packaged Resins Div.
Silic-O-Netic - time-delay relay - Heinemann Elec. Co.
Silicontrol - scr gate drives - Vectrol, Inc.
Silimite - Feedwater treatment for removal of silica - Allis-Chalmers
Silmate - silicone rubber form-in-place gaskets - General Elec. Co.
Silohm - resistors, varistors - Carbone Lorraine Industries Corp.
Silox® - reactor system - Applied Materials Inc.
Silpaint - thick film silver conductive paste for microelectronics - Sel-Rex Co. Div. Oxy Metal Industries Corp.
Silvaloy - brazing alloys - Engelhard Minerals & Chem.
Silvercap - capacitor - Del Electronics Corp.
Silver-Grip - special set screws - PIC Design Division
Silver II - silver oxide watch battery - Ray-O-Vac Div.
Silverweld - terminations - Bourns, Inc.
Silvrex - silver plating process - Sel-Rex Co. Div. Oxy Metal Industries Corp.
Silvrex - silver plating process - Sel-Rex Co. Div. Oxy Metal Industries Corp.
Simpson "260" - vom multimeter - Simpson Electric Co.
Simuline® - Telephone Channel Simulation Equipment - Seg Subsidiary
Simuline® - telephone channel test & simulation equipment - Comstron Seg.
SineDolor - Dental desensitizer - Controltek Inc.
S.I.R.&R - syncronous inverter regulator system of electronic voltage control - Acme Electric
Sivicon - silicon vidicon camera tube - Amperex Elctronic Corp.
Six-Pac - reed switch module - Controls Research Corp.
Skan-coat - reflective skanner - Skan-A-Matic Corp.
Skipper - fan - Rotron, Inc.
SKY CAP - Ceramic Capacitor - AVX Ceramics
Sky-Tie - Bus drop cable clamps - Adalet Mfg. Co.
SL - chemicals - Mallinckrodt, Inc.
Sleev-Scru - fastener-insulated - Pylon Co., Inc.
Slic-Tite with "Teflon" - 4 thread sealants: paste, stik, tape, cord - Lake Chemical Co.
SLIDELINE(R) - slide actuated potentiometer (control) - Duncan Electronics, Inc.
Slidelite - lighted switch - Leecraft Mfg. Co., Inc.
Slim-Caps - capacitors, fixed, ceramic - Republic Elctrns. Corp.
Slim Jim - magnetic tape head - Michigan Magnetics
Slim Jr. - miniature soldering iron - Hexacon Elec. Co.
Slimline - digital panel instruments - NES, Inc.
SLIMPAC - HIGH VOLTAGE RECTIFIER - Semtech Corp.
SLIMPAC JR. - HIGH VOLTAGE RECTIFIER - Semtech Corp.
SLIMPAC SR. - HIGH VOLTAGE RECTIFIER - Semtech Corp.
Slim Sr. - miniature soldering iron - Hexacon Elec. Co.
SLIP-LOCK - Teflon Insulated Terminals - U.S. Terminals
Slip-Sync - automatic synchronizer - Chadwick-Helmuth Co., Inc.
Slo-Blo - miniature fuses - Littelfuse, Inc.
Slo-Syn - synchronors/stepping motors, controls, drives - Superior Electric Co.
SMART - add on & replacement core memory - Standard Memories, Inc.
Smart counters - 6 digit display calculator - Nu-Metrics
Smitty - folding hex wrench set - Hunter Tools
Smoke Signal - smoke & gas detector - Universal Security Instrs.
Snail - connectors - Pylon Co., Inc.
Snap-A-Part - break apart ceramic substrates - Mepco/Electra, Substrate Div.
"Snapblocks" - Sectional terminal blocks - Kulka Elec. Corp.
Snap-Coupler - Tractor quick hitches - Allis-Chalmers
Snap-In - captive screws - Tridair Inds.
Snaplite - indicator light - Leecraft Mfg. Co., Inc.
SNAP-LOCK - limit switches - NAMCO CONTROLS
Snap-on - automotive hand tools - Snap-On-Tools
Snap-Out - aluminum tower - Up-Right Scaffolds
Snap-Pak - rings, retaining - Waldes Kohinoor, Inc.
SNAPPER - DC servo motors - Torque Systems
SNAP-TITE - variable resistor - Centralab
SnapTrack - relay/timer mounting system - RDI/Reed Devices, Inc.
Snaptrol - snap together replacement potentiometers - CTS Corp.
SNAP-WRAP - modular connector panels - Amphenol Ind'l. Div.
Sniffer - Portable Combustible Gas Indicator - Bacharach Instrument Co.
Snipe - Wiping action Snap Switch - Illuminated Products Inc.
Snortini - desoldering tool (mini) - Edsyn, Inc.
Snow-Bee - Snow thrower - Allis-Chalmers
-S/N- R - fatigue life gage - Micro-Measurements Div.
Socks - connectors - Thomas & Betts Co.
Soder-Mask - a temporary solder resist - Solder Removal Co.
Soder-Wick - a desoldering aid - Solder Removal Co.
Sod-R-Braze - soldering & brazing equip. - Chemetron Corp.
SODR-X-TRACTOR - desoldering tool - Pace Inc.
Softy - work hats - Clauss Cutlery Co.
So-Hot - heater - Therm-O-Lab Corp.
SOLATRON - line voltage regulator - Sola Electric
SOLDAPULLT - DESOLDERING TOOL - Edsyn, Inc.
SOLDAVAC - DESOLDERING TOOL - Edsyn, Inc.
Soldercon - IC & transistor sockets - Molex Inc.
Solderette - wavesolder equip. - Electrovert
Solder Master - elec. soldering irons - Hexacon Elec. Co.
SOLDERPAK - automated insultation - Raychem Corp.
Solid-D - polyethylene dielectric - Superior Cable Div.
Solid-Gel - rechargeable batteries - Elpower Corp.
Solid-Lite - solid state lamps & displays - OPCOA, Inc.
Solid State - dry reed hybrid modules - Struthers-Dunn, Inc.
Solid-Tubes - silicon rectifier - Elctrn. Devices
Solistrand - terminals & splices - Amp Inc.
Solofast - quick-operating fasteners - Paneloc Corp.
Solu Bridge - solution conductivity instrument - Beckman Instrs.
Solu Chek - electrical conductivity meters - Beckman Instrs.
Solu Meter - liquid measuring instrs. - Beckman Instrs.
Sol-U-Salt - plating salts - Sel-Rex Co. Div. Oxy Metal Industries Corp.
Sonac - ultrasonic controls - Delavan Electronics
"SONA GRAPH" - Sound Spectrum Analyzer - Kay Elemetrics Corp.
SONBLASTER - ultrasonic cleaner - Ultrasonic Corp.
Sono - cleaning solvents - Ultrasonic Instrs. Int'l., Inc.
Sonocaster - speaker system - Electro-Voice, Inc.
Sonocaster - loudspeaker - Electro-Voice, Inc.
SONODOME - high frequency speakers - Jensen Sound Labs.
Sonodur - hardness tester - Branson Cleaning Equip. Co.
Sonoflux - ndt - magnetic particle equipment - Automation Inds.
Sonogen - cleaners & degreasers - Branson Cleaning Equip. Co.
Sonoray - flaw/thickness tester - Branson Cleaning Equip. Co.
Sonotite - piezoelectric ceramic - Linden Labs., Inc.
Son-Tector - ultrasonic detector - Techsonics
Soundcaster - mobile sound system - PASO Sound Products Inc.
Sound Director - Sound Columns - Argos Products Co., Inc.
Sound discriminator - audio detection system - Acron Corp.
Sound Spot - microphone - Electro-Voice, Inc.
SpaceMaker - Electric motor controls - Allis-Chalmers
Space Saver - 3 1/2" compact edgewise photoelectric controller - Larson Instr. Co., Inc.
Space Saver - electrical fittings - I-T-E Electrical Components Grp.
Spade-Lok - terminal - Amp Inc.
Sparkcaps - spark gap capacitors - Radio Materials Co.
Spartan - fan - Rotron, Inc.
Spartan SSB Plus - SSB TRansceiver - Fanon/Courier Corp., Subs.
Sparvar - aerosol prods. - Krylon
Spasaver TM - Miniature switches - Chicago Switch, Inc.
SPC-12 - 8-bit general purpose industrial control minicomputer - General Automation
SPC-16 - 16-bit general purpose automation minicomputer - General Automation
Specialyst - dual optics-24x and 48x large screen - Visidyne Inc.
Spec-Master - outlets, switches - Leviton Mfg. Co., Inc.

Spec Stat - temp sw - Control Prods., Inc.

Spectra - Exposure Meters, Photometers, TV Optoliner - Photo Research Corp.

Spectrochrom - chromatographic analyzer - Beckman Instrs., (AISSD)

Spectrocolorimeter - spectrophotometer-colorimeter - Beckman Instrs., (AISSD)

Speculag - silver plating bath - Conversion Chem. Corp.

Spec 200 - electronic control inst. - Foxboro Co.

Speech Director - Sound System Lectern - Argos Products Co., Inc.

Speedetex - speed detection equipment - Speed Detectors, Inc.

Speedfoil - high speed radiant heater - Armstrong Cork Co.

Speed Nut - fasteners - Eaton Corporation

SPEEDOMAX - electronic indicators, recorders, controllers - Leeds & Northrup Co.

Speedreader - remote meter reading attachments - Singer Co.

Speed Serts - inserts & studs - Tridair Inds.

Speed Servo II - Servo Chart Recorders - Esterline Angus

Speed-Wrap - wire-wrapping tools - O. K. Machine & Tool Corp.

Speedy - wire snips - Clauss Cutlery Co.

Spemco H-H - switches - Specialties Mfg. Co., Inc.

Sphincter - sockets - Pylon Co., Inc.

Spiradel - High Q Constant Delay Line - Allen Avionics, Inc.

Spirafil - semi-rigid cable - Cablewave Systems Inc.

Spirakore - transformer - General Elec. Co.

Spiral - blower - Rotron, Inc.

Spiraltron - electron multiplier (SEM) - Galileo Electro-Optics Corp.

Spiral Wrap Heaters - heaters wraped around cylinders - Sierracin/Thermal Sys.

Spirap - wire & cable binding - Amp Inc.

SPIRA-SHIELD - flexible cable sheath - Perfection Mica Co.

Spir'ator - constant force spiral spring - Ametek, Hunter Spring Division

Split - ball bearings - MPB Corp.

Spoolarc - spooled wire - Chemetron Corp.

Sportsman - flashlights and lanterns - Ray-O-Vac Div.

Spot Check - magnetic tape head - Michigan Magnetics

Spot-Lok - nylok spot-lok socket screws - Allen Mfg. Co.

Spotmeter - Photometer - Photo Research Corp.

Spring Kit - packaged springs & forms - Helix Spring Corp.

Springter - sockets - Pylon Co., Inc.

Sprioband - wire/cables harnesses - Electrovert

Sprite - fan - Rotron, Inc.

SPT - tape, splicing - General Elec.

Sputtergun - thin film sputtering system - Sloan Technology Corp.

Sputtersphere TM - sputtering system - Materials Resch. Corp.

Squaristor - square resistors - General Resistance, Inc.

SR - clear fused quartz - Amersil, Inc.

S.R.M. - sma-type r.f. connectors - Sealectro Corp.

SRO - Stereo-4 - Electro-Voice, Inc.

S-R-4 - strain gages - BLH Elctrns., Inc.

SSB Analyzers - spectrum analyzers - Nelson Ross Elctrns.

STABILAC - Stable AC Power Source - TDC, Div. Freq. Technology Inc.

STABILARC - Lighting Ballast - TDC, Div. Freq. Technology Inc.

Stabilene - stable base film - Keuffel & Esser Co.

Stabilflo - control valves - Foxboro Co.

Stabiline - automatic voltage regulators - Superior Electric Co.

Stabilite - laser resonator design - Spectra-Physics, Inc.

Stabilizer 100 - pc board component lead lock-in system® - Hollis Engrg., Inc.

Stabilizer 150 - pc board fluxing and component lead lock-in system® - Hollis Engrg., Inc.

Stable-K - capacitors, fixed, ceramic - Republic Elctrns. Corp.

Stacer - self-extending spiral tube - Ametek, Hunter Spring Division

STACPAC - RECTIFIER, SILICON - Semtech Corp.

Staffel - terminal blocks & strips - Electrovert

Sta-Flow - synthetic plastic resins - Air Prods. & Chems., Inc.

Sta-Flux - stabilizer and flux combined for use in stabilizer 150 systems - Hollis Engrg., Inc.

Stairway-Type - tower sections - Up-Right Scaffolds

Sta-Kon - terminals, tools - Thomas & Betts Co.

Stancote - Plastic insulated wire - Standard Wire & Cable Co.

STANDCO - Tachometers, Frequency Meters, Elapsed Time Meters - Sticht Co., Inc. Herman H.

Stanflex - Rubber jacketed portable cable - Standard Wire & Cable Co.

Stantrol - temperature & heater controllers - ARI Inds., Inc.

STANTRON - MODULAR ELECTRONIC CABINETS - Stantron Div.

STARAN - associative array processor system - Goodyear Aerospace Corp.

Sta-Strap (R) - Cable Ties - Panduit Corp.

StatFlex - dc adjustable speed drive - Allis-Chalmers

STAT-I-CHART - Visual Control Boards - Rol-a-chart Div.

Statos - electrostatic recorders - Varian Assocs.

Statos - a prod. line of electrostatic recorders - Varian Data Machines

Statos Sys. - digital printer/plotter systems - Varian Data Machines

Statos 21 - electrostatic printer/plotter - Varian Data Machines

Statos 31 - electrostatic printer/plotter - Varian Data Machines

Statos 33 - electrostatic printer/plotter - Varian Data Machines

STATUS-INDICATOR - compact, 12-message projection readout - Industrial Elctrn. Engrs.

Status Seeker - logic test sets - Dataprobe, Inc.

Stavolt - power supplies - Christie Elec.

Sta-Vo-Trol - voltage regulator - General Elec. Co.

Stedivolt - a.c. line voltage regulator - Kelk, George Ltd.

Stenafax - electronic stencils - Fitchburg Coated Products

Step - sequential television equipment programmer - Chrono-log Corp.

Stereon - spkr. sys. - Electro-Voice, Inc.

STEREO-O-MATIC - record changers - V-M Corporation

STEREOSTAR - Stereoscopic Microscope - American Optical Corp.

Stereo-V - phono cartridge - Electro-Voice, Inc.

Stereo-4 - 4-channel matrix system - Electro-Voice, Inc.

STI - LED photoelectric controls - Scientific Technology

Sticky Fingers - self-adhesive rf1/em1 shielding - Instrument Specialties

STICPAC - XRAY RECTIFIER - Semtech Corp.

Stic 2 - adhesive spray - Caig Labs., Inc.

Stik Klips - adhesive backed fastening devices - Daburn Electronics & Cable Corp.

Stik-On Heaters - adhesive backed resistance heaters - Sierracin/Thermal Sys.

STODDART - Field intensity meters - Singer Instrumentation

STORED-ARC - welder - Nelson Stud Welding TRW Inc.

Storm-Flex - silicone flat cable - Storm Products Co.

Strainrite - ceramic products - Star Porcelain Co.

Strapping - wire/cables harnesses - Electrovert

STRATE-BREAKS - prescored ceramic substrates - Coors Porcelain Co.

Strato-Therm - splice & terminal - Amp Inc.

Streamseal - Butterfly valves - Allis-Chalmers

Stripac - hi freq hi power transistor package - Microwave Semiconductor Corp.

Stripall - thermal wire stripper - Teledyne Kinetics

Stripmaster - wire strippers - Ideal Industries Inc.

Strip Pack - terminal board - Elgin Elctrns., Inc.

StripSwitch - shell-less P.C. board switch - UID Electronics Div.

Striptrol - self assemble replacement kits (for side-by-side potentiometers) - CTS Corp.

Strobeguard - high intensity obstruction warning lights-for utility towers, tall buildings, microwave antennas - EG&G, Inc.

STROBETTE - stroboscopes-tachometer - Power Instrs., Inc.

Strobex - strobe light - Chadwick-Helmuth Co., Inc.

StrobolumeR - electronic strohoscope - General Radio Co.

StroboslaveR - strobostopic light source - General Radio Co.

Strobotac® - electronic stroboscope - General Radio Co.

Strobrite - high intensity stroboscope - U.S. Scientific Instrs.

Strongset - all purpose solder - Chemetron Corp.

STUNTRONIC - station controllers - Teletype Corp.

Stur-D-Dial Cord - dial cord - Gudebrod Bros. Silk Co., Inc.

Sturdi-Stand - electric soldering iron holder - Hexacon Elec. Co.

Stur-D-Lace - lacing tape - Gudebrod Bros. Silk Co., Inc.

STYCAST - casting resins - Emerson & Cuming, Inc.

Styrafil - fiberglass reinforced polystyrene - Fiberfil Div. Dart Ind.

Styrofoam - polystyrene foam - Dow Chemical Co.

Styron - polystyrene - Dow Chemical Co.

SUBBER - signal tracing analyzer-by signal substitution. - Castle TV Tuner Service, Inc.

Sub-Minax - coaxial connector - Amphenol RF Div.

Sue - digital computer - Lockheed Elctrns. Co.

Sulfamex - nickel plating chems. - Sel-Rex Co. Div. Oxy Metal Industries Corp.

Sulfil - fiberglass reinforced polysulfone - Fiberfil Div. Dart Ind.

SUNSWITCH - photoelectric controls - Ripley Co., Inc.

Super-Band - 50-270 MHZ line of solid state CATV equip - AEL Communications Corp., Sub. of Amer. Elctrn. Labs. Inc.

Super-Cast - vehicle scales - Howe Richardson Scale Co.

Super Caster - spkr. syst. - Electro-Voice, Inc.

Super Caster - Stereo-V - Electro-Voice, Inc.

Super Champ - hand tool - Amp Inc.

Supercharger - I.C. handling equipment - Delta Design, Inc.

Supercon - electrical connectors - Superior Electric Co.

Supercordx - cord - General Elec.

Supercoronol - rubber insulated cable - General Elec.

Super Erecta Shelf - open wire shelving & trucks - Metropolitan Wire Corp.

SUPERFAST - 30 NANOSECOND RECTIFIER, SILICON - Semtech Corp.

Superflex - coaxial cable - Columbia Elctrn. Cables

Super Frost AiD - component cooler - Chemtronics, Inc.

Super-Hush - thin-film resistors - Analog Devices

Superior - Gyratory and jaw crushers - Allis-Chalmers

Super-K - capacitors, fixed, ceramic - Republic Elctrns. Corp.

Supermatec - solid state controller - Hotpack Corp.

Super Mite - portable potentiometer - Thermo Elec. Co., Inc.

Supernova - computers - Data General Corp.

Super/reg - electronic DC voltage regulators - Trio Labs, Inc.

SUPERSAFE - 6 Supersafe Fluoride-Free Paste Flux - Superior Flux & Mfg. Co.

SUPERSAFE - #32 Supersafe For Use In Foam Fluxers - Superior Flux & Mfg. Co.

SUPERSAFE - #77 Supersafe Non-Corrosive Paste Flux - Superior Flux & Mfg. Co.

SUPERSAFE - #30 Supersafe Soft Solder Liquid Flux - Superior Flux & Mfg. Co.

Super-Sonax - tweeter - Electro-Voice, Inc.

Super-Stabe - power resistor networks - Analog Devices

Superstrate R - ceramic substrates, ultra-fine grained - Materials Resch. Corp.

Super-Synclamps - large servo clamps - Timber-Top, Inc.

Super-Torq - cap screws - Allen Mfg. Co.

Super-Track - ratio resistor networks - Analog Devices

Super-Twistaguide - triple strength twistaguide - Airtron

Super 270 - connector - Amphenol Connector Div.

Super-40 - waveguides & accessories - Airtron

Supramesh - filter medium - Pall Corp.

Supramesh - rigimesh w/stainless steel powder sinter-bonded - Pall Trinity Micro Corp.

Suprasil - clear fused quartz - Amersil, Inc.

Suprasil-W - clear fused quartz - Amersil, Inc.

Sure-Ty - cable ties - I-T-E Electrical Components Grp.

Surfamax - porous stainless steel fiber - Pall Trinity Micro Corp.

Surgitron - ac & dc protectors - Joslyn Elctrn. Sys.

Surmetic - plastic package (zener diodes) - Motorola Semiconductor Prods.

Sus-Tension - film processing hangers - Lektra Labs., Inc.

Sweep-Sync - automatic synchronizer - Chadwick-Helmuth Co., Inc.

Swemar - sweep marker generator - Leader Instruments Corp.

Swidget - slide switch - CW Industries

Swidget, Jr. - slide switch - CW Industries

Swing-Wa - switches, panelboards - General Elec. Co.

Swivitop - screw drivers - Moody Tools, Inc.

Sydewynder - slide switch - CW Industries

Sylgard - Resin - Dow Corning

Sylvania - intergrated circuits - Lansdale Transistor & Elctrns.

Synch-Lock - control systems - Sequential Information Systems

SYNCHRO-DIP - solid state relay - Gordos/Grisby-Barton

Synchro-Lok - thick film screen alignment system - Sel-Rex Co. Div. Oxy Metal Industries Corp.

SYNCHRON - timing motors & clock movements - Hansen Mfg. Co.

Synchro-Pac - syn. motors - Electric Machinery Mfg. Co.

SYNCHRO-REEDAC - solid state relay - Gordos/Grisby-Barton

Synchrostat - electrical controls - Electric Machinery Mfg. Co.

Synchro Sweep Generators - frequency response sweepers - Nelson Ross Elctrns.

Synchrotel - self-synchronous motors - Kollsman Instr. Co.

Synclamps - servo clamps - Timber-Top, Inc.

Sync-Loc - motors - Bristol Saybrook Co.

Syncron - condenser microphones - Dynalab Corp.

Syncronometer® - digital time comparator - General Radio Co.

Sync-Trol - synchronous-motor controls - Electric Machinery Mfg. Co.
Synduction - Motors - Allis-Chalmers
Synthane - laminated plastic - Synthane Taylor Corp.
SYNTHINOL - hook up wire - Consolidated Wire & Assoc. Corps.
Synthite - varnishes - Dolph, John C. Co.
Syntholvar - extruded pvc tubing - Varflex Corp.
Syntorque - a.c. motor - EEMCO Div.
SYNTRON - Semiconductor Products - FMC Corporation
SYNTRON - Parts Handling Products - FMC Corporation
SYNTRON - Material Handling Products - FMC Corporation
SYSTEM III&T - wire-wrapping cards - Adcor Electronic Packaging Corp.
SYSTEM III&T - artwork design services - Adcor Electronic Packaging Corp.
SYSTEM III&T - universal PC cards - Adcor Electronic Packaging Corp.
System IV/40 - Remote Intelligent Terminal System - Four-Phase Systems
System IV/70 - Intelligent Terminal System - Four-Phase Systems
System 18/30 - small, general purpose computer - General Automation
System 306 - Fourier spectrum analyzers - Elsytec, Inc.
System 547 - modular wet processing production system - Chemcut Corp.
Systrac - systems - Systron-Donner Inertial Div.
SYSTROL - solid state drive systems - Control Systems Research, Inc.
Systron - data products - Systron-Donner Inertial Div.
S-42 Alloy - antimony gold plating process - Sel-Rex Co. Div. Oxy Metal Industries Corp.

T

T-A - digital meters - Tekelec, Inc.
Tab-Gun - heat guns - Sigma Sys. Corp.
TABLOCK - mixed flow wheel - Torin Corp.
Tabl-Top - automatic plating sys. - Sel-Rex Co. Div. Oxy Metal Industries Corp.
TACHLITE - stroboscopes - Power Instrs., Inc.
Tacholog - tachometers with revolution counters - Kollsman Instr. Co.
Tach-Pak - Tachometer system - Airpax Elctrns.
Tach-Trol - Tachometer system - Airpax Elctrns.
TAG-RING - shieled wire termination - Glenair, Inc.
"Tallymaster" - adding-subtracting machines - Victor Comptometer Corp.
Tan-Film TM - tantalum thin film resistors - TRW/IRC Resistors
Tankard - digital set counter - Automatic Timing & Controls Co.
Tankard - digital set timer - Automatic Timing & Controls Co.
Tanktrol - pressure operated control - Autocon Inds., Inc.
Tantalex - tantalum electrolytic capacitors - Sprague Elec. Co.
Tantalite - lithium tantalate - Crystal Technology
Tantalytic - capacitors - General Elec. Co.
Tape Cable - flat flexible cable - Brand-Rex Co.
TAPECON - tape cable connector assemble - Burndy Corporation
TAPELESS TAPE MEASURE - Hand Held Measuring Device - ENM
TAPE PAK - fish tapes - Ideal Industries Inc.
Taperlock - connector for semi-rigid cable - Cablewave Systems Inc.
Tapeswitch - longitudinal contact pairs - Tapeswitch Corp. Amer.
Tapfree - cutting fluid - Brooks Co. Inc., Winfield
Tapit TM - Miniature pushbutton switches - Chicago Switch, Inc.
Tap-Lite - switches - Pacific Electricord Co.
Tap-Lok - self-tapping threaded inserts - Groov-Pin Corp.
TA'POT® - tape potentiometer - Howell Inst. Inc.
Taptone - electronic can tapping inspection device - Benthos, Inc.
TARGET - antennas - S & A Electronics
Tarzan - fan - Rotron, Inc.
Tasc-2 - radioisotopic analysis system - Harshaw Chemical Co.
Tasc-5 - cerebral function analyzer - Harshaw Chemical Co.
Tasc-8 - pulmonary function analyzer - Harshaw Chemical Co.
Taylorclad - metal clad laminates - Synthane Taylor Corp.
Taylorite - vulcanized fibre - Synthane Taylor Corp.
Tayloron - laminated plastic - Synthane Taylor Corp.
Tayp-Air - airborne taper pin - Amp Inc.
Tay-Tronic - welding controls - Taylor-Winfield Corp.
T-Bar - multi-contact switches & relays - T-Bar Inc.
TCI - touch switches - Refac Elctrns/Wild Rover
TDI - power supply - Transistor Devices
TDM - power supply - Transistor Devices
TDMD - power supply - Transistor Devices
Teachware - educational software - Fabri-Tek, Inc.
TechniMatiC - receiver and transmitter sys - Technical Mat'l.
Techni-Rite - Analog & Event Recorders - Gulton Inds., Inc.
Teckshield - custom shielded enclosures - Technical Wire Products, Inc.
Teckstik - shielding & sealing gasket - Technical Wire Products, Inc.
Teckstrip - EMI/RFI gasket - Technical Wire Products, Inc.
TEC-LITE - indicating devices - Tec, Inc.
Tekelec T-A - digital voltmeters, multimeters - Tekelec Inc.
TEL/CELL - telecommunications & standby battery - Globe Union, Inc.
Telco - antennas & installation accessories - GC Electronics
Telcon - metal alloys - Inter-Tech. Grp., Inc.
Tele-Beam II - large screen tv projector - Kalart Victor Corp.
Tele/Data 2000 series - data analyzer - Digitech Data Inds., Inc.
Telefax - X-Ray baggage inspection unit - Teltron
Tele-Pac TM - Elfab Corp.
Telepen - handwriting transmission systems - Telautograph Corp.
Tele-Power Poles - Divided, vertical multioutlet assemblies - Wiremold Co.
Teleproducts - communication products - Atlantic Research Coropration
TELEQUIPMENT - Low-priced Oscilloscopes - Tektronix, Inc.
Telescan - complete telemetry systems - Autocon Inds., Inc.
Telescriber - handwriting transmission systems - Telautograph Corp.
Teleslide - Drake Mfg. Co.
Telesponder - Tracking Radar Devices - Vega Precision Labs.
Telestep - remote control systems - Autocon Inds., Inc.
"Tele-Torque" - Torque-Wrenches, Dual-Scale - Owatonna Tool Co.
Teletrol - complete telemetry systems - Autocon Inds., Inc.
Televac - vacuum measuring instrumentation - Fredericks Co.
Televex - 45 RPM adaptors and playback styli - Aldshir Mfg.
Television Tube Caddy(R)-TV - Servicemans' Case - Argos Products Co., Inc.
Tel-Eye - solid state alarm sensor - Autocon Inds., Inc.
Telicon - Improved vidicon tube - Teletron
Telinc - voice processing equipment - International Communications
Teltronize - Patented process for (image tubes) - Teletron
Temars - transportation environment measuring and recording system - Endevco
"Temflex" - tapes & tabings - 3M Co.
TEM/Guide - coaxial/waveguide components - UTE Microwave
TEMPCAL® - thermocouple/thermal switch tester - Howell Inst. Inc.
Temperex - gold electroplating process for high temp applications. - Sel-Rex Co. Div. Oxy Metal Industries Corp.
Tempgard - temperature alarm system - Tenney Engrg., Inc.
Tempilabels - temperature indicating labels - Tempil Div.
Tempilaq - coatings - Tempil Div.
Tempil Pellets - pellets - Tempil Div.
Tempilstik - crayons - Tempil Div.
Temp-Lace - lacing tape - Gudebrod Bros. Silk Co., Inc.
TEMPO - Hi Fidelity Speakers - Oxford Speaker Co.
Temp-Plate - temperature indicating decals - Wahl, Wm. Corp.
Temp-R-Glas - teflon coated fiberglas - Connecticut Hard Rubber Co.
Temp-R-Tape - teflon tape - Connecticut Hard Rubber Co.
Tempruf - temperature compensated spring - Chatillon John & Sons
Tempscribe - Recording Thermometer - Bacharach Instrument Co.
Tempstat - standard controller - Hotpack Corp.
Tempstir - lab. mixer/stirrer/temp. controller - GCA/Precision Scientific
Temptron - industrial infrared thermometer - Barnes Engrg. Co.
Tenite - pollyallomer, polyester, cellulosic & polyolefin plastics - Eastman Chem. Prods.
Tenna Rotor - TV antenna rotator - Alliance Mfg. Co.
Tenna-Tube - wall-thru - Javex Elctrns.
Tenuline - RF Attenuators - Bird Electronic Corp.
Tera-Ohmmeter - insulation resistance tester - Rhode & Schwarz Sls.
TERG-A-ZYME - powder manual detergent - Alconox Inc.
Termaline - RF Loads & Wattmeters - Bird Electronic Corp.
Termalum - terminals & splices - Amp Inc.
Termashield - ferrules or splices - Amp Inc.
Termi-Blok - tab terminal junction block - Amp Inc.
TERMI CETTE - digital cassette terminal memory unit - Intern'l. Computer Prods., Inc.
Termi-Foil - terminals - Amp Inc.
Termi-Grid - interconnection sys - Amp Inc.
Termi-Kit - cable terminating system - General Elec.
TERMINET - data communications printer - General Elec. Co.
Terminyl - terminals & splices - Amp Inc.
Termi-Plate - connectors - Amp Inc.
Termi-Point - wiring system - Amp Inc.
Termi-Twist - connectors - Amp Inc.
Terrastar - amphibious vehicle - Lockheed Aircraft Svc.
TESTCLIP - I.C. tester and comparator - Fluke Trendar Corp.
Testclip - hand held-incircuit IC tester (digital) - Trendar
Test Lead Caddy - test aid - Air-O-Tronics Prods.
TESTPAC - Automatic test system - ZEHNTEL, Inc.
Tetco - speed recorder - Electric Tachometer Corp.
Texin r - urethane elastomer - Mobay Chem. Corporation
TEXTOLITE - industrial laminates - General Elec. Co.
"TFR" - transistorized float rectifier - Warren G-V Communications
TGS - taguchi gas sensor - Figaro Engrg. Inc.
TGS - taguchi (the inventor) gas-sensing semi-conductor - Figaro Engrg. Inc.
T Head - hand tool - Amp Inc.
The Big Look - voltmeters & ammeters - General Elec. Co.
The Fault Finder - AC leakage current detector - Sotcher Measurement
The Ferret&T - halogen leak detector - General Electric Co.
THELCO, FREAS - ovens, incubators, baths - GCA/Precision Scientific
The Metal Stickers - welding and soldering equip. - Hughes Aircraft Co.
Thermac - temperature control - Research, Inc.
Thermacomb - Corrugated Ceramics - American Lava Corp.
THERMALERT - infrared thermometer - Raytek, Inc.
Thermal Mapper - infra-red scanner - Bendix Corp.
ThermalMaster - industrial infrared thermometer - Barnes Engrg. Co.
Thermasplice - splice for shielded wire - Amp Inc.
Thermatabs - temperature indicating labels - Camwil Inc.
ThermaZip - thermal materials & jacketing - Zippertubing Co.
Thermcoat CC - ceramic cement - Omega Engrg., Inc.
Thermcoat CO and COL - cement - Omega Engrg., Inc.
Thermcoat HT - adhesive and electrical insulator - Omega Engrg., Inc.
Thermcoat Kit - insulation and cement kit - Omega Engrg., Inc.
Thermcoat SL - silicone lacquer - Omega Engrg., Inc.
THERMILINEAR - thermometer - Yellow Springs Instrument Co.
THERMIVOLT - signal conditioner - Yellow Springs Instrument Co.
Thermobead - Glass coated bead thermistor - Thermometrics, Inc.
Thermobond - Phenolic Insulating Varnish - Sterling
THERMOBOND - varactor diodes - Varian Electron Tube & Device Grp.
Thermobond - varactor diodes - Varian Assocs.
Thermochip - thermoelectric cooling modules - Melcor-Materials Elctrn. Prods.
Thermochuck - temp controlled chucks - Temptronic Corporation
Thermodur - High Temperature Varnish - Sterling
THERMOFIT - heat shrinkable tubing - Raychem Corp.
THERMOFLAG - Transistor Heat Dissipators - Staver Co., Inc.
Thermoflake - Flake (thick film) thermistor - Thermometrics, Inc.
"Thermoflo" - thermal flow measurement - Thermo Sys., Inc.
THERMOFORM - high temperature insulating products - Precision Paper Tube Co.
THERMOHM - temperature detector (resistance thermometer-type) - Leeds & Northrup Co.
Thermolain - ceramic products - Star Porcelain Co.
Thermolastic - heating element - Cox & Co., Inc.
Thermomatic - constant temperature block - Beckman Instrs., (AISSD)
Thermonic - induction heating equip. - Taylor-Winfield Corp.

Thermopad - plastic package (power transistors) - Motorola Semiconductor Prods.
Thermopak - Plastic Molded Triac & SCR No Metal Tab - ECC Corp.
Thermopatch - heating element - Cox & Co., Inc.
Thermopoxy Compound - Epoxies - Sterling
Thermoprobe - bead-in-glass probe thermistor - Thermometrics, Inc.
Thermorod - Bead-in-glass rod thermistor - Thermometrics, Inc.
Thermosheet - heating element - Cox & Co., Inc.
Thermospot - temp controlled probes - Temptronic Corporation
Thermo Stack - core memory stack - Fabri-Tek, Inc.
Thermostream - temp controlled microchambers - Temptronic Corporation
THERMOSWITCH - temperature controls - Fenwal, Inc.
Thermotab - Plastic Molded Triacs & SCR Metal Tab - ECC Corp.
Thermotape - heating element - Cox & Co., Inc.
Thermo-Tector - overload protection sys. - General Elec. Co.
Thermoterm - noise sources, hot - Maury Microwave Corp.
Therm-O-Trac - heat control soldering station - Hexacon Elec. Co.
THERMOVANE - Transistor Heat Dissipators - Staver Co., Inc.
Thermowatt - silicon power transistors - Motorola Semiconductor Prods.
Thermowire - heating element - Cox & Co., Inc.
The Short Stop - AC leakage current tester - Sotcher Measurement
The Voice of the Theatre - speaker systems - Altec Div.
"THIN-HEET" - etched foil heating element - Safeway Products
Thinistor - thermistor - Victory Engrg. Corp.
"Thinlay" - micro-thin selective electroplating - Advanced Materials Systems
Thinline - capacitors, fixed, ceramic - Republic Elctrns. Corp.
THINPAK - miniature relay - American Zettler, Inc.
Thinshield - electrostatic shielding technique - CEA
Thin-Trims - variable ceramic trimmers - Johanson Mfg. Corp.
THINVERTER - miniature power converters - Arnold Magnetics Corp.
THINWALL - pre-impregnated tubing - Precision Paper Tube Co.
Third-Hand - automated soldering gun - Hollis Engrg., Inc.
"Thirsty" Foam Wire - hi-absorbent urethane foam wiper - Clean Room Prods.
Thorkom - miniature polycarbonate connector - Viking Inds., Inc.
Thorn - cathode raytubes - Inter-Tech. Grp., Inc.
Thorn-Brimar - cathode raytubes - Inter-Tech. Grp., Inc.
Thorox - thorium oxide - National Beryllia Corp.
3-Wire Line - grounded production - UNGAR, Div.
3200 DIGITAL TESTER - bench top IC tester for digital IC's - Sitek, Inc.
Thruline - RF Wattmeters - Bird Electronic Corp.
Thumb Mite - miniature size thumbwheel switch - Tech Labs., Inc.
Thy-Mo-Trol - motor control - General Elec. Co.
Thyristrol - SCR proportional power & controllers - Cross Electronics Inc.
Thyrite - dielectric or resistance mat'l. - General Elec. Co.
Ti-Ball - pumps - Varian Assocs.
Timatch - connector - Times Wire & Cable
Time Capsule - 2 lead ac timer - Artisan Elctrns. Corp.
Time Electronics - voltage calibrator - Zi-Tech Div.
Timefax - electrosensitive recording paper - Fitchburg Coated Products
Timemark - electrosensitive recording paper - Fitchburg Coated Products
Time-O-Lite - photographic timers - Industrial Timer Corp.
Time-Pak - solid-state controlling device - Gems Sensors Div.
Tineon - indicator light - Leecraft Mfg. Co., Inc.
Tinnerman® brand - fasteners - Eaton Corporation
Tinsil - silver bearing solder - Bow Solder Products
Tintac - organic coating - Conversion Chem. Corp.
Tintillate - tin plating bath - Conversion Chem. Corp.
Tiny-Glow - pilot lights - Industrial Devices
Tiny "L" - inductors - Aladdin Elctrns.
Tinylite - Drake Mfg. Co.
Tinymag - relays - Torwico Elctrns., Inc.
Tinymax - transformers - Torwico Elctrns., Inc.
Tinymite - flexible coupling - Renbrandt, Inc.
TINY-PAK - Miniature flat pack package - Mini-Systems, Inc.
Tiny Ties - miniature wire & cable ties - Transcon Mfg. Co.
Tiny Trim - variable trimmer delay line - Kappa Networks
Tisan - programmer - Artisan Elctrns. Corp.
Tite-Bite - connectors - Thomas & Betts Co.
Titelite - Drake Mfg. Co.
TKC - printed circuit connectors - Teledyne Kinetics
T-Lite - bi-pin indicator light - GTE Sylvania Inc.
TOG-L-LOK - Clamping tool - Channellock, Inc.
Toho - paper tape perforator - Uchida of America Corp.
Tokin - all products - Tohoku Metal Inds., Ltd.
TONE-O-MATIC LOUDNESS - loudness control - V-M Corporation
Tong Test - clamp on ammeter - Columbia Electric Mfg. Co.
Tonomagic - nonship chemical - R-Columbia Products, Inc.
Tonotron - direct view storage tube - Hughes Aircraft Co.
Top Brass - microphone - Electro-Voice, Inc.
Tophel - thermocouple alloy - GTE Sylvania Inc.
Tophet - heating element alloy - GTE Sylvania Inc.
TOR Heat Sinks - aluminum heat sinks-transistor mounting pads - TOR Corporation
Tormax - stepper motors and control elec. - IMC Magnetics Corp.
TORQLINER - coil forms for electrical windings - Cambridge Thermionic Corp.
Torqometer - direct-reading dial torque measuring tools - Snap-On-Tools
Torq Switch - centrifugal switches - Torq Engineered Products, Inc.
Torqsyn Remote Positioner - direct drive servomechanism - Vernitron Corp.
TORQUE COMMANDER - screw driver sets - Vaco Products Co.
Torque-Rite - air tool torque control system - S. Himmelstein & Co.
Torque Watch - Torque Watch Gauge - Waters Mfg., Inc.
Torrex Series - x-ray inspection system - Torr Labs.
Torrlite Series - xenon flashtubes - Torr Labs.
Torr Seal - resin - Varian Assocs.
Torr Seal - high vacuum sealer - Varian Assocs.
Torx - fastener drive system - Camcar Screw & Mfg.
T-O-T - sealant and pipe thread compound - Lake Chemical Co.
Touch Mos - touch control technology - American Microsystems, Inc.
T-Pads - semiconductor pads - Transcon Mfg. Co.
Tra-Bond - adhesives - Tra-Con, Inc.
Tra-Cast - potting compounds - Tra-Con, Inc.
TRACER-flo - hermetic leak tester - Trio-Tech, Inc. of Calif.
Tracer-Tech - inspection penetrants - Shannon Luminous Mat'ls.
Tracker&T - servicemen's battery-operated portable leak detector - General Electric Co.
TRACOR WESTRONICS - all product lines - Westronics
Traction Booster - Tractor draft control system - Allis-Chalmers
TRACTORADIO - Applicable to Tractor radios - ATR Electronics, Inc.
Tra-Duct - conductive adhesives - Tra-Con, Inc.
TRAILFLEX - CV-cured mining cables - CCS Hatfield Wire & Cable Group
Trakfet - tracking field effect transistor - Analog Devices
Tran Bal - inverter ballast - Bodine Co.
Transactive DPIs - compact DPIs with added circuit functions - Analogic Corp.
Transaire - pressure transmitter - Taylor Instr. Process Control Div.
Trans-Box - plastic boxes - Vichek Plastics Co.
Transcope - pheumatic transmitter/recorder - Taylor Instr. Process Control Div.
Transelectric - telephone apparatus - Encom Prods. Co., Inc.
TransistAR - chemicals - Mallinckrodt, Inc.
Transitlite - laser alignment device - Spectra-Physics, Inc.
TRANS-O-MATIL - automatic transfer switch - Lakeshore Electric Corp.
Trans-Start - electrical controls - Electric Machinery Mfg. Co.
Transvolt - standard voltage - Guildline Instrs., Inc.
TransZorb - silicon transient suppressor - General Semiconductor Industries, Inc.
Travel-Tron - campor TV antenna - Antenna Corp. of America
TRENDTRAK - curve follower program control unit - Leeds & Northrup Co.
Trevar - alloy - Hamilton Technology, Inc.
Triac Kooler - heat dissipator - UNITRACK Div.
Tri-Amp - Selenium Rectifier - General Instruments Corp.
"Tri-Band" - 3-band antenna - Telrex Labs.
"Tri-Beam" - u.v. ray generators - Western Coil & Elec. Co.
Tri-Break - circuit breakers - General Elec. Co.
Tri/Clad - motors, generators, frequency converters - General Elec. Co.
Tricolor - Color Temp. Meter - Photo Research Corp.
Trigac - trigonometric analog converters - Singer Co.
Trigard - 3 electrode spark gap - Joslyn Elctrn. Sys.
Trig-R-Heat - soldering gun - Wall-Lenk Mfg. Co.
Trimatron - dimmer control - Leviton Mfg. Co., Inc.
Trimit - potentiometer - Bourns, Inc.
TRIM KITTM - Capacitor Kit - American Technical Ceramics
"Trimline" - PC mounting variable delay line - ESC Elctrns. Corp.
Trimpot - potentiometer - Bourns, Inc.
TRIM-STEP - encoder, shaft angle, optical - Trump-Ross Ind:'l. Controls
TR-IOTA - encoder, shaft angle, optical - Trump-Ross Ind:'l. Controls
TRI—PHASIC CONVERSION - autozeroing integration technique - Data Precision Corporation
Triplate - patented semiconductor process - Alpha Instr. Inc.
TRIPLE MATE - SOLDERING TIPS FOR ABOVE - Edsyn, Inc.
Triplematic - mixing, metering, dispensing machinery - Hardman Inc.
Tri-State - three stage output ICS - National Semiconductor Corp.
Trol Aid - control cleaner - Chemtronics, Inc.
Trol-A-Temp - heating & cooling controls - EWC, Inc.
Trolex - selector switch - CTS Corp.
Trolpac&T - control units (timing generator and register/decoder - Analogic Corp.
TRON - fuses & fuseholders & fuse clips - Bussmann Manufacturing
Troubleshooter - extension spotlights - Teledyne Big Beam
Troubleshooter - in-circuit component system - ZEHNTEL, Inc.
Truarc - rings, tools & gages - Waldes Kohinoor, Inc.
Trucote - flux coated silver rod - Chemetron Corp.
TRUFLEX - thermostat metals - Texas Instruments
TRU-MITE - encoder, shaft angle, optical - Trump-Ross Ind:'l. Controls
TRU-ROTA - encoder, shaft angle, optical - Trump-Ross Ind:'l. Controls
TRYPACK - modular precision power supplies - Systron Donner Trygon Div.
T-Screen - insulated tape-shield dividing - Superior Cable Div.
TTS - timeshare terminals - TTS
Tube O'Gel - thixotropic gelling agent - Beckman Instrs., (AISSD)
TUBE-PAC - SOLID STATE SILICON VACUUM TUBE REPLACEMENT - Semtech Corp.
TUBE-R-CAP - capacitor resistor combination - Centralab
Tuchswitch - solid state limit switch - Denison, R.B., Inc.
Tuff-Tainer - plastic boxes - Vichek Plastics Co.
Tuf-Test - lacing tape - Gudebrod Bros. Silk Co., Inc.
Tuf-Ties - wire & cable ties - Transcon Mfg. Co.
Tulox - cellulose acetate butyrate tubing - Blum, Julius & Co., Inc.
Tungar - rectifying apparatus - General Elec. Co.
Tun-O-Foam - tuner cleaner/lubricant - Chemtronics, Inc.
Tun-O-Lube - tuner cleaner - Chemtronics, Inc.
Tun-O-Power - tuner cleaner-polish-lubricant - Chemtronics, Inc.
Tun-O-Wash - tuner degreaser - Chemtronics, Inc.
TURBO - Varnished Cotton Sleeving - Brand-Rex Co.
TURBOCRYL - Acrylic Coated Glass Sleeving - Brand-Rex Co.
TURBOGLAS - Varnished Cotton Sleeving - Brand-Rex Co.
TURBOLEX - General Purpose Vinyl Tubing - Brand-Rex Co.
TURBOSIL - Silicone Coated Glass Sleeving - Brand-Rex Co.
TURBOTHERM - High Temperature Vinyl Tubing - Brand-Rex Co.
TurboTorr TM - Turbo-Molecular Pumping Units - Sargent Welch Sci. Co.
TURBOTUF - Vinyl Coated Glass Sleeving - Brand-Rex Co.
TURBOZONE - Low Temperature Vinyl Tubing - Brand-Rex Co.
TURBO 117 - Silicone Rubber Coated Glass Sleeving - Brand-Rex Co.
Turner - microphones - Conrac Corp.
Turn-Loc - captive screw - Deutsch Fastener Corp.
Tutorette - audiocard readers - Audiotronics
TV-PAC - HIGH VOLTAGE MULTIPLIER - Semtech Corp.
TVS - torque verification system - S. Himmelstein & Co.
Twenty/Twenty - epoxy adhesive - Packaged Resins Div.
Twenty/Twenty - epoxy adhesive - Allaco Prods Div.
Twinducer - Gear drives, two motors - Allis-Chalmers
Twin-Hex - crimp tool system - Amphenol RF Div.

Twin Light - circuit indicator light - GTE Sylvania Inc.
TWIP - SOLDERING & DESOLDERING SUPPLY HOLDER - Edsyn, Inc.
Twistaguide - twistable flexible waveguide - Airtron
Twist-Lite - lighted pushbutton switch - Master Specialties Co.
20/20 - custom panel instrument line - Westinghouse Elec. Corp.
2+2 - four tone selective call system - Bramco Controls Div.
TWYSTRON - microwave amplifier tubes - Varian Electron Tube & Device Grp.
Twystron - amplifier - Varian Palo Alto Microwave Tube Div.
Twystron - microwave amplifier - Varian Assocs.
Tygon - polyvinyl chloride tubing - Blum, Julius & Co., Inc.
Typotron - direct view storage tube - Hughes Aircraft Co.
Typotron - direct view storage tube - Hughes Aircraft Co.
Ty-Rap - cable ties, clamps, & tools & accessories - Thomas & Betts Co.
Tytex - batteries - Exide Power Sys. Div.
T-1 Military Indicator Light - indicator light - GTE Sylvania Inc.

U

UAR/T - universal asynchronous receiver/transmitter - General Instr. Corp.
UBIQUITOUS® - real-time spectrum analyzers - Nicolet Scientific Corp.
Uchida - fuse, electronic computer & related system - Uchida of America Corp.
U-D-F - unidirectional flow inductors - Ajax Magnethermic Corp.
UFLEX - UF & MNC types - CCS Hatfield Wire & Cable Group
Ulbloc - plastic package (transistors) - Motorola Semiconductor Prods.
Ulta-Solv - cleaning solvents - Udel Manufacturing
Ultipor - filter medium - Pall Corp.
Ultipor - filter media - Pall Trinity Micro Corp.
Ultra-Craft - catalog - Workman Electronic Prods., Inc.
Ultra "F" - graphite purification process - Ultra Carbon Corp.
ULTRAFLEX - Adjustable Speed Drives & Controllers - Cutler-Hammer, Inc.
Ultra-Flux - flux - Engelhard Minerals & Chem.
Ultra-Glow - illuminated push button, slide & rocker switches - UID Electronics Div.
ULTRA-KAP - ceramic capacitor - Centralab
Ultra-Mate - connector - Amphenol Connector Div.
ULTRA-ONE - variable resistor - Centralab
Ultrapak - wave soldering sys - Electrovert
ULTRA-SEAL - Solderable, protective coatings - Kenco Alloy & Chemical Co., Inc.
Ultrasil - clear fused quartz - Amersil, Inc.
ULTRA-SOL - Solvent cleaners - Kenco Alloy & Chemical Co., Inc.
Ultra-Strates - substrates .025" with a 2m" B/S - Accumet Engineering Corp.
Ultratec - catalog - Workman Electronic Prods., Inc.
Ultra-Temp - high temperature adhesive - Aremco Prods., Inc.
Ultraverter - uhf to vhf converter - Blonder-Tongue Labs., Inc.
Ultravox - portable sound column - PASO Sound Products Inc.
Ultrex - 100 ultra high purity chemicals - Baker, J.T. Chemical Co.
ULTROHM - Resistors - Ultronix, Inc.
Ultrol - cross-linked polyethylene cable - Brand-Rex Co.
Unibase - silicon power transistors - Motorola Semiconductor Prods.
UNIBUS - Signal Data Path - Digital Equipment Corp.
UNI-BUS - Bus Ducts & distribution systems - Cutler-Hammer, Inc.
Uniceram - fixed ceramic capacitors - JFD Electronics Components Corp.
Unicoat - insulation coating - Bacon Inds.
Unicom - CATV trunk amplifier - Delta-Benco-Cascade LTD.
Uni-Core - acid filled core solder - Alpha Metals, Inc.
UNI-CURVE - R-T, curve-matched, interchangable thermistors - Fenwal Elctrns.
Unidaptor - special 45 RPM adaptor - Aldshir Mfg.
Unidex - rotary switches - Oak Inds. Inc.
UNIDYNE - unidirectional microphone - Shure Brothers, Inc.
Uni-Kit - cable splicing kit - General Elec.
Uni-Laser - small, one-piece pulsed laser - Laser Inc.
Uniline - sound columns - University Sound
UNI-PAC - integrated circuit socket - Methode Elctrns., Inc.
Uniply - automatic multirange supply - Power Designs, Inc.
UNIRING - one piece compression termination - Burndy Corporation
UNI-ROTOR - pumps - Astro Dynamics
Uniseal - for microphones - Electro-Voice, Inc.
UNISPHERE - unidirectional microphone - Shure Brothers, Inc.
United Electron - tubes - United Page Inc.
Unitized - electric motors - General Elec. Co.
Unitrack - circuit card guides (plastic and metal) - UNITRACK Div.
Unitron - telescopes - Unitron Scientific, Inc.
Unitron - gamma radiography machines - Automation Inds.
Uni-Tunnel - backward diodes - Centralab Semiconductor
Unitwest - coupling - Jan Hardware Mfg. Co.
"Universal" - mobile antenna fittings - K-W Engineering Works
Universal - Clips - Mueller Electric Co.
Universal Active Filter - multi loop negative feedback filter - Kinetic Tech., Inc.
Universal Pilot Housing - pilot lamp socket - GTE Sylvania Inc.
Universal Time Capsule - AC or DC timer from 1 to 1000 seconds - Artisan Elctrns. Corp.
Uniwatt - plastic package (transistors) - Motorola Semiconductor Prods.
Uniweld - unique construction of coils, applied specifically to our line of buzzers - Endicott Coil Co.
Unpluggables - spring loaded test probes - Ostby & Barton Co.
UNREEL TM - Reel-less Wire & Cable Package - Belden Corp.
Urafil - fiberglass reinforced polyurethane - Fiberfil Div. - Dart Ind.
Uresolve - cured silicone & urethane dissolver - Dynaloy, Inc.
USE - magnetic comps. - U.S. Elctrns.
U-Tile-Mu - shielding tiles - Amuneal Mfg. Corp.
Utili-Splice - connectors - Amp Inc.
Utili-Tap - power cable - Amp Inc.
Utili-Tenshun - connectors - Amp Inc.
Uvex - weatherable plastic sheet - Eastman Chem. Prods.
UVtron - Ultraviolet radiation detector - Hamamatsu TV Co., Ltd.

V

Vaclon - pumps - Varian Assocs.
VACOMBO - kits - Vaco Products Co.
VACONNECTORS - tap connectors - Vaco Products Co.
VacPac - vacuum equipt - Hull Corp.
Vac-Seal - epoxy resin - Perkin-Elmer Ultek Inc.
Vac Sorb - vacuum forepump - Varian Assocs.
VacSorb - pumps - Varian Assocs.
VACTORR - vacuum pumps - GCA/Precision Scientific
Vactrol - optical couplers (or) isolators - Vactec, Inc.
Vaculoy - oxide free bar solder - Alpha Metals, Inc.
Vacumette - resistor - CW Industries
Vac-U-Sel - current rectifiers - General Elec. Co.
VADAC - voice analyzer converter - E-Systems Inc.
VAL-AN - Military Cases - Zero Mfg. Co.
Valley - Paper mill equipment - Allis-Chalmers
Valox - thermoplastic polyester - General Elec.
ValueLine - Motor control - Allis-Chalmers
Value Vial - vials - Beckman Instrs., (AISSD)
VALUPOWER SERIES - high power precision system slot range power supplies - Systron Donner Trygon Div.
Valvactor - valve positioner - Foxboro Co.
VAM - air variable capacitors - JFD Electronics Components Corp.
Vaporflo - humidification system - Tenney Engrg., Inc.
Varax - Line Voltage Regulator - Tele-Dynamics/Wanlass
Varfil - flexible sleeving - Varflex Corp.
Varflo - flexible sleeving - Varflex Corp.
Varglas - flexible sleeving - Varflex Corp.
Variable-D - microphone - Electro-Voice, Inc.
Variac® - adjustable autotransformer - General Radio Co.
Varicon - electrical contact - Elco
VARIDAC - converters - Perkin-Elmer Corp.
Vari-L - electrically variable inductors - Vari-L Co.
Varilok - electrical contact - Elco
Varipak - printed circuit card cage - Elco
Variplate - interconnecting system - Elco
Vari-Tex - Speed changers - Allis-Chalmers
Varitor - elect. variable inductor - Data Delay Devices
Varitrim - capacitors - Voltronics Corp.
Vari-Vac - metering valve - Vactronic Lab. Equip., Inc.
VAST - computer-controlled ATE - PRD Elctrns., Inc.
V BALL - precision rubber balls - Vernay Laboratories, Inc.
VECO Vamp - meter protector - Victory Engrg. Corp.
Vectorbord - Perforated Insulating Board - Vector Electronic Co., Inc.
Vectorgraphics 11 - interactive graphics display system - Vector General, Inc.
Vectortablet - data tablet - Vector General, Inc.
Vectrol - power sys. - Vectrol, Inc.
Velcor - hue shift corrector - Television Microtime, Inc.
Velometer - air-velocity instrument - Alnor Instrument Co.
VENT-RAK - Cabinets, Chassis & Accessories - General Devices Co., Inc.
Verifier - PCB tester - Western Electronic Systems
Verilux - digital indication - Toledo Scale
Vernistat - a.c. potentiometer - Perkin-Elmer Corp.
Vernitorq - brushless DC torque motor - Vernitron Corp.
Veroboard - P.C. Board - Vero Electronics
Verobox - Aluminum Mini-Enclosure - Vero Electronics
Verolock - Card Frame Locking Mechanism - Vero Electronics
Verorack - Card Frame - Vero Electronics
Versa-Cage - p.c. card rack - UNITRACK Div.
Versa-Fab - tape - General Elec.
Versaformer - Current transformer - Allis-Chalmers
Versa - Lock - matv device lock - Blonder-Tongue Labs., Inc.
Versamatic - book pasting machine - A. M. W. Corp.
Versamount brackets - card guides brackets (plastic and metal) - UNITRACK Div.
Versa-Pac - Motors - Allis-Chalmers
Versapak - temperature controllers - Honeywell
Versapot - calibrator/potentiometer - Biddle, James G.
VERSA-RANGE - refrigerated test chambers - Blue M Electric Co.
Versatap - matv tap offs - Blonder-Tongue Labs., Inc.
Versatol - rubber insulated cable - General Elec.
Versa-Tran - temperature controllers - Honeywell
Versa-Trap - roughing pump accessories - Perkin-Elmer Ultek Inc.
Versatyme® - programmable controller - Applied Materials Inc.
Versawatt - molded plastic package for TO-66 sockets - RCA Solid State Div.
Versilube - silicone lubricant - General Elec. Co.
Verterseal - environmentally sealed inverter - Nova Electric Mfg. Co.
Vertohold - Embedment anchor - Edo Western Corp.
V-Guard - stylus assembly - Stanton Magnetics, Inc.
VIBRACHOPPER - DC Driven Solid State Chopper - Solid State Electronics Corp.
VIBRALERT - vibration switches - Metrix Instrument Co.
Vibramike - optical displacement measuring device - Advanced Dynamic Instrs. Div.
Vibra-mite - vibration pickup - Vibra-Metrics, Inc.
VIBRA SONE - ultrasonic cleaning sys. - Phillips Mfg. Co.
Vibraswitch - monitoring sys - Robertshaw Controls Co.
Vibra-Tel - monitoring sys - Robertshaw Controls Co.
Vibrode - capacitor modulators - Beckman Instrs., (AISSD)
VIBROGROUND - ground resistance testers - Associated Research, Inc.
Vicom - commercial edgeboard connector - Viking Inds., Inc.
VICON® - CCTV accessories - Vicon Industries Inc.
Videofax - high speed document transmission - Datalog Div., Litton Sys.
Videopak - closed circuit TV systems - Audiotronics
VIDICUE - Model 5050 Video Tape Editing System - Datatron, Inc.
Vidifont - character generator - CBS Laboratories
Vidigage - thickness tester - Branson Cleaning Equip. Co.
Vigiltrol - safety switch-high level alarm - Autocon Inds., Inc.
VII® - CCTV accessories - Vicon Industries Inc.
Viking - tape equipment - Telex Communications, Inc.
Vikon - burn resistant vidicon surface - Teltron
Vikon - Non burn LLLTV vidicon - Teletron
VINYLINK - vinyl insulated splice - Burndy Corporation
VINYLUG - vinyl insulated terminal - Burndy Corporation
VIP - programmable controllers - Struthers-Dunn, Inc.
VIP - Aluminum Instrument Enclosures - Zero Mfg. Co.
Visicorder - graphic recorders - Honeywell, Inc.
Visi-Dial - dial assy. - Theta Instr. Corp.
Visi-Guard - lightning & electrical surge protector - Joslyn Elctrn. Sys.
VISTAL - Transluscent polycrystaline Al2O3 ceramic - Coors Porcelain Co.
VITACOTE - soldering iron tips - ESICO, Inc.
Vita Drive - rubber drive wheel-cleaner - Friend's Mfg.
Vitel - telecommunicatoions solder connector - Viking Inds., Inc.
Vitrohm - vitreous enamel wire-wound resistors - Ward Leonard Elec. Co. Inc.
Vitrolain - ceramic products - Star Porcelain Co.
VN-TC - Power & Control Cable - Brand-Rex Co.
VOCAL MASTER - sound system - Shure Brothers, Inc.

Voice Director - Portable P.A. System - Argos Products Co., Inc.
Vol-Con - voltage/continuity tester - Kurz-Kasch, Inc.
Voltaut - taut-band suspension sys. - Kratos
Volt-Pac - variable transformers - General Elec. Co.
Voltprobe - voltage testers - Amprobe Instr.
Voltrip - limit detection & control - Kratos
Voltsensor - voltage level monitor module - Calex Mgf. Co., Inc.
Volumax - controller peak - CBS Laboratories
Vol-U-Meter - flow calibrator - Brooks Instr. Div.
Volumetric - diaphragum - Electro-Voice, Inc.
Voyager I - portable microfiche reader - Visidyne Inc.
Voyager I - compact lap reader screen, 7"W x 9.5"H-20x or 24x - Visidyne Inc.
Voyager II - portable microfiche reader - Visidyne Inc.
V-Pac Power Sources - DC-DC converters - Reliability Inc.
VPR - metal film resistors - Vermont Precision Resistor Co.
V-Q - vacuum interrupters - Electric Machinery Mfg. Co.
VSMF - visual search microfilm - Information Handling Services
V TIP - rubber tipped armatures - Vernay Laboratories, Inc.
VTO - MIC Varactor-Tuned Oscillators (in TO-8 packages) - Avantek, Inc.
Vu-Break - circuit breakers - General Elec. Co.
Vulcan - soldering irons melting pots - Precision Elec. Co.
Vulkaflex - cross-linked polyolefin cords & leads - General Elec.
Vulkene - cross-linked polyethlene insulated wires - General Elec.
Vumatik - miniature pneumatic instrumentation - Honeywell
Vutronik - miniature electric instrumentation - Honeywell
V V C - voltage variable semiconductor capacitor - Codi Corporation
VX Super Refractory - crucibles, boats - Gte Sylvania, Inc.
Vycor - 96% silica glasses - Corning Glass Works
VYLINK - Irradiated Vinyl Insulated Wire - Brand-Rex Co.
V-2 - transducers - Westinghouse Elec. Corp.
V-53 - resistors - Vishay Resistive Systems Grp.
V71, V72, V73, V74 - digital computers - Varian Data Machines

W

Wafercon - P.C. board wafer connectors - Molex Inc.
Wafer-Sphere - butterfly valves - Jamesbury Corp.
Wait-A-Bit - delay lines - Aladdin Elctrns.
WALSCO - tape-phono drives & belts - GC Electronics
WAMCO - custom built cases - Miller, W. A. Co.
Wassco Glo Melt - resistance soldering material - American Elec. Heater
Water-Bloc - flooding compound - Superior Cable Div.
Watertite - moisture resistant rubber insulation - Okonite Co.
Water Welder - oxy-hydrogen flame generator - Henes Mfg. Co.
Wattcher - RF Monitor/Alarm - Bird Electronic Corp.
Watt-Pak - solid-state controlling device - Gems Sensors Div.
Wavedipper - lead tinning - Electrovert
Waveform Eductor - signal averager - Princeton Applied Resch. Corp.
Wavelabs - vibration measurement - Systron-Donner Inertial Div.
Wavetrak - wave tracking device - Edo Western Corp.
Weather-Ometer - accelerated weathering chamber - Atlas Electric Devices
Webair - computor room air conditioner - Weber Tech Products
WEDGELOCK - "T" SLUG CONSTRUCTION - Standard Grigsby Inc.
Weecoil - chokes, r.f. - Syscon Int'l., Inc.
Weecoil - variable inductors - Syscon Int'l., Inc.
Weecoil - if transformers, hf transformers - Syscon Int'l., Inc.
Weecoil - miniature inductive components - Syscon Int'l., Inc.
Weighmaster - electronic scales - Electro-Numerics Corp.
WELCON - Integrated Circuit Carriers, Contactors & Sockets - Wells Electronics, Inc.
Weldohm R - Strong Flat TV Lead-In - Belden Corp.
Weldox - adhesives compositions - Hardman Inc.
Wellflex - semi-rigid cable - Cablewave Systems Inc.
Wenking - potentiometer - Brinkmann Instrs., Inc.
Wenking - potentiostats - Brinkmann Instrs., Inc.
West - Temperature Controllers - Gulton Inds., Inc.
West-Cap - glass encapsulated monolythic cap - San Fernando Elec. Mfg.
West-ing Arc - elec. welding apparatus - Westinghouse Elec.
Wheeler - flanges - Varian Assocs.
Whisper - fan - Rotron, Inc.
WHO's - wire holding objects - Gudebrod Bros. Silk Co., Inc.
Widebeta - radioactivity detection sys. - Beckman Instrs., (AISSD)
Wik-It - solder remover - Wik-It Elctrns. Corp.
Wilbraz - hi-temp brazing alloys - Wilkinson Co.
Wild One - Solid State Guitar/P.A./Musical Instrument Amplifier - Wilder Engrg. Prods, Inc.
Willard - charge-retaining batteries - Wisco Div.
Winchester Relays - Reed Relays - Elctrn. Instr. & Specialty
Windjammer - motorized & belted blowers - Ametek/Lamb Electric
Wirecenter - semi-automatic wiring machine - Hughes Aircraft Co.
WIRE NUT - wire connectors - Ideal Industries Inc.
Wiretemp - wire temperature sensor - Trans-Met Engrg.
Wire-Wrap - tools and machines for making solderless wrapped connections - Gardner-Denver
Woelke - wow & flutter meters - Gotham Audio Corp.
Wolverine - loudspeakers - Electro-Voice, Inc.
Wood Electric - circuit breakers - Potter & Brumfield
Wrap Rack - card packaging - Scanbe Canoga Industries
Wrap-X - logic card with 16-14 or 16 pin 1c sockets - Datascan Div.
Wrarost - Terminals for wire wrapping - Auto-Swage Products Inc.
Wrinlay Process - markings for elect. panels - Photo Chemical Prods. Cal.
Write-On-It - labeling tape - Labelon Corp.
Wybar - component lead forming - Eraser Co.

X

XacTemp - pyrometers - Gordon, Claud S. Co.
XacTgland - adjustable T/C comp. fittings - Gordon, Claud S. Co.
XacThead - thermocouple heads - Gordon, Claud S. Co.
XacTlok - thermocouple comp. fitting - Gordon, Claud S. Co.
XacTohm - resistance temperature sensors - Gordon, Claud S. Co.
XacTpak - thermocouple assemblies - Gordon, Claud S. Co.
XacTseal - sealant for thermocouple wire ends - Gordon, Claud S. Co.
XCITE - hydraulic excitation equipment - Zonic Technical Labs.
X-Citers - magnetic tape head - Michigan Magnetics
"Xela" - knives - Klein, Mathias & Sons, Inc.
Xenolite - arc lamp sys - Christie Elec.
XL - bench & portable scales - Howe Richardson Scale Co.
X-L - power supply - Transistor Devices
XLS - soldering pencils - Wall-Lenk Mfg. Co.
XL-TC - power and control cable - Brand-Rex Co.
X-Olene - cross linked polyethylene cable - Okonite Co.
X Series - exit auxiliary lights - Teledyne Big Beam
Xtradur - soldering tips - Hexacon Elec. Co.
X-Var - paint strippers - Fidelity Chem. Prods. Corp.

Y

Yellow Handle - crimping tools - Amp Inc.
YELLOW 77 - wire pulling lubricant - Ideal Industries Inc.
YEW - measuring instruments - Yewtec Corporation
Yewtec - measuring instruments - Yewtec Corporation
Young World - toys - Midland International Corp.

Z

"Z" Amp - zener current source - General Resistance, Inc.
Zero Amp - mixing amplifier - Spectra Sonics
Zero Centurion - Carrying Cases - Zero Mfg. Co.
Zero-Flow - multilayer dielectric ink - Engelhard Minerals & Chem.
ZERO-HALLIBURTON - Aluminum Luggage & Camera Cases - Zero Mfg. Co.
Zeromatic - ph measuring instrs. - Beckman Instrs., (AISSD)
ZERO-PLY - Sandwich Construction Modular Cases - Zero Mfg. Co.
Zero Quip - Work Stations - Zero Mfg. Co.
ZERO-SPACE SERIES - Aluminum Cabinets & Consoles - Zero Mfg. Co.
ZERO-TRAK - Steel Chassis Slides - Zero Mfg. Co.
Zestron - reed relays - COSAR Corp.
ZIP DIP - zero insertion pressure dip skt - Textool Products, Inc.
Zipex - cable shielding - Cal-Metex Corp.
Zip-In - shelving, bins - Equipto
Zip-Loc - stressed panel fastener - Deutsch Fastener Corp.
Zippertubing - zip-on jacketing - Zippertubing Co.
Zip R Processor - processing equip. for metalphoto R - Metalphoto Corp.
ZIP Sys. - automated circuit test sys. - Automation Dynamics
ZipTape - marking systems - Zippertubing Co.
Z-Match - microwave comps. - Vari-L Co.
Z-Match - wide band transformers, mixers, frequency doublers - Vari-L Co.
Z-Trol - x-ray gage thickness control - Electron-Machine Corp.
"Z" Volt - zener voltage reference - General Resistance, Inc.

Last Page of this Section.

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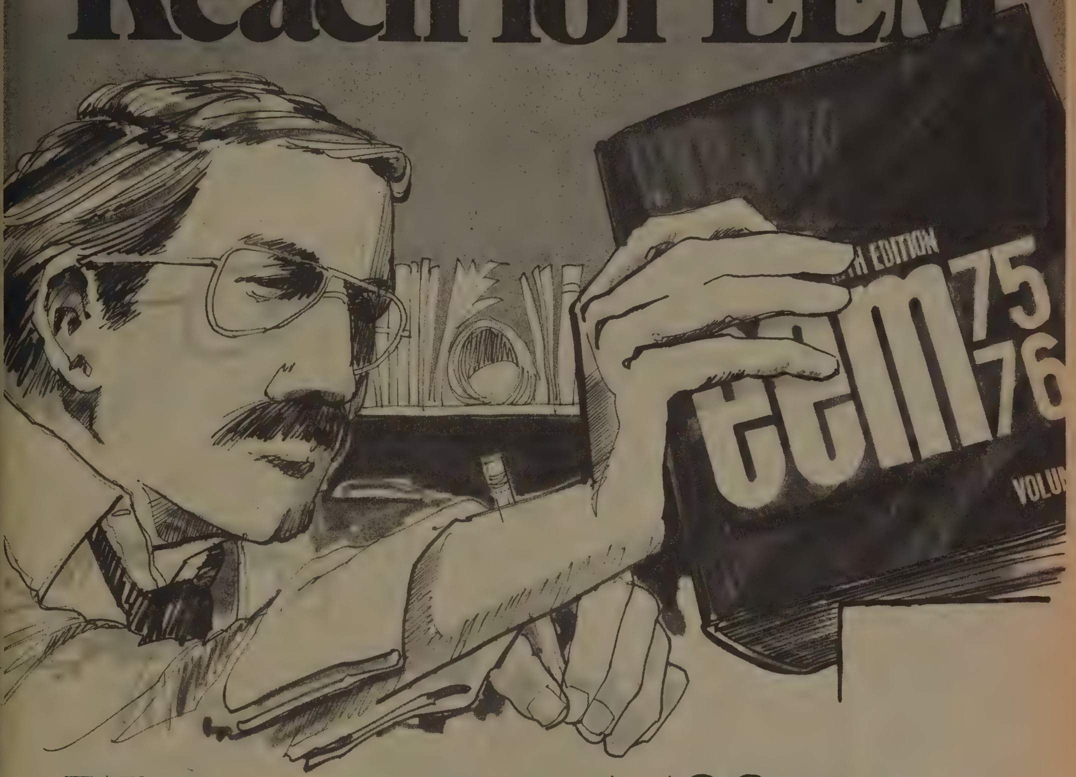

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VOLUME 2

PASSIVE COMPONENTS / SWITCHES / MATERIALS / HARDWARE / DISPLAYS / WIRE & CABLE / DISTRIBUTOR DIRECTORY

2•2 Capacitors (all types)
2•338 Chemicals / Cleaners / Coatings / Materials
2•345 Circuit Boards & Assemblies / Breadboarding Kits
2•368 Coil & Choke Assemblies & Forms
2•444 Connectors, Terminals, Sockets
2•1075 Panel Components (excluding Lighting & Displays)
2•1121 Displays & Readouts (including Lamps & Lights)
2•1210 Mechanical Components (Bearings, Cores, Magnets, etc.)
2•1258 Hardware (Non-Current Carrying)
2•1268 Insulators / Insulation
2•1276 Microwave Components & Accessories
2•1408 Resistors, Fixed
2•1584 Resistors, Variable
2•1693 Tools (Hand & Power) / Soldering Supplies
2•1720 Transformers
2•1835 Wire / Cable / Harnesses & Accessories

VOLUME 1

INSTRUMENTATION & SYSTEMS / POWER SOURCES / SUBASSEMBLIES / SEMICONDUCTORS / RELAYS / CONTROLS

1•2 Amplifier Assemblies
1•14 Audio Equipment & Accessories
1•44 Enclosures / Packaging Systems
1•110 Communications / Telemetering Equipment
1•127 Computing, Data Handling Equipment & Accessories
1•228 Control Systems & Components
1•279 Crystals / Oscillators / Crystal Filters
1•422 Delay Lines
1•468 Environmental Test Equipment
1•472 Fans / Blowers / Cooling Equipment
1•525 Filters (excluding Crystal)
1•601 Instruments, Measuring & Test
1•863 Instruments, Graphic Recording
1•880 Integrated Circuits & Hybrids
1•901 Microwave Systems & Subsystems
1•929 Motors & Drives
1•1006 Electro-Optical Components & Accessories
1•1026 Power Sources (including Batteries)
1•1540 Production Equipment / Manufacturing Services
1•1547 Relays & Solenoids
1•1837 Semiconductors
1•1910 Servomechanisms
1•1926 Switches / Protective Components
1•2308 Thermo-Electric Components
1•2330 Transducers
1•2350 Tubes & Tube Parts

AVX: The Insiders.

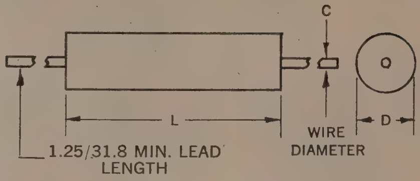
GlasGuard™

Glass Cased Axial Lead Capacitors

Style	L Max.	Dia. Max.	Wire Dia. Nom.
GC09	.170/4.30	.065/1.60	.020/.501*
GC10	.170/4.30	.100/2.54	.020/.501*
GC70	.260/6.55	.100/2.54	.020/.501*

Dimensions: Inches/Millimeters

* Alternate .025/.634 available



Temperature Characteristics

	CHAR. A	CHAR. B	CHAR. C	CHAR. E
Operating Temperature Range	−55°C to +125°C	−55°C to +125°C	−55°C to +125°C	−55°C to +85°C
Capacitance Change	0 ±30 ppm	±7½%	±15%	+22 — 56% +10°C to +85°C
EIA Characteristic	COG (NPO)	X7F	X7R	Z5U
Capacity Range	1 to 2,200 pf	10 to 10,000 pf	470 to 68,000 pf	470 to 120,000 pf
Capacity Tolerances	5%, 10%	±5%, 10%	±10%, 20%	±20%, +80% −20%
Dissipation Factor Initial	.1%	1.0%	2.5%	3.0%
Dissipation Factor Post Test	.2%	1.5%	3.0%	4.0%
Insulation Resistance Initial @ 25°C	100,000 megohms or 1,000 megs x mfd.	100,000 megohms or 1,000 megs x mfd.	100,000 megohms or 1,000 megs x mfd.	10,000 megs or 1,000 megs x mfd.
Initial @ Elevated Temperature	10,000 megs or 100 megs x mfd at 125°C.	10,000 megs or 100 megs x mfd at 125°C.	10,000 megs or 100 megs x mfd at 125°C.	1,000 megs or 10 megs x mfd at 85°C
@ 25°C After Moisture or Immersion	50,000 megs or 500 megs x mfd.	50,000 megs or 500 megs x mfd.	50,000 megs or 500 megs x mfd.	5,000 megs or 500 megs x mfd.
@ 25°C After Life	50,000 megs or 500 megs x mfd.	50,000 megs or 500 megs x mfd.	50,000 megs or 500 megs x mfd.	1,000 megs or 100 megs x mfd.
@ Elevated Temperature After Life	5,000 megs or 50 megs x mfd at 125°C.	5,000 megs or 50 megs x mfd at 125°C.	5,000 megs or 50 megs x mfd at 125°C.	N.A.
Test Conditions for Capacity and D.F. Frequency Voltage	1 — 1000 pf 1 MHz > 1000 pf 1 KHz ≤ 1.0 VRMS	1 — 100 pf 1 MHz > 100 pf 1 KHz ≤ 1.0 VRMS	1 — 100 pf 1 MHz > 100 pf 1 KHz ≤ 1.0 VRMS	1 KHz ≤ .5 VRMS
Working Voltage	200 100 50	200 100 50 25	200 100 50 25	100 50 25
Dielectric Withstanding Voltage	3X rated	3X rated	3X rated	2.5X rated

* .5 pf minimum below 10 pf

Capacitance Range in pf

	100 VDC TEMP. CHAR.				50 VDC TEMP. CHAR.				25 VDC TEMP. CHAR.		
	A	B	C	E	A	B	C	E	B	C	E
GC09	56	100	680	1800	120	390	2700	5600	—	—	.01
GC10	470	470	3300	6800	820	1800	.012 MF	.018 MF	3300	.022 MF	.033 MF
GC70	1200	1200	.01 MF	.018 MF	2200	4700	.047 MF	.056 MF	.01 MF	.068 MF	.12 MF

AVAILABLE CAPACITANCE TOLERANCES

D = ±.5 pf
J = ±5%
K = ±10%
M = ±20%
Z = +80 −20%

How to Order

GC70 1 C 10 3 K

K — Capacitance Tolerance Code
3 — Multiplier (Number of Zeros)
10 — Significant Figures of Capacitance Characteristic
C — Temperature Characteristic
1 — Voltage: 6 = 200 V; 1 = 100 V; 5 = 50 V; 2 = 25V
GC70 — Style

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AVX: The Insiders.

AVX CERALAM® CHIPS

Ceralam Chips Type ULA 25 - 50 - 100 Volt

Additional Specifications and Ordering Information on the following page.

Temperature Characteristics

	CHAR. A	CHAR. B	CHAR. C	CHAR. E
Operating Temperature Range	−55°C to +125°C	−55°C to +125°C	−55°C to +125°C	−55°C to +85°C
Capacitance Change	0 ±30 ppm	±7½%	±15%	+22 −56% +10°C to +85°C
EIA Characteristic	COG (NPO)	X7F	X7R	Z5U
Capacity Range	1 pf to 22,000	10 pf to 0.1 mfd	10 pf to .56 mfd	56 pf to .58 mfd
Capacity Tolerances	±1%*, 2%, 5%, 10%	±5%, 10%	±10%, 20%	±20%, $^{+80\%}_{-20\%}$
Dissipation Factor Initial	.1%	1.0%	2.5%	3.0%
Dissipation Factor Post Test	.2%	1.5%	3.0%	4.0%
Insulation Resistance Initial @ 25°C	100,000 megohms or 1,000 megs x mfd.	100,000 megohms or 1,000 megs x mfd.	100,000 megohms or 1,000 megs x mfd.	10,000 megs or 1,000 megs x mfd.
Initial @ Elevated Temperature	10,000 megs or 100 megs x mfd at 125°C.	10,000 megs or 100 megs x mfd at 125°C.	10,000 megs or 100 megs x mfd at 125°C.	1,000 megs or 10 megs x mfd at 85°C.
@ 25°C After Moisture or Immersion	30,000 megs or 300 megs x mfd.	30,000 megs or 300 megs x mfd.	30,000 megs or 300 megs x mfd.	3,000 megs or 300 megs x mfd.
@ 25°C After Life	30,000 megs or 300 megs x mfd.	30,000 megs or 300 megs x mfd.	30,000 megs or 300 megs x mfd.	1000 megs or 100 megs x mfd.
@ Elevated Temperature After Life	3,000 megs or 30 megs x mfd.	3,000 megs or 30 megs x mfd.	3,000 megs or 30 megs x mfd.	N.A.
Test Conditions for Capacity and D.F. Frequency Voltage	1 — 1000 pf 1 MHz‡ > 1000 pf 1 KHz 1.0 ±.2 VAC	1 — 100 pf 1 MHz > 100 pf 1 KHz 1.0 ±.2 VAC	1 — 100 pf 1 MHz > 100 pf 1 KHz 1.0 ±.2 VAC	1 KHz < .5 VAC
Working Voltage	200 100 50	200 100 50 25	200 100 50 25	100 50 25
Dielectric Withstanding Voltage	3X rated	3X rated	3X rated	2.5X rated

* 1% or .5 pf whichever is greater

† 1-100 pf if parts are for MIL-C-55681

Capacitance Range in pf

AVX TYPE/EIA STYLE	100 VDC TEMP. CHAR.				50 VDC TEMP. CHAR.				25 VDC TEMP. CHAR.		
	A	B	C	E	A	B	C	E	B	C	E
ULA05	1 to 270	100 to 270	680 to 1000	1800 to 4700	180 to 470	330 to 1000	2200 to 6800	5600 to .015 μF	1200 to 1800	8200 to .015 μF	.018 to .022 μF
ULA10 CC0805* CDR01	1 to 470	150 to 470	1200 to 3300	2700 to 8200	300 to 820	560 to 1800	3600 to .012 μF	.01 to .022 μF	2200 to 3300	.015 to .022 μF	.027 to .039 μF
ULA15	1 to 820	330 to 820	2000 to 5600	5600 to .015 μF	560 to 1200	1000 to 2700	6800 to .018 μF	.018 to .047 μF	3300 to 5600	.022 to .039 μF	.056 to .068 μF
ULA35	10 to 2200	1000 to 2200	6800 to .015 μF	.015 to .047 μF	1500 to 3600	2700 to 8200	.018 to .056 μF	.056 to .15 μF	.01 to .018 μF	.008 to .12 μF	.12 to .22 μF
ULA50	820 to 4700	1800 to 4700	.015 to .033 μF	.033 to .1 μF	3300 to 8200	2600 to .018 μF	.039 to .12 μF	.12 to .27 μF	.022 to .033 μF	.15 to .27 μF	.33 to .39 μF
ULA75	220 to 1500	560 to 1500	4700 to .012 μF	.01 to .027 μF	1000 to 2200	1800 to 5600	.015 to .039 μF	.033 to .082 μF	6800 to .010 μF	.047 to .082 μF	.10 to .12 μF
ULA55 CDR04	820 to 5000	2200 to 5600	.015 to .039 μF	.039 to .10 μF	4700 to 9100	6800 to .018 μF	.047 to .15 μF	.047 to .33 μF	.022 to .039 μF	.020 to .27 μF	.39 to .47 μF
ULA65 CDR05	1800 to .012 μF	8200 to .012 μF	.033 to .082 μF	.082 to .22 μF	.8220 to .018 μF	.015 to .047 μF	.1 to .33 μF	.27 to .68 μF	.056 to .1 μF	.056 to .68 μF	.82 to 1.0 μF
ULA70 CC1805 CDR02	270 to 1500	680 to 1500	4700 to .012 μF	.012 to .033 μF	1200 to 2700	1800 to 5600	.015 to .047 μF	.039 to .1 μF	1800 to .012 μF	.056 to .082 μF	.12 to .15 μF
ULA78 CC1808 CDR03	470 to 3300	1200 to 3300	.01 to .022 μF	.027 to .056 μF	2200 to 5600	4700 to .012 μF	.018 to .1 μF	.068 to .18 μF	.015 to .022 μF	.1 to .18 μF	.22 to .27 μF
ULA68	1800 to .01 μF	4700 to .01 μF	.033 to .082 μF	.068 to 0.22 μF	6800 to .018 μF	.012 to .039 μF	.1 to .27 μF	0.27 to .68 μF	.047 to .082 μF	.33 to 0.56 μF	.82 to 1.0 μF
ULA60 CC2225(1) CDR06(2)	2200 to .012 μF	5600 to .012 μF	.039 to .1 μF	.1 to .27 μF	.012 to .002 μF	.015 to .047 μF	.12 to .33 μF	.33 to .82 μF	.056 to .1 μF	.39 to .68 μF	1.0 to 1.2 μF

(1) EIA-RS198 designation (2) MIL-C-55681 designation

THESE PRODUCTS AVAILABLE FROM AVX CERAMICS FRANCHISED DISTRIBUTORS

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Continued from preceding page.

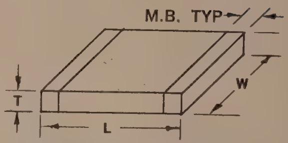
AVX CERALAM® CHIPS

Ceralam Chips Type ULA 25 - 50 - 100 Volt

Dimensions Ceralam Chips

AVX Type	L Max.	L Min.	W Max.	W Min.	T Max.	T Min.	M.B. Max.	M.B. Min.	Styles EIA-RS198 MIL-C-55681
ULA05	.060 1.52	.040 1.01	.060 1.52	.040 1.01	.050 1.27	.020 0.50	.012 .30	.003 .08	
ULA10	.090 2.28	.070 1.77	.060 1.52	.040 1.01	.050 1.27	.020 0.50	0.25 .63	.005 .13	CC 0805 CDR 01
ULA15	.105 2.66	.085 2.15	.060 1.52	.040 1.01	.060 1.52	.020 0.50	.030 .76	.010 .25	CC 1005
ULA35	.135 3.42	.115 2.92	.110 2.79	.090 2.28	.060 1.52	.020 0.50	.030 .76	.010 .25	CC 1210
ULA50	.150 3.81	.130 3.30	.180 4.57	.160 4.06	.060 1.52	.020 0.50	.030 .76	.010 .25	
ULA75	.160 4.06	.140 3.55	.060 1.52	.040 1.01	.060 1.52	.020 0.50	.030 .76	.010 .25	
ULA55	.185 4.69	.165 4.19	.135 3.42	.115 2.92	.060 1.52	.020 0.50	.030 .76	.010 .25	CC 1812 CDR 04
ULA65	.195 4.95	.175 4.44	.260 6.60	.240 6.09	.060 1.52	.020 0.50	.030 .76	.010 .25	CDR 05
ULA70	.195 4.95	.165 4.19	.060 1.52	.040 1.01	.060 1.52	.020 0.50	.030 .76	.010 .25	CC 1805 CDR 2
ULA78	.195 4.95	.165 4.19	.090 2.28	.070 1.77	.060 1.52	.020 0.50	.030 .76	.010 .25	CC 1808 CDR 03
ULA68	.235 5.97	.215 5.46	.220 5.59	.200 5.08	.060 1.52	.020 .050	.030 .76	.010 .25	
ULA60	.235 6.09	.210 5.33	.260 6.60	.235 6.09	.060 1.52	.020 0.50	.030 .76	.010 .25	CC 2225 CDR 06

Dimensions: Inches/Millimeters



Add .005/.127 to chart for solder coated lands

VOLTAGE

6 = 200 V
1 = 100 V
5 = 50 V
2 = 25 V

101 = 100 pf - third digit signifies number of zeros. Values below 10 pf use "R" in place of decimal point (5R6 = 5.6 pf).

AVAILABLE CAPACITANCE TOLERANCES

C = ±.25 pf
D = ±.5 pf
F = ±1%
G = ±2%
H = ±3%
J = ±5%
K = ±10%
M = ±20%
Z = +80 −20%

AVAILABLE TERMINATIONS

1. Palladium Silver
2. Palladium Silver Solder Alloy 62-36-2
3. Nickel Barrier-Solder Alloy (Double Solder Guard)
4. Gold — consult plant for availability
5. Silver Term
6. ————————
7. NiGuard®-Silver, Nickel, Gold Plated, Std. AVX Term
8. NiGuard®-Solder Alloy 62-36-2

Also available with ribbon or wire leads with or without epoxy skim coating. Consult factory for details.
NiGuard will be furnished unless specified otherwise.
Dimensions shown include NiGuard Lands.
Add .005 for solder coated lands.

How to Order

ULA15 5 A 10 1 K 7

7 — Termination
K — Capacitance Tolerance Code
1 — Multiplier (Number of Zeros)
10 — Significant Figures of Capacitance Characteristic
A — Temperature Characteristic
5 — Voltage
ULA15 — Style

THESE PRODUCTS AVAILABLE FROM AVX CERAMICS FRANCHISED DISTRIBUTORS

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Additional Specifications
and Ordering Information
on the following page.

SKY CAPS®

Sky Cap® Type 3400 — Dipped Monolithic

Temperature Characteristics

	CHAR. A	CHAR. B	CHAR. C	CHAR. E
Operating Temperature Range	−55°C to +125°C	−55°C to +125°C	−55°C to +125°C	−55°C to +85°C
Capacitance Change	0 ±30 ppm	±7½%	±15%	+22 −56% +10°C to +85°C
EIA Characteristic	COG (NPO)	X7F	X7R	Z5U
Capacity Range	1.8 to 47,000 pf	10 to 330,000 pf	56 pf to 33 mfd	56 pf to 6.8 mfd
Capacity Tolerances	±1%*, 2%, 5%, 10%	±5%, 10%	±10%, 20%	±20%, +80% −20%
Dissipation Factor Initial	.1%	1.0%	2.5%	3.0%
Dissipation Factor Post Test	.2%	1.5%	3.0%	4.0%
Insulation Resistance Initial @ 25°C	100,000 megohms or 1,000 megs x mfd.	100,000 megohms or 1,000 megs x mfd.	100,000 megohms or 1,000 megs x mfd.	10,000 megs or 1,000 megs x mfd.
Initial @ Elevated Temperature	10,000 megs or 100 megs x mfd at 125°C.	10,000 megs or 100 megs x mfd at 125°C.	10,000 megs or 100 megs x mfd at 125°C.	1,000 megs or 10 megs x mfd at 85°C.
@ 25°C After Moisture or Immersion	50,000 megs or 500 megs x mfd.	30,000 megs or 300 megs x mfd.	30,000 megs or 300 megs x mfd.	3,000 megs or 300 megs x mfd.
@ 25°C After Life	50,000 megs or 500 megs x mfd.	30,000 megs or 300 megs x mfd.	30,000 megs or 300 megs x mfd.	1000 megs or 100 megs x mfd.
@ Elevated Temperature After Life	5,000 megs or 50 megs x mfd at 125°	3,000 megs or 30 megs x mfd.	3,000 megs or 30 megs x mfd.	N.A.
Test Conditions for Capacity and D.F. **Frequency** **Voltage**	1 — 1000 pf 1 MHz† > 1000 pf 1 KHz 1.0 ±.2 VAC	1 — 100 pf 1 MHz > 100 pf 1 KHz 1.0 ±.2 VAC	1 — 100 pf 1 MHz > 100 pf 1 KHz 1.0 ±.2 VAC	1 KHz < .5 VAC
Working Voltage	200 100 50	200 100 50 25	200 100 50 25	100 50 25
Dielectric Withstanding Voltage	3X rated	3X rated	3X rated	2.5X rated
Solder Temperature	> 500°F	> 500°F	> 500°F	> 500°F

* 1% or .5 pf whichever is greater
† 1-100 pf if parts are for MIL-C-11015

Capacitance Range in pf

	CHAR. A		CHAR. B		CHAR. C		CHAR. E	
	100 V	50 V	50 V	50 V	50 V	25 V	50 V	25 V
3417	2.2-12	2.2-12	10-50	10-50	50-380	50-380	56-2000	56-2000
3418	68-170	170-300	250-1200	1200-1700	7200-13,000	13,000-17,000	12,000-24,000	24,000-36,000
3419 3429	360-1700	1700-3300	10,000-17,000	17,000-24,000	68,000-110,000	110,000-170,000	120,000-175,000	175,000-350,000
3424	2000-3900	3900-9200	30,000-33,000	33,000-72,000	200,000-510,000	510,000-720,000	300,000-1.0 mfd	1.0 mfd-1.7 mfd
3420 3430	2200-5100	5100-10,000	33,000-50,000	50,000-68,000	300,000-720,000	720,000-1.2 mfd	500,000-1.2 mfd	1.2 mfd-2.2 mfd
3421 3431	6800-10,000	10,000-30,000	68,000-110,000	110,000-200,000	500,000-1.2 mfd	1.2 mfd-1.7 mfd	1.2 mfd-3.0 mfd	2.7 mfd-3.6 mfd
3422 3432	16,000-30,000	30,000-50,000	170,000-220,000	220,000-340,000	680,000-2.2 mfd	2.2 mfd-4.0 mfd	2.2 mfd-5.0 mfd	5.0 mfd-6.8 mfd

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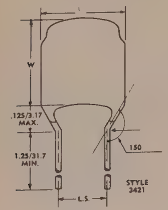
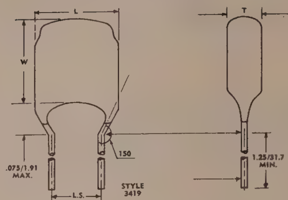
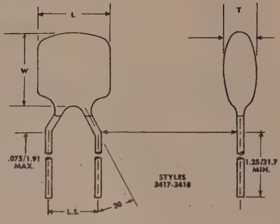
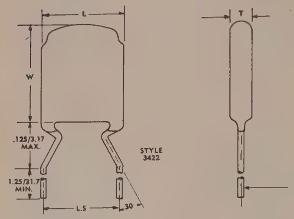
Continued from
preceding page.

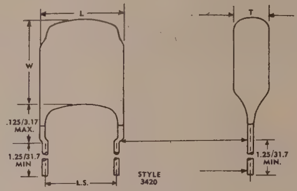
SKY CAPS®

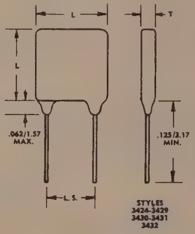

L
W
T
.125/3.17 MAX.
1.25/31.7 MIN.
150
STYLE 3421
L.S.


L
W
T
.075/1.91 MAX.
150
STYLE 3419
1.25/31.7 MIN.
L.S.


L
W
T
.075/1.91 MAX.
STYLES 3417-3418
1.25/31.7 MIN.
L.S.
30


L
W
T
.125/3.17 MAX.
STYLE 3422
1.25/31.7 MIN.
L.S
30


L
W
T
.125/3.17 MAX.
1.25/31.7 MIN
STYLE 3420
1.25/31.7 MIN.
L.S.


L
T
.062/1.57 MAX.
.125/3.17 MIN.
L.S.
STYLES 3424-3429 3430-3431 3432

Dimensions

Part Number	L Max.	W Max.	T Max.	L.S. ±.030	AWG No.
3417	.100/2.54	.100/2.54	.100/2.54	.100/2.54	24
3418	.150/3.81	.150/3.81	.100/2.54	.100/2.54	24
3419*	.200/5.08	.200/5.08	.125/3.18	.100/2.54	24
3420	.300/7.62	.300/7.62	.150/3.81	.200/5.08	24
3421	.400/10.16	.400/10.16	.150/13.81	.200/5.08	24
3422	.500/12.70	.500/12.70	.200/5.08	.400/10.16	22
3424	.390/9.91	.202/5.13	.150/3.81	.250/6.35	24
3429	.200/5.08	.200/5.08	.125/3.18	.100/2.54	24
3430	.300/7.62	.300/7.62	.150/3.81	.200/5.08	24
3431	.400/10.16	.400/10.16	.150/3.81	.200/5.08	24
3432	.500/12.7	.500/12.7	.200/5.08	.400/10.16	22

Consult factory for variations in lead spacing and lead gauge
* 3439 identical to 3419 except for .200 lead spacing

Dimensions: Inches/Millimeters

Military Equivalents

Military Specifications	3417	3418	3419	3439	3420	3421	3422
MIL-C-20	CC13 CCR13	CC14 CCR14	— —	CC15 CCR15	CC16 CCR16	CC17 CCR17	CC18 CCR18
MIL-C-11015	CK50	CK51	CK52	—	CK53	CK54	CK55

How to Order

3420 050 E 10 4 Z

- Z — Capacitance Tolerance Code
- 4 — Multiplier (Number of Zeros)
- 10 — Significant Figures of Capacitance Characteristic
- E — Temperature Characteristic
- 050 — Voltage (in Volts)
- 3420 — Style

THESE PRODUCTS AVAILABLE FROM AVX CERAMICS FRANCHISED DISTRIBUTORS

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Additional Specifications
and Ordering Information
on the following page.

CERALAM® MOLDED RADIAL LEAD CAPACITORS

Type MC — Six Sizes, Four Voltages, Four Temperature Characteristics

Temperature Characteristics

	CHAR. A	CHAR. B	CHAR. C	CHAR. E
Operating Temperature Range	−55°C to +125°C	−55°C to +125°C	−55°C to +125°C	−55°C to +85°C
Capacitance Change	0 ±30 ppm	±7½%	±15%	+22 −56% +10°C to +85°C
EIA Characteristic	COG (NPO)	X7F	X7R	Z5U
Capacity Range	1.0 to 220,000	8.2 to 1.0 mfd	56 to 5 mfd	56 pf to 10 mfd
Capacity Tolerances	±1%*, 2%, 5%, 10%	±5%, 10%	±10%, 20%	±20%, +80% −20%
Dissipation Factor Initial Max.	.1%	1.0%	2.5%	3.0%
Dissipation Factor Post Test Max.	.2%	1.5%	3.0%	4.0%
Insulation Resistance Initial @ 25°C	100,000 megohms or 1,000 megs x mfd.	100,000 megohms or 1,000 megs x mfd.	100,000 megohms or 1,000 megs x mfd.	10,000 megs or 1,000 megs x mfd.
Initial @ Elevated Temperature	10,000 megs or 100 megs x mfd at 125°C.	10,000 megs or 100 megs x mfd at 125°C.	10,000 megs or 100 megs x mfd at 125°C.	1,000 megs or 10 megs x mfd at 85°C.
@ 25°C After Moisture or Immersion	50,000 megs or 500 megs x mfd.	50,000 megs or 500 megs x mfd.	50,000 megs or 500 megs x mfd.	5,000 megs or 500 megs x mfd.
@ 25°C After Life	50,000 megs or 500 megs x mfd.	50,000 megs or 500 megs x mfd.	50,000 megs or 500 megs x mfd.	1000 megs or 100 megs x mfd.
@ Elevated Temperature After Life	5,000 megs or 50 megs x mfd at 125°	5,000 megs or 50 megs x mfd at 125°	5,000 megs or 50 megs x mfd at 125°	N.A.
Test Conditions for Capacity and D.F. Frequency Voltage	1 — 1000 pf 1 MHz† > 1000 pf 1 KHz 1.0 ±.2 VAC	1 — 100 pf 1 MHz > 100 pf 1 KHz 1.0 ±.2 VAC	1 — 100 pf 1 MHz > 100 pf 1 KHz 1.0 ±.2 VAC	1 KHz < .5 VAC
Working Voltage	200 100 50	200 100 50 25	200 100 50 25	100 50 25
Dielectric Withstanding Voltage	3X rated	3X rated	3X rated	2.5X rated
Solder Temperature	> 500°F	> 500°F	> 500°F	> 500°F

* 1% or .5 pf whichever is greater

† 1-100 pf if parts are for MIL-C-11015 or MIL-C-39014

Dimensions

	Length		Width		Thickness		Lead Spacing		Lead Dia.		Military Styles MIL-C		
	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	11015	39014	20
MC35 (Fig. 2)	.170 4.32	.150 3.81	.130 3.30	.110 2.79	.070 1.78	.050 1.27	.130 3.30	.100 2.54	.018 .456	.014 3.56	N.A.	N.A.	N.A.
MC50 (Fig. 1)	.200 5.08	.180 4.57	.200 5.08	.180 4.57	.100 2.54	.080 2.03	.215 5.46	.185 4.70	.027 .686	.023 .584	CK05	CKR05	CC05 CCR05 CC09* CCR09*
MC60 (Fig. 2)	.300 7.62	.280 7.11	.300 7.62	.280 7.11	.100 2.54	.080 2.03	.215 5.46	.185 4.70	.027 .686	.023 .584	CK06	CKR06	CC06 CCR06
MC98 (Fig. 2)	.300 7.62	.280 7.11	.300 7.62	.280 7.11	.160 4.06	.140 3.56	.215 5.46	.185 4.70	.027 .686	.023 .584	N.A.	N.A.	N.A.
MC95 (Fig. 2)	.510 12.95	.490 12.45	.510 12.95	.490 12.45	.160 4.06	.140 3.56	.430 10.92	.370 9.40	.027 .686	.023 .584	N.A.	N.A.	CC07 CCR07
MC96 (Fig.)2	.510 12.95	.490 12.45	.510 12.95	.490 12.45	.260 6.60	.240 6.10	.430 10.92	.370 9.40	.027 .686	.023 .584	N.A.	N.A.	CC08 CCR08
SC60 (Fig. 2)	.300 7.62	.280 7.11	.300 7.62	.280 7.11	.150 2.54	.080 2.03	.215 5.46	.185 4.70	.027 .686	.023 .584	CK06	CKR06 CKR08	N.A.

* MC54 identical to MC50 except 0.1″ L.S.

Dimensions: Inches/Millimeters

THESE PRODUCTS AVAILABLE FROM AVX CERAMICS FRANCHISED DISTRIBUTORS

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Continued from preceding page.

CERALAM® MOLDED RADIAL LEAD CAPACITORS

Type MC — Six Sizes, Four Voltages, Four Temperature Characteristics

Capacitance Range in pf

	100 VDC: Temp. Char.				50 VDC: Temp. Char.				25 Volts		
	A	B	C	E	A	B	C	E	B	C	E
MC35	560	560	3900	.01	910	2200	.015	.033	3900	.027	.047
MC50	3900	3900	.02	.068	6800	.015	.15	.22	.027	.18	.33
MC60	.01	.01	.12	.18	.018	.039	.47	.68	.068	.68	1.0
MC98	.018	.018	.15	.39	.033	.082	.68	1.2	.15	1.0	1.8
MC95	.082	.082	.56	1.5	.12	.27	1.8	4.7	.56	3.9	6.8
MC96	.12	.12	1.0	2.2	.22	.47	.33	.68	1.0	6.8	10.0

AVAILABLE CAPACITANCE TOLERANCES

C = ±.25 pf	G = ±2%	K = ±10%
D = ±.5 pf	H = ±3%	M = ±20%
F = ±1%	J = ±5%	Z = +80 −20%

How to Order

MC50 1 C 10 3 K

- K — Capacitance Tolerance Code
- 3 — Multiplier (number of zeros)
- 10 — Significant Figures Capacitance Characteristic
- C — Temperature Characteristic
- 1 — Voltage: 6 = 200 V; 1 = 100 V; 5 = 50 V; 2 = 25 V
- MC50 — Style

NEW! CERASEAL® TYPE SC 50 VDC

All Ceramic Case Monolithic Construction, Maximum Radiation Resistance, MIL-C-11015D Performance, Oxygen Free Copper Leads per MIL STD 1276 Type C, Thin Epoxy Overcoat

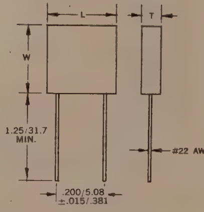
Temperature Characteristics

	CHAR. C
Operating Temperature Range	−55°C to +125°C
Capacitance Change	±15%
EIA Characteristic	X7R
Capacity Range	.47 mfd to 2.0 mfd
Capacity Tolerances	10%, 20%
Dissipation Factor Initial	2.5%
Dissipation Factor Post Test	3.0%
Insulation Resistance Initial @ 25°C Initial @ Elevated Temperature @ 25°C After Moisture or Immersion @ 25°C After Life @ Elevated Temperature After Life	 100,000 megohms or 1,000 megs x mfd. 10,000 megs or 100 megs x mfd at 125°C. 50,000 megs or 500 megs x mfd. 50,000 megs or 500 megs x mfd. 5,000 megs or 50 megs x mfd at 125°C.
Test Conditions for Capacity and D.F. Frequency Voltage	 1 KHz 1.0 ±.2 VAC
Working Voltage	200 100 50 25
Dielectric Withstanding Voltage	3X rated
Solder Temperature	> 500°F

Capacity (MF)	AVX Part No.	Dimensions L (±.010) .254	W (±.010) .254	T (Max.)
.47	SC605C474*	.290/7.37	.290/7.37	.100/2.54
.56	SC605C564*	.290/7.37	.290/7.37	.100/2.54
.68	SC605C684*	.290/7.37	.290/7.37	.100/2.54
.82	SC605C824*	.290/7.37	.290/7.37	.100/2.54
1.0	SC605C105*	.290/7.37	.290/7.37	.100/2.54
1.2	SC605C125*	.290/7.37	.290/7.37	.150/3.81
1.5	SC605C155*	.290/7.37	.290/7.37	.150/3.81
1.8	SC605C185*	.290/7.37	.290/7.37	.150/3.81
2.0	SC605C205*	.290/7.37	.290/7.37	.150/3.81

* Add Tolerance Letter K = ±10% or M = ±20%

Inches/Millimeters



CKR08 PER MIL-C-39014

AVX Ceraseal Capacitors From 1.2 to 2.0 MFD

Type Designation	Failure Rate Level (%/1,000 Hours) 2.0(L)	1.0(M)	0.1(P)	0.01(R)	0.01(S)	Capacitance pf	Capacitance Tolerance ± Percent	Rated DC Voltage Volts
CKR08BX125K-	0001	0004	0007	0010	0013	1,200,000	10	50
CKR08BX155K-	0002	0005	0008	0011	0014	1,500,000	10	50
CKR08BX205K-	0003	0006	0009	0012	0015	2,000,000	10	50

How to Order

SC60 5 C 20 5 K

- K — Capacitance Tolerance Code K = ±10%; M = ±20%
- 5 — Multiplier (Number of Zeros)
- 20 — Significant Figures of Capacitance Characteristic
- C — Temperature Characteristic C
- 5 — Voltage: 5 = 50 V
- SC60 — Style

THESE PRODUCTS AVAILABLE FROM AVX CERAMICS FRANCHISED DISTRIBUTORS

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AVX: The Insiders.

Additional Specifications and Ordering Information on the following page.

CERALAM® MILITARY TYPE

CK05-CK06 CKR05-CKR06-CKR08

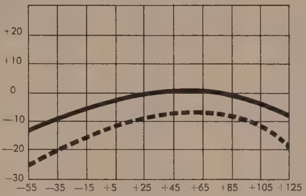
To MIL-C-11015D To MIL-C-39014B

Transfer Molded Case, Oxygen Free Copper Leads
MIL-STD. 1276 Type C, 50 - 100 - 200 Volt Ratings

Specifications

Capacity Range	10 pf to 2.0 Mfd
Capacity Tolerances	±10% and ±20%
Dissipation Factor	2.5% Max.
Insulation Resistance	100,000 Megohms Min. or 1,000 Meg-Mfd, whichever is less
Working Voltage	50, 100 or 200 VDC
Flash Test Voltage	2.5 Times Rated VDC
Temperature Characteristics	BX, ±15% ΔC, −55 to +125°C No Bias Voltage. +15 −25% ΔC, −55 to +125°C with Rated Voltage

Typical BX Voltage Temperature Limits



FAILURE RATE — LEVEL-PERCENT/1000 HOURS

L = 2.0%
M = 1.0%
P = 0.1%
R = 0.01%
S = 0.001%

Capacitance and Voltage Range Charts CK05/CK06

Capacity Value (pf)	11015 Type Designation	D.C. Volt	Capacity Value (pf)	11015 Type Designation	D.C. Volt	Capacity Value (pf)	11015 Type Designation	D.C. Volt	Capacity Value (pf)	11015 Type Designation	D.C. Volt
10	CK05BX100*	200	1200	CK05BX122†	100	1200	CK06BX122†	200	47000	CK06BX473*	100
12	CK05BX120†	200	1500	CK05BX152*	100	1500	CK06BX152*	200	56000	CK06BX563†	100
15	CK05BX150*	200	1800	CK05BX182†	100	1800	CK06BX182†	200	68000	CK06BX683*	100
18	CK05BX180†	200	2200	CK05BX222*	100	2200	CK06BX222*	200	82000	CK06BX823†	100
22	CK05BX220*	200	2700	CK05BX272†	100	2700	CK06BX272†	200	100000	CK06BX104*	100
27	CK05BX270†	200	3300	CK05BX332*	100	3300	CK06BX332*	200	120000	CK06BX124†	50
33	CK05BX330*	200	3900	CK05BX392†	100	3900	CK06BX392†	200	150000	CK06BX154*	50
39	CK05BX390†	200	4700	CK05BX472*	100	4700	CK06BX472*	200	180000	CK06BX184†	50
47	CK05BX470*	200	5600	CK05BX562†	100	5600	CK06BX562†	200	220000	CK06BX224*	50
56	CK05BX560†	200	6800	CK05BX682*	100	6800	CK06BX682*	200	270000	CK06BX274†	50
68	CK05BX680*	200	8200	CK05BX822†	100	8200	CK06BX822†	200	330000	CK06BX334*	50
82	CK05BX820†	200	10000	CK05BX103*	100	10000	CK06BX103*	200	390000	CK06BX394†	50
100	CK05BX101*	200	12000	CK05BX123†	50	12000	CK06BX123†	100	470000	CK06BX474*	50
120	CK05BX121†	200	15000	CK05BX153*	50	15000	CK06BX153*	100	560000‡	CK06BX564†	50
150	CK05BX151*	200	18000	CK05BX183†	50	18000	CK06BX183†	100	680000‡	CK06BX684*	50
180	CK05BX181†	200	22000	CK05BX223*	50	22000	CK06BX223*	100	820000‡	CK06BX824†	50
200	CK05BX221*	200	27000	CK05BX273†	50	27000	CK06BX273†	100	1.0 Mfd‡	CK06BX105*	50
270	CK05BX271†	200	33000	CK05BX333*	50	33000	CK06BX333*	100			
330	CK05BX331*	200	39000	CK05BX393†	50	39000	CK06BX393†	100			
390	CK05BX391†	200	47000	CK05BX473*	50						
470	CK05BX471*	200	56000	CK05BX563†	50						
560	CK05BX561†	200	68000	CK05BX683*	50						
680	CK05BX681*	200	82000	CK05BX823†	50						
820	CK05BX821†	200	100000	CK05BX104*	50						
1000	CK05BX102*	200									

* Add tolerance letter K = 10% or M = 20%
† Available as standard MIL part in K = 10% only
‡ Ceramic encased Ceraseal construction

Note: MIL-C-39014B has added style CKR07BX474K thru 105K which is a thicker version (.185) of CKR06.

CKR06 meets all electrical and physical specs of CKR07 and it is a thinner (.090) unit.

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Additional Specifications
and Ordering Information
on the following page.

CERALAM® MILITARY TYPE

CK05-CK06 CKR05-CKR06-CKR08

To MIL-C-11015D To MIL-C-39014B

Transfer Molded Case, Oxygen Free Copper Leads
MIL-STD. 1276 Type C, 50 - 100 - 200 Volt Ratings

MIL-C-39014 Dash Numbers

Military Type Designation	M39014/01-(Dash Number From Table)					Capacitance pf	Capacitance Tolerance ± Percent	DC Rated Voltage
	Failure Rate Level (%/1,000 Hours)							
	2.0(L)	1.0(M)	0.1(P)	0.01(R)	0.001(S)			
CKR05BX100K-	1361	1201	1241	1281	1321	10	10	200
CKR05BX100M-	1362	1202	1242	1282	1322	10	20	200
CKR05BX120K-	1363	1203	1243	1283	1323	12	10	200
CKR05BX150K-	1364	1204	1244	1284	1324	15	10	200
CKR05BX150M-	1365	1205	1245	1285	1325	15	20	200
CKR05BX180K-	1366	1206	1246	1286	1326	18	10	200
CKR05BX220K-	1367	1207	1247	1287	1327	22	10	200
CKR05BX220M-	1368	1208	1248	1288	1328	22	20	200
CKR05BX270K-	1369	1209	1249	1289	1329	27	10	200
CKR05BX330K-	1370	1210	1250	1290	1330	33	10	200
CKR05BX330M-	1371	1211	1251	1291	1331	33	20	200
CKR05BX390K-	1372	1212	1252	1292	1332	39	10	200
CKR05BX470K-	1373	1213	1253	1293	1333	47	10	200
CKR05BX470M-	1374	1214	1254	1294	1334	47	20	200
CKR05BX560K-	1375	1215	1255	1295	1335	56	10	200
CKR05BX680K-	1376	1216	1256	1296	1336	68	10	200
CKR05BX680M-	1377	1217	1257	1297	1337	68	20	200
CKR05BX820K-	1378	1218	1258	1298	1338	82	10	200
CKR05BX101K-	1379	1219	1259	1299	1339	100	10	200
CKR05BX101M-	1380	1220	1260	1300	1340	100	20	200
CKR05BX121K-	1381	1221	1261	1301	1341	120	10	200
CKR05BX151K-	1382	1222	1262	1302	1342	150	10	200
CKR05BX151M-	1383	1223	1263	1303	1343	150	20	200
CKR05BX181K-	1384	1224	1264	1304	1344	180	10	200
CKR05BX221K-	1385	1225	1265	1305	1345	220	10	200
CKR05BX221M-	1386	1226	1266	1306	1346	220	20	200
CKR05BX271K-	1387	1227	1267	1307	1347	270	10	200
CKR05BX331K-	1388	1228	1268	1308	1348	330	10	200
CKR05BX331M-	1389	1229	1269	1309	1349	330	20	200
CKR05BX391K-	1390	1230	1270	1310	1350	390	10	200
CKR05BX471K-	1391	1231	1271	1311	1351	470	10	200
CKR05BX471M-	1392	1232	1272	1312	1352	470	20	200
CKR05BX561K-	1393	1233	1273	1313	1353	560	10	200
CKR05BX681K-	1394	1234	1274	1314	1354	680	10	200
CKR05BX681M-	1395	1235	1275	1315	1355	680	20	200
CKR05BX821K-	1396	1236	1276	1316	1356	820	10	200
CKR05BX102K-	1397	1237	1277	1317	1357	1,000	20	200
CKR05BX102M-	1398	1238	1278	1318	1358	1,000	20	200
CKR05BX122K-	1399	1239	1279	1319	1359	1,200	10	100
CKR05BX152K-	1400	1240	1280	1320	1360	1,500	10	100
CKR05BX152M-	1401	1441	1481	1521	1561	1,500	20	100
CKR05BX182K-	1402	1442	1482	1522	1562	1,800	10	100
CKR05BX222K-	1403	1443	1483	1523	1563	2,200	10	100
CKR05BX222M-	1404	1444	1484	1524	1564	2,200	20	100
CKR05BX272K-	1405	1445	1485	1525	1565	2,700	10	100
CKR05BX332K-	1406	1446	1486	1526	1566	3,300	10	100
CKR05BX332M-	1407	1447	1487	1527	1567	3,300	20	100
CKR05BX392K-	1408	1448	1488	1528	1568	3,900	10	100
CKR05BX472K-	1409	1449	1489	1529	1569	4,700	10	100
CKR05BX472M-	1410	1450	1490	1530	1570	4,700	20	100
CKR05BX562K-	1411	1451	1491	1531	1571	5,600	10	100
CKR05BX682K-	1412	1452	1492	1532	1572	6,800	10	100
CKR05BX682M-	1413	1453	1493	1533	1573	6,800	20	100
CKR05BX822K-	1414	1454	1494	1534	1574	8,200	10	100
CKR05BX103K-	1415	1455	1495	1535	1575	10,000	10	100
CKR05BX103M-	1416	1456	1496	1536	1576	10,000	20	100
CKR05BX123K-	1417	1457	1497	1537	1577	12,000	10	50
CKR05BX153K-	1418	1458	1498	1538	1578	15,000	10	50
CKR05BX153M-	1419	1459	1499	1539	1579	15,000	20	50
CKR05BX183K-	1420	1460	1500	1540	1580	18,000	10	50
CKR05BX223K-	1421	1461	1501	1541	1581	22,000	10	50
CKR05BX223M-	1422	1462	1502	1542	1582	22,000	20	50
CKR05BX273K-	1423	1463	1503	1543	1583	27,000	10	50
CKR05BX333K-	1424	1464	1504	1544	1584	33,000	10	50
CKR05BX333M-	1425	1465	1505	1545	1585	33,000	20	50
CKR05BX393K-	1426	1466	1506	1546	1585	39,000	10	50
CKR05BX473K-	1427	1467	1507	1547	1587	47,000	10	50
CKR05BX473M-	1428	1468	1508	1548	1588	47,000	20	50
CKR05BX563K-	1429	1469	1509	1549	1589	56,000	10	50
CKR05BX683K-	1430	1470	1510	1550	1590	68,000	10	50
CKR05BX683M-	1431	1471	1511	1551	1591	68,000	20	50
CKR05BX823K-	1432	1472	1512	1552	1592	82,000	10	50
CKR05BX104K-	1433	1473	1513	1553	1593	100,000	10	50
CKR05BX104M-	1434	1474	1514	1554	1594	100,000	20	50

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CERALAM® MILITARY TYPE

CK05-CK06 CKR05-CKR06-CKR08

To MIL-C-11015D To MIL-C-39014B

MIL-C-39014 Dash Numbers

Military Type Designation	M39014/02-(Dash Number From Table) Failure Rate Level (%/1,000 Hours) 2.0(L)	1.0(M)	0.1(P)	0.01(R)	0.001(S)	Capacitance pf	Capacitance Tolerance ± Percent	DC Rated Voltage Volts
CKR06BX122K-	1361	1201	1241	1281	1321	1,200	10	200
CKR06BX152K-	1362	1202	1242	1282	1322	1,500	10	200
CKR06BX152M-	1363	1203	1243	1283	1323	1,500	20	200
CKR06BX182K-	1364	1204	1244	1284	1324	1,800	10	200
CKR06BX222K-	1366	1206	1246	1286	1326	2,200	10	200
CKR06BX222M-	1367	1207	1247	1287	1327	2,200	20	200
CKR06BX272K-	1368	1208	1248	1288	1328	2,700	10	200
CKR06BX332K-	1369	1209	1249	1289	1329	3,300	10	200
CKR06BX332M-	1370	1210	1250	1290	1330	3,300	20	200
CKR06BX392K-	1371	1211	1251	1291	1331	3,900	10	200
CKR06BX472K-	1372	1212	1252	1292	1322	4,700	10	200
CKR06BX472M-	1373	1213	1253	1293	1333	4,700	20	200
CKR06BX562K-	1374	1214	1254	1294	1334	5,600	10	200
CKR06BX682K-	1375	1215	1255	1295	1335	6,800	10	200
CKR06BX682M-	1376	1216	1256	1296	1336	6,800	20	200
CKR06BX822K-	1377	1217	1257	1297	1337	8,200	10	200
CKR06BX103K-	1378	1218	1258	1298	1338	10,000	10	200
CKR06BX103M-	1379	1219	1259	1299	1339	10,000	20	200
CKR06BX123K-	1380	1231	1271	1311	1351	12,000	10	100
CKR06BX153K-	1381	1220	1260	1300	1340	15,000	10	100
CKR06BX183K-	1382	1221	1261	1301	1341	18,000	10	100
CKR06BX223K-	1383	1222	1272	1302	1342	22,000	10	100
CKR06BX273K-	1384	1232	1272	1312	1352	27,000	10	100
CKR06BX333K-	1385	1223	1263	1303	1343	33,000	10	100
CKR06BX393K-	1386	1224	1264	1304	1344	39,000	10	100
CKR06BX473K-	1387	1225	1265	1305	1345	47,000	10	100
CKR06BX563K-	1388	1226	1266	1306	1346	56,000	10	100
CKR06BX683K-	1389	1227	1267	1307	1347	68,000	10	100
CKR06BX823K-	1390	1229	1269	1309	1349	82,000	10	100
CKR06BX104K-	1391	1230	1270	1310	1350	100,000	10	100
CKR06BX124K-	1392	1233	1273	1313	1353	120,000	10	50
CKR06BX154K-	1393	1234	1274	1314	1354	150,000	10	50
CKR06BX184K-	1394	1235	1275	1315	1355	180,000	10	50
CKR06BX224K-	1395	1236	1276	1316	1356	220,000	10	50
CKR06BX274K-	1396	1237	1277	1317	1357	270,000	10	50
CKR06BX334K-	1397	1238	1278	1318	1358	330,000	10	50
CKR06BX394K-	1398	1239	1279	1319	1359	390,000	10	50
CKR06BX474K-	1399	1240	1280	1320	1360	470,000	10	50
CKR06BX564K-	1400	1404	1408	1412	1416	560,000	10	50
CKR06BX684K-	1401	1405	1409	1413	1417	680,000	10	50
CKR06BX824K-	1402	1406	1410	1414	1418	820,000	10	50
CKR06BX105K-	1403	1407	1411	1415	1419	1,000,000	10	50

MIL-C-39014 CKR08 Dash Numbers

CKR08BX125K-	0001	0004	0007	0010	0013	1,200,000	10	50
CKR08BX155K-	0002	0005	0008	0011	0014	1,500,000	10	50
CKR08BX205K-	0003	0006	0009	0012	0015	2,000,000	10	50

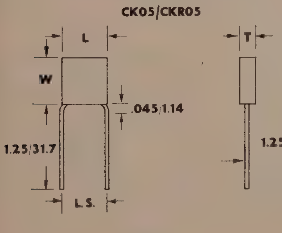

FIG. 1

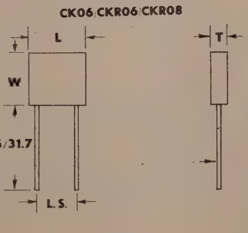

FIG. 2

	L ±.010/.250	W ±.010/.250	T ±.010/.250	L.S. ±.015/.381
CK05/CKR05	.190/4.82	.190/4.82	.090/2.29	.200/5.08
CK06/CKR06	.290/7.37	.290/7.37	.090/2.29	.200/5.08
CKR08	.290/7.37	.290/7.37	.140/3.56	.200/5.08

How to Order

MIL-C-11015 and MIL-C-20 order by Military Type Designation. MIL-C-39014 order by Part Number as listed on the following pages.

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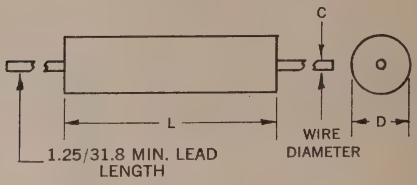
CERALAM® MOLDED AXIAL LEAD CAPACITORS

Type MC — Eight Sizes, Four Voltages, Four Temperature Characteristics



Note: Non-Conductive material shall not extend beyond .010 from end of capacitor body.

Temperature Characteristics

	CHAR. A	CHAR. B	CHAR. C	CHAR. E
Operating Temperature Range	−55°C to +125°C	−55°C to +125°C	−55°C to +125°C	−55°C to +85°C
Capacitance Change	0 ±30 ppm	±7½%	±15%	+22 −56% +10°C to +85°C
EIA Characteristic	COG (NPO)	X7F	X7R	Z5U
Capacity Range	1.0 to 220,000	10 to 1.0 mfd	56 to 6.8 mfd	56 to 10 mfd
Capacity Tolerances	±1%*, 2%, 5%, 10%	±5%, 10%	±10%. 20%	±20%, +80% −20%
Dissipation Factor Initial	.1%	1.0%	2.5%	3.0%
Dissipation Factor Post Test	.2%	1.5%	3.0%	4.0%
Insulation Resistance Initial @ 25°C Initial @ Elevated Temperature @ 25°C After Moisture or Immersion @ 25°C After Life @ Elevated Temperature After Life	100,000 megohms or 1,000 megs x mfd. 10,000 megs or 100 megs x mfd at 125°C. 50,000 megs or 500 megs x mfd. 50,000 megs or 500 megs x mfd. 5,000 megs or 50 megs x mfd at 125°C.	100,000 megohms or 1,000 megs x mfd. 10,000 megs or 100 megs x mfd at 125°C. 50,000 megs or 500 megs x mfd. 50,000 megs or 500 megs x mfd. 5,000 megs or 50 megs x mfd at 125°C.	100,000 megohms or 1,000 megs x mfd. 10,000 megs or 100 megs x mfd at 125°C. 50,000 megs or 500 megs x mfd. 50,000 megs or 500 megs x mfd. 5,000 megs or 50 megs x mfd at 125°C.	10,000 megs or 1,000 megs x mfd. 1,000 megs or 10 megs x mfd at 85°C 5,000 megs or 500 megs x mfd. 1,000 megs or 100 megs x mfd. N.A.
Test Conditions for Capacity and D.F. Frequency Voltage	1 — 1000 pf 1 MHz† > 1000 pf 1 KHz 1.0 ±.2 VAC	1 — 100 pf 1 MHz > 100 pf 1 KHz 1.0 ±.2 VAC	1 — 100 pf 1 MHz > 100 pf 1 KHz 1.0 ±.2 VAC	1 KHz < .5 VAC
Working Voltage	200 100 50	200 100 50 25	200 100 50 25	100 50 25
Dielectric Withstanding Voltage	3X rated	3X rated	3X rated	2.5X rated
Solder Temperature	> 500°F	> 500°F	> 500°F	> 500°F

* 1% or .5 pf whichever is greater
† 1-100 pf nf parts are for MIL-C-11015 or MIL-C-39014

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CERALAM® MOLDED AXIAL LEAD CAPACITORS

Dimensions

Style	Length		Dia.		Lead Dia.		Military Styles MIL-C		
	Max.	Min.	Max.	Min.	Max.	Min.	11015	39014	20
MC10	.170 4.32	.140 3.56	.100 2.54	.080 2.03	.018 .457	.014 .356	CK12	CKR11	CC75 CCR75
MC70	.260 6.60	.240 6.10	.100 2.54	.080 2.03	.027 .686	.014 .356	CK13	CKR12	CC76 CCR76
MC78	.250 6.35	.230 5.84	.140 3.56	.120 3.05	.018 .457	.014 .356			
MC20	.400 10.16	.380 9.65	.150 3.81	.130 3.38	.027 .686	.023 .584	CK14	CKR14	CC77 CCR77
MC90	.520 13.21	.480 12.19	.200 5.08	.180 4.57	.027 .686	.023 .584			
MC85	.520 13.21	.480 12.19	.265 6.73	.235 5.97	.027 .686	.023 .584	CK15	CKR15	CC78 CCR78
MC86	.710 18.03	.670 17.02	.260 6.60	.240 6.10	.027 .686	.023 .584			
MC87	.710 18.03	.670 17.02	.365 4.27	.335 8.51	.027 .686	.023 .584	CK16	CKR16	CC79 CCR79

Dimensions: Inches/Millimeters

Capacitance Range in pf

	100 VDC: Temp. Char.				50 VDC: Temp. Char.				25 Volts		
	A	B	C	E	A	B	C	E	B	C	E
MC10	560	560	4700	.01	1000	2200	.015	.033	4700	.033	.056
MC70	1200	1200	.01	.022	2200	4700	.047	.068	.01	.068	.1
MC78	4700	4700	.033	.082	8200	.015	.12	.27	.033	.22	.39
MC20	8200	8200	.10	.15	.012	.027	.27	.47	.056	.39	.68
MC90	.022	.022	.15	.39	.033	.082	.56	1.2	.15	1.2	1.8
MC85	.033	.033	.33	.56	.051	.12	1.0	2.0	.22	1.5	2.7
MC86	.047	.047	.39	.82	.082	.18	1.2	2.7	.33	2.2	3.9
MC87	.012	.12	1.0	2.2	.22	.47	3.3	6.8	1.0	6.8	10.0

How to Order

MC70 1 C 10 3 K

K — Capacitance Tolerance Code
3 — Multiplier (Number of Zeros)
10 — Significant Figures of Capacitance Characteristic
C — Temperature Characteristic
1 — Voltage: 6 = 200 V; 1 = 100 V; 5 = 50 V; 2 = 25V
MC70 — Style

AVAILABLE CAPACITANCE TOLERANCES

C = ±.25 pf
D = ±.5 pf
F = ±1%
G = ±2%
H = ±3%
J = ±5%
K = ±10%
M = ±20%
Z = +80 −20%

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AVX: The Insiders.

CERALAM® MILITARY MOLDED AXIAL CAPACITORS

Transfer Molded Cases, Oxygen Free Copper Leads
MIL-STD 1276 Type C, 50 - 100 Volt Rating

Specifications

Capacity Range	10 pf to 3.3 Mfd
Capacity Tolerance	±10% and ±20%
Dissipation Factor	2.5% Max.
Insulation Resistance	100,000 Megohms or 1000 Meg Mfd whichever is less
Working Voltage	50 or 100 VDC
Flash Test Voltage	2.5 Times Rated
Temperature Characteristic	BX ±15% ΔC −55° to +125°C No Bias Voltage BX +15 −25% ΔC −55° to +125°C With Rated Voltage BR ±15% ΔC −55° to +125°C No Bias Voltage BR +15 −40% ΔC −55° to +125°C With Rated Voltage

MIL-C-11015 Part Listing

Capacity Value pf	100 V Rating	Capacity Value pf	100 V Rating	50 V Rating
10	CK12BX100*	5600	CK13BX562†	CK12BX562†
12	CK12BX120†	6800	CK13BX682*	CK12BX682*
15	CK12BX150*	8200	CK13BX822†	CK12BX822†
18	CK12BX180†	10000	CK13BX103*	CK12BX103*
22	CK12BX220*	12000	CK14BX123†	CK13BX123†
27	CK12BX270†	15000	CK14BX153*	CK13BX153*
33	CK12BX330*	18000	CK14BX183†	CK13BX183†
39	CK12BX390†	22000	CK14BX223*	CK13BX223*
47	CK12BX470*	27000	CK14BX273†	CK13BR273†
56	CK12BX560†	33000	CK14BX333*	CK13BR333*
68	CK12BX680*	39000	CK14BX393†	CK13BR393†
82	CK12BX820†	47000	CK14BX473*	CK13BR473*
100	CK12BX101*	56000	CK14BR563†	
120	CK12BX121†	68000	CK14BR683*	
150	CK12BX151*	82000	CK14BR823†	
180	CK12BX181†	100000	CK14BR104*	
220	CK12BX221*	120000	CK15BX104*	CK14BR124†
270	CK12BX271†	150000	CK15BR124†	CK14BR154*
330	CK12BX331*	180000	CK15BR154*	CK14BR184†
390	CK12BX391†	220000	CK15BR184†	CK14BR224*
470	CK12BX471*	270000	CK15BR224*	CK14BR274†
560	CK12BX561†	330000	CK15BR274†	
680	CK12BX681*	470000	CK15BR334*	CK15BR474*
820	CK12BX821†	1 Mfd	CK16BR474*	CK15BR105*
1000	CK12BX102*	2.2 Mfd	CK16BR105*	CK16BR225*
1200	CK12BX122†	3.3 Mfd		CK16BR335*
1500	CK12BX152*			
1800	CK12BX182†			
2200	CK12BX222*			
2700	CK12BX272†			
3300	CK12BX332*			
3900	CK12BX392†			
4700	CK12BX472*			

* Add Tolerance Letter K= 10% M = 20%
† Available as standard MIL part in K = 10% only

MIL-C-20	MIL-C-11015	MIL-C-39014
CC75/CCR75	CK12	CKR11
CC76/CCR76	CK13	CKR12
CC77/CCR77	CK14	CKR14
CC78/CCR78	CK15	CKR15
CC79/CCR79	CK16	CKR16

MIL-C-20

NPO molded axial parts are now available in conformance to MIL-C-20. The table above provides information on sizes for MIL-C-20 in comparison to MIL-C-11015 and MIL-C-39014. Please consult the Military Specifications for capacitance, tolerance and voltage availability.

MIL Style	Length	Diameter	Wire Dia.
CK12	.160 ±.010	.090 ±.010	.016 $^{+.004}_{-.001}$
CKR11	.160 ±.010	.090 ±.010	.015/.027
CK13	.250 ±.010	.090 ±.010	.016 $^{+.004}_{-.001}$
CKR12	.250 ±.010	.090 ±.010	.015/.027
CK14	.390 ±.010	.140 ±.010	.025 $^{+.004}_{-.001}$
CKR14	.390 ±.010	.140 ±.010	.015/.027
CK15	.500 ±.020	.250 ±.015	.025 $^{+.004}_{-.001}$
CKR15	.500 ±.020	.250 ±.015	.015/.027
CK16	.690 ±.030	.350 ±.020	.025 $^{+.004}_{-.001}$
CKR16	.690 ±.030	.350 ±.020	.015/.027

How to Order

MIL-C-11015 and MIL-C-20 order by Military Type Designation. MIL-C-39014 order by Part Number as listed on the following pages.

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CERALAM® MILITARY MOLDED AXIAL CAPACITORS

Transfer Molded Cases, Oxygen Free Copper Leads
MIL-STD 1276 Type C, 50 - 100 Volt Rating

MIL-C-39014 Dash Numbers

Military Type Designation	M39014/05-(Dash Number From Table)					Capacitance pf	Capacitance Tolerance ± Percent	DC Rated Voltage
	Failure Rate Level (%/1,000 Hours)							
	2.0(L)	1.0(M)	0.1(P)	0.01(R)	0.001(S)			
CKR11BX100K-	2401	2601	2801	2001	2201	10	10	100
CKR11BX100M-	2402	2602	2802	2002	2202	10	20	100
CKR11BX120K-	2403	2603	2803	2003	2203	12	10	100
CKR11BX150K-	2404	2604	2804	2004	2204	15	10	100
CKR11BX150M-	2405	2605	2805	2005	2205	15	20	100
CKR11BX180K-	2406	2606	2806	2006	2206	18	10	100
CKR11BX220K-	2407	2607	2807	2007	2207	22	10	100
CKR11BX220M-	2408	2608	2808	2008	2208	22	20	100
CKR11BX270K-	2409	2609	2809	2009	2209	27	10	100
CKR11BX330K-	2410	2610	2810	2010	2210	33	10	100
CKR11BX330M-	2411	2611	2811	2011	2211	33	20	100
CKR11BX390K-	2412	2612	2812	2012	2212	39	10	100
CKR11BX470K-	2413	2613	2813	2013	2213	47	10	100
CKR11BX470M-	2414	2614	2814	2014	2214	47	20	100
CKR11BX560K-	2415	2615	2815	2015	2215	56	10	100
CKR11BX680K-	2416	2616	2816	2016	2216	68	10	100
CKR11BX680M-	2417	2617	2817	2017	2217	68	20	100
CKR11BX820K-	2418	2618	2418	2018	2218	82	10	100
CKR11BX101K-	2419	2619	2819	2019	2219	100	10	100
CKR11BX101M-	2420	2620	2820	2020	2220	100	20	100
CKR11BX121K-	2421	2621	2821	2021	2221	120	10	100
CKR11BX151K-	2422	2622	2822	2022	2222	150	10	100
CKR11BX151M-	2423	2623	2823	2023	2223	150	20	100
CKR11BX181K-	2424	2624	2824	2024	2224	180	10	100
CKR11BX221K-	2425	2625	2825	2025	2225	220	10	100
CKR11BX221M-	2426	2626	2826	2026	2226	220	20	100
CKR11BX271K-	2427	2627	2827	2027	2227	270	10	100
CKR11BX331K-	2428	2628	2828	2028	2228	330	10	100
CKR11BX331M-	2429	2629	2829	2029	2229	330	20	100
CKR11BX391K-	2430	2630	2830	2030	2230	390	10	100
CKR11BX471K-	2431	2631	2831	2031	2231	470	10	100
CKR11BX471M-	2432	2632	2832	2032	2232	470	20	100
CKR11BX561K-	2433	2633	2833	2033	2233	560	10	100
CKR11BX681K-	2434	2636	2834	2034	2234	680	10	100
CKR11BX681M-	2435	2635	2835	2035	2235	680	20	100
CKR11BX821K-	2436	2636	2836	2036	2236	820	10	100
CKR11BX102K-	2437	2637	2837	2037	2237	1,000	10	100
CKR11BX102M-	2438	2638	2838	2038	2238	1,000	20	100
CKR11BX122K-	2439	2639	2839	2039	2239	1,200	10	100
CKR11BX152K-	2440	2640	2840	2040	2240	1,500	10	100
CKR11BX152M-	2441	2641	2841	2041	2241	1,500	20	100
CKR11BX182K-	2442	2642	2842	2042	2242	1,800	10	100
CKR11BX222K-	2443	1643	2843	2043	2243	2,200	10	100
CKR11BX222M-	2444	2644	2844	2044	2244	2,200	20	100
CKR11BX272K-	2445	2655	2845	2045	2245	2,700	10	100
CKR11BX332K-	2446	2646	2846	2046	2246	3,300	10	100
CKR11BX332M-	2447	2647	2847	2047	2247	3,300	20	100
CKR11BX392K-	2448	2648	2848	2048	2248	3,900	10	100
CKR11BX472K-	2449	2649	2849	2049	2249	4,700	10	100
CKR11BX472M-	2450	2650	2850	2050	2250	4,700	20	100
CKR11BX562K-	2451	2651	2851	2051	2251	5,600	10	50
CKR11BX682K-	2452	2652	2852	2052	2252	6,800	10	50
CKR11BX682M-	2453	2653	2853	2053	2253	6,800	20	50
CKR11BX822K-	2454	2654	2854	2054	2254	8,200	10	50
CKR11BX103K-	2455	2655	2855	2055	2255	10,000	10	50
CKR11BX103M-	2456	2656	2856	2056	2256	10,000	20	50
CKR12BX562K-	2457	2657	2857	2057	2257	5,600	10	100
CKR12BX682K-	2458	2658	2858	2058	2258	6,800	10	100
CKR12BX682M-	2459	2659	2859	2059	2259	6,800	20	100
CKR12BX822K-	2460	2660	2860	2060	2260	8,200	10	100
CKR12BX103K-	2461	2661	2861	2061	2261	10,000	10	100
CKR12BX103M-	2462	2662	2862	2062	2262	10,000	20	100
CKR12BX123K-	2463	2663	2863	2063	2263	12,000	10	50
CKR12BX153K-	2464	2664	2864	2064	2264	15,000	10	50
CKR12BX153M-	2465	2665	2865	2065	2265	15,000	20	50
CKR12BX183K-	2466	2666	2866	2066	2266	18,000	10	50
CKR12BX223K-	2467	2667	2867	2067	2267	22,000	10	50
CKR12BX223M-	2468	2668	2868	2068	2268	22,000	20	50
CKR12BX273K-	2469	2669	2869	2069	2269	27,000	10	50
CKR12BX333K-	2470	2670	2870	2070	2270	33,000	10	50
CKR12BX333M-	2471	2671	2871	2071	2271	33,000	20	50
CKR12BX393K-	2472	2672	2872	2072	2272	39,000	10	50
CKR12BX473K-	2473	2673	2873	2073	2273	47,000	10	50
CKR12BX473M-	2474	2674	2874	2074	2274	47,000	20	50
FOR ADDITIONAL DETAILS REFER TO MIL-C-39014 SPECIFICATION								

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Continued from
preceding page.

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CERALAM® MILITARY MOLDED AXIAL CAPACITORS

MIL-C-39014 Dash Numbers

Military Type Designation	M39014/05-(Dash Number From Table) Failure Rate Level (%/1,000 Hours) 2.0(L)	1.0(M)	0.1(P)	0.01(R)	0.001(S)	Capacitance pf	Capacitance Tolerance ± Percent	DC Rated Voltage
Style CKR14-100 VDC (BX)								
CKR14BX123K-	2475	2675	2875	2075	2275	12,000	10	100
CKR14BX153K-	2476	2676	2876	2076	2276	15,000	10	100
CKR14BX153M-	2477	2677	2877	2077	2277	15,000	20	100
CKR14BX183K-	2478	2678	2878	2078	2278	18,000	10	100
CKR14BX223K-	2479	2679	2879	2079	2279	22,000	10	100
CKR14BX223M-	2480	2680	2880	2080	2280	22,000	20	100
CKR14BX273K-	2481	2681	2881	2081	2281	27,000	10	100
CKR14BX333K-	2482	2682	2882	2082	2282	33,000	10	100
CKR14BX333M-	2483	2683	2883	2083	2283	33,000	20	100
CKR14BX393K-	2484	2684	2884	2084	2284	39,000	10	100
CKR14BX473K-	2485	2685	2885	2085	2285	47,000	10	100
CKR14BX473M-	2486	2686	2886	2086	2286	47,000	20	100
Style CKR14-50 VDC (BX)								
CKR14BX563K-	2487	2687	2887	2087	2287	56,000	10	50
CKR14BX683K-	2488	2688	2888	2088	2288	68,000	10	50
CKR14BX683M-	2489	2689	2889	2089	2289	68,000	20	50
CKR14BX823K-	2490	2690	2890	2090	2290	82,000	10	50
CKR14BX104K-	2491	2691	2891	2091	2291	100,000	10	50
CKR14BX104M-	2492	2692	2892	2092	2292	100,000	20	50
Style CKR14-100 VDC (BR)								
CKR14BR563K-	2493	2693	2893	2093	2293	56,000	10	100
CKR14BR683K-	2494	2694	2894	2094	2294	68,000	10	100
CKR14BR683M-	2495	2695	2895	2095	2295	68,000	20	100
CKR14BR823K-	2496	2696	2896	2096	2296	82,000	10	100
CKR14BR104K-	2497	2697	2897	2097	2297	100,000	10	100
CKR14BR104M-	2498	2698	2898	2098	2298	100,000	20	100
Style CKR14-50 VDC (BR)								
CKR14BR124K-	2499	2699	2899	2099	2299	120,000	10	50
CKR14BR154K-	2500	2700	2900	2100	2300	150,000	10	50
CKR14BR154M-	2501	2701	2901	2101	2301	150,000	20	50
CKR14BR184K-	2502	2702	2902	2102	2302	180,000	10	50
CKR14BR224K-	2503	2703	2903	2103	2303	220,000	10	50
CKR14BR224M-	2504	2704	2904	2104	2304	220,000	20	50
CKR14BR274K-	2505	2705	2905	2105	2305	270,000	10	50
Style CKR15-100 VDC (BX)								
CKR15BX563K-	2506	2706	2906	2106	2306	56,000	10	100
CKR15BX683K-	2507	2707	2907	2107	2307	68,000	10	100
CKR15BX683M-	2508	2708	2908	2108	2308	68,000	20	100
CKR15BX823K-	2509	2709	2909	2109	2309	82,000	10	100
CKR15BX104K-	2510	2710	2910	2110	2310	100,000	10	100
CKR15BX104M-	2511	2711	2911	2111	2311	100,000	20	100
Style CKR15-100 VDC (BR)								
CKR15BR124K-	2512	2712	2912	2112	2312	120,000	10	100
CKR15BR154K-	2513	2713	2913	2113	2313	150,000	10	100
CKR15BR154M-	2514	2714	2914	2114	2314	150,000	20	100
CKR15BR184K-	2515	2715	2915	2115	2315	180,000	10	100
CKR15BR224K-	2516	2716	2916	2116	2316	220,000	10	100
CKR15BR224M-	2517	2717	2917	2117	2317	220,000	20	100
CKR15BR274K-	2518	2718	2918	2118	2318	270,000	10	100
CKR15BR334K-	2519	2719	2919	2119	2319	330,000	10	100
CKR15BR334M-	2520	2720	2920	2120	2320	330,000	20	100
Style CKR15-50 VDC (BR)								
CKR15BR474K-	2521	2721	2921	2121	2321	470,000	10	50
CKR15BR474M-	2522	2722	2922	2122	2322	470,000	20	50
CKR15BR684K-	2523	2723	2923	2123	2323	680,000	10	50
CKR15BR684M-	2524	2724	2924	2124	2324	680,000	20	50
CKR15BR105K-	2525	2725	2925	2125	2325	1,000,000	10	50
CKR15BR105M-	2526	2726	2926	2126	2326	1,000,000	20	50
Style CKR16-100 VDC (BR)								
CKR16BR474K-	2527	2727	2927	2127	2327	470,000	10	100
CKR16BR474M-	2528	2728	2928	2128	2328	470,000	20	100
CKR16BR684K-	2529	2729	2929	2129	2329	680,000	10	100
CKR16BR684M-	2530	2730	2930	2130	2330	680,000	20	100
CKR16BR105K-	2531	2731	2931	2131	2331	1,000,000	10	100
CKR16BR105M-	2532	2732	2932	2132	2332	1,000,000	20	100
Style CKR16-50 VDC (BR)								
CKR16BR225K-	2533	2733	2933	2133	2333	2,200,000	10	50
CKR16BR225M-	2534	2734	2934	2134	2334	2,200,000	20	50
CKR16BR335K-	2535	2735	2935	2135	2335	3,300,000	10	50
CKR16BR335M-	2536	2736	2936	2136	2336	3,300,000	20	50

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Additional Specifications and Ordering Information on the following page.

DISC CAPACITORS

Class 1, 500 V
Temperature Compensating
Type 5000 (Formerly Type DI)

High Q and Excellent Stability . . . Dipped Phenolic Coating . . . Wax Impregnated . . . Solder Coated Copper Leads. MIL-C-20 or EIA-RS198 Class 1 Environmental Performance.

Specifications

Capacity Range	1 pf thru 1000 pf
Capacity Tolerance	±.25 pf thru ±20%
Dissipation Factor	.1% Max. 30 pf and Up
Insulation Resistance	20,000 Megohms Minimum
Working Voltage	500 VDC
Flash Test Voltage	3 Times Rated
Temperature Characteristic	NPO thru N2200 consult factory for other T.C.'s
Marking	AVX, Capacity, Capacity Tol., T.C.

Class 2, 500 V
Variable Capacitance vs. Temperature
(Formerly Type DI-0 thru D1-8)

Specific capacitance stability ranges in response to temperature . . . Dipped phenolic coating . . . Wax Impregnated . . . Solder Coated Copper Leads. MIL-C-11015 or EIA-RS198 Class 2 Environmental Performance.

Specifications

Capacity Range	10 pf thru 44000 pf
Capacity Tolerance	±5% thru GMV
Dissipation Factor	2.5% Max.
Insulation Resistance	20,000 Megohms Minimum
Working Voltage	500 VDC
Flash Test Voltage	3 Times Rated
Temperature Characteristic	X5F thru X5
Marking	AVX, Capacity, Capacity Tol., T.C.*

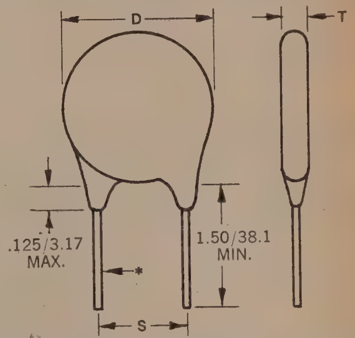
* If Specific TC is Ordered

Dimensions

New Style	Former Style	D Max.	T Max.	S ±.030/.762
5001	DI-0	.240/6.10	.156/3.97	.187/4.76
5002	DI-1	.300/7.62	.156/3.97	.250/6.35
5004	DI-2	.370/9.40	.156/3.97	.250/6.35
5006	DI-3	.425/10.8	.156/3.97	.250/6.35‡
5009	DI-3A	.490/12.5	.156/3.97	.250/6.35‡
5010	DI-4	.570/14.5	.156/3.97	.375/9.53†
5016	DI-5	.675/17.1	.156/3.97	.375/9.53†
5019	DI-6	.740/18.8	.156/3.97	.375/9.53†
5022	DI-6A	.800/20.3	.156/3.97	.375/9.53†
5023	DI-7	.900/22.9	.156/3.97	.375/9.53†
5025	DI-8	.960/24.4	.156/3.97	.375/9.53†

‡ .375 ±.030/9.53 ±.762 Available on Special Order
† .250 ±.030/6.35 ±.762 Available on Special Order

Dimensions: Inches/Millimeters



* All capacitors available with either #20 or #22 AWG Leads at AVX option unless specific gage is requested by customer.

Crimp Lead Disc Capacitors

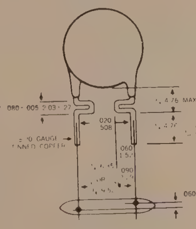
Available with either inside or outside crimp, they are designed specifically for simplification in production line assembly of printed circuit disc components.

They are available with the same electrical characteristics and physical sizes as furnished in our standard disc types.

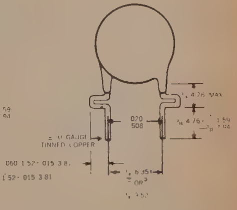
Lead spacing is .250 ±.035 on discs under .500 in diameter and .375 ±.035 on discs .500 in diameter and larger.

Lead length is normally 3⁄16″ measured from crimp — longer lead lengths are available on request.

Specify inside or outside crimp when ordering.



INSIDE CRIMP



OUTSIDE CRIMP

THESE PRODUCTS AVAILABLE FROM AVX CERAMICS FRANCHISED DISTRIBUTORS

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Continued from preceding page.

DISC CAPACITORS

Class 1

The tables shown below indicate the tolerance available on specific temperature characteristics. It may be noted that limits are established on the basis of measurements at 25°C and +85°C and that T.C. becomes more negative at low temperature. Wider tolerances are required on low capacitance values because of the effects of stray capacitance.

T.C. TOLERANCES: +25°C TO +°C IN PPM/°C

Capacitance in pf	NPO	N030	N080	N150	N220	N330	N470	N750	N1500	N2200
.5 to 2	±250	±250	±250	±250	±250	±250	±250	±250	±250	±500
2.1 to 3.9	±120	±120	±120	±120	±120	±120	±120	±120	±250	±500
4 to 9.9	±60	±60	±60	±60	±60	±60	±120	±120	±250	±500
10 and Over	±30	±30	±30	±30	±30	±60	±60	±120	±250	±500
Closest MIL-C-20D Equivalent	CG	HG	LG	PG	RG	SH	TH	UJ	NONE	NONE
EIA Desig.	COG	S1G	U1G	P2G	R2G	S2H	T2H	U2J	P3K	R3L

T.C. TOLERANCES: −55°C TO +25°C IN PPM/°C

Capacitance in pf	NPO	N030	N080	N150	N220	N330	N470	N750	N1500	N2200
.5 to 2	+250 −341	+250 −348	+250 −359	+250 −374	+250 −390	+250 −414	+250 −444	+250 −506	+250 −670	+500 −1100
2.1 to 3.9	+120 −182	+120 −189	+120 −200	+120 −215	+120 −231	+120 −255	+120 −285	+120 −340	+250 −670	+500 −1100
4 to 9.9	+60 −109	+60 −116	+60 −127	+60 −142	+60 −158	+60 −180	+120 −285	+120 −340	+250 −670	+500 −1100
10 and Over	+30 −75	+30 −80	+30 −90	+30 −105	+30 −120	+60 −180	+60 −210	+120 −340	+250 −670	+500 −1100

Capacitance Range in pf

New Style		5001	5002	5004	5006	5009	5010	5016	5019	5022	5023	5025
Former Style		DI-0	DI-1	DI-2	DI-3	DI-3A	DI-4	DI-5	DI-6	DI-6A	DI-7	DI-8
Temp. Coef.	Min. C			MAXIMUM CAPACITY AVAILABLE IN PF								
NPO	1	7	15	24	32	46	57	82	100	120	150	180
N030	1	7	15	24	32	46	57	82	100	120	150	180
N080	1.5	8	16	27	40	51	68	91	110	130	160	200
N150	1.5	9	18	32	42	60	75	100	130	150	200	230
N220	2	10	20	34	48	64	82	110	140	160	220	250
N330	2	11	22	40	48	72	91	120	150	180	240	280
N470	2.5	14	27	43	52	88	110	150	180	220	270	340
N750	3	18	38	60	80	115	150	200	240	300	360	450
N1500	10	30	62	100	120	190	270	360	430	510	680	800
N2200	15	36	82	144	190	275	360	470	620	680	910	1000

How to Order

5002 NPO 15 0 K

K — Capacitance Tolerance Code
0 — Multiplier
15 — Significant Figures of Capacitance Characteristic
NPO — Temperature Coefficient
5002 — Style

AVAILABLE CAPACITANCE TOLERANCES

C = ±.25 pf
D = ±.5 pf
F = ±1%
G = ±2%
H = ±3%
J = ±5%
K = ±10%
M = ±20%
Z = +80 −20%

THESE PRODUCTS AVAILABLE FROM AVX CERAMICS FRANCHISED DISTRIBUTORS

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DISC CAPACITORS

Class 2

MIL-C-11015D CODE

Symbol	Temperature Range	
A	−55°C to +85°C	
B	−55°C to +125°C	
C	−55°C to +150°C	
Symbol	**Cap. Change Zero Volts**	**Cap. Change Rated Volts**
R	+15%, −15%	+15%, −40%
W	+22%, −56%	+22%, −66%
X	+15%, −15%	+15%, −25%
Y	+30%, −70%	+30%, −80%
Z	+20%, −20%	+20%, −30%

Temperature characteristic is specified by combining range and change symbols, for example BR or AW. Specification slash sheets indicate the characteristic applicable to a given style of capacitor.

EIA CODE

Percent Capacity Change Over Temperature Range

RS198	Temperature Range
X7	−55°C to +125°C
X5	−55°C to +85°C
Y5	−30°C to +85°C
Z5	+10°C to +85°C
Code	**Per Cent Capacity Change**
D	±3.3%
E	±4.7%
F	±7.5%
P	±10%
R	±15%
S	±22%
T	+22%, −33%
U	+22%, −56%
V	+22%, −82%

EXAMPLE — A capacitor is desired with the capacitance value at 25°C to increase no more than 7.5% or decrease no more than 7.5% from −30°C to +85°C. EIA Code will be Y5F.

Capacitance Range in pf

New Style		5001	5002	5004	5006	5009	5010	5016	5019	5022	5023	5025
Former Style		DI-0	DI-1	DI-2	DI-3	DI-3A	DI-4	DI-5	DI-6	DI-6A	DI-7	DI-8
EIA Char.	Min. C	MAXIMUM CAPACITANCE AVAILABLE IN PF										
X5F, Y5E, Z5D	10	200	400	680	1000	1500	1800	2400	3000	3600	4500	5400
X5F, Y5F, Z5F	20	330	620	1000	1600	2200	3000	3900	5000	5600	7500	8200
X5P, Y5P, Z5P	20	430	900	1500	2300	3100	3100	5100	6700	7700	10,000	12,000
X5R, Y5S, Z5P	20	490	1000	1700	2700	3800	4400	6000	7600	9000	11,000	13,000
X5U, Y5U, Z5U	20	680	1200	2200	3300	4500	7000	10,000	13,000	15,000	20,000	24,000
Z5U	20	1000	1800	3000	5000	6200	10,000	15,000	20,000	23,000	27,000	36,000
X5V, Y5V, Z5V	20	1200	2200	3600	5600	9000	12,000	18,000	22,000	30,000	35,000	44,000

How to Order

5025 X5R 10 3 Z

Z — Capacitance Tolerance Code
3 — Multiplier (Number of Zeros)
10 — Significant Figures of Capacitance Characteristic
X5R — EIA Temperature Characteristic
5025 — Style

AVAILABLE CAPACITANCE TOLERANCES

C = ±.25 pf
D = ±.5 pf
F = ±1%
G = ±2%
H = ±3%
J = ±5%
K = ±10%
M = ±20%
Z = +80 −20%

THESE PRODUCTS AVAILABLE FROM AVX CERAMICS FRANCHISED DISTRIBUTORS

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HIGH VOLTAGE DISC CAPACITORS

Type HVD-1 thru HVD-7 — 1000 VDC thru 6000 VDC

Dipped Phenolic Coating, Wax Impregnated, Solder Coated Copper Leads
EIA-RS165 Environmental Performance

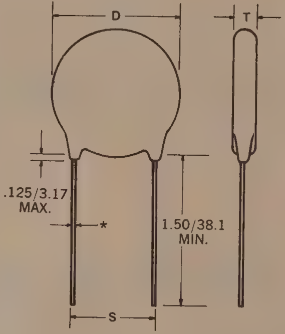
Specifications

Capacity Range	26 pf thru 22000 pf
Capacity Tolerance	10%, (X5R only) 20% & GMV
Dissipation Factor	2.5%
Insulation Resistance	20,000 Megohms Minimum
Working Voltage	1000 VDC thru 6000 VDC
Flash Test Voltage	1.75 Times Rated Voltage
Temperature Characteristic	X5R and Z5U

Type HVD Disc Capacitors are available in many variations of capacity, temperature characteristics and voltage. The capacity range charts cover the popular ranges but by no means all combinations. Our Engineering Department is available to design to your special requirements.

Capacitance Range in pf

Style Voltage & EIA Char.	Min. C	HVD-1	HVD-2	HVD-3	HVD-4	HVD-5	HVD-6	HVD-7
		MAXIMUM CAPACITANCE VALUE IN PF						
1000VX5R	51	500	750	1000	2000	3000	3700	5600
1000VZ5U	51	2000	3400	5000	9000	15,000	18,000	22,000
2000VX5R	26	250	400	600	900	1800	2200	3300
2000VZ5U	26	1000	1500	2700	3900	7500	10,000	15,000
3000VX5R	41	—	—	420	550	1000	1500	2200
3000VZ5U	41	—	—	1800	2400	4700	5600	10,000
4000VX5R	31	—	—	350	490	800	1000	1800
4000VZ5U	31	—	—	1500	2200	4000	5100	7200
5000VX5R	41	—	—	—	390	630	780	1000
5000VZ5U	41	—	—	—	1800	2700	3300	5000
6000VX5R	36	—	—	—	300	500	600	900
6000VZ5U	36	—	—	—	1500	2200	3000	4000



Dimensions: High Voltage Discs

	D	T Max.				S ±.030		
	Max.	1 KV	2-4 KV	5 KV	6 KV	1-2 KV	3-4 KV	5-6 KV
HVD-1	.310 7.87	.156 3.96	.187 4.75	.250 6.35	.312 7.92	.250 6.35	.375 9.53	.500 12.7
HVD-2	.385 9.78	.156 3.96	.187 4.75	.250 6.35	.312 7.92	.250 6.35	.375 9.53	.500 12.7
HVD-3	.440 11.18	.156 3.96	.187 4.75	.250 6.35	.312 7.92	.250 6.35	.375 9.53	.500 12.7
HVD-4	.590 14.99	.156 3.96	.187 4.75	.250 6.35	.312 7.92	.375 9.53	.375 9.53	.500 12.7
HVD-5	.690 17.53	.156 3.96	.187 4.75	.250 6.35	.312 7.92	.375 9.53	.375 9.53	.500 12.7
HVD-6	.760 19.30	.156 3.96	.187 4.75	.250 6.35	.312 7.92	.375 9.53	.375 9.53	.500 12,7
HVD-7	.906 23.01	.156 3.96	.187 4.75	.250 6.35	.312 7.92	.375 9.53	.375 9.53	.500 12.7

How to Order

HVD-3 2KV 27 2 M

M — Capacitance Tolerance Code
2 — Multiplier (Number of Zeros)
27 — Significant Figures of Capacitance Characteristic
2KV — Voltage (in KV)
HVD-3 — Style

AVAILABLE CAPACITANCE TOLERANCES

C = ±.25 pf
D = ±.5 pf
F = ±1%
G = ±2%
H = ±3%
J = ±5%
K = ±10%
M = ±20%
Z = +80 −20%

THESE PRODUCTS AVAILABLE FROM AVX CERAMICS FRANCHISED DISTRIBUTORS

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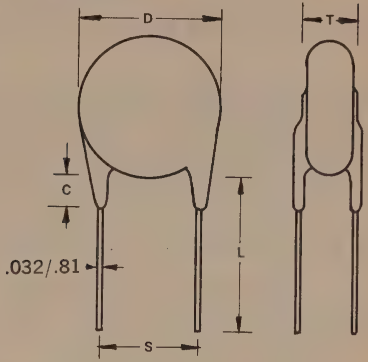
AVX: The Insiders.

VOLTAGE MULTIPLIER CAPACITORS

8 and 10 KV Discs, Style: 5038, 5039, 5054

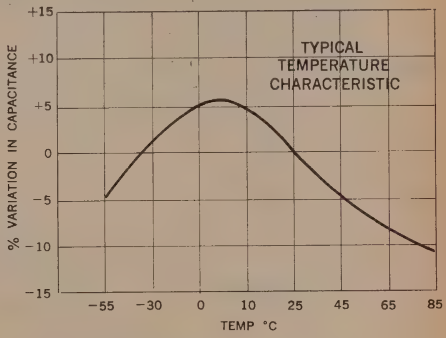


Designed for High Voltage D.C. Multiplier Circuits . . . Excellent Temperature Stability . . . Low Voltage Coefficient . . . Anti-Corona Performance Epoxy Coated — Compatible with Potting or Molding Compounds.

Specifications

Capacity	1,000 or 700 pf
Capacity Tolerance	±20%
Dissipation Factor	2% Max. at 1 KHz
Insulation Resistance	20,000 Megohms, Minimum
Working Voltage	8 and 10 KV
Flash Test Voltage	1.5 Times Rated Voltage
Temperature Characteristic	Z5R, ±15% ΔC +10 to +85°C
Voltage Characteristic	−20% ΔC at 10 KV
Corona Voltage	2500 VRMS @ 60 Hz 100 Pico Coulombs

Typical Temperature Characteristics



Dimensions

D.C. Working Voltage	Capacity pf	Dwg. Part No.	Dimensions: Inches/Millimeters				
			D Max.	T Max.	C Max.	S ±.062	L Min.
10 KV	1000	5038Z5R102MA	.850/21.6	.375/9.53	.375/9.53	.500/12.7	1.00/25.4
10 KV	1000	5054Z5R102MA	.750/17.8	.300/7.62	.250/6.35	.500/12.7	1.00/25.4
8 KV	700	5039Z5R701MA	.500/12.7	.250/6.35	.250/6.35	.500/12.7	1.00/25.4

Dimensions: Inches/Millimeters

How to Order

Specify Part No. in above chart.

Example: 5038Z5R102MA
is 1000 ±20% Z5R, .850 Max. Diam.

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FEED-THRU CAPACITORS

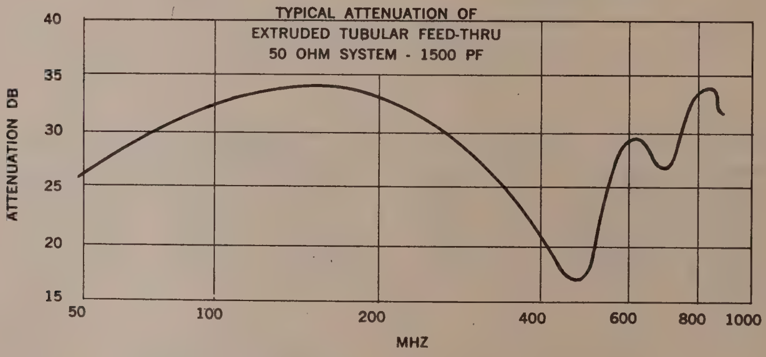
Types 4400 and 7400 — 250 and 1500 Volt — Bolt and Eyelet

Units shown are produced with conventional tubular dielectrics. Bolt type units are shown with Z5U characteristic dielectric (GP). If need exists for a specific TC, consult factory. Eyelet type feed-thrus shown as 4420 thru 4428 are inexpensive, dependable miniaturized eyelet feed-thrus differing from the 7400 Series in that the solder form is furnished as an integral part of the feed-thru — eliminating the need of solder preforms in assembly. All operations on these parts are done automatically, giving the capacitor a high degree of reliability.

Post style units have terminals held in position by a crimp and are soldered at both ends of the tube. Square terminals for wire wrapped solderless connections are also available.

Specifications

Capacity Range	5 pf thru 4000 pf
Capacity Tolerance	±5%; ±10%, ±20% and GMV
Dissipation Factor	.2 to 3%
Insulation Resistance	10,000 Megohms Minimum
Working Voltage	250, 500, 1,000 and 1,500 Volts DC
Flash Test Voltage	2 Times Rated Voltage
Temperature Characteristic	P200 thru Z5U
Marking	Typographical or Color Code on 7404-7405



AVX: The Insiders.

FEED-THRU CAPACITORS (CONT'D)

250 and 1500 Volt, TYPES 4400 and 7400 Bolt and Eyelet

Bolt Type Feed-Thru

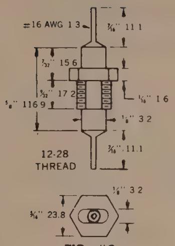

#16 AWG 1.3
7/16" 11.1
5/32" 15.6
5/32" 17.2
1/16" 1.6
1/8" 32
5/8" 116.9
7/16" 11.1
12-28 THREAD
1/8" 3.2
15/16" 23.8

FIG. #6

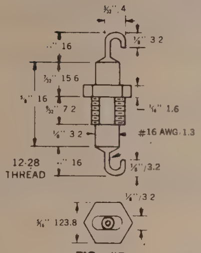

5/32" 4
1/8" 3.2
.16
5/32" 15.6
5/8" 16
9/32" 7.2
1/16" 1.6
1/8" 3.2
#16 AWG 1.3
12-28 THREAD
.16
1/8"/3.2
15/16" 123.8

FIG. #7

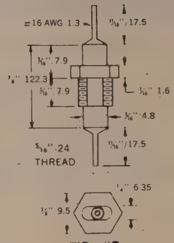

#16 AWG 1.3
11/16"/17.5
5/16" 7.9
7/8" 122.3
5/16" 7.9
1/16" 1.6
3/16" 4.8
15/16" 24
11/16"/17.5
THREAD
1/4" 6.35
3/8" 9.5

FIG. #8

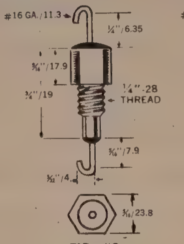

#16 GA./11.3
1/4"/6.35
11/16"/17.9
3/4"/19
1/4" 28 THREAD
5/16"/7.9
5/32"/4
15/16/23.8

FIG. #9

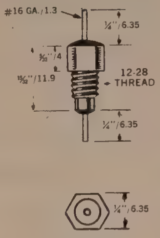

#16 GA./1.3
1/4"/6.35
5/32"/4
15/32"/11.9
12-28 THREAD
1/4"/6.35
1/4"/6.35

FIG. #10

DC WORKING VOLTAGE	TC	TYPE	CAP. RANGE	DWG.	TYPE	CAP. RANGE	DWG.
500V	GP*	CFS-1	15-1500 PF	Fig. #6	CFC-1	15-1500 PF	Fig. #7
500V	GP	BLF-1CC	† 10-4000 PF	Fig. #9	BSF-1BB	10-1500 PF	Fig. #10
1000V	GP	BLF-2CC	† 10-3000 PF	Fig. #9	BSF-2BB	10-1000 PF	Fig. #10
1500V	GP	CF-167A	100-1000 PF	Fig. #8			

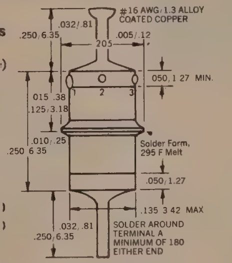
±20% Tolerance available standard
* ±10% Tolerance available

Tubular Feed-Thru

DC WORKING VOLTAGE 500 V

CAPACITY RANGE IN PF	TEMPERATURE CHARACTERISTICS
1.5 to 3	P200 (Steatite)
3 to 12	NPO ± 60
3 to 14	N080 ± 60
4 to 16	N150 ± 60
5 to 18	N220 ± 60
6 to 20	N330 ± 60
7 to 24	N470 ± 60
10 to 30	N750 ± 120
33 to 50	N1500 ± 250
50 to 75	N2200 ± 500
75 to 600	Z5P
100 to 2200	Z5U

STYLE 4423

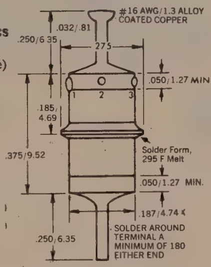

#16 AWG/1.3 ALLOY COATED COPPER
.032/.81
.005/.12
.250/6.35
.205
.050/1.27 MIN.
.015/.38
.125/3.18
.010/.25
.250/6.35
Solder Form, 295 F Melt
.050/1.27
.135/3.42 MAX
.032/.81
.250/6.35
SOLDER AROUND TERMINAL A MINIMUM OF 180 EITHER END

Same unit without center post is available as type 4420 — Inside diam. of tube will be .052 min.

DC WORKING VOLTAGE 500 V

CAPACITY RANGE IN PF	TEMPERATURE CHARACTERISTICS
1.5 to 2.5	P200 (Steatite)
3 to 12	NPO ± 60
4 to 15	N080 ± 60
5 to 16	N150 ± 60
5 to 18	N220 ± 60
6 to 20	N330 ± 60
7 to 25	N470 ± 60
10 to 33	N750 ± 120
27 to 50	N1500 ± 250
50 to 75	N2200 ± 500
75 to 600	Z5P
100 to 2200	Z5U

STYLE 4427 (Formerly EF12)

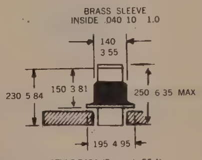

#16 AWG/1.3 ALLOY COATED COPPER
.032/.81
.250/6.35
.275
.050/1.27 MIN
.185/4.69
.375/9.52
Solder Form, 295 F Melt
.050/1.27 MIN.
.187/4.74
.250/6.35
SOLDER AROUND TERMINAL A MINIMUM OF 180 EITHER END

Same unit without center post is available as type 4428 — Inside diam. of tube will be .052 min.

DC WORKING VOLTAGE 250 V

CAPACITY RANGE IN PF	TEMPERATURE CHARACTERISTICS
5 to 10	NPO ± 60
11 to 33	N330 ± 500
22 to 33	N750 ± 120
36 to 180	N3300 ± 1000
200 to 560	X5P
620 to 1500	Z5U

STYLE 7405 (Formerly EF-5)

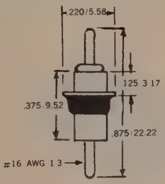

BRASS SLEEVE INSIDE .040 10 1.0
140 3 55
150 3 81
230 5 84
250 6 35 MAX
195 4 95

STYLE 7404 (Formerly EF-4) Same as above except brass sleeve in opposite end

DC WORKING VOLTAGE 500 V

CAPACITY RANGE IN PF	TEMPERATURE CHARACTERISTICS
10 to 15	NPO ± 60
16 to 43	N330 ± 500
30 to 43	N750 ± 120
47 to 200	N3300 ± 1000
220 to 680	X5P
750 to 2200	Z5U

STYLE 7406 with pin 7403 without pin


.220/5.58
125 3 17
.375 9.52
.875/22.22
#16 AWG 1 3

FORMERLY EF-6 EF-3

Available minimum capacity tolerance
Type 4420 thru 4428
±5% for P200 thru N2200
±10% for Z5P, ±20% for Z5U
Type EF-5 and EF-6
±10% for NPO thru X5P
±20% for Z5U

How to Order

4423 Z5U 10 2 M
M — Capacitance Tolerance Code
2 — Multiplier (no. of zeros)
10 — Significant Figures of Capacitance
Z5U — EIA Characteristic
4423 — Style

THESE PRODUCTS AVAILABLE FROM AVX CERAMICS FRANCHISED DISTRIBUTORS

AVX Ceramics, P.O. Box 867, Myrtle Beach, S.C. 29577 • Tel: (803) 448-3191 • TWX: 810-661-2252

Alissa Manufacturing Company

MANUFACTURERS OF HIGH RELIABILITY OPTOELECTRONIC TEST EQUIPMENT

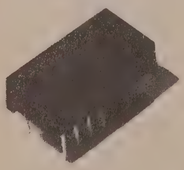
ALISSA MANUFACTURING COMPANY MANUFACTURES CUSTOMIZED OPTOPRODUCT TEST EQUIPMENT SUCH AS:

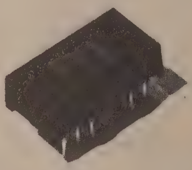
- PHOTOTRANSISTOR ARRAY TESTERS
- LED TESTERS
- PHOTODIODE TESTERS
- NUMERIC INDICATOR TESTERS
  FOR PRODUCTION AS WELL AS FINAL ACCEPTANCE TESTING.

HI-REL TESTING AND LIFE TESTING ARE PERFORMED ON ALL OPTOPRODUCTS AND OTHER RELATED COMPONENTS INCLUDING THE TESTING OF DIGIT-MONO-DIES AND PHOTO-DIES.

ALISSA WILL TEST THE ABOVE OPTOPRODUCTS PER CUSTOMER SPECIFICATIONS WHICH INCLUDE CRITICAL PARAMETERS SUCH AS:

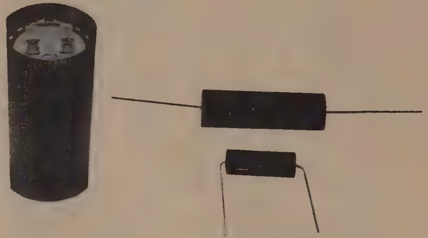
- LIGHT CURRENT SENSITIVITY CAN BE MEASURED AT 0.01 mw/cm^2
- VCE AND T_C CAN BE VARIED AND CHECKED ACCURATELY BEYOND THE PRESENT-STATE-OF-THE-ART.





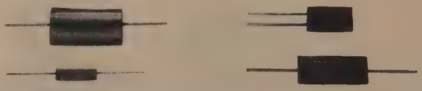
MANUFACTURERS OF HIGH RELIABILITY FILM CAPACITORS

THE HOT ONES!



WITH THE COOLEST PERFORMANCE!!

- ULTRA HIGH-REL 200°C RATED FILM CAPACITORS
- HIGH VOLTAGE CAPACITORS
- HERMETICALLY SEALED, METAL CASED CAPACITORS
- EPOXY 'B' CASED CAPACITORS
- WRAP AND FILL CAPACITORS
- SPECIAL BATH-TUB CANS WITH SEVERAL TERMINATION CONFIGURATIONS
- CAPACITORS FOR ALL TYPES OF AC/DC APPLICATIONS



FOR FURTHER INFORMATION WRITE TO
ALISSA MANUFACTURING COMPANY
2800 LA CIENEGA AVENUE, LOS ANGELES
CALIFORNIA 90034 – OR CALL
(213) 559-7480 OR (213) 559-7481

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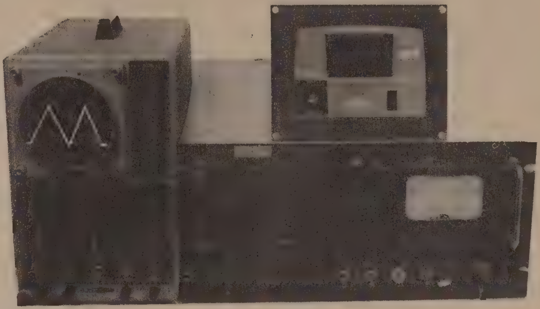
ALL ALISSA CAPACITORS ARE 100% AC-POWER CONDITIONED AT VERY HIGH FREQUENCIES AND CHECKED FOR HEAT RISE TO INSURE THE UTMOST IN RELIABILITY. THIS POWER CONDITIONING IS CONDUCTED DURING THE THERMAL SHOCK/CYCLING TEST FROM -62°C AND UP TO + 200°C, FOLLOWING THE 100% DC POWER CONDITIONING TESTS.



GENERAL CAPACITOR INFORMATION

- METAL CASED CAPACITORS AND EPOXY ‘B’ CASED CAPACITORS

  Case Sizes–can be supplied per Mil-C-83421/1 or per customer requirements
  μF Values and Voltage Ratings–per customer requirements
  Screening Levels Available–Levels 1, 2, and 3 per Table I.

- HIGH VOLTAGE CAPACITORS

  600VDC and higher voltage ratings are available in metal cases or Epoxy ‘B’ cases
  μF Values–per customer requirements
  Screening Levels Available–Levels 1, 2, and 3 per Table I.

- CAPACITOR DIELECTRICS

  The above capacitors are metallized film capacitors and are available in Polycarbonate, Polysulfone, and Kapton dielectrics

- LEAD WIRE MATERIAL AVAILABLE

  Tinned Copperweld, Oxygen Free Copper, or Nickel per Mil-Std-1276

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Alissa Manufacturing Company

CAPACITOR SPECIFICATIONS

AKJ–Polycarbonate film capacitors (metallized and foil)
CMJ–Polysulfone film capacitors (metallized and foil)
PMJ–Kapton film capacitors (metallized and foil)
Other dielectric capacitors are also available such as Mylar, Polypropylene, Polystyrene, etc.

- OPERATING TEMPERATURE RANGE

AKJ – –62°C to +125°C
CMJ – –62°C to +150°C
PMJ – –62°C to +200°C

- INSULATION RESISTANCE

The minimum Insulation Resistance when measured from terminal to terminal with an applied potential equal to the rated voltage shall be as follows:

+25°C = 3.0×10^6 MEGS Min
+85°C = 1.5×10^6 MEGS Min
+125°C = 2.5×10^4 MEGS Min

- DISSIPATION FACTOR

0.15% Max at 25°C

- TEST POTENTIAL

DC–At 25°C ± 5°C capacitors shall withstand a DC Voltage of at least 200% of the rated DC Voltage
AC–At 25°C ± 5°C capacitors shall withstand an AC Voltage of at least 200% of the rated AC Voltage

- CAPACITANCE CHANGE WITH TEMPERATURE

Relative to +25°C: –55°C = –1% and at +125°C = +0.75%

- FINE LEAK AND GROSS LEAK TESTS

Fine Leak Test–1×10^{-6} ATM-CC/sec max leak rate
Gross Leak Test–Oil test for 1 minute in accordance with method 112 of MIL-STD-202, Condition A.

- GENERAL INFORMATION

Capacitors are capable of meeting or exceeding requirements of any existing established Hi-Rel Capacitor Specification.

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Photos & Catalog by Lawrence Enterprises
P.O. Box 48474 (213) 651-3530
Los Angeles, CA 90048

TABLE NO. 1
100% SCREENING LEVELS

TEST ITEM NO.	EXAMINATION OR TEST	CONDITIONS	LIMITS		SCREENING LEVELS		
			MINIMUM	MAXIMUM	1	2	3
1	DC POWER CONDITIONING	140% OF THE RATED DC VOLTAGE DURING THERMAL SHOCK/CYCLING	AKJ → $-62°C$ to $+125°C$ CMJ → $-62°C$ to $+150°C$ PMJ → $-62°C$ to $+200°C$		24 HOURS	16 HOURS	NOT APPLICABLE
2	AC POWER CONDITIONING	140% OF THE RATED AC VOLTAGE AT 4 KHZ DURING THERMAL SHOCK/CYCLING	$-62°C$	$+125°C$	24 HOURS	16 HOURS	8 HOURS
3	SEAL	FINE LEAK TEST GROSS LEAK TEST	–	1×10^{-6} ATM/CC-SEC	✓ ✓	GROSS LEAK PER MIL-STD-202 METHOD 112, CONDITION A	GROSS LEAK PER MIL-STD-202 METHOD 112, CONDITION A
4	DIELECTRIC STRENGTH	200% OF THE RATED DC VOLTS 200% OF THE RATED AC VOLTS	60 SECONDS 60 SECONDS	–	✓ ✓	✓ ✓	✓ ✓
5	INSULATION RESISTANCE	AT RATED VOLTAGE FROM TERMINAL TO TERMINAL. FOR OVER 1 μF CAPACITORS, IR = MEGS x μF MIN. IR MEASUREMENTS ARE PERFORMED ONLY @ 25°C (ON 100% BASIS)	–	–	SEE PAGE 3	@ 25°C = 2×10^6 MEGS MIN @ 85°C = 1×10^6 MEGS MIN @ 125°C = 1×10^4 MEGS MIN	@ 25°C = 1×10^6 MEGS MIN @ 85°C = 1×10^5 MEGS MIN @ 125°C = 1×10^4 MEGS MIN
6	CAPACITANCE % TOLERANCE	@ 1 KHZ AND 25°C	–	WITHIN SPECIFIED LIMITS	✓	✓	✓
7	DISSIPATION FACTOR	@ 1 KHZ AND 25°C VALVES OVER 1 μF @ 100 HZ	–	–	0.15%	0.20%	0.20%
8	VISUAL INSPECTION	EXTERNAL—DIMENSIONS, MARKING AND WORKMANSHIP	–	WITHIN SPECIFIED LIMITS	✓	✓	✓
9	MARKING	ALL CAPACITORS ARE MARKED WITH A LOT DATE CODE FOR TRACEABILITY			CAPACITORS ARE SERIALIZED AND VARIABLES DATA SUPPLIED	✓	✓

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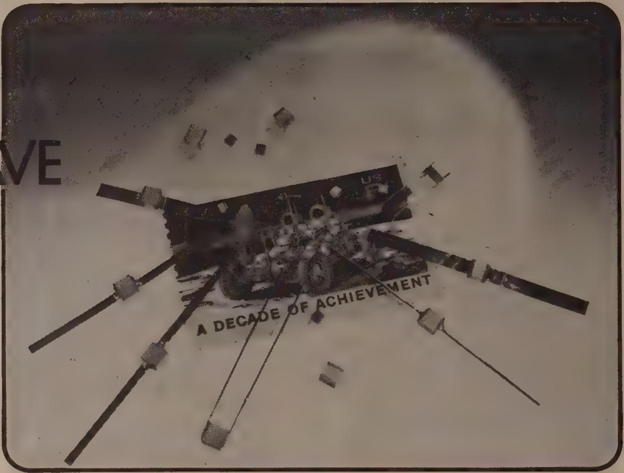
UHF/MICROWAVE CAPACITORS



ATC 100 UHF/MICROWAVE LOW-LOSS PORCELAIN CAPACITORS

- High Q thru Microwaves
- 0.1 pF to 1000 pF standard
- High R F current capability
- Rugged Terminations
- Absolute Retrace
- Hermetic Construction
- Close Tolerances standard
- High Reliability
- Completely Characterized: Full RF and DC test data

APPLICATIONS

Phased-array radar . . . wide-band amplifiers . . . low noise circuits . . . receiver RF-IF stages . . . proximity fuses . . . radiosonde . . . microwave power sources . . . UHF mobile . . . ECM . . . DME . . . UHF/microwave power amplifiers . . . tropo-scatter communications . . . commercial aircraft communications . . . military . . . marine and amateur AM/FM/SSB . . . military hand-held survival radios.

CHARACTERISTICS

Quality Factor: Greater than 10,000 at 1 MHz.
Capacitance Values: Case A, from 0.1 pF to 100 pF; Case B, from 0.1 pF to 1000 pF.

Tolerances: B (±0.1 pF); C (±0.25 pF); D (±0.5 pF); F (±1%); G (±2%); J (±5%); K (±10%); M (±20%)
Temperature Coefficient of Capacitance: +90 ±20 PPM/°C (-55°C to +125°C)
Dielectric Test Voltage: 250% of WVDC rating for 5 secs
Retrace: ±0.1% or ±0.1 pF, whichever is greater
Aging Effects: None
Piezoelectric Effects: None (No capacitance variation with voltage or pressure)
Capacitance Drift: ±0.1% or ±0.1 pF, whichever is greater
Insulation Resistance: 0.1 pF to 470 pF: 10^6 megohms min @25°C, 10^5 megohms min @125°C; 510 pF to 1000 pF: 10^5 megohms min @25°C, 10^4 megohms min @125°C
Operating Temperature Range: From -55°C to +125°C (no derating of working voltage); above 125°C, derate linearly to 50% WVDC @200°C

MILITARY SPECIFICATIONS (QPL)

The ATC 100 series is **QPL** to **MIL-C-11272: CY81** (Case A chip), **CY82** (Case A pellet), **CY83** (Case B chip), **CY84** (Case B pellet), **CY85** (Case B microstrip leaded), **CY86** (Case B axial ribbon leaded), **CY87** (Case B radial wire leaded), **CY88** (Case B radial ribbon leaded), **CY89** (Case B axial wire leaded)

ATC 100, ATC 700 CAPACITANCE TOLERANCES / RANGES

B (±0.1 pF) from 0.1 pF to 9.1 pF
C (±0.25 pF) from 0.3 pF to 9.1 pF
D (±0.5 pF) from 0.5 pF to 6.2 pF
F (±1%) from 10 pF to 5100 pF
G (±2%) from 10 pF to 5100 pF
J (±5%) from 6.8 pF to 5100 pF
K (±10%) from 6.8 pF to 5100 pF
M (±20%) from 6.8 pF to 5100 pF

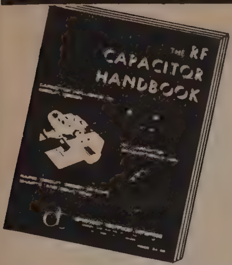
Series	Size	Capacitance Values	DC Working Voltage
ATC 100	Case A Case B	0.1 pF to 100 pF 0.1 pF to 1000 pF	50 volts 50-1000 volts (see catalog)
ATC 700	Case A Case B	47 pF to 1000 pF 200 pF to 5100 pF	50 volts 50 volts

ATC 100, ATC 700 CAPACITANCE VALUES

0.1	1.4	3.6	12	43	150	510	1800
0.2	1.5	3.9	13	47	160	560	2000
0.3	1.6	4.3	15	51	180	620	2200
0.4	1.7	4.7	16	56	200	680	2400
0.5	1.8	5.1	18	62	220	750	2700
0.6	1.9	5.6	20	68	240	820	3000
0.7	2.0	6.2	22	75	270	910	3300
0.8	2.1	6.8	24	82	300	1000	3600
0.9	2.2	7.5	27	91	330	1100	3900
1.0	2.4	8.2	30	100	360	1200	4300
1.1	2.7	9.1	33	110	390	1300	4700
1.2	3.0	10	36	120	430	1500	5000
1.3	3.3	11	39	130	470	1600	5100

CAPACITOR

FOR 1975 CATALOG, RF CAPACITOR HANDBOOK, OR CAPACITOR SAMPLES, CONTACT ATC AT



The RF Capacitor Handbook presents over 200 pages of comprehensive detail for design considerations and uses for miniature chip and leaded RF capacitors. You'll find theoretical and empirical high-frequency circuit design equations, characteristics of capacitor dielectrics, especially at high RF power levels and frequencies, actual test data at frequencies from 100 MHz to 3 GHz, and practical design methods for increasing gain and power, DC to RF conversion efficiency, bandwidth, transistor lifetime, circuit MTBF, and low-noise performance.

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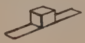
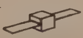
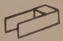
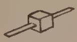
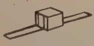
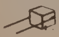
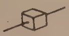
ATC 100 CHIPS AND LEADED DEVICES

CHIPS (PdAg terminations)			DIMENSIONS		
MILITARY CODE	CASE SIZE	TYPE	LENGTH	WIDTH	THICKNESS
CY81	A	Chip	.055 ± .010 in. 1.4 ± .25 mm.		.055 in. max. 1.4 mm. max.
CY83	B	Chip	.110 ± .015 in. 2.79 ± .38 mm.		.100 in. max. 2.54 mm. max.

PELLETS (solder coated chips)			DIMENSIONS		
MILITARY CODE	CASE SIZE	TYPE	LENGTH	WIDTH	THICKNESS
CY82	A	Pellet	.080 in. max. 2.03 mm. max.	.055 ± .010 in. 1.4 ± .25 mm.	.055 in. max. 1.4 mm. max.
CY84	B	Pellet	140 in. max. 3.56 mm. max.	.110 ± .015 in. 2.79 ± .38 mm.	.100 in. max. 2.54 mm. max.

LEADED CAPACITORS (CASE B)			LEAD DIMENSIONS LEAD MATERIAL: SILVER RIBBON & SILVER WIRE		
MILITARY CODE	LEAD STYLE		LENGTH	WIDTH	THICKNESS
CY85	Micro-strip		.250 in. min. 6.35 mm. min.	0.093 ± .005 in. 2.36 ± .13 mm.	.004 ± .001 in. .102 ± .025 mm.
CY86	Axial Ribbon				
CY88	Radial Ribbon				
	Narrow Axial Ribbon			.050 ± .005 in. 1.27 ± .13 mm.	.006 ± .003 in. .153 ± .076 mm.
	Narrow Micro-strip				
CY87	Radial Wire		.500 in. min. 12.7 mm. min.	≠26 AWG, nom. .016 in. dia. nom. .375 mm. dia.	
CY89	Axial Wire				

ATC 700 ULTRA-STABLE CERAMIC CAPACITORS

- True Zero T.C.
- 47 pF to 5100 pF standard
- No Piezoelectric Effects
- No Aging effects
- 1000 pF in 55 mil cube

APPLICATIONS

Excellent for low power levels at UHF frequencies as DC blocks and emitter bypasses . . . superior in VHF low power high-stability tank circuits for variable-frequency oscillators, and H.F. discriminators . . . reduces variation due to temperature in low frequency filters . . . permits predictable RC timing circuits . . . replaces mica, polystyrene and teflon dielectric capacitors with much greater capacity values per unit volume and improved environmental characteristics.

CHARACTERISTICS

Capacitance Values: Case A, from 47 pF to 1000 pF; Case B, from 200 pF to 5100 pF
Tolerances: F (±1%); G (±2%; J (±5%); K (±10%); M (±20%)
Working Voltage: 50 WVDC
Temperature Coefficient of Capacitance: 0 ± 30 PPM/°C (-55°C to +125°C)
Dissipation Factor: .0005 max @1 KHz except .001 for Case A > 470 pF
Insulation Resistance: 10^5 megohms min @ 25°C, 10^4 megohms min @ 125°C
Dielectric Test Voltage: 300% rated voltage for 5 secs
Operating Temperature Range: -55°C to +125°C

ATC 700 capacitors meet MIL-C-55681

KITS ?? SEE THE FOLLOWING PAGES

ONE NORDEN LANE, HUNTINGTON STATION, NEW YORK 11746 (516) 271-9600•TWX 510-226-6993

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ATC 100 UHF/MICROWAVE

CASE A mini-cubes®

ATC 100 A EVALUATION KIT SERIES

KIT ATC 1001C-AC:	palladium silver	$ 29.95
KIT ATC 1001C-AP:	pelletized*	$ 39.95

40 capacitors, four each of ten values and tolerances:

pF	Tol	pF	Tol	pF	Tol	pF	Tol	pF	Tol
1.0	B	2.7	D	4.7	D	12	K	47	K
1.8	C	3.3	D	8.2	K	22	K	82	K

ATC 100 A TRIM KIT™ SERIES

KIT ATC 1002C-AC:	palladium silver	$ 99.95
KIT ATC 1002C-AP:	pelletized*	$129.95

144 capacitors, four each of thirty six values and tolerances:

pF	Tol	pF	Tol	pF	Tol	pF	Tol	pF	Tol
0.3	B	1.0	B	1.7	B	2.7	B	5.1	C
0.4	B	1.1	B	1.8	B	3.0	B	5.6	C
0.5	B	1.2	B	1.9	B	3.3	C	6.2	C
0.6	B	1.3	B	2.0	B	3.6	C	6.8	J
0.7	B	1.4	B	2.1	B	3.9	C	7.5	J
0.8	B	1.5	B	2.2	B	4.3	C	8.2	J
0.9	B	1.6	B	2.4	B	4.7	C	9.1	J
								10	J

ATC 100 A DESIGNER KIT SERIES

KIT ATC 1003C-AC:	palladium silver	$119.95
KIT ATC 1003C-AP:	pelletized*	$149.95

125 capacitors, five each of twenty five values and tolerances:

pF	Tol	pF	Tol	pF	Tol	pF	Tol	pF	Tol
1.0	B	2.7	C	6.8	J	18	J	47	J
1.3	B	3.3	C	8.2	J	22	J	56	K
1.6	B	3.9	C	10	J	27	J	68	K
1.9	B	4.7	C	12	J	33	J	82	K
2.1	B	5.6	C	15	J	39	J	91	K

CASE B MAXI-"Q"UBES ™

ATC 100 B EVALUATION KIT SERIES

KIT ATC 1011C-BC:	palladium silver	$ 59.95
KIT ATC 1011C-BP:	pelletized*	$ 69.95
KIT ATC 1011C-BMS:	microstrip	$ 89.95
KIT ATC 1011C-BRW:	radial wire	$ 89.95

60 capacitors, four each of fifteen values and tolerances:

pF	Tol	pF	Tol	pF	Tol	pF	Tol	pF	Tol
1.0	C	5.6	D	16	J	51	J	200	J
2.2	D	7.5	D	24	J	75	J	470	M
3.6	D	11	J	36	J	100	J	620	M

ATC 100 B TRIM KIT™ SERIES

KIT ATC 1012C-BC:	palladium silver	$149.95
KIT ATC 1012C-BP:	pelletized*	$179.95
KIT ATC 1012C-BMS:	microstrip	$219.95

144 capacitors, four each of thirty six values and tolerances:

pF	Tol	pF	Tol	pF	Tol	pF	Tol	pF	Tol
0.3	B	1.0	B	1.7	B	2.7	B	5.1	C
0.4	B	1.1	B	1.8	B	3.0	B	5.6	C
0.5	B	1.2	B	1.9	B	3.3	C	6.2	C
0.6	B	1.3	B	2.0	B	3.6	C	6.8	J
0.7	B	1.4	B	2.1	B	3.9	C	7.5	J
0.8	B	1.5	B	2.2	B	4.3	C	8.2	J
0.9	B	1.6	B	2.4	B	4.7	C	9.1	J
								10	J

ATC 100 B DESIGNER KIT SERIES

KIT ATC 1013C-BC:	palladium silver	$249.95
KIT ATC 1013C-BP:	pelletized*	$299.95
KIT ATC 1013C-BMS:	microstrip	$279.95

250 capacitors, five each of fifty values and tolerances:

pF	Tol	pF	Tol	pF	Tol	pF	Tol	pF	Tol
0.3	B	2.7	C	9.1	J	36	J	200	K
0.4	B	3.0	C	10	J	43	J	220	K
0.5	B	3.3	C	11	J	47	J	240	K
0.6	B	3.6	C	13	J	56	K	300	K
0.7	B	4.3	C	16	J	62	K	360	M
0.9	B	5.6	C	18	J	68	K	430	M
1.2	B	6.2	C	24	J	91	K	470	M
1.5	C	6.8	J	27	J	130	K	510	M
1.8	C	7.5	J	30	J	160	K	560	M
2.2	C	8.2	J	33	J	180	K	620	M

*Pelletized chips are palladium silver chip capacitors, solder coated.

Silver bearing solder included with each kit (372°F solder, 62% Sn, 36% Pb, 2% Ag).

TOLERANCE CODE: B=±0.1 pF; C=±0.25 pF; D=±0.5 pF; F=±1%; G=±2%; J=±5%; K=±10%; M=±20%

CAPACITOR KITS

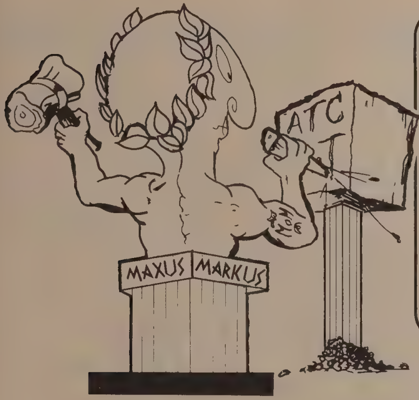
Actual Size:
55 mil cube

american technical ceramics

MARKED

ATC 100 UHF/MICROWAVE CAPACITOR KITS

DESIGN VALUES: 40 MARKED POPULAR VALUES IMMEDIATELY AVAILABLE IN PROTOTYPE AND PRODUCTION QUANTITIES (BACKED BY A STOCK OF OVER ONE MILLION CHIPS IN THE DESIGN VALUES SHOWN BELOW). MARKING MEETS MIL-STD-202, METHOD 215 AND IS UNAFFECTED BY ALL COMMONLY USED SOLVENTS AND TEMPERATURES TO 1500°F.



DESIGN VALUE KIT C1
mini-cube® A trim kit
(55 mil cube)

QTY.	CASE	CAP. (pF)	TOL.
10	A	0.1	B
10	A	0.5	B
10	A	0.8	B
10	A	1.8	B
10	A	3.3	B
10	A	4.7	C
10	A	6.2	C
10	A	8.2	C
10	A	9.1	C
10	A	10.0	J

DESIGN VALUE KIT C2
mini-cube® A Tune Kit
(55 mil cube)

QTY.	CASE	CAP. (pF)	TOL.
10	A	12.0	J
10	A	15.0	J
10	A	18.0	J
10	A	22.0	J
10	A	27.0	J
10	A	33.0	J
10	A	47.0	J
10	A	62.0	J
10	A	82.0	J
10	A	100.0	M

DESIGN VALUE KIT C3
MAXI-"Q"UBE™ B trim kit
(110 mil cube)

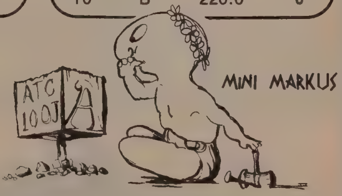
QTY.	CASE	CAP. (pF)	TOL.
10	B	1.6	C
10	B	1.8	C
10	B	2.4	C
10	B	4.7	C
10	B	5.6	C
10	B	6.2	C
10	B	7.5	C
10	B	8.2	K
10	B	10.0	K
10	B	12.0	K

DESIGN VALUE KIT C4
MAXI-"Q"UBE™ B Tune Kit
(110 mil cube)

QTY.	CASE	CAP. (pF)	TOL.
10	B	18.0	K
10	B	24.0	J
10	B	27.0	K
10	B	30.0	J
10	B	43.0	J
10	B	68.0	J
10	B	110.0	J
10	B	120.0	J
10	B	180.0	J
10	B	220.0	J

BUY ANY DESIGN VALUE KIT OF 100 ATC 100 LOW LOSS PORCELAIN CHIP CAPACITORS FOR $77.00.

To place your order for any ATC capacitor kits, write directly to the address below; for immediate delivery, call (516) 271-9600.

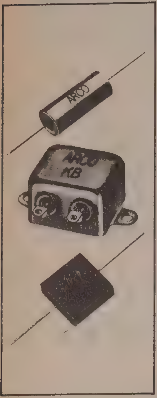


tomorrow's capacitors....today

mini-cube® is a registered trademark, and MAXI-"Q"UBE™ and TRIM KIT™ are proprietary trademarks of ATC.

ONE NORDEN LANE, HUNTINGTON STATION, NEW YORK 11746 • 516/271-9600 • TWX 510-226-6993

Arco Electronics, Inc. PFC Manufacturing Division ARCO ELECTRONICS precision polystyrene capacitors



ZERO TEMPERATURE COEFFICIENT

TYPE KT TUBULAR

TYPE KB RECTANGULAR BATHTUB CANS

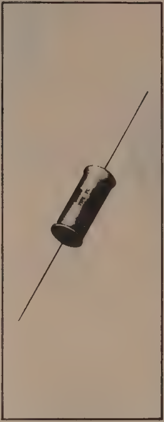
HERMETICALLY SEALED — METAL CASE

TYPE KE FLAT EPOXY ENCAPSULATED

A unique combination of Polystyrene and Mica dielectrics resulting in a capacitor offering a truly ZERO TEMPERATURE COEFFICIENT (±10 ppm/°C from −55°C to +85°C standard production) with the ultimate in long term STABILITY. Type KT and KB capacitors will meet or exceed all requirements of MIL-C-19978, where applicable, under ALL ENVIRONMENTAL CONDITIONS specified therein.

ARCO Type KT, KB, and KE capacitors provide the utmost in performance for PRECISION-OSCILLATORS, TIMING CIRCUITS, and RC NETWORKS.

BURN-IN: All ARCO capacitors are subjected to a minimum of two 16 hour burn-in periods with 300% of rated voltage applied at 85°C.



SUPERIOR ENVIRONMENTAL PROTECTION AT LOW COST — SMALLEST SIZE

TYPE PC & PJ TUBULAR

TYPE SC & SJ TUBULAR

The unique design of ARCO Type PC capacitors provides physical and electrical stability, ruggedness and strength of termination, and excellent uniformity in production. All these features enable tight control of the narrow specification limits published. Type PC offers the smallest, lowest cost construction available, while retaining optimum performance characteristics.

The Type PC enclosure provides unusual protection against moisture, solvents and inadvertent contact with a soldering iron. The rugged, heat resistant jacket material makes Type PC particularly suited to printed circuit dip-solder assemblies subject to solvent cleaning and also to densely packed component structures where there is danger of damage to adjacent units while making solder connections.

Extensive evaluation has confirmed the excellent moisture resistance of the Type PC (surpassed only by metal cased enclosures) and its conformance to the most stringent shock and vibration specifications.

Type PC capacitors are exceptionally well suited for PRECISION FILTERS, DELAY LINES, and PRECISION TIMING CIRCUITS, where small size and excellence of performance are mandatory at LOW COST.

GENERAL SPECIFICATIONS

OPERATING TEMPERATURE RANGE: The ARCO capacitor types listed can be used for continuous operation from −55°C to +85°C without derating. Transient exposure to +95°C will have NO DELETERIOUS effect.

CAPACITANCE TOLERANCE: ARCO specializes in precision capacitors. Available from standard production are tolerances of ±10%, ±5%, ±3%, ±2%, ±1%, ±½%, ±¼%, ±0.1%.

VOLTAGE RATING: All ARCO capacitors are available in 100, 200, 400, 600 and 1,000 Volts DC ratings. Special voltages can be supplied upon request or to specification.

SPECIFICATIONS

DISSIPATION FACTOR: When measured at or referred to 1 kHz the dissipation factor shall not exceed the following:

.001 @ 23°C

INSULATION RESISTANCE: Insulation resistance when measured at the applicable test temperature, shall equal or exceed the following values:

	23°C	*85°C
megohm x mfd	10^5	10^3
except the insulation resistance in megohms need not exceed	10^6	10^4

***NOTE:** Verified on 100% of production.

STABILITY: Long term (1 year) capacitance drift under maximum operating conditions shall not exceed ±0.05%.

TEMPERATURE COEFFICIENT: The temperature coefficient of ARCO Type KT, KB, and KE capacitors is truly zero, they are usually produced to a tolerance of ±10 ppm/°C. They can also be produced to zero ±5 ppm°/C. The linearity of the temperature coefficient regardless of tolerance is ±1 ppm/°C. Other temperature coefficient centers may be supplied within the range of −100 to +20 ppm/°C. THE TEMPERATURE COEFFICIENT OF THESE CAPACITORS is tested on a 100% basis. Data verifying these tests can be supplied at NO EXTRA COST as requested.

DIELECTRIC ABSORPTION: When tested in accordance with paragraph 4.6.15 of MIL-C-19978, the dielectric absorption shall not exceed 1.0% over the entire operating temperature range.

CONSTRUCTION: The ARCO Type KT, KB, and KE capacitors are constructed by a unique combination of polystyrene dielectric sections with a linear negative temperature coefficient cross compensating a mica dielectric capacitor section with a linear positive TC. The polystyrene capacitor section is wound with a SOLID CORE in the center for optimum stability, and is terminated with a disc lead assembly soldered directly to the extended foil for a completely NON-INDUCTIVE construction resulting in the lowest possible contact resistance. The mica capacitor section is the well known Arco capacitor exhibiting highest reliability and performance characteristics. The individual capacitor sections as well as their combination have been constructed so as to guarantee all performance characteristics listed as well as complete FREEDOM FROM MICROPHONISM.

SPECIFICATIONS

DISSIPATION FACTOR: When measured at or referred to 1 kHz the dissipation factor shall not exceed the following:

.0001 @ 23°C .0002 @ 85°C

INSULATION RESISTANCE: Insulation resistance when measured at the applicable test temperature, shall equal or exceed the following values:

	23°C	*85°C
megohm x mfd	10^6	1.5×10^5
except the insulation resistance in megohms need not exceed	2×10^6	3×10^5

***NOTE:** Verified on 100% of production.

DIELECTRIC ABSORPTION: When tested in accordance with paragraph 4.6.15 of MIL-C-19978, the dielectric absorption shall not exceed 0.05% over the entire operating temperature range.

STABILITY: Long term (1 year) capacitance drift under maximum operating conditions shall not exceed the following limits for the types listed:

Type PC & PJ	±0.1%	Type SC & SJ	±0.05%

TEMPERATURE COEFFICIENT: The temperature coefficient of all the ARCO capacitor types herein listed is negative 120 ±15 ppm/°C.

CONSTRUCTION: The ARCO precision polystyrene capacitors Types PC and SC are encased in an irradiated polyolefin jacket sealed with bonded silicone rubber. Types PJ & SJ are encased in a silicone treated fused polystyrene jacket. This unique construction economically protects the excellent electrical characteristics exhibited in Types PC and SC and is primarily intended for use where they will not be subjected to the following hazards:

1. Physical damage due to excessive heat during dip or flow solder assembly.
2. Solvent damage during cleaning operations.
3. Exposure to excessive humidity for prolonged periods of time.

All types herein listed are wound with a SOLID CORE in the center for optimum stability, and are terminated with a disc lead assembly soldered directly to the extended foil for a completely NON-INDUCTIVE construction resulting in the lowest possible contact resistance and exhibiting complete FREEDOM FROM MICROPHONISM.

---

precision RC networks

THE ULTIMATE IN TEMPERATURE COEFFICIENT CONTROL OF RC PRODUCT

LINEAR TC OF ±5 PPM/°C OVER TEMPERATURE RANGE OF −55°C TO +85°C

ARCO's ability to produce capacitors with adjustable and closely uniform characteristics has facilitated the design of highly precise RC networks. By matching zero temperature coefficient resistors and capacitors, or by balancing temperature coefficients to obtain a zero (or other specified) T.C. on the RC product, networks which have long term stability independent of temperature are obtained. At the same time, RC products of better than ±0.05% accuracy can be supplied. Testing is performed on a 100% basis on both resistors and capacitors with temperature coefficient data recorded at the temperature extremes.

Arco

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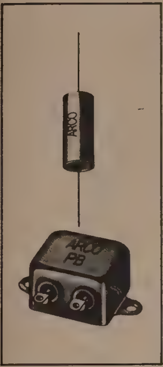
ARCO Electronics, Inc.

PFC Manufacturing Division ARCO ELECTRONICS

precision polystyrene capacitors



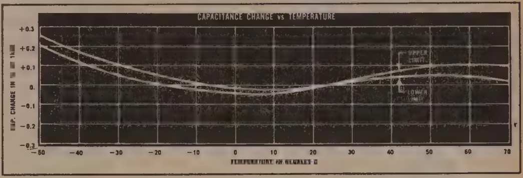
FOR MILITARY APPLICATIONS AND HOSTILE ENVIRONMENTS
TYPE PT, & ST TUBULAR
TYPE PB, & SB RECTANGULAR BATHTUB CANS
HERMETICALLY-SEALED — METAL CASE

Design innovations and extreme care in production have enabled ARCO to approach the optimum performance characteristics of the polystyrene film. These capacitors will exceed all performance requirements of MIL-C-19978 under ALL ENVIRONMENTAL CONDITIONS specified therein. ARCO polystyrene capacitors were specifically designed for the most critical applications where requirements for extremely high insulation resistance, high Q, extraordinary stability, close tolerance, and low dielectric absorption and dissipation factor are mandatory. These capacitors are intended primarily for use in ANALOG and DIGITAL COMPUTERS, CALCULATORS, HIGH Q TUNED CIRCUITS, INTEGRATORS, PRECISION FILTER CIRCUITS, PULSE NETWORKS, SERVO SYSTEMS, and as REFERENCE CAPACITORS.

TEMPERATURE-STABLE SMALL SIZE
TYPE HT TUBULAR
TYPE HB RECTANGULAR BATHTUB CANS
HERMETICALLY SEALED — METAL CASE

An exclusive ARCO design modifying the temperature characteristics of the dielectric film to provide capacitors insensitive to temperature changes (±0.1% change to 85°C). Type HT and HB capacitors will meet ALL ENVIRONMENTAL REQUIREMENTS OF MIL-C-19978.

ARCO Type HT and HB capacitors are specifically designed for INTEGRATORS, PRECISION TIMING CIRCUITS, and PRECISION RC NETWORKS.



GENERAL SPECIFICATIONS

OPERATING TEMPERATURE RANGE: The ARCO capacitor types listed can be used for continuous operation from −55°C to +85°C without derating. Transient exposure to +95°C will have NO DELETERIOUS effect.

CAPACITANCE TOLERANCE: ARCO specializes in precision capacitors. Available from standard production are tolerances of ±10%, ±5%, ±3%, ±2%, ±1%, ±½, ±¼%, ±0.1%.

DIELECTRIC ABSORPTION: When tested in accordance with paragraph 4.6.15 of MIL-C-19978, the dielectric absorption shall not exceed 0.05% over the entire operating temperature range.

INSULATION RESISTANCE: Insulation resistance when measured at the applicable test temperature, shall equal or exceed the following values:

	23°C	*85°C
megohm x mfd	10^6	1.5×10^5
except the insulation resistance in megohms need not exceed	10^8	10^6

***NOTE:** Verified on 100% of production.

CONSTRUCTION: All ARCO precision polystyrene capacitor types here listed are hermetically sealed in metal cases with compression glass-to-metal, solder-sealed terminals. They are wound with a SOLID CORE in the center for optimum stability, and are terminated with a disc lead assembly soldered directly to the extended foil for a completely NON-INDUCTIVE construction resulting in the lowest possible contact resistance and exhibiting complete FREEDOM FROM MICROPHONISM.

SPECIFICATIONS

DISSIPATION FACTOR: When measured at or referred to 1 kHz the dissipation factor shall not exceed the following:

.0001 @ 23°C .0002 @ 85°C

VOLTAGE RATING: All ARCO capacitors are available in 100, 200, 400, 600 and 1,000 Volts DC ratings. Special voltages can be supplied upon request or to specification.

STABILITY: Long term (1 year) capacitance drift under maximum operating conditions shall not exceed the following limits for the types listed:

Type PT & PB ±0.1% Type ST & SB ±0.05%

TEMPERATURE COEFFICIENT: The following temperature coefficient variants are available:

Type PT & PB negative 120 ±15 ppm/°C
Type ST & SB negative 120 ±15 ppm/°C

SPECIFICATIONS

DISSIPATION FACTOR: When measured at or referred to 1 kHz the dissipation factor shall not exceed 0.002 @ 23°C.

VOLTAGE RATING: ARCO Type HT and HB capacitors are produced in 100 Volt DC rating. Other voltages to 1,000 volts can be supplied upon request.

STABILITY: Long term (1 year) capacitance drift under maximum operating conditions shall not exceed ±0.1%.

TEMPERATURE COEFFICIENT: The temperature coefficient of ARCO Type HT and HB capacitors is controlled so that the variation of capacitance from room temperature to 85°C is less than ±0.1%; from room temperature to −55°C variation is less than ±0.25%. Tighter control is available to special order (±0.05% from 10°C to 50°C).

BURN-IN: All ARCO capacitors are subjected to a minimum of two 16 hour burn-in periods with 300% of rated voltage applied at 85°C.

---

new products

precision polypropylene capacitors

TYPE PPT TUBULAR HERMETICALLY SEALED METAL CASE

ARCO's unique design innovations and extreme care in production has resulted in a polypropylene capacitor approaching the performance parameters of polystyrene. With polypropylene dielectric there is approximately a 50% reduction in size. These capacitors can also be operated to 125°C without derating voltage. ARCO polypropylene capacitors are excellent for all critical applications which require high insulation resistance, high Q, extreme stability, close tolerance, low dielectric absorption and dissipation factor. The temperature coefficient makes an excellent choice for high Q tuned circuits, precision filter circuits, pulse networks and RC circuits.

SPECIFICATIONS

OPERATING TEMPERATURE RANGE: The ARCO capacitor types listed can be used for continuous operation from −55°C to +125°C without derating.

CAPACITANCE TOLERANCE: ARCO specializes in precision capacitors. Available from standard production are tolerances of ±10%, ±5%, ±3%, ±2%, ±1%, ±½%, ±¼%.

DIELECTRIC ABSORPTION: When tested in accordance with paragraph 4.6.15 of MIL-C-19978, the dielectric absorption shall not exceed .05% over the entire operating temperature range.

STABILITY: Long term (1 year) capacitance drift under maximum operating conditions shall not exceed:

±0.1% to 105°C ±0.2% to 125°C

DISSIPATION FACTOR: When measured at or referred to 1 kHz the dissipation factor shall not exceed the following:

.0002 @ 23°C .0003 @ 85°C

INSULATION RESISTANCE: Insulation resistance when measured at the applicable test temperature, shall equal or exceed the following values:

	23°C	*85°C	105°C	125°C
Megohm x mfd	10^6	1.5×10^5	10^5	10^4
Except the insulation resistance in megohms need not exceed	10^7	1.5×10^6	10^6	10^5

***NOTE:** Verified on 100% of production.

TEMPERATURE COEFFICIENT:
Negative 200 ±30 ppm/°C from room temperature to −55°C
Negative 350 ±30 ppm/°C from room temperature to +105°C

BURN-IN: All ARCO capacitors are subjected to a minimum of two 16 hour burn-in periods with 300% of rated voltage applied at 85°C.

CONSTRUCTION: ARCO Type PPT capacitors are hermetically sealed in metal cases with compression glass-to-metal, solder-sealed terminals. They are wound with a SOLID CORE in the center for optimum stability, and are terminated with a disc lead assembly soldered directly to the extended foil for a completely NON-INDUCTIVE construction resulting in the lowest possible contact resistance and exhibiting complete FREEDOM FROM MICROPHONISM.

ARCO

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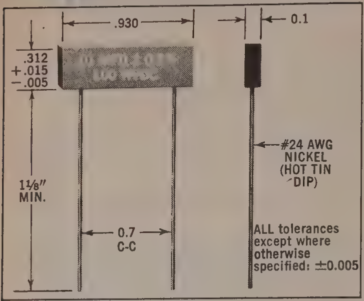
Arco Electronics, Inc. PFC precision polystyrene capacitors

Manufacturing Division
ARCO ELECTRONICS


.930
0.1
.312
+.015
−.005
.01 MFD ±5%
100 WVDC
#24 AWG
NICKEL
(HOT TIN
DIP)
1⅛"
MIN.
0.7
C-C
ALL tolerances
except where
otherwise
specified: ±0.005

TYPE PE

ARCO Electronics announces availability of a new polystyrene dielectric capacitor with a thin configuration specifically designed for conservation of space in printed circuits and in filters. Flat polystyrene sections are encapsulated in uniform epoxy preforms to provide the following features:

0.1" THICKNESS

Uniform lead spacing for p-c use.
Uniform size and flush mounting.
Both weldable and solderable leads.
Rugged, moisture proof construction.

ACTUAL
SIZE
2NI2
2NI2

WELDABLE LEADS
Nickel "A"
(solderable, too)
0.7" spacing

SPACE SAVERS
10 capacitors
per inch
.312" high
Flush mount

In addition to the physical advantages of this design, the electrical excellence of ARCO polystyrenes has been retained. High long term stability under maximum operating conditions, low dissipation factor and dielectric absorption, extremely high insulation resistance, close tolerance are featured. And also important is the ARCO control of quality which results in close uniformity not only from unit to unit, but from production lot to production lot as well.

The Nickel "A" leads of ARCO Type PE capacitors are welded directly to the capacitor section. The strength and permanence of electrical contact is thereby entirely independent of encapsulation.

All ARCO Type PE capacitors are "debugged" 100% prior to shipment by accelerated life test at stress levels exceeding ratings to eliminate potential early failures.

SPECIFICATIONS

CAPACITANCE RANGE: .001 to .01 mfd (lower and higher values are available upon request). Max. value .015 mfd.

TOLER.: ±5%, ±2%, ±1%, ±½%, ±¼%, ±0.1%.

VOLTAGE RATING: 100 VDCW.

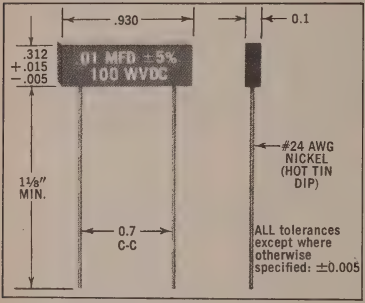
INSULATION RESISTANCE: 10^{13} ohms minimum @ 25°C, 10^{12} ohms @ 85°C.

DISSIPATION FACTOR: 0.01% maximum @ 25°C, 0.02 maximum @ 85°C.

DIELECTRIC ABSORPTION: 0.05% maximum at all temperatures.

TEMP. COEFFICIENT: Negative 190 ±30 ppm/°C.

LONG TERM OPERATING STABILITY: ±0.1% maximum drift under fixed or variable operating conditions within specified maximum limits.


.930
0.1
.312
+.015
−.005
.01 MFD ±5%
100 WVDC
#24 AWG
NICKEL
(HOT TIN
DIP)
1⅛"
MIN.
0.7
C-C
ALL tolerances
except where
otherwise
specified: ±0.005

TYPE LE, PRECISION POLYCARBONATE CAPACITORS

SPECIFICATIONS

CAPACITANCE RANGE: .001 to .025 MFD.

OPERATING TEMPERATURE: −55°C to +105°C.

DISSIPATION FACTOR: shall not exceed .3% maximum @ 25°C when measured @ 1 KHZ.

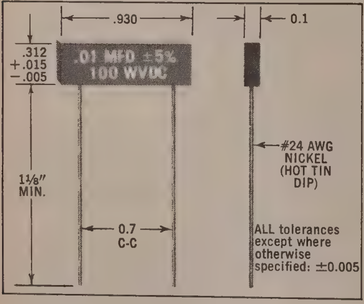
DIELECTRIC ABSORPTION: 0.5% max. @ 25°C.

LONG TERM STABILITY: ±0.2% max, for +10°C to +40°C Range ±2% max. under maximum operating conditions.

INSULATION RESISTANCE: 200,000 megohms @ 25°C.

TEMPERATURE COEFFICIENT: Capacitance charge will not exceed ±2% of the room temperature value over the entire operating temperature range.

TOLERANCES: ±5%, ±2%, ±1%.


.930
0.1
.312
+.015
−.005
.01 MFD ±5%
100 WVDC
#24 AWG
NICKEL
(HOT TIN
DIP)
1⅛"
MIN.
0.7
C-C
ALL tolerances
except where
otherwise
specified: ±0.005

TYPE EE, PRECISION POLYESTER CAPACITORS

SPECIFICATIONS

CAPACITANCE RANGE: .001 to .056 MFD.

OPERATING TEMPERATURE: −55°C to +105°C.

DISSIPATION FACTOR: Shall not exceed 1% maximum @ 25°C when measured @ 1 KHZ.

LONG TERM STABILITY: shall not exceed 10%.

INSULATION RESISTANCE: 100,000 megohms @ 25°C.
2,000 megohms @ 105°C.

TEMPERATURE COEFFICIENT: Capacitance change will not exceed:
−10% @ −55°C.
+4% @ +85°C.
+8% @ +105°C.

TOLERANCES: ±5%, ±2%, ±1%.

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ELECTRONIC COMPONENTS FOR INDUSTRY SOLD NATIONALLY THROUGH Arco DISTRIBUTORS

Arco Electronics, Inc.

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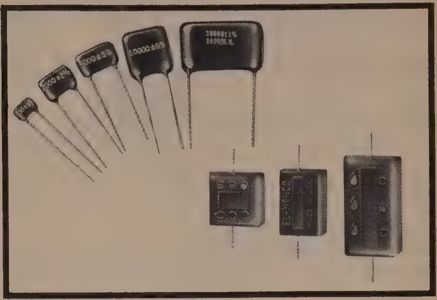
CAPACITORS

DIPPED AND MOLDED SILVERED MICA

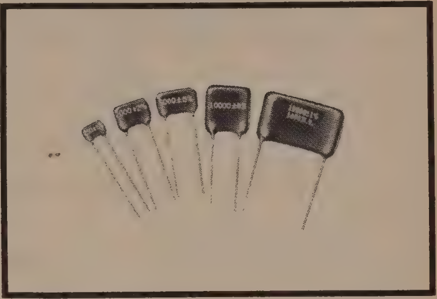
ONLY 1 FAILURE PER 43,000,000 UNIT-HOURS!



- It has been computed that "debugged" DM30, 10,000 MMF units, when subjected to 257,000 hours of life at 85°C with 100% of the rated DC voltage applied, will yield only 1 FAILURE PER 43,000,000 UNIT-HOURS!
- DM15, DM16, DM19, DM20 . . . perfect for miniaturization and for new designs using printed wiring circuits. Also available in DM30, DM42 and DM43.
- New "hairpin" parallel leads insure easy application.
- Exceed all electrical requirements of military specification MIL-C-5A.
- DM5 — subminiature completely encapsulated mica capacitors. Ideal for high density miniature applications.
- CM15, CM20, CM30, CM35 and CM42 . . . molded mica designed to meet MIL-C-5 specifications.

HIGH RELIABILITY MICA

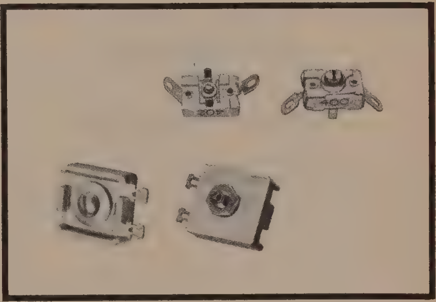
PER MIL-C-39001A



- Designed to meet the most critical design requirements.
- Types CMR04; CMR05, CMR06; CMR07 & CMR08 designed to meet MIL-C-39001A.
- Rated voltages 100, 300 and 500 VDCW.
- Temperature Ranges: 0 = −55° to +125°C
  P = −55° to +150°C
- Failure Levels: L = 2.0% per 1000 hours
  M = 1.0% per 1000 hours
  P = 0.1% per 1000 hours

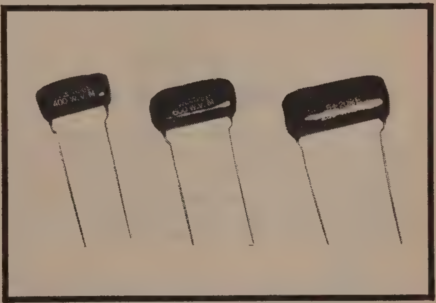
TRIMMERS/PADDERS

DESIGN VERSATILITY!



- Available in 350 VDC and 500 VDC as well as other test voltages.
- All bases are of low-loss steatite.
- Special lugs are obtainable for printed circuitry.
- Miniature units are available.
- Solder Lugs can be bent in any position without affecting the capacity setting due to the rigid construction.
- Various types of mounting brackets are available for all trimmers.
- Units can be constructed for special applications.

DIPPED TUBULARS



- Working volts DC: 100, 200, 400, 600, 1000 and 1600.
- Durez phenolic resin impregnated.
- Tolerances: ±10% and ±20% (closer tolerances available).
- Dielectric strength: 2 or 2½ times rated voltage, depending upon working voltage.
- Exceed all electrical requirements of E.I.A. specification RS-164 and military specifications MIL-C-91A and MIL-C-25A.

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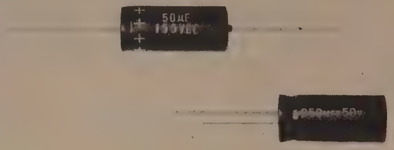
CAPACITORS

ELECTROLYTICS MINIATURE ALUMINUM ARCOLYTICS

MINIATURE ALUMINUM ELECTROLYTICS

- Ultra-small units are made for transistor circuitry and other subminiature applications.
- High quality, low cost electrolytic capacitors, with windings sealed in an aluminum can protected by a vinyl sleeve.
- Operation temperature: −30°C to +85°C.
- Available in either axial or radial lead construction.
- Available voltages: 3, 6, 12, 15, 25, 50, 100, 150, 250 and 350 VDCW.



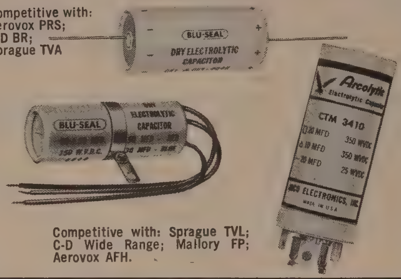
Axial and radial leads. Competitive with: Sprague TE. 30D, 500D, 502D, 503D, WH11D; C-D NLW; Mallory TT.

ARCOLYTIC CAPACITORS

TUBULAR & TWIST MOUNT ELECTROLYTICS

- Hermetically sealed in aluminum cans.
- Made with 99.99% pure aluminum foil.
- Designed for high temperature operation: 85°C.
- Suitable to withstand high surge voltages and ripple currents.
- Built and tested to meet EIA specification RS-154.
- Greater shelf, operating life and dependable performance in TV, Radio and Hi-Fi applications.
- Available in single, and multiple section units.
- Excellent moisture resistance due to construction, either hermetically sealed aluminum tube with insulating cardboard sleeves, or double insulated wax filled cardboard tubes. Supplied on tubular units only.

Competitive with:
Aerovox PRS;
C-D BR;
Sprague TVA

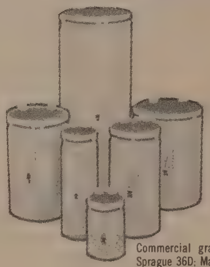


Competitive with: Sprague TVL; C-D Wide Range; Mallory FP; Aerovox AFH.

NEW PRODUCTS 85°C COMPUTER GRADE

ARCO now offers the Type ARC computer grade capacitors in the widest range of capacity and voltage available in the industry.

The ARCOLYTIC Type ARC capacitors are designed for use in computers, power supply filters, industrial controls, welders and photo flash energy storage, or any other application where high reliability, heavy duty electrolytic capacitors are required.

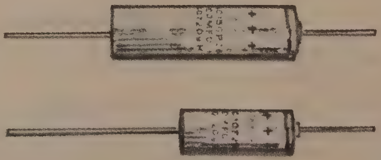


Commercial grades. Competitive with Sprague 36D; Mallory CG; GE 86F.

TUBULAR COMPUTER GRADE

ARCO Type 39A is the axial tubular version of the 85°C computer grade capacitor. These capacitors are now available in a wide variety of case sizes and standard ratings plus extra high density ratings.

ARCO 39A family capacitors are designed for use in computers, power supplies, industrial controls, energy storage or any other applications where extreme high reliability, compact size and performance are required.



Axial leads.
Competitive with Sprague 39D.

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CAPACITORS

1000VDCW CERAMIC DISCS

- Low cost, small size for by-pass and coupling applications in IF and RF circuits, where temperature coefficient is unimportant.
- Outstanding moisture resistance due to rugged phenolic coating and high temperature way impregnation.
- Conservative design provides extra reserve for resistance to surges and temporary overloads.
- Available in 1000, 3000 and 6000 VCDW, and temperature compensating (TO; NPO; N750) and stable types.
- Ideal for original equipment or for replacement.

General purpose and industrial grade. Competitive with: Sprague 5GA; Centralab DD; Aerovox GPD.

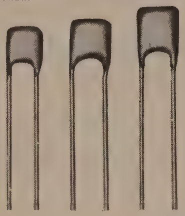
LOW VOLTAGE CERAMIC DISCS

- Inexpensive, miniature size for high density designs.
- Popular values, for Transistor circuits.
- New Low Voltage Disc Ceramics, 25, 50 and 100 VDCW.
- Small size for transistor circuitry.
- Available in ±20%, and +80% −20% tolerance.
- Values from .005 mfd to .1 mfd with Z5U or Z5V characteristics.

Competitive with: Spragues TG, HY; Centralab CK, UK, DC.

MONOLITHIC CERAMICS

- Miniature sizes for transistor circuitry.
- Available at 50, 100 VDCW.
- General Purpose, NPO and 15% Stable T.C. Types.
- Applications for Commercial Timing and Coupling Circuits.
- Capacitance Ranges from 1.0 pf thru 4.7 mfd. with ±1, 2, 5, 10 and 20% tolerances.
- Dipped Durez construction for durability.



Monolithic Ceramics
General purpose. NPO, 15% T.C. stable types. Competitive with: Erie Red-Caps; Aerovox Sky-Caps.

DIPPED TANTALUM

- Sub-miniature designs for high density packaging.
- Available in standard voltages 6.3 to 50VDCW.
- Capacitance range 0.1 to 680 MFD.
- Straight or crimped leads.
- Solid electrolyte with a highly stable oxide layer with an epoxy coating for reliability.

Competitive with
KEMIT: T360, T362
DICKSON: GS
ITT: TAG
SPRAGUE: 196D

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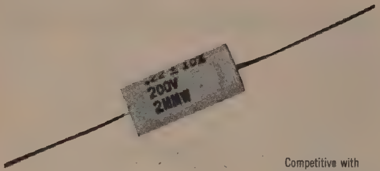
POLYESTER (MYLAR®) WRAP TYPES MW AND MWA

- Low priced film wrapped units for use in industrial electronic equipment, computers, communications and home entertainment equipment.
- Available Standard Voltages: 100, 200, 400, and 600 VDCW.
- Standard Tolerance: ±10% others on request.
- Extended Foil Construction with epoxy end-seals.
- Capacitance Range .001 to 5.0 MFD.

Competitive with
CORNELL-DUBILIER Type: WMF
SPRAGUE Type: 416P

METALIZED MYLAR® WRAP TYPE 2MMW

- Economically priced metalized film wrap units.
- Size saving over conventional film foil units.
- Voltage Rating: 200 VDC.
- Insulation Resistance: 30,000 megohms min.
- Metalized Polyester Tape - wrapped construction and end sealed with thermosetting epoxy.
- Standard tolerance: ±10%.
- Operating Temperature Range: −55°C to +85°C.
  to +125°C derated 50%



Competitive with
TRW Type: X663P
PAKTRON Type: WC.
SPRAGUE Type: 431P.

MINIATURE POLYPROPYLENE WRAP TYPE 2MP

- Small miniature design and uniform size suited for automatic insertion.
- 200 VDC working voltage.
- Operating Temperature Range: −55° to +105°C.
- Excellent Moisture Resistance.
- Capacitance Ranges .001 to .15MFD.
- Standard tolerance: ±10%.

Competitive with
PAKTRON Type: PP

MINIATURE POLYESTER (MYLAR®) WRAP TYPE 2MPT

- Highly stable units.
- Miniature designs.
- 200 VDC working voltage.
- Low inductance and high insulation resistance.
- Operating Temperature Range: −55°C to +85°C.
  to +125°C derated 50%
- Capacitance Range: .001 to .15 MFD.
- Standard Tolerance: ±10%.

Competitive with
PAKTRON Type PT
CORNELL-DUBILIER Type WMC
SPRAGUE Type 192P

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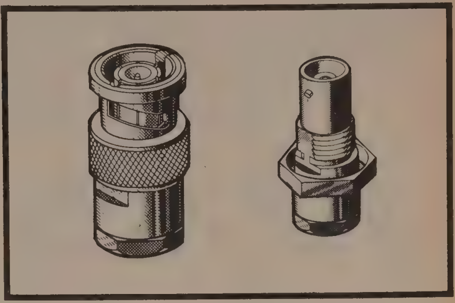
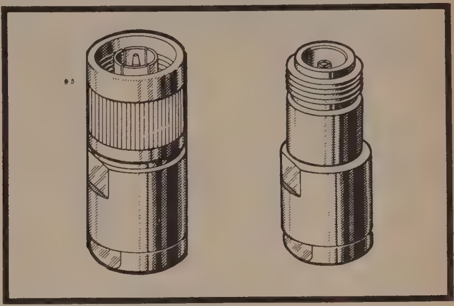
TYPE BNC

These Connectors are small and lightweight, equipped with a bayonet lock coupling for fast connection and disconnection. They are of constant impedance with a nominal value of 50 ohms and introduce little discontinuity in 50 ohm coaxial circuits. BNC's are fully weatherproofed, and rated for use where maximum voltage does not exceed 500 volts.



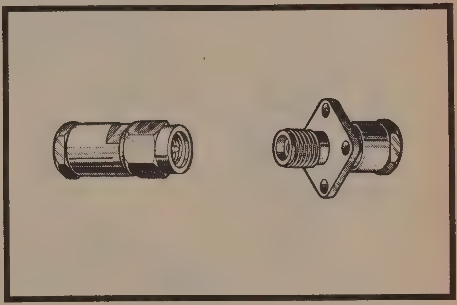
TYPE N

Recommended for use where a medium size connector with screw type coupling is desired. They are a general purpose connector of constant impedance and may be used with minimum mismatch in 50 ohm circuits. These connectors have a maximum peak rating of 1500 volts and a practical frequency limit of 10,000 mc, they are also gasketed for weatherproof operation.



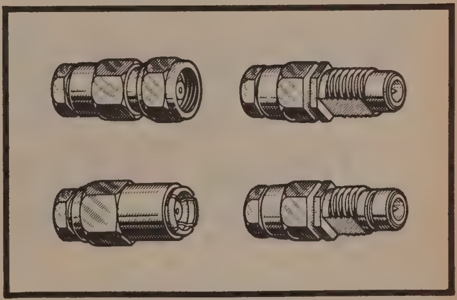
TYPE SMA

Developed to fill the need for a low VSWR general purpose connector for use at all microwave frequencies. Its inherent ruggedness, simplicity and size lend well to lower frequency usage also, it is especially well suited for systems as well as components use; with a complete range of types available. The relatively small size and low VSWR, compared to other commonly used microwave connectors, has contributed measurably to the miniaturization of microwave connectors. It also allows operation at all frequencies up to 26 GHz. Choice of materials is an important consideration. All shell and body parts are made of stainless steel for ruggedness and long life.



TYPE SMB & SMC

Designed for critical miniaturization requirements. Recommended for use in test equipment vidio lead applications, communication receivers, IF & RF circuits, or wherever miniaturization is a factor. Their rugged construction, matched impedance and excellent frequency characteristics make them well suited to missile & satellite applications. Both series are fundamentally of the same interior construction allowing outside dimensions to remain essentially constant for most cable sizes used.



ADAPTORS, JACKS & ACCESSORIES AVAILABLE

SEE OUR OTHER PAGE ON CONNECTORS PAGE 2•619

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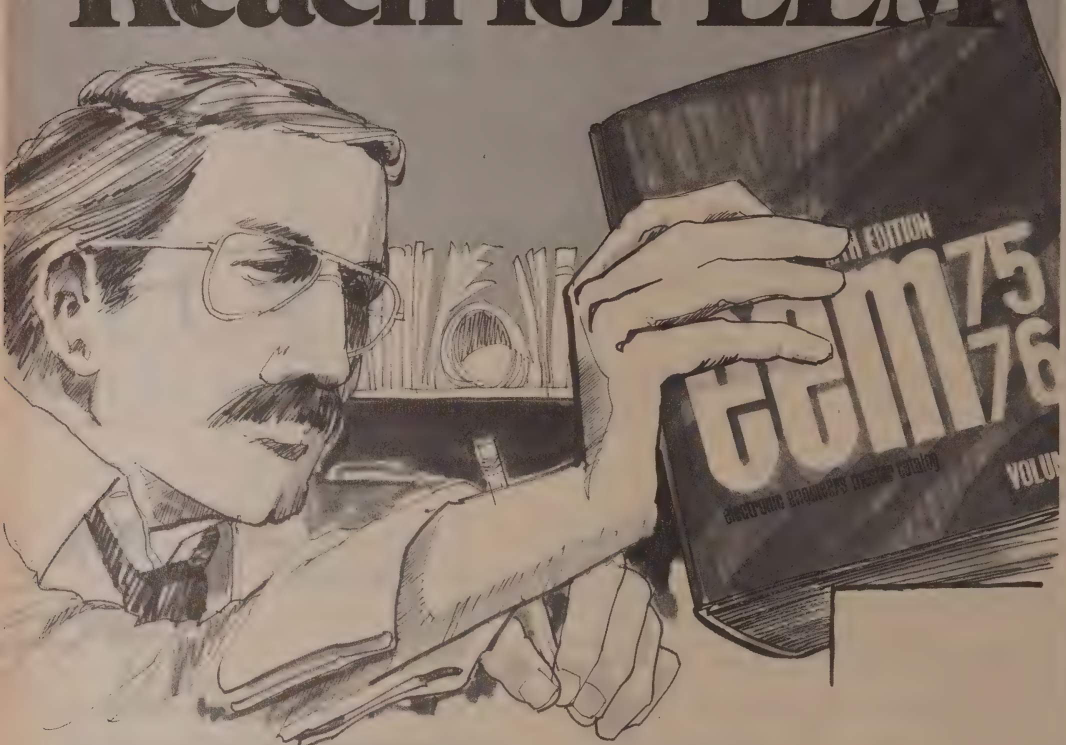

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DRIMICA CAPACITORS

High Voltage & High Reliability

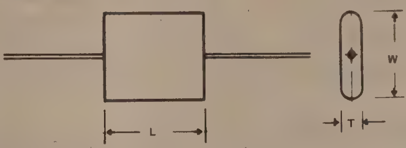
AXEL DRIMICA capacitors are used in high voltage circuits of electronic and electrical equipment. Using a solid dielectric system of reconstituted mica and thermosetting resin, AXEL capacitors are ideal for both military and industrial use where conservation of space and weight is required without compromising reliability and performance.

The dry, solid state construction permits unusual shape factors and extremely low self inductance not usually available at high voltages with oil-filled units.

Features

- High Energy Densities
- High Corona Resistance
- Low Capacitance Change with Temperature and Frequency
- High Radiation Resistance
- Dry Solid State Package — No Leaks
- No Cumbersome High Voltage Bushings
- Compatible for use in Dielectric Fluids
- Wide Temperature Capability
- Available in Mylar Wrap, Epoxy Case, Epoxy Flat Rectangular, Epoxy Flat Disc, and Epoxy Molded Enclosures

MD4AL104K
5KVDC
0.1MFD ±10%



Applications

- High Voltage DC
- Low Inductance Energy Discharge
- Pulse Forming Networks
- DC Filtering
- By-Pass
- Coupling-Blocking
- Arc Suppression
- Power Factor Correction

Meets Life requirements, Vibration and Shock, Moisture Resistance and Temperature Immersion cycling as specified in MIL-C-5, MIL-C-25, MIL-C-19978, MIL-N-23182.

DC CAPACITORS

PART NO.	WVDC	MFD	L	W	T
MD4AG254K	1000	0.25	2.12	1.82	0.19
MD4AG504K		0.50	2.12	1.82	0.37
MD4AG105K		1.0	2.12	1.82	0.72
MD4AG205K		2.0	2.12	1.82	1.42
MD4AG405K		4.0	3.25	2.07	1.45
MD4AG605K		6.0	3.25	2.07	2.16
MD4AG805K		8.0	3.25	2.07	2.87
MD4AG106K		10.0	3.25	2.07	3.58
MD4AJ104K	2000	0.10	2.12	1.40	0.18
MD4AJ254K		0.25	2.12	1.94	0.28
MD4AJ504K		0.50	2.12	1.94	0.53
MD4AJ105K		1.0	2.12	1.94	1.04
MD4AJ205K		2.0	3.25	2.90	0.78
MD4AJ405K		4.0	3.25	2.90	1.54
MD4AJ605K		6.0	3.25	2.90	2.29
MD4AL103K	3000	0.010	1.62	0.59	0.13
MD4AL253K		0.025	1.62	0.88	0.19
MD4AL503K		0.050	1.62	0.88	0.38
MD4AL104K		0.10	2.12	1.50	0.24
MD4AL254K		0.25	2.12	2.125	0.42
MD4AL504K		0.50	2.12	2.125	0.83
MD4AL105K		1.0	3.25	2.57	0.75
MD4AL205K		2.0	3.25	2.57	1.48
MD4AL405K		4.0	4.38	2.35	2.23
MD4AM103K	4000	0.010	1.62	0.68	0.22
MD4AM253K		0.025	1.62	1.02	0.31
MD4AM503K		0.050	1.62	1.02	0.62
MD4AM104K		0.10	2.12	2.03	0.35
MD4AM254K		0.25	2.12	2.50	0.69
MD4AM504K		0.50	2.12	2.50	1.34
MD4AM105K		1.0	4.38	2.28	1.05
MD4AM205K		2.0	4.38	2.28	2.07
MD4AN103K	5000	0.01	2.12	1.25	0.11
MD4AN253K		0.025	2.12	1.44	0.19
MD4AN503K		0.05	2.12	1.93	0.28
MD4AN104K		0.10	2.12	1.93	0.53
MD4AN254K		0.25	3.25	2.30	0.56
MD4AN504K		0.50	3.25	2.30	1.10
MD4AN105K		1.0	3.25	2.30	2.15
MD4AP103K	6000	0.01	2.25	1.03	0.17
MD4AP253K		0.025	3.25	1.44	0.19
MD4AP503K		0.05	3.25	1.90	0.26
MD4AP104K		0.10	3.25	1.90	0.48
MD4AP254K		0.25	4.38	2.38	0.62
MD4AP504K		0.50	4.38	2.38	1.21
MD4AP105K		1.0	4.38	2.38	2.39
MD4AR103K	7500	0.010	3.75	1.06	0.19
MD4AR253K		0.025	4.38	1.82	0.20
MD4AR503K		0.05	4.38	1.82	0.37
MD4AR104K		0.10	4.38	1.82	0.70
MD4AR254K		0.25	4.38	2.81	0.94
MD4AR504K		0.50	4.38	2.81	1.85
MD4AS103K	10,000	0.010	3.62	1.36	0.31
MD4AS253K		0.025	3.62	1.84	0.45
MD4AS503K		0.050	3.62	1.84	0.82
MD4AS104K		0.10	3.62	2.31	1.15
MD4AS254K		0.25	3.62	3.66	1.82
MD4AT502K	12,500	0.005	2.50	1.13	0.40
MD4AT103K		0.010	2.50	1.13	0.81
MD4AT253K		0.025	3.62	1.80	0.56
MD4AT503K		0.050	3.62	1.80	1.02
MD4AT104K		0.10	4.38	2.12	1.22
MD4AT254K		0.25	4.62	3.18	1.83
MD4AW252K	15,000	0.0025	3.62	0.56	0.41
MD4AW502K		0.0050	3.62	0.56	0.73
MD4AW103K		0.010	3.62	1.40	0.56
MD4AW253K		0.025	3.62	1.90	0.80
MD4AW503K		0.050	3.62	1.90	1.50
MD4AW104K		0.10	3.62	1.90	2.83
MD4AX252K	20,000	0.0025	3.62	0.71	0.56
MD4AX502K		0.0050	3.62	0.97	0.74
MD4AX103K		0.010	3.62	1.38	0.91
MD4AX253K		0.025	4.62	1.85	1.07
MD4AX503K		0.050	4.62	1.85	2.00

PULSE CAPACITORS

PART NO.	WVPK	MFD	L	W	T	MAX PRF†	MAX Ip**
MP4AF503K	600	0.05	1.88	0.68	0.25	5000	500
MP4AF104K		0.10	1.88	1.00	0.34	5000	350
MP4AF254K		0.25	2.38	1.62	0.34	5000	225
MP4AF504K		0.50	3.38	1.88	0.41	5000	150
MP4AF105K		1.0	3.38	1.88	0.81	3500	135
MP4AF205K		2.0	3.38	1.88	1.61	2300	115
MP4AG103K	1000	0.01	2.00	0.53	0.08	5000	700
MP4AG503K		0.05	2.00	0.72	0.25	5000	310
MP4AG104K		0.10	2.00	0.88	0.38	4000	250
MP4AG254K		0.25	2.00	1.43	0.53	2500	200
MP4AG504K		0.50	2.00	1.43	1.03	1500	180
MP4AG105K		1.0	4.00	2.25	0.71	1250	140
MP4AG205K		2.0	4.50	2.75	0.86	1000	110
MP4AL501K	3000	0.0005	1.25	0.62	0.15	5000	35
MP4AL102K		0.0010	1.25	0.62	0.15	5000	50
MP4AL152K		0.0015	1.50	0.62	0.15	5000	60
MP4AL252K		0.0025	1.75	0.62	0.18	5000	60
MP4AL502K		0.005	2.00	0.68	0.22	3300	65
MP4AL103K		0.010	2.00	0.68	0.44	2500	75
MP4AL253K		0.025	2.00	1.87	0.58	1500	75
MP4AL503K		0.05	2.50	2.25	0.60	1250	75
MP4AL104K		0.10	4.00	2.25	0.60	1000	75
MP4AL254K		0.25	4.50	2.75	1.00	1000	75
MP4AN501K	5000	0.0005	1.25	0.75	0.31	5000	25
MP4AN102K		0.0010	1.25	1.18	0.31	5000	25
MP4AN152K		0.0015	1.50	1.12	0.28	5000	35
MP4AN252K		0.0025	2.00	1.12	0.28	4000	50
MP4AN502K		0.005	2.50	1.50	0.31	3500	60
MP4AN103K		0.010	3.00	2.00	0.25	2500	70
MP4AN253K		0.025	3.00	2.25	0.62	1500	70
MP4AN503K		0.05	4.00	2.25	0.83	1250	70
MP4AN104K		0.10	4.50	2.75	1.10	1000	70
MP4AS501K	10,000	0.0005	1.31	1.31	0.62	5000	35
MP4AS102K		0.0010	1.50	1.50	0.62	3500	55
MP4AS152K		0.0015	1.75	1.75	0.62	3000	75
MP4AS252K		0.0025	2.00	1.75	0.62	2000	95
MP4AS502K		0.005	3.50	1.75	0.62	2000	100
MP4AS103K		0.010	4.00	2.12	0.75	1500	100
MP4AS253K		0.025	4.50	2.75	1.25	1000	100
MP4AW501K	15,000	0.0005	2.00	1.38	0.56	4000	125
MP4AW102K		0.0010	2.00	1.75	0.70	2000	125
MP4AW152K		0.0015	2.00	1.88	0.88	2000	125
MP4AW252K		0.0025	2.50	2.25	0.75	1500	170
MP4AW502K		0.005	4.00	2.25	0.75	1250	250
MP4AW103K		0.010	4.50	2.75	1.00	1000	250

† in Pulses/sec. based upon operation in still air at 25°C ambient. For higher ambients average power must be reduced accordingly or forced cooling employed.

** in Amperes

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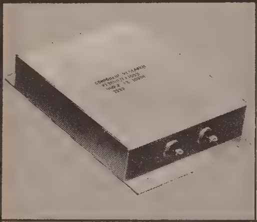
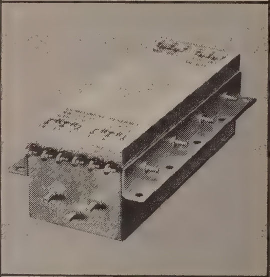
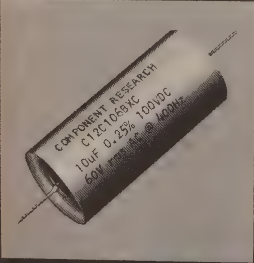
- ★ *Prices & Ordering Information*



AT LEFT: Smallest Size, highest IR, 200 uF, polycarbonate capacitor for memory applications, space guidance, and tracking stations.

AT RIGHT: Ultra-high reliability capacitor for AC applications. Has very low equivalent series resistance, is remarkably cool and efficient for its size.





AT LEFT: CRC AC-DC rated Polycarbonate capacitors are qualified to established reliability specifications, Mil-C-83421/1 and Mil-C-39022/9C.

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COMPONENT RESEARCH CATALOG J

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FOR EXPORT SALES, CONTACT M. STEWART AND CO.
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COMPONENT RESEARCH CO.

SUPPLEMENTARY CAPACITOR-INFORMATION SECTION

INDEX TO CATALOG SUPPLEMENT

CRC HAS ADDED THIS SECTION TO PROVIDE INFORMATION ON NEW PRODUCTS, UNUSUAL CAPACITOR TEST DATA, AND A COMPILATION OF MISCELLANEOUS ITEMS OF INTEREST TO DESIGNERS, COMPONENT ENGINEERS, AND RELIABILITY PERSONNEL. IN ADDITION WE ARE PLANNING TO MANUFACTURE A COMPREHENSIVE PRODUCT LINE OF STANDARD AND CUSTOM FEED-THROUGH CAPACITORS AND EMI FILTERS. WE BELIEVE THESE PRODUCTS WILL BE OF HIGHER QUALITY AND PERFORMANCE THAN ANY SIMILAR PRODUCTS NOW AVAILABLE.

MANY OF OUR CUSTOMERS NOW USING EMI FILTERS HAVE EXPRESSED DISSATISFACTION WITH THE QUALITY AND RELIABILITY OF THE FILTERS PRESENTLY AVAILABLE, AND HAVE URGED US TO ENTER THIS AREA OF INTEREST. PLEASE FORWARD TO US ANY OF YOUR REQUIREMENTS FOR CAPACITORS, NETWORKS, AND EMI FILTERS, SO THAT WE CAN DETERMINE IF WE CAN MEET YOUR NEEDS.

NEW LOCATION AFTER NOVEMBER
1655 TWENTY SIXTH STREET
SANTA MONICA, CALIFORNIA 90404

AS THIS CATALOG SUPPLEMENT IS BEING PUBLISHED, CONSTRUCTION IS BEING COMPLETED ON OUR NEW, MODERN RESEARCH AND MANUFACTURING FACILITY LOCATED A SHORT DISTANCE FROM OUR PRESENT FACILITY AT 1717 19th STREET, IN SANTA MONICA. OVER 50,000 SQUARE FEET OF MANUFACTURING, RESEARCH AND WAREHOUSE SPACE WILL BE AVAILABLE TO US TO HANDLE THE EVER INCREASING DEMAND FOR OUR ESTABLISHED RELIABILITY CAPACITORS.

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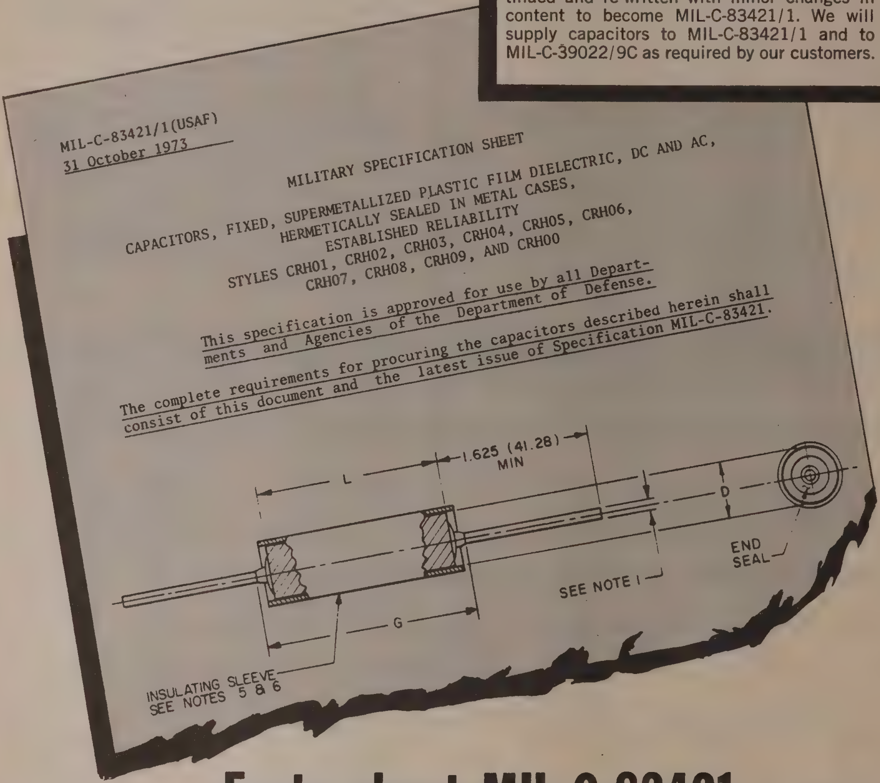
CRC PREMIUM PERFORMANCE
ESTABLISHED RELIABILITY FILM CAPACITORS

QUALIFIED TO MIL-C-83421/1 & *MIL-C-39022/9C

* **MIL-C-39022/9B and /9C** have been discontinued and re-written with minor changes in content to become MIL-C-83421/1. We will supply capacitors to MIL-C-83421/1 and to MIL-C-39022/9C as required by our customers.



MIL-C-83421/1(USAF)
31 October 1973

MILITARY SPECIFICATION SHEET

CAPACITORS, FIXED, SUPERMETALLIZED PLASTIC FILM DIELECTRIC, DC AND AC, HERMETICALLY SEALED IN METAL CASES, ESTABLISHED RELIABILITY

STYLES CRH01, CRH02, CRH03, CRH04, CRH05, CRH06, CRH07, CRH08, CRH09, AND CRH00

This specification is approved for use by all Departments and Agencies of the Department of Defense.

The complete requirements for procuring the capacitors described herein shall consist of this document and the latest issue of Specification MIL-C-83421.

Facts about MIL-C-83421

This catalog covers comprehensive information concerning MIL-C-83421/1 capacitors, including dimensions, specifications, quality assurance, retention of qualification testing and pricing.

Component Research Co. presents this information as part of its effort to improve the reliability and performance of capacitors for aerospace use.

MIL-C-83421 is a new general specification that contains higher quality, reliability and performance, metallized plastic film capacitors than MIL-C-39022/1 to MIL-C-39022/8. MIL-C-83421 will ultimately cover a range of metallized polycarbonate, polysulfone, polystyrene, polypropylene, teflon, and other plastic films. The scope of MIL-C-83421 will be to provide 100% screened, high reliability capacitors suitable for critical aerospace and industrial use.

Special screening tests and tight parameter limits have been incorporated in order to make MIL-C-83421 capacitors superior in reliability, performance, and quality for DC or AC applications.

Additional testing and data covering corona, radiation effects, ESR ratings, and dielectric absorption ratings with temperature and short durations, will ultimately be included.

CRC HIGH RELIABILITY CAPACITORS

MIL-C-83421/1 SCREENING AND KEY FEATURES

100% GROUP A SCREENING AND INSPECTION MIL-C-83421/1 POLYCARBONATE CAPACITORS

CRC QUALITY LEVEL 1			CRC QUALITY LEVEL 3		
MIL-C-83421/1 Style	VDC	CRC Capacitor Type	MIL-C-83421/1 Style	VDC	CRC Capacitor Type
CRH01	30	A12A	CRH06	30	K12A
CRH02	50	A12B	CRH07	50	K12B
CRH03	100	A12C	CRH08	100	K12C
CRH04	200	A12D	CRH09	200	K12D
CRH05	400	A12E	CRH00	400	K12E

CRC QUALITY LEVEL 1

1 48 hours Burn-In at 125°C and 140% of rated DC voltage.

2 10 Cycles of thermal aging from −65°C to +125°C.

3 Gross leak test.

4 Helium leak test. 1×10^{-6} atm cm^3/sec max. leak rate.

5 AC dielectric hipot by 100 Hz square wave at a minimum peak to peak voltage of 3 x rated DC voltage (except 800 V P/P for 400 VDC).

6 DC dielectric hipot at 200% rated volts.

7 Insulation resistance at 25°C, 300,000 megohms-uF. 3,000,000 megohms minimum for values 0.1 uF or less.

8 0.15% max. dissipation factor at 25°C.

9 Capacitance % tolerance at 25°C.

10 0.1% max. dielectric absorption.

11 Visual inspection for workmanship dimensions, marking and packaging

CRC QUALITY LEVEL 3

1 5 Cycles of thermal aging from −65°C to +125°C.

2 Gross leak test.

3 Helium leak test. 1×10^{-5} atm cm^3/sec max. leak rate.

4 AC dielectric hipot by 100 Hz square wave at a minimum peak to peak voltage of 3 x rated DC voltage (except 800 V P/P for 400 VDC).

5 DC dielectric hipot at 200% rated volts.

6 Insulation resistance at 25°C, 100,000 megohms-uF. 1,000,000 megohms minimum for values 0.1 uF or less.

7 0.15% max. dissipation factor at 25°C.

8 Capacitance % tolerance at 25°C.

9 0.1% max. dielectric absorption.

10 Visual inspection for workmanship dimensions, marking and packaging

HIGH INSULATION RESISTANCE	Styles CRH01 to CRH05 exceed 3,000,000 megohms at 25°C for values 0.1 uF or less. CRC polycarbonate capacitors have the highest insulation resistance of any capacitors available for their size. Specially screened capacitors of this type are available with an insulation resistance of 1,000,000 megohms-uF at 25°C and improved IR characteristics at higher temperatures.
AC RATED TO 40 KHz	CRC miniature metallized polycarbonate capacitors have a dissipation factor so low, (generally 0.1% but rated 0.15% max.) that they can handle high current for their size. Their dissipation factor remains low after burn-in, 100% thermal aging, and AC square wave hipot. This quality feature of CRC capacitors makes them mandatory for use in most aerospace programs which require maximum reliability in AC applications under extreme environments.
HIGH STABILITY LOW TEMP. COEFFICIENT	The A12 and K12 capacitors offer a choice of temperature coefficient and stability limits to suit your application requirements. The capacitance vs. temperature slopes from capacitor to capacitor within a lot are very similar. The A12 series differ approximately ±30PPM/°C from unit to unit, within a lot, from −55°C to +125°C.
LOWEST COST HIGHEST RELIABILITY	When ordinary type metallized polycarbonate capacitors are subjected to a form of screening to hopefully produce high reliability capacitors, the results may be costly and uncertain. The savings achieved by the use of CRC capacitors are: **Uniform performance, longer equipment life possible; Improved stability, reduced rejects, and costly failure analysis. The cost for continuous Group B testing for retention of qualification is included in the unit price; there are no extra costs for test samples or testing.**

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CRC CAPACITORS QUALITY CONFORMANCE

PERIODIC TESTING PROGRAM

(FOR RETENTION OF QPL MIL-C-83421/1)

GROUP "B" INSPECTION PER MIL-C-83421, TABLE IV

GROUP B, SUBGROUPS 1, 2 AND 3: In order to maintain qualification, Component Research Company performs Periodic Testing (Quality Conformance Testing). Capacitors are selected from current production lots of CRH01 through CRH00 styles, which have successfully completed 100% "Group A" inspection shown on page 3.

SUBGROUP 1 TESTS

10 Each CRH Style Monthly

- Barometric Pressure
- Insulation Resistance at Max. Rated Temperature
- Temperature Coefficient
- Life (2,000 Hours)

SUBGROUP 2 TESTS

CRH01 Parts Jan., July
CRH02 Parts Feb., Aug.
100 Volt Parts March, Sept.
200 Volt Parts April, Oct.
400 Volt Parts May, Nov.

- AC Conditioning 250 Hours
- Dissipation Factor
- Insulation Resistance
- △ Capacitance

SUBGROUP 3 TESTS

18 Parts Every 6 Months,
Consisting of CRH01,
CRH02, CRH03, CRH04 and CRH05

- Vibration
- Salt Spray
- Immersion
- Solderability
- Shock
- Moisture Resistance
- Terminal Strength
- Resistance to Solvents

DC LIFE TEST PERFORMED MONTHLY

GROUP B, SUBGROUP 1 FOR ALL CRH STYLES COVERING ALL FAILURE RATE LEVELS

Capacitors are DC-Life tested at 100°C and at 140% of the rated D.C. voltage for 2,000 hours. (This is an acceleration factor of 5:1, approximately).

EXAMINATION OR TEST	CONDITIONS	POST TEST LIMITS	
		CRH01, CRH02, CRH03, CRH04, and CRH05	CRH06, CRH07, CRH08, CRH09, and CRH00
Barometric Pressure	Per MIL-C-83421	No breakdowns	No breakdowns
Insulation Resistance	@ Rated voltage @ 125°C	2,000 Megs-uF need not exceed 20,000 Megs	1,000 Megs-uF need not exceed 10,000 Megs
Temperature Coefficient	△ Cap. at −55°C Retrace at 25°C △ Cap. at +125°C	−1.5% to 0.5% max. ±0.1% max. +0.8% to −0.5% max.	−2.0% to −0.5% max. ±0.25% max. ±2.0% max.

POST LIFE TEST LIMITS AFTER 2,000 HOURS LIFE

EXAMINATION OR TEST	CONDITIONS	CRH01, CRH02, CRH03, CRH04, and CRH05	CRH06, CRH07, CRH08, CRH09, and CRH00
Insulation Resistance at Rated Voltage and 25°C	Insulation Sleeves	10,000 Megs min.	10,000 Megs min.
	Terminal to Terminal	100,000 Meg-uF need not exceed 1,000,000 Megs	33,333 Megs-uF need not exceed 333,333 Megs
	Terminals to Case	10,000 Megs min.	10,000 Megs min.
△ Capacitance % change with life	At 1 KHz and 25°C	±2% max. of initial value	±4% max. of initial value
% Dissipation Factor	At 1 KHz and 25°C	0.25% max.	0.35% max.

AC-SINUSOIDAL LIFE TEST PERFORMED MONTHLY

Capacitors are AC life tested for 250 hours at 100°C and at 140% of the rated RMS voltage at the applicable test frequency as shown in Table V. This test is performed monthly in order to verify the AC RMS voltage and current ratings.

POST AC TEST LIMITS

Insulation Resistance at Rated Voltage and 25°C	100,000 Megs-uF, need not exceed 1,000,000 Megs
Capacitance % Change at 1 KHz and 25°C	2% max. of initial value
% Dissipation Factor at 25°C	0.25% max.

TABLE V AC-LIFE TEST PARAMETERS PER MIL-C-83421/1

CRH Style	Equiv. CRC Type	DC Volts Rating	400 Hz AC RMS Volts Rating	250 Hours at 100°C Life Test Conditions	
				AC RMS Volts	Frequency In Hertz
01	A12A	30	22	30	4,000
02	A12B	50	36	50	4,000
03	A12C	100	60	84	4,000
04	A12D	200	120	168	400
05	A12E	400	240	336	400

CRC HIGH RELIABILITY CAPACITORS

AC-DC LIFE TEST DATA

MIL-C-83421/1 POLYCARBONATE CAPACITORS

DC LIFE TEST

Data shown is typical of continuous DC life testing performed monthly with samples from current production lots. Samples are tested monthly to maintain failure rate P (0.1%/1,000 hrs.).

AC LIFE TEST

Each month capacitors of assorted values selected from Table I of MIL-C-83421/1 and of the voltage rating specified in paragraph 4.6.2.1.1 (b) of MIL-C-83421, are submitted to 250 hours life at the test voltage and frequency specified in Table V of MIL-C-83421/1.

The excellent low loss and high quality of CRC polycarbonate capacitors enables them to withstand this severe testing without failure. Under these test conditions a 3.9 uF, 50 VDC capacitor is handling 5 AMPS RMS. This can be considered outstanding with a case size as small as 0.562 x 1.375. A 3.9 uF, 50 VDC capacitor is normally rated at 3.6 AMPS RMS AC MAX, as shown in Table I of MIL-C-83421/1.

DC LIFE TEST DATA

PER MIL-C-83421 PARA. 3.27, 4.7.23.2.1 TEST REPORT 74TR35 CRH01 Through CRH00

TEST RESULTS FOR 280 POLYCARBONATE CAPACITORS TESTED FOR 2000 HOURS AT 100°C WITH 140% RATED VOLTAGE APPLIED.

THERE WERE NO FAILURES FOR THIS TEST.

List of Capacitors Life Tested				Insulation Resistance In Megohms at 25°C			% Capacitance Change With Life			% Dissipation Factor At 25°C		
MIL Type	CRC Type	uF Value	Quan. Tested	Post Test Limits (Min. IR)	Test Results		Post Test Limits	Test Results		Post Test Limits	Test Results	
					Low	High		Low	High		Low	High
CRH01	A12A	.47	30	2.1 x 10^5	1 x 10^6	2.3 x 10^6	±2%	-.06%	+.31%	.25%	.07%	.08%
CRH01	A12A	.10	30	1 x 10^6	1.2 x 10^6	1 x 10^7	±2%	+.01%	+.21%	.25%	.07%	.08%
CRH01	A12A	.056	30	1 x 10^6	1.7 x 10^7	3 x 10^7	±2%	+.15%	+.34%	.25%	.07%	.12%
CRH06	K12A	.15	5	2.2 x 10^5	1.3 x 10^6	2 x 10^6	±5%	-.50%	-2.1%	.35%	.11%	.14%
CRH06	K12A	.039	5	3.3 x 10^5	7.5 x 10^6	1.5 x 10^7	±5%	-.02%	-1.4%	.35%	.13%	.18%
CRH06	K12A	.082	5	3.3 x 10^5	1 x 10^7	1.5 x 10^7	±5%	+.31%	+.41%	.35%	.07%	.08%
CRH02	A12B	.12	10	8.3 x 10^6	1.7 x 10^7	5 x 10^7	±2%	-.08%	+.42%	.25%	.07%	.08%
CRH02	A12B	.05	10	1 x 10^6	5 x 10^7	5 x 10^7	±2%	+.01%	+.02%	.25%	.07%	.08%
CRH02	A12B	.012	10	1 x 10^6	5 x 10^7	5 x 10^7	±2%	-.01%	+.39%	.25%	.05%	.07%
CRH07	K12B	.15	5	2.2 x 10^5	1.7 x 10^7	2.5 x 10^7	±5%	+.05%	+.12%	.35%	.07%	.08%
CRH07	K12B	.039	5	3.3 x 10^5	2 x 10^6	1.7 x 10^7	±5%	-.28%	-1.0%	.35%	.07%	.10%
CRH07	K12B	.01	5	3.3 x 10^5	2.5 x 10^7	5 x 10^7	±5%	+.28%	-.40%	.35%	.06%	.07%
CRH03	A12C	.022	10	1 x 10^6	1.4 x 10^7	5 x 10^7	±2%	+.01%	-.15%	.25%	.07%	.08%
CRH03	A12C	.018	5	1 x 10^6	2.5 x 10^7	3 x 10^7	±2%	+.04%	+.22%	.25%	.06%	.07%
CRH03	A12C	.01	10	1 x 10^6	2 x 10^7	5 x 10^7	±2%	+1.14%	-1.19%	.25%	.05%	.10%
CRH08	K12C	.047	5	3.3 x 10^5	2.5 x 10^7	3 x 10^7	±5%	+.10%	+.19%	.35%	.07%	.08%
CRH08	K12C	.05	5	3.3 x 10^5	2 x 10^7	2.5 x 10^7	±5%	+.01%	+.14%	.35%	.07%	.08%
CRH08	K12C	.012	5	3.3 x 10^5	1.6 x 10^7	3 x 10^7	±5%	+2.6%	+3.4%	.35%	.08%	.10%
CRH04	A12D	.039	10	1 x 10^6	1.5 x 10^6	4 x 10^7	±2%	-.05%	+.12%	.25%	.07%	.07%
CRH04	A12D	.027	10	1 x 10^6	2.9 x 10^7	4 x 10^7	±2%	-.03%	+.21%	.25%	.07%	.07%
CRH04	A12D	.1	10	1 x 10^6	7 x 10^6	9 x 10^6	±2%	-.02%	+.22%	.25%	.07%	.08%
CRH09	K12D	.50	5	6.6 x 10^4	3 x 10^6	4 x 10^6	±5%	+.08%	+.14%	.35%	.07%	.09%
CRH09	K12D	.033	5	3.3 x 10^5	2.5 x 10^7	4 x 10^7	±5%	+.07%	+.14%	.35%	.06%	.07%
CRH09	K12D	.039	5	3.3 x 10^5	2 x 10^7	4 x 10^7	±5%	+.08%	+.25%	.35%	.07%	.08%
CRH05	A12E	.022	10	1 x 10^6	4 x 10^6	2.5 x 10^7	±2%	+.03%	-1.2%	.25%	.06%	.07%
CRH05	A12E	.05	10	1 x 10^6	8 x 10^6	2 x 10^7	±2%	-.03%	+.32%	.25%	.06%	.07%
CRH05	A12E	.047	10	1 x 10^6	1.7 x 10^7	2 x 10^7	±2%	+.06%	+.24%	.25%	.07%	.15%
CRH00	K12D	.068	5	3.3 x 10^5	7 x 10^5	8 x 10^6	±5%	-.08%	+.21%	.35%	.08%	.08%
CRH00	K12D	.027	5	3.3 x 10^5	8 x 10^6	3 x 10^7	±5%	+.30%	-.36%	.35%	.07%	.08%
CRH00	K12D	.039	5	3.3 x 10^5	3 x 10^6	3 x 10^7	±5%	-.10%	+.11%	.35%	.06%	.07%

AC LIFE TEST DATA

74TR35 PER MIL-C-83421 PARA. 3.28, 4.7.24

88 30 VDC CAPACITORS WERE SUBJECTED TO 30 VRMS AC AT 4000 HZ, 100°C FOR 250 HOURS. NO FAILURES OCCURRED.

67 50 VDC CAPACITORS WERE SUBJECTED TO 50 VRMS AC AT 4000 HZ, 100°C FOR 250 HOURS. NO FAILURES OCCURRED.

MIL Type	CRC Type	uF Value	Quan. Tested	IR Post Test Limits (Min. IR)	IR Low	IR High	Cap. Post Test Limits	Cap. Low	Cap. High	D.F. Post Test Limits	D.F. Low	D.F. High
CRH01	A12A	.22	22	4.5 x 10^5	2.7 x 10^6	6 x 10^6	±2%	+.06%	+.14%	.25%	.06%	.08%
CRH01	A12A	4.0	12	2.5 x 10^4	1.2 x 10^5	5 x 10^5	±2%	-.02%	+.42%	.25%	.04%	.07%
CRH01	A12A	.068	12	1 x 10^6	1.5 x 10^6	5 x 10^6	±2%	+.01%	+.29%	.25%	.06%	.07%
CRH01	A12A	.022	12	1 x 10^6	7.5 x 10^6	1.5 x 10^7	±2%	+.03%	-.57%	.25%	.06%	.07%
CRH01	A12A	1.5	6	6 x 10^4	3 x 10^5	6.2 x 10^5	±2%	-.08%	-.12%	.25%	.07%	.08%
CRH01	A12A	.82	6	1.2 x 10^5	1.1 x 10^6	1.2 x 10^6	±2%	+.05%	-.06%	.25%	.08%	.11%
CRH01	A12A	.39	6	2.5 x 10^5	1.6 x 10^6	1.8 x 10^6	±2%	+.04%	-.05%	.25%	.08%	.09%
CRH01	A12A	.47	6	2.1 x 10^5	1.7 x 10^6	1.8 x 10^6	±2%	-.01%	+.02%	.25%	.06%	.07%
CRH01	A12A	.33	6	3.0 x 10^5	1.7 x 10^6	1.8 x 10^6	±2%	+.01%	-.02%	.25%	.07%	.08%
CRH02	A12B	.1	22	1 x 10^6	3 x 10^6	7.5 x 10^6	±2%	+.06%	+.19%	.25%	.06%	.08%
CRH02	A12B	3.0	15	3.3 x 10^4	2.1 x 10^5	5 x 10^5	±2%	+.07%	+.81%	.25%	.04%	.04%
CRH02	A12B	.5	10	2 x 10^5	8.3 x 10^5	1.3 x 10^6	±2%	+.01%	+.07%	.25%	.06%	.07%
CRH02	A12B	1.0	10	1 x 10^5	4.4 x 10^5	8.3 x 10^5	±2%	+.08%	+.18%	.25%	.06%	.08%
CRH02	A12B	.1	10	1 x 10^6	3 x 10^6	4.2 x 10^6	±2%	+.09%	-.11%	.25%	.07%	.08%

CRC HIGH RELIABILITY CAPACITORS

HOW TO SELECT AND SPECIFY MIL-C-83421/1 CAPACITOR PART NUMBERS

SELECTION INFORMATION

MIL-C-83421/1 covers 30 volt to 400 volt DC rated capacitors for applications requiring a tight capacitance tolerance, excellent capacitance stability, very high insulation resistance and low loss factors. This specification applies in addition where the AC component of voltage is large with respect to the applied DC voltage, and where momentary breakdowns cannot be tolerated.

MIL-C-83421/1 offers the users two quality level styles. Each style includes 30 VDC, 50 VDC, 100 VDC, 200 VDC and 400 VDC rated capacitors, with 0.25%, 0.5%, 1%, 2%, 5% and 10% capacitance tolerances to select from.

A study of catalog page 3 provides a comparison of screening steps and key features that are unique with capacitors qualified to MIL-C-83421/1. If any doubt exists as to the use of these capacitors for high energy AC conditions not covered in the AC ratings of Table 1, a complete description of current and voltage conditions, including waveforms, should be forwarded to us for review and recommendations.

CONSTRUCTION INFORMATION

All CRH capacitors are tubular, metal cased, with both wire lead terminals isolated from the case. All the capacitors are provided with a plastic heat shrink-fit sleeve to insulate the metal case. The lead wires are #22 AWG for 0.312 or less case diameters and #20 AWG for 0.400 and 0.500 diameters. The lead wires are normally tinned copper clad steel per type "W" of MIL-STD-1276. Capacitors with gold plated nickel leads per N2 of MIL-STD-1276 can also be provided at additional cost. For 0.562" and larger diameters, #18 AWG tinned copper, OFHC, leads are used.

Unless you specifically request a lead material type for 0.500" and smaller diameters, Component Research will supply the material currently in production at time of order.

AC RATINGS

AC ratings at 400 Hz; 4000 Hz; and 40,000 Hz RMS AC voltage (sinusoidal), with current limits from −55°C to +100°C, are listed for each individual capacitance value and DC voltage rated style in Table 1. When operating above 100°C, derate all voltages linearly from full rated voltage at 100°C to 50% of rating at 125°C.

Although CRC capacitors have a low dissipation factor of 0.15% max. at 25°C, their dissipation factor is lower yet at temperatures from 75°C to 125°C.

This results in lower watts-loss and heat rise at elevated temperatures — with, of course, improved reliability for AC or DC applications.

APPLICATION NOTES

Make certain that the sum of any instantaneous peak AC voltages plus any superimposed DC voltages do not exceed the capacitor's rated DC voltage.

Effective heat sinking will permit operation at higher current levels than listed in Table 1. However, our CRC application engineers should be advised prior to use in any application where non-sinusoidal operating conditions are encountered, or when higher RMS currents are involved.

Component Research Co. can supply special AC capacitors with greater current handling capability and reduced heat rise.

FAILURE RATE LETTERS

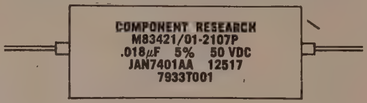
Component Research is presently qualified to failure rate "P" and intends to maintain this level continuously. Because MIL-C-83421/1 has such stringent post test limits, a "P" failure rate is indicative of higher quality than a higher letter such as "R" or "S" in other film capacitor specifications with looser post test limits.

Series A12 and K12 prices covering MIL-C-83421/1 capacitors are listed at the rear of this catalog and are based upon a "P" failure rate.

HOW TO SPECIFY MIL-C-83421/1 PART NUMBERS

For ordering and marking purposes only, MIL-C-83421/1 capacitors must be identified as M83421/01 ....

An example of MIL-Spec marking is shown below. The sample shown is a 0.018μF, 5%, 50 volt, Style CRH02 capacitor.



COMPONENT RESEARCH
Manufacturer's name, may be abbreviated when space is limited.

M83421/01
Basic military specification number (for marking only).

-2
Indicates CRH02 style which covers 50 VDC rating and higher quality screened type. (CRH07 is a 50 VDC style with reduced screening and performance. See page 3.)

107
Dash No. of required μF value and % tolerance selected from Table 1 of MIL-C-834212/1.

P
(P is failure rate letter.)

JAN
Jan marking.

7401
Weekly date code per MIL-STD-1285.

AA
Unique sub lot or batch code for traceability.

12517
CRC federal code number.

***7983T**
Unique batch test number.

***001**
Unique serial number.

**This marking found on CRC capacitors is not required by MIL-C-83421/1 but is standard marking identification used by CRC to permit maximum traceability for Level 1 parts such as CRH01 to CRH05 styles.*

ADDITIONAL MARKING EXAMPLE:

A 0.0015 μF, 1%, 100 VDC, CRH03 capacitor selected from Table 1 below would be identified as M83421/01-3015P.

MIL-C-83421/1
TABLE 1
(SECTION SHOWN OF 100 VDC STYLES)

Capacitance value (nom) (in μF)	Dimensions 1/ (in inches with mm in parentheses)			Dash number 2/						AC ratings (for sinusoidal operation from -65° to +100°C) 3/					
				Capacitance tolerance value (in %)						0 to .4 KHz		At 4 KHz		At 40 KHz	
	L ±.030(.76)	D +.020(.51) -.000	G, max	±0.25	±0.5	±1.0	±2.0	±5.0	±10.0	Volts	Current (in A)	Volts	Current (in A)	Volts	Current (in A)
0.001	0.500(12.70)	0.170(4.32)	0.700(17.78)	-001-	-002-	-003-	-004-	-005-	-006-	60.0	.001	60.0	.002	60.0	.015
0.0012	↑	↑	↑	-007-	-008-	-009-	-010-	-011-	-012-	↑	↑	↑	.002	↑	.018
0.0015				-013-	-014-	-015-	-016-	-017-	-018-				.002		.022
0.0018				-019-	-020-	-021-	-022-	-023-	-024-				.003		.027

CRC HIGH RELIABILITY CAPACITORS

MIL-C-83421/1 AC RATED CAPACITORS RELIABILITY QUESTIONS AND ANSWERS

What are the limiting factors restricting the use of metallized polycarbonate capacitors for AC applications?

A properly manufactured and screened capacitor can handle considerable RMS and peak currents from −55°C to +125°C without significant case temperature heat rise. The dissipation factor of capacitors to be used in AC applications must be uniformly low to limit the watts loss incurred usually by capacitors with a high (ESR) equivalent series resistance.

We recommend a maximum dissipation factor of 0.15% at 1 KHz as the acceptance test limit. All capacitors should be subjected to temperature cycling prior to final measurement of DF to observe if they remain less than 0.15%. This test eliminates problems which may occur in use, after storage, or operation at extreme temperatures, leading to higher DF and operational failure.

CRC catalog page 9 contains the maximum RMS current and voltage ratings for sinusoidal conditions, continuous duty cycle, at 400 Hz and 40 KHz. For conditions other than shown, send to our sales office a sketch of the current and voltage waveforms under worst case and normal operating conditions. Include all other information necessary for quotation purposes. See page 35.

Is polycarbonate better than other dielectrics for AC applications?

If size, weight, cost, or operating temperatures were not important considerations, then other dielectric style capacitors are superior to polycarbonate.

As an example, CRC can supply polystyrene, teflon, or polypropylene AC capacitors with approximately ten times lower loss than the series 12 polycarbonate capacitors.

Polysulfone introduced as a new product on pages 38 and 39, is slightly better than polycarbonate for AC applications below 100°C, and can be used above 125°C (the limit for polycarbonate), to 150°C with proper voltage derating.

CRC considers mylar and paper dielectric styles too lossy for AC applications and therefore does not recommend this type for such requirements. Additional information on AC capacitors appears on other pages of this catalog.

What type of screening test will assure that the polycarbonate capacitors are reliable for AC applications?

Once it has been determined that your application requirements can be met by CRC standard polycarbonate series 12 capacitors, the screening test used by CRC and incorporated into MIL-C-83421/1 will be sufficient to provide the quality assurance needed.

As an example 100% of the capacitors are temperature cycled then are subjected to a square wave voltage at 100 Hz at 300% of rated DC voltage for peak to peak amplitude.

During this test the capacitors must handle approximately 35 microsecond wide current pulses for one minute at a rate of 200 per second.

A routine examination of the current and voltage waveforms during square wave hipot of 10 uF, 50 VDC type CRH capacitors, shows that with 150 volts peak to peak voltage at 100 Hz applied, the peak current is 85 amps. This is equivalent to operation with a half sine wave peak current pulse of 8.5 amps/uF at a 200 PPS rate. SEE WAVEFORMS AT RIGHT.

Following the square wave voltage stress test the capacitors must meet 0.15% max. dissipation factor limits.

As shown on catalog page 5, life testing of CRC metallized polycarbonate capacitors at 400 Hz and 4000 Hz is performed continuously as retention of qualification to MIL-C-83421/1.

Are the new CRC series 12 AC rated polycarbonate capacitors higher in cost than their earlier type PL and PG capacitors supplied since 1965?

A study of series 12 polycarbonate prices, shows that with few exceptions price reductions (particularly for closer tolerances and larger uF values) are the rule. An examination of the series 12 specifications shows higher guaranteed performance and continuous retention of qualification testing. This in itself represents a substantial price decrease in terms of value adding without increased cost.

Why are CRC low dissipation factor polycarbonate capacitors replacing commonly manufactured capacitors in AC applications?

There is a risk that the dissipation factor of such capacitors will increase with use and result in hot spots at the terminations. Field failures of such capacitors have been reported where the capacitors have exploded and caused fire damage.

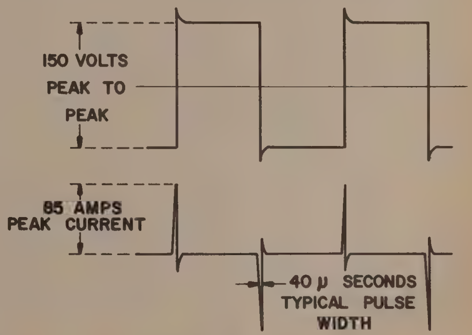
It may be possible to use ordinary higher DF capacitors without noticeable problems at 400 Hz provided that RMS voltage is sufficiently low such that the RMS current is limited. Heat sinking will also help prevent excess heat rise due to poor quality terminations.

Interestingly enough CRC polycarbonate capacitors have a lower dissipation factor at temperatures from 75°C to 125°C than at 25°C which lowers their effective heat rise at higher temperatures. Where the current source is limited, higher DF capacitors may not heat sufficiently to short, but may gradually suffer from increasing DF to the point where they are effectively open.

What is the maximum current that can be applied to MIL-C-83421/1 capacitors?

The 40 KHz current and voltage ratings listed in Table I of the Mil-Spec and also shown on page 9 of this catalog are based upon continuous operation under sinusoidal conditions. It is essential that any use under conditions exceeding these limits be discussed further with our applications engineers for elimination of failures. Under certain conditions, the capacitors can be used at higher frequencies and in square wave filtering applications. For good reliability it is best to study these special applications on an individual basis. CRC plans to provide data tables showing allowable working conditions during higher frequency sinusoidal, pulsed, and non-sinusoidal conditions.

TYPICAL VOLTAGE AND PEAK CURRENT WAVEFORMS SHOWN FOR A12B106, 10 uF, 50 V, METALLIZED POLYCARBONATE CAPACITOR DURING THE ONE MINUTE AC SQUARE WAVE SCREENING AT 100 Hz.



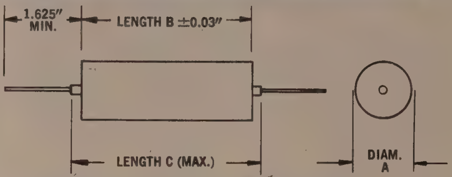
CRC HIGH RELIABILITY CAPACITORS

MIL-C-83421/1 A12, K12 CASE SIZES

SERIES 12

SERIES A12, K12 POLYCARBONATE CAPACITORS

- PART NUMBER SYSTEM 6, 18
- LIFE TEST DATA 5
- DETAILED SPECIFICATIONS 10, 11
- AC RATINGS 9
- SPECIAL AC CAPACITORS 37
- PRICES 40-44



CASE DIMENSION	TOLERANCE LIMITS
"A" Diameter	±0.010" Without Sleeving
	−0.00" +0.02" With Mylar Sleeving
"B" Case Length	±0.03" With or Without Sleeving
"C" Bead to Bead Length	The lengths shown in tables are maximum and include the solder bead. CRC "C" dimensions for A12 and K12 capacitors are 0.1" less than Mil-C-83421/1 requires.

uF	12A	30VDC		12B	50VDC		12C	100VDC		12D	200VDC		12E	400VDC	
	Diam. A	Length B	Length C	Diam. A	Length B	Length C	Diam. A	Length B	Length C	Diam. A	Length B	Length C	Diam. A	Length B	Length C
.001	.170	.500	.600	.170	.500	.600	.170	.500	.600	.170	.562	.662	.193	.562	.662
.0012	.170	.500	.600	.170	.500	.600	.170	.500	.600	.170	.562	.662	.193	.562	.662
.0015	.170	.500	.600	.170	.500	.600	.170	.500	.600	.170	.562	.662	.193	.562	.662
.0018	.170	.500	.600	.170	.500	.600	.170	.500	.600	.170	.562	.662	.193	.562	.662
.002	.170	.500	.600	.170	.500	.600	.170	.500	.600	.170	.562	.662	.193	.562	.662
.0022	.170	.500	.600	.170	.500	.600	.170	.500	.600	.170	.562	.662	.193	.562	.662
.0027	.170	.500	.600	.170	.500	.600	.170	.500	.600	.170	.562	.662	.235	.562	.662
.0033	.170	.500	.600	.170	.500	.600	.170	.500	.600	.170	.562	.662	.235	.562	.662
.0039	.170	.500	.600	.170	.500	.600	.170	.500	.600	.170	.562	.662	.235	.562	.662
.0047	.170	.500	.600	.170	.500	.600	.170	.500	.600	.170	.562	.662	.235	.562	.662
.005	.170	.500	.600	.170	.500	.600	.170	.500	.600	.170	.562	.662	.235	.562	.662
.0056	.170	.500	.600	.170	.500	.600	.170	.500	.600	.170	.562	.662	.235	.562	.662
.0068	.170	.500	.600	.170	.500	.600	.170	.562	.662	.170	.562	.662	.235	.687	.787
.0082	.170	.500	.600	.170	.562	.662	.170	.562	.662	.193	.562	.662	.235	.687	.787
.01	.170	.500	.600	.170	.562	.662	.170	.687	.787	.193	.562	.662	.235	.687	.787
.012	.170	.500	.600	.170	.562	.662	.170	.687	.787	.193	.562	.662	.235	.687	.787
.015	.170	.500	.600	.170	.562	.662	.170	.687	.787	.235	.562	.662	.235	.813	.913
.018	.170	.500	.600	.193	.562	.662	.193	.687	.787	.235	.687	.787	.312	.813	.913
.02	.170	.500	.600	.193	.562	.662	.193	.687	.787	.235	.687	.787	.312	.813	.913
.022	.170	.500	.600	.193	.562	.662	.193	.687	.787	.235	.687	.787	.312	.813	.913
.027	.170	.562	.662	.193	.562	.662	.193	.687	.787	.312	.687	.787	.312	.813	.913
.033	.170	.562	.662	.193	.562	.662	.193	.687	.787	.312	.687	.787	.312	.813	.913
.039	.170	.562	.662	.170	.687	.787	.235	.687	.787	.312	.687	.787	.312	.813	.913
.047	.170	.562	.662	.170	.687	.787	.235	.687	.787	.312	.687	.787	.400	.813	.913
.05	.170	.562	.662	.170	.687	.787	.235	.687	.787	.312	.687	.787	.400	.813	.913
.056	.170	.562	.662	.193	.687	.787	.235	.687	.787	.312	.813	.913	.400	.813	.913
.068	.170	.687	.787	.193	.687	.787	.235	.813	.913	.312	.813	.913	.400	.813	.913
.082	.170	.687	.787	.193	.813	.913	.312	.687	.787	.312	.813	.913	.400	1.063	1.163
.1	.193	.687	.787	.193	.813	.913	.312	.687	.787	.312	.813	.913	.400	1.063	1.163
.12	.193	.687	.787	.235	.687	.787	.312	.687	.787	.312	.813	.913	.400	1.063	1.163
.15	.235	.562	.662	.235	.687	.787	.312	.813	.913	.400	1.063	1.163	.400	1.375	1.475
.18	.235	.687	.787	.235	.813	.913	.312	.813	.913	.400	1.375	1.475	.500	1.375	1.475
.20	.235	.687	.787	.235	.813	.913	.312	.813	.913	.400	1.375	1.475	.500	1.375	1.475
.22	.235	.687	.787	.235	.813	.913	.312	.813	.913	.400	1.375	1.475	.500	1.375	1.475
.27	.235	.687	.787	.312	.687	.787	.312	1.063	1.163	.500	1.375	1.475	.562	1.375	1.475
.33	.235	.687	.787	.312	.687	.787	.312	1.063	1.163	.500	1.375	1.475	.562	1.375	1.475
.39	.235	.687	.787	.312	.813	.913	.400	1.063	1.163	.500	1.375	1.475	.562	1.875	1.975
.47	.312	.687	.787	.312	.813	.913	.400	1.063	1.163	.500	1.375	1.475	.562	1.875	1.975
.50	.312	.687	.787	.312	.813	.913	.400	1.063	1.163	.500	1.375	1.475	.562	1.875	1.975
.56	.312	.687	.787	.400	.813	.913	.400	1.063	1.163	.500	1.375	1.475	.562	1.875	1.975
.68	.312	.687	.787	.400	.813	.913	.500	1.125	1.225	.562	1.375	1.475	.750	1.875	1.975
.82	.312	.813	.913	.400	1.063	1.163	.500	1.125	1.225	.562	1.875	1.975	.750	1.875	1.975
1.0	.312	.813	.913	.400	1.063	1.163	.562	1.125	1.225	.562	1.875	1.975	.750	1.875	1.975
1.2	.312	.813	.913	.400	1.063	1.163	.562	1.125	1.225	.562	1.875	1.975	1.0	1.875	1.975
1.5	.400	.813	.913	.400	1.063	1.163	.562	1.375	1.475	.670	1.875	1.975	1.0	2.375	2.475
1.8	.400	.813	.913	.400	1.063	1.163	—	—	—	.750	1.875	1.975	1.0	2.375	2.475
2.0	.400	.813	.913	.500	1.125	1.225	.670	1.375	1.475	.750	1.875	1.975	1.0	2.375	2.475
2.2	.400	.813	.913	.500	1.125	1.225	.670	1.375	1.475	.750	1.875	1.975			
2.5	—	—	—	—	—	—	—	—	—	.750	1.875	1.975			
2.7	.400	.813	.913	.500	1.375	1.475	.670	1.875	1.975	.750	1.875	1.975			
3.0	.400	1.063	1.163	.500	1.375	1.475	.670	1.875	1.975	1.0	1.875	1.975			
3.3	.400	1.063	1.163	.500	1.375	1.475	.670	1.875	1.975	1.0	1.875	1.975			
3.9	.400	1.375	1.475	.562	1.375	1.475	.750	1.875	1.975	1.0	2.375	2.475			
4.7	.500	1.375	1.475	.670	1.375	1.475	.750	1.875	1.975						
5.0	.500	1.375	1.475	.670	1.375	1.475	.750	1.875	1.975						
5.6	.500	1.375	1.475	.670	1.375	1.475	.750	1.875	1.975						
6.8	.562	1.375	1.475	.670	1.875	1.975	1.0	2.375	2.475						
8.0	.562	1.375	1.475	.670	1.875	1.975	1.0	2.375	2.475						
8.2	.562	1.375	1.475	.670	1.875	1.975	1.0	2.375	2.475						
10.0	.562	1.375	1.475	.670	1.875	1.975	1.0	2.375	2.475						
12.0	.562	1.875	1.975												
15.0	.562	1.875	1.975												
20.0	.670	1.875	1.975												
22.0	.670	1.875	1.975												

CRC HIGH RELIABILITY CAPACITORS

SERIES 12 POLYCARBONATE

AC RATINGS 400 Hz TO 40,000 Hz COVERS MIL-C-83421/1 AND MIL-C-39022/9C CAPACITORS

Component Research Co. has over 150 KVA of specialized AC generating equipment operating from 400 Hz to 100,000 Hz, sinusoidal conditions, for burn-in, life testing, and continuous research and development. In addition, square wave and pulse generators capable of simulating massive energy stress or sharp rise times enables Component Research engineers to sample test standard production type capacitors to ascertain their capability under higher stress operating conditions. Custom designed capacitors for critical space, military, and commercial applications are thoroughly screened and evaluated to eliminate excess heating or any other cause for failure. The AC ratings of MIL-C-83421/1 were developed as a result of tests conducted on CRC polycarbonate capacitors from 400 Hz to 40,000 Hz. Following is data similar to that found in MIL-C-83421/1.

AC Ratings: AC ratings are for sinusoidal conditions from −55°C to +100°C. Derate linearly to 50% of AC rated RMS voltage at 125°C.

uF	12A 30VDC			12B 50VDC			12C 100VDC			12D 200VDC			12E 400VDC		
	AC RATINGS			AC RATINGS			AC RATINGS			AC RATINGS			AC RATINGS		
	RMS Volts 400 Hz	RMS Volts 40 KHz	Max. RMS Amps	RMS Volts 400 Hz	RMS Volts 40 KHz	Max. RMS Amps	RMS Volts 400 Hz	RMS Volts 40 KHz	Max. RMS Amps	RMS Volts 400 Hz	RMS Volts 40 KHz	Max. RMS Amps	RMS Volts 400 Hz	RMS Volts 40 KHz	Max. RMS Amps
.001	22.0	22.0	.006	36.0	36.0	.009	60.0	60.0	.015	120.0	80.0	.020	240.0	100.0	.025
.0012	22.0	22.0	.007	36.0	36.0	.011	60.0	60.0	.018	120.0	80.0	.024	240.0	100.0	.030
.0015	22.0	22.0	.008	36.0	36.0	.013	60.0	60.0	.022	120.0	80.0	.030	240.0	100.0	.037
.0018	22.0	22.0	.010	36.0	36.0	.016	60.0	60.0	.027	120.0	80.0	.036	240.0	100.0	.045
.002	22.0	22.0	.011	36.0	36.0	.018	60.0	60.0	.030	120.0	80.0	.040	240.0	100.0	.050
.0022	22.0	22.0	.012	36.0	36.0	.020	60.0	60.0	.033	120.0	80.0	.044	240.0	100.0	.055
.0027	22.0	22.0	.015	36.0	36.0	.024	60.0	60.0	.041	120.0	80.0	.054	240.0	100.0	.068
.0033	22.0	22.0	.018	36.0	36.0	.030	60.0	60.0	.050	120.0	80.0	.066	240.0	100.0	.083
.0039	22.0	22.0	.021	36.0	36.0	.035	60.0	60.0	.058	120.0	80.0	.078	240.0	100.0	.097
.0047	22.0	22.0	.026	36.0	36.0	.042	60.0	60.0	.071	120.0	80.0	.094	240.0	100.0	.12
.005	22.0	22.0	.028	36.0	36.0	.045	60.0	60.0	.075	120.0	80.0	.10	240.0	100.0	.13
.0056	22.0	22.0	.031	36.0	36.0	.050	60.0	60.0	.084	120.0	80.0	.11	240.0	100.0	.14
.0068	22.0	22.0	.037	36.0	36.0	.061	60.0	60.0	.10	120.0	80.0	.14	240.0	100.0	.17
.0082	22.0	22.0	.045	36.0	36.0	.074	60.0	60.0	.12	120.0	80.0	.16	240.0	100.0	.21
.01	22.0	22.0	.055	36.0	36.0	.090	60.0	60.0	.15	120.0	80.0	.20	240.0	100.0	.25
.012	22.0	22.0	.066	36.0	36.0	.11	60.0	59.0	.18	120.0	78.0	.23	240.0	100.0	.30
.015	22.0	22.0	.082	36.0	36.0	.14	60.0	58.0	.22	120.0	76.0	.29	240.0	94.0	.35
.018	22.0	22.0	.100	36.0	36.0	.16	60.0	57.0	.25	120.0	74.0	.33	240.0	90.0	.41
.02	22.0	22.0	.11	36.0	36.0	.18	60.0	55.0	.28	120.0	71.0	.36	240.0	88.0	.44
.022	22.0	22.0	.12	36.0	36.0	.20	60.0	53.0	.29	120.0	68.0	.37	240.0	85.0	.47
.027	22.0	22.0	.15	36.0	36.0	.24	60.0	51.0	.34	120.0	65.0	.44	240.0	81.0	.55
.033	22.0	22.0	.18	36.0	36.0	.30	60.0	50.0	.41	120.0	62.0	.51	240.0	78.0	.65
.039	22.0	22.0	.22	36.0	36.0	.35	60.0	48.0	.47	120.0	60.0	.59	240.0	75.0	.73
.047	22.0	22.0	.26	36.0	36.0	.42	60.0	47.0	.55	120.0	57.0	.67	240.0	71.0	.83
.05	22.0	22.0	.28	36.0	36.0	.45	60.0	46.0	.58	120.0	56.0	.70	240.0	70.0	.88
.056	22.0	22.0	.31	36.0	36.0	.50	60.0	46.0	.64	120.0	56.0	.78	240.0	67.5	.95
.068	22.0	22.0	.37	36.0	34.0	.58	60.0	42.0	.71	120.0	50.0	.85	240.0	60.0	1.02
.082	22.0	22.0	.45	36.0	32.0	.66	60.0	38.0	.78	120.0	44.0	.90	240.0	50.0	1.03
.1	22.0	22.0	.55	36.0	30.0	.75	60.0	36.0	.90	120.0	42.0	1.10	240.0	46.0	1.20
.12	22.0	22.0	.66	36.0	30.0	.90	60.0	35.0	1.05	120.0	40.0	1.20	240.0	44.5	1.34
.15	22.0	22.0	.83	36.0	26.0	.98	60.0	33.0	1.24	120.0	36.0	1.34	240.0	40.0	1.50
.18	22.0	22.0	1.00	36.0	25.0	1.13	60.0	31.0	1.40	120.0	34.0	1.54	240.0	38.0	1.70
.20	22.0	20.0	1.00	36.0	24.0	1.20	60.0	30.0	1.50	120.0	33.0	1.65	240.0	37.0	1.85
.22	22.0	18.5	1.02	36.0	23.0	1.27	60.0	27.0	1.50	120.0	32.0	1.76	240.0	35.0	1.93
.27	22.0	17.0	1.15	36.0	19.0	1.28	60.0	24.0	1.62	120.0	29.0	1.96	240.0	33.0	2.24
.33	22.0	16.0	1.32	36.0	18.0	1.48	60.0	23.0	1.90	120.0	28.0	2.31	240.0	32.0	2.65
.39	22.0	15.0	1.46	36.0	17.0	1.66	60.0	22.0	2.15	120.0	27.0	2.63	240.0	32.0	3.14
.47	22.0	14.0	1.65	36.0	15.7	1.85	60.0	21.0	2.47	120.0	26.0	3.06	240.0	31.0	3.64
.50	22.0	13.5	1.69	36.0	15.2	1.90	60.0	20.0	2.50	120.0	25.0	3.13	240.0	30.0	3.75
.56	22.0	12.9	1.81	36.0	14.4	2.01	60.0	19.0	2.64	120.0	23.0	3.17	240.0	29.0	4.05
.68	22.0	12.0	2.04	36.0	14.0	2.38	60.0	16.0	2.72	120.0	20.0	3.40	240.0	26.0	4.50
.82	22.0	10.0	2.05	36.0	12.0	2.46	60.0	14.0	2.87	120.0	18.0	3.70	240.0	23.4	4.80
1.0	22.0	8.4	2.10	36.0	10.0	2.50	60.0	12.0	3.00	120.0	15.0	3.75	240.0	20.8	5.20
1.2	22.0	7.2	2.15	36.0	9.1	2.73	60.0	11.0	3.25	120.0	13.5	4.05	240.0	18.3	5.50
1.5	22.0	5.8	2.17	36.0	7.7	2.90	60.0	10.0	3.75	120.0	12.0	4.50	240.0	16.0	6.00
1.8	22.0	4.8	2.2	36.0	6.6	3.00	—	—	—	120.0	11.0	5.00	240.0	15.0	6.80
2.0	22.0	4.4	2.2	36.0	6.2	3.10	60.0	8.1	4.10	120.0	10.0	5.00	240.0	14.0	7.00
2.2	22.0	4.0	2.2	36.0	5.8	3.20	60.0	7.5	4.12	120.0	9.1	5.00			
2.5	—	—	—	—	—	—	—	—	—	120.0	8.0	5.00			
2.7	22.0	3.3	2.2	36.0	5.0	3.34	60.0	6.5	4.40	120.0	7.7	5.20			
3.0	22.0	2.9	2.2	36.0	4.5	3.40	60.0	6.0	4.51	120.0	7.0	5.27			
3.3	22.0	2.7	2.2	36.0	4.2	3.5	60.0	5.5	4.55	120.0	6.5	5.36			
3.9	22.0	2.3	2.2	36.0	3.7	3.6	60.0	5.0	4.90	120.0	5.5	5.40			
4.7	22.0	1.9	2.2	36.0	3.1	3.6	60.0	4.3	5.00						
5.0	22.0	1.8	2.2	36.0	2.9	3.6	60.0	4.0	5.00						
5.6	22.0	1.6	2.2	36.0	2.6	3.6	60.0	3.6	5.00						
6.8	22.0	1.3	2.2	36.0	2.1	3.6	60.0	3.0	5.00						
8.0	22.0	1.1	2.2	36.0	1.8	3.6	60.0	2.5	5.00						
8.2	22.0	1.1	2.2	36.0	1.8	3.6	60.0	2.4	5.00						
10.0	22.0	.88	2.2	36.0	1.4	3.6	60.0	2.0	5.00						
12.0	22.0	.73	2.2												
15.0	22.0	.59	2.2												
20.0	22.0	.44	2.2												
22.0	22.0	.40	2.2												

COMPONENT RESEARCH CO. INC • 1717 19TH STREET • SANTA MONICA, CALIF. 90404 • (213) 829 3615 TWX (910) 343 6864

MIL-C-83421/1 POLYCARBONATE AC TESTED CAPACITORS

COMPONENT
RESEARCH
COMPANY, INC.

MIL STYLE	DC VOLTS	400 Hz AC VOLTS	CRC BASIC P/N
CRH01	30	22 VRMS	A12A
CRH02	50	36 VRMS	A12B
CRH03	100	60 VRMS	A12C
CRH04	200	120 VRMS	A12D
CRH05	400	240 VRMS	A12E

SERIES A12 QUALITY ASSURANCE

ALL CAPACITORS ARE 100% SCREENED AND TESTED AS FOLLOWS:

1	48 hours Burn-in at 125°C and 140% of the rated DC voltage.
2	Thermal aging. 10 temperature cycles from —65°C to 125°C.
3	Helium Leak Test. 1 x 10^{-6} atm/cm^3/sec max. leak rate.
4	DC dielectric strength. Apply 200% of rated DC voltage from lead to lead and from leads to case for one minute.
5	AC dielectric strength. Apply 100 Hz square wave from lead to lead at a minimum peak to peak voltage of 3 x rated DC Voltage for one minute (except 800V peak to peak for 400 VDC styles).
6	Insulation Resistance. At rated voltage and 25°C, 300,000 megs — uF minimum, but need not exceed 3,000,000 Megohms.
7	Capacitance. % Tolerance at 1 KHz and 25°C.
8	Dissipation Factor. At 1 KHz and 25°C, 0.15% maximum.
9	Temperature Coefficient. Measured from —55°C to 125°C at a minimum of 5 temperature points. (Performed on monthly lot sampling basis).
10	0.1% max. dielectric absorption.
11	Visual inspection. Check dimensions, marking and packaging.
12	Traceability to production and test records by permanent marking of parts with lot control number.
13	Process and inspection data is maintained on file per NPC-200-3, MIL-Q-9858 quality control standards and MIL-STD-790, Reliability Assurance Program.
14	Capacitors are serialized and packaged with certified test data to accompany each shipment.

CONSTRUCTION: Polycarbonate dielectric, hermetically sealed, extended metal film electrodes, leads isolated from case.

LEAD WIRE SIZE AND TYPE

Case Diameter	Lead Wire Size #AWG	Lead Wire Material
0.312″ and smaller	22	Tinned Copper Clad Steel (Tinned Copperweld) CRC type "W"
0.400″ and 0.500″	20	
0.562″ and larger	18	Oxygen free tinned copper wire CRC type "C" or type "W"

A12 ADDITIONAL INFORMATION	PAGES
• Part Number System	6, 18
• Case Dimensions	8
• AC Current and Voltage Ratings	9
• Life Test Data	5
• Reliability	7
• Patent Information	21
• Prices - Delivery - Terms	40-44

CRC SERIES A12 QUALITY LEVEL 1

SPECIFICATIONS

OPERATING TEMPERATURE: —65°C to 100°C at full rated voltage. Derate linearly from 100°C to 50% of rated voltage at 125°C.

CAPACITANCE CHANGE WITH TEMPERATURE (25°C REFERENCE)

—55°C	—0.5% to —1.5%
25°C	0.1% Max. Hysteresis
+125°C	—0.5% to +0.8%

STABILITY: Capacitance values measured at any two corresponding temperature points taken in five successive temperature cycles shall be as follows:

RANGE	RETRACE
—25°C to 85°C	0.03% Max.
—65°C to 125°C	0.2% Max.

INSULATION RESISTANCE: Measured from terminal to terminal at rated voltage, and 5 minutes maximum charge time. For values greater than 1 uF, allow an additional minute/uF charge time.

MINIMUM IR

Range	25°C	55°C	85°C	100°C	125°C
.001 to 0.1 uF (in Megohms)	3,000,000	2,000,000	1,000,000	300,000	20,000
Greater than 0.1 uF (in Megohms — uF)	300,000	200,000	100,000	30,000	2,000

Readings shown are for 1 uF or less. For values over 1 uF, divide readings by uF to obtain min IR.
Example: A 4 uF capacitor is 75,000 megohms at 25°C.

DIELECTRIC ABSORPTION: 0.1% Max. at 25°C.

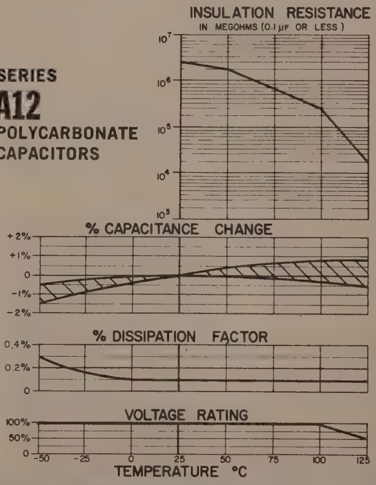
DISSIPATION FACTOR: 0.15% Max. at 1 KHz and 25°C. Values greater than 1 uF measure at 0.1 KHz.

DIELECTRIC STRENGTH: 200% of rated voltage.

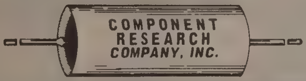
SEAL TEST: 1 x 10^{-6} atm/cm^3/sec Max. leak rate.

ENVIRONMENTAL: Capacitors shall meet all applicable requirements of MIL-C-83421/1.

SERIES
A12
POLYCARBONATE CAPACITORS



MIL-C-83421/1 POLYCARBONATE AC TESTED CAPACITORS



MIL STYLE	DC VOLTS	400 Hz AC VOLTS	CRC BASIC P/N
CRH06	30	22 VRMS	K12A
CRH07	50	36 VRMS	K12B
CRH08	100	60 VRMS	K12C
CRH09	200	120 VRMS	K12D
CRH00	400	240 VRMS	K12E

SERIES K12 QUALITY ASSURANCE

ALL CAPACITORS ARE 100% SCREENED AND TESTED AS FOLLOWS:

1	Thermal aging. 5 temperature cycles from −65°C to 125°C.
2	Helium Leak Test. 1 x 10^{-5} atm/cm³/sec max. leak rate.
3	DC dielectric strength. Apply 200% of rated DC voltage from lead to lead and from leads to case for one minute.
4	AC dielectric strength. Apply 100 Hz square wave from lead to lead at a minimum peak to peak voltage of 3 x rated DC Voltage for one minute (except 800V peak to peak for 400 VDC styles).
5	Insulation Resistance. At rated voltage and 25°C, 100,000 megs — uF minimum, but need not exceed 1,000,000 Megohms.
6	Capacitance. % Tolerance at 1 KHz and 25°C.
7	Dissipation Factor. At 1 KHz and 25°C, 0.15% maximum.
8	Temperature Coefficient. Measured from −55°C to 125°C at a minimum of 5 temperature points. (Performed on monthly lot sampling basis).
9	0.1% max. dielectric absorption.
10	Visual inspection. Check dimensions, marking and packaging.
11	Traceability to production and test records by permanent marking of parts with lot control number.
12	Process and inspection data is maintained on file per NPC-200-3, MIL-Q-9858 quality control standards and MIL-STD-790, Reliability Assurance Program.

CONSTRUCTION: Polycarbonate dielectric, hermetically sealed, extended metal film electrodes, leads isolated from case.

LEAD WIRE SIZE AND TYPE

Case Diameter	Lead Wire Size #AWG	Lead Wire Material
0.312″ and smaller	22	Tinned Copper Clad Steel (Tinned Copperweld) CRC type "W"
0.400″ and 0.500″	20	
0.562″ and larger	18	Oxygen free tinned copper wire CRC type "C" or type "W"

K12 ADDITIONAL INFORMATION	PAGES
• Part Number System	6, 18
• Case Dimensions	8
• AC Current and Voltage Ratings	9
• Life Test Data	5
• Reliability	7
• Patent Information	21
• Prices - Delivery - Terms	40-44

CRC SERIES K12 QUALITY LEVEL 3

SPECIFICATIONS

OPERATING TEMPERATURE: −65°C to 100°C at full rated voltage. Derate linearly from 100°C to 50% of rated voltage at 125°C.

CAPACITANCE CHANGE WITH TEMPERATURE (25°C REFERENCE)

−55°C	−0.5% to −2.0%
25°C	0.25% Max. Hysteresis
+125°C	±2%

STABILITY: Capacitance values measured at any two corresponding temperature points taken in five successive temperature cycles shall be as follows:

RANGE	RETRACE
−25°C to 85°C	0.05% Max.
−65°C to 125°C	0.25% Max.

INSULATION RESISTANCE: Measured from terminal to terminal at rated voltage, and 5 minutes maximum charge time. For values greater than 1 uF, allow an additional minute/uF charge time.

MINIMUM IR

Range	25°C	55°C	85°C	100°C	125°C
.001 to 0.1 uF (in Megohms)	1,000,000	500,000	100,000	50,000	10,000
Greater than 0.1 uF (in Megohms — uF)	100,000	50,000	10,000	5,000	1,000

Readings shown are for 1 uF or less. For values over 1 uF, divide readings by uF to obtain min. IR.

Example: A 10 uF capacitor is 10,000 megohms at 25°C.

DIELECTRIC ABSORPTION: 0.1% Max. at 25°C.

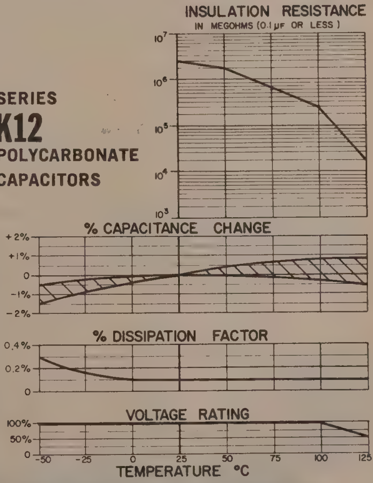
DISSIPATION FACTOR: 0.15% Max. at 1 KHz and 25°C. Values greater than 1 uF measure at 0.1 KHz.

DIELECTRIC STRENGTH: 200% of rated voltage.

SEAL TEST: 1 x 10^{-5} atm/cm³/ sec Max. leak rate.

ENVIRONMENTAL: Capacitors shall meet all applicable requirements of MIL-C-83421/1.

SERIES
K12
POLYCARBONATE
CAPACITORS



CRC HIGH RELIABILITY CAPACITORS

100% Group A Screening & Inspection

*MIL-C-39022/9 POLYCARBONATE CAPACITORS

* MIL-C-83421/1 HAS REPLACED MIL-C-39022/9C FOR NEW DESIGN. CRC WILL CONTINUE TO SUPPLY BOTH TYPES AS REQUIRED. SEE PAGES 2-11.

HIGH INSULATION RESISTANCE

CHROIA, D, G, K and N styles exceed 3,000,000 megohms at 25°C for values 0.1 uF or less. CRC polycarbonate capacitors have the highest insulation resistance of any capacitors available for their size. Special CRC capacitors are available with higher limits.

AC RATED TO 40KHz

CRC miniature polycarbonate capacitors, have a dissipation factor so low, (generally 0.1% but rated 0.15% max.) that they can handle extremely high RMS or peak current. See page 9 for further information.

HIGH STABILITY - LOW TEMPERATURE COEFFICIENT

Three quality levels are available with a choice of drift and TC limits suitable for most temperature sensitive applications. Long term drift data on file indicates 0.5% max. capacitance shelf drift for five years, with current production showing improved stability.

FREE FROM MOMENTARY BREAKDOWNS

CRC capacitors are engineered to be completely free from breakdowns, intermittents or noise. All CRC capacitors must pass rigorous testing with sensitive equipment capable of detecting changes of several picoamps.

HIGHEST QUALITY AT LOWEST COST

Year after year CRC capacitor quality is upgraded. CRC specifications become more exacting, yet CRC manages to maintain or lower capacitor prices. Furthermore, there are no additional charges for MIL-C-39022/9 Retention of Qualification Testing, when purchasing CHROI capacitors from CRC (See page 4 for Retention of Qualification Testing.)

QUALITY LEVEL ①

Equivalent CRC Types	Mil-C-39022/9 Styles	VDC
C12A	CHROIA	30
C12B	CHROID	50
C12C	CHROIG	100
C12D	CHROIK	200
C12E	CHROIN	400

1. 48 hours Burn-In at 125°C and 140% of the rated DC voltage
2. 10 Temperature Cycles from −65°C to 125°C
3. Helium Leak Test, 1 x 10^{-6} atm/cm^3/sec max.
4. AC-dielectric Strength at 100 Hz square wave at a minimum peak to peak voltage of 3x rated DC voltage (except 800V peak to peak for 400VDC styles).
5. DC-dielectric Strength at 200% of the rated DC voltage
6. Insulation Resistance at the rated voltage and 25°C, 300,000 megs — uF min., and 3,000,000 megs min. for 0.1 uF or less.
7. Capacitance % Tolerance at 1KHz and 25°C
8. Dissipation Factor at 1KHz and 25°C, 0.15% maximum
9. Visual Inspection for dimensions, marking and packaging

QUALITY LEVEL ②

Equivalent CRC Types	Mil-C-39022/9 Styles	VDC
D12A	CHROIB	30
D12B	CHROIE	50
D12C	CHROIH	100
D12D	CHROIL	200
D12E	CHROIP	400

1. 16 hours Burn-In at 25°C and 140% of the rated DC voltage
2. 10 Temperature Cycles from −65°C to 125°C
3. Helium Leak Test, 1 x 10^{-6} atm/cm^3/sec max.
4. AC-dielectric Strength at 100 Hz square wave at a minimum peak to peak voltage of 3x rated DC voltage (except 800V peak to peak for 400VDC styles).
5. DC-dielectric Strength at 200% of the rated DC voltage
6. Insulation Resistance at the rated voltage and 25°C, 200,000 megs — uF min., and 2,000,000 megs min. for 0.1 uF or less.
7. Capacitance % Tolerance at 1KHz and 25°C
8. Dissipation Factor at 1KHz and 25°C, 0.15% maximum
9. Visual Inspection for dimensions, marking and packaging

QUALITY LEVEL ③

Equivalent CRC Types	Mil-C-39022/9 Styles	VDC
E12A	CHROIC	30
E12B	CHROIF	50
E12C	CHROIJ	100
E12D	CHROIM	200
E12E	CHROIR	400

1. 5 Temperature Cycles from −65°C to 125°C
2. Helium Leak Test, 1 x 10^{-5} atm/cm^3/sec max.
3. AC-dielectric Strength at 100 Hz square wave at a minimum peak to peak voltage of 3x rated DC voltage (except 800V peak to peak for 400VDC styles).
4. DC-dielectric Strength at 200% of the rated DC voltage
5. Insulation Resistance at the rated voltage and 25°C, 100,000 megs — uF min., and 1,000,000 megs min. for 0.1 uF or less.
6. Capacitance % Tolerance at 1KHz and 25°C
7. Dissipation Factor at 1KHz and 25°C, 0.15% maximum
8. Visual Inspection for dimensions, marking and packaging

PAGE 12
catalog J

COMPONENT RESEARCH CO., INC. • 1717 19TH STREET • SANTA MONICA, CALIF. 90404 • (213) 829-3615 TWX: (910) 343-6864

CRC HIGH RELIABILITY CAPACITORS

HOW TO SELECT & SPECIFY

*MIL-C-39022/9 CAPACITOR PART NUMBERS

SELECTION INFORMATION

MIL-C-39022/9 covers 30 volt to 400 volt DC rated capacitors for applications requiring a tight capacitance tolerance, excellent capacitance stability, very high insulation resistance and low loss factors. This specification applies in addition where the AC component of voltage is large with respect to the applied DC voltage, and where momentary breakdowns cannot be tolerated.

Table II of MIL-C-39022/9 describes in part, three quality levels and their respective performance and test criteria.

CRC has clarified the data shown in table II and all additional specifications requirements, by presenting this information in test plan form on page 12 of CRC catalog J.

A study of life test data on Page 5 will indicate the excellent characteristics of polycarbonate capacitors manufactured by Component Research Co. to MIL-C-39022/9 latest revision.

HOW TO SPECIFY MILITARY PART NUMBERS

Select the style required, then place the dash number after M39022/9. As an example: A 0.001 uF 1% 50VDC CHROIE capacitor as shown in table 1 would be identified as M39022/9-E003P. **The P indicates our failure rate as of March 1972. See section dealing with failure rates on this page.**

SLEEVING

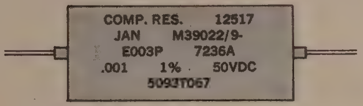
All CHROI capacitors are mylar shrink-fit sleeved.

LEADS

All CHROI capacitors are supplied with #22 AWG tinned copper clad steel leads for 0.312″ or less case diameters. #20 AWG leads are supplied for 0.400″ and .500″ diameter capacitors. Gold plated nickel leads are still being used where specifically requested, but are not recommended for new designs. #18 AWG tinned copper, OFHC leads are used for 0.562″ and larger diameter capacitors.

Unless you specifically request a lead material choice for the 0.500″ diameter and smaller cases, Component Research will supply the material currently in production at time of order.

MARKING EXPLANATION (TYPICAL EXAMPLE)



COMP. RES.	ABBREVIATION FOR COMPONENT RESEARCH CO. (WHEN SPACE IS LIMITED).
12517	CRC VENDOR CODE NO.
JAN M39022/9-	BASIC MILITARY MARKING
E003	DASH NO. SELECTED FROM TABLE 1.
P	(P IS FAILURE RATE LETTER)
7236A	WEEKLY DATE CODE PER MIL STD 1285
*5093T	REPRESENTS UNIQUE CRC TEST NUMBER.
067	UNIQUE SERIAL NUMBER

*This marking is not required by MIL-C-39022/9. This is standard CRC marking for CHR01A, D, G, K and N styles only.

*** MIL-C-83421/1 HAS REPLACED MIL-C-39022/9C FOR NEW DESIGN. CRC WILL CONTINUE TO SUPPLY BOTH TYPES AS REQUIRED. SEE PAGES 2-11.**

AC RATINGS

AC ratings at 400Hz; 4000Hz; and 40,000Hz RMS AC voltage (sinusoidal), with current limits from −55°C to +100°C, are listed for each individual capacitance value and DC voltage rated style in table 1. When operating above 100°C, derate all voltages linearly from full rated voltage at 100°C to 50% of rating at 125°C.

CRC qualified polycarbonate capacitors, with a 0.15% max. dissipation factor, will in a still-air environment, and at maximum rated operating conditions rise no more than 20°C. With conventional heat sinking methods, the capacitor heat rise will be considerably less than 20°C.

Although CRC capacitors have a low dissipation factor of 0.15% max. at 25°C, their dissipation factor is lower yet at temperatures from 75°C to 125°C.

This results in lower watts-loss and heat rise at elevated temperatures—with, of course, improved reliability for AC or DC applications.

APPLICATION NOTES

Make certain that the sum of any instantaneous peak AC voltages plus any superimposed DC voltages do not exceed the capacitor's rated DC voltage.

Effective heat sinking will permit operation at higher current levels than listed in table 1. However our CRC application engineers should be advised prior to use in any application where non-sinusoidal operating conditions are encountered, or when higher RMS currents are involved.

Our engineers will be pleased to study your needs and advise you if the capacitors will operate reliably under your special operating conditions.

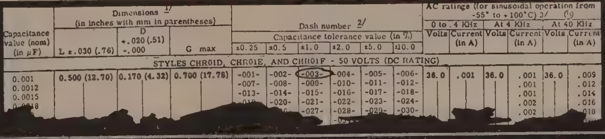
Component Research Co. can supply special AC capacitors with greater current handling capability and reduced heat rise, in the same case sizes as shown for MIL-C-39022/9. **See page 35.**

FAILURE RATE LEVELS

Component Research Co. is conducting continuous lot testing in order to achieve lower failure rates. Upon periodic review of this data by DESC, lower failure rates will be granted based on total number of capacitor life test hours without any failure.

Because MIL-C-39022/9 has such stringent post test limits the failure rate levels in MIL-C-39022/9 are effectively lower than the same failure rate levels in conventional film capacitor specifications and other military specifications.

MIL-C-39022/9 TABLE 1 (SECTION SHOWN OF 30VDC STYLES)



Capacitance value (nom) (in µF)	Dimensions 1/ (in inches with mm in parentheses)			Dash number 2/						AC ratings (for sinusoidal operation from -55° to +100°C) 3/					
	L ±.030 (.76)	D +.020 (.51) -.000	G max	Capacitance tolerance value (in %)						0 to .4 KHz		At 4 KHz		At 40 KHz	
				±0.25	±0.5	±1.0	±2.0	±5.0	±10.0	Volts	Current (in A)	Volts	Current (in A)	Volts	Current (in A)
STYLES CHR01D, CHR01E, AND CHR01F - 50 VOLTS (DC RATING)															
0.001	0.500 (12.70)	0.170 (4.32)	0.700 (17.78)	-001-	-002-	-003-	-004-	-005-	-006-	36.0	.001	36.0	.001	36.0	.009
0.0012				-007-	-008-	-009-	-010-	-011-	-012-				.001		.012
0.0015				-013-	-014-	-015-	-016-	-017-	-018-				.001		.014
0.0018				[illegible]	-020-	-021-	-022-	-023-	-024-				.002		.016
					[illegible]	-027-	-028-	-029-	-030-				.002		.018
							[illegible]								

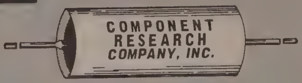
COMPONENT RESEARCH CO., INC. • 1717 19TH STREET • SANTA MONICA, CALIF. 90404 • (213) 829-3615 TWX: (910) 343 6864

PAGE 13
catalog J

SERIES
C12

POLYCARBONATE

AC TESTED CAPACITORS



- **QUALIFIED TO MIL-C-39022/9C**
- **100% SCREENED (QUALITY LEVEL 1)**
- **3,000,000 MEGOHMS IR (0.1 uF or less)**
- **0.15% MAX. DISSIPATION FACTOR**
- **STANDARD TOLERANCES ±0.25% TO ±10%**

MIL STYLE	CRC STYLE	DC VOLTS	OLD P/N
CHROIA	C12A	30VDC	03 PV
CHROID	C12B	50VDC	05 PK
CHROIG	C12C	100VDC	1 PK
CHROIK	C12D	200VDC	2 PK
CHROIN	C12E	400VDC	4 PK

- PART NUMBER SYSTEM: PAGES 13, 18
- LIFE TEST DATA: PAGE 5
- CASE DIMENSIONS: PAGE 17
- AC VOLTS AND CURRENT RATINGS: PAGE 9
- SPECIAL AC CAPACITORS: PAGE 35
- PRICES: PAGES 40-44

C12 SPECIFICATIONS

OPERATING TEMPERATURE: −65°C to 100°C at full rated voltage. Derate linearly from 100°C to 50% of rated voltage at 125°C.

TEMPERATURE COEFFICIENT OF CAPACITANCE: (25°C Reference).

−0.75% ±0.25% at −55°C	+0.05% ±0.1% at 55°C
−0.35% ±0.15% at −25°C	+0.15% ±0.15% at 85°C
−0.25% ±0.15% at −10°C	+0.25% ±0.25% at 125°C
−0.15% ±0.1% at 0°C	

STABILITY: Capacitance values measured at any two corresponding temperature points taken in five successive temperature cycles shall be as follows:

RANGE	RETRACE
−25°C to 85°C	0.03% Max.
−65°C to 125°C	0.2% Max.

INSULATION RESISTANCE: Measured from terminal to terminal at rated voltage, and 5 minutes maximum charge time. For values greater than 1 uF, allow an additional minute/uF charge time.

MINIMUM IR

Range	25°C	55°C	85°C	100°C	125°C
.001 to 0.1 uF (in Megohms)	3,000,000	2,000,000	1,000,000	300,000	20,000
Greater than 0.1 uF (in Megohms—uF)	300,000	200,000	100,000	30,000	2,000

Readings shown are for 1 uF or less. For values over 1 uF, divide readings by uF to obtain min IR.

Example: A 4 uF capacitor is 75,000 megohms at 25°C.

DIELECTRIC ABSORPTION: 0.1% Max. at 25°C.

DISSIPATION FACTOR: 0.15% Max. at 1KHz and 25°C. Values greater than 1 uF measure at 0.1KHz.

DIELECTRIC STRENGTH: 200% of rated voltage.

CONSTRUCTION: Polycarbonate dielectric, hermetically sealed, extended metal film electrodes, leads isolated from case.

LEAD WIRE SIZE AND TYPE

Case Diameter	Lead Wire Size #AWG	Lead Wire Material
0.312″ and smaller	22	Tinned Copper Clad Steel (Tinned Copperweld) CRC type "W"
0.400″ and 0.500″	20	
0.562″ and larger	18	Oxygen free tinned copper wire CRC type "C"

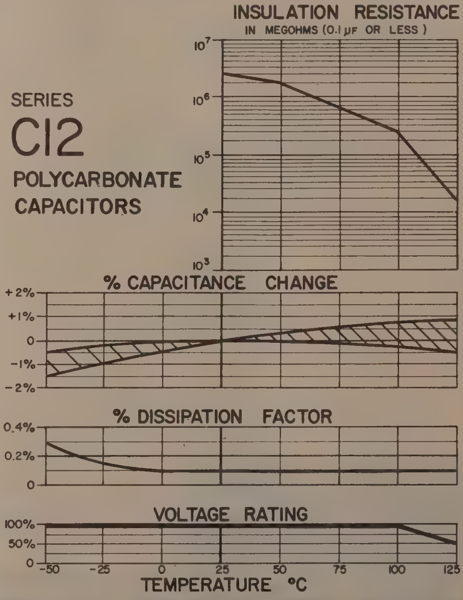
SEAL TEST: 1 x 10⁻⁶ atm/cm³/sec max. leak rate.

ENVIRONMENTAL: Capacitors shall meet all applicable requirements of MIL-C-39022/9C.

C12 QUALITY ASSURANCE

All capacitors are 100% screened and tested as follows:

1. 48 hours Burn-In at 125°C and 140% of the rated DC voltage.
2. 10 Temperature Cycles from −65°C to 125°C.
3. Helium Leak Test. 1 x 10^{-6} atm/cm³/sec max. leak rate.
4. DC dielectric strength apply 200% of rated DC voltage from lead to lead and from leads to case for one minute.
5. AC dielectric strength apply 100 Hz square wave from lead to lead at a minimum peak to peak voltage of 3 x rated DC voltage for one minute (except 800V peak to peak for 400VDC styles).
6. Insulation Resistance at the rated voltage and 25°C, 300,000 megs — uF minimum, but need not exceed 3,000,000 Megohms.
7. Capacitance % Tolerance at 1KHz and 25°C.
8. Dissipation Factor at 1KHz and 25°C, 0.15% maximum.
9. Temperature Coefficient measured from −55°C to 125°C at a minimum of 5 temperature points. (Performed on lot sampling monthly basis.)
10. Visual Inspection for dimensions, marking and packaging.
11. Traceability to production and test records by permanent marking of parts with lot control number.
12. Process and inspection data is maintained on file per NPC-200-3, MIL-Q-9858 quality control standards and MIL-STD-790, Reliability Assurance Program.
13. Capacitors are serialized and packaged with certified test data to accompany each shipment.



SERIES
D12

POLYCARBONATE
AC TESTED CAPACITORS

COMPONENT
RESEARCH
COMPANY, INC.

- **QUALIFIED TO MIL-C-39022/9C**
- **100% SCREENED (QUALITY LEVEL 2)**
- **2,000,000 MEGOHMS IR (0.1 uF or less)**
- **0.15% MAX. DISSIPATION FACTOR**
- **STANDARD TOLERANCES ±0.25% TO ±10%**

MIL STYLE	CRC STYLE	DC VOLTS	OLD P/N
CHROIB	D12A	30VDC	03 PL
CHROIE	D12B	50VDC	05 PL
CHROIH	D12C	100VDC	1 PL
CHROIL	D12D	200VDC	2 PL
CHROIP	D12E	400VDC	4 PL

- PART NUMBER SYSTEM: PAGES 13, 18
- LIFE TEST DATA: PAGE 5
- CASE DIMENSIONS: PAGE 17
- AC VOLTS AND CURRENT RATINGS: PAGE 9
- SPECIAL AC CAPACITORS: PAGE 35
- PRICES: PAGES 40-44

D12 SPECIFICATIONS

OPERATING TEMPERATURE: −65°C to 100°C at full rated voltage. Derate linearly from 100°C to 50% of rated voltage at 125°C.

TEMPERATURE COEFFICIENT OF CAPACITANCE: (25°C Reference).

−1.5% Max. at −55°C	+0.2% Max. at 55°C
−0.5% Max. at −25°C	+0.5% Max. at 85°C
−0.35% Max. at −10°C	+1.0% Max. at 125°C
−0.25% Max. at 0°C	

STABILITY: Capacitance values measured at any two corresponding temperature points taken in five successive temperature cycles shall be as follows:

RANGE	RETRACE
−25°C to 85°C	0.05% Max.
−65°C to 125°C	0.25% Max.

INSULATION RESISTANCE: Measured from terminal to terminal at rated voltage, and 5 minutes maximum charge time. For values greater than 1 uF, allow an additional minute/uF charge time.

MINIMUM IR

Range	25°C	55°C	85°C	100°C	125°C
.001 to 0.1 uF (in Megohms)	2,000,000	1,000,000	500,000	200,000	10,000
Greater than 0.1 uF (in Megohms—uF)	200,000	100,000	50,000	20,000	1,000

Readings shown are for 1 uF or less. For values over 1 uF, divide readings by uF to obtain min IR.

Example: A 6.8 uF capacitor is 30,000 megohms at 25°C.

DIELECTRIC ABSORPTION: 0.1% Max. at 25°C.

DISSIPATION FACTOR: 0.15% Max. at 1KHz and 25°C. Values greater than 1 uF measure at 0.1KHz.

DIELECTRIC STRENGTH: 200% of rated voltage.

CONSTRUCTION: Polycarbonate dielectric, hermetically sealed, extended metal film electrodes, leads isolated from case.

LEAD WIRE SIZE AND TYPE

Case Diameter	Lead Wire Size #AWG	Lead Wire Material
0.312″ and smaller	22	Tinned Copper Clad Steel (Tinned Copperweld) CRC type "W"
0.400″ and 0.500″	20	
0.562″ and larger	18	Oxygen free tinned copper wire CRC type "C"

SEAL TEST: 1 x 10-6 atm/cm³/sec max. leak rate.

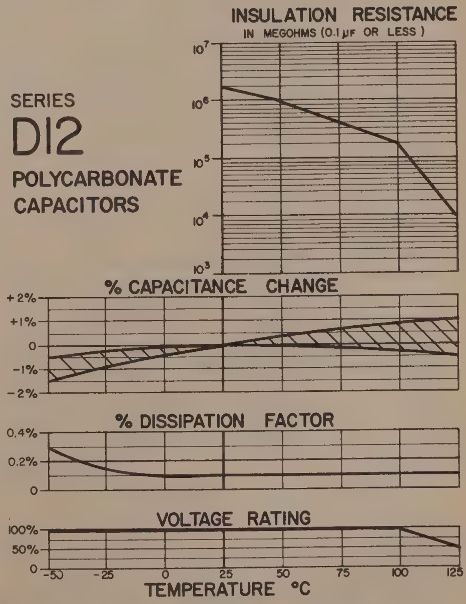
ENVIRONMENTAL: Capacitors shall meet all applicable requirements of MIL-C-39022/9C.

D12 QUALITY ASSURANCE

All capacitors are 100% screened and tested as follows:

1. 16 hours Burn-In at 125°C and 140% of the rated DC voltage.
2. 10 Temperature Cycles from −65°C to 125°C.
3. Helium Leak Test. 1 x 10-6 atm/cm³/sec max. leak rate.
4. DC dielectric strength apply 200% of rated DC voltage from lead to lead and from leads to case for one minute.
5. AC dielectric strength apply 100 Hz square wave from lead to lead at a minimum peak to peak voltage of 3 x rated DC voltage for one minute (except 800V peak to peak for 400VDC styles).
6. Insulation Resistance at the rated voltage and 25°C, 200,000 megs — uF minimum, but need not exceed 2,000,000 Megohms.
7. Capacitance % Tolerance at 1KHz and 25°C.
8. Dissipation Factor at 1KHz and 25°C, 0.15% maximum.
9. Visual Inspection for dimensions, marking and packaging.
10. Traceability to production and test records by permanent marking of parts with lot control number.
11. Process and inspection data is maintained on file per NPC-200-3, MIL-Q-9858 quality control standards, and MIL-STD-790 Reliability Assurance Program.

SERIES
D12
POLYCARBONATE
CAPACITORS



SERIES
E12

POLYCARBONATE

AC TESTED CAPACITORS

COMPONENT
RESEARCH
COMPANY, INC.

- QUALIFIED TO MIL-C-39022/9C
- 100% SCREENED (QUALITY LEVEL 3)
- 1,000,000 MEGOHMS IR (0.1 uF or less)
- 0.15% MAX. DISSIPATION FACTOR
- STANDARD TOLERANCES ±0.25% TO ±10%

MIL STYLE	CRC STYLE	DC VOLTS	OLD P/N
CHROIC	E12A	30VDC	03 PG
CHROIF	E12B	50VDC	05 PG
CHROIJ	E12C	100VDC	1 PG
CHROIM	E12D	200VDC	2 PG
CHROIR	E12E	400VDC	4 PG

• PART NUMBER SYSTEM:	PAGES 13,18
• LIFE TEST DATA:	PAGE 5
• CASE DIMENSIONS:	PAGE 17
• AC VOLTS AND CURRENT RATINGS:	PAGE 9
• SPECIAL AC CAPACITORS:	PAGE 35
• PRICES:	PAGES 40-44

E12 SPECIFICATIONS

OPERATING TEMPERATURE: −65°C to 100°C at full rated voltage. Derate linearly from 100°C to 50% of rated voltage at 125°C.

TEMPERATURE COEFFICIENT OF CAPACITANCE: (25°C Reference).

±2% Max. −55°C to 125°C
±1% Max. −25°C to 85°C
±0.5% Max. 0°C to 55°C

STABILITY: Capacitance values measured at any two corresponding temperature points taken in five successive temperature cycles shall be as follows:

RANGE	RETRACE
−25°C to 85°C	0.25% Max.
−65°C to 125°C	0.50% Max.

INSULATION RESISTANCE: Measured from terminal to terminal at rated voltage, and 5 minutes maximum charge time. For values greater than 1 uF, allow an additional minute/uF charge time.

MINIMUM IR					
Range	**25°C**	**55°C**	**85°C**	**100°C**	**125°C**
.001 to 0.1 uF (in Megohms)	1,000,000	500,000	100,000	50,000	10,000
Greater than 0.1 uF (in Megohms—uF)	100,000	50,000	10,000	5,000	1,000

Readings shown are for 1 uF or less. For values over 1 uF, divide readings by uF to obtain min IR.

Example: A 10 uF capacitor is 10,000 megohms at 25°C.

DIELECTRIC ABSORPTION: 0.1% Max. at 25°C.

DISSIPATION FACTOR: 0.15% Max. at 1KHz and 25°C. Values greater than 1 uF measure at 0.1KHz.

DIELECTRIC STRENGTH: 200% of rated voltage.

CONSTRUCTION: Polycarbonate dielectric, hermetically sealed, extended metal film electrodes, leads isolated from case.

LEAD WIRE SIZE AND TYPE		
Case Diameter	**Lead Wire Size #AWG**	**Lead Wire Material**
0.312″ and smaller	22	Tinned Copper Clad Steel (Tinned Copperweld) CRC type "W"
0.400″ and 0.500″	20	
0.562″ and larger	18	Oxygen free tinned copper wire CRC type "C"

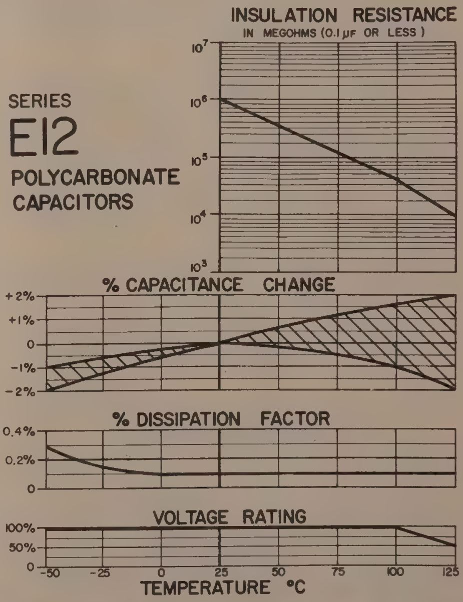
SEAL TEST: 1 x 10-5 atm/cm³/sec max. leak rate.

ENVIRONMENTAL: Capacitors shall meet all applicable requirements of MIL-C-39022/9C.

E12 QUALITY ASSURANCE

All capacitors are 100% screened and tested as follows:

1. 5 Temperature Cycles from −65°C to 125°C.
2. Helium Leak Test. 1 x 10-5 atm/cm³/sec max. leak rate.
3. DC dielectric strength apply 200% of rated DC voltage from lead to lead and from leads to case for one minute.
4. AC dielectric strength apply 100 Hz square wave from lead to lead at a minimum peak to peak voltage of 3 x rated DC voltage for one minute (except 800V peak to peak for 400VDC styles).
5. Insulation Resistance at the rated voltage and 25°C, 100,000 megs — uF minimum, but need not exceed 1,000,000 Megohms.
6. Capacitance % Tolerance at 1KHz and 25°C.
7. Dissipation Factor at 1KHz and 25°C, 0.15% maximum.
8. Visual Inspection for dimensions, marking and packaging.
9. Traceability to production and test records by permanent marking of parts with lot control number.
10. Process and inspection data is maintained on file per NPC-200-3, MIL-Q-9858 quality control standards and MIL-STD-790 Reliability Assurance Program.



CRC HIGH RELIABILITY CAPACITORS

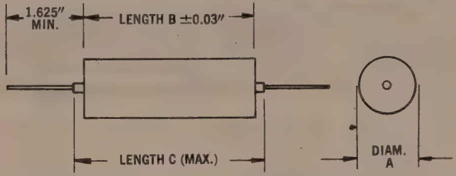
MIL-C-39022/9 POLYCARBONATE C12, D12, E12, CASE SIZES

SERIES
12

MIL-C-39022/9C VS MIL-C-83421/1

MIL-C-39022/9C Polycarbonate capacitor specifications have been replaced by MIL-C-83421/1 as explained in CRC catalog pages 2-11. MIL-C-83421/1 screening steps are not basically different than those of MIL-C-39022/9C but re-writing of the documents has resulted in a more clearly understood specification for our Metallized Polycarbonate capacitors. Several case dimensions were changed in going to MIL-C-83421/1, and minor corrections were made in current and voltage ratings, and several capacitance values were added and deleted. CRC will continue to supply both types as long as required by our customers. All "C" max dimensions for Series A12 and K12 capacitors shown on page 8 of catalog J, are 0.1" shorter than for MIL-C-39022/9C capacitors listed below.

All capacitor values and dimensions which differ from MIL-C-83421/1 or from CRC A12, K12 specifications are shown in bold face type below.



CASE DIMENSION	TOLERANCE LIMITS
"A" Diameter	±0.010" Without Sleeving −0.00" +0.02" With Mylar Sleeving
"B" Case Length	±0.03" With or Without Sleeving
"C" Bead to Bead Length	The lengths shown in tables are maximum and include the solder bead.

uF	12A	30VDC		12B	50VDC		12C	100VDC		12D	200VDC		12E	400VDC	
	Diam. A	Length B	Length C	Diam. A	Length B	Length C	Diam. A	Length B	Length C	Diam. A	Length B	Length C	Diam. A	Length B	Length C
.001	.170	.500	.700	.170	.500	.700	.170	.500	.700	.170	.562	.762	.193	.562	.762
.0012	.170	.500	.700	.170	.500	.700	.170	.500	.700	.170	.562	.762			
.0015	.170	.500	.700	.170	.500	.700	.170	.500	.700	.170	.562	.762			
.0018	.170	.500	.700	.170	.500	.700	.170	.500	.700	.170	.562	.762			
.002	.170	.500	.700	.170	.500	.700	.170	.500	.700	.170	.562	.762	.193	.562	.762
.0022	.170	.500	.700	.170	.500	.700	.170	.500	.700	.170	.562	.762			
.0027	.170	.500	.700	.170	.500	.700	.170	.500	.700	.170	.562	.762			
.0033	.170	.500	.700	.170	.500	.700	.170	.500	.700	.170	.562	.762			
.0039										.170	.562	.762			
.0047	.170	.500	.700	.170	.500	.700	.170	.500	.700	.170	.562	.762			
.005	.170	.500	.700	.170	.500	.700	.170	.500	.700	.170	.562	.762	.235	.687	.887
.0056										.170	.562	.762			
.0068	.170	.500	.700	.170	.500	.700	.170	.687	.887	.170	.562	.762			
.0082	.170	.500	.700	.170	.562	.762	.170	.687	.887	.170	.562	.762			
.01	.170	.500	.700	.170	.562	.762	.170	.687	.887	.193	.562	.762	.235	.687	.887
.012	.170	.500	.700	.170	.562	.762	.170	.687	.887	.193	.562	.762			
.015	.170	.500	.700	.170	.562	.762	.170	.687	.887	.235	.562	.762	.235	.813	1.013
.018	.170	.500	.700	.193	.562	.762	.193	.687	.887	.235	.687	.887			
.02	.170	.500	.700	.193	.562	.762	.193	.687	.887	.235	.687	.887			
.022	.170	.500	.700	.193	.562	.762	.193	.687	.887	.235	.687	.887	.312	.813	1.013
.027	.170	.562	.762	.193	.562	.762	.193	.687	.887	.312	.687	.887	.312	.813	1.013
.033	.170	.562	.762	.193	.562	.762	.193	.687	.887	.312	.687	.887	.312	.813	1.013
.039	.170	.562	.762	.170	.687	.887	.235	.687	.887	.312	.687	.887	.312	.813	1.013
.047	.170	.562	.762	.170	.687	.887	.235	.687	.887	.312	.687	.887	.400	.813	1.013
.05	.170	.562	.762	.170	.687	.887	.235	.687	.887	.312	.813	1.013	.400	.813	1.013
.056	.170	.562	.762	.193	.687	.887	.235	.687	.887	.312	.813	1.013			
.068	.170	.687	.887	.193	.687	.887	.235	.813	1.013	.312	.813	1.013	.400	.813	1.013
.082	.170	.687	.887	.193	.813	1.013	.312	.687	.887	.312	.813	1.013	.400	1.063	1.263
.1	.193	.687	.887	.193	.813	1.013	.312	.687	.887	.312	.813	1.013	.400	1.063	1.263
.12	.193	.687	.887	.235	.687	.887	.312	.687	.887	.312	.813	1.013			
.15	.235	.562	.762	.235	.687	.887	.312	.813	1.013	.400	1.063	1.263	.400	1.375	1.575
.18										.400	1.375	1.575			
.20	.235	.687	.887	.235	.813	1.013	.312	.813	1.013						
.22	.235	.687	.887	.235	.813	1.013	.312	.813	1.013	.400	1.375	1.575	.500	1.375	1.575
.27	.235	.687	.887	.312	.687	.887	.312	1.063	1.263	.500	1.375	1.575			
.33	.235	.687	.887	.312	.687	.887	.312	1.063	1.263	.500	1.375	1.575	.562	1.375	1.575
.39	.235	.687	.887	.312	.813	1.013	.400	1.063	1.263	.500	1.375	1.575			
.47	.312	.687	.887	.312	.813	1.013	.400	1.063	1.263	.500	1.375	1.575	.562	1.875	2.075
.50	.312	.687	.887	.400	.813	1.013	.400	1.063	1.263	.500	1.375	1.575	.562	1.875	2.075
.56										.500	1.375	1.575			
.68	.312	.687	.887	.400	.813	1.013	.500	1.125	1.325	.562	1.375	1.575			
.82	.312	.813	1.013	.400	1.063	1.263	.500	1.125	1.325	.562	1.875	2.075			
1.0	.312	.813	1.013	.400	1.063	1.263	.562	1.125	1.325	.562	1.875	2.075	.750	1.875	2.075
1.25										.562	1.875	2.075			
1.5	.400	.813	1.013	.400	1.063	1.263	.562	1.375	1.575	.670	1.875	2.075	1.00	2.375	2.575
2.0	.400	.813	1.013	.500	1.125	1.325	.670	1.375	1.575	.750	1.875	2.075	1.00	2.375	2.575
2.2	.400	.813	1.013	.500	1.125	1.325	.670	1.375	1.575						
2.5										.750	1.875	2.075			
3.0	.400	1.063	1.263	.500	1.375	1.575	.670	1.875	2.075	1.00	1.875	2.075			
3.3	.400	1.063	1.263	.500	1.375	1.575	.670	1.875	2.075						
4.0	.400	1.375	1.575	.562	1.375	1.575	.750	1.875	2.075	1.00	2.375	2.575			
4.7	.500	1.375	1.575	.670	1.375	1.575	.750	1.875	2.075						
5.0	.500	1.375	1.575	.670	1.375	1.575	.750	1.875	2.075						
5.6															
6.8	.562	1.375	1.575	.670	1.875	2.075	1.0	2.375	2.575						
8.0	.562	1.375	1.575	.670	1.875	2.075	1.0	2.375	2.575						
10.0	.562	1.375	1.575	.670	1.875	2.075	1.0	2.375	2.575						
15.0	.562	1.875	2.075												
20.0	.670	1.875	2.075												
22.0	.670	1.875	2.075												

CRC HIGH RELIABILITY CAPACITORS

HOW TO SPECIFY
COMPONENT RESEARCH PART NUMBERS

WINDING STYLE & CASE STYLE	DIELECTRIC	DC VOLTS	CAPACITANCE (IN PICOFARADS)	% CAP. TOLERANCE	MYLAR SLEEVING	WIRE LEADS
1. METALLIZED FILM & UNGROUNDED CASE 2. METALLIZED FILM & GROUNDED CASE 3. METALLIZED FILM & UNGROUNDED CASE (CORDWOOD) 4. METALLIZED FILM & GROUNDED CASE (CORDWOOD) 5. METAL FOIL & UNGROUNDED CASE 6. METAL FOIL & GROUNDED CASE	1. TEFLON 2. POLYCARBONATE 3. POLYSTYRENE 4. POLYSULFONE 5. POLYPROPYLENE	A 30V B 50V C 100V D 200V E 400V F 600V G 1000V H 1500V J 2000V K 3000V L 4000V M 5000V	10 INDICATES THE SIGNIFICANT DIGITS. 4 INDICATES THE NUMBER OF ZEROS TO BE ADDED TO 10. EXAMPLES: 102=1000PF=.001 uF 103=10,000PF=.01 uF 104=100,000PF=.1 uF 105=1,000,000PF=1 uF 393=39,000PF=.039 uF	A 0.1% B 0.25% D 0.5% F 1% G 2% J 5% K 10%	(S) SPECIFY "S" WHEN SLEEVING IS REQUIRED (X) SPECIFY "X" WHEN NO SLEEVING IS REQUIRED	(W) TINNED COPPER CLAD STEEL (COPPERWELD) (C) OXYGEN FREE TINNED COPPER MIL-STD-1276 TYPE C (N) GOLD PLATED NICKEL MIL-STD-1276 TYPE N2 (A) NO MATERIAL SPECIFIED. MUST BE SOLDERABLE

A 1 2 A 104 F S W

PART NUMBER EXAMPLE **A12A104FSW** ALSO APPEARS ON PAGE 19.

SCREENING CODE SYMBOL	SCREENING CONDITIONS							CAPACITOR TYPES COVERED BY SCREENING				
	BURN-IN				THERMAL AGING							
	HOURS	RATED VOLTS	VOLTAGE	TEMPERATURE	NO. OF CYCLES	LOW TEMP.	HIGH TEMP.	QUALITY LEVEL	DIELECTRIC	MIL SPEC TYPE	CRC TYPE	SEE PAGE
A	48	140%	DC	125°C	10	−65°C	+125°C	1	Polycarbonate	MIL-C-83421/1 CRH01 to 05	A12	10
B	48	140%	DC	125°C	20	−65°C	+125°C	1	Teflon	—	B11	24
C	48	140%	DC	125°C	10	−65°C	+125°C	1	Teflon Polycarbonate	— MIL-C-39022/9C	C11 C12	25 14
D	16	140%	DC	125°C	10	−65°C	+125°C	2 2 2	Polycarbonate Teflon Teflon	MIL-C-39022/9C — —	D12 D11 D51	15 26 29
E	—	—	—	—	5	−65°C	+125°C	3 3	Teflon Polycarbonate	— MIL-C-39022/9C	E11 E12	27 16
G	48	140%	DC	150°C	10	−65°C	+125°C	1	Polysulfone	—	G14	37
H	16	140%	DC	150°C	10	−65°C	+125°C	2	Polysulfone	—	H14	38
J	96	140%	DC	125°C	10	−65°C	+125°C	1 1	Teflon Polycarbonate	— —	J11 J12	37 37
K	—	—	—	—	5	−65°C	+125°C	3	Polycarbonate	MIL-C-83421/1 CRH06 to 00	K12	11
L	16	100%	DC	105°C	5	−65°C	+85°C	1	Polystyrene	—	L53	34, 37
N	—	—	—	—	5	−65°C	+85°C	3	Polystyrene	—	N53	32
R	16	140%	RMS AC 400 Hz	100°C	5	−65°C	+125°C	2	Polycarbonate	—	R12	37
X	SPECIAL SCREENING TO CUSTOMER REQUIREMENTS											19, 37

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COMPONENT RESEARCH CO., INC. • 1717 19TH STREET • SANTA MONICA, CALIF. 90404 • (213) 829-3615 TWX. (910) 343-6864

CRC HIGH RELIABILITY CAPACITORS

CAPACITOR IDENTIFICATION & CROSS REFERENCE TABLE

Component Research Co. has been manufacturing precision film capacitors since 1959. As a result of introducing new, improved products, our part numbers have changed and a few older types are now considered obsolete. CRC will continue to supply obsolete types if you cannot find a substitute item, and we are able to obtain the required film materials. Following is a guide to the old and new part number types which are similar. Due to possible differences in screening, dimensions, and performance, it is best to contact our applications department when you plan to retrofit or use our new part numbers to replace the old. Old catalogs describing obsolete part numbers are available if required.

IDENTIFICATION FOR SPECIAL REQUIREMENTS

CRC believes that there is a sufficient choice of capacitors in this catalog to satisfy virtually all applications. In the event you have any requirement involving a modification of our specifications the following special identification will be used.

Example: X11B154BW588 (typical special part number). "X" preceding the part number indicates a special customer requirement. The number group at the end of the part number is assigned as a unique identification of the special manufacturing and inspection instructions.

In the example shown above "588" is a typical unique identification number.

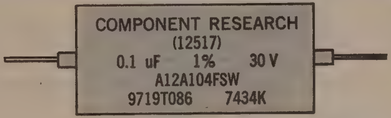
PART NUMBER EXAMPLES

Example 1 A12A104FSW shown to the right and in the marking example on Page 18, is a metallized polycarbonate, 0.1 uF, 1%, 30 VDC, ungrounded case, capacitor. The capacitor has sleeving, tinned copper-clad steel leads, 48 hours burn-in, and 10 thermal aging cycles. It is made to quality level 1.

Example 2 C11B183FXW is a "C" screened metallized teflon level 1 capacitor, 0.018 uF, 1% tol., 50 VDC. No sleeving is required. It has an ungrounded case and tinned copper clad steel leads.

Example 3 E22D15993BSC is "E" screened, metallized polycarbonate, 1.599 uF, 0.25%, 200 VDC. The capacitor has a grounded case with mylar sleeving and OFHC leads. 15993 in the part number is derived by adding three zeros to 1599 to make 1,599,000 picofarads, which is 1.599 uF. Example 3 is considered a nonstandard part because of the grounded case and the uF value.

MARKING EXAMPLE — Standard Types



UNIQUE TEST & SERIAL NO.—All level 1 capacitors are permanently identified with a test number followed by a serial number for traceability to test records. 9719T is a typical test number, 086 is the capacitor serial number.

LOT CONTROL NO.—All level 1, 2, and 3 capacitors are traceable to process records and materials used, by means of the weekly date code. The individual lot letter K, indicates the tenth lot made in the 34th week of 1972.

NOTE: ONLY LEVEL 1 CAPACITORS ARE SERIALIZED

CROSS-REFERENCE GUIDE - OLD AND NEW PART NUMBERS

POLYCARBONATE STYLES

FORMER TYPES		DC VOLTS	MIL-C-83421/1 EQUIVALENT	NEW TYPE	QUALITY LEVEL
03PV	C12A	30	CRH01	A12A	1
05PK	C12B	50	CRH02	A12B	1
1PK	C12C	100	CRH03	A12C	1
2PK	C12D	200	CRH04	A12D	1
4PK	C12E	400	CRH05	A12E	1
03PG	E12A	30	CRH06	K12A	3
05PG	E12B	50	CRH07	K12B	3
1PG	E12C	100	CRH08	K12C	3
2PG	E12D	200	CRH09	K12D	3
4PG	E12E	400	CRH00	K12E	3
MIL-C-39022/9C TYPES		**DC VOLTS**	**MIL-C-83421/1 EQUIVALENT**	**NEW TYPE**	**QUALITY LEVEL**
CHR01A		30	CRH01	A12A	1
CHR01B		30	None	D12A	2
CHR01C		30	CRH06	K12A	3
CHR01D		50	CRH02	A12B	1
CHR01E		50	None	D12B	2
CHR01F		50	CRH07	K12B	3
CHR01G		100	CRH03	A12C	1
CHR01H		100	None	D12C	2
CHR01J		100	CRH08	K12D	3
CHR01K		200	CRH04	A12D	1
CHR01L		200	None	D12D	2
CHR01M		200	CRH09	K12D	3
CHR01N		400	CRH05	A12E	1
CHR01P		400	None	D12E	2
CHR01R		400	CRH00	K12E	3
FORMER TYPES		**DC VOLTS**	**REPLACED BY**		**QUALITY LEVEL**
03PQ		30	E32A		3
05PQ		50	E32B		3

TEFLON STYLES

FORMER TYPES	DC VOLTS	NEW TYPE	QUALITY LEVEL
05TJ	50	B11B	1
1TJ	100	B11C	1
2TJ	200	B11D	1
05TC	50	C11B	1
1TC	100	C11C	1
2TC	200	C11D	1
05TA	50	D11B	2
1TA	100	D11C	2
2TA	200	D11D	2
05TL	50	E11B	3
1TL	100	E11C	3
2TL	200	E11D	3
1TU	100	D51C	2
2TU	200	D15D	2
1TF	100	None	3
05TQ	50	D31B	3

POLYSTYRENE

05PA	50	N53B	3
1PA	100	N53C	3

POLYSULFONE

05MP	50	H14B	2
1MP	100	H14C	2
2MP	200	H14D	2
4MP	400	H14E	2

MYLAR STYLES

		REPLACE WITH
1MA	100	K12C Polycarbonate
2MM	200	K12D Polycarbonate

CRC HIGH RELIABILITY CAPACITORS

MANUFACTURING & INSPECTION FLOW PLAN

MIL-C-83421 • MIL-C-39022/9C • STANDARD CAPACITORS

100% INSPECTION PER MIL-C-83421

The high reliability capacitor screening plans developed by Component Research Co. have been adopted by space and military contractors throughout the world for critical programs. The new general specification MIL-C-83421 incorporates much of the screening features shown below at an attempt to provide a "state of the art" capacitor specification for general industrial and aerospace use.

Our flow plan for manufacturing and inspection shown below covers the steps used to process and screen all of our polycarbonate, teflon, polystyrene and polysulfone film capacitors. The individual specifications shown in the catalog list the actual screening performed for each style. A choice of three quality levels provides different degrees of intensive screening to assure the highest possible quality at lowest cost. Special screening plans are available which include tests such as 100% corona inception inspection, 40 KHz AC burn-in at 100°C, high impedance monitoring for intermittent conditions at low voltage during temperature cycling, ESR inspection at 100 KHz, dielectric absorption effects with rapid switching rates and varying temperature, and many other sensitive measurement phenomena.

*MANUFACTURING AND INSPECTION FLOW PLAN

100% PROCESSED AND SCREENED

Steps 1-6 show the 100% processing (up to and including hermetic sealing), of MIL-C-39022/9 and MIL-C-83421/1 qualified polycarbonate and CRC standard capacitors — Polycarbonate, Teflon, Polystyrene and Polysulfone. The quality level selected will be determined by the individual capacitor specification.

*SPECIAL MIL-C-83421/1 SCREENING IS SHOWN ON PAGE 3

PROCESSING STEPS

1. CAPACITOR MATERIAL INSPECTION
2. IDENTIFY PROCESSING PAPERWORK WITH MATERIAL LOT NUMBERS
3. CAPACITOR SUB-ASSEMBLY INSPECTION
4. SPECIAL VACUUM PROCESSING
5. HERMETIC SEAL AFTER NITROGEN BACK-FILL
6. INITIAL INSPECTION OF COMPLETED CAPACITOR (7X POWER)

QUALITY LEVEL ①

7. BURN-IN
8. TEMPERATURE CYCLING
9. HELIUM LEAK TEST AND GROSS LEAK TEST
10. AC-DIELECTRIC STRENGTH
11. DC-DIELECTRIC STRENGTH
12. INSULATION RESISTANCE
13. % CAPACITANCE TOLERANCE
14. % DISSIPATION FACTOR
15. SELECTION FOR PERFORMANCE GRADES
16. SERIALIZATION OF LEVEL 1 CAPACITORS
17. REPEAT ELECTRICAL MEASUREMENTS AND RECORD DATA AS REQUIRED
18. CONDUCT SPECIAL MEASUREMENTS WHEN REQUIRED BY CUSTOMER
19. FINAL VISUAL INSPECTION OF WORKMANSHIP, MARKING, PAPERWORK AND PACKAGING
20. SHIP DATA AND CERTIFICATE OF COMPLIANCE WITH PARTS

Highest reliability capacitors with standard or special screening for Apollo, Viking, and other space programs. Also used in military and ultra high quality industrial applications.

Qualified for space, critical applications, F15 aircraft, and other programs.

QUALITY LEVEL ②

7. BURN-IN
8. TEMPERATURE CYCLING
9. HELIUM LEAK TEST AND GROSS LEAK TEST
10. AC-DIELECTRIC STRENGTH
11. DC-DIELECTRIC STRENGTH
12. INSULATION RESISTANCE
13. % CAPACITANCE TOLERANCE
14. % DISSIPATION FACTOR
15. FINAL VISUAL INSPECTION OF WORKMANSHIP, MARKING, PAPERWORK, AND PACKAGING
16. SHIP C OF C WITH PARTS

High reliability capacitors screened for space, missile and industrial applications. Qualified for many programs such as The Tow Missile, The Lance Missile and F15 aircraft.

QUALITY LEVEL ③

7. TEMPERATURE CYCLING
8. HELIUM LEAK TEST AND GROSS LEAK TEST
9. AC-DIELECTRIC STRENGTH
10. DC-DIELECTRIC STRENGTH
11. INSULATION RESISTANCE
12. % CAPACITANCE TOLERANCE
13. % DISSIPATION FACTOR
14. FINAL VISUAL INSPECTION OF WORKMANSHIP, MARKING, PAPERWORK AND PACKAGING
15. SHIP C OF C WITH PARTS

High reliability capacitors with reduced screening and performance levels for lower cost high volume programs, such as missiles, aircraft and telephone equipment applications.

Random samples from completed production lots of all quality levels are periodically tested.

These tests may consist of Insulation Resistance at high temperature, Dielectric Absorption, Temperature Coefficient and AC stress analysis tests.

In addition, samples are life tested for retention of qualification.

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COMPONENT RESEARCH CO., INC. • 1717 19TH STREET • SANTA MONICA, CALIF. 90404 • (213) 829-3615 TWX: (910) 343-6864

CRC HIGH RELIABILITY CAPACITORS

GENERAL PRODUCT INFORMATION

ORDERING INFORMATION — **Prices:** See pages 40 to 49 for net prices covering quantities from 1 to 10 pieces. Discount schedules for quantities up to 250 pieces are also listed. Please contact our sales office for larger quantities. **Terms:** Our terms are net 30 days to customers approved by our credit department. All shipments are F.O.B., Santa Monica, Calif. **Delivery:** Most items listed are available from stock or within 10 weeks for quantities up to 1000 pieces. **Minimum Order:** Minimum billing per order is $20.00. **Complete Part Number:** Please make certain that you have complete part number to avoid any errors or delays. Please check part number instructions in individual specification pages and part number information shown on page 18.

PATENT INFORMATION — CRC capacitors are exclusively manufactured under one or more of the following patents and additional patents pending: 3,238,428; 3,260,906; 3,292,063; 3,506,895; 3,539,886; 3,603,849; 3,626,362.

CONSTRUCTION INFORMATION — All standard capacitors listed are hermetically sealed after vacuum process and both gross leak and helium leak tested for true hermeticity. Unless otherwise specified all parts listed are metal cased, tubular, with both wire terminals isolated from the metal case.

PART NUMBER OBSOLESCENCE — Due to changes in military specifications for which we are qualified, upgrading of our catalog specifications, or size reduction, part numbers formerly used may now be obsolete. We urge our customers to change their existing drawings to indicate the new part numbers for old and new design, wherever possible. If you are unable to make this change, CRC will continue to supply and mark parts indefinitely to the old specifications. See page 19.

INSTALLATION INSTRUCTIONS — To prevent damage to the hermetic seal joint, use a tweezer type heat sink between the soldering iron and solder beads when soldering within ¼″ of beads. Prior to lead bending or twisting, protect glass seals and solder joints by gripping with a small pliers, area of leads near solder beads.

Contaminating films on the glass seal surfaces may occur during customer handling and installation of capacitors. To preserve the high insulation resistance inherent in CRC capacitors, clean the glass seal surfaces thoroughly with acetone or chlorinated hydrocarbon fluid.

CAPACITOR MEASUREMENT INFORMATION — The high quality of CRC capacitors may be difficult to evaluate unless sufficiently sensitive and accurate equipment is utilized in conjunction with proper measurement techniques.

Capacitance bridges equal to the General Radio 1620A are recommended for best accuracy of capacitance. This bridge is satisfactory for dissipation factor measurement of capacitors up to 1 uF. CRC has developed a special bridge capable of accurately measuring dissipation factor of capacitors up to 100 uF or more at frequencies up to 1KHz. For inspection of DF of larger than 1 uF capacitors it is suggested that you use samples correlated by our measurement laboratory.

Insulation resistance measurement is performed by Component Research Co. using leakage current methods which are repeatable to 1 picoamp for capacitors less than 0.1 uF. Larger values require adequate charge time to minimize dielectric absorption effects. Guard boxes are used to perform leakage current and dielectric absorption measurements.

SPECIAL MATCHING — We can assort capacitors into sets of two or more capacitors matched for capacitance value within ±0.1% of each other at nominal cost. Where capacitors must track with temperature, they can be supplied in matched sets as closely at ±0.1% over their temperature range. Capacitors of opposing temperature coefficient slopes can be supplied to obtain lower temperature coefficients than for standard types.

SPECIAL CAPACITOR VALUES — If your application requires odd values such as 0.10015 uF ±0.1% or 0.9999 uF ±0.25%, such requirements are readily met from our large stock of standard and non-standard values. Individual capacitors can be permanently marked or tagged with discrete values accurate to six places if required.

SPECIAL VOLTAGE RATINGS — Problems of size may occur when replacement of a poor quality capacitor is required. Under certain conditions such as restricting the operating temperature, or limiting DC hipot to 150% of rated volts, a substantial size reduction is possible. Check with our applications engineering department for our recommendations in such cases.

SPECIAL PART NUMBER IDENTIFICATION — CRC believes that there is a sufficient choice of capacitors in this catalog to satisfy virtually all applications. In the event you have any requirement involving a modification of our specifications, the following special identification will be used.

Example: X11B154BW588 (typical special part number). "X" preceding the part number indicates a special customer requirement. The number group at the end of the part number is assigned as a unique identification of the special manufacturing and inspection instructions. In example shown, "588" is a typical unique identification number.

STANDARD CRC CASE SIZES & WEIGHTS

CRC No. Case	CASE DIMENSIONS IN INCHES			Typical* Weight ±20% Accuracy (ounces)
	A Diam.	B Length	C Length	
CF329-1	.170	.500	.700	.0353
CF329-2	.170	.562	.762	.0424
CF329-3	.170	.687	.887	.0459
CF329-4	.193	.562	.762	.0459
CF329-5	.193	.687	.887	.0459
CF329-6	.193	.813	1.013	.0494
CF329-7	.235	.562	.762	.0494
CF329-8	.235	.687	.887	.0565
CF329-9	.235	.813	1.013	.0635
CF329-10	.312	.687	.887	.0883
CF329-11	.312	.813	1.013	.0953
CF329-12	.312	1.063	1.263	.1059
CF329-13	.400	.813	1.013	.1412
CF329-14	.400	1.063	1.263	.2118
CF329-15	.400	1.375	1.575	.2118
CF329-16	.500	1.125	1.325	.2824
CF329-17	.500	1.375	1.575	.3177
CF329-18	.562	1.125	1.325	.4059
CF329-19	.562	1.375	1.575	.4589
CF329-20	.562	1.875	2.075	.6072
CF329-21	.670	1.375	1.575	.6354
CF329-22	.670	1.875	2.075	.7589
CF329-23	.750	1.875	2.075	.9884
CF329-24	1.00	1.875	2.075	1.6061
CF329-25	1.00	2.375	2.575	1.9768
CF329-26	1.00	2.625	2.825	2.2945

CRC No. Case	CASE DIMENSIONS IN MILLIMETERS			Typical* Weight ±20% Accuracy (grams)
	A Diam.	B Length	C Length	
CF329-1	4.32	12.70	17.78	1.0
CF329-2	4.32	14.28	19.36	1.2
CF329-3	4.32	17.45	22.53	1.3
CF329-4	4.90	14.28	19.36	1.3
CF329-5	4.90	17.45	22.53	1.3
CF329-6	4.90	20.65	25.73	1.4
CF329-7	5.97	14.28	19.36	1.4
CF329-8	5.97	17.45	22.53	1.6
CF329-9	5.97	20.65	25.73	1.8
CF329-10	7.93	17.45	22.53	2.5
CF329-11	7.93	20.65	25.73	2.7
CF329-12	7.93	27.00	32.08	3.0
CF329-13	10.16	20.65	25.73	4.0
CF329-14	10.16	27.00	32.08	6.0
CF329-15	10.16	34.93	40.01	6.0
CF329-16	12.70	28.58	33.66	8.0
CF329-17	12.70	34.93	40.01	9.0
CF329-18	14.28	28.58	33.66	11.5
CF329-19	14.28	34.93	40.01	13.0
CF329-20	14.28	47.63	52.71	17.2
CF329-21	17.02	34.93	40.01	18.0
CF329-22	17.02	47.63	52.71	21.5
CF329-23	19.05	47.63	52.71	28.0
CF329-24	25.40	47.63	52.71	45.5
CF329-25	25.40	60.33	65.41	56.0
CF329-26	25.40	71.63	76.71	65.0

*The typical weights shown above apply to all capacitor types listed in our catalog. The ±20% weight tolerance covers variations in density for a given case size part made from teflon or any other listed dielectric. The weight tolerance also makes allowance for foil or metallized construction.

Please contact us if more accurate weight information is required for any given series of capacitors.

COMPONENT RESEARCH CO., INC. • 1717 19TH STREET • SANTA MONICA, CALIF. 90404 • (213) 829-3615 TWX. (910) 343-6864

CRC HIGH RELIABILITY CAPACITORS	KEY CAPACITOR FEATURES
UNIQUE CONSTRUCTION	CRC capacitor windings are firmly supported within their hermetic enclosures to withstand high frequency shock and vibration levels per MIL-C-39022/9, and MIL-C-83421. The capacitors are uniquely constructed to provide winding support for the thinnest dielectric films, and have as well, stress free lead terminations that can withstand extended temperature cycling. CRC capacitors are exclusively manufactured under one or more of the following patents and additional patents pending: 3,238,428; 3,260,906; 3,292,063; 3,506,895; 3,539,886; 3,603,849; 3,626,362.
HIGH INSULATION RESISTANCE	Standard stock capacitors, 0.1 uF and less are rated up to 10,000,000 megohms for teflon, 5,000,000 megohms for polystyrene, and 3,000,000 megohms for polycarbonate and polysulfone types. If required, capacitors can be supplied with higher ratings for extremely critical applications. Thousands of such special teflon capacitors are in use in the attitude controls for the Boeing 747. Tests by the user during which the capacitors were left on charge for several years, indicate a capacitor self-time constant that exceeds 100 years.
LOW DIELECTRIC ABSORPTION	Special CRC equipment can perform this sensitive test at fast switching rates to determine how CRC capacitors will operate in critical sample and hold circuits. Recent tests on 1 uF capacitors using 10 milliseconds charge time, 1 millisecond discharge, and 100 milliseconds recovery time, indicate readings as low as 0.0035% for teflon and 0.007% for polystyrene capacitors.
LOW DISSIPATION FACTOR	A measure of the reliability and quality of the electrode terminations is determined by capacitor heat rise during 4 KHz to 40 KHz power measurements performed by CRC. Tests prove that the superior terminations of the CRC capacitors can be verified by their low 1 KHz and 10 KHz dissipation factor readings. The permanence of this quality has been further demonstrated by maintenance of low dissipation factor after temperature cycling, DC Life, AC Life, and all other environmental conditions. SEE PAGE 5, 7, 37
HIGH STABILITY LOW TEMPERATURE COEFFICIENT	The combined effects of CRC unique winding construction, temperature cycling and burn-in result in maximum stability, uniform TC linearity, and reproduceability. Capacitors can be supplied with virtually zero TC over limited temperature spans. SEE SPECIAL MATCHING PAGE 21.
HIGH RELIABILITY SCREENING	In addition to DC burn-in and 400 Hz RMS AC burn-in, CRC performs special burn-in at frequencies up to 40 KHz. 100% temperature cycling follows each burn-in sequence. In special AC applications, we provide 100% corona inception inspection at 150% to 200% of rated RMS AC volts. SEE PAGES 7, 18, 37.

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CRC HIGH RELIABILITY CAPACITORS

A COMPARISON OF CAPACITOR TYPES

A PARTIAL LISTING OF TYPES AVAILABLE IN CATALOG "J"

DIELECTRIC	Type	Quality Level	Typical Temperature Coefficient Limits Max. % Capacitance Change Relative to 25°C							Typical Leakage Current In Nanoamps for 1 MFD Capacitors Measured at 30VDC (1 Microamp=1000 Nanoamps)				% Max. Drift 5 Cycles −25°C to +85°C	% Max. Dissipation Factor 25°C	% Max. Diel. Absorption 25°C
			−50°C	−25°C	0°C	50°C	75°C	100°C	125°C	25°C	75°C	100°C	125°C			
SERIES 11 TEFLON	B11	①	+0.4	+0.25	+0.1	−0.15	−0.2	−0.3	−0.4	0.06	0.15	0.3	1.2	0.01	0.03	0.01
	C11	①	+0.7	+0.5	+0.25	−0.25	−0.4	−0.5	−0.6	0.06	0.15	0.3	1.2	0.02	0.03	0.01
	D11	②	+0.6	+0.4	+0.2	−0.25	−0.4	−0.5	−0.6	0.06	0.15	0.3	1.2	0.02	0.03	0.01
	E11	③	+1.0	+0.7	+0.3	−0.4	−0.6	−0.8	−1.0	0.3	0.75	2.3	3	0.05	0.10	0.02
SERIES 31 TEFLON (Cordwood)	C31	①	+0.8	+0.6	+0.3	−0.35	−0.5	−0.6	−0.7	0.12	0.3	0.6	1.8	0.02	0.05	0.02
	D31	②	+0.7	+0.5	+0.25	−0.25	−0.4	−0.5	−0.6	0.12	0.3	0.6	1.8	0.02	0.05	0.02
SERIES 51 TEFLON	C51	①	+0.8	+0.6	+0.2	−0.2	−0.5	−0.6	−0.8	0.03	0.06	0.18	1.2	0.02	0.01	0.01
	D51	②	+0.8	+0.6	+0.2	−0.2	−0.5	−0.6	−0.8	0.03	0.06	0.18	1.2	0.05	0.01	0.01
	E51	③	+1.2	+0.8	+0.4	−0.3	−0.6	−0.8	−1.2	0.1	0.15	0.6	3	0.1	0.02	0.02
SERIES 12 POLY-CARBONATE	C12	①	−1.2	−0.5	−0.20	±0.15	±0.3	±0.4	±0.5	0.05	0.15	0.6	6	0.03	0.15	0.10
	D12	②	−1.5	−0.5	−0.25	±0.25	±0.4	±0.6	±1	0.1	0.3	1	18	0.05	0.15	0.10
	E12	③	−2	−1	−0.35	±0.35	±0.6	±1	±2	0.3	3	6	18	0.25	0.15	0.10
	F12	④	−2	−1	−0.35	±0.35	±0.6	±1	±2	0.3	3	6	18	0.25	0.25	0.20
SERIES 53 POLYSTYRENE	M53	②	+0.8	+0.5	+0.25	−0.25	−0.5	(85°C Max.)		0.03	0.2	—	—	0.02	0.01	0.02
	N53	③	+0.8	+0.5	+0.25	−0.25	−0.5	(85°C Max.)		0.03	0.2	—	—	0.03	0.01	0.02
SERIES 14 POLYSULFONE	G14	①	−0.5	−0.2	−0.05	±0.05	±0.1	±0.25	±0.4	0.1	1	2	10	0.03	0.15	0.20
	H14	②	−0.6	−0.3	−0.1	±0.1	±0.25	±0.4	±0.6	0.2	2	4	12	0.05	0.15	0.20

QUALIFICATION INFORMATION

Component Research Co. capacitor products appear on the preferred parts lists and qualified products lists of many agencies and defense contractors. Following is a partial list of approvals.

MIL-C-83421/1 qualification information appears on pages 2-11.

FULLY QUALIFIED FOR CRITICAL APPLICATIONS

PROGRAM	SPECIFICATION	CRC QUALIFIED CAPACITORS Former Part No.	New (Equiv.) Part No.
F-15	MIL-C-39022/9	PV, PK, PL and PG Polycarbonate	C12, D12 and E12 Series
A-7D	218-37669	PK, Polycarbonate	C12 Series
Astronaut Life Support System	195-102, 195-103	PV, PK, Polycarbonate	C12 Series
Nimbus Satellite	51865	PV, Polycarbonate	C12 Series
Apollo 8	SCD 26158	PL, Polycarbonate	D12 Series
Tow Light Source	MISI3707/1	PL, Polycarbonate	D12 Series
DC-10, B747	ED 746343	PL, Polycarbonate	D12 Series
POSEIDON	2621674	PL, Polycarbonate	D12 Series
Mark 48 Torpedo	2589355	PG, Polycarbonate	E12 Series
F-15	4001818	TJ, Teflon	B11 Series
MRSA	S30409	TC, Teflon	C11 Series
Lance	MISI3263	TA, Teflon	D11 Series
Lunar Orbiter	27-30100	TU, Teflon Foil	D51 Series
Mark 48 Torpedo	2501070, 2500774	Pa, Polystyrene	N53 Series

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PAGE 23
catalog J

SERIES
B11

TEFLON
HIGH STABILITY CAPACITORS

COMPONENT
RESEARCH
COMPANY, INC.

- QUALIFIED FOR SPACE
- 100% SCREENED (QUALITY LEVEL 1)
- 5,000,000 MEGOHMS IR (0.1 uF or less)
- 100% SERIALIZED FOR DATA RECORDING
- STANDARD TOLERANCES ±0.25% TO ±10%

CRC STYLE	DC VOLTS	OLD P/N
B11B	50VDC	05 TJ
B11C	100VDC	1 TJ
B11D	200VDC	2 TJ

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- MFG. & INSPECTION FLOW PLAN PAGE 20
- QPL PROGRAM APPROVALS PAGE 23
- CASE DIMENSIONS PAGE 28
- LIFE TEST DATA PAGE 30
- PRICES PAGE 46

B11 SPECIFICATIONS

OPERATING TEMPERATURE: −65°C to 125°C at full rated voltage.

TEMPERATURE COEFFICIENT OF CAPACITANCE: (25°C Reference).

+0.4%	Max. at −55°C	−0.15%	Max. at 55°C
+0.25%	Max. at −25°C	−0.25%	Max. at 85°C
+0.2%	Max. at −10°C	−0.4%	Max. at 125°C
+0.1%	Max. at 0°C		

STABILITY: Capacitance values measured at any two corresponding temperature points taken in five successive temperature cycles shall be as follows:

RANGE	RETRACE
−25°C to 85°C	0.01% Max.
−65°C to 125°C	0.05% Max.

INSULATION RESISTANCE: Measured from terminal to terminal at rated voltage, and 5 minutes maximum charge time. For values greater than 1 uF, allow an additional minute/uF charge time.

MINIMUM IR					
Range	25°C	55°C	85°C	100°C	125°C
.001 to 0.1 uF (in Megohms)	5,000,000	5,000,000	2,000,000	1,000,000	250,000
Greater than 0.1 uF (in Megohms—uF)	500,000	500,000	200,000	100,000	25,000

Readings shown are for 1 uF or less. For values over 1 uF, divide readings by uF to obtain min IR.

Example: A 2 uF capacitor is 250,000 megohms at 25°C.

DIELECTRIC ABSORPTION: 0.01% Max. at 25°C.

DISSIPATION FACTOR: 0.03% Max. at 1KHz and 25°C. Values greater than 1 uF measure at 0.1KHz.

DIELECTRIC STRENGTH: 200% of rated voltage.

CONSTRUCTION: Teflon dielectric, hermetically sealed, extended metal film electrodes, leads isolated from case.

LEAD WIRE SIZE AND TYPE		
Case Diameter	Lead Wire Size #AWG	Lead Wire Material
0.312″ and smaller	22	Tinned Copper Clad Steel (Tinned Copperweld) CRC type "W"
0.400″ and larger	20	

SEAL TEST: 1 x 10-6 atm/cm³/sec. max. leak rate.

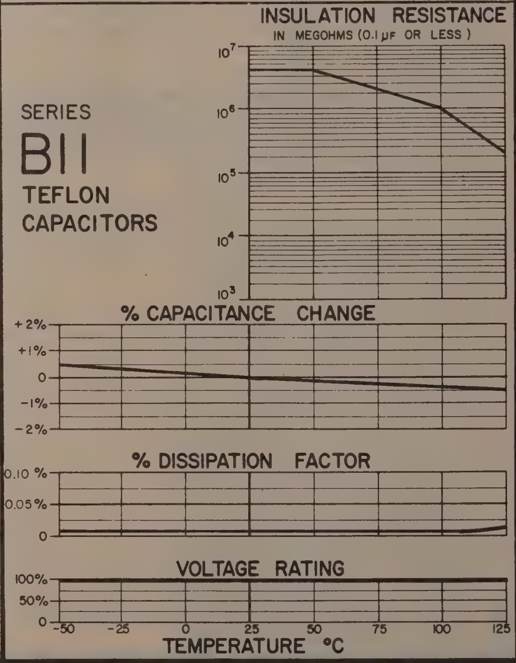
ENVIRONMENTAL: Capacitors shall meet all applicable requirements of MIL-C-83421.

B11 QUALITY ASSURANCE

All capacitors are 100% screened and tested as follows:

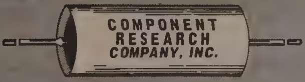
1. 48 hours Burn-In at 125°C and 140% of the rated DC voltage.
2. 20 Temperature Cycles from −65°C to 125°C.
3. Helium Leak Test. 1 x 10-6 atm/cm³/sec. max. leak rate.
4. DC dielectric strength apply 200% of rated DC voltage from lead to lead and from leads to case for one minute.
5. Insulation Resistance at the rated voltage and 25°C, 500,000 megs — uF minimum, but need not exceed 5,000,000 Megohms.
6. Capacitance % Tolerance at 1KHz and 25°C.
7. Dissipation Factor at 1KHz and 25°C, 0.03% maximum.
8. Temperature Coefficient measured from −55°C to 125°C at a minimum of 5 temperature points.
9. Visual Inspection for dimensions, marking and packaging.
10. Traceability to production and test records by permanent marking of parts with lot control number.
11. Process and inspection data is maintained on file per NPC-200-3, MIL-Q-9858 quality control standards and MIL-STD-790 Reliability Assurance Program.
12. Capacitors are serialized and packaged with certified test data to accompany each shipment.

SERIES
B11
TEFLON
CAPACITORS



SERIES
C11

TEFLON
HIGH STABILITY CAPACITORS



- **QUALIFIED FOR SPACE**
- **100% SCREENED (QUALITY LEVEL 1)**
- **5,000,000 MEGOHMS IR (0.1 uF or less)**
- **100% SERIALIZED FOR DATA RECORDING**
- **STANDARD TOLERANCES ±0.25% TO ±10%**

CRC STYLE	DC VOLTS	OLD P/N
C11B	50VDC	05 TC
C11C	100VDC	1 TC
C11D	200VDC	2 TC

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C11 SPECIFICATIONS

OPERATING TEMPERATURE: −65°C to 125°C at full rated voltage.

TEMPERATURE COEFFICIENT OF CAPACITANCE: (25°C Reference).

+0.7% Max. at −55°C	−0.25% Max. at 55°C
+0.5% Max. at −25°C	−0.50% Max. at 85°C
+0.3% Max. at −10°C	−0.60% Max. at 125°C
+0.25% Max. at 0°C	

STABILITY: Capacitance values measured at any two corresponding temperature points taken in five successive temperature cycles shall be as follows:

RANGE	RETRACE
−25°C to 85°C	0.02% Max.
−65°C to 125°C	0.1% Max.

INSULATION RESISTANCE: Measured from terminal to terminal at rated voltage, and 5 minutes maximum charge time. For values greater than 1 uF, allow an additional minute/uF charge time.

MINIMUM IR					
Range	25°C	55°C	85°C	100°C	125°C
.001 to 0.1 uF (in Megohms)	5,000,000	5,000,000	2,000,000	1,000,000	250,000
Greater than 0.1 uF (in Megohms—uF)	500,000	500,000	200,000	100,000	25,000

Readings shown are for 1 uF or less. For values over 1 uF, divide readings by uF to obtain min IR.
Example: A 2 uF capacitor is 250,000 megohms at 25°C.

DIELECTRIC ABSORPTION: 0.01% Max. at 25°C.

DISSIPATION FACTOR: 0.03% Max. at 1KHz and 25°C. Values greater than 1 uF measure at 0.1KHz.

DIELECTRIC STRENGTH: 200% of rated voltage.

CONSTRUCTION: Teflon dielectric, hermetically sealed, extended metal film electrodes, leads isolated from case.

LEAD WIRE SIZE AND TYPE		
Case Diameter	Lead Wire Size #AWG	Lead Wire Material
0.312" and smaller	22	Tinned Copper Clad Steel (Tinned Copperweld) CRC type "W"
0.400" and larger	20	

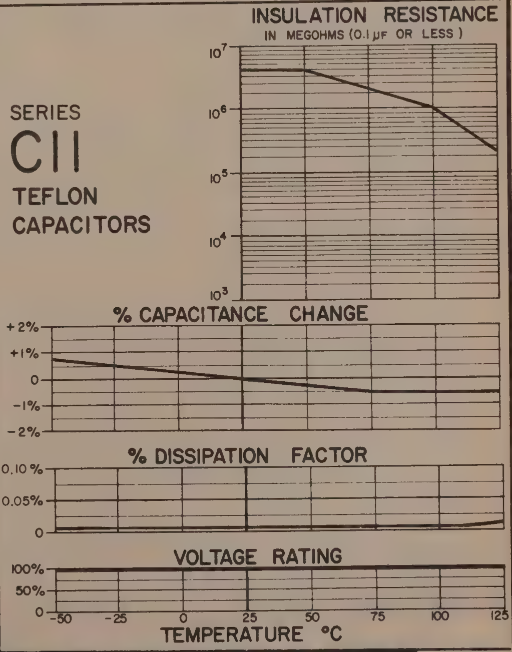
SEAL TEST: 1 x 10-⁶ atm/cm³/sec. Max. leak rate.

ENVIRONMENTAL: Capacitors shall meet all applicable requirements of MIL-C-83421.

C11 QUALITY ASSURANCE

All capacitors are 100% screened and tested as follows:

1. 48 hours Burn-In at 125°C and 140% of the rated DC voltage.
2. 10 Temperature Cycles from −65°C to 125°C.
3. Helium Leak Test. 1 x 10^{-6} atm/cm³/sec. max. leak rate.
4. DC dielectric strength apply 200% of rated DC voltage from lead to lead and from leads to case for one minute.
5. Insulation Resistance at the rated voltage and 25°C, 500,000 megs — uF minimum, but need not exceed 5,000,000 Megohms.
6. Capacitance % Tolerance at 1KHz and 25°C.
7. Dissipation Factor at 1KHz and 25°C, 0.03% maximum.
8. Capacitors are 100% tested for 0.1% maximum drift with five cycles from −65°C to 125°C.
9. Visual Inspection for dimensions, marking and packaging.
10. Traceability to production and test records by permanent marking of parts with lot control number.
11. Process and inspection data is maintained on file per NPC-200-3, MIL-Q-9858 quality control standards and MIL-STD-790 Reliability Assurance Program.
12 Capacitors are serialized and packaged with certified test data to accompany each shipment.



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SERIES
D11

TEFLON

HIGH STABILITY CAPACITORS

COMPONENT
RESEARCH
COMPANY, INC.

- **QUALIFIED FOR SPACE**
- **100% SCREENED (QUALITY LEVEL 2)**
- **5,000,000 MEGOHMS IR (0.1 uF or less)**
- **STANDARD TOLERANCES ±0.25% TO ±10%**

CRC STYLE	DC VOLTS	OLD P/N
D11B	50VDC	05 TA
D11C	100VDC	1 TA
D11D	200VDC	2 TA

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D11 SPECIFICATIONS

OPERATING TEMPERATURE: −65°C to 125°C at full rated voltage.

TEMPERATURE COEFFICIENT OF CAPACITANCE: (25°C Reference).

+0.7% Max. at −55°C
+0.5% Max. at −25°C
+0.3% Max. at −10°C
+0.25% Max. at 0°C
−0.25% Max. at 55°C
−0.5% Max. at 85°C
−0.6% Max. at 125°C

STABILITY: Capacitance values measured at any two corresponding temperature points taken in five successive temperature cycles shall be as follows:

RANGE	RETRACE
−25°C to 85°C	0.02% Max.
−65°C to 125°C	0.1% Max.

INSULATION RESISTANCE: Measured from terminal to terminal at rated voltage, and 5 minutes maximum charge time. For values greater than 1 uF, allow an additional minute/uF charge time.

MINIMUM IR					
Range	25°C	55°C	85°C	100°C	125°C
.001 to 0.1 uF (in Megohms)	5,000,000	5,000,000	2,000,000	1,000,000	250,000
Greater than 0.1 uF (in Megohms—uF)	500,000	500,000	200,000	100,000	25,000

Readings shown are for 1 uF or less. For values over 1 uF, divide readings by uF to obtain min IR.

Example: A 2 uF capacitor is 250,000 megohms at 25°C.

DIELECTRIC ABSORPTION: 0.01% Max. at 25°C.

DISSIPATION FACTOR: 0.03% Max. at 1KHz and 25°C. Values greater than 1 uF measure at 0.1KHz.

DIELECTRIC STRENGTH: 200% of rated voltage.

CONSTRUCTION: Teflon dielectric, hermetically sealed, extended metal film electrodes, leads isolated from case.

LEAD WIRE SIZE AND TYPE		
Case Diameter	Lead Wire Size #AWG	Lead Wire Material
0.312″ and smaller	22	Tinned Copper Clad Steel (Tinned Copperweld) CRC type "W"
0.400″ and larger	20	

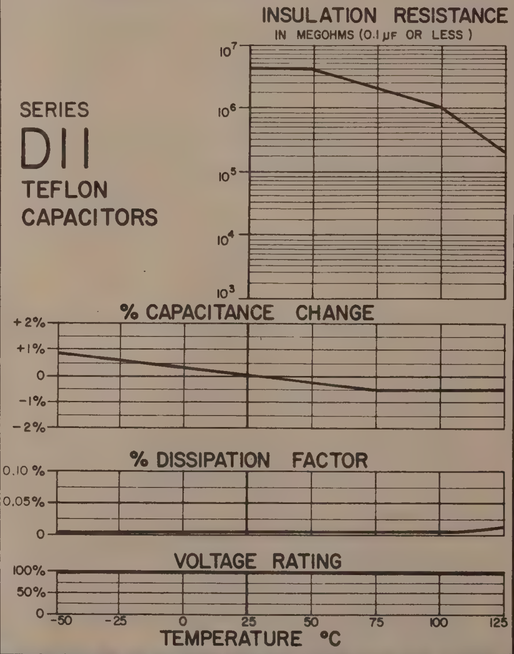
SEAL TEST: 1 x 10^{-6} atm/cm³/sec. max. leak rate.

ENVIRONMENTAL: Capacitors shall meet all applicable requirements of MIL-C-83421.

D11 QUALITY ASSURANCE

All capacitors are 100% screened and tested as follows:

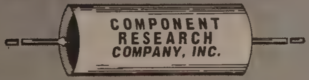
1. 16 hours Burn-In at 125°C and 140% of the rated DC voltage.
2. 10 Temperature Cycles from −65°C to 125°C.
3. Helium Leak Test. 1 x 10^{-6} atm/cm³/sec. max. leak rate.
4. DC dielectric strength apply 200% of rated DC voltage from lead to lead and from leads to case for one minute.
5. Insulation Resistance at the rated voltage and 25°C, 500,000 megs — uF minimum, but need not exceed 5,000,000 Megohms.
6. Capacitance % Tolerance at 1KHz and 25°C.
7. Dissipation Factor at 1KHz and 25°C, 0.03% maximum.
8. Visual Inspection for dimensions, marking and packaging.
9. Traceability to production and test records by permanent marking of parts with lot control number.
10. Process and inspection data is maintained on file per NPC-200-3, MIL-Q-9858 quality control standards and MIL-STD-790 Reliability Assurance Program.



SERIES
E11

TEFLON

HIGH STABILITY CAPACITORS



- RECOMMENDED FOR INDUSTRIAL AND COMPUTER DC APPLICATIONS
- 100% SCREENED (QUALITY LEVEL 3)
- 1,000,000 MEGOHMS IR (0.1 uF or less)
- STANDARD TOLERANCES ±0.25% TO ±10%

CRC STYLE	DC VOLTS	OLD P/N
E11B	50VDC	05 TL
E11C	100VDC	1 TL
E11D	200VDC	2 TL

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E11 SPECIFICATIONS

OPERATING TEMPERATURE: −65°C to 125°C at full rated voltage.

TEMPERATURE COEFFICIENT OF CAPACITANCE: (25°C Reference).

±1% Max. −55°C to 125°C

STABILITY: Capacitance values measured at any two corresponding temperature points taken in five successive temperature cycles shall be as follows:

RANGE	RETRACE
−25°C to 85°C	0.05% Max.
−65°C to 125°C	0.25% Max.

INSULATION RESISTANCE: Measured from terminal to terminal at rated voltage, and 5 minutes maximum charge time. For values greater than 1 uF, allow an additional minute/uF charge time.

MINIMUM IR

Range	25°C	55°C	85°C	100°C	125°C
.001 to 0.1 uF (in Megohms)	1,000,000	1,000,000	500,000	250,000	100,000
Greater than 0.1 uF (in Megohms—uF)	100,000	100,000	50,000	25,000	10,000

DIELECTRIC ABSORPTION: .02% Max. at 25°C.

DISSIPATION FACTOR: 0.1% Max. at 1KHz and 25°C. Values over 1 uF measure at 0.1KHz.

DIELECTRIC STRENGTH: 200% of rated voltage.

CONSTRUCTION: Teflon dielectric, hermetically sealed, extended metal film electrodes, leads isolated from case.

LEAD WIRE SIZE AND TYPE

Case Diameter	Lead Wire Size #AWG	Lead Wire Material
0.312″ and smaller	22	E11 Lead material will be either gold plated nickel or tinned copperweld as available.
0.400″ and larger	20	

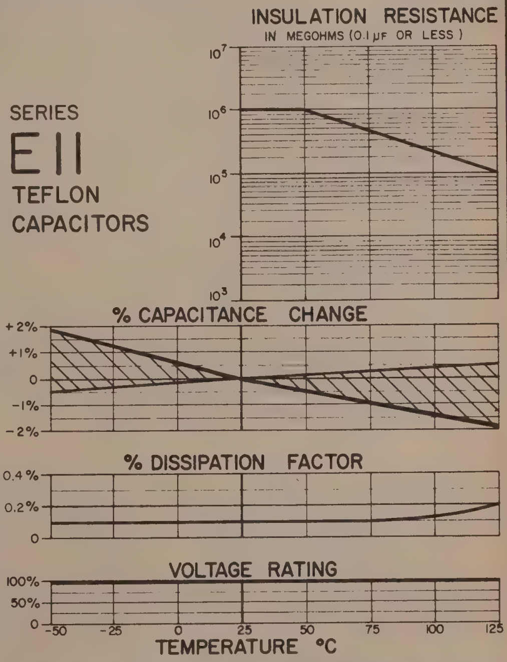
Readings shown are for 1 uF or less. For values over 1 uF, divide readings by uF to obtain min IR.
Example: A 10 uF, 100 volt capacitor at 25°C is 1,000,000/10 megs = 100,000 megohms.

SEAL TEST: 1 x 10-5 atm/cm³/sec. max. leak rate.

E11 QUALITY ASSURANCE

All capacitors are 100% screened and tested as follows:

1. 5 Temperature Cycles from −65°C to 125°C.
2. Helium Leak Test. 1 x 10-5 atm/cm³/sec. max. leak rate.
3. DC dielectric strength apply 200% of rated DC voltage from lead to lead and from leads to case for one minute.
4. Insulation Resistance at the rated voltage and 25°C, 100,000 megs — uF minimum, but need not exceed 1,000,000 Megohms.
5. Capacitance % Tolerance at 1KHz and 25°C.
6. Dissipation Factor at 1KHz and 25°C, 0.1% maximum.
7. Visual Inspection for dimensions, marking and packaging.



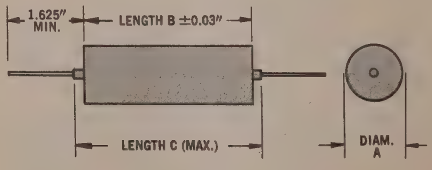
SERIES 11 TEFLON
CASE DIMENSIONS

uF	11B 50VDC			11C 100 VDC			11D 200 VDC		
	Diam. A	Length B	Length C	Diam. A	Length B	Length C	Diam. A	Length B	Length C
.001	.235	.687	.887	.235	.687	.887	.235	.687	.887
.0012	.235	.687	.887	.235	.687	.887	.235	.687	.887
.0015	.235	.687	.887	.235	.687	.887	.235	.687	.887
.0018	.235	.687	.887	.235	.687	.887	.235	.687	.887
.002	.235	.687	.887	.235	.687	.887	.235	.687	.887
.0022	.235	.687	.887	.235	.687	.887	.235	.687	.887
.0027	.235	.687	.887	.235	.687	.887	.235	.687	.887
.0033	.235	.687	.887	.235	.687	.887	.235	.687	.887
.0039	.235	.687	.887	.235	.687	.887	.235	.687	.887
.0047	.235	.687	.887	.235	.687	.887	.235	.687	.887
.005	.235	.687	.887	.235	.687	.887	.235	.687	.887
.0056	.235	.687	.887	.235	.687	.887	.235	.687	.887
.0068	.235	.687	.887	.235	.687	.887	.235	.687	.887
.0082	.235	.687	.887	.235	.687	.887	.235	.687	.887
.01	.235	.687	.887	.235	.687	.887	.235	.687	.887
.012	.235	.687	.887	.235	.687	.887	.235	.687	.887
.015	.312	.687	.887	.312	.687	.887	.312	.687	.887
.018	.312	.687	.887	.312	.687	.887	.312	.813	1.013
.02	.312	.687	.887	.312	.687	.887	.312	.813	1.013
.022	.312	.687	.887	.312	.687	.887	.312	.813	1.013
.027	.312	.687	.887	.312	.813	1.013	.312	.813	1.013
.033	.312	.687	.887	.312	.813	1.013	.400	.813	1.013
.039	.312	.687	.887	.400	.813	1.013	.400	1.063	1.263
.047	.312	.687	.887	.400	.813	1.013	.400	1.063	1.263
.05	.312	.687	.887	.400	.813	1.013	.400	1.063	1.263
.056	.312	.813	1.013	.400	.813	1.013	.400	1.063	1.263
.068	.312	.813	1.013	.400	.813	1.013	.400	1.063	1.263
.082	.312	.937	1.137	.400	1.063	1.263	.500	1.125	1.325
.1	.312	.937	1.137	.400	1.063	1.263	.500	1.125	1.325
.12	.312	1.063	1.263	.500	1.125	1.325	.500	1.375	1.575
.15	.312	1.063	1.263	.500	1.125	1.325	.562	1.375	1.575
.18	.400	1.063	1.263	.500	1.125	1.325	.562	1.375	1.575
.20	.400	1.063	1.263	.562	1.125	1.325	.562	1.375	1.575
.22	.400	1.063	1.263	.562	1.125	1.325	.562	1.375	1.575
.27	.400	1.063	1.263	.562	1.125	1.325	.670	1.375	1.575
.33	.500	1.125	1.325	.562	1.125	1.325	.670	1.375	1.575
.39	.500	1.125	1.325	.562	1.375	1.575	.562	1.875	2.075
.47	.562	1.125	1.325	.670	1.375	1.575	.670	1.875	2.075
.50	.562	1.125	1.325	.670	1.375	1.575	.670	1.875	2.075
.56	.562	1.125	1.325	.670	1.375	1.575	.670	1.875	2.075
.68	.562	1.125	1.325	.670	1.875	2.075	.750	1.875	2.075
.82	.562	1.375	1.575	.670	1.875	2.075	.750	1.875	2.075
1.0	.670	1.375	1.575	.670	1.875	2.075	.750	1.875	2.075
1.5	.670	1.875	2.075	.750	1.875	2.075	1.00	1.875	2.075
2.0	.670	1.875	2.075	1.0	1.875	2.075	1.00	2.375	2.575

TYPE D51 TEFLON
CASE DIMENSIONS

uF	D51C TEFLON 100 VDC				D51D TEFLON 200 VDC			
	BASIC PART NO.	Diam. A	Length B	Length C	BASIC PART NO.	Diam. A	Length B	Length C
.001	D51C102	.235	.687	.887	D51D102	.235	.687	.887
.0012	D51C122	.235	.687	.887	D51D122	.235	.687	.887
.0015	D51C152	.235	.687	.887	D51D152	.235	.687	.887
.0018	D51C182	.235	.687	.887	D51D182	.235	.687	.887
.002	D51C202	.235	.687	.887	D51D202	.235	.687	.887
.0022	D51C222	.235	.687	.887	D51D222	.235	.687	.887
.0027	D51C272	.235	.687	.887	D51D272	.235	.687	.887
.0033	D51C332	.235	.687	.887	D51D332	.235	.687	.887
.0039	D51C392	.235	.687	.887	D51D392	.235	.687	.887
.0047	D51C472	.235	.687	.887	D51D472	.235	.687	.887
.005	D51C502	.235	.687	.887	D51D502	.235	.687	.887
.0056	D51C562	.235	.687	.887	D51D562	.235	.687	.887
.0068	D51C682	.235	.687	.887	D51D682	.235	.687	.887
.0082	D51C822	.235	.687	.887	D51D822	.235	.687	.887
.01	D51C103	.235	.687	.887	D51D103	.235	.687	.887
.012	D51C123	.235	.687	.887	D51D123	.235	.687	.887
.015	D51C153	.312	.687	.887	D51D153	.312	.687	.887
.018	D51C183	.312	.687	.887	D51D183	.400	.813	1.013
.02	D51C203	.312	.687	.887	D51D203	.400	.813	1.013
.022	D51C223	.312	.687	.887	D51D223	.400	.813	1.013
.027	D51C273	.400	.813	1.013	D51D273	.400	1.063	1.263
.033	D51C333	.400	.813	1.013	D51D333	.400	1.063	1.263
.039	D51C393	.400	1.063	1.263	D51D393	.400	1.063	1.263
.047	D51C473	.400	1.063	1.263	D51D473	.400	1.063	1.263
.05	D51C503	.400	1.063	1.263	D51D503	.400	1.063	1.263
.056	D51C563	.400	1.063	1.263	D51D563	.400	1.063	1.263
.068	D51C683	.400	1.063	1.263	D51D683	.400	1.063	1.263
.082	D51C823	.562	1.125	1.325	D51D823	.562	1.125	1.325
.1	D51C104	.562	1.125	1.325	D51D104	.562	1.125	1.325
.12	D51C124	.562	1.125	1.325	D51D124	.562	1.375	1.575
.15	D51C154	.562	1.375	1.575	D51D154	.562	1.875	2.075
.18	D51C184	.562	1.875	2.075	D51D184	.670	1.875	2.075
.20	D51C204	.562	1.875	2.075	D51D204	.670	1.875	2.075
.22	D51C224	.562	1.875	2.075	D51D224	.670	1.875	2.075
.27	D51C274	.670	1.875	2.075	D51D274	.670	1.875	2.075
.33	D51C334	.670	1.875	2.075	D51D334	.750	1.875	2.075
.39	D51C394	.750	1.875	2.075	D51D394	.750	1.875	2.075
.47	D51C474	.750	1.875	2.075	D51D474	1.00	2.375	2.575
.50	D51C504	.750	1.875	2.075	D51D504	1.00	2.375	2.575
.56	D51C564	.750	1.875	2.075	D51D564	1.00	2.375	2.575
.68	D51C684	1.00	1.875	2.075	D51D684	1.00	2.375	2.575
.82	D51C824	1.00	2.375	2.575	D51D824	1.00	2.625	2.825
1.0	D51C105	1.00	2.375	2.575	D51D105	1.00	2.625	2.825

CONSTRUCTION INFORMATION



LEAD WIRE SIZE AND TYPE

Case Diameter	Lead Wire Size #AWG	Lead Wire Material
0.312″ and smaller	22	Tinned Copper Clad Steel (Tinned Copperweld) CRC type "W"
0.400″ and larger	20	

CASE DIMENSIONS	TOLERANCE LIMITS
"A" Diameter	±0.010″ Without Sleeving
	−0.00″ +0.02″ With Mylar Sleeving
"B" Case Length	±0.03″ With or Without Sleeving
"C" Bead to Bead Length	The lengths shown in tables are maximum and include the distance between solder beads.

CRC HIGH RELIABILITY CAPACITORS

TEFLON SPECIFICATIONS AND CASE SIZES

TYPE D51

D51 SPECIFICATIONS

OPERATING TEMPERATURE: −65°C to 125°C at full rated voltage.

TEMPERATURE COEFFICIENT OF CAPACITANCE (25°C Reference).

+0.8% Max. at −50°C	−0.3% Max. at + 50°C
+0.6% Max. at −25°C	−0.5% Max. at + 75°C
+0.3% Max. at 0°C	−0.6% Max. at +100°C
	−0.8% Max. at +125°C

STABILITY WITH 5 TEMPERATURE CYCLES:

0.05% Max. Drift	−25°C to + 85°C
0.25% Max. Drift	−65°C to +125°C

INSULATION RESISTANCE measured from terminal to terminal at rated voltage, and 5 minutes maximum charge time. For values greater than 1 mfd, allow an additional minute/mfd charge time.

MINIMUM IR					
Range	25°C	55°C	85°C	100°C	125°C
.001 to 0.1 uF (in Megohms)	10,000,000	5,000,000	3,000,000	1,500,000	300,000
Greater than 0.1 uF (in Megohms — uF)	1,000,000	500,000	300,000	150,000	30,000

DIELECTRIC ABSORPTION: 0.01% Max. at 25°C.

DISSIPATION FACTOR: 0.01% Max. at 1 KHz and 25°C.

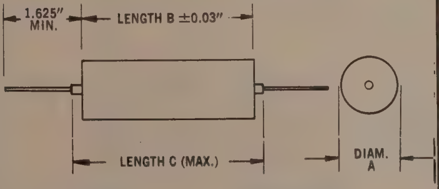
DIELECTRIC STRENGTH: 200% of rated voltage.

CONSTRUCTION: Teflon dielectric, hermetically sealed, extended metal foil or special metal film electrodes, leads isolated from case.

LEAD WIRE SIZE AND TYPE		
Case Diameter	Lead Wire Size #AWG	Lead Wire Material
0.312″ and smaller	22	Tinned Copper Clad Steel (Tinned Copperweld) CRC type "W"
0.400″ and larger	20	

SEAL TEST: 1 x 10^{-6} atm/cm³/sec. max. leak rate.

ENVIRONMENTAL: Capacitors shall meet all applicable requirements of MIL-C-83421.



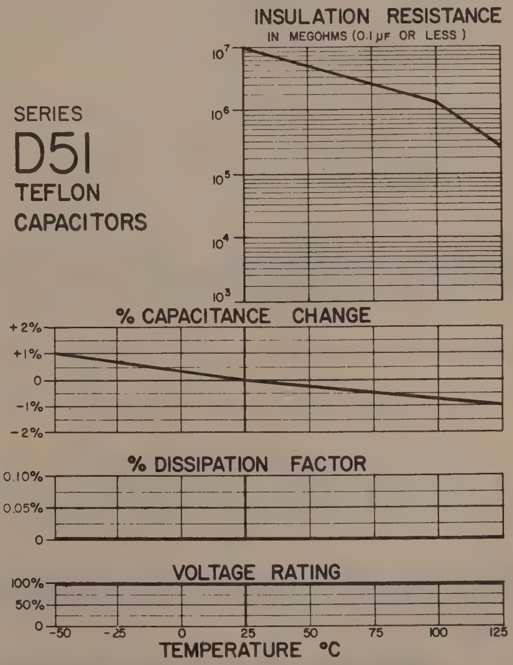
CASE DIMENSION	TOLERANCE LIMITS
"A" Diameter	±0.010″ Without Sleeving
	−0.00″ +0.02″ With Mylar Sleeving
"B" Case Length	±0.03″ With or Without Sleeving
"C" Bead to Bead Length	The lengths shown in tables are maximum and include the distance between solder beads.

- PART NUMBER SYSTEM PAGE 18
- MFG. & INSPECTION FLOW PLAN PAGE 20
- QPL PROGRAM APPROVALS PAGE 23
- CASE DIMENSIONS PAGE 28
- LIFE TEST DATA PAGE 30
- PRICES PAGE 48
- STANDARD TOLERANCES ±0.25% to ±10%

D51 QUALITY ASSURANCE

All capacitors are 100% screened and tested as follows:

1. 16 hours Burn-In at 125°C and 140% of the rated DC voltage.
2. 10 Temperature Cycles from −65°C to 125°C.
3. Helium Leak Test. 1 x 10^{-6} atm/cm³/sec. max. leak rate.
4. DC dielectric strength apply 200% of rated DC voltage from lead to lead and from leads to case for one minute.
5. Insulation Resistance at the rated voltage and 25°C, 1,000,000 megs — uF minimum, but need not exceed 10,000,000 Megohms.
6. Capacitance % Tolerance at 1KHz and 25°C.
7. Dissipation Factor at 1KHz and 25°C, 0.005% maximum.
8. Visual inspection for dimensions, marking and packaging.
9. Traceability to production and test records by permanent marking of of parts with lot control number.
10. Process and inspection data is maintained on file per NPC-200-3, MIL-Q-9858 quality control standards and MIL-STD-790 Reliability Assurance Program.



CRC HIGH RELIABILITY CAPACITORS

LIFE TEST DATA

TYPE B11B TEFLON • TYPE X51 TEFLON • TYPE "JW" TEFLON

TYPE B11B TEFLON CAPACITORS (Formerly 05TJ)

Test reports covering high reliability metallized teflon capacitors manufactured by Component Research Co. since 1962 show that these capacitors are still unequalled for low loss, stability and reliability.

The test data listed below is typical of the performance characteristics of CRC type B11B or C11B teflon capacitors, shown on pages 24 and 25 of this catalog.

Additional test data is on file which has been accumulated from qualification testing since 1963 for critical programs such as Apollo, Lunar Orbitor, Discoverer, etc.

If your application demands highest possible insulation resistance up to 125°C, and extreme low loss characteristics, we suggest series 11 teflon capacitors. For high RMS AC current applications see series 51 teflon or contact a CRC applications engineer at the address shown at bottom of page for further details.

TYPE B11B LIFE TEST SUMMARY

Summary data shown below covers 85 precision teflon 50VDC capacitors, life tested for 1000 hours at 125°C, with 70VDC applied. There were no failures for all capacitors tested. Data has been extracted from CRC test reports 70TR12, 71TR18, 71TR19, 71TR20 and 71TR21.

List of Capacitors Life Tested			Insulation Resistance In Megohms at 25°C			% Capacitance Change With Life			% Dissipation Factor at 25°C		
CRC Type	Capacitance µF Value	No. Tested	Post Test Limits	Test Results Low	Test Results High	Post Test Limits	Test Results Low	Test Results High	Post Test Limits	Test Results Low	Test Results High
05 TJ	.04667	7	2.2×10^5	1.5×10^7	4.5×10^7	0.5%	−.07%	−.27%	0.1%	.01%	.02%
05 TJ	.047	5	2.2×10^5	4×10^6	4.5×10^7	0.5%	−.08%	−.47%	0.1%	.01%	.02%
05 TJ	.05	9	2.2×10^5	2×10^6	4.5×10^7	0.5%	−.18%	−.34%	0.1%	.01%	.01%
05 TJ	.068	5	2.2×10^5	9×10^6	1.5×10^7	0.5%	−.09%	−.33%	0.1%	.01%	.05%
05 TJ	.10	11	2.2×10^5	3×10^5	4.5×10^7	0.5%	−.06%	−.37%	0.1%	.01%	.09%
05 TJ	.15	4	2.2×10^5	3×10^5	4.5×10^7	0.5%	−.09%	−.16%	0.1%	.01%	.03%
05 TJ	.1942	8	2.2×10^5	5×10^5	4.5×10^7	0.5%	−.02%	−.20%	0.1%	.01%	.04%
05 TJ	.33	5	2.2×10^5	7×10^5	1.5×10^7	0.5%	−.07%	−.16%	0.1%	.01%	.01%
05 TJ	.47	8	2.2×10^5	1.1×10^6	4.5×10^7	0.5%	−.08%	−.28%	0.1%	.01%	.08%
05 TJ	.5	6	2.2×10^5	1.5×10^6	4.5×10^7	0.5%	−.08%	−.22%	0.1%	.02%	.06%
05 TJ	2.0	17	1.1×10^5	1.3×10^5	2.2×10^7	0.5%	+.02%	−.10%	0.1%	.01%	.01%

TYPE X51 SPECIAL TEFLON CAPACITORS (Similar to New D51 Series)

Test Item No.	Examination or Test	Conditions	Limits
1	Burn-In	@ 85°C, 96 hrs. @ 750VDC	
2	Temperature Cycling	−62°C/125°C	5 cycles
3	Seal Test	Helium Leak Test	1×10^{-6} max. leak rate
4	AC-Dielectric Strength	@25°C, 30 min. 400 volts peak square wave @ 500 Hz	
5	DC-Dielectric Strength	Lead to lead and leads to case	@ 1000VDC
6	Insulation Resistance	@ 500V, 25°C	5000 picoamps max.
7	Capacitance % Tolerance	@ 1 KHz, 25°C	±0.5% max.
8	Dissipation Factor	@ 1 KHz, 25°C	0.01% max.
9	Temperature Coefficient	0°C to 25°C 25°C to 85°C	±.35% max. ±.65% max.

In applications involving abnormal AC current or voltage conditions it is recommended that you contact CRC applications engineers or consult AC data pages in this catalog.

The X51 500 volt teflon capacitors were specially designed to provide low loss high frequency AC characteristics in small package size. Our customer was having difficulty with catastrophic failure, drift and overheating using ordinary capacitors but the CRC X51 capacitors solved these problems and improved circuit performance considerably.

Table at left is part of X51 screening and processing performed on a 100% basis.

TYPE X51 LIFE TEST SUMMARY

Data shown below covers 48 teflon-foil capacitors life tested at 750VDC at 85°C for 1000 hours. There were no failures in this test. This data has been extracted from CRC test reports 70TR09, 70TR15, 71TR22 and 71TR23.

CRC Type	Capacitance µF Value	No. Tested	Post Test Limits	Test Results Low	Test Results High	Post Test Limits	Test Results Low	Test Results High	Post Test Limits	Test Results Low	Test Results High
X51	0.1	24	1×10^5	5×10^6	1.6×10^8	±1%	0.00%	+.16%	0.01%	.01%	.01%
X51	0.2	24	1×10^5	6×10^6	2×10^7	±1%	0.00%	−.16%	0.01%	.01%	.01%

SPECIAL TYPE "JW" TEFLON CAPACITORS (For Apollo)

The series 11 teflon capacitors listed in this catalog are of the same construction and are similar in performance to the "JW" teflon capacitors.

The "JW" capacitors were specially screened to meet critical Apollo requirements and were an important factor in maintenance of precise guidance and control for Apollo flights.

Life test data is shown as a demonstration of the excellent performance of our earlier teflon high reliability capacitors.

The newer series 11 teflon capacitors are now available at much lower cost than the "JW" capacitors and have even greater reliability as a result of added years of manufacturing experience.

TYPE "JW" LIFE TEST SUMMARY

The summary data shown below covers 100 precision teflon capacitors consisting of 50 05JW2233G (0.22 uF 50VDC 2%) and 50 05JW224G (.22 uF 50VDC 2%) capacitors that were life tested for 2,000 hours at 125°C and at 75VDC. There were no failures for all the capacitors tested. Data has been extracted from CRC Test Report No. 5-534.

CRC Type	Capacitance µF Value	No. Tested	Post Test Limits	Test Results Low	Test Results High	Post Test Limits	Test Results Low	Test Results High	Post Test Limits	Test Results Low	Test Results High
05 JW	.022	50	9×10^4	4.5×10^6	4.5×10^7	±3%	−.11%	−.95%	0.05%	.01%	.03%
05 JW	.22	50	9×10^4	5×10^6	1.5×10^7	±3%	−.09%	−.75%	0.05%	.01%	.04%

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catalog J

COMPONENT RESEARCH CO., INC. • 1717 19TH STREET • SANTA MONICA, CALIF. 90404 • (213) 829-3615 TWX. (910) 343-6864

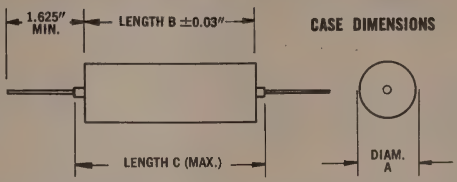
CRC HIGH RELIABILITY CAPACITORS

CORDWOOD (Reduced Length) CASE SIZES

SERIES E32 CORDWOOD POLYCARBONATE

- Specifications same as series E12 except for dimensions and AC ratings. See page 16.
- Price and ordering information appears on page 45.
- See page 18 for part number system.

SERIES E32 & D31



CASE DIMENSION	TOLERANCE LIMITS
"A" Diameter	±0.010″ Without Sleeving
	−0.00″ +0.02″ With Mylar Sleeving
"B" Case Length	±0.03″ With or Without Sleeving
"C" Bead to Bead Length	The lengths shown in tables are maximum and include the solder beads.

SERIES D31 CORDWOOD TEFLON

- See page 26 for D11 Teflon specifications which apply to D31B cordwood capacitors (except for temperature coefficient which is approximately 25% greater than D11 capacitors).
- See page 45 for prices and lead wire requirements, and ordering information.
- See page 18 for complete details concerning the part number system.

	E32A 30VDC POLYCARBONATE				E32B 50VDC POLYCARBONATE			
uF	Basic Part No.	Diam. A	Length B	Length C	Basic Part No.	Diam. A	Length B	Length C
.001	E32A102	.170	.500	.600	E32B102	.170	.500	.600
.0012	E32A122	.170	.500	.600	E32B122	.170	.500	.600
.0015	E32A152	.170	.500	.600	E32B152	.170	.500	.600
.0018	E32A182	.170	.500	.600	E32B182	.170	.500	.600
.002	E32A202	.170	.500	.600	E32B202	.170	.500	.600
.0022	E32A222	.170	.500	.600	E32B222	.170	.500	.600
.0027	E32A272	.170	.500	.600	E32B272	.170	.500	.600
.0033	E32A332	.170	.500	.600	E32B332	.170	.500	.600
.0039	E32A392	.170	.500	.600	E32B392	.170	.500	.600
.0047	E32A472	.170	.500	.600	E32B472	.170	.500	.600
.005	E32A502	.170	.500	.600	E32B502	.170	.500	.600
.0056	E32A562	.170	.500	.600	E32B562	.170	.500	.600
.0068	E32A682	.170	.500	.600	E32B682	.170	.500	.600
.0082	E32A822	.170	.500	.600	E32B822	.170	.500	.600
.01	E32A103	.170	.500	.600	E32B103	.170	.500	.600
.012	E32A123	.170	.500	.600	E32B123	.170	.500	.600
.015	E32A153	.170	.500	.600	E32B153	.170	.500	.600
.018	E32A183	.170	.500	.600	E32B183	.170	.500	.600
.02	E32A203	.170	.500	.600	E32B203	.193	.562	.600
.022	E32A223	.170	.500	.600	E32B223	.193	.562	.600
.027	E32A273	.170	.500	.600	E32B273	.193	.562	.600
.033	E32A333	.170	.500	.600	E32B333	.193	.562	.600
.039	E32A393	.170	.500	.600	E32B393	.193	.625	.670
.047	E32A473	.170	.500	.600	E32B473	.193	.625	.670
.05	E32A503	.170	.500	.600	E32B503	.193	.625	.670
.056	E32A563	.170	.562	.600	E32B563	.193	.625	.670
.068	E32A683	.170	.562	.600	E32B683	.235	.625	.670
.082	E32A823	.193	.562	.600	E32B823	.235	.625	.670
.1	E32A104	.193	.562	.600	E32B104	.235	.625	.670
.12	E32A124	.193	.687	.750	E32B124	.235	.625	.670
.15	E32A154	.193	.687	.750	E32B154	.312	.625	.670
.18	E32A184	.193	.687	.750	E32B184	.312	.625	.670
.20	E32A204	.193	.687	.750	E32B204	.312	.625	.670
.22	E32A224	.193	.687	.750	E32B224	.312	.625	.670
.27	E32A274	.235	.687	.750	E32B274	.312	.625	.670
.33	E32A334	.235	.687	.750	E32B334	.312	.687	.750
.39	E32A394	.235	.687	.750	E32B394	.312	.687	.750
.47	E32A474	.235	.687	.750	E32B474	.312	.687	.750
.50	E32A504	.235	.687	.750	E32B504	.312	.687	.750
.56	E32A564	.312	.687	.750	E32B564	.400	.687	.750
.68	E32A684	.312	.687	.750	E32B684	.400	.687	.750
.82	E32A824	.312	.687	.750	E32B824	.400	.687	.750
1.0	E32A105	.312	.687	.750	E32B105	.400	.687	.750
1.2	E32A125	.312	.813	.900				
1.5	E32A155	.312	.937	1.00				
2.0	E32A205	.312	1.063	1.10				
2.2	E32A225	.312	1.063	1.10				
2.7	E32A275	.400	.937	1.00				
3.0	E32A305	.400	.937	1.00				
3.3	E32A335	.400	.937	1.00				
4.0	E32A405	.400	1.063	1.10				
4.7	E32A475	.400	1.375	1.45				
5.0	E32A505	.400	1.375	1.45				
5.6	E32A565	.500	1.375	1.45				
6.8	E32A685	.500	1.375	1.45				
8.0	E32A805	.500	1.375	1.45				
10.0	E32A106	.500	1.375	1.45				

	D31B 50VDC TEFLON			
uF	Basic Part No.	Diam. A	Length B	Length C
.001	D31B102	.193	.562	.600
.0012	D31B122	.193	.562	.600
.0015	D31B152	.193	.562	.600
.0018	D31B182	.193	.562	.600
.002	D31B202	.193	.562	.600
.0022	D31B222	.193	.562	.600
.0027	D31B272	.193	.562	.600
.0033	D31B332	.193	.562	.600
.0039	D31B392	.235	.562	.600
.0047	D31B472	.235	.562	.600
.005	D31B502	.235	.562	.600
.0056	D31B562	.235	.562	.600
.0068	D31B682	.235	.562	.600
.0082	D31B822	.235	.562	.600
.01	D31B103	.235	.562	.600
.012	D31B123	.235	.562	.600
.015	D31B153	.235	.625	.670
.018	D31B183	.235	.625	.670
.02	D31B203	.235	.625	.670
.022	D31B223	.235	.625	.670
.027	D31B273	.235	.625	.670
.033	D31B333	.312	.625	.670
.039	D31B393	.312	.625	.670
.047	D31B473	.312	.625	.670
.05	D31B503	.312	.625	.670
.056	D31B563	.312	.625	.670
.068	D31B683	.312	.625	.670
.082	D31B823	.312	.625	.670
.1	D31B104	.312	.625	.670
.12	D31B124	.312	.937	1.00
.15	D31B154	.312	.937	1.00
.18	D31B184	.400	.937	1.00
.2	D31B204	.400	.937	1.00
.22	D31B224	.400	.937	1.00

SERIES E32 & D31 LEAD WIRE SIZE & TYPE

CASE DIAMETER	Lead Wire Size #AWG	LEAD WIRE MATERIAL
0.312″ and smaller	22	Tinned Copper Clad Steel (Tinned Copperweld) CRC type "W"
0.400″ and 0.500″	20	

ENVIRONMENTAL: Capacitors shall meet all applicable requirements of MIL-C-83421.
CONSTRUCTION: Hermetically sealed, extended metal film electrodes, leads isolated from case.

SERIES
N53

POLYSTYRENE-FOIL

HIGH INSULATION RESISTANCE AND LONG TERM STABILITY

COMPONENT
RESEARCH
COMPANY, INC.

- **QUALIFIED FOR SPACE APPLICATIONS, CRITICAL OPERATIONAL AMPLIFIER SYSTEMS AND NETWORKS**
- **100% SCREENED (LEVEL 3)**
- **5,000,000 MEGOHMS IR (0.1 MFD OR LESS)**

DC VOLTS	CRC TYPE	OLD P/N
50 VDC	N53B	05 PA
100 VDC	N53C	1 PA
200 VDC	N53D	2 PA

- PART NUMBER SYSTEM: PAGE 18
- CASE DIMENSIONS: PAGE 33
- APPLICATION NOTES: PAGE 34
- PRICES: PAGE 49
- STANDARD TOLERANCES: ±0.1% to ±10%
- SERIES L53 Capacitors with burn-in and high reliability screening can also be supplied. For advance information on a new high temperature polystyrene capacitor see pages 34, 37.

N53 SPECIFICATIONS

OPERATING TEMPERATURE: −65°C to 85°C at full rated volts.

TEMPERATURE COEFFICIENT: (See special notes below*)

Values 0.001 MFD to 0.0082 MFD	−80 ±50PPM/°C
0.01 MFD to 2.0 MFD	−60 ±50PPM/°C

*NOTES: Special Polystyrene Capacitors can be supplied with a negative coefficient of −20 to −100 PPM/°C that is linear to ±30 PPM/°C, ±20 PPM/°C and ±10 PPM/°C. A WIDE SELECTION is available of larger MFD values in bathtub and custom cases.

STABILITY: .03% maximum drift with 5 cycles from −25°C to 85°C.

INSULATION RESISTANCE: Measured from terminal to terminal at rated voltage, and 5 minutes maximum charge time. For values greater than 1 uF, allow an additional minute/uF charge time.

MINIMUM IR

Range	25°C	55°C	85°C
0.001 to 0.2 uF (in Megohms)	5,000,000 Megohms	2,500,000 Megohms	500,000 Megohms
0.22 to 1.0 uF (in Megohms)	1,000,000 Megohms	500,000 Megohms	100,000 Megohms
Above 1.0 uF (in Megohms - uF)	†1,000,000 Megohms-uF	† 500,000 Megohms-uF	†100,000 Megohms-uF

† For capacitor values over 1 uF, divide by uF value to obtain minimum IR limits.

EXAMPLE: A 2 uF capacitor at 25°C is 500,000 megohms

DIELECTRIC ABSORPTION: 0.02% Max. at 25°C.

DISSIPATION FACTOR: 0.02% Max. at 1 KHz and 25°C. Values above 1 uF measured at 0.1 KHz.

DIELECTRIC STRENGTH: 200% of rated volts.

CONSTRUCTION: Polystyrene dielectric, hermetically sealed, extended metal foil or special metal film electrodes, leads isolated from case.

LEAD WIRE SIZE AND TYPE

Case Diameter	Lead Wire Size #AWG	Lead Wire Material
0.312″ and smaller	22	Tinned Copper Clad Steel (Tinned Copperweld) CRC type "W"
0.400″ and 0.500″	20	
0.562″ and larger	18	Oxygen free tinned copper wire CRC type "C"

SEAL TEST: 1 x 10-6 atm/cm³/sec max. leak rate.

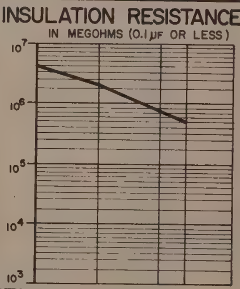
ENVIRONMENTAL: Capacitors shall be capable of meeting all applicable requirements of MIL-C-83421 including high frequency vibration.

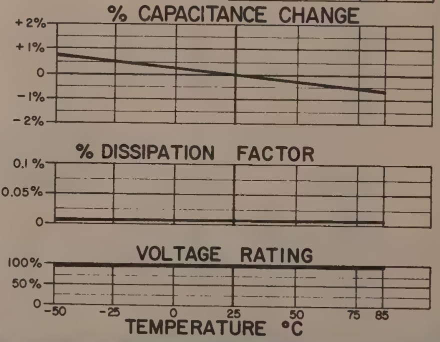
N53 QUALITY ASSURANCE

All capacitors are 100% screened and tested as follows:

1. 5 Temperature Cycles from −65°C to 85°C.
2. Helium Leak Test. 1 x 10-6 atm/cm³/sec. max. leak rate.
3. DC dielectric strength at 200% of the rated DC voltage.
4. Insulation Resistance at the rated voltage and 25°C, 1,000,000 megs — uF minimum. See minimum IR table in specifications.
5. Capacitance % Tolerance at 1 KHz and 25°C.
6. Dissipation Factor at 1 KHz and 25°C, 0.02% maximum.
7. Visual inspection (External) for dimensions, marking and packaging.
8. Traceability to production and test records by permanent marking of parts with lot control number.
9. Process and inspection data is maintained on file per NPC-200-3, Mil-Q-9858 quality control standards and MIL-STD-790 Reliability Assurance Program.

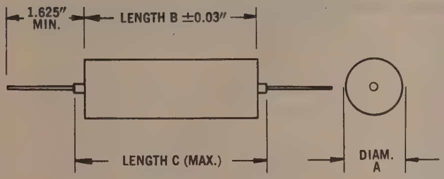
SERIES
N53
POLYSTYRENE CAPACITORS





CRC SERIES N53 POLYSTYRENE CAPACITOR DIMENSIONS

Series N53 Polystyrene Capacitors are widely used in instrumentation applications requiring high insulation resistance, low dielectric absorption, excellent stability, and linear temperature coefficient of capacitance. Larger capacitance values and higher voltage ratings are available and will be added to our N53 specifications in our next catalog issue. Contact our sales office for special requirements.



CASE DIMENSION	TOLERANCE LIMITS
"A" Diameter	±0.010" Without Sleeving
	−0.00" +0.02" With Mylar Sleeving
"B" Case Length	±0.03" With or Without Sleeving
"C" Bead to Bead Length	The lengths shown in tables are maximum and include the solder beads

uF	BASIC PART NO.	N53B 50 VDC			BASIC PART NO.	N53C 100 VDC		
		Diam. A	Length B	Length C		Diam. A	Length B	Length C
.001	N53B102	.193	.687	.887	N53C102	.193	.687	.887
.0012	N53B122	.193	.687	.887	N53C122	.193	.687	.887
.0015	N53B152	.193	.687	.887	N53C152	.193	.687	.887
.0018	N53B182	.193	.687	.887	N53C182	.193	.687	.887
.002	N53B202	.193	.687	.887	N53C202	.193	.687	.887
.0022	N53B222	.193	.687	.887	N53C222	.193	.687	.887
.0027	N53B272	.193	.687	.887	N53C272	.193	.687	.887
.0033	N53B332	.193	.687	.887	N53C332	.193	.687	.887
.0039	N53B392	.193	.687	.887	N53C392	.193	.687	.887
.0047	N53B472	.193	.687	.887	N53C472	.193	.687	.887
.005	N53B502	.193	.687	.887	N53C502	.193	.687	.887
.0056	N53B562	.193	.687	.887	N53C562	.193	.687	.887
.0068	N53B682	.193	.687	.887	N53C682	.193	.687	.887
.0082	N53B822	.193	.813	1.013	N53C822	.193	.813	1.013
.01	N53B103	.193	.813	1.013	N53C103	.193	.813	1.013
.012	N53B123	.235	.813	1.013	N53C123	.235	.813	1.013
.015	N53B153	.235	.813	1.013	N53C153	.235	.813	1.013
.018	N53B183	.312	.813	1.013	N53C183	.312	.813	1.013
.02	N53B203	.312	.813	1.013	N53C203	.312	.813	1.013
.022	N53B223	.312	.813	1.013	N53C223	.312	.813	1.013
.027	N53B273	.312	.813	1.013	N53C273	.312	.813	1.013
.033	N53B333	.312	.813	1.013	N53C333	.312	.813	1.013
.039	N53B393	.312	.813	1.013	N53C393	.400	.813	1.013
.047	N53B473	.312	.813	1.013	N53C473	.400	.813	1.013
.05	N53B503	.312	.813	1.013	N53C503	.400	.813	1.013
.056	N53B563	.312	.813	1.013	N53C563	.400	.813	1.013
.068	N53B683	.400	.813	1.013	N53C683	.400	1.063	1.263
.082	N53B823	.400	1.063	1.263	N53C823	.400	1.063	1.263
.1	N53B104	.400	1.063	1.263	N53C104	.400	1.375	1.575
.12	N53B124	.400	1.063	1.263	N53C124	.400	1.375	1.575
.15	N53B154	.400	1.375	1.575	N53C154	.400	1.375	1.575
.18	N53B184	.500	1.375	1.575	N53C184	.500	1.375	1.575
.20	N53B204	.500	1.375	1.575	N53C204	.500	1.375	1.575
.22	N53B224	.500	1.375	1.575	N53C224	.562	1.375	1.575
.27	N53B274	.562	1.375	1.575	N53C274	.562	1.875	2.075
.33	N53B334	.562	1.375	1.575	N53C334	.562	1.875	2.075
.39	N53B394	.562	1.875	2.075	N53C394	.670	1.875	2.075
.47	N53B474	.562	1.875	2.075	N53C474	.670	1.875	2.075
.50	N53B504	.562	1.875	2.075	N53C504	.670	1.875	2.075
.56	N53B564	.562	1.875	2.075	N53C564	.670	1.875	2.075
.68	N53B684	.670	1.875	2.075	N53C684	.750	1.875	2.075
.82	N53B824	.750	1.875	2.075	N53C824	1.00	1.875	2.075
1.0	N53B105	.750	1.875	2.075	N53C105	1.00	1.875	2.075
1.5	N53B155	1.0	1.875	2.075	N53C155	1.00	2.375	2.575
2.0	N53B205	1.0	2.375	2.575				

SPECIAL MINIATURE SERIES N13 POLYSTYRENE CAPACITORS

Component Research Co. has developed a new product line of special Metallized Polystyrene Capacitors, Type N13, which are approximately 50% smaller in size than the N53 Series. The N13 capacitors have the same high quality, high performance features as Series 53 and will ultimately be qualified to established reliability specification MIL-C-83421. The unique patented construction and process features of CRC capacitors have been incorporated into the N13 Series which makes them the most reliable and miniature Polystyrene capacitors available for aerospace or industrial applications. The N13 Series has a low dissipation factor of 0.02% maximum and can be fully operated to 85°C reliably without voltage derating.

We believe the N13 Series will be useful in airborne applications where the N53 Series are too large in size and weight or where the Series 12 Polycarbonate have too high a dielectric absorption or too low an insulation resistance. Please contact our sales office for further information.

COMPONENT RESEARCH CO., INC. • 1717 19TH STREET • SANTA MONICA, CALIF. 90404 • (213) 829-3615 TWX: (910) 343-6864

CRC HIGH RELIABILITY CAPACITORS

N53 POLYSTYRENE CAPACITORS
SPECIAL TYPE L53 POLYSTYRENE CAPACITORS

N53 POLYSTYRENE APPLICATION NOTES

Medical Research Laboratories, Industrial Research Institutes and Instrumentation Manufacturers find our N53 polystyrene capacitors are their favorite choice for integrating and other memory applications.

The N53B105KXC 1 uF, 50VDC capacitor shown below is, 0.750″ x 1.875″ hermetically sealed, and helium leak tested to maintain its low loss characteristics for long term use.

Typically, this capacitor exhibits less than 0.01 nanoamps leakage current at 25°C ±20°C with 10VDC applied. The low dielectric absorption, low dissipation factor and excellent capacitance stability with time, makes this capacitor ideal for laboratory and critical industrial applications.

N53 polystyrene capacitors are available in bathtub cases and custom designed metal cases where capacitance values above the standard values listed on catalog page 33 are needed.

STANDARD TUBULAR P/N N53B105KXC

Capacitors up to 100 uF of extremely high quality can be supplied to meet individual customer requirements.

The N53B106B 10 uF, 50VDC polystyrene capacitor shown below is approximately 2.25″ x 2.88″ x 2″ high, plus the ⅜″ wide mounting flanges. Leakage current at 10VDC and at 25°C is less than 0.1 nanoamps.

A 10 uF 10% 50VDC, N53B106K capacitor domestic price is approximately $40.00 in quantities from 1-10 pieces.

Special polystyrene capacitors for high AC power resonating use, are also available with very low loss frequency characteristics and heavy duty terminations.

SPECIAL BATHTUB P/N N53B106B

SPECIAL "L53" TYPE HIGH TEMPERATURE POLYSTYRENE CAPACITORS

CRC has developed miniature polystyrene capacitors that can safely be stored above 85°C. This has been made possible by the use of a combination of the CRC patented winding and termination construction, and special metal film electrodes which support the polystyrene dielectric in a stress-free manner at temperatures above 85°C (CRC patent pending.)

Although CRC is confident that operation is possible at temperatures up to 105°C, (some lots have been operated at 125°C) we recommend that the normal operating temperature range be limited from −65°C to 85°C. This recommendation is not based upon any reliability problems at 105°C, but is rather due to a slight capacitance offset (called TC Hysteresis) that occurs when operated or stored above 85°C. The L53 polystyrene capacitors have an unusually linear temperature coefficient slope from −55°C to 85°C. Their retrace is superb and we believe this type will be excellent for low cost standards which we now supply for laboratory use.

As of February 1971 a total of 40 capacitors ranging from 0.0022 MFD to 0.01 MFD consisting of 50 and 100 volts DC rated units were subjected to a Reliability Demonstration test for a total of 2,000 hours at 105°C and at 100% of the rated DC voltage. All the capacitors also received a total of 75 temperature cycles from −62°C to +85°C in order to further stress the terminations of these capacitors. The capacitors were then visually inspected, seal tested and electrically inspected.

The capacitors indicated no significant △% capacitance, % DF and IR changes and there were no opens or shorts as indicated by the measurements shown in the table below. CRC will be conducting further testing on larger quantities of capacitors covering wider microfarad and voltage ranges in order to determine the proper ratings for these unusually reliable high temperature polystyrene capacitors. See page 37.

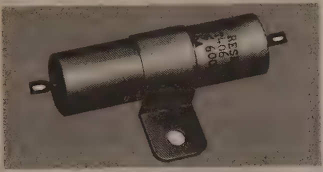
L53 POLYSTYRENE DC LIFE TEST DATA AT 105°C

TEST REPORT CRC XT398

	LIST OF CAPACITORS LIFE TESTED			INSULATION RESISTANCE IN MEGOHMS AT 25°C		% CAPACITANCE CHANGE WITH LIFE		% DISSIPATION FACTOR AT 25°C	
				Test Results		Test Results		Test Results	
	CRC Type	MFD Value	No. Tested	Low	High	Low	High	Low	High
Test results for 26 50VDC polystyrene capacitors life tested for 2,000 hours at 105°C with 50VDC applied. There were no failures for this group.	L53 L53 L53 L53	.0022 .005 .01 .068	5 5 14 2	5.6×10^5 4.5×10^7 3.4×10^5 2.2×10^7	4.5×10^7 4.5×10^7 4.5×10^7 4.5×10^7	+.05 −.03 0.00 0.00	+.80 +.34 +.30 +.70	.01 .01 .01 .01	.01 .01 .01 .01
Test results for 14 100VDC polystyrene capacitors life tested for 2,000 hours at 105°C with 100VDC applied. There were no failures for this group.	L53	.005	14	2×10^5	4.5×10^7	+.01	+.50	.01	.01

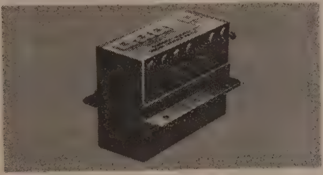
SPECIAL CAPACITOR APPLICATION SECTION

POWER RESONATING • SCR COMMUTATING • PULSE FORMING • AC ORDERING INFORMATION



The 0.033 uF, 2%, 600VDC, polystyrene capacitor shown is .562″ x 1.875″ size and is rated at 1.5 AMPS RMS AC. The capacitor is designed to handle 300V RMS AC at frequencies up to 25,000 Hz and to simultaneously withstand rugged environmental testing for a high reliability underseas application.

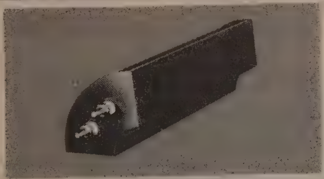
During operation and extreme environmental conditions the capacitor must not exhibit microphonics, noise, or corona and the short or long term capacitance drift must be maintained to very close limits. In many applications, burn-in under AC conditions similar to customer use can be performed as a 100% screening procedure,



In this application, high quality foil polypropylene and polystyrene capacitors were used to provide precise three phase motor control of a critical underwater guidance system. The capacitors must withstand transient voltage and current spikes during severe environmental stress without affecting reliability.

The highest quality materials are used including RTV silicone rubber potting compounds which are carefully lot controlled and processed to provide excellent electrical properties and extended life.

Typically the capacitors operate at 180V RMS from 400 Hz to 1200 Hz and must also withstand transients of 500 volts per millisecond under pulse peak to peak conditions of 800 volts.



As an example of CRC design of special purpose capacitors, four, quarter round capacitors were assembled to form a coaxial capacitor with a 2″ I.D. hole. Through this hole a copper pipe is passed with a circulating coolant to remove the heat generated due to the watts-loss of the capacitors.

In this application all parts were custom designed to provide low loss including special terminals capable of handling 100 AMPS RMS with minimum heating.

Special capacitors can be supplied to handle peak currents ranging into thousands of amperes for short periods in the microsecond region.

CRC patented capacitor designs provide the lowest possible loss, the highest reliability, consistent with minimum package size and reasonable cost.

CRC has over 150 KVA of AC power generators in constant use for power burn-in and life test of capacitors from 400 Hz to 40 KHz. Our present plans are to double this power generating capability with a view to CRC becoming a world leader in the development and manufacture of finest quality AC capacitors as well as CRC standard precision capacitors.

STUDYING YOUR AC CAPACITOR REQUIREMENTS

It is important to provide detailed information concerning all normal and worst case conditions, space availability, quantity, delivery required, and if possible any problems previously encountered with capacitors used.

In the example below the customer has presented his requirements in detail including the current and voltage waveforms.

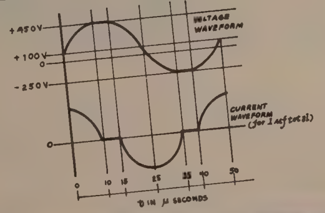
Please provide us with similar information when making inquiries for special AC capacitors so that we can make recommendations or quotations with minimum delay.

Following is a typical example of how your AC capacitor inquiry should be formulated. (Excerpt from a customer RFQ).

	REQUIREMENTS			
	C1	C2	C3	Notes
Item				
Capacitance	0.5 uF	0.1 uF	0.05 uF	
Tolerance 25°C	±1%	±1%	±1%	
Max. Capacitance Change (−20°C to +71°C)	±1%	±1%	±1%	
Peak to Peak Voltage	700V	700V	700V	1
RMS Voltage	250V	250V	250V	
Peak Current	28.3A	4.65A	2.3A	
RMS Current	17.3A	2.84A	1.4A	
Peak (Fault) Current	35.5A	5.9A	3.0A	
Max. Frequency, (KHz)	20	20	20	
Temp. Range, Operating	−20°C to +70°C	−20°C to +70°C	−20°C to +70°C	2
Temp. Range, Storage	−55°C to +85°C	−55°C to +85°C	−55°C to +85°C	
% Dissipation Factor	≤0.1%	≤0.1%	≤0.1%	3
Life, Goal in Hours	10,000	10,000	10,000	
Weight	≤0.38#	≤0.08#	≤0.04#	4
Quantity Needed	8	14	14	5
Applicable Mil Specs	N/A	N/A	N/A	
Construction	Hermetic	Tubular	Preferred	6, 7
Terminals	Axial Wire Leads			

NOTES

1. Refer to voltage waveform.
2. Frame Temp.
3. Goal is < 0.05%.
4. Goal is < 0.5#/uF. Vendor to advise case size.
5. Delivery is required within 4 weeks.
6. Vendor to recommend wire size and material. best suited for current handling. 1.5″ length is satisfactory.
7. Item presently being used is foil mylar and is overheating and has too low a Q. Please recommend capacitor that will have minimum heat rise and will maintain resonance of tank circuit within ±0.3% when operated continuously at 25°C ambient ±5°C.



LIFE TEST DATA Series 14 Polysulfone Capacitors

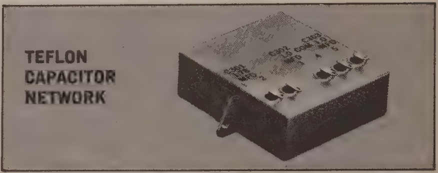
Polysulfone, one of our newer dielectric materials, has many advantages to offer in terms of extended temperature range, and low temperature coefficient of capacitance.

In accordance with the CRC established policy of introducing new products with conservative ratings, life testing has been conducted at 125°C and at ratings that we believe will provide reliable, high quality polysulfone capacitors. Our new series 14 polysulfone specifications are in line with this policy, and are based upon the manufacture and test of thousands of polysulfone capacitors since 1970.

In addition to AC life tests, DC life at higher temperatures and voltage levels are in process. Future catalog issues will undoubtedly contain additional polysulfone specifications and life test data at extended conditions.

DC LIFE TEST DATA	LIST OF CAPACITORS LIFE TESTED			INSULATION RESISTANCE IN MEGOHMS AT 25°C			% CAPACITANCE WITH LIFE			% DISSIPATION FACTOR AT 25°C		
	CRC* Type	MFD Value	No. Tested	Post Test Limits (Min. IR)	Test Results Low	Test Results High	Post Test Limits	Test Results Low	Test Results High	Post Test Limits	Test Results Low	Test Results High
TEST REPORTS CRC XT520, XT542, XT544 AND XT547 TEST RESULTS FOR 101 50VDC POLYSULFONE CAPACITORS LIFE TESTED FOR 2,000 HOURS AT 125°C WITH 53VDC APPLIED. THERE WERE NO FAILURES FOR THIS GROUP.	*05 MP	.0068	9	6.4 x 10^5	1.5 x 10^7	4.5 x 10^7	±4%	−.02%	+.89%	0.25%	.05%	.08%
	*05 MP	.22	10	2.8 x 10^5	3 x 10^6	9 x 10^6	±4%	+.01%	+.30%	0.25%	.07%	.08%
	*05 MP	1.5	40	4.5 x 10^4	8 x 10^5	3 x 10^6	±4%	+.01%	+.48%	0.25%	.03%	.06%
	*05 MP	2.0	42	3 x 10^4	2.2 x 10^5	4.5 x 10^6	±4%	+.02%	+.46%	0.25%	.03%	.05%
TEST REPORTS CRC XT518, XT539, XT540 AND XT541 TEST RESULTS FOR 128 100VDC POLYSULFONE CAPACITORS LIFE TESTED FOR 2,000 HOURS AT 125°C WITH 105VDC APPLIED. THERE WERE NO FAILURES FOR THIS GROUP.	*FORMER TYPE MP POLYSULFONE IS SIMILAR TO H14 SERIES											
	*1 MP	.01	10	6.5 x 10^5	5 x 10^6	4.5 x 10^7	±4%	−.01%	−.37%	0.25%	.05%	.07%
	*1 MP	.015	36	6.5 x 10^5	1.7 x 10^6	4.5 x 10^7	±4%	+.01%	+.93%	0.25%	.05%	.09%
	*1 MP	.068	37	6.5 x 10^5	1.3 x 10^7	9 x 10^7	±4%	+.15%	+1.21%	0.25%	.06%	.09%
	*1 MP	.12	45	5.3 x 10^5	1 x 10^6	3 x 10^7	±4%	−.01%	−.37%	0.25%	.04%	.07%

SPECIAL CAPACITOR TYPES High Energy AC Ultra High IR DC



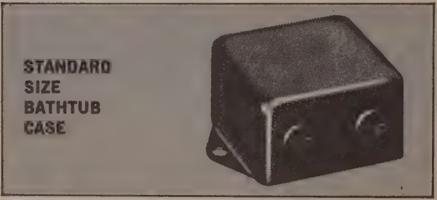
TEFLON CAPACITOR NETWORK: This teflon memory and computing network is one of the most critical components in the Lance Missile System. The capacitors must maintain very high insulation resistance, low dielectric absorption, and low capacitance change with temperature during storage and all through the severe environments of launching.

The capacitors are also specially designed to be free from mechanically induced noise which could affect the highly advanced and sensitive electronics control of the missile guidance. Testimonial letters from our customers are on file attesting to the unusually high quality and performance they have experienced in using our products.

FOR AC
APPLICATIONS

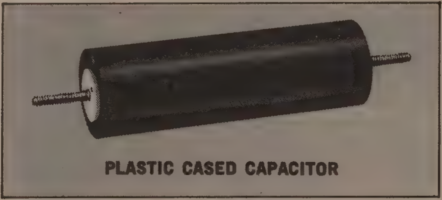
CAPACITORS DESIGNED FOR AC APPLICATIONS by CRC have very low equivalent series resistance and are remarkably cool and efficient for their size. The capacitor shown contains eight 1.2 MFD sections that operate up to 25 KHz at 170 volts AC RMS maximum with 25 amps at 25% duty cycle for each capacitor.

CRC was selected as the manufacturer to produce this special capacitor because of the extreme reliability required for a weapons program.



STANDARD SIZE BATHTUB CASES provide a quicker, convenient, lower cost method of providing special type capacitors for applications not satisfied by our standard metal cased tubular capacitors. Special capacitors of this type can frequently be shipped within three weeks of order, manufactured with a choice of dielectric materials, construction, % tolerance range, voltage ratings, and special performance characteristics that is virtually limitless in scope.

Due to a special matching and trimming technique, extremely accurate capacitors can be provided in bathtub cases at lower cost than an equivalent accuracy in our tubular style capacitors.



CRC IS NOW CUSTOM MANUFACTURING PLASTIC CASED CAPACITORS of extremely low loss and minimum heat rise for very high current, high energy applications.

These capacitors are available in ratings from DC to 50 KHz and voltages of up to 5000 volts RMS AC. The capacitors are available with brass threaded terminals or a variety of high conductivity copper lugs for low inductance and effective heat sinking. All plastic cased capacitors are thoroughly sealed against atmospheric effects by a special vacuum encapsulation process.

A standard product line offering a range of case sizes, voltage ratings, and performance styles will soon be available for prompt delivery.

CRC HIGH RELIABILITY CAPACITORS

SPECIAL SCREENING FOR CRITICAL APPLICATIONS

Component Research capacitors are used in critical applications where their reliability and performance can affect the success of an entire program involving years of preparation and billions of dollars of program cost. For over a decade, aerospace programs from Apollo to Viking have used CRC capacitors for timing circuits and other control circuits, essential for controlling spacecraft millions of miles from earth, after years of space travel.

You can depend upon CRC to provide the most reliable capacitor and screening plan for your critical applications. Following are typical screening plans for standard and special applications.

VIKING QUALIFIED POLYSULFONE

G14 Polysulfone capacitors are the H14 series listed on pages 38 and 39 with 48 hours burn-in at 150°C followed by 10 thermal aging cycles from −65°C to +125°C. A specially screened G14 type has been supplied for the Viking space program which must withstand 135°C sterilization temperatures for 600 hours, very high levels of shock and vibration, and then perform in a very high impedance circuit at low voltage levels without intermittent conditions developing. During such tests some capacitors have been observed to develop problems at low temperature and special screening methods are used in this super-critical application to 100% monitor for breakdowns during temperature cycling.

400 HZ AC BURN-IN

R12 Polycarbonate capacitors are the same as the series 12 capacitors listed in the catalog except for 100% AC burn-in at 140% of rated RMS volts at 400 Hz for 16 hours at 100°C. The 400 Hz AC testing is becoming popular as a means of achieving high reliability in aircraft programs where a faulty capacitor could lead to serious consequences. The R12 type of screening will ultimately become a standard burn-in method of testing AC capacitors for MIL-C-83421. 100% recorded readings of capacitance, dissipation factor, and insulation resistance, can be provided, before and after burn-in.

40 KHZ BURN-IN & CORONA SCREENING

Type BF51 teflon foil capacitors are being used in a high frequency switching application with a rise time of less than 1 microsecond, in a limited space. Typically a 0.025 uF, 400 VDC rated teflon foil, oil impregnated capacitor operates with; 200 volt peak to peak, 10 KHz square wave voltage conditions, a rise and fall time of 100 nanoseconds, in a 0.312 x 1.063 case. Under these conditions this teflon capacitor is relatively cool with peak current of 30 amps developed at a 20 KHz repetition rate.

Following is the 100% screening used for this AC application.

1. **Burn-in** for 48 hours at 125°C. Apply 180 VRMS at 40 KHz ±5%.
2. **Thermal aging** temperature cycle 5 times −65°C to +125°C. Per MIL-C-83421.
3. **Seal Test** Bake for 4 hours at 125°C. Check for oil leakage or visual damage.
4. **Corona Test** Apply 400 VRMS at 60 Hz and check for evidence of corona inception.
5. **AC Stress Test** Apply 100 Hz square wave voltage, terminal to terminal, for 1 minute, per MIL-C-83421/1, at 1000 volts peak to peak.
6. **DC Hipot** Apply 800 VDC terminal to terminal and to case at 25°C for 1 minute, per MIL-C-83421.
7. **Insulation Resistance** when measured wtih 400 VDC at 25°C, 1,000,000 megohms minimum.
8. **% Capacitance** at 1 KHz.
9. **% Dissipation factor** at 10 KHz, 0.01% maximum.
10. **Final visual** and mechanical inspection.

40 KHZ AC BURN-IN

Special 40 KHz burn-in for type 12 polycarbonate capacitors is available at maximum rated conditions of the RMS AC voltage conditions of Table I of MIL-C-83421/1. Typically, a 0.1 uF, 30 VDC rated type C12A104 or A12A104 is receiving 22 volts RMS AC at 40 KHz, at 85°C, for 168 hours, a special screening for the Trident program.

SCREENING FOR SPACE APPLICATIONS

Type J11 teflon and J12 polycarbonate capacitors receive 96 hours burn-in and other screening conditions as required by JPL for their space applications. If you have a JPL or similar space agency subcontract, we will be happy to coordinate capacitor specification preparation to facilitate procurement with minimum delay and effort.

105°C SCREENED POLYSTYRENE CAPACITORS

Series L53 105°C screened polystyrene capacitors are one of the many unique Component Research capacitor products which demonstrate CRC superior performance and outstanding quality. The following screening plan for a space application is typical of the many custom screening procedures we have available for the most critical and sophisticated applications.

L53 SCREENING PER TP619

Test Step	Test	Conditions	Limits	Record Readings
1	Burn-in	At 140% of rated voltage at 105°C for 16 hours.	No opens or shorts	NO
2	Temperature Cycling	5 cycles from −65°C to +85°C.	N/A	NO
3	Gross Leak	Helium bomb for 1 hour at 75 PSI. Place in alcohol and check for bubbles.	No bubbles	NO
4	Fine Leak Test	Place in helium leak detector and evacuate and check for leakage.	1 x 10^{-6} atm/ cm^3/sec. max. leakage rate	NO
5	AC Dielectric Strength	Apply 100 Hz square wave from lead to lead at min. peak voltage of 3X rated DC voltage for 1 min. minimum.	No opens or shorts	NO
6	DC Dielectric Strength	Apply 2X rated DC voltage, lead to lead and lead to case for 1 minute minimum.	No opens or shorts	NO
7	Insulation Resistance	At 25°C at rated voltage. Charge time 1 minute.Allow 1 minute additional charge time/uF for values above 1 uF.	Ref. MIL-C-83421	YES
8	Capacitance % Tolerance	At 1 KHz at 25°C.	Ref. MIL-C-83421	YES
9	Dissipation Factor	At 1 KHz at 25°C. Above 1 uF measure at .1 KHz.	.02%	YES
10	Serialize parts that pass above screening tests.			
11	DC Dielectric Strength	Apply 2X rated DC voltage, lead to lead and lead to case for 1 minute minimum.	No opens or shorts	NO
12	Insulation Resistance	At 25°C at rated voltage. Charge time 1 minute. Allow 1 minute additional charge time/uF for values above 1 uF.	Ref. MIL-C-83421	YES
13	Capacitance % Tolerance	At 1 KHz at 25°C.	Ref. MIL-C-83421	YES
14	Dissipation Factor	At 1 KHz at 25°C. Above 1 uF measure at .1 KHz.	.02%	YES
15	Burn-In	At 140% of rated DC voltage at 85°C for 100 hours.	No opens or shorts	NO
16	Temperature Cycling	5 cycles from −65°C to +85°C.	N/A	NO
17	DC Dielectric Strength	Apply 2X rated DC voltage, lead to lead and lead to case for 1 minute minimum.	No opens or shorts	NO
18	Insulation Resistance	At 25°C at rated voltage. Charge time 1 minute. Allow 1 minute additional charge time/uF for values above 1 uF.	Ref. MIL-C-83421	YES
19	Capacitance % Tolerance	At 1 KHz at 25°C.	Ref. MIL-C-83421	YES
20	Dissipation Factor	At 1 KHz at 25°C. Above 1 uF measure at .1 KHz.	.02%	YES
21	Visual Inspection	Inspect condition of leads, case and marking per CRC Method 875.	N/A	NO

FURTHER L53 POLYSTYRENE INFORMATION APPEARS ON PAGE 34.

COMPONENT RESEARCH CO., INC. • 1717 19TH STREET • SANTA MONICA, CALIF 90404 • (213) 829-3615 TWX: (910) 343-6864

SERIES
H14

POLYSULFONE
HIGH TEMPERATURE FILM CAPACITORS

COMPONENT
RESEARCH
COMPANY, INC.

- **-65°C TO +150°C OPERATING TEMPERATURE**
- **VERY LOW TEMPERATURE COEFFICIENT**
- **100% SCREENED AND TESTED**
- **MEETS APPLICABLE REQUIREMENTS OF MIL-C-83421**

DC VOLTS	CRC TYPE	OLD P/N
50VDC	H14B	05 MP
100VDC	H14C	1 MP
200VDC	H14D	2 MP
400VDC	H14E	4 MP

- PART NUMBER SYSTEM: PAGE 18
- CASE DIMENSIONS: PAGE 39
- LIFE TEST DATA: PAGE 36
- AC RATINGS: PAGE 39
- STANDARD TOLERANCES: ±0.25% to ±10%
- PRICES: Add approximately 30% to polycarbonate D12 prices shown on pages 40 - 44 or contact our sales office for exact price schedule.

H14 SPECIFICATIONS

OPERATING TEMPERATURE: −65°C to 125°C at full rated voltage. Derate linearly from 125°C to 50% of rated voltage at 150°C.

TEMPERATURE COEFFICIENT: 25°C reference

−0.5% ±0.2% at −50°C	0.00% ±0.2% at +75°C
−0.2% ±0.15% at −25°C	+0.10% ±0.3% at +100°C
0.0% ±0.1% at 0°C	+0.30% ±0.5% at +125°C
0.0% ±0.1% at +50°C	+0.50% ±0.7% at +150°C

STABILITY: Capacitance values measured at any two corresponding temperature points taken in five successive temperature cycles shall be as follows:

RANGE	RETRACE
−25°C to +85°C	.05% Max.
−65°C to +150°C	0.2% Max.

INSULATION RESISTANCE: Measured from terminal to terminal at rated voltage, and 5 minutes maximum charge time. For values greater than 1 uF, allow an additional minute/uF charge time.

MINIMUM IR					
Range	**25°C/50°C**	**75°C**	**100°C**	**125°C**	**150°C**
.001 to 0.1 uF (in Megohms)	3,000,000	1,000,000	100,000	20,000	5,000
Greater than 0.1 uF (in Megohms—uF)	300,000	100,000	10,000	2,000	500

Readings shown are for 1 uF or less. For values over 1 uF, divide readings by uF to obtain min IR.

Example: An 8 uF capacitor is 37,500 megohms at 25°C.

DIELECTRIC ABSORPTION: 0.2% Max. at 25°C.

DISSIPATION FACTOR: 0.15% Max. at 1 KHz and 25°C. Values greater than 1 uF measure at 0.1 KHz.

DIELECTRIC STRENGTH: 200% of rated DC volts.

CONSTRUCTION: Polysulfone Dielectric, extended metal film electrodes, hermetically sealed metal tubular case, leads isolated from case.

LEAD WIRE SIZE AND TYPE		
Case Diameter	**Lead Wire Size #AWG**	**Lead Wire Material**
0.312″ and smaller	22	Tinned Copper Clad Steel (Tinned Copperweld) CRC type "W"
0.400″ and 0.500″	20	
0.562″ and larger	18	Oxygen free tinned copper wire CRC type "C"

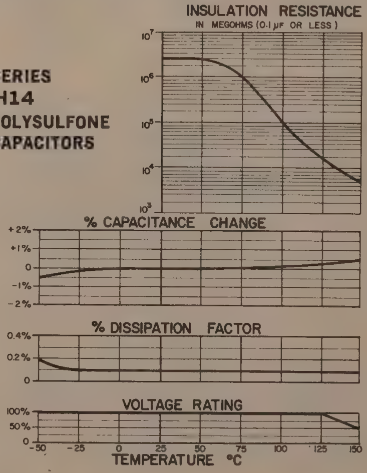
SEAL TEST: 1 x 10-6 atm/cm³/sec max. leak rate.

ENVIRONMENTAL: Capacitors shall meet all applicable requirements of MIL-C-83421.

H14 QUALITY ASSURANCE

All capacitors are 100% screened and tested as follows:

1. 16 hours Burn-In at 150°C and 140% of the rated DC voltage. (Allow for 50% derating).
2. 10 Temperature Cycles from −65°C to 125°C.
3. Helium Leak Test. 1 x 10-6 atm/cm³/sec max. leak rate.
4. DC dielectric strength apply 200% of rated DC voltage from lead to lead and leads to case for one minute.
5. AC dielectric strength apply 100 Hz square wave from lead to lead at a minimum peak to peak voltage of 3 x rated DC voltage for one minute, (except 800V peak to peak for 400VDC styles).
6. Insulation Resistance at rated voltage and 25°C, 300,000 megs — uF minimum but need not exceed 3,000,000 megohms.
7. Capacitance % Tolerance at 1 KHz and 25°C.
8. Dissipation Factor at 1 KHz and 25°C, 0.15% maximum.
9. Visual Inspection for dimensions, marking and packaging.
10. Traceability to production and test records by permanent marking of parts with lot control number.
11. Process and inspection data is maintained on file per NPC-200-3, MIL-Q-9858 quality control standards, and MIL-STD-790 Reliability Assurance Program.



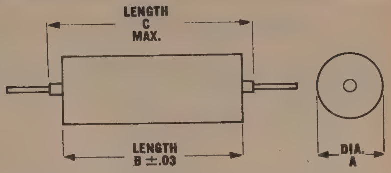
SERIES H14 POLYSULFONE CAPACITORS

CRC HIGH RELIABILITY CAPACITORS

SERIES 14 POLYSULFONE

CAPACITOR DIMENSIONS • AC RATINGS

Series H14 Polysulfone capacitors are being supplied for many applications where the temperature range exceeds 125°C and reaches 150°C, and where the temperature coefficient must be lower than for our Polycarbonate capacitors. Although the quality and supply of Polysulfone film has varied for several years of past production, CRC is continuing to receive sufficient material to manufacture most items listed below and believes the quality and supply problems will end during 1975. Type H14 specifications are subject to change and will be revised in the near future when it is anticipated they will be added to the MIL-C-83421 list of established reliability, metallized film capacitors.



NOTES:

1) "A" dimensions listed are for unsleeved cases.
2) "C" dimension is 0.2" Max. more than "B" dimensions in table.

uF	H14B 50VDC					H14C 100VDC					H14D 200VDC					H14E 400VDC				
	SIZE		AC RATINGS			SIZE		AC RATINGS			SIZE		AC RATINGS			SIZE		AC RATINGS		
	Diam. A	Length B	RMS Volts 400 Hz	RMS Volts 40 KHz	Max. RMS Amps.	Diam. A	Length B	RMS Volts 400 Hz	RMS Volts 40 KHz	Max. RMS Amps.	Diam. A	Length B	RMS Volts 400 Hz	RMS Volts 40 KHz	Max. RMS Amps.	Diam. A	Length B	RMS Volts 400 Hz	RMS Volts 40 KHz	Max. RMS Amps.
.001	.170	.500	36.0	36.0	.009	.170	.500	60.0	60.0	.015	.170	.562	120.0	80.0	.020	.193	.562	240.0	100.0	.025
.0012	.170	.500	36.0	36.0	.012	.170	.500	60.0	60.0	.018	.170	.562	120.0	80.0	.024	.193	.562	240.0	100.0	.030
.0015	.170	.500	36.0	36.0	.014	.170	.500	60.0	60.0	.022	.170	.562	120.0	80.0	.029	.193	.562	240.0	100.0	.034
.0018	.170	.500	36.0	36.0	.016	.170	.500	60.0	60.0	.027	.170	.562	120.0	80.0	.036	.193	.562	240.0	100.0	.040
.002	.170	.500	36.0	36.0	.018	.170	.500	60.0	60.0	.030	.170	.562	120.0	80.0	.040	.193	.562	240.0	100.0	.050
.0022	.170	.500	36.0	36.0	.020	.170	.500	60.0	60.0	.033	.170	.562	120.0	80.0	.044	.193	.562	240.0	100.0	.058
.0027	.170	.500	36.0	36.0	.020	.170	.500	60.0	60.0	.041	.170	.562	120.0	80.0	.054	.235	.687	240.0	100.0	.068
.0033	.170	.500	36.0	36.0	.030	.170	.500	60.0	60.0	.050	.170	.562	120.0	80.0	.066	.235	.687	240.0	100.0	.083
.0039	.170	.500	36.0	36.0	.040	.170	.500	60.0	60.0	.062	.170	.562	120.0	80.0	.070	.235	.687	240.0	100.0	.10
.0047	.170	.500	36.0	36.0	.042	.170	.500	60.0	60.0	.071	.170	.562	120.0	80.0	.094	.235	.687	240.0	100.0	.12
.005	.170	.500	36.0	36.0	.045	.170	.500	60.0	60.0	.075	.170	.562	120.0	80.0	.10	.235	.687	240.0	100.0	.13
.0056	.170	.500	36.0	36.0	.050	.170	.500	60.0	60.0	.083	.170	.562	120.0	80.0	.11	.235	.687	240.0	100.0	.14
.0068	.170	.500	36.0	36.0	.061	.170	.687	60.0	60.0	.11	.170	.562	120.0	80.0	.14	.235	.687	240.0	100.0	.17
.0082	.170	.562	36.0	36.0	.074	.170	.687	60.0	60.0	.13	.170	.562	120.0	80.0	.17	.235	.687	240.0	100.0	.21
.01	.170	.562	36.0	36.0	.090	.170	.687	60.0	60.0	.15	.193	.562	120.0	80.0	.20	.235	.687	240.0	100.0	.25
.012	.170	.562	36.0	36.0	.11	.170	.687	60.0	59.0	.18	.193	.562	120.0	78.0	.24	.235	.687	240.0	96.0	.28
.015	.170	.562	36.0	36.0	.14	.170	.687	60.0	58.0	.22	.235	.562	120.0	76.0	.29	.235	.813	240.0	94.0	.35
.018	.193	.562	36.0	36.0	.16	.193	.687	60.0	57.0	.26	.235	.687	120.0	74.0	.33	.312	.813	240.0	90.0	.40
.02	.193	.562	36.0	36.0	.18	.193	.687	60.0	55.0	.28	.235	.687	120.0	71.0	.36	.312	.813	240.0	88.0	.44
.022	.193	.562	36.0	36.0	.20	.193	.687	60.0	53.0	.30	.235	.687	120.0	68.0	.38	.312	.813	240.0	85.0	.47
.027	.193	.562	36.0	36.0	.25	.193	.687	60.0	51.0	.35	.312	.687	120.0	65.0	.44	.312	.813	240.0	81.0	.55
.033	.193	.562	36.0	36.0	.30	.193	.687	60.0	50.0	.42	.312	.687	120.0	62.0	.52	.312	.813	240.0	78.0	.65
.039	.170	.687	36.0	36.0	.35	.235	.687	60.0	48.0	.47	.312	.687	120.0	60.0	.59	.312	.813	240.0	75.0	.73
.047	.170	.687	36.0	36.0	.43	.235	.687	60.0	47.0	.56	.312	.687	120.0	57.0	.67	.400	.813	240.0	71.0	.83
.05	.170	.687	36.0	36.0	.45	.235	.687	60.0	46.0	.58	.312	.813	120.0	56.0	.70	.400	.813	240.0	70.0	.88
.056	.193	.687	36.0	36.0	.50	.235	.687	60.0	46.0	.65	.312	.813	120.0	56.0	.79	.400	.813	240.0	65.0	.91
.068	.193	.687	36.0	34.0	.58	.235	.813	60.0	42.0	.72	.312	.813	120.0	50.0	.85	.400	.813	240.0	60.0	1.0
.082	.193	.813	36.0	32.0	.66	.312	.687	60.0	38.0	.78	.312	.813	120.0	44.0	1.0	.400	1.063	240.0	50.0	1.1
.1	.193	.813	36.0	30.0	.75	.312	.687	60.0	36.0	.90	.312	.813	120.0	42.0	1.1	.400	1.063	240.0	46.0	1.2
.12	.235	.687	36.0	30.0	.90	.312	.687	60.0	35.0	1.1	.312	.813	120.0	40.0	1.2	.400	1.063	240.0	43.0	1.3
.15	.235	.687	36.0	26.0	.97	.312	.813	60.0	31.0	1.2	.400	1.063	120.0	36.0	1.4	.400	1.375	240.0	40.0	1.5
.18	.235	.813	36.0	25.0	1.0	.312	.813	60.0	30.0	1.4	.400	1.375	120.0	34.0	1.7	.500	1.375	240.0	38.0	1.7
.20	.235	.813	36.0	24.0	1.1	.312	.813	60.0	29.0	1.5	.400	1.375	120.0	33.0	1.7	.500	1.375	240.0	36.0	1.8
.22	.235	.813	36.0	20.0	1.2	.312	.813	60.0	25.0	1.5	.400	1.375	120.0	32.0	1.8	.500	1.375	240.0	35.0	1.9
.27	.312	.687	36.0	19.0	1.3	.312	1.063	60.0	24.0	1.6	.500	1.375	120.0	29.0	2.0	.562	1.375	240.0	33.0	2.1
.33	.312	.687	36.0	18.0	1.5	.312	1.063	60.0	23.0	1.9	.500	1.375	120.0	28.0	2.3	.562	1.375	240.0	32.0	2.7
.39	.312	.813	36.0	17.0	1.7	.400	1.063	60.0	22.0	2.2	.500	1.375	120.0	27.0	2.6	.562	1.875	240.0	31.5	3.2
.47	.312	.813	36.0	16.0	1.8	.400	1.063	60.0	21.0	2.4	.500	1.375	120.0	26.0	3.1	.562	1.875	240.0	31.0	3.6
.50	.400	.813	36.0	15.0	1.9	.400	1.063	60.0	20.0	2.5	.500	1.375	120.0	25.0	3.1	.562	1.875	240.0	30.0	3.8
.56	.400	.813	36.0	14.5	2.1	.400	1.063	60.0	18.0	2.5	.500	1.375	120.0	23.0	3.2	.562	1.875	240.0	28.0	4.0
.68	.400	.813	36.0	14.0	2.4	.500	1.125	60.0	16.0	2.7	.562	1.375	120.0	20.0	3.4	.750	1.875	240.0	26.0	4.4
.82	.400	1.063	36.0	12.0	2.5	.500	1.125	60.0	14.0	2.9	.562	1.875	120.0	19.0	3.8	.750	1.875	240.0	22.0	4.5
1.0	.400	1.063	36.0	10.0	2.5	.562	1.125	60.0	12.0	3.0	.562	1.875	120.0	15.0	3.9	.750	1.875	240.0	19.0	4.8
1.2	.400	1.063	36.0	9.0	2.7	.562	1.125	60.0	11.0	3.5	.562	1.875	120.0	13.5	4.0	1.00	1.875	240.0	18.0	5.4
1.5	.400	1.063	36.0	8.0	2.9	.562	1.375	60.0	10.0	3.8	.670	1.875	120.0	12.0	4.5	1.00	2.375	240.0	16.0	6.0
2.0	.500	1.125	36.0	6.0	3.0	.670	1.375	60.0	8.1	4.1	.750	1.875	120.0	10.0	5.0	1.00	2.375	240.0	14.0	7.0
2.2	.500	1.125	36.0	5.8	3.2	.670	1.375	60.0	7.5	4.2	.750	1.875	120.0	9.0	5.0	1.00	2.375	240.0	12.6	7.0
2.7	.500	1.375	36.0	5.0	3.0	.670	1.875	60.0	7.0	4.4	.750	1.875	120.0	8.0	5.1	1.00	2.625	240.0	10.3	7.0
3.0	.500	1.375	36.0	4.5	3.4	.670	1.875	60.0	6.0	4.5	1.00	1.875	120.0	7.0	5.2	1.00	2.625	240.0	9.3	7.0
3.3	.500	1.375	36.0	4.1	3.4	.670	1.875	60.0	5.5	4.6	1.00	1.875	120.0	6.0	5.3					
4.0	.562	1.375	36.0	3.6	3.6	.750	1.875	60.0	4.8	4.8	1.00	2.375	120.0	5.4	5.4					
4.7	.670	1.375	36.0	3.2	3.6	.750	1.875	60.0	4.3	5.0										
5.0	.670	1.375	36.0	3.0	3.6	.750	1.875	60.0	4.0	5.0										
5.6	.670	1.375	36.0	2.6	3.6	.750	1.875	60.0	3.5	5.0										
6.8	.670	1.875	36.0	2.2	3.6	1.0	2.375	60.0	3.0	5.0										
8.0	.670	1.875	36.0	1.8	3.6	1.0	2.375	60.0	2.4	5.0										
10.0	.670	1.875	36.0	1.5	3.6	1.0	2.375	60.0	2.0	5.0										

CRC HIGH RELIABILITY CAPACITORS

30VDC POLYCARBONATE PRICES (1-10 UNITS)

SERIES 12A

HOW TO ORDER

- Select basic part number required and place desired tolerance letter, at end of basic number.
- See part number system on page 18 for complete details concerning sleeving and wire leads.
- **IMPORTANT:** You must have complete part number for ordering purposes.

  Example: D12A183JXW describes a 0.018 uF, 5%, 30 VDC capacitor, without sleeving and with "D" type screening.

SERIES 12A INFORMATION

- Complete information is found on pages 12 - 17.
- 12A capacitors can be ordered by MIL Spec part number — See page 13.
- 5.6 uF or smaller capacitor values, (0.500" and smaller in diameter) use "W" wire leads.
- 6.8 uF or larger values, (0.562" and larger in diameter), use "C" wire leads.
- Prices subject to change.
- **QUANTITY DISCOUNTS:**

11-25 less 10%	26-50 less 15%	Contact our sales offies
51-100 less 20%	101-250 less 25%	for larger quantities.

MIL-C-83421/1	PRICE INFORMATION	SPECIFICATIONS
Type CRH01 30 VDC	Use C12A Prices +10%	See A12A Page 10
Type CRH06 30 VDC	Use E12A Prices +10%	See K12A Page 11

CRC QUALITY LEVEL 1
C12A 30V POLYCARBONATE
Equivalent to CHROIA Style of MIL-C-39022/9C

uF	BASIC PART No.	10% tol. K	5% tol. J	2% tol. G	1% tol. F	0.5% tol. D	0.25% tol. B
.001	C12A102	$6.19	$6.81	$8.05	$9.90	$11.14	$13.62
.0012	C12A122	6.19	6.81	8.05	9.90	11.14	13.62
.0015	C12A152	6.19	6.81	8.05	9.90	11.14	13.62
.0018	C12A182	6.19	6.81	8.05	9.90	11.14	13.62
.002	C12A202	6.19	6.81	8.05	9.90	11.14	13.62
.0022	C12A222	6.19	6.81	8.05	9.90	11.14	13.62
.0027	C12A272	6.19	6.81	8.05	9.90	11.14	13.62
.0033	C12A332	6.19	6.81	8.05	9.90	11.14	13.62
.0039	C12A392	6.19	6.81	8.05	9.90	11.14	13.62
.0047	C12A472	6.19	6.81	8.05	9.90	11.14	13.62
.005	C12A502	6.19	6.81	8.05	9.90	11.14	13.62
.0056	C12A562	6.19	6.81	8.05	9.90	11.14	13.62
.0068	C12A682	6.19	6.81	8.05	9.90	11.14	13.62
.0082	C12A822	6.19	6.81	8.05	9.90	11.14	13.62
.01	C12A103	6.19	6.81	8.05	9.90	11.14	13.62
.012	C12A123	6.19	6.81	8.05	9.90	11.14	13.62
.015	C12A153	6.19	6.81	8.05	9.90	11.14	13.62
.018	C12A183	6.19	6.81	8.05	9.90	11.14	13.62
.02	C12A203	6.19	6.81	8.05	9.90	11.14	13.62
.022	C12A223	6.19	6.81	8.05	9.90	11.14	13.62
.027	C12A273	6.19	6.81	8.05	9.90	11.14	13.62
.033	C12A333	6.19	6.81	8.05	9.90	11.14	13.62
.039	C12A393	6.19	6.81	8.05	9.90	11.14	13.62
.047	C12A473	6.19	6.81	8.05	9.90	11.14	13.62
.05	C12A503	6.19	6.81	8.05	9.90	11.14	13.62
.056	C12A563	6.19	6.81	8.05	9.90	11.14	13.62
.068	C12A683	6.19	6.81	8.05	9.90	11.14	13.62
.082	C12A823	6.19	6.81	8.05	9.90	11.14	13.62
.10	C12B104	6.19	6.81	8.05	9.90	11.14	13.62
.12	C12A124	6.35	6.99	8.26	10.16	11.43	13.97
.15	C12A154	6.35	6.99	8.26	10.16	11.43	13.97
.18	C12A184	6.44	7.08	8.37	10.30	11.59	14.17
.20	C12A204	6.44	7.08	8.37	10.30	11.59	14.17
.22	C12A224	6.44	7.08	8.37	10.30	11.59	14.17
.27	C12A274	6.52	7.17	8.48	10.43	11.74	14.34
.33	C12A334	6.84	7.52	8.89	10.94	12.31	15.05
.39	C12A394	6.89	7.58	8.96	11.02	12.40	15.16
.47	C12A474	6.89	7.58	8.96	11.02	12.40	15.16
.50	C12A504	6.89	7.58	8.96	11.02	12.40	15.16
.56	C12A564	7.13	7.84	9.27	11.41	12.83	15.69
.68	C12A684	7.36	8.10	9.57	11.78	13.25	16.19
.82	C12A824	7.36	8.10	9.57	11.78	13.25	16.19
1.0	C12A105	7.36	8.10	9.57	11.78	13.25	16.19
1.2	C12A125	7.79	8.57	10.13	12.46	14.02	17.14
1.5	C12A155	8.14	8.95	10.58	13.02	14.65	17.91
1.8	C12A185	8.37	9.21	10.88	13.39	15.07	18.41
2.0	C12A205	8.53	9.38	11.09	13.65	15.35	18.77
2.2	C12A225	8.96	9.86	11.65	14.34	16.13	19.71
2.7	C12A275	9.14	10.05	11.88	14.62	16.45	20.11
3.0	C12A305	9.32	10.25	12.12	14.91	16.78	20.50
3.3	C12A335	9.77	10.75	12.70	15.63	17.59	21.49
3.9	C12A395	10.28	11.31	13.36	16.45	18.50	22.62
4.0	C12A405	10.28	11.31	13.36	16.45	18.50	22.62
4.7	C12A475	11.03	12.13	14.34	17.65	19.85	24.27
5.0	C12A505	11.03	12.13	14.34	17.65	19.85	24.27
5.6	C12A565	12.13	13.34	15.77	19.41	21.83	26.69
6.8	C12A685	12.67	13.94	16.47	20.27	22.81	27.87
8.0	C12A805	14.40	15.84	18.72	23.04	25.92	31.68
8.2	C12A825	14.40	15.84	18.72	23.04	25.92	31.68
10.0	C12A106	14.40	15.84	18.72	23.04	25.92	31.68
12.0	C12A126	15.84	17.42	20.59	25.34	28.51	34.85
15.0	C12A156	18.72	20.59	24.34	29.95	33.70	41.18
20.0	C12A206	23 35	25 69	30.36	37.36	42.03	51.37
22.0	C12A226	24.48	26.93	31.82	39.17	44.06	53.86

CRC QUALITY LEVEL 2
D12A 30V POLYCARBONATE
Equivalent to CHROIB Style of MIL-C-39022/9C

uF	BASIC PART No.	10% tol. K	5% tol. J	2% tol. G	1% tol. F	0.5% tol. D	0.25% tol. B
.001	D12A102	$4.13	$4.54	$5.37	$6.61	$7.43	$9.09
.0012	D12A122	4.13	4.54	5.37	6.61	7.43	9.09
.0015	D12A152	4.13	4.54	5.37	6.61	7.43	9.09
.0018	D12A182	4.13	4.54	5.37	6.61	7.43	9.09
.002	D12A202	4.13	4.54	5.37	6.61	7.43	9.09
.0022	D12A222	4.13	4.54	5.37	6.61	7.43	9.09
.0027	D12A272	4.13	4.54	5.37	6.61	7.43	9.09
.0033	D12A332	4.13	4.54	5.37	6.61	7.43	9.09
.0039	D12A392	4.13	4.54	5.37	6.61	7.43	9.09
.0047	D12A472	4.13	4.54	5.37	6.61	7.43	9.09
.005	D12A502	4.13	4.54	5.37	6.61	7.43	9.09
.0056	D12A562	4.13	4.54	5.37	6.61	7.43	9.09
.0068	D12A682	4.13	4.54	5.37	6.61	7.43	9.09
.0082	D12A822	4.13	4.54	5.37	6.61	7.43	9.09
.01	D12A103	4.13	4.54	5.37	6.61	7.43	9.09
.012	D12A123	4.13	4.54	5.37	6.61	7.43	9.09
.015	D12A153	4.13	4.54	5.37	6.61	7.43	9.09
.018	D12A183	4.13	4.54	5.37	6.61	7.43	9.09
.02	D12A203	4.13	4.54	5.37	6.61	7.43	9.09
.022	D12A223	4.13	4.54	5.37	6.61	7.43	9.09
.027	D12A273	4.13	4.54	5.37	6.61	7.43	9.09
.033	D12A333	4.13	4.54	5.37	6.61	7.43	9.09
.039	D12A393	4.13	4.54	5.37	6.61	7.43	9.09
.047	D12A473	4.13	4.54	5.37	6.61	7.43	9.09
.05	D12A503	4.13	4.54	5.37	6.61	7.43	9.09
.056	D12A563	4.13	4.54	5.37	6.61	7.43	9.09
.068	D12A683	4.13	4.54	5.37	6.61	7.43	9.09
.082	D12A823	4.13	4.54	5.37	6.61	7.43	9.09
.10	D12A104	4.13	4.54	5.37	6.61	7.43	9.09
.12	D12A124	4.24	4.66	5.51	6.78	7.63	9.33
.15	D12A154	4.24	4.66	5.51	6.78	7.63	9.33
.18	D12A184	4.30	4.73	5.59	6.88	7.74	9.46
.20	D12A204	4.30	4.73	5.59	6.88	7.74	9.46
.22	D12A224	4.30	4.73	5.59	6.88	7.74	9.46
.27	D12A274	4.34	4.77	5.64	6.94	7.81	9.55
.33	D12A334	4.56	5.02	5.93	7.30	8.21	10.03
.39	D12A394	4.60	5.06	5.98	7.36	8.28	10.12
.47	D12A474	4.60	5.06	5.98	7.36	8.28	10.12
.50	D12A504	4.60	5.06	5.98	7.36	8.28	10.12
.56	D12A564	4.75	5.23	6.18	7.60	8.55	10.45
.68	D12A684	4.91	5.40	6.38	7.86	8.84	10.80
.82	D12A824	4.91	5.40	6.38	7.86	8.84	10.80
1.0	D12A105	4.91	5.40	6.38	7.86	8.84	10.80
1.2	D12A125	5.20	5.72	6.76	8.32	9.36	11.44
1.5	D12A155	5.42	5.96	7.05	8.67	9.76	11.92
1.8	D12A185	5.58	6.14	7.25	8.93	10.04	12.28
2.0	D12A205	5.69	6.26	7.40	9.10	10.24	12.52
2.2	D12A225	5.98	6.58	7.77	9.57	10.76	13.16
2.7	D12A275	6.10	6.71	7.93	9.76	10.98	13.42
3.0	D12A305	6.22	6.84	8.09	9.95	11.20	13.68
3.3	D12A335	6.52	7.17	8.48	10.43	11.74	14.34
3.9	D12A395	6.85	7.54	8.91	10.96	12.33	15.07
4.0	D12A405	6.85	7.54	8.91	10.96	12.33	15.07
4.7	D12A475	7.36	8.10	9.57	11.78	13.25	16.19
5.0	D12A505	7.36	8.10	9.57	11.78	13.25	16.19
5.6	D12A565	8.09	8.90	10.52	12.94	14.56	17.80
6.8	D12A685	8.45	9.30	10.99	13.52	15.21	18.59
8.0	D12A805	9.60	10.56	12.48	15.36	17.28	21.12
8.2	D12A825	9.60	10.56	12.48	15.36	17.28	21.12
10.0	D12A106	9.60	10.56	12.48	15.36	17.28	21.12
12.0	D12A126	10.56	11.62	13.73	16.90	19.01	23.23
15.0	D12A156	12.48	13.73	16.22	19.97	22.46	27.46
20.0	D12A206	15.56	17.12	20.23	24.90	28.01	34.23
22.0	D12A226	16.32	17.95	21.22	26.11	29.38	35.90

CRC QUALITY LEVEL 3
E12A 30V POLYCARBONATE
Equivalent to CHROIC Style of MIL-C-39022/9C

uF	BASIC PART No.	10% tol. K	5% tol. J	2% tol. G	1% tol. F	0.5% tol. D	0.25% tol. B
.001	E12A102	$3.44	$3.78	$4.47	$5.50	$6.19	$7.57
.0012	E12A122	3.44	3.78	4.47	5.50	6.19	7.57
.0015	E12A152	3.44	3.78	4.47	5.50	6.19	7.57
.0018	E12A182	3.44	3.78	4.47	5.50	6.19	7.57
.002	E12A202	3.44	3.78	4.47	5.50	6.19	7.57
.0022	E12A222	3.44	3.78	4.47	5.50	6.19	7.57
.0027	E12A272	3.44	3.78	4.47	5.50	6.19	7.57
.0033	E12A332	3.44	3.78	4.47	5.50	6.19	7.57
.0039	E12A392	3.44	3.78	4.47	5.50	6.19	7.57
.0047	E12A472	3.44	3.78	4.47	5.50	6.19	7.57
.005	E12A502	3.44	3.78	4.47	5.50	6.19	7.57
.0056	E12A562	3.44	3.78	4.47	5.50	6.19	7.57
.0068	E12A682	3.44	3.78	4.47	5.50	6.19	7.57
.0082	E12A822	3.44	3.78	4.47	5.50	6.19	7.57
.01	E12A103	3.44	3.78	4.47	5.50	6.19	7.57
.012	E12A123	3.44	3.78	4.47	5.50	6.19	7.57
.015	E12A153	3.44	3.78	4.47	5.50	6.19	7.57
.018	E12A183	3.44	3.78	4.47	5.50	6.19	7.57
.02	E12A203	3.44	3.78	4.47	5.50	6.19	7.57
.022	E12A223	3.44	3.78	4.47	5.50	6.19	7.57
.027	E12A273	3.44	3.78	4.47	5.50	6.19	7.57
.033	E12A333	3.44	3.78	4.47	5.50	6.19	7.57
.039	E12A393	3.44	3.78	4.47	5.50	6.19	7.57
.047	E12A473	3.44	3.78	4.47	5.50	6.19	7.57
.05	E12A503	3.44	3.78	4.47	5.50	6.19	7.57
.056	E12A563	3.44	3.78	4.47	5.50	6.19	7.57
.068	E12A683	3.44	3.78	4.47	5.50	6.19	7.57
.082	E12A823	3.44	3.78	4.47	5.50	6.19	7.57
.10	E12A104	3.44	3.78	4.47	5.50	6.19	7.57
.12	E12A124	3.53	3.88	4.59	5.65	6.35	7.77
.15	E12A154	3.53	3.88	4.59	5.65	6.35	7.77
.18	E12A184	3.58	3.94	4.65	5.73	6.44	7.88
.20	E12A204	3.58	3.94	4.65	5.73	6.44	7.88
.22	E12A224	3.58	3.94	4.65	5.73	6.44	7.88
.27	E12A274	3.62	3.98	4.71	5.79	6.52	7.96
.33	E12A334	3.80	4.18	4.94	6.08	6.84	8.36
.39	E12A394	3.83	4.21	4.98	6.13	6.89	8.43
.47	E12A474	3.83	4.21	4.98	6.13	6.89	8.43
.50	E12A504	3.83	4.21	4.98	6.13	6.89	8.43
.56	E12A564	3.96	4.36	5.15	6.34	7.13	8.71
.68	E12A684	4.09	4.50	5.32	6.54	7.36	9.00
.82	E12A824	4.09	4.50	5.32	6.54	7.36	9.00
1.0	E12A105	4.09	4.50	5.32	6.54	7.36	9.00
1.2	E12A125	4.33	4.76	5.63	6.93	7.79	9.53
1.5	E12A155	4.52	4.97	5.88	7.23	8.14	9.94
1.8	E12A185	4.65	5.12	6.05	7.44	8.37	10.23
2.0	E12A205	4.74	5.21	6.16	7.58	8.53	10.43
2.2	E12A225	4.98	5.48	6.47	7.97	8.96	10.96
2.7	E12A275	5.08	5.59	6.60	8.13	9.14	11.18
3.0	E12A305	5.18	5.70	6.73	8.29	9.32	11.40
3.3	E12A335	5.43	5.97	7.06	8.69	9.77	11.95
3.9	E12A395	5.71	6.28	7.42	9.14	10.28	12.56
4.0	E12A405	5.71	6.28	7.42	9.14	10.28	12.56
4.7	E12A475	6.13	6.74	7.97	9.81	11.03	13.49
5.0	E12A505	6.13	6.74	7.97	9.81	11.03	13.49
5.6	E12A565	6.74	7.41	8.76	10.78	12.13	14.83
6.8	E12A685	7.04	7.74	9.15	11.26	12.67	15.49
8.0	E12A805	8.00	8.80	10.40	12.80	14.40	17.60
8.2	E12A825	8.00	8.80	10.40	12.80	14.40	17.60
10.0	E12A106	8.00	8.80	10.40	12.80	14.40	17.60
12.0	E12A126	8.80	9.68	11.44	14.08	15.84	19.36
15.0	E12A156	10.40	11.44	13.52	16.64	18.72	22.88
20.0	E12A206	12.97	14.27	16 86	20.75	23.35	28.53
22.0	E12A226	13.60	14.96	17.68	21.76	24.48	29.92

CRC HIGH RELIABILITY CAPACITORS

50VDC POLYCARBONATE PRICES (1-10 UNITS)

SERIES
12B

HOW TO ORDER

- Select basic part number required and place desired tolerance letter, at end of basic number.
- See part number system on page 18 for complete details concerning sleeving and wire leads.
- **IMPORTANT:** You must have complete part number for ordering purposes.

  Example: C12B504BXW describes a 0.5 uF, 0.25%, 50 VDC capacitor, without sleeving and with "C" type screening.

SERIES 12B INFORMATION

- Complete information is found on pages 12 - 17.
- 12B capacitors can be ordered by MIL Spec part number — See page 13.
- 3.3 uF or smaller capacitor values, (0.500″ and smaller in diameter) use "W" wire leads.
- 4.0 uF or larger values, (0.562″ and larger in diameter), use "C" wire leads.
- Prices subject to change.
- **QUANTITY DISCOUNTS:**
  11-25 less 10% 26-50 less 15%
  51-100 less 20% 101-250 less 25%
  Contact our sales office for larger quantities.

MIL-C-83421/1	PRICE INFORMATION	SPECIFICATIONS
Type CRH02 50 VDC	Use C12B Prices +10%	See A12B Page 10
Type CRH07 50 VDC	Use E12B Prices +10%	See K12B Page 11

	CRC QUALITY LEVEL 1						
	C12B 50V POLYCARBONATE						
	Equivalent to CHROID Style of MIL-C-39022/9C						
uF	BASIC PART No.	10% tol. K	5% tol. J	2% tol. G	1% tol. F	0.5% tol. D	0.25% tol. B
.001	C12B102	$6.19	$6.81	$8.05	$9.90	$11.14	$13.62
.0012	C12B122	6.19	6.81	8.05	9.90	11.14	13.62
.0015	C12B152	6.19	6.81	8.05	9.90	11.14	13.62
.0018	C12B182	6.19	6.81	8.05	9.90	11.14	13.62
.002	C12B202	6.19	6.81	8.05	9.90	11.14	13.62
.0022	C12B222	6.19	6.81	8.05	9.90	11.14	13.62
.0027	C12B272	6.19	6.81	8.05	9.90	11.14	13.62
.0033	C12B332	6.19	6.81	8.05	9.90	11.14	13.62
.0039	C12B392	6.19	6.81	8.05	9.90	11.14	13.62
.0047	C12B472	6.19	6.81	8.05	9.90	11.14	13.62
.005	C12B502	6.19	6.81	8.05	9.90	11.14	13.62
.0056	C12B562	6.19	6.81	8.05	9.90	11.14	13.62
.0068	C12B682	6.19	6.81	8.05	9.90	11.14	13.62
.0082	C12B822	6.19	6.81	8.05	9.90	11.14	13.62
.01	C12B103	6.19	6.81	8.05	9.90	11.14	13.62
.012	C12B123	6.19	6.81	8.05	9.90	11.14	13.62
.015	C12B153	6.19	6.81	8.05	9.90	11.14	13.62
.018	C12B183	6.19	6.81	8.05	9.90	11.14	13.62
.02	C12B203	6.19	6.81	8.05	9.90	11.14	13.62
.022	C12B223	6.19	6.81	8.05	9.90	11.14	13.62
.027	C12B273	6.19	6.81	8.05	9.90	11.14	13.62
.033	C12B333	6.19	6.81	8.05	9.90	11.14	13.62
.039	C12B393	6.19	6.81	8.05	9.90	11.14	13.62
.047	C12B473	6.19	6.81	8.05	9.90	11.14	13.62
.05	C12B503	6.19	6.81	8.05	9.90	11.14	13.62
.056	C12B563	6.19	6.81	8.05	9.90	11.14	13.62
.068	C12B683	6.19	6.81	8.05	9.90	11.14	13.62
.082	C12B823	6.19	6.81	8.05	9.90	11.14	13.62
.10	C12A104	6.19	6.81	8.05	9.90	11.14	13.62
.12	C12B124	6.35	6.99	8.26	10.16	11.43	13.97
.15	C12B154	6.35	6.99	8.26	10.16	11.43	13.97
.18	C12B184	6.44	7.08	8.37	10.30	11.59	14.17
.20	C12B204	6.44	7.08	8.37	10.30	11.59	14.17
.22	C12B224	6.44	7.08	8.37	10.30	11.59	14.17
.27	C12B274	6.52	7.17	8.48	10.43	11.74	14.34
.33	C12B334	6.84	7.52	8.89	10.94	12.31	15.05
.39	C12B394	6.89	7.58	8.96	11.02	12.40	15.16
.47	C12B474	6.89	7.58	8.96	11.02	12.40	15.16
.50	C12B504	6.89	7.58	8.96	11.02	12.40	15.16
.56	C12B564	7.13	7.84	9.27	11.41	12.83	15.69
.68	C12B684	7.36	8.10	9.57	11.78	13.25	16.19
.82	C12B824	7.36	8.10	9.57	11.78	13.25	16.19
1.0	C12B105	7.36	8.10	9.57	11.78	13.25	16.19
1.2	C12B125	7.79	8.57	10.13	12.46	14.02	17.14
1.5	C12B155	8.14	8.95	10.58	13.02	14.65	17.91
1.8	C12B185	8.37	9.21	10.88	13.39	15.07	18.41
2.0	C12B205	8.53	9.38	11.09	13.65	15.35	18.77
2.2	C12B225	8.96	9.86	11.65	14.34	16.13	19.71
2.7	C12B275	9.14	10.05	11.88	14.62	16.45	20.11
3.0	C12B305	9.32	10.25	12.12	14.91	16.78	20.50
3.3	C12B335	9.77	10.75	12.70	15.63	17.59	21.49
3.9	C12B395	10.28	11.31	13.36	16.45	18.50	22.62
4.0	C12B405	10.28	11.31	13.36	16.45	18.50	22.62
4.7	C12B475	11.03	12.13	14.34	17.65	19.85	24.27
5.0	C12B505	11.03	12.13	14.34	17.65	19.85	24.27
5.6	C12B565	12.13	13.34	15.77	19.41	21.83	26.69
6.8	C12B685	12.67	13.94	16.47	20.27	22.81	27.87
8.0	C12B805	14.40	15.84	18.72	23.04	25.92	31.68
8.2	C12B825	14.40	15.84	18.72	23.04	25.92	31.68
10.0	C12B106	14.40	15.84	18.72	23.04	25.92	31.68

	CRC QUALITY LEVEL 2						
	D12B 50V POLYCARBONATE						
	Equivalent to CHROIE Style of MIL-C-39022/9C						
uF	BASIC PART No.	10% tol. K	5% tol. J	2% tol. G	1% tol. F	0.5% tol. D	0.25% tol. B
.001	D12B102	$4.13	$4.54	$5.37	$6.61	$7.43	$9.09
.0012	D12B122	4.13	4.54	5.37	6.61	7.43	9.09
.0015	D12B152	4.13	4.54	5.37	6.61	7.43	9.09
.0018	D12B182	4.13	4.54	5.37	6.61	7.43	9.09
.002	D12B202	4.13	4.54	5.37	6.61	7.43	9.09
.0022	D12B222	4.13	4.54	5.37	6.61	7.43	9.09
.0027	D12B272	4.13	4.54	5.37	6.61	7.43	9.09
.0033	D12B332	4.13	4.54	5.37	6.61	7.43	9.09
.0039	D12B392	4.13	4.54	5.37	6.61	7.43	9.09
.0047	D12B472	4.13	4.54	5.37	6.61	7.43	9.09
.005	D12B502	4.13	4.54	5.37	6.61	7.43	9.09
.0056	D12B562	4.13	4.54	5.37	6.61	7.43	9.09
.0068	D12B682	4.13	4.54	5.37	6.61	7.43	9.09
.0082	D12B822	4.13	4.54	5.37	6.61	7.43	9.09
.01	D12B103	4.13	4.54	5.37	6.61	7.43	9.09
.012	D12B123	4.13	4.54	5.37	6.61	7.43	9.09
.015	D12B153	4.13	4.54	5.37	6.61	7.43	9.09
.018	D12B183	4.13	4.54	5.37	6.61	7.43	9.09
.02	D12B203	4.13	4.54	5.37	6.61	7.43	9.09
.022	D12B223	4.13	4.54	5.37	6.61	7.43	9.09
.027	D12B273	4.13	4.54	5.37	6.61	7.43	9.09
.033	D12B333	4.13	4.54	5.37	6.61	7.43	9.09
.039	D12B393	4.13	4.54	5.37	6.61	7.43	9.09
.047	D12B473	4.13	4.54	5.37	6.61	7.43	9.09
.05	D12B503	4.13	4.54	5.37	6.61	7.43	9.09
.056	D12B563	4.13	4.54	5.37	6.61	7.43	9.09
.068	D12B683	4.13	4.54	5.37	6.61	7.43	9.09
.082	D12B823	4.13	4.54	5.37	6.61	7.43	9.09
.10	D12B104	4.13	4.54	5.37	6.61	7.43	9.09
.12	D12B124	4.24	4.66	5.51	6.78	7.63	9.33
.15	D12B154	4.24	4.66	5.51	6.78	7.63	9.33
.18	D12B184	4.30	4.73	5.59	6.88	7.74	9.46
.20	D12B204	4.30	4.73	5.59	6.88	7.74	9.46
.22	D12B224	4.30	4.73	5.59	6.88	7.74	9.46
.27	D12B274	4.34	4.77	5.64	6.94	7.81	9.55
.33	D12B334	4.56	5.02	5.93	7.30	8.21	10.03
.39	D12B394	4.60	5.06	5.98	7.36	8.28	10.12
.47	D12B474	4.60	5.06	5.98	7.36	8.28	10.12
.50	D12B504	4.60	5.06	5.98	7.36	8.28	10.12
.56	D12B564	4.75	5.23	6.18	7.60	8.55	10.45
.68	D12B684	4.91	5.40	6.38	7.86	8.84	10.80
.82	D12B824	4.91	5.40	6.38	7.86	8.84	10.80
1.0	D12B105	4.91	5.40	6.38	7.86	8.84	10.80
1.2	D12B125	5.20	5.72	6.76	8.32	9.36	11.44
1.5	D12B155	5.42	5.96	7.05	8.67	9.76	11.92
1.8	D12B185	5.58	6.14	7.25	8.93	10.04	12.28
2.0	D12B205	5.69	6.26	7.40	9.10	10.24	12.52
2.2	D12B225	5.98	6.58	7.77	9.57	10.76	13.16
2.7	D12B275	6.10	6.71	7.93	9.76	10.98	13.42
3.0	D12B305	6.22	6.84	8.09	9.95	11.20	13.68
3.3	D12B335	6.52	7.17	8.48	10.43	11.74	14.34
3.9	D12B395	6.85	7.54	8.91	10.96	12.33	15.07
4.0	D12B405	6.85	7.54	8.91	10.96	12.33	15.07
4.7	D12B475	7.36	8.10	9.57	11.78	13.25	16.19
5.0	D12B505	7.36	8.10	9.57	11.78	13.25	16.19
5.6	D12B565	8.09	8.90	10.52	12.94	14.56	17.80
6.8	D12B685	8.45	9.30	10.99	13.52	15.21	18.59
8.0	D12B805	9.60	10.56	12.48	15.36	17.28	21.12
8.2	D12B825	9.60	10.56	12.48	15.36	17.28	21.12
10.0	D12B106	9.60	10.56	12.48	15.36	17.28	21.12

	CRC QUALITY LEVEL 3						
	E12B 50V POLYCARBONATE						
	Equivalent to CHROIF Style of MIL-C-39022/9C						
uF	BASIC PART No.	10% tol. K	5% tol. J	2% tol. G	1% tol. F	0.5% tol. D	0.25% tol. B
.001	E12B102	$3.44	$3.78	$4.47	$5.50	$6.19	$7.57
.0012	E12B122	3.44	3.78	4.47	5.50	6.19	7.57
.0015	E12B152	3.44	3.78	4.47	5.50	6.19	7.57
.0018	E12B182	3.44	3.78	4.47	5.50	6.19	7.57
.002	E12B202	3.44	3.78	4.47	5.50	6.19	7.57
.0022	E12B222	3.44	3.78	4.47	5.50	6.19	7.57
.0027	E12B272	3.44	3.78	4.47	5.50	6.19	7.57
.0033	E12B332	3.44	3.78	4.47	5.50	6.19	7.57
.0039	E12B392	3.44	3.78	4.47	5.50	6.19	7.57
.0047	E12B472	3.44	3.78	4.47	5.50	6.19	7.57
.005	E12B502	3.44	3.78	4.47	5.50	6.19	7.57
.0056	E12B562	3.44	3.78	4.47	5.50	6.19	7.57
.0068	E12B682	3.44	3.78	4.47	5.50	6.19	7.57
.0082	E12B822	3.44	3.78	4.47	5.50	6.19	7.57
.01	E12B103	3.44	3.78	4.47	5.50	6.19	7.57
.012	E12B123	3.44	3.78	4.47	5.50	6.19	7.57
.015	E12B153	3.44	3.78	4.47	5.50	6.19	7.57
.018	E12B183	3.44	3.78	4.47	5.50	6.19	7.57
.02	E12B203	3.44	3.78	4.47	5.50	6.19	7.57
.022	E12B223	3.44	3.78	4.47	5.50	6.19	7.57
.027	E12B273	3.44	3.78	4.47	5.50	6.19	7.57
.033	E12B333	3.44	3.78	4.47	5.50	6.19	7.57
.039	E12B393	3.44	3.78	4.47	5.50	6.19	7.57
.047	E12B473	3.44	3.78	4.47	5.50	6.19	7.57
.05	E12B503	3.44	3.78	4.47	5.50	6.19	7.57
.056	E12B563	3.44	3.78	4.47	5.50	6.19	7.57
.068	E12B683	3.44	3.78	4.47	5.50	6.19	7.57
.082	E12B823	3.44	3.78	4.47	5.50	6.19	7.57
.10	E12B104	3.44	3.78	4.47	5.50	6.19	7.57
.12	E12B124	3.53	3.88	4.59	5.65	6.35	7.77
.15	E12B154	3.53	3.88	4.59	5.65	6.35	7.77
.18	E12B184	3.58	3.94	4.65	5.73	6.44	7.88
.20	E12B204	3.58	3.94	4.65	5.73	6.44	7.88
.22	E12B224	3.58	3.94	4.65	5.73	6.44	7.88
.27	E12B274	3.62	3.98	4.71	5.79	6.52	7.96
.33	E12B334	3.80	4.18	4.94	6.08	6.84	8.36
.39	E12B394	3.83	4.21	4.98	6.13	6.89	8.43
.47	E12B474	3.83	4.21	4.98	6.13	6.89	8.43
.50	E12B504	3.83	4.21	4.98	6.13	6.89	8.43
.56	E12B564	3.96	4.36	5.15	6.34	7.13	8.71
.68	E12B684	4.09	4.50	5.32	6.54	7.36	9.00
.82	E12B824	4.09	4.50	5.32	6.54	7.36	9.00
1.0	E12B105	4.09	4.50	5.32	6.54	7.36	9.00
1.2	E12B125	4.33	4.76	5.63	6.93	7.79	9.53
1.5	E12B155	4.52	4.97	5.88	7.23	8.14	9.94
1.8	E12B185	4.65	5.12	6.05	7.44	8.37	10.23
2.0	E12B205	4.74	5.21	6.16	7.58	8.53	10.43
2.2	E12B225	4.98	5.48	6.47	7.97	8.96	10.96
2.7	E12B275	5.08	5.59	6.60	8.13	9.14	11.18
3.0	E12B305	5.18	5.70	6.73	8.29	9.32	11.40
3.3	E12B335	5.43	5.97	7.06	8.69	9.77	11.95
3.9	E12B395	5.71	6.28	7.42	9.14	10.28	12.56
4.0	E12B405	5.71	6.28	7.42	9.14	10.28	12.56
4.7	E12B475	6.13	6.74	7.97	9.81	11.03	13.49
5.0	E12B505	6.13	6.74	7.97	9.81	11.03	13.49
5.6	E12B565	6.74	7.41	8.76	10.78	12.13	14.83
6.8	E12B685	7.04	7.74	9.15	11.26	12.67	15.49
8.0	E12B805	8.00	8.80	10.40	12.80	14.40	17.60
8.2	E12B825	8.00	8.80	10.40	12.80	14.40	17.60
10.0	E12B106	8.00	8.80	10.40	12.80	14.40	17.60

CRC HIGH RELIABILITY CAPACITORS

100VDC POLYCARBONATE PRICES (1-10 UNITS)

SERIES **12C**

HOW TO ORDER

- Select basic part number required and place desired tolerance letter, at end of basic number.
- See part number system on page 18 for complete details concerning sleeving and wire leads.
- **IMPORTANT:** You must have complete part number for ordering purposes.

  Example: C12C106FSC describes a 10 uF, 1%, 100 VDC capacitor, with mylar sleeving, #18AWG OFHC leads, and "C" type screening.

SERIES 12C INFORMATION

- Complete information is found on pages 12 - 17.
- 12C capacitors can be ordered by MIL Spec part number — See page 13.
- 0.82 uF or smaller capacitor values, (0.500" and smaller in diameter) use "W" wire leads.
- 1.0 uF or larger values, (0.562" and larger in diameter), use "C" wire leads.
- Prices subject to change.
- **QUANTITY DISCOUNTS:**

11-25 less 10%	26-50 less 15%	Contact our sales office
51-100 less 20%	101-250 less 25%	for larger quantities.

MIL-C-83421/1	PRICE INFORMATION	SPECIFICATIONS
Type CRH03 100VDC	Use C12C Prices +10%	See A12C Page 10
Type CRH08 100 VDC	Use E12C Prices +10%	See K12C Page 11

	CRC QUALITY LEVEL 1							CRC QUALITY LEVEL 2							CRC QUALITY LEVEL 3						
	C12C 100V POLYCARBONATE							D12C 100V POLYCARBONATE							E12C 100V POLYCARBONATE						
	Equivalent to CHROIG Style of MIL-C-39022/9C							Equivalent to CHROIH Style of MIL-C-39022/9C							Equivalent to CHROIJ Style of MIL-C-39022/9C						
uF	BASIC PART No.	10% tol. K	5% tol. J	2% tol. G	1% tol. F	0.5% tol. D	0.25% tol. B	BASIC PART No.	10% tol. K	5% tol. J	2% tol. G	1% tol. F	0.5% tol. D	0.25% tol. B	BASIC PART No.	10% tol. K	5% tol. J	2% tol. G	1% tol. F	0.5% tol. D	0.25% tol. B
.001	C12C102	$6.19	$6.81	$8.05	$9.90	$11.14	$13.62	D12C102	$4.13	$4.54	$5.37	$6.61	$7.43	$9.09	E12C102	$3.44	$3.78	$4.47	$5.50	$6.19	$7.57
.0012	C12C122	6.19	6.81	8.05	9.90	11.14	13.62	D12C122	4.13	4.54	5.37	6.61	7.43	9.09	E12C122	3.44	3.78	4.47	5.50	6.19	7.57
.0015	C12C152	6.19	6.81	8.05	9.90	11.14	13.62	D12C152	4.13	4.54	5.37	6.61	7.43	9.09	E12C152	3.44	3.78	4.47	5.50	6.19	7.57
.0018	C12C182	6.19	6.81	8.05	9.90	11.14	13.62	D12C182	4.13	4.54	5.37	6.61	7.43	9.09	E12C182	3.44	3.78	4.47	5.50	6.19	7.57
.002	C12C202	6.19	6.81	8.05	9.90	11.14	13.62	D12C202	4.13	4.54	5.37	6.61	7.43	9.09	E12C202	3.44	3.78	4.47	5.50	6.19	7.57
.0022	C12C222	6.19	6.81	8.05	9.90	11.14	13.62	D12C222	4.13	4.54	5.37	6.61	7.43	9.09	E12C222	3.44	3.78	4.47	5.50	6.19	7.57
.0027	C12C272	6.19	6.81	8.05	9.90	11.14	13.62	D12C272	4.13	4.54	5.37	6.61	7.43	9.09	E12C272	3.44	3.78	4.47	5.50	6.19	7.57
.0033	C12C332	6.19	6.81	8.05	9.90	11.14	13.62	D12C332	4.13	4.54	5.37	6.61	7.43	9.09	E12C332	3.44	3.78	4.47	5.50	6.19	7.57
.0039	C12C392	6.19	6.81	8.05	9.90	11.14	13.62	D12C392	4.13	4.54	5.37	6.61	7.43	9.09	E12C392	3.44	3.78	4.47	5.50	6.19	7.57
.0047	C12C472	6.19	6.81	8.05	9.90	11.14	13.62	D12C472	4.13	4.54	5.37	6.61	7.43	9.09	E12C472	3.44	3.78	4.47	5.50	6.19	7.57
.005	C12C502	6.19	6.81	8.05	9.90	11.14	13.62	D12C502	4.13	4.54	5.37	6.61	7.43	9.09	E12C502	3.44	3.78	4.47	5.50	6.19	7.57
.0056	C12C562	6.19	6.81	8.05	9.90	11.14	13.62	D12C562	4.13	4.54	5.37	6.61	7.43	9.09	E12C562	3.44	3.78	4.47	5.50	6.19	7.57
.0068	C12C682	6.19	6.81	8.05	9.90	11.14	13.62	D12C682	4.13	4.54	5.37	6.61	7.43	9.09	E12C682	3.44	3.78	4.47	5.50	6.19	7.57
.0082	C12C822	6.19	6.81	8.05	9.90	11.14	13.62	D12C822	4.13	4.54	5.37	6.61	7.43	9.09	E12C822	3.44	3.78	4.47	5.50	6.19	7.57
.01	C12C103	6.19	6.81	8.05	9.90	11.14	13.62	D12C103	4.13	4.54	5.37	6.61	7.43	9.09	E12C103	3.44	3.78	4.47	5.50	6.19	7.57
.012	C12C123	6.19	6.81	8.05	9.90	11.14	13.62	D12C123	4.13	4.54	5.37	6.61	7.43	9.09	E12C123	3.44	3.78	4.47	5.50	6.19	7.57
.015	C12C153	6.19	6.81	8.05	9.90	11.14	13.62	D12C153	4.13	4.54	5.37	6.61	7.43	9.09	E12C153	3.44	3.78	4.47	5.50	6.19	7.57
.018	C12C183	6.19	6.81	8.05	9.90	11.14	13.62	D12C183	4.13	4.54	5.37	6.61	7.43	9.09	E12C183	3.44	3.78	4.47	5.50	6.19	7.57
.02	C12C203	6.19	6.81	8.05	9.90	11.14	13.62	D12C203	4.13	4.54	5.37	6.61	7.43	9.09	E12C203	3.44	3.78	4.47	5.50	6.19	7.57
.022	C12C223	6.19	6.81	8.05	9.90	11.14	13.62	D12C223	4.13	4.54	5.37	6.61	7.43	9.09	E12C223	3.44	3.78	4.47	5.50	6.19	7.57
.027	C12C273	6.19	6.81	8.05	9.90	11.14	13.62	D12C273	4.13	4.54	5.37	6.61	7.43	9.09	E12C273	3.44	3.78	4.47	5.50	6.19	7.57
.033	C12C333	6.19	6.81	8.05	9.90	11.14	13.62	D12C333	4.13	4.54	5.37	6.61	7.43	9.09	E12C333	3.44	3.78	4.47	5.50	6.19	7.57
.039	C12C393	6.19	6.81	8.05	9.90	11.14	13.62	D12C393	4.13	4.54	5.37	6.61	7.43	9.09	E12C393	3.44	3.78	4.47	5.50	6.19	7.57
.047	C12C473	6.19	6.81	8.05	9.90	11.14	13.62	D12C473	4.13	4.54	5.37	6.61	7.43	9.09	E12C473	3.44	3.78	4.47	5.50	6.19	7.57
.05	C12C503	6.19	6.81	8.05	9.90	11.14	13.62	D12C503	4.13	4.54	5.37	6.61	7.43	9.09	E12C503	3.44	3.78	4.47	5.50	6.19	7.57
.056	C12C563	6.19	6.81	8.05	9.90	11.14	13.62	D12C563	4.13	4.54	5.37	6.61	7.43	9.09	E12C563	3.44	3.78	4.47	5.50	6.19	7.57
.068	C12C683	6.19	6.81	8.05	9.90	11.14	13.62	D12C683	4.13	4.54	5.37	6.61	7.43	9.09	E12C683	3.44	3.78	4.47	5.50	6.19	7.57
.082	C12C823	6.19	6.81	8.05	9.90	11.14	13.62	D12C823	4.13	4.54	5.37	6.61	7.43	9.09	E12C823	3.44	3.78	4.47	5.50	6.19	7.57
.10	C12C104	6.19	6.81	8.05	9.90	11.14	13.62	D12C104	4.13	4.54	5.37	6.61	7.43	9.09	E12C104	3.44	3.78	4.47	5.50	6.19	7.57
.12	C12C124	6.35	6.99	8.26	10.16	11.43	13.97	D12C124	4.24	4.66	5.51	6.78	7.63	9.33	E12C124	3.53	3.88	4.59	5.65	6.35	7.77
.15	C12C154	6.35	6.99	8.26	10.16	11.43	13.97	D12C154	4.24	4.66	5.51	6.78	7.63	9.33	E12C154	3.53	3.88	4.59	5.65	6.35	7.77
.18	C12C184	6.44	7.08	8.37	10.30	11.59	14.17	D12C184	4.30	4.73	5.59	6.88	7.74	9.46	E12C184	3.58	3.94	4.65	5.73	6.44	7.88
.20	C12C204	6.44	7.08	8.37	10.30	11.59	14.17	D12C204	4.30	4.73	5.59	6.88	7.74	9.46	E12C204	3.58	3.94	4.65	5.73	6.44	7.88
.22	C12C224	6.44	7.08	8.37	10.30	11.59	14.17	D12C224	4.30	4.73	5.59	6.88	7.74	9.46	E12C224	3.58	3.94	4.65	5.73	6.44	7.88
.27	C12C274	6.52	7.17	8.48	10.43	11.74	14.34	D12C274	4.34	4.77	5.64	6.94	7.81	9.55	E12C274	3.62	3.98	4.71	5.79	6.52	7.96
.33	C12C334	6.84	7.52	8.89	10.94	12.31	15.05	D12C334	4.56	5.02	5.93	7.30	8.21	10.03	E12C334	3.80	4.18	4.94	6.08	6.84	8.36
.39	C12C394	6.89	7.58	8.96	11.02	12.40	15.16	D12C394	4.60	5.06	5.98	7.36	8.28	10.12	E12C394	3.83	4.21	4.98	6.13	6.89	8.43
.47	C12C474	6.89	7.58	8.96	11.02	12.40	15.16	D12C474	4.60	5.06	5.98	7.36	8.28	10.12	E12C474	3.83	4.21	4.98	6.13	6.89	8.43
.50	C12C504	6.89	7.58	8.96	11.02	12.40	15.16	D12C504	4.60	5.06	5.98	7.36	8.28	10.12	E12C504	3.83	4.21	4.98	6.13	6.89	8.43
.56	C12C564	7.13	7.84	9.27	11.41	12.83	15.69	D12C564	4.75	5.23	6.18	7.60	8.55	10.45	E12C564	3.96	4.36	5.15	6.34	7.13	8.71
.68	C12C684	7.36	8.10	9.57	11.78	13.25	16.19	D12C684	4.91	5.40	6.38	7.86	8.84	10.80	E12C684	4.09	4.50	5.32	6.54	7.36	9.00
.82	C12C824	7.36	8.10	9.57	11.78	13.25	16.19	D12C824	4.91	5.40	6.38	7.86	8.84	10.80	E12C824	4.09	4.50	5.32	6.54	7.36	9.00
1.0	C12C105	7.36	8.10	9.57	11.78	13.25	16.19	D12C105	4.91	5.40	6.38	7.86	8.84	10.80	E12C105	4.09	4.50	5.32	6.54	7.36	9.00
1.2	C12C125	7.79	8.57	10.13	12.46	14.02	17.14	D12C125	5.20	5.72	6.76	8.32	9.36	11.44	E12C125	4.33	4.76	5.63	6.93	7.79	9.53
1.5	C12C155	8.14	8.95	10.58	13.02	14.65	17.91	D12C155	5.42	5.96	7.05	8.67	9.76	11.92	E12C155	4.52	4.97	5.88	7.23	8.14	9.94
1.8	C12C185	8.37	9.21	10.88	13.39	15.07	18.41	D12C185	5.58	6.14	7.25	8.93	10.04	12.28	E12C185	4.65	5.12	6.05	7.44	8.37	10.23
2.0	C12C205	8.53	9.38	11.09	13.65	15.35	18.77	D12C205	5.69	6.26	7.40	9.10	10.24	12.52	E12C205	4.74	5.21	6.16	7.58	8.53	10.43
2.2	C12C225	8.96	9.86	11.65	14.34	16.13	19.71	D12C225	5.98	6.58	7.77	9.57	10.76	13.16	E12C225	4.98	5.48	6.47	7.97	8.96	10.96
2.7	C12C275	9.14	10.05	11.88	14.62	16.45	20.11	D12C275	6.10	6.71	7.93	9.76	10.98	13.42	E12C275	5.08	5.59	6.60	8.13	9.14	11.18
3.0	C12C305	9.32	10.25	12.12	14.91	16.78	20.50	D12C305	6.22	6.84	8.09	9.95	11.20	13.68	E12C305	5.18	5.70	6.73	8.29	9.32	11.40
3.3	C12C335	9.77	10.75	12.70	15.63	17.59	21.49	D12C335	6.52	7.17	8.48	10.43	11.74	14.34	E12C335	5.43	5.97	7.06	8.69	9.77	11.95
3.9	C12C395	10.28	11.31	13.36	16.45	18.50	22.62	D12C395	6.85	7.54	8.91	10.96	12.33	15.07	E12C395	5.71	6.28	7.42	9.14	10.28	12.56
4.0	C12C405	10.28	11.31	13.36	16.45	18.50	22.62	D12C405	6.85	7.54	8.91	10.96	12.33	15.07	E12C405	5.71	6.28	7.42	9.14	10.28	12.56
4.7	C12C475	11.03	12.13	14.34	17.65	19.85	24.27	D12C475	7.36	8.10	9.57	11.78	13.25	16.19	E12C475	6.13	6.74	7.97	9.81	11.03	13.49
5.0	C12C505	11.03	12.13	14.34	17.65	19.85	24.27	D12C505	7.36	8.10	9.57	11.78	13.25	16.19	E12C505	6.13	6.74	7.97	9.81	11.03	13.49
5.6	C12C565	12.13	13.34	15.77	19.41	21.83	26.69	D12C565	8.09	8.90	10.52	12.94	14.56	17.80	E12C565	6.74	7.41	8.76	10.78	12.13	14.83
6.8	C12C685	12.67	13.94	16.47	20.27	22.81	27.87	D12C685	8.45	9.30	10.99	13.52	15.21	18.59	E12C685	7.04	7.74	9.15	11.26	12.67	15.49
8.0	C12C805	14.40	15.84	18.72	23.04	25.92	31.68	D12C805	9.60	10.56	12.48	15.36	17.28	21.12	E12C805	8.00	8.80	10.40	12.80	14.40	17.60
8.2	C12C825	14.40	15.84	18.72	23.04	25.92	31.68	D12C825	9.60	10.56	12.48	15.36	17.28	21.12	E12C825	8.00	8.80	10.40	12.80	14.40	17.60
10.0	C12C106	14.40	15.84	18.72	23.04	25.92	31.68	D12C106	9.60	10.56	12.48	15.36	17.28	21.12	E12C106	8.00	8.80	10.40	12.80	14.40	17.60

CRC HIGH RELIABILITY CAPACITORS

200VDC POLYCARBONATE PRICES (1-10 UNITS)

SERIES
12D

HOW TO ORDER

- Select basic part number required and place desired tolerance letter, at end of basic number.
- See part number system on page 18 for complete details concerning sleeving and wire leads.
- **IMPORTANT:** You must have complete part number for ordering purposes.
  Example: D12D224BSW describes a 0.22 uF, 0.25%, 200 VDC capacitor, with mylar sleeving and "D" type screening.

SERIES 12D INFORMATION

- Complete information is found on pages 12 - 17.
- 12D capacitors can be ordered by MIL Spec part number — See page 13.
- 0.56 uF or smaller capacitor values, (0.500″ and smaller in diameter) use "W" wire leads.
- 0.68 uF or larger values, (0.562″ and larger in diameter), use "C" wire leads.
- Prices subject to change.
- **QUANTITY DISCOUNTS:**
  11-25 less 10% 26-50 less 15%
  51-100 less 20% 101-250 less 25%
  Contact our sales office for larger quantities.

MIL-C-83421/1	PRICE INFORMATION	SPECIFICATIONS
Type CRH04 200 VDC	Use C12D Prices +10%	See A12D Page 10
Type CRH09 200 VDC	Use E12D Prices +10%	See K12D Page 11

	CRC QUALITY LEVEL 1							CRC QUALITY LEVEL 2							CRC QUALITY LEVEL 3						
	C12D 200V POLYCARBONATE							D12D 200V POLYCARBONATE							E12D 200V POLYCARBONATE						
	Equivalent to CHROIK Style of MIL-C-39022/9C							Equivalent to CHROIL Style of MIL-C-39022/9C							Equivalent to CHROIM Style of MIL-C-39022/9C						
uF	BASIC PART No.	10% tol. K	5% tol. J	2% tol. G	1% tol. F	0.5% tol. D	0.25% tol. B	BASIC PART No.	10% tol. K	5% tol. J	2% tol. G	1% tol. F	0.5% tol. D	0.25% tol. B	BASIC PART No.	10% tol. K	5% tol. J	2% tol. G	1% tol. F	0.5% tol. D	0.25% tol. B
.001	C12D102	$6.19	$6.81	$8.05	$9.90	$11.14	$13.62	D12D102	$4.13	$4.54	$5.37	$6.61	$7.43	$9.09	E12D102	$3.44	$3.78	$4.47	$5.50	$6.19	$7.57
.0012	C12D122	6.19	6.81	8.05	9.90	11.14	13.62	D12D122	4.13	4.54	5.37	6.61	7.43	9.09	E12D122	3.44	3.78	4.47	5.50	6.19	7.57
.0015	C12D152	6.19	6.81	8.05	9.90	11.14	13.62	D12D152	4.13	4.54	5.37	6.61	7.43	9.09	E12D152	3.44	3.78	4.47	5.50	6.19	7.57
.0018	C12D182	6.19	6.81	8.05	9.90	11.14	13.62	D12D182	4.13	4.54	5.37	6.61	7.43	9.09	E12D182	3.44	3.78	4.47	5.50	6.19	7.57
.002	C12D202	6.19	6.81	8.05	9.90	11.14	13.62	D12D202	4.13	4.54	5.37	6.61	7.43	9.09	E12D202	3.44	3.78	4.47	5.50	6.19	7.57
.0022	C12D222	6.19	6.81	8.05	9.90	11.14	13.62	D12D222	4.13	4.54	5.37	6.61	7.43	9.09	E12D222	3.44	3.78	4.47	5.50	6.19	7.57
.0027	C12D272	6.19	6.81	8.05	9.90	11.14	13.62	D12D272	4.13	4.54	5.37	6.61	7.43	9.09	E12D272	3.44	3.78	4.47	5.50	6.19	7.57
.0033	C12D332	6.19	6.81	8.05	9.90	11.14	13.62	D12D332	4.13	4.54	5.37	6.61	7.43	9.09	E12D332	3.44	3.78	4.47	5.50	6.19	7.57
.0039	C12D392	6.19	6.81	8.05	9.90	11.14	13.62	D12D392	4.13	4.54	5.37	6.61	7.43	9.09	E12D392	3.44	3.78	4.47	5.50	6.19	7.57
.0047	C12D472	6.19	6.81	8.05	9.90	11.14	13.62	D12D472	4.13	4.54	5.37	6.61	7.43	9.09	E12D472	3.44	3.78	4.47	5.50	6.19	7.57
.005	C12D502	6.19	6.81	8.05	9.90	11.14	13.62	D12D502	4.13	4.54	5.37	6.61	7.43	9.09	E12D502	3.44	3.78	4.47	5.50	6.19	7.57
.0056	C12D562	6.19	6.81	8.05	9.90	11.14	13.62	D12D562	4.13	4.54	5.37	6.61	7.43	9.09	E12D562	3.44	3.78	4.47	5.50	6.19	7.57
.0068	C12D682	6.19	6.81	8.05	9.90	11.14	13.62	D12D682	4.13	4.54	5.37	6.61	7.43	9.09	E12D682	3.44	3.78	4.47	5.50	6.19	7.57
.0082	C12D822	6.19	6.81	8.05	9.90	11.14	13.62	D12D822	4.13	4.54	5.37	6.61	7.43	9.09	E12D822	3.44	3.78	4.47	5.50	6.19	7.57
.01	C12D103	6.19	6.81	8.05	9.90	11.14	13.62	D12D103	4.13	4.54	5.37	6.61	7.43	9.09	E12D103	3.44	3.78	4.47	5.50	6.19	7.57
.012	C12D123	6.19	6.81	8.05	9.90	11.14	13.62	D12D123	4.13	4.54	5.37	6.61	7.43	9.09	E12D123	3.44	3.78	4.47	5.50	6.19	7.57
.015	C12D153	6.19	6.81	8.05	9.90	11.14	13.62	D12D153	4.13	4.54	5.37	6.61	7.43	9.09	E12D153	3.44	3.78	4.47	5.50	6.19	7.57
.018	C12D183	6.19	6.81	8.05	9.90	11.14	13.62	D12D183	4.13	4.54	5.37	6.61	7.43	9.09	E12D183	3.44	3.78	4.47	5.50	6.19	7.57
.02	C12D203	6.19	6.81	8.05	9.90	11.14	13.62	D12D203	4.13	4.54	5.37	6.61	7.43	9.09	E12D203	3.44	3.78	4.47	5.50	6.19	7.57
.022	C12D223	6.19	6.81	8.05	9.90	11.14	13.62	D12D223	4.13	4.54	5.37	6.61	7.43	9.09	E12D223	3.44	3.78	4.47	5.50	6.19	7.57
.027	C12D273	6.19	6.81	8.05	9.90	11.14	13.62	D12D273	4.13	4.54	5.37	6.61	7.43	9.09	E12D273	3.44	3.78	4.47	5.50	6.19	7.57
.033	C12D333	6.23	6.85	8.10	9.97	11.21	13.71	D12D333	4.15	4.57	5.40	6.64	7.47	9.13	E12D333	3.46	3.81	4.50	5.54	6.23	7.61
.039	C12D393	6.30	6.93	8.19	10.08	11.34	13.86	D12D393	4.20	4.62	5.46	6.72	7.56	9.24	E12D393	3.50	3.85	4.55	5.60	6.30	7.70
.047	C12D473	6.44	7.08	8.37	10.30	11.59	14.17	D12D473	4.30	4.73	5.59	6.88	7.74	9.46	E12D473	3.58	3.94	4.65	5.73	6.44	7.88
.05	C12D503	6.44	7.08	8.37	10.30	11.59	14.17	D12D503	4.30	4.73	5.59	6.88	7.74	9.46	E12D503	3.58	3.94	4.65	5.73	6.44	7.88
.056	C12D563	6.44	7.08	8.37	10.30	11.59	14.17	D12D563	4.30	4.73	5.59	6.88	7.74	9.46	E12D563	3.58	3.94	4.65	5.73	6.44	7.88
.068	C12D683	6.48	7.13	8.42	10.37	11.66	14.26	D12D683	4.32	4.75	5.62	6.91	7.78	9.50	E12D683	3.60	3.96	4.68	5.76	6.48	7.92
.082	C12D823	6.59	7.25	8.57	10.54	11.86	14.50	D12D823	4.39	4.83	5.71	7.02	7.90	9.66	E12D823	3.66	4.03	4.76	5.86	6.59	8.05
.10	C12D104	6.66	7.33	8.66	10.66	11.99	14.65	D12D104	4.44	4.88	5.77	7.10	7.99	9.77	E12D104	3.70	4.07	4.81	5.92	6.66	8.14
.12	C12D124	6.73	7.40	8.75	10.77	12.11	14.81	D12D124	4.49	4.94	5.84	7.18	8.08	9.88	E12D124	3.74	4.11	4.86	5.98	6.73	8.23
.15	C12D154	6.80	7.48	8.84	10.88	12.24	14.96	D12D154	4.54	4.99	5.90	7.26	8.17	9.99	E12D154	3.78	4.16	4.91	6.05	6.80	8.32
.18	C12D184	6.84	7.52	8.89	10.94	12.31	15.05	D12D184	4.56	5.02	5.93	7.30	8.21	10.03	E12D184	3.80	4.18	4.94	6.08	6.84	8.36
.20	C12D204	6.84	7.52	8.89	10.94	12.31	15.05	D12D204	4.56	5.02	5.93	7.30	8.21	10.03	E12D204	3.80	4.18	4.94	6.08	6.84	8.36
.22	C12D224	6.88	7.57	8.94	11.01	12.38	15.14	D12D224	4.58	5.04	5.95	7.33	8.24	10.08	E12D224	3.82	4.20	4.97	6.11	6.88	8.40
.27	C12D274	6.98	7.68	9.07	11.17	12.56	15.36	D12D274	4.66	5.13	6.06	7.46	8.39	10.25	E12D274	3.88	4.27	5.04	6.21	6.98	8.54
.33	C12D334	7.09	7.80	9.22	11.34	12.76	15.60	D12D334	4.73	5.20	6.15	7.57	8.51	10.41	E12D334	3.94	4.33	5.12	6.30	7.09	8.67
.39	C12D394	7.20	7.92	9.36	11.52	12.96	15.84	D12D394	4.80	5.28	6.24	7.68	8.64	10.56	E12D394	4.00	4.40	5.20	6.40	7.20	8.80
.47	C12D474	7.31	8.04	9.50	11.70	13.16	16.08	D12D474	4.87	5.36	6.33	7.79	8.77	10.71	E12D474	4.06	4.47	5.28	6.50	7.31	8.93
.50	C12D504	7.42	8.16	9.65	11.87	13.36	16.32	D12D504	4.94	5.43	6.42	7.90	8.89	10.87	E12D504	4.12	4.53	5.36	6.59	7.42	9.06
.56	C12D564	7.52	8.27	9.78	12.03	13.54	16.54	D12D564	5.02	5.52	6.53	8.03	9.04	11.04	E12D564	4.18	4.60	5.43	6.69	7.52	9.20
.68	C12D684	8.06	8.87	10.48	12.90	14.51	17.73	D12D684	5.38	5.92	6.99	8.61	9.68	11.84	E12D684	4.48	4.93	5.82	7.17	8.06	9.86
.82	C12D824	8.17	8.99	10.62	13.07	14.71	17.97	D12D824	5.45	6.00	7.09	8.72	9.81	11.99	E12D824	4.54	4.99	5.90	7.26	8.17	9.99
1.0	C12D105	8.28	9.11	10.76	13.25	14.90	18.22	D12D105	5.52	6.07	7.18	8.83	9.94	12.14	E12D105	4.60	5.06	5.98	7.36	8.28	10.12
1.2	C12D125	8.42	9.26	10.95	13.47	15.16	18.52	D12D125	5.62	6.18	7.31	8.99	10.12	12.36	E12D125	4.68	5.15	6.08	7.49	8.42	10.30
1.5	C12D155	9.11	10.02	11.84	14.58	16.40	20.04	D12D155	6.07	6.68	7.89	9.71	10.93	13.35	E12D155	5.06	5.57	6.58	8.10	9.11	11.13
1.8	C12D185	9.59	10.55	12.47	15.34	17.26	21.10	D12D185	6.40	7.04	8.32	10.24	11.52	14.08	E12D185	5.33	5.86	6.93	8.53	9.59	11.73
2.0	C12D205	10.19	11.21	13.25	16.30	18.34	22.42	D12D205	6.79	7.47	8.83	10.86	12.22	14.94	E12D205	5.66	6.23	7.36	9.06	10.19	12.45
2.2	C12D225	10.73	11.80	13.95	17.17	19.31	23.61	D12D225	7.15	7.87	9.30	11.44	12.87	15.73	E12D225	5.96	6.56	7.75	9.54	10.73	13.11
2.7	C12D275	11.27	12.40	14.65	18.03	20.29	24.79	D12D275	7.51	8.26	9.76	12.02	13.52	16.52	E12D275	6.26	6.89	8.14	10.02	11.27	13.77
3.0	C12D305	11.92	13.11	15.50	19.07	21.46	26.22	D12D305	7.94	8.73	10.32	12.70	14.29	17.47	E12D305	6.62	7.28	8.61	10.59	11.92	14.56
3.3	C12D335	12.56	13.82	16.33	20.10	22.61	27.63	D12D335	8.38	9.22	10.89	13.41	15.08	18.44	E12D335	6.98	7.68	9.07	11.17	12.56	15.37
3.9	C12D395	14.29	15.72	18.58	22.86	25.72	31.44	D12D395	9.53	10.48	12.39	15.25	17.15	20.97	E12D395	7.94	8.73	10.32	12.70	14.29	17.47
4.0	C12D405	14.29	15.72	18.58	22.86	25.72	31.44	D12D405	9.53	10.48	12.39	15.25	17.15	20.97	E12D405	7.94	8.73	10.32	12.70	14.29	17.47

CRC HIGH RELIABILITY CAPACITORS

400VDC POLYCARBONATE PRICES (1-10 UNITS)

SERIES
12E

HOW TO ORDER

- Select basic part number required and place desired tolerance letter, at end of basic number.
- See part number system on page 18 for complete details concerning sleeving and wire leads.
- **IMPORTANT:** You must have complete part number for ordering purposes.

  Example: D12E104FSW describes a 0.1 uF, 1%, 400 VDC capacitor, with mylar sleeving and "D" type screening.

SERIES 12E INFORMATION

- Complete information is found on pages 12 - 17.
- 12E capacitors can be ordered by MIL Spec part number — See page 13.
- 0.22 uF or smaller capacitor values, (0.500″ and smaller in diameter) use "W" wire leads.
- 0.33 uF or larger values, (0.562″ and larger in diameter), use "C" wire leads.
- Prices subject to change.
- **QUANTITY DISCOUNTS:**
  11-25 less 10% 26-50 less 15% Contact our sales office
  51-100 less 20% 101-250 less 25% for larger quantities.

MIL-C-83421/1	PRICE INFORMATION	SPECIFICATIONS
Type CRH05 400 VDC	Use C12E Prices +10%	See A12E Page 10
Type CRH00 400 VDC	Use E12E Prices +10%	See K12E Page 11

	CRC QUALITY LEVEL 1							CRC QUALITY LEVEL 2							CRC QUALITY LEVEL 3						
	C12E 400V POLYCARBONATE							D12E 400V POLYCARBONATE							E12E 400V POLYCARBONATE						
	Equivalent to CHROIN Style of MIL-C-39022/9C							Equivalent to CHROIP Style of MIL-C-39022/9C							Equivalent to CHROIR Style of MIL-C-39022/9C						
uF	BASIC PART No.	10% tol. K	5% tol. J	2% tol. G	1% tol. F	0.5% tol. D	0.25% tol. B	BASIC PART No.	10% tol. K	5% tol. J	2% tol. G	1% tol. F	0.5% tol. D	0.25% tol. B	BASIC PART No.	10% tol. K	5% tol. J	2% tol. G	1% tol. F	0.5% tol. D	0.25% tol. B
.001	C12E102	$6.48	$7.13	$8.42	$10.37	$11.66	$14.26	D12E102	$4.32	$4.75	$5.62	$6.91	$7.78	$9.50	E12E102	$3.60	$3.96	$4.68	$5.76	$6.48	$7.92
.0012	C12E122	6.48	7.13	8.42	10.37	11.66	14.26	D12E122	4.32	4.75	5.62	6.91	7.78	9.50	E12E122	3.60	3.96	4.68	5.76	6.48	7.92
.0015	C12E152	6.48	7.13	8.42	10.37	11.66	14.26	D12E152	4.32	4.75	5.62	6.91	7.78	9.50	E12E152	3.60	3.96	4.68	5.76	6.48	7.92
.0018	C12E182	6.48	7.13	8.42	10.37	11.66	14.26	D12E182	4.32	4.75	5.62	6.91	7.78	9.50	E12E182	3.60	3.96	4.68	5.76	6.48	7.92
.002	C12E202	6.48	7.13	8.42	10.37	11.66	14.26	D12E202	4.32	4.75	5.62	6.91	7.78	9.50	E12E202	3.60	3.96	4.68	5.76	6.48	7.92
.0022	C12E222	6.48	7.13	8.42	10.37	11.66	14.26	D12E222	4.32	4.75	5.62	6.91	7.78	9.50	E12E222	3.60	3.96	4.68	5.76	6.48	7.92
.0027	C12E272	6.48	7.13	8.42	10.37	11.66	14.26	D12E272	4.32	4.75	5.62	6.91	7.78	9.50	E12E272	3.60	3.96	4.68	5.76	6.48	7.92
.0033	C12E332	6.48	7.13	8.42	10.37	11.66	14.26	D12E332	4.32	4.75	5.62	6.91	7.78	9.50	E12E332	3.60	3.96	4.68	5.76	6.48	7.92
.0039	C12E392	6.48	7.13	8.42	10.37	11.66	14.26	D12E392	4.32	4.75	5.62	6.91	7.78	9.50	E12E392	3.60	3.96	4.68	5.76	6.48	7.92
.0047	C12E472	6.48	7.13	8.42	10.37	11.66	14.26	D12E472	4.32	4.75	5.62	6.91	7.78	9.50	E12E472	3.60	3.96	4.68	5.76	6.48	7.92
.005	C12E502	6.48	7.13	8.42	10.37	11.66	14.26	D12E502	4.32	4.75	5.62	6.91	7.78	9.50	E12E502	3.60	3.96	4.68	5.76	6.48	7.92
.0056	C12E562	6.48	7.13	8.42	10.37	11.66	14.26	D12E562	4.32	4.75	5.62	6.91	7.78	9.50	E12E562	3.60	3.96	4.68	5.76	6.48	7.92
.0068	C12E682	6.48	7.13	8.42	10.37	11.66	14.26	D12E682	4.32	4.75	5.62	6.91	7.78	9.50	E12E682	3.60	3.96	4.68	5.76	6.48	7.92
.0082	C12E822	6.48	7.13	8.42	10.37	11.66	14.26	D12E822	4.32	4.75	5.62	6.91	7.78	9.50	E12E822	3.60	3.96	4.68	5.76	6.48	7.92
.01	C12E103	6.48	7.13	8.42	10.37	11.66	14.26	D12E103	4.32	4.75	5.62	6.91	7.78	9.50	E12E103	3.60	3.96	4.68	5.76	6.48	7.92
.012	C12E123	6.48	7.13	8.42	10.37	11.66	14.26	D12E123	4.32	4.75	5.62	6.91	7.78	9.50	E12E123	3.60	3.96	4.68	5.76	6.48	7.92
.015	C12E153	6.48	7.13	8.42	10.37	11.66	14.26	D12E153	4.32	4.75	5.62	6.91	7.78	9.50	E12E153	3.60	3.96	4.68	5.76	6.48	7.92
.018	C12E183	6.48	7.13	8.42	10.37	11.66	14.26	D12E183	4.32	4.75	5.62	6.91	7.78	9.50	E12E183	3.60	3.96	4.68	5.76	6.48	7.92
.02	C12E203	6.48	7.13	8.42	10.37	11.66	14.26	D12E203	4.32	4.75	5.62	6.91	7.78	9.50	E12E203	3.60	3.96	4.68	5.76	6.48	7.92
.022	C12E223	6.48	7.13	8.42	10.37	11.66	14.26	D12E223	4.32	4.75	5.62	6.91	7.78	9.50	E12E223	3.60	3.96	4.68	5.76	6.48	7.92
.027	C12E273	6.48	7.13	8.42	10.37	11.66	14.26	D12E273	4.32	4.75	5.62	6.91	7.78	9.50	E12E273	3.60	3.96	4.68	5.76	6.48	7.92
.033	C12E333	6.48	7.13	8.42	10.37	11.66	14.26	D12E333	4.32	4.75	5.62	6.91	7.78	9.50	E12E333	3.60	3.96	4.68	5.76	6.48	7.92
.039	C12E393	6.48	7.13	8.42	10.37	11.66	14.26	D12E393	4.32	4.75	5.62	6.91	7.78	9.50	E12E393	3.60	3.96	4.68	5.76	6.48	7.92
.047	C12E473	6.62	7.28	8.61	10.59	11.92	14.56	D12E473	4.42	4.86	5.75	7.07	7.96	9.72	E12E473	3.68	4.05	4.78	5.89	6.62	8.10
.05	C12E503	6.62	7.28	8.61	10.59	11.92	14.56	D12E503	4.42	4.86	5.75	7.07	7.96	9.72	E12E503	3.68	4.05	4.78	5.89	6.62	8.10
.056	C12E563	6.66	7.33	8.66	10.66	11.99	14.65	D12E563	4.44	4.88	5.77	7.10	7.99	9.77	E12E563	3.70	4.07	4.81	5.92	6.66	8.14
.068	C12E683	6.73	7.40	8.75	10.77	12.11	14.81	D12E683	4.49	4.94	5.84	7.18	8.08	9.88	E12E683	3.74	4.11	4.86	5.98	6.73	8.23
.082	C12E823	6.77	7.45	8.80	10.83	12.19	14.89	D12E823	4.51	4.96	5.86	7.22	8.12	9.92	E12E823	3.76	4.14	4.89	6.02	6.77	8.27
.10	C12E104	6.77	7.45	8.80	10.83	12.19	14.89	D12E104	4.51	4.96	5.86	7.22	8.12	9.92	E12E104	3.76	4.14	4.89	6.02	6.77	8.27
.12	C12E124	6.98	7.68	9.07	11.17	12.56	15.36	D12E124	4.66	5.13	6.06	7.46	8.39	10.25	E12E124	3.88	4.27	5.04	6.21	6.98	8.54
.15	C12E154	6.98	7.68	9.07	11.17	12.56	15.36	D12E154	4.66	5.13	6.06	7.46	8.39	10.25	E12E154	3.88	4.27	5.04	6.21	6.98	8.54
.18	C12E184	7.09	7.80	9.22	11.34	12.76	15.60	D12E184	4.73	5.20	6.15	7.57	8.51	10.41	E12E184	3.94	4.33	5.12	6.30	7.09	8.67
.20	C12E204	7.27	8.00	9.45	11.63	13.09	15.99	D12E204	4.85	5.34	6.31	7.76	8.73	10.67	E12E204	4.04	4.44	5.25	6.46	7.27	8.89
.22	C12E224	7.56	8.32	9.83	12.10	13.61	16.63	D12E224	5.04	5.54	6.55	8.06	9.07	11.09	E12E224	4.20	4.62	5.46	6.72	7.56	9.24
.27	C12E274	7.81	8.59	10.15	12.50	14.06	17.18	D12E274	5.21	5.73	6.77	8.34	9.38	11.46	E12E274	4.34	4.77	5.64	6.94	7.81	9.55
.33	C12E334	8.06	8.87	10.48	12.90	14,51	17.73	D12E334	5.38	5.92	6.99	8.61	9.68	11.84	E12E334	4.48	4.93	5.82	7.17	8.06	9.86
.39	C12E394	8.14	8.95	10.58	13.02	14.65	17.91	D12E394	5.42	5.96	7.05	8.67	9.76	11.92	E12E394	4.52	4.97	5.88	7.23	8.14	9.94
.47	C12E474	8.24	9.06	10.71	13.18	14.83	18.13	D12E474	5.50	6.05	7.15	8.80	9.90	12.10	E12E474	4.58	5.04	5.95	7.33	8.24	10.08
.50	C12E504	8.32	9.15	10.82	13.31	14.98	18.30	D12E504	5.54	6.09	7.20	8.86	9.97	12.19	E12E504	4.62	5.08	6.01	7.39	8.32	10.16
.56	C12E564	8.42	9.26	10.95	13.47	15.16	18.52	D12E564	5.62	6.18	7.31	8.99	10.12	12.36	E12E564	4.68	5.15	6.08	7.49	8.42	10.30
.68	C12E684	9.04	9.94	11.75	14.46	16.27	19.89	D12E684	6.02	6.62	7.83	9.63	10.84	13.24	E12E684	5.02	5.52	6.53	8.03	9.04	11.04
.82	C12E824	9.65	10.62	12.55	15.44	17.37	21.23	D12E824	6.43	7.07	8.36	10.29	11.57	14.15	E12E824	5.36	5.90	6.97	8.58	9.65	11.79
1.0	C12E105	10.30	11.33	13.39	16.48	18.54	22.66	D12E105	6.86	7.55	8.92	10.98	12.35	15.09	E12E105	5.72	6.29	7.44	9.15	10.30	12.58
1.2	C12E125	12.67	13.94	16.47	20.27	22.81	27.87	D12E125	8.45	9.30	10.99	13.52	15.21	18.59	E12E125	7.04	7.74	9.15	11.26	12.67	15.49
1.5	C12E155	13.21	14.53	17.17	21.14	23.78	29.06	D12E155	8.81	9.69	11.45	14.10	15.86	19.38	E12E155	7.34	8.07	9.54	11.74	13.21	16.15
1.8	C12E185	13.75	15.13	17.88	22.00	24.75	30.25	D12E185	9.17	10.09	11.92	14.67	16.51	20.17	E12E185	7.64	8.40	9.93	12.22	13.75	16.81
2.0	C12E205	14.29	15.72	18.58	22.86	25.72	31.44	D12E205	9.53	10.48	12.39	15.25	17.15	20.97	E12E205	7.94	8.73	10.32	12.70	14.29	17.47

SERIES
E32

CORDWOOD POLYCARBONATE
CAPACITOR PRICES

HOW TO ORDER

- See page 31 for specification information and case sizes.
- Select basic part number required and place desired tolerance letter at end of basic number.
- **IMPORTANT:** You must have complete part number for ordering purposes.
  Example: E32A563GXW is a 0.056 uF, 2%, 30 VDC, polycarbonate capacitor, no sleeving with level 3 screening.
- Check part number information on page 18 for complete details concerning sleeving and wire leads.
- Type "W" leads are used for all capacitor values listed.
- Prices subject to change.
- **QUANTITY DISCOUNTS:**
  11-25 less 10% 51-100 less 20%
  26-50 less 15% 101-250 less 25%

E32A PRICES (1-10 UNITS)

uF	BASIC PART NO.	10% tol. K	5% tol. J	2% tol. G	1% tol. F	0.5% tol. D	0.25% tol. B
.001	E32A102	$4.13	$4.54	$5.37	$6.61	$7.43	$9.09
.0012	E32A122	4.13	4.54	5.37	6.61	7.43	9.09
.0015	E32A152	4.13	4.54	5.37	6.61	7.43	9.09
.0018	E32A182	4.13	4.54	5.37	6.61	7.43	9.09
.002	E32A202	4.13	4.54	5.37	6.61	7.43	9.09
.0022	E32A222	4.13	4.54	5.37	6.61	7.43	9.09
.0027	E32A272	4.13	4.54	5.37	6.61	7.43	9.09
.0033	E32A332	4.13	4.54	5.37	6.61	7.43	9.09
.0039	E32A392	4.13	4.54	5.37	6.61	7.43	9.09
.0047	E32A472	4.13	4.54	5.37	6.61	7.43	9.09
.005	E32A502	4.13	4.54	5.37	6.61	7.43	9.09
.0056	E32A562	4.13	4.54	5.37	6.61	7.43	9.09
.0068	E32A682	4.13	4.54	5.37	6.61	7.43	9.09
.0082	E32A822	4.13	4.54	5.37	6.61	7.43	9.09
.01	E32A103	4.13	4.54	5.37	6.61	7.43	9.09
.012	E32A123	4.13	4.54	5.37	6.61	7.43	9.09
.015	E32A153	4.13	4.54	5.37	6.61	7.43	9.09
.018	E32A183	4.13	4.54	5.37	6.61	7.43	9.09
.02	E32A203	4.13	4.54	5.37	6.61	7.43	9.09
.022	E32A223	4.13	4.54	5.37	6.61	7.43	9.09
.027	E32A273	4.13	4.54	5.37	6.61	7.43	9.09
.033	E32A333	4.13	4.54	5.37	6.61	7.43	9.09
.039	E32A393	4.13	4.54	5.37	6.61	7.43	9.09
.047	E32A473	4.13	4.54	5.37	6.61	7.43	9.09
.05	E32A503	4.13	4.54	5.37	6.61	7.43	9.09
.056	E32A563	4.13	4.54	5.37	6.61	7.43	9.09
.068	E32A683	4.13	4.54	5.37	6.61	7.43	9.09
.082	E32A823	4.13	4.54	5.37	6.61	7.43	9.09
.10	E32A104	4.13	4.54	5.37	6.61	7.43	9.09
.12	E32A124	4.24	4.66	5.51	6.78	7.63	9.33
.15	E32A154	4.24	4.66	5.51	6.78	7.63	9.33
.18	E32A184	4.30	4.73	5.59	6.88	7.74	9.46
.20	E32A204	4.30	4.73	5.59	6.88	7.74	9.46
.22	E32A224	4.30	4.73	5.59	6.88	7.74	9.46
.27	E32A274	4.34	4.77	5.64	6.94	7.81	9.55
.33	E32A334	4.56	5.02	5.93	7.30	8.21	10.03
.39	E32A394	4.60	5.06	5.98	7.36	8.28	10.12
.47	E32A474	4.60	5.06	5.98	7.36	8.28	10.12
.50	E32A504	4.60	5.06	5.98	7.36	8.28	10.12
.56	E32A564	4.75	5.23	6.18	7.60	8.55	10.45
.68	E32A684	4.91	5.40	6.38	7.86	8.84	10.80
.82	E32A824	4.91	5.40	6.38	7.86	8.84	10.80
1.0	E32A105	4.91	5.40	6.38	7.86	8.84	10.80
1.2	E32A125	5.20	5.72	6.76	8.32	9.36	11.44
1.5	E32A155	5.42	5.96	7.05	8.67	9.76	11.92
1.8	E32A185	5.58	6.14	7.25	8.93	10.04	12.28
2.0	E32A205	5.69	6.26	7.40	9.10	10.24	12.52
2.2	E32A225	5.98	6.58	7.77	9.57	10.76	13.16
2.7	E32A275	6.10	6.71	7.93	9.76	10.98	13.42
3.0	E32A305	6.22	6.84	8.09	9.95	11.20	13.68
3.3	E32A335	6.52	7.17	8.48	10.43	11.74	14.34
3.9	E32A395	6.85	7.54	8.91	10.96	12.33	15.07
4.0	E32A405	6.85	7.54	8.91	10.96	12.33	15.07
4.7	E32A475	7.36	8.10	9.57	11.78	13.25	16.19
5.0	E32A505	7.36	8.10	9.57	11.78	13.25	16.19
5.6	E32A565	8.09	8.90	10.52	12.94	14.56	17.80
6.8	E32A685	8.45	9.30	10.99	13.52	15.21	18.59
8.0	E32A805	9.60	10.56	12.48	15.36	17.28	21.12
8.2	E32A825	9.60	10.56	12.48	15.36	17.28	21.12
10.0	E32A106	9.60	10.56	12.48	15.36	17.28	21.12

E32B PRICES (1-10 UNITS)

BASIC PART NO.	10% tol. K	5% tol. J	2% tol. G	1% tol. F	0.5% tol. D	0.25% tol. B
E32B102	$4.13	$4.54	$5.37	$6.61	$7.43	$9.09
E32B122	4.13	4.54	5.37	6.61	7.43	9.09
E32B152	4.13	4.54	5.37	6.61	7.43	9.09
E32B182	4.13	4.54	5.37	6.61	7.43	9.09
E32B202	4.13	4.54	5.37	6.61	7.43	9.09
E32B222	4.13	4.54	5.37	6.61	7.43	9.09
E32B272	4.13	4.54	5.37	6.61	7.43	9.09
E32B332	4.13	4.54	5.37	6.61	7.43	9.09
E32B392	4.13	4.54	5.37	6.61	7.43	9.09
E32B472	4.13	4.54	5.37	6.61	7.43	9.09
E32B502	4.13	4.54	5.37	6.61	7.43	9.09
E32B562	4.13	4.54	5.37	6.61	7.43	9.09
E32B682	4.13	4.54	5.37	6.61	7.43	9.09
E32B822	4.13	4.54	5.37	6.61	7.43	9.09
E32B103	4.13	4.54	5.37	6.61	7.43	9.09
E32B123	4.13	4.54	5.37	6.61	7.43	9.09
E32B153	4.13	4.54	5.37	6.61	7.43	9.09
E32B183	4.13	4.54	5.37	6.61	7.43	9.09
E32B203	4.13	4.54	5.37	6.61	7.43	9.09
E32B223	4.13	4.54	5.37	6.61	7.43	9.09
E32B273	4.13	4.54	5.37	6.61	7.43	9.09
E32B333	4.13	4.54	5.37	6.61	7.43	9.09
E32B393	4.13	4.54	5.37	6.61	7.43	9.09
E32B473	4.13	4.54	5.37	6.61	7.43	9.09
E32B503	4.13	4.54	5.37	6.61	7.43	9.09
E32B563	4.13	4.54	5.37	6.61	7.43	9.09
E32B683	4.13	4.54	5.37	6.61	7.43	9.09
E32B823	4.13	4.54	5.37	6.61	7.43	9.09
E32B104	4.13	4.54	5.37	6.61	7.43	9.09
E32B124	4.24	4.66	5.51	6.78	7.63	9.33
E32B154	4.24	4.66	5.51	6.78	7.63	9.33
E32B184	4.30	4.73	5.59	6.88	7.74	9.46
E32B204	4.30	4.73	5.59	6.88	7.74	9.46
E32B224	4.30	4.73	5.59	6.88	7.74	9.46
E32B274	4.34	4.77	5.64	6.94	7.81	9.55
E32B334	4.56	5.02	5.93	7.30	8.21	10.03
E32B394	4.60	5.06	5.98	7.36	8.28	10.12
E32B474	4.60	5.06	5.98	7.36	8.28	10.12
E32B504	4.60	5.06	5.98	7.36	8.28	10.12
E32B564	4.75	5.23	6.18	7.60	8.55	10.45
E32B684	4.91	5.40	6.38	7.86	8.84	10.80
E32B824	4.91	5.40	6.38	7.86	8.84	10.80
E32B105	4.91	5.40	6.38	7.86	8.84	10.80

SERIES
D31B

CORDWOOD TEFLON
CAPACITOR PRICES

HOW TO ORDER

- See page 31 for specification information and case sizes.
- Select basic part number required and place desired tolerance letter at end of basic number.
- **IMPORTANT:** You must have complete part number for ordering purposes.
  Example: D31B273BSW is a 0.027 uF, 0.25%, 50VDC teflon capacitor with mylar sleeving and level 2 screening.
- Check part number information on page 18 for complete details concerning sleeving and wire leads.
- Type "W" leads are used for all capacitor values listed.
- Prices subject to change.
- **QUANTITY DISCOUNTS:**
  11-25 less 10%
  26-50 less 15%
  51-100 less 20%
  101-250 less 25%

D31B PRICES (1-10 UNITS)

uF	BASIC PART NO.	10% tol. K	5% tol. J	2% tol. G	1% tol. F	0.5% tol. D	0.25% tol. B
.001	D31B102	$4.96	$5.48	$6.47	$7.73	$9.90	$13.14
.0012	D31B122	4.96	5.48	6.47	7.73	9.90	13.14
.0015	D31B152	4.96	5.48	6.47	7.73	9.90	13.14
.0018	D31B182	4.96	5.48	6.47	7.73	9.90	13.14
.002	D31B202	4.96	5.48	6.47	7.73	9.90	13.14
.0022	D31B222	4.96	5.48	6.47	7.73	9.90	13.14
.0027	D31B272	4.96	5.48	6.47	7.73	9.90	13.14
.0033	D31B332	4.96	5.48	6.47	7.73	9.90	13.14
.0039	D31B392	4.96	5.48	6.47	7.73	9.90	13.14
.0047	D31B472	4.96	5.48	6.47	7.73	9.90	13.14
.005	D31B502	4.96	5.48	6.47	7.73	9.90	13.14
.0056	D31B562	4.96	5.48	6.47	7.73	9.90	13.14
.0068	D31B682	4.96	5.48	6.47	7.73	9.90	13.14
.0082	D31B822	4.96	5.48	6.47	7.73	9.90	13.14
.01	D31B103	4.96	5.48	6.47	7.73	9.90	13.14
.012	D31B123	4.96	5.48	6.47	7.73	9.90	13.14
.015	D31B153	4.96	5.48	6.47	7.73	9.90	13.14
.018	D31B183	4.96	5.48	6.47	7.73	9.90	13.14
.02	D31B203	4.96	5.48	6.47	7.73	9.90	13.14
.022	D31B223	4.96	5.48	6.47	7.73	9.90	13.14
.027	D31B273	5.35	5.77	6.67	7.92	10.30	14.32
.033	D31B333	5.35	5.77	6.67	7.92	10.30	14.32
.039	D31B393	5.48	6.16	7.07	8.39	10.90	14.46
.047	D31B473	5.76	6.49	7.60	8.92	11.29	14.59
.05	D31B503	5.76	6.49	7.60	8.92	11.29	14.59
.056	D31B563	6.02	6.98	9.18	10.43	12.01	14.72
.068	D31B683	6.19	7.63	9.77	11.09	13.60	15.58
.082	D31B823	7.86	9.11	10.50	11.82	14.46	17.29
.10	D31B104	7.86	9.11	10.50	11.82	14.46	17.29
.12	D31B124	8.63	9.80	11.35	12.67	15.38	19.14
.15	D31B154	8.63	9.80	11.35	12.67	15.38	19.14
.18	D31B184	11.33	12.88	14.26	15.58	18.29	21.12
.20	D31B204	11.33	12.88	14.26	15.58	18.29	21.12
.22	D31B224	11.33	12.88	14.26	15.58	18.29	21.12

CRC HIGH RELIABILITY CAPACITORS

*50VDC TEFLON PRICES (1-10 UNITS)

SERIES
11

HOW TO ORDER QUALITY LEVEL 1 B11 TEFLON

- See page 28 for 50V, 100V, and 200V, B11 series case sizes.
- *Prices shown below for 50 volt, B11B capacitors are the same for the 100 volt, B11C, and 200 volt, B11D, teflon capacitors.
- Select basic part number required and place desired tolerance letter at end of basic number.
- **IMPORTANT:** You must have complete part number for ordering purposes as shown below.
  Example: B11B103JXW is a 0.01 uF, 5%, 50V capacitor with no sleeving.
  Example: B11C334DSW is a 0.33 uF, 0.5%, 100V capacitor with mylar sleeving.
  Example: B11D105FXW is a 1.0 uF, 1%, 200V capacitor with no sleeving.
- See page 24 for B11 specifications.
- **QUANTITY DISCOUNTS:**

11-25 less 10%	26-50 less 15%
51-100 less 20%	101-250-less 25%

- Contact our sales office for larger quantities.

HOW TO ORDER QUALITY LEVEL 1 C11 TEFLON

- See page 28 for 50V, 100V, and 200V, C11 series case sizes.
- *Prices shown below for 50 volt, C11B capacitors are the same for the 100 volt, C11C, and 200 volt, C11D teflon capacitors.
- Select basic part number required and place desired tolerance letter at end of basic number.
- **IMPORTANT:** You must have complete part number for ordering purposes.
  Example: C11B682FSW is a 0.0068 uF, 1%, 50V, capacitor with mylar sleeving.
  Example: C11C152BXW is a 0.0015 uF, 0.25%, 100V, capacitor with no sleeving.
  Example: C11D155JSW is a 1.5 uF, 5%, 200V, capacitor with mylar sleeving.
- See page 25 for C11 specifications.
- Prices subject to change.
- **QUANTITY DISCOUNTS:**

11-25 less 10%	26-50 less 15%
51-100 less 20%	101-250-less 25%

- Contact our sales office for larger quantities.

B11B 50VDC TEFLON

uF	BASIC PART NO.	10% tol. K	5% tol. J	2% tol. G	1% tol. F	0.5% tol. D	0.25% tol. B
.001	B11B102	$9.30	$10.22	$12.09	$13.95	$15.80	$18.59
.0012	B11B122	9.30	10.22	12.09	13.95	15.80	18.59
.0015	B11B152	9.30	10.22	12.09	13.95	15.80	18.59
.0018	B11B182	9.30	10.22	12.09	13.95	15.80	18.59
.002	B11B202	9.30	10.22	12.09	13.95	15.80	18.59
.0022	B11B222	9.30	10.22	12.09	13.95	15.80	18.59
.0027	B11B272	9.30	10.22	12.09	13.95	15.80	18.59
.0033	B11B332	9.30	10.22	12.09	13.95	15.80	18.69
.0039	B11B392	9.30	10.22	12.09	13.95	15.80	18.59
.0047	B11B472	9.30	10.22	12.09	13.95	15.80	18.59
.005	B11B502	9.30	10.22	12.09	13.95	15.80	18.59
.0056	B11B562	9.30	10.22	12.09	13.95	15.80	18.59
.0068	B11B682	9.30	10.22	12.09	13.95	15.80	18.59
.0082	B11B822	9.30	10.22	12.09	13.95	15.80	18.59
.01	B11B103	9.30	10.22	12.09	13.95	15.80	18.59
.012	B11B123	9.30	10.22	12.09	13.95	15.80	18.59
.015	B11B153	9.30	10.22	12.09	13.95	15.80	18.59
.018	B11B183	9.34	10.27	12.14	14.01	15.88	18.68
.02	B11B203	9.38	10.32	12.19	14.07	15.94	18.75
.022	B11B223	9.43	10.37	12.24	14.12	16.02	18.84
.027	B11B273	9.47	10.41	12.30	14.20	16.08	18.92
.033	B11B333	9.92	10.92	12.91	14.89	16.86	19.85
.039	B11B393	10.27	11.30	13.33	15.38	17.46	20.52
.047	B11B473	10.56	11.60	13.73	15.83	17.94	21.11
.05	B11B503	10.56	11.60	13.73	15.83	17.94	21.11
.056	B11B563	11.02	12.11	14.31	16.53	18.73	22.04
.068	B11B683	11.60	12.76	15.09	17.41	19.72	23.21
.082	B11B823	13.78	15.15	17.91	20.66	23.42	27.55
.1	B11B104	13.78	15.15	17.91	20.66	23.42	27.55
.12	B11B124	14.10	15.50	18.33	21.15	23.95	28.18
.15	B11B154	14.70	16.17	19.11	22.05	24.99	29.40
.18	B11B184	15.99	17.60	20.79	24.00	27.19	31.99
.2	B11B204	17.53	19.26	22.78	26.28	29.79	35.04
.22	B11B224	17.53	19.26	22.78	26.28	29.79	35.04
.27	B11B274	19.21	21.13	24.01	26.89	30.73	36.50
.33	B11B334	21.21	23.32	26.52	29.69	33.92	40.29
.39	B11B394	22.93	25.22	27.52	29.81	34.40	41.27
.47	B11B474	24.10	26.51	28.92	31.33	36.15	43.38
.5	B11B504	24.89	27.38	29.87	32.36	37.34	44.80
.56	B11B564	26.49	29.14	31.79	34.44	39.74	47.68
.68	B11B684	28.07	30.88	33.68	36.49	42.11	50.53
.82	B11B824	30.15	33.17	36.18	39.20	45.23	54.27
1.0	B11B105	31.80	34.98	38.16	41.34	47.70	57.24
1.5	B11B155	39.16	43.08	46.99	50.91	55.57	63.23
2.0	B11B205	48.94	53.83	58.73	63.62	69.47	79.04

C11B 50VDC TEFLON

uF	BASIC PART NO.	10% tol. K	5% tol. J	2% tol. G	1% tol. F	0.5% tol. D	0.25% tol. B
.001	C11B102	$6.20	$6.81	$8.06	$9.30	$10.53	$12.39
.0012	C11B122	6.20	6.81	8.06	9.30	10.53	12.39
.0015	C11B152	6.20	6.81	8.06	9.30	10.53	12.39
.0018	C11B182	6.20	6.81	8.06	9.30	10.53	12.39
.002	C11B202	6.20	6.81	8.06	9.30	10.53	12.39
.0022	C11B222	6.20	6.81	8.06	9.30	10.53	12.39
.0027	C11B272	6.20	6.81	8.06	9.30	10.53	12.39
.0033	C11B332	6.20	6.81	8.06	9.30	10.53	12.39
.0039	C11B392	6.20	6.81	8.06	9.30	10.53	12.39
.0047	C11B472	6.20	6.81	8.06	9.30	10.53	12.39
.005	C11B502	6.20	6.81	8.06	9.30	10.53	12.39
.0056	C11B562	6.20	6.81	8.06	9.30	10.53	12.39
.0068	C11B682	6.20	6.81	8.06	9.30	10.53	12.39
.0082	C11B822	6.20	6.81	8.06	9.30	10.53	12.39
.01	C11B103	6.20	6.81	8.06	9.30	10.53	12.39
.012	C11B123	6.20	6.81	8.06	9.30	10.53	12.39
.015	C11B153	6.38	7.02	8.29	9.57	10.85	12.76
.018	C11B183	6.44	7.08	8.37	9.66	10.95	12.88
.02	C11B203	6.47	7.12	8.41	9.70	10.99	12.93
.022	C11B223	6.50	7.15	8.44	9.74	11.05	12.99
.027	C11B273	6.53	7.18	8.48	9.79	11.09	13.05
.033	C11B333	6.84	7.53	8.90	10.27	11.63	13.69
.039	C11B393	7.08	7.79	9.19	10.61	12.04	14.15
.047	C11B473	7.28	8.00	9.47	10.92	12.37	14.56
.05	C11B503	7.28	8.00	9.47	10.92	12.37	14.56
.056	C11B563	7.60	8.35	9.87	11.40	12.92	15.20
.068	C11B683	8.00	8.80	10.41	12.01	13.60	16.01
.082	C11B823	9.50	10.45	12.35	14.25	16.15	19.00
.1	C11B104	9.50	10.45	12.35	14.25	16.15	19.00
.12	C11B124	10.07	11.07	13.09	15.11	17.11	20.13
.15	C11B154	10.50	11.55	13.65	15.75	17.85	21.00
.18	C11B184	11.42	12.57	14.85	17.14	19.42	22.85
.2	C11B204	12.52	13.76	16.27	18.77	21.28	25.03
.22	C11B224	12.52	13.76	16.27	18.77	21.28	25.03
.27	C11B274	13.72	15.09	17.15	19.21	21.95	26.07
.33	C11B334	15.15	16.66	18.94	21.21	24.23	28.78
.39	C11B394	16.38	18.02	20.48	22.93	26.21	31.12
.47	C11B474	17.85	19.63	22.32	24.99	28.55	33.91
.5	C11B504	18.44	20.29	23.06	25.81	29.51	35.03
.56	C11B564	20.03	22.03	25.04	28.05	32.05	38.07
.68	C11B684	21.44	23.58	26.80	30.01	34.30	40.73
.82	C11B824	24.60	27.05	29.51	31.98	36.89	44.28
1.0	C11B105	26.50	29.15	31.80	34.45	39.75	47.70
1.5	C11B155	32.64	35.90	39.17	42.43	46.31	52.69
2.0	C11B205	40.78	44.86	48.94	53.01	57.89	65.87

CRC HIGH RELIABILITY CAPACITORS

*50VDC TEFLON PRICES (1-10 UNITS)

SERIES
11

HOW TO ORDER QUALITY LEVEL 2 D11 TEFLON

- See page 28 for 50V, 100V, and 200V, D11 series case sizes.
- *Prices shown below for 50 volt, D11B capacitors are the same for the 100 volt, D11C, and 200 volt, D11D, teflon capacitors.
- Select basic part number required and place desired tolerance letter at end of basic number.
- **IMPORTANT:** You must have complete part number for ordering purposes as shown below.
  Example: D11B472FXW is a 0.0047 uF, 1%, 50V capacitor with no sleeving.
  Example: D11C154KSW is a 0.15 uF, 10%, 100V capacitor with mylar sleeving.
  Example: D11D824DXW is a 0.82 uF, 0.5%, 200V capacitor with no sleeving.
- See page 26 for D11 specifications.
- **QUANTITY DISCOUNTS:**
  11-25 less 10% 26-50 less 15%
  51-100 less 20% 101-250-less 25%

D11B 50VDC TEFLON

uF	BASIC PART NO.	10% tol. K	5% tol. J	2% tol. G	1% tol. F	0.5% tol. D	0.25% tol. B
.001	D11B102	$4.13	$4.54	$5.37	$6.20	$7.02	$8.26
.0012	D11B122	4.13	4.54	5.37	6.20	7.02	8.26
.0015	D11B152	4.13	4.54	5.37	6.20	7.02	8.26
.0018	D11B182	4.13	4.54	5.37	6.20	7.02	8.26
.002	D11B202	4.13	4.54	5.37	6.20	7.02	8.26
.0022	D11B222	4.13	4.54	5.37	6.20	7.02	8.26
.0027	D11B272	4.13	4.54	5.37	6.20	7.02	8.26
.0033	D11B332	4.13	4.54	5.37	6.20	7.02	8.26
.0039	D11B392	4.13	4.54	5.37	6.20	7.02	8.26
.0047	D11B472	4.13	4.54	5.37	6.20	7.02	8.26
.005	D11B502	4.13	4.54	5.37	6.20	7.02	8.26
.0056	D11B562	4.13	4.54	5.37	6.20	7.02	8.26
.0068	D11B682	4.13	4.54	5.37	6.20	7.02	8.26
.0082	D11B822	4.13	4.54	5.37	6.20	7.02	8.26
.01	D11B103	4.13	4.54	5.37	6.20	7.02	8.26
.012	D11B123	4.13	4.54	5.37	6.20	7.02	8.26
.015	D11B153	4.40	4.84	5.72	6.60	7.48	8.80
.018	D11B183	4.44	4.88	5.77	6.66	7.55	8.88
.02	D11B203	4.46	4.91	5.80	6.69	7.58	8.92
.022	D11B223	4.48	4.93	5.82	6.72	7.62	8.96
.027	D11B273	4.50	4.95	5.85	6.75	7.65	9.00
.033	D11B333	4.72	5.19	6.14	7.08	8.02	9.44
.039	D11B393	4.88	5.37	6.34	7.32	8.30	9.76
.047	D11B473	5.02	5.52	6.53	7.53	8.53	10.04
.05	D11B503	5.02	5.52	6.53	7.53	8.53	10.04
.056	D11B563	5.24	5.76	6.81	7.86	8.91	10.48
.068	D11B683	5.52	6.07	7.18	8.28	9.38	11.04
.082	D11B823	6.55	7.21	8.52	9.83	11.14	13.10
.1	D11B104	6.55	7.21	8.52	9.83	11.14	13.10
.12	D11B124	7.19	7.91	9.35	10.79	12.22	14.38
.15	D11B154	7.50	8.25	9.75	11.25	12.75	15.00
.18	D11B184	8.16	8.98	10.61	12.24	13.87	16.32
.2	D11B204	8.94	9.83	11.62	13.41	15.20	17.88
.22	D11B224	8.94	9.83	11.62	13.41	15.20	17.88
.27	D11B274	9.80	10.78	12.25	13.72	15.68	18.62
.33	D11B334	10.82	11.90	13.53	15.15	17.31	20.56
.39	D11B394	11.70	12.87	14.63	16.38	18.72	22.23
.47	D11B474	13.22	14.54	16.53	18.51	21.15	25.12
.5	D11B504	13.66	15.03	17.08	19.12	21.86	25.95
.56	D11B564	14.84	16.32	18.55	20.78	23.74	28.20
.68	D11B684	15.88	17.47	19.85	22.23	25.41	30.17
.82	D11B824	18.92	20.81	22.70	24.60	28.38	34.06
1.0	D11B105	21.42	23.56	25.70	27.85	32.13	38.56
1.5	D11B155	29.50	32.45	35.40	38.35	44.25	53.10
2.0	D11B205	34.58	38.04	41.50	44.95	51.87	62.24

HOW TO ORDER QUALITY LEVEL 3 E11 TEFLON

- See page 28 for 50V, 100V, and 200V, E11 series case sizes.
- *Prices shown below for 50 volt, E11B capacitors are the same for the 100 volt, E11C, and 200 volt, E11D, teflon capacitors.
- Select basic part number required and place desired tolerance letter at end of basic number.
- **IMPORTANT:** You must have complete part number for ordering purposes as shown below.
  Example: E11B204JSW is a 0.2 uF, 5%, 50V, capacitor with mylar sleeving.
  Example: E11C273BXW is a 0.027 uF, 0.25%, 100V, capacitor with no sleeving.
  Example: E11D562GSW is a 0.0056 uF, 2%, 200V, capacitor with mylar sleeving.
- See Page 27 for E11 specifications.
- Prices subject to change.
- **QUANTITY DISCOUNTS:**
  11-25 less 10% 26-50 less 15%
  51-100 less 20% 101-250-less 25%
- Contact our sales office for larger quantities.

E11B 50VDC TEFLON

uF	BASIC PART NO.	10% tol. K	5% tol. J	2% tol. G	1% tol. F	0.5% tol. D	0.25% tol. B
.001	E11B102	$3.51	$3.86	$4.56	$5.27	$5.97	$7.02
.0012	E11B122	3.51	3.86	4.56	5.27	5.97	7.02
.0015	E11B152	3.51	3.86	4.56	5.27	5.97	7.02
.0018	E11B182	3.51	3.86	4.56	5.27	5.97	7.02
.002	E11B202	3.51	3.86	4.56	5.27	5.97	7.02
.0022	E11B222	3.51	3.86	4.56	5.27	5.97	7.02
.0027	E11B272	3.51	3.86	4.56	5.27	5.97	7.02
.0033	E11B332	3.51	3.86	4.56	5.27	5.97	7.02
.0039	E11B392	3.51	3.86	4.56	5.27	5.97	7.02
.0047	E11B472	3.51	3.86	4.56	5.27	5.97	7.02
.005	E11B502	3.51	3.86	4.56	5.27	5.97	7.02
.0056	E11B562	3.51	3.86	4.56	5.27	5.97	7.02
.0068	E11B682	3.51	3.86	4.56	5.27	5.97	7.02
.0082	E11B822	3.51	3.86	4.56	5.27	5.97	7.02
.01	E11B103	3.51	3.86	4.56	5.27	5.97	7.02
.012	E11B123	3.51	3.86	4.56	5.27	5.97	7.02
.015	E11B153	3.74	4.11	4.86	5.61	6.36	7.48
.018	E11B183	3.77	4.15	4.90	5.66	6.42	7.55
.02	E11B203	3.79	4.17	4.93	5.69	6.44	7.58
.022	E11B223	3.81	4.19	4.95	5.71	6.48	7.62
.027	E11B273	3.82	4.21	4.97	5.74	6.50	7.65
.033	E11B333	4.01	4.41	5.22	6.02	6.82	8.02
.039	E11B393	4.15	4.56	5.39	6.22	7.05	8.30
.047	E11B473	4.27	4.69	5.55	6.40	7.25	8.53
.05	E11B503	4.27	4.69	5.55	6.40	7.25	8.53
.056	E11B563	4.45	4.90	5.79	6.68	7.57	8.91
.068	E11B683	4.69	5.16	6.10	7.04	7.97	9.38
.082	E11B823	5.57	6.13	7.24	8.36	9.47	11.13
.1	E11B104	5.57	6.13	7.24	8.36	9.47	11.13
.12	E11B124	6.11	6.72	7.95	9.17	10.39	12.22
.15	E11B154	6.37	7.01	8.29	9.56	10.84	12.75
.18	E11B184	6.94	7.63	9.02	10.40	11.79	13.87
.2	E11B204	7.60	8.36	9.88	11.40	12.92	15.20
.22	E11B224	7.60	8.36	9.88	11.40	12.92	15.20
.27	E11B274	8.33	9.16	10.41	11.66	13.33	15.83
.33	E11B334	9.20	10.11	11.50	12.88	14.71	17.48
.39	E11B394	9.94	10.94	12.44	13.92	15.91	18.90
.47	E11B474	11.24	12.36	14.05	15.73	17.98	21.35
.5	E11B504	11.61	12.78	14.52	16.25	18.58	22.06
.56	E11B564	12.61	13.87	15.77	17.66	20.18	23.97
.68	E11B684	13.50	14.85	16.87	18.90	21.60	25.64
.82	E11B824	16.08	17.69	19.29	20.91	24.12	28.95
1.0	E11B105	18.21	20.03	21.84	23.67	27.31	32.78
1.5	E11B155	25.07	27.58	30.09	32.60	37.61	45.13
2.0	E11B205	29.39	32.33	35.27	38.21	44.09	52.90

CRC HIGH RELIABILITY CAPACITORS

100VDC & 200VDC TEFLON PRICES (1-10 UNITS)

SERIES
D51

HOW TO ORDER

- Select basic part number required and place desired tolerance letter at end of basic number.
- **IMPORTANT:** You must have complete basic number for ordering purposes as shown below.
  Example: D51C472KSW is a 0.0047 uF, 10%, 100V capacitor with mylar sleeving.
  Example: D51D824JXW is a 0.82 uF, 5%, 200V capacitor without sleeving.
- Prices subject to change.

- **QUANTITY DISCOUNTS:**
  11-25 less 10% 26-50 less 15%
  51-100 less 20% 101-250 less 25%
- Contact our sales office for larger quantities.

QUALITY LEVEL 2, D51 SERIES TEFLON CAPACITORS

- See page 28 for D51 case sizes and specifications.
- See page 30 for X51 life test data.

D51C 100VDC TEFLON

uF	BASIC PART NO.	10% tol. K	5% tol. J	2% tol. G	1% tol. F	0.5% tol. D	0.25% tol. B
.001	D51C102	$4.54	$4.99	$5.90	$6.81	$7.72	$9.08
.0012	D51C122	4.54	4.99	5.90	6.81	7.72	9.08
.0015	D51C152	4.54	4.99	5.90	6.81	7.72	9.08
.0018	D51C182	4.54	4.99	5.90	6.81	7.72	9.08
.002	D51C202	4.54	4.99	5.90	6.81	7.72	9.08
.0022	D51C222	4.54	4.99	5.90	6.81	7.72	9.08
.0027	D51C272	4.54	4.99	5.90	6.81	7.72	9.08
.0033	D51C332	4.54	4.99	5.90	6.81	7.72	9.08
.0039	D51C392	4.54	4.99	5.90	6.81	7.72	9.08
.0047	D51C472	4.54	4.99	5.90	6.81	7.72	9.08
.005	D51C502	4.54	4.99	5.90	6.81	7.72	9.08
.0056	D51C562	4.54	4.99	5.90	6.81	7.72	9.08
.0068	D51C682	4.54	4.99	5.90	6.81	7.72	9.08
.0082	D51C822	4.54	4.99	5.90	6.81	7.72	9.08
.01	D51C103	4.54	4.99	5.90	6.81	7.72	9.08
.012	D51C123	4.54	4.99	5.90	6.81	7.72	9.08
.015	D51C153	4.74	5.21	6.16	7.11	8.06	9.48
.018	D51C183	4.88	5.37	6.34	7.32	8.30	9.76
.02	D51C203	4.91	5.40	6.38	7.37	8.35	9.82
.022	D51C223	4.93	5.42	6.41	7.40	8.38	9.86
.027	D51C273	4.95	5.45	6.44	7.43	8.42	9.90
.033	D51C333	5.19	5.71	6.75	7.79	8.82	10.38
.039	D51C393	5.37	5.91	6.98	8.06	9.13	10.74
.047	D51C473	5.52	6.07	7.18	8.28	9.38	11.04
.05	D51C503	5.52	6.07	7.18	8.28	9.38	11.04
.056	D51C563	5.76	6.34	7.49	8.64	9.79	11.52
.068	D51C683	6.07	6.68	7.89	9.11	10.32	12.14
.082	D51C823	7.21	7.93	9.37	10.82	12.26	14.42
.1	D51C104	7.21	7.93	9.37	10.82	12.26	14.42
.12	D51C124	7.91	8.70	10.28	11.87	13.45	15.82
.15	D51C154	8.25	9.08	10.73	12.38	14.03	16.50
.18	D51C184	8.98	9.88	11.67	13.47	15.27	17.96
.2	D51C204	9.83	10.81	12.78	14.75	16.71	19.66
.22	D51C224	9.83	10.81	12.78	14.75	16.71	19.66
.27	D51C274	10.78	11.86	13.48	15.09	17.25	20.48
.33	D51C334	11.90	13.09	14.88	16.66	19.04	22.61
.39	D51C394	12.87	14.16	16.09	18.02	20.59	24.45
.47	D51C474	14.54	15.99	18.18	20.36	23.26	27.63
.5	D51C504	15.03	16.53	18.79	21.04	24.05	28.56
.56	D51C564	16.32	17.95	20.40	22.85	26.11	31.01
.68	D51C684	17.47	19.22	21.84	24.46	27.95	33.19
.82	D51C824	20.81	22.89	24.97	27.05	31.22	37.46
1.0	D51C105	23.56	25.92	28.27	30.63	35.34	42.41

D51D 200VDC TEFLON

uF	BASIC PART NO.	10% tol. K	5% tol. J	2% tol. G	1% tol. F	0.5% tol. D	0.25% tol. B
.001	D51D102	$4.99	$5.49	$6.49	$7.49	$8.49	$9.99
.0012	D51D122	4.99	5.49	6.49	7.49	8.49	9.99
.0015	D51D152	4.99	5.49	6.49	7.49	8.49	9.99
.0018	D51D182	4.99	5.49	6.49	7.49	8.49	9.99
.002	D51D202	4.99	5.49	6.49	7.49	8.49	9.99
.0022	D51D222	4.99	5.49	6.49	7.49	8.49	9.99
.0027	D51D272	4.99	5.49	6.49	7.49	8.49	9.99
.0033	D51D332	4.99	5.49	6.49	7.49	8.49	9.99
.0039	D51D392	4.99	5.49	6.49	7.49	8.49	9.99
.0047	D51D472	4.99	5.49	6.49	7.49	8.49	9.99
.005	D51D502	4.99	5.49	6.49	7.49	8.49	9.99
.0056	D51D562	4.99	5.49	6.49	7.49	8.49	9.99
.0068	D51D682	4.99	5.49	6.49	7.49	8.49	9.99
.0082	D51D822	4.99	5.49	6.49	7.49	8.49	9.99
.01	D51D103	4.99	5.49	6.49	7.49	8.49	9.99
.012	D51D123	4.99	5.49	6.49	7.49	8.49	9.99
.015	D51D153	5.21	5.73	6.78	7.82	8.87	10.43
.018	D51D183	5.37	5.91	6.97	8.05	9.13	10.74
.02	D51D203	5.40	5.94	7.02	8.11	9.19	10.80
.022	D51D223	5.42	5.96	7.05	8.14	9.22	10.85
.027	D51D273	5.45	6.00	7.08	8.17	9.26	10.89
.033	D51D333	5.71	6.28	7.43	8.57	9.70	11.42
.039	D51D393	5.91	6.50	7.68	8.87	10.04	11.81
.047	D51D473	6.07	6.68	7.90	9.11	10.32	12.14
.05	D51D503	6.07	6.68	7.90	9.11	10.32	12.14
.056	D51D563	6.34	6.97	8.24	9.50	10.77	12.67
.068	D51D683	6.68	7.35	8.68	10.02	11.35	13.35
.082	D51D823	7.93	8.72	10.31	11.90	13.49	15.86
.1	D51D104	7.93	8.72	10.31	11.90	13.49	15.86
.12	D51D124	8.70	9.57	11.31	13.06	14.80	17.40
.15	D51D154	9.08	9.99	11.80	13.62	15.43	18.15
.18	D51D184	9.88	10.87	12.84	14.82	16.80	19.76
.2	D51D204	10.81	11.89	14.06	16.23	18.38	21.63
.22	D51D224	10.81	11.89	14.06	16.23	18.38	21.63
.27	D51D274	11.86	13.05	14.83	16.60	18.98	22.53
.33	D51D334	13.09	14.40	16.37	18.33	20.94	24.87
.39	D51D394	14.16	15.58	17.70	19.82	22.65	26.90
.47	D51D474	15.99	17.59	20.00	22.40	25.59	30.39
.5	D51D504	16.53	18.18	20.67	23.14	26.46	31.42
.56	D51D564	17.95	19.75	22.44	25.14	28.72	34.11
.68	D51D684	19.22	21.14	24.02	26.91	30.75	36.51
.82	D51D824	22.89	25.18	27.47	29.76	34.34	41.21
1.0	D51D105	25.92	28.51	31.10	33.69	38.87	46.65

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catalog J

COMPONENT RESEARCH CO., INC. • 1717 19TH STREET • SANTA MONICA, CALIF. 90404 • (213) 829-3615 TWX: (910) 343-6864

CRC HIGH RELIABILITY CAPACITORS

50VDC & 100VDC POLYSTYRENE PRICES (1-10 UNITS)

SERIES
N53

HOW TO ORDER

- Select basic part number required and place desired tolerance letter at end of basic number.
- **IMPORTANT:** You must have complete basic number for ordering purposes as shown below.
  Example: N53B682FSW is a 0.0068 uF, 1%, 50V capacitor with mylar sleeving.
  Example: N53C155GXW is a 1.5 uF, 2%, 100V capacitor with no sleeving.
- 0.1% tolerance capacitors are available at approximately twice the 0.5% prices shown below.

- **QUANTITY DISCOUNTS:**

11-25 less 10%	26-50 less 15%
51-100 less 20%	101-250 less25%

- Contact our sales office for larger quantities.

QUALITY LEVEL 3, N53 SERIES POLYSTYRENE CAPACITORS
- See page 33 for N53 case sizes.
- See page 32 for N53 specifications.
- See page 34 for special L53 polystyrene life test data.
- See page 35 for special AC rated polystyrene capacitors.

N53B 50VDC POLYSTYRENE

uF	BASIC PART NO.	10% tol. K	5% tol. J	2% tol. G	1% tol. F	0.5% tol. D	0.25% tol. B
.001	N53B102	$4.13	$4.54	$5.37	$6.61	$7.43	$9.09
.0012	N53B122	4.13	4.54	5.37	6.61	7.43	9.09
.0015	N53B152	4.13	4.54	5.37	6.61	7.43	9.09
.0018	N53B182	4.13	4.54	5.37	6.61	7.43	9.09
.002	N53B202	4.13	4.54	5.37	6.61	7.43	9.09
.0022	N53B222	4.13	4.54	5.37	6.61	7.43	9.09
.0027	N53B272	4.13	4.54	5.37	6.61	7.43	9.09
.0033	N53B332	4.13	4.54	5.37	6.61	7.43	9.09
.0039	N53B392	4.13	4.54	5.37	6.61	7.43	9.09
.0047	N53B472	4.13	4.54	5.37	6.61	7.43	9.09
.005	N53B502	4.13	4.54	5.37	6.61	7.43	9.09
.0056	N53B562	4.13	4.54	5.37	6.61	7.43	9.09
.0068	N53B682	4.13	4.54	5.37	6.61	7.43	9.09
.0082	N53B822	4.13	4.54	5.37	6.61	7.43	9.09
.01	N53B103	4.13	4.54	5.37	6.61	7.43	9.09
.012	N53B123	4.24	4.66	5.51	6.78	7.63	9.33
.015	N53B153	4.24	4.66	5.51	6.78	7.63	9.33
.018	N53B183	4.30	4.73	5.59	6.88	7.74	9.46
.02	N53B203	4.30	4.73	5.59	6.88	7.74	9.46
.022	N53B223	4.30	4.73	5.59	6.88	7.74	9.46
.027	N53B273	4.30	4.73	5.59	6.88	7.74	9.46
.033	N53B333	4.30	4.73	5.59	6.88	7.74	9.46
.039	N53B393	4.35	4.79	5.66	6.96	7.83	9.57
.047	N53B473	4.40	4.84	5.72	7.04	7.92	9.68
.05	N53B503	4.45	4.90	5.79	7.12	8.01	9.79
.056	N53B563	4.51	4.96	5.86	7.22	8.12	9.92
.068	N53B683	4.56	5.02	5.93	7.30	8.21	10.03
.082	N53B823	4.68	5.15	6.08	7.49	8.42	10.30
.1	N53B104	4.72	5.19	6.14	7.55	8.50	10.38
.12	N53B124	4.79	5.27	6.23	7.66	8.62	10.54
.15	N53B154	4.86	5.35	6.32	7.78	8.75	10.69
.18	N53B184	4.91	5.40	6.38	7.86	8.84	10.80
.20	N53B204	5.30	5.83	6.89	8.48	9.54	11.66
.22	N53B224	5.42	5.96	7.05	8.67	9.76	11.92
.27	N53B274	5.80	6.38	7.54	9.28	10.44	12.76
.33	N53B334	6.22	6.84	8.09	9.95	11.20	13.68
.39	N53B394	6.52	7.17	8.48	10.43	11.74	14.34
.47	N53B474	6.70	7.37	8.71	10.72	12.06	14.74
.50	N53B504	6.70	7.37	8.71	10.72	12.06	14.74
.56	N53B564	6.80	7.48	8.84	10.88	12.24	14.96
.68	N53B684	6.90	7.59	8.97	11.04	12.42	15.18
.82	N53B824	7.10	7.81	9.23	11.36	12.78	15.62
1.0	N53B105	7.36	8.10	9.57	11.78	13.25	16.19
1.5	N53B155	8.09	8.90	10.52	12.94	14.56	17.80
2.0	N53B205	9.60	10.56	12.48	15.36	17.28	21.12

N53C 100VDC POLYSTYRENE

uF	BASIC PART NO.	10% tol. K	5% tol. J	2% tol. G	1% tol. F	0.5% tol. D	0.25% tol. B
.001	N53C102	$4.13	$4.54	$5.37	$6.61	$7.43	$9.09
.0012	N53C122	4.13	4.54	5.37	6.61	7.43	9.09
.0015	N53C152	4.13	4.54	5.37	6.61	7.43	9.09
.0018	N53C182	4.13	4.54	5.37	6.61	7.43	9.09
.002	N53C202	4.13	4.54	5.37	6.61	7.43	9.09
.0022	N53C222	4.13	4.54	5.37	6.61	7.43	9.09
.0027	N53C272	4.13	4.54	5.37	6.61	7.43	9.09
.0033	N53C332	4.13	4.54	5.37	6.61	7.43	9.09
.0039	N53C392	4.13	4.54	5.37	6.61	7.43	9.09
.0047	N53C472	4.13	4.54	5.37	6.61	7.43	9.09
.005	N53C502	4.13	4.54	5.37	6.61	7.43	9.09
.0056	N53C562	4.13	4.54	5.37	6.61	7.43	9.09
.0068	N53C682	4.13	4.54	5.37	6.61	7.43	9.09
.0082	N53C822	4.13	4.54	5.37	6.61	7.43	9.09
.01	N53C103	4.13	4.54	5.37	6.61	7.43	9.09
.012	N53C123	4.24	4.66	5.51	6.78	7.63	9.33
.015	N53C153	4.24	4.66	5.51	6.78	7.63	9.33
.018	N53C183	4.30	4.73	5.59	6.88	7.74	9.46
.02	N53C203	4.30	4.73	5.59	6.88	7.74	9.46
.022	N53C223	4.30	4.73	5.59	6.88	7.74	9.46
.027	N53C273	4.30	4.73	5.59	6.88	7.74	9.46
.033	N53C333	4.30	4.73	5.59	6.88	7.74	9.46
.039	N53C393	4.35	4.79	5.66	6.96	7.83	9.57
.047	N53C473	4.40	4.84	5.72	7.04	7.92	9.68
.05	N53C503	4.45	4.90	5.79	7.12	8.01	9.79
.056	N53C563	4.51	4.96	5.86	7.22	8.12	9.92
.068	N53C683	4.56	5.02	5.93	7.30	8.21	10.03
.082	N53C823	4.72	5.19	6.14	7.55	8.50	10.38
.1	N53C104	4.79	5.27	6.23	7.66	8.62	10.54
.12	N53C124	4.91	5.40	6.38	7.86	8.84	10.80
.15	N53C154	4.95	5.45	6.44	7.92	8.91	10.89
.18	N53C184	5.10	5.61	6.63	8.16	9.18	11.22
.20	N53C204	5.40	5.94	7.02	8.64	9.72	11.88
.22	N53C224	5.65	6.22	7.35	9.04	10.17	12.43
.27	N53C274	6.12	6.73	7.96	9.79	11.02	13.46
.33	N53C334	6.52	7.17	8.48	10.43	11.74	14.34
.39	N53C394	6.90	7.59	8.97	11.04	12.42	15.18
.47	N53C474	7.15	7.87	9.30	11.44	12.87	15.73
.50	N53C504	7.15	7.87	9.30	11.44	12.87	15.73
.56	N53C564	7.25	7.98	9.43	11.60	13.05	15.95
.68	N53C684	7.39	8.13	9.61	11.82	13.30	16.26
.82	N53C824	7.65	8.42	9.95	12.24	13.77	16.83
1.0	N53C105	8.09	8.90	10.52	12.94	14.56	17.80
1.5	N53C155	9.60	10.56	12.48	15.36	17.28	21.12

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COMPONENT RESEARCH

Established Reliability

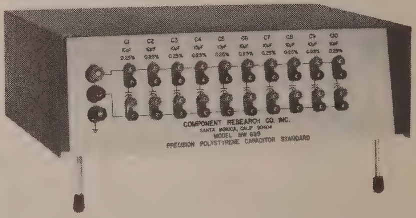
PLASTIC FILM CAPACITORS
QUALIFIED TO
MIL-C-83421/1 &
MIL-C-39022/9C

50 PAGES

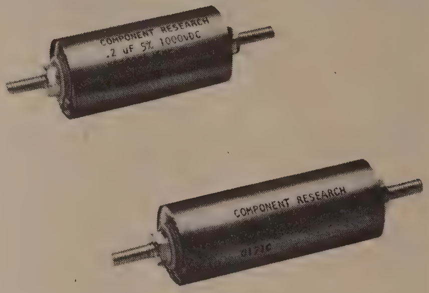
VOL. 2 PAGES 2·42 TO 2·91
IN EEM

- ★ SPECIFICATIONS
- ★ AC LIFE TEST DATA
- ★ QUALIFICATION INFORMATION
- ★ PRICES AND DELIVERY

Component Research Co. manufactures special capacitor standards which are used as references for system checkout applications. Typically, capacitor banks can be supplied from 1 uF to 1000 uF to an accuracy of ±0.1% at 25°C. Banks can be provided with selector switches or connecting links to provide series and parallel connection capability for breadboard purposes. Assemblies generally are made from high reliability type N53 polystyrene capacitor sections which are carefully aged and sealed for low temperature coefficient and drift. Their insulation resistance is usually 1,000,000 megohms-uF and the dissipation factor is less than 0.1% at the output terminals.


C1 C2 C3 C4 C5 C6 C7 C8 C9 C10
10uF
0.25%
COMPONENT RESEARCH CO. INC.
SANTA MONICA, CALIF 90404
MODEL HW 699
PRECISION POLYSTYRENE CAPACITOR STANDARD

The capacitor standard shown above consists of ten individual 10 uF, ±0.25%, 100 VDC polystyrene capacitors which can be parallel connected for a total of 100 uF, ±0.25%. Provision has been made for series or parallel connection as shown on the front panel. The individual capacitor output arrangement permits connection to both legs of comparison bridges such as impedance comparators or to ratio transformer devices.



Extremely low ESR, AC and DC rated, oil impregnated foil and metallized capacitors as shown above are available in compact hermetically sealed enclosures. These capacitors are capable of handling 50 amps RMS at frequencies up to 100 KHz or more in a case size of 1″ x 2.375″. These capacitors have an unusually low heat rise under severe AC pulsed or continuous conditions.

NEW ADDRESS IN 1975

PENNSYLVANIA AT TWENTY-SIXTH STREET
SANTA MONICA, CALIF. 90404

Our new 50,000 square foot facility at Pennsylvania and 26th St. in Santa Monica, Calif. will be in operation late in 1975. This will enable CRC to handle all orders with increased efficiency in the shortest possible time.

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COMPONENT RESEARCH CO.

CATALOG SUPPLEMENT

A

SUPPLEMENTARY CAPACITOR-INFORMATION SECTION

CRC HAS ADDED THIS SECTION TO PROVIDE INFORMATION ON NEW PRODUCTS, UNUSUAL CAPACITOR TEST DATA, AND A COMPILATION OF MISCELLANEOUS ITEMS OF INTEREST TO DESIGNERS, COMPONENT ENGINEERS, AND RELIABILITY PERSONNEL. IN ADDITION WE ARE PLANNING TO MANUFACTURE A COMPREHENSIVE PRODUCT LINE OF STANDARD AND CUSTOM FEED-THROUGH CAPACITORS AND EMI FILTERS. WE BELIEVE THESE PRODUCTS WILL BE OF HIGHER QUALITY AND PERFORMANCE THAN ANY SIMILAR PRODUCTS NOW AVAILABLE.

MANY OF OUR CUSTOMERS NOW USING EMI FILTERS HAVE EXPRESSED DISSATISFACTION WITH THE QUALITY AND RELIABILITY OF THE FILTERS PRESENTLY AVAILABLE, AND HAVE URGED US TO ENTER THIS AREA OF INTEREST. PLEASE FORWARD TO US ANY OF YOUR REQUIREMENTS FOR CAPACITORS, NETWORKS, AND EMI FILTERS, SO THAT WE CAN DETERMINE IF WE CAN MEET YOUR NEEDS.

NEW LOCATION AFTER NOVEMBER
1655 TWENTY SIXTH STREET
SANTA MONICA, CALIFORNIA 90404

AS THIS CATALOG SUPPLEMENT IS BEING PUBLISHED, CONSTRUCTION IS BEING COMPLETED ON OUR NEW, MODERN RESEARCH AND MANUFACTURING FACILITY LOCATED A SHORT DISTANCE FROM OUR PRESENT FACILITY AT 1717 19th STREET, IN SANTA MONICA. OVER 50,000 SQUARE FEET OF MANUFACTURING, RESEARCH AND WAREHOUSE SPACE WILL BE AVAILABLE TO US TO HANDLE THE EVER INCREASING DEMAND FOR OUR ESTABLISHED RELIABILITY CAPACITORS.

CATALOG-SUPPLEMENT INDEX • SUPPLEMENTARY SECTION FOLLOWS PAGE 50	SECTION
CAPACITOR CHARACTERISTICS COMPARISON CHART COVERS METALLIZED POLYCARBONATE	B
MIL-SPECIFICATION TYPE CAPACITORS, METAL CASED, WITH AXIAL LEADS.	C
LONG TERM THERMAL AGING TEST REPORT FOR METALLIZED POLYCARBONATE CAPACITORS SHOWS DATA AFTER 400 CYCLES OF CONTINUOUS EXPOSURE FROM −65°C TO +125°C.	D E
HOW TO ANTICIPATE AND PREDICT CAPACITOR TERMINATION FAILURES, AND IMPROVE RELIABILITY BY 100% SCREENING.	F
MIS-APPLICATIONS OF CAPACITORS IN AC CIRCUITS, ENVIRONMENTAL AND STORAGE EFFECTS ON TERMINATIONS AND HOW CAPACITOR OPENS AND INTERMITTENTS DEVELOP.	G
DC LIFE TEST DATA FOR METALLIZED TEFLON CAPACITORS FOR ANALOG AND MEMORY APPLICATIONS.	H
HIGH VIBRATION TEST REPORT COVERING SPECIAL C12 POLYCARBONATE CAPACITORS.	H
VIKING ULTRA HIGH-RELIABILITY METALLIZED TEFLON CAPACITORS.	I

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CATALOG SUPPLEMENT

B

COMPONENT

COMPARISON CHART FOR MIL-SPECIFICATION

Component Research Company has prepared this capacitor performance and characteristics chart in order for engineers to clearly see what choice in specification limits and screening is available in the established reliability Mil-Specifications for Metallized Polycarbonate Capacitors.

Due to possible ambiguity in specification wording, both manufacturer and user may not be following the specifications faithfully in carrying out the intent of the military requirements.

Component Research Company as a manufacturer qualified to "R" failure rate for MIL-C-83421/1 and MIL-C-39022/9C, uses the characteristics and 100% screening shown for these two MIL-SPECIFICATIONS in this chart as a minimum, for meeting specification requirements.

CHARACTERISTIC	MIL-C-83421/1		MIL-C-39022/9C
	STYLE CRH01 - CRH05	STYLE CRH06 - CRH00	STYLE CHR01A, D, G, K, N
CONSTRUCTION: METAL CASED, HERMETICALLY SEALED, TUBULAR, AXIAL LEADS	Yes	Yes	Yes
OPERATING TEMPERATURE	−65°C to +100°C Derate AC — DC Voltage by 50% @ 125°C		−65°C Derate
DC VOLTAGE RATINGS	30VDC, 50VDC, 100VDC, 200VDC, 400VDC		30VDC,
AC VOLTAGE RATINGS	From 0 to 40 KHz		From
CAPACITANCE TOLERANCES AVAILABLE	0.25%, 0.5%, 1%, 2%, 5%, 10%	0.25%, 0.5%, 1%, 2%, 5%, 10%	0.25%, 0.5%, 1%, 2%, 5%, 10%
MAXIMUM DF @ 25°C	0.15% Max.	0.15% Max.	0.15% Max.
MAXIMUM DF @ 85°C	0.15% Max.	0.15% Max.	0.15% Max.
MAXIMUM DF @ 125°C	0.15% Max.	0.15% Max.	0.15% Max.
MAXIMUM DF AFTER LIFE @ 25°C	0.25% Max.	0.35% Max.	0.25% Max.
MAXIMUM CAPACITANCE CHANGE	−1.5% to −0.5% @ −55°C +0.8% to −0.5% @ +125°C	−2.0% to −.05% @ −55°C ±2.0% @ +125°C	−1.5% to −0.5% @ −55°C +0.8% to −0.5% @ +125°C
MINIMUM I.R. FOR 0.1μF OR LESS @ RATED VOLTAGE @ +25°C	3,000,000 Megohms Min.	1,000,000 Megohms Min.	3,000,000 Megohms Min.
MINIMUM I.R. MEGS - μF	300,000 Megs - μF Need Not Exceed 3,000,000 Megohms	100,000 Megs - μF Need Not Exceed 1,000,000 Megohms	300,000 Megs - μF Need Not Exceed 3,000,000 Megohms
DIELECTRIC ABSORPTION	0.1% Max.	0.1% Max.	Not Specified
VIBRATION LEVEL	10-2000 Hz 50g's	10-2000 Hz 50g's	10-2000 Hz 20g's
SHOCK LEVEL	100g's 6 MS.	100g's 6 MS.	100g's 6 MS.
100% DC BURN-IN	Yes (48 hrs.)	No	Yes (48 hrs.)
100% THERMAL CYCLING	Yes	Yes	Yes
100% SEAL TEST (GROSS LEAK)	Yes	Yes	Yes
100% SEAL TEST (HELIUM LEAK)	Yes 1 x 10^{-6} atm CM^3/S Max. Leak Rate	Yes 1 x 10^{-5} atm CM^3/S Max. Leak Rate	Yes 1 x 10^{-6} atm CM^3/S Max. Leak Rate
100% AC SQUARE WAVE	Yes	Yes	Yes
100% DC HI-POT	Yes	Yes	Yes
100% INSULATION RESISTANCE	Yes	Yes	Yes
100% CAPACITANCE	Yes	Yes	Yes
100% DISSIPATION FACTOR	*Yes	*Yes	*Yes
100% DIELECTRIC ABSORPTION	Yes	Yes	No

*COMPONENT RESEARCH COMPANY CERTIFIES THAT IT WILL NOT SHIP ANY CAPACITORS EXCEEDING 0.15% DISSIPATION FACTOR.

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RESEARCH CO.

CATALOG SUPPLEMENT
C

TYPE METALLIZED POLYCARBONATE CAPACITORS

A study of the dissipation factor limits and the AC ratings shows that only the MIL-C-83421/1 and MIL-C-39022/9C can be reliably used for AC applications, if we consider dissipation factor critical.

Although the dissipation factor limits for MIL-C-39022/9C styles CHR01B, E, H, L, P, C, F, J, M and R are listed as greater than 0.15% every M39022/9C shipped by Component Research Company is certified to be less than 0.15%, because we feel any value higher than this will result in unreliable life in AC applications, and possibly intermittent life in DC applications. Catalog supplement sections F and G go into greater detail on this matter.

Please note that the 100% screening performed by Component Research Company using 0.15% maximum % dissipation factor, is an additional assurance of high termination quality, which established reliability Mil-Specifications do not always assure.

MIL-C-39022/9C		MIL-C-39022/7	MIL-C-39022/10
STYLE CHR01B, E, H, L, P	**STYLE CHR01C, F, J, M, R**	**STYLE CHR49**	**STYLE CHR10**
Yes	Yes	Yes	Yes
to +100°C AC-DC Voltage by 50% @ 125°C		−55°C to 85°C	−55°C to 85°C Derate DC Voltage by 60% @ 125°C
50VDC, 100VDC, 200VDC, 400VDC		None	50VDC, 100VDC, 200VDC, 400VDC, 600VDC
0 to 40 KHz		@ 0.4 KHz	None
0.25%, 0.5%, 1%, 2%, 5%, 10%	0.25%, 0.5%, 1%, 2%, 5%, 10%	5%, 10%	1%, 2%, 5%, 10%
0.2% Max.	0.25% Max.	0.3% Max.	0.25% Max.
0.2% Max.	0.25% Max.	0.6% Max.	0.40% Max.
0.2% Max.	0.25% Max.	Not Specified	0.60% Max.
0.25% Max.	0.35% Max.	0.75% Max.	0.5% Max.
−1.7% to −0.5% @ −55°C +1.2% to −0.7% @ +125°C	−2.0% to −0.5% @ −55°C ±2.0% @ +125°C	−3.0% to 0% @ −55°C −3.0% to 0% @ +85°C	−2.0% to 0% @ −55°C ±1% @ +85°C ±2% @ +125°C
2,000,000 Megohms Min.	1,000,000 Megohms Min.	50,000 Megohms Min.	250,000 Megohms Min.
200,000 Megs - μF Need Not Exceed 2,000,000 Megohms	100,000 Megs - μF Need Not Exceed 1,000,000 Megohms	25,000 Megs - μF Need Not Exceed 50,000 Megohms	100,000 Megs - μF Need Not Exceed 250,000 Megohms
Not Specified	Not Specified	Not Specified	Not Specified
10-2000 Hz 20g's	10-2000 Hz 20g's	10-2000 Hz 15g's	10-2000 Hz 20g's
100g's 6 MS.	100g's 6 MS.	100g's 6 MS.	100g's 6 MS.
Yes (16 hrs.)	No	No	Yes (48 hrs.)
Yes	Yes	Yes	Yes
Yes	Yes	Yes	Yes
Yes 1 x 10^{-6} atm CM^3/S Max. Leak Rate	Yes 1 x 10^{-5} atm CM^3/S Max. Leak Rate	No	No
Yes	Yes	No	Yes
Yes	Yes	AC Hi-Pot Instead of DC	Yes
Yes	Yes	Yes	Yes
Yes	Yes	Yes	Yes
*Yes	*Yes	Yes	Yes
No	No	No	No

*COMPONENT RESEARCH COMPANY CERTIFIES THAT IT WILL NOT SHIP ANY CAPACITORS EXCEEDING 0.15% DISSIPATION FACTOR.

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CATALOG SUPPLEMENT

D

COMPONENT

LONG TERM THERMAL AGING TEST REPORT

Thirty series C12A, 30VDC, Metallized Polycarbonate Capacitors were selected from current production and submitted to thermal aging PER MIL-C-83421/1 to determine the effects of continuous temperature cycling for 1000 cycles on dissipation factor, capacitance, and insulation resistance. As of publication date, parts completed 400 cycles from −65°C to +125°C with no evidence of visual damage, catastrophic failure, or any intermittent type measurement indication.

Testing will continue to 1000 cycles and test data will be made available to anyone requesting this information. Testing will be complete prior to our next catalog publication date of June 1976.

% CAPACITANCE DRIFT

Serial No.	Part No.	Initial Capacitance in μF	% Shift from Initial with Temperature Cycling					
			20 Cycles	50 Cycles	100 Cycles	200 Cycles	300 Cycles	400 Cycles
001	C12A102	.000998	+.02%	+.07%	+.09%	.00%	+.02%	−.01%
002	C12A102	.000997	0.00%	−.04%	+.02%	−.03%	−.03%	−.05%
003	C12A102	.000998	+.02%	0.0%	+.05%	+.01%	−.02%	−.04%
004	C12A102	.000997	+.11%	+.06%	+.13%	+.05%	+.01%	−.04%
005	C12A102	.000998	−.03%	−.03%	+.04%	−.03%	−.06%	−.12%
006	C12A102	.000998	+.05%	+.05%	+.15%	+.14%	+.13%	+.13%
007	C12A103	.010003	+.02%	+.02%	+.01%	+.31%	+.26%	+.25%
008	C12A103	.010006	+.07%	+.07%	+.05%	−.03%	−.04%	−.06%
009	C12A103	.010002	+.05%	+.06%	+.02%	−.06%	−.11%	−.11%
010	C12A103	.010010	+.05%	+.05%	−.01%	−.12%	−.16%	−.17%
011	C12A103	.010006	+.04%	+.05%	−.01%	−.14%	−.15%	−.11%
012	C12A103	.010002	+.05%	+.05%	+.01%	−.09%	−.13%	−.13%
013	C12A104	.094914	+.05%	+.06%	+.12%	+.06%	+.04%	+.03%
014	C12A104	.094869	+.05%	+.07%	+.12%	+.06%	+.04%	+.04%
015	C12A104	.094928	+.04%	+.05%	+.10%	+.02%	−.01%	−.01%
016	C12A104	.095203	+.06%	+.05%	+.11%	+.04%	+.03%	+.04%
017	C12A104	.091920	+.04%	+.04%	+.08%	+.05%	+.14%	+.18%
018	C12A104	.094990	+.05%	+.06%	+.13%	+.05%	+.03%	+.03%
019	C12A105	.997860	+.04%	+.05%	+.11%	+.04%	+.04%	+.04%
020	C12A105	.997900	+.04%	+.06%	+.13%	+.05%	+.05%	+.05%
021	C12A105	.999010	+.05%	+.07%	+.14%	+.09%	+.09%	+.09%
022	C12A105	.997800	+.04%	+.07%	+.12%	+.05%	+.06%	+.05%
023	C12A105	.998650	+.05%	+.06%	+.12%	+.05%	+.05%	+.05%
024	C12A105	.998430	+.04%	+.05%	+.12%	+.04%	+.04%	+.04%
025	C12A106	9.9504	−.01%	+.06%	+.13%	+.07%	−.01%	+.12%
026	C12A106	9.9584	+.01%	+.08%	+.16%	+.09%	+.02%	+.14%
027	C12A106	9.9623	−.01%	+.06%	+.11%	+.05%	−.04%	+.09%
028	C12A106	10.1033	−.01%	+.07%	+.13%	+.06%	−.03%	+.11%
029	C12A106	10.0928	−.01%	+.08%	+.15%	+.10%	+.01%	+.15%
030	C12A106	10.1013	−.01%	+.05%	+.12%	+.06%	+.04%	−.10%

INSULATION RESISTANCE @ RATED VOLTAGE (IN MEGOHMS)

Serial No.	Part No.	Initial Value	20 Cycles	50 Cycles	100 Cycles	200 Cycles	300 Cycles	400 Cycles
001	C12A102	15,000,000	15,000,000	10,000,000	15,000,000	15,000,000	15,000,000	15,000,000
002	C12A102	15,000,000	15,000,000	10,000,000	10,000,000	15,000,000	15,000,000	15,000,000
003	C12A102	15,000,000	10,000,000	15,000,000	15,000,000	15,000,000	15,000,000	15,000,000
004	C12A102	15,000,000	15,000,000	10,000,000	15,000,000	15,000,000	15,000,000	15,000,000
005	C12A102	15,000,000	15,000,000	15,000,000	10,000,000	15,000,000	15,000,000	15,000,000
006	C12A102	15,000,000	15,000,000	15,000,000	15,000,000	15,000,000	15,000,000	15,000,000
007	C12A103	15,000,000	15,000,000	10,000,000	15,000,000	15,000,000	15,000,000	15,000,000
008	C12A103	15,000,000	15,000,000	10,000,000	15,000,000	15,000,000	15,000,000	15,000,000
009	C12A103	15,000,000	15,000,000	15,000,000	10,000,000	15,000,000	15,000,000	15,000,000
010	C12A103	15,000,000	15,000,000	10,000,000	15,000,000	15,000,000	15,000,000	15,000,000
011	C12A103	15,000,000	10,000,000	7,500,000	15,000,000	15,000,000	15,000,000	15,000,000
012	C12A103	15,000,000	15,000,000	10,000,000	15,000,000	15,000,000	15,000,000	15,000,000
013	C12A104	6,000,000	7,500,000	7,500,000	7,500,000	7,500,000	7,500,000	6,000,000
014	C12A104	6,000,000	7,500,000	7,500,000	7,500,000	10,000,000	7,500,000	5,000,000
015	C12A104	6,000,000	7,500,000	6,000,000	6,000,000	6,000,000	6,000,000	5,000,000
016	C12A104	6,000,000	7,500,000	7,500,000	6,000,000	6,000,000	6,000,000	6,000,000
017	C12A104	7,500,000	10,000,000	7,500,000	7,500,000	7,500,000	7,500,000	6,000,000
018	C12A104	10,000,000	10,000,000	7,500,000	7,500,000	7,500,000	7,500,000	6,000,000
019	C12A105	750,000	750,000	680,000	625,000	680,000	660,000	680,000
020	C12A105	790,000	730,000	790,000	625,000	650,000	789,000	1,500,000
021	C12A105	790,000	750,000	650,000	670,000	680,000	714,000	1,570,000
027	C12A105	1,300,000	1,070,000	1,360,000	680,000	680,000	1,000,000	1,420,000
023	C12A105	850,000	790,000	750,000	680,000	680,000	830,000	790,000
024	C12A105	830,000	770,000	680,000	680,000	690,000	910,000	1,500,000
025	C12A106	300,000	170,000	65,200	136,000	187,000	187,000	270,000
026	C12A106	270,000	230,000	79,000	166,000	230,000	200,000	270,000
027	C12A106	270,000	230,000	71,400	157,000	214,000	200,000	270,000
028	C12A106	270,000	230,000	125,000	157,000	230,000	214,000	250,000
029	C12A106	270,000	250,000	120,000	150,000	230,000	214,000	250,000
030	C12A106	270,000	250,000	110,000	200,000	200,000	200,000	270,000

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DATA COVERS 400 TEMPERATURE CYCLES

A SUMMARY OF TEST RESULTS INDICATES THE FOLLOWING

Capacitance Value	Capacitance Drift Minimum	Capacitance Drift Maximum	% Dissipation Factor Freq.	% Dissipation Factor Maximum	Insulation Resistance Minimum IR in Megohms
.001μF	−.01%	+.13%	1 KHz 10 KHz	.07% .07%	15,000,000
.01μF	−.06%	+.26%	1 KHz 10 KHz	.07% .17%	15,000,000
.1μF	−.01%	+.18%	1 KHz 10 KHz	.08% .29%	5,000,000
1.0μF	+.04%	+.09%	1 KHz 10 KHz	.10% .46%	680,000
10μF	+.04%	+.15%	.1 KHz 1 KHz	.06% .27%	250 000 (Equivalent to 2,500,000 Megs-μF)

The capacitors tested are identical in construction with series A12A and K12A supplied to MIL-C-83421/1 and C12A, E12A, supplied to MIL-C-39022/9C. The only differences that exist are in screening and conditioning. This results in better stability for types with more extensive conditioning.

% DISSIPATION FACTOR @ LOW FREQUENCY

@ 1 KHz FOR VALUES 1μF OR LESS
@ 0.1 KHz FOR VALUES GREATER THAN 1μF

Serial No.	Part No.	Freq.	Initial Value	20 Cycles	50 Cycles	100 Cycles	200 Cycles	300 Cycles	400 Cycles
001	C12A102	1 KHz	.06%	.06%	.06%	.05%	.06%	.06%	.06%
002	C12A102	1 KHz	.07%	.07%	.07%	.06%	.06%	.07%	.07%
003	C12A102	1 KHz	.06%	.06%	.06%	.05%	.06%	.05%	.05%
004	C12A102	1 KHz	.06%	.06%	.06%	.05%	.06%	.05%	.05%
005	C12A102	1 KHz	.06%	.06%	.06%	.06%	.06%	.05%	.06%
006	C12A102	1 KHz	.06%	.06%	.06%	.05%	.06%	.05%	.05%
007	C12A103	1 KHz	.05%	.06%	.07%	.08%	.08%	.08%	.07%
008	C12A103	1 KHz	.05%	.06%	.07%	.07%	.07%	.07%	.07%
009	C12A103	1 KHz	.05%	.06%	.07%	.07%	.07%	.07%	.07%
010	C12A103	1 KHz	.05%	.07%	.07%	.07%	.07%	.07%	.07%
011	C12A103	1 KHz	.05%	.06%	.07%	.07%	.07%	.07%	.07%
012	C12A103	1 KHz	.06%	.06%	.07%	.07%	.07%	.07%	.07%
013	C12A104	1 KHz	.07%	.08%	.08%	.08%	.08%	.08%	.08%
014	C12A104	1 KHz	.07%	.08%	.08%	.08%	.08%	.08%	.08%
015	C12A104	1 KHz	.07%	.08%	.08%	.08%	.08%	.08%	.07%
016	C12A104	1 KHz	.07%	.07%	.08%	.08%	.08%	.08%	.07%
017	C12A104	1 KHz	.07%	.08%	.08%	.08%	.08%	.08%	.08%
018	C12A104	1 KHz	.07%	.08%	.08%	.08%	.08%	.08%	.08%
019	C12A105	1 KHz	.07%	.08%	.08%	.08%	.08%	.08%	.08%
020	C12A105	1 KHz	.08%	.09%	.09%	.09%	.09%	.10%	.10%
021	C12A105	1 KHz	.07%	.08%	.08%	.08%	.08%	.08%	.07%
022	C12A105	1 KHz	.07%	.08%	.08%	.08%	.08%	.08%	.08%
023	C12A105	1 KHz	.08%	.09%	.09%	.09%	.09%	.09%	.10%
024	C12A105	1 KHz	.08%	.09%	.09%	.09%	.09%	.10%	.10%
025	C12A106	.1 KHz	.05%	.05%	.05%	.05%	.04%	.05%	.03%
026	C12A106	.1 KHz	.04%	.04%	.04%	.04%	.04%	.06%	.03%
027	C12A106	.1 KHz	.04%	.05%	.05%	.05%	.04%	.05%	.03%
028	C12A106	.1 KHz	.04%	.04%	.04%	.04%	.04%	.05%	.03%
029	C12A106	.1 KHz	.04%	.04%	.04%	.04%	.04%	.05%	.03%
030	C12A106	.1 KHz	.04%	.04%	.04%	.04%	.04%	.05%	.03%

% DISSIPATION FACTOR @ HIGH FREQUENCY

@ 10 KHz FOR VALUES 1μF OR LESS
@ 1 KHz FOR VALUES GREATER THAN 1μF

Serial No.	Part No.	Freq.	Initial Value	20 Cycles	50 Cycles	100 Cycles	200 Cycles	300 Cycles	400 Cycles
001	C12A102	10 KHz	.06%	.07%	.07%	.06%	.07%	.07%	.07%
002	C12A102	10 KHz	.06%	.06%	.06%	.06%	.06%	.07%	.07%
003	C12A102	10 KHz	.07%	.06%	.06%	.06%	.06%	.07%	.07%
004	C12A102	10 KHz	.07%	.06%	.06%	.06%	.06%	.07%	.06%
005	C12A102	10 KHz	.07%	.06%	.06%	.06%	.06%	.06%	.07%
006	C12A102	10 KHz	.07%	.06%	.06%	.06%	.06%	.07%	.07%
007	C12A103	10 KHz	.16%	.18%	.18%	.18%	.18%	.19%	.17%
008	C12A103	10 KHz	.17%	.17%	.17%	.18%	.17%	.18%	.14%
009	C12A103	10 KHz	.17%	.17%	.17%	.17%	.17%	.18%	.13%
010	C12A103	10 KHz	.17%	.17%	.17%	.18%	.17%	.17%	.13%
011	C12A103	10 KHz	.17%	.17%	.17%	.17%	.17%	.16%	.13%
012	C12A103	10 KHz	.17%	.07%	.07%	.17%	.17%	.17%	.13%
013	C12A104	10 KHz	.21%	.21%	.21%	.21%	.23%	.25%	.23%
014	C12A104	10 KHz	.21%	.22%	.22%	.22%	.26%	.30%	.29%
015	C12A104	10 KHz	.22%	.22%	.22%	.21%	.22%	.24%	.20%
016	C12A104	10 KHz	.21%	.21%	.21%	.20%	.20%	.21%	.18%
017	C12A104	10 KHz	.21%	.21%	.21%	.20%	.25%	.22%	.21%
018	C12A104	10 KHz	.23%	.24%	.24%	.23%	.24%	.32%	.24%
019	C12A105	10 KHz	.29%	.27%	.27%	.21%	.20%	.30%	.22%
020	C12A105	10 KHz	.44%	.41%	.41%	.34%	.38%	.43%	.38%
020	C12A105	10 KHz	.27%	.25%	.25%	.21%	.19%	.27%	.15%
022	C12A105	10 KHz	.30%	.28%	.28%	.24%	.23%	.29%	.23%
023	C12A105	10 KHz	.46%	.42%	.42%	.36%	.37%	.43%	.46%
024	C12A105	10 KHz	.44%	.42%	.42%	.38%	.38%	.47%	.38%
025	C12A106	1 KHz	.20%	.12%	.11%	.13%	.13%	.12%	.24%
026	C12A106	1 KHz	.11%	.12%	.10%	.11%	.13%	.13%	.22%
027	C12A106	1 KHz	.12%	.12%	.10%	.12%	.12%	.12%	.25%
028	C12A106	1 KHz	.13%	.12%	.10%	.12%	.13%	.12%	.27%
029	C12A106	1 KHz	.12%	.12%	.11%	.12%	.12%	.10%	.25%
030	C12A106	1 KHz	.12%	.12%	.10%	.11%	.11%	.10%	.25%

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COMPONENT

HOW TO ANTICIPATE FAILURES & IMPROVE

Plastic film dielectric type capacitors can provide remarkably good electrical characteristics and high reliability but it takes a combination of sound construction, suitable film quality, exacting process control, and 100% testing to achieve this.

We are listing below some pitfalls to avoid because we are concerned with a proliferation of marginal quality capacitors frequently used in high reliability level Aerospace and industrial applications. Additional information appears on pages 7 and 37 of our catalog "J" section.

MIS-APPLICATION OF CAPACITORS IN AC CIRCUITS

To begin with, the highest quality capacitor will fail if you are exceeding its ratings by subjecting it to excessive voltage and current stresses. In sinusoidal applications metallized capacitors that warm up over 20°C after several hours of operation are considered a borderline case, and you may be applying too high an RMS voltage or frequency. Consult the AC ratings in MIL-C-83421/1 for metallized polycarbonate capacitors as a guide to typical limits.

If the capacitors you are using have higher than normal dissipation factor readings, this may be a sign of high series resistance caused by poor terminations on the capacitor section. The square wave AC screening for one minute covered in MIL-C-83421/1 is a good way of eliminating capacitors with gross dissipation factor quality.

Unfortunately, if dissipation factor limits are set too high as post test requirements, suspect capacitors will pass the square wave test, in fact may have been damaged by this test, but are permitted to pass what we consider are abnormally high DF limits. A termination that is poor at room temperature generally should be worse at higher temperature and increased heating caused by power loss at the terminations may cause ultimate degeneration and possible explosion.

We consider 100% AC burn-in at elevated temperature an excellent method of checking for good terminations. Burn-in should be followed by 100% dissipation factor examination. See page 37 for special AC screening information.

In SCR commutation and transistor switching type applications, heat rise of a metallized capacitor is not always a good means of determining if the capacitor can handle the non-sinusoidal current pulses usually encountered if the capacitor is subjected to relatively high peak currents at a low duty cycle; it may suddenly open after hours, possibly months of operation and never may have shown more than a few degrees warm-up during operation.

A recent example of operating beyond specified limits resulting in ultimate failure is shown by the following experiment performed on three 0.033μF, 30VDC, Type E12A333, metallized polycarbonate capacitors. Each capacitor has nominal case dimensions of 0.170″ diameter by 0.562″ length and #22 AWG wire leads.

The capacitors were placed in parallel to form a 0.1μF load into the output of a CRC designed power generator supplying a 60 volt peak to peak square wave at a 20KHz repetition rate.

An examination of the current pulses developed indicated that the capacitors were handling a peak current of 8.4 amps with a cosine type waveshape having a 1.2μ second width at the base.

The capacitors were operated for 100 hours at 25°C with less than 2°C heat rise. If we compare the MIL-C-83421/1 rated current at 40KHz of 0.18A rms maximum for a 0.033μF 30VDC capacitors, with the

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CAPACITOR RELIABILITY BY 100% SCREENING

peak current of 2.8 amps during this test, it appears that these capacitors can handle this level.

A more conservative level which we intend to verify by long term testing is 1.8 amps maximum peak current based on a peak current not to exceed ten times the 40KHz rms rated current of 0.18A for this capacitor. After increasing the square wave voltage to 80 volts peak to peak, the capacitors opened up.

The peak current during this test period was approximately 3.8 amps which is more than twenty times the RMS rated current of 0.18 amps. This is an example of how much higher in peak current CRC capacitors can be stressed, but certainly we do not recommend that you go to extremes in using these capacitors.

We recommend that you send us your oscilloscope current and voltage waveforms for analysis if you have non-sinusoidal applications. (See page 35, Catalog "J".) We are currently undergoing a test program to confirm that it is safe to operate our metallized polycarbonate capacitors under non-sinusoidal conditions of a 1μ second current pulse width at a 10KHz repetition rate providing the peak currents do not exceed ten times their maximum AC ratings at 40KHz.

As an example a 0.1μF 100VDC rated E12C104 or K12C104 capacitor maximum rated at 0.9A rms could be operated with 9 amps of peak current provided you did not exceed a 10KHz repetition rate.

Component Research Company bases the above as a result of many other tests and customer usage. We will of course continue to increase our test scope covering non-sinusoidal operation and publish operating specifications for such conditions.

CAPACITOR OPENS & INTERMITTENTS AFTER ENVIRONMENTAL TESTING OR LONG TERM STORAGE

CRC has frequently been requested to replace "Brand X" metallized capacitors (which may have cost 50% less). Problems began to plague production lines long after being qualified for the application and long after passing initial breadboard and preproduction tests.

Unfortunately many specifications and programs do not take time into consideration. Capacitor terminations may withstand DC burn-in, DC life, and even AC life but may start to break down as a result of expansion and contraction of all the metal and plastic materials involved in the construction of a capacitor.

The extreme differences in dimensional change between plastic and metal materials as a result of temperature cycling may result in microscopic ruptures of termination joints, possible electrode oxidation and generally unstable termination series resistance.

Component Research Company patented stress free termination design and precise quality control eliminates the above problems. This is the reason we recommend 100% temperature cycling or thermal aging followed by screening as described above.

Our goal is to continue to provide increasing amounts of detailed information and data of this type. In this manner the reliability and safety of electronic equipment needed for military and commercial transportation or general usage equipment will be enhanced and maintained.

Please contact us if you have any suggestions how to further this goal.

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COMPONENT

• DC LIFE TEST DATA FOR METALLIZED TEFLON
• VIBRATION REPORT FOR METALLIZED POLYCARBONATE

TEST REPORT No. XT907

In this test, thirty metallized Teflon Capacitors, part number D11B504, 0.5μF, 50VDC, in a 0.562″ x 1.125″ case size were subjected to DC life testing at 140% of rated voltage at 125°C. At the conclusion of 7300 hours of test the capacitors changed less than 0.5% in capacitance. There was an increase in dissipation factor to 0.12% maximum for serial number 017. Twenty-one other units remained within 0.05% dissipation factor. The dissipation factor increase is not significant for DC applications where there is a relatively small AC current content. We do not recommend this type of Teflon Capacitor for high current handling AC applications. We can supply very stable, Teflon Foil Capacitors which are capable of handling over 100 AMPS RMS per microfarad and several thousand peak amperes, if required.

The insulation resistance measured from 500,000 MEGS-μF to 12,000,000 MEGS-μF, and this we consider superb performance. As can be seen it is now possible to supply high reliability, high insulation resistance, low capacitance drift Teflon capacitors to specification limits far beyond the scope of present specifications if a program requires such performance.

DC LIFE TEST DATA FOR METALLIZED TEFLON CAPACITORS

Serial No.	Part No.	% Capacitance Drift After 7300 Hrs. Life	Insulation Resistance In Megohms After 7300 Hrs. Life	% Dissipation Factor @ 1 KHz After 7300 Hrs. Life
001	D11B504	−0.27%	10,000,000	.04%
002	D11B504	−0.11%	3,500,000	.05%
003	D11B504	−0.29%	2,300,000	.04%
004	D11B504	−0.10%	4,100,000	.11%
005	D11B504	−0.36%	1,100,000	.02%
006	D11B504	−0.18%	2,200,000	.04%
007	D11B504	−0.11%	3,300,000	.05%
008	D11B504	−0.07%	6,200,000	.06%
009	D11B504	−0.15%	2,900,000	.08%
010	D11B504	−0.05%	3,500,000	.04%
011	D11B504	−0.11%	4,500,000	.05%
012	D11B504	−0.01%	12,500,000	.05%
013	D11B504	−0.09%	12,500,000	.05%
014	D11B504	−0.06%	16,600,000	.02%
015	D11B504	−0.23%	12,500,000	.06%
016	D11B504	−0.01%	12,500,000	.08%
017	D11B504	−0.15%	7,100,000	.12%
018	D11B504	+0.02%	5,500,000	.02%
019	D11B504	−0.05%	6,200,000	.08%
020	D11B504	−0.03%	5,000,000	.04%
021	D11B504	−0.33%	12,500,000	.02%
022	D11B504	−0.43%	12,500,000	.03%
023	D11B504	−0.60%	16,600,000	.02%
024	D11B504	−0.41%	25,000,000	.05%
025	D11B504	−0.38%	12,500,000	.03%
026	D11B504	−0.42%	16,600,000	.05%
027	D11B504	−0.41%	10,000,000	.02%
028	D11B504	−0.35%	25,000,000	.02%
029	D11B504	−0.42%	25,000,000	.02%
030	D11B504	−0.46%	25,000,000	.06%

HIGH LEVEL VIBRATION TEST REPORT #644-1-74-152 FOR SPECIAL C12 POLYCARBONATE CAPACITORS

Component Research Company became involved in the development of C12A Metallized Polycarbonate capacitors capable of handling very high vibration levels, as a consequence of capacitor failures in the Atlas Centaur Program.

In this application we replaced other capacitors. Thus CRC provided far superior electrical performance, as well as rugged construction. And all this within a minimum of lead time.

During this test three samples of each case size covering the range of capacitor values to be qualified, while using random vibration, were subjected to a level of 35 grms and 70 grms. These levels were performed from 100 Hz to 1000 Hz by the contractor and no failures occurred.

TEST PERFORMED & A LIST OF THE CASE SIZES USED

Quan.	Diam.	Length	μF	VDC	Remarks
3	.170	.687	.082	30	Standard C12 Construction
3	.193	.813	.1	50	Standard C12 Construction
3	.235	.813	.22	50	Standard C12 Construction
3	.312	1.063	.27	100	Special C12 Construction
3	.400	1.375	4.0	30	Special C12 Construction
3	.400	1.375	.1	400	Special C12 Construction
3	.500	1.375	3.0	50	Special C12 Construction
3	.562	1.875	.5	400	Special C12 Construction
3	.670	1.875	6.8	50	Special C12 Construction
3	.750	1.875	5.0	100	Special C12 Construction
3	1.00	2.625	9.3	200	Special C12 Construction

Electrical measurements below were performed by the contractor and indicated that these capacitors are fully qualified to operate for the intended use.

CRC READINGS FOR THESE CAPACITORS

Serial No.	Initial Measurements		Post Vibration Measurements	
	Capacitance In μF	% Dissipation Factor	Capacitance In μF	% Dissipation Factor
XT914-1B001	.0987	.07%	.1000	.07%
XT914-1B002	.0989	.07%	.0999	.08%
XT914-1B003	.0989	.07%	.0996	.08%
XT914-1C001	2.960	.110%	2.960	.14%
XT914-1C002	2.960	.090%	2.960	.10%
XT914-1C003	2.980	.060%	2.970	.09%
XT914-1D001	.4921	.090%	.493	.11%
XT914-1D002	.4933	.096%	.494	.13%
XT914-1D003	.4906	.089%	.491	.11%
XT914-1E002	6.780	.080%	6.79	.08%
XT914-1H003	9.980	.070%	10.00	.08%
XT914-1H004	9.990	.070%	10.00	.07%
XT914-1F001	5.080	.160%	5.080	.18%
XT914-1F002	5.030	.170%	5.040	.18%
XT914-1F003	5.090	.160%	5.100	.17%
XT914-1G001	8.850	.100%	8.850	.12%
XT914-1G002	8.900	.110%	8.910	.12%
XT914-1G003	8.990	.110%	8.990	.12%

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VIKING ULTRA HIGH RELIABILITY TEFLON CAPACITOR SPECIFICATIONS

Component Research Co. is proud to have been selected for Viking sole source procurement of extremely accurate, high quality teflon capacitors similar to the B11B and B11C series shown on pages 24 and 25 of catalog J.

Critical weight limitations prevent the use of redundant circuits. The capacitors must maintain their excellent performance with 600 hours of spacecraft sterilization, severe shock and vibration levels at launching and five to ten years of space travel. A single capacitor failure may mean a major setback to one of the most important and complex space ventures known to man.

Component Research Co. accepts this challenge with a confidence based upon over a decade of experience in the manufacture of high quality, high reliability film capacitors.

100% GROUP "A" ACCEPTANCE TESTS

	EXAMINATION OR TEST	MIL-C-39022C PARAGRAPH AND AS MODIFIED BY MIL-C-39022/9B	SV90DM39022 PARAGRAPH	TEST REQUIREMENTS
1	VOLTAGE CONDITIONING		4.9	FOR 100 HOURS AT 135°C AND 140% OF RATED VDC
2	TEMPERATURE CYCLING	3.7, 4.7.3		10 CYCLES MIN. FROM −62°C to +125°C
3	SEAL		4.10	IN WATER AT 25°C
4	DC-DIELECTRIC STRENGTH	3.9, 4.7.5		AT 200% OF THE RATED VOLTAGE FOR ONE MINUTE MIN.
5	INSULATION RESISTANCE (TERMINAL TO TERMINAL ONLY)	3.10, 4.7.6	Table III	AT RATED VOLTAGE Megs x MFD Min. / Neet Not Exceed Megohms At 25°C: 5×10^5 / 5×10^6 At 100°C: 1×10^5 / 1×10^6 At 125°C: 2.5×10^4 / 2.5×10^5
6	CAPACITANCE % TOLERANCE	3.11, 4.7.7		WITHIN SPECIFIED TOLERANCE MEASURED AT 1 KHz AND 25°C
7	% DISSIPATION FACTOR	3.12, 4.7.8		0.03% MAX. AT 1 KHz AND 25°C FOR VALUES OVER 1 MFD MEASURE AT 0.1 KHz
8	TEMPERATURE COEFFICIENT	3.21, 4.7.17	Table III	AT −55°C, +0.4% MAX. AT +25°C (RETRACE), ±.02% AT +125°C, −0.4% MAX.
9	VISUAL AND MECHANICAL INSPECTION			EXTERNAL ONLY FOR DIMENSIONS, WORKMANSHIP AND MARKING
10	RADIOGRAPHIC	3.6, 4.7.2	3.2, 4.7	X-RAYED IN TWO PLANES AT 90 DEGREE ROTATION, PERPENDICULAR TO THEIR LONGITUDINAL AXES.

VIKING QUALIFICATION INSPECTION PER TABLE V OF SV90DM39022 & MIL-C-39022/9B.
74 GROUP "A" CAPACITORS WERE RANDOMLY SELECTED AND TESTED AS SHOWN.

GROUP II, 12 UNITS

- 600 hours sterilization at 135°C
- Shock (PYRO) - 1,880G, 0.4ms half sine pulse
- Shock (Landing) - 80G, 22ms duration
- Vibration (Sine) - 75G, 10 to 2,000 Hz
- Vibration (Random) - 36.6G for 3 minutes min.

POST ELECTRICAL TESTS

- △ Capacitance (% Change)
- % Dissipation Factor
- Insulation Resistance

GROUP III, 12 UNITS

- Solderability
- Low Temperature and Capacitance Change with Temp.
- Resistance to Soldering Heat
- Terminal Strength

POST ELECTRICAL TESTS

- △ Capacitance (% Change)
- % Dissipation Factor
- Insulation Resistance

GROUP IV, 50 UNITS

- Life (accelerated) for 2,000 hours min. at 125°C and 140% of rated DC voltage

POST ELECTRICAL TESTS

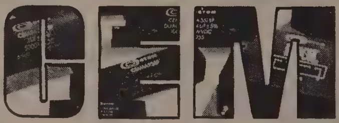
- △ Capacitance (% Change)
- % Dissipation Factor
- Insulation Resistance

COMPONENT RESEARCH CO., INC. • 1717 19th ST. • SANTA MONICA, CALIF. 90404 • (213) 829-3615 • TWX 910-343-6864

Mica Capacitors CUSTOM Has What Design Engineers Need

Wrap and Fill: **CMR Product Type**
Application: Designed primarily for hermetically sealed and potted in applications.

Epoxy Housed: **CER Product Type**
Application: For specialized mounting arrangements and operation under selected environmental parameters.



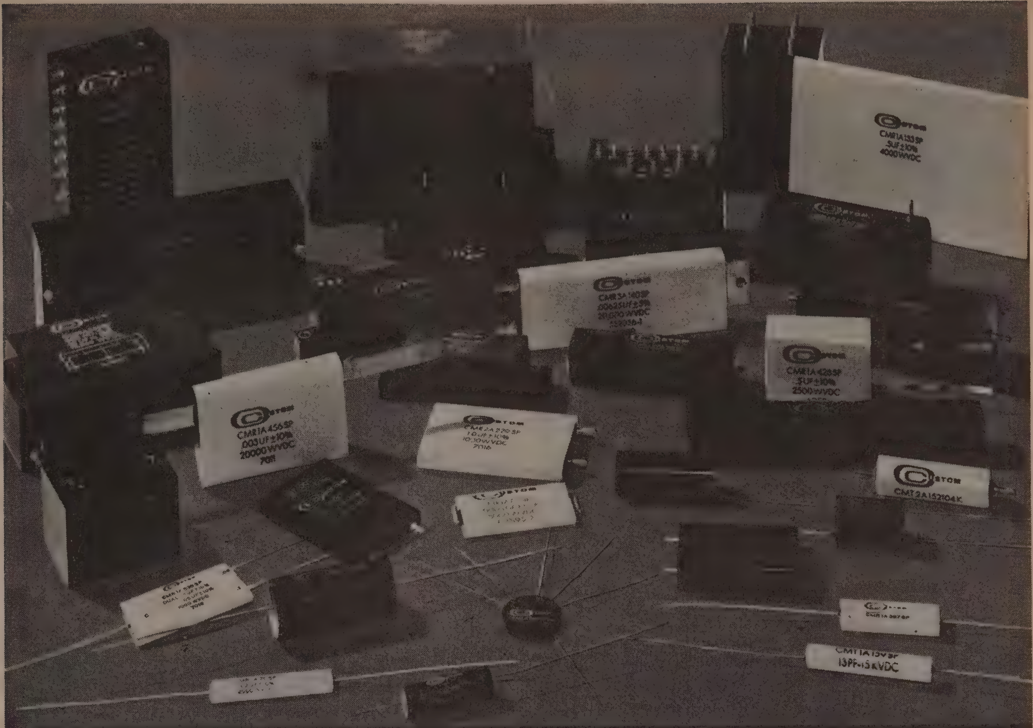
Epoxy Molded: **CEM Product Type**
Application: When specialized form factors and operation under the extremes of environmental resistance are required.

Electrical Ratings

Capacitance Range: 40 pf to 10 μf (CMR); 40 pf to 40 μf (CER, CEM).
Capacitance Tolerance: ±10% (±2, ±5 or ±20% available).
Voltage Range: 250 V to 40 KV (CMR); 250 V to 50 KV (CER, CEM).
Volume Efficiency: approx. .25 joules per cubic inch (CMR);
approx. .2 joules per cubic inch (CER, CEM).
Thermal Coefficient of Capacitance: +5% max. from 25°C to 125°C.
−3% max. from 25°C to −55°C.
Operating Temperature −65°C to +125°C without derating.

Send for FREE Product Brochures.

CUSTOM ELECTRONICS, INC.
5 Browne St., Oneonta, N. Y. 13820
PH: (607) 432-3880 TWX: 510-241-8292


CMR1A133SP
.5UF±10%
4000WVDC
CMR1A428SP
.5UF±10%
2500WVDC
CMR1A456SP
.003UF±10%
20000WVDC
7011
CMT2A152104K
13PF±15KVDC

Long on Reliability Short on Delivery

Mica Capacitors by Custom Electronics

Custom can meet your capacitor needs better, because each process in our capacitor production begins and ends with quality control to avoid failure in the field. Let us show you how we can fill your requirements.

Write for FREE descriptive TechniTip, includes sample of mica dielectric.

Check these specifications on typical units:

CMR — Wrap and Fill type

Cap. & Tol.	WVDC	L × W × T Max.	Typical Price
0.1 µf ±10%	1,000	2.062″ × 1.425″ × 0.200″	$8.05
0.1 µf ±10%	3,000	2.562″ × 1.620″ × 0.270″	9.25
0.01 µf ±10%	10,000	2.562″ × 1.800″ × 0.350″	8.80

CER — Epoxy Housed type

Cap. & Tol.	WVDC	L × W × T Max.	Typical Price
.1 µf ±10%	2,000	2.062″ × 1.39″ × .278″	$15.00
.1 µf ±10%	5,000	2.812″ × 1.906″ × .485″	18.50
.001 µf ±10%	10,000	1.938″ × 1.656″ × .312″	9.50

CEM — Epoxy Molded Type

Cap. & Tol.	WVDC	L × W × T Max.	Typical Price
500 pf ±10%	15,000	3.312″ × .812″ × .812″	$33.50
.02 µf ±10%	10,000	5.88″ × .5″ × 1.437″	22.00
.05 µf ±10%	5,000	2.75″ × 1.4″ × 1.2″	26.50

CUSTOM

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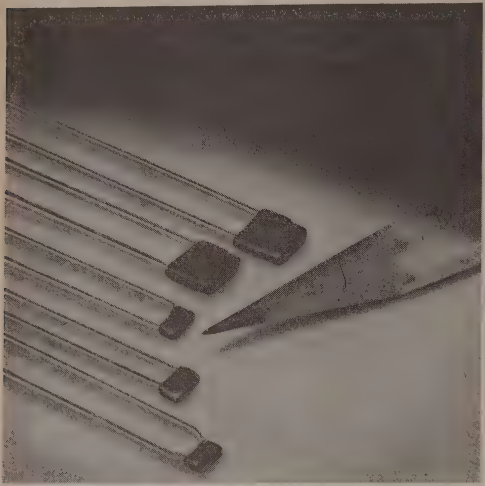
BELL INDUSTRIES

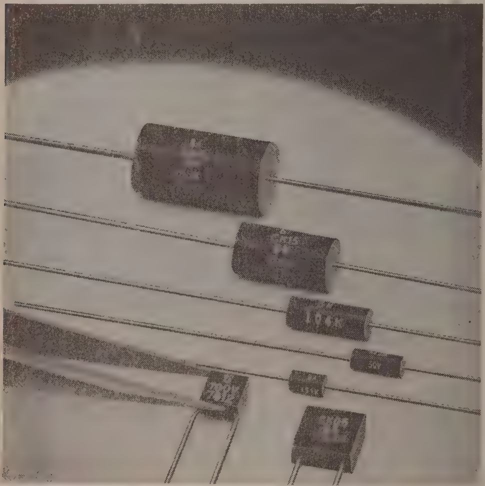
Electronic Components Division

Ceramic Capacitors

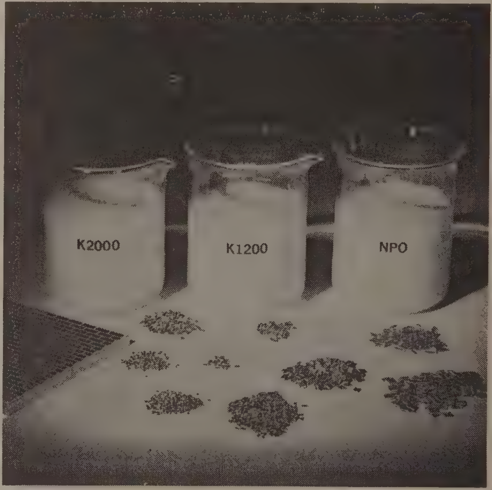


Epoxy Coated Capacitors . . . Low cost . . . NPO from 1 pf through .10 uf . . . K1200 from 1 pf through 3.3 uf . . . available with ±2%, ±5%, ±10%, ±20% tolerances or GMV.

Mil Spec Capacitors . . . Radial leads/Axial leads . . . All values . . . CK05, CK06, CK12, CK13, CK14, CK15, CK16 . . . Commercial versions available.



Leaded Ceramic Capacitors . . . Axial tubular NPO from 1 pf through .10 uf . . . Radial NPO from 1 pf through .10 uf . . . Radial K1200 from 1 pf through 3.3 uf.



Ceramic Chip Capacitors . . . K1200 (W5P) Series from 100 pf through 1 uf . . . NPO series from 1 pf through .047 uf . . . 25, 50, 100, 200 WVDC.

We specialize in custom packaging for individual requirements . . . ganged units for high density packaging . . . 22, 24 or 26 gauge leads spaced on .100″, .200″, .300″ or .400″ centers.

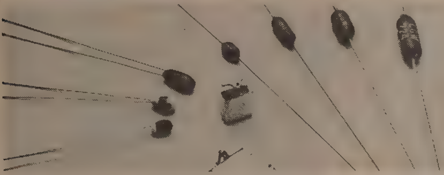
Please call for quotation, or write for full line ceramic capacitor catalog.

BELL INDUSTRIES / Electronic Components Division
150 West Cypress Ave. ▪ Burbank, California 91502 ▪ (213) 846-9302 ▪ TWX 910-498-2207

CORNING
ELECTRONICS

CORNING GLASS WORKS
Corning, New York 14830

Capacitors



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NEED MORE INFORMATION?

FOR MORE INFORMATION ON CORNING® ELECTRONIC COMPONENTS. . .

1. Contact your nearest Corning Sales Office . . . (See list of sales offices below)
2. Contact your nearest franchised Corning distributor or representative.
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Resistors
Call your local franchised Corning distributor, or . . . Call Customer Service at (814) 362-5571.

Tantalum Capacitors
Call your local franchised Corning distributor, or . . . Call Customer Service at (207) 282-5111.

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Call Product Engineering at (919) 876-1100.

Resistors
Call Product Engineering at (814) 362-5571.

Tantalum Capacitors
Call Product Engineering at (207) 282-5111.

APPLICATIONS of all PRODUCTS
Call Applications Engineering at (607) 974-8679.

SALES OFFICES AND MANUFACTURING FACILITIES

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Electronic Products Division
Corning, New York 14830
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SALES OFFICES

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Babenhauser Landstrasse 49
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Ph: 611 652031

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Sunderland SR4 6SU
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Ph: Sunderland 71481

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Alameda Ministro Rocha Azevedo, 912
Caixa Postal 8972
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SP-Brazil
Ph: 804834, 804691, 801420

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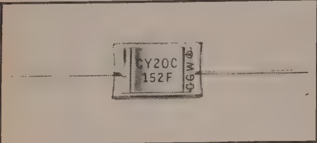
Corning International Services, S.A.
Kowa Building No. 16 Annex
9-20 Akasaka, 1-Chome
Minato-Ku, Tokyo, Japan
Ph: 586-1051

CORNING
ELECTRONICS
CORNING GLASS WORKS
Corning, New York 14830

Glass Capacitors

CYFM10, 15, 20, 30 (INDUSTRIAL); CY10, 15, 20, 30 (QPL to MIL-C-11272)



APPLICATIONS

These extremely stable glass capacitors, CORNING® style CYFM, meet or exceed all requirements of MIL-C-11272. With glass dielectric, fused monolithic construction and true glass-to-metal seals at the leads, they have very low losses and are virtually immune to severe environmental stresses.

PERFORMANCE CHARACTERISTICS

Tolerance—Available tolerances for each value of capacitance are shown in the ordering information table. For codes, refer to the Part Numbers paragraph.

Temperature Coefficient—+140 ±25 ppm/°C at 100 kHz. TC will track and retrace to within ±5 ppm. Capacitance drift is less than 0.1% or 0.1 pF, whichever is greater.

Voltage Coefficient—Zero

Losses—Extremely low, and remain relatively low at elevated temperatures. Dissipation factor is less than 0.001 at 1.0 kHz and 25°C.

Life—After 2,000 hours at 125°C with 150% of rated voltage applied, capacitance change is less than 0.5% or 0.5 pF whichever is greater.

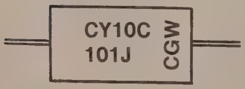
Insulation Resistance—Greater than 100,000 megohms at 25°C; greater than 10,000 megohms at 125°C.

Voltage/Temperature Ratings—Voltage ratings are shown in the ordering information table. The operating temperature range is −55°C to +125°C with no derating required.

Moisture Resistance—Exceeds all requirements of MIL-C-11272 and MIL-STD-202, Method 106.

Part Numbers—Basic part numbers are shown in the ordering information table. Add the appropriate suffix to specify tolerance. Suffix codes: "C" = ±0.25pF, "D" = ±0.5pF, "F" = ±1%, "G" = ±2%, "J" = ±5%, "K" = ±10%, "M" = ±20%.

PART MARKING



CY — Glass Capacitor
10 — Case Size
C — Operating Temperature Range
101 — Capacitance. Coded in pF
J — Tolerance
CGW — Corning Glass Works

PART NUMBERS AND ORDERING INFORMATION

STANDARD VALUES CYFM-10

Capacitance Value (pF)	Military Type Designation	Corning Part No.	DC Working Voltage	Tolerances Available
0.5	CY10C0R5*	CYFM10C0R5*	500	C
1.0	CY10C010—	CYFM10C010—	500	C,D
1.5	CY10C1R5—	CYFM10C1R5—	500	C,D
2.2	CY10C2R2—	CYFM10C2R2—	500	C,D
2.7	CY10C2R7—	CYFM10C2R7—	500	C,D
3.0	CY10C030—	CYFM10C030—	500	C,D
3.3	CY10C3R3—	CYFM10C3R3—	500	C,D
3.6	CY10C3R6—	CYFM10C3R6—	500	C,D
3.8	CY10C3R9—	CYFM10C3R9—	500	C,D
4.3	CY10C4R3—	CYFM10C4R3—	500	C,D
4.7	CY10C4R7—	CYFM10C4R7—	500	C,K
5.1	CY10C5R1—	CYFM10C5R1—	500	C,J,K
5.6	CY10C5R6—	CYFM10C5R6—	500	C,J,K
6.2	CY10C6R2—	CYFM10C6R2—	500	C,J,K
6.8	CY10C6R8—	CYFM10C6R8—	500	C,J,K
7.5	CY10C7R5—	CYFM10C7R5—	500	C,J,K
8.2	CY10C8R2—	CYFM10C8R2—	500	C,J,K
9.1	CY10C9R1—	CYFM10C9R1—	500	C,J,K
10	CY10C100—	CYFM10C100—	500	C,J,K,M
11	CY10C110—	CYFM10C110—	500	C,J,K,M
12	CY10C120—	CYFM10C120—	500	C,J,K,M
13	CY10C130—	CYFM10C130—	500	C,G,J,K,M
15	CY10C150—	CYFM10C150—	500	C,G,J,K,M
16	CY10C160—	CYFM10C160—	500	C,G,J,K,M
18	CY10C180—	CYFM10C180—	500	C,G,J,K,M
20	CY10C200—	CYFM10C200—	500	C,G,J,K,M
22	CY10C220—	CYFM10C220—	500	C,G,J,K,M
24	CY10C240—	CYFM10C240—	500	C,G,J,K,M
27	CY10C270—	CYFM10C270—	500	F,G,J,K,M
30	CY10C300—	CYFM10C300—	500	F,G,J,K,M
33	CY10C330—	CYFM10C330—	500	F,G,J,K,M
36	CY10C360—	CYFM10C360—	500	F,G,J,K,M
39	CY10C390—	CYFM10C390—	500	F,G,J,K,M
43	CY10C430—	CYFM10C430—	500	F,G,J,K,M
47	CY10C470—	CYFM10C470—	500	F,G,J,K,M
51	CY10C510—	CYFM10C510—	500	F,G,J,K,M
56	CY10C560—	CYFM10C560—	500	F,G,J,K,M
62	CY10C620—	CYFM10C620—	500	F,G,J,K,M
68	CY10C680—	CYFM10C680—	500	F,G,J,K,M
75	CY10C750—	CYFM10C750—	500	F,G,J,K,M
82	CY10C820—	CYFM10C820—	500	F,G,J,K,M
91	CY10C910—	CYFM10C910—	500	F,G,J,K,M
100	CY10C101—	CYFM10C101—	500	F,G,J,K,M
110	CY10C111—	CYFM10C111—	500	F,G,J,K,M
120	CY10C121—	CYFM10C121—	500	F,G,J,K,M
130	CY10C131—	CYFM10C131—	500	F,G,J,K,M
150	CY10C151—	CYFM10C151—	500	F,G,J,K,M
160	CY10C161—	CYFM10C161—	500	F,G,J,K,M
180	CY10C181—	CYFM10C181—	500	F,G,J,K,M
200	CY10C201—	CYFM10C201—	500	F,G,J,K,M
220	CY10C221—	CYFM10C221—	300	F,G,J,K,M
240	CY10C241—	CYFM10C241—	300	F,G,J,K,M
270	CY10C271—	CYFM10C271—	300	F,G,J,K,M
300	CY10C301—	CYFM10C301—	300	F,G,J,K,M

STANDARD VALUES CYFM-15

Capacitance Value (pF)	Military Type Designation	Corning Part No.	DC Working Voltage	Tolerances Available
220	CY15C221*	CYFM15C221*	500	F,G,J,K,M
240	CY15C241—	CYFM15C241—	500	F,G,J,K,M
270	CY15C271—	CYFM15C271—	500	F,G,J,K,M
300	CY15C301—	CYFM15C301—	500	F,G,J,K,M
330	CY15C331—	CYFM15C331—	500	F,G,J,K,M
360	CY15C361—	CYFM15C361—	500	F,G,J,K,M
390	CY15C391—	CYFM15C391—	500	F,G,J,K,M
430	CY15C431—	CYFM15C431—	500	F,G,J,K,M
470	CY15C471—	CYFM15C471—	500	F,G,J,K,M
510	CY15C511—	CYFM15C511—	500	F,G,J,K,M
560	CY15C561—	CYFM15C561—	300	F,G,J,K,M
620	CY15C621—	CYFM15C621—	300	F,G,J,K,M
680	CY15C681—	CYFM15C681—	300	F,G,J,K,M
750	CY15C751—	CYFM15C751—	300	F,G,J,K,M
820	CY15C821—	CYFM15C821—	300	F,G,J,K,M
910	CY15C911—	CYFM15C911—	300	F,G,J,K,M
1000	CY15C102—	CYFM15C102—	300	F,G,J,K,M
1100	CY15C112—	CYFM15C112—	300	F,G,J,K,M
1200	CY15C122—	CYFM15C122—	300	F,G,J,K,M

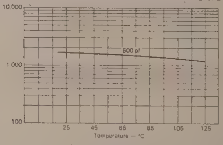
STANDARD VALUES CYFM-20

Capacitance Value (pF)	Military Type Designation	Corning Part No.	DC Working Voltage	Tolerances Available
560	CY20C561*	CYFM20C561*	500	F,G,J,K,M
620	CY20C621—	CYFM20C621—	500	F,G,J,K,M
680	CY20C681—	CYFM20C681—	500	F,G,J,K,M
750	CY20C751—	CYFM20C751—	500	F,G,J,K,M
820	CY20C821—	CYFM20C821—	500	F,G,J,K,M
910	CY20C911—	CYFM20C911—	500	F,G,J,K,M
1000	CY20C102—	CYFM20C102—	500	F,G,J,K,M
1100	CY20C112—	CYFM20C112—	500	F,G,J,K,M
1200	CY20C122—	CYFM20C122—	500	F,G,J,K,M
1300	CY20C132—	CYFM20C132—	500	F,G,J,K,M
1500	CY20C152—	CYFM20C152—	500	F,G,J,K,M
1600	CY20C162—	CYFM20C162—	500	F,G,J,K,M
1800	CY20C182—	CYFM20C182—	500	F,G,J,K,M
2000	CY20C202—	CYFM20C202—	500	F,G,J,K,M
2200	CY20C222—	CYFM20C222—	500	F,G,J,K,M
2400	CY20C242—	CYFM20C242—	500	F,G,J,K,M
2700	CY20C272—	CYFM20C272—	500	F,G,J,K,M
3000	CY20C302—	CYFM20C302—	500	F,G,J,K,M
3300	CY20C332—	CYFM20C332—	500	F,G,J,K,M
3600	CY20C362—	CYFM20C362—	300	F,G,J,K,M
3900	CY20C392—	CYFM20C392—	300	F,G,J,K,M
4300	CY20C432—	CYFM20C432—	300	F,G,J,K,M
4700	CY20C472—	CYFM20C472—	300	F,G,J,K,M
5100	CY20C512—	CYFM20C612—	300	F,G,J,K,M

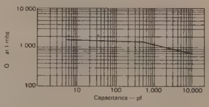
STANDARD VALUES CYFM-30

Capacitance Value (pF)	Military Type Designation	Corning Part No.	DC Working Voltage	Tolerances Available
3600	CY30C362*	CYFM30C362*	500	F,G,J,K,M
3900	CY30C392—	CYFM30C392—	500	F,G,J,K,M
4300	CY30C432—	CYFM30C432—	500	F,G,J,K,M
4700	CY30C472—	CYFM30C472—	500	F,G,J,K,M
5100	CYT0C512—	CYFM30C512—	500	F,G,J,K,M
5600	CY30C562—	CYFM30C562—	500	F,G,J,K,M
6200	CY30C622—	CYFM30C622—	500	F,G,J,K,M
6800	CY30C682—	CYFM30C682—	300	F,G,J,K,M
7500	CY30C752—	CYFM30C752—	300	F,G,J,K,M
8200	CY30C822—	CYFM30C822—	300	F,G,J,K,M
9100	CY30C912—	CYFM30C912—	300	F,G,J,K,M
10000	CY30C103—	CYFM30C103—	300	F,G,J,K,M

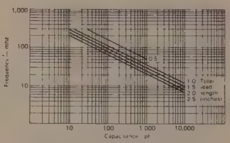
***Add letter for tolerance code above lines**



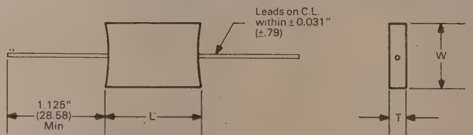
Quality Factor vs. Temperature



Quality Factor vs. Capacitance



Resonant Frequency vs. Capacitance



Dimensions—Inches (Millimeters)

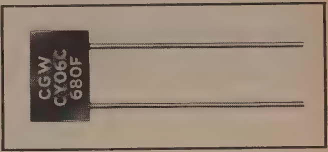
Style	L Min—Max	W Min—Max	T Min—Max	Lead Dia	Weight (Grams)
CY10	.2969-.3906 (7.54-9.93)	.1406-.2031 (3.58-5.16)	.0469-.1093 (1.19-2.77)	.020 24 AWG (.51)	.25-.50
CY15	.4219-.5156 (10.72-13.11)	.2344-.2968 (5.94-7.54)	.0625-.1562 (1.60-3.96)	.020 24 AWG (.51)	.75-1.25
CY20	.6719-.7968 17.07-20,24)	.3750-.4687 (9.52-11.91)	.0938-.1875 (2.39-4.78)	.025 22 AWG (.63)	2.50-4.00
CY30	.7032-.8281 (17.86-21.03)	.6719-.8281 (17.07-21.03)	.0938-.1875 (2.39-4.78)	.025 22 AWG (.63)	5.00-7.00

Note: Leads are solder coated Dumet.

CORNING
ELECTRONICS
CORNING GLASS WORKS
Corning, New York 14830

Glass Capacitors

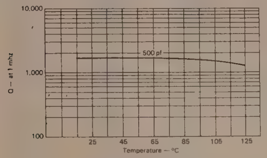
TY06, 07, 08 (INDUSTRIAL) CY06, 07, 08 (QPL to MIL-C-11272)



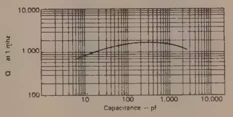
PART NUMBERS AND ORDERING INFORMATION

Capacitance Value (pF)	Military Type Designation	Corning Part No.	DC Working Voltage	Tolerances Available
	STANDARD VALUES CY06			
1.0	CY06C010—*	TY06C010—*	300	C,D
1.5	CY06C1R5—	TY06C1R5—	300	C,D
2.2	CY06C2R2—	TY06C2R2—	300	C,D
2.7	CY06C2R7—	TY06C2R7—	300	C,D
3.0	CY06C030—	TY06C030—	300	C,D
3.3	CY06C3R3—	TY06C3R3—	300	C,D
3.6	CY06C3R6—	TY06C3R6—	300	C,D
3.9	CY06C3R9—	TY06C3R9—	300	C,D
4.3	CY06C4R3—	TY06C4R3—	300	C,D
4.7	CY06C4R7—	TY06C4R7—	300	C,K
5.1	CY06C5R1—	TY06C5R1—	300	C,J,K
5.6	CY06C5R6—	TY06C5R6—	300	C,J,K
6.2	CY06C6R2—	TY06C6R2—	300	C,J,K
6.8	CY06C6R8—	TY06C6R8—	300	C,J,K
7.5	CY06C7R5—	TY06C7R5—	300	C,J,K
8.2	CY06C8R2—	TY06C8R2—	300	C,J,K
9.1	CY06C9R1—	TY06C9R1—	300	C,J,K
10	CY06C100—	TY06C100—	300	C,J,K,M
11	CY06C110—	TY06C110—	300	C,J,K,M
12	CY06C120—	TY06C120—	300	C,J,K,M
13	CY06C130—	TY06C130—	300	C,G,J,K,M
15	CY06C150—	TY06C150—	300	C,G,J,K,M
16	CY06C160—	TY06C160—	300	C,G,J,K,M
18	CY06C180—	TY06C180—	300	C,G,J,K,M
20	CY06C200—	TY06C200—	300	C,G,J,K,M
22	CY06C220—	TY06C220—	300	C,G,J,K,M
24	CY06C240—	TY06C240—	300	C,G,J,K,M
27	CY06C270—	TY06C270—	300	F,G,J,K,M
30	CY06C300—	TY06C300—	300	F,G,J,K,M
33	CY06C330—	TY06C330—	300	F,G,J,K,M
36	CY06C360—	TY06C360—	300	F,G,J,K,M
39	CY06C390—	TY06C390—	300	F,G,J,K,M
43	CY06C430—	TY06C430—	300	F,G,J,K,M
47	CY06C470—	TY06C470—	300	F,G,J,K,M
51	CY06C510—	TY06C510—	300	F,G,J,K,M
56	CY06C560—	TY06C560—	300	F,G,J,K,M
62	CY06C620—	TY06C620—	300	F,G,J,K,M
68	CY06C680—	TY06C680—	300	F,G,J,K,M
75	CY06C750—	TY06C750—	300	F,G,J,K,M
82	CY06C820—	TY06C820—	300	F,G,J,K,M
	STANDARD VALUES CY06			
91	CY06C910—*	TY06C910—*	300	F,G,J,K,M
100	CY06C101—	TY06C101—	300	F,G,J,K,M
110	CY06C111—	TY06C111—	300	F,G,J,K,M
120	CY06C121—	TY06C121—	300	F,G,J,K,M
130	CY06C131—	TY06C131—	300	F,G,J,K,M
150	CY06C151—	TY06C151—	300	F,G,J,K,M
160	CY06C161—	TY06C161—	300	F,G,J,K,M
180	CY06C181—	TY06C181—	300	F,G,J,K,M
200	CY06C201—	TY06C201—	300	F,G,J,K,M
220	CY06C221—	TY06C221—	300	F,G,J,K,M
240	CY06C241—	TY06C241—	300	F,G,J,K,M
270	CY06C271—	TY06C271—	300	F,G,J,K,M
300	CY06C301—	TY06C301—	300	F,G,J,K,M
330	CY06C331—	TY06C331—	300	F,G,J,K,M
360	CY06C361—	TY06C361—	300	F,G,J,K,M
390	CY06C391—	TY06C391—	300	F,G,J,K,M
430	CY06C431—	TY06C431—	300	F,G,J,K,M
470	CY06C471—	TY06C471—	300	F,G,J,K,M
510	CY06C511—	TY06C511—	300	F,G,J,K,M
560	CY06C561—	TY06C561—	300	F,G,J,K,M
	STANDARD VALUES CY07			
620	CY07C621—*	TY07C621—*	300	F,G,J,K,M
680	CY07C681—	TY07C681—	300	F,G,J,K,M
750	CY07C751—	TY07C751—	300	F,G,J,K,M
820	CY07C821—	TY07C821—	300	F,G,J,K,M
910	CY07C911—	TY07C911—	300	F,G,J,K,M
1000	CY07C102—	TY07C102—	300	F,G,J,K,M
	STANDARD VALUES CY08			
1100	CY08C112—*	TY08C112—*	300	F,G,J,K,M
1200	CY08C122—	TY08C122—	300	F,G,J,K,M
1300	CY08C132—	TY08C132—	300	F,G,J,K,M
1500	CY08C152—	TY08C152—	300	F,G,J,K,M
1600	CY08C162—	TY08C162—	300	F,G,J,K,M
1800	CY08C182—	TY08C182—	300	F,G,J,K,M
2000	CY08C202—	TY08C202—	300	F,G,J,K,M
2200	CY08C222—	TY08C222—	300	F,G,J,K,M
2400	CY08C242—	TY08C242—	300	F,G,J,K,M

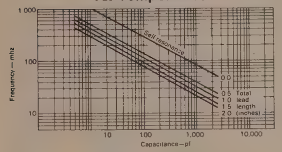
***Add letter for tolerance code above lines.**



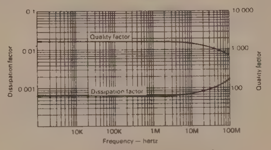
Quality Factor vs. Temperature



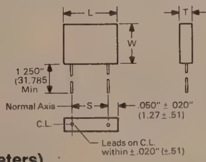
Quality Factor vs. Capacitance



Resonant Frequency vs. Capacitance



Quality Factor and Dissipation Factor vs. Frequency



Dimensions—Inches (Millimeters)

Case Size	L ±.005 (±.13)	W ±.010 (±.25)	T ±.005 (±.13)	S ±.020 (±.51)	Weight (Grams)
CY06	.300 (7.62)	.200 (5.08)	.115 (2.92)	.200 (5.08)	.3 - .4
CY07	.300 (7.62)	.300 (7.62)	.115 (2.92)	.200 (5.08)	.4 - .5
CY08	.500 (12.70)	.300 (7.62)	.115 (2.92)	.400 (10.16)	.7 - .8

Note: All leads are 24 AWG, .020 ± .002 (.51 ± .05) diameter. Leads are solderable and weldable gold-plated Dumet, per MIL-STD-1276, Type D.

APPLICATIONS

—These precision miniature glass capacitors, CORNING ® style TY0, meet or exceed all requirements of MIL-C-11272. Constructed of a fused monolithic capacitive element in a rectangular case with gold-plated radial Dumet leads, this series permits high packaging efficiency for printed circuit applications where extremely stable, low-loss capacitors are required.

PERFORMANCE CHARACTERISTICS

Tolerance—Available tolerances are "C" = ±0.25pF, "D" = ±0.5pF, "F" = ±1%, "G" = ±2%, "J" = ±5%, "K" = ±10%, "M" = ±20% as shown in the ordering information table. Standard tolerance for 5.1pF and above is ±5%, below 5.1pF the standard tolerance is ±0.25pF.

Temperature Coefficient—+140 ±25 ppm/°C at 100 kHz. TC will track and retrace to within ±5ppm. Capacitance drift is less than 0.1% or 0.1 pF, whichever is greater.

Voltage Coefficient—Zero.

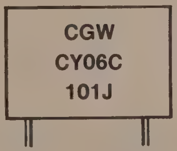
Losses—Extremely low, and remain relatively low at elevated temperatures. Dissipation factor at 1 kHz and 25°C is less than 0.001 for values greater than 100 pF and less than 0.002 for values of 100 pF and below.

Life—After 2,000 hours at 125°C with 150% of rated voltage applied, capacitance change is less than 0.5% or 0.5 pF; dissipation factor is less than 0.0025 for values above 100 pF and less than 0.0045 for values of 100 pF and below; insulation resistance is greater than 100,000 megohms.

Insulation Resistance—Greater than 100,000 megohms at 25°C; greater than 10,000 megohms at 125°C.

Voltage/Temperature Rating —WVDC over the temperature range of −55°C to + 125°C with no derating required.

PART MARKING

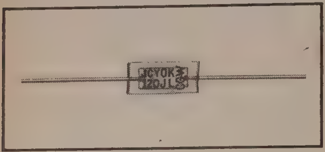


CGW — Corning Glass Works
CY — Glass Capacitor
06 — Case Size
C — Operating Temperature Range
101 — Capacitance. Coded in pF
J — Tolerance

CORNING
ELECTRONICS
CORNING GLASS WORKS
Corning, New York 14830

Glass Capacitors

CYR10, 15, 20, 30 (ESTABLISHED RELIABILITY) M23269/01, 02, 03, 04 (QPL to MIL-C-23269) FAILURE RATE LEVELS L, M AND S



APPLICATIONS

These precision glass-dielectric capacitors are QPL to Established Reliability specification MIL-C-23269. Fused monolithic construction provides excellent electrical performance, environmental immunity, stability and retraceability.

PERFORMANCE CHARACTERISTICS

Temperature Coefficient—+140 ±25 ppm/°C from −55°C to +125°C. TC of all units will track and retrace to within ±5 ppm.

Life—At rated conditions (100% rated voltage, 125°C), capacitance change is less than:

±0.5% after 2,000 hours
±2.0% after 30,000 hours

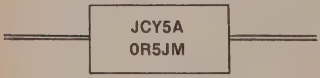
At accelerated conditions (150% rated voltage, 125°C), capacitance change is less than:

±0.5% after 2,000 hours
±2.0% after 6,000 hours

Insulation Resistance—A minimum of 100,000 megohms at 25°C and 10,000 megohms at 125°C.

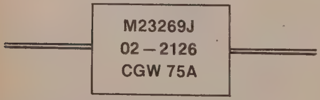
Voltage/Temperature Ratings—Voltage ratings are shown in the part number tables. The operating temperature range is −55°C to +125°C.

PART MARKING—CYR10



J — Jan Trademark
C —Capacitor
Y —Glass Dielectric
5 —Last digit of year
A —4 week lot code
OR5 — Capacitance code—
OR5 = 3.5pF
J — Capacitance tolerance—
J = ±5%
M — Failure level

PART MARKING—CYR15-30



M23269 — Military specification established reliability glass capacitor
J — Jan Trademark
02 — Case size (CYR15)
2 — Failure rate (L level)
126 — Dash Number—(capacitance in pF and capacitance tolerance
CGW — Corning Glass Works
75 — Year
A — Lot Code

PART NUMBERS AND ORDERING INFORMATION (AXIAL LEAD)

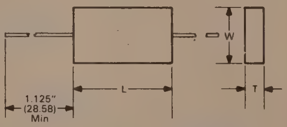
Value (pF)	Part Number* Capacitance Tolerance		
Style CYR10 M23269/01-			
500 Volts	**±.25pF**	**±.5pF**	**±5%**
.5	—001	—	—
1.0	—002	—	—
1.5	—003	—	—
2.2	—004	—005	—
2.7	—006	—	—
3.0	—007	—008	—
3.3	—009	—	—
3.6	—010	—011	—
3.9	—012	—	—
4.3	—013	—014	—
4.7	—015	—	—
5.1	—016	—	—
5.6	—017	—	—018
6.2	—019	—	—020
6.8	—021	—	—022
7.5	—023	—	—024
8.2	—025	—	—026
9.1	—027	—	—028
10	—029	—	—030
11	—031	—	—032
12	—033	—	—034
500 Volts	**±1%**	**±2%**	**±5%**
13	—	—035	—036
15	—	—037	—038
16	—	—039	—040
18	—	—041	—042
20	—	—043	—044
22	—	—045	—046
24	—	—047	—048
27	—049	—050	—051
30	—052	—053	—054
33	—055	—056	—057
36	—058	—059	—060
39	—061	—062	—063
43	—064	—065	—066
47	—067	—068	—069
51	—070	—071	—072
56	—073	—074	—075
62	—076	—077	—078
68	—079	—080	—081
75	—082	—083	—084
82	—085	—086	—087
91	—088	—089	—090
100	—091	—092	—093
110	—094	—095	—096
120	—097	—098	—099
130	—100	—101	—102
150	—103	—104	—105
160	—106	—107	—108
180	—109	—110	—111
200	—112	—113	—114
300 Volts			
220	—115	—116	—117
240	—118	—119	—120
270	—121	—122	—123
300	—124	—125	—126

Value (pF)	Part Number* Capacitance Tolerance		
Style CYR15 M23269/02-			
500 Volts	**±1%**	**±2%**	**±5%**
220	—001	—002	—003
240	—004	—005	—006
270	—007	—008	—009
300	—010	—011	—012
330	—013	—014	—015
360	—016	—017	—018
390	—019	—020	—021
430	—022	—023	—024
470	—025	—026	—027
510	—028	—029	—030
300 Volts			
560	—031	—032	—033
620	—034	—035	—036
680	—037	—038	—039
750	—040	—041	—042
820	—043	—044	—045
910	—046	—047	—048
1000	—049	—050	—051
1100	—052	—053	—054
1200	—055	—056	—057
Style CYR 20 M23269/03-			
500 Volts	**±1%**	**±2%**	**±5%**
560	—001	—002	—003
620	—004	—005	—006
680	—007	—008	—009
750	—010	—011	—012
820	—013	—014	—015
910	—016	—017	—018
1000	—019	—020	—021
1100	—022	—023	—024
1200	—025	—026	—027
1300	—028	—029	—030
1500	—031	—032	—033
1600	—034	—035	—036
1800	—037	—038	—039
2000	—040	—041	—042
2200	—043	—044	—045
2400	—046	—047	—048
2700	—049	—050	—051
3000	—052	—053	—054
3300	—055	—056	—057
300 Volts			
3600	—058	—059	—060
3900	—061	—062	—063
4300	—064	—065	—066
4700	—067	—068	—069
5100	—070	—071	—072
Style CYR 30 M23269/04-			
500 Volts	**±1%**	**±2%**	**±5%**
3600	—001	—002	—003
3900	—004	—005	—006
4300	—007	—008	—009
4700	—010	—011	—012
5100	—013	—014	—015
5600	—016	—017	—018
6200	—019	—020	—021
300 Volts			
6800	—022	—023	—024
7500	—025	—026	—027
8200	—028	—029	—030
9100	—031	—032	—033
10000	—034	—035	—036

*Add first digit to indicate failure rate, as follows:

	Failure Rate (90% Confidence)
2 — L	2%/1000 Hours
3 — M	1%/1000 Hours
7 — S	.001%/1000 Hours **NOTE:** Available only in CYR-10-30 styles with 100 wvdc rating.

Example:
M23269/01-3007
CYR10 3pF ±.25pF
M Failure Rate



Dimensions — Inches (Millimeters)

Case Size	L	W	T	Lead Dia. +.004 (+0.1) −.001 (−0.03)
CYR10	.344 ± .047 (8.74 ± 1.19)	.172 ± .031 (4.37 ± .79)	.078 ± .031 (1.98 ± .79)	.020 (.51)
CYR15	.469 ± .047 (11.91 ± 1.19)	.266 ± .031 (6.76 ± .79)	.109 ± .047 (2.77 ± 1.19)	.020 (.51)
CYR20	.734 ± .062 (18.64 ± 1.57)	.422 ± .047 (10.72 ± 1.19)	.141 ± .047 (3.58 ± 1.19)	.025 (.63)
CYR30	.766 ± .062 (19.46 ± 1.57)	.750 ± .078 (19.05 ± 1.98)	.141 ± .047 (3.58 ± 1.19)	.025 (.63)

Note: All leads are solder-coated copper-clad nickel-iron.

CORNING
ELECTRONICS
CORNING GLASS WORKS
Corning, New York 14830

Glass Capacitors

CYR51, 52, 53 (ESTABLISHED RELIABILITY) M23269/10 (QPL TO MIL-C-23269) FAILURE RATE LEVELS L, M, AND S

PART NUMBERS AND ORDERING INFORMATION (RADIAL LEAD)

Value (pF)	Part Number* Capacitance Tolerance		
	Style CYR51 M23269/10-		
300Volts	±.25pF	±2%	±5%
1	—001	—	—
1.5	—002	—	—
2.2	—003	—	—
2.7	—004	—	—
3.0	—005	—	—
3.3	—006	—	—
3.6	—007	—	—
3.9	—008	—	—
4.3	—009	—	—
4.7	—010	—	—
5.1	—011	—	—012
5.6	—013	—	—014
6.2	—015	—	—016
6.8	—017	—	—018
7.5	—019	—	—020
8.2	—021	—	—022
9.1	—023	—	—024
10	—025	—	—026
11	—027	—	—028
12	—029	—	—030
13	—031	—032	—033
15	—034	—035	—036
16	—037	—038	—039
18	—040	—041	—042
20	—043	—044	—045
22	—046	—047	—048
24	—049	—050	—051
	±1%	±2%	±5%
27	—052	—053	—054
30	—055	—056	—057
33	—058	—059	—060
36	—061	—062	—063
39	—064	—065	—066
43	—067	—068	—069
47	—070	—071	—072
51	—073	—074	—075
56	—076	—077	—078
62	—079	—080	—081
68	—082	—083	—084
75	—085	—086	—087
82	—088	—089	—090

Value (pF)	Part Number* Capacitance Tolerance		
	Style CYR51 M23269/10-		
300Volts	±1%	±2%	±5%
91	—091	—092	—093
110	—097	—098	—099
120	—100	—101	—102
130	—103	—104	—105
150	—106	—107	—108
160	—109	—110	—111
180	—112	—113	—114
200	—115	—116	—117
220	—118	—119	—120
240	—121	—122	—123
270	—124	—125	—126
300	—127	—128	—129
330	—130	—131	—132
360	—133	—134	—135
390	—136	—137	—138
430	—139	—140	—141
470	—142	—143	—144
510	—145	—146	—147
560	—148	—149	—150
	Style CYR52 M23269/10-		
300Volts	±1%	±2%	±5%
620	—201	—202	—203
680	—204	—205	—206
750	—207	—208	—209
820	—210	—211	—212
910	—213	—214	—215
1000	—216	—217	—218
	Style CYR53 M23269/10-		
300Volts	±1%	±2%	±5%
1100	—301	—302	—303
1200	—304	—305	—306
1500	—310	—311	—312
1600	—313	—314	—315
1800	—316	—317	—318
2000	—319	—320	—321
2200	—322	—323	—324
2400	—325	—326	—327

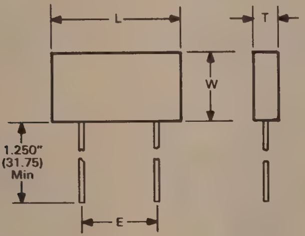
*Add first digit to indicate failure rate, as follows:

Failure Rate
(90% Confidence)

2 — L 2%/1000 Hours
3 — M 1%/1000 Hours

Example:

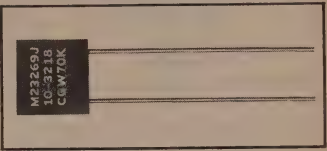
M23269-01-3007
CYR10 3pF ± 25pF
M Failure Rate
M23269/10-2053
CYR51 27 pF ±2%
L Failure Rate



Dimensions — Inches (Millimeters)

Case Size	L ± .005 (± .13)	W ± .010 (± .25)	T ± .005 (± .13)	Lead Dia. ± .002 (± .051)	S ± .020 (± .51)
CYR51	.300 (7.62)	.200 (5.08)	.115 (2.92)	.020 (.51)	.200 (5.08)
CYR52	.300 (7.62)	.300 (5.08)	.115 (2.92)	.020 (.51)	.200 (5.08)
CYR53	.500 (12.70)	.300 (7.62)	.115 (2.92)	.020 (.51)	.400 (5.08)

Note: All leads are copper-clad nickel-iron in accordance with MIL-STD-1276 Type D.



APPLICATIONS

These precision glass-dielectric capacitors are QPL to Established Reliability specification MIL-C-23269. Fused monolithic construction provides excellent electrical performance, environmental immunity, stability and retraceability.

PERFORMANCE CHARACTERISTICS

Temperature Coefficient—+140 ±25 ppm/°C from −55°C to +125°C. TC of all units will track and retrace to within ±5 ppm.

Life—At rated conditions (100% rated voltage, 125°C), capacitance change is less than:

±0.5% after 2,000 hours
±2.0% after 30,000 hours

At accelerated conditions (150% rated voltage, 125°C), capacitance change is less than:

±0.5% after 2,000 hours
±2.0% after 6,000 hours

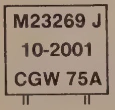
Insulation Resistance—A minimum of 100,000 megohms at 25°C and 10,000 megohms at 125°C.

Voltage/Temperature Ratings—Voltage ratings are shown in the part number tables. The operating temperature range is −55°C to +125°C.

Cross-Reference Information

MIL-C-23269 Style	MIL-C-11272 Style
CYR51	CY06
CYR52	CY07
CYR53	CY08

PART MARKING



STYLE CYR51, 52, 53

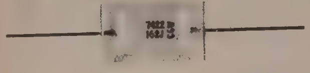
M23269 — Military specification established reliability glass capacitor
J — Jan
10 — Case Size
2 — Failure rate (L level)
001 — Capacitance. Coded in pF and capacitance tolerance
CGW — Corning Glass Works
75 — Year
A — Lot Code

CORNING
ELECTRONICS

CORNING GLASS WORKS
Corning, New York 14830

Glass Capacitors

CYFR 10, 15, 20, 30 (HIGH RELIABILITY)



CYFR20

APPLICATIONS

CORNING® style CYFR high reliability glass capacitors have failure rates among the lowest available. These capacitors meet or exceed all requirements of Corning specifications J-950 and J-951, which combine the most exacting features of many specifications and substantially exceed those of most.

PERFORMANCE CHARACTERISTICS

Tolerance—Available tolerances are "C" = 0.25 pF, "D" = ±0.5 pF, "F" = ±1%, "G" = ±2%, "J" = ±5% as shown in the ordering information table.

Temperature Coefficient—+140 ±25 ppm/°C at 100 kHz. TC will track and retrace to within ±5 ppm. Capacitance drift is less than 0.1% or 0.1 pF, whichever is greater.

Voltage Coefficient—Zero.

Losses—Extremely low, and remain relatively low at elevated temperatures and high frequencies. Dissipation factor is less than 0.001 at 1 kHz and 25°C.

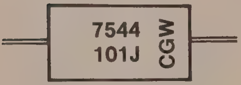
Life—After 2,000 hours at 125°C with 150% of rated voltage applied, capacitance change is less than 0.5% or 0.5 pF, dissipation factor is less than 0.0015, and insulation resistance is greater than 500,000 megohms.

Insulation Resistance—Greater than 500,000 megohms at 25°C; greater than 10,000 megohms at 125°C.

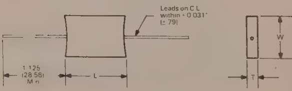
Voltage/Temperature Ratings—Voltage ratings are shown in the ordering information table. The operating temperature range is −55°C to +125°C with no derating required.

Moisture Resistance—Exceeds all requirements of MIL-C-11272 and MIL-STD-202, Method 106.

PART MARKING



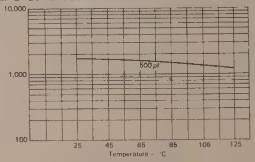
75 — Year
44 — Lot Code
101 — Capacitance. Coded in pF
J — Tolerance
CGW — Corning Glass Works



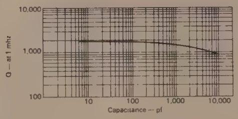
PART NUMBERS AND ORDERING INFORMATION

Capacitance Value (pF)	Corning Part Number	DC Working Voltage	Tolerances Available
STANDARD VALUES CYFR10			
0.5	CYFR10—*0R5*—**	500	C
1.0	CYFR10—010—	500	C
1.5	CYFR10—1R5—	500	C
2.2	CYFR10—2R2—	500	C,D
2.7	CYFR10—2R7—	500	C
3.0	CYFR10—030—	500	C,D
3.3	CYFR10—3R3—	500	C
3.6	CYFR10—3R6—	500	C,D
3.9	CYFR10—3R9—	500	C
4.3	CYFR10—4R3—	500	C,D
4.7	CYFR10—4R7—	500	C
5.1	CYFR10—5R1—	500	C
5.6	CYFR10—5R6—	500	C
6.2	CYFR10—6R2—	500	C,J
6.8	CYFR10—6R8—	500	C,J
7.5	CYFR10—7R5—	500	C,J
8.2	CYFR10—8R2—	500	C,J
9.1	CYFR10—9R1—	500	C,J
10	CYFR10—100—	500	C,J
11	CYFR10—110—	500	C,J
12	CYFR10—120—	500	C,J
13	CYFR10—130—	500	G,J
15	CYFR10—150—	500	G,J
16	CYFR10—160—	500	G,J
18	CYFR10—180—	500	G,J
20	CYFR10—200—	500	G,J
22	CYFR10—220—	500	G,J
24	CYFR10—240—	500	G,J
27	CYFR10—270—	500	F,G,J
30	CYFR10—300—	500	F,G,J
33	CYFR10—330—	500	F,G,J
36	CYFR10—360—	500	F,G,J
39	CYFR10—390—	500	F,G,J
43	CYFR10—430—	500	F,G,J
47	CYFR10—470—	500	F,G,J
51	CYFR10—510—	500	F,G,J
56	CYFR10—560—	500	F,G,J
62	CYFR10—620—	500	F,G,J
68	CYFR10—680—	500	F,G,J
75	CYFR10—750—	500	F,G,J
82	CYFR10—820—	500	F,G,J
91	CYFR10—910—	500	F,G,J
100	CYFR10—101—	500	F,G,J
110	CYFR10—111—	500	F,G,J
120	CYFR10—121—	500	F,G,J
130	CYFR10—131—	500	F,G,J
150	CYFR10—151—	500	F,G,J
160	CYFR10—161—	300	F,G,J
180	CYFR10—181—	300	F,G,J
200	CYFR10—201—	300	F,G,J
220	CYFR10—221—	300	F,G,J
240	CYFR10—241—	300	F,G,J
STANDARD VALUES CYFR15			
160	CYFR15—*161*—**	500	F,G,J
180	CYFR15—181—	500	F,G,J
200	CYFR15—201—	500	F,G,J
220	CYFR15—221—	500	F,G,J
STANDARD VALUES CYFR15, con't.			
240	CYFR15—*241*—**	500	F,G,J
270	CYFR15—271—	500	F,G,J
300	CYFR15—301—	500	F,G,J
330	CYFR15—331—	500	F,G,J
360	CYFR15—361—	500	F,G,J
390	CYFR15—391—	500	F,G,J
430	CYFR15—431—	500	F,G,J
470	CYFR15—471—	500	F,G,J
510	CYFR15—511—	500	F,G,J
560	CYFR15—561—	300	F,G,J
620	CYFR15—621—	300	F,G,J
750	CYFR15—751—	300	F,G,J
820	CYFR15—821—	300	F,G,J
910	CYFR15—911—	300	F,G,J
1000	CYFR15—102—	300	F,G,J
1100	CYFR15—112—	300	F,G,J
1200	CYFR15—122—	300	F,G,J
STANDARD VALUES CYFR20			
560	CYFR20—*561*—**	500	F,G,J
620	CYFR20—621—	500	F,G,J
680	CYFR20—681—	500	F,G,J
750	CYFR20—751—	500	F,G,J
820	CYFR20—821—	500	F,G,J
910	CYFR20—911—	500	F,G,J
1000	CYFR20—102—	500	F,G,J
1100	CYFR20—112—	500	F,G,J
1200	CYFR20—122—	500	F,G,J
1300	CYFR20—132—	500	F,G,J
1500	CYFR20—152—	500	F,G,J
1600	CYFR20—162—	500	F,G,J
1800	CYFR20—182—	500	F,G,J
2000	CYFR20—202—	500	F,G,J
2200	CYFR20—222—	500	F,G,J
2400	CYFR20—242—	500	F,G,J
2700	CYFR20—272—	500	F,G,J
3000	CYFR20—302—	500	F,G,J
3300	CYFR20—332—	500	F,G,J
3600	CYFR20—362—	300	F,G,J
3900	CYFR20—392—	300	F,G,J
4300	CYFR20—432—	300	F,G,J
4700	CYFR20—472—	300	F,G,J
5100	CYFR20—512—	300	F,G,J
STANDARD VALUES CYFR30			
3600	CYFR30—*362*—**	500	F,G,J
3900	CYFR30—392—	500	F,G,J
4300	CYFR30—432—	500	F,G,J
4700	CYFR30—472—	500	F,G,J
5100	CYFR30—512—	500	F,G,J
5600	CYFR30—562—	500	F,G,J
6200	CYFR30—622—	500	F,G,J
6800	CYFR30—682—	300	F,G,J
7500	CYFR30—752—	300	F,G,J
8200	CYFR30—822—	300	F,G,J
9100	CYFR30—912—	300	F,G,J
10000	CYFR30—103—	300	F,G,J

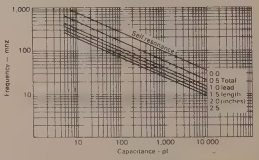
*Add S or G for lead finish **Add letter for tolerance code



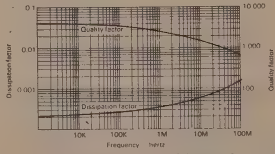
Quality Factor vs. Temperature



Quality Factor vs. Capacitance



Resonant Frequency vs. Capacitance



Quality Factor and Dissipation Factor vs. Frequency

Dimensions—Inches (Millimeters)

Style	L Min—Max	W Min—Max	T Min—Max	Lead Dia +.004 (+0.1) −.001 (−0.03)	Weight (Grams)
CYFR10	.2969—.3906 (7.54—9.93)	.1406—.2031 (3.58—5.16)	.0469—.1093 (1.19—2.77)	.020 24 AWG (.51)	.25—.50
CYFR15	.4219—.5156 (10.72—13.11)	.2344—.2968 (5.94—7.54)	.0625—.1562 (1.60—3.96)	.020 24 AWG (.51)	.75—1.25
CYFR20	.6719—.7968 (17.07—20.24)	.3750—.4687 (9.52—11.91)	.0938—.1875 (2.39—4.78)	.025 22 AWG (.63)	2.50—4 00
CYFR30	.7032—.8281 (17.86—21.03)	.6719—.8281 (17.07—21.03)	.0938—.1875 (2.39—4.78)	.025 22 AWG (.63)	5.00—7.00

Note: Leads are solderable and weldable Dumet.

CORNING
ELECTRONICS
CORNING GLASS WORKS
Corning, New York 14830

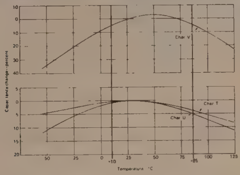
Ceramic GLASS-K™ Capacitors

CYK01, 02 (INDUSTRIAL) CK31, 32 (QPL to MIL-C-11015/25)

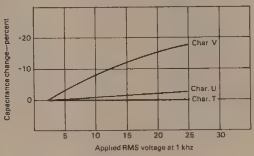
PART NUMBERS AND ORDERING INFORMATION

Capacitance Value (pF)	Corning Part No.	Military Type Designation	DC Working Voltage	Tolerances Available
STANDARD VALUES CK31				
270	CYK01BT271—*	CK31BT271—*	50	J,K
330	CYK01BT331—	CK31BT331—	50	J,K
390	CYK01BT391—	CK31BT391—	50	J,K
470	CYK01BT471—	CK31BT471—	50	J,K
560	CYK01BT561—	CK31BT561—	50	J,K
680	CYK01BT681—	CK31BT681—	50	J,K
820	CYK01BT821—	CK31BT821—	50	J,K
1000	CYK01BT102—	CK31BT102—	50	J,K
1200	CYK01BT122—	CK31BT122—	50	J,K
1500	CYK01BT152—	CK31BT152—	50	J,K
1800	CYK01BT182—	CK31BT182—	50	J,K
2200	CYK01BT222—	CK31BT222—	50	J,K
2700	CYK01BT272—	CK31BT272—	50	J,K
3300	CYK01BT332—	CK31BT332—	50	J,K
3900	CYK01BT392—	CK31BT392—	50	J,K
4700	CYK01BT472—	CK31BT472—	50	J,K
5000	CYK01BT562—	CK31BT562—	50	J,K
6800	CYK01BT682—	CK31BT682—	50	J,K
8200	CYK01BT822—	CK31BT822—	50	J,K
10000	CYK01BT103—	CK31BT103—	50	J,K
12000	CYK01BU123—	CK31BU123—	50	K,M
15000	CYK01BU153—	CK31BU153—	50	K,M
18000	CYK01BU183—	CK31BU183—	50	K,M
20000	CYK01BU203—	CK31BU203—	50	K,M
STANDARD VALUES CK31 (Cont.)				
22000	CYK01BU223—*	CK31BU223—*	50	K,M
27000	CYK01BU273—	CK31BU273—	50	K,M
33000	CYK01BU333—	CK31BU333—	50	K,M
39000	CYK01BU393—	CK31BU393—	50	K,M
47000	CYK01BU473—	CK31BU473—	50	K,M
51000	CYK01BU513—	CK31BU513—	50	K,M
STANDARD VALUES CK32				
12000	CYK02BT123—*	CK32BT123—*	50	J,K
15000	CYK02BT153—	CK32BT153—	50	J,K
18000	CYK02BT183—	CK32BT183—	50	J,K
20000	CYK02BT203—	CK32BT203—	50	J,K
22000	CYK02BU223—	CK32BU223—	50	K,M
27000	CYK02BU273—	CK32BU273—	50	K,M
33000	CYK02BU333—	CK32BU333—	50	K,M
39000	CYK02BU393—	CK32BU393—	50	K,M
56000	CYK02BV563—	CK32BV563—	50	K,M
68000	CYK02BV683—	CK32BV683—	50	K,M
82000	CYK02BV823—	CK32BV823—	50	K,M
100000	CYK02BV104—	CK32BV104—	50	K,M

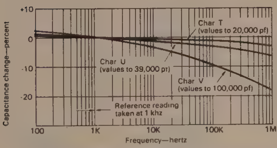
***Add Letter for Tolerance Code above line: J = ±5%, K = ±10%, M = ±20%**



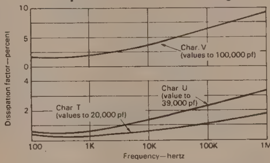
Capacitance vs. Temperature



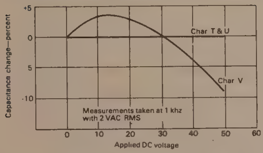
Capacitance vs. ac Voltage



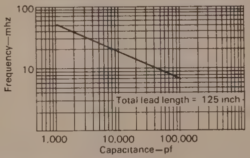
Capacitance Change vs. Frequency



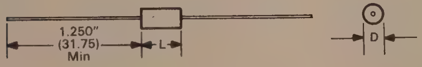
Dissipation Factor vs. Frequency



Capacitance vs. dc Voltage



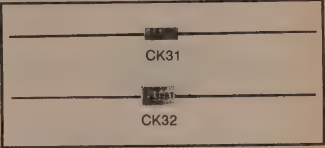
Resonant Frequency vs. Capacitance



Dimensions—Inches (Millimeters)

Case Size	L Max	D Max	Lead Dia. +.004 (.10) −.001 (.03)	Weight (Grams)
CK31	.250 (6.35)	.100 (2.54)	.016 (.41)	.2
CK32	.250 (6.35)	.140 (3.56)	.016 (.41)	.3

Note: Leads are gold-plated, solderable and weldable Dumet per MIL-STD-1276, Type D.



APPLICATIONS

These miniature multilayer ceramic capacitors, CORNING® style CYK01 and CYK02, meet or exceed all requirements of MIL-C-11015. High volumetric efficiency and reliable performance result from the special GLASS-K® dielectric, which is fused into a compact monolithic structure, sized for automatic insertion. Available in three different stability characteristics, these capacitors are suitable for both military and commercial applications in miniature circuitry.

PERFORMANCE CHARACTERISTICS

Tolerance—± 20% and ± 10% in characteristics "U" and "V", and ±10% and ±5% in characteristic "T".

Stability Characteristics—Available as follows:

T— TC: +2, −10%;
TVC: +2, −10%
U— TC: +2, −15%;
TVC: +2, −15%
V— TC: +20, −45%;
TVC: +20, −50%

Dissipation factor—
T: <1%
U: <1.5%
V: <3.0%

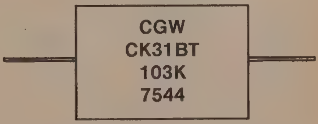
Life—Meets or exceeds requirements of MIL-C-11015. At 200% of rated voltage, 125°C, the capacitance change for each stability characteristic is as follows:
T: <2%
U: <5%
V <20%

Insulation Resistance—100,000 megohms or 1,000 megohm-microfarads, whichever is less.

Voltage/Temperature Ratings—Rated voltage is 50 Vdc. The operating temperature range is −55°C to +125°C.

Moisture Resistance—Meets or exceeds requirements of MIL-C-11015 and MIL-STD-202, Method 106. The capacitance change is less than 2% for stability characteristics T and U, and less than 5% for characteristic V.

PART MARKING

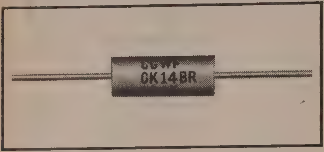


CGW — Corning Glass Works
CK — Style
31 — Case Size
B — Operating Temperature Range
T — Stability Characteristic
103 — Capacitance. Coded in pF
K — Tolerance
7544 — Date and Lot Code

CORNING
ELECTRONICS
CORNING GLASS WORKS
Corning, New York 14830

Ceramic Capacitors

CK12, 13, 14 (QPL to MIL-C-11015/20)



APPLICATIONS

These miniature multilayer ceramic capacitors are QPL to MIL-C-11015/20. The exclusive dielectric provides high volumetric efficiency and superior reliability. The monolithic units are molded into rugged flame-retardant cases, ideally suited for automatic insertion.

PERFORMANCE CHARACTERISTICS

Tolerance—±20% and ±10%.

Stability Characteristics—Available as follows:
X — TC: ±15%; TVC: +15, −25%
R — TC: ±15%; TVC: +15, −40%

Dissipation Factor—2.5% maximum @ 1 kHz.

Life—Meets or exceeds requirements of MIL-C-11015, 200% of rated voltage, 125°C, for 2,000 hours.

Insulation Resistance—100,000 megohms or 1,000 megohm-microfarads.

Voltage/Temperature Ratings —Voltage ratings are shown in the ordering information table. The operating temperature range is −55°C to +125°C.

Moisture Resistance—Meets or exceeds requirements of MIL-C-11015 and MIL-STD-202, Method 106.

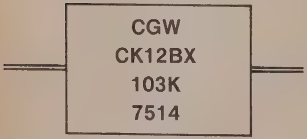
Dielectric Withstanding Voltage—250% of rated dc voltage.

Part Numbers—Part numbers are shown in the ordering information table. Use suffix "M" for ±20% tolerance if available, and suffix "K" for ±10% tolerance.

Cross-Reference Information

MIL-C-11015/20 Style	MIL-C-39014/5 Style
CK12	CKR11
CK13	CKR12
CK14	CKR14

PART MARKING



CGW — Corning Glass Works
CK — Style
12 — Case Size
B — Operating Temperature Range
X — Stability Characteristic
103 — Capacitance
K — Tolerance
7514 — Date and Lot Code

PART NUMBERS AND ORDERING INFORMATION

STANDARD VALUES CK12

Capacitance Values (pF)	Military Type Designation	DC Working Voltage	Tolerances Available
10	CK12BX100—*	100	K,M
12	CK12BX120—	100	K
15	CK12BX150—	100	K,M
18	CK12BX180—	100	K
22	CK12BX220—	100	K,M
27	CK12BX270—	100	K
33	CK12BX330—	100	K,M
39	CK12BX390—	100	K
47	CK12BX470—	100	K,M
56	CK12BX560—	100	K
68	CK12BX680—	100	K,M
82	CK12BX820—	100	K
100	CK12BX101—	100	K,M
120	CK12BX121—	100	K
150	CK12BX151—	100	K,M
180	CK12BX181—	100	K
220	CK12BX221—	100	K,M
270	CK12BX271—	100	K
330	CK12BX331—	100	K,M
390	CK12BX391—	100	K
470	CK12BX471—	100	K,M
560	CK12BX561—	100	K
680	CK12BX681—	100	K,M
820	CK12BX821—	100	K
1000	CK12BX102—	100	K,M
1200	CK12BX122—	100	K
1500	CK12BX152—	100	K,M
1800	CK12BX182—	100	K
2200	CK12BX222—	100	K,M
2700	CK12BX272—	100	K
3300	CK12BX332—	100	K,M
3900	CK12BX392—	100	K
4700	CK12BX472—	100	K,M
5600	CK12BX562—	50	K
6800	CK12BX682—	50	K,M
8200	CK12BX822—	50	K
10000	CK12BX103—	50	K,M

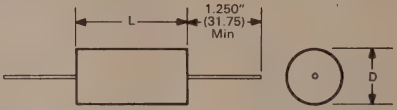
STANDARD VALUES CK13

Capacitance Values (pF)	Military Type Designation	DC Working Voltage	Tolerances Available
5600	CK13BX562—*	100	K
6800	CK13BX682—	100	K,M
8200	CK13BX822—	100	K
10000	CK13BX103—	100	K,M
12000	CK13BX123—	50	K
15000	CK13BX153—	50	K,M
18000	CK13BX183—	50	K
22000	CK13BX223—	50	K,M
27000	CK13BR273—	50	K
33000	CK13BR333—	50	K,M
39000	CK13BR393—	50	K
47000	CK13BR473—	50	K,M

STANDARD VALUES CK14

Capacitance Values (pF)	Military Type Designation	DC Working Voltage	Tolerances Available
12000	CK14BX123—*	100	K
15000	CK14BX153—	100	K,M
18000	CK14BX183—	100	K
22000	CK14BX223—	100	K,M
27000	CK14BX273—	100	K
33000	CK14BX333—	100	K,M
39000	CK14BX393—	100	K
47000	CK14BX473—	100	K,M
56000	CK14BR563—	100	K
68000	CK14BR683—	100	K,M
82000	CK14BR823—	100	K
100000	CK14BR104—	100	K,M
120000	CK14BR124—	50	K
150000	CK14BR154—	50	K,M
180000	CK14BR184—	50	K
220000	CK14BR224—	50	K,M
270000	CK14BR274—	50	K

*Add letter for tolerance code above lines.



Dimensions—Inches (Millimeters)

Case Size	L ±.010 (±.25)	D ±.010 (±.25)	Lead Dia. +.004 (.10) −.001 (.03)	Weight (Grams)
CK12	.160 (4.06)	.090 (2.29)	.016	.2
CK13	.250 (6.35)	.090 (2.29)	.016 (.41)	.2
CK14	.390 (9.91)	.140 (3.56)	.025 (.63)	.5

Note: All leads are solder-coated dumet, per MIL-STD-1276, Type D.

CORNING
ELECTRONICS

CORNING GLASS WORKS
Corning, New York 14830

Ceramic Capacitors

CKR11, 12, 14 (QPL to MIL-C-39014/5) Established Reliability

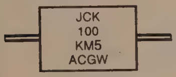
PART NUMBERS AND ORDERING INFORMATION

M39014/05 — (Dash Number) Failure Rate Level —(% 1,000 Hours)					Capacitance Value pF	Capacitance Tolerance ± %	DC Rated Voltage
2.0(L)	1.0(M)	0.1(P)	0.01(R)	0.001(S)			
Style CKR11 BX							
2401	2601	2801	2001	2201	10	10	100
2402	2602	2802	2002	2202	10	20	100
2403	2603	2803	2003	2203	12	10	100
2404	2604	2804	2004	2204	15	10	100
2405	2605	2805	2005	2205	15	20	100
2406	2606	2806	2006	2206	18	10	100
2407	2607	2807	2007	2207	22	10	100
2408	2608	2808	2008	2208	22	20	100
2409	2609	2809	2009	2209	27	10	100
2410	2610	2810	2010	2210	33	10	100
2411	2611	2811	2011	2211	33	20	100
2412	2612	2812	2012	2212	39	10	100
2413	2613	2813	2013	2213	47	10	100
2414	2614	2814	2014	2214	47	20	100
2415	2615	2815	2015	2215	56	10	100
2416	2616	2816	2016	2216	68	10	100
2417	2617	2817	2017	2217	68	20	100
2418	2618	2818	2018	2218	82	10	100
2419	2619	2819	2019	2219	100	10	100
2420	2620	2820	2020	2220	100	20	100
2421	2621	2821	2021	2221	120	10	100
2422	2622	2822	2022	2222	150	10	100
2423	2623	2823	2023	2223	150	20	100
2424	2624	2824	2024	2224	180	10	100
2425	2625	2825	2025	2225	220	10	100
2426	2626	2826	2026	2226	220	20	100
2427	2627	2827	2027	2227	270	10	100
2428	2628	2828	2028	2228	330	10	100
2429	2629	2829	2029	2229	330	20	100
2430	2630	2830	2030	2230	390	10	100
2431	2631	2831	2031	2231	470	10	100
2432	2632	2832	2032	2232	470	20	100
2433	2633	2833	2033	2233	560	10	100
2434	2634	2834	2034	2234	680	10	100
2435	2635	2835	2035	2235	680	20	100
2436	2636	2836	2036	2236	820	10	100
2437	2637	2837	2037	2237	1000	10	100
2438	2638	2838	2038	2238	1000	20	100
2439	2639	2839	2039	2239	1200	10	100
2440	2640	2840	2040	2240	1500	10	100
2441	2641	2841	2041	2241	1500	20	100
2442	2642	2842	2042	2242	1800	10	100
2443	2643	2843	2043	2243	2200	10	100
2444	2644	2844	2044	2244	2200	20	100
2445	2645	2845	2045	2245	2700	10	100
2446	2646	2846	2046	2246	3300	10	100
2447	2647	2847	2047	2247	3300	20	100
2448	2648	2848	2048	2248	3900	10	100
2449	2649	2849	2049	2249	4700	10	100
2450	2650	2850	2050	2250	4700	20	100
2451	2651	2851	2051	2251	5600	10	50
2452	2652	2852	2052	2252	6800	10	50
2453	2653	2853	2053	2253	6800	20	50
2454	2654	2854	2054	2254	8200	10	50
2455	2655	2855	2055	2255	10000	10	50
2456	2656	2856	2056	2256	10000	20	50

M39014/05 — (Dash Number) Failure Rate Level —(% 1,000 Hours)					Capacitance Value pF	Capacitance Tolerance ± %	DC Rated Voltage
2.0(L)	1.0(M)	0.1(P)	0.01(R)	0.001(S)			
Style CKR12 BX							
2457	2657	2857	2057	2257	5600	10	100
2458	2658	2858	2058	2258	6800	10	100
2459	2659	2859	2059	2259	6800	20	100
2460	2660	2860	2060	2260	8200	10	100
2461	2661	2861	2061	2261	10000	10	100
2462	2662	2862	2062	2262	10000	20	100
2463	2663	2863	2063	2263	12000	10	50
2464	2664	2864	2064	2264	15000	10	50
2465	2665	2865	2065	2265	15000	20	50
2466	2666	2866	2066	2266	18000	10	50
2467	2667	2867	2067	2267	22000	10	50
2468	2668	2868	2068	2268	22000	20	50
2469	2669	2869	2069	2269	27000	10	50
2470	2670	2870	2070	2270	33000	10	50
2471	2671	2871	2071	2271	33000	20	50
2472	2672	2872	2072	2272	39000	10	50
2473	2673	2873	2073	2273	47000	10	50
2474	2674	2874	2074	2274	47000	20	50
Style CKR14 BX							
2475	2675	2875	2075	2275	12000	10	100
2476	2676	2876	2076	2276	15000	10	100
2477	2677	2877	2077	2277	15000	20	100
2478	2678	2878	2078	2278	18000	10	100
2479	2679	2879	2079	2279	22000	10	100
2480	2680	2880	2080	2280	22000	20	100
2481	2681	2881	2081	2281	27000	10	100
2482	2682	2882	2082	2282	33000	10	100
2483	2683	2883	2083	2283	33000	20	100
2484	2684	2884	2084	2284	39000	10	100
2485	2685	2885	2085	2285	47000	10	100
2486	2686	2886	2086	2286	47000	20	100
2487	2687	2887	2087	2287	56000	10	50
2488	2688	2888	2088	2288	68000	10	50
2489	2689	2889	2089	2289	68000	20	50
2490	2690	2890	2090	2290	82000	10	50
2491	2691	2891	2091	2291	100000	10	50
2492	2692	2892	2092	2292	100000	20	50
Style CKR14 BR							
2493	2693	2893	2093	2293	56000	10	100
2494	2694	2894	2094	2294	68000	10	100
2495	2695	2895	2095	2295	68000	20	100
2496	2696	2896	2096	2296	82000	10	100
2497	2697	2897	2097	2297	100000	10	100
2498	2698	2898	2098	2298	100000	20	100
2499	2699	2899	2099	2299	120000	10	50
2500	2700	2900	2100	2300	150000	10	50
2501	2701	2901	2101	2301	150000	20	50
2502	2702	2902	2102	2302	180000	10	50
2503	2703	2903	2103	2303	220000	10	50
2504	2704	2904	2104	2304	220000	20	50
2505	2705	2905	2105	2305	270000	10	50

PART MARKING

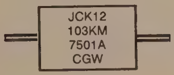
STYLE CKR11



J— JAN Trademark
C— Capacitor
K— Ceramic Dielectric

100— Capacitance Code in pF (10pF)
K— Capacitance Tolerance (±10%)
M— Failure Rate Level (1%/1000 hrs.)
5— Last Digit of Year
A— 3 Week Lot Code
CGW— Corning Glass Works

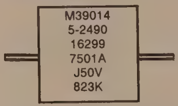
STYLE CKR12



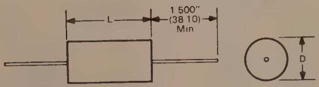
J— JAN Trademark
C— Capacitor
K— Ceramic Dielectric

12— Size
103— Capacitance (10,000 pF)
K— Capacitance Tolerance (±10%)
M— Failure Rate Level (1%/1000 hrs.)
75— Last 2 Digits of Year
01— Week of Year
A— Lot Code
CGW— Corning Glass Works

STYLE CKR14



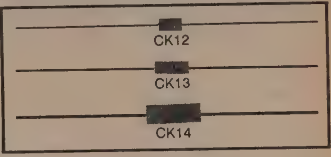
M39014— General Specification
5— Specification Sheet
2490— Dash Number
16299— CGW ID Number
75— Year
01— Week
A— Lot Code
J— JAN Trademark
50v— Voltage Rating
823— Coded Capacitance
K— Capacitance Tolerance



Dimensions—Inches (Millimeters)

Case Size	L ±.010 (±.25)	D ±.010 (±.25)	Lead Dia
CR11	.160 (4.06)	.090 (2.29)	.016 ± .001 (.41 ± .03)
CKR12	.250 (6.35)	.090 (2.29)	.016 ± .001 (.41 ± .03)
CKR14	.390 (9.91)	.140 (3.56)	.025 ± .002 (.63 ± .05)

Note —Leads are solder coated Dumet per MIL-STD-1276 Type D.



APPLICATIONS

These miniature multilayer ceramic capacitors are QPL to Established Reliability specification MIL-C-39014/5. The dielectric is fused into a monolithic structure, which is then molded into a tough, flameproof case, sized for automatic insertion. These units offer excellent frequency characteristics, superior voltage coefficients and high volumetric efficiency.

PERFORMANCE CHARACTERISTICS

Tolerance—±20% and ±10%.

Stability Characteristics—Available as follows:

BX—TC: ±15%; TVC: +15, −25%
BR—TC: ±15%; TVC: +15, −40%

Dissipation Factor—2.5% maximum.

Insulation Resistance—At 25°C, 100,000 megohms or 1,000 megohm-microfarads. At 125°C, 10,000 megohms or 100 megohm-microfarads.

Voltage/Temperature Ratings—Voltage ratings are shown in the ordering information table. The operating temperature range is −55°C to +125°C.

Part Numbers—Part numbers are formed by adding a dash number from the part number table to the basic mil spec number —M39014/05—(add dash number)

Examples:

M39014/05-2401
CKR11 10pF ±10% 100V
L Failure Rate (BX)

M39014/05-2698
CKR14 100,000 pF ±20% 100V
M Failure Rate (BR)

Cross-Reference Information

MIL-C-39014/5 Style	MIL-C-11015/20 Style
CKR11	CK12
CKR12	CK13
CKR14	CK14

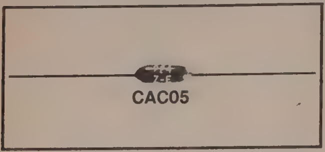
Failure Rate (90% Confidence)

L = 2%/1000 Hours
M = 1%/1000 Hours
P = .1%/1000 Hours
R = .01%/1000 Hours
S = .001%/1000 Hours

CORNING
ELECTRONICS
CORNING GLASS WORKS
Corning, New York 14830

Ceramic Capacitors

CAC02, 03, 04, 05 (SPINSEAL)™ Axial, Conformal Coated



INTRODUCING SPINSEAL™

These miniature monolithic ceramic capacitors are designed for high volume commercial and industrial applications where space and weight are at a premium. The Spinseal technology permits us to manufacture axials at high speeds while closely controlling uniformity and performance. Especially suited for automatic insertion application, Spinseal is *the* low cost axial ceramic capacitor.

EIA TEMPERATURE CHARACTERISTICS

Available as follows:

X7R (stable)—±15%
from −55°C to +125°C

Z5U (general purpose)—+22%
−56% from +10°C to +85°C

PERFORMANCE CHARACTERISTICS

Standard capacitance tolerances available.

X7R K = ±10%
M = ±20%

Z5U M = ±20%
Z = +80, −20%

Dissipation Factor:

X7R—2.5% maximum
Z5U—3.0% maximum

Insulation Resistance:

X7R—100,000 megohms or 1000 megohm-microfarads, whichever is less.

Z5U—10,000 megohms or 100 megohm-microfarads, whichever is less.

Voltage Ratings: 50 and 100 volts dc.

Dielectric Strength: 2.5 times rated voltage for 1 to 5 seconds.

PART NUMBERS AND ORDERING INFORMATION

X7R PART NUMBERS

CAP.	50 VOLT
5600pF	CAC02X7R562 * 050A
6800pF	CAC02X7R682—050A
8200pF	CAC02X7R822—050A
10000pF	CAC02X7R103—050A
.012µF	CAC02X7R123—050A
.015µF	CAC02X7R153—050A
.018µF	CAC02X7R183—050A
.022µF	CAC02X7R223—050A
10000pF	CAC03X7R103—050A
.012µF	CAC03X7R123—050A
.015µF	CAC03X7R153—050A
.018µF	CAC03X7R183—050A
.022µF	CAC03X7R223—050A
.027µF	CAC03X7R273—050A
.033µF	CAC03X7R333—050A
.039µF	CAC03X7R393—050A
.047µF	CAC03X7R473—050A
.047µF	CAC04X7R473—050A
.056µF	CAC04X7R563—050A
.068µF	CAC04X7R683—050A
.082µF	CAC04X7R823—050A
.1µF	CAC04X7R104—050A
.047µF	CAC05X7R473—050A
.056µF	CAC05X7R563—050A
.068µF	CAC05X7R683—050A
.082µF	CAC05X7R823—050A
.1µF	CAC05X7R104—050A
.12µF	CAC05X7R124—050A
.15µF	CAC05X7R154—050A
.18µF	CAC05X7R184—050A
.22µF	CAC05X7R224—050A
.27µF	CAC05X7R274—050A

CAP.	100 VOLT
10pF	CAC02X7R100 * 100A
12pF	CAC02X7R120—100A
15pF	CAC02X7R150—100A
18pF	CAC02X7R180—100A
22pF	CAC02X7R220—100A
27pF	CAC02X7R270—100A
33pF	CAC02X7R330—100A
39pF	CAC02X7R390—100A
47pF	CAC02X7R470—100A
56pF	CAC02X7R560—100A
68pF	CAC02X7R680—100A
82pF	CAC02X7R820—100A
100pF	CAC02X7R101—100A
120pF	CAC02X7R121—100A
150pF	CAC02X7R151—100A
180pF	CAC02X7R181—100A
220pF	CAC02X7R221—100A
270pF	CAC02X7R271—100A
330pF	CAC02X7R331—100A

X7R PART NUMBERS

CAP.	100 VOLT
390pF	CAC02X7R391 * 100A
470pF	CAC02X7R471—100A
560pF	CAC02X7R561—100A
680pF	CAC02X7R681—100A
820pF	CAC02X7R821—100A
1000pF	CAC02X7R102—100A
1200pF	CAC02X7R122—100A
1500pF	CAC02X7R152—100A
1800pF	CAC02X7R182—100A
2200pF	CAC02X7R222—100A
2700pF	CAC02X7R272—100A
3300pF	CAC02X7R332—100A
3900pF	CAC02X7R392—100A
4700pF	CAC02X7R472—100A
5600pF	CAC02X7R562—100A
6800pF	CAC02X7R682—100A
5600pF	CAC03X7R562—100A
6800pF	CAC03X7R682—100A
8200pF	CAC03X7R822—100A
10000pF	CAC03X7R103—100A
.012µF	CAC03X7R123—100A
.015µF	CAC03X7R153—100A
10000pF	CAC04X7R103—100A
.012µF	CAC04X7R123—100A
.015µF	CAC04X7R153—100A
.018µF	CAC04X7R183—100A
.022µF	CAC04X7R223—100A
.027µF	CAC04X7R273—100A
.033µF	CAC04X7R333—100A
.039µF	CAC04X7R393—100A
.047µF	CAC04X7R473—100A
1000pF	CAC05X7R103—100A
.012µF	CAC05X7R123—100A
.015µF	CAC05X7R153—100A
.018µF	CAC05X7R183—100A
.022µF	CAC05X7R223—100A
.027µF	CAC05X7R273—100A
.033µF	CAC05X7R333—100A
.039µF	CAC05X7R393—100A
.047µF	CAC05X7R473—100A
.056µF	CAC05X7R563—100A
.068µF	CAC05X7R683—100A
.082µF	CAC05X7R823—100A
.1µF	CAC05X7R104—100A

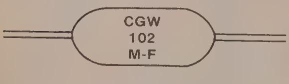
Z5U PART NUMBERS

CAP.	50 VOLT
.027µF	CAC02Z5U273 * 100A
.033µF	CAC02Z5U333—050A
.039µF	CAC02Z5U393—050A
.047µF	CAC02Z5U473—050A
.056µF	CAC03Z5U563—050A
.068µF	CAC03Z5U683—050A
.082µF	CAC03Z5U823—050A
.1µF	CAC03Z5U104—050A
.12µF	CAC03Z5U124—050A
.1µF	CAC04Z5U104—050A
.12µF	CAC04Z5U124—050A
.15µF	CAC04Z5U154—050A
.18µF	CAC04Z5U184—050A
.22µF	CAC04Z5U224—050A
.27µF	CAC04Z5U274—050A
.27µF	CAC05Z5U274—050A
.33µF	CAC05Z5U334—050A
.39µF	CAC05Z5U394—050A
.47µF	CAC05Z5U474—050A

CAP.	100 VOLT
1000pF	CAC02Z5U102 * 100A
1200pF	CAC02Z5U122—100A
1500pF	CAC02Z5U152—100A
1800pF	CAC02Z5U182—100A
2200pF	CAC02Z5U222—100A
2700pF	CAC02Z5U272—100A
3300pF	CAC02Z5U332—100A
3900pF	CAC02Z5U392—100A
4700pF	CAC02Z5U472—100A
5600pF	CAC02Z5U562—100A
6800pF	CAC02Z5U682—100A
8200pF	CAC02Z5U822—100A
.01µF	CAC02Z5U103—100A
.012µF	CAC02Z5U123—100A
.015µF	CAC02Z5U153—100A
.018µF	CAC02Z5U183—100A
.022µF	CAC02Z5U223—100A
.01µF	CAC03Z5U103—100A
.012µF	CAC03Z5U123—100A
.015µF	CAC03Z5U153—100A
.018µF	CAC03Z5U183—100A
.022µF	CAC02Z5U223—100A
.027µF	CAC03Z5U273—100A
.033µF	CAC03Z5U333—100A
.039µF	CAC03Z5U393—100A
.047µF	CAC03Z5U473—100A
.056µF	CAC03Z5U563—100A
.068µF	CAC04Z5U683—100A
.082µF	CAC04Z5U823—100A
.1µF	CAC04Z5U104—100A
.12µF	CAC04Z5U124—100A
.1µF	CAC05Z5U104—100A
.12µF	CAC05Z5U124—100A
.15µF	CAC05Z5U154—100A
.18µF	CAC05Z5U184—110A
.22µF	CAC05Z5U224—110A

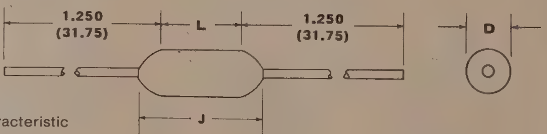
*Insert K, M or Z to Indicate Tolerance

PART MARKING



M — Tolerance ±20%
F — Temperature Characteristic
F = Z5U
(D = X7R)

CGW — Corning Glass Works
1 — First Significant Figure
0 — Second Significant Figure
2 — Multiplier



Dimension—Inches (Millimeters)

Case Size	Dimensions J Max.	Dimensions L Max.	Dimensions D Max.	Lead Dia. ±002(.05)	Voltage Rating	X7R Capacitance range	Z5U Capacitance Range
CAC02	.190 (4.83)	.145 (3.68)	.100 (2.54)	.020 (.51)	50	5600pF - .022µF	.027µF - .047µF
					100	10pF - 6800pF	.001µF - .022µF
CAC03	.290 (7.37)	.230 (5.84)	.100 (2.54)	.020 (.51)	50	.01µF - .047µF	.056µF - .12µF
					100	5600pF - .015µF	.01µF - .056 µF
CAC04	.290 (7.37)	.260 (6.60)	.145 (3.68)	.020 (.51)	50	.047µF - .1µF	.1µF - .27µF
					100	.01µF - .047µF	.068µF - .12µF
CAC05	.420 (10.67)	.370 (9.40)	.145 (3.68)	.025 (.64)	50	.047µF - .27µF	.27µF - .47µF
					100	.01µF - .1µF	.1µF - .22µF

NOTE: Leads are solder-coated dumet.

CORNING
ELECTRONICS
CORNING GLASS WORKS
Corning, New York 14830

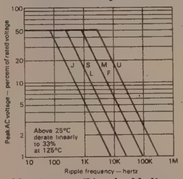
Solid Tantalum Capacitors

SUBMINIATURE MINITAN MODULAR MM SERIES

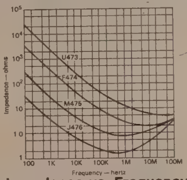
PART NUMBERS AND ORDERING INFORMATION

P/N	µF Cap.	WVDC	Max. % DF	Max. DCL
W Case Size Std. Cap. Tol +40%, −20%				
MMW-020-472*-**	.0047	20	10	0.5
MMW-020-682_-__	.0068	20	10	0.5
MMW-020-103_-__	.010	20	10	0.5
MMW-020-153_-__	.015	20	10	0.5
MMW-020-223_-__	.022	20	10	0.5
MMW-020-333_-__	.033	20	10	0.5
MMW-020-473_-__	.047	20	10	0.5
MMW-020-683_-__	.068	20	10	0.5
MMW-015-104_-__	.10	15	10	0.5
MMW-010-154_-__	.15	10	10	0.5
MMW-006-224_-__	.22	6	10	0.5
MMW-004-334_-__	.33	4	10	0.5
MMW-002-474_-__	.47	2	10	0.5
U Case Size Std. Cap. Tol +40% −20%				
MMU-020-102*-**	.0010	20	6	0.5
MMU-020-152_-__	.0015	20	6	0.5
MMU-020-222_-__	.0022	20	6	0.5
MMU-020-332_-__	.0033	20	6	0.5
MMU-020-472_-__	.0047	20	6	0.5
MMU-020-682_-__	.0068	20	6	0.5
MMU-020-103_-__	.010	20	6	0.5
MMU-020-153_-__	.015	20	6	0.5
MMU-020-223_-__	.022	20	6	0.5
MMU-020-333_-__	.033	20	6	0.5
MMU-020-473_-__	.047	20	6	0.5
MMU-020-683_-__	.068	20	6	0.5
MMU-020-104_-__	.10	20	6	0.5
MMU-020-154_-__	.15	20	6	0.5
MMU-020-224_-__	.22	20	6	0.5
MMU-015-334_-__	.33	15	6	0.5
MMU-010-474_-__	.47	10	6	0.5
MMU-006-684_-__	.68	6	6	0.5
MMU-004-105_-__	1.0	4	8	0.5
MMU-003-155_-__	1.5	3	10	0.5
MMU-002-225_-__	2.2	2	10	0.5
F Case Size Std. Cap. Tol ±20%				
MMF-035-472*-**	.0047	35	6	0.5
MMF-035-682_-__	.0068	35	6	0.5
MMF-035-103_-__	.010	35	6	0.5
MMF-035-153_-__	.015	35	6	0.5
MMF-035-223_-__	.022	35	6	0.5
MMF-035-333_-__	.033	35	6	0.5
MMF-035-473_-__	.047	35	6	0.5
MMF-035-683_-__	.068	35	6	0.5
MMF-035-104_-__	.10	35	6	0.5
MMF-035-154_-__	.15	35	6	0.5
MMF-035-224_-__	.22	35	6	0.5
MMF-035-334_-__	.33	35	6	0.5
MMF-035-474_-__	.47	35	6	0.5
MMF-025-684*-**	.68	25	6	0.5
MMF-020-105_-__	1.0	20	6	0.5
MMF-015-225_-__	2.2	10	6	0.5
MMF-006-335_-__	3.3	6	6	0.5
MMF-004-475_-__	4.7	4	8	0.5
MMF-003-685_-__	6.8	3	10	0.5
MMF-002-106_-__	10.	2	10	0.5
M Case Size Std. Cap. Tol ±20%				
MMM-035-684*-**	.68	35	6	1.0
MMM-035-105_-__	1.0	35	6	1.0
MMM-035-155_-__	1.5	35	6	1.0
MMM-025-225_-__	2.2	25	6	1.0
MMM-020-335_-__	3.3	20	6	1.0
MMM-020-475_-__	4.7	20	6	1.0
MMM-010-685_-__	6.8	10	6	1.0
MMM-006-106_-__	10.	6	6	1.0
MMM-004-156_-__	15.	4	8	1.0
MMM-003-226_-__	22.	3	10	1.0
L Case Size Std. Cap. Tol ±20%				
MML-035-225*-**	2.2	35	6	2.0
MML-035-335_-__	3.3	35	6	2.0
MML-035-475_-__	4.7	35	6	2.0
MML-025-685_-__	6.8	25	6	2.0
MML-020-106_-__	10.	20	6	2.0
MML-015-156_-__	15.	15	6	2.0
MML-010-226_-__	22.	10	6	2.0
MML-006-336_-__	33.	6	6	2.0
MML-004-476_-__	47.	4	8	2.0
S Case Size Std. Cap. Tol ±20%				
MMS-035-685*-**	6.8	35	6	3.0
MMS-025-106_-__	10.	25	6	3.0
MMS-020-156_-__	15.	20	6	3.0
MMS-015-226_-__	22.	15	6	3.0
MMS-010-336_-__	33.	10	6	3.0
MMS-006-476_-__	47.	6	6	3.0
MMS-004-686_-__	68.	4	8	3.0
J Case Size Std. Cap. Tol ±20%				
MMJ-035-106*-**	10.	35	6	9.0
MMJ-035-156_-__	15.	35	6	9.0
MMJ-035-226_-__	22.	35	6	9.0
MMJ-025-336_-__	33.	25	6	9.0
MMJ-020-476_-__	47.	20	8	9.0
MMJ-015-686_-__	68.	15	8	9.0
MMJ-010-107_-__	100.	10	8	9.0
MMJ-006-157_-__	150.	6	10	9.0
MMJ-003-227_-__	220.	3	15	9.0

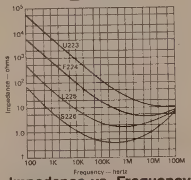
*Add "A" — for Axial leads. "R" — for Radial leads
**Add tolerance symbol— 40 = +40 −20%, W & U only; 20 = ±20%; 10 = ±10%; 05 = ± 5%;



Maximum Ripple Voltage



Impedance vs. Frequency



Impedance vs. Frequency

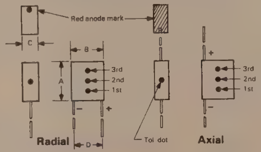
PART MARKING

MMJ case size is type marked, all others are color coded.

EIA COLOR DOT CODING

0—Black (omitted)
1—Brown
2—Red
3—Orange
4—Yellow
5—Green
6—Blue
7—Violet
8—Gray
9—White

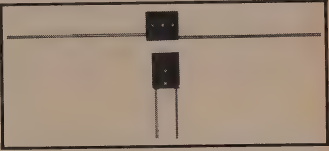
Capacitance value is shown by means of standard EIA color code dots except for the MMJ case size where all data is printed. Because the polyester cases are black, black dots are omitted. ±10% tolerance is indicated by a silver dot. ±5% tolerance by a gold dot. No tolerance dot is used for ±20%.



Dimensions—Inches (Millimeters)

Case Size	A Max.	B Max.	C Max.	D
MMW	.100 (2.54)	.050 (1.27)	.040 (1.02)	.030 (.76) ±.015 (±.38)
MMU	.125 (3.18)	.070 (1.78)	.040 (1.02)	.050 (1.27) ±.015 (±.38)
MMF	.165 (4.19)	.120 (3.05)	.070 (1.78)	.100 (2.54) ±.020 (±.51)
MMM	.225 (5.72)	.185 (4.70)	.075 (1.91)	.150 (3.81) ±.020 (±.51)
MML	.290 (7.37)	.220 (5.59)	.110 (2.79)	.180 (4.57) ±.025 (±.64)
MMS	.310 (7.87)	.230 (5.84)	.130 (3.30)	.200 (5.08) ±.025 (±.64)
MMJ	.475 (12.07)	.375 (9.53)	.150 (3.81)	.300 (7.62) ±.025 (±.64)

Leads: W leads are 33 AWG, .007 ± .001 (.18 ± .025) diameter
U, F, M leads are 30 AWG, .010 ± .002 (.25 ± .051) diameter
L, S, J leads are 26 AWG, .016 ± .002 (.41 ± .051) diameter
All anode leads are 1.625 ± .125 (41.3 ± 3.18) long
All cathode leads are 1.375 ± .125 (34.9 ± 3.18) long



APPLICATIONS

FOR FILTERING • COUPLING • BY-PASSING • TIMING

These precision, microminiature polar capacitors are suitable for general filtering, coupling, bypassing, and noncritical RC timing applications to 85°C without derating and to 125°C with derating to 2/3 WVDC (Except MMW case size). Very favorable capacitance to volume ratios make them especially suited to high density applications such as found in avionics systems, subminiature communications equipment, and thick film circuitry.

PERFORMANCE CHARACTERISTICS

Capacitance—Measured at +25°C and 120Hz on a polarized capacitance bridge with a maximum polarizing voltage of 2.2 vdc and a maximum ac signal of 1.0 volts rms.

Tolerance—Except for the MMW and MMU case sizes, Standard tolerance is ±20% with ±10% or ±5% tolerance available in all case sizes (.01 MFD and above in the W case size). 10% decade values are offered in ±10% or ±5% tolerance.

Dissipation Factor—Measured simultaneously with capacitance as above. See Part Number Table for maximum +25°C, 120 Hz values.

DC Leakage Current—With rated WVCD applied through a 1000 ohm resistor for 5 minutes maximum, DCL values in µA at +25°C will not exceed those shown in the Part Number Table. At 85°C, DCL values will not exceed 10 times Part Number Table values. At 125°C with 2/3 rated WVDC applied, DCL values will not exceed 15 times Part Number Table values.

Operating Voltage—Capacitors will operate reliably up to rated WVDC AT +85°C and to +125° C with linear derating to 2/3 WVDC (With the exception of the MMW case size which is limited to +85°C operation). Capacitors will withstand peak voltages in the reverse direction equal to 15% of the dc rating at +25°C, 10% at +55°C, and 5% at +85°C. Ac ripple voltage should be limited so that the forward dc voltage plus peak ac voltage does not exceed rated WVDC.

Surge Voltage—At +85°C and at 60-second intervals, capacitors withstand 1000 30-second applications at 130% rated WVDC.

Moisture Resistance—Following Method 106, MIL-STD-202 testing, capacitors will meet initial dc leakage requirements. Capacitance will be within ±10% of initial values.

Life Test—After 2,000 hours +85°C with rated WVDC applied, capacitors will meet initial dc leakage and DF requirements. Capacitance will not change more than ±10% from original values.

MECHANICAL

Construction—Tantalum pellets are encased in polyester sleeves and sealed with a special moisture resistant epoxy resin. This rugged, fully insulated package withstands a one minute application of a 100 volt potential applied between the leads shorted together and an encircling metal foil envelope.

Leads—Leads are solder coated (W case size leads are gold plated) pure nickel wire suitable for soldering or welding. Tested in accordance with MIL-C-55365, .007" diameter leads withstand an 8 oz pull, .010" diameter leads a 1 lb. pull, and .016 diameter leads a 3 lb. pull. All lead diameters withstand 5 rotations twist.

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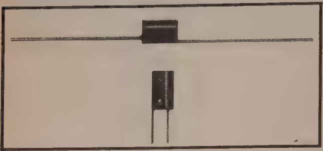
Corning, New York 14830

Solid Tantalum Capacitors

SUBMINIATURE MINITAN CORDWOOD MZ SERIES



APPLICATIONS
FOR FILTERING • COUPLING • BY-PASSING • TIMING

These precision, microminiature polar capacitors are suitable for general filtering, coupling, bypassing, and noncritical RC timing applications to +85°C without derating and to +125°C with derating to 2/3 WVDC. Very favorable capacitance to volume ratios make them especially suited to high density applications such as found in avionics systems, subminiature communications equipment, and thick film circuitry.

PERFORMANCE CHARACTERISTICS

Capacitance—Measured at +25°C and 120Hz on a polarized capacitance bridge with a maximum polarizing voltage of 2.2 vdc and a maximum ac signal of 1.0 volts rms.

Tolerance—Except for MZY and MZP case sizes, standard tolerance is ±20% with ±10% or ±5% tolerance available in all case sizes. 10% decade values are offered in ±10% or ±5% tolerance.

Dissipation Factor—Measured simultaneously with capacitance as above. See Part Number Section for maximum +25°C, 120 Hz values.

DC Leakage Current—With rated WVDC applied through a 1000 ohm resistor for a maximum of 5 minutes, at 25°C. DCL values in µA will not exceed those shown in the part number section.
at 85°C—10 times the value
at 125°C— 15 times the value (at 2/3 rated voltage).

Operating Voltage—Capacitors will operate reliably up to rated WVDC at +85°C and to +125°C with linear derating to 2/3 WVDC. Capacitors will withstand peak voltages in the reverse direction equal to 15% of the dc rating at +25°C, 10% at +55°C, and 5% at +85°C. Ac ripple voltage should be limited so that the forward dc voltage plus peak ac voltage does not exceed rated WVDC.

Surge Voltage—At +85°C and at 60-second intervals, capacitors withstand 1000 30-second applications of 130% rated WVDC.

Temperature—No derating is required between −55°C and +85°C. Between +85°C and +125°C, derate linearly to 2/3 WVDC.

Moisture Resistance—Following Method 106, MIL-STD-202 testing, capacitors will meet initial dc leakage requirements. Capacitance will be within ±10% of initial values.

Life Test—After 2,000 hours +85°C with rated WVDC applied, capacitors will meet initial dc leakage and DF requirements. Capacitance will not change more than ±10% from original values.

MECHANICAL

Construction—Tantalum pellets are encased in polyester sleeves and sealed with a special moisture resistant epoxy resin. This rugged, fully insulated package withstands a one minute application of a 100 volt potential applied between the leads shorted together and an encircling metal foil envelope.

Leads—Leads are solder coated pure nickel wire suitable for soldering or welding. Tested in accordance with MIL-C-55365, .010 diameter leads withstand a 1 lb. pull and .016 diameter leads withstand a 3 lb. pull. All lead diameters withstand 5 rotations twist.

PART NUMBERS AND ORDERING INFORMATION

MZY Case Size Std Cap. Tol +40% −20%

P/N	µF Cap.	WVDC	Max. % DF	Max. DCL
MZY-020-102*-**	.0010	20	6	0.5
MZY-020-152_-__	.0015	20	6	0.5
MZY-020-222_-__	.0022	20	6	0.5
MZY-020-332_-__	.0033	20	6	0.5
MZY-020-472_-__	.0047	20	6	0.5
MZY-020-682_-__	.0068	20	6	0.5
MZY-020-103_-__	.010	20	6	0.5
MZY-020-153_-__	.015	20	6	0.5
MZY-020-223_-__	.022	20	6	0.5
MZY-020-333_-__	.033	20	6	0.5
MZY-020-473_-__	.047	20	6	0.5
MZY-020-683_-__	.068	20	6	0.5
MZY-020-104_-__	.10	20	6	0.5
MZY-020-154_-__	.15	20	6	0.5
MZY-020-224_-__	.22	20	6	0.5
MZY-015-334_-__	.33	15	6	0.5
MZY-010-474_-__	.47	10	6	0.5
MZY-006-684_-__	.68	6	6	0.5
MZY-004-105_-__	1.0	4	8	0.5
MZY-003-155_-__	1.5	3	10	0.5
MZY-002-225_-__	2.2	2	10	0.5

MZP Case Size Std Cap. Tol +40% −20%

P/N	µF Cap.	WVDC	Max. % DF	Max. DCL
MZP-050-102*-**	.0010	50	6	0.5
MZP-050-152_-__	.0015	50	6	0.5
MZP-050-222_-__	.0022	50	6	0.5
MZP-050-332_-__	.0033	50	6	0.5
MZP-050-472_-__	.0047	50	6	0.5
MZP-050-682_-__	.0068	50	6	0.5
MZP-050-103_-__	.010	50	6	0.5
MZP-035-153_-__	.015	35	6	0.5
MZP-035-223_-__	.022	35	6	0.5
MZP-035-333_-__	.033	35	6	0.5
MZP-035-473_-__	.047	35	6	0.5
MZP-035-683_-__	.068	35	6	0.5
MZP-035-104_-__	.10	35	6	0.5
MZP-035-154_-__	.15	35	6	0.5
MZP-035-224_-__	.22	35	6	0.5
MZP-020-334_-__	.33	20	6	0.5
MZP-020-474_-__	.47	20	6	0.5
MZP-015-684*-**	.68	15	6	0.5
MZP-010-105_-__	1.0	10	6	0.5
MZP-006-155_-__	1.5	6	6	0.5
MZP-004-225_-__	2.2	4	8	0.5
MZP-003-335_-__	3.3	3	10	0.5
MZP-002-475_-__	4.7	2	10	0.5

MZB Case Size Std. Cap. Tol ±20%

P/N	µF Cap.	WVDC	Max. % DF	Max. DCL
MZB-035-334*-**	.33	35	6	0.5
MZB-035-474_-__	.47	35	6	0.5
MZB-020-684_-__	.68	20	6	0.5
MZB-020-105_-__	1.0	20	6	0.5
MZB-015-155_-__	1.5	15	6	0.5
MZB-010-225_-__	2.2	10	6	0.5
MZB-006-335_-__	3.3	6	6	0.5
MZB-004-475_-__	4.7	4	8	0.5
MZB-003-685_-__	6.8	3	10	0.5
MZB-002-106_-__	10.	2	10	0.5

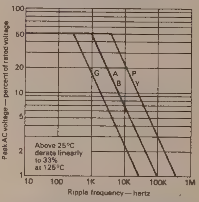
MZA Case Size Std. Cap. Tol ±20%

P/N	µF Cap.	WVDC	Max. % DF	Max. DCL
MZA-035-684*-**	.68	35	6	1.0
MZA-035-105_-__	1.0	35	6	1.0
MZA-020-155_-__	1.5	20	6	1.0
MZA-020-225_-__	2.2	20	6	1.0
MZA-015-335_-__	3.3	15	6	1.0
MZA-010-475_-__	4.7	10	6	1.0
MZA-006-685_-__	6.8	6	6	1.0
MZA-004-106_-__	10.	4	8	1.0
MZA-003-156_-__	15.	3	10	1.0
MZA-002-226_-__	22.	2	10	1.0

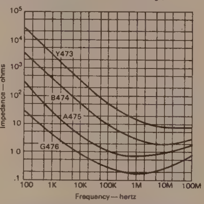
MZG Case Size Std. Cap. Tol ±20%

P/N	µF Cap.	WVDC	Max. % DF	Max. DCL
MZG-035-155*-**	1.5	35	6	1.5
MZG-035-225_-__	2.2	35	6	1.5
MZG-020-335_-__	3.3	20	6	1.5
MZG-020-475_-__	4.7	20	6	1.5
MZG-020-685_-__	6.8	20	6	1.5
MZG-015-106_-__	10.	15	6	1.5
MZG-010-156_-__	15.	10	6	1.5
MZG-006-226_-__	22.	6	6	1.5
MZG-004-336_-__	33.	4	8	1.5
MZG-003-476_-__	47.	3	10	1.5

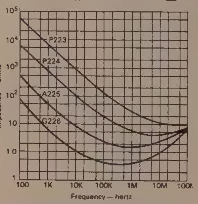
*Add—"A" for Axial, "R" for Radial.
**Add tolerance symbol— 40 = +40 −20%, Y & P only; 20 = ±20%; 10 = ±10%; 05 = ± 5%;



Maximum Ripple Voltage



Impedance vs. Frequency

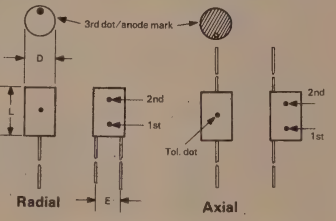


Impedance vs. Frequency

Marking—Capacitance value is shown by means of standard EIA color code dots. The anode indicator dot also serves as the third color dot. Because the Polyester cases are black, black dots are omitted. ±10% tolerance is indicated by a silver dot, ±5% tolerance by a gold dot. No tolerance dot is used for ±20%.

EIA COLOR DOT CODING

0—Black (omitted)
2—Red
4—Yellow
6—Blue
8—Gray
1—Brown
3—Orange
5—Green
7—Violet
9—White



Dimensions—Inches (Millimeters)

Case Size	L Max.	D Max.	E
MZY	.125 (3.18)	.070 (1.78)	.050 (1.27) ±.015 (±.38)
MZP	.160 (4.06)	.070 (1.78)	.050 (1.27) ±.015 (±.38)
MZB	.200 (5.08)	.080 (2.03)	.050 (1.27) ±.015 (±.38)
MZA	.225 (5.72)	.100 (2.54)	.070 (1.78) ±.020 (±.51)
MZG	.250 (6.35)	.150 (3.81)	.120 (3.05) ±.025 (±.64)

Leads Y, P, B, A leads are 30 AWG, .010±.002 (.25±.051) diameter
G leads are 26 AWG, .016±.002 (.41±.051) diameter
All anode leads are 1.625±.125 (41.3±3.18) long
All cathode leads are 1.375±.125 (34.9±3.18) long

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Solid Tantalum Capacitors

SUBMINIATURE MINITAN NONPOLAR MN SERIES

PART NUMBERS AND ORDERING INFORMATION

MNY Case Size Std. Cap. Tol. ±20%

P/N	µF Cap.	WVDC	Max. % DF	Max. DCL
MNY-020-102*-**	.0010	20	6	0.5
MNY-020-152_-__	.0015	20	6	0.5
MNY-020-222_-__	.0022	20	6	0.5
MNY-020-332_-__	.0033	20	6	0.5
MNY-020-472_-__	.0047	20	6	0.5
MNY-020-682_-__	.0068	20	6	0.5
MNY-020-103_-__	.010	20	6	0.5
MNY-020-153_-__	.015	20	6	0.5
MNY-020-223_-__	.022	20	6	0.5
MNY-020-333_-__	.033	20	6	0.5
MNY-020-473_-__	.047	20	6	0.5
MNY-020-683_-__	.068	20	6	0.5
MNY-020-104_-__	.10	20	6	0.5
MNY-015-154_-__	.15	15	6	0.5
MNY-010-224_-__	.22	10	6	0.5
MNY-006-334_-__	.33	6	6	0.5
MNY-004-474_-__	.47	4	8	0.5
MNY-003-684_-__	.68	3	10	0.5
MNY-002-105_-__	1.0	2	10	0.5

MNP Case Size Std. Cap. Tol. ±20%

P/N	µF Cap.	WVDC	Max. % DF	Max. DCL
MNP-050-102*-**	.0010	50	6	0.5
MNP-050-152_-__	.0015	50	6	0.5
MNP-050-222_-__	.0022	50	6	0.5
MNP-050-332_-__	.0033	50	6	0.5
MNP-050-472_-__	.0047	50	6	0.5
MNP-035-682_-__	.0068	35	6	0.5
MNP-035-103_-__	.010	35	6	0.5
MNP-035-153_-__	.015	35	6	0.5
MNP-035-223_-__	.022	35	6	0.5
MNP-035-333_-__	.033	35	6	0.5
MNP-035-473_-__	.047	35	6	0.5
MNP-035-683_-__	.068	35	6	0.5
MNP-035-104_-__	.10	35	6	0.5
MNP-020-154_-__	.15	20	6	0.5
MNP-020-224_-__	.22	20	6	0.5
MNP-015-334_-__	.33	15	6	0.5
MNP-010-474_-__	.47	10	6	0.5
MNP-006-684_-__	.68	6	6	0.5
MNP-004-105_-__	1.0	4	8	0.5
MNP-003-155_-__	1.5	3	10	0.5
MNP-002-225_-__	2.2	2	10	0.5

MNB Case Size Std. Cap. Tol. ±20%

P/N	µF Cap.	WVDC	Max. % DF	Max. DCL
MNB-035-154*-**	.15	35	6	0.5
MNB-035-224_-__	.22	35	6	0.5
MNB-020-334_-__	.33	20	6	0.5
MNB-020-474_-__	.47	20	6	0.5
MNB-015-684_-__	.68	15	6	0.5
MNB-010-105_-__	1.0	10	6	0.5
MNB-006-155_-__	1.5	6	6	0.5
MNB-004-225_-__	2.2	4	8	0.5
MNB-003-335_-__	3.3	3	10	0.5
MNB-002-475_-__	4.7	2	10	0.5

MNA Case Size Std. Cap. Tol. ±20%

P/N	µF Cap.	WVDC	Max. % DF	Max. DCL
MNA-035-334*-**	.33	35	6	1.0
MNA-035-474_-__	.47	35	6	1.0
MNA-020-684_-__	.68	20	6	1.0
MNA-020-105_-__	1.0	20	6	1.0
MNA-015-155_-__	1.5	15	6	1.0
MNA-010-225_-__	2.2	10	6	1.0
MNA-006-335_-__	3.3	6	6	1.0
MNA-004-475_-__	4.7	4	8	1.0
MNA-003-685_-__	6.8	3	10	1.0
MNA-002-106_-__	10.	2	10	1.0

MNG Case Size Std. Cap. Tol. ±20%

P/N	µF Cap.	WVDC	Max. % DF	Max. DCL
MNG-035-684*-**	.68	35	6	1.5
MNG-035-105_-__	1.0	35	6	1.5
MNG-020-155_-__	1.5	20	6	1.5
MNG-020-225_-__	2.2	20	6	1.5
MNG-020-335_-__	3.3	20	6	1.5
MNG-015-475_-__	4.7	15	6	1.5
MNG-010-685_-__	6.8	10	6	1.5
MNG-006-106_-__	10.	6	6	1.5
MNG-004-156_-__	15.	4	8	1.5
MNG-003-226_-__	22.	3	10	1.5

MNF Case Size Std. Cap. Tol. ±20%

P/N	µF Cap.	WVDC	Max. % DF	Max. DCL
MNF-035-104*-**	.10	35	6	0.5
MNF-035-154_-__	.15	35	6	0.5
MNF-035-224_-__	.22	35	6	0.5
MNF-025-334_-__	.33	25	6	0.5
MNF-020-474_-__	.47	20	6	0.5
MNF-015-684_-__	.68	15	6	0.5
MNF-010-105_-__	1.0	10	6	0.5
MNF-006-155_-__	1.5	6	6	0.5
MNF-004-225_-__	2.2	4	8	0.5
MNF-003-335_-__	3.3	3	10	0.5
MNF-002-475_-__	4.7	2	10	0.5

MNM Case Size Std. Cap. Tol. ±20%

P/N	µF Cap.	WVDC	Max. % DF	Max. DCL
MNM-035-334*-**	.33	35	6	1.0
MNM-035-474_-__	.47	35	6	1.0
MNM-035-684_-__	.68	35	6	1.0
MNM-025-105_-__	1.0	25	6	1.0
MNM-020-155_-__	1.5	20	6	1.0
MNM-020-225_-__	2.2	20	6	1.0
MNM-010-335_-__	3.3	10	6	1.0
MNM-006-475_-__	4.7	6	6	1.0
MNM-004-685_-__	6.8	4	8	1.0
MNM-003-106_-__	10.	3	10	1.0

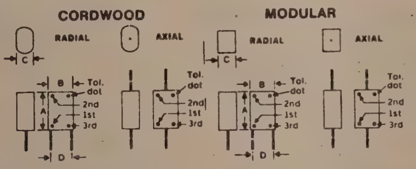
MNL Case Size Std. Cap. Tol. ±20%

P/N	µF Cap.	WVDC	Max. % DF	Max. DCL
MNL-035-105*-**	1.0	35	6	2.0
MNL-035-155_-__	1.5	35	6	2.0
MNL-035-225_-__	2.2	35	6	2.0
MNL-025-335_-__	3.3	25	6	2.0
MNL-020-475_-__	4.7	20	6	2.0
MNL-015-685_-__	6.8	15	6	2.0
MNL-010-106_-__	10.	10	6	2.0
MNL-006-156_-__	15.	6	6	2.0
MNL-004-226_-__	22.	4	8	2.0

MNS Case Size Std. Cap. Tol. ±20%

P/N	µF Cap.	WVDC	Max. % DF	Max. DCL
MNS-035-335*-**	3.3	35	6	3.0
MNS-025-475_-__	4.7	25	6	3.0
MNS-020-685_-__	6.8	20	8	3.0
MNS-015-106_-__	10.	15	6	3.0
MNS-010-156_-__	15.	10	6	3.0
MNS-006-226_-__	22.	6	6	3.0
MNS-004-336_-__	33.	4	8	3.0

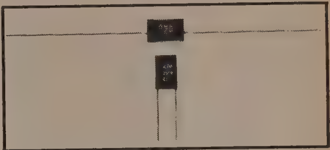
*Add—"A" for Axial, "R" for Radial
**Add tolerance Symbol— 20 = ±20%; 10 = ±10%; 05 = ± 5%;



Dimensions—Inches (Millimeters)

Case Size	A Max. (Axial)	A Max. (Radial)	B Max.	C Max.	D
MNY	.175 (4.45)	.135 (3.43)	.120 (3.05)	.070 (1.78)	.100 (2.54) ±.020 (±.51)
MNP	.210 (5.33)	.160 (4.06)	.120 (3.05)	.070 (1.78)	.100 (2.54) ±.020 (±.51)
MNB	.240 (6.10)	.200 (5.08)	.140 (3.56)	.080 (2.03)	.100 (2.54) ±.020 (±.51)
MNA	.275 (6.99)	.235 (5.97)	.190 (4.83)	.105 (2.67)	.125 (3.18) ±.020 (±.51)
MNG	.310 (7.87)	.270 (6.86)	.290 (7.37)	.155 (3.94)	.200 (5.08) ±.025 (±.64)
MNF	.220 (5.59)	.180 (4.57)	.125 (3.18)	.125 (3.18)	.100 (2.54) ±.020 (±.51)
MNM	.280 (7.11)	.240 (6.10)	.140 (3.56)	.180 (4.57)	.100 (2.54) ±.020 (±.51)
MNL	.370 (9.40)	.315 (8.00)	.180 (4.57)	.220 (5.59)	.150 (3.81) ±.025 (±.64)
MNS	.390 (9.91)	.335 (8.51)	.230 (5.84)	.230 (5.84)	.200 (5.08) ±.025 (±.64)

Leads: NG, NL and NS Leads are 26 AWG, .016 ±.002 (.41±.051) diameter
All others are 30 AWG, .010 ±.002 (.25±.051) diameter
All leads are 1.625 ±.125 (41.3 ±3.18) long
Cap and WVDC are printed on NS case



APPLICATIONS

FOR FILTERING • COUPLING • BY-PASSING • TIMING

These precision, microminiature nonpolar capacitors are intended specifically for high density packaging applications where occasional or continuous voltage reversals occur. No dc bias is required. Weldable/solderable leads and a wide range of shapes, case sizes, and lead configurations facilitate application to a broad range of miniaturized electronic circuitry.

PERFORMANCE CHARACTERISTICS

Capacitance—Measured at +25°C and 120Hz on a polarized capacitance bridge with a maximum polarizing voltage of 2.2 vdc and a maximum ac signal of 1.0 volts rms.

Tolerance—Standard tolerance is ±20% with ±10% or ±5% tolerance available in all case sizes. 10% decade values are offered in ±10% or ±5% tolerance.

Dissipation Factor—Measured simultaneously with capacitance as above. See Part Number Table for maximum +25°C, 120 Hz values.

DC Leakage Current—With rated WVDC applied through a 1000 ohm resistor for 5 minutes maximum, DCL values in µA at +25°C will not exceed those shown in Part Number Table. At 85°C DCL values will not exceed 10 times Part Number Table values. At +125°C with 2/3 rated WVDC applied, DCL values will not exceed 15 times Part Number Table values.

Operating Voltage—Capacitors will operate at +85°C and to +125°C with linear derating to 2/3 rated voltage. Dc biasing is not necessary. Peak ac voltage plus dc voltage should not exceed rated voltage.

Surge Voltage—At +85°C and at 60-second intervals, capacitors withstand 1000 30-second applications of 130% rated WVDC.

Moisture Resistance—Following Method 106, MIL-STD-202 testing, capacitors will meet initial dc leakage requirements. Capacitance will be within ±10% of initial values.

Life Test—After 2000 hours at +85°C with rated WVDC applied, capacitors will meet initial dc leakage and DF requirements. Capacitance will not change more than ±10% from original values.

MECHANICAL

Construction—Tantalum pellets are encased in polyester sleeves and sealed with a special moisture resistant epoxy resin. This rugged, fully insulated package withstands a one minute application of a 100 volt potential applied between the leads shorted together and an encircling metal foil envelope.

Leads—Leads are solder coated pure nickel wire suitable for soldering or welding. Tested in accordance with MIL-C-55365, .010 diameter leads withstand a 1 lb. pull and .016 diameter leads a 3 lb. pull. All lead diameters withstand 5 rotations twist.

Marking—Capacitance value is shown by means of standard EIA color code dots. Because the polyester cases are black, black dots are omitted. ±10% tolerance is indicated by a silver dot, ±5% tolerance by a gold dot. No tolerance dot is used for ±20%. MNS case size is type marked all other case sizes are color coded.

EIA COLOR DOT CODING

0—Black (omitted)	1—Brown
2—Red	3—Orange
4—Yellow	5—Green
6—Blue	7—Violet
8—Gray	9—White

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Corning, New York 14830

Solid Tantalum Capacitors

SUBMINIATURE MINIDIPS MD SERIES

APPLICATIONS

For Filtering • Coupling • By-Passing • Timing

These subminiature, polar tantalum capacitors are suitable for general filtering, coupling, by-passing, and non-critical RC timing applications to +85°C without voltage derating. Intended specifically for commercial and industrial applications. Minidip Series capacitors feature subminiature size and superior performance at a reasonable cost.

PERFORMANCE CHARACTERISTICS

Capacitance—Measured on a polarized capacitance bridge with a maximum polarizing voltage of 2.2 vdc and a maximum ac signal of 1.0 volts rms.

Tolerance—Standard tolerance is ±20%.

Dissipation Factor—Measured simultaneously with capacitance as above.

Operating Voltage—Capacitors will operate reliably up to rated WVDC at +85°C without derating. Ac ripple voltage should be limited so that the forward dc voltage plus peak ac voltage does not exceed rated WVDC.

Temperature Range—(−55°C to +85°C) without voltage derating.

Surge Voltage—At +85°C and at 60-second intervals, capacitors withstand 1000 30-second applications of 130% rated WVDC.

Life Test—After 2000 hours at +85°C with rated WVDC applied, capacitors will not exceed 150% of the initial dc leakage and D.F. limits. Capacitance will not change more than ±10% from the initial value.

MECHANICAL

Construction—Minidip Series capacitors feature subminiature tantalum anodes, sealed in high stability, moisture resistant epoxy.

Leads—Leads are solder coated, high purity nickel wire suitable for either soldering or welding. They will withstand a 1 lb. pull.

Marking—Capacitance value in pF is shown by means of standard EIA color code rings. Polarity and rated voltage is indicated by a colored dot.

PART NUMBERS AND ORDERING INFORMATION

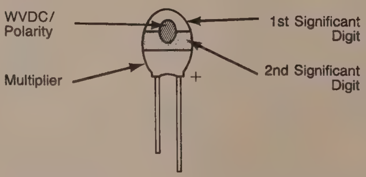
Value (Mfd)	Part Number	Case Size	Max. D.F. (%)	Max. DCL (μa)
2 Volts				
2.2	MD2-002-225-20	MD2	10	1.0
4.7	MD3-002-475-20	MD3	10	1.0
10.0	MD4-002-106-20	MD4	10	1.0
3 Volts				
1.5	MD2-003-155-20	MD2	10	1.0
3.3	MD3-003-335-20	MD3	10	1.0
6.8	MD4-003-685-20	MD4	10	1.0
4 Volts				
1.0	MD2-004-105-20	MD2	8	1.0
2.2	MD3-004-225-20	MD3	8	1.0
4.7	MD4-004-475-20	MD4	8	1.0
6 Volts				
.68	MD2-006-684-20	MD2	8	1.0
1.5	MD3-006-155-20	MD3	8	1.0
3.3	MD4-006-335-20	MD4	8	1.0
10 Volts				
.47	MD2-010-474-20	MD2	8	1.0
1.0	MD3-010-105-20	MD3	8	1.0
2.2	MD4-010-225-20	MD4	8	1.0
15 Volts				
.33	MD2-015-334-20	MD2	8	1.0
.68	MD3-015-684-20	MD3	8	1.0
1.5	MD4-015-155-20	MD4	8	1.0
20 Volts				
.15	MD2-020-154-20	MD2	8	1.0
.22	MD2-020-224-20	MD2	8	1.0
.33	MD3-020-334-20	MD3	8	1.0
.47	MD3-020-474-20	MD3	8	1.0
.68	MD4-020-684-20	MD4	8	1.0
1.0	MD4-020-105-20	MD4	8	1.0
35 Volts				
.10	MD2-035-104-20	MD2	8	1.0
.15	MD3-035-154-20	MD3	8	1.0
.22	MD3-035-224-20	MD3	8	1.0
.33	MD4-035-334-20	MD4	8	1.0
.47	MD4-035-474-20	MD4	8	1.0

Capacitance Code			WVDC/Polarity Dot	
Color	Significant Figures	Multiplier	Color	WVDC
Black	0		Brown	2v
Brown	1		White	3v
Red	2		Purple	4v
Orange	3	1,000	Yellow	6v
Yellow	4	10,000	Black	10v
Green	5	100,000	Green	15v
Blue	6	1,000,000	Blue	20v
Violet	7		Pink	35v
Gray	8			
White	9			

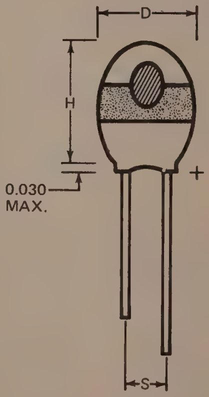
Dimensions—Inches (Millimeters)

Case Size	H Max.	D Max.	S ±0.015 (0.38)	Lead Length ±0.125 (±3.18) Anode	Lead Length ±0.125 (±3.18) Cathode	Diameter ±0.001 (±0.025)
MD2	0.175 (4.44)	0.095 (2.41)	0.050 (1.27)	1.625 (41.3)	1.375 (34.9)	30 AWG 0.010 (0.250)
MD3	0.210 (5.33)	0.110 (2.79)	0.050 (1.27)	1.625 (41.3)	1.375 (34.9)	30 AWG 0.010 (0.250)
MD4	0.260 (6.60)	0.125 (3.18)	0.050 (1.27)	1.625 (41.3)	1.375 (34.9)	30 AWG 0.010 (0.250)

PRODUCT MARKING



Note: With part oriented as shown, positive lead is on the right.



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Corning, New York 14830

Solid Tantalum Capacitors

SUBMINIATURE TANTALUM CHIPS MC SERIES

APPLICATIONS

For Filtering • Coupling • By-Passing • Timing

Microminiature MC chip capacitors are designed specifically for hybrid, thick film, and microcircuit applications where mounting space is critical and where conventionally packaged capacitors may not be used. The MC series capacitors are suitable for general coupling, filtering, by-passing, and non-critical timing applications over the temperature range of −55°C to +125°C and over the capacitance range .1 to 100µF. Extended capacitance values are available on special order.

PERFORMANCE CHARACTERISTICS

Capacitance—Measured on polarized capacitance bridge with a maximum polarizing voltage of 2.2 vdc and a maximum ac signal 1. 0 volts rms. See Part Number Table for available ratings.

Tolerance—Standard tolerance is ±20%, except for the MCU case size (+40, −20%). ±10% and ±5% tolerances are available in all case sizes. 10% decade values are offered in ±10% or ±5% tolerances.

DC Leakage Current—With rated dc voltage applied through a 1000 ohm resistor in series with the capacitor. DCL will not exceed the values shown in Part Number Table. At +85°C, DCL values will not exceed 10 times Part Number Table values. At +125°C with ⅔ rated WVDC applied, DCL values will not exceed 15 times Part Number Table values.

Operating Voltage—Capacitors will operate reliably up to rated WVDC at +85°C and +125°C with linear derating to ⅔ WVDC. Ac ripple voltage should be limited so that the forward dc voltage plus peak ac voltage does not exceed rated WVDC.

Temperature—No derating is required between −55°C and +85°C. Between +85°C and +125°C, derate linearly to ⅔ WVDC.

Surge Voltage—At +85°C and at 60-second intervals, capacitors withstand 1000 30-second applications of 130% rated WVDC.

Life Test—After 2000 hours at +85°C with rated WVDC applied, capacitors will meet initial dc leakage and DF requirements. Capacitance will not change more than ±10% from initial values.

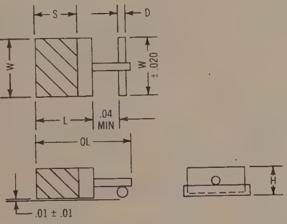
MECHANICAL

Construction—Tantalum pellets are coated with 60/38/2 (2% silver) eutectic solder suitable for reflow solder mounting. The negative terminal is the capacitor body itself. The positive terminal is a solder coated nickel wire.

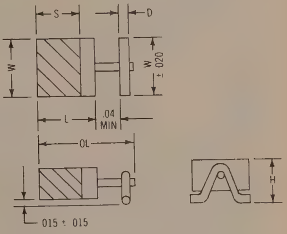
PART NUMBERS AND ORDERING INFORMATION

Part Number	Cap. In µF @25°C 120 Hz	WVDC @ 85°C	Max.DF% @25°C 120 Hz	Max.DCL In µA@ 25°C
MCU Case Size				
MCU-020-104—*	.10	20	6	0.5
MCU-020-154—	.15	20	6	0.5
MCU-020-224—	.22	20	6	0.5
MCU-015-334—	.33	15	6	0.5
MCU-010-474—	.47	10	6	0.5
MCU-006-684—	.68	6	6	0.5
MCU-004-105—	1.0	4	8	0.5
MCU-003-155—	1.5	3	10	0.5
MCF Case Size				
MCF-035-104—*	.10	35	6	0.5
MCF-035-154—	.15	35	6	0.5
MCF-035-224—	.22	35	6	0.5
MCF-035-334—	.33	35	6	0.5
MCF-035-474—	.47	35	6	0.5
MCF-025-684—	.68	25	6	0.5
MCF-020-105—	1.0	20	6	0.5
MCF-015-155—	1.5	15	6	0.5
MCF-010-225—	2.2	10	6	0.5
MCF-006-335—	3.3	6	6	0.5
MCF-004-475—	4.7	4	8	0.5
MCF-003-685—	6.8	3	10	0.5
MCF-002-106—	10.0	2	10	0.5
MCM Case Size				
MCM-035-684—*	.68	35	6	1.0
MCM-035-105—	1.0	35	6	1.0
MCM-035-155—	1.5	35	6	1.0
MCM-025-225—	2.2	25	6	1.0
MCM-020-335—	3.3	20	6	1.0
MCM-020-475—	4.7	20	6	1.0
MCM-010-685—	6.8	10	6	1.0
MCM-006-106—	10.0	6	6	1.0
MCM-004-156—	15.0	4	8	1.0
MCM-003-226—	22.0	3	10	1.0
MCL Case Size				
MCL-035-225—*	2.2	35	6	2.0
MCL-035-335—	3.3	35	6	2.0
MCL-035-475—	4.7	35	6	2.0
MCL-025-685—	6.8	25	6	2.0
MCL-020-106—	10.0	20	6	2.0
MCL-015-156—	15.0	15	6	2.0
MCL-010-226—	22.0	10	6	2.0
MCL-006-336—	33.0	6	6	2.0
MCL-004-476—	47.0	4	8	2.0
MCS Case Size				
MCS-035-685—*	6.8	35	6	3.0
MCS-025-106—	10.0	25	6	3.0
MCS-020-156—	15.0	20	6	3.0
MCS-015-226—	22.0	15	6	3.0
MCS-010-336—	33.0	10	6	3.0
MCS-006-476—	47.0	6	6	3.0
MCS-004-686—	68.0	4	8	3.0
MCJ Case Size				
MCJ-035-100—*	10.0	35	8	9.0
MCJ-035-156—	15.0	35	8	9.0
MCJ-035-226—	22.0	35	8	9.0
MCJ-025-336—	33.0	25	8	9.0
MCJ-020-476—	47.0	20	8	9.0
MCJ-015-686—	68.0	15	8	9.0
MCJ-010-107—	100.00	10	8	9.0

*Tolerance is indicated by adding suffix "−40" for +40% −20% tolerance. "−20" for ±20%, "−10" for ±10%, and "−05" for ±5% tolerance, i.e., MCU-020-104-40, MCS-035-685-10, etc.



MCU & MCF CASE SIZES



MCM THRU MCJ CASE SIZES

Dimensions —Inches (Millimeter)

Case Size	H Max.	W Max.	L Max.	OL Max.	D ±.002 (±.001)	S Min.
MCU	.060 (1.52)	.056 (1.65)	.085 (2.16)	.155 (3.94)	.016 (.41)	75%
MCF	.085 (2.16)	.110 (2.79)	.110 (2.79)	.180 (4.57)	.020 (.51)	75%
MCM	.100 (2.54)	.170 (4.32)	.175 (4.44)	.245 (6.22)	.020 (.51)	75%
MCL	.120 (3.05)	.205 (5.21)	.230 (5.84)	.300 (7.62)	.020 (.51)	75%
MCS	.145 (3.68)	.210 (5.33)	.240 (6.10)	.310 (7.87)	.020 (.51)	75%
MCJ	.170 (4.32)	.355 (9.02)	.390 (9.91)	.460 (11.68)	.020 (.51)	75%

Lead Attachment—Positive leads may be attached by conventional welding or soldering techniques. Negative terminal attachment is accomplished by reflow soldering. Soldering technique, time, and temperature are critical to reliable performance and circuit yields.

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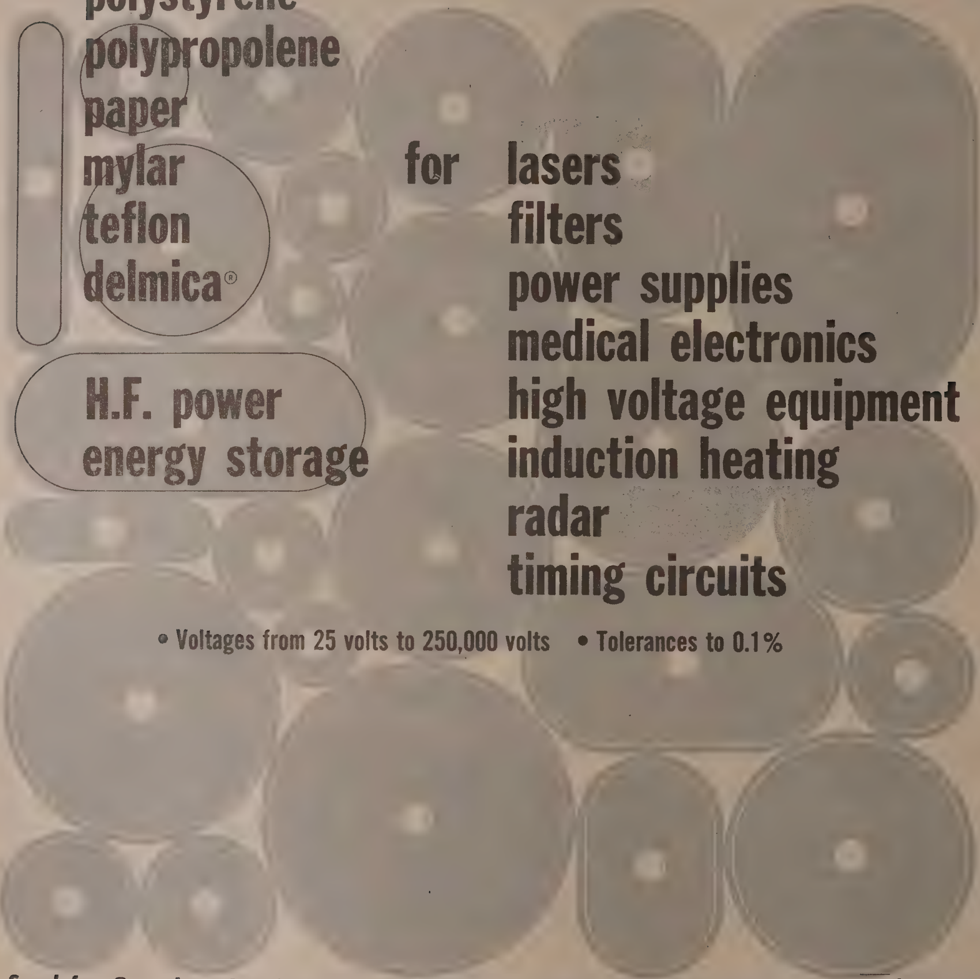

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Capacitors, in nearly any value, type, case configuration or size can be furnished by Electrocube, on special order with short delivery. We'll design them to a particular requirement or make them to your specifications. We'll supply metal cases including bath tubs, tubular and rectangular hermetically sealed units, as well as epoxy, and wrap and fill types. More than 4,000 standard units are also available. Representative data for standard units are presented on the following pages. Information on other case styles, voltages and dielectrics is available on request.

Size reductions. Electrocube can supply a full line — more than 800 different units in six case styles and four voltage ratings — that require as little as 39% of the volume of standard metallized mylar units. Volume reductions of as much as 30% are possible with Electrocube metallized polycarbonate capacitors made with .00008 gauge film.

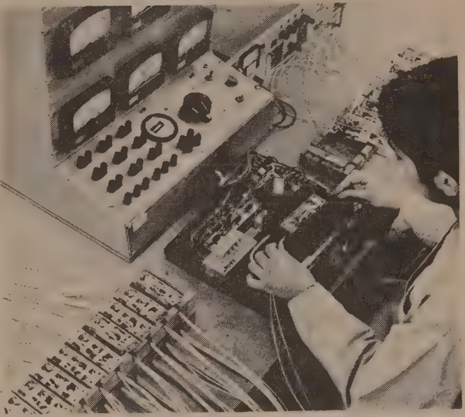
Plug-in packages. Six different sizes, both 14 and 16 lead DIP units are available for automatic insertion. Each package will accommodate as many as seven or eight capacitors. These units save package space and assembly time.

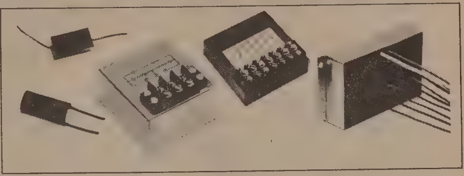
EMI filters. We also design and produce filters for a wide range of applications. Electrocube filters have been used in such projects as Apollo, Minuteman and the C-5A. We can supply subminiatures to multicircuit to high power and screen room filters — .1 to 500 Amp, 1 to 5,000 VDC, DC to 1,000 Hz. **(See page 1•553)**

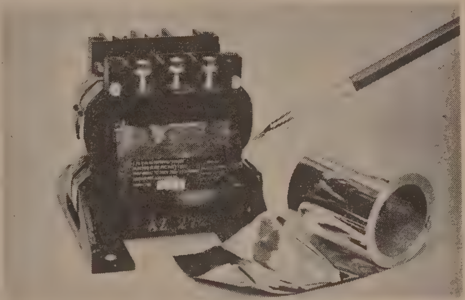
RC networks. Our RC networks are tough enough to take up to 2,000,000 arcs, sparks or noise transients. Standard molded units are rated 125 to 500 VAC, 200 to 2,000 VDC. Molded or metal case units can be furnished to your requirements.

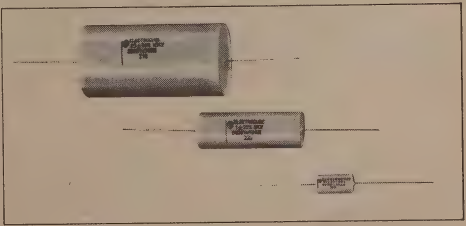
Ballasts. We can supply weight saving custom units to meet MIL specs and almost any lamp or supply requirement.

Transformers. Electrocube manufactures wire wound and foil wound transformers, both laminated and C core, toroids and special inductors. Through company funded development and testing, Electrocube introduced the first commercially available autotransformers in 10KVA and lower ratings, and has developed processing techniques that make these devices reliable and economical. We also can supply aluminum foil chokes with advantages similar to those of foil wound transformers. (See pgs. 2•1736, 2•1737)









electrocube capacitors

Metallized Polycarbonate Wrap/Fill

50 VOLT

MFD	DIMENSIONS			CATALOG PART NUMBER	LEAD SIZE (AWG)
	T ±.05"	W ±.05"	L ±.05"		
For .0010 thru .033 MFD – See Higher Voltages					
.039	.09	.18	.40	650B1A393–*	26
.047	.09	.18	.40	650B1A473–	26
.056	.09	.18	.40	650B1A563–	26
.068	.09	.18	.40	650B1A683–	26
.082	.09	18	.40	650B1A823–	26
.10	.09	.18	.40	650B1A104–	26
.12	.09	.18	.40	650B1A124–	26
.15	.10	.20	.40	650B1A154–	26
.18	.09	.18	.53	650B1A184–	26
.22	.09	.18	.53	650B1A224–	26
.27	.10	.19	.53	650B1A274–	26
.33	.11	.21	.53	650B1A334–	26
.39	.13	.22	.53	650B1A394–	24
.47	.14	.24	.53	650B1A474–	24
.56	.16	.25	.53	650B1A564–	24
.68	.18	.27	.53	650B1A684–	24
.82	.20	.29	.53	650B1A824–	24
1.0	.22	32	.53	650B1A105–	24
1.2	.20	.29	.68	650B1A125–	24
1.5	.22	.32	.68	650B1A155–	24
1.8	.23	.32	.78	650B1A185–	24
2.0	.24	.34	.78	650B1A205–	24
2.5	.28	.37	.78	650B1A255–	24
3.0	.31	.41	.78	650B1A305–	22
3.5	.34	.43	.78	650B1A355–	22
4.0	.31	.40	.95	650B1A405–	22
4.5	.33	.42	.95	650B1A455–	22
5.0	.25	.42	1.17	650B1A505–	22
6.0	.28	.45	1.17	650B1A605–	22
8.0	.34	.50	1.17	650B1A805–	22
10.0	.39	.56	1.17	650B1A106–	20
12.0	.43	.60	1.17	650B1A126–	20
15.0	.49	66	1.17	650B1A156–	20
18.0	.47	.64	1.45	650B1A186–	20
20.0	.50	.67	1.45	650B1A206–	20
30.0	.56	.73	1.70	650B1A306–	20
40.0	.66	.83	1.70	650B1A406–	20
50.0	75	.91	1 70	650B1A506–	20

100 VOLT

MFD	DIMENSIONS			CATALOG PART NUMBER	LEAD SIZE (AWG)
	T ±.05"	W ±.05"	L ±.05"		
For .0010 thru .015 MFD – See Higher Voltages					
.018	.09	.18	.40	650B1B183–*	26
.022	.09	.18	.40	650B1B223–	26
.033	.09	.18	.40	650B1B333–	26
.039	.09	.18	.40	650B1B393–	26
.047	.09	.18	.40	650B1B473–	26
.056	.10	.19	.40	650B1B563–	26
.068	.11	.21	.40	650B1B683–	26
.082	.09	.18	.53	650B1B823–	26
.10	.10	.19	.53	650B1B104–	26
.12	.11	.20	.53	650B1B124–	26
.15	.12	.22	.53	650B1B154–	24
.18	.14	.23	.53	650B1B184–	24
.22	.16	.25	.53	650B1B224–	24
.27	.18	.28	.53	650B1B274–	24
.33	.20	.30	.53	650B1B334–	24
.39	.23	.32	.53	650B1B394–	24
.47	.20	.30	.68	650B1B474–	24
.56	.23	.32	.68	650B1B564–	24
.68	.23	.32	.78	650B1B684–	24
.82	.25	.35	.78	650B1B824–	24
1.0	.28	.38	.78	650B1B105–	24
1.2	.31	.41	.78	650B1B125–	22
1.5	.31	.40	.95	650B1B155–	22
1.8	.34	.43	.95	650B1B185–	22
2.0	.27	.44	1.17	650B1B205–	22
2.5	.31	.48	1.17	650B1B255–	22
3.0	.35	.51	1.17	650B1B305–	20
3.5	.38	.55	1.17	650B1B355–	20
4.0	.41	.58	1.17	650B1B405–	20
4.5	.44	.61	1.17	650B1B455–	20
5.0	.47	.63	1.17	650B1B505–	20
6.0	.52	.68	1.17	650B1B605–	20
8.0	.53	.69	1.45	650B1B805–	20
10.0	.54	.70	1.70	650B1B106–	20
12.0	.54	.70	1.90	650B1B126–	20
15.0	.61	.78	1.90	650B1B156–	20
18.0	.68	.84	1.90	650B1B186–	20
20.0	.72	.88	1.90	650B1B206–	20

200 VOLT

MFD	DIMENSIONS			CATALOG PART NUMBER	LEAD SIZE (AWG)
	T ±.05"	W ±.05"	L ±.05"		
For .0010 thru .0033 MFD – See Higher Voltages					
.0039	.09	.18	.40	650B1C392–*	26
Thru	.09	.18	.40	650B1C. .. –	26
.015	.09	.18	.40	650B1C153–	26
.018	.10	.19	.40	650B1C183–	26
.022	.11	.20	.40	650B1C223–	26
.027	.09	.18	.53	650B1C273	26
.033	.09	.18	.53	650B1C333–	26
.039	.10	.20	.53	650B1C393–	26
.047	.11	.21	.53	650B1C473–	26
.056	.13	.22	.53	650B1C563–	24
.068	.15	.24	.53	650B1C683–	24
.082	.16	.26	.53	650B1C823–	24
.10	.18	.28	.53	650B1C104–	24
.12	.21	.30	.53	650B1C124–	24
.15	.23	.33	.53	650B1C154	24
.18	.21	.30	.68	650B1C184–	24
.22	.23	.33	.68	650B1C224–	24
.27	.24	.33	.78	650B1C274–	24
.33	.27	.36	.78	650B1C334–	24
.39	.30	.40	.78	650B1C394–	22
.47	.33	.43	.78	650B1C474–	22
.56	.32	.41	.95	650B1C564–	22
.68	.25	.42	1.17	650B1C684–	22
.82	.28	.45	1.17	650B1C824–	22
1.0	.32	.49	1.17	650B1C105–	22
1.2	.36	.52	1.17	650B1C125–	20
1.5	.41	.58	1.17	650B1C155–	20
1.8	.46	.62	1.17	650B1C185–	20
2.0	.49	.65	1.17	650B1C205–	20
2.5	.47	.64	1.45	650B1C255–	20
3.0	.47	.63	1.70	650B1C305–	20
3.5	.51	.67	1.70	650B1C355–	20
4.0	.50	.66	1.90	650B1C405–	20
4.5	.53	.70	1.90	650B1C455–	20
5.0	.57	.73	1.90	650B1C505–	20
6.0	.63	.79	1.90	650B1C605–	20
8.0	.74	.90	1.90	650B1C805–	20
10.0	.84	1.00	1.90	650B1C106–	20

Epoxy Case

50 VOLT

MFD	DIMENSIONS			S ±.015"	CATALOG PART NUMBER	LEAD SIZE (AWG)
	T ±.01"	H (MAX.)	L ±.01"			
For .0010 thru .068 MFD – See Higher Voltages						
082	18	.30	.42	.300	652A1A823 *	22
Thru	18	30	42	300	652A1A –	22
15	18	30	.42	300	652A1A154–	22
18	18	30	55	400	652A1A184	22
22	18	30	55	.400	652A1A224	22
.27	18	30	55	.400	652A1A274–	22
33	18	.30	.55	400	652A1A334	22
39	18	30	55	400	652A1A394–	22
47	24	37	55	400	652A1A474–	22
56	24	37	.55	400	652A1A564–	22
68	24	37	55	400	652A1A684–	22
82	.30	.43	55	400	652A1A824–	22
1.0	30	43	55	400	652A1A105–	22
1 2	30	43	67	500	652A1A125–	22
1 5	30	.43	67	500	652A1A155–	22
1 8	30	43	82	600	652A1A185–	22
2.0	30	43	82	600	652A1A205–	22
2 5	40	55	82	600	652A1A255	22
3 0	40	.55	82	600	652A1A305	22
3 5	40	55	82	600	652A1A355–	20
4 0	40	.55	1 04	800	652A1A405	20
4 5	40	55	1 04	800	652A1A455–	20
5 0	40	55	1 24	1 100	652A1A505–	20
6 0	.40	.55	1 24	1 100	652A1A605	20
8 0	40	55	1 24	1 100	652A1A805–	20
10 0	57	73	1 24	1 100	652A1A106–	20
12 0	57	73	1 24	1 100	652A1A126	20
15 0	57	73	1 24	1 100	652A1A156–	20
18 0	57	73	1 75	1 600	652A1A186	20
20 0	57	73	1 75	1 600	652A1A206–	20

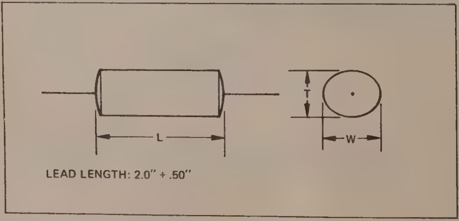
100 VOLT

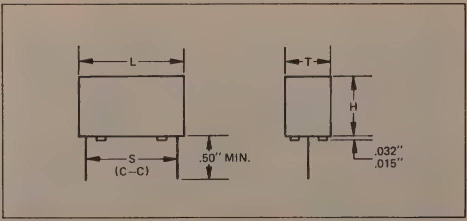
MFD	DIMENSIONS			S ±.015"	CATALOG PART NUMBER	LEAD SIZE (AWG)
	T ±.01"	H (MAX.)	L ±.01"			
For .0010 thru .022 MFD – See Higher Voltages						
.027	.18	.30	.42	.300	652A1B273–*	22
.033	.18	.30	.42	.300	652A1B333–	22
.039	.18	.30	.42	.300	652A1B393–	22
.047	.18	.30	.42	.300	652A1B473–	22
.056	.18	.30	.42	.300	652A1B563–	22
.068	.18	.30	.42	.300	652A1B683–	22
.082	.18	.30	.55	.400	652A1B823–	22
.10	.18	.30	.55	.400	652A1B104–	22
.12	.18	.30	.55	.400	652A1B124–	22
.15	.18	.30	.55	.400	652A1B154–	22
.18	.24	.37	.55	.400	652A1B184–	22
.22	.24	.37	.55	.400	652A1B224–	22
.27	.24	.37	.55	.400	652A1B274–	22
.33	.30	.43	.55	.400	652A1B334–	22
.39	.30	.43	.55	.400	652A1B394–	22
.47	.30	.43	.67	.500	652A1B474 –	22
.56	.30	.43	.67	.500	652A1B564–	22
.68	.30	.43	.82	.600	652A1B684–	22
.82	.40	.55	.82	.600	652A1B824–	20
1.0	.40	.55	.82	.600	652A1B105–	20
1.2	.40	.55	.82	.600	652A1B125–	20
1.5	.40	.55	1.04	.800	652A1B155–	20
1.8	.40	.55	1.04	.800	652A1B185–	20
2.0	.40	.55	1.24	1.100	652A1B205–	20
2.5	.40	.55	1.24	1.100	652A1B255	20
3.0	.40	.55	1.24	1.100	652A1B305–	20
3.5	.57	.73	1.24	1.100	652A1B355–	20
4.0	.57	.73	1.24	1.100	652A1B405–	20
4.5	.57	.73	1.24	1.100	652A1B455–	20
5.0	.57	.73	1.24	1.100	652A1B505–	20
6.0	.57	73	1.24	1 100	652A1B605–	20
8 0	.57	73	1.75	1.600	652A1B805–	20

200 VOLT

MFD	DIMENSIONS			S ±.015"	CATALOG PART NUMBER	LEAD SIZE (AWG)
	T ±.01"	H (MAX.)	L ±.01"			
For .0010 thru .0047 MFD – See Higher Voltages						
.0056	.18	.30	.42	.300	652A1C562–*	22
Thru	.18	.30	.42	.300	652A1C –	22
.015	.18	.30	.42	.300	652A1C153–	22
.018	.18	.30	.42	.300	652A1C183–	22
.022	.18	.30	.42	.300	652A1C223–	22
.027	.18	.30	.55	.400	652A1C273–	22
.033	.18	.30	.55	.400	652A1C333–	22
.039	.18	.30	.55	.400	652A1C393–	22
.047	.18	.30	.55	.400	652A1C473–	22
056	.24	.37	.55	.400	652A1C563–	22
068	.24	.37	.55	.400	652A1C683–	22
082	.24	.37	.55	.400	652A1C823–	22
.10	.24	.37	.55	.400	652A1C104–	22
.12	.30	.43	.55	.400	652A1C124–	22
.15	.30	.43	.55	.400	652A1C154–	22
.18	.30	.43	.67	.500	652A1C184–	22
.22	.30	.43	.67	.500	652A1C224–	22
.27	.30	.43	.82	.600	652A1C274–	22
.33	.40	.55	.82	.600	652A1C334–	20
.39	.40	.55	.82	.600	652A1C394–	20
.47	.40	.55	.82	.600	652A1C474–	20
.56	.40	.55	1.04	.800	652A1C564–	20
.68	.40	.55	1.24	1.100	652A1C684–	20
.82	.40	.55	1.24	1.100	652A1C824–	20
1.0	.40	.55	1.24	1.100	652A1C105–	20
1.2	.57	.73	1.24	1.100	652A1C125–	20
1.5	.57	.73	1.24	1.100	652A1C155–	20
1.8	.57	.73	1.24	1.100	652A1C185–	20
2.0	.57	.73	1.24	1.100	652A1C205–	20
2.5	.57	.73	1.75	1.600	652A1C255–	20
3.0	.57	.73	1.75	1.600	652A1C305–	20
3.5	.57	.73	1.75	1.600	652A1C355–	20

*Add suffix letter to part number for capacitance tolerance desired: ±20% = None ±10% = K ±5% = J ±2% = G ±1% = F.
**Higher voltages and other case styles (round wrap and fill, rectangular epoxy, round and rectangular metal hermetically sealed) are available.





electrocube capacitors

Metallized Mylar* Wrap/Fill

100 VOLT

MFD	DIMENSIONS T ±.05"	DIMENSIONS W ±.05"	DIMENSIONS L ±.05"	CATALOG PART NUMBER	LEAD SIZE (AWG)
	For .0010 thru .015 MFD – See Higher Voltages				
.018	.09	.18	.40	230B1B183–*	26
.022	.09	.18	.40	230B1B223–	26
.033	.09	.18	.40	230B1B333–	26
.039	.09	.18	.40	230B1B393–	26
.047	.09	.18	.40	230B1B473–	26
.056	.09	.18	.40	230B1B563–	26
.068	.10	.19	.40	230B1B683–	26
.082	.11	.20	.40	230B1B823–	26
.10	.09	.18	.53	230B1B104–	26
.12	.09	.18	.53	230B1B124–	26
.15	.09	.18	.53	230B1B154–	26
.18	.09	.18	.53	230B1B184–	26
.22	.10	.20	.53	230B1B224–	26
.27	.12	.22	.53	230B1B274–	24
.33	.14	.23	.53	230B1B334–	24
.39	.15	.25	.53	230B1B394–	24
.47	.17	.27	.53	230B1B474–	24
.56	.19	.28	.53	230B1B564–	24
.68	.22	.31	.53	230B1B684–	24
.82	.18	.27	.68	230B1B824–	24
1.0	.20	.29	.68	230B1B105–	24
1.2	.22	.32	.68	230B1B125–	24
1.5	.21	.30	.78	230B1B155–	24
1.8	.23	.33	.78	230B1B185–	24
2.0	.25	.34	.78	230B1B205–	24
3.0	.31	.41	.78	230B1B305–	22
4.0	.32	.41	.95	230B1B405–	22
5.0	.26	.42	1.17	230B1B505–	22
6.0	.29	.45	1.17	230B1B605–	22
8.0	.35	.51	1.17	230B1B805–	20
10.0	.46	.63	1.17	230B1B106–	20
12.0	.51	.68	1.17	230B1B126–	20
15.0	.50	.67	1.45	230B1B156–	20
18.0	.56	.72	1.45	230B1B186–	20
20.0	.52	.68	1.70	230B1B206–	20
30.0	.59	.75	1.90	230B1B306–	20
40.0	.72	.88	1.90	230B1B406–	20
50.0	.79	.95	1.90	230B1B506–	20

200 VOLT

MFD	DIMENSIONS T ±.05"	DIMENSIONS W ±.05"	DIMENSIONS L ±.05"	CATALOG PART NUMBER	LEAD SIZE (AWG)
	For .0010 thru .0047 MFD – See Higher Voltages				
.0068	.09	.18	.40	230B1C682–*	26
.010	.09	.18	.40	230B1C103–	26
.012	.09	.18	.40	230B1C123–	26
.015	.09	.18	.40	230B1C153–	26
.018	.10	.20	.40	230B1C183–	26
.022	.09	.18	.53	230B1C223–	26
.027	.09	.18	.53	230B1C273–	26
.033	.09	.18	.53	230B1C333–	26
.039	.09	.18	.53	230B1C393–	26
.047	.09	.18	.53	230B1C473–	26
.056	.11	.20	.53	230B1C563–	26
.068	.12	.22	.53	230B1C683–	24
.082	.14	.23	.53	230B1C823–	24
.10	.16	.25	.53	230B1C104–	24
.12	.17	.27	.53	230B1C124–	24
.15	.20	.29	.53	230B1C154–	24
.18	.22	.32	.53	230B1C184–	24
.22	.18	.28	.68	230B1C224–	24
.27	.20	.29	.68	230B1C274–	24
.33	.24	.33	.68	230B1C334–	24
.39	.21	.30	.78	230B1C394–	24
.47	.24	.33	.78	230B1C474–	24
.56	.26	.36	.78	230B1C564–	24
.68	.29	.39	.78	230B1C684–	24
.82	.33	.42	.78	230B1C824–	22
1.0	.32	.41	.95	230B1C105–	22
1.2	.25	.42	1.17	230B1C125–	22
1.5	.29	.45	1.17	230B1C155–	22
1.8	.32	.49	1.17	230B1C185–	22
2.0	.35	.51	1.17	230B1C205–	20
3.0	.44	.61	1.17	230B1C305–	20
4.0	.44	.61	1.45	230B1C405–	20
5.0	.45	.61	1.70	230B1C505–	20
6.0	.49	.65	1.70	230B1C605–	20
8.0	.53	.70	1.90	230B1C805–	20
10.0	.70	.87	1.90	230B1C106–	20
15.0	.87	1.04	1.90	230B1C156–	20
20.0	1.01	1.18	1.90	230B1C206–	20

Epoxy Case

100 VOLT

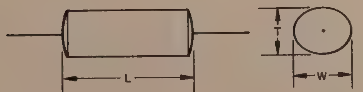
MFD	DIMENSIONS T ±.01"	DIMENSIONS H (MAX.)	DIMENSIONS L ±.01"	S ±.015"	CATALOG PART NUMBER	LEAD SIZE (AWG)
	For .0010 thru .018 MFD – See Higher Voltages					
.022	.18	.30	.42	.300	232A1B223–*	22
.027	.18	.30	.42	.300	232A1B273–	22
.033	.18	.30	.42	.300	232A1B333–	22
.039	.18	.30	.42	.300	232A1B393–	22
.047	.18	.30	.42	.300	232A1B473–	22
.056	.18	.30	.42	.300	232A1B563–	22
.068	.18	.30	.42	.300	232A1B683–	22
.082	.18	.30	.42	.300	232A1B823–	22
.10	.18	.30	.55	.400	232A1B104–	22
.12	.18	.30	.55	.400	232A1B124–	22
.15	.18	.30	.55	.400	232A1B154–	22
.18	.18	.30	.55	.400	232A1B184–	22
.22	.18	.30	.55	.400	232A1B224–	22
.27	.18	.30	.55	.400	232A1B274–	22
.33	.24	.37	.55	.400	232A1B334–	22
.39	.24	.37	.55	.400	232A1B394–	22
.47	.24	.37	.55	.400	232A1B474–	22
.56	.30	.43	.55	.400	232A1B564–	22
.68	.30	.43	.55	.400	232A1B684–	22
.82	.30	.43	.67	.500	232A1B824–	22
1.0	.30	.43	.67	.500	232A1B105–	22
1.2	.30	.43	.67	.500	232A1B125–	22
1.5	.30	.43	.82	.600	232A1B155–	22
1.8	.30	.43	.82	.600	232A1B185–	22
2.0	.40	.55	.82	.600	232A1B205–	20
3.0	.40	.55	.82	.600	232A1B305–	20
4.0	.40	.55	1.04	.800	232A1B405–	20
5.0	.40	.55	1.24	1.100	232A1B505–	20
6.0	.40	.55	1.24	1.100	232A1B605–	20
8.0	.57	.73	1.24	1.100	232A1B805–	20
10.0	.57	.73	1.24	1.100	232A1B106–	20
15.0	.57	.73	1.75	1.600	232A1B156–	20

200 VOLT

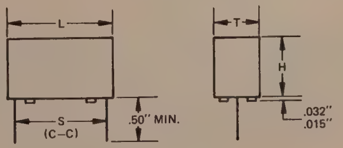
MFD	DIMENSIONS T ±.01"	DIMENSIONS H (MAX.)	DIMENSIONS L ±.01"	S ±.015"	CATALOG PART NUMBER	LEAD SIZE (AWG)
	For .0010 thru .0068 MFD – See Higher Voltages					
.0082	.18	.30	.42	.300	232A1C822–*	22
.010	.18	.30	.42	.300	232A1C103–	22
.012	.18	.30	.42	.300	232A1C123–	22
.015	.18	.30	.42	.300	232A1C153–	22
.018	.18	.30	.42	.300	232A1C183–	22
.022	.18	.30	.55	.400	232A1C223–	22
.027	.18	.30	.55	.400	232A1C273–	22
.033	.18	.30	.55	.400	232A1C333–	22
.039	.18	.30	.55	.400	232A1C393–	22
.047	.18	.30	.55	.400	232A1C473–	22
.056	.18	.30	.55	.400	232A1C563–	22
.068	.18	.30	.55	.400	232A1C683–	22
.082	.24	.37	.55	.400	232A1C823–	22
.10	.24	.37	.55	.400	232A1C104–	22
.12	.24	.37	.55	.400	232A1C124–	22
.15	.30	.43	.55	.400	232A1C154–	22
.18	.30	.43	.55	.400	232A1C184–	22
.22	.30	.43	.67	.500	232A1C224–	22
.27	.30	.43	.67	.500	232A1C274–	22
.33	.30	.43	.67	.500	232A1C334–	22
.39	.30	.43	.82	.600	232A1C394–	22
.47	.30	.43	.82	.600	232A1C474–	22
.56	.40	.55	.82	.600	232A1C564–	20
.68	.40	.55	.82	.600	232A1C684–	20
.82	.40	.55	.82	.600	232A1C824–	20
1.0	.40	.55	1.04	.800	232A1C105–	20
1.2	.40	.55	1.24	1.100	232A1C125–	20
1.5	.40	.55	1.24	1.100	232A1C155–	20
1.8	.40	.55	1.24	1.100	232A1C185–	20
2.0	.57	.73	1.24	1.100	232A1C205–	20
3.0	.57	.73	1.24	1.100	232A1C305–	20
4.0	.57	.73	1.75	1.600	232A1C405–	20
5.0	.57	.73	1.75	1.600	232A1C505–	20

*Add suffix letter to part number for capacitance tolerance desired: ±20% = None ±10% = K ±5% = J ±2% = G ±1% = F.
**Higher voltages and other case styles (round wrap and fill, rectangular epoxy, round and rectangular metal hermetically sealed) are available.

*Mylar is a registered TM of DuPont



LEAD LENGTH: 2.0" + .50"



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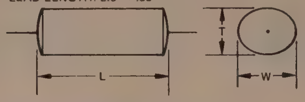


LEAD LENGTH: 2.0" + .50"

Miniature High Voltage

1000 VOLT

MFD	DIMENSIONS			CATALOG PART NUMBER	LEAD SIZE (AWG)
	T ± 05"	W ± 05"	L ± 05"		
001	12	32	1 0	520B1G102–*	20
002	16	36	1.0	520B1G202–	20
003	19	39	1.0	520B1G302–	20
005	21	41	1 0	520B1G502–	20
01	33	53	1.0	520B1G103 -	20
02	33	53	1 3	520B1G203–	20
03	41	61	1 3	520B1G303–	20
05	43	63	1 5	520B1G503 -	20
10	64	84	1 5	520B1G104–	20
20	79	99	1 8	520B1G204 -	20
30	1 01	1 21	1 8	520B1G304 -	20
50	75	1 05	3 3	520B1G504–	20
1 0	.93	1 23	4 3	520B1G105–	20

2000 VOLT

MFD	DIMENSIONS			CATALOG PART NUMBER	LEAD SIZE (AWG)
	T ± 05"	W ± 05"	L ± 05"		
,001	12	35	1 0	520B1J102–*	20
002	19	39	1 0	520B1J202–	20
003	25	45	1 0	520B1J302–	20
005	23	43	1 3	520B1J502–	20
01	34	54	1 3	520B1J103–	20
02	40	60	1 5	520B1J203–	20
03	52	72	1 5	520B1J303	20
05	45	65	2 3	520B1J503 -	20
10	55	75	3 3	520B1J104 -	20
20	60	90	4 3	520B1J204 -	20
30	76	1 06	4 3	520B1J304 -	20
50	1 02	1 32	4 3	520B1J504	18
1 0	1 50	1 80	4 3	520B1J105	18

3000 VOLT

MFD	DIMENSIONS			CATALOG PART NUMBER	LEAD SIZE (AWG)
	T ± 05"	W ± 05"	L ± 05"		
001	20	40	1.0	520B1L102–*	20
002	26	46	1.0	520B1L202–	20
003	33	53	1.0	520B1L302–	20
005	31	51	1.3	520B1L502–	20
01	46	66	1.3	520B1L103–	20
02	55	75	1.5	520B1L203–	20
03	68	88	1.5	520B1L303–	20
05	61	81	2.3	520B1L503–	20
10	68	.88	3.3	520B1L104–	20
20	78	1 08	4.3	520B1L204–	20
30	1 00	1 30	4.3	520B1L304–	18
50	1 33	1 63	4.3	520B1L504–	18
1 0	1 95	2 25	4.3	520B1L105–	18

5000 VOLT

MFD	DIMENSIONS			CATALOG PART NUMBER	LEAD SIZE (AWG)
	T ± 05"	W ± 05"	L ± 05"		
001	20	40	1 3	520B1N102–*	20
002	27	50	1 3	520B1N202–	20
003	35	55	1 3	520B1N302–	20
005	45	65	1.3	520B1N502–	20
01	52	72	1.5	520B1N103–	20
02	.67	87	1.8	520B1N203–	20
03	67	87	2.3	520B1N303–	20
05	88	1 08	2.3	520B1N503–	20
10	98	1 18	3.3	520B1N104–	18
20	1 13	1 43	4.3	520B1N204 -	18
30	1 42	1 72	4 3	520B1N304–	18
.50	1 87	2 17	4.3	520B1N504	18

8000 VOLT

MFD	DIMENSIONS			CATALOG PART NUMBER	LEAD SIZE (AWG)
	T ± 05"	W ± 05"	L ±.05"		
001	35	55	1 8	520B1Y102–*	20
002	50	70	1 8	520B1Y202	20
003	60	80	1 8	520B1Y302–	20
005	65	85	2 0	520B1Y502 -	20
01	78	98	2 5	520B1Y103 -	20
02	78	98	3 5	520B1Y203–	20
03	99	1 19	3 5	520B1Y303 -	20
05	1 02	1 32	4 5	520B1Y503–	18
.10	1.50	1.80	4.5	520B1Y104–	18
20					
30					
50					

10,000 VOLT

MFD	DIMENSIONS			CATALOG PART NUMBER	LEAD SIZE (AWG)
	T ± 05"	W ± 05"	L ± 05"		
001	40	60	1.8	520B1S102–*	20
002	60	.80	1.8	520B1S202–	20
003	60	.80	2.0	520B1S302–	20
005	66	86	2.5	520B1S502–	20
01	98	1 18	2.5	520B1S103–	20
02	98	1 18	3.5	520B1S203–	20
03	1 23	1 43	3.5	520B1S303–	20
05	1 29	1 59	4.5	520B1S503–	18
.10	1.87	2.17	4.5	520B1S104–	18
20					
30					
50					

*Add suffix letter to part number for capacitance tolerance desired: ±20% = None ±10% = K ±5% = J ±2% = G ±1% = F.
**Higher voltages and other case styles (round wrap and fill, rectangular epoxy, round and rectangular metal hermetically sealed) are available.

Mylar*/Foil

250B OVAL

Cap. Mfd.	200 WVDC				400 WVDC				600 WVDC			
	Dash Number	T	W	L	Dash Number	T	W	L	Dash Number	T	W	L
.001												
.0015									1F152	.11	.20	.53
.0022									1F222	.11	.20	.68
.0033					1E332	.11	.20	.53	1F332	.11	.20	.68
.0047					1E472	.11	.20	.68	1F472	.14	.23	.68
.0068					1E682	.11	.20	.68	1F682	.14	.23	.81
.01	1C103	.11	.20	.53	1E103	.14	.23	.68	1F103	.19	.28	.81
.015	1C153	.11	.20	.68	1E153	.14	.23	.81	1F153	.20	.29	.81
.022	1C223	.14	.23	.68	1E223	.18	.28	.81	1F223	.25	.34	.90
.033	1C333	.16	.26	.68	1E333	.20	.29	.81	1F333	.26	.35	.90
.047	1C473	.17	.27	.81	1E473	.26	.35	.90	1F473	.33	.42	.90
.068	1C683	.18	.28	.81	1E683	.31	.40	.90	1F683	.39	.48	1.17
.10	1C104	.21	.31	.81	1E104	.33	.42	.90	1F104	.41	.57	1.17
.15	1C154	.26	.35	.90	1E154	.39	.48	1.17	1F154	.45	.62	1.45
.22	1C224	.26	.43	.90	1E224	.41	.57	1.17	1F224	.47	.63	1.45
.33	1C334	.28	.45	1.17	1E334	.41	.57	1.45	1F334	.59	.75	1.68
.47	1C474	.35	.52	1.17	1E474	.47	.63	1.68	1F474	.66	.82	1.90
.68	1C684	.41	.57	1.17	1E684	.54	.70	1.90				
1.0	1C105	.41	.57	1.45	1E105	.66	.82	1.90				
1.5	1C155	.54	.70	1.45								
2.0	1C205	.59	.75	1.68								

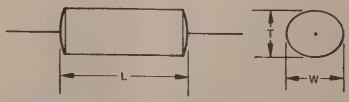
TOLERANCE ±.050

TYPE 250D ROUND

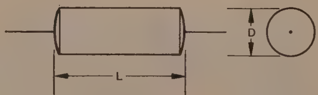
Cap. Mfd.	200 WVDC			400 WVDC			600 WVDC		
	Dash Number	D	L	Dash Number	D	L	Dash Number	D	L
.001	1C102	.14	.53	1E102	.14	.53	1F102	.14	.53
.0015	1C152	.14	.53	1E152	.14	.53	1F152	.17	.53
.0022	1C222	.14	.53	1E222	.14	.53	1F222	.17	.68
.0033	1C332	.14	.53	1E332	.17	.53	1F332	.17	.68
.0047	1C472	.14	.53	1E472	.17	.68	1F472	.20	.68
.0068	1C682	.14	.53	1E682	.17	.68	1F682	.20	.81
.01	1C103	.17	.53	1E103	.20	.68	1F103	.24	.81
.015	1C153	.17	.68	1E153	.20	.81	1F153	.25	.81
.022	1C223	.20	.68	1E223	.24	.81	1F223	.31	.90
.033	1C333	.22	.68	1E333	.26	.81	1F333	.32	.90
.047	1C473	.23	.81	1E473	.32	.90	1F473	.39	.90
.068	1C683	.24	.81	1E683	.37	.90	1F683	.45	1.17
.10	1C104	.26	.81	1E104	.39	.90	1F104	.51	1.17
.15	1C154	.32	.90	1E154	.45	1.17	1F154	.55	1.45
.22	1C224	.35	.90	1E224	.51	1.17	1F224	.57	1.45
.33	1C334	.38	1.17	1E334	.51	1.45	1F334	.69	1.68
.47	1C474	.45	1.17	1E474	.57	1.68	1F474	.76	1.90
.68	1C684	.51	1.17	1E684	.64	1.90			
1.0	1C105	.51	1.45	1E105	.76	1.90			
1.5	1C155	.64	1.45						
2.0	1C205	.75	1.68						

LEAD LENGTH 2 ± ½ INCHES

*Mylar is a registered TM of DuPont



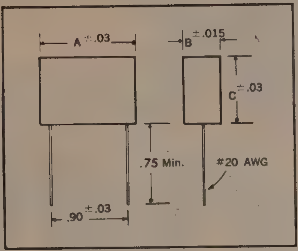
LEAD LENGTH: 2.0" + .50"



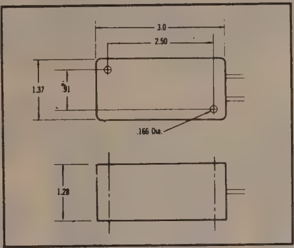
LEAD LENGTH: 2.0" + .50"

electrocube capacitors

RC Networks

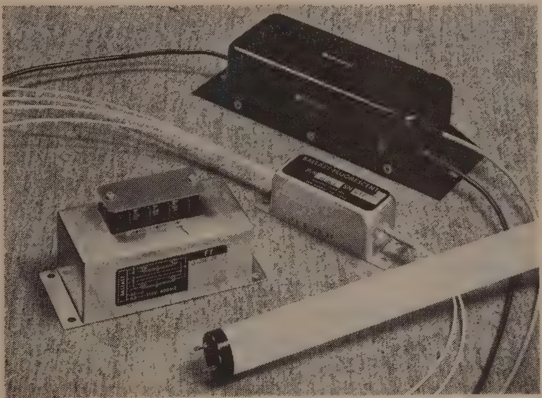


Capacity MFD	Resistance Ohms ±10%	Rated Voltage	Peak Pulse Voltage	Dimensions A in.	B in.	C in.	Electro Cube Part Number
0.5 ± 10%	22	200 VDC or 125 VAC	300 V	1.00	.38	.63	RG 1780 — 1
0.5 ± 10%	33		300 V	1.00	.38	.63	RG 1780 — 2
0.5 ± 10%	47		300 V	1.00	.38	.63	RG 1780 — 3
1.0 ± 10%	22		300 V	1.00	.50	.75	RG 1781 — 1
1.0 ± 10%	33		300 V	1.00	.50	.75	RG 1781 — 2
1.0 ± 10%	47		300 V	1.00	.50	.75	RG 1781 — 3
0.1 ± 20%	22	600 VDC or 250 VAC	900 V	1.00	.38	.63	RG 1782 — 1
0.1 ± 20%	33		900 V	1.00	.38	.63	RG 1782 — 2
0.1 ± 20%	47		900 V	1.00	.38	.63	RG 1782 — 3
0.25 ± 20%	22		900 V	1.00	.50	.75	RG 1783 — 1
0.25 ± 20%	33		900 V	1.00	.50	.75	RG 1783 — 2
0.25 ± 20%	47		900 V	1.00	.50	.75	RG 1783 — 3
0.5 ± 10%	22		900 V	1.25	.58	.83	RG 1784 — 1
0.5 ± 10%	33		900 V	1.25	.58	.83	RG 1784 — 2
0.5 ± 10%	47		900 V	1.25	.58	.83	RG 1784 — 3



Part #	Resistance Ohms	Tolerance %	Power Watts	Capacity MFD	Tolerance %	VDC Volts	VAC Volts	Thyrector Part #	Lead Length Inches	Circuit #
RG 1676-1	100	10	10	1.0	10	1000	480	N/A	24	1
-148	100	10	10	1.0	10	1000	480	N/A	48	1
-2	100	10	10	.5	10	1000	480	N/A	24	1
-3	10	10	2	1.0	10	600	250	N/A	25	1
-10	220	10	5	2.0	10	600	250	N/A	25	1
-12	220	10	2	.5	10	1000	480	N/A	24	1
-13	220	10	1	.47	10	1000	480	N/A	24	1
-1848	220	10	5	.47	10	1000	480	N/A	48	1
-19	220	10	2	1.0	10	400	120	N/A	24	1
-20	100	10	2	2.0	20	600	250	N/A	18	1
-21	10	10	5	1.0	10	1000	480	N/A	24	1

Ballasts



Electrocube has designed and produced a wide variety of fluorescent ballasts for airborne and ground systems installation, as well as selected commercial applications. These lightweight units are offered in 60 Hz and 400 Hz versions, and feature load factor correction, burnout protection and cold weather starting.

Ballasts have been produced for operation on DC and to 15 KHz, for fixed or dimmable circuits. Either leading or lagging power factors may be specified, and burnout protection can be provided against tube rectification. For cold weather applications, ballasts have been designed for normal operation in temperatures to −10°C.

While these ballasts are intended for particular customer needs, the company's modular approach to design and production, and the large inventory of existing designs accumulated over many years, enhances the probability of satisfying new requirements efficiently and economically.

electrocube®
1710 South Del Mar Avenue
San Gabriel, California 91776
Telephone: (213) 283-0511
TWX: 910-589-1609

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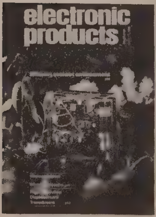

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New From ERIE | Low Profile VARI-Thin®

CERAMIC TRIMMER CAPACITORS

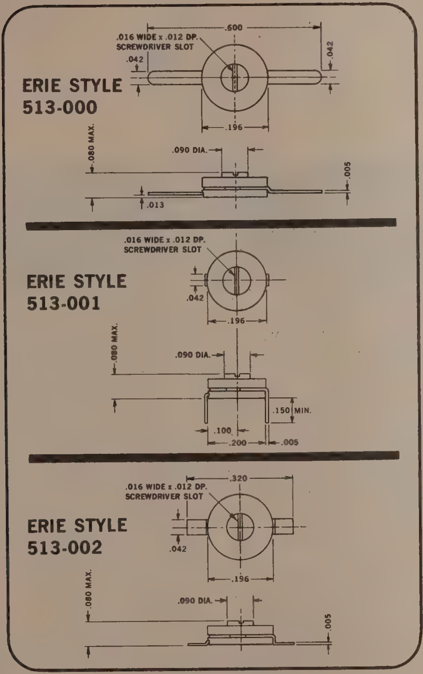
ERIE STYLE 513

3 TIMES SIZE
ACTUAL SIZE

ONLY .196″ (5mm) DIAMETER

Outstanding Features

- Only .196″ (5mm) diameter x .080″ (2mm) high
- Ideal for wide range of products requiring real miniaturized capacitance trimming.
- Operates efficiently at -55°C to +125°C
- Available in your choice of three terminal arrangements.
- Ceramic base seats directly on module substrates or circuit boards. No metal or mechanical attachments protruding beneath the base plane.
- Monobloc® Rotor design offers optimum stability for higher capacitance ranges. Eliminates need to use unstable higher K dielectric materials. Monobloc construction offers greater ruggedness which cannot be achieved when using single plate construction, particularly with fragile Hi-K Dielectric materials.


ERIE STYLE 513-000
.600
.016 WIDE x .012 DP. SCREWDRIVER SLOT
.042
.042
.196
.080 MAX.
.090 DIA.
.005
.013
ERIE STYLE 513-001
.016 WIDE x .012 DP. SCREWDRIVER SLOT
.042
.196
.080 MAX.
.090 DIA.
.150 MIN.
.100
.200
.005
ERIE STYLE 513-002
.320
.016 WIDE x .012 DP. SCREWDRIVER SLOT
.042
.196
.080 MAX.
.090 DIA.
.005

DIMENSIONS IN INCHES
For dimensions .125″, tolerance is ±.005
For dimensions .126″, tolerance is ±.015
Except as noted.

The smallest trimmer now gets smaller . . . this describes ERIE's new Style 513 VARI-Thin Ceramic Trimmer Capacitor. Only .196″ in diameter and .080″ high the ERIE 513 is perfect for electronic quartz watches, avionics apparatus, communications equipment, oscilloscopes, crystal oscillators, crystal filters . . . an almost endless variety of applications requiring miniaturized capacitance trimming. The tiny 513 VARI-Thin is available with three terminal arrangements as shown at left. Today ERIE VARI-Thin Trimmer Capacitors are found in many popular electronic quartz watches . . . principally due to their small size, excellent performance and accurate trimming capability.

SPECIFICATIONS

Working Voltage .... See Table Below
Dielectric Strength .... 2.5 times WVDC for 1 to 5 seconds
Operating Temperature Range .... —55°C to +125°C
Q Factor @ 1MHz .... 500 Min. (Dielectric Code A)
200 Min. (Dielectric Code G)
Torque .... 0.3 to 2.0 oz. in.
Qualification Specification .... ERIE Spec. 513

ORDERING DATA and CAPACITANCE RANGES

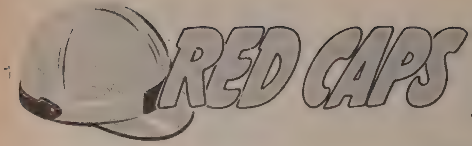
Erie Style (See terminal arrangement at left for last three digit variation.)	Dielectric Type Code	Capacitance Range (pF)	Working Voltage (Vdc) 85°C	125°C
513-000	A	1—5	100	50
513-000	A	2—10	100	50
513-000	A	3.5—20	100	50
513-000	A	5—30	100	50
513-000	G	7—40	25	25

TO ORDER:
Specify ERIE Style Number, Dielectric Code and Capacitance Range.
Call ERIE for other Capacitance Ranges and Terminal Arrangements.

Marking:
E, Cap. Range, Dielectric Type Code.

ERIE TECHNOLOGICAL PRODUCTS, INC.
ERIE, PA. 16512 814/453-5611

ERIE



50 and 100 VOLT CERAMIC CAPACITORS

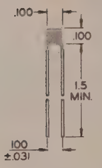
RED CAP dielectrics are manufactured by ERIE's exclusive Monobloc Process® . . . the most modern proven ceramic film technology. This advanced capability affords a broad range of capacitance values and a wide selection of temperature characteristics . . . in the smallest practical sizes . . . with proven reliability.

Lower value capacitors incorporate electrically and mechanically rugged, single plate. High capacitance values are obtained by stacking parallel plates with noble metal electrodes and firing at very high temperatures to form an inherently reliable fuzed monolithic "bloc."

RED CAPS are encapsulated with JET-SEAL, a hard, bright polymeric coating, formulated to provide mechanical and electrical protection under the most severe environmental conditions.

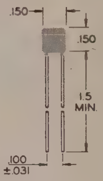
RED CAPS meet or exceed all applicable requirements of Mil-C-20 and Mil-C-11015.

8101



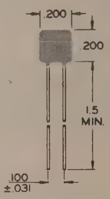
.100 THICK

8111



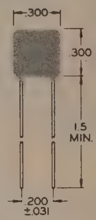
.100 THICK

8121



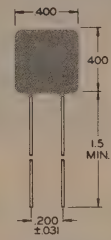
.125 THICK

8131



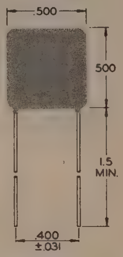
.150 THICK

8141



.150 THICK

8151



.200 THICK

100 Volt
ULTRA STABLE
−55°C to 150°C

PART NUMBER	CAP.	TOL.
8101-100 C0K0 109B	1.	±.1pF
8101-100 C0K0 129B	1.2	±.1pF
8101-100 C0K0 159B	1.5	±.1pF
8101-100 C0K0 189B	1.8	±.1pF
8101-100 C0G0 229C	2.2	±.25pF
8101-100 C0G0 279C	2.7	±.25pF
8101-100 C0G0 339C	3.3	±.25pF
8101-100 C0G0 479D	4.7	±.5pF
8101-100 C0G0 569D	5.6	±.5pF
8101-100 C0G0 689D	6.8	±.5pF
8101-100 C0G0 829D	8.2	±.5pF
8101-100 C0G0 100K	10	±10%
8111-100 C0G0 150K	15	±10%
8111-100 C0G0 220K	22	±10%
8121-100 C0G0 330K	33	±10%
8121-100 C0G0 470K	47	±10%
8121-100 C0G0 680K	68	±10%
8121-100 C0G0 101K	100	±10%
8121-100 C0G0 151K	150	±10%
8121-100 C0G0 221K	220	±10%
8121-100 C0G0 331K	330	±10%
8121-100 C0G0 471K	470	±10%
8121-100 C0G0 681K	680	±10%
8121-100 C0G0 102K	1000	±10%
8131-100 C0G0 152K	1500	±10%
8131-100 C0G0 222K	2200	±10%
8131-100 C0G0 332K	3300	±10%
8141-100 C0G0 472K	4700	±10%
8141-100 C0G0 682K	6800	±10%
8141-100 C0G0 103K	.01	±10%

100 Volt
STABLE
−55°C to 125°C

PART NUMBER	CAP.	TOL.
8101-100 W5R0 151K	150	± 10%
8101-100 W5R0 221K	220	± 10%
8101-100 W5R0 331K	330	± 10%
8111-100 W5R0 471K	470	± 10%
8111-100 W5R0 681K	680	± 10%
8121-100 W5R0 102K	1000	± 10%
8121-100 W5R0 152K	1500	± 10%
8121-100 W5R0 222K	2200	± 10%
8121-100 W5R0 332K	3300	± 10%
8121-100 W5R0 472K	4700	± 10%
8121-100 W5R0 682K	6800	± 10%
8121-100 W5R0 103K	.01	± 10%
8131-100 W5R0 153K	.015	± 10%
8131-100 W5R0 223K	.022	± 10%
8131-100 W5R0 333K	.033	± 10%
8131-100 W5R0 473K	.047	± 10%
8131-100 W5R0 683K	.068	± 10%
8131-100 W5R0 104K	.1	± 10%
8141-100 W5R0 224K	.22	± 10%
8151-100 W5R0 334K	.33	± 10%
8151-100 W5R0 474K	.47	± 10%
8151-100 W5R0 564K	.56	± 10%

50 Volt
STABLE

PART NUMBER	CAP.	TOL.
8141-050 W5R0 334K	.33	± 10%
8141-050 W5R0 474K	.47	± 10%
8151-050 W5R0 684K	.68	± 10%
8151-050 W5R0 105K	1.0	± 10%

100 Volt GENERAL PURPOSE −55°C to 85°C			50 Volt GENERAL PURPOSE −55°C to 85°C
PART NUMBER	CAP.	TOL.	PART NUMBER
8101-100-651-471M	470	± 20%	8101-050-651-471M
8101-100-651-681M	680	± 20%	8101-050-651-681M
8101-100-651-102M	1000	± 20%	8101-050-651-102M
8101-100-651-152M	1500	± 20%	8101-050-651-152M
8111-100-651-182M	1800	± 20%	8111-050-651-182M
8111-100-651-222M	2200	± 20%	8111-050-651-222M
8111-100-651-272M	2700	± 20%	8111-050-651-272M
8111-100-651-332M	3300	± 20%	8111-050-651-332M
8121-100-651-472M	4700	± 20%	8121-050-651-472M
8121-100-651-682M	6800	± 20%	8121-050-651-682M
8121-100-651-103M	.01	± 20%	8121-050-651-103M
8121-100-651-153M	.015	± 20%	8121-050-651-153M
8121-100-651-223M	.022	± 20%	8121-050-651-223M
8121-100 651-273M	.027	± 20%	8121-050-651-273M
8121-100-651-333M	.033	± 20%	8121-050-651-333M
8121-100-651-473M	.047	± 20%	8121-050-651-473M
8121-100-651-683M	.068	± 20%	8121-050-651-683M
8131-100-651-104M	.1	± 20%	8121-050-651-104M
	.1	± 20%	8131-050-651-104M
8131-100-651-154M	.15	± 20%	8121-050-651-154M
8131-100-651-224M	.22	± 20%	8131-050-651-224M
8131-100-651-274M	.27	± 20%	
8131-100-651-334M	.33	± 20%	8131-050-651-334M
8131-100-651-474M	.47	± 20%	8131-050-651-474M
8141-100-651-684M	.68	± 20%	8131-050-651-684M
8141-100-651-105M	1.0	± 20%	8131-050-651-105M
8151-100-651-155M	1.5	± 20%	8141-050-651-155M
8151-100-651-225M	2.2	± 20%	8141-050-651-225M
	3.3	± 20%	8151-050-651-335M
	4.7	± 20%	8151-050-651-475M

ERIE TECHNOLOGICAL PRODUCTS, INC., ERIE, PA. 16512 814/453-5611

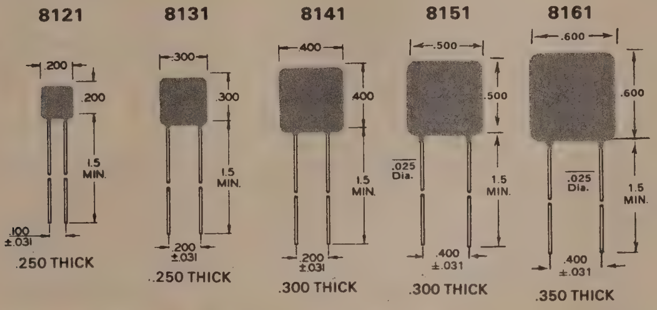
RED CAPS 500 VOLT ERIE

CERAMIC CAPACITORS

Erie High Voltage Red Caps are designed for applications where compactness and light weight are critical. Where higher voltages are required than are available in standard monolithic capacitors. Where replacement for larger size mica capacitors is advantageous. Where reliability of standard dual capacitors is not sufficient.

The range of temperature characteristics available adapts these capacitors from the ultra stable requirements of tuned circuits to the general purpose needs for coupling and by-passing. Filter Networks, Power Supplies, Transmitters, and more ideal applications for Erie High Voltage Red Cap Ceramic Capacitors.

These small size, very reliable 500 Volt Capacitors are available in a full range of capacitance values. Red Caps are manufactured by Erie's exclusive Monobloc Process® . . . a modern, advanced ceramic film technology. They feature . . . high insulation resistance, shock resistance, small size, and Jet Seal encapsulant . . . a hard, bright polymeric coating.



500 Volt ULTRA STABLE —55°C to 150°C

PART NUMBER	CAP.	TOL.
8121-500 COGO 100D	10	± .5 pF
8121-500 COGO 150J	15	5%
8121-500 COGO 220J	22	5%
8121-500 COGO 330J	33	5%
8121-500 COGO 470J	47	5%
8121-500 COGO 680J	68	5%
8121-500 COGO 101J	100	5%
8121-500 COGO 151J	150	5%
8131-500 COGO 221J	220	5%
8131-500 COGO 331J	330	5%
8131-500 COGO 471J	470	5%
8131-500 COGO 681J	680	5%
8131-500 COGO 102J	1000	5%
8141-500 COGO 152J	1500	5%
8141-500 COGO 222J	2200	5%
8141-500 COGO 332J	3300	5%
8151-500 COGO 472J	4700	5%
8161-500 COGO 682J	6800	5%
8161-500 COGO 103J	.01	5%

500 Volt STABLE —55°C to 125°C

PART NUMBER	CAP.	TOL.
8121-500 W5RO 102K	1000	10%
8121-500 W5RO 152K	1500	10%
8121-500 W5RO 222K	2200	10%
8121-500 W5RO 332K	3300	10%
8121-500 W5RO 472K	4700	10%
8121-500 W5RO 682K	6800	10%
8131-500 W5RO 103K	.01	10%
8131-500 W5RO 153K	.015	10%
8131-500 W5RO 233K	.022	10%
8131-500 W5RO 333K	.033	10%
8141-500 W5RO 473K	.047	10%
8151-500 W5RO 683K	.068	10%
8151-500 W5RO 104K	.1	10%
8161-500 W5RO 224K	.22	10%

500 Volt GENERAL PURPOSE —55°C to 85°C

PART NUMBER	CAP.	TOL.
8121-500 651 222M	2200	20%
8121-500 651 332M	3300	20%
8121-500 651 472M	4700	20%
8121-500 651 682M	6800	20%
8121-500 651 103M	.01	20%
8131-500 651 153M	.015	20%
8131-500 651 223M	.022	20%
8131-500 651 273M	.027	20%
8131-500 651 333M	.033	20%
8131-500 651 473M	.047	20%
8131-500 651 683M	.068	20%
8141-500 651 104M	.1	20%
8141-500 651 154M	.15	20%
8151-500 651 224M	.22	20%
8151-500 651 334M	.33	20%
8161-500 651 474M	.47	20%

ERIE TECHNOLOGICAL PRODUCTS, INC., ERIE, PA. 16512 814/453-5611

F-DYNE ELECTRONICS CO.
449 HOWARD AVENUE
BRIDGEPORT, Conn. 06605
(203) 367-6431

MINIATURE FILM DIELECTRIC CAPACITORS

ALL DIELECTRICS / ALL CASE STYLES

DIELECTRICS AND CHARACTERISTICS

POLYESTER (MYLAR) FOIL

Cap. Range: .0003-10 mfds
Volt. Range: 50-2000 vdc
Temp. Range: −55 to 125°C
IR: 50 K (meg) (mfds) or 100 K megs
DF: .75% max.

METALLIZED POLYESTER

Cap. Range: .01-50 mfds
Volt. Range: 50 vdc-10 kvdc
Temp. Range: −55 to 125°C
IR: 25 k (meg) (mfds) or 50 K megs
DF: 1% max.

POLYCARBONATE FOIL

Cap. Range: .0003-5 mfds
Volt. Range: 25-1000 vdc
Temp. Range: −55 to 125°C
IR: 75 K (meg) (mfds) or 500 K megs
DF: .3% max.

METALLIZED POLYCARBONATE

Cap. Range: .01-50 mfds
Volt. Range: 50-1000 vdc
Temp. Range: −55 to 125°C
IR: 30 K (meg) (mfds) or 150 K megs
DF: .3% max.

POLYPROPYLENE FOIL

Cap. Range: .0003-5 mfds
Volt. Range: 50-1000 vdc
Temp. Range: −55 to 105°C
IR: 100 K (meg) (mfds) or 500 K megs
DF: .1% max.

METALLIZED POLYPROPYLENE

Cap. Range: .01-50 mfds
Volt. Range: 50 V-10,000 vdc
Temp. Range: −55 to 105°C
IR: 50 K (meg) (mfds) or 100 K megs
DF: .2% max.

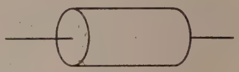
TEFLON

Cap. Range: .001-5 mfd
Volt. Range: 50-600 vdc
Temp. Range: −55 to + 160°C
IR: 1000 k (meg) (mfds) or 2000 K megs
DF: .01% max

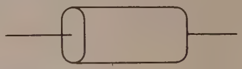
POLYSTYRENE FOIL

Cap. Range: .0005-5 mfds
Volt. Range: 50-600 vdc
Temp. Range: −55 to 85°C
IR: 100 K (meg) (mfds) or 500 K megs
DF: 1% max.

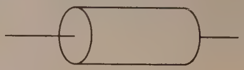
STANDARD CASE STYLES



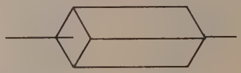
STYLE 1
WRAP & FILL-ROUND



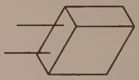
STYLE 2
WRAP & FILL-FLAT



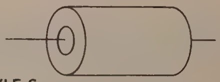
STYLE 3
EPOXY OR PHENOLIC-ROUND



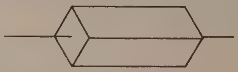
STYLE 4
EPOXY RECTANGULAR-AXIAL



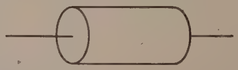
STYLE 5
EPOXY RECTANGULAR-RADIAL



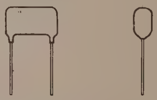
STYLE 6
METAL CASE ROUND-AXIAL



STYLE 7
METAL CASE RECTANGULAR

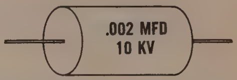


STYLE 8
STEATITE OR CERAMIC

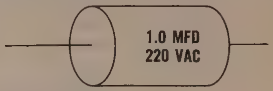


STYLE D
DIP COATED-RADIAL

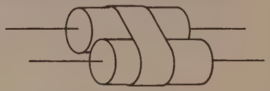
CUSTOM DESIGNS



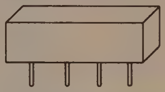
HIGH VOLTAGE



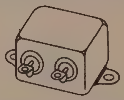
AC DESIGNS



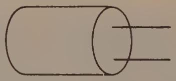
MATCHED CAPACITORS



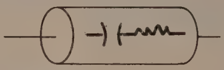
MULTIPLE CAPACITOR ASSEMBLIES



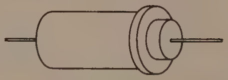
METAL CASED RECTANGULAR



PC TUBULAR



R/C NETWORKS



FEED THRU ASSEMBLIES

TEMPERATURE COMPENSATING
""O" TC and controlled capacitance change for stability or matching with resistors and pot cores

F-Dyne precision film capacitors are readily available in 10 pf capacitance increments, i.e., 430 pf, 440 pf or .18763, .18764, etc. Tolerances may be as low as .25% or .1% with matched pairs.
New—West Coast customers may call Southern Electronics Co., 726 South Flower Street, Burbank, Calif. 91502 (213) 845-2458 for information or service. Southern Electronics is wholly owned by F-Dyne Electronics

F-DYNE ELECTRONICS CO.
449 HOWARD AVENUE
BRIDGEPORT, Conn. 06605
(203) 367-6431

MINIATURE FILM DIELECTRIC CAPACITORS

ALL DIELECTRICS / ALL CASE STYLES

POPULAR STYLES

MYLAR FOIL

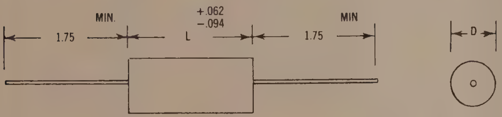
WRAP AND FILL ROUND/AXIAL LEAD

	PE 13		PE 12		PE 11		PE 11		PE 11		PE 11		PE 11	
	80 VDC		100 VDC		100 VDC		200 VDC		400 VDC		600 VDC		1000 VDC	
CAPACITANCE	D	L	D	L	D	L	D	L	D	L	D	L	D	L
.0001	.156	.375	.187	.375	.187	.500	.187	.500	.187	.500	.203	.687	.250	.687
.00027	.156	.375	.187	.375	.187	.500	.187	.500	.187	.500	.203	.687	.250	.687
.00033	.156	.375	.187	.375	.187	.500	.187	.500	.187	.500	.203	.687	.250	.687
.00047	.156	.375	.187	.375	.187	.500	.187	.500	.187	.500	.203	.687	.250	.687
.00056	.156	.375	.187	.375	.187	.500	.187	.500	.187	.500	.203	.687	.250	.687
.00068	.156	.375	.187	.375	.187	.500	.187	.500	.187	.500	.203	.687	.250	.687
.00082	.156	.375	.187	.375	.187	.500	.187	.500	.187	.500	.203	.687	.250	.687
.0010	.156	.375	.187	.375	.187	.500	.187	.500	.203	.500	.203	.687	.250	.687
.0015	.156	.375	.187	.375	.187	.500	.187	.500	.203	.500	.203	.687	.250	.687
.0022	.156	.375	.187	.375	.187	.500	.187	.500	.203	.500	.203	.687	.250	.687
.0033	.156	.375	.187	.375	.187	.500	.187	.500	.203	.500	.203	.687	.265	.687
.0047	.156	.375	.187	.375	.187	.500	.187	.500	.203	.500	.203	.687	.296	.687
.0068	.156	.375	.187	.375	.187	.500	.187	.500	.203	.500	.203	.687	.312	.687
.0082	.156	.375	.187	.375	.187	.500	.187	.500	.234	.500	.234	.687	.312	.812
.010	.171	.375	.187	.375	.187	.500	.187	.500	.250	.500	.266	.687	.359	.812
.012	.171	.375	.187	.437	.187	.500	.187	.500	.250	.500	.297	.687	.375	.812
.015	.187	.375	.187	.437	.187	.500	.187	.500	.250	.500	.281	.687	.421	.812
.022	.203	.375	.187	.500	.203	.500	.203	.500	.250	.750	.328	.687	.421	.937
.033	.218	.437	.203	.500	.218	.500	.218	.500	.296	.750	.344	.937	.500	.937
.039	.218	.437	.218	.500	.218	.625	.218	.625	.265	.875	.375	.937	.546	.937
.047	.234	.500	.250	.500	.234	.625	.234	.625	.281	.875	.406	.937	.531	1.062
.056	.234	.500	.265	.500	.250	.625	.250	.625	.312	.875	.437	.937	.562	1.062
.068	.250	.500	.281	.500	.265	.625	.265	.625	.328	.875	.469	.937	.562	1.187
.082	.265	.500	.296	.500	.296	.625	.296	.625	.359	1.062	.469	1.062	.609	1.187
.10	.296	.500	.296	.500	.281	.750	.281	.750	.390	1.062	.517	1.062	.578	1.562
.12	.312	.500	.328	.625	.296	.750	.296	.750	.343	1.312	.562	1.062	.640	1.562
.15	.296	.625	.243	.625	.328	.750	.328	.750	.375	1.312	.578	1.187	.687	1.562
.18	.312	.625	.359	.625	.296	1.062	.375	1.062	.406	1.312	.609	1.187	.765	1.562
.22	.343	.625	.293	.875	.328	1.062	.406	1.062	.437	1.312	.609	1.562	.750	1.687
.27	.296	.875	.375	.875	.343	1.187	.453	1.187	.468	1.687	.656	1.562	.828	1.687
.33	.328	.875	.406	.875	.375	1.187	.484	1.187	.500	1.687	.734	1.562	.921	1.687
.39	.296	1.187	.343	1.187	.406	1.187	.437	1.187	.546	1.687	.719	1.687	.984	1.687
.47	.343	1.187	.375	1.187	.406	1.312	.484	1.312	.609	1.687	.781	1.687	.984	1.937
.56	.359	1.187	.406	1.187	.453	1.312	.531	1.312	.641	1.687	.844	1.687	1.062	1.937
.68	.375	1.187	.453	1.187	.484	1.312	.531	1.687	.703	1.687	.937	1.687	1.156	1.937
.82	.406	1.187	.500	1.187	.515	1.312	.562	1.687	.766	1.687	.937	1.937	1.140	2.187
1.00	.468	1.187	.562	1.187	.515	1.562	.594	1.687	.844	1.687	1.125	1.937	1.375	2.187
1.25			.500	1.437	.562	1.562	.625	1.687	.875	1.937	1.250	1.937		
1.50			.540	1.437	.593	1.687	.671	1.687	.953	1.937	1.281	2.187		
1.80			.565	1.437	.656	1.687	.734	1.687	.968	2.250	1.391	2.187		
2.00			.593	1.562	.718	1.687	.750	1.687	1.109	2.250	1.438	2.187		
3.00			.734	1.562	1.000	1.812	1.031	1.937	1.344	2.250	1.578	2.500		
4.00			.718	1.812	1.187	2.062	1.062	2.187	1.344	2.500	1.718	2.750		
5.00			.812	1.812	1.250	2.250	1.281	2.187	1.500	2.500	1.828	3.000		

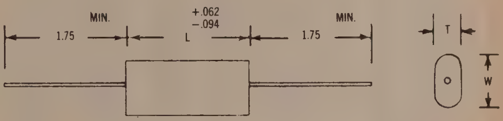
Catalog Available On Request

Lower capacitance values, higher capacitance values and non-standard capacitance values are available. Alternate case configurations are also available where space problems are encountered.

ROUND DIMENSIONAL OUTLINE



FLAT DIMENSIONAL OUTLINE



LEAD # GAGE

AWG	Diameter
#24	.250 & under
#22	.265 thru .437
#20	.453 thru .812
#18	.828 & over

D TOLERANCE

.249 & under	±.032
.250 thru .500	±.046
.501 thru 1.00	±.062
1.015 & over	±.093

LEAD GAGE

#24 AWG for T .140 & under
#22 AWG for T .156 thru .312
#20 AWG for T .328 thru .812
#18 AWG for T .828 & over

T & W TOLERANCE

.249 & under	±.032
.250 thru .500	±.046
.501 thru 1.00	±.062
1.015 & over	±.093

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ALL DIELECTRICS / ALL CASE STYLES

POPULAR STYLES

MYLAR FOIL

WRAP AND FILL FLAT/AXIAL LEAD

	PE 23			PE 22			PE 21			PE 21		
	50 & 100 VDC			100 VDC			100 VDC			200 VDC		
CAPACITANCE	T	W	L	T	W	L	T	W	L	T	W	L
.00033				.109	.218	.375	.125	.218	.500	.125	.218	.500
.00047				.109	.218	.375	.125	.218	.500	.125	.218	.500
.00056				.109	.218	.375	.125	.218	.500	.125	.218	.500
.00068				.109	.218	.375	.125	.218	.500	.125	.218	.500
.00082				.109	.218	.375	.125	.218	.500	.125	.218	.500
.0010				.109	.218	.375	.125	.218	.500	.125	.218	.500
.0015				.109	.218	.375	.125	.218	.500	.125	.218	.500
.0022				.109	.218	.375	.125	.218	.500	.125	.218	.500
.0033				.109	.218	.375	.125	.218	.500	.125	.218	.500
.0047				.109	.218	.375	.125	.218	.500	.125	.218	.500
.0068				.109	.218	.375	.125	.218	.500	.125	.218	.500
.0082				.109	.218	.375	.125	.218	.500	.125	.218	.500
.01				.109	.218	.375	.125	.218	.500	.125	.218	.500
.012				.109	.218	.375	.125	.218	.500	.125	.218	.500
.015				.109	.218	.375	.125	.218	.500	.125	.218	.500
.022	.109	.218	.375	.125	.234	.375	.140	.250	.500	.140	.250	.500
.033	.125	.234	.375	.125	.234	.375	.156	.265	.500	.156	.265	.500
.047	.109	.218	.500	.125	.234	.500	.156	.265	.625	.156	.265	.625
.056	.125	.234	.500	.140	.250	.500	.171	.281	.625	.171	.281	.625
.068	.140	.250	.500	.156	.265	.500	.203	.296	.625	.203	.296	.625
.082	.156	.265	.500	.203	.312	.500	.234	.328	.625	.234	.328	.625
.10	.189	.196	.500	.218	.328	.500	.203	.328	.750	.203	.328	.625
.12	.218	.328	.500	.234	.343	.500	.218	.343	.750	.218	.343	.750
.15	.218	.343	.625	.218	.328	.625	.250	.375	.750	.250	.375	.750
.18	.234	.328	.625	.296	.375	.625	.218	.343	1.062	.296	.421	1.062
.22	.250	.343	.625	.218	.343	.875	.250	.375	1.062	.328	.453	1.062
.27	.218	.343	.875	.234	.359	.875	.265	.390	1.187	.437	.562	1.187
.33	.234	.359	.875	.296	.421	.875	.296	.421	1.125	.406	.531	1.187
.39	.187	.312	1.187	.265	.390	1.187	.328	.453	1.187	.359	.484	1.312
.47	.218	.343	1.187	.296	.421	1.187	.328	.453	1.312	.406	.531	1.312
.56	.265	.390	1.187	.328	.453	1.187	.375	.500	1.312	.425	.591	1.312
.68	.281	.406	1.187	.375	.500	1.187	.406	.531	1.312	.359	.515	1.687
.82	.312	.437	1.187	.421	.546	1.187	.437	.562	1.312	.406	.562	1.687
1.00	.359	.484	1.187	.484	.609	1.187	.406	.546	1.562	.468	.640	1.687
1.25						1.437	.453	.625	1.562	.531	.687	1.687

	PE 21			PE 21			PE 21			
	400 VDC			600 VDC			1000 VDC			
CAPACITANCE	T	W	L	T	W	L	T	W	L	
.00033	.125	.250	.500	.125	.250	.687	.187	.296	.687	
.00047	.125	.250	.500	.125	.250	.687	.187	.296	.687	
.00056	.125	.250	.500	.125	.250	.687	.187	.296	.687	
.00068	.125	.250	.500	.125	.250	.687	.187	.296	.687	
.00082	.125	.250	.500	.125	.250	.687	.187	.296	.687	
.0010	.125	.250	.500	.125	.250	.687	.187	.296	.687	
.0015	.125	.250	.500	.125	.250	.687	.187	.312	.687	
.0022	.125	.250	.500	.125	.250	.687	.218	.343	.687	
.0033	.125	.250	.500	.125	.250	.687	.243	.359	.687	
.0047	.125	.250	.500	.156	.281	.687	.243	.359	.812	
.0068	.156	.287	.500	.171	.296	.687	.250	.375	.812	
.0082	.156	.287	.500	.187	.312	.687	.265	.390	.812	
.01	.187	.287	.500	.187	.312	.687	.281	.406	.812	
.012	.187	.287	.500	.218	.343	.687	.296	.421	.812	
.015	.187	.287	.500	.203	.328	.687	.343	.468	.812	
.022	.187	.287	.750	.250	.375	.687	.359	.484	.937	
.033	.218	.343	.750	.265	.390	.937	.437	.553	.937	
.047	.203	.328	.875	.296	.437	.937	.453	.578	1.062	
.056	.234	.359	.875	.359	.484	.937	.484	.609	1.062	
.068	.250	.375	.875	.390	.515	.937	.484	.609	1.187	
.082	.281	.406	1.062	.390	.515	1.062	.531	.656	1.187	
.10	.312	.437	1.062	.437	.578	1.062	.484	.640	1.437	
.12	.343	.609	1.062	.484	.609	1.187	.546	.703	1.437	
.15	.296	.437	1.312	.500	.625	1.187	.593	.750	1.437	
.18	.328	.453	1.312	.437	.562	1.187	.671	.828	1.437	
.22	.359	.484	1.312	.500	.671	1.437	.562	.734	1.687	
.27	.406	.609	1.437	.562	.718	1.437	.656	.812	1.687	
.33	.406	.609	1.687	.625	.796	1.437	.734	.906	1.687	
.39	.437	.859	1.687	.625	.796	1.687	.812	.968	1.687	
.47	.453	.859	1.687	.687	.843	1.687	.812	1.093	1.937	
.56	.546	.703	1.687	.750	.903	1.687	.875	1.187	1.937	
.68	.609	.765	1.687	.843	1.000	1.687	.968	1.250	1.937	
.82	.687	.828	1.687	.750	1.062	1.937	.968	1.250	2.187	
1.00	.750	.906	1.687	.937	1.250	1.937	1.187	1.500	2.187	
1.25	.703	.984	1.937	1.062	1.359	1.937				
1.50	.781	1.093	1.937	1.093	1.390	2.187				
2.00	.937	1.218	2.250	1.250	1.562	2.187				
4.00	1.187	1.500	2.250	1.531	1.828	2.750				
5.00	1.312	1.625	2.500	1.687	1.937	3.000				

Lower capacitance values, higher capacitance values and non-standard capacitance values are available.
Alternate case configurations are also available where space problems are encountered.

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MINIATURE FILM DIELECTRIC CAPACITORS
ALL DIELECTRICS / ALL CASE STYLES

POLYCARBONATE FOIL
WRAP & FILL/AXIAL LEAD

POPULAR STYLES

ROUND	PC 12		PC 11		PC 11		PC 11		PC 11		PC 11	
	50-80 VDC		100 VDC		200 VDC		400 VDC		600 VDC		1000 VDC	
CAPACITANCE	D	L	D	L	D	L	D	L	D	L	D	L
.0010	.187	.375	.187	.375	.187	.375	.187	.375	.187	.625	.234	.812
.0012	.187	.375	.187	.375	.187	.375	.187	.375	.187	.625	.250	.812
.0015	.187	.375	.187	.375	.187	.375	.187	.375	.187	.625	.281	.812
.0022	.187	.375	.187	.375	.187	.375	.187	.500	.187	.625	.343	.812
.0033	.187	.375	.187	.375	.203	.375	.203	.500	.203	.625	.359	.937
.0039	.187	.375	.187	.375	.218	.500	.219	.625	.218	.625	.375	.937
.0047	.187	.375	.187	.375	.234	.375	.234	.625	.250	.625	.421	.937
.0056	.187	.375	.187	.375	.187	.500	.250	.625	.281	.625	.359	1.187
.0068	.187	.375	.187	.375	.187	.500	.234	.750	.312	.625	.375	1.187
.0082	.187	.375	.187	.375	.187	.500	.250	.750	.312	.750	.421	1.187
.010	.187	.375	.187	.375	.203	.500	.281	.750	.343	.750	.453	1.187
.012	.187	.375	.187	.500	.203	.500	.312	.750	.375	.750	.500	1.187
.015	.203	.375	.187	.500	.234	.500	.328	.750	.437	.875	.468	1.437
.018	.187	.500	.203	.500	.250	.500	.343	.750	.421	.062	.500	1.437
.022	.187	.500	.203	.500	.250	.500	.343	.875	.437	.062	.578	1.437
.033	.203	.500	.218	.500	.234	.750	.406	.875	.500	1.187	.687	1.437
.039	.234	.500	.218	.625	.265	.750	.453	.875	.562	1.187	.656	1.687
.047	.250	.500	.234	.625	.296	.750	.453	1.187	.562	1.437	.718	1.687
.056	.265	.500	.250	.625	.312	.750	.484	1.187	.625	1.437	.781	1.687
.068	.281	.500	.265	.625	.281	1.062	.484	1.312	.625	1.562	.859	1.687
.082	.296	.500	.296	.625	.312	1.062	.531	1.312	.687	1.562	.859	1.937
.10	.296	.500	.281	.750	.345	1.062	.578	1.312	.687	1.687	.937	1.937
.12	.312	.625	.296	.750	.375	1.062	.625	1.312	.750	1.687	1.031	1.937
.15	.328	.625	.343	.750	.359	1.312	.703	1.312	.812	1.687	1.062	2.25
.18	.343	.625	.312	1.062	.390	1.312	.750	1.437	.843	1.687	1.156	2.25
.22			.343	1.062	.437	1.312	.828	1.437	.906	1.687	1.250	2.25
.27			.390	1.312	.453	1.312	.796	1.687	.931	2.00	1.312	2.50
.33			.437	1.312	.468	1.312	.890	1.687	1.031	2.00	1.451	2.50
.39			.468	1.312	.562	1.312	.953	1.687	1.125	2.00	1.560	2.75
.47			.484	1.312	.562	1.312	.750	1.937	1.250	2.00	1.656	2.75
.56			.500	1.312	.593	1.312						
.68			.500	1.312								
.82			.531	1.437								
1.00			.578	1.437								

FLAT	PC 21														
	50-80 VDC			100 VDC			200 VDC			400 VDC			600 VDC		
CAPACITANCE	T	W	L	T	W	L	T	W	L	T	W	L	T	W	L
.0010	.109	.218	.375	.109	.218	.375	.109	.218	.375	.109	.218	.500	.109	.218	.625
.0012	.109	.218	.375	.109	.218	.375	.109	.218	.375	.109	.218	.500	.109	.218	.625
.0015	.109	.218	.375	.109	.218	.375	.109	.218	.375	.109	.218	.500	.109	.218	.625
.0018	.109	.218	.375	.109	.218	.375	.109	.218	.375	.109	.218	.500	.109	.218	.625
.0022	.109	.218	.375	.109	.218	.375	.109	.218	.375	.109	.218	.500	.109	.218	.625
.0033	.109	.218	.375	.109	.218	.375	.109	.218	.375	.125	.250	.500	.143	.234	.625
.0039	.109	.218	.375	.109	.218	.375	.109	.218	.500	.140	.265	.625	.171	.265	.625
.0047	.109	.218	.375	.109	.218	.375	.109	.218	.500	.156	.281	.625	.203	.296	.625
.0056	.109	.218	.375	.109	.218	.375	.109	.218	.500	.171	.296	.625	.234	.328	.625
.0068	.109	.218	.375	.109	.218	.375	.109	.218	.500	.156	.281	.750	.250	.343	.625
.0082	.109	.218	.375	.109	.218	.375	.109	.218	.500	.171	.296	.750	.234	.359	.750
.010	.109	.218	.375	.109	.218	.375	.109	.218	.500	.203	.328	.750	.265	.390	.750
.012	.109	.218	.375	.109	.218	.375	.109	.218	.500	.203	.328	.750	.296	.421	.750
.015	.109	.218	.375	.109	.218	.375	.156	.265	.500	.250	.375	.750	.359	.484	.875
.018	.125	.218	.375	.125	.250	.500	.156	.265	.500	.250	.375	.750	.343	.468	1.062
.022	.125	.218	.375	.125	.250	.500	.171	.281	.500	.296	.421	.875	.359	.484	1.062
.027	.125	.234	.500	.156	.235	.500	.140	.250	.750	.328	.453	.875	.375	.500	1.062
.033	.125	.234	.500	.156	.235	.500	.156	.265	.750	.328	.453	.875	.421	.546	1.187
.039	.109	.218	.625	.171	.265	.625	.187	.296	.750	.375	.500	.875	.484	.609	1.187
.047	.109	.218	.625	.187	.281	.625	.218	.328	.750	.343	.515	1.187	.484	.609	1.437
.056	.125	.234	.625	.187	.281	.625	.234	.343	.750	.375	.546	1.187	.546	.671	1.437
.068	.140	.250	.625	.203	.296	.625	.203	.312	1.062	.375	.546	1.312	.500	.703	1.562
.082	.156	.265	.625	.218	.312	.625	.234	.343	1.062	.421	.593	1.312	.562	.750	1.562
.10	.171	.281	.625	.234	.328	.750	.265	.375	1.062	.468	.640	1.312	.562	.750	1.687
.12	.203	.312	.625	.234	.328	.750	.296	.406	1.062	.515	.687	1.312	.594	.796	1.687
.15	.234	.343	.625	.283	.375	.750	.250	.421	1.312	.578	.703	1.312	.625	.828	1.687
.18	.250	.359	.625	.250	.375	1.062	.281	.453	1.312	.671	.796	1.437	.718	.921	1.687
.22				.283	.407	1.062	.328	.500	1.312	.750	.875	1.437	.781	.984	1.687
.27				.343	.468	1.312	.343	.531	1.312	.718	.843	1.687	.812	1.000	2.00
.33				.359	.484	1.312	.453	.625	1.312	.812	.937	1.687	.906	1.109	2.00
.39				.390	.515	1.312	.484	.609	1.312	875	1.00	1.687	1.125	1.343	2.00
.47				.406	.531	1.312	.500	.625	1.312						
.56				.421	.546	1.312	.515	.640	1.312						
.68				.437	.562	1.437									
.82				.453	.578	1.437									
1.00				.500	.625	1.437									

Lower capacitance values, higher capacitance values and non-standard capacitance values are available.
Alternate case configurations are also available where space problems are encountered.

Catalog Available On Request

CAPACITORS

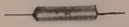
29F

29F
(Rectangular)

16K

69F, 69F2000
69F3000, 69F4000

69F
(Rectangular)



62F, 69F900

86F, 88F, 92F

84F

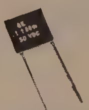
Application	Catalog Type	Description	Voltage Range	UF Range	Temperature Range	Bulletin Reference	Market Usage
For polar and nonpolar coupling, filtering, decoupling, bypass, energy storage and timing in military and high-performance industrial amplifiers, transmitters, receivers, servo systems, and navigation systems.	29F	Standard and high-voltage tantalum foil; MIL-C-3965: **CL20, CL21, CL22, CL23, CL24, CL25, CL26, CL27, CL30, CL31, CL32, CL33, CL34, CL35, CL36, CL37, CL51, CL52, CL53, CL54, CL70, CL71, CL72, CL73.** Tubular and rectangular	Up to 450 VDC	0.15 to 3500 μf	−55C to 85C or 125C	GEP-1812	Military, Industrial
High-reliability type for military or aerospace use where hermetic seal and extreme reliability are prime factors.	16K	Hermetic seal tantalum foil; MIL-C-39006: CLR25, CLR27, CLR35, CLR37.	Up to 150 VDC	0.15 to 580 μf	−55C to 125C	GEP-1858	Military
For polar applications where no reverse voltage is expected—coupling, decoupling, filtering, bypass, energy storage and timing in military and high-performance industrial amplifiers, transmitters, receivers, servo systems, and navigation systems.	69F	Tantalum porous anode; MIL-C-3965: CL64, CL65, CL55 Tubular and rectangular	Up to 125 VDC	1.7 to 2400 μf	−55C to 125C	GEP-1814	Military, Industrial
	69F2000	Extended capacitance tantalum porous anode. Tubular only.	Up to 125 VDC	22 to 1800 μf	−55C to 125C	GEP-1842	Military Industrial
For polar applications where no reverse voltage is expected — coupling, decoupling, filtering, bypass, energy storage and timing in military and high-performance industrial equipment for severe environmental conditions requiring hermetic seal.	69F3000	Glass-to-metal hermetic seal tantalum porous anode; MIL-C-3965: CL66, CL67.	Up to 125 VDC	1.7 to 560 μf	−55C to 125C	GEP-1846	Military Industrial
	69F4000	Glass-to-tantalum hermetic seal tantalum porous anode; MIL-C-39006: CLR65.	Up to 125 VDC	1.7 to 560 μf	−55C to 125C	GEP-1857	Military
For polar applications where no reverse voltage is expected—coupling, filtering, decoupling, bypass, energy storage and timing in industrial and entertainment amplifiers, transmitters, receivers, servo systems, and navigation systems, within temperature capabilities.	62F	Porous anode subminiature tantalum.	Up to 60 VDC	0.1 to 325 μf	−55C to 85C	GEC-1840	Industrial
	69F900	Subminiature tantalum porous anode	Up to 60 VDC	3.3 to 450 μf	−55C to 85C	GEP-1841	Industrial
For bulk filtering and energy storage in military and high-performance or standard industrial power supplies, including computer usage and welding equipment.	86F	High performance, high volumetric efficiency	Up to 450 VDC	75 to 540,000 μf	−40C to 65C, 85C	GEC-1813	Industrial
	88F 92F	Long life, high ripple current	Up to 150 VDC	170 to 180,000 μf	−40C to 85C	GEP-1861 GEP-1860	Industrial
For filtering, bypass, decoupling, and coupling in entertainment-type radio, TV, high-fidelity systems, and in industrial instruments and test equipment.	84F	Tubular aluminum electrolytic	Up to 450 VDC	2 to 18,000 μf	−40C to 85C	Consult GE Sales Engineer	Industrial, Entertainment

For complete information contact your nearby GE Sales Office or write to General Electric Co., Section 998-2, Schenectady, N. Y. 12345.

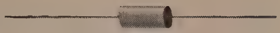
GENERAL ELECTRIC

CAPACITORS

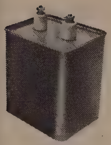
75F


65F

61F, 63F, 74F51, AE

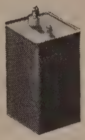

BA, 74F01

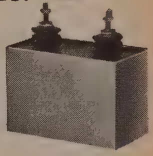
23F


23F

28F

26F, 45F


14F


14F

Application	Catalog Type	Description	Voltage Range	UF Range	Temperature Range	Bulletin Reference	Market Usage
For circuits in test, measurement, control, and communications equipment of all types, where high-quality film-foil units are an economic choice.	75F	Polyester film-foil. Epoxy-encapsulated. Welded radial leads. Units have mounting feet and precise dimensions, for high-density packaging.	50 to 600V	.0010 to 1 µf	−55C to 125C	GEP-1816	Industrial
For low-voltage printed-circuit board applications where board space is at a premium.	65F	Polyester film and aluminum foil roll, compressed and packaged in a regular epoxy case with radial leads.	50V only	.0010 to 1.5 µf	−55C to 85C	GEC-1834	Industrial
For use where size, weight, cost, and reliability give advantage over metal-clad tubulars, molded, or ceramic case units.	61F 63F AE	Polyester film-foil roll, wrap and -pot, with axial leads. 63F meets performance requirements of MIL-C-27287.	Up to 300V	.0010 to 2 µf	−55C to 125C	GEC-1833 GEP-1853 GEC-1819	Industrial, Military
	74F51	Same as 61F except with polycarbonate film dielectric	100 or 200V	.0010 to 1 µf	−55C to 125C	GEP-1854	Industrial
For manufacturing and test equipment, electronic timers and control, communications equipment, and other forms of industrial electronic equipment where small size is required.	BA	Metallized polyester film roll, wrap-and-pot, with axial leads.	100 or 200V	0.1 to 10 µf	−55C to 125C	GEC-1815	Industrial
	74F01	Same as BA except with metallized polycarbonate film.	200V	0.1 to 10 µf	−55C to 125C	GEP-1855	Industrial
General-purpose d-c capacitors for filtering, blocking, bypass, and arc-suppression in power supplies, control circuits, and other d-c circuit functions.	23F	Paper/Pyranol® in drawn metal cases.	400 to 12,500 VDC,	0.05 to 35 µf	−55C to 85C	Consult GE Sales Engineer	Industrial
Specially designed for such SCR applications as phase control, frequency multipliers and changers, power supply filters, time ratio controls, inverters, and rectifier spike suppression.	28F	Paper, metallized paper, and film dielectrics with very low internal losses and high peak current carrying capability.	200 to 2000 VDC, 115 to 700 VAC	0.25 to 150 µf	−55C to 80C	GEA-8688	Industrial
General-purpose a-c capacitors for motor and transformer applications. New Pyranol II impregnant multiplies life and increases reliability.	45F	Paper/Pyranol II in drawn oval cases.	200 to 720 VAC	0.5 to 55 µf	−30C to 70C	GEA-8691	Industrial
General-purpose a-c capacitors for transformer or motor-run applications in geographical areas where the use of polychlorinated biphenyl (PCB) impregnant is undesirable or prohibited.	26F	Paper/ECONOL* in drawn metal cases. ECONOL is the name of General Electric's new biodegradeable, low-toxicity impregnant. *Trade-mark of General Electric Co.	330 to 660 VAC	0.5 to 55 µf	−55C to 70C	Consult GE Sales Engineer	Industrial
For high-voltage d-c rectifier power supply filters, and high-voltage blocking and bypass in communications, radar and other high-voltage circuits.	14F	Paper/Film oil impregnated in all-welded steel rectangular case of leak-proof construction.	5000 to 20,000 VDC	0.67 to 150 µf	−40C to 105C	GEP-1752	Industrial
For light-duty energy storage-discharge duty, such as photoflash applications.	14F	Paper/Pyranol in fabricated steel cases.	1000 to 10,000 VDC	12.5 to 640 µf	0 to 40C	GEP-1751	Industrial

For complete information contact your nearby GE Sales Office or write to General Electric Co., Section 998-2. Schenectady, N. Y. 12345.

GENERAL ELECTRIC

CAPACITORS

GENERAL ELECTRIC INTERCHANGEABILITY GUIDE

TANTALUM ELECTROLYTIC

TYPE	GE NUMBER	MIL-C-3965E	MIL-C-39006	COMPETITOR EQUIVALENTS			
				SPRAGUE	MALLORY	TANSITOR	CORNELL-DUBILIER
Tantalum Foil 85C Polar, Plain Foil	29F	CL34, 35*		110D	TAF	TPF	TAN
85/125C Polar Plain Foil	29F/16K	CL30, 31	CLR35	120D	TFS	TPF	TAND
85C Non Polar Plain Foil	29F	CL36, 37*		111D	TAF	TPF	TAN
85/125C Non Polar Plain Foil	29F/16K	CL32, 33	CLR37	121D	TFS	TPF	TAND
85C Polar Etched Foil	29F	CL24, 25*		112D	TBF	TEF	TAN
85/125C Polar Etched Foil	29F/16K	CL20, 21, 70, 71	CLR25 CLR71	122D	TFE	TEF	TAND
85C Non Polar Etched Foil	29F	CL26, 27*		113D	TBF	TEF	TAN
85/125C Non Polar Etched Foil	29F/16K	CL22, 23, 72, 73	CLR73	123D	TFE	TEF	TAND
85/125C Package Type KSR	29F 3200	CL51, 52, 53, 54		300D 301D 302D 303D		RE RP	RC53
Tantalum Wet Slug Non Acid, Sub Miniature, Tubular	62F						
Sub Miniature Tubular	69F900			145D 146D	MTP, TAH, TAP, TNT	MW	
85/125C Tubular	69F	CL64, 65	CLR65	109D 130D	TLS	W	TX
Extended Capacitance Tubular	69F2000			109D 130D		UW	TX
Hermetically Sealed Tubular	69F3000	CL66, 67		137D	TLW	WH	TX
Hermetically Sealed Tubular	69F4000		CLR65	138D	TLW	WT	
Packaged Type	69F1100	CL55		202D 211D	TL	RW	RC64

* To MIL-C-3965C only

ALUMINUM ELECTROLYTIC

TYPE	GE NUMBER	COMPETITOR EQUIVALENTS						
		SPRAGUE	MALLORY	SANGAMO	CORNELL-DUBILIER	STM	GENERAL INSTRUMENTS	AEROVOX
A-C Motor Start	35F	9A, 7A	P	MJ	ETW			MDRP
Metal Case Tubular	43F/84F	43-51D, TVA 39D	PFP	MT/MTD, DCM	FAH		CQM, TD/TDL, TM	AFH, PCS
Computer Grade	86F	36D	CGS	DCM	FAH	91C		
Computer Grade	88F	32D	CG	500	UHL			
Computer Grade	92F	602D			UPH			

For complete information contact your nearby Sales Office, or write to General Electric Co., Section 998-2. Schenectady, N. Y. 12345.

GENERAL ELECTRIC

CAPACITORS

GENERAL ELECTRIC INTERCHANGEABILITY GUIDE

FILM DIELECTRIC

TYPE	GE NO.	COMPETITOR EQUIPMENT: SPRAGUE	CORNELL-DUBILIER	TRW	AEROVOX	WEST CAP (SAN FERNANDO ELECT.)	DEARBORN	MIDWEC	MARSHALL IND. (ELECTRON PRODUCTS)	GUDEMAN	ELECTRO CUBE	NYTRONICS	PAKTRON	WESCO
Lectro Film-B Polyester (Mylar) Film Foil	61F	410, 411P	WMF MFP	663UW	V146X	WR, PR, WF68		3	E, EE	338	250	103, 107	WA, WB,	32, 33M
Lectro Film-B Miniature Film Foil Polyester	AE	192P								356				
Lectro Film-B Military Grade (MIL-C-27287) Polyester Film	63F (CTM)	CTM	CTM	643UW (CTM)		CTM	CTM	CTM	CTM	CTM				
Micro Flat Film Foil Polyester	65F	230P		602			LP7R	2B						MW
Black Hawk Polyester	75F	225P	DMF	601PE				2 E3FR				126, 151	MB, MR, MT	
Metalized Polyester Film	BA	430, 431P	MMW	X663	V146Z	WR, WF70	LM66	7	D, DE	363, 364	210			32, 33MM
Polycarbonate Film Foil	74F51	610P	WCR	463UW				6						32 33PC
Metalized Polycarbonate Film	74F01	630, 631P	MCR, MCP	X463UW	K146Z		LP88	12	H		625		MPC	32, 33MPC

POWER AND INDUSTRIAL CAPACITORS
(OIL-FILLED)

DESCRIPTION: VOLTAGE	DIELECTRIC SYSTEM	CASE	GE TYPE NUMBERS	COMPETITOR EQUIPMENTS: SPRAGUE	CORNELL-DUBILIER	AEROVOX	SANGAMO	MALLORY	CSI
DC/AC	PAPER/FOIL	RECTANGULAR	23F	94P, 95P, 137P, 138P, 151P, 152P, 153P, 166P, 167P, 170P, 171P, 265P, 267P	T, TCD, TMK, TR, WA, WAB, WC, WCB, WCT, WU, WUB, WUT, YAB, YCB, YCT	P09, P16, P18	71		
DC/AC	PAPER/FOIL	BATHTUB	23F*	90P, 93P,	DYR	P30			
DC/AC	PAPER/FOIL	RECTAN GULAR	23F*	154P		P10 (CYLINDRICAL)	60, 62, 64, 66, 68		
AC	PAPER/FOIL	OVAL	45F	200P, 201P, OR, OV	KB, KK, KT	P142, P150F, P162F, P164F, P166F, RDO, RGO, RMD, RSO	80	31A, 32A, 37A, 38A	93G, 94G, 95G, 97G
AC	PAPER/FOIL	RECTANGULAR	45F		KGNT, KN	RY	75	27A, 28A, 29A	
AC	PAPE/FOIL	CYL	45F*	OC	KV, CMA, CRA	RR		23A	94G, 95G, 97G
DC/AC SCR TYPE	PAPER/FOIL	RECTANGULAR	28F	330P	SCRG, KKSCR, KMSCR				
DC/AC SCR TYPE	METALIZED PAPER	RECTANGULAR	28F	331P		P09ZNR			
DC/AC SCR TYPE	POLYCARB. FILM/FOIL	RECTANGULAR	28F*	332P	SCRG				
DC/AC SCR TYPE	METAL POLYCARB. FILM	RECTANGULAR	28F*	333P	SCR				
DC/AC SCR TYPE	METAL PAPER	OVAL	28F		SCR				

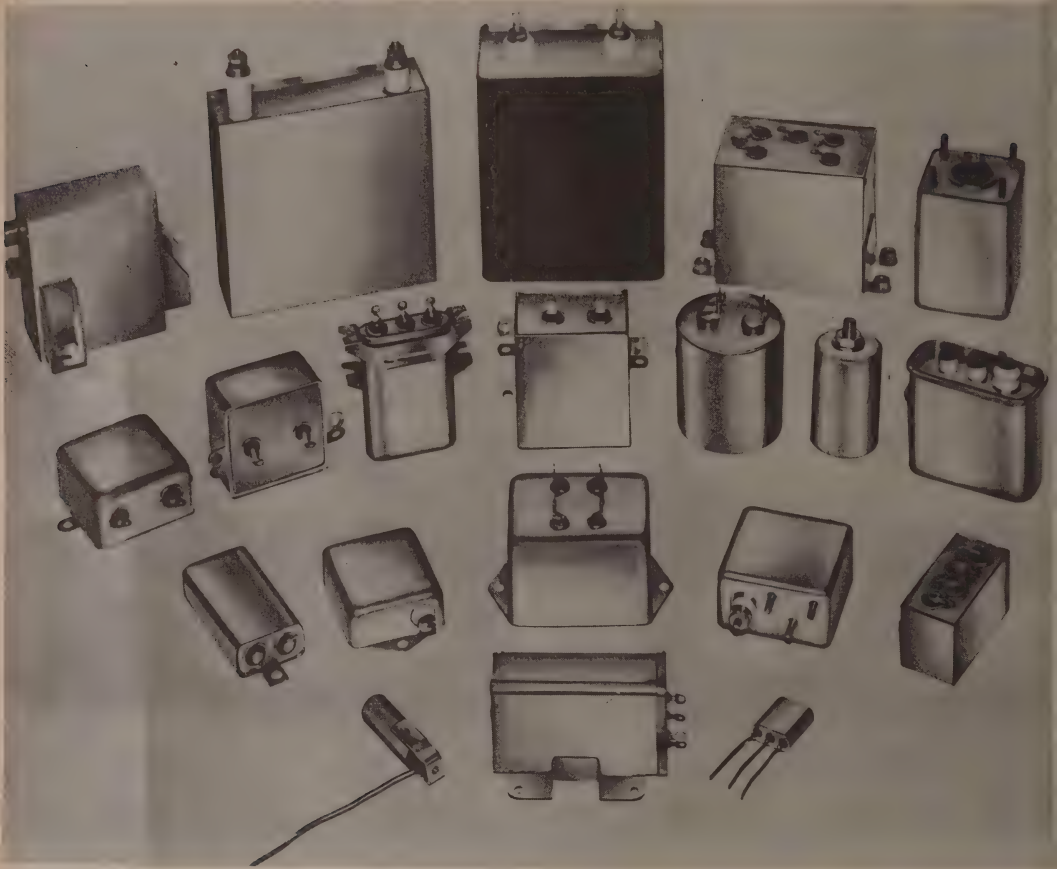
* Nearest Equivalent; GE has electrical equivalents for all competitive oil-filled designs, most offer superior performance and volumetric efficiency.

For complete information contact your nearby GE Sales Office, or write to General Electric Co., Section 998-2. Schenectady, N. Y. 12345.

GENERAL ELECTRIC

THE GUDEMAN CORPORATION
capacitors and EMI filters
340 WEST HURON STREET ▪ CHICAGO ILLINOIS 60610 ▪ 312 337 7400 ▪ TWX 910 221 3863

standard and special capacitors designed to individual specifications



The Gudeman Company has long been an established leader in the field of manufacturing special capacitors to customer's individual specifications.

Pictured above are just a few examples of the variety of styles and configurations available. There are literally thousands of designs for special capacitors in our files which have been produced over the years for satisfied users. The unique flexibility of The Gudeman Company with respect to such specials is available for use in your application.

This flexibility of design and fabrication covers not only mechanical or physical configurations but extends to the use of most dielectric materials presently available.

The examples shown above have been manufactured utilizing such dielectrics as: paper, paper-mylar, mylar, metallized mylar, polystyrene, mylar-polystyrene, teflon, metallized teflon, polycarbonate, metallized polycarbonate, metallized paper, metallized paper-mylar and irradiated polyethylene. Other dielectric materials are presently under investigation for use with both standard and special capacitors alike.

Impregnants used in conjunction with special items are: micro-crystalline wax, silicone oil, chlorinated diphenyl, mineral oil, polybutene, "perma-fil" special epon resins, and many special combination impregnants for specific applications.

Capacitor enclosures are available for standard or unusual geometric outlines with standard or special hardware as dictated by application.

As circuit design requires, units are available in multiple sections of large banks, with matched values, if necessary. Combinations of dielectric materials are also available for such "modules."

The Gudeman Company offers a unique service with respect to special capacitors with the over-all capabilities of "long and short run" facilities, engineering in depth and a closely governed Quality Control system. The Quality Control operation offers additional advantages relative to complete qualification testing facilities for quality assurance testing if necessary. The "QC" department has monitored over 60,000,000 unit hours of testing on our line of high reliability capacitors and is well versed in statistical analysis where required.

We might add that our manufacturing experience in the line of high reliability capacitors allows us to constantly improve on the reliability of all capacitors, standard or special. The feedback of information in this product line is incorporated into the design and fabrication techniques of all other lines to reduce potential "failure modes."

The Gudeman Company offers its design-engineering-production staff for consultation on your special capacitor requirements. An unusual "design-comparison" file often results in substantial savings to users in both time and money with improved performance in the capacitor component.

THE GUDEMAN CORPORATION
capacitors and EMI filters
340 WEST HURON STREET ▪ CHICAGO ILLINOIS 60610 ▪ 312 337 7400 ▪ TWX 910 221 3863

a complete index
to the complete line of capacitors and filters

type	Gudeman series #	Gudeman pg. no.	EEM pg.
capacitors			
Miniaturized Ceramic Dielectric	**701A** and **702A** Series	3	2•140
Miniature Tubular Polycarbonate Dielectric	**357** Series	4	2•141
Miniature Polycarbonate-Foil Dielectric	**401** Series	5	2•142
Balanced Polycarbonate Film-Foil Dielectric	**466** Series	6	2•143
"XC" Plastic Film Dielectric	**XC203** and **XC204** Series	7	2•144
Miniature "Mylar" Dielectric	**338** and **355** Series	9 & 10	2•146, 2•147
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"Thinfilm" Metallized Polycarbonate Dielectric	**396** and **397** series	21	2•158
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THE GUDEMAN CORPORATION
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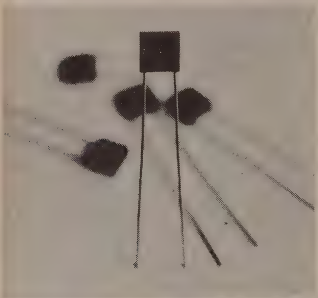
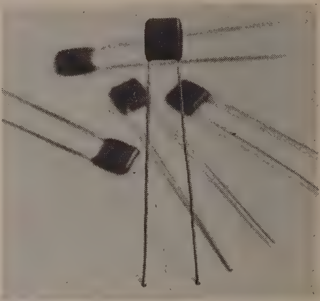
miniaturized ceramic dielectric series 701A and 702A

HIGHEST VOLUMETRIC EFFICIENCY AVAILABLE IN CAPACITANCE VALUES FROM ONE THROUGH FIVE MICROFARADS. OTHER VALUES AND SIZES THROUGH 100 MFD AVAILABLE. (100 MFD IN ONE CUBIC INCH.) 50 VOLT STABLE, 15% TC, −55°C TO +125°C

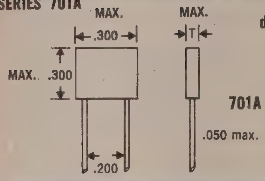


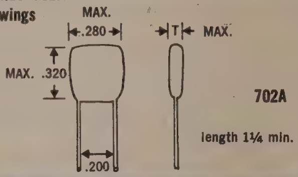


SERIES 701A

SERIES 702A

dimensional drawings



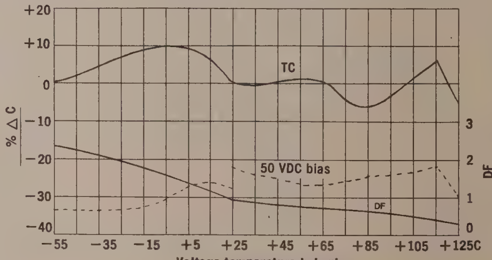


CAP MFD	T Inches	Part Number
1.0	.100	701A105K
2.0	.150	701A205K
3.0	.200	701A305K
4.0	.300	701A405K
5.0	.300	701A505K

CAP MFD	T Inches	Part Number
1.0	.090	702A105K
2.0	.140	702A205K
3.0	.190	702A305K
4.0	.290	702A405K
5.0	.290	702A505K

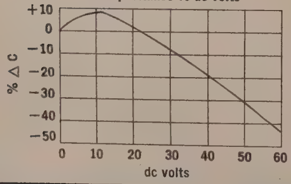
typical performance curves

from 1.0 MFD units aged 500 HRS

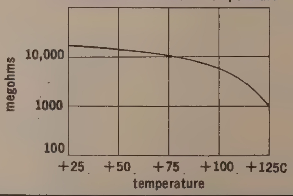


Voltage-temperature behavior

capacitance vs dc volts



insulation resistance vs temperature



features

A. Compact — no other smaller units known — an outstanding achievement
B. Style — popular radial CK06 series.
C. Stability — 15% TC, −55°C to +125°C. (EIA X7R) meets BX/BR characteristics through most applications — a unique positive trend TC
D. D F— low dissipation factor even at negative temperature range
E. Voltage — rated 50 VDC, 125 VDC Hi-pot, (typical breakdown 400-600 VDC)
F. IR — insulation resistance exceptionally high at all temperatures

construction

These special dielectric capacitors are formulated to produce a temperature characteristic (TC) which tends to be positive over most of the temperature range. They have superb multilayer technology with dense layers and are processed to eliminate the problem of internal delaminations and flaws which seem to plague others. A full soldered lead attachment using high temperature solder (MP+224°C) and encapsulated in a pre-molded shell with a tough moisture resistant epoxy.

specifications

general

Standard capacitors have 10% tolerance and solder coated copper leads. Marking includes Mfg. - Cap. and Tol. (Mil code) - Voltage - Part Number

A. Temperature Range — −55°C to +125°C
B. Capacitance — 1.0 MFD through 5.0 MFD, 10% tolerance
C. Leads — solder coated copper
D. Case — pre-molded, epoxy or epoxy "dipped"

electrical

A. Voltage — 50 VDC rated, 125 VDC Hi-pot
B. Measurement — 25°C, 1 VRMS, 1 KHz
C. Dissipation Factor — 2.5% maximum
D. Insulation Resistance — +25°C — 1000 MEGOHM-MICROFARADS +125°C — 100 MEGOHM-MICROFARADS
E. Temperature Characteristic — 15% (EIA X7R)
F. Environmental — Gudeman monolithic ceramic capacitors are designed to meet the requirements of MIL-C-39014

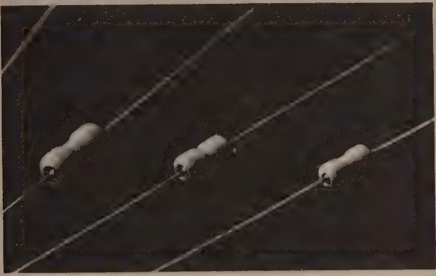
Q.C. NOTE: High voltages will temporarily change capacitance. Units can be de-aged to time zero (remove voltage and hi-pot history) by heating to +150°C for one hour.

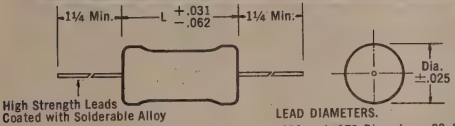
THE GUDEMAN CORPORATION
capacitors and EMI filters
340 WEST HURON STREET ▪ CHICAGO ILLINOIS 60610 ▪ 312 337 7400 ▪ TWX 910 221 3863

miniature tubular polycarbonate dielectric capacitors

series 357 "PCG" −55°C to +125°C

Sealed in Non-Metallic Cases 100 VDC and 200 VDC





LEAD DIAMETERS.
.138 and .170 Diameters: 22 AWG
.204 Diameter and larger: 20 AWG

specifications

DISSIPATION FACTOR:
Less than .25% when measured at or referred to a frequency of 1,000 CPS at +25°C.

INSULATION RESISTANCE:
The minimum insulation resistance when measured with an applied potential of 100 to 200 volts, but not to exceed the rated voltage, shall be as follows:

TEMPERATURE	MEGOHMS MINIMUM
At + 25°C	150,000
At + 85°C	15,000
At +125°C	1,000

TEST VOLTAGE:
Shall withstand a DC voltage equal to 200% of the rated voltage for one minute at a temperature of +25%, ±5°C.

ACCELERATED LIFE TEST:
Shall withstand an accelerated life test of 250 hours with 140% of the voltage rating, applied at the applicable high ambient temperature, per MIL-C-25C. Not more than one failure in 18 pieces tested shall be allowed.

VOLTAGE RATINGS:
These capacitors are designed to operate over the temperature range of −55°C to +85°C at full rated DC voltage and up to +125°C with working voltages as follows:

+85°C	+125°C
200 VDC	100 VDC
100 VDC	50 VDC

LEAD PULL TEST:
These capacitors shall withstand a five (5) pound pull applied axially for one minute.

LEAD BEND TEST:
Leads shall be bent without breakage about the point of egress from the capacitor. First 90 degrees in one direction then back to the original position, and the 90 degrees in the opposite direction.

CAPACITANCE CHANGE WITH TEMPERATURE:
The capacitance change shall not exceed the following values with reference to the +25°C capacitance value:

TEMPERATURE	% CAP. CHANGE
− 55°C	−2% Maximum
+ 85°C	±1.25% Maximum
+125°C	±2% Maximum

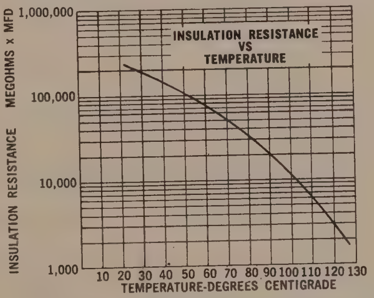
HUMIDITY TEST:
Series 357 capacitors are not intended to be operated where humidity is a problem. This series is intended for use in circuits which are encapsulated or hermetically sealed.

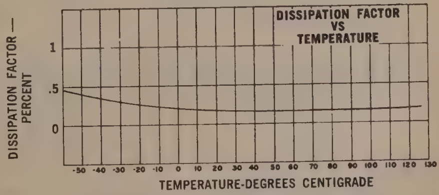
MARKING:
Small size of units limits marking information to the following: capacity, voltage, series prefix (357), Gudeman or trademark.

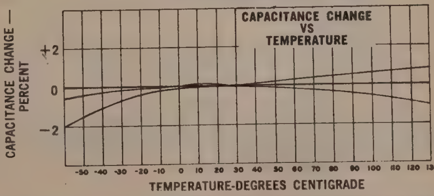
SPECIAL CAPACITORS:
Capacitance values, voltages and sizes not listed in this bulletin will be furnished upon request.

CAP. IN MFDS.	100 VDC		200 VDC	
	PART NO.	SIZE DIA. x L	PART NO.	SIZE DIA. x L
.001	357B102	.138 x 5/16	357C102	.138 x 5/16
.0015	357B152	.138 x 5/16	357C152	.170 x 5/16
.0022	357B222	.138 x 5/16	357C222	.170 x 5/16
.0033	357B332	.138 x 5/16	357C332	.170 x 7/16
.0039	357B392	.138 x 5/16	357C392	.170 x 7/16
.0047	357B472	.170 x 5/16	357C472	.204 x ½
.0068	357B682	.170 x 5/16	357C682	.204 x ½
.0082	357B822	.170 x 7/16	357C822	.225 x ½
.01	357B103	.170 x 7/16	357C103	.225 x ½
.012	357B123	.204 x ½	357C123	.225 x 9/16
.015	357B153	.204 x ½	357C153	.290 x ½
.018	357B183	.204 x 9/16	357C183	.290 x ½
.022	357B223	.204 x 9/16	357C223	.290 x 9/16
.027	357B273	.225 x 9/16	357C273	.290 x 9/16
.033	357B333	.225 x 9/16	357C333	.318 x ⅝
.039	357B393	.290 x ½	357C393	.318 x ⅝
.047	357B473	.290 x ½	357C473	.318 x ⅞
.056	357B563	.290 x ⅝	357C563	.318 x ⅞
.068	357B683	.290 x ⅝	357C683	.318 x 1
.082	357B823	.318 x ⅝	357C823	.318 x 1 3/16
.1	357B104	.318 x ⅝	357C104	.318 x 1 3/16
.12	357B124	.318 x ⅞		
.15	357B154	.318 x ⅞		
.18	357B184	.318 x 1 3/16		
.22	357B224	.318 x 1 3/16		

TYPICAL CURVES







THE GUDEMAN CORPORATION
capacitors and EMI filters
340 WEST HURON STREET ▪ CHICAGO ILLINOIS 60610 ▪ 312 337 7400 ▪ TWX 910 221 3863

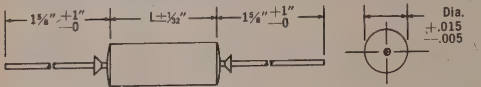
miniature polycarbonate-foil dielectric

series 401

HERMETICALLY SEALED (GLASS-TO-METAL)
TUBULAR METALLIC CASES
—55°C TO +125°C
100 VDC THRU 600 VDC

outline drawing

Standard leads consist of solid, bare, tinned wire. Special nickel leads are available for applications requiring a high degree of weldability.



LEADS: 24 gauge: .175 and .195 Dia.; 22 gauge: .235 and .312 Dia.; 20 gauge: .400 Dia. and larger case sizes.
For sleeving add .020 max. to Dia. and 1/16 to nominal case length.

specifications

CAPACITANCE AND TOLERANCE

The capacitance limits at +25°C are determined by the specified tolerance. Capacitors are measured at or referred to a frequency of 1000 cps.

DISSIPATION FACTOR

Less than .15% at 1000 cps. at +25°C.

INSULATION RESISTANCE

The charging potential is equal to the specified operating voltage for a given temperature. The minimum electrification time is two minutes. Listed below are minimum values:

Temperature	Nominal Capacitance Mfd.	R X C Megohms X mfd.	R Megohms
+25°C	Greater than .5	50,000	
	Smaller than .5		100,000
+85°C	Greater than .5	5,000	
	Smaller than .5		10,000
+125°C	Greater than .5	500	
	Smaller than .5		1,000

TEST VOLTAGE

Shall withstand a DC voltage equal to 200% of the rated voltage for one minute at a temperature of +25°C, ±5°C.

ACCELERATED LIFE TEST

Shall withstand an accelerated life test of 250 hours with 140% of applied rated voltage at applicable high test temperature. Only one failure in 12 capacitors tested shall be allowed. A failure is defined as the following:
A) If the capacitor has a short or open circuit.
B) If the capacitance has changed more than 5% from its original value.
C) If the insulation resistance is less than 50% of the specified value above.
D) If the DF is greater than 20% of its initial specified value.

TEMPERATURE AND IMMERSION CYCLING

Shall meet all requirements of the applicable paragraph of the latest issue of MIL-C-19978.

MOISTURE RESISTANCE

Designed to meet all requirements of the applicable paragraph of the latest issue of MIL-C-19978.

VIBRATION

Designed to withstand the Grade 3 vibration tests of the applicable paragraph of the latest issue of MIL-C19978.

A-C VOLTAGE RATING:

(—55°C to +85°C Ambient)

D-C Voltage Rating	400 cps
100	65
200	120
300	200
400	240
600	250

LEAD PULL TEST

Shall withstand a steady pull force of 5 lbs. applied axially to a capacitor lead for one minute.

LEAD BENDING TEST

The leads shall withstand without breakage the following stresses performed near the point of egress: bend 90 degrees in one direction, then back to the original position and 90 degrees in the opposite direction.

CAPACITANCE CHANGE WITH TEMPERATURE

The change of capacitance with reference to the actual value at ∓25°C does not exceed the following limits.

TEMPERATURE	CHANGE OF CAPACITANCE
—55°C to +125°C	2%

100 V.D.C.

Part No.	Capacitance Mfd.	Diameter Inches	Length Inches
F401B102	.001	.195	¾
F401B122	.0012	.195	¾
F401B152	.0015	.195	¾
F401B182	.0018	.195	¾
F401B222	.0022	.195	¾
F401B272	.0027	.195	¾
F401B332	.0033	.195	¾
F401B392	.0039	.195	¾
F401B472	.0047	.195	¾
F401B562	.0056	.235	¾
F401B682	.0068	.235	¾
F401B822	.0082	.312	⅞
F401B103	.01	.312	⅞
F401B123	.012	.312	⅞
F401B153	.015	.312	⅞
F401B183	.018	.312	⅞
F401B223	.022	.312	⅞
F401B273	.027	.312	⅞
F401B333	.033	.312	⅞
F401B393	.039	.400	⅞
F401B473	.047	.400	⅞
F401B563	.056	.400	⅞
F401B683	.068	.400	⅞
F401B823	.082	.400	⅞
F401B104	0.1	.400	⅞
F401B124	.12	.400	1.0
F401B154	.15	.400	1.0
F401B185	.18	.400	1¼
F401B224	.22	.400	1¼
F401B274	.27	.500	1⅛
F401B334	.33	.500	1⅛
F401B394	.39	.562	1¼
F401B474	.47	.562	1¼
F401B564	.56	.562	1⅝
F401B684	.68	.562	1⅝
F401B824	.82	.670	1⅝
F401B105	1.00	.670	1⅝

200 V.D.C.

Part No.	Capacitance Mfd.	Diameter Inches	Length Inches
F401C102	.001	.195	¾
F401C122	.0012	.195	¾
F401C152	.0015	.195	¾
F401C182	.0018	.195	¾
F401C222	.0022	.195	¾
F401C272	.0027	.235	¾
F401C332	.0033	.235	¾
F401C392	.0039	.312	⅞
F401C472	.0047	.312	⅞
F401C562	.0056	.312	⅞
F401C682	.0068	.312	⅞
F401C822	.0082	.312	⅞
F401C103	.01	.312	⅞
F401C123	.012	.312	⅞
F401C153	.015	.312	⅞
F401C183	.018	.400	⅞
F401C223	.022	.400	⅞
F401C273	.027	.400	⅞
F401C333	.033	.400	⅞
F401C393	.039	.400	⅞
F401C473	.047	.400	⅞
F401C563	.056	.400	1.0
F401C683	.068	.400	1.0
F401C823	.082	.400	1¼
F401C104	.01	.400	1¼
F401C124	.12	.500	1⅛
F401C154	.15	.500	1⅛
F401C184	.18	.562	1¼
F401C224	.22	.562	1¼
F401C274	.27	.562	1⅝
F401C334	.33	.562	1⅝
F401C394	.39	.670	1⅝
F401C474	.47	.670	1⅝
F401C564	.56	.750	1¾
F401C684	.68	.750	1¾
F401C824	.82	.750	2¼
F401C105	1.0	.750	2¼

400 V.D.C.

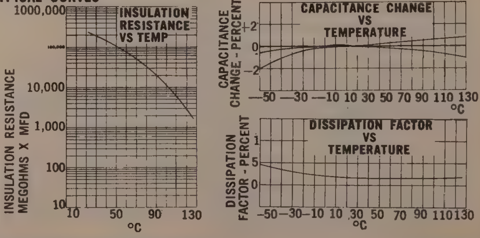
Part No.	Capacitance Mfd.	Diameter Inches	±.032 Length Inches
F401E102	.001	.235	¾
F401E122	.0012	.235	¾
F401E152	.0015	.235	¾
F401E182	.0018	.235	¾
F401E222	.0022	.235	¾
F401E272	.0027	.312	⅞
F401E332	.0033	.312	⅞
F401E392	.0039	.312	⅞
F401E472	.0047	.312	⅞
F401E562	.0056	.312	⅞
F401E682	.0068	.312	⅞
F401E822	.0082	.312	⅞
F401E103	.01	.312	⅞
F401E123	.012	.400	⅞
F401E153	.015	.400	⅞
F401E183	.018	.400	1.0
F401E223	.022	.400	1.0
F401E273	.027	.400	1¼
F401E333	.033	.400	1¼
F401E393	.039	.400	1⅜
F401E473	.047	.400	1⅜
F401E563	.056	.562	1⅛
F401E683	.068	.562	1⅛
F401E823	.082	.562	1⅜
F401E104	0.1	.562	1⅜
F401E124	.12	.562	1¾
F401E154	.15	.562	1¾
F401E184	.18	.670	1⅞
F401E224	.22	.670	1⅞
F401E274	.27	.750	1⅞
F401E334	.33	.750	1⅞
F401E394	.39	.750	2⅜
F401E474	.47	.750	2⅜
F401E564	.56	1.00	2⅛
F401E684	.68	1.00	2⅛

600 V.D.C.

Part No.	Capacitance Mfd.	Diameter Inches	±.032 Length Inches
F401F102	.001	.312	⅞
F401F122	.0012	.312	⅞
F401F152	.0015	.312	⅞
F401F182	.0018	.312	⅞
F401F222	.0022	.312	⅞
F401F272	.0027	.400	⅞
F401F332	.0033	.400	⅞
F401F392	.0039	.400	⅞
F401F472	.0047	.400	⅞
F401F562	.0056	.400	⅞
F401F682	.0068	.400	⅞
F401F822	.0082	.400	⅞
F401F103	.01	.400	⅞
F401F123	.012	.400	1.0
F401F153	.015	.400	1.0
F401F183	.018	.400	1⅛
F401F223	.022	.400	1⅛
F401F273	.027	.400	1⅜
F401F333	.033	.400	1⅜
F401F393	.039	.562	1⅛
F401F473	.047	.562	1⅛
F401F563	.056	.562	1⅜
F401F683	.068	.562	1⅜
F401F823	.082	.670	1⅝
F401F104	0.1	.670	1⅝
F401F124	.12	.670	1⅞
F401F154	.15	.670	1⅞
F401F184	.18	.750	1⅞
F401F224	.22	.750	1⅞
F401F274	.27	1.00	1⅝
F401F334	.33	1.00	1⅝
F401F394	.39	1.00	2⅛
F401F474	.47	1.00	2⅛
F401F564	.56	1.00	2½
F401F684	.68	1.00	2½

"F" indicates "Floating." Substitute "G" for "Grounded." Add following to Part No. for Tolerance: —20 = ±20%; —10 = ±10%; —5 = ±5%.

TYPICAL CURVES



THE GUDEMAN CORPORATION
capacitors and EMI filters
340 WEST HURON STREET ▪ CHICAGO ILLINOIS 60610 ▪ 312 337 7400 ▪ TWX 910 221 3863

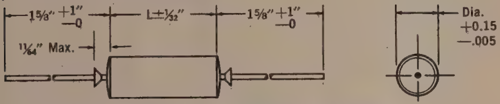
balanced polycarbonate film-foil dielectric

series 466

HERMETICALLY SEALED (GLASS-TO-METAL)
MINIATURE METAL CASE
—55°C TO +125°C WITHOUT DERATING
100 VDC THRU 600 VDC

outline drawing

Standard leads consist of solid, bare, tinned wire. Nickel or gold plated leads per MIL-STD 1276 are also available.



Leads: 22 gauge: .235 and .312 Dia.; 20 gauge: .400 and larger
For sleeving add .032 to dia. and 1/16 to the nominal case length.

specifications

CAPACITANCE AND TOLERANCE
The capacitance limits at +25°C are determined by the specified tolerance. Capacitors are measured or referred to a frequency of 1000 CPS.

DISSIPATION FACTOR
Less than .3% from +25°C to +125°C at 1000 CPS.

INSULATION RESISTANCE
The charging potential is equal to the specified operating voltage for a given temperature. The electrification time is two minutes. Minimum values are:

Temperature	Nominal Capacitance MFD	R X C Megohms X MFD	R Megohms
+25°C	Greater than .5	25,000	
	Smaller than .5		50,000
+125°C	Greater than .5	200	
	Smaller than .5		500

TEST VOLTAGE
Shall withstand a DC voltage equal to 200% of the rated voltage for one minute at a temperature of +25°C.

ACCELERATED LIFE TEST
Shall withstand an accelerated life test of 1000 hours with 140% of applied rated voltage at ∓125°C with one failure allowed in 18 capacitors tested. A failure is defined as:
- A. If the capacitor has a short or open circuit
- B. If the capacitance has changed more than 1.5% from its original measured value
- C. If the insulation resistance is less than 50% of the specified value at +25°C
- D. If the DF is greater than .5% at +25°C

TEMPERATURE AND IMMERSION CYCLING
Meets the requirements of the applicable paragraph of MIL-C-19978.

MOISTURE RESISTANCE
Meets the requirements of the applicable paragraph of MIL-C-19978.

VIBRATION
Shall withstand Grade 3 vibration tests of the applicable paragraph of MIL-C-19978.

AC VOLTAGE RATING (—55°C to ∓105°C Ambient)

DC VOLTAGE RATING	AC VOLTAGE RATING @400 CPS
100	70
200	140
400	240
600	330

LEAD PULL TEST
Shall withstand a steady pull force of 5 lbs. applied axially for one minute.

LEAD BENDING TEST
The leads shall withstand without breakage the following stresses performed near the point of egress: bend 90 degrees in one direction, then back to the original position and 90 degrees in the opposite direction.

CAPACITANCE CHANGE WITH TEMPERATURE
Values below are guaranteed performance. Typical values are lower than those stated.

Rated Voltage	Temperature	Maximum Capacitance Change*
100VDC - 200VDC	+25°C to +125°C	+ .5 % — .75%
100VDC - 200VDC	+25°C to —55°C	— .25% —1.5 %
400VDC - 600VDC	+25°C to +125°C	+1.5 % — .75%
400VDC - 600VDC	+25°C to — 55°C	—1.0 % —1.5 %

*For capacitance values greater than .01 mfd. Values of .01 mfd. and less exhibit same change as 400-600 VDC units.

100 VOLTS D.C.

Capacitance Mfd.	Part No.	Diameter Inches	Length Inches
.001	F466B102	.235	¾
.0012	F466B122	.235	¾
.0015	F466B152	.235	¾
.0018	F466B182	.235	¾
.0022	F466B222	.235	¾
.0027	F466B272	.235	¾
.0033	F466B332	.235	¾
.0039	F466B392	.235	¾
.0047	F466B472	.235	¾
.0056	F466B562	.235	¾
.0068	F466B682	.235	¾
.0082	F466B822	.312	⅞
.01	F466B103	.312	⅞
.012	F466B123	.312	⅞
.015	F466B153	.312	⅞
.018	F466B183	.312	⅞
.022	F466B223	.312	⅞
.027	F466B273	.312	⅞
.033	F466B333	.312	⅞
.039	F466B393	.312	⅞
.047	F466B473	.400	⅞
.056	F466B563	.400	⅞
.068	F466B683	.400	⅞
.082	F466B823	.400	1⅛
.10	F466B104	.400	1⅛
.12	F466B124	.400	1⅜
.15	F466B154	.400	1⅜
.18	F466B184	.562	1⅛
.22	F466B224	.562	1⅛
.27	F466B274	.562	1⅜
.33	F466B334	.562	1⅜
.39	F466B394	.562	1⅝
.47	F466B474	.562	1⅝
.56	F466B564	.670	1⅝
.68	F466B684	.670	1⅝
.82	F466B824	.750	1⅞
1.0	F466B105	.750	1⅞

400 VOLTS D.C.

.001	F466E102	.235	¾
.0012	F466E122	.235	¾
.0015	F466E152	.235	¾
.0018	F466E182	.235	¾
.0022	F466E222	.235	¾
.0027	F466E272	.235	¾
.0033	F466E332	.235	¾
.0039	F466E392	.312	⅞
.0047	F466E472	.312	⅞
.0056	F466E562	.312	⅞
.0068	F466E682	.312	⅞
.0082	F466E822	.312	⅞
.01	F466E103	.400	⅞
.012	F466E123	.400	⅞
.015	F466E153	.400	⅞
.018	F466E183	.400	⅞
.022	F466E223	.400	1⅛
.027	F466E273	.400	1⅛
.033	F466E333	.400	1⅜
.039	F466E393	.400	1⅜
.047	F466E473	.400	1⅜
.056	F466E563	.562	1⅛
.068	F466E683	.562	1⅛
.082	F466E823	.562	1⅜
.10	F466E104	.562	1⅜
.12	F466E124	.670	1⅝
.15	F466E154	.670	1⅝
.18	F466E184	.670	1⅞
.22	F466E224	.670	1⅞
.27	F466E274	.750	2⅛
.33	F466E334	.750	2⅛
.39	F466E394	1.0	2⅛
.47	F466E474	1.0	2⅛
.56	F466E564	1.0	2⅛
.68	F466E684	1.0	2⅛
.82	F466E824	1.0	2⅝

200 VOLTS D.C.

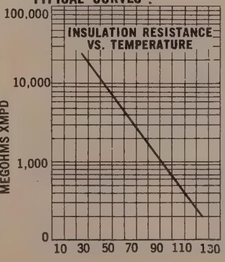
Capacitance Mfd.	Part No.	Diameter Inches	Length Inches
.001	F466C102	.235	¾
.0012	F466C122	.235	¾
.0015	F466C152	.235	¾
.0018	F466C182	.235	¾
.0022	F466C222	.235	¾
.0027	F466C272	.235	¾
.0033	F466C332	.235	¾
.0039	F466C392	.235	¾
.0047	F466C472	.235	¾
.0056	F466C562	.312	⅞
.0068	F466C682	.312	⅞
.0082	F466C822	.312	⅞
.01	F466C103	.312	⅞
.012	F466C123	.312	⅞
.015	F466C153	.312	⅞
.018	F466C183	.312	⅞
.022	F466C223	.312	⅞
.027	F466C273	.400	⅞
.033	F466C333	.400	⅞
.039	F466C393	.400	⅞
.047	F466C473	.400	1⅛
.056	F466C563	.400	1⅛
.068	F466C683	.400	1⅛
.082	F466C823	.400	1⅜
.10	F466C104	.400	1⅜
.12	F466C124	.562	1⅛
.15	F466C154	.562	1⅛
.18	F466C184	.562	1⅜
.22	F466C224	.562	1⅜
.27	F466C274	.562	1⅞
.33	F466C334	.562	1⅞
.39	F466C394	.670	1¾
.47	F466C474	.670	1¾
.56	F466C564	.750	2⅛
.68	F466C684	.750	2⅛
.82	F466C824	1.0	2⅛
1.0	F466C105	1.0	2⅛

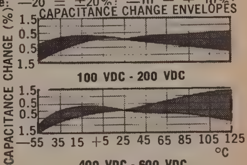
600 VOLTS D.C.

.001	F466F102	.312	¾
.0012	F466F122	.312	¾
.0015	F466F152	.312	¾
.0018	F466F182	.312	¾
.0022	F466F222	.312	⅞
.0027	F466F272	.312	⅞
.0033	F466F332	.312	⅞
.0039	F466F392	.400	⅞
.0047	F466F472	.400	⅞
.0056	F466F562	.400	⅞
.0068	F466F682	.400	⅞
.0082	F466F822	.400	⅞
.01	F466F103	.400	1
.012	F466F123	.400	1
.015	F466F153	.400	1
.018	F466F183	.400	1⅜
.022	F466F223	.400	1⅜
.027	F466F273	.500	1⅛
.033	F466F333	.500	1⅛
.039	F466F393	.562	1⅛
.047	F466F473	.562	1⅛
.056	F466F563	.562	1⅜
.068	F466F683	.562	1⅜
.082	F466F823	.670	1⅜
.10	F466F104	.670	1⅜
.12	F466F124	.670	1⅞
.15	F466F154	.670	1⅞
.18	F466F184	.750	1⅞
.22	F466F224	.750	1⅞
.27	F466F274	1	1⅞
.33	F466F334	1	1⅞
.39	F466F394	1	2⅛
.47	F466F474	1.0	2⅜
.56	F466F564	1.0	2⅝

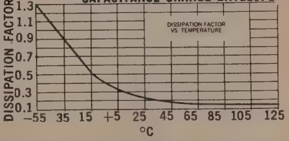
"F" indicates "floating", for grounded substitute "G"
Add following to Part No. for tolerance: —20 = ±20%; —10 = ±10%; —5 = ±5%

TYPICAL CURVES





400 VDC - 600 VDC CAPACITANCE CHANGE ENVELOPE



THE GUDEMAN CORPORATION

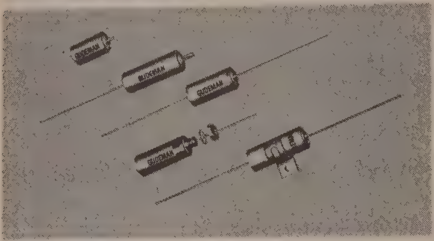
capacitors and EMI filters

340 WEST HURON STREET ■ CHICAGO ILLINOIS 60610 ■ 312 337 7400 ■ TWX 910 221 3863

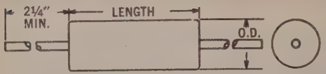
"XC" plastic film dielectric

series XC203 & XC204—

HERMETICALLY SEALED (GLASS-TO-METAL)
TUBULAR CASED
—65°C TO +165° WITHOUT DERATING
EXTENDED FOIL CONSTRUCTION
200 VDC THRU 600 VDC



outline drawing



Leads: Ga.	
24	.187 Dia.
22	.235 to .312
20	.400 and larger

Dimensions shown are for uninsulated types. When insulating sleeving is required the diameter shall be increased by a maximum of .04" and the length shall be increased by ⅛" ± 1/32".

Mtg. by means of lead wires is not recommended for units larger than .562 x 1 13/16" Lg.

Part No.	Voltage WVDC	CAP. Mfd.	Circuit 203 L.± 1/32	Circuit 203 D.±.015	Circuit 204 L.± 1/32	Circuit 204 D.±.015
XC204C102-	200	.001	11/16	.187	¾	.187
XC204C152-	200	.0015	11/16	.187	¾	.187
XC204C222-	200	.0022	13/16	.235	⅞	.235
XC204C332-	200	.0033	13/16	.235	⅞	.235
XC204C472-	200	.0047	13/16	.235	⅞	.235
XC204C682-	200	.0068	13/16	.312	⅞	.312
XC204C103-	200	.010	13/16	.312	⅞	.312
XC204C153-	200	.015	15/16	.312	1	.312
XC204C223-	200	.022	13/16	.400	⅞	.400
XC204C333-	200	.033	15/16	.400	1	.400
XC204C473-	200	.047	1 1/16	.400	1⅛	.400
XC204C683-	200	.068	1 5/16	.400	1⅜	.400
XC204C104-	200	.10	1 1/16	.562	1⅛	.562
XC204C154-	200	.15	1 5/16	.562	1⅜	.562
XC204C224-	200	.22	1 9/16	.562	1⅝	.562
XC204C334-	200	.33	1 11/16	.670	1¾	.670
XC204C474-	200	.47	1 13/16	.750	1⅞	.750
XC204E102-	400	.001	13/16	.235	⅞	.235
XC204E152-	400	.0015	13/16	.235	⅞	.235
XC204E222-	400	.0022	13/16	.235	⅞	.235
XC204E332-	400	.0033	13/16	.312	⅞	.312
XC204E472-	400	.0047	13/16	.312	⅞	.312
XC204E682-	400	.0068	15/16	.312	1	.312
XC204E103-	400	.010	13/16	.400	⅞	.400
XC204E153-	400	.015	13/16	.400	⅞	.400
XC204E223-	400	.022	1 1/16	.400	1⅛	.400
XC204E333-	400	.033	1 5/16	.400	1⅜	.400
XC204E473-	400	.047	1 1/16	.562	1⅛	.562
XC204E683-	400	.068	1 3/16	.562	1¼	.562
XC204E104-	400	.10	1 9/16	.562	1⅝	.562
XC204E154-	400	.15	1 9/16	.670	1⅝	.670
XC204E224-	400	.22	1 11/16	.750	1¾	.750
XC204E334-	400	.33	2 3/16	.750	2¼	.750
XC204F102-	600	.001	13/16	.235	⅞	.235
XC204F152-	600	.0015	15/16	.235	1	.235
XC204F222-	600	.0022	13/16	.312	⅞	.312
XC204F332-	600	.0033	13/16	.312	⅞	.312
XC204F472-	600	.0047	15/16	.312	1	.312
XC204F682-	600	.0068	13/16	.400	⅞	.400
XC204F103-	600	.010	15/16	.400	1	.400
XC204F153-	600	.015	1 1/16	.400	1⅛	.400
XC204F223-	600	.022	1 7/16	.400	1½	.400
XC204F333-	600	.033	1 3/16	.562	1¼	.562
XC204F473-	600	.047	1 5/16	.562	1⅜	.562
XC204F683-	600	.068	1 7/16	.670	1½	.670
XC204F104-	600	.10	1 13/16	.670	1⅞	.670
XC204F154-	600	.15	1 13/16	.750	1⅞	.750

"204" indicates "floating." Substitute "203" for "Grounded."
Add following to Part No. for tolerance: —20 = ±20% (Std.); —10 = ±10%; —5 = ±5%.

specifications

INSULATION RESISTANCE

The minimum insulation resistance when measured with an applied potential of 100 volts and an electrification time of two minutes shall be as follows:

At 25°C—75,000 megohm-mfds. minimum, but need not exceed 200,000 megohms

At 85°C—4000 megohm-mfds. minimum, but need not exceed 8000 megohms.

At 125°C—250 megohm-mfds. minimum, but need not exceed 500 megohms.

At 165°C—50 megohm-mfds. minimum, but need not exceed 100 megohms.

NOTE—The above IR characteristics are very conservative and it can be generally expected that they will be much higher than specified. The Gudeman engineering dept. believes that in introducing a new line of capacitors a conservative view point be maintained, thereby proffering a component which will offer the greatest degree of reliability.

POWER FACTOR

The power factor of these capacitors shall be no greater than .5 percent when measured at 1000 cps at 25°C.

ACCELERATED LIFE TEST

These capacitors shall withstand an accelerated life test of 250 hours at 165°C with an applied voltage of 140 percent of rated voltage on units not exceeding .05 watt seconds.

One failure in 12 samples permitted.

TEST VOLTAGE

These capacitors shall withstand a DC voltage equal to 200 percent of the rated voltage for one minute at a temperature of 25°C.

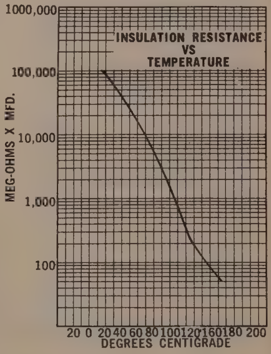
MOISTURE RESISTANCE AND VIBRATION

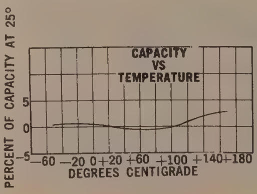
These capacitors shall meet the requirements for Moisture Resistance and Vibration of Specification MIL-C-25A.

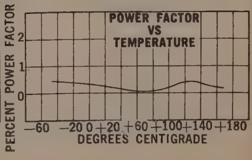
CAPACITANCE CHANGE

The capacitance change shall not be greater than —2 percent to +6 percent from —65°C to +165°C when compared to the nominal value measured at +25°C.

TYPICAL CURVES







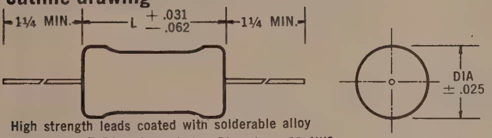
THE GUDEMAN CORPORATION
capacitors and EMI filters
340 WEST HURON STREET ■ CHICAGO ILLINOIS 60610 ■ 312 337 7400 ■ TWX 910 221 3863

miniature "mylar"* dielectric

series P356

"BLUE-R"® TUBULAR
SEALED IN NEW EPOXY COAT
—55°C TO +125°C
80 VDC TO 600 VDC

outline drawing



High strength leads coated with solderable alloy

LEAD DIAMETERS: .138 and .170 Diameters: 22 AWG
.204 Diameter and larger: 20 AWG

specifications

DISSIPATION FACTOR
The dissipation factor shall not exceed 1.0% when measured at or referred to a frequency of 1,000 CPS at +25°C.

INSULATION RESISTANCE
The minimum insulation resistance when measured with an applied potential of 80 to 500 volts, but not to exceed the rated voltage, shall be as follows:

At + 25°C 50,000 megohm-mfds minimum but need not exceed 150,000 megohms.
At + 85°C 5,000 megohms-mfds minimum but need not exceed 15,000 ohms.
At + 125°C 50 megohms-mfds minimum but need not exceed 300 megohms.

TEST VOLTAGE
Shall withstand a DC voltage equal to 200% of the rated voltage for one minute at a temperature of +25%, ±5°C.

ACCELERATED LIFE TEST
Shall withstand an accelerated life test of 250 hours with 140% of the voltage rating, applied at the applicable high ambient temperature, per MIL-C-25C. Not more than one failure in 18 pieces tested shall be allowed.

VOLTAGE RATINGS
These capacitors are designed to operate over the temperature range of —55°C to +85°C at full rated DC voltage and up to +125°C with working voltages as follows:

+85°C	+125°C
600 VDC	300 VDC
400 VDC	200 VDC
200 VDC	150 VDC
80 VDC	50 VDC

MOISTURE ASSISTANCE
Capacitors shall withstand 500 hours of 95% relative humidity at 40°C. Voltage will not be applied. Upon completion of test, units will be dried for four hours. Minimum insulation resistance at 25°C. will be 25,000 megohm-mfds but need not exceed 75,000 megohms. Not more than one failure in 12 shall be permitted.

MARKING
Small size of units limits marking information to the following: capacity, voltage, series prefix (356), Gudeman or trademark.

LEAD PULL TEST
Shall withstand a five (5) pound pull applied axially for one minute.

LEAD BENDING TEST
Leads shall be bent without breakage about the point of egress from the capacitor. First 90 degrees in one direction then back to the original position, and then 90 degrees in the opposite direction.

CAPACITANCE CHANGE WITH TEMPERATURE
The capacitance change shall not exceed the following values with reference to the +25°C capacitance value:

TEMPERATURE	% CAP. CHANGE
— 55°C	—10% Maximum
+ 85°C	+ 5% Maximum
+125°C	+16% Maximum

80 VDC

CAP. IN MFDS.	Part No.	Dia.	L.
.001			
.0015			
.0022	P356AZ222	.138"	5/16"
.0033	P356AZ332	.138"	5/16"
.0047	P356AZ472	.138"	5/16"
.0068	P356AZ682	.170"	3/8"
.0082	P356AZ822	.170"	3/8"
.01	P356AZ103	.170"	3/8"
.012	P356AZ123	.170"	7/16"
.015	P356AZ153	.170"	7/16"
.018	P356AZ183	.170"	1/2"
.022	P356AZ223	.170"	1/2"
.027	P356AZ273	.204"	7/16"
.033	P356AZ333	.204"	7/16"
.039	P356AZ393	.204"	9/16"
.047	P356AZ473	.204"	9/16"
.056	P356AZ563	.225"	9/16"
.068	P356AZ683	.225"	9/16"
.082	P356AZ823	.290"	1/2"
.1	P356AZ104	.290"	1/2"
.12	P356AZ124	.290"	5/8"
.15	P356AZ154	.290"	5/8"
.18	P356AZ184	.318"	5/8"
.22	P356AZ224	.318"	5/8"
.27	P356AZ274	.318"	7/8"
.33	P356AZ334	.318"	7/8"
.39	P356AZ394	.318"	1 3/16"
.47	P356AZ474	.318"	1 3/16"

200 VDC

CAP. IN MFDS.	Part No.	Dia.	L.
.001	P 356C102	.138"	5/16"
.0015	P 356C152	.138"	5/16"
.0022	P 356C222	.170"	5/16"
.0033	P 356C332	.170"	5/16"
.0047	P 356C472	.170"	7/16"
.0068	P 356C682	.170"	7/16"
.0082	P 356C822	.170"	1/2"
.01	P 356C103	.170"	1/2"
.012	P 356C123	.204"	7/16"
.015	P 356C153	.204"	7/16"
.018	P 356C183	.204"	9/16"
.022	P 356C223	.204"	9/16"
.027	P 356C273	.225"	9/16"
.033	P 356C333	.225"	9/16"
.039	P 356C393	.290"	1/2"
.047	P 356C473	.290"	1/2"
.056	P 356C563	.290"	5/8"
.068	P 356C683	.290"	5/8"
.082	P 356C823	.318"	5/8"
.1	P 356C104	.318"	5/8"
.12	P 356C124	.318"	7/8"
.15	P 356C154	.318"	7/8"
.18	P 356C184	.318"	1 3/16"
.22	P 356C224	.318"	1 3/16"

400 VDC

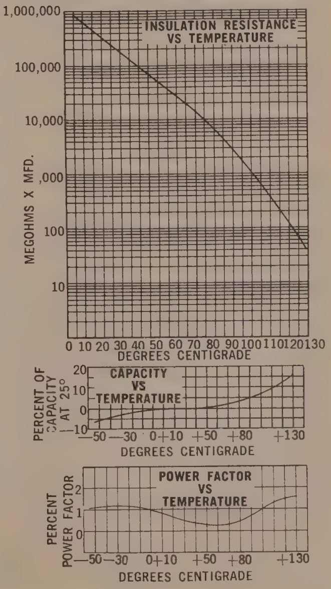
CAP. IN MFDS.	Part No.	Dia.	L.
.001	P 356E102	.170"	3/8"
.0015	P 356E152	.170"	3/8"
.0022	P 356E222	.170"	7/16"
.0033	P 356E332	.204"	7/16"
.0047	P 356E472	.204"	7/16"
.0068	P 356E682	.225"	9/16"
.0082	P 356E822	.225"	9/16"
.01	P 356E103	.225"	9/16"
.012	P 356E123	.290"	1/2"
.015	P 356E153	.290"	1/2"
.018	P 356E183	.290"	5/8"
.022	P 356E223	.290"	5/8"
.027	P 356E273	.318"	5/8"
.033	P 356E333	.318"	5/8"
.039	P 356E393	.318"	7/8"
.047	P 356E473	.318"	7/8"
.056	P 356E563	.318"	1 3/16"
.068	P 356E683	.318"	1 3/16"

600 VDC

CAP. IN MFDS.	Part No.	Dia.	L.
.001	P356F102	.170"	1/2"
.0015	P356F152	.204"	7/16"
.0022	P356F222	.204"	9/16"
.0033	P356F332	.225"	9/16"
.0047	P356F472	.290"	5/8"
.0068	P356F682	.290"	5/8"
.0082	P356F822	.318"	5/8"
.01	P356F103	.318"	5/8"
.012	P356F123	.318"	7/8"
.015	P356F153	.318"	7/8"
.018	P356F183	.318"	7/8"
.022	P356F223	.318"	7/8"

add following to part no. for tolerance:
—M = ±20%; —K = ±10%;
—J = ±5%

TYPICAL CURVES

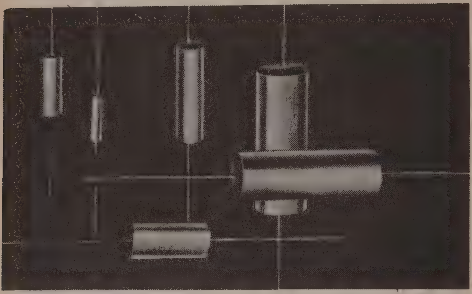


THE GUDEMAN CORPORATION
capacitors and EMI filters
340 WEST HURON STREET ■ CHICAGO ILLINOIS 60610 ■ 312 337 7400 ■ TWX 910 221 3863

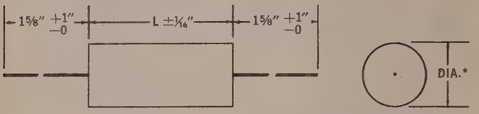
miniature "mylar"* dielectric

series 338 & 355

SEALED IN NON-METALLIC CASES with PLASTIC RESIN END SEALS
—55°C TO +125°C
50 VDC TO 600 VDC
FLAT (series 338) AND TUBULAR (series 355)

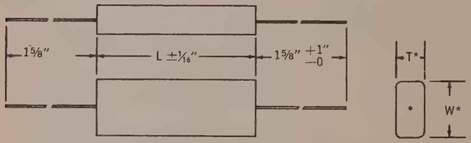


series 355 case outline



* UNDER .250" DIA. ±.031"
.250" THRU .499" DIA. ±.046"
.500" DIA. & OVER ±.062"

series 338 case outline



* UNDER .250" ±.031"
.250" THRU .499" ±.046"
.500" & OVER ±.062"

specifications

DISSIPATION FACTOR

Less than 1.0% when measured at or referred to a frequency of 1000 CPS at +25°C, per MIL-C-25C.

INSULATION RESISTANCE

The minimum insulation resistance when measured with an applied potential of 50 to 500 volts, but not to exceed the rated voltage, shall be as follows:

At + 25°C 50,000 megohm-mfds minimum but need not exceed 150,000 megohms.

At + 85°C 1000 megohm-mfds minimum but need not exceed 6000 ohms.

At + 125°C 50 megohm-mfds minimum but need not exceed 300 megohms.

TEST VOLTAGE

Shall withstand a DC voltage equal to 200% of the rated voltage for one minute at a temperature of +25°C, ±5°C.

ACCELERATED LIFE TEST

Shall withstand an accelerated life test of 250 hours with 140% of the voltage rating, applied at the applicable high ambient temperature, per MIL-C-25C.

The 355, and 338 series capacitors are furnished with high strength leads coated with a solderable alloy in the sizes shown below:

355 SERIES	GAUGE	338 SERIES
Up to .156 Dia.	#24 AWG	"T" Dim. up to .156
.156 Dia. to .375 Dia.	#22 AWG	"T" Dim. .156 to .375
.375 to .750 Dia.	#20 AWG	"T" Dim. .375 to .750
Greater than .750 Dia.	#18 AWG	"T" Dim. Over .750

MOISTURE RESISTANCE

Shall withstand the moisture resistance requirements as specified in military specification MIL-C-25C.

VIBRATION-ACCELERATION

Shall withstand the Grade 3 vibration-acceleration requirements of MIL-C-25C.

VOLTAGE RATINGS

Designed to operate over the temperature range of —55°C to +85°C at full rated DC voltage and up to +125°C with working voltages as follows:

+85°C	+125°C
600 VDC	300 VDC
400 VDC	200 VDC
200 VDC	150 VDC
150 VDC	100 VDC
50 VDC	50 VDC

LEAD PULL TEST

Shall withstand a five (5) pound pull applied axially for one minute, per MIL-C-25C.

LEAD BEND TEST

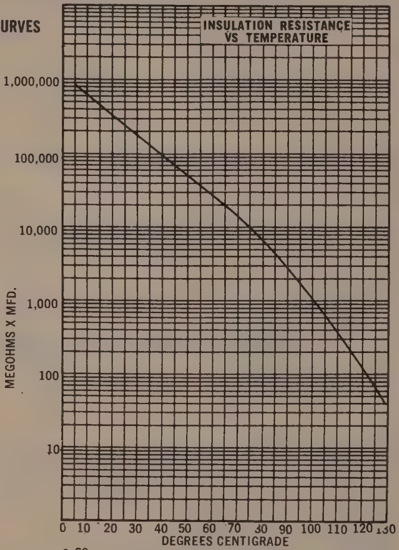
Shall be bent without breakage about the point of egress from the capacitor. First 90 degrees in one direction then back to the original position, and then 90 degrees in the opposite direction, per MIL-C-25C.

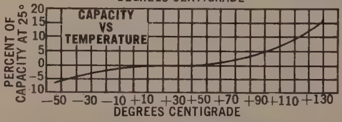
CAPACITANCE CHANGE WITH TEMPERATURE

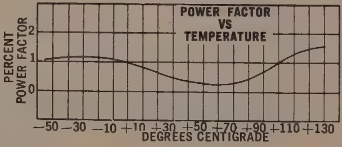
The capacitance change shall not exceed the following values with reference to the +25°C capacitance value:

TEMPERATURE	% CAP. CHANGE
− 55°C	—10% Maximum
+ 85°C	+ 5% Maximum
+125°C	+16% Maximum

TYPICAL CURVES







THE GUDEMAN CORPORATION
capacitors and EMI filters
340 WEST HURON STREET ▪ CHICAGO ILLINOIS 60610 ▪ 312 337 7400 ▪ TWX 910 221 3863

series 355

CAP. IN MFDS.	50 VDC.			150 VDC.			200 VDC.			400 VDC.			600 VDC.		
	Part No.	Dia.	L.	Part No.	Dia.	L.	Part No.	Dia.	L.	Part No.	Dia.	L.	Part No.	Dia.	L.
.001				355Y102	.156"	½"	355C102	.156"	½"	355E102	.156"	⅝"	355F102	.156"	11/16"
.0015				355Y152	.156"	½"	355C152	.156"	½"	355E152	.156"	⅝"	355F152	.171"	11/16"
.0022				355Y222	.156"	½"	355C222	.156"	½"	355E222	.156"	⅝"	355F222	.187"	11/16"
.0033				355Y332	.156"	½"	355C332	.156"	½"	355E332	.156"	⅝"	355F332	.218"	11/16"
.0047				355Y472	.156"	½"	355C472	.156"	½"	355E472	.156"	11/16"	355F472	.218"	¾"
.0068				355Y682	.156"	½"	355C682	.156"	½"	355E682	.171"	11/16"	355F682	.250"	¾"
.0082				355Y822	.156"	½"	355C822	.156"	½"	355E822	.187"	11/16"	355F822	.265"	¾"
.01				355Y103	.156"	½"	355C103	.171"	½"	355E103	.203"	11/16"	355F103	.281"	¾"
.012				355Y123	.171"	½"	355C123	.187"	½"	355E123	.218"	11/16"	355F123	.281"	13/16"
.015				355Y153	.187"	½"	355C153	.203"	½"	355E153	.234"	11/16"	355F153	.312"	13/16"
.018				355Y183	.187"	9/16"	355C183	.203"	11/16"	355E183	.250"	11/16"	355F183	.328"	13/16"
.022				355Y223	.203"	9/16"	355C223	.218"	11/16"	355E223	.265"	11/16"	355F223	.359"	13/16"
.027				355Y273	.203"	11/16"	355C273	.218"	11/16"	355E273	.250"	13/16"	355F273	.328"	1 1/16"
.033				355Y333	.203"	11/16"	355C333	.250"	11/16"	355E333	.281"	13/16"	355F333	.375"	1 1/16"
.039				355Y393	.234"	11/16"	355C393	.281"	11/16"	355E393	.296"	13/16"	355F393	.390"	1 1/16"
.047				355Y473	.234"	11/16"	355C473	.250"	13/16"	355E473	.328"	13/16"	355F473	.421"	1 1/16"
.056				355Y563	.234"	13/16"	355C563	.281"	13/16"	355E563	.296"	1 1/16"	355F563	.453"	1 1/16"
.068				355Y683	.250"	13/16"	355C683	.312"	13/16"	355E683	.328"	1 1/16"	355F683	.453"	1 3/16"
.082				355Y823	.265"	13/16"	355C823	.328"	13/16"	355E823	.343"	1 1/16"	355F823	.484"	1 3/16"
.1	355A104	.250"	13/16"	355Y104	.296"	13/16"	355C104	.359"	13/16"	355E104	.375"	1 1/16"	355F104	.453"	1 7/16"
.12	355A124	.265"	13/16"	355Y124	.328"	13/16"	355C124	.390"	13/16"	355E124	.359"	1 5/16"	355F124	.453"	1 9/16"
.15	355A154	.281"	13/16"	355Y154	.359"	13/16"	355C154	.421"	13/16"	355E154	.390"	1 5/16"	355F154	.500"	1 11/16"
.18	355A184	.312"	13/16"	355Y184	.343"	1 1/16"	355C184	.406"	1 1/16"	355E184	.375"	1 9/16"	355F184	.562"	1 11/16"
.22	355A224	.328"	13/16"	355Y224	.359"	1 1/16"	355C224	.437"	1 1/16"	355E224	.421"	1 9/16"	355F224	.609"	1 11/16"
.27	355A274	.359"	13/16"	355Y274	.359"	1 3/16"	355C274	.437"	1 3/16"	355E274	.468"	1 9/16"	355F274	.609"	2 1/16"
.33	355A334	.406"	13/16"	355Y334	.390"	1 3/16"	355C334	.484"	1 3/16"	355E334	.500"	1 9/16"	355F334	.640"	2 1/16"
.39	355A394	.359"	1 1/16"	355Y394	.406"	1 3/16"	355C394	.531"	1 3/16"	355E394	.546"	1 9/16"	355F394	.687"	2 1/16"
.47	355A474	.375"	1 1/16"	355Y474	.453"	1 3/16"	355C474	.546"	1 5/16"	355E474	.593"	1 9/16"	355F474	.765"	2 1/16"
.56	355A564	.406"	1 1/16"	355Y564	.421"	1 9/16"	355C564	.531"	1 9/16"	355E564	.593"	1 15/16"	355F564	.750"	2¼"
.68	355A684	.437"	1 1/16"	355Y684	.453"	1 9/16"	355C684	.578"	1 9/16"	355E684	.640"	1 15/16"	355F684	.828"	2¼"
.82	355A824	.484"	1 1/16"	355Y824	.500"	1 9/16"	355C824	.531"	1 13/16"	355E824	.687"	2 3/16"	355F824	.921"	2¼"
1.0	355A105	.468"	1 5/16"	355Y105	.531"	1 9/16"	355C105	.609"	1 13/16"	355E105	.750"	2 3/16"	355F105	.906"	2⅞"
1.5	355A155	.578"	1 5/16"	355Y155	.718"	1 13/16"	355C155	.750"	1 15/16"	355E155	.828"	2 7/16"	355F155	1.109"	2⅞"
2.0	355A205	.609"	1⅝"	355Y205	.812"	1 13/16"	355C205	.906"	2 3/16"	355E205	.953"	2 7/16"	355F205	1.265"	2⅞"
3.0	355A305	.734"	1⅝"												
4.0	355A405	.765"	1⅞"												
5.0	355A505	.859"	1⅞"												

series 338

CAP. IN MFDS.	50 VDC.				150 VDC.				200 VDC.				400 VDC.				600 VDC.			
	Part No.	T.	W.	L.	Part No.	T.	W.	L.	Part No.	T.	W.	L.	Part No.	T.	W.	L.	Part No.	T.	W.	L.
.001					338Y102	.125"	.234"	½"	338C102	.125"	.250"	½"	338E102	.125"	.250"	⅝"	338F102	.125"	.250"	11/16"
.0015					338Y154	.125"	.234"	½"	338C154	.125"	.250"	½"	338E154	.125"	.250"	⅝"	338F154	.125"	.250"	11/16"
.0022					338Y222	.125"	.234"	½"	338C222	.125"	.250"	½"	338E222	.125"	.250"	⅝"	338F222	.125"	.250"	11/16"
.0033					338Y332	.125"	.234"	½"	338C332	.125"	.250"	½"	338E332	.125"	.250"	⅝"	338F332	.140"	.250"	11/16"
.0047					338Y472	.125"	.234"	½"	338C472	.125"	.250"	½"	338E472	.125"	.250"	11/16"	338F472	.140"	.250"	¾"
.0068					338Y682	.125"	.234"	½"	338C682	.125"	.250"	½"	338E682	.125"	.250"	11/16"	338F682	.171"	.281"	¾"
.0082					338Y822	.125"	.234"	½"	338C822	.125"	.250"	½"	338E822	.125"	.250"	11/16"	338F822	.187"	.312"	¾"
.01					338Y103	.125"	.234"	½"	338C103	.125"	.250"	½"	338E103	.125"	.250"	11/16"	338F103	.203"	.328"	¾"
.012					338Y123	.125"	.234"	½"	338C123	.125"	.250"	½"	338E123	.140"	.250"	11/16"	338F123	.203"	.328"	13/16"
.015					338Y153	.125"	.234"	½"	338C153	.125"	.250"	½"	338E153	.156"	.265"	11/16"	338F153	.234"	.343"	13/16"
.018					338Y183	.125"	.234"	9/16"	338C183	.125"	.250"	11/16"	338E183	.171"	.281"	11/16"	338F183	.265"	.375"	13/16"
.022					338Y223	.125"	.234"	9/16"	338C223	.140"	.250"	11/16"	338E223	.187"	.312"	11/16"	338F223	.281"	.406"	13/16"
.027					338Y273	.125"	.234"	11/16"	338C273	.140"	.250"	11/16"	338E273	.171"	.281"	13/16"	338F273	.218"	.375"	1 1/16"
.033					338Y333	.125"	.234"	11/16"	338C333	.171"	.281"	11/16"	338E333	.171"	.328"	13/16"	338F333	.250"	.453"	1 1/16"
.039					338Y393	.156"	.265"	11/16"	338C393	.203"	.328"	11/16"	338E393	.218"	.343"	13/16"	338F393	.281"	.437"	1 1/16"
.047					338Y473	.156"	.265"	11/16"	338C473	.171"	.281"	13/16"	338E473	.218"	.390"	13/16"	338F473	.281"	.500"	1 1/16"
.056					338Y563	.156"	.265"	13/16"	338C563	.187"	.312"	13/16"	338E563	.187"	.343"	1 1/16"	338F563	.312"	.546"	1 1/16"
.068					338Y683	.171"	.281"	13/16"	338C683	.234"	.343"	13/16"	338E683	.234"	.375"	1 1/16"	338F683	.296"	.531"	1 3/16"
.082					338Y823	.187"	.312"	13/16"	338C823	.250"	.375"	13/16"	338E823	.250"	.406"	1 1/16"	338F823	.343"	.562"	1 3/16"
.1	338A104	.171"	.296"	13/16"	338Y104	.203"	.375"	13/16"	338C104	.281"	.406"	13/16"	338E104	.281"	.437"	1 1/16"	338F104	.312"	.531"	1 7/16"
.12	338A124	.187"	.312"	13/16"	338Y124	.218"	.390"	13/16"	338C124	.312"	.437"	13/16"	338E124	.250"	.406"	1 5/16"	338F124	.312"	.531"	1 9/16"
.15	338A154	.203"	.329"	13/16"	338Y154	.218"	.421"	13/16"	338C154	.343"	.500"	13/16"	338E154	.281"	.437"	1 1/16"	338F154	.328"	.546"	1 11/16"
.18	338A184	.234"	.359"	13/16"	338Y184	.218"	.390"	1 1/16"	338C184	.281"	.437"	1 1/16"	338E184	.281"	.437"	1 9/16"	338F184	.375"	.687"	1 11/16"
.22	338A224	.250"	.375"	13/16"	338Y224	.218"	.468"	1 1/16"	338C224	.343"	.500"	1 1/16"	338E224	.312"	.468"	1 9/16"	338F224	.421"	.718"	1 11/16"
.27	338A274	.281"	.406"	13/16"	338Y274	.250"	.406"	1 3/16"	338C274	.328"	.500"	1 3/16"	338E274	.359"	.515"	1 9/16"	338F274	.421"	.718"	2 1/16"
.33	338A334	.328"	.453"	13/16"	338Y334	.281"	.437"	1 3/16"	338C334	.359"	.531"	1 3/16"	338E334	.406"	.562"	1 9/16"	338F334	.421"	.843"	2 1/16"
.39	338A394	.265"	.406"	1 1/16"	338Y394	.312"	.468"	1 3/16"	338C394	.421"	.593"	1 3/16"	338E394	.437"	.593"	1 9/16"	338F394	.468"	.875"	2 1/16"
.47	338A474	.281"	.421"	1 1/16"	338Y474	.359"	.515"	1 3/16"	338C474	.437"	.609"	1 5/16"	338E474	.437"	.671"	1 9/16"	338F474	.578"	.984"	2 1/16"
.56	338A564	.312"	.453"	1 1/16"	338Y564	.312"	.468"	1 9/16"	338C564	.421"	.593"	1 9/16"	338E564	.437"	.671"	1 15/16"	338F564	.531"	.906"	2¼"
.68	338A684	.343"	.484"	1 1/16"	338Y684	.343"	.515"	1 9/16"	338C684	.468"	.625"	1 9/16"	338E684	.484"	.718"	1 15/16"	338F684	.625"	1.015"	2¼"
.82	338A824	.390"	.531"	1 1/16"	338Y824	.406"	.562"	1 9/16"	338C824	.421"	.593"	1 13/16"	338E824	.468"	.859"	2 3/16"	338F824	.718"	1.437"	2¼"
1.0	338A105	.343"	.531"	1 5/16"	338Y105	.375"	.687"	1 9/16"	338C105	.468"	.625"	1 13/16"	338E105	.531"	.921"	2 3/16"	338F105	.656"	1.093"	2⅞"
1.5	338A155	.453"	.640"	1 5/16"	338Y155	.562"	.796"	1 13/16"	338C155	.671"	.906"	1 15/16"	338E155	.671"	.906"	2 7/16"	338F155	.843"	1.265"	2⅞"
2.0	338A205	.484"	.671"	1⅝"	338Y205	.656"	.890"	1 13/16"	338C205	.625"	.953"	2 3/16"	338E205	.765"	1.046"	2 7/16"	338F205	1.000"	1.437"	2⅞"
3.0	338A305	.609"	.796"	1⅝"																
4.0	338A405	.609"	.843"	1⅞"																
5.0	338A505	.703"	.937"	1⅞"																

DIM. TOLERANCES:
Add following to Part No. for tolerance: —M = ±20%; —K = ±10%; —J = ±5%; —B = ±2%.
Add prefix "F" to specify outer fibreglas wrap in lieu of Mylar.

THE GUDEMAN CORPORATION

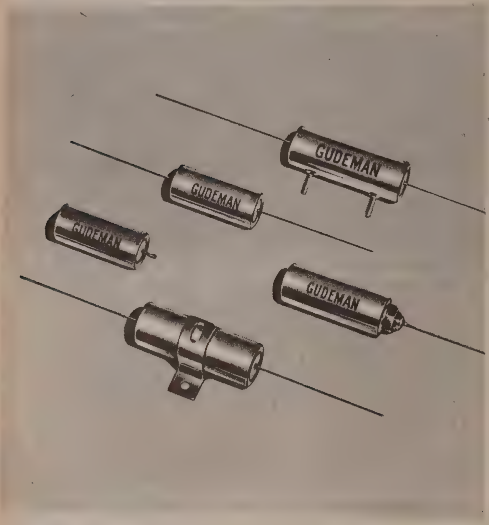
capacitors and EMI filters

340 WEST HURON STREET ▪ CHICAGO ILLINOIS 60610 ▪ 312 337 7400 ▪ TWX 910 221 3863

polystyrene dielectric

series X-727

HERMETICALLY SEALED (GLASS TO METAL)
TUBULAR METALLIC CASE
−65°C TO +85°C
LOW DIELECTRIC ABSORPTION



specifications

TEST VOLTAGE

Withstand 200% of rated voltage for 1 minute at 25°C.

LIFE TEST

Not more than one failure of 12 units on test for 250 hours when tested at 140% of rated voltage at 85°C.

DISSIPATION FACTOR

Less than .05% at 1000 Hz and 25°C up to 1. ufd and less than .2% for values over 1. ufd.

INSULATION RESISTANCE

The minimum insulation resistance when measured with an applied potential of 100 volts and an electrification time of two minutes at 25°C shall be as follows: 500,000 megohms x mfd. minimum for capacitance values from 10 mfd. to .33 mfd. For values less than .33 mfd. insulation resistance to be 1,500,000 megohms min. but need not exceed 10,000,000 megohms.

CAPACITOR "Q"

"Q" is greater than 2000 up to 1 megacycle at 25°C.

CAPACITANCE STABILITY

Less than .25% drift per year.

TEMPERATURE COEFFICIENT OF CAPACITANCE

The capacitance change shall not be greater than +1.5% to −.8% from −65°C to +85°C when referred to 25°C capacitance value, or −100 PPM/°C ±30 PPM/°C.

DIELECTRIC ABSORPTION

At 25°C — less than .05% of the initial 100 volts charging voltage shall reappear after charging for ½ hour and immediately discharging for 10 seconds through 1 ohm resistor. Absorption Voltage should be read 5 minutes but not late than 10 minutes after removing shorting bar.

Percent dielectric absorption = V Absorp./V Charge x 100

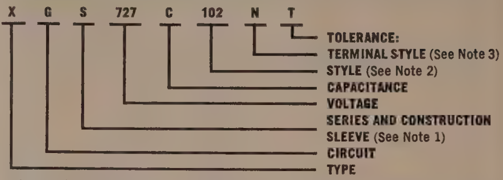
NOTES ON MEASUREMENT OF DIELECTRIC ABSORPTION

Dielectric absorption voltage is a complex phenomena and has been the subject of many studies at the Gudeman Co.

In general, the following holds true:

1. Absorption voltage is approximately proportional to charging time, charging voltage and temperature.
2. It decreases with longer shorting time.
3. Immediately after removal of shorting bar the measured absorption voltage appears low but rises steadily and finally levels off.

example of catalog number



NOTE 1. Insert letter "S" only when insulating sleeve is required.
NOTE 2. Insert the letter for style required. Absence of letter symbol indicates basic style is to be furnished.
NOTE 3. Insert the letter "T" only when solder lug terminals are required in lieu of axial wire lead terminals.

CIRCUIT AND INTERNAL CONSTRUCTION

XG-727 Specifies — one terminal grounded, extended foil construction.
XF-727 Specifies — both terminals insulated, extended foil construction.

VOLTAGE RATING AT 85°C

DC Working Voltage	Symbol
100	B
200	C
400	E
600	F

SPECIAL CAPACITORS

Non-standard capacitance values and tolerances not listed are available upon special request. Polystyrene capacitors may also be obtained in bathtub and in rectangular case styles. The above coding system can be used in like manner to obtain any specific types desired when ordering.

ELECTRICAL AND ENVIRONMENTAL TESTS

Series X-727 Polystyrene capacitors will meet the applicable electrical and environmental requirements of Military Specification MIL-C-25C in addition to the more stringent requirements as specified herein.

CAPACITANCE

The nominal capacitance value is expressed in micro-microfarads by a three digit number. The first two digits are the first two digits of the capacitance value. The last digit designates the number of zeros which follow the first two digits.

CAPACITANCE TOLERANCE

For .0099 mfd. and smaller the Standard Tolerance is ±20%. For .01 mfd. and larger the Standard Tolerance is ±10%.

Tolerance Symbol	Tolerance
—20	±20%
—10	±10%
—5	±5%
—2	±2%
—1	±1%

LEAD SPECIFICATIONS

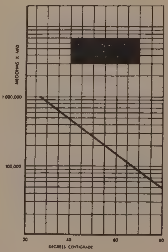
Standard lead length is 2¼" min. in the following AWG sizes.

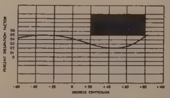
Case Diameter	AWG Size
.187	No. 24
.235 to .312	No. 22
.400 and larger	No. 20

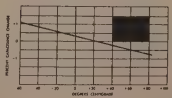
SELECTION OF EXTENDED FOIL AND INSERTED TAB CONSTRUCTION

The extended foil construction is generally recommended except where a saving of size and space is of paramount importance and the circuit requirement is such that the applied voltage is not less than 10 volts and the higher loss, due to the inserted tab construction, does not constitute a critical factor in the design of the circuit.

typical curves





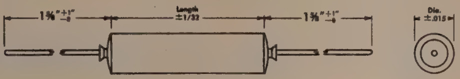


THE GUDEMAN CORPORATION
capacitors and EMI filters
340 WEST HURON STREET ▪ CHICAGO ILLINOIS 60610 ▪ 312 337 7400 ▪ TWX 910 221 3863

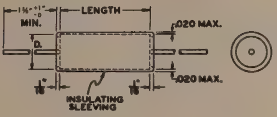
series X-727 (continued)

outline drawings

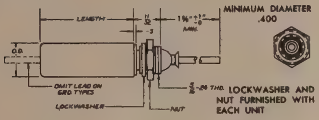
BASIC STYLE


1⅜"+1"/-0
Length ±1/32
1⅜"+1"/-0
Dia. ±.015

SLEEVING STYLE

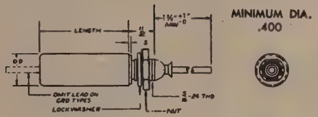

1⅜"+1"/-0 MIN.
LENGTH
.020 MAX.
D.
.020 MAX.
1/16"
1/16"
INSULATING SLEEVING

STYLE "N"


LENGTH
1⅜"+1"/-0 MIN.
MINIMUM DIAMETER .400
O.D.
OMIT LEAD ON GRD TYPES
LOCKWASHER
NUT
⅜-24 THD. LOCKWASHER AND NUT FURNISHED WITH EACH UNIT

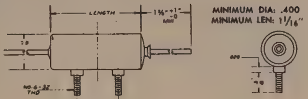
When "D" is	then "S" is
.400"	.000"
.562" (and up)	.031"

STYLE "NF"


LENGTH
1⅜"+1"/-0 MIN.
MINIMUM DIA. .400
O.D.
OMIT LEAD ON GRD TYPES
LOCKWASHER
NUT
⅜-24 THD

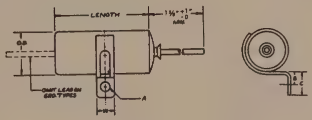
When "D" is	then "S" is
.400"	.000"
.562" (and up)	.031"

STYLE "K"


LENGTH
1⅜"+1"/-0 MIN
MINIMUM DIA: .400
MINIMUM LEN: 1 1/16"
O.D
NO. 6-32 THD
W

When "L" is	then "W" is
1 1/16"	⅝"
1 5/16"	¾"
1 9/16"	⅞"
1 13/16"	1⅛"
2 1/16"	1¼"
2 9/16"	1⅞"
2¾	2"

STYLE "J"


LENGTH
1⅜"+1"/-0 MIN
O.D.
OMIT LEAD ON GRD TYPES
A
W

When "D" is	then "W" is	"A" is	"B" is	"C" is
.235"	¼"	.144"	.187"	.312"
.312"	¼"	.144"	.187"	.312"
.400"	¼"	.144"	.187"	.312"
.562"	½"	.156"	.250"	.437"
.670"	½"	.156"	.250"	.437"
.750"	½"	.156"	.250"	.437"
1.000"				

series XG-727

ONE TERMINAL GROUNDED — EXTENDED FOIL CONSTRUCTION*

Dimensions shown are for uninsulated types. When insulating sleeve is required the diameter shall be increased by a maximum of .04" and the length shall be increased by ⅛" ±1/32". Mounting by means of lead wires is not recommended for units larger than .562" x 1 13/16".

Type	Cap. Mfd.	30 WVDC		100 WVDC		200 WVDC		400WVDC		600 WVDC	
		D ±.015	L ±1/32	D ±.015	L ±1/32	D ±.015	L ±1/32	D ±.015	L ±1/32	D ±.015	L ±1/32
XG-727___102	.001	.187	11/16					.312	13/16	.312	13/16
XG-727___152	.0015	.187	11/16					.312	13/16	.312	13/16
XG-727___222	.0022	.187	11/16			.235	13/16	.312	13/16	.400	13/16
XG-727___332	.0033	.187	11/16			.235	13/16	.312	13/16	.400	13/16
XG-727___472	.0047	.187	11/16			.312	13/16	.400	13/16	.400	1 1/16
XG-727___562	.0056	.235	11/16								
XG-727___682	.0068	.235	11/16	.235	¾	.400	3/16	.400	1 1/16	.400	1 1/16
XG-727___822	.0082	.235	11/16								
XG-727___103	.01	.235	11/16	.312	13/16	.400	1 1/16	.400	1 5/16	.400	1 5/16
XG-727___123	.012	.235	13/16								
XG-727___153	.015	.235	13/16	.312	13/16	.400	1 1/16	.400	1 5/16	.562	1 5/16
XG-727___183	.018	.312	13/16								
XG-727___223	.022	.312	13/16	.400	13/16	.400	1 5/16	.562	1 1/16	.562	1 9/16
XG-727___273	.027	.312	13/16								
XG-727___333	.033	.312	13/16	.400	1 1/16	.562	1 1/16	.562	1 5/16	.670	1 9/16
XG-727___473	.047	.312	13/16	.400	1 5/16	.562	1 5/16	.562	1 9/16	.670	1 13/16
XG-727___563	.056	.400	13/16								
XG-727___683	.068	.400	13/16	.562	1 1/16	.562	1 9/16	.670	1 9/16	.750	2 1/16
XG-727___823	.082	.400	13/16								
XG-727___104	.1	.400	13/16	.562	1 5/16	.670	1 9/16	1.00	1 13/16	1.00	1 13/16
XG-727___124	.12	.400	1 1/16								
XG-727___153	.15	.400	1 5/16	.562	1 9/16	.670	1 13/16	1.00	1 13/16	1.00	2 1/16
XG-727___184	.18										
XG-727___224	.22	.400	1 5/16	.670	1 9/16	.750	2 1/16	1.00	1 13/16	1.00	2¾
XG-727___274	.27	.562	1 1/16								
XG-727___334	.33	.562	1 1/16	.670	1 13/16	1.00	1⅝	1.00	2 9/16		
XG-727___394	.39	.562	1 5/16								
XG-727___474	.47	.562	1 5/16	.750	2 1/16	1.00	2 1/16				
XG-727___564	.56	.670	1 5/16								
XG-727___684	.68	.670	1 5/16	1.00	1 13/16	1.00	2¾				
XG-727___105	1.0			1.00	2 1/16						

* FOR SERIES XF-727 (both terminals insulated, extended foil construction) add 1/16" to length

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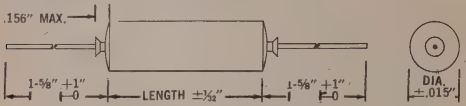
miniature "mylar*"—foil (extended foil) dielectric

series 383

HERMETICALLY SEALED (GLASS-TO-METAL)
TUBULAR METALLIC CASES
—55°C TO +85°C WITHOUT DERATING
30 VDC THRU 600 VDC

outline drawing



Grounded circuits are available in all sizes: for grounded length subtract 1/16 inch from catalog length.

Case Diameter (Inches)	Lead Gauge (AWG)
.175 and .195	24
.235 and .312	22
.400 and up	20

Standard leads consist of solid, bare, tinned wire. Special nickel leads are available for applications requiring a higher degree of weldability.

specifications

CAPACITANCE AND TOLERANCE
The capacitance limits at ±25°C are determined by the specified tolerance. Capacitors which have a nominal value of 1 MFD or less are measured or referred to a frequency of 1000 cps. Nominal capacitances above 1 MFD are measured at or referred to a frequency of 60 cps.

DISSIPATION FACTOR
Less than 0.6% at +25°C.

INSULATION RESISTANCE
The charging potential is equal to the specified operating voltage for a given temperature. The minimum electrification time is two minutes. Listed below are minimum values:

Temperature	Nominal Capacitance Mfd	R X C Megohms X Mfd	R Megohms
25°C	Greater than .5	50,000	
	Smaller than .5		100,000
85°C	Greater than .1	5,000	
	Smaller than .1		50,000
125°C	Greater than .02	100	
	Smaller than .02		5,000
150°C	Greater than .01	10	
	Smaller than .01		1,000

TEST VOLTAGE
Designed to withstand a test potential equal to 200% of the rated voltage for two minutes at 25°C.
The test voltage must be applied and discharged through a current limiting resistance of approximately 1000 ohms.

VOLTAGE RATING ABOVE 85°C
Derate above +85°C at a rate of 1.2% of rated voltage per degree C.

ACCELERATED LIFE TEST
Capacitors are designed to withstand a test potential equal to 140% of the rated voltage at the test temperature used for a period of 250 hours. One failure in 25 samples tested is permitted. The life test voltage must be applied and discharged through a current limiting resistance of approximately 1,000 ohms.

TEMPERATURE AND IMMERSION CYCLING
Designed to meet all requirements of the applicable paragraph of the latest issue of MIL-C-25.

MOISTURE RESISTANCE
Designed to meet all requirements of the applicable paragraph of the latest issue of MIL-C-25.

VIBRATION
Designed to withstand the Grade 3 vibration tests of the applicable paragraph of the latest issue of MIL-C-25.

AC VOLTAGE RATING
Designed to operate safely up to the following AV voltages at 85°C.

NOMINAL VOLTAGE VDC	AC — VOLTAGES AT 85°C (rms)	
	Up to 120 cps	Up to 400 cps
100	70	56
200	140	70
400	280	110
600	420	160

For 105°C operation the listed AC voltages should be derated to 60% of the 85°C values.
If both AC and DC voltages are present the sum of the DC voltage and the amplitude of the AC voltage must not exceed the specified DC-rating at a given temperature.

LEAD PULL TEST
Designed to withstand a steady pull force of 5 lbs. applied axially to a capacitor lead for one minute.

LEAD BENDING TEST
The leads withstand without breakage the following stresses performed near the point of egress: bend 90 degrees in one direction, then back to the original position and 90 degrees in the opposite direction.

30 VOLTS

Part No.	Cap MFD	Dia. In.	Length In.
F383Z155	1.5	.562	1⅝
F383Z225	2.2	.670	1⅞
F383Z335	3.3	.750	1⅞
F383Z475	4.7	.750	2⅝

50 VOLTS

Part No.	Cap MFD	Dia. In.	Length In.
F383A562	.0056	.175	¾
F383A682	.0068	.175	¾
F383A822	.0082	.175	¾
F383A103	.01	.175	¾
F383A123	.012	.175	¾
F383A153	.015	.175	¾
F383A183	.018	.195	¾
F383A223	.022	.195	¾
F383A273	.027	.195	¾
F383A333	.033	.195	¾
F383A393	.039	.235	¾
F383A473	.047	.235	¾
F383A563	.056	.312	⅞
F383A683	.068	.312	⅞
F383A823	.082	.312	⅞
F383A104	.1	.312	⅞
F383A124	.12	.312	⅞
F383A154	.15	.312	⅞
F383A184	.18	.400	⅞
F383A224	.22	.400	⅞
F383A274	.27	.400	⅞
F383A334	.33	.400	⅞
F383A394	.39	.400	1⅛
F383A474	.47	.400	1⅛
F383A564	.56	.400	1⅜
F383A684	.68	.400	1⅜
F383A824	.82	.562	1⅛
F383A105	1.0	.562	1⅛

200 VOLTS

Part No.	Cap MFD	Dia. In.	Length In.
F383C562	.0056	.235	¾
F383C682	.0068	.235	¾
F383C822	.0082	.235	¾
F383C103	.01	.235	¾
F383C123	.012	.235	¾
F383C153	.015	.235	¾
F383C183	.018	.235	¾
F383C223	.022	.235	¾
F383C273	.027	.312	⅞
F383C333	.033	.312	⅞
F383C393	.039	.312	⅞
F383C473	.047	.312	⅞
F383C563	.056	.312	⅞
F383C683	.068	.312	⅞
F383C823	.082	.400	⅞
F383C104	.1	.400	⅞
F383C124	.12	.400	⅞
F383C154	.15	.400	⅞
F383C184	.18	.400	1⅛
F383C224	.22	.400	1⅛
F383C274	.27	.400	1⅜
F383C334	.33	.400	1⅜
F383C394	.39	.562	1⅛
F383C474	.47	.562	1⅛
F383C564	.56	.562	1⅜
F383C684	.68	.562	1⅜
F383C824	.82	.562	1⅞
F383C105	1.0	.562	1⅞

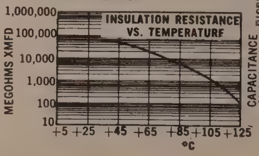
100 VOLTS

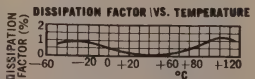
Part No.	Cap MFD	Dia. In.	Length In.
F383B102	.001	.175	¾
F383B122	.0012	.175	¾
F383B152	.0015	.175	¾
F383B182	.0018	.175	¾
F383B222	.0022	.175	¾
F383B272	.0027	.175	¾
F383B332	.0033	.175	¾
F383B392	.0039	.175	¾
F383B472	.0047	.175	¾
F383B562	.0056	.195	¾
F383B682	.0068	.195	¾
F383B822	.0082	.235	¾
F383B103	.01	.235	¾
F383B123	.012	.235	¾
F383B153	.015	.235	¾
F383B183	.018	.235	¾
F383B223	.022	.235	¾
F383B273	.027	.312	⅞
F383B333	.033	.312	⅞
F383B393	.039	.312	⅞
F383B473	.047	.312	⅞
F383B563	.056	.312	⅞
F383B683	.068	.312	⅞
F383B823	.082	.400	⅞
F383B104	.1	.400	⅞
F383B124	.12	.400	⅞
F383B154	.15	.400	⅞
F383B184	.18	.400	1⅛
F383B224	.22	.400	1⅛
F383B274	.27	.400	1⅜
F383B334	.33	.400	1⅜
F383B394	.39	.562	1⅛
F383B474	.47	.562	1⅛
F383B564	.56	.562	1⅜
F383B684	.68	.562	1⅜
F383B824	.82	.562	1⅞
F383B105	1.0	.562	1⅞
F383B155	1.5	.670	1⅞
F383B205	2.0	.750	1⅞

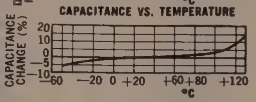
400 VOLTS

Part No.	Cap MFD	Dia. In.	Length In.
F388E272	.0027	.235	¾
F383E332	.0033	.235	¾
F383E392	.0039	.235	¾
F383E472	.0047	.235	¾
F383E822	.0082	.312	⅞
F383E103	.01	.312	⅞
F383E123	.012	.312	⅞
F383E153	.015	.312	⅞
F383E183	.018	.312	1
F383E223	.022	.312	1
F383E273	.027	.400	⅞
F383E333	.033	.400	⅞
F383E393	.039	.400	1
F383E473	.047	.400	1
F383E563	.056	.400	1¼
F383E683	.068	.400	1¼
F383E823	.082	.400	1½
F383E104	.1	.400	1½
F383E124	.12	.562	1⅛
F383E154	.15	.562	1⅛
F383E184	.18	.562	1½
F383E224	.22	.562	1½
F383E274	.27	.562	1⅞
F383E334	.33	.562	1⅞
F383E394	.39	.670	1⅞
E383E474	.47	.670	1⅞
F383E564	.56	.750	2⅛
F383E684	.68	.750	2⅛
F383E824	.82	.750	2⅝
F383E105	1.0	.750	2⅝

Add following to part no. to indicate tolerance: —20 = ±20%; —10 = ±10%; —5 = ±5%
"F" Indicates "Floating", Substitute "G" for "Grounded"


INSULATION RESISTANCE VS. TEMPERATURE


DISSIPATION FACTOR VS. TEMPERATURE


CAPACITANCE VS. TEMPERATURE

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*DuPont Trademark

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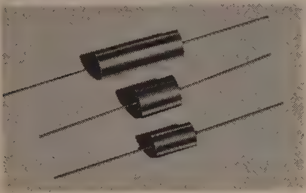
capacitors and EMI filters
340 WEST HURON STREET ■ CHICAGO ILLINOIS 60610 ■ 312 337 7400 ■ TWX 910 221 3863

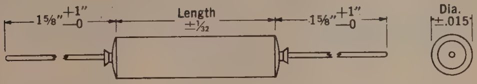
extended foil teflon dielectric

series 371

HERMETICALLY SEALED (GLASS TO METAL)
TUBULAR METAL CASE
—55°C TO +200°C WITHOUT DERATING
200 VDC THRU 600 VDC



outline drawing



LEAD SPECIFICATIONS: Solid tinned leads 1⅝" long +1" —0 tolerance. No. 22 AWG for .235" and .312" Dia. cans. No. 20 AWG for larger case diameters. For Series F371 (Both Terminals Insulated From Case) add 1/16" to above case length for diameters larger than .400". For diameters .400 and smaller add 3/32" to above case length.

specifications

DISSIPATION FACTOR

Maximum dissipation factor shall be 0.1% at +25°C when measured at a frequency of 1000 CPS. Maximum dissipation factor shall be 0.2% at +200°C.

INSULATION RESISTANCE

The minimum insulation resistance when measured with an applied potential of between 200 and 500 volts and an electrification time of 2 minutes, but never greater than rated voltage shall be as follows:

At + 25°C	125,000 megohm-mfds capacitance values .5 MFD and greater. 250,000 megohms for cap. values below .5 MFDS.
+ 85°C	40,000 meg-mfds for cap. values 1. MFD and greater. 40,000 megohms for cap. values below 1. MFD.
+ 125°C	5,000 meg x mfds for cap. values .25 MFD and greater.

TEST VOLTAGE

Shall withstand a DC voltage equal to 200% of the rated voltage for 2 minutes. Test voltage will be applied and discharged through a current limiting resistor of one Ohm per volt.

LIFE TEST VOLTAGE

Shall withstand an accelerated life test of 250 hours at +200°C and 140% of rated voltage. One failure in 12 samples permitted.

CAPACITANCE DRIFT

Capacitance will drift less than 2% from its initial value at 25°C after being temperature cycled from —55°C to 200°C.

CAPACITANCE "Q"

The "Q" of Gudeman Series 371 will average 5000 up to +125°C and will exceed 500 at +200°C.

DIELECTRIC ABSORPTION

At +25°C less than .05% of the initial 100 volts charging voltage shall reappear after charging for ½ hour and immediately discharging for 10 seconds through a one ohm resistor. Absorption voltage should be read 5 minutes, but not later than 10 minutes, after removing shorting bar. Percent dielectric absorption =V absorption x 100.
V charge

MOISTURE RESISTANCE AND VIBRATION

Shall meet the requirements for moisture resistance and vibration of Specification MIL-C-25A.

CAPACITANCE CHANGE WITH TEMPERATURE

Capacitance change shall not be greater than —4% at 200°C or +2.5% at —55°C relative to the nominal value at +25°C.

200 VDC

Part No.	Capacity	Dia. ±.015"	Length ±1/32"
G371C152	.0015	.235	23/32"
G371C392	.0039	.312	27/32"
G371C472	.0047	.312	27/32"
G371C822	.0082	.400	27/32"
G371C103	.01	.400	27/32"
G371C123	.012	.400	1 3/32"
G371C153	.015	.400	1 3/32"
G371C183	.018	.400	1 7/32"
G371C223	.022	.400	1 7/32"
G371C273	.027	.562	1 1/16"
G371C333	.033	.562	1 1/16"
G371C393	.039	.562	1 3/16"
G371F473	.047	.562	1 3/16"
G371F563	.056	.562	1 7/16"
G371F683	.068	.562	1 7/16"
G371F823	.082	.562	1 13/16"
G371F104	.1	.562	1 13/16"
G371F124	.12	.562	1 13/16"
G371F154	.15	.562	1 13/16"
G371F184	.18	.750	1 13/16"
G371F224	.22	.750	1 15/16"
G371F274	.27	1.00	1 11/16"
G371F394	.39	1.00	1 13/16"
G371F474	.47	1.00	2 3/16"

600 VDC

Part No.	Capacity	Dia. ±.015"	Length ±1/32"
G371F102	.001	.235	23/32"
G371F122	.0012	.312	27/32"
G371F152	.0015	.312	27/32"
G371F182	.0018	.312	27/32"
G371F222	.0022	.312	27/32"
G371F272	.0027	.312	27/32"
G371F332	.0033	.312	27/32"
G371F392	.0039	.400	27/32"
G371F472	.0047	.400	27/32"
G371F562	.0056	.400	27/32"
G371F682	.0068	.400	27/32"

400 VDC

Part No.	Capacity	Dia. ±.015"	Length ±1/32"
G371E822	.0082	.400	29/32"
G371E103	.01	.400	1 1/32"
G371E153	.015	.400	1 5/32"
G371E183	.018	.562	15/16"
G371E223	.022	.562	1 1/16"
G371E273	.027	.562	1 1/16"
G371E333	.033	.562	1 3/16"
G371E393	.039	.562	1 5/16"
G371E473	.047	.562	1 7/16"
G371E563	.056	.562	1 9/16"
G371E683	.068	.562	1 13/16"
G371E823	.082	.670	1 9/16"
G371E104	.1	.670	1 13/16"
G471E124	.12	.750	2 1/16"
G371E154	.15	.750	2 1/16"
G371E184	.18	1.000	1 13/16"
G371E224	.22	1.000	1 13/16"
G371E274	.27	1.000	2 5/16"
G371E334	.33	1.000	2 5/16"

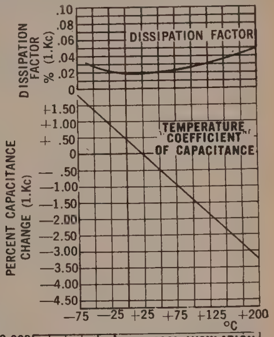
600 VDC continued

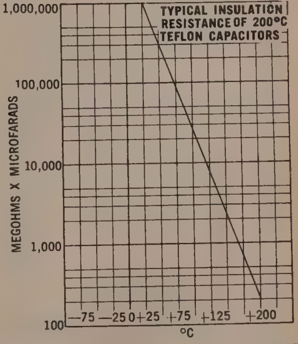
Part No.	Capacity	Dia. ±.015"	Length ±1/32"
G371F822	.0082	.400	1 3/32"
G371F103	.01	.400	1 3/32"
G371F123	.012	.400	1 7/32"
G371F153	.015	.400	1 7/32"
G371F183	.018	.562	1 1/16"
G371F223	.022	.562	1 1/16"
G371F273	.027	.562	1 3/16"
G371F333	.033	.562	1 3/16"
G371F393	.039	.562	1 7/16"
G371F473	.047	.562	1 7/16"
G371F563	.056	.562	1 13/16"
G371F683	.068	.562	1 13/16"
G371F823	.082	1.000	1 13/16"
G371F104	.1	1.000	1 13/16"
G371F124	.12	1.000	2 5/16"
G371F154	.15	1.000	2 5/16"

"G" indicates "Grounded". Substitute "F" for "Floating"

Add following to part no. for tolerance: —20 = ±20%; —10= ±10%; —5 = ±5%; —2 = ±2%; —1 = ±1%

TYPICAL CURVES



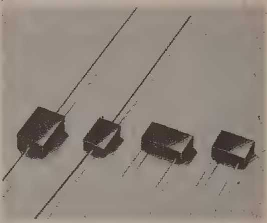


THE GUDEMAN CORPORATION
capacitors and EMI filters
340 WEST HURON STREET ▪ CHICAGO ILLINOIS 60610 ▪ 312 337 7400 ▪ TWX 910 221 3863

"thinfilm" metallized polycarbonate dielectric

series 317 & 318

ULTRAMINIATURE
SEALED IN RECTANGULAR EPOXY CASES
−55°C TO +125°C WITHOUT DERATING
SERIES 317 AXIAL LEADS
SERIES 318 RADIAL LEADS



specifications

OPERATING TEMPERATURE RANGE
317-318 series capacitors are designed to operate within the temperature range of −55°C to +125°C without voltage derating.

CAPACITANCE AND TOLERANCE
The capacitance limits at +25°C are determined by the specified tolerance. Capacitance is measured at or referred to a frequency of 1000 Hz.

DISSIPATION FACTOR
Th dissipation factor at +25°C is less than 0.5% at 1000 Hz.

TEST VOLTAGE
Capacitors shall withstand a DC voltage equal to 200% of the rated voltage for one minute at a temperature of +25°C, ±5°C. Test will be applied through resistor of 1 ohm per volt.

INSULATION RESISTANCE
The minimum insulation resistance when measured at rated voltage but not to exceed 500 VDC shall be as follows:
At +25°C 100,000 megohm-mfds. minimum but need not exceed 200,000 megohms.
At +125°C 100 megohm-mfds. minimum but need not exceed 2000 megohms.

ACCELERATED LIFE TEST
Capacitors shall withstand an accelerated life test of 250 hours with 140% of applied rated voltage at applicable high test temperature. Only one failure in 12 capacitors tested shall be allowed. A failure is defined as the following:
A) If the capacitor has "opened".
B) If the capacitance has changed more than 5% from its original value.
C) If the insulation resistance is less than 30% of its original specified value.
D) If the dissipation factor is greater than 1%.

CAPACITANCE CHANGE WITH TEMPERATURE
The change of capacitance with reference to the actual value at +25°C shall not exceed ±2%.

LEAD SPECIFICATIONS
The 317 and 318 series capacitors are furnished with solid-bare, tinned lead. See table in part number listing for lead gauge.
NOTE: Nickel "A" weldable leads are available with capacitors specified in this bulletin, add letter "W" as a suffix on the part number.

LEAD PULL TEST
These capacitors shall withstand a five (5) pound pull applied axially for one minute.

LEAD BEND TEST
Leads shall be bent without breakage about the point of egress from the capacitor. First 90 degrees in one direction then back to the original position and then 90 degrees in the opposite direction.

HUMIDITY TEST
Capacitors shall withstand 250 hours of 95% relative humidity at 40°C. Voltage will not be applied. Upon completion of test, units will be dried for four hours. Minimum product of insulation resistance @ 25°C shall be 33% of the original specified value.
The capacitance is not to change more than 5% of its original value.
The dissipation factor shall not exceed 1.5%.

series 317

50 VDC

Cap.	L ±1/32	W ±.01	T ±.01	Lead Gauge	Gudeman Part No.
.001	.42	.29	.17	24	317A102
.0012	.42	.29	.17	24	317A122
.0015	.42	.29	.17	24	317A152
.0018	.42	.29	.17	24	317A182
.0022	.42	.29	.17	24	317A222
.0027	.42	.29	.17	24	317A272
.0033	.42	.29	.17	24	317A332
.0039	.42	.29	.17	24	317A392
.0047	.42	.29	.17	24	317A472
.0056	.42	.29	.17	24	317A562
.0068	.42	.29	.17	24	317A682
.0082	.42	.29	.17	24	317A822
.01	.42	.29	.17	24	317A103
.012	.42	.29	.17	24	317A123
.015	.42	.29	.17	24	317A153
.018	.42	.29	.17	24	317A183
.022	.42	.29	.17	24	317A223
.027	.42	.29	.17	24	317A273
.033	.42	.29	.17	24	317A333
.039	.42	.29	.17	24	317A393
.047	.42	.29	.17	24	317A473
.056	.42	.29	.17	24	317A563
.068	.42	.29	.17	24	317A683
.082	.42	.29	.17	24	317A823
.10	.42	.29	.17	24	317A104
.12	.57	.29	.17	24	317A124
.15	.57	.29	.17	24	317A154
.18	.57	.29	.17	24	317A184
.22	.57	.29	.17	24	317A224
.25	.55	.36	.23	24	317A254
.27	.55	.36	.23	24	317A274
.33	.55	.36	.23	24	317A334
.39	.55	.36	.23	24	317A394
.47	.55	.36	.23	24	317A474
.50	.57	.42	.29	24	317A504
.56	.57	.42	.29	24	317A564
.68	.57	.42	.29	24	317A684
.75	.82	.42	.29	22	317A754
.82	.82	.42	.29	22	317A824
1.0	.82	.42	.29	22	317A105
1.2	.82	.42	.29	22	317A125
1.5	.82	.54	.39	22	317A155
1.8	.82	.54	.39	22	317A185
2.0	.82	.54	.39	20	317A205
2.2	.82	.54	.39	22	317A225
2.7	1.24	.54	.39	20	317A275
3.0	1.24	.54	.39	20	317A305
3.3	1.24	.54	.39	20	317A335
3.9	1.24	.54	.39	20	317A395
4.7	1.24	.54	.39	20	317A475
5.0	1.24	.54	.39	20	317A505
5.6	1.24	.54	.39	20	317A565
6.8	1.20	.72	.56	20	317A685

NOTE: FILM-FOIL CONSTRUCTION MAY BE USED IN CAP. VALUES TO .01 UF

100 VDC

Cap.	L ±1/32	W ±.01	T ±.01	Lead Gauge	Gudeman Part No.
.001	.42	.29	.17	24	317B102
.0012	.42	.29	.17	24	317B122
.0015	.42	.29	.17	24	317B152
.0018	.42	.29	.17	24	317B182
.0022	.42	.29	.17	24	317B222
.0027	.42	.29	.17	24	317B272
.0033	.42	.29	.17	24	317B392
.0039	.42	.29	.17	24	317B392
.0047	.42	.29	.17	24	317B472
.0056	.42	.29	.17	24	317B562
.0068	.42	.29	.17	24	317B682
.0082	.42	.29	.17	24	317B822
.01	.42	.29	.17	24	317B103
.012	.42	.29	.17	24	317B123
.015	.42	.29	.17	24	317B153
.018	.42	.29	.17	24	317B183
.022	.42	.29	.17	24	317B223
.027	.42	.29	.17	24	317B273
.033	.42	.29	.17	24	317B333
.039	.42	.29	.17	24	317B393
.047	.57	.29	.17	24	317B473
.056	.57	.29	.17	24	317B563
.068	.57	.29	.17	24	317B683
.082	.55	.36	.23	24	317B823
.10	.55	.36	.23	24	317B104
.12	.55	.36	.23	24	317B124
.15	.55	.36	.23	24	317B154
.18	.57	.42	.29	24	317B184
.22	.57	.42	.29	24	317B224
.25	.67	.42	.29	24	317B254
.27	.67	.42	.29	24	317B274
.33	.67	.42	.29	24	317B334
.39	.67	.42	.29	24	317B394
.47	.82	.42	.29	22	317B474
.50	.82	.42	.29	22	317B504
.56	.82	.54	.39	22	317B564
.68	.82	.54	.39	22	317B684
.75	.82	.54	.39	22	317B754
.82	.82	.54	.39	22	317B824
1.0	1.04	.54	.39	22	317B105
1.5	1.19	.54	.39	20	317B155
2.0	1.24	.72	.56	20	317B205
3.0	1.24	.72	.56	20	317B305
5.0	1.75	.72	.56	20	317B505

200 VDC

Cap.	L ±1/32	W ±.01	T ±.01	Lead Gauge	Gudeman Part No.
.001	.42	.29	.17	24	317C102
.0012	.42	.29	.17	24	317C122
.0015	.42	.29	.17	24	317C152
.0018	.42	.29	.17	24	317C182
.0022	.42	.29	.17	24	317C222
.0027	.42	.29	.17	24	317C272
.0033	.42	.29	.17	24	317C332
.0039	.42	.29	.17	24	317C392
.0047	.42	.29	.17	24	317C472
.0056	.42	.29	.17	24	317C562
.0068	.42	.29	.17	24	317C682
.0082	.42	.29	.17	24	317C822
.01	.42	.29	.17	24	317C103
.012	.42	.29	.17	24	317C123
.015	.42	.29	.17	24	317C153
.018	.42	.29	.17	24	317C183
.022	.57	.29	.17	24	317C223
.027	.57	.29	.17	24	317C273
.033	.57	.29	.17	24	317C333
.039	.57	.29	.17	24	317C393
.047	.55	.36	.23	24	317C473
.056	.55	.36	.23	24	317C563
.068	.55	.36	.23	24	317C683
.082	.57	.42	.29	24	317C823
.10	.57	.42	.29	24	317C104
.12	.57	.42	.29	24	317C124
.15	.67	.42	.29	24	317C154
.18	.67	.42	.29	24	317C184
.22	.82	.42	.29	22	317C224
.25	.82	.42	.29	22	317C254
.27	.82	.42	.29	22	317C274
.33	.82	.54	.39	22	317C334
.39	.82	.54	.39	22	317C394
.47	.82	.54	.39	22	317C474
.50	.82	.54	.39	22	317C504
.56	1.04	.54	.39	22	317C564
.68	1.04	.54	.39	20	317C684
.75	1.19	.54	.39	20	317C754
.82	1.19	.54	.39	20	317C824
1.0	1.24	.72	.56	20	317C105
1.5	1.24	.72	.56	20	317C155
2.0	1.75	.72	.56	20	317C205
3.0	1.75	.72	.56	20	317C305

THE GUDEMAN CORPORATION

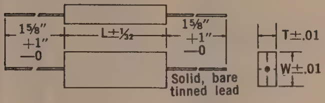
capacitors and EMI filters

340 WEST HURON STREET ▪ CHICAGO ILLINOIS 60610 ▪ 312 337 7400 ▪ TWX 910 221 3863

series 317 & 318 continued

outline drawings
series 317

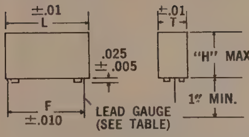
See Part No. Table for Lead Gauge.
Dimensions noted in inches.



NOTE: .42x.31x18 cases have one round standoff between leads.

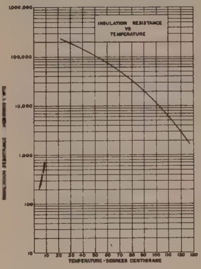
.55 x .31 x 18 has two standoffs between leads.

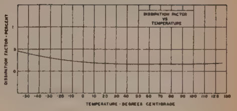
series 318

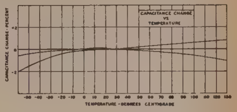


NOTE: Nickel "A" weldable leads are available with capacitors specified in this bulletin, add letter "W" as a suffix on the part number.

typical curves







example of part number

K 105 A 317

CAPACITANCE TOLERANCE:
B = ±2% J = ±5%
K = ±10% M = ±20%

CAPACITANCE: The nominal capacitance value expressed in picofarads is identified by a three digit number: The first two digits represent significant figures and the last digit specifies the number of zeros to follow.

VOLTAGE RATING: A = 50

SERIES NUMBER:
317 metallized polycarbonate dielectric extended foil construction premolded plastic case, axial leads with resin end seal.

318 metallized polycarbonate, extended foil construction premolded plastic case, radial leads with resin end seal.

series 318

50 VDC

Cap.	L	H	T	F	Lead Gauge	Gudeman Part No.
.001	.42	.31	.18	.300	22	318A102
.0012	.42	.31	.18	.300	22	318A122
.0015	.42	.31	.18	.300	22	318A152
.0018	.42	.31	.18	.300	22	318A182
.0022	.42	.31	.18	.300	22	318A222
.0027	.42	.31	.18	.300	22	318A272
.0033	.42	.31	.18	.300	22	318A332
.0039	.42	.31	.18	.300	22	318A392
.0047	.42	.31	.18	.300	22	318A472
.0056	.42	.31	.18	.300	22	318A562
.0068	.42	.31	.18	.300	22	318A682
.0082	.42	.31	.18	.300	22	318A822
.01	.42	.31	.18	.300	22	318A103
.012	.42	.31	.18	.300	22	318A123
.015	.42	.31	.18	.300	22	318A153
.018	.42	.31	.18	.300	22	318A183
.022	.42	.31	.18	.300	22	318A223
.027	.42	.31	.18	.300	22	318A273
.033	.42	.31	.18	.300	22	318A333
.039	.42	.31	.18	.300	22	318A393
.047	.42	.31	.18	.300	22	318A473
.056	.42	.31	.18	.300	22	318A563
.068	.42	.31	.18	.300	22	318A683
.082	.42	.31	.18	.300	22	318A823
.10	.42	.31	.18	.300	22	318A104
.12	.55	.31	.18	.400	22	318A124
.15	.55	.31	.18	.400	22	318A154
.18	.55	.31	.18	.400	22	318A184
.22	.55	.31	.18	.400	22	318A224
.25	.55	.38	.24	.400	22	318A254
.27	.55	.38	.24	.400	22	318A274
.33	.55	.38	.24	.400	22	318A334
.39	.55	.38	.24	.400	22	318A394
.47	.55	.38	.24	.400	22	318A474
.50	.55	.44	.30	.400	22	318A504
.56	.55	.44	.30	.400	22	318A564
.68	.55	.44	.30	.400	22	318A684
.75	.55	.44	.30	.400	22	318A684
.82	.82	.44	.30	.600	22	318A824
1.0	.82	.44	.30	.600	22	318A105
1.2	.82	.44	.30	.600	22	318A125
1.5	.82	.56	.40	.600	22	318A155
1.8	.82	.56	.40	.600	22	318A185
2.0	.82	.56	.40	.600	22	318A205
2.2	.82	.56	.40	.600	22	318A225
2.7	1.24	.56	.40	1.100	20	318A275
3.0	1.24	.56	.40	1.100	20	318A305
3.3	1.24	.56	.40	1.100	20	318A335
3.9	1.24	.56	.40	1.100	20	318A395
4.7	1.24	.56	.40	1.100	20	318A475
5.0	1.24	.56	.40	1.100	20	318A505
5.6	1.24	.56	.40	1.100	20	318A565
6.8	1.24	.74	.57	1.100	20	318A685

100 VDC

Cap.	L	H	T	F	Lead Gauge	Gudeman Part No.
.001	.42	.31	.18	.300	22	318B102
.0012	.42	.31	.18	.300	22	318B122
.0015	.42	.31	.18	.300	22	318B152
.0018	.42	.31	.18	.300	22	318B182
.0022	.42	.31	.18	.300	22	318B222
.0027	.42	.31	.18	.300	22	318B272
.0033	.42	.31	.18	.300	22	318B332
.0039	.42	.31	.18	.300	22	318B392
.0047	.42	.31	.18	.300	22	318B472
.0056	.42	.31	.18	.300	22	318B562
.0082	.42	.31	.18	.300	22	318B822
.01	.42	.31	.18	.300	22	318B103
.012	.42	.31	.18	.300	22	318B123
.015	.42	.31	.18	.300	22	318B153
.018	.42	.31	.18	.300	22	318B183
.022	.42	.31	.18	.300	22	318B223
.027	.42	.31	.18	.300	22	318B273
.033	.42	.31	.18	.300	22	318B333
.039	.42	.31	.18	.300	22	318B393
.047	.55	.31	.18	.400	22	318B473
.056	.55	.31	.18	.400	22	318B563
.068	.55	.31	.18	.400	22	318B683
.082	.55	.38	.24	.400	22	318B823
.10	.55	.38	.24	.400	22	318B104
.12	.55	.38	.24	.400	22	318B124
.15	.55	.38	.24	.400	22	318B154
.18	.55	.38	.24	.400	22	318B184
.22	.55	.44	.30	.400	22	318B224
.27	.67	.44	.30	.500	22	318B274
.33	.67	.44	.30	.500	22	318B334
.39	.67	.44	.30	.500	22	318B394
.47	.82	.44	.30	.600	22	318B474
.56	.82	.56	.40	.600	22	318B564
.68	.82	.56	.40	.600	22	318B684
.82	.82	.56	.40	.600	22	318B824
1.0	1.04	.56	.40	.800	22	318B105
1.2	1.24	.56	.40	1.100	20	318B125
1.5	1.24	.56	.40	1.100	20	318B155
1.8	1.24	.74	.57	1.100	20	318B185
2.0	1.24	.74	.57	1.100	20	318B205
2.2	1.24	.74	.57	1.100	20	318B225
2.7	1.24	.74	.57	1.100	20	318B275
3.0	1.24	.74	.57	1.100	20	318B305
3.3	1.75	.74	.57	1.600	20	318B335
3.9	1.75	.74	.57	1.600	20	318B395
4.7	1.75	.74	.57	1.600	20	318B475
5.0	1.75	.74	.57	1.600	20	318B505
5.6	1.75	.74	.57	1.600	20	318B565

200 VDC

Cap.	L	H	T	F	Lead Gauge	Gudeman Part No.
.001	.42	.31	.18	.300	22	318C102
.0012	.42	.31	.18	.300	22	318C122
.0015	.42	.31	.18	.300	22	318C152
.0018	.42	.31	.18	.300	22	318C182
.0022	.42	.31	.18	.300	22	318C222
.0027	.42	.31	.18	.300	22	318C272
.0033	.42	.31	.18	.300	22	318C332
.0039	.42	.31	.18	.300	22	318C392
.0047	.42	.31	.18	.300	22	318C472
.0056	.42	.31	.18	.300	22	318C562
.0082	.42	.31	.18	.300	22	318C822
.01	.42	.31	.18	.300	22	318C103
.012	.42	.31	.18	.300	22	318C123
.015	.42	.31	.18	.300	22	318C153
.018	.42	.31	.18	.300	22	318C183
.022	.55	.31	.18	.400	22	318C223
.027	.55	.31	.18	.400	22	318C273
.033	.55	.31	.18	.400	22	318C333
.039	.55	.31	.18	.400	22	318C393
.047	.55	.38	.24	.400	22	318C473
.056	.55	.38	.24	.400	22	318C563
.068	.55	.38	.24	.400	22	318C683
.082	.55	.44	.30	.400	22	318C823
.10	.55	.44	.30	.400	22	318C104
.12	.55	.44	.30	.400	22	318C124
.15	.67	.44	.30	.500	22	318C154
.18	.67	.44	.30	.500	22	318C184
.22	.82	.44	.30	.600	22	318C224
.27	.82	.44	.30	.600	22	318C274
.33	.82	.56	.40	.600	22	318C334
.39	.82	.56	.40	.600	22	318C394
.47	.82	.56	.40	.600	22	318C474
.56	1.04	.56	.40	.800	22	318C564
.68	1.04	.56	.40	.800	22	318C684
.82	1.24	.56	.40	1.100	20	318C824
1.0	1.24	.74	.57	1.100	20	318C105
1.2	1.24	.74	.57	1.100	20	318C125
1.5	1.24	.74	.57	1.100	20	318C155
1.8	1.75	.74	.57	1.600	20	318C185
2.0	1.75	.74	.57	1.600	20	318C205
2.2	1.75	.74	.57	1.600	20	318C225
2.7	1.75	.74	.57	1.600	20	318C275
3.0	1.75	.74	.57	1.600	20	318C305

NOTE: FILM-FOIL CONSTRUCTION MAY BE USED IN CAP. VALUES TO .01 UF

THE GUDEMAN CORPORATION
capacitors and EMI filters
340 WEST HURON STREET ■ CHICAGO ILLINOIS 60610 ■ 312 337 7400 ■ TWX 910 221 3863

metallized polycarbonate dielectric

series 409 & 410

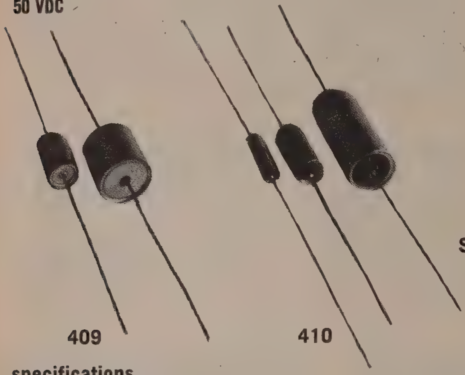
409 SERIES — HERMETICALLY SEALED (Ceramic End Seals)

410 SERIES — MINIATURE TUBULAR TYPES (Metal Case — Glass to Metal Seals)

.00008″ THICK FILM

—55°C TO +125°C WITHOUT DERATING

50 VDC



specifications

CAPACITANCE AND TOLERANCE

The capacitance limits at +25°C are determined by the specified tolerance.

Capacitance is measured at or referred to a frequency of 1000 Hz.

DISSIPATION FACTOR

The dissipation factor at +25°C is less than 0.3% at 1000 Hz.

INSULATION RESISTANCE

The charging potential is equal to the specified operating voltage for a given temperature. The electrification time is two minutes. Listed below are minimum values:

TEMPERATURE	CAPACITANCE (mfd.)	RXC (megohms x mfd.)	R (megohms)
25°C	>.5	100,000	
	<.5		200,000
125°C	>.5	1000	
	<.5		2000

ACCELERATED LIFE TEST

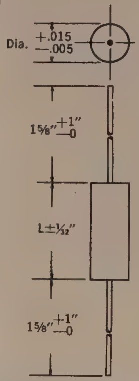
Capacitors shall withstand an accelerated life test of 250 hours with 140% of applied rated voltage at applicable high test temperature. Only one failure in 18 capacitors tested shall be allowed. A failure is defined as the following:

A) If the capacitor has "opened."

B) If the capacitance has changed more than 5% from its original value.

C) If the insulation resistance is less than 50% of its original value.

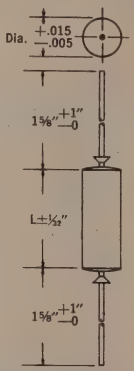
Series 409



Dim. Include Solder Eyelet

LEADS: 24 gauge: .175 and .195 Dia.; 22 gauge: .235 and .312 Dia.; 20 gauge: .400 Dia. and larger case sizes.

Series 410



LEADS: 24 gauge: .175 and .195 Dia.; 22 gauge: .235 and .312 Dia.; 20 gauge: .400 Dia. and larger case sizes.

For Sleeving Add .020 max to Dia. and 1/32 ± 1/32 to length

Part No.	Cap in MFDS.	Dia.	L
F409A103	.01	.175	15/32
F409A123	.012	.175	15/32
F409A153	.015	.175	15/32
F409A183	.018	.175	15/32
F409A223	.022	.175	15/32
F409A273	.027	.175	15/32
F409A333	.033	.175	15/32
F409A473	.047	.175	15/32
F409A563	.056	.175	15/32
F409A683	.068	.195	15/32
F409A823	.082	.195	15/32
F409A104	.1	.195	15/32
F409A124	.12	.235	15/32
F409A154	.15	.235	15/32
F409A184	.18	.312	15/32
F409A224	.22	.312	15/32
F409A274	.27	.312	15/32
F409A334	.33	.312	15/32
F409A474	.47	.400	15/32
*F409-001	.56	.400	15/32
F409A564	.56	.312	19/32
*F409-002	.68	.500	15/32
F409A684	.68	.400	19/32
*F409-003	.82	.500	15/32
F409A824	.82	.400	19/32
*F409-004	1.0	.562	15/32
F409A105	1.0	.400	19/32
*F409-005	1.2	.562	15/32
F409A125	1.2	.500	19/32
F409A155	1.5	.500	19/32
F409A205	2.0	.562	19/32
F409A305	3.0	.670	19/32

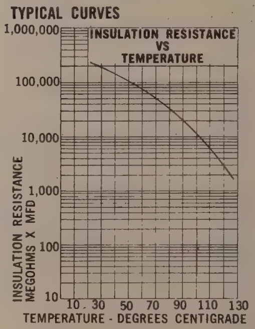
*Special No. assigned to alternate sizes for same cap. valves.

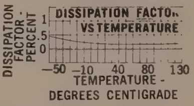
Part No.	Cap in MFDS.	Dia.	L
F410A103	.01	.175	17/32
F410A123	.012	.175	17/32
F410A153	.015	.175	17/32
F410A183	.018	.175	17/32
F410A223	.022	.175	17/32
F410A273	.027	.175	17/32
F410A333	.033	.175	17/32
F410A473	.047	.175	17/32
F410A563	.056	.175	17/32
F410A683	.068	.175	5/8
F410A823	.082	.175	5/8
F410A104	.1	.175	5/8
F410A124	.12	.175	5/8
F410A154	.15	.195	5/8
F410A184	.18	.195	5/8
F410A224	.22	.235	5/8
F410A274	.27	.235	5/8
F410A334	.33	.312	5/8
F410A474	.47	.312	5/8
F410A564	.56	.312	5/8
F410A684	.68	.312	27/32
F410A824	.82	.312	27/32
F410A105	1.0	.312	27/32
F410A125	1.2	.400	27/32
F410A155	1.5	.400	27/32
F410A185	1.8	.400	27/32
F410A205	2.0	.400	27/32
F410A225	2.2	.400	1 1/8
F410A275	2.7	.400	1 1/8
F410A305	3.0	.400	1 1/8
F410A335	3.3	.400	1 1/8
F410A395	3.9	.500	1 1/8
F410A475	4.7	.500	1 1/8
F410A505	5.0	.500	1 1/8
F410A565	5.6	.500	1 1/8
F410A685	6.8	.562	1 5/16
F410A825	8.2	.562	1 5/16
F410A106	10.0	.670	1 5/16
F410A156	15.0	.750	1 3/8

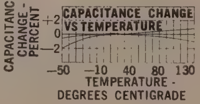
"F" indicates "Floating". Substitute "G" for "Grounded"

Add following to part no. for tolerance: —20 = ±20%; —10 = ±10%; —5 = ±5%; —1 = ±1%.

TYPICAL CURVES







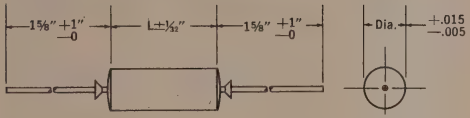
THE GUDEMAN CORPORATION
capacitors and EMI filters
340 WEST HURON STREET ■ CHICAGO ILLINOIS 60610 ■ 312 337 7400 ■ TWX 910 221 3863

miniature metallized polycarbonate dielectric

series 410

HERMETICALLY SEALED (GLASS-TO-METAL)
TUBULAR METALLIC CASES
—55°C TO +125°C WITHOUT DERATING
100 TO 400 VDC

outline drawing



Standard leads consist of solid, bare, tinned wire. Special nickel leads are available for applications requiring a higher degree of weldability.

LEADS: 24 gauge: .175 and .195 Dia.; 22 gauge: .235 and .312 Dia.; 20 gauge: .400 Dia. and larger case sizes.

For sleeving add .020 max. to Dia. and .032 $^{+.032}_{-.015}$ extension to each end of capacitor.

specifications

CAPACITANCE AND TOLERANCE
The capacitance limits at +25°C are determined by the specified tolerance. Capacitors are measured or referred to a frequency of 1000 cps.

DISSIPATION FACTOR
The dissipation factor at +25°C is less than 0.3% at 1000 cps.

INSULATION RESISTANCE
The charging potential is equal to the specified operating voltage for a given temperature. The minimum electrification time is two minutes. Listed below are minimum values:

Temperature	Nominal Capacitance Mfd	R X C Megohms X mfd	R Megohms
25°C	Greater than .5	100,000	
	Smaller than .5		200,000
125°C	Greater than .5	1,000	
	Smaller than .5		2,000

TEST VOLTAGE
Shall withstand a DC voltage equal to 200% of the rated voltage for one minute at a temperature of +25°C, ±5°C. Test will be applied through resistor of 1 ohm per volt.

TEMPERATURE AND IMMERSION CYCLING
Designed to meet all requirements of the applicable paragraph of the latest issue of MIL-C-18312.

ACCELERATED LIFE TEST
Shall withstand an accelerated life test of 250 hours with 140% of applied rated voltage at applicable high test temperature. Only one failure in 18 capacitors tested shall be allowed. A failure is defined as the following.
A) If the capacitor has "opened."
B) If the capacitance has changed more than 5% from its original value.
C) If the insulation resistance is less than 50% of its original value.
(D) If the DF is greater than 1%.

MOISTURE RESISTANCE
Designed to meet all requirements of the applicable paragraph of the latest issue of MIL-C-18312.

VIBRATION
Designed to withstand the Grade 3 vibration tests of the applicable paragraph of the latest issue of MIL-C-18312.

A-C VOLTAGE RATING:
(—55C to +85C Ambient)

D-C Voltage Rating	400 cps
100	65
200	120
300	200
400	240

LEAD PULL TEST
Designed to withstand a steady pull force of 5 lbs. applied axially to a capacitor lead for one minute.

LEAD BENDING TEST
The leads shall withstand without breakage the following stresses performed near the point of egress: bend 90 degrees in one direction, then back to the original position and 90 degrees in the opposite direction.

CAPACITANCE CHANGE WITH TEMPERATURE
The change of capacitance with reference to the actual value at +25°C does not exceed the following limits:

TEMPERATURE	CHANGE OF CAPACITANCE
—55°C	2%
+125°C	1%

100 VDC

Cap in MFDS.	Part No.	Dia.*	L.*
.01	F410B103	.175	9/16"
.012	F410B123	.175	9/16"
.015	F410B153	.175	9/16"
.018	F410B183	.195	9/16"
.022	F410B223	.195	9/16"
.027	F410B273	.195	9/16"
.033	F410B333	.195	9/16"
.039	F410B393	.195	9/16"
.047	F410B473	.195	5/8"
.056	F410B563	.195	5/8"
.068	F410B683	.235	5/8"
.082	F410B823	.235	5/8"
.1	F410B104	.235	11/16"
.12	F410B124	.235	11/16"
.15	F410B154	.312	5/8"
.18	F410B184	.312	5/8"
.22	F410B224	.312	11/16"
.27	F410B274	.312	11/16"
.33	F410B334	.312	13/16"
.39	F410B394	.312	13/16"
.47	F410B474	.400	11/16"
.56	F410B564	.400	13/16"
.68	F410B684	.400	13/16"
.82	F410B824	.400	15/16"
1.0	F410B105	.400	1"
1.5	F410B155	.500	1 1/8"
2.0	F410B205	.500	1 5/16"
3.0	F410B305	.562	1 5/16"
4.0	F410B405	.670	1 5/16"
5.0	F410B505	.670	1 9/16"
7.0	F410B705	.750	1 7/8"
8.0	F410B805	.750	2 1/8"
10.0	F410B106	1.00	2 1/8"

200 VDC

Cap in MFDS.	Part No.	Dia.*	L.*
.01	F410C103	.175	11/16"
.012	F410C123	.195	11/16"
.015	F410C153	.195	11/16"
.018	F410C183	.235	11/16"
.022	F410C223	.235	11/16"
.027	F410C273	.235	11/16"
.033	F410C333	.235	13/16"
.039	F410C393	.235	13/16"
.047	F410C473	.235	13/16"
.056	F410C563	.235	13/16"
.068	F410C683	.312	13/16"
.082	F410C823	.312	13/16"
.1	F410C104	.312	13/16"
.12	F410C124	.312	15/16"
.15	F410C154	.312	15/16"
.18	F410C184	.400	13/16"
.22	F410C224	.400	13/16"
.27	F410C274	.400	1 1/16"
.33	F410C334	.400	1 1/16"
.39	F410C394	.400	1 5/16"
.47	F410C474	.400	1 5/16"
.56	F410C564	.562	1 1/16"
.68	F410C684	.562	1 1/16"
.82	F410C824	.562	1 5/16"
1.0	F410C105	.562	1 5/16"
1.5	F410C155	.670	1 5/16"
2.0	F410C205	.670	1 9/16"
3.0	F410C305	.750	1 7/8"
4.0	F410C405	.750	2 1/8"
5.0	F410C505	.750	2 3/8"
7.0	F410C705	1.00	1 7/8"
8.0	F410C805	1.00	2 1/8"
10.0	F410C106	1.00	2 5/8"

300 VDC

Cap in MFDS.	Part No.	Dia.*	L.*
.01	F410D103	.235	11/16"
.012	F410D123	.312	13/16"
.015	F410D153	.312	13/16"
.018	F410D183	.312	13/16"
.022	F410D223	.312	13/16"
.027	F410D273	.312	13/16"
.033	F410D333	.312	13/16"
.039	F410D393	.312	13/16"
.047	F410D473	.312	13/16"
.056	F410D563	.312	1 1/16"
.068	F410D683	.312	1 1/16"
.082	F410D823	.400	1 1/16"
.1	F410D104	.400	1 1/16"
.12	F410D124	.400	1 5/16"
.15	F410D154	.400	1 5/16"
.18	F410D184	.500	1 1/16"
.22	F410D224	.500	1 1/16"
.27	F410D274	.562	1 1/16"
.33	F410D334	.562	1 1/16"
.39	F410D394	.562	1 5/16"
.47	F410D474	.562	1 5/16"
.56	F410D564	.562	1 13/16"
.68	F410D684	.562	1 13/16"
.82	F410D824	.670	1 13/16"
1.0	F410D105	.670	1 13/16"
1.5	F410D155	.750	2 1/8"
2.0	F410D205	.750	2 3/8"
3.0	F410D305	1.00	1 7/8"
4.0	F410D405	1.00	2 3/8"

400 VDC

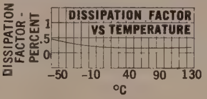
Cap in MFDS.	Part No.	Dia.*	L.*
.01	F410E103	.312	13/16"
.012	F410E123	.312	13/16"
.015	F410E153	.312	13/16"
.018	F410E183	.312	13/16"
.022	F410E223	.312	13/16"
.027	F410E273	.312	1 1/16"
.033	F410E333	.312	1 1/16"
.039	F410E393	.312	1 1/16"
.047	F410E473	.312	1 1/16"
.056	F410E563	.400	1 1/16"
.068	F410E683	.400	1 1/16"
.082	F410E823	.400	1 5/16"
.1	F410E104	.400	1 5/16"
.12	F410E124	.500	1 1/16"
.15	F410E154	.500	1 1/16"
.18	F410E184	.562	1 5/16"
.22	F410E224	.562	1 5/16"
.27	F410E274	.562	1 9/16"
.33	F410E334	.562	1 9/16"
.39	F410E394	.670	1 9/16"
.47	F410E474	.670	1 9/16"
.56	F410E564	.670	1 13/16"
.68	F410E684	.670	1 13/16"
.82	F410E824	.750	2 1/8"
1.0	F410E105	.750	2 1/8"
1.5	F410E155	1.00	2 1/8"
2.0	F410E205	1.00	2 1/8"

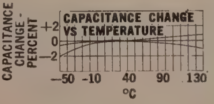
*Sizes shown are for floating circuit. Subtract 1/16" from length for grounded circuit.

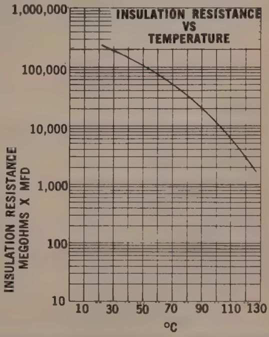
"F" indicates "Floating". Substitute "G" for Grounded.

Add following to part no. for tolerance: —20 = ±20%; —10 = ±10%; —5 = ±5%; —1 = ±1%.

TYPICAL CURVES





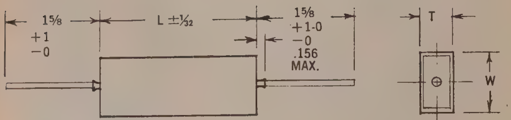


THE GUDEMAN CORPORATION
capacitors and EMI filters
340 WEST HURON STREET ▪ CHICAGO ILLINOIS 60610 ▪ 312 337 7400 ▪ TWX 910 221 3863

miniature metallized polycarbonate dielectric series 412

hermetically sealed (glass-to-metal) rectangular metallic cases −55°C to +125°C without derating 50 to 400 vdc

outline drawing



dimensions

Body		Lead Gage
T $^{+.015}_{-.005}$	W $^{+.015}_{-.005}$	AWG (Dia.)
.220	.340	22 (.025)
.310	.410	22 (.025)
.400	.570	20 (.032)
.500	.650	20 (.032)
.600	.800	20 (.032)

For Style "S" - Insulated Case. Add .020 Max. to "T" and "W" dimension and 1/16 nominal to case length.

engineering specifications

BASIC DESCRIPTION
Gudeman 412 series capacitors use a metallized polycarbonate dielectric, hermetically sealed in rectangular metallic, non-magnetic cases with glass-to-metal compression seals.

OPERATING TEMPERATURE RANGE
412 series capacitors are designed to operate within the temperature range of −55°C to +125°C without voltage derating.

CAPACITANCE AND TOLERANCE
The capacitance limits at +25°C are determined by the specified tolerance. Capacitors are measured or referred to a frequency of 1000 cps.

DISSIPATION FACTOR
The dissipation factor at +25°C is less than 0.3% at 1000 cps.

INSULATION RESISTANCE
The charging potential is equal to the specified operating voltage for a given temperature. The minimum electrification time is two mintues. Listed below are minimum values:

Temperature	Nominal Capacitance Mfd.	R X C Megohms X Mfd.	R Megohms
25°C	Greater than .5	100,000	
	Smaller than .5		200,000
125°C	Greater than .5	1,000	
	Smaller than .5		2,000

ACCELERATED LIFE TEST
Capacitors shall withstand an accelerated life test of 250 hours with 140% of applied rated voltage at applicable high test temperature. Only one failure in 18 capacitors tested shall be allowed. A failure is defined as the following:
- A) If the capacitor has "opened."
- B) If the capacitance has changed more than 5% from its original value.
- C) If the insulation resistance is less than 50% of its original value.
- D) If the DF is greater than 1%.

TEST VOLTAGE
412 series capacitors shall withstand a DC voltage equal to 200% of the rated voltage for one minute at a temperature of +25°C, ±5°C. Test will be applied through resistor of 1 ohm per volt.

TEMPERATURE AND IMMERSION CYCLING
This series is designed to meet all requirements of the applicable paragraph of the latest issue of MIL-C-39022.

MOISTURE RESISTANCE
This series is designed to meet all requirements of the applicable paragraph of the latest issue of MIL-C-39022.

VIBRATION
This series is designed to withstand the Grade 3 vibration tests of the applicable paragraph of the latest issue of MIL-C-39022.

AC VOLTAGE RATING:
(−55°C to +85°C Ambient)

DC Voltage Rating	400 cps
50	30
100	65
200	120
300	200
400	240

LEAD PULL TEST
Capacitors of this series are designed to withstand a steady pull force of 5 lbs. applied axially to a capacitor lead for one minute.

LEAD BENDING TEST
The leads shall withstand without breakage the following stresses performed near the point of egress: bend 90 degrees in one direction, then back to the original position and 90 degrees in the opposite direction.

LEAD SPECIFICATIONS
Standard leads consist of solid, bare, tinned wire. Special nickel leads are available for applications requiring a higher degree of weldability.

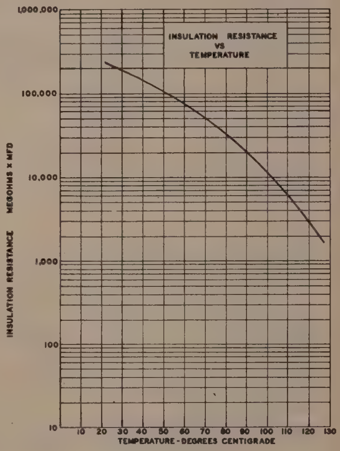
CAPACITANCE CHANGE WITH TEMPERATURE
The change of capacitance with reference to the actual value at +25°C does not exceed the following limits:

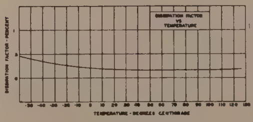
Temperature	Change of Capacitance
−55°C	−2%
+125°C	±1%

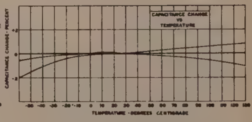
SPECIAL CAPACITORS
Capacitance values, voltage ratings, tolerances and sizes not listed in this catalog will be furnished upon request.

ENGINEERING SERVICE
Please feel free to consult our engineering department, without obligation, for assistance on any problem relating to the design, use or application of capacitors.

typical curves







THE GUDEMAN CORPORATION

capacitors and EMI filters

340 WEST HURON STREET ▪ CHICAGO ILLINOIS 60610 ▪ 312 337 7400 ▪ TWX 910 221 3863

series 412 (continued)

50 VOLTS

Part No.	Cap.	T	Inches W	L
F412A822	.0082	.220	.340	17/32
F412A103	.01	.220	.340	17/32
F412A123	.012	.220	.340	17/32
F412A153	.015	.220	.340	17/32
F412A183	.018	.220	.340	17/32
F412A223	.022	.220	.340	17/32
F412A273	.027	.220	.340	17/32
F412A333	.033	.220	.340	17/32
F412A393	.039	.220	.340	17/32
F412A473	.047	.220	.340	17/32
F412A563	.056	.220	.340	17/32
F412A683	.068	.220	.340	17/32
F412A823	.082	.220	.340	17/32
F412A104	.1	.220	.340	17/32
F412A124	.12	.220	.340	17/32
F420A154	.15	.220	.340	17/32
F412A184	.18	.220	.340	17/32
F412A224	.22	.220	.340	17/32
F412A274	.27	.220	.340	5/8
F412A334	.33	.220	.340	5/8
F412A394	.39	.220	.340	5/8
F412A474	.47	.220	.340	5/8
F412A564	.56	.220	.340	27/32
F412A684	.68	.220	.340	27/32
F412A824	.82	.220	.340	27/32
F412A105	1.0	.220	.340	27/32
F412A125	1.2	.220	.340	1 1/8
F412A155	1.5	.220	.340	1 1/8
F412A185	1.8	.310	.410	27/32
F412A225	2.2	.310	.410	1 1/8
F412A275	2.7	.310	.410	1 1/8
F412A335	3.3	.310	.410	1 5/16
F412A395	3.9	.310	.410	1 5/16
F412A475	4.7	.400	.570	1 1/8
F412A565	5.6	.400	.570	1 1/8
F412A685	6.8	.400	.570	1 5/16
F412A825	8.2	.400	.570	1 9/16
F412A106	10.0	.500	.650	1 5/16
F412A126	12.0	.500	.650	1 9/16
F412A156	15.0	.500	.650	1 13/16

75 VOLTS

Part No.	Cap.	T	Inches W	L
F412AX822	.0082	.220	.340	17/32
F412AX103	.01	.220	.340	17/32
F412AX123	.012	.220	.340	17/32
F412AX153	.015	.220	.340	17/32
F412AX183	.018	.220	.340	17/32
F412AX223	.022	.220	.340	17/32
F412AX273	.027	.220	.340	17/32
F412AX333	.033	.220	.340	17/32
F412AX393	.039	.220	.340	17/32
F412AX473	.047	.220	.340	17/32
F412AX563	.056	.220	.340	17/32
F412AX683	.068	.220	.340	17/32
F412AX823	.082	.220	.340	17/32
F412AX104	.1	.220	.340	17/32
F412AX124	.12	.220	.340	17/32
F412AX154	.15	.220	.340	5/8
F412AX184	.18	.220	.340	5/8
F412AX224	.22	.220	.340	27/32
F412AX274	.27	.220	.340	27/32
F412AX334	.33	.220	.340	27/32
F412AX394	.39	.220	.340	27/32
F412AX474	.47	.220	.340	27/32
F412AX564	.56	.220	.340	1 1/8
F412AX684	.68	.220	.340	1 1/8
F412AX824	.82	.220	.340	1 1/8
F412AX105	1.0	.310	.410	27/32
F412AX125	1.2	.310	.410	1 1/8
F412AX155	1.5	.310	.410	1 1/8
F412AX185	1.8	.310	.410	1 5/16
F412AX225	2.2	.400	.570	1 1/8
F412AX275	2.7	.400	.570	1 1/8
F412AX335	3.3	.400	.570	1 5/16
F412AX395	3.9	.400	.570	1 9/16
F412AX475	4.7	.400	.570	1 9/16
F412AX565	5.6	.400	.570	1 13/16
F412AX685	6.8	.500	.650	1 9/16
F412AX825	8.2	.500	.650	1 13/16
F412AX106	10.0	.500	.650	2 1/16
F412AX126	12.0	.500	.650	2 5/16
F412AX156	15.0	.600	.800	2 1/16

100 VOLTS

Part No.	Cap.	T	Inches W	L
F412B822	.0082	.220	.340	17/32
F412B103	.01	.220	.340	17/32
F412B123	.012	.220	.340	17/32
F412B153	.015	.220	.340	17/32
F412B183	.018	.220	.340	17/32
F412B223	.022	.220	.340	17/32
F412B273	.027	.220	.340	17/32
F412B333	.033	.220	.340	17/32
F412B393	.039	.220	.340	17/32
F412B473	.047	.220	.340	17/32
F412B563	.056	.220	.340	17/32
F412B683	.068	.220	.340	17/32
F412B823	.082	.220	.340	17/32
F412B104	.1	.220	.340	5/8
F412B124	.12	.220	.340	5/8
F412B154	.15	.220	.340	5/8
F412B184	.18	.220	.340	27/32
F412B224	.22	.220	.340	27/32
F412B274	.27	.220	.340	27/32
F412B334	.33	.220	.340	27/32
F412B394	.39	.220	.340	1 1/8
F412B474	.47	.220	.340	1 1/8
F412B564	.56	.220	.340	1 1/8
F412B684	.68	.310	.410	27/32
F412B824	.82	.310	.410	1 1/8
F412B105	1.0	.310	.410	1 1/8
F412B125	1.2	.310	.410	1 5/16
F412B155	1.5	.400	.570	1 1/8
F412B185	1.8	.400	.570	1 1/8
F412B225	2.2	.400	.570	1 5/16
F412B275	2.7	.400	.570	1 5/16
F412B335	3.3	.400	.570	1 9/16
F412B395	3.9	.400	.570	1 13/16
F412B475	4.7	.500	.650	1 9/16
F412B565	5.6	.500	.650	1 13/16
F412B685	6.8	.500	.650	2 1/16
F412B825	8.2	.500	.650	2 5/16
F412B106	10.0	.600	.800	2 1/16
F412B126	12.0	.600	.800	2 5/16
F412B156	15.0	.600	.800	2 5/16

150 VOLTS

Part No.	Cap.	T	Inches W	L
F412Y822	.0082	.220	.340	17/32
F412Y103	.01	.220	.340	17/32
F412Y103	.012	.220	.340	17/32
F412Y153	.015	.220	.340	17/32
F412Y183	.018	.220	.340	17/32
F412Y223	.022	.220	.340	17/32
F412Y273	.027	.220	.340	17/32
F412Y333	.033	.220	.340	17/32
F412Y393	.039	.220	.340	17/32
F412Y473	.047	.220	.340	17/32
F412Y563	.056	.220	.340	5/8
F412Y683	.068	.220	.340	5/8
F412Y823	.082	.220	.340	5/8
F412Y104	.1	.220	.340	27/32
F412Y124	.12	.220	.340	27/32
F412Y154	.15	.220	.340	27/32
F412Y184	.18	.220	.340	27/32
F412Y224	.22	.220	.340	1 1/8
F412Y274	.27	.220	.340	1 1/8
F412Y334	.33	.220	.340	1 1/8
F412Y394	.39	.310	.410	27/32
F412Y474	47	.310	.410	1 1/8
F412Y564	.56	.310	.410	1 1/8
F412Y684	.68	.310	.410	1 5/16
F412Y824	.82	.400	.570	1 1/8
F412Y105	1.0	.400	.570	1 1/8
F412Y125	1.2	.400	.570	1 5/16
F412Y155	1.5	.400	.570	1 5/16
F412Y185	1.8	.400	.570	1 9/16
F412Y225	2.2	.400	.570	1 13/16
F412Y275	2.7	.500	.650	1 9/16
F412Y335	3.3	.500	.650	1 13/16
F412Y395	3.9	.500	.650	2 1/16
F412Y475	4.7	.500	.650	2 5/16
F412Y565	5.6	.600	.800	2 1/16
F412Y685	6.8	.600	.800	2 5/16

200 VOLTS

Part No.	Cap.	T	Inches W	L
F412C822	.0082	.220	.340	17/32
F412C103	.01	.220	.340	17/32
F412C123	.012	.220	.340	17/32
F412C153	.015	.220	.340	17/32
F412C183	.018	.220	.340	17/32
F412C223	.022	.220	.340	17/32
F412C273	.027	.220	.340	17/32
F412C333	.033	.220	.340	17/32
F412C393	.039	.220	.340	5/8
F412C473	.047	.220	.340	5/8
F412C563	.056	.220	.340	27/32
F412C683	.068	.220	.340	27/32
F412C823	.082	.220	.340	27/32
F412C104	.1	.220	.340	27/32
F412C124	.12	.220	.340	27/32
F412C154	.15	.220	.340	1 1/8
F412C184	.18	.220	.340	1 1/8
F412C224	.22	.220	.340	1 1/8
F412C274	.27	.310	.410	1 1/8
F412C334	.33	.310	.410	1 1/8
F412C394	.39	.310	.410	1 1/8
F412C474	.47	.310	.410	1 5/16
F412C564	.56	.400	.570	1 1/8
F412C684	.68	.400	.570	1 1/8
F412C824	.82	.400	.570	1 5/16
F412C105	1.0	.400	.570	1 9/16
F412C125	1.2	.400	.570	1 9/16
F412C155	1.5	.400	.570	1 13/16
F412C185	1.8	.500	.650	1 9/16
F412C225	2.2	.500	.650	1 13/16
F412C275	2.7	.500	.650	2 1/16
F412C335	3.3	.500	.650	2 5/16
F412C395	3.9	.600	.800	2 1/16
F412C475	4.7	.600	.800	2 5/16

300 VOLTS

Part No.	Cap.	T	Inches W	L
F412D822	.0082	.220	.340	17/32
F412D103	.01	.220	.340	17/32
F412D123	.012	.220	.340	17/32
F412D153	.015	.220	.340	5/8
F412D183	.018	.220	.340	5/8
F412D223	.022	.220	.340	5/8
F412D273	.027	.220	.340	27/32
F412D333	.033	.220	.340	27/32
F412D393	.039	.220	.340	27/32
F412D473	.047	.220	.340	27/32
F412D563	.056	.220	.340	1 1/8
F412D683	.068	.220	.340	1 1/8
F412D823	.082	.220	.340	1 1/8
F412D104	.1	.310	.410	27/32
F412D124	.12	.310	.410	1 1/8
F412D154	.15	.310	.410	1 1/8
F412D184	.18	.310	.410	1 5/16
F412D224	.22	.400	.570	1 1/8
F412D274	.27	.400	.570	1 1/8
F412D334	.33	.400	.570	1 5/16
F412D394	.39	.400	.570	1 5/16
F412D474	.47	.400	.570	1 9/16
F412D564	.56	.400	.570	1 13/16
F412D684	.68	.500	.650	1 9/16
F412D824	.82	.500	.650	1 13/16
F412D105	1.0	.500	.650	2 1/16
F412D125	1.2	.500	.650	2 5/16
F412D155	1.5	.600	.800	2 1/16
F412D185	1.8	.600	.800	2 5/16

400 VOLTS

Part No.	Cap.	T	Inches W	L
F412E822	.0082	.220	.340	17/32
F412E103	.01	.220	.340	5/8
F412E123	.012	.220	.340	5/8
F412E153	.015	.220	.340	27/32
F412E183	.018	.220	.340	27/32
F412E223	.022	.220	.340	27/32
F412E273	.027	.220	.340	27/32
F412E333	.033	.220	.340	27/32
F412E393	.039	.220	.340	1 1/8
F412E473	.047	.220	.340	1 1/8
F412E563	.056	.310	.410	27/32
F412E683	.068	.310	.410	1 1/8
F412E823	.082	.310	.410	1 1/8
F412E104	.1	.310	.410	1 1/8
F412E124	.12	.310	.410	1 5/16
F412E154	.15	.400	.570	1 1/8
F412E184	.18	.400	.570	1 1/8
F412E224	.22	.400	.570	1 5/16
F412E274	.27	.400	.570	1 9/16
F412E334	.33	.400	.570	1 13/16
F412E394	.39	.400	.570	1 13/16
F412E474	.47	.500	.650	1 9/16
F412E564	.56	.500	.650	1 13/16
F412E684	.68	.500	.650	2 1/16
F412E824	.82	.500	.650	2 5/16
F412E105	1.0	.600	.800	2 1/16
F412E125	1.2	.600	.800	2 5/16

example of part number

NSE F 412 B 154 S —10

CAPACITANCE TOLERANCE: −20 ±20%; −10 ±10%; −5 ±5%; −1 ±1%.

MODIFICATION: Leave blank if basic style is desired. Insert the following letters to identify a modified style. **S**—Polyester insulating sleeve. (Nominal to the nominal case length.)

CAPACITANCE: Expressed in micro-microfarads by a three-digit number. The first two represent significant figures, the last one the number of zeroes to follow. (Example: .15MFD.)

VOLTAGE: **B**—100VDC; **C**—200VDC; **D**—300VDC; **E**—400VDC; **A**—50VDC; **AX**—75VDC; **Y**—150VDC.

SERIES NUMBER: Identifies the basic capacitor as described in this catalog.

CIRCUIT: **F**—For "Floating" (sizes as listed). **G**—For "Grounded" (subtract 1/16" from floating length).

For units with no solder seal "extension" where high component density exists or for printed circuit board applications; add prefix "NSE" to part number. (Example: NSE F412B1545-10.)

THE GUDEMAN CORPORATION
capacitors and EMI filters
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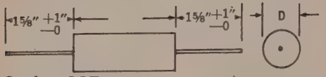
"thinfilm" metallized polycarbonate dielectric

series 396 & 397

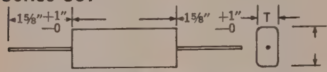
ULTRAMINIATURE TUBULAR (Series 396)
AND FLAT CAPACITORS (Series 397)
SEALED IN NON-METALLIC CASES
WITH PLASTIC RESIN END SEALS
—55°C TO +125°C WITHOUT DERATING
100 VDC TO 200 VDC

outline drawings

Series 396



Series 397



Solid, Bare Tinned Lead
See Part No. Table for Lead Gauge

NOTE: Nickel "A" weldable leads are available!
Add suffix "W" to Part No. for nickel lead.

specifications

CAPACITANCE AND TOLERANCE

The capacitance limits at +25°C are determined by the specified tolerance.
Capacitors are measured or referred to a frequency of 1000 cps.

DISSIPATION FACTOR

The dissipation factor at +25°C shall be less than 0.5% at 1000 cps.

INSULATION RESISTANCE

The charging potential is equal to the specified operating voltage for a given temperature. The minimum electrification time is two minutes. Listed below are minimum values:

Temperature	Nominal Capacitance Mfd.	R X C Megohms X mfd.	R Megohms
25°C	Greater than .5 Smaller than .5	50,000	100,000
125°C	Greater than .5 Smaller than .5	500	1,000

TEST VOLTAGE

Shall withstand a DC voltage equal to 200% of the rated voltage for one minute at a temperature of +25°C, ±5°C. Test voltage will be applied through resistor of 1 ohm per volt.

ACCELERATED LIFE TEST

Shall withstand an accelerated life test of 250 hours with 140% of applied rated voltage at applicable high test temperature. Only one failure in 12 capacitors tested shall be allowed. A failure is defined as the following:

A) If the capacitor has "opened."
B) If the capacitance has changed more than 5% from its original value.
C) If the insulation resistance is less than 50% of the original specified value.
D) If the DF is greater than 1%.

HUMIDITY

Not intended to be operated where humidity is a problem. This series is intended for use in circuits which are encapsulated or hermetically sealed.

LEAD PULL TEST

These capacitors shall withstand a five (5) pound pull applied axially for one minute, per MIL-C-25.

LEAD BEND TEST

Leads shall be bent without breakage about the point of egress from the capacitor. First 90 degrees in one direction then back to the original position and then 90 degrees in the opposite direction.

CAPACITANCE CHANGE WITH TEMP.

The change of capacitance with reference to the actual value at 25°C will not exceed the following limits:

TEMPERATURE	CHANGE OF CAPACITANCE
— 55°C +125°C	—2% ±1%

SERIES 396

50 VOLTS

Cap. In Mfds.	Part No.	Dia. Max.	L ±1/16	Ld. Ga.
.01	396A103	.171	½"	24
.012	396A123	.171	½"	24
.015	396A153	.171	½"	24
.018	396A183	.171	½"	24
.022	396A223	.171	½"	24
.027	396A273	.171	½"	24
.033	396A333	.171	½"	24
.047	396A473	.171	½"	24
.056	396A563	.171	½"	24
.068	396A683	.171	⅝"	24
.082	396A823	.171	⅝"	24
.1	396A104	.171	⅝"	24
.12	396A124	.171	⅝"	24
.15	396A154	.187	⅝"	24
.18	396A184	.187	⅝"	24
.22	396A224	.234	⅝"	22
.27	396A274	.234	⅝"	22
.33	396A334	.312	⅝"	22
.47	396A474	.312	⅝"	22
.56	396A564	.312	⅝"	22
.68	396A684	.312	13/16"	22
.82	396A824	.312	13/16"	22
1.0	396A105	.312	13/16"	22
1.2	396A125	.390	13/16"	20
1.5	396A155	.390	13/16"	20
1.8	396A185	.390	13/16"	20
2.0	396A205	.390	13/16"	20
2.2	396A225	.390	1 ⅛"	20
2.7	396A275	.390	1 ⅛"	20
3.0	396A305	.390	1 ⅛"	20
3.3	396A335	.390	1 ⅛"	20
3.9	396A395	.500	1 ⅛"	20
4.7	396A475	.500	1 ⅛"	20
5.0	396A505	.500	1 ⅛"	20
5.6	396A565	.500	1 ⅛"	20
6.8	396A685	.562	1 5/16"	20
8.2	396A825	.562	1 5/16"	20
10.0	396A106	.671	1 5/16"	20
15.0	396A156	.750	1 ⅜"	20

100 VOLTS

Cap. In Mfds.	Part No.	Dia. Max.	L ±1/16	Ld. Ga.
.01	396B103	.203	9/16"	24
.012	396B123	.203	9/16"	24
.015	396B153	.203	9/16"	24
.018	396B183	.218	9/16"	24
.022	396B223	.218	9/16"	24
.027	396B273	.218	9/16"	24
.033	396B333	.218	9/16"	24
.039	396B393	.218	9/16"	24
.047	396B473	.218	⅝"	24
.056	396B563	.218	⅝"	24
.068	396B683	.250	⅝"	22
.075	396B753	.250	⅝"	22
.082	396B823	.250	⅝"	22
.1	396B104	.250	11/16"	22
.12	396B124	.250	11/16"	22
.15	396B154	.343	⅝"	22
.18	396B184	.343	⅝"	22
.22	396B224	.343	11/16"	22
.27	396B274	.343	11/16"	22
.33	396B334	.343	13/16"	22
.39	396B394	.343	13/16"	22
.47	396B474	.421	11/16"	20
.56	396B564	.421	13/16"	20
.68	396B684	.421	13/16"	20
.82	396B824	.421	15/16"	20
1.0	396B105	.421	1"	20
1.5	396B155	.531	1 ⅛"	20
2.0	396B205	.531	1 5/16"	20
3.0	396B305	.593	1 5/16"	20
4.0	396B405	.703	1 5/16"	20
5.0	396B505	.703	1 9/16"	20
7.0	396B705	.781	1 ⅞"	20
8.0	396B805	.781	1 ⅞"	20
10.0	396B106	1.031	2 ⅛"	20

200 VOLTS

Cap. In Mfds.	Part No.	Dia. Max.	L ±1/16	Ld. Ga.
.01	396C103	.203	11/16"	24
.012	396C123	.218	11/16"	24
.015	396C153	.218	11/16"	24
.018	396C183	.250	11/16"	22
.022	396C223	.250	11/16"	22
.027	396C273	.250	11/16"	22
.033	396C333	.250	13/16"	22
.039	396C393	.250	13/16"	22
.047	396C473	.250	13/16"	22
.056	396C563	.250	13/16"	22
.068	396C683	.343	13/16"	22
.082	396C823	.343	13/16"	22
.1	396C104	.343	13/16"	22
.12	396C124	.343	15/16"	22
.15	396C154	.343	15/16"	22
.18	396C184	.421	13/16"	20
.22	396C224	.421	13/16"	20
.27	396C274	.421	1 1/16"	20
.33	396C334	.421	1 1/16"	20
.39	396C394	.421	1 5/16"	20
.47	396C474	.421	1 5/16"	20
.56	396C564	.593	1 1/16"	20
.68	396C684	.593	1 1/4"	20
.82	396C824	.593	1 5/16"	20
1.0	396C105	.593	1 5/16"	20
1.5	396C155	.703	1 5/16"	20
2.0	396C205	.703	1 9/16"	20
3.0	396C305	.781	1 ⅞"	20
4.0	396C405	.781	2 ⅛"	20
5.0	396C505	.781	2 ⅜"	20
7.0	396C705	1.031	1 ⅞"	20
8.0	396C805	1.031	2 ⅛"	20
10.0	396C106	1.031	2 ⅝"	20

SERIES 397

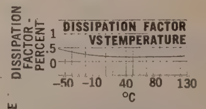
100 VOLTS

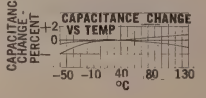
Cap. In Mfds.	Part No.	T Max.	W Max.	L ±1/16	Ld. Ga.
.01	397B103	.156	.250	9/16"	24
.012	397B123	.156	.250	9/16"	24
.015	397B153	.156	.250	9/16"	24
.018	397B183	.156	.250	9/16"	24
.022	397B223	.156	.250	9/16"	24
.027	397B273	.156	.250	9/16"	24
.033	397B333	.156	:250	9/16"	24
.039	397B393	.156	.250	9/16"	24
.047	397B473	.156	.250	⅝"	24
.056	397B563	.156	.250	⅝"	24
.068	397B683	.171	.296	⅝"	22
.075	397B753	.171	.296	⅝"	22
.082	397B823	.171	.296	⅝"	22
.1	397B104	.171	.296	11/16"	22
.12	397B124	.171	.296	11/16"	22
.15	397B154	.265	.390	⅝"	22
.18	397B184	.265	.390	⅝"	22
.22	397B224	.265	.390	11/16"	22
.27	397B274	.265	.390	11/16"	22
.33	397B334	.265	.390	13/16"	22
.39	397B394	.265	.390	13/16"	22
.47	397B474	.343	.453	11/16"	20
.56	397B564	.343	.453	13/16"	20
.68	397B684	.343	.453	13/16"	20
.82	397B824	.343	.453	15/16"	20
1.0	397B105	.343	.453	1"	20
1.5	397B155	.421	.578	1⅛"	20
2.0	397B205	.421	.578	1 5/16"	20
3.0	397B305	.484	.640	1 5/16"	20
4.0	397B405	.578	.765	1 5/16"	20
5.0	397B505	.578	.765	1 5/16"	20
7.0	397B705	.656	.859	1⅞"	20
8.0	397B805	.656	.859	1⅞"	20
10.0	397B106	.906	1.109	2⅛"	20

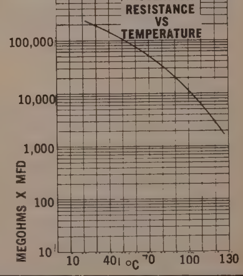
200 VOLTS

Cap. In Mfds.	Part No.	T Max.	W Max.	L ±1/16	Ld. Ga.
.01	397C103	.156	.250	11/16"	24
.012	397C123	.156	.250	11/16"	24
.015	397C153	.156	.250	11/16"	24
.018	397C183	.171	.211	11/16"	22
.022	397C223	.171	.211	11/16"	22
.027	397C273	.171	.211	11/16"	22
.033	397C333	.171	.211	13/16"	22
.039	397C393	.171	.211	13/16"	22
.047	397C473	.171	.211	13/16"	22
.056	397C563	.171	.211	13/16"	22
.068	397C683	.265	.390	13/16"	22
.082	397C823	.265	.390	13/16"	22
.1	397C104	.265	.390	13/16"	22
.12	397C124	.265	.390	15/16"	22
.15	397C154	.265	.390	15/16"	22
.18	397C184	.343	.453	13/16"	20
.22	397C224	.343	.453	13/16"	20
.27	397C274	.343	.453	1 1/16"	20
.33	397C334	.343	.453	1 1/16"	20
.39	397C394	.343	.453	1 5/16"	20
.47	397C474	.343	.453	1 5/16"	20
.56	397C564	.484	.640	1 1/16"	20
.68	397C684	.484	.640	1 1/16"	20
.82	397C824	.484	.640	1 5/16"	20
1.0	397C105	.484	.640	1 5/16"	20
1.5	397C155	.593	.750	1 5/16"	20
2.0	397C205	.593	.750	1 9/16"	20
3.0	397C305	.656	.859	1⅞"	20
4.0	397C405	.656	.859	2⅛"	20
5.0	397C505	.656	.859	2⅜"	20
7.0	397C705	.906	1.109	1⅞"	20
8.0	397C805	.906	1.109	2⅛"	20
10.0	397C106	.906	1.109	2⅝"	20

TYPICAL CURVES







THE GUDEMAN CORPORATION
capacitors and EMI filters
340 WEST HURON STREET ▪ CHICAGO ILLINOIS 60610 ▪ 312 337 7400 ▪ TWX 910 221 3863

"thinfilm" metallized mylar* dielectric

series 322 & 323

ULTRA MINIATURE CAPACITORS

SEALED IN RECTANGULAR EPOXY CASES WITH RESIN END SEAL

100 VDC TO 200 VDC

SERIES 322 — RADIAL LEADS

SERIES 323 — AXIAL LEADS

specifications

DISSIPATION FACTOR

The dissipation factor shall not exceed 1.0% when measured at or referred to a frequency of 1,000 CPS at +25°C. Nominal capacitance values above 1.0 mfd. are measured at or referred to a frequency of 60 cps.

INSULATION RESISTANCE

The minimum insulation resistance when measured with an applied potential of 50 to 200 volts, but not to exceed the rated voltage, shall be as follows:
At +25°C 10,000 megohm-mfds. minimum but need not exceed 30,000 megohms.
At +85°C 500 megohm-mfds. minimum but need not exceed 3000 megohms.
At +125°C 10 megohm-mfds. minimum but need not exceed 150 megohms.

ACCELERATED LIFE TEST

Shall withstand an accelerated life test of 250 hours with 140% of applied rated voltage at applicable high test temperature. Only one failure in 12 capacitors tested shall be allowed.
A failure is defined as the following:
A) If the capacitor has "opened" or short circuited.
B) If the capacitance has changed more than 10% from its original value.
C) If the insulation resistance is less than 30% of its specified value.

TEST VOLTAGE

Shall withstand a DC voltage equal to 200% of the rated voltage for one minute at a temperature of +25°C±5°C.

VOLTAGE RATINGS

Designed to operate over the temperature range of —55°C to +85°C at full rated DC voltage and up to +125°C with working voltages as follows:

+85°C	+125°C
200VDC	100VDC
100VDC	50VDC

HUMIDITY TEST

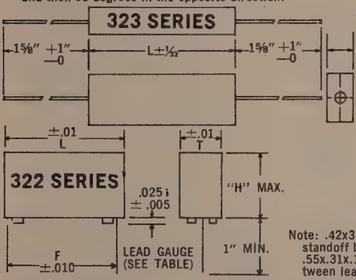
Capacitors shall withstand 250 hours of 95% relative humidity at 40°C. Voltage will not be applied. Upon completion of test, units will be dried for four hours. Minimum product of insulation resistance shall be 5000 megohm-mfd but need not exceed 15,000 megohms.
The capacitance will change not more than 10% of its original value. The dissipation factor shall not increase over 1.5%.

LEAD PULL TEST

Shall withstand a five (5) pound pull applied axially for one minute.

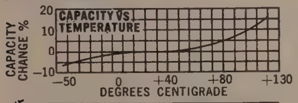
LEAD BEND TEST

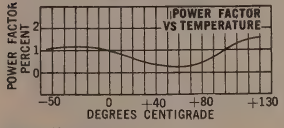
Leads shall be bent without breakage about the point of the egress from the capacitor. First 90 degrees in one direction then back to the original position, and then 90 degrees in the opposite direction.

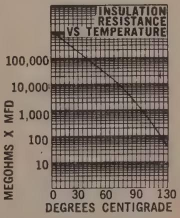


Note: .42x31x.18 case have one round standoff between leads.
.55x.31x.18 has two standoffs between leads.

TYPICAL CURVES







*DuPont trademark

100 VDC

MFD	100 VDC L	W	T	Part No.	Lead Gauge
.001	.42	.29	.17	323B102	24
.0012	.42	.29	.17	323B122	24
.0015	.42	.29	.17	323B152	24
.0018	.42	.29	.17	323B182	24
.0022	.42	.29	.17	323B222	24
.0027	.42	.29	.17	323B272	24
.0033	.42	.29	.17	323B332	24
.0039	.42	.29	.17	323B392	24
.0047	.42	.29	.17	323B472	24
.0056	.42	.29	.17	323B562	24
.0068	.42	.29	.17	323B682	24
.0082	.42	.29	.17	323B822	24
.01	.42	.29	.17	323B103	24
.012	.42	.29	.17	323B123	24
.015	.42	.29	.17	323B153	24
.018	.42	.29	.17	323B183	24
.022	.42	.29	.17	323B223	24
.027	.42	.29	.17	323B273	24
.033	.42	.29	.17	323B333	24
.039	.42	.29	.17	323B393	24
.047	.42	.29	.17	323B473	24
.056	.57	.29	.17	323B563	24
.068	.57	.29	.17	323B683	24
.082	.57	.29	.17	323B823	24
.10	.57	.29	.17	323B104	24
.12	.57	.29	.17	323B124	24
.15	.55	.36	.23	323B154	24
.18	.55	.36	.23	323B184	24
.22	.55	.36	.23	323B224	24
.25	.55	.36	.23	323B254	24
.27	.55	.36	.23	323B274	24
.33	.57	.42	.29	323B334	24
.39	.57	.42	.29	323B394	24
.47	.67	.42	.29	323B474	24
.50	.67	.42	.29	323B504	24
.56	.67	.42	.29	323B564	24
.68	.67	.42	.29	323B684	24
.75	.82	.42	.29	323B754	24
.82	.82	.42	.29	323B824	22
1.0	.82	.54	.39	323B105	22
1.5	.82	.54	.39	323B155	22
2.0	1.04	.54	.39	323B205	22
3.0	1.24	.54	.39	323B305	22
5.0	1.75	.72	.56	323B505	20
8.0	1.75	.72	.56	323B805	20
10.0	1.92	.72	.56	323B106	20

200 VDC

MFD	200 VDC L	W	T	Part No.	Lead Gauge
.001	.42	.29	.17	323C102	24
.0012	.42	.29	.17	323C122	24
.0015	.42	.29	.17	323C152	24
.0018	.42	.29	.17	323C182	24
.0022	.42	.29	.17	323C222	24
.0027	.42	.29	.17	323C272	24
.0033	.42	.29	.17	323C332	24
.0039	.42	.29	.17	323C392	24
.0047	.42	.29	.17	323C472	24
.0056	.42	.29	.17	323C562	24
.0068	.42	.29	.17	323C682	24
.0082	.42	.29	.17	323C822	24
.01	.42	.29	.17	323C103	24
.012	.42	.29	.17	323C123	24
.015	.42	.29	.17	323C153	24
.018	.42	.29	.17	323C183	24
.022	.42	.29	.17	323C223	24
.027	.57	.29	.17	323C273	24
.033	.57	.29	.17	323C333	24
.039	.57	.29	.17	323C393	24
.047	.55	.36	.23	323C473	24
.056	.55	.36	.23	323C563	24
.068	.55	.36	.23	323C683	24
.082	.55	.36	.23	323C823	24
.1	.57	.42	.29	323C104	24
.12	.57	.42	.29	323C124	24
.15	.67	.42	.29	323C154	24
.18	.67	.42	.29	323C184	24
.22	.67	.42	.29	323C224	24
.25	.82	.42	.29	323C254	22
.27	.82	.42	.29	323C274	22
.33	82	.54	.39	323C334	22
.39	.82	.54	.39	323C394	22
.47	.82	.54	.39	323C474	22
.50	.82	.54	.39	323C504	22
.56	1.04	.54	.39	323C564	22
.68	1.04	.54	.39	323C684	22
.75	1.04	.54	.39	323C754	22
.82	1.19	.54	.39	323C824	22
1.0	1.19	.54	.39	323C105	22
1.5	1.75	.72	.56	323C155	20
2.0	1.75	.72	.56	323C205	20
3.0	1.75	.72	.56	323C305	20

SERIES 322

100 VDC

MFD	100 VDC L	H	T	F	Part No.	Ld. Ga.
.001	.42	.31	.18	.300	322B102	22
.0012	.42	.31	.18	.300	322B122	22
.0015	.42	.31	.18	.300	322B152	22
.0018	.42	.31	.18	.300	322B182	22
.0022	.42	.31	.18	.300	322B222	22
.0027	.42	.31	.18	.300	322B272	22
.0033	.42	.31	.18	.300	322B332	22
.0039	.42	.31	.18	.300	322B392	22
.0047	.42	.31	.18	.300	322B472	22
.0056	.42	.31	.18	.300	322B562	22
.0068	.42	.31	.18	.300	322B682	22
.0082	.42	.31	.18	.300	322B822	22
.01	.42	.31	.18	.300	322B103	22
.012	.42	.31	.18	.300	322B123	22
.015	.42	.31	.18	.300	322B153	22
.018	.42	.31	.18	.300	322B183	22
.022	.42	.31	.18	.300	322B223	22
.027	.42	.31	.18	.300	322B273	22
.033	.42	.31	.18	.300	322B333	22
.039	.42	.31	.18	.300	322B393	22
.047	.42	.31	.18	.300	322B473	22
.056	.55	.31	.18	.400	322B563	22
.068	.55	.31	.18	.400	322B683	22
.082	.55	.31	.18	.400	322B823	22
.1	.55	.31	.18	.400	322B104	22
.12	.55	.31	.18	.400	322B124	22
.15	.55	.38	.24	.400	322B154	22
.18	.55	.38	.24	.400	322B184	22
.22	.55	.38	.24	.400	322B224	22
.25	.55	.38	.24	.400	322B254	22
.27	.55	.38	.24	.400	322B274	22
.33	.55	.44	.30	.400	322B334	22
.39	.55	.44	.30	.400	322B394	22
.47	.67	.44	.30	.500	322B474	22
.50	.67	.44	.30	.500	322B504	22
.56	.67	.44	.30	.500	322B564	22
.68	.67	.44	.30	.500	322B684	22
.75	.82	.44	.30	.600	322B754	22
.82	.82	.44	.30	.600	322B824	22
1.0	.82	.56	.40	.600	322B105	22
1.5	.82	.56	.40	.600	322B155	22
2.0	1.04	.56	.40	.800	322B205	22
3.0	1.24	.56	.40	1.100	322B305	20
5.0	1.75	.74	.57	1.600	322B505	20
8.0	1.75	.74	.57	1.600	322B805	20

200 VDC

MFD	200 VDC L	H	T	F	Part No.	Ld. Ga.
.001	.42	.31	.18	.300	322C102	22
.0012	.42	.31	.18	.300	322C122	22
.0015	.42	.31	.18	.300	322C152	22
.0018	.42	.31	.18	.300	322C182	22
.0022	.42	.31	.18	.300	322C222	22
.0027	.42	.31	.18	.300	322C272	22
.0033	.42	.31	.18	.300	322C332	22
.0039	.42	.31	.18	.300	322C392	22
.0047	.42	.31	.18	.300	322C472	22
.0056	.42	.31	.18	.300	322C562	22
.0068	.42	.31	.18	.300	322C682	22
.0082	.42	.31	.18	.300	322C822	22
.01	.42	.31	.18	.300	322C103	22
.012	.42	.31	.18	.300	322C123	22
.015	.42	.31	.18	.300	322C153	22
.018	.42	.31	.18	.300	322C183	22
.022	.42	.31	.18	.300	322C223	22
.027	.55	.31	.18	.400	322C273	22
.033	.55	.31	.18	.400	322C333	22
.039	.55	.31	.18	.400	322C393	22
.047	.55	.38	.24	.400	322C473	22
.056	.55	.38	.24	.400	322C563	22
.068	.55	.38	.24	.400	322C683	22
.082	.55	.38	.24	.400	322C823	22
.1	.55	.44	.30	.400	322C104	22
.12	.55	.44	.30	.400	322C124	22
.15	.67	.44	.30	.500	322C154	22
.18	.67	.44	.30	.500	322C184	22
.22	.67	.44	.30	.500	322C224	22
.25	.82	.44	.30	.600	322C254	22
.27	.82	.44	.30	.600	322C274	22
.33	.82	.56	.40	.600	322C334	22
.39	.82	.56	.40	.600	322C394	22
.47	.82	.56	.40	.600	322C474	22
.50	.82	.56	.40	.600	322C504	22
.56	1.04	.56	.40	.800	322C564	22
.68	1.04	.56	.40	.800	322C684	22
.75	1.04	.56	.40	.800	322C754	22
.82	1.24	.56	.40	1.100	322C824	20
1.0	1.24	.56	.40	1.100	322C105	20
1.5	1.75	.74	.57	1.600	322C155	20
2.0	1.75	.74	.57	1.600	322C205	20
3.0	1.75	.74	.57	1.600	322C305	20

NOTE: Nickel "A" weldable leads are available, simply add the letter "W" as a suffix on the part number.

Note: Larger case sizes may be supplied in plastic case material other than epoxy. Add following to part no. for tolerance: —M = ±20%; —K = ±10%; —J = ±5%; —B = ±2%.

THE GUDEMAN CORPORATION

capacitors and EMI filters

340 WEST HURON STREET ▪ CHICAGO ILLINOIS 60610 ▪ 312 337 7400 ▪ TWX 910 221 3863

"thinfilm" metallized mylar* dielectric

series 363 & 364

ULTRA MINIATURE FLAT AND TUBULAR CAPACITORS
SEALED IN NON-METALLIC CASES with PLASTIC RESIN END SEALS
—55°C TO +125°C
100 VDC TO 600 VDC

specifications

DISSIPATION FACTOR
The dissipation factor shall not exceed 1.0% when measured at or referred to a frequency of 1,000 CPS at +25°C per MIL-C-25C. Nominal capacitance values above 1.0 mfd. are measured at or referred to a frequency of 60 cps.

INSULATION RESISTANCE
The minimum insulation resistance when measured with an applied potential of 50 to 500 volts, but not to exceed the rated voltage, shall be as follows:

At + 25°C	50,000 megohm-mfds minimum but need not exceed 150,000 megohms
At + 85°C	500 megohm-mfds minimum but need not exceed 3000 megohms
At + 125°C	10 megohm-mfds minimum but need not exceed 150 megohms

TEST VOLTAGE
Shall withstand a DC voltage equal to 200% of the rated vol age for one minute at a temperature of +25°C, ± 5°C.

ACCELERATED LIFE TEST
Shall withstand an accelerated life test of 250 hours with 140% of applied rated voltage at applicable high test temperature. Only one failure in 12 capacitors tested shall be allowed. A failure is defined as the following:

A) If the capacitor has "opened" or short circuited.
B) If the capacitance has changed more than 10% from its original value.
C) If the insulation resistance is less than 30% of its original value.

VOLTAGE RATINGS
Designed to operate over the temperature range of —55°C to +85°C at full rated DC voltage and up to +125°C with working voltages as follows:

+85°C	+125°C
400 VDC	200 VDC
200 VDC	100 VDC
100 VDC	50 VDC

MOISTURE RESISTANCE
Shall withstand the moisture resistance requirements as specified in military specification MIL-C-25C.

VIBRATION-ACCELERATION
These capacitors shall withstand the Grade 3 vibration-acceleration requirements of MIL-C-25C.

LEAD PULL TEST
Shall withstand a five (5) pound pull applied axially for one minute, per MIL-C-25C.

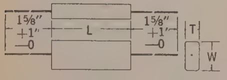
LEAD BEND TEST
Leads shall be bent without breakage about the point of egress from the capacitor. First 90 degrees in one direction then back to the original position, and then 90 degrees in the opposite direction, per MIL-C-25C.

CAPACITANCE TEST WITH TEMPERATURE
The capacitance change shall not exceed the following values with reference to the +25°C capacitance value:

TEMPERATURE	% CAP CHANGE
— 55°C	—10% Maximum
+ 85°C	+ 5% Maximum
+125°C	+16% Maximum

outline drawings

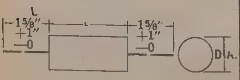
Series 363



NOTE: Nickel "A" weldable leads are available with the capacitors specified in this bulletin, simply add the letter "W" as a suffix on the part number.

DIMENSIONAL TOLERANCES: T & W Under .250 ± .046, .250 & Up ± .062, Length ± 1/16"

Series 364



DIMENSIONAL TOLERANCES: Under .250 dia. ± .046, .250 dia and up ± .062, length ± 1/16"

363 SERIES

100 VDC

Cap. in Mfds.	Part No.	T.	W.	L.	Lead Gau. AWG
.015	363B153	.125"	.250"	11/16"	24
.018	363B183	.125"	.250"	11/16"	24
.022	363B223	.125"	.250"	11/16"	24
.027	363B273	.125"	.250"	11/16"	24
.033	363B333	.125"	.250"	11/16"	24
.039	363B393	.125"	.250"	11/16"	24
.047	363B473	.125"	.250"	11/16"	24
.056	363B563	.125"	.250"	11/16"	24
.068	363B683	.125"	.250"	11/16"	24
.082	363B823	.125"	.250"	11/16"	24
.10	363B104	.125"	.250"	11/16"	24
.12	363B124	.125"	.250"	11/16"	24
.15	363B154	.125"	.250"	11/16"	24
.18	363B184	.125"	.250"	11/16"	24
.22	363B224	.140"	.250"	11/16"	22
.27	363B274	.156"	.281"	11/16"	22
.33	363B334	.171"	.296"	11/16"	22
.39	363B394	.187"	.312"	11/16"	22
.47	363B474	.218"	.343"	13/16"	22
.56	363B564	.250"	.375"	13/16"	22
.68	363B684	.187"	.312"	15/16"	22
.82	363B824	.218"	.343"	15/16"	22
1.0	363B105	.218"	.359"	1 1/16"	22
1.5	363B155	.250"	.421"	1 1/16"	22
2.0	*363W205	.296"	.468"	1 1/16"	20
3.0	*363W305	.312"	.500"	1 5/16"	20
4.0	*363W405	.375"	.562"	1 3/8"	20
5.0	*363W505	.437"	.625"	1 3/8"	20
6.0	*363W605	.500"	.687"	1 5/8"	20
7.0	*363W705	.546"	.734"	1 5/8"	20
8.0	*363W805	.500"	.734"	1 7/8"	20
9.0	*363W905	.562"	.796"	1 7/8"	20
10.0	*363W106	.578"	.812"	1 7/8"	20

200 VDC

Cap. in Mfds.	Part No.	T.	W.	L.	Lead Gau. AWG
.015	363C153	.125"	.250"	11/16"	24
.018	363C183	.125"	.250"	11/16"	24
.022	363C223	.125"	.250"	11/16"	24
.027	363C273	.125"	.250"	11/16"	24
.033	363C333	.125"	.250"	11/16"	24
.039	363C393	.125"	.250"	11/16"	24
.047	363C473	.125"	.250"	11/16"	24
.056	363C563	.125"	.250"	11/16"	24
.068	363C683	.140"	.265"	11/16"	22
.082	363C823	.171"	.281"	11/16"	22
.10	363C104	.187"	.296"	11/16"	22
.12	363C124	.140"	.265"	13/16"	22
.15	363C154	.171"	.281"	13/16"	22
.18	363C184	.187"	.296"	13/16"	22
.22	363C224	.218"	.329"	13/16"	22
.27	363C274	.250"	.359"	13/16"	22
.33	363C334	.281"	.390"	13/16"	22
.39	363C394	.265"	.375"	15/16"	22
.47	363C474	.296"	.406"	15/16"	20
.56	363C564	.296"	.421"	1 1/16"	20
.68	363C684	.343"	.468"	1 1/16"	20
.82	363C824	.375"	.500"	1 1/16"	20
1.0	363C105	.312"	.468"	1 5/16"	20
1.5	363C155	.406"	.562"	1 3/8"	20
2.0	363C205	.468"	.640"	1 3/8"	20
3.0	363C305	.468"	.640"	1 5/8"	20
4.0	363C405	.500"	.703"	1 7/8"	20
5.0	363C505	.562"	.781"	1 7/8"	20
6.0	363C605	.656"	.875"	1 7/8"	20

400 VDC

Cap. in Mfds.	Part No.	T.	W.	L.	Lead Gau. AWG
.015	363E153	.125"	.250"	11/16"	24
.018	363E183	.125"	.250"	11/16"	24
.022	363E223	.125"	.250"	11/16"	24
.027	363E273	.140"	.250"	11/16"	22
.033	363E333	.156"	.265"	11/16"	22
.039	363E393	.187"	.281"	11/16"	22
.047	363E473	.203"	.312"	11/16"	22
.056	363E563	.140"	.250"	13/16"	22
.068	363E683	.156"	.265"	13/16"	22
.082	363E823	.171"	.281"	13/16"	22
.10	363E104	.187"	.296"	13/16"	22
.12	363E124	.218"	.328"	13/16"	22
.15	363E154	.250"	.359"	13/16"	22
.18	363E184	.234"	.343"	15/16"	22
.22	363E224	.265"	.375"	15/16"	22
.27	363E274	.281"	.406"	15/16"	20
.33	363E334	.281"	.437"	1 1/16"	20
.39	363E394	.312"	.468"	1 1/16"	20
.47	363E474	.343"	.500"	1 1/16"	20
.56	363E564	.312"	.468"	1 5/16"	20
.68	363E684	.359"	.515"	1 5/16"	20
.82	363E824	.406"	.546"	1 3/8"	20
1.0	363E105	.375"	.562"	1 5/8"	20
1.5	363E155	.453"	.640"	1 5/8"	20
2.0	363E205	.546"	.734"	1 5/8"	20
3.0	363E305	.609"	.843"	1 7/8"	20
4.0	363E405	.718"	.953"	1 7/8"	20
5.0	363E505	.828"	1.062"	1 7/8"	20

364 SERIES

100 VDC

Cap in Mfds.	Part No.	Dia.	L.	Lead Gau. AWG.
.0068	364B682	.156"	11/16"	24
.0082	364B822	.156"	11/16"	24
.010	364B103	.156"	11/16"	24
.012	364B123	.156"	11/16"	24
.015	365B153	.156"	11/16"	24
.018	364B183	.156"	11/16"	24
.022	364B223	.156"	11/16"	24
.027	364B273	.156"	11/16"	24
.033	364B333	.156"	11/16"	24
.039	364B393	.156"	11/16"	24
.047	364B473	.156"	11/16"	24
.056	364B563	.156"	11/16"	24
.068	364B683	.156"	11/16"	24
.082	364B823	.156"	11/16"	24
.10	364B104	.171"	11/16"	24
.12	364B124	.171"	11/16"	24
.15	364B154	.187"	11/16"	24
.18	364B184	.203"	11/16"	24
.22	364B224	.218"	11/16"	22
.27	364B274	.234"	11/16"	22
.33	364B334	.250"	11/16"	22
.39	364B394	.265"	11/16"	22
.47	364B474	.296"	13/16"	22
.56	364B564	.328"	13/16"	22
.68	364B684	.281"	15/16"	22
.82	364B824	.296"	15/16"	22
1.0	364B105	.312"	1 1/16"	22
1.5	364B155	.359"	1 1/16"	22
2.0	*364W205	.406"	1 1/16"	20
3.0	*364W305	.421"	1 5/16"	20
4.0	*364W405	.500"	1 3/8"	20
5.0	*364W505	.562"	1 3/8"	20
6.0	*364W605	.625"	1 5/8"	20
7.0	*364W705	.671"	1 5/8"	20
8.0	*364W805	.656"	1 7/8"	20
9.0	*364W905	.718"	1 7/8"	20
10.0	*364W106	.734"	1 7/8"	20

*60VDC @ +85°C
*30VDC @ +125°C

200 VDC

Cap in Mfds.	Part No.	Dia.	L.	Lead Gau. AWG.
.0068	364C682	.156"	11/16"	24
.0082	364C822	.156"	11/16"	24
.010	364C103	.156"	11/16"	24
.012	364C123	.156"	11/16"	24
.015	364C153	.156"	11/16"	24
.018	364C183	.156"	11/16"	24
.022	364C223	.156"	11/16"	24
.027	364C273	.156"	11/16"	24
.033	364C333	.171"	11/16"	24
.039	364C393	.187"	11/16"	24
.047	364C473	.203"	11/16"	24
.056	364C563	.203"	11/16"	24
.068	364C683	.218"	11/16"	22
.082	364C823	.250"	11/16"	22
.10	364C104	.265"	11/16"	22
.12	364C124	.218"	13/16"	22
.15	364C154	.250"	13/16"	22
.18	364C184	.265"	13/16"	22
.22	364C224	.296"	13/16"	22
.27	364C274	.328"	13/16"	22
.33	364C334	.343"	13/16"	22
.39	364C394	.343"	15/16"	22
.47	364C474	.375"	15/16"	20
.56	364C564	.390"	1 1/16"	20
.68	364C684	.421"	1 1/16"	20
.82	364C824	.468"	1 1/16"	20
1.0	364C105	.421"	1 5/16"	20
1.5	364C155	.500"	1 3/8"	20
2.0	364C205	.593"	1 3/8"	20
3.0	364C305	.578"	1 5/8"	20
4.0	364C405	.640"	1 7/8"	20
5.0	364C505	.703"	1 7/8"	30
6.0	364C605	.781"	1 7/8"	20

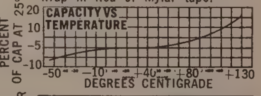
400 VDC

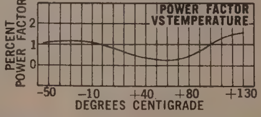
Cap in Mfds.	Part No.	Dia.	L.	Lead Gau. AWG.
.0068	364E682	.156"	11/16"	24
.0082	364E822	.156"	11/16"	24
.010	364E103	.156"	11/16"	24
.012	364E123	.171"	11/16"	24
.015	364E153	.187"	11/16"	24
.018	364E183	.187"	11/16"	24
.022	364E223	.203"	11/16"	24
.027	364E273	.218"	11/16"	22
.033	364E333	.234"	11/16"	22
.039	364E393	.250"	11/16"	22
.047	364E473	.265"	11/16"	22
.056	364E563	.203"	13/16"	22
.068	364E683	.218"	13/16"	22
.082	364E823	.250"	13/16"	22
.10	364E104	.265"	13/16"	22
.12	364E124	.296"	13/16"	22
.15	364E154	.328"	13/16"	22
.18	364E184	.296"	15/16"	22
.22	364E224	.343"	15/16"	22
.27	364E274	.375"	15/16"	20
.33	364E334	.390"	1 1/16"	20
.39	364E394	.421"	1 1/16"	20
.47	364E474	.453"	1 1/16"	20
.56	364E564	.421"	1 5/16"	20
.68	364E684	.453"	1 5/16"	20
.82	364E824	.500"	1 3/8"	20
1.0	364E105	.500"	1 5/8"	20
1.5	364E155	.578"	1 5/8"	20
2.0	364E205	.671"	1 5/8"	20
3.0	364E305	.765"	1 7/8"	20
4.0	364E405	.875"	1 7/8"	20
5.0	364E505	.984"	1 7/8"	20

*60VDC RATING @ +85°C
*30VDC RATING @ +125°C

Add following to Part No. for Tolerance: —M = ±20%; —K = ±10%; —J = ±5%; —B = ±2%.

Add Prefix "F" for fiberglass outer wrap in lieu of Mylar tape.





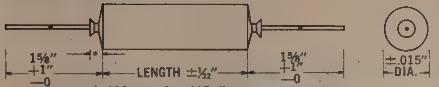
THE GUDEMAN CORPORATION
capacitors and EMI filters
340 WEST HURON STREET ▪ CHICAGO ILLINOIS 60610 ▪ 312 337 7400 ▪ TWX 910 221 3863

miniature metallized mylar* dielectric

series 68

HERMETICALLY SEALED (GLASS-TO-METAL)
TUBULAR METALLIC CASES
—55°C TO +125°C WITHOUT DERATING
100 VDC THRU 600 VDC

outline drawing



* .093 max for .125 dia otherwise .156 max

Standard leads consist of solid, bare, tinned wire. Special nickel leads are available for applications requiring a higher degree of weldability.

Case Diameter (Inches)	Lead Gauge (AWG)
.125 thru .187	24
.235 and .312	22
.400 and up	20

specifications

CAPACITANCE AND TOLERANCE
The capacitance limits at 25°C are determined by the specified tolerance. Capacitors which have a nominal valu of 1 MFD or less are measured or referred to a frequency of 1000 cps. Nominal capacitances above 1 MFD are measured at or referred to a frequency of 60 cps.

DISSIPATION FACTOR
The dissipation factor at 25°C is less than 1.0%. Reference frequencies are as specified above.

INSULATION RESISTANCE
The charging potential is equal to the specified operating voltage for a given temperature. The minimum electrification time is two minutes. Listed below are minimum values:

Temperature	Nominal Capacitance MFD	R x C Megohms x MFD	R Megohms
25°C	Greater than .333	50,000	
	Smaller than .333		150,000
85°C	Greater than .167	500	
	Smaller than .167		3,000
125°C	Greater than .067	10	
	Smaller than .067		150

TEST VOLTAGE
Designed to withstand a test potential equal to 200% of the rated voltage for two minutes at 25°C.
The test voltage must be applied and discharged through a current limiting resistance of approximately 1000 ohms.

VOLTAGE RATING ABOVE 85°
No derating of the voltage is required for nominal ratings of 200, 400 and 600 VDC. All 100 VDC capacitors, however, are to be derated above 85°C at the rate of 1 VDC per degree C.

ACCELERATED LIFE TEST — AT 125°C
Capacitors are designed to withstand a test potential equal to 140% of the voltage at 125°C for a period of 250 hours.
The life test voltage must be applied and discharged through a current limiting resistance of approximately 1000 ohms.

TEMPERATURE AND IMMERSION CYCLING
Designed to meet all requirements of the applicable paragraph of the latest issue of MIL-C-25.

MOISTURE RESISTANCE
Designed to meet all requirements of the applicable paragraph of the latest issue of MIL-C-25.

VIBRATION
Designed to withstand the vibration tests of the applicable paragraph of the latest issue of MIL-C-25.

LEAD PULL TEST
Capacitors of this series are designed to withstand a steady pull force of 5 lbs. applied axially to a capacitor lead for one minute.

LEAD BENDING TEST
The leads withstand without breakage the following stresses performed near the point of egress: bend 90 degrees in one direction, then back to the original position and 90 degrees in the opposite direction.

CAPACITANCE CHANGE WITH TEMPERATURE
The change of capacitance with reference to the actual value at 25°C does not exceed the following limits:

TEMPERATURE	CHANGE OF CAPACITANCE
— 55°C	— 8%
+ 85°C	+ 5%
+125°C	+18%

AC VOLTAGE RATING
Designed to operate safely up to the following AC voltages at 85°C.

DC VOLTAGE RATING	AC — VOLTAGES AT 85°C (rms) Up to 120 cps	AC — VOLTAGES AT 85°C (rms) Up to 400 cps
100	70	56
200	140	70
400	280	110
600	420	160

For 105°C operation the listed AC voltages should be derated to 60% of the 85°C values.
If both AC and DC voltages are present, the sum of the DC voltage and the amplitude of the AC voltage must not exceed the specified DC-rating at a given temperature.

100 VOLTS

Part No.	Capacitance MFD.	Diameter Inches	Length Inches
F68B102	.0010	.125	7/16
F68B122	.0012	.125	7/16
F68B152	.0015	.125	7/16
F68B182	.0018	.125	7/16
F68B222	.0022	.125	7/16
F68B272	.0027	.125	7/16
F68B332	.0033	.125	7/16
F68B392	.0039	.125	7/16
F68B472	.0047	.125	7/16
F68B562	.0056	.125	7/16
F68B682	.0068	.125	7/16
F68B822	.0082	.125	7/16
F68B103	.010	.125	7/16
F68B123	.012	.125	7/16
F68B153	.015	.125	7/16
F68B183	.018	.125	9/16
F68B223	.022	.125	9/16
F68B273	.027	.125	9/16
F68B333	.033	.125	11/16
F68B393	.039	.125	11/16
F68B473	.047	.175	5/8
F68B563	.056	.175	5/8
F68B683	.068	.175	5/8
F68B823	.082	.175	5/8
F68B104	.10	.235	5/8
F68B124	.12	.235	5/8
F68B154	.15	.235	13/16
F68B184	.18	.235	13/16
F68B224	.22	.235	15/16
F68B274	.27	.312	13/16
F68B334	.33	.312	13/16
F68B394	.39	.312	13/16
F68B474	.47	.312	15/16
F68B564	.56	.400	13/16
F68B684	.68	.400	13/16
F68B824	.82	.400	15/16
F68B105	1.0	.400	15/16
F68B155	1.5	.500	15/16
F68B205	2.0	.562	15/16
F68B305	3.0	.562	1 1/8
F68B405	4.0	.670	1 1/8
F68B505	5.0	.670	1 3/8
F68B605	6.0	.670	1 7/8
F68B805	8.0	.670	1 7/8
F68B106	10.0	.750	1 7/8
F68B126	12.0	.750	2 1/8
F68B146	14.0	.750	2 1/8
F68B166	16.0	1.000	2 1/8
F68B206	20.0	1.000	2 1/8

grounded circuit available in diameters of .175 in. and up.

200 VOLTS

Part No.	Capacitance MFD.	Diameter Inches	Length Inches
F68C103	.010	.175	5/8
F68C123	.012	.175	5/8
F68C153	.015	.175	5/8
F68C183	.018	.175	5/8
F68C223	.022	.187	5/8
F68C273	.027	.187	5/8
F68C333	.033	.235	5/8
F68C393	.039	.235	5/8
F68C473	.047	.235	5/8
F68C563	.056	.235	13/16
F68C683	.068	.235	13/16
F68C823	.082	.235	13/16
F68C104	.10	.312	13/16
F68C124	.12	.312	13/16
F68C154	.15	.312	13/16
F68C184	.18	.312	13/16
F68C224	.22	.400	13/16
F68C274	.27	.400	13/16
F68C334	.33	.400	13/16
F68C394	.39	.400	13/16
F68C474	.47	.400	1 1/8
F68C564	.56	.400	1 1/8
F68C684	.68	.562	1 1/8
F68C824	.82	.562	1 1/8
F68C105	1.0	.562	1 1/8
F68C155	1.5	.562	1 5/16
F68C205	2.0	.670	1 5/16
F68C305	3.0	.670	1 9/16
F68C405	4.0	.670	1 13/16
F68C505	5.0	.750	1 13/16
F68C805	8.0	1.000	1 13/16
F68C106	10.0	1.000	2 5/16

400 VOLTS

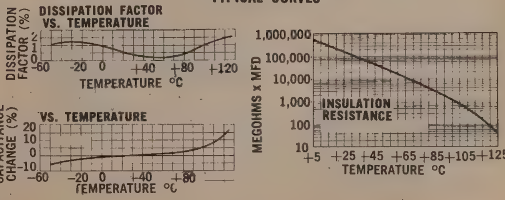
Part No.	Capacitance MFD.	Diameter Inches	Length Inches
F68E103	.010	.235	13/16
F68E123	.012	.235	13/16
F86E153	.015	.235	13/16
F68E183	.018	.235	13/16
F68E223	.022	.312	13/16
F68E273	.027	.312	13/16
F68E333	.033	.312	13/16
F68E393	.039	.312	13/16
F68E473	.047	.400	13/16
F68E563	.056	.400	13/16
F68E683	.068	.400	13/16
F68E823	.082	.400	13/16
F68E104	.10	.400	1 1/8
F68E124	.12	.400	1 1/8
F68E154	.15	.400	1 1/8
F68E184	.18	.400	1 5/16
F68E224	.22	.400	1 5/16
F68E274	.27	.562	1 1/8
F68E334	.33	.562	1 1/8
F68E394	.39	.562	1 5/16
F68E474	.47	.562	1 5/16
F68E564	.56	.670	1 5/16
F68E684	.68	.670	1 5/16
F68E824	.82	.750	1 5/16
F68E105	1.0	.750	1 7/16
F68E155	1.5	1.000	1 5/16
F68E205	2.0	1.000	1 13/16
F68E305	3.0	1.000	2 5/16
F68E405	4.0	1.000	2 9/16

600 VOLTS

Part No.	Capacitance MFD.	Diameter Inches	Length Inches
F68F103	.010	.312	13/16
F68F123	.012	.312	13/16
F68F153	.015	.312	1 1/8
F68F183	.018	.312	1 1/8
F68F223	.022	.400	1 1/8
F68F273	.027	.400	1 1/8
F68F333	.033	.400	1 1/8
F68F393	.039	.400	1 1/8
F68F473	.047	.400	1 1/8
F68F563	.056	.562	1 1/8
F68F683	.068	.562	1 1/8
F68F823	.082	.562	1 1/8
F68F104	.10	.562	1 1/8
F68F124	.12	.562	1 1/8
F68F154	.15	.562	1 5/16
F68F184	.18	.562	1 7/16
F68F224	.22	.670	1 5/8
F68F274	.27	.670	1 7/16
F68F334	.33	.750	1 7/16
F68F394	.39	.750	1 13/16
F68F474	.47	.750	1 13/16
F68F564	.56	.750	2 5/16
F68F684	.68	.750	2 5/16
F68F824	.82	1.000	1 13/16
F68F105	1.00	1.000	2 1/16

F indicates "Floating". Substitute "G" for "Grounded".
Add following to Part No. for Tolerance: —20 = ±20%; —10 = ±10%; —5 = ±5%.

TYPICAL CURVES



THE GUDEMAN CORPORATION

capacitors and EMI filters

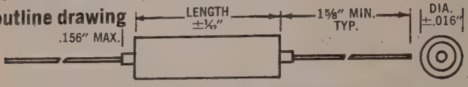
340 WEST HURON STREET ▪ CHICAGO ILLINOIS 60610 ▪ 312 337 7400 ▪ TWX 910 221 3863

polyester & kraft capacitor tissue dielectric

series 51

WAX IMPREGNATED — METALLIZED DIELECTRIC
HERMETICALLY SEALED (GLASS TO METAL)
TUBULAR METAL CASE
—55°C TO +125°C WITHOUT DERATING
100 THRU 600 VDC

outline drawing



Standard leads consist of solid, bare, tined wire. Special Nickel leads are available for applications requiring a higher degree of weldability.

LEAD SPECIFICATIONS

Case Diameter (inches)	Lead Gauge (AWG)
.187	24
.235 and .312	22
.400 and up	20

specifications

CAPACITANCE AND TOLERANCE
The capacitance limits at +25°C are determined by the specified tolerance. Capacitors which have a nominal value of 1 MFD or less are measured at or referred to a frequency of 1000 cps. Nominal capacitances above 1 MFD are measured at or referred to a frequency of 60 cps.

DISSIPATION FACTOR
The dissipation factor at +25°C is less than 1.0%. Reference frequencies are as specified above.

INSULATION RESISTANCE
The charging potential is equal to the specified operating voltage for a given temperature. The minimum electrification time is two minutes.

TEMPERATURE	Nominal Capacitance MFD	Voltage VDC	R x C Megohms x MFD	R Megohms
+ 25°C	Greater than .167	ALL	2,000	
	Smaller than .167			12,000
+ 125°C	Greater than .067	100 thru 300 VDC	10	
	Smaller than .067			150
	Greater than .067	400 and 600 VDC	40	
	Smaller than .067			600

TEST VOLTAGE
Designed to withstand a test potential equal to 200% of the rated voltage for two minutes at + 25°C.
The test voltage must be applied and discharged through a current limiting resistance of approximately 1,000 ohms.

VOLTAGE RATING ABOVE 85°C.
No derating of the voltage is required for nominal ratings of 200 through 600 VDC. All 100 VDC capacitors, however, are to be derated above + 85°C at the rate of 1 VDC per degree C.

ACCELERATED LIFE TEST — AT 125°C
Designed to withstand a test potential equal to 140% of the rated voltage at + 125°C for a period of 250 hours.
The life test voltage must be applied and discharged through a current limiting resistance of approximately 1,000 ohms.

TEMPERATURE AND IMMERSION CYCLING
Designed to meet all requirements of the applicable paragraph of the latest issue of MIL-C-25.

MOISTURE RESISTANCE
Designed to meet all requirements of the applicable paragraph of the latest issue of MIL-C-25.

VIBRATION
Designed to withstand the vibration tests of the applicable paragraph of the latest issue of MIL-C-25.

AC OPERATION
51 Series capacitors are designed to operate up to the following AC voltages.

NOMINAL VOLTAGE VDC	AC VOLTAGES AT + 85°C (rms) Up to 120 cps	Up to 400 cps
100	70	56
200	140	70
300	220	96
400	280	110
600	420	160

For + 105°C operation the listed AC voltages should be derated to 60% of the + 85°C values.
If both AC and DC voltages are present, the sum of the DC voltage and the amplitude of the AC voltage must not exceed the specified DC rating at a given temperature.

LEAD PULL TEST
Capacitors of this series are designed to withstand a steady pull force of 5 lbs. applied axially to a capacitor lead for one minute.

LEAD BENDING TEST
The leads withstand without breakage the following stresses performed near the point of egress: bend 90 degrees in one direction, then back to the original position and 90 degrees in the opposite direction.

CAPACITANCE CHANGE WITH TEMPERATURE
The change of capacitance with reference to the actual value at 25°C does not exceed the following limits.

TEMPERATURE	CHANGE OF CAPACITANCE
— 55°C	— 10%
+ 85°C	+ 4%
+ 125°C	+ 13%

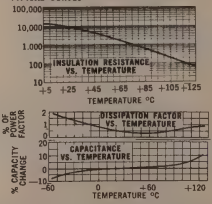
100 VOLTS

Part No.	Capacitance MFD.	Diameter Inches	Length Inches
F51B102	.0010	.175	⅝
F51B122	.0012	.175	⅝
F51B152	.0015	.175	⅝
F51B182	.0018	.175	⅝
F51B222	.0022	.175	⅝
F51B272	.0027	.175	⅝
F51B332	.0033	.175	⅝
F51B392	.0039	.175	⅝
F51B472	.0047	.175	⅝
F51B562	.0056	.175	⅝
F51B682	.0068	.175	⅝
F51B822	.0082	.175	⅝
F51B103	.010	.175	⅝
F51B123	.012	.175	⅝
F51B153	.015	.175	⅝
F51B183	.018	.175	⅝
F51B223	.022	.175	⅝
F51B273	.027	.175	⅝
F51B333	.033	.175	⅝
F51B393	.039	.175	⅝
F51B473	.047	.175	⅝
F51B563	.056	.175	⅝
F51B683	.068	.235	⅝
F51B823	.082	.235	⅝
F51B104	.10	.235	⅝
F51B124	.12	.235	13/16
F51B154	.15	.235	13/16
F51B184	.18	.235	15/16
F51B224	.22	.312	13/16
F51B274	.27	.312	13/16
F51B334	.33	.312	13/16
F51B394	.39	.312	15/16
F51B474	.47	.400	13/16
F51B564	.56	.400	13/16
F51B684	.68	.400	15/16
F51B824	.82	.400	15/16
F51B105	1.0	.500	15/16
F51B155	1.5	.562	15/16
F51B205	2.0	.562	1⅛
F51B305	3.0	.670	1⅛
F51B405	4.0	.670	1⅜
F51B505	5.0	.670	1⅞
F51B605	6.0	.670	1⅞
F51B805	8.0	.750	1⅞
F51B106	10.0	.750	2⅛

200 VOLTS

Part No.	Capacitance MFD.	Diameter Inches	Length Inches
F51C103	.010	.235	¾
F51C123	.012	.235	¾
F51C153	.015	.235	¾
F51C183	.018	.235	¾
F51C223	.022	.235	¾
F51C273	.027	.235	¾
F51C333	.033	.235	¾
F51C393	.039	.312	⅞
F51C473	.047	.312	⅞
F51C563	.056	.312	⅞
F51C683	.068	.312	⅞
F51C823	.082	.312	⅞
F51C104	.10	.312	⅞
F51C124	.12	.312	1⅛
F51C154	.15	.312	1⅛
F51C184	.18	.400	⅞
F51C224	.22	.400	⅞
F51C274	.27	.400	1⅛
F51C334	.33	.400	1⅛
F51C394	.39	.500	1⅛
F51C474	.47	.500	1⅛
F51C564	.56	.500	1⅛
F51C684	.68	.500	1⅛
F51C824	.82	.562	1⅛
F51C105	1.0	.562	1⅛
F51C155	1.5	.562	1⅝
F51C205	2.0	.670	1⅝
F51C305	3.0	.670	1⅞
F51C405	4.0	.750	1⅞
F51C505	5.0	1.000	1⅞
F51C605	6.0	1.000	1⅞
F51C805	8.0	1.000	1⅞
F51C106	10.0	1.000	2⅜
F51C126	12.0	1.000	2⅝

TYPICAL CURVES



300 VOLTS

Part No.	Capacitance MFD.	Diameter Inches	Length Inches
F51D103	.010	.312	⅞
F51D123	.012	.312	⅞
F51D153	.015	.312	⅞
F51D183	.018	.312	⅞
F51D223	.022	.312	⅞
F51D273	.027	.312	⅞
F51D333	.033	.312	1⅛
F51D393	.039	.312	1⅛
F51D473	.047	.312	1⅛
F51D563	.056	.400	⅞
F51D683	.068	.400	⅞
F51D823	.082	.400	1⅛
F51D104	.10	.400	1⅛
F51D124	.12	.400	1⅛
F51D154	.15	.400	1⅜
F51D184	.18	.400	1⅜
F51D224	.22	.500	1⅜
F51D274	.27	.500	1⅜
F51D334	.33	.562	1⅜
F51D394	.39	.562	1⅜
F51D474	.47	.562	1⅝
F51D564	.56	.562	1⅝
F51D684	.68	.670	1⅞
F51D824	.82	.670	1⅞
F51D105	1.0	.750	1⅞
F51D155	1.5	.750	2⅛
F51D205	2.0	1.00	1⅞
F51D255	2.5	1.00	2⅛
F51D305	3.0	1.00	2⅜

400 VOLTS

Part No.	Capacitance MFD.	Diameter Inches	Length Inches
F51E103	.010	.312	⅞
F51E123	.012	.312	⅞
F51E153	.015	.312	⅞
F51E183	.018	.312	⅞
F51E223	.022	.312	⅞
F51E273	.027	.312	1⅛
F51E333	.033	.312	1⅛
F51E393	.039	.400	1⅛
F51E473	.047	.400	1⅛
F51E563	.056	.400	1⅛
F51E683	.068	.400	1⅛
F51E823	.082	.500	1⅛
F51E104	.10	.500	1⅛
F51E124	.12	.500	1⅛
F51E154	.15	.500	1⅛
F51E184	.18	.562	1⅜
F51E224	.22	.562	1⅜
F51E274	.27	.562	1⅝
F51E334	.33	.562	1⅝
F51E394	.39	.670	1⅝
F51E474	.47	.670	1⅝
F51E564	.56	.670	1⅞
F51E684	.68	.670	1⅞
F51E824	.82	.750	1⅞
F51E105	1.0	.750	1⅞
F51E155	1.5	1.000	1⅞
F51E205	2.0	1.000	1⅞
F51E305	3.0	1.000	2⅝

600 VOLTS

Part No.	Capacitance MFD.	Diameter Inches	Length Inches
F51F103	.010	.312	⅞
F51F123	.012	.312	⅞
F51F153	.015	.312	⅞
F51F183	.018	.312	1⅛
F51F223	.022	.312	1⅛
F51F273	.027	.312	1⅛
F51F333	.033	.312	1⅛
F51F393	.039	.400	1⅛
F51F473	.047	.400	1⅛
F51F563	.056	.400	1⅛
F51F683	.068	.400	1⅛
F51F823	.082	.500	1⅛
F51F104	.10	.500	1⅛
F51F124	.12	.562	1⅛
F51F154	.15	.562	1⅛
F51F184	.18	.562	1⅜
F51F224	.22	.562	1⅜
F51F274	.27	.562	1⅝
F51F334	.33	.562	1⅝
F51F394	.39	.670	1⅝
F51F474	.47	.670	1⅝
F51F564	.56	.670	1⅞
F51F684	.68	.670	1⅞
F51F824	.82	1.000	1⅞
F51F105	1.0	1.000	1⅞
F51F155	1.5	1.000	2⅛
F51F205	2.0	1.000	2⅛
F51F255	2.5	1.000	2⅝

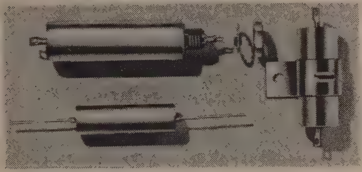
Add following to Part No. for tolerance: —20 = ±20%; —10 = ±10%; —5 = ±5%.
"F" indicatts Floating. Substitute "G" for grounded. Subtract 1/16" from length for grounded types.

THE GUDEMAN CORPORATION
capacitors and EMI filters
340 WEST HURON STREET ■ CHICAGO ILLINOIS 60610 ■ 312 337 7400 ■ TWX 910 221 3863

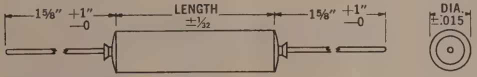
metalized paper dielectric

series 88

HERMETICALLY SEALED (GLASS TO METAL)
TUBULAR METAL CASE
—55°C TO +125°C WITHOUT DERATING
50 VDC
WIRE LEADS OR LUG TERMINALS



outline drawing



Solid Tinned Wire Leads.

The folowing lead sizes will apply:

.235 and .312 diameter	#22 AWG
.400 diameter and up	#20 AWG

NOTE: Mounting by means of lead wires is not recommended for units larger than .562 x 1 13⁄16″ long

NF STYLE WILL BE FURNISHED WITH #22 AWG LEADS.

specifications

CAPACITANCE AND TOLERANCE
The capacitance shall be within the specified tolerance limits of the nominal rating.
Capacitors of 1.0 MFD or less shall be measured at, or referred to, a frequency of 1000 cycles per second at 25°C. Capacitors greater than 1.0 MFD shall be measured at, or referred to, a frequency of 60 cycles per second at 25°C.

DISSIPATION FACTOR
The dissipation factor shall be a maximum of 1.0% at 25°C.
Capacitors of 1.0 MFD or less shall be measured at, or referred to, a frequency of 1000 cycle per second. Capacitors above 1.0 MFD shall be measured at, or referred to, a frequency of 60 cycles per second.

INSULATION RESISTANCE
Insulation resistance shall be measured at a charging potential of 50 VDC.
The insulation resistance shall equal or exceed the following for capacitance values up to and including 4.0 MFD.

Temperature	Tolerance
25°C—	4000 megohms X mfd or 12,000 megohms, whichever is less
85°C—	100 megohms X mfd or 300 megohms, whichever is less
125°C—	10 megohms X mfd or 150 megohms, whichever is less

For values above 4.0 MFD, the insulation resistance shall equal or exceed the following:

Temperature	Tolerance
25°C—	2000 megohms X mfd
85°C—	50 megohms X mfd
125°C—	5 megohms X mfd

TEST VOLTAGE
Shall withstand a D.C. potential of 200% of rated D.C. voltage at a temperature of 25°C applied for a period not to exceed two minutes, without permanent breakdown.
When the case is not a terminal, they shall withstand a D.C. potential of 200% of rated voltage between the case and the terminals.

LIFE TEST
Shall withstand a test potential of 140% of the rated D.C. voltage at 125°C for 250 hours.
One failure out of twelve (12) samples tested is allowed. A capacitor will be considered to have failed when:

A. The capacitance has changed more than 10% from its original value.
B. The insulation resistance is less than 50% of its original requirements.
C. It exhibits a permanent open or short circuit.

TEMPERATURE & IMMERSION CYCLING
These capacitors shall meet the temperature and immersion cycling test of Military Specification MIL-C-25C.

MOISTURE RESISTANCE
Shall meet the moisture resistance requirements of Military Specification MIL-C-25C.

VIBRATION
Shall withstand the Grade 3 vibration as specified in Military Specification MIL-C-25C.

CORROSION RESISTANCE
These capacitors shall meet the corrosion test of Military Specification MIL-C-25C.

specifications (continued)

LEAD PULL TEST
Shall withstand a pull of 5 lbs. applied axially to the lead for a period of one minute.

LEAD BEND TEST
The leads shall withstand without breakage, a bend at the point of egress from the capacitor first 90° in one direction, back to the original position and then 90° in the opposite direction.

SHOCK
When securely mounted by their normal mounting means, the capacitors shall withstand 3 impact shocks of 50G intensity (18 shocks total) in each direction of each of the three major axis. The time duration of each impulse shock shall be 11 ±1 milli-seconds.
There shall be no intermittent or permanent open or short circuit as a result of this test.

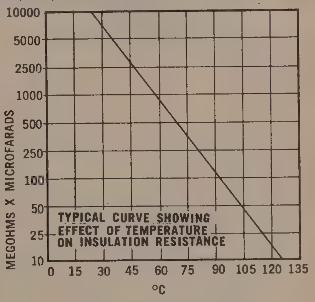
CAPACITANCE CHANGE WITH TEMPERATURE
The Capacitance change at 125°C shall not be greater than 5% of the measured capacitance value at +25°C.
The capacitance change at —55°C shall not be greater than 10% of the measured capacitance value at +25°C.

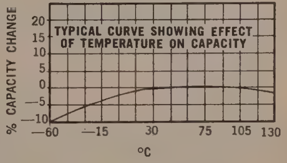
Part No.	Capacity	Voltage	O.D.	XMG Length	XMF Length
	Under .1 MFD	50 VDC	.235	⅝″	11⁄16″
XMF-88A104	.1	50 VDC	.235	⅝″	11⁄16″
XMF-88A124	.12	50 VDC	.235	¾″	13⁄16″
XMF-88A154	.15	50 VDC	.235	¾″	13⁄16″
XMF-88A184	.18	50 VDC	.235	15⁄16″	1″
XMF-88A224	.22	50 VDC	.235	15⁄16″	1″
XMF-88A274	.27	50 VDC	.312	15⁄16″	1″
XMF-88A334	.33	50 VDC	.312	15⁄16″	1″
XMF-88A394	.39	50 VDC	.312	15⁄16″	1″
XMF-88A474	.47	50 VDC	.312	15⁄16″	1″
XMF-88A564	.56	50 VDC	.400	15⁄16″	1″
XMF-88A684	.68	50 VDC	.400	15⁄16″	1″
XMF-88A824	.82	50 VDC	.400	15⁄16″	1″
XMF-88A105	1.00	50 VDC	.400	1 1⁄16″	1 ⅛″
XMF-88A155	1.50	50 VDC	.500	1 1⁄16″	1 ⅛″
XMF-88A205	2.00	50 VDC	.562	1 1⁄16″	1 ⅛″
XMF-88A305	3.00	50 VDC	.562	1 ¼″	1 5⁄16″
XMF-88A405	4.00	50 VDC	.670	1 ¼″	1 5⁄16″
XMF-88A505	5.00	50 VDC	.670	1 ½″	1 9⁄16″
XMF-88A605	6.00	50 VDC	.750	1 ¾″	1 13⁄16″
XMF-88A805	8.00	50 VDC	.750	2″	2 1⁄16″
XMF-88A106	10.00	50 VDC	.750	2″	2 1⁄16″
XMF-88A126	12.00	50 VDC	1.000	1 ¾″	1 13⁄16″
XMF-88A146	14.00	50 VDC	1.000	2″	2 1⁄16″
XMF-88A166	16.00	50 VDC	1.000	2″	2 1⁄16″
XMF-88A206	20.00	50 VDC	1.000	2 ⅝″	2 11⁄16″

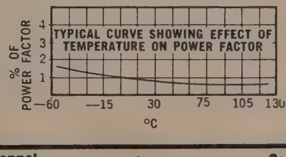
"F" Indicates "Floating". Substitute "G" for "Grounded".

NOTE: 1—When sleeving is required, insert the letter "S" after prefix, example: XMFS — XMGS.

TYPICAL CURVES







THE GUDEMAN CORPORATION
capacitors and EMI filters

340 WEST HURON STREET ■ CHICAGO ILLINOIS 60610 ■ 312 337 7400 ■ TWX 910 221 3863

paper dielectric — inserted tab construction

series GC245 & 246

HERMETICALLY SEALED IN GLASS CASES
HIGH VOLTAGE — 1000 VDC THRU 10,000 VDC
—55°C TO +85°C WITHOUT DERATING
75% RATING TO 105°C

specifications

HIGH ALTITUDE APPLICATION:
The DC Voltage ratings listed are primarily for application at a barometric pressure between 28 and 32 inches. For high altitude application the permissible DC voltage should never exceed the rated DC voltage and shall be equal to or less than the maximum permissible operating voltage per length of glass tubing as follows:

PERMISSIBLE VOLTAGE RATING FOR HIGH ALTITUDE

Tube Length (in.)	1 3/16	1 9/16	1¾	2¼	2¾	3½	4¼
Max. Volt. at 50,000 ft.	4500	5000	5300	5500	6000	7000	8000
Max. Volt. at 60,000 ft.	2400	2800	3500	4000	4300	4500	4700

RIPPLE VOLTAGE:
The ratings given are the steady-state DC voltage, or the DC voltage plus the permissible ripple voltage wherein the peak value of the permissible ripple voltage shall not exceed:

20% of the rating at 60 cps.
15% of the rating at 120 cps.
8% of the rating at 400 cps.
5% of the rating at 1000 cps.

INSULATION RESISTANCE:
The minimum insulation resistance when measured with an applied potential of 100 to 500 volts shall be as follows:

At 25°C—10,000 megohm-mfds. minimum but need not exceed 20,000 megohms.
At 85°C—100 megohm-mfds. minimum but need not exceed 1000 megohms.
At 105°C—30 megohm-mfds. minimum but need not exceed 300 megohms.

TEST VOLTAGE:
Shall withstand a DC voltage equal to 200% of the rated voltage for five seconds at a temperature of 25°C.

LIFE TEST:
Shall withstand an accelerated life test of 250 hours at 85°C with an applied voltage as follows:

Watt-Second Group	% of Rated Voltage for life test
0. to 0.49 watt-seconds	140
0.5 to 4.9 watt-seconds	130

One failure in 12 samples tested is permitted.

VOLTAGE DERATING:
When operated at high ambient temperature the capacitors shall be derated as follows:

At 85°C	No derating
At 105°C	25% derating

POWER FACTOR:
The power factor at 25°C shall not be more than 1% when measured at or referred to a frequency of 1000 cycles per second.

LEAD PULL TEST
Shall withstand for one minute a steady 5 pound pull applied axially.

VIBRATION:
The GC246 Series capacitors (wire leads) shall be mounted and soldered to rigidly supported terminals and the length of the lead shall be approximately ⅝ of an inch when measured from the capacitor to the supporting terminal. The GC245 Series shall be mounted to brackets.
The capacitors when mounted and subjected to a simple harmonic motion having an amplitude of 0.03 inches (Total excursion 0.06 inches maximum), and the frequency being varied uniformly between 10 to 55 cycles per second and return in approximately one minute. This motion shall be applied for a period of three hours in any direction. During the last ½ hour of vibration measurement shall be made for intermittent contacts, open circuits or short circuits. One failure in six samples tested is permitted.

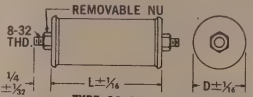
TEMPERATURE AND IMMERSION CYCLING:
These capacitors shall be subjected to five thermal cycles as follows:

Start at +25°C
Raise to +105°C
Return to +25°C
Reduce to —55°C
Return to +25°C

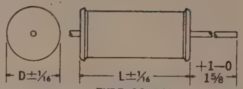
After the thermal cycle the capacitors shall be subjected to five successive immersion cycles in two tanks of saturated solutions of sodium chloride and water, one at 65°C and the other at 0°C. The period of each cycle shall consist of 60 minutes immersion in each tank. After immersion cycling, the capacitors shall be washed in tap water, surface dried with a clean cloth and dried from 4 to 6 rours at room temperature. Tre capacitor srall meet the following requirements:

Dielectric Strength	125% Rated Voltage
Insulation Resistance	4000 megohms-mfds. minimum but need not exceed 8000 megohms.

In addition, the capacitors shall show no harmful or extensive corrosion and at least 90% of the exposed metallic surfaces of the capacitors shall be protected by the finish.



TYPE GC 245



TYPE GC 246

1000 WVDC at 85°C

Catalog Number	CAP. MFD.	Dimensions L.	D.
GC246G102	.001	1 3/16	17/32
GC246G202	.002	1 3/16	17/32
GC246G502	.005	1 3/16	17/32
GC246G103	.01	1 3/16	17/32
GC246G203	.02	1 3/16	17/32
GC246G503	.05	1 9/16	17/32
GC246G104	.1	1¾	⅝
GC245G254	.25	2¼	¾
GC245G504	.5	2¾	⅞
GC245G105	1.0	2¾	1¼

2000 WVDC at 85°C

Catalog Number	CAP. MFD.	Dimensions L.	D.
GC246J102	.001	1 3/16	17/32
GC246J202	.002	1 3/16	17/32
GC246J502	.005	1 3/16	17/32
GC246J103	.01	1 3/16	17/32
GC246J203	.02	1 9/16	17/32
GC245J503	.05	1½	¾
GC245J104	.1	2¼	¾
GC245J254	.25	2¾	1
GC245J504	.5	2¾	1⅜

3000 WVDC at 85°C

Catalog Number	CAP. MFD.	Dimensions L.	D.
GC246L102	.001	1 3/16	17/32
GC246L202	.002	1 3/16	17/32
GC246L502	.005	1 3/16	17/32
GC246L103	.01	1 9/16	17/32
GC245L203	.02	1½	¾
GC245L503	.05	2¼	¾
GC245L104	.1	2¾	⅞
GC245L254	.25	2¾	1⅜

5000 WVDC at 85°C

Catalog Number	CAP. MFD.	Dimensions L.	D.
GC246N102	.001	1 9/16	17/32
GC246N202	.002	1 9/16	17/32
GC246N502	.005	1¾	⅝
GC245N103	.01	1¾	⅞
GC245N203	.02	2¼	⅞
GC245N503	.05	2¾	1⅛
GC245N104	.1	2¾	1 9/16

7500 WVDC at 85°C

Catalog Number	CAP. MFD.	Dimensions L.	D.
GC245R102	.001	1¾	¾
GC245R202	.002	2	¾
GC245R502	.005	2¼	¾
GC245R103	.01	2¾	⅞
GC245R203	.02	2¾	1⅛
GC245R503	.05	2¾	1 9/16
GC245R104	.1	4¼	1 9/16

1500 WVDC at 85°C

Catalog Number	CAP. MFD.	Dimensions L.	D.
GC246H102	.001	1 3/16	17/32
GC246H202	.002	1 3/16	17/32
GC246H502	.005	1 3/16	17/32
GC246H103	.01	1 3/16	17/32
GC246H203	.02	1 3/16	17/32
GC246H503	.05	1¾	⅝
GC245H104	.1	2	¾
GC245H254	.25	2¾	⅞
GC245H504	.5	2¾	1¼
GC245H105	1.0	3½	1⅜

2500 WVDC at 85°C

Catalog Number	CAP. MFD.	Dimensions L.	D.
GC246K102	.001	1 3/16	17/32
GC246K202	.002	1 3/16	17/32
GC246K502	.005	1 3/16	17/32
GC246K103	.01	1 9/16	17/32
GC246K203	.02	1 9/16	⅝
GC245K503	.05	2	¾
GC245K104	.1	2¼	⅞
GC245K254	.25	2¾	1⅛
GC245K504	.5	3½	1⅜

4000 WVDC at 85°C

Catalog Number	CAP. MFD.	Dimensions L.	D.
GC246M102	.001	1 3/16	17/32
GC246M202	.002	1 3/16	17/32
GC246M502	.005	1 9/16	⅝
GC245M103	.01	1¾	¾
GC245M203	.02	2	¾
GC245M503	.05	2¼	1
GC245M104	.1	2¾	1⅜
GC245M254	.25	4¼	1⅜

6000 WVDC at 85°C

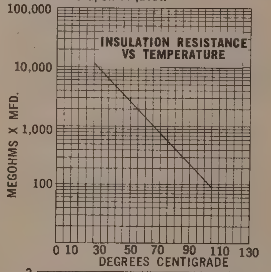
Catalog Number	CAP. MFD.	Dimensions L.	D.
GC246P102	.001	1 9/16	⅝
GC246P202	.002	1¾	⅝
GC245P502	.005	2	¾
GC245P103	.01	2	⅞
GC245P203	.02	2¾	⅞
GC245P503	.05	2¾	1⅜
GC245P104	.1	4¼	1⅜

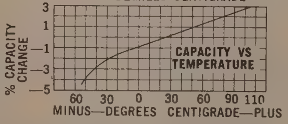
10,000 WVDC at 85°C

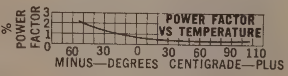
Catalog Number	CAP. MFD.	Dimensions L.	D.
GC245S102	.001	2¼	¾
GC245S202	.002	2¾	¾
GC245S502	.005	2¾	⅞
GC245S103	.01	2¾	1⅜
GC245S203	.02	3½	1⅜
GC245S503	.05	4¼	1 23/32

Tolerance = ±20%. Closer tolerances available upon request.

TYPICAL CURVES







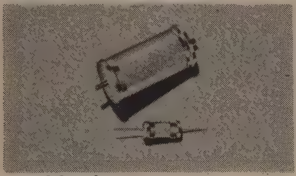
THE GUDEMAN CORPORATION
capacitors and EMI filters

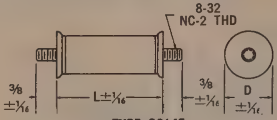
340 WEST HURON STREET ▪ CHICAGO ILLINOIS 60610 ▪ 312 337 7400 ▪ TWX 910 221 3863
FOR CURRENT SOURCE DATA CALL TOLL-FREE 800-645-9200 (IN N. Y. STATE CALL COLLECT (516) 294-0990)

high voltage capacitors — 2000 VDC thru 10,000 VDC

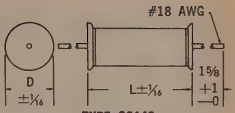
series GC145 & GC146

PAPER PLASTIC FILM DIELECTRIC — INSERTED TAB CONSTRUCTION
HERMETICALLY SEALED IN GLASS CASE
—55°C TO +125°C WITHOUT DERATING
SERIES 145 — SCREW STUD TERMINALS
SERIES 146 — WIRE LEADS





TYPE GC145
(For Case Diameters Larger Than 5/8")



TYPE GC146
(For Case Diameters of 5/8" or Under)

specifications

HIGH ALTITUDE APPLICATION:
The DC Voltage ratings listed are primarily for application at a barometric pressure between 28 and 32 inches. For high altitude application the permissible DC voltage should never exceed the rated DC voltage and shall be equal to or less than the maximum permissible operating voltage per length of glass tubing as follows:

PERMISSIBLE VOLTAGE RATING FOR HIGH ALTITUDE							
Tube Length (in.)	1 3/16	1 9/16	1 3/4	2 1/4	2 3/4	3 1/2	4 1/4
Max. Volt at 50,000 Ft.	4500	5000	5300	5500	6000	7000	8000
Max. Volt at 60,000 Ft.	2400	2800	3500	4000	4300	4500	4700

RIPPLE VOLTAGE:
The ratings given are the steady-state DC voltage, or the DC voltage plus the permissible ripple voltage wherein ahe peak value of the permissible ripple voltage shall not exceed:

20% of the rating at 60 cps.
15% of the rating at 120 cps.
8% of the rating at 400 cps.
5% of the rating at 1000 cps.
1% of the rating at 10,000 cps.

INSULATION RESISTANCE:
The minimum insulation resistance when measured with an applied potential of 500 volts shall be as follows:

At + 25°C—20,000 megohm-mfds. minimum but need not exceed 100,000 megohms.
At +125°C—20 megohm-mfds. minimum but need not exceed 250 megohms.

TEST VOLTAGE:
Shall withstand a DC Voltage equal to 200% of the rated voltage for five seconds at a temperature of +25°C.

ACCELERATED LIFE TEST:
These capacitors shall withstand an accelerated life test at 250 hours at +125°C with an applied voltage as follows:

Watt-Second Group	% of Rated Voltage for Life Test
0. to 0.49 Watt-Seconds	140
0.5 to 4.9 Watt-Seconds	130

One failure in 12 samples tested is permitted.

TEMPERATURE AND IMMERSION CYCLING:
Shall meet the temperature and immersion cycling tests of military specification MIL-C-25C.

POWER FACTOR:
The power factor of the capacitors at +25°C shall not be more than 1% when measured at or referred to a frequency of 1000 cycles per second.

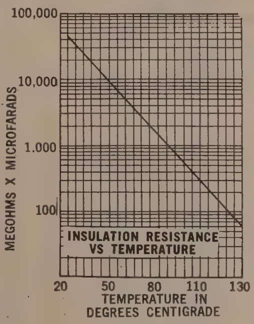
MOISTURE RESISTANCE:
Shall meet the moisture resistance tests of the military specification MIL-C-25C.

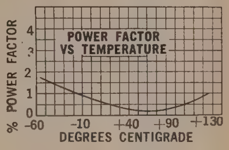
VIBRATION:
Shall meet the high frequency vibration requirements of MIL-C-25C.

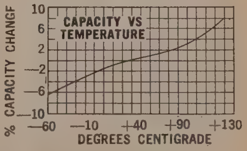
Part No.	CAP. MFD	DIMENSIONS D	DIMENSIONS L
2000 VOLTS DC			
GC146J102	.001	17/32"	1 3/16"
GC146J202	.002	17/32"	1 3/16"
GC146J502	.005	17/32"	1 3/16"
GC146J103	.01	17/32"	1 3/16"
GC146J203	.02	5/8"	1 9/16"
GC145J503	.05	3/4"	2 1/4"
GC145J104	.1	1"	2 1/4"
GC145J254	.25	1 3/8"	2 3/4"
3000 VOLTS DC			
GC146L102	.001	17/32"	1 3/16"
GC146L202	.002	17/32"	1 3/16"
GC146L502	.005	17/32"	1 9/16"
GC146L103	.01	5/8"	1 9/16"
GC145L203	.02	3/4"	1 3/4"
GC145L503	.05	1"	2 1/4"
GC145L104	.1	1 3/8"	2 3/4"
4000 VOLTS DC			
GC146M102	.001	17/32"	1 9/16"
GC146M202	.002	17/32"	1 9/16"
GC146M502	.005	5/8"	1 9/16"
GC145M103	.01	3/4"	1 3/4"
GC145M203	.02	3/4"	2 1/4"
GC145M503	.05	1 1/8"	2 3/4"
GC145M104	.1	1 3/8"	2 3/4"
5000 VOLTS DC			
GC146N102	.001	17/32"	1 9/16"
GC146N202	.002	5/8"	1 9/16"
GC145N502	.005	3/4"	1 9/16"
GC145N103	.01	1"	1 3/4"
GC145N203	.02	1"	2 1/4"
GC145N503	.05	1 3/8"	2 3/4"
GC145N104	.1	1 3/8"	3 1/2"
7500 VOLTS DC			
GC146R102	.001	5/8"	2 1/4"
GC145R202	.002	3/4"	1 3/4"
GC145R502	.005	3/4"	2 1/4"
GC145R103	.01	1"	2 1/4"
GC145R203	.02	1 3/8"	2 3/4"
GC145R503	.05	1 3/8"	4 1/4"
10,000 VOLTS DC			
GC145S102	.001	3/4"	2 1/4"
GC145S202	.002	1"	2 1/4"
GC145S502	.005	1"	2 3/4"
GC145S103	.01	1 3/8"	2 3/4"
GC145S203	.02	1 3/8"	4 1/4"

Add following to Part No. for tolerance: —M = ±20%; —K= ±10%; —J = ±5%.

TYPICAL CURVES







THE GUDEMAN CORPORATION
capacitors and EMI filters
340 WEST HURON STREET ■ CHICAGO ILLINOIS 60610 ■ 312 337 7400 ■ TWX 910 221 3863

paper plastic dielectric

series 672

DRAWN RECTANGULAR CASE
−55°C TO +125°C
400 VDC TO 12500 VDC

specifications

ACCELERATED LIFE TEST
These capacitors shall withstand an accelerated life test of 250 hours with 140% of the voltage rating, applied at the applicable high ambient temperature, per MIL-C-25C. Not more than one failure in 24 units tested will be permitted.

TEST VOLTAGE
The 672 Series capacitor shall withstand a DC voltage equal to 200% of the rated voltage between terminals and terminals to case for one minute at a temperature of +25°C to ±5°C.

RIPPLE VOLTAGE
The sum of the peak AC voltage and the applied DC voltage shall not exceed the applicable rated voltage.
The peak AC voltage shall not exceed the percentage of the rated voltage as follows:

20% @ 60 Hz	8% @ 400 Hz	1% @ 10 KHz
15% @ 120 Hz	5% @ 1KHz	

VOLTAGE RATINGS
The 672 Series, temperature symbol E, capacitors are designed for continuous operation over the temperature range of −55°C to +85°C. The 672 Series, temperature symbol K, capacitors are designed for continuous operation over the temperature range of −55°C to +125°C.

CAPACITANCE CHANGE WITH TEMPERATURE
The capacitance change shall not exceed ±10% over the operating temperature range of −55°C to +125°C when referred to the +25°C capacitance value.

DISSIPATION FACTOR
The dissipation factor shall not exceed .5% when measured at or referred to a frequency of 60 Hz at +25°C per MIL-C-19978B.

INSULATION RESISTANCE
The minimum insulation resistance when measured with an applied potential equal to the DC voltage rating or 500 VDC, whichever is less and an electrification time of two minutes shall be as follows:

At +25°C The minimum insulation resistance shall be 20,000 megohms times microfarads, but need not exceed 100,000 megohms.
At +85°C The minimum insulation resistance shall be 300 megohms times microfarads, but need not exceed 2,000 megohms.
At +125°C The minimum insulation resistance shall be 20 megohms times microfarads, but need not exceed 250 megohms.

Insulation resistance to case when the case is not a terminal shall be greater than 50,000 megohms.

MILITARY SPECIFICATION
These capacitors are designed to meet and exceed the requirements of Military Specification MIL-C-19978B, Style CQ72 (MIL-C-199788/3).

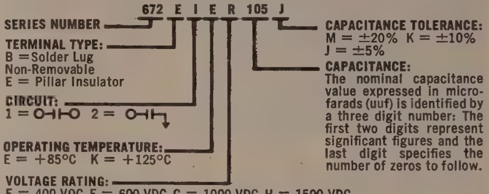
MOISTURE RESISTANCE
The 672 Series capacitors shall withstand the moisture resistance requirements as specified in military specification MIL-C-25C.

VIBRATION-ACCELERATION
These capacitors shall withstand the Grade 3 (2,000 cycle) vibration-acceleration requirements of MIL-C-25C. (MIL standard 202B, method 204, test condition B.)

TEMPERATURE AND IMMERSION
These capacitors shall meet the temperature and immersion cycling requirements of MIL-C-25C.

SPECIAL CAPACITORS
Capacitance values, voltages and sizes not listed will be furnished upon request.

example of part number



672 E I E R 105 J

SERIES NUMBER

TERMINAL TYPE:
B = Solder Lug
Non-Removable
E = Pillar Insulator

CIRCUIT:
1 = 2 =

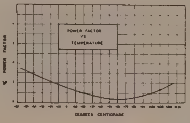
OPERATING TEMPERATURE:
E = +85°C K = +125°C

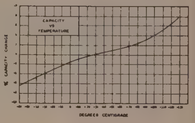
VOLTAGE RATING:
E = 400 VDC F = 600 VDC G = 1000 VDC H = 1500 VDC
J = 2000 VDC K = 2500 VDC L = 3000 DC M = 4000 VDC
N = 5000 VDC P = 6000 VDC R = 7500 VDC S = 10,000 VDC T = 12,500 VDC

CAPACITANCE TOLERANCE:
M = ±20% K = ±10%
J = ±5%

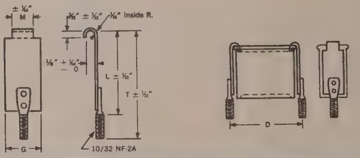
CAPACITANCE:
The nominal capacitance value expressed in microfarads (uuf) is identified by a three digit number: The first two digits represent significant figures and the last digit specifies the number of zeros to follow.

typical curves

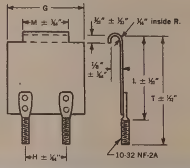




spade bracket



Ref Bkt	Part Number	G Max.	L	T	M	D	H
			Measurements in Inches				
A1	1041-SA1	5/8	1.375	2.375	25/64	2 1/16	—
A2	1041-SA2	5/8	2	3	25/64	2 1/16	—
A3	1041-SA3	5/8	2.625	3.625	25/64	2 1/16	—
A4	1041-SA4	5/8	3	4	25/64	2 1/16	—
A5	1041-SA5	5/8	3.625	4.625	25/64	2 1/16	—
A6	1041-SA6	5/8	4.5	5.5	25/64	2 1/16	—
B1	1041-SB1	5/8	2.25	3.25	25/64	2 3/4	—
B2	1041-SB2	5/8	2.625	3.625	25/64	2 3/4	—
B3	1041-SB3	5/8	3.25	4.25	25/64	2 3/4	—
B4	1041-SB4	5/8	3.625	4.625	25/64	2 3/4	—
B5	1041-SB5	5/8	4	5	25/64	2 3/4	—
B6	1041-SB6	5/8	4.5	5.5	25/64	2 3/4	—
C1	1041-SC1	5/8	3	4	25/64	4	—
C2	1041-SC2	5/8	3.625	4.625	25/64	4	—
C3	1041-SC3	5/8	4	5	25/64	4	—
C4	1041-SC4	5/8	4.5	5.5	25/64	4	—
D1	1041-SD1	1.375	3	4	27/32	4	5/8
D2	1041-SD2	1.375	3.625	4.625	27/32	4	5/8
D3	1041-SD3	1.375	3.750	4.750	27/32	4	5/8
D4	1041-SD4	1.375	4	5	27/32	4	5/8
D5	1041-SD5	1.375	4.5	5.5	27/32	4	5/8
E1	1041-ES1	1.875	2.5	3.5	1.344	4	1.25
E2	1041-SE2	1.875	3.125	4.125	1.344	4	1.25
E3	1041-SE3	1.875	3.625	4.625	1.344	4	1.25
E4	1041-SE4	1.875	4.25	5.25	1.344	4	1.25
E5	1041-SE5	1.875	4.5	5.5	1.344	4	1.25
E6	1041-SE6	1.875	4.875	5.875	1.344	4	1.25
F1	1041-SF1	1.875	4.5	5.5	1.344	4	1.25
F2	1041-SF2	1.875	5.5	6.5	1.344	4	1.25
G1	1041-SG1	2.813	4.25	5.25	2.281	4	1.938
G2	1041-SG2	2.813	4.5	5.5	2.281	4	1.938
G3	1041-SG3	2.813	4.875	5.875	2.281	4	1.938
G4	1041-SG4	2.813	5.25	6.25	2.281	4	1.938
J1	1041-SJ1	4	3.625	4.625	3.656	4	3.375
J2	1041-SJ2	4	4.125	5.125	3.656	4	3.375
J3	1041-SJ3	4	4.5	5.5	3.656	4	3.375
J4	1041-SJ4	4	4.875	5.875	3.656	4	3.375
J5	1041-SJ5	4	5.25	6.25	3.656	4	3.375
J6	1041-SJ6	4	5.75	6.75	3.656	4	3.375
J7	1041-SJ7	4	6.25	7.25	3.656	4	3.375
J8	1041-SJ8	4	6.75	7.75	3.656	4	3.375
J9	1041-SJ9	4	7.25	8.25	3.656	4	3.375
J10	1041-SJ10	4	8.25	9.25	3.656	4	3.375
J11	1041-SJ11	4	9.375	10.375	3.656	4	3.375



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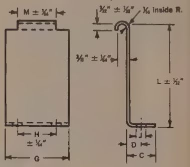
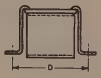
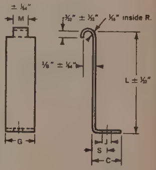


Ref Bkt	Part Number	G Max.	J	L	M	S	C	H	D
			Measurements in Inches						
A1	1042-FA1	5/8	.187	1.500	25/64	.219	.437	—	2 1/4
A2	1042-FA2	5/8	.187	2.125	25/64	.219	.437	—	2 1/4
A3	1042-FA3	5/8	.187	2.75	25/64	.219	.437	—	2 1/4
A4	1042-FA4	5/8	.187	3.125	25/64	.219	.437	—	2 1/4
A5	1042-FA5	5/8	.187	3.75	25/64	.219	.437	—	2 1/4
A6	1042-FA6	5/8	.187	4.625	25/64	.219	.437	—	2 1/4
B1	1042-FB1	5/8	.187	2.375	25/64	.250	.469	—	3
B2	1042-FB2	5/8	.187	2.75	25/64	.250	.469	—	3
B3	1042-FB3	5/8	.187	3.375	25/64	.250	.469	—	3
B4	1042-FB4	5/8	.187	3.75	25/64	.250	.469	—	3
B5	1042-FB5	5/8	.187	4.125	25/64	.250	.469	—	3
B6	1042-FB6	5/8	.187	4.625	25/64	.250	.469	—	3
C1	1042-FC1	5/8	.187	3.125	25/64	.250	.469	—	4 3/8
C2	1042-FC2	5/8	.187	3.75	25/64	.250	.469	—	4 3/8
C3	1042-FC3	5/8	.187	4.125	25/64	.250	.469	—	4 3/8
C4	1042-FC4	5/8	.187	4.625	25/64	.250	.469	—	4 3/8
D1	1042-FD1	1.375	.213	3.125	27/32	.281	.562	5/8	4 3/8
D2	1042-FD2	1.375	.213	3.75	27/32	.281	.562	5/8	4 3/8
D3	1042-FD3	1.375	.213	3.875	27/32	.281	.562	5/8	4 3/8
D4	1042-FD4	1.375	.213	4.125	27/32	.281	.562	5/8	4 3/8
D5	1042-FD5	1.375	.213	4.625	27/32	.281	.562	5/8	4 3/8
E1	1041-FE1	1.875	.213	2.625	1.344	.281	.562	1.25	4 3/8
E2	1042-FE2	1.875	.213	3.25	1.344	.281	.562	1.25	4 3/8
E3	1042-FE3	1.875	.213	3.75	1.344	.281	.562	1.25	4 3/8
E4	1042-FE4	1.875	.213	4.375	1.344	.281	.562	1.25	4 3/8
E5	1042-FE5	1.875	.213	4.625	1.344	.281	.562	1.25	4 3/8
E6	1042-FE6	1.875	.213	5	1.344	.281	.562	1.25	4 3/8
F1	1042-FF1	1.875	.213	4.625	1.344	.281	.562	1.25	4 3/8
F2	1042-FF2	1.875	.213	5.625	1.344	.281	.562	1.25	4 3/8
G1	1042-FG1	2.813	.213	4.375	2.281	.281	.562	1.938	4 3/8
G2	1042-FG2	2.813	.213	4.625	2.281	.281	.562	1.938	4 3/8
G3	1042-FG3	2.813	.213	5	2.281	.281	.562	1.938	4 3/8
G4	1042-FG4	2.813	.213	5.375	2.281	.281	.562	1.938	4 3/8
J1	1042-FJ1	4	.281	3.75	3.656	.297	.562	3.375	4 3/8
J2	1042-FJ2	4	.281	4.25	3.656	.297	.562	3.375	4 3/8
J3	1042-FJ3	4	.281	4.625	3.656	.297	.562	3.375	4 3/8
J4	1042-FJ4	4	.281	5	3.656	.297	.562	3.375	4 3/8
J5	1042-FJ5	4	.281	5.375	3.656	.297	.562	3.375	4 3/8
J6	1042-FJ6	4	.281	5.875	3.656	.297	.562	3.375	4 3/8
J7	1042-FJ7	4	.281	6.375	3.656	.344	.625	3.375	4 1/2
J8	1042-FJ8	4	.281	6.875	3.656	.344	.625	3.375	4 1/2
J9	1042-FJ9	4	.281	7.375	3.656	.344	.625	3.375	4 1/2
J10	1042-FJ10	3.475	.281	8.375	3.656	.344	.625	3.375	4 1/2
J11	1042-FJ11	3.475	.281	9.5	3.656	.344	.625	3.375	4 1/2





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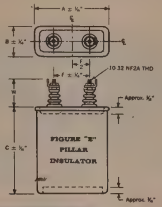
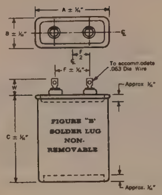




series 672 (continued)

Capacitance	Part Number Figure E	Part Number Figure B	Measurements in Inches			W Max.	Ref Bkt
			A	B	C		
400 VOLTS							
0.50	672E1EE504	672B1EE504	1 13/16	1 1/16	1⅝	¾	A1
1	672E1EE105	672B1EE105	1 13/16	1 1/16	1⅝	¾	A1
2	672E1EE205	672B1EE205	1 13/16	1 1/16	2¼	¾	A2
4	672E1EE405	672B1EE405	2½	1 3/16	2⅞	¾	B2
6	672E1EE605	672B1EE605	2½	1 3/16	4¾	¾	B6
8	672E1EE805	672B1EE805	3¾	1¼	4¼	¾	C3
10	672E1EE106	672B1EE106	3¾	1¼	4¾	¾	C4
12	672E1EE126	672B1EE126	3¾	1¾	3⅞	¾	D2
15	672E1EE156	672B1EE156	3¾	1¾	4¾	¾	D5
600 VOLTS							
0.50	672E1EF504	672B1EF504	1 13/16	1 1/16	1⅝	¾	A1
1	672E1EF205	672B1EF205	1 13/16	1 1/16	2¼	¾	A2
2	672E1EF105	672B1EF105	1 13/16	1 1/16	2¼	¾	A2
4	672E1EF405	672B1EF405	2½	1 3/16	3½	¾	B3
6	672E1EF605	672B1EF605	2½	1 3/16	4¾	¾	B6
8	672E1EF805	672B1EF805	3¾	1¼	3⅞	¾	C2
10	672E1EF106	672B1EF106	3¾	1¼	4¾	¾	C4
12	672E1EF126	672B1EF126	3¾	2¼	3⅜	¾	E2
15	672E1EF156	672B1EF156	3¾	2¼	4¾	¾	E5
1000 VOLTS							
0.50	672E1EG504	672B1EG504	1 13/16	1 1/16	1⅝	¾	A1
1	672E1EG105	672B1EG105	1 13/16	1 1/16	2¼	¾	A2
2	672E1EG205	672B1EG205	1 13/16	1 1/16	3⅞	¾	A5
4	672E1EG405	672B1EG405	2½	1 3/16	4¾	¾	B6
6	672E1EG605	672B1EG605	3¾	1¼	4¾	¾	C4
8	672E1EG805	672B1EG805	3¾	1¾	3⅞	¾	D2
10	672E1EG106	672B1EG106	3¾	1¾	4¾	¾	D5
12	672E1EG126	672B1EG126	3¾	2¼	4½	¾	E4
15	672E1EG156	672B1EG156	3¾	2½	4¾	¾	F1
1500 VOLTS							
0.1	672E1EH104	672B1EH104	1 13/16	1 1/16	1⅝	¾	A1
0.25	672E1EH254	672B1EH254	1 13/16	1 1/16	1⅝	¾	A1
0.50	672E1EH504	672B1EH504	1 13/16	1 1/16	2¼	¾	A2
1	672E1EH105	672B1EH105	1 13/16	1 1/16	3⅞	¾	A5
2	672E1EH205	672B1EH205	2½	1 3/16	4¾	¾	B6
4	672E1EH405	672B1EH405	3¾	1¾	4¾	¾	D5
6	672E1EH605	672B1EH605	3¾	3 3/16	4½	¾	G1
8	672E1EH805	672B1EH805	4 9/16	3¾	4⅜	¾	J2
10	672E1EH106	672B1EH106	4 9/16	3¾	5⅛	¾	J4
12	672E1EH126	672B1EH126	4 9/16	3¾	6	¾	J6
15	672E1EH156	672B1EH156	4 9/16	3¾	8½	¾	J10
2000 VOLTS							
2	672E1EJ205		3¾	1¼	4¾	1⅜	C4
4	672E1EJ405		3¾	2½	4¾	1⅜	F1
6	672E1EJ605		3¾	3 3/16	5⅛	1⅜	G3
8	672E1EJ805		4 9/16	3¾	4⅜	1⅜	J2
10	672E1EJ106		4 9/16	3¾	5½	1⅜	J5
12	672E1EJ126		4 9/16	3¾	6	1⅜	J6
15	672E1EJ156		4 9/16	3¾	9⅝	1⅜	J11
2500 VOLTS							
2	672E1EK205		3¾	1¼	4¾	1⅜	C4
4	672E1EK405		3¾	2¼	5⅛	1⅜	E6
6	672E1EK605		4 9/16	3¾	4⅜	1⅜	J2
8	672E1EK805		4 9/16	3¾	5½	1⅜	J5
10	672E1EK106		4 9/16	3¾	6½	1⅜	J7
12	672E1EK126		4 9/16	3¾	9⅝	1⅜	J11
3000 VOLTS							
1	672E1EL105		3¾	1¾	3¼	1⅜	D1
2	672E1EL205		3¾	2¼	3⅞	1⅜	E3
4	672E1EL405		3¾	3 3/16	5½	1⅜	G4
6	672E1EL605		4 9/16	3¾	5½	1⅜	J5
4000 VOLTS							
1	672E1EM105		3¾	1¼	3⅞	2 3/16	C2
2	672E1EM205		3¾	2¼	5⅛	2 3/16	E6
4	672E1EM405		4 9/16	3¾	5½	2 3/16	J5
5000 VOLTS							
0.1	672E1EN104		3¾	1¼	3¼	2 3/16	C1
0.25	672E1EN254		3¾	1¼	3¼	2 3/16	C1
0.50	672E1EN504		3¾	1¼	3¼	2 3/16	C1
1	672E1EN105		3¾	1¾	3⅞	2 3/16	D2
2	672E1EN205		3¾	2½	5¾	2 3/16	F2
6000 VOLTS							
0.1	672E1EP104		3¾	1¼	3¼	2 3/16	C1
0.25	672E1EP254		3¾	1¼	3¼	2 3/16	C1
0.50	672E1EP504		3¾	1¼	3¼	2 3/16	C1
1	672E1EP105		3¾	2¼	4¾	2 3/16	E5
2	672E1EP205		3¾	3 3/16	4½	2 3/16	G1
7500 VOLTS							
0.1	672E1ER104		3¾	1¼	3¼	2 3/16	C1
0.25	672E1ER254		3¾	1¼	3⅞	2 3/16	C2
0.50	672E1ER504		3¾	2¼	4½	2 3/16	E4
1	672E1ER105		3¾	3 3/16	5⅛	2 3/16	G3
2	672E1ER205		4 9/16	3¾	8½	2 3/16	J10
10,000 VOLTS							
0.1	672E1ES104		3¾	1¼	3⅞	2 3/16	C2
0.25	672E1ES254		3¾	2¼	3⅞	2 3/16	E3
0.50	672E1ES504		3¾	2½	5¾	2 3/16	F2
1	672E1ES105		4 9/16	3¾	6	2 3/16	J6

Capacitance	Part Number Figure E	Part Number Figure B	Measurements in Inches			W Max.	Ref Bkt
			A	B	C		
12,500 VOLTS							
0.1	672E1ET104		3¾	2¼	3⅜	2⅛	E2
0.25	672E1ET254		3¾	2¼	4½	2⅛	E4
0.50	672E1ET504		4 9/16	3¾	5⅛	2⅛	J4
1	672E1ET105		4 9/16	3¾	8½	2⅛	J10
400 VOLTS							
0.25	672E1KE254	672B1KE254	1 13/16	1 1/16	1⅝	¾	A1
0.50	672E1KE504	672B1KE504	1 13/16	1 1/16	2¼	¾	A2
1	672E1KE105	672B1KE105	1 13/16	1 1/16	2⅞	¾	A3
2	672E1KE205	672B1KE205	1 13/16	1 1/16	3⅞	¾	A5
4	672E1KE405	672B1KE405	2½	1 3/16	4¾	¾	B6
6	672E1KE605	672B1KE605	3¾	1¼	4¼	¾	C3
8	672E1KE805	672B1KE805	3¾	1¾	4¼	¾	D4
10	672E1KE106	672B1KE106	3¾	2¼	4½	¾	E4
12	672E1KE126	672B1KE126	3¾	2¼	5⅛	¾	E6
15	672E1KE156	672B1KE156	3¾	3 3/16	5½	¾	G4
600 VOLTS							
0.50	672E1KF504	672B1KF504	1 13/16	1 1/16	2¼	¾	A2
1	672E1KF105	672B1KF105	1 13/16	1 1/16	2⅞	¾	A3
2	672E1KF205	672B1KF205	2½	1 3/16	3⅞	¾	B4
4	672E1KF405	672B1KF405	3¾	1¾	3⅞	¾	D2
6	672E1KF605	672B1KE605	3¾	2¼	4½	¾	E4
8	672E1KF805	672B1KF805	3¾	2½	4¾	¾	F1
10	672E1KF106	672B1KF106	4 9/16	3¾	4⅜	¾	J2
12	672E1KF126	672B1KF126	4 9/16	3¾	4¾	¾	J3
15	672E1KF156	672B1KF156	4 9/16	3¾	6	¾	J6
1000 VOLTS							
0.25	672E1KG254	672B1KG254	1 13/16	1 1/16	2¼	¾	A2
0.50	672E1KG504	672B1KG504	1 13/16	1 1/16	2⅞	¾	A3
1	672E1KG105	672B1KG105	2½	1 3/16	3½	¾	B3
2	672E1KH205	672B1KG205	3¾	1¼	4¾	¾	C4
4	672E1KG405	672B1KG405	3¾	2½	4¾	1⅜	F1
6	672E1KG605	672B1KG605	3¾	3 3/16	4¾	1⅜	G2
8	672E1KG805	672B1KG805	4 9/16	3¾	4⅜	1⅜	J2
10	672E1KG106	672B1KG106	4 9/16	3¾	5½	1⅜	J5
12	672E1KG126	672B1KG126	4 9/16	3¾	6	1⅜	J6
15	672E1KG156	672B1KG156	4 9/16	3¾	9⅝	1⅜	J11
1500 VOLTS							
0.1	672E1KH104	672B1KH104	1 13/16	1 1/16	1⅝	¾	A1
0.28	672E1KH254	672B1KH254	1 13/16	1 1/16	2¼	¾	A2
0.50	672E1KH504	672B1KH504	1 13/16	1 1/16	3⅞	¾	A5
1	672E1KH105	672B1KH105	2½	1 3/16	4¼	¾	B5
2	672E1KH205	672B1KH205	3¾	1¾	4¼	1⅜	D4
4	672E1KH405	672B1KH405	3¾	3 3/16	5½	1⅜	G4
6	672E1KH605	672B1KH605	4 9/16	3¾	6	1⅜	J6
8	672E1KH805	672B1KH805	4 9/16	3¾	8½	1⅜	J10
2000 VOLTS							
1	672E1KJ105		3¾	1¼	4¼	1⅜	C3
2	672E1KJ205		3¾	2¼	5⅛	1⅜	E6
4	672E1KJ405		4 9/16	3¾	5⅛	1⅜	J4
6	672E1KJ605		4 9/16	3¾	7	1⅜	J8
2500 VOLTS							
0.50	672E1KK504		2½	1 3/16	4¼	1⅜	B5
1	672E1KK105		3¾	1¾	3⅞	1⅜	D2
2	672E1KK205		3¾	3 3/16	5½	1⅜	G4
4	672E1KK405		4 9/16	3¾	7	1⅜	J8
3000 VOLTS							
1	672E1KL105		3¾	2¼	4½	1⅜	E4
2	672E1KL205		4 9/16	3¾	4⅜	1⅜	J2
4	672E1KL405		4 9/16	3¾	9⅝	1⅜	J11
4000 VOLTS							
0.25	672E1KM254		3¾	1¼	3¼	2 3/16	C1
0.50	672E1KM504		3¾	1¼	4¾	2 3/16	C4
1	672E1KM105		3¾	2½	5¾	2 3/16	F2
2	672E1KM205		4 9/16	3¾	6½	2 3/16	J7
5000 VOLTS							
0.50	672E1KN504		3¾	2¼	4½	2 3/16	E4
1	672E1KN105		3¾	3 3/16	5½	2 3/16	G4
2	672E1KN205		4 9/16	3¾	9⅝	2 3/16	J11
6000 VOLTS							
0.25	672E1KP254		3¾	1¾	3⅞	2 3/16	D2
0.50	672E1KP504		3¾	2¼	5⅛	2 3/16	E6
1	671E1KP105		4 9/16	3¾	6	2 3/16	J6
7500 VOLTS							
0.1	672E1KR104		3¾	1¼	3¼	2 3/16	C1
0.25	672E1KR254		3¾	3 3/16	4½	2 3/16	G1
0.50	672E1KR504		4 9/16	3¾	4¾	2 3/16	J3
10,000 VOLTS							
0.1	672E1KS104		3¾	2¼	3⅜	2 3/16	E2
0.25	672E1KS254		4 9/16	3¾	4¾	2 3/16	J3
0.50	672E1KS504		4 9/16	3¾	7½	2 3/16	J9
12,500 VOLTS							
0.1	672E1KT104		4 9/16	3¾	3⅞	2 3/16	J1
0.25	672E1KT254		4 9/16	3¾	5½	2 3/16	J5

THE GUDEMAN CORPORATION

capacitors and EMI filters

340 WEST HURON STREET ▪ CHICAGO ILLINOIS 60610 ▪ 312 337 7400 ▪ TWX 910 221 3863

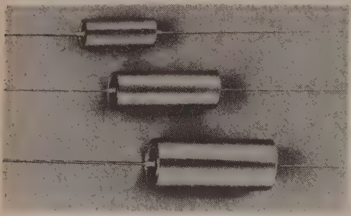
paper plastic dielectric

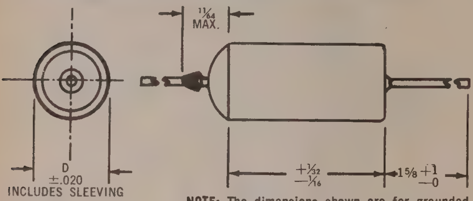
series 462

HIGH RELIABILITY CAPACITORS
HERMETICALLY SEALED (GLASS TO METAL)

TUBULAR METALLIC CASE

—65°C TO +125°C WITHOUT DERATING





NOTE: The dimensions shown are for grounded (XRGS) units. For floating (XRFS) units add 3/32" to length for diameters of .255, .332 and .420. Above .420 diameter, add 1/16" to length.

Furnished with "copper-clad" steel wire leads.

Case Diameter (In.)	AWG Size
.235 to .312	22
.400 to 1.00	20

specifications

XRFS462 units meet all electrical environmental requirements of MIL-C-14157.

INSULATION RESISTANCE

The minimum insulation resistance when measured in accordance with Specification MIL-C-14157 shall be as follows:

At 25°C—15,000 megohm-mfds. for capacitance values .6MFD and greater. 25,000 megohms for capacitance values below .6 MFD.

AT 125°C—20 megohm-mfds. for capacitance values .08 MFD and greater. 250 megohms for capacitance values below .08 MFD.

CAPACITANCE CHANGE FROM +25°C ±5°C.

The maximum capacitance change shall be as follows:

At — 65°C ±3°C . . . + 2%, —10%
At +125°C ±3°C . . . +10%, — 3%

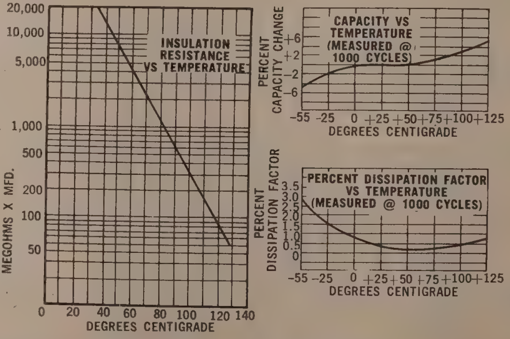
DISSIPATION FACTOR

The dissipation factor when measured at room temperature shall not be more than 0.6%.

Cap.	Dia.	Length	Part No.	MIL-C-14157 Designation
200 VOLTS D.C.				
.0068	.255	23/32	XRGS462C682	CPV09A3C682
.022	.332	27/32	XRGS462C223	CPV09A3C223
.033	.332	31/32	XRGS462C333	CPV09A3C333
.047	.420	27/32	XRGS462C473	CPV09A3C473
.068	.420	1 3/32	XRGS462C683	CPV09A3C683
.1	.420	1 11/32	XRGS462C104	CPV09A3C104
.15	.582	1 1/16	XRGS462C154	CPV09A3C154
.22	.582	1 5/16	XRGS462C224	CPV09A3C224
.33	.582	1 9/16	XRGS462C334	CPV09A3C334
.47	.690	1 9/16	XRGS462C474	CPV09A3C474
.68	.770	1 13/16	XRGS462C684	CPV09A3C684
1.0	.770	2 5/16	XRGS462C105	CPV09A3C105
300 VOLTS D.C.				
.0047	.255	23/32	XRGS462Z472	CPV09A3D472
.015	.332	27/32	XRGS462Z153	CPV09A3D153
.022	.332	31/32	XRGS462Z223	CPV09A3D223
.033	.420	27/32	XRGS462Z333	CPV09A3D333
.047	.420	1 3/32	XRGS462Z473	CPV09A3D473
.068	.420	1 7/32	XRGS462Z683	CPV09A3D683
.1	.582	1 1/16	XRGS462Z104	CPV09A3D104
.15	.582	1 5/16	XRGS462Z154	CPV09A3D154
.22	.582	1 9/16	XRGS462Z224	CPV09A3D224
.33	.690	1 11/16	XRGS462Z334	CPV09A3D334
.47	.770	1 13/16	XRGS462Z474	CPV09A3D474
.68	.770	2 5/16	XRGS462Z684	CPV09A3D684
1.0	1.020	2 1/16	XRGS462Z105	CPV09A3D105
400 VOLTS D.C.				
.0022	.255	23/32	XRGS462E222	CPV09A3E222
.0033	.255	23/32	XRGS462E332	CPV09A3E332
.0068	.332	27/32	XRGS462E682	CPV09A3E682
.01	.332	27/32	XRGS462E103	CPV09A3E103
.015	.332	31/32	XRGS462E153	CPV09A3E153
.022	.420	27/32	XRGS462E223	CPV09A3E223
.033	.420	31/32	XRGS462E333	CPV09A3E333
.047	.420	1 7/32	XRGS462E473	CPV09A3E473
.068	.420	1 15/32	XRGS462E683	CPV09A3E683
.1	.582	1 3/16	XRGS462E104	CPV09A3E104
.15	.582	1 7/16	XRGS462E154	CPV09A3E154
.22	.690	1 7/16	XRGS462E224	CPV09A3E224
.33	.690	1 13/16	XRGS462E334	CPV09A3E334
.47	.770	2 1/16	XRGS462E474	CPV09A3E474
.68	.770	2 9/16	XRGS462E684	CPV09A3E684
1.0	1.020	2 3/16	XRGS462E105	CPV09A3E105
600 VOLTS D.C.				
.001	.255	23/32	XRGS462F102	CPV09A3F102
.0015	.255	23/32	XRGS462F152	CPV09A3F152
.0022	.332	27/32	XRGS462F222	CPV09A3F222
.0033	.332	27/32	XRGS462F332	CPV09A3F332
.0047	.332	27/32	XRGS462F472	CPV09A3F472
.0068	.332	31/32	XRGS462F682	CPV09A3F682
.01	.420	27/32	XRGS462F103	CPV09A3F103
.015	.420	31/32	XRGS462F153	CPV09A3F153
.022	.420	1 3/32	XRGS462F223	CPV09A3F223
.033	.420	1 15/32	XRGS462F333	CPV09A3F333
.047	.582	1 1/16	XRGS462F473	CPV09A3F473
.068	.582	1 5/16	XRGS462F683	CPV09A3F683
.1	.582	1 11/16	XRGS462F104	CPV09A3F104
.15	.690	1 11/16	XRGS462F154	CPV09A3F154
.22	.770	1 13/16	XRGS462F224	CPV09A3F224
.33	.770	2 9/16	XRGS462F334	CPV09A3F334
.47	1.020	2 1/16	XRGS462F474	CPV09A3F474

"G" in Part No. indicates "Grounded". Substitute "F" for "Floating".
Add following to part no. for tolerance: —K = ±10%; —J = ±5%.

TYPICAL CURVES



GI capacitors

CROSS REFERENCE CHART AND INDEX

Manufacturer	Electrolytic P— Mfg. Type	Electrolytic P— GI Type	Film P— Mfg. Type	Film P— GI Type	Mica P— Mfg. Type	Mica P— GI Type
Aerovox	CRE PTT BCD	984 984 985	V161 V146X	165 165	ADM10 ADM15 ADM19 ADM20 ADM30	RDM10 RDM15 RDM19 RDM20 RDM30
Cornell-Dubilier	NLW WHR	974 904	WMF CTM	165 165	CD10 CD15 CD20 CD30 CD42	RDM10 RDM15 RDM20 RDM30 RDM42
Elmenco/IEC	—	—	—	—	DM5 DM10 DM15 DM16 DM19 DM20 DM30 DM42	RDM05 RDM10 RDM15 RDM16 RDM19 RDM20 RDM30 RDM42
F. Dyne	—	—	A B C	165 165 165	—	—
General Electric	76F 77F 78F	974 974 974	61F 63F AE	165 165 165	—	—
Gudeman	—	—	355 356	165 165	—	—
Mallory	TT TTX MTA MTV	974 974 984 985	—	—	—	—

Manufacturer	Electrolytic P— Mfg. Type	Electrolytic P— GI Type	Film P— Mfg. Type	Film P— GI Type	Mica P— Mfg. Type	Mica P— GI Type
Midwec	—	—	3(3X) 301 3X1 CTM	165 165 165 165	—	—
Nytronics	—	—	MAF 107	165 165	—	—
S & EL	—	—	10R	165	—	—
Sangamo	556	987	—	—	D10 D15 D19 D20 D30 D42	RDM10 RDM15 RDM19 RDM20 RDM30 RDM42
Southern	—	—	MR	165	—	—
Sprague	TL 30D TE 500D 600D 31D 89D	984 974 974 974 994 984 985	192P 148P	165 165	42M	RDM19
Standard	—	—	MW-R	165	—	—
Tex-Cap	—	—	24	165	—	—
TRW	—	—	663uW 608	165 165	—	—
West-Cap	MAC	974	Rap-N-Fill	165	—	—

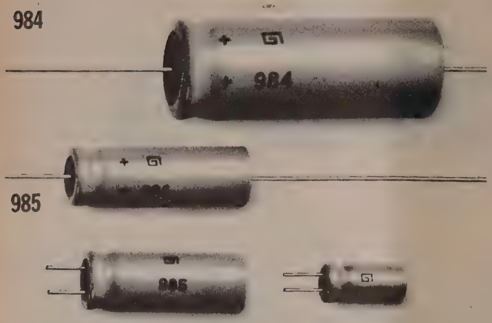
The GI catalog tells you almost everything you need to know about our capacitors. Sub-miniature aluminum electrolytics. Silver dipped mica. Polyester film capacitors. Off the shelf delivery available from your local GI/Miconics distributor.

GENERAL INSTRUMENT CORPORATION

the capacitor company

SUB-MINIATURE ALUMINUM ELECTROLYTIC CAPACITORS −30° TO +85°C GI POLAR TYPE 984 AND 985

SPECIFICATIONS



Construction: Tubular aluminum case with electrical grade rubber end seal and copper tinned terminal wires emerging from the seal. Internal connections are all-welded. A PVC sleeve insulates the case.

Configuration: Type 984 has axial leads. Alternate Type 986 has negative lead brought down side of case under the PVC insulating sleeve. Type 985 is designed for P/C mounting.

Operating Temperature: −30° C to +85° C (continuous) for sizes shown. Special designs available for +85° C and +105° C.

Working Voltage (Vdcw): The maximum continuous voltage which may be applied for the temperature range.

Surge Voltage (Vdcs): The maximum allowable short term (30 second) voltage, including transients and peak ripple which may be applied without damage.

The surge test is performed with a 1000 ohm resistor connected in series with the capacitor. The surge voltage shown in the tables is applied for 30 seconds at a rate of 12 times per hour for 100 hours at +25° C. At the completion of the test, capacitors shall meet the initial DC leakage requirements.

Capacitance: Shown as microfarads (uF) in the tables for each case size and working voltage. Measurement is made by the bridge method at +25° C and 120Hz with a maximum 1.0 volt rms signal applied.

Capacitance Tolerance: The standard tolerance is −10% +75% of rated capacitance from 3 to 50 Vdcw and −10% +50% from 51 to 150 Vdcw. Special tolerances are available: ±10% for 10uF and up; ±20% for 5uF and up.

Polarity: Types 984 and 985 capacitors are polarized for DC operation.

Reverse Voltage: Voltage reversals not exceeding 1.5 volts may be applied without damage.

Leakage Current (DCL): DCL in microamperes (uA) is measured after capacitors have been pre-conditioned by applying rated voltage (Vdcw) for 15 minutes at least 24 hours and not more than 48 hours prior to testing. To test, apply Vdcw to the capacitor with a 1000 ohm resistor in series for 5 minutes. Read DCL in uA. The maximum allowable DCL is determined by:

$$I = .06E\sqrt{C}$$

Where: I = Current in microamperes; E = Rated DC voltage; and C = Rated capacitance in microfarads. Leakage current need not be less than that derived from the formula or the following, whichever is greater:

Rated Vdcw	3	6	12	15	16	25	50	100	150
DCL uA	4	4	4	4	8	8	8	15	30

Dissipation Factor (DF): DF in percent is measured by the bridge method at +25° C and 120Hz with a maximum 1.0 volt rms signal applied. DF shall not exceed:

Rated Vdcw	3	6	12	15	25	50	100	150
DF%	40	35	30	26	19	19	17	15

Equivalent Series Resistance (ESR): $\text{ESR} = \dfrac{\text{DF} \times 10^4}{2\pi fC}$

Where: DF = Dissipation Factor in %; f = frequency (Hertz); and C = Capacitance in microfarads (uF).

Ripple Current: The peak ripple voltage in combination with the DC polarizing voltage shall not exceed 120% of the rated Vdcw nor cause a voltage reversal in excess of 1.5 volts.

The maximum rms ripple current in milliamperes (mA) at +70°C and 120 Hertz which may be applied is:

Case Dia. Code	**B**	**M**	**E**	**G**	**H**	**J**	**K**	**L**
Case Dia. In.	.257	.282	.333	.396	.458	.521	.612	.646
Max. Ripple mA	$8\sqrt{C}$	$9\sqrt{C}$	$10\sqrt{C}$	$15\sqrt{C}$	$20\sqrt{C}$	$25\sqrt{C}$	$30\sqrt{C}$	$35\sqrt{C}$

For maximum ripple current at temperatures less than +70° C and frequencies other than 120 Hertz, multiply the figures derived from the preceding table by:

Temp. °C	Frequency (Hz)			
	60	120	400	2400
70	.8	1.0	1.1	1.4
65	1.6	2.0	2.2	2.8
45	2.0	2.5	2.75	3.5
25	2.4	3.0	3.3	4.2

Life Test: Test is conducted in a suitable chamber with circulating air. Apply voltage not to exceed the rated Vdcw for 1000 hours at +85° C ± 2° C. Remove capacitors from chamber and allow to cool to +25° C ±1° C in a normal manner. Capacitance shall be at least 85% of the initial measured value (90% for a 500 hour life test). The product of ESR (ohms) and capacitance (uF) shall not exceed 130% of initial requirements.

Shelf Test: Conduct test in chamber with circulating air. No voltage is applied for 100 hours at +85° C ±2° C. Remove capacitors from chamber and allow to cool to +25° C ±1° C in a normal manner. Measure the capacitance as previously described. It shall meet initial requirements as shall ESR. The DCL shall not exceed 200% of the initial requirements.

Low Temperature Test: A suitable chamber must be used and capacitors stabilized to within ±1° C of the testing temperature. Measure capacitance as previously described. It shall not have decreased to less than the percentages of the initial measured value as shown:

Vdcw	Temperature °C		
	+25	−20	−30
3–12	100%	70%	60%
15 up	100%	85%	75%

Terminal Test: Terminal wires shall withstand a steady axial pull of 5 pounds for 5 seconds.

Marking: Minimum marking shall be: General Instrument logotype. Capacitance (uF), Vdcw, EIA code, date code and polarity. Marking is normally applied to the outer PVC sleeve.

Packaging: Standard packaging is bulk in corrugated cartons (Approx. 4″ × 7″ × 9″). Reel packaging is available for Type 984 up to .375″ diameter. The standard G.I. reel packaging specification is available upon request.

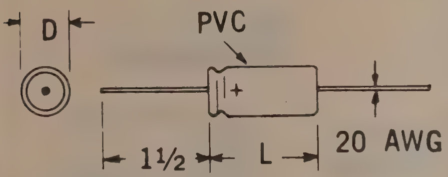
SUB-MINIATURE ALUMINUM ELECTROLYTIC CAPACITORS
−30° TO +85°C GI POLAR TYPE 984 AND 985

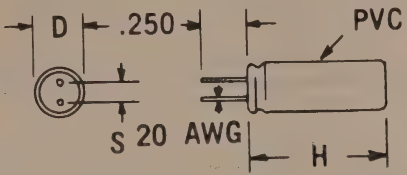
AXIAL LEAD
984 POLAR −30° +85°C

Specially engineered for commercial and entertainment electronic use. Combine high volumetric efficiency with excellent performance and reliability. 37 standard case sizes. Working voltages from 3 to 150. Popular ratings are shown below.

RADIAL LEAD
985 POLAR −30° +85°C

Special high gain foils are used for maximum volumetric efficiency consistent with reliability performance. The operating temperature range is compatible with most commercial and entertainment electronic applications. The 72 ratings shown below are the most popular.





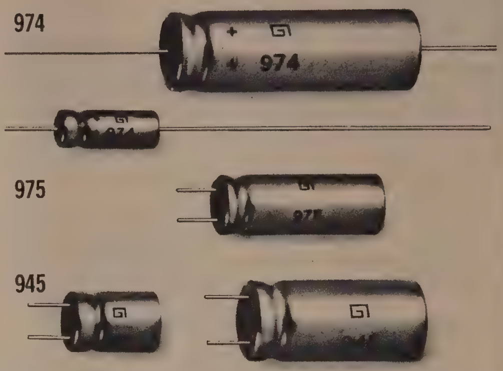
Cap. μF	Vdcw Max.	Dia. x Length (Max. Ins.)	Cat. No. 984-
1	150	.275 x .662	BC0678
2	150	.275 x .787	BE0679
5	50	.257 x .662	BC0658
5	100	.257 x .912	BH0702
5	150	.333 x .912	EH0682
8	100	.333 x .787	EE0704
8	150	.396 x .912	GH0683
10	25	.257 x .662	BC0632
10	50	.257 x .787	BE0660
10	100	.333 x .787	EE0705
10	150	.396 x .912	GH0684
15	15	.257 x .662	BC0604
15	25	.257 x .787	BE0633
15	50	.333 x .787	EE0661
15	100	.333 x .912	EH0706
15	150	.396 x 1.162	GM0685
20	15	.257 x .662	BE0605
20	25	.257 x .787	BE0634
20	50	.333 x .787	EE0662
20	100	.396 x .912	GH0707
20	150	.396 x 1.412	GS0686
25	15	.257 x .787	BE0606
25	25	.257 x .912	BH0635
25	50	.333 x .912	EH0663
25	100	.396 x .912	GH0708
25	150	.396 x 1.537	GU0687
50	15	.333 x .787	EE0610
50	25	.333 x .912	EH0639
50	50	.396 x .912	GH0667
50	100	.458 x 1.162	HM0709
50	150	.612 x 1.162	KM0691
75	25	.396 x .787	GE0641
75	50	.396 x 1.037	GK0669
75	100	.458 x 1.162	HM0710
75	150	.612 x 1.537	KU0714
100	15	.333 x .912	EH0614
100	25	.396 x .912	GH0634
100	50	.458 x 1.037	HK0671
100	100	.612 x 1.162	KM0711
100	150	.656 x 1.662	LW0715
150	12	.396 x .787	GE0586
150	15	.396 x .912	GH0617
150	25	.458 x .912	HH0646
150	50	.458 x 1.412	HS0674
200	15	.458 x .912	HH0619
200	25	.396 x 1.287	GP0648
200	50	.521 x 1.287	JP0676
200	100	.612 x 1.662	KW0712
250	6	.396 x .912	GH0557
250	12	.458 x .912	HH0589
250	15	.458 x 1.037	HK0620
250	25	.458 x 1.287	HP0649
250	50	.521 x 1.537	JU0677
500	6	.396 x 1.287	GP0560
500	12	.458 x 1.287	HP0592
500	15	.458 x 1.412	HS0623
500	25	.521 x 1.537	JU0652
500	50	.656 x 1.662	LW0717
800	12	.521 x 1.412	JS0594
800	15	.612 x 1.162	KM0625
800	25	.612 x 1.537	KU0720
1000	12	.521 x 1.537	JU0595
1000	15	.612 x 1.412	KS0692
1000	25	.656 x 1.662	LW0721
1500	15	.656 x 1.662	LW0728
2000	6	.612 x 1.537	KU0722
2000	12	.656 x 1.662	LW0729
2500	3	.612 x 1.412	KS0723
2500	6	.656 x 1.537	LU0724
3000	3	.612 x 1.662	KW0725
3500	3	.656 x 1.662	LW0726

Cap. μF	Vdcw Max.	Dia. x Height (Max. Ins.)	S *	Cat. No. 985-
1	150	.271 x .537	2	CA0680
2	150	.271 x .787	2	CE0681
5	50	.271 x .537	2	CA0659
5	100	.271 x .787	2	CE0701
5	150	.333 x .787	3	EE0684
8	100	.333 x .662	3	EC0702
8	150	.396 x .787	4	GE0685
10	25	.271 x .537	2	CA0633
10	50	.333 x .537	3	EA0661
10	100	.333 x .787	3	EE0703
10	150	.396 x .787	4	GE0686
15	15	.271 x .537	2	CA0604
15	25	.271 x .662	2	CC0634
15	50	.333 x .662	3	EC0662
15	100	.333 x .912	3	EH0704
15	150	.396 x 1.037	4	GK0687
20	15	.271 x .662	2	CC0605
20	25	.333 x .537	3	EA0635
20	50	.333 x .787	3	EE0663
20	100	.396 x .787	4	GE0705
20	150	.458 x 1.037	4	HK0688
25	15	.271 x .662	2	CC0606
25	25	.333 x .537	3	EA0636
25	50	.333 x .787	3	EE0664
25	100	.396 x .787	4	GE0706
25	150	.521 x .912	5	JH0689
50	15	.333 x .662	3	EC0610
50	25	.333 x .787	3	EE0640
50	50	.396 x .787	4	GE0668
50	100	.458 x 1.037	4	HK0707
50	150	.646 x 1.037	6	LK0693
75	25	.396 x .662	4	GC0642
75	50	.396 x 1.037	4	GK0670
75	100	.521 x 1.162	5	JM0708
75	150	.646 x 1.287	6	LP0709
100	15	.396 x .662	4	GC0614
100	25	.396 x .787	4	GE0644
100	50	.458 x 1.037	4	HK0672
100	100	.646 x 1.037	6	LK0710
100	150	.646 x 1.662	6	LW0711
150	15	.396 x .787	4	GE0617
150	25	.396 x 1.037	4	GK0647
150	50	.521 x 1.037	5	JK0675
150	100	.646 x 1.287	6	LP0712
200	15	.396 x .912	4	CH0619
200	25	.458 x 1.037	4	HK0649
200	50	.646 x .912	6	LH0677
200	100	.646 x 1.537	6	LU0713
250	6	.396 x .787	4	GE0714
250	12	.396 x .912	4	GH0589
250	15	.396 x 1.037	4	GK0620
250	25	.521 x .912	5	JH0650
250	50	.521 x 1.537	6	JU0678
500	6	.521 x .787	5	JE0715
500	12	.458 x 1.162	4	HM0592
500	15	.521 x 1.162	5	JM0623
500	25	.646 x 1.037	6	LK0653
500	50	.646 x 1.662	6	LW0716
800	12	.521 x 1.287	5	JP0594
800	15	.646 x 1.037	6	LK0625
800	25	.646 x 1.412	6	LS0717
1000	12	.646 x 1.037	6	LK0595
1000	15	.646 x 1.287	6	LP0626
1000	25	.646 x 1.662	6	LK0718
1500	12	.646 x 1.412	6	LS0719
1500	15	.646 x 1.537	6	LU0720
2000	6	.646 x 1.412	6	LS0721
2000	12	.646 x 1.662	6	LW0722
2500	3	.646 x 1.287	6	LP0694
2500	6	.646 x 1.537	6	LU0723
3000	3	.646 x 1.537	6	LU0724
3500	3	.646 x 1.662	6	LW0725

* "S" for All Types ±.015″ 1 = .100 2 = .125 3 = .150 4 = .200 5 = .250 6 = .283 7 = .312

SUB-MINIATURE ALUMINUM ELECTROLYTIC CAPACITORS
−40° TO +85°C GI POLAR TYPE 974, 975 AND 945

SPECIFICATIONS



Construction: Type 974, tubular aluminum case with butyl end seal, PVC insulating sleeve and axial wire leads. Alternate Type 976 has negative lead brought down side of case under the PVC insulating sleeve. Type 975 has both terminal wires emerging through the end for P/C mounting. The Type 945 adds a phenolic disc for improved resistance to vibration.

Operating Temperature: −40° C to +85° C (continuous)

Working Voltage: The maximum continuous working voltage (Vdcw) which may be applied for the operating parameters stated.

Surge Voltage (Vdcs): The maximum allowable short term (0.5 minute) voltage including transients and peak ripple which may be applied for 30 seconds without permanent damage.

The surge test is performed with a 1000 ohm resistor connected in series with the capacitor. Surge voltage is applied for 30 seconds at a rate of 12 times per hour for 100 hours at +25° C. At the completion of this test, capacitors shall meet the initial DC leakage requirements.

Capacitance: Shown as microfarads (uF) in the tables for each case size and working voltage. Measurement is made by the bridge method at +25° C and 120Hz with a maximum 1.0 volt rms signal applied.

Capacitance Tolerance: The standard tolerance is −10% +75% of rated capacitance from 3 to 50 Vdcw and −10% +50% from 51 to 150 Vdcw. Tolerances of ±20% are available for 5uF and up or ±10% for 10uF and up.

Polarity: Types 974, 975 and 945 capacitors are polarized for DC operation.

Reverse Voltage: Voltage reversals not exceeding 1.5 volts may be applied without damage.

Leakage Current: Expressed as DCL and in terms of microamperes (uA). Capacitors must be pre-conditioned by applying rated voltage (Vdcw) for 15 minutes at least 24 hours and not more than 48 hours prior to testing. Measure DCL by applying rated DC voltage (Vdcw) to the capacitor with a 1000 ohm resistor in series for five minutes and read DCL in microamperes (uA). Maximum allowable DCL is determined by the formula:

$$I = \frac{E\sqrt{C}}{30}$$

Where: I = Current in microamperes; E = Rated DC voltage; and C = Rated capacitance in microfarads.

Leakage current need not be less than that derived from the formula or the following, whichever is greater:

Rated Vdcw	3	6	12	15	25	50	150
DCL (uA)	1	1	2	2.5	3	4	15

Dissipation Factor: The Dissipation Factor (DF) in percent is measured by the bridge method at ±25° C and 120Hz with a maximum 1.0 volt rms signal applied.

DF (in percent) shall not exceed:

Rated Vdcw	3	6	12	15	25	50	150
DF%	34	26	26	26	19	19	15

$$\text{Equivalent Series Resistance: ESR (ohms)} = \frac{DF \times 10^4}{2\pi fC}$$

Where: DF = Dissipation Factor (%); f = frequency (Hz); and C = Capacitance (uF).

Ripple Current: Peak ripple voltage in combination with the DC polarizing voltage shall not exceed 120% of the rated Vdcw nor cause a voltage reversal exceeding 1.5 volts. Maximum ripple at +85° C and 120Hz is:

Case Dia. (Max. In.)	.271	.333	.396	.458	.521	.646
Max Ripple (mA)	$8\sqrt{C}$	$10\sqrt{C}$	$15\sqrt{C}$	$20\sqrt{C}$	$25\sqrt{C}$	$35\sqrt{C}$

At temperatures other than 85° C or frequencies other than 120 Hertz, multiply the above figures by:

Temp. °C	Frequency (Hertz) 60	120	400	2400
85	.8	1.0	1.1	1.4
65	1.6	2.0	2.2	2.8
45	2.0	2.5	2.75	3.5
25	2.4	3.0	3.3	4.2

Life Test: Conduct test in a chamber with circulating air. Apply rated voltage for 1000 hours at +85° C ±2° C. Remove the capacitors and allow to cool normally to +25° C ±1° C. Capacitance shall be at least 85% of the initial measured value. The product of ESR and capacitance shall not exceed 130% of the initial requirements.

Shelf Test: Test is conducted in a suitable chamber with circulating air. The capacitors are stored for 100 hours in the chamber at +85° C with no voltage applied. At the conclusion of 100 hours, remove the capacitors from the chamber and allow them to cool to +25° C ±1° C in a normal manner. Measure the capacitance as previously described. It shall meet initial requirements as shall ESR. DCL shall not exceed two times the initial requirements.

Low Temperature Test: In a suitable chamber, stabilize the temperature to within ±1° C of the desired value. The capacitance is measured while the capacitors remain in the chamber and shall not have decreased to less than the percentages of the initial measured value as follows:

Vdcw	Temperature °C +25	−20	−30	−40
3–12	100%	70%	60%	45%
15 up	100%	85%	75%	60%

Terminal Test: Terminal wires shall withstand a steady axial pull of 5 pounds for 5 seconds.

Marking: Minimum marking on the PVC insulating sleeve shall be: General Instrument logotype, capacitance, Vdcw, EIA code, date code and polarity.

Packaging: 974—Standard packaging is bulk in corrugated cartons (approx. 4″ × 7″ × 9″). Reel packaging is available for Type 974 up to .375″ diameter. The standard G.I. reel packaging specification is available upon request.

975/945—Bulk in egg-crate cartons.

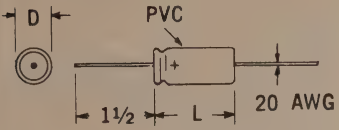
CAPACITOR DIVISION GI GENERAL INSTRUMENT CORPORATION GI 600 WEST JOHN ST., HICKSVILLE, NEW YORK 11802

PHONE: (516) 733-3000 / TWX: 510-221-1865 / IN CANADA: GENERAL INSTRUMENT LTD., 61 INDUSTRY STREET, TORONTO, ONTARIO

SUB-MINIATURE ALUMINUM ELECTROLYTIC CAPACITORS
−40° TO +85°C POLAR TYPE 974, 975 AND 945

AXIAL LEAD
974 POLAR −40° +85°C

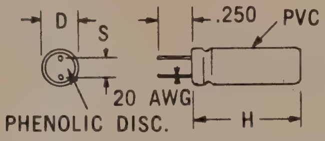
Designed for industrial electronic use over broad temperature range. High reliability performance with 0.634% per 1000 hr. failure rate at 60% confidence level. 72 popular ratings stocked by Miconics Distributors shown below.



Cap. µF	Vdcw Max.	Dia. x Length (Max. Ins.)	Cat. No. 974-
1	150	.257 x .662	BC0155
2	150	.257 x .787	BE0156
3	150	.333 x .787	EE0157
4	150	.333 x .787	EE0158
5	50	.257 x .662	BC0125
5	100	.333 x .662	EC0149
5	150	.333 x .912	EH0159
6	100	.333 x .787	EE0150
6	150	.396 x .819	GG0160
8	50	.257 x .787	BE0127
8	100	.333 x .787	EE0151
8	150	.396 x .787	GE0161
10	25	.257 x .662	BC0018
10	50	.333 x .662	EC0128
10	100	.333 x .912	EH0152
10	150	.396 x .912	GH0162
15	15	.257 x .662	BC0104
15	25	.257 x .787	BE0116
15	50	.333 x .787	EE0129
15	100	.396 x .912	GH0153
15	150	.396 x 1.162	GM0163
20	15	.275 x .787	BE0025
20	25	.333 x .662	EC0117
20	50	.333 x .787	EE0054
20	100	.396 x .912	GH0154
20	150	.396 x 1.412	GS0164
25	15	.257 x . 787	BE0005
25	25	.333 x .787	EE0118
25	50	.333 x .912	EH0057
25	50	.333 x .912	GK0192
25	150	.396 x 1.537	GU0198
50	15	.333 x .787	EE0016
50	25	.333 x .912	EH0122
50	50	.396 x 1.037	GK0131
50	100	.396 x 1.537	GU0195
50	150	.521 x 1.537	JU0201
75	15	.333 x .912	EH0109
75	25	.396 x .912	GH0022
75	50	.396 x 1.287	GP0132
75	100	.521 x 1.412	JS0196
100	6	.333 x .787	EE0017
100	12	.333 x .912	EH0010
100	15	.333 x 1.037	EK0004
100	25	.396 x 1.037	GK0130
100	50	.396 x 1.537	GU0133
100	100	.521 x 1.537	JU0197
150	6	.333 x .912	EH0077
150	12	.396 x .912	GH0028
150	15	.396 x 1.037	GK0030
150	25	.396 x 1.287	GP0143
150	50	.458 x 1.537	HU0185
200	6	.396 x .912	GH0079
200	12	.396 x 1.037	GK0011
200	15	.458 x .912	HH0141
200	25	.458 x 1.287	HP0144
200	50	.521 x 1.537	JU0191
250	6	.396 x .912	GH0020
250	12	.396 x 1.162	GM0179
250	15	.396 x 1.287	GP0166
250	25	.458 x 1.412	HS0180
500	6	.458 x 1.162	HM0138
500	12	.458 x 1.412	HS0177
500	15	.458 x 1.537	HU0176
500	25	.521 x 1.537	JU0178
800	3	.396 x 1.537	GU0136
800	15	.521 x 1.537	JU0188
1000	6	.521 x 1.412	JS0183
1000	12	.521 x 1.537	JU0187
1300	3	.521 x 1.412	JS0181
1300	6	.521 x 1.287	JP0184
1800	3	.521 x 1.287	JP0182

RADIAL LEAD
945 POLAR −40° +85°C

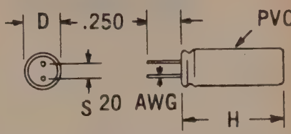
Same electrical performance as 975, but have special phenolic disc at end seal for maximum physical reliability and resistance to shock. Especially suited for automotive and avionics applications.



Cap. µF	Vdcw Max.	Dia. x Height (Max. Ins.)	S *	Cat. No. 945-
4	150	.396 x .599	4	GB0604
5	100	.396 x .599	4	GB0605
5	150	.396 x .724	4	GD0606
8	100	.396 x .599	4	GB0609
8	150	.458 x .724	4	HD0610
10	50	.396 x .599	4	GB0611
10	100	.396 x .724	4	GD0612
10	150	.458 x .850	4	HG0613
15	50	.396 x .599	4	GB0614
15	100	.458 x .724	4	HD0615
15	150	.521 x .850	5	JG0616
20	25	.396 x .599	4	GB0617
20	50	.396 x .724	4	GD0618
20	100	.396 x .850	4	GG0619
20	150	.521 x .974	5	JJ0620
25	25	.396 x .599	4	GB0621
25	50	.396 x .724	4	GD0622
25	100	.458 x .850	4	HG0623
25	150	.521 x .974	5	JJ0624
50	15	.396 x .599	4	GB0625
50	25	.396 x .724	4	GD0626
50	50	.458 x .850	4	HG0627
50	100	.521 x 1.099	5	JL0628
50	150	.646 x 1.099	7	LL0629
75	12	.396 x .599	4	GB0630
75	15	.396 x .724	4	GD0631
75	25	.458 x .724	4	HD0632
75	50	.521 x .850	5	JG0633
75	100	.646 x .974	7	LJ0634
75	150	.646 x 1.349	7	LR0635
100	15	.396 x .724	4	GD0637
100	25	.458 x .850	4	HG0638
100	50	.521 x .974	5	JJ0639
100	100	.646 x 1.224	7	LN0640
100	150	.646 x 1.724	7	LX0641
150	15	.458 x .850	4	HG0645
150	25	.521 x .850	5	JG0646
150	50	.646 x .974	7	LJ0647
150	100	.646 x 1.474	7	LT0648
200	15	.458 x .974	4	HJ0652
200	25	.521 x .974	5	JJ0653
200	50	.646 x 1.099	7	LL0654
200	100	.646 x 1.724	7	LX0655
250	15	.521 x .850	5	JG0659
250	25	.521 x 1.099	5	JL0660
250	50	.646 x 1.224	7	LN0661
500	15	.646 x .974	7	LJ0665
500	25	.646 x 1.224	7	LN0666
800	15	.646 x 1.224	7	LN0670
800	25	.646 x 1.599	7	LV0671
1000	6	.646 x 1.099	7	LL0673
1000	12	.646 x 1.224	7	LN0674
1000	15	.646 x 1.474	7	LT0675
1500	6	.646 x 1.224	7	LN0677
1500	12	.646 x 1.599	7	LV0678
2000	3	.646 x 1.224	7	LN0679
2000	6	.646 x 1.474	7	LT0680
2500	3	.646 x 1.474	7	LT0681
2500	6	.646 x 1.724	7	LX0682
3000	3	.646 x 1.599	7	LV0683
3500	3	.646 x 1.724	7	LX0684

RADIAL LEAD
975 POLAR −40° +85°C

Engineered for maximum reliability over the broad operating temperature range. Especially suitable for industrial electronic circuits. 67 standard case configurations are available.



Cap. µF	Vdcw Max.	Dia. x Height (Max. Ins.)	S *	Cat. No. 975-
1	150	.271 x .537	2	CA0674
2	150	.333 x .537	3	EA0675
3	150	.333 x .662	3	EC0676
4	150	.333 x .662	3	EC0677
5	50	.271 x .662	2	CC0655
5	100	.271 x .787	2	CE0701
5	150	.333 x .787	3	EE0678
6	50	.271 x .662	2	CC0720
6	100	.333 x .662	3	EC0703
6	150	.333 x .787	3	EE0704
8	50	.271 x .662	2	CC0656
8	100	.333 x .662	3	EC0705
8	150	.396 x .787	4	GE0679
10	25	.271 x .662	2	CC0630
10	50	.271 x .787	2	CE0657
10	100	.333 x .787	3	EE0706
10	150	.396 x .787	4	GE0680
15	15	.271 x .537	2	CA0602
15	25	.271 x .662	2	CC0631
15	50	.333 x .662	3	EC0658
15	100	.396 x .787	4	GE0707
15	150	.396 x 1.037	4	GK0681
20	15	.271 x .662	2	CC0603
20	25	.271 x .787	3	CE0632
20	50	.333 x .787	3	EE0659
20	100	.396 x .787	4	GE0708
20	150	.458 x 1.037	4	HK0682
25	15	.271 x .662	2	CC0604
25	25	.333 x .662	3	EC0633
25	50	.396 x .662	4	GC0660
25	100	.396 x .912	4	GH0709
25	150	.521 x .912	5	JH0683
50	15	.333 x .662	3	EC0608
50	25	.396 x .662	4	GC0637
50	50	.396 x .912	4	GH0664
50	100	.458 x 1.162	4	HM0710
50	150	.646 x 1.037	6	LK0687
75	25	.396 x .787	4	GE0639
75	50	.396 x 1.162	4	GM0666
75	100	.646 x .912	6	LH0711
75	150	.646 x 1.287	6	LP0712
100	12	.333 x .912	3	EH0582
100	15	.396 x .662	4	GC0612
100	25	.396 x .912	4	GH0641
100	50	.458 x 1.162	4	HM0668
100	100	.646 x 1.162	6	LM0713
100	150	.646 x 1.662	6	LW0714
150	12	.396 x .787	4	GE0585
150	15	.396 x .912	4	GH0615
150	25	.458 x .912	4	HH0644
150	50	.646 x .912	6	LH0671
150	100	.646 x 1.412	6	LS0715
200	12	.396 x .912	4	GH0587
200	15	.396 x 1.037	4	GK0617
200	25	.521 x .912	5	JH0646
200	50	.646 x 1.037	6	LK0673
200	100	.646 x 1.662	6	LW0716
250	15	.458 x 1.037	4	HK0618
250	25	.521 x 1.037	5	JK0647
250	50	.646 x 1.162	6	LM0717
250	75	.646 x 1.662	6	LW0718
500	12	.521 x 1.037	5	JK0591
500	15	.521 x 1.162	5	JM0621
500	25	.646 x 1.162	6	LM0650
500	35	.646 x 1.537	6	LU0719
800	15	.646 x 1.162	6	LM0623
800	25	.646 x 1.537	6	LU0720
1000	15	.646 x 1.412	6	LS0721
1500	12	.646 x 1.537	6	LU0722
2000	10	.646 x 1.662	6	LW0723
2500	6	.646 x 1.662	6	LW0724
3000	3	.646 x 1.662	6	LW0725

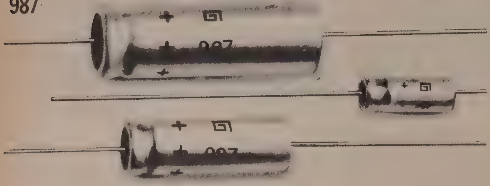
* "S" for All Types ±.015" 1 = .100 2 = .125 3 = .150 4 = .200 5 = .250 6 = .283 7 = .312

CAPACITOR DIVISION GENERAL INSTRUMENT CORPORATION 600 WEST JOHN ST., HICKSVILLE, NEW YORK 11802
PHONE: (516) 733-3000 / TWX: 510-221-1865 / IN CANADA: GENERAL INSTRUMENT LTD., 61 INDUSTRY STREET, TORONTO, ONTARIO

SUB-MINIATURE ALUMINUM ELECTROLYTIC CAPACITORS
—40° TO +105°C POLAR TYPE 987

SPECIFICATIONS

987



Construction: Tubular aluminum case with high temperature elastomer seal and axial wire leads. All critical connections welded. Polyester insulating sleeves are standard.

Configuration: Axial wire leads for point to point wiring or horizontal mounting on P/C board.

Operating Temperature: —40°C to +105°C.

Working Voltage: Expressed as Vdcw in the tables and is the maximum continuous voltage which may be applied over the operating temperature range.

Surge Voltage: Expressed as Vdcs in the tables. This is the maximum allowable short term (0.5 minute) voltage including transients and peak ripple which may be applied without causing permanent damage.

The surge test is performed with a 1000 ohm resistor connected in series with the capacitor. The surge voltage shown in the tables is applied for 30 seconds at a rate of twelve times per hour for 100 hours at +25° C. At completion of test, units shall meet leakage requirements.

Capacitance: Capacitance is shown in microfarads (uF) in the tables for each case size and range of working voltages. Measurement is made by the bridge method at +25° C and 120 Hertz with a maximum 1.0 volt rms signal applied during measurement.

Capacitance Tolerance: The standard tolerance is —10% +50% of rated capacitance. Where required, ±20% tolerance is available above 5 uF; ±10% may be specified above 10uF.

Polarity: Type 987 capacitors are polarized for DC operation.

Reverse Voltage: Voltage reversals not exceeding 1.5 volts may be applied without damage.

Leakage Current: Expressed as DCL and in terms of microamperes (uA). Capacitors must be pre-conditioned by applying rated voltage (Vdcw) for 15 minutes at least 24 hours and not more than 48 hours prior to testing. Measure DCL by applying rated DC voltage (Vdcw) to the capacitor with a 1000 ohm resistor in series for five minutes and read DCL in microamperes (uA). Maximum allowable DCL is determined by the formula:

$$I = \frac{E\sqrt{C}}{30}$$

Where: I = Current in microamperes; E = Rated DC voltage; and C = Rated capacitance in microfarads.

Leakage current need not be less than that derived from the formula or the following, whichever is greater:

Rated Vdcw	3	6	12	15	25	50
DCL uA	1	1	2	2.5	3	4

Dissipation Factor: Expressed as DF in terms of percent. Measurement is made by the bridge method at +25° C and 120 Hertz with a maximum 1.0 volt rms signal applied. The dissipation factor at 120 Hertz shall not exceed the values shown in the following table:

Rated Vdcw	3	6	12	15	25	50
DF%	30	24	24	22	18	10

$$ESR = \frac{DF \times 10^4}{2\pi fC}$$

Where: DF = Dissipation Factor in %; f = frequency (Hertz); and C = Capacitance (uF).

Ripple Current: The peak ripple voltage in combination with the DC polarizing voltage shall not exceed 120% of the rated Vdcw nor cause a voltage reversal in excess of 1.5 volts. The maximum rms ripple current in milliamperes (mA) at +105° C and 120 Hertz which may be applied is:

Case Dia. (In.) (Max.)	.257	.333	.396	.458	.521
Max. Ripple (mA)	$8\sqrt{C}$	$10\sqrt{C}$	$15\sqrt{C}$	$20\sqrt{C}$	$25\sqrt{C}$

For maximum ripple current at temperatures less than +105°C and frequencies other than 120 Hertz, multiply the figures derived from the preceding table by:

Temp.	Frequency (Hertz)			
°C	60	120	400	2400
105	.8	1.0	1.1	1.4
85	1.6	2.0	2.2	2.8
65	2.0	2.5	2.75	3.5
25	2.4	3.0	3.3	4.2

Life Test: Test is conducted in a suitable chamber with circulating air. Apply voltage not to exceed the rated Vdcw for 1000 hours at +105° C ±2° C. Remove capacitors from chamber and allow to cool to +25° C ±1° C in a normal manner. Capacitance shall be at least 85% of the initial measured value (90% for a 500 hour life test). The product of ESR (ohms) and capacitance (uF) shall not exceed 130% of initial requirements.

Shelf Test: Test is conducted in a suitable chamber with circulating air. The capacitors are stored for 100 hours in the chamber at +105° C with no voltage applied. At the conclusion of 100 hours, remove the capacitors from the chamber and allow them to cool to +25° C ±1° C in a normal manner. Measure the capacitance as previously described. It shall meet initial requirements as shall ESR. DCL shall not exceed two times the initial requirements.

Low Temperature Test: A suitable test chamber must be used and capacitors stabilized to within ±1° C of the testing temperature. Capacitance is measured as previously described. The capacitance shall not have decreased to less than the percentages of the initial measured value as shown in the following table:

Vdcw	Temperature °C		
	+25° C	—30° C	—40° C
3–20	100%	75%	60%
25–40	100%	80%	70%
50	100%	85%	75%

Low Temperature Impedance: At low temperatures the 120 Hertz impedance shall not increase more than that shown in the following table:

Vdcw	Temperature		
	+25° C	—30° C	—40° C
3–20	100%	5.0x	10.0x
25–40	100%	3.0x	5.0x
50	100%	1.5x	3.0x

Lead Test: Leads shall withstand a steady pull of 5 pounds applied axially for 5 seconds.

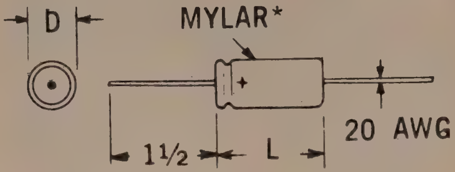
Marking: Minimum marking shall be General Instrument logotype, Capacitance (uF), Vdcw, EIA code, date code and polarity.

Packaging: Standard packaging is bulk in corrugated cartons (approx. 4″ × 7″ × 9″). Reel packaging is available up to .375″ diameter. The standard G.I. reel packaging specification is available upon request.

SUB-MINIATURE ALUMINUM ELECTROLYTIC CAPACITORS −40° TO +105°C GI POLAR TYPE 987

AXIAL LEAD
987 POLAR −40° +105°C

Extended temperature range for extra reliable performance at temperatures up to +105°C. Specially selected foils and electrolytes are used in manufacturing these capacitors. Recommended standard ratings are shown below.



Cap. μF	Vdcw Max.	Dia x Length (Max. Inches)	Cat. No. 987-
5	40	.257 x .662	BC0604
5	50	.257 x .787	BE0604
5	60	.257 x .787	BE0605
6	30	.257 x .662	BC0606
6	50	.257 x .787	BE0607
6	60	.257 x .912	BH0608
8	25	.257 x .662	BC0609
8	25	.257 x .787	BE0609
8	50	.257 x .912	BH0610
10	25	.257 x .787	BE0613
10	50	.257 x .912	BH0614
15	20	.257 x .787	BE0617
15	30	.257 x .912	BH0618
15	50	.333 x .787	EE0619
20	10	.257 x .787	BE0621
20	25	.257 x .912	BH0622
20	50	.333 x .912	EH0623
25	10	.257 x .787	BE0625
25	25	.333 x .787	EE0626
25	50	.333 x 1.037	EK0627
50	10	.333 x .787	EE0629
50	25	.333 x 1.037	EK0630
50	50	.396 x 1.162	GM0631
75	10	.333 x .912	EH0633
75	25	.396 x .912	GH0634
75	50	.396 x 1.412	GS0635
100	10	.333 x 1.037	EK0637
100	25	.396 x 1.162	GM0638
100	50	.458 x 1.412	HS0639
125	20	.396 x 1.162	GM0641

Cap. μF	Vdcw Max.	Dia x Length (Max. Inches)	Cat. No. 987-
125	25	.396 x 1.287	GP0642
125	50	.521 x 1.287	JP0643
150	10	.396 x 1.037	GK0645
150	25	.458 x 1.162	HM0646
150	30	.458 x 1.287	HP0647
150	50	.521 x 1.537	JU0648
200	10	.396 x 1.162	GM0649
200	20	.396 x 1.537	GU0650
200	30	.458 x 1.537	HU0651
200	40	.521 x 1.537	JU0652
250	10	.396 x 1.287	GP0653
250	20	.458 x 1.412	HS0654
250	30	.521 x 1.412	JS0655
300	10	.396 x 1.412	GS0656
300	20	.458 x 1.537	HU0657
300	30	.521 x 1.537	JU0658
350	10	.396 x 1.537	GU0659
350	20	.521 x 1.412	JS0660
350	25	.521 x 1.537	JU0661
400	6	.396 x 1.412	GS0662
400	10	.458 x 1.412	HS0663
400	20	.521 x 1.537	JU0664
500	3	.396 x 1.412	GS0665
500	6	.396 x 1.537	GU0666
500	10	.458 x 1.537	HU0667
650	10	.521 x 1.537	JU0668
750	3	.458 x 1.412	HS0669
750	6	.521 x 1.412	JS0670
1000	3	.521 x 1.412	JS0671

AVAILABLE NOW

EXTENDED TEMPERATURE RANGE
SUBMINIATURE ALUMINUM ELECTROLYTICS

−55°C TO +105°C
AND
−55°C TO +125°C

AXIAL AND RADIAL LEAD

CONTACT FRED MALDEIS
(516) 733-3311
OR YOUR LOCAL REPRESENTATIVE

SUB-MINIATURE ALUMINUM ELECTROLYTIC CAPACITORS −30° TO +85°C NON-POLAR TYPE 904 AND 905

Construction: 904 Tubular aluminum case with elastomer seals at each end for axial terminal wires. PVC insulating sleeves are supplied as standard. 905 Tubular aluminum case with single elastomer seal and PVC insulating sleeve.

Operating Temperature: −30° C to +85° C.

Working Voltage: Expressed as Vnpw in the tables and is the maximum continuous voltage which may be applied over the operating temperature range.

Surge Voltage: Expressed as Vdcs in the tables. This is the maximum allowable short term (0.5 minute) voltage including transients and peak ripple which may be applied without causing permanent damage.

The surge test is performed with a 1000 ohm resistor connected in series with the capacitor. The surge voltage shown in the tables is applied for 30 seconds at a rate of twelve times per hour for 100 hours at +25° C. At completion of test units shall meet initial leakage requirements.

Capacitance: Capacitance is shown in microfarads (uF) in the tables for each case and range of working voltages. Measurement is made by the bridge method at +25° C and 120 Hertz with a maximum 1.0 volt rms signal applied during measurement.

Capacitance Tolerance: The standard tolerance is ±30% of the nominal rated value for all operating voltages. Special tolerances are available: ±20% for ratings 5 uF and up; ±10% for ratings 10 uF and up.

Polarity: Types 904 and 905 capacitors are non-polarized for DC operation. Working voltage (Vnpw) may be applied in either direction.

Frequency: Types 904 and 905 capacitors are rated for operation at 120 Hertz. Special designs are available for other frequencies. Contact the factory.

Leakage Current: Expressed as DCL and in terms of microamperes (uA). Capacitors must be pre-conditioned by applying rated voltage (Vdcw) for 15 minutes at least 24 hours and not more than 48 hours prior to testing. Measure DCL by applying rated DC voltage (Vdcw) to the capacitor with a 1000 ohm resistor in series for five minutes and read DCL in microamperes (uA). Maximum allowable DCL is determined by the formula:

$$I = .06E\sqrt{C}$$

Where: I = Current in microamperes; E = Rated DC voltage; and C = Rated capacitance in microfarads.

Leakage current need not be less than that derived from the formula or the following, whichever is greater:

Rated Vnpw	3	6	12	15	16	25	50	100
DCL uA	4	4	4	4	8	8	8	15

Dissipation Factor: Expressed as DF in terms of percent and measured by the bridge method at +25° C and 120Hz with a maximum 1.0 volt rms signal applied. The dissipation factor shall not exceed the values shown:

Case Dia. (Inches)	.257	.271	.333	.396	.458	.521	.646
(Code)	(B)	(C)	(E)	(G)	(H)	(J)	(L)
DF%	20	20	20	15	15	15	15

Equivalent Series Resistance: Expressed as ESR in ohms as follows:

$$ESR = \frac{DF \times 10^4}{2\pi fC}$$

Where: DF = Dissipation Factor in %; f = frequency in Hertz; C = Capacitance in uF.

SPECIFICATIONS

Ripple Current: The maximum allowable ripple current is derived from the formula:

$$I = K\sqrt{WC}$$

Where: I = Current in milliamperes (mA); K = Constant (61.5 for B, C and E diameters and 71 for G, H, J and L); W = Watts (see table); C = Capacitance in microfarads (uF).

TYPE 904 MAXIMUM WATTS/CASE SIZE

Length.	G	J	L	N	S	U
Dia.						
B	.062	X	X	X	X	X
E	.064	.093	.109	.121	X	X
G	X	.117	.129	.143	.173	.187
H	X	.135	.152	.170	.187	.221
J	X	X	.177	.197	.236	.256

TYPE 905 MAXIMUM WATTS/CASE SIZE

Length.	A	C	E	H	K	M	P	S	U	W
Dia.										
C	.044	.054	.062	.074	X	X	X	X	X	X
E	.056	.068	.081	.094	.105	X	X	X	X	X
G	.066	.083	.096	.110	.120	.143	.150	.173	.180	X
H	X	.100	.110	.140	.150	.170	.180	.190	.220	X
J	X	X	.140	.160	.180	.197	.210	.236	.260	X
L	X	X	X	.200	.220	.252	.280	.300	.330	.350

Life Test: Test is conducted in suitable chamber with circulating air. Apply rated voltage for 500 hours at +85° C ±2° C and reverse voltage each 24 hours throughout test. Remove capacitors from chamber and allow to cool normally to room temperature (+25° C ±1° C). Capacitance shall be at least 80% of initial measured value and DF shall not increase to more than 150% of initial requirement.

Shelf Test: Test is conducted in a suitable chamber with circulating air. The capacitors are stored for 100 hours in the chamber at +70° C with no voltage applied. At the conclusion of 100 hours, remove the capacitors from the chamber and allow them to cool to +25° C ±1° C in a normal manner. Measure the capacitance as previously described. It shall meet initial requirements as shall ESR. DCL shall not exceed two times the initial requirements.

Low Temperature Test: A suitable test chamber must be used and capacitors stabilized to within ±1° C of the testing temperature. Capacitance is measured as previously described. The capacitance shall not have decreased to less than the percentages of the initial measured value as shown in the following table:

Vnpw	Temperature °C +25	 −20	 −30
3–12	100%	70%	60%
15 up	100%	85%	70%

Lead Test: Leads shall withstand a steady pull of 5 pounds applied axially for 5 seconds.

Marking: Minimum marking shall be General Instrument logotype, Capacitance (uF), Vnp, EIA code, and date code. Marking is normally applied to the outer PVC sleeve.

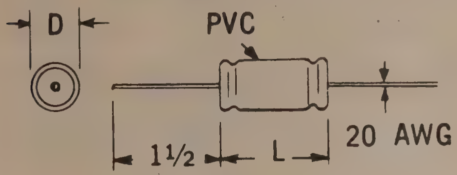
Packaging: Type 904 and 905 standard packaging is bulk in corrugated cartons (approx. 4″ × 7″ × 9″). Reel packaging is available for Type 904 up to .375 diameter. The standard G.I. reel packaging specification is available upon request.

CAPACITOR DIVISION GENERAL INSTRUMENT CORPORATION 600 WEST JOHN ST., HICKSVILLE, NEW YORK 11802
PHONE: (516) 733-3000 / TWX: 510-221-1865 / IN CANADA: GENERAL INSTRUMENT LTD., 61 INDUSTRY STREET, TORONTO, ONTARIO

SUB-MINIATURE ALUMINUM ELECTROLYTIC CAPACITORS −30° TO +85°C NON-POLAR TYPE 904 AND 905

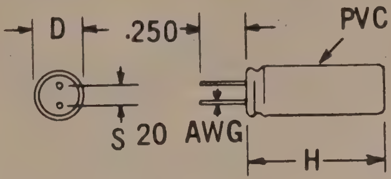
AXIAL LEAD
904 NON-POLAR −30° +85°C

Engineered for non-polar applications. Special double bung construction ensures balanced operation in critical circuits. Standard tolerance is ±30%, ±20% is available above 5 μF and ±10% is available above 10 μF. Recommended standard ratings appear below. The complete range of values and specifications appear in Bulletin EL-118. * ±20% only.



RADIAL LEAD
905 NON-POLAR −30° +85°C

Designed for non-polar electronic applications. The isolated case ensures balanced operation. The standard capacitance tolerance is ±30%, ±20% is available above 5 μF and ±10% is available above 10 μF. For complete specifications and all available ratings, see the engineering Bulletin EL-117.



Cap. μF	Vdcw Max.	Dia. x Length (Max. Inches)	Cat. No. 904-
1	75	.257 x .819	BG0600
1	100	.333 x .819	EG0601
2	25	.257 x .819	BG0602
2	50	.333 x .819	EG0603
2	75	.333 x .944	EJ0604
2	100	.333 x 1.069	EL0605
3	25	.257 x .819	BG0606
3	50	.333 x .819	EG0607
3	75	.333 x .944	EJ0608
3	100	.333 x 1.069	EL0609
5	25	.333 x .819	EG0610
5	50	.333 x .944	EJ0611
5	100	.396 x 1.069	GL0612
10	15	.333 x .819	EG0613
10	25	.333 x .944	EJ0614
10	50	.333 x 1.194	EN0615
10	100	.396 x 1.537	GU0616
15	15	.333 x .944	EJ0617
15	25	.333 x 1.069	EL0618
15	50	.396 x 1.194	GN0619
15	100	.458 x 1.537	HU0620
20	15	.333 x .944	EJ0621
20	25	.333 x 1.194	EN0622
20	50	.396 x 1.387	GS0623
20	100	.521 x 1.387	JS0624
25	15	.333 x 1.069	EL0625
25	25	.333 x 1.194	EN0626
25	50	.396 x 1.537	GU0627
25	100	.521 x 1.537	JU0628
50	6	.333 x 1.069	EL0629
50	10	.333 x 1.194	EN0630
50	15	.396 x 1.194	GN0631
50	25	.396 x 1.387	GS0632
50	50	.521 x 1.537	JU0633
50	75	.521 x 1.537	JU0634†
75	6	.333 x 1.194	EN0635
75	10	.396 x 1.194	GN0636
75	15	.396 x 1.387	GS0637
75	25	.458 x 1.537	HU0638
75	50	.521 x 1.537	JU0639†
100	6	.396 x 1.069	GL0640
100	10	.396 x 1.387	GS0641
100	15	.458 x 1.387	HS0642
100	25	.521 x 1.387	JS0643
125	6	.396 x 1.194	GN0644
125	10	.396 x 1.537	GU0645
125	15	.458 x 1.537	HU0646
125	25	.521 x 1.537	JU0647
150	6	.396 x 1.387	GS0648
150	10	.458 x 1.387	HS0649
150	15	.521 x 1.387	JS0650
150	25	.521 x 1.537	JU0651†
175	6	.396 x 1.537	GU0652
175	10	.458 x 1.537	HU0653
175	15	.521 x 1.537	JU0654
200	6	.396 x 1.537	GU0655
200	10	.521 x 1.387	JS0656
200	15	.521 x 1.537	JU0657
250	6	.458 x 1.387	HS0658
250	10	.521 x 1.537	JU0659
250	15	.521 x 1.537	JU0660†
275	6	.458 x 1.537	HU0661
275	10	.521 x 1.537	JU0662
300	6	.521 x 1.387	JS0663
300	10	.521 x 1.537	JU0664
325	6	.521 x 1.387	JS0665
325	10	.521 x 1.537	JU0666†
350	6	.521 x 1.387	JS0667
350	10	.521 x 1.537	JU0668†
425	6	.521 x 1.537	JU0669
500	6	.521 x 1.537	JU0670†
550	6	.521 x 1.537	JU0671

Cap. μF	Vdcw Max.	Dia. x Height (Max. Inches)	S *	Cat. No. 905-
1	75	.271 x .537	2	CA0601
1	100	.271 x .662	2	CC0602
2	75	.271 x .787	2	CE0603
2	100	.333 x .662	3	EC0604
3	25	.271 x .537	2	CA0605
3	50	.271 x .787	2	CE0606
3	100	.333 x .787	3	EE0607
5	50	.333 x .662	2	CC0608
5	50	.333 x .662	3	EC0609
5	100	.396 x .787	4	GE0610
8	25	.271 x .787	2	CE0611
8	50	.333 x .787	3	EE0612
8	100	.396 x .912	4	GH0613
10	25	.333 x .662	3	EC0614
10	50	.333 x .912	3	EH0615
10	100	.458 x .912	4	HH0616
15	15	.333 x .662	3	EC0617
15	50	.396 x .787	4	GE0618
15	75	.458 x .912	4	HH0619
15	100	.521 x .912	5	JH0620
20	25	.396 x .662	4	GC0621
20	50	.458 x .787	4	HE0622
20	100	.521 x 1.037	5	JK0623
25	25	.396 x .787	4	GE0624
25	50	.458 x .912	4	HH0625
25	75	.521 x 1.037	5	JK0626
25	100	.646 x .912	6	LH0627
30	15	.396 x .662	4	GC0628
30	25	.396 x .787	4	GE0629
30	50	.458 x 1.037	4	HK0630
30	100	.646 x 1.037	6	LK0631
40	15	.396 x .787	4	GE0632
40	25	.396 x .912	4	GH0633
40	50	.521 x 1.037	5	JK0634
40	100	.646 x 1.287	6	LP0635
50	15	.396 x .787	4	GE0636
50	25	.458 x .912	4	HH0637
50	50	.521 x 1.162	5	JM0638
50	75	.646 x 1.037	6	LK0639
50	100	.646 x 1.412	6	LS0640
75	15	.458 x .912	4	HH0641
75	25	.521 x .912	5	JH0642
75	50	.646 x 1.037	6	LK0643
75	75	.646 x 1.412	6	LS0644
100	10	.458 x .912	4	HH0645
100	15	.458 x 1.037	4	HK0646
100	25	.521 x 1.037	5	JK0647
100	50	.646 x 1.287	6	LP0648
100	75	.646 x 1.662	6	LW0649
125	10	.458 x .912	4	HH0650
125	15	.521 x .912	5	JH0651
125	25	.646 x .912	6	LH0652
125	50	.646 x 1.537	6	LU0653
150	10	.458 x 1.037	4	HK0654
150	15	.521 x 1.037	5	JK0655
150	25	.646 x 1.037	6	LK0656
150	50	.646 x 1.662	6	LW0657
175	10	5.21 x 1.037	5	JM0658
175	15	.521 x 1.037	5	JK0659
175	25	.646 x 1.162	6	LM0660
200	10	.521 x 1.037	5	JK0661
200	15	.521 x 1.287	5	JP0662
200	25	.646 x 1.162	6	LM0663
250	10	.521 x 1.162	5	JM0664
250	15	.521 x 1.412	5	JS0665
250	25	.646 x 1.412	6	LS0666
350	10	.646 x 1.037	6	LK0667
350	15	.646 x 1.287	6	LP0668
500	10	.646 x 1.412	6	LS0669
500	15	.646 x 1.662	6	LW0670
700	10	.646 x 1.662	6	LW0671
1000	6	.646 x 1.537	6	LU0672

* "S" for All Types ±.010"   1 = .100   2 = .125   3 = .150   4 = .200   5 = .250   6 = .283   7 = .312

DIPPED SILVER-MICA CAPACITORS COMMERCIAL RDM and MIL-C-5D TYPES

Mica capacitors are as near to the perfect model of a capacitor as one can acquire commercially. Schematically the mica is classic: A flat insulator with conductors on each side. Electrically it is hard to beat. It has been said that if all other capacitors suddenly evaporated and only the mica was left, mica could do any task. Of course this is not very practical because electronic economics would take a terrible beating. But, here we have the second oldest capacitor known to man (The Leyden Jar is less than one year older), and the mica capacitor hangs in there doing its assigned tasks.

Why is the mica capacitor so good? One really need look no farther than the basic dielectric. Mica is a totally inert inorganic material. Formed millions of years ago by the awesome pressures of the earth's creation. Few other materials have mica's record of stability. And, it is this stability which makes mica so desirable in capacitors.

Stability is what makes the mica so widely used in RF circuitry. Once selected and installed, the mica stays there doing its job. This is also one of the reasons micas are widely specified in precision instruments: Rock solid stability. And, there's another point: accuracy. Capacitance tolerances to plus or minus one-half percent are available at very little extra expense (Above 100pF, of course).

The original mica capacitor was not an exact model of efficiency. Crude and cumbersome, it was gradually supplanted by the molded style. The molded style has now largely been replaced by the dipped style thanks to the invention of epoxy.

The dipped mica capacitor is made of a series of thin mica sheets with pure silver deposited on each side in a precise pattern and location. The sheets are then stacked with conductive foil (usually tin) between each sheet. The foil is folded toward one end and the entire stack clamped under pressure and held there by the clamp/terminal assembly. The terminals take off in one direction from the stack to form a "radial" configuration.

The stack is immediately treated with silicone to prevent moisture infiltration. Then the stack is dipped into Durez from one to four times to form an outer coating. This coating is porous and provides the media for the final epoxy impregnation. Of course there is a practical limit, which happens to be four coats, beyond which there is little or no gain in humidity protection.

The coating process is important to the user. The best protection is secured by the normal four coat G. I. Type RDM. The single coat SRDM offers good protection but should not be used in severe humidity conditions without subsequent potting. Another type, the ERDM has no Durez at all. It only has epoxy. This type must always be potted after assembly.

Mica capacitors may be operated continuously from −55 to +150°C which is well within the operating parameters of most other electronic components. The temperature coefficient is generally positive. Several TC values may be stated by the user within the limits of availability (See listings).

The following pages contain a listing of all MIL-C-5D ratings plus a selection of popular intermediate values. The list also shows non-MIL types such as RDM05, 16 and 20.

General Instrument is fully qualified to MIL-C-5D in styles CM04 through 13 in all ratings and voltages.

The lists on the following pages show a wide selection of popular ratings but are only a hint of the broad range of values and configurations available. For complete information, write for Bulletin MC-2B.

HOW TO SPECIFY MICA CAPACITORS

1. Select the desired capacitance/voltage/lead spacing. Lead spacing is standard within each type and increases as the Type number becomes larger. RDM05 is the smallest (.120″) and RDM42 the largest (1.062″).
2. Select the desired capacitance tolerance. Not all tolerances are available in all ratings (see notes). This is because the minimum practical tolerance is plus or minus ½ picofarad.
3. Decide whether normal straight wire leads or the crimped configuration will be best. There is no extra charge for crimped leads.
4. Use the following lists to identify the exact capacitor desired by means of the part numbering system.
   Typical part number: RDM10CD010D03
   a. *Prefix:* No prefix (as shown) indicates straight leads. Use "2" as a prefix for standard outside crimp.
   b. *Style:* RDM = Multiple Durez/Epoxy
      SRDM = Single Durez/Epoxy
      ERDM = Epoxy only. No Durez.
   c. *Type:* 05, 10, 15, 16, 19, 20, 30 or 42 (Lead spacing increases as type number increases).
   d. *Characteristic:* This refers to the temperature coefficient in parts per million PER°C and capacitance drift. The example states "C" which is −200 to +200 ppM and plus or minus (0.5% *plus* 0.1 pF)
      "D" = −100 to +100 ppM and ±(0.3% + .1 pF)
      "E" = −20 to +100 ppM and ±(0.1% + .1 pF)
      "F" = 0 to +70 ppM and ±(0.05% + .1 pF)
      The listings show the *best* available characteristic.
   e. *Working Voltage:* In the example "D" shows the working voltage as 500 Vdcw.
      "C" = 300 Vdcw
      "A" = 100 Vdcw
      Other voltages available on special order (Please see Bulletin MC-2B for details).
   f. *Capacitance:* Expressed in picofarads (pF). The example shows "010" (zero, one, zero). The last digit *always* indicates the number of zeros. The *preceeding* digits are significant. The example "010" therefore indicates *one* picofarad.
      010 = 1 pF, 100 = 10 pF, 101 = 100 pF, 102 = 1000 pF, 1250 = 125 pF, 1251 = 1250 pF, etc.
   g. *Tolerance:* This is always shown by a code letter. The example shows "D" which is ±½ pF and the *tightest* available tolerance for *any* rating. "E" = ±½%, F = ±1%, G = ±2%, H = ±3%, J = ±5%, K = ±10%, M = ±20%. Note that "D" and "J" are synonomous at 10 pF.
   h. *Operating Temperature:* Shown by the next to last digit in the part number as the letter "O". The standard is "O" which is −55 to ±125°C. "P" = −55 to +150°C and is available on most ratings. "N" is sometimes used in old specs and indicates −55 to +85°C.
   i. *Vibration Grade:* The last digit "3" indicates resistance to vibration per MIL-STD-202D, Method 204A (Condition D) from 10-2000Hz which is standard.

DIPPED SILVER-MICA CAPACITORS
RDM05-RDM10 and MIL-C-5D CM04/09

RDM05 (NO MIL EQUIV.)

Small and compact, the RDM05 is ideal for miniature delay lines and similar equipment.

While there is no MIL equivalent to the RDM05, each operating parameter of the capacitor well exceeds MIL requirements. The tables below show the full range of ratings available from 1 to 200 pF. Intermediate ratings are also available. Crimped leads are not recommended.

Cap. pF	Vdcw (Max.)	G. I. Type No. *	Opt. RDM Tol.	Max. Size (Inches)					
				RDM05			SRDM05		
				L	W	T	L	W	T
1	300	RDM05 CC010D03		.270	.190	.110	.250	.160	.090
2	300	RDM05 CC020D03		.270	.190	.110	.250	.160	.090
3	300	RDM05 CC030D03	M	.270	.190	.110	.250	.160	.090
4	300	RDM05 CC040D03	M	.270	.190	.110	.250	.160	.090
5	300	RDM05 CC050D03	MK	.270	.190	.110	.250	.160	.090
6	300	RDM05 CC060D03	MK	.270	.190	.110	.250	.160	.090
7	300	RDM05 CC070D03	MK	.270	.190	.110	.250	.160	.090
8	300	RDM05 CC080D03	MK	.270	.190	.110	.250	.160	.090
10	300	RDM05 CC100±03	MKJD	.270	.190	.110	.250	.160	.090
12	300	RDM05 CC120±03	MKJD	.270	.190	.110	.250	.160	.090
15	100	RDM05 CA150±03	MKJD	.270	.190	.110	.250	.160	.090
15	300	RDM05 CC150±03	MKJD	.270	.190	.120	.250	.170	.100
18	100	RDM05 CA180±03	MKJD	.270	.190	.110	.250	.160	.090
18	300	RDM05 CC180±03	MKJHD	.270	.200	.120	.250	.170	.100
20	100	RDM05 CA200±03	MKJHD	.270	.190	.110	.250	.160	.090
20	300	RDM05 CC200±03	MKJHD	.270	.200	.120	.250	.170	.100
22	100	RDM05 CA220±03	MKJHD	.270	.190	.120	.250	.160	.100
22	300	RDM05 CC220±03	MKJHD	.270	.200	.120	.250	.170	.100
24	100	RDM05 CA240±03	MKJHD	.270	.190	.120	.250	.170	.100
24	300	RDM05 CC240±03	MKJHD	.270	.200	.120	.250	.170	.100
27	100	RDM05 EA270±03	DKJHG	.270	.190	.120	.250	.170	.100
27	300	RDM05 EC270±03	DKJHG	.270	.200	.130	250	.170	.110
30	100	RDM05 EA300±03	DKJHG	.270	.200	.120	.250	.170	.100
30	300	RDM05 EC300±03	DKJHG	.270	.200	.130	.250	.170	.110
33	100	RDM05 EA330±03	DKJHG	.270	.200	.120	.250	.170	.100
33	300	RDM05 EC330±03	DKJHG	.270	.200	.130	.250	.170	.110
36	100	RDM05 EA360±03	DKJHG	.270	.200	.120	.250	.170	.100
36	300	RDM05 EC360±03	DKJHG	.270	.210	.130	.250	.170	.110
39	100	RDM05 EA390±03	DKJHG	.270	.200	.120	.250	.170	.100
39	300	RDM05 EC390±03	DKJHG	.270	.210	.130	.250	.180	.110
43	100	RDM05 EA430±03	DKJHG	.270	.200	.120	.250	.170	.100
43	300	RDM05 EC430±03	DKJHG	.270	.210	.140	.250	.180	.120
47	100	RDM05 EA470±03	DKJHG	.270	.200	.130	.250	.170	.110
47	300	RDM05 EC470±03	DKJHG	.270	.210	.140	.250	.180	.120
51	100	RDM05 EA510±03	KJHGF	.270	.200	.130	.250	.170	.110
51	300	RDM05 EC510±03	KJHGF	.270	.210	.140	.250	.180	.120
56	100	RDM05 EA560±03	KJHGF	.270	.200	.130	.250	.170	.110
56	300	RDM05 EC560±03	KJHGF	.270	.220	.150	.250	.180	.130
62	100	RDM05 EA620±03	KJHGF	.270	.210	.130	.250	.170	.110
62	300	RDM05 EC620±03	KJHGF	.270	.220	.150	.250	.180	.130
68	100	RDM05 CA680±03	KJHGF	.270	.210	.140	.250	.180	.110
68	300	RDM05 CC680±03	KJHGF	.270	.220	.150	.250	.190	.130
75	100	RDM05 CA750±03	KJHGF	.270	.210	.140	.250	.180	.120
75	300	RDM05 CC750±03	KJHGF	.270	.230	.160	.250	.190	.140
82	100	RDM05 CA820±03	KJHGF	.270	.210	.140	.250	.180	.120
82	300	RDM05 CC820±03	KJHGF	.270	.230	.160	.250	.190	.140
91	100	RDM05 FA910±03	KJHGF	.270	.210	.140	.250	.180	.120
91	300	RDM05 FC910±03	KJHGF	.270	.230	.170	.250	.190	.150
100	100	RDM05 FA101±03	JHGFE	.270	.220	.150	.250	.180	.130
100	300	RDM05 FC101±03	JHGFE	.270	.240	.180	.250	.200	.160
110	100	RDM05 FA111±03	JHGFE	.270	.220	.150	.250	.190	.130
110	300	RDM05 FC111±03	JHGFE	.270	.240	.180	.250	.200	.160
120	100	RDM05 FA121±03	JHGFE	.270	.220	.160	.250	.190	.140
120	300	RDM05 FC121±03	JHGFE	.270	.250	.190	.250	.210	.170
130	100	RDM05 FA131±03	JHGFE	.270	.230	.160	.250	.190	.140
150	100	RDM05 FA151±03	JHGFE	.270	.230	.170	.250	.190	.150
160	100	RDM05 FA161±03	JHGFE	.270	.240	.170	.250	.200	.150
170	100	RDM05 FA171±03	JHGFE	.270	.240	.180	.250	.200	.160
180	100	RDM05 FA181±03	JHGFE	.270	.240	.180	.250	.200	.160
190	100	RDM05 FA191±03	JHGFE	.270	.245	.185	.250	.205	.165
200	100	RDM05 FA201±03	JHGFE	.270	.250	.190	.250	.210	.170

* Complete type number by inserting tolerance code in space marked "±". Add prefix "S" for SRDM.

RDM10 (CM04/09)

The smallest MIL-C-5D style, the RDM10 (CM04/09) is one of the most popular mica capacitors.

The table below shows *all* of the available MIL ratings plus a selection of RDM10 ratings within the full range from 1 to 1000pF. Intermediate ratings are available and may be specified.

Cap. pF 1.	G. I. Type *	MIL Type *	G. I. & MIL Type No. *	Opt. MIL Tol.	Opt. RDM Tol.	Max. Size (Inches)					
						RDM10 & CM04			SRDM10		
						L	W	T	L	W	T
1	RDM10	CM04	CD010D03			.360	.330	.190	.310	.230	.120
2	RDM10		CD020D03			.360	.330	.190	.310	.230	.120
3	RDM10		CD030D03		M	.360	.330	.190	.310	.230	.120
5	RDM10	CM04	CD050D03		MK	.360	.330	.190	.310	.230	.120
6	RDM10	CM04	CD060D03		MK	.360	.330	.190	.310	.230	.120
7	RDM10	CM04	CD070D03		MK	.360	.330	.190	.310	.230	.120
8	RDM10	CM04	CD080D03		MK	.360	.330	.190	.310	.230	.120
10	RDM10	CM04	CD100D03		MKJ	.360	.330	.190	.310	.230	.120
12	RDM10	CM04	CD120J03		MKD	.360	.330	.190	.310	.230	.120
15	RDM10	CM04	CD150J03		MKD	.360	.330	.190	.310	.230	.120
18	RDM10	CM04	CD180J03		MKHD	.360	.330	.190	.310	.230	.120
20	RDM10	CM04	ED200J03		MKHD	.360	.330	.190	.310	.230	.120
22	RDM10	CM04	ED220J03		MKHD	.360	.330	.190	.310	.230	.120
24	RDM10	CM04	ED240J03		MKHD	.360	.330	.190	.310	.230	.120
27	RDM10	CM04	ED270±03	JG	DKJHG	.370	.330	.190	.310	.230	.120
30	RDM10	CM04	ED300±03	JG	DKJHG	.370	.340	.190	.310	.230	.120
33	RDM10	CM04	ED330±03	JG	DKJHG	.370	.340	.190	.310	.230	.120
36	RDM10	CM04	ED360±03	JG	DKJHG	.370	.340	.190	.310	.230	.120
39	RDM10	CM04	ED390±03	JG	DKJHG	.370	.340	.190	.310	.230	.120
43	RDM10	CM04	ED430±03	JG	DKJHG	.370	.340	.190	.310	.230	.120
47	RDM10	CM04	ED470±03	JG	DKJHG	.370	.340	.190	.310	.230	.120
51	RDM10	CM04	ED510±03	JGF	KJHGF	.370	.340	.190	.310	.230	.120
56	RDM10	CM04	ED560±03	JGF	KJHGF	.370	.340	.190	.310	.230	.120
62	RDM10	CM04	ED620±03	JGF	KJHGF	.370	.340	.190	.310	.230	.130
68	RDM10	CM04	ED680±03	JGF	KJHGF	.370	.340	.190	.320	.230	.130
75	RDM10	CM04	ED750±03	JGF	KJHGF	.370	.340	.200	.320	.230	.130
82	RDM10	CM04	ED820±03	JGF	KJHGF	.370	.350	.200	.320	.230	.130
91	RDM10	CM04	FD910±03	JGF	KJHGF	.370	.350	.200	.320	.230	.130
100	RDM10	CM04	FD101±03	JGF	JHGFE	.370	.350	.200	.320	.230	.130
110	RDM10	CM04	FD111±03	JGF	JHGFE	.380	.350	.200	.320	.240	.140
120	RDM10	CM04	FD121±03	JGF	JHGFE	.380	.350	.200	.320	.240	.140
130	RDM10	CM04	FD131±03	JGF	JHGFE	.380	.360	.200	.320	.240	.140
150	RDM10	CM04	FD151±03	JGF	JHGFE	.380	.360	.210	.320	.240	.140
160	RDM10	CM04	FD161±03	JGF	JHGFE	.380	.360	.210	.320	.240	.140
180	RDM10	CM04	FD181±03	JGF	JHGFE	.390	.370	.210	.330	.240	.150
200	RDM10	CM04	FD201±03	JGF	JHGFE	.390	.370	.220	.330	.240	.150
220	RDM10	CM04	FD221±03	JGF	JHGFE	.390	.370	.220	.340	.250	.160
240	RDM10	CM04	FD241±03	JGF	JHGFE	.390	.380	.220	.340	.250	.160
③ 270	RDM10	CM04	FC271±03	JGF	JHGFE	.390	.380	.220	.340	.250	.160
③ 300	RDM10	CM04	FC301±03	JGF	JHGFE	.390	.380	.220	.340	.250	.160
① 330	RDM10	CM04	FA331±03	JGF	JHGFE	.390	.370	.220	.330	.240	.150
① 360	RDM10	CM04	FA361±03	JGF	JHGFE	.390	.380	.220	.340	.250	.160
① 390	RDM10	CM04	FA391±03	JGF	JHGFE	.390	.380	.220	.340	.250	.160
① 430	RDM10		FA431±03		JHGFE	.400	.380	.220	.350	.260	.170
① 470	RDM10		FA471±03		JHGFE	.400	.380	.220	.350	.260	.170
① 510	RDM10		FA511±03		JHGFE	.400	.390	.230	.350	.260	.170
① 560	RDM10		FA561±03		JHGFE	.400	.390	.240	.360	.270	.180
① 620	RDM10		FA621±03		JHGFE	.400	.390	.240	.360	.270	.180
① 680	RDM10		FA681±03		JHGFE	.400	.390	.240	.360	.270	.180
① 750	RDM10		FA751±03		JHGFE	.400	.390	.240	.370	.280	.180
① 820	RDM10		FA821±03		JHGFE	.400	.390	.250	.370	.280	.190
① 910	RDM10		FA911±03		JHGFE	.400	.390	.250	.370	.290	.190
①1000	RDM10		FA102±03		JHGFE	.400	.390	.250	.370	.290	.190

1. Ratings are for 500 Vdcw except ① (100V) and ③ (300V).

* Complete type number by inserting tolerance code in space marked "±". Add prefix "S" for SRDM. Add prefix "2" to RDM for crimped leads. Change CM04 to CM09 for crimped leads.

READ "HOW TO SPECIFY" BEFORE ORDERING

DIPPED SILVER-MICA CAPACITORS RDM15 (CM05/10) and RDM16

RDM15 (CM05/10)

By far the most popular mica capacitor style, the RDM15 (CM05/10) offers a broad range of ratings from 1 to 1500 pF and an advantageous size/cost ratio. All ratings in MIL-C-5D CM05/10 are shown in the table below *plus* the full *range* of RDM15 ratings. Intermediate ratings are available in RDM15.

Cap. pF 1.	G. I. Type *	MIL Type *	G. I. & MIL Type No. *	Opt. MIL Tol.	Opt. RDM Tol.	Max. Size (Inches)					
						RDM15 & CM05			SRDM10		
						L	W	T	L	W	T
1	RDM15	CM05	CD010D03			.450	.360	.170	.430	.280	.140
5	RDM15	CM05	CD050D03		MK	.450	.360	.170	.430	.280	.140
6	RDM15	CM05	CD060D03		MK	.450	.360	.170	.430	.280	.140
7	RDM15	CM05	CD070D03		MK	.450	.360	.170	.430	.280	.140
8	RDM15	CM05	CD080D03		MK	.450	.360	.170	.430	.280	.140
10	RDM15	CM05	CD100J03		MKD	.450	.360	.170	.430	.280	.140
12	RDM15	CM05	CD120J03		MKD	.450	.360	.170	.430	.280	.140
15	RDM15	CM05	CD150J03		MKD	.450	.360	.170	.430	.280	.140
18	RDM15	CM05	CD180J03		MKDH	.450	.360	.170	.430	.280	.140
20	RDM15	CM05	ED200J03		MKDH	.450	.360	.170	.430	.280	.140
22	RDM15	CM05	ED220J03		MKDH	.450	.360	.170	.430	.280	.140
24	RDM15	CM05	ED240J03		MKDH	.450	.360	.170	.430	.280	.140
27	RDM15	CM05	ED270±03	JG	KDJHG	.450	.360	.170	.430	.280	.140
30	RDM15	CM05	ED300±03	JG	KDJHG	.450	.360	.170	.430	.280	.140
33	RDM15	CM05	ED330±03	JG	KDJHG	.450	.360	.170	.430	.280	.140
36	RDM15	CM05	ED360±03	JG	KDJHG	.450	.360	.170	.430	.280	.140
39	RDM15	CM05	ED390±03	JG	KDJHG	.450	.360	.170	.430	.280	.140
43	RDM15	CM05	ED430±03	JG	KDJHG	.450	.360	.170	.430	.280	.140
47	RDM15	CM05	ED470±03	JG	KDJHG	.450	.360	.170	.430	.280	.140
51	RDM15	CM05	ED510±03	JGF	KJHGF	.450	.360	.170	.430	.280	.140
56	RDM15	CM05	ED560±03	JGF	KJHGF	.450	.360	.170	.430	.280	.140
62	RDM15	CM05	ED620±03	JGF	KJHGF	.450	.360	.170	.430	.280	.140
68	RDM15	CM05	ED680±03	JGF	KJHGF	.450	.360	.180	.430	.280	.150
75	RDM15	MC05	ED750±03	JGF	KJHGF	.450	.360	.180	.430	.280	.140
82	RDM15	CM05	ED820±03	JGF	KJHGF	.450	.360	.180	.430	.280	.150
91	RDM15	CM05	FD910±03	JGF	KJHGF	.460	.360	.180	.430	.280	.150
100	RDM15	CM05	FD101±03	JGF	JHGFE	.460	.360	.180	.430	.280	.150
110	RDM15	CM05	FD111±03	JGF	JHGFE	.460	.370	.180	.440	.290	.150
120	RDM15	CM05	FD121±03	JGF	JHGFE	.460	.370	.180	.440	.290	.150
130	RDM15	CM05	FD131±03	JGF	JHGFE	.460	.370	.180	.440	.290	.150
150	RDM15	CM05	FD151±03	JGF	JHGFE	.460	.370	.190	.440	.290	.150
160	RDM15	CM05	FD161±03	JGF	JHGFE	.460	.370	.190	.440	.290	.150
180	RDM15	CM05	FD181±03	JGF	JHGFE	.460	.370	.190	.440	.290	.160
200	RDM15	CM05	FD201±03	JGF	JHGFE	.460	.380	.190	.440	.290	.160
220	RDM15	CM05	FD221±03	JGF	JHGFE	.460	.380	.200	.440	.300	.160
240	RDM15	CM05	FD241±03	JGF	JHGFE	.460	.380	.200	.440	.300	.160
270	RDM15	CM05	FD271±03	JGF	JHGFE	.470	.390	.210	.440	.300	.160
300	RDM15	CM05	FD301±03	JGF	JHGFE	.470	.390	.210	.450	.310	.160
330	RDM15	CM05	FD331±03	JGF	JHGFE	.470	.390	.210	.450	.310	.160
360	RDM15	CM05	FD361±03	JGF	JHGFE	.470	.390	.210	.450	.310	.170
390	RDM15	CM05	FD391±03	JGF	JHGFE	.470	.390	.210	.450	.310	.170
430	RDM15		FD431±03		JHGFE	.470	.390	.210	.450	.310	.170
470	RDM15		FD471±03		JHGFE	.470	.400	.220	.450	.310	.180
③ 510	RDM15		FC511±03		JHGFE	.460	.380	.200	.440	.300	.160
510	RDM15		FD511±03		JHGFE	.470	.400	.220	.450	.310	.190
③ 560	RDM15		FC561±03		JHGFE	.460	.380	.200	.450	.310	.160
560	RDM15		FD561±03		JHGFE	.480	.410	.230	.460	.330	.190
① 620	RDM15		FA621±03		JHGFE	.470	.380	.200	.460	.310	.160
③ 620	RDM15		FC621±03		JHGFE	.470	.380	.200	.450	.310	.160
620	RDM15		FD621±03		JHGFE	.480	.410	.230	.460	.330	.190
① 680	RDM15		FA681±03		JHGFE	.470	.390	.210	.450	.310	.160
③ 680	RDM15		FC681±03		JHGFE	.470	.390	.210	.450	.310	.160
680	RDM15		FD681±03		JHGFE	.490	.420	.240	.470	.330	.190
① 750	RDM15		FA751±03		JHGFE	.470	.390	.210	.450	.310	.170
③ 750	RDM15		FC751±03		JHGFE	.470	.390	.210	.450	.310	.170
750	RDM15		FD751±03		JHGFE	.500	.430	.250	.470	.330	.190
① 820	RDM15		FA821±03		JHGFE	.470	.390	.210	.450	.310	.170
③ 820	RDM15		FC821±03		JHGFE	.470	.390	.210	.450	.310	.170
① 910	RDM15		FA911±03		JHGFE	.470	.400	.220	.450	.310	.170
③ 910	RDM15		FC911±03		JHGFE	.470	.400	.220	.460	.320	.180
①1000	RDM15		FA102±03		JHGFE	.480	.400	.230	.450	.310	.170
③1000	RDM15		FC102±03		JHGFE	.480	.400	.230	.460	.320	.180
①1200	RDM15		FA122±03		JHGFE	.490	.420	.240	.460	.320	.180
③1200	RDM15		FC122±03		JHGFE	.500	.430	.250	.470	.330	.190
①1500	RDM15		FA152±03		JHGFE	.500	.430	.250	.470	.330	.190

RDM16 (NO MIL EQUIV.)

The RDM16 is a special mica capacitor engineered for telephone equipment.

There is no MIL equivalent to the RDM16 but all performance details well exceed the MIL requirements. The tables below list the full range of values from 100 to 1800 pF. In addition to the ratings shown, intermediate ratings may be specified.

Cap. pF	Vdcw (Max.)	G. I. Type No. *		Opt. RDM Tol.	Max. Size (Inches)					
					RDM16			SRDM16		
					L	W	T	L	W	T
100	500	RDM16	FD101±03	JHGFE	.720	.350	.180	.680	.280	.130
110	500	RDM16	FD111±03	JHGFE	.720	.360	.180	.680	.280	.130
120	500	RDM16	FD121±03	JHGFE	.720	.260	.180	.680	.280	.130
130	500	RDM16	FD131±03	JHGFE	.720	.360	.180	.680	.280	.130
150	500	RDM16	FD151±03	JHGFE	.720	.360	.180	.680	.280	.130
160	500	RDM16	FD161±03	JHGFE	.720	.360	.180	.680	.280	.130
180	500	RDM16	FD181±03	JHGFE	.720	.360	.180	.680	.280	.130
200	500	RDM16	FD201±03	JHGFE	.730	.360	.190	.680	.280	.130
220	500	RDM16	FD221±03	JHGFE	.730	.360	.190	.680	.280	.130
240	500	RDM16	FD241±03	JHGFE	.730	.360	.190	.680	.280	.130
250	500	RDM16	FD251±03	JHGFE	.730	.370	.190	.690	.290	.130
270	500	RDM16	FD271±03	JHGFE	.730	.370	.190	.690	.290	.140
300	500	RDM16	FD301±03	JHGFE	.730	.370	.190	.690	.290	.140
330	500	RDM16	FD331±03	JHGFE	.730	.370	.200	.690	.290	.140
360	400	RDM16	FD361±03	JHGFE	.730	.370	.200	.690	.290	.140
390	500	RDM16	FD391±03	JHGFE	.730	.370	.200	.690	.290	.140
430	500	RDM16	FD431±03	JHGFE	.730	.380	.200	.700	.300	.150
470	500	RDM16	FD471±03	JHGFE	.740	.380	.210	.700	.300	.150
510	500	RDM16	FD511±03	JHGFE	.740	.380	.210	.700	.300	.150
560	400	RDM16	FD561±03	JHGFE	.740	.390	.210	.710	.300	.160
620	500	RDM16	FD621±03	JHGFE	.750	.390	.220	.710	.300	.160
680	500	RDM16	FD681±03	JHGFE	.750	.390	.220	.710	.300	.160
750	500	RDM16	FD751±03	JHGFE	.750	.400	.230	.710	.310	.170
820	300	RDM16	FC821±03	JHGFE	.740	.390	.210	.700	.300	.150
910	300	RDM16	FC911±03	JHGFE	.740	.390	.210	.710	.300	.160
1000	300	RDM16	FC102±03	JHGFE	.750	.390	.220	.710	.300	.160
1100	300	RDM16	FC112±03	JHGFE	.750	.390	.220	.710	.300	.160
1200	300	RDM16	FC122±03	JHGFE	.750	.400	.230	.710	.310	.170
1300	300	RDM16	FC132±03	JHGFE	.750	.400	.240	.710	.310	.170
1500	300	RDM16	FC152±03	JHGFE	.760	.400	.240	.720	.320	.180
1600	100	RDM16	FA162±03	JHGFE	.760	.400	.240	.720	.320	.180
1800	100	RDM16	FA182±03	JHGFE	.760	.400	.240	.730	.320	.190

* Complete the type number by inserting the desired tolerance code in the space marked "±". For single dip style add the prefix "S". For crimped leads add the prefix "2".

MICA CAPACITOR TOLERANCES

Cap. Tol.	MIL-C-5D		RDM	
	Code	pF Range	Code	pF Range
±½pF	D	1-10	D	1-100
±20%			M	3-100K
±10%			K	5-100K
± 5%	J	12-91K	J	10-100K
± 3%			H	18-100K
± 2%	G	27-91K	G	27-100K
± 1%	F	51-91K	F	51-100K
±½%			E	100-100K

◀ RDM15 NOTES

1. Ratings are for 500 Vdcw except ① (100V) and ③ (300V).

* Complete type number by inserting tolerance code in space marked "±". Add prefix "S" for SRDM. Add prefix "2" to RDM for crimped leads. Change CM05 to CM10 for crimped leads.

READ "HOW TO SPECIFY" BEFORE ORDERING

DIPPED SILVER-MICA CAPACITORS RDM19 (CM06/11) and RDM20

RDM19 (CM06/11)

The RDM19 (CM06/11) offers a higher level of capacitance than the RDM15 and is somewhat larger. *All* MIL-C-5D ratings are shown below plus a selection of RDM19 values which illustrate the range of the line. Intermediate ratings within the range are available.

Cap. pF 1.	G. I. Type *	MIL Type *	G. I. & MIL Type No. *	Opt. MIL Tol.	Opt. RDM Tol.	Max. Size (Inches) RDM19 & CM06			SRDM19		
						L	W	T	L	W	T
100	RDM19		FD101±03		JHGFE	.640	.500	.190	.610	.450	.130
110	RDM19		FD111±03		JHGFE	.640	.500	.190	.610	.450	.130
120	RDM19		FD121±03		JHGFE	.640	.500	.190	.610	.450	.130
130	RDM19		FD131±03		JHGFE	.640	.500	.190	.610	.450	.130
150	RDM19		FD151±03		JHGFE	.640	.500	.190	.610	.450	.130
160	RDM19		FD161±03		JHGFE	.640	.500	.190	.610	.450	.130
180	RDM19		FD181±03		JHGFE	.640	.500	.190	.610	.450	.130
200	RDM19		FD201±03		JHGFE	.640	.500	.190	.610	.450	.130
220	RDM19		FD221±03		JHGFE	.640	.500	.190	.610	.450	.130
220	RDM19		FD221±03		JHGFE	.640	.500	.190	.610	.450	.130
240	RDM19		FD241±03		JHGFE	.640	.500	.190	.610	.450	.130
270	RDM19		FD271±03		JHGFE	.640	.500	.190	.610	.450	.140
300	RDM19		FD301±03		JHGFE	.640	.500	.190	.610	.450	.140
330	RDM19		FD331±03		JHGFE	.640	.500	.190	.610	.450	.140
360	RDM19		FD361±03		JHGFE	.640	.510	.200	.610	.450	.140
390	RDM19		FD391±03		JHGFE	.640	.510	.200	.610	.450	.140
430	RDM19	CM06	FD431±03	JGF	JHGFE	.640	.510	.200	.610	.450	.140
470	RDM19	CM06	FD471±03	JGF	JHGFE	.640	.510	.200	.610	.450	.140
510	RDM19	CM06	FD511±03	JGF	JHGFE	.650	.510	.200	.610	.450	.140
560	RDM19	CM06	FD561±03	JGF	JHGFE	.650	.510	.200	.610	.450	.140
620	RDM19	CM06	FD621±03	JGF	JHGFE	.650	.510	.200	.610	.460	.150
680	RDM19	CM06	FD681±03	JGF	JHGFE	.650	.510	.210	.610	.460	.150
750	RDM19	CM06	FD751±03	JGF	JHGFE	.650	.510	.210	.610	.460	.150
820	RDM19	CM06	FD821±03	JGF	JHGFE	.650	.510	.210	.610	.460	.150
910	RDM19	CM06	FD911±03	JGF	JHGFE	.650	.510	.210	.620	.460	.160
1000	RDM19	CM06	FD102±03	JGF	JHGFE	.650	.520	.220	.620	.460	.160
1100	RDM19	CM06	FD112±03	JGF	JHGFE	.650	.520	.220	.620	.460	.160
1200	RDM19	CM06	FD122±03	JGF	JHGFE	.660	.520	.220	.620	.460	.170
1300	RDM19	CM06	FD132±03	JGF	JHGFE	.660	.520	.220	.620	.460	.170
1500	RDM19	CM06	FD152±03	JGF	JHGFE	.660	.520	.230	.620	.460	.170
1600	RDM19	CM06	FD162±03	JGF	JHGFE	.660	.530	.230	.620	.460	.180
1800	RDM19	CM06	FD182±03	JGF	JHGFE	.670	.530	.240	.630	.460	.180
2000	RDM19	CM06	FD202±03	JGF	JHGFE	.670	.530	.240	.630	.460	.180
2200	RDM19	CM06	FD222±03	JGF	JHGFE	.670	.530	.250	.630	.460	.190
2400	RDM19	CM06	FD242±03	JGF	JHGFE	.670	.540	.260	.630	.470	.210
2700	RDM19	CM06	FD272±03	JGF	JHGFE	.680	.540	.270	.630	.470	.220
3000	RDM19	CM06	FD302±03	JGF	JHGFE	.680	.550	.280	.630	.470	.230
3300	RDM19	CM06	FD332±03	JGF	JHGFE	.680	.550	.290	.640	.480	.240
3600	RDM19	CM06	FD362±03	JGF	JHGFE	.680	.560	.300	.640	.480	.250
3900	RDM19	CM06	FD392±03	JGF	JHGFE	.690	.560	.310	.640	.480	.260
4300	RDM19	CM06	FD432±03	JGF	JHGFE	.690	.570	.330	.650	.490	.280
4700	RDM19	CM06	FD472±03	JGF	JHGFE	.700	.580	.350	.650	.490	.300
③5100	RDM19		FC512±03		JHGFE	.680	.550	.300	.630	.480	.240
5100	RDM19		FD512±03		JHGFE	.710	.590	.370	.660	.500	.320
①5600	RDM19		FA562±03		JHGFE	.680	.560	.310	.640	.480	.250
③5600	RDM19		FC562±03		JHGFE	.680	.560	.310	.640	.480	.250
①6200	RDM19		FA622±03		JHGFE	.690	.560	.310	.640	.480	.250
③6200	RDM19		FC622±03		JHGFE	.690	.560	.320	.640	.480	.260
①6800	RDM19		FA682±03		JHGFE	.690	.570	.320	.640	.480	.260
③6800	RDM19		FC682±03		JHGFE	.690	.570	.330	.640	.490	.270
①7500	RDM19		FA752±03		JHGFE	.700	.570	.340	.650	.490	.280
①8200	RDM19		FA822±03		JHGFE	.700	.580	.350	.650	.490	.300

RDM19/SRDM19 ALSO AVAILABLE IN:
1000 VDCW FROM 100 pF to 3000 pF.
SEE BULLETIN MC-2B

1. All ratings are for 500 Vdcw except ① (100V) and ③ (300V).

* Complete type number by adding tolerance code in space marked "±". For single dipped style add prefix "S" to RDM. For crimped leads add prefix "2" to RDM. For crimped lead MIL types change CM06 to CM11.

READ "HOW TO SPECIFY" BEFORE ORDERING

RDM20 (NO MIL EQUIV.)

The RDM20 was originally designed for use in television receivers. It offers genuine reliability advantages to other users because of its well-proven record providing the modest size increase can be accommodated.

There is no MIL equivalent to the RDM20. However, all performance details well exceed the MIL requirements.

Cap. pF	Vdcw (Max.)	G. I. Type No. *		Opt. RDM Tol.	Max. Size (Inches) RDM20			SRDM20		
					L	W	T	L	W	T
100	500	RDM20	ED101±03	JHGFE	.750	.500	.180	.700	.450	.120
120	500	RDM20	ED121±03	JHGFE	.750	.500	.190	.700	.450	.130
150	500	RDM20	ED151±03	JHGFE	.750	.500	.190	.700	.450	.130
180	500	RDM20	ED181±03	JHGFE	.750	.500	.190	.700	.450	.130
220	500	RDM20	ED221±03	JHGFE	.750	.500	.190	.700	.450	.130
270	500	RDM20	ED271±03	JHGFE	.750	.500	.190	.700	.450	.130
330	500	RDM20	ED331±03	JHGFE	.750	.500	.190	.700	.450	.130
390	500	RDM20	ED391±03	JHGFE	.750	.500	.190	.700	.450	.130
470	500	RDM20	ED471±03	JHGFE	.750	.500	.190	.700	.450	.130
560	500	RDM20	FD561±03	JHGFE	.750	.500	.190	.700	.450	.130
680	500	RDM20	FD681±03	JHGFE	.750	.510	.190	.700	.450	.140
820	500	RDM20	FD821±03	JHGFE	.750	.510	.200	.700	.450	.140
1000	500	RDM20	FD102±03	JHGFE	.750	.510	.200	.700	.450	.140
1200	500	RDM20	FD122±03	JHGFE	.750	.510	.200	.700	.450	.140
1500	500	RDM20	FD152±03	JHGFE	.750	.510	.210	.700	.460	.150
1800	500	RDM20	FD182±03	JHGFE	.760	.520	.220	.710	.460	.150
2200	500	RDM20	FD222±03	JHGFE	.760	.520	.220	.710	.460	.160
2700	500	RDM20	FD272±03	JHGFE	.770	.540	.260	.710	.460	.200
3300	500	RDM20	FD332±03	JHGFE	.780	.550	.280	.720	.470	.220
3600	500	RDM20	FD362±03	JHGFE	.780	.550	.290	.720	.470	.230
3900	500	RDM20	FD392±03	JHGFE	.780	.560	.300	.720	.480	.240
4700	300	RDM20	FC472±03	JHGFE	.770	.540	.270	.720	.470	.220
4700	500	RDM20	FD472±03	JHGFE	.790	.560	.320	.730	.480	.260
5600	300	RDM20	FC562±03	JHGFE	.780	.550	.290	.720	.480	.240
5600	500	RDM20	FD562±03	JHGFE	.790	.570	.340	.730	.490	.280
6800	100	RDM20	FA682±03	JHGFE	.780	.560	.300	.720	.470	.230
6800	300	RDM20	FC682±03	JHGFE	.790	.560	.320	.730	.480	.260
6800	500	RDM20	FD682±03	JHGFE	.800	.590	.370	.740	.500	.320
8200	100	RDM20	FA822±03	JHGFE	.780	.560	.310	.720	.480	.250
8200	300	RDM20	FC822±03	JHGFE	.790	.570	.340	.730	.490	.280
8200	500	RDM20	FD822±03	JHGFE	.810	.610	.410	.750	.510	.360
9100	100	RDM20	FA912±03	JHGFE	.790	.570	.330	.730	.480	.260
9100	300	RDM20	FC912±03	JHGFE	.800	.580	.360	.740	.490	.290
9100	500	RDM20	FD912±03	JHGFE	.810	.620	.430	.760	.520	.380
10K	100	RDM20	FA103±03	JHGFE	.790	.570	.340	.730	.490	.270
10K	300	RDM20	FC103±03	JHGFE	.800	.590	.370	.740	.490	.300
10K	500	RDM20	FD103±03	JHGFE	.820	.630	.450	.760	.530	.400
11K	100	RDM20	FA113±03	JHGFE	.790	.580	.350	.730	.490	.280
11K	300	RDM20	FC113±03	JHGFE	.800	.590	.380	.740	.500	.320
12K	100	RDM20	FA123±03	JHGFE	.800	.580	.360	.740	.490	.290
12K	300	RDM20	FC123±03	JHGFE	.810	.600	.400	.750	.500	.340
13K	100	RDM20	FA133±03	JHGFE	.800	.590	.380	.740	.500	.310
15K	100	RDM20	FA153±03	JHGFE	.810	.600	.400	.750	.500	.330
16K	100	RDM20	FA163±03	JHGFE	.810	.610	.410	.750	.510	.350
18K	100	RDM20	FA183±03	JHGFE	.820	.620	.440	.760	.520	.370
82	1000	RDM20	EF820±03	KJHGF	.750	.500	.190	.700	.450	.130
150	1000	RDM20	EF151±03	JHGFE	.750	.500	.190	.700	.450	.130
300	1000	RDM20	EF301±03	JHGFE	.750	.510	.200	.700	.460	.140
430	1000	RDM20	EF431±03	JHGFE	.760	.510	.200	.710	.460	.140
560	1000	RDM20	FF561±03	JHGFE	.760	.510	.210	.710	.460	.150
820	1000	RDM20	FF821±03	JHGFE	.760	.520	.220	.710	.470	.160
1500	1000	RDM20	FF152±03	JHGFE	.770	.530	.250	.720	.480	.190
3000	1000	RDM20	FF302±03	JHGFE	.780	.560	.310	.730	.510	.250
4300	1000	RDM20	FF432±03	JHGFE	.800	.590	.360	.750	.540	.300
5600	1000	RDM20	FF562±03	JHGFE	.810	.620	.420	.760	.570	.360
68	1500	RDM20	EH680±03	DJHGF	.750	.500	.190	.700	.450	.130
82	1500	RDM20	EH820±03	DJHGF	.750	.500	.190	.700	.450	.130
100	1500	RDM20	EH101±03	JHGFE	.750	.510	.200	.700	.460	.140
150	1500	RDM20	EH151±03	JHGFE	.750	.510	.200	.700	.460	.140
300	1500	RDM20	EH301±03	JHGFE	.750	.520	.210	.700	.470	.150
470	1500	RDM20	EH471±03	JHGFE	.760	.520	.230	.710	.470	.170
680	1500	RDM20	FH681±03	JHGFE	.770	.520	.250	.720	.480	.190
910	1500	RDM20	FH911±03	JHGFE	.770	.540	.270	.720	.490	.210
1200	1500	RDM20	FH122±03	JHGFE	.780	.560	.300	.730	.510	.240
1500	1500	RDM20	FH152±03	JHGFE	.790	.570	.320	.740	.520	.260

* Complete the type number by inserting the desired tolerance letter code in the space marked "±".

DIPPED SILVER-MICA CAPACITORS RDM30 (CM07/12) and RDM42 (CM08/13)

RDM30 (CM07/12)

The RDM30 (CM07/12) provides ratings from 470 to 30,000 pF and operating voltages up to 2000 Vdcw.

The tables below list all of the available CM07/12 MIL ratings plus additional RDM30 ratings which illustrate the broad range available. Intermediate values may be specified in the RDM type.

Cap. pF 1.	G. I. Type *	MIL Type *	G. I. & MIL Type No. *	Opt. MIL Tol.	Opt. RDM Tol.	Max. Size (Inches) RDM30 & CM07 L	W	T	SRDM30 L	W	T
470	RDM30		FD471±03		JHGFE	.760	.840	.230	.710	.780	.160
560	RDM30		FD561±03		JHGFE	.770	.850	.240	.720	.790	.170
680	RDM30		FD681±03		JHGFE	.770	.850	.240	.720	.790	.170
820	RDM30		FD821±03		JHGFE	.770	.850	.240	.720	.790	.170
1000	RDM30		FD102±03		JHGFE	.770	.850	.240	.720	.790	.170
1200	RDM30		FD122±03		JHGFE	.770	.850	.240	.720	.790	.170
1500	RDM30		FD152±03		JHGFE	.770	.850	.240	.720	.790	.170
1800	RDM30		FD182±03		JHGFE	.770	.850	.240	.720	.790	.180
2000	RDM30		FD202±03		JHGFE	.770	.850	.240	.720	.790	.180
2400	RDM30		FD242±03		JHGFE	.770	.850	.250	.720	.790	.180
2700	RDM30		FD272±03		JHGFE	.770	.850	.250	.720	.790	.190
3000	RDM30		FD302±03		JHGFE	.770	.850	.250	.720	.790	.190
3300	RDM30		FD332±03		JHGFE	.770	.850	.260	.720	.790	.190
3600	RDM30		FD362±03		JHGFE	.770	.850	.260	.720	.790	.200
3900	RDM30		FD392±03		JHGFE	.770	.850	.270	.720	.790	.200
4700	RDM30		FD472±03		JHGFE	.780	.850	.270	.720	.790	.210
5100	RDM30	CM07	FD512±03	JGF	JHGFE	.780	.860	.280	.720	.790	.210
5600	RDM30	CM07	FD562±03	JGF	JHGFE	.780	.870	.290	.720	.790	.220
6200	RDM30	CM07	FD622±03	JGF	JHGFE	.780	.870	.290	.730	.800	.220
6800	RDM30	CM07	FD682±03	JGF	JHGFE	.780	.870	.300	.730	.800	.230
7500	RDM30	CM07	FD752±03	JGF	JHGFE	.790	.880	.310	.730	.800	.240
8200	RDM30	CM07	FD822±03	JGF	JHGFE	.790	.880	.320	.730	.800	.250
③9100	RDM30		FC912±03		JHGFE	.780	.870	.280	.720	.790	.210
9100	RDM30	CM07	FD912±03	JGF	JHGFE	.790	.880	.330	.730	.800	.260
③ 10K	RDM30		FC103±03		JHGFE	.780	.870	.290	.730	.800	.220
10K	RDM30	CM07	FD103±03	JGF	JHGFE	.800	.890	.340	.730	.800	.270
③ 11K	RDM30		FC113±03		JHGFE	.780	.870	.300	.730	.800	.230
11K	RDM30	CM07	FD113±03	JGF	JHGFE	.800	.890	.350	.740	.810	.280
③ 12K	RDM30		FC123±03		JHGFE	.790	.880	.310	.730	.800	.240
12K	RDM30	CM07	FD123±03	JGF	JHGFE	.800	.890	.360	.740	.810	.290
③ 13K	RDM30		FC133±03		JHGFE	.790	.880	.310	.730	.800	.250
13K	RDM30	CM07	FD133±03	JGF	JHGFE	.810	.890	.370	.740	.810	.300
③ 15K	RDM30		FC153±03		JHGFE	.790	.880	.330	.730	.800	.260
15K	RDM30	CM07	FD153±03	JGF	JHGFE	.810	.900	.390	.740	.820	.330
③ 16K	RDM30		FC163±03		JHGFE	.800	.890	.340	.730	.800	.270
16K	RDM30	CM07	FD163±03	JGF	JHGFE	.820	.900	.410	.740	.820	.340
③ 18K	RDM30		FC183±03		JHGFE	.800	.890	.360	.740	.810	.280
18K	RDM30	CM07	FD183±03	JGF	JHGFE	.820	.910	.430	.750	.820	.360
③ 20K	RDM30		FC203±03		JHGFE	.810	.890	.370	.740	.810	.300
20K	RDM30	CM07	FD203±03	JGF	JHGFE	.830	.920	.450	.750	.830	.380
① 22K	RDM30		FA223±03		JHGFE	.810	.890	.370	.740	.810	.310
① 24K	RDM30		FA243±03		JHGFE	.810	.900	.400	.740	.820	.320
① 27K	RDM30		FA273±03		JHGFE	.810	.900	.410	.740	.820	.340
① 30K	RDM30		FA303±03		JHGFE	.820	.910	.420	.750	.820	.360

RDM30/SRDM30 ALSO AVAILABLE IN:
1000 VDCW FROM 470–12,000 pF
1500 VDCW FROM 100–5,600 pF
2000 VDCW FROM 100–5,600 pF

1. All ratings are for 500 Vdcw except ① (100V) and ③ (300V).

* Complete the type number by inserting the desired tolerance code in the space marked "±". For the single dip style add the prefix "S" to RDM. For crimped lead RDM, add the prefix "2". For crimped lead MIL, change CM07 to CM12.

READ "HOW TO SPECIFY" BEFORE ORDERING

RDM42 (CM08/13)

The RDM42 is the largest MIL-C-5D dipped style (CM08/13). It offers ratings as high as 100,000 pF (.10uF) and operating voltages to 1500 Vdcw.

All (CM08/13) ratings appear in the tables below plus the extended range of the commercial RDM42. In addition to the RDM42 ratings shown, intermediate values may be specified and in tolerances as tight as ±0.5%.

Cap. pF	G. I. Type *	MIL Type *	G. I. & MIL Type No. *	Opt. MIL Tol.	Opt. RDM Tol.	Max. Size (Inches) RDM42 & CM08 L	W	T	SRDM42 L	W	T
3300	RDM42		FD332±03		JHGFE	1.410	.870	.280	1.370	.800	.220
3900	RDM42		FD392±03		JHGFE	1.410	.870	.280	1.370	.800	.220
4700	RDM42		FD472±03		JHGFE	1.410	.870	.280	1.370	.800	.220
5600	RDM42		FD562±03		JHGFE	1.410	.870	.280	1.370	.800	.220
6800	RDM42		FD682±03		JHGFE	1.410	.870	.280	1.370	.800	.220
8200	RDM42		FD822±03		JHGFE	1.410	.870	.280	1.370	.800	.220
10K	RDM42		FD103±03		JHGFE	1.410	.870	.280	1.370	.800	.220
12K	RDM42		FD123±03		JHGFE	1.410	.870	.280	1.370	.800	.220
15K	RDM42		FD153±03		JHGFE	1.410	.870	.280	1.370	.800	.220
18K	RDM42		FD183±03		JHGFE	1.410	.870	.290	1.370	.800	.230
20K	RDM42		FD203±03		JHGFE	1.410	.870	.300	1.380	.800	.240
22K	RDM42	CM08	FD223±03	JGF	JHGFE	1.420	.880	.310	1.380	.810	.240
③ 24K	RDM42		FC243±03		JHGFE	1.420	.870	.300	1.380	.810	.240
24K	RDM42	CM08	FD243±03	JGF	JHGFE	1.430	.880	.320	1.380	.810	.250
③ 27K	RDM42		FC273±03		JHGFE	1.420	.880	.310	1.380	.810	.240
27K	RDM42	CM08	FD273±03	JGF	JHGFE	1.430	.880	.330	1.380	.810	.260
③ 30K	RDM42		FC303±03		JHGFE	1.430	.880	.320	1.380	.810	.260
30K	RDM42	CM08	FD303±03	JGF	JHGFE	1.440	.890	.350	1.380	.810	.280
③ 33K	RDM42		FC333±03		JHGFE	1.430	.880	.340	1.380	.810	.270
33K	RDM42	CM08	FD333±03	JGF	JHGFE	1.440	.890	.360	1.390	.820	.290
③ 36K	RDM42		FC363±03		JHGFE	1.440	.890	.350	1.390	.820	.280
36K	RDM42	CM08	FD363±03	JGF	JGHFE	1.450	.900	.380	1.390	.820	.310
③ 39K	RDM40		FC393±03		JHGFE	1.440	.890	.360	1.390	.820	.290
39K	RDM42	CM08	FD393±03	JGF	JHGFE	1.450	.900	.400	1.390	.830	.330
③ 43K	RDM42		FC433±03		JHGFE	1.450	.900	.370	1.390	.830	.310
43K	RDM42	CM08	FD433±03	JGF	JHGFE	1.460	.910	.420	1.400	.830	.350
③ 47K	RDM42		FC473±03		JHGFE	1.450	.900	.390	1.400	.830	.330
47K	RDM42	CM08	FD473±03	JGF	JHGFE	1.470	.910	.450	1.420	.840	.380
③ 51K	RDM42		FC513±03		JHGFE	1.460	.900	.400	1.410	.830	.330
51K	RDM42	CM08	FD513±03	JGF	JHGFE	1.480	.920	.470	1.430	.840	.400
① 56K	RDM42		FA563±03		JHGFE	1.440	.900	.370	1.390	.830	.310
③ 56K	RDM42	CM08	FC563±03	JGF	JHGFE	1.460	.910	.420	1.410	.840	.350
① 62K	RDM42		FA623±03		JHGFE	1.450	.900	.390	1.400	.830	.330
③ 62K	RDM42	CM08	FC623±03	JGF	JHGFE	1.470	.920	.450	1.420	.840	.380
① 68K	RDM42		FA683±03		JHGFE	1.460	.900	.410	1.410	.830	.340
③ 68K	RDM42	CM08	FC683±03	JGF	JHGFE	1.480	.920	.470	1.430	.840	.400
① 75K	RDM42	CM08	FA753±03	JGF	JHGFE	1.470	.910	.440	1.420	.840	.380
① 82K	RDM42	CM08	FA823±03	JGF	JHGFE	1.480	.920	.460	1.430	.840	.390
① 91K	RDM42	CM08	FA913±03	JGF	JHGFE	1.500	.940	.500	1.450	.860	.430
①100K	RDM42		FA104±03		JHGFE	1.520	.960	.540	1.470	.880	.470

RDM42/SRDM42 ALSO AVAILABLE IN:
1000 VDCW FROM 3000–30,000 pF
1500 VDCW FROM 1000–20,000 pF
SEE BULLETIN MC-2B

1. All ratings are for 500 Vdcw except ① (100V) and ③ (300V).

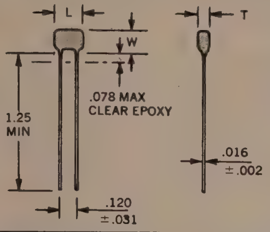
* Complete type number by inserting desired tolerance code in space marked "±". For single dip RDM, add prefix "S". For crimped lead RDM, add prefix "2". For crimped lead MIL, change CM08 to CM13.

MICA CAPACITOR TOLERANCES

Cap. Tol.	MIL-C-5D Code	MIL-C-5D pF Range	RDM Code	RDM pF Range
±½ pF	D	1 - 10	D	1 - 100
±20%			M	3 - 100K
±10%			K	5 - 100K
± 5%	J	12 - 91K	J	10 - 100K
± 3%			H	18 - 100K
± 2%	G	27 - 91K	G	27 - 100K
± 1%	F	51 - 91K	F	51 - 100K
±½%			E	100 - 100K

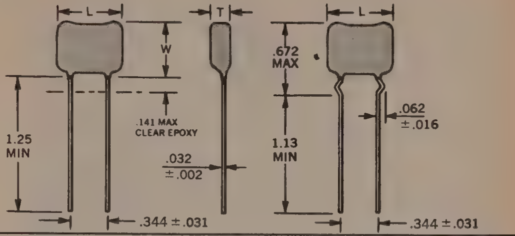
DIPPED SILVER-MICA CAPACITORS
RDM and MIL-C-5D, STYLES and DIMENSIONS

RDM05/SRDM05
NO MIL EQUIV.

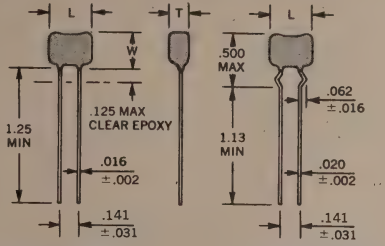

L
W
T
.078 MAX
CLEAR EPOXY
1.25
MIN
.016
±.002
.120
±.031

CRIMPED
LEADS
NOT
RECOMMENDED

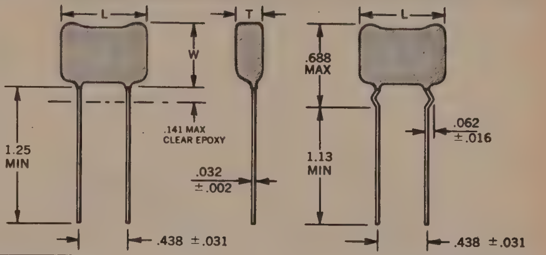
RDM19/SRDM19 **2RDM19/2SRDM19**
MIL CM06 **MIL CM11**


L
W
T
.141 MAX
CLEAR EPOXY
1.25
MIN
.032
±.002
.344 ±.031
L
.672
MAX
.062
±.016
1.13
MIN
.344 ±.031

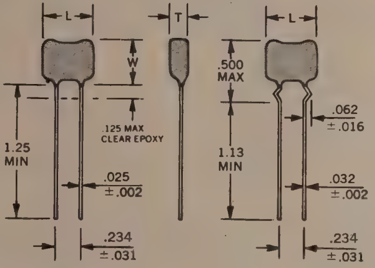
RDM10/SRDM/10 **2RDM10/2SRDM10**
MIL CM04 **MIL CM09**


L
W
T
.125 MAX
CLEAR EPOXY
1.25
MIN
.016
±.002
.141
±.031
L
.500
MAX
.062
±.016
1.13
MIN
.020
±.002
.141
±.031

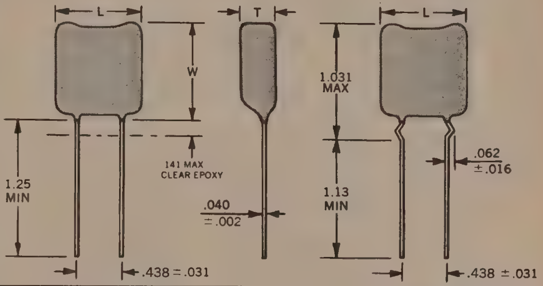
RDM20/SRDM20 **2RDM20/2SRDM20**
NO MIL EQUIV.


L
W
T
.141 MAX
CLEAR EPOXY
1.25
MIN
.032
±.002
.438 ±.031
L
.688
MAX
.062
±.016
1.13
MIN
.438 ±.031

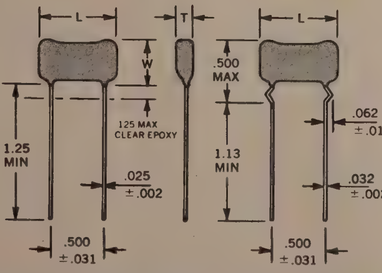
RDM15/SRDM15 **2RDM15/2SRDM15**
MIL CM05 **MIL CM10**


L
W
T
.125 MAX
CLEAR EPOXY
1.25
MIN
.025
±.002
.234
±.031
L
.500
MAX
.062
±.016
1.13
MIN
.032
±.002
.234
±.031

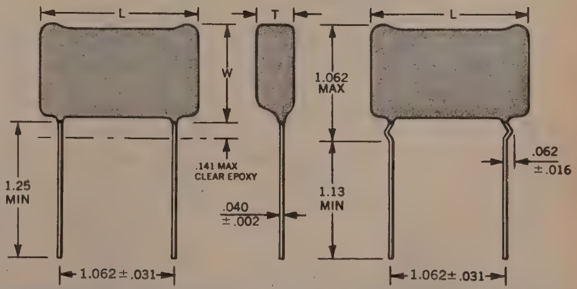
RDM30/SRDM30 **2RDM30/2SRDM30**
MIL CM07 **MIL CM12**


L
W
T
141 MAX
CLEAR EPOXY
1.25
MIN
.040
±.002
.438 ±.031
L
1.031
MAX
.062
±.016
1.13
MIN
.438 ±.031

RDM16/SRDM16 **2RDM16/2SRDM16**
NO MIL EQUIV.

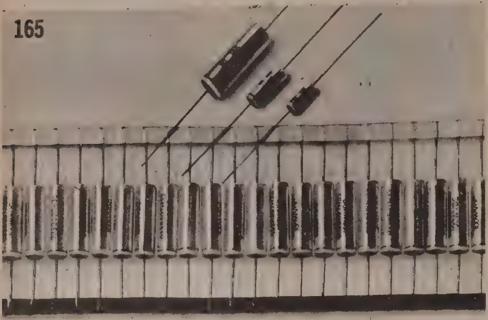

L
W
T
125 MAX
CLEAR EPOXY
1.25
MIN
.025
±.002
.500
±.031
L
.500
MAX
.062
±.016
1.13
MIN
.032
±.002
.500
±.031

RDM42/SRDM42 **2RDM42/2SRDM42**
MIL CM08 **MIL CM13**


L
W
T
.141 MAX
CLEAR EPOXY
1.25
MIN
.040
±.002
1.062±.031
L
1.062
MAX
.062
±.016
1.13
MIN
1.062±.031

CRYSTAL-CAP® POLYESTER FILM (MYLAR*) CAPACITORS TYPE 165 AXIAL LEADS

SPECIFICATIONS



Construction: Extended dielectric of self-sealed polyester film with tinned axial terminal wires.

Operating Temperature: −55° C to +85° C at full rated working voltage. −55° C to +125° C permissible with voltage derating, (See Capacitance vs. Temperature chart below.)

Working Voltage: Expressed as Vdcw in tables. This is the maximum continuous voltage which may be applied at +85° C. For +125° C operation, see voltage derating chart below.

Surge Voltage: Expressed as Vdcs. Capacitors shall withstand a surge voltage of 250% of rated Vdcw for 15 seconds or 200% for 60 seconds.

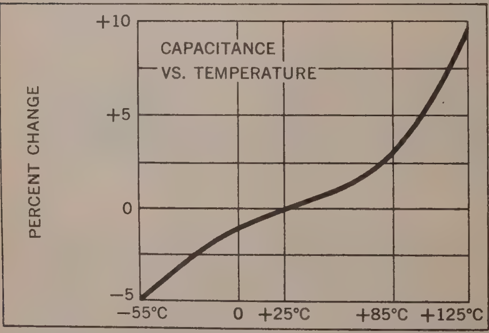
Capacitance: Shown in microfarads (uF) in the tables and measured by the bridge method at +25° C and 1000 Hertz.

Capacitance Tolerance: The standard tolerance is ± 10% of rated capacitance. ±20% and ±5% tolerance is also available.

Outer Foil: The outer foil is indicated by a printed bar adjacent to the associated terminal wire.

Insulation Resistance: Expressed as IR. Measure by applying rated Vdcw or 500 Vdc (whichever is lesser) for two minutes. IR shall be within the following limits:

Temp. °C	Megohm - uF's	Need not exceed (Megohms)
+25	50,000	100,000
+85	5,000	15,000
+105	1,000	2,000
+125	50	200



Dissipation Factor: Expressed as DF in terms of percent. When measured by the bridge method at ±25° C and 1000 Hertz, DF shall not exceed 1.0%.

Life Test: Test is conducted in a suitable chamber with circulating air. Apply 150% of rated Vdcw for 250 hours at +85°C. Remove capacitors from test chamber and allow to cool normally to ±25°C ±1°C. Measure capacitance, IR and dissipation factor: IR shall not be less than 75% of initial required values; capacitance shall be within ±10% of initial value; DF shall not exceed 1.0%. No more than one failure per lot of 24 is permitted.

Humidity Test: Test must be conducted in a suitable chamber with calibrated measuring equipment and circulating air. Capacitors shall withstand 90% (+5% —0%) relative humidity at +65°C ±2°C for 500 hours. At completion of exposure, wipe capacitors dry and let stand in circulating air for four hours at +25°C. At conclusion of drying cycle, measure insulation resistance (IR) at +25°C ±1°C. IR shall not be less than 75% of initial required value. No more than one failure per lot of 18 is permitted.

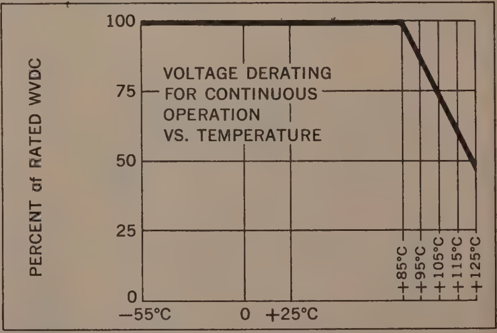
Terminal Bond Test: Clamp one terminal wire to a suitable support and attach 4.4 lb. weight to opposite wire with capacitor body in vertical position. Test shall be conducted for 10 seconds. No physical or electrical damage shall have occurred to capacitor.

Terminal Bend Test: Clamp capacitor securely in a suitable fixture with the body in a vertical position. Grasp the end of the upper terminal wire and bend it over a time period of 5 seconds to a position 90° to the right of the body. Return to original position over a period of 5 seconds. Bend the wire 90° to the left over a period of 5 seconds. Return to original position over a period of 5 seconds. Terminal wire shall remain intact. Axial pull on the wire shall not have exceeded 2.2 lbs. during this test.

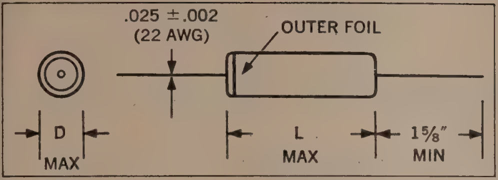
Marking: Minimum marking shall be: 1. General Instrument symbol and Type (165), 2. Outer foil bar, 3. Capacitance in uF, 4. Tolerance, and 5. Working voltage.

Customer part number or other marking may be applied on special order.

Packaging: Standard packaging is bulk in corrugated cartons. Reel packaging is available for Type 165 up to .375 inches maximum diameter. The standard G.I. reel packaging specification is available on request.



CRYSTAL-CAP® POLYESTER FILM (MYLAR*) CAPACITORS TYPE 165 AXIAL LEADS



General Instrument "Crystal-Cap" film capacitors are made with DuPont Mylar in a unique manner. The bodies are self-sealed with the terminal wires being inserted precisely on center under heat and pressure. This construction provides both an excellent electrical connection and a very strong mechanical bond. This bond is actually stronger than typical wrap and fill types and far less susceptible to damage from soldering activities either manual or automatic.

As with all Mylar capacitors, applications include bypass, timing, coupling and filtering. Operating temperatures range from −55°C to +85°C at full rated voltage. Operation to +125°C is common except that voltage must be de-rated 50%. A unit rated at 200 Vdcw may be operated continuously at that voltage at +85°C but must not be operated continuously above 100 Vdcw at +125°C.

The particular advantage of the Crystal-Cap capacitor in addition to its construction and performance is the concentricity of the terminal wires. This makes it ideal for automatic insertion equipment. Furthermore, the very simplicity of its design causes it to be smaller in size than other Mylar types (wrap and fill, molded, end-capped, etc.). Metallized Mylar capacitors are, of course, smaller but these specialized types cost considerably more and suffer distinct performance limitations.

The table below lists all standard Crystal-Cap capacitors from .001 to 1.0 uF and 50 to 600 Vdcw. Standard packaging is bulk. However, all sizes up to .375″ diameter and/or 1.031″ body length are available taped and reeled at modest extra cost.

NOTES:

HOW TO SPECIFY TYPE 165 CAPACITORS

1. Select working voltage and capacitance
2. Read the Type 165 part number
3. Insert at "*", *B* for bulk package or *T* for tape and reel
4. Add at "+", tolerance code letter:
   M = ±20%, K = ±10%, J = ±5%

TYPE 165 — Maximum Diameter x Length (Inches) and Part Numbers

Cap. uF	50–80 Vdcw			100 Vdcw			200 Vdcw			400 Vdcw			600 Vdcw			Cap. uF
	G. I. P/N (See Notes)	Max. Size Dia.	Max. Size Lgt.	G. I. P/N (See Notes)	Max. Size Dia.	Max. Size Lgt.	G. I. P/N (See Notes)	Max. Size Dia.	Max. Size Lgt.	G. I. P/N (See Notes)	Max. Size Dia.	Max. Size Lgt.	G. I. P/N (See Notes)	Max. Size Dia.	Max. Size Lgt.	
.0010	165*0001+	.170	.468	165*0038+	.170	.468	165*0075+	.170	.468	165*0112+	.170	.468	165*.0145+	.170	.468	.0010
.0012	165*0002+	.170	.468	165*0039+	.170	.468	165*0076+	.170	.468	165*0113+	.170	.468	165*.0146+	.170	.468	.0012
.0015	165*0003+	.170	.468	165*0040+	.170	.468	165*0077+	.170	.468	165*0114+	.170	.468	165*.0147+	.180	.468	.0015
.0018	165*0004+	.170	.468	165*0041+	.170	.468	165*0078+	.170	.468	165*0115+	.170	.468	165*.0148+	.175	.531	.0018
.0022	165*0005+	.170	.468	165*0042+	.170	.468	165*0079+	.170	.468	165*0116+	.170	.468	165*.0149+	.170	.593	.0022
.0027	165*0006+	.170	.468	165*0043+	.170	.468	165*0080+	.170	.468	165*0117+	.180	.468	165*.0150+	.180	.593	.0027
.0033	165*0007+	.170	.468	165*0044+	.170	.468	165*0081+	.170	.468	165*0118+	.195	.468	165*.0151+	.190	.593	.0033
.0039	165*0008+	.170	.468	165*0045+	.170	.468	165*0082+	.170	.468	165*0119+	.205	.468	165*.0152+	.200	.593	.0039
.0047	165*0009+	.170	.468	165*0046+	.170	.468	165*0083+	.170	.468	165*0120+	.215	.468	165*.0153+	.200	.656	.0047
.0050	165*0172+	.170	.468	165*0173+	.170	.468	165*0174+	.170	.468	165*0175+	.220	.468	165*.0176+	.205	.656	.0050
.0056	165*0010+	.170	.468	165*0047+	.175	.468	165*0084+	.175	.468	165*0121+	.205	.531	165*.0154+	.215	.656	.0056
.0068	165*0011+	.170	.468	165*0048+	.175	.468	165*0085+	.170	.531	165*0122+	.220	.531	165*.0155+	.225	.656	.0068
.0082	165*0012+	.170	.468	165*0049+	.175	.468	165*0086+	.180	.531	165*0123+	.210	.593	165*.0156+	.230	.718	.0082
.010	165*0013+	.170	.468	165*0050+	.170	.531	165*0087+	.190	.531	165*0124+	.230	.593	165*.0157+	.245	.718	.010
.012	165*0014+	.170	.531	165*0051+	.175	.531	165*0088+	.205	.531	165*0125+	.245	.593	165*.0158+	.240	.843	.012
.015	165*0015+	.175	.531	165*0052+	.170	.593	165*0089+	.225	.531	165*0126+	.265	.593	165*.0159+	.250	.906	.015
.018	165*0016+	.185	.531	165*0053+	.180	.593	165*0090+	.215	.593	165*0127+	.285	.593	165*.0160+	.265	.906	.018
.022	165*0017+	.200	.531	165*0054+	.195	.593	165*0091+	.215	.656	165*0128+	.285	.656	165*.0161+	.275	.968	.022
.027	165*0018+	.215	.531	165*0055+	.210	.593	165*0092+	.235	.656	165*0129+	.315	.656	165*.0162+	.265	1.218	.027
.033	165*0019+	.230	.531	165*0056+	.230	.593	165*0093+	.250	.656	165*0130+	.340	.656	165*.0163+	.285	1.218	.033
.039	165*0020+	.220	.593	165*0057+	.245	.593	165*0094+	.270	.656	165*0131+	.340	.718	165*.0164+	.305	1.218	.039
.047	165*0021+	.220	.656	165*0058+	.245	.656	165*0095+	.290	.656	165*0132+	.330	.843	165*.0165+	.315	1.343	.047
.050	165*0177+	.225	.656	165*0178+	.250	.656	165*0179+	.300	.656	165*0180+	.340	.843	165*.0181+	.320	1.343	.050
.056	165*0022+	.235	.656	165*0059+	.245	.718	165*0096+	.315	.656	165*0133+	.340	.906	165B.0166+	.340	1.343	.056
.068	165*0023+	.255	.656	165*0060+	.250	.781	165*0097+	.320	.718	165*0134+	.355	.968	165B.0167+	.365	1.343	.068
.082	165*0024+	.275	.656	165*0061+	.270	.781	165*0098+	.295	.906	165*0135+	.335	1.218	165B.0169+	.395	1.343	.082
.10	165*0025+	.300	.656	165*0062+	.295	.781	165*0099+	.320	.906	165B0136+	.365	1.218	165B.0169+	.435	1.343	.10
.12	165*0026+	.300	.718	165*0063+	.300	.843	165*0100+	.330	.968	165B0137+	.370	1.343	165B.0186+	.470	1.343	.12
.15	165*0027+	.335	.718	165*0064+	.315	.906	165*0101+	.365	.968	165B0138+	.410	1.343	165B.0187+	.520	1.343	.15
.18	165*0028+	.360	.718	165*0065+	.330	.968	165B0102+	.345	1.218	165B0139+	.445	1.343	165B.0188+	.565	1.343	.18
.22	165*0029+	.350	.843	165*0066+	.310	1.031	165B0103+	.355	1.343	165B0140+	.490	1.343	165B.0189+	.620	1.343	.22
.27	165*0030+	.335	1.031	165*0067+	.375	1.031	165B0104+	.390	1.343	165B0141+	.535	1.343	165B.0190+	.635	1.343	.27
.33	165*0031+	.370	1.031	165B0068+	.340	1.218	165B0105+	.430	1.343	165B0142+	.590	1.343				.33
.39	165B0032+	.335	1.343	165B0069+	.400	1.218	165B0106+	.460	1.343	165B0143+	.640	1.343				.39
.47	165B0033+	.365	1.343	165B0070+	.415	1.343	165B0107+	.505	1.343	165B0144+	.700	1.343				.47
.50	165B0182+	.380	1.343	165B0183+	.425	1.343	165B0184+	.520	1.343	165B0185+	.720	1.343				.50
.56	165B0034+	.400	1.343	165B0071+	.450	1.343	165B0108+	.545	1.343							.56
.68	165B0035+	.435	1.343	165B0072+	.490	1.343	165B0109+	.600	1.343							.68
.82	165B0036+	.475	1.343	165B0073+	.535	1.343	165B0110+	.655	1.343							.82
1.00	165B0037+	.520	1.343	165B0074+	.590	1.343	165B0111+	.720	1.343							1.00

CAPACITOR DIVISION **GENERAL INSTRUMENT CORPORATION** 600 WEST JOHN ST., HICKSVILLE, NEW YORK 11802
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OTTOWA, CAN., Wackid Radio, (613) 728-1821

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CAPACITOR DIVISION GENERAL INSTRUMENT CORPORATION 600 WEST JOHN ST., HICKSVILLE, NEW YORK 11802
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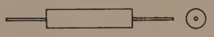
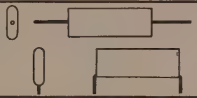
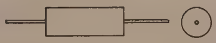
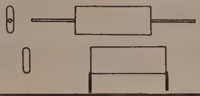
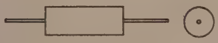
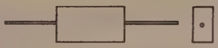
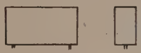
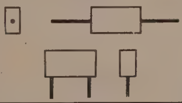
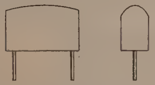
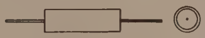
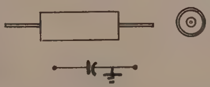
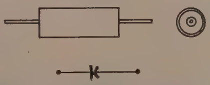
MIDWEC

MYLAR FOIL

Type	Configuration	Case Style	Cap. Range (MFDS)	Volt Range (VDC)	Size Range (Inches)
3		Plastic Wrap & Fill	.001 to 2.00	100 to 1000	.156 x .500 to 1.609 x 3.000
3F 3FR		Plastic Wrap & Fill	.001 to 2.00	100 to 600	.125 x .250 x .500 to .984 x 1.937 x 3.000
3X		Plastic Wrap & Fill	.010 to 5.00	up to 100	.117 x .406 to .840 x 1.812
3XF 3XFR		Plastic Wrap & Fill	.010 to 5.00	up to 100	.075 x .149 x .437 to .578 x .875 x 1.812
301 3XI		Plastic Wrap & Fill	.0001 to .33	up to 100	.140 x .500 to .500 x .500
E3F		Epoxy	.001 to 2.00	100 or 200	.160 x .240 x .420 to .560 x .720 x 1.950
E3FR		Epoxy	.0010 to 1.00	100 or 200	.095 x .265 x .375 to .295 x 1.100 x 1.785
E3XF E3XFR		Epoxy	.015 to 2.00 .0082 to 1.00	50	.170 x .290 x .550 to .550 x .720 x 1.250 .095 x .265 x .375 to .250 x .890 x .985
D3		Epoxy Dip	.001 to .68	100	.200 x .350 x .500 to .475 x .875 x 1.125
P3		Phenolic	.001 to 2.00	100 to 600	.250 x .625 to 1.00 x 2.0
H3G H3GS		Hermetic Seal	.001 to 2.0	100 to 600	.173 x .687 to 1.00 x 2.812
H3 H3S		Hermetic Seal	.001 to 2.00	100 to 600	.173 x .750 to 1.00 x 2.875

GENERAL NOTES

Capacitance Tolerance: Standard tolerance is ±5%. All types available in ±20%, ±10%, ±3%, ±2%, and ±1%. The capacitance shall be measured at 1000 Hz. at 25°C for values up to and including 5.0 mfd. Values larger than 5.0 mfd. shall be measured at 60 Hz. and 25°C.

Dissipation Factor: Less than 0.60% when measured at 1000 Hz. and 25°C for values up to and including 5.0 mfd. and 60 Hz. for values larger than 5.0 mfd. 60 Hz. and 25°C.

Insulation Resistance: Greater than 100,000 megohm-microfarads after a 2 minute electrification at rated voltage and 25°C, but the I.R. need not exceed 200,000 megohms.

Dielectric Strength: Twice rated voltage for 60 seconds at 25°C, thru a current limiting resistance of 100 ohms per volt.

Temperature Range: May be operated at rated voltage from −55°C to +85°C and +125°C with 50% derating.

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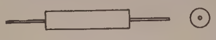
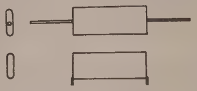
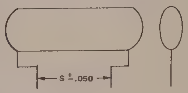
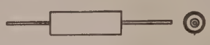
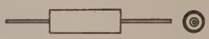
POLYSTYRENE-FOIL

Type	Configuration	Case Style	Cap. Range (MFDS)	Volt Range (VDC)	Size Range (Inches)
4		Plastic Wrap & Fill	.001 to 1.000	100 to 600	.235 x .562 to 1.593 x 3.062
4F 4FR		Plastic Wrap & Fill	.001 to 1.000	100 to 600	.153 x .295 x .562 to .812 x 1.250 x 2.125
D4		Epoxy Dip	.0001 to .10	100	.350 x .500 x .560 to .600 x .750 x 1.100
H4 H4S		Hermetic Seal	.001 to 1.00	100	.193 x .750 to 1.00 x 2.125
H44A H44B		Hermetic Seal	.01 to 1.00	100	.312 x .875 to .750 x 2.375

GENERAL NOTES

Capacitance Tolerance: Standard tolerance is ±5%. Also available in ±20%, ±10%, ±3%, ±2%, and ±1%. The capacitance shall be measured at 1000 Hz. and 25°C.

Dissipation Factor: Less than 0.1% when measured at 1000 Hz. and 25°C.

Insulation Resistance: 500,000 megohm-microfarads after a 2 minute electrification period at rated voltage and 25°C. The I.R. need not exceed 500,000 megohms.

Dielectric Strength: 200% of rated voltage for 60 seconds at 25°C thru a current limiting resistance of 100 ohms per volt.

Life Test: 250 hours at 140% of rated voltage and 85°C.

Temperature Range: May be operated at rated voltage from −55°C to +85°C.

Temperature Coefficient: −120 parts per million per °C, ±20 PPM.

Dielectric Absorption: Will not exceed 0.1% when measured at 25°C.

Capacitance Tolerance: Standard tolerance is ±5%. Also available in ±20%, ±10%, ±3%, ±2%, and ±1%. The capacitance shall be measured at 1000 Hz. and 25°C.

Dissipation Factor: Less than .05% when measured as above.

Temperature Coefficient: H44A ≦ ±20 PPM/°C
H44B ≦ ±40 PPM/°C

Insulation Resistance: 1,000,000 megohm-microfarads following a 2 minute electrification at rated voltage and 25°C. I.R. need not exceed 1,000,000 megohms. 250,000 meg. mfd. at 85°C.

Dielectric Strength: Twice rated voltage for 60 seconds at 25°C through a current limiting resistance of 100 ohms per volt.

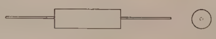
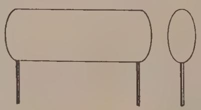
Temperature Range: May be operated at rated voltage from −55°C to +85°C.

Life Test: 250 hours at 140% of rated voltage and 85°C.

Humidity Resistance: Meet or exceed requirements of MIL-STD-202, Method 103B, Test Condition A.

Construction: Extended foil winding, polystyrene dielectric, hermetically sealed case.

POLYPROPYLENE-FOIL

Type	Configuration	Case Style	Cap. Range (MFDS)	Volt Range (VDC)	Size Range (Inches)
5		Plastic Wrap & Fill	.0001 to 1.000	160	.205 x .500 to .785 x 1.937
D5		Epoxy Dip	.0001 to .10	160	.300 x .450 x .500 to .475 x .625 x 1.025

Capacitance Tolerance: Standard tolerance is ±5%. Also available in ±20%, ±10%, ±3%, ±2%, and ±1%. The capacitance shall be measured at 1000 Hz. and 25°C.

Dissipation Factor: Less than 0.1% when measured at 1000 Hz. and 25°C.

Insulation Resistance: 300,000 megohm-microfarads after a 2 minute electrification period at rated voltage and 25°C. The I.R. need not exceed 300,000 megohms.

Dielectric Strength: 200% of rated voltage for 60 seconds at 25°C thru a current limiting resistance of 100 ohms per volt.

Life Test: 250 hours at 140% of rated voltage and 85°C.

Temperature Range: May be operated at rated voltage from −55°C to +85°C.

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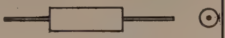
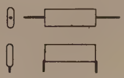
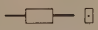
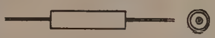
POLYCARBONATE-FOIL

Type	Configuration	Case Style	Cap. Range (MFDS)	Volt Range (VDC)	Size Range (Inches)
6		Plastic Wrap & Fill	.001 to 1.00	100	.155 x .500 to .995 x 1.937
6F 6FR		Plastic Wrap & Fill	.001 to 1.00	100	.095 x .175 x .500 to .785 x 1.185 x 1.937
E6F		Epoxy	.001 to 1.00	100	.160 x .240 x .420 to .560 x .720 x 1.950
H6 H6S		Hermetic Seal	.001 to 1.00	100	.193 x .562 to 1.00 x 2.00

GENERAL NOTES

Capacitance Tolerance: Standard tolerance is ±5%. Also available in ±20%, ±10%, ±4%, ±3%, ±2%, and ±1%. The Capacitance shall be measured at 1000 Hz. and 25°C.

Dissipation Factor: Less than 0.20% when measured at 1000 Hz. and 25°C.

Insulation Resistance: Greater than 200,000 megohm-mfds. following a 2 minute electrification period at rated voltage or 500 VDC; whichever is less; and 25°C. I.R. need not exceed 500,000 megohms.

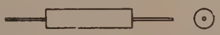
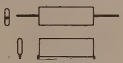
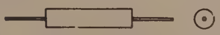
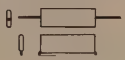
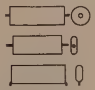
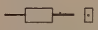
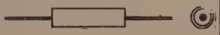
Dielectric Strength: Twice rated voltage for 60 seconds at 25°C, thru current limiting resistance of 100 ohms per volt.

Dielectric Absorption: Shall not exceed 0.5% (Ref. MIL-C-19978B).

Life Test: 250 hours at 140% of rated voltage and +125°C.

Temperature Range: May be operated at rated voltage from −55°C to +125°C.

METALIZED MYLAR

Type	Configuration	Case Style	Cap. Range (MFDS)	Volt Range (VDC)	Size Range (Inches)
7		Plastic Wrap & Fill	.0047 to 10.00	200 to 600	.125 x .437 to 1.187 x 2.250
7F 7FR		Plastic Wrap & Fill	.0047 to 12.00	200 to 600	.125 x .187 x .437 to 1.218 x 1.750 x 2.00
7T		Plastic Wrap & Fill	.01 to 20.0	100	.125 x .437 to 1.062 x 2.500
7TF 7TFR		Plastic Wrap & Fill	.01 to 20.0	100	.093 x .156 x .437 to .750 x 1.187 x 2.500
7X 7XF 7XFR		Plastic Wrap & Fill	.10 to 22.00	100	.218 x .468 to .875 x 1.750 .140 x .218 x .468 to .733 x 1.062 x 1.750
E7F		Epoxy	.005 to 6.00	200 to 600	.160 x .240 x .420 to .560 x .720 x 1.950
H7 H7S		Hermetic Seal	.0047 to 10.00	200	.173 x .625 to 1.00 x 2.250

Capacitance Tolerance: Standard tolerance is ±5%. Also available in ±20%, ±10%, ±3%, ±2%, and ±1%. The capacitance shall be measured at 1000 Hz. and 25°C for values up to and including 5.0 mfd. Larger values shall be measured at 60 Hz. and 25°C.

Dissipation Factor: Less than 1.0% when measured as specified above.

Dielectric Strength: Twice rated voltage for 60 seconds at 25°C; thru a current limiting resistance of 100 ohms per volt.

Insulation Resistance: 30,000 megohm-microfarads following a 2 minute electrification period at rated voltage and 25°C. I.R. need not exceed 30,000 megohms.

Life Test: 500 hours at 140% of rated voltage and 85°C.

Humidity Resistance: Meets or exceeds requirement of MIL-STD-202, Method 103B, Test Condition A.

Temperature Range: May be operated at rated voltage from −55°C to +85°C and to +125°C with 50% derating.

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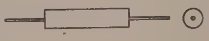
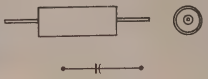
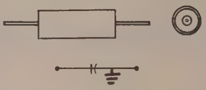
TELEPHONE: 308-632-4127 • TWX 910-627-0061

MIDWEC

POLYSULFONE-FOIL

Type	Configuration	Case Style	Cap. Range (MFDS)	Volt Range (VDC)	Size Range (Inches)
8		Plastic Wrap & Fill	.001 to 2.00	100	.218 x .562 to .875 x 1.687
H8 **H8S**		Hermetic Seal	.001 to 2.00	up to 100	.193 x .687 to 1.000 x 1.875
H8G **H8GS**		Hermetic Seal	.001 to 2.00	100	.193 x .687 to 1.000 x 1.781

GENERAL NOTES

Capacitance Tolerance: Standard tolerance is ±5%. Also available in ±20%, ±10%, ±3%, ±2%, and ±1%. The capacitance shall be measured at 1000 Hz. and 25°C.

Dissipation Factor: Less than 0.2% when measured at 1000 Hz. and 25°C.

Insulation Resistance: Greater than 200,000 megohm-mfds. after a 2 minute electrification period at rated voltage and 25°C. I.R. need not exceed 500,000 megohms.

Dielectric Strength: Twice rated voltage for 60 seconds at 25°C through current limiting resistance of 100 ohms per volt, when applied terminal to terminal and terminal to case.

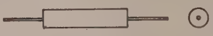
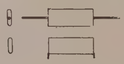
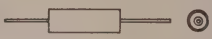
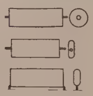
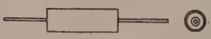
Life Test: 500 hours at 140% of rated voltage and 150°C.

Humidity Resistance: Meet or exceed requirements of MIL-STD-202, Method 103B, Test Condition A.

Temperature Range: May be operated at rated voltage from −55°C to +150°C with no derating.

Construction: Extended foil winding, polysulfone dielectric.

METALIZED POLYCARBONATE

12		Plastic Wrap & Fill	.01 to 10.00	100	.200 x .500 to 1.140 x 2.312
12F **12FR**		Plastic Wrap & Fill	.01 to 10.00	100	.155 x .270 x .500 to .925 x 1.350 x 2.000
H12 **H12S**		Hermetic Seal	.01 to 10.00	100	.173 x .625 to 1.00 x 2.375
12X **12XF** **12XFR**		Plastic Wrap & Fill	.10 to 20.00	50	.245 x .530 to 1.030 x 1.812 .170 x .295 x .530 to .815 x 1.200 x 1.812
H12X **H12XS**		Hermetic Seal	.10 to 20.00	50	.233 x .625 to 1.00 x 2.125

Capacitance Tolerance: Standard tolerance is ±5%. Also available in ±20%, ±10%, ±3%, ±2%, and ±1%. The capacitance shall be measured at 1000 Hz. and 25°C for values up to and including 5.0 mfd. Larger values to be measured at 60 Hz.

Dissipation Factor: Less than 0.50% when measured as specified above.

Insulation Resistance: Greater than 75,000 megohm-microfarads after a 2 minute electrification period at rated voltage and 25°C. I.R. need not exceed 150,000 megohms.

Dielectric Strength: 200% of rated voltage for 60 seconds at 25°C thru a current limiting resistance of 100 ohms per volt.

Temperature Range: May be operated at rated voltage from −55°C to +125°C.

Life Test: 250 hours at 140% of rated voltage and 85°C.

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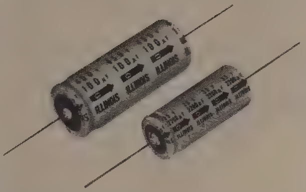
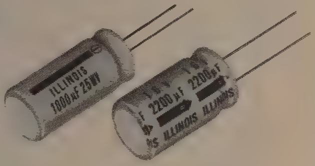
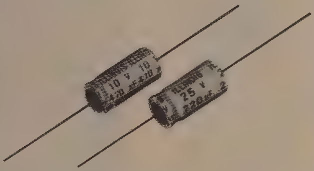


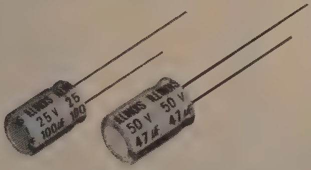
TYPE T COMMERCIAL/INDUSTRIAL ELECTROLYTIC CAPACITORS
0.47 MFD TO 22,000 MFD
6.3 WVDC TO 500 WVDC
-40°C +85°C MINIMUM
2000 HOUR OPERATION



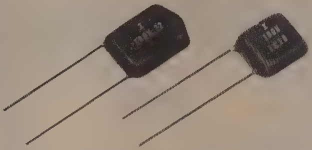
TYPE R COMMERCIAL/INDUSTRIAL ELECTROLYTIC CAPACITORS
0.47 MFD TO 10,000 MFD
6.3 WVDC TO 450 WVDC
-40°C +85°C MINIMUM
2000 HOUR OPERATION



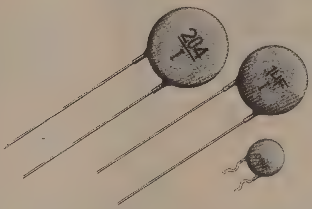
TYPE EX CONSUMER/COMMERCIAL ELECTROLYTIC CAPACITORS
0.47 MFD TO 500 MFD
6.3 WVDC TO 50 WVDC
-40°C +85°C MINIMUM
1000 HOUR OPERATION



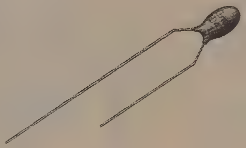
TYPE PC CONSUMER/COMMERCIAL ELECTROLYTIC CAPACITORS
0.47 MFD TO 250 MFD
6.3 WVDC TO 50 WVDC
-40°C +85°C MINIMUM
1000 HOUR OPERATION



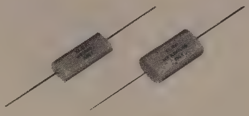
TYPE UM POLYESTER FILM CAPACITORS
INDUCTIVE WINDING
.001 MFD TO .47 MFD
100 WVDC OPERATION
±10% AND ±5% CAPACITY TOLERANCES



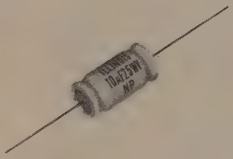
CERAMIC CAPACITORS
TYPE CC AND TYPE CQ
TEMPERATURE COMPENSATING
TYPE BC AND TYPE BQ
TEMPERATURE STABLE
TYPE GC AND TYPE GQ
GENERAL PURPOSE



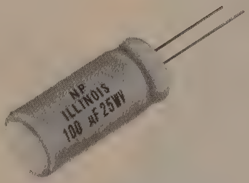
TYPE SD SOLID DIPPED TANTALUM CAPACITORS
0.1 MFD TO 100 MFD
3.15 WVDC TO 35 WVDC
±20% CAPACITY TOLERANCE



TYPE MW METALLIZED MYLAR CAPACITORS
WRAP AND FILLED CONSTRUCTION
NON-INDUCTIVE WINDING
250 WVDC TO 1600 WVDC
.01 MFD TO 10 MFD
±10% AND ±5% CAPACITY TOLERANCE



TYPE BPT NON-POLARIZED ELECTROLYTIC CAPACITORS
0.47 MFD TO 1000 MFD
16 WVDC TO 50 WVDC
-25°C +85°C MINIMUM
1000 HOUR OPERATION



TYPE BPR NON-POLARIZED ELECTROLYTIC CAPACITORS
0.47 MFD TO 470 MFD
16 WVDC TO 50 WVDC
-25°C +85°C MINIMUM
1000 HOUR OPERATION

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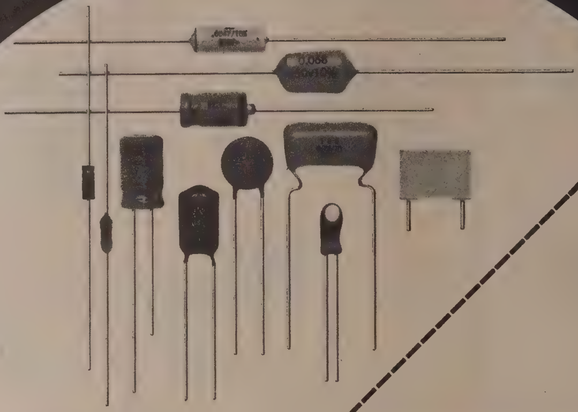
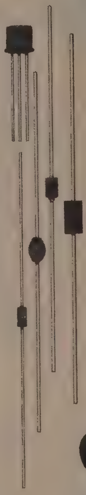
For Passive Components, Semiconductors and Tubes, we're the head of the class.



PASSIVE COMPONENTS

- **Capacitors**—aluminum electrolytics, non-polarized electrolytics, polyester and metalized polyester film, dipped tantalum, ceramic disc
- **Resistors**—carbon film and carbon composition



SEMICONDUCTORS

- Rectifier diodes
- Switching diodes
- Zener diodes
- Epoxy cased signal transistors

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- Domestic and foreign
- Consumer and industrial
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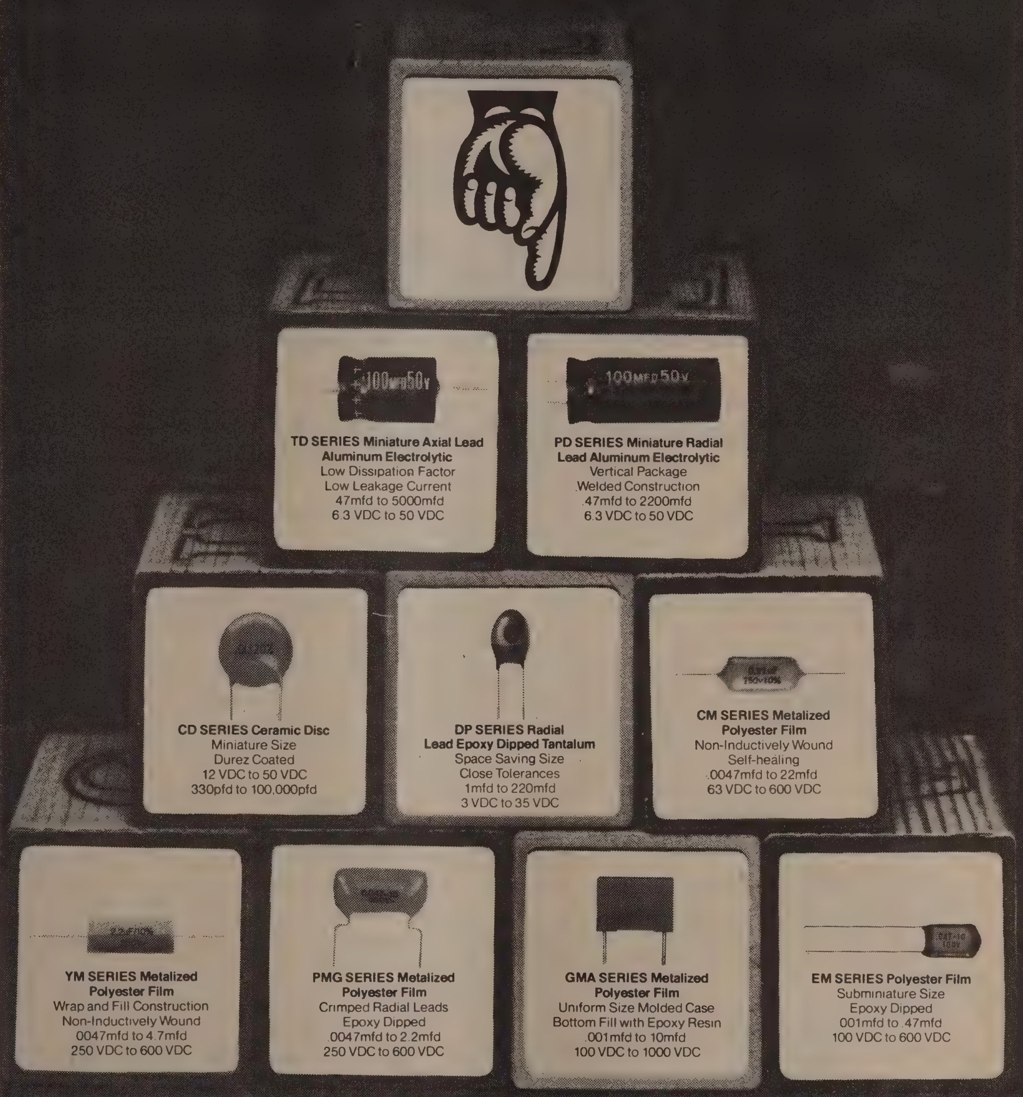

TD SERIES Miniature Axial Lead Aluminum Electrolytic
Low Dissipation Factor
Low Leakage Current
47mfd to 5000mfd
6.3 VDC to 50 VDC

PD SERIES Miniature Radial Lead Aluminum Electrolytic
Vertical Package
Welded Construction
.47mfd to 2200mfd
6.3 VDC to 50 VDC

CD SERIES Ceramic Disc
Miniature Size
Durez Coated
12 VDC to 50 VDC
330pfd to 100,000pfd

DP SERIES Radial Lead Epoxy Dipped Tantalum
Space Saving Size
Close Tolerances
1mfd to 220mfd
3 VDC to 35 VDC

CM SERIES Metalized Polyester Film
Non-Inductively Wound
Self-healing
.0047mfd to 22mfd
63 VDC to 600 VDC

YM SERIES Metalized Polyester Film
Wrap and Fill Construction
Non-Inductively Wound
0047mfd to 4.7mfd
250 VDC to 600 VDC

PMG SERIES Metalized Polyester Film
Crimped Radial Leads
Epoxy Dipped
.0047mfd to 2.2mfd
250 VDC to 600 VDC

GMA SERIES Metalized Polyester Film
Uniform Size Molded Case
Bottom Fill with Epoxy Resin
.001mfd to 10mfd
100 VDC to 1000 VDC

EM SERIES Polyester Film
Subminiature Size
Epoxy Dipped
001mfd to .47mfd
100 VDC to 600 VDC

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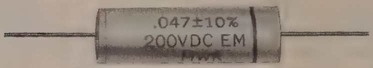
Expanded plant and production facilities enable rapid delivery of established reliability CMRO capacitors, in quantity, per military specification MIL-C-39001, to a failure rate "P" level—0.1% per 1,000 hours at a 90% confidence level—no more than one failure per 1,000,000 unit-hours of operation! El-Menco also offers the world's largest range of standard Dipped Mica (DM) and Molded Mica (MM) capacitors: in dipped from 1 pF to 159,000 pF, in molded from 1 pF to 20,000 pF, both in a variety of voltages and tolerances from ±0.5 pF to ±10%.



Film Capacitors

Production quantity requirements of our Mylar* film capacitors, MDEF and MDE series, and of our Mylar wrapped and filled capacitors, MWR series, are available. Also, other styles and dielectrics, such as polypropylene, metallized mylar, molded mylar, and ceramic encased film capacitors.

*TM DuPont Corp.

Electrolytics

Off-the-shelf delivery is now provided of our TAD axial, PCD radial, and non-polarized miniature aluminum electrolytic series. These have welded construction and insulated aluminum cans. Unique end seal provides proper venting while effectively resisting humidity and cleaning agents.

Electro Motive CORPORATION

Melville, New York | Florence, South Carolina

CAPACITORS

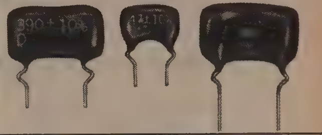
Mica

DIPPED MICA

DM Series — Fabricated from the finest India Ruby Muscovite mica which exhibits the best characteristics obtainable. The result is optimum high temperature characteristics and excellent stability. Qualified to Mil-C-39001.

Capacitance Range: 1 pF — 159,000 pF

Operating Voltage: 50, 100, 500 V.D.C. Higher voltages available.

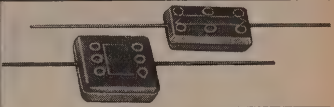


MOLDED MICA

MM Series — Molded with mineral filled epoxy compound, encapsulating the finest mica available. Qualified to Mil-C-5.

Capacitance Range: 1 pF — 20,000 pF

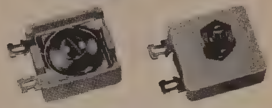
Operating Voltage: 100, 300, 500 V.D.C. Higher voltages available.



VARIABLE MICA TRIMMERS

Variable Compression type made of stacked mica dielectric between nonferrous metal conducting plates mounted on a ceramic base. Any desired capacitance within the physical limitations of the ceramic base is available.

Operating Voltage: 175 and 250 V.D.C.



Film

MYLAR* FILM

MDEF, MDE Series — Non-inductively wound Mylar dielectric, dipped in a special formulated epoxy material.

Capacitance Range: .001 MFD — 1.0 MFD

Operating Voltage: 100 and 200 V.D.C.

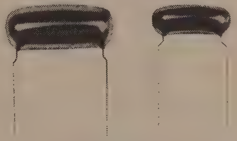
.068±10%
200WV EM
.033±10%
200WV EM

POLYPROPYLENE

PPD Series—Radial leads, polypropylene film dielectric, extended foil construction and epoxy resin encased. These units show their greatest advantage when peak currents and several amperes are encountered and where corona resistance and low dissipation factor are a design criterion.

Capacitance Range: .001 MFD — .47 MFD

Operating Voltage: 200, 400, 600, 800, 1000, 1600 V.D.C.

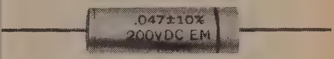


MYLAR* WRAP

MWR Series — axial lead extended foil Mylar dielectric. Mylar wrap with end fill of epoxy.

Capacitance Range: .001 MFD — 1.5 MFD

Operating Voltage: 100 and 200 V.D.C.



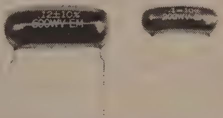
MYLAR* PAPER

MPD Series — Dipped in phenolic resin and vacuum impregnated which make this type completely solid and, therefore, will not drip under any operating temperature.

Capacitance Range: .001 MFD — .5 MFD

Operating Voltage: 200, 400, 600, 1000, 1600 V.D.C.

*TM DuPont Corp.



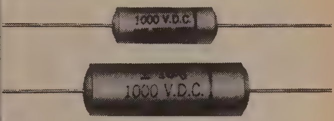
CERAMIC TUBE

PCE paper ceramic, MPCE Mylar-paper ceramic Series — Non-inductively wound, vacuum impregnated in mineral oil. Enclosed in an impervious steatite ceramic tube sealed with epoxy and fill.

Capacitance Range: .001 MFD — .5 MFD

Operating Voltage: ***PCE*** *200, 400, 600, 1000 V.D.C.*

MPCE *1000, 1600, 2000 V.D.C.*



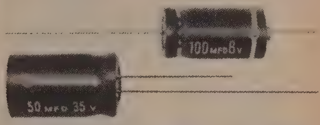
Electrolytic

MINIATURE ALUMINUM ELECTROLYTIC

TAD axial, PCD radial Series — Welded construction, in PVC insulated aluminum cans. Unique end seal provides proper venting while effectively resisting humidity and cleaning agents.

Capacitance Range: .47 MFD — 2200 MFD

Operating Voltage: 6 Volts D.C. — 50 Volts D.C.

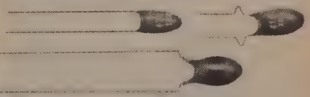


DIPPED SOLID TANTALUM

DIT Series — Radial lead epoxy dipped miniature capacitors for printed circuit applications.

Capacitance Range: .1 MFD — 470 MFD

Operating Voltage: 3 Volts D.C. — 35 Volts D.C.



For further information or samples for evaluation, contact the El-Menco representative in your territory or Electro Motive in Melville.

Melville, New York 11746 / (516) 694-7700 Cable: Incortels NY TWX No.: 510-224-6427 Telex: 96-7852
Florence, South Carolina 29501 / (803) 669-2182 Cable: Elmotive FLR Telex: 57-3339

ELECTRO MOTIVE CORPORATION

REGISTERED
TRADE MARK

1924·1974

Over 50 years... Nothing succeeds like success.

In 1924, we employed six people. Then, wireless was a novelty. We were selling condensers as piece parts to home radio builders. We've diversified a lot and have become an international name, synonymous with quality components for the communications industry.

Jackson components are tried and tested to give perfect reliability over a long life. And you can have components custom made to suit your individual requirements.

Add to this our skilled personnel and up-to-the-minute equipment and you can understand why our 50 years experience is your guarantee of a reliable product.

We have been exporting our components to America for the past 20 years. All in all, those 20 years have been good ones and we've no reason to expect the next 20 won't be better.

That's success for you.

New Products include:–

A range of Capacitive Angular and Linear Displacement Transducers.

●

A ceramic dielectric Trimmer less than 3mm. thick.

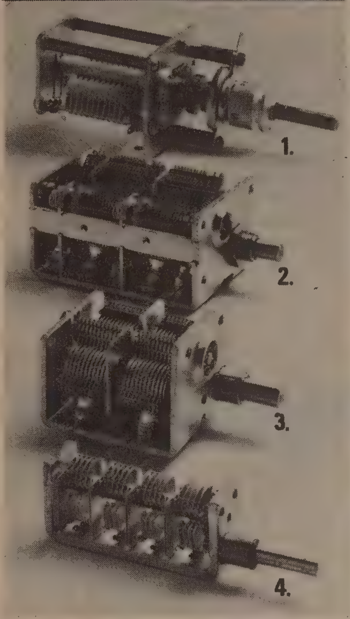
●

An air dielectric non-rotating piston trimmer specially designed for microwave applications.

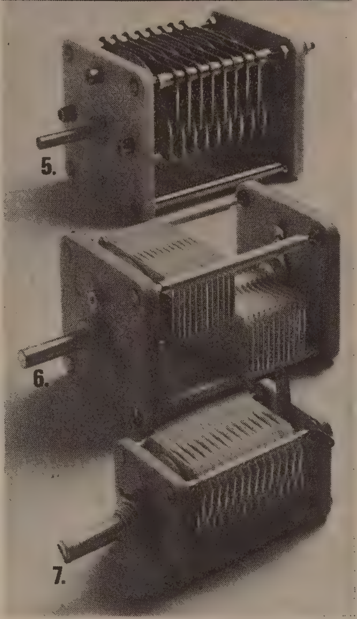
JACKSON BROTHERS (LONDON) **LIMITED**
USA: M. Swedgal, 258 Broadway, New York, N.Y. 10007 Telephone: (212) 962-5485
ENGLAND: Kingsway, Waddon, Croydon, CR9 4DG. Tel: 01-681 2754

Variable Capacitors

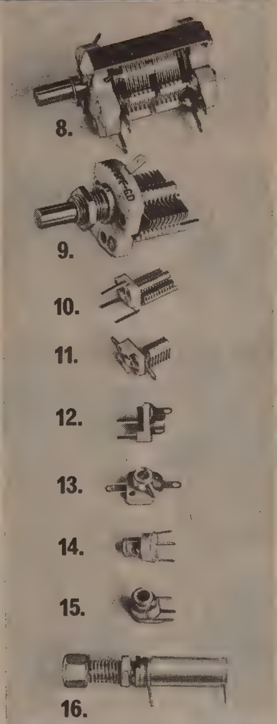
TUNING



TRANSMITTING



TRIMMING



This is only a small selection from our total range. For full details write for illustrated catalogue.

TUNING	Part No.
1. V.F.O. Capacitor	4170
2. P.503 AM/FM	4229/503/AM-FM
3. OG 2 Gang A.M.	5250/2/1G
4. C21 4 Gang F.M.	5560/4

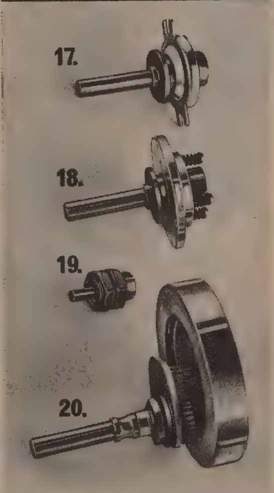
TRANSMITTING	Part No.
5. TX 5 Capacitor	5720/1
6. C9 Capacitor	5070/1 s/s
7. C11A Capacitor	5050/18

TRIMMING	Part No.
8. C808 Split Stator Trimmer	5103
9. C804 Air Spaced Trimmer	4567
10. C16 Air Trimmer PC/T	5440/PC/T
11. C16 Air Trimmer	5440
12. C16 P.M. Tetfer	5640/P.M.
13. C16 Tetfer	5640
14. 8MM V.P.C.	5750 V.P.C.
15. 8MM H.P.C.	5750 H.P.C.
16. Tubular Capacitor	4463
TUNING CONTROLS	
17. DAF Ball Drive	4511/DAF
18. Adjustable Torque Ball Drive	5620
19. Miniature 10:1 Drive	5870/1
20. Accelerator Spinwheel	5810/1

Also
- Tuning Controls
- Drives
- Terminals

JACKSON BROS (LONDON) LTD
USA: M. Swedgal, 258 Broadway, New York, N.Y. 10007
Telephone: (212) 962-5485
ENGLAND: Kingsway, Waddon, Croydon, CR9 4DG. Tel: 01-681 2754

TUNING CONTROLS



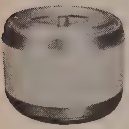
vacuum capacitors

INTRODUCTION: ITT Jennings offers the broadest available line of high voltage capacitors for radio frequency applications. Units are available in glass and ceramic envelopes with working voltage ratings of 2 kv to 40 kv, at capacitance values to 5000pfd, with current ranges of 250 amps air cooled and 750 amps rms water cooled at 16 mhz.

ADVANTAGES: The use of a vacuum dielectric allows a unit design with a number of electrical, mechanical, and environmental advantages which include the following:

1. *High Voltage*—The high dielectric strength allows maximum voltage levels of any capacitor for a given capacity rating.
2. *High Current*—Due to low losses and heavy copper construction, vacuum capacitors carry high rf currents.
3. *Compact Design*—Units are small for their power handling capabilities due to the high breakdown voltage of the vacuum dielectric.
4. *High Maximum to Minimum Capacity Ratio*—Capacity change ratios are available to 150:1, making them desirable for wide tuning ranges.
5. *Low Losses*—Extremely low losses occur because of the dielectric, the low loss glass and ceramic envelopes, and the copper and silver solder construction. Therefore, units are able to handle large currents at high rf frequencies that would destroy capacitors with other dielectrics.
6. *Self Healing*—The vacuum dielectric permits moderate overloads that would damage other materials.
7. *High Altitude Operation*—Vacuum capacitors are free from internal degradation from extreme environmental conditions.

vacuum fixed capacitors



RF WORKING KV	TYPE		CAPACITY	PEAK VOLTAGE KILOVOLTS		CONTINUOUS RMS AMPERES² (16 MHz)	NOMINAL DIMENSIONS (Inches)	
			PF	TEST (60 Hz)	WORKING¹		LENGTH	DIAMETER
3 kv	G*	JSLF	1000	5	3	70	1.7	3.2
		JSLF	5000	5	3	80	2.9	4.3
		JCSL	1000, 1500, 2000	5	3	50	4.0	2.9
7 kv to 9 kv	G	JCSF	25, 40, 50, 80, 120, 150	15	9	20	1.7	1.7
		JCS	250, 400, 500	15	9	65	4.0	3.1
		JCS	1000	12	7.2	65	4.7	3.7
		MC1	500, 750, 1000	15	9	80	4.2	4.2
		MMC1	2000	15	9	125	5.0	6.2
		MMC	1500, 2000	15	9	140	9.3	6.2
	C	CFDP	2000	15	9	125	3.3	5.7
12 kv to 20 kv	G	MC	500, 750, 1000	20	12	120	8.4	5.0
		MLC	500, 750, 1000	30	18	125	9.3	4.5
	C	CY	1, 2, 3, 4, 5	30	18	8	3.3	0.8
		CLF1	6, 12, 25, 50, 75, 100	30	20	70	6.5	2.3
		CLF1	200, 250	30	18	70	6.5	2.7
		CFED	150, 300	30	18	100	3.7	3.8
		CFED	500, 750, 1000	25	15	125	3.9	4.9
		CFFP	2000	35	21	215	5.8	8.2
27 kv to 33 kv	G	MMHC	450	55	33	145	9.3	6.2
		MMHC	1000	45	27	200	13.0	9.3
30 kv to 36 kv	C	CFHD	12, 25, 50, 100	60	36	130	5.2	3.8
		CFHD	200, 300	60	36	180	5.4	4.9
		CFHP	450	55	33	215	5.5	5.7
		CFHP	1000	50	30	215	6.2	7.2

*G = Glass; C = Ceramic

[1] RF working voltage is the maximum RF voltage that can be applied to the capacitor over the 2-32 MHz frequency range, provided the RF current rating is not exceeded.

[2] RF current rating is dependent upon capacity and frequency. Write for complete applications data.

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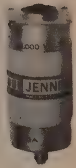
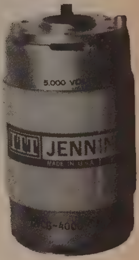
DIVISION OF INTERNATIONAL TELEPHONE AND TELEGRAPH CORPORATION

vacuum variable capacitors

RF WORKING KV		TYPE	CAPACITY	PEAK VOLTAGE KILOVOLTS		CONTINUOUS RMS AMPERES² (16 MHz)	NOMINAL DIMENSIONS (Inches)	
			PF	TEST (60 Hz)	Working¹		LENGTH	DIAMETER
1.8 kv to 5 kv	G	UCSL	4-250	5	3	30	4.2	2.2
		UCSL	5-750, 7-1000, 10-1500, 20-2000	5	3	42	8.3	3.2
		UCSL	50-3000	3	1.8	42	8.8	4.2
		USL	5-500	5	3	40	5.8	2.4
		USLS	5-465 Shorting	5	3	40	5.7	2.4
	C	CVCC	25-2500	5	3	60	5.3	3.8
		CVCD	5-500	5	3	70	6.0	2.8
		CVCD	10-1500, 20-2000, 50-3000	5	3	80	8.3	4.9
		CVCE	10-750	5	3	80	7.1	3.8
		CMV1	8-1000	3	3	25	4.4	1.8
		CMV1	8-650	5	5	25	4.4	1.8
		CMV1	25-4000	5	5	45	6.6	3.4
7.2 kv to 15 kv	G	ECS	2-8, 3-30	15	9	20	4.2	1.2
		UCS	5-200, 10-400	15	9	42	9.0	3.2
		UCSB	5-100	15	9	40	4.9	2.4
		UCSX	25-1000	15	9	45	9.9	3.8
		UCSXF	12-1000, 15-1200	15	9	50	10.1	4.4
		UCSXF	20-1500, 50-2000	12	7.2	50	10.1	5.2
		VMMC	50-1000, 100-2000	15	9	90	15.7	6.2
		VMMC	100-5000	15	9	125	21.4	9.3
	C	CADC	3-30	15	9	36	4.7	1.4
		CVDD	6.5-50, 10-100	15	9	70	6.7	2.8
		CVDD	10-300, 20-500	15	9	80	7.6	3.8
		CVDD	25-1000	15	9	105	8.0	4.9
		CVEP	25-500, 50-1000, 100-1500	20	12	140	10.2	7.2
		CVEP	100-2000	15	9	150	10.2	7.2
20 kv to 35 kv	G	UCSVH	8-35	35	21	35	4.8	3.0
		UHC	10-75	60	36	60	12.0	5.0
	C	CVFP	15-250, 25-450	40	24	140	9.6	5.7
		CVFP	20-750, 35-1000	40	24	150	11.7	7.2
		CVFP	100-2000	35	21	150	14.5	8.2
		CVHC	100-1600 (Air Cooled)	40	24	250	17.8	8.2
		CVHE	25-650 (Air Cooled)	55	33	250	12.5	7.2
		CVHP	10-250, 25-450, 30-650	55	33	170	11.9	7.2
		CVHP	60-1000	50	30	190	14.5	8.2
		CVHW	20-250, 25-450 (Wated Cooled)	50	30	700	13.5	7.6
		CWV1	100-1000 (Water Cooled)	50	30	600	18.0	8.2
40 kv	C	CWV1	100-1600 (Water Cooled)	60	36	750	23.0	12.6





* G = Glass; C = Ceramic

[1] RF working voltage is the maximum RF voltage that can be applied to the capacitor over the 2-32 MHz frequency range, provided the RF current rating is not exceeded.

[2] RF current rating is dependent upon capacity and frequency. Write for complete applications data.

APPLICATIONS: Because of the high power handling capability of vacuum capacitors, their application is broad in the field of communications where space is critical or where high voltage must be safely handled with maximum reliability.

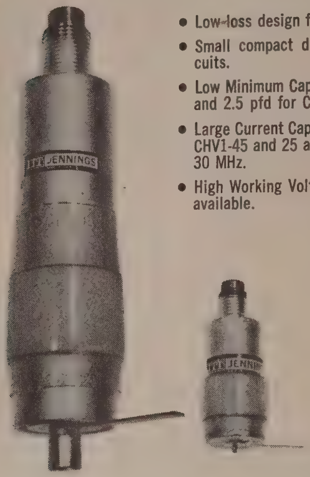
Specific uses for the Jennings capacitor would include tunable or fixed elements in transmitter tank circuits, in impedance matching networks for antenna couplers, in high power filters for multi-coupling and harmonic reduction, and in various voltage dividing networks.

ITT JENNINGS 970 McLaughlin Ave. • San Jose, Calif. 95116 • (408) 292-4025

DIVISION OF INTERNATIONAL TELEPHONE AND TELEGRAPH CORPORATION

gas capacitors

CHV SERIES • VHF CAPACITORS



- Low-loss design for use in high Q circuits.
- Small compact design suitable for VHF circuits.
- Low Minimum Capacity—1.5 pfd for CHV1-45 and 2.5 pfd for CHV2-50.
- Large Current Capacity—15 amperes RMS for CHV1-45 and 25 amperes RMS for CHV2-50 at 30 MHz.
- High Working Voltage—3 KV and 9 KV units available.

ITT Jennings CHV series variable capacitors give a new measure of capability to the designer of VHF circuits. Their unique gas dielectric provides a sealed low loss unit that can be used to construct compact circuits of extremely high "Q". "Q's" higher than 5000 have been achieved in circuits designed for use in the 30-80 MHz frequency range. Typical applications include VHF transmitter, antennas, antenna couplers and transmitting multicouplers. In the latter application the high circuit "Q" allows closer frequency spacing of the transmitters operating into the multicoupler. In addition, the high voltage and current capability of these capacitors will easily handle the circulating currents and resonant voltages encountered in a high "Q" design.

Specifications	CHV1-45-005	CHV2-50-0015
Peak Test Voltage (60 Hz)	5 KV	15 KV
Maximum Capacitance	45.0 pfd	50 pfd
Minimum Capacitance	1.5 pfd	2.5 pfd
RF Working Voltage	3 KV peak	9 KV peak
RF Current Rating at 30 MHz	15 amp RMS	25 amp RMS
Push Force (at 25°C)	20 lbs.	25 lbs.
Operating Temperature	−55° to +125°C	

CGF SERIES DC BLOCKER CAPACITORS

- Low (less than 1 microampere) and stable DC leakage current.
- High RF current rating.
- Rugged Construction.
- Compact size.

The CGF Series of fixed capacitors utilize the latest techniques in capacitor design to provide a DC blocker of highest performance. Units are silver brazed and use a gas dielectric to achieve a low and stable DC leakage current. Internal construction maximizes heat flow from capacitor plates to mounting rings for high RF current capability.

The CGF Series is available with working voltages of from 6 to 18 KV DC or Peak RF in two sizes, one with 6, 9 and 12 KV ratings, the other with 15 and 18 KV ratings. Peak test voltages (60 Hz) range from 10 to 30 KV.

The units are specifically designed for DC blocker applications in high power RF amplifiers where the capacitor must handle both DC and RF voltages. In these applications the sum of the DC plus the Peak RF voltage should not exceed the rated working voltage.

The units are of rugged ceramic and metal construction and exceed the shock and vibration requirements specified in MIL-C-23183. They are cooled by natural connection and are suitable for mounting in any position.

GENERAL DATA

Capacity (Pf)	1000 (±5%)
Maximum RF Current	150 amp at 16 MHz
Maximum DC Leakage Current at Working Voltage	1 microampere
Operating Temperature	−55°C to +125°C
Cooling	Natural Connection
Temperature Coefficient	0 ±100 PPM/°C

RF CURRENT VS FREQUENCY

Frequency (MHz)	2	3	4	8	16	24	32
Current (Amps RMS)							
CGF1-1000	*	*	215	180	150	135	125
CGF2-1000	*	190	180	165	150	145	140

* Current limited by RF working voltage.

Specifications

Model	Peak Test Voltage (60 Hz)	Peak Working Voltage RF or DC	Dimensions (Inches)	
			Length	Diameter
CGF1-1000-0010	10 KV	6 KV	3.50	4.75
CGF1-1000-0015	15 KV	9 KV	3.50	4.75
CGF1-1000-0020	20 KV	12 KV	3.50	4.75
CGF2-1000-0025	25 KV	15 KV	3.95	6.03
CGF2-1000-0030	30 KV	18 KV	3.95	6.03

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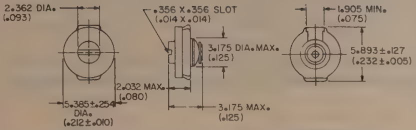
E. F. JOHNSON COMPANY®

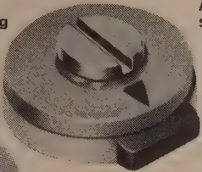
Sub-Miniature Ceramic Disc Trimmers

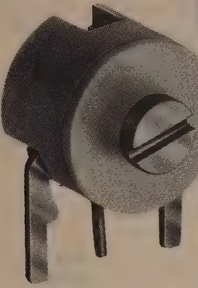
100 SERIES. This sub-miniature ceramic disc trimmer exhibits extreme environmental stability and long life due to the encapsulation of the rotor plate in titanate. Diameter is .218″ on PC Mount Vertical tuning and Horizontal tuning. Leadless Vertical tuning diameter is .212″ except for terminal portion on which center line dimension is .232″. The stator is high alumina for lower loss and higher strength—a necessity for extreme environmental conditions. Smooth linear tuning is realized by precision lapping of bearing surfaces. Designed to meet or exceed performance criteria of MIL-C-81B. Operating range is —55° to 125° C. NPO temperature characteristics, Type A. Working voltage 100 VDC up to 85°C, 50 VDC up to 125° C. Peak withstanding voltage is greater than twice the working voltage.


2.362 DIA. (.093)
.356 X .356 SLOT (.014 X .014)
3.175 DIA. MAX. (.125)
1.905 MIN. (.075)
5.893 ± .127 (.232 ± .005)
2.032 MAX. (.080)
5.385 ± .254 DIA. (.212 ± .010)
3.175 MAX. (.125)

Leadless, Vertical Tuning

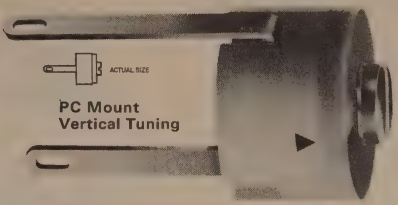
ACTUAL SIZE



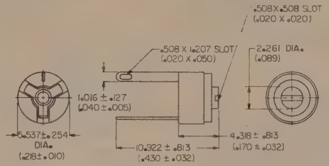


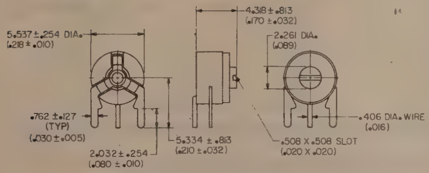
ACTUAL SIZE

PC Mount Horizontal Tuning

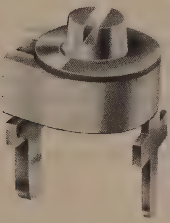

ACTUAL SIZE

PC Mount Vertical Tuning


.508 X .508 SLOT (.020 X .020)
.508 X 1.207 SLOT (.020 X .050)
2.261 DIA. (.089)
1.016 ± .127 (.040 ± .005)
5.537 ± .254 DIA. (.218 ± .010)
10.922 ± .813 (.430 ± .032)
4.318 ± .813 (.170 ± .032)


4.318 ± .813 (.170 ± .032)
2.261 DIA. (.089)
5.537 ± .254 DIA. (.218 ± .010)
.762 ± .127 (TYP) (.030 ± .005)
2.032 ± .254 (.080 ± .010)
5.334 ± .813 (.210 ± .032)
.508 X .508 SLOT (.020 X .020)
.406 DIA. WIRE (.016)

PC Vertical Cat. No.	PC Horizonal Cat. No.	Leadless Cat. No.	Nominal Capacity (pF) Max.	Min.	Net Price
274-0009-005	**274-0009-105**	**274-0009-250**	9.0	2.5	**$3.95**
274-0020-005	**274-0020-105**	**274-0020-250**	20.0	3.5	**3.95**
274-0025-005	**274-0025-105**	**274-0025-250**	25.0	5.0	**3.95**



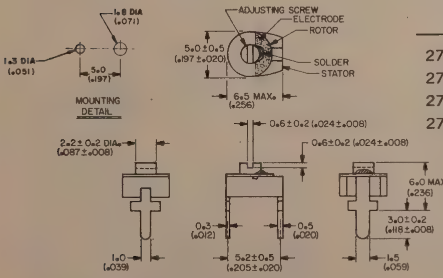
This 5mm size ceramic trimmer is designed to preclude metal particle migration by utilizing tin plating of the stator plate rather than silver, and providing polarity orientation by means of terminal size.

Titinate rotor is precision lapped to minimize capacitance aging.

Q is 500 minimum at 1 MHz. Working voltage is 50 VDC up to +85°C. Temperature range, —30°C to +85°C.

Dielectric strength 150 VDC for 5 seconds. Insulation resistance 10,000 megohms at 50 VDC. Starting and running torque .415 to 2.08 oz.-in. (30 to 150 gram-centimeters).

PRINTED CIRCUIT MOUNTING


1.8 DIA (.071)
1.3 DIA (.051)
5.0 (.197)
MOUNTING DETAIL
ADJUSTING SCREW
ELECTRODE
ROTOR
5.0 ± 0.5 (.197 ± .020)
SOLDER
STATOR
6.5 MAX. (.256)
0.6 ± 0.2 (.024 ± .008)
0.6 ± 0.2 (.024 ± .008)
2.2 ± 0.2 DIA. (.087 ± .008)
6.0 MAX. (.236)
3.0 ± 0.2 (.118 ± .008)
0.3 (.012)
0.5 (.020)
1.0 (.039)
5.2 ± 0.5 (.205 ± .020)
1.5 (.059)

(Equivalent dimensions in inches)

ELECTRICAL CHARACTERISTICS

Part No.	Temperature Characteristics	Temperature Coefficient (X10⁻⁶/°C)	Nominal Capacitance (PF) Min.	Max.	Rated Voltage (VDC)	Net Price
278-0103-005	A	NPO	1.0	3.0	50	**57¢**
278-0105-005	A	NPO	2.0	5.0	50	**57¢**
278-0410-005	D	N750	4.0	10.0	50	**57¢**
278-0420-005	D	N750	8.0	20.0	50	**57¢**

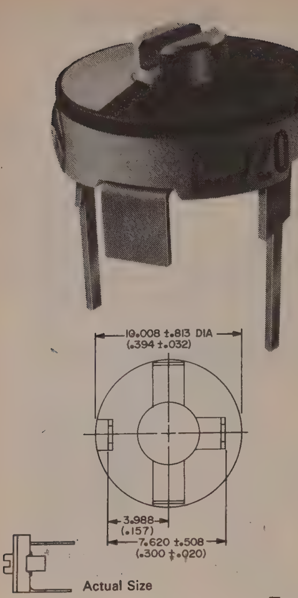
TEMPERATURE CHARACTERISTICS

Characteristics	—30°C Min (%)	Max (%)	+85°C Min (%)	Max (%)
A	—3.1	+1.4	—2.5	+2.0
D	+1.0	+5.0	—5.0	—1.5

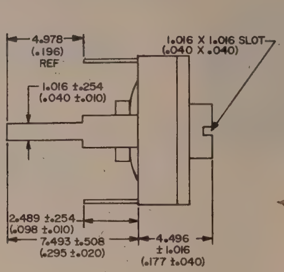
10MM CERAMIC TRIMMER. Capacity ranges up to 30.0 pF maximum with an operating temperature range from —30°C to 125°C. Mount by means of two terminals on .300″ centers, interchangeable with other similar ceramic trimmer types and also our type "T" air variable capacitor.

Q value is 500 minimum at 1 MHz. Working voltage 350 WVDC up to 85°C, 200 WVDC up to 125°C. Dielectric strength: 700 VDC for 5 seconds. Insulation resistance: greater than 10,000 megohms at 350 VDC. Starting and running torque: 1 Oz./in. to 6.5 oz./in.

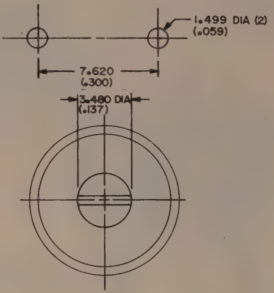
Stator is ceramic (steatite). Rotor is titanate. Terminals and contacts are of brass and brass alloys. All metal parts are silver plated and iridited.



10.008 ±.813 DIA
(.394 ±.032)
3.988
(.157)
7.620 ±.508
(.300 ±.020)
Actual Size



4.978
(.196)
REF
1.016 X 1.016 SLOT
(.040 X .040)
1.016 ±.254
(.040 ±.010)
2.489 ±.254
(.098 ±.010)
7.493 ±.508
(.295 ±.020)
4.496
± 1.016
(.177 ±.040)



1.499 DIA (2)
(.059)
7.620
(.300)
3.480 DIA
(.137)

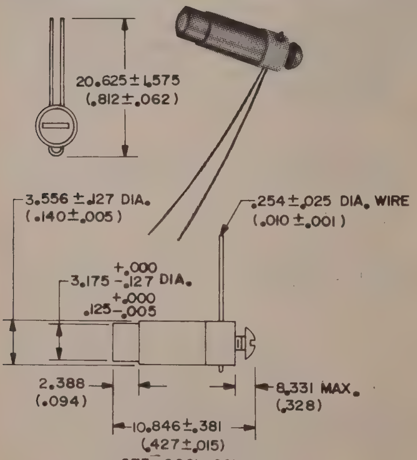
Part No.	Temperature Coefficient (X10−6/°C)	Nominal Capacitance (PF) Min.	Max.	Net Price
275-0108-005	NPO	3.0	8.0	$0.58
275-0112-005	NPO	3.0	12.0	.58
275-0213-005	N330	5.0	13.0	.58
275-0320-005	N470	5.0	20.0	.58
275-0430-005	N750	5.0	30.0	.58

Miniature Teflon® dielectric trimmer capacitors

These trimming capacitors are ideally suited for VHF and UHF applications requiring low minimum capacity and delta C. They provide high resolution and electrical stability. Tuning is linear. Q is high (2000 @ 150 MHz typically). Insulation resistance 10^6 megohms. Temperature range —55° to +150°C. High resistance to shock and vibration.

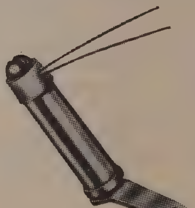
Metal parts are gold plated. Insulation is Teflon®.

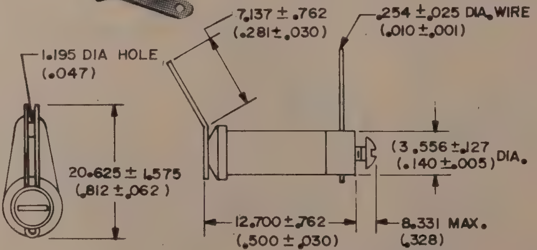
® Teflon is a registered trade name of Du Pont Co.



20.625 ± 1.575
(.812 ± .062)
3.556 ± .127 DIA.
(.140 ± .005)
.254 ± .025 DIA. WIRE
(.010 ± .001)
3.175 +.000 −.127 DIA.
.125 +.000 −.005
2.388
(.094)
8.331 MAX.
(.328)
10.846 ± .381
(.427 ± .015)

273-0001-001





7.137 ± .762
(.281 ± .030)
.254 ± .025 DIA. WIRE
(.010 ± .001)
1.195 DIA HOLE
(.047)
20.625 ± 1.575
(.812 ± .062)
(3.556 ± .127
(.140 ± .005) DIA.
12.700 ± .762
(.500 ± .030)
8.331 MAX.
(.328)

273-0001-002

Cat. No.	Mounting	Nom. pf. Max.	Cap. Per Sec. Min.	Torque Oz. In.	Voltage Break-down	Adjustment Turns Per Inch	Net Price
273-0001-001	PC	1.5	.25	.2-3.0	2,000	80	$0.60
273-0001-002	Solder Lug	1.5	.25	.2-3.0	2,000	80	.90

E. F. JOHNSON COMPANY®

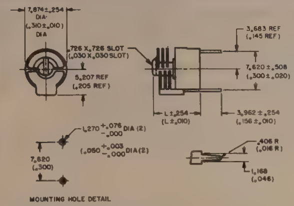
Air Variable Capacitors

Johnson sub-miniature air variable capacitors are available in a variety of sizes, mounting configurations and section types. Rotors and stators are precision machined from one piece of solid brass for outstanding stability, uniformity and freedom from moisture entrapment. They offer high "Q" . . . typically 2000 @ 150 MH$_2$ and exceptionally low temperature coefficient: Type T plus 30± 15 ppm/°C; Type U plus 45± 15 ppm/°C. Metal parts are silver-plated. Types U and V ceramic are steatite grade L-423 or better. Type T ceramic is 95% Alumina grade L-624 or better.

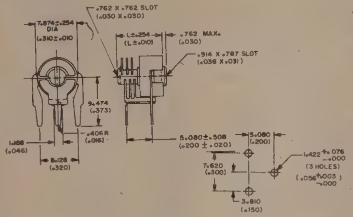
Type "T" Air Variable Capacitors

Designed to meet or exceed E1A-RS 2-4 and MIL-STD.202C methods 204 A and 201 A. Offer excellent retrace characteristics. Can be supplied with tuning slot on both ends of rotor. High temperature versions available as specials.

ACTUAL SIZE
Vertical
Tuning


7,874±,254 DIA (,310±,010) DIA
,726 X,726 SLOT (,030 X,030 SLOT)
5,207 REF (,205 REF)
3,683 REF (,145 REF)
7,620±,508 (,300±,020)
L±,254 (L±,010)
3,962±,254 (,156±,010)
1,270 +,076 −,000 DIA (2)
(,060 +,003 −,000 DIA (2)
7,620 (,300)
,406 R (,016 R)
1,168 (,046)
MOUNTING HOLE DETAIL

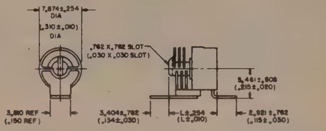
ACTUAL SIZE
Horizontal
Tuning

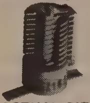

.762 X .762 SLOT (.030 X .030)
7.874±.254 DIA (.310±.010
L±.254 (L±.010)
.762 MAX. (.030)
.914 X .787 SLOT (.036 X .031)
9.474 (.373)
.406 R (.016)
1.168 (.046)
8.128 (.320)
5.080±.508 (.200±.020)
5.080 (.200)
7.620 (.300)
1.422 +.076 −.000 (3 HOLES) (.056 +.003 −.000)
3.810 (.150)

PC Mount

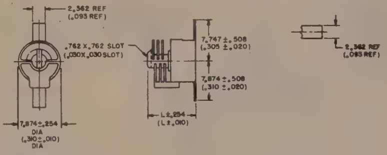
Vert. Tuning Cat. No.	Horiz. Tuning Cat. No.	Nominal Capacity (pF)		Length (In.)	Vert. Net Price	Horiz. Net Price
		Max.	Min.			
187-0103-005	187-0303-105	5.4	1.3	.36	$0.66	$0.70
187-0106-005	187-0306-105	11.0	1.7	.47	.70	.74
187-0109-005	187-0309-105	15.7	1.9	.58	.78	.82

ACTUAL SIZE
Horizontal
Tuning


7,874±,254 DIA (,310±,010) DIA
,762 X,762 SLOT (,030 X,030 SLOT)
5,461±,508 (,215±,020)
3,810 REF (,150 REF)
3,404±,762 (,134±,030)
L±,254 (L±,010)
2,921±,762 (,115±,030)



ACTUAL SIZE
Vertical
Tuning


2,362 REF (,093 REF)
,762 X,762 SLOT (,030X,030 SLOT)
7,747±,508 (,305±,020)
7,874±,508 (,310±,020)
L±,254 (L±,010)
7,874±,254 DIA (,310±,010) DIA
2,362 REF (,093 REF)

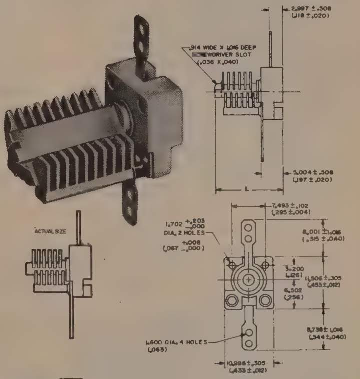
Stripline Mount

Vert. Tuning Cat. No.	Horiz. Tuning Cat. No.	Nominal Capacity (pF)		Length (In.)	Vert. Net Price	Horiz. Net Price
		Max.	Min.			
187-0103-175	187-0103-165	5.4	1.3	.36	$0.82	$0.82
187-0106-175	187-0106-165	11.0	1.7	.47	.84	.84
187-0109-175	187-0109-165	15.7	1.9	.58	.86	.86

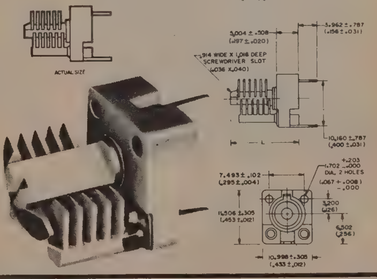
Also available as specials with minimum of 4 plates to maximum of 20 plates.

Type "U" Capacitors

Cat. No.	Nominal Capacity (pF)		Plates	L±1/32"	Peak Withstanding Voltage	Air Gap	Net Price
	Max.	Min.					
Two-Hole Mounting / Type "U" Capacitors—Single Section							
189-0501-004	4.2	1.2	4	27/64"	650	.010"	$0.75
189-0502-004	6.7	1.3	6	15/32"	650	.010"	.77
189-0503-004	9.2	1.4	8	33/64"	650	.010"	.75
189-0504-004	11.6	1.5	10	9/16"	650	.010"	.77
189-0505-004	14.1	1.7	12	39/64"	650	.010"	.80
189-0506-004	16.7	1.8	14	43/64"	650	.010"	.82
189-0507-004	19.3	2.0	16	23/32"	500	.010"	.84
189-0508-004	21.9	2.2	18	49/64"	500	.010"	.86
189-0509-004	24.5	2.4	20	13/16"	500	.010"	.88

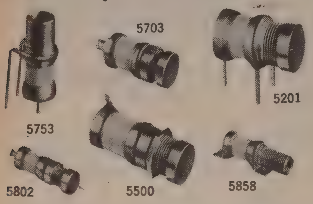

ACTUAL SIZE
2,997±,508 (,118±,020)
,914 WIDE X 1,016 DEEP SCREWDRIVER SLOT (,036 X,040)
5,004±,508 (,197±,020)
L
7,493±,102 (,295±,004)
1,702 +,203 −,000 DIA, 2 HOLES (,067 +,008 −,000)
8,001±1,016 (,315±,040)
3,200 (,126)
11,506±,305 (,453±,012)
6,502 (,256)
8,738±1,016 (,344±,040)
1,600 DIA, 4 HOLES (,063)
10,998±,305 (,433±,012)

Cat. No.	Nominal Capacity (pF)		Plates	L±1/32"	Peak Withstanding Voltage	Air Gap	Net Price
	Max.	Min.					
Printed Circuit Mounting / Vertical Type "U" Capacitors—Single Section							
189-0501-005	4.2	1.2	4	27/64"	650	.010"	$0.70
189-0502-005	6.7	1.3	6	15/32"	650	.010"	.73
189-0503-005	9.2	1.4	8	33/64"	650	.010"	.70
189-0504-005	11.6	1.5	10	9/16"	650	.010"	.73
189-0505-005	14.1	1.7	12	39/64"	650	.010"	.75
189-0506-005	16.7	1.8	14	43/64"	650	.010"	.77
189-0507-005	19.3	2.0	16	23/32"	500	.010"	.79
189-0508-005	21.9	2.2	18	49/64"	500	.010"	.82
189-0509-005	24.5	2.4	20	13/16"	500	.010"	.84


ACTUAL SIZE
3,004±.508 (.197±.020)
3.962±.787 (.156±.031)
,914 WIDE X 1,016 DEEP SCREWDRIVER SLOT (,036 X,040)
L
10,160±,787 (,400±,031)
1.702 +.203 −.000 DIA. 2 HOLES (.067 +.008 −.000)
7.493±.102 (,295±,004)
3,200 (,126)
11,506±,305 (,453±,012)
6,502 (,256)
10.998±.305 (,433±,012)

Johanson VARIABLE CAPACITORS

HIGH Q AIR CAPACITORS



Air capacitors are beautiful for microwave, VHF, and UHF applications. They offer fine tuning, ultra high Q, low temperature coefficients and sizes for hybridcircuit as well as standard applications. Models 5200 (PC25) and 5201 (PC26) are QPL approved to MIL Spec 14409C.

Part No.	Length	Dia.	Capacitance Range — pf	Q @ 100 MHz
5200	.48	.28	0.8 to 10.0	>5000
5500*	.75	.28	1.0 to 20.0	>1500
5700	.48	.22	0.4 to 6.0	>10,000
5750	.51	.22	0.8 to 10.0	>7500
5800	.48	.15	0.35 to 3.5	>10,000
5850	.51	.15	0.5 to 5.0	>7500

*Illustrated

CERAMIC TRIMMER CAPACITORS

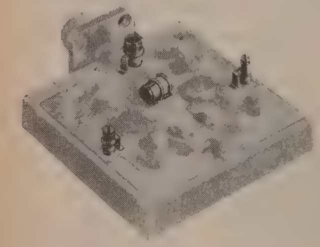
9350-9354
9330-9335
9306-9311

Ceramic trimmer capacitors are designed for broadband applications from audio to 200 MHz, where a negative temperature characteristic and ease of adjustment is important. Typical applications include crystal filters, crystal oscillators, CATV amplifiers, and communications and test equipment. Models are available for top tuning (illustrated), side tuning (illustrated) and bottom tuning.

Part No.	Part No.	Capacitance Range PF	Temperature Coefficient (PPM/°C)	Q @ 10 MHz
9306	9330	1.7 to 6.0	NPO ±250	>500
9307	9331	1.7 to 10.0	NPO ±250	>500
9308	9332	2.3 to 20.0	−450 ±250	>500
9309	9333	3.8 to 30.0	−550 ±250	>300
9310	9334	4.0 to 40.0	−1400 ±800	>200
9311	9335	4.5 to 50.0	−1400 ±800	>200

Part No.	Capacitance pf	Temperature Coefficient ppm/°C	Min. Q @ 100 MHz
9350	1.0 to 3.0	50 ±50	>500
9351	2.0 to 5.0	NPO ±200	>500
9352	3.0 to 10.0	N600 ±300	>300
9353	3.5 to 18.0	N800 ±300	>100
9354	5.0 to 25.0	N1400 ±500	>100

GIGA-TRIM® CAPACITORS

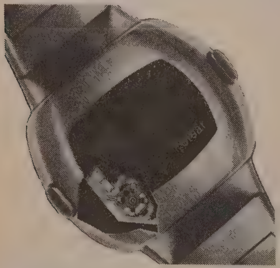


Giga-Trim (gigahertz-trimmers) are tiny variable capacitors which provide a beautifully straightforward technique to fine tune RF hybrid circuits and MIC's into proper behavior. They replace time consuming cut-and-try adjustment techniques and trimming by interchange of fixed capacitors.

7261 SL
7262
7263
7264
7265

Part No.	Length	Dia.	Capacitance Range — pf	Q @ 250 MHz
7200	.55	.07	0.1 to 1.3	>250
7240	.55	.07	0.2 to 2.0	>2000
7260	.21	.07	0.3 to 1.2	>4000
7270	.31	.12	0.6 to 4.5	>2000
7280	.21	.12	0.4 to 2.5	>3000
7290	.56	.12	0.8 to 8.0	>1000

THIN-TRIM® CAPACITORS



Thin-Trim capacitors are a new development in tiny variable capacitors for demanding applications from quartz crystal watches to phased array MIC's. They provide the hybrid and microwave design engineer a reliable means of adjusting capacitance rather than abrasive trimming of fixed capacitors.

9402
9410 PC
9401

Part No.	Capacitance Range — pf	Temperature Coefficient	Q @ 100 MHz
9401-2	0.5 to 2.0	−200 ±200/°C	>1000
9401-4	1.0 to 4.0	−700 ±300/°C	>1000
9402-4	3.0 to 12.0	−700 ±300/°C	>750
9410-2	4.0 to 18.0	−200 ±200/°C	>900
9410-3	6.0 to 35.0	−400 ±200/°C	>700
9410-4	7.0 to 45.0	−750 ±300/°C	>500

JOHANSON MANUFACTURING CORPORATION
BOONTON, NEW JERSEY 07005
TELEPHONE (201) 334-2676 TWX 710-987-8367

CERAMIC CHIP CAPACITORS

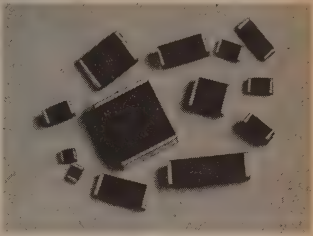
Johanson
Monolithic Dielectrics

STANDARD CHIP CAPACITORS

Maximum Capacitance Available in Popular Sizes

JMDI Size	Dielectric	12 VDCW	25 VDCW	50 VDCW	100 VDCW	200 VDCW
R11 (.050 x .040 x .040T)	COG		560pf	560pf	560pf	470pf
	X7R		.012mfd	.01mfd	3300pf	1500pf
	Y5V	.056mfd				
R15 (.080 x .050 x .050T)	COG		1500pf	1500pf	1500pf	1200pf
	X7R		.039mfd	.027mfd	.013mfd	5600pf
	Y5V	.150mfd				
R29 (.180 x .080 x .065T)	COG		.012mfd	.012mfd	.012mfd	8200pf
	X7R		.270mfd	.180mfd	.120mfd	.047mfd
	Y5V	1.20mfd				
S41 (.125 x .095 x .065T)	COG		.01mfd	.01mfd	.01mfd	8200pf
	X7R		.22mfd	.15mfd	.082mfd	.039mfd
	Y5V	1.5mfd				

Fourteen configurations are available in four basic dielectrics; NPO/COG, BX/X7R, Z5U, and Y5V characteristics, to meet MIL-C-55681A and EIA 198B specifications. Capacitors feature high volume efficiency of capacitance, and are ideal for hybrid circuit applications.

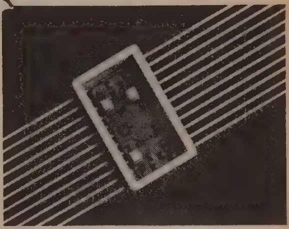


ULTRA HIGH CAPACITANCE CHIP CAPACITORS

Maximum Capacitance Available in Popular Sizes

JMDI Size	Dielectric	6 VDCW	12 VDCW
R11 (.050 x .040 x .040T)	Y5V	.068mfd	.056mfd
R15 (.080 x .050 x .050T)	Y5V	.180mfd	.150mfd
S41 (.125 x .095 x .065T)	Y5V	1.80mfd	1.50mfd
S48 (.225 x .250 x .080T)	Y5V	5.60mfd	4.70mfd
L76 (.585 x .298 x .070T)	Y5V	12.0mfd	10.0mfd

Chips feature very high volume efficiency of capacitance, attainable through unique processing techniques and Y5V (K12000) dielectric. Values exceeding 10mfd available, depending on chip configuration. Ideal in circuits where space is a premium or as replacement of tantalum chips.



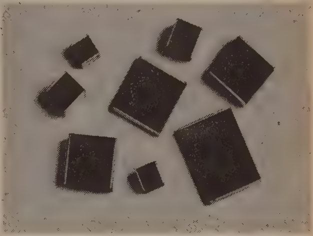
HIGH VOLTAGE CHIP CAPACITORS

Maximum Capacitance Available with Voltage Applied

JMDI Size	1000 VDCW	2000 VDCW	3000 VDCW	4000 VDCW
HV42	6800pf	1800pf	6800pf	330pf
HV46	.015mfd	3900pf	1500pf	680pf
HV50	.033mfd	8200pf	3300pf	1500pf
HV60	.056mfd	.015mfd	4700pf	2200pf
HV65	.082mfd	.022mfd	8200pf	4700pf

Part No.	Dimensions (L x W x T)		
HV42	.15	.15	.12
HV46	.19	.19	.12
HV50	.33	.33	.12
HV60	.40	.40	.12
HV65	.54	.40	.12

Available in either NPO/COG or BX/X7R dielectric, these units are designed to obtain high capacitance values to 4000 VDCW. Typical applications include high voltage power supplies and meter multiplier circuits. Built to suit specific customer requirements.



HIGH Q MICROWAVE CHIP CAPACITORS

JMDI Size	Dielectric	Max. Capacitance Available
R9 (.040 x .030 x .030T)	Hi-Q	18pf
R12 (.055 x .055 x .055T)	Hi-Q	100pf
R15 (.080 x .050 x .050T)	Hi-Q	270pf
S42 (.110 x .110 x .100T)	Hi-Q	1000pf

General Specifications:

Q @ 1 MHz > 10,000 (DF < .0001)

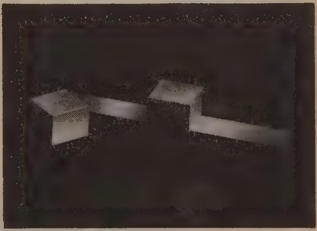
Q @ 100 MHz $> \frac{20000}{\text{Capacitance (pf)}}$

T.C. +90 ±20 ppm/°C

Temp. Range −55°C to 125°C

VDCW up to 250V, (500 VDC test)

High-Q microwave chip capacitors are available in four basic sizes, displaying excellent performance in the VHF, UHF and microwave ranges. The configurations, insertion loss, and resonance-free performance make these chips ideal for microstrip and hybrid MIC applications. Available with standard termination or with easy to mount coplanar leads.



JOHANSON/MONOLITHIC DIELECTRICS, INC.
P.O. BOX 6456, BURBANK, CALIF. 91505
TWX 910-498-2735 TELEPHONE (201) 848-4465

DRY ELECTROLYTIC AC CAPACITORS

NEW
SMALLER
SIZE*

FOR MOTOR STARTING AND OTHER INTERMITTENT SERVICE

Mallory Type "P" Capacitors described here are designated "Motor Starting Types." These low cost, compact units are the result of more than 36 years experience in manufacturing electrolytic capacitors. They are not designed for continuous duty on AC, but are ideal in intermittent applications within their voltage, temperature, and duty cycle capabilities.

RATING BY CASE SIZE

"MAX" indicates maximum capacity for this case size.

MFD	110 VAC	125 VAC	165 VAC	220 VAC	250 VAC	330 VAC
21-25	1	1	1	1	1	1
25-30	1	1	1	1	1	1
30-36	1	1	1	1	1	MAX 1
36-43	1	1	1	1	1	MAX 2
43-52	1	1	1	1	MAX 1	3 or 4
47-56	1	1	1	1	2	3 or 4
53-64	1	1	1	MAX 1	MAX 2	MAX 3
64-77	1	1	1	2	3 or 4	4
72-87	1	1	1	MAX 2	MAX 3	MAX 4
88-106	1	1	1	3 or 4	MAX 4	5 or 6
108-130	1	1	1	MAX 3	5 or 6	MAX 5
124-149	1	1	MAX 1	MAX 4	5 or 6	MAX 6
130-154	1	1	2	5 or 6	5 or 6	7
145-174	1	1	2	5 or 6	MAX 5	7
161-193	1	1	MAX 2	5 or 6	MAX 6	MAX 7
189-227	1	MAX 1	3 or 4	MAX 5	7	8
216-260	MAX 1	2	3 or 4	MAX 6	7	8
233-280	2	MAX 2	MAX 3	7	MAX 7	8
243-292	2	3 or 4	4	7	8	8
270-324	MAX 2	3 or 4	4	7	8	8
324-389	3 or 4	3 or 4	4	MAX 7	8	MAX 8
340-408	3 or 4	MAX 3	MAX 4	8	8	—
378-455	3 or 4	4	5 or 6	8	8	—
400-480	MAX 3	4	5 or 6	8	8	—
430-516	4	4	5 or 6	8	8	—
460-553	4	4	5 or 6	8	MAX 8	—
540-648	4	MAX 4	MAX 5 + 6	8	—	—
590-708	MAX 4	5 or 6	7	MAX 8	—	—
710-850	5 or 6	5 or 6	7	—	—	—
815-970	5 or 6	MAX 5 + 6	MAX 7	—	—	—
850-1020	5 or 6	7	—	—	—	—
900-1080	MAX 5 +6	7	—	—	—	—
1020-1264	7	7	—	—	—	—
1175-1410	7	MAX 7	—	—	—	—
1326-1590	MAX 7	—	—	—	—	—

CASE SIZE CODES

Case Number	Diameter	Height
1	1 7/16	2¾
†2	1 7/16	3⅜
3	1 7/16	4⅜
†4	1 13/16	3⅜
†5	1 13/16	4⅜
6	2 1/16	3⅜
†7	2 1/16	4⅜
8	2 9/16	4⅜

†NEMA Standard Sizes.

*Standard Size Type P Still Available.

MALLORY MALLORY CAPACITOR COMPANY

a division of P. R. MALLORY & CO. INC.
Box 372, Indianapolis, Indiana 46206

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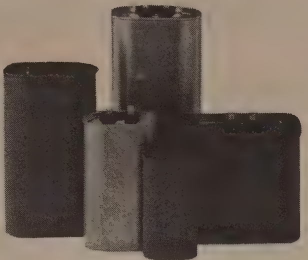
TYPE AC-OIL PAPER DIELECTRIC CAPACITORS

Mallory paper dielectric capacitors are useful in a variety of applications where continuous operation of this device is required on the normal AC power available in home and in industry. Refrigeration equipment, air conditioners, computers, and other business machines are representative of some of the products which employ these capacitors for efficient operation. Also they are utilized frequently in industrial controls, phase shifting and other heavy duty services.

These capacitors offer assurance of consistent performance in the applications listed. This level of reliability is the result of refinements attained throughout many years of manufacturing paper dielectric capacitors.

These capacitors contain polychlorinated biphenyls (PCB), which some studies have shown may be an environmental contaminant. These capacitors are also available with NON-PCB for application in areas which require biodegradable oil.

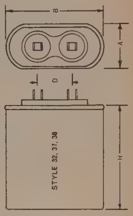


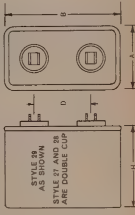
USES

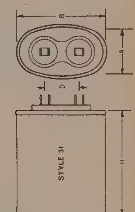
- AIR CONDITIONING
- BUSINESS MACHINES
- POWER SUPPLIES
- REFRIGERATION
- INDUSTRIAL CONTROL
- PHASE SHIFTING
- FAN MOTORS
- LIGHTING

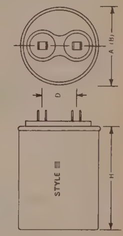
NORMAL PERFORMANCE — RATINGS AND SIZES

Voltage	MFD	Style	VAR Rating	Dimension "H"	Catalog Number
236	3	32	63.0	1¹¹⁄₁₆	32BB2303
236	4	32	84.0	1¹¹⁄₁₆	32BB2304
236	5	32	105.0	2¹⁄₁₆	32BB2305
236	6	32	126.0	2⁵⁄₁₆	32BB2306
236	7 5	32	157.5	2⁹⁄₁₆	32BB23075
236	8	32	168.0	2⁹⁄₁₆	32BB2308
236	10	32	210.0	3⅜	32BB2310
236	12.5	32	262.5	4³⁄₁₆	32BB23125
236	12.5	37	262.5	2⅝	37BB23125
236	15	37	315.0	2⅞	37BB2315
236	17.5	37	367.4	3⅛	37BB23175
236	20	37	419.9	3½	37BB2320
236	25	37	524.9	4¼	37BB2325
236	30	37	629.9	5¼	37BB2330
236	35	37	734.9	5¾	37BB2335
236	35	38	734.9	4¾	38BB2335
236	40	37	839.9	6¼	37BB2340
236	40	38	839.9	5¼	38BB2340
236	45	27	944.9	3¾	27BB2345
236	45	37	944.9	7¼	37BB2345
236	45	38	944.9	5¾	38BB2345
236	50	27	1050	3¾	27BB2350
236	50	38	1050	6¼	38BB2350
236	60	27	1260	4³⁄₁₆	27BB2360
236	60	38	1260	7¼	38BB2360
330	4	32	164.2	2¹⁄₁₆	32BB3304
330	5	32	205.3	2⁵⁄₁₆	32BB3305
330	6	32	246.3	2⁹⁄₁₆	32BB3306
330	7.5	32	307.9	3⅜	32BB33075
330	8	32	328.4	3⅜	32BB3308
330	10	31	410.5	2¼	31BB3310
330	10	32	410.5	4³⁄₁₆	32BB3310
330	10	37	410.5	2⅝	37BB3310
330	12	32	492.7	4¾	32BB3312
330	12	37	492.7	2⅞	37BB3312
330	12.5	31	513.2	2¾	31BB33125
330	12.5	32	513.2	5	32BB33125
330	12.5	37	513.2	2⅞	37BB33125
330	15	31	615.8	3	31BB3315
330	15	37	615.8	3½	37BB3315
330	15	38	615.8	3⅛	38BB3315
330	17.5	31	718.5	3⅜	31BB33175
330	17.5	37	718.5	3⅞	37BB33175
330	17.5	38	718.5	3⅛	38BB33175
330	20	31	821.1	3¾	31BB3320
330	20	37	821.1	4¼	37BB3320
330	20	38	821.1	3½	38BB3320
330	25	31	1026	4⅝	31BB3325
330	25	37	1026	5¼	37BB3325
330	25	38	1026	4¼	38BB3325
330	30	31	1232	5³⁄₁₆	31BB3330
330	30	37	1232	6¼	37BB3330
330	30	38	1232	4¾	38BB3330
330	35	27	1437	3⁵⁄₁₆	27BB3335
330	35	31	1437	6¼	31BB3335
330	35	37	1437	6¾	37BB3335
330	35	38	1437	5¾	38BB3335
330	40	27	1642	3¾	27BB3340
330	40	31	1642	7	31BB3340
330	40	38	1642	6¼	38BB3340
330	45	27	1847	4³⁄₁₆	27BB3345
330	45	31	1847	7⁵⁄₁₆	31BB3345
330	45	38	1847	6¾	38BB3345
330	50	27	2053	4³⁄₁₆	27BB3350
330	50	38	2053	7¼	38BB3350
330	60	27	2463	5³⁄₁₆	27BB3360
330	60	38	2463	8½	38BB3360
370	2	32	103.2	1¹¹⁄₁₆	32BB3702
370	3	32	154.8	2¹⁄₁₆	32BB3703
370	4	32	206.4	2⁵⁄₁₆	32BB3704
370	5	32	258.1	2¾	32BB3705
370	6	32	309.7	3¹⁄₁₆	32BB3706
370	7.5	31	387.1	2¼	31BB37075
370	7.5	32	387.1	3¹³⁄₁₆	32BB37075
370	8	31	412.9	2¼	31BB3708
370	8	32	412.9	4³⁄₁₆	32BB3708
370	8	37	412.9	2⅝	37BB3708
370	10	31	516.1	2¾	31BB3710
370	10	32	516.1	4¾	32BB3710
370	10	37	516.1	2⅞	37BB3710
370	12.5	31	645.1	3	31BB37125
370	12.5	37	645.1	3½	37BB37125
370	15	31	774.2	3¾	31BB3715
370	15	37	774.2	3⅞	37BB3715
370	15	38	774.2	3½	38BB3715
370	17.5	31	903.2	4⅛	31BB37175
370	17.5	37	903.2	4¾	37BB37175
370	17.5	38	903.2	3¾	38BB37175
370	20	31	1032	4⅝	31BB3720
370	20	37	1032	5¼	37BB3720
370	20	38	1032	4¼	38BB3720
370	25	27	1290	3⁵⁄₁₆	27BB3725
370	25	28	1290	5³⁄₁₆	28BB3725
370	25	31	1290	5³⁄₁₆	31BB3725
370	25	37	1290	6¼	37BB3725
370	25	38	1290	4¾	38BB3725
370	30	27	1548	3¾	27BB3730
370	30	31	1548	6¼	31BB3730
370	30	37	1548	7¼	37BB3730
370	30	38	1548	5¾	38BB3730
370	35	27	1806	3¾	27BB3735
370	35	31	1806	7⁵⁄₁₆	31BB3735
370	35	38	1806	6¾	38BB3735
370	40	27	2064	4⅝	27BB3740
370	40	31	2064	8½	31BB3740
370	40	38	2064	7¼	38BB3740
370	45	27	2322	4⅝	27BB3745
370	45	38	2322	8	38BB3745
370	50	27	2581	5³⁄₁₆	27BB3750
370	50	38	2581	9	38BB3750
400	3	32	181.0	2¹⁄₁₆	32BB4003
400	4	32	241.3	2⁹⁄₁₆	32BB4004
400	5	32	301.6	3¹⁄₁₆	32BB4005
400	6	32	361.9	3¹³⁄₁₆	32BB4006
400	7	31	422.2	2½	31BB4007
400	7.5	31	452.4	2½	31BB40075
400	7.5	32	452.4	4⅜	32BB40075
400	7.5	37	452.4	2⅞	37BB40075
400	8	31	482.5	2½	31BB4008
400	8	32	482.5	4¾	32BB4008
400	8	37	482.5	2⅞	37BB4008
400	10	31	603.2	3	31BB4010
400	10	37	603.2	3½	37BB4010
400	12	31	723.8	3⅜	31BB4012
400	12.5	31	754.0	3¾	31BB40125
400	12.5	37	754.0	4¼	37BB40125
400	15	31	904.8	4⅛	31BB4015
400	15	37	904.8	4¾	37BB4015
400	15	38	904.8	3¾	38BB4015
400	17.5	31	1056	4⅝	31BB40175
400	17.5	37	1056	5¼	37BB40175
400	17.5	38	1056	4¼	38BB40175
400	20	31	1206	5³⁄₁₆	31BB4020
400	20	37	1206	6¼	37BB4020
400	20	38	1206	4¾	38BB4020
400	22.5	38	1357	5¼	38BB40225
400	25	27	1508	3¾	27BB4025
400	25	31	1508	6¼	31BB4025
400	25	37	1508	7¼	37BB4025
400	25	38	1508	5¾	38BB4025
400	30	27	1810	4³⁄₁₆	27BB4030
400	30	38	1810	6¾	38BB4030
400	35	27	2111	4⅝	27BB4035
400	35	31	2111	8½	31BB4035
400	35	38	2111	8	38BB4035
400	40	27	2413	5³⁄₁₆	27BB4040
400	40	38	2413	9	38BB4040
400	45	27	2714	5⅞	27BB4045
400	45	38	2714	9½	38BB4045
400	50	27	3016	6¼	27BB4050
400	55	27	3318	6¾	27BB4055
440	2	32	146.0	2¹⁄₁₆	32BB4402
440	3	32	219.0	2⁵⁄₁₆	32BB4403
440	4	32	291.9	3¹⁄₁₆	32BB4404
440	5	31	364.9	2¼	31BB4405
440	5	32	364.9	3¹³⁄₁₆	32BB4405
440	6	31	437.9	2½	31BB4406
440	6	32	437.9	4³⁄₁₆	32BB4406
440	7	31	510.9	2¾	31BB4407
440	7.5	31	547.4	2¾	31BB44075
440	7.5	37	547.4	3⅛	37BB44075
440	8	31	583.9	3	31BB4408
440	8	37	583.9	3½	37BB4408
440	10	31	729.9	3⅜	31BB4410
440	10	37	729.9	3⅞	37BB4410
440	12	31	875.8	4⅛	31BB4412
440	12.5	31	912.3	4⅛	31BB44125
440	12.5	37	912.3	4¾	37BB44125
440	15	31	1095	4⅝	31BB4415
440	15	37	1095	5¾	37BB4415
440	15	38	1095	4¼	38BB4415
440	17.5	27	1277	3⁵⁄₁₆	27BB44175
440	17.5	31	1277	5³⁄₁₆	31BB44175
440	17.5	37	1277	6¼	37BB44175
440	17.5	38	1277	4¾	38BB44175
440	20	27	1460	3⁵⁄₁₆	27BB4420
440	20	31	1460	6¼	31BB4420
440	20	37	1460	7¼	37BB4420
440	20	38	1460	5¼	38BB4420
440	22.5	38	1642	6¼	38BB44225
440	25	27	1825	4³⁄₁₆	27BB4425
440	25	31	1825	7⁵⁄₁₆	31BB4425
440	25	38	1825	6¾	38BB4425
440	30	27	2190	4⅝	27BB4430
440	30	38	2190	8	38BB4430
440	35	27	2554	5³⁄₁₆	27BB4435
440	35	38	2554	9	38BB4435
440	40	27	2919	5⅞	27BB4440
440	40	38	2919	10	38BB4440
440	45	27	3284	6¼	27BB4445
440	50	27	3649	6¾	27BB4450
440	55	27	4014	7¼	27BB4455
660	2	32	328.4	2⁵⁄₁₆	32BB6602
660	3	31	492.7	2¼	31BB6603
660	3	32	492.7	3⅜	32BB6603
660	4	31	656.9	2½	31BB6604
660	4	37	656.9	2⅞	37BB6604
660	5	31	821.1	2¾	31BB6605
660	5	37	821.1	3⅛	37BB6605
660	6	31	985.3	3	31BB6606
660	6	37	985.3	3⅞	37BB6606
660	8	37	1314	4¾	37BB6608
660	10	31	1642	4⅝	31BB6610
660	10	38	1642	4¼	38BB6610
660	12	27	1971	3⁵⁄₁₆	27BB6612
660	12	38	1971	4¾	38BB6612
660	15	38	2463	6¼	38BB6615









NOTE: Drawings and tables shown are for standard sizes and configurations. Part numbers shown above are for PCB. NON-PCB may be ordered by substituting "N" in place of the "B" (3rd Digit). Example: 32NB2303.

ROUND AND OVAL CONTAINERS				
STYLE	A	B	H	D
23	2	2	■	13⁄16
31	2⁵⁄₃₂	2²⁷⁄₃₂	*	13⁄16
32	1⁵⁄₁₆	2⁵⁄₃₂	*	13⁄16
37	1²⁹⁄₃₂	2²⁹⁄₃₂	*	13⁄16
38	1³¹⁄₃₂	3²¹⁄₃₂	*	13⁄16

*See Rating Table for Dimension "H".

RECTANGULAR CONTAINERS				
STYLE	A	B	H	D
27	2²⁷⁄₃₂	4⁹⁄₁₆	*	13⁄16
28	2⁵⁄₃₂	2²⁷⁄₃₂	*	13⁄16
29	3¾	4⁹⁄₁₆	*	2

*See Rating Table for Dimension "H".

MALLORY

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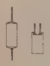
ALUMINUM ELECTROLYTIC CAPACITORS

Type	Description	Terminals	Temp. Range (°C)	Voltage Range (WVDC)	Cap. Range (MFD)	Std. Tol. (%MFD)	Case Sizes Dia. x Length (in.) H x W x D (in.)	Features	TIB
TT TTX 	Aluminum Tubular, Axial Lead	Wire Leads	−40 to +85 −55 to +85	1 to 150	1 to 4600 1 to 2500	−10 +100 −10 +50	.26 x .62 to .75 .37 x .62 to 1.50 .44 x 1.00 to 2.00 .50 x 1.00 to 2.00 .62 x 1.00 to 1.50	Miniature, All Welded Construction Low DCL, Low ESR	4-104 4-105
TCW 	Aluminum Tubular, Axial Lead	Wire Leads	−20 to +85	3 to 450	2 to 20,000	−10 +100	.50 x 1.12 to 2.12 .62 x 1.12 to 2.62 .75 x 1.12 to 2.75 .87 x 1.37 to 3.12 1.00 x 1.37 to 3.89	All Welded Construction	4-103
TC 	Aluminum Tubular, Axial Lead or Single Ended	Wire Leads, Solder Lugs, PC Lugs	−40 to +85 −30 to +85	50 to 300 301 to 450	10 to 2250 10 to 130	−10 +100 −10 +50	.50 x 1.06 to 1.31 .62 x 1.06 to 1.81 .75 x 1.06 to 2.69 .87 x 1.31 to 2.69 1.00 x 1.31 to 3.81	Single or Dual Section, Rugged, Choice of Terminals	4-102
TCG TPG 	Aluminum Tubular, Axial Lead	Wire Leads	−40 to +85	3 to 450	3 to 23,000 2 to 17,000	−10 +75 −10 +50 −10 +100	.31 x .62 to .75 .37 x .81 to 1.62 .43 x .62 to 2.50 .50 x 1.12 to 2.12 .62 x 1.12 to 2.62 .75 x 1.12 to 2.62 .87 x 1.12 to 3.12 1.00 x 1.12 to 3.62	Computer Grade High MFD, Low DCL, Low ESR, All Welded Construction, High Reliability, Premium Grade	4-307 4-67
VTT VPG 	Aluminum Can, Vertical Mount, Single Ended	Wire Leads, Plug-in	−20 to +85 −40 to +85	6 to 50 3 to 150	1.5 to 47 20 to 2000	−10 +100 −10 +50	.24 x .43 .50 x 1.00 .50 x 1.25 .50 x 1.62	Miniature, All Welded Construction, High Reliability, Low DCL, Low ESR, Premium Grade	4-202 4-306
FP PFP 	Aluminum Can, Twist-Tab or PC Vertical Mount	Solder Lugs, Wire Wrap, PC Lugs	−30 to +85	3 to 450	20 to 75,000	−10 +150 −10 +100 −10 +50	.75 x 2.00 1.00 x 1.50 to 4.00 1.37 x 1.75 to 5.00	Single or Multi-Section	4-101
CGS CG PG 	Aluminum Can, Bracket Mount or Chassis Mount	Solder Lugs, Screw, Turret	−40 to +65 −40 to +85	3 to 450	10 to 540,000	−10 +75 −10 +50	1.00 x 1.50 to 4.00 1.00 x 1.75 to 4.25 1.37 x 2.00 to 4.75 1.37 x 2.12 to 5.62 1.75 x 2.12 to 5.62 1.75 x 2.25 to 5.62 2.00 x 2.12 to 5.62 2.50 x 3.12 to 5.62 3.00 x 3.62 to 8.62	65°C Computer 85°C Computer Grade, Low DCL, Low ESR, Hi Ripple Capability High Reliability, Premium Grade	4-303 4-304 4-56
SFC 	Aluminum Can, Bracket or Buss-Bar Mount	Buss-Bar Screw	−40 to +85	6 to 50	6800 to 100,000	−0 +100	3.00 x 4.12 to 5.62	Computer Grade, Low DCL, ULtra-Low ESR, Ultra-High Ripple Capability	4-310
MTA MTV MCT 	Molded Plastic Tubular, Axial Lead, Vertical Mount, Single Ended	Wire Leads, Plug-in Wire Pins Flexible	−30 to +85	3 to 100	3 to 4500 3 to 9000	−10 +100 −10 +50	.31 x .87 .37 x .81 to 1.31 .37 x 1.12 .50 x .81 to 1.50 .50 x 1.50 .75 x 2.16 .87 x 1.50 to 2.50	Low Cost, All Welded Construction	4-201
HC NP 	Bakelite Case, Single Ended	Screw	−20 to +65	3 to 450 3 to 450NP	65 to 40,000 30 to 32,000	−10 +150 −10 +100 −10 +50 ±25%	1.44 x 2.75 to 2.06 x 4.37	Rugged Hi-Pot Case, Versatile Mounting, Non-Polar	4-46

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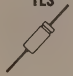
TANTALUM ELECTROLYTIC CAPACITORS

TANTALUM SOLID ELECTROLYTE

Type	Description	Terminals	Temp. Range (°C)	Voltage Range (WVDC)	Cap. Range (MFD)	Std. Tol. (%MFD)	Case Sizes Dia. x Length (in.) H x W x D (in.)	Features	TIB
TAS	Metal Tubular, Axial Lead	Wire Leads	−80 to +125	6 to 50	.0047 to 330	±5 ±10 ±20	.12 x .25 .17 x .44 .28 x .65 .34 x .75	Hermetic	4-801
TER	Mylar Sleeve over Metal Tubular, Axial Lead	Wire Leads	−55 to +125	6 to 50	.0047 to 330	±5 ±10 ±20	.13 x .29 .18 x .47 .29 x .69 .35 x .79	MIL Style CSR13 Reliability Per MIL-C-39003D	4-813
TIM	Rectangular Molded Plastic, Radial Lead	Wire Leads, Plug-in	−55 to +125	3 to 50	.082 to 220	±10 ±20	.22 x .28 x .17 .33 x .36 x .17 .34 x .23 x .10 .37 x .60 x .19 .41 x .32 x .17	Low Cost, High Density Mounting, Automatic Insertion Capability	4-806
TAC	Molded Plastic Tubular, Axial Lead	Wire Leads	−55 to +125	3 to 50	.082 to 82	±10 ±20	.10 x .29 .14 x .34 .17 x .34 .19 x .53	Low Cost, Automatic Insertion Capability	4-806
TDM	Plastic Dipped, Rectangular Radial Lead	Wire Leads	−55 to +85	6 to 50	.10 to 330	±10 ±20	.27 x .27 x .18 .33 x .32 x .21 .37 x .40 x .22 .40 x .40 x .25 .46 x .48 x .32 .56 x .58 x .32	Low Profile Low Cost	4-814
TDC	Plastic Dipped, Radial Lead	Wire Leads	−55 to +85	6 to 50	.10 to 330	±10 ±20	.17 x .35 .25 x .50 .35 x .65 .40 x .75	Very Low Cost	4-810

TANTALUM LIQUID ELECTROLYTE

TLS 	Silver Tubular, Axial Lead	Wire Leads	−55 to +125	6 to 125	1.7 to 1200	±5 ±10 −15 +20 −15 +30 −15 +50	.19 x .45 .28 x .64 .37 x .77 .37 x 1.06	MIL-C-3955 Styles CL64 & CL65, Low DCL, Wide Temp. Range	4-71
TLX	Silver Tubular, Axial Lead, Hermetic Seal	Wire Leads	−55 to +125	6 to 125	1.7 to 1200	±5 ±10 −15 +20 −15 +30 −15 +50	.19 x .45 .28 x .64 .37 x .77 .37 x 1.06	MIL Style CLR65 Reliability Per MIL-C-39006, Low DCL, High Voltage, Wide Temp. Range	4-607
CMT	Copper Tubular, Red Plastic, Axial Lead	Wire Leads	−55 to +85	6 to 60	1 to 450	±20	.11 x .30 .11 x .40 .14 x .60 .22 x .78	Low Cost, High MFD, Miniature Size	4-609
MTP	Silver Tubular, Red Plastic, Axial Lead	Wire Leads	−55 to +85	6 to 60	3.3 to 470	±20	.11 x .30 .11 x .40 .14 x .60 .22 x .78	High MFD, Miniature Size	4-606
TAH	Silver Tubular, Green Plastic, Axial Lead	Wire Leads	−55 to +125	4 to 60	2 to 330	−15 +75 ±10 −10 +20 −15 +20 −15 +50	.23 x .46 .23 x .59 .23 x .80	Miniature Size, Wide Temp. Range Low DCL	4-57
XTM **XTK** **XTH** **XTL** **XTV**	Silver Can, Single or Dual Ended, Hermetic Seal	Wire Leads Screw, Stud, Solder Lug, Turret	−55 to +175	20 to 900	2 to 2200	−15 +75 −15 +50 ±20	.66 x .44 to 1.78 .87 x .54 to 4.06 1.12 x .60 to 2.81	MIL Style CLR10 14 and 17, Reliability Per MIL-C-39006, High Temp., High MFD, High Voltage	4-84

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a division of P. R. MALLORY & CO. INC.
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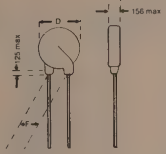
muRata

ceramic capacitors

Super-Cap™ to 100V ±10%

TC-X5P



TYPE	DIMENSIONS		16 VOLTS		25 VOLTS		50 VOLTS		100 VOLTS	
	D (MAX)	F	MAX CAP	IR (MEGΩ)	MAX CAP	IR (MEGΩ)	MAX CAP	IR (MEGΩ)	MAX CAP	IR (MEGΩ)
DD350	.237	.250	.015	350	.01	500	.01	500	—	—
DD360	.290	.250	.022	250	.015	350	.015	350	.01	500
DD380	.350	.250	.05	110	.022	250	.022	250	.015	350
DD310	.430	.250	.068	75	.05	110	.05	110	.022	250
DD312	.540	.375	.1	50	.068	75	.068	75	.05	110
DD314	.600	.375	.15	40	.1	50	.1	50	.068	75
DD316	.690	.375	.18	35	.12	38	.12	38	.1	50

Standard Capacitance tolerance: ±10%(K), ±20%(M), +80%, −20% (Z) 12V units also available

monolithic

RESIN COATED RECTANGULARS

- NPO, X7F, X7R, Z5U Materials
- 25, 50 and 100 VDC
- 1 PF to 1.5 MF
- ±5, ±10, ±20 and +80, −20% Tolerances

CHIPS

- NPO, X7F, X7R, Z5U Materials
- 25, 50 and 100 VDC
- 1 PF to 680,000 PF
- ±5, ±10, ±20 and +80, −20% Tolerances

MOLDED RECTANGULARS

- NPO, X7R and Z5U Materials
- 25 and 50 VDC
- 10 to 470,000 PF
- ±10, ±20 and +80, −20% Tolerances

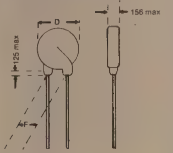
CASED RECTANGULARS

- CK-05 and CK-06 Style
- BX Characteristics
- 50, 100 and 200 VDC
- ±10 and ±20% Tolerances
- 10 to 100,000 PF

MOLDED TUBULARS

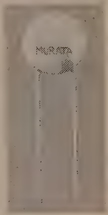
- NPO and X7R Materials
- CK-12 and CK-14 Styles
- 100 VDC
- 10 to 33,000 PF
- ±5, ±10 and ±20% Tolerances

temperature compensating 500 VDC

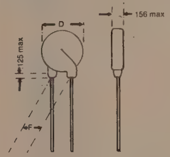


TYPE	DIMENS.		NPO	N030	N080	N150	N220	N330	N470	N750	N1500	N2200
	D MAX	F ±.06										
DD57	.275	.252	2-16	2-16	3-18	4-20	4-24	5-39	5-39	8-47	22-68	27-82
DD60	.296	.250	12-20	12-20	14-24	15-27	16-31	18-47	18-47	41-62	50-100	60-125
DD61	.375	.250	20-36	20-36	20-39	22-43	27-47	33-82	33-82	51-110	75-150	91-180
DD62-2	.434	.250	36-56	36-56	39-62	43-75	47-82	82-130	82-130	110-150	150-240	180-270
DD62-3	.500	.375	56-82	56-82	62-91	75-110	82-130	130-200	130-200	150-240	240-360	270-470
DD62-0	.591	.375	82-120	82-120	91-130	110-150	130-160	200-270	200-270	240-360	360-470	470-560
DD63-2	.670	.375	120-160	120-160	130-180	150-180	160-200	270-390	270-390	360-470	470-620	560-820
DD63-0	.749	.375	160-200	160-200	180-240	180-270	200-330	390-470	390-470	470-620	620-1100	820-1300

Standard Capacitance Tolerance: ±5%(J), ±10%(K), ±20%(M)



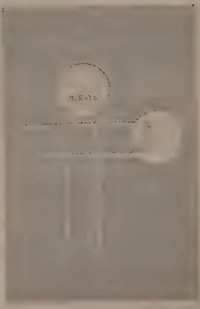
general purpose 500 VDC



TYPE	DIMENSIONS		CAPACITANCE (pf)			
	D (MAX)	F	X5F	Y5P Z5F Z5P X5R	Y5U	Z5U
DD57-0	.275	.250	100 120 150 180 220 270 330 390 470 560	100 120 150 180 220 270 330 390 470 560 680 820	1000	1000, 1500 1800 2000
DD60	.296	.250	680, 820	1000, 1200	1200, 1500	2200, 2700
DD61	.375	.250	1000, 1200	1500, 2200	2000, 3900	3300, 5600
DD62-2	.434	.250	1500	3300	4700, 5600	6800, 8200
DD62-3	.500	.375	1800, 2200, 2700	3900, 4700	6800, 8200	10000
DD62-0	.591	.375	3300, 3900	5600, 6800	10000, 12000	12000, 18000
DD63-2	.670	.375	4700	7500, 10000	15000, 18000	20000, 22000
DD63-0	.749	.375	5600	12000	20000, 22000	27000, 33000

Standard Capacitance Tolerances Y5F, Y5P, Z5F, Z5P: ±10%, ±20%(K,M).
Y5U, Z5U: +80, −20%(Z). Other tolerances available on special order.

NOTE: For higher capacitance, units are available with two disc elements upon special request. 1000 VDCW capacitors are also available on special request.



muRata CORPORATION OF AMERICA Rockmart, Georgia 30153
Tel: 404-684-7143

Nytronics Components Group Inc.
ORANGE STREET, DARLINGTON, S. C. 29532
(803) 393-5421 • TWX 810-665-2182

POLYESTER FILM CAPACITORS

POLYESTER FILM CAPACITORS
EXTENDED FOIL/FILM WRAP/EPOXY END FILL
STYLE 107 −55°C TO +125°C

ELECTRICAL AND ENVIRONMENTAL CHARACTERISTICS

CAPACITANCE MEASUREMENTS

Capacitors of 1.0 µF or less shall be measured at a frequency of 1000 Hz. Capacitors greater than 1.0 µF shall be measured at 60 Hz. The standard capacitance tolerance is 20%. Other tolerances are available upon request.

Reference: MIL-STD-202, Method 305.

TEMPERATURE CHARACTERISTICS

The maximum change in capacitance from the measured value at +25°C shall be −6% at −55°C, and +15% at +125°C.

DISSIPATION FACTOR

When measured as specified in Paragraph 1, the dissipation factor at +25°C shall not exceed 0.6% for values up to 1.0 µF and shall not exceed 1.0% for greater capacitance values.

INSULATION RESISTANCE

When measured at +25°C, and rated voltage (or 500 VDC, whichever is less), the insulation resistance shall be a minimum of 50,000 megohm-microfarads, but need not exceed 100,000 megohms. The period of electrification shall not exceed two minutes.

Reference: MIL-STD-202, Method 302.

VOLTAGE DERATING

The capacitors may be operated at full rated voltage from −55°C to +85°C, or with linear derating to 50% of rated voltage above +85°C with a maximum temperature of +125°C.

VOLTAGE TEST

When tested at +25°C, the capacitors shall withstand the indicated DC test voltages for a period of one minute:

Terminal to terminal	200% of DC rating
Terminal to case (less than .235 diameter)	200% of DC rating
Terminal to case (greater than .235 diameter)	400% of DC rating or 2,000 VDC, whichever is less

Reference: MIL-STD-202, Method 301.

LIFE TESTING

When tested for 1000 hours at 150% of the appropriate rated voltage for the test temperature, the capacitors shall exhibit no more than one failure in twelve pieces tested. Alternatively, an accelerated +125°C test may be performed at the +85°C voltage rating for a period of 250 hours. A failure is defined as:

a) A capacitance change of more than 10% of its initial value;
b) A dissipation factor greater than that specified in Paragraph 3;
c) An insulation resistance less than ⅓ that specified in Paragraph 4; or
d) A permanent open or short.

VIBRATION

The capacitors will meet or exceed in the vibration requirements of MIL-STD-202, Method 201.

NYTRONICS CATALOG NUMBERING SYSTEM

107 B 103 M

Nytronics Style

D.C. Voltage Rating
B = 100V
C = 200V
E = 400V
F = 600V

Capacitance
In µµf. The first two digits are the significant figures, the third is the number of zeros.

Capacitance Tolerance
F = ±1%
P = ±2%
J = ±5%
K = ±10%
M = ±20%

Note: Special capacitance values, voltage ratings and sizes available to customer requirements.

PHYSICAL SIZE TOLERANCES

	100 Volts DC & 200 Volts DC		400 Volts DC	
DIAMETER	Up to .158	+.032 −.000	Up to .218	±.032
	.159 to .200	+.040 −.000	.219 to .500	±.046
	Over .200	+.050 −.000	Over .500	±.062
LENGTH		+1/16 −0		+3/32 −1/16

TINNED COPPERWELD LEADS

No. 22 AWG. (.025) for cases up to .325 Dia.
No. 20 AWG. (.032) for cases .326 thru 1.0 Dia.
No. 18 AWG. (.040) for cases above 1.0 Dia.

Also available are the following styles with characteristics similar to Type 107.

STYLE 103
Flat Press with Axial Leads
Extended Foil Construction
Polyester Film Dielectric
Film Wrap-Epoxy Endfill
−55°C to +125°C Operation

STYLE 118
Round Body with Axial Leads
Extended Foil Construction
Polyester Film Dielectric
Polyethylene Case-Epoxy Endfill
−55°C to +100°C Operation

STANDARD RATINGS

Capacitance µf	Dia. x Length		Cat. No.
100 VOLTS DC WORKING			
.001	.138	⅜	107B102M
.0015	.138	⅜	107B152M
.0022	.138	⅜	107B222M
.0033	.138	⅜	107B332M
.0047	.138	⅜	107B472M
.0068	.138	⅜	107B682M
.0082	.138	⅜	107B822M
.01	.158	⅜	107B103M
.015	.158	21/32	107B153M
.022	.158	21/32	107B223M
.027	.158	21/32	107B273M
.033	.158	21/32	107B333M
.047	.190	21/32	107B473M
.068	.220	21/32	107B683M
.082	.265	21/32	107B823M
.1	.265	11/16	107B104M
.12	.300	¾	107B124M
.15	.330	¾	107B154M
.22	.350	15/16	107B224M
.27	.350	1 1/16	107B274M
.33	.385	1 1/16	107B334M
.39	.415	1 1/16	107B394M
.47	.450	1 1/16	107B474M
.56	.490	1 1/16	107B564M
.68	.540	1 1/16	107B684M
.82	.570	1 1/16	107B824M
1.	.590	1 3/16	107B105M
1.5	.670	1 5/16	107B155M
1.8	.730	1 5/16	107B185M
2.0	.700	1½	107B205M
200 VOLTS DC WORKING			
.001	.138	⅜	107C102M
.0015	.138	⅜	107C152M
.0022	.138	⅜	107C222M
.0033	.138	⅜	107C332M
.0047	.138	⅜	107C472M
.0068	.138	⅜	107C682M
.0082	.138	⅜	107C822M
.01	.158	⅜	107C103M
.015	.158	21/32	107C153M
.022	.158	21/32	107C223M
.027	.158	21/32	107C273M
.033	.158	21/32	107C333M
.047	.190	21/32	107C473M
.068	.220	21/32	107C683M
.082	.265	21/32	107C823M
.1	.265	11/16	107C104M
.12	.285	13/16	107C124M
.15	.315	13/16	107C224M
.22	.325	1 1/16	107C224M
.27	.330	1 3/16	107C274M
.33	.360	1 3/16	107C334M
.39	.395	1 3/16	107C394M
.47	.430	1 3/16	107C474M
.56	.465	1 3/16	107C564M
.68	.510	1 3/16	107C684M
.82	.580	1 3/16	107C824M
1.	.590	1 5/16	107C105M
1.5	.680	1 7/16	107C155M
1.8	.740	1 7/16	107C185M
2.0	.750	1 9/16	107C205M
400 VOLTS DC WORKING			
.001	.156	⅝	107E102M
.0015	.156	⅝	107E152M
.0022	.156	⅝	107E222M
.0033	.156	⅝	107E332M
.0047	.187	⅝	107E472M
.0068	.218	⅝	107E682M
.0082	.234	⅝	107E822M
.01	.250	⅝	107E103M
.015	.296	⅝	107E153M
.022	.312	¾	107E223M
.027	.281	⅞	107E273M
.033	.312	⅞	107E333M
.047	.343	⅞	107E473M
.068	.375	1	107E683M
.082	.406	1	107E823M
.1	.421	1	107E104M
.12	.468	1	107E124M
.15	.468	1¼	107E154M
.22	.546	1⅜	107E224M
.27	.609	1⅜	107E274M
.33	.593	1⅝	107E334M
.39	.625	1⅝	107E394M
.47	.671	1⅝	107E474M
.56	.718	1¾	107E564M
.68	.796	1¾	107E684M
.82	.812	1⅞	107E824M
1.	.812	2	107E105M
1.5	.921	2¼	107E155M
1.8	1.015	2¼	107E185M
2.0	1.093	2¼	107E205M

Special capacitance values, tolerances and sizes are available on request.

Nytronics Components Group Inc.
ORANGE STREET, DARLINGTON, S. C. 29532
(803) 393-5421 • TWX 810-665-2182

POLYSTYRENE CAPACITORS

POLYSTYRENE CAPACITORS

EXTENDED FOIL
FILM WRAP/EPOXY END-FILL
STYLE 133
−55°C TO +85°C

ELECTRICAL AND ENVIRONMENTAL CHARACTERISTICS

CAPACITANCE MEASUREMENTS

Capacitors of 1.0 µF or less shall be measured at a frequency of 1000 Hz.

Capacitors greater than 1.0 µF shall be measured at 60 Hz.

The standard capacitance tolerance is 20%. Other tolerances are available upon request.

Reference: MIL-STD-202. Method 305.

TEMPERATURE CHARACTERISTICS AND STABILITY

When measured over the full operating range, the Temperature Coefficient shall be −120ppm/°C ±30ppm/°C.

There shall be less than 0.1% change per year in capacitance when operated between +20°C and +50°C.

After cycling from −55°C to +75°C, the capacitance shall not vary more than 0.2% from its initial measurement at +25°C.

DISSIPATION FACTOR

When measured as specified in Paragraph 1, the dissipation factor at +25°C shall not exceed 0.1%.

INSULATION RESISTANCE

When measured at +25°C, and rated voltage (or 500 VDC, whichever is less), the insulation resistance shall be a minimum of 200,000 megohm-microfarads, but need not exceed 500,000 megohms. The period of electrification shall not exceed two minutes.

Reference: MIL-STD-202, Method 302.

VOLTAGE DERATING

The capacitors may be operated at full rated voltage from −55°C to +65°C, or with linear derating to 60% of rated voltage above +65°C to the maximum operating temperature of +85°C.

VOLTAGE TEST

When tested at +25°C, the capacitors shall withstand the indicated DC test voltages for a period of one minute:

Terminal to terminal	200% of DC rating
Terminal to case (less than .235 diameter)	200% of DC rating
Terminal to case (greater than .235 diameter)	400% of DC rating or 2.000 VDC, whichever is less

Reference: MIL-STD-202, Method 301.

LIFE TESTING

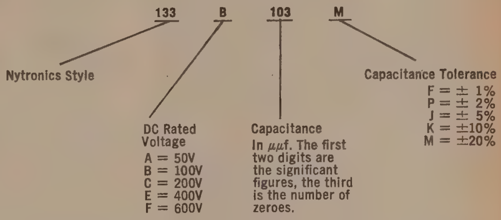
When tested at 85°C for 250 hours at full 65°C rated voltage, the capacitors shall exhibit no more than one failure in twelve pieces tested. A failure is defined as:

a) A capacitance change of more than 6% of its initial value;
b) A dissipation factor greater than that specified in Paragraph 3;
c) An insulation resistance less than 60% that specified in Paragraph 4; or
d) A permanent open or short.

VIBRATION

The capacitors will meet or exceed the vibration requirements of MIL-STD-202, Method 201.

NYTRONICS CATALOG NUMBERING SYSTEM



DC Rated Voltage
A = 50V
B = 100V
C = 200V
E = 400V
F = 600V

Capacitance
In µµf. The first two digits are the significant figures, the third is the number of zeroes.

Capacitance Tolerance
F = ± 1%
P = ± 2%
J = ± 5%
K = ±10%
M = ±20%

Note: Special capacitance values, voltage ratings and sizes available to customer requirement.

Intermediate value available.

STANDARD RATINGS AT 85°C

50 VOLTS DC WORKING

Capacitance MFD	Diameter	Length	Cat. No.
.001	.218	.625	133A102M
.0015	.218	.625	133A152M
.0022	.218	.625	133A222M
.0033	.218	.625	133A332M
.0039	.218	.625	133A392M
.0047	.218	.625	133A472M
.0068	.218	.625	133A682M
.0082	.218	.625	133A822M
.01	.218	.625	133A103M
.015	.260	.625	133A153M
.022	.260	.750	133A223M
.027	.290	.750	133A273M
.033	.325	.750	133A333M
.039	.350	.812	133A393M
.047	.375	.812	133A473M
.068	.390	.937	133A683M
.082	.420	.937	133A823M
.1	.420	.937	133A104M
.12	.460	1.000	133A124M
.15	.460	1.125	133A154M
.18	.500	1.125	133A184M
.22	.600	1.125	133A224M
.27	.655	1.437	133A274M
.39	.703	1.437	133A394M
.47	.734	1.562	133A474M

100 VOLTS DC WORKING

Capacitance µf	Diameter	Length	Cat. No.
.001	.218	.750	133B102M
.0015	.218	.750	133B152M
.0022	.218	.750	133B222M
.0033	.218	.750	133B332M
.0039	.218	.750	133B392M
.0047	.218	.750	133B472M
.0068	.234	.750	133B682M
.0082	.234	.750	133B822M
.01	.296	.750	133B103M
.012	.296	.750	133B123M
.015	.296	.750	133B153M
.022	.318	.875	133B223M
.027	.328	.875	133B273M
.033	.343	.875	133B333M
.039	.359	.875	133B393M
.047	.375	.875	133B473M
.068	.406	1.000	133B683M
.082	.460	1.000	133B823M
.1	.460	1.000	133B104M
.15	.460	1.125	133B154M
.18	.500	1.125	133B184M
.22	.600	1.125	133B224M
.27	.655	1.437	133B274M
.39	.703	1.437	133B394M
.47	.734	1.562	133B474M

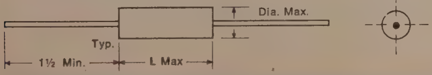
200 VOLTS DC WORKING

Capacitance µf	Diameter	Length	Cat. No.
.001	.218	.750	133C102M
.0015	.218	.750	133C152M
.0022	.218	.750	133C222M
.0033	.218	.750	133C332M
.0039	.218	.750	133C392M
.0047	.218	.750	133C472M
.0068	.234	.750	133C682M
.0082	.234	.750	133C822M
.01	.296	1.000	133C103M
.012	.296	1.000	133C123M
.015	.296	1.000	133C153M
.022	.318	1.000	133C223M
.027	.375	1.000	133C273M
.033	.375	1.000	133C333M
.039	.437	1.125	133C393M
.047	.437	1.125	133C473M
.068	.500	1.125	133C683M
.082	.562	1.375	133C823M
.1	.500	1.375	133C104M
.15	.625	1.375	133C154M
.18	.687	1.375	133C184M
.22	.687	1.812	133C224M
.27	.687	1.812	133C274M
.39	.875	1.812	133C394M
.47	1.000	1.812	133C474M

400 VOLTS DC WORKING

Capacitance µf	Diameter	Length	Cat. No.
.001	.218	.750	133E102M
.0015	.218	.750	133E152M
.0022	.218	.750	133E222M
.0033	.218	.750	133E332M
.0039	.218	.750	133E392M
.0047	.218	.750	133E472M
.0068	.234	.750	133E682M
.0082	.234	.750	133E822M
.01	.320	1.000	133E103M
.012	.320	1.000	133E123M
.015	.400	1.000	133E153M
.022	.400	1.000	133E223M
.027	.450	1.125	133E273M
.033	.450	1.125	133E333M
.039	.515	1.125	133E393M
.047	.515	1.125	133E473M
.068	.562	1.125	133E683M
.082	.562	1.375	133E823M
.1	.640	1.375	133E104M
.15	.640	1.812	133E154M
.18	.700	1.812	133E184M
.22	.750	1.812	133E224M
.27	.750	1.812	133E274M
.39	1.000	1.812	133E474M
.47	1.000	1.812	133E474M

CONFIGURATIONS



LEAD WIRE SIZE

No. 22 AWG. (.025) for cases up to .325 Dia.

No. 20 AWG. (.032) for cases .326 thru 1.0 Dia.

No. 18 AWG. (.040) for cases above 1.0 Dia.

Nytronics Components Group Inc.
ORANGE STREET, DARLINGTON, S. C. 29532
(803) 393-5421 • TWX 810-665-2182

CERAMIC TUBE CAPACITORS/ TYPE CT

PAPER DIELECTRIC-OIL IMPREGNATED U.L. APPROVED FOR "ACROSS-THE-LINE" USE

GENERAL

Type CT are mineral oil impregnated, paper and foil capacitors, non-inductively wound. The case is of steatite ceramic with epoxy resin endfill.

ELECTRICAL SPECIFICATION

Temperature Range: −40°C to +85°C with full rated voltage applied.

Dielectric Strength at 25°C.: The capacitors will withstand the following test voltage for 5 seconds when applied thru a current limiting resistor of not less than 20 OHMS per volt.

600 VDC and less: 250% of rated voltage.

Greater than 600 VDC: 200% of rated voltage.

Dissipation Factor: The dissipation factor shall not exceed 1.% when measured at +25°C. Units shall be measured at 1000 CPS for capacitance of 1. MFD and less, and 60 CPS for capacitance greater than 1. MFD.

Insulation Resistance:

Temperature	Megohms MFD	Megohms Need Not Exceed
25°C	2000	10,000
85°C	20	250

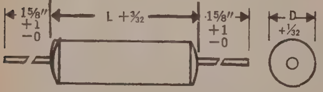
Humidity Test: The capacitor shall withstand continuous exposure at a relative humidity of 95% at a temperature of 40°C. for 250 hours. At the conclusion of the test, after drying in circulating air at room temperature for four hours, the insulation resistance shall not be less than one-third of the value shown in the specifications above.

Life Test: The capacitor shall withstand 150% of rated voltage at 85°C for 250 hours. Not more than one failure in twelve allowed. After life test, the insulation resistance shall not be less than one half of the initial requirements. Power factor shall not exceed 1.5% and the dielectric strength shall be the same as the initial requirements. All measurements at 25°C.

Underwriters' Laboratory Testing: Those capacitors rated .001 to .22 MFD and 400 or 600 WVDC shall meet or exceed the requirements of UL Subject 492 pertaining to antenna coupling, line by-pass and across-the-line components including the "UL Flame Test", "Across-The-Line Discharge Test" and "Expulsion Test". (See Nytronics Yellow Card Approval #E46325, dated 6 March, 1970.

TINNED COPPERWELD LEADS

Nominal Wire Dia.	Nominal Tube Dia.
#22 AWG (.025)	Thru .374 Dia.
#20 AWG (.032)	.375 thru .717 Dia.
#18 AWG (.040)	.718 & larger Dia.



Contact factory for the following:
1600 VDC
Intermediate values,
Type 177 (solid impregnate)

Smaller size, UL approval for antenna coupling and line-by-pass application.

Nytronics Part No.	Capacitance MFD	Dia.	Length	Nytronics Part No.	Capacitance MFD	Dia.	Length
200 VOLTS DC WORKING							
CT2-D1	.001	.300	.875	CT2-S47	.047	.400	1.187
CT2-D15	.0015	.300	.875	CT2-S68	.068	.467	1.437
CT2-D22	.0022	.300	.875	CT2-S82	.082	.540	1.437
CT2-D33	.0033	.300	.875	CT2-P1	.1	.540	1.437
CT2-D47	.0047	.300	.875	CT2-P12	.12	.548	1.500
CT2-D68	.0068	.300	.875	CT2-P15	.15	.640	1.875
CT2-D82	.0082	.300	.875	CT2-P22	.22	.640	1.875
CT2-S1	.01	.300	.875	CT2-P33	.33	.738	1.875
CT2-S12	.012	.340	.937	CT2-P39	.39	.738	1.875
CT2-S18	.018	.340	.937	CT2-P47	.47	.785	1.875
CT2-S22	.022	.400	1.187	CT2-P56	.56	.875	2.250
CT2-S27	.027	.400	1.187	CT2-P82	.82	.937	2.500
CT2-S33	.033	.400	1.187	CT2-1	1.	.937	2.750
400 VOLTS DC WORKING							
CT4-D1	.001	.300	.875	CT4-S47	.047	.540	1.437
CT4-D15	.0015	.300	.875	CT4-S56	.056	.548	1.500
CT4-D18	.0018	.300	.875	CT4-S68	.068	.562	1.625
CT4-D22	.0022	.300	.875	CT4-S82	.082	.562	1.625
CT4-D33	.0033	.300	.875	CT4-P1	.1	.640	1.750
CT4-D47	.0047	.300	.875	CT4-P12	.12	.640	1.875
CT4-D68	.0068	.340	.937	CT4-P15	.15	.738	1.875
CT4-D82	.0082	.375	1.000	CT4-P18	.18	.785	1.875
CT4-S1	.01	.375	1.000	CT4-P22	.22	.812	2.000
CT4-S12	.012	.400	1.187	CT4-P27	.27	.875	2.250
CT4-S15	.015	.400	1.187	CT4-P33	.33	.875	2.250
CT4-S22	.022	.467	1.250	CT4-P39	.39	.937	2.500
CT4-S33	.033	.467	1.250	CT4-P47	.47	.937	2.500
CT4-S39	.039	.540	1.437				
600 VOLTS DC WORKING							
CT6-D1	.001	.340	.937	CT6-S47	.047	.540	1.437
CT6-D15	.0015	.340	.937	CT6-S56	.056	.640	1.750
CT6-D22	.0022	.340	.937	CT6-S68	.068	.640	1.750
CT6-D33	.0033	.340	.937	CT6-S82	.082	.640	1.875
CT6-D47	.0047	.340	.937	CT6-P1	.1	.640	1.875
CT6-D68	.0068	.400	1.187	CT6-P12	.12	.738	1.875
CT6-D82	.0082	.400	1.187	CT6-P15	.15	.785	1.875
CT6-S1	.01	.400	1.187	CT6-P18	.18	.785	1.875
CT6-S12	.012	.400	1.187	CT6-P22	.22	.812	2.000
CT6-S15	.015	.400	1.187	CT6-P27	.27	.937	2.500
CT6-S22	.022	.467	1.250	CT6-P33	.33	.937	2.500
CT6-S33	.033	.540	1.437	CT6-P39	.39	.937	2.750
CT6-S39	.039	.540	1.437	CT6-P47	.47	.937	2.750
1000 VOLTS DC WORKING							
CT10-D1	.001	.340	.937	CT10-S22	.022	.540	1.437
CT10-D15	.0015	.340	.937	CT10-S25	.025	.548	1.500
CT10-D18	.0018	.340	.937	CT10-S27	.027	.548	1.500
CT10-D22	.0022	.340	.937	CT10-S33	.033	.640	1.750
CT10-D27	.0027	.400	1.187	CT10-S39	.039	.640	1.750
CT10-D33	.0033	.400	1.187	CT10-S47	.047	.640	1.750
CT10-D39	.0039	.400	1.187	CT10-S56	.056	.738	1.875
CT10-D47	.0047	.400	1.187	CT10-S82	.082	.785	1.875
CT10-D68	.0068	.400	1.187	CT10-P1	.1	.785	1.875
CT10-D82	.0082	.400	1.187	CT10-P12	.12	.812	2.125
CT10-S1	.01	.400	1.187	CT10-P15	.15	.812	2.125
CT10-S12	.012	.467	1.250	CT10-P18	.18	.937	2.500
CT10-S15	.015	.467	1.250	CT10-P22	.22	.937	2.500

NYTRONICS CATALOG NUMBERING SYSTEM

CT — Nytronics Type

2 — Rated Voltage In Hundreds
2 = 200 VDC
4 = 400 VDC
6 = 600 VDC
10 = 1000 VDC
16 = 1600 VDC

P — Capacitance
D = .001 to .0099 μF
S = .01 to .099 μF
P = .1 to .99 μF
No Letter = 1 μF or greater

22 — Capacitance Significant Figures

Example — A Type CT Capacitor rated .22 μF, 200 WVDC is described by CT2-P22
A Type CT Capacitor rated .022 μF, 400 WVDC is described by CT4-S22

Nytronics Components Group Inc.
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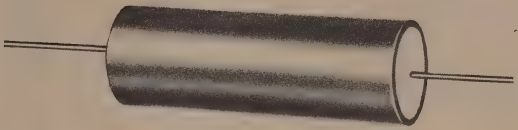
TUBULAR CAPACITORS

HIGH VOLTAGE TUBULAR CAPACITORS DUAL DIELECTRIC/OIL IMPREGNATED PHENOLIC CASED/EPOXY END FILL/TYPE 161



TYPE 161

RECOMMENDED APPLICATIONS

Nytronics Type 161 Capacitors are well-suited for use in Oscilloscopes, Electronic Air Cleaners, Power Supplies of industrial devices, and related equipment. The design of these capacitors employs a Paper/Polyester Film Section, oil impregnated, incased in a phenolic tube designed specifically for high voltage application. A unique epoxy endfill process precludes oil seepage which occasionally occurs in similar designs.

TYPICAL RATINGS

CAP/MFD	3000 VDC	5000 VDC	8000 VDC	10,000 VDC
.005	½ x 1½	9⁄16 x 1⅞	¾ x 2	¾ x 2½
.01	9⁄16 x 1⅞	¾ x 1⅞	¾ x 2¼	⅞ x 2½
.05	¾ x 21⁄16	1 x 2½	1 x 4¼	1½ x 3⅛

NOTE: Other Ratings can be designed to your specifications.

OPERATING TEMPERATURE

−55°C to +85°C at full rated voltage.

DISSIPATION FACTOR

Will not exceed 1% at 25°C.

MEASUREMENTS

Capacitance up to 1 microfarad are measured at a frequency of 1000 cycles per second and capacitances over 1 microfarad at 60 cps.

DIELECTRIC STRENGTH TEST

Units will withstand a potential of 150% of rated voltage applied for one minute at 25°C.

STANDARD TOLERANCE

±20%. Other tolerances available on request.

STANDARD MARKING

Nytronics, Part No., Capacitance, Voltage, and Date Code.

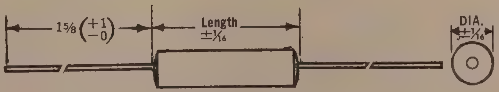
INSULATION RESISTANCE

When measured at the applicable test temperature with an electrification time of two minutes at 500 volts shall be equal to or greater than the values listed below:

Test Temperature	25°C	85°C
Megohms X Microfarads	2000	10
except that the insulation resistance in megohms need not exceed	25000	250

MOISTURE RESISTANCE

These capacitors will meet the moisture resistance requirements of EIA Specification RS-164, which requires units to withstand a 95% Relative Humidity at 40°C, except time of exposure may be increased to 500 hours. After exposure and subsequent drying periods, the insulation resistance will not be less than ⅓ of the initial requirement.



Tinned Copperweld Leads #20 AWG (.032) for sizes to ⅝″ Dia.
#18 AWG (.040) for sizes ⅝″ Dia. and over.

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POLYESTER CAPACITORS

METALLIZED POLYESTER CAPACITORS TYPE 188 FILM WRAP / EPOXY END FILL −55°C TO +125°C

Type 188 Capacitors features extremely small size, light weight and self clearing metallized construction which virtually eliminates catastrophic failures. Well suited for Voltage Multiplier Circuits in TV power supplies and Electrostatic copiers. Also ideal for Potting or encapsulating in Electronic Sub assemblies, Power supplies, etc.

CAPACITANCE

Measurements shall be made at 1000 cycles per second for capacitance values thru 1. MFD and at 60 cycles per second for values over 1. MFD.

CAPACITANCE TOLERANCE

Standard capacitance tolerance is ±20% (M). Closer tolerances available upon request.

DISSIPATION FACTOR

The dissipation factor shall not exceed 1% when measured at 25°C. Measurements shall be made at 1000 Hz for capacitance values thru 1. MF and at 60 Hz for higher values.

TEST VOLTAGE

Capacitors shall withstand 200% of rated DC voltage for one minute at 25°, with the charging and discharge current limited to a maximum of 1. Ampere.

OPERATING TEMPERATURES

−55°C to +125°C.

LIFE TEST

Capacitors shall withstand a life test of 250 hours at 125°C, with 140% of the 125°C rated DC voltage applied. A resistance of one ohm per volt of applied voltage shall be inserted in series with the capacitor.

VOLTAGE DERATING

These capacitors will operate as full DC voltage ratings at 85°C. For operation at temperatures above 85°C, see Figure 4.

VIBRATION

Capacitors shall withstand a vibration test per Method 204, Test condition B of MIL-STD-202B as modified by MIL-C-27287. After test, the I.R. will be equal to or greater than 1/3 of the initial requirement.

INSULATION RESISTANCE

Temperature	Megohms x MF	IR Need Not Exceed Megohms
25°C	20,000	50,000
85°C	1,000	5,000
125°C	10	100

Measurements, shall be made after two minutes charge at rated voltage or 500 VDC, whichever is less.

HUMIDITY TEST

These capacitors shall meet the humidity test requirements of MIL-STD-202 Method, 103B, Test condition B. After testing, the I.R. will be equal to or greater than 1/3 of the initial requirement.

NOMENCLATURE

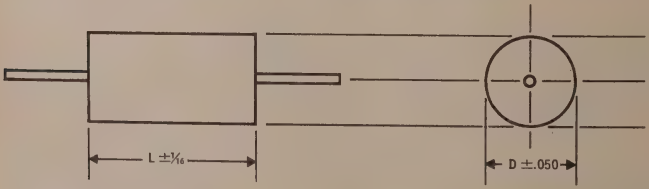
188 E 104 M

Case Style
188 - Cylindrical
189 - Flat Oval

DC Rated Voltage
B = 100 VDC
C = 200 VDC
E = 400 VDC
F = 600 VDC

Capacitance
Expressed in pf, first two digits are significant figures, third digit indicates number of zeroes following first two digits.

Capacitance Tolerance
M = ±20%
K = ±10%
J = ±5%



Capacitance	Diameter	Length	Cat. No.

100 VOLTS DC WORKING

Capacitance	Diameter	Length	Cat. No.
.010	.16	.40	188B103M
.012	.16	.40	188B123M
.015	.16	.40	188B153M
.018	.16	.40	188B183M
.022	.16	.40	188B223M
.027	.16	.40	188B273M
.033	.16	.40	188B333M
.039	.18	.40	188B393M
.047	.20	.40	188B473M
.056	.16	.53	188B563M
.068	.16	.53	188B683M
.082	.17	.53	188B823M
.10	.19	.53	188B104M
.12	.20	.53	188B124M
.15	.19	.65	188B154M
.18	.21	.65	188B184M
.22	.23	.65	188B224M
.27	.25	.65	188B274M
.33	.27	.65	188B334M
.39	.29	.65	188B394M
.47	.26	.78	188B474M
.56	.28	.78	188B564M
.68	.30	.78	188B684M
.82	.33	.78	188B824M
1.0	.36	.78	188B105M
1.2	.34	.97	188B125M
1.5	.37	.97	188B155M
2.0	.42	.97	188B205M
2.5	.42	1.17	188B255M
3.0	.45	1.17	188B305M
3.5	.49	1.17	188B355M
4.0	.52	1.17	188B405M
4.5	.49	1.45	188B455M
5.0	.52	1.45	188B505M

200 VOLTS DC WORKING

Capacitance	Diameter	Length	Cat. No.
.010	.16	.40	188C103M
.012	.17	.40	188B123M
.015	.19	.40	188C153M
.018	.21	.40	188C183M
.022	.16	.53	188C223M
.027	.17	.53	188C273M
.033	.19	.53	188C333M
.039	.20	.53	188C393M
.047	.18	.65	188C473M
.056	.20	.65	188C563M
.068	.21	.65	188C683M
.082	.23	.65	188C823M
.10	.25	.65	188C104M
.12	.27	.65	188C124M
.15	.30	.65	188C154M
.18	.27	.78	188C184M
.22	.30	.78	188C224M
.27	.32	.78	188C274M
.33	.35	.78	188C334M
.39	.33	.97	188C394M
.47	.35	.97	188C474M
.56	.38	.97	188C564M
.68	.42	.97	188C684M
.82	.46	.97	188C824M
1.0	.45	1.17	188C105M
1.2	.49	1.17	188C125M
1.5	.54	1.17	188C155M
2.0	.56	1.45	188C205M
2.5	.61	1.45	188C255M
3.0	.67	1.45	188C305M
3.5	.65	1.68	188C355M
4.0	.69	1.68	188C405M
4.5	.73	1.68	188C455M
5.0	.77	1.68	188C505M

Lead Sizes
.160 dia. — .250 = .020
.251 dia. — .500 = .025
.501 dia. & over = .032

METALLIZED POLYESTER CAPACITORS TYPE 188 FILM WRAP / EPOXY END FILL −55°C TO +125°C (CONT'D)

FIGURE 1
Type 188 and 189 Capacitors Typical Capacitance Change vs. Temperature

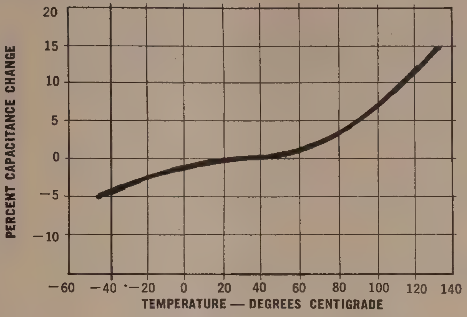


FIGURE 2
Type 188 and 189 Capacitors Typical Dissipation Factor vs. Temperature

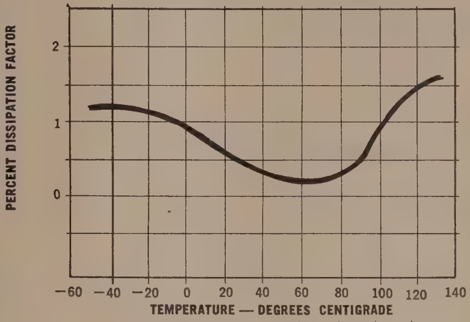


FIGURE 3
Type 188 and 189 Capacitors Insulation Resistance vs. Temperature

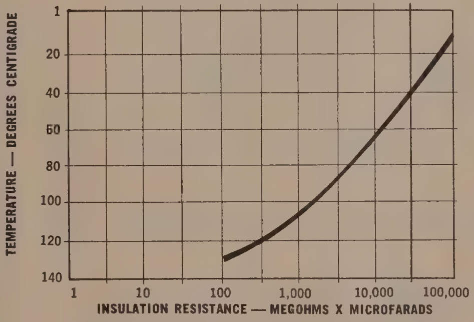
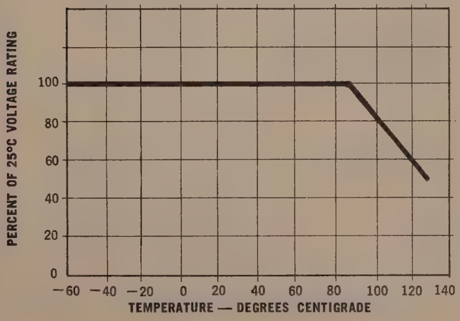


FIGURE 4
Type 188 and 189 Capacitors Temperature Derating Chart



400 VOLTS DC WORKING

Capacitance	Diameter	Length	Cat. No.
.010	.20	.40	188E103M
.012	.16	.53	188E123M
.015	.17	.53	188E153M
.018	.19	.53	188E183M
.022	.20	.53	188E223M
.027	.18	.65	188E273M
.033	.20	.65	188E333M
.039	.21	.65	188E393M
.047	.23	.65	188E473M
.056	.25	.65	188E563M
.068	.27	.65	188E683M
.082	.25	.78	188E823M
.10	.27	.78	188E104M
.12	.29	.78	188E124M
.15	.32	.78	188E154M
.18	.35	.78	188E184M
.22	.33	.97	188E224M
.27	.36	.97	188E274M
.33	.39	.97	188E334M
.39	.42	.97	188E394M
.47	.46	.97	188E474M
.56	.44	1.17	188E564M
.68	.48	1.17	188E684M
.82	.54	1.17	188E824M
1.0	.53	1.45	188E105M
1.2	.57	1.45	188E125M
1.5	.63	1.45	188E155M
2.0	.65	1.68	188E205M
2.5	.73	1.68	188E255M
3.0	.79	1.68	188E305M
3.5	.85	1.68	188E355M
4.0	.78	2.25	188E405M
4.5	.83	2.25	188E455M
5.0	.87	2.25	188E505M

600 VOLTS DC WORKING

.010	.20	.53	188F103M
.012	.18	.65	188F123M
.015	.20	.65	188F153M
.018	.22	.65	188F183M
.022	.23	.65	188F223M
.027	.25	.65	188F273M
.033	.28	.65	188F333M
.039	.26	.78	188F393M
.047	.28	.78	188F473M
.056	.30	.78	188F563M
.068	.32	.78	188F683M
.082	.35	.78	188F823M
.10	.33	.97	188F104M
.12	.35	.97	188F124M
.15	.39	.97	188F154M
.18	.44	.97	188F184M
.22	.42	1.17	188F224M
.27	.45	1.17	188F274M
.33	.50	1.17	188F334M
.39	.55	1.17	188F394M
.47	.54	1.45	188F474M
.56	.58	1.45	188F564M
.68	.63	1.45	188F684M
.82	.63	1.68	188F824M
1.0	.69	1.68	188F105M
1.2	.75	1.68	188F125M
1.5	.84	1.68	188F155M
2.0	.83	2.25	188F205M
2.5	.92	2.25	188F255M
3.0	1.00	2.25	188F305M

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POLYESTER CAPACITORS

METALLIZED POLYESTER CAPACITORS TYPE 189 FILM WRAP / EPOXY END FILL −55°C TO +125°C

Type 189 Capacitors features extremely small size, light weight and self clearing metallized construction which virtually eliminates catastrophic failures. Well suited for Voltage Multiplier Circuits in TV power supplies and Electrostatic copiers. Also ideal for Potting or encapsulating in Electronic Sub assemblies, Power supplies, etc.

CAPACITANCE

Measurements shall be made at 1000 cycles per second for capacitance values thru 1. MFD and at 60 cycles per second for values over 1. MFD.

CAPACITANCE TOLERANCE

Standard capacitance tolerance is ±20% (M). Closer tolerances available upon request.

DISSIPATION FACTOR

The dissipation factor shall not exceed 1% when measured at 25°C. Measurements shall be made at 1000 Hz for capacitance values thru 1. MF and at 60 Hz for higher values.

TEST VOLTAGE

Capacitors shall withstand 200% of rated DC voltage for one minute at 25°, with the charging and discharge current limited to a maximum of 1. Ampere.

OPERATING TEMPERATURES

−55°C to +125°C.

LIFE TEST

Capacitors shall withstand a life test of 250 hours at 125°C, with 140% of the 125°C rated DC voltage applied. A resistance of one ohm per volt of applied voltage shall be inserted in series with the capacitor.

VOLTAGE DERATING

These capacitors will operate as full DC voltage ratings at 85°C. For operation at temperatures above 85°C, see Figure 4.

VIBRATION

Capacitors shall withstand a vibration test per Method 204, Test condition B of MIL-STD-202B as modified by MIL-C-27287.

INSULATION RESISTANCE

Temperature	Megohms x MF	IR Need Not Exceed Megohms
25°C	20,000	50,000
85°C	1,000	5,000
125°C	10	100

Measurements, shall be made after two minutes charge at rated voltage or 500 VDC, whichever is less.

HUMIDITY TEST

These capacitors shall meet the humidity test requirements of MIL-STD-202 Method, 103B, Test condition B. After testing, the I.R. will be equal to or greater than ⅓ of the initial requirement.

NOMENCLATURE

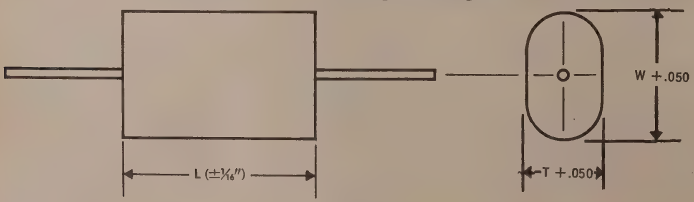
189 E 104 M

Case Style
188 - Cylindrical
189 - Flat Oval

DC Rated Voltage
B = 100 VDC
C = 200 VDC
E = 400 VDC
F = 600 VDC

Capacitance
Expressed in pf, first two digits are significant figures, third digit indicates number of zeroes following first two digits.

Capacitance Tolerance
M = ±20%
K = ±10%
J = ±5%



Capacitance	Thickness	Width	Length	Cat. No.
100 VOLTS DC WORKING				
.010	.10	.20	.40	189B103M
.012	.10	.20	.40	189B123M
.015	.10	.20	.40	189B153M
.018	.10	.20	.40	189B183M
.022	.10	.20	.40	189B223M
.027	.10	.20	.40	189B273M
.033	.10	.20	.40	189B333M
.039	.10	.20	.40	189B393M
.047	.10	.22	.40	189B473M
.056	.11	.24	.40	189B563M
.068	.10	.20	.53	189B683M
.082	.10	.20	.53	189B823M
.10	.10	.20	.53	189B104M
.12	.10	.23	.53	189B124M
.15	.12	.25	.53	189B154M
.18	.14	.27	.53	189B184M
.22	.17	.30	.53	189B224M
.27	.19	.32	.53	189B274M
.33	.21	.34	.53	189B334M
.39	.24	.37	.53	189B394M
.47	.21	.34	.65	189B474M
.56	.23	.36	.65	189B564M
.68	.27	.40	.65	189B684M
.82	.24	.37	.78	189B824M
1.0	.26	.42	.78	189B105M
1.2	.29	.45	.78	189B125M
1.5	.33	.49	.78	189B155M
2.0	.32	.48	.97	189B205M
2.5	.36	.52	.97	189B255M
3.0	.35	.51	1.17	189B305M
3.5	.38	.54	1.17	189B355M
4.0	.41	.57	1.17	189B405M
4.5	.44	.60	1.17	189B455M
5.0	.47	.63	1.17	189B505M
6.0	.52	.68	1.17	189B605M
8.0	.46	.62	1.68	189B805M
10.0	.53	.69	1.68	189B106M
200 VOLTS DC WORKING				
.010	.10	.20	.40	189C103M
.012	.10	.20	.40	189C123M
.012	.10	.20	.40	189C153M
.018	.13	.23	.40	189B183M
.022	.13	.26	.40	189C223M
.027	.10	.20	.53	189C273M
.033	.12	.22	.53	189C333M
.039	.12	.25	.53	189C393M
.047	.13	.26	.53	189C473M
.056	.14	.27	.53	189C563M
.068	.16	.29	.53	189C683M
.082	.18	.31	.53	189C823M
.10	.20	.33	.53	189C104M
.12	.22	.35	.53	189C124M
.15	.26	.39	.53	189C154M
.18	.24	.37	.65	189C184M
.22	.26	.39	.65	189C224M
.27	.24	.37	.78	189C274M
.33	.27	.40	.78	189C334M
.39	.30	.43	.78	189C394M
.47	.33	.46	.78	189C474M
.56	.37	.50	.78	189C564M
.68	.32	.48	.97	189C684M
.82	.35	.51	.97	189C824M
1.0	.35	.51	1.17	189C105M
1.2	.38	.54	1.17	189C125M
1.5	.43	.59	1.17	189C155M
2.0	.52	.68	1.17	189C205M
2.5	.46	.62	1.68	189C255M
3.0	.49	.65	1.68	189C305M
3.5	.54	.70	1.68	189C355M
4.0	.58	.74	1.68	189C405M
4.5	.62	.78	1.68	189C455M
5.0	.64	.84	1.68	189C505M
6.0	.70	.90	1.68	189C605M
8.0	.84	1.04	1.68	189C805M
10.0	.75	.95	2.25	189C106M

Lead Sizes

Nom. Body Length	Lead Dia.
Thru .530	.020
.650 thru .970	.025
Above .970	.032

Nytronics Components Group Inc.

ORANGE STREET, DARLINGTON, S. C. 29532
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POLYESTER CAPACITORS

METALLIZED POLYESTER CAPACITORS TYPE 189 FILM WRAP / EPOXY END FILL −55°C TO +125°C (CONT'D)

FIGURE 1
Type 188 and 189 Capacitors Typical Capacitance Change vs. Temperature

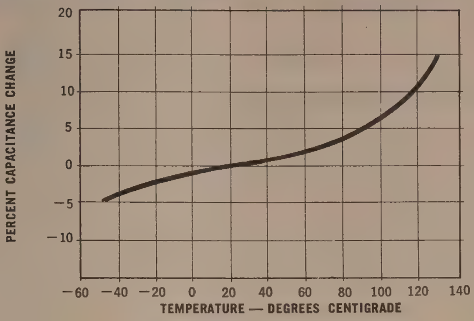


FIGURE 2
Type 188 and 189 Capacitors Typical Dissipation Factor vs. Temperature

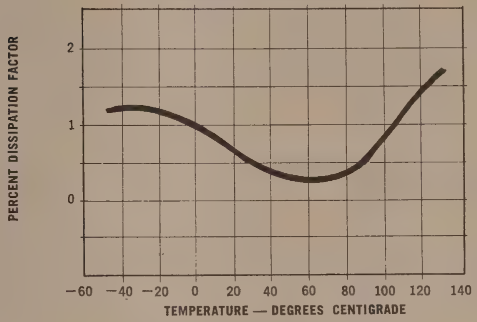


FIGURE 3
Type 188 and 189 Capacitors Typical Insulation Resistance vs. Temperature

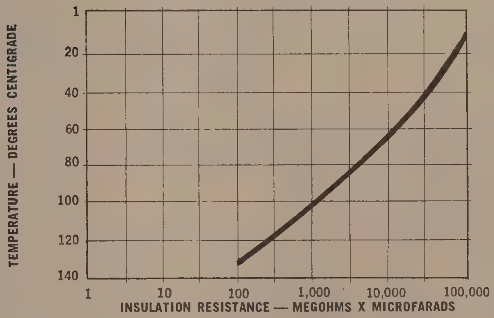
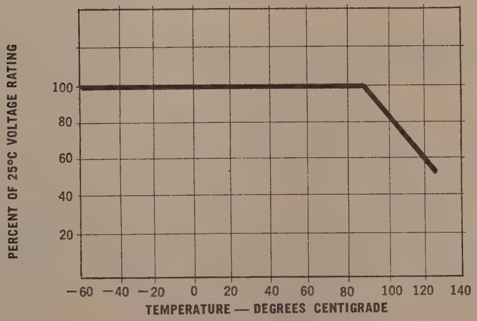


FIGURE 4
Type 188 and 189 Capacitors Temperature Derating Chart



Capacitance	Thickness	Width	Length	Cat. No.
400 VOLTS DC WORKING				
.010	.14	.24	.40	189E103M
.012	.10	.23	.53	189E123M
.015	.11	.21	.53	189E153M
.018	.12	.22	.53	189E183M
.022	.12	.25	.53	189E223M
.027	.13	.26	.53	189E273M
.033	.15	.28	.53	189E333M
.039	.17	.30	.53	189E393M
.047	.19	.32	.53	189E473M
.056	.21	.34	.53	189E563M
.068	.23	.36	.53	189E683M
.082	.26	.39	.53	189E823M
.10	.23	.36	.65	189E104M
.12	.25	.38	.65	189E124M
.15	.24	.37	.78	189E154M
.18	.26	.39	.78	189E184M
.22	.30	.43	.78	189E224M
.27	.33	.46	.78	189E274M
.33	.36	.52	.78	189E334M
.39	.33	.49	.97	189E394M
.47	.33	.53	.97	189E474M
.56	.34	.50	1.17	189E564M
.68	.38	.54	1.17	189E684M
.82	.43	.59	1.17	189E824M
1.0	.48	.64	1.17	189E105M
1.2	.54	.70	1.17	189E125M
1.5	.46	.62	1.68	189E155M
2.0	.54	.70	1.68	189E205M
2.5	.60	.80	1.68	189E255M
3.0	.67	.87	1.68	189E305M
3.5	.73	.93	1.68	189E355M
4.0	.78	.98	1.68	189E405M
4.5	.69	.89	2.25	189E455M
5.0	.75	.95	2.25	189E505M
600 VOLTS DC WORKING				
.010	.12	.25	.53	189F103M
.012	.13	.26	.53	189F123M
.015	.15	.28	.53	189F153M
.018	.17	.30	.53	189F183M
.022	.19	.32	.53	189F223M
.027	.21	.34	.53	189F273M
.033	.24	.37	.53	189F333M
.039	.21	.34	.65	189F393M
.047	.24	.37	.65	189F473M
.056	.22	.35	.78	189F563M
.068	.25	.38	.78	189F683M
.082	.27	.40	.78	189F823M
.10	.30	.43	.78	189F104M
.12	.32	.48	.78	189F124M
.15	.36	.52	.78	189F154M
.18	.33	.49	.97	189F184M
.22	.37	.53	.97	189F224M
.27	.36	.52	1.17	189F274M
.33	.40	.56	1.17	189F334M
.39	.44	.60	1.17	189F394M
.47	.49	.65	1.17	189F474M
.56	.41	.57	1.68	189F564M
.68	.45	.61	1.68	189F684M
.82	.51	.67	1.68	189F824M
1.0	.58	.74	1.68	189F105M
1.2	.64	.80	1.68	189F125M
1.5	.73	.89	1.68	189F155M
2.0	.69	.89	2.25	189F205M
2.5	.80	1.00	2.25	189F225M
3.0	.87	1.07	2.25	189F305M

INTERMEDIATE VALUES AVAILABLE.

Nytronics Components Group Inc.
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METALLIZED PAPER/ MYLAR* CAPACITORS

METALLIZED PAPER/MYLAR* CAPACITORS HERMETICALLY SEALED TYPE 230

ELECTRICAL AND ENVIRONMENTAL CHARACTERISTICS

1. CAPACITANCE MEASUREMENTS

Capacitors of 1.0 μF or less shall be measured at a frequency of 1000 Hz. Capacitors greater than 1.0 μF measured at 60 Hz.

The standard capacitance tolerance is 20%. Other tolerances are available upon request.
Reference: MIL-STD-202, Method 305.

2. TEMPERATURE CHARACTERISTICS

The maximum change in capacitance from the measured value at +25°C shall be as follows:
Characteristic: N — Temperature: −55°C — Max. Change: −15%.

3. DISSIPATION FACTOR

When measured as specified in Paragraph 1, the dissipation factor at +25°C shall not exceed 1.0%.

4. INSULATION RESISTANCE

When measured at 25°C, and rated voltage (or 500 VDC, whichever is less), the insulation resistance shall be as follows:
Characteristic: N — Megohms x Microfarads: 2,000 — Need Not Exceed (Megohms): 12,000.
Reference: MIL-STD-202, Method 302.

5. VOLTAGE DERATING

The capacitors may be operated at full rated voltage from −55°C to +125°C.

6. VOLTAGE TEST

When tested at +25°C, the capacitors shall withstand the indicated DC test voltages for a period of one minute:

Terminal to terminal	200% of DC rating
Terminal to case (where case is not a terminal)	200% of DC rating

Reference: MIL-STD-202, Method 301.

7. LIFE TESTING

When tested for 1000 hours at 140% of the full rated voltage for the test temperature, the capacitors shall exhibit no more than one failure in twelve pieces tested. A failure is defined as:
- a) A capacitance change of more than 10% of its initial value;
- b) A dissipation factor greater than that specified in Paragraph 3;
- c) An insulation resistance less than 1/3 that specified in Paragraph 4; or
- d) A permanent open or short.

8. VIBRATION

The capacitors will meet or exceed the vibration requirements of MIL-STD-202, Method 204, Condition B.

NYTRONICS CATALOG NUMBERING SYSTEM

230 A 3 E 104 M 2

NYTRONICS TYPE
230 Metallized
Paper/Mylar

TERMINALS
Wire Leads
No. 22 AWG. (.025)
for case Dia. .312 and under
No. 20 AWG. (.032)
for case Dia. over .312

CIRCUIT
Circuit 1 Circuit 3

DC RATED VOLTAGE
C = 200
E = 400
F = 600

CAPACITANCE
In uuf. The first two digits are the significant figures, the third is the number of zeroes.

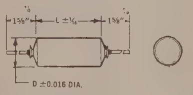
CAPACITANCE TOLERANCE
M = ±20%
K = ±10%
J = ±5%

STYLE

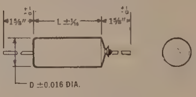
METALLIZED DIELECTRIC CAPACITORS HERMETICALLY SEALED TYPE 230

BASIC STYLES

Circuit1



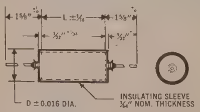
Circuit 3*



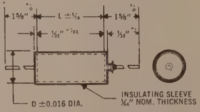
* Deduct 1/16" from L

STYLE 2

Circuit 1

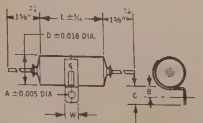


Circuit 3



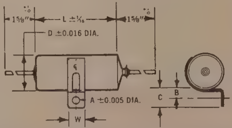
STYLE 7

Circuit 1



D	W	A	B±1/32	C	
235	¼	.144	.187	312	±1/32
.312	¼	144	187	.312	±1/32
.400	¼	144	.187	312	±1/32
562	½	.156	250	.437	±1/16
670	½	.156	.250	437	±1/16
.750	½	.156	.250	437	±1/16
1.000	½	.156	250	437	±1/16

Circuit 3



TYPE 230 METALLIZED PAPER/ MYLAR OPERATION TEMP. AT −55°C TO +125°C

Nytronics Part Number	Capacitance μf	Dia. ±1/32	Length ±1/16
200 VOLTS DC WORKING			
230A1C103M	.01	.175	¾
230A1C123M	.012	.195	¾
230A1C153M	.015	.195	¾
230A1C183M	.018	.235	¾
230A1C223M	.022	.235	¾
230A1C273M	.027	.235	¾
230A1C333M	.033	.235	¾
230A1C393M	.039	.312	27/32
230A1C473M	.047	.312	27/32
230A1C563M	.056	.312	27/32
230A1C683M	.068	.312	27/32
230A1C823M	.082	.312	27/32
230A1C104M	† .1	.312	27/32
230A1C124M	.12	.312	1⅛
230A1C154M	.15	.312	1⅛
230A1C184M	.18	.312	1⅛
230A1C224M	† .22	.312	1⅛
230A1C274M	.27	.400	1⅛
230A1C334M	.33	.400	1⅛
230A1C394M	.39	.400	1⅛
230A1C474M	† .47	.400	1⅛
230A1C564M	.56	.500	1⅛
230A1C684M	.68	.500	1⅛
230A1C824M	.82	.562	1⅛
230A1C105M	† 1.	.562	1⅛
230A1C155M	† 1.5	.562	1 27/32
230A1C205M	2.	.562	1 27/32
230A1C225M	† 2.2	.562	1 27/32
230A1C335M	† 3.3	.670	1⅞
230A1C475M	† 4.7	1.000	1⅞
230A1C685M	† 6.8	1.000	1⅞
230A1C106M	†10.	1.000	2⅜
230A1C126M	†12.	1.000	2⅝
400 VOLTS DC WORKING			
230A1E103M	.01	.312	13/16
230A1E123M	.012	.312	13/16
230A1E153M	.015	.312	13/16
230A1E183M	.018	.312	13/16
230A1E223M	.022	.312	13/16
230A1E273M	.027	.312	1⅛
230A1E333M	.033	.312	1⅛
230A1E393M	.039	.312	1⅛
230R1E473M	† .047	.312	1⅛
230R1E563M	.056	.400	1⅛
230R1E683M	.068	.400	1⅛
230A1E823M	.082	.400	1⅛
230R1E104M	† .1	.400	1⅛
230A1E124M	.12	.500	1⅛
230A1E154M	.15	.500	1⅛
230A1E184M	.18	.562	1⅛
230A1E224M	† .22	.562	1⅛
230A1E274M	.27	.562	1⅝
230A1E334M	.33	.562	1⅝
230A1E394M	.39	.562	1⅝
230A1E474M	† .47	.562	1⅝
230A1E564M	.56	.670	1⅞
230A1E684M	.68	.670	1⅞
230A1E824M	.82	.750	1⅞
230A1E105M	† 1.	.750	1⅞
230A1E155M	1.5	1.000	1⅞
230A1E205M	2.	1.000	1⅞
230A1E225M	† 2.2	1.000	1⅞
230A1E335M	† 3.3	1.000	2⅝
600 VOLTS DC WORKING			
230A1F103M	† .01	.312	13/16
230A1F123M	.012	.312	13/16
230A1F153M	.015	.312	13/16
230A1F183M	.018	.312	13/16
230A1F223M	† .022	.312	13/16
230A1F273M	.027	.312	1⅛
230A1F333M	.033	.312	1⅛
230A1F393M	.039	.400	1⅛
230A1F473M	† .047	.400	1⅛
230A1F563M	.056	.400	1⅛
230A1F683M	.068	.400	1⅛
230A1F823M	.082	.500	1⅛
230A1F104M	† .1	.500	1⅛
230A1F124M	.12	.562	1⅛
230A1F154M	.15	.562	1⅛
230A1F184M	.18	.562	1⅜
230A1F224M	† .22	.562	1⅜
230A1F274M	.27	.562	1⅝
230A1F334M	.33	.652	1⅝
230A1F394M	.39	.670	1⅝
230A1F474M	† .47	.670	1⅝
230A1F564M	.56	.670	1⅞
230A1F684M	.68	.670	1⅞
230A1F824M	.82	1.000	1⅞
230A1F105M	† 1.	1.000	1⅞
230A1F155M	† 1.5	1.000	1⅞
230A1F205M	2.	1.000	2⅛
230A1F225M	† 2.2	1.000	2⅝

† Denotes MIL Values * DuPont TM

Nytronics Components Group Inc.
ORANGE STREET, DARLINGTON, S. C. 29532
(803) 393-5421 • TWX 810-665-2182

POLYSTYRENE FILM CAPACITORS

POLYSTYRENE FILM CAPACITORS HERMETICALLY SEALED TYPE 231 −65°C to +85°C

ELECTRICAL AND ENVIRONMENTAL CHARACTERISTICS

1. CAPACITANCE MEASUREMENTS

Capacitors of 1.0 µF or less shall be measured at a frequency of 1000 Hz. Capacitors greater than 1.0 µF measured at 60 Hz.
Tolerances of ±20%, ±10%, ±5%, ±2%, ±1% are standard. Tolerances closer than ±1% are available upon request.
Reference: MIL-STD-202, Method 305.

2. TEMPERATURE/CHARACTERISTICS AND STABILITY

When measured over the full operating range, the Temperature Coefficient shall be −120 ppm/°C ±30 ppm/°C.
There shall be less than 0.1% change per year in capacitance when operated between +20°C and +50°C. When cycled from −55°C to +75°C, the capacitance shall not vary more than 0.2% from its initial measurement.

3. DISSIPATION FACTOR

When measured as specified in Paragraph 1, the dissipation factor at +25°C shall not exceed 0.1%.

4. INSULATION RESISTANCE

When measured at +25°C, and rated voltage (or 500 VDC, whichever is less), the insulation resistance shall be a minimum of 200,000 megohm-microfarads, but need not exceed 500,000 megohms. The period of electrification shall not exceed two minutes.
Reference: MIL-STD-202, Method 302.

5. VOLTAGE DERATING

The capacitors may be operated at full rated voltage from −55°C to +85°C.

6. VOLTAGE TEST

When tested at +25°C, the capacitors shall withstand the indicated DC test voltages for a period of one minute:

Terminal to terminal	200% of DC rating
Terminal to case	200% of DC rating

Reference: MIL-STD-202, Method 301.

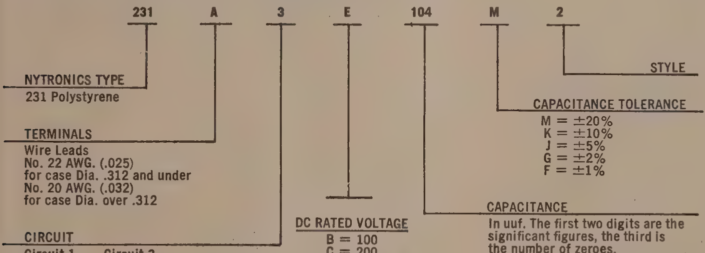
7. LIFE TESTING

When tested at 85°C for 250 hours at 140% of the rated voltage, the capacitors shall exhibit no more than one failure in twelve pieces tested. A failure is defined as:
a) A capacitance change of more than 6% of its initial value;
b) A dissipation factor greater than that specified in Paragraph 3;
c) An insulation resistance less than 60% that specified in Paragraph 4; or
d) A permanent open or short.

8. VIBRATION

The capacitors will meet or exceed the vibration requirements of MIL-STD-202, METHOD 201.

NYTRONICS CATALOG NUMBERING SYSTEM



NYTRONICS TYPE
231 Polystyrene

TERMINALS
Wire Leads
No. 22 AWG. (.025)
for case Dia. .312 and under
No. 20 AWG. (.032)
for case Dia. over .312

CIRCUIT
Circuit 1 Circuit 3

DC RATED VOLTAGE
B = 100
C = 200
E = 400
F = 600

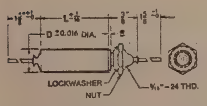
CAPACITANCE
In uuf. The first two digits are the significant figures, the third is the number of zeroes.

CAPACITANCE TOLERANCE
M = ±20%
K = ±10%
J = ±5%
G = ±2%
F = ±1%

STYLE

CONFIGURATIONS

Circuit 1



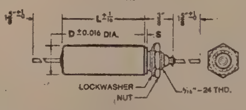
STYLE 3

D	S
.400	.020
.562 and up	.031

Minimum D=.400″

Circuit 3

Deduct 1/16 from L



CONFIGURATIONS ALSO AVAILABLE BASIC STYLE / STYLE 2 STYLE 7 — SEE METALLIZED PAPER/MYLAR CAPACITORS ON PREVIOUS PAGE.

STANDARD RATINGS

100 VOLTS DC WORKING

Nytronics Part No.	Capacitance µf	Dia. ±.016	Length ±1/16
231A1B822K	.0082	.235	15/16
231A1B103K	.01	.235	15/16
231A1B123K	.012	.235	15/16
231A1B153K	.015	.235	15/16
231A1B183K	.018	.312	15/16
231A1B223K	.022	.312	15/16
231A1B273K	.027	.312	15/16
231A1B333K	.033	.312	15/16
231A1B393K	.039	.312	15/16
231A1B473K	.047	.400	15/16
231A1B563K	.056	.400	15/16
231A1B683K	.068	.400	15/16
231A1B823K	.082	.562	15/16
231A1B104K	.10	.562	15/16
231A1B124K	.12	.562	15/16
231A1B154K	.15	.562	15/16
231A1B184K	.18	.562	1 5/16
231A1B224K	.22	.562	1 5/16
231A1B274K	.27	.670	1 5/16
231A1B334K	.33	.670	1 5/16
231A1B394K	.39	.670	1 11/16
231A1B474K	.47	.670	1 11/16
231A1B564K	.56	.670	1 11/16
231A1B684K	.68	.750	1 11/16
231A1B824K	.82	1.000	1 11/16
231A1B105K	1.0	1.000	1 11/16
231A1B125K	1.2	1.000	1 11/16

200 VOLTS DC WORKING

Nytronics Part No.	Capacitance µf	Dia. ±.016	Length ±1/16
231A1C472K	.0047	.235	15/16
231A1C562K	.0056	.235	15/16
231A1C682K	.0068	.235	15/16
231A1C822K	.0082	.312	15/16
231A1C103K	.01	.312	15/16
231A1C123K	.012	.312	15/16
231A1C153K	.015	.312	15/16
231A1C183K	.018	.312	15/16
231A1C223K	.022	.400	15/16
231A1C273K	.027	.400	15/16
231A1C333K	.033	.400	15/16
231A1C393K	.039	.400	15/16
231A1C473K	.047	.562	15/16
231A1C563K	.056	.562	15/16
231A1C683K	.068	.562	15/16
231A1C823K	.082	.562	15/16
231A1C104K	.10	.562	1 5/16
231A1C124K	.12	.562	1 5/16
231A1C154K	.15	.670	1 5/16
231A1C184K	.18	.670	1 5/16
231A1C224K	.22	.670	1 11/16
231A1C274K	.27	.670	1 11/16
231A1C334K	.33	.750	1 11/16
231A1C394K	.39	1.000	1 11/16
231A1C474K	.47	1.000	1 11/16
231A1C564K	.56	1.000	1 11/16

400 VOLTS DC WORKING

Nytronics Part No.	Capacitance µf	Dia. ±.016	Length ±1/16
231A1E222K	.0022	.235	15/16
231A1E272K	.0027	.235	15/16
231A1E332K	.0033	.235	15/16
231A1E392K	.0039	.235	15/16
231A1E472K	.0047	.312	15/16
231A1E562K	.0056	.312	15/16
231A1E682K	.0068	.312	15/16
231A1E822K	.0082	.312	15/16
231A1E103K	.01	.312	15/16
231A1E123K	.012	.312	15/16
231A1E153K	.015	.400	15/16
231A1E183K	.018	.400	15/16
231A1E223K	.022	.400	15/16
231A1E273K	.027	.562	15/16
231A1E333K	.033	.562	15/16
231A1E393K	.039	.562	15/16
231A1E473K	.047	.562	15/16
231A1E563K	.056	.562	15/16
231A1E683K	.068	.562	1 5/16
231A1E823K	.082	.670	1 5/16
231A1E104K	.10	.670	1 5/16
231A1E124K	.12	.562	1 11/16
231A1E154K	.15	.670	1 11/16
231A1E184K	.18	.670	1 11/16
231A1E224K	.22	.750	1 11/16
231A1E274K	.27	.750	1 11/16
231A1E334K	.33	1.000	1 11/16
231A1E394K	.39	1.000	1 11/16
231A1E474K	.47	1.000	1 11/16

600 VOLTS DC WORKING

Nytronics Part No.	Capacitance µf	Dia. ±.016	Length ±1/16
231A1F102K	.001	.235	15/16
231A1F122K	.0012	.235	15/16
231A1F152K	.0015	.235	15/16
231A1F182K	.0018	.235	15/16
231A1F222K	.0022	.312	15/16
231A1F272K	.0027	.312	15/16
231A1F332K	.0033	.312	15/16
231A1F392K	.0039	.312	15/16
231A1F472K	.0047	.312	15/16
231A1F562K	.0056	.312	15/16
231A1F682K	.0068	.312	15/16
231A1F822K	.0082	.312	15/16
231A1F103K	.01	.400	15/16
231A1F123K	.012	.400	15/16
231A1F153K	.015	.562	15/16
231A1F183K	.018	.562	15/16
231A1F223K	.022	.562	15/16
231A1F273K	.027	.562	15/16
231A1F333K	.033	.562	1 5/16
231A1F393K	.039	.562	1 5/16
231A1F473K	.047	.670	1 5/16
231A1F563K	.056	.670	1 5/16
231A1F683K	.068	.562	1 11/16
231A1F823K	.082	.670	1 11/16
231A1F104K	.10	.670	1 11/16
231A1F124K	.12	.750	1 11/16
231A1F154K	.15	1.000	1 11/16
231A1F184K	.18	1.000	1 11/16
231A1F224K	.22	1.000	1 11/16

Nytronics Components Group Inc.
ORANGE STREET, DARLINGTON, S. C. 29532
(803) 393-5421 • TWX 810-665-2182

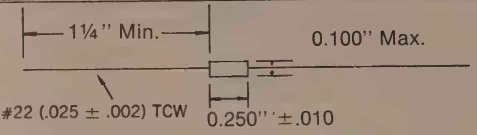
CERAMIC CAPACITORS

The DECI-CAP

4.7 pF to 27,000 pF in 49 Standard Values.
Available from stock for Immediate Delivery.
Epoxy molded for highest performance and reliability.
High density cordwood packaging facilitated by single size.
(.100 diameter x .250 length for entire range.)

DECI-CAPS offer the design engineer unique epoxy-molded reliability and a new high standard in performance. These subminiature ceramic capacitors feature low power factor and exhibit outstanding stability over the entire —55° to +125°C operating range. Rugged epoxy molded envelope and high quality ceramic dielectric is designed to meet the environmental requirements of MIL-C-11015.

Electrical Characteristics	Deci-Cap
Capacitance Range, pF	4.7 to 27,000
Working Voltage 4.7 to 470 pF 560-27000	 200 VDC 100 VDC
Standard Tolerance	±10%
Dissipation Factor	.025 Max.
I.R., Megohms	20,000 Min.
Max. Charge from 25°C Capacitance, —55 to +125°C	± 15%



Cap., pF	Deci-Cap Cat. No.
4.7	DC-047
5.6	DC-056
6.8	DC-068
8.2	DC-082
10	DC-100
12	DC-120
15	DC-150
18	DC-180
22	DC-220
27	DC-270
33	DC-330
39	DC-390
47	DC-470
56	DC-560
68	DC-680
82	DC-820
100	DC-101
120	DC-121
150	DC-151
180	DC-181
220	DC-221
270	DC-271
330	DC-331
390	DC-391
470	DC-471

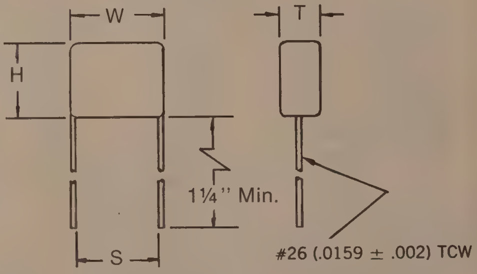
Cap., pF	Deci-Cap Cat. No.
560	DC-561
680	DC-681
820	DC-821
1000	DC-102
1200	DC-122
1500	DC-152
1800	DC-182
2200	DC-222
2700	DC-272
3300	DC-332
3900	DC-392
4700	DC-472
5600	DC-562
6800	DC-682
8200	DC-822
10000	DC-103
12000	DC-123
15000	DC-153
18000	DC-183
22000	DC-223
27000	DC-273

Add K to Cat. No. for ±10% Tol, J for ±5%, M for ±20%

The HY-CAP

High Capacity Ceramic Capacitor. Capacitance Range .01 mfd to 2.5 mfd.*

Nytronics offers the HY-CAP Ceramic Capacitor to accommodate design application in coupling, by-pass, filter, and all other circuits where temperature stability and high capacitance are mandatory. .016 diameter leads are ideal for point-to-point wiring as well as PC work.



ELECTRICAL CHARACTERISTICS

Capacitance Range:.01 mfd to 2.5 mfd *
Tolerance: ±20% Std.; ±10% also available
Working Voltage: 100 Volts D.C. (No derating to 125°C).
Dissipation Factor: .025 Max.
Insulation Resistance: 1000 Megohm-microfarad, min.
Capacitance Change with Temperature: Max. Change ±15% from 25°C Cap., from —55° to +125°C.

NCG Part No.	Cap. (mfd.)	Size	NCG Part No.	Cap. (mfd.)	Size
HC-A-103-M	.01	A	HC-C-154-M	.15	C
HC-A-123-M	.012	A	HC-C-184-M	.18	C
HC-A-153-M	.015	A	HC-C-224-M	.22	C
HC-A-183-M	.018	A	HC-C-274-M	.27	C
HC-A-223-M	.022	A	HC-C-334-M	.33	C
HC-A-273-M	.027	A	HC-C-394-M	.39	C
HC-A-333-M	.033	A	HC-C-474-M	.47	C
HC-B-393-M	.039	B	HC-D-105-M	1.0	D
HC-B-473-M	.047	B	HC-E-155-M	1.5	E
HC-B-563-M	.056	B	HC-F-205-M	2.0	F
HC-B-683-M	.068	B	HC-G-255-M	2.5	G
HC-B-823-M	.082	B			
HC-B-104-M	.10	B			
HC-B-124-M	.12	B			

Size	W max.	H max.	T max.	S ±.050
A	0.225	0.175	0.110	0.200
B	0.325	0.310	0.150	0.300
C	0.670	0.355	0.150	0.625
D	0.800	0.550	0.225	0.625
E	0.800	0.550	0.250	0.625
F	0.800	0.550	0.300	0.625
G	0.800	0.550	0.375	0.625

Nytronics Components Group Inc.
ORANGE STREET, DARLINGTON, S. C. 29532
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CERAMIC CAPACITORS

The NYT-CAP

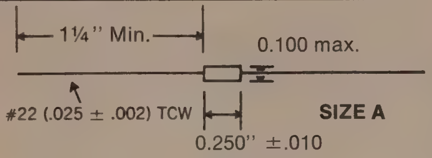
NPO SERIES

Ultra High Stability —0 ±25 ppm/°C Temperature Coefficient.
Transfer Molded Epoxy Case for high component density.
New extended range to 10,000 pF.
Available from stock.

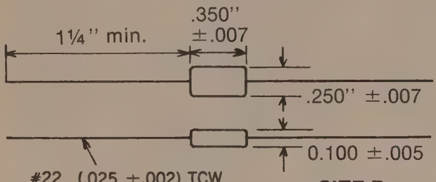
A new development from Nytronics' ceramic research laboratory now makes possible the manufacture of an extremely stable ceramic capacitor in a miniature package size. Now you can have the capacitor stability long desired for use in oscillators, filters, and other critical circuitry.

ELECTRICAL CHARACTERISTICS
Capacitance Range: 4.7 pF to 10,000 pF.
Capacitance Tolerance: ±10% Standard; others available.
Working Voltage: 200 Volts D.C. to 4700 pF; 50 WVDC above this value.
Temperature Coefficient: ±25 ppm/°C over temperature range of −55°C to +125°C.
Dissipation Factor: Less than 0.001 at 25°C.
Insulation Resistance: 100,000 Megohms at 25°C. (Minimum)

Note: Hybrid Manufacturers — Also available from stock as monolithic (unencapsulated) chips for micro-circuit applications. "A" chip size is .170 X .065 X .070; "B" is .280 X .195 X .070. Other specs same as above. To order use part No. prefix NCU in place of NC.



SIZE A



SIZE B

Nytronics Part No.	Capacity (pF)	Case Size
NC-047	4.7	A
NC-056	5.6	A
NC-068	6.8	A
NC-082	8.2	A
NC-100	10	A
NC-120	12	A
NC-150	15	A
NC-180	18	A
NC-220	22	A
NC-270	27	A
NC-330	33	A

Nytronics Part No.	Capacity (pF)	Case Size
NC-390	39	A
NC-470	47	A
NC-560	56	A
NC-680	68	A
NC-820	82	A
NC-101	100	A
NC-121	120	A
NC-151	150	A
NC-181	180	A
NC-221	220	A

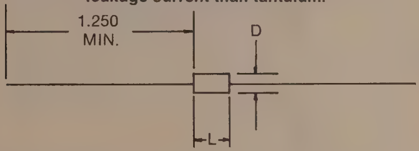
Nytronics Part No.	Capacity (pF)	Case Size
NC-271	270	B
NC-331	330	B
NC-391	390	B
NC-471	470	B
NC-561	560	B
NC-681	680	B
NC-821	820	B
NC-102	1000	B
NC-122	1200	B
NC-152	1500	B

Nytronics Part No.	Capacity (pF)	Case Size
Nc-182	1800	B
NC-222	2200	B
NC-272	2700	B
NC-332	3300	B
NC-392	3900	B
NC-472	4700	B
NC-562	5600	B
NC-682	6800	B
NC-822	8200	B
NC-103	10000	B

The MILI-CAP

EPOXY MOLDED EK12 - EK16

New series of encapsulated axial lead ceramic capacitors featuring values to 3.3 uf. Much lower leakage current than tantalum.



Case Size	L	D	Lead Size
A	.160 ±.010	.090 ±.010	26 Awg
B	.250 ±.010	.090 ±.010	26
C	.390 ±.010	.140 ±.010	22
D	.500 ±.020	.250 ±.015	22
E	.690 ±.030	.350 ±.020	22

ELECTRICAL CHARACTERISTICS:

Capacitance Range: 10 pF to 3.3 uF
Capacitance Tolerance: ±10% std.; other available
Power Factor: Less than 2.5% at 1 KHz, 25°C
Temperature Range: −55°C to ±125°C
Temperature Characteristic: ±15% max. Change from 25°C
Insulation Resistance: capacitance >100,000 Megohms or 1000 Megohms Microfarads, whichever is less.

Designed to meet the requirements of MIL-C-11015/20 B

Cap.	WVDC	Nytronics Catalog No.	Case Size	Cap.	WVDC	Nytronics Catalog No.	Case Size
10 Pf	100	EK12BX100K	A	10,000	100	EK13BX103K	B
12	100	EK12BX120K	A	12,000	50	EK13BX123K	B
15	100	EK12BX150K	A	15,000	50	EK13BX153K	B
18	100	EK12BX180K	A	18,000	50	EK13BX183K	B
22	100	EK12BX220K	A	22,000	50	EK13BX223K	B
27	100	EK12BX270K	A	27,000	50	EK13BR273K	B
33	100	EK12BX330K	A	33,000	50	EK13BR333K	B
39	100	EK12BX390K	A	39,000	50	EK13BR393K	B
47	100	EK12BX470K	A	47,000	50	EK13BR473K	B
56	100	EK12BX560K	A	.012 Mfd	100	EK14BX123K	C
68	100	EK12BX680K	A	.015	100	EK14BX153K	C
82	100	EK12BX820K	A	.018	100	EK14BX183K	C
100	100	EK12BX101K	A	.022	100	EK14BX223K	C
120	100	EK12BX121K	A	027	100	EK14BX273K	C
150	100	EK12BX151K	A	.033	100	EK14BX333K	C
180	100	EK12BX181K	A	.039	100	EK14BX393K	C
220	100	EK12BX221K	A	.047	100	EK14BX473K	C
270	100	EK12BX271K	A	.056	100	EK14BR563K	C
330	100	EK12BX331K	A	.068	100	EK14BR683K	C
390	100	EK12BX391K	A	.1	100	EK14BR104K	C
470	100	EK12BX471K	A	.12	50	EK14BR124K	C
560	100	EK12BX561K	A	.15	50	EK14BR154K	C
680	100	EK12BX681K	A	.18	50	EK14BR184K	C
820	100	EK12BX821K	A	.22	50	EK14BR224K	C
1000	100	EK12BX102K	A	.27	50	EK14BR274K	C
1200	100	EK12BX122K	A	.1	100	EK15BX104K	D
1500	100	EK12BX152K	A	.12	100	EK15BR124K	D
1800	100	EK12BX182K	A	.15	100	EK15BR154K	D
2200	100	EK12BX222K	A	.18	100	EK15RB184K	D
2700	100	EK12BX272K	A	.22	100	EK15BR224K	D
3300	100	EK12BX332K	A	.27	100	EK15BR274K	D
3900	100	EK12BX392K	A	.33	100	EK15BR334K	D
4700	100	EK12BX472K	A	.47	50	EK15BR474K	D
5600	50	EK12BX562K	A	1.0	50	EK15BR105K	D
6800	50	EK12BX692K	A	.47	100	EK16BR474K	E
8200	50	EK12BX822K	A	1.0	100	EK16BR105K	E
10.000	50	EK12BX103K	A	2.2	50	EK16BR225K	E
5600	100	EK13BX562K	B	3.3	50	EK16BR335K	E
6800	100	EK13BX682K	B				
8200	100	EK13BX822K	B				

Nytronics Components Group Inc.
ORANGE STREET, DARLINGTON, S. C. 29532
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HERMETICALLY SEALED CAPACITORS

HERMETICALLY SEALED CAPACITORS CP04 AND CP05 TO MIL-C-25

INSERTED TAB CAPACITORS

μF	WVDC	TYPE CP04A1* Plain Metal Case Char. K −55°C to +125°C	Size* D. x L.
.001	600	CP04A1KF102K3	.235 x 3/4
.0015	600	CP04A1KF152K3	.235 x 3/4
.0022	600	CP04A1KF222K3	.235 x 3/4
.0033	600	CP04A1KF332K3	.235 x 3/4
.0047	600	CP04A1KF472K3	.235 x 3/4
.0068	600	CP04A1KF682K3	.235 x 3/4
.01	400	CP04A1KE103K3	.235 x 3/4
	600	CP04A1KF103K3	.312 x 7/8
.015	200	CP04A1KC153K3	.235 x 3/4
	600	CP04A1KF153K3	.312 x 7/8
.022	200	CP04A1KF223K3	.235 x 3/4
	600	CP04A1KF223K3	.312 x 7/8
.033	100	CP04A1KB333K3	.235 x 3/4
	400	CP04A1KE333K3	.312 x 7/8
	600	CP04A1KF333K3	.400 x 7/8
.047	200	CP04A1KC473K3	.312 x 7/8
	400	CP04A1KE473K3	.400 x 7/8
	600	CP04A1KF473K3	.400 x 1 1/8
.068	200	CP04A1KC683K3	.312 x 7/8
	400	CP04A1KE683K3	.400 x 1 1/8
	600	CP04A1KF683K3	.400 x 1 3/8
.1	100	CP04A1KB104K3	.312 x 7/8
	200	CP04A1KC104K3	.400 x 7/8
	400	CP04A1KE104K3	.400 x 1 3/8
	600	CP04A1KF104K3	.562 x 1 1/8
.15	100	CP04A1KB154K3	.400 x 7/8
	200	CP04A1KC154K3	.400 x 1 1/8
	400	CP04A1KE154K3	.562 x 1 1/8
	600	CP04A1KF154K3	.562 x 1 3/8
.22	100	CP04A1KB224K3	.400 x 1 3/8
	200	CP04A1KC224K3	.400 x 1 3/8
	400	CP04A1KE224K3	.562 x 1 3/8
	600	CP04A1KF224K3	.562 x 1 7/8
.33	100	CP04A1KB334K3	.400 x 1 3/8
	200	CP04A1KC334K3	.562 x 1 1/8
	400	CP04A1KE334K3	.562 x 1 7/8
	600	CP04A1KF334K3	.670 x 1 7/8
.47	100	CP04A1KB474K3	.562 x 1 1/8
	200	CP04A1KC474K3	.562 x 1 3/8
	400	CP04A1KE474K3	.670 x 1 7/8
	600	CP04A1KF474K3	.750 x 2 1/8
.68	100	CP04A1KB684K3	.562 x 1 3/8
	200	CP04A1KC684K3	.562 x 1 7/8
	400	CP04A1KE684K3	.750 x 2 1/8
	600	CP04A1KF684K3	1.0 x 1 7/8
1.0	100	CP04A1KB105K3	.562 x 1 7/8
	200	CP04A1KC105K3	.670 x 1 7/8
	400	CP04A1KE105K3	1.0 x 1 7/8

μF	WVDC	TYPE CP05A1* Metal Case with Insulating Sleeve Char. K −55°C to +125°C	Size* D. x L.
.001	600	CP05A1KF102K3	.298 x 13/16
.0015	600	CP05A1KF152K3	.298 x 13/16
.0022	600	CP05A1KF222K3	.298 x 13/16
.0033	600	CP05A1KF332K3	.298 x 13/16
.0047	600	CP05A1KF472K3	.298 x 13/16
.0068	600	CP05A1KF682K3	.298 x 13/16
.01	400	CP04A1KE103K3	.298 x 13/16
	600	CP05A1KF103K3	.375 x 15/16
.015	200	CP05A1KC153K3	.298 x 13/16
	600	CP05A1KF153K3	.375 x 15/16
.022	200	CP05A1KC223K3	.298 x 13/16
	600	CP05A1KF223K3	.375 x 15/16
.033	100	CP05A1KB333K3	.298 x 13/16
	400	CP05A1KE333K3	.375 x 15/16
	600	CP05A1KF333K3	.463 x 15/16
.047	200	CP05A1KC473K3	.375 x 15/16
	400	CP05A1KE473K3	.463 x 15/16
	600	CP05A1KF473K3	.463 x 15/16
.068	200	CP05A1KC683K3	.375 x 15/16
	400	CP05A1KE683K3	.463 x 1 3/16
	600	CP05A1KF683K3	.463 x 1 7/16
.1	100	CP05A1KB104K3	.375 x 15/16
	200	CP05A1KE104K3	.463 x 15/16
	400	CP05A1KF104K3	.463 x 1 7/16
	600		.625 x 1 3/16
.15	100	CP05A1KB154K3	.463 x 15/16
	200	CP05A1KC154K3	.463 x 1 3/16
	400	CP05A1KE154K3	.625 x 1 3/16
	600	CP05A1KF154K3	.625 x 1 7/16
.22	100	CP05A1KB224K3	.463 x 1 3/16
	200	CP05A1KC224K3	.463 x 1 7/16
	400	CP05A1KE224K3	.625 x 1 7/16
	600	CP05A1KF224K3	.625 x 1 15/16
.33	100	CP05A1KB334K3	.463 x 1 7/16
	200	CP05A1KC334K3	.625 x 1 3/16
	400	CP05A1KE334K3	.625 x 1 15/16
	600	CP05A1KF334K3	.733 x 1 15/16
.47	100	CP05A1KB474K3	.625 x 1 3/16
	200	CP05A1KC474K3	.625 x 1 7/16
	400	CP05A1KE474K3	.733 x 1 15/16
	600	CP05A1KF474K3	.813 x 2 3/16
.68	100	CP05A1KB684K3	.625 x 1 7/16
	200	CP05A1KC684K3	.625 x 1 15/16
	400	CP05A1KE684K3	.813 x 2 3/16
	600	CP05A1KF684K3	1.063 x 1 15/16
1.0	100	CP05A1KB105K3	.625 x 1 15/16
	200	CP05A1KC105K3	.733 x 1 15/16
	400	CP05A1KE105K3	1.063 x 1 15/16

NOTE: The capacitors listed in this table have a capacitance tolerance of ±10%.
* For case grounded reduce L dimension by 1/16″. Above listing are ratings listed in Mil-C-25C. Other values are available in Nytronics Commercial Equivalents.

NYTRONICS CATALOG NUMBERING SYSTEM

CP 04 A 1 K B 273 K 1

CP — MILITARY TYPE
CAPACITORS
Fixed,
Paper dielectric,
Direct current,
Hermetically sealed in
metallic cases

04 — SUBMINIATURE CAPACITORS
CP05
CP10
CP11

A — TERMINALS
A = axial leads

1 — CIRCUIT
1 =
3 =

K — CHARACTERISTIC
K = −55°C to +125°C

B — DC VOLTAGE RATING

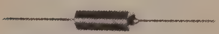
273 — CAPACITANCE
In uuf. The first two digits are the significant figures, the third is the number of zeros.

K — CAPACITANCE TOLERANCE
K = ±10%

1 — VIBRATION GRADE
1 = 10 to 55 cps
3 = 10 to 2000 cps

RATED VOLTAGE DESIGNATIONS
(DC working at 40°C, except for characteristic K which is 85°C)
B = 100 C = 200 E = 400 F = 600 G = 1000

BASIC STYLE



CP04A1/CP08A1
CIRCUIT 1 — Case Floating

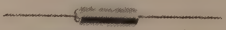
CP04A3/CP08A3
CIRCUIT 3 — Case Grounded

STYLE 3

CP11A1/CP13A1
CIRCUIT 1 — Case Floating

CP11A3/CP13A3
CIRCUIT 3 — Case Grounded

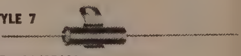
STYLE V (Insulated)



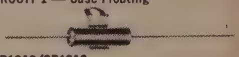
CP05A1/CP09A1
CIRCUIT 1 — Case Floating

CP05A3/CP09A3
CIRCUIT 3 — Case Grounded

STYLE 7



CP10A1/CP12A1
CIRCUIT 1 — Case Floating



CP10A3/CP12A3
CIRCUIT 3 — Case Grounded

Nytronics Components Group Inc.

ORANGE STREET, DARLINGTON, S. C. 29532
(803) 393-5421 • TWX 810-665-2182

HERMETICALLY SEALED CAPACITORS

HERMETICALLY SEALED CAPACITORS CP08 AND CP09 TO MIL-C-25

EXTENDED FOIL CAPACITORS

µF	WVDC	TYPE CP08A1 Plain Metal Case Char. K −55°C to +125°C	Size* D. x L.
.001	600	CP08A1KF102K3	.235 x ¾
.0015	600	CP08A1KF152K3	.235 x ¾
.0022	600	CP08A1KF222K3	.235 x ¾
.0033	400 600	CP08A1KE332K3 CP08A1KF332K3	.235 x ¾ .312 x ⅞
.0047	200 600	CP08A1KC472K3 CP08A1KF472K3	.235 x ¾ .312 x ⅞
.0068	200 600	CP08A1KC682K3 CP08A1KF682K3	.235 x ¾ .312 x ⅞
.01	100 600	CP08A1KB103K3 CP08A1KF103K3	.235 x ¾ .312 x ⅞
.015	100 400 600	CP08A1KB153K3 CP08A1KE153K3 CP08A1KF153K3	.235 x ¾ .312 x ⅞ .400 x ⅞
.022	200 600	CP08A1KC223K3 CP08A1KF223K3	.312 x ⅞ .400 x ⅞
.033	200 400 600	CP08A1KC333K3 CP08A1KE333K3 CP08A1KF333K3	.312 x ⅞ .400 x ⅞ .400 x 1⅛
.047	100 200 400 600	CP08A1KB473K3 CP08A1KC473K3 CP08A1KE473K3 CP08A1KF473K3	.312 x ⅞ .400 x ⅞ .400 x 1⅛ .400 x 1⅜
.068	200 400 600	CP08A1KC683K3 CP08A1KE683K3 CP08A1KF683K3	.400 x ⅞ .400 x 1⅜ .562 x ⅛
.1	100 200 400 600	CP08A7KB104K3 CP08A1KC104K3 CP08A1KE104K3 CP08A1KF104K3	.400 x ⅞ .400 x 1⅛ .562 x 1⅛ .562 x 1⅜
.15	100 200 400 600	CP08A1KB154K3 CP08A1KC154K3 CP08A1KE154K3 CP08A1KF154K3	.400 x 1⅛ .400 x 1⅜ .562 x 1⅜ .562 x 1⅝
.22	100 200 400 600	CP08A1KB224K3 CP08A1KC224K3 CP08A1KE224K3 CP08A1KF224K3	.400 x 1⅜ .562 x 1⅛ .562 x 1⅝ .670 x 1⅝
.33	100 200 400 600	CP08A1KB334K3 CP08A1KC334K3 CP08A1KE334K3 CP08A1KF334K3	.562 x 1⅛ .562 x 1⅜ .670 x 1⅝ .750 x 2⅛
.47	100 200 400 600	CP08A1KB474K3 CP08A1KC474K3 CP08A1KE474K3 CP08A1KF474K3	.562 x 1⅜ .562 x 1⅝ .750 x 2⅛ .750 x 2⅜
.68	100 200	CP08A1KB684K3 CP08A1KC684K3	.562 x 1⅝ .670 x 1⅝
1.0	100 200	CP08A1KB105K3 CP08A1KC105K3	.670 x 1⅝ .750 x 2⅛

µF	WVDC	TYPE CP09A1 Metal Case with Insulating Sleeve Char. K −55°C to +125°C	Size* D. x L.
.001	600	CP09A1KF102K3	.298 x 13/16
.0015	600	CP09A1KF152K3	.298 x 13/16
.0022	600	CP09A1KF222K3	.298 x 13/16
.0033	400 600	CP09A1KE332K3 CP09A1KF332K3	.298 x 13/16 .375 x 15/16
.0047	200 600	CP09A1KC472K3 CP09A1KF472K3	.298 x 13/16 .375 x 15/16
.0068	200 600	CP09A1KC683K3 CP09A1KF682K3	.298 x 13/16 .375 x 15/16
.01	100 600	CP09A1KB103K3 CP09A1KF103K3	.298 x 13/16 .375 x 15/16
.015	100 400 600	CP09A1KB153K3 CP09A1KE153K3 CP09A1KF153K3	.298 x 13/16 .375 x 15/16 .463 x 15/16
.022	200 600	CP09A1KF223K3 CP09A1KC223K3	.463 x 15/16 .375 x 15/16
.033	200 400 600	CP09A1KC333K3 CP09A1KE333K3 CP09A1KF333K3	.375 x 15/16 .463 x 15/16 .463 x 1 3/16
.047	100 200 400 600	CP09A1KB473K3 CP09A1KC473K3 CP09A1KE473K3 CP09A1KF473K3	.375 x 15/16 .463 x 15/16 .463 x 1 3/16 .463 x 1 7/16
.068	200 400 600	CP09A1KC683K3 CP09A1KE683K3 CP09A1KF683K3	.463 x 15/16 .463 x 1 7/16 .625 x 1 3/16
.1	100 200 400 600	CP09A1KB104K3 CP09A1KC104K3 CP09A1KE104K3 CP09A1KF104K3	.463 x 15/16 .463 x 1 3/16 .625 x 1 3/16 .625 x 1 7/16
.15	100 200 400 600	CP09A1KB154K3 CP09A1KC154K3 CP09A1KE154K3 CP09A1KF154K3	.463 x 1 3/16 .463 x 1 7/16 .625 x 1 7/16 .625 x 1 11/16
.22	100 200 400 600	CP09A1KB224K3 CP09A1KC224K3 CP09A1KE224K3 CP09A1KF224K3	.463 x 1 7/16 .625 x 1 3/16 .625 x 1 11/16 .733 x 1 11/16
.33	100 200 400 600	CP09A1KB334K3 CP09A1KC334K3 CP09A1KE334K3 CP09A1KF334K3	.625 x 1 3/16 .625 x 1 7/16 .733 x 1 11/16 .813 x 2 3/16
.47	100 200 400 600	CP09A1KB474K3 CP09A1KC474K3 CP09A1KE474K3 CP09A1KF474K3	.625 x 1 7/16 .625 x 1 11/16 .813 x 2 3/16 .813 x 2 7/16
.68	100 200	CP09A1KB684K3 CP09A1KC684K3	.625 x 1 11/16 .733 x 1 11/16
1.0	100 200	CP09A1KB105K3 CP09A1KC105K3	.733 x 1 11/16 .813 x 2 3/16

* For case grounded reduce L dimension by 1/16″.

NYTRONICS CATALOG NUMBERING SYSTEM

CP 08 A 1 K B 273 K 1

MILITARY TYPE
CAPACITORS
Fixed,
Paper dielectric,
Direct current,
Hermetically sealed in
metallic cases

SUBMINIATURE CAPACITORS
CP09
CP12
CP13

TERMINALS
A = axial leads

CIRCUIT
1 =
3 =

CHARACTERISTIC
K = −55°C to +125°C

DC VOLTAGE RATING

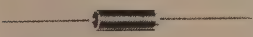
CAPACITANCE
In uuf. The first two digits are the significant figures, the third is the number of zeros.

CAPACITANCE TOLERANCE
K = ±10%

VIBRATION GRADE
1 = 10 to 55 cps
3 = 10 to 2000 cps

RATED VOLTAGE DESIGNATIONS
(DC working at 40°C, except for characteristic K which is 85°C)
B = 100 C = 200 E = 400 F = 600 G = 1000

BASIC STYLE

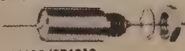


CP04A1/CP08A1
CIRCUIT 1 — Case Floating

CP04A3/CP08A3
CIRCUIT 3 — Case Grounded

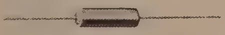
STYLE 3

CP11A1/CP13A1
CIRCUIT 1 — Case Floating

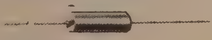


CP11A3/CP13A3
CIRCUIT 3 — Case Grounded

STYLE V (Insulated)

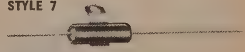


CP05A1/CP09A1
CIRCUIT 1 — Case Floating



CP05A3/CP09A3
CIRCUIT 3 — Case Grounded

STYLE 7



CP10A1/CP12A1
CIRCUIT 1 — Case Floating

CP10A3/CP12A3
CIRCUIT 3 — Case Grounded

Nytronics Components Group Inc.
ORANGE STREET, DARLINGTON, S. C. 29532
(803) 393-5421 • TWX 810-665-2182

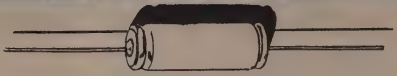
MIL TYPE CP25 - CP29
MIL-C-25
(LATEST REVISION)

MIL-C-25 (LATEST REVISION) CP25 TO CP29

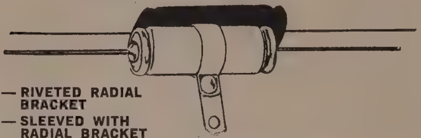
Available in capacitances from .003 thru 0.1 mf and voltages of 1500 VDC.

Type Designation[1]	Rated Voltage	Capacitance µf
CP2-A-EC104-	200	.1
CP2-A-EC254-	200	.25
CP2-A-EC504-	200	.5
CP2-A-EF302-	600	.003
CP2-A-EF602-	600	.006
CP2-A-EF103-	600	.01
CP2-A-EF203-	600	.02
CP2-A-EF503-	600	.05
CP2-A-EF104-	600	.1
CP2-A-EF254-	600	.25
CP2-A-EF504-	600	.5
CP2-A-EG302-	1,000	.003
CP2-A-EG602-	1,000	.006
CP2-A-EG103-	1,000	.01
CP2-A-EG203-	1,000	.02
CP2-A-EG503-	1,000	.05
CP2-A-EG104-	1,000	.1
CP2-A-EG254-	1,000	.25
CP2-A-EH302-	1,500	.003
CP2-A-EH602-	1,500	.006
CP2-A-EH103-	1,500	.01
CP2-A-EH203-	1,500	.02
CP2-A-EH503-	1,500	.05
CP2-A-EH104-	1,500	.1

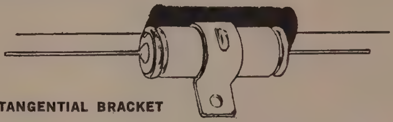
[1] Complete type designation will include additional symbols to complete style designation and to indicate circuit and capacitance tolerance.



CP25 — UNINSULATED BODY
CP26 — INSULATED BODY

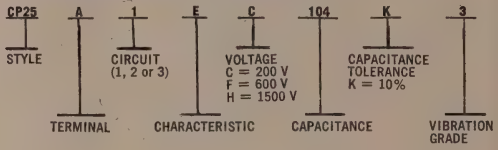


CP27 — RIVETED RADIAL BRACKET
CP28 — SLEEVED WITH RADIAL BRACKET



CP29 — TANGENTIAL BRACKET

TYPE - DESIGNATION EXAMPLE (CP25A1EC104K)

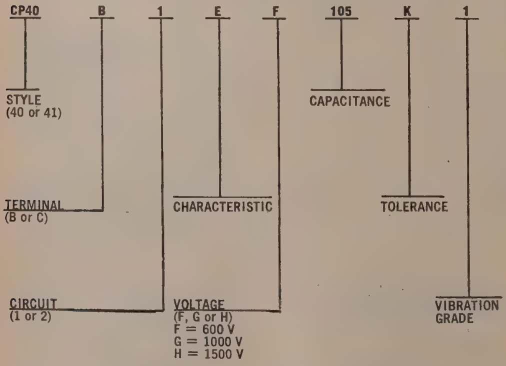

CP25
A
1
E
C
104
K
3
STYLE
CIRCUIT
(1, 2 or 3)
VOLTAGE
C = 200 V
F = 600 V
H = 1500 V
CAPACITANCE
TOLERANCE
K = 10%
TERMINAL
CHARACTERISTIC
CAPACITANCE
VIBRATION
GRADE

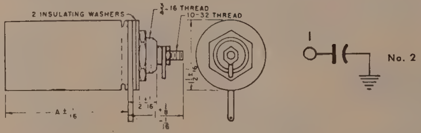
CP40, CP41 (TYPES PCM, PCIM)

Available in capacitances from .25 mf thru 4.0 mf and voltages of 600 VDC thru 1500 VDC.

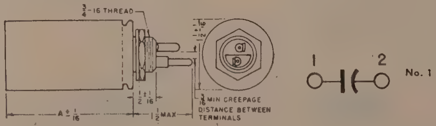
Type Designation 1/	DC Voltage Rating (see fig. 2) Volts	Capacitance µf
CP4 - - - - F105K1	600	1
CP4 - - - - F205K1	600	2
CP4 - - - - F405K1	600	4
CP4 - - - - G105K1	1,000	1
CP4 - - - - G205K1	1,000	2
CP4 - - - - H254K1	1,500 3/	0.25
CP4 - - - - H504K1	1,500	0.5
CP4 - - - - H105K1	1,500	1

TYPE - DESIGNATION EXAMPLE (CP40B1EF105K)


CP40
B
1
E
F
105
K
1
STYLE
(40 or 41)
CAPACITANCE
TERMINAL
(B or C)
CHARACTERISTIC
TOLERANCE
CIRCUIT
(1 or 2)
VOLTAGE
(F, G or H)
F = 600 V
G = 1000 V
H = 1500 V
VIBRATION
GRADE


2 INSULATING WASHERS
3/4-16 THREAD
10-32 THREAD
A ± 1/16
1/2 ± 1/16
1 1/8 ± 1/16
1/2 ± 1/16
1
No. 2

CIRCUIT DIAGRAM — CP40
Available with (C) or (B) Terminals

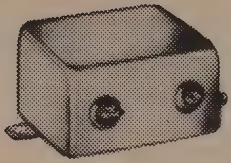

3/4-16 THREAD
1/2 ± 1/16
A ± 1/16
1/2 ± 1/16
1 1/2 MAX
3/16 MIN CREEPAGE DISTANCE BETWEEN TERMINALS
1
2
No. 1

CIRCUIT DIAGRAM — CP41
Available only with (B) Terminal

Nytronics Components Group Inc.
ORANGE STREET, DARLINGTON, S. C. 29532
(803) 393-5421 • TWX 810-665-2182

MIL TYPE
CP53, CP54, CP55
MIL-C-25 (LATEST REVISION)

CAPACITORS MIL TYPE CP53, CP54, CP55



Section assembled in hermetically sealed tin-coated drawn-shell container. Mineral-oil impregnated and filled. Lug-type terminal seals. Meets requirements of MIL-C-25.

Temperature Rating: −55°C to +85°C.

Standard Tolerance: −10% to +20%.

PDM VARIATIONS

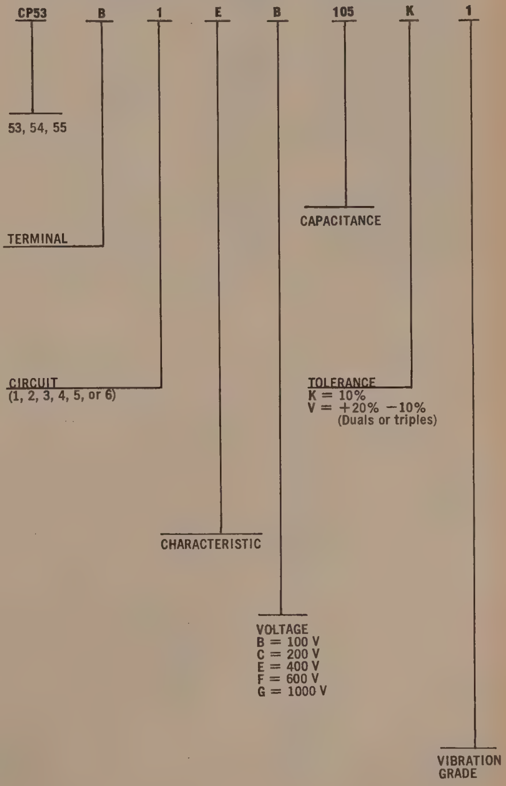
MIL Type CP53, with terminals on side.

PDMT (CP54) With terminals on top.

PDMB (CP55) With terminals on the bottom.

Type Designation	DC Voltage Rating Volts	Capacitance μf
CP5-B- - B105K1	100	1
CP5-B-EB205K1	100	2
CP5-B- - B405K1	100	4
CP5-B-FB805K1	100	8
CP5-B-FB106K1	100	10
CP5-B-FC504K1	200	0.5
CP5-B-EC105K1	200	1
CP5-B-EC205K1	200	2
CP5-B-KE503K1	400	0.05
CP5-B-KE104K1	400	0.10
CP5-B-KE254K1	400	0.25
CP5-B-KE504K1	400	0.5
CP5-B-KE105K1	400	1
CP5-B-EF254K1	600	0.25
CP5-B- - F504K1	600	0.5
CP5-B- - F105K1	600	1
CP5-B-EF205K1	600	2
CP5-B-EG503K1	1,000	0.05
CP5-B-EG104K1	1,000	0.1
CP5-B- - G254K1	1,000	0.25
CP5-B-EG504K1	1,000	0.5
CP5-B-EG105K1	1,000	1
CP5-B-EF503V1	600	0.05-0.05
CP5-B-EF104V1	600	0.1 -0.1
CP5-B- - F254V1	600	0.25-0.25
CP5-B- - F504V1	600	0.5 -0.5
CP5-B-EF105V1	600	1 -1
CP5-B-EG503V1	1,000	0.05-0.05
CP5-B- - G104V1	1,000	0.1 -0.1
CP5-B-EG254V1	1,000	0.25-0.25
CP5-B-EG504V1	1,000	0.5 -0.5
CP5-B5-E504V1	400	0.5 -0.5 -0.5
CP5-B5-F104V1	600	0.1 -0.1 -0.1
CP5-B5EF254V1	600	0.25-0.25-0.25
CP5-B5EF504V1	600	0.5 -0.5 -0.5
CP5-B5EG503V1	1,000	0.05-0.05-0.05
CP5-B5EG104V1	1,000	0.1 -0.1 -0.1
CP5-B5EG254V1	1,000	0.25-0.25-0.25

TYPE - DESIGNATION EXAMPLE (CP53B1EB105K)

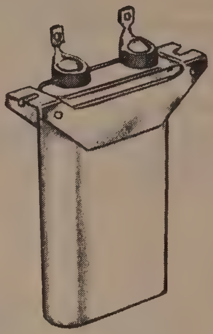

CP53
B
1
E
B
105
K
1
53, 54, 55
CAPACITANCE
TERMINAL
CIRCUIT
(1, 2, 3, 4, 5, or 6)
TOLERANCE
K = 10%
V = +20% −10%
(Duals or triples)
CHARACTERISTIC
VOLTAGE
B = 100 V
C = 200 V
E = 400 V
F = 600 V
G = 1000 V
VIBRATION GRADE

Nytronics Components Group Inc.
SAGE ELECTRONICS CORPORATION
ORANGE STREET, DARLINGTON, S. C. 29532 (803) 393-5421 • TWX 810-665-2182

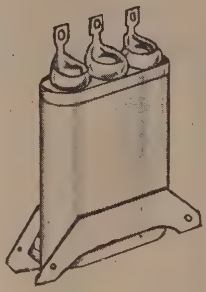
MIL TYPE
CP67, CP69
MIL-C-25 (LATEST REVISION)

CAPACITORS MIL TYPE CP67, CP69

Type Designation	DC Voltage Rating Volts	Capacitance µf
CP6-B-EF503K1	600	0.05
CP6-B-EF104K1	600	0.1
CP6-B-EF254K1	600	0.25
CP6-B-EF504K1	600	0.5
CP6-B- - F105K1	600	1
CP6-B-EG103K1	1,000	0.01
CP6-B-EG203K1	1,000	0.02
CP6-B-EG503K1	1,000	0.05
CP6-B- - G104K1	1,000	0.1
CP6-B-EG254K1	1,000	0.25
CP6-B- - G504K1	1,000	0.5
CP6-B-EF503V1	600	0.05-0.05
CP6-B-EF104V1	600	0.1 -0.1
CP6-B-EF254V1	600	0.25-0.25
CP6-B- - F504K1	600	0.5 -0.5
CP6-B-EG103V1	1,000	0.01-0.01
CP6-B-EG203V1	1,000	0.02-0.02
CP6-B- - G503V1	1,000	0.05-0.05
CP6-B- - G104V1	1,000	0.1 -0.1
CP6-B- - G254V1	1,000	0.25-0.25
CP6-B-5-F503V1	600	0.05-0.05-0.05
CP6-B5EFP04V1	600	0.1 -0.1 -0.1
CP6-B5-F254V1	600	0.25-0.25-0.25
CP6-B5EG103V1	1,000	0.01-0.01-0.01
CP6-B5EG203V1	1,000	0.02-0.02-0.02
CP6-B5EG503V1	1,000	0.05-0.05-0.05
CP6-B5EG104V1	1,000	0.1 -0.1 -0.1

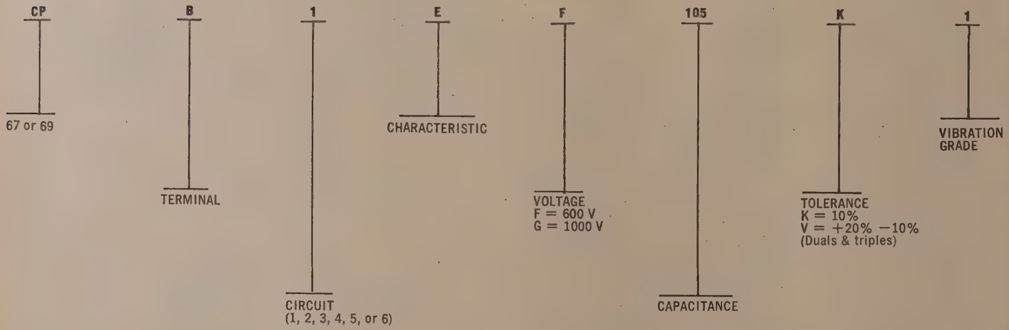


CP69



CP67

TYPE - DESIGNATION EXAMPLE

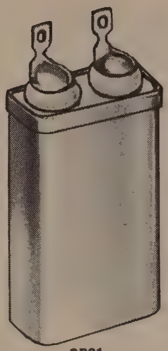

CP
B
1
E
F
105
K
1
67 or 69
CHARACTERISTIC
VIBRATION GRADE
TERMINAL
VOLTAGE
F = 600 V
G = 1000 V
TOLERANCE
K = 10%
V = +20% −10%
(Duals & triples)
CIRCUIT
(1, 2, 3, 4, 5, or 6)
CAPACITANCE

Nytronics Components Group Inc.
ORANGE STREET, DARLINGTON, S. C. 29532
(803) 393-5421 • TWX 810-665-2182

**MIL TYPE
CP91 SERIES
MIL-C-25 (LATEST REVISION)**

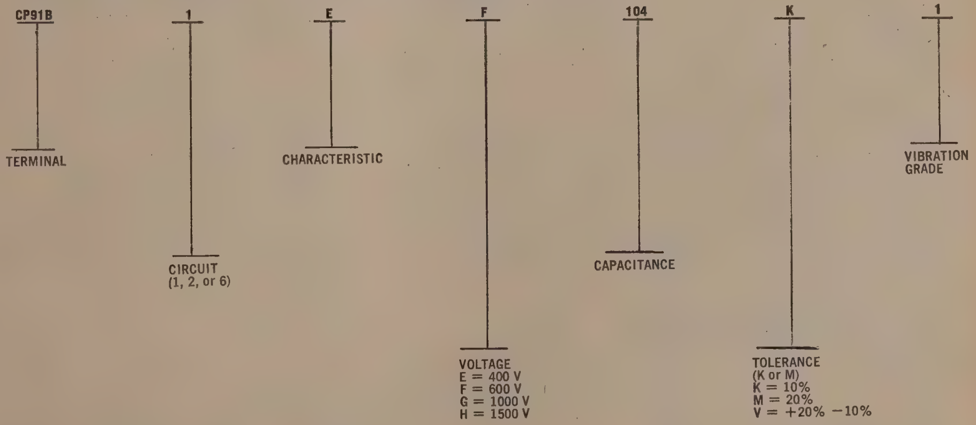
CAPACITOR MIL TYPE CP91 SERIES

Type Designation	DC Voltage Rating Volts	Capacitance µf	Capacitance Tolerance
CP91B-KE104K1	400	0.1	K
CP91B-KE254K1	400	0.25	K
CP91B1KE504K1	400	0.5	K
CP91B-E105K1	400	1	K
CP91B-EF503K1	600	0.05	K
CP91B-EF254K1	600	0.25	K
CP91B-EF504K1	600	0.5	K
CP91B-F105K1	600	1	K
CP91B-EG103K1	1,000	0.01	K
CP91B-EG203K1	1,000	0.02	K
CP91B-EG503K1	1,000	0.05	K
CP91B-EG104K1	1,000	0.1	K
CP91B-EG254K1	1,000	0.25	K
CP91B-G504K1	1,000	0.5	K
CP91B6EE503V1	400	0.05-0.05 3/	V
CP91B6EE104V1	400	0.1 -0.1	V
CP91B6EE504V1	400	0.5 -0.5	V
CP91B6EF503V1	600	0.05-0.05	V
CP91B6-F104V1	600	0.1 -0.1	V
CP91B6EF254V1	600	0.25-0.25	V
CP91B6-F504V1	600	0.5 -0.5	V
CP91B6EG103V1	1,000	0.01-0.01	V
CP91B6EG203V1	1,000	0.02-0.02	V
CP91B6EG503V1	1,000	0.05-0.05	V
CP91B6-G104V1	1,000	0.1 -0.1	V
CP91B6-G254V1	1,000	0.25-0.25	V
CP91B6EH103V1	1,500	0.01-0.01	V
CP91B6EH503V1	1,500	0.05-0.05	V


CP91

NOTE: AVAILABLE WITH SPADE-LUG
OR FOOTED BRACKET

TYPE - DESIGNATION EXAMPLE

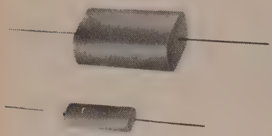

CP91B
1
E
F
104
K
1
TERMINAL
CHARACTERISTIC
VIBRATION GRADE
CIRCUIT (1, 2, or 6)
CAPACITANCE
VOLTAGE
E = 400 V
F = 600 V
G = 1000 V
H = 1500 V
TOLERANCE
(K or M)
K = 10%
M = 20%
V = +20% −10%

THE POTTER COMPANY

METALIZED POLYESTER FILM CAPACITORS

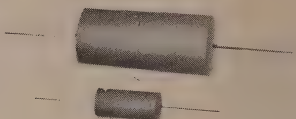
for Instrumentation, Data Processing, Telecommunications, Industrial Controls & Special Applications

WRAP & FILL — FLATTENED



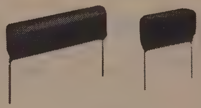
SERIES 3200

WRAP & FILL — ROUND



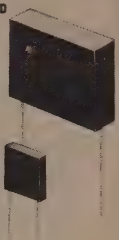
SERIES 3400

EPOXY DIPPED



SERIES 4309

PLASTIC CASED



SERIES 4308

SERIES 3200 FLATTENED

CAP MFD's	200 VDC L	200 VDC T	200 VDC W	400 VDC L	400 VDC T	400 VDC W	600 VDC L	600 VDC T	600 VDC W
.01	.44	.15	.28	.44	.15	.28	.50	.15	.28
.022	.44	.15	.28	.50	.15	.28	.63	.19	.32
.027	.44	.15	.28	.50	.17	.30	.63	.21	.34
.033	.44	.15	.28	.50	.19	.32	.63	.24	.37
.047	.44	.15	.28	.63	.20	.33	.63	.29	.42
.056	.50	.15	.28	.63	.22	.36	.75	.24	.37
.068	.50	.16	.29	.63	.24	.37	.75	.28	.41
.082	.50	.17	.30	.63	.27	.40	.75	.28	.45
.1	.50	.19	.33	.75	.24	.37	.75	.33	.50
.22	.75	.20	.34	.75	.34	.54	.88	.44	.62
.27	.75	.23	.36	.75	.38	.58	1.00	.44	.61
.33	.75	.25	.38	.75	.42	.62	1.00	.49	.67
.47	1.00	.23	.36	1.00	.40	.60	1.25	.49	.68
.56	1.00	.26	.39	1.00	.43	.63	1.25	.55	.75
.68	1.00	.29	.42	1.25	.42	.62	1.25	.59	.79
.82	1.00	.33	.46	1.25	.40	.70	1.25	.59	.88
1.0	1.00	.36	.49	1.25	.45	.75	1.25	.69	.99
1.5	1.00	.45	.58	1.25	.58	.88	1.50	.79	1.09
2.0	1.25	.42	.56	1.50	.59	.89	1.50	.93	1.23
3.0	1.25	.50	.63	1.50	.75	1.05	1.75	.96	1.26

SERIES 3400 ROUND

CAP MFD's	200 VDC L	200 VDC D	400 VDC L	400 VDC D	600 VDC L	600 VDC D
.01	.44	.20	.44	.20	.50	.22
.022	.44	.20	.50	.23	.63	.27
.027	.44	.20	.50	.25	.63	.29
.033	.44	.20	.63	.24	.63	.31
.047	.50	.20	.63	.28	.75	.31
.056	.50	.22	.63	.30	.75	.34
.068	.50	.23	.63	.32	.75	.37
.082	.50	.25	.63	.35	.88	.35
.1	.63	.24	.75	.32	1.00	.35
.22	.75	.28	1.00	.36	1.25	.43
.27	.75	.31	1.00	.40	1.25	.47
.33	.75	.33	1.00	.44	1.25	.52
.47	1.00	.31	1.25	.44	1.50	.54
.56	1.00	.34	1.25	.47	1.50	.59
.68	1.00	.37	1.25	.52	1.50	.65
.82	1.00	.41	1.25	.57	1.50	.70
1.0	1.25	.37	1.25	.63	1.50	.77
1.5	1.25	.44	1.50	.68	1.75	.85
2.0	1.25	.50	1.50	.78	1.75	.98
3.0	1.50	.56	1.75	.84	2.00	1.050

SERIES 4309 EPOXY DIPPED

CAP MFD's	200 VDC L	200 VDC W	200 VDC H	200 VDC C	400 VDC L	400 VDC W	400 VDC H	400 VDC C	600 VDC L	600 VDC W	600 VDC H	600 VDC C
.022	.44	.22	.35	.30	.50	.25	.38	.40	.69	.25	.38	.56
.027	.44	.22	.35	.30	.56	.25	.37	.40	.69	.26	.42	.56
.033	.44	.23	.35	.30	.56	.26	.39	.40	.69	.28	.44	.56
.047	.50	.23	.36	.40	.69	.26	.39	.56	.81	.29	.45	.70
.056	.50	.24	.37	.40	.69	.26	.43	.56	.81	.31	.47	.70
.068	.50	.26	.39	.40	.69	.28	.45	.56	.81	.33	.50	.70
.082	.56	.25	.38	.40	.81	.27	.44	.70	.81	.34	.54	.70
.1	.56	.27	.40	.40	.81	.29	.46	.70	.94	.34	.54	.80
.15	.69	.27	.40	.56	.81	.33	.52	.70	.94	.41	.60	.80
.18	.69	.29	.41	.56	.94	.33	.52	.80	.94	.44	.64	.80
.22	.69	.29	.46	.56	.94	.36	.55	.80	1.06	.45	.64	.90
.27	.69	.32	.49	.56	.94	.39	.59	.80	1.06	.49	.69	.90
.33	.81	.30	.47	.70	.94	.43	.62	.80	1.19	.50	.70	1.06
.47	.81	.35	.52	.70	1.06	.46	.66	.90	1.44	.53	.72	1.30
.56	.81	.36	.56	.70	1.06	.50	.70	.90	1.44	.53	.82	1.30
.68	.94	.36	.56	.80	1.19	.51	.71	1.06	1.56	.55	.85	1.40
.82	.94	.39	.59	.80	1.19	.56	.75	1.06	1.56	.60	.89	1.40
1.0	.94	.43	.62	.80	1.19	.61	.81	1.06	1.69	.64	.93	1.56
1.5	1.06	.47	.67	.90	1.44	.61	.91	1.30	1.69	.74	1.04	1.56
2.0	1.19	.46	.75	1.06	1.44	.71	1.00	1.30	1.94	.84	1.13	1.80

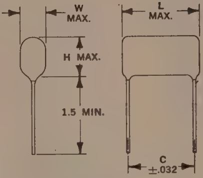
SERIES 4308 PLASTIC CASED

CAP MFD's	200 VDC W	200 VDC T	200 VDC H	400 VDC W	400 VDC T	400 VDC H
.022	.40	.10	.40	.50	.15	.50
.027	.50	.15	.50	.50	.15	.50
.033	.50	.15	.50	.50	.15	.50
.047	.50	.15	.50	.68	.25	.50
.056	.50	.15	.50	.68	.25	.50
.068	.50	.15	.50	.68	.25	.50
.082	.50	.15	.50	.68	.25	.50
.1	.50	.15	.50	.88	.25	.50
.15	.68	.25	.50	1.00	.25	.50
.18	.68	.25	.50	1.00	.25	.75
.22	.68	.25	.50	1.00	.25	.75
.27	.88	.25	.50	1.00	.31	.75
.33	.88	.25	.50	1.00	.31	.75
.47	1.00	.25	.50	1.00	.50	.75
.56	1.00	.25	.75	1.00	.75	.75
.68	1.00	.25	.75	1.00	.75	.75
.82	1.00	.31	.75			
1.0	1.00	.31	.75			
1.5	1.00	.50	.75			
2.0	1.00	.75	.75			

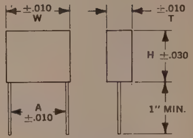
SERIES 4308

Case Width	Lead Spacing (A)	Lead Size
.34	.20	26
.40	.30	26
.50	.40	24
.68	.60	22
.88	.80	22
1.00	.90	20

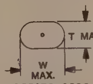
Shown here are only a portion of standard POTTER CO. capacitors ready for immediate delivery. Our engineers, if required, will design special capacitors to meet specific requirements.



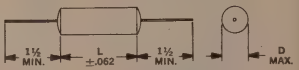
SERIES 4309



SERIES 4308



SERIES 3200



SERIES 3400

WRAP AND FILL STYLES utilize thermosetting pressure sensitive polyester film wrap filled with a flame-retardant epoxy providing excellent moisture resistance and protection against high external voltage stresses.

EPOXY DIPPED STYLES are coated with a rigid flame-retardant epoxy and offer excellent lead strength. The **BLUESEAL** process assures high moisture resistance in a small, economical package.

PLASTIC CASED STYLES employ a rectangular premolded case completely filled with a flame retardant epoxy assuring uniformity of size and shape. The rugged design provides added capacitance stability, environmental protection, and reliability under severe mechanical stress.

CHARACTERISTICS

CAPACITANCE: Standard tolerance is ±20%.

OPERATING TEMPERATURE RANGE: −55°C to +125°C. Derate 50% for operation at 125°C.

DIELECTRIC STRENGTH: 150% of rated voltage.

INSULATION RESISTANCE: Minimum 10,000 megohm-microfarads, but need not exceed 30,000 megohms.

DISSIPATION FACTOR: 1% maximum for .01 MFD and above, for less than .01 MFD, 1.5% maximum.

CONSTRUCTION: Metalized Polyester Film, Extended Foil.

LEADS: Tinned copper.

Standard ratings in all case styles are 50 thru 600 VDC and up to 10 MFD.

THE POTTER COMPANY also manufactures other types of film capacitors such as Metalized Polycarbonate and Polyester & Foil. Please send for complete catalog, listing full specifications for all types.

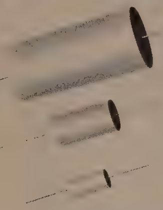
THE POTTER COMPANY

P.O. BOX 337, NORTH HIGHWAY 51
WESSON, MISSISSIPPI 39191 (601) 643-2216
A Division of Pemcor, Inc.

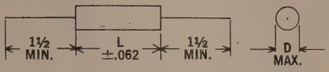
THE POTTER COMPANY

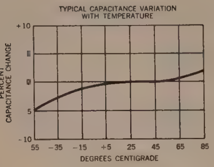
HIGH VOLTAGE BLUSEAL FILM CAPACITORS — SERIES 3460

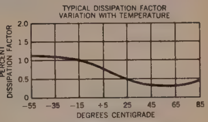
Metalized Polyester Wrap and Fill Styles

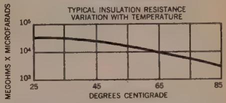


PERFORMANCE CURVES









CAP. MFD.	1000 VDC		2000 VDC		4000 VDC		6000 VDC		8000 VDC		10,000 VDC		15,000 VDC	
	L	D	L	D	L	D	L	D	L	D	L	D	L	D
.001	.750	.300	.750	.300	1.125	.300	1.500	.300	1.875	.300	2.250	.300	3.062	.370
.0012	.750	.300	.750	.300	1.125	.300	1.500	.300	1.875	.300	2.250	.300	3.062	.398
.0015	.750	.300	.750	.300	1.125	.300	1.500	.300	1.875	.300	2.250	.302	3.062	.435
.0018	.750	.300	.750	.300	1.125	.300	1.500	.300	1.875	.300	2.250	.321	3.062	.470
.0022	.750	.300	.750	.300	1.125	.300	1.500	.300	1.875	.319	2.250	.347	3.062	.509
.0025	.750	.300	.750	.300	1.125	.300	1.500	.300	1.875	.332	2.250	.364	3.062	.538
.0027	.750	.300	.750	.300	1.125	.300	1.500	.302	1.875	.343	2.250	.374	3.062	.559
.0033	.750	.300	.750	.301	1.125	.300	1.500	.325	1.875	.371	2.250	.402	3.062	.610
.0039	.750	.300	.750	.322	1.125	.300	1.500	.347	1.875	.396	2.250	.431	3.062	.658
.0047	.750	.300	.750	.342	1.125	.321	1.500	.374	1.875	.423	2.250	.466	3.062	.715
.005	.750	.300	.750	.351	1.125	.325	1.500	.384	1.875	.437	2.250	.478	3.062	.736
.0056	.750	.300	.750	.369	1.125	.339	1.500	.399	1.875	.458	2.250	.503	3.062	.775
.0068	.750	.321	.750	.398	1.125	.367	1.500	.434	1.875	.495	2.250	.545	3.062	.848
.0082	.750	.347	.750	.432	1.125	.396	1.500	.471	1.875	.537	2.250	.593	3.062	.925
.01	.750	.374	.875	.351	1.125	.431	1.500	.512	1.875	.587	2.250	.647	3.062	1.016
.012	.750	.402	.875	.377	1.125	.466	1.500	.556	1.875	.636	2.250	.702	3.062	1.232
.015	.750	.442	.875	.413	1.125	.512	1.500	.614	1.875	.702	2.250	.778	3.062	1.107
.018	.875	.357	.875	.450	1.125	.556	1.500	.667	1.875	.764	2.250	.848	3.062	1.343
.022	.875	.387	.875	.490	1.750	.396	1.500	.731	1.875	.838	2.250	.931	3.062	1.480
.025	.875	.408	.875	.517	1.750	.417	1.500	.775	1.875	.890	2.250	.988	3.062	1.575
.027	.875	.423	1.250	.364	1.750	.425	2.500	.510	1.875	.922	3.812	.638	3.062	1.635
.033	.875	.461	1.250	.394	1.750	.468	2.500	.556	1.875	1.014	3.812	.700		
.039	.875	.495	1.250	.421	1.750	.503	2.500	.599	3.187	.682	3.812	.754		
.047	.875	.537	1.250	.457	1.750	.545	2.500	.651	3.187	.742	3.812	.823		
.05	.875	.552	1.250	.470	1.750	.560	2.500	.670	3.187	.764	3.812	.848		
.056	1.250	.390	1.250	.493	1.750	.589	2.500	.706	3.187	.805	3.812	.894		
.068	1.250	.423	1.250	.535	1.750	.642	2.500	.841	3.187	.881	3.812	.977		
.082	1.250	.458	1.250	.582	1.750	.697	2.500	.771	3.187	.961	3.812	1.069		
.1	1.250	.500	1.250	.637	1.750	.764	2.500	.922	3.187	1.056	3.812	1.174		
.12	1.250	.541	1.750	.536	1.750	.831	2.500	1.005	3.187	1.152	3.812	1.282		
.15	1.250	.599	1.750	.591	1.750	.922	2.500	1.047	3.187	1.282	3.812	1.427		
.18	1.250	.649	1.750	.640	1.750	1.005	2.500	1.219						
.22	1.250	.712	1.750	.701	1.750	1.105	2.500	1.342						
.25	1.750	.583	1.750	.743	1.750	1.174								
.27	1.750	.602	1.750	.771	1.750	1.219								
.33	1.750	.658	1.750	.845	1.750	1.342								
.39	1.750	.710	2.250	.771										
.47	1.750	.774	2.250	.840										
.5	1.750	.796	2.250	.864										
.56	2.250	.709	2.250	.911										
.67	2.250	.774	2.250	1.000										
.82	2.250	.845	2.250	1.091										
1.0	2.250	.926	2.250	1.200										

HOW TO ORDER

Please order by complete part number as outlined below.

3460 G 393 M

TYPE
High Voltage
Metalized Polyester
Wrap and Fill

VOLTAGE
G — 1000
J — 2000
M — 4000
P — 6000
V — 8000
S — 10,000
W — 15,000

CAPACITANCE
Expressed in picofarads and identified by a three-digit number.
First two digits represent significant figures.
Last digit specifies the number of zeros.

CAPACITANCE TOLERANCE
M — ±20%
K — ±10%

Send for Complete BLUSEAL CATALOG SERIES 3460

CHARACTERISTICS

CAPACITANCE: Standard tolerance is ±20%.

OPERATING TEMP. RANGE: −40°C to +85°C without voltage derating.

DIELECTRIC STRENGTH: 150% of rated voltage for capacitors rated at 1000 VDC and 2000 VDC, 125% of rated voltage for capacitors rated at 4000 VDC through 15,000 VDC.

INSULATION RESISTANCE: 10,000 megohm-microfarads, but need not exceed 30,000 megohms at 25°C.

DISSIPATION FACTOR: 1% maximum at 25°C and 1000 Hz.

CONSTRUCTION: Metalized Polyester film, extended foil, axial leads.

CASE: Yellow thermosetting pressure-sensitive adhesive polyester film wrap, with blue flame-retardant epoxy end fill.

LEADS: Tinned copper.
22 AWG for All Diameters up to and Including .39
20 AWG for All Diameters .40 and Larger

THE POTTER COMPANY

P.O. BOX 337, NORTH HIGHWAY 51
WESSON, MISSISSIPPI 39191 (601) 643-2216
A Division of Pemcor, Inc.

MUCON® SUBminiature CERAMIC CAPACITORS

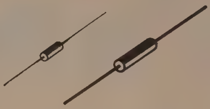
ULTRA-STABLE NPO MU-CAPS®

MOST STABLE MINIATURE CAPACITOR MADE

T.C.--ZERO ±30 PPM/°C

AXIAL
RADIAL

SQUARE ... from 1 PF. to .22 MF.



TUBULAR ... from 1 PF. to .22 MF.

THINLINE

RADIAL
AXIAL

Mucon's Thinline Capacitors are made of the following 16 different ceramic bodies for a broad choice of size and electrical properties:

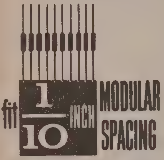
Temperature-Compensating Materials:	NP0	N080	N150
	N220	N330	N450
	N750	N1400	N2400
	N3300	N4700	N5600

General Purpose Materials: LOW-VAR, STABLE-K, HIGH-K & SUPER-K for wide range of stability and capacitance.

SPECIFICATIONS

Capacitance: Range: TEMP.-COMP. BODIES 1/2 pf - 2200 pf
GEN. PURPOSE BODIES 50 pf - 150,000 pf
Voltages: 25 WVDC, 50WVDC, 200 WVDC and 500 WVDC
Leads: Tinned Copper, Nickel or Dumet to MIL Spec.
Shapes: Square, rectangular, single or multiple element.

NARROW-CAPS®

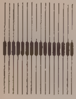


NARROW-CAPS are designed for 1/10" modular spacing on printed circuits, or for cordwood applications.

SPECIFICATIONS

Capacitance: Range: 5 pf - 100.000 pf
Voltages: 10 WVDC - 50 WVDC
Sizes: .095" max. wide x 1/4" max. long x .095" max. thick through 750 pf. Larger values 5/16" max. long.
Leads: #26 Tinned Copper, Nickel or Dumet to MIL Spec.

SLIM-CAPS ®



Designed for applications which require capacitors slimmer than NARROW-CAPS. SLIM-CAPS are .065" wide x .065" thick max. Body lengths from .100"—.250" max.

SPECIFICATIONS

Capacitance Range: 1/2 pf - 20,000 pf
Voltages: 50 WVDC
Leads: #30 Tinned Copper, Nickel or Dumet to MIL Spec.

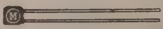
CHIPS SINGLE LAYER

Sizes: .030" Sq. and up
Capacitance: SUPER-K Ceramic 150 PF. to 10,000 PF.
HIGH-K " 100 PF. to 5,000 PF.
STABLE-K " 50 PF. to 2,700 PF.
LOW-VAR " 20 PF. to 1,000 PF.
TEMP. COMP. " 1 PF. to 330 PF.
Electrodes: Normally silver. Other precious metals on request
Voltage: 50 WVDC

CHIPS MONOLITHIC MULTILAYER

Sizes: From .050" x .050" x .050" to .610" x .310" x .080"
Capacitance: STABLE-K Ceramic 10 PF. to 2 MF.
NPO " 1 PF. to .027 MF.
Electrodes: Normally silver. Other precious metals on request
Voltage: 50 WVDC

M-CAPS



M-CAPS are monolithic capacitors with maximum capacitance/volume ratio in a choice of 3 dielectrics to cover all requirements. From .100" square to .300" square.

RIBBON LEADS

Style RLA

Size and specifications same as "Thinline" capacitors shown above, except radial and axial tinned copper ribbon leads, approximately .006" thick x 3/32" wide for units with max. size of .150" and up; .045" wide for smaller units.

WRITE FOR FREE CATALOG LISTING COMPLETE DETAILED SPECIFICATIONS FOR ALL MUCON SUB-MINIATURE CERAMIC CAPACITORS, ELEMENTS & FILTERS

QPL's

CK05 and CK06
CK12 thru CK16

MILITARY CAPACITANCE RANGE IN PF MIL-C-20 NPO

STYLE	CAP. RANGE	VOLTAGE	STYLE	CAP. RANGE	VOLTAGE
CC75/CCR75	1.0 - 68	200	CC77/CCR77	2,700 - 5,600	50
CC75/CCR75	82 - 220	200	CC78/CCR78	820 - 3,300	200
CC75/CCR75	330 - 680	50	CC78/CCR78	3,900 - 12,000	100
CC76/CCR76	82 - 120	200	CC78/CCR78	15,000 - 27,000	50
CC76/CCR76	270 - 390	100	CC79/CCR79	3,900 - 10,000	200
CC76/CCR76	820 - 1,000	50	CC79/CCR79	15,000 - 39,000	100
CC77/CCR77	150 - 680	200	CC79/CCR79	47,000 - 82,000	50
C77/CCR77	470 - 2,200	100			

REPUBLIC ELECTRONICS CORP.

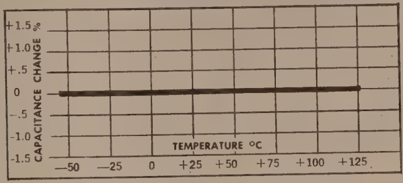
176 E. 7th St., PATERSON, N. J. 07524
201-279-0300 TWX 510-234-5908

MUCON® MU® CAPS ULTRA-STABLE ±.3% MOLDED CAPACITORS

MUCON ultra stable MU-CAPS consist of capacitor elements made of MUCON NPO ceramic encased in a specially formulated epoxy. Meet MIL-C-20.

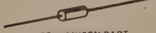
CAP. PF	MUCON PART RADIAL LEADS	CASE SIZE	MUCON PART AXIAL LEADS	CASE SIZE
CK05 SIZE .200" x .200" x .100"				
10	MU25CG100M	A	MU27CG100M	F
12	MU25CG120M	A	MU27CG120M	F
15	MU25CG150M	A	MU27CG150M	F
18	MU25CG180M	A	MU27CG180M	F
22	MU25CG220M	A	MU27CG220M	F
27	MU25CG270M	A	MU27CG270M	F
33	MU25CG330M	A	MU27CG330M	F
39	MU25CG390M	A	MU27CG390M	F
47	MU25CG470M	A	MU27CG470M	F
56	MU25CG560M	A	MU27CG560M	F
68	MU25CG680M	A	MU27CG680M	F
82	MU25CG820M	A	MU27CG820M	F
100	MU25CG101M	A	MU27CG101M	F
120	MU25CG121M	A	MU27CG121M	F
150	MU25CG151M	A	MU27CG151M	F
180	MU25CG181M	A	MU27CG181M	F
220	MU25CG221M	A	MU27CG221M	F
330	MU25CG331M	A	MU27CG331M	F
390	MU25CG391M	A	MU27CG391M	F
470	MU25CG471M	A	MU27CG471M	F
560	MU25CG561M	A	MU27CG561M	F
680	MU25CG681M	A	MU27CG681M	F
820	MU25CG821M	A	MU27CG821M	F
1000	MU25CG102M	A	MU27CG102M	F
1200	MU25CG122M	A	MU27CG122M	F
1500	MU25CG152M	A	MU27CG152M	F
1800	MU25CG182M	A	MU27CG182M	F
2200	MU25CG222M	A	MU27CG222M	F
2700	MU25CG272M	A	MU27CG272M	F
3300	MU25CG332M	A	MU27CG332M	F
CK06 SIZE .300" x .300" x .100"				
1200	MU26CG122M	B	MU28CG122M	G
1500	MU26CG152M	B	MU28CG152M	G
1800	MU26CG182M	B	MU28CG182M	G
2200	MU26CG222M	B	MU28CG222M	G
2700	MU26CG272M	B	MU28CG272M	G
3300	MU26CG332M	B	MU28CG332M	G
3900	MU26CG392M	B	MU28CG392M	G
4700	MU26CG472M	B	MU28CG472M	G
5600	MU26CG562M	B	MU28CG562M	G
6800	MU26CG682M	B	MU28CG682M	G
8200	MU26CG822M	B	MU28CG822M	G
10,000	MU26CG103M	B	MU28CG103M	G
12,000	MU26CG123M	B	MU28CG123M	G
MODIFIED CK06 SIZE .300" x .300" x .170"				
15,000	MU29CG153M	B-1	MU30CG153M	G-1
18,000	MU29CG183M	B-1	MU30CG183M	G-1
22,000	MU29CG223M	B-1	MU30CG223M	G-1
CC68 SIZE .500" x .500" x .150"				
10,000	MU08CG103M	D	MU13CG103M	I
12,000	MU08CG123M	D	MU13CG123M	I
15,000	MU08CG153M	D	MU13CG153M	I
18,000	MU08CG183M	D	MU13CG183M	I
22,000	MU08CG223M	D	MU13CG223M	I
27,000	MU08CG273M	D	MU13CG273M	I
33,000	MU08CG333M	D	MU13CG333M	I
39,000	MU08CG393M	D	MU13CG393M	I
47,000	MU08CG473M	D	MU13CG473M	I
56,000	MU08CG563M	D	MU13CG563M	I
68,000	MU08CG683M	D	MU13CG683M	I
82,000	MU08CG823M	D	MU13CG823M	I
100,000	MU08CG104M	D	MU13CG104M	I
120,000	MU08CG124M	D	MU13CG124M	I
150,000	MU08CG154M	D	MU13CG154M	I
180,000	MU08CG184M	D	MU13CG184M	I
220,000	MU08CG224M	D	MU13CG224M	I

CAPACITANCE:	Values 1000 Pf and below measured at 1 MHz. Values above 1000 Pf measured at 1 KHz.
CAPAC. TOL.:	Last letter of part number. Specify M for ± 20%, K for ± 10%, J for ± 5%, G for ± 2%. Note all parts are shown for ± 20%.
POWER FACTOR:	Measured same as capacitance .1% max.
INSUL. RESIST.:	100,000 Megohms or 1000 Megohm Microfarads whichever is less.
WORKING VOLTAGE:	50 WVDC
TEMP. RANGE:	−55°C to +125°C.
TEMP. COEFF.:	Zero ± 30 ppm/°C.
TEMP. CHARACT.:	± .3% max. from + 25°C. See curve.
LEADS:	No. 22 AWG tinned copper 1¼" long minimum except #26 AWG for case sizes MT11 thru MT13.

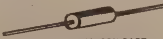


CAP PF	MUCON PART
1	MT11CG109D
2	MT11CG209D
3	MT11CG309D
5	MT11CG509K
7.5	MT11CG759K
10	MT11CG100K
12	MT11CG120K
15	MT11CG150K
18	MT11CG180K
22	MT11CG220K
27	MT11CG270K
30	MT11CG300K
33	MT11CG330K
39	MT11CG390K
47	MT11CG470K
56	MT11CG560K
68	MT11CG680K
82	MT11CG820K
100	MT11CG101K
120	MT11CG121K
150	MT11CG151K
180	MT11CG181K
220	MT11CG221K
270	MT11CG271K
330	MT11CG331K
390	MT11CG391K
470	MT11CG471K
560	MT11CG561K

CAP. PF	MUCON PART
CK12 SIZE	
5	MT12CG509M
6	MT12CG609M
7	MT12CG709M
8	MT12CG809M
9	MT12CG909M
10	MT12CG100M
12	MT12CG120M
15	MT12CG150M
18	MT12CG180M
22	MT12CG220M
27	MT12CG270M
33	MT12CG330M
39	MT12CG390M
47	MT12CG470M
56	MT12CG560M
68	MT12CG680M
82	MT12CG820M
100	MT12CG101M
120	MT12CG121M
150	MT12CG151M
180	MT12CG181M
220	MT12CG221M
270	MT12CG271M
330	MT12CG331M
390	MT12CG391M
470	MT12CG471M
560	MT12CG561M
680	MT12CG681M
820	MT12CG821M
1000	MT12CG102M
1200	MT12CG122M
1500	MT12CG152M
1800	MT12CG182M

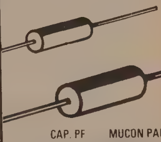


CAP PF	MUCON PART
CK13 SIZE	
5	MT13CG509M
6	MT13CG609M
7	MT13CG709M
8	MT13CG809M
9	MT13CG909M
10	MT13CG100M
12	MT13CG120M
15	MT13CG150M
18	MT13CG180M
22	MT13CG220M
27	MT13CG270M
33	MT13CG330M
39	MT13CG390M
47	MT13CG470M
56	MT13CG560M
68	MT13CG680M
82	MT13CG820M
100	MT13CG101M
120	MT13CG121M
150	MT13CG151M
180	MT13CG181M
220	MT13CG221M
270	MT13CG271M
330	MT13CG331M
390	MT13CG391M
470	MT13CG471M
560	MT13CG561M
680	MT13CG681M
820	MT13CG821M
1000	MT13CG102M
1200	MT13CG122M
1500	MT13CG152M
1800	MT13CG182M

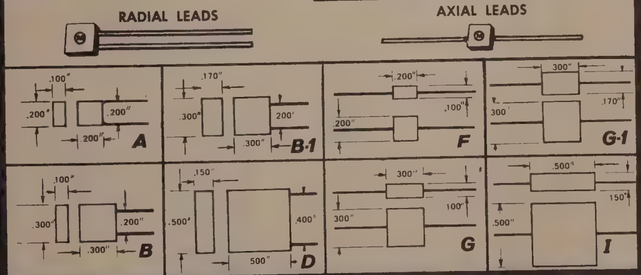


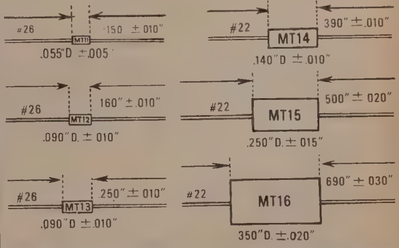
CAP PF	MUCON PART
CK14 SIZE	
82	MT14CG820M
100	MT14CG101M
120	MT14CG121M
150	MT14CG151M
180	MT14CG181M
220	MT14CG221M
270	MT14CG271M
330	MT14CG331M
390	MT14CG391M
470	MT14CG471M
560	MT14CG561M
680	MT14CG681M
820	MT14CG821M
1000	MT14CG102M
1200	MT14CG122M
1500	MT14CG152M
1800	MT14CG182M
2200	MT14CG222M
2700	MT14CG272M
3300	MT14CG332M
3900	MT14CG392M
4700	MT14CG472M
5600	MT14CG562M
6800	MT14CG682M
8200	MT14CG822M
10000	MT14CG103M
12000	MT14CG123M
15000	MT14CG153M
18000	MT14CG183M
22000	MT14CG223M
27000	MT14CG273M

CAP PF	MUCON PART
CK15 SIZE	
100	MT15CG101M
120	MT15CG121M
150	MT15CG151M
180	MT15CG181M
220	MT15CG221M
270	MT15CG271M
330	MT15CG331M
390	MT15CG391M
470	MT15CG471M
560	MT15CG561M
680	MT15CG681M
820	MT15CG821M
1000	MT15CG102M
1200	MT15CG122M
1500	MT15CG152M
1800	MT15CG182M
2200	MT15CG222M
2700	MT15CG272M
3300	MT15CG332M
3900	MT15CG392M
4700	MT15CG472M
5600	MT15CG562M
6800	MT15CG682M
8200	MT15CG822M
10,000	MT15CG103M
12,000	MT15CG123M
15,000	MT15CG153M
18,000	MT15CG183M
22,000	MT15CG223M
27,000	MT15CG273M
33,000	MT15CG333M
39,000	MT15CG393M



CAP. PF	MUCON PART
CK16 SIZE	
6800	MT16CG682M
8200	MT16CG822M
10,000	MT16CG103M
12,000	MT16CG123M
15,000	MT16CG153M
18,000	MT16CG183M
22,000	MT16CG223M
27,000	MT16CG273M
33,000	MT16CG333M
39,000	MT16CG393M
47,000	MT16CG473M
56,000	MT16CG563M
68,000	MT16CG683M
82,000	MT16CG823M
100,000	MT16CG104M
120,000	MT16CG124M
150,000	MT16CG154M
180,000	MT16CG184M
220,000	MT16CG224M





REPUBLIC ELECTRONICS CORP.

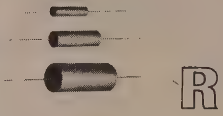
176 E. 7th St., PATERSON, N. J. 07524
201-279-0300
TWX 710-988 5908

S&EI® Manufacturing/Capacitors

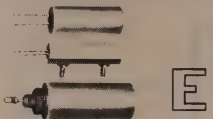
18800 Parthenia Street, Northridge, California 91324 • (213) 349-4111 • TWX 910-493-1252

CASE STYLES →

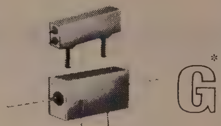
FEATURES ↓



Wrap and Fill, round



Hermetically, sealed, tubular



Hermetically, sealed, rectangular

17 SERIES — METALIZED*MYLAR

For circuits that require the ultimate electrical properties Non Polar coupled with the smallest size over a wide temp. range.

- IR: 50K Meg × MFD Min. +25° C
- DF Less Than 1% IKHZ at +25°C
- Dielectric Strength: 200% of rated VDC 1 Min. Max.
- Temperature Range: −55° C to +125° C
- Voltage versus Temp.: 100% rated Voltage to 100° C 50% derating to +125° C
- Capacity versus Temp.: −55° C to +25° C, +5% change; +25° C to +85° C, +3%, and +25° C to +105° C, +7% change
- Quality Control and Production Tests consist of 100% group A requirements of MIL C 18312 on hermetic seal style E and all tests except for moisture leak tests on styles W-U-R-N-B-D.

17R

CASE SIZES DIA	LGTH.	100 VDC MFD	200 VDC MFD	400 VDC MFD	600 VDC MFD
17	40	.001	.001	.001	001
17	.40	.022	.0068	.0033	0012
22	.40	039	027	.01	0047
23	54	.12	.033	.027	0082
27	54	.18	12	047	01
.32	.67	.50	22	056	015
34	.83	.68	.33	.12	039
46	83		39	18	047
.28	97	.82			
.39	97	1.5	47	22	
.47	.97		.68	.27	
41	1.17	2 0	82	33	082
56	1.17	5.0	1 5	.50	18
.60	1.17			.56	
65	1.68	10 0	4 0	1 0	68
89	1.68	20 0	8 0	3.0	1 5

17E

CASE SIZES DIA.	LGTH.	100 VDC MFD	200 VDC MFD	400 VDC MFD	600 VDC MFD
.175	.500	.022	.0068	0033	.001
.195	.500	.039	.0082	.0068	.0049
.235	.500		.027	.01	
.195	.625	.056			.0056
.235	.625	.12	.056	.018	.01
.312	625	.18	.12	.047	
.312	.750	.33	.18	.056	.015
.400	.750	.50	.27	.1	.033
.400	.875	.68	.39	.12	.047
400	1.125	1.5	.68		.056
.400	1.375	2.0			.1
.500	1 375	4.0	1.5	.39	.15
.562	1.375			.50	.18
.67	1.375	5.0		.56	
562	1 875		.20	.82	.39
.670	1 875	10.0	4.0	1.0	.56
.750	1 875	12.0	5.0	1 5	.82

17G

CASE SIZES TK.	WD.	LG.	100 VDC MFD	200 VDC MFD	400 VDC MFD	600 VDC MFD
.22	.34	.562	.082	.027	01	0047
.22	.34	.687	.22	.056	.033	018
.22	.34	812	.33	.10	056	027
.22	.34	.937	.50	.12	.068	033
.22	.34	1.125	.68	.18	1	047
.31	41	.937	.82	.27	15	068
.31	.41	1 125	1.0	.39	18	.1
31	.41	1 312	1.5	.50	.27	12
40	.57	1 125	2 0	75	.39	.18
.40	.57	1.312	3.0	82	56	.27
.40	.57	1 562		1 0	68	.33
.40	.57	1 812	5 0	1.5	.82	.39
.50	.65	1.562		2.0	1.0	50
.50	.65	1.812				.56
.50	.65	2 062	8.0		1 5	.75
.50	.65	2 312		3 0		82
.60	.80	2 062	12.0		2 0	1 0
.60	.80	2 312	15.0	5.0		

22 SERIES — METALIZED POLYCARBONATE

For circuits that require flat T.C., low losses, small size over a wide temperature and frequency range. Used in many wave filter, discriminator and critical timing circuits.

- IR: 100K Meg × MFD Min. at +25° C
- DF less than .3% measured IKHZ at 25° C
- Dielectric Strength: Up to 200% of rated VDC Max. I Min.
- Temperature Range: −55° C to +105° C. When properly encased will operate to +125° C
- Temperature Coefficient: From −55° C to +25° C, 1.5% max change; +25° C to +105° C, −.7% max. change.
- QC & Production Tests consist of 100% to group A requirements MIL C 18312 on hermetic seal style E and to all except moisture leak test on styles W-U-R-N-B-D.

22R

CASE SIZES DIA.	LGTH.	MFD 50 VDC MFD	MFD 100 VDC MFD	MFD 200 VDC MFD	MFD 400 VDC MFD
.18	.40	.082	.039	.01	.0047
.21	.40	.18	.068	.022	.01
.18	.54	.22	.082	.027	.015
.24	.54	.33	.18	.056	.027
.38	.54	.56	.22	.082	.047
.24	.67		.25	.1	.056
.29	.67	.68	.27	.15	.1
.32	.67	.75	.39	.25	.12
.40	.67	1.0	.56		
.32	.83	1.5	.82	.27	15
.39	.83	2.0	1.0	.39	.18
.41	.97		1.5	.47	.22
.48	.97			.56	.33
.38	1.16	4.0		.68	.39
.45	1.16	5.0	2.0	1.0	.5
.50	1.16	8.0	2.5	1.5	.68
.62	1.16	12.0			
.64	1.68	15.0	5.6		
.68	1.68	20.0	8.0		
1.06	1 68	50.0	12.0		
.44	1.78			2 0	.75
.675	1.78			4.0	

22E

CASE SIZES DIA.	LGTH.	50 VDC MFD	100 VDC MFD	200 VDC MFD	400 VDC MFD	600 VDC MFD
.175	.50	.033	.018		.0015	
.195	.50	.082	.039	.022	.0022	.001
.235	.50					
.195	.625	.12	.082		.01	
.235	.625	.18	.1	.033	.027	
.312	.625	.56	.12	.056	.033	.0082
.312	.750	.68	.27	.18	.056	.022
.400	.750	1.0	.50	.25	.082	.027
.40	.875	2.0	.56	.39	.1	.039
.50	.875		.68		.18	.056
.40	1.125	3.0	1.0	.47		
.50	1.125	5.0	2.0	.56	.25	.12
.562	1.125	6.8			.33	
.50	1.375	8.0	3.0	1.0	.50	.18
.562	1.375			1.5		
.670	1.375	10.0	5.0			.27
.562	1.875	15.0	6.8	2.0	.82	.33
670	1 875	18.0	8 0	3.0		.50
75	1 875	20 0	12 0	4 0	1 0	56
1 0	1 875	40 0	22.0	8 0	1.5	.82

22G

CASE SIZES TK.	WD.	LG.	50 VDC MFD	100 VDC MFD	200 VDC MFD	400 VDC MFD	600 VDC MFD
.22	.34	.562	.39	.039	.015	.0063	.0047
.22	.34	.687	.56	.056	.056	.015	.01
.22	.34	.812	.82	.18	.082	.022	.015
.22	.34	.937	1.0	.39	.12	.033	.022
.22	.34	1.125			.18	.047	.027
.31	.41	.937	2.0	.68	.39	.056	.039
.31	.41	1 125	3.0	1.0	.50	.082	.056
.31	.41	1 312				.12	.068
.40	57	1.125	5.0		.75	.18	.12
40	57	1 312		2.0	.82	.25	.15
.40	.57	1 562	7.0	3.0	1.0	.33	.18
.40	.57	1 812			1.5	.39	.25
.50	.65	1 562	10.0	7.0		.47	.27
.50	.65	1 812		10.0	2.0	.56	.33
50	.65	2 062				.68	.39
50	.65	2 312			3.0	.75	.50
.60	.80	2.062			5.0	1.0	.75

13 SERIES — POLYSTYRENE

For the instruments that require long term stability, low leakage, minimum dielectric absorption.

Used in many critical computer timing and hybrid circuits.

- Temperature Range: −55° C to +85° C
- IR: 100K Meg × MFD Min +25° C
- DF: .05% Max IKHZ at +25° C
- TC: 130 PPM / ° C ± 20 PPM
- Quality and Production test consists of 100% to group A level of MIL C 19978 on style E and all requirements except moisture leak test on style R.

13R

CASE SIZES DIA.	LGTH.	100 VDC MFD	200 VDC MFD	400 VDC MFD	600 VDC MFD
280	.680	.001	001	.001	001
.280	.680	.01	0068	.005	0033
312	680	.022	.01	.0082	0068
.312	.875	.033	.015	.01	032
.343	.875	.039	027	.015	01
375	875	.05	.033	022	015
468	875	.082	039	025	
406	1.0	.1	047	033	02
468	1 0	12	05	039	027
437	1 25	15	068	05	033
50	1 25	20	1	068	039
531	1 25	27	15	082	05

13E

CASE SIZES DIA.	LGTH.	100 VDC MFD	200 VDC MFD	400 VDC MFD
.195	.75	.0027	.0015	
.195	.75	.0039	.0018	
.195	.75	.0082	.0033	.0015
.235	.75	.012	.0068	.0027
.312	.75	.022	.015	.01
.400	.87	.068	.033	.018
.500	1 0	.12	.068	.033
.562	1.12	.22	.1	.068
.562	1.375	.33	.15	.1

10 SERIES —*MYLAR FOIL

For the instrument that requires high reliability, precise characteristics year after year. Used in many communication, telephone, tracking and test instrument devices.

- Temperature Range: −55° C to +125° C
- IR: 50K Meg × MFD Min. at +25° C
- Dielectric Strength: 200% of rated VDC max. I Min.
- DF less than .5% IKHZ at 25° C
- Temperature Coefficient:
  - +5% change from −55° C to +25° C
  - +5% change from +25° C to +85° C
  - +9% change from +25° C to +105° C
  - +14% change from +25° C to +125° C
- QC and Production Tests are 100% to group A of MIL C 19978 on hermetic style E and all tests except moisture leak requirement style R.

10R

CASE SIZES DIA.	LGTH.	100 VDC MFD	200 VDC MFD	400 VDC MFD	600 VDC MFD	1000 VDC MFD
.156	.500	.001	.001			
.156	.500	.01	.0082			
203	.500	.015	.015			
.203	.625	.022	.022	.0068		
.265	625	.039	.027	.01		
.218	.750	.047	.03	.02	.0047	.001
.296	750	.082	.047	.022	.0032	.0015
312	.750		.068	.025	.01	
.281	.875	.1	.075	.027	.015	.0022
.375	.875	.15	.1	047	.022	.01
359	1.0	.22		.068	.027	.015
.50	1.0			.12	.068	
.406	1 125	.39	.22			
.468	1.250	.47	.33	.15	.082	.047
.625	1.250	.82	.47		.1	
.609	1 375		.56	.27	.15	

10E

CASE SIZES DIA	LGTH	100 VDC MFD	200 VDC MFD	400 VDC MFD	600 VDC MFD
195	.625	.001	.001	.001	.001
195	.625	.015	.01	0047	.0015
235	.625		.015	0068	
312	.625		.027	015	
312	.750	.082	033		.0082
.312	.875	.12	.047	.027	
.400	.875	.15	.082	.047	.022
.400	1.125	.22	.15	.068	.027
.400	1.375	.33	.22	.1	.033
.500	1.375	.50	.33	.15	.068
.562	1.375	.56	.47	.22	.082
.670	1.375	.90		27	
670	1 875	1.0	.56		.12
.670	1.875	1.25	.82	.39	.15
.750	1.875	1.5	1.0	.56	.33
1 0	1.875	2.0	1.5	.82	.39

*The pictorial "G" style series displayed are not standard; however depicts two popular methods of mounting features. Many mounting and terminal features can be designed and manufactured to your specifications by request to our representatives or factory direct, without delivery delay.

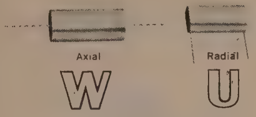
IMPORTANT NOTICE: THE NEW MINIATURE 50VDC AND 100VDC SIZES IN OUR 22 SERIES IS A MAJOR SIZE REDUCTION IN METALIZED POLYCARBONATES.

*MYLAR DUPONT
TRADE NAME FOR
POLYESTER FILM

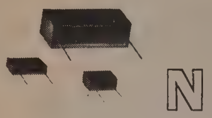
All intermediate values not listed are available as standard products.

S&EI® Manufacturing/Capacitors

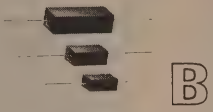
18800 Parthenia Street, Northridge, California 91324 • (213) 349-4111 • TWX 910-493-1252



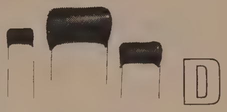
Wrap and Fill, rectangular



Molded, radial leads



Molded, axial leads.



Epoxy Dip Case

17W/17U

CASE SIZES L	T	W	100 VDC MFD	200 VDC MFD	400 VDC MFD	600 VDC MFD
40	.12	.22	.022	.0056	.0033	.001
40	.17	.27	.039	.027	.01	.0047
54	.17	.28	.12	.039	.018	.0082
54	.21	.32	.18	.12	.047	.01
67	.25	.38	.39	.18	.056	012
67	.30	.42	.50	.27	.082	.015
83	27	38	.56	29	1	033
83	42	50	68	33	18	047
97	22	35	82	47	2	
97	32	46	1 5	68	22	
1 17	34	5	2 0	82	33	1
1 17	47	65	5 0	1 5	56	18
1 68	47	56	8 0	2 0	82	27
1 68	50	65	10 0	4 0	1 0	39
1 68	65	85	15 0	5 0	1 5	82
1 68	75	1 0	20 0	8 0	2 0	1 5

17N

CASE SIZE L	T	H	100 VDC MFD	200 VDC MFD	400 VDC MFD	600 VDC MFD
.395	095	.295	.039	01	.0027	
.42	16	.31	047	027	012	0047
55	.16	.31	12	.033	022	012
.55	.19	.38	.18	056		
55	24	.38	27	12	047	
.55	30	.40	39		1	
68	19	50	68			
67	30	50		27		018
82	30	70			18	039
88	25	50	1 0	39		
1 0	37	50	2 0	68	27	056
1 24	40	75	5 0	1 5	68	18
1 75	57	75	8 0	3 0	1 5	39

17B

CASE SIZES TK	WD	LG.	100 VDC MFD	200 VDC MFD	400 VDC MFD	600 VDC MFD
.17	29	.42	001	001	001	001
.17	.29	.42	047	027	.01	0047
.17	.29	.57	.056	.033	012	.0062
.17	.29	57	12	039	015	.0082
.23	36	.57	.15	.047	018	009
.23	.36	.57	.27	082	.039	.01
29	42	57	39	15	047	
29	42	67	68	27	1	015
39	54	82	1 0	5	18	047
39	54	1 04	2 0	68	27	
39	54	1 19	2 5	1 0	39	1
56	72	1 24	5 4	1 5	56	18
56	72	1 75	10 0	4 0	1 0	5

17D

CASE SIZES L	T	H	100 VDC MFD	200 VDC MFD	400 VDC MFD	600 VDC MFD
.39	.17	35	022	01	0068	0022
.39	.19	38	039	027	01	0047
.52	17	.35	082	047	015	0056
.52	26	45	18	.10	047	01
.65	23	42	22	.12	056	012
.65	25	.45	39	15	082	015
65	.35	.55	5	27	.1	
81	27	43	56			027
81	42	60	68	39	18	047
95	37	53	1 0	56		
95	38	59	1 5	68	22	
95	46	66			27	
1 15	34	55				082
1 15	39	60	2 0	75	33	10
1 15	43	65	3 0	1 0	39	12

22W/22U

CASE SIZES L	T	W	50 VDC MFD	100 VDC MFD	200 VDC MFD	400 VDC MFD
.40	.12	.22	.047	.018	.01	.001
.40	.15	.27	.25	.039	.022	.01
.54	.13	.23	.27	.082	.027	.015
.54	.16	.28	.39	.1	.047	.027
54	.21	.32	.50	.12	.082	.047
.67	.18	.29	.82	.15	.1	.056
.67	.22	.40	1.0	.39	.25	.12
.83	.28	.38	1.5	.56	.30	.15
.83	.32	.45	2.0	.68	.39	.18
.97	.33	.48		1.0	.47	.27
.97	.10	.55		1.2	.56	.36
1.16	.32	.43	5.0	1.5	.68	.50
1.16	437	.55	10.0	2.5	1.5	.63
1.16	.54	.66	12.0	3.0		
1.68	.51	.64	15.0	5.0		
1.68	.73	.86	30.0			

22N

CASE SIZES L	T	H	50 VDC MFD	100 VDC MFD	200 VDC MFD	400 VDC MFD	600 VDC MFD
.395	.095	.295	.068	.01	.0068	.0015	
.42	.16	.31	.075	.047	.01	.0022	
.42	.18	.31	.1		.022	.0047	.0022
.55	.16	.31		.12	.039	018	.0047
.55	.18	.31	.22	.15	.056	.027	
.55	185	.38		.18	.068		
.55	.24	.38	.50	.22	.082	.039	.012
.55	.30	.40	.68	.27		.047	.018
.67	.30	.45		.39	.22		.027
67	.30	50		.56		.068	
.82	.30	.42	1 0		.27	.1	.039
82	40	.50	1.5	1.0	.39	.15	.068
1.0	.37	.50	3.0	1 5	.68		.1
1 24	.40	.50	5.0	2.0	.82	.22	
1 24	57	.75	10.0	4.0	1.5	.50	.27
1 75	57	75	18 0	6 8	3 0	82	33
1 75	57	1 0	22 0	10 0			

22B

CASE SIZES T'HK.	WDTH	LGTH	50 VDC MFD	100 VDC MFD	200 VDC MFD	400 VDC MFD	600 VDC MFD
.17	29	.42	.1	.047	.022	.01	.0033
.17	.29	57	.22	.1	.039	.022	.0068
.23	36	.57	.33	.22	.082	.047	.01
.29	42	57	.68	.27	.1		.018
23	42	67			.25		027
.29	42	.82	1 0	.75	.27	.068	
39	54	82	1 5	1 0	.50	.12	.082
39	54	1 04	2 0		68	18	
39	54	1 19	5 0	3 0	.82	.33	.15
.56	72	1 24	10 0	5 0	1.5	.5	.27
56	72	1 75	18 0	8.0	3.0	.82	.39
56	72	1 92	22 0				

22D

CASE SIZES +.032 −.096 L	T	H	50 VDC MFD	100 VDC MFD	200 VDC MFD	400 VDC MFD	600 VDC MFD
.39	.19	.36	.068	.01	.01	.0022	0015
.39	.18	.39			.015	.0047	0022
.39	.23	.45	.1	.0	.022	.01	
.52	.18	.39	.18	.12	.033		.0047
.52	.26	.45	.50	.22	.082	.027	.01
.52	.35	.58	.68	.27		.047	.018
.64	.35	.53			.25		.027
.64	.49	.72		.56		.12	
.81	.35	.55	.75		.33		.039
.81	.40	.63	1.0		.39	.15	.056
.81	.44	.68	1.5	1.0		.18	.082
.95	.38	.61			.47	.25	
.95	.42	.66	3 0	1.5	.56	.33	
1.15	.37	.63			.75		.1
1.15	.43	.65	5 0	2.0	1.0	.39	12

All intermediate values not listed are available as standard products.

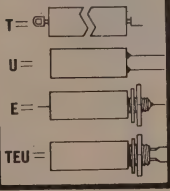
ORDERING AND PART NUMBER INFORMATION

The dimensional tolerances for case styles R-W-U-D are ±.05. Styles G-B-N-E are ±.031, on length, and ±.015 for other dimensions. All units are available in any value, ranging from .001 MFD to their maximum capacity, with tolerances to ±1%. Standard tolerance is ±20%. Other types of leads, configurations, and encasements are available upon request to meet your special requirements.

***9**

Hermetic case Style Accessories

9 = Insulated Sleeve



17

Dielectric

- 17 = Metalized Mylar
- 22 = Metalized Polycarbonate
- 10 = Mylar Foil
- 13 = Polystyrene Foil

E

Case Style

- E = Hermetic Rnd.
- G = Hermetic Rect.
- W = Wrap Fill, Oval, Axial
- U = Wrap Fill, Oval, Radial
- N = Molded Radial
- B = Molded Axial
- R = Wrap Fill, Round
- D = Epoxy Dip

***1**

Circuits

- 1 = Case Floating
- 2 = Case ground
- 3 = Case ground With Lead
- 5 = Feed Through

B

Voltage

- A = 50 VDC
- B = 100 VDC
- C = 200 VDC
- D = 300 VDC
- E = 400 VDC
- F = 600 VDC
- G = 1000 VDC

103

Capacitance

Expressed in MMFD
103 = .01 MFD
Last digit No Zeros

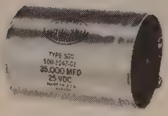
K

Tolerance

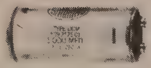
- Standard ± 20%
- K = ± 10%
- J = ± 5%
- H = ± 3%
- G = ± 2%
- F = ± 1%

**Use these key part numbers only when ordering style E, G, hermetic seal encasements. Remaining part numbers are applicable when ordering case styles R-W-U-N-B-D.*

See YELLOW SECTION for Local Sales Offices and Key Personnel

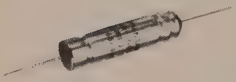


Type 500—Electrolytic
Computer Grade 85°C
Bulletin 2236

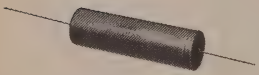


Type DCM—Electrolytic
Computer Grade 65°C
Bulletin 2231

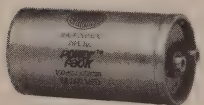
Type 557—Electrolytic
— 55°C to + 125°C
Mil-C-39018
Bulletin 2240



Type 556—Electrolytic
Commercial Grade
Bulletin 2239



Type 066—Electrolytic
Industrial Grade
Bulletin 2241



Type 100—Electrolytic
Premium Grade
High Ripple Current
— 55°C to + 105°C
Bulletin 2271

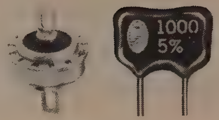
Type U5—Molded Mica
Automatic Insertion
Bulletin 2325

SPECIFY SANGAMO CAPACITORS

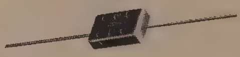
for Industrial Military Computer Communications and Instrument Applications

For more detailed information
contact your nearest Sangamo
Representative.

SANGAMO
ELECTRIC COMPANY
Capacitor Division
P.O. BOX 128
PICKENS, SOUTH CAROLINA 29671
Phone: 803 - 878-6311



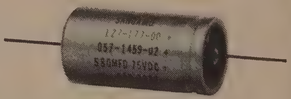
Type M—Mica Button
Type D—Mica Dipped
Bulletins 2311, 2323, & 2312



Type R—Mica Molded
Bulletin 2320

Type G—Mica
Transmitting
Bulletin 2322

Type 291—Cast Mica
Transmitting
Bulletin 2324



Type 057—Electrolytic
Premium Grade
— 55°C to + 85°C
Bulletin 2244

AK
.01 MFD
2500 WVDC
HK
2500 WVDC

Type AK & HK—Molded Mica
Fixed Terminals
Bulletin 2321

DOWN GO COST, SIZE, WEIGHT, VOLUME.

DESIGN SMALLER WITH NEW SANGAMO **Power Pack**™ *TYPE 100 CAPACITORS*

Imagine a much smaller, much lighter weight computer grade electrolytic capacitor. It's a breakthrough in technology that lets you break through in design.

You can use fewer capacitors at less cost because the Sangamo Type 100 features high ripple current capability up to 46 amps at 120 Hz @ 65°C. Regulate the power supply better thanks to ESR values ranging from .0062 ohms to .052 ohms at 120 Hz. And count on additional savings since you get no temperature or voltage derating with operating temperatures that range from—55°C to 105°C.

What's more, all-aluminum construction of the Type 100 allows higher internal temperature without deterioration. And excellent impedance vs. frequency response over the entire temperature range means power supplies can operate more efficiently in the 20 to 40 KHz range.

For details on Type 100 Power Pack Capacitors, just write to Jim Dutton, Marketing Manager Aluminum Electrolytic Capacitors, Sangamo Electric Company, Pickens, S. C. 29671, U.S.A. Or call him at (803) 878-6311 and ask for Bulletin 2271.

Then start thinking small.

SANGAMO
ELECTRIC COMPANY

390

TYPE 100 TYPICAL RATINGS

	1-3/8" x 4-1/8"					2" x 4-1/8"					3" x 5-5/8"				
Rated VDC	Capacitance (mfd)	Max. ESR 120 Hz (Ohms)	Max. Ripple Current @ 120 Hz (rms amps)			Capacitance (mfd)	Max. ESR 120 Hz (Ohms)	Max. Ripple Current @ 120 Hz (rms amps)			Capacitance (mfd)	Max. ESR 120 Hz (Ohms)	Max. Ripple Current @ 120 Hz (rms amps)		
			65°C	85°C	105°C			65°C	85°C	105°C			65°C	85°C	105°C
10	20,000	.0146	22.5	17.0	6.5	45,000	.0084	31.5	22.5	8.5	170,000	.0077	45.0	31.0	10.0
15	14,000	.0147	22.0	16.5	6.5	32,000	.0087	31.0	22.0	8.5	110,000	.0079	45.0	30.5	10.0
25	9,000	.0154	21.5	15.5	6.0	19,000	.0091	30.5	21.5	8.0	73,000	.0080	44.0	30.0	9.5
50	4,400	.0168	19.5	13.5	5.0	9,800	.0101	29.0	20.0	7.0	36,000	.0087	42.0	29.0	9.0

METALLIZED POLYESTER CAPACITORS

SEACOR DELIVERS

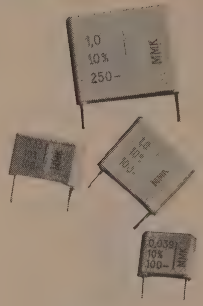
SERIES MMK METALLIZED POLYESTER CAPACITORS

DESCRIPTION

Series MMK metallized polyester capacitors are miniature, rectangular units with a molded thermoplastic case meeting U.L. flammability specifications 94 VE-1. The special MMKO case is molded of an extraordinary new plastic material. This special case has a 94 VE-0 flame rating and is virtually impervious to most solvents including, for example, FREON TMC* and those used for cleaning and degreasing electronic assemblies. It also exhibits very low water absorption; less than 0.08%/24 hours and 0.35% at equilibrium. The material is non-corroding.

All electrical specifications and dimensional data are identical for both the standard MMK and the special MMKO.

Series MMK units are available in 42 standard, commonly required values from 0.0027 mfd to 6.8 mfd. They are characterized by low dissipation factors and high circulating current capability. MMK's are designed for tube or solid state printed circuit applications where shape factors make for ease of assembly and stable vertical mounting with low profile. MMK's are available in voltage ratings of 100, 250, 400 and 630 VDC although not all values are standard in all voltages. Construction uses a non-inductive type winding.



MMK

SPECIFICATIONS

Capacitance Values: 0.0027 mfd to 6.8 mfd
Tolerances: ±5%, 10%, 20% std.; ±1% and 2.5% spcl.
Working Voltages: 100 VDC, 250 VDC, 400 VDC, 630 VDC, nominal
Test Voltages—
- **Between term:** 1.5 x working voltage applied for 1 min.
- **Term to Case:** 2500 VDC
- **Life Test:** 1.5 x working VDC @ 85°C for 1000 hrs

Dissipation Factor, tan δ:
- less than 100 x 10^{-4} @ 1 KHz for C greater than 1 μF
- less than 200 x 10^{-4} @ 10 KHz for C less than 1 μF

Insulation Resistance: >30,000 Mohms for C less than 0.1 μF and VDC greater than 250
Op. Temp. Range: −40°C to 100°C, derate voltage 1.5%/°C from 85°C to 100°C
Temp. Coeff.: Tc ∓ +(400±200) x 10^{-6}/°C; approx. 600 ppm/°C
Self Inductance: Approx. 10 nH/cm of case length

Construction—
- **Style:** Flat, rectangular, low profile; radial wire leads
- **Case:** Std. MMK, self-extinguishing thermoplastic; Spcl. MMKO, special thermoplastic (VE-O), epoxy resin end fill
- **Leads:** MMK, MMKO, copper tinned leads 0.236" long

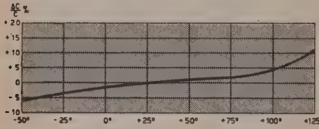
Request complete specifications.

TYPE 105 METALLIZED POLYESTER MINIATURE CAPACITORS

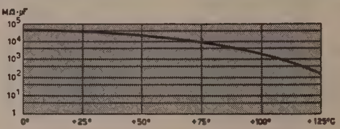
105

FEATURES—

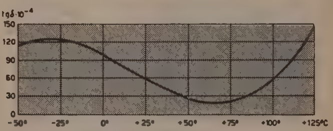
Miniature size ■ Polyester ("Mylar"*) wound dielectric ■ Encapsulated; epoxy end fill ■ Low cost ■ −55°C to +125°C ■ Low dissipation factor ■ Non-inductive.



Capacitance Versus Temperature



Insulation Resistance Versus Temperature



Power Factor Versus Temperature

SPECIFICATIONS—

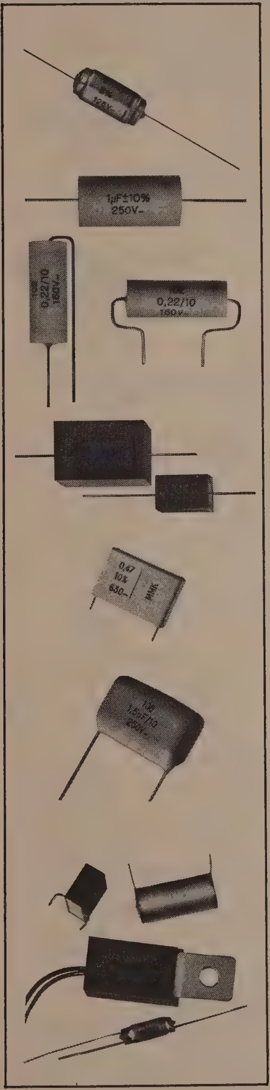
Std. Values: (100V) 0.068 mfd to 10.0 mfd; (250V) 0.033 mfd to 4.7 mfd; (400V) 0.015 mfd to 2.2 mfd; (630V) .01 mfd to 0.47 mfd
Tolerances: ±5%, 10% std; other tols. on request
Working Voltage(s): 100 VDC, 250 VDC, 400 VDC, 630 VDC
Test Voltage: 1.5 x working voltage
Power Factor: Tan δ ≤7.5 x 10^{-3} @ 1 KHz, 25°C
Insulation Resistance: C >.33 mfd, RC ≥10,000 Mohms microfarad
C ≤.33 mfd, R ≥30,000 Mohms
Op. Temp. Range: −55°C to +125°C; derate V 1.2% above 85°C
Temp. Coeff.: Approx. 600 ppm/°C; see curve
Construction: Non-inductive; metallized polyester, Mylar wrap, epoxy end fill
Leads: Solder-coated, copper clad steel wire, 1.38" ±.2" long

* ® Dupont

Seacor Inc. 598 Broadway ■ Norwood, New Jersey 07648 ■ (201) 768-6070 ■ TELEX 135354

CAPACITORS
FILM
CAPACITORS

STANDARD OR SPECIAL—QUALITY and PRICE



Whatever your wound film capacitor requirement, Seacor probably has it. And if it's really special—we'll do it.

Seacor: a broad line of standard wound dielectrics; quality and reliable delivery **proven** over the years; more than competitive prices. And, a top-flight engineering staff with an insatiable appetite for specials.

Representative Seacor wound capacitors are listed—and there are lots of others which aren't. Whether you need an off the shelf standard or an exotic ultraspecial: Check Seacor. First.

TUBULAR AXIAL LEAD

Polystyrene Foil: 25V, 63V, 160V, 630V; 10 PF to 0.1 MF; 1%, 2-1/2%, 5%, 10%, 20%.

Polyester Foil: 160V, 250V, 400V, 630V, 1000V; 1000 PF to 2 MF; 5%, 10%, 20%.

Metallized Polyester: 100V, 160V, 250V, 400V, 630V, 1000V; 1000 PF to 20 MF; 5%, 10%, 20%.

Metallized Polycarbonate: 100V, 160V, 250V, 400V, 630V, 1000V; 3300 PF to 20 MF; 5%, 10%, 20%.

HV Metallized Polycarbonate: 1500V, 2500V, 3500V, 5000V, 10,000V, 16,000V, 22,000V; 470 PF to 1.0 MF; 5%, 10%, 20%.

MOLDED CASE, AXIAL LEAD

Metallized Polyester: 63V, 160V, 250V, 400V; 0.01 MF to 10.0 MF; 5%, 10%, 20%.

Metallized Polycarbonate: 63V, 160V, 250V, 400V; 0.01 MF to 10.0 MF; 1%, 2%, 5%, 10%, 20%.

MOLDED CASE, RADIAL LEAD

Metallized Polyester: 100V, 250V, 400V, 630V; 1000 PF to 6.8 MF; 5%, 10%, 20%.

Metallized Polycarbonate: 63V, 160V, 250V, 400V; 0.01 MF to 10.0 MF; 1%, 2%, 5%, 10%, 20%.

EPOXY DIPPED RADIAL LEAD

Metallized Polyester: 63V, 160V, 250V, 400V, 630V; 1000 PF to 10 MF; 5%, 10%, 20%.

Metallized Polycarbonate: 63V, 160V, 250V, 400V; 0.01 MF to 10.0 MF; 1%, 2%, 5%, 10%, 20%.

Polyester Foil: 50V, 100V, 200V, 400V, 600V; 1000 PF to 0.47 MF; 10%, 20%.

ABOUT THOSE SPECIALS:

There's no "take 'em or leave 'em" at Seacor. Any wound capacitor you need—however exotic—we'll do our level best to produce for you, on-time and at high Seacor quality: closer tolerances; new dielectric films; film combinations, e.g., mylar/polycarbonate; high voltages, e.g., 25KV to 40KV. And mechanical specials: special brackets, lugs, leads, form factors, materials, etc., etc.

Seacor's engineers **can.** Find out for yourself.

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SOUTHERN ELECTRONICS CORPORATION
726 S. FLOWER ST.
BURBANK, CALIFORNIA 91502
(213) 845-2458

FILM DIELECTRIC CAPACITORS
CUSTOM / STANDARD

DIELECTRICS AND CHARACTERISTICS

POLYESTER (MYLAR) FOIL
Cap. Range: .0003-10 mfds
Volt. Range: 50-2000 vdc
Temp. Range: −55 to 125°C
IR: 50 K (meg) (mfds) or 100 K megs
DF: .75% max.

METALLIZED POLYESTER
Cap. Range: .01-50 mfds
Volt. Range: 50 vdc-10 kvdc
Temp. Range: −55 to 125°C
IR: 25 k (meg) (mfds) or 50 K megs
DF: 1% max.

POLYCARBONATE FOIL
Cap. Range: .0003-5 mfds
Volt. Range: 25-1000 vdc
Temp. Range: −55 to 125°C
IR: 75 K (meg) (mfds) or 500 K megs
DF: .3% max.

METALLIZED POLYCARBONATE
Cap. Range: .01-50 mfds
Volt. Range: 50-1000 vdc
Temp. Range: −55 to 125°C
IR: 30 K (meg) (mfds) or 150 K megs
DF: .3% max.

POLYPROPYLENE FOIL
Cap. Range: .0003-5 mfds
Volt. Range: 50-1000 vdc
Temp. Range: −55 to 105°C
IR: 100 K (meg) (mfds) or 500 K megs
DF: .1% max.

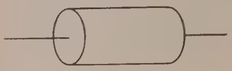
METALLIZED POLYPROPYLENE
Cap. Range: .01-50 mfds
Volt. Range: 50 V-10,000 vdc
Temp. Range: −55 to 105°C
IR: 50 K (meg) (mfds) or 100 K megs
DF: .2% max.

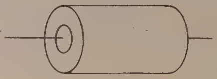
TEFLON
Cap. Range: .001-5 mfd
Volt. Range: 50-600 vdc
Temp. Range: −55 to + 160°C
IR: 1000 K (meg) (mfds) or 2000 K megs
DF: .01% max.

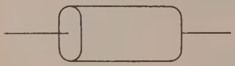
POLYSTYRENE FOIL
Cap. Range: .0005-5 mfds
Volt. Range: 50-600 vdc
Temp. Range: −55 to 85°C
IR: 100 K (meg) (mfds) or 500 K megs
DF: .1% max.

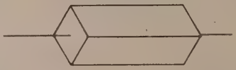
POLYSULFONE FOIL
Cap. Range: .0003-5 mfds
Volt. Range: 25-1000 vdc
Temp. Range: −55 to 150°C
IR: 75 K (meg) (mfds) or 500 K megs
DF: .3% max.

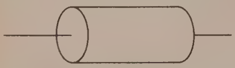
STANDARD CASE STYLES

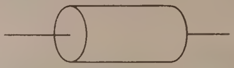

STYLE 1
WRAP & FILL-ROUND

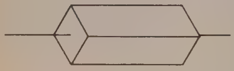

STYLE 6
METAL CASE ROUND-AXIAL

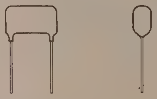

STYLE 2
WRAP & FILL-FLAT

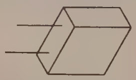

STYLE 7
METAL CASE RECTANGULAR


STYLE 3
EPOXY OR PHENOLIC-ROUND

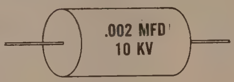

STYLE 8
STEATITE OR CERAMIC


STYLE 4
EPOXY RECTANGULAR-AXIAL

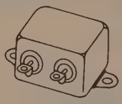

STYLE D
DIP COATED-RADIAL

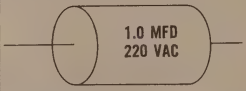

STYLE 5
EPOXY RECTANGULAR-RADIAL

CUSTOM DESIGNS

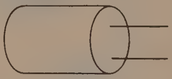


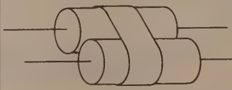
HIGH VOLTAGE

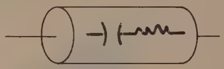

METAL CASED
RECTANGULAR

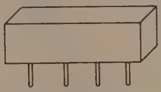


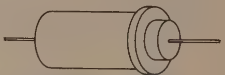
AC DESIGNS


PC TUBULAR


MATCHED CAPACITORS


R/C NETWORKS


MULTIPLE CAPACITOR
ASSEMBLIES


FEED THRU ASSEMBLIES

PROMPT SERVICE ON SPECIAL AND STANDARD CAPACITORS AND FILTERS.

Capacitors and filters are available from Southern Electronics to meet your special application requirements. Non-standard values, tolerances and case configurations can be supplied from stock or with quick delivery.

A full line of standard film and Kraft-film dielectric capacitors is also available from stock or with a short delivery cycle.

TEMPERATURE COMPENSATING
"0" TC and controlled capacitance change for stability or matching with resistors or pot cores

SOUTHERN ELECTRONICS CORPORATION/ A WHOLLY OWNED SUBSIDIARY OF **F-DYNE ELECTRONICS COMPANY**
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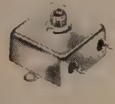
449 HOWARD AVE./BRIDGEPORT, CONN./(203) 367-6431

SOUTHERN ELECTRONICS CORPORATION
726 S. FLOWER ST.
BURBANK, CALIFORNIA 91502
(213) 845-2458

FILM DIELECTRIC CAPACITORS
CUSTOM / STANDARD

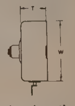
POPULAR METAL CASE STYLES

POLYSTYRENE/FOIL Adjustable Type PS 7A Hermetically sealed, Metal case

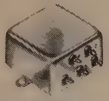


MFD	100/400 VDC		
	L	W	T
.047	1.125	1.000	.500
.10	1.125	1.000	.6875
.47	2.000	1.750	.875
1.0	2.000	2.000	1.000
4.7	3.0625	2.875	2.125
10.0	3.0625	4.4375	2.125

NOTES
1. 0° to + 65°C Temperature Range.
2. Adjustment Range of ± 1-1/2% from nominal.
3. .01 Long Term Drift at controlled Temperature.
4. .005% Voltage coefficient available on request.

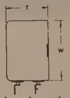


POLYSTYRENE/FOIL Decade Type PS 7D Hermetically sealed, Metal case

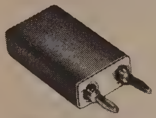


Decade Range	100/400 VDC		
MFD	L	W	T
.001— .01	1.750	1.250	.875
.01 — .10	1.750	1.250	.875
.10 — 1.0	2.000	2.000	1.500
1.0 —10.0	5.000	4.250	4.375

NOTES
ALSO AVAILABLE SWITCH MOUNTED FOR PANEL ASSEMBLY

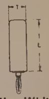


POLYSTYRENE/FOIL Plug-in Type PS 7P Hermetically sealed, Metal case

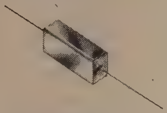


MFD	100 V			MFD	200/400 V		
	W	T	L		W	T	L
.047	1.3125	.625	1.250	.047	1.3125	.625	1.250
.10	1.3125	.625	1.250	.10	1.3125	.625	1.250
.47	1.3125	.625	1.500	.47	1.3125	.625	2.250
1.0	1.3125	.625	2.000	1.0	1.6	1.000	2.500
2.0	1.6	1.000	2.500	2.0			

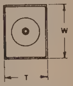
NOTES
STANDARD BANANA PLUG MOUNTING ON ¾" CENTERS



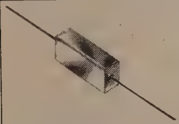
MYLAR/FOIL Rectangular Type PE 7G Hermetically sealed, Metal case



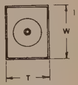
MFD	100 V			MFD	200V			MFD	400V		
	T	L	W		T	W	L		T	W	L
.0047	.22	.34	.5625	.0047	.22	.34	.5625	.0047	.22	.34	.5625
.01	.22	.34	.5625	.01	.22	.34	.5625	.01	.22	.34	.6875
.047	.22	.34	.6875	.047	.31	.41	.8125	.047	.31	.41	.8125
.10	.31	.41	.8125	.10	.31	.41	1.125	.10	.40	.57	1.125
.47	.40	.57	1.3125	.47	.40	.57	1.5625	.47	.50	.65	1.8125
1.0	.40	.57	1.8125	1.0	.60	.80	1.8125	1.0	.60	.80	2.3125
2.0	.60	.80	1.8125	2.0				2.0			



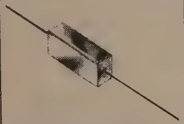
METALLIZED MYLAR Rectangular Type MPE 7G Hermetically sealed, Metal case



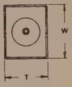
MFD	50 V			MFD	100 V			MFD	200 V		
	T	W	L		T	W	L		T	W	L
.01	.22	.34	.5625	.01	.22	.34	.5625	.01	.22	.34	.5625
.047	.22	.34	.5625	.047	.22	.34	.5625	.047	.22	.34	.6875
.10	.22	.34	.5625	.10	.22	.34	.6875	.10	.22	.34	.8125
.47	.22	.34	.8125	.47	.31	.41	.8125	.47	.40	.57	1.125
1.0	.31	.41	.8125	1.0	.31	.41	1.125	1.0	.40	.57	1.5625
4.7	.40	.57	1.5625	4.7	.40	.57	1.8125	4.7	.60	.80	2.0625



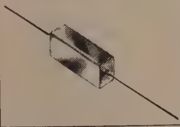
METALLIZED POLYCARBONATE Rectangular Type MPC 7G Hermetically sealed, Metal case



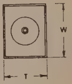
MFD	50 V			MFD	100 V			MFD	200 V		
	T	W	L		T	W	L		T	W	L
.01	.22	.34	.5625	.01	.22	.34	.5625	.01	.22	.34	.5625
.047	.22	.34	.5625	.047	.22	.34	.5625	.047	.22	.34	.6875
.10	.22	.34	.5625	.10	.22	.34	.6875	.10	.22	.34	.8125
.47	.22	.34	.6875	.47	.31	.41	.8125	.47	.40	.57	1.125
1.0	.31	.41	.8125	1.0	.40	.57	1.125	1.0	.40	.57	1.3125
4.7	.40	.57	1.25	4.7	.50	.65	1.8125	4.7	.60	.80	2.3125



POLYSTYRENE/FOIL Rectangular Type PS 7G Hermetically sealed, Metal case



MFD	100 V			MFD	200/400 V			MFD	600 V		
	T	W	L		T	W	L		T	W	L
.001	.22	.34	.82	.001	.22	.34	.82	.001	.22	.34	.82
.0047	.22	.34	.82	.0047	.22	.34	.82	.0047	.22	.34	.94
.01	.22	.34	.82	.01	.22	.34	.94	.01	.31	.41	1.12
.047	.31	.41	.94	.047	.40	.57	1.12	.047	.40	.57	1.81
.10	.40	.57	1.12	.10	.40	.57	1.81	.10	.60	.80	1.81
.47	.50	.65	1.81	.47				.47			
1.0	.60	.80	2.06	1.0				1.0			



Lower capacitance values, higher capacitance values and non-standard capacitance values are available.
Alternate case configurations are also available where space problems, are encountered.

Catalog Available On Request

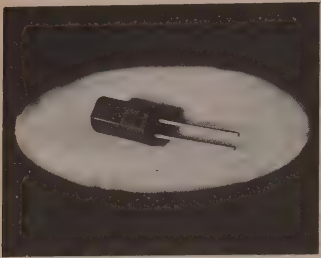
SOUTHERN ELECTRONICS CORPORATION/A WHOLLY OWNED SUBSIDIARY OF **F-DYNE ELECTRONICS COMPANY**

726 S. FLOWER ST./BURBANK, CALIFORNIA 91502/(213) 845-2458

449 HOWARD AVE./BRIDGEPORT, CONN./(203) 367-6431

SPRAGUE CAPACITORS

TYPE 198D ECONOLINE★ PLASTIC-CASE SOLID-TANTALUM CAPACITORS



- Low-cost production-oriented capacitors.
- Solid flame-retardant epoxy case has precise dimensions for automatic insertion. Completely shock and vibration resistant.
- Flatted area on side has clear easy-to-read marking. 2nd flat near top provides easy identification of positive lead either visually or by touch.
- Standoff feet on base eliminate moisture entrapment and facilitate cleaning of wiring boards.
- Low d-c leakage, low dissipation factor.
- Withstand severe temperature cycling and temperature shock over entire temperature range of −55 C to +85 C.
- Units listed below have straight leads with .100″ spacing as standard. For formed leads with .200″ or .250″ spacing, change last digit in Cat. No. to 2 or 3, respectively.
- Capacitance Tolerance, ±10%. Capacitors with asterisk (*) are also available with tolerance of ±20%. For ±20% tolerance, change 9th character in Cat. No. from 9 to 0.
- For complete technical data, refer to latest issue of Engineering Bulletin 3546.

★ Trademark

4 WVDC, 5.3 V SURGE

μF	Dia. x Height	Cat. No.
10	.250 x .325	198D106X9004H1*
12	.250 x .325	198D126X9004H1
15	See 20 WVDC Listing	
18	See 15 WVDC Listing	
22	See 15 WVDC Listing	
27	See 10 WVDC Listing	
33	See 10 WVDC Listing	
39	See 10 WVDC Listing	
47	See 6 WVDC Listing	
56	See 6 WVDC Listing	
68	See 6 WVDC Listing	
82	.250 x .475	198D826X9004K1
100	.250 x .475	198D107X9004K1*

6 WVDC, 8 V SURGE

μF	Dia. x Height	Cat. No.
6.8	.250 x .325	198D685X9006H1*
8.2	.250 x .325	198D825X9006H1
10	See 25 WVDC Listing	
12	See 25 WVDC Listing	
15	See 20 WVDC Listing	
18	See 15 WVDC Listing	
22	See 15 WVDC Listing	
27	See 10 WVDC Listing	
33	See 10 WVDC Listing	
39	See 10 WVDC Listing	
47	.250 x .475	198D476X9006K1*
56	.250 x .475	198D566X9006K1
68	.250 x .475	198D686X9006K1*

10 WVDC, 13 V SURGE

μF	Dia. x Height	Cat. No.
4.7	.250 x .325	198D475X9010H1*
5.6	.250 x .325	198D565X9010H1
6.8	See 35 WVDC Listing	
8.2	See 25 WVDC Listing	
10	See 25 WVDC Listing	
12	See 25 WVDC Listing	
15	See 20 WVDC Listing	
18	See 15 WVDC Listing	
22	See 15 WVDC Listing	
27	.250 x .475	198D276X9010K1
33	.250 x .475	198D336X9010K1*
39	.250 x .475	198D396X9010K1

15 WVDC, 20 V SURGE

μF	Dia. x Height	Cat. No.
3.3	.250 x .325	198D335X9015H1*
3.9	.250 x .325	198D395X9015H1
4.7	See 35 WVDC Listing	
5.6	See 35 WVDC Listing	
6.8	See 35 WVDC Listing	
8.2	See 25 WVDC Listing	
10	See 25 WVDC Listing	
12	See 25 WVDC Listing	
15	See 20 WVDC Listing	
18	.250 x .475	198D186X9015K1
22	.250 x .475	198D226X9015K1*

20 WVDC, 26 V SURGE

μF	Dia. x Height	Cat. No.
2.7	.250 x .325	198D275X9020H1
3.3	See 35 WVDC Listing	
3.9	See 35 WVDC Listing	
4.7	See 35 WVDC Listing	
5.6	See 35 WVDC Listing	
6.8	See 35 WVDC Listing	
8.2	See 25 WVDC Listing	
10	See 25 WVDC Listing	
12	See 25 WVDC Listing	
15	.250 x .475	198D156X9020K1*

25 WVDC, 32 V SURGE

μF	Dia. x Height	Cat. No.
1.2	.250 x .325	198D125X9025H1
1.5	.250 x .325	198D155X9025H1*
1.8	.250 x .325	198D185X9025H1
2.2	.250 x .325	198D225X9025H1*
2.7	See 35 WVDC Listing	
3.3	See 35 WVDC Listing	
3.9	See 35 WVDC Listing	
4.7	See 35 WVDC Listing	
5.6	See 35 WVDC Listing	
6.8	See 35 WVDC Listing	
8.2	.250 x .475	198D825X9025K1
10	.250 x .475	198D106X9025K1*
12	.250 x .475	198D126X9025K1

35 WVDC, 46 V SURGE

μF	Dia. x Height	Cat. No.
0.10	.250 x .325	198D104X9035H1*
0.12	.250 x .325	198D124X9035H1
0.15	.250 x .325	198D154X9035H1*
0.18	.250 x .325	198D184X9035H1
0.22	.250 x .325	198D224X9035H1*
0.27	.250 x .325	198D274X9035H1
0.33	.250 x .325	198D334X9035H1*
0.39	.250 x .325	198D394X9035H1
0.47	.250 x .325	198D474X9035H1*
0.56	.250 x .325	198D564X9035H1
0.68	.250 x .325	198D684X9035H1*
0.82	.250 x .325	198D824X9035H1
1.0	.250 x .325	198D105X9035H1*
1.2	.250 x .475	198D125X9035K1
1.5	.250 x .475	198D155X9035K1*
1.8	.250 x .475	198D185X9035K1
2.2	.250 x .475	198D225X9035K1*
2.7	.250 x .475	198D275X9035K1
3.3	.250 x .475	198D335X9035K1*
3.9	.250 x .475	198D395X9035K1
4.7	.250 x .475	198D475X9035K1*
5.6	.250 x .475	198D565X9035K1
6.8	.250 x .475	198D685X9035K1*

50 WVDC, 65 V SURGE

μF	Dia. x Height	Cat. No.
0.10	.250 x .325	198D104X9050H1*
0.12	.250 x .325	198D124X9050H1
0.15	.250 x .325	198D154X9050H1*
0.18	.250 x .325	198D184X9050H1
0.22	.250 x .325	198D224X9050H1*
0.27	.250 x .325	198D274X9050H1
0.33	.250 x .325	198D334X9050H1*
0.39	.250 x .325	198D394X9050H1
0.47	.250 x .325	198D474X9050H1*
0.56	.250 x .325	198D564X9050H1
0.68	.250 x .325	198D684X9050H1*
0.82	.250 x .325	198D824X9050H1
1.0	.250 x .325	198D105X9050H1*
1.2	.250 x .475	198D125X9050K1
1.5	.250 x .475	198D155X9050K1*
1.8	.250 x .475	198D185X9050K1
2.2	.250 x .475	198D225X9050K1*
2.7	.250 x .475	198D275X9050K1
3.3	.250 x .475	198D335X9050K1*
3.9	.250 x .475	198D395X9050K1
4.7	.250 x .475	198D475X9050K1*

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IND-EEM-28EBAR

Sizes subject to change without notice.

SPRAGUE CAPACITORS

TYPE 196D DIPPED TANTALEX® SOLID-TANTALUM CAPACITORS

- Epoxy-Dipped Coating Economically Provides Good Electrical and Mechanical Protection.
- High Stability, Very Little Capacitance Change, Even at Outer Limits of Operating Temperature Range (−55C to +85C).
- Low Dissipation Factor Permits Higher Ripples.
- Radial Leads For Mounting on Printed Boards.
- Capacitance Tolerance, ±10%. Capacitors With Asterisk (*) Are Also Available With Tolerance of ±20%. For ±20% Tolerance, Change 9th Character in Cat. No. from 9 to 0.
- Capacitors Listed Here Have Long Leads. Catalog Numbers Ending with A1 Have Straight Leads with .125″ Spacing; A3 Indicates Straight Leads with .250″ Spacing (See Unit 1). Numbers Ending with E4 Have "Hockeystick" Leads with .250″ Spacing (See Unit 2). For Short "Hockeystick" Pin Leads (.187″ L., .250″ Spacing) Change A1 or E4 to E3. (See Unit 3).
- For Complete Technical Data, Refer to Latest Issue of Engineering Bulletin 3545.

UNIT 1
UNIT 3
UNIT 2

4 WVDC, 5.3 V SURGE

μF	Dia. x Height	Cat. No.
10	.175 x .375	196D106X9004HA1*
12	.175 x .375	196D126X9004HA1
15	See 15 WVDC Listing	
18	See 15 WVDC Listing	
22	See 10 WVDC Listing	
27	See 10 WVDC Listing	
33	See 6 WVDC Listing	
39	See 6 WVDC Listing	
47	.225 x .425	196D476X9004JA1*
56	.225 x .425	196D566X9004JA1
68	See 6 WVDC Listing	
82	.225 x .450	196D826X9004KA1
100	.225 x .450	196D107X9004KA1*
120	See 6 WVDC Listing	
150	See 6 WVDC Listing	
180	.350 x .650	196D187X9004PE4
180	.450 x .500	★196D187X9004LA3
220	.350 x .650	196D227X9004PE4*
270	See 6 WVDC Listing	
330	See 6 WVDC Listing	

6 WVDC, 8 V SURGE

μF	Dia. x Height	Cat. No.
6.8	.175 x .375	196D685X9006HA1*
8.2	.175 x .375	196D825X9006HA1
10	See 20 WVDC Listing	
12	See 20 WVDC Listing	
15	See 15 WVDC Listing	
18	See 15 WVDC Listing	
22	See 10 WVDC Listing	
27	See 10 WVDC Listing	
33	.225 x .425	196D336X9006JA1*
39	.225 x .425	196D396X9006JA1
47	.225 x .450	196D476X9006KA1*
56	.225 x .450	196D566X9006KA1
68	.225 x .450	196D686X9006KA1*
82	See 10 WVDC Listing	
100	See 10 WVDC Listing	
120	.350 x .650	196D127X9006PE4
120	.450 x .500	★196D127X9006LA3
150	.350 x .650	196D157X9006PE4*
180	See 10 WVDC Listing	
220	See 10 WVDC Listing	
270	.400 x .750	196D277X9006TE4
330	.400 x .750	196D337X9006TE4*

10 WVDC, 13 V SURGE

μF	Dia. x Height	Cat. No.
4.7	.175 x .375	196D475X9010HA1*
5.6	.175 x .375	196D565X9010HA1
6.8	See 25 WVDC Listing	
8.2	See 25 WVDC Listing	
10	See 20 WVDC Listing	
12	See 20 WVDC Listing	
15	See 15 WVDC Listing	
18	See 15 WVDC Listing	
22	.225 x .425	196D226X9010JA1*
27	.225 x .425	196D276X9010JA1
33	.225 x .450	196D336X9010KA1*
39	.225 x .450	196D396X9010KA1
47	See 20 WVDC Listing	
56	See 15 WVDC Listing	
68	See 15 WVDC Listing	
82	.350 x .650	196D826X9010PE4
82	.450 x .500	★196D826X9010LA3
100	.350 x .650	196D107X9010PE4*
120	See 15 WVDC Listing	
150	See 15 WVDC Listing	
180	.400 x .750	196D187X9010TE4
180	.600 x .800	★196D187X9010MA3
220	.400 x .750	196D227X9010TE4*

15 WVDC, 20 V SURGE

μF	Dia. x Height	Cat. No.
3.3	.175 x .375	196D335X9015HA1*
3.9	.175 x .375	196D395X9015HA1
4.7	See 35 WVDC Listing	
5.6	See 25 WVDC Listing	
6.8	See 25 WVDC Listing	
8.2	See 25 WVDC Listing	
10	See 20 WVDC Listing	
12	See 20 WVDC Listing	
15	.225 x .425	196D156X9015JA1*
18	.225 x .425	196D186X9015JA1
22	.225 x .450	196D226X9015KA1*
27	See 25 WVDC Listing	
33	See 25 WVDC Listing	
39	See 20 WVDC Listing	
47	See 20 WVDC Listing	
56	.350 x .650	196D566X9015PE4
68	.350 x .650	196D686X9015PE4*
82	See 20 WVDC Listing	
100	See 20 WVDC Listing	
120	.400 x .750	196D127X9015TE4
150	.400 x .750	196D157X9015TE4*

20 WVDC, 26 V SURGE

μF	Dia. x Height	Cat. No.
2.7	.175 x .375	196D275X9020HA1
3.3	See 35 WVDC Listing	
3.9	See 35 WVDC Listing	
4.7	See 35 WVDC Listing	
5.6	See 25 WVDC Listing	
6.8	See 25 WVDC Listing	
8.2	See 25 WVDC Listing	
10	.225 x .425	196D106X9020JA1*
12	.225 x .425	196D126X9020JA1
15	.225 x .450	196D156X9020KA1*
18	.225 x .450	196D186X9020KA1
22	See 35 WVDC Listing	
27	See 25 WVDC Listing	
33	See 25 WVDC Listing	
39	.350 x .650	196D396X9020PE4
47	.350 x .650	196D476X9020PE4*
56	See 25 WVDC Listing	
68	See 25 WVDC Listing	
82	.400 x .750	196D826X9020TE4
82	.600 x .800	★196D826X9020MA3
100	.400 x .750	196D107X9020TE4*

25 WVDC, 32 V SURGE

μF	Dia. x Height	Cat. No.
1.2	.175 x .375	196D125X9025HA1
1.5	.175 x .375	196D155X9025HA1*
1.8	.175 x .375	196D185X9025HA1
2.2	.175 x .375	196D225X9025HA1*
2.7	See 35 WVDC Listing	
3.3	See 35 WVDC Listing	
3.9	See 35 WVDC Listing	
4.7	See 35 WVDC Listing	
5.6	.225 x .425	196D565X9025JA1
6.8	.225 x .425	196D685X9025JA1*
8.2	.225 x .425	196D825X9025JA1
10	.225 x .450	196D106X9025KA1*
12	.225 x .450	196D126X9025KA1
15	See 35 WVDC Listing	
18	.350 x .650	196D186X9025PE4
22	See 35 WVDC Listing	
27	.350 x .650	196D276X9025PE4
33	.350 x .650	196D336X9025PE4*
39	See 35 WVDC Listing	
47	See 35 WVDC Listing	
56	.400 x .750	196D566X9025TE4
68	.400 x .750	196D686X9025TE4*

35 WVDC, 46 V SURGE

μF	Dia. x Height	Cat. No.
0.10	.175 x .375	196D104X9035HA1*
0.12	.175 x .375	196D124X9035HA1
0.15	.175 x .375	196D154X9035HA1*
0.18	.175 x .375	196D184X9035HA1
0.22	.175 x .375	196D224X9035HA1*
0.27	.175 x .375	196D274X9035HA1
0.33	.175 x .375	196D334X9035HA1*
0.39	.175 x .375	196D394X9035HA1
0.47	.175 x .375	196D474X9035HA1*
0.56	.175 x .375	196D564X9035HA1
0.68	.175 x .375	196D684X9035HA1*
0.82	.175 x .375	196D824X9035HA1
1.0	.175 x .375	196D105X9035HA1*
1.2	.225 x .425	196D125X9035JA1
1.5	.225 x .425	196D155X9035JA1*
1.8	.225 x .425	196D185X9035JA1
2.2	.225 x .425	196D225X9035JA1*
2.7	.225 x .425	196D275X9035JA1
3.3	.225 x .425	196D335X9035JA1*
3.9	.225 x .425	196D395X9035JA1
4.7	.225 x .425	196D475X9035JA1*
5.6	.225 x .450	196D565X9035KA1
6.8	.225 x .450	196D685X9035KA1*
8.2	.350 x .650	196D825X9035PE4
10	.350 x .650	196D106X9035PE4*
12	.350 x .650	196D126X9035PE4
12	.450 x .500	★196D126X9035LA3
15	.350 x .650	196D156X9035PE4*
18	.350 x .650	196D186X9035PE4
18	.600 x .800	★196D186X9035MA3
22	.350 x .650	196D226X9035PE4*
27	.400 x .750	196D276X9035TE4
33	.400 x .750	196D336X9035TE4*
39	.400 x .750	196D396X9035TE4
47	.400 x .750	196D476X9035TE4*

50 WVDC, 65 V SURGE

μF	Dia. x Height	Cat. No.
0.10	.175 x .375	196D104X9050HA1*
0.12	.175 x .375	196D124X9050HA1
0.15	.175 x .375	196D154X9050HA1*
0.18	.175 x .375	196D184X9050HA1
0.22	.175 x .375	196D224X9050HA1*
0.27	.175 x .375	196D274X9050HA1
0.33	.175 x .375	196D334X9050HA1*
0.39	.175 x .375	196D394X9050HA1
0.47	.175 x .375	196D474X9050HA1*
0.56	.175 x .375	196D564X9050HA1
0.68	.175 x .375	196D684X9050HA1*
0.82	.175 x .375	196D824X9050HA1
1.0	.175 x .375	196D105X9050HA1*
1.2	.225 x .425	196D125X9050JA1
1.5	.225 x .425	196D155X9050JA1*
1.8	.225 x .425	196D185X9050JA1
2.2	.225 x .425	196D225X9050JA1*
2.7	.225 x .425	196D275X9050JA1
3.3	.225 x .425	196D335X9050JA1*
3.9	.225 x .425	196D395X9050KA1
4.7	.225 x .425	196D475X9050KA1*
5.6	.350 x .650	196D565X9050PE4
6.8	.350 x .650	196D685X9050PE4*
8.2	.350 x .650	196D825X9050PE4
10	.350 x .650	196D106X9050PE4*
12	.350 x .650	196D126X9050PE4
15	.350 x .650	196D156X9050PE4*
18	.400 x .750	196D186X9050TE4
22	.400 x .750	196D226X9050TE4*

★DISC ANODE NOT RECOMMENDED FOR NEW EQUIPMENT DESIGNS; AVAILABLE UNTIL PRESENT STOCKS ARE EXHAUSTED.

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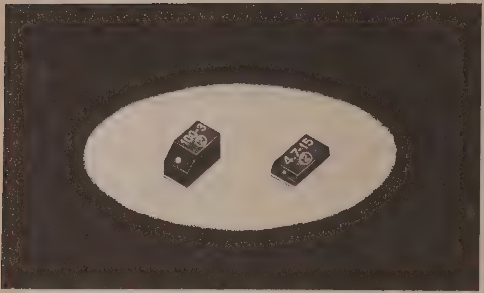
IND-EEM-2-EFAI

Sizes subject to change without notice

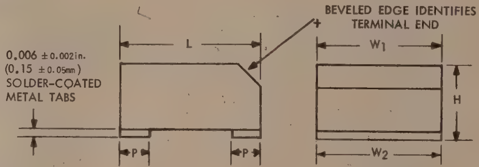
SPRAGUE CAPACITORS

TYPE 193D DOMINO® SOLID-TANTALUM CAPACITORS WITH FLUSH SOLDERABLE PAD TERMINALS



- Designed for hybrid circuit and low-profile printed wiring board applications.
- Fully-molded construction. Epoxy case provides superior mechanical protection during handling and mounting as well as excellent stability in severe operating and storage environments.
- Leadless design minimizes inductance and saves space. Exposed terminal surfaces on bottom of capacitor. Can be attached to substrates or circuit boards by dip-soldering, welding, re-flow soldering, or other conventional methods.
- Compatible with automatic assembly equipment.
- Low-profile configuration makes Domino Capacitors ideal for use in molded assemblies such as dual in-line (DIP) packages.
- Low d-c leakage, low dissipation factor.
- Capacitance tolerance, ±10%.
- Operating range −55C to +85C. May be operated up to +125C when derated to two-thirds of rated working voltage.
- For complete technical data, refer to latest issue of Engineering Bulletin 3532.

Case Code	DIMENSIONS (in inches)				
	L ±.005	W_1 ±.01 (Case)	$W_2 {}^{+.01}_{-.005}$ (Pads)	H ±.005	P ±.01
A	.180	.100	.090	.070	.030
B	.180	.100	.090	.100	.030
C	.320	.180	.170	.070	.050
D	.320	.180	.170	.100	.050
E	.320	.180	.170	.195	.050



µF	Case Code	Catalog Number*
3 WVDC, 4 VDC SURGE		
100.0	E	193D107X9003E2
6 WVDC, 8 VDC SURGE		
3.3	B	193D335X9006B2
33.0	D	193D336X9006D2
68.0	E	193D686X9006E2
10 WVDC, 13 VDC SURGE		
1.0	A	193D105X9010A2
2.2	B	193D225X9010B2
6.8	C	193D685X9010C2
47.0	E	193D476X9010E2

µF	Case Code	Catalog Number*
15 WVDC, 20 VDC SURGE		
4.7	C	193D475X9015C2
10.0	D	193D106X9015D2
20 WVDC, 26 VDC SURGE		
0.47	A	193D474X9020A2
1.0	B	193D105X9020B2
3.3	C	193D335X9020C2
6.8	D	193D685X9020D2
22.0	E	193D226X9020E2
35 WVDC, 46 VDC SURGE		
0.22	A	193D224X9035A2
1.5	C	193D155X9035C2
3.9	D	193D395X9035D2
10.0	E	193D106X9035E2

*Capacitors listed here have a capacitance tolerance of ±10%. These units are also available with a capacitance tolerance of ±5% on special order. To specify ±5% capacitors, change the 8th and 9th characters in the catalog number from "X9" to "X5."

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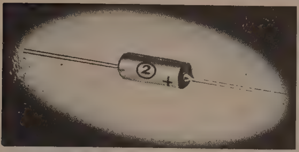
IND-EEM-27-EFAI

Sizes subject to change without notice

SPRAGUE CAPACITORS

TYPE 150D TANTALEX® SOLID-TANTALUM CAPACITORS



- Hermetically sealed metal case.
- Exhibit stable capacitance and low dissipation factor over temperature range of −80 C to +85 C. With appropriate voltage derating, may be operated to +125 C.
- Listed units have plastic sleeves. For bare case, end Cat. No. in "0" instead of "2."
- Also available as non-polarized capacitors. See Type 151D in Catalog C-563.
- Listed units have capacitance tolerance of ±10%. Capacitors with asterisk (*) are also available with capacitance tolerance of ±20%. For ±20% tolerance, change 9th character in catalog number from 9 to 0.
- For complete technical data, refer to latest issue of Engineering Bulletin 3520.

µF	Size Code	Cat. No.
6 WVDC — 8 VDC SURGE		
.22	A	150D224X9006A2*
.27	A	150D274X9006A2
.33	A	150D334X9006A2*
.39	A	150D394X9006A2
.47	A	150D474X9006A2*
.56	A	150D564X9006A2
.68	A	150D684X9006A2*
.82	A	150D824X9006A2
1.0	A	150D105X9006A2*
1.2	A	150D125X9006A2
1.5	A	150D155X9006A2*
1.8	A	150D185X9006A2
2.2	A	150D225X9006A2*
2.7	A	150D275X9006A2
3.3	A	150D335X9006A2*
3.9	A	150D395X9006A2
4.7	A	150D475X9006A2*
5.6	A	150D565X9006A2
6.8	A	150D685X9006A2*
8.2	B	150D825X9006B2
10	B	150D106X9006B2*
12	B	150D126X9006B2
15	B	150D156X9006B2
18	B	150D186X9006B2
22	B	150D226X9006B2*
27	B	150D276X9006B2
33	B	150D336X9006B2*
39	B	150D396X9006B2
47	B	150D476X9006B2*
56	B	150D566X9006B2
60	B	150D606X9006B2*
68	R	150D686X9006R2*
82	R	150D826X9006R2
100	R	150D107X9006R2*
120	R	150D127X9006R2*
150	R	150D157X9006R2*
180	R	150D187X9006R2*
220	S	150D227X9006S2*
270	S	150D277X9006S2*
330	S	150D337X9006S2*
10 WVDC — 13 VDC SURGE		
.22	A	150D224X9010A2*
.27	A	150D274X9010A2
.33	A	150D334X9010A2*
.39	A	150D394X9010A2
.47	A	150D474X9010A2*
.56	A	150D564X9010A2
.68	A	150D684X9010A2*
.82	A	150D824X9010A2
1.0	A	150D105X9010A2*
1.2	A	150D125X9010A2
1.5	A	150D155X9010A2*
1.8	A	150D185X9010A2
2.2	A	150D225X9010A2*
2.7	A	150D275X9010A2
3.3	A	150D335X9010A2*
3.9	A	150D395X9010A2
4.7	A	150D475X9010A2*
5.6	B	150D565X9010B2
6.8	B	150D685X9010B2
8.2	B	150D825X9010B2
10	B	150D106X9010B2
12	B	150D126X9010B2
15	B	150D156X9010B2*
18	B	150D186X9010B2
22	B	150D226X9010B2*
27	B	150D276X9010B2
33	B	150D336X9010B2*
39	B	150D396X9010B2
40	B	150D406X9010B2*
47	R	150D476X9010R2*
56	R	150D566X9010R2
68	R	150D686X9010R2*
82	R	150D826X9010R2
100	R	150D107X9010R2*
120	R	150D127X9010R2*
150	S	150D157X9010S2*
180	S	150D187X9010S2
220	S	150D227X9010S2*
15 WVDC — 18 VDC SURGE		
.22	A	150D224X9015A2*
.27	A	150D274X9015A2
.33	A	150D334X9015A2*
.39	A	150D394X9015A2
.47	A	150D474X9015A2*
.56	A	150D564X9015A2
.68	A	150D684X9015A2*
.82	A	150D824X9015A2
1.0	A	150D105X9015A2*
1.2	A	150D125X9015A2
1.5	A	150D155X9015A2*
1.8	A	150D185X9015A2
2.2	A	150D225X9015A2*
2.7	A	150D275X9015A2
3.3	A	150D335X9015A2*
3.9	B	150D395X9015B2
4.7	B	150D475X9015B2*
5.6	B	150D565X9015B2
6.8	B	150D685X9015B2
8.2	B	150D825X9015B2
10	B	150D106X9015B2*
12	B	150D126X9015B2
15	B	150D156X9015B2*
18	B	150D186X9015B2
22	B	150D226X9015B2*
27	R	150D276X9015R2
33	R	150D336X9015R2*
39	R	150D396X9015R2
47	R	150D476X9015R2*
56	R	150D566X9015R2
68	R	150D686X9015R2*
82	S	150D826X9015S2
100	S	150D107X9015S2*
120	S	150D127X90152S
150	S	150D157X9015S2*
20 WVDC — 23 VDC SURGE		
.0047	A	150D472X9020A2*
.0056	A	150D562X9020A2
.0068	A	150D682X9020A2*
.0082	A	150D822X9020A2
.01	A	150D103X9020A2*
.012	A	150D123X9020A2
.015	A	150D153X9020A2*
.018	A	150D183X9020A2
.022	A	150D223X9020A2*
.027	A	150D273X9020A2
.033	A	150D333X9020A2*
.039	A	150D393X9020A2
.047	A	150D473X9020A2*
.056	A	150D563X9020A2
.068	A	150D683X9020A2*
.082	A	150D823X9020A2
.10	A	150D104X9020A2*
.12	A	150D124X9020A2
.15	A	150D154X9020A2*
.18	A	150D184X9020A2
.22	A	150D224X9020A2*
.27	A	150D274X9020A2
.33	A	150D334X9020A2*
.39	A	150D394X9020A2
.47	A	150D474X9020A2*
.56	A	150D564X9020A2
.68	A	150D684X9020A2*
.82	A	150D824X9020A2
1.0	A	150D105X9020A2*
1.2	A	150D125X9020A2
1.5	A	150D155X9020A2*
1.8	A	150D185X9020A2
2.2	A	150D225X9020A2*
2.7	B	150D275X9020B2
3.3	B	150D335X9020B2*
3.9	B	150D395X9020B2
4.7	B	150D475X9020B2
5.6	B	150D565X9020B2
6.8	B	150D685X9020B2*
8.2	B	150D825X9020B2
10	B	150D106X9020B2*
12	B	150D126X9020B2
15	B	150D156X9020B2*
18	R	150D186X9020R2
22	R	150D226X9020R2*
27	R	150D276X9020R2
33	R	150D336X9020R2*
39	R	150D396X9020R2
47	R	150D476X9020R2*
56	S	150D566X9020S2
68	S	150D686X9020S2*
82	S	150D826X9020S2
100	S	150D107X9020S2*
35 WVDC — 40 VDC SURGE		
.0047	A	150D472X9035A2*
.0056	A	150D562X9035A2
.0068	A	150D682X9035A2*
.0082	A	150D822X9035A2
.01	A	150D103X9035A2*
.012	A	150D123X9035A2
.015	A	150D153X9035A2*
.018	A	150D183X9035A2
.022	A	150D223X9035A2*
.027	A	150D273X9035A2
.033	A	150D333X9035A2*
.039	A	150D393X9035A2
.047	A	150D473X9035A2*
.056	A	150D563X9035A2
.068	A	150D683X9035A2*
.082	A	150D823X9035A2
.10	A	150D104X9035A2*
.12	A	150D124X9035A2
.15	A	150D154X9035A2*
.18	A	150D184X9035A2
.22	A	150D224X9035A2*
.27	A	150D274X9035A2
.33	A	150D334X9035A2*
.39	A	150D394X9035A2
.47	A	150D474X9035A2*
.56	A	150D564X9035A2
.68	A	150D684X9035A2*
.82	A	150D824X9035A2
1.0	A	150D105X9035A2*
1.2	B	150D125X9035B2
1.5	B	150D155X9035B2*
1.8	B	150D185X9035B2
2.2	B	150D225X9035B2*
2.7	B	150D275X9035B2
3.3	B	150D335X9035B2*
3.9	B	150D395X9035B2
4.7	B	150D475X9035B2*
5.6	B	150D565X9035B2
6.8	B	150D685X9035B2*
8.2	R	150D825X9035R2
10	R	150D106X9035R2*
12	R	150D126X9035R2
15	R	150D156X9035R2*
18	R	150D186X9035R2
22	R	150D226X9035R2*
27	S	150D276X9035S2
33	S	150D336X9035S2*
39	S	150D396X9035S2
47	S	150D476X9035S2*
50 WVDC — 65 VDC SURGE		
.0047	A	150D472X9050A2*
.0056	A	150D562X9050A2
.0068	A	150D682X9050A2*
.0082	A	150D822X9050A2
.01	A	150D103X9050A2*
.012	A	150D123X9050A2
.015	A	150D153X9050A2*
.018	A	150D183X9050A2
.022	A	150D223X9050A2*
.027	A	150D273X9050A2
.033	A	150D333X9050A2*
.039	A	150D393X9050A2
.047	A	150D473X9050A2*
.056	A	150D563X9050A2
.068	A	150D683X9050A2*
.082	A	150D823X9050A2
.1	A	150D104X9050A2*
.12	A	150D124X9050A2
.15	A	150D154X9050A2*
.18	A	150D184X9050A2
.22	A	150D224X9050A2*
.27	A	150D274X9050A2
.33	A	150D334X9050A2*
.39	A	150D394X9050A2
.47	A	150D474X9050A2*

DIMENSIONS

Code	D. x L.
A	.135″ x .286″
B	.185″ x .474″
R	.289″ x .686″
S	.351″ x .786″

Sizes subject to change without notice.

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IND-EEM-1-EFAI

SPRAGUE CAPACITORS

TYPE 150D SOLID-ELECTROLYTE TANTALEX® CAPACITORS (Cont.)

µF	Size Code	Cat. No.
.56	A	150D564X9050A2
.68	A	150D684X9050A2*
.82	A	150D824X9050A2
1.0	A	150D105X9050A2*
1.2	B	150D125X9050B2
1.5	B	150D155X9050B2*
1.8	B	150D185X9050B2
2.2	B	150D225X9050B2*
2.7	B	150D275X9050B2
3.3	B	150D335X9050B2*
3.9	B	150D395X9050B2
4.7	B	150D475X9050B2*
5.6	R	150D565X9050R2
6.8	R	150D685X9050R2*
8.2	R	150D825X9050R2
10	R	150D106X9050R2*
12	R	150D126X9050R2
15	R	150D156X9050R2*
18	R	150D186X9050R2
22	S	150D226X9050S2*
60 WVDC — 78 VDC SURGE		
.0047	A	150D472X9060A2*
.0056	A	150D562X9060A2
.0068	A	150D682X9060A2*
.0082	A	150D822X9060A2
.01	A	150D103X9060A2*
.012	A	150D123X9060A2
.015	A	150D153X9060A2*
.018	A	150D183X9060A2
.022	A	150D223X9060A2*
.027	A	150D273X9060A2
.033	A	150D333X9060A2*
.039	A	150D393X9060A2
.047	A	150D473X9060A2*
.056	A	150D563X9060A2
.068	A	150D683X9060A2*
.082	A	150D823X9060A2
.1	A	150D104X9060A2*
.12	A	150D124X9060A2
.15	A	150D154X9060A2*
.18	A	150D184X9060A2
.22	A	150D224X9060A2*
.27	A	150D274X9060A2
.33	A	150D334X9060A2*
.39	A	150D394X9060A2
.47	A	150D474X9060A2*
.56	A	150D564X9060A2
.68	A	150D684X9060A2*
.82	B	150D824X9060B2
1.0	B	150D105X9060B2*
1.2	B	150D125X9060B2
1.5	B	150D155X9060B2*
1.8	B	150D185X9060B2
2.2	B	150D225X9060B2*
2.7	B	150D275X9060B2
3.3	B	150D335X9060B2*
3.9	B	150D395X9060B2
4.7	R	150D475X9060R2*
5.6	R	150D565X9060R2
6.8	R	150D685X9060R2*
8.2	R	150D825X9060R2
10	R	150D106X9060R2*
12	S	150D126X9060S2
15	S	150D156X9060S2*
18	S	150D186X9060S2
22	S	150D226X9060S2*
75 WVDC - 97 VDC SURGE		
.0047	A	150D472X9075A2*
.0056	A	150D562X9075A2
.0068	A	150D682X9075A2*
.0082	A	150D822X9075A2
.01	A	150D103X9075A2*
.012	A	150D123X9075A2
.015	A	150D153X9075A2*
.018	A	150D183X9075A2
.022	A	150D223X9075A2*
.027	A	150D273X9075A2
.033	A	150D333X9075A2*
.039	A	150D393X9075A2
.047	A	150D473X9075A2*
.056	A	150D563X9075A2
.068	A	150D683X9075A2*
.082	A	150D823X9075A2
.1	A	150D104X9075A2*
.12	A	150D124X9075A2
.15	A	150D154X9075A2*
.18	A	150D184X9075A2
.22	A	150D224X9075A2*
.27	A	150D274X9075A2
.33	A	150D334X9075A2*
.39	A	150D394X9075A2
.47	A	150D474X9075A2*
.56	A	150D564X9075A2
.68	A	150D684X9075A2*
.82	B	150D824X9075B2
1.0	B	150D105X9075B2*
1.2	B	150D125X9075B2
1.5	B	150D155X9075B2*
1.8	B	150D185X9075B2
2.2	B	150D225X9075B2*
2.7	B	150D275X9075B2
3.3	B	150D335X9075B2*
3.9	B	150D395X9075B2
4.7	R	150D475X9075R2*
5.6	R	150D565X9075R2
6.8	R	150D685X9075R2*
8.2	R	150D825X9075R2
10.0	R	150D106X9075R2*
12.0	S	150D126X9075S2
15.0	S	150D156X9075S2*
100 WVDC 115 VDC SURGE		
.0047	A	150D472X9100A2*
.0056	A	150D562X9100A2
.0068	A	150D682X9100A2*
.0082	A	150D822X9100A2
.01	A	150D103X9100A2*
.012	A	150D123X9100A2
.015	A	150D153X9100A2*
.018	A	150D183X9100A2
.022	A	150D223X9100A2*
.027	A	150D273X9100A2
.033	A	150D333X9100A2*
.039	A	150D393X9100A2
.047	A	150D473X9100A2*
.056	A	150D563X9100A2
.068	A	150D683X9100A2*
.082	A	150D823X9100A2
.1	A	150D104X9100A2*
.12	A	150D124X9100A2
.15	A	150D154X9100A2*
.18	A	150D184X9100A2
.22	A	150D224X9100A2*
.27	A	150D274X9100A2
.33	A	150D334X9100A2*
.39	A	150D394X9100A2
.47	A	150D474X9100A2*
.56	A	150D564X9100A2
.68	B	150D684X9100B2*
.82	B	150D824X9100B2
1.0	B	150D105X9100B2*
1.2	B	150D125X9100B2
1.5	B	150D155X9100B2*
1.8	B	150D185X9100B2
2.2	B	150D225X9100B2*
2.7	B	150D275X9100B2
3.3	R	150D335X9100R2*
3.9	R	150D395X9100R2
4.7	R	150D475X9100R2*
5.6	R	150D565X9100R2
6.8	R	150D685X9100R2*
125 WVDC - - 140 VDC SURGE		
.0047	A	150D472X9125A2*
.0056	A	150D562X9125A2
.0068	A	150D682X9125A2*
.0082	A	150D822X9125A2
.01	A	150D103X9125A2*
.012	A	150D123X9125A2
.015	A	150D153X9125A2*
.018	A	150D183X9125A2
.022	A	150D223X9125A2*
.027	A	150D273X9125A2
.033	A	150D333X9125A2*
.039	A	150D393X9125A2
.047	A	150D473X9125A2*
.056	A	150D563X9125A2
.068	A	150D683X9125A2*
.082	A	150D823X9125A2
.1	A	150D104X9125A2*
.12	A	150D124X9125A2
.15	A	150D154X9125A2*
.18	A	150D184X9125A2
.22	A	150D224X9125A2*
.27	A	150D274X9125A2
.33	A	150D334X9125A2*
.39	A	150D394X9125A2
.47	A	150D474X9125A2*
.56	B	150D564X9125B2
.68	B	150D684X9125B2*
.82	B	150D824X9125B2
1.0	B	150D105X9125B2*
1.2	B	150D125X9125B2
1.5	B	150D155X9125B2*
1.8	B	150D185X9125B2
2.2	B	150D225X9125B2*

EXTENDED-RANGE TYPE 150D TANTALEX® CAPACITORS®

- Extended capacitance ratings (higher capacitance values in smaller case sizes) required in some new equipment designs.
- Available at premium prices.

µF	Size Code	Cat. No.
6 WVDC 8 VDC SURGE		
10	A	150D106X9006A2*
12	A	150D126X9006A2
15	A	150D156X9006A2*
68	B	150D686X9006B2*
82	B	150D826X9006B2
100	B	150D107X9006B2*
330	R	150D337X9006R2*
390	R	150D397X9006R2
470	R	150D477X9006R2*
560	S	150D567X9006S2
680	S	150D687X9006S2*
820	S	150D827X9006S2
1000	S	150D108X9006S2*
10 WVDC 13 VDC SURGE		
5.6	A	150D565X9010A2
6.8	A	150D685X9010A2*
8.2	A	150D825X9010A2
10	A	150D106X9010A2*
47	B	150D476X9010B2*
56	B	150D566X9010B2
68	B	150D686X9010B2*
82	B	150D826X9010B2
150	R	150D157X9010R2*
180	R	150D187X9010R2*
220	R	150D227X9010R2*
270	R	150D277X9010R2
330	S	150D337X9010S2*
390	S	150D397X9010S2
470	S	150D477X9010S2*
560	S	150D567X9010S2
15 WVDC 18 VDC SURGE		
3.9	A	150D395X9015A2
4.7	A	150D475X9015A2*
5.6	A	150D565X9015A2
6.8	A	150D685X9015A2*
27	B	150D276X9015B2
33	B	150D336X9015B2*
39	B	150D396X9015B2
82	R	150D826X9015R2
100	R	150D107X9015R2
120	R	150D127X9015R2
150	R	150D157X9015R2*
180	R	150D187X9015R2
220	S	150D227X9015S2*
270	S	150D277X9015S2
330	S	150D337X9015S2*
20 WVDC - 23 VDC SURGE		
2.7	A	150D275X9020A2
3.3	A	150D335X9020A2*
3.9	A	150D395X9020A2
4.7	A	150D475X9020A2*
18	B	150D186X9020B2
22	B	150D226X9020B2*
27	B	150D276X9020B2
56	R	150D566X9020R2
68	R	150D686X9020R2*
82	R	150D826X9020R2
100	R	150D107X9020R2*
120	R	150D127X9020R2
150	S	150D157X9020S2*
180	S	150D187X9020S2
220	S	150D227X9020S2*
30 WVDC 34 VDC SURGE		
2.2	A	150D225X9030A2*
2.7	A	150D275X9030A2
12	B	150D126X9030B2
15	B	150D156X9030B2*
18	B	150D186X9030B2
56	R	150D566X9030R2
68	R	150D686X9030R2*
82	S	150D826X9030S2
100	S	150D107X9030S2*
35 WVDC -- 40 VDC SURGE		
1.2	A	150D125X9035A2
1.5	A	150D155X9035A2*
1.8	A	150D185X9035A2
8.2	B	150D825X9035B2
10	B	150D106X9035B2*
27	R	150D276X9035R2
33	R	150D336X9035R2*
39	R	150D396X9035R2
47	R	150D476X9035R2*
56	S	150D566X9035S2
68	S	150D686X9035S2*
50 WVDC — 65 VDC SURGE		
1.2	A	150D125X9050A2
1.5	A	150D155X9050A2*
5.6	B	150D565X9050B2
6.8	B	150D685X9050B2*
22	R	150D226X9050R2*
27	R	150D276X9050R2
33	S	150D336X9050S2*
39	S	150D396X9050S2

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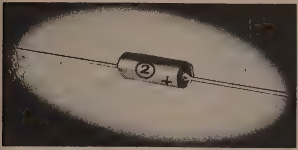
SPRAGUE CAPACITORS

EST. REL. MIL-C-39003 STYLE CSR13 SOLID TANTALUMS



- Solid-electrolyte tantalum type. Glass-to-metal hermetic seal. 125 C operation.
- Handled by Sprague and Sprague industrial distributors in full compliance with MIL-STD-790. Manufactured, marked, packed, shipped, received, inspected, stored in separate area, free from contamination or mix-up with other components.
- For complete technical data, refer to latest issue of Engineering Bulletin 3520.2.

SIZE CODE

A = .135″D.x286″L.   C = .289″D.x686″L.
B = .185″D.x474″L.   D = .351″D.x786″L.

				MIL PART NUMBER M39003/01-									
				Failure Rate L (2%)		Failure Rate M (1%)		Failure Rate P (0.1%)		Failure Rate R (0.01%)		Failure Rate S (0.001%)	
µF	WVDC	Size Code	MIL Type Designation*	Cap. Tol. ±20%	Cap. Tol. ±10%	Cap. Tol. ±20%	Cap. Tol. ±10%	Cap. Tol. ±20%	Cap. Tol. ±10%	Cap. Tol. ±20%	Cap. Tol. ±10%	Cap. Tol. ±20%	Cap. Tol. ±10%
5.6	6	A	CSR13B565K-	—	2001	—	2241	—	2481	—	2721	—	2961
6.8	6	A	CSR13B685--	2003	2002	2243	2242	2483	2482	2723	2722	2963	2962
47	6	B	CSR13B476--	2005	2004	2245	2244	2485	2484	2725	2724	2965	2964
56	6	B	CSR13B566K-	—	2006	—	2246	—	2486	—	2726	—	2966
150	6	C	CSR13B157--	2008	2007	2248	2247	2488	2487	2728	2727	2968	2967
180	6	C	CSR13B187K-	—	2009	—	2249	—	2489	—	2729	—	2969
270	6	D	CSR13B277K-	—	2010	—	2250	—	2490	—	2730	—	2970
330	6	D	CSR13B337--	2012	2011	2252	2251	2492	2491	2732	2731	2972	2971
3.9	10	A	CSR13C395K-	—	2013	—	2253	—	2493	—	2733	—	2973
4.7	10	A	CSR13C475--	2015	2014	2255	2254	2495	2494	2735	2734	2975	2974
27	10	B	CSR13C276K-	—	2016	—	2256	—	2496	—	2736	—	2976
33	10	B	CSR13C336--	2018	2017	2258	2257	2498	2497	2738	2737	2978	2977
39	10	B	CSR13C396K-	—	2019	—	2259	—	2499	—	2739	—	2979
82	10	C	CSR13C826K-	—	2020	—	2260	—	2500	—	2740	—	2980
100	10	C	CSR13C107--	2022	2021	2262	2261	2502	2501	2742	2741	2982	2981
120	10	C	CSR13C127K-	—	2023	—	2263	—	2503	—	2743	—	2983
180	10	D	CSR13C187K-	—	2024	—	2264	—	2504	—	2744	—	2984
220	10	D	CSR13C227--	2026	2025	2266	2265	2506	2505	2746	2745	2986	2985
2.7	15	A	CSR13D275K-	—	2027	—	2267	—	2507	—	2747	—	2987
3.3	15	A	CSR13D335--	2029	2028	2269	2268	2509	2508	2749	2748	2989	2988
18	15	B	CSR13D186K-	—	2030	—	2270	—	2510	—	2750	—	2990
22	15	B	CSR13D226--	2032	2031	2272	2271	2512	2511	2752	2751	2992	2991
56	15	C	CSR13D556K-	—	2033	—	2273	—	2513	—	2753	—	2993
68	15	C	CSR13D686--	2035	2034	2275	2274	2515	2514	2755	2754	2995	2994
120	15	D	CSR13D127K-	—	2036	—	2276	—	2516	—	2756	—	2996
150	15	D	CSR13D157--	2038	2037	2278	2277	2518	2517	2758	2757	2998	2997
1.2	20	A	CSR13E125K-	—	2039	—	2279	—	2519	—	2759	—	2999
1.5	20	A	CSR13E155--	2041	2040	2281	2280	2521	2520	2761	2760	3001	3000
1.8	20	A	CSR13E185K-	—	2042	—	2282	—	2522	—	2762	—	3002
2.2	20	A	CSR13E225--	2044	2043	2284	2283	2524	2523	2764	2763	3004	3003
8.2	20	B	CSR13E825K-	—	2045	—	2285	—	2525	—	2765	—	3005
10	20	B	CSR13E106--	2047	2046	2287	2286	2527	2526	2767	2766	3007	3006
12	20	B	CSR13E126K-	—	2048	—	2288	—	2528	—	2768	—	3008
15	20	B	CSR13E156--	2050	2049	2290	2289	2530	2529	2770	2769	3010	3009
27	20	C	CSR13E276K-	—	2051	—	2291	—	2531	—	2771	—	3011
33	20	C	CSR13E336--	2053	2052	2293	2292	2533	2532	2773	2772	3013	3012
39	20	C	CSR13E396K-	—	2054	—	2294	—	2534	—	2774	—	3014
47	20	C	CSR13E476--	2056	2055	2296	2295	2536	2535	2776	2775	3016	3015
56	20	D	CSR13E566K-	—	2057	—	2297	—	2537	—	2777	—	3017
68	20	D	CSR13E686--	2059	2058	2299	2298	2539	2538	2779	2778	3019	3018
82	20	D	CSR13E826K-	—	2060	—	2300	—	2540	—	2780	—	3020
100	20	D	CSR13E107--	2062	2061	2302	2301	2542	2541	2782	2781	3022	3021

*Type Nos. shown are incomplete. Capacitance Tolerance and/or Failure Rate must be added at end of number. Where 10th character (cap. tol.) is blank, insert "K" for ±10%, "M" for ±20%. A last character must be added to denote Failure Rate. Insert "L" for 2%, "M" for 1%, "P" for 0.1%, "R" for 0.01%, "S" for 0.001%.

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SPRAGUE CAPACITORS

STYLE CSR13 SOLID TANTALUMS - (continued)

μF	WVDC	Size Code	MIL Type Designation*	MIL PART NUMBER M39003/01-- Failure Rate L (2%)		Failure Rate M (1%)		Failure Rate P (0.1%)		Failure Rate R (0.01%)		Failure Rate S (0.001%)	
				Cap. Tol. ±20%	Cap. Tol. ±10%	Cap. Tol. ±20%	Cap. Tol. ±10%	Cap. Tol. ±20%	Cap. Tol. ±10%	Cap. Tol. ±20%	Cap. Tol. ±10%	Cap. Tol. ±20%	Cap. Tol. ±10%
5.6	35	B	CSR13F565K-	—	2063	—	2303	—	2543	—	2783	—	3023
6.8	35	B	CSR13F685--	2065	2064	2305	2304	2545	2544	2785	2784	3025	3024
22	35	C	CSR13F226--	2067	2066	2307	2306	2547	2746	2787	2786	3027	3026
27	35	D	CSR13F276K-	—	2068	—	2308	—	2548	—	2788	—	3028
33	35	D	CSR13F336--	2070	2069	2310	2309	2550	2549	2790	2789	3030	3029
39	35	D	CSR13F396K-	—	2071	—	2311	—	2551	—	2791	—	3031
47	35	D	CSR13F476--	2073	2072	2313	2312	2553	2552	2793	2792	3033	3032
.0047	50	A	CSR13G472--	2075	2074	2315	2314	2555	2554	2795	2794	3035	3034
.0056	50	A	CSR13G562K-	—	2076	—	2316	—	2556	—	2796	—	3036
.0068	50	A	CSR13G682--	2078	2077	2318	2317	2558	2557	2798	2797	3038	3037
.0082	50	A	CSR13G822K-	—	2079	—	2319	—	2559	—	2799	—	3039
.01	50	A	CSR13G103--	2081	2080	2321	2320	2561	2560	2801	2800	3041	3040
.012	50	A	CSR13G123K-	—	2082	—	2322	—	2562	—	2802	—	3042
.015	50	A	CSR13G153--	2084	2083	2324	2323	2564	2563	2804	2803	3044	3043
.018	50	A	CSR13G183K-	—	2085	—	2325	—	2565	—	2805	—	3045
.022	50	A	CSR13G223--	2087	2086	2327	2326	2567	2566	2807	2806	3047	3046
.027	50	A	CSR13G273K-	—	2088	—	2328	—	2568	—	2808	—	3048
.033	50	A	CSR13G333--	2090	2089	2330	2329	2570	2569	2810	2809	3050	3049
.039	50	A	CSR13G393K-	—	2091	—	2331	—	2571	—	2811	—	3051
.047	50	A	CSR13G473--	2093	2092	2333	2332	2573	2572	2813	2812	3053	3052
.056	50	A	CSR13G563K-	—	2094	—	2334	—	2574	—	2814	—	3054
.068	50	A	CSR13G683--	2096	2095	2336	2335	2576	2575	2816	2815	3056	3055
.082	50	A	CSR13G823K-	—	2097	—	2337	—	2577	—	2817	—	3057
.1	50	A	CSR13G104--	2099	2098	2339	2338	2579	2578	2819	2818	3059	3058
.12	50	A	CSR13G124K-	—	2100	—	2340	—	2580	—	2820	—	3060
.15	50	A	CSR13G154--	2102	2101	2342	2341	2582	2581	2822	2821	3062	3061
.18	50	A	CSR13G184K-	—	2103	—	2343	—	2583	—	2823	—	3063
.22	50	A	CSR13G224--	2105	2104	2345	2344	2585	2584	2825	2824	3065	3064
.27	50	A	CSR13G274K-	—	2106	—	2346	—	2586	—	2826	—	3066
.33	50	A	CSR13G334--	2108	2107	2348	2347	2588	2587	2828	2827	3068	3067
.39	50	A	CSR13G394K-	—	2109	—	2349	—	2589	—	2829	—	3069
.47	50	A	CSR13G474--	2111	2110	2351	2350	2591	2590	2831	2830	3071	3070
.56	50	A	CSR13G564K-	—	2112	—	2352	—	2592	—	2832	—	3072
.68	50	A	CSR13G684--	2114	2113	2354	2353	2594	2593	2834	2833	3074	3073
.82	50	A	CSR13G824K-	—	2115	—	2355	—	2595	—	2835	—	3075
1.0	50	A	CSR13G105--	2117	2116	2357	2356	2597	2596	2837	2836	3077	3076
1.2	50	B	CSR13G125K-	—	2118	—	2358	—	2598	—	2838	—	3078
1.5	50	B	CSR13G155--	2120	2119	2360	2359	2600	2599	2840	2839	3080	3079
1.8	50	B	CSR13G185K-	—	2121	—	2361	—	2601	—	2841	—	3081
2.2	50	B	CSR13G225--	2123	2122	2363	2362	2603	2602	2843	2842	3083	3082
2.7	50	B	CSR13G275K-	—	2124	—	2364	—	2604	—	2844	—	3084
3.3	50	B	CSR13G335--	2126	2125	2366	2365	2606	2605	2846	2845	3086	3085
3.9	50	B	CSR13G395K-	—	2127	—	2367	—	2607	—	2847	—	3087
4.7	50	B	CSR13G475--	2129	2128	2369	2368	2609	2608	2849	2848	3089	3088
5.6	50	C	CSR13G565K-	—	2130	—	2370	—	2610	—	2850	—	3090
6.8	50	C	CSR13G685--	2132	2131	2372	2371	2612	2611	2852	2851	3092	3091
8.2	50	C	CSR13G825K-	—	2133	—	2373	—	2613	—	2853	—	3093
10	50	C	CSR13G106--	2135	2134	2375	2374	2615	2614	2855	2854	3095	3094
12	50	C	CSR13G126K-	—	2136	—	2376	—	2616	—	2856	—	3096
15	50	C	CSR13G156--	2138	2137	2378	2377	2618	2617	2858	2857	3098	3097
18	50	C	CSR13G186K-	—	2139	—	2379	—	2619	—	2859	—	3099
22	50	D	CSR13G226--	2141	2140	2381	2380	2621	2620	2861	2860	3101	3100
.1	75	A	CSR13H104--	2143	2142	2383	2382	2723	2622	2863	2862	3103	3102
.12	75	A	CSR13H124K-	—	2144	—	2384	—	2624	—	2864	—	3104
.15	75	A	CSR13H154--	2146	2145	2386	2385	2626	2625	2866	2865	3106	3105
.18	75	A	CSR13H184K-	—	2147	—	2387	—	2627	—	2867	—	3107

*Type Nos. shown are incomplete. Capacitance Tolerance and/or Failure Rate must be added at end of number. Where 10th character (cap. tol.) is blank, insert "K" for ±10%, "M" for ±20%. A last character must be added to denote Failure Rate. Insert "L" for 2%, "M" for 1%, "P" for 0.1%, "R" for 0.01%, "S" for 0.001%.

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Sizes subject to change without notice.

SPRAGUE CAPACITORS

STYLE CSR13 SOLID TANTALUMS - (continued)

μF	WVDC	Size Code	MIL Type Designation*	MIL PART NUMBER M39003/01--									
				Failure Rate L (2%)		Failure Rate M (1%)		Failure Rate P (0.1%)		Failure Rate R (0.01%)		Failure Rate S (0.001%)	
				Cap. Tol. ±20%	Cap. Tol. ±10%	Cap. Tol. ±20%	Cap. Tol. ±10%	Cap. Tol. ±20%	Cap. Tol. ±10%	Cap. Tol. ±20%	Cap. Tol. ±10%	Cap. Tol. ±20%	Cap. Tol. ±10%
.22	75	A	CSR13H224--	2149	2148	2389	2388	2629	2628	2869	2868	3109	3108
.27	75	A	CSR13H274K-	—	2150	—	2390	—	2630	—	2870	—	3110
.33	75	A	CSR13H334--	2152	2151	2392	2391	2632	2631	2872	2871	3112	3111
.39	75	A	CSR13H394K-	—	2153	—	2393	—	2633	—	2873	—	3113
.47	75	A	CSR13H474--	2155	2154	2395	2394	2635	2634	2875	2874	3115	3114
.56	75	A	CSR13H564K-	—	2156	—	2396	—	2636	—	2876	—	3116
.68	75	A	CSR13H684--	2158	2157	2398	2397	2638	2637	2878	2877	3118	3117
.82	75	B	CSR13H824K-	—	2159	—	2399	—	2639	—	2879	—	3119
1.0	75	B	CSR13H105--	2161	2160	2401	2400	2641	2640	2881	2880	3121	3120
1.2	75	B	CSR13H125K-	—	2162	—	2402	—	2642	—	2882	—	3122
1.5	75	B	CSR13H155--	2164	2163	2404	2403	2644	2643	2884	2883	3124	3123
1.8	75	B	CSR13H185K-	—	2165	—	2405	—	2645	—	2885	—	3125
2.2	75	B	CSR13H225--	2167	2166	2407	2406	2647	2646	2887	2886	3127	3126
2.7	75	B	CSR13H275K-	—	2168	—	2408	—	2648	—	2888	—	3128
3.3	75	B	CSR13H335--	2170	2169	2410	2409	2650	2649	2890	2889	3130	3129
3.9	75	B	CSR13H395K-	—	2171	—	2411	—	2651	—	2891	—	3131
4.7	75	C	CSR13H475--	2173	2172	2413	2412	2653	2652	2893	2892	3133	3132
5.6	75	C	CSR13H565K-	—	2174	—	2414	—	2654	—	2894	—	3134
6.8	75	C	CSR13H685--	2176	2175	2416	2415	2656	2655	2896	2895	3136	3135
8.2	75	C	CSR13H825K-	—	2177	—	2417	—	2657	—	2897	—	3137
10	75	C	CSR13H106--	2179	2178	2419	2418	2659	2658	2899	2898	3139	3138
12	75	D	CSR13H126K-	—	2180	—	2420	—	2660	—	2900	—	3140
15	75	D	CSR13H156--	2182	2181	2422	2421	2662	2661	2902	2901	3142	3141
.0047	100	A	CSR13J472--	2184	2183	2424	2423	2664	2663	2904	2903	3144	3143
.0056	100	A	CSR13J562K-	—	2185	—	2425	—	2665	—	2905	—	3145
.0068	100	A	CSR13J682--	2187	2186	2427	2426	2667	2666	2907	2906	3147	3146
.0082	100	A	CSR13J822K-	—	2188	—	2428	—	2668	—	2908	—	3148
.01	100	A	CSR13J103--	2190	2189	2430	2429	2670	2669	2910	2909	3150	3149
.012	100	A	CSR13J123K-	—	2191	—	2431	—	2671	—	2911	—	3151
.015	100	A	CSR13J153--	2193	2192	2433	2432	2673	2672	2913	2912	3153	3152
.018	100	A	CSR13J183K-	—	2194	—	2434	—	2674	—	2914	—	3154
.022	100	A	CSR13J223--	2196	2195	2436	2435	2676	2675	2916	2915	3156	3155
.027	100	A	CSR13J273K-	—	2197	—	2437	—	2677	—	2917	—	3157
.033	100	A	CSR13J333--	2199	2198	2439	2438	2679	2678	2919	2918	3159	3158
.039	100	A	CSR13J393K-	—	2200	—	2440	—	2680	—	2920	—	3160
.047	100	A	CSR13J473--	2202	2201	2442	2441	2682	2681	2922	2921	3162	3161
.056	100	A	CSR13J563K-	—	2203	—	2443	—	2683	—	2923	—	3163
.068	100	A	CSR13J683--	2205	2204	2445	2444	2685	2684	2925	2924	3165	3164
.082	100	A	CSR13J823K-	—	2206	—	2446	—	2686	—	2926	—	3166
.1	100	A	CSR13J104--	2208	2207	2448	2447	2688	2687	2928	2927	3168	3167
.12	100	A	CSR13J124K-	—	2209	—	2449	—	2689	—	2929	—	3169
.15	100	A	CSR13J154--	2211	2210	2451	2450	2691	2690	2931	2930	3171	3170
.18	100	A	CSR13J184K-	—	2212	—	2452	—	2692	—	2932	—	3172
.22	100	A	CSR13J224--	2214	2213	2454	2453	2694	2693	2934	2933	3174	3173
.27	100	A	CSR13J274K-	—	2215	—	2455	—	2695	—	2935	—	3175
.33	100	A	CSR13J334--	2217	2216	2457	2456	2697	2696	2937	2936	3177	3176
.39	100	A	CSR13J394K-	—	2218	—	2458	—	2698	—	2938	—	3178
.47	100	A	CSR13J474--	2220	2219	2460	2459	2700	2699	2940	2939	3180	3179
.56	100	A	CSR13J564K-	—	2221	—	2461	—	2701	—	2941	—	3181
.68	100	B	CSR13J684--	2223	2222	2463	2462	2703	2702	2943	2942	3183	3182
.82	100	B	CSR13J824K-	—	2224	—	2464	—	2704	—	2944	—	3184
1.0	100	B	CSR13J105--	2226	2225	2466	2465	2706	2705	2946	2945	3186	3185
1.2	100	B	CSR13J125K-	—	2227	—	2467	—	2707	—	2947	—	3187
1.5	100	B	CSR13J155--	2229	2228	2469	2468	2709	2708	2949	2948	3189	3188
1.8	100	B	CSR13J185K-	—	2230	—	2470	—	2710	—	2950	—	3190
2.2	100	B	CSR13J225--	2232	2231	2472	2471	2712	2711	2952	2951	3192	3191
2.7	100	B	CSR13J275K-	—	2233	—	2473	—	2713	—	2953	—	3193

*Type Nos. shown are incomplete. Capacitance Tolerance and/or Failure Rate must be added at end of number. Where 10th character (cap. tol.) is blank, insert "K" for ±10%, "M" for ±20%. A last character must be added to denote Failure Rate. Insert "L" for 2%, "M" for 1%, "P" for 0.1%, "R" for 0.01%, "S" for 0.001%.

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IND-EEM-39-EFAI

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SPRAGUE CAPACITORS

EST. REL. MIL-C-39003 STYLE CSR23 SOLID TANTALUMS

- Essentially the same as Type CSR13 capacitors but with extended capacitance ratings (higher capacitance in same size cases) required in some new equipment designs.

				MIL PART NUMBER M39003/03-									
				Failure Rate L (2%)		Failure Rate M (1%)		Failure Rate P (0.1%)		Failure Rate R (0.01%)		Failure Rate S (0.001%)	
μF	WVDC	Size Code	MIL Type Designation*	Cap. Tol. ±20%	Cap. Tol. ±10%	Cap. Tol. ±20%	Cap. Tol. ±10%	Cap. Tol. ±20%	Cap. Tol. ±10%	Cap. Tol. ±20%	Cap. Tol. ±10%	Cap. Tol. ±20%	Cap. Tol. ±10%
10	6	A	CSR23B106--	0002	0001	0102	0101	0202	0201	0302	0301	0402	0401
12	6	A	CSR23B126K-	—	0003	—	0103	—	0203	—	0303	—	0403
100	6	B	CSR23B107--	0005	0004	0105	0104	0205	0204	0305	0304	0405	0404
330	6	C	CSR23B337--	0007	0006	0107	0106	0207	0206	0307	0306	0407	0406
390	6	C	CSR23B397K-	—	0008	—	0108	—	0208	—	0308	—	0408
470	6	C	CSR23B477--	0010	0009	0110	0109	0210	0209	0310	0309	0410	0409
680	6	D	CSR23B687--	0012	0011	0112	0111	0212	0211	0312	0311	0412	0411
820	6	D	CSR23B827K-	—	0013	—	0113	—	0213	—	0313	—	0413
1000	6	D	CSR23B108--	0015	0014	0115	0114	0215	0214	0315	0314	0415	0414
6.8	10	A	CSR23C685--	0017	0016	0117	0116	0217	0216	0317	0316	0417	0416
8.2	10	A	CSR23C825K-	—	0018	—	0118	—	0218	—	0318	—	0418
47	10	B	CSR23C476--	0020	0019	0120	0119	0220	0219	0320	0319	0420	0419
56	10	B	CSR23C566K-	—	0021	—	0121	—	0221	—	0321	—	0421
68	10	B	CSR23C686--	0023	0022	0123	0122	0223	0222	0323	0322	0423	0422
82	10	B	CSR23C826K-	—	0024	—	0124	—	0224	—	0324	—	0424
220	10	C	CSR23C227--	0026	0025	0126	0125	0226	0225	0326	0325	0426	0425
270	10	C	CSR23C277K-	—	0027	—	0127	—	0227	—	0327	—	0427
390	10	D	CSR23C397K-	—	0028	—	0128	—	0228	—	0328	—	0428
470	10	D	CSR23C477--	0030	0029	0130	0129	0230	0229	0330	0329	0430	0429
560	10	D	CSR23C567K-	—	0031	—	0131	—	0231	—	0331	—	0431
4.7	15	A	CSR23D475--	0033	0032	0133	0132	0233	0232	0333	0332	0433	0432
5.6	15	A	CSR23D565K-	—	0034	—	0134	—	0234	—	0334	—	0434
33	15	B	CSR23D336--	0036	0035	0136	0135	0236	0235	0336	0335	0436	0435
39	15	B	CSR23D396K-	—	0037	—	0137	—	0237	—	0337	—	0437
150	15	C	CSR23D157--	0039	0038	0139	0138	0239	0238	0339	0338	0439	0438
180	15	C	CSR23D187K-	—	0040	—	0140	—	0240	—	0340	—	0440
220	15	D	CSR23D227--	0042	0041	0142	0141	0242	0241	0342	0341	0442	0441
270	15	D	CSR23D277K-	—	0043	—	0143	—	0243	—	0343	—	0443
330	15	D	CSR23D337--	0045	0044	0145	0144	0245	0244	0345	0344	0445	0444
2.7	20	A	CSR23E275K-	—	0046	—	0146	—	0246	—	0346	—	0446
3.3	20	A	CSR23E335--	0048	0047	1048	0147	0248	0247	0348	0347	0448	0447
3.9	20	A	CSR23E395K-	—	0049	—	0149	—	0249	—	0349	—	0449
18	20	B	CSR23E186K-	—	0050	—	0150	—	0250	—	0350	—	0450
22	20	B	CSR23E226--	0052	0051	0152	0151	0252	0251	0352	0351	0452	0451
27	20	B	CSR23E276K-	—	0053	—	0153	—	0253	—	0353	—	0453
56	20	C	CSR23E566K-	—	0054	—	0154	—	0254	—	0354	—	0454
68	20	C	CSR23E686--	0056	0055	0156	0155	0256	0255	0356	0355	0456	0455
82	20	C	CSR23E826K-	—	0057	—	0157	—	0257	—	0357	—	0457
100	20	C	CSR23E107--	0059	0058	0159	0158	0259	0258	0359	0358	0459	0458
120	20	C	CSR23E127K-	—	0060	—	0160	—	0260	—	0360	—	0460
150	20	D	CSR23E157--	0062	0061	0162	0161	0262	0261	0362	0361	0462	0461
180	20	D	CSR23E187K-	—	0063	—	0163	—	0263	—	0363	—	0463
1.8	35	A	CSR23F185K-	—	0064	—	0164	—	0264	—	0364	—	0464
8.2	35	B	CSR23F826K-	—	0065	—	0165	—	0265	—	0365	—	0465
10	35	B	CSR23F106--	0067	0066	0167	0166	0267	0266	0367	0366	0467	0466
33	35	C	CSR23F336--	0069	0068	0169	0168	0269	0268	0369	0368	0469	0468
39	35	C	CSR23F396K-	—	0070	—	0170	—	0270	—	0370	—	0470
47	35	C	CSR23F476--	0072	0071	0172	0171	0272	0271	0372	0371	0472	0471
56	35	D	CSR23F566K-	—	0073	—	0173	—	0273	—	0373	—	0473
68	35	D	CSR23F686--	0075	0074	0175	0174	0275	0274	0375	0374	0475	0474
1.2	50	A	CSR23G125K-	—	0076	—	0176	—	0276	—	0376	—	0476
1.5	50	A	CSR23G155--	0078	0077	0178	0177	0278	0277	0378	0377	0478	0477
5.6	50	B	CSR23G565K-	—	0079	—	0179	—	0279	—	0379	—	0479
6.8	50	B	CSR23G685--	0081	0080	0181	0180	0281	0280	0381	0380	0481	0480
22	50	C	CSR23G226--	0083	0082	0183	0182	0283	0282	0383	0382	0483	0482
27	50	C	CSR23G276K-	—	0084	—	0184	—	0284	—	0384	—	0484
33	50	D	CSR23G336--	0086	0085	0186	0185	0286	0285	0386	0385	0486	0485
39	50	D	CSR23G396K-	—	0087	—	0187	—	0287	—	0387	—	0487

*Type Nos. shown are incomplete. Capacitance Tolerance and/or Failure Rate must be added at end of number. Where 10th character (cap. tol.) is blank, insert "K" for ±10%, "M" for ±20%. A last character must be added to denote Failure Rate. Insert "L" for 2%, "M" for 1%, "P" for 0.1%, "R" for 0.01%, "S" for 0.001%.

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IND-EEM-42-EFAI

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SPRAGUE CAPACITORS

ESTABLISHED RELIABILITY MIL-C-39006
STYLE CLR25/27 and CLR35/37 FOIL TANTALUM CAPACITORS

- Rated for operation to 85 C (to 125 C with voltage derating).
- Handled by Sprague and Sprague industrial distributors in full compliance with MIL-STD-790. Manufactured, marked, packed, shipped, received inspected, stored in separate area, free from contamination or mix-up with other components.
- Capacitance tolerances: Style CLR25 27 . . . 15 thru 30V = +75, −15%; 50 thru 75V = +50, −15%; 100V and up = +30, −15%. Style CLR35 37 . . . 15 thru 150V = ±20%; 200V and up = ±15%.

SIZE CODE

A = .219″ D. x .668″ L.
B = .312″ D. x .969″ L.
C = .406″ D. x 1.438″ L.
D = .406″ D. x 2.125″ L.
E = .406″ D. x 2.750″ L.

STYLE CLR25, POLARIZED ETCHED FOIL

GLASS-TO-METAL HERMETIC SEAL

			MIL Part No. M39006/01-			
µF	WVDC	Size Code	Failure Rate L(2%)	Failure Rate M(1%)	Failure Rate P(.1%)	Failure Rate R(.01%)
60	15	B	3001	3030	3059	3038
200	15	C	3002	3031	3060	3089
400	15	D	3003	3032	3061	3090
580	15	E	3004	3033	3062	3091
40	25	B	3005	3034	3063	3092
120	25	C	3006	3035	3064	3093
250	25	D	3007	3036	3065	3094
350	25	E	3008	3037	3066	3095
32	30	B	3009	3038	3067	3096
110	30	C	3010	3039	3068	3097

			MIL Part No. M39006/01-			
µF	WVDC	Size Code	Failure Rate L(2%)	Failure Rate M(1%)	Failure Rate P(.1%)	Failure Rate R(.01%)
220	30	D	3011	3040	3069	3098
300	30	E	3012	3041	3070	3099
18	50	B	3013	3042	3071	3100
60	50	C	3014	3043	3072	3101
75	50	E	3015	3044	3073	3102
100	50	D	3016	3045	3074	3103
150	50	E	3017	3046	3075	3104
12	75	B	3018	3047	3076	3105
30	75	C	3019	3048	3077	3106
70	75	D	3020	3049	3078	3107

			MIL Part No. M39006/01-			
µF	WVDC	Size Code	Failure Rate L(2%)	Failure Rate M(1%)	Failure Rate P(.1%)	Failure Rate R(.01%)
100	75	E	3021	3050	3079	3108
8	100	B	3022	3051	3080	3109
25	100	C	3023	3052	3081	3110
50	100	D	3024	3053	3082	3111
70	100	E	3025	3054	3083	3112
4	150	B	3026	3055	3084	3113
13	150	C	3027	3056	3085	3114
25	150	D	3028	3057	3086	3115
36	150	E	3029	3058	3087	3116

ELASTOMER SEAL

			MIL Part No. M39006/01-			
µF	WVDC	Size Code	Failure Rate L(2%)	Failure Rate M(1%)	Failure Rate P(.1%)	Failure Rate R(.01%)
15	15	A	2200	2232	2264	2296
60	15	B	2201	2233	2265	2297
200	15	C	2202	2234	2266	2298
400	15	D	2203	2235	2267	2299
580	15	E	2204	2236	2268	2300
10	25	A	2205	2237	2269	2301
40	25	B	2206	2238	2270	2302
120	25	C	2207	2239	2271	2303
250	25	D	2208	2240	2272	2304
350	25	E	2209	2241	2273	2305
8	30	A	2210	2242	2274	2306

			MIL Part No. M39006/01-			
µF	WVDC	Size Code	Failure Rate L(2%)	Failure Rate M(1%)	Failure Rate P(.1%)	Failure Rate R(.01%)
32	30	D	2211	2243	2275	2307
4.5	50	A	2212	2244	2276	2308
18	50	B	2213	2245	2277	2309
60	50	C	2214	2246	2278	2310
100	50	D	2215	2247	2279	2311
150	50	E	2216	2248	2280	2312
3	75	A	2217	2249	2281	2313
12	75	B	2218	2250	2282	2314
30	75	C	2219	2251	2283	2315
70	75	D	2220	2252	2284	2316
100	75	E	2221	2253	2285	2317

			MIL Part No. M39006/01-			
µF	WVDC	Size Code	Failure Rate L(2%)	Failure Rate M(1%)	Failure Rate P(.1%)	Failure Rate R(.01%)
2	100	A	2222	2254	2286	2318
8	100	B	2223	2255	2287	2319
25	100	C	2224	2256	2288	2320
50	100	D	2225	2257	2289	2321
70	100	E	2226	2258	2290	2322
1	150	A	2227	2259	2291	2323
4	150	B	2228	2260	2292	2324
13	150	C	2229	2261	2293	2325
25	150	D	2230	2262	2294	2326
36	150	E	2231	2263	2295	2327

STYLE CLR27, NON-POLARIZED ETCHED FOIL

GLASS-TO-METAL HERMETIC SEAL

			MIL Part No. M39006/02-			
µF	WVDC	Size Code	Failure Rate L(2%)	Failure Rate M(1%)	Failure Rate P(.1%)	Failure Rate R(.01%)
40	15	B	1200	1228	1256	1284
120	15	C	1201	1229	1257	1285
250	15	D	1202	1230	1258	1286
350	15	E	1203	1231	1259	1287
20	25	B	1204	1232	1260	1288
70	25	C	1205	1233	1261	1289
140	25	D	1206	1234	1262	1290
200	25	E	1207	1235	1263	1291
18	30	B	1208	1236	1264	1292

			MIL Part No. M39006/02-			
µF	WVDC	Size Code	Failure Rate L(2%)	Failure Rate M(1%)	Failure Rate P(.1%)	Failure Rate R(.01%)
60	30	C	1209	1237	1265	1293
120	30	D	1210	1238	1266	1294
170	30	E	1211	1239	1267	1295
10	50	B	1212	1240	1268	1296
30	50	C	1213	1241	1269	1297
60	50	D	1214	1242	1270	1298
80	50	E	1215	1243	1271	1299
6	75	B	1216	1244	1272	1300
15	75	C	1217	1245	1273	1301

			MIL Part No. M39006/02-			
µF	WVDC	Size Code	Failure Rate L(2%)	Failure Rate M(1%)	Failure Rate P(.1%)	Failure Rate R(.01%)
35	75	D	1218	1246	1274	1302
50	75	E	1219	1247	1275	1303
4	100	B	1220	1248	1276	1304
12	100	C	1221	1249	1277	1305
25	100	D	1222	1250	1278	1306
35	100	E	1223	1251	1279	1307
2	150	B	1224	1252	1380	1308
6	150	C	1225	1253	1381	1309
12	150	D	1226	1254	1282	1310
18	150	E	1227	1255	1283	1311

ELASTOMER SEAL

			MIL Part No. M39006/02-			
µF	WVDC	Size Code	Failure Rate L(2%)	Failure Rate M(1%)	Failure Rate P(.1%)	Failure Rate R(.01%)
10	15	A	2200	2232	2264	2296
40	15	B	2201	2233	2265	2297
120	15	C	2202	2234	2266	2298
250	15	D	2203	2235	2267	2299
350	15	E	2204	2236	2268	2300
5	25	A	2205	2237	2269	2301
20	25	B	2206	2238	2270	2302
70	25	C	2207	2239	2271	2303
140	25	D	2208	2240	2272	2304
200	25	E	2209	2241	2273	2305
4.5	30	A	2210	2242	2274	2306

			MIL Part No. M39006/02-			
µF	WVDC	Size Code	Failure Rate L(2%)	Failure Rate M(1%)	Failure Rate P(.1%)	Failure Rate R(.01%)
18	30	D	2211	2243	2275	2307
2.5	50	A	2212	2244	2276	2308
10	50	B	2213	2245	2277	2309
30	50	C	2214	2246	2278	2310
60	50	D	2215	2247	2279	2311
80	50	E	2216	2248	2280	2312
1.5	75	A	2217	2249	2281	2313
6	75	B	2218	2250	2282	2314
15	75	C	2219	2251	2283	2315
35	75	D	2220	2252	2284	2316
50	75	E	2221	2253	2285	2317

			MIL Part No. M39006/02-			
µF	WVDC	Size Code	Failure Rate L(2%)	Failure Rate M(1%)	Failure Rate P(.1%)	Failure Rate R(.01%)
1	100	A	2222	2254	2286	2318
4	100	B	2223	2255	2287	2319
12	100	C	2224	2256	2288	2320
25	100	D	2225	2257	2289	2321
35	100	E	2226	2258	2290	2322
0.5	150	A	2227	2259	2291	2323
2	150	B	2228	2260	2292	2324
6	150	C	2229	2261	2293	2325
12	150	D	2230	2262	2294	2326
18	150	E	2231	2263	2295	2327

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SPRAGUE CAPACITORS

STYLE CLR35, POLARIZED PLAIN FOIL

GLASS-TO-METAL HERMETIC SEAL

µF	WVDC	Size Code	MIL Part No. M39006/03-			
			Failure Rate L(2%)	Failure Rate M(1%)	Failure Rate P(.1%)	Failure Rate R(.01%)
18	15	B	1300	1349	1398	1447
55	15	C	1301	1350	1399	1448
110	15	D	1302	1351	1400	1449
160	15	E	1303	1352	1401	1450
12	25	B	1304	1353	1402	1451
35	25	C	1305	1354	1403	1452
70	25	D	1306	1355	1404	1453
100	25	E	1307	1356	1405	1454
10	30	B	1308	1357	1406	1455
30	30	C	1309	1358	1407	1456
60	30	D	1310	1359	1408	1457
85	30	E	1311	1360	1409	1458
68	35	E	1312	1361	1410	1459
6	50	B	1313	1362	1411	1460

µF	WVDC	Size Code	MIL Part No. M39006/03-			
			Failure Rate L(2%)	Failure Rate M(1%)	Failure Rate P(.1%)	Failure Rate R(.01%)
20	50	C	1314	1363	1412	1461
40	50	D	1315	1364	1413	1462
55	50	E	1316	1365	1414	1463
4	75	B	1317	1366	1415	1464
14	75	C	1318	1367	1416	1465
28	75	D	1319	1368	1417	1466
40	75	E	1320	1369	1418	1467
3	100	B	1321	1370	1419	1468
10	100	C	1322	1371	1420	1469
20	100	D	1323	1372	1421	1470
30	100	E	1324	1373	1422	1471
2	150	B	1325	1374	1423	1472
7	150	C	1326	1375	1424	1473
14	150	D	1327	1376	1425	1474

µF	WVDC	Size Code	MIL Part No. M39006/03-			
			Failure Rate L(2%)	Failure Rate M(1%)	Failure Rate P(.1%)	Failure Rate R(.01%)
20	150	E	1328	1377	1426	1475
1.5	200	B	1329	1378	1427	1476
5	200	C	1330	1379	1428	1477
10	200	D	1331	1380	1429	1478
15	200	E	1332	1381	1430	1479
1.2	250	B	1333	1382	1431	1480
4	250	C	1334	1383	1432	1481
8	250	D	1335	1384	1433	1482
12	250	E	1336	1385	1434	1483
1	300	B	1337	1386	1435	1484
3	300	C	1338	1387	1436	1485
7	300	D	1339	1388	1437	1486
10	300	E	1340	1389	1438	1487

ELASTOMER SEAL

µF	WVDC	Size Code	MIL Part No. M39006/03-			
			Failure Rate L(2%)	Failure Rate M(1%)	Failure Rate P(.1%)	Failure Rate R(.01%)
4.5	15	A	2300	2360	2420	2480
18	15	B	2301	2361	2421	2481
55	15	C	2302	2362	2422	2482
110	15	D	2303	2363	2423	2483
160	15	E	2304	2364	2424	2484
3	25	A	2305	2365	2425	2485
12	25	B	2306	2366	2426	2486
35	25	C	2307	2367	2427	2487
70	25	D	2308	2368	2428	2488
100	25	E	2309	2369	2429	2489
2.5	30	A	2310	2370	2430	2490
10	30	B	2311	2371	2431	2491
30	30	C	2312	2372	2432	2492
60	30	D	2313	2373	2433	2493
85	30	E	2314	2374	2434	2494
1.5	50	A	2315	2375	2435	2495
6	50	B	2316	2376	2436	2496

µF	WVDC	Size Code	MIL Part No. M39006/03-			
			Failure Rate L(2%)	Failure Rate M(1%)	Failure Rate P(.1%)	Failure Rate R(.01%)
20	50	C	2317	2377	2437	2497
40	50	D	2318	2378	2438	2498
55	50	E	2319	2379	2439	2499
1	75	A	2320	2380	2440	2500
4	75	B	2321	2381	2441	2501
14	75	C	2322	2382	2442	2502
28	75	D	2323	2383	2443	2503
40	75	E	2324	2384	2444	2504
0.8	100	A	2325	2385	2445	2505
3	100	B	2326	2386	2446	2506
10	100	C	2327	2387	2447	2507
20	100	D	2328	2388	2448	2508
30	100	E	2329	2389	2449	2509
0.5	150	A	2330	2390	2450	2510
2	150	B	2331	2391	2451	2511
7	150	C	2332	2392	2452	2512
14	150	D	2333	2393	2453	2513

µF	WVDC	Size Code	MIL Part No. M39006/03-			
			Failure Rate L(2%)	Failure Rate M(1%)	Failure Rate P(.1%)	Failure Rate R(.01%)
20	150	E	2334	2394	2454	2514
0.35	200	A	2335	2395	2455	2515
1.5	200	B	2336	2396	2456	2516
5	200	C	2337	2397	2457	2517
10	200	D	2338	2398	2458	2518
15	200	E	2339	2399	2459	2519
0.3	250	A	2340	2400	2460	2520
1.2	250	B	2341	2401	2461	2521
4	250	C	2342	2402	2462	2522
8	250	D	2343	2403	2463	2523
12	250	E	2344	2404	2464	2524
0.27	300	A	2345	2405	2465	2525
1	300	B	2346	2406	2466	2526
3	300	C	2347	2407	2467	2527
7	300	D	2348	2408	2468	2528
10	300	E	2349	2409	2469	2529

STYLE CLR37, NON-POLARIZED PLAIN FOIL

GLASS-TO-METAL HERMETIC SEAL

µF	WVDC	Size Code	MIL Part No. M39006/04-			
			Failure Rate L(2%)	Failure Rate M(1%)	Failure Rate P(.1%)	Failure Rate R(.01%)
10	15	B	1200	1245	1290	1335
35	15	C	1201	1246	1291	1336
70	15	D	1202	1247	1292	1337
100	15	E	1203	1248	1293	1338
6	25	B	1204	1249	1294	1339
20	25	C	1205	1250	1295	1340
40	25	D	1206	1251	1296	1341
60	25	E	1207	1252	1297	1342
5.5	30	B	1208	1253	1298	1343
18	30	C	1209	1254	1299	1344
36	30	D	1210	1255	1300	1345
45	30	E	1211	1256	1301	1346
3	50	B	1212	1257	1302	1347
10	50	C	1213	1258	1303	1348

µF	WVDC	Size Code	MIL Part No. M39006/04-			
			Failure Rate L(2%)	Failure Rate M(1%)	Failure Rate P(.1%)	Failure Rate R(.01%)
20	50	D	1214	1259	1304	1349
30	50	E	1215	1260	1305	1350
2	75	B	1216	1261	1306	1351
7	75	C	1217	1262	1307	1352
14	75	D	1218	1263	1308	1353
20	75	E	1219	1264	1309	1354
1.5	100	B	1220	1265	1310	1355
5	100	C	1221	1266	1311	1356
10	100	D	1222	1267	1312	1357
15	100	E	1223	1268	1313	1358
1	150	B	1224	1269	1314	1359
1.2	150	B	1225	1270	1315	1360
3.5	150	C	1226	1271	1316	1361
7	150	D	1227	1272	1317	1362

µF	WVDC	Size Code	MIL Part No. M39006/04-			
			Failure Rate L(2%)	Failure Rate M(1%)	Failure Rate P(.1%)	Failure Rate R(.01%)
10	150	E	1228	1273	1318	1363
0.75	200	B	1229	1274	1319	1364
2.5	200	C	1230	1275	1320	1365
5	200	D	1231	1276	1321	1366
7.5	200	E	1232	1277	1322	1367
0.6	250	B	1233	1278	1323	1368
2	250	C	1234	1279	1324	1369
4	250	D	1235	1280	1325	1370
6	250	E	1236	1281	1326	1371
0.47	300	B	1237	1282	1327	1372
1.5	300	C	1238	1283	1328	1373
3.3	300	D	1239	1284	1329	1374
4.7	300	E	1240	1285	1330	1375

ELASTOMER SEAL

µF	WVDC	Size Code	MIL Part No. M39006/04-			
			Failure Rate L(2%)	Failure Rate M(1%)	Failure Rate P(.1%)	Failure Rate R(.01%)
.25	15	A	2300	2355	2410	2465
10	15	B	2301	2356	2411	2466
35	15	C	2302	2357	2412	2467
70	15	D	2303	2358	2413	2468
100	15	E	2304	2359	2414	2469
1.5	25	A	2305	2360	2415	2470
6	25	B	2306	2361	2416	2471
20	25	C	2307	2362	2417	2472
40	25	D	2308	2363	2418	2473
60	25	E	2309	2364	2419	2474
1.4	30	A	2310	2365	2420	2475
5.5	30	B	2311	2366	2421	2476
18	30	C	2312	2367	2422	2477
36	30	D	2313	2368	2423	2478
45	30	E	2314	2369	2424	2479
0.8	50	A	2315	2370	2425	2480
3	50	B	2316	2371	2426	2481

µF	WVDC	Size Code	MIL Part No. M39006/04-			
			Failure Rate L(2%)	Failure Rate M(1%)	Failure Rate P(.1%)	Failure Rate R(.01%)
10	50	C	2317	2372	2427	2482
20	50	D	2318	2373	2428	2483
30	50	E	2319	2374	2429	2484
0.5	75	A	2320	2375	2430	2485
2	75	B	2321	2376	2431	2486
7	75	C	2322	2377	2432	2487
14	75	D	2323	2378	2433	2488
20	75	E	2324	2379	2434	2489
0.4	100	A	2325	2380	2435	2490
1.5	100	B	2326	2381	2436	2491
5	100	C	2327	2382	2437	2492
10	100	D	2328	2383	2438	2493
15	100	E	2329	2384	2439	2494
0.25	150	A	2330	2385	2440	2495
1.5	150	B	2331	2386	2441	2496
3.5	150	C	2332	2387	2442	2497
7	150	D	2333	2388	2443	2498

µF	WVDC	Size Code	MIL Part No. M39006/04-			
			Failure Rate L(2%)	Failure Rate M(1%)	Failure Rate P(.1%)	Failure Rate R(.01%)
10	150	E	2334	2389	2444	2499
0.15	200	A	2335	2390	2445	2500
0.75	200	B	2336	2391	2446	2501
2.5	200	C	2337	2392	2447	2502
5	200	D	2338	2393	2448	2503
7.5	200	E	2339	2394	2449	2504
0.15	250	A	2340	2395	2450	2505
0.6	250	B	2341	2396	2451	2506
2	250	C	2342	2397	2452	2507
4	250	D	2343	2398	2453	2508
6	250	E	2344	2399	2454	2509
0.12	300	A	2345	2400	2455	2510
0.47	300	B	2346	2401	2456	2511
1.5	300	C	2347	2402	2457	2512
3.3	300	D	2348	2403	2458	2513
4.7	300	E	2349	2404	2459	2514

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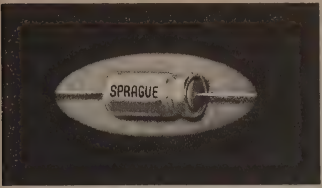
SPRAGUE CAPACITORS

TYPE 130D SINTERED-ANODE TANTALEX® CAPACITORS

NOTE: Type 109D (shown on next page) are comparable capacitors, and are generally more readily available.



- Reliable, superior quality capacitors rated for 125 C operation without voltage derating.
- Especially suited for military and critical industrial equipment.
- Capacitors listed below have plastic-film insulation. For bare metal case, change last digit of Cat. No. from "2" to "0" and subtract .016" from diameter and .063" from length.
- Meets 2000 cycle MIL missile vibration requirements.
- For complete technical data, refer to latest issue of Sprague Engineering Bulletins 3701 and 3701.2.

SIZE CODE

C = .203"D. x .515"L.
F = .296"D. x .703"L.
T = .390"D. x .828"L.
W = .390"D. x 1.312"L.

*GROUP 1: Standard Ratings

µF	Size Code	Cat. No.
4 WVDC		
27	C	130D276X9004C2
30	C	130D306X9004C2
120	F	130D127X9004F2
140	F	130D147X9004F2
290	T	130D297X9004T2
330	T	130D337X9004T2
5 WVDC		
22	C	130D226X9005C2
25	C	130D256X9005C2
100	F	130D107X9005F2
120	F	130D127X9005F2
260	T	130D267X9005T2
290	T	130D297X9005T2
7 WVDC		
18	C	130D186X9007C2
20	C	130D206X9007C2
85	F	130D856X9007F2
100	F	130D107X9007F2
220	T	130D227X9007T2
250	T	130D257X9007T2
10 WVDC		
13	C	130D136X9010C2
15	C	130D156X9010C2
55	F	130D556X9010F2
70	F	130D706X9010F2
150	T	130D157X9010T2
170	T	130D177X9010T2
15 WVDC		
9	C	130D905X9015C2
10	C	130D106X9015C2
45	F	130D456X9015F2
50	F	130D506X9015F2
100	T	130D107X9015T2
110	T	130D117X9015T2
20 WVDC		
7	C	130D705X9020C2
8	C	130D805X9020C2
35	F	130D356X9020F2
40	F	130D406X9020F2
80	T	130D806X9020T2
100	T	130D107X9020T2
30 WVDC		
4.5	C	130D455X9030C2
5	C	130D505X9030C2
22	F	130D226X9030F2
25	F	130D256X9030F2
55	T	130D556X9030T2
60	T	130D606X9030T2
40 WVDC		
3.6	C	130D365X9040C2
4	C	130D405X9040C2
18	F	130D186X9040F2
20	F	130D206X9040F2
45	T	130D456X9040T2
50	T	130D506X9040T2
50 WVDC		
3	C	130D305X9050C2
3.5	C	130D355X9050C2
13	F	130D136X9050F2
15	F	130D156X9050F2
35	T	130D356X9050T2
40	T	130D406X9050T2
70 WVDC		
2.5	C	130D255X9070C2
10	F	130D106X9070F2
11	F	130D116X9070F2
27	T	130D276X9070T2
30	T	130D306X9070T2
85 WVDC		
1.7	C	130D175X9085C2
9	F	130D905X9085F2
18	T	130D186X9085T2
100 WVDC		
1.7	C	130D175X9100C2
6.8	F	130D685X9100F2
14	T	130D146X9100T2

†GROUP 2: Approximately twice the capacitance of Group 1 capacitors of the same physical size at a given voltage rating.

µF	Size Code	Cat. No.
4 WVDC		
68	C	130D686X0004C2
270	F	130D277X0004F2
560	T	130D567X0004T2
1200	W	130D128X0004W2
5 WVDC		
56	C	130D566X0005C2
220	F	130D227X0005F2
430	T	130D437X0005T2
850	W	130D857X0005W2
7 WVDC		
47	C	130D4760007C2
180	F	130D187X0007F2
390	T	130D397X0007T2
750	W	130D757X0007W2
10 WVDC		
33	C	130D336X0010C2
120	F	130D127X0010F2
270	T	130D277X0010T2
540	W	130D547X0010W2
15 WVDC		
22	C	130D226X0015C2
100	F	130D107X0015F2
180	T	130D187X0015T2
350	W	130D357X0015W2
20 WVDC		
15	C	130D156X0020C2
68	F	130D686X0020F2
150	T	130D157X0020T2
300	W	130D307X0020W2
30 WVDC		
10	C	130D106X0030C2
47	F	130D476X0030F2
82	T	130D826X0030T2
160	W	130D167X0030W2
40 WVDC		
8.2	C	130D825X0040C2
39	F	130D396X0040F2
68	T	130D686X0040T2
140	W	130D147X0040W2
50 WVDC		
6.8	C	130D685X0050C2
33	F	130D336X0050F2
56	T	130D566X0050T2
110	W	130D117X0050W2
70 WVDC		
4.7	C	130D475X0070C2
22	F	130D226X0070F2
43	T	130D436X0070T2
86	W	130D866X0070W2
85 WVDC		
3.6	C	130D365X0085C2
14	F	130D146X0085F2
25	T	130D256X0085T2
56	W	130D566X0085W2
100 WVDC		
3	C	130D305X0100C2
11	F	130D116X0100F2
22	T	130D226X0100T2

†GROUP 3: Extended-range capacitors, with substantially higher capacitance than units of the same physical size in Groups 1 or 2.

µF	Size Code	Cat. No.
4 WVDC		
200	C	130D207X0004C2
820	F	130D827X0004F2
1500	T	130D158X0005T2
5 WVDC		
180	C	130D187X0005C2
680	F	130D687X0005F2
1400	T	130D148X0005T2
7 WVDC		
120	C	130D127X0007C2
150	C	130D157X0007C2
470	F	130D477X0007F2
560	F	130D567X0007F2
1000	T	130D108X0007T2
1200	T	130D128X0007T2
10 WVDC		
82	C	130D826X0010C2
100	C	130D107X0010C2
330	F	130D337X0010F2
390	F	130D397X0010F2
680	T	130D687X0010T2
820	T	130D827X0010T2
15 WVDC		
68	C	130D686X0015C2
270	F	130D277X0015F2
560	T	130D567X0015T2
20 WVDC		
39	C	130D396X0020C2
47	C	130D476X0020C2
56	C	130D566X0020C2
150	F	130D157X0020F2
180	F	130D187X0020F2
220	F	130D227X0020F2
330	T	130D337X0020T2
390	T	130D397X0020T2
470	T	130D477X0020T2
30 WVDC		
33	C	130D336X0030C2
120	F	130D127X0030F2
270	T	130D277X0030T2
40 WVDC		
18	C	130D186X0040C2
27	C	130D276X0040C2
68	F	130D686X0040F2
100	F	130D107X0040F2
140	T	130D147X0040T2
220	T	130D227X0040T2
50 WVDC		
12	C	130D126X0050C2
15	C	130D156X0050C2
22	C	130D226X0050C2
47	F	130D476X0050F2
56	F	130D566X0050F2
82	F	130D826X0050F2
82	T	130D826X0050T2
110	T	130D117X0050T2
180	T	130D187X0050T2

*Capacitance tolerance, ±10%. For +20, −15% tolerance change "X9" in Cat. No. to "C2." For +75, −15% tolerance change "X9" to "C7."
†Capacitance tolerance, ±20%. For ±10% tolerance, change digit after "X" from "0" to "9."

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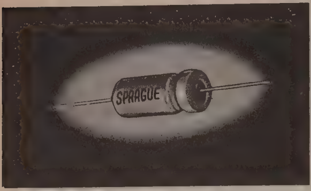
SPRAGUE CAPACITORS

TYPE 109D SINTERED-ANODE TANTALEX® CAPACITORS



- Reliable, superior quality capacitors dual-rated for 125 C and 85C operation.
- Especially suited for military and critical industrial equipment.
- Capacitors listed below have plastic-film insulation. For bare metal case, change last digit of Cat. No. from "2" to "0" and subtract .016" from diameter and .063" from length.
- Meets 2000 cycle MIL missile vibration requirements.
- For complete technical data, refer to latest issue of Sprague Engineering Bulletins 3700 and 3700.2.

SIZE CODE

C = .203"D. x .515"L.
T = .390"D. x .828"L.
F = .296"D. x .703"L.
W = .390"D. x 1.312"L.

*GROUP 1: Standard Ratings

µF	Size Code	Cat. No.
6 WVDC @ 85 C 4 WVDC @ 125 C		
27	C	109D276X9006C2
30	C	109D306X9006C2
120	F	109D127X9006F2
140	F	109D147X9006F2
290	T	109D297X9006T2
330	T	109D337X9006T2
8 WVDC @ 85 C 5 WVDC @ 125 C		
22	C	109D226X9008C2
25	C	109D256X9008C2
100	F	109D107X9008F2
120	F	109D127X9008F2
260	T	109D267X9008T2
290	T	109D297X9008T2
10 WVDC @ 85 C 7 WVDC @ 125 C		
18	C	109D186X9010C2
20	C	109D206X9010C2
85	F	109D856X9010F2
100	F	109D107X9010F2
220	T	109D227X9010T2
250	T	109D257X9010T2
15 WVDC @ 85 C 10 WVDC @ 125 C		
13	C	109D136X9015C2
15	C	109D156X9015C2
55	F	109D556X9015F2
70	F	109D706X9015F2
150	T	109D157X9015T2
170	T	109D177X9015T2
25 WVDC @ 85 C 15 WVDC @ 125 C		
9	C	109D905X9025C2
10	C	109D106X9025C2
45	F	109D456X9025F2
50	F	109D506X9025F2
100	T	109D107X9025T2
110	T	109D117X9025T2
30 WVDC @ 85 C 20 WVDC @ 125 C		
7	C	109D705X9030C2
8	C	109D805X9030C2
35	F	109D356X9030F2
40	F	109D406X9030F2
80	T	109D806X9030T2
100	T	109D107X9030T2
50 WVDC @ 85 C 30 WVDC @ 125 C		
4.5	C	109D455X9050C2
5	C	109D505X9050C2
22	F	109D226X9050F2
25	F	109D256X9050F2
55	T	109D556X9050T2
60	T	109D606X9050T2
60 WVDC @ 85 C 40 WVDC @ 125 C		
3.6	C	109D365X9060C2
4	C	109D405X9060C2
18	F	109D186X9060F2
20	F	109D206X9060F2
45	T	109D456X9060T2
50	T	109D506X9060T2
75 WVDC @ 85 C 50 WVDC @ 125 C		
3	C	109D305X9075C2
3.5	C	109D355X9075C2
13	F	109D136X9075F2
15	F	109D156X9075F2
35	T	109D356X9075T2
40	T	109D406X9075T2
100 WVDC @ 85 C 70 WVDC @ 125 C		
2.5	C	109D255X9100C2
10	F	109D106X9100F2
11	F	109D116X9100F2
27	T	109D276X9100T2
30	T	109D306X9100T2
125 WVDC @ 85 C 85 WVDC @ 125 C		
1.7	C	109D175X9125C2
9	F	109D905X9125F2
18	T	109D186X9125T2
150 WVDC @ 85 C 100 WVDC @ 125 C		
1.7	C	109D175X9150C2
6.8	F	109D685X9150F2
14	T	109D146X9150T2

†GROUP 2:

Approximately twice the capacitance of Group 1 capacitors of the same physical size at a given voltage rating.

µF	Size Code	Cat. No.
6 WVDC @ 85 C 4 WVDC @ 125 C		
68	C	109D686X0006C2
270	F	109D277X0006F2
560	T	109D567X0006T2
1200	W	109D128X0006W2
8 WVDC @ 85 C 5 WVDC @ 125 C		
56	C	109D566X0008C2
220	F	109D227X0008F2
430	T	109D437X0008T2
850	W	109D857X0008W2
10 WVDC @ 85 C 7 WVDC @ 125 C		
47	C	109D476X0010C2
180	F	109D187X0010F2
390	T	109D397X0010T2
750	W	109D757X0010W2
15 WVDC @ 85 C 10 WVDC @ 125 C		
33	C	109D336X0015C2
120	F	109D127X0015F2
270	T	109D277X0015T2
540	W	109D547X0015W2
25 WVDC @ 85 C 15 WVDC @ 125 C		
22	C	109D226X0025C2
100	F	109D107X0025F2
180	T	109D187X0025T2
350	W	109D357X0025W2
30 WVDC @ 85 C 20 WVDC @ 125 C		
15	C	109D156X0030C2
68	F	109D686X0030F2
150	T	109D157X0030T2
300	W	109D307X0030W2
50 WVDC @ 85 C 30 WVDC @ 125 C		
10	C	109D106X0050C2
47	F	109D476X0050F2
82	T	109D826X0050T2
160	W	109D167X0050W2
60 WVDC @ 85 C 40 WVDC @ 125 C		
8.2	C	109D825X0060C2
39	F	109D396X0060F2
68	T	109D686X0060T2
140	W	109D147X0060W2
75 WVDC @ 85 C 50 WVDC @ 125 C		
6.8	C	109D685X0075C2
33	F	109D336X0075F2
56	T	109D566X0075T2
110	W	109D117X0075W2
100 WVDC @ 85 C 70 WVDC @ 125 C		
4.7	C	109D475X0100C2
22	F	109D226X0100F2
43	T	109D436X0100T2
86	W	109D866X0100W2
125 WVDC @ 85 C 85 WVDC @ 125 C		
3.6	C	109D365X0125C2
14	F	109D146X0125F2
25	T	109D256X0125T2
56	W	109D566X0125W2
150 WVDC @ 85 C 100 WVDC @ 125 C		
3	C	109D305X0150C2
11	F	109D116X0150F2
22	T	109D226X0150T2

†GROUP 3:

Extended-range capacitors, with substantially higher capacitance than units of the same physical size in Groups 1 or 2.

µF	Size Code	Cat. No.
6 WVDC @ 85 C 4 WVDC @ 125 C		
200	C	109D207X0006C2
820	F	109D827X0006F2
1500	T	109D158X0006T2
8 WVDC @ 85 C 5 WVDC @ 125 C		
180	C	109D187X0008C2
680	F	109D687X0008F2
1400	T	109D148X0008T2
10 WVDC @ 85 C 7 WVDC @ 125 C		
120	C	109D127X0010C2
150	C	109D157X0010C2
470	F	109D477X0010F2
560	F	109D567X0010F2
1000	T	109D108X0010T2
1200	T	109D128X0010T2
15 WVDC @ 85 C 10 WVDC @ 125 C		
82	C	109D826X0015C2
100	C	109D107X0015C2
330	F	109D337X0015F2
390	F	109D397X0015F2
680	T	109D687X0015T2
820	T	109D827X0015T2
25 WVDC @ 85 C 15 WVDC @ 125 C		
68	C	109D686X0025C2
270	F	109D277X0025F2
560	T	109D567X0025T2
30 WVDC @ 85 C 20 WVDC @ 125 C		
39	C	109D396X0030C2
47	C	109D476X0030C2
56	C	109D566X0030C2
150	F	109D157X0030F2
180	F	109D187X0030F2
220	F	109D227X0030F2
330	T	109D337X0030T2
390	T	109D397X0030T2
470	T	109D477X0030T2
50 WVDC @ 85 C 30 WVDC @ 125 C		
33	C	109D336X0050C2
120	F	109D127X0050F2
270	T	109D277X0050T2
60 WVDC @ 85 C 40 WVDC @ 125 C		
18	C	109D186X0060C2
27	C	109D276X0060C2
68	F	109D686X0060F2
100	F	109D107X0060F2
140	T	109D147X0060T2
220	T	109D227X0060T2
75 WVDC @ 85 C 50 WVDC @ 125 C		
12	C	109D126X0075C2
15	C	109D156X0075C2
22	C	109D226X0075C2
47	F	109D476X0075F2
56	F	109D566X0075F2
82	F	109D826X0075F2
82	T	109D826X0075T2
110	T	109D117X0075T2
180	T	109D187X0075T2

*Capacitance tolerance, ±10%. For +20, −15% tolerance, change "X9" in Cat. No. to "C2". For +75, −15% tolerance, change "X9" to "C7".

†Capacitance tolerance, +20%. For ±10% tolerance change digit after "X" from "0" to "9".

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IND-EEM-19A-EOAF

Sizes subject to change without notice

SPRAGUE CAPACITORS

TYPE 146D SINTERED-ANODE TANTALEX® CAPACITORS

- Miniature commercial/industrial tantalum capacitors with reliable elastomer seal for use on printed wiring boards, in packaged circuit modules, and other applications where space is at a premium.
- TFE-fluorocarbon elastomer high-temperature seal with thermo-setting epoxy resin end-fill provides improved mechanical strength.
- Designed for continuous operation over temperature range of −55 C to +85 C.
- Special construction offers outstanding resistance to temperature cycling and provides trouble-free application when flow-soldering to printed wiring boards.
- Excellent stability of all electrical parameters, even after severe high temperature testing (85 C for 1000 hours at rated voltage).
- Metal-encased, with outer plastic-film insulation.
- For complete technical data, refer to latest issue of Sprague Engineering Bulletin 3751.

		Catalog Number	
µF	Dia. x Length	±20% Cap. Tol.	±10% Cap. Tol.
6 WVDC			
47	.110 x .400	146D476X0006G2	146D476X9006G2
150	.140 x .600	146D157X0006H2	146D157X9006H2
470	.220 x .775	146D477X0006J2	146D477X9006J2
10 WVDC			
33	.110 x .400	146D336X0010G2	146D336X9010G2
100	.140 x .600	146D107X0010H2	146D107X9010H2
120	.140 x .600	146D127X0010H2	146D127X9010H2
330	.220 x .775	146D337X0010J2	146D337X9010J2
15 WVDC			
22	.110 x .400	146D226X0015G2	146D226X9015G2
82	.140 x .600	146D826X0015H2	146D826X9015H2
220	.220 x .775	146D227X0015J2	146D227X9015J2
20 WVDC			
15	.110 x .400	146D156X0020G2	146D156X9020G2
56	.140 x .600	146D566X0020H2	146D566X9020H2
180	.220 x .775	146D187X0020J2	146D187X9020J2
30 WVDC			
10	.110 x .400	146D106X0030G2	146D106X9030G2
47	.140 x .600	146D476X0030H2	146D476X9030H2
30 WVDC - (cont.)			
100	.220 x .775	146D107X0030J2	146D107X9030J2
120	.220 x .775	146D127X0030J2	146D127X9030J2
50 WVDC			
6.8	.110 x .400	146D685X0050G2	146D685X9050G2
27	.140 x .600	146D276X0050H2	146D276X9050H2
82	.220 x .775	146D826X0050J2	146D826X9050J2
60 WVDC			
1.0	.110 x .400	146D105X0060G2	146D105X9060G2
1.2	.110 x .400	146D125X0060G2	146D125X9060G2
1.5	.110 x .400	146D155X0060G2	146D155X9060G2
1.8	.110 x .400	146D185X0060G2	146D185X9060G2
2.2	.110 x .400	146D225X0060G2	146D225X9060G2
2.7	.110 x .400	146D275X0060G2	146D275X9060G2
3.3	.110 x .400	146D335X0060G2	146D335X9060G2
3.9	.110 x .400	146D395X0060G2	146D395X9060G2
4.7	.110 x .400	146D475X0060G2	146D475X9060G2
5.6	.110 x .400	146D565X0060G2	146D565X9060G2
22	.140 x .600	146D226X0060H2	146D226X9060H2
56	.220 x .775	146D566X0060J2	146D566X9060J2

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IND-EEM-53-EFAI

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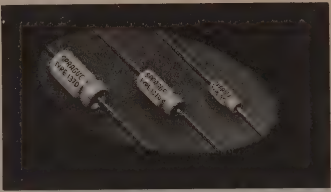
SPRAGUE CAPACITORS

TYPE 137D HERMETICALLY-SEALED GELLED-ELECTROLYTE SINTERED-ANODE TANTALEX® CAPACITORS

- Glass-to-metal Hermetic Seal Makes Type 137D Capacitors Especially Well Suited For Use in Satellites and Other Space Equipment.
- Gelled-electrolyte For Optimum Performance Characteristics
- High Volumetric Efficiency Results in Space Savings
- Operating Temperature Range of —55C to +175C
- Available in Voltage Ratings From 6 WVDC Through 150 WVDC At 85C With Appropriate Derating For Higher Temperature Operation
- Capacitors Listed Below Have Outer Plastic Insulating Sleeve. For Units with Bare Case, End Catalog Number in 0 Instead of 2
- For Complete Technical Data, See Latest Issue of Sprague Engineering Bulletin Number 3703

Call Your Sprague Industrial Distributor For Current Quantity Prices



µF	Case Size	Catalog Number*
	6 WVDC	
68	C	137D686X0006C2
140	C	137D147X0006C2
270	F	137D277X0006F2
560	F	137D567X0006F2
560	A	137D567X0006A2
560	T	137D567X0006T2
1000	T	137D108X0006T2
1200	W	137D128X0006W2
	8 WVDC	
56	C	137D566X0008C2
120	C	137D127X0008C2
220	F	137D227X0008F2
470	F	137D477X0008F2
470	A	137D477X0008A2
470	T	137D477X0008T2
850	T	137D857X0008T2
1000	W	137D108X0008W2
	10 WVDC	
39	C	137D396X0010C2
47	C	137D476X0010C2
82	C	137D826X0010C2
100	C	137D107X0010C2
150	F	137D157X0010F2
180	F	137D187X0010F2
330	F	137D337X0010F2
330	A	137D337X0010A2
330	T	137D337X0010T2
390	F	137D397X0010F2
390	A	137D397X0010A2
390	T	137D397X0010T2
600	T	137D607X0010T2
680	W	137D687X0010W2
750	T	137D757X0010T2
820	W	137D827X0010W2
	15 WVDC	
33	C	137D336X0015C2
68	C	137D686X0015C2
120	F	137D127X0015F2
270	F	137D277X0015F2
270	A	137D277X0015A2
270	T	137D277X0015T2
540	T	137D547X0015T2
560	W	137D567X0015W2
	20 WVDC	
27	C	137D276X0020C2
56	C	137D566X0020C2
100	F	137D107X0020F2
220	F	137D227X0020F2
220	A	137D227X0020A2
220	T	137D227X0020T2
390	T	137D397X0020T2
470	W	137D477X0020W2
	25 WVDC	
22	C	137D226X0025C2
47	C	137D476X0025C2
100	F	137D107X0025F2
180	F	137D187X0025F2
180	A	137D187X0025A2
180	T	137D187X0025T2
350	T	137D357X0025T2
390	W	137D397X0025W2
	30 WVDC	
18	C	137D186X0030C2
39	C	137D396X0030C2
82	F	137D826X0030F2
150	F	137D157X0030F2
150	A	137D157X0030A2
150	T	137D157X0030T2
300	T	137D307X0030T2
330	W	137D337X0030W2
	35 WVDC	
12	C	137D126X0035C2
15	C	137D156X0035C2
27	C	137D276X0035C2
33	C	137D336X0035C2
56	F	137D566X0035F2
68	F	137D686X0035F2
100	F	137D107X0035F2
100	A	137D107X0035A2
100	T	137D107X0035T2
120	F	137D127X0035F2
120	A	137D127X0035A2
120	T	137D127X0035T2
180	T	137D187X0035T2
220	T	137D227X0035T2
220	W	137D227X0035W2
270	W	137D277X0035W2
	50 WVDC	
10	C	137D106X0050C2
22	C	137D226X0050C2
47	F	137D476X0050F2
82	F	137D826X0050F2
82	A	137D826X0050A2
82	T	137D826X0050T2
160	T	137D167X0050T2
180	W	137D187X0050W2
	60 WVDC	
8.2	C	137D825X0060C2
18	C	137D186X0060C2
39	F	137D396X0060F2
68	F	137D686X0060F2
68	A	137D686X0060A2
68	T	137D686X0060T2
140	T	137D147X0060T2
150	W	137D157X0060W2
	75 WVDC	
5.6	C	137D565X0075C2
6.8	C	137D685X0075C2
12	C	137D126X0075C2
15	C	137D156X0075C2
27	F	137D276X0075F2
33	F	137D336X0075F2
47	F	137D476X0075F2
47	A	137D476X0075A2
47	T	137D476X0075T2
56	F	137D566X0075F2
56	A	137D566X0075A2
56	T	137D566X0075T2
82	T	137D826X0075T2
100	W	137D107X0075W2
110	T	137D117X0075T2
120	W	137D127X0075W2
	100 WVDC	
3.9	C	137D395X0100C2
4.7	C	137D475X0100C2
15	F	137D156X0100F2
18	F	137D186X0100F2
22	F	137D226X0100F2
33	A	137D336X0100A2
33	T	137D336X0100T2
43	A	137D436X0100A2
43	T	137D436X0100T2
68	W	137D686X0100W2
86	W	137D866X0100W2
	125 WVDC	
3.6	C	137D365X0125C2
9.0	F	137D905X0125F2
14	F	137D146X0125F2
18	T	137D186X0125T2
25	T	137D256X0125T2
28	A	137D286X0125A2
56	W	137D566X0125W2
	150 WVDC	
1.7	C	137D175X0150C2
3.0	C	137D305X0150C2
6.8	F	137D685X0150F2
11	F	137D116X0150F2
14	T	137D146X0150T2
22	T	137D226X0150T2
22	A	137D226X0150A2
47	W	137D476X0150W2

DIMENSIONS

Case Code	Diam. x Length
C	0.219 x 0.515
F	0.312 x 0.704
A	0.312 x 1.095
T	0.406 x 0.828
W	0.406 x 1.312

*Catalog numbers listed above are for ±20% tolerance capacitors. For units with capacitance tolerance of +20%, —15%, change X0 in middle of catalog number to C2; for +75, —15%, change digits to C7; for ±10%, change digits to X9.

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IND-EEM-6A-PRAR

Sizes subject to change without notice.

SPRAGUE CAPACITORS

TYPE 138D HERMETICALLY-SEALED GELLED-ELECTROLYTE SINTERED-ANODE TANTALEX® CAPACITORS

- Improved reliability through use of a glass-to-tantalum true hermetic anode seal.
- New construction eliminates all internal lead welds while retaining the strength of conventional internal lead-welded parts.
- Capacitor construction also offers outstanding resistance to extensive temperature cycling.
- Designed to meet or exceed environmental and life test requirements of MIL-C-39006.
- Gelled-electrolyte gives premium performance for all capacitor parameters with respect to frequency and temperature variations.
- Capacitance values ranging from up to 1200 µF at 6 WVDC to 47 µF at 150 WVDC.
- Standard capacitance tolerances, ±20% and ±10%. See (†).
- Rated for 85 C operation, and can be operated up to 125 C with appropriate voltage derating.
- For complete technical data, refer to latest issue of Sprague Engineering Bulletin 3704.

µF	D. x L.	Catalog Number*†
	6 WVDC	
30	.219 x .515	138D306X0006C2
68	.219 x .515	138D686X0006C2
140	.312 x .704	138D147X0006F2
270	.312 x .704	138D277X0006F2
330	.406 x .828	138D337X0006T2
560	.406 x .828	138D567X0006T2
1200	.406 x 1.126	138D128X0006K2
	8 WVDC	
25	.219 x .515	138D256X0008C2
56	.219 x .515	138D566X0008C2
220	.312 x .704	138D227X0008F2
430	.406 x .828	138D437X0008T2
850	.406 x 1.126	138D857X0008K2
	10 WVDC	
20	.219 x .515	138D206X0010C2
47	.219 x .515	138D476X0010C2
100	.312 x .704	138D107X0010F2
180	.312 x .704	138D187X0010F2
250	.406 x .828	138D257X0010T2
390	.406 x .828	138D397X0010T2
750	.406 x 1.126	138D757X0010K2
	15 WVDC	
15	.291 x .515	138D156X0015C2
33	.219 x .515	138D336X0015C2
70	.312 x .704	138D706X0015F2
120	.312 x .704	138D127X0015F2
170	.406 x .828	138D177X0015T2
270	.406 x .828	138D277X0015T2
540	.406 x 1.126	138D547X0015K2
	25 WVDC	
10	.219 x .515	138D106X0025C2
22	.219 x .515	138D226X0025C2
100	.312 x .704	138D107X0025F2
180	.406 x .828	138D187X0025T2
350	.406 x 1.126	138D357X0025K2
	30 WVDC	
8.0	.219 x .515	138D805X0030C2
15	.219 x .515	138D156X0030C2
40	.312 x .704	138D406X0030F2
68	.312 x .704	138D686X0030F2
100	.406 x .828	138D107X0030T2
150	.406 x .828	138D157X0030T2
300	.406 x 1.126	138D307X0030K2

µF	D. x L.	Catalog Number*†
	50 WVDC	
5.0	.219 x .515	138D505X0050C2
10	.219 x .515	138D106X0050C2
25	.312 x .704	138D256X0050F2
47	.312 x .704	138D476X0050F2
60	.406 x .828	138D606X0050T2
82	.406 x .828	138D826X0050T2
160	.406 x 1.126	138D167X0050K2
	60 WVDC	
4.0	.219 x .515	138D405X0060C2
8.2	.219 x .515	138D825X0060C2
20	.312 x .704	138D206X0060F2
39	.312 x .704	138D396X0060F2
50	.406 x .828	138D506X0060T2
68	.406 x .828	138D686X0060T2
140	.406 x 1.126	138D147X0060K2
	75 WVDC	
3.5	.219 x .515	138D355X0075C2
6.8	.219 x .515	138D685X0075C2
15	.312 x .704	138D156X0075F2
33	.312 x .704	138D336X0075F2
40	.406 x .828	138D406X0075T2
56	.406 x .828	138D566X0075T2
110	.406 x 1.126	138D117X0075K2
	100 WVDC	
2.5	.219 x .515	138D255X0100C2
4.7	.219 x .515	138D475X0100C2
11	.312 x .704	138D116X0100F2
22	.312 x .704	138D226X0100F2
30	.406 x .828	138D306X0100T2
43	.406 x .828	138D436X0100T2
86	.406 x 1.126	138D866X0100K2
	125 WVDC	
1.7	.219 x .515	138D175X0125C2
3.6	.219 x .515	138D365X0125C2
9.0	.312 x .704	138D905X0125F2
14	.312 x .704	138D146X0125F2
18	.406 x .828	138D186X0125T2
25	.406 x .828	138D256X0125T2
56	.406 x 1.126	138D566X0125K2
	150 WVDC	
1.7	.219 x .515	138D175X0150C2
3.0	.219 x .515	138D305X0150C2
6.8	.312 x .704	138D685X0150F2
11	.312 x .704	138D116X0150F2
14	.406 x .828	138D146X0150T2
22	.406 x .828	138D226X0150T2
47	.406 x 1.126	138D476X0150K2

*Catalog numbers listed above are for units with outer plastic-film insulating sleeve. For bare case units, change last digit of Cat. No. from "2" to "0" and subtract .032" from diameter and .063" from length. †Capacitors listed above have capacitance tolerance of ±20%. For ±10% units, change "X0" in center of cat. no. to "X9".

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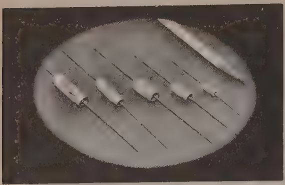
EEM-IND-70-EFAI

Sizes subject to change without notice.

SPRAGUE CAPACITORS

MIL-C-3965 HERMETICALLY-SEALED GELLED-ELECTROLYTE SINTERED-ANODE TANTALEX® CAPACITORS—TYPE CL66 & CL67



- Glass-to-Metal Hermetic Seal Makes These Capacitors Especially Well-Suited For Use In Satellites and Other Applications Requiring The Benefits of true Hermetic Sealing
- May Be Operated At Temperatures Up To 175C
- Extremely low leakage Current
- Military Version Of Well-Known Sprague Type 137D
- Capacitors Listed Here Have Capacitance Tolerance Of ±10%. For ±5% Capacitors, Change 10th Character In MIL Type No. From K To J. For ±20% Capacitance Tolerance, Change K To M

Call Your Sprague Industrial Distributor For Current Quantity Prices

μF	Diam. x Length*	MIL Type Number Bare Case	MIL Type Number w/Insulating Sleeve
		6 WVDC	
30	.188 x .453	CL66BB300KPG	CL67BB300KPG
68	.188 x .453	CL66BB680KPG	CL67BB680KPG
140	.281 x .641	CL66BB141KPG	CL67BB141KPG
270	.281 x .641	CL66BB271KPG	CL67BB271KPG
330	.375 x .766	CL66BB331KPG	CL67BB331KPG
560	.375 x .766	CL66BB561KPG	CL67BB561KPG
		8 WVDC	
25	.188 x .453	CL66BC250KPG	CL67BC250KPG
56	.188 x .453	CL66BC560KPG	CL67BC560KPG
220	.281 x .641	CL66BC221KPG	CL67BC221KPG
430	.375 x .766	CL66BC431KPG	CL67BC431KPG
		10 WVDC	
20	.188 x .453	CL66BD200KPG	CL67BD200KPG
47	.188 x .453	CL66BD470KPG	CL67BD470KPG
100	.281 x .641	CL66BD101KPG	CL67BD101KPG
180	.281 x .641	CL66BD181KPG	CL67BD181KPG
250	.375 x .766	CL66BD251KPG	CL67BD251KPG
390	.375 x .766	CL66BD391KPG	CL67BD391KPG
		15 WVDC	
15	.188 x .453	CL66BE150KPG	CL67BE150KPG
33	.188 x .453	CL66BE330KPG	CL67BE330KPG
70	.281 x .641	CL66BE700KPG	CL67BE700KPG
120	.281 x .641	CL66BE121KPG	CL67BE121KPG
170	.375 x .766	CL66BE171KPG	CL67BE171KPG
270	.375 x .766	CL66BE271KPG	CL67BE271KPG
		25 WVDC	
10	.188 x .453	CL66BG100KPG	CL67BG100KPG
22	.188 x .453	CL66BG220KPG	CL67BG220KPG
100	.281 x .641	CL66BG101KPG	CL67BG101KPG
180	.375 x .766	CL66BG181KPG	CL67BG181KPG
		30 WVDC	
8	.188 x .453	CL66BH080KPG	CL67BH080KPG
15	.188 x .453	CL66BH150KPG	CL67BH150KPG
40	.281 x .641	CL66BH400KPG	CL67BH400KPG
68	.281 x .641	CL66BH680KPG	CL67BH680KPG
100	.375 x .766	CL66BH101KPG	CL67BH101KPG
150	.375 x .766	CL66BH151KPG	CL67BH151KPG

μF	Diam. x Length*	MIL Type Number Bare Case	MIL Type Number w/Insulating Sleeve
		50 WVDC	
5	.188 x .453	CL66BJ050KPG	CL67BJ050KPG
10	.188 x .453	CL66BJ100KPG	CL67BJ100KPG
25	.281 x .641	CL66BJ250KPG	CL67BJ250KPG
47	.281 x .641	CL66BJ470KPG	CL67BJ470KPG
60	.375 x .766	CL66BJ600KPG	CL67BJ600KPG
82	.375 x .766	CL66BJ820KPG	CL67BJ820KPG
		60 WVDC	
4	.188 x .453	CL66BK040KPG	CL67BK040KPG
8.2	.188 x .453	CL66BK8R2KPG	CL67BK8R2KPG
20	.281 x .641	CL66BK200KPG	CL67BK200KPG
39	.281 x .641	CL66BK390KPG	CL67BK390KPG
50	.375 x .766	CL66BK500KPG	CL67BK500KPG
68	.375 x .766	CL66BK680KPG	CL67BK680KPG
		75 WVDC	
3.5	.188 x .453	CL66BL3R5KPG	CL67BL3R5KPG
6.8	.188 x .453	CL66BL6R8KPG	CL67BL6R8KPG
15	.281 x .641	CL66BL150KPG	CL67BL150KPG
33	.281 x .641	CL66BL330KPG	CL67BL330KPG
40	.375 x .766	CL66BL400KPG	CL67BL400KPG
56	.375 x .766	CL66BL560KPG	CL67BL560KPG
		100 WVDC	
2.5	.188 x .453	CL66BN2R5KPG	CL67BN2R5KPG
4.7	.188 x .453	CL66BN4R7KPG	CL67BN4R7KPG
11	.281 x .641	CL66BN110KPG	CL67BN110KPG
22	.281 x .641	CL66BN220KPG	CL67BN220KPG
30	.375 x .766	CL66BN300KPG	CL67BN300KPG
43	.375 x .766	CL66BN430KPG	CL67BN430KPG
		125 WVDC	
1.7	.188 x .453	CL66BP1R7KPG	CL67BP1R7KPG
3.6	.188 x .453	CL66BP3R6KPG	CL67BP3R6KPG
9	.281 x .641	CL66BP090KPG	CL67BP090KPG
14	.281 x .641	CL66BP140KPG	CL67BP140KPG
25	.375 x .766	CL66BP250KPG	CL67BP250KPG

*Dimensions shown are for CL66 capacitors. For CL67 units, add .031" to diameter and .063" to length.

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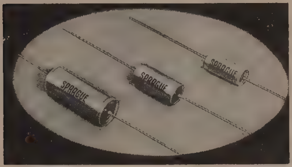
IND-EEM-16-PRAR

Sizes subject to change without notice.

SPRAGUE CAPACITORS

ESTABLISHED RELIABILITY MIL-C-39006
STYLE CLR65 SINTERED-ANODE TANTALUM CAPACITORS



- Handled by Sprague and Sprague industrial distributors in full compliance with MIL-STD-790. Manufactured, marked, packed, shipped, received, inspected, stored in separate area, free from contamination or mix-up with other components.
- Rated for operation to 85 C (to 125 C with voltage derating.)

SIZE CODE

A	.188″ D. x .453″ L.
B	.281″ D. x .641″ L.
C	.375″ D. x .766″ L.
D	.375″ D. x 1.062″ L.
E	.375″ D. x 1.250″ L.

MIL Part No. M39006/09-

ELASTOMER-SEALED CAPACITORS TO MIL-C-39006/9B

µF	WVDC	Size Code	Failure Rate L (2%) Cap. Tol. ±20%	Failure Rate L (2%) Cap. Tol. ±10%	Failure Rate M (1%) Cap. Tol. ±20%	Failure Rate M (1%) Cap. Tol. ±10%	Failure Rate P (0.1%) Cap. Tol. ±20%	Failure Rate P (0.1%) Cap. Tol. ±10%	Failure Rate R (0.01%) Cap. Tol. ±20%	Failure Rate R (0.01%) Cap. Tol. ±10%
30	6	A	1621	1622	1826	1827	2652	2653	2857	2858
68	6	A	1624	1625	1829	1830	2655	2656	2860	2861
140	6	B	1627	1628	1832	1833	2658	2659	2863	2864
270	6	B	1630	1631	1835	1836	2661	2662	2866	2867
330	6	C	1633	1634	1838	1839	2664	2665	2869	2870
560	6	C	1636	1637	1841	1842	2667	2668	2872	2873
1200	6	D	1639	1640	1844	1845	2670	2671	2875	2876
25	8	A	1641	1642	1846	1847	2672	2673	2877	2878
56	8	A	1644	1645	1849	1850	2675	2676	2880	2881
220	8	B	1647	1648	1852	1853	2678	2679	2883	2884
430	8	C	1650	1651	1855	1856	2681	2682	2886	2887
850	8	D	1653	1654	1858	1859	2684	2685	2889	2890
20	10	A	1655	1656	1860	1861	2686	2687	2891	2892
47	10	A	1658	1659	1863	1864	2689	2690	2894	2895
100	10	B	1661	1662	1866	1867	2692	2693	2897	2898
180	10	B	1664	1665	1869	1870	2695	2696	2900	2901
250	10	C	1667	1668	1872	1873	2698	2699	2903	2904
390	10	C	1670	1671	1875	1876	2701	2702	2906	2907
750	10	D	1673	1674	1878	1879	2704	2705	2909	2910
15	15	A	1675	1676	1880	1881	2706	2707	2911	2912
33	15	A	1678	1679	1883	1884	2709	2710	2914	2915
70	15	B	1681	1682	1886	1887	2712	2713	2917	2918
120	15	B	1684	1685	1889	1890	2715	2716	2920	2921
170	15	C	1687	1688	1892	1893	2718	2719	2923	2924
270	15	C	1690	1691	1895	1896	2721	2722	2926	2927
540	15	D	1693	1694	1898	1899	2724	2725	2929	2930
10	25	A	1695	1696	1900	1901	2726	2727	2931	2932
22	25	A	1698	1699	1903	1904	2729	2730	2934	2935
100	25	B	1701	1702	1906	1907	2732	2733	2937	2938
180	25	C	1704	1705	1909	1910	2735	2736	2940	2941
350	25	D	1707	1708	1912	1913	2738	2739	2943	2944
8	30	A	1709	1710	1914	1915	2740	2741	2945	2946
15	30	A	1712	1713	1917	1918	2743	2744	2948	2949
40	30	B	1715	1716	1920	1921	2746	2747	2951	2952
68	30	B	1718	1719	1923	1924	2749	2750	2954	2955
100	30	C	1721	1722	1926	1927	2752	2753	2957	2958

µF	WVDC	Size Code	Failure Rate L (2%) Cap. Tol. ±20%	Failure Rate L (2%) Cap. Tol. ±10%	Failure Rate M (1%) Cap. Tol. ±20%	Failure Rate M (1%) Cap. Tol. ±10%	Failure Rate P (0.1%) Cap. Tol. ±20%	Failure Rate P (0.1%) Cap. Tol. ±10%	Failure Rate R (0.01%) Cap. Tol. ±20%	Failure Rate R (0.01%) Cap. Tol. ±10%
150	30	C	1724	1725	1929	1930	2755	2756	2960	2961
300	30	D	1727	1728	1932	1933	2758	2759	2963	2964
5	50	A	1729	1730	1934	1935	2760	2761	2965	2966
10	50	A	1732	1733	1937	1938	2763	2764	2968	2969
25	50	B	1735	1736	1940	1941	2766	2767	2971	2972
47	50	B	1738	1739	1943	1944	2769	2770	2974	2975
60	50	C	1741	1742	1946	1947	2772	2773	2977	2978
82	50	C	1744	1745	1949	1950	2775	2776	2980	2981
160	50	D	1747	1748	1952	1953	2778	2779	2983	2984
4	60	A	1749	1750	1954	1955	2780	2781	2985	2986
8.2	60	A	1752	1753	1957	1958	2783	2784	2988	2989
20	60	B	1755	1756	1960	1961	2786	2787	2991	2992
39	60	B	1758	1759	1963	1964	2789	2790	2994	2995
50	60	C	1761	1762	1966	1967	2792	2793	2997	2998
68	60	C	1764	1765	1969	1970	2795	2796	3000	3001
140	60	D	1767	1768	1972	1973	2798	2799	3003	3004
3.5	75	A	1769	1770	1974	1975	2800	2801	3005	3006
6.8	75	A	1772	1773	1977	1978	2803	2804	3008	3009
15	75	B	1775	1776	1980	1981	2806	2807	3011	3012
33	75	B	1778	1779	1983	1984	2809	2810	3014	3015
40	75	C	1781	1782	1986	1987	2812	2813	3017	3018
56	75	C	1784	1785	1989	1990	2815	2816	3020	3021
110	75	D	1787	1788	1992	1993	2818	2819	3023	3024
2.5	100	A	1789	1790	1994	1995	2820	2821	3025	3026
4.7	100	A	1792	1793	1997	1998	2823	2824	3028	3029
11	100	B	1795	1796	2621	2622	2826	2827	3031	3032
22	100	B	1798	1799	2624	2625	2829	2830	3034	3035
30	100	C	1801	1802	2627	2628	2832	2833	3037	3038
43	100	C	1804	1805	2630	2631	2835	2836	3040	3041
86	100	D	1807	1808	2633	2634	2838	2839	3043	3044
1.7	125	A	1809	1810	2635	2636	2840	2841	3045	3046
3.6	125	A	1812	1813	2638	2639	2843	2844	3048	3049
9	125	B	1815	1816	2641	2642	2846	2847	3051	3052
14	125	B	1818	1819	2644	2645	2849	2850	3054	3055
18	125	C	3267	3268	3270	3271	3273	3274	3276	3277
25	125	C	1821	1822	2647	2648	2852	2853	3057	3058
56	125	D	1824	1825	2650	2651	2855	2856	3060	3061

HERMETICALLY-SEALED CAPACITORS TO MIL-C-39006/9B

µF	WVDC	Size Code	Failure Rate L (2%) Cap. Tol. ±20%	Failure Rate L (2%) Cap. Tol. ±10%	Failure Rate M (1%) Cap. Tol. ±20%	Failure Rate M (1%) Cap. Tol. ±10%	Failure Rate P (0.1%) Cap. Tol. ±20%	Failure Rate P (0.1%) Cap. Tol. ±10%	Failure Rate R (0.01%) Cap. Tol. ±20%	Failure Rate R (0.01%) Cap. Tol. ±10%
30	6	A	4001	4002	4206	4207	4411	4412	4616	4617
68	6	A	4004	4005	4209	4210	4414	4415	4619	4620
140	6	B	4007	4008	4212	4213	4417	4418	4622	4623
270	6	B	4010	4011	4215	4216	4420	4421	4625	4626
330	6	C	4013	4014	4218	4219	4423	4424	4628	4629
560	6	C	4016	4017	4221	4222	4426	4427	4631	4632
1200	6	E	4019	4020	4224	4225	4429	4430	4634	4635
25	8	A	4021	4022	4226	4227	4431	4432	4636	4637
56	8	A	4024	4025	4229	4230	4434	4435	4639	4640
220	8	B	4027	4028	4232	4233	4437	4438	4642	4643
430	8	C	4030	4031	4235	4236	4440	4441	4645	4646
850	8	E	4033	4034	4238	4239	4443	4444	4648	4649

µF	WVDC	Size Code	Failure Rate L (2%) Cap. Tol. ±20%	Failure Rate L (2%) Cap. Tol. ±10%	Failure Rate M (1%) Cap. Tol. ±20%	Failure Rate M (1%) Cap. Tol. ±10%	Failure Rate P (0.1%) Cap. Tol. ±20%	Failure Rate P (0.1%) Cap. Tol. ±10%	Failure Rate R (0.01%) Cap. Tol. ±20%	Failure Rate R (0.01%) Cap. Tol. ±10%
20	10	A	4035	4036	4240	4241	4445	4446	4650	4651
47	10	A	4038	4039	4243	4244	4448	4449	4653	4654
100	10	B	4041	4042	4246	4247	4451	4452	4656	4657
180	10	B	4044	4045	4249	4250	4454	4455	4659	4660
250	10	C	4047	4048	4252	4253	4457	4458	4662	4663
390	10	C	4050	4051	4255	4256	4460	4461	4665	4666
750	10	E	4053	4054	4258	4259	4463	4464	4668	4669
15	15	A	4055	4056	4260	4261	4465	4466	4670	4671
33	15	A	4058	4059	4263	4264	4468	4469	4673	4674
70	15	B	4061	4062	4266	4267	4471	4472	4676	4677
120	15	B	4064	4065	4269	4270	4474	4475	4679	4680
170	15	C	4067	4068	4272	4273	4477	4478	4682	4683

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IND-EEM-75-EPOA

All sizes subject to change without notice

SPRAGUE CAPACITORS

STYLE CLR65 TANTALUM CAPACITORS, continued

MIL Part No. M39006/09-

µF	WVDC	Size Code	Failure Rate L (2%) Cap. Tol. ±20%	Failure Rate L (2%) Cap. Tol. ±10%	Failure Rate M (1%) Cap. Tol. ±20%	Failure Rate M (1%) Cap. Tol. ±10%	Failure Rate P (0.1%) Cap. Tol. ±20%	Failure Rate P (0.1%) Cap. Tol. ±10%	Failure Rate R (0.01%) Cap. Tol. ±20%	Failure Rate R (0.01%) Cap. Tol. ±10%
270	15	C	4070	4071	4275	4276	4480	4481	4685	4686
540	15	E	4073	4074	4278	4279	4483	4484	4688	4689
10	25	A	4075	4076	4280	4281	4485	4486	4690	4691
22	25	A	4078	4079	4283	4284	4488	4489	4693	4694
100	25	B	4081	4082	4286	4287	4491	4492	4696	4697
180	25	C	4084	4085	4289	4290	4494	4495	4699	4700
350	25	E	4087	4088	4292	4293	4497	4498	4702	4703
8	30	A	4089	4090	4294	4295	4499	4500	4704	4705
15	30	A	4092	4093	4297	4298	4502	4503	4707	4708
40	30	B	4095	4096	4300	4301	4505	4506	4710	4711
68	30	B	4098	4099	4303	4304	4508	4509	4713	4714
100	30	C	4101	4102	4306	4307	4511	4512	4716	4717
150	30	C	4104	4105	4309	4310	4514	4515	4719	4720
300	30	E	4107	4108	4312	4313	4517	4518	4722	4723
5	50	A	4109	4110	4314	4315	4519	4520	4724	4725
10	50	A	4112	4113	4317	4318	4522	4523	4727	4728
25	50	B	4115	4116	4320	4321	4525	4526	4730	4731
47	50	B	4118	4119	4323	4324	4528	4529	4733	4734
60	50	C	4121	4122	4326	4327	4531	4532	4736	4737
82	50	C	4124	4125	4329	4330	4534	4535	4739	4740
160	50	E	4127	4128	4332	4333	4537	4538	4742	4743
4	60	A	4129	4130	4334	4335	4539	4540	4744	4745
8.2	60	A	4132	4133	4337	4338	4542	4543	4747	4748
20	60	B	4135	4136	4340	4341	4545	4546	4750	4751
39	60	B	4138	4139	4343	4344	4548	4549	4753	4754
50	60	C	4141	4142	4346	4347	4551	4552	4756	4757
68	60	C	4144	4145	4349	4350	4554	4555	4759	4760
140	60	E	4147	4148	4352	4353	4557	4558	4762	4763
3.5	75	A	4149	4150	4354	4355	4559	4560	4764	4765
6.8	75	A	4152	4153	4357	4358	4562	4563	4767	4768
15	75	B	4155	4156	4360	4361	4565	4566	4770	4771
33	75	B	4158	4159	4363	4364	4568	4569	4773	4774
40	75	C	4161	4162	4366	4367	4571	4572	4776	4777
56	75	C	4164	4165	4369	4370	4574	4575	4779	4780
110	75	E	4167	4168	4372	4373	4577	4578	4782	4783
2.5	100	A	4169	4170	4374	4375	4579	4580	4784	4785
4.7	100	A	4172	4173	4377	4378	4582	4583	4787	4788
11	100	B	4175	4176	4380	4381	4585	4586	4790	4791
22	100	B	4178	4179	4383	4384	4588	4589	4793	4794
30	100	C	4181	4182	4386	4387	4591	4592	4796	4797
43	100	C	4184	4185	4389	4390	4594	4595	4799	4800
86	100	E	4187	4188	4392	4393	4597	4598	4802	4803
1.7	125	A	4189	4190	4394	4395	4599	4600	4804	4805
3.6	125	A	4192	4193	4397	4398	4602	4603	4807	4808
9	125	B	4195	4196	4400	4401	4605	4606	4810	4811
14	125	B	4198	4199	4403	4404	4608	4609	4813	4814
18	125	C	5026	5027	5029	5030	5032	5033	5035	5036
25	125	C	4201	4202	4406	4407	4611	4612	4816	4817
56	125	E	4204	4205	4409	4410	4614	4615	4819	4820

HERMETICALLY-SEALED CAPACITORS TO MIL-C-39006/9C

MIL Part No. M39006/09-

µF	WVDC	Size Code	Failure Rate L (2%) Cap. Tol. ±20%	Failure Rate L (2%) Cap. Tol. ±10%	Failure Rate M (1%) Cap. Tol. ±20%	Failure Rate M (1%) Cap. Tol. ±10%	Failure Rate P (0.1%) Cap. Tol. ±20%	Failure Rate P (0.1%) Cap. Tol. ±10%
30	6	A	6001	6002	6206	6207	6411	6412
68	6	A	6004	6005	6209	6210	6414	6415
140	6	B	6007	6008	6212	6213	6417	6418
270	6	B	6010	6011	6215	6216	6420	6421
330	6	C	6013	6014	6218	6219	6423	6424
560	6	C	6016	6017	6221	6222	6426	6427
1200	6	E	6019	6020	6224	6225	6429	6430
25	8	A	6021	6022	6226	6227	6431	6432
56	8	A	6024	6025	6229	6230	6434	6435
220	8	B	6027	6028	6232	6233	6437	6438
430	8	C	6030	6031	6235	6236	6440	6441
850	8	E	6033	6034	6238	6239	6443	6444
20	10	A	6035	6036	6240	6241	6445	6446
47	10	A	6038	6039	6243	6244	6448	6449
100	10	B	6041	6042	6246	6247	6451	6452
180	10	B	6044	6045	6249	6250	6454	6455
250	10	C	6047	6048	6252	6253	6457	6458
390	10	C	6050	6051	6255	6256	6460	6461
750	10	E	6053	6054	6258	6259	6463	6464
15	15	A	6055	6056	6260	6261	6465	6466
33	15	A	6058	6059	6263	6264	6468	6469
70	15	B	6061	6062	6266	6267	6471	6472
120	15	B	6064	6065	6269	6270	6474	6475
170	15	C	6067	6068	6272	6273	6477	6478
270	15	C	6070	6071	6275	6276	6480	6481
540	15	E	6073	6074	6278	6279	6483	6484
10	25	A	6075	6076	6280	6281	6485	6486
22	25	A	6078	6079	6283	6284	6488	6489
100	25	B	6081	6082	6286	6287	6491	6492
180	25	C	6084	6085	6289	6290	6494	6495
350	25	E	6087	6088	6292	6293	6497	6498
8	30	A	6089	6090	6294	6295	6499	6500
15	30	A	6092	6093	6297	6298	6502	6503
40	30	B	6095	6096	6300	6301	6505	6506
68	30	B	6098	6099	6303	6304	6508	6509
100	30	C	6101	6102	6306	6307	6511	6512
150	30	C	6104	6105	6309	6310	6514	6515
300	30	E	6107	6108	6312	6313	6517	6518
5	50	A	6109	6110	6314	6315	6519	6520
10	50	A	6112	6113	6317	6318	6522	6523
25	50	B	6115	6116	6320	6321	6525	6526
47	50	B	6118	6119	6323	6324	6528	6529
60	50	C	6121	6122	6326	6327	6531	6532
82	50	C	6124	6125	6329	6330	6534	6535
160	50	E	6127	6128	6332	6333	6537	6538
4	60	A	6129	6130	6334	6335	6539	6540
8.2	60	A	6132	6133	6337	6338	6542	6543
20	60	B	6135	6136	6340	6341	6545	6546
39	60	B	6138	6139	6343	6344	6548	6549
50	60	C	6141	6142	6346	6347	6551	6552
68	60	C	6144	6145	6349	6350	6554	6555
140	60	E	6147	6148	6352	6353	6557	6558
3.5	75	A	6149	6150	6354	6355	6559	6560
6.8	75	A	6152	6153	6357	6358	6562	6563
15	75	B	6155	6156	6360	6361	6565	6566
33	75	B	6158	6159	6363	6364	6568	6569
40	75	C	6161	6162	6366	6367	6571	6572
56	75	C	6164	6165	6369	6370	6574	6575
110	75	E	6167	6168	6372	6373	6577	6578
2.5	100	A	6169	6170	6374	6375	6579	6580
4.7	100	A	6172	6173	6377	6378	6582	6583
11	100	B	6175	6176	6380	6381	6585	6586
22	100	B	6178	6179	6383	6384	6588	6589
30	100	C	6181	6182	6386	6387	6591	6592
43	100	C	6184	6185	6389	6390	6594	6595
86	100	E	6187	6188	6392	6393	6597	6598
1.7	125	A	6189	6190	6394	6395	6599	6600
3.6	125	A	6192	6193	6397	6398	6602	6603
9	125	B	6195	6196	6400	6401	6605	6606
14	125	B	6198	6199	6403	6404	6608	6609
18	125	C	6201	6202	6406	6407	6611	6612
25	125	C	6204	6205	6409	6410	6614	6615
56	125	E	7027	7028	7030	7031	7033	7034

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SPRAGUE CAPACITORS

TYPE 500D MINIATURE METAL-CASE ALUMINUM 'LYTICS

- Industrial quality at moderate prices.
- Excellent low Temperature operation
- All-welded construction — no pressure joints to cause open or intermittent circuits.
- Withstand high surge voltages
- Long shelf life, extremely low leakage current
- Will withstand 1000 hr. life test at rated voltage and 85 C.
- High capacitance in ultra-small physical size
- Furnished with plastic outer insulating sleeves
- For complete technical data, see latest issue of Sprague Engineering Bulletin 3149.

µF	D. x L.	Cat. No.
3 WVDC		
1	.260 x .536	500D105G003BA7
2	.260 x .536	500D205G003BA7
3	.260 x .536	500D305G003BA7
4	.260 x .536	500D405G003BA7
5	.260 x .536	500D505G003BA7
6	.260 x .536	500D605G003BA7
8	.260 x .536	500D805G003BA7
10	.260 x .536	500D106G003BA7
15	.260 x .536	500D156G003BA7
20	.260 x .536	500D206G003BA7
25	.260 x .536	500D256G003BA7
30	.260 x .536	500D306G003BA7
50	.260 x .723	500D506G003BB7
65	.260 x .723	500D656G003BB7
75	.322 x .723	500D756G003CB7
100	.322 x .723	500D107G003CB7
130	.322 x .723	500D137G003CB7
150	.322 x .848	500D157G003CC7
200	.322 x .848	500D207G003CC7
250	.385 x .848	500D257G003DC7
300	.385 x .848	500D307G003DC7
400	.385 x .973	500D407G003DD7
500	.385 x 1.286	500D507G003DF7
600	.385 x 1.286	500D607G003DF7
800	.385 x 1.536	500D807G003DH7
900	.448 x 1.286	500D907G003EF7
1000	.448 x 1.536	500D108G003EH7
1200	.448 x 1.536	500D128G003EH7
1500	.510 x 1.536	500D158G003FH7
1800	.510 x 1.536	500D188G00DFH7
2000	.510 x 1.536	500D208G003FH7
2200	.510 x 1.786	500D228G003FK7
2500	.510 x 1.786	500D258G003FK7
6 WVDC		
1	.260 x .536	500D105G006BA7
2	.260 x .536	500D205G006BA7
3	.260 x .536	500D305G006BA7
4	.260 x .536	500D405G006BA7
5	.260 x .536	500D505G006BA7
6	.260 x .536	500D605G006BA7
8	.260 x .536	500D805G006BA7
10	.260 x .536	500D106G006BA7
15	.260 x .536	500D156G006BA7
20	.260 x .536	500D206G006BA7
25	.260 x .723	500D256G006BB7
35	.260 x .723	500D356G006BB7
50	.260 x .723	500D506G006BB7
75	.322 x .723	500D756G006CB7
90	.322 x .723	500D906G006CB7
100	.322 x .848	500D107G006CC7
140	.322 x .848	500D147G006CC7
150	.385 x .848	500D157G006DC7
200	.385 x .848	500D207G006DC7
250	.385 x .973	500D257G006DD7
300	.385 x .973	500D307G006DD7
400	.385 x 1.286	500D407G006DF7
500	.385 x 1.536	500D507G006DH7
600	.385 x 1.536	500D607G006DH7
700	.448 x 1.286	500D707G006EF7
800	.448 x 1.536	500D807G006EH7
950	.448 x 1.536	500D957G006EH7
1000	.510 x 1.286	500D108G006FF7
1200	.510 x 1.536	500D128G006FH7
1500	.510 x 1.536	500D158G006FH7
1800	.510 x 1.786	500D188G006FK7
2000	.510 x 1.786	500D208G006FK7
12 WVDC		
1	.260 x .536	500D105G012BA7
2	.260 x .536	500D205G012BA7
3	.260 x .536	500D305G012BA7
4	.260 x .536	500D405G012BA7
5	.260 x .536	500D505G012BA7
6	.260 x .536	500D605G012BA7
8	.260 x .536	500D805G012BA7
10	.260 x .536	500D106G012BA7
15	.260 x .536	500D156G012BA7
20	.260 x .723	500D206G012BB7
25	.260 x .723	500D256G012BB7
30	.260 x .723	500D306G012BB7
50	.322 x .723	500D506G012CB7
60	.322 x .723	500D606G012CB7
75	.322 x .848	500D756G012CC7
90	.385 x .723	500D906G012DB7
100	.322 x .848	500D107G012CC7
140	.385 x .848	500D147G012DC7
150	.385 x .973	500D157G012DD7
190	.385 x .973	500D197G012DD7
200	.385 x 1.286	500D207G012DF7
250	.385 x 1.286	500D257G012DF7
290	.385 x 1.286	500D297G012DF7
390	.385 x 1.536	500D397G012DH7
400	.448 x 1.286	500D407G012EF7
450	.448 x 1.286	500D457G012EF7
500	.448 x 1.536	500D507G012EH7
600	.448 x 1.536	500D607G012EH7
800	.510 x 1.536	500D807G012FH7
1000	.510 x 1.786	500D108G012FK7
1200	.510 x 1.786	500D128G012FK7
16 WVDC		
1	.260 x .536	500D105G016BA7
2	.260 x .536	500D205G016BA7
3	.260 x .536	500D305G016BA7
4	.260 x .536	500D405G016BA7
5	.260 x .536	500D505G016BA7
6	.260 x .536	500D605G016BA7
8	.260 x .536	500D805G016BA7
10	.260 x .536	500D106G016BA7
15	.260 x .723	500D156G016BB7
20	.260 x .723	500D206G016BB7
25	.260 x .723	500D256G016BB7
30	.322 x .723	500D306G016CB7
35	.322 x .723	500D356G016CB7
50	.322 x .723	500D506G016CB7
75	.322 x .848	500D756G016CC7
85	.385 x .723	500D856G016DB7
90	.322 x .848	500D906G016CC7
100	.385 x .848	500D107G016DC7
130	.385 x .848	500D137G016DC7
150	.385 x .973	500D157G016DD7
180	.385 x .973	500D187G016DD7
200	.385 x 1.286	500D207G016DF7
250	.385 x 1.286	500D257G016DF7
300	.385 x 1.536	500D307G016DH7
350	.385 x 1.536	500D357G016DH7
400	.448 x 1.286	500D407G016EF7
450	.448 x 1.536	500D457G016EH7
500	.448 x 1.536	500D507G016EH7
600	.448 x 1.536	500D607G016EH7
800	.510 x 1.536	500D807G016FH7
1000	.510 x 1.786	500D108G016FK7
25 WVDC		
1	.260 x .536	500D105G025BA7
2	.260 x .536	500D205G025BA7
3	.260 x .536	500D305G025BA7
4	.260 x .536	500D405G025BA7
5	.260 x .536	500D505G025BA7
6	.260 x .536	500D605G025BA7
8	.260 x .536	500D805G025BA7
10	.260 x .723	500D106G025BB7
15	.260 x .723	500D156G025BB7
20	.322 x .723	500D206G025CB7
25	.322 x .723	500D256G025CB7
30	.322 x .723	500D306G025CB7
35	.322 x .723	500D356G025CB7
50	.322 x .848	500D506G025CC7
75	.385 x .848	500D756G025DC7
100	.385 x .973	500D107G025DD7
150	.385 x 1.286	500D157G025DF7
200	.385 x 1.536	500D207G025DH7
250	.448 x 1.286	500D257G025EF7
300	.448 x 1.536	500D307G025EH7
350	.448 x 1.536	500D357G025EH7
400	.510 x 1.286	500D407G025FF7
450	.510 x 1.536	500D457G025FH7
500	.510 x 1.536	500D507G025FH7
600	.510 x 1.786	500D607G025FK7
50 WVDC		
1	.260 x .536	500D105G050BA7
2	.260 x .536	500D205G050BA7
3	.260 x .536	500D305G050BA7
4	.260 x .536	500D405G050BA7
5	.260 x .723	500D505G050BB7
6	.260 x .723	500D605G050BB7
8	.260 x .723	500D805G050BB7
10	.322 x .723	500D106G050CB7
15	.322 x .723	500D156G050CB7
20	.322 x .848	500D206G050CC7
25	.322 x .848	500D256G050CC7
35	.385 x .848	500D356G050DC7
50	.385 x .973	500D506G050DD7
75	.385 x 1.286	500D756G050DF7
100	.385 x 1.536	500D107G050DH7
120	.448 x 1.286	500D127G050EF7
150	.448 x 1.536	500D157G050EH7
200	.510 x 1.286	500D207G050FF7
250	.510 x 1.286	500D257G050FF7
300	.510 x 1.536	500D307G050FH7
350	.510 x 1.786	500D357G050FK7
400	.510 x 1.786	500D407G050FK7
100 WVDC		
1	.260 x .536	500D105F100BA7
2	.260 x .723	500D205F100BB7
3	.322 x .723	500D305F100CB7
4	.322 x .723	500D405F100CB7
5	.322 x .848	500D505F100CC7
6	.322 x .848	500D605F100CC7
8	.385 x .848	500D805F100DC7
10	.385 x .848	500D106F100DC7
15	.385 x .848	500D156F100DD7
20	.385 x 1.286	500D206F100DF7
25	.385 x 1.536	500D256F100DH7
30	.385 x 1.536	500D306F100DH7
40	.448 x 1.536	500D406F100EH7
50	.510 x 1.536	500D506F100FH7
60	.510 x 1.536	500D606F100FH7
75	.510 x 1.786	500D756F100FK7
150 WVDC		
1	.260 x .536	500D105F150BA7
2	.260 x .723	500D205F150BB7
3	.322 x .723	500D305F150CB7
4	.322 x .848	500D405F150CC7
5	.322 x .848	500D505F150CC7
6	.385 x .848	500D605F150DC7
7	.385 x .848	500D705F150DC7
8	.385 x .848	500D805F150DC7
10	.385 x .973	500D106F150DD7
15	.385 x 1.286	500D156F150DF7
20	.385 x 1.536	500D206F150DH7
25	.448 x 1.286	500D256F150EF7
30	.448 x 1.536	500D306F150EH7
35	.510 x 1.536	500D356F150FH7
40	.510 x 1.536	500D406F150FH7
50	.510 x 1.786	500D506F150FK7
200 WVDC		
1	.260 x .723	500D105F200BB7
2	.322 x .723	500D205F200CB7
3	.322 x .848	500D305F200CC7

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IND-EEM-14A-EFAF

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SPRAGUE CAPACITORS

TYPE 500D ALUMINUM ELECTROLYTICS, continued

μF	D. x L.	Cat. No.
4	.385 x .848	500D405F200DC7
5	.385 x .848	500D505F200DC7
6	.385 x .973	500D605F200DD7
8	.385 x 1.286	500D805F200DF7
10	.385 x 1.286	500D106F200DF7
15	.448 x 1.286	500D156F200EF7
20	.448 x 1.536	500D206F200EH7
25	.510 x 1.536	500D256F200FH7
30	.510 x 1.786	500D306F200FK7

250 WVDC

μF	D. x L.	Cat. No.
1	.322 x .723	500D105F250CB7
2	.385 x .723	500D205F250DB7
3	.385 x .848	500D305F250DC7
4	.385 x .973	500D405F250DD7
5	.385 x 1.286	500D505F250DF7
6	.385 x 1.286	500D605F250DF7
8	.385 x 1.536	500D805F250DH7
10	.448 x 1.286	500D106F250EF7
12	.448 x 1.536	500D126F250EH7
15	.510 x 1.536	500D156F250FH7
20	.510 x 1.786	500D206F250FK7

300 WVDC

μF	D. x L.	Cat. No.
1	.322 x .723	500D105F300CB7
2	.385 x .848	500D205F300DC7
3	.385 x .973	500D305F300DD7
4	.385 x 1.286	500D405F300DF7
5	.385 x 1.286	500D505F300DF7
6	.385 x 1.536	500D605F300DH7
8	.448 x 1.536	500D805F300EH7
10	.448 x 1.536	500D106F300EH7
12	.510 x 1.536	500D126F300FH7
15	.510 x 1.536	500D156F300FH7

350 WVDC

μF	D. x L.	Cat. No.
1	.322 x .848	500D105F350CC7
2	.385 x .848	500D205F350DC7
3	.385 x .973	500D305F350DD7
4	.385 x 1.286	500D405F350DF7
5	.385 x 1.536	500D505F350DH7
6	.385 x 1.536	500D605F350DH7
8	.448 x 1.536	500D805F350EH7
10	.510 x 1.536	500D106F350FH7
12	.510 x 1.536	500D126F350FH7
15	.510 x 1.786	500D156F350FK7

400 WVDC

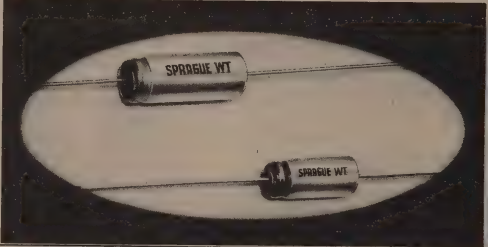
μF	D. x L.	Cat. No.
1	.385 x .848	500D105F400DC7
2	.385 x 1.286	500D205F400DF7
3	.385 x 1.536	500D305F400DH7
4	.448 x 1.286	500D405F400EF7
5	.448 x 1.536	500D505F400EH7
6	.510 x 1.286	500D605F400FF7
8	.510 x 1.536	500D805F400FH7
10	.510 x 1.786	500D106F400FK7

450 WVDC

μF	D. x L.	Cat. No.
1	.385 x .848	500D105F450DC7
2	.385 x 1.286	500D205F450DF7
3	.448 x 1.286	500D305F450EF7
4	.448 x 1.536	500D405F450EH7
5	.510 x 1.286	500D505F450FF7
6	.510 x 1.536	500D605F450FH7
8	.510 x 1.786	500D805F450FK7
10	.510 x 1.786	500D106F450FK7

TYPE WH11D AXIAL-LEAD ECONOMY ELECTROLYTICS

- Made in Hong Kong by Sprague World Trade Corp.
- Operating temperature range, −20 C to +85 C.
- All-welded construction – no pressure joints to cause open or intermittent circuits.
- Low leakage current – means minimum drain and longer battery life in bypass circuits.
- Also excellent as coupling capacitors.
- For complete technical data, refer to latest issue of Sprague Engineering Bulletin 3148.



3 WVDC, 4 V SURGE

μF	D. x L.	Cat. No.
25	.260 x .536	WH11D256G003Y
65	.260 x .723	WH11D656G003A
100	.322 x .723	WH11D107G003X
120	.322 x .723	WH11D127G003X
150	.385 x .723	WH11D157G003C
200	.385 x .723	WH11D207G003C
350	.385 x .973	WH11D357G003E
400	.385 x .973	WH11D407G003E
500	.385 x 1.286	WH11D507G003F
600	.385 x 1.286	WH11D607G003F
800	.385 x 1.536	WH11D807G003G
1000	.465 x 1.286	WH11D108G003K
1300	.465 x 1.536	WH11D138G003M
2000	.510 x 1.536	WH11D208G003R
2500	.510 x 1.786	WH11D258G003S

6 WVDC, 8 V SURGE

μF	D. x L.	Cat. No.
20	.260 x .536	WH11D206G006Y
50	.260 x .723	WH11D506G006A
75	.322 x .723	WH11D756G006X
120	.385 x .723	WH11D127G006C
250	.385 x .973	WH11D257G006E
300	.385 x .973	WH11D307G006E
350	.385 x 1.286	WH11D357G006F
400	.385 x 1.286	WH11D407G006F
500	.385 x 1.536	WH11D507G006G
600	.385 x 1.536	WH11D607G006G
700	.465 x 1.286	WH11D707G006K
800	.465 x 1.536	WH11D807G006M
950	.465 x 1.536	WH11D957G006M
1000	.510 x 1.286	WH11D108G006P
1500	.510 x 1.536	WH11D158G006R
2000	.510 x 1.786	WH11D208G006S

12 WVDC, 15 V SURGE

μF	D. x L.	Cat. No.
15	.260 x .536	WH11D156G012Y
35	.260 x .723	WH11D356G012A
65	.322 x .723	WH11D656G012X
100	.385 x .723	WH11D107G012C
200	.385 x .973	WH11D207G012E
300	.385 x 1.286	WH11D307G012F
400	.385 x 1.536	WH11D407G012G
500	.465 x 1.286	WH11D507G012K
650	.465 x 1.536	WH11D657G012M
700	.510 x 1.286	WH11D707G012P
800	.510 x 1.536	WH11D807G012R
1200	.510 x 1.786	WH11D128G012S

16 WVDC, 18 V SURGE

μF	D. x L.	Cat. No.
10	.260 x .536	WH11D106G016Y
20	.260 x .723	WH11D206G016A
25	.260 x .723	WH11D256G016A
50	.322 x .723	WH11D506G016X
65	.385 x .723	WH11D656G016C
75	.385 x .723	WH11D756G016C
120	.385 x .973	WH11D127G016E
150	.385 x .973	WH11D157G016E
200	.385 x 1.286	WH11D207G016F
250	.385 x 1.286	WH11D257G016F
300	.385 x 1.536	WH11D307G016G
350	.385 x 1.536	WH11D357G016G
400	.465 x 1.286	WH11D407G016K
450	.465 x 1.286	WH11D457G016K
500	.465 x 1.536	WH11D507G016M
600	.465 x 1.536	WH11D607G016M
650	.510 x 1.286	WH11D657G016P
800	.510 x 1.536	WH11D807G016R
1000	.510 x 1.786	WH11D108G016S

25 WVDC, 35 V SURGE

μF	D. x L.	Cat. No.
1	.260 x .536	WH11D105G025Y
2	.260 x .536	WH11D205G025Y
3	.260 x .536	WH11D305G025Y
4	.260 x .536	WH11D405G025Y
5	.260 x .536	WH11D505G025Y
6	.260 x .536	WH11D605G025Y
8	.260 x .536	WH11D805G025Y
10	.260 x .723	WH11D106G025A
15	.260 x .723	WH11D156G025A
20	.322 x .723	WH11D206G025X
25	.322 x .723	WH11D256G025X
35	.322 x .723	WH11D356G025X
50	.385 x .723	WH11D506G025C
65	.385 x .973	WH11D656G025E
75	.385 x .973	WH11D756G025E
100	.385 x .973	WH11D107G025E
120	.385 x 1.286	WH11D127G025F
150	.385 x 1.286	WH11D157G025F
200	.385 x 1.536	WH11D207G025G
250	.465 x 1.286	WH11D257G025K
300	.465 x 1.536	WH11D307G025M
350	.465 x 1.536	WH11D357G025M
400	.510 x 1.286	WH11D407G025P
450	.510 x 1.536	WH11D457G025R
500	.510 x 1.536	WH11D507G025R
600	.510 x 1.786	WH11D607G025S

50 WVDC, 65 V SURGE

μF	D. x L.	Cat. No.
1	.260 x .536	WH11D105G050Y
2	.260 x .536	WH11D205G050Y
3	.260 x .536	WH11D305G050Y
4	.260 x .536	WH11D405G050Y
5	.260 x .723	WH11D505G050A
6	.260 x .723	WH11D605G050A
8	.260 x .723	WH11D805G050A
10	.322 x .723	WH11D106G050X
15	.322 x .723	WH11D156G050X
20	.385 x .723	WH11D206G050C
25	.385 x .723	WH11D256G050C
35	.385 x .973	WH11D356G050E
50	.385 x .973	WH11D506G050E
65	.385 x 1.286	WH11D656G050F
75	.385 x 1.286	WH11D756G050F
100	.385 x 1.536	WH11D107G050G
120	.465 x 1.286	WH11D127G050K
150	.465 x 1.536	WH11D157G050M
200	.510 x 1.286	WH11D207G050P
250	.510 x 1.286	WH11D257G050P
300	.510 x 1.536	WH11D307G050R
350	.510 x 1.786	WH11D357G050S
400	.510 x 1.786	WH11D407G050S

100 WVDC, 125 V SURGE

μF	D. x L.	Cat. No.
1	.260 x .536	WH11D105F100Y
2	.260 x .723	WH11D205F100A
3	.322 x .723	WH11D305F100X
4	.322 x .723	WH11D405F100X
5	.385 x .723	WH11D505F100C
6	.385 x .723	WH11D605F100C
8	.385 x .973	WH11D805F100E
10	.385 x .973	WH11D106F100E
15	.385 x .973	WH11D156F100E
20	.385 x 1.286	WH11D206F100F
25	.385 x 1.536	WH11D256F100G
35	.465 x 1.536	WH11D356F100M
50	.510 x 1.536	WH11D506F100R
65	.510 x 1.786	WH11D656F100S
75	.510 x 1.786	WH11D756F100S

150 WVDC, 175 V SURGE

μF	D. x L.	Cat. No.
1	.260 x .536	WH11D105F150Y
2	.322 x .723	WH11D205F150X
3	.385 x .723	WH11D305F150C
4	.385 x .723	WH11D405F150C
5	.385 x .723	WH11D505F150C
6	.385 x .973	WH11D605F150E
8	.385 x .973	WH11D805F150E
10	.385 x 1.286	WH11D106F150F
15	.385 x 1.286	WH11D156F150F
20	.385 x 1.536	WH11D206F150G
25	.465 x 1.536	WH11D256F150M
35	.510 x 1.536	WH11D356F150R
50	.510 x 1.786	WH11D506F150S

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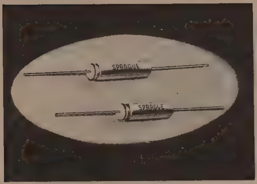
IND-EEM-14C-EFAI

All sizes subject to change without notice.

SPRAGUE CAPACITORS

TYPE TE LITTL-LYTIC® ELECTROLYTICS



- Compare! These ultra-small capacitors will withstand a 2000 hr. life test at rated voltage and maximum operating temperature of 105 C.
- Extremely low d-c leakage current, low dissipation factor, high capacitance stability, even after severe high temperature shelf testing.
- Proven dependable performance in industrial as well as entertainment equipment with either transistor or modified electron-tube circuits.
- All terminal connections are welded, eliminating possibility of "open" or intermittent contacts occasionally found in pressure joints of conventional capacitors.
- Ultra-low leakage current
- Metal-encased, with clear plastic outer insulating sleeves.
- For complete technical data, see latest issue of Sprague Engineering Bulletin 3150.

3 WVDC

µF	D. x L.	Sprague Products Cat. No.	Sprague O.E.M. Part. No.
1	.260 x .536	TE-1050	30D105G003BA9
2	.260 x .536	TE-1051	30D205G003BA9
3	.260 x .536	TE-1052	30D305G003BA9
4	.260 x .536	TE-1052.1	30D405G003BA9
5	.260 x .536	TE-1052.2	30D505G003BA9
6	.260 x .536	TE-1052.3	30D605G003BA9
8	.260 x .536	TE-1052.5	30D805G003BA9
10	.260 x .536	TE-1053	30D106G003BA9
15	.260 x .536	TE-1053.5	30D156G003BA9
20	.260 x .536	TE-1054	30D206G003BA9
25	.260 x .536	TE-1055	30D256G003BA9
30	.260 x .536	TE-1055.5	30D306G003BA9
50	.260 x .723	TE-1058	30D506G003BB9
65	.260 x .723	TE-1058.5	30D656G003BB9
75	.322 x .723	TE-1059	30D756G003CB9
100	.322 x .723	TE-1059.5	30D107G003CB9
130	.322 x .723	TE-1060.1	30D137G003CB9
150	.322 x .848	TE-1061	30D157G003CC9
200	.322 x .848	TE-1064	30D207G003CC9
250	.385 x .848	TE-1065	30D257G003DC9
300	.385 x .848	TE-1066	30D307G003DC9
400	.385 x .973	TE-1067	30D407G003DD9
500	.385 x 1.286	TE-1068	30D507G003DF9
600	.385 x 1.286	TE-1069.1	30D607G003DF9
800	.385 x 1.536	TE-1070.1	30D807G003DH9

6 WVDC

µF	D. x L.	Sprague Products Cat. No.	Sprague O.E.M. Part. No.
1	.260 x .536	TE-1080	30D105G006BA9
2	.260 x .536	TE-1081	30D205G006BA9
3	.260 x .536	TE-1082	30D305G006BA9
4	.260 x .536	TE-1083	30D405G006BA9
5	.260 x .536	TE-1084	30D505G006BA9
6	.260 x .536	TE-1085	30D605G006BA9
8	.260 x .536	TE-1086	30D805G006BA9
10	.260 x .536	TE-1087	30D106G006BA9
15	.260 x .536	TE-1089	30D156G006BA9
20	.260 x .536	TE-1090	30D206G006BA9
25	.260 x .723	TE-1091	30D256G006BB9
35	.260 x .723	TE-1093	30D356G006BB9
50	.260 x .723	TE-1100	30D506G006BB9
75	.322 x .723	TE-1101.5	30D756G006CB9
90	.322 x .723	TE-1101.7	30D906G006CB9
100	.322 x .848	TE-1102	30D107G006CC9
140	.322 x .848	TE-1102.5	30D147G006CC9
150	.385 x .848	TE-1103	30D157G006DC9
200	.385 x .848	TE-1104	30D207G006DC9
250	.385 x .973	TE-1105	30D257G006DD9
300	.385 x .973	TE-1106	30D307G006DD9
400	.385 x 1.286	TE-1107	30D407G006DF9
500	.385 x 1.536	TE-1107.5	30D507G006DH9
600	.385 x 1.536	TE-1108.5	30D607G006DH9

12 WVDC

µF	D. x L.	Sprague Products Cat. No.	Sprague O.E.M. Part. No.
1	.260 x .536	TE-1120	30D105G012BA9
2	.260 x .536	TE-1121	30D205G012BA9
3	.260 x .536	TE-1122	30D305G012BA9
4	.260 x .536	TE-1123	30D405G012BA9
5	.260 x .536	TE-1127	30D505G012BA9
6	.260 x .536	TE-1127.1	30D605G012BA9
8	.260 x .536	TE-1127.3	30D805G012BA9
10	.260 x .536	TE-1128	30D106G012BA9
15	.260 x .536	TE-1129	30D156G012BA9
20	.260 x .723	TE-1130	30D206G012BB9
25	.260 x .723	TE-1131	30D256G012BB9
30	.260 x .723	TE-1132.1	30D306G012BB9
50	.322 x .723	TE-1133	30D506G012CB9
60	.322 x .723	TE-1133.5	30D606G012CB9
75	.322 x .848	TE-1134	30D756G012CC9
90	.385 x .723	TE-1134.5	30D906G012DB9
100	.322 x .848	TE-1135	30D107G012CC9
140	.385 x .848	TE-1135.5	30D147G012DC9
150	.385 x .973	TE-1136	30D157G012DD9
190	.385 x .973	TE-1136.5	30D197G012DD9
200	.385 x 1.286	TE-1137	30D207G012DF9
250	.385 x 1.286	TE-1138	30D257G012DF9
290	.385 x 1.286	TE-1139	30D297G012DF9
390	.385 x 1.536	TE-1140	30D397G012DH9

16 WVDC

µF	D. x L.	Sprague Products Cat. No.	Sprague O.E.M. Part. No.
1	.260 x .536	TE-1148	30D105G016BA9
2	.260 x .536	TE-1149	30D205G016BA9
3	.260 x .536	TE-1150	30D305G016BA9
4	.260 x .536	TE-1151	30D405G016BA9
5	.260 x .536	TE-1152	30D505G016BA9
6	.260 x .536	TE-1153	30D605G016BA9
8	.260 x .536	TE-1154	30D805G016BA9
10	.260 x .536	TE-1155	30D106G016BA9
15	.260 x .723	TE-1156	30D156G016BB9
20	.260 x .723	TE-1157	30D206G016BB9
25	.260 x .723	TE-1157.1	30D256G016BB9
30	.322 x .723	TE-1158	30D306G016CB9
35	.322 x .723	TE-1159	30D356G016CB9
50	.322 x .723	TE-1160	30D506G016CB9
75	.322 x .848	TE-1161	30D756G016CC9
85	.385 x .723	TE-1161.5	30D856G016DB9
90	.322 x .848	TE-1161.7	30D906G016CC9
100	.385 x .848	TE-1162	30D107G016DC9
130	.385 x .848	TE-1162.5	30D137G016DC9
150	.385 x .973	TE-1163	30D157G016DD9
180	.385 x .973	TE-1163.7	30D187G016DD9
200	.385 x 1.286	TE-1164	30D207G016DF9
250	.385 x 1.286	TE-1164.5	30D257G016DF9
300	.385 x 1.536	TE-1165.5	30D307G016DH9
350	.385 x 1.536	TE-1166	30D357G016DH9

25 WVDC

µF	D. x L.	Sprague Products Cat. No.	Sprague O.E.M. Part. No.
1	.260 x .536	TE-1200	30D105G025BA9
2	.260 x .536	TE-1201	30D205G025BA9
3	.260 x .536	TE-1201.1	30D305G025BA9
4	.260 x .536	TE-1201.2	30D405G025BA9
5	.260 x .536	TE-1202	30D505G025BA9
6	.260 x .536	TE-1203	30D605G025BA9
8	.260 x .536	TE-1203.5	30D805G025BA9
10	.260 x .723	TE-1204	30D106G025BB9
15	.260 x .723	TE-1205	30D156G025BB9
20	.322 x .723	TE-1206	30D206G025CB9
25	.322 x .723	TE-1207	30D256G025CB9
30	.322 x .723	TE-1207.5	30D306G025CB9
35	.322 x .723	TE-1208	30D356G025CB9
50	.322 x .848	TE-1209	30D506G025CC9
75	.385 x .848	TE-1210	30D756G025DC9
100	.385 x .973	TE-1211	30D107G025DD9
150	.385 x 1.286	TE-1212	30D157G025DF9
200	.385 x 1.536	TE-1213	30D207G025DH9

50 WVDC

µF	D. x L.	Sprague Products Cat. No.	Sprague O.E.M. Part. No.
1	.260 x .536	TE-1300	30D105G050BA9
2	.260 x .536	TE-1301	30D205G050BA9
3	.260 x .536	TE-1302	30D305G050BA9
4	.260 x .536	TE-1302.1	30D405G050BA9
5	.260 x .723	TE-1303	30D505G050BB9
6	.260 x .723	TE-1303.1	30D605G050BB9
8	.260 x .723	TE-1303.3	30D805G050BB9
10	.322 x .723	TE-1304	30D106G050CB9
15	.322 x .723	TE-1304.2	30D156G050CB9
20	.322 x .848	TE-1305	30D206G050CC9
25	.322 x .848	TE-1305.5	30D256G050CC9
35	.385 x .848	TE-1306	30D356G050DC9
50	.385 x .973	TE-1307	30D506G050DD9
75	.385 x 1.286	TE-1308	30D756G050DF9
100	.385 x 1.536	TE-1309	30D107G050DH9

100 WVDC

µF	D. x L.	Sprague Products Cat. No.	Sprague O.E.M. Part. No.
1	.260 x .536	TE-1400	30D105F100BA9
2	.260 x .723	TE-1401	30D205F100BB9
3	.322 x .723	TE-1402	30D305F100CB9
4	.322 x .723	TE-1403	30D405F100CB9
5	.322 x .848	TE-1404	30D505F100CC9
6	.322 x .848	TE-1405	30D605F100CC9
8	.385 x .848	TE-1406	30D805F100DC9
10	.385 x .848	TE-1407	30D106F100DC9
15	.385 x .973	TE-1408	30D156F100DD9
20	.385 x 1.286	TE-1409	30D206F100DF9
25	.385 x 1.536	TE-1410	30D256F100DH9
30	.385 x 1.536	TE-1411	30D306F100DH9

150 WVDC

µF	D. x L.	Sprague Products Cat. No.	Sprague O.E.M. Part. No.
1	.260 x .536	TE-1500	30D105F150BA9
2	.260 x .723	TE-1501	30D205F150BB9
3	.322 x .723	TE-1502	30D305F150CB9
4	.322 x .848	TE-1503	30D405F150CC9
5	.322 x .848	TE-1504	30D505F150CC9
6	.385 x .848	TE-1505	30D605F150DC9
7	.385 x .848	TE-1505.5	30D705F150DC9
8	.385 x .848	TE-1506	30D805F150DC9
10	.385 x .973	TE-1507	30D106F150DD9
15	.385 x 1.286	TE-1508.1	30D156F150DF9
20	.385 x 1.536	TE-1509	30D206F150DH9

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IND-EEM-15-EFA!

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SPRAGUE CAPACITORS

TYPE TVA ATOM® ELECTROLYTICS

- Whether for TV sets, ac/dc sets, auto radios, home radio-phono combinations, or other electronic equipment, the ATOM line will handle most tubular electrolytic capacitor requirements.

- The smallest dependable standard tubular—capacitors up to 475 volts operate at temperatures to 85°C (185°F). Higher voltage capacitors are designed for 65°C operation.
- Low leakage current, low dissipation factor, long shelf life.
- Will withstand high temperatures, high ripple currents, high surge voltages.
- Metal case construction with thermoplastic outer insulating sleeve except as noted by dagger (†) sign.
- Catalog numbers with TVAN prefix are non-polarized, and are ideal for speaker crossover networks. They are listed on 2nd following page.
- Starred (★) items have metal mounting strap attached, as shown in photo.

μF	WVDC	Dia. x Length	Cat. No.
SINGLE UNITS (Polar)*			
1000	1	⅝ x 2⅛	TVA-1080
1	3	1/4 x 17/32	TVA-1081
2	3	1/4 x 17/32	TVA-1081.1
3	3	1/4 x 17/32	TVA-1081.2
4	3	1/4 x 17/32	TVA-1081.3
5	3	1/4 x 17/32	TVA-1081.4
6	3	1/4 x 17/32	TVA-1081.5
8	3	1/4 x 17/32	TVA-1081.6
10	3	1/4 x 17/32	TVA-1082
15	3	1/4 x 17/32	TVA-1082.5
20	3	1/4 x 17/32	TVA-1083
25	3	1/4 x 17/32	TVA-1084
30	3	1/4 x 17/32	TVA-1084.5
50	3	1/4 x 23/32	TVA-1085
65	3	1/4 x 23/32	TVA-1085.5
75	3	5/16 x 23/32	TVA-1088
100	3	5/16 x 23/32	TVA-1089
130	3	5/16 x 23/32	TVA-1089.5
150	3	5/16 x 27/32	TVA-1090
200	3	5/16 x 27/32	TVA-1091
250	3	3/8 x 27/32	TVA-1091.5
300	3	3/8 x 27/32	TVA-1092
400	3	3/8 x 31/32	TVA-1093
500	3	3/8 x 1 9/32	TVA-1094
600	3	3/8 x 1 9/32	TVA-1095
750	3	3/8 x 1 17/32	TVA-1097
800	3	3/8 x 1 17/32	TVA-1097.1
900	3	7/16 x 1 9/32	TVA-1097.2
1000	3	7/16 x 1 17/32	TVA-1097.3
1200	3	7/16 x 1 17/32	TVA-1097.4
1500	3	1/2 x 1 17/32	TVA-1097.5
1800	3	1/2 x 1 17/32	TVA-1097.6
2000	3	1/2 x 1 17/32	TVA-1097.7
2200	3	1/2 x 1 13/16	TVA-1097.8
2500	3	1/2 x 1 13/16	TVA-1097.9
3000	3	3/4 x 1 21/32	TVA-1098
4000	3	13/16 x 1 21/32	TVA-1099
5000	3	13/16 x 1 29/32	TVA-1099.1
10000	3	15/16 x 2 5/32	TVA-1099.6
1	6	1/4 x 17/32	TVA-1099.80
2	6	1/4 x 17/32	TVA-1099.81
3	6	1/4 x 17/32	TVA-1099.82
4	6	1/4 x 17/32	TVA-1099.83
5	6	1/4 x 17/32	TVA-1099.84
6	6	1/4 x 17/32	TVA-1099.85
8	6	1/4 x 17/32	TVA-1099.86
10	6	1/4 x 17/32	TVA-1099.87
15	6	1/4 x 17/32	TVA-1099.89
20	6	1/4 x 17/32	TVA-1099.90
25	6	1/4 x 23/32	TVA-1099.91
35	6	1/4 x 23/32	TVA-1099.93
50	6	1/4 x 23/32	TVA-1100
75	6	5/16 x 23/32	TVA-1100.5
90	6	5/16 x 23/32	TVA-1100.6
100	6	5/16 x 27/32	TVA-1101
140	6	5/16 x 27/32	TVA-1101.2
150	6	3/8 x 27/32	TVA-1101.5
200	6	3/8 x 27/32	TVA-1101.7
250	6	3/8 x 31/32	TVA-1102
300	6	3/8 x 31/32	TVA-1102.1
400	6	3/8 x 1 9/32	TVA-1102.3
500	6	3/8 x 1 17/32	TVA-1103
600	6	3/8 x 1 17/32	TVA-1103.2
700	6	7/16 x 1 9/32	TVA-1103.4
800	6	7/16 x 1 17/32	TVA-1103.8
950	6	7/16 x 1 17/32	TVA-1103.9
1000	6	1/2 x 1 9/32	TVA-1104
1200	6	1/2 x 1 17/32	TVA-1104.1
1500	6	1/2 x 1 17/32	TVA-1105
1800	6	1/2 x 1 25/32	TVA-1105.1
2000	6	1/2 x 1 25/32	TVA-1106
2500	6	3/4 x 1 21/32	TVA-1106.5
3000	6	3/4 x 1 29/32	TVA-1107
4000	6	7/8 x 1 29/32	TVA-1108
5000	6	7/8 x 1 29/32	TVA-1109
10000	6	1 x 2 13/32	TVA-1115
1000	10	1/2 x 1 13/16	TVA-1128
3000	10	7/8 x 1 21/32	TVA-1129.2
4000	10	7/8 x 1 29/32	TVA-1129.4
5000	10	1 x 2 5/32	TVA-1129.5
10000	10	1 1/8 x 2 11/16	TVA-1129.8
1	12	1/4 x 17/32	TVA-1129.80
2	12	1/4 x 17/32	TVA-1129.81
3	12	1/4 x 17/32	TVA-1129.82
4	12	1/4 x 17/32	TVA-1129.83
5	12	1/4 x 17/32	TVA-1129.84
6	12	1/4 x 17/32	TVA-1129.85
8	12	1/4 x 17/32	TVA-1129.86
10	12	1/4 x 17/32	TVA-1129.87
15	12	1/4 x 17/32	TVA-1129.89
20	12	1/4 x 23/32	TVA-1129.90
25	12	1/4 x 23/32	TVA-1129.91
30	12	1/4 x 23/32	TVA-1129.92
50	12	5/16 x 23/32	TVA-1129.94
60	12	5/16 x 23/32	TVA-1129.95
75	12	5/16 x 27/32	TVA-1129.96
90	12	3/8 x 23/32	TVA-1129.97
100	12	5/16 x 23/32	TVA-1130
140	12	3/8 x 27/32	TVA-1130.2
150	12	3/8 x 31/32	TVA-1130.3
190	12	3/8 x 31/32	TVA-1130.5
200	12	3/8 x 1 9/32	TVA-1130.6
250	12	3/8 x 1 9/32	TVA-1131
290	12	3/8 x 1 9/32	TVA-1131.1
390	12	3/8 x 1 17/32	TVA-1131.2
400	12	7/16 x 1 9/32	TVA-1131.3
450	12	7/16 x 1 9/32	TVA-1131.5
500	12	7/16 x 1 17/32	TVA-1132
600	12	7/16 x 1 17/32	TVA-1132.2
800	12	1/2 x 1 9/16	TVA-1132.4
900	12	1/2 x 1 13/16	TVA-1132.5
1000	12	1/2 x 1 13/16	TVA-1133
1200	12	1/2 x 1 13/16	TVA-1133.4
1500	12	3/4 x 1 21/32	TVA-1133.5
2000	12	7/8 x 1 21/32	TVA-1134
2500	12	7/8 x 1 21/32	TVA-1134.5
3000	12	7/8 x 2 5/32	TVA-1135
4000	12	15/16 x 2 5/32	TVA-1136
5000	12	1 x 2 13/32	TVA-1136.1
10000	12	1 1/4 x 2 11/16	TVA-1137
1	16	1/4 x 17/32	TVA-1140
2	16	1/4 x 17/32	TVA-1141
3	16	1/4 x 17/32	TVA-1142
4	16	1/4 x 17/32	TVA-1143
5	16	1/4 x 17/32	TVA-1144
6	16	1/4 x 17/32	TVA-1144.1

* For non-polarized single units, see catalog numbers with TVAN prefix on 2nd following page.

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IND-EEM-4A-EFA1

Sizes subject to change without notice.

SPRAGUE CAPACITORS

TYPE TVA ATOM® ELECTROLYTICS - Continued

SINGLE UNITS - Continued

μF	WVDC	Dia. x Length	Cat. No.
8	16	1/4 x 17/32	TVA-1144.2
10	16	1/4 x 17/32	TVA-1145
15	16	1/4 x 23/32	TVA-1146
20	16	1/4 x 23/32	TVA-1147
25	16	1/4 x 23/32	TVA-1148
30	16	5/16 x 23/32	TVA-1149
35	16	5/16 x 23/32	TVA-1149.1
50	16	5/16 x 23/32	TVA-1150
75	16	5/16 x 27/32	TVA-1151
85	16	3/8 x 23/32	TVA-1152
90	16	5/16 x 27/32	TVA-1153
100	16	3/8 x 27/32	TVA-1160
130	16	3/8 x 27/32	TVA-1160.2
150	16	3/8 x 31/32	TVA-1160.3
175	16	3/8 x 31/32	TVA-1160.4
180	16	3/8 x 31/32	TVA-1160.5
200	16	3/8 x 1 9/32	TVA-1160.6
250	16	3/8 x 1 9/32	TVA-1161
300	16	3/8 x 1 17/32	TVA-1161.1
350	16	3/8 x 1 17/32	TVA-1161.2
400	16	7/16 x 1 9/32	TVA-1161.5
450	16	7/16 x 1 17/32	TVA-1161.6
500	16	7/16 x 1 17/32	TVA-1162
600	16	7/16 x 1 17/32	TVA-1162.2
800	16	1/2 x 1 9/16	TVA-1162.3
1000	16	1/2 x 1 13/16	TVA-1163
1200	16	1/2 x 1 13/16	TVA-1164
1500	16	13/16 x 1 21/32	TVA-1175.2
2000	16	13/16 x 1 21/32	★TVA-1170
2500	16	7/8 x 1 29/32	TVA-1175.3
3000	16	7/8 x 1 29/32	TVA-1175
4000	16	15/16 x 2 5/32	TVA-1175.4
5000	16	1 x 2 5/32	TVA-1175.5
6000	16	1 1/8 x 2 5/32	TVA-1175.6
8000	16	1 1/8 x 2 11/16	TVA-1175.7
10000	16	1 1/4 x 2 11/16	TVA-1175.8
15000	16	1 1/4 x 3 11/16	TVA-1175.11
20000	16	1 3/8 x 4 5/32	TVA-1175.13
150	20	3/8 x 31/32	TVA-1180
1500	20	7/8 x 1 21/32	TVA-1190
2300	20	1 x 1 21/32	TVA-1194
1	25	1/4 x 17/32	TVA-1200
2	25	1/4 x 17/32	TVA-1201
3	25	1/4 x 17/32	TVA-1201.1
4	25	1/4 x 17/32	TVA-1202
5	25	1/4 x 17/32	TVA-1203
6	25	1/4 x 17/32	TVA-1203.1
8	25	1/4 x 17/32	TVA-1203.3
10	25	1/4 x 23/32	TVA-1204
15	25	1/4 x 23/32	TVA-1204.2
20	25	5/16 x 23/32	TVA-1204.5
25	25	5/16 x 23/32	TVA-1205.
30	25	5/16 x 23/32	TVA-1205.1
35	25	5/16 x 23/32	TVA-1205.2
40	25	5/16 x 27/32	TVA-1205.7
50	25	5/16 x 27/32	TVA-1206
75	25	3/8 x 27/32	TVA-1206.1
100	25	3/8 x 31/32	TVA-1207
150	25	3/8 x 1 9/32	TVA-1207.5
200	25	3/8 x 1 17/32	TVA-1207.7
250	25	7/16 x 1 9/32	TVA-1208
300	25	7/16 x 1 17/32	TVA-1208.5
350	25	7/16 x 1 17/32	TVA-1208.6
400	25	1/2 x 1 5/16	TVA-1208.7
450	25	1/2 x 1 9/16	TVA-1208.8
500	25	1/2 x 1 9/16	TVA-1209
600	25	1/2 x 1 13/16	TVA-1209.2
800	25	3/4 x 1 21/32	TVA-1209.4
1000	25	13/16 x 1 21/32	TVA-1211
1500	25	7/8 x 1 29/32	TVA-1212
2000	25	1 x 1 29/32	TVA-1213
2500	25	1 x 1 29/32	TVA-1213.5
*3000	25	1 x 2 5/32	TVA-1214
4000	25	1 1/8 x 2 11/16	TVA-1214.2
5000	25	1 1/8 x 2 11/16	TVA-1214.5
8000	25	1 1/4 x 3 11/16	TVA-1214.8
10000	25	1 3/8 x 3 11/16	TVA-1214.10
*900	30	7/8 x 1 21/32	TVA-1222
1000	30	15/16 x 1 29/32	TVA-1222.1
200	35	7/16 x 1 17/32	TVA-1223
300	35	1/2 x 1 9/16	TVA-1225
500	35	1/2 x 1 13/16	TVA-1227
5500	35	1 x 3 13/32	TVA-1229
1	50	1/4 x 17/32	TVA-1300
2	50	1/4 x 17/32	TVA-1301
3	50	1/4 x 17/32	TVA-1302
4	50	1/4 x 17/32	TVA-1302.7
5	50	1/4 x 23/32	TVA-1303
6	50	1/4 x 23/32	TVA-1303.1
8	50	1/4 x 23/32	TVA-1303.2
10	50	5/16 x 23/32	TVA-1304
15	50	5/16 x 23/32	TVA-1305
20	50	5/16 x 27/32	TVA-1305.5
25	50	5/16 x 27/32	TVA-1306
35	50	3/8 x 27/32	TVA-1306.2
40	50	3/8 x 31/32	TVA-1306.5
50	50	3/8 x 31/32	TVA-1308
60	50	3/8 x 1 9/32	TVA-1309.3
75	50	3/8 x 1 9/32	TVA-1309.4
100	50	3/8 x 1 17/32	TVA-1310
120	50	7/16 x 1 9/32	TVA-1310.1
125	50	7/16 x 1 17/32	TVA-1310.2
150	50	7/16 x 1 17/32	TVA-1311
200	50	1/2 x 1 5/16	TVA-1311.5
250	50	1/2 x 1 5/16	TVA-1312
300	50	1/2 x 1 9/16	TVA-1312.1
350	50	1/2 x 1 13/16	TVA-1312.2
400	50	1/2 x 1 13/16	TVA-1313
500	50	3/4 x 1 21/32	TVA-1315
600	50	13/16 x 1 21/32	TVA-1315.2
800	50	7/8 x 1 21/32	TVA-1315.4
1000	50	15/16 x 1 29/32	TVA-1316
1500	50	15/16 x 2 5/32	TVA-1318
2000	50	1 1/8 x 2 5/32	TVA-1318.2
2500	50	1 1/8 x 2 11/16	TVA-1318.3
3000	50	1 1/4 x 2 11/16	TVA-1318.4
4000	50	1 1/4 x 3 5/32	TVA-1318.5
5000	50	1 3/8 x 3 1/8	TVA-1318.7
8000	50	1 3/8 x 4 5/32	TVA-1318.10
250	60	1/2 x 1 9/16	TVA-1319
500	75	1 x 2 21/32	TVA-1319.5
1000	75	1 x 2 21/32	TVA-1319.7
*1500	75	1 x 3 21/32	TVA-1319.8
2000	75	1 3/8 x 2 3/8	TVA-1319.9
10	90	3/8 x 27/32	TVA-1320
16	90	3/8 x 31/32	TVA-1321
1	100	1/4 x 17/32	TVA-1330
2	100	1/4 x 23/32	TVA-1331
3	100	5/16 x 23/32	TVA-1332
4	100	5/16 x 23/32	TVA-1333
5	100	5/16 x 27/32	TVA-1334
6	100	5/16 x 27/32	TVA-1335
8	100	3/8 x 27/32	TVA-1336
10	100	3/8 x 27/32	TVA-1337
15	100	3/8 x 31/32	TVA-1338
20	100	3/8 x 1 9/32	TVA-1339
25	100	3/8 x 1 17/32	TVA-1340
30	100	3/8 x 1 17/32	TVA-1341
40	100	7/16 x 1 17/32	TVA-1342
50	100	1/2 x 1 9/16	TVA-1343
60	100	1/2 x 1 9/16	TVA-1344
75	100	1/2 x 1 13/16	TVA-1345
85	100	3/4 x 1 13/32	TVA-1345.2
100	100	3/4 x 1 13/32	TVA-1346
150	100	13/16 x 1 21/32	TVA-1347
200	100	7/8 x 1 29/32	TVA-1348
250	100	7/8 x 1 29/32	TVA-1349
300	100	1 x 1 29/32	TVA-1350
400	100	1 x 2 5/32	TVA-1375
500	100	1 1/8 x 2 5/32	TVA-1376
600	100	1 1/8 x 2 11/16	TVA-1377
800	100	1 1/8 x 2 11/16	TVA-1379
1000	100	1 1/4 x 2 11/16	TVA-1380
1500	100	1 1/4 x 3 11/16	TVA-1382
2000	100	1 3/8 x 4 5/32	TVA-1384
1	150	1/4 x 17/32	TVA-1400
2	150	1/4 x 23/32	TVA-1400.1
3	150	5/16 x 23/32	TVA-1400.2
4	150	5/16 x 27/32	TVA-1402
5	150	5/16 x 27/32	TVA-1403
6	150	3/8 x 27/32	TVA-1403.1
7	150	3/8 x 27/32	TVA-1403.2
8	150	3/8 x 27/32	TVA-1405
10	150	3/8 x 31/32	TVA-1406
12	150	3/8 x 1 9/32	TVA-1407
15	150	3/8 x 1 9/32	TVA-1408
16	150	3/8 x 1 17/32	TVA-1409
20	150	3/8 x 1 17/32	TVA-1410
25	150	7/16 x 1 9/32	TVA-1411
30	150	7/16 x 1 17/32	TVA-1412
35	150	1/2 x 1 17/32	TVA-1412.1
40	150	1/2 x 1 17/32	TVA-1413
50	150	1/2 x 1 13/16	TVA-1414
60	150	13/16 x 1 13/32	TVA-1415
75	150	7/8 x 1 13/32	TVA-1416
80	150	7/8 x 1 13/32	TVA-1418
85	150	7/8 x 1 21/32	TVA-1418.1
100	150	7/8 x 1 21/32	TVA-1420
150	150	7/8 x 2 5/32	TVA-1422
160	150	1 x 1 29/32	TVA-1422.5
200	150	1 x 2 5/32	TVA-1423
*250	150	1 1/8 x 2 5/32	★TVA-1424
300	150	1 1/8 x 2 11/16	TVA-1425
350	150	1 x 3 5/32	TVA-1426
400	150	1 1/4 x 2 11/16	TVA-1426.1
500	150	1 1/4 x 3 5/32	TVA-1428
1000	150	1 3/8 x 4 5/32	TVA-1429
80	175	13/16 x 1 29/32	TVA-1430
1	200	1/4 x 23/32	TVA-1434
2	200	5/16 x 23/32	TVA-1435
3	200	5/16 x 27/32	TVA-1436
4	200	3/8 x 27/32	TVA-1437
5	200	3/8 x 27/32	TVA-1438
6	200	3/8 x 31/32	TVA-1439
8	200	3/8 x 1 9/32	TVA-1440
10	200	3/8 x 1 9/32	TVA-1441
15	200	7/16 x 1 9/32	TVA-1442
20	200	7/16 x 1 17/32	TVA-1442.1
25	200	1/2 x 1 9/16	TVA-1442.2
30	200	1/2 x 1 13/16	TVA-1442.3
40	200	13/16 x 1 13/32	TVA-1442.5
50	200	13/16 x 1 21/32	TVA-1443
60	200	7/8 x 1 21/32	TVA-1443.1
75	200	13/16 x 2 5/32	TVA-1444
85	200	7/8 x 1 29/32	TVA-1444.2
100	200	7/8 x 2 5/32	TVA-1445
120	200	1 x 1 29/32	TVA-1446
*150	200	1 x 2 5/32	★TVA-1447
*200	200	1 1/8 x 2 11/16	★TVA-1480
500	200	1 1/4 x 3 11/16	TVA-1484
1	250	5/16 x 23/32	TVA-1500
2	250	3/8 x 23/32	TVA-1500.1
3	250	3/8 x 27/32	TVA-1500.2
4	250	3/8 x 31/32	TVA-1501
5	250	3/8 x 1 9/32	TVA-1502
6	250	3/8 x 1 9/32	TVA-1502.1
8	250	3/8 x 1 9/32	TVA-1503
10	250	7/16 x 1 9/32	TVA-1504
12	250	7/16 x 1 17/32	TVA-1505
15	250	1/2 x 1 9/16	TVA-1506
16	250	1/2 x 1 9/16	TVA-1507
20	250	1/2 x 1 13/16	TVA-1508
25	250	3/4 x 1 13/32	TVA-1509
30	250	13/16 x 1 13/32	TVA-1510
40	250	7/8 x 1 13/32	TVA-1511
50	250	7/8 x 1 21/32	TVA-1512
60	250	7/8 x 1 29/32	TVA-1513
70	250	7/8 x 1 29/32	TVA-1515
75	250	7/8 x 2 5/32	TVA-1520
85	250	7/8 x 2 5/32	TVA-1521

★Mounting Strap Attached. *Single-ended with two 8-inch flexible leads.

IND-SERV-EEM-5-EFAI

Sizes subject to change without notice.

SPRAGUE CAPACITORS

TYPE TVA ATOM® ELECTROLYTICS - Continued

SINGLE UNITS - Continued

μF	WVDC	Dia. x Length	Cat. No.
100	250	1 x 1 29/32	TVA-1522
125	250	7/8 x 2 5/8	TVA-1524
150	250	1 1/8 x 2 5/32	TVA-1525
160	250	1 x 2 5/32	TVA-1526
*200	250	1 1/4 x 2 11/16	TVA-1528
225	250	1 x 3 5/32	TVA-1528.2
250	250	1 x 3 5/32	TVA-1528.3
300	250	1 1/4 x 3 5/32	TVA-1528.5
400	250	1 1/4 x 3 11/16	TVA-1528.7
450	250	1 3/8 x 3 11/16	TVA-1528.8
500	250	1 3/8 x 3 11/16	TVA-1528.9
600	250	1 3/8 x 4 5/32	TVA-1529
6	275	3/8 x 1 17/32	TVA-1530
1	300	5/16 x 23/32	TVA-1540
2	300	3/8 x 27/32	TVA-1541
3	300	3/8 x 31/32	TVA-1542
4	300	3/8 x 1 9/32	TVA-1543
5	300	3/8 x 1 9/32	TVA-1544
6	300	3/8 x 1 17/32	TVA-1545
8	300	7/16 x 1 17/32	TVA-1546
10	300	7/16 x 1 17/32	TVA-1547
12	300	1/2 x 1 9/16	TVA-1548
15	300	1/2 x 1 9/16	TVA-1549
20	300	1/2 x 1 13/16	TVA-1550
25	300	3/4 x 1 21/32	TVA-1551
30	300	3/4 x 1 29/32	TVA-1552
40	300	13/16 x 1 29/32	TVA-1553
50	300	7/8 x 1 29/32	TVA-1570
60	300	7/8 x 2 5/32	TVA-1570.1
75	300	1 x 2 5/32	TVA-1571
85	300	1 x 2 13/32	TVA-1571.2
100	300	1 1/8 x 2 5/32	TVA-1573
*140	300	1 x 3 5/32	★TVA-1575
*150	300	1 1/4 x 2 11/16	TVA-1576
*200	300	1 1/4 x 3 5/32	TVA-1578
300	300	1 3/8 x 3 11/16	TVA-1580
400	300	1 3/8 x 4 5/32	TVA-1582
1	350	5/16 x 27/32	TVA-1599
2	350	3/8 x 27/32	TVA-1600
3	350	3/8 x 31/32	TVA-1600.1
4	350	3/8 x 1 9/32	TVA-1601
5	350	3/8 x 1 17/32	TVA-1602.5
6	350	3/8 x 1 17/32	TVA-1602.6
8	350	7/16 x 1 17/32	TVA-1603
10	350	1/2 x 1 9/16	TVA-1604
12	350	1/2 x 1 9/16	TVA-1605
15	350	1/2 x 1 13/16	TVA-1607
16	350	3/4 x 1 13/32	TVA-1607.1
20	350	3/4 x 1 21/32	TVA-1608
25	350	3/4 x 1 29/32	TVA-1609
30	350	7/8 x 1 21/32	TVA-1610
40	350	7/8 x 1 29/32	TVA-1611
50	350	7/8 x 2 5/32	TVA-1612
60	350	15/16 x 2 5/32	TVA-1613
75	350	1 x 2 13/32	TVA-1614
85	350	1 1/8 x 2 5/32	TVA-1615
100	350	1 x 2 21/32	TVA-1620
*150	350	1 1/4 x 2 11/16	TVA-1622
160	350	1 x 3 21/32	TVA-1623
*200	350	1 1/4 x 3 5/32	TVA-1624
250	350	1 3/8 x 3 11/16	TVA-1627
*300	350	1 3/8 x 4 5/32	TVA-1628
1	385	3/8 x 27/32	TVA-1640
2	385	3/8 x 1 9/32	TVA-1641
4	385	7/16 x 1 9/32	TVA-1643
1	400	3/8 x 27/32	TVA-1645
2	400	3/8 x 1 9/32	TVA-1646
3	400	3/8 x 1 17/32	TVA-1647
4	400	7/16 x 1 9/32	TVA-1648
5	400	7/16 x 1 17/32	TVA-1649
6	400	1/2 x 1 5/16	TVA-1650
8	400	1/2 x 1 9/16	TVA-1651
10	400	1/2 x 1 13/16	TVA-1652
12	400	1/2 x 1 13/16	TVA-1653
15	400	3/4 x 1 21/32	TVA-1654
16	400	3/4 x 1 21/32	TVA-1655
20	400	3/4 x 1 29/32	TVA-1656
25	400	7/8 x 1 21/32	TVA-1657
30	400	15/16 x 1 21/32	TVA-1658
40	400	15/16 x 1 29/32	TVA-1659
50	400	1 x 2 5/32	TVA-1660
60	400	1 x 2 13/32	TVA-1661
75	400	1 1/8 x 2 5/32	TVA-1662
85	400	1 1/8 x 2 11/16	TVA-1663
100	400	1 1/4 x 2 11/16	TVA-1664
150	400	1 1/4 x 3 5/32	TVA-1665
200	400	1 1/4 x 3 11/16	TVA-1666
250	400	1 3/8 x 4 5/32	TVA-1667
1	450	3/8 x 27/32	TVA-1700
2	450	3/8 x 1 9/32	TVA-1701
3	450	7/16 x 1 9/32	TVA-1701.1
4	450	7/16 x 1 17/32	TVA-1702
5	450	1/2 x 1 5/16	TVA-1703
6	450	1/2 x 1 9/16	TVA-1703.1
8	450	1/2 x 1 13/16	TVA-1704
10	450	1/2 x 1 13/16	TVA-1705
12	450	3/4 x 1 21/32	TVA-1706
15	450	3/4 x 1 29/32	TVA-1707
16	450	7/8 x 1 21/32	TVA-1708
20	450	13/16 x 2 5/32	TVA-1709
25	450	15/16 x 1 29/32	TVA-1710
30	450	1 x 1 29/32	TVA-1711
40	450	15/16 x 2 13/32	TVA-1712
50	450	1 1/8 x 2 5/32	TVA-1713
60	450	1 1/8 x 2 5/32	TVA-1714
75	450	1 1/4 x 2 11/16	TVA-1715
80	450	1 x 3 21/32	TVA-1716
85	450	1 1/4 x 2 11/16	TVA-1717
100	450	1 1/4 x 3 5/32	TVA-1718
120	450	1 1/4 x 3 11/16	TVA-1718.3
*150	450	1 3/8 x 3 11/16	TVA-1719
160	450	1 3/8 x 3 11/16	TVA-1719.2
*200	450	1 3/8 x 4 5/32	TVA-1720
1	475	1/2 x 1 13/32	TVA-1790
2	475	5/8 x 1 5/32	TVA-1791
3	475	5/8 x 1 13/32	TVA-1792
4	475	5/8 x 1 21/32	TVA-1800
5	475	5/8 x 1 21/32	TVA-1800.1
6	475	11/16 x 1 21/32	TVA-1800.2
8	475	3/4 x 1 13/32	TVA-1801
10	475	3/4 x 1 21/32	TVA-1802
12	475	3/4 x 1 29/32	TVA-1802.1
15	475	13/16 x 1 29/32	TVA-1803
16	475	7/8 x 1 21/32	TVA-1803.1
20	475	13/16 x 2 5/32	TVA-1804
1	500	1/2 x 1 5/32	TVA-1890
3	500	5/8 x 1 13/32	TVA-1895
5	500	3/4 x 1 5/32	TVA-1901
8	500	3/4 x 1 21/32	TVA-1902
10	500	3/4 x 1 21/32	TVA-1903
12	500	7/8 x 1 29/32	TVA-1904
16	500	7/8 x 2 5/32	TVA-1905
20	500	7/8 x 2 5/32	TVA-1906
30	500	1 x 1 29/32	TVA-1907
40	500	1 x 2 13/32	TVA-1908
60	500	1 x 3 13/32	TVA-1910
15	525	7/8 x 2 5/32	TVA-1920
2	550	5/8 x 1 5/32	TVA-1930
4	600	13/16 x 2 3/8	TVA-1960
8	600	1 1/16 x 2 7/8	TVA-1962
10	600	1 1/16 x 3 3/16	TVA-1963
16	600	1 1/16 x 4 3/16	TVA-1965
20	600	1 1/16 x 3 7/8	TVA-1966

SINGLE UNITS (Non-Polarized)

μF	Volts	Dia. x Length	Cat. No.
500	3	3/8 x 1 17/32	TVAN-1095
50	6	3/8 x 23/32	TVAN-1100.1
125	6	3/8 x 31/32	TVAN-1101.5
500	6	1/2 x 1 13/16	TVAN-1103.1
2	10	1/4 x 17/32	TVAN-1109
5	10	1/4 x 17/32	TVAN-1110
6	10	1/4 x 17/32	TVAN-1111
8	10	1/4 x 17/32	TVAN-1112
10	10	1/4 x 23/32	TVAN-1112.4
30	10	5/16 x 27/32	TVAN-1115
50	10	3/8 x 23/32	TVAN-1117
160	10	3/8 x 1 9/32	TVAN-1120
170	10	3/8 x 1 9/32	TVAN-1121
450	10	5/8 x 1 21/32	TVAN-1125
500	10	5/8 x 1 21/32	TVAN-1126
2000	10	7/8 x 2 5/32	TVAN-1129
500	12	5/8 x 2 1/8	TVAN-1132.1
4	15	1/4 x 17/32	TVAN-1150
10	15	1/4 x 23/32	TVAN-1155
500	15	5/8 x 2 1/8	TVAN-1162.1
1000	15	3/4 x 2 1/8	TVAN-1163.1
2.5	20	1/4 x 17/32	TVAN-1176
1	25	1/4 x 23/32	TVAN-1200
2	25	1/4 x 17/32	TVAN-1202
4	25	1/4 x 23/32	★TVAN-1202.2
5	25	1/4 x 23/32	TVAN-1203.1
8	25	5/16 x 23/32	★TVAN-1203.8
10	25	5/16 x 23/32	TVAN-1204.1
16	25	5/16 x 27/32	TVAN-1204.3
20	25	3/8 x 27/32	TVAN-1204.6
25	25	3/8 x 23/32	TVAN-1205.1
35	25	3/8 x 27/32	TVAN-1205.5
50	25	3/8 x 31/32	TVAN-1206.1
100	25	3/8 x 1 17/32	TVAN-1207.1
3	30	1/4 x 23/32	TVAN-1215
20	30	3/8 x 27/32	TVAN-1220
10	40	5/16 x 27/32	TVAN-1230
20	40	3/8 x 31/32	TVAN-1232
2	50	1/4 x 23/32	TVAN-1301.1
3	50	1/4 x 23/32	TVAN-1302.1
4	50	1/4 x 23/32	★TVAN-1302.5
5	50	5/16 x 23/32	TVAN-1303.1
10	50	5/16 x 27/32	TVAN-1304.1
25	50	3/8 x 1 9/32	TVAN-1306.1
30	50	3/8 x 1 9/32	TVAN-1306.2
50	50	7/16 x 1 9/32	TVAN-1308.1
60	50	7/16 x 1 17/32	TVAN-1309.2
100	50	1/2 x 1 9/16	TVAN-1310.1
10	100	1/2 x 1 5/8	TVAN-1333
20	100	5/8 x 1 21/32	TVAN-1335
40	100	3/4 x 1 21/32	TVAN-1340
4	150	9/16 x 1 21/32	TVAN-1402.1
10	150	3/4 x 1 13/32	TVAN-1406.1
40	150	3/4 x 2 1/8	TVAN-1413.1
2	200	1/2 x 1 13/32	TVAN-1435.1
4	200	1 x 1 29/32	TVAN-1436
60	200	1 x 2 21/32	TVAN-1440
1	300	1/2 x 1 13/32	TVAN-1560
20	300	7/8 x 1 29/32	TVAN-1568
5	350	3/4 x 1 21/32	TVAN-1602
10	350	1 x 1 29/32	TVAN-1604.1
20	350	1 x 2 5/32	TVAN-1608.1
10	400	7/8 x 1 29/32	★TVAN-1650
20	400	1 x 2 5/32	TVAN-1652
10	450	1 x 1 29/32	TVAN-1705.1

DUAL UNITS

μF	WVDC	Dia. x Length	Cat. No.
1500-1000	20-20	1 1/16x 3 7/16	TVA-2175
2000-500	30-30	1 1/4 x 3 3/8	†TVA-2231
3000-1000	30-30	1 1/2 x 3 5/8	†TVA-2232.1
5000-1000	30-30	1 1/2 x 4 3/8	†TVA-2235
10-10	50-50	13/16 x 1 5/16	★TVA-2315
100-500	75-75	1 1/2 x 3 7/8	†TVA-2330
200-150	85-25	15/16 x 2 5/16	TVA-2335
15-25	150-25	7/8 x 1 3/16	TVA-2345
350-100	150-50	1 1/8 x 3 5/8	†TVA-2358
16-16	150-150	13/16 x 1 9/16	★TVA-2420
30-20	150-150	7/8 x 1 7/16	★TVA-2421
20-12	150-150	13/16 x 1 9/16	★TVA-2425
20-20	150-150	3/4 x 1 7/16	★TVA-2428
30-30	150-150	7/8 x 1 7/16	★TVA-2434
40-20	150-150	7/8 x 1 7/16	★TVA-2438

★Mounting Strap Attached. *Single-ended with two 8-inch flexible leads. †Kraftboard Case Construction. IND-SERV-EEM-6-EFAI Sizes subject to change without notice.

SPRAGUE CAPACITORS

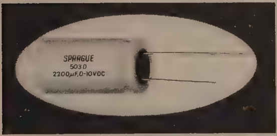
TYPE TVA ATOM® ELECTROLYTICS - Continued

µF	WVDC	Dia. x Length	Cat. No.
DUAL UNITS – Continued			
40-30	150-150	15/16 x 1 13/16	★TVA-2442
40-40	150-150	7/8 x 1 15/16	★TVA-2445
50-30	150-150	7/8 x 1 15/16	★TVA-2450
50-50	150-150	7/8 x 1 15/16	★TVA-2453
60-20	150-150	7/8 x 1 15/16	★TVA-2455
60-40	150-150	15/16 x 2 13/16	★TVA-2456
60-60	150-150	15/16 x 2 13/16	★TVA-2457
80-20	150-150	7/8 x 2 7/16	★TVA-2459
80-30	150-150	7/8 x 2 3/16	★TVA-2460
80-40	150-150	7/8 x 2 7/16	★TVA-2461
80-50	150-150	7/8 x 2 7/16	★TVA-2462
100-50	150-150	1 x 2 11/16	★TVA-2463
100-100	150-150	1 3/8 x 3 3/8	†TVA-2464
130-20	150-150	15/16 x 2 13/16	TVA-2464.8
150-20	150-150	1 x 2 11/16	TVA-2465.5
150-50	150-150	1 1/16x 2 13/16	TVA-2465.8
150-150	150-150	1 3/8 x 3 1/8	†TVA-2466
200-5	150-150	1 x 3 7/16	★TVA-2467

µF	WVDC	D. x L.	Cat. No.
200-100	150-150	1 3/8 x 3 7/8	†★TVA-2470
250-50	150-150	1 3/8 x 2 7/8	†TVA-2473
425-20	150-150	1 3/8 x 3 3/8	†TVA-2473.5
250-200	150-150	1 3/8 x 3 7/8	†TVA-2475
60-125	200-50	1 1/8 x 2 7/8	†★TVA-2484
60-1	200-200	15/16 x 2 5/16	★TVA-2493
200-5	200-200	1 x 3 11/16	★TVA-2498
20-20	250-250	15/16 x 1 13/16	★TVA-2515
40-10	250-250	7/8 x 1 15/16	★TVA-2520
80-10	250-250	1 x 2 3/16	★TVA-2525
120-80	250-250	1 3/8 x 3 1/8	†TVA-2535
140-100	300-50	1 3/8 x 3 3/8	†TVA-2563
200-100	300-50	1 3/8 x 3 7/8	†★TVA-2565
60-32	300-300	1 1/16x 3 1/16	★TVA-2585
150-100	300-300	1 3/8 x 4 3/8	†TVA-2590
150-100	350-25	1 1/2 x 3 1/8	TVA-2622
30-5	350-350	15/16 x 2 5/16	TVA-2635.5
30-20	350-350	1 x 1 15/16	TVA-2636
140-5	350-350	1 1/4 x 3 7/8	†★TVA-2640

µF	WVDC	D. x L.	Cat. No.
10-100	450-50	15/16 x 2 5/16	★TVA-2663
8-8	450-450	15/16 x 1 13/16	★TVA-2720
10-10	450-450	7/8 x 1 15/16	★TVA-2722
16-8	450-450	15/16 x 2 5/16	★TVA-2725
20-20	450-450	7/8 x 2 11/16	TVA-2730
30-30	450-450	1 x 3 3/16	★TVA-2735
40-40	450-450	1 x 3 15/16	★TVA-2740
50-30	450-450	1 x 3 15/16	★TVA-2743
80-30	450-450	1 x 4 7/16	★TVA-2750
20-100	475-50	1 1/16x 2 9/16	★TVA-2765
DUAL UNITS – separate sections – 4 leads (available until present stocks are exhausted)			
20-20	150-150	1 x 2 3/8	TU-220
40-20	150-150	1 1/16 x 2 5/8	TU-420
120-120	150-150	1 1/16 x 4	TU-2120
16-16	250-250	1 x 2 7/8	TU-216
8-8	450-450	1 1/16 x 3 3/8	TU-88
16-16	450-450	1 3/8 x 3 1/8	TU-1616

TYPE 503D VERTI-LYTIC® MINIATURE ELECTROLYTICS



- Made in Hong Kong by Sprague World Trade Corp. to meet the demand for low-cost capacitors in high-density applications.
- Metal-encased, with plastic insulating sleeve.
- Designed for 85 C operation.
- Excellent capacitance stability and ESR.
- Low leakage current.
- For complete technical data, refer to latest issue of Engineering Bulletin 3153.

µF	D. x L.	Cat. No.
0-6 WVDC, 8 V SURGE		
47	.236 x .433	503D476G6R3AS
100	.315 x .492	503D107G6R3BB
470	.394 x .787	503D477G6R3CG
680	.512 x .787	503D687G6R3DG
1000	.512 x .984	503D108G6R3DK
1500	.630 x .984	503D158G6R3EK
2200	.630 x 1.240	503D228G6R3ER
3300	.630 x 1.614	503D338G6R3ET
0-10 WVDC, 13, V SURGE		
33	.236 x .433	503D336G010AS
68	.315 x .492	503D686G010BB
100	.394 x .492	503D107G010CB
150	.394 x .492	503D157G010CB
220	.394 x .630	503D227G010CD
330	.394 x .787	503D337G010CG
470	.512 x .787	503D477G010DG
680	.512 x .984	503D687G010DK
1000	.630 x .984	503D108G010EK
1500	.630 x 1.240	503D158G010ER
2200	.630 x 1.437	503D228G010EU
0-16 WVDC, 20 V SURGE		
6.8	.197 x .433	503D685G016HS
10	.197 x .433	503D106G016HS
15	.236 x .433	503D156G016AS
22	.236 x .433	503D226G016AS
47	.315 x .492	503D476G016BB
68	.394 x .492	503D686G016CB
100	.394 x .630	503D107G016CD
150	.394 x .630	503D157G016CD

µF	D. x L.	Cat. No.
220	.394 x .787	503D227G016CG
330	.512 x .787	503D337G016DG
470	.512 x .984	503D477G016DK
680	.630 x .984	503D687G016EK
1000	.630 x 1.240	503D108G016ER
1500	.630 x 1.614	503D158G016ET
0-25 WVDC, 32 V SURGE		
0.47	.197 x .433	503D474G025HS
0.68	.197 x .433	503D684G025HS
1.0	.197 x .433	503D105G025HS
1.5	.197 x .433	503D155G025HS
2.2	.197 x .433	503D225G025HS
3.3	.197 x .433	503D335G025HS
4.7	.197 x .433	503D475G025HS
6.8	.236 x .433	503D685G025AS
10	.236 x .433	503D106G025AS
15	.315 x .492	503D156G025BB
22	.315 x .492	503D226G025BB
33	.315 x .492	503D336G025BB
47	.394 x .492	503D476G025CB
68	.394 x .630	503D686G025CD
100	.394 x .787	503D107G025CG
150	.512 x .787	503D157G025DG
220	.512 x .787	503D227G025DG
330	.512 x 984	503D337G025DK
470	.630 x .984	503D477G025EK
680	.630 x 1.240	503D687G025ER
1000	.630 x 1.437	503D108G025EU
0-35 WVDC, 44 V SURGE		
6 8	236 x 433	503D685G035AS
33	.394 x .492	503D336G035CB
47	.394 x .630	503D476G035CD
150	.512 x .787	503D157G035DG

µF	D. x L.	Cat. No.
220	.512 x .984	503D227G035DK
330	.630 x .984	503D337G035EK
470	.630 x 1.240	503D477G035ER
680	.630 x 1.437	503D687G035EU
0-50 WVDC, 63 V SURGE		
2.2	.197 x .433	503D225G050HS
4.7	.236 x .433	503D475G050AS
15	.315 x .492	503D156G050BB
33	.394 x .630	503D336G050CD
68	.394 x .787	503D686G050CG
100	.512 x .787	503D107G050DG
220	.630 x .984	503D227G050EK
330	.630 x 1.240	503D337G050ER
470	.630 x 1.614	503D477G050ET
0-63 WVDC, 73 V SURGE		
0.47	.197 x .433	503D474G063HS
0.68	.197 x .433	503D684G063HS
1.0	.197 x .433	503D105G063HS
1.5	.197 x .433	503D155G063HS
2.2	.236 x .433	503D225G063AS
3.3	.236 x .433	503D335G063AS
4.7	.315 x .492	503D475G063BB
6.8	.315 x .492	503D685G063BB
10	.315 x .492	503D106G063BB
15	.394 x .492	503D156G063CB
22	.394 x .492	503D226G063CB
33	.394 x .787	503D336G063CG
47	.394 x .787	503D476G063CG
68	.512 x .787	503D686G063DG
100	.512 x .984	503D107G063DK
150	.630 x .984	503D157G063EK
220	.630 x 1.437	503D227G063EU
330	.630 x 1.614	503D337G063ET

★Mounting Strap Attached. †Kraftboard Case Construction.

EEM-21-EFAI

Sizes subject to change without notice.

SPRAGUE CAPACITORS

TYPE TVL TWIST-LOK® ELECTROLYTICS

- Capacitors to 475V Operate up to 85 C (185 F). Higher Voltage Units Designed for 65 C
- Withstand High Surge Voltages
- Etched Cathode Construction. Ideal for High Ripple Selenium Rectifier Circuits
- Can be Mounted "Above Ground" Using Phenolic Mounting Plate and Insulating Tube
- Units Noted by † Sign are Exact Replacements for Color TV
- Catalog numbers with a TVLP Prefix Indicate Units with a Common Positive.

For a more complete line of over 600 Type TVL Capacitors, refer to Sprague Catalog C-563.

SINGLE UNITS

μF	WVDC	D. x L.	Cat. No.
†1000	15	1 x 1½	TVL-1165
2000	15	1⅜ x 2	TVL-1168
3000	15	1⅜ x 2	TVL-1170
4000	15	1⅜ x 2	TVL-1173
500	25	1 x 1½	TVL-1220
1000	25	1⅜ x 2	TVL-1230
†2000	25	1⅜ x 1¾	TVL-1242
†400	35	1 x 1¾	TVL-1256
†3000	35	1⅜ x 2½	TVL-1269
100	50	¾ x 2	TVL-1317
250	50	1 x 2	TVL-1324
†500	50	1⅜ x 2	TVL-1330
†500	50	1 x 1¾	TVL-1330.1
†1000	50	1⅜ x 2½	TVL-1338
†1500	50	1⅜ x 2½	TVL-1341
2000	50	1⅜ x 2½	TVLP-1342
†50	150	1 x 1½	TVL-1415
100	150	1 x 1½	TVL-1423
120	150	1 x 2	TVL-1425
140	150	1 x 2½	TVL-1428
150	150	1 x 2	TVL-1429
150	150	1⅜ x 2	TVL-1430
200	150	1⅜ x 2	TVL-1431
200	150	1 x 3	TVL-1431.1
300	150	1⅜ x 2	TVL-1434
†500	150	1⅜ x 3½	TVL-1439.5
†120	200	1⅜ x 2	TVL-1469
125	200	1 x 2½	TVL-1470
150	200	1 x 3	TVL-1741
†150	200	1⅜ x 2	TVL-1471.1
160	200	1⅜ x 2	TVL-1473
†200	200	1⅜ x 2	TVL-1475
†200	200	1 x 3½	TVL-1475.1
†220	200	1 x 3½	TVL-1476
†300	200	1⅜ x 4	TVL-1480
†400	200	1⅜ x 3½	TVL-1485
†500	200	1⅜ x 4	TVL-1490
20	250	1 x 1½	TVL-1509
40	250	1 x 2	TVL-1519
80	250	1 x 2	TVL-1530
100	250	1 x 3	TVL-1535
150	250	1 x 2½	TVL-1539
150	250	1⅜ x 2	TVL-1540
†160	250	1⅜ x 2½	TVL-1541
†160	250	1 x 3½	TVL-1541.1
†200	250	1⅜ x 2½	TVL-1547
†250	250	1⅜ x 4	TVL-1548
†300	250	1⅜ x 2½	TVL-1550
†80	300	1 x 2½	TVL-1573
100	300	1 x 2½	TVL-1578
150	300	1⅜ x 3½	TVL-1584
160	300	1⅜ x 2½	TVL-1585
†200	300	1⅜ x 3	TVL-1586
†250	300	1⅜ x 3	TVL-1590
40	350	1 x 2	TVL-1621
50	350	1 x 2	TVL-1622
80	350	1⅜ x 2	TVL-1630
†100	350	1⅜ x 2	TVL-1635
125	350	1⅜ x 2½	TVL-1638
†150	350	1⅜ x 2½	TVL-1642
†200	350	1⅜ x 3½	TVL-1643
†250	350	1⅜ x 3½	TVL-1644.2
†320	350	1⅜ x 4	TVL-1645
10	450	1 x 1½	TVL-1705
20	450	1 x 2	TVL-1714
30	450	1 x 2½	TVL-1720
40	450	1 x 2½	TVL-1725
†50	450	1 x 2½	TVL-1728
†70	450	1⅜ x 3	TVL-1734
†80	450	1⅜ x 2½	TVL-1735
100	450	1⅜ x 2½	TVL-1750
125	450	1⅜ x 3	TVL-1760
†150	450	1⅜ x 3½	TVL-1770
160	450	1⅜ x 4	TVL-1772
†90	475	1⅜ x 3½	TVL-1850
30	500	1 x 2½	TVL-1947
40	500	1 x 2½	TVL-1950
†80	500	1⅜ x 2½	TVL-1958
†90	500	1⅜ x 2½	TVL-1960
†100	500	1⅜ x 3	TVL-1962

DUAL UNITS

μF	WVDC	D. x L.	Cat. No.
†1000-1000	15-15	1⅜ x 2½	TVL-2161
†500-500	25-25	1⅜ x 2	TVL-2233
1000-500	25-25	1⅜ x 2	TVL-2239
†500-500	35-35	1⅜ x 2	TVL-2245.5
100-100	50-50	1 x 1½	TVL-2326
†1000-1000	50-50	1⅜ x 2½	TVL-2335.4
40-40	150-150	1 x 1½	TVL-2428
50-30	150-150	1 x 1½	TVL-2432
†50-50	150-150	1 x 1½	TVL-2435
70-30	150-150	1 x 2	TVL-2439
80-50	150-150	1 x 2	TVL-2442.1
200-200	150-150	1⅜ x 2½	TVL-2447
†50-250	175-175	1⅜ x 2	TVL-2449.5
60-60	200-200	1 x 1¾	TVL-2461
100-100	200-200	1⅜ x 3	TVL-2464
†250-100	200-200	1⅜ x 3	TVL-2475
300-300	200-200	1⅜ x 4	TVL-2475.5
20-20	250-250	1 x 1½	TVL-2515
40-40	250-250	1 x 1¾	TVL-2520
†150-150	250-250	1⅜ x 2½	TVL-2535
†200-200	250-250	1⅜ x 4	TVL-2538
150-250	300-150	1⅜ x 3	TVL-2560.7
150-100	300-300	1⅜ x 3	TVL-2591
200-100	300-300	1⅜ x 4	TVL-2595
20-20	350-350	1 x 2	TVL-2626
30-30	350-350	1 x 2½	TVL-2628
†50-10	350-350	1 x 3	TVL-2629
†50-30	350-350	1⅜ x 2	TVL-2630
80-40	350-350	1⅜ x 2½	TVL-2634
†80-80	350-350	1⅜ x 2½	TVL-2635
†100-40	350-350	1⅜ x 3	TVL-2638
100-60	350-350	1⅜ x 2½	TVL-2639
†100-100	350-350	1⅜ x 3	TVL-2641
†150-100	350-350	1⅜ x 3½	TVL-2642.4
†150-150	350-350	1⅜ x 4	TVL-2642.5
160-10	350-350	1⅜ x 3	TVL-2643
†200-200	350-350	1⅜ x 4½	TVL-2645.5
†300-20	350-350	1⅜ x 4	TVL-2645.7
80-80	400-200	1⅜ x 3½	TVL-2656
†100-80	400-350	1⅜ x 4	TVL-2657.16
†60-60	400-400	1⅜ x 3	TVL-2668
†100-100	400-400	1⅜ x 4	TVL-2678.5
†80-40	450-200	1⅜ x 3	TVL-2720
†20-160	450-250	1⅜ x 2½	TVL-2722.7
†80-200	450-250	1⅜ x 4½	TVL-2722.8
†90-200	450-250	1⅜ x 4	TVL-2723
†10-50	450-350	1⅜ x 2	TVL-2726
†80-2	450-350	1⅜ x 2½	TVL-2738.5
†10-10	450-450	1 x 2	TVL-2750
†20-20	450-450	1 x 2½	TVL-2755
†30-10	450-450	1 x 2½	TVL-2757
30-30	450-450	1⅜ x 2	TVL-2759
†40-20	450-450	1⅜ x 2	TVL-2762
†40-40	450-450	1⅜ x 2½	TVL-2764
†50-50	450-450	1⅜ x 3	TVL-2767
60-20	450-450	1⅜ x 3	TVL-2768
†60-60	450-450	1⅜ x 3	TVL-2772
80-10	450-450	1⅜ x 3	TVL-2776
80-20	450-450	1⅜ x 2½	TVL-2776.5
†80-40	450-450	1⅜ x 3½	TVL-2778
†80-50	450-450	1⅜ x 3½	TVL-2778.5
†80-80	450-450	1⅜ x 3½	TVL-2779
†100-40	450-450	1⅜ x 3½	TVL-2780
†100-60	450-450	1⅜ x 4	TVL-2782
†100-100	450-450	1⅜ x 4	TVL-2782.5
†120-20	450-450	1⅜ x 3½	TVL-2783
†80-80	475-250	1⅜ x 3½	TVL-2807.8
†80-160	475-250	1⅜ x 4½	TVL-2808
20-20	500-500	1⅜ x 2	TVL-2935
30-30	500-500	1⅜ x 2	TVL-2937
40-40	500-500	1⅜ x 2½	TVL-2940
60-40	500-500	1⅜ x 3½	TVL-2944

TRIPLE UNITS

μF	WVDC	D. x L.	Cat. No.
850-400-4	16-16-11.5	1 x 2½	TVL-3021
†600-400-100	100-100-100	1⅜ x 4	TVL-3402.6
40-30-20	150-150-150	1 x 2	TVL-3438
40-40-40	150-150-150	1 x 1¾	TVL-3440
50-50-50	150-150-150	1 x 2	TVL-3442
60-40-20	150-150-150	1 x 1¾	TVL-3443
80-40-20	150-150-150	1 x 2	TVL-3444
†250-200-50	150-150-150	1⅜ x 3½	TVL-3453.8
†250-200-50	175-175-175	1⅜ x 4	TVL-3454.12
200-200-40	200-150-150	1⅜ x 3	TVL-3461.7
250-200-50	200-150-150	1⅜ x 3½	TVL-3461.8
200-150-150	200-200-200	1⅜ x 4	TVL-3489.3
250-100-5	200-200-200	1⅜ x 3	TVL-3489.5
250-200-10	200-200-200	1⅜ x 4	TVL-3490
†250-200-50	200-200-200	1⅜ x 3½	TVL-3491
†4-80-10	300-175-150	1 x 2	TVL-3560.21
80-10-200	300-300-200	1⅜ x 3	TVL-3577.9
80-40-40	300-300-300	1⅜ x 2½	TVL-3583
200-100-2	300-300-300	1⅜ x 4	TVL-3588
150-100-100	350-350-50	1⅜ x 4½	TVL-3628.5
†250-3-200	350-350-25	1⅜ x 4	TVL-3636.18
150-5-100	350-350-50	1⅜ x 2½	TVL-3637.3
100-150-200	350-350-25	1⅜ x 3½	TVL-3637.10

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EEM-22-EFAI

† Exact replacement for Color TV

Sizes subject to change without notice.

SPRAGUE CAPACITORS

TVL TWIST-LOK ELECTROLYTICS, continued

µF	WVDC	D. x L.	Cat. No.
†50-50-50	350-350-350	1⅜ x 3½	TVL-3639.9
60-40-20	350-350-350	1⅜ x 2½	TVL-3640
80-60-60	350-350-350	1⅜ x 3½	TVL-3642
†100-100-40	350-350-350	1⅜ x 4	TVL-3646.5
140-140-20	350-350-350	1⅜ x 4	TVL-3648
†200-300-4	350-350-350	1⅜ x 3½	TVL-3648.5
†200-80-120	350-350-350	1⅜ x 4½	TVL-3648.6
†160-100-60	350-350-350	1⅜ x 4½	TVL-3648.7
†400-40-25	350-350-350	1⅜ x 4½	TVL-3648.9
80-80-200	400-200-25	1⅜ x 3	TVL-3651.8
80-80-100	400-200-50	1⅜ x 3	TVL-3652
10-4-20	400-350-25	1 x 2	TVL-3668
80-40-100	400-400-50	1⅜ x 3	TVL-3683
80-40-150	400-400-50	1⅜ x 4	TVL-3684
100-10-80	400-400-350	1⅜ x 3½	TVL-3689.3
†100-30-20	400-400-400	1⅜ x 4	TVL-3697
†50-160-50	450-250-50	1⅜ x 4	TVL-3711.2
†20-160-40	450-250-150	1⅜ x 3½	TVL-3711.3
†50-10-160	450-350-250	1⅜ x 4½	TVL-3719.4
†80-2-25	450-350-25	1⅜ x 2½	TVL-3719.10
†80-50-100	450-350-200	1⅜ x 3½	TVL-3723.7
†20-20-20	450-350-350	1 x 3½	TVL-3724.12
†150-50-10	250-450-400	1⅜ x 4	TVL-3725.11
10-10-20	450-450-25	1 x 2	TVL-3731
20-20-20	450-450-25	1 x 3	TVL-3739
†80-65-50	450-450-50	1⅜ x 3½	TVL-3754.9
†80-20-100	450-450-50	1⅜ x 3	TVL-3757
†80-50-50	450-450-50	1⅜ x 4	TVL-3757.1
†50-80-250	450-450-50	1⅜ x 4	TVL-3757.4
†50-5-50	450-450-350	1⅜ x 3	TVL-3774.5
†50-20-4	450-450-350	1 x 3½	TVL-3774.6
†10-80-80	400-450-450	1⅜ x 4½	TVL-3775.7
†80-80-20	450-450-400	1⅜ x 3½	TVL-3775.9
10-10-10	450-450-450	1 x 2	TVL-3776
15-15-15	450-450-450	1 x 2½	TVL-3778.2
†20-20-20	450-450-450	1⅜ x 2	TVL-3780
†30-20-20	450-450-450	1⅜ x 2½	TVL-3781
30-30-30	450-450-450	1⅜ x 3	TVL-3782
†40-10-10	450-450-450	1⅜ x 2	TVL-3783
40-30-20	450-450-450	1⅜ x 2½	TVL-3784
40-40-10	450-450-450	1⅜ x 2½	TVL-3785
40-40-20	450-450-450	1⅜ x 2½	TVL-3786
40-40-40	450-450-450	1⅜ x 3	TVL-3787
†50-20-4	450-450-450	1 x 3½	TVL-3787.5
†60-20-20	450-450-450	1⅜ x 3	TVL-3789
60-40-20	450-450-450	1⅜ x 3	TVL-3791
†60-50-30	450-450-450	1⅜ x 3½	TVL-3791.3
†60-60-20	450-450-450	1⅜ x 3½	TVL-3791.4
†80-30-20	450-450-450	1⅜ x 3½	TVL-3791.8
†80-40-20	450-450-450	1⅜ x 3	TVL-3793
†80-50-30	450-450-450	1⅜ x 4	TVL-3793.3
†80-50-20	450-450-450	1⅜ x 3½	TVL-3793.4
†100-50-20	450-450-450	1⅜ x 4½	TVL-3793.8
40-80-10	475-450-450	1⅜ x 3½	TVL-3816
†50-40-40	475-475-25	1⅜ x 3½	TVL-3816.11
†50-18-40	475-475-25	1⅜ x 2½	TVL-3816.12
†18-10-40	475-475-25	1⅜ x 2	TVL-3816.13
†80-10-18	475-475-475	1⅜ x 3½	TVL-3875
†80-30-10	475-475-475	1⅜ x 3	TVL-3877
30-20-20	500-500-500	1⅜ x 2½	TVL-3956

QUADRUPLE UNITS

µF	WVDC	D. x L.	Cat. No.
†200-500-500-500	125-100-60-35	1⅜ x 3½	TVL-4358
†200-200-100-10	150-150-150-75	1⅜ x 2½	TVL-4440.3
250-200-10-10	175-175-150-150	1⅜ x 3½	TVL-4449
300-200-20-20	175-175-150-150	1⅜ x 4½	TVL-4449.2
200-200-60-30	175-175-175-175	1⅜ x 3½	TVL-4450
†200-200-200-30	175-175-175-175	1⅜ x 4½	TVL-4451
250-400-50-5	200-175-175-175	1⅜ x 4½	TVL-4468
†80-450-150-5	200-200-175-175	1⅜ x 4½	TVL-4469.5
240-240-160-5	200-200-200-200	1⅜ x 4½	TVL-4479.4
240-180-160-5	200-200-200-200	1⅜ x 4½	TVL-4479.8
250-200-40-10	200-200-200-200	1⅜ x 3½	TVL-4479.10
250-200-20-10	200-200-200-200	1⅜ x 3½	TVL-4479.11
160-450-60-5	200-200-200-200	1⅜ x 4½	TVL-4479.14
250-200-10-10	250-250-250-250	1⅜ x 4	TVL-4541
250-200-40-10	250-250-250-250	1⅜ x 4	TVL-4542
40-40-20-10	300-300-300-300	1⅜ x 2	TVL-4579
†50-500-500-200	350-50-25-25	1⅜ x 2½	TVL-4596
†100-500-500-200	350-50-25-25	1⅜ x 3	TVL-4599
†200-40-100-20	350-50-50-50	1⅜ x 3½	TVL-4599.4
100-150-5-100	350-200-150-50	1⅜ x 3	TVL-4603.7
†10-20-10-50	350-200-200-50	1⅜ x 2	TVL-4603.13
†5-100-20-100	350-200-200-25	1⅜ x 2	TVL-4603.15
†120-100-100-100	350-300-150-75	1⅜ x 4	TVL-4604.15
†180-80-150-100	350-200-200-200	1⅜ x 4½	TVL-4604.17
150-20-200-120	350-350-175-175	1⅜ x 4	TVL-4608.10
†100-50-100-100	350-350-200-50	1⅜ x 3½	TVL-4608.11
†5-20-100-100	350-350-200-50	1⅜ x 2	TVL-4608.12
100-60-10-100	350-350-200-150	1⅜ x 4½	TVL-4609.4
150-100-20-100	350-350-350-25	1⅜ x 4½	TVL-4622.9
†250-20-20-50	350-350-350-25	1⅜ x 4½	TVL-4622.11
†150-100-10-60	350-350-350-50	1⅜ x 4½	TVL-4624.8
150-100-10-100	350-350-350-50	1⅜ x 4	TVL-4633.8
†20-20-20-20	350-350-350-350	1⅜ x 2½	TVL-4634.13
†40-100-200-250	350-350-200-350	1⅜ x 5	TVL-4634.25
†40-40-40-40	350-350-350-350	1⅜ x 4	TVL-4635.3
80-60-40-20	350-350-350-350	1⅜ x 3½	TVL-4635.7
100-100-50-50	350-350-350-350	1⅜ x 4	TVL-4635.15
150-100-50-10	350-350-350-350	1⅜ x 4	TVL-4635.16
†100-150-20-20	350-350-350-350	1⅜ x 4½	TVL-4635.23
†100-250-100-25	350-350-350-350	1⅜ x 4½	TVL-4635.27
80-80-4-100	400-200-150-50	1⅜ x 3½	TVL-4636.3
10-4-4-20	400-350-150-25	1⅜ x 2	TVL-4651.5
40-80-100-25	400-350-200-50	1⅜ x 3	TVL-4654
80-40-100-40	400-400-50-25	1⅜ x 3	TVL-4663.3
80-40-100-20	400-400-50-25	1⅜ x 3	TVL-4663.4
100-10-30-20	400-400-50-50	1⅜ x 2½	TVL-4663.5
†80-10-80-100	400-400-250-50	1⅜ x 3	TVL-4664.8
100-10-20-20	400-400-350-50	1⅜ x 3	TVL-4666.2
80-40-10-100	400-400-400-200	1⅜ x 3½	TVL-4671.2
†80-40-30-4	400-400-400-350	1⅜ x 3	TVL-4672
100-80-10-10	400-400-400-400	1⅜ x 3½	TVL-4683
†100-80-30-10	400-400-400-400	1⅜ x 4½	TVL-4683.8
†100-100-40-10	400-400-400-400	1⅜ x 4½	TVL-4684
†20-160-50-50	450-250-75-50	1⅜ x 4	TVL-4701.3
†80-2-100-25	450-350-25-25	1⅜ x 3	TVL-4705.3
10-140-100-20	450-350-300-300	1⅜ x 4	TVL-4705.9
†50-20-4-40	450-450-150-25	1⅜ x 2½	TVL-4712.9
†50-40-4-40	450-450-150-25	1⅜ x 2½	TVL-4712.10
†80-30-20-50	450-450-250-50	1⅜ x 3½	TVL-4714.2
†30-20-160-40	450-450-250-150	1⅜ x 4	TVL-4714.4
†30-50-100-250	450-450-250-50	1⅜ x 4½	TVL-4714.5
†80-50-20-50	450-450-250-50	1⅜ x 4	TVL-4714.6
†30-20-160-10	450-450-250-250	1⅜ x 4	TVL-4714.10
†80-50-20-150	450-450-250-25	1⅜ x 4	TVL-4714.11
†100-30-20-50	450-450-350-50	1⅜ x 4	TVL-4716.3
†30-20-4-200	450-450-350-250	1⅜ x 4	TVL-4716.4
†80-30-40-40	450-450-350-150	1⅜ x 4	TVL-4716.7
†100-30-20-50	450-450-350-75	1⅜ x 3½	TVL-4716.8
†10-10-10-20	450-450-450-25	1⅜ x 2	TVL-4723
20-20-20-20	450-450-450-25	1⅜ x 2	TVL-4724.2
40-40-40-40	450-450-450-25	1⅜ x 3	TVL-4739
†80-50-10-20	450-450-450-25	1⅜ x 4	TVL-4739.9
†80-30-20-40	450-450-450-150	1⅜ x 4	TVL-4754
†80-80-20-2	450-450-250-450	1⅜ x 4½	TVL-4757.7
†30-20-10-20	450-450-450-350	1⅜ x 2½	TVL-4757.12
†10-10-10-10	450-450-450-450	1⅜ x 2	TVL-4760
20-10-10-10	450-450-450-450	1⅜ x 2	TVL-4761
†20-20-20-20	450-450-450-450	1⅜ x 2½	TVL-4763
30-30-20-20	450-450-450-450	1⅜ x 3	TVL-4769.4
†40-20-20-20	450-450-450-450	1⅜ x 2½	TVL-4771.7
†40-40-20-20	450-450-450-450	1⅜ x 2½	TVL-4773
40-40-30-30	450-450-450-450	1⅜ x 4	TVL-4774
40-40-40-40	450-450-450-450	1⅜ x 3½	TVL-4775
†60-20-20-20	450-450-450-450	1⅜ x 3	TVL-4778
†70-25-5-5	450-450-450-450	1⅜ x 2½	TVL-4781
†80-40-20-20	450-450-450-450	1⅜ x 3½	TVL-4784.1
10-80-40-100	475-400-400-50	1⅜ x 4	TVL-4805.2
†80-4-4-200	475-450-450-25	1⅜ x 4	TVL-4813.2
†80-40-30-10	475-450-450-450	1⅜ x 3½	TVL-4814.4
†50-18-4-40	475-475-150-25	1⅜ x 2½	TVL-4814.7
†30-4-4-200	475-475-475-25	1⅜ x 2	TVL-4818.4
†100-4-4-200	475-475-475-25	1⅜ x 4	TVL-4818.5
†80-4-4-4	475-450-450-450	1⅜ x 3	TVL-4820.3
†50-40-4-40	475-475-150-25	1⅜ x 3½	TVL-4820.4
†80-80-4-4	475-475-450-450	1⅜ x 4½	TVL-4820.5
†80-4-4-200	475-475-475-25	1⅜ x 3½	TVL-4823
20-20-20-20	475-475-475-475	1⅜ x 2½	TVL-4834
40-20-10-10	475-475-475-475	1⅜ x 2½	TVL-4840
†80-4-30-4	475-475-475-475	1⅜ x 3½	TVL-4845

For a more complete line of over 600 Type TVL Capacitors, refer to Sprague Catalog C-563.

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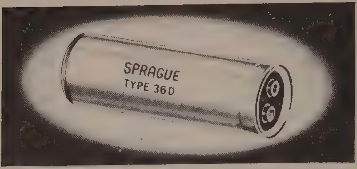
†Exact replacement for Color TV

Sizes subject to change without notice.

SPRAGUE CAPACITORS

TYPE 36D POWERLYTIC® ALUMINUM ELECTROLYTICS



RECOMMENDED FOR REPLACEMENT APPLICATIONS

- Excellent space economy at operating temperatures to 85 C.
- Uses most reliable seal developed by Sprague for aluminum 'lytic capacitors.
- Low ESR, low leakage currents.
- Pressure-type safety vents employing silicone rubber are used on all cases.
- Extremely long shelf life.
- For technical data, refer to Sprague Engineering Bulletin 3431.

μF	Size Code	Catalog Number*
3 WVDC, 4 VDC SURGE		
10000	AA	36D103G003AA2A
20000	AB	36D203G003AB2A
30000	AC	36D303G003AC2A
36000	AD	36D363G003AD2A
41000	AE	36D413G003AE2A
46000	AF	36D463G003AF2A
47000	BB	36D473G003BB2A
70000	BC	36D703G003BC2A
80000	CB	36D803G003CB2A
82000	BD	36D823G003BD2A
94000	BE	36D943G003BE2A
100000	BF	36D104G003BF2A
120000	CC	36D124G003CC2A
140000	CD	36D144G003CD2A
160000	CE	36D164G003CE2A
170000	DC	36D174G003DC2A
180000	CF	36D184G003CF2A
200000	DD	36D204G003DD2A
230000	DE	36D234G003DE2A
270000	DF	36D274G003DF2A
6 WVDC, 8 VDC SURGE		
7000	AA	36D702G006AA2A
14000	AB	36D143G006AB2A
21000	AC	36D213G006AC2A
25000	AD	36D253G006AD2A
29000	AE	36D293G006AE2A
32000	AF	36D323G006AF2A
33000	BB	36D333G006BB2A
50000	BC	36D503G006BC2A
57000	CB	36D573G006CB2A
58000	BD	36D583G006BD2A
66000	BE	36D663G006BE2A
75000	BF	36D753G006BF2A
86000	CC	36D863G006CC2A
100000	CD	36D104G006CD2A
110000	CE	36D114G006CE2A
120000	DC	36D124G006DC2A
140000	DD	36D144G006DD2A
160000	DE	36D164G006DE2A
190000	DF	36D194G006DF2A
10 WVDC, 12 VDC SURGE		
6000	AA	36D602G010AA2A
12000	AB	36D123G010AB2A
18000	AC	36D183G010AC2A
21000	AD	36D213G010AD2A
24000	AE	36D243G010AE2A
27000	AF	36D273G010AF2A
28000	BB	36D283G010BB2A
42000	BC	36D423G010BC2A
48000	CB	36D483G010CB2A
49000	BD	36D493G010BD2A
56000	BE	36D563G010BE2A
63000	BF	36D633G010BF2A
72000	CC	36D723G010CC2A
84000	CD	36D843G010CD2A
96000	CE	36D963G010CE2A
100000	CF	36D104G010CF2A
100000	DC	36D104G010DC2A
120000	DD	36D124G010DD2A
140000	DE	36D144G010DE2A
160000	DF	36D164G010DF2A
15 WVDC, 18 VDC SURGE		
4600	AA	36D462G015AA2A
9200	AB	36D922G015AB2A
13000	AC	36D133G015AC2A
16000	AD	36D163G015AD2A
18000	AE	36D183G015AE2A
20000	AF	36D203G015AF2A
21000	BB	36D213G015BB2A
31000	BC	36D313G015BC2A
36000	CB	36D363G015CB2A
37000	BD	36D373G015BD2A
42000	BE	36D423G015BE2A
47000	BF	36D473G015BF2A
54000	CC	36D543G015CC2A
63000	CD	36D633G015CD2A
72000	CE	36D723G015CE2A
80000	DC	36D803G015DC2A
81000	CF	36D813G015CF2A
93000	DD	36D933G015DD2A
100000	DE	36D104G015DE2A
120000	DF	36D124G015DF2A
25 WVDC, 30 VDC SURGE		
2700	AA	36D272G025AA2A
5500	AB	36D552G025AB2A
8200	AC	36D822G025AC2A
9600	AD	36D962G025AD2A
11000	AE	36D113G025AE2A
12000	AF	36D123G025AF2A
18000	BC	36D183G025BC2A
21000	CB	36D213G025CB2A
22000	BD	36D223G025BD2A
25000	BE	36D253G025BE2A
28000	BF	36D283G025BF2A
32000	CC	36D323G025CC2A
38000	CD	36D383G025CD2A
43000	CE	36D433G025CE2A
47000	DC	36D473G025DC2A
48000	CF	36D483G025CF2A
55000	DD	36D553G025DD2A
63000	DE	36D633G025DE2A
71000	DF	36D713G025DF2A
30 WVDC, 40 VDC SURGE		
2000	AA	36D202G030AA2A
4000	AB	36D402G030AB2A
6000	AC	36D602G030AC2A
7200	AD	36D722G030AD2A
8300	AE	36D832G030AE2A
9300	AF	36D932G030AF2A
9500	BB	36D952G030BB2A
14000	BC	36D143G030BC2A
16000	BD	36D163G030BD2A
19000	BE	36D193G030BE2A
21000	BF	36D213G030BF2A
24000	CC	36D243G030CC2A
28000	CD	36D283G030CD2A
32000	CE	36D323G030CE2A
36000	DC	36D363G030DC2A
37000	CF	36D373G030CF2A
42000	DD	36D423G030DD2A
48000	DE	36D483G030DE2A
54000	DF	36D543G030DF2A
40 WVDC, 50 VDC SURGE		
1800	AA	36D182G040AA2A
3600	AB	36D362G040AB2A
5500	AC	36D552G040AC2A
6400	AD	36D642G040AD2A
7300	AE	36D732G040AE2A
8300	AF	36D832G040AF2A
8400	BB	36D842G040BB2A
12000	BC	36D123G040BC2A
14000	BD	36D143G040BD2A
16000	BE	36D163G040BE2A
19000	BF	36D193G040BF2A
21000	CC	36D213G040CC2A
25000	CD	36D253G040CD2A
28000	CE	36D283G040CE2A
31000	DC	36D313G040DC2A
32000	CF	36D323G040CF2A
37000	DD	36D373G040DD2A
42000	DE	36D423G040DE2A
48000	DF	36D483G040DF2A
50 WVDC, 65 VDC SURGE		
1300	AA	36D132G050AA2A
2600	AB	36D262G050AB2A
3900	AC	36D392G050AC2A
4600	AD	36D462G050AD2A
5200	AE	36D522G050AE2A
5900	AF	36D592G050AF2A
6000	BB	36D602G050BB2A
9000	BC	36D902G050BC2A
10000	BD	36D103G050BD2A
12000	BE	36D123G050BE2A
13000	BF	36D133G050BF2A
15000	CC	36D153G050CC2A
18000	CD	36D183G050CD2A
20000	CE	36D203G050CE2A
22000	DC	36D223G050DC2A
23000	CF	36D233G050CF2A
26000	DD	36D263G050DD2A
30000	DE	36D303G050DE2A
34000	DF	36D343G050DF2A
75 WVDC, 95 VDC SURGE		
850	AA	36D851G075AA2A
1700	AB	36D172G075AB2A
2500	AC	36D252G075AC2A
3000	AD	36D302G075AD2A
3400	AE	36D342G075AE2A
3800	AF	36D382G075AF2A
3900	BB	36D392G075BB2A
5900	BC	35D592G075BC2A
6700	CB	36D672G075CB2A
6900	BD	36D692G075BD2A
7800	BE	36D782G075BE2A
8800	BF	36D882G075BF2A
10000	CC	36D103G075CC2A
11000	CD	36D113G075CD2A
13000	CE	36D133G075CE2A
14000	DC	36D143G075DC2A
15000	CF	36D153G075CF2A
17000	DD	36D173G075DD2A
20000	DE	36D203G075DE2A
22000	DF	36D223G075DF2A
100 WVDC, 125 VDC SURGE		
450	AA	36D451G100AA2A
900	AB	36D901G100AB2A
1300	AC	36D132G100AC2A
1500	AD	36D152G100AD2A
1800	AE	36D182G100AE2A
2000	AF	36D202G100AF2A
3000	BC	36D302G100BC2A
3500	CB	36D352G100CB2A
3600	BD	36D362G100BD2A
4000	BE	36D402G100BE2A
4500	BF	36D452G100BF2A
5300	CC	36D532G100CC2A
6100	CD	36D612G100CD2A
7000	CE	36D702G100CE2A
7800	CF	36D782G100CF2A
7800	DC	36D782G100DC2A
9100	DD	37D912G100DD2A
10000	DE	36D103G100DE2A
11000	DF	36D113G100DF2A
150 WVDC, 175 VDC SURGE		
300	AA	36D301F150AA2A
600	AB	36D601F150AB2A
900	AC	36D901F150AC2A
1100	AD	36D112F150AD2A
1200	AE	36D122F150AE2A
1300	AF	36D132F150AF2A
1400	BB	36D142F150BB2A
2100	BC	36D212F150BC2A
2400	BD	36D242F150BD2A
2700	BE	36D272F150BE2A
3100	BF	36D312F150BF2A
3600	CC	36D362F150CC2A
4200	CD	36D422F150CD2A
4700	CE	36D472F150CE2A
5300	CF	36D532F150CF2A
5300	DC	36D532F150DC2A
6200	DD	36D622F150DD2A
7000	DE	36D702F150DE2A
7800	DF	36D782F150DF2A
200 WVDC, 250 VDC SURGE		
250	AA	36D251F200AA2A
430	AB	36D431F200AB2A
640	AC	36D641F200AC2A
770	AD	36D771F200AD2A
850	AE	36D851F200AE2A
950	AF	36D951F200AF2A
1400	BC	36D142F200BC2A
1600	CB	36D162F200CB2A
1700	BD	36D172F200BD2A
1900	BE	36D192F200BE2A
2100	BF	36D212F200BF2A
2500	CC	36D252F200CC2A
2900	CD	36D292F200CD2A
3300	CE	36D332F200CE2A
3700	CF	36D372F200CF2A
3700	DC	36D372F200DC2A
4300	DD	36D432F200DD2A
4800	DE	36D482F200DE2A
5500	DF	36D552F200DF2A
250 WVDC, 300 VDC SURGE		
170	AA	36D171F250AA2A
350	AB	36D351F250AB2A
530	AC	36D531F250AC2A
630	AD	36D631F250AD2A
700	AE	36D701F250AE2A
780	AF	36D781F250AF2A
800	BB	36D801F250BB2A
1200	BC	36D122F250BC2A
1300	CB	36D132F250CB2A
1400	BD	36D142F250BD2A
1500	BE	36D152F250BE2A
1700	BF	36D172F250BF2A
2000	CC	36D202F250CC2A
2400	CD	36D242F250DC2A

DIMENSIONS

Code	D. x L.	Code	D. x L.	Code	D. x L.	Code	D. x L.
AA	1.453 x 2.250	AF	1.453 x 5.750	BF	2.078 x 5.750	CF	2.578 x 5.750
AB	1.453 x 3.250	BB	2.078 x 3.250	CB	2.578 x 3.250	DC	3.078 x 4.250
AC	1.453 x 4.250	BC	2.078 x 4.250	CC	2.578 x 4.250	DD	3.078 x 4.750
AD	1.453 x 4.750	BD	2.078 x 4.750	CD	2.578 x 4.750	DE	3.078 x 5.250
AE	1.453 x 5.250	BE	2.078 x 5.250	CE	2.578 x 5.250	DF	3.078 x 5.750
						DJ	3.078 x 8.750

*Capacitors listed have outer plastic-film insulation. For bare case, change 13th character of cat. no. from "2" to "0" and subtract .078" from diameter and .125" from length. Capacitors listed have low-insert terminals. For high-insert or solder-lug terminals, change last character of cat. no. from "A" to "B" or "C," respectively.

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IND-EEM-16D-EFAF

Sizes subject to change without notice.

SPRAGUE CAPACITORS

TYPE 36D POWERLYTIC® ELECTROLYTICS, continued

250 WVDC, 300 VDC SURGE (cont.)

µF	Size Code	Catalog Number*
2700	CE	36D272F250CE2A
3000	CF	36D302F250CF2A
3000	DC	36D302F250DC2A
3500	DD	36D352F250DD2A
4000	DE	36D402F250DE2A
4500	DF	36D452F250DF2A

300 WVDC, 350 VDC SURGE

µF	Size Code	Catalog Number*
120	AA	36D121F300AA2A
240	AB	36D241F300AB2A
370	AC	36D3/1F300AC2A
450	AD	36D451F300AD2A
500	AE	36D501F300AE2A
550	AF	36D551F300AF2A
820	BC	36D821F300BC2A
950	BD	36D951F300BD2A
1100	BE	36D112F300BE2A
1200	BF	36D122F300BF2A
1400	CC	36D142F300CC2A
1600	CD	36D162F300CD2A
1800	CE	36D182F300CE2A
2100	CF	36D212F300CF2A
2100	DC	36D212F300DC2A

300 WVDC, 350 VDC SURGE (cont.)

µF	Size Code	Catalog Number*
2400	DD	36D242F300DD2A
2700	DE	36D272F300DE2A
3100	DF	36D312F300DF2A

350 WVDC, 400 VDC SURGE

µF	Size Code	Catalog Number*
95	AA	36D950F350AA2A
190	AB	36D191F350AB2A
290	AC	36D291F350AC2A
360	AD	36D361F350AD2A
390	AE	36D391F350AE2A
420	BB	36D421F350BB2A
440	AF	36D441F350AF2A
650	BC	36D651F350BC2A
750	CB	36D/51F350CB2A
780	BD	36D781F350BD2A
880	BE	36D881F350BE2A
1000	BF	36D102F350BF2A
1100	CC	36D112F350CC2A
1300	CD	36D132F350CD2A
1500	CE	36D152F350CE2A
1600	DC	36D162F350DC2A
1700	CF	36D172F350CF2A
1900	DD	36D192F350DD2A

350 WVDC, 400 VDC SURGE (cont.)

µF	Size Code	Catalog Number*
2200	DE	36D222F350DE2A
2500	DF	36D252F350DF2A

400 WVDC, 475 VDC SURGE

µF	Size Code	Catalog Number*
65	AA	36D650F400AA2A
120	AB	36D121F400AB2A
190	AC	36D191F400AC2A
230	AD	36D231F400AD2A
270	AE	36D271F400AE2A
290	BB	36D291F400BB2A
300	AF	36D301F400AF2A
420	BC	36D421F400BC2A
490	CB	36D491F400CB2A
530	BD	36D531F400BD2A
610	BE	36D611F400BE2A
680	BF	36D681F400BF2A
790	CC	36D791F400CC2A
910	CD	36D911F400CD2A
1000	CE	36D102F400CE2A
1000	DC	36D102F400DC2A
1100	CF	36D112F400CF2A
1200	DD	36D122F400DD2A
1400	DE	36D142F400DE2A

400 WVDC, 475 VDC SURGE (cont.)

µF	Size Code	Catalog Number*
1600	DF	36D162F400DF2A

450 WVDC, 525 VDC SURGE

µF	Size Code	Catalog Number*
50	AA	36D500F450AA2A
100	AB	36D101F450AB2A
140	AC	36D141F450AC2A
170	AD	36D171F450AD2A
190	AE	36D191F450AE2A
210	AF	36D211F450AF2A
220	BB	36D221F450BB2A
330	BC	36D331F450BC2A
380	CB	36D381F450CB2A
390	BD	36D391F450BD2A
440	BE	36D441F450BE2A
490	BF	36D491F450BF2A
570	CC	36D571F450CC2A
660	CD	36D661F450CD2A
760	CE	36D761F450CE2A
850	CF	36D851F450CF2A
860	DC	36D861F450DC2A
1000	DD	36D102F450DD2A
1100	DE	36D112F450DE2A
1200	DF	36D122F450DF2A

TYPE 36DX POWERLYTIC® ALUMINUM ELECTROLYTICS

RECOMMENDED FOR NEW EQUIPMENT DESIGNS

- Have extended capacitance ratings (higher capacitance, smaller cases) required in new designs.
- Capacitors listed have outer plastic-film insulation. For bare case, change 14th digit of Cat. No. from "2" to "0". Capacitors listed have low-insert terminals. For high-insert or solder-lug terminals, change last letter from "A" to "B" or "C" respectively.

10 WVDC, 12 VDC SURGE

µF	Size Code	Catalog Number
9000	AA	36DX902G010AA2A
18000	AB	36DX183G010AB2A
27000	AC	36DX273G010AC2A
41000	AF	36DX413G010AF2A
58000	BC	36DX583G010BC2A
88000	BF	36DX883G010BF2A
100000	CC	36DX104G010CC2A
150000	CF	36DX154G010CF2A
150000	DC	36DX154G010DC2A
230000	DF	36DX234G010DF2A
390000	DJ	36DX394G010DJ2A

15 WVDC, 18 VDC SURGE

µF	Size Code	Catalog Number
7500	AA	36DX752G015AA2A
15000	AB	36DX153G015AB2A
22000	AC	36DX223G015AC2A
34000	AF	36DX343G015AF2A
50000	BC	36DX503G015BC2A
75000	BF	36DX753G015BF2A
83000	CC	36DX833G015CC2A
120000	CF	36DX124G015CF2A
120000	DC	36DX124G015DC2A
180000	DF	36DX184G015DF2A
300000	DJ	36DX304G015DJ2A

25 WVDC, 30 VDC SURGE

µF	Size Code	Catalog Number
4500	AA	36DX452G025AA2A
9000	AB	36DX902G025AB2A
13000	AC	36DX133G025AC2A
20000	AF	36DX203G025AF2A
30000	BC	36DX303G025BC2A
45000	BF	36DX453G025BF2A
50000	CC	36DX503G025CC2A
75000	CF	36DX753G025CF2A
75000	DC	36DX753G025DC2A
110000	DF	36DX114G025DF2A
190000	DJ	36DX194G025DJ2A

30 WVDC, 40 VDC SURGE

µF	Size Code	Catalog Number
4000	AA	36DX402G030AA2A
8000	AB	36DX802G030AB2A
12000	AC	36DX123G030AC2A
18000	AF	36DX183G030AF2A
26000	BC	36DX263G030BC2A
39000	BF	36DX393G030BF2A
44000	CC	36DX443G030CC2A
66000	CF	36DX663G030CF2A
66000	DC	36DX663G030DC2A
97000	DF	36DX9/3G030DF2A
160000	DJ	36DX164G030DJ2A

40 WVDC, 50 VDC SURGE

µF	Size Code	Catalog Number
2900	AA	36DX292G040AA2A
5800	AB	36DX582G040AB2A
8700	AC	36DX872G040AC2A
13000	AF	36DX133G040AF2A
20000	BC	36DX203G040BC2A
30000	BF	36DX303G040BF2A
34000	CC	36DX343G040CC2A
51000	CF	36DX513G040CF2A
51000	DC	36DX513G040DC2A
76000	DF	36DX/63G040DF2A
120000	DJ	36DX124G040DJ2A

50 WVDC, 65 VDC SURGE

µF	Size Code	Catalog Number
2400	AA	36DX242G050AA2A
4800	AB	36DX482G050AB2A
7200	AC	36DX722G050AC2A
11000	AF	36DX113G050AF2A
16000	BC	36DX163G050BC2A
24000	BF	36DX243G050BF2A
27000	CC	36DX273G050CC2A
40000	CF	36DX403G050CF2A
41000	DC	36DX413G050DC2A
61000	DF	36DX613G050DF2A
100000	DJ	36DX104G050DJ2A

75 WVDC, 95 VDC SURGE

µF	Size Code	Catalog Number
1400	AA	36DX142G075AA2A
2800	AB	36DX282G075AB2A
4200	AC	36DX422G075AC2A
6300	AF	36DX632G075AF2A
10000	BC	36DX103G075BC2A
15000	BF	36DX153G075BF2A
17000	CC	36DX173G075CC2A
25000	CF	36DX253G075CF2A
25000	DC	36DX253G075DC2A
37000	DF	36DX373G075DF2A
60000	DJ	36DX603G075DJ2A

100 WVDC, 125 VDC SURGE

µF	Size Code	Catalog Number
850	AA	36DX851G100AA2A
1700	AB	36DX172G100AB2A
2600	AC	36DX262G100AC2A
3800	AF	36DX382G100AF2A
5800	BC	36DX582G100BC2A
8700	BF	36DX872G100BF2A
9800	CC	36DX982G100CC2A
15000	CF	36DX153G100CF2A
15000	DC	36DX153G100DC2A
21000	DF	36DX213G100DF2A
36000	DJ	36DX363G100DJ2A

200 WVDC, 250 VDC SURGE

µF	Size Code	Catalog Number
300	AA	36DX301F200AA2A
590	AB	36DX591F200AB2A
850	AC	36DX851F200AC2A
1200	AF	36DX122F200AF2A
1400	BB	36DX142F200BB2A
2000	BC	36DX202F200BC2A
2900	BF	36DX292F200BF2A
3400	CC	36DX342F200CC2A
4900	CF	36DX492F200CF2A
7400	DF	36DX742F200DF2A
12000	DJ	36DX123F200DJ2A

250 WVDC, 300 VDC SURGE

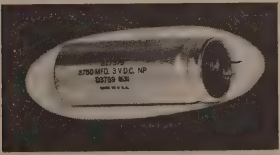
µF	Size Code	Catalog Number
250	AA	36DX251F250AA2A
500	AB	36DX501F250AB2A
740	AC	36DX741F250AC2A
1100	AF	36DX112F250AF2A
1200	BB	36DX122F250BB2A
1700	BC	36DX172F250BC2A
2500	BF	36DX252F250BF2A
2900	CC	36DX292F250CC2A
4200	CF	36DX422F250CF2A
6300	DF	36DX632F250DF2A
10000	DJ	36DX103F250DJ2A

350 WVDC, 400 VDC SURGE

µF	Size Code	Catalog Number
130	AA	36DX131F350AA2A
260	AB	36DX261F350AB2A
380	AC	36DX381F350AC2A
580	AF	36DX581F350AF2A
610	BB	36DX611F350BB2A
880	BC	36DX881F350BC2A
1300	BF	36DX132F350BF2A
1500	CC	36DX152F350CC2A
2200	CF	36DX222F350CF2A
3300	DF	36DX332F350DF2A
5100	DJ	36DX512F350DJ2A

450 WVDC, 525 VDC SURGE

µF	Size Code	Catalog Number
80	AA	36DX800F450AA2A
160	AB	36DX161F45CAB2A
230	AC	36DX231F450AC2A
350	AF	36DX351F450AF2A
380	BB	36DX381F450BB2A
540	BC	36DX541F450BC2A
800	BF	36DX801F450BF2A
930	CC	36DX931F450CC2A
1300	CF	36DX132F450CF2A
2000	DF	36DX202F450DF2A
3100	DJ	36DX312F450DJ2A



SPECIAL PURPOSE ELECTROLYTIC CAPACITORS

- Designed to Filter Low Voltage Power Supplies for Aircraft
- Solder Lug Terminals

µF	D. x L.	VDC	Catalog Number	
1250	1 x 2¾	3NP	D16255	(S17377)†
3750	1⅜ x 3⅝	3NP	D3759	(S17378)†

†Please use "S" number when ordering.

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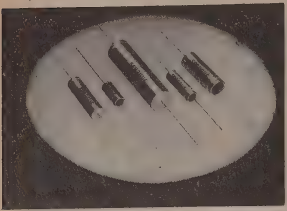
SPRAGUE CAPACITORS

TYPE 39D POWERLYTIC® ELECTROLYTIC CAPACITORS



Designed for applications which require the greatest possible capacitance in small physical case sizes.

- Type 39D capacitors supplement the original Type 36D Can-type Powerlytic line by offering high-capacitance units in axial-lead tubular configuration.
- Welds at all critical anode and cathode terminals eliminate riveted or pressure connections to assure freedom from open circuit even during operation in the microvolt or millivolt signal range.
- Improved molded phenolic end seals.
- Furnished with outer plastic insulating sleeve.
- Operating temperature range, − 20 C to +85 C.
- These capacitors are provided with a pressure-sensitive safety vent.
- Low ESR, low leakage currents.
- Service life, 10 yrs. or more in normal circuit applications.
- For complete technical data, see latest issue of Sprague Engineering Bulletin 3415.

CALL YOUR SPRAGUE INDUSTRIAL DISTRIBUTOR FOR CURRENT QUALITY PRICES

3 WVDC, 4 VDC SURGE

µF	Diam.xLength	Catalog Number*
400	.562x1.250	39D407G003EE4
900	.562x1.750	39D907G003EJ4
1300	.562x2.250	39D138G003EL4
1400	.812x1.250	39D148G003GE4
1800	.687x1.750	39D188G003FJ4
2100	.937x1.250	39D218G003HE4
2700	.687x2.250	39D278G003FL4
2900	.812x1.750	39D298G003GJ4
3000	1.062x1.250	39D308G003JE4
3600	.687x2.750	39D368G003FP4
4200	.937x1.750	39D428G003HJ4
4300	.812x2.250	39D438G003GL4
5700	.812x2.750	39D578G003GP4
6000	1.062x1.750	39D608G003JJ4
8500	.937x2.750	39D858G003HP4
9000	1.062x2.250	39D908G003JL4
10000	.937x3.250	39D109G003HS4
12000	1.062x2.750	39D129G003JP4
15000	1.062x3.250	39D159G003JS4
18000	1.062x3.750	39D189G003JT4

6 WVDC, 8 VDC SURGE

µF	Diam.xLength	Catalog Number*
300	.562x1.250	39D307G006EE4
600	.562x1.750	39D607G006EJ4
900	.562x2.250	39D907G006EL4
1000	.812x1.250	39D108G006GE4
1200	.687x1.750	39D128G006FJ4
1500	.937x1.250	39D158G006HE4
1900	.687x2.250	39D198G006FL4
2000	.687x2.250	39D208G006GJ4
2100	1.062x1.250	39D218G006JE4
2500	.687x2.750	39D258G006FP4
3000	.812x2.250	39D308G006GL4
4000	.812x2.750	39D408G006GP4
4200	1.062x1.750	39D428G006JJ4
6000	.937x2.750	39D608G006HP4
6300	1.062x2.250	39D638G006JL4
7500	.937x3.250	39D758G006HS4
8500	1.062x2.750	39D858G006JP4
10000	1.062x3.250	39D109G006JS4
12000	1.062x3.750	39D129G006JT4

10 WVDC, 12 VDC SURGE

µF	Diam.xLength	Catalog Number*
250	.562x1.250	39D257G010EE4
500	.562x1.750	39D507G010EJ4
800	.562x2.250	39D807G010EL4
850	.812x1.250	39D857G010GE4
1000	.687x1.750	39D108G010FJ4
1200	.937x1.250	39D128G010HE4
1600	.687x2.250	39D168G010FL4
1700	.812x1.750	39D178G010GJ4
2100	.687x2.750	39D218G010FP4
2500	.812x2.250	39D258G010GL4
3400	.812x2.750	39D348G010GP4
3500	1.062x1.250	39D358G010JJ4
5000	.937x2.750	39D508G010HP4
5200	1.062x2.250	39D528G010JL4
6300	.937x3.250	39D638G010HS4
7100	1.062x2.750	39D718G010JP4
8800	1.062x3.250	39D888G010JS4
10000	1.062x3.750	39D109G010JT4

15 WVDC, 18 VDC SURGE

µF	Diam.xLength	Catalog Number*
200	.562x1.250	39D207G015EE4
400	.562x1.750	39D407G015EJ4
600	.562x2.250	39D607G015EL4
800	.687x1.750	39D807G015FJ4
950	.937x1.250	39D957G015HE4
1200	.687x2.250	39D128G015FL4
1300	.812x1.750	39D138G015GJ4
1600	.687x2.750	39D168G015FP4
1900	.812x2.250	39D198G015GL4
2500	.812x2.750	39D258G015GP4
2600	1.062x1.750	39D268G015JJ4
3800	.937x2.750	39D388G015HP4
4000	1.062x2.250	39D408G015JL4
4700	.937x3.250	39D478G015HS4
5300	1.062x2.750	39D538G015JP4
6600	1.062x3.250	39D668G015JS4
8000	1.062x3.750	39D808G015JT4

25 WVDC, 30 VDC SURGE

µF	Diam.xLength	Catalog Number*
100	.562x1.250	39D107G025EE4
200	.562x1.750	39D207G025EJ4
350	.562x2.250	39D357G025EL4
450	.687x1.750	39D457G025FJ4
500	.937x1.250	39D507G025HE4
700	.687x2.250	39D707G025FL4
750	.812x1.750	39D757G025GJ4
800	1.062x1.250	39D807G025JE4
950	.687x2.750	39D957G025FP4
1000	.812x2.250	39D108G025GL4
1100	.937x1.750	39D118G025HJ4
1500	.812x2.750	39D158G025GP4
1600	1.062x1.750	39D168G025JJ4
1700	.937x2.250	39D178G025HL4
2200	.937x2.750	39D228G025HP4
2400	1.062x2.250	39D248G025JL4
2800	.937x3.250	39D288G025HS4
3200	1.062x2.750	39D328G025JP4
4000	1.062x3.250	39D408G025JS4
4700	1.062x3.750	39D478G025JT4

30 WVDC, 40 VDC SURGE

µF	Diam.xLength	Catalog Number*
75	.562x1.250	39D756G030EE4
150	.562x1.750	39D157G030EJ4
250	.562x2.250	39D257G030EL4
350	.687x1.750	39D357G030FJ4
400	.937x1.250	39D407G030HE4
500	.687x2.250	39D507G030FL4
600	1.062x1.250	39D607G030JE4
700	.687x2.750	39D707G030FP4
850	.812x2.250	39D857G030GL4
1100	.812x2.750	39D118G030GP4
1200	.937x2.250	39D128G030HL4
1700	.937x2.750	39D178G030HP4
1800	1.062x2.250	39D188G030JL4
2100	.937x3.250	39D218G030HS4
2400	1.062x2.750	39D248G030JP4
3000	1.062x3.250	39D308G030JS4
3600	1.062x3.750	39D368G030JT4

*These capacitors have outer insulation. For units with bare case, change last character in catalog number from 4 to 0, and subtract .062" from diameter and .125" from length.

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IND-EEM-16B-EFAF

Sizes subject to change without notice

SPRAGUE CAPACITORS

TYPE 39D POWERLYTIC® ELECTROLYTICS, continued

40 WVDC, 50 VDC SURGE

μF	Diam. x Length	Catalog Number*
75	.562x1.250	39D756G040EE4
150	.562x1.750	39D157G040EJ4
200	.562x2.250	39D207G040EL4
250	.812x1.250	39D257G040GE4
300	.687x1.750	39D307G040FJ4
350	.937x1.250	39D357G040HE4
450	.687x2.250	39D457G040FL4
500	.812x1.750	39D507G004GJ4
600	.687x2.750	39D607G040FP4
750	.812x2.250	39D757G040GL4
1000	.812x2.750	39D108G040GP4
1100	.937x2.250	39D118G040HL4
1500	.937x2.750	39D158G040HP4
1600	1.062x2.250	39D168G040JL4
1900	.937x3.250	39D198G040HS4
2100	1.062x2.750	39D218G040JP4
2600	1.062x3.250	39D268G040JS4
3200	1.062x3.750	39D328G040JT4

50 WVDC, 65 VDC SURGE

μF	Diam. x Length	Catalog Number*
50	.562x1.250	39D506G050EE4
100	.562x1.750	39D107G050EJ4
150	.562x2.250	39D157G050EL4
200	.687x1.750	39D207G050FJ4
250	.937x1.250	39D257G050HE4
350	.687x2.250	39D357G050FL4
450	.687x2.750	39D457G050FP4
500	.812x2.250	39D507G050GL4
700	.812x2.750	39D707G050GP4
750	1.062x1.750	39D757G050JJ4
800	.937x2.250	39D807G050HL4
1100	.937x2.750	39D118G050HP4
1300	.937x3.250	39D138G050HS4
1500	1.062x2.750	39D158G050JP4
1900	1.062x3.250	39D198G050JS4
2300	1.062x3.750	39D238G050JT4

75 WVDC, 95 VDC SURGE

μF	Diam. x Length	Catalog Number*
30	.562x1.250	39D306G075EE4
75	.562x1.750	39D756G075EJ4
100	.562x2.250	39D107G075EL4
150	.687x1.750	39D157G075FJ4
200	.687x2.250	39D207G075FL4
250	1.062x1.250	39D257G075JE4
300	.687x2.750	39D307G075FP4
350	.812x2.250	39D357G075GL4
450	.812x2.750	39D457G075GP4
500	.937x2.250	39D507G075HL4
700	.937x2.750	39D707G075HP4
750	1.062x2.250	39D757G075JL4
850	.937x3.250	39D857G075HS4
1000	1.062x2.750	39D108G075JP4
1200	1.062x3.250	39D128G075JS4
1500	1.062x3.750	39D158G075JT4

100 WVDC, 125 VDC SURGE

μF	Diam. x Length	Catalog Number*
15	.562x1.250	39D156F100EE4
35	.562x1.750	39D356F100EJ4
55	.562x2.250	39D556F100EL4
60	.812x1.250	39D606F100GE4
75	.687x1.750	39D756F100FJ4
90	.937x1.250	39D906F100HE4
110	.687x2.250	39D117F100FL4
120	.812x1.750	39D127F100GJ4
130	1.062x1.250	39D137F100JE4
150	.687x2.750	39D157F100FP4
180	.937x1.750	39D187F100HJ4
190	.812x2.250	39D197F100GL4
250	.812x2.750	39D257F100GP4
260	1.062x1.750	39D267F100JJ4
280	.937x2.250	39D287F100HL4
370	.937x2.750	39D377F100HP4
390	1.062x2.250	39D397F100JL4
460	.937x3.250	39D467F100HS4
520	1.062x2.750	39D527F100JP4
650	1.062x3.250	39D657F100JS4
780	1.062x3.750	39D787F100JT4

150 WVDC, 175 VDC SURGE

μF	Diam. x Length	Catalog Number*
10	.562x1.250	39D106F150EE4
25	.562x1.750	39D256F150EJ4
40	.562x2.250	39D406F150EL4
50	.687x1.750	39D506F150FJ4
60	.937x1.250	39D606F150HE4
80	.687x2.250	39D806F150FL4
85	.812x1.750	39D856F150GJ4
88	1.062x1.250	39D886F150JE4
100	.687x2.750	39D107F150FP4
120	.812x2.250	39D127F150GL4
170	.812x2.750	39D177F150GP4
190	.937x2.250	39D197F150HL4
250	.937x2.750	39D257F150HP4
260	1.062x2.250	39D267F150JL4
310	.937x3.250	39D317F150HS4
350	1.062x2.750	39D357F150JP4
440	1.062x3.250	39D447F150JS4
530	1.062x3.750	39D537F150JT4

200 WVDC, 250 VDC SURGE

μF	Diam. x Length	Catalog Number*
9	.562 x 1.250	39D905F200EE4
15	.562 x 1.750	39D156F200EJ4
25	.562 x 2.250	39D256F200EL4
30	.812 x 1.250	39D306F200GE4
35	.687 x 1.750	39D356F200FJ4
40	.937 x 1.250	39D406F200HE4
55	.687 x 2.250	39D556F200FL4
60	.812 x 1.750	39D606F200GJ4
75	.687 x 2.750	39D756F200FP4
80	.937 x 1.750	39D806F200HJ4
90	.812 x 2.250	39D906F200GL4
120	.812 x 2.750	39D127F200GP4
130	.937 x 2.750	39D137F200HL4
170	.937 x 2.750	39D177F200HP4
180	1.062 x 2.250	39D187F200JL4
220	.937 x 3.250	39D227F200HS4
250	1.062 x 2.750	39D257F200JP4
310	1.062 x 3.250	39D317F200JS4
370	1.062 x 3.750	39D377F200JT4

250 WVDC, 300 VDC SURGE

μF	Diam. x Length	Catalog Number*
7	.562x1.250	39D705F250EE4
15	.562x1.750	39D156F250EJ4
20	.562x2.250	39D206F250EL4
30	.687x1.750	39D306F250FJ4
35	.937x1.250	39D356F250HE4
45	.687x2.250	39D456F250FL4
50	1.062x1.250	39D506F250JE4
60	.687x2.750	39D606F250FP4
70	.812x2.250	39D706F250GL4
95	.812x2.750	39D956F250GP4
100	.937x2.250	39D107F250HL4
140	.937x2.750	39D147F250HP4
150	1.062x2.250	39D157F250JL4
180	.937x3.250	39D187F250HS4
200	1.062x2.750	39D207F250JP4
250	1.062x3.250	39D257F250JS4
300	1.062x3.750	39D307F250JT4

300 WVDC, 350 VDC SURGE

μF	Diam. x Length	Catalog Number*
5	.562x1.250	39D505F300EE4
10	.562x1.750	39D106F300EJ4
15	.562x2.250	39D156F300EL4
20	.687x1.750	39D206F300FJ4
25	.937x1.250	39D256F300HE4
30	.687x2.250	39D306F300FL4
40	.687x2.750	39D406F300FP4
50	.812x2.250	39D506F300GL4
65	.812x2.750	39D656F300GP4
75	.937x2.250	39D756F300HL4
100	.937x2.750	39D107F300HP4
120	.937x3.250	39D127F300HS4
130	1.062x2.750	39D137F300JP4
170	1.062x3.250	39D177F300JS4
200	1.062x3.750	39D207F300JT4

350 WVDC, 400 VDC SURGE

μF	Diam. x Length	Catalog Number*
4	.562x1.250	39D405F350EE4
8	.562x1.750	39D805F350EJ4
12	.562x2.250	39D126F350EL4
15	.687x1.750	39D156F350FJ4
20	.687x2.250	39D206F350FL4
25	.812x1.750	39D256F350GJ4
30	.687x2.750	39D306F350FP4
40	.812x2.250	39D406F350GL4
50	.812x2.750	39D506F350GP4
60	.937x2.250	39D606F350HL4
80	.937x2.750	39D806F350HP4
100	.937x3.250	39D107F350HS4
110	1.062x2.750	39D117F350JP4
130	1.062x3.250	39D137F350JS4
160	1.062x3.750	39D167F350JT4

400 WVDC, 475 VDC SURGE

μF	Diam. x Length	Catalog Number*
2	.562x1.250	39D205F400EE4
5	.562x1.750	39D505F400EJ4
10	.687x1.750	39D106F400FJ4
15	.687x2.250	39D156F400FL4
20	.687x2.750	39D206F400FP4
25	.812x2.250	39D256F400GL4
35	.812x2.750	39D356F400GP4
40	.937x2.250	39D406F400HL4
55	.937x2.750	39D556F400HP4
65	.937x3.250	39D656F400HS4
75	1.062x2.750	39D756F400JP4
90	1.062x3.250	39D906F400JS4
110	1.062x3.750	39D117F400JT4

450 WVDC, 525 VDC SURGE

μF	Diam. x Length	Catalog Number*
1	.562x1.250	39D105F450EE4
3	.562x1.750	39D305F450EJ4
5	.562x2.250	39D505F450EL4
10	.687x2.250	39D106F450FL4
15	.687x2.750	39D156F450FP4
20	.812x2.250	39D206F450GL4
25	.812x2.750	39D256F450GP4
35	.937x2.750	39D356F450HP4
45	.937x3.250	39D456F450HS4
50	1.062x2.750	39D506F450JP4
65	1.062x3.250	39D656F450JS4
75	1.062x3.750	39D756F450JT4

*These capacitors have outer insulation. For units with bare case, change last character in catalog number from 4 to 0, and subtract .062" from diameter and .125" from length.

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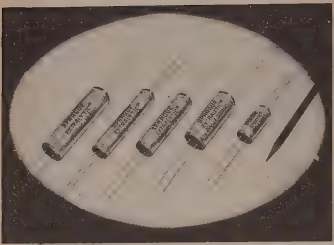
IND-EEM-16C-PRAR

Sizes subject to change without notice.

SPRAGUE CAPACITORS

TYPE 604D 4-TERMINAL EXTRALYTIC® ALUMINUM ELECTROLYTIC CAPACITORS



- Premium-grade capacitors with true four-terminal construction, specifically designed for use in switching regulators and other high frequency applications.
- Low equivalent series resistance, low inductance, low impedance.
- Operating temperature range, −55 C to +105 C.
- Guaranteed inductance limit of 2 nH, with typical values of less than 1nH when used in the four-terminal mode.
- Impedance limits at 10 kHz are as low as 17 mΩ.
- Capacitance tolerance: 5- through 50-volt capacitors, −10 +50%. Above 50 volts, −10 +75%.
- Outer plastic film insulation with polymer-coated end seals which permit degreasing in halogenated solvents.
- For complete technical data, refer to latest issue of Engineering Bulletin 3458.

μF	Dia. x Length	Catalog Number
	5 WVDC	
2400	.812 x 1.843	604D242G005GJ6
3300	.812 x 2.343	604D332G005GL6
3700	.937 x 1.843	604D372G005HJ6
4400	.812 x 2.843	604D442G005GP6
5000	.937 x 2.343	604D502G005HL6
5700	.812 x 3.343	604D572G005GS6
6200	.937 x 2.843	604D622G005HP6
7200	1.062 x 2.343	604D722G005JL6
8800	.937 x 3.343	604D882G005HS6
10000	1.062 x 2.843	604D103G005JP6
13000	1.062 x 3.343	604D133G005JS6
16000	1.062 x 3.843	604D163G005JT6
	7.5 WVDC	
2000	.812 x 1.843	604D202G7R5GJ6
3000	.937 x 1.843	604D302G7R5HJ6
3800	.812 x 2.843	604D382G7R5GP6
4400	.937 x 2.343	604D442G7R5HL6
4800	1.062 x 1.843	604D482G7R5JJ6
5000	.812 x 3.343	604D502G7R5GS6
5800	.937 x 2.843	604D582G7R5HP6
6200	1.062 x 2.343	604D622G7R5JL6
7500	.937 x 3.343	604D752G7R5HS6
9000	1.062 x 2.843	604D902G7R5JP6
11000	1.062 x 3.343	604D113G7R5JS6
14000	1.062 x 3.843	604D143G7R5JT6
	10 WVDC	
1700	.812 x 1.843	604D172G010GJ6
2300	.812 x 2.343	604D232G010GL6
2600	.937 x 1.843	604D262G010HJ6
3000	.812 x 2.843	604D302G010GP6
3600	.937 x 2.343	604D362G010HL6
4100	.812 x 3.343	604D412G010GS6
4800	.937 x 2.843	604D482G010HP6
5100	1.062 x 2.343	604D512G010JL6
6300	.937 x 3.343	604D632G010HS6
7500	1.062 x 2.843	604D752G010JP6
9700	1.062 x 3.343	604D972G010JS6
12000	1.062 x 3.843	604D123G010JT6
	16 WVDC	
1400	.812 x 1.843	604D142G016GJ6
1900	.812 x 2.343	604D192G016GL6
2100	.937 x 1.843	604D212G016HJ6
2700	.937 x 2.343	604D272G016HL6
3400	.812 x 3.343	604D342G016GS6
4200	1.062 x 2.343	604D422G016JL6
5200	.937 x 3.343	604D522G016HS6
6100	1.062 x 2.843	604D612G016JP6
6400	.937 x 3.843	604D642G016HT6
8000	1.062 x 3.343	604D802G016JS6
10000	1.062 x 3.843	604D103G016JT6
	20 WVDC	
1200	.812 x 1.843	604D122G020GJ6
1800	.937 x 1.843	604D182G020HJ6
2200	.812 x 2.843	604D222G020GP6
2400	.937 x 2.343	604D242G020HL6
2900	.812 x 3.343	604D292G020GS6
3400	.937 x 2.843	604D342G020HP6
3700	1.062 x 2.343	604D372G020JL6
4500	.937 x 3.343	604D452G020HS6
5300	1.062 x 2.843	604D532G020JP6
7000	1.062 x 3.343	604D702G020JS6
8600	1.062 x 3,843	604D862G020JT6
	25 WVDC	
900	.812 x 1.843	604D901G025GJ6
1200	.812 x 2.343	604D122G025GL6
1600	.812 x 2.843	604D162G025GP6
2000	.937 x 2.343	604D202G025HL6
2500	1.062 x 2.343	604D252G025JL6
2800	.937 x 2.843	604D282G025HP6
3600	1.062 x 2.843	604D362G025JP6
4700	1.062 x 3.343	604D472G025JS6
5700	1.062 x 3.843	604D572G025JT6
	30 WVDC	
700	.812 x 1.843	604D701G030GJ6
900	.812 x 2.343	604D901G030GL6
1300	.812 x 2.843	604D132G030GP6
1600	.937 x 2.343	604D162G030HL6
2000	1.062 x 2.343	604D202G030JL6
2200	.937 x 2.843	604D222G030HP6
2800	1.062 x 2.843	604D282G030JP6
3000	.937 x 3.343	604D302G030HS6
3600	1.062 x 3.343	604D362G030JS6
4500	1.062 x 3.843	604D452G030JT6
	40 WVDC	
550	.812 x 1.843	604D551G040GJ6
700	.812 x 2.343	604D701G040GL6
900	.937 x 1.843	604D901G040HJ6
1200	.937 x 2.343	604D122G040HL6
1500	1.062 x 2.343	604D152G040JL6
1700	.937 x 2.843	604D172G040HP6
2300	.937 x 3.343	604D232G040HS6
2900	1.062 x 3.343	604D292G040JS6
3600	1.062 x 3.843	604D362G040JT6
	50 WVDC	
300	.812 x 1.843	604D301G050GJ6
400	.812 x 2.343	604D401G050GL6
530	.937 x 1.843	604D531G050HJ6
700	.937 x 2.343	604D701G050HL6
870	1.062 x 2.343	604D871G050JL6
1000	.937 x 2.843	604D102G050HP6
1200	1.062 x 2.843	604D122G050JP6
1600	1.062 x 3.343	604D162G050JS6
2000	1.062 x 3.843	604D202G050JT6
	75 WVDC	
200	.812 x 1.843	604D201F075GJ6
260	.812 x 2.343	604D261F075GL6
350	.937 x 1.843	604D351F075HJ6
450	.937 x 2.343	604D451F075HL6
570	1.062 x 2.343	604D571F075JL6
650	.937 x 2.843	604D651F075HP6
850	.937 x 3.343	604D851F075HS6
1000	1.062 x 3.343	604D102F075JS6
1300	1.062 x 3.843	604D132F075JT6
	100 WVDC	
130	.812 x 1.843	604D131F100GJ6
170	.812 x 2.343	604D171F100GL6
230	.937 x 1.843	604D231F100HJ6
300	.937 x 2.343	604D301F100HL6
380	1.062 x 2.343	604D381F100JL6
430	.937 x 2.843	604D431F100HP6
550	1.062 x 2.843	604D551F100JP6
700	1.062 x 3.343	604D701F100JS6
850	1.062 x 3.843	604D851F100JT6
	200 WVDC	
50	.812 x 1.843	604D500F200GJ6
85	.937 x 1.843	604D850F200HJ6
100	.937 x 2.343	604D101F200HL6
150	.937 x 2.843	604D151F200HP6
200	1.062 x 2.843	604D201F200JP6
250	.937 x 3.843	604D251F200HT6
320	1.062 x 3.843	604D321F200JT6

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IND-EEM-55-EFAI

Sizes subject to change without notice.

SPRAGUE CAPACITORS

TYPE 672D EXTRALYTIC® ALUMINUM ELECTROLYTICS

- Specifically designed for use in switching regulators and other high frequency applications.
- Miniature single-ended 'lytics feature low equivalent series resistance, inductance, and impedance.
- High capacitance values combined with low inductance and low ESR limits makes these capacitors very useful for bus bar decoupling in data processing applications.
- Premium-grade capacitors offer guaranteed inductance limit of 20nH with typical values of less than 10nH.
- Furnished with outer plastic-film insulation with supplementary polymer coated end-seal.
- Capacitance tolerance, −10, +100%.
- Operating temperature range, −55 C to +105 C.
- For complete technical data, refer to latest issue of Sprague Engineering Bulletin 3452.

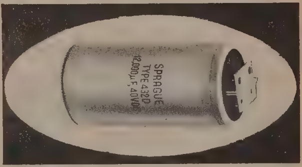
µF	Dia. x Length	Catalog Number
6.3 WVDC		
68	.336 x .630	672D686H6R3BB5C
120	.413 x .677	672D127H6R3CC5C
180	.413 x .740	672D187H6R3CD5C
220	.413 x .927	672D227H6R3CG5C
680	.500 x 1.165	672D687H6R3DM5C
820	.500 x 1.462	672D827H6R3DT5C
1200	.500 x 1.790	672D128H6R3DS5C
12 WVDC		
56	.336 x .630	672D566H012BB5C
100	.413 x .677	672D107H012CC5C
120	.413 x .740	672D127H012CD5C
180	.413 x .927	672D187H012CG5C
470	.500 x 1.165	672D477H012DM5C
680	.500 x 1.462	672D687H012DT5C
1000	.500 x 1.790	672D108H012DS5C
15 WVDC		
47	.336 x .630	672D476H015BB5C
82	.413 x .677	672D826H015CC5C
100	.413 x .740	672D107H015CD5C
150	.413 x .927	672D157H015CG5C
390	.500 x 1.165	672D397H015DM5C
560	.500 x 1.462	672D567H015DT5C
820	.500 x 1.790	672D827H015DS5C

µF	Dia. x Length	Catalog Number
20 WVDC		
33	.336 x .630	672D336H020BB5C
56	.413 x .677	672D566H020CC5C
82	.413 x .740	672D826H020CD5C
100	.413 x .927	672D107H020CG5C
330	.500 x 1.165	672D337H020DM5C
390	.500 x 1.462	672D397H020DT5C
560	.500 x 1.790	672D567H020DS5C
25 WVDC		
27	.336 x .630	672D276H025BB5C
47	.413 x .677	672D476H025CC5C
68	.413 x .740	672D686H025CD5C
82	.413 x .927	672D826H025CG5C
270	.500 x 1.165	672D277H025DM5C
330	.500 x 1.462	672D337H025DT5C
470	.500 x 1.790	672D477H025DS5C
40 WVDC		
18	.336 x .630	672D186H040BB5C
39	.413 x .677	672D396H040CC5C
47	.413 x .740	672D476H040CD5C
56	.413 x .927	672D566H040CG5C
180	.500 x 1.165	672D187H040DM5C
270	.500 x 1.462	672D277H040DT5C
390	.500 x 1.790	672D397H040DS5C

µF	Dia. x Length	Catalog Number
50 WVDC		
12	.336 x .630	672D126H050BB5C
18	.413 x .677	672D186H050CC5C
22	.413 x .740	672D226H050CD5C
27	.413 x .927	672D276H050CG5C
82	.500 x 1.165	672D826H050DM5C
120	.500 x 1.462	672D127H050DT5C
180	.500 x 1.790	672D187H050DS5C
60 WVDC		
12	.413 x .677	672D126H060CC5C
18	.413 x .740	672D186H060CD5C
22	.413 x .927	672D226H060CG5C
68	.500 x 1.165	672D686H060DM5C
82	.500 x 1.462	672D826H060DT5C
120	.500 x 1.790	672D127H060DS5C
100 WVDC		
4.7	.413 x .677	672D475H100CC5C
6.8	.413 x .740	672D685H100CD5C
8.2	.413 x .927	672D825H100CG5C
27	.500 x 1.165	672D276H100DM5C
39	.500 x 1.462	672D396H100DT5C
47	.500 x 1.790	672D476H100DS5C

TYPE 432D COMPULYTIC® ALUMINUM ELECTROLYTICS

- Revolutionary electrolytic capacitors for ultra-low-impedance applications.
- Impedance limits at 10 kHz are as low as .001 ohm, with typical values of only half the specified limits.
- Special strip-line terminals are ideal for use with laminated-bus power distribution systems found in modern EDP equipment.
- Stacked-foil construction allows capacitance values to 100,000 µF with extremely low ESR of typically less than .001 ohm and inductance of only 1 nH.
- Operating temperature range, −40 C to +85 C.
- For complete technical data, refer to latest issue of Sprague Engineering Bulletin 3443.



µF	Dia. x Length	Catalog Number
6 WVDC		
3,900	1.453 x 2.250	432D392006AA2
10,000	1.453 x 4.250	432D103006AC2
56,000	3.078 x 4.250	432D563006DC2
100,000	3.078 x 5.750	432D104006DF2
7.5 WVDC		
2,700	1.453 x 2.250	432D2727R5AA2
6,800	1.453 x 4.250	432D6827R5AC2
47,000	3.078 x 4.250	432D4737R5DC2
68,000	3.078 x 5.750	432D6837R5DF2
10 WVDC		
2,200	1.453 x 2.250	432D222010AA2
5,600	1.453 x 4.250	432D562010AC2
33,000	3.078 x 4.250	432D333010DC2
56,000	3.078 x 5.750	432D563010DF2

µF	Dia. x Length	Catalog Number
15 WVDC		
1,800	1.453 x 2.250	432D182015AA2
4,700	1.453 x 4.250	432D472015AC2
27,000	3.078 x 4.250	432D273015DC2
39,000	3.078 x 5.750	432D393015DF2
20 WVDC		
1,200	1.453 x 2.250	432D122020AA2
3,300	1.453 x 4.250	432D332020AC2
18,000	3.078 x 4.250	432D183020DC2
27,000	3.078 x 5.750	432D273020DF2
25 WVDC		
1,000	1.453 x 2.250	432D102025AA2
2,700	1.453 x 4.250	432D272025AC2
15,000	3.078 x 4.250	432D153025DC2
22,000	3.078 x 5.750	432D223025DF2

µF	Dia. x Length	Catalog Number
30 WVDC		
820	1.453 x 2.250	432D821030AA2
2,200	1.453 x 4.250	432D222030AC2
12,000	3.078 x 4.250	432D123030DC2
18,000	3.078 x 5.750	432D183030DF2
40 WVDC		
560	1.453 x 2.250	432D561040AA2
1,500	1.453 x 4.250	432D152040AC2
8,200	3.078 x 4.250	432D822040DC2
12,000	3.078 x 5.750	432D123040DF2
50 WVDC		
470	1.453 x 2.250	432D471050AA2
1,000	1.453 x 4.250	432D102050AC2
6,800	3.078 x 4.250	432D682050DC2
10,000	3.078 x 5.750	432D103050DF2

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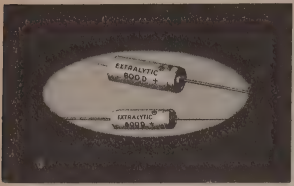
SPRAGUE CAPACITORS



TYPE 600D EXTRALYTIC® ALUMINUM ELECTROLYTIC CAPACITORS

- Extended Operating Temperature Range From —55C to +125C
- Industrial version of CU12 and CU13 units
- Dual Rating Makes Possible Operation At Either 85C or 125C
- Voltage Ratings Up to 250 Volts D-C
- Improved Oxide Systems, Etching Techniques, and End Seals; a New Electrolyte Makes The Type 600D Equivalent to Or Better Than Comparable Foil Tantalum Capacitors.
- Lower Cost and One Third The Weight of Comparable Foil Tantalums

For Complete Technical Data, See Latest Issue of Sprague Engineering Bulletin 3455.

CALL YOUR SPRAGUE INDUSTRIAL DISTRIBUTOR FOR CURRENT QUANTITY PRICES

µF	Case Code	Catalog Number†
7 WVDC @ 85C, 5 WVDC @ 125C		
120	KD	600D127G007KD4
220	DD	600D227G007DD4
270	DE	600D277G007DE4
390	DG	600D397G007DG4
560	DJ	600D567G007DJ4
820	DL	600D827G007DL4
1000	DX	600D108G007DX4
10 WVDC @ 85C, 7 WVDC @ 125C		
100	KD	600D107G010KD4
180	DD	600D187G010DD4
220	DE	600D227G010DE4
330	DG	600D337G010DG4
470	DJ	600D447G010DJ4
680	DL	600D687G010DL4
820	DX	600D827G010DX4
15 WVDC @ 85C, 10 WVDC @ 125C		
68	KD	600D686G015KD4
82	KD	600D826G015KD4
150	DD	600D157G015DD4
180	DE	600D187G015DE4
270	DG	600D277G015DG4
390	DJ	600D397G015DJ4
560	DL	600D567G015DL4
680	DX	600D687G015DX4
20 WVDC @ 85C, 15 WVDC @ 125C		
68	KD	600D686G020KD4
100	DD	600D107G020DD4
140	DE	600D147G020DE4
220	DG	600D227G020DG4
290	DJ	600D297G020DJ4
440	DL	600D447G020DL4
600	DX	600D607G020DX4
30 WVDC @ 85C, 20 WVDC @ 125C		
33	KD	600D336G030KD4
47	KD	600D476G030KD4
82	DD	600D826G030DD4
100	DE	600D107G030DE4
120	DG	600D127G030DG4
150	DG	600D157G030DG4
220	DJ	600D227G030DJ4
330	DL	600D337G030DL4
390	DX	600D397G030DX4
40 WVDC @ 85C, 30 WVDC @ 125C		
30	KD	600D306G040KD4
50	DD	600D506G040DD4
70	DE	600D706G040DE4
100	DG	600D107G040DG4
140	DJ	600D147G040DJ4
210	DL	600D217G040DL4
280	DX	600D287G040DX4
50 WVDC @ 85C, 40 WVDC @ 125C		
22	KD	600D226G050KD4
33	DD	600D336G050DD4
47	DE	600D476G050DE4
56	DG	600D566G050DG4
68	DG	600D686G050DG4
100	DJ	600D107G050DJ4
150	DL	600D157G050DL4
180	DX	600D187G050DX4
60 WVDC @ 85C, 50 WVDC @ 125C		
17	KD	600D176G060KD4
25	DD	600D256G060DD4
40	DE	600D406G060DE4
60	DG	600D606G060DG4
80	DJ	600D806G060DJ4
120	DL	600D127G060DL4
160	DX	600D167G060DX4
75 WVDC @ 85C, 60 WVDC @ 125C		
12	KD	600D126F075KD4
22	DD	600D226F075DD4
33	DE	600D336F075DE4
47	DG	600D476F075DG4
68	DJ	600D686F075DJ4
100	DL	600D107F075DL4
120	DX	600D127F075DX4
100 WVDC @ 85C, 75 WVDC @ 125C		
8.2	KD	600D825F100KD4
12	DD	600D126F100DD4
15	DE	600D156F100DE4
22	DG	600D226F100DG4
33	DJ	600D336F100DJ4
47	DL	600D476F100DL4
68	DX	600D686F100DX4
150 WVDC @ 85C, 100 WVDC @ 125C		
4.7	KD	600D475F150KD4
5.6	KD	600D565F150KD4
8.2	DD	600D825F150DD4
12	DE	600D126F150DE4
18	DG	600D186F150DG4
22	DJ	600D226F150DJ4
33	DL	600D336F150DL4
56	DX	600D566F150DX4
200 WVDC @ 85C, 150 WVDC @ 125C		
4	KD	600D405F200KD4
6	DD	600D605F200DD4
8	DE	600D805F200DE4
13	DG	600D136F200DG4
17	DJ	600D176F200DJ4
26	DL	600D266F200DL4
39	DX	600D396F200DX4
250 WVDC @ 85C, 200 WVDC @ 125C		
3.3	KD	600D335F250KD4
5.6	DD	600D565F250DD4
6.8	DE	600D685F250DE4
10	DG	600D106F250DG4
12	DJ	600D126F250DJ4
22	DL	600D226F250DL4
27	DX	600D276F250DX4

TABLE OF DIMENSIONS

Case Code	With Outer Insulation D x L
KD	.296 x 1.000
DD	.390 x 1.000
DE	.390 x 1.187
DG	.390 x 1.437
DJ	.390 x 1.687
DL	.390 x 2.249
DX	.390 x 2:749

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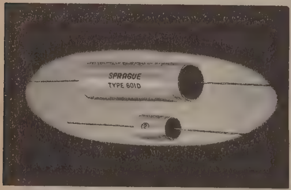
†Catalog numbers listed are for capacitors with Outer Insulation. For units with bare can substitute "0" for "4" at the end of the catalog number, and subtract 1/64" from diameter and 1/16" from length.



TYPE 601D EXTRALYTIC® ALUMINUM ELECTROLYTIC CAPACITORS

- Supplement 600D With Higher Capacitance
- Industrial version of CU16 and CU17 units
- Pressure-sensitive Safety Vent
- Designed to Operate at a Temperature Range of —55C to +85C
- Unique New Electrolyte, High-gain Etched Foil, Improved Oxide System Provide Long Life With Superior Electrical Characteristics
- For Complete Technical Data, See Latest Issue of Sprague Engineering Bulletin 3456

Call Your Sprague Industrial Distributor For Current Quantity Prices

µF	D. x L.	Catalog Number*
5 WVDC, 7 WDV SURGE		
750	.687 x 1.250	601D757G005FE4
1200	.812 x 1.250	601D128G005GE4
1500	.687 x 1.750	601D158G005FJ4
1700	.937 x 1.250	601D178G005HE4
2300	.687 x 2.250	601D238G005FL4
2400	.812 x 1.750	601D248G005GJ4
2700	.687 x 2.750	601D278G005FP4
3500	.687 x 3.250	601D358G005FS4
3600	.812 x 2.250	601D368G005GL4
4200	.687 x 3.750	601D428G005FT4
4300	.812 x 2.750	601D438G005GP4
4700	1.062 x 1.750	601D478G005JJ4
5200	.937 x 2.250	601D528G005HL4
5500	.812 x 3.250	601D558G005GS4
6100	.937 x 2.750	601D618G005HP4
6700	.812 x 3.750	601D678G005GT4
7100	1.062 x 2.250	601D718G005JL4
7900	.937 x 3.250	601D798G005HS4
8300	1.062 x 2.750	601D838G005JP4
9600	.937 x 3.750	601D968G005HT4
10000	1.062 x 3.250	601D109G005JS4
13000	1.062 x 3.750	601D139G005JT4
7.5 WVDC, 10 VDC SURGE		
650	.687 x 1.250	601D657G7R5FE4
1000	.812 x 1.250	601D108G/R5GE4
1300	.687 x 1.750	601D138G7R5FJ4
1400	.937 x 1.250	601D148G7R5HE4
1900	.687 x 2.250	601D198G7R5FL4
2000	.812 x 1.750	601D208G7R5GJ4
2200	.687 x 2.750	601D228G7R5FP4
2900	.687 x 3.250	601D298G7R5FS4
3000	.812 x 2.250	601D308G7R5GL4
3500	.687 x 3.750	601D358G7R5FT4

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*Catalog numbers listed are for capacitors with outer insulation. For bare case change "4" to "0" at end of catalog number and subtract .062" from diameter and .125" from length.

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IND-EEM-17-PPAR

All sizes subject to change without notice.

SPRAGUE CAPACITORS

TYPE 601D EXTRALYTIC® ALUMINUM ELECTROLYTIC CAPACITORS, Continued

µF	D. x L.	Catalog Number*
3600	.812 x 2.750	601D368G7R5GP4
4000	1.062 x 1.750	601D408G7R5JJ4
4400	.937 x 2.250	601D448G7R5HL4
4600	.812 x 3.250	601D468G7R5GS4
5100	.937 x 2.750	601D518G7R5HP4
5600	.812 x 3.750	601D568G7R5GT4
6000	1.062 x 2.250	601D608G7R5JL4
6600	.937 x 3.250	601D668G7R5HS4
7000	1.062 x 2.750	601D708G7R5JP4
8100	.937 x 3.750	601D818G7R5HT4
9000	1.062 x 3.250	601D908G7R5JS4
11000	1.062 x 3.750	601D119G7R5JT4

10 WVDC, 15 VDC SURGE

µF	D. x L.	Catalog Number*
540	.687 x 1.250	601D547G010FE4
850	.812 x 1.250	601D857G010GE4
1000	.687 x 1.750	601D108G010FJ4
1200	.937 x 1.250	601D128G010HE4
1600	.687 x 2.250	601D168G010FL4
1700	.812 x 1.750	601D178G010GJ4
1800	.687 x 2.750	601D188G010FP4
2400	.687 x 3.250	601D248G010FS4
2500	.812 x 2.250	601D258G010GL4
2900	.687 x 3.750	601D298G010FT4
3000	.812 x 2.750	601D308G010GP4
3300	1.062 x 1.750	601D338G010JJ4
3600	.937 x 2.250	601D368G010HL4
3800	.812 x 3.250	601D388G010GS4
4200	.937 x 2.750	601D428G010HP4
4700	.812 x 3.750	601D478G010GT4
5000	1.062 x 2.250	601D508G010JL4
5500	.937 x 3.250	601D558G010HS4
5800	1.062 x 2.750	601D588G010JP4
6700	.937 x 3.750	601D678G010HT4
7500	1.062 x 3.250	601D758G010JS4
9100	1.062 x 3.750	601D918G010JT4

15 WVDC, 20 VDC SURGE

µF	D. x L.	Catalog Number*
400	.687 x 1.250	601D407G015FE4
650	.812 x 1.250	601D657G015GE4
800	.687 x 1.750	601D807G015FJ4
930	.937 x 1.250	601D937G015HE4
1200	.687 x 2.250	601D128G015FL4
1300	.812 x 1.750	601D138G015GJ4
1400	.687 x 2.750	601D148G015FP4
1800	.687 x 3.250	601D188G015FS4
1900	.812 x 2.250	601D198G015GL4
2200	.687 x 3.750	601D228G015FT4
2500	1.062 x 1.750	601D258G015JJ4
2700	.937 x 2.250	601D278G015HL4
2900	.812 x 3.250	601D298G015GS4
3200	.937 x 2.750	601D328G015HP4
3500	.812 x 3.750	601D358G015GT4
3800	1.062 x 2.250	601D388G015JL4
4200	.937 x 3.250	601D428G015HS4
4400	1.062 x 2.750	601D448G015JP4
5100	.937 x 3.750	601D518G015HT4
5700	1.062 x 3.250	601D578G015JS4
6900	1.062 x 3.750	601D698G015JT4

20 WVDC, 30 VDC SURGE

µF	D. x L.	Catalog Number*
290	.687 x 1.250	601D297G020FE4
460	.812 x 1.250	601D467G020GE4
580	.687 x 1.750	601D587G020FJ4
660	.937 x 1.250	601D667G020HE4
900	.812 x 1.750	601D907G020GJ4
1000	.687 x 2.750	601D108G020FP4
1300	.687 x 3.250	601D138G020FS4
1600	.687 x 3.750	601D168G020FT4
1800	1.062 x 1.750	601D188G020JJ4
1900	.937 x 2.250	601D198G020HL4
2000	.812 x 3.250	601D208G020GS4
2300	.937 x 2.750	601D238G020HP4
2500	.812 x 3.750	601D258G020GT4
2700	1.062 x 2.250	601D278G020JL4
2900	.937 x 3.250	601D298G020HS4
3100	1.062 x 2.750	601D318G020JP4
3600	.937 x 3.750	601D368G020HT4
4000	1.062 x 3.250	601D408G020JS4
4900	1.062 x 3.750	601D498G020JT4

25 WVDC, 40 VDC SURGE

µF	D. x L.	Catalog Number*
220	.687 x 1.250	601D227G025FE4
350	.812 x 1.250	601D357G025GE4
440	.687 x 1.750	601D447G025FJ4
500	.937 x 1.250	601D507G025HE4
660	.687 x 2.250	601D667G025FL4
680	.812 x 1.250	601D687G025JE4
700	.812 x 1.750	601D707G025GJ4
770	.687 x 2.750	601D777G025FP4
990	.687 x 3.250	601D997G025FS4
1000	.812 x 2.250	601D108G025GL4
1200	687 x 3.750	601D128G025FT4
1300	1.062 x 1.750	601D138G025JJ4
1500	.812 x 3.250	601D158G025GS4
1700	.937 x 2.750	601D178G025HP4
1900	.812 x 3.750	601D198G025GT4
2000	1.062 x 2.250	601D208G025JL4
2200	.937 x 3.250	601D228G025HS4
2300	1.062 x 2.750	601D238G025JP4
2700	.937 x 3.750	601D278G025HT4
3000	1.062 x 3.250	601D308G025JS4
3700	1.062 x 3.750	601D378G025JT4

30 WVDC, 45 VDC SURGE

µF	D. x L.	Catalog Number*
190	.687 x 1.250	601D197G030FE4
310	.812 x 1.250	601D317G030GE4
390	.687 x 1.750	601D397G030FJ4
440	.937 x 1.250	601D447G030HE4
580	.687 x 2.250	601D587G030FL4
600	1.062 x 1.250	601D607G030JE4
620	.812 x 1.750	601D627G030GJ4
680	.687 x 2.750	601D687G030FP4
870	.687 x 3.250	601D877G030FS4
880	.937 x 1.750	601D887G030HJ4
930	.812 x 2.250	601D937G030GL4
1000	.687 x 3.750	601D108G030FT4
1200	1.062 x 1.750	601D128G030JJ4
1400	.812 x 3.250	601D148G030GS4
1500	.937 x 2.750	601D158G030HP4
1700	.812 x 3.750	601D178G030GT4
1800	1.062 x 2.250	601D188G030JL4
2000	.937 x 3.250	601D208G030HS4
2100	1.062 x 2.750	601D218G030JP4
2400	.937 x 3.750	601D248G030HT4
2700	1.062 x 3.250	601D278G030JS4
3300	1.062 x 3.750	601D338G030JT4

40 WVDC, 60 VDC SURGE

µF	D. x L.	Catalog Number*
140	.687 x 1.250	601D147G040FE4
220	.812 x 1.250	601D227G040GE4
270	.687 x 1.750	601D277G040FJ4
300	.937 x 1.250	601D307G040HE4
400	.687 x 2.250	601D407G040FL4
430	1.062 x 1.250	601D437G040JE4
440	.812 x 1.750	601D447G040GJ4
480	.687 x 2.750	601D487G040FP4
620	.687 x 3.250	601D627G040FS4
630	.937 x 1.750	601D637G040HJ4
660	.812 x 2.250	601D667G040GL4
760	.687 x 3.750	601D767G040FT4
770	.812 x 2.750	601D777G040GP4
860	1.062 x 1.750	601D867G040JJ4
950	.937 x 2.250	601D957G040HL4
1000	.812 x 3.250	601D108G040GS4
1100	.937 x 2.750	601D118G040HP4
1200	.812 x 3.750	601D128G040GT4
1400	.937 x 3.250	601D148G040HS4
1500	1.062 x 2.750	601D158G040JP4
1700	.937 x 3.750	601D178G040HT4
1900	1.062 x 3.250	601D198G040JS4
2300	1.062 x 3.750	601D238G040JT4

50 WVDC, 75 VDC SURGE

µF	D. x L.	Catalog Number*
110	.687 x 1.250	601D117G050FE4
170	.812 x 1.250	601D177G050GE4
220	.687 x 1.750	601D227G050FJ4
250	.937 x 1.250	601D257G050HE4
330	.687 x 2.250	601D337G050FL4
340	1.062 x 1.250	601D347G050JE4
350	.812 x 1.750	601D357G050GJ4
380	.687 x 2.750	601D387G050FP4
500	.687 x 3.250	601D507G050FS4
600	.687 x 3.750	601D607G050FT4
680	1.062 x 1.750	601D687G050JJ4
750	.937 x 2.250	601D757G050HL4
790	.812 x 3.250	601D797G050GS4
870	.937 x 2.750	601D877G050HP4
950	.812 x 3.750	601D957G050GT4
1000	1.062 x 2.250	601D108G050JL4
1100	.937 x 3.250	601D118G050HS4
1500	1.062 x 3.250	601D158G050JS4
1800	1.062 x 3.750	601D188G050JT4

75 WVDC, 100 VDC SURGE

µF	D. x L.	Catalog Number*
45	.687 x 1.250	601D456F075FE4
75	.812 x 1.250	601D756F075GE4
95	.687 x 1.750	601D956F075FJ4
100	.937 x 1.250	601D107F075HE4
140	.687 x 2.250	601D147F075FL4
150	.812 x 1.750	601D157F075GJ4
160	.687 x 2.750	601D167F075FP4
210	.687 x 3.250	601D217F075FS4
220	.812 x 2.250	601D227F075GL4
260	.687 x 3.750	601D267F075FT4
290	1.062 x 1.750	601D297F075JJ4
320	.937 x 2.250	601D327F075HL4
340	.812 x 3.250	601D347F075GS4
380	.937 x 2.750	601D387F075HP4
400	.812 x 3.750	601D407F075GT4
440	1.062 x 2.250	601D447F075JL4
490	.937 x 3.250	601D497F075HS4
500	1.062 x 2.750	601D507F075JP4
600	.937 x 3.750	601D607F075HT4
660	1.062 x 3.250	601D667F075JS4
800	1.062 x 3.750	601D807F075JT4

100 WVDC, 150 VDC SURGE

µF	D. x L.	Catalog Number*
25	.687 x 1.250	601D256F100FE4
45	.812 x 1.250	601D456F100GE4
55	.687 x 1.750	601D556F100FJ4
65	.937 x 1.250	601D656F100HE4
80	.687 x 2.250	601D806F100FL4
90	.812 x 1.750	601D906F100GJ4
95	.687 x 2.750	601D956F100FP4
120	.687 x 3.250	601D127F100FS4
130	.812 x 2.250	601D137F100GL4
150	.687 x 3.750	601D157F100FT4
180	1.062 x 1.750	601D187F100JJ4
200	.812 x 3.250	601D207F100GS4
230	.937 x 2.750	601D237F100HP4
250	.812 x 3.750	601D257F100GT4
280	1.062 x 2.250	601D287F100JL4
300	.937 x 3.250	601D307F100HS4
320	1.062 x 2.750	601D327F100JP4
370	.937 x 3.750	601D377F100HT4
420	1.062 x 3.250	601D427F100JS4
500	1.062 x 3.750	601D507F100JT4

150 WVDC, 200 VDC SURGE

µF	D. x L.	Catalog Number*
18	.687 x 1.250	601D186F150FE4
30	.812 x 1.250	601D306F150GE4
35	.687 x 1.750	601D356F150FJ4
45	.937 x 1.250	601D456F150HE4
55	.687 x 2.250	601D556F150FL4
60	.812 x 1.750	601D606F150GJ4
65	.687 x 2.750	601D656F150FP4
85	.687 x 3.250	601D856F150FS4
90	.937 x 1.750	601D906F150HJ4
95	.812 x 2.250	601D956F150GL4
100	.687 x 3.750	601D107F150FT4
130	1.062 x 1.750	601D137F150JJ4
140	.812 x 3.250	601D147F150GS4
160	.937 x 2.750	601D167F150HP4
170	.812 x 3.750	601D177F150GT4
190	1.062 x 2.250	601D197F150JL4
210	.937 x 3.250	601D217F150HS4
230	1.062 x 2.750	601D237F150JP4
260	.937 x 3.750	601D267F150HT4
290	1.062 x 3.250	601D297F150JS4
360	1.062 x 3.750	601D367F150JT4

200 WVDC, 250 VDC SURGE

µF	D. x L.	Catalog Number*
16	.687 x 1.250	601D166F200FE4
25	.812 x 1.250	601D256F200GE4
30	.687 x 1.750	601D306F200FJ4
35	.937 x 1.250	601D356F200HE4
45	.687 x 2.750	601D456F200FL4
50	.812 x 1.750	601D506F200GJ4
55	.687 x 2.750	601D556F200FP4
70	.687 x 3.250	601D706F200FS4
75	.812 x 2.250	601D756F200GL4
85	.687 x 3.750	601D856F200FT4
90	.812 x 2.750	601D906F200GP4
100	.812 x 3.250	601D107F200GS4
110	.937 x 2.250	601D117F200HL4
130	.937 x 2.750	601D137F200HP4
140	.812 x 3.750	601D147F200GT4
160	1.062 x 2.250	601D167F200JL4
170	.937 x 3.250	601D177F200HS4
180	1.062 x 2.750	601D187F200JP4
210	.937 x 3.750	601D217F200HT4
240	1.062 x 3.250	601D247F200JS4
290	1.062 x 3.750	601D297F200JT4

*Catalog numbers listed are for capacitors with outer insulation. For bare case change "4" to "0" at end of cat. no. and subtract .062" from D, and .125" from L.

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IND-EEM-17A-EBAP

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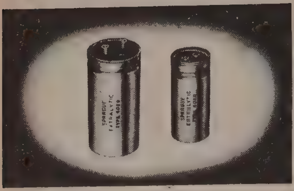
SPRAGUE CAPACITORS



TYPE 602D EXTRALYTIC® ALUMINUM ELECTROLYTIC CAPACITORS

- Large Cylindrical Power Supply Filter Capacitors With Exceptional Performance Over Long and Trouble-free life
- High Ripple Current Capability
- Designed For Continuous Operation Over Temperature Range of —55 C to +85 C
- Extremely Useful on Input of Power Supply Filters, as They Will Safely Carry as Much as 10 amps of Ripple Current at 120 Hz
- Superior Humidity Seal
- For Complete Technical Data, See Latest Issue of Sprague Engineering Bulletin 3457

5 WVDC, 7 V SURGE

μF	Size Code	Cat. No.*
8,000	AA	602D802G005AA2A
17,000	AB	602D173G005AB2A
25,000	AC	602D253G005AC2A
29,000	AD	602D293G005AD2A
34,000	AE	602D343G005AE2A
37,000	AF	602D373G005AF2A
40,000	BB	602D403G005BB2A
60,000	BC	602D603G005BC2A
67,000	CB	602D673G005CB2D
70,000	BD	602D703G005BD2D
80,000	BE	602D803G005BE2A
90,000	BF	602D903G005BF2A
100,000	CC	602D104G005CC2D
110,000	CD	602D114G005CD2D
130,000	CE	602D134G005CE2D
150,000	CF	602D154G005CF2D
150,000	DC	602D154G005DC2D
170,000	DD	602D174G005DD2D
200,000	DE	602D204G005DE2D
220,000	DF	602D224G005DF2D

10 WVDC, 15 V SURGE

μF	Size Code	Cat. No.*
5,000	AA	602D502G010AA2A
10,000	AB	602D103G010AB2A
15,000	AC	602D153G010AC2A
17,000	AD	602D173G010AD2A
20,000	AE	602D203G010AE2A
22,000	AF	602D223G010AF2A
24,000	BB	602D243G010BB2A
37,000	BC	602D373G010BC2A
42,000	CB	602D423G010CB2D
43,000	BD	602D433G010BD2A
48,000	BE	602D483G010BE2A
55,000	BF	602D553G010BF2A
64,000	CC	602D643G010CC2D
75,000	CD	602D753G010CD2D
86,000	CE	602D863G010CE2D
94,000	DC	602D943G010DC2D
96,000	CF	602D963G010CF2D
110,000	DD	602D114G010DD2D
120,000	DE	602D124G010DE2D
140,000	DF	602D144G010DF2D

15 WVDC, 20 V SURGE

μF	Size Code	Cat. No.*
4,000	AA	602D402G015AA2A
8,000	AB	602D802G015AB2A
12,000	AC	602D123G015AC2A
14,000	AD	602D143G015AD2A
16,000	AE	602D163G015AE2A
18,000	AF	602D183G015AF2A
20,000	BB	602D203G015BB2A
30,000	BC	602D303G015BC2A
35,000	BD	602D353G015BD2A
40,000	BE	602D403G015BE2A
42,000	CB	602D423G015CB2D
45,000	BF	602D453G015BF2A
51,000	CC	602D513G015CC2D
59,000	CD	602D593G015CD2D
68,000	CE	602D683G015CE2D
76,000	CF	602D763G015CF2D
76,000	DC	602D763G015DC2D
89,000	DD	602D893G015DD2D
100,000	DE	602D104G015DE2D
110,000	DF	602D114G015DF2D

20 WVDC, 30 V SURGE

μF	Size Code	Cat. No.*
2,800	AA	602D282G020AA2A
5,100	AB	602D512G020AB2A
8,600	AC	602D862G020AC2A
10,000	AD	602D103G020AD2A
11,000	AE	602D113G020AE2A
13,000	AF	602D133G020AF2A
20,000	BC	602D203G020BC2A
23,000	BD	602D233G020BD2A
24,000	CB	602D243G020CB2D
26,000	BE	602D263G020BE2A
30,000	BF	602D303G020BF2A
37,000	CC	602D373G020CC2D
43,000	CD	602D433G020CD2D
47,000	CE	602D473G020CE2D
54,000	DC	602D543G020DC2D
55,000	CF	602D553G020CF2D
63,000	DD	602D633G020DD2D
73,000	DE	602D733G020DE2D
82,000	DF	602D823G020DF2D

25 WVDC, 40 V SURGE

μF	Size Code	Cat. No.*
2,500	AA	602D252G025AA2A
5,000	AB	602D502G025AB2A
7,500	AC	602D752G025AC2A
8,700	AD	602D872G025AD2A
10,000	AE	602D103G025AE2A
11,000	AF	602D113G025AF2A
17,000	BC	602D173G025BC2A
20,000	BD	602D203G025BD2A
20,000	CB	602D203G025CB2D
23,000	BE	602D233G025BE2A
25,000	BF	602D253G025BF2A
30,000	CC	602D303G025CC2D
35,000	CD	602D353G025CD2D
40,000	CE	602D403G025CE2D
44,000	DC	602D443G025DC2D
45,000	CF	602D453G025CF2D
52,000	DD	602D523G025DD2D
60,000	DE	602D603G025DE2D
67,000	DF	602D673G025DF2D

30 WVDC, 40 V SURGE

μF	Size Code	Cat. No.*
2,200	AA	602D222G030AA2A
4,400	AB	602D442G030AB2A
6,600	AC	602D662G030AC2A
7,700	AD	602D772G030AD2A
8,800	AE	602D882G030AE2A
9,900	AF	602D992G030AF2A
10,000	BB	602D103G030BB2A
15,000	BC	602D153G030BC2A
17,000	BD	602D173G030BD2A
18,000	CB	602D183G030CB2D
20,000	BE	602D203G030BE2A
22,000	BF	602D223G030BF2A
26,000	CC	602D263G030CC2D
30,000	CD	602D303G030CD2D
34,000	CE	602D343G030CE2D
38,000	DC	602D383G030DC2D
39,000	CF	602D393G030CF2D
45,000	DD	602D453G030DD2D
52,000	DE	602D523G030DE2D
58,000	DF	602D583G030DF2D

40 WVDC, 55 V SURGE

μF	Size Code	Cat. No.*
1,800	AA	602D182G040AA2A
3,700	AB	602D372G040AB2A
5,500	AC	602D552G040AC2A
6,400	AD	602D642G040AD2A
7,400	AE	602D742G040AE2A
8,200	AF	602D822G040AF2A
9,000	BB	602D902G040BB2A
13,000	BC	602D133G040BC2A
15,000	BD	602D153G040BD2A
15,000	CB	602D153G040CB2A
18,000	BE	602D183G040BE2A
19,000	BF	602D193G040BF2A
22,000	CC	602D223G040CC2D
25,000	CD	602D253G040CD2D
28,000	CE	602D283G040CE2D
32,000	DC	602D323G040DC2D
33,000	CF	602D333G040CF2D
37,000	DD	602D373G040DD2D
43,000	DE	602D433G040DE2D
48,000	DF	602D483G040DF2D

50 WVDC, 75 V SURGE

μF	Size Code	Cat. No.*
1,400	AA	602D142G050AA2A
2,900	AB	602D292G050AB2A
4,400	AC	602D442G050AC2A
5,100	AD	602D512G050AD2A
5,800	AE	602D582G050AE2A
6,600	AF	602D662G050AF2A
9,000	BC	602D902G050BC2A
10,000	BC	602D103G050BC2A
11,000	BD	602D113G050BD2A
12,000	CB	602D123G050CB2D
13,000	BE	602D133G050BE2A
15,000	BF	602D153G050BF2A
17,000	CC	602D173G050CC2D
20,000	CD	602D203G050CD2D
22,000	CE	602D223G050CE2D
25,000	CF	602D253G050CF2D
25,000	DC	602D253G050DC2D
30,000	DD	602D303G050DD2D
34,000	DE	602D343G050DE2D
39,000	DF	602D393G050DF2D

75 WVDC, 100 V SURGE

μF	Size Code	Cat. No.*
530	AA	602D531F075AA2A
1,000	AB	602D102F075AB2A
1,600	AC	602D162F075AC2A
1,800	AD	602D182F075AD2A
2,000	AE	602D202F075AE2A
2,400	AF	602D242F075AF2A
2,600	BB	602D262F075BB2A
3,900	BC	602D392F075BC2A
4,400	CB	602D442F075CB2D
4,500	BD	602D452F075BD2A
5,000	BE	602D502F075BE2A
5,800	BF	602D582F075BF2A
6,600	CC	602D662F075CC2D
7,700	CD	602D772F075CD2D
8,800	CE	602D882F075CE2D
9,500	DC	602D952F075DC2D
9,900	CF	602D992F075CF2D
11,000	DD	602D113F075DD2D
13,000	DE	602D133F075DE2D
14,000	DF	602D143F075DF2D

100 WVDC, 150 V SURGE

μF	Size Code	Cat. No.*
250	AA	602D251F100AA2A
500	AB	602D501F100AB2A
800	AC	602D801F100AC2A
900	AD	602D901F100AD2A
1,000	AE	602D102F100AE2A
1,100	AF	602D112F100AF2A
1,200	BB	602D122F100BB2A
1,800	BC	602D182F100BC2A
2,100	BD	602D212F100BD2A
2,100	CB	602D212F100CB2D
2,400	BE	602D242F100BE2A
2,600	BF	602D262F100BF2A
3,100	CC	602D312F100CC2D
3,600	CD	602D362F100CD2D
4,100	CE	602D412F100CE2D
4,500	CF	602D452F100CF2D
4,600	DC	602D462F100DC2D
5,500	DD	602D552F100DD2D
6,000	DE	602D602F100DE2D
6,700	DF	602D672F100DF2D

SIZE CODE

Code	D. x L.	Code	D. x L.
AA	1.438 x 2.188	BF	2.062 x 5.688
AB	1.438 x 3.188	CB	2.578 x 3.250
AC	1.438 x 4.188	CC	2.578 x 4.250
AD	1.438 x 4.688	CD	2.578 x 4.750
AE	1.438 x 5.188	CE	2.578 x 5.250
AF	1.438 x 5.688	CF	2.578 x 5.750
BB	2.062 x 3.188	DC	3.078 x 4.250
BC	2.062 x 4.188	DD	3.078 x 4.750
BD	2.062 x 4.688	DE	3.078 x 5.250
BE	2.062 x 5.188	DF	3.078 x 5.750

*Catalog numbers listed are for capacitors with outer insulation. For bare case, change 14th character of cat. no. from "2" to "0" and subtract .063" from both diameter and length. Capacitors listed have low-screw insert terminals. For high-screw insert terminals, change last character of cat. no. from "A" to "B".

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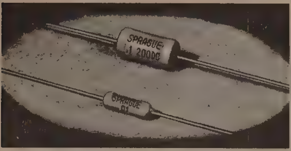
SPRAGUE CAPACITORS

TYPE 192P PACER® FILMITE® 'E' CAPACITORS



- Completely New Construction — Extended Foil Film Sections Terminate in End Caps with Wire Leads Assuring Best Possible Non-inductive Section.
- Controlled Dimensions Permit Use of Automatic Insertion Equipment for Installing Pacer Capacitors on Printed Wiring Boards.
- Entire Assembly Protected by Orange Heat Shrinkable Mylar Sleeve.
- Pacers are Wound with Ultra-thin Polyester Film Dielectric and Thin Gage Foil under Controlled Atmospheric Conditions.
- Rated for Operation from −55 C to +85 C (−67 F to +185 F).
- Capacitance Tolerance: ±10%.
- For complete data, see Engineering Bulletin 2066.

µF	D. x L.	Cat. No.
80 WVDC		
.0022	9/64 x 5/16	192P2229R8
.0027	9/64 x 5/16	192P2729R8
.0033	9/64 x 5/16	192P3329R8
.0039	9/64 x 5/16	192P3929R8
.0047	9/64 x 5/16	192P4729R8
.0056	11/64 x 3/8	192P5629R8
.0068	11/64 x 3/8	192P6829R8
.0082	11/64 x 3/8	192P8229R8
.01	11/64 x 3/8	192P1039R8
.012	11/64 x 7/16	192P1239R8
.015	11/64 x 7/16	192P1539R8
.018	11/64 x 1/2	192P1839R8
.022	11/64 x 1/2	192P2239R8
.027	7/32 x 7/16	192P2739R8
.033	7/32 x 7/16	192P3339R8
.039	7/32 x 9/16	192P3939R8
.047	7/32 x 9/16	192P4739R8
.056	15/64 x 9/16	192P5639R8
.068	15/64 x 9/16	192P6839R8
.082	19/64 x 1/2	192P8239R8
.1	19/64 x 1/2	192P1049R8
.12	19/64 x 5/8	192P1249R8
.15	19/64 x 5/8	192P1549R8
.18	21/64 x 5/8	192P1849R8
.22	21/64 x 5/8	192P2249R8
.27	21/64 x 7/8	192P2749R8
.33	21/64 x 1 3/16	192P3349R8
.39	21/64 x 1 3/16	192P3949R8
.47*	21/64 x 1 3/16	192P4749R8*
200 WVDC		
.0001	9/64 x 5/16	192P10192
.00012	9/64 x 5/16	192P12192
.00015	9/64 x 5/16	192P15192
.00018	9/64 x 5/16	192P18192
.00022	9/64 x 5/16	192P22192
.00027	9/64 x 5/16	192P27192
.00033	9/64 x 5/16	192P33192
.00039	9/64 x 5/16	192P39192
.00047	9/64 x 5/16	192P47192
.00056	9/64 x 5/16	192P56192
.00068	9/64 x 5/16	192P68192
.00082	9/64 x 5/16	192P82192
.001	9/64 x 5/16	192P10292
.0012	9/64 x 5/16	192P12292
.0015	9/64 x 5/16	192P15292
.0018	11/64 x 5/16	192P18292
.0022	11/64 x 5/16	192P22292
.0027	11/64 x 5/16	192P27292
.0033	11/64 x 5/16	192P33292
.0039	11/64 x 7/16	192P39292
.0047	11/64 x 7/16	192P47292
.0056	11/64 x 7/16	192P56292
.0068	11/64 x 7/16	192P68292
.0082	11/64 x 1/2	192P82292
.01	11/64 x 1/2	192P10392
.012	7/32 x 7/16	192P12392
.015	7/32 x 7/16	192P15392
.018	7/32 x 9/16	192P18392
.022	7/32 x 9/16	192P22392
.027	15/64 x 9/16	192P27392
.033	15/64 x 9/16	192P33392
.039	19/64 x 1/2	192P39392
.047	19/64 x 1/2	192P47392
.056	19/64 x 5/8	192P56392
.068	19/64 x 5/8	192P68392
.082	21/64 x 5/8	192P82392
.1	21/64 x 5/8	192P10492
.12	21/64 x 7/8	192P12492
.15	21/64 x 7/8	192P15492
.18	21/64 x 1 3/16	192P18492
.22	21/64 x 1 3/16	192P22492
400 WVDC		
.00047	11/64 x 3/8	192P47194
.00056	11/64 x 3/8	192P56194
.00068	11/64 x 3/8	192P68194
.00082	11/64 x 3/8	192P82194
.001	11/64 x 3/8	192P10294
.0012	11/64 x 3/8	192P12294
.0015	11/64 x 3/8	192P15294
.0018	11/64 x 7/16	192P18294
.0022	11/64 x 7/16	192P22294
.0027	7/32 x 7/16	192P27294
.0033	7/32 x 7/16	192P33294
.0039	7/32 x 7/16	192P39294
.0047	7/32 x 7/16	192P47294
.0056	15/64 x 9/16	192P56294
.0068	15/64 x 9/16	192P68294
.0082	15/64 x 9/16	192P82294
.01	15/64 x 9/16	192P10394
.012	19/64 x 1/2	192P12394
.015	19/64 x 1/2	192P15394
.018	19/64 x 5/8	192P18394
.022	19/64 x 5/8	192P22394
.027	21/64 x 5/8	192P27394
.033	21/64 x 5/8	192P33394
.039	21/64 x 7/8	192P39394
.047	21/64 x 7/8	192P47394
.056	21/64 x 1 3/16	192P56394
.068	21/64 x 1 3/16	192P68394

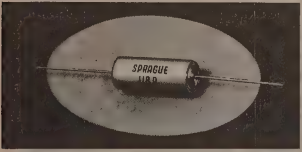
TYPE DF METALLIZED FILM ORANGE DROP® CAPACITORS

SPRAGUE
SPRAGUE
SPRAGUE
SPRAGUE

- Fit Easily into Tight Spots Because They're Smaller Than Other Types of Comparably-Rated Capacitors
- Extremely High Insulation Resistance Insures Peak Performance At Temperatures Up to +85C (185F)
- Radial Leads Are Extra Long For Point-to-Point Wiring and Crimped For Printed Board Insertion
- Double Dipped in Orange Epoxy Resin For Protection Against Heat And Humidity
- Capacitance Tolerance: ±10%
- Same as Sprague O.E.M. Type 277P
- For Complete Data, See Latest Issue of Sprague Engineering Bulletin 2040.

µF	H. x T. x L.	Cat. No.
100 WVDC		
.15	15/32 x 1/4 x 13/16	1DF-P15
.22	1/2 x 1/4 x 13/16	1DF-P22
.33	17/32 x 5/16 x 13/16	1DF-P33
.47	5/8 x 13/32 x 13/16	1DF-P47
.68	9/16 x 11/32 x 1 1/4	1DF-P68
1.0	5/8 x 13/32 x 1 1/4	1DF-M1
1.5	11/16 x 15/32 x 1 1/4	1DF-M1.5
2.0	25/32 x 9/16 x 1 1/4	1DF-M2
2.5	13/16 x 19/32 x 1 1/4	1DF-M2.5
3.0	25/32 x 9/16 x 1 5/8	1DF-M3
3.5	13/16 x 19/32 x 1 5/8	1DF-M3.5
4.0	27/32 x 5/8 x 1 5/8	1DF-M4
4.5	7/8 x 21/32 x 1 5/8	1DF-M4.5
5.0	29/32 x 11/16 x 1 5/8	1DF-M5
5.5	15/16 x 23/32 x 1 5/8	1DF-M5.5
200 WVDC		
.15	9/16 x 3/8 x 3/16	2DF-P15
.22	5/8 x 7/16 x 13/16	2DF-P22
.33	11/16 x 1/2 x 13/16	2DF-P33
.47	13/16 x 9/16 x 13/16	2DF-P47
.68	3/4 x 1/2 x 1 1/4	2DF-P68
1.0	13/16 x 9/16 x 1 1/4	2DF-M1
1.5	7/8 x 5/8 x 1 1/4	2DF-M1.5
2.0	15/16 x 11/16 x 1 1/4	2DF-M2
2.5	1 1/16 x 13/16 x 1 1/4	2DF-M2.5
3.0	15/16 x 11/16 x 1 5/8	2DF-M3
3.5	1 x 3/4 x 1 5/8	2DF-M3.5
4.0	1 1/16 x 13/16 x 1 5/8	2DF-M4
4.5	1 1/8 x 7/8 x 1 5/8	2DF-M4.5
5.0	1 1/8 x 7/8 x 1 5/8	2DF-M5
5.5	1 3/16 x 15/16 x 1 5/8	2DF-M5.5

118P DIFILM® METALLIZED CAPACITORS



- Best of their type possible to produce at the present state of the art
- Rated for operation at 125°C WITHOUT VOLTAGE DERATING.
- Unique dual dielectric — a combination of metallized paper and of polyester film, impregnated with high-temperature mineral wax.
- May be used at extremely low voltages where metallized paper construction has previously been unsatisfactory.
- Capacitors listed below are ungrounded case (insulated section) units without outer insulating sleeves. For information on other styles consult your Sprague Industrial Distributor.
- For units with insulating sleeves, change last digit from "2" to "4."
- Cap. Tolerance ±10%. For ±20% units, change 8th digit from "9" to "0."
- For complete data, see latest issue of Engineering Bulletin 2211.

µF	D. x L.	Cat. No.
200 WVDC		
.01	.175 x .749	118P10392S2
.015	.195 x .749	118P15392S2
.022	.235 x .749	118P22392S2
.033	.235 x .749	118P33392S2
.047	.312 x .874	118P47392S2
.068	.312 x .874	118P68392S2
.082	.312 x .874	118P82392S2
.1	.312 x .874	118P10492S2
.15	.312 x 1.124	118P15492S2
.22	.400 x .874	118P22492S2
.27	.400 x 1.124	118P27492S2
.33	.400 x 1.124	118P3349S22
.47	.500 x 1.124	118P47492S2
.56	.500 x 1.124	118P56492S2
.68	.500 x 1.124	118P68492S2
.82	.562 x 1.124	118P82492S2
1.0	.562 x 1.124	118P10592S2
1.5	.562 x 1.624	118P15592S2
2.0	.670 x 1.624	118P20592S2
3.0	.670 x 1.874	118P30592S2
4.0	.750 x 1.874	118P40592S2
5.0	1.000 x 1.874	118P50592S2
6.0	1.000 x 1.874	118P60592S2
8.0	1.000 x 1.874	118P80592S2
10.0	1.000 x 2.374	118P10692S2
12.0	1.000 x 2.624	118P12692S2
400 WVDC		
.15	.500 x 1.124	118P15494S2
1.0	.750 x 1.874	118P10594S2
2.0	1.000 x 1.874	118P20594S2
3.0	1.000 x 2.624	118P30594S2
600 WVDC		
.01	.312 x .874	118P10396S2
.047	.400 x 1.124	118P47396S2
.1	.500 x 1.124	118P10496S2
.15	.562 x 1.124	118P15496S2
.22	.562 x 1.374	118P22496S2
.33	.562 x 1.624	118P33496S2
.47	.670 x 1.624	118P47496S2
1.0	1.000 x 1.874	118P10596S2
2.0	1.000 x 2.124	118P20596S2
2.5	1.000 x 2.624	118P25596S2

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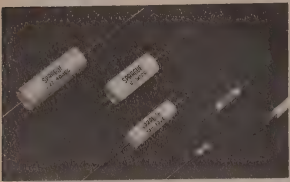
*Available until present stocks are exhausted.

IND-EEM-40a-EFAI

Sizes subject to change without notice.

SPRAGUE CAPACITORS

TYPE 416P YELLOW JACKET® FILMITE® 'E' CAPACITORS

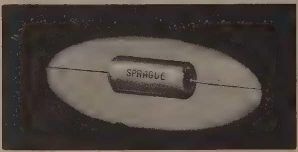


- Economy-priced for commercial applications. Made in Taiwan by Taiwan Sprague Corp.
- Extended-foil construction.
- Protected against moisture by outer wrap of polyester film and plastic resin end seals.
- Light-weight capacitors of minimum size.
- Rated for −55 C to +85 C operation (to +105 C with voltage derating).
- High insulation resistance.
- For complete technical data, refer to latest issue of Engineering Bulletin 2063C.

μF	D. x L.	Cat. No.
50 WVDC		
0.012	.190 x 0.531	416P1239R5
0.015	.190 x 0.531	416P1539R5
0.018	.200 x 0.594	416P1839R5
0.022	.200 x 0.594	416P2239R5
0.027	.210 x 0.656	416P2739R5
0.033	.210 x 0.656	416P3339R5
0.039	See 100 WVDC Listing	
0.047	See 100 WVDC Listing	
0.056	.250 x 0.718	416P5639R5
0.068	.250 x 0.718	416P6839R5
0.082	.290 x 0.750	416P8239R5
0.1	.290 x 0.750	416P1049R5
0.12	.315 x 0.812	416P1249R5
0.15	.315 x 0.812	416P1549R5
0.18	.315 x 1.062	416P1849R5
0.22	.315 x 1.062	416P2249R5
0.27	.375 x 1.062	416P2749R5
0.33	.375 x 1.062	416P3349R5
0.39	.430 x 1.062	416P3949R5
0.47	.430 x 1.062	416P4749R5
0.56	.450 x 1.375	416P5649R5
0.68	.450 x 1.375	416P6849R5
0.82	.500 x 1.375	416P8249R5
1.0	.500 x 1.375	416P1059R5
100 WVDC		
0.001	See 200 WVDC Listing	
0.0012	See 200 WVDC Listing	
0.0015	See 200 WVDC Listing	
0.0018	See 200 WVDC Listing	
0.0022	See 200 WVDC Listing	
0.0027	See 200 WVDC Listing	
0.0033	See 200 WVDC Listing	
0.0039	See 200 WVDC Listing	
0.0047	See 200 WVDC Listing	
0.0056	.190 x 0.450	416P56291
0.0068	.190 x 0.450	416P68291
0.0082	.190 x 0.450	416P82291
0.01	.190 x 0.450	416P10391
0.012	See 200 WVDC Listing	
0.015	See 200 WVDC Listing	
0.018	See 200 WVDC Listing	
0.022	See 200 WVDC Listing	
0.027	.190 x 0.718	416P27391
0.033	.190 x 0.718	416P33391
0.039	.215 x 0.718	416P39391
0.047	.215 x 0.718	416P47391
0.056	.215 x 0.844	416P56391
0.068	.215 x 0.844	416P68391
0.082	.245 x 0.844	416P82391
0.1	.245 x 0.844	416P10491
0.12	.285 x 0.844	416P12491
0.15	.285 x 0.844	416P15491
0.18	.290 x 1.250	416P18491
0.22	.290 x 1.250	416P22491
0.27	.325 x 1.250	416P27491
0.33	.325 x 1.250	416P33491
0.39	.380 x 1.250	416P39491
0.47	.380 x 1.250	416P47491
0.56	.455 x 1.562	416P56491
0.68	.455 x 1.562	416P68491
0.82	.535 x 1.562	416P82491
1.0	.535 x 1.562	416P10591
200 WVDC		
0.001	.190 x 0.450	416P10292
0.0012	.190 x 0.450	416P12292
0.0015	.190 x 0.450	416P15292
0.0018	.190 x 0.450	416P18292
0.0022	.190 x 0.450	416P22292
0.0027	.190 x 0.450	416P27292
0.0033	.190 x 0.450	416P33292
0.0039	.190 x 0.450	416P39292
0.0047	.190 x 0.450	416P47292
0.0056	.190 x 0.718	416P56292
0.0068	.190 x 0.718	416P68292
0.0082	.190 x 0.718	416P82292
0.01	.190 x 0.718	416P10392
0.012	.190 x 0.718	416P12392
0.015	.190 x 0.718	416P15392
0.018	.190 x 0.718	416P18392
0.022	.190 x 0.718	416P22392
0.027	.190 x 0.844	416P27392
0.033	.190 x 0.844	416P33392
0.039	.210 x 0.844	416P39392
0.047	.210 x 0.844	416P47392
0.056	.240 x 0.844	416P56392
0.068	.240 x 0.844	416P68392
0.082	.275 x 0.969	416P82392
0.1	.275 x 0.969	416P10492
0.12	.345 x 1.000	416P12492
0.15	.345 x 1.000	416P15492
0.18	.355 x 1.250	416P18492
0.22	.355 x 1.250	416P22492
0.27	.425 x 1.250	416P27492
0.33	.425 x 1.250	416P33492
0.39	.440 x 1.562	416P39492
0.47	.440 x 1.562	416P47492
0.56	.610 x 1.750	416P56492
0.68	.610 x 1.750	416P68492
0.82	.710 x 1.875	416P82492
1.0	.710 x 1.875	416P10592
400 WVDC		
0.0027	.190 x 0.718	416P27294
0.0033	.190 x 0.718	416P33294
0.0039	.190 x 0.718	416P39294
0.0047	.190 x 0.718	416P47294
0.0056	.200 x 0.718	416P56294
0.0068	.200 x 0.718	416P68294
0.0082	.210 x 0.844	416P82294
0.01	.210 x 0.844	416P10394
0.012	.230 x 0.844	416P12394
0.015	.230 x 0.844	416P15394
0.018	.265 x 0.844	416P18394
0.022	.265 x 0.844	416P22394
0.027	.315 x 0.875	416P27394
0.033	.315 x 0.875	416P33394
0.039	.325 x 1.000	416P39394
0.047	.325 x 1.000	416P47394
0.056	.340 x 1.250	416P56394
0.068	.340 x 1.250	416P68394
0.082	.400 x 1.250	416P82394
0.1	.400 x 1.250	416P10494
0.12	.405 x 1.562	416P12494
0.15	.405 x 1.562	416P15494
0.18	.480 x 1.562	416P18494
0.22	.480 x 1.562	416P22494
0.27	.650 x 1.750	416P27494
0.33	.650 x 1.750	416P33494
0.39	.725 x 1.937	416P39494
0.47	.725 x 1.937	416P47494
600 WVDC		
0.001	.190 x 0.718	416P10296
0.0012	.190 x 0.718	416P12296
0.0015	.190 x 0.718	416P15296
0.0018	.190 x 0.718	416P18296
0.0022	.190 x 0.718	416P22296
0.0027	.205 x 0.718	416P27296
0.0033	.205 x 0.718	416P33296
0.0039	.235 x 0.718	416P39296
0.0047	.235 x 0.718	416P47296
0.0056	.240 x 0.844	416P56296
0.0068	.240 x 0.844	416P68296
0.0082	.270 x 0.844	416P82296
0.01	.270 x 0.844	416P10396
0.012	.315 x 0.875	416P12396
0.015	.315 x 0.875	416P15396
0.018	.375 x 0.875	416P18396
0.022	.375 x 0.875	416P22396
0.027	.395 x 1.000	416P27396
0.033	.395 x 1.000	416P33396
0.039	.400 x 1.250	416P39396
0.047	.400 x 1.250	416P47396
0.056	.455 x 1.250	416P56396
0.068	.455 x 1.250	416P68396
0.082	.470 x 1.562	416P82396
0.1	.470 x 1.562	416P10496
0.12	.545 x 1.562	416P12496
0.15	.545 x 1.562	416P15496
0.18	.590 x 1.937	416P18496
0.22	.590 x 1.937	416P22496
0.27	.800 x 1.937	416P27496
0.33	.800 x 1.937	416P33496
0.39	.890 x 2.125	416P39496
0.47	.890 x 2.125	416P47496

TYPE 260P METALLIZED FILMITE® 'K' CAPACITORS

- Designed for applications such as low-frequency tuned circuits, analog computer reference capacitors and precision timing and integrated circuits.
- High insulation resistance, high stability, minimum capacitance change with temperature, low dielectric absorption, low dissipation factor.
- Capacitor sections are of non-inductive construction.
- Will operate at full rated voltage over the temperature range of −55 C to +105 C.
- Capacitance tolerance, ±5%.
- Voltage rating, 200 WVDC.
- For complete technical data, refer to latest issue of Engineering Bulletin 2705.



μF	D. x L.	Cat. No.
.01	.175 x 3/4	260P10352S4
.015	.195 x 3/4	260P15352S4
.022	.235 x 3/4	260P22352S4
.033	.235 x 3/4	260P33352S4
.047	.312 x 7/8	260P47352S4
.056	.312 x 7/8	260P56352S4
.068	.312 x 7/8	260P68352S4
.1	.312 x 7/8	260P10452S4
.15	.312 x 1 1/8	260P15452S4
.22	.400 x 7/8	260P22452S4
.33	.400 x 1 1/8	260P33452S4
.47	.400 x 1 3/8	260P47452S4
.68	.562 x 1 1/8	260P68452S4
1.0	.562 x 1 3/8	260P10552S4
2.0	.670 x 1 5/8	260P20552S4
3.0	.750 x 1 7/8	260P30552S4
4.0	.750 x 2 1/8	260P40552S4
5.0	.750 x 2 3/8	260P50552S4
7.0	1.000 x 1 7/8	260P70552S4
8.0	1.000 x 2 1/8	260P80552S4
10.0	1.000 x 2 5/8	260P10652S4

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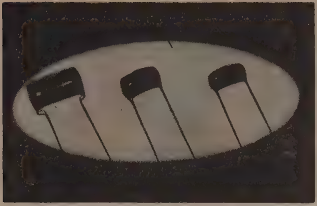
IND-EEM-44-EFAF

Sizes subject to change without notice.

SPRAGUE CAPACITORS

TYPE 225P FILMITE® 'E' ORANGE DROP® CAPACITORS

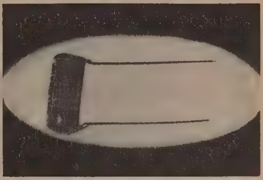


- Designed specifically for printed wiring board applications and are furnished with radial leads to facilitate insertion on boards.
- Find wide application in television receivers, radio sets, and commercial electronic equipment.
- Designed for operation at temperatures to 85 C.
- Capacitor sections are wound from polyester film and thin-gage foil under carefully controlled atmospheric conditions.
- Protected against moisture by a wax-free conformal coating of epoxy.
- Capacitance tolerance, ±10%.
- For complete technical data, refer to latest issue of Sprague Engineering Bulletin 2062.

μF	H. x T. x L.	Cat. No.
	100 WVDC	
.001	5/16 x 13/64 x 45/64	225P10291WD3
.0012	5/16 x 13/64 x 45/64	225P12291WD3
.0015	5/16 x 13/64 x 45/64	225P15291WD3
.0018	5/16 x 13/64 x 45/64	225P18291WD3
.0022	5/16 x 13/64 x 45/64	225P22291WD3
.0027	5/16 x 13/64 x 45/64	225P27291WD3
.0033	5/16 x 13/64 x 45/64	225P33291WD3
.0039	5/16 x 13/64 x 45/64	225P39291WD3
.0047	5/16 x 13/64 x 45/64	225P47291WD3
.0056	5/16 x 13/64 x 45/64	225P56291WD3
.0068	5/16 x 13/64 x 45/64	225P68291WD3
.0082	5/16 x 13/64 x 45/64	225P82291WD3
.01	5/16 x 13/64 x 45/64	225P10391WD3
.012	5/16 x 13/64 x 45/64	225P12391WD3
.015	5/16 x 13/64 x 45/64	225P15391WD3
.018	5/16 x 13/64 x 45/64	225P18391WD3
.022	5/16 x 13/64 x 45/64	225P22391WD3
.027	21/64 x 15/64 x 45/64	225P27391WD3
.033	21/64 x 15/64 x 45/64	225P33391WD3
.039	11/32 x 1/4 x 45/64	225P39391WD3
.047	11/32 x 1/4 x 45/64	225P47391WD3
.056	3/8 x 9/32 x 45/64	225P56391WD3
.068	3/8 x 9/32 x 45/64	225P68391WD3
.082	17/32 x 21/64 x 45/64	225P82391WD3
.1	17/32 x 21/64 x 45/64	225P10491WD3
.12	19/32 x 3/8 x 13/16	225P12491XD3
.15	5/8 x 13/32 x 13/16	225P15491XD3
18	11/16 x 7/16 x 13/16	225P18491XD3
.22	23/32 x 15/32 x 13/16	225P22491XD3
.27	3/4 x 1/2 x 13/16	225P27491XD3
.33	25/32 x 17/32 x 13/16	225P33491XD3
.39	13/16 x 9/16 x 13/16	225P39491XD3
.47	7/8 x 5/8 x 13/16	225P47491XD3
.56	57/64 x 9/16 x 1 3/16	225P56491YD3
.68	29/32 x 19/32 x 1 3/16	225P68491YD3
.82	61/64 x 21/32 x 1 3/16	225P82491YD3
1.0	63/64 x 47/64 x 1 3/16	225P10591YD3
	200 WVDC	
.001	9/16 x 15/64 x 13/16	225P10292XD3
.0015	9/16 x 15/64 x 13/16	225P15292XD3
.0022	9/16 x 15/64 x 13/16	225P22292XD3
.0033	9/16 x 15/64 x 13/16	225P33292XD3
.0047	9/16 x 15/64 x 13/16	225P47292XD3
.0068	19/32 x 1/4 x 13/16	225P68292XD3
.01	19/32 x 1/4 x 13/16	225P10392XD3
.015	19/32 x 1/4 x 13/16	225P15392XD3
.022	19/32 x 1/4 x 13/16	225P22392XD3
.033	5/8 x 9/32 x 13/16	225P33392XD3
.047	5/8 x 9/32 x 13/16	225P47392XD3
.068	41/64 x 5/16 x 13/16	225P68392XD3
.1	23/32 x 3/8 x 13/16	225P10492XD3
.15	3/4 x 27/64 x 13/16	225P15492XD3
.22	25/32 x 15/32 x 13/16	225P22492XD3
.33	23/32 x 27/64 x 1-3/16	225P33492YD3
.47	27/32 x 1/2 x 1-3/16	225P47492YD3
.68	1 9/64 x 27/32 x 1-3/16	225P68492YD3
	400 WVDC	
.001	9/16 x 15/64 x 13/16	225P10294XD3
.0015	9/16 x 15/64 x 13/16	225P15294XD3
.0022	9/16 x 15/64 x 13/16	225P22294XD3
.0033	9/16 x 15/64 x 13/16	225P33294XD3
.0047	9/16 x 15/64 x 13/16	225P47294XD3
.0068	19/32 x 1/4 x 13/16	225P68294XD3
.01	19/32 x 1/4 x 13/16	225P10394XD3
.015	19/32 x 9/32 x 13/16	225P15394XD3
.022	19/32 x 5/16 x 13/16	225P22394XD3
.033	21/32 x 11/32 x 13/16	225P33394XD3
.047	21/32 x 27/64 x 13/16	225P47394XD3
.068	13/16 x 31/64 x 13/16	225P68394XD3
.1	27/32 x 17/32 x 13/16	225P10494XD3
.15	13/16 x 31/64 x 1-3/16	225P15494YD3
.22	57/64 x 9/16 x 1-3/16	225P22494YD3
.33	1 x 47/64 x 1-3/16	225P33494YD3
.47	1 9/64 x 27/32 x 1-3/16	225P47494YD3

TYPE 418P ORANGE DROP® FILMITE® 'E' CAPACITORS

- Widely used in TV, radio, and allied commercial equipment.
- Combine excellent electrical characteristics, compactness, and low cost.
- "Hockeystick" crimped radial-lead design for easy insertion on printed wiring boards.
- Wound with polyester film and thin gage foil under carefully controlled atmospheric conditions.
- Protected against moisture by wax-free conformal coating of epoxy.
- Designed for operation at temperatures to 85 C.
- May be operated to 125 C with voltage derating.
- Capacitance tolerance, ±10%.
- For complete technical data, refer to latest issue of Sprague Engineering Bulletin 2062.



μF	D. x L.	Cat. No.
	100 WVDC	
.033	.400 x .700	418P33391JD3
.039	.400 x .700	418P39391JD3
.047	.400 x .700	418P47391JD3
.056	.400 x .700	418P56391JD3
.068	.400 x .700	418P68391JD3
.082	.400 x .900	418P82391KD3
.10	.400 x .900	418P10491KD3
.12	.450 x .900	418P12491KD3
.15	.450 x .900	418P15491KD3
.18	.450 x 1.200	418P18491LD3
.22	.450 x 1.200	418P22491LD3
.27	.500 x 1.200	418P27491LD3
.33	.500 x 1.200	418P33491LD3
.39	.550 x 1.600	418P39491MD3
.47	.550 x 1.600	418P47491MD3
.56	.650 x 1.600	418P56491MD3
.68	.650 x 1.600	418P68491MD3
.82	.700 x 1.600	418P82491MD3
1.0	.700 x 1.600	418P10591MD3
	200 WVDC	
.018	.400 x .700	418P18392JD3
.022	.400 x .700	418P22392JD3
.027	.400 x .700	418P27392JD3
.033	.400 x .900	418P33392KD3
.039	.400 x .900	418P39392KD3
.047	.400 x .900	418P47392KD3
.056	.400 x 1.200	418P56392LD3
.068	.400 x 1.200	418P68392LD3
.082	.450 x 1.200	418P82392LD3
.10	.450 x 1.200	418P10492LD3
.12	.500 x 1.200	418P12492LD3
.15	.500 x 1.200	418P15492LD3
.18	.550 x 1.200	418P18492LD3
.22	.550 x 1.200	418P22492LD3
.27	.500 x 1.600	418P27492MD3
.33	.500 x 1.600	418P33492MD3
.39	.550 x 1.600	418P39492MD3

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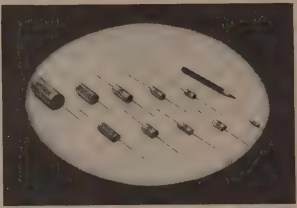
SPRAGUE CAPACITORS

TYPE 418P ORANGE DROP CAPACITORS, continued

µF	D. x L.	Cat. No.
.47	.550 x 1.600	418P47492MD3
	400 WVDC	
.0082	.400 x .700	418P82294JD3
.010	.400 x .700	418P10394JD3
.012	.400 x .700	418P12394JD3
.015	.400 x .700	418P15394JD3
.018	.400 x .900	418P18394KD3
.022	.400 x .900	418P22394KD3
.027	.400 x .900	418P27394KD3
.033	.400 x .900	418P33394KD3
.039	.450 x 1.200	418P39394LD3
.047	.450 x 1.200	418P47394LD3
.056	500 x 1.200	418P56394LD3
.068	.500 x 1.200	418P68394LD3
.082	.550 x 1.200	418P82394LD3
.10	.550 x 1.200	418P10494LD3
.12	.600 x 1.200	418P12494LD3
.15	.600 x 1.200	418P15494LD3
.18	.600 x 1.600	418P18494MD3
.22	.600 x 1.600	418P22494MD3
.27	.650 x 1.600	418P27494MD3
.33	.650 x 1.600	418P33494MD3
.39	.720 x 1.600	418P39494MD3
.47	.720 x 1.600	418P47494MD3
	600 WVDC	
.0010	.400 x .700	418P10296JD3
.0012	.400 x .700	418P12296JD3
.0015	.400 x .700	418P15296JD3
.0018	.400 x .700	418P18296JD3
.0022	.400 x .700	418P22296JD3
.0027	.400 x .700	418P27296JD3
.0033	.400 x .700	418P33296JD3
.0039	.400 x .700	418P39296JD3
.0047	.400 x .700	418P47296JD3
.0056	.400 x .700	418P56296JD3
.0068	.400 x .700	418P68296KD3
.0082	.400 x .900	418P82296KD3
.010	.400 x .900	418P10396KD3
.012	.400 x .900	418P12396KD3
.015	.400 x .900	418P15396KD3
.018	.450 x .900	418P18396KD3
.022	.450 x .900	418P22396KD3
.027	.450 x 1.200	418P27396LD3
.033	.450 x 1.200	418P33396LD3
.039	.550 x 1.200	418P39396LD3
.047	.550 x 1.200	418P47396LD3
.056	.600 x 1.200	418P56396LD3
.068	.600 x 1.200	418P68396LD3
.082	.650 x 1.200	418P82396LD3
.10	.650 x 1.200	418P10496LD3
.12	.700 x 1.600	418P12496MD3
.15	.700 x 1.600	418P15496MD3
.18	.800 x 1.600	418P18496MD3
.22	.800 x 1.600	418P22496MD3

TYPE 431P METFILM® 'E' CAPACITORS

- Unique Construction Gives Definite Space Advantages Over Metal-Encased, Molded, or Wax-Coated Cardboard-Case Tubulars of Comparable Ratings.
- Axial-Lead Polyester-Film Capacitor Section Protected Against Moisture By An Outer Wrap of Polyester-Film Tape.
- An Improved End Seal of a Plastic Resin Which Bonds With the Film Wrap and the Tinned Leads Provides Superior Humidity Resistance.
- Because of Their Small Size, These Capacitors Are Particularly Well-Suited For Potting or Encapsulating in Electronic Sub-Assemblies.
- For Complete Technical Data, Refer to The Latest Issue of Sprague Engineering Bulletin 2445.
- Call Your Sprague Industrial Distributor For Current Quantity Prices.



µF	T. x W. x L.	Cat. No.
	50 WVDC	
.047	3/32 x 3/16 x 5/8	431P4739R5
.068	1/8 x 7/32 x 5/8	431P6839R5
.10	5/32 x 7/32 x 5/8	431P1049R5
.15	3/16 x 1/4 x 5/8	431P1549R5
.22	5/32 x 9/32 x 3/4	431P2249R5
.33	3/16 x 5/16 x 3/4	431P3349R5
.47	3/16 x 5/16 x 1	431P4749R5
.68	3/16 x 3/8 x 1	431P6849R5
1.0	1/4 x 13/32 x 1	431P1059R5
1.5	9/32 x 1/2 x 1	431P1559R5
2.0	3/8 x 9/16 x 1	431P2059R5
2.5	11/32 x 17/32 x 1-1/4	431P2559R5
3.0	3/8 x 19/32 x 1-1/4	431P3059R5
4.0	3/8 x 19/32 x 1-1/2	431P4059R5
5.0	13/32 x 19/32 x 1-3/4	431P5059R5
6.0	15/32 x 11/16 x 1-1/2	431P6059R5
7.0	15/32 x 11/16 x 1-3/4	431P7059R5
10.0	9/16 x 25/32 x 1-3/4	431P1069R5
12.0	1/2 x 13/16 x 2-1/4	431P1269R5
	200 WVDC	
.015	3/32 x 3/16 x 5/8	431P15392
.022	1/8 x 3/16 x 5/8	431P22392
.033	1/8 x 7/32 x 5/8	431P33392
.047	5/32 x 1/4 x 5/8	431P47392
.068	5/32 x 9/32 x 3/4	431P68392
.1	3/16 x 5/16 x 3/4	431P10492
.15	7/32 x 11/32 x 3/4	431P15492
.22	1/4 x 13/32 x 3/4	431P22492
.33	7/32 x 13/32 x 1	431P33492
.47	7/32 x 13/32 x 1-1/4	431P47492
.68	5/16 x 17/32 x 1	431P68492
1.0	5/16 x 17/32 x 1-1/4	431P10592
1.5	11/32 x 9/16 x 1-1/2	431P15592
2.0	3/8 x 9/16 x 1-3/4	431P20592
2.5	15/32 x 21/32 x 1-1/2	431P25592
3.0	15/32 x 21/32 x 1-3/4	431P30592
4.0	17/32 x 3/4 x 1-3/4	431P40592
5.0	15/32 x 3/4 x 2-1/4	431P50592
6.0	15/32 x 25/32 x 2-1/2	431P60592
7.0	3/4 x 15/16 x 1-3/4	431P70592
10.0	23/32 x 1 x 2-1/4	431P10692
12.0	23/32 x 1 x 2-1/2	431P12692
	400 WVDC	
.0033	3/32 x 3/16 x 5/8	431P33294
.0047	1/8 x 3/16 x 5/8	431P47294
.0068	5/32 x 7/32 x 5/8	431P68294
.01	3/16 x 1/4 x 5/8	431P10394
.015	5/32 x 9/32 x 3/4	431P15394
.022	3/16 x 5/16 x 3/4	431P22394
.033	7/32 x 11/32 x 3/4	431P33394
.047	1/4 x 13/32 x 3/4	431P47394
.068	7/32 x 3/8 x 1	431P68394
.1	9/32 x 7/16 x 1	431P10494
.15	5/16 x 17/32 x 1	431P15494
.22	13/32 x 19/32 x 1	431P22494
.33	11/32 x 9/16 x 1-1/2	431P33494
.47	3/8 x 9/16 x 1-3/4	431P47494
.68	15/32 x 21/32 x 1-3/4	431P68494
1.0	1/2 x 23/32 x 2	431P10594
1.5	1/2 x 25/32 x 2-1/2	431P15594
	600 WVDC	
.0015	3/32 x 3/16 x 5/8	431P15296
.0022	1/8 x 3/16 x 5/8	431P22296
.0033	5/32 x 7/32 x 5/8	431P33296
.0047	1/8 x 1/4 x 3/4	431P47296
.0068	5/32 x 9/32 x 3/4	431P68296
.01	3/16 x 5/16 x 3/4	431P10396
.015	3/16 x 3/8 x 3/4	431P15396
.022	1/4 x 13/32 x 3/4	431P22396
.033	7/32 x 3/8 x 1	431P33396
.047	7/32 x 3/8 x 1-1/4	431P47396
.068	5/16 x 1/2 x 1	321P68396
.1	3/8 x 19/32 x 1	431P10496
.15	3/8 x 19/32 x 1-1/4	431P15496
.22	11/32 x 9/16 x 1-3/4	431P22496
.33	7/16 x 21/32 x 1-3/4	431P33496
.47	9/16 x 3/4 x 1-3/4	431P47496
.68	15/32 x 25/32 x 2-1/2	431P68496
1.0	3/4 x 31/32 x 2	431P10596
1.5	3/4 x 1-1/16 x 2-1/2	431P15596

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IND-EEM-38-EFAF

All sizes subject to change without notice.

SPRAGUE CAPACITORS

ORANGE DROP® DIPPED TUBULARS

SPRAGUE
6PS

- Widely Used in TV, Radio and Allied Commercial Equipment
- Crimped Wire Leads for Correct Spacing When Mounted On Printed Wiring Boards.
- Outside Foil on All Units Identified by Black Striping
- Double Dipped in Bright Orange Epoxy Resin—Beats Heat and Humidity
- Won't Leak or Drip
- Capacitance Tolerance, ±10%

µF	D. x L.	Cat. No.
	200 WVDC	
.02	29 64 x 15 16	2PS-S20
.022	29 64 x 15 16	2PS-S22
.047	33 64 x 15 16	2PS-S47
.05	33 64 x 15 16	2PS-S50
.1	35 64 x 1 1 4	2PS-P10
.15	5 8 x 1 1 4	2PS-P15
.2	43 64 x 1 3 8	2PS-P20
.22	43 64 x 1 3 8	2PS-P22
.25	43 64 x 1 3 8	2PS-P25
.33	11 16 x 1 11 16	2PS-P33
.47	49 64 x 1 11 16	2PS-P47
.5	49 64 x 1 11 16	2PS-P50
	400 WVDC	
.01	15 32 x 3 4	4PS-S10
.015	33 64 x 3 4	4PS-S15
.02	31 64 x 15 16	4PS-S20
.022	31 64 x 15 16	4PS-S22
.025	31 64 x 15 16	4PS-S25
.03	17 32 x 15 16	4PS-S30
.033	17 32 x 15 16	4PS-S33
.04	33 64 x 1 1 4	4PS-S40
.047	33 64 x 1 1 4	4PS-S47
.05	33 64 x 1 1 4	4PS-S50
.056	37 64 x 1 1 4	4PS-S56
.068	37 64 x 1 1 4	4PS-S68
.075	37 64 x 1 1 4	4PS-S75
.1	41 64 x 1 1 4	4PS-P10
.15	43 64 x 1 3 8	4PS-P15
.2	43 64 x 1 11 16	4PS-P20
.22	43 64 x 1 11 16	4PS-P22
.25	43 64 x 1 11 16	4PS-P25
	600 WVDC	
.001	25 64 x 3 4	6PS-D10
.0012	25 64 x 3 4	6PS-D12
.0015	25 64 x 3 4	6PS-D15
.0018	25 64 x 3 4	6PS-D18
.002	25 64 x 3 4	6PS-D20
.0022	25 64 x 3 4	6PS-D22
.0025	27 64 x 3 4	6PS-D25
.0027	27 64 x 3 4	6PS-D27
.003	27 64 x 3 4	6PS-D30
.0033	27 64 x 3 4	6PS-D33
.0039	29 64 x 3 4	6PS-D39
.004	29 64 x 3 4	6PS-D40
.0047	29 64 x 3 4	6PS-D47
.005	29 64 x 3 4	6PS-D50
.0056	15 32 x 3 4	6PS-D56
.006	15 32 x 3 4	6PS-D60
.0068	15 32 x 3 4	6PS-D68
.0075	15 32 x 3 4	6PS-D75
.008	29 64 x 15 16	6PS-D80
.0082	29 64 x 15 16	6PS-D82
.01	29 64 x 15 16	6PS-S10
.012	31 64 x 15 16	6PS-S12
.015	31 64 x 15 16	6PS-S15
.02	35 64 x 15 16	6PS-S20
.022	35 64 x 15 16	6PS-S22
.025	35 64 x 15 16	6PS-S25
.027	17 32 x 1 1 4	6PS-S27
.03	17 32 x 1 1 4	6PS-S30
.033	17 32 x 1 1 4	6PS-S33
.035	17 32 x 1 1 4	6PS-S35
.039	19 32 x 1 1 4	6PS-S39
.04	19 32 x 1 1 4	6PS-S40
.047	19 32 x 1 1 4	6PS-S47
.05	19 32 x 1 1 4	6PS-S50
.056	41 64 x 1 1 4	6PS-S56
.06	41 64 x 1 1 4	6PS-S60
.068	41 64 x 1 1 4	6PS-S68
.075	41 64 x 1 1 4	6PS-S75
.082	11 16 x 1 3 8	6PS-S82
.1	11 16 x 1 3 8	6PS-P10
.15	47 64 x 1 11 16	6PS-P15
.2	27 32 x 1 11 16	6PS-P20
.22	27 32 x 1 11 16	6PS-P22
.25	27 32 x 1 11 16	6PS-P25
.33	59 64 x 1 11 16	6PS-P33
.47	1 1 64 x 1 11 16	6PS-P47
	1000 WVDC	
.001	25 64 x 3 4	10PS-D10
.0015	13 32 x 3 4	10PS-D15
.002	7 16 x 3 4	10PS-D20
.0022	7 16 x 3 4	10PS-D22
.003	7 16 x 15 16	10PS-D30
.0033	7 16 x 15 16	10PS-D33
.004	15 32 x 15 16	10PS-D40
.0047	15 32 x 15 16	10PS-D47
.005	15 32 x 15 16	10PS-D50
.0068	31 64 x 15 16	10PS-D68
.01	35 64 x 15 16	10PS-S10
.015	17 32 x 1 1 4	10PS-S15
.022	37 64 x 1 3 8	10PS-S22
.033	19 32 x 1 3 8	10PS-S33
.039	43 64 x 1 3 8	10PS-S39
.047	43 64 x 1 3 8	10PS-S47
.056	47 64 x 1 11 16	10PS-S56
.068	47 64 x 1 11 16	10PS-S68
.082	49 64 x 1 11 16	10PS-S82
.1	49 64 x 1 11 16	10PS-P10
	1600 WVDC	
.0005	1 2 x 7 8	16PS-T50*
.001	13 32 x 7 8	16PS-D10
.0015	7 16 x 1 7 8	16PS-D15
.002	1 2 x 7 8	16PS-D20
.0022	1 2 x 7 8	16PS-D22
.003	7 16 x 1 1 8	16PS-D30
.0033	7 16 x 1 1 8	16PS-D33
.0039	31 64 x 1 1 8	16PS-D39
.004	31 64 x 1 1 8	16PS-D40
.0047	31 64 x 1 1 8	16PS-D47
.005	31 64 x 1 1 8	16PS-D50
.006	17 32 x 1 1 8	16PS-D60
.0068	17 32 x 1 1 8	16PS-D68
.007	17 32 x 1 1 8	16PS-D70
.0075	17 32 x 1 1 8	16PS-D75
.008	5 8 x 1 5 32	16PS-D80
.01	5 8 x 1 5 32	16PS-S10
.015	21 32 x 1 19 64	16PS-S15
.018	3 4 x 1 19 64	16PS-S18
.02	3 4 x 1 19 64	16PS-S20
.022	3 4 x 1 19 64	16PS-S22
.03	3 4 x 1 39 64	16PS-S30
.033	3 4 x 1 39 64	16PS-S33
.04	27 32 x 1 39 64	16PS-S40
.047	27 32 x 1 39 64	16PS-S47
.05	27 32 x 1 39 64	16PS-S50
	2000 WVDC	
.001	3 8 x 1 1 4	20PS-D10
.0015	27 64 x 1 1 8	20PS-D15
.0022	15 32 x 1 1 8	20PS-D22
.0033	33 64 x 1 1 8	20PS-D33
.0047	1 2 x 1 3 8	20PS-D47
.0056	37 64 x 1 3 8	20PS-D56
.0068	37 64 x 1 3 8	20PS-D68
.0082	39 64 x 1 3 8	20PS-D82
.027	51 64 x 1 11 16	20PS-S27

TYPE 279P* ISOFARAD® PLASTIC FILM CAPACITORS

- Isofarad Quality is a Must in Color TV Synchroguide Circuits, Horizontal and Vertical Oscillators, Bridge and Parallel-T Circuits and Other Tuned Circuit Applications Requiring Close Tolerance and Zero Temperature Coefficient of Capacitance
- Superior to Silvered Mica Capacitors, Yet Less Expensive
- Constant Capacitance Will Not Change More Than ±0.2% from Room Temperature to +80 C at a Maximum Rated Voltage. Will Withstand Operating Temperatures to 85 C (185 F)
- Capacitance Tolerance: ±5%
- For complete data, see latest issue of Engineering Bulletin 2071

SPRAGUE 279P

µF	WVDC	D. x L.	Cat. No.
.001	500	3/8 x 1	279P10255VB3
.0015	500	3/8 x 1	279P15255VB3
.0068	500	3/8 x 1-1/4	279P68255WB3
.015	500	7/16 x 1-1/4	279P15355XB3
.022	500	1/2 x 1-1/2	279P22355YB3
.033	500	1/2 x 1-1/2	279P33355YB3
.047	500	5/8 x 1-7/8	279P47355ZB3
.068	500	5/8 x 1-7/8	279P68355ZB3

*Available until present stocks are exhausted.

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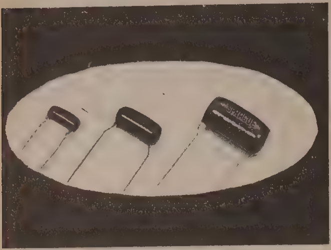
SPRAGUE CAPACITORS

TYPE 715P FILMITE® 'L' ORANGE DROP® DIPPED TUBULARS

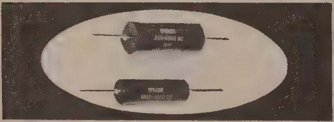


- Polypropylene film capacitors similar to polystyrene units with their high a-c current-carrying capability, but have added advantage of operating temperatures to 105 C and extremely low dissipation factor.
- Ideal for applications where high a-c current flow is found, as in certain solid-state TV vertical circuits, r-f generators, and pulse-forming networks.
- Exhibit capacitance change of less than 3% over entire operating temperature range.
- Temperature coefficient is negative and virtually linear at 180 ppm/°C over the temperature range of +25 C to +105 C, making capacitors suitable for matching with positive TC resistors and inductors to maintain circuit stability.
- Conformally coated with flame-retardant epoxy which also provides protection from humidity and mechanical damage.
- Capacitance tolerance, ±5%.
- Furnished with 1.250" long "hockeystick" crimped leads.
- For complete technical data, refer to latest issue of Engineering Bulletin 2090.

µF	Dia. x Length	Catalog Number
	400 WVDC	
.01	.400 x .750	715P10354JD3
.015	.450 x .750	715P15354JD3
.033	.500 x .950	715P33354KD3
.15	.650 x 1.300	715P15454LD3
.22	.700 x 1.700	715P22454MD3
.33	.800 x 1.700	715P33454MD3
.47	.900 x 1.700	715P47454MD3
	600 WVDC	
.001	.400 x .750	715P10256JD3
.0015	.400 x .750	715P15256JD3
.0022	.400 x .750	715P22256JD3
.0033	.400 x .750	715P33256JD3
.0047	.450 x .750	715P47256JD3
.0068	.450 x .750	715P68256JD3
.01	.450 x .950	715P10356KD3
.015	.500 x .950	715P15356KD3
.022	.550 x .950	715P22356KD3
.047	.600 x 1.300	715P47356LD3
.068	.650 x 1.300	715P68356LD3
.1	.750 x 1.300	715P10456LD3
.15	.750 x 1.700	715P15456MD3
.22	.850 x 1.700	715P22456MD3

µF	Dia. x Length	Catalog Number
	800 WVDC	
.015	.550 x 1.300	715P15358LD3
.022	.600 x 1.300	715P22358LD3
.033	.700 x 1.300	715P33358LD3
.068	.800 x 1.700	715P68358MD3
.1	.900 x 1.700	715P10458MD3
	1200 WVDC	
.015	.650 x 1.300	715P153512LD3
.047	.850 x 1.700	715P473512MD3
	1600 WVDC	
.0022	.500 x 1.300	715P222516LD3
.0033	.550 x 1.300	715P332516LD3
.0047	.600 x 1.300	715P472516LD3
.0068	.650 x 1.300	715P682516LD3
.01	.700 x 1.300	715P103516LD3
.015	.750 x 1.700	715P153516MD3
.022	.850 x 1.700	715P223516MD3
.033	.950 x 1.700	715P333516MD3

TYPE 185P HIGH-VOLTAGE TELECAP® DIFILM® CAPACITORS



- Minimize corona in high-voltage circuits.
- Axial-lead premolded cases are rugged and non-flammable.
- Capacitance tolerance, ±10%.
- Higher ripple voltage capability than conventional extended-foil non-inductive capacitors.
- For complete data, see latest issue of Engineering Bulletin 2011.

µF	WVDC	D. x L.	Cat. No.	µF	WVDC	D. x L.	Cat. No.	µF	WVDC	D. x L.	Cat. No.
.047	6,000	1 3/8 x 2 3/4	185P473960	.0010	10,000	1 x 2 1/2	185P1029100	.0047	10,000	1 3/8 x 2 3/4	185P4729100
.033	7,000	1 3/8 x 2 3/4	185P333970	.0015	10,000	1 x 2 1/2	185P1529100	.0068	10,000	1 3/8 x 2 3/4	185P6829100
.022	8,000	1 3/8 x 2 3/4	185P223980	.0022	10,000	1 x 2 1/2	185P2229100	.010	10,000	1 3/8 x 2 3/4	185P1039100
.00047	10,000	3/4 x 2 1/4	18504719100	.0033	10,000	1 x 2 1/2	185P3329100	.015	10,000	1 3/8 x 2 3/4	185P1539100

*Available until present stocks are exhausted.

† At vendor's option, 5/16" dia. units may be furnished.

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IND-EEM-41-EFAI

All sizes subject to change without notice.

SPRAGUE CAPACITORS

TYPE CP53 CAPACITORS TO MIL-C-25

- Impregnated with specially processed mineral oil to exceed performance requirements of MIL-C-25A
- Hermetically sealed, with silicone rubber compression terminals
- Rated for—55°C to +85°C operation
- Drawn metal cases have mounting flanges as integral part of containers
- Single and dual capacitance units have insulated sections—triple capacitance units have grounded cases

Call Your Sprague Industrial Distributor
for Current Quantity Prices

SPRAGUE
CP53B4EF504V
2x.5MF 600VDC

NOTE: Capacitors listed below have capacitance tolerances of +20%, —10% (V) or ±10% (K).

μF	Volts	L. x W. x H.	Cat. No.
Single Capacitance			
.05	1000	1 13/16 x 1 x 3/4	CP53B1EG503K1
.1	1000	1 13/16 x 1 x 3/4	CP53B1EG104K1
.25	600	1 13/16 x 1 x 3/4	CP53B1EF254K1
.25	1000	1 13/16 x 1 x 7/8	CP53B1EG254K1
.5	600	1 13/16 x 1 x 1	CP53B1EF504K1
.5	1000	2 x 1 3/4 x 7/8	CP53B1EG504K1
1.0	600	2 x 1 3/4 x 1	CP53B1EF105K1
1.0	1000	2 x 2 x 1 1/8	CP53B1EG105K1
2.0	200	2 x 2 x 1	CP53B1EC205K1*
2.0	600	2 x 2 x 1 1/8	CP53B1EF205K1
4.0	100	2 x 2 x 1 1/8	CP53B1EB405K1*

Call Your Sprague Distributor for Prices

μF	Volts	L. x W. x H.	Cat. No.
Dual Capacitance			
.1 + .1	600	1 13/16 x 1 x 3/4	CP53B4EF104V1
.1 + .1	1000	1 13/16 x 1 x 7/8	CP53B4EG104V1
.25+ .25	600	1 13/16 x 1 x 1	CP53B4EF254V1
.25+ .25	1000	2 x 1 3/4 x 7/8	CP53B4EG254V1
.5 + .5	600	2 x 1 3/4 x 1	CP53B4EF504V1
.5 + .5	1000	2 x 2 x 1 1/8	CP53B4EG504V1
1.0 +1.0	600	2 x 2 x 1 1/8	CP53B4EF105V1
Triple Capacitance			
.1+.1+.1	600	1 13/16 x 1 x 7/8	CP53B5EF104V1
.5+.5+.5	600	2 x 2 x 1 1/8	CP53B5EF504V1*

Call Your Sprague Distributor for Prices

TYPE CP70*, CP72 CAPACITORS to MIL-C-25

- Ruggedly Designed for Heavy-Duty Applications
- Long Life and Reliable Service under High Ambient Temperatures
- Terminals have Ceramic Pillar Insulators (E) or Rubber Compression Seals (B)
- Impregnated with a Specially Processed Mineral Oil to Withstand Severe Operating Conditions
- Char. F Units Designed for Ground Equipment Where Low Temperatures are not Encountered

Call Your Sprague Industrial Distributor
For Current Quantity Prices

μF	WVDC	Char. E (E Term.)		Case Code	Char. F (B Term.)		Case Code	Char. E (B Term.)		Case Code
		MIL-C-25A Cat. No.	MIL-C-25C Cat. No.		MIL-C-25C Cat. No.	MIL-C-25C Cat. No.		MIL-C-25A Cat. No.	MIL-C-25C Cat. No.	
.25	2000	—	CP72E1EJ254K1	B1	—	—	—	—	—	—
.5	1000	—	CP72E1EG504K1	A2	—	—	—	—	—	—
.5	1500	—	CP72E1EH504K1	A3	—	—	—	—	—	—
1.0	600	—	CP72E1EF105K1	A2	—	—	—	—	—	
1.0	1000	—	CP72E1EG105K1	A3	—	—	—	—	CP72B1EG105K1*	A3
1.0	2000	—	CP72E1EJ105K1	B6	—	—	—	—	—	—
2.0	600	—	CP72E1EF205K1	A4	CP70B1FF205K	—	A4	—	—	—
2.0	1000	—	CP72E1EG205K1	A6	—	—	—	CP70B1EG205K	CP/2B1EG205K1	A6
2.0	2500	CP70E1EK205K	—	E5	—	—	—	—	—	—
4.0	600	—	CP72E1EF405K1	B4	CP70B1FF405K	—	B3	—	CP72B1EF405K1	B4
4.0	1000	—	—	C2	CP70B1FG405K	—	B6	—	—	
4.0	1500	—	CP72E1EH405K1	D4	—	—	—	—	—	
4.0	2500	CP70E1EK405K	—	J2	—	—	—	—	—	—
6.0	600	—	CP72E1EF605K1	C2	—	—	—	—	CP72B1EF605K1	C2
6.0	1000	—	CP72E1EG605K1	D3	CP70B1FG605K	—	C4	CP70B1EG605K	—	D3
6.0	1500	CP70E1EH605K	—	E5	CP70B1FH605K	—	E5	CP70B1EH605K	—	E5
8.0	600	—	—	C3	—	—	—	—	CP72B1EF805K1	C3
8.0	1000	—	CP72E1EG805K1	D5	—	—	—	CP70B1EG805K	—	C4
8.0	1500	—	—	—	—	—	—	CP70B1EH805K	—	F2
10.0	600	—	CP72E1EF106K1	D3	—	CP72B1FF106K1	C4	—	CP72B1EF106K1	D3
10.0	1000	—	CP72E1EG106K1	E5	—	—	—	CP70B1EG106K	—	E5
12.0	1000	—	—	E6	—	—	—	CP70B1EG126K	—	E6

Code	Dimensions W. x T. x H.
A2	1 13/16 x 1 1/16 x 2 1/4
A3	1 13/16 x 1 1/16 x 2 7/8
A4	1 13/16 x 1 1/16 x 3 1/4
A6	1 13/16 x 1 1/16 x 4 3/4
B1	2 1/2 x 1 3/16 x 2 1/2
B3	2 1/2 x 1 3/16 x 3 1/2
B4	2 1/2 x 1 3/16 x 3 7/8
B6	2 1/2 x 1 3/16 x 4 3/4
C2	3 3/4 x 1 1/4 x 3 7/8
C3	3 3/4 x 1 1/4 x 4 1/4
C4	3 3/4 x 1 1/4 x 4 3/4
D3	3 3/4 x 1 3/4 x 4
D4	3 3/4 x 1 3/4 x 4 1/4
D5	3 3/4 x 1 3/4 x 4 3/4
E5	3 3/4 x 2 1/4 x 4 3/4
E6	3 3/4 x 2 1/4 x 5 1/8
F2	3 3/4 x 2 1/2 x 5 3/4
J2	4 9/16 x 3 3/4 x 4 3/8

*Available until present stocks are exhausted.

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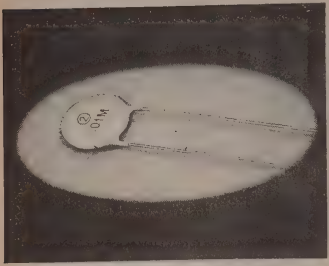
EEM-26-EFAI

All sizes subject to change without notice.

SPRAGUE CAPACITORS

CERA-MITE® CERAMIC CAPACITORS



- Tiny, Tough, Dependable In Every Application
- Low Self-Inductance Of Silvered Flat-plate Design Means Very High By-pass Efficiency In All TV Circuits
- Flat-plate Construction Permits Higher Self-resonant Frequency Than Tubular Ceramic Or Molded Mica Capacitors
- Tough Moisture-proof Coating Protects Against Short-circuiting And Assures Good Performance Under Severe Conditions Of Humidity And Vibration
- Cera-mite Capacitors Easily Fit Into Tight Spaces, Even Across Subminiature Tube Sockets
- Designed For 85C (185F) Continuous Operation

Call your Sprague Industrial Distributor for Current Quantity Prices

GENERAL APPLICATION TYPES

- Excellent Where Temperature Coefficient Is Not Important, Such As By-pass and Coupling Applications in IF and RF Circuits
- EIA Designation: 5GA=Z5U, TG=Z5U
- Low Cost, Smallest Size 1 kV General Application Type Available
- Same Characteristics Available In High Voltage Ratings At Low Cost

1000 WVDC ±20% Tol.

pF	Sprague Products Cat. No.	Sprague O.E.M. Part No.	Size D. x T.
5.0	5GA-V50	C023B102E5R0M	5/16 x 5/32
6.8	5GA-V68	C023B102E6R8M	5/16 x 5/32
7.5	5GA-V75	C023B102E7R5M	5/16 x 5/32
8.2	5GA-V82	C023B102E8R2M	5/16 x 5/32
10	5GA-Q10	C023B102E100M	5/16 x 5/32
12	5GA-Q12	C023B102E120M	5/16 x 5/32
15	5GA-Q15	C023B102E150M	5/16 x 5/32
18	5GA-Q18	C023B102E180M	5/16 x 5/32
20	5GA-Q20	C023B102E200M	5/16 x 5/32
22	5GA-Q22	C023B102E220M	5/16 x 5/32
25	5GA-Q25	C023B102E250M	5/16 x 5/32
27	5GA-Q27	C023B102E270M	5/16 x 5/32
30	5GA-Q30	C023B102E300M	5/16 x 5/32
33	5GA-Q33	C023B102E330M	5/16 x 5/32
39	5GA-Q39	C023B102E390M	5/16 x 5/32
47	5GA-Q47	C023B102E470M	5/16 x 5/32
50	5GA-Q50	C023B102E500M	5/16 x 5/32
56	5GA-Q56	C023B102E560M	5/16 x 5/32
68	5GA-Q68	C023B102E680M	5/16 x 5/32
75	5GA-Q75	C023B102E750M	5/16 x 5/32
82	5GA-Q82	C023B102E820M	5/16 x 5/32
100	5GA-T10	C023B102E101M	5/16 x 5/32
120	5GA-T12	C023B102E121M	5/16 x 5/32
150	5GA-T15	C023B102E151M	5/16 x 5/32
180	5GA-T18	C023B102E181M	5/16 x 5/32
200	5GA-T20	C023B102E201M	5/16 x 5/32
220	5GA-T22	C023B102E221M	5/16 x 5/32
250	5GA-T25	C023B102E251M	5/16 x 5/32
270	5GA-T27	C023B102E271M	5/16 x 5/32
300	5GA-T30	C023B102E301M	5/16 x 5/32
330	5GA-T33	C023B102E331M	5/16 x 5/32
360	5GA-T36	C023B102E361M	5/16 x 5/32
390	5GA-T39	C023B102E391M	5/16 x 5/32
470	5GA-T47	C023B102E471M	5/16 x 5/32

1000 WVDC (cont.)

pF	Sprague Products Cat. No.	Sprague O.E.M. Part No.	Size D. x T.
500	5GA-T50	C023B102E501M	5/16 x 5/32
560	5GA-T56	C023B102E561M	5/16 x 5/32
680	5GA-T68	C023B102E681M	5/16 x 5/32
750	5GA-T75	C023B102E751M	5/16 x 5/32
800	5GA-T80	C023B102E801M	5/16 x 5/32
820	5GA-T82	C023B102E821M	5/16 x 5/32
.001 μF	5GA-D10	C023B102E102M	5/16 x 5/32
.0012	5GA-D12	C023B102E122M	5/16 x 5/32
.0015	5GA-D15	C023B102E152M	5/16 x 5/32
.0018	5GA-D18	C023B102E182M	5/16 x 5/32
.002	5GA-D20	C023B102E202M	5/16 x 5/32
.0022	5GA-D22	C023B102F222M	3/8 x 5/32
.0025	5GA-D25	C023B102F252M	3/8 x 5/32
.0027	5GA-D27	C023B102F272M	3/8 x 5/32
.003	5GA-D30	C023B102F302M	3/8 x 5/32
.0033	5GA-D33	C023B102F332M	3/8 x 5/32
.0039	5GA-D39	C023B102G392M	7/16 x 5/32
.004	5GA-D40	C023B102G402M	7/16 x 5/32
.0047	5GA-D47	C023B102G472M	7/16 x 5/32
.005	5GA-D50	C023B102G502M	7/16 x 5/32
.0068	5GA-D68	C023A102H682M	1/2 x 5/32
.0082	5GA-D82	C023A102J822M	5/8 x 5/32
.01	5GA-S10	C023A102K103M	5/8 x 5/32
.015	5GA-S15	C023B102L153M	11/16 x 5/32
.02	5GA-S20	C023B102P203M	7/8 x 5/32

500 WVDC ±20% Tol.

pF	Sprague Products Cat. No.	Sprague O.E.M. Part No.	Size D. x T.
.01 μF	5GAS-S10	C023B501G103M	7/16 x 5/32
.02	5GAS-S20	C023A501J203M	5/8 x 5/32
.025	5GA-S25	C023A501K253M	5/8 x 5/32
.04	5GA-S40	C023A501P403M	7/8 x 5/32
.05	5GA-S50	C023A501P503M	7/8 x 5/32
.1	5GA-P10	41C92A10	7/8 x 3/16

3000 WVDC ±20% Tol.

pF	Sprague Products Cat. No.	Sprague O.E.M. Part No.	Size D. x T.
1.5	30GA-V15	C023B302E1R5M	5/16 x 5/32
3.3	30GA-V33	C023B302E3R3M	5/16 x 5/32
4.7	30GA-V47	C023B302E4R7M	5/16 x 5/32
5.0	30GA-V50	C032B302E5R0M	5/16 x 5/32
6.0	30GA-V60	C023B302E6R0M	5/16 x 5/32
6.8	30GA-V68	C023B302E6R8M	5/16 x 5/32
7.5	30GA-V75	C023B302E7R5M	5/16 x 5/32
8.2	30GA-V82	C023B302E8R2M	5/16 x 5/32
10	30GA-Q10	C023B302E100M	5/16 x 5/32
12	30GA-Q12	C023B302E120M	5/16 x 5/32
15	30GA-Q15	C023B302E150M	5/16 x 5/32
18	30GA-Q18	C023B302E180M	5/16 x 5/32
20	30GA-Q20	C023B302E200M	5/16 x 5/32
22	30GA-Q22	C023B302E220M	5/16 x 5/32
25	30GA-Q25	C023B302E250M	5/16 x 5/32
27	30GA-Q27	C023B302E270M	5/16 x 5/32
30	30GA-Q30	C023B302E300M	5/16 x 5/32
33	30GA-Q33	C023B302E330M	5/16 x 5/32
39	30GA-Q39	C023B302E390M	5/16 x 5/32
47	30GA-Q47	C023B302E470M	5/16 x 5/32
50	30GA-Q50	C023B302E500M	5/16 x 5/32
56	30GA-Q56	C023B302E560M	5/16 x 5/32
60	30GA-Q60	C023B302E600M	5/16 x 5/32
62	30GA-Q62	C023B302E620M	5/16 x 5/32
68	30GA-Q68	C023B302E680M	5/16 x 5/32
75	30GA-Q75	C023B302E750M	5/16 x 5/32
82	30GA-Q82	C023B302E820M	5/16 x 5/32
100	30GA-T10	C023B302E101M	5/16 x 5/32
120	30GA-T12	C023B302E121M	5/16 x 5/32
150	30GA-T15	C023B302E151M	5/16 x 5/32
180	30GA-T18	C023B302E181M	5/16 x 5/32
200	30GA-T20	C023B302E201M	5/16 x 5/32

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IND-EEM-49-EFAI

Sizes subject to change without notice.

SPRAGUE CAPACITORS

CERA-MITE® CERAMIC CAPACITORS, continued

3000 WVDC (cont.)

pF	Sprague Products Cat. No.	Sprague O.E.M. Part No.	Size D. x T.
220	30GA-T22	C023B302E221M	5/16 x 5/32
250	30GA-T25	C023B302E251M	5/16 x 5/32
270	30GA-T27	C023B302E271M	5/16 x 5/32
300	30GA-T30	C023B302E301M	5/16 x 5/32
330	30GA-T33	C023B302E331M	5/16 x 5/32
390	30GA-T39	C023B302E391M	5/16 x 5/32
400	30GA-T40	C023B302E401M	5/16 x 5/32
470	30GA-T47	C023B302E471M	5/16 x 5/32
500	30GA-T50	C023B302E501M	5/16 x 5/32
560	30GA-T56	C023B302E561M	5/16 x 5/32
680	30GA-T68	C023B302F681M	3/8 x 5/32
750	30GA-T75	C023B302F751M	3/8 x 5/32
820	30GA-T82	C023B302F821M	3/8 x 5/32
.001 μF	30GA-D10	C023B302F102M	3/8 x 5/32
.0012	30GA-D12	C023B302F122M	3/8 x 5/32
.0015	30GA-D15	C023B302G152M	7/16 x 5/32
.002	30GA-D20	C023B302H202M	1/2 x 5/32
.0022	30GA-D22	C023B302H222M	1/2 x 5/32
.0025	30GA-D25	C023B302H252M	1/2 x 5/32
.0027	30GA-D27	C023B302J272M	9/16 x 5/32
.003	30GA-D30	C023B302J302M	9/16 x 5/32
.0033	30GA-D33	C023B302J332M	9/16 x 5/32
.0039	30GA-D39	C023B302K392M	5/8 x 5/32
.004	30GA-D40	C023B302K402M	5/8 x 5/32
.0047	30GA-D47	C023B302L472M	11/16 x 5/32
.005	30GA-D50	C023B302L502M	11/16 x 5/32
.006	30GA-D60	C023A302M602M	3/4 x 5/32
.0068	30GA-D68	C023A302M682M	3/4 x 5/32
.008	30GA-D80	C023A302P802M	7/8 x 5/32
.0082	30GA-D82	C023A302P822M	7/8 x 5/32
.01	30GA-S10	C023A302P103M	7/8 x 5/32

6000 WVDC ±20% Tol.

pF	Sprague Products Cat. No.	Sprague O.E.M. Part No.	Size D. x T.
1.5	60GA-V15	C023B602J1R5M	9/16 x 5/32
4.7	60GA-V47	C023B602J4R7M	9/16 x 5/32
6.8	60GA-V68	C023B602J6R8M	9/16 x 5/32
8.2	60GA-V82	C023B602J8R2M	9/16 x 5/32
10	60GA-Q10	C023B602J100M	9/16 x 5/32
12	60GA-Q12	C023B602J120M	9/16 x 5/32
15	60GA-Q15	C023B602J150M	9/16 x 5/32
18	60GA-Q18	C023B602J180M	9/16 x 5/32
20	60GA-Q20	C023B602J200M	9/16 x 5/32
22	60GA-Q22	C023B602J220M	9/16 x 5/32
25	60GA-Q25	C023B602J250M	9/16 x 5/32
27	60GA-Q27	C023B602J270M	9/16 x 5/32
30	60GA-Q30	C023B602J300M	9/16 x 5/32
33	60GA-Q33	C023B602J330M	9/16 x 5/32
39	60GA-Q39	C023B602J390M	9/16 x 5/32
47	60GA-Q47	C023B602J470M	9/16 x 5/32
50	60GA-Q50	C023B602J500M	9/16 x 5/32
56	60GA-Q56	C023B602J560M	9/16 x 5/32
60	60GA-Q60	C023B602J600M	9/16 x 5/32
68	60GA-Q68	C023B602J680M	9/16 x 5/32
75	60GA-Q75	C023B602J750M	9/16 x 5/32
82	60GA-Q82	C023B602J820M	9/16 x 5/32
100	60GA-T10	C023B602J101M	9/16 x 5/32
120	60GA-T12	C023B602J121M	9/16 x 5/32
150	60GA-T15	C023B602J151M	9/16 x 5/32
180	60GA-T18	C023B602J181M	9/16 x 5/32
200	60GA-T20	C023B602J201M	9/16 x 5/32
220	60GA-T22	C023B602J221M	9/16 x 5/32
6000 WVDC (cont.)			
250	60GA-T25	C023B602J251M	9/16 x 5/32
270	60GA-T27	C023B602J271M	9/16 x 5/32
300	60GA-T30	C023B602J301M	9/16 x 5/32
330	60GA-T33	C023B602J331M	9/16 x 5/32
390	60GA-T39	C023B602J391M	9/16 x 5/32
400	60GA-T40	C023B602J401M	9/16 x 5/32
470	60GA-T47	C023B602J471M	9/16 x 5/32
500	60GA-T50	C023B602J501M	9/16 x 5/32
560	60GA-T56	C023B602J561M	9/16 x 5/32
680	60GA-T68	C023B602J681M	9/16 x 5/32
750	60GA-T75	C023B602J751M	9/16 x 5/32
820	60GA-T82	C023B602J821M	9/16 x 5/32
.001 μF	60GA-D10	C023B602J102M	9/16 x 5/32
.0012	60GA-D12	C023B602J122M	9/16 x 5/32
.0015	60GA-D15	C023B602J152M	9/16 x 5/32
.0022	60GA-D22	C023B602K222M	5/8 x 5/32
.0025	60GA-D25	C023B602L252M	11/16 x 5/32
.0027	60GA-D27	C023B602L272M	11/16 x 5/32
.003	60GA-D30	C023A602M302M	3/4 x 5/32
.0033	60GA-D33	C023A602M332M	3/4 x 5/32
.0039	60GA-D39	C023A602P392M	7/8 x 5/32
.0047	60GA-D47	C023A602P472M	7/8 x 5/32

7500 WVDC ±20% Tol.

pF	Sprague Products Cat. No.	Sprague O.E.M. Part No.	Size D. x T.
4.7	75GA-V47	C066A752L4R7M	11/16 x 5/32
8.2	75GA-V82	C066A752L8R2M	11/16 x 5/32
10	75GA-Q10	C066A752L100M	11/16 x 5/32
12	75GA-Q12	C066A752L120M	11/16 x 5/32
15	75GA-Q15	C066A752L150M	11/16 x 5/32
18	75GA-Q18	C066A752L180M	11/16 x 5/32
20	75GA-Q20	C066A752L200M	11/16 x 5/32
22	75GA-Q22	C066A752L220M	11/16 x 5/32
30	75GA-Q30	C066A752L300M	11/16 x 5/32
33	75GA-Q33	C066A752L330M	11/16 x 5/32
47	75GA-Q47	C066A752L470M	11/16 x 5/32
56	75GA-Q56	C066A752L560M	11/16 x 5/32
100	75GA-T10	C066A752L101M	11/16 x 5/32
220	75GA-T22	C066A752L221M	11/16 x 5/32
470	75GA-T47	C066A752L471M	11/16 x 5/32
500	75GA-T50	C066A752L501M	11/16 x 5/32
560	75GA-T56	C066A752L561M	11/16 x 5/32
680	75GA-T68	C066A752L681M	11/16 x 5/32
750	75GA-T75	C066A752L751M	11/16 x 5/32
820	75GA-T82	C066A752L821M	11/16 x 5/32
.001 μF	75GA-D10	C066A752L102M	11/16 x 5/32
.0012	75GA-D12	C066A752L122M	11/16 x 5/32
.0015	75GA-D15	C066A752L152M	11/16 x 5/32
.0018	75GA-D18	C023A752M182M	3/4 x 5/32
.002	75GA-D20	C023A752P202M	7/8 x 5/32
.0022	75GA-D22	C023A752P222M	7/8 x 5/32
.0025	75GA-D25	C023A752P252M	7/8 x 5/32

HIGH-K TYPES

- Designed for By-Pass and Coupling Applications Where Additional Capacitance Will Not Affect Circuit Operation
- Smallest Physical Size
- EIA Designation: 5HK=Z5U
- 5HKS-S10 thru 5HK-P10, **500 WVDC,** Capacitance Tolerance: +80 —20%
- All Other 5HK are **1000 WVDC,** Capacitance Tolerance: GMV

SINGLE UNITS

μF	Sprague Products Cat. No.	Sprague O.E.M. Part No.	Size D. x T.
.001	5HK-D10	C023B102E102P	5/16 x 5/32
.0015	5HK-D15	C023B102F152P	3/8 x 5/32
.002	5HK-D20	C023B102F202P	3/8 x 5/32
.0022	5HK-D22	C023B102F222P	3/8 x 5/32
.0033	5HK-D33	C023B102G332P	7/16 x 5/32
.0039	5HK-D39	C023B102G392P	7/16 x 5/32
.0047	5HK-D47	C023A102H472P	1/2 x 5/32
.005	5HK-D50	C023A102H502P	1/2 x 5/32
.0068	5HK-D68	C023A102J682P	9/16 x 5/32
.0082	5HK-D82	C023A102K822P	11/16 x 5/32
.01	5HK-S10	C023A102L103P	11/16 x 5/32
.01	5HKS-S10	C023A501G103Z	7/16 x 5/32
.015	5HK-S15	C023A501J153Z	9/16 x 5/32
SINGLE UNITS (cont.)			
.02	5HK-S20	C023A501J203Z	9/16 x 5/32
.025	5HK-S25	C023A501K253Z	5/8 x 5/32
.04	5HK-S40	44C124A	11/16 x 3/16
.05	5HK-S50	33C58	11/16 x 3/16
.1	5HK-P10	41C92	7/8 x 3/16

DUAL UNITS

μF	Sprague Products Cat. No.	Sprague O.E.M. Part No.	Size D. x T.
2 x .001	5HK-2D10	20C253	7/16 x 5/32
2 x .0015	5HK-2D15	55C67	1/2 x 5/32
2 x .002	5HK-2D20	29C175	9/16 x 5/32
2 x .0022	5HK-2D22	29C27	9/16 x 5/32
2 x .0047	5HK-2D47	36C330	3/4 x 5/32
2 x .01	5HK-2S10	41C238	7/8 x 5/32
2 x .02	5HK-2S20	41C219	1 x 7/32

MINIATURIZED DISC CERAMIC CAPACITORS FOR TRANSISTORIZED CIRCUITRY

- Intended for Coupling and By-Pass Applications

Type TG Standard Tolerance ±20%

μF	Volts	Sprague Products Cat. No.	Sprague O.E.M. Part No.	Size D. x T
.005	100	TG-D50	C023B101E502M	5/16 x 5/32
.01	100	TG-S10	C023B101F103M	3/8 x 5/32
.02	100	TG-S20	C023B101H203M	1/2 x 5/32
.025	100	TG-S25	C023B101H253M	1/2 x 5/32
.03	100	TG-S30	C023B101J303M	5/8 x 5/32
.05	100	TG-S50	55C23A7	1/2 x 5/32
.1	100	TG-P10	33C41B6	11/16 x 5/32
.05	100	TGL-S50	C023B101L503M	11/16 x 5/32

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IND-EEM-50-EFAI

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SPRAGUE CAPACITORS

CERA-MITE® CERAMIC CAPACITORS, continued

FREQUENCY-STABLE TYPES

- Better Stability Than the General Application Types.
- Ideal for Replacing Other Types of Capacitors Such as Molded Micas, Paper Tubulars, and Mylar Film Tubulars
- Available in IKV and a Smaller Size 250 Volt Rating
- Tighter Tolerance of ±10% is Better Than General Application Types
- Small Size, Low Cost
- EIA Designation: 10SS=Z5P, 2SS=Z5P

SEMI-STABLE 250 WVDC STANDARD TOLERANCE ±10%

µF	Sprague Products Cat. No.	Sprague O.E.M. Part. No.	Size D. x T.	µF	Sprague Products Cat. No.	Sprague O.E.M. Part. No.	Size D. x T.	µF	Sprague Products Cat. No.	Sprague O.E.M. Part. No.	Size D. x T.
750pF	2SS-T75	C055B251E751K	5/16 x 5/32	.0022	2SS-D22	C055B251F222K	3/8 x 5/32	.0068	2SS-D68	C055A251J682K	9/16 x 5/32
820pF	2SS-T82	C055B251E821K	5/16 x 5/32	.0027	2SS-D27	C055B251G272K	7/16 x 5/32	.0082	2SS-D82	C055A251L822K	11/16 x 5/32
.001	2SS-D10	C055B251E102K	5/16 x 5/32	.0033	2SS-D33	C055B251G332K	7/16 x 5/32	.01	2SS-S10	C055A251M103K	3/4 x 5/32
.0012	2SS-D12	C055B251E122K	5/16 x 5/32	.0039	2SS-D39	C055B251H392K	1/2 x 5/32	.012	2SS-S12	29C527	9/16 x 7/32
.0015	2SS-D15	C055B251F152K	3/8 x 5/32	.0047	2SS-D47	C055B251H472K	1/2 x 5/32	.015	2SS-S15	33C304	11/16 x 7/32
.0018	2SS-D18	C055B251F182K	3/8 x 5/32	.005	2SS-D50	C055B251H502K	1/2 x 5/32	.018	2SS-S18	33C291	11/16 x 7/32
.002	2SS-D20	C055B251F202K	3/8 x 5/32	.0056	2SS-D56	C055A251J562K	9/16 x 5/32	.02	2SS-S20	36C413	3/4 x 7/32

SEMI-STABLE 1000 WVDC STANDARD TOLERANCE ±10%

pF	Sprague Products Cat. No.	Sprague O.E.M. Part No.	Size D. x T.	µF	Sprague Products Cat. No.	Sprague O.E.M. Part. No.	Size D. x T.	µF	Sprague Products Cat. No.	Sprague O.E.M. Part. No.	Size D. x T.
470	10SS-T47	C055B102E471K	5/16 x 5/32	.0018	10SS-D18	C055B102G182K	7/16 x 5/32	.0068	10SS-D68	C055A102L682K	11/16 x 5/32
500	10SS-T50	C055B102E501K	5/16 x 5/32	.002	10SS-D20	C055B102G202K	7/16 x 5/32	.0082	10SS-D82	C055A102M822K	3/4 x 5/32
560	10SS-T56	C055B102E561K	5/16 x 5/32	.0022	10SS-D22	C055B102G222K	7/16 x 5/32	.010	10SS-S10	C055A102P103K	7/8 x 5/32
680	10SS-T68	C055B102E681K	5/16 x 5/32	.0027	10SS-D27	C055B102H272K	1/2 x 5/32	.012	10SS-S12	33C249A	3/4 x 7/32
750	10SS-T75	C055B102E751K	5/16 x 5/32	.0033	10SS-D33	C055A102H332K	1/2 x 5/32	.015	10SS-S15	41C299A	15/16 x 7/32
820	10SS-T82	C055B102E821K	5/16 x 5/32	.0039	10SS-D39	C055A102J392K	9/16 x 5/32	.018	10SS-S18	41C300A1	15/16 x 7/32
.001µF	10SS-D10	C055B102F102K	3/8 x 5/32	.0047	10SS-D47	C055A102K472K	5/8 x 5/32	.02	10SS-S20	41C301A1	15/16 x 7/32
.0012	10SS-D12	C055B102F122K	3/8 x 5/32	.005	10SS-D50	C055A102K502K	5/8 x 5/32	.022	10SS-S22	41C310A1	15/16 x 7/32
.0015	10SS-D15	C055B102F152K	3/8 x 5/32	.0056	10SS-D56	C055A102K562K	5/8 x 5/32				

TEMPERATURE-STABLE TYPES

- Used Where Minimum Capacitance Change With Temperature Is An Important Consideration
- EIA Designation: 10TS=X5E
- Standard Capacitance Tolerance: ±10%
- Rated at **1000 WVDC**

pF	Sprague Products Cat. No.	Sprague O.E.M. Part No.	Size D. x T.	pF	Sprague Products Cat. No.	Sprague O.E.M. Part No.	Size D. x T.	µF	Sprague Products Cat. No.	Sprague O.E.M. Part. No.	Size D. x T.
3.3	10TS-V33	C072B102E3R3K	5/16 x 5/32	75	10TS-Q75	C072B102E750K	5/16 x 5/32	.001	10TS-D10	C072B102G102K	7/16 x 5/32
5.0	10TS-V50	C072B102E5R0K	5/16 x 5/32	82	10TS-Q82	C072B102E820K	5/16 x 5/32	.0012	10TS-D12	C072B102G122K	7/16 x 5/32
6.8	10TS-V68	C072B102E6R8K	5/16 x 5/32	91	10TS-Q91	C072B102E910K	5/16 x 5/32	.0015	10TS-D15	C072B102J152K	9/16 x 5/32
7.5	10TS-V75	C072B102E7R5K	5/16 x 5/32	100	10TS-T10	C072B102E101K	5/16 x 5/32	.0018	10TS-D18	C072B102J182K	9/16 x 5/32
8.2	10TS-V82	C072B102E8R2K	5/16 x 5/32	120	10TS-T12	C072B102E121K	5/16 x 5/32	.0020	10TS-D20	C072B102J202K	9/16 x 5/32
10	10TS-Q10	C072B102E100K	5/16 x 5/32	150	10TS-T15	C072B102E151K	5/16 x 5/32	.0022	10TS-D22	C072B102J222K	9/16 x 5/32
12	10TS-Q12	C072B102E120K	5/16 x 5/32	180	10TS-T18	C072B102E181K	5/16 x 5/32	.0025	10TS-D25	C072B102K252K	5/8 x 5/32
15	10TS-Q15	C072B102E150K	5/16 x 5/32	200	10TS-T20	C072B102E201K	5/16 x 5/32	.0027	10TS-D27	C072B102K272K	5/8 x 5/32
18	10TS-Q18	C072B102E180K	5/16 x 5/32	220	10TS-T22	C072B102E221K	5/16 x 5/32	.0030	10TS-D30	C072B102K302K	5/8 x 5/32
20	10TS-Q20	C072B102E200K	5/16 x 5/32	250	10TS-T25	C072B102E251K	5/16 x 5/32	.0033	10TS-D33	C072B102L332K	11/16 x 5/32
22	10TS-Q22	C072B102E220K	5/16 x 5/32	270	10TS-T27	C072B102E271K	5/16 x 5/32	.0039	10TS-D39	C072A102M392K	3/4 x 5/32
25	10TS-Q25	C072B102E250K	5/16 x 5/32	300	10TS-T30	C072B102E301K	5/16 x 5/32	.0040	10TS-D40	C072A102M402K	3/4 x 5/32
27	10TS-Q27	C072B102E270K	5/16 x 5/32	330	10TS-T33	C072B102E331K	5/16 x 5/32	.0047	10TS-D47	C072A102P472K	7/8 x 5/32
30	10TS-Q30	C072B102E300K	5/16 x 5/32	390	10TS-T39	C072B102E391K	5/16 x 5/32	.0050	10TS-D50	C072A102P502K	7/8 x 5/32
33	10TS-Q33	C072B102E330K	5/16 x 5/32	470	10TS-T47	C072B102E471K	5/16 x 5/32	.0056	10TS-D56	C072A102P562K	7/8 x 5/32
39	10TS-Q39	C072B102E390K	5/16 x 5/32	500	10TS-T50	C072B102E501K	5/16 x 5/32	.0068	10TS-D68	36C108A	13/16 x 7/32
47	10TS-Q47	C072B102E470K	5/16 x 5/32	560	10TS-T56	C072B102F561K	3/8 x 5/32	.0075	10TS-D75	36C395	13/16 x 7/32
50	10TS-Q50	C072B102E500K	5/16 x 5/32	680	10TS-T68	C072B102F681K	3/8 x 5/32	.0082	10TS-D82	41C306A	15/16 x 7/32
56	10TS-Q56	C072B102E560K	5/16 x 5/32	750	10TS-T75	C072B102F751K	3/8 x 5/32	.01	10TS-S10	41C121A1	15/16 x 7/32
68	10TS-Q68	C072B102E680K	5/16 x 5/32	820	10TS-T82	C072B102F821K	3/8 x 5/32				

DISC CERAMICS FOR AC APPLICATIONS

- Rated at 125 VAC 60 Hz or 1400 VDC
- Standard Tolerance ±20%
- For AC Line Bypass Application
- Heavy Duty for Long Life

µF	Sprague Products Catalog No.	Sprague O.E.M. Part No.	D. x T.
.001	125L-D10	19C251	3/8 x 7/32
.0015	125L-D15	19C252	3/8 x 7/32
.002	125L-D20	19C253	3/8 x 7/32
.0047	125L-D47	29C145	9/16 x 7/32
.005	125L-D50	29C145A	9/16 x 7/32
.01	125L-S10	36C218	3/4 x 7/32
.02	125L-S20	36C220	3/4 x 1/4
2 x .005	125L-2D50	29C147	9/16 x 1/4
2 x .01	125L-2S10	36C219	3/4 x 1/4

DISC CERAMICS FOR BUFFER APPLICATIONS

- Rated at 2000 WVDC
- Standard Tolerance ±20%

µF	Sprague Products Catalog No.	Sprague O.E.M. Part No.	D. x T.
.001	BL-D10	29C162	9/16 x 7/32
.002	BL-D20	29C163	9/16 x 7/32
.003	BL-D30	29C164	9/16 x 7/32
.004	BL-D40	29C165	9/16 x 7/32
.005	BL-D50	29C251	9/16 x 7/32
.006	BL-D60	44C126	11/16 x 7/32
.007	BL-D70	33C82	11/16 x 7/32
.0075	BL-D75	33C81	11/16 x 7/32
.008	BL-D80	33C84	11/16 x 7/32
.01	BL-S10	36C151	3/4 x 7/32

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IND-EEM-50A-EFAI

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SPRAGUE CAPACITORS

CERA-MITE® CERAMIC CAPACITORS, continued

TEMPERATURE-COMPENSATING AND NPO TYPES

- Zero Temperature-coefficient Capacitors used Where Capacitance Change with Temperature is Undesirable
- Superior to Silvered-mica Types in Stability, High "Q", and IR
- Eliminate oscillator drift in TV, FM, VHF and AM receivers
- Negative Temperature Coefficient is 30 ppm/°C for N030 types, 80 ppm/°C for N080 types, 150 ppm/°C for N150 types, 220 ppm/°C for N220 types, 330 ppm/°C for N330 types, 470 ppm/°C for N470 types, 750 ppm/°C for N750 types, 1500 ppm/°C for N1500 types and 2200 ppm/°C for N2200 types.
- Capacitance Tolerance: 12 pF & up, ±5%; 10 pF & below, ±0.5 pF
- Rated at 1000 WVDC
- For use in Tuned Circuits
- Temp-compensating Types Have a Linear Negative Coefficient Curve
- Available in Standard 5% Decade Values.

pF	Sprague Products Cat. No.	Sprague O.E.M. Part No.	Size D. x T.
NPO			
1.0	10TCC-V10	C030B102S1R0D	3/8 x 1/4
1.2	10TCC-V12	C030B102S1R2D	3/8 x 1/4
1.5	10TCC-V15	C030B102S1R5D	3/8 x 1/4
1.8	10TCC-V18	C030B102S1R8D	3/8 x 1/4
2.2	10TCC-V22	C030B102S2R2D	3/8 x 1/4
2.7	10TCC-V27	C030B102S2R7D	3/8 x 1/4
3.0	10TCC-V30	C030B102S3R0D	3/8 x 1/4
3.3	10TCC-V33	C030B102E3R3D	5/16 x 5/32
3.9	10TCC-V39	C030B102E2R9D	5/16 x 5/32
4.7	10TCC-V47	C030B102E4R7D	5/16 x 5/32
5.0	10TCC-V50	C030B102E5R0D	5/16 x 5/32
5.6	10TCC-V56	C030B102E5R6D	5/16 x 5/32
6.8	10TCC-V68	C030B102E6R8D	5/16 x 5/32
8.2	10TCC-V82	C030B102E8R2D	5/16 x 5/32
10	10TCC-Q10	C030B102E100D	5/16 x 5/32
12	10TCC-Q12	C030B102E120J	5/16 x 5/32
15	10TCC-Q15	C030B102E150J	5/16 x 5/32
18	10TCC-Q18	C030B102E180J	5/16 x 5/32
20	10TCC-Q20	C030B102E200J	5/16 x 5/32
22	10TCC-Q22	C030B102E220J	5/16 x 5/32
25	10TCC-Q25	C030B102E250J	5/16 x 5/32
27	10TCC-Q27	C030B102E270J	5/16 x 5/32
30	10TCC-Q30	C030B102F300J	3/8 x 5/32
33	10TCC-Q33	C030B102F330J	3/8 x 5/32
39	10TCC-Q39	C030B102F390J	3/8 x 5/32
47	10TCC-Q47	C030B102G470J	7/16 x 5/32
50	10TCC-Q50	C030B102G500J	7/16 x 5/32
56	10TCC-Q56	C030A102G560J	7/16 x 5/32
68	10TCC-Q68	C030A102G680J	7/16 x 5/32
75	10TCC-Q75	C030A102H750J	1/2 x 5/32
82	10TCC-Q82	C030A102H820J	1/2 x 5/32
100	10TCC-T10	C030A102H101J	1/2 x 5/32
120	10TCC-T12	C030A102J121J	9/16 x 5/32
150	10TCC-T15	C030A102K151J	9/16 x 5/32
180	10TCC-T18	33C307	3/4 x 7/32
200	10TCC-T20	33C308	3/4 x 7/32
220	10TCC-T22	33C418	3/4 x 7/32
270	10TCC-T27	41C410	13/16 x 7/32
300	10TCC-T30	41C411	13/16 x 7/32
330	10TCC-T33	41C412	15/16 x 7/32
390	10TCC-T39	41C272	15/16 x 7/32
N470			
3.0	10TCT-V30	C035B102S3R0D	3/8 x 1/4
3.3	10TCT-V33	C035B102S3R3D	3/8 x 1/4
3.9	10TCT-V39	C035B102S3R9D	3/8 x 1/4
4.7	10TCT-V47	C035B102S4R7D	3/8 x 1/4
5.0	10TCT-V50	C035B102S5R0D	3/8 x 1/4
5.6	10TCT-V56	C035B102S5R6D	3/8 x 1/4
6.8	10TCT-V68	C035B102S6R8D	3/8 x 1/4
8.2	10TCT-V82	C035B102S8R2D	3/8 x 1/4
10	10TCT-Q10	C035B102E100D	5/16 x 5/32
12	10TCT-Q12	C035B102E120J	5/16 x 5/32
15	10TCT-Q15	C035B102E150J	5/16 x 5/32
N470 (cont.)			
18	10TCT-Q18	C035B102E180J	5/16 x 5/32
20	10TCT-Q20	C035B102E200J	5/16 x 5/32
22	10TCT-Q22	C035B102E220J	5/16 x 5/32
25	10TCT-Q25	C035B102F250J	3/8 x 5/32
27	10TCT-Q27	C035B102F270J	3/8 x 5/32
30	10TCT-Q30	C035B102F300J	3/8 x 5/32
33	10TCT-Q33	C035B102F330J	3/8 x 5/32
39	10TCT-Q39	C035B102F390J	3/8 x 5/32
47	10TCT-Q47	C035B102G470J	7/16 x 5/32
50	10TCT-Q50	C035B102G500J	7/16 x 5/32
56	10TCT-Q56	C035B102G560J	7/16 x 5/32
68	10TCT-Q68	C035B102H680J	1/2 x 5/32
75	10TCT-Q75	C035B102H750J	1/2 x 5/32
82	10TCT-Q82	C035B102H820J	1/2 x 5/32
100	10TCT-T10	C035B102J101J	9/16 x 5/32
120	10TCT-T12	C035A102J121J	9/16 x 5/32
150	10TCT-T15	C035A102K151J	5/8 x 5/32
180	10TCT-T18	C035A102L181J	11/16 x 5/32
200	10TCT-T20	C035A102L201J	11/16 x 5/32
220	10TCT-T22	C035A102M221J	3/4 x 5/32
270	10TCT-T27	C035A102P271J	7/8 x 5/32
300	10TCT-T30	C035A102P301J	7/8 x 5/32
330	10TCT-T33	C035A102P331J	7/8 x 5/32
390	10TCT-T39	C035A102P391J	7/8 x 5/32
470	10TCT-T47*	36C344	13/16 x 7/32
560	10TCT-T56*	41C248	15/16 x 7/32
680	10TCT-T68*	41C291	15/16 x 7/32
750	10TCT-T75*	41C292	15/16 x 7/32
N750			
4.7	10TCU-V47	C036B102S4R7D	3/8 x 1/4
5.0	10TCU-V50	C036B102S5R0D	3/8 x 1/4
5.6	10TCU-V56	C036B102S5R6D	3/8 x 1/4
6.8	10TCU-V68	C036B102S6R8D	3/8 x 1/4
8.2	10TCU-V82	C036B102S8R2D	3/8 x 1/4
10	10TCU-Q10	C036B102S100D	3/8 x 1/4
12	10TCU-Q12	C036B102E120J	5/16 x 5/32
15	10TCU-Q15	C036B102E150J	5/16 x 5/32
18	10TCU-Q18	C026B102E180J	5/16 x 5/32
20	10TCU-Q20	C036B102E200J	5/16 x 5/32
22	10TCU-Q22	C026B102E220J	5/16 x 5/32
25	10TCU-Q25	C026B102E250J	5/16 x 5/32
27	10TCU-Q27	C026B102E270J	5/16 x 5/32
30	10TCU-Q30	C026B102E300J	5/16 x 5/32
33	10TCU-Q33	C036B102E330J	5/16 x 5/32
39	10TCU-Q39	C036B102F390J	3/8 x 5/32
47	10TCU-Q47	C036B102F470J	3/8 x 5/32
50	10TCU-Q50	C036B102F500J	3/8 x 5/32
56	10TCU-Q56	C036B102F560J	3/8 x 5/32
68	10TCU-Q68	C036B102G680J	7/16 x 5/32
75	10TCU-Q75	C036B102G750J	7/16 x 5/32
82	10TCU-Q82	C036B102G820J	7/16 x 5/32
N750, cont.			
100	10TCU-T10	C036B102H101J	1/2 x 5/32
120	10TCU-T12	C036B102H121J	1/2 x 5/32
150	10TCU-T15	C036A102J151J	9/16 x 5/32
180	10TCU-T18	C036A102K181J	5/8 x 5/32
200	10TCU-T20	C036A102K201J	5/8 x 5/32
220	10TCU-T22	C036A102K221J	5/8 x 5/32
270	10TCU-T27	C036A102L271J	11/16 x 5/32
300	10TCU-T30	C036A102M301J	3/4 x 5/32
330	10TCU-T33	C036A102M331J	3/4 x 5/32
390	10TCU-T39	C036A102P391J	7/8 x 5/32
470	10TCU-T47	C036A102P471J	7/8 x 5/32
560	10TCU-T56	33C238	3/4 x 7/32
680	10TCU-T68	36C348	13/16 x 7/32
750	10TCU-T75	41C293	15/16 x 7/32
820	10TCU-T82	41C294	15/16 x 7/32
1000	10TCU-D10	41C295	15/16 x 7/32
N2200			
10	10TCY-Q10	C041B102S100D	3/8 x 1/4
12	10TCY-Q12	C041B102S120J	3/8 x 1/4
15	10TCY-Q15	C041B102S150J	3/8 x 1/4
18	10TCY-Q18	C041B102S180J	3/8 x 1/4
20	10TCY-Q20	C041B102S200J	3/8 x 1/4
22	10TCY-Q22	C041B102E220J	5/16 x 5/32
25	10TCY-Q25	C041B102E250J	5/16 x 5/32
27	10TCY-Q27	C041B102E270J	5/16 x 5/32
30	10TCY-Q30	C041B102E300J	5/16 x 5/32
33	10TCY-Q33	C041B102E330J	5/16 x 5/32
39	10TCY-Q39	C041B102E390J	5/16 x 5/32
47	10TCY-Q47	C041B102E470J	5/16 x 5/32
50	10TCY-Q50	C041B102E500J	5/16 x 5/32
56	10TCY-Q56	C041B102E560J	5/16 x 5/32
68	10TCY-Q68	C041B102E680J	5/16 x 5/32
75	10TCY-Q75	C041B102E750J	5/16 x 5/32
82	10TCY-Q82	C041B102F820J	3/8 x 5/32
100	10TCY-T10	C041B102F101J	3/8 x 5/32
120	10TCY-T12	C041B102F121J	3/8 x 5/32
150	10TCY-T15	C041B102G151J	7/16 x 5/32
180	10TCY-T18	C041B102G181J	7/16 x 5/32
200	10TCY-T20	C041B102G201J	7/16 x 5/32
220	10TCY-T22	C041B102H221J	1/2 x 5/32
270	10TCY-T27	C041B102H271J	1/2 x 5/32
300	10TCY-T30	C041A102J301J	9/16 x 5/32
330	10TCY-T33	C041A102J331J	9/16 x 5/32
390	10TCY-T39	C041A102J391J	9/16 x 5/32
470	10TCY-T47	C041A102K471J	5/8 x 5/32
560	10TCY-T56	C041A102L561J	11/16 x 5/32
680	10TCY-T68	C041A102M681J	3/4 x 5/32
750	10TCY-T75	C041A102M751J	3/4 x 5/32
820	10TCY-T82	C041A102P821J	7/8 x 5/32
1000	10TCY-D10	C041A102P102J	7/8 x 5/32
1200	10TCY-D12*	33C264	3/4 x 7/32
1500	10TCY-D15*	36C365	13/16 x 7/32
1800	10TCY-D18*	41C333	15/16 x 7/32
2000	10TCY-D20*	41C334	15/16 x 7/32
2200	10TCY-D22*	41C335	15/16 x 7/32

*Available until present stocks are exhausted.

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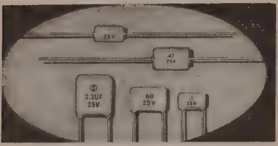
EEM-87-EFAI

Sizes subject to change without notice.

SPRAGUE CAPACITORS

1C, 2C, 3C, 4C, and 5C MONOLYTHIC® CERAMIC CAPACITORS



- Proven Reliable in Wide Usage Over Many Years of Exacting Service.
- Available in a Variety of Body Formulations, Capacitance Values, and Sizes.
- Made By Spraying Alternate Layers of Ceramic Dielectric Material and Metallic Electrodes, then Firing Into a Single, All But Indestructible Homogeneous Block.
- Protected Against Mechanical Damage and Moisture by a Tough Resin Coating.
- For Complete Technical Data, See Latest Issue of Engineering Bulletin 6201.

Call Your Sprague Industrial Distributor
For Current Quantity Prices

NOTE: Capacitors listed in this section have radial leads. For axial-lead units, change "C4" or "C5" at end of Cat. No. to "B1."

TEMPERATURE CHARACTERISTICS

Formulation	Temp. Range	Max. Change over Temp. Range
NPO	−55C to +125C	NPO ±60 ppm/°C
N030	−55C to +125C	−30 ±30 ppm/°C
N750	−55C to +125C +25C to + 85C	meets MIL-C-20 Char. UJ −750 ±120 ppm/°C
X7R	−55C to +125C	±15%
Z5U	+10C to + 85C	+22, −56%

GENERAL-APPLICATION FORMULATION Z5U

TYPE 1C—50 WVDC

µF	Size Code	Cat. No.*
.01	A	1C023103D8500C4
.015	A	1C023153D8500C4
.022	A	1C023223D8500C4
.033	A	1C023333D8500C4
.047	A	1C023473D8500C4
.068	A	1C023683D8500C4
.10	B	1C023104D8500C4

TYPE 2C—50 WVDC

µF	Size Code	Cat. No.*
.01	C	2C023103D8500C4
.015	C	2C023153D8500C4
.022	C	2C023223D8500C4
.033	C	2C023333D8500C4
.047	C	2C023473D8500C4
.068	C	2C023683D8500C4
.10	C	2C023104D8500C4
.15	D	2C023154D8500C4
.22	D	2C023224D8500C4
.33	F	2C023334D8500C4
.47	F	2C023474D8500C4
.68	F	2C023684D8500C4

TYPE 3C—50 WVDC

µF	Size Code	Cat. No.*
.01	H	3C023103D8500C5
.015	H	3C023153D8500C5
.022	H	3C023223D8500C5
.033	H	3C023333D8500C5
.047	H	3C023473D8500C5
.068	H	3C023683D8500C5
.10	H	3C023104D8500C5
.15	H	3C023154D8500C5
.22	H	3C023224D8500C5
.33	I	3C023334D8500C5
.47	I	3C023474D8500C5
.68	M	3C023684D8500C5
1.0	M	3C023105D8500C5

TYPE 5C—50 WVDC

µF	Size Code	Cat. No.*
.10	N	5C023104D8500C5
.10	T	†*5C023104D8500B3
.15	N	5C023154D8500C5
.15	T	†*5C023154D8500B3
.22	N	5C023224D8500C5
.22	T	†*5C023224D8500B3
.33	N	5C023334D8500C5
.33	U	†*5C023334D8500B3
.47	O	5C023474D8500C5
.47	U	†*5C023474D8500B3
.68	O	5C023684D8500C5
.68	U	†*5C023684D8500B3
1.0	Q	5C023105D8500C5
1.0	W	†*5C023105D8500B3
1.5	S	5C023155D8500C5
1.5	W	†*5C023155D8500B3
2.2	U	5C023225D8500C5
3.3	U	5C023335D8500C5

†*TYPE 2C—25 WVDC

µF	Size Code	Cat. No.*
.01	E	2C023103D8250A3
.015	E	2C023153D8250A3
.022	E	2C023223D8250A3
.033	E	2C023333D8250A3
.047	E	2C023473D8250A3
.068	E	2C023683D8250A3
.10	E	2C023104D8250A3
.15	E	2C023154D8250A3
.22	E	2C023224D8250A3
.33	G	2C023334D8250A3
.47	G	2C023474D8250A3

†*TYPE 3C—25 WVDC

µF	Size Code	Cat. No.*
.01	H	3C023103D8250A3
.015	H	3C023153D8250A3
.022	H	3C023223D8250A3
.033	H	3C023333D8250A3
.047	H	3C023473D8250A3
.068	H	3C023683D8250A3
.10	H	3C023104D8250A3
.15	J	3C023154D8250A3
.22	J	3C023224D8250A3
.33	K	3C023334D8250A3
.47	K	3C023474D8250A3

†*TYPE 4C—25 WVDC

µF	Size Code	Cat. No.*
.15	X	4C023154D8250A3
.22	X	4C023224D8250A3
.33	X	4C023334D8250A3
.47	X	4C023474D8250A3
.68	Y	4C023684D8250A3
1.0	Z	4C023105D8250A3
1.5	Z	4C023155D8250A3

†*TYPE 5C—25 WVDC

µF	Size Code	Cat. No.*
.1	T	5C023104D8250B3
.15	T	5C023154D8250B3
.22	T	5C023224D8250B3
.33	T	5C023334D8250B3
.47	T	5C023474D8250B3
.68	T	5C023684D8250B3
1.0	V	5C023105D8250B3
1.5	V	5C023155D8250B3
2.2	W	5C023225D8250B3
3.3	W	5C023335D8250B3

*Available until present stocks are exhausted. †Available with radial leads only.

*Capacitors listed have cap. tol. of +80, −20%. For ±20% capacitors, change D8 in Cat. No. to X0.

DIMENSIONS (in inches)

Size Code	Radial-Lead L.	Radial-Lead W.	Radial-Lead T.	Axial-Lead L.	Axial-Lead W.	Axial-Lead T.
A	.200	.200	.125	.200	.200	.156
B	.200	.200	.150	.200	.200	.156
C	.300	.200	.125	.300	.200	.156
D	.300	.200	.150	.300	.200	.156
E	.300	.300	.125	—	—	—
F	.300	.300	.150	.300	.300	.156
G	.300	.300	.238	—	—	—
H	.390	.200	.125	.390	.200	.156
I	.390	.200	.150	.390	.200	.156
J	.390	.200	.156	—	—	—
K	.390	.200	.238	—	—	—
L	.400	.400	.125	.390	.400	.156
M	.400	.400	.150	.390	.400	.156
N	.500	.200	.125	.500	.200	.156
O	.500	.200	.150	.500	.200	.156
P	.500	.296	.125	.500	.296	.156
Q	.500	.296	.150	.500	.296	.156
R	.500	.400	.125	.500	.400	.156
S	.500	.400	.150	.500	.400	.156
T	.500	.500	.125	.500	.500	.156
U	.500	.500	.150	.500	.200	.156
V	.500	.500	.156	—	—	—
W	.500	.500	.238	.500	.500	.156
X	.515	.296	.125	—	—	—
Y	.515	.296	.156	.515	.296	.156
Z	.515	.296	.238	—	—	—

TEMPERATURE-STABLE FORMULATION X7R

TYPE 1C—50 WVDC∆

µF	Size Code	Cat. No.**
.001	A	1C067102X0500C4
.0012	A	1C067122X0500C4
.0015	A	1C067152X0500C4
.0022	A	1C067222X0500C4
.0027	A	1C067272X0500C4
.0033	A	1C067332X0500C4
.0039	A	1C067392X0500C4
.0047	A	1C067472X0500C4
.0056	A	1C067562X0500C4
.0068	A	1C067682X0500C4
.0082	A	1C067822X0500C4
.010	A	1C067103X0500C4
.012	A	1C067123X0500C4
.015	A	1C067153X0500C4
.018	A	1C067183X0500C4
.022	A	1C067223X0500C4
.027	A	1C067273X0500C4
.033	A	1C067333X0500C4

TYPE 2C—50 WVDC∆

µF	Size Code	Cat. No.**
.010	C	2C067103X0500C4
.012	C	2C067123X0500C4
.015	C	2C067153X0500C4
.018	C	2C067183X0500C4
.022	C	2C067223X0500C4
.033	C	2C067333X0500C4
.039	C	2C067393X0500C4
.047	E	2C067473X0500C4
.056	E	2C067563X0500C4
.068	E	2C067683X0500C4
.082	E	2C067823X0500C4
.10	E	2C067104X0500C4
.12	F	2C067124X0500C4
.15	F	2C067154X0500C4

TYPE 3C—50 WVDC∆

µF	Size Code	Cat. No.**
.010	H	3C067103X0500C5
.012	H	3C067123X0500C5
.015	H	3C067153X0500C5
.018	H	3C067183X0500C5
.022	H	3C067223X0500C5
.027	H	3C067273X0500C5
.033	H	3C067333X0500C5
.039	H	3C067393X0500C5
.047	H	3C067473X0500C5
.056	H	3C067563X0500C5
.068	H	3C067683X0500C5
.082	H	3C067823X0500C5
.10	H	3C067104X0500C5
.12	M	3C067124X0500C5
.15	M	3C067154X0500C5
.18	M	3C067184X0500C5
.22	M	3C067224X0500C5
.27	M	3C067274X0500C5
.33	M	3C067334X0500C5

TYPE 5C -50 WVDC∆

µF	Size Code	Cat. No.**
.10	N	5C067104X0500C5
.12	N	5C067124X0500C5
.15	N	5C067154X0500C5
.18	N	5C067184X0500C5
.22	P	5C067224X0500C5
.27	P	5C067274X0500C5
.33	S	5C067334X0500C5
.39	S	5C067394X0500C5
.47	U	5C067474X0500C5
.56	U	5C067564X0500C5
.68	U	5C067684X0500C5

**Capacitors listed above have cap. tol. of ±20%. For ±10% capacitors, change X0 in Cat. No. to X9.

∆May be operated at 100 WVDC by derating to 85 C.

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IND-EEM-47 -EFAI

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SPRAGUE CAPACITORS

TEMPERATURE-COMPENSATING FORMULATION NPO

*Capacitance Tolerance, ±10%. For ±20% units, change X9 in Cat. No. to X0.

TYPE 1C—50 WVDC

pF	Size	Cat. No.*
10	A	1C082100X9500C4
11	A	1C082110X9500C4
12	A	1C082120X9500C4
13	A	1C082130X9500C4
15	A	1C082150X9500C4
16	A	1C082160X9500C4
18	A	1C082180X9500C4
20	A	1C082200X9500C4
22	A	1C082220X9500C4
24	A	1C082240X9500C4
27	A	1C082270X9500C4
30	A	1C082300X9500C4
33	A	1C082330X9500C4
36	A	1C082360X9500C4
39	A	1C082390X9500C4
43	A	1C082430X9500C4
47	A	1C082470X9500C4
51	A	1C082510X9500C4
56	A	1C082560X9500C4
62	A	1C082620X9500C4
68	A	1C082680X9500C4
75	A	1C082750X9500C4
82	A	1C082820X9500C4
91	A	1C082910X9500C4
100	A	1C082101X9500C4
110	A	1C082111X9500C4
120	A	1C082121X9500C4
130	A	1C082131X9500C4
150	A	1C082151X9500C4
160	A	1C082161X9500C4
180	A	1C082181X9500C4
200	A	1C082201X9500C4
220	A	1C082221X9500C4
240	A	1C082241X9500C4
270	A	1C082271X9500C4
300	A	1C082301X9500C4
330	A	1C082331X9500C4
360	A	1C082361X9500C4
390	A	1C082391X9500C4
430	A	1C082431X9500C4
470	A	1C082471X9500C4
510	A	1C082511X9500C4
560	A	1C082561X9500C4

TYPE 2C—50 WVDC

pF	Size	Cat. No.*
620	C	2C082621X9500C4
680	C	2C082681X9500C4
750	C	2C082751X9500C4
820	C	2C082821X9500C4
910	C	2C082911X9500C4
1000	C	2C082102X9500C4
1100	C	2C082112X9500C4
1200	C	2C082122X9500C4
1300	C	2C082132X9500C4
1500	C	2C082152X9500C4
1600	C	2C082162X9500C4
1800	C	2C082182X9500C4
2000	C	2C082202X9500C4
2200	E	2C082222X9500C4
2400	E	2C082242X9500C4
2700	E	2C082272X9500C4

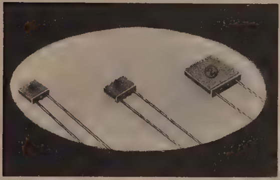
TYPE 3C—50 WVDC

pF	Size	Cat. No.*
680	H	3C082681X9500C5
750	H	3C082751X9500C5
820	H	3C082821X9500C5
910	H	3C082911X9500C5
1000	H	3C082102X9500C5
1100	H	3C082112X9500C5
1200	H	3C082122X9500C5
1300	H	3C082132X9500C5
1500	H	3C082152X9500C5
1600	H	3C082162X9500C5
1800	I	3C082182X9500C5
2000	I	3C082202X9500C5
2200	I	3C082222X9500C5
2400	I	3C082242X9500C5
2700	L	3C082272X9500C5
3000	L	3C082302X9500C5
3300	L	3C082332X9500C5
3600	L	3C082362X9500C5
3900	L	3C082392X9500C5
4300	L	3C082432X9500C5
4700	L	3C082472X9500C5
5100	L	3C082512X9500C5
5600	M	3C082562X9500C5
6200	M	3C082622X9500C5

TYPE 5C—50 WVDC

pF	Size	Cat. No.*
680	N	5C082681X9500C5
750	N	5C082751X9500C5
820	N	5C082821X9500C5
910	N	5C082911X9500C5
1000	N	5C082102X9500C5
1100	N	5C082112X9500C5
1200	N	5C082122X9500C5
1300	N	5C082132X9500C5
1500	N	5C082152X9500C5
1600	N	5C082162X9500C5
1800	N	5C082182X9500C5
2000	N	5C082202X9500C5
2200	N	5C082222X9500C5
2400	N	5C082242X9500C5
2700	N	5C082272X9500C5
3000	O	5C082302X9500C5
3300	O	5C082332X9500C5
3600	P	5C082362X9500C5
3900	P	5C082392X9500C5
4300	P	5C082432X9500C5
4700	P	5C082472X9500C5
5100	P	5C082512X9500C5
5600	R	5C082562X9500C5
6200	R	5C082622X9500C5
6800	R	5C082682X9500C5
7500	R	5C082752X9500C5
8200	T	5C082822X9500C5
9100	T	5C082912X9500C5
.01µF	T	5C082103X9500C5

TYPE 7C MONOLYTHIC® CERAMIC CAPACITORS



- All Capacitors Listed Rated at 50 WVDC.
- New Phenolic Terminal Base With Stand-Off "Feet" Provides these Advantages: No Resin Run-Down on Leads; Uniform Lead Spacing; No Dirt and Moisture Entrapment; Degreasing Fluid Flows Freely Between Capacitors and Board.
- Made by Spraying Alternate Layers of Ceramic Dielectric Material and Metallic Electrodes, Firing into a Homogeneous block, then Coating with a Tough Phenolic Resin.
- For Complete Technical Data, See Latest Issue of Engineering Bulletin 6202.

DIMENSIONS

Case Code	L.	W.	T.
D	.390	.275	.160
E	.535	.550	.160
F	.535	.550	.260

TEMPERATURE-COMPENSATING FORMULATION NPO

pF	Size	Cat. No.†
51	D	7C082510X0500D
56	D	7C082560X0500D
62	D	7C082620X0500D
68	D	7C082680X0500D
75	D	7C082750X0500D
82	D	7C082820X0500D
91	D	7C082910X0500D
100	D	7C082101X0500D
110	D	7C082111X0500D
120	D	7C082121X0500D
130	D	7C082131X0500D
150	D	7C082151X0500D
160	D	7C082161X0500D
180	D	7C082181X0500D
200	D	7C082201X0500D
220	D	7C082221X0500D
240	D	7C082241X0500D
270	D	7C082271X0500D
300	D	7C082301X0500D
330	D	7C082331X0500D
360	D	7C082361X0500D
390	D	7C082391X0500D
430	D	7C082431X0500D
470	D	7C082471X0500D
510	D	7C082511X0500D

TEMPERATURE-COMPENSATING FORMULATION X7R

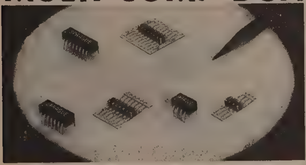
pF	Size	Cat. No.†
1200	D	7C067122X0500D
1500	D	7C067152X0500D
1800	D	7C067182X0500D
2200	D	7C067222X0500D
2700	D	7C067272X0500D
3300	D	7C067332X0500D
3900	D	7C067392X0500D
4700	D	7C067472X0500D
5600	D	7C067562X0500D
6800	D	7C067682X0500D
8200	D	7C067822X0500D

GENERAL-APPLICATION FORMULATION Z5U

µF	Size	Cat. No.†
.010	D	7C023103X0500D
.015	D	7C023153X0500D
.022	D	7C023223X0500D
.033	D	7C023333X0500D
.047	D	7C023473X0500D
.068	D	7C023683X0500D
.10	D	7C023104X0500D
.15	D	7C023154X0500D
.22	D	7C023224X0500D
.33	E	7C023334X0500E
.47	E	7C023474X0500E
.68	E	7C023684X0500E
1.0	E	7C023105X0500E
1.5	E	7C023155X0500E
2.2	F	7C023225X0500F

†Capacitors listed above have capacitance tolerance of ±20%. Formulations NPO and X7R also available with tolerance of ±10% . . . change X0 in Cat. No. to X9. Formulation Z5U also available with tolerance of +80, −20% . . . change X0 in Cat. No. to D8.

MULTI-COMP® DUAL IN-LINE MONOLYTHIC® CERAMIC CAPACITORS



- Monolithic construction — made by depositing alternate thin layers of metallic electrodes and ceramic dielectric material, then firing into an all but indestructible solid homogeneous block, which is molded in a tough plastic DIP package.
- Multiple-section units with 8, 14, and 16 leads.
- Rated at 100 WVDC over the operating temperature range of −55 C to +70 C.
- Capacitance tolerance, ±20%.
- For complete technical data, see latest issue of Engineering Bulletin 6242.

DIMENSIONS

Type	L.	W.	T.
939C	.450	.260	.245
934C	.750	.260	.245
936C	.850	.260	.245

µF	No. of Sec.	Cat. No.	pF	No. of Sec.	Cat. No.	pF	No. of Sec.	Cat. No.	pF	No. of Sec.	Cat. No.	µF	No. of Sec.	Cat. No.
.01	4	939C103X0SR	18	8	936C180X0SR	150	8	936C151X0SR	1500	8	936C152X0SR	.015	8	936C153X0SR
.1	4	939C104X0SR	22	8	936C220X0SR	220	8	936C221X0SR	2200	8	936C222X0SR	.022	8	936C223X0SR
100pF	7	934C101X0SR	33	8	936C330X0SR	330	8	936C331X0SR	3300	8	936C332X0SR	.033	8	936C333X0SR
1000	7	934C102X0SR	47	8	936C470X0SR	470	8	936C471X0SR	4700	8	936C472X0SR	.047	8	936C473X0SR
.01µF	7	934C103X0SR	68	8	936C680X0SR	680	8	936C681X0SR	6800	8	936C682X0SR	.068	8	936C683X0SR
.047	7	934C473X0SR	82	8	936C820X0SR	820	8	936C821X0SR	8200	8	936C822X0SR	.082	8	936C823X0SR
.1	7	934C104X0SR	100	8	936C101X0SR	1000	8	936C102X0SR	.01µF	8	936C103X0SR	.1	8	936C104X0SR

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IND-REM-48-EFAI

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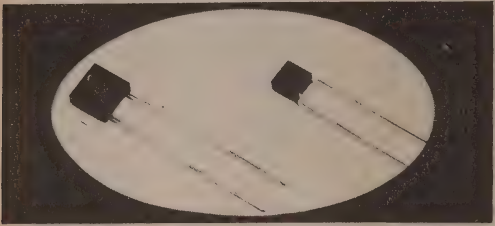
SPRAGUE CAPACITORS

ESTABLISHED RELIABILITY MIL-C-39014

STYLE CKR05 and CKR06 MOLDED CERAMIC CAPACITORS



- Handled by Sprague and Sprague industrial distributors in full compliance with MIL-STD-790. Manufactured, marked, packed, shipped, received, inspected, stored in separate area, free from contamination or mix-up with other components.

- Ceramic dielectric, molded case. Operating temperature range, −55 C to +125 C.
- General purpose – for use in applications where appreciable variations in capacitance with respect to temperature, voltage, frequency, and life can be tolerated.
- EIA temperature characteristic X7R, MIL characteristic BX.
- Case insulation will withstand 150% of d-c rated voltage.
- Lead spacing, .200″
- "L" failure rate (2%).
- For complete technical data, refer to latest issue of Engineering Bulletin 6251.7.

STYLE CKR05 (.190″ wide x .190″ high x .090″ thick)

pF	WVDC	MIL Type No. Cap. Tol. ±10%	MIL Type No. Cap. Tol. ±20%
10	200	CKR05BX100KL	CKR05BX100ML
12	200	CKR05BX120KL	—
15	200	CKR05BX150KL	CKR05BX150ML
18	200	CKR05BX180KL	—
22	200	CKR05BX220KL	CKR05BX220ML
27	200	CKR05BX270KL	—
33	200	CKR05BX330KL	CKR05BX330ML
39	200	CKR05BX390KL	—
47	200	CKR05BX470KL	CKR05BX470ML
56	200	CKR05BX560KL	—
68	200	CKR05BX680KL	CKR05BX680ML
82	200	CKR05BX820KL	—
100	200	CKR05BX101KL	CKR05BX101ML
120	200	CKR05BX121KL	—
150	200	CKR05BX151KL	CKR05BX151ML
180	200	CKR05BX181KL	—
220	200	CKR05BX221KL	CKR05BX221ML
270	200	CKR05BX271KL	—
330	200	CKR05BX331KL	CKR05BX331ML
390	200	CKR05BX391KL	—
470	200	CKR05BX471KL	CKR05BX471ML
560	200	CKR05BX561KL	—
680	200	CKR05BX681KL	CKR05BX681ML
820	200	CKR05BX821KL	—
1000	200	CKR05BX102KL	CKR05BX102ML
1200	100	CKR05BX122KL	—
1500	100	CKR05BX152KL	CKR05BX152ML
1800	100	CKR05BX182KL	—
2200	100	CKR05BX222KL	CKR05BX222ML
2700	100	CKR05BX272KL	—
3300	100	CKR05BX332KL	CKR05BX332ML
3900	100	CKR05BX392KL	—
4700	100	CKR05BX472KL	CKR05BX472ML
5600	100	CKR05BX562KL	—
6800	100	CKR05BX682KL	CKR05BX682ML
8200	100	CKR05BX822KL	—
10000	100	CKR05BX103KL	CKR05BX103ML
12000	50	CKR05BX123KL	—
15000	50	CKR05BX153KL	CKR05BX153ML
18000	50	CKR05BX183KL	—
22000	50	CKR05BX223KL	CKR05BX223ML
27000	50	CKR05BX273KL	—
33000	50	CKR05BX333KL	CKR05BX333ML
39000	50	CKR05BX393KL	—
47000	50	CKR05BX473KL	CKR05BX473ML
56000	50	CKR05BX563KL	—
68000	50	CKR05BX683KL	CKR05BX683ML
82000	50	CKR05BX823KL	—
100000	50	CKR05BX104KL	CKR05BX104ML

STYLE CKR06 (.290″ wide x .290″ high x .090″ thick)

pF	WVDC	MIL Type No. Cap. Tol. ±10%	MIL Type No. Cap. Tol. ±20%
1200	200	CKR06BX122KL	—
1500	200	CKR06BX152KL	CKR06BX152ML
1800	200	CKR06BX182KL	—
2200	200	CKR06BX222KL	CKR06BX222ML
2700	200	CKR06BX272KL	—
3300	200	CKR06BX332KL	CKR06BX332ML
3900	200	CKR06BX392KL	—
4700	200	CKR06BX472KL	CKR06BX472ML
5600	200	CKR06BX562KL	—
6800	200	CKR06BX682KL	CKR06BX682ML
8200	200	CKR06BX822KL	—
10000	200	CKR06BX103KL	CKR06BX103ML
12000	100	CKR06BX123KL	—
15000	100	CKR06BX153KL	—
18000	100	CKR06BX183KL	—
22000	100	CKR06BX223KL	—
27000	100	CKR06BX273KL	—
33000	100	CKR06BX333KL	—
39000	100	CKR06BX393KL	—
47000	100	CKR06BX473KL	—
56000	100	CKR06BX563KL	—
68000	100	CKR06BX683KL	—
82000	100	CKR06BX823KL	—
100000	100	CKR06BX104KL	—
120000	50	CKR06BX124KL	—
150000	50	CKR06BX154KL	—
180000	50	CKR06BX184KL	—
220000	50	CKR06BX224KL	—

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IND-EEM-20-EFAI

Sizes subject to change without notice.

SPRAGUE CAPACITORS

HYPERCON® CERAMIC DISCS

SPRAGUE
HY-150

- Superior to electrolytic capacitors of similar capacitance values due to very low power factor.
- Ultra-miniature . . . ideal for use in transistorized circuitry.
- For bypass and coupling, but particularly well-suited for any low-voltage use where high capacitance and low power factor are important.
- Capacitance tolerance: For catalog numbers ending Y . . . . +50, −20% . . . . For catalog numbers ending in Z . . . +80, −20%.
- For complete technical data, see latest issue of Engineering Bulletin 6141.

3 WVDC, Body Code C052*

μF	Sprague Products Cat. No.	Sprague O.E.M. Part No.	D. x T.
2.2	HY-150*	C052A3R0P225Z	7/8 x 5/32

12 WVDC, Body Code C092

μF	Sprague Products Cat. No.	Sprague O.E.M. Part No.	D. x T.
.022	HY-340	C092B120E223Y	5/16 x 5/32
.033	HY-345	C092B120F333Y	3/8 x 5/32
.047	HY-350	C092B120G473Y	7/16 x 5/32
.068	HY-355	C092B120G683Y	7/16 x 5/32
.1	HT-360	C092B120H104Y	1/2 x 5/32
.15	HY-365	C092B120K154Y	5/8 x 5/32
.22	HY-370	C092B120L224Y	11/16 x 5/32
.33	HY-375	C092A120P334Y	7/8 x 5/32
.47	HY-380	C092A120P474Y	7/8 x 5/32

16 WVDC, Body Code C092

μF	Sprague Products Cat. No.	Sprague O.E.M. Part No.	D. x T.
.01	HY-420	C092B160C103Z	1/4 x 5/32
.022	HY-425	C092B160E223Z	5/16 x 5/32
.033	HY-430	C092B160F333Z	3/8 x 5/32
.047	HY-435	C092B160G473Z	7/16 x 5/32
.068	HY-440	C092B160G683Z	7/16 x 5/32
.1	HY-450	C092B160H104Z	1/2 x 5/32
.2	HY-470	C092B160L204Z	11/16 x 5/32

16 WVDC, Body Code C092

μF	Sprague Products Cat. No.	Sprague O.E.M. Part No.	D. x T.
.022	HY-625	C092B160E223Y	5/16 x 5/32
.033	HY-630	C092B160F333Y	3/8 x 5/32
.047	HY-635	C092B160G473Y	7/16 x 5/32
.068	HY-640	C092B160G683Y	7/16 x 5/32
.1	HY-650	C092B160H104Y	1/2 x 5/32
.15	HY-665	C092B160K154Y	5/8 x 5/32
.22	HY-670	C092B160L224Y	11/16 x 5/32
.33	HY-675	C092A160P334Y	7/8 x 5/32

25 WVDC, Body Code C092

μF	Sprague Products Cat. No.	Sprague O.E.M. Part No.	D. x T.
.0047	HY-510	C092B250C472Z	1/4 x 5/32
.01	HY-520	C092B250C103Z	1/4 x 5/32
.022	HY-525	C092B250E223Z	5/16 x 5/32
.033	HY-530	C092B250F333Z	3/8 x 5/32
.047	HY-535	C092B250G473Z	7/16 x 5/32
.068	HY-540	C092B250G683Z	7/16 x 5/32
.1	HY-550	C092B250H104Z	1/2 x 5/32

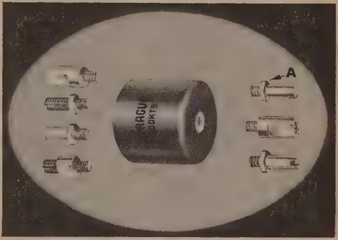
25 WVDC, Body Code C092

μF	Sprague Products Cat. No.	Sprague O.E.M. Part No.	D. x T.
.015	HY-720	C092B250C153Y	1/4 x 5/32
.022	HY-725	C092B250E223Y	5/16 x 5/32
.033	HY-730	C092B250F333Y	3/8 x 5/32
.047	HY-735	C092B250G473Y	7/16 x 5/32
.068	HY-740	C092B250G683Y	7/16 x 5/32
.1	HY-750	C092B250H104Y	1/2 x 5/32
.15	HY-765	C092B250K154Y	5/8 x 5/32
.22	HY-770	C092B250L224Y	11/16 x 5/32

*AVAILABLE UNTIL PRESENT STOCKS ARE EXHAUSTED.

HIGH-VOLTAGE DOORKNOB CERAMICS

- For Bypass, Arc Suppression and Other High-Voltage Applications
- 20DK-T5 Comes Complete with 7 Terminals, as illustrated. (Packaged 2 per Plastic Box, with 14 terminals)
- 30DK-T5 is Supplied with 2 Terminals, as per Style Marked "A"
- Capacitor Body has Female Threads for interchangeable Screw-in Terminals



pF	KV	Diam. x Length	Sprague Products Cat. No.	Sprague O.E.M. Part No.
500	20	1.000 x 1.122	20DK-T5	708C50
500	30	1.312 x 1.312	30DK-T5	715C009501D8303BN

Call Your Sprague Distributor for Current Prices

- Cast in Non-Flammable, Moisture-resistant, Epoxy Resin

TYPE 424M* DIPPED MICA CAPACITORS

- Expressly Made for Applications Requiring Optimum Capacitance Stability and Retrace Characteristics.
- Designed For Continuous Operation at Temperatures Up to +85 C.
- Not Affected by High Relative Humidity.
- Critically-Tested Mica Dielectric With "Fired-On" Silver electrodes.
- Special Electrode Terminations to Minimize Capacitance Drift and Internal Noise.
- Resin-Impregnated Multiple Phenolic Coating for High Moisture Resistance and Mechanical Strength.
- Capacitance Tolerance, ±5%.
- For Complete Technical Data, See Latest Issue of Engineering Bulletin 1015.

500 WVDC

pF	L. x W. x T.	Cat. No.
82	.640 x .500 x .190	424MC82R0J501
91	.640 x .500 x .190	424MC91R0J501
100	.640 x .500 x .190	424MC1000J501
110	.640 x .500 x .190	424MC1100J501
220	.640 x .500 x .190	424ME2200J501
510	.650 x .510 x .200	424ME5100J501
1100	.650 x .520 x .220	424ME1101J501

500 WVDC (Cont.)

pF	L. x W. x T.	Cat. No.
1200	.660 x .520 x .220	424ME1201J501
1300	.660 x .520 x .220	424ME1301J501
1500	.660 x .520 x .230	424ME1501J501
1600	.660 x .530 x .230	424ME1601J501
2200	.670 x .530 x .250	424ME2201J501
3000	.680 x .550 x .280	424ME3001J501
3600	.680 x .560 x .300	424ME3601J501

500 WVDC (Cont.)

pF	L. x W. x T.	Cat. No.
4300	.690 x .570 x .330	424ME4301J501
4700	.700 x .580 x .350	424ME4701J501
5100	.710 x .590 x .370	424ME5101J501

300 WVDC

pF	L. x W. x T.	Cat. No.
5600	.680 x .550 x .310	424ME5601J301

*Available until present stocks are exhausted.

IND-EEM-54-FFAI

All sizes subject to change without notice.

SPRAGUE CAPACITORS

TYPE MW and CM04/5/6 DIPPED MICA CAPACITORS

- Excellent electrical characteristics at low cost.
- For applications such as timing circuits and tuning circuits, where good capacitance stability and retrace are required.
- Operating temperature range: −55 C to +125 C.

- Multiple dipped coatings of phenolic and epoxy resins for high moisture resistance.
- Rated for operation at voltages to 500 WVDC.
- Capacitance tolerance: thru 10pF, ±½pF; 12 pF and above, ±5%.

DIMENSIONS (in inches)

Code	L	W	T	Code	L	W	T	Code	L	W	T	Code	L	W	T
A	.360	.330	.190	M	.450	.360	.180	Y	.650	.510	.200	KK	.670	530	.240
B	.370	.330	.190	N	.460	.360	.180	Z	.650	.510	.200	LL	.670	.530	.250
C	370	.340	.190	O	.460	.370	.180	AA	.650	.510	.210	MM	.670	.540	.260
D	.370	.340	.200	P	.460	.370	.190	BB	.650	.510	.210	NN	.680	.540	.270
E	.370	.350	.200	Q	.460	.380	.190	CC	.650	.510	.210	OO	.680	.550	.280
F	380	.350	.200	R	.460	.380	.200	DD	.650	.520	.220	PP	.680	.550	.290
G	.380	.360	.200	S	.470	.390	.210	EE	.650	.520	.220	QQ	.680	.560	.300
H	380	.360	.210	T	.470	.400	.220	FF	.660	.520	.220	RR	.690	.560	.310
I	.390	.370	.210	U	.480	.400	.230	GG	.660	.520	.220	SS	.690	.570	.330
J	.390	.380	.220	V	.480	.410	.230	HH	.660	.520	.230	TT	.700	.580	.350
K	.390	.380	.230	W	.490	.420	.240	II	.660	.530	.230	UU	.710	.590	.370
L	.450	.360	.170	X	.640	.510	.200	JJ	.670	.530	.240				

TYPE MWA and CM04 (Lead Spacing, 0.140")

pF	Size Code	Industrial/ Commercial Cat. No.	MIL-C-5 Part No.	pF	Size Code	Industrial/ Commercial Cat. No.	MIL-C-5 Part No.	pF	Size Code	Industrial/ Commercial Cat. No.	MIL-C-5 Part No.
1	A	MWA-010	CM04CD010D03	36	C	MWA-360	CM04ED360J03	150	H	MWA-151★	CM04FD151J03★
5	A	MWA-050★	CM04CD050D03★	39	C	MWA-390★	CM04ED390J03★	160	H	MWA-161	CM04FD161J03
6	A	MWA-060	CM04CD060D03	43	C	MWA-430★	CM04ED430J03★	180	I	MWA-181	CM04FD181J03
7	A	MWA-070	CM04CD070D03	47	C	MWA-470★	CM04ED470J03★	200	J	MWA-201★	CM04FD201J03★
8	A	MWA-080	CM04CD080D03	51	C	MWA-510★	CM04ED510J03★	220	J	MWA-221★	CM04FD221J03★
10	A	MWA-100★	CM04CD100D03★	56	C	MWA-560★	CM04ED560J03★	240	J	MWA-241★	CM04FD241J03★
12	A	MWA-120★	CM04CD120J03★	62	C	MWA-620★	CM04ED620J03★	300	J	MWA-301	—
15	A	MWA-150★	CM04CD150J03★	68	C	MWA-680★	CM04ED680J03★	330	J	MWA-331	—
18	A	MWA-180★	CM04CD180J03★	75	C	MWA-750★	CM04ED750J03★	360	J	MWA-361	—
20	A	MWA-200★	CM04ED200J03★	82	D	MWA-820★	CM04ED820J03★	390	J	MWA-391	—
22	A	MWA-220★	CM04ED220J03★	91	E	MWA-910★	CM04FD910J03★	430	K	MWA-431	—
24	A	MWA-240★	CM04ED240J03★	100	E	MWA-101★	CM04FD101J03★	470	K	MWA-471	—
27	B	MWA-270★	CM04ED270J03★	110	F	MWA-111★	CM04FD111J03★	510	K	MWA-511	—
30	C	MWA-300★	CM04ED300J03★	120	F	MWA-121★	CM04FD121J03★				
33	C	MWA-330★	CM04ED330J03★	130	G	MWA-131	CM04FD131J03				

TYPE MWB and CM05 (Lead Spacing, 0.234")

pF	Size Code	Industrial/ Commercial Cat. No.	MIL-C-5 Part No.	pF	Size Code	Industrial/ Commercial Cat. No.	MIL-C-5 Part No.	pF	Size Code	Industrial/ Commercial Cat. No.	MIL-C-5 Part No.
1	L	MWB-010	CM05CD010D03	36	L	MWB-360	CM05ED360J03★	150	P	MWB-151	CM05FD151J03★
5	L	MWB-050	CM05CD050D03★	39	L	MWB-390	CM05ED390J03★	160	P	MWB-161	CM05FD161J03★
6	L	MWB-060	CM05CD060D03	43	L	MWB-430	CM05ED430J03★	180	P	MWB-181	CM05FD181J03★
7	L	MWB-070	CM05CD070D03	47	L	MWB-470	CM05ED470J03★	200	Q	MWB-201	CM05FD201J03★
8	L	MWB-080	CM05CD080D03	51	L	MWB-510	CM05ED510J03★	220	R	MWB-221	CM05FD221J03★
10	L	MWB-100	CM05CD100D03★	56	L	MWB-560	CM05ED560J03★	240	R	MWB-241	CM05FD241J03
12	L	MWB-120	CM05CD120J03★	62	L	MWB-620	CM05ED620J03★	270	S	MWB-271★	CM05FD271J03★
15	L	MWB-150	CM05CD150J03★	68	M	MWB-680	CM05ED680J03★	300	S	MWB-301★	CM05FD301J03★
18	L	MWB-180	CM05CD180J03★	75	M	MWB-750	CM05ED750J03★	330	S	MWB-331★	CM05FD331J03★
20	L	MWB-200	CM05ED200J03★	82	M	MWB-820	CM05ED820J03★	360	T	MWB-361★	CM05FD361J03★
22	L	MWB-220	CM05ED220J03★	91	N	MWB-910	CM05FD910J03	390	T	MWB-391★	CM05FD391J03★
24	L	MWB-240	CM05ED240J03★	100	N	MWB-101	CM05FD101J03★	430	U	MWB-431	—
27	L	MWB-270	CM05ED270J03★	110	O	MWB-111	CM05FD111J03★	470	V	MWB-471	—
30	L	MWB-300	CM05ED300J03★	120	O	MWB-121	CM05FD121J03★	510	W	MWB-511	—
33	L	MWB-330	CM05ED330J03★	130	O	MWB-131	CM05FD131J03★				

TYPE MWC and CM06 (Lead Spacing, 0.343")

pF	Size Code	Industrial/ Commercial Cat. No.	MIL-C-5 Part No.	pF	Size Code	Industrial/ Commercial Cat. No.	MIL-C-5 Part No.	pF	Size Code	Industrial/ Commercial Cat. No.	MIL-C-5 Part No.
430	X	MWC-431	CM06FD431J03	1000	DD	MWC-102★	CM06FD102J03★	2400	MM	MWC-242★	CM06FD242J03★
470	X	MWC-471★	CM06FD471J03★	1100	EE	MWC-112★	CM06FD112J03★	2700	NN	MWC-272★	CM06FD272J03★
510	Y	MWC-511★	CM06FD511J03★	1200	FF	MWC-122★	CM06FD122J03★	3000	OO	MWC-302★	CM06FD302J03★
560	Y	MWC-561★	CM06FD561J03★	1300	GG	MWC-132	CM06FD132J03	3300	PP	MWC-332★	CM06FD332J03★
620	Z	MWC-621★	CM06FD621J03★	1500	HH	MWC-152★	CM06FD152J03★	3600	QQ	MWC-362★	CM06FD362J03★
680	AA	MWC-681★	CM06FD681J03★	1600	II	MWC-162★	CM06FD162J03★	3900	RR	MWC-392★	CM06FD392J03★
750	BB	MWC-751★	CM06FD751J03★	1800	JJ	MWC-182★	CM06FD182J03★	4300	SS	MWC-432	CM06FD432J03
820	BB	MWC-821★	CM06FD821J03★	2000	KK	MWC-202★	CM06FD202J03★	4700	TT	MWC-472★	CM06FD472J03★
910	CC	MWC-911★	CM06FD911J03★	2200	LL	MWC-222★	CM06FD222J03★	5100	UU	MWC-512	—

★ Normally in stock, or readily available. Consult your Sprague distributor for availability of other capacitors.

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EEM-IND-82-EFAI

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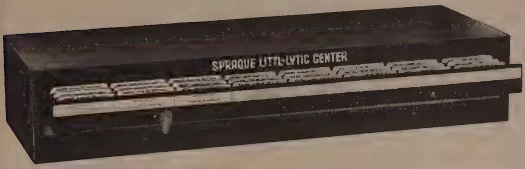
SPRAGUE CAPACITORS

CAPACITOR SERVICENTERS in steel cabinets



- Custom-designed to put popular-rated capacitors at your fingertips.
- Capacitors 'filed' in compartmented drawers outfitted with pre-printed index cards.
- Rugged yet attractive . . . constructed of heavy-gage steel, finished in baked blue enamel.
- J-150 contains 795 disc ceramics. J-141 contains 200 miniature axial-lead tubular electrolytics. J-152 contains 392 single-ended electrolytics.

J-150 CERAMICENTER®

(See Sprague Cera-mite® Capacitor pages for detailed information on these capacitors)

Quan.	Cat. No.	pF
	GA TYPES 1000 WVDC	
5	5GA-V50	5
10	5GA-Q10	10
5	5GA-Q15	15
5	5GA-Q22	22
5	5GA-Q33	33
5	5GA-Q39	39
10	5GA-Q47	47
10	5GA-Q50	50
5	5GA-Q68	68
5	5GA-Q82	82
10	5GA-T10	100
5	5GA-T12	120
10	5GA-T15	150
5	5GA-T22	220
5	5GA-T27	270
10	5GA-T33	330
5	5GA-T39	390

Quan.	Cat. No.	µF
10	5GA-T47	470
10	5GA-T50	500
5	5GA-T68	680
5	5GA-T82	820
25	5GA-D10	.001µF
10	5GA-D15	.0015
10	5GA-D20	.002
10	5GA-D33	.0033
10	5GA-D40	.004
10	5GA-D47	.0047
10	5GA-D50	.005
25	5GA-S10	.01
10	5GA-S15	.015
25	5GA-S20	.02
	HIGH-K TYPES Thru .01µF, 1000 WVDC .02 µF and up, 500 WVDC	
20	5HK-D10	.001
10	5HK-D15	.0015

Quan.	Cat. No.	µF
25	5HK-D50	.005
25	5HK-S10	.01
10	5HK-S20	.02
25	5HK-S50	.05
25	5HK-P10	.1
	TEMPERATURE-STABLE TYPES 1000 WVDC	
10	10TS-T10	100pF
10	10TS-T47	470
10	10TS-T50	500
5	10TS-T68	680
10	10TS-D10	.001µF
5	10TS-D15	.0015
10	10TS-D20	.002
5	10TS-D30	.003
10	10TS-D50	.005
5	10TS-D68	.0068
20	10TS-S10	.01

Quan.	Cat. No.	pF
	GA TYPES 100 WVDC	
25	TG-D50	.005
25	TG-S10	.01
25	TG-S20	.02
25	TG-S25	.025
25	TG-S30	.03
25	TG-P10	.1
	ULTRA-MINIATURE TYPES HY-300 Series, 12 WVDC HY-400 Series, 16 WVDC HY-500 Series, 25 WVDC	
5	HY-340	.022
5	HY-345	.033
5	HY-350	.047
5	HY-355	.068
5	HY-360	.1

Quan.	Cat. No.	µF
5	HY-365	.15
5	HY-370	.22
5	HY-375	.33
5	HY-380	.47
5	HY-420	.01
5	HY-425	.022
5	HY-430	.033
5	HY-435	.047
5	HY-440	.068
5	HY-450	.1
5	HY-470	.2
5	HY-510	.0047
5	HY-520	.01
5	HY-525	.022
5	HY-530	.033
5	HY-535	.047
5	HY-540	.068
5	HY-550	.1

J-141 LITTL-LYTIC® CENTER

(See Sprague Littl-Lytic Capacitor page for detailed information on these capacitors)

Quan.	Cat. No.	µF
	3 WVDC	
5	TE-1059.5	100
5	TE-1064	200
5	TE-1068	500
	6 WVDC	
5	TE-1104	200
5	TE-1106	300
	12 WVDC	
5	TE-1127	5
5	TE-1133	50
5	TE-1135	100
5	TE-1137	200
5	TE-1138	250
	16 WVDC	
5	TE-1155	10
5	TE-1157	20
5	TE-1162	100
5	TE-1163	150
5	TE-1164	200
	25 WVDC	
5	TE-1200	1
5	TE-1201	2
5	TE-1202	5
5	TE-1203	6

Quan.	Cat. No.	µF
	25 WVDC, cont.	
5	TE-1204	10
5	TE-1205	15
5	TE-1207	25
5	TE-1208	35
5	TE-1209	50
5	TE-1210	75
5	TE-1211	100
	50 WVDC	
5	TE-1300	1
5	TE-1301	2
5	TE-1302	3
5	TE-1302.1	4
5	TE-1303	5
5	TE-1303.3	8
5	TE-1304	10
5	TE-1305	20
5	TE-1306	35
5	TE-1307	50
	100 WVDC	
5	TE-1407	10
5	TE-1409	20
	150 WVDC	
5	TE-1504	5
5	TE-1507	10

J-152 VERTI-LYTIC® CENTER

(See Sprague Verti-Lytic Capacitor page for detailed information on these capacitors)

Quan.	Cat. No.	µF
	0 – 6.3 WVDC	
10	EV-1026	47
10	EV-1030	100
10	EV-1050	470
10	EV-1060	1000
	0 – 10 WVDC	
10	EV-1125	33
25	EV-1130	100
10	EV-1140	220
10	EV-1145	330
25	EV-1150	470
10	EV-1160	1000
	0 – 16 WVDC	
10	EV-1222	10
10	EV-1224	22
10	EV-1226	47
10	EV-1230	100
10	EV-1240	220
10	EV-1245	330
10	EV-1250	470
12	EV-1260	1000

Quan.	Cat. No.	µF
	0 – 25 WVDC	
10	EV-1315	1.0
10	EV-1317	2.2
10	EV-1318	3.3
10	EV-1319	4.7
10	EV-1322	10
10	EV-1323	15
10	EV-1325	33
10	EV-1326	47
10	EV-1330	100
10	EV-1340	220
10	EV-1345	330
10	EV-1350	470
10	EV-1360	1000
	0 – 35 WVDC	
10	EV-1450	450
	0 – 50 WVDC	
10	EV-1519	4.7
	0 – 63 WVDC	
10	EV-1615	1.0
10	EV-1618	3.3
10	EV-1622	10

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EEM-81-PPAO

SPRAGUE-GOODMAN CAPACITORS

PISTONCAP® PRECISION TRIMMER CAPACITORS

- Low Loss Glass or Quartz Dielectric.
- Fully Interchangeable with JFD and Erie.
- Simplified Long Life, Reliable Adjust Mechanism.
- High Stability Under Conditions of Changing Frequency, Voltage, Temperature, etc.
- Dielectric Strength, Twice Rated Voltage.
- Driving Torque, 1 to 10 ounce-inches.
- Insulation Resistance, 10^6 Megohms at +25 C. (See Temperature Table for IR at Peak Temp.)
- Standard Sealed and Expanded Range Sealed Types Use Latest Design of Multi-lobed Seal at Adjust End.
- Types GER, GFR, GEL, and GFL Employ Embedded Electrode Construction for Expanded Capacitance Range.

MIL-C-14409C CAPACITORS

Sprague-Goodman is an approved supplier of the following Series:

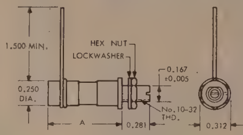
Style	Characteristics	Style	Characteristics
PC38	H, J	PC43	All
PC39	All	PC48	H, J
PC40	H, J	PC50	H, J
PC41	H, J	PC51	H, J
PC42	H, J	PC52	H, J

Dielectric Material	Capacitance Range in pF Min.	Capacitance Range in pF Max.	D-C Voltage Rating (Volts)	Minimum Quality Factor Q	Temp. Char. (See Table)	Panel Mounting Length A	Panel Mounting Cat. No.	Printed Circuit Mounting Length A	Printed Circuit Mounting Cat. No.
OPEN END STYLE									
Standard Glass	0.8	4.5	750	500	J	.297	GGP4R500	.312	GGC4R500
Standard Glass	0.8	8.5	750	500	J	.547	GGP8R500	.562	GGC8R500
Standard Glass	0.8	12.0	750	500	H	.750	GGP12000	.766	GGC12000
Standard Glass	0.8	18.0	750	500	H	.984	GGP18000	1.000	GGC18000
Standard Glass	1.0	30.0	750	350	H	1.594	GGP30000	1.609	GGC30000
Hi-Range Glass	0.8	5.5	750	1000	J	.297	GHP5R500	.312	GHC5R500
Hi-Range Glass	0.8	11.0	750	900	J	.547	GHP11000	.562	GHC11000
Hi-Range Glass	0.8	16.0	750	800	H	.750	GHP16000	.766	GHC16000
Hi-Range Glass	0.8	23.0	750	700	H	.984	GHP23000	1.000	GHC23000
Hi-Range Glass	1.0	38.0	750	500	H	1.594	GHP38000	1.609	GHC38000
Quartz	0.6	1.8	750	1500	Q	.297	GQP1R800	.312	GQC1R800
Quartz	0.6	5.5	750	1500	Q	.547	GQP5R500	.562	GQC5R500
Quartz	0.6	9.5	750	1500	Q	.984	GQP9R500	1.000	GQC9R500
Quartz	0.8	16.0	750	1500	Q	1.594	GQP16000	1.609	GQC16000
STANDARD SEALED STYLE									
Standard Glass	0.8	4.5	750	500	J	.359	GGR4R500	.656	GGL4R500
Standard Glass	0.8	8.5	1250	500	J	.594	GGR8R500	.906	GGL8R500
Standard Glass	0.8	12.0	1250	500	H	.812	GGR12000	1.109	GGL12000
Standard Glass	0.8	18.0	1250	500	H	1.062	GGR18000	1.359	GGL18000
Standard Glass	1.0	30.0	1250	350	H	1.656	GGR30000	1.953	GGL30000
Hi-Range Glass	0.8	5.5	750	1000	J	.359	GHR5R500	.656	GHL5R500
Hi-Range Glass	0.8	11.0	1250	900	J	.594	GHR11000	.906	GHL11000
Hi-Range Glass	0.8	16.0	1250	800	H	.812	GHR16000	1.109	GHL16000
Hi-Range Glass	0.8	23.0	1250	700	H	1.062	GHR13000	1.359	GHL23000
Hi-Range Glass	1.0	38.0	1250	500	H	1.656	GHR38000	1.953	GHL38000
Quartz	0.6	1.8	750	1500	Q	.359	GQR1R800	.656	GQL1R800
Quartz	0.6	5.5	1250	1500	Q	.625	GQR5R500	.922	GQL5R500
Quartz	0.6	9.5	1250	1500	Q	1.062	GQR9R500	1.359	GQL9R500
Quartz	0.8	16.0	1250	1500	Q	1.656	GQR16000	1.953	GQL16000
EXPANDED-RANGE SEALED STYLE									
Standard Glass	1.0	14	1000	500	G	.469	GER14000	.780	GEL14000
Standard Glass	1.0	28	1000	350	G	.703	GER28000	1.020	GEL28000
Standard Glass	1.0	42	1000	250	G	.922	GER42000	1.235	GEL42000
Standard Glass	1.0	60	1000	250	G	1.172	GER60000	1.480	GEL60000
Standard Glass	1.0	90	1000	250	G	1.766	GER90000	2.080	GEL90000
Hi-Range Glass	1.0	16	1000	750	G	.469	GFR16000	.780	GFL16000
Hi-Range Glass	1.0	36	1000	550	G	.703	GFR36000	1.020	GFL36000
Hi-Range Glass	1.0	52	1000	350	G	.922	GFR52000	1.235	GFL52000
Hi-Range Glass	1.0	75	1000	250	G	1.172	GFR75000	1.480	GFL75000
Hi-Range Glass	1.0	120	1000	250	G	1.766	GFR12100	2.080	GFL12100

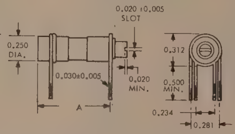
TEMPERATURE TABLE

Temp. Char.	Operating Temperature Range	Temp. Coefficient (ppm/°C)	IR at Peak Temp. (MΩ)
G	−55 C to +125 C	±150	10^5
H	−55 C to +125 C	±100	10^5
J	−55 C to +125 C	±50	10^5
Q	−55 C to +150 C	+50, −0	10^6

OPEN END STYLE

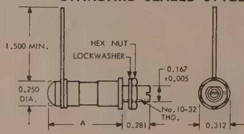


Panel Mounting

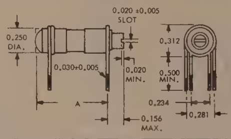


Printed Circuit Mounting

STANDARD SEALED STYLE

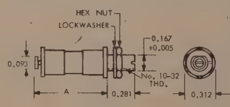


Panel Mounting

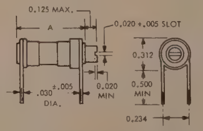


Printed Circuit Mounting

EXPANDED-RANGE SEALED STYLE



Panel Mounting



Printed Circuit Mounting

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IND-EEM-30-PPAO

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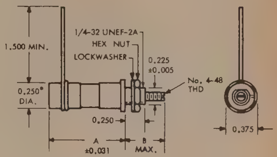
SPRAGUE-GOODMAN CAPACITORS

PISTONCAP® PRECISION TRIMMER CAPACITORS, continued

EXTENDED-SCREW STYLE

Dielectric Material	Capacitance Range in pF Min.	Max.	D-C Voltage Rating	Minimum Q at 20 MHz	Temp. Coeff. in ppm/°C	Length A	Screw Extension B	Cat. No.
Standard Glass	0.5	3.0	750	500	±50	.484	.625	GGW3R000
Standard Glass	0.8	8.5	750	500	±75	.578	.625	GGW8R500
Standard Glass	0.7	9.0	750	500	±75	.656	.656	GGW9R000
Standard Glass	0.8	12.0	750	500	±100	.765	.750	GGW12000
Standard Glass	0.8	18.0	750	500	±100	1.000	.843	GGW18000
Standard Glass	0.8	30.0	750	500	±100	1.594	1.141	GGW30000
Standard Glass	0.7	9.0	750	500	+0, −150	.656	.765	GSG900
Standard Glass	0.6	14.0	750	500	+0, −150	1.000	1.000	GSG901
Standard Glass	0.8	18.0	750	500	+0, −150	1.000	.953	GSG902
Standard Glass	0.8	30.0	750	500	+0, −150	1.594	1.250	GSG903
Standard Glass	0.7	9.0	750	500	+400±100	.656	.797	GSG904
Standard Glass	0.8	18.0	750	500	+400±100	1.000	.938	GSG905
Standard Glass	0.8	30.0	750	500	+400±100	1.594	1.250	GSG906
Hi-Range Glass	0.5	4.5	750	1000	±100	.484	.625	GHW4R500
Hi-Range Glass	0.8	11.0	750	900	±100	.578	.625	GHW11000
Hi-Range Glass	0.8	13.0	750	900	±100	.609	.625	GHW13000
Hi-Range Glass	0.8	17.0	750	800	±100	.765	.750	GHW17000
Hi-Range Glass	1.0	24.0	750	700	±100	1.000	.812	GHW24000
Hi-Range Glass	1.0	40.0	750	500	±100	1.594	1.125	GHW40000
Quartz	0.6	5.5	750	1500	+50, −0	.563	.765	GQW5R500
Quartz	0.6	9.5	750	1500	+50, −0	1.000	.891	GQW9R500
Quartz	0.8	16.0	750	1500	+50, −0	1.594	1.250	GQW16000
Quartz	0.7	4.5	750	1500	+50, −0	.438	.546	GSG907
Quartz	0.6	6.0	750	1500	+50, −0	.625	.906	GSG908
Quartz	0.8	10.0	750	1500	+50, −0	1.000	.891	GSG909
Quartz	9.0	21.0	750	1500	+50, −0	1.594	1.000	GSG910

EXTENDED-SCREW STYLE


1.500 MIN.
1/4-32 UNEF-2A
HEX NUT
LOCKWASHER
0.225
±0.005
0.250*
DIA.
No. 4-48
THD
0.250
A
±0.031
B
MAX.
0.375

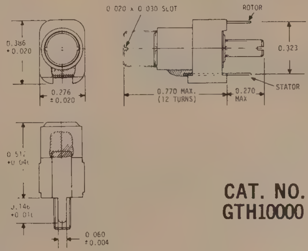
*EXCEPT GSG907 THRU GSG910, WHICH HAVE A DIA. OF 0.312

Panel Mounting

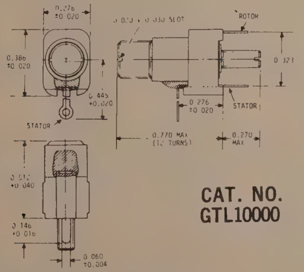
MULTI-TURN TEFLON★ TRIMMER CAPACITORS

- Printed Circuit Mounting Type
- Top or Bottom Adjustment
- Straight Line Capacitance Curve
- Stable and Rugged Construction
- Excellent Characteristics at Low Cost
- Linear Temperature Coefficient
- Sensitive Multi-Turn Adjustment
- Capacitance Range: 2.0 to 10.0 pF
- Voltage Rating: 250 Volts D-C
- Dielectric Strength: 500 Volts D-C
- Q at 10 MHz: 1000 Min.
- Temp. Coeff.: NPO ±200 ppm/°C
- Driving Torque: 0.4 to 5.0 ounce-inches
- Operating Temp. Range: −40°C to +100°C

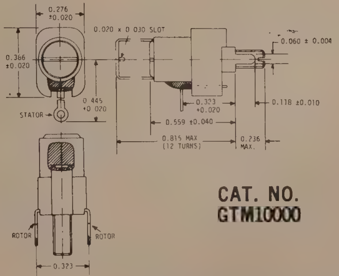
★ Trademark, E. I. DuPont


0.020 x 0.030 SLOT
ROTOR
0.386
+0.020
0.323
0.276
±0.020
0.770 MAX.
(12 TURNS)
0.270
MAX
STATOR
0.512
+0.040
0.146
+0.016
0.060
±0.004

CAT. NO.
GTH10000


0.276
±0.020
0.020 x 0.030 SLOT
ROTOR
0.386
±0.020
0.321
0.445
+0.020
0.276
±0.020
STATOR
STATOR
0.770 MAX
(12 TURNS)
0.270
MAX
0.512
+0.040
0.146
+0.016
0.060
±0.004

CAT. NO.
GTL10000


0.276
±0.020
0.020 x 0.030 SLOT
0.060 ± 0.004
0.366
±0.020
0.445
+0.020
STATOR
0.323
+0.020
0.118 ±0.010
0.559 ±0.040
0.815 MAX
(12 TURNS)
0.236
MAX.
ROTOR
ROTOR
0.323

CAT. NO.
GTM10000

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IND-EEM-24-EFAI

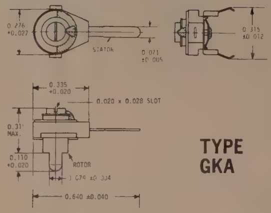
All sizes subject to change without notice.

SPRAGUE-GOODMAN CAPACITORS

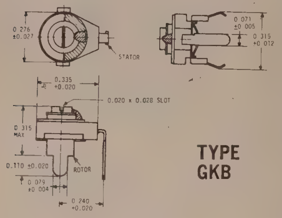
MINIATURE CERAMIC TRIMMER CAPACITORS

- Printed Circuit Mounting Type
- Compact Form Factor Conserves Mounting Space
- Straight Line Capacitance Curve
- Low Cost for Industrial and Commercial Applications
- Variety of Mounting Configurations
- Snap Fit in Printed Circuit Board

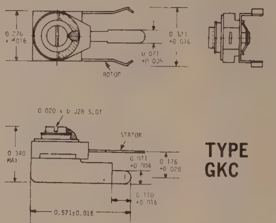
- Operating Temp. Range: −55°C to +85°C
- Voltage Rating: 250 Volts D-C
- Dielectric Strength: 500 Volts D-C
- Insulation Resistance: 10^3 Megohms Min. at +25°C
- Driving Torque: 0.5 to 2.5 ounce-inches (Types A-F) 0.4 to 2.0 ounce-inches (Type G)


0.276 ±0.027
STATOR
0.071 ±0.005
0.315 ±0.012
0.335 ±0.020
0.020 x 0.028 SLOT
0.31 MAX.
0.110 ±0.020
ROTOR
0.079 ±0.004
0.640 ±0.040

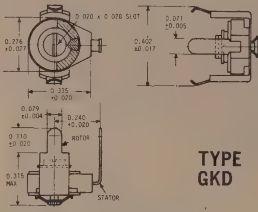
TYPE GKA


0.276 ±0.027
STATOR
0.071 ±0.005
0.315 ±0.012
0.335 ±0.020
0.020 x 0.028 SLOT
0.315 MAX
0.110 ±0.020
ROTOR
0.079 ±0.004
0.240 ±0.020

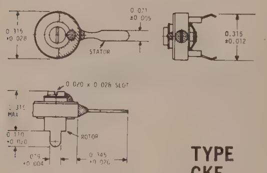
TYPE GKB


0.276 ±0.016
ROTOR
0.071 ±0.005
0.020 x 0.028 SLOT
STATOR
0.340 MAX
0.071 ±0.004
0.176 ±0.028
0.110 ±0.016
0.571±0.016

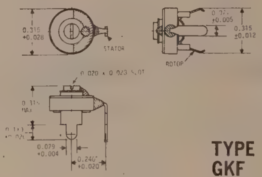
TYPE GKC


0.020 x 0.028 SLOT
0.276 ±0.027
0.071 ±0.005
0.402 ±0.012
0.335 ±0.020
0.079 ±0.004
0.240 ±0.020
0.110 ±0.020
ROTOR
0.315 MAX
STATOR

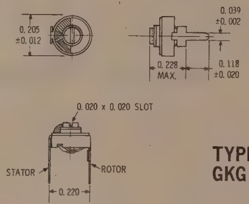
TYPE GKD


0.071 ±0.005
0.315 ±0.028
STATOR
0.315 ±0.012
0.020 x 0.028 SLOT
0.315 MAX
0.110 ±0.020
ROTOR
0.079 ±0.004
0.345 ±0.026

TYPE GKE


0.315 ±0.028
STATOR
0.071 ±0.005
0.315 ±0.012
ROTOR
0.020 x 0.028 SLOT
0.315 MAX
0.079 ±0.004
0.240 ±0.020

TYPE GKF


0.039 ±0.002
0.205 ±0.012
0.228 MAX.
0.118 ±0.020
0.020 x 0.020 SLOT
STATOR
ROTOR
0.220

TYPE GKG

Cap. Range Min.	Max.	Min. Q at 10 MHz	Temp.* Coeff. in ppm/°C	Cat. No.	Color Code
1.5	4.0	300	NPO±250	GKG4R000	Black
2.0	6.0	300	NPO±200	GKA6R000 GKB6R000 GKC6R000 GKD6R000	Red
2.0	6.0	300	−100±200	GKG6R000	Red
2.0	10.0	300	NPO±200	GKA10000 GKB10000 GKC10000 GKD10000	None
2.8	10.0	300	−600±300	GKG10000	None
3.3	18.0	300	−800±300	GKG18000	Blue
2.5	20.0	500	−450±200	GKA20000 GKB20000 GKC20000 GKD20000	Blue
4.0	30.0	300	−750±250	GKA30000 GKB30000 GKC30000 GKD30000	Orange
5.1	40.0	200	−1400±800	GKA40000 GKB40000 GKC40000 GKD40000	Brown
5.1	50.0	200	−1400±800	GKA50000 GKB50000 GKC50000 GKD50000	Green
6.0	60.0	200	−1400±800	GKE60000 GKF60000	Pink
6.0	70.0	200	−1400±800	GKE70000 GKF70000	Gray

*Temperature coefficient is measured over range of −20 C to +70 C for Types A-F and −25 C to +85 C for Type G.

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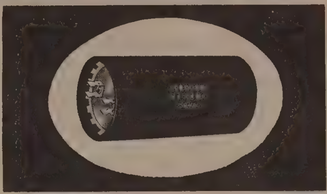
IND-EEM-25-EFAI

All sizes subject to change without notice.

SPRAGUE A-C CAPACITORS

TYPE AB MOTOR-STARTING ELECTROLYTIC CAPACITORS

- Designed for intermittent duty cycles in motor-starting applications.
- Housed in molded phenolic cases for protection against moisture, dirt, and grease. Will not deteriorate in humid atmosphere, as is often the case with cardboard-encased capacitors.
- Universal terminals for use with quick-connect connectors. Terminals also have notches and eyes for wrapping leads if connections are to be soldered.
- Operating temperature range, −30°C to +65°C.
- Only a single end cap and clip-type bracket are needed for easy mounting on any modern motor.
- 2 clip-on terminal adapters included with each capacitor, for attaching lead wires without soldering.



µF Min.-Max.	D. x L.	Catalog Number
125 VOLTS A-C, 60 CYCLES At 125 volts a-c . . . 120,000 starts min. with two ¾- second starts per minute		
21-25	1 7/16 x 2 3/4	AB-1201
25-30	1 7/16 x 2 3/4	AB-1202
30-36	1 7/16 x 2 3/4	AB-1203
38-46	1 7/16 x 2 3/4	AB-1204
43-53	1 7/16 x 2 3/4	AB-1205
53-64	1 7/16 x 2 3/4	AB-1207
64-77	1 7/16 x 2 3/4	AB-1208
72-88	1 7/16 x 2 3/4	AB-1209
88-108	1 7/16 x 2 3/4	AB-1210
108-130	1 7/16 x 2 3/4	AB-1213
124-149	1 7/16 x 2 3/4	AB-1216
130-156	1 7/16 x 2 3/4	AB-1219
145-175	1 7/16 x 2 3/4	AB-1222
161-193	1 7/16 x 2 3/4	AB-1225
189-227	1 7/16 x 2 3/4	AB-1228
200-240	1 7/16 x 2 3/4	AB-1230
216-259	1 7/16 x 3 3/8	AB-1231
233-280	1 7/16 x 3 3/8	AB-1234
243-292	1 7/16 x 3 3/8	AB-1237
270-324	1 7/16 x 3 3/8	AB-1240
324-388	1 13/16 x 3 3/8	AB-1242
340-408	1 13/16 x 3 3/8	AB-1243
378-440	1 13/16 x 3 3/8	AB-1246
400-480	1 13/16 x 3 3/8	AB-1249
430-516	1 13/16 x 3 3/8	AB-1252
460-552	1 13/16 x 3 3/8	AB-1255
540-648	1 13/16 x 4 3/8	AB-1258
590-708	1 13/16 x 4 3/8	AB-1261
705-845	2 1/16 x 4 3/8	AB-1262
800-920	2 1/16 x 4 3/8	AB-1263
1000-1200	2 9/16 x 4 3/8	AB-1265
165 VOLTS A-C, 60 CYCLES At 165 volts a-c . . . 60,000 starts min. with one 1-second start per minute		
108-130	1 7/16 x 3 3/8	AB-1613
124-149	1 7/16 x 3 3/8	AB-1616
130-156	1 13/16 x 3 3/8	AB-1619
145-175	1 13/16 x 3 3/8	AB-1622
161-193	1 13/16 x 3 3/8	AB-1625
189-227	1 13/16 x 3 3/8	AB-1628
216-259	1 13/16 x 3 3/8	AB-1631
233-280	1 13/16 x 4 3/8	AB-1634
243-292	1 13/16 x 4 3/8	AB-1637
270-324	1 13/16 x 4 3/8	AB-1640
340-408	2 1/16 x 4 3/8	AB-1643
378-440	2 1/16 x 4 3/8	AB-1646
400-480	2 1/16 x 4 3/8	AB-1649
250 VOLTS A-C, 60 CYCLES At 250 volts a-c . . . 40,000 starts min. with forty 1-second starts per hour		
21-25	1 7/16 x 2 3/4	AB-2501
25-30	1 7/16 x 2 3/4	AB-2502
30-36	1 7/16 x 3 3/8	AB-2503
36-43	1 7/16 x 3 3/8	AB-2504
43-53	1 7/16 x 3 3/8	AB-2505
47-56	1 7/16 x 3 3/8	AB-2506
53-64	1 13/16 x 3 3/8	AB-2507
64-77	1 13/16 x 3 3/8	AB-2508
72-88	1 13/16 x 3 3/8	AB-2509
88-108	1 13/16 x 4 3/8	AB-2510
108-130	1 13/16 x 4 3/8	AB-2512
124-149	1 13/16 x 4 3/8	AB-2516
130-156	1 13/16 x 4 3/8	AB-2519
145-175	2 1/16 x 4 3/8	AB-2522
161-193	2 1/16 x 4 3/8	AB-2525
189-227	2 1/16 x 4 3/8	AB-2528
216-259	2 9/16 x 4 3/8	AB-2531
233-280	2 9/16 x 4 3/8	AB-2532
280-333	2 9/16 x 4 3/8	AB-2533
330 VOLTS A-C, 60 CYCLES At 330 volts a-c . . . 40,000 starts min. with forty 1-second starts per hour		
21-25	1 7/16 x 3 3/8	AB-3201
25-30	1 7/16 x 3 3/8	AB-3202
30-36	1 13/16 x 3 3/8	AB-3203
36-43	1 13/16 x 3 3/8	AB-3204
43-53	1 13/16 x 3 3/8	AB-3205
53-64	1 13/16 x 4 3/8	AB-3207
64-77	1 13/16 x 4 3/8	AB-3208
72-88	2 1/16 x 4 3/8	AB-3209
88-108	2 1/16 x 4 3/8	AB-3210
108-130	2 9/16 x 4 3/8	AB-3213
124-149	2 9/16 x 4 3/8	AB-3216
130-156	2 9/16 x 4 3/8	AB-3219
145-175	2 9/16 x 4 3/8	AB-3222
161-193	2 9/16 x 4 3/8	AB-3225
189-227	2 9/16 x 4 3/8	AB-3226
216-259	2 9/16 x 4 3/8	AB-3227

TYPE OV OVAL-CASE MOTOR-RUN CAPACITORS

- Impregnated with non-flammable synthetic askarel liquid which has low power factor, high dielectric constant, high dielectric strength.
- Mechanically rugged construction — will withstand severe motor vibration. Drawn metal case eliminates danger of leaky soldered seams.
- Terminals mechanically linked by molded phenolic dual insulating cup, which prevents individual terminals from turning and forms a leak-proof seal.
- Universal terminals for use with female quick-connect terminations found on wiring harnesses. Terminals also have notches and eyes for wrapping leads if connections are to be soldered.
- T after cat. no. means internally-fused unit.

SPRAG
CLORIN
30 M
440 V

µF	W. x T. x H.	Catalog Number
SINGLE SECTION CAPACITORS		
370 VOLTS A-C, 60 CYCLES		
2	2 5/32 x 1 5/16 x 1 5/8	OV-3020
3	2 5/32 x 1 5/16 x 2	OV-3030
4	2 5/32 x 1 5/16 x 2 1/4	OV-3040
5	2 5/32 x 1 5/16 x 2 5/8	OV-3050
6	2 5/32 x 1 5/16 x 3	OV-3060
7.5	2 5/32 x 1 5/16 x 3 3/4	OV-3075
9	2 29/32 x 1 29/32 x 2 5/8	OV-3090
10	2 29/32 x 1 29/32 x 2 3/4	OV-3100
12.5	2 29/32 x 1 29/32 x 3 1/4	OV-3125
15	2 29/32 x 1 29/32 x 3 3/4	OV-3150
15	2 29/32 x 1 29/32 x 3 3/4	OV-3150T
17.5	2 29/32 x 1 29/32 x 4 1/4	OV-3175
17.5	2 29/32 x 1 29/32 x 4 1/4	OV-3175T
20	2 29/32 x 1 29/32 x 4 3/4	OV-3200
25	2 29/32 x 1 29/32 x 5 3/4	OV-3250
25	2 29/32 x 1 29/32 x 5 3/4	OV-3250T
27.5	2 29/32 x 1 29/32 x 6 1/4	OV-3275
30	3 21/32 x 1 31/32 x 5 1/4	OV-3300
30	3 21/32 x 1 31/32 x 5 1/4	OV-3300T
35	3 21/32 x 1 31/32 x 5 7/8	OV-3350
35	3 21/32 x 1 31/32 x 5 7/8	OV-3350T
40	3 31/32 x 1 31/32 x 7 1/8	OV-3400
40	3 21/32 x 1 31/32 x 7 1/8	OV-3400T
45	3 31/32 x 1 29/32 x 8	OV-3450
45	3 31/32 x 1 29/32 x 8	OV-3450T
50	3 31/32 x 1 29/32 x 8	OV-3500
50	3 31/32 x 1 29/32 x 8	OV-3500T
440 VOLTS A-C, 60 CYCLES		
2	2 5/32 x 1 5/16 x 2	OV-4020
3	2 5/32 x 1 5/16 x 2 3/8	OV-4030
4	2 5/32 x 1 5/16 x 3	OV-4040
5	2 5/32 x 1 5/16 x 3 1/2	OV-4050
6	2 5/32 x 1 5/16 x 4 3/16	OV-4060
7.5	2 5/32 x 1 5/16 x 5	OV-4075
8	2 29/32 x 1 29/32 x 3 1/8	OV-4080
10	2 29/32 x 1 29/32 x 3 5/8	OV-4100
10	2 29/32 x 1 29/32 x 3 5/8	OV-4100T
12.5	2 29/32 x 1 29/32 x 4 3/8	OV-4125
15	2 29/32 x 1 29/32 x 5 1/4	OV-4150
15	2 29/32 x 1 29/32 x 5 1/4	OV-4150T
17.5	2 29/32 x 1 29/32 x 6 1/2	OV-4175
20	2 29/32 x 1 29/32 x 6 1/2	OV-4200
20	2 29/32 x 1 29/32 x 6 1/2	OV-4200T
22.5	2 29/32 x 1 29/32 x 6 1/2	OV-4225
25	3 21/32 x 1 31/32 x 6	OV-4250
25	3 21/32 x 1 31/32 x 6	OV-4250T
30	3 21/32 x 1 31/32 x 7	OV-4300
30	3 21/32 x 1 31/32 x 7	OV-4300T
35	3 21/32 x 1 31/32 x 8 1/8	OV-4350
35	3 21/32 x 1 31/32 x 8 1/8	OV-4350T
40	3 21/32 x 1 31/32 x 9 1/8	OV-4400
45	3 21/32 x 1 31/32 x 9 1/2	OV-4450
660 VOLTS A-C, 60 CYCLES		
1	2 5/32 x 1 5/16 x 2	OV-6010
2	2 5/32 x 1 5/16 x 3 1/4	OV-6020
3	2 5/32 x 1 5/16 x 4 3/8	OV-6030
4	2 29/32 x 1 29/32 x 3 3/8	OV-6040
5	2 29/32 x 1 29/32 x 3 7/8	OV-6050
6	2 29/32 x 1 29/32 x 4 5/8	OV-6060
8	2 29/32 x 1 29/32 x 5 3/4	OV-6080
DUAL SECTION CAPACITORS		
370 VOLTS A-C, 60 CYCLES		
15+3	2 29/32 x 1 29/32 x 4 3/8	OVD-3153
15+4	2 29/32 x 1 29/32 x 4 5/8	OVD-3154
15+5	2 29/32 x 1 29/32 x 4 3/4	OVD-3155
15+10	2 29/32 x 1 29/32 x 5 3/4	OVD-3158
17.5+4	2 29/32 x 1 29/32 x 5 1/8	OVD-3174
17.5+5	2 29/32 x 1 29/32 x 5 1/4	OVD-3175
17.5+17.5	3 21/32 x 1 31/32 x 5 7/8	OVD-3178T
20+3	2 29/32 x 1 29/32 x 5 3/8	OVD-3203
20+4	2 29/32 x 1 29/32 x 5 1/2	OVD-3204
20+5	3 21/32 x 1 31/32 x 4 1/2	OVD-3205
20+15	3 21/32 x 1 31/32 x 5 5/8	OVD-3208
25+3	3 21/32 x 1 31/32 x 4 7/8	OVD-3253
25+4	3 21/32 x 1 31/32 x 5	OVD-3254
25+5	3 21/32 x 1 31/32 x 5 1/4	OVD-3255
25+6	3 21/32 x 1 31/32 x 5 1/4	OVD-3256
30+3	3 21/32 x 1 31/32 x 5 1/2	OVD-3303
30+4	3 21/32 x 1 31/32 x 5 5/8	OVD-3304
30+5	3 21/32 x 1 31/32 x 5 7/8	OVD-3305
35+3	3 21/32 x 1 31/32 x 6 1/4	OVD-3353
35+4	3 21/32 x 1 31/32 x 7	OVD-3354
35+5	3 21/32 x 1 31/32 x 7 1/8	OVD-3355
35+5	3 21/32 x 1 31/32 x 7 1/8	OVD-3355T
40+3	3 21/32 x 1 31/32 x 7 5/8	OVD-3403
440 VOLTS A-C, 60 CYCLES		
5+4	2 29/32 x 1 29/32 x 3 3/8	OVD-4054
10+3	2 29/32 x 1 29/32 x 4 1/2	OVD-4103
10+4	2 29/32 x 1 29/32 x 4 3/4	OVD-4104
10+5	2 29/32 x 1 29/32 x 5 1/8	OVD-4105
15+4	2 29/32 x 1 29/32 x 6 1/4	OVD-4154
15+5	2 29/32 x 1 29/32 x 6 1/2	OVD-4155
17.5+4	2 29/32 x 1 29/32 x 7	OVD-4174
17.5+5	3 21/32 x 1 31/32 x 5 1/2	OVD-4175
17.5+7.5	3 21/32 x 1 31/32 x 6	OVD-4177
17.5+17.5	3 21/32 x 1 31/32 x 8 1/8	OVD-4178T
20+4	3 21/32 x 1 31/32 x 5 3/4	OVD-4204
20+5	3 21/32 x 1 31/32 x 6	OVD-4205
20+15	3 21/32 x 1 31/32 x 8	OVD-4208
25+4	3 21/32 x 1 31/32 x 6 3/4	OVD-4254
27.5+4	3 21/32 x 1 31/32 x 7 3/8	OVD-4274
30+5	3 21/32 x 1 31/32 x 8 1/8	OVD-4305
35+3	3 21/32 x 1 31/32 x 8 3/4	OVD-4353
35+4	3 21/32 x 1 31/32 x 9	OVD-4354
35+5	3 21/32 x 1 31/32 x 9 1/8	OVD-4355
35+5	3 21/32 x 1 31/32 x 9 1/8	OVD-4355T
40+5	3 21/32 x 1 31/32 x 9 1/2	OVD-4405
TRIPLE SECTION CAPACITORS		
370 VOLTS A-C, 60 CYCLES		
15+3+2	3 21/32 x 1 31/32 x 3 5/8	OVT-31532
25+3+2	3 21/32 x 1 31/32 x 5 1/8	OVT-32532
35+3+2	3 21/32 x 1 31/32 x 7 1/8	OVT-33532
40+3+2	3 21/32 x 1 31/32 x 8	OVT-34032

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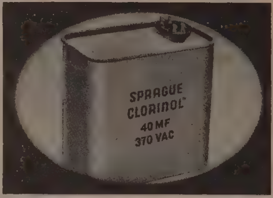
IND-EEM-78-EFAI

Sizes subject to change without notice.

SPRAGUE A-C CAPACITORS

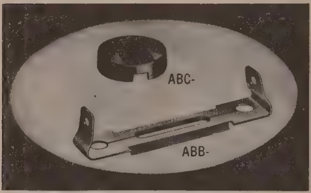
TYPE OR RECTANGULAR-CASE MOTOR-RUN CAPACITORS

- Higher capacitance values than are usually found in oval or cylindrical units.
- Non-flammable synthetic askarel liquid impregnant is derived from halogenated aromatic hydrocarbons. This askarel impregnant has low power factor, a high dielectric constant, and high dielectric strength.
- Drawn seamless case eliminates the danger of leaky soldered seams. Double-rolled edges of cover closure protect against 'popouts' and assure an extremely reliable seal between cover and can.
- Special terminal construction. The two terminals are mechanically linked by a molded phenolic dual insulating cup. This 'dogbone' shaped bushing prevents individual terminals from turning and, forms a reliable leakproof seal.
- Internally fused units have (T) suffix in Cat. No.



µF	W. x T. x H.	Catalog Number
SINGLE SECTION CAPACITORS		
370 VOLTS A-C, 60 CYCLES		
25	4 9/16 x 2 27/32 x 3 5/16	OR-3250
35	4 9/16 x 2 27/32 x 3⅜	OR-3350
40	4 9/16 x 2 27/32 x 4	OR-3400
45	4 9/16 x 2 27/32 x 4⅝	OR-3450
50	4 9/16 x 2 27/32 x 4⅞	OR-3500
440 VOLTS A-C, 60 CYCLES		
17.5	4 9/16 x 2 27/32 x 3 5/16	OR-4175
20	4 9/16 x 2 27/32 x 3 5/16	OR-4200
25	4 9/16 x 2 27/32 x 3 5/16	OR-4250
30	4 9/16 x 2 27/32 x 3½	OR-4300
35	4 9/16 x 2 27/32 x 4½	OR-4350
35	4 9/16 x 2 27/32 x 4½	OR-4350T
40	4 9/16 x 2 27/32 x 5	OR-4400
40	4 9/16 x 2 27/32 x 5	OR-4400T
45	4 9/16 x 2 27/32 x 5⅝	OR-4450
45	4 9/16 x 2 27/32 x 5⅝	OR-4450T
50	4 9/16 x 2 27/32 x 6¼	OR-4500
50	4 9/16 x 2 27/32 x 6¼	OR-4500T
55	4 9/16 x 2 27/32 x 6¾	OR-4550
55	4 9/16 x 2 27/32 x 6¾	OR-4550T
60	4 9/16 x 2 27/32 x 7¾	OR-4600
65	4 9/16 x 2 27/32 x 8¼	OR-4650T
660 VOLTS A-C, 60 CYCLES		
10	4 9/16 x 2 27/32 x 3 5/16	OR-6100
12	4 9/16 x 2 27/32 x 3 5/16	OR-6120
15	4 9/16 x 2 27/32 x 3 5/16	OR-6150
DUAL SECTION CAPACITORS		
440 VOLTS A-C, 60 CYCLES		
40+5	4 9/16 x 2 27/32 x 5¾	ORD-4405

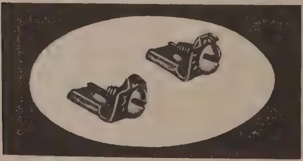
MOUNTING HARDWARE FOR TYPE AB CAPACITORS



- Plastic end caps.
- Plated steel brackets.

Capacitor Size	Catalog Number
END CAPS	
1 7/16 D.	ABC-1 (lead hole at top)
1 7/16 D.	ABC-2 (lead hole at bot.)
1 13/16 D.	ABC-3 (lead hole at top)
1 13/16 D.	ABC-4 (lead hole at bot.)
2 1/16 D.	ABC-5 (lead hole at top)
2 1/16 D.	ABC-6 (lead hole at bot.)
2 9/16 D.	ABC-7 (lead hole at top)
2 9/16 D.	ABC-8 (lead hole at bot.)
MOUNTING BRACKETS	
1 7/16 D. x 2¾ L.	ABB-1
1 7/16 D. x 3⅜ L.	ABB-2
1 13/16 D. x 3⅜ L.	ABB-2
1 13/16 D. x 4⅜ L.	ABB-3
2 1/16 D. x 4⅜ L.	ABB-3
2 9/16 D. x 4⅜ L.	ABB-3

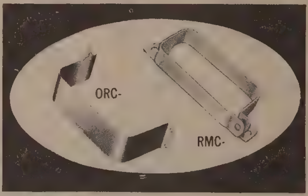
SCREW ADAPTERS FOR MOTOR-START CAPACITORS



- Clip-on terminal adapters, equipped with screws, for making lead wire connections without soldering.

Catalog Number..................................4-10-14

MOUNTING CLAMPS FOR TYPE OR CAPACITORS



- For rectangular capacitors.
- Plated steel.

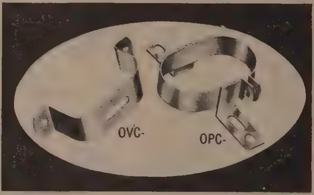
Capacitor Size	Catalog Number
4 9/16 W. x 2 27/32 T.	ORC-1
1 13/16 W. x 1 1/16 T.	RMC-17
2½ W. x 1 3/16 T.	RMC-19
3¾ W. x 1¼ T.	RMC-20
3¾ W. x 1¾ T.	RMC-28
2 31/32 W. x 2 9/32 T.	RMC-38
4 9/16 W. x 2 27/32 T.	RMC-45

SAFETY BOOTS FOR TERMINALS OF MOTOR-RUN CAPACITORS

Oil-resistant neoprene rubber covers for terminal assemblies of Type OV and Type OR Clorinol® capacitors, a safety feature especially desirable in appliance applications.
For single-section capacitor, use one boot. For triple-section capacitor, two boots are required.

Catalog Number..................................RG-1

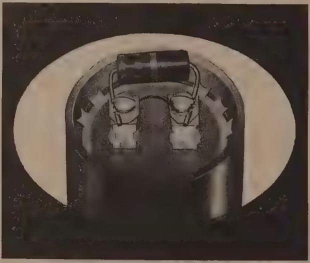
MOUNTING CLAMPS FOR TYPE OV CAPACITORS



- For oval capacitors.
- Plated steel.

Capacitor Size	Catalog Number
2 5/32 W. x 1 5/16 T.	OPC-1
2 5/32 W. x 1 5/16 T.	OVC-1
2 29/32 W. x 1 29/32 T.	OVC-3
3 21/32 W. x 1 31/32 T.	OVC-4

BLEEDER RESISTORS



Cat. No. 2BR-1530, 15,000 ohms @ 2 watts for Type AB motor-start capacitors. Cat. No. 1BR-2240, 220,000 ohms @ 1 watt, for Type OV and OR motor-run capacitors. Reduces feedback of surge voltage and bleeds capacitor voltage to safe level after power is turned off. Packaged 5 to a box.

Catalog Number	Ohms
2BR-1530	15,000
1BR-2240	220,000

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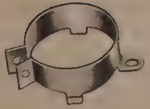
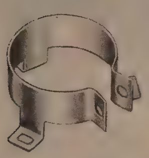
IND-EEM-79-EOAO

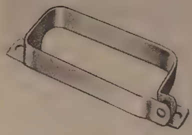
Sizes subject to change without notice

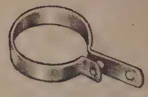
SPRAGUE CAPACITORS

CAPACITOR MOUNTING HARDWARE









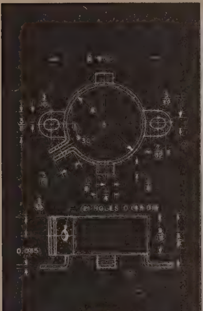


FIG. 1

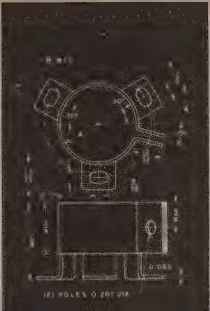


FIG. 2

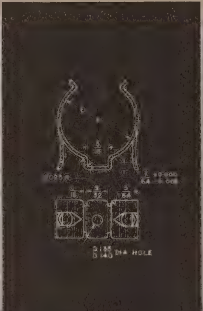


FIG. 3

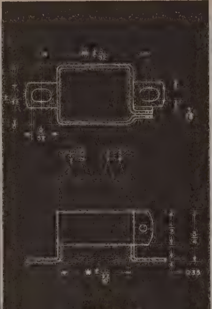


FIG. 4

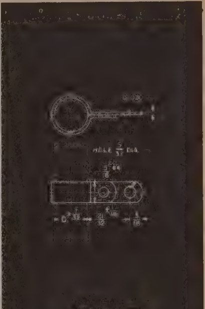


FIG. 5

VERTICAL MOUNTING CLAMPS FOR CYLINDRICAL CAPACITORS

Old Cat. No.	New Cat. No.	Fig. No.	A	B
CMC-16	4586-97	1	1″	1 7/16″
CMC-20	4586-97F	1	1 1/4″	1 11/16″
CMC-22	4586-97A	1	1 3/8″	1 25/32″
CMC-24	4586-97B	1	1 1/2″	1 15/16″
CMC-28	4586-97C	1	1 3/4″	2 3/16″
CMC-28A	4-36-14M	2	1 3/4″	2 3/16″
CMC-32	4586-48	2	2″	2 1/2″
CMC-33	4586-2B	2	2 1/16″	2 9/16″
CMC-40	4586-1	2	2 1/2″	3″
CMC-41	4586-2D	2	2 9/16″	3 1/16″
CMC-48	4586-2	2	3″	3 1/2″
CMC-49	4586-2A	2	3 1/16″	3 9/16″

HORIZONTAL MOUNTING CLIPS FOR CYLINDRICAL CAPACITORS

Old Cat. No.	New Cat. No.	Fig. No.	D
UMC-6	36-520N	3	3/8″
UMC-8	36-520J	3	1/2″
UMC-10	36-520K	3	5/8″
UMC-12	36-520L	3	3/4″
UMC-14	36-520M	3	7/8″
UMC-16	36-520G	3	1″
UMC-22	36-520H	3	1 3/8″

VERTICAL MOUNTING CLAMPS FOR RECTANGULAR CAPACITORS

Old Cat. No.	New Cat. No.	Fig. No.	T	W	M
RMC-17	36-627	4	1 1/16″	1 13/16″	2 1/4″
RMC-19	36-627A	4	1 3/16″	2 1/2″	3″
RMC-20	36-627B	4	1 1/4″	3 3/4″	4 3/8″
RMC-28	36-627C	4	1 3/4″	3 3/4″	4 3/8″
RMC-36	36-627D	4	2 1/4″	3 3/4″	4 3/8″
RMC-38	3-36-120	4	2 9/32″	2 31/32″	4 3/8″
RMC-40	36-627E	4	2 1/2″	3 3/4″	4 3/8″
RMC-45	3-36-119	4	2 27/32″	4 9/16″	4 3/8″
RMC-73	36-627Y	4	3 3/4″	4 9/16″	4 3/8″

MOUNTING STRAPS FOR TUBULAR COMPONENTS

Old Cat. No.	New Cat. No.	Fig. No.	D	Old Cat. No.	New Cat. No.	Fig. No.	D
TMS-4	36-68T	5	1/4″	TMS-14	36-59J	5	7/8″
TMS-5	36-59	5	5/16″	TMS-15	36-59K	5	15/16″
TMS-6	36-59A	5	3/8″	TMS-16	36-59L	5	1″
TMS-7	36-59B	5	7/16″	TMS-17	36-59M	5	1 1/16″
TMS-8	36-59C	5	1/2″	TMS-18	36-59N	5	1 1/8″
TMS-9	36-69D	5	9/16″	TMS-19	36-59P	5	1 3/16″
TMS-10	36-69E	5	5/8″	TMS-20	36-59R	5	1 1/4″
TMS-11	36-69F	5	11/16″	TMS-21	36-59S	5	1 5/16″
TMS-12	36-69G	5	3/4″	TMS-22	36-59T	5	1 3/8″
TMS-13	36-69H	5	13/16″				

KRAFTBOARD INSULATING TUBES

Tightly-fitting closed-top black Kraft. For "above-ground" use with can-type capacitors.

Old Cat. No.	New Cat. No.	Description	Old Cat. No.	New Cat. No.	Description
HKT-1	407-57A	For 1″ x 2″ can	HKT-7	407-57E	For 1 3/8″ x 3″ can
HKT-2	407-57N	For 1″ x 2 1/2″ can	HKT-8	407-57Z	For 1 3/8″ x 3 1/2″ can
HKT-3	407-57D	For 1″ x 3″ can	HKT-9	407-174C	For 1 3/8″ x 4″ can
HKT-4	407-174E	For 1″ x 4″ can	HKT-10	407-174P	For 1 3/8″ x 4 1/2″ can
HKT-5	407-57B	For 1 3/8″ x 2″ can	HKT-12	407-57	For 3/4″ x 2″ can
HKT-6	407-57R	For 1 3/8″ x 2 1/2″ can	HKT-14	407-57U	For 1″ x 3 1/2″ can

MOUNTING PLATES

For use with Twist-Lok® capacitors

Cat. No.	Description
36-17	Metal, for 1″ D. capacitor
36-18	Metal, for 1 3/8″ D. capacitor
36-19	Phenolic, for 3/4″ D. capacitor
36-20	Phenolic, for 1″ D. capacitor
36-21	Phenolic, for 1 3/8″ D. capacitor

PRINTED WIRING BOARD ADAPTERS

Used on terminals and lugs of twist-prong-type units so that capacitors may be mounted on printed boards. Eight adapters per package, complete with instructions.

Package of 8....Cat. No. PC-8

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IND-EEM-68-EFAI

Sizes subject to change without notice.

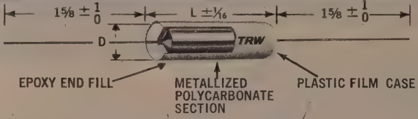
TRW® CAPACITORS

METALLIZED POLYCARBONATE

DIELECTRIC
TYPE X463UW CAPACITORS
ULTRA-MINIATURE — FULL RATED

X463UW

- Fully Rated from −55°C to +125°C
- Low Capacitance Change With Temperature — Less Than 1½% from −55°C thru +125°C



Lead Gauge: 24 AWG 9/16 Length and Less
22 AWG 11/16 Through 13/16 Length
20 AWG 1 Through 1½ Length
18 AWG 1 13/16 Length and Greater

Dimensional Tolerances: Note: Diameters given in table below are nominal.

For Max. Dia. add the following:
.000 Thru .250 Dia. +.031
.251 Thru .350 Dia. +.047
.351 Thru .450 Dia. +.062
.451 Thru .550 Dia. +.094
.551 Thru .650 Dia. +.125
.651 Thru .750 Dia. +.156
.751 And Above Dia. +.188

Length: ±1/16

SPECIFICATIONS

Insulation Resistance: Minimum values according to Table I.

TABLE I

Temperature	+25°C	+85°C	+125°C
Megohms X Microfarads	60,000	6,000	600
Need Not Exceed (Megohms)	200,000	50,000	5,000

Measured after 2 minutes electrification at rated voltage.

Dissipation Factor: Less than 0.3% at 25°C when measured at or referred to 1000 ±20 Hz for capacitance values up to and including 10 mfd.

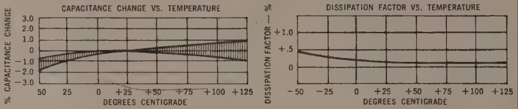
Dielectric Strength: Twice rated voltage for one minute through a limiting resistance of 100 ohms/volt.

Temperature Range: −55°C to +125°C with no voltage derating.

Humidity Resistance: No more than one failure allowed of 12 units tested when tested as outlined in MIL-STD-202C, Method 103B, Condition B, with 100 volts or rated voltage applied, whichever is less.

For Film-Foil Polycarbonate TRW Type 463UW is Available

TYPICAL CHARACTERISTIC CURVES



DIMENSIONS

CAP. IN MFDS.	50 VOLT D.C.			100 VOLT D.C.			200 VOLT D.C.			400 VOLT D.C.		
	D		L	D		L	D		L	D		L
.001	.156	x	7/16	.156	x	7/16	.156	x	7/16	.156	x	7/16
.0012	.156	x	7/16	.156	x	7/16	.156	x	7/16	.156	x	7/16
.0015	.156	x	7/16	.156	x	7/16	.156	x	7/16	.156	x	7/16
.0018	.156	x	7/16	.156	x	7/16	.156	x	7/16	.156	x	7/16
.0022	.156	x	7/16	.156	x	7/16	.156	x	7/16	.156	x	7/16
.0027	.156	x	7/16	.156	x	7/16	.156	x	7/16	.156	x	7/16
.0033	.156	x	7/16	.156	x	7/16	.156	x	7/16	.188	x	7/16
.0039	.156	x	7/16	.156	x	7/16	.156	x	7/16	.188	x	7/16
.0047	.156	x	7/16	.156	x	7/16	.156	x	7/16	.203	x	7/16
.0056	.156	x	7/16	.156	x	7/16	.156	x	7/16	.219	x	7/16
.0068	.156	x	7/16	.156	x	7/16	.156	x	7/16	.219	x	7/16
.0082	.156	x	7/16	.156	x	7/16	.156	x	7/16	.203	x	9/16
.010	.156	x	7/16	.156	x	7/16	.172	x	7/16	.219	x	9/16
.012	.156	x	7/16	.156	x	7/16	.188	x	7/16	.234	x	9/16
.015	.156	x	7/16	.156	x	7/16	.203	x	7/16	.250	x	9/16
.018	.156	x	7/16	.156	x	7/16	.219	x	7/16	.266	x	9/16
.022	.156	x	7/16	.156	x	7/16	.234	x	7/16	.297	x	9/16
.027	.156	x	7/16	.156	x	7/16	.250	x	7/16	.250	x	11/16
.033	.156	x	7/16	.172	x	7/16	.266	x	7/16	.297	x	11/16
.039	.156	x	7/16	.188	x	7/16	.219	x	9/16	.312	x	11/16
.047	.156	x	7/16	.203	x	7/16	.234	x	9/16	.328	x	11/16
.056	.156	x	7/16	.219	x	7/16	.250	x	9/16	.359	x	11/16
.068	.172	x	7/16	.234	x	7/16	.266	x	9/16	.328	x	13/16
.082	.188	x	7/16	.187	x	9/16	.297	x	9/16	.359	x	13/16
.10	.203	x	7/16	.203	x	9/16	.250	x	11/16	.391	x	13/16
.12	.219	x	7/16	.219	x	9/16	.266	x	11/16	.438	x	13/16
.15	.219	x	7/16	.234	x	9/16	.297	x	11/16	.438	x	1
.18	.234	x	7/16	.250	x	9/16	.328	x	11/16	.469	x	1
.22	.203	x	9/16	.266	x	9/16	.344	x	11/16	.516	x	1
.27	.203	x	9/16	.281	x	11/16	.344	x	13/16	.562	x	1
.33	.219	x	9/16	.312	x	11/16	.359	x	13/16	.547	x	1¼
.39	.234	x	9/16	.328	x	11/16	.391	x	13/16	.594	x	1¼
.47	.250	x	9/16	.359	x	11/16	.421	x	13/16	.641	x	1¼
.56	.266	x	9/16	.375	x	11/16	.421	x	1	.625	x	1½
.68	.266	x	11/16	.344	x	13/16	.453	x	1	.672	x	1½
.82	.281	x	11/16	.359	x	13/16	.484	x	1	.750	x	1½
1.00	.312	x	11/16	.391	x	13/16	.531	x	1	.718	x	1 13/16
1.25	.328	x	11/16	.422	x	13/16	.500	x	1¼	.812	x	1 13/16
1.50	.359	x	11/16	.453	x	13/16	.547	x	1¼	.906	x	1 13/16
1.80	.344	x	13/16	.453	x	1	.594	x	1¼	.984	x	1 13/16
2.00	.344	x	13/16	.500	x	1	.625	x	1¼	.875	x	2 5/16
3.00	.406	x	13/16	.547	x	1¼	.656	x	1½	1.062	x	2 5/16
4.00	.453	x	13/16	.625	x	1¼	.750	x	1½	—		—
5.00	.469	x	1	.593	x	1½	.750	x	1 13/16	—		—
8.00	.500	x	1¼	.641	x	1 13/16	.828	x	2 5/16	—		—
10.00	.547	x	1¼	.703	x	1 13/16	.922	x	2 5/16	—		—

TRW® *CAPACITORS • 301 WEST O ST, OGALLALA, NEBRASKA 69153 • PHONE: 308-284-3611 • TWX: 910-620-0321*

TRW® CAPACITORS

METALLIZED POLYCARBONATE

DIELECTRIC
TYPE X440 CAPACITORS
MICRO-MINIATURE — LIGHT WEIGHT

X440

- **Minimum Possible Size — Lightweight**
- **Very Low Temperature Coefficient**
- **Fully Rated from −55°C to +125°C**
- **High Insulation Resistance**

.0047 MFD .056 MFD .1 MFD

ACTUAL SIZE

SPECIFICATIONS

Voltage Rating: 50 VDC from −55°C to +125°C.

Insulation Resistance: Greater than 500,000 megohms @ 25°C. Typical change of IR vs. Temp. is shown in the curve.

Dissipation Factor: Less than .3% at 1K Hz @ 25°C.

Capacitance Change with Temperature: a. Between 0°C and 125°C, as referenced to 25°C, capacity change will not exceed +½ −1½%.
b. TC of capacitance characteristic is 0 +50 −150 PPM/°C between 0°C and 125°C.

Dielectric Strength: 200% of rated voltage applied for 2 minutes through limiting resistance of 100 ohm/volt.

Life Test: Tested in accordance with Mil-C-27287, 250 hrs., 125°C @ 1.4 RV. IR greater than 70% of original requirement, DF less than .3%, cap. change less than 1%.

Humidity Resistance: Tested in accordance with Mil-C-27287, 40°C, 95% RH, 240 hours. IR greater than 10 gigaohms @ 25°C. DF less than .3%.

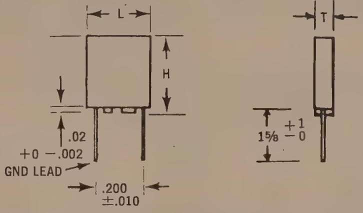
Lead Pull Test: 5 lbs. in any direction.

Construction: Metallized polycarbonate dielectric, non-inductive winding. Epoxy case with standoffs.

Leads: 24 gauge tinned solid wire on .2″ centers.

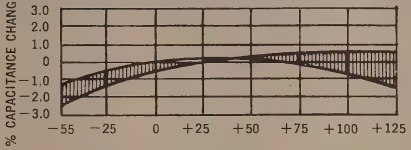
The X440 has been specifically designed to be a real help in the ever increasing problem of fitting components in today's miniaturized designs. Its absolute minimum size (precision dimensions and the close tolerance lead spacing permit space savings impossible before). Additionally, the highly superior electrical properties of polycarbonate are of immense value in modern high performance circuitry.

Standoffs on the bottom of the premolded case provide for rigid, secure mounting and facilitate cleaning of the printed circuit boards. Leads are uniformly and accurately spaced on .200″ centers.

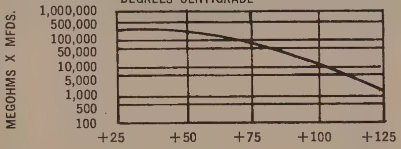


TYPICAL CHARACTERISTIC CURVES

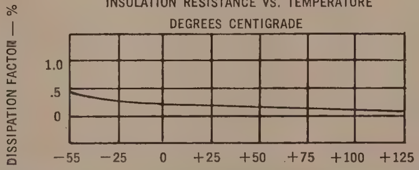
CAPACITANCE CHANGE VS. TEMPERATURE
DEGREES CENTIGRADE



INSULATION RESISTANCE VS. TEMPERATURE
DEGREES CENTIGRADE



INSULATION RESISTANCE VS. TEMPERATURE
DEGREES CENTIGRADE



DIMENSIONS

	50 VDC		
CAP IN MFDS.	**T ±.005**	**H ±.005**	**L ±.005**
.001	.095	.245	.290
.0012	.095	.245	.290
.0015	.095	.245	.290
.0018	.095	.245	.290
.0022	.095	.245	.290
.0027	.095	.245	.290
.0033	.095	.245	.290
.0039	.095	.245	.290
.0047	.095	.245	.290
.0056	.095	.320	.290
.0068	.095	.320	.290
.0082	.095	.320	.290

	50 VDC		
CAP IN MFDS.	**T ±.005**	**H ±.005**	**L ±.005**
.010	.095	.320	.290
.012	.095	.320	.290
.015	.095	.320	.290
.018	.095	.320	.290
.022	.095	.320	.290
.027	.095	.320	.290
.033	.095	.320	.290
.039	.095	.320	.290
.047	.095	.320	.290
.056	.095	.320	.290
.068	.145	.320	.290
.082	.145	.320	.290
.10	.145	.320	.290

TRW® CAPACITORS

METALLIZED POLYCARBONATE

DIELECTRIC
TYPE X482 - X483 CAPACITORS
HERMETICALLY SEALED — SUB-MINIATURE

X482
X483

- Fully Rated to 125°C
- Excellent Stability
- High Insulation Resistance
- Tolerances to ±1%

SPECIFICATIONS

Insulation Resistance: Minimum values according to Table I.

TABLE I

Temperature	+25°C	+85°C	+125°C
Megohms X Microfarads	100,000	15,000	1,000
Need Not Exceed (Megohms)	200,000	30,000	2,000

Measured after 2 minutes electrification at rated voltage.

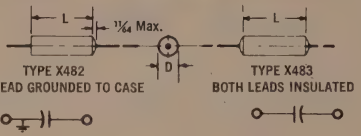
Dissipation Factor: Less than 0.30% when measured at or referred to 1000 ±20 Hz for capacitance values up to and including 10 MFD at 25 ±5°C.

Environmental Properties: Temperature and Immersion Cycling, Vibration, Moisture Resistance, and Shock to meet requirements of Mil-C-18312.

Tempeature Range: −55°C to 125°C with full rated voltage.

Dielectric Strength: Twice rated voltage (Terminal-to-Terminal) and Terminal-to-Case where case is not a terminal for 1 minute through a minimum resistance of 100 ohms/volt.

FOR FILM FOIL CONSTRUCTION TRW TYPE 482-483 IS AVAILABLE

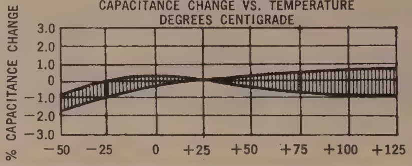


Dimensional Tolerances: Diameter: +.015 −.005. Length: ±.031. Standard lead length 1 5/8 +1, −0.

Lead Gauge: 24 AWG .195 Diameter & Less
22 AWG .235 and .312 Diameter
20 AWG .400 Diameter & Greater

Insulated Cases: For insulated case sizes (Polyester Sleeve) add 1/16″ to unit length and .020 to diameter. Tolerance on unit size (with insulated sleeve) is as follows: Diameter ±.015 — Length ±.062

TYPICAL CHARACTERISTIC CURVE
CAPACITANCE CHANGE VS. TEMPERATURE
DEGREES CENTIGRADE



X483 DIMENSIONS

For Type X482 Sizes subtract 1/16″ from X483 Length.

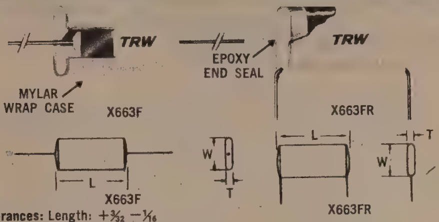
CAP. IN MFDS.	50 VOLT D.C. D	x	L	100 VOLT D.C. D	x	L	200 VOLT D.C. D	x	L	400 VOLT D.C. D	x	L
.0010	.175	x	9/16	.175	x	9/16	.175	x	9/16	.235	x	5/8
.0012	.175	x	9/16	.175	x	9/16	.175	x	9/16	.235	x	5/8
.0015	.175	x	9/16	.175	x	9/16	.175	x	9/16	.235	x	5/8
.0018	.175	x	9/16	.175	x	9/16	.175	x	9/16	.235	x	5/8
.0022	.175	x	9/16	.175	x	9/16	.175	x	9/16	.235	x	5/8
.0027	.175	x	9/16	.175	x	9/16	.175	x	9/16	.235	x	5/8
.0033	.175	x	9/16	.175	x	9/16	.175	x	9/16	.235	x	5/8
.0039	.175	x	9/16	.175	x	9/16	.175	x	9/16	.235	x	5/8
.0047	.175	x	9/16	.175	x	9/16	.175	x	9/16	.235	x	5/8
.0056	.175	x	9/16	.175	x	9/16	.175	x	9/16	.235	x	5/8
.0068	.175	x	9/16	.175	x	9/16	.175	x	9/16	.235	x	5/8
.0082	.175	x	9/16	.175	x	9/16	.175	x	9/16	.235	x	5/8
.010	.175	x	9/16	.175	x	9/16	.175	x	5/8	.235	x	11/16
.012	.175	x	9/16	.175	x	9/16	.175	x	5/8	.235	x	13/16
.015	.175	x	9/16	.175	x	9/16	.175	x	5/8	.235	x	13/16
.018	.175	x	9/16	.175	x	9/16	.195	x	5/8	.235	x	13/16
.022	.175	x	9/16	.175	x	9/16	.195	x	5/8	.312	x	11/16
.027	.175	x	9/16	.175	x	5/8	.235	x	5/8	.312	x	13/16
.033	.175	x	9/16	.175	x	5/8	.235	x	5/8	.312	x	13/16
.039	.175	x	9/16	.175	x	5/8	.235	x	11/16	.312	x	15/16
.047	.175	x	9/16	.195	x	5/8	.235	x	11/16	.400	x	13/16
.056	.175	x	9/16	.195	x	5/8	.312	x	5/8	.400	x	13/16
.068	.175	x	5/8	.235	x	5/8	.312	x	5/8	.400	x	15/16
.082	.175	x	5/8	.235	x	5/8	.312	x	11/16	.400	x	15/16
.10	.175	x	5/8	.235	x	11/16	.312	x	11/16	.400	x	1 1/16
.12	.175	x	5/8	.235	x	11/16	.312	x	13/16	.400	x	1 5/16
.15	.195	x	5/8	.312	x	5/8	.312	x	13/16	.400	x	1 5/16
.18	.195	x	5/8	.312	x	5/8	.400	x	11/16	.562	x	1 1/16
.22	.235	x	5/8	.312	x	11/16	.400	x	13/16	.562	x	1 1/16
.27	.235	x	5/8	.312	x	11/16	.400	x	13/16	.562	x	1 5/16
.33	.312	x	5/8	.312	x	13/16	.400	x	15/16	.562	x	1 9/16
.39	.312	x	5/8	.312	x	13/16	.400	x	1 1/16	.562	x	1 9/16
.47	.312	x	5/8	.400	x	11/16	.400	x	1 1/16	.562	x	1 13/16
.56	.312	x	5/8	.400	x	13/16	.500	x	1 1/16	.670	x	1 9/16
.68	.312	x	13/16	.400	x	13/16	.500	x	1 1/16	.670	x	1 13/16
.82	.312	x	13/16	.400	x	15/16	.562	x	1 1/16	.750	x	1 13/16
1.0	.312	x	15/16	.400	x	1 1/16	.562	x	1 5/16	.750	x	2 1/16
1.25	.400	x	13/16	.400	x	1 1/16	.562	x	1 5/16	.750	x	2 5/16
1.50	.400	x	13/16	.500	x	1 1/16	.562	x	1 9/16	1.000	x	1 13/16
2.00	.400	x	15/16	.562	x	1 1/16	.670	x	1 9/16	1.000	x	2 1/16
3.00	.400	x	1 1/16	.562	x	1 5/16	.670	x	1 13/16	—		—
4.00	.500	x	1 1/16	.562	x	1 9/16	.750	x	1 13/16	—		—
5.00	.562	x	1 1/16	.670	x	1 5/16	.750	x	2 5/16	—		—
8.00	.562	x	1 5/16	.750	x	1 13/16	1.000	x	2 1/16	—		—
10.00	.670	x	1 5/16	.750	x	2 1/16	1.000	x	2 9/16	—		—

TRW® CAPACITORS

METALLIZED MYLAR* DIELECTRIC TYPE X663F - X663FR CAPACITORS FLAT FOR PREMIUM SPACE SAVINGS

X663F
X663FR

- High Insulation Resistance
- Self-healing
- Long Stable Life
- Axial or Radial Leads



SPECIFICATIONS

Insulation Resistance: Minimum values according to Table I.

TABLE I

Temperature	+25°C	+85°C	+125°C
Megohms X Microfarads	30,000	3,000	50
Need Not Exceed (Megohms)	30,000	3,000	50

Measured after 2 minutes electrification at rated voltage.

Dissipation Factor: Less than 1.0%, when measured at or referred to 1,000 ±20 Hz, for cap. values up to and including 1.0 mfd at 25 ±5°C. Except for units having a T. Dim. of .171 or less the D.F. shall not exceed 1.5%. Cap. values greater than 1.0 mfd measured at 60 ±6 Hz.

Temperature Range: −55°C to 100°; to +125°C with 50% derating; 50 volt capacitors full rated to 125°C.

Humidity Resistance: These designs comply with test requirements as outlined in MIL-STD-202C, method 103B, Condition B. IR no less than ⅓ minimum values listed in Table I.

Dielectric Strength: Twice rated voltage for one minute through a limiting resistance of 100 ohms/volt.

Capacitance Tolerance: Standard tolerance ±20%; also available in ±10%, and ±5%.

Tolerances: Length: +3/32 −1/16

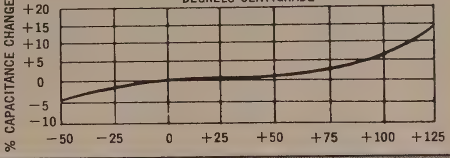
Thickness or width: ±.031 up thru .218
±.046 on .219 thru .500
±.062 on .501 and greater

Lead Gauge: 24 AWG up to .203 thick.
22 AWG .204 thru .265 thick
20 AWG .266 thru .546 thick
18 AWG .547 thick and greater

Lead Spacing (X663FR Only): Center line to center line distance between leads shall equal nominal length of the capacitor plus 3/32 ±1/16 when measured .062 below body line.

Lead Length: Type X663F — 1⅝ +1, −0
Type X663FR — 1″ min.

TYPICAL CHARACTERISTIC CURVE
CAPACITANCE CHANGE VS. TEMPERATURE
DEGREES CENTIGRADE



DIMENSIONS

CAP. IN MFDS.	50 WVDC (To 125°C)			100 & 200 VOLTS			400 VOLTS			600 VOLTS		
	T	W	L	T	W	L	T	W	L	T	W	L
.01	(For Capacitance values smaller than .027 mf use 100 volt parts)			.125 x	.187 x	7/16	.140 x	.265 x	11/16	.187 x	.296 x	11/16
.012				.140 x	.203 x	7/16	.156 x	.281 x	11/16	.203 x	.328 x	11/16
.015				.140 x	.218 x	7/16	.171 x	.296 x	11/16	.218 x	.343 x	11/16
.018				.156 x	.234 x	7/16	.187 x	.312 x	11/16	.234 x	.406 x	11/16
.022				.171 x	.250 x	7/16	.203 x	.312 x	11/16	.250 x	.453 x	11/16
.027	.093 x	.187 x	7/16	.187 x	.250 x	7/16	.234 x	.343 x	11/16	.265 x	.468 x	11/16
.033	.109 x	.187 x	7/16	.187 x	.265 x	7/16	.250 x	.375 x	11/16	.296 x	.500 x	11/16
.039	.125 x	.203 x	7/16	.140 x	.250 x	9/16	.218 x	.296 x	15/16	.218 x	.406 x	15/16
.047	.140 x	.218 x	7/16	.156 x	.265 x	9/16	.218 x	.328 x	15/16	.234 x	.437 x	15/16
.056	.156 x	.234 x	7/16	.171 x	.281 x	9/16	.234 x	.375 x	15/16	.281 x	.484 x	15/16
.068	.156 x	.250 x	7/16	.187 x	.296 x	9/16	.234 x	.421 x	15/16	.312 x	.531 x	15/16
.082	.140 x	.265 x	9/16	.203 x	.312 x	9/16	.265 x	.453 x	15/16	.343 x	.562 x	15/16
.1	.156 x	.265 x	9/16	.218 x	.328 x	9/16	.296 x	.484 x	15/16	.375 x	.593 x	15/16
.12	.171 x	.296 x	9/16	.250 x	.359 x	9/16	.312 x	.531 x	15/16	.312 x	.562 x	1¼
.15	.187 x	.312 x	9/16	.265 x	.390 x	9/16	.343 x	.562 x	15/16	.343 x	.609 x	1¼
.18	.203 x	.328 x	9/16	.218 x	.343 x	11/16	.281 x	.531 x	1¼	.406 x	.656 x	1¼
.22	.140 x	.265 x	11/16	.234 x	.375 x	11/16	.296 x	.562 x	1¼	.453 x	.703 x	1¼
.27	.156 x	.281 x	11/16	.265 x	.421 x	11/16	.343 x	.546 x	1½	.484 x	.781 x	1¼
.33	.187 x	.312 x	11/16	.281 x	.468 x	11/16	.359 x	.593 x	1½	.515 x	.828 x	1½
.39	.203 x	.328 x	11/16	.312 x	.484 x	11/16	.390 x	.671 x	1½	.515 x	.859 x	1½
.47	.218 x	.328 x	11/16	.343 x	.515 x	11/16	.406 x	.718 x	1½	.515 x	.890 x	1½
.56	.250 x	.343 x	11/16	.312 x	.484 x	15/16	.406 x	.812 x	1½	.609 x	.968 x	1½
.68	.265 x	.375 x	11/16	.328 x	.515 x	15/16	.421 x	.890 x	1½	.671 x	1.031 x	1½
.82	.218 x	.390 x	13/16	.359 x	.562 x	15/16	.500 x	.781 x	1¾	.625 x	1.093 x	1¾
1.00	.234 x	.406 x	13/16	.390 x	.578 x	15/16	.515 x	.875 x	1¾	.671 x	1.187 x	1¾
1.25	.281 x	.484 x	13/16	.375 x	.531 x	1¼	.546 x	1.000 x	1¾	.781 x	1.281 x	1¾
1.50	.281 x	.484 x	15/16	.406 x	.578 x	1¼	.562 x	1.125 x	1¾	.859 x	1.375 x	1¾
1.80	.312 x	.515 x	15/16	.406 x	.656 x	1¼	.671 x	1.125 x	1¾	.968 x	1.468 x	1¾
2.00	.328 x	.531 x	15/16	.406 x	.718 x	1¼	.765 x	1.125 x	1¾	1.032 x	1.515 x	1¾
3.00	.359 x	.562 x	1¼	.453 x	.765 x	1½	.875 x	1.406 x	1¾	—	—	—
4.00	.328 x	.656 x	1½	.500 x	.890 x	1½	—	—	—	—	—	—
5.00	.390 x	.703 x	1½	.515 x	.906 x	1¾	—	—	—	—	—	—
8.00	.437 x	.843 x	1¾	.687 x	1.187 x	1 13/16	—	—	—	—	—	—
10.00	.515 x	.921 x	1¾	.750 x	1.203 x	1 13/16	—	—	—	—	—	—

* DuPont's trademark for polyester film

TRW® CAPACITORS

METALLIZED MYLAR* & MYLAR* DIELECTRIC 601PE - X601PE

TYPE 601PE - 601CPE — X601PE - X601CPE CAPACITORS
SUB-MINIATURE IN A TOUGH RUGGED CASE

- **Dipped Epoxy Coating**

SPECIFICATIONS — 601PE - 601CPE

Insulation Resistance: Minimum values according to Table I.

TABLE I

Temperature	+25°C	+85°C	+125°C
Megohms X Microfarads	50,000	2,000	20
Need Not Exceed (Megohms)	100,000	5,000	100

Measured after 2 minutes electrification at 100 VDC or rated voltage, whichever is greater.

Dissipation Factor: Less than 1.0% when measured at or referred to 1000 ±20 Hz for capacitance values up to and including 1.0 mfd. at 25°C ±5°C. Capacitance values greater than 1.0 mfd. measured at 60 ±6 Hz.

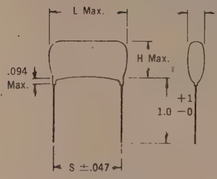
Dielectric Strength: Twice rated voltage for 1 minute through 100 ohms per volt limiting resistance.

Humidity Resistance: These designs comply with test requirements per MIL-STD-202C, method 103B, Condition B, no voltage applied. Minimum resistance after test, 15,000 megohms.

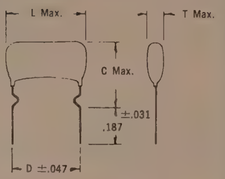
Capacitance Tolerance: Within specified tolerance when measured at 1000 ±20 Hz, 25 ±5°C (standard is 20%).

Temperature Range: May be operated at rated voltage from −55°C to +85°C. Derate to 50% when operating at 125°C.

X601PE & 601PE

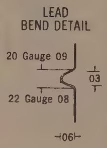


X601CPE & 601CPE



Lead Gauge

V.D.C.	#22 AWG TCW	#20 AWG TCW
35	.01 -.1	.15 -1.0
50	.001-.068	.10 -1.0
100	.001-.068	.10 -1.0
200	.001-.022	.033- .47
400	.001-.0068	.010- .22
600	.001-.0068	.010- .15



TYPES 601PE - 601CPE DIMENSIONS

	35 VOLTS					50 VOLTS					600 VOLTS				
CAP. IN MFDS.	Length A	Crimp Height B	Crimp Width D	Thick E	Height F	Length A	Crimp Height B	Crimp Width D	Thick E	Height F	Length A	Crimp Height B	Crimp Width D	Thick E	Height F
.001	—	—	—	—	—	.406	.450	.300	.156	.218	.593	.800	.400	.250	.562
.0015	—	—	—	—	—	.406	.500	.300	.156	.234	.593	.800	.400	.250	.562
.0022	—	—	—	—	—	.406	.500	.300	.187	.281	.593	.800	.400	.281	.562
.0033	—	—	—	—	—	.406	.550	.300	.187	.297	.593	.875	.400	.312	.625
.0047	—	—	—	—	—	.406	.550	.300	.187	.312	.593	.900	.400	.312	.656
.0068	—	—	—	—	—	.406	.550	.300	.203	.312	.718	.900	.400	.250	.656
.010	.406	.450	.300	.156	.218	.406	.600	.300	.203	.344	.718	.950	.400	.281	.687
.015	.406	.500	.300	.187	.250	.406	.600	.300	.203	.360	.718	.950	.400	.312	.718
.022	.406	.550	.300	.187	.312	.422	.650	.300	.203	.390	.718	1.000	.400	.343	.750
.033	.406	.600	.300	.187	.344	.531	.650	.300	.191	.406	.844	1.050	.600	.375	.812
.047	.406	.650	.300	.218	.406	.531	.700	.300	.203	.453	.844	1.100	.600	.406	.843
.068	.484	.750	.300	.218	.484	531	.781	.300	.218	.500	.968	1.200	.700	.406	.937
.10	.562	.750	.400	.250	.562	.650	.850	.400	.235	.525	1.093	1.250	.800	.468	1.000
.15	.562	.850	.400	.250	.609	.671	.900	.400	.260	.650	1.218	1.400	1.000	.531	1.156
.22	.718	.900	.400	.265	.668	.728	.900	.400	.306	.687	—	—	—	—	—
.33	.718	.900	.400	.297	.668	.812	.950	.500	.312	.750	—	—	—	—	—
.47	.844	.950	.600	.312	.734	.937	1.000	.700	.344	.781	—	—	—	—	—
.68	.844	1.000	.600	.344	.781	1.109	1.125	.800	.375	.906	—	—	—	—	—
1.0	.953	1.000	.700	.422	.797	1.109	1.250	.800	.438	1.000	—	—	—	—	—

Note: Also available in 100, 200, & 400 VDC.

TYPES X601PE - X601CPE DIMENSIONS

SPECIFICATIONS — X601PE - X601CPE

Insulation Resistance: Minimum values according to Table I.

TABLE I

Temperature	+25°C	+85°C	+125°C
Megohms X Microfarads	20,000	2,000	20
Need Not Exceed (Megohms)	30,000	5,000	50

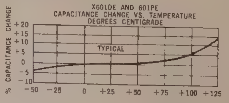
Measured after 2 minutes electrification at rated voltage.

Dissipation Factor: Less than 1.0% when measured at or referred to 1000 ±20 Hz for capacitance values up to and including 1.0 mfd. at 25°C ±5°C. Capacitance values greater than 1.0 mfd. measured at 60 ±6 Hz.

Dielectric Strength: Twice rated voltage for 1 minute through 100 ohms per volt limiting resistance.

Humidity Resistance: Tested as outlined in MIL-STD-202C, Method 103B, Condition B, no voltage applied. After final conditioning, IR no less than 1/3 minimum values listed in Table I.

Temperature Range: −55°C to 100°C, to 125°C with 50% derating.



	100 VOLTS D.C.					200 VOLTS D.C.				
CAP. IN MFDS.	Length A	Thick E	Height F	Crimp Height B	Crimp Width D	Length A	Thick E	Height F	Crimp Height B	Crimp Width D
.01	—	—	—	—	—	.375	.205	.287	.500	.300
.012	—	—	—	—	—	.375	.220	.303	.550	.300
.015	—	—	—	—	—	.375	.220	.318	.550	.300
.018	—	—	—	—	—	.375	.236	.350	.600	.300
.022	—	—	—	—	—	.375	.251	.365	.600	.300
.027	.375	.173	.287	.500	.300	.375	.267	.365	.600	.300
.033	.375	.189	.287	.500	.300	.375	.267	.381	.650	.300
.039	.375	.205	.303	.550	.300	.500	.220	.365	.600	.400
.047	.375	.236	.318	.550	.300	.500	.236	.381	.650	.400
.056	.375	.236	.350	.600	.300	.500	.251	.396	.650	.400
.068	.375	.236	.365	.600	.300	.500	.267	.412	.650	.400
.082	.500	.220	.381	.650	.400	.500	.283	.428	.700	.400
.1	.500	.236	.381	.650	.400	.500	.298	.443	.700	.400
.12	.500	.251	.412	.650	.400	.500	.345	.475	.750	.400
.15	.500	.267	.428	.700	.400	.500	.361	.506	.750	.400
.18	.500	.283	.443	.700	.400	.656	.214	.459	.700	.500
.22	.656	.220	.381	.650	.500	.656	.330	.490	.750	.500
.27	.656	.236	.397	.650	.500	.656	.361	.537	.800	.500
.33	.656	.267	.428	.700	.500	.656	.377	.584	.850	.500
.39	.656	.283	.443	.700	.500	.656	.408	.600	.850	.500
.47	.656	.298	.443	.700	.500	.656	.439	.646	.900	.500
.56	.656	.345	.459	.700	.500	.906	.408	.600	.850	.700
.68	.656	.361	.490	.750	.500	.906	.423	.646	.900	.700
.82	.781	.298	.506	.750	.600	.906	.455	.693	.950	.700
1.00	.781	.330	.522	.750	.600	.906	.486	.709	.950	.700
1.25	.781	.377	.600	.850	.600	1.156	.470	.662	CRIMPED LEADS NOT RECOMMENDED	
1.50	.906	.377	.600	.850	.700	1.156	.502	.709		
1.80	.906	.408	.646	.900	.700	1.156	.502	.787		
2.00	.906	.423	.662	.900	.700	1.156	.502	.850		
3.00	1.156	.455	.693	CRIMPED LEADS NOT RECOMMENDED		1.437	.549	.896		
4.00	1.437	.423	.787			1.437	.596	1.021		
5.00	1.437	.486	.834			1.687	.620	1.037		
8.00	1.687	.532	.974			1.687	.783	1.303		
10.00	1.687	.626	1.052			1.687	.861	1.334		

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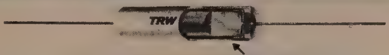
* DuPont's trademark for polyester film

TRW® CAPACITORS

METALLIZED MYLAR*

DIELECTRIC
TYPE X682 - X683 CAPACITORS
MINIATURE-METALLIZED MYLAR* —
HERMETICALLY SEALED

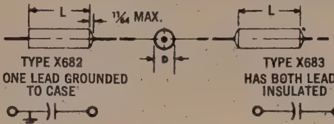
X682
X683



METALLIZED MYLAR

- Self Healing
- Long, Stable Life
- Military Grade
- Capacitance Values thru 12.0 mfd.
- Temperature Range −55°C thru +125°C (With Full Rated Voltage)
- High Insulation Resistance

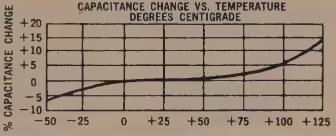
For insulated case styles 2 and 4, add .020 to diameter shown and change tolerance to +.032 −.036. Add .062 to length shown and change tolerance to ±.062.



Dimensional Tolerances: Diameter: +.015 −.005. Length: ±.062. Standard Lead Length 1⅝″ +1 −0

Lead Gauge: 24 AWG .195 and below case diameters
22 AWG .235 and .312 case diameters
20 AWG .400 and above case diameters

TYPICAL CHARACTERISTIC CURVE
CAPACITANCE CHANGE VS. TEMPERATURE
DEGREES CENTIGRADE



SPECIFICATIONS

Insulation Resistance: Greater than 25,000 megohm-microfarads at 25°C but the IR need not exceed 50,000 megohms.

Dissipation Factor: Less than 1% when measured at or referred to 1000 ±20 Hz for capacitance values up to and including 1.0 mfd at 25 ±5°C. Capacitors greater than 1.0 mfd measured at 60 ±6 Hz.

Temperature Range: Full rated voltage from −55°C to +125°C.

D-C Voltage Ratings: Standard ratings include 50, 200, 400 and 600 volts. Higher ratings are available on a special design basis.

Temperature and Immersion Cycling: Tested to paragraph 4.6.10 or MIL-C-18312 to meet paragraph 3.13 of same specification.

Moisture Resistance: Tested to paragraph 4.6.13 of MIL-C-18312 to meet paragraph 3.16 of same specification.

Construction: Non-inductive winding, metal enclosed, hermetically sealed.

X683
DIMENSIONS

Note: For type X682 dimensions (one lead grounded to case) subtract ¹⁄₁₆″ from type X683 length.

CAP. IN MFDS.	50 VOLT D.C. D	50 VOLT D.C. L	200 VOLT D.C. D	200 VOLT D.C. L	400 VOLT D.C. D	400 VOLT D.C. L	600 VOLT D.C. D	600 VOLT D.C. L
.010	.175 x	9/16	.175 x	9/16	.235 x	¾	.312 x	13/16
.012	.175 x	9/16	.175 x	9/16	.235 x	¾	.312 x	13/16
.015	.175 x	9/16	.195 x	9/16	.235 x	¾	.312 x	13/16
.018	.175 x	¾	.195 x	9/16	.235 x	¾	.312 x	13/16
.022	.175 x	¾	.195 x	¾	.235 x	¾	.312 x	13/16
.027	.175 x	¾	.235 x	¾	.312 x	13/16	.312 x	1⅛
.033	.175 x	¾	.235 x	¾	.312 x	13/16	.312 x	1⅛
.039	.195 x	¾	.235 x	¾	.312 x	1⅛	.400 x	1⅛
.047	.195 x	¾	.235 x	¾	.312 x	1⅛	.400 x	1⅛
.056	.235 x	¾	.312 x	27/32	.400 x	1⅛	.400 x	1⅛
.068	.235 x	¾	.312 x	27/32	.400 x	1⅛	.400 x	1⅛
.082	.235 x	¾	.312 x	27/32	.400 x	1⅛	.500 x	1⅛
.10	.235 x	¾	.312 x	27/32	.400 x	1⅛	.500 x	1⅛
.12	.235 x	⅞	.312 x	1⅛	.500 x	1⅛	.562 x	1⅛
.15	.235 x	⅞	.312 x	1⅛	.500 x	1⅛	.562 x	1⅛
.18	.312 x	⅞	.312 x	1⅛	.562 x	1⅛	.562 x	1⅜
.22	.312 x	⅞	.312 x	1⅛	.562 x	1⅛	.562 x	1⅜
.27	.312 x	⅞	.400 x	1⅛	.562 x	1⅜	.562 x	1⅝
.33	.312 x	⅞	.400 x	1⅛	.562 x	1⅜	.562 x	1⅝
.39	.312 x	1⅛	.400 x	1⅛	.562 x	1⅝	.670 x	1⅝
.47	.312 x	1⅛	.400 x	1⅛	.562 x	1⅝	.670 x	1⅝
.56	.400 x	1⅛	.500 x	1⅛	.670 x	1⅝	.750 x	1⅞
.68	.400 x	1⅛	.500 x	1⅛	.670 x	1⅝	.750 x	1⅞
.82	.400 x	1⅛	.562 x	1⅛	.750 x	1⅞	1.000 x	1 27/32
1.00	.400 x	1⅛	.562 x	1⅛	.750 x	1⅞	1.000 x	1 27/32
1.50	.500 x	1⅛	.562 x	1 27/32	1.000 x	1⅞	1.000 x	1⅞
2.20	.562 x	1⅛	.562 x	1 27/32	1.000 x	1⅞	1.000 x	2⅝
2.70	.562 x	1⅜	.670 x	1⅞	1.000 x	2⅝	—	—
3.30	.562 x	1⅜	.670 x	1⅞	1.000 x	2⅝	—	—
3.90	.562 x	1⅝	.750 x	1⅞	—	—	—	—
4.70	.562 x	1⅞	1.000 x	1⅞	—	—	—	—
5.60	.670 x	1⅝	1.000 x	1⅞	—	—	—	—
6.80	.670 x	1⅞	1.000 x	1⅞	—	—	—	—
8.20	.750 x	1⅞	1.000 x	2⅜	—	—	—	—
10.00	.750 x	1⅞	1.000 x	2⅜	—	—	—	—
12.00	.750 x	2⅜	1.000 x	2⅝	—	—	—	—

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* DuPont's trademark for polyester film

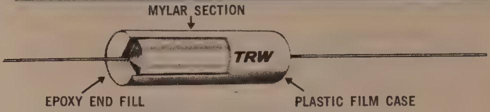
OTHER TRW METAL ENCLOSED— HERMETICALLY SEALED MYLAR* CAPACITORS AVAILABLE

- TRW TYPE 616-617
- TRW TYPE 612-613
- TRW TYPE 682-683
- TRW TYPE 692-693 (CQ TYPES)

CONTACT FACTORY FOR CONSTRUCTION & DESIGN CHARACTERISTICS

TRW® CAPACITORS

MYLAR*
DIELECTRIC
TYPE 663UW CAPACITORS
LONG LIFE RELIABILITY—TAPE WRAPPED CASE
663UW



- **For Maximum Space Saving**
- **"Instrument" Quality**
- **Tough, Moisture Resisting Case**
- **Tolerance to ±1%**

Lead Gauge: 24 AWG all diameters, up to and including .250.
22 AWG all diameters, .251 thru .438.
20 AWG all diameters, .439 thru .749.
18 AWG all diameters, .750 and greater.

SPECIFICATIONS

Dissipation Factor: Less than 1.0% when measured at or referred to 1000 ±20 Hz for capacitance values up to and including 1.0 mfd. at 25°C ±5°C. Capacitance values greater than 1.0 mfd. measured at 60 ±6 Hz.

Insulation Resistance: Greater than 70,000 megohm-microfarads at 25°C, but the IR need not exceed 140,000 megohms. See separate curve for figures at higher temperatures.

Dielectric Strength: 2 times rated voltage for one minute through a limiting resistance of 100 ohms/volt.

Humidity Resistance: Will meet or exceed requirements of MIL-C-27287, Paragraph 3.12, when tested in accordance with MIL-Std.-202C, Method 103B, Condition B.

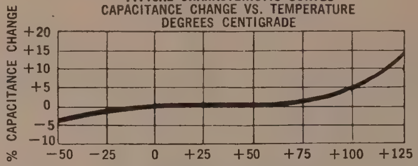
Temperature Range: May be operated at rated voltage from −55°C to +85°C and to +125°C with 50% derating.

Length Tolerance: +3/32, −1/16—Standard lead length 1⅝ +1 −0.

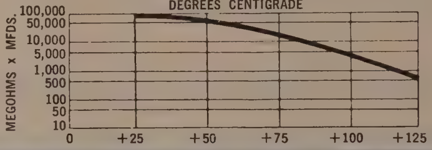
Diameter Tolerances: .218 and under ±.031
.219 to .500 ±.046
.501 and over ±.062

TYPICAL CHARACTERISTIC CURVES

CAPACITANCE CHANGE VS. TEMPERATURE
DEGREES CENTIGRADE



INSULATION RESISTANCE VS. TEMPERATURE
DEGREES CENTIGRADE



DIMENSIONS

CAP. IN MFD.	100 VOLTS	200 VOLTS	400 VOLTS	600 VOLTS	1000 VOLTS
	D L	D L	D L	D L	D L
.001	.156 x ½	.156 x ½	.156 x ⅝	.156 x ¾	.218. x ¾
.0012	.156 x ½	.156 x ½	.156 x ⅝	.171 x ¾	.234 x ¾
.0015	.156 x ½	.156 x ½	.156 x ⅝	.171 x ¾	.234 x ¾
.0018	.156 x ½	.156 x ½	.156 x ⅝	.187 x ¾	.187 x ⅞
.0022	.156 x ½	.156 x ½	.156 x ⅝	.187 x ¾	.203 x ⅞
.0027	.156 x ½	.156 x ½	.156 x ⅝	.203 x ¾	.234 x ⅞
.0033	.156 x ½	.156 x ½	.156 x ⅝	.203 x ¾	.250 x ⅞
.0039	.156 x ½	.156 x ½	.171 x ⅝	.218 x ¾	.265 x ⅞
.0047	.156 x ½	.156 x ½	.187 x ⅝	.234 x ¾	.281 x ⅞
.0056	.156 x ½	.156 x ½	.203 x ⅝	.250 x ¾	.312 x ⅞
.0068	.156 x ½	.156 x ½	.218 x ⅝	.265 x ¾	.328 x ⅞
.0082	.156 x ½	.156 x ½	.234 x ⅝	.281 x ¾	.343 x ⅞
.01	.156 x ½	.171 x ½	.250 x ⅝	.312 x ¾	.375 x ⅞
.012	.171 x ½	.187 x ½	.281 x ⅝	.281 x ⅞	.328 x 1
.015	.187 x ½	.203 x ½	.296 x ⅝	.312 x ⅞	.359 x 1
.018	.187 x ⅝	.234 x ⅝	.281 x ¾	.343 x ⅞	.312 x 1⅛
.022	.203 x ⅝	.250 x ⅝	.312 x ¾	.375 x ⅞	.343 x 1⅛
.027	.218 x ⅝	.265 x ⅝	.281 x ⅞	.359 x 1	.406 x 1¼
.033	.218 x ⅝	.250 x ¾	.312 x ⅞	.406 x 1	.468 x 1¼
.039	.218 x ¾	.265 x ¾	.343 x ⅞	.437 x 1	.500 x 1¼
.047	.234 x ¾	.296 x ¾	.343 x ⅞	.453 x 1	.531 x 1¼
.056	.250 x ¾	.328 x ¾	.343 x 1	.500 x 1	.515 x 1½
.068	.265 x ¾	.343 x ¾	.375 x 1	.531 x 1	.562 x 1½
.082	.296 x ¾	.375 x ¾	.406 x 1	.515 x 1¼	.609 x 1½
.1	.281 x ⅞	.375 x ⅞	.421 x 1	.562 x 1⅜	.625 x 1½
.12	.296 x ⅞	.390 x ⅞	.468 x 1	.609 x 1⅜	.671 x 1½
.15	.328 x ⅞	.453 x ⅞	.468 x 1¼	.671 x 1⅜	.796 x 1½
.18	.296 x 1	.406 x 1⅛	.500 x 1⅜	.656 x 1⅝	.718 x 1¾
.22	.328 x 1	.432 x 1⅛	.546 x 1⅜	.718 x 1⅝	.796 x 1¾
.27	.375 x 1⅛	.453 x 1⅛	.609 x 1⅜	.781 x 1⅝	.859 x 1¾
.33	.438 x 1⅛	.500 x 1⅛	.593 x 1⅝	.765 x 2	.937 x 2
.39	.468 x 1⅛	.515 x 1¼	.625 x 1⅝	.812 x 2	1.015 x 2
.47	.468 x 1¼	.546 x 1¼	.671 x 1⅝	.859 x 2	1.109 x 2
.56	.515 x 1¼	.609 x 1⅜	.718 x 1¾	.937 x 2	1.062 x 2¼
.68	.562 x 1¼	.609 x 1⅝	.796 x 1¾	1.015 x 2	1.125 x 2¼
.82	.625 x 1¼	.640 x 1⅝	.812 x 1⅞	.953 x 2½	1.187 x 2⅝
1.00	.593 x 1½	.671 x 1¾	.812 x 2	1.125 x 2½	1.296 x 2⅝
1.25	.656 x 1½	.750 x 1¾	.906 x 2	1.234 x 2½	1.265 x 3
1.50	.718 x 1¾	.828 x 1¾	.921 x 2¼	1.234 x 3	1.359 x 3
1.80	.781 x 1¾	.828 x 1⅞	1.015 x 2¼	1.375 x 3	1.453 x 3
2.00	.812 x 1¾	.875 x 2	1.093 x 2¼	1.421 x 3	1.609 x 3

OTHER TRW MYLAR* TAPE WRAPPED CAPACITORS
TYPE 643UW (CTM) TYPE 663F & 663FR

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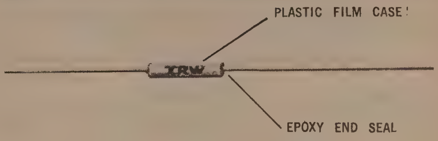
* DuPont's trademark for polyester film

TRW® CAPACITORS

MYLAR*
DIELECTRIC
TYPE 608 - 608T CAPACITORS
FOIL WOUND "MICROMINIATURE"
75% SMALLER THAN MIL-C-25
50% SMALLER THAN MIL-C-27287

608

- Exceptionally Small Size
- High Insulation Resistance
- Instrument Quality
- Tolerance to ±1%



SPECIFICATIONS

Insulation Resistance: Minimum values according to Table I.

TABLE I

Temperature	+25°C	+85°C	+125°C
Megohms X Microfarads	50,000	1,000	25
Need Not Exceed (Megohms)	100,000	10,000	250

Measured after 2 minutes electrification at rated voltage.

Dissipation Factor: Less than 1.0% when measured at or referred to 1000 ±20 Hz for capacitance values up to and including 1.0 mfd. at 25°C ±5°C. Capacitance values greater than 1.0 mfd. measured at 60 ±6 Hz.

Dielectric Strength: Twice rated voltage for one minute through a limiting resistance of 100 ohms/volt.

Humidity Resistance: Will exceed requirements of MIL-C-27287, Paragraph 3.12, when tested at 40°C for 240 hours.

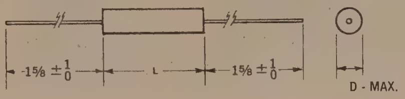
Temperature Range: May be operated at rated voltage from −55°C to +85°C and to 125°C with 50% derating.

Winding Construction: Extended foil (Non-inductive).

Capacitance Tolerances: ±20% ±10% ±5% ±1%.

NOTE: TYPE 608T

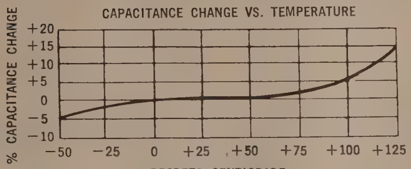
Available on request, 608T will meet all environmental requirements of MIL-C-27287.

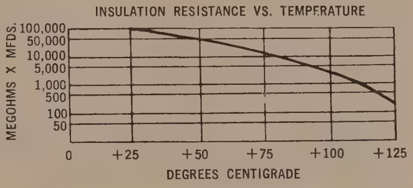


Dimensional Tolerances: Length: +.063 −.031
Standard lead length 1⅝ +1 −0.

Lead Gauge: 26 AWG .375 Length
24 AWG .531 thru .781 Length
22 AWG .937 thru 1.031 Length
20 AWG 1.188 thru 1.312 Length

TYPICAL CHARACTERISTIC CURVES





DIMENSIONS

CAP. IN MFDS.	50 VOLTS D - MAX.	50 VOLTS L	100 VOLTS D - MAX.	100 VOLTS L
.001	—	—	.111	.375
.0012	—	—	.111	.375
.0015	—	—	.118	.375
.0018	—	—	.125	.375
.0022	—	—	.125	.375
.0027	—	—	.132	.375
.0033	—	—	.132	.375
.0039	—	—	.139	.375
.0047	—	—	.139	.375
.0056	—	—	.151	.375
.0068	—	—	.151	.375
.0082	—	—	.158	.375
.010	—	—	.165	.375
.012	.171	.375	.185	.375
.015	.171	.375	.185	.375
.018	.203	.375	.206	.375
.022	.203	.375	.206	.375
.027	.218	.375	.245	.375
.033	.234	.375	.245	.375
.039	.250	.375	.282	.375
.047	.250	.375	.282	.375
.056	.296	.375	.312	.531
.068	.296	.375	.343	.531
.082	.343	.375	.375	.531
.10	.375	.375	.375	.531
.12	.375	.531	—	—
.15	.375	.531	—	—
.18	.375	.531	—	—
.22	.375	.531	—	—
.27	.437	.781	—	—
.33	.437	.781	—	—
.39	.468	.937	—	—
.47	.468	.937	—	—
.56	.515	1.031	—	—
.68	.515	1.031	—	—
.82	.562	1.188	—	—
1.00	.562	1.188	—	—
1.25	.671	1.188	—	—
1.50	.718	1.188	—	—
1.80	.750	1.312	—	—
2.00	.797	1.312	—	—

* DuPont's trademark for polyester film

TRW® CAPACITORS

- Superior performance in a smaller package
- Available to ±1% tolerance
- Exceeds all environmental requirements of MIL-C-25
- Ideally suited for transistor circuitry

This series is based on years of experience in the design and construction of mylar dielectric capacitors. In addition, the use of high reliability techniques in manufacturing processes result in a design capable of replacing MIL-C-25 type units with very substantial size and weight savings.

The inherent stability of mylar dielectric capacitors makes them an ideal choice where freedom from drift under continuous duty is required. This characteristic also lends itself well to close initial tolerance requirements.

HIGH RELIABILITY REQUIREMENTS

These designs are capable of being produced to high reliability specifications comparable to MIL-C-14157 and MIL-C-19978.

Such customer applications are handled on a "project" basis, and the amount of premium cost varies depending on the level of performance required and on the lot acceptance testing specified.

SPECIFICATIONS

Insulation Resistance: Greater than 40,000 megohm-microfarads at 25°C, but the IR need not exceed 100,000 megohms. See separate curve for figures at higher temperatures.

Dissipation Factor: Less than 1% when measured at or referred to 1000 ±20 Hz at 25 ±5°C.

Temperature Range: −55°C to +85°C; to +125° with 50% derating.

Moisture Resistance: Tested to paragraph 4.6.10 of MIL-C-25 or to paragraph 4.6.16 of MIL-C-19978.

Dielectric Strength: Twice rated voltage for one minute through limiting resistance of 100 ohms per volt.

Temperature and Immersion Cycling: These designs comply with test requirements of military specification MIL-C-25. Tested to paragraph 4.6.12 of MIL-C-19978.

Special Case Styles: Available in all case and mounting variations of MIL-C-25 tubular types CP04 through CP11.

Capacitance Tolerances: Standard tolerance ±20%; also available in ±10%, ±5% and ±1%.

Voltage Range: 100, 200, 300, 400 and 600 volts. Type 682-683 also available in 50 volt sizes.

Vibration: These capacitors will meet the vibration test of military specification MIL-C-25. Tested to paragraph 4.6.10.2 of MIL-C-19978.

Life Test: 250 hours at +85°C and 125% of rated voltage. No more than 1 failure in 18 units tested.

Construction: Types 682 and 683 are extended foil.

APPLICATIONS

Airborne Instrumentation: The extremely miniature size and light weight of Types 682-683 are key advantages in airborne applications. Their use has contributed directly to the success of many instrument designers in achieving miniaturization goals.

Miniaturized Computers: Computers for commercial as well as military applications often require miniature capacitor designs. Where hermetically sealed types are needed, Types 682-683 offer appreciable space-savings over paper dielectric designs of equivalent ratings.

Transistor Circuitry: Miniaturized printed circuit chassis for computers and other similar applications capitalize on the space-saving feature of this design.

CROSS REFERENCE

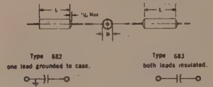
MIL-C-25	Space Saving Alternates	MIL-C-25	Space Saving Alternates
CP08, Circ. 1	683, Style 2	CP09, Circ. 1	683, Style 4
CP08, Circ. 3	682, Style 1	CP09, Circ. 3	682, Style 3

*DuPont's trademark for polyester film.

MYLAR* DIELECTRIC TYPE 682-683 CAPACITORS METAL ENCLOSED, HERMETICALLY SEALED. SPACE SAVING REPLACEMENT FOR MIL-C-25

682-683

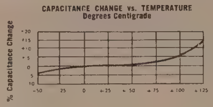
For insulated case styles 3 and 4, add .020 to diameter shown and change tolerance to +.032 −.036. Add .062 to length shown and change tolerance to ±.062.

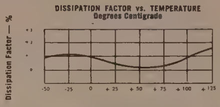


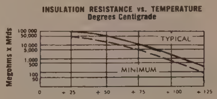
Dimensional Tolerances:
Diameter — +.015 −.005.
Length — ±.062.
Standard lead length — 1⅝ +1 −0.

Lead Gauge:
24 AWG up to and including .193.
22 AWG from .233 to .313.
20 AWG .400 and above.

TEMPERATURE TYPICAL CHARACTERISTIC CURVES


CAPACITANCE CHANGE vs. TEMPERATURE
Degrees Centigrade


DISSIPATION FACTOR vs. TEMPERATURE
Degrees Centigrade


INSULATION RESISTANCE vs. TEMPERATURE
Degrees Centigrade

TYPE 683

DIMENSIONS (Sizes of Type 682 are 1/16" shorter than 683)

EXTENDED FOIL CONSTRUCTION

Capacitance in Mfds.	100 & 200 Volts D L	300 Volts D L	400 & 600 Volts D L
.001	.173 x 23/32	.173 x 23/32	.173 x 23/32
.0012	.173 x 23/32	.173 x 23/32	.173 x 23/32
.0015	.173 x 23/32	.173 x 23/32	.173 x 23/32
.0018	.173 x 23/32	.173 x 23/32	.173 x 23/32
.0022	.173 x 23/32	.173 x 23/32	.173 x 23/32
.0027	.173 x 23/32	.173 x 23/32	.173 x 23/32
.0033	.173 x 23/32	.173 x 23/32	.173 x 23/32
.0039	.173 x 23/32	.173 x 23/32	.173 x 23/32
.0047	.173 x 23/32	.173 x 23/32	.173 x 23/32
.0056	.173 x 23/32	.173 x 23/32	.193 x 27/32
.0068	.173 x 23/32	.173 x 23/32	.193 x 27/32
.0082	.173 x 23/32	.173 x 23/32	.193 x 27/32
.01	.173 x 23/32	.173 x 27/32	.233 x 27/32
.012	.193 x 23/32	.173 x 1	.233 x 27/32
.015	.193 x 23/32	.173 x 1	.233 x 27/32
.018	.233 x 23/32	.233 x 15/16	.313 x 27/32
.022	.233 x 23/32	.233 x 15/16	.313 x 27/32
.027	.233 x 23/32	.233 x 15/16	.313 x 27/32
.033	.233 x 23/32	.233 x 1	.313 x 27/32
.039	.313 x 23/32	.313 x 15/16	.400 x 27/32
.047	.313 x 23/32	.313 x 15/16	.400 x 27/32
.056	.313 x 27/32	.313 x 1	.400 x 1 1/16
.068	.313 x 27/32	.313 x 1	.400 x 1 1/16
.082	.313 x 27/32	.400 x 3/4	.400 x 1 1/8
.1	.313 x 27/32	.400 x 15/16	.400 x 1 1/4
.12	.400 x 7/8	.400 x 1	.400 x 1 3/8
.15	.400 x 7/8	.400 x 1 3/16	.560 x 1 1/8
.18	.400 x 1 1/16	.400 x 1 5/16	.560 x 1 1/8
.22	.400 x 1 1/16	.400 x 1 5/16	.560 x 1 1/8
.27	.400 x 1 1/4	.500 x 1 1/4	.560 x 1 1/2
.33	.400 x 1 1/4	.500 x 1 1/4	.560 x 1 5/8
.39	.500 x 1 3/16	.560 x 1 1/4	.668 x 1 5/8
.47	.500 x 1 3/16	.560 x 1 3/8	.750 x 1 3/8
.56	.560 x 1 3/8	.560 x 1 5/8	.750 x 1 3/4
.68	.560 x 1 3/8	.560 x 1 3/4	.750 x 1 7/8
.82	.560 x 1 19/32	.560 x 1 7/8	.750 x 2 1/16
1.00	.560 x 1 19/32	.668 x 2	.750 x 2 1/16

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TRW® CAPACITORS

POLYSTYRENE
DIELECTRIC **863UW-863T**
TYPE 863UW AND 863T CAPACITORS
POLYSTYRENE HIGH QUALITY SUBMINIATURES
"SKIN-TIGHT" PLASTIC FILM CASE

- **Maximum Space Savings**
- **Tolerance to ±1%**
- **High Stability**
- **Extremely High IR**
- **Very Low Dielectric Absorption**
- **Excellent Retrace**

As can be seen from the above design highlights, these TRW Polystyrene dielectric capacitors are ideally suited for use in computer and timing circuitry. Their plastic film case provides the ultimate subminiature size. The 863T, which combines the size of the 863UW with special production procedures, is capable of meeting the environmental requirements of MIL-C-27287 within 85°C and 200% of rated voltage.

The dielectric absorption, or accumulation of charge after discharge, is exceptionally low. This fact, coupled with the characteristics of high capacitance stability and high insulation resistance, make the 863UW/863T ideal for use in many critical applications.

Detailed application engineering service data is available for the best results in the use of Polystyrene capacitors for your particular circuit. Contact the TRW Capacitor Engineering Dept.

SPECIFICATIONS

Temperature Range: May be operated at rated voltage from −55°C to +85°C.

Insulation Resistance: Greater than 300,000 megohm-microfarads at 25°C, but the IR need not exceed 500,000 megohms. See separate curve for figures at higher temperatures.

Dissipation Factor: Less than .10% when measured at or referred to 1000 ±20CPS.

Dielectric Strength: Twice rated voltage for one minute through a limiting resistance of 100 ohms/volt.

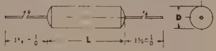
Life Test: 250 hours at +85°C and 125% of rated voltage. No more than one failure allowed of 18 units tested.

Temperature Coefficient: −110 ±30 parts/million/°C.

Humidity Resistance: Will meet or exceed requirements of MIL-C-27287, paragraph 3.12, when tested in accordance with MIL-STD-202C, Method 103B, Condition B. One failure allowed of 18 units tested.

Types 863UW and 863T have exceptionally low capacitance change with temperature. Their temperature coefficient is —110±PPM/°C.

CUT-AWAY SHOWS CONSTRUCTION



Dimensional Tolerances:
Diameter — Max.
Length — ±1⁄16
Standard lead length — 1⅝
+1, −0.

Lead Gauge:
24 AWG .000 dia. thru .235 dia.
22 AWG .236 dia. thru .438 dia.
20 AWG .439 dia. thru .749 dia.
18 AWG .750 dia. and greater.

Capacitance Tolerances: Standard tolerance ±20%. Also available in ±10%, ±5%, ±2%, ±1%.

Winding Construction: Extended Foil (Non-Inductive).

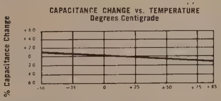
APPLICATIONS

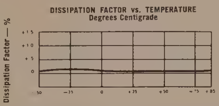
Timing Circuits: The extremely low dielectric absorption of Polystyrene film capacitors is a main factor for consideration in its use in computers and timing circuits.

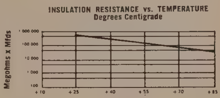
Precision Test and Measuring Equipment: Laboratory Standards Equipment and circuits which require a very minimum distortion call upon the Polystyrene capacitors in their design.

General: In general, capacitor users select Polystyrene types where the importance of low TC (negative) or low dielectric absorption is the controlling factor. These advantages are now available in a small package.

TEMPERATURE TYPICAL CHARACTERISTIC CURVES


CAPACITANCE CHANGE vs. TEMPERATURE
Degrees Centigrade


DISSIPATION FACTOR vs. TEMPERATURE
Degrees Centigrade


INSULATION RESISTANCE vs. TEMPERATURE
Degrees Centigrade

TYPES 863UW AND 863T

DIMENSIONS (Type 863T will meet all environmental requirements of MIL-C-27287 with two exceptions: **1.** Temp. shall never exceed 85°C. **2.** Dielectric strength shall never exceed 200% of rated voltage.)

Capacitance in Mfds.	100 Volts D L	200 Volts D L	400 Volts D L	600 Volts D L
.001	.187 x ¾	.187 x ¾	.187 x ¾	.234 x ¾
.0012	.187 x ¾	.187 x ¾	.218 x ¾	.250 x ¾
.0015	.187 x ¾	.187 x ¾	.218 x ¾	.250 x ¾
.0018	.187 x ¾	.187 x ¾	.250 x ¾	.281 x ¾
.0022	.187 x ¾	.187 x ¾	.281 x ¾	.281 x ¾
.0027	.218 x ¾	.218 x ¾	.312 x ¾	.312 x ¾
.0033	.218 x ¾	.218 x ¾	.312 x ¾	.312 x ¾
.0039	.234 x ¾	.234 x ¾	.312 x ¾	.312 x ⅞
.0047	.234 x ¾	.234 x ¾	.312 x ⅞	.312 x ⅞
.0056	.265 x ¾	.265 x ¾	.328 x ⅞	.328 x ⅞
.0068	.265 x ¾	.265 x ¾	.328 x ⅞	.328 x ⅞
.0082	.296 x ¾	.281 x ⅞	.359 x ⅞	.375 x ⅞
.01	.296 x ¾	.281 x ⅞	.359 x ⅞	.375 x ⅞
.012	.328 x ¾	.312 x ⅞	.375 x ⅞	.406 x ⅞
.015	.343 x ¾	.312 x ⅞	.390 x ⅞	.359 x 1⅛
.018	.312 x ⅞	.359 x ⅞	.375 x 1⅛	.437 x 1⅛
.022	.312 x ⅞	.359 x ⅞	.375 x 1⅛	.500 x 1⅛
.027	.343 x ⅞	.375 x 1⅛	.406 x 1⅛	.531 x 1¼
.033	.343 x ⅞	.375 x 1⅛	.453 x 1⅛	.546 x 1¼
.039	.375 x ⅞	.406 x 1⅛	.500 x 1¼	.593 x 1¼
.047	.390 x ⅞	.437 x 1⅛	.562 x 1¼	.625 x 1¼
.056	.375 x 1⅛	.453 x 1¼	.593 x 1¼	.656 x 1⅜
.068	.375 x 1⅛	.453 x 1¼	.625 x 1¼	.687 x 1⅜
.082	.406 x 1⅛	.500 x 1¼	.656 x 1¼	.687 x 1¾
.1	.421 x 1⅛	.531 x 1¼	.562 x 1¾	.703 x 1¾
.12	.500 x 1¼	.546 x 1¾	.625 x 1¾	.781 x 1¾
.15	.531 x 1¼	.546 x 1¾	.687 x 1¾	.843 x 1¾
.18	.578 x 1⅜	.593 x 1¾	.750 x 1¾	.843 x 2⅛
.22	.609 x 1⅜	.625 x 1¾	.781 x 1¾	.875 x 2⅛
.27	.640 x 1⅜	.718 x 1¾	.812 x 2⅛	.937 x 2⅜
.33	.656 x 1⅜	.750 x 1¾	.890 x 2⅛	.968 x 2⅜
.39	.687 x 1¾	.812 x 2⅛	.890 x 2⅜	1.062 x 2⅜
.47	.703 x 1¾	.828 x 2⅛	.906 x 2⅜	1.187 x 2⅜
.56	.781 x 1¾	.875 x 2⅛	1.062 x 2⅜	1.281 x 2⅜
.68	.812 x 1¾	.921 x 2⅛	1.109 x 2⅜	1.375 x 2⅜
.82	.906 x 2⅛	.953 x 2⅜	1.250 x 2⅜	1.500 x 2⅜
1.0	.953 x 2⅛	.984 x 2⅜	1.375 x 2⅜	1.687 x 2⅜

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TRW® CAPACITORS

MYLAR*
DIELECTRIC 663F-663FR
TYPE 663F-663FR CAPACITORS
FLAT SHAPES THAT INVITE "CROWDING"
OVAL CROSS-SECTION AXIAL OR RADIAL LEADS

- Sub-miniature Size
- Skin-tight Non-metallic Case
- Require Minimum Chassis Area
- Low Silhouette for Transistorized Circuits
- High Insulation Resistance
- Available in Tolerances to ±5%

SPECIFICATIONS

Dissipation Factor: Less than 1.0% when measured at or referred to 1000 ±20 Hz for capacitance values up to and including 1.0 mfd. at 25°C ±5°C Capacitance values greater than 1.0 mfd. measured at 60 ±6 Hz.

Insulation Resistance: Greater than 70,000 megohm-microfarads at 25°C, but the IR need not exceed 140,000 megohms. See separate curve for figures at higher temperatures.

Lead Pull Test: Capacitor Thickness — Force Applied*
Through .359″ . . . 4 pounds. Over .359″ . . . 8 pounds.
*axially for 663F — radially for 663FR.

Life Test: 250 hours at 85°C and 125% of rated voltage. No more than one failure allowed of 18 units tested.

Dielectric Strength: Twice rated voltage for one minute through a limiting resistance of 100 ohms/volt.

Humidity Resistance: Will meet or exceed requirements of MIL-C-27287, Paragraph 3.12, when tested in accordance with MIL-Std.-202C, Method 103B, Condition B. One failure allowed of 18 units tested.

Temperature Range: May be operated at rated voltage from −55°C to +85°C and to +125°C with 50% derating.

Winding Design: Extended foil construction.

APPLICATIONS

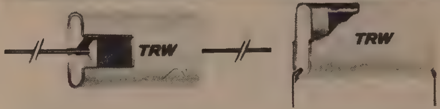
Mounting Flexibility: Sub-miniature size plus oval cross section helps solve many packaging problems where maximum space economy is required. This is of particular advantage in accomplishing last minute circuit changes.

Printed Circuits: Radial lead type 663FR provides leads that are pre-positioned for insertion into printed circuit boards. The tough mylar case is unaffected by the heat of dip-soldering.

Military Use: In addition to use in commercial and instrument grade products type 663F and 663FR are used in a wide variety of military items where hermetic sealing is not an absolute requirement. All versions of Type 663 are well suited for use in potted assemblies.

Capacitance Stability: Tests continued for 10,000 hours under rated operating conditions show that only negligible drift in capacitance and dissipation factor is encountered in these designs.

Transistor Circuits: Miniaturized printed circuit chassis for computers and other similar applications capitalize on the space-saving feature of this design.

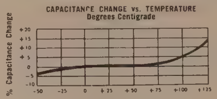


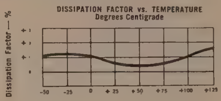
Special purpose types 663F and 663FR have all the electrical ruggedness and dependability of TRW basic Type 663UW. This capacitor design has wide acceptance in both military and high quality instrument applications backed up by years of dependable field service.

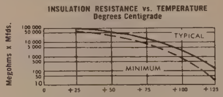
Size is minimized by use of space-saving Mylar dielectric for the capacitor element and of a tough, dense plastic film case of less than 1/64″ thickness.

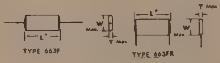
Shape of the 663F and 663FR is ideally adapted to layouts where chassis area is limited. The radial lead arrangement of Type 663FR finds best advantage in printed circuit chassis, and is well suited to dip-soldering techniques.

TEMPERATURE TYPICAL CHARACTERISTIC CURVES









	Type 663F	Type 663FR
Lead Gauge:	24 AWG	22 AWG all nom. lengths up to & including ¾″.
	22 AWG	20 AWG all nom. lengths ⅞″ to 1⅛″.
	20 AWG	20 AWG all nom. lengths 1¼″ to 1¾″.
	18 AWG	18 AWG all nom. lengths 1⅞″ & above.

Lead Length: Type 663F — 1⅝″ +1 −0. Type 663FR — 1″ minimum.

Tolerances: Length — +3/32 −1/16.

Lead Spacing (663FR Only): Center line to center line distance between leads shall equal nominal length of the capacitor, ±1/16 when measured 1/16″ below body line. Lead spacing tolerance ±1/16.

DIMENSIONS

Capacitance in Mfds.	50 Volts			100 Volts			200 Volts			400 Volts			600 Volts			1,000 Volts		
	T	W	L	T	W	L	T	W	L	T	W	L	T	W	L	T	W	L
.001													.156 x	.297 x	¾	.187 x	.297 x	¾
.0012													.156 x	.297 x	¾	.187 x	.297 x	¾
.0015													.156 x	.297 x	¾	.187 x	.297 x	¾
.0018													.171 x	.297 x	¾	.203 x	.297 x	¾
.0022													.171 x	.297 x	¾	.187 x	.297 x	⅞
.0027													.187 x	.297 x	¾	.203 x	.297 x	⅞
.0033													.187 x	.297 x	¾	.219 x	.297 x	⅞
.0039													.187 x	.312 x	¾	.234 x	.312 x	⅞
.0047										.156 x	.297 x	⅝	.187 x	.328 x	¾	.250 x	.328 x	⅞
.0056										.171 x	.297 x	⅝	.203 x	.343 x	¾	.281 x	.343 x	⅞
.0068										.187 x	.297 x	⅝	.250 x	.359 x	¾	.297 x	.391 x	⅞
.0082										.219 x	.328 x	⅝	.250 x	.391 x	¾	.297 x	.453 x	⅞
.01							.156 x	.297 x	⅝	.219 x	.359 x	⅝	.297 x	.453 x	¾	.297 x	.484 x	⅞
.012							.156 x	.297 x	⅝	.281 x	.406 x	⅝	.281 x	.453 x	⅞	.281 x	.453 x	1
.015							.156 x	.297 x	⅝	.328 x	.453 x	⅝	.328 x	.484 x	⅞	.328 x	.484 x	1
.018							.171 x	.312 x	⅝	.250 x	.453 x	¾	.328 x	.484 x	⅞	.281 x	.484 x	1⅛
.022				.156 x	.297 x	⅝	.187 x	.328 x	⅝	.297 x	.453 x	¾	.328 x	.516 x	⅞	.328 x	.516 x	1⅛
.027	.156 x	.281 x	½	.171 x	.297 x	⅝	.219 x	.359 x	⅝	.297 x	.422 x	⅞	.328 x	.516 x	1	.359 x	.547 x	1¼
.033	.156 x	.281 x	½	.187 x	.312 x	⅝	.187 x	.297 x	¾	.328 x	.453 x	⅞	.359 x	.547 x	1	.359 x	.609 x	1¼
.039	.171 x	.296 x	⅝	.156 x	.281 x	¾	.203 x	.328 x	¾	.343 x	.453 x	⅞	.375 x	.578 x	1	:391 x	.687 x	1¼
.047	.171 x	.296 x	⅝	.171 x	.312 x	¾	.219 x	.359 x	¾	.359 x	.453 x	⅞	.391 x	.609 x	1	.422 x	.734 x	1¼
.056	.171 x	.312 x	⅝	.187 x	.312 x	¾	.250 x	.453 x	¾	.281 x	.484 x	1	.406 x	.687 x	1	.375 x	.734 x	1½
.068	.171 x	.312 x	⅝	.203 x	.328 x	¾	.297 x	.453 x	¾	.328 x	.516 x	1	.453 x	.734 x	1	.422 x	.765 x	1½
.082	.171 x	.312 x	¾	.218 x	.358 x	¾	.328 x	.484 x	¾	.359 x	.547 x	1	.422 x	.672 x	1¼	.453 x	.797 x	1½
.1	.171 x	.312 x	¾	.203 x	.328 x	⅞	.297 x	.484 x	⅞	.359 x	.609 x	1	.453 x	.797 x	1⅜	.484 x	.859 x	1½
.12	.187 x	.375 x	⅞	.234 x	.375 x	⅞	.328 x	.516 x	⅞	.391 x	.672 x	1	.484 x	.859 x	1⅜	.547 x	.922 x	1½
.15	.187 x	.375 x	⅞	.250 x	.421 x	⅞	.359 x	.609 x	⅞	.359 x	.672 x	1¼	.516 x	.922 x	1⅜	.547 x	1.109 x	1½
.18	.250 x	.469 x	⅞	.250 x	.437 x	1	.281 x	.500 x	1⅛	.359 x	.750 x	1⅜	.500 x	.906 x	1⅝	.500 x	1.093 x	1¾
.22	.250 x	.469 x	⅞	.281 x	.468 x	1	.328 x	.578 x	1⅛	.422 x	.797 x	1⅜	.578 x	.922 x	1⅝	.578 x	1.109 x	1¾
.27	.281 x	.531 x	1	.312 x	.531 x	1⅛	.391 x	.609 x	1⅛	.453 x	.859 x	1⅜	.578 x	1.171 x	1⅝	.672 x	1.171 x	1¾
.33	.281 x	.531 x	1	.328 x	.562 x	1⅛	.422 x	.672 x	1⅛	.453 x	.859 x	1⅝	.516 x	1.109 x	2	.672 x	1.234 x	2
.39	.312 x	.560 x	1	.358 x	.593 x	1⅛	.453 x	.734 x	1¼	.484 x	.922 x	1⅝	.578 x	1.171 x	2	.703 x	1.484 x	2
.47	.312 x	.560 x	1	.328 x	.672 x	1¼	.422 x	.797 x	1¼	.516 x	.922 x	1⅝	.640 x	1.234 x	2	.734 x	1.484 x	2
.56	.312 x	.560 x	1⅛	.358 x	.703 x	1¼	.453 x	.859 x	1⅜	.516 x	1.047 x	1¾	.734 x	1.297 x	2	.797 x	1.547 x	2¼
.68	.375 x	.703 x	1⅛	.358 x	.765 x	1¼	.578 x	.859 x	1⅝	.547 x	1.109 x	1¾	.828 x	1.359 x	2	.859 x	1.672 x	2¼
.82	.375 x	.734 x	1⅛	.391 x	.843 x	1¼	.609 x	.922 x	1⅝	.609 x	1.234 x	1⅞	.672 x	1.484 x	2½	.797 x	1.609 x	2⅝
1.00	.406 x	.750 x	1¼	.453 x	.859 x	1½	.547 x	.922 x	1¾	.640 x	1.171 x	2	.797 x	1.547 x	2½	.922 x	1.734 x	2⅝
1.25	.406 x	.750 x	1¼	.484 x	.922 x	1½	.547 x	1.171 x	1¾	.703 x	1.359 x	2	.828 x	1.609 x	2½	.891 x	1.672 x	3
1.50	.406 x	.797 x	1½	.515 x	.937 x	1¾	.609 x	1.297 x	1¾	.734 x	1.359 x	2¼	.859 x	1.672 x	3	.953 x	1.797 x	3
1.80	.468 x	.875 x	1½	.531 x	1.125 x	1¾	.672 x	1.297 x	1⅞	.703 x	1.484 x	2¼	.891 x	1.922 x	3	1.047 x	1.984 x	3
2.00	.500 x	.875 x	1½	.546 x	1.171 x	1¾	.734 x	1.297 x	1⅞	.765 x	1.547 x	2¼	.984 x	2.047 x	3	1.171 x	2.171 x	3

---

*DuPont's trademark for polyester film.

TRW® CAPACITORS

A WORD ABOUT TRW
— HIGH RELIABILITY
— CONDITIONED RELIABILITY

HIGH RELIABILITY

High Reliability at TRW Capacitors involves designing, manufacturing, conditioning and testing of parts to assure and predict a high level of performance. Manufacture under clean room conditions and raw material traceability are always included. TRW Capacitors has been deeply involved in High Reliability programs for many years, and has supplied to most missile, space and AEC systems, devices of demonstrated high performance built to specifications typically generated by joint effort with our customers.

Complete capability in clean room manufacturing and in environmental, qualification, screening, and life testing is available for the requirements of custom high reliability programs of varying complexities.

TYPICAL SCREENING-CONDITIONING SEQUENCE:

- **Burn-In**
- **Temperature Cycling**
- **Insulation Resistance at High Temperature (85°C to 125°C)**
- **Temperature Coefficient**
- **Radiographic Inspections**
- **Seal Test (Hermetically Sealed Units)**
- **Capacitance Check**
- **Dissipation Factor**
- **Withstanding Voltage**

The tests are conducted at various times and temperatures and the sequences and combinations can be performed to customer requirements.

CONDITIONED RELIABILITY

Where highest levels of reliability, with attendant extra expense and extended deliveries, are not required, Conditioned Reliability parts are often the ideal answer. Conditioned Reliability is a screening process of TRW standard or special devices on a 100% basis, using various tests and conditioning processes as required to attain an agreed upon predicted level of performance.

FACILITIES:

TRW Capacitors maintains a fully equipped testing facility for the complete Conditioned Reliability testing program. All equipment for both environmental and electrical testing and conditioning is capable of meeting all customer requirements.

QUALITY ASSURANCE:

Process and inspection data is maintained on file per NPC-200-3, MIL-Q-9858 Quality control standards and MIL-STD-790 Reliability Assurance Program.

APPLICATIONS:

TRW Conditioned Reliability capacitors are used in high performance applications. Typical uses can be found in:

- **Instrumentation**
- **Computers**
- **Missiles**
- **Space Vehicles**
- **Weapon Systems**
- **Communication Systems**

All TRW product types are adaptable to reliability conditioning, and great flexibility is available for designing such processing to attain the performance level desired. The amount of premium cost involved varies with the product chosen and the conditioning program specified.

TRW® CAPACITORS

- Long Stable Life
- Very High Insulation Resistance
- Lowest Dissipation Factor
- Humidity Resistant
- Saves on Size and Weight
- Capacitance Tolerance to 1%

Used for a number of years in the non-precision power capacitor field, polypropylene has now been developed by TRW Capacitors as a dielectric for miniaturized precision capacitors exhibiting unique and outstanding electrical and environmental characteristics. Particularly worthy of note is its stability. The X363UW exhibits negligible shift in capacitance under long term exposure to humidity, operating life, and temperature cycling. Insulation resistance, dielectric absorption and dissipation factor properties are all the equivalent of or superior to those of polystyrene.

Humidity resistance is excellent, with little change in any parameter occurring with exposure to moisture.

Combined with metallized construction providing size and weight savings equivalent to those of metallized polycarbonate capacitors, these properties make the X363UW ideal for precision instrument, communications, and high density circuitry applications.

SPECIFICATIONS

Insulation Resistance: Minimum values according to table below.

Temperature	+25°C	+85°C	+105°C
Megohms x Microfarads	300,000	30,000	3,000
Need Not Exceed (Megohms)	500,000	50,000	5,000

Measured after two minutes electrification at 200 Volts.

Dissipation Factor: Less than 0.1% at 25°C when measured at or referred to 1000 ±20 Hz for capacitance values up to and including 10.0 mfd.

Dielectric Strength: Twice rated voltage for one minute through a limiting resistance of 100 ohms/volt.

Dielectric Absorption: When tested per MIL-C-19978 the dielectric absorption shall not exceed .05%. Shorter test methods produce lower results. For further information, consult TRW Engineering.

Capacitance: Shall be within specified tolerance when measured at or referred to 1000 ±20 Hz for values up to and including 10.0 mfd. at 25° ±5°C.

Temperature Range: −55°C to 105°C with no voltage derating.

Life: Tested for 1000 hours at 105°C and 150% of rated voltage. Insulation resistance and dissipation factor shall meet original requirements. No more than 1 failure permitted of 12 parts tested.

Humidity: When tested per Method 106 MIL-STD-202 (no voltage applied) the following post test limits shall apply: Insulation resistance shall be no less than 20% minimum values listed in above table. Dissipation factor shall not exceed .1% and capacitance change no more than .5%. No more than 1 failure permitted for 12 parts tested.

Case: White polyester tape wrap with epoxy endfill.

Lead Material: Tinned solid copper wire.

Lead Pull Test: Tested as outlined in MIL-STD-202, Method 211, Condition A. Will withstand force of the following magnitude:
4½ lbs. — Diameters up to and including .359.
5 lbs. — Diameters over .359.

Instrumentation: Excellent stability plus outstanding electrical properties make the X363UW ideal for use in timing and integrating circuitry.

Severe Environments: The X363UW exhibits negligible capacitance drift and electrical property degradation under environmental conditions normally requiring hermetically sealed encasements with other dielectrics. Temperature, of course, must be limited to 105°C.

Close Tolerance: Where close tolerance capacitors are required, the X363UW is ideal because of inherent stability with service conditions and life.

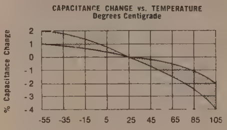
Military Use: The inherent long life characteristics and reliable performance capability of the X363UW render it suitable for a wide variety of military applications where hermetic sealing or temperature capability higher than 105°C are not absolute requirements.

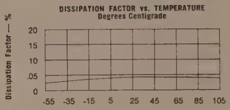
METALLIZED POLYPROPYLENE

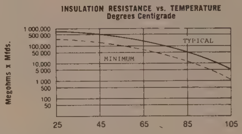
DIELECTRIC **X363UW**
TYPE X363UW CAPACITORS
SUBMINIATURE... INSTRUMENT GRADE
PLASTIC FILM CASE

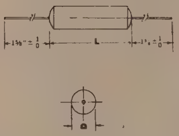
TEMPERATURE TYPICAL CHARACTERISTIC CURVES

TYPE X363UW









Dimensional Tolerances — Diameter:
000 thru .250 Dia. ±.046. .251 thru .375 Dia. ±.062. .376 thru .500 Dia. ±.078. .501 thru .750 Dia. ±.093. .751 and above ±.125.

Lead Gauge:

Body Length	AWG
9/16 & Less	24
11/16 thru 13/16	22
15/16 thru 1½	20
¾ & Greater	18

Standard Lead Length: 1⅝" +1 −0.

DIMENSIONS

Capacitance in Mfds.	200 VDC D	L	400 VDC D	L
.010	.188 x	7/16	.234 x	7/16
.012	.203 x	7/16	.250 x	7/16
.015	.219 x	7/16	.234 x	½
.018	.234 x	7/16	.250 x	½
.022	.203 x	½	.266 x	½
.027	.219 x	½	.250 x	9/16
.033	.234 x	½	.266 x	9/16
.039	.266 x	½	.297 x	9/16
.047	.250 x	9/16	.266 x	11/16
.056	.266 x	9/16	.281 x	11/16
.068	.281 x	9/16	.312 x	11/16
.082	.312 x	9/16	.328 x	11/16
.10	.281 x	11/16	.328 x	13/16
.12	.297 x	11/16	.344 x	13/16
.15	.328 x	11/16	.375 x	13/16
.18	.359 x	11/16	.406 x	13/16
.22	.391 x	11/16	.406 x	15/16
.27	.375 x	13/16	.453 x	15/16
.33	.406 x	13/16	.484 x	15/16
.39	.438 x	13/16	.531 x	15/16
.47	.422 x	15/16	.500 x	1¼
.56	.469 x	15/16	.516 x	1¼
.68	.500 x	15/16	.562 x	1¼
.82	.547 x	15/16	.625 x	1¼
1.00	.516 x	1¼	.609 x	1½
1.25	.562 x	1¼	.672 x	1½
1.50	.609 x	1¼	.734 x	1½
1.80	.656 x	1¼	.719 x	1¾
2.00	.688 x	1¼	.766 x	1¾
3.00	.734 x	1½	.922 x	1¾
4.00	.844 x	1½	.875 x	2¼
5.00	.844 x	1¾	.984 x	2¼
8.00	.906 x	2¼	—	—
10.00	1.000 x	2¼	—	—

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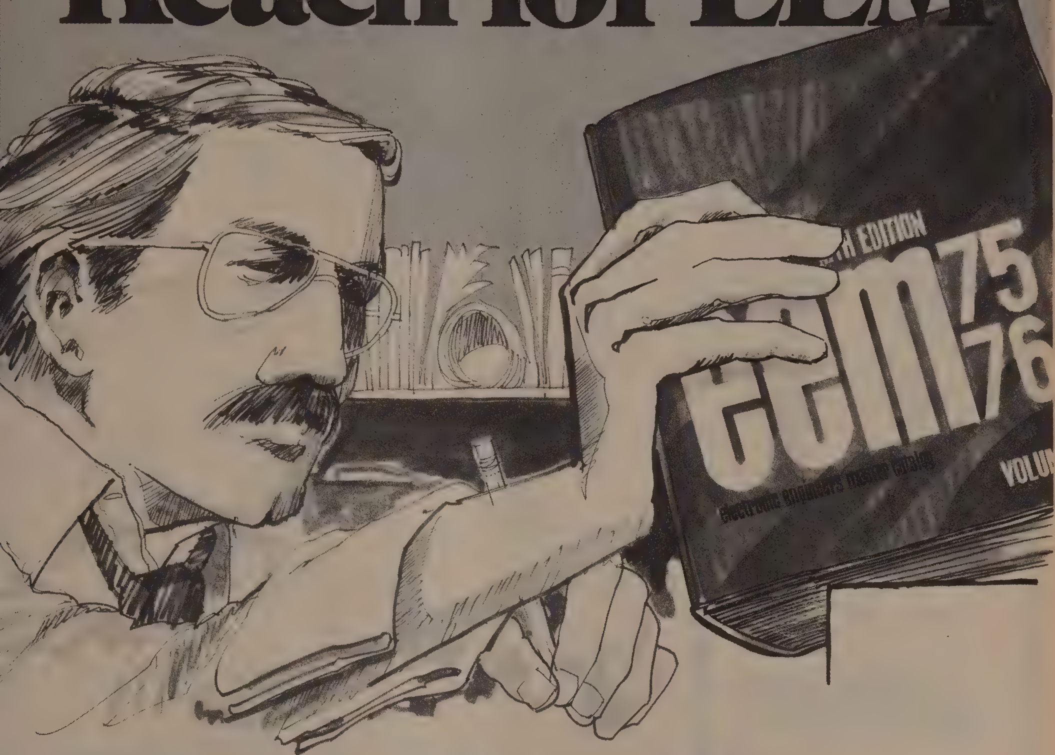
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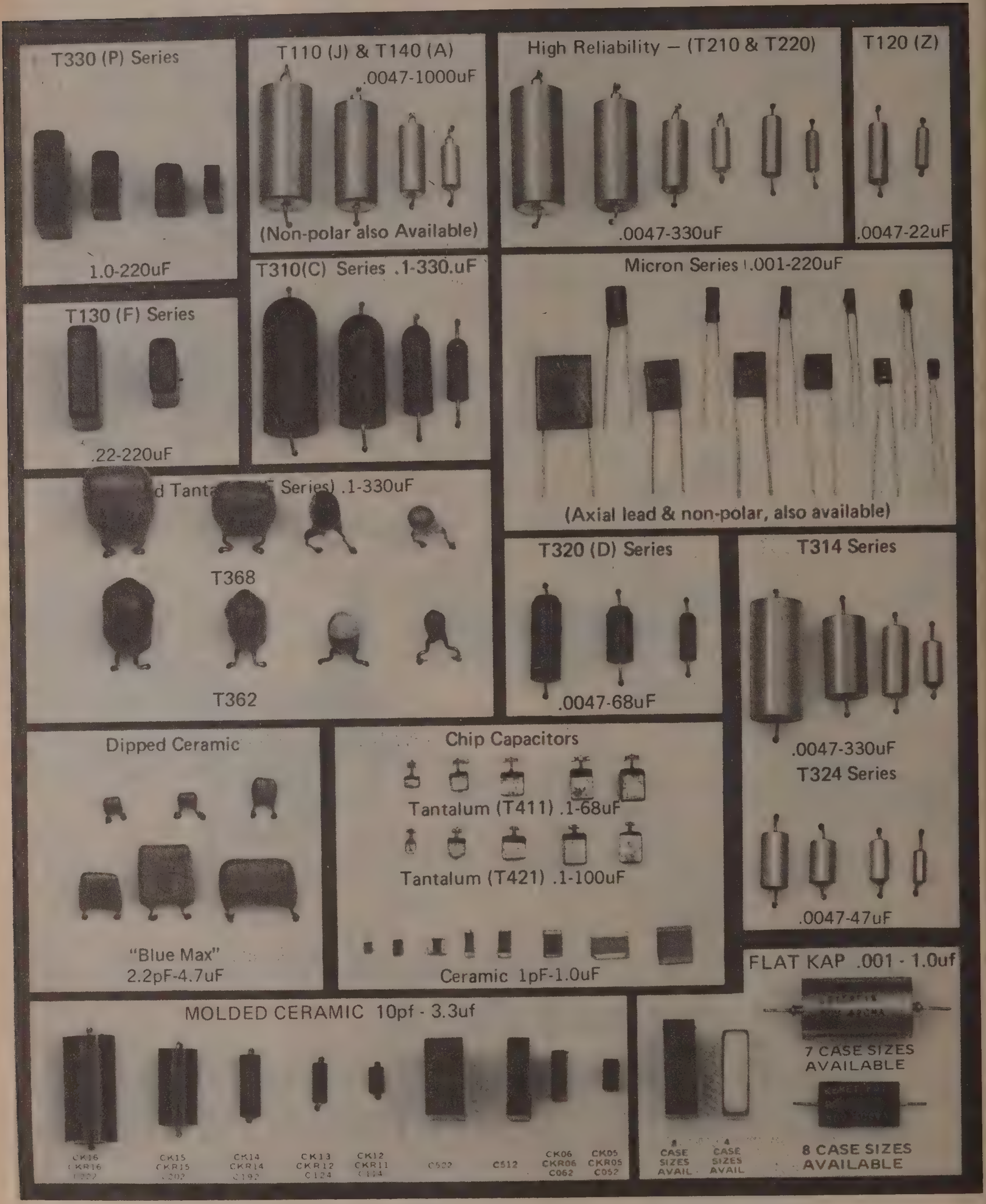
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CK15 CKR15 C202
CK14 CKR14 C192
CK13 CKR12 C124
CK12 CKR11 C114
C522
C512
CK06 CKR06 C062
CK05 CKR05 C052
8 CASE SIZES AVAIL
4 CASE SIZES AVAIL

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KEMET® TANTALUM, CERAMIC & FILM CAPACITORS

CAPACITOR REFERENCE

						REQUEST CATALOG
SOLID TANTALUM	HERMETIC SEAL	Standard and CSR13	T110 (J)	Popular military style — axial lead — 4 case sizes — high volumetric efficiency. Reference includes CSR13 capacitors which are available to S failure rate level.	.0047-330uF 6-125VDC	F-1851
		Non-Polar and CSR91	T111 (N)	Designed for applications where reversal of polarity is the prime consideration. Axial lead — 4 case sizes. Comparable performance to T110 Series.	.0023-160uF 6-125VDC	F-1852
		Miniature and CSR09	T120 (Z)	Compact especially designed for cordwood construction and packaging applications where space is a premium. Matches standard resistor and diode sizes.	.0047-22uF 6-125VDC	F-2028
		Radial-Lead	T130 (F)	Rectangular form permits maximum volumetric efficiency and packaging density. Meets or exceeds requirements of MIL-C-39003.	.22-220uF 6-75VDC	F-2628
		Extended Range and CSR23	T140 (A)	Extended range (to 1000uF-6V) in standard MIL cases. Also, available in T242 Series (CSR23) and in T141 Series (non-polar version).	.82-1000uF 6-60VDC	F-2138
		High Reliability	T210 (KG)	The ultimate in high reliability solid tantalums with failure rates as low as .001%/K hrs. Manufactured to KEMET's specification GR500 which outlines the most sophisticated and accurate reliability measurement method in the industry.	.0047-1000uF 6-125VDC	F-2697
	EPOXY	Molded-Axial	T310 (C)	Bullet shaped for positive polarity identification. 4 case sizes. Ideal for application in commerical and industrial electronic equipment.	.10-330uF 6-50VDC	F-2622
		Metal Case	T314 & T324	Metal Case with high impact, moisture resistant epoxy and seal in 4 miniature and 4 sub-miniature axial lead case sizes. Economical	.0047-330uF 6-50VDC	F-2791
		Molded Axial Miniature	T320 (D)	Molded axial cordwood size featuring extremely high capacitance-to-volume ratio. 3 case sizes. Precision dimensions permits use in high speed automatic insertion applications.	.0047-68uF 6-50VDC	F-2632
		Molded-Radial	T330 (P)	Compact precision molded space saving rectangular shape provides superior packing factor and space utilization in high density packaging applications.	.10-220uF 6-50VDC	F-1885
		Dipped Industrial	T362 T368 (E)	Economical — Radial lead — Dip coated epoxy encapsulation. Excellent performance characteristics over full temperature range. Available in .125" or .250 lead spacing.	.10-330uF 6-50VDC	F-2638
		Sub-Miniature Plastic Sealed	T370 Micron	Complete line of sub-miniature plastic sealed tantalums deisgned for use in hybrid & thick film circuits. Available in a variety of case styles, sizes, and lead configurations in polar & non-polar versions.	.001-220uF 2-50VDC	F-2710
		Dipped (Consumer)	T390 & T392	For consumer and commercial circuit applications. Low profile with .100" & .200" lead spacing for .1 inch PC board grids. 6 case sizes.	.1-680uF 3-50VDC	F-2816
	CHIP	Rectangular	T411 & T421	The ultimate in volumetric efficiency. Designed for hybid circuits and P.C. board applications. Copper Counter-Electrode permits assembly temperatures to 300° C and continuous operating temperatures to 175° C.	.10-100uF 4-50VDC	F-2715
CERAMIC	MIL LEADED	MIL-C-11015D	CK Series	Manufactured to MIL-C-11015D requirements. Includes CK05-CK06-CK12-CK13-CK14-CK15 and CK16 capacitors.	10pf-3.3uF 50-200VDC	F-2724
		MIL-C39014B	CKR Series	Established reliability — CKR05, CKR06, CKR11, CKR12, CKR14, CKR15, and CKR16 capacitors available to "R" (0.01%/K hrs.) failure rate level in most styles.	10pf-3.3uF 50-100VDC	F-2724
	KEMET	Dipped "Blue Max"	Dipped	Economical, radial lead, epoxy dipped maximum CV range monolithic Ceramic Capacitors in three dielectrics — COG Ultra-Stable; X7R Stable and Z5U General Purpose. 6 precision case sizes.	2.2pF-4.7uF 50,100 & 200 VDC	F-2795
		NPO& MIL-C-20	NPO	Ultra-stable monolithic ceramic capacitors in standard radial and axial lead MIL-CK/CKR sizes. 0 ± 30PPM/° C. MIL-C-20 styles CC & CCR.	1-82,000pf 50-200VDC	F-2793
	CHIPS	"Solder & Gold Guard"	0805 2225	8 standard sizes in two precision dielectrics — BX and NPO. Exclusive "Solder Guard" and "Gold Guard" end metalization, for high temperature assembly.	1-1,000,000p 50-100VDC	F2731
		MIL-C-55681	CDR	New military established reliability CDR01-CDR06 ceramic chip capacitors for critical applications — 6 case sizes.	10-470,000p 50-100VDC	F-2731
FILM		Flat Kap	F-300 Series	Ultra stable parylene film — available to 0 ± 50PPM/° C and capacitance tolerance to ± ½%. 8 case sizes radial and axial leads.	.001-1uF 50VDC	F-2274 F-2742

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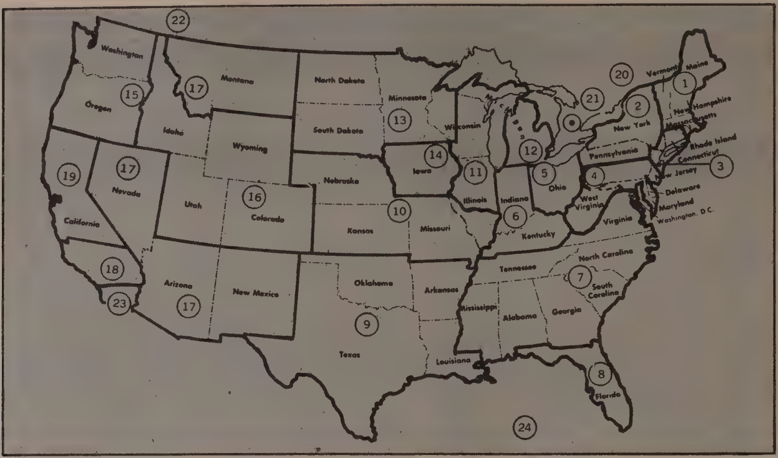
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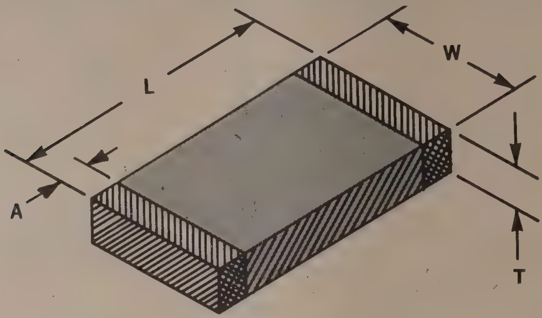
Woodland Hills	JACO Electronics	213-887-6400
Colorado		
Denver	Hamilton/Avnet Electronics	303-534-1212
Connecticut		
Danbury	Schweber Electronics	203-792-3500
Georgetown	Hamilton/Avnet Electronics	203-762-0361
Florida		
Ft. Lauderdale	Hall-Mark Electronics	305-855-4020
Hollywood	Schweber Electronics	305-927-0511
Hollywood	Hamilton/Avnet Electronics	305-925-5401
Georgia		
Atlanta	Schweber Electronics	404-449-9170
Atlanta	Hamilton/Avnet Electronics	404-448-0800
Illinois		
Elk Grove	Schweber Electronics	312-593-2740
Schiller Park	Hamilton/Avnet Electronics	312-678-6310
Indiana		
Indianapolis	Graham Electronics Supply	317-634-8486
Kansas		
Lenexa	Hamilton/Avnet Electronics	913-888-8900
Maryland		
Baltimore	Technico	301-828-6416
Baltimore	Hamilton/Avnet Electronics	301-796-5000
Rockville	Schweber Electronics	301-881-2970
Massachusetts		
Burlington	Hamilton/Avnet Electronics	617-273-2120
Lexington	Harvey Electronics	617-861-9200
Waltham	Schweber Electronics	617-890-8484
Michigan		
Livonia	Hamilton/Avnet Electronics	313-522-4700
Troy	Schweber Electronics	313-583-9242
Minnesota		
Edina	Hamilton/Avnet Electronics	612-941-3801
Edina	Schweber Electronics	612-941-5280
Missouri		
Hazelwood	Hamilton/Avnet Electronics	314-731-1144
N. Kansas City	L Comp-Kansas City, Inc.	816-221-2400
New Jersey		
Cedar Grove	Hamilton/Avnet Electronics	201-239-0800
Clifton	Wilshire Electronics	201-365-2600
Mt. Laurel	Hamilton/Avnet Electronics	609-234-2133
Somerset	Schweber Electronics	201-469-6008
New Mexico		
Albuquerque	Hamilton/Avnet Electronics	505-765-1500
New York		
Buffalo	Summit Distributors	716-884-3450
Hauppauge	JACO Electronics	516-273-5500
Rochester	Summit Distributors	716-334-8110
Rochester	Hamilton/Avnet Electronics	716-442-7820
Rochester	Schweber Electronics	716-461-4000
E. Syracuse	Hamilton/Avnet Electronics	315-437-2642
Westbury	Hamilton/Avnet Electronics	516-333-5800
Westbury	Schweber Electronics	516-334-7474
North Carolina		
Winston-Salem	Kirkman Electronics	919-724-0541
Ohio		
Beachwood	Schweber Electronics	216-464-2970
Dayton	Pioneer/Dayton	513-236-9900
Dayton	Hamilton/Avnet Electronics	513-433-0610
Cleveland	Hamilton/Avnet Electronics	216-461-1400
Pennsylvania		
Huntington Valley	Hall-Mark Electronics	215-355-7300
Texas		
Dallas	Hamilton/Avnet Electronics	214-661-8661
Dallas	Schweber Electronics	214-661-5010
Houston	Hamilton/Avnet Electronics	713-526-4661
Houston	Schweber Electronics	713-784-3600
Utah		
Salt Lake City	Hamilton/Avnet Electronics	801-262-8451
Washington		
Seattle	Hamilton/Avnet Electronics	206-746-8750
Canada		
Montreal	Hamilton/Avnet Electronics	514-331-6443
Mississauga	Hamilton/Avnet Electronics	416-677-7432
Mississauga	Schweber Electronics	416-678-9050
Ottawa	Hamilton/Avnet Electronics	613-725-3071

UNION CARBIDE CORPORATION

COMPONENTS DEPARTMENT
P. O. Box 5928 — Greenville, South Carolina 29606 — Telephone (803) 963-6300 — TELEX 57-0496

CERAMOLITHIC® CHIP CAPACITORS



HOW TO ORDER

N 050 BI 102 J PS

- DIELECTRIC CHARACTERISTIC[1] — N
- WORKING VOLTS DC[2] — 050
- TYPE — BI
- CAPACITANCE IN PICOFARADS[3] — 102
- TOLERANCE[4] — J
- TERMINATIONS[5] — PS

USCC will supply a **solderable** termination. If a specific termination material is required, see note "4" in ordering information. If solder coated parts are ordered, add .015 to the maximum part length and .010 to the maximum part width and thickness.

1. N = COG Dielectric
   W = X7R Dielectric
   Y = Y5V Dielectric
2. 050 = 50 WVDC
   100 = 100 WVDC
   200 = 200 WVDC
3. 102 = 1,000 pF (.001 Mfd); i.e., third digit signifies number of zeroes. For values below 10pF, use "R" in place of decimal point (1R5 = 1.5pF)
4. Minimum available capacitance tolerances:
   D = ±0.5pF (1pF to 10pF)
   F = ±1% (56pF and above)
   G = ±2% (27pF and above)
   H = ±3% (18pF and above) — COG Dielectric
   J = ±5% (10pF and above)
   K = ±10% (5.6pF and above) — X7R Dielectric
   M = ±20% (2.7pF and above) — Y5V Dielectric
   Z = +80%, −20%
   P = +100%, −0 (GMV)
   NOTE: BB chips available in J,K,M,Z or P tolerances only.
5. PS = Palladium Silver only
   A = Silver only
   S = Solder coat
   G = Gold only
   NOTE: Solder coating not available on BB size.

SPECIFICATIONS

WORKING VOLTAGES: 50/100/200 VDC for the COG dielectric, 50/100 VDC for the X7R and Y5V dielectrics.

TEMPERATURE COEFFICIENTS:
COG Dielectric — 0 ±30 PPM/°C, −55°C to +125°C
X7R Dielectric — ±15% TC, −55°C to +125°C
Y5V Dielectric — +22%, −82%, −30° to +85°C

DISSIPATION FACTORS: .15% for the COG dielectric, 2.5% for the X7R and Y5V dielectrics; maximum at 1kHz, 25°C.

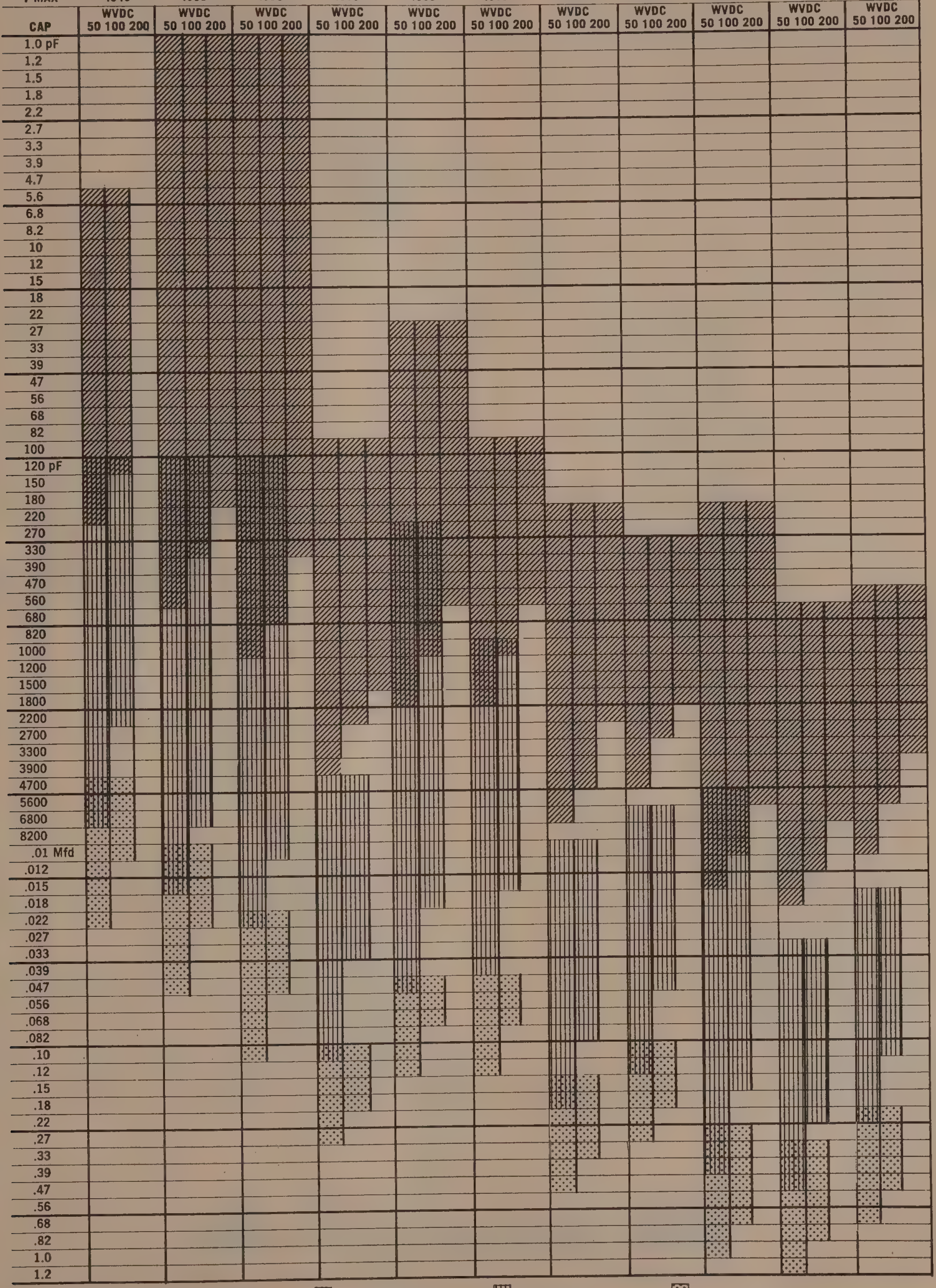
INSULATION RESISTANCE: 100k megohms or 100 megohm-microfarads for the COG dielectric and 100K megohms or 500 megohm-microfarads for the X7R and Y5V dielectrics; whichever is less at +25°C.

DIELECTRIC STRENGTH: 250% of the rated voltage for the COG and X7R dielectrics and 200% of the rated voltage for the Y5V dielectric; 50 ma maximum charging current.

USCC **USCC/Centralab**
Electronics Division ▪ Globe-Union Inc.
4561 Colorado Boulevard ■ Los Angeles, Ca. 90039
(213) 240-4880

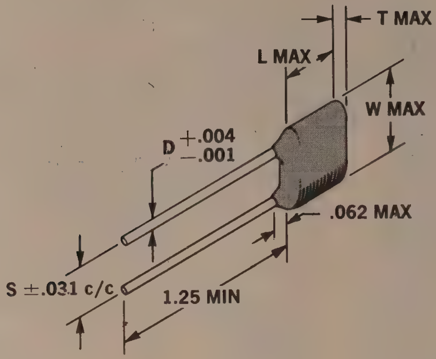
CERAMOLITHIC® CHIP CAPACITORS

TYPE	BB	BC	BF	FH	BI	BJ	HJ	DJ	MJ	LL	FP
A MIN/MAX	.005/.015	.010/.030	.010/.035	.010/.035	.010/.035	.010/.035	.010/.035	.010/.035	.010/.035	.015/.040	.010/.035
L	.050±.006	.080±.010	.100±.010	.125±.010	.150±.010	.180±.015	.175±.015	.180±.015	.180±.015	.225±.015	.350±.015
W	.050±.006	.050±.010	.050±.010	.095±.010	.050±.010	.050±.015	.125±.015	.080±.015	.250±.015	.210±.015	.095±.010
T MAX	.040	.050	.060	.065	.065	.065	.065	.065	.065	.065	.070



ALL DIMENSIONS ARE IN INCHES ▨ COG Dielectric ▥ X7R Dielectric ▦ Y5V Dielectric

MONO-KAP CERAMIC CAPACITORS



HOW TO ORDER

CW20 C 103 K 2

TYPE — CW20

WORKING VOLTS DC[1] — C

CAPACITANCE IN PICOFARADS (pF)[2] — 103

TOLERANCE[3] — K

SPECIAL LEAD SPACING[4] — 2

1. **WVDC AVAILABLE:**
   C = 50 VDC
   A = 100 VDC
   B = 200 VDC (Contact the factory for available capacitance values in 200 VDC units not listed in the catalog.)
2. 103 = 10,000 pF (.01Mfd); i.e., the third digit signifies number of zeros. For values below 10 pF use "R" in place of decimal point (4R7 = 4.7 pF)
3. **MINIMUM AVAILABLE CAPACITANCE TOLERANCES:**
   D = ±0.5 pF (4.7 pF to 10 pF)
   F = ±1% (56 pF and above)
   G = ±2% (27 pF and above)
   H = ±3% (18 pF and above)
   J = ±5% (10 pF and above)
   K = ±10% (5.6 pF and above)
   M = ±20% (4.7 pF and above)
   Z = +80%, −20% (4.7 pF and above)
   P = +100%, −0% (GMV — all values)
4. Special lead spacing available on the .200 X .200 size only — S = .200 instead of .100. To order suffix the standard part number with a "2".

MECHANICAL SPECIFICATIONS

CASE: Epoxy coated

LEAD MATERIAL: Solder coated, copper clad steel.

TERMINAL STRENGTH: Method 211, MIL-STD-202, test condition A (5 pounds)

MARKING: As size permits, the following markings will be used (listed in order of preference)

- Capacitance
- Mfg. Identification
- Tolerance
- Temperature Characteristic
- Voltage

NOTE: Where size is prohibitive, only capacitance will be indicated. Marking one side only.

ENVIRONMENTAL SPECIFICATIONS

BAROMETRIC PRESSURE: Method 105, MIL-STD-202, test condition E (150,000 feet), 100% of rated voltage applied for 5 seconds, current limited to 50 mA.

VIBRATION: Method 204, MIL-STD-202, test condition B (10-2,000 cps; 15 G)

SHOCK: Method 205, MIL-STD-202, test condition C (50 G; 11 ms)

TEMPERATURE CYCLING: Method 107, MIL-STD-202, −55°C to +125°C for COG and X7R dielectrics; −55°C +85°C for Z5U and Y5V dielectrics.

IMMERSION CYCLING: Method 104, MIL-STD-202, test condition A (15 minutes in tap water)

MOISTURE RESISTANCE: Method 106, MIL-STD-202, 10 cycles without loading voltage applied.

LIFE: 200% of rated voltage at +125°C for COG and X7R dielectrics, 150% of rated voltage at +85°C for Z5U and Y5V dielectrics; for 1000 hours.

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(213) 240-4880

MONO—KAP™

100% MONOLITHIC CONSTRUCTION

COG (NPO) CHARACTERISTIC

WORKING VOLTAGE: 50/100/200 VDC
TEMPERATURE COEFFICIENT: 0±30 PPM/°C from −55°C to +125°C (EIA Characteristic COG)
DISSIPATION FACTOR: .15% maximum at 1 kHz, 25°C
INSULATION RESISTANCE: 100 K megohms or 100 megohm-microfarads, whichever is less at 25°C, 100 VDC applied
DIELECTRIC STRENGTH: 250% rated voltage with 50 ma maximum charging current
CAPACITANCE TOLERANCES AVAILABLE: D, F, G, H, J, K, M
NOTE: CN10 J, K, and M only

TYPE	CN10			CN15			CN20			CN30			CN40			CN50		
L	.100			.150			.200			.300			.400			.500		
W	.100			.150			.200			.300			.400			.500		
T	.100			.100			.125			.150			.150			.200		
S	.100			.100			.100*			.200			.200			.400		
D	.016			.016			.020			.020			.020			.025		
CAP	WVDC			WVDC			WVDC			WVDC			WVDC			WVDC		
	50	100	200	50	100	200	50	100	200	50	100	200	50	100	200	50	100	200
4.7 pF	■	▨	■															
5.6	■	■	■	■	■	■												
6.8	■	▨	■	■	■	■												
8.2	■	■	■	■	■	■												
10	■	■	■	■	▨	■												
12	■	■	■	■	■	■	■	■	■									
15	■	■	■	■	▨	■	■	■	■									
18	■	■		■	■	■	■	■	■									
22	■	■		■	▨	■	■	■	■									
27	■	■		■	■	■	■	■	■									
33	■	■		■	▨	■	■	■	■									
39	■	■		■	■	■	■	■	■									
47	■	■		■	▨	■	■	■	■									
56	■	■		■	■		■	■	■									
68 pF	■	■		■	▨		■	■	■									
82	■			■	■		■	■	■									
100	■			■	▨		■	■	■									
120	■			■	■		■	■	■									
150	■			■	▨		■	■	■									
180	■			■	■		■	■	■									
220	■			■	▨		■	■	■									
270				■			■	■	■									
330				■			■	▨	■									
390				■			■	■	■									
470				■			■	▨	■									
560				■			■	■	■									
680							■	▨	■									
820							■	■		■	■	■						
1000							■	▨		■	■	■						
1200							■	■		■	■	■						
1500							■	▨		■	■	■						
1800							■			■	■	■						
2200							■			■	▨	■						
2700							■			■	■		■	■	■			
3300							■			■	▨		■	■	■			
3900										■	■		■	■	■			
4700										■	▨		■	■	■			
5600										■	■		■	■	■			
6800										■	▨		■	■	■			
8200										■			■	■		■	■	■
.01 Mfd										■			■	▨		■	■	■
.012													■			■	■	■
.015													■			■	■	■
.018													■			■	■	■
.022													■			■	■	■
.027																■	■	
.033																■	■	
.039																■		
.047																■		

*Special lead spacing, see note "4" in ordering information for complete details.

ALL DIMENSIONS ARE IN INCHES

X7R CHARACTERISTIC

WORKING VOLTAGE: 50/100 VDC (Contact the factory for available capacitance values in 200 VDC units)
TEMPERATURE COEFFICIENT: ±15% from −55°C to +125°C, (EIA Characteristic X7R)
DISSIPATION FACTOR: 2.5% maximum at 1 kHz, 25°C
INSULATION RESISTANCE: 100 K megohms or 500 megohm-microfarads, whichever is less at 25°C, 100 VDC applied
DIELECTRIC STRENGTH: 250% rated voltage with 50 ma maximum charging current
CAPACITANCE TOLERANCES AVAILABLE: K, M, Z, P

TYPE	CW10		CW15		CW20		CW30		CW40		CW50	
L	.100		.150		.200		.300		.400		.500	
W	.100		.150		.200		.300		.400		.500	
T	.100		.100		.125		.150		.150		.200	
S	.100		.100		.100*		.200		.200		.400	
D	.016		.016		.020		.020		.020		.025	
CAP	WVDC		WVDC		WVDC		WVDC		WVDC		WVDC	
	50	100	50	100	50	100	50	100	50	100	50	100
68 pF	■	■	■	■								
82	■	■	■	■								
100	■	■	■	■								
120	■	■	■	■								
150	■	■	▨	▨								
180	■	■	▨	▨								
220	■	■	▨	▨								
270	■	■	▨	▨								
330	■	■	▨	▨								
390	■	■	▨	▨								
470	■	■	▨	▨								
560	■	■	▨	▨	■	■						
680	■	■	▨	▨	■	■						
820	■	■	▨	▨	■	■						
1000	■	■	▨	▨	■	■						
1200	■	■	▨	▨	■	■						
1500	■	■	▨	▨	■	■						
1800	■	■	▨	▨	■	■						
2200	■		▨	▨	■	■						
2700	■		▨	▨	■	■						
3300	■		▨	▨	■	■						
3900	■		▨	▨	■	■						
4700	■		▨	▨	■	■						
5600	■		■	▨	■	■						
6800			▨		■	▨						
8200			▨		■	▨						
.01 Mfd			▨		■	▨						
.012			▨		■	▨	■	■				
.015			▨		■	▨	■	■				
.018					▨	▨	■	■				
.022					▨	▨	■	■				
.027					▨	▨	■	■				
.033					▨	▨	■	■				
.039					▨		■	▨				
.047					▨		■	▨				
.056					▨		■	▨	■	■		
.068					▨		■	▨	■	■		
.082					▨		■	▨	■	■		
.10					■		▨	▨	■	■		
.12							■	■	■	■	■	■
.15							▨	■	■	▨	■	■
.18							■		■	■	■	■
.22							▨		■	▨	■	■
.27							■		■	■	■	■
.33							■		■	■	■	▨
.39									■		■	■
.47									■		■	▨
.56									■		■	▨
.68									■		■	
.82											■	
1.0											■	

▨ DISTRIBUTOR PRODUCT ITEMS

MONO-KAP™ CERAMIC CAPACITORS

Z5U CHARACTERISTIC

WORKING VOLTAGE: 50/100 VDC (Contact the factory for available capacitance values in 200 VDC units.)

TEMPERATURE COEFFICIENT: +22%, −56% from +10°C to +85°C (EIA Characteristic Z5U) see graph on page 3.

DISSIPATION FACTOR: 2.5% maximum at 1 kHz, 25°C

INSULATION RESISTANCE: 100 K megohms or 500 megohm-microfarads, whichever is less at 25°C, 100 VDC applied

DIELECTRIC STRENGTH: 200% rated voltage with 50 ma maximum charging current

CAPACITANCE TOLERANCES AVAILABLE: M, Z, P

TYPE	CZ10	CZ15	CZ20	CZ30	CZ40	CZ50
L	.100	.150	.200	.300	.400	.500
W	.100	.150	.200	.300	.400	.500
T	.100	.100	.125	.150	.150	.200
S	.100	.100	.100*	.200	.200	.400
D	.016	.016	.020	.020	.020	.025

CAP	WVDC 50	100	WVDC 50	100	WVDC 50	100	WVDC 50	100	WVDC 50	100	WVDC 50	100
1000 pF	■	■										
1200	■	■										
1500	■	■	■	■								
1800	■	■	■	■								
2200	■	■	■	■								
3300	■	■	■	■								
3900	■	■	■	■								
4700	■	■	■	■								
5600	■	■	■	■								
6800	■	■	■	■								
8200	■		■	■								
.01 Mfd	■		■	■								
.012	■		■	■								
.015			■	■								
.018			■	■								
.022			■		■	■						
.033			■		■	■	■	■				
.039			■		■	■	■	■				
.047					■	■	■	■				
.056					■	■	■	■				
.068					■	■	■	■				
.082					■	■	■	■				
.100					■	■	■	■				
.12					■	■	■	■				
.15					■		■	■				
.18					■		■	■				
.22					■		■	■				
.33							■	■				
.39							■	■				
.47							■	■				
.56							■	■				
.68							■		■	■		
.82							■		■	■		
1.0							■		■	■	■	■
1.2							■		■	■	■	■
1.5									■		■	■
1.8									■		■	■
2.2									■		■	■
3.3											■	
3.9											■	
4.7											■	

Y5V CHARACTERISTIC

WORKING VOLTAGE: 50/100 VDC (Contact the factory for available capacitance values in 200 VDC units.)

TEMPERATURE COEFFICIENT: +22%, −82% from −30° to +85°C (EIA Characteristic Y5V) see graph on page 3.

DISSIPATION FACTOR: 2.5% maximum at 1 kHz, 25°C

INSULATION RESISTANCE: 100 K megohms or 500 megohm-microfarads, whichever is less at 25°C, 100 VDC applied

DIELECTRIC STRENGTH: 200% rated voltage with 50 ma maximum charging current

CAPACITANCE TOLERANCES AVAILABLE: M, Z, P

TYPE	CY10	CY15	CY20	CY30	CY40	CY50
L	.100	.150	.200	.300	.400	.500
W	.100	.150	.200	.300	.400	.500
T	.100	.100	.125	.150	.150	.200
S	.100	.100	.100*	.200	.200	.400
D	.016	.016	.020	.020	.020	.025

CAP	WVDC 50	100	WVDC 50	100	WVDC 50	100	WVDC 50	100	WVDC 50	100	WVDC 50	100
270 pF	■	■	■	■								
330	■	■	■	■								
470	■	■	▨	■								
680	■	■	▨	■								
1000	■	■	▨	■								
1500	■	■	▨	■								
1800	■	■	■	■								
2200	■	■	▨	■								
2700	■	■	■	■								
3300	■	■	▨	■	■	■						
4700	■	■	▨	■	■	■						
6800	■	■	▨	▨	■	■						
.01 Mfd	■	■	▨	▨	■	■						
.015	■		▨	▨	■	■						
.022	■		▨	▨	■	■						
.027			■	■	■	■	■	■				
.033			▨	▨	■	■	■	■				
.047			▨		■	▨	■	■				
.068			▨		■	▨	■	■				
.1					▨	▨	■	■				
.15					▨	▨	■	■	■	■		
.22					▨	▨	■	■	■	■		
.27					■		■	■	■	■		
.33					▨		■	▨	■	■	■	■
.47					▨		■	▨	■	■	■	■
.68							▨	▨	■	■	■	■
1.0							▨	▨	■	■	■	■
1.5							▨		■	▨	■	■
2.2							▨		■	▨	■	■
3.3									▨		■	■
4.7											■	
6.8											■	
10.0											■	

▨ DISTRIBUTOR PRODUCT ITEMS

USCC **USCC/Centralab**

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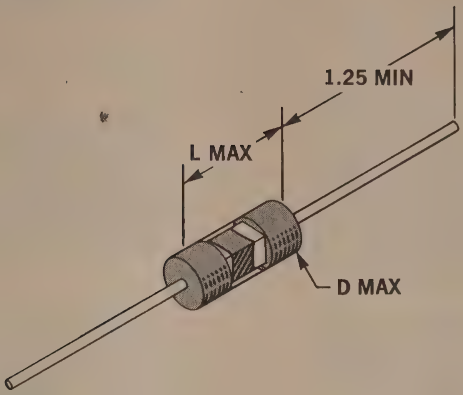
ALL DIMENSIONS ARE IN INCHES

MONO–GLASS CERAMIC CAPACITORS



HOW TO ORDER

C40 C 103 K

SERIES

WORKING VOLTS DC[1]

CAPACITANCE IN PICOFARADS (pF)[2]

TOLERANCE[3]

1. **WVDC AVAILABLE:**
   C = 50 VDC
   A = 100 VDC
2. 103 = 10,000 pF (.01 mfd); i.e., the third digit signifies number of zeros. For values below 10 pF use "R" in place of decimal point (4R7 = 4.7 pF)
3. **MINIMUM AVAILABLE CAPACITANCE TOLERANCES:**
   D = ±0.5 pF (1-10 pF)
   J = ±5% (10 pF and above)
   K = ±10% (5.6 pF and above)
   M = ±20% (2.7 pF and above)
   Z = +80%, −20% (all values)
   P = +100%, −0% (GMV — all values)

MECHANICAL SPECIFICATIONS

CASE: Glass to metal seal
LEAD MATERIAL: .025" dia. — Solderable lead
MARKING:
Parts will be marked with the following:
"USCC"
Capacitance
Tolerance Letter Designation
Voltage
NOTE: When space permits, the dielectric will be indicated.

ENVIRONMENTAL SPECIFICATIONS

BAROMETRIC PRESSURE: Method 105, MIL-STD-202, test condition E (150,000 feet), 100% of rated voltage applied for 5 seconds, current limited to 50 mA.

VIBRATION: Method 204, MIL-STD-202, test condition B (10-2,000 cps; 15 G)

SHOCK: Method 205, MIL-STD-202, test condition C (50 G; 11 ms)

TEMPERATURE CYCLING: Method 107, MIL-STD-202, −55°C to +125°C for COG and X7R dielectrics; −55°C +85°C for Z5U and Y5V dielectrics.

IMMERSION CYCLING: Method 104, MIL-STD-202, test condition A (15 minutes in tap water)

MOISTURE RESISTANCE: Method 106, MIL-STD-202, 10 cycles without loading voltage applied.

LIFE: 200% of rated voltage at +125°C for COG and X7R dielectrics, 150% of rated voltage at +85°C for Z5U and Y5V dielectrics; for 1000 hours.

USCC **USCC/Centralab**
Electronics Division ▪ Globe-Union Inc.
4561 Colorado Boulevard ▪ Los Angeles, Ca. 90039
(213) 240-4880

MONO-GLASS

GLASS ENCAPSULATED
CERAMIC CAPACITOR

C40 SERIES

COG (NPO) CHARACTERISTIC

WORKING VOLTAGE: 50/100 VDC
TEMPERATURE COEFFICIENT: 0 ±30 PPM/°C, −55°C to +125°C (EIA Characteristic COG);
DISSIPATION FACTOR: .15% maximum at 1 kHz, 25°C
INSULATION RESISTANCE: 100 K megohms or 100 megohm-microfarads, whichever is less at 25°C, at rated voltage
DIELECTRIC STRENGTH: 250% rated voltage with 50 ma maximum charging current
CAPACITANCE TOLERANCES AVAILABLE: D, J, K, M.
NOTE: These represent the most competitive tolerances in standard case sizes. For tolerances below ±5% in capacitance values above 10pF, contact the factory for unit dimensions.

L MAX D MAX	.200 .100		.250 .100		.300 .150		.400 .150	
CAP	WVDC 50	100	WVDC 50	100	WVDC 50	100	WVDC 50	100
1.0 pF	▨	▨						
1.2	▨	▨						
1.5	▨	▨						
1.8	▨	▨						
2.2	▨	▨						
2.7	▨	▨						
3.3	▨	▨						
3.9	▨	▨						
4.7	▨	▨						
5.6	▨	▨						
6.8	▨	▨						
8.2	▨	▨						
10	▨	▨						
12	▨	▨						
15	▨	▨						
18	▨	▨						
22	▨	▨						
27	▨	▨						
33	▨	▨						
39	▨	▨						
47	▨	▨						
56	▨	▨						
68	▨	▨						
82	▨	▨						
100 pF	▨	▨						
120	▨	▨						
150	▨	▨						
180	▨	▨						
220	▨	▨						
270	▨	▨						
330	▨	▨						
390	▨			▨				
470	▨			▨				
560			▨	▨				
680			▨	▨				
820			▨			▨		
1000			▨			▨		
1200					▨	▨		
1500					▨	▨		
1800					▨	▨		
2200					▨	▨		
2700					▨	▨		
3300					▨	▨		
3900					▨	▨		
4700					▨			▨
5600					▨			▨
6800							▨	▨
8200							▨	
.01 Mfd							▨	

C41 SERIES

X7R (W) CHARACTERISTICS

WORKING VOLTAGE: 50/100 VDC
TEMPERATURE COEFFICIENT: ±15% from −55°C to +125°C (EIA Characteristic X7R)
DISSIPATION FACTOR: 2.5% maximum at 1 kHz, 25°C
INSULATION RESISTANCE: 100 K megohms or 500 megohm-microfarad whichever is less at 25°C, at rated voltage
DIELECTRIC STRENGTH: 250% rated voltage with 50 ma maximum charging current
CAPACITANCE TOLERANCES AVAILABLE: K, M, Z, P

L MAX D MAX	.200 .100		.250 .100		.300 .150		.400 .150	
CAP	WVDC 50	100	WVDC 50	100	WVDC 50	100	WVDC 50	100
100 pF	▨	▨						
120	▨	▨						
150	▨	▨						
180	▨	▨						
220	▨	▨						
270	▨	▨						
330	▨	▨						
390	▨	▨						
470	▨	▨						
560	▨	▨						
680	▨	▨						
820	▨	▨						
1000	▨	▨						
1200	▨	▨						
1500	▨	▨						
1800	▨	▨						
2200	▨	▨						
2700	▨	▨						
3300	▨			▨				
3900	▨			▨				
4700	▨					▨		
5600	▨					▨		
6800	▨					▨		
8200	▨					▨		
.01 Mfd	▨					▨		
.012			▨			▨		
.015			▨			▨		
.018					▨	▨		
.022					▨	▨		
.027					▨	▨		
.033					▨	▨		
.039					▨	▨		
.047					▨	▨		
.056					▨			▨
.068					▨			▨
.082					▨			▨
.10					▨			
.12							▨	
.15							▨	
.18							▨	

ALL DIMENSIONS
ARE IN INCHES

MONO-GLASS CERAMIC CAPACITORS

C42 SERIES

Y5V CHARACTERISTIC

WORKING VOLTAGE: 50/100 VDC
TEMPERATURE COEFFICIENT: +22%, −82% from − 30°C to +85°C (EIA Characteristic Y5V)
DISSIPATION FACTOR: 2.5% maximum at 1 kHz, 25°C
INSULATION RESISTANCE: 100 K megohms or 500 megohm-microfarad, whichever is less at 25°C, at rated voltage
DIELECTRIC STRENGTH: 200% rated voltage with 50 ma maximum charging current
CAPACITANCE TOLERANCES AVAILABLE: M, Z, P

L MAX D MAX	.200 .100		.250 .100		.300 .150		.400 .150	
	WVDC		WVDC		WVDC		WVDC	
CAP	50	100	50	100	50	100	50	100
1000	▨	▨						
1200	▨	▨						
1500	▨	▨						
1800	▨	▨						
2200	▨	▨						
2700	▨	▨						
3300	▨	▨						
3900	▨	▨						
4700	▨	▨						
5600	▨	▨						
6800	▨	▨						
8200	▨	▨						
.01 Mfd	▨	▨						
.012	▨			▨				
.015	▨			▨				
.018	▨			▨				
.022	▨			▨				
.027	▨					▨		
.033	▨					▨		
.039	▨					▨		
.047	▨					▨		
.056			▨			▨		
.068			▨			▨		
.082			▨			▨		
.10			▨			▨		
.12					▨	▨		
.15					▨	▨		
.18					▨	▨		
.22					▨	▨		
.27					▨			▨
.33					▨			▨
.39					▨			▨
.47					▨			▨
.56							▨	
.68							▨	
.82							▨	
1.0							▨	

C43 SERIES

Z5U CHARACTERISTIC

WORKING VOLTAGE: 50/100 VDC
TEMPERATURE COEFFICIENT: +22%, −56% from +10°C to +85°C (EIA Characteristic Z5U)
DISSIPATION FACTOR: 2.5% maximum at 1 kHz, 25°C
INSULATION RESISTANCE: 100 K megohms or 500 megohm-microfarads, whichever is less at 25°C, 100 VDC applied
DIELECTRIC STRENGTH: 200% rated voltage with 50 ma maximum charging current
CAPACITANCE TOLERANCES AVAILABLE: M, Z, P

L MAX D MAX	.200 .100		.250 .100		.300 .150		.400 .150	
	WVDC		WVDC		WVDC		WVDC	
CAP	50	100	50	100	50	100	50	100
560 pF	▨	▨						
680	▨	▨						
820	▨	▨						
1000	▨	▨						
1200	▨	▨						
1500	▨	▨						
1800	▨	▨						
2200	▨	▨						
2700	▨	▨						
3300	▨	▨						
3900	▨	▨						
4700	▨	▨						
5600	▨			▨				
6800	▨			▨				
8200	▨			▨				
.01 Mfd	▨			▨				
.012	▨					▨		
.015	▨					▨		
.018	▨					▨		
.022	▨					▨		
.027			▨			▨		
.033			▨			▨		
.039			▨			▨		
.047			▨			▨		
.056			▨			▨		
.068			▨			▨		
.082			▨			▨		
.10			▨			▨		
.12					▨	▨		
.15					▨	▨		
.18					▨	▨		
.22					▨			▨
.27					▨			▨
.33					▨			▨
.39							▨	
.47							▨	
.56							▨	
.68							▨	

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ALL DIMENSIONS ARE IN INCHES

VARADYNE

TYPE BP CAPACITORS ULTRA-STABLE NPO

SPECIFICATIONS

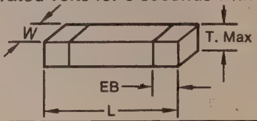
Capacitance: 1.0 pf thru 100 pf measured at 1.0 VRMS, 1.0 MHz. Over 100 pf measured at 1.0 VRMS, 1.0 KHz.

Dissipation Factor: 0.15% max. measured at 1.0 VRMS, 1.0 MHz, 1.0 pf thru 100 pf. Over 100 pf measured at 1.0 VRMS, 1.0 KHz.

Insulation Resistance: 100,000 Megohms or 1,000 Megohm-mfd whichever is less @ 25°C: 10,000 Megohms or 100 Megohm-mfd whichever is less @ 125°C.

Dielectric Strength: 250% rated volts for 5 seconds with 50 ma max current.

L = Length W = Width
T. Max = Thickness (max)
EB = Electrode Band



HOW TO ORDER

3 BP 050 S 101 J ( )

- Size — 3
- Dielectric — BP
- DC working volts (50 or 100) — 050
- Chip capacitor — S
- Capacitance code, pf (ex 100 pf) — 101
- Tolerance: K ± 10%, J ± 5%, G ± 2%, F ± 1%; Under 10 pf, C ± .25 pf, D ± .5 pf — J
- Standard termination is silver. No letter required. For non-standard terminations use following: (D) Palladium Silver or (S) Solder coated readily available. (G) Gold and (P) Platinum Gold special order. — ( )

Size	1		2		3		4		5		6		18		10		14		Capacitance Code (EIA)
Length	.050 ± .005		.075 ± .005		.095 ± .010		.150 ± .010		.120 ± .010		.170 ± .010		.195 ± .010		.220 ± .015		.245 ± .015		
Width	.050 ± .005		.045 ± .005		.050 ± .010		.050 ± .010		.095 ± .010		.070 ± .010		.125 ± .010		.230 ± .015		.225 ± .015		
Thickness Max.	.050		.050		.060		.050		.065		.070		.070		.070		.080		
Electrode Band	.005/.020		.010/.030		.010/.030		.010/.030		.010/.030		.010/.035		.025/.045		.020/.050		.020/.050		
Volts	50	100	50	100	50	100	50	100	50	100	50	100	50	100	50	100	50	100	
1.0 8.2	■	■	■	■	■	■	■	■											IRO 8R2
10	■	■	■	■	■	■	■	■	■	■									100
12	■	■	■	■	■	■	■	■	■	■									120
15	■	■	■	■	■	■	■	■	■	■									150
18	■	■	■	■	■	■	■	■	■	■									180
22	■	■	■	■	■	■	■	■	■	■									220
27	■	■	■	■	■	■	■	■	■	■									270
33	■	■	■	■	■	■	■	■	■	■									330
39	■	■	■	■	■	■	■	■	■	■									390
47	■	■	■	■	■	■	■	■	■	■	■	■							470
56	■	■	■	■	■	■	■	■	■	■	■	■							560
68	■	■	■	■	■	■	■	■	■	■	■	■							680
82	■	■	■	■	■	■	■	■	■	■	■	■							820
100	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■			101
120	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■			121
150	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■			151
180	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■			181
220	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■			221
270	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■			271
330	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■			331
390	■		■	■	■	■	■	■	■	■	■	■	■	■	■	■			391
470	■		■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	471
560	■		■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	561
680			■		■	■	■	■	■	■	■	■	■	■	■	■	■	■	681
820			■		■	■	■	■	■	■	■	■	■	■	■	■	■	■	821
1000					■		■	■	■	■	■	■	■	■	■	■	■	■	102
1200					■		■	■	■	■	■	■	■	■	■	■	■	■	122
1500							■	■	■	■	■	■	■	■	■	■	■	■	152
1800							■	■	■	■	■	■	■	■	■	■	■	■	182
2200							■		■	■	■	■	■	■	■	■	■	■	222
2700							■		■	■	■	■	■	■	■	■	■	■	272
3300									■	■	■		■	■	■	■	■	■	332
3900									■	■	■		■	■	■	■	■	■	392
4700									■		■		■	■	■	■	■	■	472
5600									■				■	■	■	■	■	■	562
6800									■				■		■	■	■	■	682
8200													■		■	■	■	■	822
.01 mfd															■	■	■	■	103
.012															■	■	■	■	123
.015															■	■	■	■	153
.018															■	■	■	■	183
.022															■		■	■	223
.027															■		■	■	273
.033																	■		333
.039																	■		393
.047																	■		473
.056																	■		563
.068																			683
.082																			823
.100																			104

Note: Sizes shown are popular standards. Varadyne maintains in-depth stock of these sizes. Other sizes to .082 mfd in type BP are available on special order.

VARADYNE INDUSTRIES, INC., 1547 18th STREET, SANTA MONICA, CALIFORNIA 90404 • (213) 829-2984 TWX (910) 343-6856

VARADYNE

TYPE BX CHIP CAPACITORS STABLE (±15%) EIA CHAR. X7R

SPECIFICATIONS

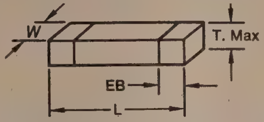
Capacitance: Per table measured at 1.0 VRMS, 1.0 KHz, 25°C.

Dissipation Factor: 2.0% max at 1.0 VRMS, 1.0 KHz, 25°C.

Insulation Resistance: 100,000 megohms or 1,000 megohm-mfd whichever is less @ 25°C; 10,000 megohms or 100 megohm-mfd whichever is less at 125°C.

Dielectric Strength: 250% rated volts for 5 seconds with 50 ma max current.

L = Length W = Width
T. Max = Thickness (max)
EB = Electrode Band



HOW TO ORDER 3 BX 050 S 103 K ( )

- Size — 3
- Dielectric — BX
- DC working volts (50 or 100) — 050
- Chip capacitor — S
- Capacitance code, pf (ex 10,000pf) — 103
- Tolerance: J = ± 5%, K = ± 10%, M = ± 20% — K
- Standard termination is silver. No letter required. For non-standard terminations use following: (D) Palladium Silver or (S) Solder coated readily available. (G) Gold and (P) Platinum Gold special order. — ( )

Size	1		2		3		4		5		6		18		10		14		
Length	.050 ± .005		.075 ± .005		.095 ± .010		.150 ± .010		.120 ± .010		.170 ± .010		.195 ± .010		.220 ± .015		.245 ± .015		
Width	.050 ± .005		.045 ± .005		.050 ± .010		.050 ± .010		.095 ± .010		.070 ± .010		.125 ± .010		.230 ± .015		.225 ± .015		
Thickness Max.	.050		.050		.060		.050		.065		.070		.070		.070		.080		
Electrode Band	.005/.020		.010/.030		.010/.030		.010/.030		.010/.030		.010/.035		.025/.045		.020/.050		.020/.050		
Volts	50	100	50	100	50	100	50	100	50	100	50	100	50	100	50	100	50	100	Capacitance Code (EIA)
120 pf	■	■	■	■	■	■	■	■											121
150	■	■	■	■	■	■	■	■											151
180	■	■	■	■	■	■	■	■											181
220	■	■	■	■	■	■	■	■											221
270	■	■	■	■	■	■	■	■	■	■									271
330	■	■	■	■	■	■	■	■	■	■	■	■							331
390	■	■	■	■	■	■	■	■	■	■	■	■							391
470	■	■	■	■	■	■	■	■	■	■	■	■							471
560	■	■	■	■	■	■	■	■	■	■	■	■							561
680	■	■	■	■	■	■	■	■	■	■	■	■							681
820	■	■	■	■	■	■	■	■	■	■	■	■							821
1000	■	■	■	■	■	■	■	■	■	■	■	■							102
1200	■	■	■	■	■	■	■	■	■	■	■	■							122
1500	■	■	■	■	■	■	■	■	■	■	■	■							152
1800	■	■	■	■	■	■	■	■	■	■	■	■							182
2200	■	■	■	■	■	■	■	■	■	■	■	■	■	■					222
2700	■	■	■	■	■	■	■	■	■	■	■	■	■	■					272
3300	■	■	■	■	■	■	■	■	■	■	■	■	■	■					332
3900	■	■	■	■	■	■	■	■	■	■	■	■	■	■					392
4700	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■			472
5600	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	562
6800	■		■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	682
8200	■		■		■	■	■	■	■	■	■	■	■	■	■	■	■	■	822
.01 mfd	■		■		■	■	■	■	■	■	■	■	■	■	■	■	■	■	103
.012			■		■		■	■	■	■	■	■	■	■	■	■	■	■	123
.015			■		■		■	■	■	■	■	■	■	■	■	■	■	■	153
.018					■		■	■	■	■	■	■	■	■	■	■	■	■	183
.022					■		■	■	■	■	■	■	■	■	■	■	■	■	223
.027					■		■		■	■	■	■	■	■	■	■	■	■	273
.033							■		■	■	■	■	■	■	■	■	■	■	333
.039							■		■	■	■		■	■	■	■	■	■	393
.047							■		■	■	■		■	■	■	■	■	■	473
.056									■		■		■	■	■	■	■	■	563
.068									■		■		■	■	■	■	■	■	683
.082									■				■	■	■	■	■	■	823
.10									■				■		■	■	■	■	104
.12													■		■	■	■	■	124
.15													■		■	■	■	■	154
.18													■		■	■	■	■	184
.22															■	■	■	■	224
.27															■		■	■	274
.33															■		■	■	334
.39															■		■		394
.47															■		■		474
.56																	■		564
.68																	■		684
.82																	■		824
1.0																	■		105
1.2																			125
1.5																			155
1.8																			185

Note: Sizes shown are popular standards. Varadyne maintains in-depth stock of these sizes. Other sizes to 2.2 mfd in type BX are available on special order.

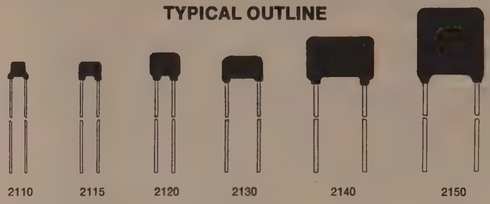
VARADYNE INDUSTRIES, INC., 1547 18th STREET, SANTA MONICA, CALIFORNIA 90404 • (213) 829-2984 TWX (910) 343-6856

VARADYNE

50 VOLT STABLE (15%TC) MONOLITHIC CAPACITORS

Recommended where good stability of capacitance is required with changes in voltage, temperature and frequency.

TYPICAL OUTLINE



CAP	VARADYNE PART NO.*		L	W	T	S*	D*
120	2110BR	050R121 K or M	.100	.100	.100	.100	.016
150	2110BR	050R151 K or M	.100	.100	.100	.100	.016
180	2110BR	050R181 K or M	.100	.100	.100	.100	.016
220	2110BR	050R221 K or M	.100	.100	.100	.100	.016
270	2110BR	050R271 K or M	.100	.100	.100	.100	.016
330	2110BR	050R331 K or M	.100	.100	.100	.100	.016
390	2115BR	050R391 K or M	.150	.150	.100	.100	.016
470	2115BR	050R471 K or M	.150	.150	.100	.100	.016
560	2115BR	050R561 K or M	.150	.150	.100	.100	.016
680	2115BR	050R681 K or M	.150	.150	.100	.100	.016
820	2115BR	050R821 K or M	.150	.150	.100	.100	.016
1000	2120BR	050R102 K or M	.200	.200	.125	.100 or .250	.016 or .020
1200	2120BR	050R122 K or M	.200	.200	.125	.100 or .250	.016 or .020
1500	2120BR	050R152 K or M	.200	.200	.125	.100 or .250	.016 or .020
1800	2120BR	050R182 K or M	.200	.200	.125	.100 or .250	.016 or .020
2200	2120BR	050R222 K or M	.200	.200	.125	.100 or .250	.016 or .020
2700	2120BR	050R272 K or M	.200	.200	.125	.100 or .250	.016 or .020
3300	2120BR	050R332 K or M	.200	.200	.125	.100 or .250	.016 or .020
3900	2120BR	050R392 K or M	.200	.200	.125	.100 or .250	.016 or .020
4700	2120BR	050R472 K or M	.200	.200	.125	.100 or .250	.016 or .020
5600	2120BR	050R562 K or M	.200	.200	.125	.100 or .250	.016 or .020
6800	2120BR	050R682 K or M	.200	.200	.125	.100 or .250	.016 or .020
8200	2120BR	050R822 K or M	.200	.200	.125	.100 or .250	.016 or .020
.01	2120BR	050R103 K or M	.200	.200	.125	.100 or .250	.016 or .020
.012	2130BR	050R123 K or M	.300	.300	.150	.200 or .375	.020 or .025
.015	2130BR	050R153 K or M	.300	.300	.150	.200 or .375	.020 or .025
.018	2130BR	050R183 K or M	.300	.300	.150	.200 or .375	.020 or .025
.022	2130BR	050R223 K or M	.300	.300	.150	.200 or .375	.020 or .025
.027	2130BR	050R273 K or M	.300	.300	.150	.200 or .375	.020 or .025
.033	2130BR	050R333 K or M	.300	.300	.150	.200 or .375	.020 or .025
.039	2130BR	050R393 K or M	.300	.300	.150	.200 or .375	.020 or .025
.047	2130BR	050R473 K or M	.300	.300	.150	.200 or .375	.020 or .025
.056	2130BR	050R563 K or M	.300	.300	.150	.200 or .375	.020 or .025
.068	2130BR	050R683 K or M	.300	.300	.150	.200 or .375	.020 or .025
.082	2130BR	050R823 K or M	.300	.300	.150	.200 or .375	.020 or .025
.1	2130BR	050R104 K or M	.300	.300	.150	.200 or .375	.020 or .025
.12	2130BR	050R124 K or M	.300	.300	.150	.200 or .375	.020 or .025
.15	2130BR	050R154 K or M	.300	.300	.150	.200 or .375	.020 or .025
.18	2130BR	050R184 K or M	.300	.300	.150	.200 or .375	.020 or .025
.22	2130BR	050R224 K or M	.300	.300	.150	.200 or .375	.020 or .025
.27	2140BR	050R274 K or M	.400	.400	.150	.200 or .375	.020 or .025
.33	2140BR	050R334 K or M	.400	.400	.150	.200 or .375	.020 or .025
.39	2140BR	050R394 K or M	.400	.400	.150	.200 or .375	.020 or .025
.47	2140BR	050R474 K or M	.400	.400	.150	.200 or .375	.020 or .025
.56	2140BR	050R564 K or M	.400	.400	.150	.200 or .375	.020 or .025
.68	2150BR	050R684 K or M	.500	.500	.200	.375 or .400	.020 or .025
.82	2150BR	050R824 K or M	.500	.500	.200	.375 or .400	.020 or .025
1.0	2150BR	050R105 K or M	.500	.500	.200	.375 or .400	.020 or .025

TEMPERATURE COEFFICIENT

±15% max. change (X7R)
−55° C to +125° C

INSULATION RESISTANCE

2500 Megohm-mfd or 100K Megohms, whichever is less at 25° C initial

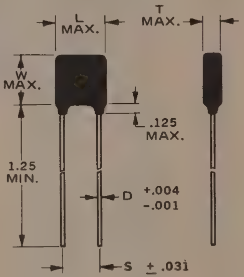
DISSIPATION FACTOR

2.0% MAX when measured per MIL-C-11015

AFTER LIFE TEST, IMMERSION OR MOISTURE:

Insulation Resistance = 250 Megohm-Mfd. or 10K Megohms, whichever is less.

Dissipation Factor = Less Than 2.5%

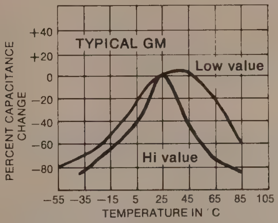


* WHEN ORDERING SPECIFY:

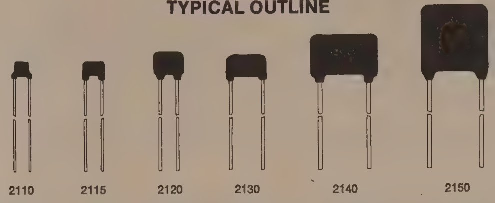
1. TOLERANCE K±10%, M±20%
2. LEAD SPACING
3. LEAD DIAMETER

50 VOLT GENERAL PURPOSE MONOLITHIC CAPACITORS

Varadyne general purpose capacitors are designed for those applications requiring maximum capacitance in minimum case size where wide variations in capacitance due to temperature, voltage and frequency may be tolerated. Parts are made with Varadyne's multilayer monolithic capacitor elements and are epoxy coated for complete environmental protection.



TYPICAL OUTLINE



CAP	VARADYNE PART NO.*	L	W	T	S*	D*
470	2110GM 050R471 M or Z	.100	.100	.100	.100	.016
680	2110GM 050R681 M or Z	.100	.100	.100	.100	.016
1000	2110GM 050R102 M or Z	.100	.100	.100	.100	.016
1500	2110GM 050R152 M or Z	.100	.100	.100	.100	.016
1800	2110GM 050R182 M or Z	.100	.100	.100	.100	.016
2200	2115GM 050R222 M or Z	.150	.150	.100	.100	.016
2700	2115GM 050R272 M or Z	.150	.150	.100	.100	.016
3300	2115GM 050R332 M or Z	.150	.150	.100	.100	.016
4700	2115GM 050R472 M or Z	.150	.150	.100	.100	.016
6800	2120GM 050R682 M or Z	.200	.200	.125	.100 or .250	.016 or .020
.01	2120GM 050R103 M or Z	.200	.200	.125	.100 or .250	.016 or .020
.015	2120GM 050R153 M or Z	.200	.200	.125	.100 or .250	.016 or .020
.022	2120GM 050R223 M or Z	.200	.200	.125	.100 or .250	.016 or .020
.027	2120GM 050R273 M or Z	.200	.200	.125	.100 or .250	.016 or .020
.033	2120GM 050R333 M or Z	.200	.200	.125	.100 or .250	.016 or .020
.047	2120GM 050R473 M or Z	.200	.200	.125	.100 or .250	.016 or .020
.068	2120GM 050R683 M or Z	.200	.200	.125	.100 or .250	.016 or .020
.1	2120GM 050R104 M or Z	.200	.200	.125	.100 or .250	.016 or .020
.15	2120GM 050R154 M or Z	.200	.200	.125	.100 or .250	.016 or .020
.1	2130GM 050R104 M or Z	.300	.300	.150	.200 or .375	.020 or .025
.15	2130GM 050R154 M or Z	.300	.300	.150	.200 or .375	.020 or .025
.22	2130GM 050R224 M or Z	.300	.300	.150	.200 or .375	.020 or .025
.27	2130GM 050R274 M or Z	.300	.300	.150	.200 or .375	.020 or .025
.33	2130GM 050R334 M or Z	.300	.300	.150	.200 or .375	.020 or .025
.47	2130GM 050R474 M or Z	.300	.300	.150	.200 or .375	.020 or .025
.68	2130GM 050R684 M or Z	.300	.300	.150	.200 or .375	.020 or .025
1.0	2130GM 050R105 M or Z	.300	.300	.150	.200 or .375	.020 or .025
1.5	2140GM 050R155 M or Z	.400	.400	.150	.200 or .375	.020 or .025
2.2	2140GM 050R225 M or Z	.400	.400	.150	.200 or .375	.020 or .025
2.7	2140GM 050R275 M or Z	.400	.400	.150	.200 or .375	.020 or .025
3.3	2150GM 050R335 M or Z	.500	.500	.200	.375 or .400	.020 or .025
4.7	2150GM 050R475 M or Z	.500	.500	.200	.375 or .400	.020 or .025

INSULATION RESISTANCE

2500 Megohm-mfd or 10K Megohms, whichever is less at 25° C initial

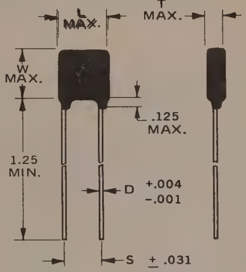
DISSIPATION FACTOR

2.5% MAX when measured per MIL-C-11015

AFTER LIFE TEST, IMMERSION OR MOISTURE:

Insulation Resistance = 250 Megohm-Mfd. or 1000 Megohms, whichever is less.

Dissipation Factor = Less Than 3%



* WHEN ORDERING SPECIFY:

1. TOLERANCE M±20%, Z $^{+80}_{-20}$
2. LEAD SPACING
3. LEAD DIAMETER

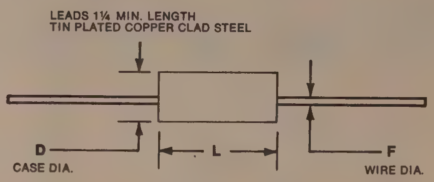
VARADYNE INDUSTRIES, INC., 1547 18th STREET, SANTA MONICA, CALIFORNIA 90404 • (213) 829-2984 TWX (910) 343-6856

VARADYNE

AXIAL LEAD-GLASS CASE MONOLITHIC CERAMIC CAPACITORS

AVAILABLE IN THREE STANDARD CASE SIZES

Style	Dimensions		
	L Max.	D Max.	F
1801	.160	.100	.020 std. 016 opt.
1802	.260	.100	.020 std. 016 opt.
1803	.400	.155	.020 std.



CHOICE OF THREE CERAMIC FORMULATIONS

TYPE BN—ULTRA STABLE NPO

Where complete stability of capacitance is required when changes in temperature frequency and voltage are encountered. Also, where low loss and/or high Q are necessary.

Insulation Resistance: 100,000 megohms or 1,000 megohm-mfd, whichever is less, at 25°C.

10,000 megohms or 100 megohm-mfd, whichever is less at 125°C.

Dissipation Factor: 0.15% max. measured at 1.0 vrms. 1.0 MHz 10 pf through 100 pf. Over 100 pf measured at 1.0 KHz.

Dielectric Strength: 250% rated volts for 5 seconds with 50 ma max. current.

TYPE BR—STABLE X7R

In applications where moderate variations in capacitance due to changes in frequency, temperature and voltage may be tolerated.

Insulation Resistance: 100,000 megohms or 1,000 megohm-mfw, whichever is less at 25°C.

10,000 megohms or 100 megohm-mfd, whichever is less at 125°C.

Dissipation Factor: 2.0% max. measured at 1.0 vrms. 1.0 KHz at 25°C.

Dielectric Strength: 250% rated volts for 5 seconds with 50 ma max. current.

TYPE GM—GENERAL PURPOSE

For use in applications where wide variations in capacitance are acceptable (i.e., by-pass) or where the environment is closely controlled.

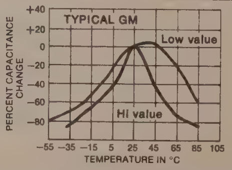
Insulation Resistance: 10,000 megohms or 100 megohm-mfd, whichever is less at 25°C.

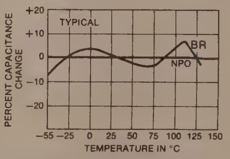
1,000 megohms or 10 megohm-mfd, whichever is less at 85°C.

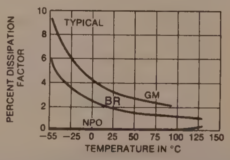
Dissipation Factor: 2.5% max. measured at 1.0 KHz at 25°C.

Dielectric Strength: 250% rated volts for 5 seconds with 50 ma max. current.

Temperature Effects







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VARADYNE

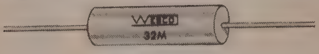
AXIAL LEAD-GLASS CASE MONOLITHIC CERAMIC CAPACITORS

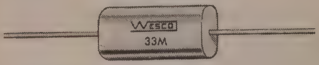
CAP	ULTRA STABLE 50 VOLT NPO	STABLE (15% TC) 50 VOLT X7R	GENERAL PURPOSE 50 VOLT
10	1801 or 1802 BN 050A100 J or K		
12	1801 or 1802 BN 050A120 J or K		
15	1801 or 1802 BN 050A150 J or K		
18	1801 or 1802 BN 050A180 J or K		
22	1801 or 1802 BN 050A220 J or K		
27	1801 or 1802 BN 050A270 J or K		
33	1801 or 1802 BN 050A330 J or K		
39	1801 or 1802 BN 050A390 J or K		
47	1801 or 1802 BN 050A470 J or K		
56	1801 or 1802 BN 050A560 J or K		
68	1801 or 1802 BN 050A680 J or K		
82	1801 or 1802 BN 050A820 J or K		
100	1801 or 1802 BN 050A101 J or K		
120	1801 or 1802 BN 050A121 J or K	1801 or 1802 BR 050A121 K or M	
150	1801 or 1802 BN 050A151 J or K	1801 or 1802 BR 050A151 K or M	
180	1801 or 1802 BN 050A181 J or K	1801 or 1802 BR 050A181 K or M	
220	1801 or 1803 BN 050A221 J or K	1801 or 1802 BR 050A221 K or M	
270	1801 or 1802 BN 050A271 J or K	1801 or 1802 BR 050A271 K or M	
330	1801 or 1802 BN 050A331 J or K	1801 or 1802 BR 050A331 K or M	
390	1801 or 1802 BN 050A391 J or K	1801 or 1802 BR 050A391 K or M	
470	1801 or 1802 BN 050A471 J or K	1801 or 1802 BR 050A471 K or M	
560	1801 or 1802 BN 050A561 J or K	1801 or 1802 BR 050A561 K or M	
680	1801 or 1802 BN 050A681 J or K	1801 or 1802 BR 050A681 K or M	
820	1802 or 1803 BN 050A821 J or K	1801 or 1802 BR 050A821 K or M	
1000	1802 or 1803 BN 050A102 J or K	1801 or 1802 BR 050A102 K or M	
1200	1802 or 1803 BN 050A122 J or K	1801 or 1802 BR 050A122 K or M	
1500	1802 or 1803 BN 050A152 J or K	1801 or 1802 BR 050A152 K or M	
1800	1802 or 1803 BN 050A182 J or K	1801 or 1802 BR 050A182 K or M	
2200	1803 BN 050A222 J or K	1801 or 1802 BR 050A222 K or M	
2700	[illegible]	1801 or 1802 BR 050A272 K or M	
3300	[illegible]	1801 or 1802 BR 050A332 K or M	
3900	[illegible]	1801 or 1802 BR 050A392 K or M	
4700	[illegible]	1801 or 1802 BR 050A472 K or M	
5600	[illegible]	1801 or 1802 BR 050A562 K or M	
6800	[illegible]	1801 or 1802 BR 050A682 K or M	
8200	[illegible]	1801 or 1802 BR 050A822 K or M	
.01	[illegible] BN 050A103 J or K	1801 or 1802 BR 050A103 K or M	
.012		1801 or 1802 BR 050A123 K or M	1801 or 1802 GM 050A123 M or Z
.015		1801 or 1802 BR 050A153 K or M	1801 or 1802 GM 050A153 M or Z
.018		1802 BR 050A183 K or M	1801 or 1802 GM 050A183 M or Z
.022		1802 BR 050A223 K or M	1801 or 1802 GM 050A223 M or Z
.027		1802 BR 050A273 K or M	1801 or 1802 GM 050A273 M or Z
.033		1802 BR 050A333 K or M	1801 or 1802 GM 050A333 M or Z
.039		1802 BR 050A393 K or M	1801 or 1802 GM 050A393 M or Z
.047		1802 BR 050A473 K or M	1801 or 1802 GM 050A473 M or Z
.056		[illegible]	1802 or 1803 GM 050A563 M or Z
.068		[illegible]	1802 or 1803 GM 050A683 M or Z
.082		[illegible]	1802 or 1803 GM 050A823 M or Z
.1		[illegible]	1802 or 1803 GM 050A104 M or Z
.12		[illegible]	1802 or 1803 GM 050A124 M or Z
.15		[illegible]	1803 GM 050A154 M or Z
.18		[illegible]	[illegible] M or Z
.22		[illegible]	[illegible] M or Z
.27		[illegible]	[illegible] M or Z
.33			[illegible] M or Z
.39			[illegible] M or Z
.47			[illegible] M or Z
.56			[illegible] M or Z
.68			[illegible] M or Z
.82			[illegible] M or Z
1.0			[illegible]

VARADYNE INDUSTRIES, INC., 1547 18th STREET, SANTA MONICA, CALIFORNIA 90404 • (213) 829-2984 TWX (910) 343-6856

WESCO®

MYLAR* FILM-FOIL CAPACITORS





SPECIFICATIONS

DIELECTRIC WITHSTANDING VOLTAGE

200% of rated voltage applied through a minimum limiting resistance of 100 Ohms/Volt. Duration of voltage stress shall be 15 seconds minimum and 1 minute maximum at 25°C.

TEMPERATURE RANGE

−55°C to +85°C with full rated voltage applied. To +125°C with 50% of rated voltage.

INSULATION RESISTANCE

At 25°C after 2 minutes of electrification at rated voltage or 500 VDC, whichever is less, the minimum product of Insulation Resistance and Capacitance shall be 100,000 megohms-microfarads, but need not exceed 100,000 megohms.

DISSIPATION FACTOR

Shall not exceed 0.75% when measured at 25°C and 1000 Hz, ±20 Hz. See characteristic curves for D.F. ratings at other temperatures.

CAPACITANCE AND TOLERANCE

Shall be measured within the tolerance limits specified. Measurements will be made at 25°C and 1000 Hz ±20 Hz.

LIFE TEST

Shall withstand 140% of rated voltage at 85°C for 250 hours. One failure in twelve shall be permitted.

CAPACITANCE STABILITY (DRIFT)

Less than 0.50% when measured in the following manner: three capacitance readings at 25°C, each made prior to and after temperature cycling from room to 80°C, and room to −55°C. The mathematical difference between the two extremes, divided by the intermediate value, and then multiplied by 100, yields the stability expressed in percent.

HUMIDITY RESISTANCE

Meets requirements of Mil-C-27287,, Para. 3.12 when tested in accordance with Mil-STD.-202C, Method 103 B, Condition B.

LEAD PULL AND BEND TEST

Steady pull of 5 pounds applied axially to leads for one minute. Bend test shall consist of one bend from the point of egress, first 90° in one direction, back to the original axial position, and then 90° in the opposite direction with no evidence of breakage.

FEATURES

Wrap and fill construction.
Tubular or oval configuration for optimum space savings.
Extended foil design.
Quality control procedures per Mil-Q-9858.
Will meet or exceed Mil-C-27287.

APPLICATIONS

Computers
Data Processing Equipment
Peripheral Equipment
Aircraft and Missile Systems
Industrial Instrumentation
Navigation and Distance Measuring Equipment
Communications Equipment
Filters

TYPE 32M RATINGS AND DIMENSIONS

Capacity in Mfds.	100 VOLTS			200 VOLTS			400 VOLTS			600 VOLTS		
	D	L	Cat. No. 32M — K-1	D	L	Cat. No. 32M — K-2	D	L	Cat. No. 32M — K-4	D	L	Cat. No. 32M — K-6
.001	.187	7/16	1001	.187	7/16	1001	.187	9/16	1001	.187	9/16	1001
.0012	.187	7/16	1201	.187	7/16	1201	.187	9/16	1201	.187	9/16	1201
.0015	.187	7/16	1501	.187	7/16	1501	.187	9/16	1501	.187	9/16	1501
.0018	.187	7/16	1801	.187	7/16	1801	.187	9/16	1801	.187	9/16	1801
.0022	.187	7/16	2201	.187	7/16	2201	.187	9/16	2201	.187	9/16	2201
.0027	.187	7/16	2701	.187	7/16	2701	.187	9/16	2701	.203	9/16	2701
.0033	.187	7/16	3301	.187	7/16	3301	.187	9/16	3301	.218	9/16	3301
.0039	.187	7/16	3901	.187	7/16	3901	.187	9/16	3901	.218	9/16	3901
.0047	.187	7/16	4701	.187	7/16	4701	.187	9/16	4701	.187	11/16	4701
.0056	.187	7/16	5601	.187	7/16	5601	.187	9/16	5601	.203	11/16	5601
.0068	.187	7/16	6801	.187	7/16	6801	.187	9/16	6801	.203	11/16	6801
.0082	.187	7/16	8201	.187	7/16	8201	.203	9/16	8201	.218	11/16	8201
.01	.187	7/16	1002	.203	7/16	1002	.218	9/16	1002	.234	11/16	1002
.012	.187	7/16	1202	.234	7/16	1202	.234	9/16	1202	.265	11/16	1202
.015	.203	7/16	1502	.250	7/16	1502	.265	9/16	1502	.281	11/16	1502
.018	.218	7/16	1802	.203	9/16	1802	.218	11/16	1802	.265	13/16	1802
.022	.234	7/16	2202	.218	9/16	2202	.250	11/16	2202	.281	13/16	2202
.027	.265	7/16	2702	.234	9/16	2702	.234	13/16	2702	.312	13/16	2702
.033	.218	9/16	3302	.218	11/16	3302	.265	13/16	3302	.296	15/16	3302
.039	.187	11/16	3902	.234	11/16	3902	.281	13/16	3902	.328	15/16	3902
.047	.203	11/16	4702	.250	11/16	4702	.312	13/16	4702	.359	15/16	4702
.056	.218	11/16	5602	.281	11/16	5602	.296	15/16	5602	.375	15/16	5602
.068	.250	11/16	6802	.312	11/16	6802	.328	15/16	6802	.421	15/16	6802
.082	.265	11/16	8202	.296	13/16	8202	.343	15/16	8202	.375	1 3/16	8202
.1	.265	13/16	1003	.328	13/16	1003	.390	15/16	1003	.421	1 3/16	1003
.12	.281	13/16	1203	.328	15/16	1203	.359	1 3/16	1203	.453	1 3/16	1203
15	.312	13/16	1503	.359	15/16	1503	.390	1 3/16	1503	.500	1 3/16	1503
.18	.312	15/16	1803	.359	1 1/16	1803	.437	1 5/16	1803	.515	1 5/16	1803
.22	.343	15/16	2203	.390	1 1/16	2203	.484	1 5/16	2203	.562	1 5/16	2203
.27	.343	1 1/16	2703	.406	1 3/16	2703	.468	1 9/16	2703	.562	1 9/16	2703
.33	.375	1 1/16	3303	.437	1 3/16	3303	.515	1 9/16	3303	.578	1 11/16	3303
.39	.375	1 3/16	3903	.468	1 3/16	3903	.562	1 9/16	3903	.625	1 11/16	3903
.47	.406	1 3/16	4703	.515	1 3/16	4703	.609	1 9/16	4703	.687	1 11/16	4703
.56	.437	1 3/16	5603	.531	1 5/16	5603	.640	1 11/16	5603	.750	1 11/16	5603
.68	.484	1 3/16	6803	.515	1 9/16	6803	.703	1 11/16	6803	.796	1 13/16	6803
.82	.531	1 3/16	8203	.578	1 9/16	8203	.734	1 13/16	8203	.828	1 15/16	8203
1.0	.546	1 5/16	1004	.593	1 11/16	1004	.781	1 15/16	1004	.921	1 15/16	1004
1.25	.578	1 7/16	1254	.671	1 11/16	1254	—	—	—	—	—	—
1.50	.625	1 7/16	1504	.734	1 11/16	1504	—	—	—	—	—	—
2.0	.687	1 9/16	2004	.812	1 13/16	2004	—	—	—	—	—	—

TYPE 33M RATINGS AND DIMENSIONS

Capacity in Mfds.	100 VOLTS				200 VOLTS				400 VOLTS				600 VOLTS			
	T	W	L	Cat. No. 33M — K1	T	W	L	Cat. No. 33M — K2	T	W	L	Cat. No. 33M — K4	T	W	L	Cat. No. 33M — K6
.001	.125	.234	7/16	1001	.125	.234	7/16	1001	.109	.203	9/16	1001	.109	.203	9/16	1001
.0012	.125	.234	7/16	1201	.125	.234	7/16	1201	.109	.203	9/16	1201	.109	.203	9/16	1201
.0015	.125	.234	7/16	1501	.125	.234	7/16	1501	.125	.234	9/16	1501	.125	.234	9/16	1501
.0018	.125	.234	7/16	1801	.125	.234	7/16	1801	.125	.234	9/16	1801	.125	.234	9/16	1801
.0022	.125	.234	7/16	2201	.125	.234	7/16	2201	.125	.234	9/16	2201	.125	.234	9/16	2201
.0027	.125	.234	7/16	2701	.125	.234	7/16	2701	.125	.234	9/16	2701	.125	.234	9/16	2701
.0033	.125	.234	7/16	3301	.125	.234	7/16	3301	.125	.234	9/16	3301	.140	.281	9/16	3301
.0039	.125	.234	7/16	3901	.125	.234	7/16	3901	.125	.234	9/16	3901	.140	.265	9/16	3901
.0047	.125	.234	7/16	4701	.125	.234	7/16	4701	.125	.234	9/16	4701	.125	.265	11/16	4701
.0056	.125	.234	7/16	5601	.125	.234	7/16	5601	.125	.234	9/16	5601	.125	.250	11/16	5601
.0068	.125	.234	7/16	6801	.125	.234	7/16	6801	.125	.234	9/16	6801	.125	.250	11/16	6801
.0082	.125	.234	7/16	8201	.125	.234	7/16	8201	.140	.234	9/16	8201	.140	.265	11/16	8201
.01	.125	.234	7/16	1002	.140	.250	7/16	1002	.156	.250	9/16	1002	.156	.281	11/16	1002
.012	.125	.234	7/16	1202	.171	.265	7/16	1202	.171	.265	9/16	1202	.171	.312	11/16	1202
.015	.140	.234	7/16	1502	.187	.281	7/16	1502	.187	.312	9/16	1502	.203	.328	11/16	1502
.018	.156	.250	7/16	1802	.140	.234	9/16	1802	.140	.281	11/16	1802	.171	.312	13/16	1802
.022	.171	.281	7/16	2202	.156	.250	9/16	2202	.171	.296	11/16	2202	.203	.343	13/16	2202
.027	.203	.296	7/16	2702	.171	.281	9/16	2702	.156	.281	13/16	2702	.234	.359	13/16	2702
.033	.140	.250	9/16	3302	.156	.250	11/16	3302	.171	.312	13/16	3302	.218	.343	15/16	3302
.039	.125	.234	11/16	3902	.171	.265	11/16	3902	.203	.328	13/16	3902	.250	.375	15/16	3902
.047	.140	.250	19/16	4702	.171	.312	11/16	4702	.203	.375	13/16	4702	.281	.406	15/16	4702
.056	.156	.265	11/16	5602	.203	.328	11/16	5602	.187	.359	15/16	5602	.281	.453	15/16	5602
.068	.187	.281	11/16	6802	.218	.359	11/16	6802	.218	.390	15/16	6802	.312	.500	15/16	6802
.082	.187	.312	11/16	8202	.218	.343	13/16	8202	.250	.421	15/16	8202	.281	.453	1 3/16	8202
.1	.187	.312	13/16	1003	.234	.375	13/16	1003	.281	.453	15/16	1003	.312	.500	1 3/16	1003
.12	.203	.328	13/16	1203	.218	.390	15/16	1203	.250	.421	1 3/16	1203	.343	.515	1 3/16	1203
.15	.234	.359	13/16	1503	.250	.421	15/16	1503	.281	.484	1 3/16	1503	.390	.578	1 3/16	1503
.18	.218	.328	15/16	1803	.234	.437	1 1/16	1803	.312	.515	1 5/16	1803	.406	.578	1 5/16	1803
.22	.250	.359	15/16	2203	.265	.468	1 1/16	2203	.359	.562	1 5/16	2203	.468	.640	1 5/16	2203
.27	.234	.406	1 1/16	2703	.281	.484	1 3/16	2703	.343	.546	1 9/16	2703	.437	.640	1 9/16	2703
.33	.265	.437	1 1/16	3303	.328	.515	1 3/16	3303	.390	.593	1 9/16	3303	.468	.671	1 11/16	3309
.39	.265	.453	1 3/16	3903	.359	.562	1 3/16	3903	.437	.640	1 9/16	3903	.500	.703	1 11/16	3903
.47	.296	.500	1 3/16	4703	.406	.593	1 3/16	4703	.484	.687	1 9/16	4703	.562	.765	1 11/16	4703
.56	.328	.531	1 3/16	5603	.406	609	1 5/16	5603	.515	.718	1 11/16	5603	.625	.828	1 11/16	5603
.68	.375	.562	1 3/16	6803	.406	.609	1 9/16	6803	.578	.781	1 11/16	6803	.656	.875	1 13/16	6803
.82	.421	.609	1 3/16	8203	.453	.656	1 9/16	8203	.609	.812	1 13/16	8203	.703	.906	1 15/16	8203
1.0	.437	.625	1 5/16	1004	.484	.687	1 11/16	1004	.656	.859	1 15/16	1004	.781	.984	1 15/16	1004
1.25	.453	.656	1 7/16	1254	.453	.859	1 11/16	1254	—	—	—	—	—	—	—	—
1.50	.515	.718	1 7/16	1504	.515	.906	1 11/16	1504	—	—	—	—	—	—	—	—
2.0	.468	.875	1 9/16	2004	.578	.984	1 13/16	2004	—	—	—	—	—	—	—	—

STANDARD LEAD SIZES: #24 AWG TCW: up to and including .203″ Dia., #22 AWG TCW: from .204″ thru .312″ Dia., #20 AWG TCW : /313″ Dia. and over. **CAPACITY TOLERANCE: STANDARD** . . . ±10% / OTHER . . . from ±20% to ±1%. Other values as well as voltage ratings are available on request.

*DuPONT REGISTERED TRADEMARK

WESCO® ELECTRICAL COMPANY
201 MUNSON STREET • GREENFIELD, MASSACHUSETTS 01301 • PHONE: (413) 774-4358

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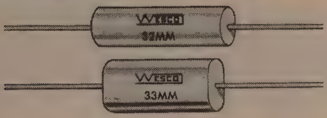
METALIZED MYLAR* CAPACITORS



SPECIFICATIONS

DIELECTRIC WITHSTANDING VOLTAGE

200% of rated voltage applied through a minimum limiting resistance of 100 Ohms/Volt. Duration of voltage stress shall be 15 seconds minimum and 1 minute maximum at 25°C.

TEMPERATURE RANGE

−55°C to +85°C with full rated voltage applied. To +125°C with 50% of rated voltage.

INSULATION RESISTANCE

At 25°C after 2 minutes of electrification at rated voltage or 500 VDC, whichever is less, the minimum product of Insulation Resistance and Capacitance shall be 30,000 megohms-microfarads, but need not exceed 30,000 megohms.

DISSIPATION FACTOR

Shall not exceed 1.0% when measured at 25°C and 1000 Hz, ±20 Hz. See characteristic curves for D.F. ratings at other temperatures.

CAPACITANCE AND TOLERANCE

Shall be measured within the tolerance limits specified. Measurements will be made at 25°C and 1000 Hz, ±20 Hz.

LIFE TEST

Shall withstand 140% of rated voltage at 85°C for 250 hours. One failure in twelve shall be permitted.

CAPACITANCE STABILITY (DRIFT)

Less than 0.3% when measured in the following manner: three capacitance readings at 25°C, each made prior to and after temperature cycling from room to 85°C, and room to −55°C. The mathematical difference between the two extremes, divided by the intermediate value, and then multiplied by 100, yields the stability expressed in percent.

HUMIDITY RESISTANCE

Meets requirements of Mil-C-27287, Para. 3.12 when tested in accordance with Mil-STD.-202C, Method 103 B, Condition B.

LEAD PULL AND BEND TEST

Steady pull of 5 pounds applied axially to leads for one minute. Bend test shall consist of one bend from the point of egress, first 90° in one direction, back to the original axial position, and then 90° in the opposite direction with no evidence of breakage.

FEATURES

- Wrap and fill construction
- Tubular and oval configuration for optimum space savings
- Extended foil design
- Miniature size — lightweight
- Low dissipation factor
- Excellent stability
- Quality control procedures per Mil-Q-9858

APPLICATIONS

- Data Processing Equipment
- Aircraft and Missile Systems
- Industrial Instrumentation
- Navigation and Distance Measuring Equipment
- Communications Equipment
- Tachometers
- Filters
- Peripheral Equipment

TYPE 32MM RATINGS AND DIMENSIONS

Capacity in Mfds.	100 VOLTS			200 VOLTS			400 VOLTS			600 VOLTS		
	D	L	Cat. No. 32MM — K-1	D	L	Cat. No. 32MM — K-2	D	L	Cat. No. 32MM — K-4	D	L	Cat. No. 32MM — K-6
.0068	—	—	—	—	—	—	.218	9/16	6801	.312	9/16	6801
.0082	—	—	—	—	—	—	.234	9/16	8201	.171	11/16	8201
.01	—	—	—	—	—	—	.265	9/16	1002	.250	11/16	1002
.012	—	—	—	—	—	—	.203	11/16	1202	.265	11/16	1202
.015	—	—	—	—	—	—	.218	11/16	1502	.296	11/16	1502
.018	—	—	—	.203	7/16	1802	.234	11/16	1802	.328	11/16	1802
.022	—	—	—	.218	7/16	2202	.250	11/16	2202	.375	11/16	2202
.027	.171	7/16	2702	.234	7/16	2702	.265	11/16	2702	.390	11/16	2702
.033	.187	7/16	3302	.265	7/16	3302	.296	11/16	3302	.437	11/16	3302
.039	.187	7/16	3902	.203	9/16	3902	.234	15/16	3902	.328	15/16	3902
.047	.203	7/16	4702	.218	9/16	4702	.265	15/16	4702	.375	15/16	4702
.056	.218	7/16	5602	.234	9/16	5602	.265	15/16	5602	.390	15/16	5602
.068	.250	7/16	6802	.250	9/16	6802	.296	15/16	6802	.437	15/16	6802
.082	.187	9/16	8202	.265	9/16	8202	.328	15/16	8202	.468	15/16	8202
.1	.203	9/16	1003	.281	9/16	1003	.343	15/16	1003	.515	15/16	1003
.12	.218	9/16	1203	.312	9/16	1203	.328	1 3/16	1203	.453	1 3/16	1203
.15	.234	9/16	1503	.343	9/16	1503	.343	1 3/16	1503	.515	1 3/16	1503
.18	.250	9/16	1803	.296	11/16	1803	.375	1 3/16	1803	.562	1 3/16	1803
.22	.234	11/16	2203	.328	11/16	2203	.406	1 3/16	2203	.625	1 3/16	2203
.27	.250	11/16	2703	.359	11/16	2703	.453	1 3/16	2703	.687	1 3/16	2703
.33	.265	11/16	3303	.406	11/16	3303	.437	1 7/16	3303	.656	1 7/16	3303
.39	.281	11/16	3903	.437	11/16	3903	.468	1 7/16	3903	.703	1 7/16	3903
.47	.312	11/16	4703	.468	11/16	4703	.515	1 7/16	4703	.781	1 7/16	4703
.56	.343	11/16	5603	.406	15/16	5603	.546	1 7/16	5603	.843	1 7/16	5603
.68	.375	11/16	6803	.437	15/16	6803	.609	1 7/16	6803	.921	1 7/16	6803
.82	.359	13/16	8203	.406	1 3/16	8203	.593	1 11/16	8203	.906	1 11/16	8203
1.0	.390	13/16	1004	.437	1 3/16	1004	.656	1 11/16	1004	1.000	1 11/16	1004
1.25	.421	13/16	1254	.500	1 3/16	1254	.734	1 11/16	1254	1.171	1 11/16	1254
1.50	.421	15/16	1504	.531	1 3/16	1504	.796	1 11/16	1504	1.265	1 11/16	1504
1.80	.453	15/16	1804	.593	1 3/16	1804	.875	1 11/16	1804	1.375	1 11/16	1804
2.0	.484	15/16	2004	.625	1 3/16	2004	.921	1 11/16	2004	1.406	1 11/16	2004
3.0	.484	1 3/16	3004	.656	1 7/16	3004	—	—	—	—	—	—
4.0	.562	1 3/16	4004	.750	1 7/16	4004	—	—	—	—	—	—
5.0	.625	1 3/16	5004	.765	1 11/16	5004	—	—	—	—	—	—
8.0	.703	1 7/16	8004	.828	2 1/16	8004	—	—	—	—	—	—
10.0	.781	1 7/16	1005	.921	2 1/16	1005	—	—	—	—	—	—

TYPE 33MM RATINGS & DIMENSIONS

Capacity in Mfds.	100 VOLTS				200 VOLTS				400 VOLTS				600 VOLTS			
	T	W	L	Cat. No. 33MM — K1	T	W	L	Cat. No. 33MM — K2	T	W	L	Cat. No. 33MM — K4	T	W	L	Cat. No. 33MM — K6
.0068	—	—	—	—	—	—	—	—	.140	.281	9/16	6801	.234	.359	9/16	6801
.0082	—	—	—	—	—	—	—	—	.156	.296	9/16	8201	.078	.218	11/16	8201
.01	—	—	—	—	—	—	—	—	.187	.312	9/16	1002	.171	.296	11/16	1002
.012	—	—	—	—	—	—	—	—	.125	.250	11/16	1202	.140	.281	11/16	1202
.015	—	—	—	—	—	—	—	—	.140	.265	11/16	1502	.203	.343	11/16	1502
.018	—	—	—	—	—	—	—	—	.156	.281	11/16	1802	.218	.421	11/16	1802
.022	—	—	—	—	.140	.281	7/16	2202	.171	.312	11/16	2202	.250	.437	11/16	2202
.027	.109	.203	7/16	2702	.156	.296	7/16	2702	.203	.328	11/16	2702	.281	.484	11/16	2702
.033	.125	.218	7/16	3302	.187	.312	7/16	3302	.218	.359	11/16	3302	.312	.531	11/16	3302
.039	.125	.234	7/16	3902	.125	.250	9/16	3902	.156	.296	15/16	3902	.218	.421	15/16	3902
.047	.140	.250	7/16	4702	.140	.265	9/16	4702	.171	.312	15/16	4702	.250	.437	15/16	4702
.056	.156	.265	7/16	5602	.156	.281	9/16	5602	.187	.328	15/16	5602	.265	.468	15/16	5602
.068	.187	.281	7/16	6802	.171	.296	9/16	6802	.218	.343	15/16	6802	.312	.515	15/16	6802
.082	.109	.234	9/16	8202	.187	.312	9/16	8202	.218	.390	15/16	8202	.343	.562	15/16	8202
.1	.125	.250	9/16	1003	.203	.343	9/16	1003	.250	.421	15/16	1003	.390	.593	15/16	1003
.12	.140	.265	9/16	1203	.234	.359	9/16	1203	.218	.390	1 3/16	1203	.343	.546	1 3/16	1203
.15	.156	.281	9/16	1503	.265	.390	9/16	1503	.250	.421	1 3/16	1503	.390	.596	1 3/16	1503
.18	.187	.312	9/16	1803	.234	.359	11/16	1803	.281	.453	1 3/16	1803	.437	.640	1 3/16	1803
.22	.156	.281	11/16	2203	.250	.390	11/16	2203	.296	.500	1 3/16	2203	.500	.687	1 3/16	2203
.27	.171	.296	11/16	2703	.281	.406	11/16	2703	.343	.531	1 3/16	2703	.562	.765	1 3/16	2703
.33	.187	.312	11/16	3303	.281	.484	11/16	3303	.312	.515	1 7/16	3303	.531	.734	1 7/16	3303
.39	.218	.343	11/16	3903	.312	.515	11/16	3903	.343	.546	1 7/16	3903	.578	.781	1 7/16	3903
.47	.234	.359	11/16	4703	.359	.562	11/16	4703	.390	.578	1 7/16	4703	.640	.843	1 7/16	4703
.56	.250	.406	11/16	5603	.281	.484	15/16	5603	.437	.625	1 7/16	5603	.718	.921	1 7/16	5603
.68	.281	.437	11/16	6803	.328	.515	15/16	6803	.484	.687	1 7/16	6803	.796	1.000	1 7/16	6803
.82	.250	.421	13/16	8203	.296	.484	1 3/16	8203	.468	.671	1 11/16	8203	.781	.984	1 11/16	8203
1.0	.281	.453	13/16	1004	.328	.531	1 3/16	1004	.531	.734	1 11/16	1004	.857	1.078	1 11/16	1004
1.25	.312	.515	13/16	1254	.375	.578	1 3/16	1254	.609	.812	1 11/16	1254	1.062	1.265	1 11/16	1254
1.50	.296	.500	15/16	1504	.421	.625	1 3/16	1504	.671	.875	1 11/16	1504	1.156	1.359	1 11/16	1504
1.80	.328	.515	15/16	1804	.406	.687	1 3/16	1804	.750	.953	1 11/16	1804	1.265	1.484	1 11/16	1804
2.0	.359	.562	15/16	2004	.421	.718	1 3/16	2004	.796	1.000	1 11/16	2004	1.281	1.484	1 11/16	2004
3.0	.375	.578	1 3/16	3004	.406	.812	1 3/16	3004	—	—	—	—	—	—	—	—
4.0	.406	.703	1 3/16	4004	.625	.828	1 7/16	4004	—	—	—	—	—	—	—	—
5.0	.453	.750	1 3/16	5004	.640	.828	1 11/16	5004	—	—	—	—	—	—	—	—
8.0	.531	.828	1 7/16	8004	.656	.953	2 1/16	8004	—	—	—	—	—	—	—	—
10.0	.609	.906	1 7/16	1005	.750	1.046	2 1/16	1005	—	—	—	—	—	—	—	—

STANDARD LEAD SIZES: #24 AWG TCW: up to and including, 203″ Dia., #22 AWG TCW: from .204″ thru .312″ Dia., #20 AWG TCW: .313″ Dia. and over. **CAPACITY TOLERANCE:** STANDARD . . . ±10% / OTHER . . . from ±20% to ±2%. Other values as well as voltage ratings are available on request.

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POLYSTYRENE CAPACITORS

SPECIFICATIONS

DIELECTRIC WITHSTANDING VOLTAGE

200% of rated voltage applied through a minimum limiting resistance of 100 Ohms/Volt. Duration of voltage stress shall be 15 seconds minimum and 1 minute maximum at 25°C.

INSULATION RESISTANCE

At 25°C after 2 minutes of electrification at rated voltage or 500 VDC, whichever is less, the minimum product of Insulation Resistance and Capacitance shall be 500,000 megohms-microfarads, but need not exceed 500,000 megohms.

DISSIPATION FACTOR

Shall not exceed .05% when measured at 25°C and 1000 Hz, ± Hz. See characteristic curves for D.F. ratings at other temperatures.

CAPACITANCE AND TOLERANCE

Shall be measured within the tolerance limits specified. Measurements will be made at 25°C and 1000 Hz, ±20 Hz.

LIFE TEST

Shall withstand 140% of rated voltage at 85°C for 250 hours. One failure in twelve shall be permitted.

TEMPERATURE COEFFICIENT

Capacitance shall change linearly over operating temperature range at rate of −105, ±30 parts per million/°C.

CAPACITANCE STABILITY (DRIFT)

Less than .05% when measured in the following manner: three capacitance readings at 25°C, each made prior to and after temperature cycling from room to 85°C, and room to −55°C. The mathematical difference between the two extremes, divided by the intermediate value, and then multiplied by 100, yields the stability expressed in percent.

HUMIDITY RESISTANCE

Meets requirements of Mil-C-27287, Para. 3.12 when tested in accordance with Mil-STD.-202C, Method 103 B, Condition B.

LEAD PULL AND BEND TEST

Steady pull of 5 pounds applied axially to leads for one minute. Bend test shall consist of one bend from the point of egress, first 90° in one direction, back to the original axial position, and then 90° in the opposite direction with no evidence of breakage.

TEMPERATURE RANGE

−55°C to +85°C with full rated voltage applied.

TYPE 32P
RATINGS & DIMENSIONS

Capacity in Mfds.	100 VOLTS			200 VOLTS			400 VOLTS		
	D	L	Cat. No. 32P — J-1	D	L	32P Cat. No. — J-2	D	L	Cat. No. 32P — J-4
.001	.187	9/16	1001	.187	9/16	1001	.187	9/16	1001
.0012	.187	9/16	1201	.187	9/16	1201	.187	9/16	1201
.0015	.187	9/16	1501	.187	9/16	1501	.187	9/16	1501
.0018	.187	11/16	1801	.187	11/16	1801	.187	11/16	1801
.0022	.187	11/16	2201	.187	11/16	2201	.187	11/16	2201
.0027	.187	11/16	2701	.187	11/16	2701	.187	11/16	2701
.0033	.187	11/16	3301	.187	11/16	3301	.187	11/16	3301
.0039	.187	11/16	3901	.187	11/16	3901	.187	11/16	3901
.0047	.187	11/16	4701	.187	11/16	4701	.234	11/16	4701
.0056	.187	11/16	5601	.187	11/16	5601	.250	11/16	5601
.0068	.187	11/16	6801	.187	11/16	6801	.234	13/16	6801
.0082	.187	11/16	8201	.203	11/16	8201	.250	13/16	8201
.01	.203	11/16	1002	.234	11/16	1002	.265	13/16	1002
.012	.218	11/16	1202	.218	13/16	1202	.296	13/16	1202
.015	.234	11/16	1502	.250	13/16	1502	.328	13/16	1502
.018	.234	13/16	1802	.265	13/16	1802	.359	13/16	1802
.022	.250	13/16	2202	.281	13/16	2202	.343	15/16	2202
.027	.265	13/16	2702	.312	13/16	2702	.375	15/16	2702
.033	.296	13/16	3302	.343	13/16	3302	.406	15/16	3302
.039	.328	13/16	3902	.375	13/16	3902	.453	15/16	3902
.047	.343	13/16	4702	.359	15/16	4702	437	1 1/16	4702
.056	.375	13/16	5602	.390	15/16	5602	.484	1 1/16	5602
.068	.375	15/16	6802	.421	15/16	6802	.484	1 3/16	6802
.082	.406	15/16	8202	.421	1 1/16	8202	.531	1 3/16	8202
.1	.453	15/16	1003	.468	1 1/16	1003	.578	1 3/16	1003
.12	.484	15/16	1203	.515	1 1/16	1203	.625	1 3/16	1203
.15	.500	1 1/16	1503	.531	1 3/16	1503	.656	1 5/16	1503
.18	.531	1 1/16	1803	.578	1 3/16	1803	.671	1 7/16	1803
.22	.546	1 3/16	2203	.640	1 3/16	2203	.671	1 11/16	2203
.27	.609	1 3/16	2703	.656	1 5/16	2703	.734	1 11/16	2703
.33	.625	1 5/16	3303	.687	1 7/16	3303	.812	1 11/16	3303
.39	.671	1 5/16	3903	.750	1 7/16	3903	—	—	—
.47	.703	1 7/16	4703	.734	1 11/16	4703	—	—	—

STANDARD LEAD SIZES: #24 AWG TCW: up to and including .203″ Dia.
#22 AWG TCW: from .204″ thru .312″ Dia.
#20 AWG TCW: .313″ Dia.and over

CAPACITY TOLERANCE: STANDARD . . . ±5% / OTHER . . . from ±20% to ±1%
Other values as well as voltage ratings are available upon request.

METALIZED POLYCARBONATE CAPACITORS

SPECIFICATIONS

DIELECTRIC WITHSTANDING VOLTAGE

200% of rated voltage applied through a minimum limiting resistance of 100 Ohms/Volt. Duration of voltage stress shall be 15 seconds minimum and 1 minute maximum at 25°C.

TEMPERATURE RANGE

−55°C to +85°C with full rated voltage applied. To +125°C with 50% of rated voltage.

INSULATION RESISTANCE

At 25°C after 2 minutes of electrification at rated voltage or 500 VDC, whichever is less, the minimum product of Insulation Resistance and Capacitance shall be 50,000 megohms-microfarads, but need not exceed 50,000 megohms.

DISSIPATION FACTOR

Shall not exceed 0.3% when measured at 25°C and 1000 Hz, ±20 Hz. See characteristic curves for D.F. ratings at other temperatures.

CAPACITANCE AND TOLERANCE

Shall be measured within the tolerance limits specified. Measurements will be made at 25°C and 1000 Hz, ±20 Hz.

LIFE TEST

Shall withstand 140% of rated voltage at 85°C for 250 hours. One failure in twelve shall be permitted.

CAPACITANCE STABILITY (DRIFT)

Less than 0.3% when measured in the following manner: three capacitance readings at 25°C, each made prior to and after temperature cycling from room to 85°C, and room to −55°C. The mathematical difference between the two extremes, divided by the intermediate value, and then multiplied by 100, yields the stability expressed in percent.

HUMIDITY RESISTANCE

Meets requirements of Mil-C-27287, Para. 3.12 when tested in accordance with Mil-STD.-202C, Method 103B, Condition B.

LEAD PULL AND BEND TEST

Steady pull of 5 pounds applied axially to leads for one minute. Bend test shall consist of one bend from the point of egress, first 90° in one direction, back to the original axial position, and then 90 ° in the opposite direction with no evidence of breakage.

TYPE 32MPC
RATINGS & DIMENSIONS

Capacity in Mfds.	50 VOLTS			100 VOLTS			200 VOLTS		
	D	L	Cat. No. 32MPC — K-05	D	L	Cat. No. 32MPC — K-1	D	L	Cat. No. 32MPC — K-2
.012	—	—	—	—	—	—	.171	.40	1202
.015	—	—	—	—	—	—	.187	.40	1502
.018	—	—	—	—	—	—	.203	.40	1802
.022	—	—	—	.156	.40	2202	.218	.40	2202
.027	—	—	—	.171	.40	2702	.234	.40	2702
.033	—	—	—	.171	.40	3302	.250	.40	3302
.039	—	—	—	.187	.40	3902	.187	.53	3902
.047	—	—	—	.203	.40	4702	.203	.53	4702
.056	—	—	—	.218	.40	5602	.218	.53	5602
.068	—	—	—	.234	.40	6802	.234	.53	6802
.082	.156	.40	8202	.187	.53	8202	.265	.53	8202
.1	.171	.40	1003	.203	.53	1003	.234	.65	1003
.12	.187	.40	1203	.218	.53	1203	.250	.65	1203
.15	.203	.40	1503	.234	.53	1503	281	.65	1503
.18	.218	.40	1803	.250	.53	1803	.296	.65	1803
.22	.171	.53	2203	.265	.53	2203	.328	.65	2203
.27	.187	.53	2703	.250	.65	2703	.312	.78	2703
.33	.203	.53	3303	.265	.65	3303	.343	.78	3303
.39	.203	.53	3903	.281	.65	3903	.359	.78	3903
.47	.218	.53	4703	.312	.65	4703	.406	.78	4703
.56	.250	.53	5603	.328	.65	5603	.390	.90	5603
.68	.218	.65	6803	.328	.78	6803	.421	.90	6803
.82	.234	.65	8203	.343	.78	8203	.468	.90	8203
1.0	.265	.65	1004	.375	.78	1004	.515	.90	1004
1.25	.296	.65	1254	.421	.78	1254	.484	1.18	1254
1.50	.312	.65	1504	.453	.78	1504	.531	1.18	1504
1.80	.328	.78	1804	.453	.90	1804	.578	1.18	1804
2.0	.343	.78	2004	.468	.90	2004	.609	1.18	2004
3.0	.390	.78	3004	.484	1.18	3004	.656	1.45	3004
4.0	.437	.78	4004	.546	1.18	4004	.750	1.45	4004
5.0	.437	.90	5004	.431	1.45	5004	.734	.178	5004
8.0	.468	1.18	8004	.593	1.78	8004	.859	2.06	8004
10.0	.515	1.18	1005	.656	1.78	1005	.953	2.06	1005

STANDARD LEAD SIZES: #24 AWG TCW: up to and including .203″ Dia.
#22 AWG TCW: from .204″ thru .312″ Dia.
#20 AWG TCW: .313″ Dia.and over

CAPACITY TOLERANCE: STANDARD . . . ±10% / OTHER . . . from ±20% to ±2%
Other values as well as voltage ratings are available upon request.

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POLYPROPYLENE CAPACITORS

SPECIFICATIONS

DIELECTRIC WITHSTANDING VOLTAGE

200% of rated voltage applied through a minimum limiting resistance of 100 Ohms/Volt. Duration of voltage stress shall be 15 seconds minimum and 1 minute maximum at 25°C.

INSULATION RESISTANCE

At 25°C after 2 minutes of electrification at rated voltage or 500 VDC, whichever is less, the minimum product of Insulation Resistance and Capacitance shall be 250,000 megohms-microfarads, but need not exceed 250,000 megohms.

DISSIPATION FACTOR

Shall not exceed .05% when measured at 25°C and 1000 Hz, ±20 Hz. See characteristic curves for D.F. ratings at other temperatures.

CAPACITANCE AND TOLERANCE

Shall be measured within the tolerance limits specified. Measurements will be made at 25°C and 1000 Hz, ±20 Hz.

LIFE TEST

Shall withstand 140% of rated voltage at 105°C for 250 hours. One failure in twelve shall be permitted.

TEMPERATURE COEFFICIENT

Capacitance shall change linearly over operating temperature range of −55°C to +85°C at rate of −290, ±75 parts per million/°C.

CAPACITANCE STABILITY (DRIFT)

Less than .2% when measured in the following manner: three capacitance readings at 25°C, each made prior to and after temperature cycling from room to 105°C, and room to −55°C. The mathematical difference between the two extremes, divided by the intermediate value, and then multiplied by 100, yields the stability expressed in percent.

HUMIDITY RESISTANCE

Meets requirements of Mil-C-27287, Para 3.12 when tested in accordance with Mil-STD.-202C, Method 103 B, Condition B.

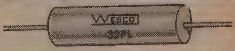
LEAD PULL AND BEND TEST

Steady pull of 5 pounds applied axially to leads for one minute. Bend test shall consist of one bend from the point of egress, first 90° in one direction, back to the original axial position, and then 90° in the opposite direction with no evidence of breakage.

TEMPERATURE RANGE

−55°C to +105°C with full rated voltage applied.

TYPE 32PL RATINGS & DIMENSIONS



Capacity in Mfds.	100 VOLTS			200 VOLTS			400 VOLTS		
	D	L	Cat.No. 32PL — K-1	D	L	Cat.No. 32PL — K-2	D	L	Cat.No. 32PL — K-4
.0010	.187	.406	1001	.187	.406	1001	.187	.406	1001
.0015	.187	.406	1501	.187	.406	1501	.203	.406	1501
.0022	.187	.406	2201	.187	.406	2201	.234	.406	2201
.0033	.187	.406	3301	.187	.406	3301	.187	.531	3301
.0039	.187	.406	3901	.203	.406	3901	.187	.531	3901
.0047	.187	.406	4701	.187	.531	4701	.203	.531	4701
.0056	.187	.406	5601	.187	.531	5601	.218	.531	5601
.0068	.187	.406	6801	.187	.531	6801	.234	.531	6801
.0082	.187	.406	8201	.187	.531	8201	.203	.656	8201
.0100	.204	.406	1002	.203	.531	1002	.218	.656	1002
.015	.219	.531	1502	.203	.656	1502	.265	.656	1502
.022	.250	.531	2202	.234	.656	2202	.312	.656	2202
.027	.265	.531	2702	.265	.656	2702	.328	.656	2702
.033	.234	.656	3302	.281	.656	3302	.328	.781	3302
.039	.250	.656	3902	.312	.656	3902	.359	.781	3902
.047	.281	.656	4702	.296	.781	4702	.390	.781	4702
.056	.281	.656	5602	.312	.781	5602	.421	.781	5602
.068	.296	.656	6802	.343	.781	6802	.406	.906	6802
.082	.312	.781	8202	.375	.781	8202	.437	.906	8202
.10	.344	.781	1003	.375	.906	1003	.484	.906	1003
.12	.375	.781	1203	.406	.906	1203	.453	1.156	1203
.15	.375	.906	1503	.453	.906	1503	.500	1.156	1503
.18	.406	.906	1803	.484	.906	1803	.546	1.156	1803
.22	.437	.906	2203	.484	1.031	2203	.687	1.156	2203
.27	.437	1.031	2703	.531	1.031	2703	.578	1.406	2703
.33	.500	1.031	3303	.593	1.031	3303	.640	1.406	3303
.39	.531	1.031	3903	.593	1.156	3903	.687	1.406	3903
.47	.531	1.156	4703	.656	1.156	4703	.750	1.406	4703
.56	.578	1.156	5603	.625	1.406	5603	.825	1.406	5603
.68	.625	1.156	6803	.687	1.406	6803	.825	1.656	6803
.82	.625	1.406	8203	.687	1.656	8203	.906	1.656	8203
1.0	.687	1.406	1004	.734	1.656	1004	1.000	1.656	1004

STANDARD LEAD SIZES: #24 AWG TCW: up to and including .203″ Dia.
#22 AWG TCW: from .204″ thru .312″ Dia.
#20 AWG TCW: .313″ Dia.and over

CAPACITY TOLERANCE: STANDARD . . . ±10% / OTHER . . . from 20% to ±1%
Other values as well as voltage ratings are available upon request.

FEATURES

32P

- Wrap and fill construction
- Excellent long-term stability
- Superior "Q" for tuned circuits
- High insulation resistance
- Linear temperature coefficient
- Quality control procedures per Mil-Q-9858
- Extended foil design

32MPC

- Wrap and fill construction
- Micro-miniature — lightweight
- Low dissipation factor
- Zero TC ±50 ppm/°C from +25°C to +55°C
- Extended foil design
- Excellent stability
- Quality control procedures per Mil-Q-9858

32PL

- Wrap and fill construction
- Excellent long-term stability
- Superior "Q" for tuned circuits
- High insulation resistance
- Linear temperature coefficient (−55°C to +85°C)
- Quality control procedures per Mil-Q-9858
- Extended foil design

APPLICATIONS

32P & 32PL

- Computers
- Data Processing Equipment
- Aircraft and Missile Systems
- Industrial Instrumentation
- Navigation and Distance Measuring Equipment
- Communications Equipment
- Timing and Retrace Circuits
- Integrating Networks
- High "Q" Low Loss Filters
- Peripheral Equipment

32MPC

- Data Processing Equipment
- Aircraft and Missile Systems
- Industrial Instrumentation
- Navigation and Distance Measuring Equipment
- Communications Equipment
- Tachometers
- Filters
- Peripheral Equipment

EXPLANATION OF CATALOG NUMBER

32 M 1002 K-1

32	Round, Wrap and Fill, with epoxy seals.
M	Mylar-Foil, Axial Leads*
1002	In Picofarads — first three digits are significant. Last digit specifies number of zeros, i.e., 1002 = 10,000 pfd. or 0.01 mfd.
K	Capacity Tolerance: K = ±10% H = ±20% F = ±1% M = ±20% J = ±5% G = ±2%
1	DC Voltage Rating: 05 = 50 VDC 2 = 200 VDC 6 = 600 VDC 1 = 100 VDC 4 = 400 VDC etc.
*	For Radial Leads, add letter "R" at end of part number.

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HUMISEAL COATINGS

GENERAL CHART

Listed in this General Chart of Properties are ten of the most frequently used HumiSeal Protective Coatings and their principal properties. These have been tabulated in order to facilitate comparison of their characteristics and selection of the most suitable type for a specific application. In addition to these HumiSeal types we manufacture a variety of coatings for special purposes, including high temperature applications. Should none of the coatings listed in this chart fulfill your requirements, we suggest that you contact us for recommendations.

	PROPERTIES OF LIQUID HumiSeal										THERMAL PROPERTIES		
HumiSeal Type[1]	Specific Weight (lbs. per gallon)[2]	Solids Content (% by weight)[3]	Viscosity, with catalyst when applicable (centipoises)[4]	Flash Point (°F)[5]	Drying Time for Handling[6]	Recommended Curing Conditions	Time Required to Reach Optimum Properties	Pot Life, at Room Temperature	Shelf Life, at Room Temperature	Coverage per gallon (in sq. ft.) After One Dip	Continuous Use Temperature Range (°F)	Thermal Shock Test[7]	Solderability[8]
1B12	7.3	20	30	40	10 min.	24 hrs. at room temp. or 30 min. at 170°F	24 hrs.	1 year	1 year	550	−75°F to +280°F	Passes	Good
1B15	7.6	35	470	30	10 min.	24 hrs. at room temp. or 30 min. at 170°F	24 hrs.	1 year	1 year	450	−75°F to +270°F	Passes	Good
1B31	7.6	35	160	30	10 min.	24 hrs. at room temp. or 30 min. at 170°F	24 hrs.	6 mos.	6 mos.	450	−75°F to +270°F	Passes	Good
1A20	8.5	50	120	60	60 min.	24 hrs. at room temp.	1 week	6 mos.	6 mos.	375	−70°F to +250°F	Passes	Excellent
1A27	8.0	50	5000	100	15 min.	24 hrs. at room temp.	1 week	1 year	1 year	450	−90°F to +250°F	Passes	Excellent
1A33	7.7	44	160	30	15 min.	24 hrs. at room temp.	1 week	6 mos.	6 mos.	300	−90°F to +250°F	Passes	Excellent
2A72	7.8	36	<20	70	60 min.	24 hrs. at room temp. or 2 hrs at 170°F	1 week	4 hrs.	6 mos.	650	−70°F to +250°F	Passes	Excellent
2B13	7.5	42	50	40	30 min.	90 min. at 200°F	1 week	24 hrs.	1 year	480	−70°F to +270°F	Passes	Poor
2A51	9.2	100	6000	non flammable	2 hrs.	24 hrs. at room temp. or 2 hrs. at 200°F	1 week	6 hrs.	6 mos.	200	−70°F to +250°F	Passes	Poor
2A53	7.8	54	300	70	30 min.	2 hrs. at 200°F	1 week	24 hrs.	6 mos.	400	−70°F to +250°F	Passes	Poor

HumiSeal TYPES LISTED IN BOLD PRINT COMPLY WITH THE REQUIREMENTS OF MIL-I-46058C

All technical data in this bulletin are based on test results using the stated standards and are believed to be correct. However, since the end use of HumiSeal materials (and the manner of storing and handling them) is beyond our control, we make no warranty — expressed or implied — as to the fitness of use, results to be obtained from or effects of use with respect to these materials. Their use shall be solely by the judgment of and at the risk of the end-user notwithstanding any statement contained in this bulletin.

1. The first digit in the type number specifies whether the product is a one-, or a two-component system.
2. Fed-Std 141a, Method 4184.
3. Fed-Std 141a, Method 4044.
4. Fed-Std 141a, Method 4287.
5. Fed-Std 141a, Method 4291.
6. Fed-Std 141a, Method 4061.
7. Mil-I-46058C.
8. Visual evaluation for ease of soldering with an 85 watt iron through a 2 mil film.
9. Fluorescent dye may be added if required.
10. Fed-Std 141a, Method 2121.
11. Fed-Std 406, Method 7031, Procedure A.
12. Fed-Std 141a, Method 6303.
13. ASTM-D150-65T, at 1 MHz and 25°C.
14. Mil-I-46058C Insulation resistance during 10th cycle, at 65°C and 98% RH.

FOR ELECTRONICS

OF PROPERTIES

HumiSeal Protective Coatings are available in one-quart or one-gallon cans, five-gallon pails, or fifty-five gallon drums. HumiSeal types 1B15 and 1A27 are also available in 16-ounce aerosol containers. All HumiSeal types listed in this chart may be applied by dip, brush or spray. Literature on recommended techniques for the proper application of coatings and preparation of the substrate is available upon request.

PROPERTIES OF CURED HumiSeal COATING

PHYSICAL PROPERTIES							ELECTRICAL PROPERTIES					CHEMICAL PROPERTIES			
Color[9]	Specific Gravity	Average Build After One Dip (mils)[10]	Water Absorption (%)[11]	Flexibility[7]	Adhesion[12]	Mar Resistance[12]	Dielectric Constant[13]	Dissipation Factor[13]	Dielectric Strength (volts)[7]	Insulation Resistance (teraohms)[7]	Moisture Resistance (gigaohms)[14]	Main Constituent	Fungus Resistance[7]	Resistance to Solvents	HumiSeal Type[1]
Water Clear	1.05	0.5	.18	Very Good	Excellent	Very Good	2.8	.010	6000	250	30	Acrylic	Excellent	Very Good	1B12
Water Clear	1.05	2	.20	Fair	Excellent	Fair	2.3	.010	8000	350	40	Acrylic	Excellent	Fair	1B15
Water Clear	1.06	2	.20	Excellent	Excellent	Very Good	2.5	.010	7500	800	60	Acrylic	Excellent	Good	1B31
Light Straw	1.05	2	.30	Excellent	Very Good	Excellent	3.5	.028	8000	300	48	Polyurethane	Excellent	Excellent	1A20
Green Tinge	1.05	5	.31	Excellent	Excellent	Fair	3.6	.020	7500	200	12	Polyurethane	Fair	Good	1A27
Yellow Tinge	1.05	2	.31	Excellent	Excellent	Fair	3.6	.030	7500	200	16	Polyurethane	Excellent	Good	1A33
Yellow Tinge	1.09	0.5	.30	Excellent	Excellent	Good	3.6	.024	3500	300	56	Polyurethane	Excellent	Excellent	2A72
Yellow Tinge	1.06	2	.20	Excellent	Excellent	Excellent	3.0	.030	8000	300	33	Epoxy	Excellent	Excellent	2B13
Yellow Tinge	1.10	15	.31	Fair	Good	Good	3.0	.030	6000	400	6	Epoxy	Excellent	Good	2A51
Yellow Tinge	0.95	1	.30	Excellent	Excellent	Excellent	3.0	.030	8000	200	28	Epoxy	Excellent	Excellent	2A53

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Garden City, New York 11530

epm

electronic products magazine

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SPECIFY GC ELECTRONICS ... FOR ALL YOUR CHEMICAL NEEDS!

GC Electronics offers you the most complete line available anywhere. Whether it be cleaners, lubricants, adhesives, coolants, insulating compounds, finishes, printed circuit chemicals - - - GC offers them all in a wide variety of sizes and containers - - - bottles, tubes, aerosol cans, drums. For the finest quality and service, specify GC Electronics.

WRITE FOR CATALOG FR-75 FOR COMPLETE GC CHEMICAL LISTING

GC ELECTRONICS
NON-FLAMMABLE
DRY-KLEEN
DRY
CONTACT CLEANER
RELAY-KLEEN
Contact Cleaner
SPRA KLEEN
NO-OX
DE-OX-ID
CONTACT CLEANER
FREEZE MIST
COOLS CIRCUITS 3 TIMES FASTER
CIRCUIT COOLER
High quality silicone lubricant

DRY KLEEN

Clean contacts, relays and other electronic devices. Leaves absolutely no deposits. Excellent degreaser for inks and gummy deposits on all electrical or mechanical apparatus. Non-flammable.

8669	16 oz. aerosol	$2.53

RELAY KLEEN

Cleans relays, contacts and other electronic devices where no oily, residual deposits are desired. Excellent degreaser and general solvent for gummy deposits on all electrical or mechanical equipment. Non-flammable; contains no carbon tetrachloride.

8682-3	3 oz. aerosol	$1.23
8682	6 oz. aerosol	2.08
8682-16	16 oz. aerosol	3.84

SPRA KLEEN

Eliminates noise due to dust, dirt and corrosion on electrical contacts. Cleans and lubricates contacts, controls, relays, switches and other sliding contact devices in one fast operation.

8666-3	3 oz. aerosol	$ .86
8666	6 oz. aerosol	1.18
8666-16	16 oz. aerosol	2.35

NO-OX

Electronic contact cleaner dissolves corrosion quickly without harsh solvents. Lubricates and protects silde contacts long after application. Recommended for maintenance of volume and tone controls, attenuators, relay contacts, patchboard jacks and similar equipment.

100-02	2 oz. bottle	$1.38
100-06	6 oz. aerosol	2.48

DE-OX-ID

The most powerful all-purpose TV-radio cleaner! Consists of active ingredients in a light oil base. Use on volume and tone controls, audio mixers, relays—restores noise free operation instantaneously. Highly concentrated—protects for months.

19-2	2 oz. bottle	$1.38
19-6	6 oz. aerosol	2.48
19-16	16 oz. bottle	8.80

EXTRA DRY SUPER FREEZE MIST

Cools circuits 3 times faster! Locates bad capacitors, transistors and oxidized joints by instantly cooling components. Non-toxic, odor free, leaves no liquid residue on parts.

10-702-3	3 oz. aerosol	$ .88
10-702	15 oz. aerosol	2.75

ZERO MIST CIRCUIT COOLER

Locates "intermittence" in electronic equipment caused by overheating of components. Cools components instantly pinpointing faulty capacitors, transistors, oxidized junctions.

8667	16 oz. aerosol	$2.63

SILI-SPRA

High quality silicone lubricant! Handy aerosol features exclusive 3-way valve that applies a light lubricating film that lasts and won't leave a residue buildup. Ideal for home, office or workshop.

10-600	6 oz. aerosol	$1.53

Complete rapid bonding adhesive kit makes it possible to bond surfaces that before could not be bonded: Dupont Teflon, glass, polyethylene, vinyl or silicone rubber. Simply brush CYANO-PREP on surface to be bonded. CYANO-PREP evaporates immediately leaving the surface ready for bonding. Then apply GR-R-RIP!—a drop holds tons. To safely remove excess of adhesive from skin, clothes or tools, use CYANO-SOLV. Kit contains one each of:

(10-115)	GR-R-RIP!	(2 gram tube)
(10-125)	CYANO-PREP	(1 oz. bottle)
(10-130)	CYANO-SOLV	(1 oz. bottle)
10-135	MIRACLE ADHESIVE KIT	$4.95

ALL ITEMS IN KIT AVAILABLE SEPARATELY

CYANO-PREP
CYANO-SOLV

10-125	10-115	10-130
$1.75	$1.99	$1.75

micro-circuits electrically conductive coatings

For Research and Production in: Electronics, Medicine, Aerospace, Electro-Mechanics, Communications

EVERY DESIGN AND RESEARCH ENGINEER SHOULD EVALUATE THESE

TEN BASIC WAYS TO USE OUR CONDUCTIVE COATINGS

How many of **your** problems will they solve?

They are far from complete, but they certainly will suggest new approaches to your problems. The data folders in the Kits list the proper kit materials and suggested methods for solving each type of problem below.

1 Do you want to know exactly when something breaks, stretches, twists, slides, falls down, gets up, expands, shrinks, grows, vibrates, tears, cracks or smiles?

These effects, frequently correlated with an oscillograph record or record of applied force, usually depend upon the breaking of a current path through a conductive film painted on the surface under test.

2 Do you want to be warned or have something happen when it starts to rain, water rises, something boils over, a surface absorbs chemicals or moisture, a surface dries out, or wets its diaper?

These effects, which can be used to change the indication on an ohmmeter or to operate a relay, result from the enormous change in resistance which occurs when a drop of water or other chemical bridges the gap between two electrodes or grids painted on an insulating surface.

3 Do you need an easily-built working model of (or a less-expensive production replacement for) a complex, metallic, current-carrying part such as an antenna element, a fuse clip, a lamp socket, or 1001 other large and small pieces of conducting hardware?

Just make the part out of cardboard, bakelite, plaster of Paris, wood, lucite, glass tubing, or other material which is physically suitable; then brush, dip, or spray on a suitable conductive coating.

4 Do you need closely adhering terminals (temporary or permanent) on any surface for measuring volume or surface resistance, for determining the amount of salt water in a rock sample, or for measuring the capacitance or dielectric constant of materials?

5 Do you want to shield an instrument or component electrostatically or electromagnetically?

Often you can paint the shield right on the plastic case, glass envelope, or other surface.

6 Are you in a hurry to test a design change in a resistor, conductor, or capacitor in a printed or etched circuit; or would you like to draw a complete new printed circuit for your product?

7 Do you need a heating element for a chemical breaker, a crystal oven, a time-delay relay, or an aircraft gadget which needs heating or de-icing?

7 Continued

A wide range of accurately-adjusted resistance paints are available in the S31 KIT, and the instructions permit you to obtain fairly accurate resistance values with a minimum of experience.

8 Without requiring physical contact, would you like to:

See the amplitude or wave form at different points on a vibrating object?

Know when a certain amount of material has accumulated (such as dust on a refrigerator cooling radiator or material in a bin)?

Determine the per cent solids in foamed plastic, etc.?

Determine, rapidly and automatically, whether sheets or separate objects are thick enough, wide enough, or full enough?

These effects can be measured by measuring capacitance or dielectric constant changes with the aid of conductive-paint areas. Depending upon the problem, the effect can be measured on a capacitance bridge, seen on an oscilloscope, or used to vary the frequency of an oscillator.

9 Do you need a rapid method of building up worn conductive surfaces, grounding components, or connecting terminals on a terminal board?

10 Do you have problems involving sorting, timing, synchronizing, reversing, accepting, or rejecting?

Often it can be done by painting one or more conductive areas on a moving surface or object, so that stationary contact fingers will operate a relay or solenoid at the proper time. For example:

A dot of silver Micropaint at the end of a recording tape will operate a reversing mechanism.

Areas of low-cost resistance paint brushed on proper areas on the tops of boxes or other objects according to a pre-determined code will operate solenoids to push them off of a conveyor at the proper place.

A conductive area on a rotating disc or drum, on a tape, or on an object moving along a conveyor provides an easily-modified means of initiating a complex sequence of operating, holding, releasing, timing, counting, alerting, slowing down, speeding up, time delay, and revising functions.

NOTE: The above suggestions are rather general and are for illustration only. Specific applications may be patented or in process of being patented without our knowledge. We are not suggesting infringement of any patent and suggest that possible commercial applications be checked with your patent attorney.

micro-circuits co., inc.

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PHONE: (616) 469-2727

micro-circuits

ELECTRICALLY CONDUCTIVE SHIELDING, RESISTOR, AND ANTI-STATIC COATINGS

For Research and Production in: Electronics, Medicine, Aerospace, Electro-Mechanics, Communications

CONDUCTIVE COATINGS SELECTOR TABLE

Conductive Paint Catalog Numbers. See Descriptions Below	MOST FREQUENT USES							
	Static Shield	RF Shield	Aircraft Precipitation Static	High Voltage Stress Relief	Resistors Conductors 0-10 megs	Resistors 10 megs to 50,000 megs	Contacts Conductors Grounds	Sensors: Proximity, Bending, Moisture, Cracking, Timing, etc.
SC12, 13, 15, 20	√	√			√		√	√
SC17	√	√			√		√	√
RS14	√	√			√		√	√
RS17	√				√		√	√
RSE22	√				√		√	√
RSE100			√	√				
RS110			√	√				
RA-2			√					
R-Series				√	√			√
UHR-Series				√		√		

DESCRIPTIONS OF PAINTS LISTED ABOVE

NOTES ON DESCRIPTIONS OF PAINTS: Most of the coatings have been in use (with continuing improvement) for 5 to 20 years. They have many uses which are far removed from the uses which are mentioned. The indicated resistance per square is our production test value. Resistances obtained by the user may be varied by changing the thickness, by absorption into the substrate, by partial dissolving into undercoats or overcoats, etc. Resistance per square is the resistance measured between two opposite sides of a square area of the paint painted between two parallel electrodes of substantially zero resistance. If paint thickness remains constant then resistance is independent of dimensions and a 1″ square will have the same resistance as a 1 mile square.

We recommend a phone call to discuss proposed applications. These paints are usually available in production quantities on one or two day notice. We also have or can make a wide range of other conductive coatings.

SC12, SC13, AND SC15 AIR DRYING SILVER MICROPAINTS. These are highly conductive coatings for "wires," electromagnetic shielding, "soldering" fine wires, contacts on magnetic tape, coating of experimental parts of paper, plastic, wood, etc. to simulate metal parts, and a wide variety of other uses. They have been used by magicians and to indicate the fracture of rocks. Resistance of SC12 is less than 0.2 ohms per square. SC13 is more flexible but less conductive. Good adhesion. Stand 500°F. but soften below this. SC15 dries more slowly than SC12 and is suggested for ruling pen and silk screen application. Solvent SL14 for SC12 and SC13. Solvent SL-2 for SC15.

SC17 FLEXIBLE SILVER MICROPAINT. Very flexible. May be stretched up to 150%. For use on polyethylene, rubber, etc. where there are adhesion and flexibility problems. Has been used for skin contacts in medical tests but we have a superior substitute for this application. Imparts excellent rust-preventive conductive surface on steel for RF gaskets, door closures, etc. Prevents RF leakage at microwave plumbing joints simply by painting over the joints (SC13 is used for the same purpose). Resistance about 0.5 ohm per square or less as applied. Rises to about 10 ohms when stretched 100%. Brush or spray application. Solvent — SL14.

SC20. NEW SKIN CONTACT PAINT BONDS SILVER TO SKIN. New SC20 Silver Micropaint aids in the study of weak and elusive electrical body signals which may yield new discoveries. Accurate detailed recording requires a low level of distortion. Conventional skin-recorder interfaces vary due to skin movement, perspiration, and electrolytic action. The new SC20 silver electrode becomes part of the skin surface. Just paint it on and use within 1-2 minutes. Non-toxic, non-allergenic. No discomfort. Low cost per contact. Lasts up to two weeks with patient or research subject living, normal, active life. Remove with rubbing alcohol. May lead to discoveries based on long-term changes masked by conventional contacts.

RS17 FLEXIBLE SHIELDING MICROPAINT (formerly RS17B). Good adhesion to polyethylene, rubber, etc. Good weather resistance and rust preventive characteristics. Will stretch 30-50%. Uses are somewhat similar to those of SC17 but are determined by its higher resistance of 150 ohms per square or lower and very much lower cost. Spray or brush. Solvent SL14.

RSE22 EPOXY SHIELDING MICROPAINT. Very good adhesion, abrasion resistance, and chemical resistance. Appears to be unaffected by continuous immersion in 10% salt solution at 200°F. Has many applications in forming ground surfaces, shielding, conductive corrosion protection, etc. 200 ohms per square or less. Curing agent (supplied) is mixed in before use. Pot life is 4 to 8 hours. Brush, spray, or dip. Solvents are SE100 (spray) or SE200 (brush).

RS110 AND RSE100 AIRCRAFT ANTI-STATIC MICROPAINTS (RAIN-EROSION-RESISTANT). Both coatings have a unique formulation which yields optimum anti-static characteristics under a wide range of application conditions and techniques. They may be depended upon to perform satisfactorily even when no equipment is available to test them after application. RS110 is a lacquer-base coating. Chief advantage is fast application and drying without curing agents. However customers have reported the service life to be in excess of 2000 hours without apparent loss of effectiveness on slow speed aircraft. RSE100 is an epoxy coating with very important advantages over neoprene anti-static coatings: Requires only two coats, no special primers, easily recoated and repaired. In accelerated laboratory tests under both dry and salt spray conditions RSE100 abrasion resistance equalled or exceeded that of neoprene anti-static coatings. Solvent SE100.

RA-2 ADDITIVE. This is added to commercially available decorative aircraft coatings. It permits decorative coatings to be applied over the black anti-static coatings on radomes and antenna covers without loss of anti-static effectiveness and without static puncture damage to the decorative coatings. RA-2 Additive is being used by U. S. and foreign air lines, aircraft manufacturers, and aircraft electronic manufacturers.

R-SERIES RESISTANCE MICROPAINTS. This is a series of five carefully adjusted resistance paints. It has been estimated that about 4000 ¼-watt resistors can be painted from one 25 cc (1 oz.) bottle. The stock numbers follow: The number following the stock number is the resistance in ohms per square: R01 — 125 ohms (per sq.), R11 — 500 ohms, R21 — 12,500 ohms, R31 — 0.31 megs, R41 — 3.1 megs. The paints may be mixed for intermediate values. By varying the ratio of length to width each stock paint will yield resistors varying from about ⅕th of the indicated value to about 5 or more times the indicated value. Maximum operating temperature is about 250°F. but they will stand much higher temperatures briefly. Brush, spray, ruling pen. Solvent SL14.

UHR-SERIES (ULTRA HIGH RESISTANCE) MICROPAINTS. These seven paints continue above the R-Series in resistance values. Use where a high meg resistor or a slow electrical leak is needed. May be applied with moderate precision with a ruling pen or artists brush. Can replace very expensive high meg resistors in non-critical applications for a fraction of a cent per resistor. Also used to equalize voltage gradients in high voltage insulators, etc. Made with a highly stable, moisture-resistant binder. Solvent SL14.

micro-circuits co., inc.

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Exacting Sprays for Exact Results by . . .

KONTAKT CHEMIE

Imported from West Germany

Cleaning, Protecting and Insulating Sprays for Electronic and Electrical Production and Maintenance

KONTAKT 60 OXIDE-DISSOLVING
The proven treatment agent for all electrical contact disturbances. Dissolves oxide and sulphide layers, dirt, oils, resins, fats, traces of metal abrasions, etc. . . . leaves a protective microfilm. Eliminates high contact resistances due to atmospheric influences. Effective even under conditions of minimum current flow and lowest contact pressure. Safe on all types of constructional materials . . . plastics, metals, hardboard, etc. Guaranteed trouble-free operation.
6 oz. and 16 oz. aerosol cans with flexible spray tube.
Also available in bulk liters.

KONTAKT
60
KONTAKT

TUNER
600
KONTAKT

NEW!
TUNER 600 SUPER CLEANER
Immediately eliminates contact disturbances on channel switches without changing the capacitance and frequency response. Even sensitive tuners are not de-tuned. Eliminates disassembly, thereby reducing service time. Highest operational safety . . . non-conductive. Harmless, non-flammable, instant drying, no residue.
6 oz. aerosol cans with flexible spray tube.

KONTAKT 61 "The Preserver" ANTI-CORROSION LUBE
A world renowned self-cleaning, anti-corrosion agent, formulated principally for application on, and precision lubrication of, new non-oxidized contact surfaces. Reduces mechanical abrasions of all surfaces by several orders of magnitude. Immeasurably increases service life and is perfectly safe on all construction materials. Guaranteed trouble-free operation.
6 oz. and 16 oz. aerosol cans with flexible spray tube.
Also available in bulk liters.

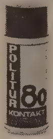
KONTAKT
61
KONTAKT

KONTAKT
WL
KONTAKT

KONTAKT WL CLEANS AND DEGREASES
Fast, efficient results from KONTAKT'S multi-purpose solvent mix. Cleans and degreases badly soiled electrical contacts. Aids the excellent cleaning effect of "KONTAKT 60" by rapidly removing dissolved oxide particles. Safe, will not attack constructional materials . . . plastics, metals, hardboard, etc.
6 oz. and 16 oz. aerosol cans with flexible spray tube.

NEW!
KONTAFLON 85 "Greasefree Lubricant"
A suspension spray containing particles of polytetrafluoride ethyl (PTFE) as an effective constituent. It is a greasefree, waxlike lubricant and repelling agent practically invisible to the eye. It can be applied in all cases where oily substances (mineral or silicon oils) cannot be used, and where graphite or molybdenum sulphide cause excessive discoloration. Ideal for universal use.
6 oz. aerosol cans with flexible spray tube.

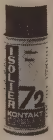
KONTAFLON
85
KONTAKT



POLITUR 80 CLEANS AND POLISHES
Cleans and polishes in one process. For all wood, plastic or painted surfaces, and colors. Conceals and eliminates minor scratches and produces a high-gloss, durable coating.
6 oz. aerosol cans

PLASTIC SPRAY 70 INSULATING LACQUER
Resistant to dilute acids, caustic solutions, alcohol, oils, moisture and dust. Durable through -70°C to 100°C temperature extremes. High quality transparent coating with a wide range of applications.
6 oz. and 16 oz. aerosol cans

PLASTIK
70
KONTAKT



ISOLIER SPRAY 72 INSULATING OIL
High grade, high viscosity with a dieletric value of 20 Kv/mm. Silicone basis, will not dry out or cause sticking of parts. Stable through -50°C to 200°C temperature extremes. Moisture repellent and non-toxic. Contact surfaces, accidentally sprayed, will not be adversely affected.
6 oz. aerosol cans with flexible spray tube.

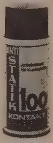
FLUID 101 MOISTURE PENETRATOR
Displaces moisture, penetrates under water and protects against corrosion! FLUID 101 assists wherever moisture is harmful. It prevents interruptions in electrical and electronic equipment caused by water condensation. Wet distributors, ignition cables or spark plugs are no longer a problem. Ideal for marine applications.
6 oz. and 16 oz. aerosol cans

SPRÜHÖL
88
KONTAKT

NEW!
OIL SPRAY 88 HIGH GRADE OIL
Lubricates the most inaccessible parts, simplifying maintenance. Acid free, remains fluid in -40°C to 175°C extremes of temperature. Inhibits oxidation.
6 oz. aerosol cans with flexible spray tube.

COLD SPRAY 75 INSTANT COLD
Cools to -42°C for rapid location of thermal breaks when repairing electronic equipment, saving time of dismantling and measurement of individual components. Prevents heat damage during soldering. Ideal for use in applications requiring rapidly reduced temperatures or freezing. Non-toxic, non-flammable and chemically inert; harmless to components.
6 oz. and 16 oz. aerosol cans with flexible spray tube.

KÄLTE
75
KONTAKT



ANTI STATIK SPRAY 100 STATIC ELIMINATOR
Prevents build up of static charges on all plastic products. Its uses include cleaning and preserving valuable recordings. Prevents dust deposits, formed as a result of static charges, on plastic products, remaining effective over a long period. Excellent for the treatment of television picture tubes and protection masks.
2½ oz. and 6 oz. aerosol cans.

VIDEO-SPRAY 90 MAGNETIC HEAD CLEANER
Dissolves even hardened dirt from the gaps of magnetic heads on video and sound tape recorders and data processing equipment. It is completely harmless, electrically non-conductive, non-flammable, dries quickly without leaving a residue and offers a high degree of safety in use.
2½ oz. and 6 oz. aerosol cans with flexible spray tube.

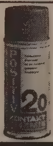
VIDEO
90
KONTAKT

GRAPHIT
33
KONTAKT

GRAPHIT SPRAY 33 CONDUCTIVE COATING
Provides a conductive and durable coating on non-conductive surfaces directly from the spray can. Its uses include the repair and renovation of damaged screens of cathode ray tubes. Eliminates static charges . . . acts as an effective screen. Adheres to all smooth surfaces.
16 oz. aerosol cans

LOTLACK SK10 SOLDERING VARNISH
A protective coating/lacquer which prevents the oxidation of PC boards, thus permitting increased shelf-life. Also acts as a soldering flux with excellent soldering capabilities. SK10 is equally suitable for use in manufacturing and servicing.
16 oz. aerosol cans

LOTLACK
SK10
KONTAKT



POSITIV 20 PHOTO COPYING PAINT
Positive process coating for printed circuits for use by technicians and others concerned with the fabrication of single, or small runs of printed circuits. Transparent drawings of printed circuits can be copied directly on to a board coated with Positiv 20. The high resolution gives clear sharp edges. A large exposure range provides the required safety.
6 oz. aerosol cans

Send for catalog, specifications and price information

REGMO DATA CORPORATION

6992 Oxford St.
Minneapolis, MN 55426
612/925-3800

P.C. BOARDS

We are manufacturers of quality printed circuit boards with many years of experience, and our service has satisfied numerous customers from Coast to Coast.

We are specializers in many diverse industries; such as Medical Electronics, Electronic Security, Instrumentation, Navigational, Aviation, Emergency Lighting, Computers, as well as many others.

With extensive experience, know-how, and modern facilities backing our organization, we are confident that we can supply and fulfill your requirements.

Some of our more general capabilities include:

- *Single Sided*
- *Double Sided*
- *Plated Thru*
- *Tape Drilling*
- *Pierce & Blanking*
- *Gold Plating*
- *Nickel Plating*
- *Tin Plating*
- *Lead-Tin Plating*
- *Reflow Solder*

Whether you have a requirement for prototypes or production quantities, or wish further information-call collect. We are willing and able to serve you.

ACI

APPLIED CIRCUITS INC.
31-24 14th Street, L.I.C. N.Y. 11106

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Tel. (212) 274-6001

IPC UL

ACCUTRONICS

"STANDS FOR ACCURACY AND CONTROL IN PRINTED CIRCUITRY"

SERVICE SAVINGS DELIVERY

QUALITY CONTROL

HERE IS HOW YOU BENEFIT

Complete **photography and prototype** lab.

Micro-adjustable silk screening equipment for plus or minus .001 **repeatability.**

Optical location of blank and pierce operations for close tolerance punch pattern registration. Plus or minus .005" or better.

All products receive constant in-process monitoring, 100% final inspection and final audit to assure **quality** boards.

Drill and route capability.

Normal lead time required, **2 weeks** — 24 hour service when needed.

Underwriters Laboratory process approved UL flame retardant material and **approved** process.

Manufacturing of boards with "Roll tinned" edge connectors as a possible **ubtitute for gold** (gold plating is available).

Exceptional solderability.

Over 50 years of combined management **experience.**

Member IPC.

accutronics / printed circuit division

225 North First Street – Cary, Illinois 60013

Phone 312-639-2102 – TWX 910-237-1680 – Cable AKUTRONX

NEW * PRINTED CIRCUIT BOARDS

SNAP-A-WAY ⁝ SNAP-A-WAY

SNAP-A-WAY SNAP-A-WAY

SNAP-A-WAY style boards can offer substantial savings for either **Manual** or **Machine** insertion operations • Board costs are reduced through skeletal scrap reduction • Assembly and soldering times are reduced through minimized handling • Snap-a-Way's are produced during the normal board production cycle and do not require the older costly scoring methods.

SNAP-A-WAY FOR HIGH VOLUME COST REDUCTIONS!!!

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BUILD&TEST AS FAST AS

CSC continental specialties

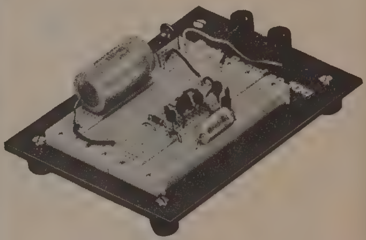
Continental Specialties offers a total line of breadboard Prototest devices . . . everything from inexpensive kits to high-power professional units and logic monitors too. Available off-the-shelf from your local distributor or direct from the factory. These high quality, compact units come with a guarantee of complete satisfaction or your money back within 10 days.

44 Kendall Street, Box 1942, New Haven, CT 06509 • 203/624-3103
West Coast Office: Box 7809, San Francisco, CA 94119 • 415/383-4207

Made in USA • *Patents Pending
Prices are subject to change.

Continental Specialties PROTO BOARD-100 is a complete Mini-Breadboard Budget Kit with full 10 IC capacity.

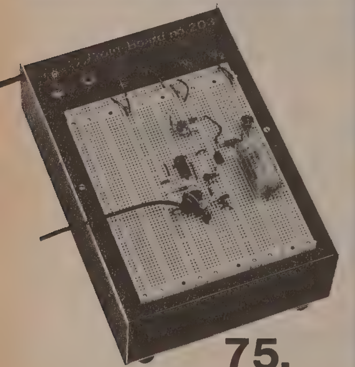
The PB-100 is a low cost, big 10 IC capacity breadboard kit with all the quality of Continental Specialties QT Sockets and the best of the Proto Board series. Each kit is complete down to the last nut, bolt and screw, including 2 QT-35S Sockets; 1 QT-35B Bus Strip; 2 5-way binding posts; 4 rubber feet; screws and easy assembly instructions. Measures 4.50″ (114.3mm) wide x 6.00″ (152.4mm) long x 1.35″ (34.3mm) high. Order today off-the-shelf from CSC or your local distributor.



Complete Kit . . .

19.95

Add $1.50 shipping and handling



75.

Add $2.50 shipping and handling

PROTO BOARD 203 offers Power for The Professional. Breadboard and test with 5 Volt, 1 AMP regulated power supply.

The PB-203 is a total, ready-to-use power breadboard Prototest device with a built-in regulated, short-proof power supply. Just plug it in and start building! 2 extra floating 5-way binding posts are included for external signals. Self-contained, with a power switch indicator lamp and power fuse. Full 24 14-pin DIP capacity in an attractive two-tone quality case. All metal construction, measuring 6.60″ (168mm) wide x 9.75″ (248mm) long x 3.25″ (82.6mm) high. Weighs 5 lbs. Order today off-the-shelf from CSC or local distributor.

FOR IMMEDIATE OFF-THE-SHELF DELIVERY

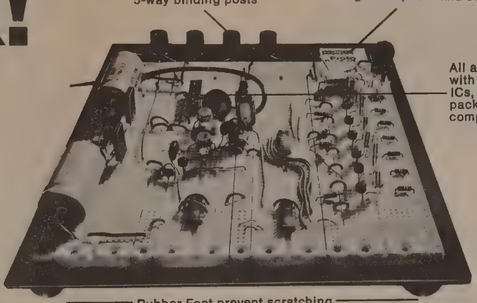
West Coast Office: Box 7809, San Francisco, CA 94119 • 415/383-4207

CHARGE ON BANKAMERICARD, MASTER CHARGE OR AMERICAN EXPRESS. FOREIGN ORDERS ADD 15% FOR SHIPPING AND HANDLING.

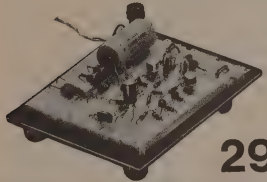
CIRCUITS YOU THINK!

4 Versatile Breadboard Prototest Devices eliminate soldering and patch cords!

Continental Specialties PROTO BOARDS let you make all circuit and power interconnections with common #22 AWG solid hook-up wire, while power distribution buses make wiring a snap. Aluminum base plates offer solid work surfaces for perfect ground plane and rubber feet prevent scratching. Each PROTO BOARD features one or more 5-way binding posts to tie into system or power supply ground. All are compatible with digital or linear ICs in TO5s, DIP packs and discrete components. And each is completely assembled, ready-to-use. Order today off-the-shelf from CSC or your local distributor.



Each has one or more 5-way binding posts
Aluminum base is perfect ground plane and solid surface
All are compatible with digital/linear ICs, in TO5s, DIP packs and discrete components
All connections made with common #22 AWG hook-up wire
Rubber Feet prevent scratching



29^{95}

Continental Specialties

PROTO BOARD No. 101

This compact, inexpensive model features 10 14-pin DIP capacity and measures only 5.8″ long x 4.5″ wide. Order today off-the-shelf from CSC or your local distributor.

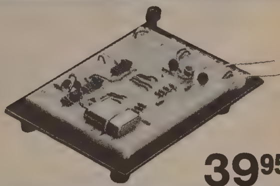
Add $2.00 for shipping and handling.

Continental Specialties

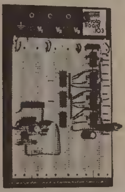
PROTO BOARD No. 102

Here is another compact model, but with 12 14-pin DIP capacity, measuring 7″ long x 4.5″ wide. It offers considerably more versatility than PB-101. Order today off-the-shelf from CSC or your local distributor.

Add $2.00 for shipping and handling.



39^{95}



59^{95}

Continental Specialties

PROTO BOARD No. 103

The PB-103 offers 2,250 solderless tie points, and four 5-way binding posts. This mid-size PROTO BOARD has a big 24 14-pin DIP capacity, and measures 9″ long x 6″ wide. Order today off-the-shelf from CSC or your local distributor.

Add $2.50 for shipping and handling.

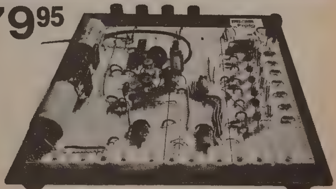
Continental Specialties

PROTO BOARD No. 104

This big, versatile model features 3,060 solderless tie points, four 5-way binding posts, 32 14-pin DIP capacity, and measures 9.5″ long x 8″ wide. A big model for big testing jobs. Order today off-the-shelf from CSC or your local distributor.

Add $2.50 for shipping and handling.

79^{95}



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BUILD&TEST AS FAST AS

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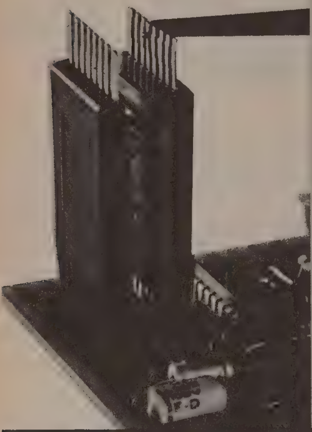
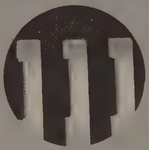


Continental Specialties PROTO-CLIP offers Power-On/Hands-Off signal tracing . . . yet costs under $5.00!

Continental Specialties PROTO-CLIP lets you trace signals or troubleshoot fast. Plus you can inject signals or wire unused circuits into existing boards. Scope probes and test leads lock onto the unique toothed grips (see inset below). Flexible plastic web* construction eliminates springs and pivots. You'll get thousands of operations. Plus, the narrow throat is perfect for high density pc boards. Order today off-the-shelf from CSC or your local distributor.



PC-14	14-pin PROTO-CLIP:	**$4.50 each**
PC-16	16-pin PROTO-CLIP:	**$4.75 each**

Add $1.00 for shipping and handling.

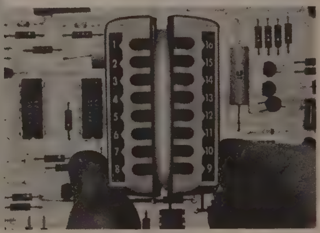
*Patents Pending

Continental Specialties LOGIC MONITOR brings ICs to life faster than a scope and safer than a voltmeter.

The amazing Continental Specialties LOGIC MONITOR is self-powered, self-contained and pocket-size. It requires no adjustments or calibrations as it simultaneously displays static and dynamic logic states of DTL, TTL, HTL or CMOS DIP ICs. Now you can watch your signals work their way through counters, shift registers, timers, adders, flip-flops, decoders, even entire systems. High intensity LEDs turn on when lead voltages exceed the 2V threshold. *No power supply is needed!* Power-seeking gate network locates DIP supply leads and feeds them into the LOGIC MONITOR. Forget about grounds, pin counting or sync polarity. Simply clip the LOGIC MONITOR to any DIP IC up to 16 pins. Precision plastic guides and a flexible plastic web* insure positive connections between non-corrosive nickel/silver contacts and the IC leads. Logic levels appear instantly on 16 large (.125" dia.) high intensity LEDs. Logic "I" (high voltage)-LED ON. Logic "O" (low voltage or open circuit)-LED OFF. Order today off-the-shelf from CSC or your local distributor.

Add $2.50 for shipping and handling.

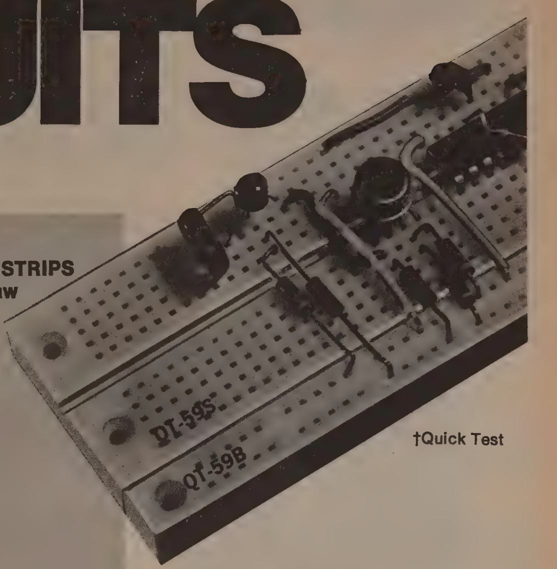
84.95



FOR IMMEDIATE OFF-THE-SHELF DELIVERY

CHARGE ON BANKAMERICARD, MASTER CHARGE OR AMERICAN EXPRESS. FOREIGN ORDERS ADD 15% FOR SHIPPING AND HANDLING.

CIRCUITS YOU THINK!



†Quick Test

Continental Specialties QT† SOCKETS and BUS STRIPS let you breadboard circuits as fast as you can draw them! Plug-in. Wire. Test. Modify. Build. All without patch cords or solder!

Keep going non-stop, from idea stage to final design, using the same components over again without bending, twisting or loading with solder. The fast, reliable QTs let you try out new ideas or rejuvenate old ones with complete safety to your discrete and IC components and your fingers.

SIMPLE MOUNTING

Mounting holes in the housing let you top mount to any flat surface with 4-40 flat head screws, or 6-32F self-tapping screws for behind-the-panel mounting.

ACCEPTS ALL STANDARD COMPONENTS

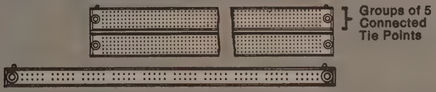
QTs conform to 1/10" grid and are DIP compatible. ICs, diodes, resistors, capacitors, transistors, etc. are plugged right into the socket and/or strip, without messy, time-consuming soldering.

HOOK-UP

All you need is a wire stripper and #22 AWG solid hook-up wire. Connect power and ground leads to your bus strip. Plug in your ICs, transistors, resistors, etc. Now interconnect components with #22 wire. Connect a signal source to bus strip or directly to input point of your circuit. Each socket has *5 tie points per terminal;* each bus strip has *2 separate rows of interconnecting terminals.* Turn on the power and signal source. Hook-up a scope probe, counter, etc. Then, if you have to add a wire, need another IC or component — just plug it in. You'll never burn your fingers or get solder shorts. And you don't need any special patch cords, either.

INTERCONNECTIONS

Each terminal consists of 5 connected solderless tie points formed from a prestressed, spring loaded noncorrosive alloy to insure secure mechanical and low resistance electrical connections.



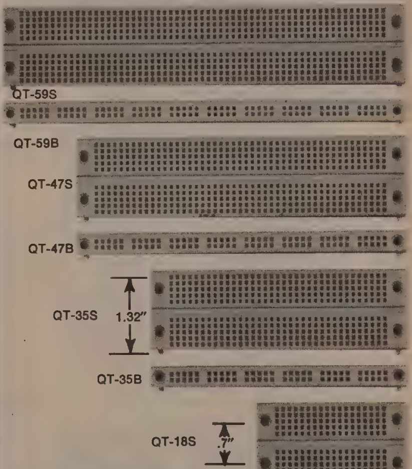
2 Buses of Interconnected Terminals—5 Tie Points Each

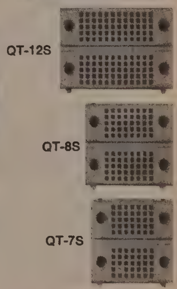
Simply push in your lead, wire or component and you've got a connection, quickly and easily, without damage to either the socket or your components. It's that simple!

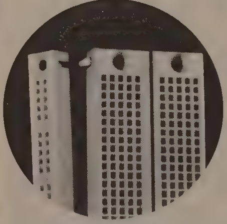
All Sockets are 1.32" wide. All Bus Strips are .36" wide. All Sockets and Bus Strips are .33" thick. And all are great for high temperature operation — for worst case circuit design to 100°C.

	Length	Hole-to-Hole	Terminals	Unit Price $
QT-59S	6.5"	6.2"	118	12.50
QT-59B	6.5"	6.2"	20	2.50
QT-47S	5.3"	5.0"	94	10.00
QT-47B	5.3"	5.0"	16	2.25
QT-35S	4.1"	3.8"	70	8.50
QT-35B	4.1"	3.8"	12	2.00
QT-18S	2.4"	2.1"	36	4.75
QT-12S	1.8"	1.5"	24	3.75
QT-8S	1.4"	1.1"	16	3.25
QT-7S	1.3"	1.0"	14	3.00

Add $1.50 for shipping and handling.







Exclusive SNAP/LOCK allows you to expand or contract your breadboard by snapping together as many sockets or strips as you need.

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DEFIANCE CIRCUIT CORPORATION

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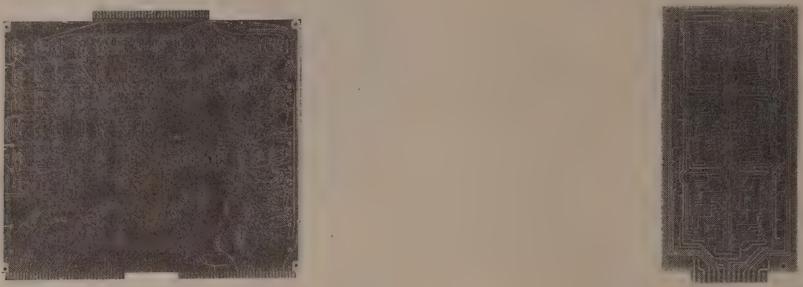
PRINTED CIRCUIT BOARDS FOR INDUSTRY

Our people are dedicated to supplying the quality you expect. Our complete and modern facility assures you of the latest technical advances in equipment and processes. Our computerized production control system eliminates production bottlenecks and insures on-time delivery. Our modern photo lab and chemical lab give us the tools and analysis without relying on outside sources. Our complete die tooling facility reduces both lead time and cost. Whatever your board requirements are, Defiance will respond with a prompt and competitive quotation.



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COMMUNICATIONS

COMMERCIAL

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DEFIANCE CIRCUIT CORPORATION

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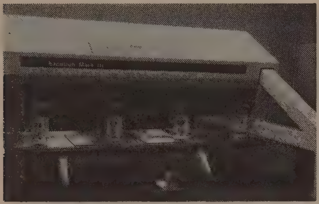
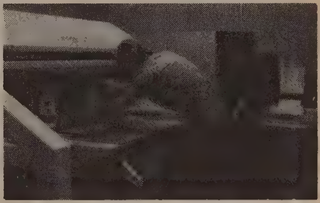
ENGINEERING

Over twenty years of experience assures compatability inspection of all incoming artworks. The chemical lab monitors plating solutions for dependable process control.

QUALITY CONTROL

Competent employees and the latest in equipment and procedures in both in-process inspection and final inspection give you the product quality you expect.



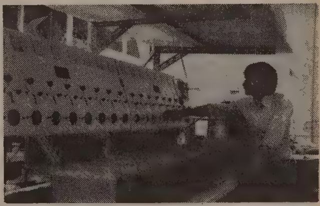


DRILLING

Defiance was one of the first independent companies to employ numerical control drilling exclusively. We will compare drilling capability with anyone without hesitation.

IMAGE DEPARTMENT

We utilize both the screening and dry film processes. Whether the requirements are simple or difficult, we are competitive due to our flexibility of equipment.



PLATING

Tight process control and trained personnel assure high quality. The gold plating tanks contain individual rectifiers per panel to more accurately control thickness.

FABRICATION

A complete tool and die department including EDM equipment give us a competitive edge in both cost and delivery. High volume runs are blanked. Low volume orders are routed.

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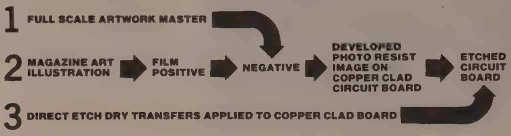
printed circuit kits••• DATAK

new photo etch kit.........Makes printed circuits THREE WAYS

Duplicate industrial techniques to make one or hundreds of identical printed circuits. Remarkable **POS-NEG**™ (pat. pend.) system will photocopy 1:1 art directly from a magazine page. Make 1:1 artwork masters, negatives, positives. Sensitize ordinary copper clad circuit boards: use your negative to expose; then develop and etch the final circuit. **No camera. No darkroom.** No tracing, pasting or film cutting. All materials supplied except photoflood bulb available at any camera store.


1 FULL SCALE ARTWORK MASTER
2 MAGAZINE ART ILLUSTRATION
FILM POSITIVE
NEGATIVE
DEVELOPED PHOTO RESIST IMAGE ON COPPER CLAD CIRCUIT BOARD
ETCHED CIRCUIT BOARD
3 DIRECT ETCH DRY TRANSFERS APPLIED TO COPPER CLAD BOARD

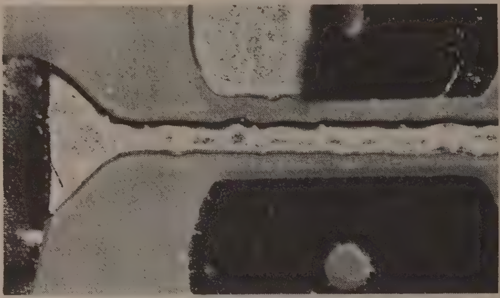
KIT CONTAINS: 5″x6″ steel printing frame with plate glass and backboard, 4 sheets 5″x6″ photocopy film, yellow filter, chemicals for 1 pint film developer and 1 pint film fixer, 5″x6″ copper clad board, spray can photo etch resist, 1 pint resist developer, 2 sheets 8½″x11″ layout film, 1 roll 1/16″ and 1 roll 1/32″ printed circuit tape, 8 sheets dry transfer direct etch PC patterns including pads, transistors, round can and flat pack ICs, DIP ICs, edge card connectors, lines, circles, jogs, etc., ¼ lb. anhydrous ferric chloride to make 1 pint etchant, instructions.

ER-4 COMPLETE PHOTO ETCH KIT $24.95

direct etch printed circuit kit

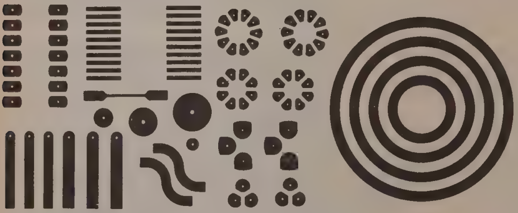
This one step kit uses a unique dry transfer resist that etches razor-sharp patterns. Lay out circuits directly on the copper board by rubbing down dry transfer patterns and lines. Connect with resist tape or leave unconnected for breadboards. Blow-up illustration shows 2 oz. copper circuit board **made only with materials in kit.** Black dry transfer resist is partly removed to show etched copper. Pattern is .015″ squeeze-through wire transferred between 2 DIP pads. Pad edges are spaced .030″ apart.

KIT CONTAINS: two 3″x4½″ and two 2¼″x3″ copper clad boards, 8 sheets direct etch PC patterns, 2 rolls PC resist tape (see ER-2 for description of patterns and tape), ¼ lb. anhydrous ferric chloride (makes 1 pint), combination storage box and etch tray, instructions.



ER-1 COMPLETE DIRECT ETCH KIT $5.95

photo etch and direct etch refill kits



DIRECT ETCH RESIST PATTERNS

8 sheets 3″x5″ 1:1 patterns include lines, circles, jogs, squeeze-throughs, TO-3 & TO-18 transistors, TO-99, TO-100, DIP & flatpack ICs, donut pads, roll of 1/16″ and 1/32″ resist tape. Withstands ferric chloride, ammonium persulfate, peroxide and other etch systems.

ER-2 DIRECT ETCH RESIST PATTERNS $3.39

DRY CONCENTRATED ETCHANT

¼ lb. anhydrous ferric chloride in vapor tight package makes 1 pint etchant, enough for 200 sq. in. of copper board. Costs less than liquid etch solutions.

ER-3 DRY CONCENTRATED ETCHANT $1.25

POS-NEG™ PHOTOCOPY FILM

Polyester base film makes negatives or positives directly from opaque or translucent art in one step. Handle in subdued light. Expose with #2 photoflood.

ER-5 SIX SHEETS 5″x6″ POS-NEG FILM $3.39

FILM PROCESS CHEMICALS

3 chemical packets make 1 pint litho film developer and 1 pint acid fixer. Handles 15 sheets copy film.

ER-6 FILM PROCESS CHEMICALS $1.79

PHOTO RESIST SPRAY

Photosensitive PC board coating. Unexposed coat is dissolved by resist developer. Exposed areas remain to act as an etch resist. Coats up to 400 sq. in.

ER-7 PHOTO RESIST SPRAY (2.5 oz. net wt.) $2.95

PHOTO RESIST DEVELOPER

Solvent blend develops exposed photoresist. Use with ER-7 spray resist.

ER-8 RESIST DEVELOPER (16 fl. oz.) $2.95

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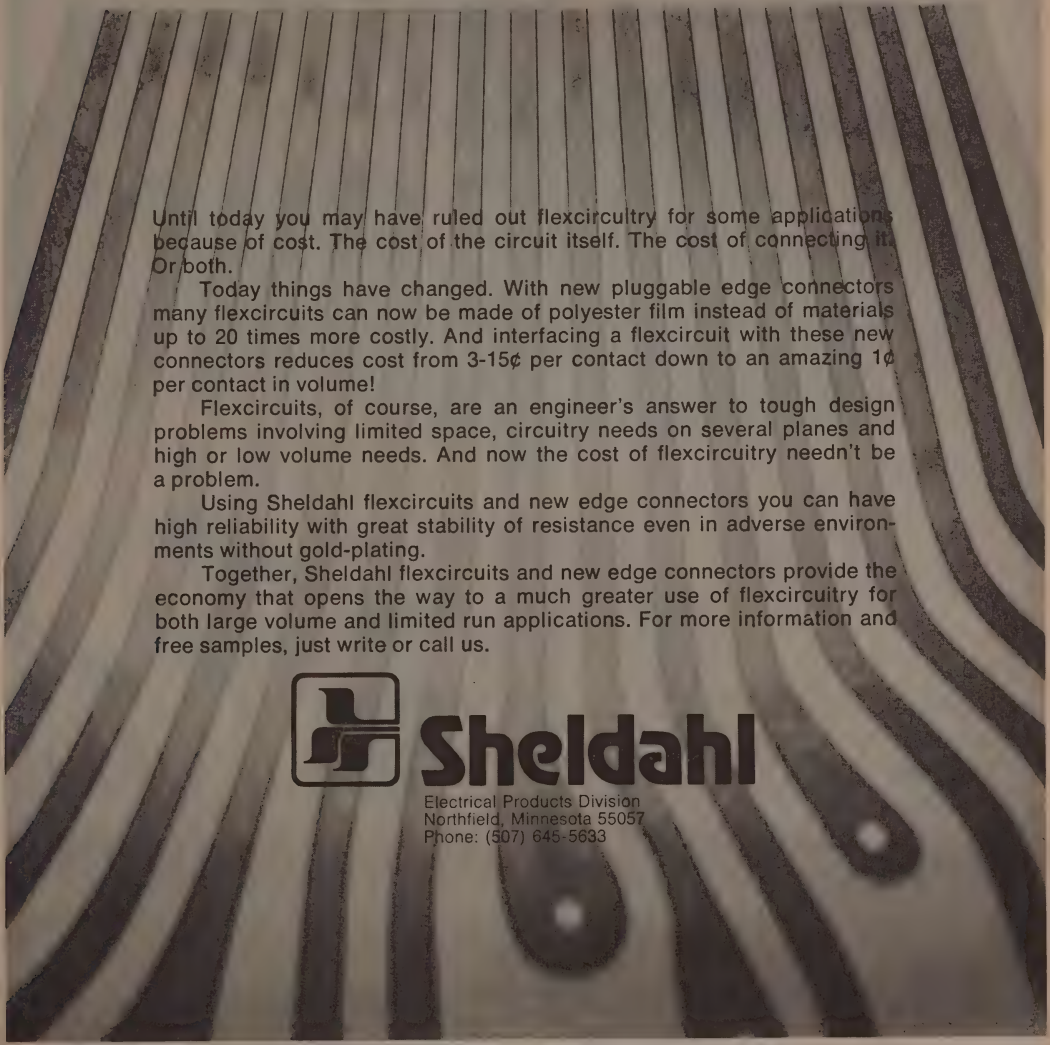
Now Sheldahl flexcircuitry is affordable for even more applications.



Until today you may have ruled out flexcircultry for some applications because of cost. The cost of the circuit itself. The cost of connecting it. Or both.

Today things have changed. With new pluggable edge connectors many flexcircuits can now be made of polyester film instead of materials up to 20 times more costly. And interfacing a flexcircuit with these new connectors reduces cost from 3-15¢ per contact down to an amazing 1¢ per contact in volume!

Flexcircuits, of course, are an engineer's answer to tough design problems involving limited space, circuitry needs on several planes and high or low volume needs. And now the cost of flexcircuitry needn't be a problem.

Using Sheldahl flexcircuits and new edge connectors you can have high reliability with great stability of resistance even in adverse environments without gold-plating.

Together, Sheldahl flexcircuits and new edge connectors provide the economy that opens the way to a much greater use of flexcircuitry for both large volume and limited run applications. For more information and free samples, just write or call us.

Sheldahl

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PRINTED CIRCUIT BOARDS

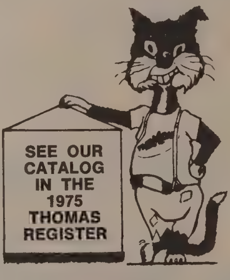
- **SINGLE SIDED**
- **DOUBLE SIDED**
- **PLATED THROUGH HOLES**
- **MEET IPC AND MIL SPECS**
- **FAST PROTOTYPE DELIVERY**

SGL Printed Circuits, with long experience and complete knowledge of latest production techniques, is a leader in printed circuit technology. Our modern, well-equipped facilities provide a quality manufacturing capability that assures you printed circuitry that meets your most exacting requirements.

The order you place with us is processed by skilled technicians whose standards of quality workmanship produce a superior product with on-time delivery. We maintain stocks in XXXP, FR-3, FR-4, G-10 and G-11, enabling us to assure supply and offer prompt shipments.

If you have a current need for printed circuits, we would appreciate your consideration of our company. If your specifications are fully developed, send them to us for quotation. They will receive prompt attention. If a personal visit to discuss the development or technical requirements of your printed board would be helpful, call us or write at the address below.

Where Quality Matters In Printed Circuitry.



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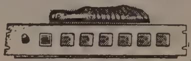
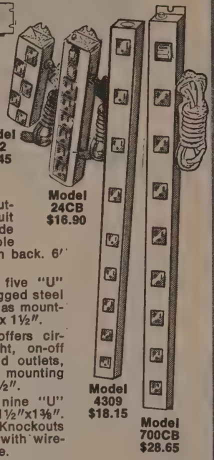
SGL WABER Electric

"U" Gr. OUTLET STRIPS And WHEELED CARTS



Model 900CB $23.15



SGL WABER pre-wired outlet strips provide multiple outlets with switch, pilot light, and circuit breaker included in most models. Shown here are typical units from over 200 models available. Heavy-duty components are housed in sturdy steel cases. Rated at 15 amperes, 120 volts. Finished in hammertone gray.

Model 900CB — This unit has six outlets, lighted rocker switch, and circuit breaker, Made to fit standard 19″ wide relay rack. Other models available with controls in front and outlets in back. 6′ cord-set.

Model 602 — Highly useful where five "U" ground outlets only are needed. Rugged steel case. Tough 6′ neoprene cord-set. Has mounting ears and measures 8⅝″ x 2⅜″ x 1½″.

Model 24CB — This popular unit offers circuit breaker protection, pilot light, on-off switch, six heavy duty "U" ground outlets, tough 6′ neoprene cord-set, and mounting ears. Dimensions: 13⅛″ x 2⅜″ x 1½″.

Model 4309 — UL listed unit has nine "U" ground outlets and measures 36″x1½″x1⅜″. Internally wired, ready to wire-in. Knockouts on either end and leads provided with wire-nuts for fast installation. Steel case.

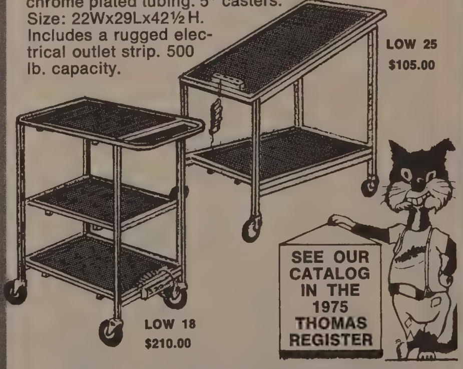
Model 700CB — Eight rugged "U" ground outlets in a steel case measuring 49″x2″x1½″ with lighted rocker switch and circuit breaker protection. 6′ neoprene cord-set.

Any of the above 6′ cord-set models can be supplied in a 15′ length at an additional cost of $2.10.

SGL WABER SCOPE CART AND WHEELED CARRIER

LOW 25 — Welded steel construction. Adjustable stops. 3″ swiveling casters. Complete with electrical outlet strip. Size: 21Wx31Lx33½″H. Top shelf inclines 20°. 360 lb. capacity.

LOW 18—One of the most versatile carriers available. Ideal for audio-visual, hospital, labs, etc. Constructed of 1″ square steel chrome plated tubing. 5″ casters. Size: 22Wx29Lx42½H. Includes a rugged electrical outlet strip. 500 lb. capacity.



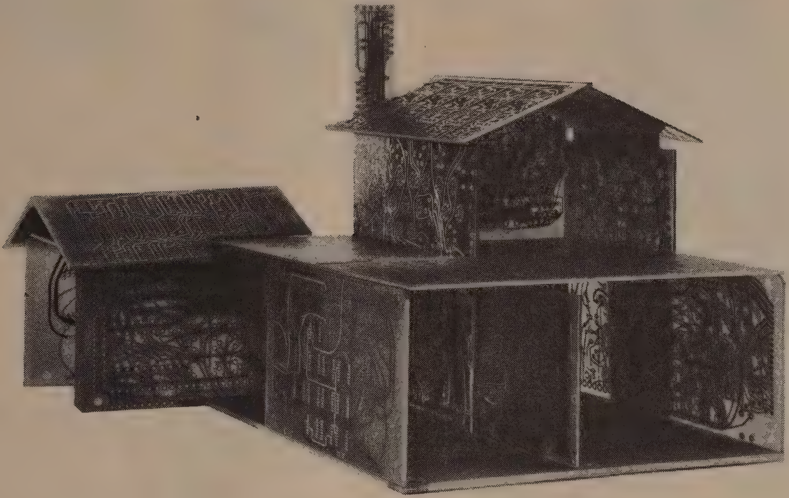
SGL WABER Electric

A division of SGL INDUSTRIES, INC.
300 HARVARD AVENUE
WESTVILLE, NEW JERSEY 08093
(609) 456-5400 TWX: 710-944-0758

Prices Subject To Change Without Notice

TRW® CINCH-GRAPHIK

High volume, production of P.C. boards for automotive, data processing, communications, instrumentation, aerospace and military applications.



Single and double-sided printed circuit boards and
Precision multilayer printed circuit boards with plated-thru holes

At TRW/Cinch Graphik you'll find the industry's most modern facilities combined with the industry's most knowledgeable, experienced people . . . the people that have made TRW/Cinch Graphik foremost in its field. These are the people who have devised and developed the innovations and techniques that enabled TRW/Cinch Graphik to develop the first through-hole plating and the first multilayer boards with 36 layers on automated equipment.

Perfection is a creed at TRW/Cinch Graphik . . . out of 800 people, one in every five is directly involved in inspection and quality control. To these people, meeting the requirements of Military Specifications such as MIL-P-55110 and MIL-S-9858 has become second nature.

TRW/Cinch Graphik can handle your largest delivery requirements . . . our 125,000 square foot plant houses the most advanced precision production equipment in the industry. For high volume commercial, industrial, or military printed circuit boards, look to the leader in printed circuitry . . . look to TRW/Cinch Graphik.

Contact your nearest TRW/Cinch District Office listed in the manufacturers section, or contact TRW/Cinch Graphik, an Electronic Components Division of TRW Inc., 200 South Turnbull Canyon Road, City of Industry, California 91744. Phone (213) 333-1201.

Vector

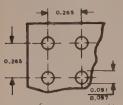
VECTORBORD®—MICRO-VECTORBORD® PHOTO SENSITIZED BOARD

Vectorbord® and **Micro-Vectorbord®** prepunched terminal boards are time, work and money saving materials used throughout the electronic industry. Fire retardant material is precision punched in a wide variety of sizes, hole patterns, and thicknesses for later installation of terminals and components. Vector terminals in solder and wrapped wire models are available to fit all hole sizes. Pattern "A" or "AA" is good for experimental or other work where space is not critical. Pattern "B" is useful for work with small components such as resistors and capacitors. Pattern "G" is particularly useful for transistor usage. Patterns "H" and "P" are specially designed for use with integrated circuits and devices packaged with leads on 0.1 in. multiples.

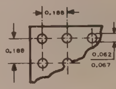
Special sizes and hole layouts can be made to order if one of the standard catalog items does not meet requirements. When ordering special size boards the following MAXIMUM BOARD WIDTHS apply:

Pattern "A" in phenolic & epoxy paper or glass laminates: 29"
Pattern "B" all materials: 6"
Pattern "G" in phenolic & epoxy paper: 20". In epoxy glass: 16"
Pattern "H" in epoxy glass: 8.51" Pattern "P": 8.50"

Phenolic: MIL Spec PBE-P per MIL-P-3115 NEMA grade FR2. Copper-clad phenolic meets NEMA FR2 and is 1 oz.
Paper Epoxy: MIL Spec P-22324 type PEE NEMA grade FR3. Copper-clad FL-PX per MIL-P-13949E NEMA grade FR3.
Epoxy Glass: MIL Spec MIL-P-181776 type GEE NEMA FR4 and G-10. Copperclad MIL Spec 13949E type FL-GF-NEMA grade FR4 and G-10.



PATTERN "A"



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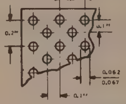

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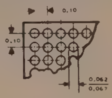

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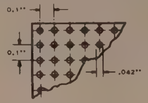
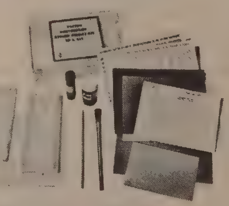


PATTERN "P"

Pattern	Material	Catalog No.	Length Inches	Width Inches	Thick. Inches	Copper Clad
A	Phenolic	18A18	4.8	4.8	1/16	None
		32A3	8.51	.82	1/16	None
		32A9	8.51	2.41	1/16	None
		32A17	8.5	4.5	1/16	None
		32A18	8.51	4.8	1/16	None
		64A17	16.99	4.5	1/16	None
		64A18	16.99	4.80	1/16	None
		72A32	19.11	8.51	1/16	None
		32AA7	8.51	1.88	3/32	None
		32AA9	8.51	2.41	3/32	None
		32AA18	8.51	4.80	3/32	None
		64AA18	16.99	4.80	3/32	None
		64AA32	16.99	8.51	3/32	None
		64AA132	35.01	16.99	3/32	None
	Epoxy Paper	32A17EP	8.5	4.5	1/16	None
		64A17EP	16.99	4.5	1/16	None
		64A18EP	16.99	4.80	1/16	None
		32AA18EP	8.51	4.80	3/32	None
		64AA18EP	16.99	4.80	3/32	None
		64AA32EP	16.99	8.51	3/32	None
		132A64EP	35.0	17.0	1/16	None
	Epoxy Glass	32A18WE	8.51	4.80	1/16	None
		64A18WE	16.99	4.80	1/16	None
B	Phenolic	45B30	8.51	5.69	1/16	None
		90B30	16.97	5.69	1/16	None
G	Phenolic	42G24	8.51	4.80	1/16	None
		42G42	8.51	8.51	1/16	None
		42G22	8.5	4.5	1/16	None
		85G22	16.99	4.5	1/16	None
		85G24	16.99	4.80	1/16	None
		85G42	16.99	8.51	1/16	None
		95G43	19.00	8.60	1/16	None
		95G87	19.00	17.40	1/16	None
		95G175	35.00	19.00	1/16	None
	Epoxy Paper	32G22EP	6.5	4.5	1/16	None
		42G22EP	8.5	4.5	1/16	None
		42G24EP	8.51	4.8	1/16	None
		85G22EP	16.99	4.5	1/16	None
		85G24EP	16.99	4.80	1/16	None
		85G42EP	16.99	8.51	1/16	None
	Epoxy Glass	32G22WE	6.5	4.5	1/16	None
		42G22WE	8.5	4.5	1/16	None
		42G24WE	8.51	4.80	1/16	None
		42G42WE	8.51	8.51	1/16	None
		85G22WE	16.99	4.5	1/16	None
		85G24WE	16.99	4.80	1/16	None
		85G42WE	16.99	8.51	1/16	None
		175G22WE	35.0	4.5	1/16	None
	Copper Clad Epoxy Glass	42G22WEC1	8.5	4.5	1/16	One Side
		42G22WEC2	8.5	4.5	1/16	Two Sides
H	Epoxy Glass	170H48WE	17.0	4.8	1/16	None
P	Epoxy Glass	29P29-062	3.0	3.0	1/16	None
		44P29-062	4.5	3.0	1/16	None
		59P19-032	6.0	2.0	1/32	None
		59P44-032	6.0	4.5	1/32	None
		64P44-016	6.5	4.5	1/64	None
		64P44-032	6.5	4.5	1/32	None
		64P44-062	6.5	4.5	1/16	None
		84P44-062	8.5	4.5	1/16	None
		169P26-062	17.0	2.73	1/16	None
		169P44-062	17.0	4.5	1/16	None
		169P59-016	17.0	6.0	1/64	None
		169P59-032	17.0	6.0	1/32	None
		169P59-047	17.0	6.0	3/64	None
		169P79-062	17.0	8.0	1/16	None
		169P84-062	17.0	8.5	1/16	None
		349P84-062	35.0	8.5	1/16	None
		169P44-062C1	17.0	4.5	1/16	One Side
		169P59-032C1	17.0	6.0	1/32	One Side
		169P84-062C1	17.0	8.5	1/16	One Side
		169P44-062C2	17.0	4.5	1/16	Two Sides
		169P84-062C2	17.0	8.5	1/16	Two Sides
	Epoxy Paper	64P44-062EP	6.5	4.5	1/16	None
		84P44-062EP	8.5	4.5	1/16	None
		138P42-062EP	13.9	4.5	1/16	None
		169P26-062EP	17.0	2.73	1/16	None
		169P44-062EP	17.0	4.5	1/16	None
		169P47-062EP	17.0	4.8	1/16	None
		169P84-062EP	17.0	8.5	1/16	None
		64P44-062EPC1	6.5	4.5	1/16	One Side
		169P44-062EPC1	17.0	4.5	1/16	One Side
		64P44-062EPC2	6.5	4.5	1/16	Two Sides
		169P44-062EPC2	17.0	4.5	1/16	Two Sides
	Phenolic	64P44-062XXXP	6.5	4.5	1/16	None
		169P44-062XXXP	17.0	4.5	1/16	None
		169P59-062XXXP	17.0	6.0	1/16	None

NEW — POSITIVE ACTING PHOTO SENSITIZED COPPER CLAD BOARD FOR FASTER, EASIER ETCHED CIRCUITS

POSITIVE PHOTO SENSITIZED COPPER-CLAD BOARD



32X POSITIVE PHOTO RESIST KIT

New Vector positive acting coated photosensitized board speeds etched circuit manufacture because boards are coated with positive acting resist. Positive artwork is used for the circuit master pattern making use of readily available positive drafting aids. No reversing step required. A finished etched circuit can be made in less than an hour and boards etch in any common etchant. Vector postive acting developer must be used after exposure of the boards under U.V. light source such as a photo flood lamp or sunlight.

Kits 32X or 32XA are recommended for trial evaluations of the system; later, purchase only boards and developer.

ORDERING INFORMATION

32X Kit: Contains 1 board 4½"x6½"x1/16" coated 2 sides; one 2.73"x 4½"x1/16" board coated 1 side; etching chemical and box; artwork patterns; developer; glass pressure plate; complete instructions.

32XA Kit: Contains above items plus 1 board 8"x9"x1/16" coated 1 side; 1 board 4½"x6½"x1/16" coated 1 side; 1 board 4½"x7¼"x1/16" coated 1 side. Larger artwork assortment, more chemical.

1/16" THICK POSITIVE ACTING PHOTOSENSITIZED BOARDS

Catalog No.	Description			C. C Coating	Pkg. Quan.
	Length	Width	Material		
CU90/80-1R	9	7.99	Phenolic	1 side	5
CU65/45-2R	6.5	4.5	Phenolic	2 sides	5
CU65/45-1R	6.5	4.5	Phenolic	1 side	5
CU45/27-1R	4.5	2.73	Phenolic	1 side	5
CU45/30WE-1R	4.5	3.0	Epoxy Glass	1 side	3
CU65/27WE-1R	6.5	2.73	Epoxy Glass	1 side	3
CU159/80WE-1R	15.85	7.98	Epoxy Glass	1 side	2

POSITIVE ACTING DEVELOPER

0088-21-15	1 oz. bottle
0088-21-16	8 oz. bottle

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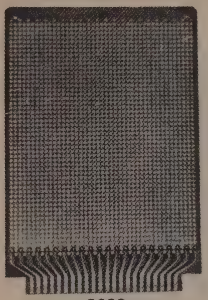
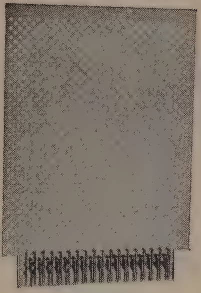
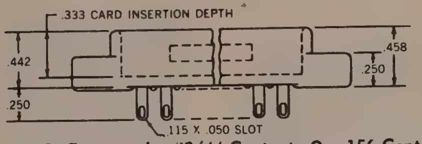
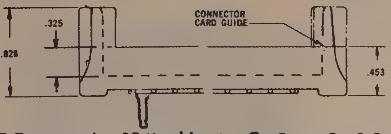
Vector PLUGBORDS SAVE TIME – MONEY


3662

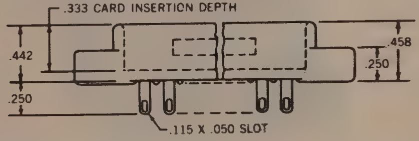

848WE



R644 P.C. Receptacle, 22/44 Contacts On .156 Centers



R635 Receptacle, 35 Double-tier Contacts On 0.2 Centers For Use With Vector 848WE And 848PWE Plugboards



R630 P.C. Receptacle, 15/30 Contacts On .156 Centers

BR27-3 RECEPTACLE MOUNTED CARD GUIDE (on R630 Receptacle with 2.73 in. wide Plugbord)

PLUGBORDS FOR GENERAL USE WITH CONTACTS
But Without Matrix or Circuit Patterns

Use for building prototype, test and short run plug-in circuits with these Plugboards because almost any component from DIPs to large resistors can be mounted anywhere on the boards. Boards have an overall grid of prepunched holes, either 0.042 in. dia. on 0.1 in. centers (Pattern "P"), 0.062 in. dia. on alternate 0.1 in. centers (Pattern "G"), or 0.062 in. dia. on 0.1 in. centers (Pattern "H"). Boards are available with varied connector arrangements and mating connectors are listed. Back to back contacts on each etched side terminate in independent hole pads. Most boards have holes for attaching card ejectors.

CONTACT SPECIFICATIONS. Etched contacts:
Epoxy glass Plugbords -- 2 oz. copper 0.0001 in. nickel, 0.00002 in. gold.
Phenolic Plugbords -- 1 oz. copper solder coated.

Quality flame-retardant 1/16" thick board materials are the same as those used for Vectorbord® and Micro-Vectorbord®, see preceding page. Terminals to fit. See our pages Sect. 2100

Pattern	Board Size	Epoxy Paper	Epoxy Glass	Phenolic	Contacts No.	Contacts Style	Contacts Spacing	Contacts Plating	Mating Connectors Solder Tail	Mating Connectors Wrapped Tail
G	4.5"x6.5"	812	812WE	----	16	ElcoVar	.2	Gold	R616-1	----
G	3"x4.5"	837	837WE	----	12	ElcoVar	.2	Gold	R612-1	----
G	4.5"x6.5"	838	838WE	----	44	Etched	.156	Tinned	R644	R644-3
G	4.5"x6.5"	838-1	838WE-1	----	44	Etched	.156	Tinned	R644	R644-3
G	4.5"x6.5"	838A	838AWE	----	22	Etched	.156	Tinned	R644	R644-3
G	4.5"x6.5"	838GN	838WEGN	----	44	Etched	.156	NPGF	R644	R644-3
G	4.5"x6.5"	838A-1	838AWE-1	----	22	Etched	.156	Tinned	R644	R644-3
G	4.5"x6.5"	----	838WE-1GN	----	44	Etched	.156	NPGF	R644	R644-3
P	2.73"x4.5"	----	3796	----	30	Etched	.156	NPGF	R630	----
P	4.5"x6.5"	----	848WE	----	35	ElcoVar	.10	Gold	R635	----
P	3"x4.5"	----	837PWE	----	12	ElcoVar	.2	Gold	R612-1	----
P	2.73"x4.5"	----	3795	----	44	Etched	.1	NPGF	----	R644-2
P	2.73"x4.5"	----	----	3795-2	44	Etched	.1	Tinned	----	R644-2
P	2.73"x4.5"	----	3797	----	30	Etched	.156	NPGF	R630	----
P	2.73"x4.5"	----	----	3797-1	30	Etched	.156	NPGF	R630	----
P	4.5"x6.5"	----	3719-1	----	72	Etched	.1	Tinned	----	R636-1
P	4.5"x9.6"	----	3719-4	----	72	Etched	.1	NPGF	----	R636-1
P	4.5"x6.5"	----	3662	----	44	Etched	.156	NPGF	R644	R644-3
P	4.5"x6.5"	----	----	3662-1	44	Etched	.156	NPGF	R644	R644-3
P	4.5"x9.6"	----	3662-2	----	44	Etched	.156	Tinned	R644	R644-3
P	7.98"x9.6"	----	3673	----	80	Etched	.125	NPGF	----	R680

ElcoVar=Elco Varicon NPGF=Nickel Plated Gold Flashed

RECOMMENDED CARD CAGES See our pages Sect. 1400
For above Plugbords: 4.5"x6.5" - CCK3 or CCK3P; 4.5"x4.5" - CCK13A or CCK13AP; 7.98"x9.6" - CCK17; 4.5"x9.6" - CCK4, CCK14 or CCK14P.

RECEPTACLE MOUNTED CARD GUIDES

The BR27 Series Card Guides provide rugged support for 1/16 in. free-standing circuit boards and sure guidance while engaging board and receptacle. This arrangement is commonly found on "mother boards" and in units where space is at a premium. Package quantity all catalog numbers: 2 guides; 2 screws, 4/40; Pan Hd., 3/4 in. long; 2 flat washers; 2 lock washers; 2 hex nuts, 4/40. In bulk quantities (more than 50 prs.) fasteners packaged separately from guides. Material is aluminum alloy, clear anodized.

ORDERING INFORMATION

Guide No.	Connector	For Plugbord Types:
BR27	R644, R644-3 (0.156")	4.5" wide Plugbords with centered contacts, such as Vector 838-1, 3474, 3677, 3682 and 3662 Series.
BR27-1	R636-1 (0.1")	4.5" wide Plugbords with centered contacts, such as Vector 3719 Series.
BR27-3	R630 (0.156")	2.73" wide Plugbords with centered contacts, such as Vector 3796 and 3797 Series.
BR27-4	R644-2 (0.1")	2.73" wide Plugbords with centered contacts, such as Vector 3795.

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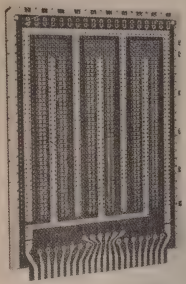
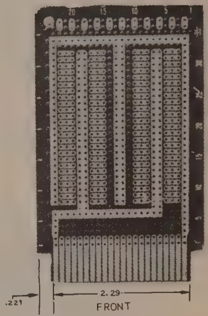
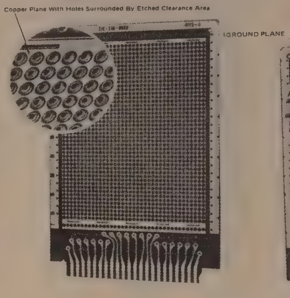
Vector PLUGBORDS FOR FLEXIBILITY



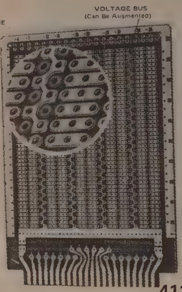
3677-2



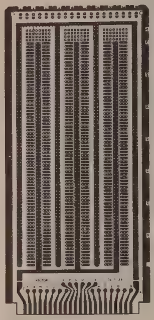
3795-3



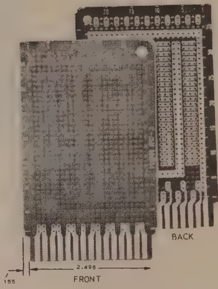
4112-4
(Back)



4112-4
(Front)



3677



3797-3

3690 CARD EXTENDER

PLUGBORDS WITH ETCHED TINNED PADS AND BUSES

Use for prototype, test, and short run plug-in circuits. All boards have an overall hole grid of 0.042 in. holes on 0.1 in. centers (Pattern "P"). All etched circuitry above contact area is tinned for easy soldering. Boards are available with varied contact arrangements and mating connectors are listed. Back to back contacts on each etched side terminate in independent hole pads.

3677, 3797 and 3795 SERIES

These Plugbords have etched tinned buses, interleaved between pad areas. All models have tinned 3-hole pad groups for easy component mounting and interconnection. DIPs or components may be soldered directly to pads, or terminals installed in pads. Socket tabs may also be attached to the pads to facilitate making component changes. The heavy etched and tinned interleaved ground and voltage buses make complicated circuit construction quite easy, while providing great flexibility. The 3677 series has 96 individual pads for mounting T0-5 and T0-18 transistors or round case integrated circuits.

4112 SERIES

These Plugbords have groups of 3-hole pads, interleaved "zig-zag" voltage bus, plus an overall etched ground plane on opposite side. The "zig-zag" design permits installed pins to connect or bypass the bus as desired. Reduced impedance and noise can be achieved with addition of Vector's double overhead trolley bus. DIPs or components may be soldered directly to pads, or terminals installed in pads. Socket tabs may also be attached to the pads.

CONTACT SPECIFICATIONS. Etched contacts:
Epoxy glass Plugbords -- 2 oz. copper 0.0001 in. nickel, 0.00002 in. gold.
Phenolic Plugbords -- 1 oz. copper solder coated.

Quality flame-retardant 1/16" thick board materials are the same as those used for Vectorbord® and Micro-Vectorbord®, see preceding page. Terminals to fit. See our pages Sect. 2100

		No.14-p DIPs	Contacts - Etched			Mating Connectors	
Board Size	Part No.	Accom.	No.	Spacing	Plating	Solder Tail	Wrapped Tail
2.73"x4.5"	3795-1 †	6	44	.1	NPGF	----	R644-2
2.73"x4.5"	3795-3 *	6	44	.1	Tinned	----	R644-2
2.73"x4.5"	3793-2 †	6	30	.156	NPGF	R630	----
2.73"x4.5"	3797-3 *	6	30	.156	Tinned	R630	----
4.5"x9.6"	3677 †	24	44	.156	NPGF	R644	R644-3
4.5"x9.6"	3677-1 †	24	22	.156	NPGF	R644	R644-3
4.5"x6.5"	3677-2 †	24	44	.156	NPGF	R644	R644-3
4.5"x6.5"	4112-4 †	25	44	.156	NPGF	R644	R644-3

*Phenolic †Epoxy Glass NPGF=Nickel Plated Gold Flashed

For above Plugbords: **RECOMMENDED CARD CAGES** our pgs. Sect. 1400
4.5"x6.5" -- CCK3 or CCK3P 4.5"x4.5" -- CCK13A or CCK13AP
7.98"x9.6" -- CCK17 4.5"x9.6" -- CCK4, CCK14 or CCK14P

3690 SERIES CARD EXTENDERS

Card Extenders allow extension of operating cards beyond cages for tests. Quality epoxy glass with nickel plated gold flashed plug tips and high quality top connector where indicated.

Model No.	Width-Length	Contacts	Spacing	Mounted Top Connector
3690	4.5"x6.5"	44	.156	Yes
3690-1	4.5"x6.5"	44	.156	No
3690-2	4.5"x11.0"	72	.10	Yes
3690-3	4.5"x11.0"	72	.10	No
3690-4	4.5"x7.5"	72	.10	Yes
3690-6	4.5"x11.0"	44	.156	Yes
3690-8	2.73"x5.5"	44	.100	Yes
3690-10	2.73"x5.5"	30	.156	Yes
3690-11	4.5"x8.0"	44	.156	No

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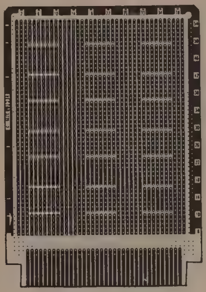
Vector WRAPPABLE – MATRIX PLUGBORDS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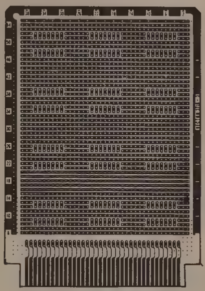
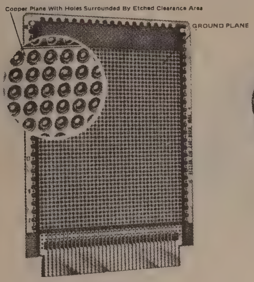
(Y Side)


3719-3
(X Side)



4066-4
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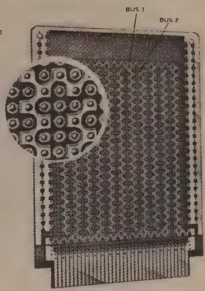
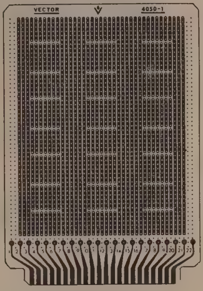
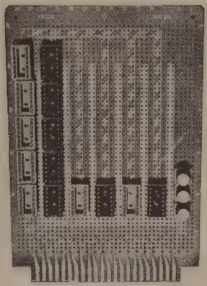
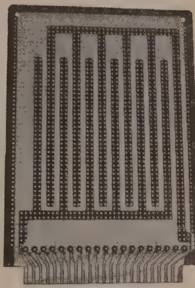


4066-4
(Front)



4050-1


3682-2
(Back)


3682-2
(Front)

MATRIX PLUGBORDS

All models listed have an overall grid of 0.042 in. dia. holes on 0.1 in. centers (Vector "P" Pattern). They provide a cost-saving approach to manufacture of plug-in circuit boards for small to medium quantity requirements. Wiring time is reduced because of the provided 2 oz. copper tinned etched conductors running vertically ("X") and horizontally ("Y") on some models. On the "X" side the lines are broken to permit mounting 14-pin DIPs. 16- and 24-pin DIPs can also be mounted by cutting the lines with Vector P139 Line Cutter or a hobby knife. Connections between board sides may readily be accomplished with any Vector pins for 0.042 in. holes and solder preforms which drop over the pins or Spring Bus Links T112. Boards are furnished with transparent layout paper printed in contrasting colors for "X" and "Y" sides. Board materials are 1/16 in. thick flame-retardant epoxy paper or epoxy glass. Card edge etched contacts are nickel plated and gold flashed. 3474 series has removable reinforcing aluminum "Kardej" on 3 sides which "tracks" in guides for 1/16 in. cards.

CONTACT SPECIFICATIONS. Etched contacts:
Epoxy Glass Plugbords – 2 oz. copper 0.0001 in. nickel, 0.00002 in. gold.
Phenolic Plugbords – 1 oz. copper solder coated.

Board Size	Material	Matrix	Part No.	Contacts - Etched Gold Plated No.	Spacing	Mating Connectors Solder Tail	Wrapped Tail
4.5"x6.5"	Epox.Glass	Y	3719-2	72	.1	----	R636-1
4.5"x6.5"	" "	X-Y	3719-3	72	.1	----	R636-1
4.5"x6.5"	Epox.Paper	X-Y	3474	44	.156	R644	R644-3
4.5"x6.5"	" "	Y	3474-3	22	.156	R644	R644-3
4.5"x6.5"	Epox.Glass	Y	4050-1	44	.156	R644	R644-3
4.5"x6.5"	" "	X-Y	4050-2	44	.156	R644	R644-3

Quality flame-retardant 1/16" thick board materials are the same as those used for Vectorbord® and Micro-Vectorbord®, see preceding page. For terminals for boards listed this page, see our pages Sect. 2100

WIRE WRAPPABLE PLUGBORDS

Vector wire wrappable Plugbords are furnished with an overall grid of 0.042 in. holes on 0.1 in. centers, tinned interleaved buses, and ground planes on one side of some models. DIP sockets and wire wrappable terminals or socket pins may be installed wherever required and connected however required. "Free" board areas without buses are provided on all models for mounting discretes or other large components. All boards are flame-retardant epoxy glass and furnished with the most popular edge connectors, nickel plated and gold flashed. Ejector holes are provided on all models, and a full line of supporting compatible card and module cages is available from Vector. "Special" features on some models are:

GROUND PLANES -- A heavy overall 2 oz. tinned copper area on one board side can be used to reduce noise and transients, and to provide low impedance when used with buses on opposite side. A copper-free area surrounds each hole in the ground plane so installed terminals may be connected as required to one, or both, board side(s) as required.

ZIG-ZAG BUSES (on 4066 Series) -- Two uniquely configured independent bus paths accommodate terminal tails for connections as required. Use of high capacitance Vector double overhead trolley bus series with zig-zag bus lowers impedance for high frequency circuits, such as encountered in ECL 10,000 series logic.

CONTACT SPECIFICATIONS. Same as listed for Matrix Plugbords.

Board Size	Part No.	No Cont.	Spacing	Gnd. Plane	No. 14-p DIPs Accom.	No. Independ. Buses Wiring Side	Component Side	Mating Connectors Solder Tail	Wrapped Tail
4.5"x9.6"	3682	44	.156	No	54	2	---	R644	R644-3
4.5"x6.5"	3682-2	44	.156	No	30	2	---	R644	R644-3
4.5"x6.5"	3682-4	44	.156	Yes	30	2	1	R644	R644-3
4.5"x6.5"	4066-4	72	.100	Yes	34	2	1	---	R636-1
4.5"x4.5"	4066-5	72	.100	Yes	18	2	1	---	R636-1

RECOMMENDED CARD CAGES See our pages Sect. 1400
For above Plugbords: 4.5"x6.5" - CCK3 or CCK3P; 4.5"x4.5" - CCK13A or CCK13AP; 7.98"x9.6" - CCK17; 4.5"x9.6" - CCK4, CCK14 or CCK14P.

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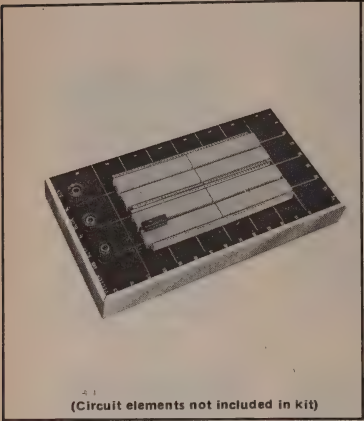
Vector KLIP-BLOK/STRIP BREADBOARDING SYSTEM


(Circuit elements not included in kit)

51X KLIP-BLOK KIT - Assembled

Accepts up to 12 DIPs, has 970 tie points. Consists of big 4½"x8"x1/16" glass epoxy premarked Micro-Vectorbord® base, panel mounted on 1" high aluminum frame with eight 24-quad (T66-96) Klip-Bloks and four 48-contact Klip-Buses installed, ready for plugging in up to 12 DIPs and associated circuitry. Three 5-way binding posts are installed at one end. The Micro-Vectorbord panel provides space and facility for mounting extra large components. Kit includes stick-on MS9A and MS10A DIP contact Marker Strips, and special T49-1 Adapter Pins for plugging large components into Klip-Bloks/Strips.

51X-GP - Same as **51X**, except has heavy overall copper ground plane on panel underside.

No Soldering **Use With DIPs. Other I.C.s and Discrete Components** **No Wrapping**

Build circuits quickly with Klip-Bloks, Klip-Strips and Klip-Buses. Simply insert components into these spring clip units and make interconnections with ordinary wire. Designing, modifying and testing the circuit is easily accomplished without the need of special patch cords or risk of damaging components.

Klip-Bloks, Strips and Buses consist of spring clips with four connected tie points or 'quads.' Klip-Strips and Buses utilize the quads in strips of various lengths, from 4 to 48 tie points with insulated casings, while Klip-Bloks have these quads encased in nylon shells, either 8 (T66-32) or 24 (T66-96) quads each. All Klip-Bloks, Strips and Buses are spaced on 0.1" grids for optimum I.C. breadboarding. Klip-Bloks, Strips and Buses accept leads from 0.015" to 0.032" dia. Ordinary 22 ga. wire (0.0253" dia.) is ideal for strapping. Components may be inserted into the clips from either top or bottom. The Bloks serve as sockets for components with extra tie points for interconnections. Accompanying Klip-Buses make voltage and ground readily accessible.

Contacts used in Klip-Bloks and Strips are tin lead coated beryllium copper for thousands of reliable connections. Plastic housings on Klip-Bloks are nylon, and insulated brass shells are used on Klip-Strips and Buses.

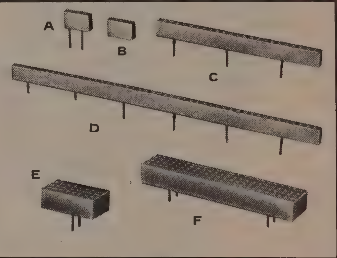
VERSATILE. Klip-Bloks, Strips and Buses fit "P" Pattern Micro-Vectorbord (0.042" dia. holes on 0.1" grid). Thus units may be "moved around" as needed with NO WASTED TIE POINTS. Plus, there is extra SPACE on the Vectorbord base to mount switches, pots, transformers--OR extra Klip units.

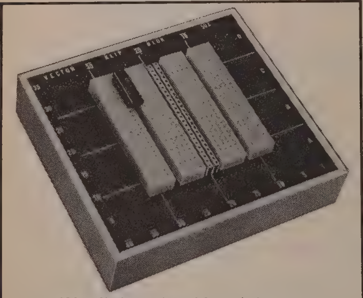
REUSABLE. Low-cost Klips and chassis panels may be used over and over again. Klips are good for thousands of insertions and may also be removed and replaced as desired.

Fig.	Part No.	Description	Pkg.Qty.
A	T45-4	Klip-Strip w/mtg. pins	16, 100
B	T45A-4	Patch-Klip - no mtg. pins	16, 100
--	T45-8	Klip-Strip - two quads	2, 10
C	T45-24	Klip-Bus	2, 10
D	T45-48	Klip-Bus	2, 10
--	P154-1	Insertion/Removal Tool for above Klip units	1
E	T66-32	Klip-Blok (8-quad)	4, 16
F	T66-96	Klip-Blok (24-quad)	2, 8
--	P92B	Removal Prod for Bloks	1
--	T49-1	Adapter Pins for leads to .050"	100
	570G-1	Solderless Breadbd. Socket (2 8-qd. Klip-Bloks mounted on nylon base)-for 14-or 16-pin DIP w/3 solderless connections. Stick-or screw-on.	1

EFFICIENT USE OF SPACE. Since components may be mounted on both top and bottom of the Vectorbord base, space is fully utilized. T49-1 Adapter Pins for leads to 0.050" dia. are available.

EXPANDABLE BREADBOARDS. 4½"x8" modules may be coupled together or mounted in larger frames for up to multiples of 144 sq. inches of breadboarding area (see next page).




(Circuit elements not included in kit)

50X KLIP-BLOK KIT - Assembled

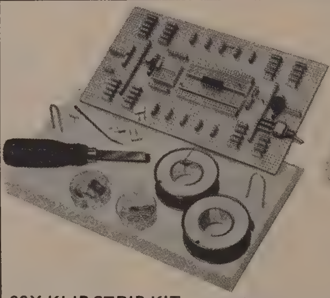
Accepts up to 6 DIPs, has 432 tie points. Micro-Vectorbord base size is 4"x4½"x1/16" with printed registration for pin position identification. Includes four 24-quad (T66-96) Klip-Bloks, two T45-24 Klip-Buses, marker strips for 14- and 16-pin DIP identification, and extruded aluminum frame 1" high.

49X KLIP-BLOK KIT - Assembled

Accepts up to 3 DIPs, has 240 tie points. Micro-Vectorbord base is 2.7"x4½"x1/16" with printed registration (2 sides), has two 24-quad (T66-96) Klip-Bloks, two T45-24 Klip-Buses, marker strips for DIP pin position, and extruded aluminum frame 1" high.

48X KLIP-BLOK KIT - Assembled

Starter kit has unperforated base 2.7"x4½"x1/16" and 240 tie points (no bottom entry). Plus two 24-quad (T66-96) Klip-Bloks, two T45-24 Klip-Buses, DIP Marker Strips MS9A and MS10A. Base mounted on rubber bump feet.


33X KLIP-STRIP KIT

(Circuit elements not included in kits)

34X KLIP-BLOK KIT

CONVENIENT BREADBOARDING KITS

33X KLIP-STRIP KIT. For the circuit using DIPs and discretes where flexible layout and component placement is desirable. Contains 70 total Klip-Strips and Buses, two 8-quad (T66-32) and two 24-quad (T66-96) Klip-Bloks, "P" Pattern Micro-Vectorbord (4½"x8"x1/16"), support foam mounting pad, bare and insulated 22 ga. wire, assorted terminals and pins, mounting devices for switches, pots, etc., insertion and removal tools. Plus complete instructions and application notes.

34X KLIP-BLOK KIT. A large assortment of Klip-Bloks (four 8-quad (T66-32) and four 24-quad (T66-96) makes this kit ideal for DIP circuitry. Also contains 16 Klip-Strips and Buses, "P" Pattern Micro-Vectorbord (4½"x8"x1/16"), foam mounting pad, terminals and pins, bare and insulated 22 ga. wire, insertion and removal tools, mounting devices for other components. Plus complete instructions and application notes.

39X MULTI-CONN KLIP-BLOK KIT. Features snap-in-out Micro-Vectorbord panel. Has two 8-quad (T66-32) and six 24-quad (T66-96) Klip-Bloks, 8 Klip-Strips and Buses, "P" Pattern Micro-Vectorbord (4½"x8"x1/16"), terminals, insertion and removal tools, switch and pot mounting loops, DIP marker strips, 75 ft. bare and insulated 22 ga. wire, 2" high aluminum chassis frame. Vectorbord simply snaps into chassis, holds firmly, yet easily removable.

VECTOR ELECTRONIC COMPANY, INC. 12460 Gladstone Avenue, Sylmar CA 91342 Phone (213) 365-9661 TWX 910-496-1539

Vector

NEW BREADBOARDING KITS

40X MULTI-CONN KIT
(Circuit elements not included in kit)

40X SOLDER KIT WITH P173 WIRING PENCIL

Unique new kit for faster circuit construction. Features the P173 Wiring Pencil and "solder-thru" insulated wire. The tool is used to route and draw 36 ga. wire around tabs or component leads from a self-contained spool. A touch of solder melts through the insulation, thus assuring fast, reliable connections. Kit contains P173 Tool; 1 "P" Pattern Padboard (4½"x8"x1/16") with etched, tinned copper oval pads and buses; 1 plain "P" Pattern Micro-Vectorbord® (4½"x8"x1/16"); over 300 assorted terminals and pins including solderable and wrappable types; six 16-pin DIP sockets; 2 round 8-pin I.C. sockets; two 570G-1 16-pin solderless breadboard sockets; 25 R41 Sockets for LEDs with .018" leads; solderless slip-on contacts for .040" pins; 100 ft. of bare and insulated 22 ga. wire; 400 ft. of 36 ga. "solder-thru" wire; wire jumpers; solder preforms; bus strips; DIP marker strips; foam mounting pad; pot and switch mounting loops; and 2" high aluminum chassis frame.

41X COMBINATION WIRE WRAPPING/SOLDER CONSTRUCTION KIT

Kit has almost everything needed to make wire wrapped circuit breadboards. Includes manual P160-2A Hand Wire Wrapping Tool for fast, reliable connections; 100 ft. of wire wrapping 22 ga. hook-up wire and 36 ga. "solder-thru" wire; "P" Pattern Micro-Vectorbord chassis (4½"x8"x1/16"); wire/cutter/stripper; over 300 terminals including 4 different .025" sq. types and some solder types; ten 16-pin wire wrap DIP sockets; R32 Socket Pins; socket contacts for .018" LEDs; bus strips; pot and switch mounting loops; terminal installing tools; alignment block; and 2" high aluminum chassis frame.

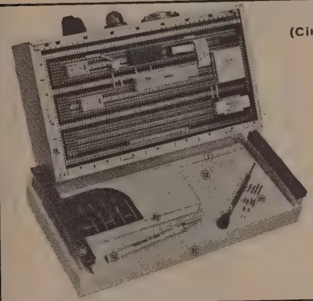
43X SERIES MULTI-CONN CHASSIS

All Multi-Conn Chassis are supplied assembled with 2" high extruded aluminum side frames for adjustable card positions and perforated aluminum bottom covers installed. Breadboards or covers snap into place in outer case grooves for insertion, and press out for easy removal. Boards mount in inner slots of chassis with the aid of supplied hardware. Rubber bump feet are included.

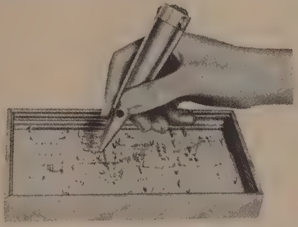
Boards listed may be used in 43X Series Chassis without purchase of additional joiner strips. Usable quantity for available area listed below:

Part No.	Description (Available Board Space in Chassis)	43X (8"x4½")	43X-2 (8"x9.4")	43X-4 9.24" x 2 (8"x9.24")
79P44-062PG-1	"P" Patt.(.042"h. on .1" ctrs.) Poly-glass, 4½"x8"x1/16", unclad	1	2	2†
79A44-062PG-1	"A" Patt.(.093"h. on .1" ctrs.) Poly-glass, 4½"x8"x1/16", unclad	1	2	2†
92A81PG	"A" Patt. Poly-glass, 9.24"x8"x1/16", unclad	--	1	2†
92P81PG	"P" Patt. Poly-glass, 9.24"x8"x1/16", unclad	--	1	2†
3677-6	"P" Patt. Epoxy glass, 4½"x8"x1/16", 1 side copperclad pads	1	2	2†
3677-7	"P" Patt. Epoxy glass Padboard, 4½"x8"x1/16", 1 side copperclad ground plane	1	2	2†
3677-8	"P" Patt. Epoxy glass Padboard, 4½"x8"x1/16", 2 sides copperclad, 1 side ground plane, other side copperclad per 3677-6	1	2	2†
3677-9	"P" Patt. Epoxy glass Padboard, 4½"x8"x1/16", 2 sides copperclad, both sides have ground plane	1	2	2†

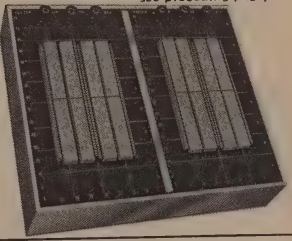
†Uses half of available space--allows choice of 8"x9.24" board for remaining space.



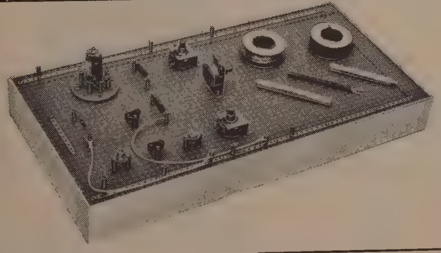
41X MULTI-CONN KIT
(Circuit elements not included in kit)



P173 WIRING PENCIL



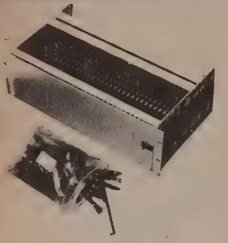
43X-2 CHASSIS KIT w/ two 51X Panels Installed
(for data on 51X, see preceding page)



25X SOLDERLESS EXPERIMENTER'S DELUXE KIT FOR TUBES AND TRANSISTORS

Large kit has big 8½"x17"x3/32" perforated Vectorbord chassis with 3/32" dia. holes on .265" centers supported by 2" high aluminum frame. Kit is ideal for experimenting with tubes, transistors, and discrete components. Most connections can be made without solder, using the patented solderless spring U-clip terminals T32 or T30N-2 included in the kit. The large, strong chassis accommodates large, heavy components. Being solderless, most parts are reusable. Includes 2 power transistor sockets; 4 universal TO-5 type 4-lead transistor sockets; three 7- and 9-pin miniature tube sockets; two 8-pin octal tube sockets; over 100 solder terminals; bus strips; hook-up wire and patch leads; miscellaneous screws, nuts, spacers, brackets; layout paper.

vero VERO ELECTRONICS INC.



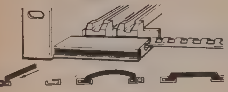
VERORACK 3A

VERORACK 3A KITS ARE EASY TO ASSEMBLE AND YET PROVIDE MAXIMUM VERSATILITY. SLOTTED END PLATES ACCEPT A VARIETY OF CARD WIDTHS AND LENGHTS WITHIN EACH STANDARD END PLATE HEIGHT. THE /5 MODELS ARE SUPPLIED WITH TWO 17" LONG MOLDED NORYL GUIDE BLOCKS WITH CARD SLOTS AT o.5" CENTERS. UP TO 34 CARDS WITH A LENGTH OF EITHER 6.5" OR 8.0" CAN BE ACCOMODATED. THE /V MODELS CONTAIN GUIDE LOCATION STRIPS WHICH PERMIT CUSTOM LOCATION OF CARDS AT ANY MULTIPLE OF 0.2" CENTERS. THREE LENGTHS OF SNAP-IN GUIDES ARE AVAILABLE FOR USE WITH /V MODELS. WHEN RECOMMENDED CARD LENGHTS ARE USED, CARDS ARE SUPPORTED OVER 85% OF THEIR LENGTH. RECOMMENDED CARD LENGTHS: G1½B - 5.6", G2B - 6.5", G3B - 8.0". CONNECTOR MOUNTING RAILS & ASSOCIATED HARDWARE ARE INCLUDED IN KITS. ASSEMBLY CHARGE IS $7.50.

3A FRAME KIT ORDERING INFORMATION

OVERALL DIMENSIONS CARD HEIGHT

PART NUMBER	PANEL HEIGHT	WIDTH	DEPTH	MAX.	MIN.	GUIDES INCLUDED	CARD SPACING	PRICE
VR3A/3U/.5/G2	5.25"	19"	11"	4.5"	2.75"	YES	.05"	$30.80
VR3A/4U/.5/G2	7.0"	19"	11"	6.25"	4.5"	YES	.05"	32.23
VR3A/3U/V	5.25"	19"	11"	4.5"	2.75"	NO*	VARIABLE	22.62
VR3A/4U/V	7.0"	19"	11"	6.25"	4.5"	NO*	VARIABLE	25.03

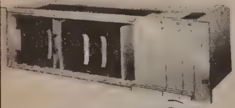


*SNAP-IN GUIDES FOR USE IN /V FRAME KITS

PART NO.	GUIDE TYPE	RECOMMENDED CARD LENGTH	PRICE PER PKG. OF 10
13130	G1½B	5.6"	$1.10
12597	G2B	6.5"	1.70
14572	G3B	8.0" & 9.6"	2.10

HINGED PANEL KITS FOR USE WITH VERORACK 3A FRAMES

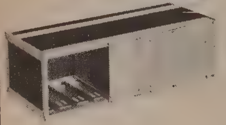
PART NO.	FRAME HEIGHT	PRICE
11935/1	3U	$11.00 ea.
12935/2	4U	12.00 ea.



VERORACK 4

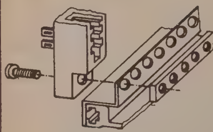
VERORACK 4 IS A FRAME DESIGNED TO ACCOMODATE CARDS AND/OR MODULE UNITS. THESE FRAMES ARE RUGGEDLY CONSTRUCTED AND INCLUDE TWO ANODIZED ALUMINUM END PLATES AND FOUR EXTRUSIONS. CARD/MODULE GUIDES ARE 3A SNAP-IN TYPE (G2B). VERORACK 4 ACCEPTS 4.5" x 6.5" OR 3.94" x 6.3" CARDS AT ANY MULTIPLE OF 0.2" CENTERS.

PART NO. 4C/A/0.2 PRICE $29.64 USE GUIDE NO. 12597 PRICE $1.70 PER PKG. OF 10



VERORACK 4 CONVERSION KIT

VERORACK 4 CAN BE CONVERTED TO A FREE STANDING COVERED UNIT. THE FRAME END PLATE ANGLES ARE REMOVED AND REPLACED BY THE EXTRUSIONS AND PANELS AS SHOWN AT LEFT.
PART NO. 62194 PRICE/KIT $18.74



VERORACK 4 CONNECTOR MOUNTING STRIPS

CONNECTOR MOUNTING STRIPS ARE ATTACHED TO THE REAR EXTRUSION OF VERORACK 4 FRAMES TO PERMIT MOUNTING OF CONNECTORS WITH 4.03" MOUNTING CENTERS.

PART NO. 61488 PRICE $3.16

COMPATIBLE CONNECTORS:

PART NO.	CONTACTS	PRICE
2245	22	$3.10
2245/2	44	3.96

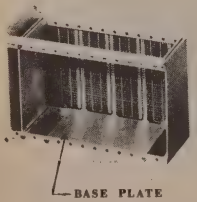
VERORACK 4 SOCKET MOUNTING PLATES

SOCKET MOUNTING PLATES ARE ATTACHED TO THE REAR EXTRUSION OF VERORACK 4 TO PERMIT MOUNTING OF 24 CONTACT BLUE RIBBON RACK AND PANEL CONNECTORS.

PART NO. 61699 PRICE $1.48

COMPATIBLE CONNECTORS:

PART NO.	CONTACTS	PRICE
RS 24	24	$4.36



VERORACK 4 - MODULES

MODULE FRONT PANEL WIDTHS ARE MEASURED IN MULTIPLES OF 0.2". EACH FRAME WILL ACCEPT A TOTAL WIDTH OF 16.8". EACH MODULE KIT CONSISTS OF A FRONT PANEL WITH HANDLE, REAR PANEL, AND EITHER 2 OR 4 GUIDE RAIL EXTRUSIONS, PLUS HARDWARE.

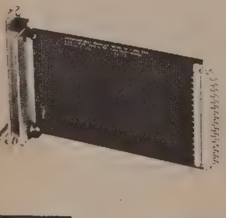
PART NO.	PANEL "H"	"W"	"D"	PRICE
K3/3	5.25"	0.6"	6.32"	$ 4.65
K3/4	5.25"	0.8"	6.32"	4.75
K3/6	5.25"	1.2"	6.32"	4.91
K3/12	5.25"	2.4"	6.32"	7.68
K3/14	5.25"	2.8"	6.32"	8.24
K3/18	5.25"	3.6"	6.32"	8.86
K3/24	5.25"	4.8"	6.32"	9.58
K3/42	5.25"	8.4"	6.32"	11.40
K3/60	5.25"	12.0"	6.32"	13.76
K3/84	5.25"	16.8"	6.32"	16.19

P.C. BOARDS (3.94 x 6.3) CAN BE MOUNTED ON SIDES OF MODULES, ALSO MODULES CAN BE ENCLOSED, DETAILS AVAILABLE ON REQUEST.

VERORACK 4 - FRONT PANELS

FRONT PANEL WIDTHS ARE MEASURED IN MULTIPLES OF 0.2". EACH FRAME WILL ACCEPT A TOTAL WIDTH OF 16.8". FRONT PANELS ARE SUPPLIED IN KIT FORM AND CONSIST OF A FRONT PANEL, HANDLE AND HARDWARE. CARD MOUNTING BRACKETS SHOULD BE ORDERED SEPERATELY.

PART NO.	PANEL "H"	"W"	PRICE
FP3/3	5.25"	0.6"	$2.66
FP3/4	5.25"	0.8"	2.66
FP3/6	5.25"	1.2"	2.73
FP3/12	5.25"	2.4"	3.34
FP3/14	5.25"	2.8"	3.83
FP3/18	5.25"	3.6"	4.32
FP3/24	5.25"	4.8"	4.86
FP3/42	5.25"	8.4"	7.04
FP3/60	5.25"	12.0"	8.24
FP3/84	5.25"	16.8"	9.95



CARD MOUNTING BRACKETS

CARD MOUNTING BRACKETS ARE USED TO ATTACH P.C. CARDS TO FRONT PANELS. PRICE INCLUDES HARDWARE.
PART NO. 62099/F
PRICE $1.50/PKG. OF 10

VERORACK 4 - MODULE BASE PLATES

EXTRUDED ALUMINUM BASE PLATES TO PROVIDE A SURFACE FOR COMPONENT MOUNTING ARE AVAILABLE FOR MODULES 2.4" WIDE AND GREATER. EACH BASE PLATE IS SUPPLIED WITH HARDWARE.

PART NO.	MODULE WIDTH	PRICE
62212	2.4"	$ .80
62214	2.8"	.89
62218	3.6"	1.00
62224	4.8"	1.20
62242	8.4"	1.57
62260	12.0"	2.02
62284	16.8"	2.52

VERORACK 4 CARD RETENTION STRIP

FRONT PANELS CAN BE USED AS DUMMIES TO COVER SECTIONS OF FRAME FILLED WITH CARDS. CARD RETENTION STRIPS ARE LENGTHS OF SELF-ADHESIVE FOAM TO DAMPEN VIBRATION. SUPPLIED IN 16.7" LENGTHS.
PART NO. 62093
PRICE $ .45
CARD RETAINING CLIP: (FOR OPEN CARD FRAME CONDITIONS ONLY) CARDS MAY BE RETAINED INDIVIDUALLY BY CLIP #62185
PRICE $1.50/PKG. OF 10

vero
171 E. BRIDGE ROAD,
HAUPPAUGE, N.Y.

TEL:516-234-0400
TWX:510-227-8890

IN CANADA CALL
613-549-5152
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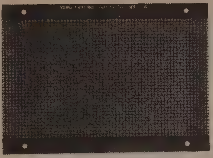
VERO ELECTRONICS INC.

TERMINAL BOARDS

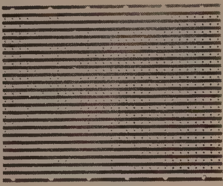


PRE-PUNCHED BOARDS ON A 0.1" x 0.1" HOLE MATRIX ARE AVAILABLE IN A VARIETY OF SIZES IN EITHER EPOXY GLASS OR XXXP PHENOLIC BASE. BOTH .040" AND .052" HOLE SIZES ARE OFFERED MAKING THESE BOARDS EQUALLY USEFUL FOR BOTH DISCREET COMPONENTS AND I.C.'s. A VARIETY OF TERMINAL AND SOCKET PINS ARE AVAILABLE FOR USE WITH THESE BOARDS.

PART NO.	LENGTH	WIDTH	HOLE DIA.	PRICE	/FG PRICE	COMPATIBLE TERMINALS
409*	6.4"	4.7"	.052"	$1.52	$3.72	
410*	9.4"	7.05"	.052"	2.88	3.72	TP/2140, TP/2143
523*	17.9"	4.5"	.052"	2.48	12.38	TP/2141,
1010/FG	17.0"	4.8"	.052"	-	8.20	MT/11081
5033/1FG	17.0"	8.5"	.052"	-	9.64	
522*	17.9"	3.744"	.040"	2.30	-	TP/2144, TP/11032, TP/2142 TP/11034, MT/11082 MT/13378 MT/14909/1
+E600	6.3	3.94	.040	2.43	-	

*ALSO AVAILABLE IN EPOXY GLASS. TO SPECIFY, ADD /FG TO PART NO.
+Compatible with Verorack 4 Modules.

VEROBOARDS

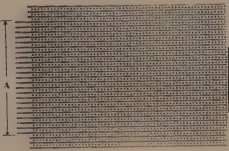


VEROBOARD IS MANUFACTURED FROM .062" PHENOLIC OR EPOXY GLASS LAMINATE WITH 1 OZ. COPPER FOIL. THE BASE MATERIAL IS PUNCHED AND SOME OF THE COPPER IS REMOVED TO LEAVE PARALLEL, PUNCHED COPPER STRIPS. CIRCUIT ASSEMBLY IS ACCOMPLISHED BY INTERCONNECTING THE COPPER STRIPS WITH COMPONENTS AND BREAKING THE STRIPS WHERE NECESSARY WITH EITHER A SPOT FACE CUTTER (PART NO. 2022, PRICE $1.79 EACH) OR DRILL. PLUG-IN VERSIONS WITH GOLD FLASHED CONTACTS ARE ALSO AVAILABLE. HOLE MATRIX IS 0.1x0.1" ON ALL BOARDS FOLLOWING.

	PART NO.	HOLE DIA.	LENGTH	WIDTH	PRICE	PRICE /FG	COMPATIBLE TERMINALS
FULLY PIERCED VEROBOARD	VB/122*	.040"	17.9"	3.74"	$5.29	$12.00	TP/2144, TP/2142, TP/11032, TP/11034, MT/11082 MT/13378 MT/14909/1
	VB/124	.040"	17.9"	7.05"	9.47	-	
	VB/125	.040"	6.4"	3.97"	2.03	-	
	VB/126*	.040"	17.9"	4.7"	7.00	14.00	
	+E100	.040	6.3"	3.94"	3.60	-	

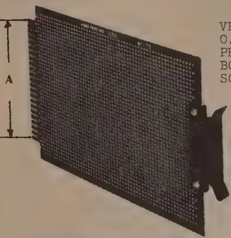
*ALSO AVAILABLE IN EPOXY GLASS. TO SPECIFY, ADD /FG TO PART NO. +Compatible with Verorack 4 Modules

PLUG-IN VEROBOARDS



PART NO.	MATRIX	HOLE DIA.	LENGTH	WIDTH	# CONTACT	A	PRICE	CONN.	COMPATIBLE TERMINALS
VB/310	0.1x0.1"	.040"	7.85"	4.99"	32	3.294"	$6.24	2234	TP/2144, TP/11032, TP/2192 TP/11034, MT/13378 MT/11082
VB/11246	0.156x0.1"	.052"	6.5"	4.5"	22	3.590"	4.53	2245	TP/2140, TP/2143, TP/2141 MT/11081

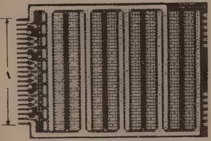
FINGER BOARDS

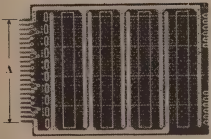


VERO FINGER BOARDS ARE EPOXY GLASS BOARDS PIERCED WITH EITHER AN .052" OR .040" DIAMETER HOLES ON A 0.1"x0.1" MATRIX. EACH BOARD IS BASICALLY A TERMINAL BOARD PROVIDED WITH A ROW OF GOLD FLASHED COPPER CONTACT FINGERS AT ONE END TO BE USED WITH A STANDARD P.C. EDGE CONNECTOR. THESE BOARDS HANDLE BOTH DUAL IN LINE AND DISCRETE COMPONENTS, AND ARE IDEALLY SUITED FOR USE WITH WIRE WRAP® I.C. SOCKET PINS.

PART NO.	HOLE DIA.	LENGTH	WIDTH	CONTACTS	SPACING	A	PRICE	CONN.	COMPATIBLE TERMINALS
10290	.052"	6.5"	4.5"	22/22	.156"	3.572"	$7.84	2245/2	MT/11081
12846	.052"	6.5"	4.5"	40/40	.100"	4.029"	9.48	13565	
24928	.040"	6.5"	4.5"	22/22	.156"	3.572"	9.94	2245/2	TP/2144, TP/11032
50767	.040"	9.6"	4.5"	22/22	.156"	3.572"	11.16	2245/2	TP/2142, TP/11034,
50768	.040"	9.6"	4.5"	36/36	.100"	3.687"	17.75	—	MT/13378 MT/11082

VERO D.I.P. BOARDS



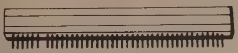


VERO D.I.P. BOARDS MAY BE USED FOR MOUNTING AND INTERCONNECTING DUAL-IN-LINE PACKAGES FOR R&D OR PRODUCTION RUNS. POWER AND GROUND RAILS ARE POSITIONED ADJACENT TO ALL D.I.P. LOCATIONS AND ARE CONNECTED TO THE EDGEBOARD CONTACTS. DUPLICATE POWER AND GROUND RAILS HAVE ALSO BEEN PROVIDED ON THE REVERSE SIDE IN ORDER TO REDUCE IMPEDANCE. D.I.P. BOARDS ARE PUNCHED OVERALL WITH A MATRIX OF .040 HOLES ON 0.1" CENTERS TO ACCEPT DUAL-IN-LINE PACKAGES OR I.C. SOCKETS AND THE HOLES OUTSIDE THE COPPER TRACKS MAY BE USED FOR TERMINAL PIN INTERCONNECTION. PACKAGING DENSITY IS SHOWN AS NUMBER OF 14 PIN DEVICES THAT FIT ON EACH BOARD.

PART NO.	LENGTH	WIDTH	CONTACTS	SPACING	A	DENSITY	PRICE	CONN.	COMPATIBLE TERMINALS
11820*	6.5"	4.5"	40	0.1"	4.025"	20	$6.20	2236	TP/2144, TP/2142 TP/11032, TP/11034 MT/13378 MT/14909/1 MT/11082
11821	6.5"	4.5"	40	0.1"	4.025"	20	9.10	2236	
11822*	6.5"	4.5"	42 + PCL	0.1"	4.5"	20	6.23	2238	
11823	6.5"	4.5"	42 + POL	0.1"	4.5"	20	9.13	2238	
11824*	6.5"	4.5"	22/22	0.156"	3.572"	20	7.25	2245/2	
11825	6.5"	4.5"	22/22	0.156"	3.572"	20	9.26	2245/2	
12498*	6.5"	4.5"	40/40	0.1"	4.025"	20	8.76	13565	
12499	6.5"	4.5"	40/40	0.1"	4.025"	20	10.55	13565	
12749	8.0"	4.5"	42 + POL	0.1"	4.5"	25	11.88	2238	
+E701	6.3"	3.94"	37	0.1"	3.94	16	8.57	CS700	

*XXXP MATERIAL-ALL OTHERS G10FR4 EPOXY GLASS   +Compatible with Verorack 4 Modules.

VERO P.C. EDGE CONNECTORS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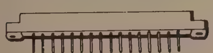
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STYLE	PART NO.	# CONTACTS	CONTACT SPACING	MOUNTING CENTERS	PRICE
B	2234	32	0.1"	3.70"	$7.24
A	2236	40	0.1"	4.388"	4.76
A	2238	42	0.1"	4.888"	4.84
B	2245	22	0.156"	4.026"	3.10
B	2245/2	22/22	0.156"	4.026"	3.96
A	13565	40/40	0.1"	4.388"	5.26
A	CS700	37	0.1"	3.94"	3.24

®T.M. Gardner Denver

171 E. BRIDGE ROAD,
HAUPPAUGE, N.Y.

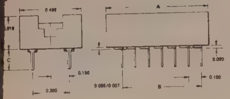
TEL:516-234-0400
TWX:510-227-8890

IN CANADA CALL
613-549-5152

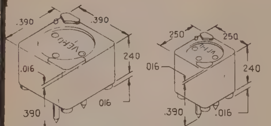
vero VERO ELECTRONICS INC.

VERO HIGH RELIABILITY SOCKETS

VERO SOCKETS INCORPORATE HIGH RELIABILITY DUAL LEAF WIPING CONTACTS WITH A CHOICE OF SOLDER OR WIRE WRAP^R TAILS. EACH SOCKET IS ALSO OFFERED WITH EITHER GOLD OR TIN PLATED TERMINATIONS. BODY MATERIAL IS GLASS FILLED NYLON AND CONTACTS ARE BERYLIUM COPPER.

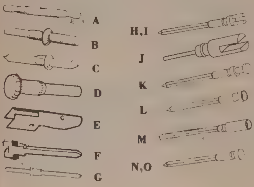


PART NO.	# OF CONTS.	A	B	C	TERMINATION	PLATE	PRICE 1-99	100-499	500-999	1000+
14954	8	.400"	.300"	.146"	SOLDER	GOLD	.62	.42	.39	.37
19147	8	.400"	.300"	.146"	SOLDER	TIN	.54	.36	.34	.32
14952	8	.400"	.300"	.674"	WRAP	GOLD	.74	.49	.46	.44
19146	8	.400"	.300"	.674"	WRAP	TIN	.63	.42	.39	.38
12490	14	.786"	.600"	.146"	SOLDER	GOLD	.79	.53	.49	.47
18736	14	.786"	.600"	.146"	SOLDER	TIN	.67	.45	.42	.40
14919	14	.786"	.600"	.674"	WRAP	GOLD	.90	.60	.56	.54
18738	14	.786"	.600"	.674"	WRAP	TIN	.79	.53	.49	.47
14296	16	.887"	.700"	.146"	SOLDER	GOLD	.85	.57	.53	.51
18737	16	.887"	.700"	.146"	SOLDER	TIN	.73	.49	.46	.44
14297	16	.887"	.700"	.674"	WRAP	GOLD	1.05	.70	.66	.63
18739	16	.887"	.700"	.674"	WRAP	TIN	.86	.58	.54	.52
14916	24	1.290"	1.100"	.146"	SOLDER	GOLD	1.82	1.22	1.14	1.09
19314	24	1.290"	1.100"	.146"	SOLDER	TIN	1.48	.99	.93	.89
14914	24	1.290"	1.100"	.674"	WRAP	GOLD	2.12	1.42	1.33	1.27
19313	24	1.290"	1.100"	.674"	WRAP	TIN	1.51	1.01	.94	.91



VERO TRANSISTOR SOCKETS

TYPE	PART NO.	FINISH	PRICE 1-99	100-499	500-999	1000+
TO5	22601/8	GOLD	.31	.21	.20	.19
TO5	22600/8	TIN	.26	.17	.16	.15
TO18	22599/8	GOLD	.31	.21	.20	.19
TO18	22598/8	TIN	.26	.17	.16	.15



NAME	PART NO.	HOLE DIA.	OVERALL LENGTH	# TOOL	PRICE
A TERMINAL PIN	TP/2144	0.040"	0.469"	IT/2151	12.47/M
	TP/2140/3073	0.052"	0.469"	IT/2150	14.97/M
B SHOULDERED TERMINAL PIN	TP/11032	0.040"	0.380"	IT/2151	10.88/M
	TP/2143	0.052"	0.470"	IT/2150	14.85/M
	TP/2142	0.040"	0.380"	IT/2151	10.88/M
C HALF PIN	TP/11034	0.040"	0.286"	IT/2151	13.18/M
	TP/2141	0.052"	0.286"	IT/2150	13.26/M
D SHORTING PIN	TP/11036	0.040"	0.125"	IT/2151	10.94/M
	TP/11037	0.052"	0.125"	IT/2150	10.94/M
E MINIATURE TERMINAL	MT/11081	0.052"	0.360"	IT/11772/4	7.96/5C
	MT/11082	0.040"	0.360"	IT/11772/4	7.96/5C
F MINIWRAP TERMINAL	MT/13378	0.040	0.690	14477	15.84/5C
G DBL. SIDED MINIWRAP TERM	MT/14909/1	0.040	0.970	14477	19.98/5C

MINIWRAP TERMINAL AND SOCKET PINS

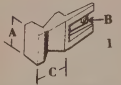
PIN #	NAME	PART NUMBER	COMPATIBLE HOLE DIA. PIERCED	DRILLED	PRICE
PIN H	HEADER PIN	22580/3/2	Ø 0.052	Ø 0.055	7.24/C
PIN I	HEADER PIN	23191/3/2	Ø 0.040	Ø 0.041	7.24/C
PIN J	TERMINAL HEADER PIN	22579/2	Ø 0.052	Ø 0.055	6.84/C
PIN K	TEST POINT PIN	23192/3/2	Ø 0.052	Ø 0.055	5.30/C
PIN L	SOCKET PIN	22683/3/2	Ø 0.052	Ø 0.055	11.13/C
PIN M	SOCKET PIN	22690/3/2	Ø 0.040	Ø 0.041	14.99/C
PIN N	SINGLE SIDED PIN	22684/3/2	Ø 0.052	Ø 0.055	4.91/C
PIN O	SINGLE SIDED PIN	23190/3/2	Ø 0.040	Ø 0.041	4.76/C

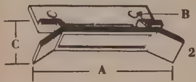
PIN A TO E INCLUSIVE ARE PRODUCED FROM BRASS. PIN F IS PRODUCED FROM 36 S.W.G. BERYLLIUM COPPER. ALL PINS HAVE A FLOW BRIGHTENED TIN FINISH. A SPECIALLY DESIGNED PIN INSERTION TOOL IS AVAILABLE.

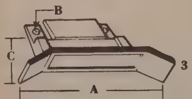
ALL MINIWRAP TERMINAL AND SOCKET PINS ARE MANUFACTURED FROM BRASS WITH A GOLD OVER NICKEL PLATING.

TERMINAL INSERTION TOOLS

PART NUMBER	PIN TYPE & SIZE	PRICE
IT/2150	ALL .052"	$2.34
IT/2151	ALL .040"	2.34
IT/11772/4	052 MINIATURE TERMINAL	2.34
IT/11772/5	040 MINIATURE TERMINAL	2.34





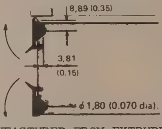


VERO CARD HANDLES

MOLDED IN NORYL, THESE THREE ATTRACTIVELY STYLED CARD HANDLES ARE AVAILABLE IN SIX STANDARD COLORS AND EITHER RIVET/BOLT ON (10036) OR SNAP ON (10035 & 10037).

#	PART NO.	PRICE	A	B	C
1	10035	$1.60/10	.38	.098	.420
2	10036	2.90/10	2.23	.130	.500
3	10037	2.90/10	2.23	.098	.500

FOR COLORS ADD SUFFIXES TO THE PART NUMBERS AS FOLLOWS: BLACK----, GRAY /1, RED /2, BLUE /3, GREEN /4, YELLOW /5



VERO CARD EJECTORS

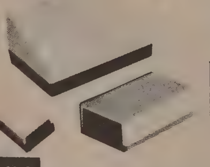
DESIGNED TO BE USED WITH ANY .062" P.C. BOARD. AVAILABLE IN BLACK ONLY.
PART NO.: 13301 PRICE: $1.85/PKG. OF 10 (5 PCS. EACH LEFT & RIGHT)
NOTE: MIN. CARD SPACING .400

VEROBOX · ALUMINUM

MANUFACTURED FROM EXTRUDED ALUMINUM SECTIONS, THESE ATTRACTIVELY STYLED MINI BOXES ARE SUPPLIED IN KIT FORM COMPLETE WITH HARDWARE AND FRONT AND REAR PANELS. STD. FINISH IS BLK. ANODIZE, AVAIL. UNFINISHED

PART NUMBER	"W"	"H"	"D"	PRICE
AVB/F50-100/50	4"	2"	2"	$3.52
AVB/F50-100/75	4"	2"	3"	3.92
AVB/F100-100/50	4"	4"	2"	4.65

PART NUMBER	"W"	"H"	"D"	PRICE
AVB/F100-100/75	4"	4"	3"	$5.19
AVB/F100-150-50	6"	4"	2"	5.78
AVB/F100-100/200	4"	4"	8"	7.93



VEROBOX · PLASTIC

THESE TWO-TONE GRAY PLASTIC BOXES ARE ACCURATELY MOLDED FROM HI-IMPACT POLYSTYRENE. FOUR THREADED INSERTS ARE MOLDED INTO THE LOWER SECTION OF EACH BOX AND THE TONGUE AND GROOVED SECTIONS PROVIDE TIGHT CLOSURE.

RECTANGULAR BOXES

PART NUMBER	WIDTH	HEIGHT	LENGTH	PRICE
90-10-087	1.969"	.984"	3.937"	$2.68
90-11-087	1.969"	1.575"	3.937"	3.04
90-20-087	2.529"	1.575"	4.724"	3.38
90-80-087*	6.141"	3.937"	8.661"	9.70

PART NUMBER	WIDTH	HEIGHT	LENGTH	PRICE
90-30-087	3.150"	1.969"	5.906"	$3.86
90-40-087	4.331"	2.362"	7.402"	5.12

SLOPING UNITS

PART NUMBER	WIDTH	HEIGHT	LENGTH	PRICE
90-81-087+	6.141"	3.937"	8.661"	7.52

*WITH ANODIZED ALUMINUM FRONT PLATE. +WITH PLASTIC GRILL.

^R T.M. Gardner Denver

vero 171 E. BRIDGE ROAD,
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There is more catalog data available to you at your fingertips than ever before...when you

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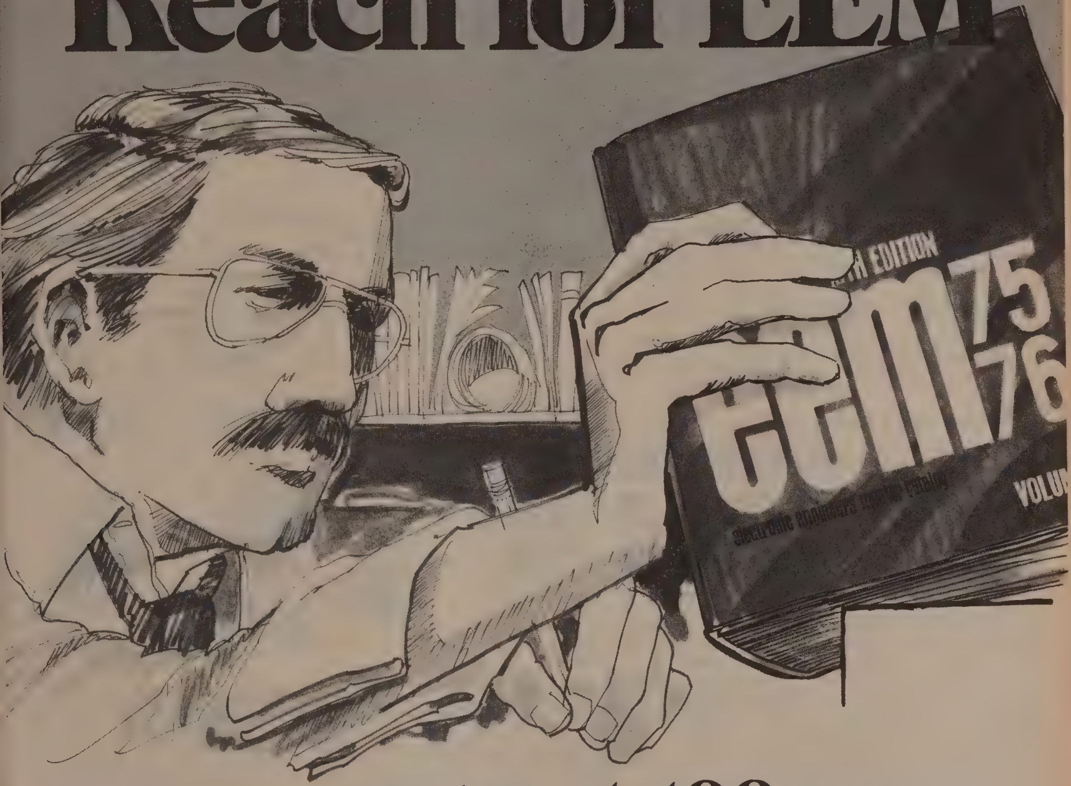
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AIRCO® Electronics

Bradford, Pa. (814) 362-5536

The "Versa Coils"

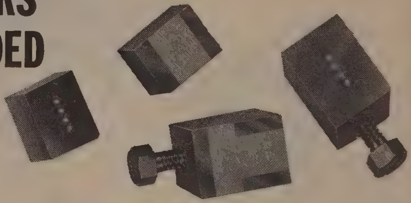
VARIABLE INDUCTORS SHIELDED OR UNSHIELDED HORIZONTAL AND VERTICAL MOUNTING

"UNITORQUE" CONSTRUCTION WITH 1 TO 4 IN-OZ TORQUE; NO MORE BROKEN CORES; 3% MAX. COUPLING

Airco Type	Inductance Range µh	No. of Standard Values	"Q" Range Min.	Tunable Range	Dimensions (Inches) Body (Nom.) Dia.	Length	Lead Wire	Applicable Military Specifications
VC (Unshielded)	.1-100,000	45	15-100	±10% to ±20%	.400	.500	.025 Dia. .250 Length	C15305 Grade 1 Class B
VCM (Shielded)	.1-100,000	73	60-120	±10%	.320	.400	.020 Dia. .375 Length	
VL (Shielded)	.1-100,000	73	60-120	Fixed	.320	.275	.020 Dia. .375 Length	

AIRCO®

MOLDED CHIP INDUCTORS SHIELDED OR UNSHIELDED VARIABLE OR FIXED



These tiny coils are wirewound — NOT foil or other laminate construction. Pads for reflow soldering or conductive epoxy bonding. Suitable for vibratory bowl feeding. Designed to meet MIL-I-83446

Airco Type	Inductance Range µh	Number of Standard Values	"Q" Range Min.	SRF Range Min. — MHz	Dimensions (Inches) Body (Max.) Height	Length	Width
CM	.01-1000 ±10%	61	25-45	20-250	.130	.150	.120
CV	.1-1000 variable	37	15-45	1.1-500	.160	.150	.200

Intermediate, non-standard values and specials available also — consult Bradford plant.

TINY SHIELDED MOLDED INDUCTORS

These are great space savers. A full product range for all your applications — shielded molded (10S), molded unshielded (10) and conformal coated (05). Can be used in DIP packages and hybrid applications.

Airco Type	Inductance Range µh	No. of Standard Values	"Q" Range Min.	SRF Range Min. — MHz	Dimensions (Inches) Body (Nom.) Dia.	Length	Lead Wire	Applicable Military Specifications
10S (Shielded)	.1-1000 ±10%	49	34-55	3.5-500	.105	.160	.016 Dia. 1.5 Length	MS-21397 MS-21396 MIL-C-15305
10 (Molded)	.1-1000 ±10%	49	21-55	2.0-500	.105	.160		
05 (Conformal)	.1-1000 ±10%	49	21-55	2.0-500	.055	.145		

For additional inductor information contact Airco Electronics, P.O. Box 547, Bradford, Pa. 16701. Phone (814) 362-5536, TWX 510-695-5921.

AIRCO® Electronics

Nogales, Arizona (602) 287-5851

MOLDED RF INDUCTORS TO MILITARY SPECIFICATION

Airco Inductors are for Radio Frequency and Pulse Circuit applications. The standard inductors from 0.1 µh through 10,000 µh are designed to meet the requirements of MIL-C-15305. Our High Reliability has been proven by over 253,470,000 unit test hours. You are always assured of uniformity of product, a result of stringent Quality and Inspection procedures at every production stage.

Airco Type	Inductance Range µh	Number of Standard Values	"Q" Range Min.	SRF Range Min — MHz	Dimensions (Inches) Body (Nom.) Dia.	Length	Lead Wire	Applicable Military Specifications
09	.1 — 1,000	49	25 — 55	3.4 — 680	.095	.250	.020	MS 75083 MS 75084
15	.15 — 1,800	71	30 — 75	1.6 — 525	.156	.375	.025	MS 75085A MS 18130
19	.15 — 5,600	58	30 — 65	1.1 — 510	.190	.440	.025	MS 90538 MS 75008
22	.47 — 3,600	37	35 — 70	1.5 — 300	.220	.560	.025	MS 90539 MS90542
24	3,900 — 10,000	11	80	.95 — 1.45	.240	.740	.028 .032	MS 90540 MS 90541
25	47 — 150	7	18 — 75	8.3 — 13.5	.250	.560	.025	MS 75052
28	1.2 — 120	25	40 — 95	10 — 170	.280	.940	.028	MS 91189
31	180 — 390	5	75 — 80	3.9 — 6.0	.310	.560	.028	MS 75053
37	470 — 1,000	5	70 — 80	2.7 — 3.7	.375	.625	.028	MS 75054
46	1,500 — 10,000	5	70 — 85	.8 — 2.2	.468	.687	.028	MS 75055

SHIELDED MOLDED RF INDUCTORS

Shielded Inductors incorporate a low reluctance magnetic shield that practically eliminates the stray magnetic field of the usual solenoid inductor or coil. Except for the shield, the materials, construction, product uniformity, etc., are the same as our other molded coils.

Airco Type	Inductance Range µh	Number of Standard Values	"Q" Range Min.	SRF Range Min. — MHz	Dimensions (Inches) Body (Nom.) Dia.	Length	Lead Wire	Applicable Military Specifications
15S	.1 — 68,000	71	23 — 60	.13 — 250	.162	.410	.025	MS 75087 MS 75088 MS 75089 MS 90537

SHIELDED CONFORMAL COATED RF INDUCTORS

A shielded inductor with a reasonable price, used in industrial and consumer products.

Airco Type	Inductance Range µh	Number of Standard Values	"Q" Range Min.	SRF Range Min. — MHz	Dimensions (Inches) Body (Max.) Dia.	Length	Lead Wire
14S	.1-56,000	70	25—71	1.56—500	.125 to .169*	.450	.025

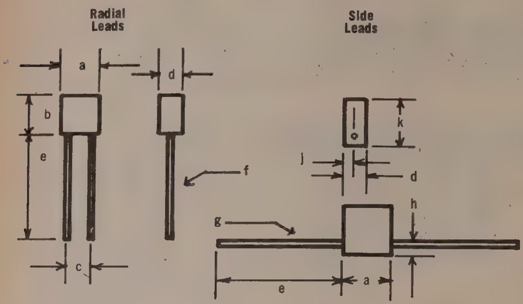
*Varies with inductance.

CONFORMAL COATED RF INDUCTORS

These cords feature a varnish-epoxy coating, quality performance and reasonable prices for non-military products.

Airco Type	Inductance Range µh	Number of Standard Values	"Q" Range Min.	SRF Range Min. — MHz	Dimensions (Inches) Body (Max.) Dia.	Length	Lead Wire
08N	.1 — 1,000 ± 10%	49	30 — 45	3.4 — 680	.085	.200	.020
17N	.1 — 3,300 ± 10%	55	30 — 50	1.3 — 600	.175	.400	.025

In addition to these catalog items, we can supply various specialty coils for your requirements. Our capabilities include Pi winding, hash or high current, balun, ferrite bead and network types of inductors. Contact Airco Electronics, P.O. Box 1692, Grand plaza, Nogales, Arizona 85621 Phone (602) 287-5851 TWX 910-973-9794.



Encapsulated Subminiature and Miniature Toroidal Inductors

Features

- Applications: printed circuits and modules
- Environmental: designed to meet MIL-C-15305, Grade 1, Class B (−55°C to +125°C)
- Moisture and shock resistant, immersion proof
- Powdered iron toroidal core, low external magnetic field
- Identification: part number and inductance value printed in contrasting color

General Specifications (All Series)

Maximum operating temperature: 125°C
Rated temperature rise (at 90°C): 35°C
Dielectric withstanding voltage: 700 v rms
Terminal pull: 5 pounds
Altitude rating: 70,000 feet
Overload current: 1.4 times the rated current
Add Suffix -S to P/N for side leads configuration

T1 SERIES

Part Number	Apparent Induc., uH	Min. Q	Test freq., MHz	Max. DC resist., ohms	Rated DC current mA
100066	0.01	60	150	0.02	3000
100067	0.012	60	150	0.02	3000
100068	0.015	60	150	0.02	3000
100069	0.018	60	150	0.02	3000
100070	0.022	60	100	0.02	3000
100071	0.027	60	100	0.02	3000
100072	0.033	60	100	0.02	3000
100073	0.039	60	100	0.02	3000
100074	0.047	60	100	0.02	3000
100075	0.056	60	100	0.02	3000
100076	0.068	60	100	0.03	2500
100077	0.082	60	100	0.04	2200
100078	0.10	80	50	0.04	2200
100079	0.12	80	50	0.05	2000
100080	0.15	80	50	0.06	1800
100081	0.18	80	50	0.07	1600
100082	0.22	80	50	0.08	1500
100083	0.27	80	50	0.10	1400
100084	0.33	80	50	0.12	1300
100085	0.39	80	50	0.15	1150
100086	0.47	80	50	0.20	1000
100087	0.56	70	50	0.25	900
100088	0.68	70	50	0.30	800
100089	0.82	70	50	0.35	750
100090	1.0	70	50	0.40	700

a	b	c	d	e	f	g	h	j	k
.2	.2	.1	.1	1.0	#24	#26	.05	.05	.26

Inductance Tolerances: 0.01 to 0.082 uH, ±20%; 0.10 to 1.0 uH, ±10%

T2 SERIES

Part Number	Apparent Induc., uH	Min. Q	Test freq., MHz	Max. DC resist., ohms	Rated DC current mA
100092	0.10	55	25	0.04	2200
100093	0.12	60	25	0.05	2000
100094	0.15	60	25	0.06	1800
100095	0.18	60	25	0.07	1600
100096	0.22	65	25	0.08	1500
100097	0.27	65	25	0.10	1400
100098	0.33	65	25	0.11	1300
100099	0.39	65	25	0.14	1200
100100	0.47	65	25	0.17	1100
100101	0.56	70	25	0.22	1000
100102	0.68	70	25	0.27	900
100103	0.82	70	25	0.30	800
100104	1.0	70	25	0.35	750
100105	1.2	60	7.9	0.40	700
100106	1.5	60	7.9	0.50	630
100107	1.8	60	7.9	0.70	530
100108	2.2	60	7.9	0.90	470
100109	2.7	60	7.9	1.1	420
100110	3.3	60	7.9	1.3	390
100111	3.9	60	7.9	1.5	360
100112	4.7	60	7.9	1.8	330
100113	5.6	60	7.9	2.0	310
100114	6.8	60	7.9	2.2	300
100115	8.2	60	7.9	2.4	290
100116	10	60	7.9	2.6	280

a	b	c	d	e	f	g	h	j	k
.2	.2	.1	.1	1.0	#24	#26	.05	.05	.26

Inductance Tolerances: 0.10 to 0.82 uH, ±10%; 1.0 to 10 uH, ±5%.

T3 SERIES

Part Number	Apparent Induc., uH	Min. Q	Test freq., MHz	Max. DC resist., ohms	Rated DC current mA
100117	10	75	2.5	1.1	550
100118	12	75	2.5	1.3	500
100119	15	75	2.5	1.5	450
100120	18	80	2.5	1.9	410
100121	22	80	2.5	2.3	380
100122	27	80	2.5	2.7	350
100123	33	80	2.5	3.3	320
100124	39	80	2.5	3.9	290
100125	47	80	2.5	4.7	260
100126	56	80	2.5	5.6	240
100127	68	80	2.5	6.8	220
100128	82	80	2.5	8.1	200
100129	100	80	2.5	9.7	180
100130	120	45	0.79	12	160
100131	150	45	0.79	14	150
100132	180	45	0.79	17	140
100133	220	50	0.79	20	130
100134	270	55	0.79	24	120
100135	330	55	0.79	19	130
100136	390	55	0.79	22	120
100137	470	55	0.79	27	110
100138	560	55	0.79	32	100
100139	680	55	0.79	19	130
100140	820	50	0.79	23	120
100141	1000	50	0.79	27	110

a	b	c	d	e	f	g	h	j	k
.27	.27	.2	.15	1.0	#22	#24	.05	.075	.33

Inductance Tolerance: ±5%; closer tolerances on request.

T4 SERIES

Part Number	Apparent Induc., uH	Min. Q	Test freq., KHz	Max. DC resist., ohms	Rated DC current mA
100142	100	75	790	6	280
100143	120	75	790	7	260
100144	150	75	790	8	240
100145	180	75	790	10	220
100146	220	80	790	12	200
100147	270	80	790	14	180
100148	330	80	790	17	160
100149	390	80	790	20	150
100150	470	75	790	24	140
100151	560	75	790	28	130
100152	680	75	790	33	120
100153	820	75	790	39	110
100154	1000	75	790	45	100
100155	1200	45	250	31	120
100156	1500	45	250	37	110
100157	1800	50	250	44	100
100158	2200	50	250	52	90
100159	2700	50	250	61	85
100160	3300	50	250	71	80
100161	3900	50	250	82	75
100162	4700	50	250	93	70
100163	5600	45	250	105	65
100164	6800	40	250	140	60
100165	8200	40	250	160	55
100166	10000	50	250	180	50

a	b	c	d	e	f	g	h	j	k
.375	.375	.2	.187	1.0	#22	#24	.05	.093	.42

Inductance Tolerance: ±5%; closer tolerances on request.

MOLDED SHIELDED MINIATURE RF CHOKES

An extremely useful series of chokes where extraneous coupling presents problems in dense packaging. Electromagnetic shielding limits coupling to less than 3% when two units are placed side by side.

Part Number	MS Type	Induct. Micro-henries ±10%	D.C. Resistance Max.	Milli-amp Rating Max.
9250-101	90537-1	0.10	.025	2900
9250-121	90537-2	.12	.034	2800
9250-151	90537-3	.15	.037	2750
9250-181	90537-4	.18	.047	2200
9250-221	90537-5	.22	.067	1700
9250-271	90537-6	.27	.11	1500
9250-331	90537-7	.33	.13	1300
9250-391	90537-8	.39	.18	1100
9250-471	90537-9	.47	.25	1000
9250-561	90537-10	.56	.33	900
9250-681	90537-11	.68	.45	750
9250-821	90537-12	.82	.59	600
9250-102	90537-13	1.00	.07	1900
9250-122	90537-14	1.20	.093	1600
9250-152	90537-15	1.50	.12	1300
9250-182	90537-16	1.80	.14	1200
9250-222	90537-17	2.20	.19	1100
9250-272	90537-18	2.70	.28	950
9250-332	90537-19	3.30	.35	800
9250-392	90537-20	3.90	.40	750
9250-472	90537-21	4.70	.55	650
9250-562	90537-22	5.60	.72	550
9250-682	90537-23	6.80	1.02	500
9250-822	90537-24	8.20	1.32	475
9250-103	90537-25	10.0	1.62	450
9250-123	90537-26	12.0	2.00	400
9250-153	90537-27	15.0	.80	620
9250-183	90537-28	18.0	.89	610
9250-223	90537-29	22.0	.96	600
9250-273	90537-30	27.0	1.19	500
9250-333	90537-31	33.0	1.37	490
9250-393	90537-32	39.0	1.93	410
9250-473	90537-33	47.0	2.11	400
9250-563	90537-34	56.0	2.23	380
9250-683	90537-35	68.0	2.70	370
9250-823	90537-36	82.0	2.44	360
9250-104	90537-37	100.0	3.12	325
9250-124	90537-38	120.0	3.60	290
9250-154	90537-39	150.0	4.10	275
9250-184	90537-40	180.0	4.40	260
9250-224	90537-41	220.0	5.00	250
9250-274	90537-42	270.0	5.80	240
9250-334	90537-43	330.0	6.40	225
9250-394	90537-44	390.0	7.40	200
9250-474	90537-45	470.0	9.50	180
9250-564	90537-46	560.0	10.5	174
9250-684	90537-47	680.0	11.8	168
9250-824	90537-48	820.0	13.0	152
9250-105	90537-49	1,000.0	17.5	135
9250-125	90537-50	1,200.0	22.1	115
9250-155	90537-51	1,500.0	26.5	110
9250-185	90537-52	1,800.0	29.9	105
9250-225	90537-53	2,200.0	33.8	99
9250-275	90537-54	2,700.0	47.3	83
9250-335	90537-55	3,300.0	53.0	80
9250-395	90537-56	3,900.0	73.8	67
9250-475	90537-57	4,700.0	81.6	63
9250-565	90537-58	5,600.0	98.9	56
9250-685	90537-59	6,800.0	111.0	54
9250-825	90537-60	8,200.0	119.0	52
9250-106	90537-61	10,000.0	137.0	49

0.10 thru 0.82 uh — Phenolic Core

1.00 thru 12 uh — Iron Core

15 + uh — Ferrite Core

Size: .157 ±.010 diameter; .395 ±.020 length
Leads AWG #22TCW; 1.438 ±.188 length

MICRO MITE MOLDED RF CHOKES

Nicknamed the "Micro-Mite", these rugged coils exhibit high Q and very low distributed capacity, all concentrated into an amazingly small package. Size reduction ranges up to 80% of equivalent standard molded chokes. The construction of these coils permits miniaturization without the use of ferrite materials, thus maintaining temperature stability.

Miller Part Number	MS Type	Induct. Micro-henries ±5%	D.C. Resist. Max.	Milli-amp Rating Max.	Mold Size
9210-54	90538-01	36	2.50	180	D
9210-56	90538-02	39	2.60	176	D
9210-58	90538-03	43	2.70	172	D
9210-60	90538-04	47	2.75	170	D
9210-62	90538-05	51	2.85	167	D
9210-64	90538-06	56	3.00	164	D
9210-66	90538-07	62	3.15	160	D
9210-68	90538-08	68	3.30	156	D
9210-70	90538-09	75	3.70	147	D
9210-72	90538-10	82	3.90	143	D
9210-74	90538-11	91	4.30	136	D
9210-76	90538-12	100	4.50	133	D
9210-78	90538-13	110	4.90	128	D
9210-80	90538-14	120	5.20	124	D
9210-82	90538-15	130	5.45	121	D
9210-84	90538-16	150	6.05	114	D
9210-86	90538-17	160	6.40	111	D
9210-88	90538-18	180	6.75	108	D
9210-90	90538-19	200	7.10	106	D
9210-92	90538-20	220	7.45	103	D
9210-94	90538-21	240	7.80	101	D
9220-00	90539-01	270	8.2	110	A
9220-02	90539-02	300	8.7	107	A
9220-04	90539-03	330	9.1	105	A
9220-06	90539-04	360	9.6	102	A
9220-08	90539-05	390	10.0	100	A
9220-10	90539-06	430	10.6	97	A
9220-12	90539-07	470	11.1	95	A
9220-14	—	500	11.6	93	A
9220-15	90539-08	510	11.6	92	A
9220-16	90539-09	560	12.3	91	A
9220-18	90539-10	620	13.0	88	A
9220-20	90539-11	680	13.7	85	A
9220-22	90539-12	750	14.4	83	A
9220-24	90539-13	820	15.1	81	A
9220-26	90539-14	910	15.8	79	A
9220-28	90539-15	1000	16.5	78	A
9220-30	90540-01	1100	21.0	78	B
9220-32	90540-02	1200	22.0	76	B
9220-34	90540-03	1300	23.0	75	B
9220-36	90540-04	1500	25.0	72	B
9220-38	90540-05	1600	26.0	70	B
9220-40	90540-06	1800	28.0	68	B
9220-42	90540-07	2000	29.0	67	B
9220-44	90540-08	2200	30.0	66	B
9220-46	90540-09	2400	31.0	64	B
9220-48	90540-10	2700	33.0	62	B
9220-50	90540-11	3000	35.0	61	B
9220-52	90540-12	3300	38.0	58	B
9220-54	90540-13	3600	40.0	57	B
9220-56	90541-01	3900	44.0	61	C
9220-58	90541-02	4300	46.0	59	C
9220-60	90541-03	4700	48.0	58	C
9220-62	90541-04	5000	50.0	57	C
9220-64	90541-05	5600	53.0	56	C
9220-66	90541-06	6200	56.0	54	C
9220-68	90541-07	6800	59.0	52	C
9220-70	90541-08	7500	62.0	51	C
9220-72	90541-09	8200	65.0	50	C
9220-74	90541-10	9100	68.0	49	C
9220-76	90541-11	10000	72.0	47	C

Mold Size	Mold Diameter	Mold Length	Lead Size	Lead Length
A	.190±.010	.440±.010	AWG #22	1.44±.188
B	.215±.010	.560±.010	AWG #21	1.44±.188
C	.240±.010	.740±.010	AWG #20	1.44±.188
D	.155±.010	.375±.010	AWG #22	1.44±.188

MOLDED RF CHOKES

Miller Part Number	MS Type	Induct. Micro-henries*	D.C. Re-sist. Max.	Milli-amp Rating Max.
9310-00	18130-1	.15*	.03	2450
9310-02	18130-2	.22*	.055	1900
9310-04	18130-3	.33*	.09	1400
9310-06	18130-4	.47*	.12	1225
9310-07	18130-5	.56	.135	1220
9310-08	18130-6	.68	.15	1100
9310-10	18130-7	.82	.22	900
9310-12	18130-8	1.00	.29	830
9310-14	18130-9	1.20	.42	650
9310-16	18130-10	1.50	.50	600
9310-18	18130-11	1.80	.65	525
9310-20	18130-12	2.20	.95	435
9310-22	18130-13	2.70	1.20	385
9310-24	18130-14	3.30	2.00	300
9310-26	18130-15	3.90	2.30	280
9310-28	18130-16	4.70	2.60	260
9310-30	18130-17	5.60	.32	750
9310-32	18130-18	6.80	.50	600
9310-34	18130-19	8.20	.60	545
9310-36	18130-20	10.0	.90	445
9310-38	18130-21	12.0	1.10	404
9310-40	18130-22	15.0	1.40	370
9310-42	18130-23	18.0	2.25	280
9310-44	18130-24	22.0	2.50	265
9310-46	—	24.0	2.50	265
9310-48	18130-25	27.0	2.60	260
9310-50	—	30.0	2.80	255
9310-52	18130-26	33.0	3.00	250

Mold Size: .156±.010 Diameter; .375±.010 Lgth. Leads: AWG #22 TCW; 1.437±.188 Lgth.

9320-00	75008-21	.15*	.030	3000
9320-02	75008-22	.22*	.035	2800
9320-04	75008-23	.33*	.065	2000
9320-06	75008-24	.47*	.085	1700
9320-07	75008-25	.56	.125	1450
9320-08	75008-26	.68	.150	1300
9320-09	75008-27	.82	.205	1100
9320-10	75008-28	1.00	.290	930
9320-11	75008-29	1.20	.400	785
9320-12	75008-30	1.50	.485	700
9320-13	75008-31	1.80	.740	580
9320-14	75008-32	2.20	.970	505
9320-16	75008-33	2.70	1.20	460
9320-18	75008-34	3.30	.140	1350
9320-20	75008-35	3.90	.155	1250
9320-22	75008-36	4.70	.210	1100
9320-24	75008-37	5.60	.280	935
9320-26	75008-38	6.80	.375	810
9320-28	75008-39	8.20	.440	750
9320-30	75008-40	10.0	.605	640
9320-32	75008-41	12.0	1.05	490
9320-34	75008-42	15.0	1.20	460
9320-35	75008-43	18.0	1.95	360
9320-36	75008-44	22.0	2.20	335
9320-38	75008-45	27.0	2.75	300

Mold Size: .188±.031 Diameter; 0.437±.031 Lgth. Leads: AWG #22 TCW; 1.437±.188 Lgth.

9330-00	90542-01	.47	.06	1970
9330-01	90542-02	.56	.08	1850
9330-02	90542-03	.68	.08	1700
9330-03	90542-04	.82	.11	1520
9330-04	90542-05	1.00	.14	1290
9330-05	90542-06	1.20	.19	1120
9330-06	90542-07	1.50	.28	925
9330-07	90542-08	1.80	.37	790
9330-08	90542-09	2.20	.50	680
9330-10	90542-10	2.70	.65	600
9330-12	90542-11	3.30	1.00	480
9330-14	90542-12	3.90	1.20	440
9330-16	90542-13	4.70	1.80	360
9330-18	90542-14	5.60	.13	1340
9330-20	90542-15	6.80	.20	1080
9330-22	90542-16	8.20	.22	1030
9330-24	90542-17	10.0	.26	950
9330-26	90542-18	12.0	.45	720
9330-28	90542-19	15.0	.52	670
9330-30	90542-20	18.0	.70	580
9330-32	90542-21	22.0	1.00	480
9330-34	90542-22	27.0	1.30	420
9330-36	90542-23	33.0	1.50	390
9330-38	90542-24	39.0	2.00	340

Mold Size: .22±.03 Diameter; 0.560±.010 Lgth. Leads: AWG #22 TCW; 1.437 ±.19 Lgth.
*Inductance Tolerance: ±20%.
All Others 10%.

MICRO-MINIATURE MOLDED RF CHOKES

We are pleased to offer the following series of molded RF chokes. They represent what we believe to be the smallest package for the current rating specified. Color Coding is per MIL-C-15305.

Miller Part Number	MS Type	Inductance Micro-henries ±10%	D.C. Resistance Max.	Milliamp Rating Max.
9230-94	75083-1	.10	.07	1100
9230-96	75083-2	.12	.08	1100
9230-00	75083-3	.15	.10	1100
9230-02	75083-4	.18	.12	1010
9230-04	75083-5	.22	.14	935
9230-06	75083-6	.27	.16	875
9230-08	75083-7	.33	.20	780
9230-10	75083-8	.39	.30	640
9230-12	75083-9	.47	.35	590
9230-14	75083-10	.56	.50	495
9230-16	75083-11	.68	.60	450
9230-18	75083-12	.82	.85	380
9230-20	75083-13	1.00	1.00	350
9230-22	75084-1	1.20	.18	825
9230-24	75084-2	1.50	.22	745
9230-26	75084-3	1.80	.30	640
9230-28	75084-4	2.20	.40	550
9230-30	75084-5	2.70	.50	495
9230-32	75084-6	3.30	.85	380
9230-34	75084-7	3.90	1.00	350
9230-36	75084-8	4.70	1.20	320
9230-38	75084-9	5.60	1.80	260
9230-40	75084-10	6.80	2.00	245
9230-42	75084-11	8.20	2.70	210
9230-44	75084-12	10.0	3.70	180
9230-46	75084-13	12.0	2.70	210
9230-48	75084-14	15.0	2.80	205
9230-50	75084-15	18.0	3.10	195
9230-52	75084-16	22.0	3.30	190
9230-54	75084-17	27.0	3.50	185
9230-56	75085-1	33.0	3.40	187
9230-58	75085-2	39.0	3.60	180
9230-60	75085-3	47.0	4.50	165
9230-62	75085-4	56.0	5.70	145
9230-64	75085-5	68.0	6.70	135
9230-66	75085-6	82.0	7.30	130
9230-68	75085-7	100.0	8.00	125
9230-70	75085-8	120.0	13.00	97
9230-72	75085-9	150.0	15.00	85
9230-74	75085-10	180.0	17.00	79
9230-76	75085-11	220.0	21.00	73
9230-78	75085-12	270.0	25.00	65
9230-80	75085-13	330.0	28.00	62
9230-82	75085-14	390.0	35.00	55
9230-84	75085-15	470.0	42.00	50
9230-86	75085-16	560.0	46.00	48
9230-88	75085-17	680.0	60.00	42
9230-90	75085-18	820.0	65.00	40
9230-92	75085-19	1000.0	72.00	38

Mold Size: .095 ± .010 Diameter; .250 ±.010 Length.
Leads: AWG #24 TCW; 1.500 ± .188 Length.

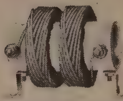
MOLDED RF CHOKES

Miller Part Number	MS Type	Micro-henries ±10%	D.C. Resist. Max.	Milli-amp Rating Max.	Mold Size
9340-00	91189-14	1.2	.075	2400	—
9340-02	91189-15	1.5	.090	2150	—
9340-03	91189-16	1.8	.135	1750	—
9340-04	91189-17	2.2	.160	1600	—
9340-06	91189-18	2.7	.220	1350	—
9340-08	91189-19	3.3	.305	1150	—
9340-10	91189-20	3.9	.45	955	—
9340-12	91189-21	4.7	.560	860	—
9340-14	91189-22	5.6	.745	745	—
9340-16	91189-23	6.8	1.05	635	—
9340-18	91189-24	8.2	1.4	550	—
9340-20	91189-25	10.0	1.9	460	—
9340-22	91189-26	12.0	2.65	395	—
9340-24	91189-27	15.0	3.25	355	—
9340-26	91189-28	18.0	4.15	315	—
9340-28	91189-29	22.0	.295	1150	—
9340-30	91189-30	27.0	.350	1050	—
9340-32	91189-31	33.0	.550	865	—
9340-34	91189-32	39.0	.65	810	—
9340-36	91189-33	47.0	1.0	640	—
9340-38	91189-34	56.0	1.15	610	—
9340-39	91189-35	68.0	1.85	470	—
9340-40	91189-36	82.0	2.10	440	—
9340-42	91189-37	100.0	2.50	405	—
9340-44	91189-38	120.0	4.10	315	—

Mold Size: 0.280 ± .031 Diameter;
.940 ± .062 Length.
Leads: AWG #21 TCW; 1.437 ± .188 Length.

9350-00	75052-1	47.0	5.9	195	A
9350-02	75052-2	56.0	6.4	185	A
9350-04	75052-3	68.0	3.3	255	A
9350-06	75052-4	82.0	3.5	245	A
9350-08	75052-5	100.0	3.8	235	A
9350-10	75052-6	120.0	4.7	215	A
9350-12	75052-7	150.0	5.3	200	A
9350-14	75053-1	180.0	5.5	225	B
9350-16	75053-2	220.0	5.9	220	B
9350-18	75053-3	270.0	6.6	210	B
9350-20	75053-4	330.0	7.8	185	B
9350-22	75053-5	390.0	8.7	180	B
9350-24	75054-1	470.0	9.0	190	C
9350-26	75054-2	560.0	10.0	180	C
9350-28	75054-3	680.0	11.2	170	C
9350-30	75054-4	820.0	13.0	155	C
9350-32	75054-5	1000.0	14.5	145	C
9350-34	75055-1	1500.0	22.0	127	D
9350-36	—	2000.0	26.0	125	D
9350-37	75055-2	2200.0	27.0	115	D
9350-38	—	2500.0	30.0	115	D
9350-39	75055-3	2700.0	32.0	105	D
9350-40	—	5000.0	65.0	78	D
9350-41	75055-4	5100.0	66.0	73	D
9350-44	75055-5	10000.0	70.0	71	D

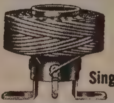
COIL DIMENSIONS	A	B	C	D
DIAMETER ±.010	.250	.310	.375	.468
LENGTH ±.010	.560	.560	.625	.687



DUAL LINE FILTER CHOKES

Miller Dual Duo-Lateral Line Filter Chokes are wound with two coils on one form, giving the advantage of small physical size in cases where space requirements are stringent and two single coils would occupy too much area. Identical in specifications, except for dimensions, to our single type Duo-Lateral chokes. They are wound on white ceramic forms 2″ in diameter by 4½″ long.

Cat. No.	Amps.	Ohms	Uh.	Dimensions
D-7826	5	.28	570	4½″ x 4″
D-7827	10	.15	370	4½″ x 4″
D-7828	15	.085	200	4½″ x 4″
D-7829	20	.05	135	4½″ x 4″



LIGHT DUTY DUO-LATERAL LINE FILTER CHOKES

Single Line Filter Chokes

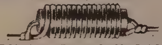
Dimensions: 1⅞″ x 1¾″.

Cat. No.	Amperes	Ohms	Uh.
7825	2	.7	600
7825-3	3	.25	250
7825-5	5	.1	100
7825-8	8	.05	50

DUAL LINE FILTER CHOKES

Dimensions: 3¼″ x 2⅛″.

Cat. No.	Amperes	Ohms	Uh.
D-7825	2	.7	600
D-7825-3	3	.25	250
D-7825-5	5	.1	100
D-7825-8	8	.05	50



HEAVY DUTY HASH CHOKES

Part No.	Uh. ±20%	Ohms Max.	Amps.	Dimensions
5218	3.35	.010	20	17/32″ x 1 5/16″
5219	4.9	.016	15	½″ x 1¼″
5220	8.8	.021	10	½″ x 1¼″
5230	4.0	.012	8	5/16″ x 29/32″
5240	40.0	.082	3	9/16″ x 1¼″
5248	68.0	.054	5	17/32″ x 1¼″
5250	100.0	.216	2	5/16″ x 1¼″
5252	125.0	.080	3.5	½″ x 1¼″
5254	250.0	.170	2.5	7/16″ x 1¼″
5256	500.0	.260	2.0	9/16″ x 1¼″

SERIES S, M, L MOLDED R F CHOKES

Inductance Tolerance

0.1 to 22 uH, ±10% on Q-meter / 27 uH to 10,000, ±5% 1,000 bridge

Physical and Environmental Characteristics

Operating tem. −55° to +125°C terminal strength — meets five pound pull test per MIL-C-15305

All series meet requirements of MIL-C-15305, Grade 1, Class B

SERIES S

Part Number	-L- Micro-Henries	Max DC Res, Ohms	Max I mA
100170	0.10	0.02	4000
100171	0.12	0.025	3500
100172	0.15	0.03	3000
100173	0.18	0.03	3000
100174	0.22	0.03	3000
100175	0.27	0.04	2700
100176	0.33	0.05	2500
100177	0.39	0.08	2000
100178	0.47	0.08	2000
100179	0.56	0.10	1700
100180	0.68	0.12	1500
100181	0.82	0.18	1300
100182	1.0	0.24	1100
100183	1.2	0.35	1000
100184	1.5	0.43	850
100185	1.8	0.65	720
100186	2.2	0.80	610
100187	2.7	0.12	1600
100188	3.3	0.15	1400
100189	3.9	0.23	1200
100190	4.7	0.30	1000
100191	5.6	0.45	900
100192	6.8	0.55	800
100193	8.2	0.65	720
100194	10.0	0.73	650
100195	12.0	1.1	590
100196	15.0	1.4	500
100197	18.0	1.6	460
100198	22.0	1.8	430
100199	27.0	2.7	360
100200	33.0	3.5	300
100201	39.0	3.8	290
100202	47.0	4.0	275
100203	56.0	4.4	265
100204	68.0	4.7	250
100205	82.0	5.3	235
100206	100.0	6.0	220

SERIES M

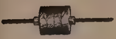
Part Number	-L- Micro-Henries	Max DC Res, Ohms	Max ! mA
100207	1.0	0.04	2700
100208	1.2	0.04	2700
100209	1.5	0.04	2700
100210	1.8	0.05	2500
100211	2.2	0.05	2500
100212	2.7	0.05	2500
100213	3.3	0.05	2500
100214	3.9	0.07	2100
100215	4.7	0.09	1800
100216	5.6	0.14	1550
100217	6.8	0.17	1300
100218	8.2	0.25	1150
100219	10.0	0.32	1000
100220	12.0	0.47	870
100221	15.0	0.62	730
100222	18.0	0.72	660
100223	22.0	0.8	600
100224	27.0	1.2	520
100225	33.0	1.5	450
100226	39.0	2.3	380
100227	47.0	3.0	300
100228	56.0	4.2	270
100229	68.0	5.2	250
100230	82.0	6.2	220
100231	100.0	7.0	200
100232	120.0	7.5	200
100233	150.0	8.0	190
100234	180.0	9.0	185
100235	220.0	10.0	180
100236	270.0	11.0	172
100237	330.0	12.0	165
100238	390.0	13.0	157
100239	470.0	14.0	150
100240	560.0	16.0	145
100241	680.0	17.0	140
100242	820.0	19.0	132
100243	1000.0	21.0	125

SERIES L

Part Number	-L- Micro-Henries	Max DC Res, Ohms	Max I mA
100244	10.0	0.15	1800
100245	12.0	0.23	1600
100246	15.0	0.3	1300
100247	18.0	0.4	1150
100248	22.0	0.5	1000
100249	27.0	0.6	900
100250	33.0	0.7	850
100251	39.0	1.1	720
100252	47.0	1.3	620
100253	56.0	1.8	540
100254	68.0	2.4	450
100255	82.0	2.8	425
100256	100.0	3.2	400
100257	120.0	4.8	360
100258	150.0	6.4	280
100259	180.0	9.5	240
100260	220.0	12.0	200
100261	270.0	13.0	195
100262	330.0	14.0	190
100263	390.0	15.5	180
100264	470.0	17.0	170
100265	560.0	18.5	165
100266	680.0	20.0	155
100267	820.0	22.0	150
100268	1000.0	24.0	145
100269	1200.0	27.0	137
100270	1500.0	29.0	130
100271	1800.0	32.0	125
100272	2200.0	35.0	120
100273	2700.0	40.0	112
100274	3300.0	45.0	105
100275	3900.0	49.0	100
100276	4700.0	53.0	95
100277	5600.0	60.0	90
100278	6800.0	67.0	85
100279	8200.0	75.0	82
100280	10000.0	80.0	80

Series	Lengths	Diameter	Lead Size	Lead Length
S	.44 max.	.188 max.	#22 AWG	1.3 min.
M	.60 max.	.25 max.	#21 AWG	1.3 min.
L	.90 max.	.31 max.	#21 AWG	1.3 min.

SUB-MINIATURE RF CHOKES

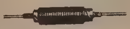


An extremely versatile series of iron core RF chokes designed to meet the industries' demand for high reliability, ultra-miniature components. The coils are ideally suited to network and filter design, delay lines, and computer applications. The coils are impregnated with a moisture resistant lacquer and on special order they can be fungus-proofed per JAN-T-152 using varnish per MIL-V-173A. They can also be encapsulated in epoxy resin to conform to Grade 1, Class B of MIL-C-15305.

Miller Part No.	Inductance Nominal*	D.C. Resistance Max.	Milliamp Rating Max.	Max. Winding Diam.	Form Length ±1/32
70F107AP	.10 uh★	.013	3922	.156	5/16
70F157AP	.15 uh★	.025	2828	.141	5/16
70F227AP	.22 uh★	.038	2294	.141	5/16
70F337AP	.33 uh★	.070	1690	.125	5/16
70F477AP	.47 uh★	.125	1264	.125	5/16
70F687AP	.68 uh★	.200	1000	.125	5/16
70F757AP	.75 uh★	.264	870	.125	5/16
70F827AP	.82 uh★	.290	830	.125	5/16
70F106AI	1.0 uh	.048	2041	.165	1/4
70F126AI	1.2 uh	.072	1666	.160	1/4
70F156AI	1.5 uh	.096	1443	.160	1/4
70F186AI	1.8 uh	.096	1443	.160	1/4
70F226AI	2.2 uh	.156	1132	.160	1/4
70F276AI	2.7 uh	.168	1091	.160	1/4
70F336AI	3.3 uh	.240	912	.150	1/4
70F396AI	3.9 uh	.264	870	.150	1/4
70F476AI	4.7 uh	.457	661	.150	1/4
70F566AI	5.6 uh	.492	637	.150	1/4
70F686AI	6.8 uh	.624	566	.150	1/4
70F756AI	7.5 uh	.624	566	.150	1/4
70F826AI	8.2 uh	.744	518	.150	1/4
70F916AI	9.1 uh	1.44	288	.160	1/4
70F105AI	10 uh	1.56	277	.160	1/4
70F125AI	12 uh	1.68	267	.160	1/4
70F155AI	15 uh	1.92	250	.165	1/4
70F185AI	18 uh	2.28	229	.165	1/4
70F225AI	22 uh	2.28	229	.165	1/4
70F255AI	25 uh	2.64	213	.170	1/4
70F275AI	27 uh	2.64	213	.170	1/4
70F335AI	33 uh	2.76	208	.170	1/4
70F395AI	39 uh	3.36	188	.175	1/4
70F475AI	47 uh	3.36	188	.175	1/4
70F565AI	56 uh	3.84	176	.180	1/4
70F685AI	68 uh	4.20	169	.180	1/4
70F755AI	75 uh	4.56	162	.185	1/4
70F825AI	82 uh	4.80	158	.185	1/4
70F915AI	91 uh	4.92	156	.185	1/4
70F104AI	100 uh	7.68	139	.165	1/4
70F124AI	120 uh	8.16	135	.165	1/4
70F154AI	150 uh	8.16	135	.165	1/4
70F184AI	180 uh	8.16	135	.170	1/4
70F204AI	200 uh	10.3	120	.170	1/4
70F224AI	220 uh	11.5	114	.170	1/4
70F254AI	250 uh	12.1	111	.170	1/4
70F274AI	270 uh	13.2	106	.175	1/4
70F304AI	300 uh	13.2	106	.175	1/4
70F334AI	330 uh	13.9	103	.175	1/4
70F354AI	350 uh	14.4	102	.180	1/4
70F394AI	390 uh	15.8	97	.180	1/4
70F474AI	470 uh	16.3	95	.185	1/4
70F504AI	500 uh	18.0	91	.195	1/4
70F564AI	560 uh	19.2	88	.195	1/4
70F684AI	680 uh	19.8	87	.200	1/4
70F754AI	750 uh	22.9	80	.210	1/4
70F824AI	820 uh	22.9	80	.210	1/4
70F914AI	910 uh	24.0	79	.220	1/4
70F103AI	1.00 mh	24.0	79	.225	1/4
70F123AI	1.20 mh	33.6	66	.220	1/4
70F153AI	1.50 mh	37.2	63	.225	1/4
70F183AI	1.80 mh	42.0	59	.235	1/4
70F223AI	2.20 mh	45.6	57	.240	1/4
70F253AI	2.50 mh	45.6	57	.260	3/8
70F273AI	2.70 mh	45.6	57	.260	3/8
70F333AI	3.30 mh	51.6	53	.260	3/8
70F393AI	3.90 mh	57.6	51	.275	3/8
70F473AI	4.70 mh	64.8	48	.285	3/8
70F563AI	5.60 mh	69.6	46	.300	3/8
70F683AI	6.80 mh	78.0	43	.310	3/8
70F753AI	7.50 mh	85.2	41	.310	3/8
70F823AI	8.20 mh	92.4	40	.330	3/8
70F913AI	9.10 mh	98.4	39	.330	3/8
70F102AI	10.0 mh	101	38	.335	3/8
70F122AI	12 mh	100	50	.300	1/2
70F152AI	15 mh	113	47	.300	1/2
70F182AI	18 mh	128	44	.325	1/2
70F222AI	22 mh	144	41	.330	1/2
70F252AF	25 mh	115	46	.300	5/8
70F272AF	27 mh	120	45	.313	5/8
70F332AF	33 mh	134	43	.313	5/8
70F392AF	39 mh	147	41	.330	5/8
70F472AF	47 mh	168	38	.344	5/8
70F502AF	50 mh	175	37	.360	5/8
70F562AF	56 mh	189	36	.360	5/8
70F682AF	68 mh	215	34	.375	5/8
70F752AF	75 mh	222	33	.390	5/8
70F822AF	82 mh	238	32	.390	5/8
70F912AF	91 mh	250	31	.390	5/8
70F101AF	100 mh	278	29	.406	5/8

*Tolerance 0.1 to 1.0 uh ±20%, 1.1 to 15 uh ±10%, over 15 uh ±5% ★Measured with leads 1/4" long from Q Meter binding posts

PHENOLIC CORE SINGLE LAYER WINDINGS

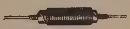


Dimensions of core: 3/16" diameter x 3/4" long. Leads are 1½" long.

Miller Part Number	Inductance Nominal*	D. C. Resistance Maximum	Milliamp Rating Maximum	Diameter over Winding
4602	1.0 uh	.050	2000	.270
4604	1.5 uh	.093	1800	.270
4606	2.4 uh	.190	1500	.270
4608	3.9 uh	.450	1000	.270
4609	5.5 uh	.670	850	.270
4610	6.2 uh	.830	700	.270
4611	8.2 uh	1.20	600	.270
4612	10.0 uh	1.50	500	.270

*Tolerance 1.0 uh ±20%, 1.1 to 10 uh ±10%

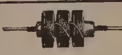
IRON CORE SINGLE LAYER WINDINGS



Dimensions of core: 7/32" diameter x 7/8" long. Leads are 1½" long.

4622	10 uh ±5%	.11	1500	.29
4624	15 uh ±5%	.17	1000	.29
4626	24 uh ±5%	.34	800	.29
4628	39 uh ±5%	.65	600	.29
4629	55 uh ±5%	1.0	500	.29
4630	62 uh ±5%	1.2	475	.29
4631	82 uh ±5%	1.9	450	.29
4632	100 uh ±5%	3.0	400	.29

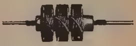
PHENOLIC CORE 3-SECTION WINDINGS



Dimensions of core: 3/16" diameter x 3/4" long. Leads are 1½" long.

4642	.10 mh ±5%	5.4	160	.406
4644	.15 mh ±5%	6.5	160	.406
4646	.24 mh ±5%	8.5	160	.438
4648	.39 mh ±5%	11	160	.500
4649	.55 mh ±5%	13	160	.500
4650	.62 mh ±5%	15	160	.531
4651	.75 mh ±5%	16	160	.531
4652	1.0 mh ±5%	19	160	.563

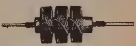
IRON CORE 3-SECTION WINDINGS



Dimensions of core: 7/32" diameter x 7/8" long. Leads are 1½" long.

Miller Part Number	Inductance @ 1000 Hertz	D. C. Resistance Maximum	Milliamp Rating Maximum	Diameter over Winding
4662	1.0 mh ±5%	8.6	160	.469
4664	1.5 mh ±5%	11	160	.469
4666	2.4 mh ±5%	15	160	.531
4668	3.9 mh ±5%	20	160	.563
4669	5.5 mh ±5%	25	160	.594
4670	6.2 mh ±5%	37	100	.531
4671	8.2 mh ±5%	46	100	.563
4672	10 mh ±5%	50	100	.594

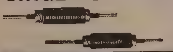
FERRITE CORE 3-SECTION WINDINGS



Dimensions of core: 1/4" diameter x 7/8" long. Leads are 1½" long.

6302	2.5 mh ±5%	9.0	160	.469
6304	5.0 mh ±5%	14	160	.531
6306	10 mh ±5%	31	100	.531
6308	25 mh ±5%	82	65	.531
6310	50 mh ±5%	127	65	.625

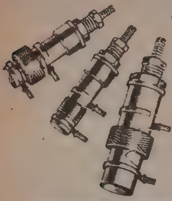
SINGLE LAYER COLOR CODED RF CHOKES



The following solenoid wound R.F. Chokes are impregnated with a thermosetting varnish and are color coded to EIA standards. Form Dimensions .156 x ½".

Part No.	L*	R Ohms Max.	I Ma. Max.
74F106AP	1.0 uh	.20	1000
74F126AP	1.2 uh	.22	950
74F156AP	1.5 uh	.25	900
74F186AP	1.8 uh	.28	850
74F226AP	2.2 uh	.30	800
74F276AP	2.7 uh	.50	700
74F336AP	3.3 uh	.70	600
74F396AP	3.9 uh	.80	500
74F476AP	4.7 uh	1.00	400
74F566AP	5.6 uh	1.80	350
74F686AP	6.8 uh	1.85	300
74F826AP	8.2 uh	1.90	275
74F105AP	10 uh	3.00	250
74F125AP	12 uh	3.60	200
74F155AP	15 uh	6.00	150
74F185AP	18 uh	7.50	100
74F225AI	22 uh	2.00	500
74F275AI	27 uh	1.85	450
74F335AI	33 uh	2.00	450
74F395AI	39 uh	2.60	400
74F475AI	47 uh	3.50	350
74F565AI	56 uh	3.75	300
74F685AI	68 uh	4.00	250
74F825AI	82 uh	5.10	200
74F104AI	100 uh	6.00	150

* Tolerance 1.0 to 2.2 uh. ±20%. 2.7 to 100 uh. ±10%



RESINITE ADJUSTABLE RF COILS

Resinite is a phenolic impregnated tubing which combines the mechanical and dielectric advantages of phenolics with the high dielectric strength, moisture resistance, and non-corrosive properties of cellulose acetate. Resinite can be certified to MIL-P-79B Type PBG. This series features an extremely wide choice of inductance ranges and utilizes only the highest quality commercial materials throughout. They find application where the severe moisture resistant characteristics of the encapsulated units and the mechanical properties of the ceramics are not required.

Miller Part No.	Inductance Min.	Inductance Max.	R Ohms Max.	Max. Current Ma.	Dia. over Winding
20A107RBI	.088 uh	.120 uh	.041	1600	.343
20A157RBI	.131 uh	.180 uh	.044	1600	.343
20A227RBI	.162 uh	.264 uh	.051	1600	.343
20A337RBI	.238 uh	.396 uh	.054	1000	.343
20A477RBI	.356 uh	.564 uh	.078	1000	.343
20A687RBI	.508 uh	.816 uh	.082	635	.343
20A827RBI	.735 uh	.984 uh	.090	635	.343
20A106RBI	.885 uh	1.20 uh	.135	400	.343
20A156RBI	1.08 uh	1.80 uh	.205	400	.343
20A226RBI	1.62 uh	2.64 uh	.522	100	.343
20A336RBI	2.38 uh	3.96 uh	.640	100	.343
20A476RBI	3.56 uh	5.64 uh	.770	100	.343
20A686RBI	5.08 uh	8.16 uh	.950	100	.343
20A826RBI	7.35 uh	9.84 uh	1.00	100	.343
20A105RBI	8.85 uh	12.0 uh	1.45	100	.343
20A155RBI	10.8 uh	18.0 uh	1.70	100	.343
20A225RBI	16.2 uh	26.4 uh	2.10	100	.343
20A335RBI	23.8 uh	39.6 uh	2.59	100	.343
20A475RBI	35.6 uh	56.4 uh	3.10	100	.343
20A685RBI	50.8 uh	81.6 uh	3.84	100	.343
20A825RBI	73.5 uh	98.4 uh	4.71	100	.375
20A104RBI	88.5 uh	120. uh	5.00	100	.406
20A154RBI	108. uh	180. uh	5.95	100	.406
20A224RBI	162. uh	264. uh	7.50	100	.406
20A334RBI	238. uh	396. uh	9.50	100	.437
20A474RBI	356. uh	564. uh	12.0	100	.500
20A684RBI	508. uh	816. uh	14.5	100	.500
20A824RBI	735. uh	984. uh	17.0	100	.562
20A103RBI	885. uh	1.20 mh	21.0	100	.594

VERTICAL MOUNTED PRINTED CIRCUIT VELVETORK ADJUSTABLE R F COILS

Dimensions (form only) Over Collar 3/8" Dia. x 3/4" long.

The coil form is Polyester impregnated Alpha-Cellulose tubing with internally bonded resilient ribs which provide both thread and torque control. Coils may be adjusted from either end of form.

Miller Part No.	Inductance Min.	Inductance Max.	R Ohms Max.	Max. Current Ma.	Dia. over Winding
23A107RPC	.095 uh	.125 uh	.02	4100	.40
23A157RPC	.130 uh	.170 uh	.02	1600	.37
23A227RPC	.185 uh	.265 uh	.02	1600	.37
23A337RPC	.285 uh	.410 uh	.03	1000	.37
23A477RPC	.420 uh	.580 uh	.03	2500	.37
23A687RPC	.540 uh	.850 uh	.03	1600	.37
23A827RPC	.640 uh	1.00 uh	.03	1600	.37
23A106RPC	.760 uh	1.25 uh	.04	1600	.37
23A156RPC	1.20 uh	1.87 uh	.06	1000	.37
23A226RPC	1.65 uh	2.75 uh	.14	400	.37
23A336RPC	2.40 uh	4.10 uh	.17	400	.37
23A476RPC	3.40 uh	5.80 uh	.24	400	.37
23A686RPC	4.60 uh	8.50 uh	.39	250	.37
23A826RPC	5.60 uh	10.0 uh	.64	160	.37
23A105RPC	7.10 uh	12.5 uh	.77	160	.37
23A155RPC	10.0 uh	18.7 uh	1.68	100	.37
23A225RPC	14.8 uh	27.5 uh	1.91	100	.37
23A335RPC	22.0 uh	41.0 uh	2.34	100	.37
23A475RPC	31.0 uh	58.0 uh	2.72	100	.40
23A685RPC	43.5 uh	85.0 uh	3.30	100	.40
23A825RPC	61.0 uh	100.0 uh	3.89	100	.40
23A104RPC	76.0 uh	125.0 uh	4.39	100	.40
23A154RPC	105.0 uh	187.0 uh	5.46	100	.40
23A224RPC	160.0 uh	275.0 uh	6.70	100	.44
23A334RPC	240.0 uh	410.0 uh	8.30	100	.44
23A474RPC	360.0 uh	580.0 uh	10.50	100	.48
23A684RPC	530.0 uh	850.0 uh	12.90	100	.48
23A824RPC	700.0 uh	1.00 mh	14.90	100	.53
23A103RPC	910.0 uh	1.25 mh	17.10	100	.58
23A153RPC	990.0 uh	1.87 mh	28.20	65	.45
23A223RPC	1.60 mh	2.75 mh	34.80	65	.45
23A333RPC	2.40 mh	4.10 mh	42.90	65	.48
23A473RPC	3.40 mh	5.80 mh	51.60	65	.48
23A683RPC	5.15 mh	8.50 mh	63.60	65	.55
23A823RPC	7.40 mh	10.00 mh	75.60	65	.55
23A102RPC	9.80 mh	12.50 mh	87.30	65	.55
23A152RPC	12.00 mh	18.70 mh	111.0	65	.60
23A222RPC	12.10 mh	27.50 mh	197.0	33	.60
23A332RPC	18.20 mh	41.00 mh	244.0	33	.60
23A472RPC	27.50 mh	58.00 mh	302.0	33	.60
23A682RPC	40.00 mh	85.00 mh	378.0	33	.58
23A822RPC	50.00 mh	100.00 mh	423.0	33	.58
23A101RPC	62.00 mh	125.00 mh	468.0	33	.60

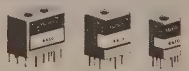
SHIELDED SUBMINIATURE ADJUSTABLE R F COILS

These compact adjustable coils offer a minimum two-to-one inductance range with relatively small changes in Q. The tuning adjustment is accessible from either the top or bottom of the coil assembly. Magnetic shielding is achieved through the use of cup cores while the metal shield offers effective electrostatic shielding. Printed circuit terminals on base and shield.

imensions: 1/2" sq. x 5/8" high.

Miller Part Number	Inductance Min.	Inductance Max.	R Ohms Max.	Max. Current Ma.
9050	1.5 uh	3.0 uh	.66	80
9051	3.0 uh	7.0 uh	.85	125
9052	7.0 uh	14.0 uh	1.38	80
9053	14.0 uh	28.0 uh	2.10	80
9054	28.0 uh	60.0 uh	3.00	100
9055	60.0 uh	120. uh	4.00	100
9056	120. uh	280. uh	5.75	80
9057	280. uh	650. uh	12.0	80
9058	650. uh	1.3 mh	15.0	100
9059	1.3 mh	3.0 mh	23.0	100
9059-1	1.8 mh	2.2 mh	10.0	141
9060	3.0 mh	10.0 mh	76.0	30
9061	8.0 mh	20.0 mh	110.	30
9062	15.0 mh	40.0 mh	150.	30
9063	20.0 mh	60.0 mh	175.	25

I F COMPONENTS SUB MINIATURE

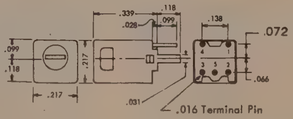


The transformers in this series represents the state of the art, as it relates to a commercial product. In both the 455 kc. and 10.7 Mc. groups there are a complete set of I.F. transformers as well as Ratio Detector and Discriminator transformers. Part No. 8814 incorporates a single section mechanical filter that sharpens the I.F. passband appreciably 4 kc. @ 6 db and 12 kc. @ 20 db. The physical dimensions of this unit are .415 wide .460 deep and .600 high.

Dimensions: **8849, 8850, 8851, 8805, 8806 & 8807 — 25/32" x 7/16" x 1/2" high.**
8852, 8853 & 8854 — 13/32" sq. x 5/8" high.
8810, 8811, 8812 & 8813 — 9/32" sq. x 15/32" high.
8814 — 13/32 x 15/32" x 9/16".

Cat. No.	Specs	Description
		10.7 Mc. Transistor Transformers
8849	500 kc. P/P	10.7 Mc. Ratio Detector
8850	300 kc. P/P	10.7 Mc. Discriminator
8851-A	6 db 300 kc.	10.7 Mc. Double Tuned IF
8852	100 K-300	10.7 Mc. Single Tuned IF
8853	20 K-500	10.7 Mc. Single Tuned IF
8854	25 K-500	10.7 Mc. Single Tuned IF
		455 Kc. Transistor Transformers
8805	20 kc. P/P	455 kc. Ratio Detector
8806	20 kc. P/P	455 kc. Discriminator
8807	6 db 15 kc.	455 kc. Double Tuned IF
8810	50 K-800	455 kc. Single Tuned IF
8811	30 K-500	455 kc. Single Tuned IF
8812	20 K-5 K	455 kc. Single Tuned IF
8813	Oscillator (455 kc. IF), (Tuning Cap. 78 to 110 pf. Max.)	
8814	70 K-800	455 kc. Single Tuned IF with Single Section Mechanical Filter

TRANSISTOR COILS . . . SMALLEST YET LESS THAN 1/4"



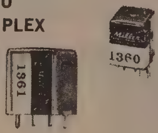
A complete set of 455 KHz IF transformers and matching Osc. coil, and a complete set of 10.7 MHz IF transformers and matching Discriminator coils . . . all so small as to be almost unbelievable.

Each unit measures only .217 x .217 x .339 and is for printed circuitry.

Cat. No.	Freq.	Impedance	Use
8855	10.7 MHz	20 K— 75 Ω	1st IF
8856	10.7 MHz	15 K—300 Ω	2nd & 3rd IF
8857	10.7 MHz	12 K— 3 K	Disc. Pri.
8858	10.7 MHz	— 12 K	Disc. Sec.
8815	455 KHz	50 K— 2 K	1st IF
8816	455 KHz	50 K— 2 K	2nd IF
8817	455 KHz	5 K— 5 K	3rd IF
8818	540-1600 KHz		BC Osc.

(Tuning capacitor 67-78 pF maximum)

SMALLEST YET STEREO MULTIPLEX



These recently developed Multiplex units when used with a Motorola IC #MC1304 FM Stereo Demodulator form a complete FM Stereo Decoder System. They provide excellent opportunity for OEM and Experimenter projects. Ask for "The Coil Forum" Application Note.

Each Multiplex System requires:

1 No. 1363 — PCB (PC Board)
2 No. 1359 and 1 No. 1360 or
2 No. 1361 and 1 No. 1362

Cat. No.	Description	Size
1359	19 KHz	.591 x .402 x .402
1360	38 KHz	.591 x .402 x .402
1361	19 KHz	.748 x .591 x .591
1362	38 KHz	.748 x .591 x .591

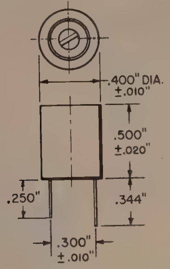
VL—SERIES VARIABLE INDUCTORS

Vertical Mount: Printed Circuit—Mil C 15305.

Tunable Range: .10 uH ±10%. .15-.22 uH ±15%. .33-4700 uH ±20%.

Operating Temp.: −55°C to +125°C.

Leads: No. 22 TCW.



Part No.	L nom uH	max DCR at 25°C ohms
VL-R10	0.10	0.02
VL-R15	0.15	0.035
VL-R22	0.22	0.04
VL-R33	0.33	0.04
VL-R47	0.47	0.05
VL-R68	0.68	0.07
VL-1R0	1.00	0.13
VL-1R5	1.50	0.24
VL-2R2	2.20	0.30
VL-3R3	3.30	0.45
VL-4R7	4.70	0.80
VL-6R8	6.80	1.1
VL-100	10.0	1.9
VL-150	15.0	3.2
VL-220	22.0	3.4

Part No.	L nom uH	max DCR at 25°C ohms
VL-330	33.0	3.6
VL-470	47.0	4.5
VL-680	68.0	5.5
VL-101	100.0	6.7
VL-151	150.	11.0
VL-221	220.	13.0
VL-331	330.	16.0
VL-471	470.	18.0
VL-681	680.	21.0
VL-102	1000.	38.0
VL-152	1500.	54.0
VL-222	2200.	66.0
VL-332	3300.	85.0
VL-472	4700.	99.0

VLS SERIES VARIABLE INDUCTORS (SHIELDED)

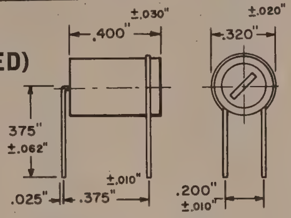
May be mounted either Vertically or Horizontally.

Printed Circuit: Mil C 15305.

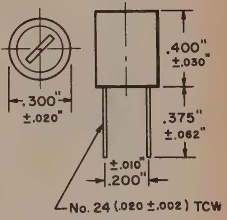
Tunable Range: .10 uH .12 uH ±5%. All others ±10%.

Operating Temp.: −55°C to +125°C.

Leads: No. 24 TCW.



HORIZONTAL STYLE



VERTICAL STYLE

Part No.	Nom. Inductance	DCR 25°C, Max. ohms	Max. I mA
VLSR10	.10 uH	0.030	2500
VLSR12	.12 uH	0.030	2500
VLSR15	.15 uH	0.030	2500
VLSR18	.18 uH	0.035	2400
VLSR22	.22 uH	0.038	2300
VLSR27	.27 uH	0.040	2200
VLSR33	.33 uH	0.040	2200
VLSR39	.39 uH	0.045	2100
VLSR47	.47 uH	0.045	2100
VLSR56	.56 uH	0.050	2000
VLSR68	.68 uH	0.055	1900
VLSR82	.82 uH	0.060	1800
VLS1R0	1.00 uH	0.070	1700
VLS1R2	1.2 uH	0.085	1670
VLS1R5	1.5 uH	0.100	1540
VLS1R8	1.8 uH	0.110	1470
VLS2R2	2.2 uH	0.120	1410
VLS2R7	2.7 uH	0.125	1380
VLS3R3	3.3 uH	0.165	1200
VLS3R9	3.9 uH	0.180	1135
VLS4R7	4.7 uH	0.245	985
VLS5R6	5.6 uH	0.265	950
VLS6R8	6.8 uH	0.330	853
VLS8R2	8.2 uH	0.460	720
VLS100	10. uH	0.640	620
VLS120	12. uH	0.800	545
VLS150	15. uH	0.865	520
VLS180	18. uH	0.940	504
VLS220	22. uH	1.03	460
VLS270	27. uH	1.18	418
VLS330	33. uH	1.30	398
VLS390	39. uH	1.41	385
VLS470	47. uH	1.61	350
VLS560	56. uH	2.08	330
VLS680	68. uH	2.20	320
VLS820	82. uH	2.42	300

Part No.	Nom. Inductance	DCR 25°C, Max. ohms	Max. I mA
VLS101	100. uH	2.15	333
VLS121	120. uH	2.38	316
VLS151	150. uH	2.52	306
VLS181	180. uH	2.88	288
VLS221	220. uH	3.18	273
VLS271	270. uH	3.50	260
VLS331	330. uH	4.80	222
VLS391	390. uH	5.44	209
VLS471	470. uH	5.90	201
VLS561	560. uH	6.30	194
VLS681	680. uH	7.20	181
VLS821	820. uH	8.00	172
VLS102	1,000. uH	12.0	141
VLS122	1,200. uH	13.5	132
VLS152	1,500. uH	16.5	119
VLS182	1,800. uH	18.0	114
VLS222	2,200. uH	20.5	107
VLS272	2,700. uH	22.5	102
VLS332	3,300. uH	42.0	76
VLS392	3,900. uH	47.5	71
VLS472	4,700. uH	53.0	67
VLS562	5,600. uH	62.5	65
VLS682	6,800. uH	69.5	58
VLS822	8,200. uH	75.0	56
VLS103	10,000. uH	100.0	49
VLS123	12,000. uH	64.0	60
VLS153	15,000. uH	84.0	52
VLS183	18,000. uH	93.0	50
VLS223	22,000. uH	104.0	45
VLS273	27,000. uH	173.0	35
VLS333	33,000. uH	187.0	32
VLS393	39,000. uH	220.0	30
VLS473	47,000. uH	253.0	28
VLS563	56,000. uH	285.0	26
VLS683	68,000. uH	311.0	24
VLS823	82,000. uH	385.0	22
VLS104	100,000. uH	420.0	20

9100 SERIES SHIELDED ADJUSTABLE R.F. COILS

These ultra compact adjustable coils offer a good inductance range with relatively small changes in Q. Tuning is accessible from either top or bottom of the assembly. Magnetic shielding is achieved by the use of cup cores while the copper shield offers effective electrostatic shielding. Printed circuit terminals on base and shield.

Dimensions: .440" Sq. x .550" High. Applications between 10 kHz and 200 MHz.

Part No.	L Min.	L Max.	Max. DC Resist. Ohms	Max. Current
9101	.099 uH	.134 uH	0.01	4.85 A
9102	.129 uH	.192 uH	0.01	4.43 A
9103	.165 uH	.258 uH	0.02	3.97 A
9104	.246 uH	.418 uH	0.02	3.83 A
9105	.366 uH	.627 uH	0.02	3.43 A
9106	.588 uH	.950 uH	0.90	516 mA
9107	.830 uH	1.54 uH	1.02	485 mA
9108	1.44 uH	2.94 uH	1.38	417 mA
9109	2.52 uH	5.70 uH	1.76	368 mA
9110	5.35 uH	13.49 uH	2.92	286 mA
9111	12.50 uH	29.45 uH	4.72	225 mA
9112	26.25 uH	71.25 uH	6.97	185 mA
9113	64.57 uH	163 uH	9.98	155 mA
9114	147 uH	430 uH	16.32	121 mA
9115	422 uH	1.10 mH	27.84	92 mA
9116	1.05 mH	3.74 mH	41.06	76 mA
9117	3.36 mH	11.12 mH	78.92	55 mA

CUSTOM WINDINGS A SPECIALTY

LET US QUOTE ON YOUR

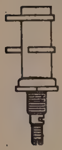
REQUIREMENTS!

WRITE FOR
FULL LINE CATALOG '75

COIL FORMS

Ceramic, Phenolic, Nylon and Alpha Cellulose Coil Forms Printed Circuit and Bushing Mount

This short form listing of our adjustable coils forms tabulates the major parameters and available cores. All metal parts are plated for protection against corrosion and the powdered iron core materials are moisture proofed.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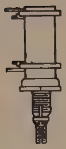
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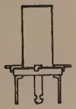
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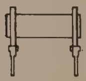
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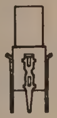
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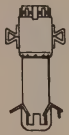
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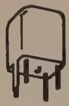
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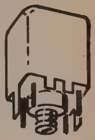

H

Miller Part Number	Style	Form Material	Form Dimensions	Mounting	Terminals
4300	A	Ceramic	.205 x .593	Bushing	2 Wire rings
60A022	B	Ceramic	.205 x .593	Bushing	2 Collars with 1 Terminal on each
60A024	B	Ceramic	.205 x .593	Bushing	2 Collars with 2 Terminals on each
4500	A	Ceramic	.260 x .858	Bushing	2 Wire rings
62A022	B	Ceramic	.260 x .858	Bushing	2 Collars with 1 Terminal on each
62A024	B	Ceramic	.260 x .858	Bushing	2 Collars with 2 Terminals on each.
4400	A	Ceramic	.375 x 1.060	Bushing	2 Wire rings
64A022	B	Ceramic	.375 x 1.060	Bushing	2 Collars with 1 Terminal on each
64A024	B	Ceramic	.375 x 1.060	Bushing	2 Collars with 2 Terminals on each
20A000	A	Phenolic (PBG)	.250 x .860	Bushing	2 Wire rings
21A000	A	Phenolic (PBG)	.375 x 1.125	Bushing	2 Wire rings
27A013 (1)	C	Alpha Cellulose	.162 x .400	Printed Circuit	3 Terminals
27A014 (1)	C	Alpha Cellulose	.162 x .400	Printed Circuit	4 Terminals
26A024 (1)	D	Alpha Cellulose	.162 x .520	Printed Circuit	2 Collars with 2 Terminals on each
25A014 (1)	C	Alpha Cellulose	.211 x .625	Printed Circuit	4 Terminals
24A024 (1)	D	Alpha Cellulose	.211 x .680	Printed Circuit	2 Collars with 2 Terminals on each
46A013	C	Ceramic	.260 x .625	Printed Circuit	3 Terminals
46A014	C	Ceramic	.260 x .625	Printed Circuit	4 Terminals
47A024	D	Ceramic	.260 x .625	Printed Circuit	2 Collars with 2 Terminals on each
23A013*	E	Alpha Cellulose	.281 x .750	Printed Circuit	3 Terminals
23A014*	E	Alpha Cellulose	.281 x .750	Printed Circuit	4 Terminals
4200*	F	Nylon	.285 x 1.250	Clip	2 Terminals

The following cores are available for all above listed coil forms. Add the Core Dash No. after the Miller Part No., i.e. 4500-4.

Core Dash No.	Recommended Frequency Range	Material	Color Code
—0	Form only		
—1	0.2 — 1.5 MHz	Powdered Iron	Yellow
—2	1.0 — 20 MHz	Powdered Iron	Red
—3	20 — 50 MHz	Powdered Iron	Green
—4	50 — 200 MHz	Powdered Iron	White
—5	100 and up MHz	Brass	None
—6	2.0 — 25 MHz	Powdered Iron	Purple
—7	25 and up MHz	Powdered Iron	Blue
—8*	Under 25 MHz	Ferrite	None

(1) —6 and —7 cores are ferrite for these coil forms *Available for 23A013, 23A014 and 4200 forms only
Mounting hardware supplied where required

51A	G	The recommended frequency, core material and color code for this group will not be in agreement with the above table. For complete specifications see General Catalog 75.
52A	H	
53A	H	
54A	H	
55A	H	
9100	G	

HIGH Q MOLDED ADJUSTABLE COILS

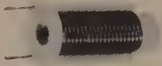
The 48A series of coils listed below may easily be tapped at ⅛, ¼, ⅜, ⅝, ¾, ⅞ turn if desired.

Frequency range 30 MHz to 250 MHz
Wire size: 20 AWG tinned copper
Form length: .73 inches

Coil OD: .310 inches
Lead spacing: .408 inches
Core: 10-32 x ⅜″ Carbonyl J

Miller Part Number	Minimum Inductance	Maximum Inductance	D.C. Current
48A518mpc	.046 uH	.055 uH	2A
48A778mpc	.071 uH	.082 uH	2A
48A117mpc	.099 uH	.122 uH	2A
48A147mpc	.118 uH	.157 uH	2A
48A187mpc	.150 uH	.207 uH	2A
48A227mpc	.181 uH	.278 uH	2A
48A257mpc	.209 uH	.283 uH	2A
48A287mpc	.241 uH	.316 uH	2A
48A317mpc	.270 uH	.351 uH	2A

49A Series

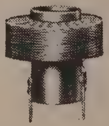


Frequency range: 10 MHz to 250 MHz
Wire size: 22 AWG single polyurethane coated with tinned leads
Form length: .87 inches except 49A146MPC
Coil OD: .285 inches
Lead Spacing: .324 inches
Core: 10-32 x ⅜″ Carbonyl J

Miller Part Number	Minimum Inductance	Maximum Inductance	D.C. Current
49A678mpc	.060 uH	.074 uH	1.5A
49A127mpc	.100 uH	.132 uH	1.5A
49A167mpc	.134 uH	.194 uH	1.5A
49A217mpc	.170 uH	.258 uH	1.5A
49A347mpc	.250 uH	.415 uH	1.5A
49A537mpc	.393 uH	.657 uH	1.5A
49A757mpc	.600 uH	.900 uH	1.5A
49A997mpc	.810 uH	1.160 uH	1.5A
49A126mpc	.960 uH	1.340 uH	1.5A
49A146mpc*	1.180 uH	1.530 uH	1.5A

*Form Length 1.09 inches

AIR CORE PRINTED CIRCUIT R.F. CHOKES



The following R.F. Chokes have been designed to offer a wide range of inductance values for use in printed circuit applications. Our standard stock of these coils is impregnated with a high grade coil varnish to prevent moisture absorption. On special orders we can supply these items treated with fungus resistant material, or encapsulated in epoxy resin to meet MIL—C—15305. **Coil length: ⅞″ on all items.**

Miller Part Number	Measured on General Radio Inductance Bridge Type 1632-A Inductance @ 1000 Hertz	D.C. Resistance Maximum	Milliamp Rating Maximum
970	1.0 mh ±5%	20.6	125
971	1.2 mh ±5%	23.8	125
972	1.5 mh ±5%	26.4	125
973	1.8 mh ±5%	29.6	125
974	2.2 mh ±5%	32.9	125
975	2.7 mh ±5%	37.4	125
976	3.3 mh ±5%	41.8	125
977	3.9 mh ±5%	46.7	125
978	4.7 mh ±5%	51.8	125
979	5.6 mh ±5%	57.6	125
980	6.8 mh ±5%	64.4	125
981	8.2 mh ±5%	73.0	100
982	10.0 mh ±5%	81.6	100
983	12.0 mh ±5%	92.4	100
984	15.0 mh ±5%	105.	100
985	18.0 mh ±5%	117.	100
986	22.0 mh ±5%	130.	75
987	27.0 mh ±5%	145.	75
988	33.0 mh ±5%	251.	75
989	39.0 mh ±5%	277.	75
990	47.0 mh ±5%	316.	50
991	56.0 mh ±5%	351.	50
992	68.0 mh ±5%	391.	50
993	82.0 mh ±5%	442.	50
994	100.0 mh ±5%	473.	50

FREQUENCY SELECTIVE R.F. CHOKES

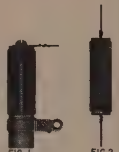


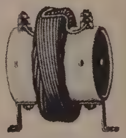
FIG. I
FIG. 2

Designed for maximum efficiency and highest impedance at specific operating frequencies this group of R.F. chokes eliminates the designer's task of attempting to choose the best coil for a particular application from miscellaneous and often insufficient design data. Designed to cover the major Amateur and Industrial communication frequencies.

Part No.	Inductance ±10%	Freq. Mc
RFC-3.5	266. uh	1.8-5
RFC-7	208. uh	3-13
RFC-14	84. uh	7-20
RFC-21	38.5 uh	15-30
RFC-28	24. uh	25-40
RFC-50	8.2 uh	30-90
RFC-144	1.72 uh	75-180
RFC-220	.82 uh	160-340
RFC-420	.22 uh	350-500

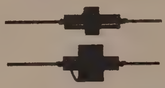
The above R.F. Chokes have a conservative rating of 600 ma.

MEDIUM DUTY DUO-LATERAL LINE FILTER CHOKES



Cat. No.	Amps.	Ohms	Induc.	Dimensions
7826	5	.28	570 uh	2½″ x 4″
7827	10	.15	370 uh	2½″ x 4″
7828	15	.085	200 uh	2½″ x 4″
7829	20	.05	135 uh	2½″ x 4″

SINGLE PI FERRITE CORE R.F. CHOKES



This series of single pi R.F. Chokes affords maximum Q with minimum resistance through the use of ferrite core material. The coils are impregnated in a fungus resistant lacquer. Form Dimensions .187 x ⅝″

Part Number	L ±5%	Max. R Ohms	Max. Ma.
73F104AF	100. uh	2.0	250
73F124AF	120. uh	2.2	250
73F154AF	150. uh	2.5	250
73F184AF	180. uh	2.9	250
73F224AF	220. uh	3.2	250
73F274AF	270. uh	3.6	250
73F334AF	330. uh	3.8	250
73F394AF	390. uh	4.2	225
73F474AF	470. uh	4.8	200
73F564AF	560. uh	5.3	200
73F684AF	680. uh	6.0	200
73F824AF	820. uh	6.8	200
73F103AF	1.0 mh	7.5	150
73F123AF	1.2 mh	7.8	150
73F153AF	1.5 mh	8.8	150
73F183AF	1.8 mh	11.0	150
73F223AF	2.2 mh	12.0	150
73F273AF	2.7 mh	13.5	125
73F333AF	3.3 mh	15.1	125
73F393AF	3.9 mh	18.0	125
73F473AF	4.7 mh	21.5	100
73F563AF	5.6 mh	25.0	80
73F683AF	6.8 mh	29.0	80
73F823AF	8.2 mh	30.0	80
73F102AF	10.0 mh	34.0	80

SINGLE PI R.F. CHOKES

A series of Single Pi R.F. Chokes wound on phenolic forms with axial leads. They are rated at 250 ma. maximum current and are thoroughly impregnated with a moisture and fungus resistant varnish.

Part No.	L ±5%	Min. Fo.	Ohms Max.
72F105AP	10 uh	13	1.58
72F125AP	12 uh	12	1.69
72F155AP	15 uh	11	1.85
72F185AP	18 uh	9.8	2.08
72F225AP	22 uh	9.6	2.28
72F275AP	27 uh	8.9	2.54
72F335AP	33 uh	8.1	2.87
72F395AP	39 uh	7.5	3.14
72F475AP	47 uh	7.2	3.43
72F565AP	56 uh	6.5	3.72
72F685AP	68 uh	6.1	4.20
72F825AP	82 uh	5.8	4.44
72F104AP	100 uh	5.3	5.16
72F124AP	120 uh	5.0	5.64
72F154AP	150 uh	4.6	6.36
72F184AP	180 uh	4.3	7.02
72F224AP	220 uh	4.0	7.91
72F274AP	270 uh	3.5	8.94
72F334AP	330 uh	3.3	9.96
72F394AP	390 uh	3.1	10.9
72F474AP	470 uh	2.9	12.0
72F564AP	560 uh	2.6	13.2
72F684AP	680 uh	2.4	14.6
72F824AP	820 uh	2.2	16.1
72F103AP	1000 uh	1.9	19.1

ADJUSTABLE WIDE RANGE INDUCTORS

Due to the wide range of these coils they will find immediate application in many prototype designs where the exact value of the required inductance is not known.

Dimensions: Max. dia. ⅞" x 2¼" long. Mtg. hole 5⁄16"

Miller Part Number	Inductance Minimum	Inductance Maximum	R Ohms Max.	Max. Current Ma.
9001	40. uh	.240 mh	2.04	250
9002	.180 mh	.800 mh	4.08	250
9003	.570 mh	2.80 mh	8.52	250
9004	2.10 mh	8.00 mh	15.4	250
9005	6.00 mh	16.0 mh	33.6	200
9006	12.0 mh	40.0 mh	91.2	125
9007	30.0 mh	105. mh	148.	75
9008	78.0 mh	240. mh	264.	75
9009	180. mh	750. mh	620.	50

ECONOMY ADJUSTABLE R.F. CHOKES

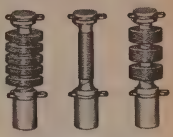
Dimensions: ⅜" x 1⅜" long.

Through the use of a recently developed Nylon molding process we are able to offer an inexpensive line of adjustable chokes. These items feature a wide inductance range which has been achieved through the use of a threaded ferrite core. They can be adjusted from either the top or bottom. This lends a degree of flexibility to your design. Mounting is achieved by means of a metal clip in a 5⁄16" round hole or a special keyed hole. Instructions supplied with each coil.

Miller Part Number	Inductance Minimum	Inductance Maximum	R Ohms Max.	Max. Current Ma.
4201	.300 uh	.580 uh	.04	636
4201-A	.550 uh	1.10 uh	.05	636
4202	1.00 uh	2.50 uh	.15	400
4203	2.00 uh	5.50 uh	.19	400
4204	5.00 uh	12.0 uh	1.1	126
4205	10.0 uh	25. uh	1.6	100
4206	20.0 uh	55. uh	2.3	100
4207	50.0 uh	140. uh	4.0	100
4208	120. uh	330. uh	6.6	100
4209	310. uh	860. uh	12.	100

CERAMIC FORM R.F. CHOKES

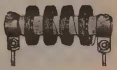
A series of high quality fixed coils wound on a silicone impregnated steatite form. The coils are the standoff type and are mounted by a single 6-32 screw. They find primary application in low power transmitters and associated equipment where relatively high current capacity and low distributed capacitance are important.



Form Dimensions:
11⁄16" Dia. x 1 15⁄16" long

Cat. Number	Inductance ±5% @ 1000 Cycles	Resistance Max.	Rated Current
4552	0.25 mh.	9.6	150 ma.
4553	0.50 mh.	14.4	150 ma.
4554	1.0 mh.	20.4	150 ma.
4555	2.5 mh.	33.6	150 ma.
4556	5.0 mh.	54.0	150 ma.
4557	0.25 mh.	4.20	300 ma.
4558	0.50 mh.	6.60	300 ma.
4559	1.0 mh.	11.5	300 ma.
4560	2.5 mh.	20.4	300 ma.
4561	5.0 mh.	22.8	300 ma.

CERAMIC CORE R.F. CHOKES



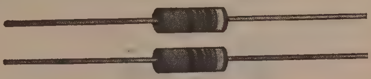
Miller ceramic core radio frequency chokes are the result of careful research and design, and present advantages found in no other comparable chokes. These chokes have extremely low distributed capacity.

Dimensions: (form) ¼" diameter by 1½" long. All chokes are impregnated with a moisture- and fungus-resistant varnish.

MULTIPLE PI WOUND CHOKES

Part No.	mh	Ohms Max.	ma
4531-0	.25	9.6	200
4531	.5	14.4	200
4531-1	1.	20.4	200
4532	1.5	25.2	200
4537	2.5	33.6	200
4538	5.	50.4	125
4539	7.5	98.4	125
4540	10.	114.	125
4541	25.	192.	125

MOLDED R.F. CHOKES



This series of molded chokes conforms to the requirements of Mil type LT8K. Mold Size: .281 ±.031 Diameter; .937 ±.0625 Length. Leads: 1.500 ±.125.

Measured on Model 260A Q-Meter

Miller Part Number	MS Type	Inductance Microhenries	D.C. Resistance Maximum	Milliamp Rating Maximum
9360-01	91189-1	1.1 ±20%	0.09	2800
9360-02	91189-2	2.2 ±20%	.20	1800
9360-03	91189-3	3.3 ±10%	.32	1500
9360-04	91189-4	4.7 ±10%	.60	1100
9360-05	91189-5	6.8 ±10%	1.10	800
9360-06	91189-6	10.0 ±10%	1.80	600
9360-07	91189-7	15.0 ±10%	3.00	500
9360-08	91189-8	22.0 ±10%	.30	1500
9360-09	91189-9	33.0 ±10%	.60	1100
9360-10	91189-10	47.0 ±10%	1.20	700
9360-11	91189-11	82.0 ±10%	2.20	600
9360-12	91189-12	100.0 ±10%	2.80	500
9360-13	91189-13	120.0 ±10%	4.00	400

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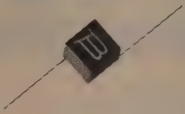
BOURNS INC
MAGNETICS DIVISION

MICROMINIATURE INDUCTORS

Standard Part Numbers — Stock Available

MODEL 4221 MICROINDUCTOR — .125" x .125" x .125"

Inductor P/N	Inductance* Hy(min) @ 1V, 1KHz	DCR Ω
4221-0001	0.5h	230
4221-0002	3.5h	2000
4221-0003	0.1h	53
4221-0004	1.0h	525



Standard Part Numbers — Stock Available

MODEL 4222 MICROINDUCTOR — .310" x .410" x .465"

ELECTRICAL

Inductance range	100μ Hy to 6 Hy
Frequency	50 Hz to 50 KHz
Voltage level	.1 to 20 V
DC current	0 to 20 ma
DCR	10 to 5,000 ohms
Q	.5 to 6.0
Power dissipation	180 mw max for 40°C rise

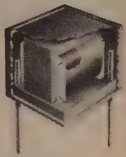
4212-
0001
BOURNS

Inductor P/N	Inductance Hy(min) @ 300 Hz	Q-Min @ 1 V, 1 KHz	DCR Ω	DC ma
4222-0001	6 at 15 V	5.0	1200	2.0
4222-0002	3.5 at 5 V	4.0	1200	2.0
4222-0003	1.25 at 3 V	3.5	180	2.0
4222-0004	0.3 at 3 V	3.0	40	4.0
4222-0005	0.1 at 3 V	2.0	15	5.0

Standard Part Numbers — Stock Available

MODEL 4220 MICROINDUCTOR — .250" x .250" x .250"

Inductor P/N	Inductance Hy(min) @ 1 V, 1 KHz	Q-Min @ 1 V, 1 KHz	DCR Ω	DC ma*
4220-0001	66	.75	2100	0
4220-0006	2	4	1495	2.0
4220-0007	.08	5	25	4.0
4220-0008	3.5	3.5	1495	1.0
4220-0009	6.0	4.5	1495	.25
4220-0010	.1	6	54	4.0
4220-0011	1	4	364	.25
4220-0012	.5	5.5	223	.75
4220-0013	50	.75	1495	0
4220-0014	.7	5.0	364	1.5
4220-0015	.2	5.0	38	1.5
4220-0016	4.5	3.5	1495	.75



Inductor P/N	Inductance Hy ±10% @ 1 V, 1 KHz, ODC	Q Min. @ 1 V, 1 KHz	DCR Ω ±20%	DC ma
4220-0030	.033	6.0	16	4.2
4220-0031	.047	6.0	24	3.4
4220-0032	.075	5.5	38	2.7
4220-0033	.120	5.5	64	2.1
4220-0034	.180	5.5	93	1.7
4220-0035	.300	5.0	155	1.3
4220-0036	.500	5.0	245	1.1
4220-0037	.750	5.0	385	.85
4220-0038	1.00	5.0	570	.75
4220-0039	2.00	4.5	980	.54
4220-0040	3.00	4.5	1550	.43
4220-0041	5.00	4.0	2480	.34
4220-0042	8.00	4.0	4010	.26

* With DC current applied — approximately — 10% drop in inductance occurs.

BOURNS INC
MAGNETICS DIVISION

INDUSTRIAL/COMMERCIAL INDUCTORS

Standard Part Numbers — Stock Available

IN-9000 SERIES / POWER INDUCTORS

Part No.	Inductance		DCR Ω	Dimensions
	MHY —10% ±40%	Ma DC		
IN-9025	3	1000	0.25	Fig. 1
IN-9026	6	350	0.2	1
IN-9027	11	1000	0.75	1
IN-9028	400	135	31	1
IN-9029	1500	20	85	1
IN-9030	2000	65	180	1
IN-9031	250	275	16	Fig. 2
IN-9032	700	135	40	2
IN-9033	2500	50	150	2
IN-9034	4500	50	325	2
IN-9035	7000	50	550	2
IN-9036	30	750	2	Fig. 3
IN-9037	50	750	3	3
IN-9038	125	550	6	3
IN-9039	400	275	22	3

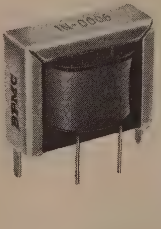


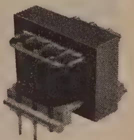
Fig. No.	L	W	H	Terminals	Mounting
1	1.47	.90	1.25	Pins	PC Tabs
2	1.74	1.10	1.39	Leads	Holes
3	1.98	1.48	1.65	Leads	Holes

Special Order Modifications Available

IN-9000 SERIES / DUAL MINIATURE INDUCTORS

- Can be Connected for Series or Parallel Operation
- Wide Inductance Range
- Miniature Size

Part No.	Inductance —10 ±40%				DCR Ω Typ Series Connected	Size
	Series Connection		Parallel Connection			
	HYS	DCMA	HYS	DCMA		
IN-9001	40	1	10	2	6700	Fig. 1
IN-9002	16	2	4	4	1100	1
IN-9003	8	4	2	8	600	1
IN-9004	3.6	4	.9	8	160	1
IN-9005	1	20	.25	40	60	Fig. 2
IN-9006	.6	40	.15	80	36	2
IN-9007	.4	60	.10	120	20	2
IN-9008	.06	80	.015	160	4	2



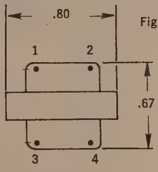


Fig. 1

HEIGHT — .64

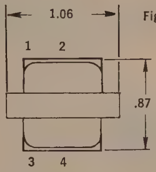
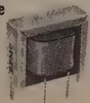


Fig. 2

HEIGHT — .81

Toroidal Transformers & Inductors

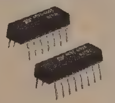
Commercial/Industrial Filter Choke



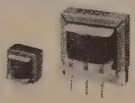
Ferrite Core Transformers & Inductors

¼" x ¼" x ¼" Micro Transformers & Inductors

Dual-In-Line Pulse Transformers



Transformers & Inductors Commercial/Industrial



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CADDELL-BURNS

40 East 2nd Street, Mineola, N.Y. 11501 — Area Code 516 746-2310

MINIATURE SHIELDED VARIABLE INDUCTORS

TYPE 6319-6320

6319

VERTICAL MOUNT

6320

HORIZONTAL MOUNT

.420 Sq. x .575 L.

Electrical Specifications for Both Types are Identical

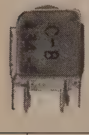
Stock No.	Inductance Range Microhenries Min.	Max.	Q′	Q″	Wire Size AWG
6320-1	.25	.65	90	50	26
6320-2	.5	1.2	87	68	30
6320-3	.9	2.3	90	63	32
6320-4	2.0	5.3	68	70	36
6320-5	4.4	10	56	102	7/44
6320-6	8	16	48	100	7/44
6320-7	13	29	70	97	7/44
6320-8	23	54	58	80	7/44
6320-9	45	95	60	70	7/44
6320-10	77	155	35	65	39
6320-11	125	290	41	60	39
6320-12	230	520	42	54	39
6320-13	420	860	41	47	39
6320-14	700	1200	39	52	39

TYPE 435

Subminiature Variable Coil
Printed Circuit—Nylon Form

Shield .420 sq. x .575 h.

Stock No.	Inductance Range Microhenries Min.	Max.	Q′	Q″	Wire Size AWG
435-1	0.25	0.5	90	60	26
435-2	0.48	1.0	85	60	30
435-3	0.9	2.1	85	60	32
435-4	1.7	3.9	55	65	36
435-5	3.5	8.5	60	50	38
435-6	7.5	17.0	60	50	38
435-7	16.5	35.0	55	60	7/44
435-8	33.0	70.0	50	50	7/44
	Use #2102 Tuning Tool				



TYPE 434

Miniature Variable Coil

Printed Circuit—Nylon Form—
Aluminum Shield .550 sq. x .580 h.

Stock No.	Inductance Range Microhenries Min.	Max.	Q′	Q″	Wire Size AWG
434-1	0.55	0.9	105	95	28
434-2	0.9	1.45	100	80	30
434-3	1.4	2.4	70	85	32
434-4	2.2	4.1	70	90	36
434-5	3.9	7.7	65	70	36
434-6	7.5	11.0	45	85	7/44
434-7	11.0	17.5	65	90	7/44
434-8	17.5	27.5	65	90	7/44
434-9	27.0	42.0	65	85	7/44
434-10	42.0	64.0	65	85	7/44
	Use #2102 Tuning Tool				

LOW-COST PRINTED-CIRCUIT VARIABLE INDUCTORS

6460

6461

6462

TYPE 6460

Variable R.F. Inductors
Four Printed Circuit Terminals, Mounting—.5″ x .8″ Centers
Size 5/8″ x 5/8″ x .985 Long
Polyester Cellulose Coil Form

Stock No.	Inductance Range Microhenries Min.	Max.	Q′	Q″	Nom. D.C. Res. Ohms	Wire Size AWG
6460-1	.06	.09	80	105	.008	22
6460-2	.09	.16	100	130	.010	22
6460-3	.15	.29	120	140	.011	22
6460-4	.19	.40	130	145	.012	22
6460-5	.32	.68	80	105	.08	20/44
6460-6	.60	1.35	80	125	.11	20/44
6460-7	1.14	2.5	90	135	.15	20/44
6460-8	2.0	4.0	100	140	.21	20/44
6460-9	3.1	5.6	110	120	.26	20/44
6460-10	4.5	8.1	48	85	.29	20/44
6460-11	7.0	11.4	43	150	.37	20/44
6460-12	9.7	16.4	80	140	.47	20/44
6460-13	15.6	26.2	90	155	.61	20/44
6460-14	19.2	44	80	110	1.80	7/44
6460-15	41	95	80	90	2.56	7/44
6460-16	70	183	65	100	3.24	7/44
6460-17	180	525	90	98	5.76	7/44
6460-18	445	1040	94	105	9.32	7/44

Note: Inductance & Q at various frequencies can be altered by changing type of core used (see parts section for cores available). Dash No. 1 thru 15 uses Powdered Iron Core 302—250—6R. Dash No. 16 thru 18 uses Ferrite Core 303—250—6R.

TYPE 6461

Variable R.F. Coil Series
Size 5/8″ x 5/8″ x .625 Long
0.5″ P.C. Mounting

Stock No.	Inductance Range Microhenries Min.	Max.	Q′	Q″	Nom. D.C. Res. Ohms	Wire Size AWG
6461-1	.09	.12	58	66	.007	22
6461-2	.1	.14	102	128	.009	22
6461-3	.14	.22	128	150	.01	22
6461-4	.18	.33	134	155	.011	22
6461-5	.23	.44	140	154	.013	22
6461-6	.37	.68	87	105	.102	7/41
6461-7	.58	1.1	87	100	.136	7/41
6461-8	1.1	2.2	72	115	.2	7/41
6461-9	2	4.4	80	112	.29	7/41
6461-10	3.3	8	96	140	.77	7/44
6461-11	7	13.6	70	130	1.02	7/44
6461-12	12.4	25.5	85	134	1.42	7/44
6461-13	22.5	49	90	127	1.93	7/44
6461-14	47	100	86	97	2.8	7/44
6461-15	99	174	75	142	4.2	7/44
6461-16	170	332	95	146	6.0	7/44
6461-17	322	570	102	140	8.5	7/44
6461-18	525	910	97	125	10.4	7/44

TYPE 6462

Variable R.F. Coil
with Powdered Iron Shield
Size 5/8″ x 5/8″ x .730 Long
0.5″ P.C. Mounting

Stock No.	Inductance Range Microhenries Min.	Max.	Q′	Q″	Nom. D.C. Res. Ohms	Wire Size AWG
6462-1	.08	.10	84	89	.007	22
6462-2	.4	.8	82	100	.11	7/41
6462-3	.6	1.3	85	105	.14	7/41
6462-4	1.1	2.6	71	115	.20	7/41
6462-5	2.1	5.1	85	145	.55	7/44
6462-6	3.4	8.6	96	145	.75	7/44
6462-7	8.0	16.9	70	150	1.14	7/44
6462-8	16.2	39.5	94	142	1.52	7/44
6462-9	34	84	86	110	2.21	7/44
6462-10	57	124	80	145	2.74	7/44
6462-11	67	141	80	148	3.16	7/44

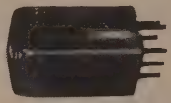
FERRITE POT CORE INDUCTORS & TRANSFORMERS

Caddell-Burns has complete facilities for winding and assembling all types of pot core assemblies, both fixed and variable. Write or telephone with your specifications.

TRANSFORMER DESIGN KIT

The C-B 6370 Multitran Assembly provides the engineer with a flexible approach to R.F. and I.F. transformer design. The 6370 assembly is available with a choice of shielding cups (powdered iron or ferrite) and tuning cores in a wide range of sizes and materials. Coils may be wound directly on the coil form; or type 6373 coils listed below, may be used. These coils are wound on slip-tubes and may be moved on the coil form permitting precise adjustment of coupling and bandwidth. Or the coils may be used singly for the design of tuned circuits, filters and traps. The parameters tabulated below are typical values for single coils mounted in the type 6370 assembly.

When an optimum design has been established, we will manufacture transformers, to specification, in any quantity.



TYPE 6370

.545 Sq. x 1.00 H.

TYPE 6373 COILS for C-B 6370 ASSEMBLY

Stock No.	Nom. Induct. Microhenries	Q ffi L Nom.	DCR Ohms
6373-1	.10	100	.007
6373-2	.25	110	.020
6373-3	.50	115	.032
6373-4	1.0	100	.060
6373-5	2.5	108	.240
6373-6	5.0	118	.310
6373-7	10	110	.919
6373-8	25	140	1.14
6373-9	50	135	1.45
6373-10	100	135	2.27
6373-11	250	145	3.70
6373-12	500	130	4.92
6373-13	1000	105	9.19
6373-14	2500	108	14.8
6373-15	5000	100	21.5
6373-16	10000	70	51.2

CONTINUED:

Stock No.	Inductance Range Min.	Max.	Wire Size AWG
6373-1	.08	.14	22
6363-2	.22	.37	26
6373-3	.41	.73	26
6373-4	.37	1.25	30
6373-5	.90	3.30	10/44
6373-6	1.41	6.00	10/44
6373-7	4.20	17	7/44
6373-8	10	38	7/44
6373-9	14	60	7/44
6373-10	35	125	7/44
6373-11	96	330	7/44
6373-12	150	640	7/44
6373-13	215	1200	5/44
6373-14	610	3000	5/44
6373-15	1000	6000	5/44
6373-16	2450	12000	39

CADDELL-BURNS

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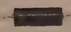
SHIELDED CHOKES

TYPES 6375, 6376



1 uH-5 mH ● 10% Tolerance
.156 Dia. x .375 L.

Stock No.	Induct. Micro-henries	Q	SRF MHz	DCR Ohms	Wire Size AWG
6375-1	1	65	250	.005	34
6375-2	2.5	55	145	.008	34
6375-3	5	45	105	.012	34
6375-4	10	78	70	.042	39
6375-5	25	64	45	.066	39
6375-6	50	70	33	.125	40
6375-7	100	85	25	.284	40
6376-1	100	58	8	.530	36
6376-2	250	62	3.5	.800	36
6376-3	500	62	2.5	1.70	38
63-76-4	1000	58	1.1	3.90	40
6376-5	2500	62	.700	6.30	40
6376-6	5000	55	.610	14.0	42

TYPE 1670

.25 mH-100 mH ● 10% Tolerance
.250 Dia. x .500 L

Stock No.	Induct-ance Milli-henries	Min. Q	A.C. Test Volts	Max. D.C. Res. Ohms	Cur-rent Rating MA	Wire Size AWG
1670-1	.25	3.0	.007	.22	800	28
1670-2	.50	3.0	.014	.40	500	30
1670-3	1.0	3.0	.028	.75	315	32
1670-4	2.5	3.5	.07	2.2	250	33
1670-5	5.0	3.5	.14	3.9	200	34
1670-6	10.0	3.5	.15	7.0	125	36
1670-7	25.0	3.5	.30	18	125	36
1670-8	50.0	4.0	.40	35	75	38
1670-9	100.0	4.0	.24	60	50	40

TYPE 1662

5 mH - 1000 mH
10% Tolerance
.500 Dia. x .750 L

Stock No.	Induct-ance Milli-henries	Min. Q	A.C. Test Volts	Max. D.C. Res. Ohms	Cur-rent Rating MA	Wire Size AWG
1662-1	5.0	10.0	.14	.75	800	28
1662-2	10.0	10.0	.16	2.2	500	30
1662-3	25.0	10.0	.32	4.0	315	32
1662-4	50.0	10.0	.42	9.5	200	34
1662-5	100.0	10.0	.24	26	125	36
1662-6	250.0	10.0	.40	50	75	38
1662-7	500.0	10.0	.46	150	50	40
1662-8	1000.0	10.0	.25	220	30	42

ALL COILS ON THIS AND OPPOSITE PAGE ARE ALSO AVAILABLE:

- TO HIGHER, INTERMEDIATE, OR LOWER INDUCTANCES.
- ENCAPSULATED OR WITH SPECIAL COATINGS.

COIL WINDERS

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LOW-RESISTANCE CHOKES R.F. CHOKES

TYPE 6470

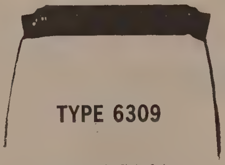
Ferrite Choke—10% Tolerance
Low D.C. Resistance
Size .230 Dia. x ½" Long

Stock No.	Inductance Microhenries	Nominal Q	Nominal D.C. Res. Ohms	Wire Size AWG
6470-1	4	14	.02	24
6470-2	6	12	.04	26
6470-3	8	12	.04	26
6470-4	10	30	.04	26
6470-5	15	27	.05	26
6470-6	20	26	.06	26
6470-7	25	27	.07	26
6470-8	50	23	.13	28
6470-9	75	18	.14	28
6470-10	100	27	.18	28
6470-11	250	34	.7	32
6470-12	500	20	.9	32
6470-13	750	15	1.2	32
6470-14	1000	67	2.4	34
6470-15	2500	35	4.0	34
6470-16	5000	47	9.2	37
6470-17	7500	28	10.8	37
6470-18	10000	19	12.2	37

TYPE 6310

Ferrite Choke—10% Tolerance
Low D.C. Resistance
Size 7/16" D. x 3/4" L.

Stock No.	Nominal Inductance Microhenries	Nominal Q	Nominal D.C. Res. Ohms	Self Res. MHz	Current Rating Amps
6310-1	6.8	17	.013	30.0	5.0
6310-2	10	72	.021	21.0	3.2
6310-3	15	64	.028	16.7	3.2
6310-4	22	55	.032	11.0	3.2
6310-5	33	38	.039	6.6	3.2
6310-6	50	32	.065	5.2	2.0
6310-7	75	20	.072	3.7	2.0
6310-8	100	58	.103	2.8	2.0
6310-9	250	28	.228	1.7	1.3
6310-10	500	28	.485	1.45	0.8
6310-11	750	22	.576	0.76	0.8
6310-12	1000	32	.944	0.51	0.6

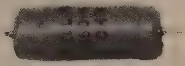


TYPE 6309

Hi-Current Ferrite Choke Series
Inductance Tolerance 10% (L')

Stock No.	Inductance uH	Cur. Rating Amps.	DC. Res. Ohms	Nom. Length	Nom. O.D.
6309-1	13	52	.005	2.3	.58
6309-2	18	33	.007	2.3	.54
6309-3	31	20	.012	2.3	.50
6309-4	46	13	.019	2.3	.48
6309-5	79	8	.036	2.3	.46
6309-6	34	52	.008	3.7	.58
6309-7	53	33	.012	3.7	.54
6309-8	80	20	.019	3.7	.50
6309-9	120	13	.031	3.7	.48
6309-10	199	8	.058	3.7	.46
6309-11	64	52	.010	5.3	.58
6309-12	106	33	.014	5.3	.54
6309-13	146	20	.024	5.3	.50
6309-14	225	13	.042	5.3	.48
6309-15	410	8	.083	5.3	.46

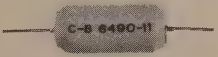
HIGH-CURRENT CHOKES



TYPE 6150

HIGH CURRENT, VINYL JACKETED CHOKE
.375 Dia. x 1.00 L
FERRITE FORM
10 uH - 100 uH ● 10% Tolerance

Stock No.	Induct-ance Micro-henries	Max. D.C. Res. Ohms	Current Rating Amps	Min. Q	Wire Size AWG
6150-1	10.0	0.020	10.0	32	18
6150-2	20.0	0.035	6.0	25	20
6150-3	30.0	0.060	4.0	28	22
6150-4	40.0	0.105	2.5	30	24
6150-5	50.0	0.110	2.5	20	24
6150-6	75.0	0.180	1.5	25	26
6150-7	100.0	0.360	1.0	30	28



TYPE 6490

High Current Choke, Vinyl Covered
Ferrite Form .437 Dia. x 1.25 L.
10 uH - 1000 uH ● 10% Tolerance

Stock No.	Inductance Microhenries at 1 kHz	Max. D.C. Res. Ohms	Current Rating Amps
6490-1	10	.008	20
6490-2	20	.015	13
6490-3	30	.027	8
6490-4	40	.042	5
6490-5	50	.065	4
6490-6	75	.12	2.5
6490-7	100	.05	8
6490-8	250	.12	5
6490-9	500	.26	3.2
6490-10	750	.48	2
6490-11	1000	.70	1.6

TYPE 6400

Hi-Current Chokes
Low D.C. Resistance
Vinyl Jacket
Ferrite Form ½" O.D. x 2¾" Long
#16 Leads 1½" Long
10% Tolerance

Stock No.	Inductance Millihenries*	Rating Amps+	Approx. D.C. Res.	Wire Size
6400-1	.08	13	.03	16
6400-2	.13	8	.06	18
6400-3	.22	5	.12	20
6400-4	.35	3.2	.23	22
6400-5	.56	2	.42	24
6400-6	.78	1.3	.8	26
6400-7	1.4	.8	1.7	28
6400-8	2	.5	3.2	30

*Chokes can be made to any intermediate inductance.
+Current ratings are conservative.

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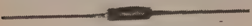
MINIATURE CHOKES



TYPE 660

Miniature Choke, Single Layer—10% Tol.
Phenolic Form .095" D. x 5/16" L.

Stock No.	Inductance Microhenries	Q	Self Res. M.C.	DC Res. Ohms	Wire Size AWG
660-1	0.1	65	...	.03	26
660-2	0.2	60	...	.03	28
660-3	0.3	55	...	.06	30
660-4	0.4	55	>400	.06	30
660-5	0.5	55	360	.13	32
660-6	0.75	50	300	.22	34
660-7	1.0	30	260	.37	36
660-8	1.5	30	210	.72	38
660-9	2.0	30	180	.95	38

TYPE 620

Microminiature Ferrite Chokes—10% Tol.
Form Size .075" D x 11/32" D. L.

Stock No.	Inductance Microhenries	Q	Self Res. M.C.	DC Res. Ohms	Wire Size AWG
620-1	1	40	235	.12	36
620-2	2.5	40	150	.19	36
620-3	5	40	100	.26	36
620-4	7.5	40	90	.33	36
620-5	10	45	75	.38	36
620-6	15	60	60	.66	38
620-7	20	55	53	.80	38
620-8	25	50	49	.93	38
620-9	50	90	34	2.85	42
620-10	75	90	28	5.80	44
620-11	100	90	23	7.50	44

TYPE 659

Sub-Miniature Ferrite Chokes—10% Tol.
Form Size .107" D. x .330" L.

Stock No.	Inductance Microhenries	Q	Self Res. M.C.	DC Res. Ohms	Wire Size AWG
659-1	250	50	3	1.8	36
659-2	500	45	2	3.5	38
659-3	1000	60	...	10	40
659-4	2500	55	...	30	42
659-5	5000	50	...	40	44
659-6	10000	45	...	68	44

CW COIL

IS NOW A DIVISION OF
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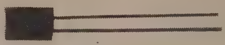
SEND FOR CATALOG AND PRICE LIST

PRINTED CIRCUIT CHOKES

P.C. CHOKES
TYPE 6550

P.C. Choke—10% Tolerance
FERRITE FORM
.300 Mounting Centers
.100 Wide x .375 L. x .250 H.

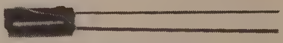
Stock No.	Induct. Micro-Henries	Q	SRF MHz	DCR Ohms
6550-1	1.0	100	215	.02
6550-2	2.5	70	135	.03
6550-3	5.0	75	115	.06
6550-4	7.5	80	87	.10
6550-5	10	90	82	.17
6550-6	25	100	42	.50
6550-7	50	90	14	1.0
6550-8	75	75	8.5	1.1
6550-9	100	100	4.6	1.4
6550-10	250	90	2.7	2.3
6550-11	500	65	1.9	3.3
6550-12	750	40	1.6	4.2
6550-13	1000	100	1.6	16
6550-14	2500	100	1.0	16
6550-15	5000	70	0.6	28
6550-16	7500	50	0.4	42
6550-17	10000	60	0.4	60



TYPE 6180

Encapsulated P.C. Chokes—10% Tol.
1/4" D. x 3/8" L. 0.1" Terminal Spacing

Stock No.	Inductance Millihenries	Min. Q (at 1 KHz)	D.C. Res. Ohms	Wire Size AWG
6180-1	.10	1.0	.5	32
6180-2	.25	1.0	1.3	34
6180-3	.50	1.0	2.8	36
6180-4	1.0	1.0	5.0	37
6180-5	2.5	1.0	13	39
6180-6	5.0	1.0	25	40
6180-7	10.0	1.0	56	42
6180-8	25.0	1.0	130	44
6180-9	50.0	1.0	250	45

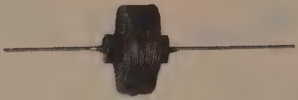


TYPE 680

One End Chokes—5% Tol.
Phenolic Coil Form Size .218" D. x ½" L. Particularly adapted for close point to point and printed circuit wiring.

Stock No.	Inductance Microhenries	Q	Self Res. M.C.	DC Res. Ohms	Wire Size AWG
680-1	1.0	65	140	.06	26
680-2	2.5	70	85	.22	30
680-3	5.0	70	70	.70	34
680-4	7.5	70	50	.95	34
680-5	10	45	47	1.6	36
680-6	10	30	25	1.3	36
680-7	15	30	21	1.5	36
680-8	25	25	17	2.1	36
680-9	50	25	12	3.0	36
680-10	100	35	9	4.5	36
680-11	250	30	6	7.5	36
680-12	500	30	4.4	11.0	36
680-13	750	30	3.6	14.0	36
680-14	.1000	40	2.2	17.0	36
680-15	2500	40	1.5	28.0	36

UNIVERSAL-WOUND CHOKES



TYPE 30

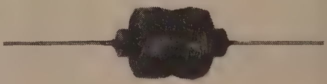
0.8 Ampere R.F. Choke—5% Tolerance
Molded Phenolic Form Size .250 D. x 1/2 L.

Stock No.	Nom. Inductance Microhenries	Q at 1 KHz	Nom. D.C. Res. Ohms	Self Res. MHz	Nom. O.D.
30-1	25	0.36	0.44	14.2	0.47
30-2	50	0.47	0.63	10.7	0.52
30-3	75	0.58	0.80	9.0	0.58
30-4	100	0.62	0.98	7.7	0.60
30-5	200	0.88	1.44	5.7	0.68
30-6	300	1.05	1.80	4.7	0.75
30-7	400	1.20	2.16	4.2	0.80
30-8	500	1.25	2.48	3.7	0.85

TYPE 40

0.8 Ampere R.F. Choke—5% Tolerance
Molded Powdered Iron Form Size .250 D. x 7/8 L.

Stock No.	Nom. Inductance Microhenries	Nom. Q	Nom. D.C. Res. Ohms	Self Res. MHz	Nom. O.D.
40-1	50	85	0.37	11.5	.38
40-2	100	56	0.55	7.5	.40
40-3	200	47	0.85	5.3	.46
40-4	300	42	1.06	4.5	.48
40-5	400	38	1.27	4.0	.51
40-6	500	36	1.47	3.6	.54
40-7	750	30	1.90	2.9	.58
40-8	1000	35	2.34	2.6	.64
40-9	1500	32	3.09	2.2	.70
40-10	2000	30	3.77	1.9	.77



TYPE 50

0.8 Ampere R.F. Choke—5% Tolerance
Ferrite Form Size .250 D. x 7/8 L.

Stock No.	Nom. Inductance Millihenries	Nom. Q	Nom. D.C. Res. Ohms	Self Res. MHz	Nom. O.D.
50-1	0.1	45	0.35	5.7	.38
50-2	0.25	35	0.58	3.7	.41
50-3	0.5	28	0.87	2.7	.45
50-4	0.75	23	1.13	2.2	.50
50-5	1.0	32	1.42	1.9	.54
50-6	1.5	28	1.87	1.6	.61
50-7	2.0	20	2.30	1.3	.64
50-8	2.5	25	2.67	1.2	.68
50-9	3.0	25	3.05	1.1	.70
50-10	4.0	25	3.74	1.0	.78

CADDELL-BURNS

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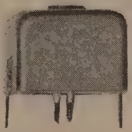
NEW!



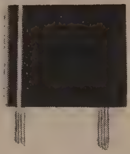
TYPE 6610

LOW-PROFILE LOW-RESISTANCE VARIABLE INDUCTORS

.790 Sq. x .625 H.
84 uH - 870 MH
10% Tolerance

Stock Number	Lmax.	Lmin.	DCR (Ohms)	Wire Size (AWG)	Current Rating (Amperes)
6610-1	84.0 uH	37.0 uH	0.10	22	4.0
6610-2	129	60.0	0.14	23	3.3
6610-3	168	78.0	0.20	24	2.5
6610-4	370	173	0.38	25	2.0
6610-5	600	275	0.60	26	1.5
6610-6	1.02 MH	470	1.02	27	1.1
6610-7	1.58	780	1.60	28	.800
6610-8	2.50	1.16 MH	2.80	29	.650
6610-9	3.60	1.68	3.75	30	.500
6610-10	5.00	2.30	5.40	31	.420
6610-11	8.30	3.80	8.80	32	.315
6610-12	11.8	5.60	13.6	33	.260
6610-13	19.5	8.30	21.4	34	.200
6610-14	27.0	12.0	31.0	35	.165
6610-15	35.0	16.0	47.0	36	.125
6610-16	72.0	35.0	80.0	37	.100
6610-17	117	54.0	125	38	.075
6610-18	210	95.0	230	39	.065
6610-19	375	162	410	40	.050
6610-20	580	275	620	41	.040
6610-21	870	400	90	42	.030

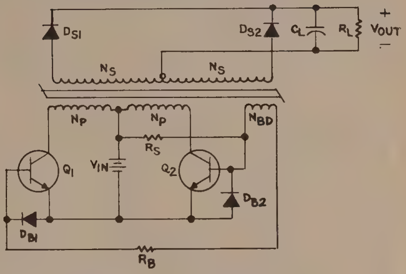
NEW!



TYPE 6600

DC-DC CONVERTER TRANSFORMERS

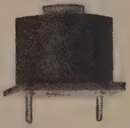
EPOXY ENCAPSULATED
.720 W. x .860 L.x .760 H.



Q_1, Q_2 = GE-D44C5
D_{B1}, D_{B2} = GE-DT230F
D_{S1}, D_{S2} = GE-A114D
$R_B = 18\Omega$
$R_S = 820\Omega$
$C_L = .039\mu f$
V_{IN} = 6 VOLTS
V_{OUT} = 225 VOLTS
P_{OUT} = 12 WATTS NOMINAL
f = 55KHz

OTHER VOLTAGES AVAILABLE—SEND FOR DATA SHEET WITH SUGGESTED CIRCUIT DIAGRAMS AND PERFORMANCE CURVES.

NEW!



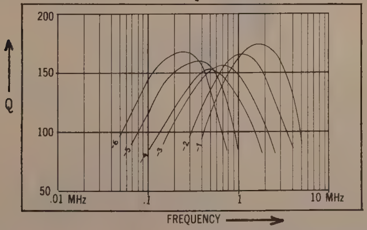
TYPE 6620

LOW-PROFILE HIGH-Q VARIABLE INDUCTORS

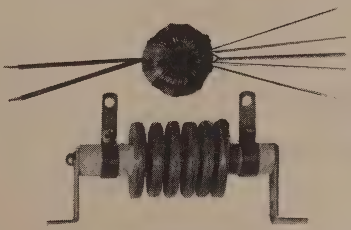
.730 Sq. x .625 H. 10 uH - 500 uH Variable ±15% Min.

Stock Number	Nominal Inductance (uH)	DCR (Ohms)	Current Rating (Amperes)
6620-1	10	0.15	0.60
6620-2	25	0.26	0.60
6620-3	50	0.35	0.60
6620-4	100	0.54	0.60
6620-5	250	0.90	0.60
6620-6	500	1.24	0.60

TYPICAL Q CURVES



CUSTOM WINDING



Caddell-Burns offers 29 years of experience in the design and manufacture of all types of coils, with complete facilities for custom winding to customer specification. Send us your requirements for a prompt quote.

MODIFIED STOCK COILS

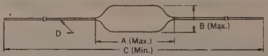
Any of the coils shown on these pages can be wound to intermediate inductance values, or modified to meet customer requirements, often at no additional cost.

DEPENDABLE DALE® INDUCTORS

TYPE IR-2 and IR-4 EPOXY CONFORMAL COATED INDUCTORS

- ■ Models for precision and commercial applications
- ■ Combines durability and low cost ■ Flame retardant coating

Standard Tolerance: ±1%, ±3%, ±5%, ±10%. **Inductance Range:** .10 µh to 1000 µh. 49 standard values. Q, self-resonant frequency, DC resistance, rated current and core material as specified for IM models below.



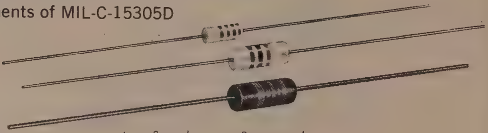
DIMENSIONS

MODEL NO.	A	B	C	D
IR-2	.350″	.135″	2.955″	24 AWG
IR-4	.450″	.200″	2.985″	22 AWG

TYPE IM MOLDED INDUCTORS TYPE IMS MOLDED SHIELDED INDUCTORS

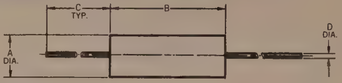
- ■ Meets electrical, material, mechanical and environmental requirements of MIL-C-15305D
- ■ Features precision performance, reliability
- ■ Wide range of inductance values in a small package
- ■ Flame retardant molded coating

Standard values IM-2 (49) **and IM-4** (47). Tolerance, Q, test frequency L & Q, self-resonant frequency, DC resistance, DC current rating and core material per standards shown in the Inductance Range and Mil Standard Chart below.



INDUCTANCE RANGE

MODEL NO.	INDUCTANCE RANGE FROM	INDUCTANCE RANGE TO	CLASSIFICATION GRADE	CLASSIFICATION CLASS	MILITARY STANDARD
IM-2	.10 µH	1.00 µH	1	B	MS-75083
	1.2 µH	27. µH	1	A	MS-75084
	33. µH	1000. µH	1	A	MS-75085
IM-4	.15 µH	4.7 µH	1	B	MS-18130
	5.6 µH	33. µH	1	A	MS-14046
	36. µH	240. µH	1	A	MS-90538
IMS-5	.10 µH	.82 µH	1	A	MS-75087
	1.0 µH	12.0 µH	1	A	MS-75088
	15.0 µH	100,000µH	1	A	MS-75089



DIMENSIONS

MODEL NO.		A	B	C	D
IM-2	MAX.	.105	.260	1.626	.0215
	MIN.	.085	.240	1.250	.0185
IM-4	MAX.	.165	.385	1.626	.027
	MIN.	.145	.365	1.250	.023
IMS-5	MAX.	.172	.430	1.626	.027
	MIN.	.152	.390	1.250	.023

FILTER INDUCTORS (Toroidal) Type TE and TD

Choice of encapsulated (TE) or dipped (TD) styles. TE models are designed to meet MIL-T-27C, Type TF5SX20ZZ. TD models combine low cost with high performance in commercial applications. High Q and wide selection of Q vs frequency ranges, plus a large number of inductance values.

SPECIFICATIONS

DALE TYPE TE or TD	INDUCTANCE	STANDARD TOLERANCE
2Q0	50.0 µh to 10.0 mh	±1% > 2 mh ±2% 0.05 mh to 2.0 mh
2Q3	470 µh to 120 mh	
2Q4	1.00 mh to 250 mh	
3Q0	50.0 µh to 15 mh	±1% >2 mh ±2% 154 µh to 2 mh ±5% < 150 µh
3Q3	500 µh to 1 h	
3Q4	1 mh to 4 h	
4Q0	150 µh to 20 mh	±1% >2 mh ±2% <2 mh
4Q3	1 mh to 2 h	
4Q4	2 mh to 7.5 h	
5Q0	1 mh to 100 mh	±1% >2 mh ±2% < 2 mh
5Q3	5 mh to 2 h	
5Q4	10 mh to 20 h	

Within the inductance ranges shown above, Dale offers a wide choice of standard values each of which is within one percent of the preceding and succeeding values.

DIMENSIONS

TE-2 = .437″ O.D. x .270″ H., .300″ terminal spacing
TD-2 = .437″ O.D. x .25″ H., 2″ flexible leads

TE-3 = .685″ O.D. x .385″ H., .500″ terminal spacing
TD-3 = .685″ O.D. x .32″ H., 3″ flexible leads

TE-4 = 1.062″ O.D. x .500″ H., .900″ terminal spacing
TD-4 = 1.062″ O.D. x .437″ H., 4″ flexible leads

TE-5 = 1.32″ O.D. x .725″ H., 1″ terminal spacing
TD-5 = 1.32″ O.D. x .688″ H., 6″ flexible leads

TEMPERATURE COEFFICIENT CODE (APPLIES TO CORE ONLY)

T.C. CODE	TEMPERATURE COEFFICIENT	TEMPERATURE RANGE	TYPE	T.C. AVAILABILITY Q0	Q3	Q4
TA	0±1%	−55°C to +125°C	All		X	X
TB	0±0.1%	+13°C to +35°C	TE-4 & 5		X	X
TD	0±0.1%	0°C to +55°C	All		X	X
TE	0±0.15%	0°C to +55°C	TE-4 & 5			X
TL*	+40 to +110 PPM/°C +85 to +185 PPM/°C	−55°C to +25°C +25°C to +85°C	TE-3, 4 and 5			X
TM	0±0.25%	−65°C to +125°C	All		X	X
TR	50 PPM/°C (Typical)	−65°C to +125°C	All	X		
TW	0±0.25%	−55°C to +85°C	All		X	X

*Inverse of typical temperature coefficient of polystyrene capacitor.

HIGH CURRENT FILTER CHOKES Type IH

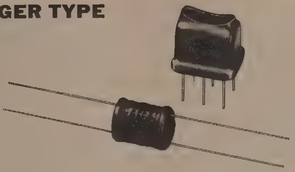
- ■ Pre-tinned leads for printed circuit mounting ■ Flame retardant coating
- ■ Meet a wide range of noise filtering needs.

SPECIFICATIONS

MODEL	I (Max.)	L @ 1 KHz	DC RESISTANCE (Max.)	SERIES RESONANT FREQUENCY (Min.)	WIDTH	DIA.	PIN SPACING	PIN SIZE
IH5-10	5 Amps	10µh ± 10%	.015Ω	20 MHz	1-3/16 Max.	11/16 Max.	1 ± 1/16	#16 AWG
IH5-100	5 Amps	100µh ± 10%	.050Ω	2.5 MHz	1-3/8 Max.	7/8 Max.	1 ± 1/16	#16 AWG
IH10-50	10 Amps	50µh ± 10%	.025Ω	4.0 MHz	1-3/8 Max.	1 Max.	1 ± 1/16	#14 AWG

DEPENDABLE DALE® TRANSFORMERS

TYPE PT10 and PT20 PULSE TRANSFORMERS—TRIGGER TYPE



- Designed for low cost trigger source isolation in half and full wave SCR power control circuits including motor speed controls, heater controls and incandescent lighting controls
- Choice of printed circuit or bobbin-type configurations
- Designed to transfer high amplitude or long duration pulses without saturation.

TRANSFORMER SPECIFICATIONS

Electrical

Primary Inductance Values: 200μh to 5000μh

Turns Ratio: 1:1, 1:1:1, 2:1, 2:1:1 and 5:1

Temperature Range: –10°C to +70°C

Dielectric Test @ 60 Hz: 1600 Volts RMS

AC Line Voltage @ 60 Hz: 240 Volts RMS Max.

Material

Bobbin: Nylon

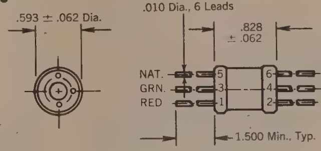
Leads: Tinned, solderable. PT10 = Polyurethane insulated magnet wire for clip or bracket mounting. PT20 = Tinned copper #20 AWG for printed circuit mounting.

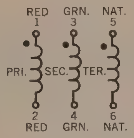
Covering: Thermoplastic

Header: Thermoset Plastic

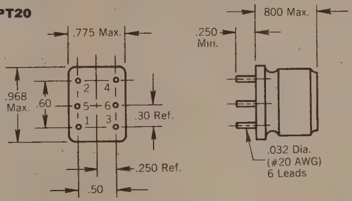
Also available in standard models with 4 pins or leads for applications where only primary and secondary windings are required.

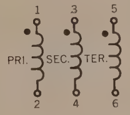
PT10





PT20





DC-DC CONVERTER TRANSFORMERS

TYPE ITC

- Designed especially for low power applications
- Uses include power supplies for battery-operated portable instruments, operational amplifiers, and gas discharge displays
- P.C. mounting
- Available in open or encapsulated styles
- Easily custom-designed for specific applications.

ELECTRICAL DESIGN RANGE

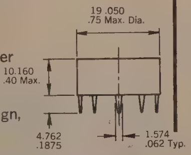
Input Voltages: 1.5-30 volts DC

Output Voltages: Up to 200 volts DC from rectifier

Power: Up to 3 watts

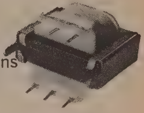
Operating Frequency: 10-20KHz typical design

Power Efficiency: 50 to 80%, depending on design, power and voltage levels.



POWER TRANSFORMER

TYPE PL



- Control equipment and instrument applications
- Voltage step up or step down
- Provides isolation from power line
- P. C. Plug-in mounting design
- Laminated construction
- Designed to meet U.L. requirements
- 8-pin dual primary model also available

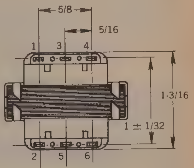
ELECTRICAL

Primary Voltage: 115 volts RMS 60 Hz

Available Output Voltages: 4 volts to 230 volts at 1.2 watts

Dielectric Strength: 1250 volts 60 Hz primary-secondary core

Temperature Rise: 25°C maximum at rated load



CUSTOM BOBBIN COILS

- Statistical control on high volume production items
- Low initial tooling cost

CUSTOM TOROIDS

- Potted with case sizes to fit your specific designs
- Open wound using Dale-formulated coatings for extra protection
- Hermetically-sealed cans
- Pulse transformers, inverters, RF inductors and transformers with or without terminal boards. Unusual shapes and sizes a specialty.

DALE ELECTRONICS, INC., P.O. BOX 180, YANKTON, SOUTH DAKOTA 57078 PHONE 605–665-9301

A subsidiary of The Lionel Corporation

Delevan
Division

AMERICAN
PRECISION
INDUSTRIES INC.

270 QUAKER RD. / EAST AURORA, N. Y. 14052
TELEPHONE (716) 652-3600 TELEX 91-293

MOLDED RF *coils and inductive components*

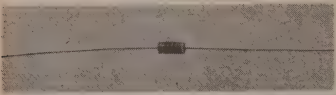
DELEVAN PARTS WILL MEET ALL REQUIREMENTS OF MIL-C-15305

From Delevan's inception its product philosophy called for an extremely high degree of precision manufacturing to meet exacting performance levels required by quality-minded manufacturers of electronic systems. Delevan's engineering paces new product development in the coil industry, and its products are continually monitored by environmental testing to maintain consistently high standards.

With today's problems of miniaturization; hybrid circuits; and reliability, both functional and process-wise, Delevan becomes even more prominent in the inductor and component industry. Our philosophies have not changed. Check with us for any inductive requirement — from chip inductors for hybrids to miniature axial leaded, shielded or non-shielded units for both Hi-Reliability or Commercial application. Our expanded environmental and x-ray capabilities guarantee performance.

SERIES 0819

MILITARY SPECIFICATIONS:
MIL-C-15305 (LT4K & LT10K)



PHYSICAL PARAMETERS —
Length: .200±.010
Diameter: .078±.008
Lead Size: AWG #26 TCW.
Lead Length: 1.5±.12

CURRENT RATING at 90°C AMB. —
LT4K: 35°C Rise.
LT10K: 15°C Rise.

OPERATING TEMPERATURE —
LT4K: −55°C to +125°C.
LT10K: −55°C to +105°C.

POWER DISSIPATION at 90°C —
LT4K: .145 Watts.
LT10K: .062 Watts.

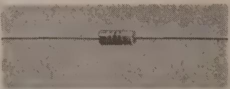
WEIGHT IN GRAMS —
LT4K: .19 Max.
LT10K: .22 Max.

Part Number	Inductance Microhenries	Q Min.	Test Freq. (MHz)	Resonant Freq. Min. (MHz)	DC Resistance Max. (Ohms)	Current Rating D.C. mA (Max.)
CORE MATERIAL: PHENOLIC (LT4K)						
0819-00	.10±10%	35	25	680	.12	935
0819-02	.12±10%	35	25	650	.14	865
0819-04	.15±10%	35	25	560	.15	835
0819-06	.18±10%	35	25	540	.18	760
0819-08	.22±10%	30	25	500	.22	690
0819-10	.27±10%	30	25	440	.36	540
0819-12	.33±10%	25	25	410	.42	500
0819-14	.39±10%	25	25	380	.48	465
0819-16	.47±10%	25	25	340	.57	430
CORE MATERIAL: IRON (LT10K)						
0819-18	.56±10%	40	25	250	.15	560
0819-20	.68±10%	40	25	215	.16	545
0819-22	.82±10%	40	25	200	.18	515
0819-24	1.0 ±10%	40	25	190	.22	465
0819-26	1.2 ±10%	35	7.9	170	.25	435
0819-28	1.5 ±10%	40	7.9	150	.44	330
0819-30	1.8 ±10%	40	7.9	135	.48	315
0819-32	2.2 ±10%	45	7.9	130	.66	268
0819-34	2.7 ±10%	45	7.9	110	.78	247
0819-36	3.3 ±10%	45	7.9	100	1.1	208
0819-38	3.9 ±10%	50	7.9	95	1.2	198
0819-40	4.7 ±10%	55	7.9	88	1.9	158
0819-42	5.6 ±10%	55	7.9	78	2.5	138
0819-44	6.8 ±10%	55	7.9	69	2.9	128
0819-46	8.2 ±10%	55	7.9	62	4.0	109

Part Number	Inductance Microhenries	Q Min.	Test Freq. (MHz)	Resonant Freq. Min. (MHz)	DC Resistance Max. (Ohms)	Current Rating D.C. mA (Max.)
CORE MATERIAL: IRON (LT10K) (Cont'd)						
0819-48	10±10%	55	7.9	58	4.6	102
0819-50	12±10%	40	2.5	31	3.0	126
0819-52	15±10%	40	2.5	26	3.4	118
0819-54	18±10%	40	2.5	23	3.8	112
0819-56	22±10%	45	2.5	20	4.1	108
0819-58	27±10%	45	2.5	17	4.5	103
0819-60	33±10%	45	2.5	15	5.0	97
0819-62	39±10%	45	2.5	13.5	6.8	83.5
0819-64	47±10%	45	2.5	12.5	7.4	80
0819-66	56±10%	45	2.5	11.5	10.0	69
0819-68	68±10%	45	2.5	10.5	11.5	64
0819-70	82±10%	45	2.5	10.0	16.0	54.5
0819-72	100±10%	45	2.5	9.5	17.5	52
CORE MATERIAL: FERRITE (LT10K)						
0819-74	120±10%	35	.79	8.9	16.0	54.5
0819-76	150±10%	35	.79	7.9	17.5	52
0819-78	180±10%	35	.79	7.5	19.0	50
0819-80	220±10%	35	.79	7.1	26.5	42.5
0819-82	270±10%	35	.79	6.6	28.5	41
0819-84	330±10%	35	.79	6.2	40.5	34
0819-86	390±10%	35	.79	5.9	43.0	33
0819-88	470±10%	35	.79	5.4	48.0	31.5
0819-90	560±10%	35	.79	5.0	60.0	28
0819-92	680±10%	35	.79	4.5	66.0	27
0819-94	820±10%	35	.79	3.9	72.0	25.5
0819-96	1000±10%	35	.79	3.3	79.0	24.5

SERIES 1025

MILITARY SPECIFICATIONS:
MS-75083 (LT4K)
MS-75084 (LT10K)
MS-75085 (LT10K)



PHYSICAL PARAMETERS —
Length: .250±.010
Diameter: .095±.010
Lead Size: AWG #24 TCW.
Lead Length: 1.5±.12

CURRENT RATING at 90°C AMB. —
LT4K: 35°C Rise.
LT10K: 15°C Rise.

OPERATING TEMPERATURE —
LT4K: −55°C to +125°C.
LT10K: −55°C to +105°C.

POWER DISSIPATION at 90°C —
LT4K: .21 Watts.
LT10K: .09 Watts.

WEIGHT IN GRAMS: .03 Max.

Part Number	Inductance Microhenries	Q Min.	Test Freq. (MHz)	Resonant Freq. Min. (MHz)	DC Resistance Max. (Ohms)	Current Rating D.C. mA (Max.)
CORE MATERIAL: PHENOLIC (LT4K)						
1025-94	.10±10%	40	25.0	680	.08	1380
1025-96	.12±10%	40	25.0	640	.09	1300
1025-00	.15±10%	38	25.0	600	.10	1230
1025-02	.18±10%	35	25.0	550	.12	1120
1025-04	.22±10%	33	25.0	510	.14	1040
1025-06	.27±10%	33	25.0	430	.16	975
1025-08	.33±10%	30	25.0	410	.22	830
1025-10	.39±10%	30	25.0	365	.30	710
1025-12	.47±10%	30	25.0	330	.35	660
1025-14	.56±10%	30	25.0	300	.50	550
1025-16	.68±10%	28	25.0	275	.60	500
1025-18	.82±10%	28	25.0	250	.85	420
1025-20	1.00±10%	25	25.0	230	1.00	390
CORE MATERIAL: IRON (LT10K)						
1025-22	1.20±10%	25	7.9	150	.18	620
1025-24	1.50±10%	28	7.9	140	.22	560
1025-26	1.80±10%	30	7.9	125	.30	480
1025-28	2.20±10%	30	7.9	115	.40	415
1025-30	2.70±10%	37	7.9	100	.55	355
1025-32	3.30±10%	45	7.9	90	.85	285
1025-34	3.90±10%	45	7.9	80	1.00	263
1025-36	4.70±10%	45	7.9	75	1.20	239
1025-38	5.60±10%	50	7.9	65	1.80	195
1025-40	6.80±10%	50	7.9	60	2.00	185
1025-42	8.20±10%	55	7.9	55	2.70	160

Part Number	Inductance Microhenries	Q Min.	Test Freq. (MHz)	Resonant Freq. Min. (MHz)	DC Resistance Max. (Ohms)	Current Rating D.C. mA (Max.)
CORE MATERIAL: IRON (LT10K) (Cont'd)						
1025-44	10.0±10%	55	7.9	50	3.30	144
1025-46	12.0±10%	45	2.5	40	2.70	160
1025-48	15.0±10%	45	2.5	35	2.80	157
1025-50	18.0±10%	50	2.5	30	3.10	149
1025-52	22.0±10%	50	2.5	25	3.30	144
1025-54	27.0±10%	50	2.5	20	3.50	140
CORE MATERIAL: FERRITE (LT10K)						
1025-56	33.0±10%	45	2.5	24	3.40	142
1025-58	39.0±10%	45	2.5	22	3.60	138
1025-60	47.0±10%	45	2.5	20	4.50	124
1025-62	56.0±10%	45	2.5	18	5.70	110
1025-64	68.0±10%	50	2.5	15	6.70	102
1025-66	82.0±10%	50	2.5	14	7.30	97
1025-68	100.0±10%	50	2.5	13	8.00	93
1025-70	120.0±10%	30	.79	12	13.00	73
1025-72	150.0±10%	30	.79	11	15.00	68
1025-74	180.0±10%	30	.79	10	17.00	63
1025-76	220.0±10%	30	.79	9	21.00	57
1025-78	270.0±10%	30	.79	8	25.00	53
1025-80	330.0±10%	30	.79	7	28.00	50
1025-82	390.0±10%	30	.79	6.5	35.00	45
1025-84	470.0±10%	30	.79	6	42.00	40
1025-86	560.0±10%	30	.79	5	46.00	39
1025-88	680.0±10%	30	.79	4.2	60.00	34
1025-90	820.0±10%	30	.79	3.8	65.00	33
1025-92	1000.0±10%	30	.79	3.4	72.00	32

Delevan
Division

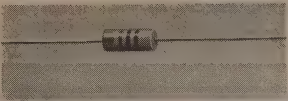
AMERICAN
PRECISION
INDUSTRIES INC.

MOLDED RF

coils and inductive components

SERIES 1537

MILITARY SPECIFICATIONS:
MS-14046 (LT10K)
MS-18130 (LT4K)
MS-90538 (LT10K)



PHYSICAL PARAMETERS —
Length: .375±.010
Diameter: .155±.010
Lead Size: AWG #22 TCW.
Lead Length: 1.44±.12

CURRENT RATING at 90°C AMB. —
LT4K: 35°C Rise.
LT10K: 15°C Rise.

OPERATING TEMPERATURE —
LT4K: −55°C to +125°C.
LT10K: −55°C to +105°C.

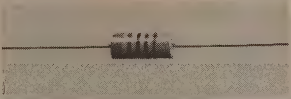
POWER DISSIPATION at 90°C —
LT4K: .312 Watts.
LT10K: .134 Watts.

WEIGHT IN GRAMS: .9 Max.

Part Number	Inductance Microhenries	Q Min.	Test Freq. (MHz)	Resonant Freq. Min. (MHz)	DC Resistance Max. (Ohms)	Current Rating D.C. mA (Max.)
CORE MATERIAL: PHENOLIC (LT4K)						
1537-00	.15±20%	50	25.0	525	.03	2740
1537-02	.22±20%	50	25.0	450	.055	2020
1537-04	.33±20%	45	25.0	360	.09	1580
1537-06	.47±20%	45	25.0	310	.12	1370
1537-07	.56±10%	50	25.0	280	.135	1290
1537-08	.68±10%	50	25.0	250	.15	1220
1537-10	.82±10%	50	25.0	220	.22	1020
1537-12	1.00±10%	50	25.0	200	.29	880
1537-14	1.20±10%	33	7.9	180	.42	730
1537-16	1.50±10%	33	7.9	160	.50	670
1537-18	1.80±10%	33	7.9	150	.65	590
1537-20	2.20±10%	33	7.9	135	.95	485
1537-22	2.70±10%	33	7.9	120	1.20	430
1537-24	3.30±10%	33	7.9	110	2.00	335
1537-26	3.90±10%	33	7.9	100	2.30	310
1537-28	4.70±10%	33	7.9	90	2.60	294
CORE MATERIAL: IRON (LT10K)						
1537-30	5.60±10%	45	7.9	60	.32	565
1537-32	6.80±10%	50	7.9	55	.50	450
1537-34	8.20±10%	50	7.9	50	.60	410
1537-36	10.0 ±10%	55	7.9	45	.90	335
1537-38	12.0 ±10%	65	2.5	42	1.10	305
1537-40	15.0 ±10%	65	2.5	40	1.40	271
1537-42	18.0 ±10%	75	2.5	34	2.25	213
1537-44	22.0 ±10%	75	2.5	30	2.50	202
1537-46	24.0 ± 5%	60	2.5	26	2.50	202
CORE MATERIAL: IRON (LT10K) (Cont'd)						
1537-47	27.0±10%	60	2.5	25	2.60	198
1537-48	27.0± 5%	60	2.5	25	2.60	198
1537-50	30.0± 5%	65	2.5	21	2.80	191
1537-51	33.0±10%	65	2.5	19	3.00	185
1537-52	33.0± 5%	65	2.5	19	3.00	185
1537-54	36.0± 5%	60	2.5	15.5	2.50	202
1537-56	39.0± 5%	60	2.5	14.5	2.60	198
1537-58	43.0± 5%	60	2.5	13.7	2.70	194
1537-60	47.0± 5%	55	2.5	13.0	2.75	193
1537-62	51.0± 5%	55	2.5	12.7	2.85	189
1537-64	56.0± 5%	55	2.5	12.0	3.00	184
1537-66	62.0± 5%	55	2.5	11.5	3.15	180
1537-68	68.0± 5%	55	2.5	11.0	3.30	176
1537-70	75.0± 5%	55	2.5	10.5	3.70	166
1537-72	82.0± 5%	50	2.5	10.3	3.90	162
1537-74	91.0± 5%	50	2.5	10.0	4.30	154
1537-76	100.0± 5%	50	2.5	9.5	4.50	151
1537-78	110.0± 5%	60	.79	8.9	4.90	144
1537-80	120.0± 5%	65	.79	8.7	5.20	140
1537-82	130.0± 5%	65	.79	8.5	5.45	137
1537-84	150.0± 5%	65	.79	8.0	6.05	130
1537-86	160.0± 5%	65	.79	7.5	6.40	126
1537-88	180.0± 5%	65	.79	7.0	6.75	123
1537-90	200.0± 5%	65	.79	6.5	7.10	120
1537-92	220.0± 5%	65	.79	6.2	7.45	117
1537-94	240.0± 5%	65	.79	5.9	7.80	115

SERIES 1840

MILITARY SPECIFICATIONS:
MS-75008 (LT4K)
MS-75101 (LT10K)



PHYSICAL PARAMETERS —
Length: .437±.010
Diameter: .187±.010
Lead Size: AWG #22 TCW.
Lead Length: 1.44±.12

CURRENT RATING at 90°C AMB. —
LT4K: 35°C Rise.
LT10K: 15°C Rise.

OPERATING TEMPERATURE —
LT4K: −55°C to +125°C.
LT10K: −55°C to +105°C.

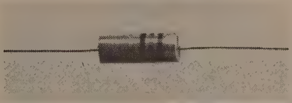
POWER DISSIPATION at 90°C —
LT4K: .385 Watts.
LT10K: .165 Watts.

WEIGHT IN GRAMS: .95 Max.

Part Number	Inductance Microhenries	Q Min.	Test Freq. (MHz)	Resonant Freq. Min. (MHz)	DC Resistance Max. (Ohms)	Current Rating D.C. mA (Max.)
CORE MATERIAL: PHENOLIC (LT4K)						
1840-00	.15±20%	55	25.0	510	.030	3050
1840-02	.22±20%	55	25.0	415	.035	2820
1840-04	.33±20%	55	25.0	350	.050	2360
1840-06	.47±20%	55	25.0	300	.080	1860
1840-07	.56±10%	55	25.0	270	.100	1670
1840-08	.68±10%	55	25.0	250	.120	1520
1840-09	.82±10%	55	25.0	220	.180	1240
1840-10	1.00±10%	55	25.0	200	.250	1050
1840-11	1.20±10%	35	7.9	180	.400	835
1840-12	1.50±10%	35	7.9	170	.485	755
1840-13	1.80±10%	35	7.9	150	.740	610
1840-14	2.20±10%	35	7.9	140	.900	555
1840-16	2.70±10%	35	7.9	120	1.100	525
CORE MATERIAL: PHENOLIC (LT4K (Cont'd)						
1840-18	3.30±10%	35	7.9	70	.120	1020
1840-20	3.90±10%	35	7.9	65	.155	900
1840-22	4.70±10%	35	7.9	60	.210	775
CORE MATERIAL: IRON (LT10K)						
1840-24	5.60±10%	35	7.9	50	.280	670
1840-26	6.80±10%	35	7.9	50	.375	580
1840-28	8.20±10%	35	7.9	48	.400	560
1840-30	10.0 ±10%	35	7.9	42	.600	455
1840-32	12.0 ±10%	50	2.5	36	.850	385
1840-34	15.0 ±10%	55	2.5	30	1.200	324
1840-35	18.0 ±10%	60	2.5	30	1.800	265
1840-36	22.0 ±10%	60	2.5	24	2.000	251
1840-38	27.0 ±10%	65	2.5	22	2.750	214

SERIES 2150

MILITARY SPECIFICATIONS:
MS-14052 (LT10K)
MS-90542 (LT4K)



PHYSICAL PARAMETERS —
Length: .560±.010
Diameter: .220±.010
Lead Size: AWG #22 TCW.
Lead Length: 1.44±.12

CURRENT RATING at 90°C AMB. —
LT4K: 35°C Rise.
LT10K: 15°C Rise.

OPERATING TEMPERATURE —
LT4K: −55°C to +125°C.
LT10K: −55°C to +105°C.

POWER DISSIPATION at 90°C —
LT4K: .427 Watts.
LT10K: .183 Watts.

WEIGHT IN GRAMS: 1.5 Max.

Part Number	Inductance Microhenries	Q Min.	Test Freq. (MHz)	Resonant Freq. Min. (MHz)	DC Resistance Max. (Ohms)	Current Rating D.C. mA (Max.)
CORE MATERIAL: PHENOLIC (LT4K)						
2150-00	.47±10%	65	25.0	300	.06	2270
2150-01	.56±10%	65	25.0	270	.07	2100
2150-02	.68±10%	65	25.0	240	.08	1960
2150-03	.82±10%	65	25.0	220	.11	1670
2150-04	1.00±10%	65	25.0	200	.14	1480
2150-05	1.20±10%	40	25.0	180	.19	1270
2150-06	1.50±10%	40	7.9	160	.28	1050
2150-07	1.80±10%	40	7.9	150	.37	915
2150-08	2.20±10%	40	7.9	135	.50	785
2150-10	2.70±10%	40	7.9	120	.65	690
2150-12	3.30±10%	40	7.9	105	1.00	555
2150-14	3.90±10%	40	7.9	100	1.20	505
CORE MATERIAL: PHENOLIC (LT4K (Cont'd)						
2150-16	4.70±10%	40	7.9	90	1.80	415
2150-18	5.60±10%	35	7.9	55	.13	1040
2150-20	6.80±10%	35	7.9	50	.20	835
2150-22	8.20±10%	35	7.9	44	.22	795
CORE MATERIAL: IRON (LT10K)						
2150-24	10.0±10%	35	7.9	42	.26	735
2150-26	12.0±10%	45	2.5	34	.45	560
2150-28	15.0±10%	45	2.5	32	.52	520
2150-30	18.0±10%	50	2.5	28	.70	445
2150-32	22.0±10%	60	2.5	24	1.00	375
2150-34	27.0±10%	60	2.5	22	1.30	330
2150-36	33.0±10%	60	2.5	20	1.50	305
2150-38	39.0±10%	70	2.5	18	2.00	264

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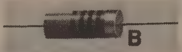
MOLDED RF coils and inductive components

SERIES 2500

MILITARY SPECIFICATIONS:
MS-90539 (LT10K)
MS-90540 (LT10K)
MS-90541 (LT10K)

A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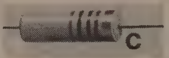
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CURRENT RATING at 90°C AMB.: 15°C Rise.

OPERATING TEMPERATURE: −55°C to +105°C.

CORE MATERIAL: IRON (LT10K)							
Part Number	**Inductance Microhenries**	**Q Min.**	**Test Freq. (MHz)**	**Resonant Freq. Min. (MHz)**	**DC Resistance Max. (Ohms)**	**Current Rating DC mA (Max.)**	**Mold Size**
2500-00	270±5%	65	.790	5.6	8.2	126	A
2500-02	300±5%	65	.790	5.3	8.7	122	A
2500-04	330±5%	65	.790	5.0	9.1	120	A
2500-06	360±5%	65	.790	4.7	9.6	115	A
2500-08	390±5%	65	.790	4.5	10.0	114	A
2500-10	430±5%	65	.790	4.3	10.6	111	A
2500-12	470±5%	65	.790	4.0	11.0	108	A
2500-14	500±5%	65	.790	3.7	11.3	106	A
2500-15	510±5%	65	.790	3.8	11.6	105	A
2500-16	560±5%	65	.790	3.6	12.3	104	A
2500-18	620±5%	60	.790	3.5	13.0	101	A
2500-20	680±5%	60	.790	3.4	13.7	97	A
2500-22	750±5%	60	.790	3.3	14.4	95	A
2500-24	820±5%	60	.790	3.1	15.1	92	A
2500-26	910±5%	60	.790	3.0	15.8	91	A
2500-28	1000±5%	60	.790	2.8	16.5	88	A
2500-30	1100±5%	60	.250	2.8	21	81	B
2500-32	1200±5%	60	.250	2.7	22	79	B
2500-34	1300±5%	60	.250	2.6	23	78	B
2500-36	1500±5%	65	.250	2.4	25	76	B
2500-38	1600±5%	65	.250	2.3	26	74	B
2500-40	1800±5%	65	.250	2.2	28	71	B
2500-42	2000±5%	65	.250	2.1	29	69	B
2500-44	2200±5%	70	.250	2.0	30	68	B
2500-46	2400±5%	70	.250	1.9	31	67	B
2500-48	2700±5%	70	.250	1.8	33	65	B

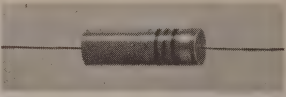
Part Number	Inductance Microhenries	Q Min.	Test Freq. (MHz)	Resonant Freq. Min. (MHz)	DC Resistance Max. (Ohms)	Current Rating DC mA (Max.)	Mold Size
2500-50	3000±5%	70	.250	1.7	35	63	B
2500-52	3300±5%	70	.250	1.6	38	61	B
2500-54	3600±5%	70	.250	1.5	40	59	B
2500-56	3900±5%	80	.250	1.45	44	62	C
2500-58	4300±5%	80	.250	1.40	46	60	C
2500-60	4700±5%	80	.250	1.35	48	59	C
2500-62	5000±5%	80	.250	1.3	50	58	C
2500-63	5100±5%	80	.250	1.3	50	58	C
2500-64	5600±5%	80	.250	1.25	53	56	C
2500-66	6200±5%	80	.250	1.2	56	55	C
2500-68	6800±5%	80	.250	1.15	59	54	C
2500-70	7500±5%	80	.250	1.10	62	52	C
2500-72	8200±5%	80	.250	1.05	65	51	C
2500-74	9100±5%	80	.250	1.0	68	49	C
2500-76	10000±5%	80	.250	.95	72	48	C

PHYSICAL PARAMETERS

Mold Size	Diameter	Length	Lead Size & Type	Lead Length	Power Dissipation in Watts 90°C	Max. Weight in Grams
A	.190±.010	.440±.010	AWG #22 TCW	1.44±.12	.166	.95
B	.215±.010	.560±.010	AWG #21 TCW	1.44±.12	.182	1.5
C	.240±.010	.740±.010	AWG #20 TCW	1.44±.12	.213	2.5

SERIES 2890

MILITARY SPECIFICATIONS:
MS-75103 (LT10K)
MS-91189 (LT4K)



PHYSICAL PARAMETERS —
Length: .900±.010
Diameter: .280±.010
Lead Size: AWG #21 TCW.
Lead Length: 1.44±.12

CURRENT RATING at 90°C AMB. —
LT4K: 35°C Rise.
LT10K: 15°C Rise.

OPERATING TEMPERATURE —
LT4K: −55°C to +125°C.
LT10K: −55°C to +105°C.

POWER DISSIPATION at 90°C —
LT4K: .598 Watts.
LT10K: ,256 Watts.

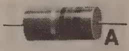
WEIGHT IN GRAMS: 3.9 Max.

CORE MATERIAL: PHENOLIC (LT4K)						
Part Number	**Inductance Microhenries**	**Q Min.**	**Test Freq. (MHz)**	**Resonant Freq. Min. (MHz)**	**DC Resistance Max. (Ohms)**	**Current Rating D.C. mA (Max.)**
2890-00	1.2±10%	60	7.9	170	.075	2400
2890-02	1.5±10%	60	7.9	160	.090	2190
2890-03	1.8±10%	60	7.9	140	.135	1790
2890-04	2.2±10%	60	7.9	125	.160	1640
2890-06	2.7±10%	60	7.9	115	.220	1400
2890-08	3.3±10%	60	7.9	100	.305	1190
2890-10	3.9±10%	60	7.9	95	.450	980
2890-12	4.7±10%	60	7.9	90	.560	880
2890-14	5.6±10%	60	7.9	80	.745	760
2890-16	6.8±10%	60	7.9	75	1.05	640
2890-18	8.2±10%	60	7.9	68	1.40	555
2890-20	10.0±10%	60	7.9	60	1.90	475
2890-22	12.0±10%	40	2.5	53	2.65	405
2890-24	15.0±10%	40	2.5	50	3.25	365
2890-26	18.0±10%	40	2.5	45	4.15	320

CORE MATERIAL: IRON (LT10K)						
Part Number	**Inductance Microhenries**	**Q Min.**	**Test Freq. (MHz)**	**Resonant Freq. Min. (MHz)**	**DC Resistance Max. (Ohms)**	**Current Rating D.C. mA (Max.)**
2890-28	22.0±10%	50	2.5	24	.295	815
2890-30	27.0±10%	45	2.5	22	.35	750
2890-32	33.0±10%	60	2.5	19	.55	595
2890-34	39.0±10%	55	2.5	18	.65	550
2890-36	47.0±10%	65	2.5	16	1.00	445
2890-38	56.0±10%	65	2.5	14	1.15	410
2890-39	68.0±10%	75	2.5	13	1.85	325
2890-40	82.0±10%	75	2.5	12	2.10	305
2890-42	100.0±10%	75	2.5	12	2.50	279
2890-44	120.0±10%	95	.79	10	4.10	219

SERIES 3500

MILITARY SPECIFICATIONS:
MS-14047 (LT10K)
MS-14048 (LT10K)
MS-14049 (LT10K)
MS-14050 (LT10K)
MS-75052 (LT4K)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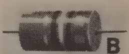
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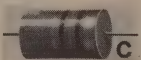
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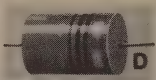
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CURRENT RATING at 90°C AMB. —
LT4K: 35°C Rise.
LT10K: 15°C Rise.

OPERATING TEMPERATURE —
LT4K: −55°C to +125°C.
LT10K: −55°C to +105°C.

Part Number	Inductance Microhenries	Q Min.	Test Freq. (MHz)	Resonant Freq. Min. (MHz)	DC Resistance Max. (Ohms)	Current Rating DC mA (Max.)	Mold Size
CORE MATERIAL: PHENOLIC (LT4K)							
3500-00	47±10%	18	2.5	13.5	5.9	225	A
3500-02	56±10%	18	2.5	13.0	6.4	216	A
3500-04	68±10%	70	2.5	13.0	3.3	210	A
3500-06	82±10%	65	2.5	11.7	3.5	196	A
3500-08	100±10%	65	2.5	10.7	3.8	188	A
CORE MATERIAL: IRON (LT10K)							
3500-10	120±10%	75	.79	9.3	4.7	169	A
3500-12	150±10%	75	.79	8.3	5.3	159	A
3500-14	180±10%	80	.79	6.0	5.5	171	B
3500-16	220±10%	80	.79	5.5	5.9	165	B
3500-18	270±10%	80	.79	5.1	6.6	156	B
3500-20	330±10%	75	.79	4.2	7.8	143	B
3500-22	390±10%	75	.79	3.9	8.7	136	B
3500-24	470±10%	80	.79	3.7	9.0	140	C
3500-26	560±10%	80	.79	3.5	10.0	133	C
3500-28	680±10%	75	.79	3.2	11.2	125	C
3500-30	820±10%	75	.79	3.0	13.0	116	C
3500-32	1000±10%	70	.79	2.7	14.5	110	C
3500-34	1500±10%	85	.25	2.2	22.0	93	D

Part Number	Inductance Microhenries	Q Min.	Test Freq. (MHz)	Resonant Freq. Min. (MHz)	DC Resistance (Ohms) Max.	Current Rating DC mA (Max.)	Mold Size
CORE MATERIAL: IRON (LT10K) (Cont'd)							
3500-36	2000±10%	85	.25	1.9	26.0	86	D
3500-37	2200±10%	85	.25	1.8	27.0	84	D
3500-38	2500±10%	85	.25	1.7	30.0	80	D
3500-39	2700±10%	85	.25	1.6	32.0	77	D
3500-40	5000±10%	70	.25	1.2	65.0	54	D
3500-41	5100±10%	70	.25	1.0	66.0	53	D
3500-42	10000±10%	70	.25	.8	70.0	52	D*
3500-44	10000±10%	70	.25	.8	70.0	52	D

PHYSICAL PARAMETERS

Mold Size	Diameter	Length	Lead Size & Type	Lead Length	Power Dissipation in Watts 90°C	Max. Weight in Grams
A	.250±.010	.560±.010	AWG #22 TCW	1.44±.12	LT4K .415 LT10K .175	2.0
B	.310±.010	.560±.010	AWG #21 TCW	1.44±.12	.21	2.8
C	.375±.010	.625±.010	AWG #21 TCW	1.44±.12	.23	4.0
D	.468±.010	.687±.010	AWG #21 TCW *(3500-42) AWG #20 TCW	1.44±.12	.25	6.4

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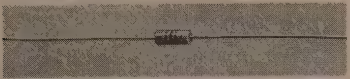
SHIELDED RF

coils and inductive components

SERIES 0925

MILITARY SPECIFICATIONS:
MIL-C-15305 (LT10K)



PHYSICAL PARAMETERS —
Length: .250±.010
Diameter: .095±.010
Lead Size: AWG #26 TCW.
Lead Length: 1.44±.188

CURRENT RATING at 90°C AMB.: 15°C Rise.

OPERATING TEMPERATURE: −55°C to +105°C.

POWER DISSIPATION at 90°C: 58.5 mW.

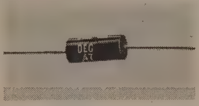
WEIGHT IN GRAMS: .25 Max.

INCREMENTAL CURRENT: Current level which causes a Max. of 5% decrease in inductance.

COUPLING: 3% Max.

Part Number	Inductance Microhenries	Q Min.	Test Freq. (MHz)	Resonant Freq. Min. (MHz)	DC Resistance Max. (Ohms)	Current Rating DC mA (Max.)	Incremental Current DC mA (Max.)
0925-101	.10±10%	54	25.0	490	.10	670	670
0925-121	.12±10%	52	25.0	430	.11	635	635
0925-151	.15±10%	50	25.0	415	.12	610	610
0925-181	.18±10%	49	25.0	375	.13	585	585
0925-221	.22±10%	47	25.0	330	.15	545	545
0925-271	.27±10%	46	25.0	300	.16	530	530
0925-331	.33±10%	44	25.0	260	.18	495	495
0925-391	.39±10%	42	25.0	230	.19	485	485
0925-471	.47±10%	41	25.0	220	.21	460	460
0925-561	.56±10%	41	25.0	210	.23	440	440
0925-681	.68±10%	39	25.0	180	.24	430	430
0925-821	.82±10%	38	25.0	165	.27	405	405
0925-102	1.00±10%	37	25.0	150	.30	385	385
0925-122	1.20±10%	40	7.9	130	.73	247	247
0925-152	1.50±10%	41	7.9	115	.86	228	228
0925-182	1.80±10%	43	7.9	105	.95	217	217
0925-222	2.20±10%	45	7.9	95	1.10	202	202
0925-272	2.70±10%	48	7.9	90	1.20	193	193
0925-332	3.30±10%	49	7.9	80	1.30	185	185
0925-392	3.90±10%	50	7.9	75	1.50	173	173
0925-472	4.70±10%	53	7.9	70	2.40	136	136
0925-562	5.60±10%	54	7.9	60	2.90	124	124
0925-682	6.80±10%	55	7.9	55	3.20	118	118
0925-822	8.2±10%	55	7.9	53	3.60	111	111
0925-103	10.0±10%	57	7.9	50	4.00	106	106
0925-123	12.0±10%	36	2.5	35	2.70	129	129
0925-153	15.0±10%	38	2.5	30	3.20	118	118
0925-183	18.0±10%	40	2.5	26	3.80	108	108
0925-223	22.0±10%	40	2.5	25	4.90	96	96
0925-273	27.0±10%	40	2.5	22	5.80	88	88
0925-333	33.0±10%	41	2.5	21	6.50	83	83
0925-393	39.0±10%	42	2.5	20	7.90	75	75
0925-473	47.0±10%	44	2.5	17	9.30	69	69
0925-563	56.0±10%	44	2.5	16	11.0	64	64
0925-683	68.0±10%	45	2.5	14	12.0	61	61
0925-823	82.0±10%	45	2.5	13	13.0	59	59
0925-104	100.0±10%	40	2.5	10.5	16.8	55	55
0925-124	120.0±10%	31	.79	13	5.80	88	27
0925-154	150.0±10%	33	.79	12	7.90	75	24
0925-184	180.0±10%	33	.79	11	9.40	69	22
0925-224	220.0±10%	35	.79	10	11.0	64	20
0925-274	270.0±10%	37	.79	9.0	12.0	61	18
0925-334	330.0±10%	40	.79	8.0	16.0	53	16
0925-394	390.0±10%	38	.79	7.8	21.0	46	14
0925-474	470.0±10%	36	.79	7.5	24.0	43	13
0925-564	560.0±10%	36	.79	7.0	28.0	40	12

SERIES 1537-700



MILITARY SPECIFICATIONS:
MIL-C-15305 (LT4K)

PHYSICAL PARAMETERS —
Length: .375±.010
Diameter: .156±.010
Lead Size: AWG #22 TCW.
Lead Length: 1.44±.12

CURRENT RATING at 90°C AMB.: 35°C Rise.

OPERATING TEMPERATURE: −55°C to +125°C.

POWER DISSIPATION at 90°C: .20 Watts Max.

WEIGHT IN GRAMS: .6 Max.

INCREMENTAL CURRENT: Current level which causes a Max. of 5% decrease in inductance.

COUPLING: 2% Max.

Part Number	Inductance Microhenries	Q Min.	Test Freq. L & Q (MHz)	Resonant Freq. Min. (MHz)	DC Resistance Max. (Ohms)	Current Rating DC mA (Max.)	Incremental Current DC mA (Max.)
1537-770	.10±10%	45	25	250	.019	2760	2760
1537-771	.12±10%	45	25	250	.023	2500	2500
1537-701	.15±10%	45	25	250	.028	2270	2270
1537-772	.18±10%	45	25	250	.032	2120	2120
1537-702	.22±10%	45	25	250	.039	1920	1920
1537-773	.27±10%	45	25	250	.048	1730	1730
1537-703	.33±10%	45	25	250	.054	1630	1630
1537-774	.39±10%	45	25	250	.058	1580	1580
1537-704	.47±10%	45	25	235	.062	1530	1530
1537-705	.56±10%	45	25	210	.088	1280	1280
1537-706	.68±10%	40	25	190	.093	1240	1240
1537-707	.82±10%	40	25	180	.12	1100	1100
1537-708	1.0 ±10%	40	25	150	.15	980	980
1537-709	1.2 ±10%	45	7.9	140	.08	1340	445
1537-710	1.5 ±10%	45	7.9	125	.10	1200	400
1537-711	1.8 ±10%	45	7.9	114	.12	1100	365
1537-712	2.2 ±10%	45	7.9	103	.15	980	355
1537-713	2.7 ±10%	50	7.9	94	.22	810	275
1537-714	3.3 ±10%	50	7.9	85	.27	730	210
1537-715	3.9 ±10%	50	7.9	79	.29	705	200
1537-716	4.7 ±10%	50	7.9	72	.32	670	185
1537-717	5.6 ±10%	50	7.9	67	.40	600	165
1537-718	6.8 ±10%	50	7.9	62	.50	540	150
1537-719	8.2 ±10%	50	7.9	58	.62	485	135
1537-720	10.0 ±10%	50	7.9	55	.78	430	125
1537-721	12.0 ±10%	45	2.5	50	.66	470	110
1537-722	15.0 ±10%	45	2.5	45	.75	440	100
1537-723	18.0 ±10%	45	2.5	40	.85	410	93
1537-724	22.0 ±10%	50	2.5	36	.95	390	87
1537-725	27.0 ±10%	50	2.5	32	1.1	360	73
1537-726	33.0 ±10%	50	2.5	29	1.7	291	68
1537-727	39.0±10%	55	2.5	26	2.1	262	59
1537-728	47.0±10%	55	2.5	23	2.4	245	55
1537-729	56.0±10%	60	2.5	20	2.7	231	50
1537-730	68.0±10%	60	2.5	18	3.0	220	44
1537-731	82.0±10%	60	2.5	15	3.7	198	40
1537-732	100.0±10%	50	2.5	11	2.2	256	39
1537-733	120.0±10%	55	.79	10	2.5	240	31
1537-734	150.0±10%	55	.79	9.3	2.8	227	28
1537-735	180.0±10%	55	.79	9.0	3.2	215	25
1537-736	220.0±10%	55	.79	8.0	3.7	198	23
1537-737	270.0±10%	55	.79	7.3	4.6	177	21
1537-738	330.0±10%	55	.79	7.0	5.0	170	19
1537-739	390.0±10%	55	.79	6.0	5.5	162	18
1537-740	470.0±10%	60	.79	5.8	6.0	155	16
1537-741	560.0±10%	60	.79	5.5	7.5	139	15
1537-742	680.0±10%	60	.79	5.0	8.8	128	14
1537-743	820.0±10%	60	.79	4.3	11.0	115	13
1537-744	1000.0±10%	60	.79	4.2	14.0	102	12
1537-745	1200.0±10%	50	.25	3.6	17.0	92	10
1537-746	1500.0±10%	50	.25	3.2	23.0	79	9.5
1537-747	1800.0±10%	50	.25	2.9	27.0	73	8.5
1537-748	2200.0±10%	50	.25	2.6	30.0	69	8.0
1537-749	2700.0±10%	50	.25	2.3	36.0	63	7.0
1537-750	3300.0±10%	50	.25	2.1	45.0	57	6.5
1537-751	3900.0±10%	50	.25	1.9	52.0	53	6.0
1537-752	4700.0±10%	50	.25	1.7	65.0	47	5.0
1537-753	5600.0±10%	50	.25	1.6	76.0	44	4.8
1537-754	6800.0±10%	50	.25	1.5	87.0	41	4.7
1537-755	8200.0±10%	50	.25	1.4	115.0	35	4.1
1537-756	10000.0±10%	45	.25	1.3	142.0	32	3.6

Delevan
Division

AMERICAN
PRECISION
INDUSTRIES INC.

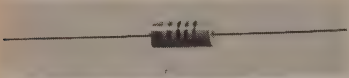
270 QUAKER RD. / EAST AURORA, N. Y. 14052
TELEPHONE (716) 652-3600 TELEX 91-293

SHIELDED RF

coils and inductive components

SERIES 1641

MILITARY SPECIFICATIONS:
MS-75087 (LT10K)
MS-75088 (LT10K)
MS-75089 (LT10K)



PHYSICAL PARAMETERS —
Length: .410±.020
Diameter: .162±.010
Lead Size: AWG #22 TCW.
Lead Length: 1.44±.12

CURRENT RATING at 90°C AMB.: 15°C Rise.

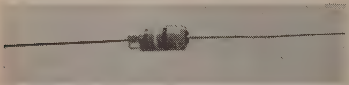
OPERATING TEMPERATURE: −55°C to +105°C.
POWER DISSIPATION at 90°C: .11 Watts Max.
WEIGHT IN GRAMS: 1.0 Max.
INCREMENTAL CURRENT: Current level which causes a Max. of 5% decrease in inductance.
COUPLING: 3% Max.

Part Number	Inductance Microhenries	Q Min.	Test Freq. (MHz)	Self-Resonant Freq. Min. (MHz)	DC Resistance Max. (Ohms)	Current Rating DC mA (Max.)	Incremental Current DC mA (Max.)
1641-101	.10±10%	50	25	250	.025	1830	1830
1641-121	.12±10%	51	25	250	.034	1570	1570
1641-151	.15±10%	51	25	250	.037	1500	1500
1641-181	.18±10%	50	25	250	.047	1330	1330
1641-221	.22±10%	49	25	250	.067	1120	1120
1641-271	.27±10%	47	25	250	.11	870	870
1641-331	.33±10%	46	25	250	.13	800	800
1641-391	.39±10%	44	25	250	.18	680	680
1641-471	.47±10%	44	25	235	.25	580	580
1641-561	.56±10%	43	25	210	.33	505	505
1641-681	.68±10%	42	25	190	.45	430	430
1641-821	.82±10%	40	25	180	.59	375	375
1641-102	1.0 ±10%	44	25	140	.07	1090	1090
1641-122	1.2 ±10%	44	7.9	130	.10	900	900
1641-152	1.5 ±10%	44	7.9	115	.12	835	835
1641-182	1.8 ±10%	44	7.9	105	.14	775	775
1641-222	2.2 ±10%	44	7.9	100	.19	665	665
1641-272	2.7 ±10%	44	7.9	92	.28	545	545
1641-332	3.3 ±10%	44	7.9	85	.35	490	490
1641-392	3.9 ±10%	44	7.9	75	.40	455	455
1641-472	4.7 ±10%	44	7.9	70	.55	390	390
1641-562	5.6 ±10%	44	7.9	65	.72	340	340
1641-682	6.8 ±10%	50	7.9	55	1.02	285	285
1641-822	8.2 ±10%	50	7.9	50	1.32	250	250
1641-103	10.0 ±10%	50	7.9	46	1.62	228	228
1641-123	12.0 ±10%	55	2.5	44	2.00	205	205
1641-153	15.0 ±10%	45	2.5	49	.80	325	250
1641-183	18.0 ±10%	45	2.5	45	.89	305	235
1641-223	22.0 ±10%	45	2.5	41	.96	295	220
1641-273	27.0 ±10%	45	2.5	38	1.19	265	200
1641-333	33.0 ±10%	45	2.5	34	1.37	248	190

Part Number	Inductance Microhenries	Q Min.	Test Freq. (MHz)	Self-Resonant Freq. Min. (MHz)	DC Resistance Max. (Ohms)	Current Rating DC mA (Max.)	Incremental Current DC mA (Max.)
1641-393	39.0±10%	50	2.5	29	1.93	209	180
1641-473	47.0±10%	50	2.5	27	2.11	200	175
1641-563	56.0±10%	50	2.5	25	2.23	194	160
1641-683	68.0±10%	50	2.5	21	2.70	176	150
1641-823	82.0±10%	50	2.5	10.5	2.44	186	140
1641-104	100.0±10%	50	2.5	10.0	3.12	164	120
1641-124	120.0±10%	55	.79	9.7	3.60	153	95
1641-154	150.0±10%	55	.79	8.5	4.10	143	90
1641-184	180.0±10%	55	.79	8.0	4.40	138	85
1641-224	220.0±10%	55	.79	7.5	5.00	130	80
1641-274	270.0±10%	55	.79	7.0	5.80	120	70
1641-334	330.0±10%	55	.79	6.5	6.40	115	65
1641-394	390.0±10%	60	.79	6.2	7.40	107	60
1641-474	470.0±10%	60	.79	5.7	9.50	94	58
1641-564	560.0±10%	60	.79	4.7	10.5	90	55
1641-684	680.0±10%	60	.79	4.5	11.8	84	50
1641-824	820.0±10%	60	.79	4.2	13.0	80	45
1641-105	1000.0±10%	60	.79	3.8	17.5	70	40
1641-125	1200.0±10%	45	.25	1.5	22.1	62	35
1641-155	1500.0±10%	45	.25	1.2	26.5	56	33
1641-185	1800.0±10%	45	.25	1.0	29.9	53	30
1641-225	2200.0±10%	45	.25	.97	33.8	50	27
1641-275	2700.0±10%	45	.25	.92	47.3	42	25
1641-335	3300.0±10%	45	.25	.84	53.0	40	22
1641-395	3900.0±10%	45	.25	.80	73.8	34	20
1641-475	4700.0±10%	45	.25	.74	81.6	32	19
1641-565	5600.0±10%	44	.25	.73	98.9	29.0	17
1641-685	6800.0±10%	40	.25	.66	111.0	27.6	16
1641-825	8200.0±10%	40	.25	.54	119.0	26.6	15
1641-106	10000.0±10%	40	.25	.47	137.0	24.7	14

SERIES 2307

MILITARY SPECIFICATIONS:
MS-90537 (LT10K)



PHYSICAL PARAMETERS —
Length: .395±.020
Diameter: .157±.010
Lead Size: AWG #22 TCW.
Lead Length: 1.44±.12

CURRENT RATING at 90°C AMB.: 15°C Rise.

OPERATING TEMPERATURE: −55°C to +105°C.
POWER DISSIPATION at 90°C: .11 Watts Max.
WEIGHT IN GRAMS: .75 Max.
INCREMENTAL CURRENT: Current level which causes a Max. of 5% decrease in inductance.
COUPLING: 3% Max.

Part Number	Inductance Microhenries	Q Min.	Test Freq. (MHz)	Resonant Freq. Min. (MHz)	DC Resistance Max. (Ohms)	Current Rating DC mA (Max.)	Incremental Current DC mA (Max.)
2307-101	.10±10%	50	25	250	.025	1830	1830
2307-121	.12±10%	51	25	250	.034	1570	1570
2307-151	.15±10%	51	25	250	.037	1500	1500
2307-181	.18±10%	50	25	250	.047	1330	1330
2307-221	.22±10%	49	25	250	.067	1120	1120
2307-271	.27±10%	47	25	250	.11	870	870
2307-331	.33±10%	46	25	250	.13	800	800
2307-391	.39±10%	44	25	250	.18	680	680
2307-471	.47±10%	44	25	235	.25	580	580
2307-561	.56±10%	43	25	210	.33	505	505
2307-681	.68±10%	42	25	190	.45	430	430
2307-821	.82±10%	40	25	180	.59	375	375
2307-102	1.00±10%	47	25	140	.07	1090	1090
2307-122	1.20±10%	46	7.9	130	.093	900	900
2307-152	1.50±10%	45	7.9	115	.12	835	835
2307-182	1.80±10%	43	7.9	105	.14	775	775
2307-222	2.20±10%	45	7.9	100	.19	665	665
2307-272	2.70±10%	46	7.9	92	.28	545	545
2307-332	3.30±10%	44	7.9	85	.35	490	490
2307-392	3.90±10%	44	7.9	75	.40	455	455
2307-472	4.70±10%	44	7.9	70	.55	390	390
2307-562	5.60±10%	47	7.9	65	.72	340	340
2307-682	6.80±10%	50	7.9	55	1.02	285	285
2307-822	8.20±10%	50	7.9	50	1.32	250	250
2307-103	10.0 ±10%	49	7.9	46	1.62	228	228
2307-123	12.0 ±10%	55	2.5	44	2.00	205	205
2307-153	15.0 ±10%	44	2.5	49	.80	325	250
2307-183	18.0 ±10%	45	2.5	45	.89	305	235
2307-223	22.0 ±10%	46	2.5	41	.96	295	220
2307-273	27.0 ±10%	49	2.5	38	1.19	265	200
2307-333	33.0 ±10%	45	2.5	34	1.37	248	190

Part Number	Inductance Microhenries	Q Min.	Test Freq. (MHz)	Resonant Freq. Min. (MHz)	DC Resistance Max. (Ohms)	Current Rating DC mA (Max.)	Incremental Current DC mA (Max.)
2307-393	39.0±10%	53	2.5	29	1.93	209	180
2307-473	47.0±10%	52	2.5	27	2.11	200	175
2307-563	56.0±10%	49	2.5	25	2.23	194	160
2307-683	68.0±10%	51	2.5	21	2.70	176	150
2307-823	82.0±10%	45	2.5	10.5	2.44	186	140
2307-104	100.0±10%	52	2.5	10.0	3.12	164	120
2307-124	120.0±10%	57	.79	9.7	3.60	153	95
2307-154	150.0±10%	56	.79	8.5	4.10	148	90
2307-184	180.0±10%	60	.79	8.0	4.40	138	85
2307-224	220.0±10%	58	.79	7.5	5.00	130	80
2307-274	270.0±10%	60	.79	7.0	5.80	120	70
2307-334	330.0±10%	54	.79	6.5	6.40	115	65
2307-394	390.0±10%	67	.79	6.2	7.40	107	60
2307-474	470.0±10%	60	.79	5.7	9.50	94	58
2307-564	560.0±10%	60	.79	4.7	10.5	90	55
2307-684	680.0±10%	60	.79	4.5	11.8	84	50
2307-824	820.0±10%	57	.79	4.2	13.0	80	45
2307-105	1000.0±10%	65	.79	3.8	17.5	70	40
2307-125	1200.0±10%	45	.25	1.5	22.1	62	35
2307-155	1500.0±10%	49	.25	1.2	26.5	56	33
2307-185	1800.0±10%	47	.25	1.0	29.9	53	30
2307-225	2200.0±10%	50	.25	.97	33.8	50	27
2307-275	2700.0±10%	47	.25	.92	47.3	42	25
2307-335	3300.0±10%	43	.25	.84	53.0	40	22
2307-395	3900.0±10%	43	.25	.80	73.8	35	20
2307-475	4700.0±10%	44	.25	.74	81.6	32	19
2307-565	5600.0±10%	45	.25	.73	98.9	29	17
2307-685	6800.0±10%	43	.25	.66	111.0	27.6	16
2307-825	8200.0±10%	42	.25	.54	119.0	26.6	15
2307-106	10000.0±10%	39	.25	.47	137.0	24.7	14

Delevan
Division

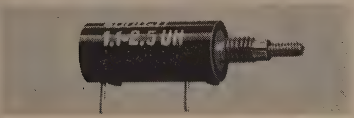
AMERICAN
PRECISION
INDUSTRIES INC.

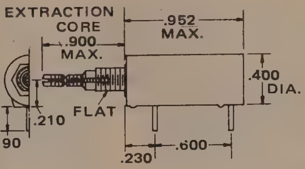
MOLDED VARIABLE RF

coils and inductive components

SERIES 4000 & 4100

MILITARY SPECIFICATIONS:
MS-90543 (LT12V)
MS-90546 (LT12V)





CURRENT RATING at 90°C AMB.: 15°C Rise.
OPERATING TEMPERATURE: −55°C to +105°C.
WEIGHT IN GRAMS: 7.0 Max.
CRIMP-ON TERMINAL —
Crimp-on terminals are available as an accessory.
Material: Tinned brass.

PHYSICAL PARAMETERS (Max.): .160″ sq. x .075″ High.

ORDERING INFORMATION:
1. Chart shows Tork-Tite design P/N. For Taper-Lock design replace the 4000 prefix with a 4100 prefix.
2. For optional crimp-on terminals — suffix total P/N with "TA."

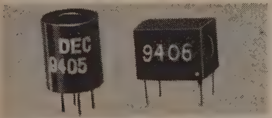
NOTE: Units can be used in either printed circuit or chassis mounted applications.

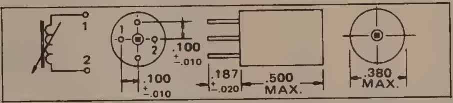
Part Number	Min. Core Position		Test Freq. (MHz)	Max. Core Position		SRF Min. (MHz)	DCR Max. (Ohms)	Current Rating DC mA (Max.)
	L Max.	Q Min.		L Min.	Q Min.			
POWER DISSIPATION AT 90°C: .213 Watts								
4000-00	.18 μH	85	25	.28 μH	100	225.0	.05	1800
4000-01	.23 μH	90	25	.40 μH	100	210.0	.05	1800
4000-02	.25 μH	95	25	.38 μH	110	200.0	.055	1720
4000-03	.29 μH	95	25	.64 μH	110	165.0	.055	1720
4000-04	.35 μH	95	25	.52 μH	110	185.0	.06	1650
4000-05	.37 μH	100	25	.90 μH	110	140.0	.06	1650
4000-06	.45 μH	105	25	.70 μH	110	165.0	.08	1430
4000-07	.50 μH	105	25/7.9	1.2 μH	95	125.0	.08	1430
4000-08	.62 μH	110	25	1.0 μH	110	125.0	.09	1340
4000-09	.70 μH	105	25/7.9	1.8 μH	90	95.0	.09	1340
4000-10	.83 μH	100	25/7.9	1.6 μH	65	100.0	.10	1280
4000-11	1.1 μH	75	7.9	2.5 μH	65	75.0	.10	1280
4000-12	1.3 μH	65	7.9	2.5 μH	80	78.0	.23	840
4000-13	1.3 μH	65	7.9	3.6 μH	65	68.0	.23	840
4000-14	1.7 μH	70	7.9	3.4 μH	85	62.0	.35	680
4000-15	2.0 μH	70	7.9	6.0 μH	75	56.0	.35	680
4000-16	2.6 μH	70	7.9	5.5 μH	95	52.0	.75	465
4000-17	3.0 μH	80	7.9	9.0 μH	100	45.0	.75	465
4000-18	3.8 μH	80	7.9	7.3 μH	95	42.0	1.00	405
4000-19	4.0 μH	80	7.9/2.5	11.0 μH	90	39.0	1.00	405
4000-20	5.8 μH	85	7.9/2.5	11.0 μH	90	34.0	1.4	340
4000-21	7.5 μH	80	7.9/2.5	18.0 μH	95	32.0	1.4	340
POWER DISSIPATION AT 90°C: .195 Watts								
4000-22	9.3 μH	65	7.9/2.5	18.0 μH	90	24.0	1.5	315
4000-23	12.0 μH	70	2.5	30.0 μH	100	21.0	1.5	315
4000-24	13.5 μH	70	2.5	27.0 μH	90	18.0	2.0	274
4000-25	15.0 μH	70	2.5	44.0 μH	90	16.0	2.0	274
4000-26	20.0 μH	75	2.5	40.0 μH	90	15.6	2.2	261
4000-27	25.0 μH	75	2.5	65.0 μH	90	13.0	2.2	261
4000-28	30.0 μH	80	2.5	58.0 μH	90	12.5	3.0	223
4000-29	35.0 μH	80	2.5	90.0 μH	85	10.0	3.0	223
4000-30	46.0 μH	80	2.5	87.0 μH	80	10.6	3.8	198
POWER DISSIPATION AT 90°C: .195 Watts (Cont'd)								
4000-31	55.0 μH	80	2.5/.79	130.0 μH	85	8.0	3.8	198
4000-32	70.0 μH	75	2.5/.79	130.0 μH	85	8.0	4.2	189
4000-33	80.0 μH	70	2.5/.79	200.0 μH	85	6.8	4.2	189
4000-34	105.0 μH	75	.79	170.0 μH	85	7.0	4.5	182
4000-35	120.0 μH	70	.79	290.0 μH	85	5.6	4.5	182
4000-36	150.0 μH	65	.79	250.0 μH	80	5.5	6.0	158
4000-37	200.0 μH	60	.79	430.0 μH	75	4.5	6.0	158
4000-38	225.0 μH	55	.79	390.0 μH	70	3.6	13.0	107
4000-39	300.0 μH	50	.79	620.0 μH	70	3.2	13.0	107
4000-40	360.0 μH	55	.79	600.0 μH	60	2.8	17.0	94
4000-41	400.0 μH	50	.79	1.00mH	60	2.4	17.0	94
POWER DISSIPATION AT 90°C: .165 Watts								
4000-42	570.0 μH	35	.79/.25	1.25mH	45	1.95	19.0	82
4000-43	600.0 μH	35	.79/.25	1.70mH	50	1.9	19.0	82
4000-44	1.05mH	40	.25	2.00mH	45	1.45	23.0	74
4000-45	1.05mH	35	.25	2.70mH	50	1.28	23.0	74
4000-46	1.60mH	35	.25	3.20mH	45	1.30	33.0	62
4000-47	1.70mH	30	.25	4.00mH	40	1.10	33.0	62
4000-48	2.50mH	35	.25	5.00mH	40	1.10	41.0	56
4000-49	2.50mH	30	.25	6.00mH	35	.84	41.0	56
4000-50	3.70mH	35	.25	7.50mH	40	.80	61.0	46
4000-51	3.70mH	30	.25	9.00mH	35	.70	61.0	46
4000-52	5.00mH	35	.25	10.0 mH	35	.65	81.0	40
4000-53	5.80mH	30	.25/.079	13.0 mH	30	.60	81.0	40
4000-54	8.50mH	35	.25/.079	16.0 mH	35	.46	120.0	32
4000-55	8.50mH	30	.25/.079	22.0 mH	35	.37	120.0	32
4000-56	12.5 mH	25	.079	25.0 mH	35	.34	170.0	27
4000-57	13.0 mH	25	.079	30.0 mH	35	.28	170.0	27
4000-58	20.0 mH	20	.079	38.0 mH	30	.28	230.0	23
4000-59	21.0 mH	20	.079	47.0 mH	25	.21	230.0	23
4000-60	30.0 mH	20	.079	56.0 mH	30	.22	345.0	19
4000-61	35.0 mH	20	.079	70.0 mH	25	.14	345.0	19

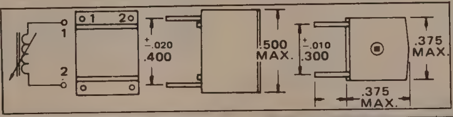
NOTE: All even dash numbers (-00, -02, -04 . . .) utilize Powdered Iron Cores. Odd dash numbers (-01, -03, -05 . . .) utilize Ferrite Cores.

SERIES 9405 & 9406

MILITARY SPECIFICATIONS:
MIL-C-15305C (LT6V)







LEADS: AWG #24 Tinned Copperweld.
TUNING TORQUE: 0.1 to 3.5 oz. in.
PIN #1: Identified by white dot.
CURRENT RATING at 90°C AMB.: 35°C Rise.
PHYSICAL PARAMETERS (Max.): .375″ sq. x .500″.
OPERATING TEMPERATURE: −55°C to +125°C.
POWER DISSIPATION at 90°C: .3 Watts.
WEIGHT IN GRAMS: 4.0 Max.
UNITS: Electro-magnetically shielded and tunable from either end.

Part Number 9405/9406	Nominal Inductance Microhenries	L Min. Microhenries	L Max. Microhenries	Test Freq. (MHz)	Q Min. at L Min.	Q Min. at L Max.	SRF Min. (MHz)	DC Resistance Max. (Ohms)	Current Rating DC mA (Max.)
-01	.10	.080	.120	25	45	43	250	.030	2690
-02	.15	.120	.180	25	53	50	198	.035	2490
-04	.22	.154	.286	25	55	52	195	.056	1970
-06	.33	.231	.429	25	51	49	142	.060	1900
-08	.47	.329	.611	25	53	51	110	.064	1840
-10	.68	.476	.884	25	51	48	130	.073	1720
-12	1.00	.700	1.30	25/7.9	51	67	95	.600	600
-14	1.50	1.05	1.95	7.9	55	82	76	.620	590
-16	2.20	1.54	2.86	7.9	65	103	57	.720	550
-18	3.30	2.31	4.29	7.9	70	91	39	1.05	455
-20	4.70	3.29	6.11	7.9	74	87	37	1.15	435
-22	6.80	4.76	8.84	7.9	72	88	27	1.30	410
-24	10.0	7.00	13.0	7.9/2.5	72	87	18	1.50	380
-26	15.0	10.5	19.5	2.5	66	93	16	2.35	305
-28	22.0	15.4	28.6	2.5	74	102	12	2.80	278
-30	33.0	23.1	42.9	2.5	83	110	11	3.00	269
-32	47.0	32.9	61.1	2.5	76	96	8.0	3.70	242
-34	68.0	47.6	88.4	2.5	70	73	7.0	4.35	223
-36	100	70.0	130	2.5/.79	65	67	6.5	5.50	198
-38	150	105	195	.79	53	81	4.5	9.20	153
-40	220	154	286	.79	61	83	3.5	9.70	149
-42	330	231	429	.79	42	57	3.2	14.0	124
-44	470	329	611	.79	48	67	3.1	15.0	120
-46	680	476	884	.79	45	57	2.4	20.0	104
-48	1000	700	1300	.79/.25	48	52	1.9	24.5	94.0
-50	1500	1050	1950	.25	38	53	1.3	30.0	85.0
-52	2200	1540	2860	.25	42	65	1.2	38.0	75.5
-54	3300	2310	4290	.25	42	57	.85	45.0	69.5
-56	4700	3290	6110	.25	38	51	.68	70.0	55.5
-58	6800	4760	8840	.25	38	49	.60	100.0	46.5
-60	10000	7000	13000	.25/.079	40	40	.50	115.0	43.5

ORDERING INFORMATION
Vertical Coil = Dash No. prefixed by 9405.
Horizontal Coil = Dash No. prefixed by 9406.
Additionally: an electrostatic shield is available on custom basis.

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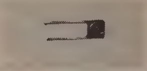
AMERICAN
PRECISION
INDUSTRIES INC.

270 QUAKER RD. / EAST AURORA, N. Y. 14052
TELEPHONE (716) 652-3600 TELEX 91-293

MICRO-I® COILS

coils and inductive components

SERIES 100



MILITARY SPECIFICATIONS:
MS-21367 (LT10K)

MECHANICAL CONFIGURATION:
1. Units are epoxy encapsulated.
2. Leads are tin-plated Beryllium Copper. (Gold plated leads available on special order.)

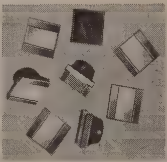
PHYSICAL PARAMETERS (Max.): .110″ sq. x .065″ High.
CURRENT RATING at 90°C: 15°C Rise.
OPERATING TEMPERATURE: −55°C to +105°C.
POWER DISSIPATION at 90°C: 20.5 mW.
WEIGHT IN GRAMS: .03 Max.

Part Number	Inductance Microhenries	Q Min.	Test Freq. (MHz)	Self-Resonant Freq. Min. (MHz)	DC Resistance Max. (Ohms)	Current Rating D.C. mA (Max.)
100-150	.015±30%	40	50	250	.065	492
100-220	.022±30%	40	50	250	.090	418
100-330	.033±30%	40	50	250	.115	370
100-470	.047±30%	40	50	250	.120	360
100-680	.068±30%	40	50	250	.150	324
100-101	.100±30%	40	50	250	.170	304
100-121	.12 ±20%	35	25	250	.140	335
100-151	.15 ±20%	40	25	250	.160	313
100-181	.18 ±20%	40	25	250	.190	287
100-221	.22 ±20%	40	25	250	.21	274
100-271	.27 ±20%	40	25	250	.24	256
100-331	.33 ±20%	40	25	250	.25	251
100-391	.39 ±20%	40	25	200	.28	237
100-471	.47 ±20%	40	25	175	.31	225
100-561	.56 ±20%	40	25	170	.45	185

Part Number	Inductance Microhenries	Q Min.	Test Freq. (MHz)	Self-Resonant Freq. Min. (MHz)	DC Resistance Max. (Ohms)	Current Rating D.C. mA (Max.)
100-681	.68±20%	40	25	165	.62	159
100-821	.82±20%	35	25	160	.65	155
100-102	1.00±20%	35	25	135	.73	145
100-122	1.20±10%	35	7.9	120	1.00	125
100-152	1.50±10%	32	7.9	110	1.20	114
100-182	1.80±10%	32	7.9	95	1.50	102
100-222	2.20±10%	35	7.9	80	1.70	96
100-272	2.70±10%	35	7.9	70	2.00	89
100-332	3.30±10%	37	7.9	65	2.20	84
100-392	3.90±10%	37	7.9	60	2.80	75
100-472	4.70±10%	40	7.9	55	3.10	71
100-562	5.60±10%	40	7.9	50	3.30	69
100-682	6.80±10%	40	7.9	45	3.80	64
100-822	8.20±10%	40	7.9	43	5.00	56
100-103	10.0 ±10%	40	7.9	40	5.60	53

CHIP INDUCTORS
SERIES 103

MILITARY SPECIFICATIONS:
MIL-C-15305 (LT4K & LT10K)



OPERATING TEMPERATURE —
LT4K: −55°C to +125°C.
LT10K: −55°C to +105°C.

CURRENT RATING at 90°C AMB —
Ferrite Core: 15°C Rise (LT10K)
Phenolic Core: 35°C Rise (LT4K).

WEIGHT MAX.: .03 Grams Max.

POWER DISSIPATION at 90°C: 75 mW Max.

THERMAL CONDUCTANCE: 5 mW/°C Min.

INSULATION RESISTANCE:
1000 Megohms Min. at 100 VDC.

PHYSICAL PARAMETERS (Max.): .110″ sq. x .075″ High.
Solder Rails both bottom and sides.

DIELECTRIC WITHSTANDING VOLTAGE:
Sea Level (14.7 psia) 140 Vrms.
Altitude 70K Ft. (.643 psia) 50 Vrms.

LOAD LIFE at 90°C: 2000 Hrs. at Rated Current.

PERCENT COUPLING: 3% Max.

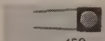
MECHANICAL CONFIGURATION:
1. Units have epoxy overcoat.
2. Contact areas for reflow soldering are gold plated per MIL-G-45204 Type 1 - Grade A.

Part Number	Inductance Microhenries	Q Min.	Test Freq. (MHz)	Self-Resonant Freq. Min. (MHz)	DC Resistance Max. (Ohms)	Current Rating D.C. mA (Max.)
CORE MATERIAL: PHENOLIC (LT4K)						
103-100M	.010±20%	60	50	250	.060	1490
103-150M	.015±20%	55	50	250	.078	1310
103-220M	.022±20%	50	50	250	.108	1110
103-330M	.033±20%	48	50	250	.120	1050
103-470M	.047±20%	42	50	250	.145	960
103-680M	.068±20%	36	50	250	.195	825
103-101M	.100±20%	32	50	250	.230	760
CORE MATERIAL: FERRITE (LT10K)						
103-121M	.12±20%	30	25	250	.125	675
103-151M	.15±20%	25	25	250	.175	570
103-181M	.18±20%	25	25	250	.200	535
103-221K	.22±10%	25	25	250	.220	510
103-271K	.27±10%	25	25	250	.230	500
103-331K	.33±10%	25	25	250	.235	490
103-391K	.39±10%	22	25	250	.240	485
103-471K	.47±10%	22	25	250	.260	470
103-561K	.56±10%	22	25	250	.278	455
103-681K	.68±10%	22	25	220	.520	330

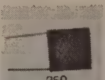
Part Number	Inductance Microhenries	Q Min.	Test Freq. (MHz)	Self-Resonant Freq. Min. (MHz)	DC Resistance Max. (Ohms)	Current Rating D.C. mA (Max.)
CORE MATERIAL: FERRITE (LT10K) (Cont'd)						
103-821K	.82±10%	22	25	200	.530	325
103-102K	1.0±10%	22	25	174	.540	320
103-122K	1.2±10%	22	7.9	154	.740	275
103-152K	1.5±10%	22	7.9	135	.840	260
103-182K	1.8±10%	22	7.9	117	.920	250
103-222K	2.2±10%	22	7.9	100	1.000	240
103-272K	2.7±10%	24	7.9	85	1.15	220
103-332K	3.3±10%	24	7.9	82	1.40	200
103-392K	3.9±10%	24	7.9	80	1.55	190
103-472K	4.7±10%	24	7.9	74	1.80	180
103-562K	5.6±10%	22	7.9	67	2.00	170
103-682K	6.8±10%	22	7.9	60	2.20	160
103-822K	8.2±10%	22	7.9	54	2.50	150
103-103K	10.0±10%	24	7.9	48	3.45	130
103-123K	12.0±10%	25	2.5	44	3.80	122
103-153K	15.0±10%	25	2.5	36	5.60	102
103-183K	18.0±10%	25	2.5	30	5.80	100
103-223K	22.0±10%	25	2.5	26	6.40	95
103-273K	27.0±10%	25	2.5	22	6.90	90

SERIES 150 & 250

MILITARY SPECIFICATIONS:
SERIES 150 **MS-21368** (LT10K)
SERIES 250 **MS-21369** (LT10K)



150



250

MECHANICAL CONFIGURATION:
1. Units are epoxy encapsulated.
2. Leads are tin-plated Beryllium Copper. (Gold plated leads available on special order.)

CURRENT RATING at 90°C: 15°C Rise.

OPERATING TEMPERATURE: −55°C to +105°C.

PHYSICAL PARAMETERS (Max.):
Series 150: .160″ sq. x .065″ high.
Series 250: .250″ sq. x .065″ High.

POWER DISSIPATION at 90°C —
Series 150: 22.5 mW.
Series 250: 37 mW.

WEIGHT IN GRAMS —
Series 150: .05 Max.
Series 250: .18 Max.

Part Number	Inductance Microhenries	Q Min.	Test Freq. (MHz)	Self-Resonant Freq. Min. (MHz)	DC Resistance Max. (Ohms)	Current Rating D.C. mA (Max.)
150-123	12.0±10%	45	2.5	32	3.50	70
150-153	15.0±10%	45	2.5	28	3.80	67
150-183	18.0±10%	45	2.5	24	4.50	62
150-223	22.0±10%	45	2.5	22	5.00	59
150-273	27.0±10%	45	2.5	20	6.30	52
150-333	33.0±10%	45	2.5	18	7.00	50
150-393	39.0±10%	45	2.5	16	8.20	46
150-473	47.0±10%	45	2.5	15	9.00	44
150-563	56.0±10%	45	2.5	13	13.0	36
150-683	68.0±10%	45	2.5	.12	14.0	35
150-823	82.0±10%	45	2.5	11	19.0	30
150-104	100 ±10%	45	2.5	10	23.0	27

Part Number	Inductance Microhenries	Q Min.	Test Freq. (MHz)	Self-Resonant Freq. Min. (MHz)	DC Resistance Max. (Ohms)	Current Rating D.C. mA (Max.)
250-124	120±10%	45	.79	6.0	10.0	53
250-154	150±10%	45	.79	5.5	16.0	42
250-184	180±10%	45	.79	5.0	18.0	40
250-224	220±10%	45	.79	4.3	20.0	38
250-274	270±10%	45	.79	3.6	22.0	36
250-334	330±10%	45	.79	3.3	24.0	34
250-394	390±10%	45	.79	3.0	26.0	33
250-474	470±10%	40	.79	2.7	31.0	30
250-564	560±10%	40	.79	2.4	36.0	28
250-684	680±10%	40	.79	2.2	41.0	26
250-824	820±10%	40	.79	2.0	47.0	25
250-105	1000±10%	35	.79	1.8	54.0	23

NOTES: 1. Measurement Techniques: L, Q and SRF measured on Boonton Q and Rx meters using special test fixtures. Details for fixtures available.
2. Marking: Part number and quantity will appear on package as units are too small for legible marking.

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AMERICAN
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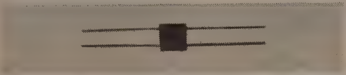
INDUSTRIES INC.

MOLDED MICRO-I® COILS

SERIES 155

MILITARY SPECIFICATIONS:
MIL-C-15305 (LT10K)



PHYSICAL PARAMETERS (Max.) .160″ Sq. x .075″ High.

CURRENT RATING at 90°C: 15°C Rise.

OPERATING TEMPERATURE: −55°C to +105°C.

POWER DISSIPATION at 90°C: 22.5 mW.

WEIGHT IN GRAMS: .15 Max.

Part Number	Inductance Microhenries	Q Min.	Test Freq. (MHz)	Self-Resonant Freq. Min. (MHz)	DC Resistance Max. (Ohms)	Current Rating D.C. mA (Max.)
155-150	.015±30%	40	50	250	.085	450
155-220	.022±30%	40	50	250	.090	440
155-330	.033±30%	40	50	250	.115	385
155-470	.047±30%	40	50	250	.120	380
155-680	.068±30%	40	50	250	.150	340
155-101	.100±30%	40	50	250	.170	320
155-121	.12 ±20%	35	25	250	.140	350
155-151	.15 ±20%	40	25	250	.160	330
155-181	.18 ±20%	40	25	250	.190	300
155-221	.22 ±20%	40	25	250	.21	286
155-271	.27 ±20%	40	25	250	.24	268
155-331	.33 ±20%	40	25	250	.25	262
155-391	.39 ±20%	40	25	200	.28	248
155-471	.47 ±20%	40	25	175	.31	235
155-561	.56 ±20%	40	25	170	.45	195
155-681	.68 ±20%	40	25	165	.62	166
155-821	.82 ±20%	40	25	135	.65	162
155-102	1.00 ±20%	40	25	120	.73	153
155-122	1.20 ±10%	40	7.9	105	1.00	131
155-152	1.50 ±10%	40	7.9	90	1.20	120
155-182	1.80 ±10%	40	7.9	75	1.50	107

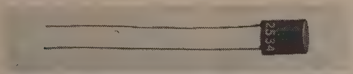
Part Number	Inductance Microhenries	Q Min.	Test Freq. (MHz)	Self-Resonant Freq. Min. (MHz)	DC Resistance Max. (Ohms)	Current Rating D.C. mA (Max.)
155-222	2.20±10%	40	7.9	65	1.70	101
155-272	2.70±10%	40	7.9	60	2.00	93
155-332	3.30±10%	40	7.9	54	2.20	88
155-392	3.90±10%	40	7.9	50	2.80	78
155-472	4.70±10%	40	7.9	45	3.10	74
155-562	5.60±10%	40	7.9	42	3.30	72
155-682	6.80±10%	40	7.9	38	3.80	67
155-822	8.20±10%	40	7.9	35	5.00	58
155-103	10.0 ±10%	40	7.9	33	5.60	55
155-123	12.0 ±10%	45	2.5	32	3.50	69
155-153	15.0 ±10%	45	2.5	28	3.80	66
155-183	18.0 ±10%	45	2.5	24	4.50	61
155-223	22.0 ±10%	45	2.5	22	5.00	58
155-273	27.0 ±10%	45	2.5	20	6.30	52
155-333	33.0 ±10%	45	2.5	17	7.00	49
155-393	39.0 ±10%	45	2.5	16	8.20	45
155-473	47.0 ±10%	45	2.5	15	9.00	43
155-563	56.0 ±10%	45	2.5	13	13.00	36
155-683	68.0 ±10%	45	2.5	12	14.00	35
155-823	82.0 ±10%	45	2.5	11	19.00	30
155-104	100.0 ±10%	45	2.5	10	23.00	27

NOTES:
1. Coil terminations are thermal-compression bonded.
2. Measurement Techniques: L, Q and SRF measured in Boonton Q and Rx meters using special test fixtures. Measurements to be made between terminals 1 and 2. Details for fixtures available.
3. Marking: Delevan part number is printed on top surface. Terminals 1 and 2 are oriented to the right of part number.

POTTED COILS

SERIES 2534

MILITARY SPECIFICATIONS:
MIL-C-15305 (LT6K)



PHYSICAL PARAMETERS —
Height: .345 Max.
Diameter: .25±.010
Lead Size: AWG. #24 TCW.
Lead Length: 1.62±.12
Lead Spacing: .200 +.010—.030

CURRENT RATING at 90°C AMB.: 35°C Rise.

OPERATING TEMPERATURE: −55°C to +125°C.

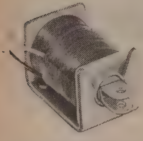
POWER DISSIPATION at 90°C: .23 Watts Max.

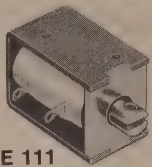
WEIGHT IN GRAMS: .86 Max.

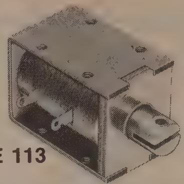
Part Number	Inductance Millihenries	Q Min.	Test Freq. (KHz)	Resonant Freq. Min. (MHz)	DC Resistance Max. (Ohms)	Current Rating D.C. mA (Max.)
2534-00	.10±10%	80	790	3.6	1.8	305
2534-02	.12±10%	80	790	3.3	2.0	290
2534-04	.15±10%	75	790	3.2	2.1	283
2534-06	.18±10%	70	790	2.8	2.2	277
2534-08	.22±10%	65	790	2.5	2.4	265
2534-10	.27±10%	80	790	2.3	3.2	229
2534-12	.33±10%	75	790	2.2	3.6	216
2534-14	.39±10%	70	790	2.0	4.1	203
2534-16	.47±10%	65	790	1.9	4.5	193
2534-18	.56±10%	65	790	1.8	4.8	187
2534-20	.68±10%	60	790	1.7	5.5	175
2534-22	.82±10%	50	790	1.6	6.1	166
2534-24	1.00±10%	45	790	1.4	6.5	161
2534-26	1.20±10%	70	250	1.2	11	124
2534-28	1.50±10%	70	250	1.15	12	118
2534-30	1.80±10%	70	250	1.1	17	100
2534-32	2.20±10%	70	250	.95	18	97
2534-34	2.70±10%	65	250	.75	24	84
2534-36	3.30±10%	65	250	.72	27	79
2534-38	3.90±10%	65	250	.68	30	75

Part Number	Inductance Millihenries	Q Min.	Test Freq. (KHz)	Resonant Freq. Min. (MHz)	DC Resistance Max. (Ohms)	Current Rating D.C. mA (Max.)
2534-40	4.70±10%	60	250	.61	34	70
2534-42	5.60±10%	60	250	.60	37	68
2534-44	6.80±10%	55	250	.48	45	61
2534-46	8.20±10%	50	250	.47	48	59
2534-48	10.0 ±10%	45	250	.42	51	58
2534-50	12.0 ±15%	35	79	.41	105	40
2534-52	15.0 ±15%	35	79	.32	120	38
2534-54	18.0 ±15%	35	79	.30	140	35
2534-56	22.0 ±15%	35	79	.25	170	31.5
2534-58	27.0 ±15%	35	79	.24	245	26.2
2534-60	33.0 ±15%	30	79	.19	280	24.5
2534-62	39.0 ±15%	30	79	.18	330	22.6
2534-64	47.0 ±15%	30	79	.17	370	21.3
2534-66	56.0 ±15%	25	79	.16	460	19.1
2534-68	68.0 ±15%	20	79	.13	550	17.5
2534-70	82.0 ±15%	18	79	.12	610	16.6
2534-72	100.0 ±15%	15	79	.11	670	15.8
2534-74	120.0 ±15%	10	50	.09	1200	11.8
2534-76	150.0 ±15%	10	50	.06	1410	10.9

SOLENOIDS


E 109


E 111


E 113

■ Voltages from 6 V to 230 V AC or DC ■ Custom lead lengths and terminal variations ■ Special plunger lengths and styles ■ Impregnated or encapsulated models

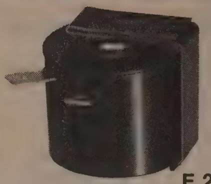
Specifications

	Power Requirement Intermittent/Continuous (25%)	Pull (Continuous Only)
E 109	18 W/4.5 W	8 oz. @ .05" gap
E 111	20 W/5.2 W	20 oz. @ .05" gap
E 113	30 W/8 W	35 oz. @ .05" gap

■ All metal parts are zinc plated. ■ Staked yoke standard. You may specify conical or flat plungers on production orders. ■ Life expectancy at rated load: 5 x 10^6.

BUZZERS

E 29L


E 29T

■ Produce loud, distinctive sound ■ Mount quickly, easily with single screw ■ Manufactured with exclusive Uni-Weld® process

Specifications

Order by number code: E 29 or E 30	Terminals		Leads (5" Length Standard)	
	E 29	E 30	E 29	E 30
6 Volt, 60 Hz.	6E29T	6E30T	6E29L	6E30L
12 Volt, 60 Hz.	12E29T	12E30T	12E29L	12E30L
24 Volt, 60 Hz.	24E29T	24E30T	24E29L	24E30L
120 Volt, 60 Hz.	120E29T	120E30T	120E29L	120E30L

Ask about quantity prices.
Special voltages and terminals available.

VIBRATORS

E 305

E 301

■ Improve distribution and flow of solid or liquid materials ■ Long life ■ Noiseless ■ Adhesive mounting pad ■ Easy to install

Specifications

Model: Miniature Vibrator, E 305
Voltage: 115 V AC, continuous duty (other voltages to specification)
Input: 5 watts
Vibrating Frequency: 120 cps.
Force: 2.5 g's
Size: 1.50" (3.81 cm) x 1.00" (2.54 cm) x 1.25" (3.18 cm)
Weight: 1.8 oz. (50 gms.)

CLICKERS

E 8600

■ Creates distinctive sound in electronic keyboards
■ Reduces chance of error on "silent", "soft-touch" keyboards

Specifications

Duty Cycle: Approx. 15% max.
Coil: 20 ohm
Coil Insulation: 1500 V AC, 60 Hz. to frame. Other voltages to specification. Special windings available to suit other operating conditions.
Recommended Conditions: 20 volt pulse for 5 millisecond duration. (Signal may be varied by changing the duration of applied pulse.)
Termination: 8" leads standard. Terminals available.

Coil products to your specifications

Coils for any application: solenoids, power converters, relays, printers, reed switches, clocks, motors, clutches, tachometers, controls, transformers, vibrators, buzzers.

Check our capabilities: random wound bobbin coils, thread interweave coils, coil assemblies, transfer molding, encapsulation, impregnation, fluidized bedcoating, ultrasonic welding.

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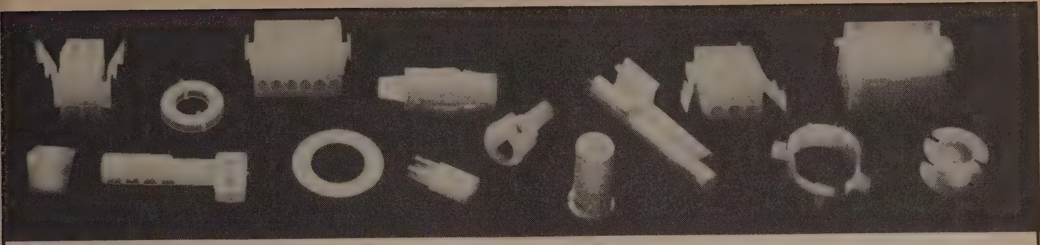

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Single source responsibility with all in-plant facilities and services from concept to delivery. Complete design and engineering ability, precision tool making, production and quality control to meet or exceed customary tolerances.

Harbison does it all ....

Specializing in injection molding of electrical and electronic components including coil forms, bobbins and connector housings. Materials such as glass filled nylon, Zytel 101, Valox, Delrin, Noryl, and phenolics.

modular family molding !!!

The economies of multiple cavity molding with the precision and quality of custom molding . . . allow a mix or match with significant savings. All this and industry-beating delivery time!

Harbison customers are sold but **never** forgotten

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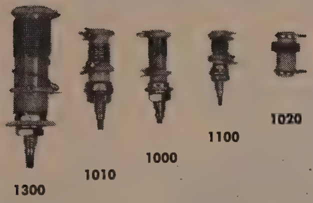
TO COVER ALL FREQUENCY RANGES FROM AUDIO TO 200 MHZ

COILS ON CERAMIC FORMS PER MIL-I-10

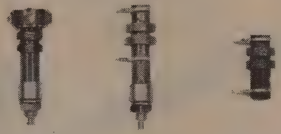


Series No.	Dimensions (Inches) Dia.	Dimensions (Inches) Length	Mtg. Hole Dia. (Inches)
1000	.50	.88	.196
1020	.50	.63	.050, .500 Apart
1100	.33	.63	.166
1300	.70	1.80	.252
1010	.43	.88	.196

Miniature 1000 Series

Part No.	Range Microhenries	Average Q
1000-A	1.0- 1.6	70 @ 7.9 MHz
1000-B	1.6- 2.7	80 @ 7.9 MHz
1000-C	2.7- 4.5	85 @ 7.9 MHz
1000-D	4.5- 8.5	85 @ 7.9 MHz
1000-E	8.5-14.5	75 @ 2.5 MHz
1000-F	14.5-22	65 @ 2.5 MHz
1000-G	22-29	65 @ 2.5 MHz
1000-H	29-55	85 @ 2.5 MHz
1000-I	55-110	80 @ 2.5 MHz
1000-J	110-185	85 @ .79 MHz
1000-K	185-305	85 @ .79 MHz
1000-L	305-515	85 @ .79 MHz
1000-M	515-820	85 @ .79 MHz
1000-N	820-1100	75 @ .79 MHz
RF Printed Circuit Coils		
1020-A	0.41- 0.53	75 @ 25 MHz
1020-B	0.85- 1.15	65 @ 7.9 MHz
1020-C	1.87- 2.50	65 @ 7.9 MHz
1020-D	4.0 - 5.4	70 @ 7.9 MHz
1020-E	7.5 -12.5	70 @ 2.5 MHz
1020-F	20 -29	80 @ 2.5 MHz
1020-G	33 -61	80 @ 2.5 MHz
1020-H	80 -120	60 @ 0.79 MHz
1020-I	170 -260	70 @ 0.79 MHz
Subminiature 1100 Series		
1100-A	0.9- 1.4	60 @ 7.9 MHz
1100-B	1.4- 1.9	70 @ 7.9 MHz
1100-C	1.9- 2.6	65 @ 7.9 MHz
1100-D	2.6- 3.7	65 @ 7.9 MHz
1100-E	3.7- 5.5	65 @ 7.9 MHz
1100-F	5.5- 7.4	60 @ 7.9 MHz
1100-G	7.4-12.5	70 @ 7.9 MHz
1100-H	12.5-18.0	65 @ 2.5 MHz
1100-I	18.0-28.0	70 @ 2.5 MHz
1100-J	28.0-38.0	70 @ 2.5 MHz
1100-K	38.0-55.0	70 @ 2.5 MHz
Transmitter 1300 Series		
1300-A		For use from 90-200 MHz
1300-B		For use from 40-90 MHz
1300-C		For use from 20-40 MHz
1300-D	0.7- 1.1	170 @ 25 MHz
1300-E	1.1- 1.7	130 @ 7.9 MHz
1300-F	1.7- 2.7	140 @ 7.9 MHz
1300-G	2.7- 4.5	140 @ 7.9 MHz
1300-H	4.5- 6.8	140 @ 7.9 MHz
1300-I	6.8-10.8	140 @ 7.9 MHz
1300-J	10.8-17.0	110 @ 2.5 MHz
1300-K	17.0-29.0	95 @ 2.5 MHz
1300-L	29.0-45.0	100 @ 2.5 MHz
1300-M	45.0-75.0	100 @ 2.5 MHz
HF Coils, Variable Approx. ±15%		
1010-A	0.118	115 @ 50 MHz
1010-B	0.225	125 @ 25 MHz
1010-C	0.315	130 @ 25 MHz

WIDE ADJUSTMENT RANGE 120 SERIES



120 Series
Mica-filled form
.75″ O.D. x 1.3″ H.
.196″ dia. mtg. hole

PCS-120 Series
Phenolic form

PC-120 Series
Phenolic form
.5″ O.D. x 1.25″ L.
.05″ Pins,
.70″ Apart

Part No.	Range Microhenries	Average Q
120-A	2-3	70 @ 7.9 MHz
120-B	3-5	80 @ 7.9 MHz
120-C	5-9	85 @ 7.9 MHz
120-D	9-18	65 @ 2.5 MHz
120-E	18-36	70 @ 2.5 MHz
120-F	36-64	65 @ 2.5 MHz
120-G	64-105	85 @ 2.5 MHz
120-H	105-200	80 @ .79 MHz
120-I	200-500	75 @ .79 MHz
120-J	500-1000	85 @ .79 MHz
120-K	1000-2000	50 @ .25 MHz

Subminiature 600 Series

- Variable ±10%
- Shielded
- 0.3″ O.D. x 0.4″ H
- .020″ Leads .30″ Apart

Part No.	Nominal Microhenries	Average Q
600U1X0	1.0	120 @ 7.9 MHz
600U1X5	1.5	120 @ 7.9 MHz
600U2X2	2.2	120 @ 7.9 MHz
600U3X3	3.3	130 @ 7.9 MHz
600U4X7	4.7	125 @ 7.9 MHz
600U6X8	6.8	140 @ 7.9 MHz
600U10X	10	135 @ 7.9 MHz
600U15X	15	130 @ 2.5 MHz
600U22X	22	135 @ 2.5 MHz
600U33X	33	130 @ 2.5 MHz
600U47X	47	130 @ 2.5 MHz
600U68X	68	120 @ 2.5 MHz
600MX10	100	100 @ 2.5 MHz
600MX15	150	125 @ .79 MHz
600MX22	220	130 @ .79 MHz
600MX33	330	125 @ .79 MHz
600MX47	470	120 @ .79 MHz
600MX68	680	100 @ .79 MHz
600M1X0	1000	100 @ .79 MHz

High Q RF Coils, Fixed

- .75″ O.D. x .63″ H
- Hermetically sealed
- Complete shielding
- For printed circuitry
- For standard circuitry

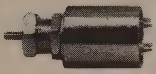
Part No.	Nominal Microhenries	Average Q
1219-A	0.47± 5%	90 @ 20 MHz
1219-B	1.0 ± 5%	100 @ 10 MHz
1219-C	2.2 ± 5%	130 @ 8 MHz
1219-D	4.7 ± 5%	130 @ 5 MHz
1219-E	10 ± 5%	130 @ 3 MHz
1219-F	22 ± 3%	185 @ 1.7 MHz
1219-G	47 ±3%	185 @ 1 MHz
1219-H	100 ±3%	200 @ 0.8 MHz
1219-I	220 ±3%	225 @ 0.7 MHz
1219-J	470 ±3%	250 @ 0.6 MHz
1219-K	1000 ±3%	300 @ 0.5 MHz
1219-L	2200 ±3%	300 @ 0.25 MHz

Hi Q 801, 802 Series, Adjustable ±10%

801, 802 Series
1.18″ O.D. x .93″ H

Part No.	Nominal Millihenries	Peak Q
801M1X0	1.0	100 @ 10 kHz
801M1X5	1.5	100 @ 10 kHz
801M2X2	2.2	100 @ 10 kHz
801M3X3	3.3	100 @ 10 kHz
801M4X7	4.7	100 @ 10 kHz
801M6X8	6.8	100 @ 10 kHz
801M10X	10	200 @ 20 kHz
801M15X	15	200 @ 20 kHz
801M22X	22	200 @ 20 kHz
801M33X	33	200 @ 20 kHz
801M47X	47	200 @ 20 kHz
801M68X	68	200 @ 20 kHz
801HX10	100	300 @ 30 kHz
801HX15	150	300 @ 30 kHz
801HX22	220	300 @ 30 kHz
801HX33	330	250 @ 20 kHz
801HX47	470	250 @ 20 kHz
801HX68	680	250 @ 20 kHz
801H1X0	1000	150 @ 15 kHz
802M1X0	1.0	400 @ 100 kHz
802M1X5	1.5	400 @ 100 kHz
802M2X2	2.2	400 @ 100 kHz
802M3X3	3.3	400 @ 100 kHz
802M4X7	4.7	400 @ 100 kHz
802M6X8	6.8	400 @ 100 kHz
802M10X	10	400 @ 70 kHz
802M15X	15	400 @ 70 kHz
802M22X	22	400 @ 70 kHz
802M33X	33	400 @ 70 kHz
802M47X	47	400 @ 40 kHz

SHIELDED COILS



- Shielded
- Encapsulated

- .44″ Diameter **900 Series**

Part No.	Range Microhenries	Average Q
900-A	0.5- 0.8	80 @ 25 MHz
900-B	0.8- 1.3	70 @ 18 MHz
900-C	1.3- 2.0	60 @ 15 MHz
900-D	2.0- 4.0	70 @ 8 MHz
900-E	4.0- 7.0	70 @ 5 MHz
900-F	7.0-12.0	70 @ 4 MHz
900-G	12.0-20.0	70 @ 3 MHz
900-H	20.0-35.0	70 @ 2.5 MHz
900-I	35.0-60.0	70 @ 2.0 MHz
900-J	60.0-100.0	70 @ 1.0 MHz

- .63″ Diameter **1500 Series**

Part No.	Range Millihenries	Average Q
1500-A	.100- .175	80 @ 790 kHz
1500-B	.175- .300	80 @ 790 kHz
1500-C	.300- .500	80 @ 790 kHz
1500-D	.500- .800	75 @ 790 kHz
1500-E	.800-1.15	55 @ 500 kHz
1500-F	1.15-1.50	55 @ 250 kHz
1500-G	1.50-2.30	55 @ 250 kHz
1500-H	2.30-3.50	50 @ 250 kHz
1500-I	3.50-7.50	40 @ 250 kHz

For North Hills Wideband Transformers See Section 5600.

North Hills Electronics, INC.

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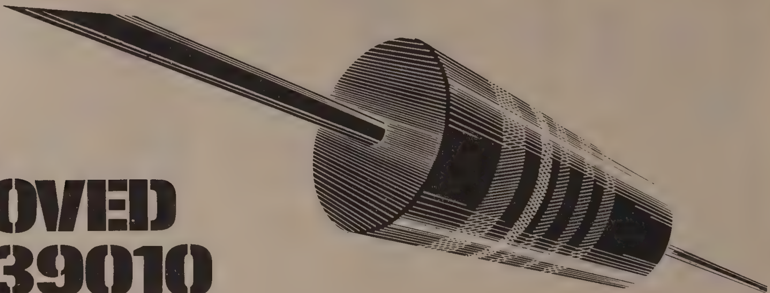

APPROVED MIL-C-39010

FAILURE RATE "P" .1%/1000 HRS.

Nytronics' history of technical leadership in inductors has a new chapter. The first company to extend the standard line concept to variable inductors has remained ahead in every subsequent step of refinement and miniaturization.

Today, there's a new place for a familiar group of inductors under highest reliability military specifications—MIL-C-39010 (latest revision). The unique "T" lead construction eliminates fine wire consideration that has previously concerned design engineers on critical circuitry.

With sizes ranging from the world's smallest shielded inductor to the most complex variable inductor . . . shielded, unshielded, chip and variable, in hundreds of off-the-shelf values. . . it makes good sense to check first with Nytronics or your local distributor.

Now tested and approved to highest reliability military specifications.

Nytronics Standard Inductor Part Number	Standard Military Series	New High Reliability Qualification
SWD	MS90537	MIL-C-39010-1A, 2A, + 3A
SWD	MS75087	MIL-C-39010-1A
SWD	MS75088	MIL-C-39010-2A
SWD	MS75089	MIL-C-39010-3A
RFC-S	MS75008	MIL-C-39010-4A
RFC-S	MS75101	MIL-C-39010-5A
RFC-SS	MS18130	MIL-C-39010-6A
RFC-SS	MS14046	MIL-C-39010-7A

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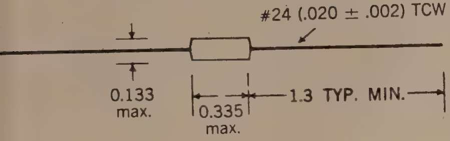
Inductors

WEE-WEE-DUCTOR SERIES

The smallest shielded inductor for high density circuits 0.10 to 1,000 uh 0.133" diameter x 0.335" length. We have 49 stock values.

The **WEE-WEE-DUCTOR** offers the Design Engineer a subminiature shielded inductor to solve special problems in density circuit application. This shielded inductor has great inductance-to-size ratio and is designed to meet the stringent requirements of MIL-C-15305 (latest revision).

0.10 to 10,000uH
0.133" diameter x 0.335" length
49 stock values



ELECTRICAL CHARACTERISTICS

Inductance Tolerance:	±10% (Q-Meter).
Dielectric Strength:	700 volts RMS at sea level.
Self-Resonant Frequency:	Minimum f_o to be not less than 80% of published data, and measured with full length leads on Q-Meter.
Rating:	I maximum based on ⅓ watt dissipation.

DENSITY CHARACTERISTICS

Volume:	0.0041 cubic inches.
Weight:	0.50 grams maximum.
Shielding:	Less than 3% coupling with two units mounted side by side at 1000 cycles.

PHYSICAL AND ENVIRONMENTAL CHARACTERISTICS

Operating Temperature:	−55°C to +125°C.
Terminal Strength:	Meets five pound pull test; five 360° rotations in alternate directions per MIL-C-15305 (latest revision).
Moisture, Vibration and Shock Resistance:	Meets requirements of MIL-C-15305 (latest revision). High Frequency: 10 cps to 2000 cps @ 15G ±10% maximum for 12 logarithmic swings each of 20 minute duration repeated for each of three mutually perpendicular planes. Shock: 50G, 11 MS.
Marking:	Color coded per MIL-C-15305 (latest revision).

WEE-WEE-DUCTOR STANDARD VALUES

NCG PART NO.	L	Q min.		approx. SRF	Max. DCR	Max. I	Incr.* I
	µH		MHz	MHz	Ω	mA	mA
WEE-WEE- 0.10	0.10	42	25	500	.112	1720	>1720
WEE-WEE- 0.12	0.12	42	25	500	.126	1630	>1630
WEE-WEE- 0.15	0.15	42	25	500	.138	1550	>1550
WEE-WEE- 0.18	0.18	42	25	458	.165	1420	>1420
WEE-WEE- 0.22	0.22	42	25	414	.198	1330	>1330
WEE-WEE- 0.27	0.27	42	25	373	.220	1230	>1230
WEE-WEE- 0.33	0.33	42	25	360	.258	1140	>1140
WEE-WEE- 0.39	0.39	42	25	339	.292	1060	>1060
WEE-WEE- 0.47	0.47	41	25	309	.360	960	> 960
WEE-WEE- 0.56	0.56	39	25	295	.397	915	> 915
WEE-WEE- 0.68	0.68	36	25	270	.472	840	> 840
WEE-WEE- 0.82	0.82	35	25	250	.638	720	> 720
WEE-WEE- 1.0	1.0	42	25	170	.208	1260	>1260
WEE-WEE- 1.2	1.2	38	7.9	150	.225	1210	>1210
WEE-WEE- 1.5	1.5	38	7.9	139	.265	1120	>1120
WEE-WEE- 1.8	1.8	38	7.9	129	.285	1080	>1080
WEE-WEE- 2.2	2.2	36	7.9	118	.330	1000	>1000
WEE-WEE- 2.7	2.7	38	7.9	106	.381	935	> 935
WEE-WEE- 3.3	3.3	38	7.9	98	.432	875	> 875
WEE-WEE- 3.9	3.9	40	7.9	91	.576	755	> 755
WEE-WEE- 4.7	4.7	42	7.9	83	.787	650	> 650
WEE-WEE- 5.6	5.6	42	7.9	77	1.04	565	> 565
WEE-WEE- 6.8	6.8	45	7.9	67	1.40	485	> 485
WEE-WEE- 8.2	8.2	47	7.9	62	1.68	440	> 440
WEE-WEE- 10	10	51	7.9	55	2.58	355	> 355
WEE-WEE- 12	12	51	2.5	49	3.65	300	> 300
WEE-WEE- 15	15	45	2.5	55	.862	620	200
WEE-WEE- 18	18	43	2.5	50	1.02	570	175
WEE-WEE- 22	22	42	2.5	45	1.12	545	160
WEE-WEE- 27	27	37	2.5	41	1.28	510	155
WEE-WEE- 33	33	46	2.5	37	1.70	440	150
WEE-WEE- 39	39	38	2.5	33	1.99	405	145
WEE-WEE- 47	47	42	2.5	29	2.41	370	140
WEE-WEE- 56	56	41	2.5	27	2.85	340	130
WEE-WEE- 68	68	46	2.5	23	3.21	320	120
WEE-WEE- 82	82	46	2.5	21	3.57	305	115
WEE-WEE- 100	100	43	2.5	19	4.10	280	100
WEE-WEE- 120	120	50	0.79	16	5.97	235	80
WEE-WEE- 150	150	49	0.79	15	7.05	215	68
WEE-WEE- 180	180	56	0.79	14	8.12	200	64
WEE-WEE- 220	220	53	0.79	12	14.8	150	60
WEE-WEE- 270	270	57	0.79	11.5	16.8	140	58
WEE-WEE- 330	330	57	0.79	10.5	18.6	130	56
WEE-WEE- 390	390	57	0.79	10.0	21.1	120	54
WEE-WEE- 470	470	50	0.79	8.5	32.2	100	52
WEE-WEE- 560	560	50	0.79	7.5	36.4	95	50
WEE-WEE- 680	680	56	0.79	7.0	41.1	90	48
WEE-WEE- 820	820	49	0.79	6.5	45.0	85	47
WEE-WEE-1000	1000	49	0.79	6.0	52.0	80	45

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* Incremental Current: The D.C. current required to cause a maximum reduction of 5 percent from nominal inductance value.

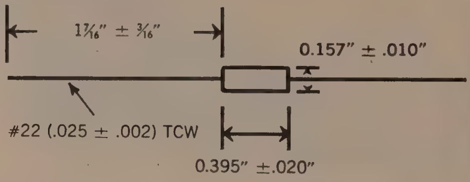
Nytronics Components Group Inc.
ORANGE STREET, DARLINGTON, S. C. 29532
(803) 393-5421 • TWX 810-665-2182

Inductors

MS-INDUCTOR SERIES
75087, 75088, 75089
MOLDED SHIELDED INDUCTOR

Ultra-Reliable Molded Shielded Miniature Inductor.
Inductance Range: 0.1uH to 100,000uH.

The **MS-INDUCTOR SERIES** are R.F. Inductors specifically designed to meet the demanding requirements of MIL-C-15305 (latest revision). The MS-INDUCTOR Series epoxy molded envelope and shielding offers the design engineer reliability, electrical performance, and minimum coupling in high density packaging.



ELECTRICAL CHARACTERISTICS

Inductance Tolerance: ±10% over the entire inductance range.
Dielectric Strength: 700 volts RMS at sea level.
Self-Resonant Frequency: Measured per MIL-C-15305 (latest revision).
Q: Measured on a Q-Meter.
Maximum Current: Based on temperature rise not to exceed 15°C at 90°C ambient.

DENSITY CHARACTERISTICS

Volume: 0.0076 cubic inches **Weight:** 0.75 grams maximum
Shielding: At 1000 cycles two units assembled side by side exhibit less than 3% coupling.

PHYSICAL AND ENVIRONMENTAL CHARACTERISTICS

Operating Temperature: −55°C to +105°C.

Terminal Strength: Meets five pound pull test; five 360° rotations in alternate directions per MIL-C-15305 (latest revision).

Moisture, Vibration, and Shock Resistance: Meets requirements of MIL-C-15305 (latest revision), Grade 1, Class B. High frequency 10 cps to 2000 cps @ 15G ±10% maximum for 12 lograithmic swings each of 20 minute duration repeated for each of three mutually perpendicular planes. Shock: 50G, 11 MS.

Marking: Color coded per MIL-C-15305 (latest revision).

Material	MS No.	NCG P/N	L	Q min		Min. SRF	Max. DCR	Max. I	Incr.† I
			uH		MHz	MHz	Ω	mA	mA
PHENOLIC	MS75087-1	SWD	0.10	50	25	250	0.025	1790	>2900
	MS75087-2	SWD	0.12	51	25	250	0.034	1530	>2800
	MS75087-3	SWD	0.15	51	25	250	0.037	1470	>2750
	MS75087-4	SWD	0.18	50	25	250	0.047	1300	>2200
	MS75087-5	SWD	0.22	49	25	250	0.067	1100	>1700
	MS75087-6	SWD	0.27	47	25	250	0.11	855	>1500
	MS75087-7	SWD	0.33	46	25	250	0.13	780	>1300
	MS75087-8	SWD	0.39	44	25	250	0.18	670	>1100
	MS75087-9	SWD	0.47	44	25	235	0.25	565	>1000
	MS75087-10	SWD	0.56	43	25	210	0.33	490	> 900
	MS75087-11	SWD	0.68	42	25	190	0.45	420	> 750
	MS75087-12	SWD	0.82	40	25	180	0.59	370	> 600
IRON	MS75088-1	SWD	1.0	44	25	140	0.070	1070	>1900
	MS75088-2	SWD	1.2	44	7.9	130	0.093	895	>1600
	MS75088-3	SWD	1.5	44	7.9	115	0.12	815	>1300
	MS75088-4	SWD	1.8	44	7.9	105	0.14	775	>1200
	MS75088-5	SWD	2.2	44	7.9	100	0.19	650	>1100
	MS75088-6	SWD	2.7	44	7.9	92	0.28	535	> 950
	MS75088-7	SWD	3.3	44	7.9	85	0.35	480	> 800
	MS75088-8	SWD	3.9	44	7.9	75	0.40	450	> 750
	MS75088-9	SWD	4.7	44	7.9	70	0.55	380	> 650
	MS75088-10	SWD	5.6	44	7.9	65	0.72	335	> 550
	MS75088-11	SWD	6.8	50	7.9	55	1.02	280	> 500
	MS75088-12	SWD	8.2	50	7.9	50	1.32	250	> 475
	MS75088-13	SWD	10	50	7.9	46	1.62	220	> 450
	MS75088-14	SWD	12	55	2.5	44	2.00	200	> 400
FERRITE	MS75089-1	SWD	15	44	2.5	49	0.80	315	250
	MS75089-2	SWD	18	45	2.5	45	0.89	300	235
	MS75089-3	SWD	22	46	2.5	41	0.96	290	220
	MS75089-4	SWD	27	49	2.5	38	1.19	260	200
	MS75089-5	SWD	33	45	2.5	34	1.37	240	190
	MS75089-6	SWD	39	53	2.5	29	1.93	205	180
	MS75089-7	SWD	47	52	2.5	27	2.11	195	175
	MS75089-8	SWD	56	49	2.5	25	2.23	190	160
	MS75089-9	SWD	68	51	2.5	21	2.70	170	150
	MS75089-10	SWD	82	45	2.5	10.5	2.44	180	140
FERRITE	MS75089-11	SWD	100	52	2.5	10.0	3.12	160	120
	MS75089-12	SWD	120	57	0.79	9.7	3.60	150	95
	MS75089-13	SWD	150	56	0.79	8.5	4.10	140	90
	MS75089-14	SWD	180	60	0.79	8.0	4.40	135	85
	MS75089-15	SWD	220	58	0.79	7.5	5.00	125	80
	MS75089-16	SWD	270	60	0.79	7.0	5.80	115	70
	MS75089-17	SWD	330	54	0.79	6.5	6.40	110	65
	MS75089-18	SWD	390	67	0.79	6.2	7.40	105	60
	MS75089-19	SWD	470	60	0.79	5.7	9.50	92	58
	MS75089-20	SWD	560	60	0.79	4.7	10.5	90	55
	MS75089-21	SWD	680	60	0.79	4.5	11.8	80	50
	MS75089-22	SWD	820	57	0.79	4.2	13.0	80	45
	MS75089-23	SWD	1000	60	0.79	3.8	17.5	70	40
	MS75089-24	SWD	1200	45	0.25	1.5	22.1	60	35
	MS75089-25	SWD	1500	49	0.25	1.2	26.5	55	33
	MS75089-26	SWD	1800	47	0.25	1.0	29.9	50	30
	MS75089-27	SWD	2200	50	0.25	0.97	33.8	50	27
	MS75089-28	SWD	2700	47	0.25	0.92	47.3	40	25
	MS75089-29	SWD	3300	43	0.25	0.84	53.0	40	22
	MS75089-30	SWD	3900	43	0.25	0.80	73.8	35	20
	MS75089-31	SWD	4700	44	0.25	0.74	81.6	31	19
	MS75089-32	SWD	5600	45	0.25	0.73	98.9	28	17
	MS75089-33	SWD	6800	43	0.25	0.66	111.0	27	16
	MS75089-34	SWD	8200	42	0.25	0.54	119.0	26	15
	MS75089-35	SWD	10,000	39	0.25	0.47	137.0	24	14
	MS75089-36	SWD	12,000	31	0.079	0.33	143.0	23	13
	MS75089-37	SWD	15,000	31	0.079	0.29	157.0	22	12
	MS75089-38	SWD	18,000	31	0.079	0.28	175.0	21	10
	MS75089-39	SWD	22,000	27	0.079	0.25	274.0	17	9
	MS75089-40	SWD	27,000	27	0.079	0.21	308.0	16	8
	MS75089-41	SWD	33,000	27	0.079	0.19	343.0	15	7.5
	MS75089-42	SWD	39,000	27	0.079	0.17	376.0	15	6.0
	MS75089-43	SWD	47,000	23	0.079	0.16	473.0	13	5.5
	MS75089-44	SWD	56,000	23	0.079	0.14	512.0	13	5.0
	MS75089-45	SWD	68,000	23	0.079	0.13	580.0	12	4.0
	MS75089-46	SWD	82,000	21	0.079	0.12	618.0	11	3.5
	MS75089-47	SWD	100,000	18	0.079	0.11	678.0	11	3.0

† INCREMENTAL CURRENT: The D.C. current required to cause a 5% reduction in the nominal inductance value.

Nytronics Components Group Inc.

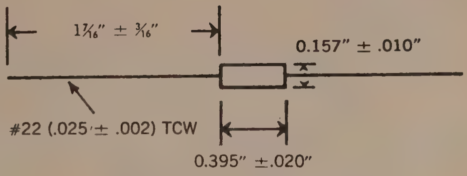
ORANGE STREET, DARLINGTON, S. C. 29532
(803) 393-5421 • TWX 810-665-2182

Inductors

MS-INDUCTOR SERIES
90537
MOLDED SHIELDED INDUCTOR
(Manufactured per MS-90537)

Ultra-Reliable Molded Shielded Miniature Inductor.
Inductance Range: 0.1uH to 100,000uH.
Unique "T" design eliminates Fine Wire considerations.

The **MS-INDUCTOR SERIES** are R.F. Inductors specifically designed to meet the demanding requirements of MIL-C-15305 (latest revision). The MS-INDUCTOR Series epoxy molded envelope and shielding offers the design engineer reliability, electrical performance, and minimum coupling in high density packaging.



ELECTRICAL CHARACTERISTICS

Inductance Tolerance: ±10% over the entire inductance range.
Dielectric Strength: 700 volts RMS at sea level.
Self-Resonant Frequency: Measured per MIL-C-15305 (latest revision).
Q: Measured on Q-Meter.

Maximum Current: Based on temperature rise not to exceed 35°C at 90°C ambient.

DENSITY CHARACTERISTICS

Volume: 0.0076 cubic inches **Weight:** 0.75 grams maximum
Shielding: At 1000 cycles two units assembled side by side exhibit less than 3% coupling.

PHYSICAL AND ENVIRONMENTAL CHARACTERISTICS

Operating Temperature: —55°C to +125°C.

Terminal Strength: Meets five pound pull test; five 360° rotations in alternate directions per MIL-C-15305 (latest revision).

Moisture, Vibration, and Shock Resistance: Meets requirements of MIL-C-15305D, Grade 1, Class B. High frequency 10 cps to 2000 cps @ 15G ±10% maximum for 12 logarithmic swings each of 20 minute duration repeated for each of three mutually perpendicular planes. Shock: 50G, 11 MS.

Marking: Color coded per MIL-C-15305 (latest revision).

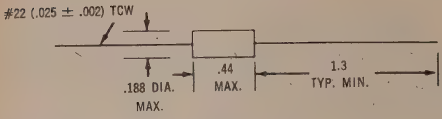
Material	MS Catalog No.	NCG P/N	L	Q Min.		Min. SRF	Max. DCR	Max. I	Incr.** I
			µH		MHz	MHz	Ω	mA	mA
PHENOLIC	90537-1	SWD	0.10	50	25	250	0.025	2900	>2900
	90537-2	SWD	0.12	51	25	250	0.034	2800	>2800
	90537-3	SWD	0.15	51	25	250	0.037	2750	>2750
	90537-4	SWD	0.18	50	25	250	0.047	2200	>2200
	90537-5	SWD	0.22	49	25	250	0.067	1700	>1700
	90537-6	SWD	0.27	47	25	250	0.11	1500	>1500
	90537-7	SWD	0.33	46	25	250	0.13	1300	>1300
	90537-8	SWD	0.39	44	25	250	0.18	1100	>1100
	90537-9	SWD	0.47	44	25	235	0.25	1000	>1000
	90537-10	SWD	0.56	43	25	210	0.33	900	>900
	90537-11	SWD	0.68	42	25	190	0.45	750	>750
	90537-12	SWD	0.82	40	25	180	0.59	600	>600
IRON	90537-13	SWD	1.0	47	25	140	0.070	1900	>1900
	90537-14	SWD	1.2	46	7.9	130	0.093	1600	>1600
	90537-15	SWD	1.5	45	7.9	115	0.12	1300	>1300
	90537-16	SWD	1.8	43	7.9	105	0.14	1200	>1200
	90537-17	SWD	2.2	45	7.9	100	0.19	1100	>1100
	90537-18	SWD	2.7	46	7.9	92	0.28	950	>950
	90537-19	SWD	3.3	44	7.9	85	0.35	800	>800
	90537-20	SWD	3.9	44	7.9	75	0.40	750	>750
	90537-21	SWD	4.7	44	7.9	70	0.55	650	>650
	90537-22	SWD	5.6	47	7.9	65	0.72	550	>550
	90537-23	SWD	6.8	50	7.9	55	1.02	500	>500
	90537-24	SWD	8.2	50	7.9	50	1.32	475	>475
	90537-25	SWD	10	49	7.9	46	1.62	450	>450
	90537-26	SWD	12	55	2.5	44	2.00	400	>400
FERRITE	90537-27	SWD	15	44	2.5	49	0.80	620	250
	90537-28	SWD	18	45	2.5	45	0.89	610	235
	90537-29	SWD	22	46	2.5	41	0.96	600	220
	90537-30	SWD	27	49	2.5	38	1.19	500	200
	90537-31	SWD	33	45	2.5	34	1.37	490	190
	90537-32	SWD	39	53	2.5	29	1.93	410	180
	90537-33	SWD	47	52	2.5	27	2.11	400	175
	90537-34	SWD	56	49	2.5	25	2.23	380	160
	90537-35	SWD	68	51	2.5	21	2.70	370	150
	90537-36	SWD	82	45	2.5	10.5	2.44	360	140
FERRITE	90537-37	SWD	100	52	2.5	10.0	3.12	325	120
	90537-38	SWD	120	57	.79	9.7	3.60	290	95
	90537-39	SWD	150	56	.79	8.5	4.10	275	90
	90537-40	SWD	180	60	.70	8.0	4.40	260	85
	90537-41	SWD	220	58	.79	7.5	5.00	250	80
	90537-42	SWD	270	60	.79	7.0	5.80	240	70
	90537-43	SWD	330	54	.79	6.5	6.40	225	65
	90537-44	SWD	390	67	.79	6.2	7.40	200	60
	90537-45	SWD	470	60	.79	5.7	9.50	180	58
	90537-46	SWD	560	60	.79	4.7	10.5	174	55
	90537-47	SWD	680	60	.79	4.5	11.8	168	50
	90537-48	SWD	820	57	.79	4.2	13.0	152	45
	90537-49	SWD	1000	65	.79	3.8	17.5	135	40
	90537-50	SWD	1200	45	.25	1.5	22.1	115	35
	90537-51	SWD	1500	49	.25	1.2	26.5	110	33
	90537-52	SWD	1800	47	.25	1.0	29.9	105	30
	90537-53	SWD	2200	50	.25	0.97	33.8	99	27
	90537-54	SWD	2700	47	.25	0.92	47.3	83	25
	90537-55	SWD	3300	43	.25	0.84	53.0	80	22
	90537-56	SWD	3900	43	.25	0.80	73.8	67	20
	90537-57	SWD	4700	44	.25	0.74	81.6	63	19
	90537-58	SWD	5600	45	.25	0.73	98.9	56	17
	90537-59	SWD	6800	43	.25	0.66	111.0	54	16
	90537-60	SWD	8200	42	.25	0.54	119.0	52	15
	90537-61	SWD	10,000	39	.25	0.47	137.0	49	14
	90537-62	SWD	12,000	31	.079	0.33	143.0	46	13
	90537-63	SWD	15,000	31	.079	0.29	157.0	45	12
	90537-64	SWD	18,000	31	.079	0.28	175.0	41	10
	90537-65	SWD	22,000	27	.079	0.25	274.0	33	9
	90537-66	SWD	27,000	27	.079	0.21	308.0	31	8
	90537-67	SWD	33,000	27	.079	0.19	343.0	30	7.5
	90537-68	SWD	39,000	27	.079	0.17	376.0	27	6.0
	90537-69	SWD	47,000	23	.079	0.16	473.0	26	5.5
	90537-70	SWD	56,000	23	.079	0.14	512.0	25	5.0
	90537-71	SWD	68,000	23	.079	0.13	580.0	24	4.0
	90537-72	SWD	82,000	21	.079	0.12	618.0	23	3.5
	90537-73	SWD	100,000	18	.079	0.11	678.0	22	3.0

**INCREMENTAL CURRENT — The D.C. current required to cause a 5% reduction in the nominal inductance value.

SPECIFICATIONS
FIXED INDUCTORS
RFC-S SERIES

Proven reliability molded inductors specifically designed to meet MIL-C-15305 (latest revision). Inductance 0.1 to 1000uH.

ACTUAL SIZE



ELECTRICAL CHARACTERISTICS

Inductance Tolerance:	0.1 to 22uH ±10% on Q-Meter 27uH to 1000 ±5% 1,000 cps bridge 120uH to 1000 uH ± 5% on Q-Meter
Dielectric Strength:	700 volts RMS at sea level.
Self-Resonant Frequency:	Minimum f_0 to be not less than 80% of published data and measured with full length leads on Grid-Dip Meter.
Q:	Measured on Q-Meter.
Rating:	⅓ watt dissipation for series S

DENSITY CHARACTERISTICS

Volume:	S Type — 0.012 cu. in.
Weight:	S Type — 0.90 grams

PHYSICAL AND ENVIRONMENTAL CHARACTERISTICS

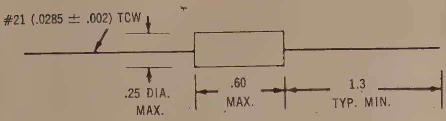
Operating Temperature:	—55°C to +125°C.
Terminal Strength:	Meets five pound pull test per MIL-C-15305. (latest revision).
Moisture, Vibration, and Shock Resistance:	Meets requirements of MIL-C-15305 Grade 1, Class B. High frequency 10 cps to 2000 cps @ 15G ± 10% maximum for 12 logarithmic swings, each of 20 minute duration repeated for each of three mutually perpendicular planes. (body mounted)

MS NO.	NCG PART NO.	L	Q min		approx. SRF	Max. DCR	max. I	MATERIAL
		uH		MHz	MHz	Ω	mA	
MS21389-1	RFC-S- 0.10	0.10	85	50	500	.02	4000	PHENOLIC
MS21389-2	RFC-S- 0.12	0.12	85	50	500	0.25	3500	
MS21389-3	RFC-S- 0.15	0.15	85	50	500	.03	3000	
MS21389-4	RFC-S- 0.18	0.18	75	50	500	.03	3000	
MS21389-5	RFC-S- 0.22	0.22	75	50	500	.03	3000	
MS21389-6	RFC-S- 0.27	0.27	70	45	470	.04	2700	
MS21389-7	RFC-S- 0.33	0.33	70	40	440	.05	2500	
MS21389-8	RFC-S- 0.39	0.39	65	40	400	.08	2000	
MS21389-9	RFC-S- 0.47	0.47	60	25	360	.08	2000	
MS21389-10	RFC-S- 0.56	0.56	55	25	330	.10	1700	
MS21389-11	RFC-S- 0.68	0.68	55	25	300	.12	1500	
MS21389-12	RFC-S- 0.82	0.82	50	25	275	.18	1300	
MS21389-13	RFC-S- 1.0	1.0	50	20	250	.24	1100	
MS21389-14	RFC-S- 1.2	1.2	45	20	220	.35	1000	
MS21389-15	RFC-S- 1.5	1.5	45	15	200	.43	850	
MS21389-16	RFC-S- 1.8	1.8	45	15	180	.65	720	
MS21389-17	RFC-S- 2.2	2.2	45	15	165	.80	610	
MS21390-1	RFC-S- 2.7	2.7	55	10	110	.12	1600	IRON
MS21390-2	RFC-S- 3.3	3.3	55	10	100	.15	1400	
MS21390-3	RFC-S- 3.9	3.9	60	10	95	.23	1200	
MS21390-4	RFC-S- 4.7	4.7	70	7.9	90	.30	1000	
MS21390-5	RFC-S- 5.6	5.6	65	7.9	80	.45	900	
MS21390-6	RFC-S- 6.8	6.8	65	7.9	70	.55	800	
MS21390-7	RFC-S- 8.2	8.2	60	7.9	65	.65	720	
MS21390-8	RFC-S- 10	10	60	5	60	.73	650	
MS21390-9	RFC-S- 12	12	65	5	53	1.1	590	
MS21390-10	RFC-S- 15	15	80	2.5	47	1.4	500	
MS21390-11	RFC-S- 18	18	75	2.5	43	1.6	460	
MS21390-12	RFC-S- 22	22	75	2.5	40	1.8	430	
MS21390-13	RFC-S- 27	27	75	2.5	36	2.7	360	
MS21390-14	RFC-S- 33	33	85	2.5	32	3.5	300	
MS21390-15	RFC-S- 39	39	80	2.5	26	3.8	290	
MS21390-16	RFC-S- 47	47	80	2.5	22	4.0	275	
MS21390-17	RFC-S- 56	56	75	2.5	19	4.4	265	
MS21390-18	RFC-S- 68	68	75	2.5	16	4.7	250	
MS21390-19	RFC-S- 82	82	75	2.5	13	5.3	235	
MS21390-20	RFC-S- 100	100	75	1.5	10	6.0	220	
MS21390-21	RFC-S- 120	120	65	0.79	7.2	5.0	170	
MS21390-22	RFC-S- 150	150	65	0.79	6.7	5.8	164	
MS21390-23	RFC-S- 180	180	65	0.79	6.3	6.6	158	
MS21390-24	RFC-S- 220	220	65	0.79	5.9	7.4	155	
MS21390-25	RFC-S- 270	270	65	0.79	5.6	8.0	150	
MS21390-26	RFC-S- 300	300	65	0.79	5.3	8.6	145	
MS21390-27	RFC-S- 330	330	65	0.79	5.0	8.9	142	
MS21390-28	RFC-S- 360	360	65	0.79	4.7	9.6	137	
MS21390-29	RFC-S- 390	390	65	0.79	4.5	9.9	135	
MS21390-30	RFC-S- 430	430	65	0.79	4.3	10.4	131	
MS21390-31	RFC-S- 470	470	65	0.79	4.0	10.9	128	
MS21390-32	RFC-S- 510	510	65	0.79	3.8	11.6	124	
MS21390-33	RFC-S- 560	560	65	0.79	3.6	11.8	123	
MS21390-34	RFC-S- 620	620	60	0.79	3.5	12.5	120	
MS21390-35	RFC-S- 680	680	60	0.79	3.4	13.5	115	
MS21390-36	RFC-S- 750	750	60	0.79	3.3	14.0	113	
MS21390-37	RFC-S- 820	820	60	0.79	3.1	15.0	110	
MS21390-38	RFC-S- 910	910	60	0.79	3.0	15.5	107	
MS21390-39	RFC-S-1000	1000	60	0.79	2.8	16.5	104	

SPECIFICATIONS
FIXED INDUCTORS
RFC-M SERIES

Proven reliability molded inductors specifically designed to meet MIL-C-15305 (latest revision). Inductance 1.0 to 2200uH.

ACTUAL SIZE



MS NO.	NCG PART NO.	L	Q Min.		approx. SRF	Max. DCR	Max. I	MATERIAL
		uH		MHz	MHz	Ω	mA	
MS21388-1	RFC-M- 1.0	1.0	100	15	170	.04	2700	IRON
MS21388-2	RFC-M- 1.2	1.2	100	15	155	.04	2700	
MS21388-3	RFC-M- 1.5	1.5	100	10	140	.04	2700	
MS21388-4	RFC-M- 1.8	1.8	95	10	125	.05	2500	
MS21388-5	RFC-M- 2.2	2.2	95	10	110	.05	2500	
MS21388-6	RFC-M- 2.7	2.7	68	7.9	95	.05	2500	
MS21388-7	RFC-M- 3.3	3.3	60	7.9	90	.05	2500	
MS21388-8	RFC-M- 3.9	3.9	60	7.9	87	.07	2100	
MS21388-9	RFC-M- 4.7	4.7	60	7.9	75	.09	1800	
MS21388-10	RFC-M- 5.6	5.6	65	7.9	70	.14	1550	
MS21388-11	RFC-M- 6.8	6.8	70	7.9	65	.17	1300	
MS21388-12	RFC-M- 8.2	8.2	65	7.9	57	.25	1150	
MS21388-13	RFC-M- 10	10	65	5	50	.32	1000	
MS21388-14	RFC-M- 12	12	65	5	45	.47	870	
MS21388-15	RFC-M- 15	15	75	4	40	.62	730	
MS21388-16	RFC-M- 18	18	65	4	37	.72	660	
MS21388-17	RFC-M- 22	22	65	2.5	35	.8	600	
MS21388-18	RFC-M- 27	27	65	2.5	31	1.2	520	
MS21388-19	RFC-M- 33	33	80	2.5	27	1.5	450	
MS21388-20	RFC-M- 39	39	80	2.5	25	2.3	380	
MS21388-21	RFC-M- 47	47	100	2.5	24	3.0	300	
MS21388-22	RFC-M- 56	56	100	2.5	22	4.2	270	
MS21388-23	RFC-M- 68	68	100	2.5	20	5.2	250	
MS21388-24	RFC-M- 82	82	100	2.5	18	6.2	220	
MS21388-25	RFC-M- 100	100	100	1.5	17	7	200	
MS21388-26	RFC-M- 120	120	95	1.5	14	7.5	200	
MS21388-27	RFC-M- 150	150	90	1.0	11	8	190	
MS21388-28	RFC-M- 180	180	85	1.0	9	9	185	
MS21388-29	RFC-M- 220	220	85	1.0	7	10	180	
MS21388-30	RFC-M- 270	270	80	1.0	5.5	11	172	
MS21388-31	RFC-M- 330	330	80	.8	4.5	12	165	
MS21388-32	RFC-M- 390	390	75	.8	4.0	13	157	
MS21388-33	RFC-M- 470	470	75	.8	3.5	14	150	
MS21388-34	RFC-M- 560	560	65	.8	3.1	16	145	
MS21388-35	RFC-M- 680	680	65	.8	2.7	17	140	
MS21388-36	RFC-M- 820	820	65	.8	2.5	19	132	
MS21388-37	RFC-M-1000	1000	70	.5	2.3	21	125	
MS21388-38	RFC-M-1200	1200	60	.25	2.7	22	120	
MS21388-39	RFC-M-2200	2200	70	.25	2.0	30	100	

ELECTRICAL CHARACTERISTICS

Inductance Tolerance:	1.0 to 22uH ± 10% on Q-Meter 27uH to 2200 ± 5% 1,000 cps bridge
Dielectric Strength:	700 volts RMS at sea level.
Self-Resonant Frequency:	Minimum f_0 to be not less than 80% of published data and measured with full length leads on Grid-Dip Meter.
Q:	Measured on Q-Meter.
Rating:	⅓ watt dissipation for series M

DENSITY CHARACTERISTICS

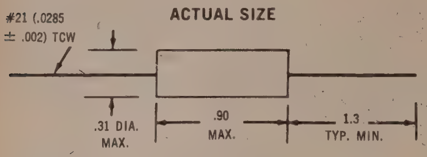
Volume:	M Type — 0.029 cu. in.
Weight:	M Type — 2.00 grams

PHYSICAL AND ENVIRONMENTAL CHARACTERISTICS

Operating Temperature:	−55°C to +125°C.
Terminal Strength:	Meets five pound pull test per MIL-C-15305.
Moisture, Vibration, and Shock Resistance:	Meets requirements of MIL-C-15305 (latest revision). High frequency 10 cps to 2000 cps @ 15G ± 10% maximum for 12 logarithmic swings, each of 20 minute duration repeated for each of three mutually perpendicular planes. (body mounted)

SPECIFICATIONS
FIXED INDUCTORS
RFC-L SERIES

Proven reliability molded inductors specifically designed to meet MIL-C-15305 (latest revision). Inductance 1.0 to 10,000uH.



ELECTRICAL CHARACTERISTICS

Inductance Tolerance: 0.1 to 22uH ±10% on Q-Meter
27uH to 10,000 ±5%
1,000 cps bridge

Dielectric Strength: 700 volts RMS at sea level.

Self-Resonant Frequency: Minimum f_0 to be not less than 80% of published data and measured with full length leads on Grid-Dip Meter.

Q: Measured on Q-Meter.

Rating: ½ watt dissipation for L series.

DENSITY CHARACTERISTICS

Volume: L Type — 0.068 cu. in.

Weight: L Type 4.10 grams

PHYSICAL AND ENVIRONMENTAL CHARACTERISTICS

Operating Temperature: −55°C to +125°C.

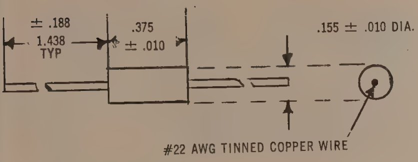
Terminal Strength: Meets five pound pull test per MIL-C-15305 (latest revision).

Moisture, Vibration, and Shock Resistance: Meets requirements of MIL-C-15305 (latest revision). High frequency 10 cps to 2000 cps @ 15G ± 10% maximum for 12 logarithmic swings, each of 20 minute duration repeated for each of three mutually perpendicular planes. (body mounted)

MS NO.	NCG PART NO.	L	Q min		approx. SRF	Max. DCR	max. I	MAT.
		µH		MHz	MHz	Ω	mA	
MS21380-1	RFC-L- 1.0	1.0	130	15	170	.03	4000	IRON
MS21380-2	RFC-L- 1.2	1.2	130	15	155	.03	4000	
MS21380-3	RFC-L- 1.5	1.5	130	10	140	.03	4000	
MS21380-4	RFC-L- 1.8	1.8	130	10	125	.03	4000	
MS21380-5	RFC-L- 2.2	2.2	130	10	115	.04	3500	
MS21380-6	RFC-L- 2.7	2.7	100	10	102	.04	3500	
MS21380-7	RFC-L- 3.3	3.3	100	7.9	90	.04	3500	
MS21380-8	RFC-L- 3.9	3.9	80	7.9	85	.05	3100	
MS21380-9	RFC-L- 4.7	4.7	75	7.9	80	.05	3100	
MS21380-10	RFC-L- 5.6	5.6	65	7.9	72	.06	3000	
MS21380-11	RFC-L- 6.8	6.8	65	7.9	65	.06	3000	
MS21380-12	RFC-L- 8.2	8.2	65	7.9	57	.11	2400	
MS21380-13	RFC-L- 10	10	75	5	50	.15	1800	
MS21380-14	RFC-L- 12	12	75	5	45	.23	1600	
MS21380-15	RFC-L- 15	15	75	5	40	.3	1300	
MS21380-16	RFC-L- 18	18	75	5	36	.4	1150	
MS21380-17	RFC-L- 22	22	75	2.5	32	.5	1000	
MS21380-18	RFC-L- 27	27	70	2.5	30	.6	900	
MS21380-19	RFC-L- 33	33	70	2.5	28	.7	850	
MS21380-20	RFC-L- 39	39	70	2.5	26	1.1	720	
MS21380-21	RFC-L- 47	47	75	2.5	25	1.3	620	
MS21380-22	RFC-L- 56	56	80	2.5	22	1.8	540	
MS21380-23	RFC-L- 68	68	100	2.5	20	2.4	450	
MS21380-24	RFC-L- 82	82	100	2.5	18	2.8	425	
MS21380-25	RFC-L- 100	100	100	1.5	17	3.2	400	
MS21380-26	RFC-L- 120	120	100	1.5	15	4.8	360	
MS21380-27	RFC-L- 150	150	100	1.0	14	6.4	280	
MS21380-28	RFC-L- 180	180	95	1.0	12	9.5	240	
MS21380-29	RFC-L- 220	220	95	1.0	11	12	200	
MS21380-30	RFC-L- 270	270	70	1.0	9	13	195	
MS21380-31	RFC-L- 330	330	65	.79	7.5	14	190	
MS21380-32	RFC-L- 390	390	65	.79	6.5	15.5	180	
MS21380-33	RFC-L- 470	470	60	.79	5.5	17	170	
MS21380-34	RFC-L- 560	560	75	.5	4	18.5	165	
MS21380-35	RFC-L- 680	680	75	.5	3.2	20	155	
MS21380-36	RFC-L- 820	820	75	.5	2.8	22	150	
MS21380-37	RFC-L- 1000	1000	75	.5	2.4	24	145	
MS21380-38	RFC-L- 1200	1200	75	.5	2.1	27	137	
MS21380-39	RFC-L- 1500	1500	75	.4	1.9	29	130	
MS21380-40	RFC-L- 1800	1800	65	.4	1.7	32	125	
MS21380-41	RFC-L- 2200	2200	65	.25	1.5	35	120	
MS21380-42	RFC-L- 2700	2700	65	.25	1.3	40	112	
MS21380-43	RFC-L- 3300	3300	65	.25	1.2	45	105	
MS21380-44	RFC-L- 3900	3900	65	.25	1.05	49	100	
MS21380-45	RFC-L- 4700	4700	65	.25	.95	53	95	
MS21380-46	RFC-L- 5600	5600	65	.25	.85	60	90	
MS21380-47	RFC-L- 6800	6800	65	.25	.75	67	85	
MS21380-48	RFC-L- 8200	8200	65	.25	.65	75	82	
MS21380-49	RFC-L-10000	10000	65	.15	.58	80	80	

SPECIFICATIONS
FIXED INDUCTORS
RFC-SS SERIES

Molded inductors specifically designed to meet MIL-C-15305 (latest revision). Inductance from 0.15 to 240uH.



ELECTRICAL CHARACTERISTICS

Inductance Tolerance: 0.15 to 330 uH ± 10%
360 to 2400 uH ± 5%
Measured on Q meter per MIL-C-15305 (latest revision).

Dielectric Strength: 700 volts RMS @ sea level

Rated Current: Based on max. temp. rise of 35°C (ambient 90°C) for RFC-SS-0.15 to -330
15°C (ambient 90°C) for RFC-SS-36 to -240

PHYSICAL AND ENVIRONMENTAL CHARACTERISTICS

Operating Temperature: Max. 125°C for RFC-SS-0.15 to -330
Max. 105°C for RFC-SS-36 to -240

Terminal Strength: Meets five pound pull test per MIL-C-15305 (latest revision).

Moisture, Vibration, and Shock Resistance: Meets requirements of MIL-C-15305 (latest revision), high frequency 10 cps for 12 logarithmic swings, each of 20 minute duration repeated for each of three mutually perpendicular planes.

Printing: Color banded.

MS NO.	NCG PART NO.	L uH	Q Min.	@ MHz	Min. SRF MHz	Max. DCR Ω	Rated DC Cur. mA
MS18130-1	RFC-SS- .15	0.15	50	25	525	0.03	2450
MS18130-2	RFC-SS- .22	0.22	50	25	450	0.05	1900
MS18130-3	RFC-SS- .33	0.33	45	25	360	0.09	1400
MS18130-4	RFC-SS- .47	0.47	45	25	310	0.12	1225
MS18130-5	RFC-SS- .56	0.56	50	25	280	0.13	1220
MS18130-6	RFC-SS- .68	0.68	50	25	250	0.15	1100
MS18130-7	RFC-SS- .82	0.82	50	25	220	0.22	900
MS18130-8	RFC-SS- 1.00	1.00	50	25	200	0.29	830
MS18130-9	RFC-SS- 1.20	1.20	33	7.9	180	0.42	650
MS18130-10	RFC-SS- 1.50	1.5	33	7.9	160	0.50	600
MS18130-11	RFC-SS- 1.80	1.8	33	7.9	150	0.65	525
MS18130-12	RFC-SS- 2.2	2.2	33	7.9	135	0.95	435
MS18130-13	RFC-SS- 2.7	2.7	33	7.9	120	1.20	385
MS18130-14	RFC-SS- 3.3	3.3	33	7.9	110	2.00	300
MS18130-15	RFC-SS- 3.9	3.9	33	7.9	100	2.30	280
MS18130-16	RFC-SS- 4.7	4.7	33	7.9	90	2.60	260
MS14046-1	RFC-SS- 5.6	5.6	45	7.9	60	0.32	750
MS14046-2	RFC-SS- 6.8	6.8	50	7.9	55	0.50	600
MS14046-3	RFC-SS- 8.2	8.2	50	7.9	50	0.60	545
MS14046-4	RFC-SS- 10	10.0	55	7.9	45	0.90	445
MS14046-5	RFC-SS- 12	12	65	2.5	42	1.10	404
MS14046-6	RFC-SS- 15	15	65	2.5	40	1.40	370
MS14046-7	RFC-SS- 18	18	75	2.5	34	2.25	280
MS14046-8	RFC-SS- 22	22	75	2.5	30	2.50	265
MS14046-9	RFC-SS- 27	27	60	2.5	25	2.60	260
MS14046-10	RFC-SS- 33	33	65	2.5	19	3.00	250
MS90538-1	RFC-SS- 36	36	60	2.5	15.5	2.50	180
MS90538-2	RFC-SS- 39	39	60	2.5	14.5	2.60	176
MS90538-3	RFC-SS- 43	43	60	2.5	13.7	2.70	172
MS90538-4	RFC-SS- 47	47	55	2.5	13.0	2.75	170
MS90538-5	RFC-SS- 51	51	55	2.5	12.7	2.85	167
MS90538-6	RFC-SS- 56	56	55	2.5	12.0	3.00	164
MS90538-7	RFC-SS- 62	62	55	2.5	11.5	3.15	160
MS90538-8	RFC-SS- 68	68	55	2.5	11.0	3.30	156
MS90538-9	RFC-SS- 75	75	55	2.5	10.5	3.70	147
MS90538-10	RFC-SS- 82	82	50	2.5	10.3	3.9	143
MS90538-11	RFC-SS- 91	91	50	2.5	10.0	4.3	136
MS90538-12	RFC-SS-100	100	50	2.5	9.5	4.5	133
MS90538-13	RFC-SS-110	110	60	0.79	8.9	4.9	128
MS90538-14	RFC-SS-120	120	65	0.79	8.7	5.2	124
MS90538-15	RFC-SS-130	130	65	0.79	8.5	5.45	121
MS90538-16	RFC-SS-150	150	65	0.79	8.0	6.05	114
MS90538-17	RFS-SS-160	160	65	0.79	7.5	6.40	111
MS90538-18	RFC-SS-180	180	65	0.79	7.0	6.75	108
MS90538-19	RFC-SS-200	200	65	0.79	6.5	7.10	106
MS90538-20	RFC-SS-220	220	65	0.79	6.2	7.45	103
MS90538-21	RFC-SS-240	240	65	0.79	5.9	7.8	101

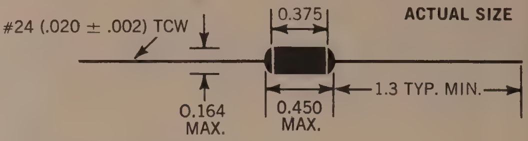
Nytronics Components Group Inc.
ORANGE STREET, DARLINGTON, S. C. 29532
(803) 393-5421 • TWX 810-665-2182

Inductors

WEE-DUCTOR

Miniature Shielded Inductor with high inductance-to-size ratio.
0.10uH to 180,000uH in 76 values
Designed to meet MIL-C-15305C.

The **WEE-DUCTOR** was the first miniature shielded inductor that Nytronics standardized for stock delivery. This encapsulated non-flammable shielded unit in a 0.164″ diameter by 0.450″ long envelope offers the design engineer extremely high inductance for density packaging. The WEE-DUCTOR is designed to meet the environmental requirements of MIL-C-15305 (latest revision).



ELECTRICAL CHARACTERISTICS

Inductance Tolerance: 0.1 to 22uH ±10% (Q-Meter); 27uH to 1,000 ±5% (1KC Bridge); 1,200uH to 56,000uH ±10% (1KC Bridge) 68,000uH to 180,000uH ±20% (1KC Bridge) measured at point on leads ½ inch from body.

Dielectric Strength: 700 volts RMS at sea level.

Self-Resonant Frequency: Minimum f_0 to be not less than 80% of published data, and measured with full length leads on Q-Meter.

Q: Measured on Q-Meter.

Maximum Current: Based on temperature rise not to exceed 40°C at 85°C ambient.

DENSITY CHARACTERISTICS

Volume: 0.0087 cubic inches **Weight:** 0.75 grams maximum
Shielding: Less than 3% coupling with two units measured side by side at 1000 cycles.

PHYSICAL AND ENVIRONMENTAL CHARACTERISTICS

Operating Temperature: —55°C to +125°C.
Terminal Strength: Meets five pound pull test; five 360° rotations in alternate directions per MIL-C-15305 (latest revision).
Moisture, Vibration, and Shock Resistance: Meets requirements of MIL-C-15305 (latest revision). Low frequency 10 to 55 cps @ .06″ maximum total excursion at rate of 1 linear sweep per minute for 2 hours repeated for each of three mutually perpendicular planes. Shock: 50G, 11 M.S.
Marking: Printed with pertinent data.

MATERIAL	NCG PART NO.	L	Q min		Approx. SRF	approx. Cd	Max. DCR	Max. I	Incr* I
		µH		MHz	MHz	µµF	Ω	mA	mA
PHENOLIC	WEE- 0.10	0.10	63	25	>500	0.67	0.020	4000	4000
	WEE- 0.12	0.12	61	25	>500	0.67	0.029	3350	3350
	WEE- 0.15	0.15	59	25	>500	0.67	0.032	3000	3000
	WEE- 0.18	0.18	57	25	458	0.67	0.040	2850	2850
	WEE- 0.22	0.22	56	25	414	0.67	0.045	2700	2700
	WEE- 0.27	0.27	50	25	373	0.67	0.08	2000	2000
	WEE- 0.33	0.33	48	25	337	0.67	0.09	1900	1900
	WEE- 0.39	0.39	48	25	310	0.67	0.16	1420	1420
	WEE- 0.47	0.47	48	25	283	0.67	0.17	1400	1400
	WEE- 0.56	0.56	45	25	258	0.67	0.36	960	960
	WEE- 0.68	0.68	45	25	235	0.67	0.37	940	940
	WEE- 0.82	0.82	41	25	214	0.67	0.46	870	870
IRON	WEE- 1.0	1.0	42	7.9	164	0.92	0.062	2300	2300
	WEE- 1.2	1.2	43	7.9	150	0.92	0.067	2200	2200
	WEE- 1.5	1.5	41	7.9	135	0.92	0.16	1420	1420
	WEE- 1.8	1.8	42	7.9	124	0.92	0.17	1370	1370
	WEE- 2.2	2.2	42	7.9	112	0.92	0.19	1300	1300
	WEE- 2.7	2.7	41	7.9	107	0.92	0.20	1270	1270
	WEE- 3.3	3.3	40	7.9	91.5	0.92	0.31	1030	1030
	WEE- 3.9	3.9	40	7.9	84.5	0.92	0.33	1000	1000
	WEE- 4.7	4.7	40	7.9	76.5	0.92	0.58	750	750
	WEE- 5.6	5.6	40	7.9	69.5	0.92	0.64	710	710
	WEE- 6.8	6.8	40	7.9	63.5	0.92	0.68	680	680
	WEE- 8.2	8.2	45	7.9	57.5	0.92	1.3	500	500
	WEE- 10	10	46	2.5	52.5	0.92	1.4	480	480
	WEE- 12	12	47	2.5	47.5	0.92	1.5	460	460
	WEE- 15	15	47	2.5	42.5	0.92	1.7	440	440
FERRITE	WEE- 18	18	45	2.5	53.5	0.49	0.88	610	235
	WEE- 22	22	47	2.5	47.0	0.50	0.95	590	220
	WEE- 27	27	42	2.5	44.0	0.48	1.15	530	200
	WEE- 33	33	43	2.5	40.0	0.48	1.2	520	193
	WEE- 39	39	45	2.5	36.5	0.48	1.6	450	183
	WEE- 47	47	46	2.5	33.0	0.49	1.8	420	177
	WEE- 56	56	40	2.5	30.0	0.49	2.2	390	170
	WEE- 68	68	40	2.5	27.0	0.50	2.3	375	165
	WEE- 82	82	42	2.5	17.5	1.0	2.4	360	160
	WEE- 100	100	63	.79	15.0	1.0	2.6	345	157
	WEE- 120	120	62	.79	14.0	1.0	2.9	330	145

MATERIAL	NCG PART NO.	L	Q min		Approx SRF	approx. Cd	Max. DCR	Max. I	Incr* I
		µH		MHz	MHz	µµF	Ω	mA	mA
FERRITE	WEE- 150	150	63	.79	12.5	1.0	3.3	315	126
	WEE- 180	180	60	.79	11.5	1.0	3.6	300	110
	WEE- 220	220	57	.79	11.0	0.94	4.1	280	105
	WEE- 270	270	52	.79	10.0	0.92	4.8	260	91
	WEE- 330	330	50	.79	9.0	0.92	5.6	240	87
	WEE- 390	390	43	.79	8.5	0.87	6.2	230	72
	WEE- 470	470	66	.79	8.0	0.83	10.0	180	67
	WEE- 560	560	64	.79	7.5	0.82	11.5	170	65
	WEE- 680	680	71	.79	6.5	0.87	12.0	160	60
	WEE- 820	820	67	.79	6.0	0.87	13.8	150	55
	WEE- 1000	1000	62	.79	5.6	0.87	16.0	140	52
	WEE- 1200	1200	52	.250	1.490	9.0	18.2	135	50
	WEE- 1500	1500	51	.250	1.460	8.0	23.7	118	48
	WEE- 1800	1800	51	.250	1.420	6.5	30.2	105	42
	WEE- 2200	2200	50	.250	1.300	6.8	33.7	99	37
	WEE- 2700	2700	51	.250	1.180	6.8	43.1	87	33
	WEE- 3300	3300	52	.250	1.050	7.0	48.7	82	30
	WEE- 3900	3900	48	.250	.960	7.0	62.7	72	29
	WEE- 4700	4700	48	.250	.840	7.4	70.5	68	28
	WEE- 5600	5600	48	.250	.810	6.8	104	56	24
	WEE- 6800	6800	45	.250	.740	6.8	11[illegible]	53	20
	WEE- 8200	8200	38	.250	.580	9.2	146	47	18
	WEE- 10,000	10,000	36	.079	.470	11.5	76.6	66	15
	WEE- 12,000	12,000	36	.079	.370	15.0	109	55	14
	WEE- 15.000	15,000	38	.079	.330	15.0	119	52	13
	WEE- 18,000	18,000	38	.079	.305	15.0	138	49	13
	WEE- 22,000	22,000	32	.079	.295	13.0	219	39	12
	WEE- 27,000	27,000	32	.079	.270	13.0	259	35	12
	WEE- 33,000	33,000	32	.079	.250	12.5	296	33	11
	WEE- 39,000	39,000	30	.079	.215	14.0	395	29	10
	WEE- 47,000	47,000	25	.079	.210	12.5	452	27	9
	WEE- 56,000	56,000	25	.079	.195	12.0	499	26	8
	WEE- 68,000	68,000	20	.079	.130	18.4	395	29	1.1
	WEE- 82,000	82,000	20	.079	.125	16.5	452	27	1.1
	WEE-100,000	100,000	20	.079	.115	16.2	499	26	1.1
	WEE-120,000	120,000	20	.070	.105	16.8	540	23	1.1
	WEE-150,000	150,000	20	.060	.098	13.4	750	20	1.0
	WEE-180,000	180,000	20	.050	.094	13.4	880	18	0.8

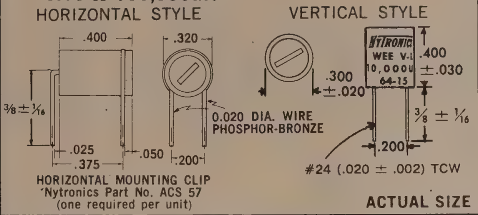
*Incremental Current: The D.C. current required to cause a maximum reduction of 5 percent from nominal inductance value.

Nytronics Components Group Inc.
ORANGE STREET, DARLINGTON, S. C. 29532
(803) 393-5421 • TWX 810-665-2182

VARIABLE INDUCTORS

WEE V-L

NOW MIL APPROVED MIL-C-15305 (latest revision) — MS21381 & MS21402
Subminiature Shielded Adjustable Inductor
High Q Values
Vertical or Horizontal* Mounting
Unitized Epoxy-Molded Construction
0.400″ by 0.300″
0.10 to 100,000uH



The **WEE V-L** is designed to accommodate close inductance adjustments in high-density circuits that demand exceptional stability and high "Q" in the smallest size available.

The **WEE V-L** is qualified MIL-C-15305 (latest revision). Printed board mounting is facilitated by 0.200 grid spacing and unit has shield construction to allow maximum density packaging. Standardized in 73 stock values.

ELECTRICAL CHARACTERISTICS

Adjustable Inductance Range:	±10%† over entire range as measured per MIL-C-15305 (latest revision).
Q and f₀ Values:	Minimum not less than 80% of specified value at L nominal.
Dielectric Strength:	840 Volts R.M.S. at sea level.
Working Voltage:	300 Volts D.C.
Maximum Current:	Based on temperature rise not to exceed 15°C at 90°C ambient.
Incremental Current:	Defined as the DC current required to cause a five percent reduction in the nominal inductance value.

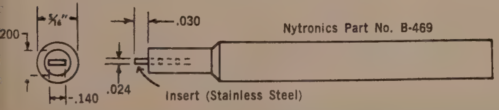
DENSITY CHARACTERISTICS

Weight:	1.5 grams maximum
Volume:	.0346 cubic inches
Shielding:	3% coupling maximum when two units are tested side by side.

PHYSICAL AND ENVIRONMENTAL CHARACTERISTICS

Use Nytronics Tuning Tool No. B-469 or equal.

Torque:	0.75 to 6.0 inch-oz.
Operating Temperature:	−55°C to +105°C.
Moisture, Vibration, and Shock Resistance:	Meet requirements of MIL-C-15305 (latest revision). Low frequency 10 to 55 cps @ .06″ maximum total excursion at rate of 1 linear sweep per minute for 2 hours repeated for each of three mutually perpendicular planes. Shock: 50G, 11 MS. (body mounted)
Marking:	Manufacturer data printed.
Terminal Pull:	Three pounds.



MS No.	NCG Part No.	L nom. uH	f MHz	Q nom.	SRF Nom. MHz	Max. DCR ohms	Max. I m.a.	Incr. I m.a.
MS21381-1	WEE V-L† 0.10	.10	25	70	>250	0.030	2500	2500
MS21831-2	WEE V-L† 0.12	.12	25	70	>250	0.030	2500	2500
MS21381-3	WEE V-L 0.15	.15	25	70	>250	0.030	2500	2500
MS21381-4	WEE V-L 0.18	.18	25	70	>250	0.035	2400	2400
MS21381-5	WEE V-L 0.22	.22	25	70	>250	0.038	2300	2300
MS21381-6	WEE V-L 0.27	.27	25	80	>250	0.040	2200	2200
MS21381-7	WEE V-L 0.33	.33	25	80	>250	0.040	2200	2200
MS21381-8	WEE V-L 0.39	.39	25	80	250	0.045	2100	2100
MS21381-9	WEE V-L 0.47	.47	25	80	230	0.045	2100	2100
MS21381-10	WEE V-L 0.56	.56	25	80	220	0.050	2000	2000
MS21381-11	WEE V-L 0.68	.68	25	80	190	0.055	1900	1900
MS21381-12	WEE V-L 0.82	.82	25	85	180	0.060	1800	1800
MS21381-13	WEE V-L 1.00	1.00	25	85	160	0.070	1700	1700
MS21381-14	WEE V-L 1.2	1.2	7.9	90	170	0.085	1670	1670
MS21381-15	WEE V-L 1.5	1.5	7.9	100	155	0.100	1540	1540
MS21381-16	WEE V-L 1.8	1.8	7.9	115	135	0.110	1470	1470
MS21381-17	WEE V-L 2.2	2.2	7.9	110	120	0.120	1410	1410
MS21381-18	WEE V-L 2.7	2.7	7.9	110	104	0.125	1380	1380
MS21381-19	WEE V-L 3.3	3.3	7.9	90	93.0	0.165	1200	1200
MS21381-20	WEE V-L 3.9	3.9	7.9	90	87.0	0.180	1135	1135
MS21381-21	WEE V-L 4.7	4.7	7.9	95	79.0	0.245	985	985
MS21381-22	WEE V-L 5.6	5.6	7.9	95	72.0	0.265	950	950
MS21381-23	WEE V-L 6.8	6.8	7.9	85	63.0	0.330	853	853
MS21381-24	WEE V-L 8.2	8.2	7.9	95	60.0	0.460	720	720
MS21381-25	WEE V-L 10	10	7.9	90	54.0	0.640	620	620
MS21381-26	WEE V-L 12	12	2.5	120	37.0	0.800	545	545
MS21381-27	WEE V-L 15	15	2.5	120	28.8	0.865	520	520
MS21381-28	WEE V-L 18	18	2.5	115	23.8	0.940	504	504
MS21381-29	WEE V-L 22	22	2.5	125	21.3	1.03	460	460
MS21381-30	WEE V-L 27	27	2.5	115	20.6	1.18	418	418
MS21381-31	WEE V-L 33	33	2.5	120	18.6	1.30	398	398
MS21381-32	WEE V-L 39	39	2.5	120	17.7	1.41	385	385
MS21381-33	WEE V-L 47	47	2.5	110	14.9	1.61	350	350
MS21381-34	WEE V-L 56	56	2.5	115	13.9	2.08	330	330
MS21381-35	WEE V-L 68	68	2.5	105	12.9	2.20	320	320
MS21381-36	WEE V-L 82	82	2.5	105	11.7	2.42	300	300
MS21402-1	WEE V-L 100	100	2.5	95	10.5	2.15	333	333
MS21402-2	WEE V-L 120	120	0.790	95	5.60	2.38	316	190
MS21402-3	WEE V-L 150	150	0.790	90	5.20	2.52	306	175
MS21402-4	WEE V-L 180	180	0.790	95	4.90	2.88	288	150
MS21402-5	WEE V-L 220	220	0.790	95	4.60	3.18	273	125
MS21402-6	WEE V-L 270	270	0.790	100	4.20	3.50	260	120
MS21402-7	WEE V-L 330	330	0.790	100	3.55	4.80	222	110
MS21402-8	WEE V-L 390	390	0.790	100	3.45	5.44	209	105
MS21402-9	WEE V-L 470	470	0.790	100	3.20	5.90	201	100
MS21402-10	WEE V-L 560	560	0.790	95	2.90	6.30	194	90
MS21402-11	WEE V-L 680	680	0.790	100	2.70	7.20	181	80
MS21402-12	WEE V-L 820	820	0.790	90	2.50	8.00	172	70
MS21402-13	WEE V-L 1,000	1,000	0.790	100	2.35	12.0	141	65
MS21402-14	WEE V-L 1,200	1,200	0.250	95	2.20	13.5	132	60
MS21402-15	WEE V-L 1,500	1,500	0.250	90	1.90	16.5	119	55
MS21402-16	WEE V-L 1,800	1,800	0.250	100	1.80	18.0	114	47
MS21402-17	WEE V-L 2,200	2,200	0.250	100	1.70	20.5	107	43
MS21402-18	WEE V-L 2,700	2,700	0.250	95	1.50	22.5	102	39
MS21402-19	WEE V-L 3,300	3,300	0.250	90	1.40	42.0	76	36
MS21402-20	WEE V-L 3,900	3,900	0.250	85	1.27	47.5	71	35
MS21402-21	WEE V-L 4,700	4,700	0.250	85	1.24	53.0	67	34
MS21402-22	WEE V-L 5,600	5,600	0.250	85	0.93	62.5	65	31
MS21402-23	WEE V-L 6,800	6,800	0.250	75	0.79	69.5	58	27
MS21402-24	WEE V-L 8,200	8,200	0.250	80	0.75	75.0	56	26
MS21402-25	WEE V-L 10,000	10,000	0.250	70	0.70	100.0	49	24
MS21402-26	WEE V-L 12,000	12,000	0.079	70	0.50	64	60	40
MS21402-27	WEE V-L 15,000	15,000	0.079	70	0.38	84	52	34
MS21402-28	WEE V-L 18,000	18,000	0.079	70	0.36	93	50	30
MS21402-29	WEE V-L 22,000	22,000	0.079	70	0.32	104	45	28
MS21402-30	WEE V-L 27,000	27,000	0.079	70	0.30	173	35	26
MS21402-31	WEE V-L 33,000	33,000	0.079	70	0.27	187	32	24
MS21402-32	WEE V-L 39,000	39,000	0.079	70	0.26	220	30	22
MS21402-33	WEE V-L 47,000	47,000	0.079	70	0.25	253	28	20
MS21402-34	WEE V-L 56,000	56,000	0.079	70	0.24	285	26	19
MS21402-35	WEE V-L 68,000	68,000	0.079	60	0.20	311	24	18
MS21402-36	WEE V-L 82,000	82,000	0.079	60	0.19	385	22	16
MS21402-37	WEE V-L 100,000	100,000	0.079	60	0.17	420	20	15

* For Horizontal mounting use Nytronics mounting clip No. ACS-57 or order with prefix H (i.e. H WEE V-L 0.10).

† Tunable range ±5.0% on 0.10uH & 0.12uH

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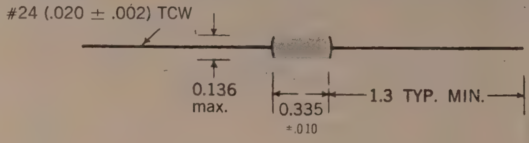
Inductors

SUPER WEE-WEE-DUCTOR

An Ultra-Reliable molded shielded inductor. Subminiature size for high density circuits. Great Inductance-to-size ratio. .10 uH to 10,000 uH. 0.136″ diameter x 0.335″ length. 61 stock values.



The **SUPER WEE-WEE-DUCTOR,** a shielded miniaturized inductor, provides a greater inductance-to-size ratio in a molded epoxy envelope. Use of unique "T" lead construction on all values from .10 uH to 10,000 uH assures exceptional reliability in ranges where fine wire sizes are used. This MS inductor series is designed to meet the stringent requirements of MIL-C-15305 (latest revision). This provides the design engineer with utmost reliability, electrical performance, and minimum coupling in high density packaging.

ELECTRICAL CHARACTERISTICS

Inductance Tolerance: ±10% (Q-Meter).
Dielectric Strength: 700 volts RMS at sea level.
Self-Resonant Frequency: Measured with full length leads on Q-Meter.
Q: Measured on Q-Meter.
Rating: I maximum based on ⅓ watt dissipation.

DENSITY CHARACTERISTICS

Volume: 0.0041 cubic inches.
Weight: 0.50 grams maximum.
Shielding: Less than 3% coupling with two units mounted side by side at 1000 cycles.

PHYSICAL AND ENVIRONMENTAL CHARACTERISTICS

Operating Temperature: −55°C to + 125°C.
Terminal Strength: Meets five pounds pull test; five 360° rotations in alternate directions per MIL-C-15305 (latest revision).
Moisture, Vibration and Shock Resistance: Meets requirements of MIL-C-15305 (latest revision). High Frequency: 10 cps to 2000 cps @ 15G ±10% maximum for 12 lograithmic swings each of 20 minute duration repeated for each of three mutually perpendicular planes. Shock: 50G, 11 MS.
Marking: Color coded per MIL-C-15305 (latest revision).

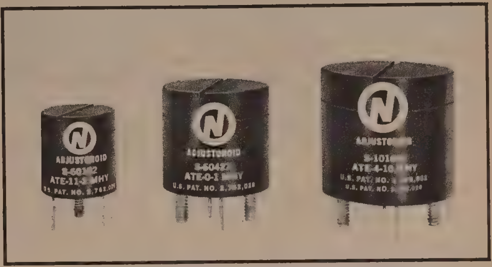
SUPER WEE-WEE-DUCTOR STANDARD VALUES

Material	MS No.	NCG Part No.	L	Q min.		min. Fo	approx. Cd	Max. DCR	Max. I	Incr.* I
			µH		MHz	MHz	Pf	Ω	mA	mA
PHENOLIC	MS21399-1	SW-W- 0.10	0.10	42	25	480	.70	.087	1650	>1650
	MS21399-2	SW-W- 0.12	0.12	42	25	460	.63	.090	1630	>1630
	MS21399-3	SW-W- 0.15	0.15	42	25	400	.66	.098	1550	>1550
	MS21399-4	SW-W- 0.18	0.18	42	25	360	.62	.117	1420	>1420
	MS21399-5	SW-W- 0.22	0.22	42	25	340	.63	.141	1330	>1330
	MS21399-6	SW-W- 0.27	0.27	42	25	320	.59	.157	1230	>1230
	MS21399-7	SW-W- 0.33	0.33	42	25	295	.55	.178	1140	>1140
	MS21399-8	SW-W- 0.39	0.39	42	25	275	.55	.208	1060	>1060
	MS21399-9	SW-W- 0.47	0.47	41	25	250	.56	.257	960	> 960
	MS21399-10	SW-W- 0.56	0.56	39	25	238	.52	.283	915	> 915
	MS21399-11	SW-W- 0.68	0.68	36	25	224	.50	.337	840	> 840
	MS21399-12	SW-W- 0.82	0.82	35	25	205	.50	.470	720	> 720
IRON	MS21400-1	SW-W- 1.0	1.0	38	25	135	.87	.170	1180	>1180
	MS21400-2	SW-W- 1.2	1.2	38	7.9	124	.87	.190	1150	>1150
	MS21400-3	SW-W- 1.5	1.5	38	7.9	114	.87	.212	1050	>1050
	MS21400-4	SW-W- 1.8	1.8	38	7.9	105	.89	.242	990	> 990
	MS21400-5	SW-W- 2.2	2.2	38	7.9	95	.88	.263	950	> 950
	MS21400-6	SW-W- 2.7	2.7	38	7.9	85	.83	.320	880	> 880
	MS21400-7	SW-W- 3.3	3.3	38	7.9	78	.81	.345	820	> 820
	MS21400-8	SW-W- 3.9	3.9	42	7.9	74	.76	.411	755	> 755
	MS21400-9	SW-W- 4.7	4.7	42	7.9	68	.75	.562	650	> 650
	MS21400-10	SW-W- 5.6	5.6	42	7.9	62	.77	.742	565	> 565
	MS21400-11	SW-W- 6.8	6.8	45	7.9	55	.80	1.00	485	> 485
	MS21400-12	SW-W- 8.2	8.2	47	7.9	51	.78	1.20	440	> 440
	MS21400-13	SW-W- 10	10	51	7.9	45	.78	1.84	355	> 335
	MS21400-14	SW-W- 12	12	51	2.5	41	.85	2.60	300	> 300
FERRITE "T" LEAD	MS21401-1	SW-W- 15	15	45	2.5	48	.55	.635	610	200
	MS21401-2	SW-W- 18	18	45	2.5	44	.55	.728	570	175
	MS21401-3	SW-W- 22	22	45	2.5	37	.60	.825	530	160
	MS21401-4	SW-W- 27	27	45	2.5	32	.65	.950	500	155
	MS21401-5	SW-W- 33	33	46	2.5	30	.65	1.26	430	150
	MS21401-6	SW-W- 39	39	46	2.5	27	.66	1.42	405	145
	MS21401-7	SW-W- 47	47	46	2.5	23	.66	1.72	370	140
	MS21401-8	SW-W- 56	56	48	2.5	21	.75	2.03	340	130
	MS21401-9	SW-W- 68	68	48	2.5	18.5	.75	2.29	320	120
	MS21401-10	SW-W- 82	82	46	2.5	17.0	.75	2.55	305	115
	MS21401-11	SW-W- 100	100	46	2.5	15.5	.78	2.92	280	100
	MS21401-12	SW-W- 120	120	53	0.79	14.5	.72	3.30	235	80
	MS21401-13	SW-W- 150	130	53	0.79	13.0	.70	4.30	215	68
	MS21401-14	SW-W- 180	180	53	0.79	11.5	.70	5.40	200	64
	MS21401-15	SW-W- 220	220	55	0.79	10.0	.84	6.65	150	60
	MS21401-16	SW-W- 270	270	57	0.79	9.50	.74	7.60	140	58
	MS21401-17	SW-W- 330	330	57	0.79	8.50	.75	8.50	130	56
	MS21401-18	SW-W- 390	390	57	0.79	8.00	.74	10.0	120	54
	MS21401-19	SW-W- 470	470	57	0.79	7.20	.70	13.5	100	52
	MS21401-20	SW-W- 560	560	61	0.79	6.40	.70	14.5	95	50
	MS21401-21	SW-W- 680	680	61	0.79	5.80	.78	16.0	90	48
	MS21401-22	SW-W- 820	820	58	0.79	5.30	.78	19.0	85	47
	MS21401-23	SW-W- 1000	1000	58	0.79	4.80	.78	21.5	80	45
	MS21401-24	SW-W- 1200	1200	55	0.25	2.90	1.9	23	100	40
	MS21401-25	SW-W- 1500	1500	55	0.25	2.80	1.6	30	90	35
	MS21401-26	SW-W- 1800	1800	55	0.25	2.60	1.5	33	86	32
	MS21401-27	SW-W- 2200	2200	55	0.25	2.55	1.3	40	78	30
	MS21401-28	SW-W- 2700	2700	55	0.25	2.40	1.2	43	74	28
	MS21401-29	SW-W- 3300	3300	55	0.25	2.00	1.1	58	65	26
	MS21401-30	SW-W- 3900	3900	55	0.25	1.95	1.1	76	56	23
	MS21401-31	SW-W- 4700	4700	55	0.25	1.85	1.1	85	53	20
	MS21401-32	SW-W- 5600	5600	55	0.25	1.75	1.0	100	48	18
	MS21401-33	SW-W- 6800	6800	50	0.25	1.58	1.0	127	43	15
	MS21401-34	SW-W- 8200	8200	50	0.25	1.55	1.0	150	40	12
	MS21401-35	SW-W- 10,000	10,000	50	0.25	1.45	1.0	190	37	10

* INCREMENT CURRENT — The D.C. current required to cause a 5% reduction in the nominal inductance value.

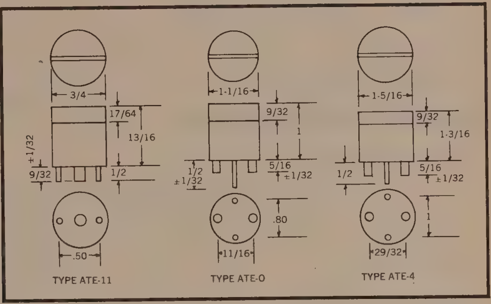
SPECIFICATIONS
ADJUSTOROID SERIES
VARIABLE TOROIDAL INDUCTORS

This radically new development in the toroidal coil field offers a variable toroid in one of three case sizes as shown. The **ADJUSTOROID** was developed especially for printed circuit and similar lightweight applications. This unit is epoxy encapsulated, and there is no physical contact between the adjusting screw and the toroidal winding. Inductance adjustment is achieved through magnetic coupling.



(U.S. Patent Numbers 2,762,020 and 3,100,882)

Variable Toroid
Stepless Adjustment
Very High "Q"
Available to 12 Henries
Epoxy Encapsulated
Fully Shielded



ELECTRICAL CHARACTERISTICS:

Adjustable Inductance Range:	Not less than ±5% from nominal
Q and fo values:	Minimum not less than 80% of specified value at nominal inductance.
Incremental Current:	Defined as the D.C. current required to cause a 5% reduction in the nominal inductance value.

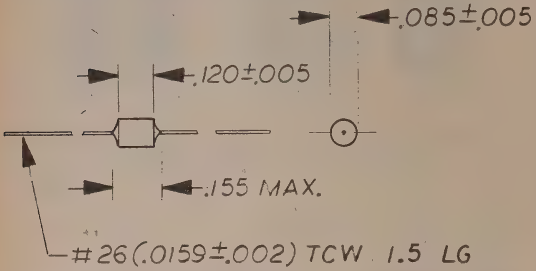
PHYSICAL AND ENVIRONMENTAL CHARACTERISTICS:

Weight:	Type ATE-11: 0.83 oz. Type ATE-0: 2.0 oz. Type ATE-4: 4.0 oz.

NCG Part No.	L nom. (Hy)	Q Nom.	Freq. (KHz)	Fo Nom. (KHz)	DCR Nom. (Ω)	Incr. I (Ma.)
ATE-11-0.010	.010	75	15	350	6	55
ATE-11-0.012	.012	75	15	300	8	51
ATE-11-0.015	.015	75	15	250	9	45
ATE-11-0.018	.018	75	15	250	10	41
ATE-11-0.022	.022	75	15	200	13	37
ATE-11-0.027	.027	75	15	200	14	34
ATE-11-0.033	.033	70	15	150	20	30
ATE-11-0.039	.039	70	15	150	22	28
ATE-11-0.047	.047	70	15	150	29	25
ATE-11-0.056	.056	70	15	100	32	23
ATE-11-0.068	.068	65	10	100	35	21
ATE-11-0.082	.082	65	10	100	48	19
ATE-11-0.100	.100	60	10	95	53	17
ATE-11-0.120	.120	60	10	90	58	16
ATE-11-0.150	.150	55	10	80	85	14
ATE-11-0.180	.180	55	10	70	92	13
ATE- 0-0.220	.220	95	7	45	55	21
ATE- 0-0.270	.270	95	7	40	76	19
ATE- 0-0.330	.330	95	7	35	83	17
ATE- 0-0.390	.390	90	6	35	111	16
ATE- 0-0.470	.470	90	6	30	122	14
ATE- 0-0.560	.560	90	6	25	181	12
ATE- 0-0.680	.680	85	6	20	185	12
ATE- 0-0.820	.820	85	6	20	202	11
ATE- 0-1.00	1.00	85	5	20	291	10
ATE- 0-1.20	1.20	80	5	20	320	9
ATE- 0-1.50	1.50	80	5	15	358	8
ATE- 4-1.80	1.80	100	4	13	198	14
ATE- 4-2.20	2.20	90	3	12	220	13
ATE- 4-2.70	2.70	90	3	11	300	11
ATE- 4-3.30	3.30	90	3	9	331	10
ATE- 4-3.90	3.90	80	2	8	455	9
ATE- 4-4.70	4.70	80	2	7	500	8
ATE- 4-5.60	5.60	80	2	7	545	8
ATE- 4-6.80	6.80	60	1.5	6	785	7
ATE- 4-8.20	8.20	60	1.5	5	862	6
ATE- 4-10.0	10.0	40	1	5	1207	6
ATE- 4-12.0	12.0	40	1	4	1323	5

SPECIFICATIONS
FIXED INDUCTORS
PEE-WEE SERIES

The amazing **PEE-WEE DUCTOR** represents a 66% size reduction from the smallest magnetically shielded axial leaded inductor series heretofore available anywhere. Furthermore, this size reduction was obtained with negligible loss of electrical performance by employing several unique concepts in RF coil design.



ALL DIMENSIONS IN INCHES

ELECTRICAL CHARACTERISTICS:

Inductance Tolerance: ± 10% (Std).

L,Q,F, values: Measurements per MIL-C-15305. (latest revision).

Incremental Current: Incremental current in table is for 5% reduction in inductance value.

Dielectric Strength: 300 Volts RMS @ Sea Level.

Temperature Coefficient of Inductance values: Temperature Range of −20°C to +80°C.

Inductance	Temp. Coefficient
0.10uH thru 1.0uH	+50 PPM/C
1.2uH thru 10uH	+100 PPM/C
12uH thru 100uH	+200 PPM/C
120uH thru 1000uH	+500 PPM/C

DENSITY CHARACTERISTICS:

Volume: .0007 Cubic Inches

Weight: 0.12 Grams

Shielding: 5% maximum coupling for two units side by side.

Marking: EIA color coded

PHYSICAL AND ENVIRONMENTAL CHARACTERISTICS:

Terminal pull: 3 lbs. minimum.

Environmental: Will meet the requirements of MIL-C-15305 (latest revision).

OPTIONS:

Inductance Values: Additional Inductance Values from .025 uH up to 10,000 uH available on special order.

PEE-WEE DUCTOR STANDARD VALUES

NCG PART NO.	L µH	Q min. @	MHz	min. SRF MHz	Max. DCR Ω	Max. I mA	Incr. I mA
PW- 0.10	.10	52	25	500	.060	1500	*
PW- 0.12	.12	52	25	480	.070	1400	*
PW- 0.15	.15	52	25	450	.080	1300	*
PW- 0.18	.18	55	25	430	.090	1200	*
PW- 0.22	.22	55	25	390	.11	1100	*
PW- 0.27	.27	55	25	340	.12	1000	*
PW- 0.33	.33	52	25	310	.14	950	*
PW- 0.39	.39	52	25	280	.16	900	*
PW- 0.47	.47	50	25	250	.20	800	*
PW- 0.56	.56	50	25	220	.25	750	*
PW- 0.68	.68	48	25	200	.27	700	*
PW- 0.82	.82	48	25	180	.36	600	*
PW- 1.0	1.0	45	25	165	.40	525	*
PW- 1.2	1.2	45	7.9	150	.70	425	*
PW- 1.5	1.5	45	7.9	130	.80	400	*
PW- 1.8	1.8	45	7.9	120	.90	350	*
PW- 2.2	2.2	45	7.9	110	1.3	320	*
PW- 2.7	2.7	45	7.9	100	1.8	275	*
PW- 3.3	3.3	42	7.9	70	1.7	290	*
PW- 3.9	3.9	45	7.9	65	1.8	275	*
PW- 4.7	4.7	45	7.9	58	2.6	225	*
PW- 5.6	5.6	45	7.9	54	2.9	210	*
PW- 6.8	6.8	45	7.9	50	3.3	200	*
PW- 8.2	8.2	45	7.9	48	4.5	170	*
PW- 10	10	45	7.9	45	4.8	165	*
PW- 12	12	45	2.5	40	2.0	250	230
PW- 15	15	45	2.5	36	2.5	230	180
PW- 18	18	45	2.5	31	3.5	195	150
PW- 22	22	46	2.5	28	4.5	170	135
PW- 27	27	48	2.5	25	5.0	160	115
PW- 33	33	48	2.5	23	5.5	150	105
PW- 39	39	48	2.5	22	7.0	140	100
PW- 47	47	50	2.5	21	7.5	135	95
PW- 56	56	52	2.5	19	8.0	130	90
PW- 68	68	55	2.5	18	9.0	120	83
PW- 82	82	55	2.5	16	14	95	65
PW- 100	100	55	2.5	14	16	90	70
PW- 120	120	34	.79	9.5	10	115	40
PW- 150	150	34	.79	8.8	12	105	35
PW- 180	180	34	.79	8.1	15	90	32
PW- 220	220	36	.79	7.8	20	80	30
PW- 270	270	36	.79	7.3	23	75	27
PW- 330	330	36	.79	6.8	26	70	25
PW- 390	390	36	.79	6.0	35	65	23
PW- 470	470	38	.79	5.6	37	60	21
PW- 560	560	40	.79	5.0	40	58	20
PW- 680	680	40	.79	4.3	48	54	18
PW- 820	820	40	.79	3.8	54	47	17
PW-1000	1000	40	.79	3.5	65	43	15

* GREATER THAN MAX I

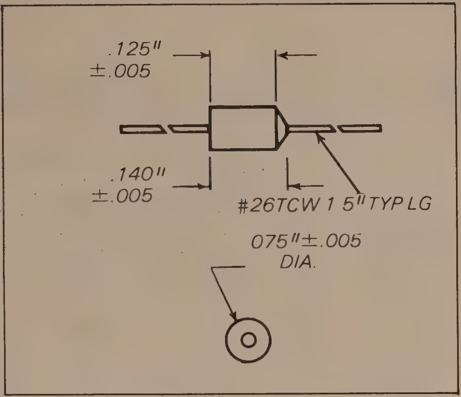
Nytronics Components Group Inc.
ORANGE STREET, DARLINGTON, S. C. 29532
(803) 393-5421 • TWX 810-665-2182

Inductors

NEW Pee Dee Ductor Series

Marking: EIA color coded

The Pee Dee Ductor is a new, microminiature, axial-leaded RF inductor for hybrid circuit applications. It is significantly smaller than any unshielded inductor available anywhere. Designed to meet the requirements of MIL-C-15305 (latest revision), this reliable, high performance inductor has a standard inductance tolerance of ±10%. Values below 0.1 uh and above 1000 uh are available on special order.



ELECTRICAL DATA

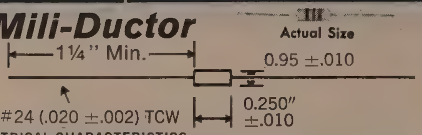
NCG Part No.	L uH	Q (Min.)	Test Freq. MHz	F° Min. MHz	DCR Max. Ohms	Rated Current mA
PD-0.10	0.10	42	25	500	0.2	600
PD-0.12	0.12	42	25	450	0.2	600
PD-0.15	0.15	42	25	400	0.25	575
PD-0.18	0.18	45	25	380	0.25	575
PD-0.22	0.22	45	25	360	0.30	565
PD-0.27	0.27	50	25	300	0.30	565
PD-0.33	0.33	45	25	280	0.35	560
PD-0.39	0.39	50	25	260	0.37	550
PD-0.47	0.47	50	25	250	0.39	535
PD-0.56	0.56	50	25	240	0.40	525
PD-0.68	0.68	50	25	220	0.45	500
PD-0.82	0.82	50	25	180	0.50	480
PD-1.0	1.0	50	25	170	0.60	450
PD-1.2	1.2	42	7.9	150	0.70	425
PD-1.5	1.5	45	7.9	130	0.80	400
PD-1.8	1.8	45	7.9	120	0.90	350
PD-2.2	2.2	45	7.9	110	1.3	320
PD-2.7	2.7	45	7.9	105	1.8	275
PD-3.3	3.3	35	7.9	100	1.1	340
PD-3.9	3.9	35	7.9	90	1.4	310
PD-4.7	4.7	35	7.9	85	1.6	290
PD-5.6	5.6	35	7.9	70	1.8	275
PD-6.8	6.8	40	7.9	65	2.0	250
PD-8.2	8.2	40	7.9	62	2.2	245
PD-10	10	45	7.9	60	3.0	210
PD-12	12	45	2.5	35	2.0	250
PD-15	15	45	2.5	30	2.2	245
PD-18	18	45	2.5	25	2.5	230
PD-22	22	45	2.5	23	2.7	220
PD-27	27	50	2.5	21	3.8	195
PD-33	33	50	2.5	20	4.5	170
PD-39	39	50	2.5	16	6.0	150
PD-47	47	50	2.5	14	6.5	145
PD-56	56	50	2.5	12	7.8	135
PD-68	68	55	2.5	10	8.6	130
PD-82	82	50	2.5	9.0	9.8	120
PD-100	100	55	2.5	8.0	11.5	110
PD-120	120	28	.79	7.0	15.0	90
PD-150	150	28	.79	6.0	16.5	88
PD-180	180	25	.79	5.5	22	75
PD-220	220	24	.79	5.2	31	62
PD-270	270	24	.79	5.0	38	56
PD-330	330	24	.79	4.8	42	53
PD-390	390	24	.79	3.6	58	47
PD-470	470	24	.79	3.4	60	45
PD-560	560	24	.79	3.2	65	43
PD-680	680	22	.79	3.0	90	36
PD-820	820	23	.79	2.5	95	34
PD-1000	1000	21	.79	2.0	130	30

Nytronics Components Group Inc.
ORANGE STREET, DARLINGTON, S. C. 29532
(803) 393-5421 • TWX 810-665-2182

Inductors

NEW —MS INDUCTOR SERIES
75083, 75084, 75085
MOLDED INDUCTOR / 0.100 uh to 1000 uh

Mili-Ductor



The MS Inductor Series are RF Inductors specifically designed to meet the demanding requirements of MIL-C-15305 (latest revision). This MS Series is Epoxy Molded enveloped features reliability and uniformity in a Subminiature Inductor.

ELECTRICAL CHARACTERISTICS
Inductance Tolerance: ±10% over entire range.
Dielectric Strength: 1000 volts RMS at sea level.
Self-Resonant Frequency: Measured per MIL-C-15305 (latest revision).
Rating: Maximum current based on: 35°C rise in 90° ambient for phenolic, 15°C rise in 90° ambient for iron, 35°C rise in 70° ambient for ferrite core inductors.

DENSITY CHARACTERISTICS
Volume: 0.002 cubic inches; **Weight** .030 grams.

PHYSICAL AND ENVIRONMENTAL CHARACTERISTICS
Operating Temperature: —55°C to +125°C phenolic core, —55°C to +105°C iron and ferrite core.
Terminal Strength: Meets five pound pull test; five 360° rotations in alternate directions per MIL-C-15305 (latest revision).
Moisture, Vibration, and Shock Resistance: Meets requirements of MIL-C-15305 (latest revision), 10 cps to 2000 cps @ 15G ±10% maximum for 12 logarithmic swings each of 20 minute duration repeated for each of three mutually perpendicular planes. Shock: 50G, 11 MS (body mounted).

MS No.	NCG Part No.	±10% Inductance uh	Q Min.	Test Frequency (L & Q) MHz	Self-resonant Frequency, Min. MHz	DC Resistance Max. Ohms	Rated DC Current MA
MS75083-01	MD	.10	40	25.0	680	.08	1350
MS75083-02	MD	.12	40	25.0	640	.09	1270
MS75083-03	MD	.15	38	25.0	600	.10	1200
MS75083-04	MD	.18	35	25.0	550	.12	1105
MS75083-05	MD	.22	33	25.0	510	.14	1025
MS75083-06	MD	.27	33	25.0	430	.16	960
MS75083-07	MD	.33	30	25.0	410	.22	815
MS75083-08	MD	.39	30	25.0	365	.30	700
MS75083-09	MD	.47	30	25.0	330	.35	650
MS75083-10	MD	.56	30	25.0	300	.50	545
MS75083-11	MD	.68	28	25.0	275	.60	495
MS75083-12	MD	.82	28	25.0	250	.85	415
MS75083-13	MD	1.00	25	25.0	230	1.00	385
MS75084-01	MD	1.2	25	7.9	150	.18	590
MS75084-02	MD	1.5	28	7.9	140	.22	535
MS75084-03	MD	1.8	30	7.9	125	.30	455
MS75084-04	MD	2.2	30	7.9	115	.40	395
MS75084-05	MD	2.7	37	7.9	100	.55	355
MS75084-06	MD	3.3	45	7.9	90	.85	270
MS75084-07	MD	3.9	45	7.9	80	1.00	250
MS75084-08	MD	4.7	45	7.9	75	1.20	230
MS75084-09	MD	5.6	50	7.9	65	1.80	185
MS75084-10	MD	6.8	50	7.9	60	2.00	175
MS75084-11	MD	8.2	55	7.9	55	2.70	155
MS75084-12	MD	10	55	7.9	50	3.70	130
MS75084-13	MD	12	45	2.5	40	2.70	155
MS75084-14	MD	15	40	2.5	35	2.80	150
MS75084-15	MD	18	50	2.5	30	3.10	145
MS75084-16	MD	22	50	2.5	25	3.30	140
MS75084-17	MD	27	50	2.5	20	3.50	135
MS75085-01	MD	33	45	2.5	24	3.4	130
MS75085-02	MD	39	45	2.5	22	3.6	125
MS75085-03	MD	47	45	2.5	20	4.5	110
MS75085-04	MD	56	45	2.5	18	5.7	100
MS75085-05	MD	68	50	2.5	15	6.7	92
MS75085-06	MD	82	50	2.5	14	7.3	88
MS75085-07	MD	100	50	2.5	13	8	84
MS75085-08	MD	120	30	.79	12	13	66
MS75085-09	MD	150	30	.79	11	15	61
MS75085-10	MD	180	30	.79	10	17	57
MS75085-11	MD	220	30	.79	9	21	52
MS75085-12	MD	270	30	.79	8	25	47
MS75085-13	MD	330	30	.79	7	28	45
MS75085-14	MD	390	30	.79	6.5	35	40
MS75085-15	MD	470	30	.79	6	42	36
MS75085-16	MD	560	30	.79	5	46	35
MS75085-17	MD	680	30	.79	4	60	30
MS75085-18	MD	820	30	.79	3.8	65	29
MS75085-19	MD	1000	30	.79	3.4	72	28

Nytronics Components Group Inc.
ORANGE STREET, DARLINGTON, S. C. 29532
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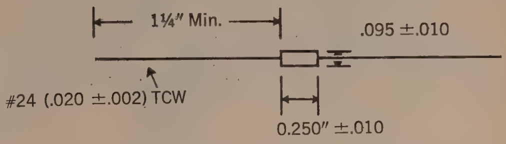
Inductors

DECI-DUCTOR

New Subminiature Inductor 0.10uH to 1000uH Range
0.100″ diameter by 0.250″ length 49 STANDARD VALUES

The **DECI-DUCTOR** offers the design engineer epoxy-molded reliability and uniformity in a subminiature R.F. Inductor. This smallest of Nytronics growing R.F. Inductor line is designed to meet all the environmental specifications of MIL-C-15305 (latest revision).



ELECTRICAL CHARACTERISTICS

Inductance Tolerance: ±10% over entire range.
Dielectric Strength: 700 volts RMS at sea level.
Self-Resonant Frequency: Measured per MIL-C-15305 (latest revision).
Rating: Maximum Current based on 35°C rise in 90°C ambient.

DENSITY CHARACTERISTICS

Volume: 0.002 cubic inches **Weight:** 0.35 grams

PHYSICAL AND ENVIRONMENTAL CHARACTERISTICS

Operating Temperature: —55°C to +125°C

Terminal Strength: Meets three pound pull test; five 360° rotations in alternate directions per MIL-C-15305 (latest revision).

Moisture, Vibration, and Shock Resistance: Meets requirements of MIL-C-15305 (latest revision), 10 cps to 2000 cps @ 15 G ±10% maximum for 12 logarithmic swings each of 20 minute duration repeated for each of three mutually perpendicular planes. Shock: 50G, 11 MS (body mounted).

Marking: Color coded per MIL-C-15305 (latest revision).

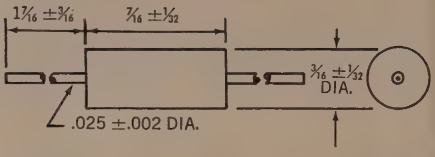
	NCG Part No.	L	Q Min.		Min. SRF	Max. DCR	Max I.
		uH		MHz	MHz	Ohms	mA
PHENOLIC	DD-0.10	0.10	40	25	690	0.07	2000
	DD-0.12	0.12	40	25	650	0.08	1900
	DD-0.15	0.15	38	25	600	0.09	1750
	DD-0.18	0.18	38	25	550	0.10	1600
	DD-0.22	0.22	35	25	510	0.11	1550
	DD-0.27	0.27	35	25	470	0.15	1350
	DD-0.33	0.33	32	25	410	0.21	1150
	DD-0.39	0.39	32	25	370	0.29	970
	DD-0.47	0.47	32	25	340	0.35	820
	DD-0.56	0.56	32	25	310	0.48	700
	DD-0.68	0.68	33	25	280	0.65	600
	DD-0.82	0.82	30	25	255	0.82	500
	DD-1.00	1.00	30	25	240	1.10	475
IRON	DD-1.20	1.20	30	7.9	155	0.16	1200
	DD-1.50	1.50	32	7.9	140	0.20	1100
	DD-1.80	1.80	35	7.9	130	0.32	900
	DD-2.20	2.20	35	7.9	120	0.37	760
	DD-2.70	2.70	37	7.9	105	0.49	700
	DD-3.30	3.30	45	7.9	95	0.67	575
	DD-3.90	3.90	45	7.9	87	0.95	500
	DD-4.70	4.70	45	7.9	80	1.10	475
	DD-5.60	5.60	52	7.9	75	1.60	380
	DD-6.80	6.80	52	7.9	65	1.80	350
	DD-8.20	8.20	60	7.9	62	2.40	300
	DD-10.0	10.0	60	7.9	52	3.40	265
	DD-12.0	12.0	45	2.5	42	2.40	300
	DD-15.0	15.0	47	2.5	36	2.70	275
	DD-18.0	18.0	50	2.5	32	3.00	260
	DD-22.0	22.0	50	2.5	28	3.30	250
	DD-27.0	27.0	50	2.5	25	3.80	240
FERRITE	DD-33.0	33.0	50	2.5	30	3.80	260
	DD-39.0	39.0	50	2.5	26	4.10	240
	DD-47.0	47.0	50	2.5	24	4.40	210
	DD-56.0	56.0	50	2.5	22	5.70	205
	DD-68.0	68.0	52	2.5	19	6.50	180
	DD-82.0	82.0	52	2.5	17	7.30	175
	DD-100	100	50	2.5	15	8.20	165
	DD-120	120	28	0.79	14	14	110
	DD-150	150	28	0.79	13	16	105
	DD-180	180	28	0.79	12	18	100
	DD-220	220	26	0.79	11	25	90
	DD-270	270	26	0.79	10	33	75
	DD-330	330	26	0.79	9.0	37	70
	DD-390	390	25	0.79	8.0	51	60
	DD-470	470	27	0.79	7.0	56	58
	DD-560	560	27	0.79	6.5	61	55
	DD-680	680	28	0.79	6.0	70	50
	DD-820	820	28	0.79	5.5	91	45
	DD-1000	1000	28	0.79	5.2	102	40

Nytronics Components Group Inc.

ORANGE STREET, DARLINGTON, S. C. 29532
(803) 393-5421 • TWX 810-665-2182

Inductors

MS-INDUCTOR SERIES
75008-75101
MOLDED INDUCTOR
(Manufactured per MS75008 - MS75101)



ALL DIMENSIONS IN INCHES

Proven reliability molded inductors designed to meet MS75008 and MIL-C-15305 (latest revision). Inductance 0.15 to 27.0 uhy.

ELECTRICAL CHARACTERISTICS

Inductance Tolerance: 0.15 to 0.47 uhy ±20%; 0.56 to 27.0 uhy ±10%
Dielectric Strength: 700 Volts RMS at sea level
Max. Temp. Rise: 35°C

PHYSICAL AND ENVIRONMENTAL CHARACTERISTICS

Operating Temperature: —55°C to +125°C.
Terminal Strength: Meets five pound pull test per MIL-C-15305 (latest revision).
Moisture, Vibration, and Shock Resistance: Meets requirements of MIL-C-15305 (latest revision). High frequency 10 cps to 2000 cps @ 15G ±10% maximum for 12 logarithmic swings, each of 20 minute duration repeated for each of three mutually perpendicular planes. (body mounted)
Volume: S Type — 0.012 cu. in.
Weight: S Type — 0.90 grams
Marking: Color banded per MIL-C-15305 (latest revision).

MS No.	NCG P/N	Inductance	Q; Min.	Test Frequency	Self-resonant Frequency, Min.	DC Resistance, Max.	Rated DC Current	Material
		uh		MHz	MHz	Ohms	ma	
75008-21	RFC-S	0.15 ±20%	55	25.0	510	0.030	3,000	PHENOLIC
75008-22	RFC-S	0.22 ±20%	50	25.0	415	0.035	2,800	
75008-23	RFC-S	0.33 ±20%	50	25.0	350	0.065	2,000	
75008-24	RFC-S	0.47 ±20%	50	25.0	300	0.085	1,700	
75008-25	RFC-S	0.56 ±10%	50	25.0	270	0.125	1,450	
75008-26	RFC-S	0.68 ±10%	45	25.0	250	0.150	1,300	
75008-27	RFC-S	0.82 ±10%	40	25.0	210	0.205	1,100	
75008-28	RFC-S	1.00 ±10%	40	25.0	200	0.290	930	
75008-29	RFC-S	1.20 ±10%	30	7.9	180	0.400	785	
75008-30	RFC-S	1.50 ±10%	30	7.9	170	0.485	700	
75008-31	RFC-S	1.80 ±10%	30	7.9	150	0.740	580	
75008-32	RFC-S	2.20 ±10%	30	7.9	140	0.970	505	
75008-33	RFC-S	2.70 ±10%	30	7.9	120	1.20	460	IRON
MS75101-1	RFC-S	3.30 ±10%	30	7.9	70	0.140	1,350	
MS75101-2	RFC-S	3.90 ±10%	30	7.9	65	0.155	1,250	
MS75101-3	RFC-S	4.70 ±10%	30	7.9	60	0.210	1,100	
MS75101-4	RFC-S	5.60 ±10%	30	7.9	50	0.280	935	
MS75101-5	RFC-S	6.80 ±10%	30	7.9	50	0.375	810	
MS75101-6	RFC-S	8.20 ±10%	30	7.9	48	0.440	750	
MS75101-7	RFC-S	10.00 ±10%	30	7.9	42	0.605	640	
MS75101-8	RFC-S	12.00 ±10%	50	2.5	36	1.05	490	
MS75101-9	RFC-S	15.00 ±10%	55	2.5	30	1.20	460	
MS75101-10	RFC-S	18.00 ±10%	60	2.5	30	1.95	360	
MS75101-11	RFC-S	22.00 ±10%	60	2.5	24	2.20	335	
MS75101-12	RFC-S	27.00 ±10%	65	2.5	22	2.75	300	

Nytronics, Inc.
ORANGE STREET, DARLINGTON, S. C. 29532
(803) 393-5421 • TWX 810-665-2182

The Wee-Bit
(Nytronics Delay Line Sections)

NYTRONICS
WL 60 NS
Z 500 S

**Unique sectional construction available utilizing individual pre-designed Wee-Bit Pulse Delay elements.
48 hour delivery not 8 weeks.
No tooling expenses.**

The **WEE-BIT** offers the advantage of assembling a unique sectionalized delay line that reduces delivery on prototype delay lines from weeks to days and eliminates expensive tooling and design efforts. Consisting of pre-designed LC sections called Wee-Bits, a discrete value of delay time is offered. The aggregate number of Wee-Bits determines the total delay time and is a function of delay to rise time ratio. An assembly is made of selected Wee-Bits mounted on printed circuit boards that conform to MIL-P-13949B, stacked or single layer and permits increment of delay to be tapped without disturbing uniform pulse shape. Wee-Bit size 0.401″ long by 0.625″ wide by 0.230″ height and are epoxy molded to meet environmental conditions of MIL-C-15305 (latest revision). Temperature range −55°C to 125°C. 300 VDC working voltage. Delay time available per Wee-Bit from 10 nanoseconds to 100 nanoseconds in 10 nanoseconds increments. Wee-Bits also stocked with 200 nanoseconds delay. This unique wee line sectionalized delay line concept allows reduction of approximately 40% in number of sections ordinarily required*, flexibility of design, and line tapping.

NCG Part No.	Delay Time N.S.	Delay Tolerance	Approximate Band Width MHz	DC Resistance (ohms) Max.	Std. Impedance ohms ±10%
WL-10NS	10	±1NS	25 MHz	0.70	500
WL-20NS	20	±5%	19 MHz	1.10	500
WL-30NS	30	±5%	13 MHz	1.40	500
WL-40NS	40	±5%	7.5 MHz	1.60	500
WL-50NS	50	±5%	6.5 MHz	1.90	500
WL-60NS	60	±5%	5.5 MHz	2.10	500
WL-70NS	70	±5%	4.5 MHz	2.25	500
WL-80NS	80	±5%	4.0 MHz	2.50	500
WL-90NS	90	±5%	3.75 MHz	2.60	500
WL-100NS	100	±5%	3.5 MHz	2.80	500
WL-200NS	200	±5%	1.5 MHz	4.20	500

NOTE: Other impedance values available upon request.

LEADING ELECTRICAL PARTICULARS

Delay Tolerance:	±5%
Risetime Tolerance:	±20%
Noise:	1 to 10%, less than 3% for most types
Ripple:	1 to 10%, less than 3% for most types
Attenuation:	0.2 db/usec. to 1.0 db/usec. most types 0.2 db/usec.
Temp. Coefe.:	$150\ (10)^{6}$ us/us —°C
Impedance:	500 ohms ±5%
Operating Voltage:	300 Volts D.C.

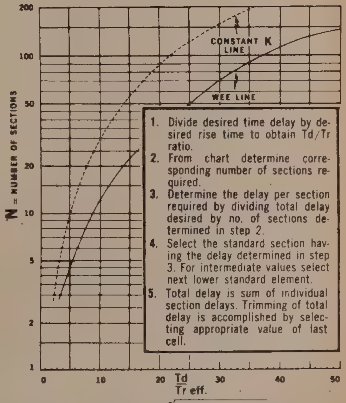
Tr MEASURED AT 10% & 90% and Td MEASURED AT 50% POINTS OF INPUT AND OUTPUT PULSES. Individual Sections furnished in ±5% Tolerance (or ±1NS, whichever is greater) and must be tested in accordance with Nytronics, Inc. DSI 394.

LEADING MECHANICAL PARTICULARS
(for 15 section delay line)

Length of 15 cells	6.125″
Length of 15 cells plus P.C. mounting board	7.141″
Width of cells plus P.C. mounting board	0.750″
Height of cells plus P.C. mounting board	0.330″

Basic cell size: Length — 0.401″
Width — 0.625″
Height — 0.230″

Temperature range and operation environmental conditions are covered by MIL-C-15305 (latest revision).



1. Divide desired time delay by desired rise time to obtain Td/Tr ratio.
2. From chart determine corresponding number of sections required.
3. Determine the delay per section required by dividing total delay desired by no. of sections determined in step 2.
4. Select the standard section having the delay determined in step 3. For intermediate values select next lower standard element.
5. Total delay is sum of individual section delays. Trimming of total delay is accomplished by selecting appropriate value of last cell.

$$Tr\ eff. = \sqrt{Tr^{2}_{OUT} - Tr^{2}_{IN}}$$

IF Tr OUT ≥ 10x Tr IN, Tr eff. = Tr OUT

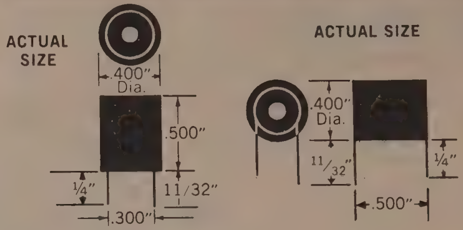
*Compared to constant K

Nytronics Components Group Inc.
ORANGE STREET, DARLINGTON, S. C. 29532
(803) 393-5421 • TWX 810-665-2182

VARIABLE INDUCTORS

VIV-VIH

Miniature with inductance range of 0.10 to 4700uH in 29 values.
Encapsulated in epoxy resin for reliability.
Designed to meet MIL-C-15305 (latest revision).



Terminal Leads #22 (.025 ± .002) VCW

VERTICAL STYLE HORIZONTAL STYLE

The **VARIABLE INDUCTOR** offers high reliability and exceptional stability over extreme temperature variations. This small lightweight unit is furnished in vertical and horizontal styles to facilitate mounting on printed circuit boards. The unit is designed to meet the requirements of MIL-C-15305 (latest revision).

ELECTRICAL CHARACTERISTICS

Inductance Range:	0.33 to 4700uH Tunable Range ±20% 0.15 to 0.22uH Tunable Range ±15% 0.1 Tunable Range ±10% All measurements at 25°C on Q-Meter using miniature alligator clips mounted 1/32" from body. Q values ±20%
Self-Resonant Frequency:	Minimum f_0 to be not less than 80% of published data as measured with Grid-Dip Meter

DENSITY CHARACTERISTICS

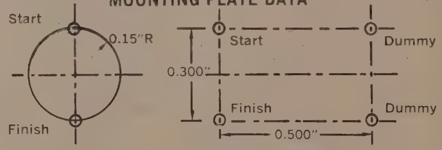
Volume:	0.063 cubic inches
Weight:	2.6 grams

PHYSICAL AND ENVIRONMENTAL CHARACTERISTICS

Torque:	0.75 to 5.0 inch-ounces Use Nytronics Tuning Tool No. B-305 or equal.
Operating Temperature:	−55°C to +125°C
Terminal Strength:	Meets five pound pull tests.
Moisture, Vibration, and Shock Resistance:	Meets requirements of MIL-C-15305 (latest revision). Low frequency 10 cps to 55 cps @ .06" total excursion at rate of 1 linear sweep per minute for 2 hours repeated for each of 3 mutually perpendicular planes. Shock: 50G, 11ms.
Core Material:	Iron
Marking:	Manufacturer data printed.

NCG PART NOS.		L nom	Q at L nom		Approx. SRF, L nom.	Max. DCR
VIV	VIH	μH		MHz	MHz	Ω
VIV- 0.10	VIH- 0.10	0.10	85	25.	>500.	0.02
VIV- 0.15	VIH- 0.15	0.15	100	25.	>500.	0.035
VIV- 0.22	VIH- 0.22	0.22	100	25.	>500.	0.04
VIV- 0.33	VIH- 0.33	0.33	100	25.	334.	0.04
VIV- 0.47	VIH- 0.47	0.47	100	25.	285.	0.05
VIV- 0.68	VIH- 0.68	0.68	100	25.	237.	0.07
VIV- 1.00	VIH- 1.00	1.00	90	25.	205.	0.13
VIV- 1.50	VIH- 1.50	1.50	70	7.9	168.	0.24
VIV- 2.20	VIH- 2.20	2.20	73	7.9	135.	0.30
VIV- 3.30	VIH- 3.30	3.30	80	7.9	112.	0.45
VIV- 4.70	VIH- 4.70	4.70	75	7.9	100.0	0.80
VIV- 6.80	VIH- 6.80	6.80	80	7.9	80.0	1.1
VIV- 10.0	VIH- 10.0	10.0	82	7.9	67.0	1.9
VIV- 15.0	VIH- 15.0	15.0	65	2.5	54.2	3.2
VIV- 22.0	VIH- 22.0	22.0	55	2.5	17.5	3.4
VIV- 33.0	VIH- 33.0	33.0	54	2.5	15.0	3.6
VIV- 47.0	VIH- 47.0	47.0	51	2.5	13.2	4.5
VIV- 68.0	VIH- 68.0	68.0	55	2.5	12.0	5.5
VIV- 100	VIH- 100	100.0	50	2.5	10.5	6.7
VIV- 150	VIH- 150	150.	50	.79	3.0	11.0
VIV- 220	VIH- 220	220.	50	.79	2.70	13.0
VIV- 330	VIH- 330	330.	48	.79	2.24	16.0
VIV- 470	VIH- 470	470.	45	.79	1.90	18.0
VIV- 680	VIH- 680	680.	42	.79	1.70	21.0
VIV-1000	VIH-1000	1000.	40	.79	1.40	38.0
VIV-1500	VIH-1500	1500.	40	.25	1.14	54.0
VIV-2200	VIH-2200	2200.	44	.25	0.96	66.0
VIV-3300	VIH-3300	3300.	46	.25	0.86	85.0
VIV-4700	VIH-4700	4700.	48	.25	0.76	99.0

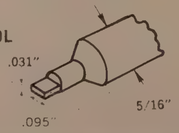
MOUNTING PLATE DATA



VERTICAL HORIZONTAL

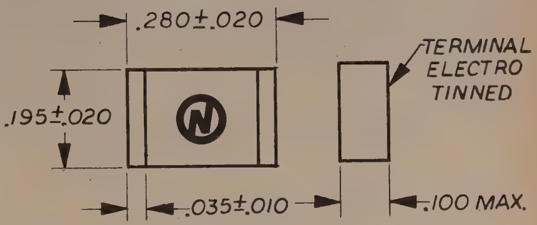
TYPICAL ALIGNING TOOL

B-305



SPECIFICATIONS
CHIP INDUCTORS
WEE-CHIP SERIES

The Wee-Chip Inductor is a magnetically shielded miniaturized fixed inductor made especially for mounting on substrates. The inductor body is constructed of high stability, low loss ferrite, combined with a coil cavity of optimum cross sectional area and mean radius, producing a unit having excellent "Q" factor. Copper terminations are of the wrap-around type for the greatest degree of mounting flexibility.



ELECTRICAL CHARACTERISTICS

Inductance Tolerance:	±10% over entire range; standard.
Dielectric Strength:	500 VRMS

DENSITY CHARACTERISTICS

Volume:	0.0055 Cubic Inches.
Weight:	0.35 grams (Max.)
Marking:	Manufacturer Data Printed

ELECTRICAL DATA

NCG PART NO.	L Uh ± 10%	Q (MIN)	TEST FREQ. MHz	SRF MIN MHz	DCR (MAX) OHMS	CURRENT (MAX) MA
WCI - 15	15	70	2.5	21.5	1.75	345
WCI - 18	18	70	2.5	19.0	1.90	335
WCI - 22	22	75	2.5	17.5	2.20	325
WCI - 27	27	75	2.5	16.0	2.40	310
WCI - 33	33	75	2.5	15.0	2.60	300
WCI - 39	39	75	2.5	14.5	2.75	295
WCI - 47	47	75	2.5	13.0	2.95	285
WCI - 56	56	75	2.5	12.0	3.25	270
WCI - 68	68	75	2.5	11.0	3.50	255
WCI - 82	82	75	2.5	10.5	4.00	235
WCI - 100	100	70	2.5	9.0	4.25	225
WCI - 120	120	70	0.79	8.5	4.50	215
WCI - 150	150	70	0.79	7.0	5.50	200
WCI - 180	180	75	0.79	6.5	6.50	190
WCI - 220	220	75	0.79	6.0	8.00	170
WCI - 270	270	75	0.79	5.5	12.0	140
WCI - 330	330	75	0.79	5.0	13.0	130
WCI - 390	390	75	0.79	4.5	14.0	120
WCI - 470	470	75	0.79	4.0	15.0	115
WCI - 560	560	75	0.79	3.5	22.0	100
WCI - 680	680	70	0.79	3.0	24.0	95
WCI - 820	820	70	0.79	2.5	26.0	90
WCI - 1000	1000	70	0.79	2.0	36.0	75

(1) Shielding: 2% max. coupling when two units are tested side by side.
(2) Designed to meet the requirements of MIL-C-15305, Grade 2, Class B.
(3) Stability: Temp. coefficient of inductance ranges from 100 to 500 ppm/°C depending on inductance.
(4) Current Ratings: Based on a 35°C temperature rise from an ambient temp. of 90°C.
(5) L, Q & F_0 measurements made using Boonton 260-A Q-meter.
(6) Other values & tolerances available on special order.

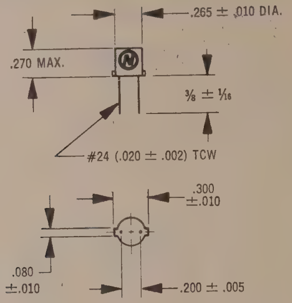
SPECIFICATIONS
FIXED INDUCTORS
PEE-CEE DUCTOR SERIES

The PEE-CEE is designed to meet MIL-C-15305 (latest revision), Grade 1, Class B. Printed board mounting is facilitated by 0.200 grid spacing and unit has shielded construction to allow maximum density packaging. Standardized in 73 stock values.

Subminiature Shielded
High Q Values

Radial Lead Fixed Inductor
0.10 to 100,000uH

Unitized Epoxy-Molded Construction



All dimensions in inches

ELECTRICAL CHARACTERISTICS

Inductance:	±10% over entire range as measured per MIL-C-15305 (latest revision).
Q and f_o Values:	Minimum not less than 80% of specified value
Dielectric Strength:	840 Volts R.M.S. at sea level.
Working Voltage:	300 Volts D.C.
Maximum Current:	Based on temperature rise not to exceed 35°C at 90°C ambient.
Incremental Current:	Defined as the DC current required to cause a five percent reduction in the nominal inductance value.

DENSITY CHARACTERISTICS

Weight:	1.5 grams maximum
Volume:	.015 cubic inches
Shielding:	3% coupling maximum when two units are tested side by side.

PHYSICAL AND ENVIRONMENTAL CHARACTERISTICS

Operating Temperature:	−55°C to +125°C.
Moisture, Vibration, and Shock Resistance:	Meet requirements of MIL-C-15305 (latest revision). Low frequency 10 to 55 cps @ .06″ maximum total excursion at rate of 1 linear sweep per minute for 2 hours repeated for each of three mutually perpendicular planes. Shock: 50G, 11 MS. (body mounted)
Marking:	Manufacturer data printed.
Terminal Pull:	Three pounds.

PEE-CEE DUCTOR STANDARD VALUES

NCG Part No.	L	Test Freq.	Q nom.	SRF nom.	D.C.R. Max.	Max. I	Incr. I
	µh	MHz		MHz	ohms	m.a.	m.a.
PC 0.10	.10	25	70	>250	0.030	2500	2500
PC 0.12	.12	25	70	>250	0.030	2500	2500
PC 0.15	.15	25	70	>250	0.030	2500	2500
PC 0.18	.18	25	70	>250	0.035	2400	2400
PC 0.22	.22	25	70	>250	0.038	2300	2300
PC 0.27	.27	25	80	>250	0.040	2200	2200
PC 0.33	.33	25	80	>250	0.040	2200	2200
PC 0.39	.39	25	80	250	0.045	2100	2100
PC 0.47	.47	25	80	230	0.045	2100	2100
PC 0.56	.56	25	80	220	0.050	2000	2000
PC 0.68	.68	25	80	190	0.055	1900	1900
PC 0.82	.82	25	85	180	0.060	1800	1800
PC 1.00	1.00	25	85	160	0.070	1700	1700
PC 1.2	1.2	7.9	90	170	0.085	1670	1670
PC 1.5	1.5	7.9	100	155	0.100	1540	1540
PC 1.8	1.8	7.9	115	135	0.110	1470	1470
PC 2.2	2.2	7.9	110	120	0.120	1410	1410
PC 2.7	2.7	7.9	110	104	0.125	1380	1380
PC 3.3	3.3	7.9	90	93.0	0.165	1200	1200
PC 3.9	3.9	7.9	90	87.0	0.180	1135	1135
PC 4.7	4.7	7.9	95	79.0	0.245	985	985
PC 5.6	5.6	7.9	95	72.0	0.265	950	950
PC 6.8	6.8	7.9	85	63.0	0.330	853	853
PC 8.2	8.2	7.9	95	60.0	0.460	720	720
PC 10	10	7.9	90	54.0	0.640	620	620
PC 12	12	2.5	120	37.0	0.800	545	545
PC 15	15	2.5	120	28.8	0.865	520	520
PC 18	18	2.5	115	23.8	0.940	504	504
PC 22	22	2.5	125	21.3	1.03	460	460
PC 27	27	2.5	115	20.6	1.18	418	418
PC 33	33	2.5	120	18.6	1.30	398	398
PC 39	39	2.5	120	17.7	1.41	385	385
PC 47	47	2.5	110	14.9	1.61	350	350
PC 56	56	2.5	115	13.9	2.08	330	330
PC 68	68	2.5	105	12.9	2.20	320	320
PC 82	82	2.5	105	11.7	2.42	300	300
PC 100	100	2.5	95	10.5	2.15	333	333
PC 120	120	0.790	95	5.60	2.38	316	190
PC 150	150	0.790	90	5.20	2.52	306	175
PC 180	180	0.790	95	4.90	2.88	288	150
PC 220	220	0.790	95	4.60	3.18	273	125
PC 270	270	0.790	100	4.20	3.50	260	120
PC 330	330	0.790	100	3.55	4.80	222	110
PC 390	390	0.790	100	3.45	5.44	209	105
PC 470	470	0.790	100	3.20	5.90	201	100
PC 560	560	0.790	95	2.90	6.30	194	90
PC 680	680	0.790	100	2.70	7.20	181	80
PC 820	820	0.790	90	2.50	8.00	172	70
PC 1,000	1,000	0 790	100	2.35	12.0	141	65
PC 1,200	1,200	0.250	95	2.20	13.5	132	60
PC 1,500	1,500	0.250	90	1.90	16.5	119	55
PC 1,800	1,800	0.250	100	1.80	18.0	114	47
PC 2,200	2,200	0.250	100	1.70	20.5	107	43
PC 2,700	2,700	0.250	95	1.50	22.5	102	39
PC 3,300	3,300	0.250	90	1.40	42.0	76	36
PC 3,900	3,900	0.250	85	1.27	47.5	71	35
PC 4,700	4,700	0.250	85	1.24	53.0	67	34
PC 5,600	5,600	0.250	85	0.93	62.5	65	31
PC 6,800	6,800	0.250	75	0.79	69.5	58	27
PC 8,200	8,200	0.250	80	0.75	75.0	56	26
PC 10,000	10,000	0.250	70	0.70	100.0	49	24
PC 12,000	12,000	0.079	70	.50	64	60	40
PC 15,000	15,000	0.079	70	.38	84	52	34
PC 18,000	18,000	0.079	70	.36	93	50	30
PC 22,000	22,000	0.079	70	.32	104	45	28
PC 27,000	27,000	0.079	70	.30	173	35	26
PC 33,000	33,000	0 079	70	.27	187	32	24
PC 39,000	39,000	0.079	70	.26	220	30	22
PC 47,000	47,000	0.079	70	.25	253	28	20
PC 56,000	56,000	0.079	70	.24	285	26	19
PC 68,000	68,000	0.079	60	.20	311	24	18
PC 82,000	82,000	0.079	60	.19	385	22	16
PC 100,000	100,000	0.079	60	.17	420	20	15

Nytronics Components Group Inc.
ORANGE STREET, DARLINGTON, S. C. 29532
(803) 393-5421 • TWX 810-665-2182

NEW Variable, Magnetically Shielded, Electrostatically Shielded Inductor

DESIGNED TO MEET REQUIREMENTS OF MIL-C-15305 (LATEST REVISION)

ELECTRICAL:

Tuning Range > 10%.
Flat Q Response Across Tuning Range.
Low DCR to L Ratio.

INDUCTANCE:

< 1uh to > 1000uh available in 10% Retma values each with > 10% tuning range.

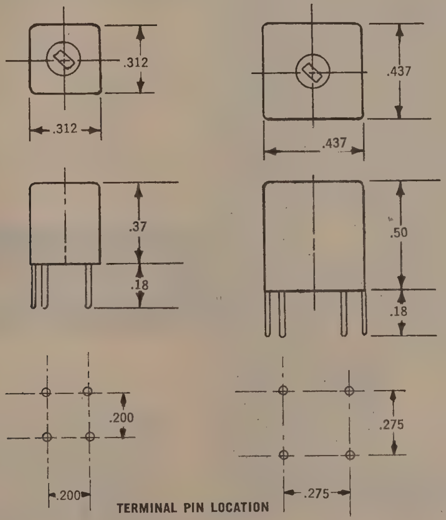
OPERATING TEMPERATURE RANGE:

−55°C to 125°C (higher on request).

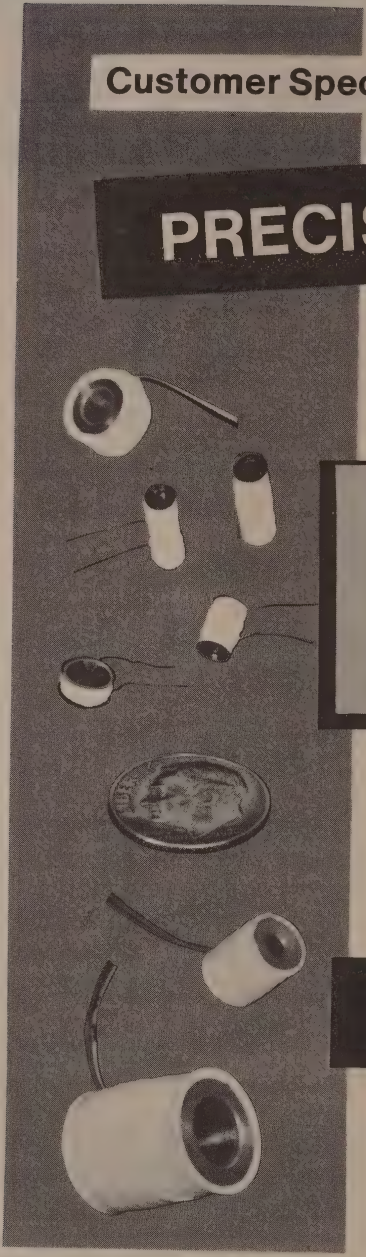
TYPICAL TEMPERATURE COEFFICIENT:

30 to 65 ppm/°C positive.

MECHANICAL:



Specific information available upon request.



Customer Specification ....

PRECISION COILS

10 years' experience makes us specialists in winding

THIN-WALL HIGH EFFICIENCY COILS

Let us help you develop the ideal coil for your application.

Dia-Netics, INC.

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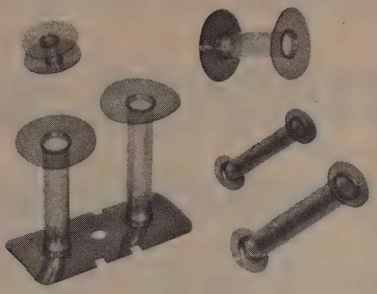
Extra Power
Added Sensitivity



KAPTON
THIN-WALL
FABRICATED
BOBBINS

THIN-WALL STRUCTURE

Provides maximum winding space with added turns at the inside small diameter.

KAPTON MATERIAL

Solvent resistant.
Withstands temperatures from — 296°C to + 400°C.
Will not fuse or melt in flames.
Radiation resistant.
Maintains physical, chemical and electrical properties over a wide range of temperature and frequency.

DIA-NETICS SERVICE

Assures a dependable source of space-saving bobbins or complete coils at low initial setup cost. Send us a print or description for immediate attention.

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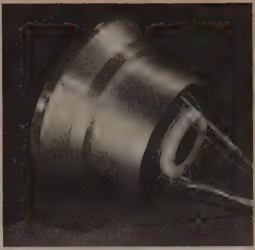
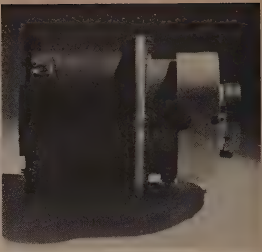


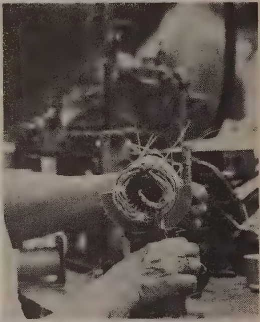


syntronic product index

COMPLETE LINE OF YOKES & COILS FOR PRECISION CRT DISPLAYS

Syntronic Instruments, Inc., founded in 1949 is one of the pioneers in the development of CRT precision yokes. We offer a wide selection of standard deflection yokes and coils designed and fabricated to meet industrial and military specifications. Our most popular styles and sizes are listed in the product index shown on the next three pages. Catalog pages and/or engineering drawings showing performance characteristics, electrical data and dimensions are available on request.

As the largest manufacturer of precision yokes we have developed our engineering, prototype and production capabilities to meet the needs of the information display engineer. If the component you need is not listed among our standard items, we invite you to contact one of our field sales engineers—or call one of our yoke specialists at (312) 543-6444. Here's how we will go to work to help you with your CRT display design problem. First we develop an idea, making something tailored for your application. Then, you may want 10 pieces to perform just like the prototype. Then 100 or 1,000. We have the production flexibility and the know-how to make one part or a thousand. We have the whole package . . . ideas and good repetitive products—yokes, coils, accessories, assemblies. Your exact requirements can be met for cameras, flying spot scanners, scanning electron microscopes, storage devices, etc. If you are designing or building a display, ask us to put our 25 years of experience to work for you.



syntronic

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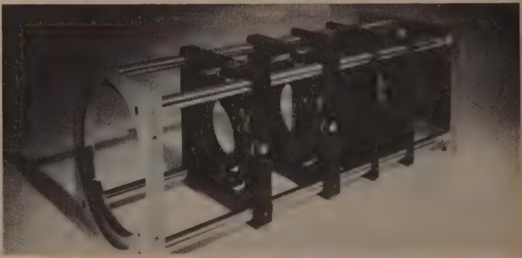
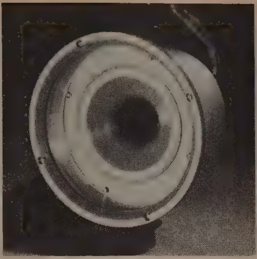
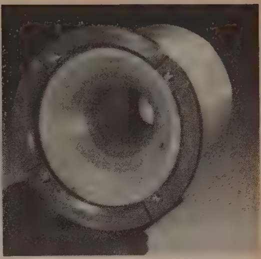
Phone (312) 543-6444.







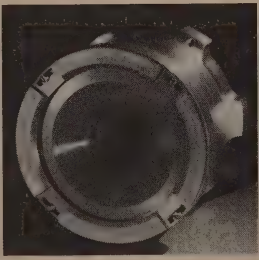
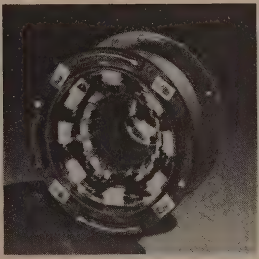
YOKES

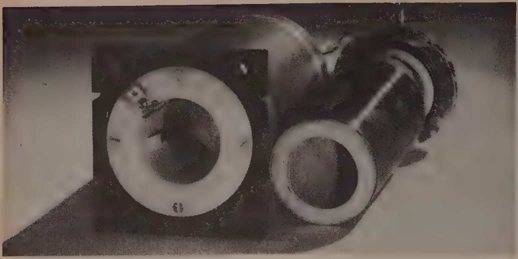
INSIDE DIAMETER (INCHES)	DEFLECTION ANGLE 42°	52°	70°	90°	SINGLE ENDED	PUSH-PULL	HIGH EFFICIENCY	HIGH Q	RAPID SETTLING	HIGH RESOLUTION	PRECISE GEOMETRY	LOW RESIDUAL	LINE SCAN	LIGHTWEIGHT	LOW COST	PART NUMBER
.500/ .600		■				■	■							■		C6201
		■				■	■							■		C6202
		■			■		■							■		C6203
		■			■		■							■		C6204
		■			■		■							■		C8900
.900			■		■		■	■	■		■					C7400
			■		■			■	■		■					C7770
		■				■		■	■						■	C7810
	■				■		■							■		C7840
		■			■		■	■	■							C8010
			■		■				■					■		C8075
			■		■				■					■		C8080
			■		■		■	■	■					■		C8190
			■		■			■	■		■					C8221
			■			■		■	■	■						C8325
		■			■			■	■							C8395
				■	V	H		■	■	■				■		C8420
		■			■		■							■		C8515
		■			■		■							■	■	C8530
				■	■		■	■	■					■		C8575
	■				■			■	■					■	■	C8735
1.075/ 1.080		■			■		■							■		C4190
		■				■	■							■		C4220
			■		■		■							■		C7290
			■			■	■							■		C7300
			■			■					■			■	■	C8065
				■	■									■		C8225
		■			V	H	■							■		C8275
			■		■						■				■	C8365
		■			■									■		C8414
		■			■		■							■		C8610
		■			■		■							■		C8645
		■			■			■	■					■	■	C8685
			■		■			■	■		■					C8995
1.125/ 1.187			■		■		■	■	■	■						C8110
			■		■			■	■						■	C8120
			■		■			■	■		■					C8175
		■			■		■	■	■		■					C8202
	■				■			■	■	■		■				C8270
			■		■		■							■		C8285
			■		■			■	■	■						C8290

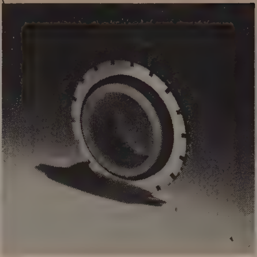
■ DENOTES CHARACTERISTIC OF PART

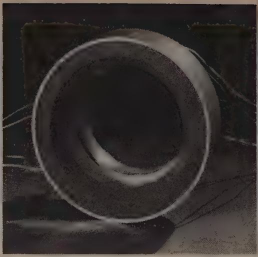
YOKES

INSIDE DIAMETER (INCHES)	DEFLECTION ANGLE 42°	52°	70°	90°	SINGLE ENDED	PUSH-PULL	HIGH EFFICIENCY	HIGH Q	RAPID SETTLING	HIGH RESOLUTION	PRECISE GEOMETRY	LOW RESIDUAL	LINE SCAN	LIGHTWEIGHT	LOW COST	PART NUMBER
1.125/ 1.187			■		■			■	■					■	■	C8599
			■		■			■	■					■	■	C8640
		■			■		■									C8650
		■			■			■	■					■	■	C8665
				■	■			■	■					■		C8925
1.515/ 1.520		■			■		■					■				C2875
		■				■	■					■				C2877
	■				■		■					■				C3311
	■					■	■					■				C3331
			■		■		■					■				C3411
			■			■	■					■				C3431
				■	■		■					■				C3511
				■		■	■					■				C3531
		■			■				■			■			■	C5380
	■					■			■	■		■				C6767
	■				■				■	■		■	■			C7075
			■		■		■		■	■		■	■			C7665
		■				■		■	■						■	C7720
			■		■		■	■	■							C7730
			■		■			■	■						■	C7777
			■			■		■	■		■					C7785
				■	■										■	C7794
				■	■			■	■		■				■	C7815
			■		■		■				■	■				D7850
	■				■		■	■	■							C7875
	■					■	■	■	■							C7880
		■			■		■	■	■							C7885
		■				■	■	■	■							C7890
			■		■		■	■	■							C7895
			■			■	■	■	■							C7900
				■	■		■	■	■							C7905
				■		■	■	■	■							C7910
			■		■		■	■	■						■	C7960
	■				■			■	■							C7975
				■	■			■	■						■	C7990
			■			■	■	■	■			■				C8025
		■			■		■								■	C8035
		■			■		■		■			■				C8055
			■			■		■	■		■				■	C8070
			■		■		■	■	■	■						C8115
				■	■			■	■		■				■	C8130







YOKES

INSIDE DIAMETER (INCHES)	DEFLECTION ANGLE				SINGLE ENDED	PUSH-PULL	HIGH EFFICIENCY	HIGH Q	RAPID SETTLING	HIGH RESOLUTION	PRECISE GEOMETRY	LOW RESIDUAL	LINE SCAN	LIGHTWEIGHT	LOW COST	PART NUMBER
	42°	52°	70°	90°												
1.515/ 1.520	■					■		■	■						■	C8160
	■				■			■	■	■						C8180
			■		■			■	■		■					C8195
				■	■				■	■		■				C8240
			■		■		■	■	■		■					C8250
				■	■			■	■						■	D8295
	■				■				■	■		■	■			C8330
			■		■			■	■	■		■				C8350
		■				■	■	■	■							C8356
			■		■			■	■		■					C8370
	■				■		■	■	■						■	C8415
		■			■		■							■	■	C8445
			■		■		■								■	C8460
		■				■				■		■			■	C8485
		■				■	■							■	■	C8509
	■				■			■	■						■	C8555
	■				■			■	■					■	■	C8560
	■				■			■	■	■					■	C8580
			■		■			■	■		■					C8655
		■			■		■			■		■	■		■	C8660
		■			■			■	■					■	■	C8670
		■			■		■		■			■				C8683
			■		■			■	■		■				■	C8715
			■			■					■					C8725
			■		■			■	■	■	■					C8730
		■			■		■	■	■						■	C8740
		■			■		■	■	■							C8777
			■		■			■	■						■	C8780
	■				■		■			■		■				C8785
	■				■					■	■	■				C8850
			■		■			■	■	■						C8895
			■			■	■			■		■				C8905
			■			■	■	■	■		■					C8950
				■	■			■	■		■					C8955
		■			■		■	■	■	■		■	■			C8960
2.000		■				■										C4061
		■			■											C4081
		■			■										■	C6610
	■				■					■						C7926
				■	■		■			■						C8145
	■				■					■						C8335

■ DENOTES CHARACTERISTIC OF PART

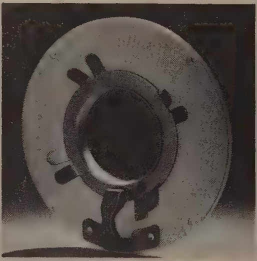
ROTATING COIL ASSEMBLY

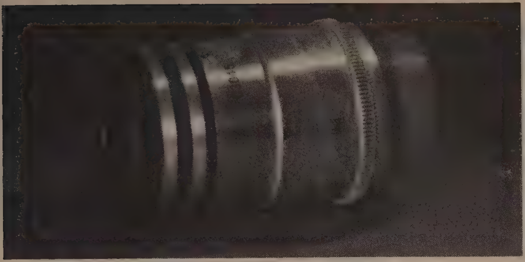
INSIDE DIAMETER (INCHES)	DEFLECTION ANGLE			SINGLE AXIS	TWO AXIS	ALIGNMENT COIL	OFF-CENTERING COIL	OFF-CENTERING MAGNET	CONTACT BRUSHES & OUTER HOUSING	SMALL SIZE	PART NUMBER
	42°	50°	70°								
0.97			■	■						■	D2649
1.00			■	■		■			■		CX10352
1.12		■		■		■		■		■	C3045
1.50		■			■				■		D3975
		■			■	■			■		D4120
1.61		■		■					■		C1199
			■	■					■		C2105
		■		■			■		■		D2540
		■		■					■		C3132
1.63		■		■			■		■		DX10099

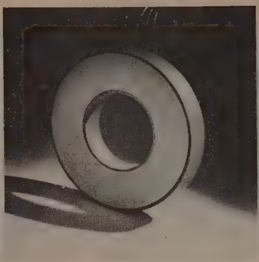
IMMERSION OPTICS

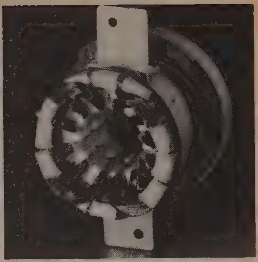
INSIDE DIAMETER (INCHES)	EM FOCUS	ES FOCUS	ALIGNMENT COIL	VIDICON TYPE	PLUMBICON TYPE	SEC TYPE	IMAGE ORTHICON	IMAGE DISSECTOR	SCAN CONVERTER	COLOR CAMERA	HIGH RESOLUTION	PRECISE GEOMETRY	ORTHO ADJUSTMENT	RAPID RECOVERY	MINIATURE	LOW COST	PART NUMBER
1.01		■	■	■													D4401
1.05		■	■			■											C4567
1.06	■		■	■							■						C4350
	■		■	■												■	C4763
	■		■	■	■					■	■	■	■				D6490
		■		■												■	C4024
		■	■	■												■	C4025
	■			■							■						*C3742 C3743
	■		■	■					■							■	*C4022 C4250
	■			■					■							■	*C4020 C4021
1.07	■		■	■							■						D5465
	■		■	■	■					■		■		■	■		C8185
1.09	■		■	■					■						■		C8265
1.10	■		■	■					■		■				■		C8658
1.39	■		■		■						■	■					C6144
1.44						■	■	■									C7520
4.38						■	■	■									C4930

*USED IN PAIRS









FOCUS COILS

INSIDE DIAMETER (INCHES)	STATIC	STATIC/DYNAMIC	SINGLE GAP	DOUBLE GAP	HIGH SPEED DYNAMIC	LOW RESIDUAL	LOW ASTIGMATISM	MINIMUM DYNAMIC SPOT SHIFT	HIGH POWER	COLOR SWITCHING	FLYING SPOT SCANNER	SCAN CONVERTERS	PART NUMBER
0.60	■		■									■	B4845
0.65	■		■									■	C4834
1.00	■		■										C3138
1.19		■	■									■	C5215
		■	■									■	C5315
		■	■			■						■	C6240
		■	■					■				■	C8440
1.56	■		■										C1552
	■		■						■				C2612
		■		■					■				C3062
		■	■						■		■	■	C7375
		■	■		■				■		■	■	C7380
		■		■	■			■	■		■		C8745
		■	■				■		■		■		C8990
1.62		■	■		■				■				C8045
		■		■	■			■		■	■		C8480
2.10		■		■	■		■	■	■		■		C8150
2.13	■		■						■				C1517

ACCESSORY COILS

INSIDE DIAMETER (INCHES)	WRITING (DIDDLE) SINGLE AXIS	WRITING (DIDDLE) TWO AXIS	BEAM ALIGNMENT (CENTERING)	ASTIGMATISM CORRECTION	PINCUSHION CORRECTION	ELECTRON BEAM MACHINE	PART NUMBER
1.025		■					C8425
1.18		■					C7495
			■				C7440
				■			C8345
1.52			■				B3072
				■			C6050
1.53	■						C8435
		■					C5903
1.56						■	C4848
2.14			■				C7965
				■			C7970
3.31					■		C4330
3.68					■		C4254

PERMANENT MAGNET ACCESSORIES

B4118 Anti-Pincushion Device for 7/8" and 1" CRT necks. Mounts on front of yoke. Ideal for airborne or other lightweight displays.

C4077 Anti-Pincushion Device for 1 7/16" CRT necks. Eliminates geometric distortions over entire CRT face when used with independent circuit correction of horizontal and vertical traces.

B5129 Beam Centering Magnet Assemblies for 7/8" Dia. neck CRT's. A series of easily adjustable devices available in 9 different ranges of flux density. Screwdriver adjustment.

B4323 Beam Centering Assemblies. Available in various magnet strengths for 1 1/8" neck CRT's. Screwdriver adjustment.

C4268 Beam Centering Device. A simple, low cost unit for 1 1/2" neck CRT's. Adjusts by moving tabs. Available in various magnet strengths. Locks securely. Corrects gun misalignment and poor aperature flooding.

MECHANICAL ACCESSORIES

D8300 CRT mount for 5" round tube. Maximum stability. Quick CRT removal. Rugged four-rod frame comes with **D7450** or **D7675** micropositioner(s) and optional **C7755** fixed coil positioners. Available with or without electromagnetic shielding.

D8305 CRT mount for 7" round tube. Similar design to **D8300**, using standard positioners.

D8310 CRT mount for 10" round tube. Similar design to **D8300**, with stepped front. Uses standard positioners.

Special CRT mounts for large CRT's up through 36" diameters are available by special order. Standard four-rod frame.

D7450 (for 3.50" O.D. coils)**/D7675** (for 4.00" O.D. coils). Micropositioner for deflection yoke, focus coil or lens. Moderate cost, minimum backlash. Independent fine adjustments with locks for: pitch, yaw, horizontal and vertical translation. Use with any standard four-rod mount assembly.

C8795 Yoke rotator for **D7450/D7675** micropositioner. For easy alignment of yoke's deflection axis to a fixed mechanical axis. Rotational range ±5° from center position. Screwdriver adjustment.

C7755 Fixed coil positioner. Holds magnetic components, such as centering coils or astigmatism correction coils, rigidly and accurately. Use with any standard four-rod mount assembly.

C8450 Low-cost coil positioner for 4" O.D. coils. Horizontal and vertical translation only. Use with standard four-rod mount assembly.

D4499 Micrometer-controlled precision aligner. For fast accurate alignment of deflection yokes, focus coils and pincushion correctors. Bench mount design ideal for laboratory research and prototype evaluation.

C6161 Yoke rotator for **D4499** micropositioner for easy alignment of yoke's deflection axis to a fixed mechanical axis. Rotational range ±5° from center position. Screwdriver adjustment.

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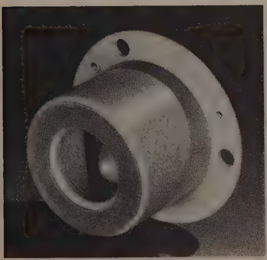
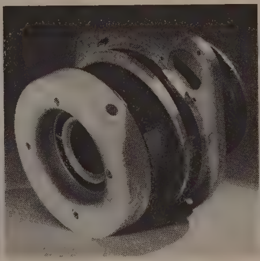
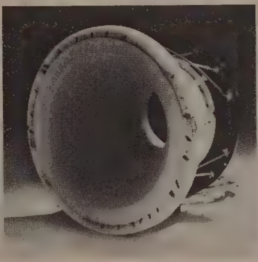
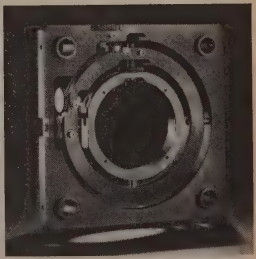
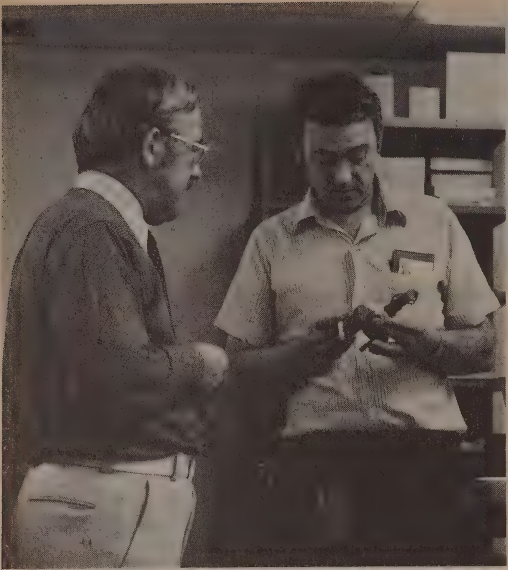
100 Industrial Road, Addison IL 60101
Phone (312) 543-6444











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yoke application checklist

Yoke selection involves consideration of many interacting factors: the requirements of the display system, the cathode ray tube to be used, and the circuitry involved.

The Yoke Application Checklist on the opposite page, based on our twenty-five years of experience in the design and manufacture of yokes, has been developed to illustrate some of these interactions, and to provide you with a checklist of information to be evaluated by our yoke specialists.

As a result of thorough evaluation, a yoke of more reasonable cost and superior performance can often be used when it is possible to allow some small trade-off variations in these interacting factors.

When working with Syntronic Instruments, Inc., it is not necessary for you to become deeply involved in the design of the yoke. By merely filling out the checklist in whole or in part and submitting a copy to our engineers, you can be sure that all factors will be considered and that we will be able to recommend a yoke design that will be best suited for your application.

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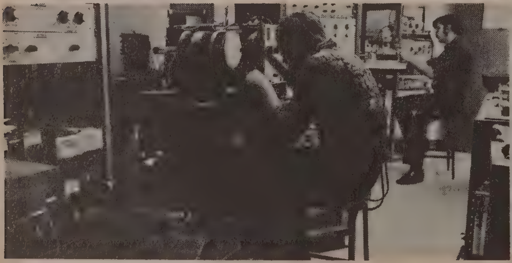
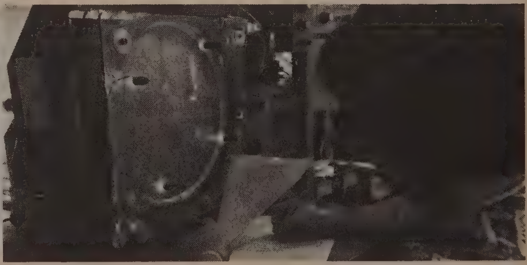
Phone (312) 543-6444





YOKE APPLICATION CHECKLIST

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SYNTRONIC INSTRUMENTS, INC.
100 Industrial Road, Addison, Ill. 60101
(312) 543-6444

NAME ______ TITLE ______
COMPANY ______
ADDRESS ______ CITY ______ STATE ______ ZIP ______
PHONE ______

DISPLAY

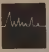
ALPHANUMERIC AND/OR SYMBOLS

SEQUENTIAL ☐

RANDOM ☐

RADAR

PPI ☐


A SCOPE ☐

B SCOPE ☐

Az El ☐

GRAPHIC

VECTORS ☐

LARGE SYMBOLS ☐

TV RASTER

☐

☐ SCAN CONVERTER/STORAGE

OTHER ______

VIEWING CIRCUMSTANCES

AMBIENT LIGHT CONDITIONS

BRIGHT ☐ MEDIUM ☐ ☐ DARK ☐

PHOTOGRAPHIC RECORDING ☐

OTHER ______

DISPLAY ACCURACY

KEY CONSIDERATIONS FOR ACCURACY OF IMAGE — NOT YET SPECIFIED

______ ☐

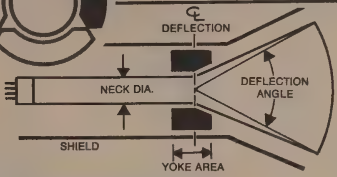
MAXIMUM SPOT SIZE AT CENTER ______

MAXIMUM SPOT SIZE AT CORNERS ______ ☐

GEOMETRY AT CORNERS ______ ☐

OTHER ______

______



CRT SPECIFICATIONS

NOT YET SPECIFIED

ACCELERATION VOLTAGE ______ ☐
DEFLECTION ANGLE ______ ☐
NECK DIAMETER ______ ☐
☐ ELECTROSTATIC FOCUS ______ ☐
☐ MAGNETIC FOCUS ______ ☐
TYPE:
MFG. NO. ______ SIZE ______ ☐
LINE WIDTH ______ CENTER SPOT SIZE ______ ☐
FACE ☐ FLAT ☐ CURVED
TUBE ☐ ROUND ☐ RECTANGULAR

MECHANICAL LIMITATIONS

☐ CRT SHIELD REQUIRED ______ ☐
SHIELD I.D. IN YOKE AREA ______ ☐
YOKE ☐ FIXED ☐ ROTATING

PRIMARY CONSIDERATIONS

(POSSIBLE TRADEOFFS)

☐ POWER ______
☐ WEIGHT ______
☐ PRECISION ______
☐ RESOLUTION ______
☐ ENVIRONMENT ______
☐ PRICE ______
☐ OTHER ______

GENERAL CLASS OF APPLICATION

☐ MILITARY
☐ AIRBORNE
☐ GROUND
☐ SHIPBOARD
☐ COMMERCIAL
☐ CONSUMER
☐ INDUSTRIAL
☐ MARINE

SCAN

	HORIZONTAL	VERTICAL	NOT YET SPECIFIED
SWEEP RATE (IF SAWTOOTH)	______	______	☐
WAVE FORM (IF UNUSUAL) ______			
MINIMUM RETRACE TIMES	______	______	☐
BLANKING TIME	______	______	☐
SETTLING TIME	______	______	☐

CIRCUIT CONSIDERATION

SINGLE-ENDED	______	______	☐
OR PUSH-PULL	______	______	☐
MAXIMUM VOLTAGE ACROSS YOKE	______	______	☐
MAXIMUM CURRENT TO YOKE	______	______	☐
RESONANT SCAN	______	______	☐
OPERATIONAL AMPLIFIER SCAN	______	______	☐
RESONANT FREQUENCY OF YOKE	______	______	☐

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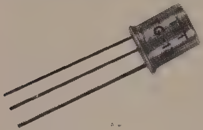
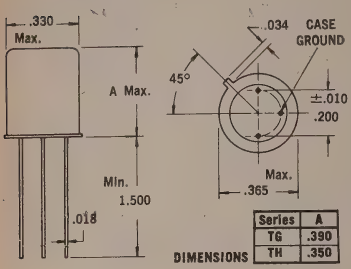
13402 SOUTH 71 HIGHWAY, GRANDVIEW, MO. 64030
PHONE: (816) 761-6314   TWX 910-777-7037

MINI-L HERMETICALLY SEALED R.F. INDUCTORS — TG, TH SERIES





Series	A
TG	.390
TH	.350

TG SERIES

- DESIGNED TO MEET THE REQUIREMENTS OF MIL-T-27, GRADE 4, CLASS S.
- FREQUENCY RANGE: 10 to 500 KHz.
- INDUCTANCE RANGE: 1 to 500 mh.
- INDUCTANCE TOLERANCES: ±5%.
- INDUCTANCE STABILITY: ±2% (−20°C to +85°).

TH SERIES

- DESIGNED TO MEET THE REQUIREMENTS OF MIL-C-150305, GRADE 1, CLASS 0.
- FREQUENCY RANGE: 100 KHz to 10 MHz.
- INDUCTANCE RANGE: 10 uh to 1000 uh.
- INDUCTANCE TOLERANCES: 10 uh through 33 uh ±10%, 39 uh through 130 uh ±5%, greater than and including 150 uh ±3%.
- INDUCTANCE STABILITY: ±2% (−20°C to +85°C).

TG SERIES

- HERMETICALLY SEALED, HIGH "Q" INDUCTOR IN A TO-5 TRANSISTOR CONFIGURATION.
- LOW EXTERNAL MAGNETIC AND ELECTROSTATIC FIELD.

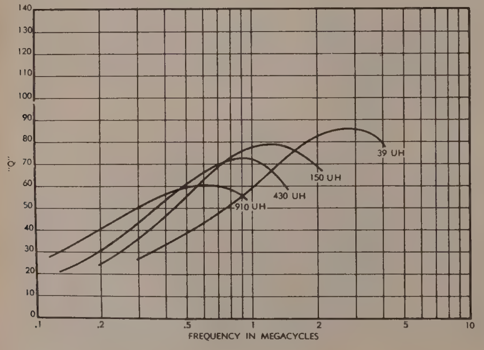
Part No.	Inductance (MH)	Inductance Test Freq. (KHz)	"Q" Min.	"Q" Test Freq. (KHz)	DCR Max. (ohms)	Min. SRF (MHz)	DC Curr. (ma)
TG- 1	1.0	10	120	200	3.3	1500	123
TG- 2	1.2	10	120	200	3.6	1300	118
TG- 3	1.5	10	120	200	4.8	1160	102
TG- 4	1.75	10	120	200	5.2	1080	98
TG- 5	2.0	10	120	200	5.7	1000	94
TG- 6	2.4	10	120	200	7.9	920	80
TG- 7	3.0	10	120	150	8.9	820	75
TG- 8	3.6	10	120	150	9.8	730	71
TG- 9	4.3	10	120	150	13.7	660	60
TG-10	5.0	10	120	150	14.7	600	58
TG-11	6.0	10	120	150	20.0	540	50
TG-12	7.2	10	120	100	21.8	480	48
TG-13	8.6	10	100	100	24.0	430	45
TG-14	10.0	10	100	100	32.4	400	39
TG-15	12.0	10	100	100	34.8	360	38
TG-16	15.0	10	100	100	39.1	320	36
TG-17	17.5	10	85	70	55.0	300	30
TG-18	20.0	10	85	70	60.0	280	29
TG-19	24.0	10	85	70	64.7	250	28
TG-20	30.0	10	85	70	86.3	220	24
TG-21	36.0	10	85	70	95.8	195	23
TG-22	43.0	10	85	70	132	185	19
TG-23	50.0	10	85	70	143	165	18
TG-24	60.0	10	75	50	155	145	18
TG-25	72.0	10	75	50	172	130	17
TG-26	86.0	10	75	50	233	125	15
TG-27	100	10	75	50	252	115	14
TG-28	120	5	75	50	290	105	13
TG-29	150	5	50	40	323	95	13
TG-30	175	5	50	40	350	85	12
TG-31	200	5	50	40	477	80	10
TG-32	240	5	50	40	693	71	10
TG-33	300	5	50	40	735	63	8
TG-34	360	5	30	30	1005	57	7
TG-35	430	5	30	30	1100	51	6.5
TG-36	500	5	30	20	1200	48	6.5

TH SERIES

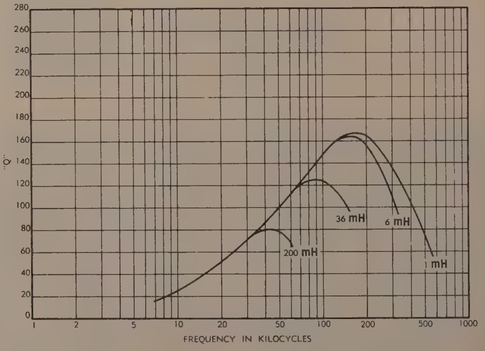
- AMBIENT TEMPERATURE RANGE: −55°C to +130°C.
- DIELECTRIC WITHSTANDING VOLTAGE: 100 volts rms.
- INSULATION RESISTANCE: 10,000 meg. ohms Min.

Part No.	Inductance (uh)	Inductance Test Freq. (KHz)	"Q" Min.	"Q" Test Freq. (KHz)	DCR Max. (ohms)	Min. SRF (MHz)	DC Curr. (ma)
TH- 7	10	1000	75	2500	2.4	35.0	102
TH- 8	12	1000	75	2500	2.5	30.0	100
TH- 9	15	1000	75	2500	2.6	25.0	98
TH-10	18	1000	75	2500	2.7	23.0	96
TH-11	22	1000	75	2500	2.8	20.0	94
TH-12	27	1000	75	2500	2.9	17.0	93
TH-13	33	1000	75	2500	3.0	14.0	91
TH-14	39	500	70	2500	3.1	11.0	90
TH-15	47	500	70	2500	3.2	10.0	88
TH-16	56	500	70	2500	3.3	9.5	87
TH-17	68	500	70	2500	3.4	9.0	85
TH-18	82	500	70	2500	4.5	8.0	74
TH-19	100	500	70	1500	5.1	7.5	70
TH-20	110	500	70	1500	6.0	7.0	64
TH-21	120	500	70	1500	6.2	6.5	63
TH-22	130	500	70	1500	6.4	6.0	62
TH-23	150	500	70	1500	6.6	5.5	61
TH-24	160	500	60	790	8.6	5.3	54
TH-25	180	500	60	790	9.0	5.0	52
TH-26	200	500	60	790	9.5	4.5	51
TH-27	220	250	60	790	10.0	4.0	50
TH-28	240	250	60	790	10.6	3.8	48
TH-29	270	250	60	790	11.2	3.6	48
TH-30	300	250	60	790	14.2	3.4	42
TH-31	330	250	60	790	14.6	3.2	41
TH-32	360	250	60	790	15.0	3.0	41
TH-33	390	250	60	790	15.6	2.9	40
TH-34	430	250	60	790	16.4	2.8	39
TH-35	470	250	60	790	20.4	2.7	35
TH-36	510	250	60	790	21.8	2.6	34
TH-37	560	250	60	790	23.6	2.5	32
TH-38	620	250	60	790	24.6	2.3	32
TH-39	680	250	50	790	25.8	2.1	31
TH-40	750	250	50	790	26.8	1.9	31
TH-41	820	250	50	790	38.4	1.7	25
TH-42	910	250	50	790	40.8	1.5	24
TH-43	1000	250	50	790	42.6	1.4	24

TH TYPICAL "Q" VS FREQUENCY



TG TYPICAL "Q" VS FREQUENCY



TOROTEL INC.

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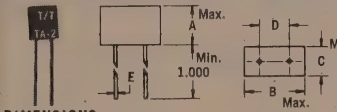
MINI-L ENCAPSULATED R.F. INDUCTORS — TA, TF, TB & TD SERIES



DIMENSIONS

Series	A	B	C	D	E	Max. Power
TA	.225	.210	.110	.100	.020	0.2 Watt
TB	.300	.280	.160	.200	.025	0.33 Watt
TD	.390	.390	.197	.200	.025	0.5 Watt
TF	.225	.210	.110	.100	.020	0.2 Watt

TA SERIES

- MIN. "Q": 60 to 70.
- INDUCTANCE RANGE: .1 uh to 10 uh.
- FREQUENCY RANGE: 1 to 50 MHz.
- INDUCTANCE TOLERANCES: Less than 1.0 uh, ±10%. Greater than or equal to 1.0 uh, ±5%. Closer tolerances available by special request.
- INDUCTANCE TC: +50 PPM/°C maximum.
- MAXIMUM POWER DISSIPATION: 0.2 watt.

TF SERIES

- MIN. "Q": 60 to 80.
- FREQUENCY RANGE: 20 to 300 MHz.
- INDUCTANCE RANGE: .01 to 1 uh.
- INDUCTANCE TOLERANCES: Less than 0.1 uh, ±20%. Greater than or equal to 0.1 uh, ±10%. Closer tolerances available by special request.
- INDUCTANCE TC: +200 PPM/°C maximum.
- MAXIMUM POWER DISSIPATION: 0.2 watt.

TD SERIES

- MIN. "Q": 40 to 80.
- INDUCTANCE RANGE: 100 to 10,000 uh.
- RECOMMENDED FREQUENCY RANGE: 50 kHz to 10 MHz.
- INDUCTANCE TOLERANCE: ±5%. Closer tolerances available by special request.
- INDUCTANCE TC: From +60 PPM/°C, maximum to +300 PPM/°C maximum, depending upon inductance value.
- MAXIMUM POWER DISSIPATION: .50 watt.

TB SERIES

- MIN. "Q": 50 to 80.
- RECOMMENDED FREQUENCY RANGE: 50 kHz to 35 MHz.
- INDUCTANCE RANGE: 10 to 1,000 uh.
- INDUCTANCE TOLERANCE: ±5%. Closer tolerances available by special request.
- INDUCTANCE TC: From +60 PPM/°C maximum to +300 PPM/°C maximum, depending upon inductance value.
- MAXIMUM POWER DISSIPATION: .33 watt.

- DESIGNED TO MEET THE REQUIREMENTS OF MIL-C-15305, GRADE 1, CLASS B (−55°C to +125°C). +125°C).
- DIELECTRIC WITHSTANDING VOLTAGE: 700 volts rms.

TA SERIES

Part No.	Apparent Inductance (uh)	Min. "Q"	Test Freq. (MHz)	Min. SRF (MHz)	Max. DCR (ohms)	DC Curr. (ma)
TA- 1	0.10	60	25	450	0.04	2230
TA- 2	0.12	60	25	410	0.05	2000
TA- 3	0.15	65	25	350	0.06	1825
TA- 4	0.18	65	25	325	0.07	1675
TA- 5	0.22	65	25	300	0.08	1550
TA- 6	0.27	65	25	280	0.09	1475
TA- 7	0.33	65	25	260	0.10	1400
TA- 8	0.39	70	25	240	0.11	1325
TA- 9	0.47	70	25	220	0.15	1125
TA-10	0.56	70	25	200	0.20	1000
TA-11	0.68	70	25	180	0.25	900
TA-12	0.82	70	25	165	0.30	810
TA-13	1.0	70	25	150	0.35	750
TA-14	1.2	65	7.9	130	0.25	875
TA-15	1.5	65	7.9	120	0.30	800
TA-16	1.8	65	7.9	110	0.50	600
TA-17	2.2	65	7.9	100	0.75	500
TA-18	2.7	65	7.9	90	0.90	450
TA-19	3.3	65	7.9	70	1.0	425
TA-20	3.9	65	7.9	60	1.2	400
TA-21	4.7	60	7.9	50	1.5	350
TA-22	5.6	60	7.9	45	1.7	325
TA-23	6.8	60	7.9	40	2.0	300
TA-24	8.2	60	7.9	37	2.4	290
TA-25	10.0	60	7.9	35	2.6	280

TB SERIES

Part No.	Apparent Inductance (uh)	Min. "Q"	Test Freq. (MHz)	Min. SRF (MHz)	Max. DCR (ohms)	DC Curr. (ma)
TB- 1	10	75	2.5	35	1.1	550
TB- 2	12	75	2.5	31	1.3	500
TB- 3	15	75	2.5	27	1.5	460
TB- 4	18	80	2.5	25	1.9	410
TB- 5	22	80	2.5	22	2.2	380
TB- 6	27	80	2.5	20	2.6	350
TB- 7	33	80	2.5	18	3.3	320
TB- 8	39	80	2.5	16	3.8	290
TB- 9	47	80	2.5	14	4.6	260
TB-10	56	80	2.5	12	5.6	240
TB-11	68	80	2.5	11	6.7	220
TB-12	82	80	2.5	10	8.1	200
TB-13	100	80	2.5	9.1	9.6	180
TB-14	120	50	0.79	8.2	10.0	175
TB-15	150	50	0.79	7.5	11.0	160
TB-16	180	50	0.19	6.5	12.0	155
TB-17	220	50	0.79	5.6	13.0	150
TB-18	270	55	0.79	5.0	17.0	125
TB-19	330	55	0.79	4.5	19.0	130
TB-20	390	55	0.79	4.0	21.0	120
TB-21	470	55	0.79	3.5	22.0	115
TB-22	560	55	0.79	3.0	24.0	110
TB-23	680	55	0.79	2.8	19.0	130
TB-24	820	50	0.79	2.5	23.0	120
TB-25	1,000	50	0.79	2.5	26.0	110

- RATED TEMPERATURE RISE: 35°C at an ambient temperature of 90°C.
- LEADS: Tinned Copper. Weldable leads available by special order.

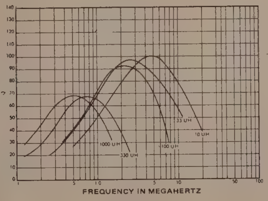
TF SERIES

Part No.	Apparent Inductance (uh)	Min. "Q"	Test Freq. (MHz)	Min. SRF (MHz)	Max. DCR (ohms)	DC Curr. (ma)
TF- 1	0.01	60	150	1000	0.02	3100
TF- 2	0.012	60	150	1000	0.02	3100
TF- 3	0.015	60	150	1000	0.02	3100
TF- 4	0.018	60	150	1000	0.02	3100
TF- 5	0.022	60	100	900	0.02	3100
TF- 6	0.027	60	100	800	0.02	3100
TF- 7	0.033	60	100	750	0.02	3100
TF- 8	0.039	60	100	700	0.02	3100
TF- 9	0.047	60	100	650	0.02	3100
TF-10	0.056	60	100	600	0.02	3100
TF-11	0.068	60	100	550	0.03	2500
TF-12	0.082	60	100	500	0.03	2500
TF-13	0.10	80	50	450	0.04	2200
TF-14	0.12	80	50	400	0.05	2000
TF-15	0.15	80	50	350	0.06	1800
TF-16	0.18	80	50	320	0.07	1650
TF-17	0.22	80	50	300	0.08	1500
TF-18	0.27	80	50	280	0.10	1400
TF-19	0.33	80	50	260	0.12	1300
TF-20	0.39	80	50	240	0.15	1150
TF-21	0.47	80	50	220	0.20	1000
TF-22	0.56	70	50	200	0.25	900
TF-23	0.68	70	50	180	0.30	800
TF-24	0.82	70	50	160	0.35	750
TF-25	1.0	70	50	150	0.40	700

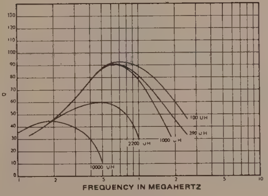
TD SERIES

Part No.	Apparent Inductance (uh)	Min. "Q"	Test Freq. (MHz)	Min. SRF (MHz)	Max. DCR (ohms)	DC Curr. (ma)
TD- 1	100	75	790	8.4	6	280
TD- 2	120	75	790	7.5	7	260
TD- 3	150	75	790	6.8	8	240
TD- 4	180	75	790	6.1	10	220
TD- 5	220	80	790	5.4	12	200
TD- 6	270	80	790	4.7	14	180
TD- 7	330	80	790	4.2	17	165
TD- 8	390	80	790	3.8	20	150
TD- 9	470	75	790	3.4	24	140
TD-10	560	75	790	3.1	28	130
TD-11	680	75	790	2.8	33	120
TD-12	820	75	790	2.5	40	110
TD-13	1,000	75	790	2.2	46	100
TD-14	1,200	45	250	1.9	30	120
TD-15	1,500	45	250	1.6	35	110
TD-16	1,800	50	250	1.4	40	105
TD-17	2,200	50	250	1.3	50	95
TD-18	2,700	50	250	1.2	60	85
TD-19	3,300	50	250	1.1	70	80
TD-20	3,900	50	250	1.0	80	75
TD-21	4,700	50	250	.9	90	70
TD-22	5,600	45	250	.8	100	65
TD-23	6,800	40	250	.7	140	60
TD-24	8,200	40	250	.6	160	55
TD-25	10,000	40	250	.6	175	50

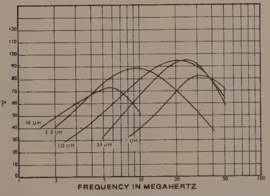
TB TYPICAL "Q" VS FREQUENCY



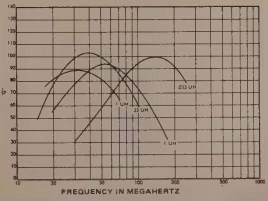
TD TYPICAL "Q" VS FREQUENCY



TA TYPICAL "Q" VS FREQUENCY



TF TYPICAL "Q" VS FREQUENCY



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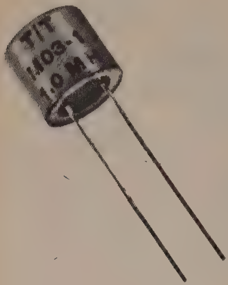
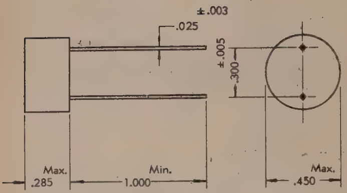
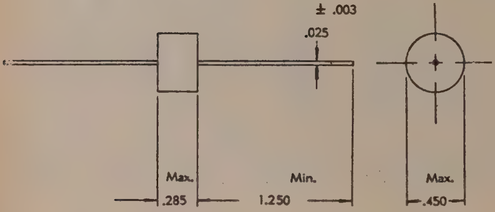


When ordering add the prefix **P**, **PA** or **M** to the part number for the case type desired.



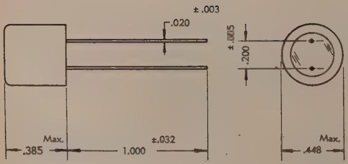
TYPE P

Epoxy Encapsulated
MIL-T-27C, Grade 5, Class 5



TYPE PA

Axial Lead Epoxy Encapsulated

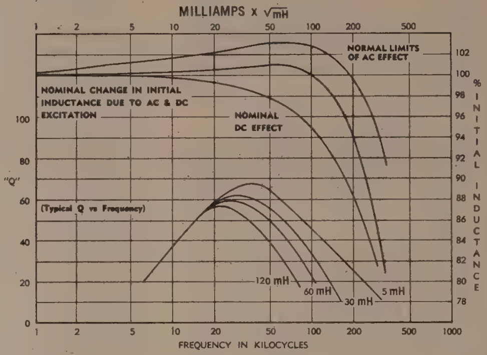


TYPE M

Metal Cased
MIL-T-27C, Grade 4, Class R

CORE NO. 03

- Recommended Frequency: Up to 50 kHz
- Maximum Inductance: 250 mH
- Standard Tolerance: ±1.0%



Inductance (mH)	Part Number	TYPICAL DC Resistance (ohms)	Distributed Capacity (pf)
1.0	03-1	1.5	14
1.25	03-2	1.7	14
1.5	03-3	2.4	18
1.75	03-4	2.6	20
2.0	03-5	2.7	20
2.4	03-6	3.7	22
2.5	03-7	3.8	22
3.0	03-8	4.0	24
3.6	03-9	5.7	24
4.3	03-10	6.2	24
5.0	03-11	6.7	26
6.0	03-12	9.3	26
7.2	03-13	10.0	26
7.5	03-14	10.5	28
8.0	03-15	11.0	28
8.6	03-16	14.0	28
10.0	03-17	15.0	30
12.0	03-18	15.5	32
12.5	03-19	16.0	34
15.0	03-20	23.0	36
17.5	03-21	25.0	38
20.0	03-22	26.0	40
24.0	03-23	35.0	42
30.0	03-24	39.0	44
36.0	03-25	58.0	46
43.0	03-26	64.0	48
50.0	03-27	69.0	50
60.0	03-28	78.0	52
72.0	03-29	106.	54
75.0	03-30	108.	56
86.0	03-21	140.	58
100.0	03-32	150.	60
120.0	03-33	155.	62
150.0	03-34	228.	64
175.0	03-35	246.	66
178.0	03-36	248.	66
200.0	03-37	333.	68
250.0	03-38	373.	70

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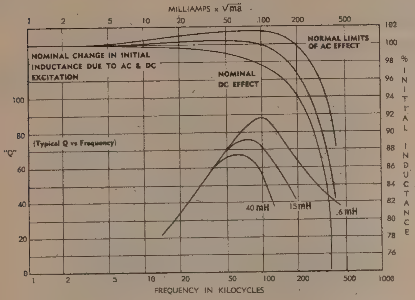
CORE NO. 13

- Recommended Frequency: 10 kHz to 200 kHz
- Maximum Inductance: 100 mH
- Standard Tolerance: ±1.0%

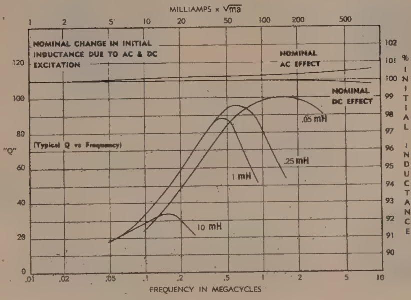


When ordering add the prefix **P**, **M** or **PA** to the part number for the case type desired.

Inductance (mH)	Part Number	TYPICAL DC Resistance (ohms)	TYPICAL Distributed Capacity (pf)
.50	13-1	1.5	14
.60	13-2	1.6	14
.72	13-3	2.4	14
.86	13-4	2.6	14
1.0	13-5	2.8	16
1.25	13-6	3.9	16
1.5	13-7	4.1	18
1.75	13-8	5.7	18
2.0	13-9	6.1	20
2.4	13-10	6.7	22
2.5	13-11	6.8	24
3.0	13-12	9.5	24
3.6	13-13	10.5	26
4.3	13-14	14.7	28
5.0	13-15	15.5	30
6.0	13-16	16.0	30
7.2	13-17	24.0	32
8.6	13-18	26.0	34
10.0	13-19	27.0	36
12.0	13-20	39.0	38
15.0	13-21	41.0	40
17.5	13-22	59.0	40
20.0	13-23	63.0	42
24.0	13-24	67.0	42
25.0	13-25	68.0	44
30.0	13-26	100.	44
36.0	13-27	103.	46
40.0	13-28	108.	46
43.0	13-29	142.	48
50.0	13-30	154.	48
60.0	13-31	168.	50
72.0	13-32	228.	50
86.0	13-33	250.	52
100.0	13-34	340.	52

CORE NO. 29

- Recommended Frequency: 50 kHz to 5 MHz
- Maximum Inductance: 15 mH
- Standard Tolerance: ±1.0%



Inductance (mH)	Part Number	TYPICAL DC Resistance (ohms)	TYPICAL Distributed Capacity (pf)
.05	29-1	1.2	10
.06	29-2	1.6	10
.072	29-3	1.8	10
.075	29-4	1.8	12
.086	29-5	1.9	12
.100	29-6	2.1	12
.120	29-7	2.3	12
.125	29-8	3.0	12
.150	29-9	3.3	12
.175	29-10	3.5	14
.200	29-11	4.5	14
.240	29-12	4.9	14
.250	29-13	5.0	14
.300	29-14	7.0	14
.360	29-15	7.7	14
.400	29-16	8.1	16
.430	29-17	10.5	16
.500	29-18	12.3	16
.600	29-19	13.5	16
.720	29-20	16.2	16
.750	29-21	16.5	18
.860	29-22	17.7	18
1.00	29-23	19.1	18
1.20	29-24	25.9	20
1.25	29-25	26.4	20
1.50	29-26	29.0	22
1.75	29-27	37.6	22
2.00	29-28	40.3	24
2.40	29-29	44.0	24
2.50	29-30	45.0	26
3.00	29-31	64.	28
3.60	29-32	69.	28
4.00	29-33	73.	30
4.30	29-34	76.	32
5.00	29-35	102.	34
6.00	29-36	112.	34
7.20	29-37	122.	36
7.50	29-38	125.	38
8.60	29-39	162.	40
10.0	29-40	175.	42

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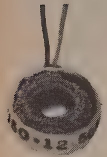
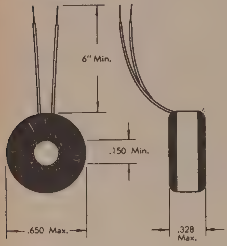
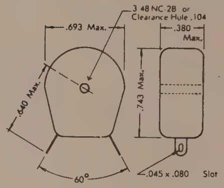
UNCASED —
TYPE U
Wt. .25 oz.




6" Min.
.150 Min.
.650 Max.
.328 Max.

COMPRESSION MOLDED —
TYPE P
Wt. .35 oz.

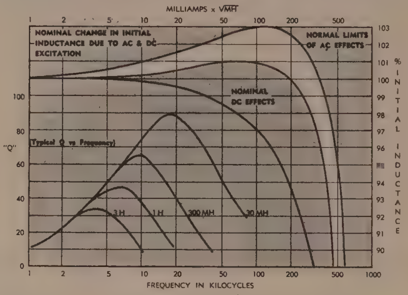
P50-69
TOROTEL
4 HY


3 48 NC-2B or Clearance Hole .104
.693 Max.
.380 Max.
.640 Max.
.743 Max.
60°
.045 x .080 Slot

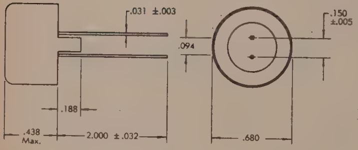
SUB-MINIATURE

CORE NO. 50

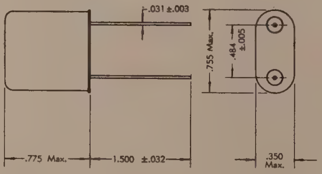
- Recommended Frequency: Up to 20 kHz
- Maximum Inductance: 4.5 H
- Tolerance: ±1%
- Special Core Stabilization Available: D, L, M, W
- Mechanical Tolerance: ±.015 unless otherwise indicated



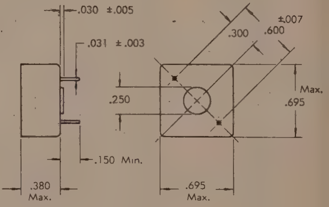
METAL CASED —
TYPE M
Wt. .45 oz.


.031 ±.003
.150 ±.005
.094
.188
.438 Max.
2.000 ±.032
.680

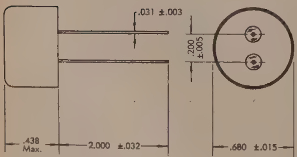
METAL CASED —
TYPE MC
Wt. .45 oz.


.031 ±.003
.755 Max.
.484 ±.005
.775 Max.
1.500 ±.032
.350 Max.

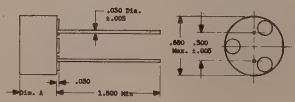
PRINTED CIRCUIT —
TYPE S
Wt. .35 oz.


.030 ±.005
.031 ±.003
.300
±.007 .600
.250
Max. .695
.150 Min.
.380 Max.
.695 Max.

METAL CASED-GRID SPACING —
TYPE MG
Wt. .45 oz.

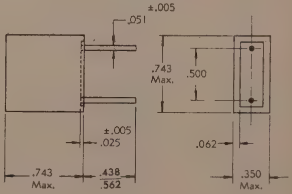

.031 ±.003
.200 ±.005
.438 Max.
2.000 ±.032
.680 ±.015

PRINTED CIRCUIT
TYPE PS & PST
Wt. 3.5 oz.


.030 Dia. ±.005
.680 Max.
.300 ±.005
.030
Dim. A
1.500 Min

Style	Dim. A
PS	.435
PST	.390

PRINTED CIRCUIT
TYPE PC
Wt. 3.5 oz.


±.005 .051
.743 Max.
.500
±.005 .025
.062
.743 Max.
.438 .562
.350 Max.

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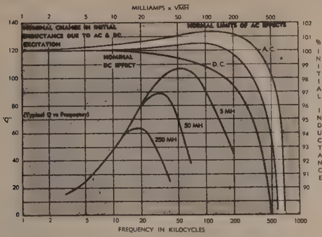
CORE NO. 51

- Recommended Frequency: 10kHz to 100 kHz
- Maximum Inductance: 1 H
- Tolerance: ±1%
- Special Core Stabilization Available: D, M, W
- Mechanical Tolerance: ±.015 unless otherwise indicated

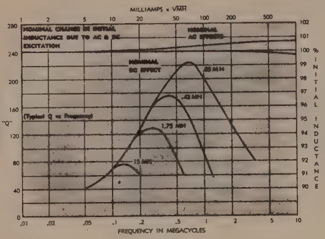
STOCKED FOR IMMEDIATE DELIVERY



CORE NO. 53

- Recommended Frequency: 50 kHz to 8 MHz
- Maximum Inductance: 20 mH
- Tolerance: ±1%
- Only Core Stabilization Available: H
- Mechanical Tolerance: ±.015 unless otherwise indicated

STOCKED FOR IMMEDIATE DELIVERY



CORE NO. 50

STANDARD INDUCTANCE VALUES

Inductance	Part Number	TYPICAL DC Resistance (ohms)	TYPICAL Distributed Capacity (pf)
1.0 mH	50-1	.6	30
2.5 mH	50-2	1.4	31
5.0 mH	50-3	2.8	31
6.0 mH	50-40	3.3	32
7.2 mH	50-41	3.9	32
7.5 mH	50-4	4.1	32
8.6 mH	50-42	4.7	33
10.0 mH	50-5	5.4	33
12. mH	50-43	6.5	33
12.5 mH	50-6	6.6	33
15. mH	50-7	7.5	34
17.5 mH	50-44	9.4	34
20. mH	50-8	10.7	34
24. mH	50-45	12.9	34
25. mH	50-9	13.5	34
30. mH	50-10	16.1	35
36. mH	50-46	19.4	35
40. mH	50-11	21.5	35
43. mH	50-47	23.1	36
50. mH	50-12	27.3	36
60. mH	50-48	32.6	36
72. mH	50-49	38.9	37
75. mH	50-13	41.	37
86. mH	50-50	47.	38
100. mH	50-14	54.	38
120. mH	50-51	66.	38
125. mH	50-15	68.	39
150. mH	50-16	81.	39
175. mH	50-53	95.	40
200. mH	50-17	108.	40
240. mH	50-54	130.	41
250. mH	50-52	135.	41
300. mH	50-18	161.	42
360. mH	50-55	194.	42
400. mH	50-19	215.	43
430. mH	50-56	231.	43
500. mH	50-20	268.	44
600. mH	50-57	321.	44
720. mH	50-58	387.	45
750. mH	50-21	403.	45
860. mH	50-59	461.	46
1.0 H	50-22	536.	46
1.2 H	50-60	643.	47
1.25 H	50-61	672.	47
1.5 H	50-62	804.	48
1.75 H	50-63	938.	48
2.0 H	50-64	1103.	49
2.4 H	50-67	1286.	50
2.5 H	50-66	1339.	50
3.0 H	50-65	1607.	51
3.6 H	50-68	1928.	52
4. H	50-69	2142.	53

STANDARD INDUCTANCE VALUES

U—Uncased	MG—Metal Cased-Grid Spacing
P—Compression Molded†	MC—Metal Cased
S—Printed Circuit	PS, PST
M—Metal Cased	PC—Printed Circuit

When ordering add case prefix to part number for package type desired. (Example: MC-53-43)

CORE NO. 51

STANDARD INDUCTANCE VALUES

Inductance	Part Number	TYPICAL DC Resistance (ohms)	TYPICAL Distributed Capacity (pf)
1.0 mH	51-1	1.2	25
1.2 mH	51-2	1.3	25
1.5 mH	51-3	1.7	26
1.75 mH	51-4	1.9	26
2.0 mH	51-5	2.5	26
2.4 mH	51-6	2.7	26
3.0 mH	51-7	3.3	27
3.6 mH	51-8	4.4	27
4.3 mH	51-9	4.7	27
5.0 mH	51-10	5.5	28
6.0 mH	51-11	6.6	28
7.2 mH	51-12	7.8	28
8.6 mH	51-13	9.4	28
10. mH	51-14	10.9	28
12. mH	51-15	13.1	28
15. mH	51-16	16.3	29
17.5 mH	51-17	18.9	29
20. mH	51-18	21.7	29
24. mH	51-19	26.0	29
30. mH	51-20	33.	29
36. mH	51-21	39.	29
43. mH	51-22	47.	29
50. mH	51-23	55.	30
60. mH	51-24	66.	30
72. mH	51-25	78.	30
86. mH	51-26	94.	30
100. mH	51-27	109.	31
120. mH	51-28	130.	31
150. mH	51-29	162.	31
175. mH	51-30	189.	31
200. mH	51-31	217.	32
240. mH	51-32	260.	32
300. mH	51-33	325.	33
360. mH	51-34	389.	33
430. mH	51-35	466.	34
500. mH	51-36	546.	35

CORE NO. 53

STANDARD INDUCTANCE VALUES

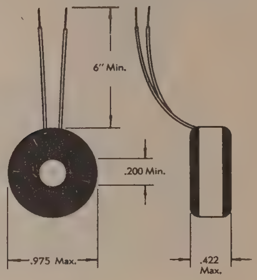
Inductance	Part Number	TYPICAL DC Resistance (ohms)	TYPICAL Distributed Capacity (pf)
0.05 mH	53-1	.42	6
0.06 mH	53-2	.50	6
0.072 mH	53-3	.60	6
0.075 mH	53-4	.61	6
0.086 mH	53-5	.72	6
0.10 mH	53-6	.78	6
0.12 mH	53-7	.89	6
0.125 mH	53-8	.94	6
0.15 mH	53-9	1.17	7
0.175 mH	53-10	1.26	7
0.20 mH	53-11	1.72	7
0.24 mH	53-12	2.02	7
0.25 mH	53-13	2.08	8
0.30 mH	53-14	2.28	8
0.36 mH	53-15	2.44	8
0.40 mH	53-16	3.2	8
0.43 mH	53-17	3.3	8
0.50 mH	53-18	4.8	8
0.60 mH	53-19	5.6	8
0.72 mH	53-20	5.9	8
0.75 mH	53-21	7.4	8
0.86 mH	53-22	7.5	8
1.0 mH	53-23	10.1	8
1.2 mH	53-24	11.3	8
1.25 mH	53-25	11.4	8
1.5 mH	53-26	12.5	8
1.75 mH	53-27	13.5	9
2.0 mH	53-28	18.2	9
2.4 mH	53-29	19.9	9
2.5 mH	53-30	20.8	9
3.0 mH	53-31	23.1	9
3.6 mH	53.32	23.2	9
4.0 mH	53-33	25.9	9
4.3 mH	53-34	27.1	9
5.0 mH	53-35	36.	9
6.0 mH	53-36	39.	9
7.2 mH	53-37	51.	9
7.5 mH	53-38	52.	9
8.6 mH	53-39	57.	9
10.0 mH	53-40	64.	9
12.0 mH	53-41	86.	9
12.5 mH	53-42	94.	9
15.0 mH	53-43	104.	9

†Add "C" to part number of molded inductor if clearance hole is desired.

TOROTEL INC.

13402 SOUTH 71 HIGHWAY, GRANDVIEW, MO. 64030
PHONE: (816) 761-6314 TWX 910-777-7037

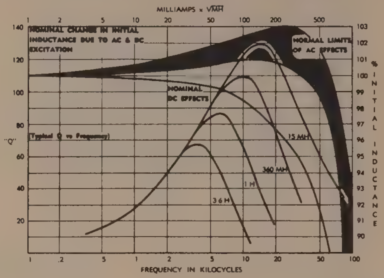
UNCASED —
TYPE U
Wt. .55 oz.


6" Min.
.200 Min.
.975 Max.
.422 Max.

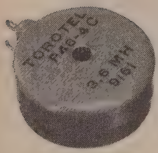
CORE NO. 06

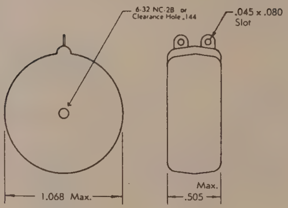
- Recommended Frequency: Up to 20 kHz
- Maximum Inductance: 7.2 H
- Tolerance: ±1%
- Special Core Stabilization Available: B, D, E, G, L, M, W
- Studs are available on the "M" Series on special request
- Mechanical Tolerance: ±.015 unless otherwise indicated

STOCKED FOR IMMEDIATE DELIVERY

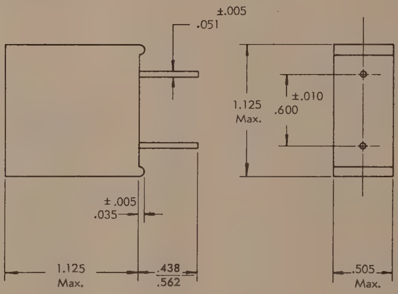


COMPRESSION MOLDED —
TYPE P
Wt. 1.0 oz.



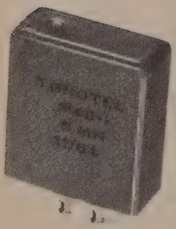

6-32 NC-2B or Clearance Hole .144
.045 x .080 Slot
1.068 Max.
Max. .505

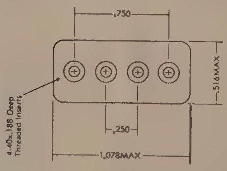
PRINTED CIRCUIT —
TYPE PC


±.005
.051
1.125 Max.
±.010
.600
±.005
.035
1.125 Max.
.438
.562
.505 Max.

METAL CASED —
TYPE M
Wt. 1.5 oz.

Maximum Height 1.250




.750
.516MAX
.250
1.078MAX
4-40x.188 Deep Threaded Inserts

PC — 06 SERIES

TOROTEL
PC06-12
100 MH
6631

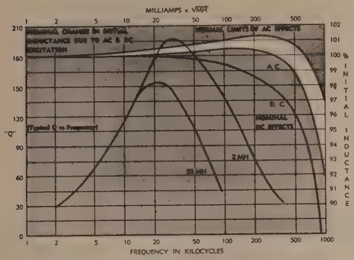
TOROTEL INC.

13402 SOUTH 71 HIGHWAY, GRANDVIEW, MO. 64030
PHONE: (816) 761-6314 TWX 910-777-7037

CORE NO. 48

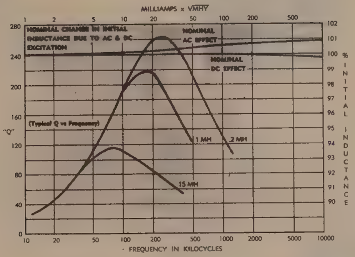
- Recommended Frequency: Up to 100 kHz
- Maximum Inductance: 1 H
- Tolerance: ±1%
- Special Core Stabilization Available: B, D, E, M, W
- Studs are available on the "M" Series on special request
- Mechanical Tolerance: ±.015 unless otherwise indicated

STOCKED FOR IMMEDIATE DELIVERY



CORE NO. 73

- Recommended Frequency: 50 kHz to 1 MHz
- Maximum Inductance: 30 mH
- Tolerance: ±1%
- Only Core Stabilization Available: H
- Studs are available on the "M" Series on special request
- Mechanical Tolerance: ±.015 unless otherwise indicated



CORE NO. 06

STANDARD INDUCTANCE VALUES

Inductance	Part Number	TYPICAL DC Resistance (ohms)	TYPICAL Distributed Capacity (pf)
5.0 mH	06-1	1.05	40
6.0 mH	06-40	1.26	42
7.2 mH	06-41	1.51	43
7.5 mH	06-2	1.58	43
8.6 mH	06-42	1.80	43
10. mH	06-3	2.10	44
12. mH	06-43	2.52	44
12.5 mH	06-4	2.63	44
15. mH	06-5	3.15	44
17.5 mH	06-44	3.67	45
20. mH	06-6	4.20	45
24. mH	06-45	5.04	45
25. mH	06-7	5.25	46
30. mH	06-8	6.30	46
36. mH	06-46	7.56	47
40. mH	06-9	8.40	48
43. mH	06-47	9.03	48
50. mH	06-10	10.5	48
60. mH	06-48	12.6	49
72. mH	06-49	15.1	49
75. mH	06-11	15.8	49
86. mH	06-50	18.0	49
100. mH	06-12	21.0	50
120. mH	06-51	25.2	50
125. mH	06-13	26.3	51
150. mH	06-14	31.5	51
175. mH	06-53	36.8	51
200. mH	06-15	42.0	52
240. mH	06-54	50.4	52
250. mH	06-52	52.5	52
300. mH	06-16	63.0	53
360. mH	06-55	75.6	53
400. mH	06-17	84.0	54
430. mH	06-56	90.3	54
500. mH	06-18	105.	55
600. mH	06-57	126.	55
720. mH	06-58	151.	55
750. mH	06-19	158.	56
860. mH	06-59	180.	56
1.0 H	06-20	210.	57
1.2 H	06-60	252.	57
1.25 H	06-21	263.	57
1.5 H	06-22	315.	58
1.75 H	06-61	368.	58
2.0 H	06-23	420.	58
2.4 H	06-62	504.	59
2.5 H	06-69	525.	59
3.0 H	06-24	630.	59
3.6 H	06-70	756.	60
4.3 H	06-71	840.	60
5.0 H	06-72	903.	61
6.0 H	06-73	1260.	62
7.2 H	06-74	1512.	62

U—Uncased	**PC**—Printed Circuit
P—Compression Molded†	**M**—Metal Cased

When ordering add case prefix to part number for package type desired. (Example: P06-1)

CORE NO. 48

STANDARD INDUCTANCE VALUES

Inductance	Part Number	TYPICAL DC Resistance (ohms)	TYPICAL Distributed Capacity (pf)
2.0 mH	48-1	0.84	30
2.4 mH	48-2	1.01	31
3.0 mH	48-3	1.26	31
3.6 mH	48-4	1.51	32
4.3 mH	48-5	1.80	32
5.0 mH	48-6	2.10	33
6.0 mH	48-7	2.50	33
7.2 mH	48-8	3.02	34
8.6 mH	48-9	3.61	34
10. mH	48-10	4.20	35
12. mH	48-11	5.05	35
15. mH	48-12	6.30	36
17.5 mH	48-13	7.35	36
20. mH	48-14	8.40	37
24. mH	48-15	10.1	37
30. mH	48-16	12.6	38
36. mH	48-17	15.1	39
43. mH	48-18	18.0	39
50. mH	48-19	21.0	40
60. mH	48-20	25.2	41
72. mH	48-21	30.2	42
86. mH	48-22	36.1	43
100. mH	48-23	42.0	44
120. mH	48-24	50.4	45
150. mH	48-25	63.0	46
175. mH	48-26	73.5	47
200. mH	48-27	84.0	48
240. mH	48-28	101.	49
300. mH	48-29	126.	50
360. mH	48-30	151.	51
430. mH	48-31	180.	52
500. mH	48-32	210.	53
600. mH	48-33	252.	54

CORE NO. 73

STANDARD INDUCTANCE VALUES

Inductance	Part Number	TYPICAL DC Resistance (ohms)	TYPICAL Distributed Capacity (pf)
0.1 mH	73-1	0.22	12
0.12 mH	73-2	0.26	12
0.125 mH	73-3	0.28	13
0.15 mH	73-4	0.33	13
0.175 mH	73-5	0.39	13
0.20 mH	73-6	0.44	14
0.24 mH	73-7	0.53	14
0.25 mH	73-8	0.55	14
0.3 mH	73-9	0.66	14
0.36 mH	73-10	0.79	14
0.4 mH	73-11	0.88	14
0.43 mH	73-12	0.95	14
0.5 mH	73-13	1.10	14
0.6 mH	73-14	1.32	14
0.72 mH	73-15	1.58	15
0.75 mH	73-16	1.65	15
0.86 mH	73-17	1.89	15
1.0 mH	73-18	2.2	15
1.2 mH	73-19	2.6	15
1.25 mH	73-20	2.7	16
1.5 mH	73-21	3.3	16
1.75 mH	73-22	3.9	16
2.0 mH	73-23	4.4	16
2.4 mH	73-24	5.3	17
2.5 mH	73-25	5.5	17
3.0 mH	73-26	6.6	17
3.6 mH	73-27	7.9	17
4.0 mH	73-28	8.8	18
4.3 mH	73-29	9.5	18
5.0 mH	73-30	11.0	19
6.0 mH	73-31	13.2	19
7.2 mH	73-32	15.8	19
7.5 mH	73-33	16.5	20
8.6 mH	73-34	18.9	20
10.0 mH	73-35	22.0	20
12.0 mH	73-36	26.4	21
12.25 mH	73-37	27.5	21
15.0 mH	73-38	33.0	22
17.5 mH	73-39	38.5	22
20. mH	73-40	44.0	23

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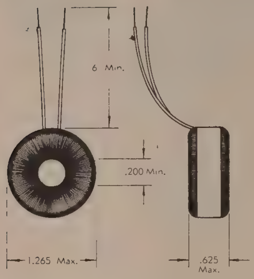
†Add "C" to part number of molded inductor if clearance hole is desired.

TOROTEL INC.

13402 SOUTH 71 HIGHWAY, GRANDVIEW, MO. 64030
PHONE: (816) 761-6314 TWX 910-777-7037

UNCASED —

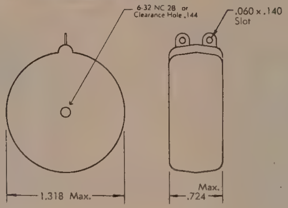
TYPE U
Wt. 1.6 oz.



COMPRESSION MOLDED —

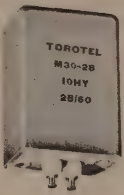
TYPE P
Wt. 2.5 oz.

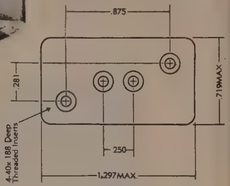
TOROTEL
P30-40



METAL CASED —

TYPE M
Wt. 3.5 oz.





Maximum Height 1.750

CORE NO. 30

STANDARD INDUCTANCE VALUES

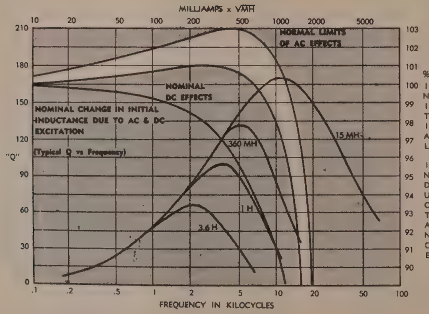
Inductance	Uncased Type	† Compression Molded	Metal Cased	TYPICAL DC Resistance (Ohms)	TYPICAL Distributed Capacity (pf)
5.0 mH	U30-1	P30-1	M30-1	0.53	63
6.0 mH	U30-40	P30-40	M30-40	0.63	64
7.2 mH	U30-41	P30-41	M30-41	0.76	65
7.5 mH	U30-2	P30-2	M30-2	0.79	66
8.6 mH	U30-42	P30-42	M30-42	0.90	67
10. mH	U30-3	P30-3	M30-3	1.05	68
12. mH	U30-43	P30-43	M30-43	1.26	69
12.5 mH	U30-4	P30-4	M30-4	1.31	69
15. mH	U30-5	P30-5	M30-5	1.58	70
17.5 mH	U30-44	P30-44	M30-44	1.84	71
20. mH	U30-6	P30-6	M30-6	2.10	72
24. mH	U30-45	P30-45	M30-45	2.52	73
25. mH	U30-7	P30-7	M30-7	2.63	73
30. mH	U30-8	P30-8	M30-8	3.15	75
36. mH	U30-46	P30-46	M30-46	3.78	76
40. mH	U30-9	P30-9	M30-9	4.20	77
43. mH	U30-47	P30-47	M30-47	4.52	78
50. mH	U30-10	P30-10	M30-10	5.25	79
60. mH	U30-48	P30-48	M30-48	6.30	80
72. mH	U30-49	P30-49	M30-49	7.56	81
75. mH	U30-11	P30-11	M30-11	7.86	81
86. mH	U30-50	P30-50	M30-50	9.03	82
100. mH	U30-12	P30-12	M30-12	10.5	83
120. mH	U30-51	P30-51	M30-51	12.6	84
125. mH	U30-13	P30-13	M30-13	13.1	84
150. mH	U30-14	P30-14	M30-14	15.8	85
175. mH	U30-53	P30-53	M30-53	18.4	86
200. mH	U30-15	P30-15	M30-15	21.0	87
240. mH	U30-54	P30-54	M30-54	25.2	88
250. mH	U30-52	P30-52	M30-52	26.3	88
300. mH	U30-16	P30-16	M30-16	31.5	89
360. mH	U30-55	P30-55	M30-55	37.8	90
400. mH	U30-17	P30-17	M30-17	42.0	91
430. mH	U30-56	P30-56	M30-56	45.2	91
500. mH	U30-18	P30-18	M30-18	52.5	92
600. mH	U30-57	P30-57	M30-57	63.0	93
720. mH	U30-58	P30-58	M30-58	75.6	94
750. mH	U30-19	P30-19	M30-19	78.7	96
860. mH	U30-59	P30-59	M30-59	90.3	97
1.0 H	U30-20	P30-20	M30-20	105.0	98
1.2 H	U30-60	P30-60	M30-60	126.0	99
1.25 H	U30-21	P30-21	M30-21	131.3	99
1.5 H	U30-22	P30-22	M30-22	157.5	100
1.75 H	U30-61	P30-61	M30-61	183.8	101
2.0 H	U30-23	P30-23	M30-23	210.0	102
2.4 H	U30-62	P30-62	M30-62	252.0	103
2.5 H	U30-69	P30-69	M30-69	262.5	103
3.0 H	U30-24	P30-24	M30-24	315.0	104
3.6 H	U30-63	P30-63	M30-63	378.0	106
4.0 H	U30-25	P30-25	M30-25	420.0	107
4.3 H	U30-64	P30-64	M30-64	451.5	108
5.0 H	U30-26	P30-26	M30-26	525.0	109
6.0 H	U30-65	P30-65	M30-65	630.0	110
7.2 H	U30-66	P30-66	M30-66	756.0	111
7.5 H	U30-27	P30-27	M30-27	787.5	112
8.6 H	U30-67	P30-67	M30-67	903.0	113
10.0 H	U30-28	P30-28	M30-28	1050.0	114
12.0 H	U30-68	P30-68	M30-68	1260.0	115
12.5 H	U30-29	P30-29	M30-29	1312.5	116
15.0 H	U30-30	P30-30	M30-30	1575.0	117
17.5 H	U30-31	P30-31	M30-31	1837.5	118

†Add "C" to part number of molded inductor if clearance hole is desired.

CORE NO. 30

- Recommended Frequency: Up to 20 kHz
- Maximum Inductance: 17.5 H
- Tolerance: ±1%
- Special Core Stabilization Available: B, D, E, G, L, M, W
- Studs are available on the "M" Series on special request
- Mechanical Tolerance: ±.015 unless otherwise indicated

STOCKED FOR IMMEDIATE DELIVERY



TOROTEL INC.

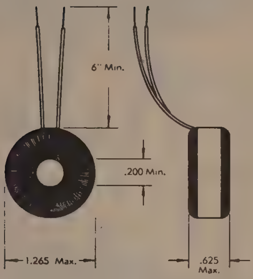
13402 SOUTH 71 HIGHWAY, GRANDVIEW, MO. 64030
PHONE: (816) 761-6314 TWX 910-777-7037

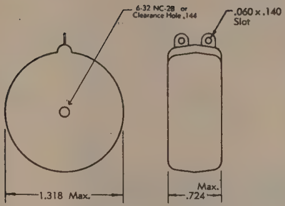
UNCASED — TYPE U
Wt. 1.6 oz.

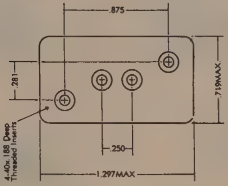
COMPRESSION MOLDED — TYPE P
Wt. 2.5 oz.

METAL CASED — TYPE M
Wt. 3.5 oz.

TOROTEL
M94-23
100 MH
40/62





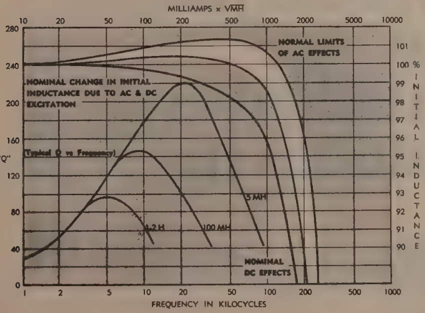


Maximum Height 1.750

CORE NO. 94

- Recommended Frequency: Up to 75 kHz
- Maximum Inductance: 1 H
- Tolerance: ±1%
- Special Core Stabilization Available: B, D, M, W
- Studs are available on the "M" Series on special request
- Mechanical Tolerance: ±.015 unless otherwise indicated

STOCKED FOR IMMEDIATE DELIVERY



CORE NO. 94

STANDARD INDUCTANCE VALUES

Inductance	Uncased Type	† Compression Molded	Metal Cased	TYPICAL DC Resistance (Ohms)	TYPICAL Distributed Capacity (pf)
5.0 mH	U94-1	P94-1	M94-1	1.05	32
6.0 mH	U94-2	P94-2	M94-2	1.26	32
7.2 mH	U94-3	P94-3	M94-3	1.51	33
7.5 mH	U94-4	P94-4	M94-4	1.58	34
8.6 mH	U94-5	P94-5	M94-5	1.80	35
10.0 mH	U94-6	P94-6	M94-6	2.10	35
12.0 mH	U94-7	P94-7	M94-7	2.52	36
12.5 mH	U94-8	P94-8	M94-8	2.63	37
15.0 mH	U94-9	P94-9	M94-9	3.15	38
17.5 mH	U94-10	P94-10	M94-10	3.67	39
20.0 mH	U94-11	P94-11	M94-11	4.20	40
24.0 mH	U94-12	P94-12	M94-12	5.04	41
25.0 mH	U94-13	P94-13	M94-13	5.25	41
30.0 mH	U94-14	P94-14	M94-14	6.30	42
36.0 mH	U94-15	P94-15	M94-15	7.56	43
40.0 mH	U94-16	P94-16	M94-16	8.40	44
43.0 mH	U94-17	P94-17	M94-17	9.03	44
50.0 mH	U94-18	P94-18	M94-18	10.5	45
60.0 mH	U94-19	P94-19	M94-19	12.6	46
72.0 mH	U94-20	P94-20	M94-20	15.1	46
75.0 mH	U94-21	P94-21	M94-21	15.8	47
86.0 mH	U94-22	P94-22	M94-22	18.0	47
100. mH	U94-23	P94-23	M94-23	21.0	48
120. mH	U94-24	P94-24	M94-24	25.2	49
125. mH	U94-25	P94-25	M94-25	26.3	49
150. mH	U94-26	P94-26	M94-26	31.5	50
175. mH	U94-27	P94-27	M94-27	36.8	51
200. mH	U94-28	P94-28	M94-28	42.0	52
240. mH	U94-29	P94-29	M94-29	50.4	53
250. mH	U94-30	P94-30	M94-30	52.5	54
300. mH	U94-31	P94-31	M94-31	63.0	54
360. mH	U94-32	P94-32	M94-32	75.6	56
400. mH	U94-33	P94-33	M94-33	84.0	57
430. mH	U94-34	P94-34	M94-34	90.0	57
500. mH	U94-35	P94-35	M94-35	105.0	57
600. mH	U94-36	P94-36	M94-36	126.0	58
720. mH	U94-37	P94-37	M94-37	151.0	58
750. mH	U94-38	P94-38	M94-38	158.0	59
860. mH	U94-39	P94-39	M94-39	181.0	59

†Add "C" to part number of molded inductor if clearance hole is desired.

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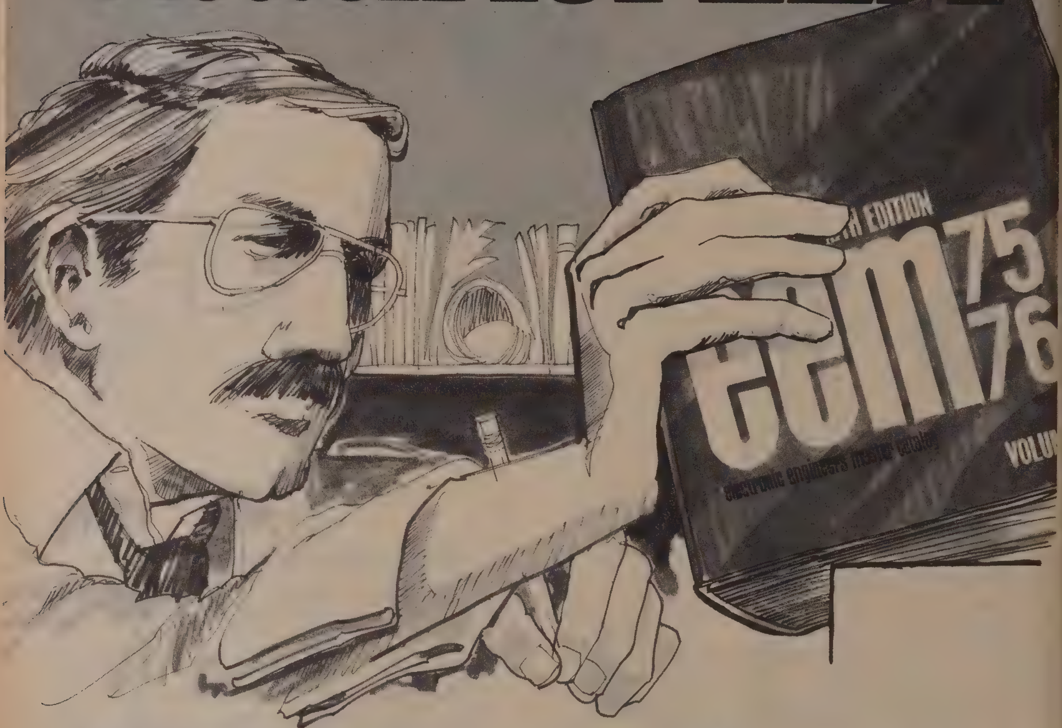
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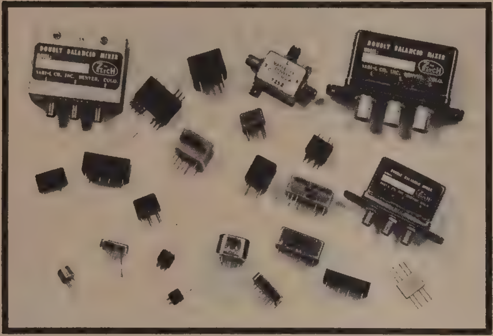

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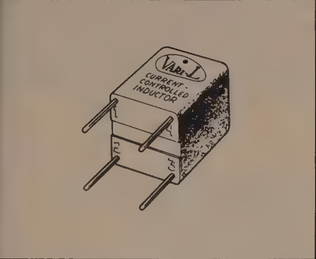
VARI-L ELECTRICALLY VARIABLE INDUCTORS



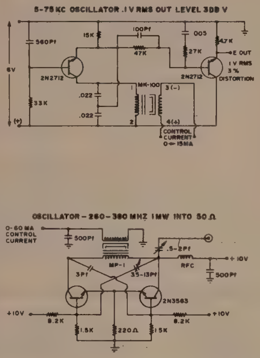


FIGURE 19
TYPICAL VARI-L CIRCUITS

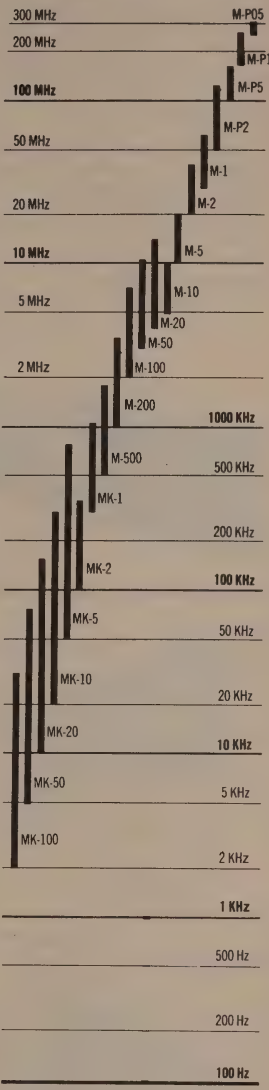
The **Vari-L Inductor** consists of a high-Q coil wound on a ferromagnetic core, and an electromagnetic element for controlling its inductance. The coil is connected into an oscillator, amplifier or filter, along with suitable capacitance to establish the initial parameters; current in the control winding will then do the tuning. The rate of control can be slow for semi-fixed operation — or fast, up to several thousand Hz, for sweep or frequency modulation. The control current is usually in the milliampere range, or can be made higher to fit special applications.

The component is entirely solid-state, with no moving parts to get out of adjustment or wear out, so it can safely be located remote from the control point or potted as part of your own intricate subassembly.

Vari-L tuning has been in use for 15 years in numerous industrial instruments, and in critical military applications including outer space and oceanography. It is a natural for such sweep services as TV-alignment generators, spectrum analyzers, and panoramic receivers; but it is also chosen frequently because of its non-mechanical advantages such as remote control, sub-miniaturization, or automatic (closed-loop) tuning.

The **"MITE"** Series described below was brought out to keep step with the trend toward printed circuits and smaller equipment; but we also make larger units for high-power circuits or multi-function service.

We will quote promptly on your special requirements. Contact factory sales for appropriate bulletin.



TYPICAL
FREQUENCY RANGES
OF THE
"MITE"-SERIES MODELS

The ranges shown are approximate and usually may be extended

ELECTRICALLY VARIABLE INDUCTOR SPECIFICATIONS

MODEL	INDUCTANCE AT ZERO CONTROL CURRENT ±10% (L_s)	INDUCTANCE AT MAX. RECOMMENDED CONTROL CURRENT (L_{sat})	TYP. FREQ.† AT ZERO CONTROL CURRENT (F_s)	HIGH-FREQ. END OF RANGE WITH F. SHOWN (F_{sat})	CONTROL WINDING INDUCTANCE ±20% (L_c)	PRICE 1 - 9
MK-100	100 MH	.445 MH	2 KHz	30 KHz	450 MH	$22.10
MK-50	50 MH	.223 MH	5 KHz	75 KHz	450 MH	$22.10
MK-20	20 MH	.089 MH	10 KHz	150 KHz	450 MH	$22.10
MK-10	10 MH	.045 MH	20 KHz	300 KHz	450 MH	$22.10
MK-5	5 MH	.022 MH	50 KHz	750 KHz	450 MH	$22.10
MK-2	2 MH	.163 MH	.1 MHz	.35 MHz	160 MH	$22.10
MK-1	1 MH	.082 MH	.3 MHz	1.05 MHz	160 MH	$22.10
M-500	500 μH	40.8 μH	.5 MHz	1.75 MHz	160 MH	$22.65
M-200	200 μH	16.3 μH	1 MHz	3.5 MHz	160 MH	$21.65
M-100	100 μH	8.15 μH	2 MHz	7 MHz	160 MH	$21.65
M-50	50 μH	4.08 μH	3 MHz	10.5 MHz	160 MH	$21.65
M-20	20 μH	1.63 μH	4 MHz	14 MHz	160 MH	$21.65
M-10	10 μH	2.5 μH	5 MHz	10 MHz	80 MH	$21.65
M-5	5 μH	1.25 μH	10 MHz	20 MHz	80 MH	$21.65
M-2	2 μH	.5 μH	20 MHz	40 MHz	80 MH	$21.65
M-1	1 μH	.25 μH	30 MHz	60 MHz	75 MH	$21.65
M-P5	.5 μH	.125 μH	60 MHz	120 MHz	75 MH	$21.65
M-P2	.2 μH	.078 μH	100 MHz	160 MHz	55 MH	$21.65
M-P1	.1 μH	.051 μH	170 MHz	240 MHz	55 MH	$21.65
M-P05	.05 μH	.035 μH	250 MHz	300 MHz	55 MH	$21.65

For all models except MM-10 the control-winding resistance is 75 ohms, and maximum recommended control current is 60 ma. Rc of MM-10 is 30 ohms. / Shield Cans are available at $1 extra per unit.

†The ranges shown are approximate and usually may be extended.

VARI-L CO., INC. • 3883 MONACO PARKWAY • DENVER, COLORADO 80207 • (303) 321-1511 • TWX 910-931-0590

Bantam Jack Panels

Bantam Jack Panels are designed to satisfy the increasing demand for more compact patchfields in modern electronic and communication equipment. Bantam Jack Panels, with miniaturized jacks, provide twice the number of jacks in a standard size panel. They require only ½ the rack space previously used by conventional panels. The new panel assemblies weigh 65% less when compared to an assembly using an equivalent number of jacks on a conventional jack panel. ■ Bantam Jack Panels are compact, lightweight, and yet provide the same dependable service as the long established telephone types. This new design offers 96 jacks (48 pairs) in a 1¾ inch x 19 inch standard sized panel. The jacks on this panel are spaced to prevent the cross patching of adjacent circuits when using double plugs.

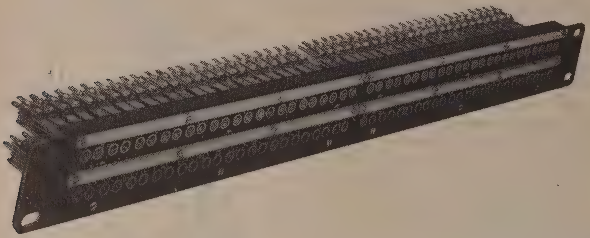
specifications

1. **Panel:** Aluminum alloy, extruded. Finished black anodized per Mil-A-8625A. Overall dimensions 1¾"x19"—Standard EIA mounting centers.
2. **Jack Mounting:** Four moulded plastic inserts, each provides for 24 jacks. Pairs of jacks on 5/16 inch centers. Double-row panel provides 96 jacks total. Blank inserts can be furnished where only single row of jacks is required.
3. **Designation Strip:** Extruded clear plastic.
4. Panel assemblies are available with a wide variety of two and three-conductor jacks. See listing of Bantam jacks for complete details.

PJ-731	Double row panel, assembly less jacks, holds 96 jacks.
PJ-737	Double row panel, with 48 pair (96 total) PJ-818 jacks.
PJ-739	Double row panel, with 48 pair (96 total) PJ-839 jacks.
PJ-724	Panel inserts, less jacks, 24 holes.
PJ-700	Panel inserts, blank (same as PJ-724 without holes).
PJ-736*	Double row panel, with 104 PJ-818 jacks.
PJ-738*	Double row panel, with 104 PJ-839 jacks.

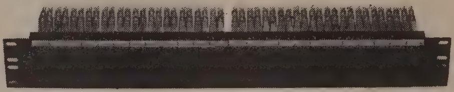
*Panels with 104 jacks (26 per insert, jacks all on 5/16 inch centers) are available on special order.

Custom panel assemblies with up to 104 jacks are available on special order.



Bantam Triple Row Jack Panel

Bantam Triple Row Jack Panels provides 144 jacks in a 2⅝ inch x 19 inch size panel. The specification and construction of this panel is the same as Bantam Double Row Panels except width of panel is one and one-half the standard panel size. Mounting centers conform to standard EIA rack spacing. Three rows of jacks with 48 jacks in each row. These three rows are particularly desirable for use in 2 wire and 4 wire VF Circuit applications where space can be saved by having three verticle jacks appear as a jack set.



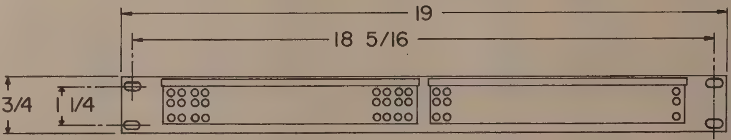
"BANTAM TRIPLE ROW JACK PANEL — 2⅝" WIDE"

BANTAM TRIPLE ROW JACK PANEL

PJ-732	Triple Row Panel Assembly, less jacks, holds 144 jacks
PJ-733	Triple Row Panel, with 144 PJ-818 Jacks
PJ-734	Triple Row Panel, with 144 PJ-839 Jacks
PJ-735	Triple Row Panel, with 96 PJ-839 Jacks (top and middle row) 48 PJ-838 Jacks (bottom row).

Bantam 2 + 1 Jack Panels

Bantam 2 + 1 Jack Panels are the newest development in the ADC line of Bantam components which offer the maximum in patching density. These unique three row panels feature three miniature jacks on a single frame, which effectively requires ⅓ less space than regular Bantam jacks. The Bantam 2+1 panels include 48 of these three conductor jacks, in a standard size 1¾ inch wide by 19 inch long panel. These panels were especially designed to provide vertically positioned jack sets such as the "Line", "Equipment" and "Monitor" jacks in a Voice Frequency Circuit. The Bantam 2 + 1 Jacks provided in these panels are available with solder type terminals and with wire wrap terminals.



"BANTAM 2 + 1 JACK PANEL — 1¾" WIDE"

PJ-721	Panel Assembly, with 48 PJ-821 Jacks
PJ-721W	Panel Assembly, with 48 PJ-821W Jacks

ADC PRODUCTS

Division of MAGNETIC CONTROLS COMPANY
4900 West 78th Street, Minneapolis, Minnesota 55435
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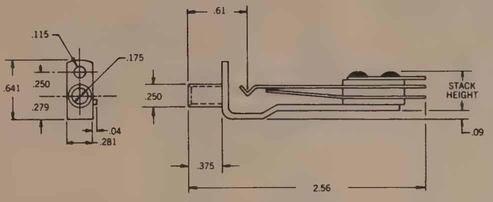
Bantam Jacks

Bantam Jacks will meet the electrical, mechanical and environmental requirements of the military specification for long frame telephone jacks. Although reduced in size these jacks will provide the same reliable service equal to that expected from regular size telephone jacks. These jacks are available in a variety of two and three conductor types, with isolated circuit contacts as well as normalling contacts.

FOR COMPLETE LINE OF BANTAM LITES, SWITCHES, ACCESSORIES, SEE ADC COMMUNICATIONS COMPONENTS CATALOG.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STACK HEIGHT
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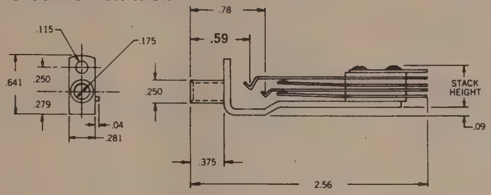
2.56

2 CONDUCTOR JACK

3 CONDUCTOR JACK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STACK HEIGHT
.09
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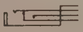
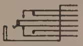
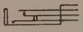
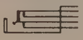
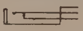
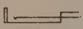
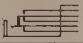
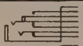
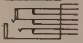
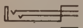
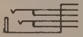
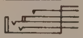
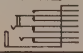
2.56

SCHEMATIC DIAGRAM	PART NO.	STACK HEIGHT (Inches)
	PJ-803	13/32
	PJ-808	43/64
	PJ-815	35/64
	PJ-816	35/64
	PJ-818	13/32
	PJ-823	27/64
	PJ-836	5/8
	PJ-805	43/64
	PJ-824	43/64
	PJ-838	35/64
	PJ-839	17/32
	PJ-841	43/64
	PJ-880	3/4

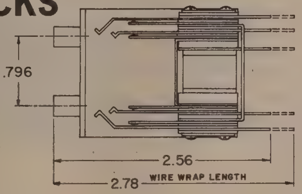
specifications

Frame: Steel, Cadmium plate with chromate conversion coating to withstand 50 hours of salt spray.
Springs: Nickel silver.
Contacts: W. E. #1 gold alloy, cross-bar contacts are welded to springs.
Insulation: Spacers, Phenolic Type PBE-P per MIL-P-3115B.
Bushing: Brass, silver soldered to frame. Finish same as frame.

If gold plating is required for all surfaces, jacks should be ordered as the PJ number with a "G" suffix. ADC uses .00005 gold per MIL-G-45204, TYPE II. The solder lugs are not tinned for gold plated jacks. Any requirements other than those described require special notation.

Bantam Twin Jacks

Bantam Twin Jacks are the miniature equivalent of the ADC PJ-482 or the WE 482A. These three conductor type jacks have normal contacts on both the tip and ring springs strapped, thereby reducing and simplifying wiring. The Bantam Twin Jacks are designed with sleeves on .796 inch centers and are made to mount in the ADC PJ-731 Double Row Panels and the PJ-732 Triple Row Panels. Bantam Twin Jacks are available with solder terminals and wire wrap terminals.


.796
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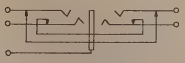
WIRE WRAP LENGTH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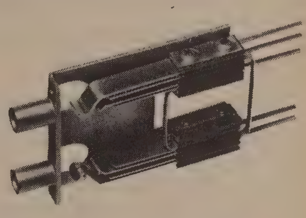
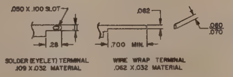
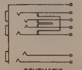


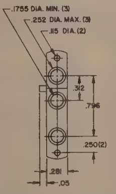
PJ-882 Bantam Twin Jack — Solder Terminals
PJ-882W Bantam Twin Jack — Wire Wrap Terminals

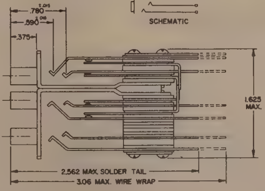
Bantam 2 + 1 Jacks

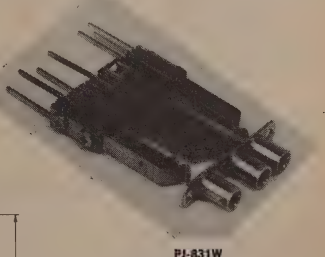
Bantam 2 + 1 Jacks offer almost unbelievable space saving advantages . . . Savings even greater than regular Bantam jacks. Bantam 2 + 1 Jacks literally permits tripling of the patching density of a 1¾ inch wide panel. This unique design features three jacks on a single frame. The jacks are three conductor types. Two of the jacks have normal contacts on both tip and ring springs. These normal contacts are strapped to simplify wiring. Ideally suited to VF Circuit applications where two of the jacks would function as "Line" and "Equipment" jacks and the third as a "Monitor" jack. Up to 48 Bantam 2 + 1 Jacks can be mounted on a 1¾ inch wide by 19 inch long panel. Bantam 2 + 1 Jacks are available with solder type terminals and, with wire wrap terminals. These very remarkable miniature jacks are specifically designed to mount in the Bantam 2 + 1 Panel PJ-721.


.050 X .100 SLOT
.28
SOLDER (EYELET) TERMINAL
.109 X .032 MATERIAL
.062
.700 MIN.
WIRE WRAP TERMINAL
.062 X .032 MATERIAL
.060
.070


SCHEMATIC


.1755 DIA. MIN. (3)
.252 DIA. MAX. (3)
.115 DIA. (2)
.312
.796
.250(2)
.281
.05


.780 ±.015
.590 ±.015
.375
1.625 MAX.
2.562 MAX. SOLDER TAIL
3.06 MAX. WIRE WRAP


PJ-831W
(Wire Wrap Terminals)

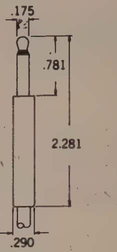
Bantam Patch Cords

Bantam Patch Cords are plastic jacketed, shielded cords complete with molded-on plugs. The plugs are made with molded insulation between conductors. Bantam Patch Cords are available with single and double two and three conductor plugs. A cord strain relief feature is included in the plug construction.

Bantam plugs may be gold plated on special order per MIL-G-45204, Type II, .00005 inches thick.

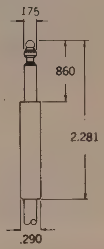
2 CONDUCTOR SINGLE PLUG

Length (see Note 1)	Single (2) Conductor Plug
6 inch	PJ-701
12 inch	PJ-702
18 inch	PJ-703
24 inch	PJ-704
30 inch	PJ-705
36 inch	PJ-706
48 inch	PJ-708
60 inch	PJ-710



3 CONDUCTOR SINGLE PLUG

Length (see Note 1)	Single (3) Conductor Plug
6 inch	PJ-711
12 inch	PJ-712
18 inch	PJ-713
24 inch	PJ-714
30 inch	PJ-715
36 inch	PJ-716
48 inch	PJ-718
60 inch	PJ-720



specifications

Cord: Plastic jacketed, stranded copper conductors, braided shield. Jacket color — gray.

Plugs: Conductor parts are brass, finished to 32 microinch finish maximum.

Plug Insulation: Molded nylon.

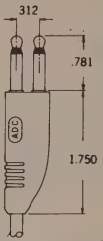
Internal Connections: Soldered.

Plug Shell: Plastic, black, rigid thermoplastic.

NOTE 1: Length is measured from the rear of the plug shell to rear of plug shell on opposite end.

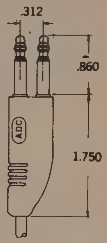
2 CONDUCTOR (DOUBLE)

Length	Double (2) Conductor Plug
6 inch	PJ-751
12 inch	PJ-752
18 inch	PJ-753
24 inch	PJ-754
30 inch	PJ-755
36 inch	PJ-756
48 inch	PJ-758
60 inch	PJ-760



3 CONDUCTOR (DOUBLE)

Length	Double (3) Conductor Plug
6 inch	PJ-761
12 inch	PJ-762
18 inch	PJ-763
24 inch	PJ-764
30 inch	PJ-765
36 inch	PJ-766
48 inch	PJ-768
60 inch	PJ-770



specifications

Cord: Plastic jacketed, stranded copper conductors, braided shield. Jacket color — gray.

Plugs: Conductor parts are brass, finished to 32 microinch finish maximum.

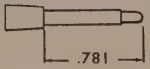
Plug Insulation: Molded nylon.

Internal Connections: Soldered.

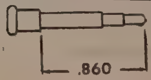
Plug Shell: Plastic, gray, flexible thermoplastic.

Dummy Plugs

Plugs are used to actuate Bantam Jacks. They are constructed of an insulating plastic material.



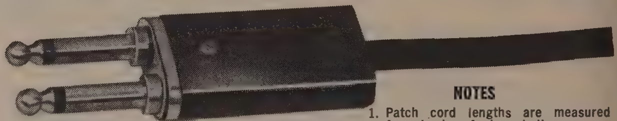
2 CONDUCTOR PJ-747



3 CONDUCTOR PJ-748

Patch Cords

ADC Patch Cords have become standards in the communications industry. The heavy Nylon braided jacket excels in abrasion resistance. All cords have been designed to give the ultimate combination of durability, flexibility and reliability. ADC has numerous combinations of special cord assemblies using virtually every plug combination required. You are invited to submit your requests or requirements for quotations.



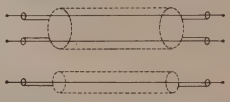
PATCH CORD LENGTH	TOLERANCE
6 inch	+ .375″ —.00″
1 foot	+ .75 ″ —.00″
2 feet	+1.125″ —.00″
3 feet	+1.375″ —.00″
4 feet	+1.625″ —.00″
5 feet	+2.0 ″ —.00″
6 feet	+2.25 ″ —.00″
10 feet	+2.625″ —.00″

NOTES

1. Patch cord lengths are measured from backs of plug shells.
2. All cords and cord assemblies will withstand 500 V, 60 Hz PBT between all conductor. Cordage is designed to have minimum leakage resistance of 50 Megohms with 100 volts applied.

2 CONDUCTOR SHIELDED, CORD ASSEMBLIES

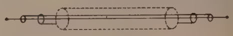
Length	Cord w/ PJ-1 Plugs
6 inch	PJ-10½
1 foot	PJ-11
2 feet	PJ-12
3 feet	PJ-13
4 feet	PJ-14
5 feet	PJ-15
6 feet	PJ-16
10 feet	PJ-10



These cords provide two tinsel wire conductors plus a braided shield. The overall jacket is braided nylon. Black nylon is standard.

3 CONDUCTOR SHIELDED, CORD ASSEMBLIES

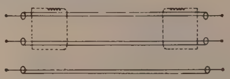
Length	Cord w/ PJ-2 Plugs	Cord w/ PJ-051R Plugs
1 foot	PJ-71	PJ-81
2 feet	PJ-72	PJ-82
3 feet	PJ-73	PJ-83
4 feet	PJ-74	PJ-84
5 feet	PJ-75	PJ-85
6 feet	PJ-76	PJ-86



These cords provide two tinsel wire conductors plus a braided shield. Overall jacket is braided nylon. Black nylon is standard.

2 CONDUCTOR UNSHIELDED, CORD ASSEMBLIES

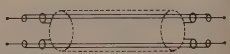
Patch Cords Length	Cord w/ PJ-047R Plugs
1 foot	PJ-471
2 feet	PJ-472
3 feet	PJ-473
4 feet	PJ-474
5 feet	PJ-475
6 feet	PJ-476



The PJ-180 and PJ-470 series cords offer tinsel wire conductors, thermo plastic insulated. Standard color for PJ-180 series patch cords is slate. The standard color for the PJ-470 series cords is red.

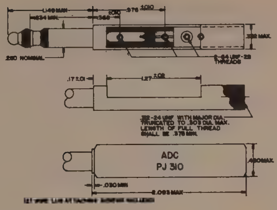
3 CONDUCTOR SHIELDED, CORD ASSEMBLIES

Length	Cord w/ PJ-7 Plugs	Cord w/ PJ-8 Plugs
1 foot	PJ-171	PJ-91
2 feet	PJ-172	PJ-92
3 feet	PJ-173	PJ-93
4 feet	PJ-174	PJ-94
5 feet	PJ-175	PJ-95
6 feet	PJ-176	PJ-96



The PJ-90 and PJ-170 series cords provide four tinsel wire conductors, plus a shield common to both sleeves on the plugs. Standard color for these cords is black.

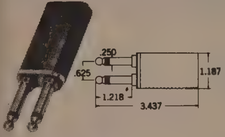
Plugs


1.140 MIN
.634 MIN.
.200
.360
.976 ±.010
.332 MAX.
.250 NOMINAL
8-24 UNF-2B THREADS
.17 ±.01
1.27 ±.02
.332-24 UNF WITH MAJOR DIA. TRUNCATED TO .303 DIA. MAX. LENGTH OF FULL THREAD SHALL BE .375 MIN.
ADC
PJ 310
.480 MAX.
.030 MIN
2.093 MAX

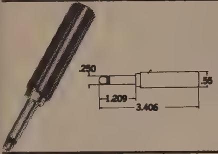
ADC PRODUCTS

Division of MAGNETIC CONTROLS COMPANY
4900 West 78th Street, Minneapolis, Minnesota 55435
Tel: (612) 835-6800 — TWX: 910-576-2832 — TELEX: 29-032

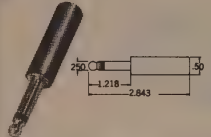
PJ-310 — Manufactured under license from Western Electric. Introducing ADC's PJ-310 — equivalent to WECO's popular 310 plug. Designed for use with 1/4" diameter tip, ring, and sleeve jacks. Profiled construction allows for close contour tolerances. Nylon insulation provides long life wear resistance.


.250
.625
1.187
1.218
3.437

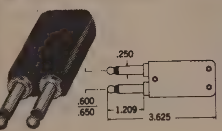
PJ-1 — Equivalent WE-241. Heavy duty die cast frame. Black phenolic shell. Has self-aligning plug sleeves on 5/8" centers for use with all standard jack panels. Two tip conductors, plus sleeve connection common to both sleeves.


.250
.56
1.209
3.406

PJ-047R,B—Equivalent WE-347. Designed for use with tip and sleeve jacks. Molded insulation, red (R) or black (B) plastic handle, design and construction in accordance with MIL-P-642B specifications.

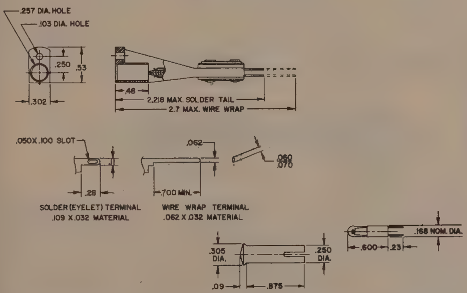

.250
.50
1.218
2.843

PJ-055B,M,R. — Formerly ADC PJ-5, fits 1/4" phone jacks. Black (B) or red (R) plastic or Metal (M) shell. Screw terminals, designed and manufactured in accordance with MIL-P-642B.


.250
.600
.650
1.209
3.625

PJ-327 — Equivalent WE-327. Twin plug provides two electrically independent 2 conductor plugs in a black phenolic shell which is notched to indicate polarity. Self-aligning plug sleeves are on 5/8" centers. Designed and constructed in accordance with specification MIL-P-642B.

Bantam Lamp Socket

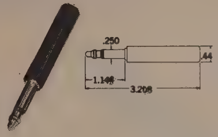

.257 DIA. HOLE
.103 DIA. HOLE
.250
.53
.302
.48
2.218 MAX. SOLDER TAIL
2.7 MAX. WIRE WRAP
.050 X .100 SLOT
.062
.060
.070
.28
.700 MIN.
SOLDER (EYELET) TERMINAL .109 X .032 MATERIAL
WIRE WRAP TERMINAL .062 X .032 MATERIAL
.305 DIA.
.250 DIA.
.09
.875
.168 NOM. DIA.
.600
.23

Bantam Lamp Sockets accepts T-1¼ style Bi-Pin base incandescent lamps and the ADC Bantam LED module. Both lamps and LED's are available in 6, 14, and 28 volt ratings and in red, green, amber, and white colors (lamp caps for the incandescent lamps). Bantam lamp sockets mount in panels in the same manner as bantam jacks.

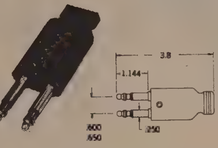
SPECIFICATIONS:

Case is glass filled nylon. Conductor lugs are die formed of nickel silver with tin-dipped solder lugs.

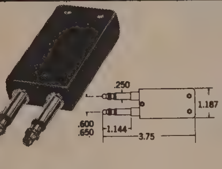
PJ-850	Solder Lamp Socket
PJ-850W	Wire Wrap Lamp Socket
PJ-729W,R,G,A	Lamp Cap
PJ-860, 861, 862	Incandescent Lamps
4-25979-XXXX	LED Module


.250
.44
1.148
3.208

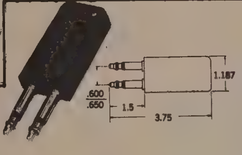
PJ-2 — Equivalent WE-291A. Designed for use with 1/4" diameter tip, ring and sleeve jacks. Especially designed cone-shaped tip to prevent momentary shorting of tip and ring conductors when used with ADC PJ-339, WE-239A or similar three circuit jacks.


3.8
1.144
.600
.650
.250

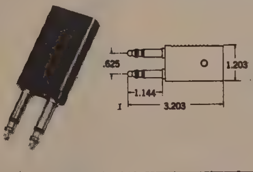
PJ-4 — Looping plug, dual three conductor type. Same conductor configuration as PJ-051 except has conductors wired internally, tip to tip, ring to ring and sleeve to sleeve. Black plastic shell.


.250
1.187
.600
.650
1.144
3.75

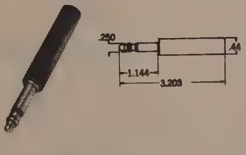
PJ-7 — Equivalent WE-425. Twin type plug with tip, ring and sleeve conductors on 5/8" centers for use with all standard jack panels. Designed to mate with three conductor jacks having 1/4" diameter sleeves. Molded insulation. Black phenolic shell is notched to indicate polarity.


1.187
.600
.650
1.5
3.75

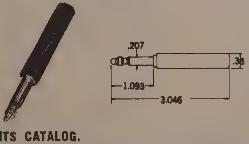
PJ-8 — Dual three conductor type with same conductor configuration as PJ-2, designed for non-shorting of tip and ring circuits when used with PJ-339, WE-239A or similar jacks. Black plastic handle notched to indicate polarity.


.625
1.203
1.144
3.203

PJ-9 — Equivalent WE-338. Designed for applications requiring two separate 3 conductor circuits. Will mate with three-conductor jacks having 1/4" diameter sleeves. Molded insulation, black plastic handle notched to indicate polarity. Self-aligning plug sleeves on 5/8" centers. Has two separate cord entry holes and requires "Y" type cord or two separate cords.


.250
.44
1.144
3.203

PJ-051R,B — Equivalent WE-310. Designed for use with 1/4" tip, ring and sleeve jacks. Molded insulation, red or black plastic shell, three conductor. Is in accordance with MIL-P-642B.


.207
.38
1.093
3.046

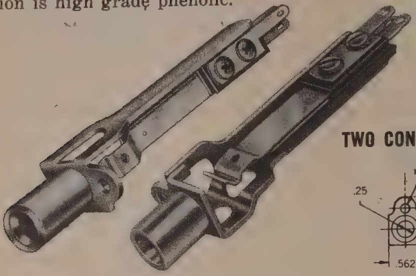
PJ-309 — Equivalent WE-309. Three conductor type. Has .207 diameter sleeve (small diameter). Intended for use with ADC PJ-246, PJ-249 and similar three circuit jacks which have .210 I.D. sleeves. Molded insulation — red plastic handle. Designed and constructed per MIL-P-642B.

FOR COMPLETE LINE OF COAXIAL PLUGS, SEE ADC COMMUNICATIONS COMPONENTS CATALOG.

Jacks

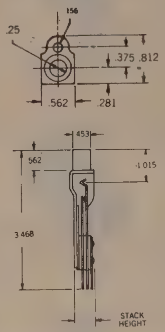
TELEPHONE TYPE

ADC is recognized as a leading supplier of long frame, telephone type jacks. As evidence of their outstanding quality, ADC jacks are used by the country's foremost manufacturers of communication equipment. The unique, ADC one-piece frame is strong, dimensionally stable and readily interchangeable both mechanically and electrically with commonly used jacks. Plating withstands 50-hour salt spray tests. W. E. #1 gold alloy contacts are welded to nickel silver springs. Lugs are hot tin dipped. Insulation is high grade phenolic.

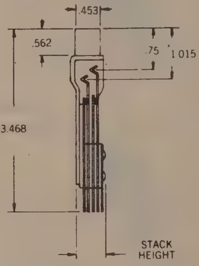


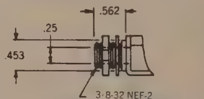
Schematic Diagram	Jacks	WE Equiv.	Frame Style	Stack Height (Inches)
	PJ-115	215-A	A	5/8
	PJ-116	216-A	A	5/8
	PJ-117	217-A	A	9/16
	PJ-123	223-A	A	7/16
	PJ-125	225-A	A	21/32
	PJ-202	None	C	3/4
	PJ-203	303-A	A	9/16
	PJ-204**	None	A	3/4
	PJ-205**	240-A	A	3/4
	PJ-206**	242-A	A	3/4
	PJ-207**	285-A	A	27/32
	PJ-208**	284-A	A	63/64
	PJ-209**	411-A	A	27/32
	PJ-226	226-A	A	5/8
	PJ-237	237-A	A	15/32
	PJ-238	238-A	A	9/16
	PJ-240	240-C	C	3/4
	Pj-241**	241-A	A	3/4
	PJ-242	242-C	C	3/4
	PJ-280	280-C	C	23/32
	PJ-318	218-A	A	1/2
	PJ-336	236-C	C	19/32
	PJ-338	438-C	C	13/16
	PJ-339	239-A	A	9/16
	PJ-418	218-C	C	1/2
	PJ-246*	246-A	A	9/16
	PJ-248*	248-A	A	9/16
	PJ-249*	249-A	A	9/16

TWO CONDUCTOR

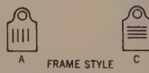


THREE CONDUCTOR





THREADED SLEEVE AVAILABLE ON SPECIAL ORDER



SPECIFICATIONS:

Frame: Steel, plated to withstand 50 hours salt spray per Mil-STD-202, Method.
Sleeve: Brass, nickle plated.
Springs: Nickle silver with tinned lugs.
Insulators: Phenolic, per Mil-P-3115 B type.

MILITARY JACKS

Designed to meet the rugged, exacting requirements of military applications. These ADC jacks are made in accordance with Mil-J-641B specifications. Highest quality materials and closely held tolerances on dimensions conform with military specifications.

Schematic Diagram	MIL Jacks	Frame Style	Stack Height (Inches)	Schematic Diagram	MIL Jacks	Frame Style	Stack Height (Inches)
	JJ-015	C	3/4		JJ-073**	A	3/4
	JJ-016	A	9/16		JJ-074	A	3/4
	JJ-017**	A	3/4		JJ-075**	A	3/4
	JJ-019	C	11/16		JJ-077	A	27/32
	JJ-022	A	9/16		JJ-078**	A	63/64
	JJ-024	A	1/2		JJ-084	A	5/8
	JJ-035	A	5/8		JJ-085	A	9/16
	JJ-042	A	9/16		JJ-086	A	7/16
	JJ-072	A	5/8		JJ-087**	A	27/32

*For use with PJ-309 or other similar type plugs having .207″ diameter sleeves.

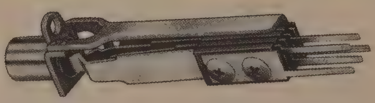
**Caution — Because of Stack Height these "A" frame jacks cannot be installed on 5/8″ centers. "C" Frame version if not listed can be furnished on special order.

TWIN JACKS

ADC Twin Jacks are essentially two jacks with a common mounting frame. Jack sleeves are on 5/8″ centers for vertical mounting in standard jack panels. Normal springs are cross-connected or strapped. Jack sleeves are brass, nickel plated. Die formed springs are nickel silver. Frame and hardware are steel, cadmium-chromate plated to withstand 50 hours salt spray.

Part No.	WE Equivalent	No. Cond.	Use With Plug
PJ-410	410A	2	PJ-327, PJ-047, PJ-1
PJ-482	482A	3	PJ-051, PJ-7
PJ-482W	—	3	PJ-051, PJ-7

WRAPID JACKS (For Wrapped Solderless Connections)



ADC offers a variety of Wrapid Jacks with .032″ by .062″ rectangular terminals for wrapped wire connections. These jacks feature cross-bar contacts. Overall length is 3.825″ maximum, otherwise, dimensionally the same as telephone jacks.

Schematic Diagram	Wrapid Jack	Frame Style
	PJ-238W	A
	PJ-240W	C
	PJ-241W	A
	PJ-242W	C
	PJ-339W	A
	PJ-246W	A

FOR COMPLETE LINE OF COAXIAL PLUGS, SEE ADC COMMUNICATIONS COMPONENTS CATALOG.

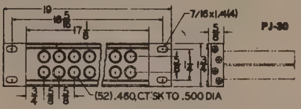
Jack Panels

ADC offers the most complete assortment of jack panels available today. ADC panels are used in television and broadcasting stations, recording studios, industrial paging systems, and communication equipment of all kinds where there is a need to efficiently switch and distribute audio signals. Molded of solid phenolic, reinforced with steel to provide maximum rigidity and strength. Jacks are spaced to permit use of any standard double plug with ⅝″ spacing. Mounting brackets and designation strips* furnished with each panel. All panels designed to fit standard 19″ relay rack. Consult ADC for your standard and special jack panel requirements.

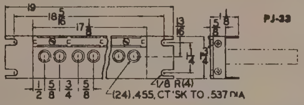
*The jack panels as illustrated are equipped with ADC standard designation strips as shown. PJ-30, PJ-35, PJ-36 and PJ-37 type panels can be supplied with the reinforcement strips drilled and tapped to accommodate the Western Electric equivalent designation strips (PJ-899A, PJ-899B, PJ-903A and PJ-903B). The suffix "A" added to the part number denotes panels which are modified to accommodate these alternate type designation strips. Designation strips are to be ordered separately.

SPECIFICATIONS

Panel: Molded, thermoset plastic per Mil-M-14F, Type CFG, black.
Mounting Brackets: PJ-31 and PJ-33: Die cast zinc, finished black lacquer. PJ-30, PJ-35, PJ-36, PJ-37: Steel, finished cadmium + chromate per Mil-F-14072 #M262, Type II.
Reinforcing Strips: PJ-31 and PJ-33: Steel, finished nickel plated. PJ-30, PJ-35, PJ-36, PJ-37: Steel, finished cadmium + chromate per Mil-F-14072 #M262, Type II.



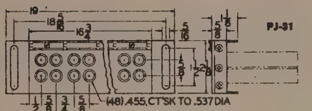
PJ-30
Double Panel. Holds 52 jacks — requires 1¾″ panel space. Double designation strip. Brackets for flush rack mounting. All jack mounting holes on ⅝″ centers.



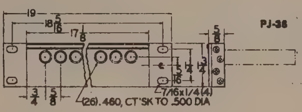
PJ-33
Single Panel. Holds 24 jacks. Holes are spaced to prevent patching adjacent circuits. Requires 1¾″ panel space.

FOR LAMP SOCKET AND CAPS,
SEE ADC COMMUNICATIONS COMPONENTS CATALOG

PJ-35 Same as PJ-30, except has 7″ standoff mounting brackets.



PJ-31
Double Panel. Holds 48 jacks. Holes are spaced to prevent patching adjacent circuits. Requires 2⅛″ panel space.

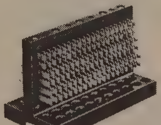


PJ-36
Single Panel. Holds 26 jacks — requires 1¾″ panel space. Brackets for flush rack mounting. All jack mounting holes on ⅝″ centers.

PANELS LESS JACKS	PJ-30	PJ-30A	PJ-31	PJ-33	PJ-35	PJ-35A	PJ-36	PJ-36A
PANEL WITH PJ-318	PJ-340	PJ-340A	PJ-341	PJ-343	PJ-350	PJ-350A	PJ-360	PJ-360A
PANEL WITH PJ-339	PJ-390	PJ-390A	PJ-391	PJ-393	PJ-395	PJ-395A	PJ-396	PJ-396A

Molded Terminal Blocks

ADC Pin Terminal Blocks are molded of durable, black thermoset plastic per Military specifications MIL-F-14F. Terminals are brass with electro-tin plating for lasting solderability. The PJ-101 series blocks have terminals graduated in length for ease of wiring. All Terminal Blocks are numbered along the top row for easy terminal identification.



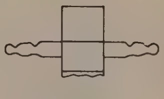


Fig. 1
SOLDER/SOLDER

No. Rows	Catalog No.*	No. Terminals	Catalog No.	No. Terminals	Height
1	PJ-101	20	PJ-660-1	26	1.906
2	PJ-102	40	PJ-660-2	52	2.250
3	PJ-103	60	PJ-660-3	78	2.593
4	PJ-104	80	PJ-660-4	104	2.937
5	PJ-105	100	PJ-660-5	130	3.281
6	PJ-106	120	PJ-660-6	156	3.625
7	PJ-107	140	PJ-660-7	182	3.968
8	PJ-108	160	PJ-660-8	208	4.312
9	PJ-109	180	PJ-660-9	234	4.656
10	PJ-110	200	PJ-660-10	260	4.968
11	PJ-111	220	PJ-660-11	286	5.281
12	PJ-112	240	PJ-660-12	312	5.593

*Solder/Solder (See Fig. 1) Add "SW" to Cat. No. for solder/wire wrap (Fig. 2). Add "WW" to Cat. No. for Wire Wrap/Wire Wrap (Fig. 3).

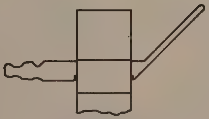


Fig. 2
SOLDER/WIRE WRAP

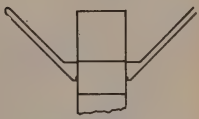
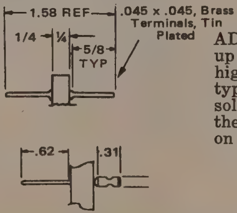


Fig. 3
WIRE WRAP/WIRE WRAP

"WRAPID" Terminal Blocks

No. of Terminals	Wrapped Solderless Application Fig. 1 Terminal	Solder or Solderless Application Fig. 2 Terminal	Height
40	PJ-604	PJ-644	1.75
60	PJ-606	PJ-646	2.25
80	PJ-608	PJ-648	2.75
100	PJ-610	PJ-650	3.25
120	PJ-612	PJ-652	3.75

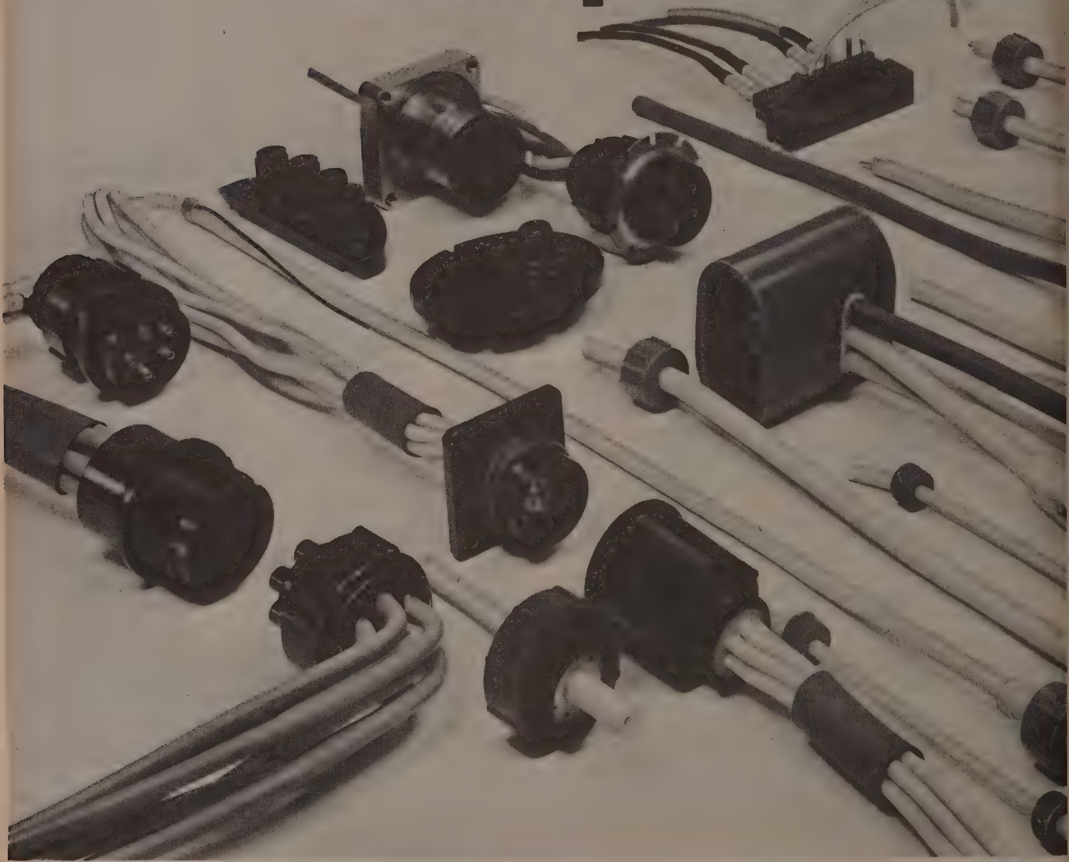


ADC Products "Wrapid" Terminal Blocks provide for up to 120 connections in a space of 2½″ wide by 3¾″ high (max.). Ten models in two series offer the proper type and number of connectors for either wrapped solderless or wrapped solder terminals on one side of the block to solder or solderless (wrapped) terminals on the other side.

ADC PRODUCTS
Division of MAGNETIC CONTROLS COMPANY
4900 West 78th Street, Minneapolis, Minnesota 55435
Tel: (612) 835-6800 — TWX: 910-576-2832 — TELEX: 29-032

Our high-voltage connectors and lead assemblies have everything.

Except corona.



We designed that out, right at the start. For safety's sake. And while we were at it, we designed-*in* compactness, light weight, quick-disconnectability...and reliability.

We're AMP Capitron Division, a leading designer and manufacturer of custom high-voltage, high-altitude, high-temperature hermetic connectors, lead assemblies and receptacles. For commercial and military applications.

We put a lot of effort into research and development of high-voltage interconnection products. And make it work for you on power supplies modulators, pulse-forming networks, high-voltage transformers, magnetrons, klystrons, traveling wave tubes and cathode ray tubes.

Here are some key features of our products. If you'd like further information, please call 717-367-1105. Or write AMP Capitron Division, Elizabethtown, Pa. 17022.

Hermetic connectors

- Safe—no exposed high voltage parts
- Space saving—maximum performance from the minimum size and weight
- Color coded for easy identification
- Fast connect and disconnect
- Wide temperature range (-55°C to +125°C)
- Positive mating of lead into receptacle
- RFI shielding—optional
- Fungus, moisture, oil, and chemical resistant
- High altitude operation—up to 80,000 feet without voltage derating
- Excellent mechanical strength—resistant to vibration and shock
- High dielectric strength
- Preassembled—no tools required
- High reliability—operates under extreme environmental conditions
- Versatile—top access, splice or bulkhead application
- Voltage rating: to 150,000 VDC.
- One through nine positions
- Radiation resistant
- Lead wire remains flexible from -62°C to +250° C
- Meets applicable military specifications
- Quick, easy installation

Lead assemblies and receptacles

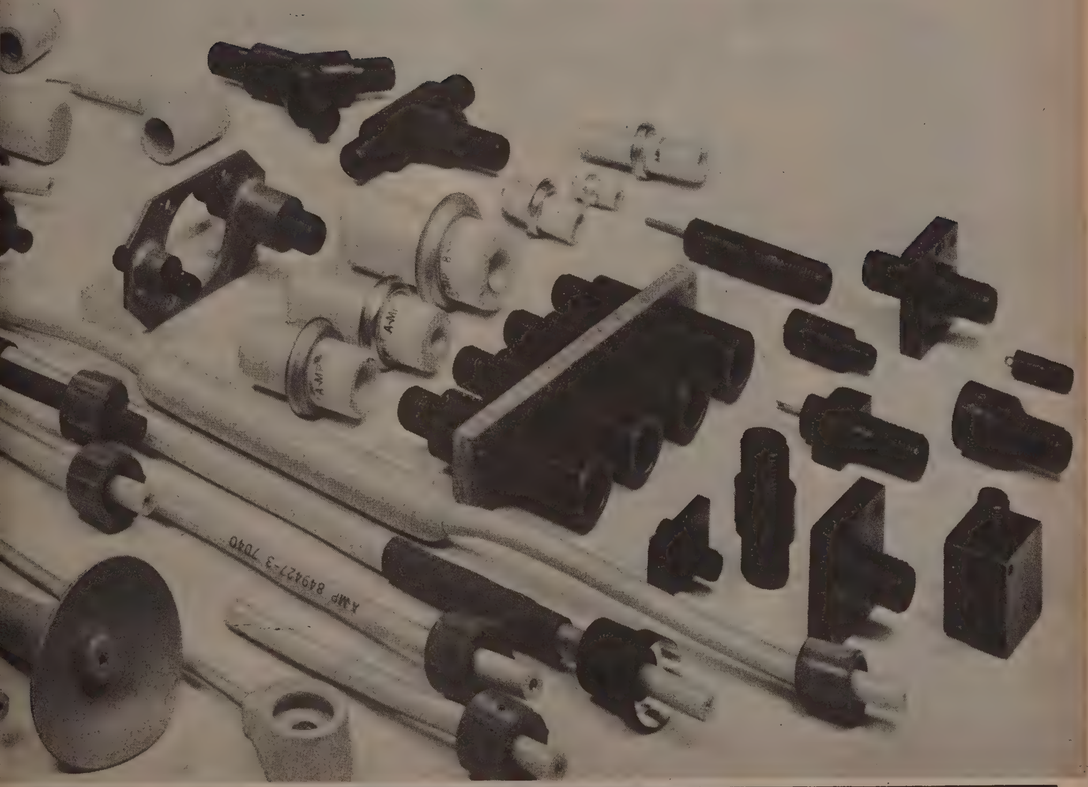
- Lightweight, space saving, safe
- Wide temperature range: -55° C to +125° C (-67°F to +257°F)*
- Voltage ratings: to 50,000 volts DC†
- Easy to install—no tools needed
- Insulation: extruded silicone rubber
- Receptacles: ceramic or glass epoxy
- Quick disconnect
- High dielectric and mechanical strength
- Hermetically sealed and corona-resistant
- High altitude operation: up to 70,000 ft. without derating
- Meets applicable mil. specs. for shock and vibration resistance
- RFI shielding optional

* Higher temperature components up to + 200° C (+392° F) on request.

† Special designs to 200,000 volts DC on request.

AMP
INCORPORATED

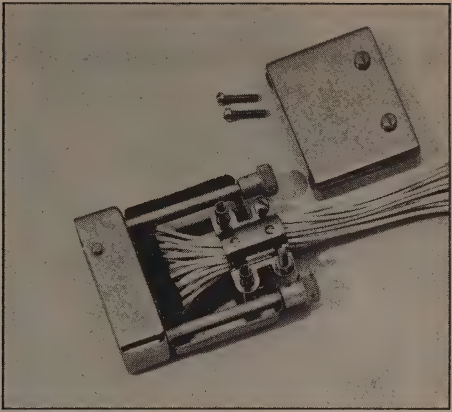
AMP is a trademark of AMP Incorporated.
Data subject to change without notice.



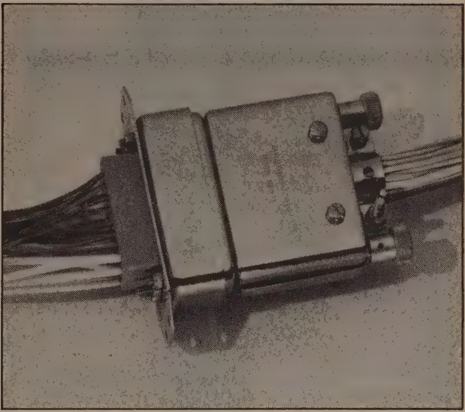
AirBorn builds versatility.

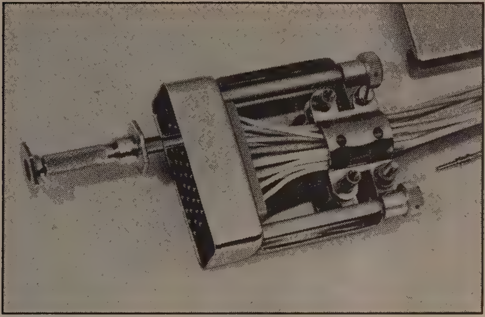
Available in any AirBorn miniature or subminiature electronic connector.

Removable Hood



Stainless Steel Construction

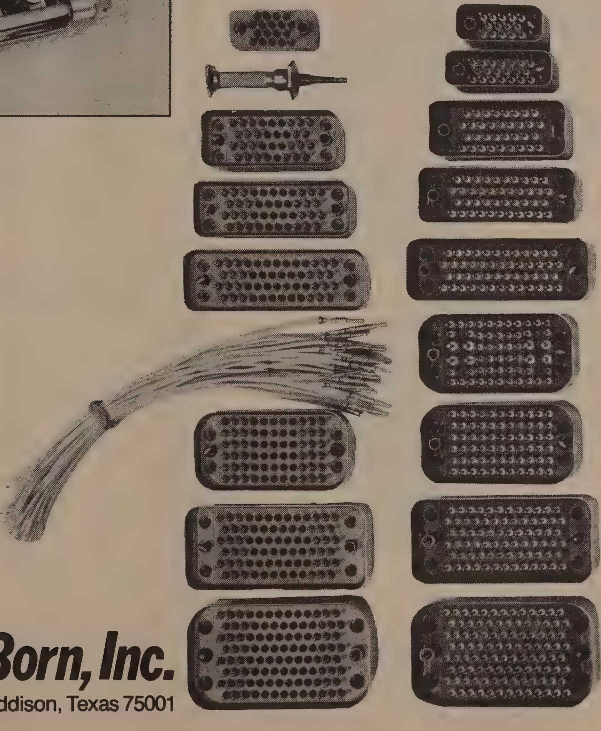




Removable Crimp Contacts
as well as standard solder cups

Crimp, Removable Contacts
50 lb. minimum resistance to push out. Stainless steel shells, mounting plates, and split hoods optional. Sizes: 18,34,42,50, 66,75,104.

Soldercup Contacts retained in molding. Rugged .0625 dia pins. Stainless steel shells, mounting plates, and split hoods optional. Sizes: 14,20,34,42, 50,50-8,66,75,104.



AirBorn, Inc.

4321 AirBorn Drive, Addison, Texas 75001

AirBorn connectors

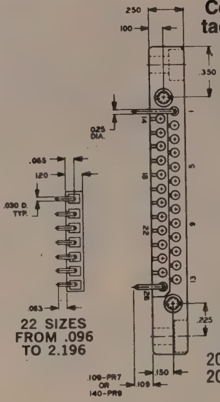
AirBorn Connectors for PC Card to Chassis or Mother Board Connections

Two series of subminiature, right-angle .030″ dia. BeCu pin to socket connectors.

Series WT: Single-row connectors on .100″ centers.

Series WTB: Double-row connectors on .100″ centers, offset .050″. Three or six 50-ohm Coax available with 20-contact connectors.

Terminations: Soldercup, wave solder, Wire-Wrap*, and crimp insertable.

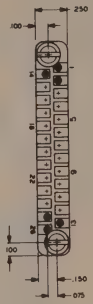

.250
.100
.350
.025 DIA.
.065
.120
.030 D. TYP.
.063
14
5
18
9
22
13
26
.225
.150
.109-PR7 OR 140-PR9
.109
22 SIZES FROM .096 TO 2.196

Contacts	Length Overall
10	1.350
14	1.550
20	1.850
24	2.050
26	2.150
30	2.350
36	2.650
40	2.850
44	3.050
50	3.350
54	3.550
56	3.650
60	3.850
66	4.150
70	4.350
90	5.650
100	6.150
120	7.150
20+3	2.850
20+6	4.050

AirBorn Connectors for PC Board Input-Output, Cable to Panel and Cable to Chassis Connections

Series WTA: Subminiature, rectangular plug and receptacle, .100″ centers, two rows offset .050″, .030″ dia. BeCu contacts.

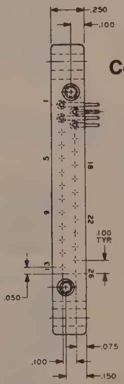
Terminations: Soldercup, wave solder, and Wire-Wrap*.


.100
.250
14
5
18
9
22
13
26
.100
.150
.075

Contacts	Overall Length
10	.850
14	1.050
20	1.350
24	1.550
26	1.650
30	1.850
36	2.150
40	2.350
44	2.550
50	2.850
54	3.050
56	3.150
60	3.350
66	3.650
70	3.850

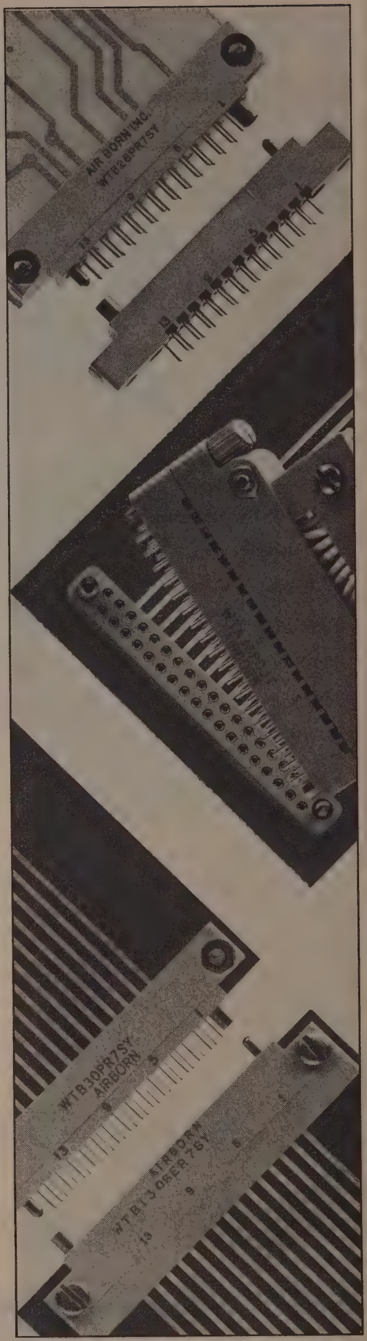
AirBorn Connectors for Extender Board and Test Applications

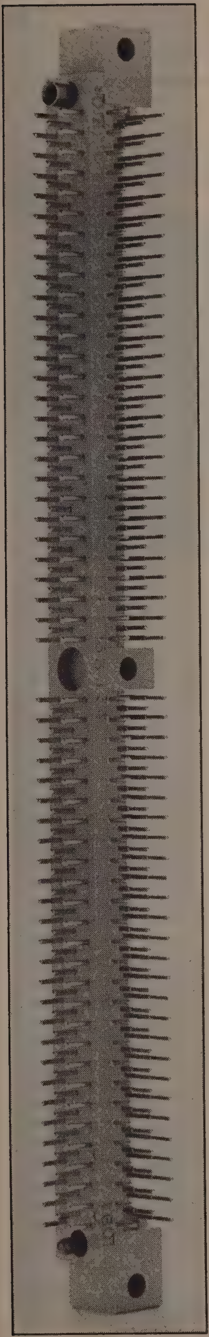
Series WTBT: Right angle receptacles combine with right angle plugs for extender board applications. Available in combinations from 10 to 70 contacts. Choice of .109″ or .140″ termination lengths. Also provides a test vehicle using conventional plugs with guiding or jackscrew locking devices.


.250
.100
5
18
9
22
.100 TYP.
13
26
.050
.075
.100
.150

Contacts	Length Overall
10	1.350
14	1.550
20	1.850
24	2.050
26	2.150
30	2.350
36	2.650
40	2.850
44	3.050
50	3.350
54	3.550
56	3.650
60	3.850
66	4.150
70	4.350

Check with us on status of parts to: MIL-C-55302/55, 56, 57, 58, 59, 60, 61, 62, 63, 64, 65, 66.

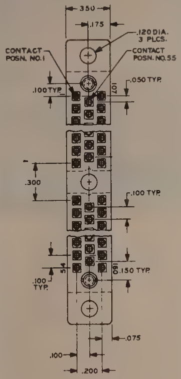

AIR BORN INC.
WTB26PR7SY
WTB30PR7SY
AIRBORN
AIRBORN
WTB130SER76Y



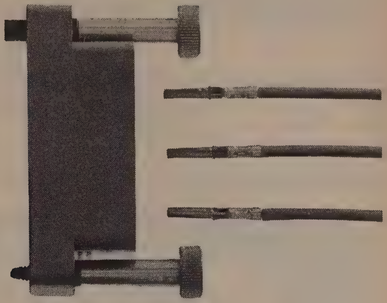
160 Dip Pin Contacts in a Right-Angle PC Board Connector

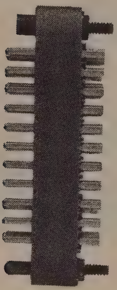
Series WG: Only 6.4″ long. Three rows staggered with contacts centered on .100″; terminations on .125″ centers.

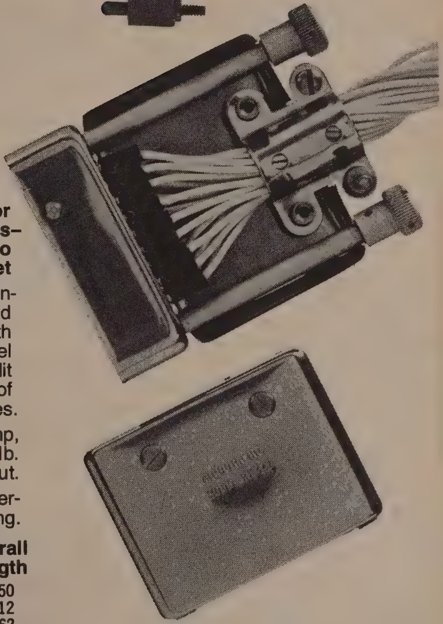
Terminations: Receptacles have solder cup, dip pin, or Wire-Wrap*.


.350
.175
.120 DIA. 3 PLCS.
CONTACT POSN. NO. 1
CONTACT POSN. NO. 55
.050 TYP.
.100 TYP.
107
.300
.100 TYP.
54
160
.150 TYP.
.100 TYP.
.075
.100
.200

Contacts	Overall Length
160	6.400





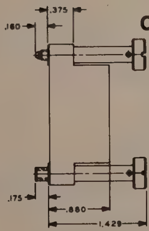


AirBorn Connectors for Inter-equipment Connections– Cable to Panel, Cable to Cable, and Drawer to Cabinet

Two series of miniature, rectangular connectors with rugged .0625″ dia. contacts. Both available with stainless steel shells, mounting plates, split hoods, and environment-proof features.

Series K, EK: Features crimp, removable contacts with 50 lb. minimum resistance to push-out.

Series P, EP: Features solder-cup contacts retained in molding.


.375
.160
.175
.880
1.429

Contacts	Series	Overall Length
14	P	1.250
18	K	1.312
20	P	1.562
34	K&P	2.000
42	K&P	2.312
50	K&P	2.700
50-8	P	2.281
66	K&P	2.281
75	K&P	2.700
104	K&P	2.760

*Registered TM of Gardner-Denver Company.

AirBorn, Inc.

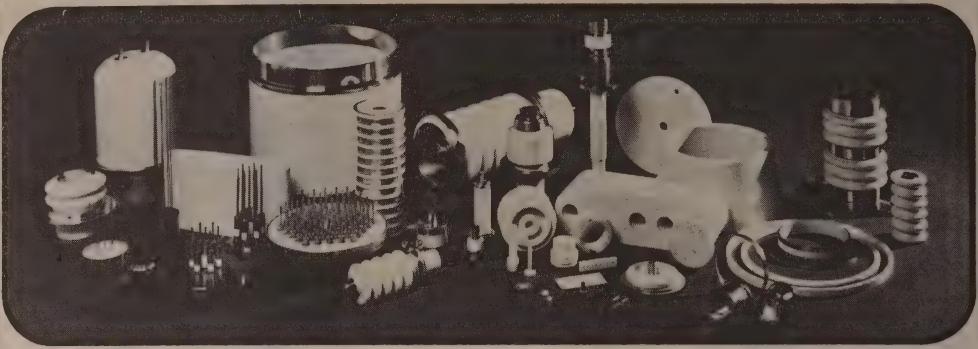
4321 AirBorn Drive,
Addison, Texas 75001

ALBEROX ... *For outstanding performance in high temperature, hermetic terminals.*

We're SPECIALISTS in brazing METAL parts to high alumina CERAMICS for demanding HIGH TEMPERATURE, HERMETIC applications.

CUSTOM HERMETIC CONNECTORS Multipin hermetic connectors for demanding vacuum and space applications requiring 400°C. bakeout — conditions where glass connectors won't stand up — are being produced in a variety of configurations. To save cost, Alberox can also provide connector sub-assemblies such as pin decks to be brazed or welded into shells or flanges by the customer.

MINIATURE TUBE AND PIN SEALS Many high temperature applications require insulated pin or tube feedthrus. These are available with weldable or brazeable metal parts, and can be added to covers or flanges, etc. All Alberox feedthrus are suitable for cryogenic environments.



Since 1961, we have designed and produced a wide variety of seals for custom applications in diverse components such as . . .

- VACUUM FEEDTHRU TERMINALS
- CERAMIC ELECTRON TUBE AND VACUUM SWITCH ENVELOPES
- NUCLEAR REACTOR PENETRATOR FEEDTHRU TERMINALS and INSULATORS
- SQUIBB and DETONATOR CONNECTORS
- POWER SEMICONDUCTOR HOUSINGS
- SPACE FLIGHT HERMETIC CONNECTORS
- JET ENGINE THERMOCOUPLE COMPONENTS
- HIGH PRESSURE OIL WELL LOGGING FEEDTHRUS
- CAPACITORS and TRANSFORMER TERMINALS

In addition to the above, Alberox has designed and produced state-of-the-art components for critical nuclear devices.

The Alberox plant was designed and built specifically for the efficient production of ceramic-to-metal seals. We manufacture our own A-950 high alumina ceramic, which enables us to optimize on the best metalizing process for this ceramic; thus we can provide superior seals. By making our own ceramic, our customers benefit by fast delivery on custom designs.

Another important feature of Alberox is that all of the plating requirements are met "in-house", including nickel, gold, copper, silver, bright tin and solder plating!

We have several types of BRAZING FURNACES for brazing ceramic-to-metal and metal-to-metal parts in HIGH VACUUM, or HYDROGEN, ARGON or any other specified atmosphere! The standard operating procedure is to custom program the brazing cycle, taking into account the ceramic, the types of metals, braze materials and the atmosphere.

Alberox exercises complete control, from the design stage right through all manufacturing operations — to meet or exceed the highest quality standards and maintain the fastest delivery in the industry. Products made by Alberox are assured to outperform all design parameters set for them!

HIGH PRESSURE FEEDTHRUS *Alberox A-950 Alumina* has extraordinarily high compressive strength (350,000 psi). By using this strength to its best advantage, ceramic-to-metal seals can be produced to withstand high static or dynamic pressures. Thousands of these seals have been manufactured by Alberox.

MULTITERMINAL FEEDTHRUS Multiterminal feedthrus differ from multipin connectors in that individual feedthru terminals are brazed or welded into a metal deck or flange. These feedthrus are generally used for higher voltage applications than can be accommodated by a regular ceramic pin deck or connector. Alberox has an extensive line of catalog tubular terminal bushings which are often used for the individual feedthrus. In this way, custom multiterminal feedthrus can be delivered quickly.

POWER FEEDTHRUS Copper, or just about any other type of metal, from ⅛ inch to over 1 inch in diameter can be provided in power feedthrus. Modifications of our standard catalog tubular and fluted terminal bushings are often perfectly suited, and custom ceramic-to-metal seal designs can be easily accommodated. Weldable or brazeable flanges also can be added to the feedthrus to allow easy installation on existing flanges or bulkheads.

INSULATORS AND STANDOFFS Insulators and standoffs can be supplied in tubular or fluted shapes, bare or glazed, with or without metal adapters or studs. Alberox manufactures plain ceramic parts for use as spacers, insulators, supports, isolators, decks, or washers. Metalized and glazed cylinders are also available for envelopes of high power electron tubes such as Thyratrons or for vacuum switches.

CATALOG HIGH VOLTAGE BUSHINGS Alberox stocks the largest variety of high voltage tubular and fluted high alumina terminal bushings in the industry. Modifications to these catalog items are easily made. Typical modifications are: special studs, brazed-in-center conductors, different metal parts, finishes and ceramic dimensional changes. Fast delivery at reasonable prices can still be maintained. Ask for Catalog #472 which illustrates details of these parts.

Alberox is ready to assist you with your ceramic-to-metal seal design requirements. When you need FAST DELIVERY of SUPERB ceramic-to-metal seals, at realistic prices — contact ALBEROX.

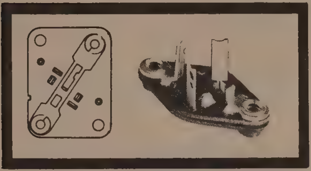
ALBEROX CORPORATION
Industrial Park
New Bedford, Massachusetts 02745
Phone 617-995-1725

AMATOM ELECTRONIC HARDWARE

a Division of MITE Corporation
446 Blake Street · New Haven · Conn. 06515 · (203) 397-3311 · Telex: 96-3419

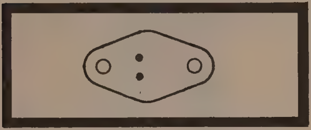
Manufacturer of Standard Hardware for the Electric and Electronic Industries

Largest Stock of "OFF THE SHELF" Items Available Anywhere



TRANSISTOR SOCKETS

Phenolic or Nylon sockets for TO-3 and TO-66 cases.

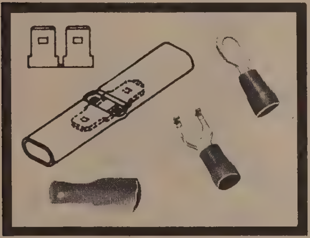


MICA INSULATORS

Precision stamped mica insulators for high electric strength, low dielectric loss, high surface and volume resistivities and excellent thermal stability. It is infusible and non-flammable.

CHASSIS FASTENERS

Available in Brass and Aluminum, 1/4 and 5/16 square. Threads: 4-40 and 6-32. For chassis from 1/32 through 1/4 thick.

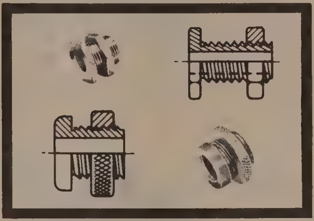


SOLDERLESS TERMINALS

Pre-insulated spade and ring terminals for 22-18 and 16-14 wire sizes in various stud sizes. Fully insulated female quick connect terminals in .250 series for 14-16, 18-20 wire sizes and .187 series for 18-20 wire sizes. All insulation color coded for appropriate wire size. Also—Quick connect stationary male terminals; adaptors and fully insulated line connector.

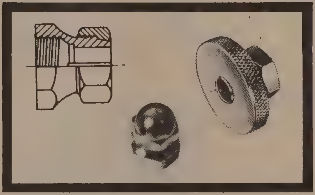
INSERTS

Brass or Stainless Steel inserts designed to provide metal threads in plastic materials. Available as a standard part in two lengths. Also available to your drawing on special order. Threads: 2-56 through 3/8-24. Lengths: .219 through .812.



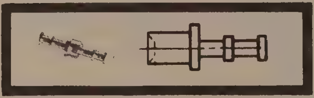
PANEL BUSHINGS

INSULATING
METAL (SCREW TYPE)
METAL (SWAGE TYPE)
POTENTIOMETER



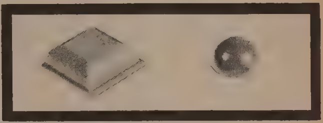
SHAFT LOCKS

- HAND TYPE
  - Cap Nut
  - Open End
- WRENCH TYPE
  - Cap Nut
  - Open End



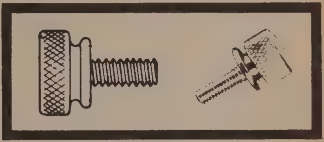
SOLDER TERMINALS

SCREW TYPE
SWAGE TYPE
SINGLE TURRET
DOUBLE TURRET
TRIPLE TURRET
FEED THRU
SINGLE END
DOUBLE END
HOLLOW
FORKED
MILLED



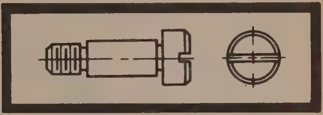
ADHESIVE BACKED POLYURETHANE BUMPERS

No costly screws, rivets or time-consuming mechanical fastener operation. Just "bump-it-on." High tack adhesive grabs immediately. Speeds assembly. Saves on labor costs.



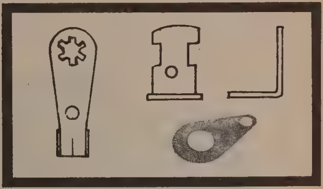
THUMB SCREWS

Available in Brass, Aluminum, Stainless Steel. Head diameters: 3/8 through 1/2. Threads: 6-32 through 1/4-20.



PRECISION SHOULDER SCREWS

Available in Brass, Aluminum, Stainless Steel. Barrel diameters: 1/8 through 1/4. Barrel lengths: 1/8 through 1-1/2. Threads: 4-40, 8-32, 10-32.



SOLDER LUGS

Wide variety of lugs, terminals, wire clips, brackets, jumpers etc.

EXTENDERS-SHAFT
REDUCERS-SHAFT
INSULATORS
COUPLINGS
SYNCLAMPS

Full Line Catalog Available on Request

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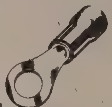
CORPORATION

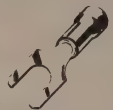
INDUSTRIAL PRODUCTS

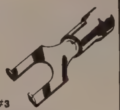
Solderless Terminals & Connectors

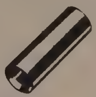
P. O. Box 11005 / Greensboro, North Carolina 27409

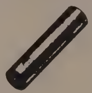
Body Styles

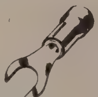

#1
RING TERMINAL

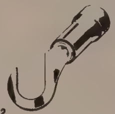

#2
SPADE TERMINAL

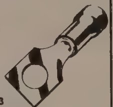

#3
FLANGED SPADE
TERMINALS

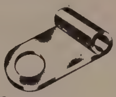

#4
PARALLEL

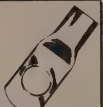

#5
BUTT

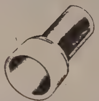

#11
FORK TERMINAL
(X TYPE)

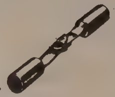

#12
HOOK TERMINAL

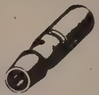

#13
RECTANGULAR
TERMINALS

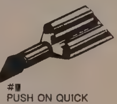

#14
FLAG TERMINALS

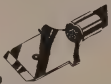

#15
TUBULAR
LUGS & SPLICES

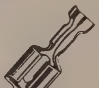

#6
CLOSED END
CONNECTOR

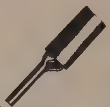

#7
KNIFE DISCONNECT
(WRISTLOCK)
CONNECTOR

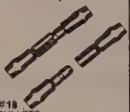

#8
SNAP PLUG
CONNECTOR

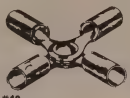

#9
PUSH ON QUICK
DISCONNECT
(FEMALE)

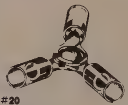

#10
PUSH ON QUICK
DISCONNECT
(MALE)


#16
FEMALE
DISCONNECT
(OPEN BARREL)

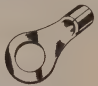

#17
WIRE PINS

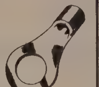

#18
BULLETS
(MALE-FEMALE)

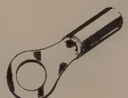

#19
4 WAY
X CONNECTOR

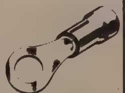

#20
3 WAY
Y CONNECTOR

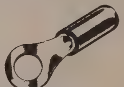
Barrel Types

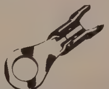

#1
Butted Seam
Type: WS Terminal
(Non-Insulated)

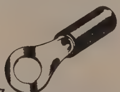

#2
Brazed Seam
Type: Terminal
(Non-Insulated)

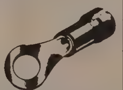

#3
Type: N, V Terminal
(Insulated)


#4
Type: FN, FV Terminal
(Insulated)


#5
Type: D Terminal
(Non-Insulated) Straight
Metal Sleeve


#6
Type: FD Terminal
(Non-Insulated) Flared
Metal Sleeve


#7
Type: ND, VD Terminal
(Insulated) Wire Support
Sleeve


#8
Type: FND, FVD Terminal
(Insulated) Wire Support
Sleeve

BARREL TYPE #	PREFIX	EXPLANATION OF TYPES
(1)	WS	NON-INSULATED BUTTED SEAM
(2)	NONE	NON-INSULATED BRAZED SEAM
(3)	V OR N	INSULATED, STRAIGHT PLASTIC
(4)	FV OR FN	INSULATED, FLARED PLASTIC
(5)	D	NON-INSULATED WITH STRAIGHT COPPER SLEEVE (INSULATION GRIP)
(6)	FD	NON-INSULATED WITH FLARED COPPER SLEEVE

BARREL TYPE #	PREFIX	EXPLANATION OF TYPES
(7)	VD	INSULATED WITH STRAIGHT PLASTIC OVER COPPER SLEEVE (INSULATION GRIP)
(8)	FVD	INSULATED WITH FLARED PLASTIC OVER COPPER SLEEVE (INSULATION GRIP)
(9)	NONE	SEAMLESS — NON-INSULATED
(10)		TYPE (3) WITH SEAMLESS INSERT
(11)		TYPE (4) WITH SEAMLESS INSERT

ALLIED SYSTEMS CORPORATION

Patchboard Programming Systems

Allied Systems now offers two complete lines of patchcord programming systems, with more than twenty-one sizes available. Allied also supplies associated patch cords and hardware for both lines.

Catalog 567 covers IBM style systems which normally have a contact spacing of .250 X .281 or .281 X .281. These systems use larger taper pins for rear panel wiring.

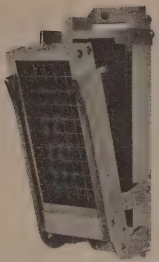
Catalog 667 covers hook type systems which have a contact spacing of .250 X .250. These systems are available for taper pin, wire wrap or locking latch type rear panel wiring.

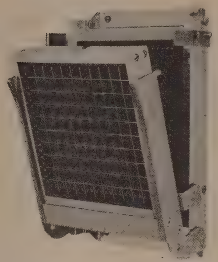
Patch cords are available in a variety of types: single conductor, coax, two conductor shielded, etc., to fit any programming requirement.

Thirteen sizes of *fixed* programming systems are available in both types of systems, ranging in size from 200 to 3264 contacts.

The extremely competitive pricing of the Allied Systems lines, plus the unexcelled quality of their products, gives you, the user, a competitive edge in the design and pricing of your system.

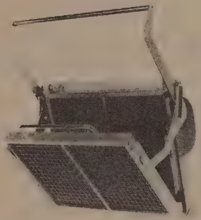
Call your nearest Allied Rep. or Home Office for application help in using Allied Systems patch panels and programming systems, or for prices.

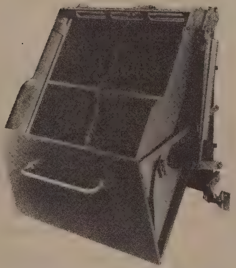

MODEL 902 200 POSITIONS

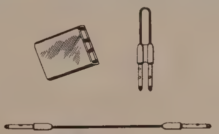

MODEL 904 440 POSITIONS

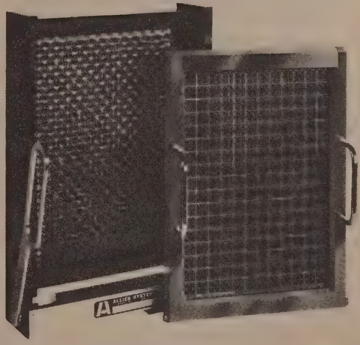
MODEL 901 680 POSITIONS

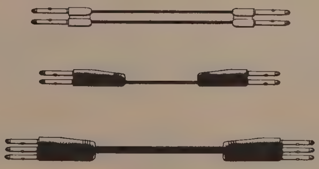
MODEL 922 1280 POSITIONS


MODEL 921 1600 POSITIONS


MODEL 910 5120 POSITIONS




MODEL 816



4 Tri-Port Circle Phone (919) 299-2294 P. O. Box 11005 Greensboro, N. C. 27409

EEM INDEX

BUNKER RAMO AMPHENOL

THE LEADING NAME IN CONNECTORS, POTENTIOMETERS, SWITCHES, CONTROLS, AND INTERCONNECTION SYSTEMS

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BUNKER RAMO AMPHENOL

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AMPHENOL DOES IT BETTER!

BUNKER RAMO
AMPHENOL
SALES DIVISION
DISTRIBUTION CENTER

Amphenol Sales Division maintains a unique Distribution Center

THE BIGGEST ELECTRONIC COMPONENT PARTS STORE IN THE WORLD

Gets our products to our customers the fastest way possible.

These are our manufacturing divisions and the products they produce to stock the store.

CONNECTOR DIVISION
2801 South 25th Avenue, Broadview, Illinois 60153
- Standard Cylindrical MIL-C-5015 type connectors
- Miniature Cylindrical Environmental Resistant connectors, Mil-C-83723/Mil-C-26482
- High Reliability Environmental Miniature Cylindrical connectors
- Miniature MS type connectors
- High Density Environmental connectors, Mil-C-81511
- Environmental Rack & Panel connectors, Mil-C-26518
- High Environmental Cable assemblies

CONTROLS OPERATION
120 South Main Street, Janesville, Wisconsin 53545
- Precision Potentiometers
- Turns Counting Dials
- Trimmers

R F Division
33 East Franklin Street, Danbury, Connecticut 06810
- Coaxial Connectors
- Standard U.G. connectors
- Miniature R F connectors
- Mil-C-39012 connectors
- Coaxial Switches

INDUSTRIAL DIVISION
1830 South 54th Avenue, Cicero, Illinois 60650
- Plugs & Sockets
- P.C. Connectors
- I.C. Sockets
- Sub miniature connectors
- Microphone connectors
- Telephone Bridging adapters
- Rack & Panel connectors
- AC Power Plugs
- Relay Sockets

CADRE DIVISION
20 Valley Street, Endicott, New York 13760
- Industrial Cable assemblies

AMPHENOL SALES DIVISION
2875 South 25th Avenue
Broadview, Illinois 60153
DIVISIONS OF BUNKER RAMO CORPORATION

Our Sales Offices are listed in this volume, and Amphenol Products are sold by franchised distributors from coast to coast. For catalogs and product literature, contact Amphenol Sales Division — 2875 South 25th Avenue, Broadview, Illinois 60153 PH: (312) 345-4260 TWX: 910-266-1961 or the proper division for information on particular products.

BUNKER RAMO AMPHENOL

FAST DELIVERY ON QUALITY AMPHENOL PRODUCTS FROM OUR DISTRIBUTORS LISTED BELOW

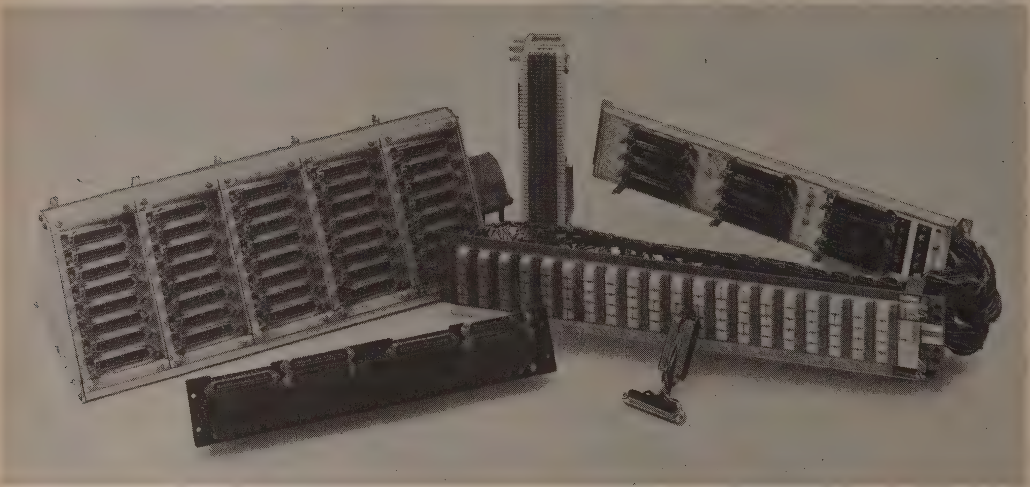
State	City	Distributor	Phone Number
AZ	Phoenix	Liberty	(602) 257-1272
AZ	Phoenix	Moltronics	(602) 272-7951
CA	Sunnyvale	Bell Industries	(408) 734-8570
CA	Irvine	Cramer/LA	(213) 771-8300
CA	Mountain View	Elmar Electronics	(415) 961-3611
CA	Los Angeles	Kierulff Electronics	(213) 685-5511
CA	San Diego	Kierulff Electronics	(714) 278-2112
CA	El Segundo	Liberty Electronics	(213) 322-8100
CA	San Diego	Liberty Electronics	(714) 565-9171
CA	San Diego	Moltronics	(714) 278-5020
CA	South Gate	Moltronics	(213) 773-6521
CA	San Carlos	Sterling Electronics	(415) 592-2353
CO	Denver	Newark-Denver Elec. Supply	(303) 757-3351
CT	New Haven	Connector Corp. of America	(203) 624-0127
CT	Hamden	Wilshire Electronics	(203) 281-1166
DC	Baltimore	Arrow Electronics	(301) 247-5200
DC	Gaithersburg	Cramer/EW, Inc.	(301) 948-0110
DC	Gaithersburg	Pioneer Electronics	(301) 948-0710
FL	Hollywood	Cramer/EW, Inc.	(305) 923-8181
FL	Orlando	Cramer/EW, Inc.	(305) 894-1511
IL	Elgin	Allied Electronics	(312) 421-2400
IL	Skokie	Bell Industries	(312) 965-7500
IL	Peoria	Klaus Radio, Inc.	(309) 691-4840
IL	Chicago	Newark Electronics Corp.	(312) 638-4411
IL	Palatine	Ohm/Electronics, Inc.	(312) 359-5500
IN	Indianapolis	Graham Electronics Supply	(317) 634-8202
IN	South Bend	Radio Distributing Co., Inc.	(219) 287-2911
KA	Wichita	Interstate Electronic Supply	(316) 264-6317
MD	——(See District of Columbia)——		
MA	Newton Centre	Cramer Electronics, Inc.	(617) 969-7700
MA	N. Wilbraham	Industrial Components Corp.	(413) 596-3854
MA	Waltham	Schweber Electronics	(617) 890-8484
MA	Burlington	Wilshire Electronics	(617) 272-8200
MI	Wyoming	Newark Industrial Elecs.	(616) 241-6681
MI	Detroit	R.S. Electronics	(313) 491-1000
MI	Ann Arbor	Wedemeyer Electronic Sply.	(313) 665-8611
MN	Edina	Cramer/Bonn Co.	(612) 835-7811
MN	Minneapolis	Newark-Minneapolis Elec. Corp.	(612) 331-6350
MO	University City	Olive Industrial Elec. Inc.	(314) 863-7800
MO	Kansas City	Walter Radio Supply, Inc.	(816) 531-7015
NJ	——(See New York City/Philadelphia Area)——		
NY	East Syracuse	Cramer/Eastern	(315) 437-6671
NY	Farmingdale	DRW Electronic Corp.	(516) 249-2660
NY	Binghamton	Federal Electronics, Inc.	(607) 748-8211
NY	Buffalo	Genesee Radio Parts Co., Inc.	(716) 873-9661
NY	Plainview	Progress Electronics Co.	(516) 433-1700
NY	Somerset, NJ	Schweber Electronics	(201) 469-6008
NY	Westbury	Schweber Electronics	(516) 334-7474
NY	Rochester	Simcona Electronics Corp.	(716) 328-3230
NY	Buffalo	Summit Distributors	(716) 884-3450
NY	Clifton, NJ	Wilshire Electronics/NJ	(201) 365-2600
NC	Winston-Salem	Cramer/EW	(919) 725-8711
OH	Cleveland	Pioneer/Cleveland Div. of Pioneer Std. Electronics, Inc.	(216) 587-3600
OH	Dayton	Pioneer/Dayton Div. of Pioneer Std. Electronics, Inc.	(513) 236-9900
OH	Cincinnati	Schuster Electric Co.	(513) 984-1600
OH	Beachwood	Schweber Electronics	(216) 464-2970
PA	Philadelphia	Almo Electronics Corp.	(215) 698-4000
PA	Pittsburgh	Cameradio Co.	(412) 288-2600
PA	Montgomeryville	Pyttronic Industries, Inc.	(215) 643-2850
PA	Pennsauken, NJ	Radio Electric Service Co.	(215) 925-6900
TN	Nashville	Electra Distributing Co.	(615) 329-3971
TX	Dallas	Hamilton/Avnet Electronics	(214) 661-8661
TX	Houston	Hamilton/Avnet Electronics	(713) 526-4661
TX	Dallas	Sterling Electronics	(214) 357-9131
TX	Houston	Sterling Electronics	(713) 627-9800
TX	Dallas	Texas Instrument Supply Co.	(214) 238-6821
UT	Salt Lake City	W. H. Bintz Co.	(801) 363-5821
WA	Bellevue	Bell Industries	(206) 747-1515
WA	Seattle	Liberty Electronics	(206) 763-8200
WI	Milwaukee	Electronic Expeditors, Inc.	(414) 228-8100

BUNKER RAMO **AMPHENOL**

Amphenol Sales Division
2875 South 25th Avenue, Broadview, Illinois 60153
PH: (312) 345-4260 TWX: 910-266-1961

TELEPHONE SPECIAL PRODUCTS

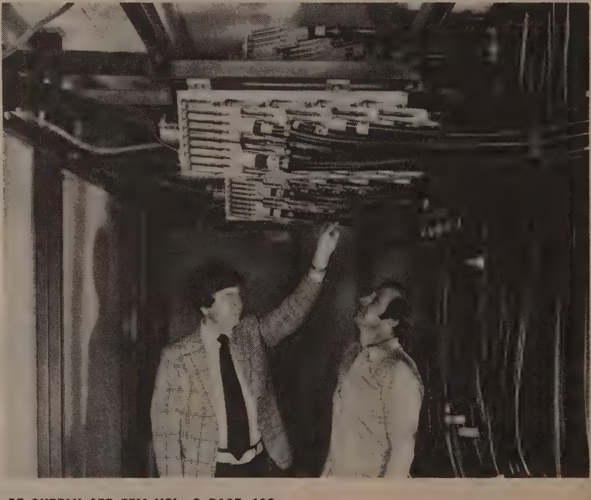
BUNKER RAMO AMPHENOL



Program board developed and manufactured by Sealectro Corporation, Inc., Mamaroneck, N.Y.

No matter what your interconnection requirements, Amphenol Cadre has the facilities and the technology available to help you meet your needs. For example, the Sealectro Corporation program panel shown above was custom-wired and connectorized by Cadre to meet the needs of one telephone company. The other field-proved components were either developed by Cadre and telephone company engineers, or they were Cadre-customized to meet specific installation requirements. Each is a custom solution to an interconnection problem as unique as your own. And each is economical and efficient.

If you represent a telephone operating or interconnecting company, or a telephone equipment manufacturer, call Cadre's technology to work for you. From a single component to an entire system, Cadre has the total capability to help you. Amphenol Cadre Division, Endicott, New York 13760. (607) 754-4444.



Rochester Telephone installation with Delta Splice Chambers mounted overhead. 25-pair ribbon connectors in triangular chamber mate with pre-terminated cables to replace time-consuming random splicing. Result: less congestion, quick connect-disconnect capability and substantial reductions in labor costs.

FOR LOCAL SOURCE OF SUPPLY SEE EEM VOL. 2 PAGE 462

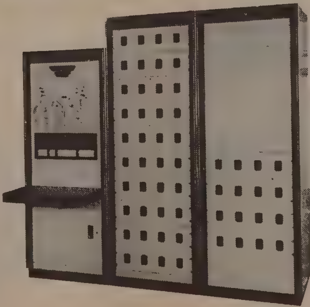
SEMI-AUTOMATIC WIRE-WRAPPING; AUTOMATIC TEST

BUNKER RAMO AMPHENOL

We can handle your complete back-panel wire-wrapping including all inventories right up to and including final inspection. You just have to bolt it in. And you can be sure of a completely tested, 100%-error-free back panel.

All your back panels can be tested with an Omnitester 900 Wiring Analyzer. This unit, pictured here in the center, has forward scan capabilities to determine, for example, whether a missing wire went to some other point. It then identifies that point.

The unit further tests for continuity resistance, insulation resistance, DC hipot, and features programmable dwell time.



All this at a price less than in-house fabrication. No costly inventories, no capital tied to costly equipment. You can furnish the back panels or we can supply our own.

Delivery? Just 2 to 8 weeks, depending on the job and material availability. And we have two locations: Longmont, Colorado or Endicott, New York. For more details just call your nearest Amphenol sales office or write us direct. Amphenol Cadre Division, Bunker Ramo Corporation, 20 Valley St., Endicott, N. Y. 13760.

FOR LOCAL SOURCE OF SUPPLY SEE EEM VOL. 2 PAGE 462

INTERCONNECTION SYSTEMS

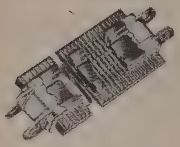
BUNKER RAMO AMPHENOL

Running Cables and Wired Products

Wired running cable assemblies offer the telephone industry the answer to one of its biggest operating questions: how to save time, effort, and money. Amphenol Cadre Division's wired running cables for key set installations are factory-wired.

With the plug-ended concept, the installer merely mates the Amphenol Micro-Ribbon®. connectors (or plugs) on either end of the cable with another running cable key set, bridging adaptor or additional system component connectors. It takes seconds, is elementary, and is low in cost.

The Micro-Ribbon Connector



More than 100 million Micro-Ribbon Amphenol 57 Series Connectors are in use today, without a single reported failure.

Unlike pin-and-socket connectors, the Micro-Ribbon contacts are self-cleaning; all foreign matter is dislodged during insertion. Greater contact continuity is assured. And the ribbon type is less expensive, too, with off-the-shelf availability.

The Cable

Amphenol Cadre running cable is constructed of solid, annealed, bare copper wire insulated with high-density, heat-stabilized, color-coded, semi-rigid polyvinyl chloride. To minimize crosstalk, individual conductors are twisted in color-coded pairs. Outer jacket consists of polyvinyl chloride or equivalent material, resistant to moisture, weathering, abrasion, corrosion, heat, and environmental cracking. A nylon ripcord inserted between jacket and conductors allows free stripping of jacket without damage to conductors.

Electrical Characteristics

Conductor Size	24 AWG.
Maximum Conductor resistance at 68F (ohms/M ft.)	27.5
Average Mutual capacitance at 1 kHz (mf/M ft.)	0.17
Minimum Insulation resistance (megohms/M ft.)	100

25-Pair Running Cable Description — Also Typical of 50, 75 & 100 Pair Running Cable

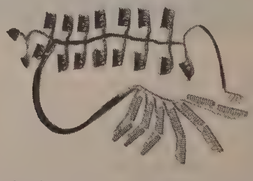
Type No.	One End	Overall Cable Assembly Length (feet)	Other End
AC-A25B-SE-3	Connector	3.5	Raw-ended
AC-A25B-DE-3	Connector	3.5	Connector
AC-A25D-DE-3	Plug	3.5	Plug
AC-B25A-DE-3	Connector	3.5	Plug
AC-A25D-SE-3	Raw-ended	3.5	Plug
AC-A25B-SE-5	Connector	5	Raw-ended
AC-A25B-DE-5	Connector	5	Connector
AC-A25D-DE-5	Plug	5	Plug
AC-B25A-DE-5	Connector	5	Plug
AC-A25D-SE-5	Raw-ended	5	Plug
AC-A25B-SE-10	Connector	10	Raw-ended
AC-A25B-DE-10	Connector	10	Connector
AC-A25D-DE-10	Plug	10	Plug
AC-B25A-DE-10	Connector	10	Plug
AC-A25D-SE-10	Raw-Ended	10	Plug
AC-A25B-SE-15	Connector	15	Raw-ended
AC-A25B-DE-15	Connector	15	Connector
AC-A25D-DE-15	Plug	15	Plug
AC-B25A-DE-15	Connector	15	Plug
AC-A25D-SE-15	Raw-ended	15	Plug
AC-A25B-SE-25	Connector	25	Raw-ended
AC-A25B-DE-25	Connector	25	Connector
AC-A25D-DE-25	Plug	25	Plug
AC-B25A-DE-25	Connector	25	Plug
AC-A25D-SE-25	Raw-ended	25	Plug
AC-A25B-SE-50	Connector	50	Raw-ended
AC-A25B-DE-50	Connector	50	Connector
AC-A25D-DE-50	Plug	50	Plug
AC-B25A-DE-50	Connector	50	Plug
AC-A25D-SE-50	Raw-ended	50	Plug
AC-A25B-SE-75	Connector	75	Raw-ended
AC-A25B-DE-75	Connector	75	Connector
AC-A25D-DE-75	Plug	75	Plug
AC-B25A-DE-75	Connector	75	Plug
AC-A25D-SE-75	Raw-ended	75	Plug
AC-A25B-SE-100	Connector	100	Raw-ended
AC-A25B-DE-100	Connector	100	Connector
AC-A25D-DE-100	Plug	100	Plug
AC-B25A-DE-100	Connector	100	Plug
AC-A25D-SE-100	Raw-ended	100	Plug
AC-A25B-SE-150	Connector	150	Raw-ended
AC-A25B-DE-150	Connector	150	Connector
AC-A25D-DE-150	Plug	150	Plug
AC-B25A-DE-150	Connector	150	Plug
AC-A25D-SE-150	Raw-ended	150	Plug
AC-A25B-SE-200	Connector	200	Raw-ended
AC-A25B-DE-200	Connector	200	Connector
AC-A25D-DE-200	Plug	200	Plug
AC-B25A-DE-200	Connector	200	Plug
AC-A25D-SE-200	Raw-ended	200	Plug

NOTE: The connector referred to in the table is Amphenol Part No. 57-10500-7, the plug is Amphenol Part No. 57-20500-14

Multi-Conductor Cables

Amphenol Cadre specializes in multi-conductor cables and is expert in every phase of production. Each cable must meet rigidly controlled quality standards at every stage of production. Just before shipment, each cable is again completely tested on custom-modified automatic inspection equipment.

Harness Assembly



Amphenol Cadre has years of experience in harness manufacturing. One result has been a large accumulation of harness know-how. Many customers come to Amphenol Cadre for redesign of point-to-point wiring in engineering prototypes; others for high volume production of complex harness systems.

When advanced programs require optimum-reliability intra-unit connections, many defense contractors turn to Amphenol Cadre for high environmental harness systems.

Electromechanical Assemblies

Amphenol Cadre can help keep you on schedule and your costs in line. Temporary plant overloads not only delay shipments but also tie up valuable time and material in process. Extended overtime and decreased efficiency rapidly begin to cut into profits. One way to avoid these problems and stay on schedule is by subcontracting the over-capacity production.

Amphenol Cadre's reaction time is such that we can quickly absorb short-term plant overloads usually at a price less than in-house cost.

Working closely with a customer's engineering laboratory, our production design people can competently turn engineering models into practical production realities.

Our design recommendations on chassis and printed circuit board layout, harness and cable configurations, molded plastic alternates for costly hardware, and connector and termination approaches have saved many manufacturers expensive trial and error prototype production and redesign.

Custom Molding

POLYSTYRENE • POLYPROPYLENE • POLYCARBONATES • ACETALS • POLY-VINYL-CHLORIDE • POLYETHELENE • NYLONS • ACRILONITRILE-BUTADIENE-STYRENE • Others

DECAPSULATION SERVICES

BUNKER RAMO AMPHENOL

The ACCESS™ Process for Safe, Selective Decapsulation

What is the ACCESS™ Process?

A service of Amphenol Cadre Division to selectively decapsulate or de-pot components such as molded cable assemblies, connectors, electronic modules, printed circuit boards.

Why Should the ACCESS Process be Used?

It saves money — typically 50% of new equipment cost — by salvaging potted components now being scrapped or expensively reworked.

When Should the ACCESS Process be Used?

When existing equipment needs modification, repair, or reworking to give it new life and usefulness.

What Kinds of Equipment Does the ACCESS Process Work On?

The ACCESS process effects economical recovery, repair, and re-use of encapsulated components for aircraft, aerospace interconnection systems, oceanographic equipment, automatic equipment, and sealed assemblies used in communications, data processing, medical electronics, and marine retrofit programs.

Who Performs the ACCESS Process?

Amphenol Cadre Division can conduct decapsulation in their Endicott, N.Y. or Longmont, Colorado facilities.

Will ACCESS Affect Reuse?

There is absolutely no residue left from the process that will affect remaining elements such as insulated wire, metal parts, connector parts, or plating.

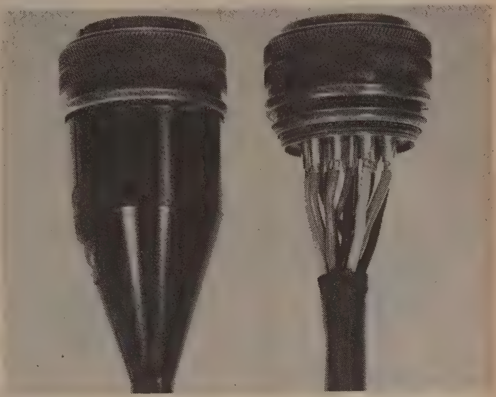
Will the ACCESS Process Remove Any Kind of Potting or Sealant?

The ACCESS process will selectively remove polyurethanes, polysulfides, silicone rubbers, butyl compounds, epoxies, foams, and room temperature vulcanizers, without damaging components.

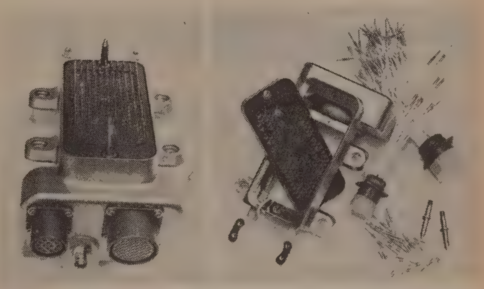
Where has the ACCESS Process been Used?

Here are some of the assemblies that Cadre and the ACCESS process have brought back to life.

In addition, Cadre has successfully used the ACCESS process on electrical penetration assemblies, miniaturized computers, missile filters, electronic sensors, relay racks, and many others.



This cable harness termination, potted in polyurethane, was decapsulated using the ACCESS process, with no damage to insulation, jacketing, inserts, metal parts or plating. In and out of Cadre's plant in 5 days, this connector's refurbishment saved its owner 60% of total replacement cost.



Here's a launcher umbilical assembly, potted with epoxy compound and filled with polyurethane. After the ACCESS process: a total recovery of components, and a saving of 40% of new component cost.

FOR LOCAL SOURCE OF SUPPLY
SEE EEM VOL. 2 PAGE 462

STANDARD CIRCULAR CONNECTORS

BUNKER RAMO AMPHENOL

97 SERIES CONNECTORS

- **PROVEN**
- **LOW COST**
- **RELIABLE**

ONLY AMPHENOL GIVES YOU . . .

FASTER, EASIER TERMINATIONS

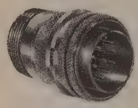
Amphenol 97 Series connector contacts do not rotate within the insert. They're factory-aligned to uniformly position the solder cups for easy soldering. Why waste valuable assembly time positioning contacts? — Amphenol's exclusive non-rotating contact design simplifies soldering and lowers termination costs.

DEPENDABLE, LONG-LASTING TERMINATIONS

- Our blue diallyl-phthalate inserts provide high insulating resistance and dimensional stability in the presence of **both** high humidity and high temperature . . . performance unmatched by melamine or neoprene materials.
- Only Amphenol 97 Series inserts feature molded barriers between each contact. The barriers increase the surface distance between contacts, thus increasing the insert's voltage rating.
- For added strength, Amphenol pin inserts in sizes 20 and larger have additional dielectric thickness.
- Amphenol coupling rings are machined from solid bar stock. This exclusive feature provides extra strength.

PLUGS

Straight

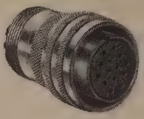


97-3106A
Solid Shell

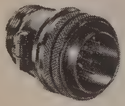
Angle

97-3108A
Solid Shell

Quick Disconnect

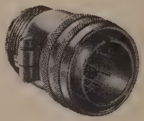


97-3107A
Solid Shell



973106B
Split Shell

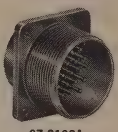
97-3108B
Split Shell



97-3107B
Split Shell

RECEPTACLES

Box Mounting

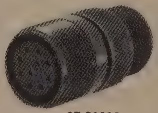


97-3102A
Solid Shell

Wall Mounting

97-3100A
Solid Shell

Cable



97-3101A
Solid Shell

A cure for the connector part number problem.

1 How many wires are you going to connect? What gauge?

These two questions are important, because they indicate which insert you need. There are literally hundreds to choose from.

The insert chart illustrates the 203 inserts with 43 inserts most often used are bracketed. Chances are the one you need is there.

Here's an example of how to use the chart. Say you want to connect eight 16-ga. wires. Just find the section of the chart marked 8 contacts. Insert number 20-7 is the one you want because it contains eight 16-ga. contacts and is one of the most often used. The one you choose might depend on your space or voltage requirements. The voltage capacity of each insert is listed under its diagram.

If you have more than one wire size to connect, the method is essentially the same. Actually, the insert configurations for multiple-size wires are a lot more flexible than they appear. That's because you can always solder a smaller wire to a larger contact. However, soldering a large wire to a small contact isn't recommended because of size and current requirements.

2 What if several identical connectors have different functions?

Here's a situation to watch out for. You have four identical receptacles on a panel. One carries high current loads. The others have low current functions. A plug mated with the wrong receptacle (cross-mating) could ruin your valuable equipment.

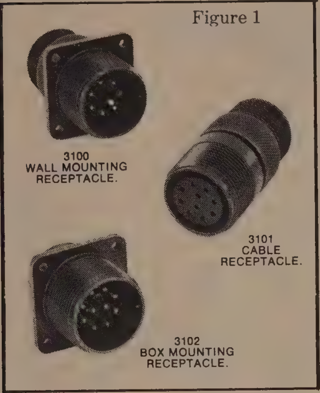
To avoid cross-mating, you can order identical inserts positioned in both the plugs and receptacles at various angles from standard. These variations from standard position are called Alternate Insert Positions.

STANDARD CIRCULAR CONNECTORS

BUNKER RAMO AMPHENOL

3 What kind of receptacle do you need?

Figure 1



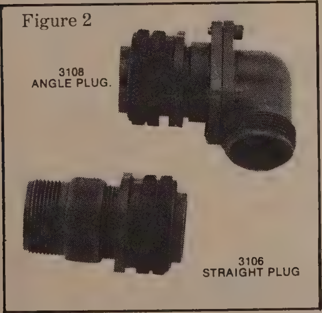
For wall mounting. Figure 1 shows a Wall Receptacle, type 3100. The elongated back of this receptacle extends through thick wall material. It is threaded to accept standard hardware fittings.

For unmounted applications. Use the Cable Receptacle, type 3101, shown in Figure 1.

For box or panel mounting. Use the Box Receptacle, type 3102. This receptacle's back is short to conserve space. It is not threaded on the back end and is used when no accessories such as clamps are needed.

4 What kind of plug do you need?

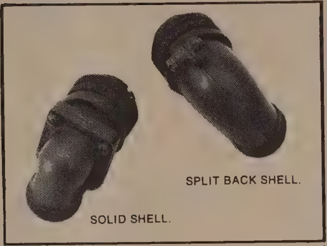
Figure 2



For ordinary situations. The Straight Plug, type 3106 (Figure 2), meets most connector requirements. However . . .

When space is critical. You may want to consider using an Angle Plug, type 3108. This type plug, shown in Figure 2, lets the cable enter your equipment at a right angle.

5 Do you need a plug with Solid or Split Back Shell?



You can get both straight and angle plugs in solid or split back shell designs. With the solid shell, you have greater strength. You save space, too. On the other hand, the split shell design lets you quickly inspect the solder terminals when you need to. This feature could be pretty important if you'll be subjecting the connector to rough handling and heavy use.

The type identification for solid shell construction is the letter A immediately after the main shell type number: i.e. 3106A or 3108A. Likewise, the type identification for split back shell construction is B: i.e. 3106B or 3108B. Because of application, receptacles are made in solid back shell construction only. Their type identification is 3100A, 3101A and 3102A.

6 Which connector gets the socket? The receptacle or the plug?

You're at the point where you designate which inserts are used with which shells. Since either pin or socket inserts can be used with plugs or receptacles, now's the time to make your choice.

Here's a good rule of thumb. Order the sockets for the connector at the "hot" side of the circuit. By having sockets at the power source, there's little chance that a wayward finger or screwdriver will short the circuit or cause personal injury.

The code for Sockets is simply S following the insert code number. For Pins, it is P. Therefore, 20-7P insert would have pin contacts while a 20-7S insert would have socket contacts.

7 Do you need a non-reflective finish or a shiny finish?

If you prefer the standard dull-olive cadmium plate finish, which is non-reflective, then no suffix number is needed. If you would rather have the shiny, clear cadmium plate finish, just add the suffix (639) at the end of your part number.

Both finishes give you the same high conductivity and resistance to corrosion.

HOW TO ASSEMBLE MS CONNECTOR PART NUMBERS

MS 3101 A 28-21 S Y (639)

SERIES NUMBER
MS — Military Standard for A, B, E, F & R construction
97 — Like MS, but AMPHENOL exclusive design for A & B construction

SHELL TYPE
3100 Wall Receptacle
3101 Cable Receptacle
3102 Box Receptacle
3106 Straight Plug
3107 Quick Disconnect Plug
3108 Angle Plug

SHELL CONSTRUCTION
A — Solid
B — Split

INSERT NUMBER
Consists of

SHELL SIZE
8S, 10SL, 12S, 12*, 14S, 14*, 16S, 16, 18, 20, 22, 24, 28, 32, 36, 40*, (Size is "A" thread in 16ths)

CONFIGURATION
Code numbers (from 1 up) for insert configuration
Note: Code numbers are specific for each shell size. The same code number represents different configurations in different shell sizes.

CONTACT
P — Pin
S — Socket

ALTERNATE INSERT POSITION
Omit for standard position
W, X, Y, or for alternate positions, depending on insert

SHELL FINISH
Omit for standard finish
(604) Anodized with bichromate seal
(608) Black anodized
(639) Clear cadmium plate

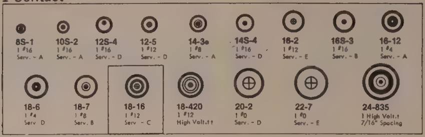
FOR LOCAL SOURCE OF SUPPLY SEE EEM VOL. 2 PAGE 462

STANDARD CIRCULAR CONNECTORS

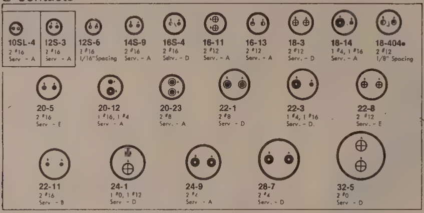
BUNKER RAMO AMPHENOL

97 Series — Insert Arrangements

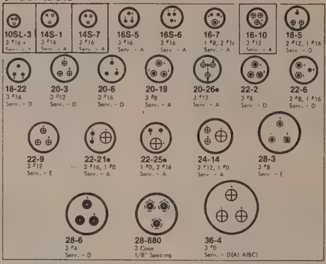
1 Contact


8S-1 1 #16 Serv. - A
10S-2 1 #16 Serv. - A
12S-4 1 #16 Serv. - D
12-5 1 #12 Serv. - D
14-3• 1 #8 Serv. - A
14S-4 1 #16 Serv. - D
16-2 1 #12 Serv. - E
16S-3 1 #16 Serv. - B
16-12 1 #4 Serv. - A
18-6 1 #4 Serv D
18-7 1 #8 Serv. B
18-16 1 #12 Serv - C
18-420 1 #12 High Volt.††
20-2 1 #0 Serv. - D
22-7 1 #0 Serv. - E
24-835 1 High Volt.† 7/16" Spacing

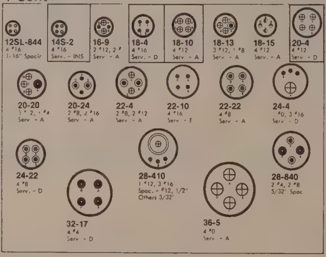
2 Contacts


10SL-4 2 #16 Serv - A
12S-3 2 #16 Serv - A
12S-6 2 #16 1/16"Spacing
14S-9 2 #16 Serv. - A
16S-4 2 #16 Serv. - D
16-11 2 #12 Serv. - A
16-13 2 #12 Serv. - A
18-3 2 #12 Serv. - D
18-14 1 #4, 1 #16 Serv. - A
18-404• 2 #12 1/8" Spacing
20-5 2 #16 Serv - E
20-12 1 #16, 1 #4 Serv - A
20-23 2 #8 Serv. - A
22-1 2 #8 Serv - D
22-3 1 #4, 1 #16 Serv. - D.
22-8 2 #12 Serv. - E
22-11 2 #16 Serv - B
24-1 1 #0, 1 #12 Serv - D
24-9 2 #4 Serv - A
28-7 2 #4 Serv. - D
32-5 2 #0 Serv - D

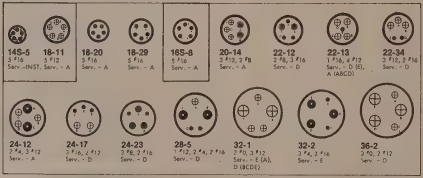
3 Contacts


10SL-3 3 #16 • Serv. - A
14S-1 3 #16 Serv - A
14S-7 3 #16 Serv - A
16S-5 3 #16 Serv - A
16S-6 3 #16 Serv - A
16-7 1 #8, 2 #16 Serv. - A
16-10 3 #12 Serv - A
18-5 2 #12, 1 #16 Serv - D
18-22 3 #16 Serv. - D
20-3 3 #12 Serv. - D
20-6 3 #16 Serv. - D
20-19 3 #8 Serv. - A
20-26• 3 #12 Serv - A
22-2 3 #8 Serv - D
22-6 2 #8, 1 #16 Serv. - D
22-9 3 #12 Serv. - E
22-21• 2 #16, 1 #0 Serv. - A
22-25• 1 #0, 2 #16 Serv. - A
24-14 2 #12, 1 #0 Serv - A
28-3 3 #8 Serv - E
28-6 3 #4 Serv. - D
28-880 3 Coax 1/8" Spacing
36-4 3 #0 Serv. - D(A) A(BC)

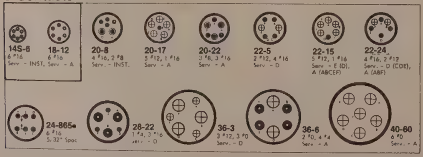
4 Contacts


12SL-844 4 #16 1/16" Spacing
14S-2 4 #16 Serv. - INS
16-9 2 #12, 2 #
Serv - A
18-4 4 #16 Serv. - D
18-10 4 #12 Serv - A
18-13 3 #12, 1 #8 Serv - A
18-15 4 #12 Serv. - A
20-4 4 #12 Serv - D
20-20 3 #12, 1 #4 Serv - A
20-24 2 #8, 2 #16 Serv - A
22-4 2 #8, 2 #12 Serv - A
22-10 4 #16 Serv - E
22-22 4 #8 Serv - A
24-4 #0, 3 #16 Serv - D
24-22 4 #8 Serv. - D
28-410 1 #12, 3 #16 Spac. - #12, 1/2" Others 3/32"
28-840 2 #4, 2 #8 5/32" Spac
32-17 4 #4 Serv - D
36-5 4 #0 Serv - A

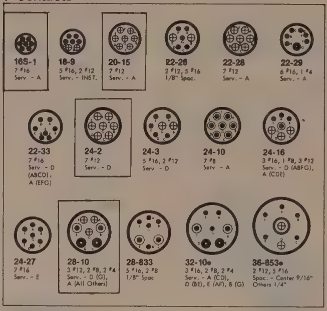
5 Contacts


14S-5 5 #16 Serv.-INST.
18-11 5 #12 Serv. - A
18-20 5 #16 Serv. - A
18-29 5 #16 Serv. - A
16S-8 5 #16 Serv. - A
20-14 3 #12, 2 #8 Serv. - A
22-12 2 #8, 3 #16 Serv. - D
22-13 1 #16, 4 #12 Serv. - D (E), A (ABCD)
22-34 3 #12, 2 #16 Serv. - D
24-12 2 #4, 3 #12 Serv. - A
24-17 3 #16, 2 #12 Serv. - D
24-23 3 #8, 2 #16 Serv. - D
28-5 1 #12, 2 #4, 2 #16 Serv. - D
32-1 2 #0, 3 #12 Serv. - E (A), D (BCDE)
32-2 3 #4, 2 #16 Serv. - E
36-2 3 #0, 2 #12 Serv - D

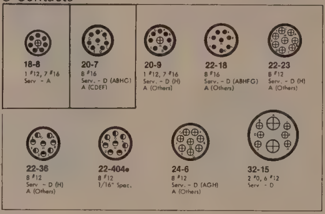
6 Contacts


14S-6 6 #16 Serv - INST.
18-12 6 #16 Serv - A
20-8 4 #16, 2 #8 Serv. - INST.
20-17 5 #12, 1 #16 Serv - A
20-22 3 #8, 3 #16 Serv - A
22-5 2 #12, 4 #16 Serv - D
22-15 5 #12, 1 #16 Serv - E (D), A (ABCEF)
22-24 4 #16, 2 #12 Serv. - D (CDE), A (ABF)
24-865• 6 #16 5/32" Spac
28-22 3 #4, 3 #16 Serv - D
36-3 3 #12, 3 #0 Serv. - D
36-6 2 #0, 4 #4 Serv - A
40-60 6 #0 Serv. - A

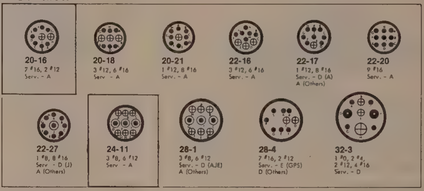
7 Contacts


16S-1 7 #16 Serv - A
18-9 5 #16, 2 #12 Serv. - INST.
20-15 7 #12 Serv. - A
22-26 2 #12, 5 #16 1/8" Spac.
22-28 7 #12 Serv. - A
22-29 6 #16, 1 #4 Serv. - A
22-33 7 #16 Serv - D (ABCD), A (EFG)
24-2 7 #12 Serv. - D
24-3 5 #16, 2 #12 Serv - D
24-10 7 #8 Serv - A
24-16 3 #16, 1 #8, 3 #12 Serv. - D (ABFG), A (CDE)
24-27 7 #16 Serv. - E
28-10 3 #12, 2 #8, 2 #4 Serv. - D (G), A (All Others)
28-833 5 #16, 2 #8 1/8" Spac
32-10• 3 #16, 2 #8, 2 #4 Serv. - A (CD), D (BE), E (AF), B (G)
36-853• 2 #12, 5 #16 Spac. - Center 9/16" Others 1/4"

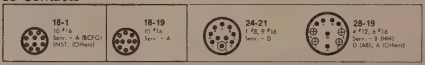
8 Contacts


18-8 1 #12, 7 #16 Serv - A
20-7 8 #16 Serv. - D (ABHG) A (CDEF)
20-9 1 #12, 7 #16 Serv. - D (H) A (Others)
22-18 8 #16 Serv. - D (ABHFG) A (Others)
22-23 8 #12 Serv. - D (H) A (Others)
22-36 8 #12 Serv - D (H) A (Others)
22-404• 8 #12 1/16" Spac.
24-6 8 #12 Serv. - D (AGH) A (Others)
32-15 2 #0, 6 #12 Serv - D

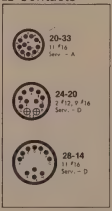
9 Contacts


20-16 7 #16, 2 #12 Serv. - A
20-18 3 #12, 6 #16 Serv - A
20-21 1 #12, 8 #16 Serv. - A
22-16 3 #12, 6 #16 Serv. - A
22-17 1 #12, 8 #16 Serv. - D (A) A (Others)
22-20 9 #16 Serv. - A
22-27 1 #8, 8 #16 Serv - D (J) A (Others)
24-11 3 #8, 6 #12 Serv - A
28-1 3 #8, 6 #12 Serv. - D (AJE) A (Others)
28-4 7 #16, 2 #12 Serv. - E (GPS) D (Others)
32-3 1 #0, 2 #4, 2 #12, 4 #16 Serv. - D

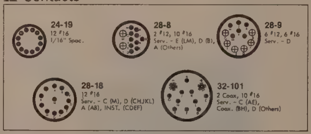
10 Contacts


18-1 10 #16 Serv. - A (BCFG) INST. (Others)
18-19 10 #16 Serv - A
24-21 1 #8, 9 #16 Serv. - D
28-19 4 #12, 6 #16 Serv. - B (HM) D (AB), A (Others)

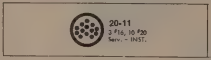
11 Contacts


20-33 11 #16 Serv - A
24-20 2 #12, 9 #16 Serv. - D
28-14 11 #16 Serv. - D

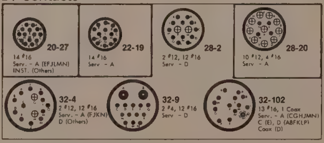
12 Contacts


24-19 12 #16 1/16" Spac.
28-8 2 #12, 10 #16 Serv. - E (LM), D (B), A (Others)
28-9 6 #12, 6 #16 Serv. - D
28-18 12 #16 Serv. - C (M), D (CHJKL) A (AB), INST. (CDEF)
32-101 2 Coax, 10 #16 Serv. - C (AE), Coax. (BH), D (Others)

13 Contacts


20-11 3 #16, 10 #20 Serv. - INST.

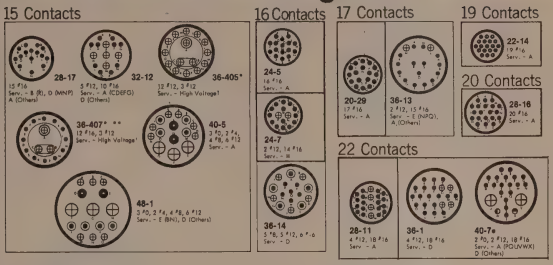
14 Contacts

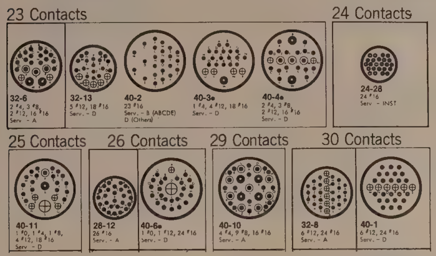

20-27 14 #16 Serv. - A (EFJLMN) INST. (Others)
22-19 14 #16 Serv - A
28-2 2 #12, 12 #16 Serv - D
28-20 10 #12, 4 #16 Serv - A
32-4 2 #12, 12 #16 Serv. - A (FJKN) D (Others)
32-9 2 #4, 12 #16 Serv - D
32-102 13 #16, 1 Coax Serv. - A (CGHJMN) C (E), D (ABFKLP) Coax (D)

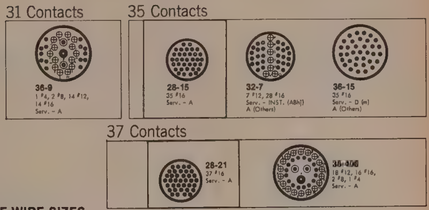
STANDARD CIRCULAR CONNECTORS

BUNKER RAMO AMPHENOL

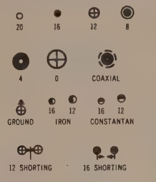
97 Series — Insert Arrangements

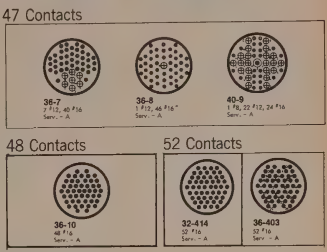

15 Contacts
28-17
15 #16
Serv. - B (R), D (MNP)
A (Others)
32-12
5 #12, 10 #16
Serv. - A (CDEFG)
D (Others)
36-405*
12 #12, 3 #12
Serv. - High Voltage†
36-407* **
12 #16, 3 #12
Serv. - High Voltage†
40-5
3 #0, 2 #4,
4 #8, 6 #12
Serv. - A
48-1
3 #0, 2 #4, 4 #8, 6 #12
Serv. - E (BN), D (Others)
16 Contacts
24-5
16 #16
Serv. - A
24-7
2 #12, 14 #16
Serv. - B
36-14
5 #8, 5 #12, 6 #16
Serv - D
17 Contacts
20-29
17 #16
Serv. - A
36-13
2 #12, 15 #16
Serv - E (NPQ),
A (Others)
19 Contacts
22-14
19 #16
Serv. - A
20 Contacts
28-16
20 #16
Serv. - A
22 Contacts
28-11
4 #12, 18 #16
Serv - A
36-1
4 #12, 18 #16
Serv. - D
40-7•
2 #0, 2 #12, 18 #16
Serv. - A (PQUVWX)
D (Others)


23 Contacts
32-6
2 #4, 3 #8,
2 #12, 16 #16
Serv - A
32-13
5 #12, 18 #16
Serv. - D
40-2
23 #16
Serv. - B (ABCDE)
D (Others)
40-3•
1 #4, 4 #12, 18 #16
Serv. - D
40-4•
2 #4, 3 #8,
2 #12, 16 #16
Serv. - D
24 Contacts
24-28
24 #16
Serv - INST
25 Contacts
40-11
1 #0, 1 #4, 1 #8,
4 #12, 18 #16
Serv - D
26 Contacts
28-12
26 #16
Serv. - A
40-6•
1 #0, 1 #12, 24 #16
Serv. - D
29 Contacts
40-10
4 #4, 9 #8, 16 #16
Serv. - A
30 Contacts
32-8
6 #12, 24 #16
Serv. - A
40-1
6 #12, 24 #16
Serv. - D


31 Contacts
36-9
1 #4, 2 #8, 14 #12,
14 #16
Serv. - A
35 Contacts
28-15
35 #16
Serv. - A
32-7
7 #12, 28 #16
Serv. - INST. (ABhj)
A (Others)
36-15
35 #16
Serv. - D (m)
A (Others)
37 Contacts
28-21
37 #16
Serv. - A
18 #12, 16 #16,
2 #8, 1 #4
Serv. - A

CODE OF WIRE SIZES


20
16
12
8
4
0
COAXIAL
GROUND
16
12
IRON
16
12
CONSTANTAN
12 SHORTING
16 SHORTING


47 Contacts
36-7
7 #12, 40 #16
Serv. - A
36-8
1 #12, 46 #16
Serv. - A
40-9
1 #8, 22 #12, 24 #16
Serv. - A
48 Contacts
36-10
48 #16
Serv. - A
52 Contacts
32-414
52 #16
Serv. - A
36-403
52 #16
Serv - A

CURRENT RATING

Contact Size	20	16	12	8	4	0
Amperes	10	22	41	73	135	245

SERVICE		INST	A	D	E	B	C
Limiting Operating Voltage at sea level	DC	250	700	1250	1750	2450	4200
	AC (rms)	200	500	900	1250	1750	3000

CAP AND CHAIN ASSEMBLIES

Ordering Information and Dimensions

Fit 97 type receptacles and plugs. Provide protection against live circuits and keep out dirt and dust when connector is not in use.

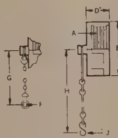
Two styles are available: the MS type with a stainless steel link chain, and the Amphenol standard type with a beaded chain. Both use the same caps and both have a cadmium olive drab finish.

FOR RECEPTACLES

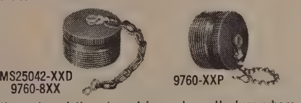
MS25043-XXD
9760-9XX

9760-XX

Has internal threads and is used on all receptacles (MS3102, MS3101 and MS3100). A soft rubber disc seats on the connector shell forming a watertight joint.



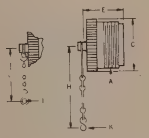
FOR PLUGS



MS25042-XXD
9760-8XX

9760-XXP

Has external threads and is used on all plugs where a coupling nut is provided (MS3106 and MS3108).



Part Numbers				For Connector Size	Dimensions — Inches										
For Receptacles		For Plugs													
MS25043-XXD Type‡	Amphenol Standard†	MS25042-XXD Type‡	Amphenol Standard†		A Thrds.	B*	C	D*	E	F	G	H	I	J	K
9760-908	9760-8	9760-808	9760-8P	8S	½-28	⅝	½	7/16	21/32	.125	2 9/16	4.0	.125	.140	.156
9760-910	9760-10	9760-810	9760-10P	10S, 10SL	⅝-24	13/16	⅝	7/16	21/32	.125	2 9/16	4.0	.125	.140	.156
9760-912	9760-12	9760-812	9760-12P	12, 12S, 12SL	¾-20	15/16	¾	7/16	27/32	.125	2 9/16	4.5	.125	.140	.156
9760-914	9760-14	9760-814	9760-14P	14, 14S	⅞-20	1 1/16	⅞	7/16	27/32	.125	2 9/16	4.5	.125	.140	.156
9760-916	9760-16	9760-816	9760-16P	16, 16S	1 -20	1⅛	1	7/16	27/32	.167	4⅝	4.5	.167	.140	.156
9760-918	9760-18	9760-818	9760-18P	18	1⅛-18	1 5/16	1⅛	7/16	27/32	.167	4⅝	4.5	.167	.140	.156
9760-920	9760-20	9760-820	9760-20P	20	1¼-18	1 7/16	1¼	7/16	27/32	.167	4⅝	5.0	.167	.140	.187
9760-922	9760-22	9760-822	9760-22P	22	1⅜-18	1 9/16	1⅜	7/16	27/32	.167	4⅝	5.0	.167	.140	.187
9760-924	9760-24	9760-824	9760-24P	24	1½-18	1 11/16	1½	7/16	27/32	.167	4⅝	5.5	.167	.171	.187
9760-928	9760-28	9760-828	9760-28P	28	1¾-18	1 59/64	1¾	½	27/32	.167	4⅝	7.5	.167	.171	.187
9760-932	9760-32	9760-832	9760-32P	32	2 -18	2 3/16	2	½	27/32	.190	5¾	7.5	.260	.187	.218
9760-936	9760-36	9760-836	9760-36P	36	2¼-16	2 7/16	2¼	½	27/32	.190	5¾	7.5	.260	.187	.218

* B dimension 1/16" less and D dimension 1/64" less for screw machine parts.

† Caps less chains are available. To order, add G to the part number; for example, 9760-8G.

‡ Complete the MS part number by substituting the shell size for XX. For example, to get a MS type cap for a size 10 receptacle, order MS25043-10D.

97 CONNECTOR ACCESSORIES

Protective Caps for MS Connectors — 97121

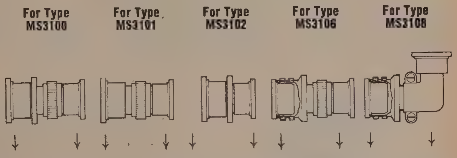
MS90376 Expendable polyethylene dust caps provide added protection for precision-built MS connectors during storage and handling, in assembling with other equipment, and after complete assembly into a finished apparatus. Protective caps cover threaded sections of plugs and receptacles; assure against damage to thread from any cause; permit low-cost, attractive coverings which protect contacts and the insulation from dust, dirt and handling damage.

Type 97121-4XXY—For engagement with internal threads of coupling rings.

Type 97121-4XXR—For engagement with external threads; for coupling and fitting threads

How to Order Connectors with Caps Assembled

TYPES AND SIZES REQUIRED


For Type MS3100
For Type MS3101
For Type MS3102
For Type MS3106
For Type MS3108

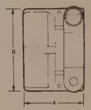
Connector Size	For Type MS3100		For Type MS3101		For Type MS3102		For Type MS3106		For Type MS3108	
	Mating End	Termination End	Mating End	Termination End	Mating End	Termination End	Mating End	Termination End	Mating End	Termination End
8S	-408R	-408R	-408R	-408R	-408R		-408Y	-408R	-408Y	-408R
10S	-410R	-408R	-410R	-408R	-410R	-408R	-410Y	-408R	-410Y	-408R
10SL	-410R	-410R	-410R	-410R	-410R	-410R	-410Y	-410R	-410Y	-410R
12S-12	-412R	-410R	-412R	-410R	-412R		-412Y	-410R	-412Y	-410R
14S-14	-414R	-412R	-414R	-412R	-414R	-412R	-414Y	-412R	-414Y	-412R
16S-16	-416R	-414R	-416R	-414R	-416R	-414R	-416Y	-414R	-416Y	-414R
18	-418R	-416R	-418R	-416R	-418R	-416R	-418Y	-416R	-418Y	-416R
20	-420R	-420Y	-420R	-420Y	-420R	-418R	-420Y	-420Y	-420Y	-420Y
22	-422R	-420Y	-422R	-420Y	-422R	-420R	-422Y	-420Y	-422Y	-420Y
24	-424R	-424Y	-424R	-424Y	-424R	-422R	-424Y	-424Y	-424Y	-424Y
28	-428R	-424Y	-428R	-424Y	-428R		-428Y	-424Y	-428Y	-424Y
32	-432R	-428R	-432R	-428R	-432R		-432Y	-428R	-432Y	-428R
36	-436R	-432R	-436R	-432R	-436R		-436Y	-432R	-436Y	-432R
40	-440R	-436R	-440R	-436R	-440R		-440Y	-436R	-440Y	-436R

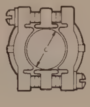
NOTE: A complete part number consists of type number 97121 and the size indicated by a dash number such as -408R, or 440Y. Examples of complete part numbers: 97121-408R, 97121-440Y, etc.

97 Connector Accessories

Cable Clamp

For jacketed cable or wires protected by tubing. On MS3057A Cable Clamp, both clamping halves float, so that cable is always centered, affording maximum strain relief. With unjacketed cable or wire bundles without tubing, use corresponding MS3420 bushing. To order clamp with bushing, add -1 to the Amphenol part number. With shell sizes 16 and larger, two telescoping bushings are furnished.

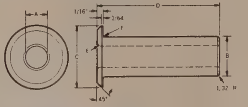




MS Number	Amphenol Number	Shell Size	Max. O.D. Cable	Dimensions — Inches A	B	C	Threads
MS3057-4A	97-3057-1004	10SL, 12S	5/16	.795	.842	5/16	5/8-24
MS3057-6A	97-3057-1007	14, 14S	7/16	.850	.995	7/16	3/4-20
MS3057-8A	97-3057-1008	16, 16S	9/16	.920	1.120	9/16	7/8-20
MS3057-10A	97-3057-1010	18	5/8	.920	1.216	5/8	1 -20
MS3057-12A	97-3057-1012	20, 22	3/4	.927	1.403	3/4	1 3/16-18
MS3057-16A	97-3057-1016	24, 28	15/16	1.015	1.683	15/16	1 7/16-18
MS3057-20A	97-3057-1020	32	1 1/4	1.095	2.050	1 1/4	1 3/4-18
MS3057-24A	97-3057-1024	36	1 3/8	1.156	2.245	1 3/8	2 -18

Bushing

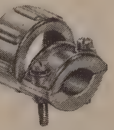
Rubber bushing specifically designed for MS3057A Cable Clamp. Protects wire bundles and unjacketed cables from possible damage by cable clamp. Can also be used as reducing bushing.

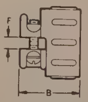


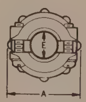
Part Number MS	Part Number Amphenol	Dimensions — Inches A Dia.	B Dia.	C Dia.	D	E Rad	F Rad
3420-3	9779-513-3	.130	2.10	.374	2.875	1/32	1/32
3420-4	9779-513-4	.220	.302	.500	2.750	1/32	1/32
3420-6	9779-513-6	.312	.427	.614	2.625	1/32	1/16
3420-8	9779-513-8	.437	.552	.739	2.500	1/16	1/16
3420-10	9779-513-10	.562	.615	.864	2.375	1/16	1/16
3420-12	9779-513-12	.625	.740	1.059	2.250	1/16	1/16
3420-16	9779-513-16	.750	.927	1.039	2.125	1/16	1/16
3420-20	9779-513-20	.937	1.240	1.591	2.000	1/16	1/16
3420-24	9779-513-24	1.250	1.365	1.842	1.875	1/16	1/16

Cable Clamp

For jacketed cable or wires protected by tubing. To provide for the most firm grip, the cable or wires should be centered in the jaws of the clamp. A vinyl or rubber bushing or sleeve may be used for this purpose. In applications where the cable is subject to considerable flexing, the resilient sleeve should project for several inches along the wire. This reinforcement lengthens the life of the cable. For centering and sealing, one resilient washer and two fiber washers are included with each clamp.



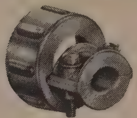




AN Number	Fits Shell Size	Fits AN Fitting Size	Max. O.D. Cable	Dimensions — Inches A	B	E	F	Threads	Weight Lbs. per 100
AN3057-3	8S, 10S	3	1/4	11/16	1	1/4	1/8	1/2-28	1.89
AN3057-4	†10SL, 12S	4	5/16	25/32	1	5/16	3/16	5/8-24	2.12
AN3057-6	14, 14S	6	7/16	15/16	1 5/64	7/16	3/16	3/4-20	2.94
AN3057-8	16, 16S	8	9/16	1 1/16	1 1/8	9/16	9/32	7/8-20	3.44
AN3057-10	18	10	5/8	1 3/16	1 1/8	5/8	5/16	1 -20	4.72
AN3057-12	20, 22	12	3/4	1 3/8	1 3/16	3/4	5/16	1 3/16-18	6.10
AN3057-16	24, 28	16	15/16	1 5/8	1 5/16	15/16	3/8	1 7/16-18	8.71
AN3057-20	32	20	1 1/4	1 15/16	1 1/2	1 1/4	1/2	1 3/4-18	14.85
AN3057-24	36	24	1 3/8	2 3/16	1 9/16	1 3/8	19/32	2 -18	18.15
AN3057-28	40	28	1 5/8	2 1/2	1 9/16	1 5/8	21/32	2 1/4-16	21.50

† Clamps for connectors size 12 are the same as for sizes 10SL and 12S.

Step Down Cable Clamp — 97-3057



Like the AN3057 except for the step down feature that accommodates smaller cable than that for which AN3057 was designed.

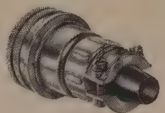
Amphenol Number	Fits Shell Size	Fits AN Fitting Size	Max. O.D. Cable	Dimensions — Inches A	B	E	F	Threads	Weight Lbs. per 100
97-3057-10-6	18	10	1/2	1 3/16	1 1/8	7/16	3/16	1 -20	3.94
97-3057-12-6	20, 22	12	1/2	1 3/8	1 3/16	7/16	3/16	1 3/16-18	4.40

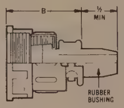
NOTE: The selection of fittings for connection to MS connectors is based on the connector size AND the cable or conduit size. For other connections, such as terminations and couplings, fitting sizes correspond to the size of the cable or conduit used.

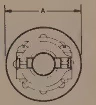
Waterproof Cable Clamps

The complete waterproof cable clamp assembly No. 9767 (for use with MS connectors) consists of an AN3057 Cable Clamp, a rubber bushing, washer and an AN3055 Adapter. It is available for all sizes MS and 97 plugs. The sectional view of Amphenol 9767 Waterproof Cable Clamp shows the parts of the clamp.

To assure the watertight integrity of this clamp when assembled to an MS plug, the plug must be ordered with deviation (417) which supplies a W washer cemented to the shoulder of the plug shell.







Max. Cable O.D. Inches	Amphenol Number	Connector Size	Dimensions — Inches A	B	Threads	Weight Lbs. per 100
5/32	9767-12-3	10SL, 12S, 12	25/32	1 17/32	5/8-24	3.19
7/32	9767-10-4	8S, 10S	11/16	1 17/32	1/2-28	3.46
	9767-12-4	10SL, 12S, 12	25/32	1 17/32	5/8-24	3.82
	9767-14-4	12SL, 14S, 14	29/32	1 17/32	3/4-20	3.87
	9767-16-4	16S, 16	1 1/16	1 17/32	7/8-20	4.00
11/32	9767-14-6	12SL, 14S, 14	29/32	1 19/32	3/4-20	5.54
	9767-16-6	16S, 16	1 1/16	1 19/32	7/8-20	5.84
	9767-18-6	18	1 3/16	1 19/32	1 -20	5.94
7/16	9767-16-8	16S, 16	1 1/16	1 19/32	7/8-20	6.92
	9767-18-8	18	1 3/16	1 19/32	1 -20	7.10
	9767-22-8	20, 22	1 3/8	1 19/32	1 3/16-18	7.27
9/16	9767-18-10	18	1 3/16	1 19/32	1 -20	8.79
	9767-22-10	20, 22	1 3/8	1 19/32	1 3/16-18	8.97
	9767-28-10	24, 28	1 5/8	1 17/32	1 7/16-18	9.12
11/16	9767-22-12	20, 22	1 3/8	1 21/32	1 3/16-18	12.65
	9767-28-12	24, 28	1 5/8	1 21/32	1 7/16-18	12.86
	9767-32-12	32	1 15/16	1 23/32	1 3/4-18	13.05
27/32	9767-28-16	24, 28	1 5/8	1 25/32	1 7/16-18	14.95
	9767-32-16	32	1 15/16	1 27/32	1 3/4-18	16.13
	9767-36-16	36	2 3/16	1 31/32	2 -18	16.26
1 1/32	9767-32-20	32	1 15/16	1 31/32	1 3/4-18	22.27
	9767-36-20	36	2 3/16	2 1/32	2 -18	22.41
	9767-40-20	40	2 7/16	2 3/32	2 1/4-16	22.61
1 3/16	9767-36-24	36	2 3/16	2 3/32	2 -18	29.85

For AN Fittings

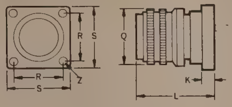
When selecting a cable clamp for a connection with fittings, the 9767 Waterproof Cable Clamp without the adapter may be used. AN fittings have the required inside tapered surface for seating the special rubber bushing.

Max. Cable O.D. Inches	Amphenol Number	Fitting Size	Dimensions — Inches A	B	Threads	Weight Lbs. per 100
5/32	9767-3	3	21/32	1	1/2-28	2.09
7/32	9767-4	4	25/32	1	5/8-24	2.45
11/32	9769-6	6	29/32	1 5/64	3/4-20	3.94
7/16	9767-8	8	1 1/16	1 1/8	7/8-20	4.57
9/16	9767-10	10	1 3/16	1 1/8	1 -20	5.97
11/16	9767-12	12	1 3/8	1 3/16	1 3/16-18	7.85
27/32	9767-16	16	1 5/8	1 5/16	1 7/16-18	9.53
1 1/32	9767-20	20	1 15/16	1 1/2	1 3/4-18	16.41
1 3/16	9767-24	24	2 3/16	1 9/16	2 -18	22.40

97 Series — Special Purpose Connectors

Box Type Plugs — (97-5105 Construction)

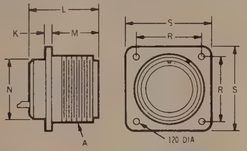
Square flange for mounting directly on box or housing. Provides a means of directly connecting two pieces of equipment without interconnecting wires. Available in all sizes with either male or female inserts. To order, complete the part number (97-5105) by adding the proper insert number. (See other pages for insert information.) Example: 97-510528-20S. To prevent connectors from rotating, order deviation 205 (a single stake, with swivel ring pinned) or 206 (double staking, with both swivel plate and swivel ring pinned); for example: 97-510528-20S(205) or 97-510528-20S(206).



Connector Size	Dimensions — Inches					Z Mounting Threads
	K	L	Q	R	S	
8S	1/8	7/8	3/4	9/16	25/32	4-36
10S	1/8	7/8	7/8	9/16	25/32	4-36
12S	5/32	31/32	1	13/16	1 1/16	4-36
12	5/32	1 3/8	1	13/16	1 1/16	4-36
14S	5/32	31/32	1 1/8	13/16	1 1/16	4-36
14	5/32	1 3/8	1 1/8	13/16	1 1/16	4-36
16S	5/32	31/32	1 1/4	1	1 5/16	6-32
16	5/32	1 13/32	1 1/4	1	1 5/16	6-32
18	5/32	1 13/32	1 11/32	1	1 5/16	6-32
20	3/16	1 13/32	1 15/32	1 1/4	1 5/8	10-24
22	3/16	1 13/32	1 19/32	1 1/4	1 5/8	10-24
24	3/16	1 13/32	1 23/32	1 9/16	2	10-24
28	3/16	1 13/32	1 31/32	1 9/16	2	10-24
32	1/4	1 1/2	2 7/32	1 13/16	2 1/2	10-24
36	1/4	1 1/2	2 15/32	1 13/16	2 1/2	10-24

Small Flange Receptacles — (115 Construction)

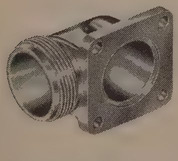
Receptacles are available in sizes 12S and 14S with pin or socket inserts and in size 10SL with pin contacts only. To order, complete part number (97-3102) by adding proper insert and construction number (115).

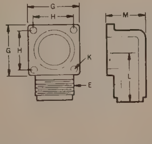


Connector Size	Coupling Threads A	Dimensions — Inches					
		K	L	M	N	R	S
10SL	5/8-24	5/64	55/64	9/16	5/8	.625	13/16
12S	3/4-20	3/32	27/32	9/16	5/8	.664	7/8
14S	7/8-20	3/32	27/32	9/16	23/32	.730	15/16

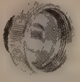
Junction Shells — 9784

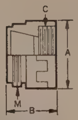
These junction shells may be used as panel terminations to hold cable harnesses when not in use or as right-angle feed-throughs similar to the AN3064. Adding the AN3057 cable clamps provides strain relief.





Amphenol Number	Use Fitting Size	Dimensions — Inches						Weight Lbs. per 100
		E Threads	G	H	K Dia.	L	M	
9784-10S	3	1/2-28	25/32	9/16	.120	7/8	5/8	1.20
9784-12	4	5/8-24	1 1/16	13/16	.125	1	23/32	1.20
9784-14	6	3/4-20	1 1/16	13/16	.125	1	25/32	2.34
9784-16	8	7/8-18	1 5/16	1	.141	1 1/8	31/32	2.84
9784-18	10	1 -20	1 5/16	1	.141	1 1/8	1 1/32	3.98
9784-22	12	1 3/16-18	1 5/8	1 1/4	.203	1 5/16	1 1/4	6.60
9784-28	16	1 7/16-18	2	1 9/16	.203	1 1/2	1 25/32	12.47
9784-32	20	1 3/4-18	2 1/2	1 13/16	.203	1 25/32	2 1/16	12.47
9784-36	24	2 -18	2 1/2	1 13/16	.203	1 25/32	2 13/16	20.01





Adapter — AN3055

The AN3055 adapter is used with standard MS connectors as a reducing or extending bushing.

Conduit Size Inches*	AN Number	Used on Connector Sizes	Dimensions — Inches				Weight Lbs. per 100
			A	B	C Threads	M Threads	
3/16	AN3055-12-3	12S, 12	25/32	7/8	5/8-24	1/2-28	1.10
	AN3055-12-4	12S, 12	25/32	7/8	5/8-24	5/8-24	1.37
1/4	AN3055-14-4	14S, 14	29/32	7/8	3/4-20	5/8-24	1.42
	AN3055-16-4	16S, 16	1 1/16	7/8	7/8-20	5/8-24	1.55
	AN3055-14-6	14S, 14	23/32	7/8	3/4-20	3/4-20	1.60
3/8	AN3055-16-6	16S, 16	1 1/16	7/8	7/8-20	3/4-20	1.90
	AN3055-18-6	18	1 3/16	7/8	1 -20	3/4-20	2.00
	AN3055-16-8	16S, 16	1 1/16	7/8	7/8-20	7/8-20	2.35
1/2	AN3055-18-8	18	1 3/16	7/8	1 -20	7/8-20	2.53
	AN3055-22-8	20, 22	1 3/8	7/8	1 3/16-18	7/8-20	2.70
	AN3055-18-10	18	1 3/16	7/8	1 -20	7/8-20	2.82
5/8	AN3055-22-10	20, 22	1 3/8	7/8	1 3/16-18	1 -20	3.00
	AN3055-28-10	24, 28	1 5/8	7/8	1 7/16-18	1 -20	3.15
	AN3055-22-12	20, 22	1 3/8	7/8	1 3/16-18	1 3/16-18	4.80
3/4	AN3055-28-12	24, 28	1 5/8	7/8	1 7/16-18	1 3/16-18	5.01
	AN3055-32-12	32	1 15/16	15/16	1 3/4-18	1 3/16-18	5.20
	AN3055-28-16	24, 28	1 5/8	7/8	1 7/16-18	1 7/16-18	5.42
1	AN3055-32-16	32	1 15/16	15/16	1 3/4-18	1 7/16-18	5.60
	AN3055-36-16	36	2 3/16	1 1/16	2 -18	1 7/16-18	5.73
	AN3055-32-20	32	1 7/8	15/16	1 3/4-18	1 3/4-18	5.86
1 1/4	AN3055-36-20	36	2 3/16	1 1/16	2 -18	1 3/4-18	6.00
	AN3055-40-20	40	2 7/16	1 1/16	2 1/4-16	1 3/4-18	6.20
1 1/2	AN3055-36-24	36	2 1/8	1 1/16	2 -18	2 -18	7.45

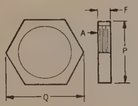
* Indicates nominal inside diameter of flexible Shielding Conduit No. AN-WW-C-561 or outside diameter of rigid aluminum conduit No. AND-10101. Brass or other conduit of similar size may be used with these fittings.

Conduit Box Connectors — AN3064

Used with AN3066 conduit coupling locknut to form a termination at conduit boxes or panel. The conduit box connector may also be used with AN3057 cable clamp to relieve strain on wiring cable terminals.

Conduit Size Inches*	AN Number	Use Conduit Coupling Lock Nut Size	Use Conduit Coupling Nut No.	Dimensions — Inches				Weight Lbs. per 100
				A Threads	B	F	P	
3/16	AN3064-3	AN3066-3	AN3054-3	1/2-28	3/4	1/8	11/16	1.17
1/4	AN3064-4	AN3066-4	AN3054-4	5/8-24	3/4	1/8	13/16	1.75
3/8	AN3064-6	AN3066-6	AN3054-6	3/4-20	3/4	1/8	15/16	2.18
1/2	AN3064-8	AN3066-8	AN3054-8	7/8-20	7/8	3/16	1 1/16	3.15
5/8	AN3064-10	AN3066-10	AN3054-10	1 -20	7/8	3/16	1 1/4	3.94
3/4	AN3064-12	AN3066-12	AN3054-12	1 3/16-18	7/8	3/16	1 3/8	4.98
1	AN3064-16	AN3066-16	AN3054-16	1 7/16-18	7/8	3/16	1 5/8	5.75
1 1/4	AN3064-20	AN3066-20	AN3054-20	1 3/4-18	15/16	3/16	2	9.17

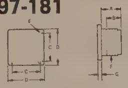
Lock Nut — AN3066



Conduit Size Inches*	AN Number	Dimensions — Inches				Weight Lbs. per 100
		A Threads	F	P	Q	
3/16	AN3066-3	1/2-28	1/8	11/16	51/64	.28
1/4	AN3066-4	5/8-24	1/8	13/16	15/16	.36
3/8	AN3066-6	3/4-20	1/8	15/16	1 3/32	.41
1/2	AN3066-8	7/8-20	3/16	1 1/16	1 15/64	.72
5/8	AN3066-10	1 -20	3/16	1 1/4	1 7/16	.86
3/4	AN3066-12	1 3/16-18	3/16	1 3/8	1 19/32	1.01
1	AN3066-16	1 7/16-18	3/16	1 5/8	1 7/8	1.25
1 1/4	AN3066-20	1 3/4-18	3/16	2	2 5/16	1.85
1 1/2	AN3066-24	2 -18	3/16	2 3/16	2 17/32	2.04

Dummy Receptacle Shells — 97-181

Same as standard MS receptacle without installation or contacts. Used for anchoring straight or angle type MS plugs when they are not in use.



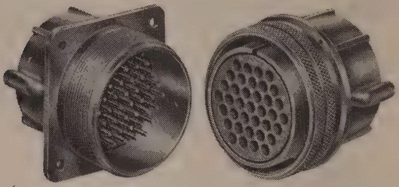
For Connector Size	MS Number	Amphenol Number	Dimensions — Inches						Mtg. Flange Thickness		Wt. Lbs. per 100
			A	B	C	D	E Dia.	F Threads	Max.	Min.	
8S	MS3105-8S	97-181-8S	.562	.375	.594	.875	.120	1/2-28	.156	.078	1.01
10S	MS3105-10S	97-181-10S	.562	.375	.719	1.000	.120	5/8-24	.156	.078	1.10
12S	MS3105-12S	97-181-12S	.562	.375	.812	1.094	.120	3/4-20	.156	.078	1.73
14S	MS3105-14S	97-181-14S	.750	.625	.812	1.094	.120	3/4-20	.156	.078	2.00
16S	MS3105-16S	97-181-16S	.562	.375	.906	1.188	.120	7/8-20	.156	.078	2.35
12	MS3105-12	97-181-12	.750	.625	.906	1.188	.120	7/8-20	.156	.078	2.30
14	MS3105-14	97-181-14	.562	.375	.969	1.281	.120	1 -20	.156	.078	2.41
16	MS3105-16	97-181-16	.750	.625	.969	1.281	.120	1 -20	.156	.078	3.10
18	MS3105-18	97-181-18	.750	.625	1.062	1.375	.120	1 1/8-16	.203	.094	3.18
20	MS3105-20	97-181-20	.750	.625	1.156	1.500	.120	1 1/4-18	.203	.094	3.80
22	MS3105-22	97-181-22	.750	.625	1.250	1.625	.120	1 3/8-18	.203	.094	4.50
24	MS3105-24	97-181-24	.812	.625	1.375	1.750	.147	1 1/2-18	.203	.094	5.00
28	MS3105-28	97-181-28	.812	.625	1.562	2.000	.147	1 3/4-18	.203	.094	6.58
32	MS3105-32	97-181-32	.875	.625	1.750	2.250	.173	2 -18	.359	.125	9.75
36	MS3105-36	97-181-36	.875	.625	1.933	2.500	.173	2 1/4-16	.359	.125	11.90
40	MS3105-40	97-181-40	.875	.625	2.188	2.750	.173	2 1/2-16	.359	.125	14.25

STANDARD CIRCULAR CONNECTORS

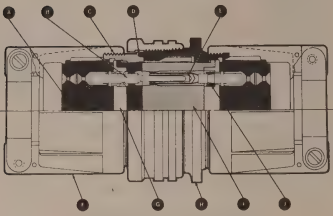
BUNKER RAMO AMPHENOL

246 SERIES

ENVIRONMENT RESISTANT CONNECTORS



246-3100R & 246-3106R



246-3106F & 246-3100F

A ENVIRONMENTAL SEALING GROMMET
B MS90453 PIN CONTACT
C PLUG SHELL
D STATIC "O" RING
E MS90454 HOODED SOCKET CONTACT
F MS(F) CABLE SUPPORT
G ANTI-DEFLECTION CONTACT RETENTION DISK
H RECEPTACLE SHELL
I BONDED MONOBLOCK CONSTRUCTION
J SERVICEABLE SHROUDED CONTACT RETENTION CLIP

MIL-C-5015 Performance, MS Contacts Plus "Poke-Home" Speed and Reliability

Amphenol 246 Series connectors simplify and speed wiring changes by providing the combination of rear insertable, front removable, crimp Poke-Home contacts. The MS90453 pin contact and MS90454 socket contact were recently standardized and will be included in proposed procurement Specification MIL-C-23216. They can be crimped with the standard MS tool, M22520/1-01, Amphenol No. 294-542 with turret head M22520/1-02, Amphenol No. 294-1889-XX.

Damage-Resistance Contact Retention System

Metal retaining clips combine with a shrouded retention disk to prevent damage to the contact system. The metal retaining clips, identical in both male and female insert assemblies, can be removed and replaced in the field. They are shrouded to minimize damage by untrained personnel. Forces as high as 50 pounds with the removal tool cocked at angles of 10° can be applied without damaging the clip. At angles of more than 10°, the tip of the tool rides out the retention disk. In addition, the shrouded contact retention prevents excessive skewing of contacts that might prevent proper connector mating.

Contact retention force exceeds the requirements of MIL-C-26482 and MIL-C-26500. The forces required for contact insertion and removal are kept down to a low level for ease in servicing.

Interchangeable Contacts

The 246 Series uses the contacts recently standardized by proposed specification MIL-C-39029. This specification, which covers the contacts for all crimp Poke-Home MIL-C-5015 connectors, eliminates the long and short versions of the contacts. Instead, it provides one standard length contact to be used in both standard length and short-shell connectors. This enables both the 16S-1 and the 18-1 shells, for example, to use the same contact.

The 246 Series connectors are interchangeable and intermateable with all other MIL-C-5015 connectors. They meet or exceed all the requirements of MIL-C-5015.

INSERT CONFIGURATIONS

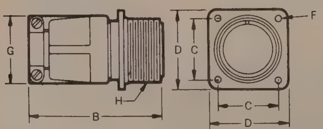
Insert	Contacts	Insert	Contacts	Insert	Contacts	Insert	Contacts	Insert	Contacts
10SL-3	3 #16	16S-1	7 #16	18-19	10 #16	20-33	11 #16	28-12	26 #16
10SL-4	2 #16	18-1	10 #16	18-22	3 #16	22-8	2 #12	28-15	35 #16
12S-3	2 #16	18-4	4 #16	20-4	4 #12	22-14	19 #16	28-21	37 #16
12-5	1 #12	18-9	2 #12 5 #16	20-6	3 #16	22-19	14 #16	32-7	7 #12 28 #16
14S-2	4 #16			20-17	5 #12 1 #16	24-20	2 #12 9 #16		
14S-5	5 #16	18-10	4 #12					32-17	4 #4
14S-7	3 #16	18-11	5 #12	20-27	14 #16	24-27	7 #16	36-5	4 #0
14S-9	2 #16	18-12	6 #16	20-29	17 #16	24-28	24 #16	36-10	48 #16

ACCESSORY TOOLS

294-542	M22520/1-01 Univ. Crimp Tool
294-229	#12 Contact Insertion Tool
294-230	#12 Contact Removal Tool
294-192	#16 Contact Insertion Tool
294-219	#16 Contact Removal Tool

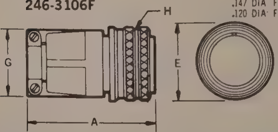
DIMENSIONS (Inches)

246-3100F



MOUNTING HOLES
.173 DIA FOR SIZES 32 AND 36
.147 DIA FOR SIZES 24 AND 28
.120 DIA FOR ALL OTHER SIZES

246-3106F



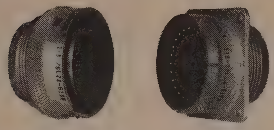
Size	A Max.	B Max.	C ±.005	D ±.031	E Dia. Max.	F ±.005	G ±.031	H Thread
10SL	2.067	2.067	.719	1.000	.876	.120	.865	⅝"-24UNEF
12S	2.067	2.067	.812	1.094	1.001	.120	.865	¾"-20UNEF
14S	2.129	2.129	.906	1.188	1.126	.120	.990	⅞"-20UNEF
16S	2.129	2.129	.969	1.281	1.251	.120	1.120	1"-20UNEF
16	2.375	2.281	.969	1.281	1.251	.120	1.120	1"-20UNEF
18	2.437	2.343	1.062	1.375	1.345	.120	1.211	1⅛"-18UNEF
20	2.497	2.403	1.156	1.500	1.469	.120	1.468	1¼"-18UNEF
22	2.497	2.403	1.250	1.625	1.595	.120	1.468	1⅜"-18UNEF
24	2.673	2.579	1.375	1.750	1.719	.147	1.750	1½"-18UNEF
28	2.673	2.579	1.562	2.000	1.969	.147	1.750	1¾"-18NS
32	2.779	2.675	1.750	2.250	2.219	.173	2.056	2"-18NS
36	2.779	2.675	1.938	2.500	2.469	.173	2.250	2¼"-16UN

MINIATURE ENVIRONMENTAL CONNECTORS

BUNKER RAMO AMPHENOL

MERLIN I Rear Release 118 Series Connectors

Qualified to MIL-C-83723 & MIL-C-26482



Advanced State of the Art

Amphenol's MERLIN I is a rear-release, polymer retention, upgraded version of MIL-C-83723/0026482 connector representing a true advance in rear release design. Amphenol design has improved the quality while reducing the weight and offering the greater dielectric spacing by the elimination of metal contact retention clips. These 118 Series connectors are qualified to MIL-C-83723 and MIL-C-0026482.

Retention System

Merlin I connectors utilize an all polymer retention disc with integrally molded polymer contact retention clips. This design results in lower cost and higher integrity in that the metal clip system requires close dimensional control of twice as many dimensions as does the comparable all dielectric system.

New Materials

Amphenol has had extensive experience with Astrel P360*. It has been used successfully in the Astro 348® Series (MIL-C-81511C) and now upgraded for individual contact retention and release. This thermoplastic polymer possesses outstanding mechanical and electrical properties and is resistant to alkalis, acids, fuels and solvents.

Military/Industrial Specifications

The Merlin I connectors are the first of its kind to meet and exceed performance requirements of all three of the following standard specifications:

NAVY — MIL-C-0026482 (175° Class L fluid resistant)
MIL-C-0026482 (200° Class E)
AIR FORCE — MIL-C-83723A (200°C Class R fluid resistant)
AERONAUTICS INDUSTRIES ASSOCIATION — NAS 1599

Typical Applications

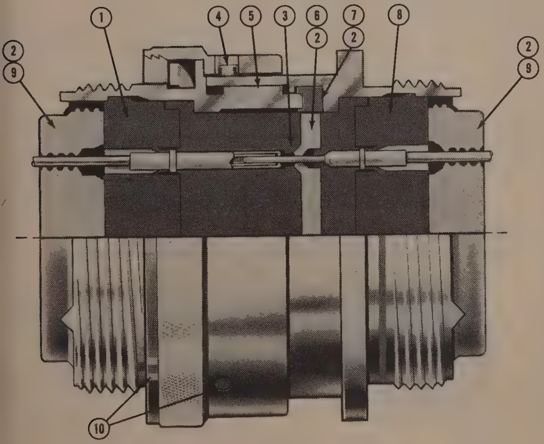
- Process control systems or oil industry where fluid resistance is essential.
- Paving equipment where constant temperatures of 200°C are reached.
- Portable communications equipment or traffic control where weight and size are major factors.
- Ideal to upgrade MIL-C-26482E installations, through retrofit and replacement.
- Ground support equipment where cylindrical connector applications are required .
- Marine equipment where cylindrical connector applications are required.

User Benefits

- **7/16″ shorter, up to 40% lighter for total system weight reduction and lower cost per pound.**
- **62% increased dielectric separation reduces outgassing and weight loss improving connector temperature life.**
- **Reduced number of connector parts, up to 122, decreases failure modes while increasing reliability.**
- **Resistant to fuels, oils and cleaning solutions for longer life.**
- **Mis-mating due to bent pins eliminated by hard front closed entry socket insert with a hooded two-tinned, prod-proof socket contact.**
- **Intermateable and intermountable with existing circuitry reducing replacement and upgrading costs.**

* Registered Trademark of 3M Co.
® Registered Trademark of Bunker Ramo Corp.

DESIGN FEATURES



1 **Molded One-Piece Polymer Contact Retention Disc** — Fewer connector parts — Greater reliability
2 **Fluorosilicone Fluid Resistant Seal Material** — Allows one connector to meet stringent fluid requirements of various specifications
3 **Closed Entry Socket Insert and Contacts** — Eliminates mis-mating due to bent pins — System reliability
4 **Bayonet Coupling System** — Quick mating of connectors — Lowers operating costs
5 **5 Key Shell Polarization** — Assures positive contact alignment prior to mating
6 **Interfacial Mating Seal** — Maintains system integrity
7 **Static Peripheral Shell Seal** — Maintains system integrity
8 **Monoblock Construction — Inserts Bonded to Shells** — Helps to assure complete connector reliability
9 **Self-Sealing Rear Grommets** — Assures environmental sealing with or without rear hardware
10 **Visual Mating Indicators** — Quick indication that connector is fully mated
11 **Shell to Shell Grounding Fingers***
12 **7/16″ shorter, 40% lighter weight**
13 **Accepts standard NAS 1599, MIL-C-0026482, and MIL-C-83723 Hardware**
14 **Durable Conductive Shell Finish**

* Consult factory

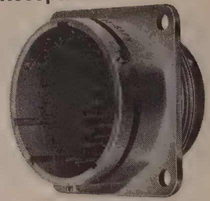
MINIATURE ENVIRONMENTAL CONNECTORS

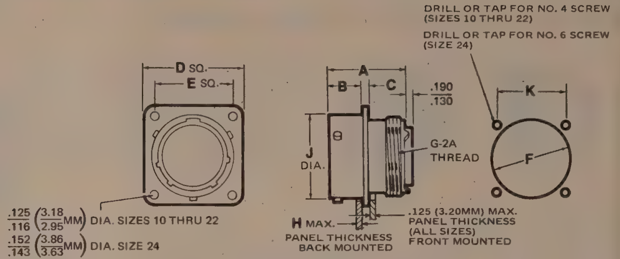
BUNKER RAMO AMPHENOL

MERLIN I Rear Release 118 Series Connectors

Shell Styles and Dimensions

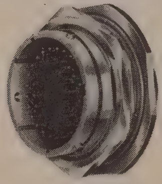
Square Flange Receptacle

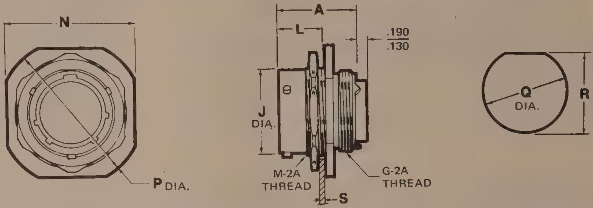



DRILL OR TAP FOR NO. 4 SCREW (SIZES 10 THRU 22)
DRILL OR TAP FOR NO. 6 SCREW (SIZE 24)
D SQ.
E SQ.
A
B
C
.190
.130
K
J DIA.
G-2A THREAD
F
.125 (3.18 / 2.95 MM) / .116 DIA. SIZES 10 THRU 22
.152 (3.86 / 3.63 MM) / .143 DIA. SIZE 24
H MAX.
PANEL THICKNESS BACK MOUNTED
.125 (3.20MM) MAX. PANEL THICKNESS (ALL SIZES) FRONT MOUNTED

Shell Size	A Inches	A MM	B Inches	B MM	C Inches	C MM	D Max. Inches	D Max. MM	E Inches	E MM	F Inches	F MM	G Thread	H Max. Inches	H Max. MM	J Dia. Inches	J Dia. MM	K Inches	K MM	L Max. Inches	L Max. MM
10	1.040 1.023	26.42 25.98	.442 .431	11.23 10.95	.056 .046	1.42 1.17	.954	24.23	.719	18.26	.690 .680	17.53 17.27	5/8-24 NEF	.087	2.21	.591 .585	15.01 14.86	.724 .714	18.39 18.14	1.082	27.48
12							1.047	26.59	.812	20.62	.869 .859	22.07 21.82	3/4-20 UNEF			.751 .745	19.08 18.92	.817 .807	20.75 20.50	1.176	29.87
14							1.141	28.98	.906	23.01	.994 .984	25.24 24.99	7/8-20 UNEF			.876 .870	22.25 22.10	.911 .901	23.14 22.89	1.270	32.36
16							1.234	31.34	.969	24.61	1.118 1.108	28.40 28.14	1-20 UNEF			1.001 .995	25.43 25.27	.974 .964	24.74 24.49	1.364	34.65
18							1.328	33.73	1.062	26.97	1.243 1.233	31.57 31.32	1 1/16-18 NEF			1.126 1.120	28.60 28.45	1.067 1.057	27.10 26.85	1.458	37.03
20	1.103 1.086	28.02 27.58	.567 .556	14.40 14.12	.088 .078	2.24 1.98	1.453	36.91	1.156	29.36	1.368 1.358	34.75 34.49	1 3/16-18 NEF	.212	5.38	1.251 1.245	31.78 31.62	1.161 1.151	29.49 29.24	1.582	40.18
22							1.578	40.08	1.250	31.75	1.493 1.483	37.92 37.67	1 5/16-18 NEF			1.376 1.370	34.95 34.80	1.255 1.245	31.88 31.62	1.708	43.38
24			.600 .589	15.24 14.96			1.703	43.26	1.375	34.93	1.620 1.610	41.15 40.89	1 7/16-18 NEF			1.501 1.495	38.13 37.97	1.380 1.370	35.05 34.80	1.832	46.53

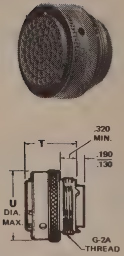
Single Hole Mount Receptacle




N
P DIA.
A
L
.190
.130
J DIA.
M-2A THREAD
G-2A THREAD
S
Q DIA.
R

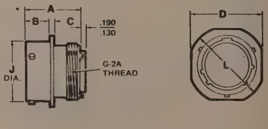
Shell Size	A Inches	A MM	G Thd.	J Dia. Inches	J Dia. MM	L Inches	L MM	M Thread	N Inches	N MM	P Dia. Inches	P Dia. MM	Q Dia. Inches	Q Dia. MM	R Inches	R MM	S Inches	S MM
10	1.040 1.023	26.42 25.98	5/8-24 NEF	.591 .585	15.01 14.86	.664 .658	16.87 16.71	11/16-24 NEF	1.078 1.047	27.38 26.59	1.203 1.172	30.56 29.77	.702 .692	17.83 17.58	.666 .656	16.92 16.66	.187 .062	4.75 1.57
12			3/4-20 UNEF	.751 .745	19.08 18.92			7/8-20 UNEF	1.266 1.235	32.16 31.37	1.391 1.360	35.33 34.54	.900 .890	22.86 22.61	.829 .819	21.06 20.80		
14			7/8-20 UNEF	.876 .870	22.25 22.10			1-20 UNEF	1.391 1.360	35.33 34.54	1.516 1.485	38.51 37.72	1.015 1.005	25.78 25.53	.953 .943	24.21 23.95		
16			1-20 UNEF	1.001 .995	25.43 25.27			1 1/8-18 NEF	1.516 1.485	38.51 37.72	1.641 1.610	41.68 40.89	1.140 1.130	28.96 28.70	1.077 1.067	27.36 27.10		
18			1 1/16-18 NEF	1.126 1.120	28.60 28.45			1 1/4-18 NEF	1.641 1.610	41.68 40.89	1.766 1.735	44.86 44.07	1.265 1.255	32.13 31.88	1.202 1.192	30.53 30.28		
20	1.103 1.086	28.02 27.58	1 3/16-18 NEF	1.251 1.245	31.78 31.62	.727 .721	18.47 18.31	1 3/8-18 NEF	1.828 1.797	46.43 45.64	1.954 1.923	49.63 48.84	1.390 1.380	35.31 35.05	1.327 1.317	33.71 33.45	.250 .062	6.35 1.57
22			1 5/16-18 NEF	1.376 1.370	34.95 34.80			1 1/2-18 NEF	1.954 1.923	49.63 48.84	2.078 2.047	52.78 51.99	1.515 1.505	38.48 38.23	1.452 1.442	36.88 36.63		
24			1 7/16-18 NEF	1.501 1.495	38.13 37.97			1 5/8-18 NEF	2.078 2.047	52.78 51.99	2.203 2.172	55.96 55.17	1.640 1.630	41.66 41.40	1.577 1.567	40.06 39.80	.219 .062	5.56 1.57

PLUG


T
.320 MIN.
.190
.130
U DIA. MAX.
G-2A THREAD

Shell Size	T Inches	T MM	U Dia. Max. Inches	U Dia. Max. MM	G Thread
10	1.035 1.014	26.29 25.76	.871	22.12	5/8-24 NEF
12			1.001	25.43	3/4-20 UNEF
14			1.133	28.79	7/8-20 UNEF
16			1.290	32.77	1-20 UNEF
18			1.350	34.29	1 1/16-18 NEF
20			1.470	37.34	1 3/16-18 NEF
22			1.602	40.69	1 5/16-18 NEF
24			1.711	43.46	1 7/16-18 NEF

CABLE RECEPTACLE


A
B
C
.190
.130
J DIA.
G-2A THREAD
D
L

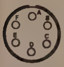
MINIATURE ENVIRONMENTAL CONNECTORS

BUNKER RAMO AMPHENOL

MERLIN I Rear Release 118 Series Connectors

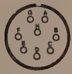
Insert Arrangements

10-6



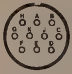
6#20
Service Rating I

12-8



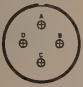
8#20
Service Rating I

12-10



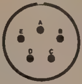
10#20
Service Rating I

14-4



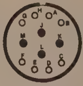
4#12
Service Rating I

14-5



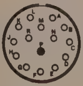
5#16
Service Rating II

14-12



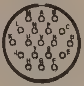
8#20, 4#16
Service Rating I

14-15



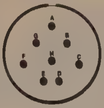
14#20, 1#16
Service Rating I

14-19



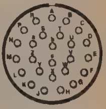
19#20
Service Rating I

16-8



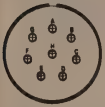
8#16
Service Rating II

16-26



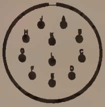
26#20
Service Rating I

18-8



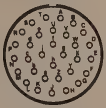
8#12
Service Rating I

18-11



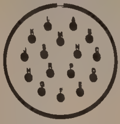
11#16
Service Rating II

18-32



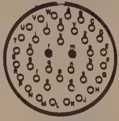
32#20
Service Rating I

20-16



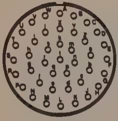
16#16
Service Rating II

20-39



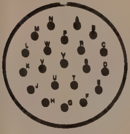
37#20, 2#16
Service Rating I

20-41



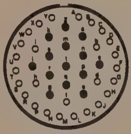
41#20
Service Rating I

22-21



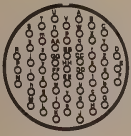
21#16
Service Rating II

22-41



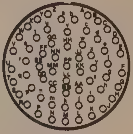
27#20, 14#16
Service Rating I

22-55

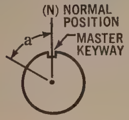


55#20
Service Rating I

24-61



61#20
Service Rating I



VERTICAL C/L OF INSERT ROTATED IN RESPECT TO MASTER KEYWAY

Contact identification is for front face of pin insert (Socket insert opposite).

Alternate Insert Positions

Shell Size	Insert Arrangement	a				
		N	W	X	Y	Z
10	-6	0°	90°	—	—	—
12	-8	0°	90°	112°	203°	292°
12	-10	0°	60°	155°	270°	295°
14	-4	0°	45°	—	—	—
14	-5	0°	40°	92°	184°	273°
14	-12	0°	43°	90°	—	—
14	-15	0°	17°	110°	155°	234°
14	-19	0°	30°	165°	315°	—
16	-8	0°	54°	152°	180°	331°
16	-26	0°	60°	—	275°	338°
18	-8	0°	180°	—	—	—
18	-11	0°	62°	119°	241°	340°
18	-32	0°	35°	138°	222°	265°
20	-16	0°	238°	318°	333°	347°
20	-39	0°	63°	144°	252°	333°
20	-41	0°	45°	126°	225°	—
22	-21	0°	16°	135°	175°	349°
22	-41	0°	39°	135°	264°	—
22	-55	0°	30°	142°	226°	314°
24	-61	0°	30°	180°	270°	324°

* Socket Insert Shown (Pin Insert Opposite)

How to Order

Military Standard Part Number for MIL-C-83723 Connectors

MIL-C-83723, Revision B connectors can be ordered by the Military part numbers. The connector part number is per the following example:

M83723—02 R 22 55 N

Specification Number

Shell and Contact Style
01 — Narrow Square Flange with socket contacts
02 — Narrow Square Flange with pin contacts
05 — Single Hole Mount with socket contacts
06 — Single Hole Mount with pin contacts
07 — Cable Receptacle with socket contacts
08 — Cable Receptacle with pin contacts
13 — Straight Plug with socket contacts
14 — Straight Plug with pin contacts

Connector Class
R — Fluid Resistant 200°C, conductive finish

Shell Size
10 12 14 16 18 20 22 24

Insert Arrangement
See above

Alternate Insert Position
N, W, X, Y, Z
As per table above

Military Standard Part Number for MIL-C-26482 Connectors

MIL-C-26482 connectors can be ordered by the Military part numbers. The connector part number is per the following example:

MS3470—L 22 55 P N

Specification Number
MS3470 — Receptacle, narrow flange mount
MS3471 — Receptacle, cable connecting
MS3474 — Receptacle, rear mounting jam nut
MS3476 — Plug, straight

Connector Class
L — Fluid Resistant, 175°C, conductive finish
E* — Non-fluid resistant, 200°C, conductive finish

Shell Size
10 12 14 16 18 20 22 24

Insert Arrangement
See above

Contact Type*
P — Pin Contact
S — Socket Contact
*For non-power contact applications substitute "A" for "P" and "B" for "S"

Alternate Insert Position
N, W, X, Y, Z
As per table above

* Amphenol Class E Connector is Fluid Resistant

Part Numbers Merlin 118 Connectors

To order the specific Merlin 118 connectors you want, the connector part number is per the following example:

118—10 R 22—55 P N

Series Designation

Military Specification
1 — MIL-C-83723
2 — MIL-C-26482

Shell Style
0 — Square Flange Receptacle
1 — Cable Connecting Receptacle
3 — Single Hole Mounting Receptacle
6 — Straight Plug

Connector Class
R — Fluid Resistant, 200°C, conductive finish (MIL-C-83723)
L — Fluid Resistant, 175°C, conductive finish (MIL-C-26482)
E — Fluid Resistant, 200°C, conductive finish (MIL-C-26482)

Shell Size
10 12 14 16 18 20 22 24

Insert Arrangement
See above

Contact Type
P — Pin Contact
S — Socket Contact

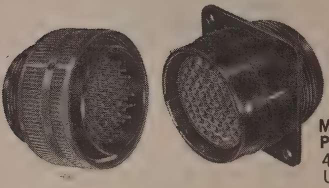
Alternate Insert Position
N, W, X, Y, Z
As per table above

MINIATURE CIRCULAR CONNECTORS

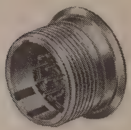
BUNKER RAMO AMPHENOL

48 Series High-Reliability, Environment-Resistant Connectors

MIL-C-26500 PERFORMANCE
48 Series Regular

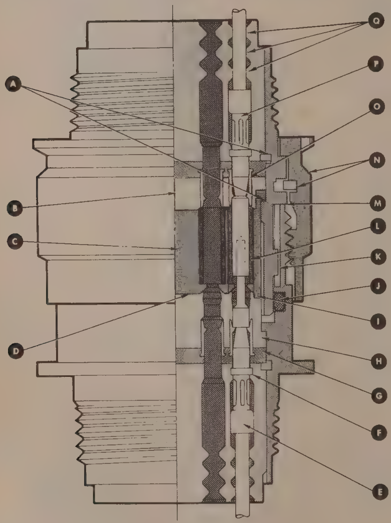


MIL-C-38300 PERFORMANCE
48 Series Ultra-Mate®



Hermetically Sealed Receptacle

OUTSTANDING DESIGN FEATURES



A. POSITIVE LOCATION CAPTIVATED INSERT (MECHANICAL INTERLOCK)
B. RESILIENT REAR INSERT
C. CLOSED ENTRY HARD DIELECTRIC "ULTRAMATE" FRONT INSERT
D. INSERT STATIC FACE SEAL
E. PIN CONTACT, MIL-C-26636
F. CONTACT PRESSURIZING SEAL
G. ANTI-DEFLECTION DISC
H. RESILIENT PIN INSERT
I. INSERT RIM SEAL
J. DYNAMIC "O" RING SHELL SEAL
K. FIVE KEY SHELL POLARIZATION
L. RELEASING SLEEVE
M. METAL TO METAL SHOULDER
N. BAYONET OR THREADED COUPLING, PERMANENT CAPTIVATION
O. CONTACT RETENTION CLIP
P. SOCKET CONTACT, MIL-C-26636
Q. SELF-SEALING, THREE-RISER REAR GROMMET

SIGNIFICANT ADVANCE IN STATE-OF-THE-ART

On the ground or in space, wherever there is a requirement for superior environmental protection, high reliability, and minimum weight and bulk, 48 Series miniature environment-resistant connectors are the answer.

In developing this series, Amphenol faced the problem of satisfying reliability, logistics, and present and anticipated environmental requirements for connector usage. To solve the problem, Amphenol had to generate advanced design concepts, formulate materials specifically for connector usage, and work out new production techniques. The resulting connectors exceed the stringent requirements of MIL-C-26500(USAF) and MIL-C-38300(USAF) for performance and reliability.

FULL PERFORMANCE IN EXTREME ENVIRONMENTS

Advance materials technology and complete environmental sealing enable these remarkable connectors to:

- Operate continuously at 200°C (392°F)
- Withstand thermal shock cycling from −55°C (−67°F) to 260°C (500°F)
- Support 1500V RMS from sea level to 350,000 ft., mated
- Maintain environmental and electrical integrity during and after 0 to 2000 CPS vibration during exposure to 200°C (392°F) and −55°C (−67°F)
- Withstand physical shock of 100 gravity units
- Resist corrosion, ozone, sand and dust

ULTRA-MATE® CLOSED ENTRY AND FRONT SERVICING

Ultra-Mate connectors are identical to the other connectors in the 48 Series, but the socket inserts have a hard face of glass-filled epoxy. They are the first to combine the positive reliability of closed entry with the speed and convenience of front servicing. In addition, the MIL-C-26636 contacts are tamper proof. Wrong-size contacts or oversize test prods cannot be inserted in the hard dielectric contact entryways on the socket inserts.

COMPLETE ENVIRONMENTAL SEALING

48 Series connectors are fully sealed against extreme environmental conditions.

Amphenol-developed, silicone rubber dielectric provides resilience and unsurpassed resistance to tear, compression set, fluids and high temperatures.

When the connectors are mated, insert faces compress to form a resilient dielectric seal around each individual contact. A continuous barrier on the periphery of the socket insert mates with a recess around the pin insert to form an additional compression seal. A dynamic "O" ring seal between mated shells constitutes still another barrier to dirt and moisture, and protects the integrity of the face seals. Together with monoblock construction, this puts void-free, continuous dielectric around each contact through the entire connector length.

Monoblock construction, with bonded interfaces between the dielectric components (insert, anti-deflection disc, and grommet) eliminates air voids and protects connectors from degrading moisture and altitude conditions. A pressurizing seal around each contact at the major O.D. prevents the passage of air or moisture through the contact hole, and triple sealing riser design at each wire hole in the grommet seals each individual wire.

GO/NO-GO RELIABILITY

When an Ultra-Mate connector is mated, you can be sure there is proper contact. The socket contacts are closely surrounded by hard dielectric with a chamfered entry to guide in the pins accurately. However, if the pins are bent, the hard dielectric presents a closed entry and prevents mating.

LIGHT WEIGHT AND HIGH CONTACT DENSITY

Connector shells are impact-extruded aluminum forgings with a high strength-to-weight ratio. The insert arrangement is designed for the maximum number of contacts within the area available.

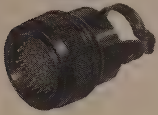
POKE-HOME® CONTACTS

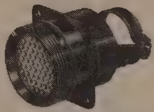
Poke-home contacts (front release, rear insertable) provide for easy servicing of connector circuits without disassembling the connector from its mounting, or disturbing adjacent contacts. MIL-C-26636 contacts are crimped quickly, consistently, and reliably with either hand or power tools. They have high electrical conductivity, present a smooth configuration, and completely protect electrical contact pressure-members from environmental and handling damage. The contacts come in sizes 20, 16, 12 and shielded, with rhodium-over-silver plating. Other platings such as gold are available; write factory for details.)

48 Series High-Reliability, Environment-Resistant Connectors (Continued)

Shell Types

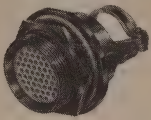
Threaded Plug
48-06RXX-XXX
MS24266RXXTXXX

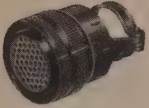




Threaded Square Flange Receptacle
48-00RXX-XXX
MS24264RXXTXXX

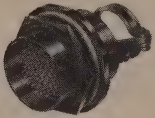
Threaded Single Hole Mounting Receptacle
48-03RXX-XXX
MS24265RXXTXXX

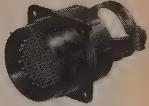




Bayonet Plug
48-16RXX-XXX
MS24266RXXBXXX

Bayonet Single Hole Mounting Receptacle
48-13RXX-XXX
MS24265RXXBXXX





Bayonet Square Flange Receptacle
48-10RXX-XXX
MS24264RXXBXXX

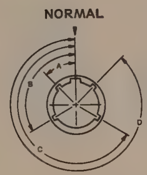
Alternate Shell Positions

	For Connectors Size 8 and 10				For Connectors Size 12, 14, 16, 18, 20, 22, and 24			
Position	A	B	C	D	A	B	C	D
Normal	105°	140°	215°	265°	105°	140°	215°	265°
6	102°	132°	248°	320°	18°	149°	192°	259°
7	80°	118°	230°	312°	92°	152°	222°	342°
9	64°	155°	234°	304°	24°	135°	199°	240°
8	35°	140°	205°	275°	84°	152°	204°	334°
10*	25°	115°	220°	270°	98°	152°	268°	338°

*Position 10 not available in size 8 connector.

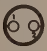
Front Face of Receptacle Shown

Note: Alternate positions 6 through 10 incorporate special shell polarizing key and keyways. All inserts remain in the normal position.

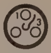


Inserts Available (Showing front face of socket insert)

SHELL SIZE — 8
MS-27561

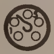


2 #20 contacts
Insert 8-2*

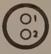


3 #20 contacts
Insert 8-3

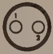
SHELL SIZE — 10
MS-24260



5 #20 contacts
Insert 10-5‡

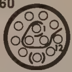


2 #20 contacts
Insert 10-2*

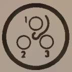


2 #16 contacts
Insert 10-20*

SHELL SIZE — 12
MS-24260

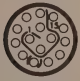


12 #20 contacts
Insert 12-12‡

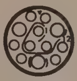


3 #16 contacts
Insert 12-3

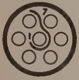
SHELL SIZE — 14
MS-24260



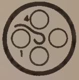
15 #20 contacts
Insert 14-15‡



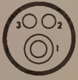
9 #20 contacts
3 #16 contacts
Insert 14-12*



7 #16 contacts
Insert 14-7‡

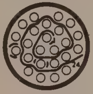


4 #12 contacts
Insert 14-4†

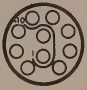


2 #16 contacts
1 #2 shielded contact
Insert 14-3

SHELL SIZE — 16
MS-24261

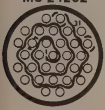


24 #20 contacts
Insert 16-24‡

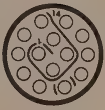


10 #16 contacts
Insert 16-10*

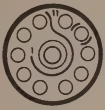
SHELL SIZE — 18
MS-24262



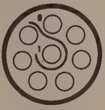
31 #20 contacts
Insert 18-31‡



14 #16 contacts
Insert 18-14

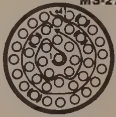


10 #16 contacts
1 #2 shielded contact
Insert 18-11

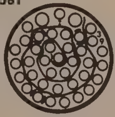


8 #12 contacts
Insert 18-8†

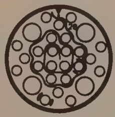
SHELL SIZE — 20
MS-27561



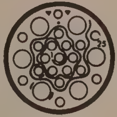
41 #20 contacts
Insert 20-41‡*



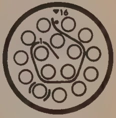
37 #20 contacts
2 #16 contacts
Insert 20-39*



24 #20 contacts
4 #12 contacts
Insert 20-28*†

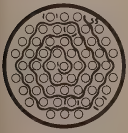


19 #20 contacts
6 #12 contacts
Insert 20-25*†

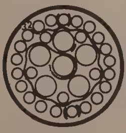


16 #16 contacts
Insert 20-16*

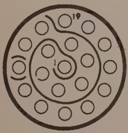
SHELL SIZE — 22
MS-24263



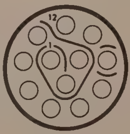
55 #20 contacts
Insert 22-55‡



26 #20 contacts
6 #12 contacts
Insert 22-32*†

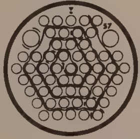


19 #16 contacts
Insert 22-19‡

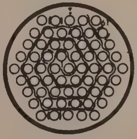


12 #12 contacts
Insert 22-12†

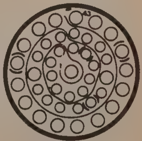
SHELL SIZE — 24
MS-27561



2 #12 contacts
55 #20 contacts
Insert 24-57*†



61- #20 contacts
Insert 24-61‡*



23 #20 contacts
20 #16 contacts
Insert 24-43*

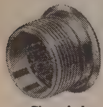
---

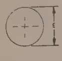
‡ Available with hard-dielectric face socket inserts for Ultra-Mate (MIL-C-38300) connectors. Pin inserts for MIL-C-38300 connectors have a resilient face and, except for marking, are identical to MIL-C-26500 pin inserts.
* Not included MS-2426X at time of printing.
† #1 shielded contact is interchangeable with #12 power contact

48 Series High-Reliability, Environment-Resistant Connectors (Continued)

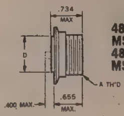
Hermetic Receptacles

SOLDER FLANGE


Threaded

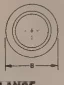


PANEL CUTOUT
Both threaded and bayonet receptacles

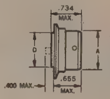

.734
MAX
D
A TH'D
.400 MAX.
.655
MAX.

48-05HXX-XXP(108)
MS27034HXXT-XXP
48-05HXX-XXP
MS27034YXXT-XXP

Bayonet



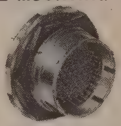
FLANGE
Both threaded and bayonet receptacles


.734
MAX.
D
A
.400 MAX.
.655
MAX.

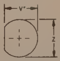
48-15HXX-XXP(108)
MS27034H-XXB-XXP
48-15HXX-XXP
MS27034Y-XXB-XXP

SINGLE HOLE MOUNTING

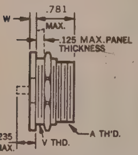
THREADED


BAYONET

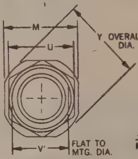
48-7005



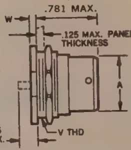
PANEL CUT-OUT


W
.781
MAX.
.125 MAX. PANEL THICKNESS
A TH'D.
.235
MAX.
V THD.

48-03HX-XXX
***MS24265HXXT-XXX**
****MS24265HXXTXXEX or CX**


M
U
Y OVERALL DIA.
V'
FLAT TO MTG. DIA.

FLANGE AND NUT
BOTH THREADED AND BAYONET RECEPTACLES


W
.781 MAX.
.125 MAX. PANEL THICKNESS
A
.235
MAX.
V THD

48-13HXX-XXX
***MS24265HXXB-XXX**
****MS24265HXXTXXEX CX or CX**

* Specify whether solder pocket or eyelet contact tail is desired.
** E = Eyelet Contact C = Solder Pocket Contact

Hermetically sealed receptacles in the 48 Series have a leakage rate of less than .01 micron cubic foot of helium per hour with one atmosphere differential. To simplify contact identification, Amphenol puts contact spiral markings on the glass dielectric as well as on the face seal. It uses its exclusive identoseal process to mark the glass.

The receptacles are available with either threaded or bayonet coupling in either of two shell styles: solder flange or single hole hex nut mounting shells. They take most of the 48 Series pin inserts shown on these pages. The part numbers to use in ordering are shown in the table on the following page.

The shells are non-magnetic stainless steel. The contacts are made of 52 alloy and are rhodium plated, flattened and pierced. Solder cups are furnished when you order deviation (108).

Amphenol 48 Series Hermetics are built to the specifications of MIL-C-26500.

The temperature and electrical capabilities correspond directly to the 48 Series Resilient Connector.

Shell Size	A+.000 −.005	A Thrd.	B Max.	D Max.	+.010 −.000 E
10	.659	11/16-24	.860	.557	.567
12	.829	7/8-20	1.065	.750	.755
14	.898	15/16-20	1.110	.807	.817
16	1.025	1 1/16-18	1.230	.933	.942
18	1.131	1 3/16-18	1.360	1.057	1.067
22	1.381	1 7/16-18	1.610	1.307	1.317

Write factory for information on sizes 8, 20 and 24.

HERMETICALLY SEALED RECEPTACLES

Hermetically sealed, feed-through connector.
Has two #16 pin contacts, one shielded pin contact.
Has bayonet coupling, mates with 48-16R14-3S or 48-16R14-2/1S.
Offers all features of MIL-C-26500B (USAF), including continuous operation at 200°C; interfacial insert seal, insert rim seal, and dynamic O ring between shells; visual full engagement indicators for mating; and five polarizing keys in alternate positions to prevent mismating.

SPECIFICATIONS

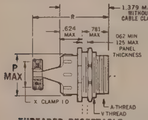
Derated current ratings at continuous operation for contacts of #52 alloy

Contact Size	Amps.	For AWG Wire Size
20	5	24-22-20
16	10	18-16
12	20	14-12
#2 Shielded	5	

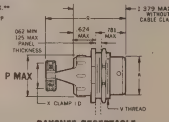
Shell Size	A+.000 −.005	A Thrd.	Y Max.	M Max.	U Max.	V Thrd.	V' ±.003	V'' ±.005	W Max.	Z ±.005
10	.659	11/16-24	1.192	1.109	.953	3/4-20	.718	.730	.137	.760
12	.829	7/8-20	1.380	1.296	1.140	15/16-20	.905	.917	.137	.947
14	.898	15/16-20	1.505	1.396	1.250	1-20	.968	.980	.137	1.010
16	1.025	1 1/16-18	1.630	1.521	1.329	1 1/8-20	1.093	1.105	.137	1.135
18	1.131	1 3/16-18	1.740	1.646	1.455	1 1/4-20	1.217	1.225	.137	1.260
22	1.381	1 7/16-18	2.040	1.959	1.705	1 1/2-20	1.467	1.475	.137	1.510

Write factory for information on sizes 18 and 24.

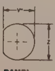
Single Hole Mounting Receptacles


1.379 MAX.**
WITHOUT CABLE CLAMP
R
.624
MAX
.781
MAX
.062 MIN
.125 MAX
PANEL THICKNESS
P
MAX
X CLAMP I D
A-THREAD
V THREAD

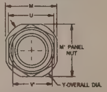
THREADED RECEPTACLE
48-03RXX-XXX
MS24265RXXT-XXX


1.379 MAX **
WITHOUT CABLE CLAMP
R
.062 MIN
.125 MAX
PANEL THICKNESS
.624
MAX
.781
MAX
P MAX
A
X CLAMP I D
V THREAD

BAYONET RECEPTACLE
48-13RXX-XXX
MS24265RXXB-XXX



PANEL CUT-OUT


M
U
M' PANEL NUT
V'
Y-OVERALL DIA.

FLANGE AND NUT

BOTH THREADED AND BAYONET RECEPTACLES

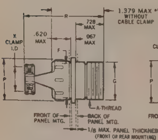
Shell Size	A Thrd.	A +.000 −.005	M Max.	M' Max.	P Max.*	U Max.	V Thrd.	V' ±.003	V'' ±.005	X ±.015	Y Max.	Z ±.005	R Max.
8	9/16-24	.536	.984	.938	.582	.828	5/8-20	.593	.605	.180	1.068	.635	1.890
10	11/16-24	.659	1.109	1.082	.731	.953	3/4-20	.718	.730	.270	1.192	.760	1.890
12	7/8-20	.829	1.296	1.299	.919	1.140	15/16-20	.905	.917	.400	1.380	.947	1.890
14	15/16-20	.898	1.396	1.371	.981	1.250	1-20	.968	.980	.460	1.505	1.010	2.125
16	1 1/16-18	1.025	1.521	1.515	1.106	1.329	1 1/8-20	1.093	1.105	.610	1.630	1.135	2.125
18	1 3/16-18	1.131	1.646	1.660	1.231	1.455	1 1/4-20	1.217	1.225	.690	1.740	1.260	2.125
20	1 5/16-18	1.256	1.771	1.770	1.356	1.642	1 3/8-18	1.342	1.350	.830	1.860	1.385	2.125
22	1 7/16-18	1.381	1.959	1.948	1.481	1.705	1 1/2-20	1.467	1.475	.940	2.040	1.510	2.125
24	1 9/16-18	1.506	2.084	2.084	1.606	1.892	1 5/8-18	1.592	1.600	1.040	2.160	1.635	2.125

**Add .042 for Ultra-Mate connectors with socket inserts.

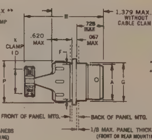
Recommended Minimum Torque for Jam Nut

Shell Size	8	10	12	14	16	18	20	22	24
Torque (Inch/Lbs.)	28	36	56	64.5	69	81	102	122.5	144

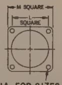
Square Flange Receptacles


R
1.379 MAX **
WITHOUT CABLE CLAMP
.728
MAX
X
CLAMP
I.D
.620
MAX
.067
MAX
F
P
G
A-THREAD
FRONT OF PANEL MTG.
BACK OF PANEL MTG.
1/8 MAX. PANEL THICKNESS (FRONT OR REAR MOUNTING)

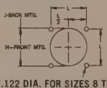
THREADED RECEPTACLE
48-00RXX-XXX
MS24264RXXT-XXX


R
1.379 MAX.**
WITHOUT CABLE CLAMP
.728
X
CLAMP
I D
.620
MAX
.067
MAX
F
P
A
G
FRONT OF PANEL MTG.
BACK OF PANEL MTG.
1/8 MAX. PANEL THICKNESS (FRONT OR REAR MOUNTING)

BAYONET RECEPTACLE
48-10RXX-XXX
MS24264RXXB-XXX


M SQUARE
L
SQUARE

.125/.116 DIA. FOR SIZES 8 THRU 22
.152/.154 DIA. FOR SIZE 24


L
L/2
J-BACK MTG.
H—FRONT MTG.
L

.132/.122 DIA. FOR SIZES 8 THRU 22
.159/.149 DIA. FOR SIZE 24

PANEL CUT-OUT DIMENSIONS FOR BOTH THREADED AND BAYONET RECEPTACLES

Shell Size	A. Thrd.	A +.000 −.005	F Max.	G Max.	H Min.	J Min.	L ±.005	M ±.005	P Max.	X ±.015	R Max.
8	9/16-24	.536	.437	.561	.447	.620	.594	.812	.582	.180	1.890
10	11/16-24	.659	.562	.696	.572	.748	.719	.937	.731	.270	1.890
12	7/8-20	.829	.750	.875	.760	.913	.812	1.031	.919	.400	1.890
14	15/16-20	.898	.812	.935	.822	.980	.906	1.125	.981	.460	2.125
16	1 1/16-18	1.025	.938	1.062	.948	1.107	.969	1.250	1.106	.610	2.125
18	1 3/16-18	1.131	1.062	1.187	1.072	1.209	1.062	1.343	1.231	.690	2.125
20	1 5/16-18	1.256	1.182	1.312	1.192	1.337	1.156	1.437	1.356	.830	2.125
22	1 7/16-18	1.381	1.312	1.437	1.322	1.452	1.250	1.562	1.481	.940	2.125
24	1 9/16-18	1.506	1.432	1.562	1.442	1.577	1.375	1.703	1.606	1.040	2.125

**Add .042 for Ultra-Mate connectors with socket inserts.

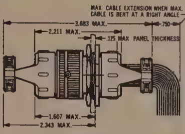
MINIATURE CIRCULAR CONNECTORS

BUNKER RAMO AMPHENOL

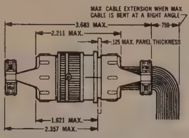
48 Series High-Reliability, Environment-Resistant Connectors (Continued)

Single Hole Mounting Hermetic Receptacles

Mated Pairs Threaded or Bayonet Coupling

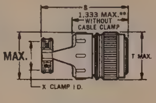


SINGLE HOLE MOUNTING RECEPTACLE AND STRAIGHT PLUG

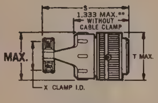

MAX CABLE EXTENSION WHEN MAX. CABLE IS BENT AT A RIGHT ANGLE
3.683 MAX.
.750
2.211 MAX.
.125 MAX. PANEL THICKNESS
1.621 MAX.
2.357 MAX.

SQUARE FLANGE RECEPTACLE AND STRAIGHT PLUG

Plugs



THREADED PLUG
48-06RXX-XXX
MS24266RXXT-XXX



BAYONET PLUG
48-16RXX-XXX
MS24266RXXB-XXX

Shell Size	P Max.*	T Max.* Thrd.	T Max.* Bay.	X ±.015	S Max.
8	.582	.708	.766	.180	1.832
10	.731	.836	.906	.270	1.832
12	.919	1.025	1.078	.400	1.832
14	.981	1.125	1.141	.460	2.067
16	1.106	1.250	1.266	.610	2.067
18	1.231	1.375	1.375	.690	2.067
20	1.356	1.510	1.510	.830	2.067
22	1.481	1.625	1.625	.940	2.067
24	1.606	1.760	1.760	1.040	2.067

How to Order:

Amphenol Numbers

To get the specific 48 Series connector you want, put together the part number as per the following typical example.

48 – 0 6 R 22 – 55 P 6 – (102)

SERIES DESIGNATION	COUPLING TYPE	SHELL STYLE	ENVIRONMENTAL CLASS	SHELL SIZE	NUMBER OF CONTACTS	CONTACT STYLE	Alternate Shell Positions	DEVIATIONS
48—	0—Threaded 1—Bayonet	0—Square Flange Receptacle 3—Single Hole Mounting Receptacle ¶ 5—Solder Flange Mounting Receptacle (Hermetic only) ¶ 6—Straight Plug	R—Meets MIL-C-26500 (USAF) Hard Socket Insert *C—Meets MIL-C-38300 (USAF)* H—Hermetically Sealed ¶ G—Grounding F—Fluid Resistant	8, 10, 12, 14, 16, 18, 20, 22, 24	2, 3, 4, 5, 7, 8, 10, 11, 12, 14, 15, 16, 19, 24, 25, 28, 31, 32, 39, 41, 43, 55, 57, or 61	P—Pin S—Socket	6, 7, 8, 9, 10 as per table	(100) Connector for Potting (102) Connector Less Cable Support † (105) Connector Less Contacts † (106) Connector Less Contacts and Less Cable Support † (108) Hermetic Receptacle with Solder Cup Contact (135) Gold Iridite Finish on Shell — 48-XXGXX-XX(135) *(145) MIL-C-38300 Resilient Insert "P" contact only

See Table of available inserts

¶Hermetics are available in receptacle shell style "X3" (MS24265) and "X5" (MS27034).

*The 48 Series part numbers for Ultra-Mate connectors (MIL-C-38300) are 48-XXCXX-XXSX and 48-XXRXX-XXPX(145). MIL-C-38300 connectors are furnished without cable clamp. If a cable support is desired, it must be ordered separately.

†Marked with MS part number per MIL-C-26500C.

Military Standard Part Numbers

You can use MS as well as Amphenol part numbers in ordering 48 Series connectors. The MS part numbers for MIL-C-26500 connectors are worked out on the basis shown in the table below. Please take special note that MIL-C-26500D Revision has eliminated the cable support from the callout. Amphenol allows 48 Series connectors to be ordered by either MIL-C-26500 Rev C or Rev. D in order to alleviate the many logistic problems that were created by Revision D. To eliminate delays please specify to what MIL-C-26500 revision level the connectors are being ordered.

The part numbers for MIL-C-38300 connectors start off with the identification M38300/ and take the form M38300/XXX-XXX. To determine the specific M numbers, refer to military specification MIL-C-38300.

MS24266 R 22 T 55 P 6 X

MS SHELL DRAWING	ENVIRONMENTAL CLASS	SHELL SIZE	COUPLING TYPE	NUMBER OF CONTACTS	CONTACT STYLE	Alternate Shell Positions	CABLE SUPPORT
MS24264—Square Flange Receptacle MS24265—Single Hole Mounting Receptacle ¶ MS24266—Straight Plug MS27034—Solder Flange Mounting Receptacle (Hermetic only)	R—Meets MIL-C-26500 (USAF) †G—Grounding H—Hermetically Sealed ¶ Solder Pocket Contacts Y—Hermetically Sealed ¶ Flattened and Pierced Contacts	8, 10, 12, 14, 16, 18, 20, 22, or 24	T—Threaded B—Bayonet	2, 3, 4, 5, 7, 8, 10, 11, 12, 14, 15, 16, 19, 24, 25, 28, 31, 32, 39, 41, 43, 55, 57, or 61	P—Pin S—Socket C—Solder Pocket E—Eyelet	6, 7, 8, 9, 10	X—Less cable support (Omit if cable support is desired) Applies only when ordering to MIL-C-26500C

Part numbers, both Amphenol and Military Standard, for the contacts and assembly tools are listed below.

¶Hermetics are available in receptacle shell style (MS24265) and (MS27034).

†Contact nearest Amphenol sales office for availability.

Poke-Home Contacts and Tool Applications

CONTACTS — When you order 48 Series connectors with contacts, the contact package contains enough contacts to complete the insert arrangement and have at least 2 spares left. The package also includes enough sealing plugs for at least 15% of the contacts in the insert, in any case a minimum of 3 sealing plugs. To provide proper sealing, insert unwired contacts and sealing plugs in all unused holes. (Use a #12 contact for a #1 shielded hole.) To order contacts and sealing plugs separately use the part numbers in the table below. Contacts may also be ordered in reels for use with automatic crimping tools.

TOOLS — Note that various tools are available for crimping, inserting, and removing each size contact.

Contact Size	Wire Size AWG	Max. Current Rating Amps.	AMPHENOL Part No.		MS Part No.		Crimping Tool	Bushing (Positioner)	Crimp Jaw Setting Dia. (Insp.)	Insertion Tool	Removal Tool	
			Pin	Socket	Pin	Socket					Standard Connector	Ultra-Mate Connector
No. 20	24 22 20	3.0 5.0 7.5	48-1595-02	248-136-2001S-02	MS24254-20P	MS24255-20S	294-126 294-186 294-243 294-293 294-358 294-506	Included 294-1266 Turret Hd. Turret Hd. 294-444 Automatic	.031-.041 .031-.041 .031-.041	294-88 (MS24256A20)	294-89 (MS24256R20)	294-203, (MS24256RH20)
No. 16	18 16	16 22	48-1825-02	48-100-1600S-02 OR 248-136-1600S-02	MS24254-16P	MS24255-16S	294-126 294-243 294-293 294-358 294-506	Included Turret Hd. Turret Hd. 294-901 Automatic	.041-.053 .041-.053	294-96 (MS24256A16)	294-97 (MS24256R16)	294-180, (MS24256RH16)
No. 12	14 12	32 41	48-1827-02	48-1215-02 OR 248-136-1200S-02	MS24254-12P	MS24255-12S	294-86 294-126 294-243 294-293 294-358 294-506	294-903 Included Turret Hd. Turret Hd. 294-903 Automatic	.0625 .062-.072 .062-.072	294-72 (MS24256A12)	294-73 (MS24256R12)	294-183, (MS24256RH12)

CONTACT FACTORY FOR INFORMATION AND SPECIFICATIONS ON SHIELDED CONTACTS

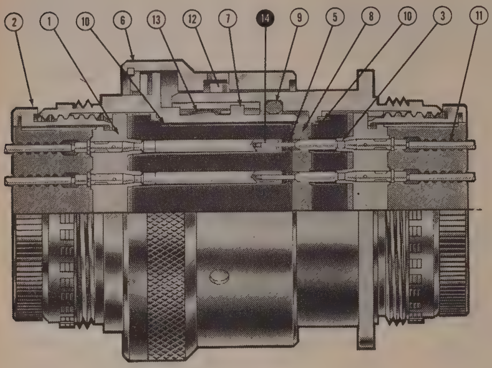
HIGH-DENSITY CONNECTORS

BUNKER RAMO AMPHENOL

ASTRO/348

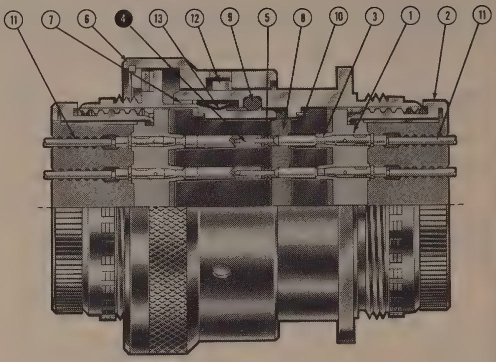
DESIGN FEATURES — CIRCULAR CONNECTORS

SERIES 1



Series 1 Construction

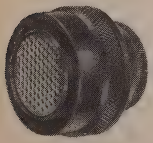
SERIES 2

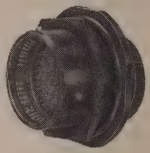


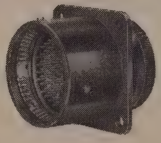
Series 2 Construction

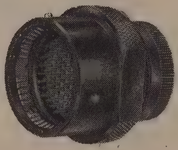
1 Molded One-Piece Contact Retention Disc.
2 Captivated Rear-Locking Nut (Metal to Metal Bottoming).
3 Individual Contact Risers.
4 Anti-Scoop Recessed Pin Contacts (in receptacle).
5 Closed Entry Socket Insert and Contacts.
6 Captivated Triple Bayonet Coupling System.
7 5 Key Shell Polarization. (Series 2 size 8 has 2 keys.)
8 Interfacial Mating Seal.
9 Dynamic "O" Ring Peripheral Shell Ring.
10 Monoblock Construction — Inserts Bonded to Shells.
11 Self-Sealing Rear Grommets.
12 Visual Mating Indicator.
13 Shell to Shell Grounding Fingers.
14 Anti-Scoop Recessed Pin Contacts (in Plug and Receptacle).
15 Connectors will accommodate ⅛" (.375 to .500) variation in gap between mounting surfaces.
16 Connectors will accommodate radial misalignment of up to .031 — (.062 total float).
17 Conical float spring maintains interfacial seal.
18 2 Key Shell polarization.

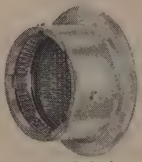
Shell Constructions — Series 2

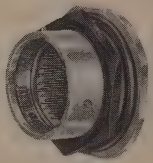

Plug


Single Hole Mtg. Receptacle

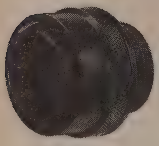

Square Flange Receptacle

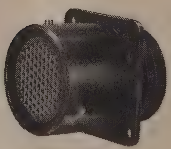

Cable Receptacle

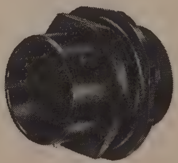

Hermetic Seal — Solder Flange Receptacle

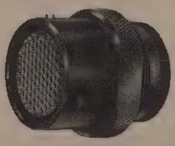

Hermetic Seal — Recptacle Single Hole Mtg.

Series 1


Plug

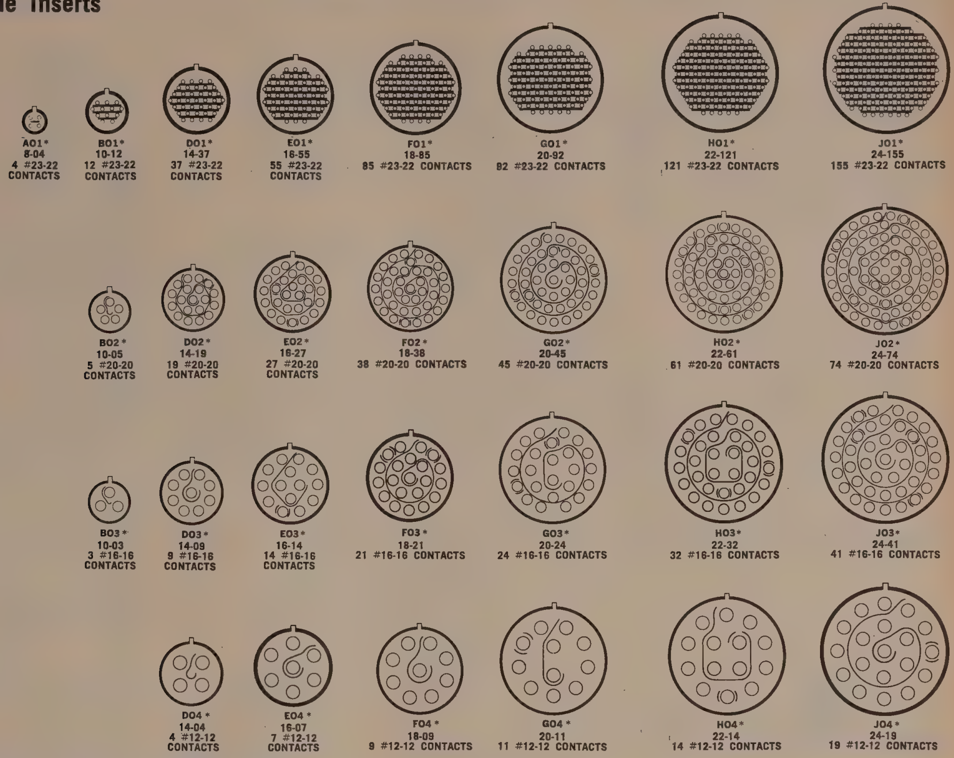

Square Flange Receptacle


Single Hole Mtg. Receptacle

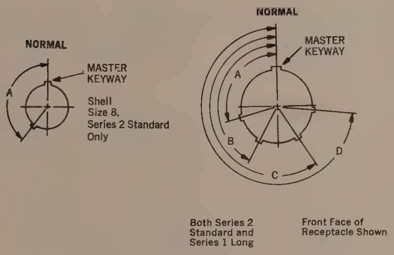

Cable Receptacle

Amphenol ASTRO/348 High Density Connectors (Continued)

Available Inserts


A01*
8-04
4 #23-22
CONTACTS
B01*
10-12
12 #23-22
CONTACTS
D01*
14-37
37 #23-22
CONTACTS
E01*
16-55
55 #23-22
CONTACTS
F01*
18-85
85 #23-22 CONTACTS
G01*
20-92
92 #23-22 CONTACTS
H01*
22-121
121 #23-22 CONTACTS
J01*
24-155
155 #23-22 CONTACTS
B02*
10-05
5 #20-20
CONTACTS
D02*
14-19
19 #20-20
CONTACTS
E02*
16-27
27 #20-20
CONTACTS
F02*
18-38
38 #20-20 CONTACTS
G02*
20-45
45 #20-20 CONTACTS
H02*
22-61
61 #20-20 CONTACTS
J02*
24-74
74 #20-20 CONTACTS
B03*
10-03
3 #16-16
CONTACTS
D03*
14-09
9 #16-16
CONTACTS
E03*
16-14
14 #16-16
CONTACTS
F03*
18-21
21 #16-16 CONTACTS
G03*
20-24
24 #16-16 CONTACTS
H03*
22-32
32 #16-16 CONTACTS
J03*
24-41
41 #16-16 CONTACTS
D04*
14-04
4 #12-12
CONTACTS
E04*
16-07
7 #12-12
CONTACTS
F04*
18-09
9 #12-12 CONTACTS
G04*
20-11
11 #12-12 CONTACTS
H04*
22-14
14 #12-12 CONTACTS
J04*
24-19
19 #12-12 CONTACTS

ALTERNATE SHELL POSITIONS


NORMAL
MASTER KEYWAY
A
Shell Size 8, Series 2 Standard Only
NORMAL
MASTER KEYWAY
A
B
C
D
Both Series 2 Standard and Series 1 Long
Front Face of Receptacle Shown

STANDARD SERIES 2
(Angular Location)

Key and Keyway Arrangement	Shell Size 8	Shell Sizes 10 and 14				Shell Sizes 16 and 18			
	A	A	B	C	D	A	B	C	D
1	128°	105°	140°	215°	265°	105°	140°	215°	265°
2	190°	102°	132°	248°	320°	18°	149°	192°	259°
3	205°	80°	118°	230°	312°	92°	152°	222°	342°
4	220°	35°	140°	205°	275°	84°	152°	204°	334°
5	235°	64°	155°	235°	304°	24°	135°	199°	240°
6	250°	35°	115°	220°	270°	98°	152°	268°	338°

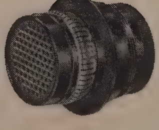
LONG SERIES 1
(Angular Location)

Key and Keyway Arrangement	Shell Size 8				ShellSizes 10 and 14				Shell Sizes 16, 18, 20, 22, 24			
	A	B	C	D	A	B	C	D	A	B	C	D
1	105°	140°	215°	265°	95°	141°	208°	236°	80°	142°	196°	293°
2	102°	132°	248°	320°	113°	156°	182°	292°	135°	170°	200°	310°
3	80°	118°	230°	312°	90°	145°	195°	252°	49°	169°	200°	244°
4	35°	140°	205°	275°	53°	156°	220°	255°	66°	140°	200°	257°
5	64°	155°	234°	304°	119°	146°	176°	298°	62°	145°	180°	280°
6	91°	131°	197°	240°	51°	141°	184°	242°	79°	153°	197°	272°

GROUNDING FINGERS

SERIES 2

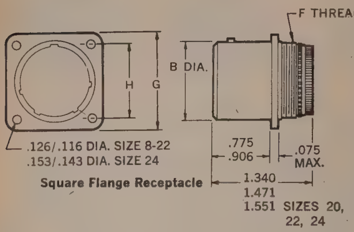
SERIES 1



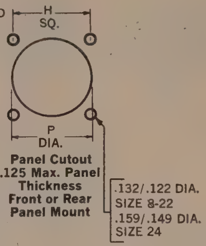
Shell-to-shell grounding is established by beryllium spring fingers permanently fixed to the Series 2 receptacle shell and permanently fixed to the Series 1 plug shell. These spring fingers, spaced at a minimum of 6 per inch (except at key-ways in Series 2 construction), make contact at least .090 inch before pin-socket electrical engagement occurs during mating and maintain contact at least .090 inch after pin-socket disengagement during unmating.

Amphenol ASTRO/348 High Density Connectors (Continued)

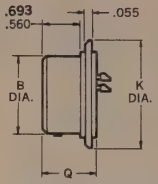
Shell Style and Dimensions (inches) All dimensions are shown as MAX.


F THREAD
H
G
B DIA.
.126/.116 DIA. SIZE 8-22
.153/.143 DIA. SIZE 24
.775
.906
.075
MAX.
1.340
1.471
1.551 SIZES 20, 22, 24

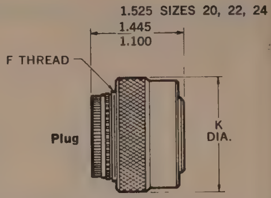
Square Flange Receptacle

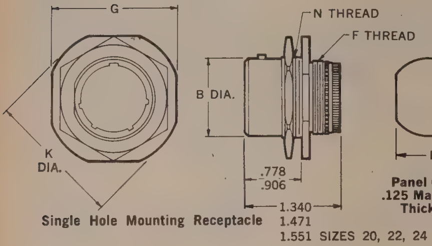

H
SQ.
P
DIA.
.132/.122 DIA.
SIZE 8-22
.159/.149 DIA.
SIZE 24

Panel Cutout
.125 Max. Panel
Thickness
Front or Rear
Panel Mount

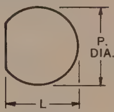

.693
.560
.055
B
DIA.
K
DIA.
Q

Hermetic Seal Solder Flange Receptacle

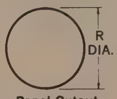

1.525 SIZES 20, 22, 24
1.445
1.100
F THREAD
Plug
K
DIA.


G
N THREAD
F THREAD
B DIA.
K
DIA.
.778
.906
1.340
1.471
1.551 SIZES 20, 22, 24

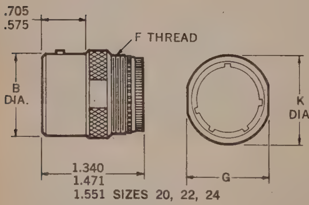
Single Hole Mounting Receptacle



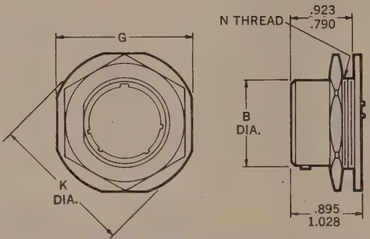
Panel Cutout
.125 Max. Panel
Thickness



Panel Cutout
.125 Max. Panel
Thickness

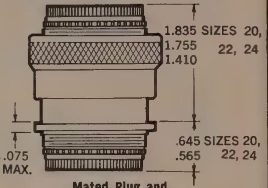

.705
.575
F THREAD
B
DIA.
K
DIA.
1.340
1.471
1.551 SIZES 20, 22, 24
G

Cable Receptacle

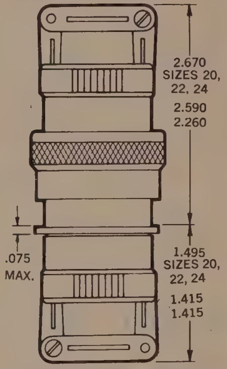

G
N THREAD
.923
.790
B
DIA.
K
DIA.
.895
1.028

Hermetic Seal Single Hole Mounting Receptacle

Mated Connectors Dimensions (inches)


1.835 SIZES 20,
1.755 22, 24
1.410
.075
MAX.
.645 SIZES 20,
.565 22, 24

Mated Plug and Square Flange Receptacle

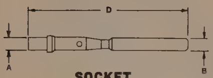

2.670
SIZES 20,
22, 24
2.590
2.260
.075
MAX.
1.495
SIZES 20,
22, 24
1.415
1.415

Mated Plug and Square Flange Receptacle with Cable Supports

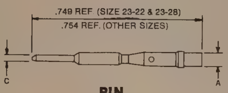
Dimension	SHELL SIZE												
	8-Standard Series 2	8-Long Series 1	10-Standard Series 2	10-Long Series 1	14-Standard Series 2	14-Long Series 1	16-Standard Series 2	16-Long Series 1	18-Standard Series 2	18-Long Series 1	20-Long Series 1	22-Long Series 1	24-Long Series 1
B Dia. Max.	.553	.553	.678	.678	.928	.928	1.054	1.054	1.178	1.178	1.303	1.428	1.553
F Thread	½-28	½-28	⅝-28	⅝-28	⅞-28	⅞-28	1-28	1-28	1⅛-28	1⅛-28	1¼-28	1⅜-28	1½-28
G Max. Sq. Flange Recept.	.820	.820	.945	.945	1.133	1.133	1.258	1.258	1.351	1.351	1.475	1.570	1.711
G Max. Cable Recept. Flats	.565	.565	.690	.690	.940	.940	1.066	1.066	1.190	1.190	1.315	1.440	1.565
G Single Hole Mtg. Recept. & Herm. Seal "D" Hole Recept.	.989	.989	1.114	1.114	1.401	1.401	1.526	1.526	1.651	1.651	1.776	1.901	2.026
H ±.005	.594	.594	.719	.719	.906	.906	.969	.969	1.062	1.062	1.156	1.250	1.375
K Dia. Max. Cable Recept.	.780	.780	.900	.900	1.150	1.150	1.280	1.280	1.400	1.400	1.525	1.650	1.775
K Dia. Max. Single Hole Mtg. Recept. & Herm. Seal Single Hole	1.072	1.072	1.197	1.197	1.510	1.510	1.635	1.635	1.745	1.745	1.870	1.995	2.120
K Dia. Max. Plug	.850	.850	.975	.975	1.225	1.225	1.350	1.350	1.475	1.475	1.624	1.749	1.874
K Dia. Max. Herm. Seal Solder Flange Recept.	.945	.945	1.070	1.070	1.320	1.320	1.446	1.446	1.570	1.570	1.816	1.941	2.066
L ±.005	.605	.605	.730	.730	.980	.980	1.105	1.105	1.230	1.230	1.355	1.480	1.605
N Thread	⅝-20	⅝-20	¾-20	¾-20	1-20	1-20	1⅛-20	1⅛-20	1¼-20	1¼-20	1⅜-20	1½-20	1⅝-20
P Dia. ±.005	.635	.635	.760	.760	1.010	1.010	1.135	1.135	1.260	1.260	1.385	1.510	1.635
Q Max.	.710	.843	.710	.843	.710	.843	.710	.843	7.40	.873	.903	.903	.903
R Dia. ±.005	.661	.661	.786	.786	1.036	1.036	1.162	1.162	1.286	1.286	1.411	1.536	1.661

ASTRO/348

CONTACTS



SOCKET



PIN

DIMENSIONS

Size	A Max.		B Max.		C Max.		D Ref.		Current Rating
	Series 2	Series 1	Series 2	Series 1	Series 2	Series 1	Series 2	Series 1	
23-22	.050	.050	.051	.051	.028	.028	.713	1.043	5.0 Amps
23-28	.050	.050	.051	.051	.028	.028	.713	1.043	1.5 Amps
20-20	.078	.078	.078	.078	.041	.041	.718	1.048	7.5 Amps
16-16	.103	.103	.113	.113	.063	.063	.718	1.048	13.0 Amps
12-12	.158	.158	.161	.161	.095	.095	.718	1.048	23.0 Amps

TABLE OF POWER CONTACTS

Contact Size		Wire Size	Amphenol Part Number		MS Part Number	
			Socket	Pin	Socket	Pin
23-22	Series 2 Contacts	#22, #24, #26	348-100-2201S-02	348-100-2202P-02	MS90460A23-22	MS90461A23-22
23-28		#28, #30, #32	348-100-5047S-02	348-100-5047P-02	MS90460A23-28	MS90461A23-28
20-20		#20, #22, #24	348-100-2000S-02	348-100-2000P-02	MS90460A20-20	MS90461A20-20
16-16		#16, #18, #20	348-100-1600S-02	348-100-1600P-02	MS90460A16-16	MS90461A16-16
12-12		#12, #14	348-100-1200S-02	348-100-1200P-02	MS90460A12-12	MS90461A12-12
23-22	Series 1 Contacts	#22, #24, #26	348-100-2203S-02	348-100-2202P-02	MS3343A23-22	MS90461A23-22
23-28		#28, #30, #32	348-100-5048S-02	348-100-5047P-02	MS3343A23-28	MS90461A23-28
20-20		#20, #22, #24	348-100-2003S-02	348-100-2000P-02	MS3343A20-20	MS90461A20-20
16-16		#16, #18, #20	348-100-1603S-02	248-100-1600P-02	MS3343A16-16	MS90461A16-16
12-12		#12, #14	348-100-1203S-02	348-100-1200P-02	MS3343A12-12	MS90461A12-12

Note: Shielded and thermocouple contacts available, consult factory.

FOR CONTACT FINISHES:
"A" 150°C. MS rating, use Amphenol P/N with -02 (see table).
"B" 200°C. MS rating, use Amphenol P/N with -03.
EXAMPLE: MS90460B23-22 is equivalent to 348-100-2201S-03.

TABLE OF THERMOCOUPLE CONTACTS

Contact Size		Material	Wire Size	Amphenol Part Number Socket	Pin
20-20	SERIES 2	LEADED COPPER	#20, #22, #24	348-100-5014S	348-100-5014P
	SERIES 1			348-100-5019S	348-100-5014P
	SERIES 2	ALUMEL		348-100-5015S	348-100-5015P
	SERIES 1			348-100-5020S	348-100-5015P
	SERIES 2	CHROMEL		348-100-5016S	348-100-5016P
	SERIES 1			348-100-5021S	348-100-5016P
	SERIES 2	IRON		348-100-5017S	348-100-5017P
	SERIES 1			348-100-5022S	348-100-5017P
	SERIES 2	CONSTANTAN		348-100-5018S	348-100-5018P
	SERIES 1			348-100-5023S	348-100-5018P

WIRE RANGE ACCOMMODATIONS

Wire Barrel Size	Wire Size	O.D. of Finished Wire, (Inch) 1/		Oversize Wire 2/	Wire Number (reference) 3/
28	32 30 28	0.030 min. 0.054 max.	.042 nominal	0.064 max.	MIL-W-16878
22	26 24 22	0.030 min. 0.054 max.	.042 nominal	0.064 max.	MS21985 MIL-W-81381 MIL-W-16878
20	24 22 20	0.041 min. 0.081 max.	.062 nominal	0.085 max.	MS21985 MS21985 MIL-W-81044
16	18 16	0.066 min. 0.101 max.	.083 nominal	0.109 max.	MS21985 MIL-W-81044
12	14 12	0.097 min. 0.155 max.	.126 nominal	0.170 max.	MS18133 MIL-W-81044

1/ All contacts may be assembled with either minimum or maximum diameter wire as shown or in any combination thereof. When using groupings of oversize wire, they shall be randomly distributed.

2/ 50 percent of the contacts in a given insert arrangement may be assembled with oversize wire up to and including the maximum diameter shown; however, the remaining 50 percent shall not exceed the nominal finished wire diameter nor shall they be less than the minimum finished wire diameters.

3/ Wire numbers are for reference only and are not intended to restrict the use of acceptable wire-types with these connectors.

Shielded Contacts

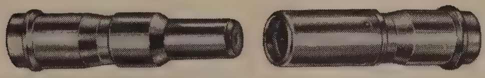


TABLE OF SHIELDED CONTACTS — Dimens. Same as Power Contacts 16-16 & 12-12.

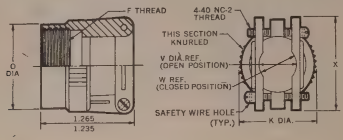
Contact Size		Cable* Accommodation	Amphenol Part Number Socket	Pin	MS Part Number Socket	Pin
16	SERIES 2	RG-178A/U RG-196A/U	348-100-6010S-02	348-100-6010P-02	N/A	N/A
	SERIES 1		348-100-6011S-02	348-100-6010P-02	N/A	N/A
16	SERIES 2	REVERE WH-95623	348-100-6014S-02	348-100-6014P-02	N/A	N/A
	SERIES 1		348-100-6015S-02	348-100-6014P-02	N/A	N/A
12	SERIES 2	RG-187A/U RG-188A/U RG-179B/U	348-100-6000S-02	348-100-6000P-02	N/A	N/A
	SERIES 1		348-100-6005S-02	348-100-6000P-02	N/A	N/A
12	SERIES 2	RAYCHEM 48-950	348-100-6001S-02	348-100-6001P-02	N/A	N/A
	SERIES 1		348-100-6006S-02	348-100-6001P-02	N/A	N/A
12	SERIES 2	RG-180B/U RG-195A/U MICRODOT 293-3922	348-100-6002S-02	348-100-6002P-02	N/A	N/A
	SERIES 1		348-100-6007S-02	348-100-6002P-02	N/A	N/A
12	SERIES 2	MICRODOT 250-4070	348-100-6003S-02	348-100-6003P-02	N/A	N/A
	SERIES 1		348-100-6008S-02	348-100-6003P-02	N/A	N/A
12	SERIES 2	RAYCHEM 48-502	348-100-6004S-02	348-100-6004P-02	N/A	N/A
	SERIES 1		348-100-6009S-02	348-100-6004P-02	N/A	N/A
12	SERIES 2	REVERE WH-95623	348-100-6013S-02	348-100-6012P-02	N/A	N/A
	SERIES 1		348-100-6012S-02	348-100-6012P-02	N/A	N/A

* Cables shown are typical for that contact pin. Consult factory for contact section if your cable requirements are not shown.

ASTRO/348 HARDWARE ACCESSORIES

STRAIGHT CABLE CLAMPS

Dimensions in inches.
Dimensions are the same for Series 1 and Series 2 Connectors.
Cable clamp usage is recommended to prevent excessive strain from being applied to the wire terminations.



Notes: 1. Dimensions are after plating.

Support cable or wire at the connector and prevent twisting, pulling and strain on the wire terminations.

BASIC MILITARY PART NUMBER M81511/13

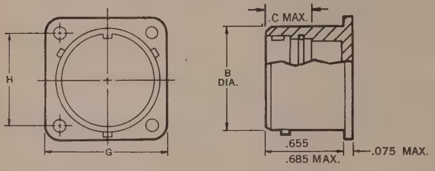
Amphenol Part No.	Shell Size	F Thread	K Dim. Max.	O Dia. Max.	V Dia. Ref.	W Ref.	X Dim. Max.
348-260-08001	8	½-28UNEF-2B	.650	.555	.125	.062	.775
348-260-10001	10	⅝-28UN-2B	.775	.680	.250	.125	.955
348-260-14001	14	⅞-28UN-2B	1.022	.930	.500	.250	1.145
348-260-16001	16	1-28UN-2B	1.150	1.056	.625	.357	1.210
348-260-18001	18	1⅛-28UN-2B	1.280	1.180	.750	.500	1.330
348-260-20001	20	1¼-28UN-2B	1.400	1.305	.875	.625	1.470
348-260-22001	22	1⅜-28UN-2B	1.525	1.430	1.000	.625	1.580
348-260-24001	24	1½-28UN-2B	1.650	1.555	1.125	.750	1.720

1 Indicates Olive Drab Chromate Finish (150°C. Conn's.)
2 Indicates Dull Chromium Finish (175° and 200°C. Conn's.)

DUMMY RECEPTACLE

Dimensions in inches.

Note: Series 1 = Long Design



Notes: 1. Dimensions are after plating.
2. Dummy Receptacles are aluminum with finish noted.

Anchor disconnected plugs and prevent damage or accumulation of dirt on face of plugs.

BASIC MILITARY PART NUMBERS M81511/19 (Series 2) M81511/30 (Series 1)

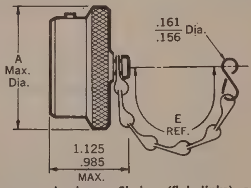
Amphenol Part No.	Shell Size	Use With	B Dia. Max.	C Max.	G Max.	H ±.005
348-167-08000-01	8	Series 2	.553	.485	.820	.594
348-292-08000-01	8	Series 1	.553	.625	.820	.594
348-167-10000-01	10	Series 2	.678	.485	.945	.719
348-292-10000-01	10	Series 1	.678	.625	.945	.719
348-167-14000-01	14	Series 2	.928	.485	1.133	.906
348-292-14000-01	14	Series 1	.928	.625	1.133	.906
348-167-16000-01	16	Series 2	1.054	.485	1.258	.969
348-292-16000-01	16	Series 1	1.054	.625	1.258	.969
348-167-18000-01	18	Series 2	1.178	.485	1.351	1.062
348-292-18000-01	18	Series 1	1.178	.625	1.351	1.062
348-292-20000-01	20	Series 1	1.303	.625	1.475	1.156
348-292-22000-01	22	Series 1	1.428	.625	1.570	1.250
348-292-24000-01	24	Series 1	1.553	.625	1.711	1.375

1 Indicates Olive Drab Chromate Finish (150°C. Conn's.)
2 Indicates Dull Chromium Finish (175° and 200°C. Conn's.)

CAPS AND CHAINS

Metal caps seal face of unmated connectors and keep out dirt and foreign materials.

PLUG CAP



Note: Caps are aluminum. Chains (flat links) and eyelets are stainless steel.
Series 1 = Long Design.

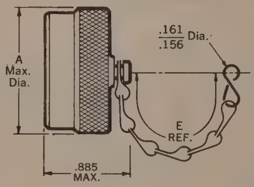
BASIC MILITARY PART NUMBER M81511/17 (Series 2) M81511/29 (Series 1)

Amphenol Part No.	Shell Size	A Max.	E Ref.
348-139-08001	8	.845	3.0
348-289-08001	8	.845	3.0
348-139-10001	10	.970	3.0
348-289-10001	10	.970	3.0
348-139-14001	14	1.220	3.5
348-289-14001	14	1.220	3.5
348-139-16001	16	1.345	3.5
348-289-16001	16	1.345	3.5
348-139-18001	18	1.470	3.5
348-289-18001	18	1.470	3.5
348-289-20001	20	1.595	3.5
348-289-22001	22	1.720	3.5
348-289-24001	24	1.845	3.5

1 Indicates Olive Drab Chromate Finish (150°C. Conn's.)
2 Indicates Dull Chromium Finish (175° and 200°C. Conn's.)

RECEPTACLE CAP

(For both Standard and Long)



BASIC MILITARY PART NUMBER M81511/18

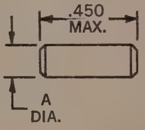
Amphenol Part No.	Shell Size	A Max.	E Ref.
348-140-08001	8	.845	3.0
348-140-10001	10	.970	3.0
348-140-14001	14	1.220	3.5
348-140-16001	16	1.345	3.5
348-140-18001	18	1.470	3.5
348-140-20001	20	1.595	3.5
348-140-22001	22	1.720	3.5
348-140-24001	24	1.845	3.5

1 Indicates Olive Drab Chromate Finish (150°C. Conn's.)
2 Indicates Dull Chromium Finish (175° and 200°C. Conn's.)

CONTACT SEALING PLUGS

Use with both Series 2 — Standard and Series 1 — Long Connectors.

Teflon sealing plugs assure proper connector sealing whenever all contacts are not employed.

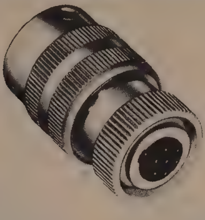


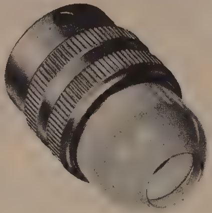
BASIC MILITARY PART NUMBER 81511/15

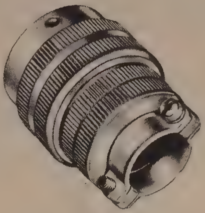
Contact Size	Amphenol Part No.	A Dia. Max.	Color Code
23-22/28	348-132-22000	.050	White
20-20	348-132-20000	.070	Red
16-16	348-132-16000	.095	Blue
12-12	348-132-12000	.145	Yellow

67 Series MinniE® Environment Resistant Connectors

Miniature, Quick-Disconnect, Bayonet-Lock Connectors


E
With unitized grommet for individual use seal


P
Includes potting mold


C
Vise action with two screw strain relief

Environmentally Sealed

- Choice of unitized back end grommet or provision for potting. Both exceed moisture resistance requirements of MIL-C-5015.
- Face seal gasket has individual barriers to isolate each contact.
- No derating for altitude is required up to 70,000 feet if the sealed connectors are mated.
- Sealed connectors take 1500 V RMS at 70,000 feet.
- Vibration resistance per Method 204, MIL-STD-202A is 10 to 2,000 cps at 20 G's.
- Temperature cycling range per MIL-C-5015 is −67°F to
- +257°F.

Lightweight and Convenient

- Flattened incline angle of bayonet slots makes mating easier.
- Clamp and grommet combine to form a unitized seal for ease of assembly and maintenance.
- Connectors convert easily from E style to P style and vice versa.
- Yellow ring on receptacle shell gives visual indication of connector engagement.
- Weight is about half that of standard connectors with same number of contacts.
- Eighteen different insert configurations are available.
- Alternate insert positions are available.

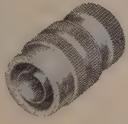
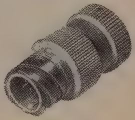
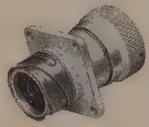
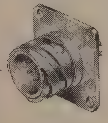
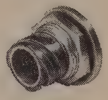
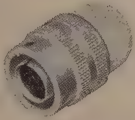
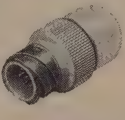
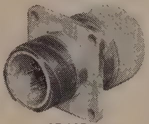
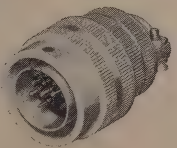
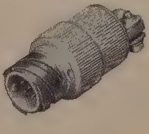
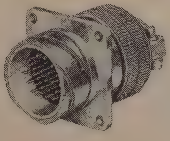
Efficient and Long-Lasting

- Spring-loaded coupling ring provides positive locking action in bayonet slot and a constant compensating force to counteract compression set of resilient face seal.
- Stainless steel bayonet slots and pins reduce wear and friction. Three-pin bayonet coupling minimizes rocking action of the mated plug and receptacle.
- Hooded female contacts resist test prod damage.
- Hard insert dielectric and resilient face seal on pin inserts positively retain contacts so there is no possibility of their being pushed out of the insert.

Hermetically Sealed

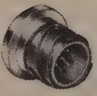
Hermetically sealed 67 Series connectors are available in two shell styles — hex nut mounted receptacles. Each shell style is available in 11 different insert configurations with up to 48 contacts.

Wide Variety for Wide Range of Applications

	Plugs	Cable-to-Cable Receptacles	Wall Receptacles	Panel Mounting Receptacles	Round Flange Receptacles
With Grommet for Individual Wire Seal	 67-06E	 67-01E	 67-00E	 67-02E	 67-03E
With Form for Potting Seal	 67-06P	 67-01P	 67-00P		
With Standard Type Cable Clamp for Unjacketed Individual Wire Leads	 67-06C	 67-01C	 67-00C		

Hermetically Sealed

67-04H
Hermetically Sealed
Round Flange
Receptacle
Front Mount

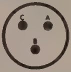

67-04H(105)
Hermetically Sealed
Round Flange
Receptacle —
Stake-on Solder
Flange
Front Mount

67 Series MinniE Environment Resistant Connectors (Continued)

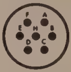
Inserts Available (showing front face of pin insert)

SIZE 12 INSERTS

*12-60
3 #16 contacts

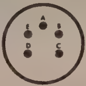


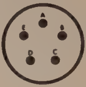
*12-7
7 #20 contacts



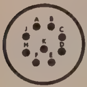
SIZE 14 INSERTS

*14-5
5 #20 contacts

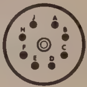




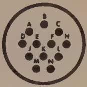
14-63
5 #16 contacts



*14-9
9 #20 contacts



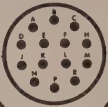
*14-61
8 #20 plus
1 shielded contact

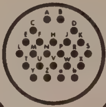


*14-12**
12 #20 contacts

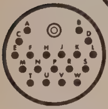
SIZE 18 INSERTS

*18-64
14 #16
contacts

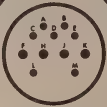




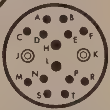
*18-24**
24 #20
contacts



*18-62
19 #20 plus
1 shielded contact



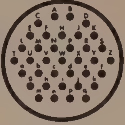
18-65
7 #20 and
4 #16 contacts



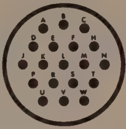
18-16
2 shielded contacts
2 #16 contacts
12 #20 contacts

SIZE 20 INSERTS

*20-37**
37 #20
contacts

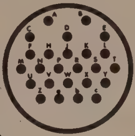


20-66
19 #16
contacts

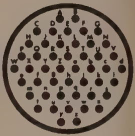


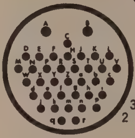
SIZE 22 INSERTS

22-67
25 #16
contacts

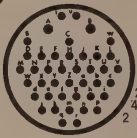


*22-48
48 #20
contacts





22-68
36 #20 and
2 #16 contacts

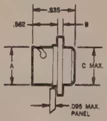


22-69
40 #20 and
2 #16 contacts

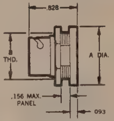
*Available in hermetically sealed receptacles.
**Also available with Poke-Home contact insert.
Current rating—#20 contact: 7.5 amps, #16 contact: 12 amps.
Shielded contact: 7.5 amps.

All inserts listed here are available for all shell styles and classes except hermetics. Inserts available in hermetically sealed receptacles are indicated by an asterisk. (The first two digits of the insert number show the shell size; the 3rd and 4th digits are a code for the insert configuration.)

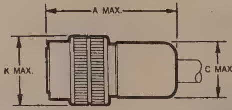
67-02E


.835
.562
B
A
C MAX.
.095 MAX.
PANEL

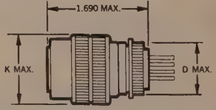
67-03E


.828
B
THD.
A DIA.
.156 MAX.
PANEL
093

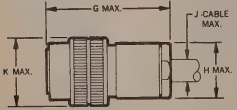
67-06P


A MAX.
K MAX.
C MAX.

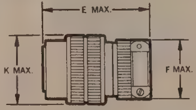
67-06E


1.690 MAX.
K MAX.
D MAX.

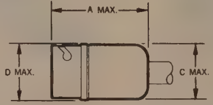
67-06J


G MAX.
J -CABLE
MAX.
K MAX.
H MAX.

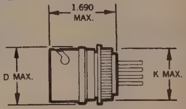
67-06C


E MAX.
K MAX.
F MAX.

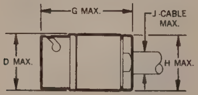
67-01P


A MAX.
D MAX.
C MAX.

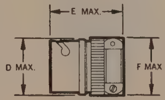
67-01E


1.690
MAX.
D MAX.
K MAX.

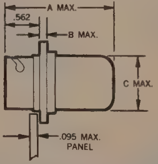
67-01J


G MAX.
J -CABLE
MAX.
D MAX.
H MAX.

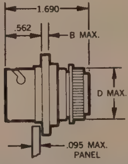
67-01C


E MAX.
D MAX.
F MAX

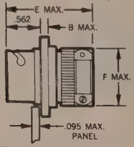
67-00P


A MAX.
.562
B MAX.
C MAX.
.095 MAX.
PANEL

67-00E


1.690
.562
B MAX.
D MAX.
.095 MAX.
PANEL

67-00C


E MAX.
.562
B MAX.
F MAX.
.095 MAX.
PANEL

Connector Size	A	B	C	D	E	F	G	H	J	K
12	1.687	.062	.795	.895	1.870	.817	1.937	.706	.250	.957
14	1.687	.093	.920	1.000	1.870	.967	1.937	.812	.375	1.082
18	1.687	.093	1.170	1.250	1.870	1.185	1.937	1.062	.656	1.375
20	1.734	.093	1.223	1.375	1.970	1.312	2.312	1.187	.750	1.500
22	1.734	.093	1.352	1.468	1.970	1.440	2.312	1.317	.875	1.625

165 Series Miniature MS-Type Connectors

COMPACT AND CONVENIENT

Connectors in the 165 Series are only about one-third the size and weight of standard MS connectors with the same number of contacts.

Bayonet coupling provides quick disconnect.

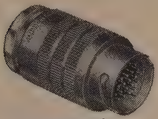
WIDELY APPLICABLE

Eight different insert configurations and five different shell styles in two sizes — large and small — provide enough variations for a wide range of applications.

Plugs and cable receptacles are available with either a built-in cable clamp to provide positive strain relief or with provision for potting. On all connectors, alternate insert positions are available for gang mounting.

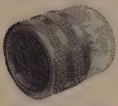
WEATHERPROOF AND PRESSURE PROOF

When mated, 165 Series connectors are pressure proof and completely waterproof. The connectors using female inserts feature a sandwich construction with the insert spun into a cartridge; the connectors are factory sealed to prevent leakage. O-ring seals are used in both plugs and receptacles. They meet the exacting pressure seal requirements of MIL-C-5015, Class C construction.

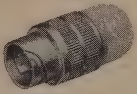


Cable Receptacle for Jacketed Cable

Plug for Jacketed Cable



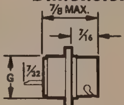
Plug for Potting

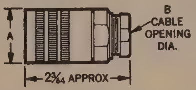


Cable Receptacle for Potting

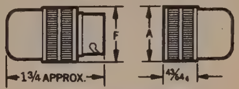
Square Flange Receptacle

Dimensions (Inches)

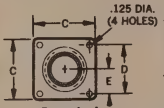




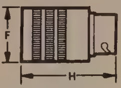
Plug



Potting Constructions



Receptacle



Cable Receptacle

	A	B	C	D	E	F	G	H
Small	57/64	3/8	1 1/16	25/32	25/64	7/8	13/16	1 59/64
Large	1 9/64	21/32	1 5/16	31/32	31/64	1 1/8	1 1/16	1 15/16

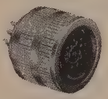
See 182 Series for insert positions

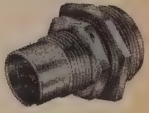
Connectors with Shielded Contact and Ground Shield

- Important in aircraft and instrumentation applications, for example, fuel gaging.
- Shield continuity was recently upgraded by additon of heat treated beryllium copper finger pressure members to the socket shield.
- Available in a number of shell styles, including potting construction plug and cable receptacle, plugs with spring-loaded coupling ring, and square flange receptacle.
- Available also in combination of environmentally sealed and cable clamp construction.
- Two different insert configurations

  Eight #20 contacts,
  1 shielded contact

  Nineteen #20 contacts,
  1 shielded contact





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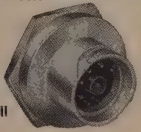
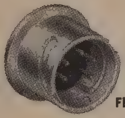
182 Series Hermetic Miniature MS-Type Connectors

Mate With 165 Series



Type 2 Threaded Back Shell



Type 1 Solder Flange Shell

HIGHLY RELIABLE

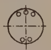
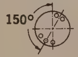
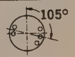
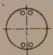
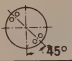
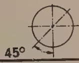
The 182 Series features a rugged compression seal which is extremely strong and highly resistant to thermal shock; it also has very high insulation resistance. To assure strictest adherence to requirements, 182 Series receptacles are tested by mass spectrometer at the maximum sensitivity of the instrument.

WIDELY APPLICABLE

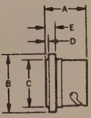
Like 165 Series connectors, 182 Series receptacles come in two sizes — large and small — and are available in most 165 Series insert configurations. There are two shell styles — Type I, Solder Flange, and Type II, Threaded Back Shell, with and without O ring. There are two types of contacts available: solder pocket, and flat and pierced. Alternate insert positions (shown at right) allow for gang mounting.

Alternate Insert Positions

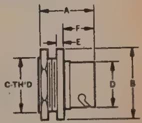
Applicable to both 165 and 182 Series

	Normal	Position X	Position W
Small			
Large			

Dimensions (Inches)



Type 1



Type 2

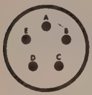
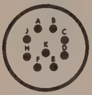
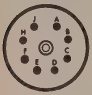
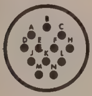
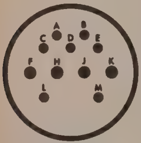
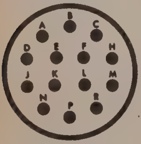
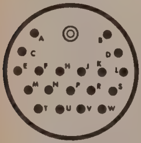
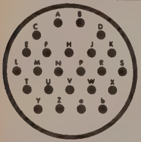
Type I	A ±.006	B ±.006	C ±.003	D ±.002	E ±.006	F —
Small	.641	.841	.685	.042	.109	—
Large	.641	1.082	.926	.042	.204	—
Type II	±.009	±.006	C-Thrd.	±.006	±.006	±.006
Small 182-1	.791	1.064	13/16-28	.688	.127	.439
182-1-1001	.791	1.064	13/16-28	.688	.127	.439
182-1-1008	.791	1.064	13/16-28	.688	.127	.439
182-15-1002	.791	1.064	13/16-28	.688	.127	.439
All Others	.783	.877	3/4-20	.688	.074	.534
Large	.822	1.439	1 1/16-18	.925	.127	.439

STANDARD CIRCULAR CONNECTORS

BUNKER RAMO AMPHENOL

165 and 182 Series Availability and Ordering Information

Showing front face of pin insert, socket insert is reversed.

INSERT ARRANGEMENTS (Approx. 3/5 actual size)		Insert Style	Plug	Receptacle Sq. Flange	Cable Receptacle	Hermetic Seal Receptacles				Potting Constructions	
						Type 1— Solder Flange Shell		Type 2— Threaded Back Shell		Plug	Cable Receptacles
						Flat & Pierced Contacts	Solder Pocket Contacts	Flat & Pierced Contacts	Solder Pocket Contacts		
	5 #20 contacts Current rating (Amperes) 7.5 Voltage rating (Volts RMS at sea level) 600	PIN	165-33	165-35	165-35-1002	182-35-1000	182-35-1001	182-35	182-35-1002	165-33-1000	165-35-1000
		SOCKET	165-34	165-36	165-36-1003	—	—	—	—	165-34-1000	165-36-1000
	9 #20 contacts Current rating (Amperes) 7.5 Voltage Rating (Volts RMS at sea level) 500	PIN	165-13	165-15	165-15-1002	182-15	182-15-1000	182-15-1001	182-15-1002*	165-13-1000	165-15-1000
		SOCKET	165-14	165-16	165-16-1003	—	—	—	—	165-14-1000	165-16-1000
	8 #20 contacts 1 Shielded Current rating (Amperes) 10 Voltage rating (Volts RMS at sea level) 500	PIN	165-82	165-73	165-73-1001	182-1-1007	182-1-1000	182-1-1008*	182-1-1001*	165-82-1000	165-73-1000
		SOCKET	165-61-1008	165-83	165-83-1001	—	—	—	—	165-61	165-83-1000
	12 #20 contacts Current rating (Amperes) 7.5 Voltage rating (Volts RMS at sea level) 500	PIN	165-9	165-11	165-11-1002	182-11-1001	182-11	182-11-1005	182-11-1002	165-9-1000	165-11-1000
		SOCKET	165-10	165-12	165-12-1002	—	—	—	—	165-10-1000	165-12-1000
	7 #20 contacts 4 #16 contacts Current rating (Amperes) no. 20 7.5 no. 16 17 Voltage rating (Volts RMS at sea level) 500	PIN	165-17	165-19	165-19-1002	—	—	—	—	165-17-1000	165-19-1000
		SOCKET	165-18	165-20	165-20-1003	—	—	—	—	165-18-1000	165-20-1000
	14 #16 contacts Current rating (Amperes) 17 Voltage rating (Volts RMS at sea level) 500	PIN	165-29	165-31	165-31-1003	182-31	182-31-1002	182-31-1003*	182-31-1001*	165-29-1000	165-31-1000
		SOCKET	165-30	165-32	165-32-1006	—	—	—	—	165-30-1000	165-32-1000
	19 #20 contacts 1 Shielded Current rating (Amperes) 10 Voltage rating (Volts RMS at sea level) 500	PIN	165-86	165-84	165-84-1001	182-2-1004	182-2-1000	182-2-1005*	182-2-1001*	165-86-1000	165-84-1000
		FEMALE	165-62-1007	165-85	165-85-1001	—	—	—	—	165-62	165-85-1000
	24 #20 contacts Current rating (Amperes) 7.5 Voltage rating (Volts RMS at sea level) 500	PIN	165-25	165-27	165-27-1005	182-27-1000	182-27-1006	182-27*	182-27-1005*	165-25-1000	165-27-1000
		SOCKET	165-26	165-28	165-28-1003	—	—	—	—	165-26-1000	165-28-1000

*Supplied with "O" ring.

MULTI-PURPOSE SUBMINIATURE CONNECTORS

BUNKER RAMO AMPHENOL

115 SERIES

In transducers, pressure switches, vibration monitors, accelerometers, constant speed drives . . . in aerospace, oceanographic, or medical instrumentation . . . wherever lightweight, rugged, high-reliability connectors are needed to withstand very high temperatures, severe vibration and corrosion, 115 Series subminiatures are the connectors to consider.

Tiny and Tough Standard Version

Designed to stand up under grueling conditions, 115 Series 2 Contact connectors are subminiature in size but "big" in performance. Most of the connectors in this series weigh less than ½ ounce and, when mated, are less than 1¼ inch long. Yet their current rating is 7.5 amps and their voltage rating is 1500V (RMS). In the standard version, some of the connectors have an operating range of −54°C (−65°F) to 204°C (400°F).

Fuel-resistant Viton "B" face seals, flame-retardant diallyl isophthalate inserts, and corrosion-resistant rhodium over silver plated contacts enable these connectors to work well even under adverse conditions.

When waterproofing is necessary, any of the 115 Series subminiature connectors can be potted.

Pin contacts are molded in, and socket contacts are held in place with "C" washers. The inserts are held in the shells by spinning and/or bonding. Alternate insert positions are available.

The 115-5050 plug features a foolproof coupling ring locking mechanism that keeps the connector fully mated even under extreme vibration. It also features contacts which can be quickly crimped with the MS3191 tool, Amphenol No. 294-1166 with special positioners. Insertion and removal tools are not needed for the contacts.

1000°F High-Temperature Version

In addition to the many advantages offered by the standard version, the 115 Series high-temperature version provides for exceptionally high ranges of temperature. With stainless steel shells, contacts and hardware and with inserts of Amphenol ceramic, 115 Series high-temperature plugs serve excellently in temperatures up to 1000°F (538°C) or more.

SPECIFICATIONS

STANDARD VERSION

Shell	Nickel Plated Brass.
Contacts	Brass, rhodium over silverplate. Solder cups to take #20 AWG wire, except on 115-5050 plug which has crimped contacts which accept #18 wire.
Inserts	Diallyl isophthalate.
Face Seal	Viton "B", 65 durometer, on receptacles.
Current Rating	7.5 Amps.
Voltage Rating	1500V (RMS).
Insulation Resistance	5000 Megohms (min.) when tested as per MIL-STD-202, Method 302, Condition B.
Altitude Immersion	Meets requirements of Par. 4.6.11 MIL-C-26500B (USAF) when potted and mated.
Temperature Range	−54°C (−65°F) to 260°C (500°F).

HIGH-TEMPERATURE VERSION

Shell	Stainless Steel.
Contacts	Stainless Steel. Terminal ends have flats to facilitate welding or brazing of conductors.
Inserts	Ceramic.
Face Seal	
Current Rating	1.0 Amp.
Voltage Rating	2000V AC minimum @ 60 Hz.
Insulation Resistance	200,000 Megohms @ 50V DC @ 73°F. 400 Megohms @ 900°F.
Altitude Immersion	Not applicable.
Temperature Range	−73°C (−100°F) to 538°C (1000°F) and more.

Application Tools for No. 20 Crimp Socket Contacts on 115-5050 Connectors

- Crimp Tool — 294-1166
- Bushing Positioner — For 18 Ga. Wire, 294-1468 — For 20 Ga. Wire, 294-1469.

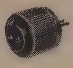
CONNECTOR AVAILABILITY

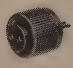
The connectors shown below constitute only a representative selection of the 115 Series subminiature connectors available. Through rearrangement or modification of components, many other configurations can be produced to match your specific requirements. Consult your Amphenol representative for the answers to your particular application.

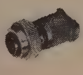
ALL DIMENSIONS SHOWN IN INCHES

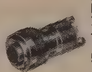
STANDARD VERSION

2 CONTACTS


115-5035 Plug
.562 dia. x .843
Mating Connectors:
115-5036, -5037, 5038, -5042, -5043 and -5060
Stainless steel, passivated, coupling ring.

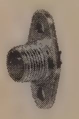

115-5035-1000 Plug (Same as 115-5035 except for keyway)
.562 dia. x .843
Mating Connector:
115-5043-1000
Keyway 30° counterclockwise. Stainless steel, passivated, coupling ring.

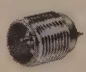

115-5035-1001 Plug
.687 dia. x 1.300
Mating Connectors:
115-5036, -5037, -5038, -5042, -5043 and -5060
Same as 115-5035 but has a mechanical strain relief clamp.


115-5050 Plug
.700 dia. x 1.500
Mating Connectors:
115-5036, -5037, -5038, -5042, -5043 and -5060
Improved version of 115-5053, including coupling ring locking mechanism & crimp Poke Home contacts.

115-5036 Receptacle
.532 dia. x .687
Mating Connectors:
115-5035, -5050 and 115-5035-1001
Flange notched 90° clockwise.

115-5037 Receptacle
.559 dia. x .687
Mating Connectors:
115-5035, -5050 and 115-5035-1001
Nickel plated steel housing silver brazed to connector.


115-5038 Receptacle
1.210 x .640 x .687
Mating Connectors:
115-5035, -5050 and 115-5035-1001
Nickel plated elliptical steel flange silver brazed to connector.


115-5042 Receptacle
7/16-27NS-2A x .687
Mating Connectors:
115-5035, -5050 and 115-5035-1001
Threaded shell (flangeless).

115-5040 Receptacle
.624 dia. x .776
Mating Connector:
115-5041
Hermetically sealed. Leakage less than .1 micron cu. ft. per hour.

115-5043 Receptacle
.532 dia. x .687
Mating Connectors:
115-5035, -5050 and 115-5035-1001
No notch on flange.

115-5043-1000 Receptacle (Same as 115-5043 except for key)
.552 dia. x .687
Mating Connectors:
115-5035-1000
Key 30° clockwise.

115-5060 Receptacle
.875 x .875 x .687
115-5060-1000 Receptacle
.750 x .750 x .687
Mating Connector:
115-5035, -5050 and 115-5035-1001
Nickel plated square steel flange silver brazed to connector.

115-5041 Plug
.625 dia. x .650
Mating Connector:
115-5040
Stainless steel, passivated, coupling ring.

HIGH TEMPERATURE VERSION

115-5059 Plug
.645 dia. x 1.460
For braided stainless steel armor wire.

115-5059-1 Plug
.645 dia. x 1.460
For 1/8" diameter 2-conductor hard-line cable.

115-5061 Plug
.562 Hex x 1.300
Like 115-5059-1 but smaller & lighter.

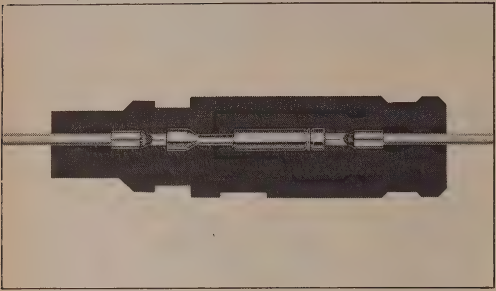
115-5066 Plug
.562 hex x 1.900
Like 115-5059-1 but good for 600°F and crimp contacts.

ENVIRONMENTAL-RESISTANT TRANSPORTATION CONNECTOR

BUNKER RAMO AMPHENOL

TRANSCON 44: BREAKTHROUGH IN DESIGN

Amphenol's 44 Series is an all resilient, one piece, waterproof connector. Amphenol design has incorporated crimp Poke-Home® contacts in five insert configurations. These 44 Series connectors offer high performance along with low cost, making this connector ideally suited for those applications where an environmentally sealed yet inexpensive connector is needed.



USER BENEFITS

- **Environmentally Sealed.** Waterproof seals prevent liquids from entering the connector to cause electrical or electronic circuit failures.
- **Longer Service Life.** The unique one-piece shell and insert construction minimize the number of parts and failure modes for predictably longer service life.
- **Durable.** The resilient connector body is abrasion resistant and is impervious to water, lubricants, fuel, ozone, and road salts.
- **Lower Installed Cost.** Punch-press contacts enable the use of automated stripping and crimping equipment resulting in a lower on-line production and installed assembly cost.
- **High Reliability.** The use of hooded female contacts in addition to the molded-in polarizing flat assures proper contact/connector alignment and eliminates the possibility of lost or cross-wired circuits.
- **Low Maintenance Cost.** Should the need arise, the connectors can be easily serviced in the field with the use of inexpensive hand crimp and insertion tools. This minimizes equipment down-time and required maintenance time.
- **Easy Mating.** Simple, positive, push-pull coupling and disconnect of connectors requires no special assembly instructions. Obvious visual and mechanical mating indicators help avoid damage to components resulting in lost or intermittent circuits.

NEW MATERIALS

Amphenol has incorporated a resilient material in the 44 Series which allows the insulator to be molded as one complete unit. This material proved to be the most successful under such conditions as salt spraying, vibration and shock. Added to this are Amphenol's Poke-Home® contacts made of a copper alloy with electro-tin plating. This combination makes the 44 Series not only highly reliable but less costly to use.

OPERATIONAL CHARACTERISTICS

Voltage Rating:	Limiting operating voltage at sea level - DC 250 Volts, AC 200 Volts RMS.
Current Rating:	5 amps continuous, 7-10 amp surge.
Temperature Range:	Continuous operation from —40°F to +255°F (—40°C to +125°C)

TERMINATION

A. Punch-press contacts utilize Essex type crimping equipment.

B. Contacts accept wire sizes of 14 AWG, 16 AWG, and 18 AWG with an overall wire insulation diameter range of .080 to .130 inches.

C. Standard contact packaging: 5,000 unit reels for semi-automatic machine crimping.

D. Contacts individually packaged for hand tool crimping applications.

TYPICAL APPLICATIONS

- 44 Series connectors can be used as truck accessory disconnects under the hood or frame, on axles or near the engine.
- Automotive applications could call for the 44 Series in systems such as anti-skid, brake warning, pressure warning or speed indication.
- Periphery equipment like toll booths, traffic signals or highway safety and lighting equipment also could have a need fulfilled by the 44 Series.
- Marine industry applications such as starter motors, distributors, batteries, controls and even fuel injection systems.
- Amphenol 44 Series connectors have excellent opportunities in the recreational vehicle where manufacturers are continually looking for better means of inter-connecting cars to trailer/campers.

AVAILABILITY

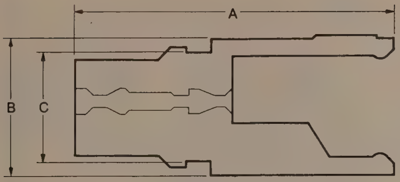
Amphenol's 44 Series connector family is available now. The 44 Series family now includes 2, 3, 4, 5, and 6 contact configurations.

® Registered trademark of Bunker Ramo Corporation.

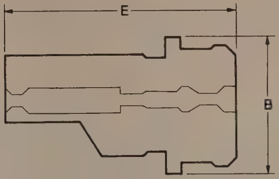
ENVIRONMENTAL-RESISTANT TRANSPORTATION CONNECTOR

BUNKER RAMO AMPHENOL

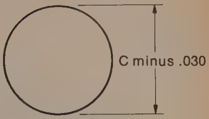
DIMENSIONS



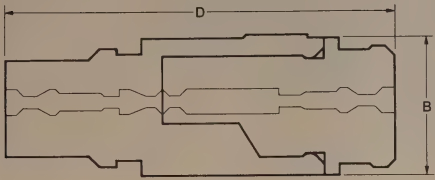
RECEPTACLE



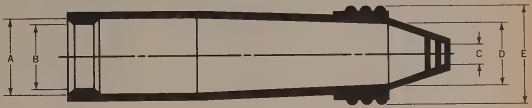
PLUG



PANEL CUTOUT



MATED



NEOPRENE BOOT

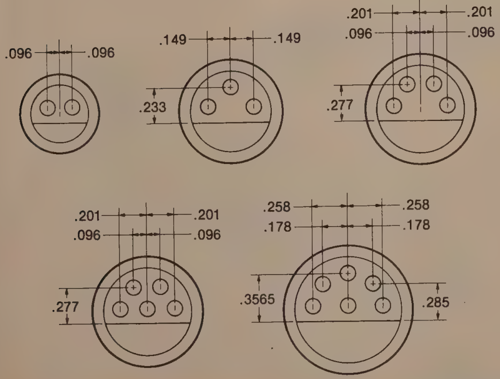
CONNECTORS

NUMBER OF CONTACTS	A Max.	B Max.	C ±.005	D Max.	E Max.
2	1.780	.620	.470	2.220	1.282
3	1.780	.721	.571	2.220	1.282
4	1.780	.832	.682	2.220	1.282
5	1.780	.832	.682	2.220	1.282
6	1.780	.946	.796	2.220	1.282

NEOPRENE BOOT (For Jacketed-Cable Applications)

NUMBER OF CONTACTS	A Max.	B Max.	C Max.	D Max.	E Max.
2	.456	.405	.127	.376	.600
3	.557	.506	.229	.457	.700

INSERT CONFIGURATIONS



PART NUMBERING CONFIGURATION

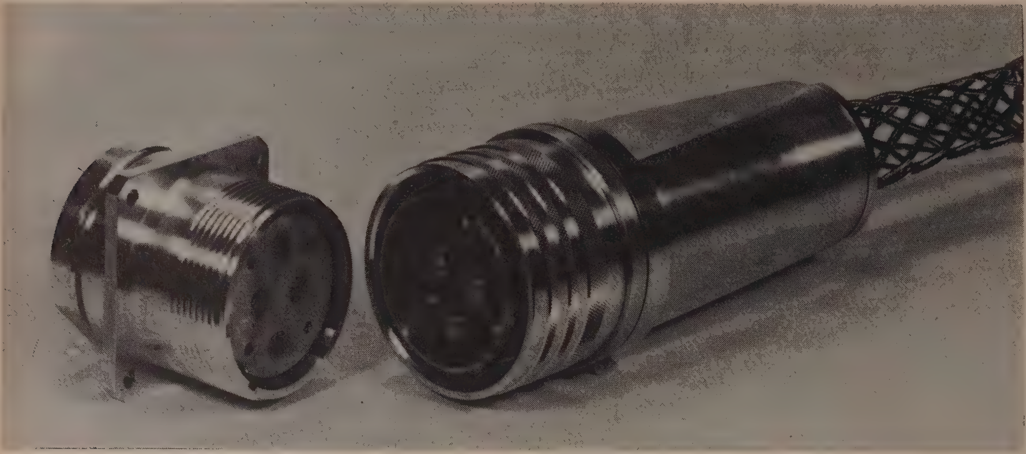
No. of Contacts	Receptacles	Plugs	Boots
2	44-104-10002-02	44-103-10002	44-105-10002-02
3	44-104-10003-02	44-103-10003	44-105-10003-02
4	44-104-10104-02	44-103-10004	N/A
5	44-104-10105-02	44-103-10005	N/A
6	44-104-10006-02	44-103-10006	N/A

CONTACTS:	Pin Contact — Part Number 44-100-1414P — Used In Receptacles Only. Socket Contact — Part Number 44-102-1414S — Used In Plugs Only.
TEMPERATURE RANGE:	Continuous operation from −40°F to +256°F (−40°C to +125°C).

POWER-DISTRIBUTION INTERCONNECT

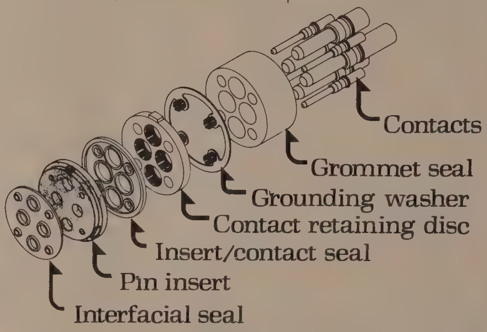
BUNKER RAMO AMPHENOL

229 SERIES

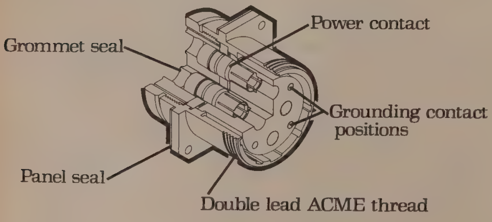


These Class L Connectors are a special design for power distribution using portable power cable. They are intended for use where they will be subjected to severe impact, such as dropping on concrete, run over by vehicles or subjected to extremes of field-service use. They are quenching if inadvertently separated under full load. They are waterproof when mated or unmated, capped or uncapped. They are designed to meet all OSHA and National Electrical Code requirements for grounding. They use insertable crimp-type contacts.

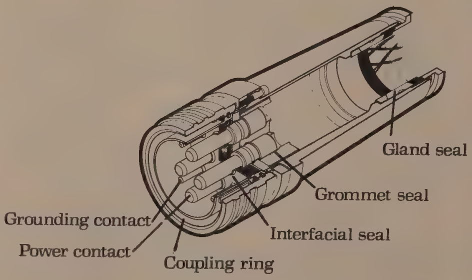
INTERNAL COMPONENTS


Contacts
Grommet seal
Grounding washer
Contact retaining disc
Insert/contact seal
Pin insert
Interfacial seal

WALL MOUNT RECEPTACLE


Power contact
Grommet seal
Grounding contact positions
Panel seal
Double lead ACME thread

STRAIGHT PLUG

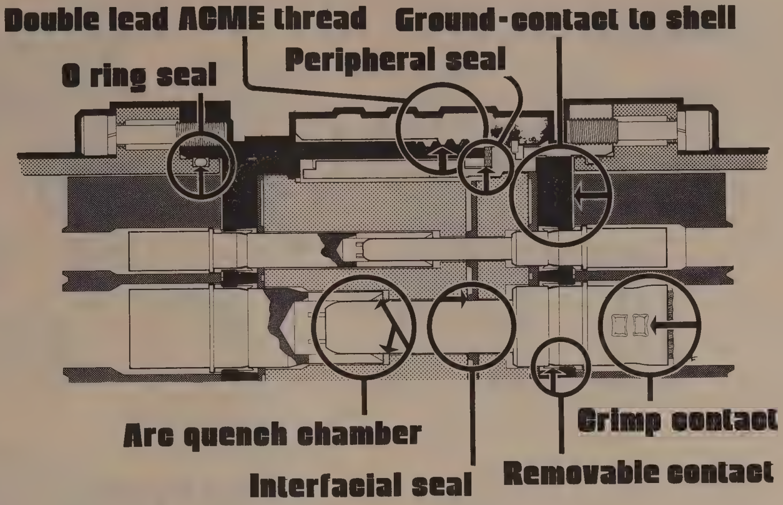

Gland seal
Grommet seal
Grounding contact
Interfacial seal
Power contact
Coupling ring

FOR LOCAL SOURCE OF SUPPLY SEE EEM VOL. 2 PAGE 462

POWER-DISTRIBUTION INTERCONNECT

BUNKER RAMO AMPHENOL

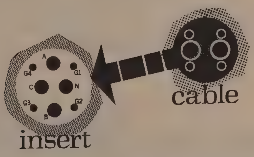
229 SERIES



FEATURES

- **SAFETY** — Complete protection for personnel and using equipment whether connectors are mated or unmated under rated load.
- **ARC QUENCHING** — Socket contacts are recessed within the socket insert to provide an arc-suppressing chamber within the connector. This assures positive safety for the user.
- **ENVIRONMENT RESISTANT** — Connector design and materials withstand the most severe operating conditions. See specifics in the Environmental Highlights Table.
- **CRIMP CONTACTS** — Connector design permits cable termination to contacts by solder or crimp method. Contacts are removable for repair or maintenance.

INSERT PATTERNS



- **MATCHED CONNECTOR/CABLE-CROSS SECTION PATTERNS** — Connector-insert patterns are designed to resemble and match cable cross sections. This feature greatly facilitates cable termination.
- **ACME-THREAD COUPLING** — Modified Acme thread will not clog under adverse conditions such as ice, snow, sand or mud. Quick coupling is an additional feature.
- **COMPLETELY WATERPROOF** — These connectors are completely waterproof assemblies regardless whether mated, or unmated, capped or uncapped. Sealing is accomplished by:

  Main-Joint Gasket
  "O"-Ring Seal
  Interfacial Seal
  Cable-Gland Seal
  Grommet Seal for Individual Conductors

Shell size	Current rating (amps)	Conductor size
28	40	6
32	60	4
44	100	1/0
*48	150	2/0
52	200	4/0

*Consult factory for availability.

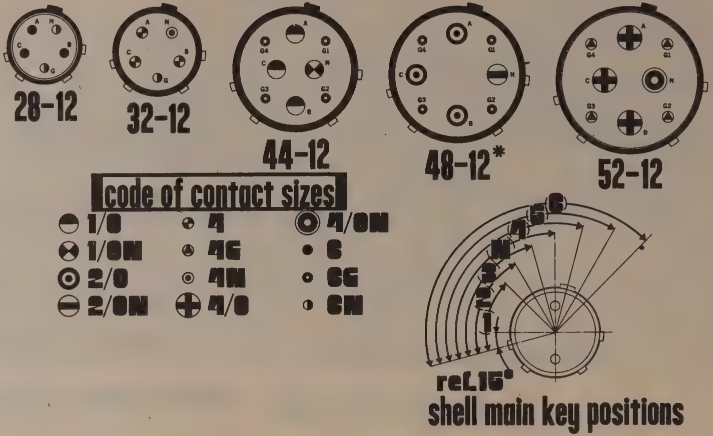
- **HIGH CURRENT CAPACITY** — Five current ratings are available to 200 amperes in a 52 shell-size connector having four each #4/0 power contacts and four each #4 ground contacts.
- **NO CROSS MATING** — Connector design is foolproof, with mating polarization detailed for specific voltage, current, frequency, phase and grounding requirements. Five-key shell polarizing prevents mating with a connector of different power characteristics.
- **RUGGED** — All metal parts are high-strength aluminum. End connectors meet a cable-assembly drop test from a height of 6″. Molded parts are of high-strength materials designed to withstand heavy and severe usage.

POWER-DISTRIBUTION INTERCONNECT

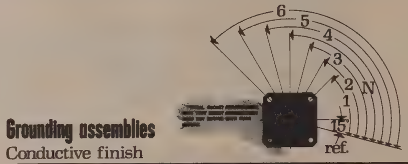
BUNKER RAMO AMPHENOL

229 SERIES

INSERT ARRANGEMENTS

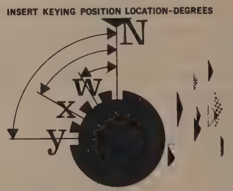

28-12
32-12
44-12
48-12*
52-12
A
N
B
C
G
G1
G2
G3
G4
code of contact sizes
1/0
1/0N
2/0
2/0N
4
4G
4N
4/0
4/0N
6
6G
6N
1
2
3
N
4
5
6
ref.15°
shell main key positions

VOLTAGE, PHASE AND GROUND CONTROL


6
5
4
3
2
N
1
15°
ref.
Grounding assemblies
Conductive finish

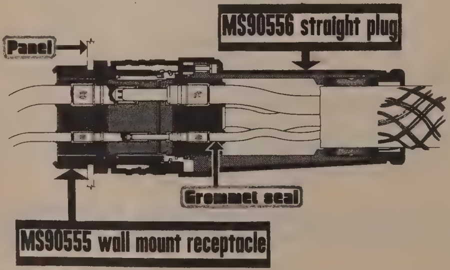
shell main key positions					
60 Hz & 400 Hz					
1 phase AC			3 phase AC		
120V	240V	120/240V	120/208V	240/416V	277/480V
4(120°)	5(135°)	4(120°)	4(120°)	5(135°)	6(150°)

FREQUENCY CONTROL

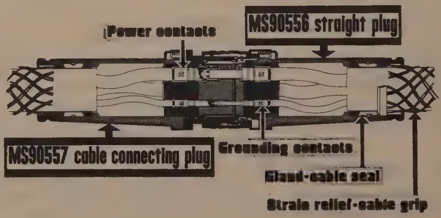

INSERT KEYING POSITION LOCATION-DEGREES
N
W
X
Y

Normal keying position used for DC and 60 Hz AC.
WXY positions for 400 Hz AC.

CABLE TO WALL MOUNT


MS90556 straight plug
Panel
Grommet seal
MS90555 wall mount receptacle

CABLE TO CABLE MOUNT


Power contacts
MS90556 straight plug
MS90557 cable connecting plug
Grounding contacts
Gland-cable seal
Strain relief-cable grip

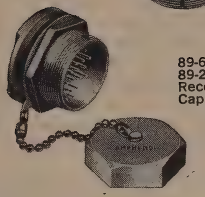
* Consult Factory for Availability.

SUBMERSION-PROOF CONNECTORS

BUNKER RAMO AMPHENOL

89 SERIES

89-61XX-XX (XX)
and 89-1XX-XX (XX)
Plug Assembly with
Cap and Chain.
Mates with
89-2XX-XX or
89-5XX-XX.



89-62XX-XX and
89-2XX-XX Panel
Receptacle with
Cap and Chain

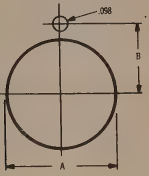
89-65XX-XX (XX)
and 89-5XX-XX (XX)
Cable
Receptacle with
Cap and Chain.

Connectors used in Ground Support Equipment must be rugged and reliable — and easy to handle under all conditions. Fully meeting these particulars, Amphenol's popular 89 series GSE connectors are used in many top missile projects. In fact, nearly every basic industry around the world depends on these heavy duty connectors. The growing list includes agriculture, mining, transportation, petroleum, marine, construction, and basic metals production. In short, they're a must whereever a rugged, completely waterproof electrical connection is required.

GSE connectors are completely waterproof and provide dependable service even when submerged in mud, ice or water. An internal rubber gasket in the cable clamp adapter, a type "W" washer at the mating faces and another washer used with panel mounting receptacles provide assured protection. Shells and cable clamp adapters are machined from top quality aluminum bar stock to achieve far greater strength than is possible to obtain with die cast methods.

For rough weather handling, coupling rings are extra-long and heavily grooved. Flats are conveniently located for field-servicing with standard open-end wrenches. Caps and chains are standard on all connectors.

Amphenol GSE connectors are available in a large number of standard MS inserts. They are interchangeable with AN/MS connectors with the same shell size and insert arrangement. Connectors exceed the water immersion requirements of MIL-C-12520. Inserts conform to MIL-C-5015.



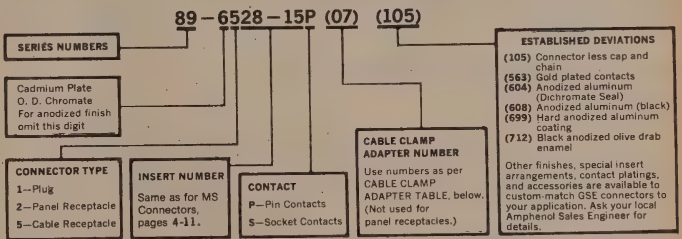
Shell Size	Dimensions — Inches A +.010 −.000	B ±.002
22	1.385	.796
28	1.760	.984
32	2.010	1.109

Shell Size	Dimensions — Inches 89-1 Length*	 Dia.	 89-2 Length*	 Dia.	 89-5 Length*	 Dia.	 Min. Chassis Hole Dia.	 Max. Chassis Thickness
22	5 1/16	1 21/32	1 13/32	1 7/8	5	1 3/4	1 25/64	5/16
28	5 1/16	2 1/32	1 13/32	2 1/4	5	2 1/8	1 49/64	5/16
32	5 3/16	2 11/32	1 13/32	2 1/2	5 1/8	2 3/8	2 1/64	5/16

* Includes cable clamp adapter

HOW TO ORDER 89 SERIES CONNECTORS

1. Select the 89 series connector to match the application: plug, panel receptacle, or cable receptacle.
2. Select the insert. Amphenol 89 Series inserts have the same size and arrangement as MS connector inserts of the same designation. Select the insert to meet your requirements from the Insert Configuration Table, pages 4-11. Then check this insert number against the 89 Series Insert Availability Table below to make sure it is available for Submersion-Proof Connectors.
3. From the table of cable clamp adapters below find the cable clamp adapter to fit the cable O.D. you will use.
4. Put together the part number as per the following typical example:



89 – 6528 – 15P (07) (105)

SERIES NUMBERS

Cadmium Plate
O. D. Chromate
For anodized finish
omit this digit

CONNECTOR TYPE
1—Plug
2—Panel Receptacle
5—Cable Receptacle

INSERT NUMBER
Same as for MS Connectors, pages 4-11.

CONTACT
P—Pin Contacts
S—Socket Contacts

CABLE CLAMP ADAPTER NUMBER
Use numbers as per CABLE CLAMP ADAPTER TABLE, below. (Not used for panel receptacles.)

ESTABLISHED DEVIATIONS
(105) Connector less cap and chain
(563) Gold plated contacts
(604) Anodized aluminum (Dichromate Seal)
(608) Anodized aluminum (black)
(699) Hard anodized aluminum coating
(712) Black anodized olive drab enamel

Other finishes, special insert arrangements, contact platings, and accessories are available to custom-match GSE connectors to your application. Ask your local Amphenol Sales Engineer for details.

EXAMPLES: To get a plug with a 32-6 insert, pin contacts, and cable clamp adapter that will take a .319" to .375" (tolerance included) cable jacket, you would order 89-132-6P(06). To get the same plug cadmium plated with an olive drab chromate conversion coating, you would order 89-6132-6P(06). To get the same cadmium plated O.D. finish plug with socket contacts, you would order 89-6132-6S(06).

If you don't want the cap and chain, add (105) to the part number. For example, to order the same cadmium plated O.D. finish plug with socket contacts as above but without cap and chain, you would order 89-6132-6S(06)(105).

89 SERIES INSERT AVAILABILITY

Insert Number	No. of Contacts	Insert Number	No. of Contacts	Insert Number	No. of Contacts	Insert Number	No. of Contacts
22-1	2	22-20	9	28-6	3	28-880	3
22-2	3	22-21	3	28-7	2	32-1	5
22-3	2	22-22	4	28-8	12	32-2	5
22-4	4	22-23	8	28-9	12	32-3	9
22-5	6	22-24	6	28-10	7	32-4	14
22-6	3	22-25	3	28-11	22	32-5	2
22-7	1	22-26	7	28-12	26	32-6	23
22-8	2	22-27	9	28-14	11	32-7	35
22-9	3	22-28	7	28-15	35	32-8	30
22-10	4	22-29	7	28-16	20	32-9	14
22-11	2	22-33	7	28-17	15	32-10	7
22-12	5	22-34	5	28-18	12	32-12	15
22-13	5	22-36	8	28-19	10	32-13	23
22-14	19	22-404	8	28-20	14	32-15	8
22-15	6	28-1	9	28-21	37	32-17	4
22-16	9	28-2	14	28-22	6	32-101	12
22-17	9	28-3	3	28-410	4	32-102	14
22-18	8	28-4	9	28-833	7	32-414	52
22-19	14	28-5	5	28-840	4		

CABLE CLAMP ADAPTERS

Cable Clamp Adapter No.	Will Take Cable O.D. of	Mates With Connector Size 22	 28	 32	Cable Clamp Adapter No.	Will Take Cable O.D. of	Mates With Connector Size 22	 28	 32
(04)	.188 to .250	X	X	X	(14)	.813 to .875		X	X
(05)	.250 to .312	X	X	X	(15)	.875 to .937		X	X
(06)	.313 to .375	X	X	X	(16)	.938 to 1.000		X	X
(07)	.375 to .437	X	X	X	(17)	1.000 to 1.062		X	X
(08)	.438 to .500	X	X	X	(18)	1.063 to 1.125		X	X
(09)	.500 to .562	X	X	X	(19)	1.125 to 1.187			X
(10)	.563 to .625	X	X	X	(20)	1.188 to 1.250			X
(11)	.625 to .687	X	X	X	(21)	1.250 to 1.312			X
(12)	.688 to .750	X	X	X	(22)	1.313 to 1.375			X
(13)	.750 to .812		X	X					

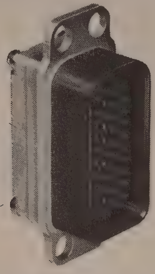
Clearance between maximum cable O.D. and minimum clamp I.D. has been allowed.

RACK AND PANEL CONNECTORS

BUNKER RAMO AMPHENOL

217 SERIES - MIL-C-26518

MINIATURE ENVIRONMENT RESISTANT CONNECTORS



A SIGNIFICANT ADVANCE IN THE STATE-OF-THE-ART — On the ground or in space, wherever there is a requirement for superior environmental protection, high performance, and minimum weight and bulk, 217 Series miniature environment resistant connectors are the answer.

In developing the 217 Series, Amphenol faced the problem of satisfying reliability, logistics, and present and anticipated environmental requirements for connector usage. To solve the problem, Amphenol had to generate advanced design concepts, formulate materials specifically for connector usage, and work out new production techniques. The resulting 217 Series connectors exceed the stringent requirements of both MIL-C-26518 (USAF) and MIL-C-38300 (USAF) for performance and reliability.

TWO VERSIONS — 217 Series connectors are available in two different versions:

1. Both mating faces in silicone rubber, conforming to MIL-C-26518 (USAF).
2. The plug (with socket contacts) incorporating the Amphenol Ultra-Mate® principle — a hard dielectric face conforming to MIL-C-38300 (USAF).

Since the receptacle (with pin contacts) is identical in both versions, there is complete inter-mateability with either the standard resilient plug or the Ultra-Mate.

COMPLETE ENVIRONMENTAL SEALING — Monoblock construction, with bonded interfaces between the three dielectric components (insert, anti-deflection disc, and grommet) eliminates air voids and protects connectors from degrading moisture and altitude conditions. Amphenol-developed silicone rubber dielectric provides resilience and unsurpassed resistance to tear, compression set, fluids, and high temperatures. On mating, insert faces compress to form a resilient dielectric seal around each individual contact. Together with monoblock construction, this puts void-free, continuous dielectric around each contact through the entire connector length.

A pressurizing seal around each contact prevents the passage of air or moisture through the contact hole, and twin sealing risers at each wire hole in the grommet double-seal each individual wire. A continuous barrier on the periphery of the socket insert mates with a recess around the pin insert to form an additional compression seal. A dynamic lip seal between mated shells constitutes still another barrier to dirt and moisture, and protects the integrity of the face seals.

GO/NO-GO RELIABILITY — When an Ultra-Mate connector mates, you can be sure there is proper electrical contact. In Ultra-Mate connectors of the 217 Series, the socket contacts are closely surrounded by hard dielectric. Where connector pins are slightly misaligned, the beveled entry of Ultra-Mase connectors guides them in right. However, if the pins are badly bent, the hard dielectric presents a closed entry and prevents mating. To insure contact seal, there is an additional resilient layer behind the hard face.

LIGHT WEIGHT AND HIGH CONTACT DENSITY — Connector shells are of high-strength, impact-extruded aluminum forgings with a high strength-to-weight ratio. The insert arrangement is designed for the maximum number of contacts within the area available.

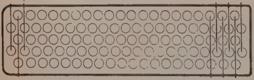
POKE-HOME® CONTACTS — The Poke-Home contacts can be individually inserted or removed without disassembling the connector or disturbing adjacent contacts. Even in the Ultra-Mate connectors, which have a hard dielectric face, they can be released from the front. These high temperature, MIL-C-26636 contacts are crimped quickly, consistently, and reliably with either hand or power tools, shown on page 2•500. They have high electrical conductivity, present a smooth configuration, and completely protect electrical contact pressure-members from environmental and handling damage. The contacts come in sizes 12, 16, 20, and shielded, with rhodium-over-silver plating.

VARIETY OF CONFIGURATIONS — Plugs and receptacles are available in two shell sizes with various contact arrangements. Contacts are crimp applied. Connectors are mated under tension by dual spring-loaded mounting assemblies and fixed bushings. Either the plug or the receptacle may be spring loaded. The receptacle mounts on the panel front or rear.

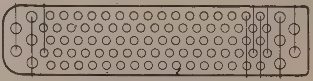
AVAILABLE INSERT ARRANGEMENTS

Showing Rear Face of Pin Inserts

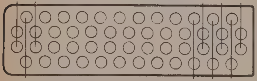
SIZE A SHELL



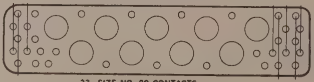
102—SIZE NO. 20 CONTACTS △



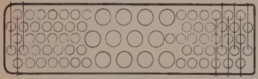
82—SIZE NO. 20 CONTACTS
10—SIZE NO. 16 CONTACTS △



50—SIZE NO. 16 CONTACTS

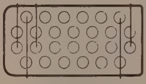


33—SIZE NO. 20 CONTACTS
9—SIZE NO. 2 SHIELDED CONTACTS △

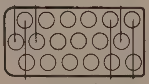


65—SIZE NO. 20 CONTACTS
*12—SIZE NO. 12 CONTACTS △

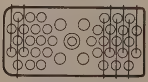
SIZE B SHELL



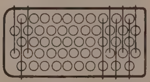
26—SIZE NO. 16 CONTACTS



*18—SIZE NO. 12 CONTACTS



36—SIZE NO. 20 CONTACTS
4—SIZE NO. 16 CONTACTS △
* 1—SIZE NO. 1 SHIELDED CONTACT



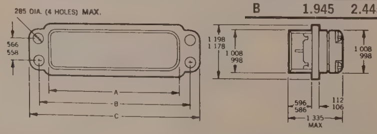
52—SIZE NO. 20 CONTACTS △

No. 1 Shielded contact is interchangeable with size no. 12 contact.
△ Available in closed entry hard dielectric "ULTRAMATE."
Special insert arrangements and coupling mechanisms may be obtained by contacting Amphenol Connector Division.

DIMENSIONS

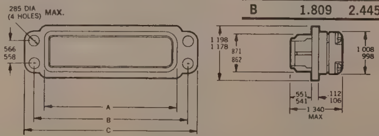
STYLE P (PIN INSERT) RECEPTACLES

Shell Size	A ±.005	B ±.004	C ±.005
A	3.375	3.875	4.296
B	1.945	2.445	2.866



STYLE S (SOCKET INSERT) PLUGS

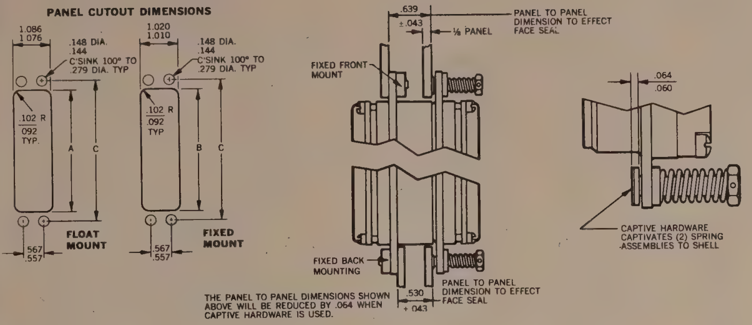
Shell Size	A ±.005	B ±.004	C ±.005
A	3.239	3.875	4.296
B	1.809	2.445	2.866



RACK AND PANEL CONNECTORS

BUNKER RAMO AMPHENOL

MOUNTING DIMENSIONS


PANEL CUTOUT DIMENSIONS
1.086
1.076
.148 DIA.
.144
C'SINK 100° TO
.279 DIA. TYP
.102 R
.092
TYP.
A
C
FLOAT MOUNT
.567
.557
1.020
1.010
.148 DIA.
.144
C'SINK 100° TO
.279 DIA. TYP
.102 R
.092
TYP
B
C
FIXED MOUNT
.567
.557
.639
±.043
⅛ PANEL
PANEL TO PANEL DIMENSION TO EFFECT FACE SEAL
FIXED FRONT MOUNT
FIXED BACK MOUNTING
.530
+.043
PANEL TO PANEL DIMENSION TO EFFECT FACE SEAL
THE PANEL TO PANEL DIMENSIONS SHOWN ABOVE WILL BE REDUCED BY .064 WHEN CAPTIVE HARDWARE IS USED.
.064
.060
CAPTIVE HARDWARE CAPTIVATES (2) SPRING ASSEMBLIES TO SHELL

Shell Size	Dimensions A	B	C
A	3.459 3.449	3.393 3.383	3.880 3.870
B	2.030 2.020	1.964 1.954	2.450 2.440

HOW TO ORDER 217 SERIES CONNECTORS

217—24C—A077S—10

SERIES DESIGNATION
217—

SHELL AND CONTACT TYPE

Use number in appropriate column below.

Socket Contacts (Plug)	Pin Contacts (Receptacle)	Number of Contacts
20	**21**	102
22	**23**	92
24	**25**	77
28	**29**	52
30	**31**	26
32	**33**	18
48	**49**	50
50	**51**	42
54	**55**	41

INSERT CONSTRUCTION

C—Closed Entry, Hard Dielectric, Ultra-Mate
R—Resilient Front

SHELL SIZE

A, B

TOTAL NUMBER OF CONTACTS

	#20	#16	#12	No. 1 Shielded	No. 2 Shielded
102	102				
092	82	10			
077	65		12		
052	52				
026		26			
018			18		
042	33				9
041	36	4		1	
050		50			

TYPE OF CONTACT

P—Pin
S—Socket

COMPONENTS INCLUDED

0 Plug or Receptacle Connector **with** contacts and spare sealing plugs.

1 Plug or Receptacle Connector **without** contacts.

2 Connector with captive retainer and spring mounting assemblies assembled to connector **without** contacts.

3 Same as 2 except **with** contacts included, packaged separately.

4 Connector, **without** contacts, with retainer nuts (MS* Fixed bushing) packaged separately.

5 Same as 4 except **with** contacts incuded, packaged separately.

6 Connector, **without** contacts, with spring loaded mounting assembly (MS**) packaged separately.

7 Same as 6 except **with** contacts included, packaged separately.

8 Connector without contacts, with retainer nuts (stainless) (MS* Fixed Bushing) packaged separately.

9 Same as 8 except with contacts included, packaged separately.

*Fixed Bushing:

MS No.	AMPHENOL No.
MS 24700-1	217-537 (Set of 4) Aluminum
MS 24700-2	217-955 (Set of 4) Stainless

**Spring Loaded Mounting Assembly:

MS 24695-1	217-678 (A Size) (Set of 4)
MS 24695-2	217-679 (B Size) (Set of 4)

SHELL FINISH

1 MIL-C-26518 hard coat anodize on front of shell, gold iridite on flange and on grommet ferrule
5 Gold Iridite
6 Black Anodize

The part numbering system has been set up to provide a complete and exact description through the part number. To find the Amphenol part number to order, put together the four groups of digits and letters that specify the particular 217 Series connector you want, as per the following example.

CONTACT DATA

Contact Size	Max. Current Rating	Wire Size	AMPHENOL Part No.		MS Part No.	
			Pin	Socket	Pin	Socket
No. 20	7.5 amps	24-22-20 AWG	48-1595-02	248-136-2001S-02	MS24254-20P	MS24255-20S
No. 16	22 amps	18-16 AWG	48-1825-02	248-136-1600S-02	MS24254-16P	MS24255-16S
No. 12	41 amps	14-12 AWG	48-1827-02	248-136-1200S-02	MS24254-12P	MS24255-12S
No. 1 (shielded)*						
Resilient	3 amps	**	48-1226-02	48-1227-02	MS27184-22P	MS27185-22S
Hard Front	3 amps	**	—	48-1227-50	—	MS27450-22S
No. 2 (shielded)						
Resilient	7.5 amps	***	48-2187-02	48-2188-02	MS27184-20P	MS27185-20S
Hard Front	1 amp	RG-195/U	48-2187-50	48-2188-50	—	—

* Replaces No. 12 power contact. Can accommodate cables RG179/U, RG179A/U, RG187/U, RG188/U and RG161/U as well as shielded contacts. Cables RG195/U, RG178/U, RG178A/U and RG196/U can also be accommodated with modification to shielded contacts.

** Cable MIL-C-27500-22KIN6 (Extruded) or 22 AWG per MIL-C-7078 type II.

*** Cable MIL-C-27500-22KIN6; 20KIN6; 18KIN6 (Extruded) or 22, 20, 18 AWG per MIL-C-7078 type II.

STANDARD CIRCULAR CONNECTOR TOOLS

BUNKER RAMO AMPHENOL

ASTRO/348® SERIES POWER CONTACTS AND SHIELDED CONTACTS

Amphenol Connector Division has a complete tool department maintained as a benefit to our connector customers. These tools are designed for Amphenol's Poke-Home® contacts used in rear insertion/front removable connectors.

Contact Size	Wire Size AWG	Max. Current Rating Amps	AMPHENOL Part No.		Crimping Tool	Contact Locator or Positioner	Crimp Jaw Setting	Insertion Tool	Removal Tool
			Pin	Socket					
12-12	14 12	23	348-100-1200P—XX	348-100-1200S—XX or 348-100-1203S—XX	294-1462 † or 294-1718 *	294-1722-01 or 294-1722-02	See Data Plate	294-33 (MS3323-12)	294-34 (Pin) (MS3342-12) 294-35 (Skt.) (MS3344-12)
16-16	20 18 16	13	348-100-1600P—XX	348-100-1600S—XX or 348-100-1603S—XX	294-1462 † or 294-1718 *	294-1722-01 or 294-1722-02	See Data Plate	294-30 (MS3323-16)	294-31 (Pin) (MS3342-16) 294-32 (Skt.) (MS3344-16)
20-20	24 22 20	7.5	348-100-2000P—XX	348-100-2000S—XX or 348-100-2003S—XX	294-1462 † or 294-1718 *	294-1722-01 or 294-1722-02	See Data Plate	294-27 (MS3323-20)	294-28 (Pin) (MS3342-20) 294-29 (Skt.) (MS3344-20)
23-22	26 24 22	5	348-100-2202P—XX	348-100-2201S—XX or 348-100-2203S—XX	294-268 †† or 294-297 **	294-1551-01 or 294-1551-02	See Data Plate	294-278 (MS3323-22)	294-286 (Pin) (MS3342-23) 294-287 (Skt.) (MS3344-23)
23-28	32 30 28	1.5	348-100-5047P—XX	348-100-5047S—XX or 348-100-5048S—XX	294-268 †† or 294-297 **	294-1551-01 or 294-1551-02	See Data Plate	294-278 (MS3323-22)	294-286 (Pin) (MS3342-23) 294-287 (Skt.) (MS3344-23)

Size 12 Shielded Contact	Outer Body Hex Crimp Tool (Includes Hex Die Set)	Center Pin Tools		Insertion Tool	Removal Tool
		Crimping Tool	Bushing		
348-100-6000P-XX -6000S-XX -6001P-XX -6001S-XX -6002P-XX -6002S-XX -6003P-XX -6003S-XX -6004P-XX -6004S-XX	294-525	294-297 (MS3198-1)	294-1816-01	294-33 ②	294-34 (Pin) (MS3342-12) 294-35 (Skt.) (MS3344-12)
348-100-6005S-XX -6006S-XX -6007S-XX -6008S-XX -6009S-XX -6012P-XX -6012S-XX -6013S-XX	294-525	294-297 (MS3198-1)	294-1816-01	294-33 ②	294-34 (Pin) (MS3342-12) 294-35 (Skt.) (MS3344-12)

Size 16 Shielded Contact	Outer Body Hex Crimp Tool (Includes Hex Die Set)	Center Pin Tools		Insertion Tool	Removal Tool
		Crimping Tool	Bushing		
348-100-6010P-XX -6010S-XX -6011S-XX	294-532	294-297 (MS3198-1)	294-1817-01	294-30 ③	294-31 (Pin) (MS3342-16) 294-32 (Skt.) (MS3344-16)

POKE-HOME CONTACTS AND TOOL APPLICATIONS

48 AND 248 SERIES CONTACTS FOR 48 AND 217 SERIES CONNECTORS

CONTACTS

When you order 48 or 217 Series connectors with contacts, the contact package contains enough contacts to complete the insert arrangement and have at least 2 spares left. The package also includes enough sealing plugs for at least 15% of the contacts in the insert, in any case a minimum of 3 sealing plugs. To order contacts and sealing plugs separately use the part numbers in the table below. Contacts may also be ordered in reels or bowls for use with automatic/feed crimping tools.

TOOLS

Note that various tools are available for crimping, inserting, and removing each size contact. However, the recommended tools are indicated in red.

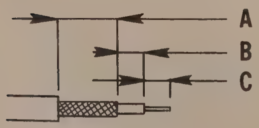
Contact Size	Wire Size AWG	Max Current Rating Amps	AMPHENOL Part No.		MS Part No.		Crimping Tool	Contact Locator or Positioner	Crimp Jaw Setting Dia.	Insertion Tool	Removal Tool	
			Pin	Socket	Pin	Socket					Standard Connector	Ultra-Mate Connector
No. 20	24 22 20	3.0 5.0 7.5	48-1595-02	48-100-2000S-02 or 248-136-2001S-02	MS24254-20P	MS24255-20S	294-90 294-126 294-186 294-243 294-293 294-358 294-506 294 1166 294-1264	Included Included Included Turret Hd. Turret Hd. 294-444 Auto/Feed 294 1169 294-1266	0335 .030-.041 Data Plate " " .030-.041 .030-.041 030-041 030-.041	294-88 (MS24256A20)	294-89 (MS24256R20)	294-203 (MS24256RH20)
No 16	18 16	16 22	48-1825-02	48-100-1600S-02 or 248-136-1600S-02	MS24254-16P	MS24255-16S	294-85 294-126 294-243 294-293 294-358 294-506 294 1166	Included Included Turret Hd. Turret Hd. 294-901 Auto/Feed 294-1170	.0415 Data Plate " " .041-.053 041-053 041-.053	294-96 (MS24256A16)	294-97 (MS24256R16)	294-180 (MS24256RH16)
No. 12	14 12	32 41	48-1827-02	48-1215-02 or 248-136-1200S-02	MS24254-12P	MS24255-12S	294-86 294-126 294-243 294-293 294-358 294-506 294-1166	Included Included Turret Hd. Turret Hd. 294-903 Auto/Feed 294-1171	0625 Data Plate " " .062-072 062-072 062-072	294-72 (MS24256A12)	294-73 (MS24256R12)	294-183 (MS24256RH12)
No 1 (Shielded) * Resilient Hard Front	** **	3 3	48-1226-02 —	48-1227-02 48-1227-50	MS27184-22P —	MS27185-22S MS7450-22S	See Below			294-72 † (MS24256A12)	294-73 † (MS24256R12)	294-264
No 2 (Shielded) Resilient Hard Front	** **	7.5	48-2187-02	48 2188-02	MS27184-20P	MS27185-20S				294-128 †	294-127 †	294-184 †

* Replaces No. 12 power contact. ** See cable application table below

† These tools are applicable to all #1 and #2 shielded contacts, respectively, not just contacts listed here.

NOTE: To maintain the environmental seal and to prevent the other contacts from becoming misaligned, insert a #12 contact, pin or socket as applicable, into any empty connector holes intended for a #1 shielded contact but left unused. Then seal with a sealing plug.

SHIELDED CONTACT CRIMPING



Shielded Contact Size	Shielded Contact	Contact Pin or Sockets	Cable Stripping Dimensions (See Diagram) †1/64, — .000 inch			Crimp Tools Center Contact (Amphenol Nos.)			Outer Ferrule Crimp Tool (Includes Hex Dies)	Cable Application
			A	B	C	Tool	Contact Locator or Positioner	Crimp Setting		
#1 Shielded	48-1226-02 48-1227-02 48-1227-50	P S S	7/32	5/64	7/64	294-289	294-1631	See Data Plate	294-529	#22 AWG per MIL-C-7078, Type II and RG-174/U, -188/U RG-161/U, -179/U, -179A/U, -187/U
	48-1226-57 48-1227-57	P S	7/32	5/64	7/64	294-289	294-1631	See Data Plate	294-528	Raychem 9530A11
#1 Shielded	48-1226-51 -54 48-1227-51 -54, -56	P S	7/32	1/32	5/32	294-289	294-1631	See Data Plate	294-528	RG-180/U, 180A/U, -180B/U, -195/U
#1 Shielded	48 1226-55 48-1227-55	P S	15/64	1/32	5/32	294-289	294-1631	See Data Plate	294-529	RG-178/U, 178A/U, 178B/U, 196/U
#2 Shielded	48-2187-02 48-2188-02	P S	7/32	7/64	9/64	294 126 * 294-289 294-1166 † 294-358	294 1014 294-1630 294-1014 294-1015	031 035 .031-035	294-528	#18 20, 22 AWG per MIL C-7078, Type II and MIL-C-27500-18, -20, -22 Kin6 Extruded Jacket
	48-2187-50 -51 48-2188-50 -51, -53 -54	P S	7/32	7/64	9/64	294-1166 † 294-358 294-289	294-1014 294-1015 294-1630	— .031-.035 See Data Plate	294-528	RG-180/U, -180A/U, -180B/U, -195/U
	48-2187-52 48-2188-52	P S	5/16	7/64	9/64	294-358 294-289	294-1015 294-1630	031-035 See Data Plate	294-530	RG-59/U and 21-541
#2 Shielded	48-1292-02 48-1293-02	P S	7/32	7/64	9/64	294-1166	294-1014	.031-.035	294-528	Boeing Co BMS 13-5D, Type III Class A and BMS 13-18 Type III Class I Sizes #22, #20, #18

* Conforms to MIL STD-MS3191-1. Inactive for new Navy procurement. † Same as 294-126, less positioners.

STANDARD CIRCULAR CONNECTOR TOOLS

BUNKER RAMO AMPHENOL

48 AND 248 MODIFIED CONTACTS FOR 48 AND 217 SERIES CONNECTORS

48 SERIES CONTACTS

Part Number	Contact Style	Contact Size	Wire Size	Insulation Wire O.D. (Inches)	Crimping Tool	Contact Locator or Positioner	Insertion Tool	Removal Tool Standard Connector	Removal Tool Ultra-Mate Connector
48-100-5008P-02	Pin	20	18	.090 Max.	294-1166 *	294-1505	294-88 ★	294-89 ②	294-203 ⑤
48-100-5008S-02	Socket	20	18	.090 Max.	294-1166 *	294-1505	294-88 ★	294-89 ②	294-203 ⑤
48-100-5007P-02	Pin	20	16	.090 Max.	294-1166 *	294-1140	294-96 ①	294-89 ②	294-203 ⑤
48-100-5007S-02	Socket	20	16	.090 Max.	294-1166 *	294-1140	294-96 ①	294-89 ②	294-203 ⑤
48-100-5017P-02	Pin	20	26, 28, 30	.040 Min.	294-126 †	Included	294-88 ★	294-89 ②	294-203 ⑤
48-100-5017S-02	Socket	20	26, 28, 30	.040 Min.	294-126 †	Included	294-88 ★	294-89 ②	294-203 ⑤
48-100-5021P-02	Pin	16	14	.130 Max.	294-358	294-901	294-96 ①	294-97 ③	294-180 ⑥
48-100-5020P-02	Pin	12	10	.170 Max.	294-1166 *	294-1668	294-284	294-73 ④	294-183 ⑦

248 SERIES CONTACTS

The modified 248 Series contacts are designed to accept larger wire sizes.

Part Number	Contact Style	Contact Size	Wire Size	Insulation Wire O.D. (Inches)	Crimping Tool	Contact Locator or Positioner	Insertion Tool	Removal Tool Standard Connector	Removal Tool Ultra-Mate Connector
248-136-2018S-02	Socket	20	18	.090 Max.	294-1166 *	294-1505	294-88 ★	294-89 ②	294-203 ⑤
248-136-2016S-02	Socket	20	16	.090 Max.	294-1166 *	294-1140	294-96 ①	294-89 ②	294-203 ⑤
248-136-1614S-02	Socket	16	14	.130 Max.	294-358	294-901	294-96 ①	294-97 ③	294-180 ⑥
248-136-1210S-02	Socket	12	10	.170 Max.	294-1166 *	294-1668	294-284	294-73 ④	294-183 ⑦

67 AND 69 SERIES CONTACTS

Contact Size	Wire Size AWG	Current Rating Amps	AMPHENOL Part No. Pin	AMPHENOL Part No. Socket	Crimping Tool	Contact Locator or Positioner	Crimp Jaw Setting	Insertion and Removal Tool
20	24 22 20	3.0 5.0 7.5	67-1890	67-1772	294-358 294-506 294-1166 *	294-1035 Automatic Feed 294-1081	.033-.041 .033-.041 .031-.041 .031-.041	294-152
20	24 22 20	3.0 5.0 7.5	18-313	175-257	294-358 294-506 294-1166 *	294-1035 Automatic Feed 294-1081	.033-.-41 .033-.041 .031-.041 .031-.041	294-193
16 16S	16-18 20	22	69-1120 or 69-1125	69-1105 or 69-1110	294-293 ⑧ 294-358 294-243 ⑧	Included 294-901 Included	See Data Plate .062-.072 See Data Plate	294-39
12	12 14	41	69-1115	69-1100	294-293 ⑧ 294-358 294-243 ⑥	Included 294-903 Included	See Data Plate .041-.053 See Data Plate	294-40
Coax			69-14500	69-14501		Center Contact Soldered Outer Ferrule Crimped with 294-531		294-71

246 SERIES CONTACTS

Contact Size	Wire Size AWG	Max. Current Rating Amps.	AMPHENOL Part No. Pin	AMPHENOL Part No. Socket	Crimping Tool	Contact Locator or Positioner	Crimp Jaw Setting	Insertion Tool	Removal Tool
16	20 18 16	22	246-12600-16000—XX	246-12800-16000—XX	294-243 ⑧ 294-293 ⑧ 294-1166 * 294-126 †	Included Included 294-1170 Included	See Data Plate See Data Plate .041-.053 .041-.053	294-192 (MS90455-1)	294-219 (MS90456-1)
12	14 12	41	246-12600-12000—XX	246-12800-12000—XX	294-243 ⑧ 294-293 ⑧ 294-1166 * 294-126 †	Included Included 294-1171 Included	See Data Plate See Data Plate .062-.072 .062-.072	294-229 (MS90455-2)	294-230 (MS90456-2)
8	10 8	73	246-12600-08000—XX	246-12800-08000—XX	Pico ** #400-B	Pico Die Assy. ** #414DA-8N	Pico** Locator #4066-2	294-237 (MS90455-3)	294-240 (MS90456-3)
4	6 4	135	246-12600-04000—XX	246-12800-04000—XX	Pico ** #400-B	Pico Die Assy. ** #414DA-4N	Pico** Locator #4066-1	294-236 (MS90455-4)	294-239 (MS90456-4)
0	2 0	245	246-12600-01000—XX	246-12800-01000—XX	Pico ** #400-B	Pico Die Assy. ** #414DA-"O" N	Pico** Locator #4066	294-235 (MS90455-5)	294-241 (MS90456-5)

ELECTRICAL INTERCONNECTION SYSTEMS

BUNKER RAMO AMPHENOL

SAMS

Amphenol Connector Division
— SAMS Operation —

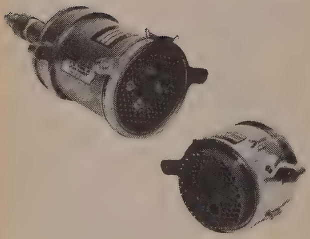
For an answer to your interconnection problems call on the best — call on Amphenol.

Amphenol SAMS Division, pioneers in high reliability interconnection systems for the Aerospace industry, produces a wide variety of electrical interconnects for aircraft, nuclear power plants, naval vessels, ground vehicles and equipment, and missile/ordnance systems.

The solution to your problem, whether a simple wire harness assembly for a Military combat vehicle, or a sophisticated cable system for missile guidance and control, can be produced to your specifications or can be custom designed to meet your performance requirements.

We have provided some of the most complex, EMI/RFI shielded multi-element interconnection systems ever produced/designed, manufactured and tested to standards never before achieved, for programs where technical skills are paramount —

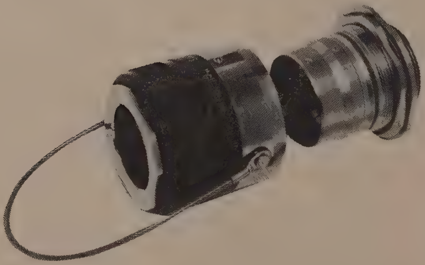
Yet, as many have learned, our skills at saving you money in a design-to-cost effort are just as sharply honed.



HAWK LAUNCHER HARNESS

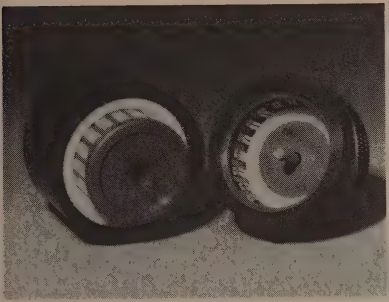
SPECIALIZED CAPABILITIES

GENIE 711 SERIES is an example of our specialized capabilities. This new reliable design configuration is for multiple applications of **quick-disconnect, umbilical** electrical connections. Mate by a straight axial push! disconnect any one of three ways: 1.) Standard lanyard quick-disconnect with optional manual release; 2.) Lanyard quick-disconnect with safety-latching provision and 3.) Conventional disconnect.



SAMS
Amphenol Connector Division
— SAMS Operation —

SPECIAL PURPOSE CONNECTORS



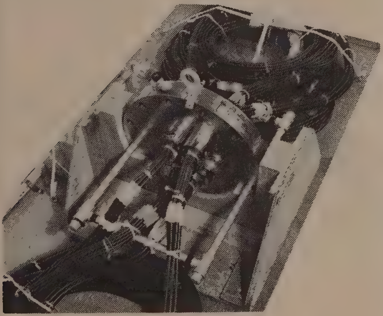
WHEN THE CONNECTOR YOU NEED IS NOT IN A CATALOG...

...SAMS is the place to call! One of our primary concerns is finding new approaches to disconnect methods, contact design and interconnection assembly.

Even harsh environments such as EMI/RFI/EMP exposure to nuclear radiation are challenges successfully met numerous times by SAMS! Years of experience in the aerospace and missile fields have enabled SAMS to solve connector problems never encountered by most connector manufacturers, and have permitted us to accumulate a background of specialized knowledge available nowhere else in the industry.

If your connector is not a catalog item, call SAMS. **Ours** aren't either!

NUCLEAR POWER PRODUCTS



HELPING TO SOLVE THE ENERGY CRISIS...

...is one of SAMS' more important activities; and we have pioneered the field of electrical interconnections for nuclear reactor plants. You'll find SAMS-designed electrical penetration assemblies (EPA's) in many major nuclear projects in the United States today. They're engineered to meet not only the electrical/electronic requirements of the interface between the reactor and its surroundings, but also to withstand the hostile environment of the reactor itself.

In addition to EPA's, SAMS produces radiation-resistant instrumentation, power and special connectors, splices and other pre-fabricated nuclear interconnection devices for use within this most destructive environment.

If your interconnection needs are nuclear oriented, whether in power plants, test or research facilities, you'll find expert assistance at Amphenol SAMS.

FOR LOCAL SOURCE OF SUPPLY SEE EEM VOL. 2 PAGE 462

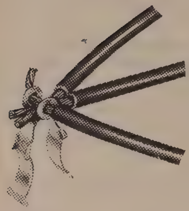
USEFUL INFORMATION ABOUT AMPHENOL INDUSTRIAL INTERCONNECTIONS

Amphenol Industrial Division offers the most comprehensive line of industrial interconnections obtainable anywhere. The information here covers Amphenol's complete line of industrial **standard** interconnections, ordinarily available from stock.

Amphenol also has a large selection of **non-standard** industrial interconnections, too numerous to classify. If you do not see what you require, contact the factory for availability and full information.

THIS INFORMATION WILL HELP YOU MAKE THE MOST EFFICIENT USE OF THE FOLLOWING PAGES

CONTACTS FOR LOW-RESISTANCE SERVICE



"A" CONTACT

Used for all standard-size Amphenol sockets with 4, 5, 6 or 7 contacts. Provides a firm grip on large tube or relay prongs and permits soldering several wires to one lug. Wire-hole diameter: .078".

"B" CONTACT

Used for all standard-size Amphenol sockets with 8, 9, 10 or 11 contacts, except loktal types. Commonly called "tuning-fork" contacts, they form a low-resistance contact with tube or relay prongs. A series of waves along the two tines assure excellent wiping action to remove films and foreign matter. Wire-hole diameter: .082".

CLOVER-LEAF CONTACT

Used for octal socket 59-103 (page **2•512**). Patented design provides superior retention on mating plug to resist vibration and shock in severe-service applications. Solder tail has two .093" wire holes.

WRAP-AROUND CONTACT

Used in several standard tube and relay sockets and audio-type connectors. Furnishes a full 360° of contact with the mating pin for high conductivity. Solder tail has one .093" x .078" wire hole.

WIRE-WRAPPABLE CONTACTS

are available for all 77-MIP and 78-S-type sockets having 8 or more contacts. Two post sizes are offered—.016"x.062" for up to 22 AWG wire; .025"x .062" for up to 16 gauge. Both half-inch-long tails accept two wrap levels.

PRINTED-BOARD CONTACTS

are a standard option for all 77-MIP- and 78-S-type sockets with 8 contacts or more. They are easily inserted into .0625"-diameter plated-through holes in printed boards and dip or wave soldered into place. Useable tail length is ⅛" with a tapered tip for fast insertion. The contact shoulder rests on the board to maintain a 1/16" clearance for ventilation or cleaning.

CHOICE OF MOUNTINGS

MIP (MOLDED-IN-PLATE)

Sturdy steel mounting plate is molded directly into phenolic body to eliminate breakage frequently encountered when riveting laminated type sockets. Designed for above chassis mounting, but can also be mounted below chassis.

RETAINER RING

Sockets mount quickly and easily without screws or rivets. Retainer rings are easily assembled with the Amphenol Retainer-Ring Hand Tool (see p. **2•514**). Sockets with multiple notches may be positioned to line up contacts for most convenient wiring.

REPLACEMENT TYPE

Steel mounting plate is firmly assembled to socket with retainer ring. Sockets with multiple notches may be positioned to line up contacts with original wiring.

FOR LOCAL SOURCE OF SUPPLY SEE EEM VOL. 2 PAGE 462

SELECT YOUR DIELECTRIC AND CONTACT MATERIALS

Many tube/relay sockets, plugs and other industrial interconnections are used for applications for which they were not originally intended. To assure reliable service, these non-standard uses should be analyzed prior to ordering to determine the best combination of contact and dielectric materials for the application. To aid in selection, the information that follows outlines electrical and mechanical properties of contact and dielectric material available from Amphenol.

CONTACT MATERIALS

BRASS

Brass has high conductivity and is relatively low in cost. However, it age-hardens or crystallizes under stress; thus will not stand up to repeated insertion/withdrawal cycles. Brass contacts can change in form and spring qualities over a period of time.

PHOSPHOR BRONZE

In the medium-cost area, approximately 50% higher than brass. Spring quality is good. However, it has lower conductivity in comparison with other copper alloys.

LUBALOY

A 90% copper, 8.25% zinc, 1.75% silver alloy which is relatively low in cost with fairly good conductivity characteristics. Its spring quality is less than that of phosphor bronze.

BERYLLIUM-COPPER

After proper heat treatment, beryllium-copper contacts have substantially greater life-cycle characteristics and will withstand more insertion and withdrawal cycles over a wider range of pin sizes than any other commercial non-ferrous spring material. Sockets utilizing beryllium-copper contacts are ideally adapted to test equipment and other applications where changing of tubes, relays or plugs is frequent. The material does not age-harden or crystallize over a reasonable period of time.

DIELECTRIC MATERIALS

GENERAL-PURPOSE PHENOLIC

Black, wood-flour-filled phenolic for applications requiring good electrical qualities with mechanical characteristics better than the acceptable minimum.

MICA-FILLED PHENOLIC

Tan/yellow, low-loss, low-water-absorption, mineral-filled phenolic compound for applications requiring superior dielectric properties.

CERAMIC

Grey/white, withstands high temperatures, is non-hygroscopic, has low-loss factor. Recommended for high-frequency work, in transmitters and amplifiers where output is greater than 20 watts. Also recommended for relays or other apparatus which are located in or near high-temperature equipment.

DIALLYL PHTHALATE

Blue, mineral-filled for use where close dimensional tolerances must be met, dimensional stability is a must and where high arc- and insulation-resistance are required. Especially recommended where electrical and mechanical characteristics must be maintained under operating conditions involving extreme humidity and temperature. A superior dielectric material available on special order.

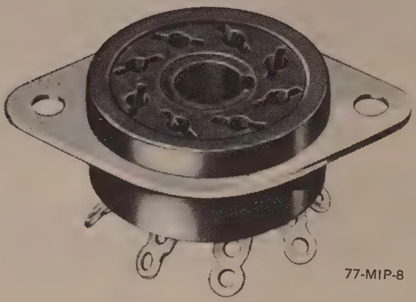
DIELECTRIC MATERIALS ELECTRICAL/MECHANICAL CHARACTERISTICS

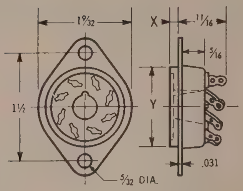
Molding Compound ⟶	General Purpose Phenolic	Mica Filled Phenolic	Ceramic	Diallyl Phthalate
MIL Spec—Type	MIL-M-14F CFG	MIL-M-14F MFE	—	MIL-M-14 MDG
Max. Opr. Temperature (Continuous)	300°F	300°F	1400°F	300°F
Insulation Resistance (Volume Megs.-CMS)	10^3	10^6	10^8	4×7^{10}
Water Absorption (ASTM 24 Hrs.)	1.31%	.61%	0.00%	.45%
Tensile Strength (Lbs./Sq. In.)	6100	5400	8500	5500
Dielectric Strength (Volts/MIL)	346	475	400	360
Loss Factor (Not %)	.178 @ 1,000,000 cycles	.040 @ 1,000,000 cycles	.007	.02

TUBE/RELAY SOCKETS

BUNKER RAMO AMPHENOL

77-"MIP" MOLDED-IN-PLATE SERIES Solder Termination


77-MIP-8



X=$\frac{3}{32}$ on MIP-4-5-6-7S & 7L
X=.145 on MIP-8-9-11-12
Y=$1\frac{7}{64}$ on MIP-4-5-6-7S
Y=$1\frac{15}{64}$ on MIP-7L-20
Y=$1\frac{9}{64}$ on MIP-11-12

These sockets have a steel plate molded directly into the solid phenolic body to assure secure, reliable mounting. The steel plate also eliminates the possibility of breaking ordinary laminated sockets while riveting them to the chassis or crimped-on plates loosening in service.

Contacts are spaced for easy, fast wiring. Two holes in each contact tail provide wiring and anchoring points for resistors, capacitors, chokes and other components.

These sockets are intended for above-chassis mounting in round holes $1\frac{3}{16}''$ diameter. 77-MIP-20 only requires a $1\frac{5}{16}''$ hole. Design also allows for below-chassis mounting.

Standard sockets are molded in general-purpose black phenolic; mounting plate is nickel-plated steel; contacts are cadmium-plated copper alloy. Optional materials and finishes available from stock include mica-filled phenolic, phosphor-bronze, silver-plated contacts with stainless-steel mounting plate; or tinned contact tails on special order. See ordering information.

ORDERING INFORMATION

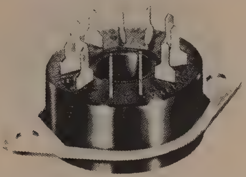
Part No.	Contacts			Pin Circle Diameter	Voltage Rating (RMS)	Current Rating (Amps)	Mating Plug (p. 2•512)
	No.	Material	Type (p. 2•504)				
77-MIP-4	4	Brass	A	.640	2000	5	86-CP4
77-MIP-5	5	Brass	A	.750	1250	5	86-CP5
77-MIP-6	6	Brass	A	.750	1250	5	86-CP6
77-MIP-7S	7 Std.	Brass	A	.750	1250	5	86-CP7S
77-MIP-8	8 Octal	Lubaloy	B	.687	1250	3	86-CP8
77-MIP-9	9	Lubaloy	B	.687	1250	3	86-CP9
77-MIP-11	11	Lubaloy	B	.750	500	3	86-CP11
77-MIP-12	12	Lubaloy	B	.750	500	3	86-CP12
77-MIP-20	20	Brass	Wrap Around	1.000 Outer .687 Inner	500	3	71-20

For deviations from standard, put deviation letter or number **after** part number above as follows: T—mica-filled phenolic; M—phosphor-bronze, silver-plated contacts and stainless-steel mounting plate; 1—tinned contact tails. Example: 77-MIP-9TM 1.

FOR LOCAL SOURCE OF SUPPLY SEE EEM VOL. 2 PAGE 462

77 "MIP" MOLDED-IN-PLATE

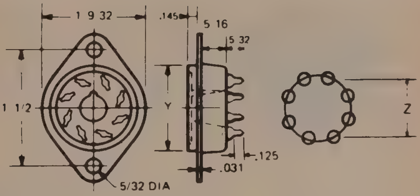
PRINTED-BOARD TERMINATIONS



Simplify production of printed boards requiring vacuum tubes or plug-in relays. Simply insert sockets into .0625"-diameter plated-through holes in boards and flow- or wave-solder into place. The molded-in-plate reduces strain on the terminals during tube or relay insertion or withdrawal when the mounting plate is fastened to the board with screws and spacers.

Tapered "lead-in" terminals assist in fast insertion and each has a shoulder allowing .016" clearance above the board for better air circulation and ease of cleaning.

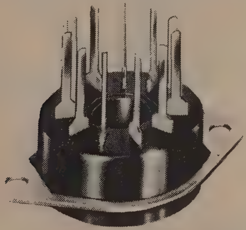
Contacts are cadmium-plated Lubaloy. Their tuning-fork design provides positive wiping action on the pins for low-contact resistance and high retention force. Tails are ⅛" long, 1/16" wide, .016" thick. Mount on printed boards up to ⅛" thick. Each contact is rated 3 amp continuous. Dielectric is general-purpose black phenolic.



DIMENSIONS AND ORDERING INFORMATION

Number of Contacts	Part Number	(Z) Pin Circle Diameter	Y
8	77-MIP8W-0125	.687	1 7/64"
9	77-MIP9W-0125	.687	1 7/64"
11	77-MIP11W-0125	.750	1 9/64"
12	77-MIP12W-0125	.750	1 9/64"
20	77-MIP20W-0125	outer 1.000 inner .687	1 15/64"

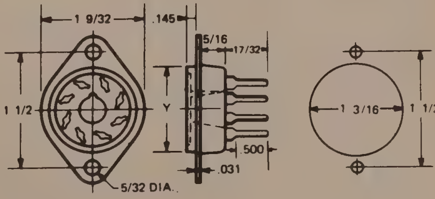
WIRE-WRAPPING TERMINATIONS



Here is real convenience for users of hand and/or semi-automatic wire-wrapping equipment. Terminate tube or relay sockets in the same operation as other components to eliminate the extra soldering operation.

Dielectric is general-purpose black phenolic. Contacts are cadmium-plated copper alloy for resistance to oxidation and improved conductivity. All tails are ½" long and 1/16" wide. Two thicknesses are available for different amperages and wire sizes, as follows:

	Standard Contact	Heavy-Duty Contact
Thickness	.016"	.025"
Current Rating	3 amp. cont.	7.5 amp. cont.
Contact Retention Force (One .093" dia. pin)	3 oz. min.	5 oz. min.
Wire size	Accepts 2 wraps of 22 AWG wire	Accepts 2 wraps of up to 16 AWG wire



ORDERING INFORMATION

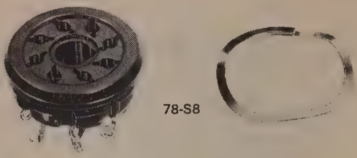
Number of Contacts	Standard Contact	Heavy-Duty Contact
8	77-MIP8W-0500	77-MIP8W-0525
9	77-MIP9W-0500	77-MIP9W-0525
11	77-MIP11W-0500	77-MIP11W-0525
12	77-MIP12W-0500	77-MIP12W-0525

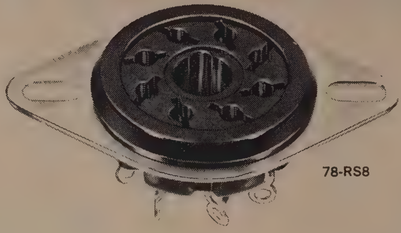
FOR LOCAL SOURCE OF SUPPLY
SEE EEM VOL. 2 PAGE 462

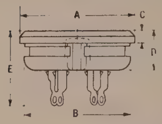
TUBE/RELAY SOCKETS

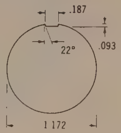
BUNKER RAMO AMPHENOL

78 "S" SERIES
with retainer-ring mounting and solder-eyelet termination


78-S8


78-RS8





Recommended Panel Cutout

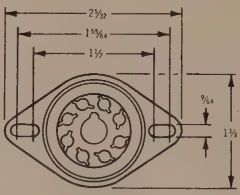
DIMENSIONS

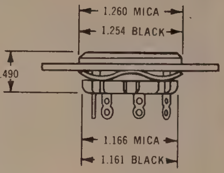
Sockets	A	B	C	D	E
78-S4,-S5,-S6,-S7S	1¼	1$\frac{5}{32}$	.135	.420	$\frac{27}{32}$ Approx.
78-S8,-S9,-S11,-S12,-S16	1¼	1$\frac{5}{32}$	.145	.490	⅞ Approx.

Aside from mounting provisions, 78S Series Sockets are identical to the 77-MIP Series described on pgs. **2•506** and **2•507**, both in characteristics and deviations available. The 78S Series features retainer-ring mounting for quick, easy, secure fastening to the chassis or panel without screws or rivets. Mount them either with a screwdriver or Amphenol Hand Tool 51-3 (see p. **2•513**). 78S Series Sockets are notched around their circumference to permit positioning and mounting in the location that allows the most convenient wiring. One retainer ring is furnished with each 78S Series Socket.

These sockets can also be used with 86 CP type plugs and 3 Series plug caps to make reliable, low-cost cable assemblies.

IMPORTANT: Specify chassis thickness. Unless otherwise specified, 78S Series Sockets are grooved to fit from 22 gauge (.031") to 18 gauge (.050") panels or chassis. This standard grooving also fits standard plug caps (p. **2•521**). To assure a secure mount when chassis or panel is outside the 22 to 18 gauge limit, specify exact thickness and then the sockets will be grooved to order. Non-standard groove locations are available to fit up to 13 gauge (.093") panel thickness.





REPLACEMENT SOCKETS

These sockets are ideal for all replacements, especially as substitutes for broken and noisy wafer types. They are standard 78S Series Sockets, but with a sturdy, nickel-plated steel mounting plate fastened by a retainer ring.

Slotted mounting holes fit all centers from 1½" to 1$\frac{55}{64}$". Other dimensions and characteristics are identical to the 78S Series Sockets above.

ORDERING INFORMATION

To order 78-RS Series Sockets, put together the part number as in the following example:

78—R S 4 T M 1

78 Series

Type
RS—Replacement
S—"S" Type

Number of Contacts

4 -4	8-8 Octal
5 -5	8L-8 Loktal
6 -6	9-9
7S -7 std.	11-11
	16-16

DEVIATIONS

Where no deviations are specified, mounting plate is steel, contacts are cadmium-plated brass, contact tails are not tinned, and dielectric is black phenolic. To specify any of the following deviations, add these designations at the end of the part number:

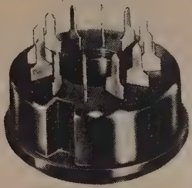
T—Mica-filled phenolic
M—Phosphor-bronze, silver-plated contacts
1—Contact tails tinned

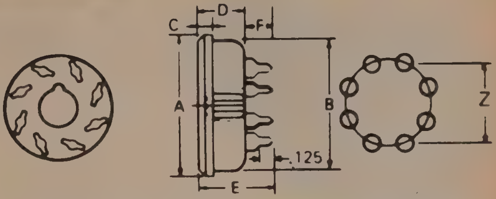
FOR LOCAL SOURCE OF SUPPLY
SEE EEM VOL. 2 PAGE 462

TUBE/RELAY SOCKETS

BUNKER RAMO AMPHENOL

PRINTED-BOARD TERMINATIONS





Where vacuum tubes or plug-in relays must be mounted on printed boards, these are the sockets to use for fast, trouble-free production. Simply insert contact tails into .065"-diameter plated-through holes in board and wave- or flow-solder in place. Contacts have tapered tips on tails to facilitate insertion and a .016"-deep shoulder which provides clearance between the socket and board for improved air circulation and easier cleaning.

Contacts are cadmium-plated Lubaloy. Tuning-fork design provides unmatched wiping action for low contact resistance and high retention force. Contact tails are ⅛" long (exclusive of tapered lead-in portion), ¹⁄₁₆" wide and .016" thick. Easily mounts on boards up to ⅛" (.125") thick. Current rating: 3 amp continuous. Dielectric is general-purpose black phenolic.

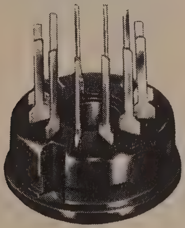
DIMENSIONS AND MOUNTING INFORMATION

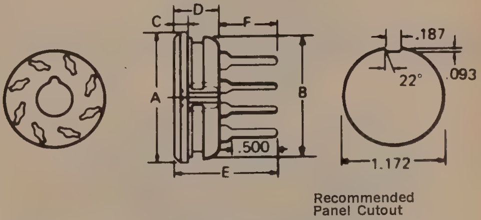
Sockets	A	B	C	D	E	F
All	1¼	1⁵⁄₃₂	.145	.490	Approx. .646	⁵⁄₃₂

ORDERING INFORMATION

Number of Contacts	Part Number	(Z) Pin Circle Diameter
8	78-S8W-0125	.687
9	78-S9W-0125	.687
11	78-S11W-0125	.750
12	78-S12W-0125	.750
16	78-S16W-0125	outer .750 inner eccentric

WIRE-WRAPPABLE TERMINATIONS





Users of wire-wrapping equipment can simplify their production operations with these sockets. Hand or semi-automatic-wrap vacuum tube or relay sockets at the same time other components are wire-wrapped, thereby eliminating additional soldering steps. Sockets are easily mounted in panels .031" to .050" thick with Amphenol Retainer Ring hand tool (p. **2**•513).

Dielectric is general-purpose black phenolic, with contacts of cadmium-plated copper alloy. Tails are ½" long and ¹⁄₁₆" wide. Two tail thicknesses are available, as shown below:

	Standard Contact	Heavy Duty Contact
Thickness	.016 in.	.025 in.
Current Rating	3 amps continuous	7.5 amps continuous
Contact Retention Force (Single .093" dia. pin)	3 oz. min.	5 oz. min.
Wire Gauge	Accepts 2 wraps of 22 gauge wire	Accepts 2 wraps of up to 16 gauge wire

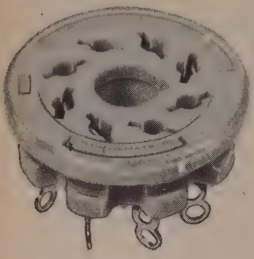
DIMENSIONS AND MOUNTING INFORMATION

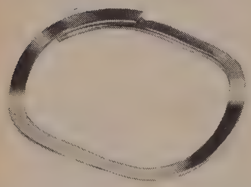
Sockets	A	B	C	D	E	F
All	1¼	1⁵⁄₃₂	.145	.490	1½	⁹⁄₁₆

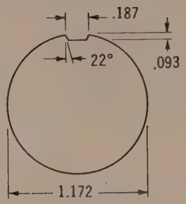
FOR LOCAL SOURCE OF SUPPLY
SEE EEM VOL. 2 PAGE 462

ORDERING INFORMATION

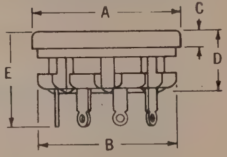
Number of Contacts	Standard Contact	Heavy-Duty Contact
8	78-S8W-0500	78-S8W-0525
9	78-S9W-0500	78-S9W-0525
11	78-S11W-0500	78-S11W-0525
12	78-S12W-0500	78-S12W-0525







Recommended Panel Cutout



CERAMIC 49SS SERIES

Designed for high-temperature applications, these 49SS Series Sockets are non-hygroscopic and have low-loss factor. Amphenol ceramic will withstand continuous operating temperatures of 1400°F. Contacts are silver-plated phosphor-bronze for continued high retention.

These sockets feature Amphenol Retainer-Ring design for fast, easy, compact mounting with a screwdriver or the Retainer-Ring Hand Tool (p. **2•513**). They are grooved to fit up to .093″ chassis or panel thickness. A spacer washer furnished with each socket permits the unit to be mounted firmly to any chassis from 1/32″ to 1/16″ thick.

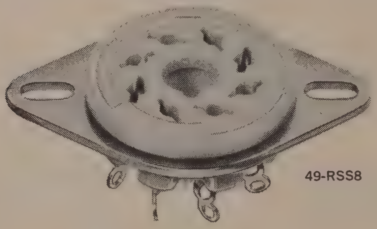
Dimensions

A	B	C	D	E approx.
1¼	1 5/32	.135	.420	27/32
1¼	1 5/32	.145	.490	7/8

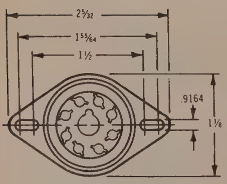
ORDERING INFORMATION

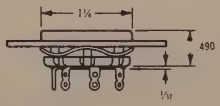
Part no.	Contacts No.	Contacts Type (p. 2•504)	Pin Circle Diameter	Voltage Rating (RMS at Sea Level)	Current Rating (Amps)
49-SS4	4	A	.640	2000	5
49-SS8	8	B	.687	1250	3

49RSS CERAMIC REPLACEMENT SOCKETS



49-RSS8





Ideal for high temperature and humidity applications where other sockets fail, these ceramic replacement units have an already-assembled retainer ring and nickel-plated-steel mounting plate. Slotted mounting holes permit mounting screws or rivets on centers from 1½″ to 1 55/64″ to make installation quick and easy. A chassis or panel cutout of 1 9/32″ is required for mounting the socket. Contact material and type, pin-circle diameter and electrical characteristics are identical to the 49SS Series above with a corresponding number of contacts.

ORDERING INFORMATION

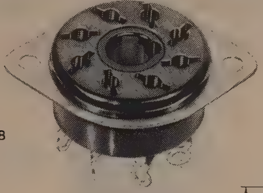
49-RSS4	4-contact Ceramic Replacement Socket
49-RSS8	8-contact Ceramic Replacement Socket

FOR LOCAL SOURCE OF SUPPLY SEE EEM VOL. 2 PAGE 462

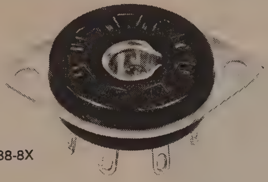
TUBE/RELAY SOCKETS

BUNKER RAMO AMPHENOL

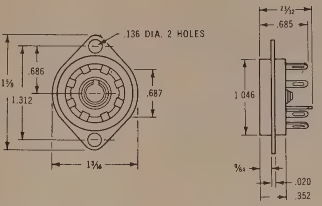
88 SERIES COMPACT "MIP" SOCKETS



88-8



88-8X



These 8-contact sockets have rugged molded-in mounting plates and mount in 1⅛"-diameter round holes.

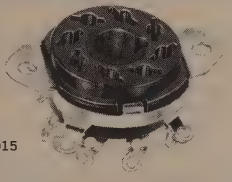
The 88-8 socket mates with standard "Octal" plug bases and its smaller size requires less space. The 88-8X "Loktal" socket incorporates a center ground contact to grip the pilot post of the tube. Outer contacts accept .040" to .050"-diameter pins.

Both styles have cadmium-plated phosphor-bronze contacts. Dielectric is general-purpose black phenolic. They are rated 1250 volts (RMS at sea level), 3 amp. per contact.

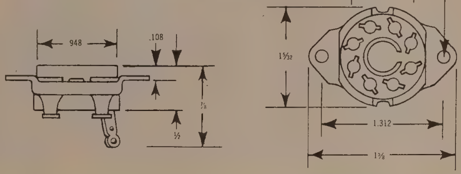
ORDERING INFORMATION

88-8	Octal Compact "MIP" Socket
88-8X	Loktal Compact "MIP" Socket

88 SERIES SADDLE-TYPE OCTAL SOCKET



88-015



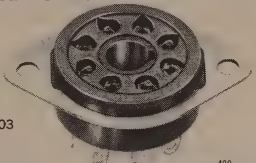
Economical sockets with 4 lugs for easy below-chassis mounting. Choice of either wrap-around or tuning-fork contacts (see p. **2**•504). "Clinched-on" mounting plate has two .140"-diameter mounting holes. Socket mounts through 1"-diameter round hole. Black, general-purpose-phenolic dielectric. Mica-filled dielectric also available on special order.

Rated 1250 volts (RMS at sea level), 3 amp per contact maximum.

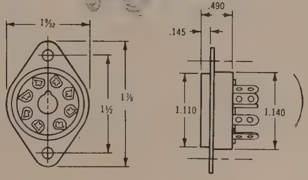
ORDERING INFORMATION

Part No.	No.	Contacts	
		Material	Type (p. 2•504)
88-001	8	Brass	Wrap-around
88-015	8	Lubaloy	B

59 SERIES HEAVY-DUTY OCTAL SOCKET
with clover-leaf contacts



59-103



Intended for extended-service conditions — for example, repeated insertion/withdrawal cycles and high retention forces in spite of shock or vibration — this rugged socket is an exact replacement for 77-MIP-8 (p. **2**•506). Cloverleaf-type contacts are silver-plated phosphor-bronze and ultra-reliable. Stainless-steel mounting plate is molded directly into mica-filled phenolic body. Rated 1250 volts (RMS, sea level), 3 amp.

ORDERING INFORMATION

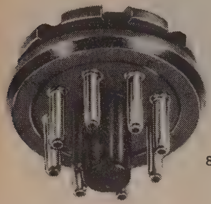
59-103	Heavy-Duty Octal Socket

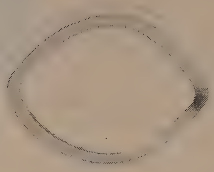
FOR LOCAL SOURCE OF SUPPLY
SEE EEM VOL. 2 PAGE 462

STANDARD PLUGS

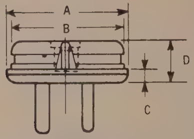
BUNKER RAMO AMPHENOL

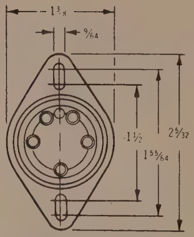
86-CP SERIES
with retainer-ring mounting


86-CP8



86-RCP-5





DIMENSIONS

Part No.	A	B	C	D
86-CP4, -CP5, -CP6, -CP7S	1¼	1 5/32	5/32	7/16
86-CP8, -CP9, -CP11, -CP12, -CP16	1¼	1 5/32	.145	7/16

No screws or rivets required for 86-CP Series plugs, but mounting is secure and reliable nonetheless with the Amphenol Retainer Ring. One is furnished with each plug. Retainer ring is easily assembled with the 51-3 Hand Tool (opposite page).

Use as chassis connectors with plug-in units; or as inexpensive cable connectors. They can also be assembled into plug caps or receptacle shells (both p. 2•521). Guide posts are omitted on plugs with 4 to 7 contacts, but they are positively polarized by the use of two pins with larger diameter than the others.

Contacts are nickel-plated brass. Standard dielectric is general-purpose black phenolic. All 86-CP Series Plugs are also available in mica-filled phenolic on special order. To order mica-filled, add "T" to part number. Example: 86-CP8T.

IMPORTANT: Specify chassis thickness. Unless otherwise specified, plugs are grooved to fit 22 gauge (.031") to 18 gauge (.050") panels or chassis. This standard grooving also fits plug caps (page). To assure secure mounting on chassis or panel of gauges outside these limits, specify exact thickness and plugs will be grooved to order. Plugs can be grooved to fit up to 13 gauge (.093").

86-RCP SERIES REPLACEMENT-TYPE PLUGS

These are standard 86-CP Series Plugs with an already-assembled retainer ring holding a nickel-plated-steel mounting plate.

Slotted mounting-plate holes accommodate rivets or screws on 1½" to 1 55/64" centers.

86-RCP ORDERING INFORMATION

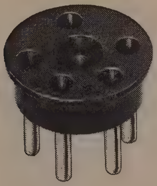
To order 86-RCP Series Replacement-type plugs, insert "R" in standard part numbers in chart below. Example: 86-RCP8. Standard dielectric is general-purpose black phenolic, but mica-filled phenolic is also available on special order. To order mica-filled, add "T" to part number below. Example: 86-RCP8T.

FOR LOCAL SOURCE OF SUPPLY SEE EEM VOL. 2 PAGE 462

ORDERING INFORMATION

Part No.	Contacts	Pin Circle Diameter	Voltage Rating (RMS)	Current Rating (Amps)	Mating Sockets	
					Ret. Ring Type	"MIP" Type
86-CP4	4	.640	2000	5	78-S4	77-MIP4
86-CP5	5	.750	1250	5	78-S5	77-MIP5
86-CP6	6	.750	1250	5	78-S6	77-MIP6
86-CP7S	7 Std.	.750	1250	5	78-S7S	77-MIP7S
86-CP8	8 Octal	.687	1250	5	78-S8	77-MIP8
86-CP9	9	.687	1250	5	78-S9	77-MIP9
86-CP11	11	.750	500	5	78-S11	77-MIP11
86-CP12	12	.750	500	3	78-S12	77-MIP12
86-CP16	16	Outer: 750 Inner: Eccentric	500	5	78-S16	—

71 SERIES MOLDED SPEAKER-TYPE PLUGS


71-5

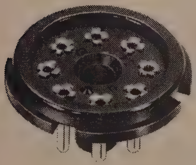
Originally designed as speaker plugs, but are also useful for many other purposes—test panels, intercommunications systems, public-address systems, etc.

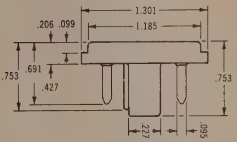
Contacts are rigidly secured in the dielectric—cannot work loose or get out of alignment. All plugs are positively polarized and each contact is numbered for correct wiring. Plugs with 4 and 5 contacts have molded finger-grips; units with more contacts have straight sides. Dielectric is general-purpose black phenolic; contacts are nickel-plated brass.

ORDERING INFORMATION

Part No.	Contacts	Pin Circle Diameter	Voltage Rating (RMS)	Current Rating (Amps)	Mating Sockets	
					"S" Type (p. 2•508)	"MIP" Type (p. 2•506)
71-4	4	.640	2000	5	78-S4	77-MIP-4
71-5	5	.750	1250	5	78-S5	77-MIP-5
71-8	8	.687	1250	5	78-S8	77-MIP-8
71-9	9	.687	1250	5	78-S9	77-MIP-9
71-12	12	.750	500	5	78-S12	77-MIP-12
71-20	20	1.000 Outer .687 Inner	500	5	—	77-MIP-20

50 SERIES RELAY AND TUBE BASES


50-801

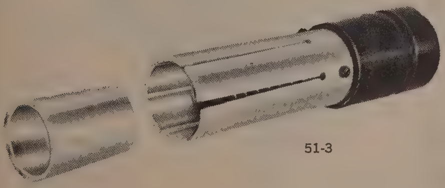


For all standard-size 8- and 11-pin tube/relay sockets. Four notches around circumference of dielectric permit quick staking of relay plate to either 8- or 11-pin plug base. Base is general-purpose black phenolic; contacts are nickel-plated brass. Rated 1250 volts (RMS at sea level), 5 amp.

ORDERING INFORMATION

50-801	8-contact Relay and Tube Base
50-820	11-contact Relay and Tube Base

RETAINER-RING HAND MOUNTING TOOL


51-3

Permits mounting retainer-ring-type sockets, plugs and receptacles to chassis and panels at production-line speeds. For all 78S and 49SS Series Sockets, 86-CP Series plugs and 60, 61 and 160 Series line plugs and receptacles. Requires approximately 6½" minimum clearance to operate.

ORDERING INFORMATION

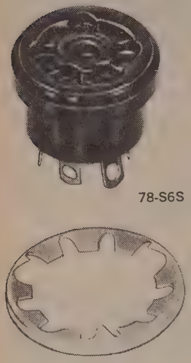
51-3	Retainer-Ring Hand Mounting Tool

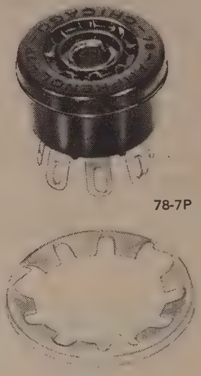
FOR LOCAL SOURCE OF SUPPLY SEE EEM VOL. 2 PAGE 462

MINIATURE TUBE SOCKETS

BUNKER RAMO AMPHENOL

78 SERIES MINIATURE
with retainer-ring mounting

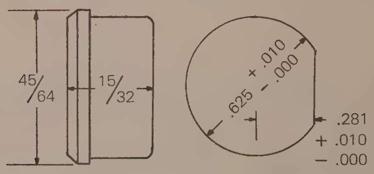

78-S6S


78-7P

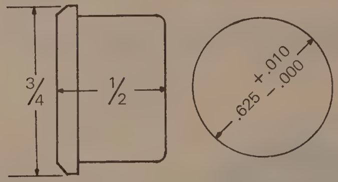
Designed for limited-space applications, these sockets are similar to the 78S Series type, but are less than half their size.

Mount them without screws or rivets in either ⅝" round or, for anti-rotation, in "D"-shaped holes, as shown. One friction-type retainer ring is furnished with each socket and is easily assembled to make rigid, secure mounting. Standard dielectric is general-purpose black phenolic; please specify if mica-filled phenolic is desired. All contacts rated 500 volts (RMS at sea level), 3 amp.

DIMENSIONS AND MOUNTING INFORMATION



Size and mounting hole for No. 78-7P. 78-S3S and 78-S4S.
Laboratory and servicemen can mount socket in plain round hole.



Size and mounting hole for No. 78-S5S and 78-S6S.

FOR LOCAL SOURCE OF SUPPLY SEE EEM VOL. 2 PAGE 462

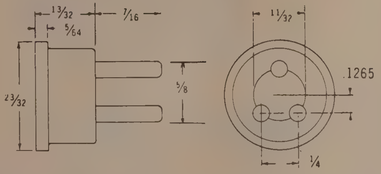
ORDERING INFORMATION

Part No.	Contacts		Pin Circle Diameter	Mating Plugs (pgs. 2•515, 518, 520)	
	No.	Type		Unshielded	Shielded
78-S3S	3	B	.344	71-3S	91-MPM3L
78-S4S	4	B	.406	71-4S	91-MPM4L
78-S5S	5	Wrap-around	.406	71-5S	91-MPM5L
78-S6S	6	Wrap-around	.406	71-6S	91-MPM6L
78-7P	7	Wrap-around	.375	86-896	86-895

MINIATURE UNSHIELDED PLUGS

SERIES 71 CABLE-END PLUGS

71-3S

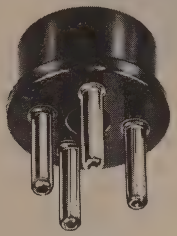


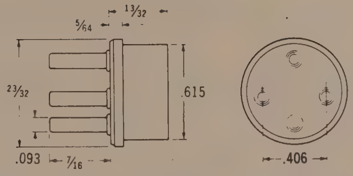
Compact plugs are useful for connecting bookshelf and other small-size speakers. Also ideal for all types of plug-in connections where space is limited. Body is general-purpose black phenolic with molded-in nickel-plated brass contacts that will not work loose or get out of alignment. Contacts are deeply recessed in body to prevent shorts from pulled-back insulation. Mate accurately with miniature sockets (preceding page). Rated 500 volts (RMS at sea level), 5 amp.

ORDERING INFORMATION

Part no.	Contacts	Pin Circle Diameter	Mating Socket Unshielded (p. 2•514)
71-3S	3	.343	78-S3S
71-4S	4	.406	78-S4S
71-5S	5	.406	78-S5S
71-6S	6	.406	78-S6S

86 SERIES CHASSIS-MOUNT PLUGS


86-CP-4S



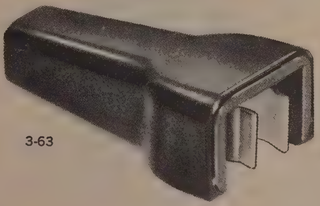
Friction-type retainer ring assembles easily and holds plug securely in panel or chassis. Ideal for connecting speakers, carbon microphones, test equipment or other units in limited-space areas.

Plugs are general-purpose black phenolic and mount in 5/8" round hole. Contacts are nickel-plated brass. Rated 500 volts (RMS at sea level), 5 amp.

ORDERING INFORMATION

Part no.	Contacts	Pin Circle Diameter	Mating Socket Shielded (p. 2•520)
86-CP-3S	3	.343	91-MPF3S
86-CP-4S	4	.406	91-MPF4S
86-CP-5S	5	.406	91-MPF5S
86-CP-6S	6	.406	91-MPF6S

UNIVERSAL GRID CAP


3-63

Easily snaps onto and securely holds tube-grid studs from 1/4" to 1/2" diameter on both metal and glass tubes. General-purpose black phenolic with spring-brass holding contact.

ORDERING INFORMATION

3-63	Universal Grid Cap

FOR LOCAL SOURCE OF SUPPLY SEE EEM VOL. 2 PAGE 462

MINIATURE TUBE SOCKETS

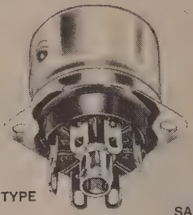
BUNKER RAMO AMPHENOL

7 AND 9-CONTACT MINIATURE SOCKETS

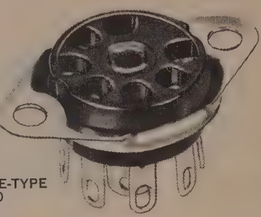
147 SERIES—7 CONTACTS

147 and 59 Series Sockets are designed for all 7- and 9-contact miniature tube applications. They are available with or without tube-shield base or center shield and for either above- or below chassis mounting.

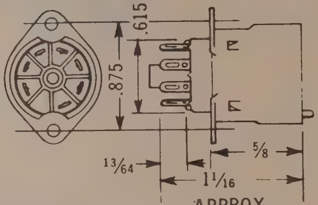
Interchangeable with corresponding military types (MIL-S-12883A). Dielectric is either general-purpose-black or low-loss, mica-filled phenolic. All sockets are rated 500 volts (RMS at sea level), 1 amp. per contact.

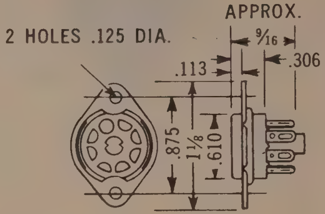


SHIELD BASE TYPE
147-905



SADDLE-TYPE
147-500





ORDERING INFORMATION

SHIELD BASE TYPE

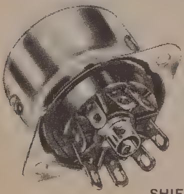
Insulator Material	Part No. Phosphor Bronze Cadmium Plated Contacts	Part No. Beryllium Copper Silver Plated Contacts	Mtg. Hole Dia. Saddle	Center Shield
Black	147-905	*	.095	Large
Mica	147-913	*	.095	Small
Mica	—	147-916	.125	Small

**Must be specified*

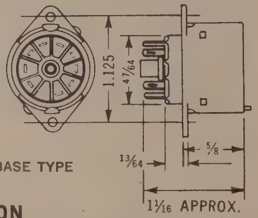
SADDLE TYPE—Cadmium-plated, phosphor-bronze contacts only. For bottom mounting (Top mounting available when specified).

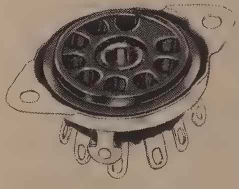
Insulator Material	Part No.	Mtg. Hole Dia. Saddle	Center Shield
G. P. Phenolic	147-500	.125	Large
G. P. Phenolic	147-504	.125	None
Mica	147-505	.125	Small

59 SERIES—9 CONTACTS

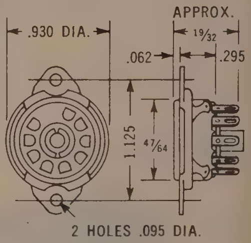


SHIELD BASE TYPE
59-407





SADDLE TYPE
59-409



ORDERING INFORMATION

SHIELD BASE TYPE

Insulator Material	Part No. Phosphor Bronze Cadmium Plated Contacts	Part No. Beryllium Copper Silver Plated Contacts	Mtg. Hole Dia. Saddle	Center Shield
Mica	*	59-403	.125	Large
Mica	59-405	*	.095	None
Black	59-406	*	.095	Large
Mica	59-407	*	.095	Large

**Must be specified*

SADDLE TYPE—Cadmium-plated, phosphor-bronze contacts only. For bottom mounting.

Insulator Material	Part No.	Mtg. Hole Dia. Saddle	Center Shield
G. P. Phenolic	59-409	.095	Large
Mica	59-410	.095	Large

For mating sockets see p. 2•517

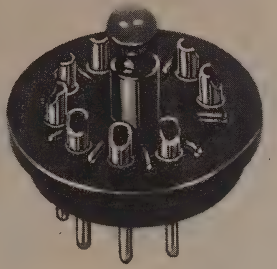
FOR LOCAL SOURCE OF SUPPLY SEE EEM VOL. 2 PAGE 462

MINIATURE PLUGS

BUNKER RAMO AMPHENOL

86 SERIES MINIATURE CABLE-TYPE PLUGS

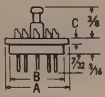
to mate with 147 and 59 Series Sockets



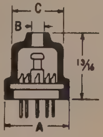
These space-saving miniature plugs are especially intended for use with the miniature tube sockets on the opposite page. They are meant for applications where a highly reliable, top-quality plug is required.

86 Series Plugs are molded from blue diallyl phthalate, a superior dielectric material. Contacts are brass, overplated with gold over silver. A center strain-relief post is molded-in to aid in relieving stress on solder connections.

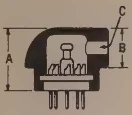
Plugs can be provided with or without rubber plug caps. Caps are available with end cable outlet or side cable outlet. See ordering information below.



PLUG



PLUG WITH CAP



PLUG WITH SIDE OUTLET CAP

ELECTRICAL AND MECHANICAL SPECIFICATIONS

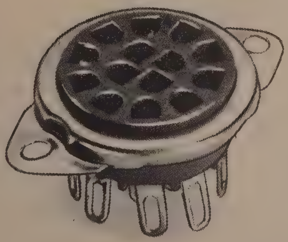
Voltage Rating: 1500 volts (RMS at sea level)
Current Rating: 5 Amps
Insulation: Diallyl Phthalate per MIL-M-14 Type MDG
Insulation Resistance (min.): 100,000 megohms
Contact Pins: .040″ dia., SAE #72 brass

ORDERING INFORMATION

Part No.	Description	A	B	C	Pin Circle Diameter
86-896	7-Pin Plug	.685	.575	.070	.375
86-893	9-Pin Plug	.778	.668	.070	.468
86-895	7-Pin Plug with Cap	.781	.171	.625	.375
86-897	9-Pin Plug with Cap	.875	.285	.718	.468
86-894	7-Pin Plug with Side Outlet Cap	.750	.468	.171	.375

59 SERIES RELAY SOCKETS

14-CONTACT RELAY SOCKET



Premium wrap-around-type contacts provide low-resistance mating. Contact material is silver-plated phosphor bronze with hot-tin-dipped tails. Tails are slotted for easy wiring. Dielectric is mica-filled phenolic. Cadmium-steel mounting plate has two .125″-dia. holes on 1.125″ centers. Fits .750″ minimum-diameter mounting hole. Mates with 14-contact relay plugs.

ORDERING INFORMATION

59-106	14-Contact Relay Socket

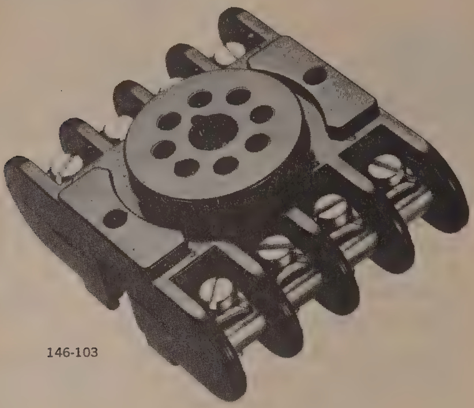
FOR LOCAL SOURCE OF SUPPLY SEE EEM VOL. 2 PAGE 462

INDUSTRIAL RELAY SOCKETS

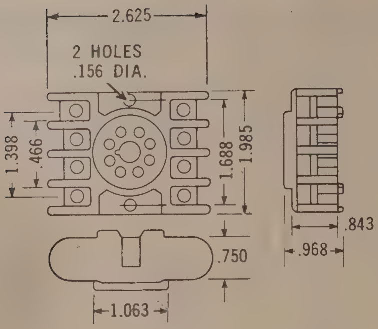
BUNKER RAMO **AMPHENOL**

U/L RECOGNIZED 146 SERIES INDUSTRIAL OCTAL SOCKETS

U/L File no. E 56473



146-103



Many design improvements at no extra cost make these a top value in octal relay sockets. Long screws with captivated pressure plate allow termination of bare wire, solid or stranded, from 20 to 12 AWG without attaching rings or spade-type lugs. The design holds the wire securely and prevents shearing when tightened. The longer screw permits clamping more than one wire or lug without difficulty. Binding screws withstand 45 in.-lb. torque to prevent strip-out when tightening.

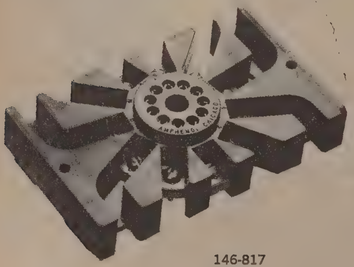
Molded in one-piece phenolic, this relay socket operates dependably despite continuous temperatures of 300°F. Cloverleaf contacts provide 4 lines of contact for minimum resistance and hold the relay in place despite severe vibration and shock. Insulating barriers provide long creepage paths between contacts and ground for utmost reliability, RETMA-numbered terminals. Sockets may be gang-mounted.

A unique design feature permits reversing the screw terminals to allow the socket to be mounted and wired from the bottom. Rated 10 Amp per contact at 1250 volts (RMS at sea level).

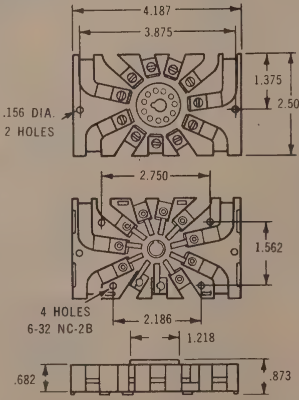
ORDERING INFORMATION

Part No.	Description
146-103	Standard Socket—surface mounted
146-104	Socket with 4 self-tapping screws for tie points—Top mounted
146-203	Same as 146-103 except for bottom mounting
146-204	Same as 146-104 execept for bottom mounting

11-CONTACT INDUSTRIAL RELAY SOCKET



146-817



All the features of the octal socket shown above, with 360° wrap-around contacts instead of cloverleaf type. This socket also has 4 self-tapping screws for tie points. Rated 10 Amps maximum per contact, 600 volts (RMS at sea level).

ORDERING INFORMATION

146-817	11-Contact Industrial Relay Socket

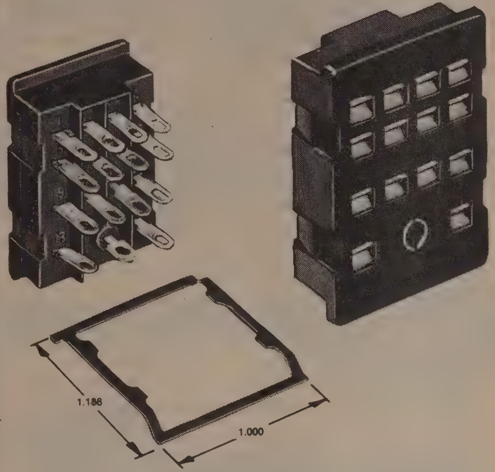
FOR LOCAL SOURCE OF SUPPLY SEE EEM VOL. 2 PAGE 462

MINIATURE RELAY SOCKETS

BUNKER RAMO AMPHENOL

U/L RECOGNIZED 59 SERIES
14-CONTACT MINIATURE RELAY SOCKETS

U/L File no. E 12869

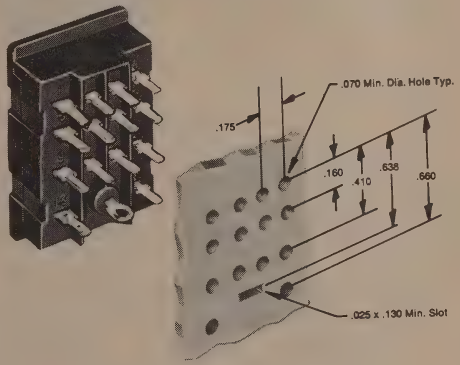


Amphenol's rectangular 14-contact relay sockets are designed for the popular 4PDT general-purpose miniature relay. These sturdy sockets increase flexibility of equipment design and assembly procedures and provide easier testing and servicing. They offer an unusual range of high-quality features at very low cost. Conforming to electronic industry standards, they replace many higher-cost sockets without any modifications.

Sockets are available with either printed-board or solder-eyelet contact tails. A spring-steel mounting clip is furnished with each solder-type socket that makes mounting fast, easy and secure.

An optional relay hold-down spring (P/N 59-1002) permits other than vertical mounting and also assures reliable relay operation in applications where vibration is present. It mounts over the relay and attaches to small notches in the socket flange.

14-contact miniature sockets are ideal for applications that use miniaturized components such as computer and data-processing equipment, business machines, communications equipment, etc.



SPECIFICATIONS

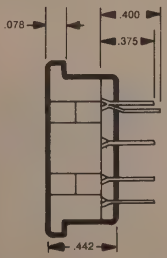
Current rating: 5 amp.
Voltage rating: 250 volts (RMS at sea level)
Contacts: Cadmium-plated brass
Dielectric: General-purpose black phenolic

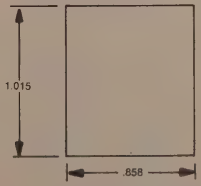
ORDERING INFORMATION

59-133*	14-contact miniature relay, Solder-eyelet tails
59-134	14-contact miniature relay, Printed-board tails

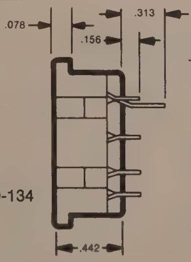
*Includes spring-steel mounting clip

59-133



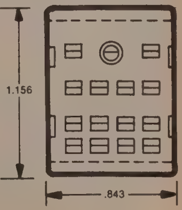


59-133 Panel Cutout
Panel Thickness: .031 to .062
Punch for cutout may be ordered from Greenlee Tool Co., Rockford, Ill. Type #731R



159-134

59-133 and 159-134

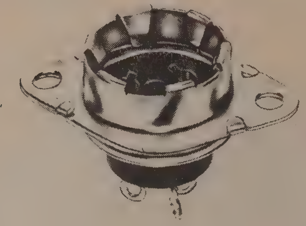


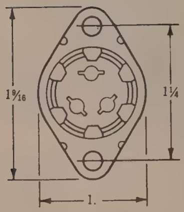
FOR LOCAL SOURCE OF SUPPLY SEE EEM VOL. 2 PAGE 462

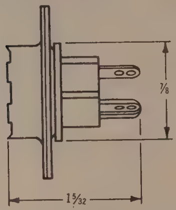
SOCKETS/CABLE CONNECTORS

BUNKER RAMO **AMPHENOL**

78 SERIES SHIELDED-CHASSIS SOCKETS







Consists of a standard 78 Series miniature socket (p. **2**•514), assembled in a cadmium-plated, drawn-steel mounting plate and shield. Spring contacts on shield wipe mating connector shell and assure good electrical continuity between shield, shell and mounting surface. They also hold shell firmly to prevent accidental disconnect. The assembly is sturdily constructed to withstand the action of high-speed riveting machines on production lines.

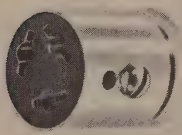
Mount these 78 Series sockets either on surface or below chassis or panel through ⅞"-dia. hole. Mounting holes are on 1¼" centers.

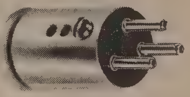
Use these economical receptacles for either shielded or unshielded cable. Recommended for lower-amperage applications on appliances and test panels; for auto-radio connection; and for audio and RF connections for microphones, speakers and antennas. For a fully shielded connection mate with 91 Series Long-Shell Shielded Plugs below. Rated 500 volts (RMS at sea level) 3 amps. max.

ORDERING INFORMATION

Part No.	Contacts		Pin Circle Diameter	Mating Plugs Shielded
	No.	Type (p. 2•504)		
78-PCG3	3	B	.344	91-MPM3L
78-PCG4	4	B	.406	91-MPM4L
78-PCG5	5	Wrap-around	.406	91-MPM5L
78-PCG6	6	Wrap-around	.406	91-MPM6L

91 SERIES CABLE CONNECTORS





Compact, reliable connectors for either shielded or unshielded cable. Recommended as battery, antenna or inexpensive microphone connectors. Accommodates cables up to ¼" diameter.

Bodies are general-purpose black phenolic, housed in cadmium-plated brass shells held in place by set screws. Polarized contact spacing assures correct insertion. All connectors rated 500 volts (RMS at sea level), 3 amps. max.

ORDERING INFORMATION

CABLE PLUGS

Short Shell ¹³⁄₁₆" Long	Long Shell 1³⁄₁₆" Long	Mating Sockets			
		Cable Socket Short ¹³⁄₁₆"	Cable Socket Long 1³⁄₁₆"	Chassis Shielded (with Long Shell only)	Chassis Unshielded
91-MPM3S	91-MPM3L	91-MPF3S	91-MPF3L	78-PCG3	78-S3S
91-MPM4S	91-MPM4L	91-MPF4S	91-MPF4L	78-PCG4	78-S4S
91-MPM5S	91-MPM5L	91-MPF5S	91-MPF5L	78-PCG5	78-S5S
91-MPM6S	91-MPM6L	91-MPF6S	91-MPF6L	78-PCG6	78-S6S

CABLE SOCKETS

Short Shell ¹³⁄₁₆" Long	Long Shell 1³⁄₁₆" Long	Mating Plugs		
		Cable Plug Short ¹³⁄₁₆"	Cable Plug Long 1³⁄₁₆"	Chassis Unshielded
91-MPF3S	91-MPF3L	91-MPM3S	91-MPM3L	86-CP3S
91-MPF4S	91-MPF4L	91-MPM4S	91-MPM4L	86-CP4S
91-MPF5S	91-MPF5L	91-MPM5S	91-MPM5L	86-CP5S
91-MPF6S	91-MPF6L	91-MPM6S	91-MPM6L	86-CP6S

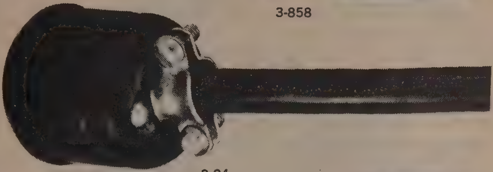
FOR LOCAL SOURCE OF SUPPLY SEE EEM VOL. 2 PAGE 462

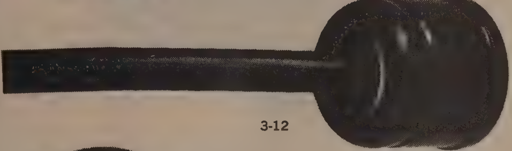
HARDWARE AND ACCESSORIES

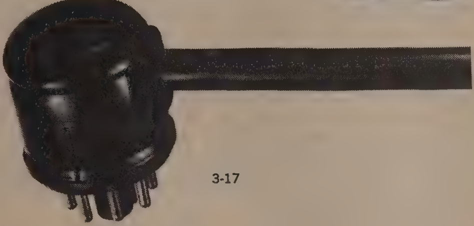
BUNKER RAMO AMPHENOL

3 SERIES SHIELDED END CAPS
for plugs and sockets

3-858


3-24


3-12

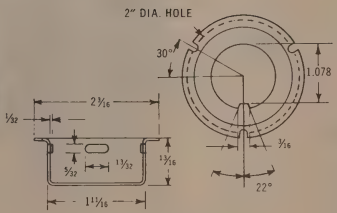

3-17

These sturdy end caps fit all retainer-ring-type plugs and sockets, including 49SS, 60, 61, 78S, 86CP and 160 Series. They provide a protected, attractive cable termination and are intended for applications where connectors must be mated and unmated. Molded thermoplastic caps are two-piece construction for ease of assembly and have molded-in, handy finger-grips to aid mating and unmating. When assembled, end cap is securely anchored to plug or socket. Metal caps quickly snap onto all standard grooved plugs and sockets.

ORDERING INFORMATION

Part no.	Description	Finish	Length
3-10	Steel, no cable outlet, no insulator	Black epoxy	1"
3-12	Steel, end outlet, 5/16" I.D. insulator	Black epoxy	1"
3-13	Steel, end outlet, 7/16" I.D. insulator	Black epoxy	1"
3-17	Steel, side outlet, rubber grommet, 7/16" I.D. insulator	Black epoxy	1"
3-24	Steel, cable clamp for up to 3/8" wire, insulator	Black epoxy	1 7/16"
3-858	Thermoplastic, end outlet, strain relief, 5/16" O.D. wire	Black styrene	1 3/4"
3-CC4	Cable clamp only as used on 3-24 above	Cadmium	—

RECEPTACLE SHELLS



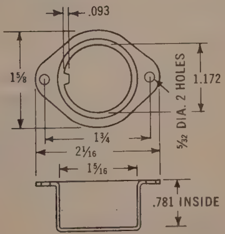
Aluminum shells raise 49SS, 78S Sockets, 86-CP plugs and power-line-type connectors 13/16" above surface of panel or chassis. Permits wiring from top of chassis or panel—knockouts on all 4 sides provide convenient wiring entrances. Mount through 1 3/4" hole; 3 mounting notches accept #6 screws.

ORDERING INFORMATION

61-23	Receptacle Shell

RECESSED-MOUNTING SHELLS

(Recessed Mounting Shell)



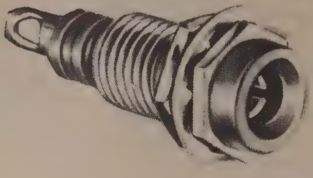
Used where flush mounting of standard grooved plugs or sockets is needed. These sturdy cadmium-plated steel shells permit mounting of 49SS, 78S Sockets, 86-CP Plugs and power-line-type connectors 1 3/16" below surface of panel or chassis. Mounts in 1 7/16" hole; is held through two 5/32" screw holes on 1 3/4" centers.

ORDERING INFORMATION

61-61	Recessed Mounting Shell

FOR LOCAL SOURCE OF SUPPLY SEE EEM VOL. 2 PAGE 462

350 SERIES COMMERCIAL TIP JACKS for .080″-dia. plug



350-61001-X

These tip jacks accomodate a wide variety of applications. They are designed to fit .080″-dia. plugs. 9/16″ long and mount through a 1/4″ hole. Seven colors are available for coding — please specify colors desired.

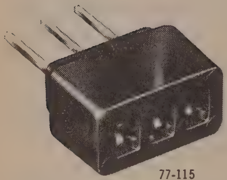
MATERIAL AND ELECTRICAL SPECIFICATIONS

Dielectric: Nylon (Zytel 101)
Mounting Shell: Nickel-plated brass
Hex Nut: Nickel-plated .062″ brass
Lockwasher: Nickel-plated steel
Contacts: Silver-plated beryllium copper
Rated Current: 5 amp.
Rated Voltage: 1000 volts max. (RMS at sea level)
Voltage Drop: 20 millivolts max. at rated current
Insulation Resistance: 5000 megohms min.
Operating Temperature: 256°F max.

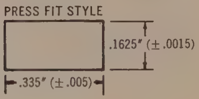
ORDERING INFORMATION

350-61001-X	Commercial Tip Jack (Replace "X" with number for color desired, as follows: —1 Red, —2 Black, —3 Brown, —4 Green, —5 Orange, —6 White, —7 Blue)

77 SERIES SCR SOCKETS



77-115



These inexpensive sockets permit fast, easy installation, withdrawal and replacement of silicon-controlled rectifiers, such as the GE C106 or other equivalent flat-pack SCRs with 3 leads. SCR simply plugs in—no riveting or soldering. Contact tails are for either wire-wrapping or printed-board termination. Socket is designed to be press-fitted into panel cut-out shown or soldered to printed board. Rated 500 volts (RMS at sea level), 5 amps per contact.

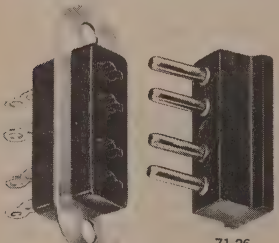
SPECIFICATIONS

Contacts: Nickel-silver, .323″ long and .020″ square. Three contacts on .100 centers with mating depth of .160″.
Dielectric: Black Nylon, type 6

ORDERING INFORMATION

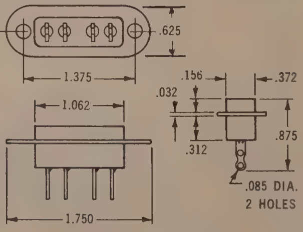
77-115	SCR Socket

4-CONTACT RECTANGULAR PLUG AND SOCKET



71-26

77-26



For many types of compact apparatus. Plugs are frequently used as self-sustaining coil form. Receptacle has molded-in mounting plate. Two .085″ holes in socket contact tail permit easy wiring. Dielectric is general-purpose black phenolic. Rated 500 volts (RMS at sea level), 3 amps per contact.

ORDERING INFORMATION

71-26	4-Contact Rectangular Plug
77-26	4-Contact Rectangular Receptacle

FOR LOCAL SOURCE OF SUPPLY SEE EEM VOL. 2 PAGE 462

146 SERIES INDUSTRIAL ANGLE-TYPE SOCKET

146-106

For super-jumbo 4-pin industrial-type tubes. Provides vertical-tube panel mounting, without need for horizontal supporting structure. Sturdy, heavy-wall construction with rugged mounting bracket furnished. Includes retaining clip to hold tube securely during vibration and shock.

ORDERING INFORMATION

146-106	Industrial Angle-type Socket

98 SERIES PREFOCUSED LAMP RECEPTACLE

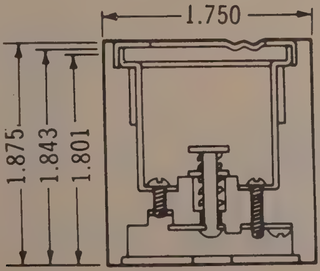
U/L Listed

98-8

Can be installed in most 8 and 16mm movie projectors using medium-base prefocused lamps and high-wattage floodlights, beacons, etc. without drilling new holes. Rated 1000 watts, 110-250 volts. Heavy-duty contacts continue to assure minimum resistance for maximum light intensity. Special heat-resistant phenolic body withstands temperatures to 450°F; ceramic body is available for higher temperature service. Heavy fiber insulator is included; covers terminals after wiring. U/L recognized.

ORDERING INFORMATION

98-8	Prefocused Lamp Receptacle, Phenolic
98-1	Prefocused Lamp Receptacle, Ceramic



FOR LOCAL SOURCE OF SUPPLY
SEE EEM VOL. 2 PAGE 462

91 SERIES EXCELLITE® CONNECTORS

Low-cost, sturdy audio-type connectors with latch-lock couplings that provide easy, positive mating and unmating. Intermateable and interchangeable with both Switchcraft and Cannon XLR type units (see p. **2**•527), they are made of rugged, molded ABS with lustrous nickel plating to permanently retain their handsome good looks. Also available in black, high-impact, unplated ABS for applications that do not require shielding (p. **2**•526). Excellite® Connectors have unusual resistance to denting, chipping, cracking, peeling and tarnishing. They are obtainable in both cable plugs and panel receptacles, all with 3, 4, 5 and 6 contacts, as required. Only Amphenol Excellite Connectors combine all these features.

Save time and money. Cost less to buy initially; save installation time, as well as time for servicing or field repairs if ever required.

Lighter and more rugged. Excellite Connectors are considerably lighter than comparable zinc die-cast units. They also lack the inherent brittleness of zinc to provide longer, trouble-free service.

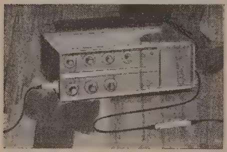
Fool-proof polarization. Key on receptacle and lock-in keying on plug positively prevent accidental mismating.

Positive ground. In all Excellite Connectors, contact #1 engages first and is intended for use as a ground contact. By grounding before electrical connection, possible damage to delicate solid-state equipment or microphones is prevented.

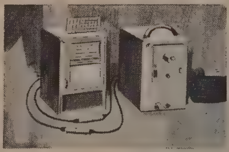
Easier wiring. Shell, button and insert are all one assembly. This unitized insert is easily removed to expose the solder-cup-type contacts to permit quick, positive termination.

TYPICAL APPLICATIONS

Excellite Connectors have a multitude of uses in many types of industrial, commercial and consumer equipment. Among these are:

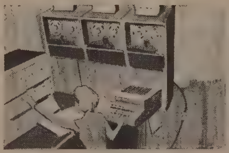


Audio Equipment — microphones, amplifiers, preamps, mixers, speakers, record players, tape decks, recorders, intercoms, 2-way radio, broadcast-studio equipment, sound movie projectors, film-strip projectors, video-recording systems, patch cords.



Test Instruments — analyzers, bridges, comparators, decade boxes, gauges and indicators, meters, standards, test probes, medical-electronics instruments, x-ray equipment, scientific recording and measuring devices.

Control System — counters, detectors, alarms, transducers, servos, photo-electric cells, gauges, timers, regulators.



Other — computer peripheral equipment, educational equipment, nuclear equipment, entertainment systems.

AUDIO-TYPE CONNECTORS

BUNKER RAMO AMPHENOL

91 SERIES EXCELLITE® CONNECTORS

Nickel-plated shells

Material Specifications:

Shell and Cable Clamp — Molded, plateable-grade ABS with bright nickel plate over copper base

Insert Dielectric—Molded Type 6 Nylon

Contacts—Copper-alloy, silver-plated and chromate dipped. Solder-cup termination

Cable Relief — General-purpose 40-60 durometer Neoprene

Mechanical Specifications:

Cable Clamp — Cable clamp and gland accept all commonly used .250″ to .313″-dia. cable. Optional boot for cable from .189″ to .250″ diameter available on special order.

Operating Temperatures—20° to 160°F

Vibration—Conforms to MIL-STD-202 method 204, test condition D

Durability—Withstands 500 coupling cycles without any significant mechanical or electrical effects. Mated pair withstands applied force of 275 lb.

Corrosion Resistance — Withstands standard MIL-STD-202 48-hr salt-spray test without damage or corrosion.

Electrical Specifications

Rated Voltage—133 volts (RMS at sea level)

Rated Amperage—3 Contact, 15 amp.
4 Contact, 10 amp.
5 Contact, 7.5 amp.
6 Contact, 7.5 amp.

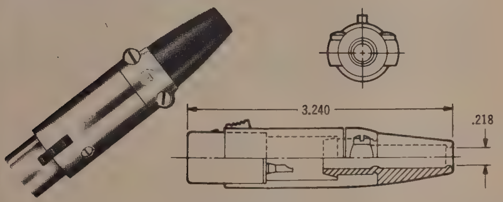
Dielectric Withstanding Voltage—1400 volts at 60 Hz for one minute between any two contacts or between any contact and connector shell.

Dielectric Resistance—Exceeds 100 megohms

Contact Resistance—Voltage drop is between 45-55 millivolts at rated current, depending on contact and wire size.

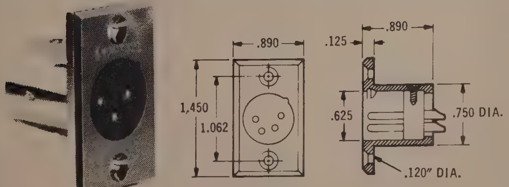
ORDERING INFORMATION FOR LOCAL SOURCE OF SUPPLY SEE EEM VOL. 2 PAGE 462

Straight Cord Plugs



Socket Contacts

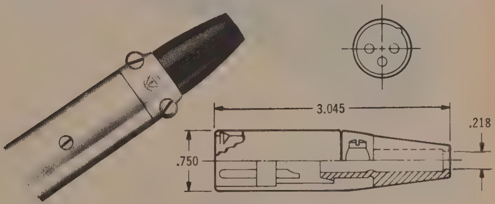
Number of Contacts	3	4	5	6
Part Number	91-454	91-458	91-462	91-465



Pin Contacts

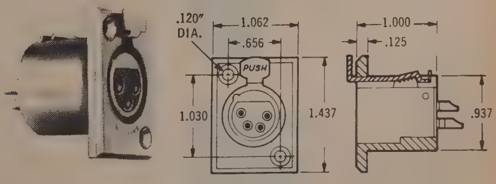
Number of Contacts	3	4	5	6
Part Number	91-453	91-457	91-461	91-466

Panel Mounting Receptacles



Pin Contacts

Number of Contacts	3	4	5	6
Part Number	91-455	91-459	91-463	91-467



Socket Contacts

Number of Contacts	3	4	5	6
Part Number	91-456	91-460	91-464	91-469

AUDIO-TYPE CONNECTORS

BUNKER RAMO AMPHENOL

91 SERIES EXCELLITE® CONNECTORS
with low-cost, unplated shells

These connectors are identical in materials, mechanical and electrical specifications and contact arrangement to the 91 Series Excellite Connectors shown on p. **2**•525, but have unplated low lustre black shells. They are, therefore, offered at lower cost. Ideal for power connections where RF or EMI shielding is not required or for use in budget-priced units. These unplated connectors are completely intermateable and intermountable with the connectors shown on the preceding page.

FOR LOCAL SOURCE OF SUPPLY SEE EEM VOL. 2 PAGE 462

ORDERING INFORMATION
Straight Cord Plugs, unplated

Socket Contacts

No. of Contacts	3	4	5	6
Part Number	91-404	91-408	91-416	91-471

Pin Contacts

No. of Contacts	3	4	5	6
Part Number	91-403	91-407	91-411	91-470

ORDERING INFORMATION
Panel Mounting Receptacles, unplated

Pin Contacts

No. of Contacts	3	4	5	6
Part Number	91-405	91-409	91-413	91-472

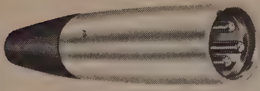
Socket Contacts

No. of Contacts	3	4	5	6
Part Number	91-406	91-410	91-414	

AUDIO-TYPE CONNECTORS

BUNKER RAMO AMPHENOL

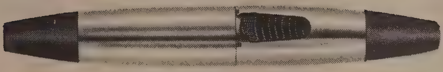
91 SERIES QWIKS


91-853

91-856

91-855

91-854


91-853 91-854

Easy-to-operate, quick-disconnect units that are ideal for microphones or other equipment that is moved frequently. Disconnect by simply pressing a button and pulling apart. Connect by merely pressing plug or jack into receptacle until they "click" together. Units stay securely mated until you decide otherwise. Cable plug and jack also mate. All are intermateable with Excellite and other industry standard audio connectors.

Qwiks have bodies of high-grade zinc alloy and are finished in attractive and corrosion-resistant satin-finish nickel. Contacts are a copper base alloy and are gold plated for resistance to oxidation and continued high conductivity. Dielectric is premium diallyl phthalate.

ORDERING INFORMATION

Part no.		
3 Contact	4 Contact	Description
91-853	91-857	Male Cable Plug
91-854	91-858	Female Cable Plug
91-855	91-859	Male Chassis Receptacle
91-856	91-860	Female Chassis Receptacle

91 SERIES EXCELLITE INTERCHANGEABILITY AND INTERMATEABILITY CROSS-REFERENCE

This cross-reference will assist in selecting Amphenol 91 Series Excellite Connector part numbers for equivalent Switchcraft, Cannon and Amphenol Qwik types. All Excellite Connectors shown are electrically equivalent and mechanically interchangeable to the other types. Excellite part numbers shown are for plated connectors; for unplated types (also intermountable, intermateable, and interchangeable) see opposite page.

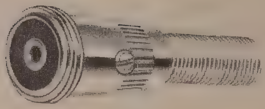
1. To replace any of these:			2. Use this Excellite part number		3. All connectors at left intermate with Excellite Part Number:	
Cannon	Switch-craft	Amphenol Qwik	Amphenol Excellite	Description	Panel Mount	Cord Plug
XLR-3-11C	A3F	91-854	91-454	3-contact Female Cord Plug	91-455	91-453
XLR-3-12C	A3M	91-853	91-453	3-contact Male Cord Plug	91-456	91-454
XLR-3-31	D3F	91-856	91-456	3-contact Female Panel Mount	—	91-453
XLR-3-32	D3M	91-855	91-455	3-contact Male Panel Mount	—	91-454
XLR-4-11C	A4F	91-858	91-458	4-contact Female Cord Plug	91-459	91-457
XLR-4-12C	A4M	91-857	91-457	4-contact Male Cord Plug	91-460	91-458
XLR-4-31	D4F	91-860	91-460	4-Contact Female Panel Mount	—	91-457
XLR-4-32	D4M	91-859	91-459	4-contact Male Panel Mount	—	91-458
XLR-5-11C	A5F	—	91-462	5-contact Female Cord Plug	91-463	91-461
XLR-5-12C	A5M	—	91-461	5-contact Male Cord Plug	91-464	91-462
XLR-5-31	D5F	—	91-464	5-contact Female Panel Mount	—	91-461
XLR-5-32	D5M	—	91-463	5-contact Male Panel Mount	—	91-462
—	A6F	—	91-465	6-contact Female Cord Plug	91-467	91-466
—	A6M	—	91-466	6-contact Male Cord Plug	91-469	91-465
—	D6F	—	91-469	6-contact Female Panel Mount	—	91-466
—	D6M	—	91-467	6-contact Male Panel Mount	—	91-465

MICROPHONE CONNECTORS

BUNKER RAMO AMPHENOL

75 SERIES SINGLE-CONTACT CONNECTORS

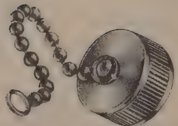
75-PC1M



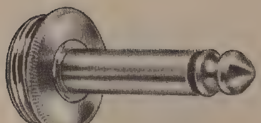
75-MC1M

75-MC1F

75-MC1FA



75-CCC1



75-MC1P

Widely used by leading manufacturers for many types of equipment including amplifiers, transmitters, recorders, speakers, headphones, security alarms, juke boxes, vending machines and other devices.

Shielded-cable-type connector is chrome-plated brass and is practically unbreakable. The threaded ends engage with the coupling to make a physically secure, electrical noise-free and leak-proof connection—the center contacts remain firmly together when mated. Spring cord protectors prevent undue cable flexing and breakage; accept cables up to ¼"-diameter. For grounding to chassis, mount receptacle in .385" hole; .500"-dia. hole for ungrounded two-circuit applications. Receptacle can be screwed directly into housing or stand by means of ⅜"-24 tapped hole.

Use the 75-MC1F straight plug as a cable jack by merely unscrewing the coupling ring and sliding it back over the cord. The 75-CCC1 Cap and Chain is recommended for covering the receptacle to keep it free from dust and foreign matter when not in use.

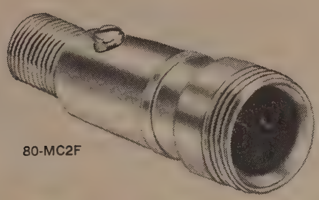
ORDERING INFORMATION

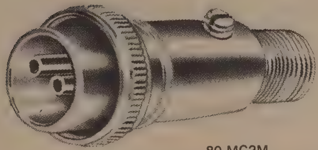
Part No.	Description
75-PC1M	Locknut Receptacle
75-MC1M	Cable Jack
75-MC1F	Straight Plug
75-MC1FA	Angle Plug
75-MC1P	Phone Plug Adapter
75-CCC1	Cap and Chain

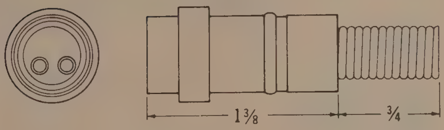
MICROPHONE CONNECTORS

BUNKER RAMO AMPHENOL

80 SERIES SINGLE- AND DOUBLE-CONTACT CONNECTORS

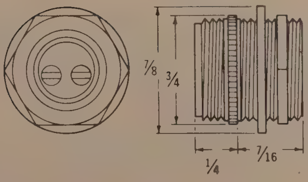

80-MC2F


80-MC2M



80-PC2F

80-PC2M



These one-and two-contact connectors have a wide variety of applications such as shielded and microphone cables, twisted pairs, photo-cell leads, patch cords, electronic instruments and similar equipment.

Dielectric is general-purpose black phenolic; shells are attractively finished in polished chrome. Both plugs and receptacles are precision-constructed to assure positive connections free from electrical noise, leaks or shorts.

Both cable plugs and panel receptacles are available with either male or female contacts. All mount through ⅝″-diameter holes. Maximum panel thickness for lock-nut-type receptacle is 11/32″. Threaded housings permit mounting directly on mike body with ⅝″-24 tapped hole for a neat installation. Spring cable guard protects against flexing and wear; accepts cables up to 5/16″-diameter. Cap and chain 75-CCC1 (opposite page) also fits 80 Series Connectors to protect from dust and foreign matter when not in use. Assemblies are polarized to prevent mis-mating. Plug and socket inserts are interchangeable in all shell styles.

ELECTRICAL SPECIFICATIONS

	Single Contact		Double Contact	
	Male	Female	Male	Female
Voltage Rating (RMS at Sea Level)	1250 v.	1250 v.	600 v.	600 v.
Current Rating (amps)	5	3	3	3
Voltage Breakdown between terminals and ground	3000 v.	4000 v.	2000 v.	2000 v.

ORDERING INFORMATION

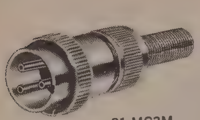
No. contacts	Cable Plug	Mating Connectors	
		Cable-to-Cable	Cable-to-Panel
1 Male	80-M	80-F	80-C
1 Male	80-M1	80-F1	—
1 Female	80-F	80-M	—
1 Female	80-F1	80-M1	80-C1
2 Male	80-MC2M	80-MC2F	80-PC2F
2 Male	80-MC2M1	80-MC2F1	—
2 Female	80-MC2F	80-MC2M	—
2 Female	80-MC2F1	80-MC2M1	80-PC2M

FOR LOCAL SOURCE OF SUPPLY SEE EEM VOL. 2 PAGE 462

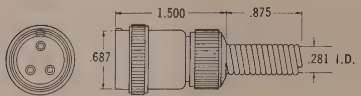
MICROPHONE CONNECTORS

BUNKER RAMO AMPHENOL

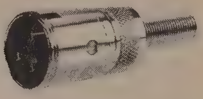
91 SERIES CONNECTORS

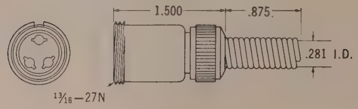

91-MC3M

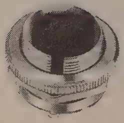
MC3F1



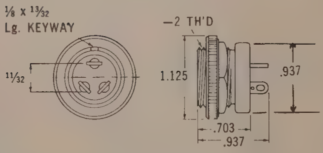
91-MC3F


91-MC3M1




91-PC3F

91-PC3M



While these 3, 4 and 6-contact connectors are intended primarily for audio equipment, they are also widely used where components must be connected and disconnected from portable equipment.

The screw-type coupling-ring connection prevents accidental disconnects. A squeeze-type clamp grips the cable firmly after assembly and prevents strain on the soldered terminations.

Dielectric is molded general-purpose black phenolic. Cable shells are finished in high lustre chrome plate. Cord-protector springs for 3-contact style have .281" I.D., 4- and 6-contact types have .385 I.D. Chassis receptacles mount in 27/32"-dia. holes with maximum chassis thickness of 1/8". Their service end accepts either a cable plug coupling ring or the protective cap and chain shown below. All assemblies have keyed polarization to prevent mis-mating.

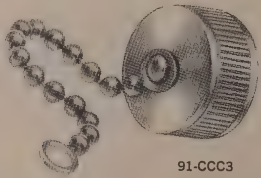
ELECTRICAL SPECIFICATIONS

	3-contact		4-contact		6-contact	
	Female	Male	Female	Male	Female	Male
Voltage Rating (RMS Sea Level)	600v.	800v.	600v.	600v.	600v.	600v.
Current Rating (amps)	5	5	3	3	3	3
Voltage Breakdown (RMS) between Terminal and Ground (volts)	2000	2000	2000	2000	2000	2000

ORDERING INFORMATION

Contacts no. and type	Cable Plug	Mating Connectors	
		Cable-to-Cable	Cable-to-Panel
3 Male	91-MC3M	91-MC3F	91-PC3F
3 Male	91-MC3M1	91-MC3F1	—
3 Female	91-MC3F	91-MC3M	—
3 Female	91-MC3F1	91-MC3M1	91-PC3M
4 Male	91-MC4M	91-MC4F	91-PC4F
4 Male	91-MC4M1	91-MC4F1	—
4 Female	91-MC4F	91-MC4M	—
4 Female	91-MC4F1	91-MC4M1	91-PC4M
6 Male	91-MC6M	91-MC6F	91-PC6F
6 Male	91-MC6M1	91-MC6F1	—
6 Female	91-MC6F	91-MC6M	—
6 Female	91-MC6F1	91-MC6M1	91-PC6M

PROTECTIVE CAP AND CHAIN


91-CCC3

Seals all chassis-type receptacles shown above against dirt and tampering. Ruggedly constructed with chrome-plated, heavy brass cap and sturdy brass-nickel-plated bead chain.

ORDERING INFORMATION

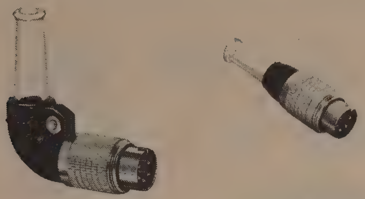
91-CCC3	Protective Cap and Chain

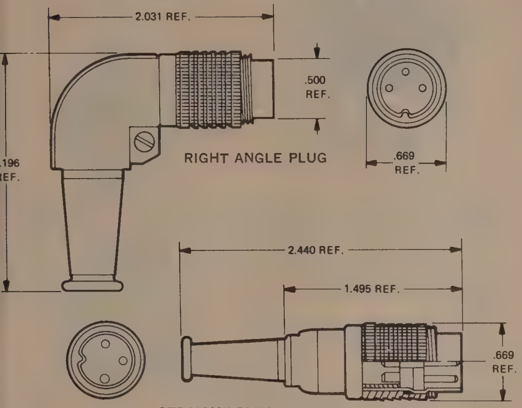
FOR LOCAL SOURCE OF SUPPLY SEE EEM VOL. 2 PAGE 462

MICROPHONE CONNECTORS

BUNKER RAMO AMPHENOL

91-T SERIES MINIATURE CONNECTORS





RIGHT ANGLE PLUG

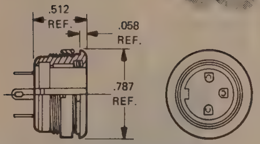
STRAIGHT PLUG

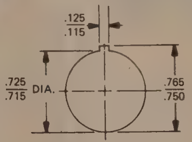
These miniature audio/electronic cable-to-panel connectors are approximately ⅓ smaller than the standard 91 Series coupling-ring connectors shown on the opposite page. Seven styles are available with 2, 3, 4, 5, 6, 7 and 12 contacts. They are useful everywhere a reliable, space-saving interconnection is desired.

Cable plugs are obtainable in either straight or right-angle styles. Both have molded black polycarbonate dielectric insert and bushing; bright nickel-plated shell and coupling ring. Strain relief is clear PVC plastic; accepts cable up to 7/32" O.D. Pin contacts with solder-cup tails are standard. Socket contacts are available on special order.

Panel receptacles have a nickel-plated brass shell and hex nut; dielectric is also black polycarbonate. The receptacle securely mounts in a .720"-dia. keyed panel opening by means of the hex-type nut. Socket contacts with pre-tinned solder-eyelet tails are standard; pin contacts are obtainable on special order.

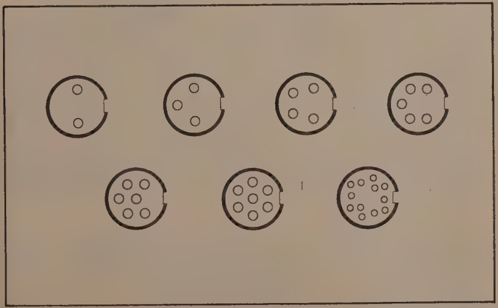
The screw-lock coupling securely holds the connector halves together to withstand shock and vibration to prevent accidental disconnects. Polarization to prevent mis-mating is achieved two ways—by a key in the shell and by contact arrangement.





PANEL CUTOUT

CONTACT ARRANGEMENT



SPECIFICATIONS

Current Rating: 3 amps max. per contact
Voltage Rating: 2-7 contacts incl. 120v. (RMS at Sea Level) 12-contact, 60v. (RMS at Sea Level)
Dielectric: Black polycarbonate
Contacts: Socket—Silverplated phosphor bronze
Pin—Silver-plated brass
Accommodates Wire Size: 20 AWG

ORDERING INFORMATION

No. of Contacts	Cable Plugs Straight	Cable Plugs Right-Angle	Panel Receptacles
2	91-T-3200-1	91-T-3200-6	91-T-3203-9
3	91-T-3260-1	91-T-3260-6	91-T-3263-9
4	91-T-3300-1	91-T-3300-6	91-T-3303-9
5	91-T-3360-1	91-T-3360-6	91-T-3363-9
6	91-T-3400-1	91-T-3400-6	91-T-3403-9
7	91-T-3475-1	91-T-3475-6	91-T-3478-9
12	91-T-3635-1	91-T-3635-6	91-T-3638-9

FOR LOCAL SOURCE OF SUPPLY SEE EEM VOL. 2 PAGE 462

POWER-CORD PLUGS

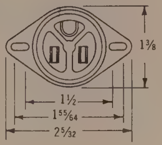
BUNKER RAMO AMPHENOL

U/L LISTED 160 SERIES 2-POLE GROUNDED CONNECTORS

U/L File no. 12869

Dual-rated, heavy-duty plugs and receptacles—for either 15 amp, 125 volt or 10 amp, 250 volt. Meet U/L requirements for grounding home appliances and tools, as well as single-phase industrial equipment. All plugs and receptacles incorporate both terminal screws and solder-eyelet terminations.

WITH MOUNTING PLATE

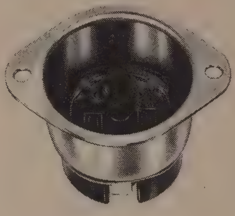


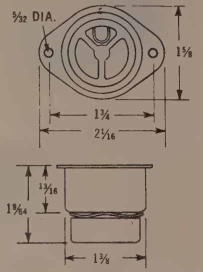
Nickel-plated-steel mounting plate assembled to molded thermoplastic body. Mounting requires 1 9/32"-dia. center hole and two 5/32"-dia. holes on 1½" to 1 55/64" centers. Contacts and grounding prong are brass. Plug is U/L listed. Receptacle is recognized under the U/L component program.

ORDERING INFORMATION

160-2-N	2-pole Receptacle
160-3-N	2-pole Plug

FLUSH MOTOR TYPE



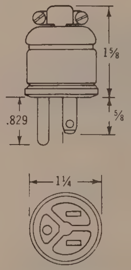


Consists of 160-10 and 160-11 inserts (below) assembled in cadmium-plated steel shells for below-surface mounting. Mount in 1 7/16"-dia. hole with two 5/32" screw holes on 1¾" centers. Plug is U/L Listed. Receptacle is recognized under the U/L component program.

ORDERING INFORMATION

160-4-N	2-pole Flush Motor Receptacle
160-5-N	2-pole Flush Motor Plug

SHIELDED TYPE

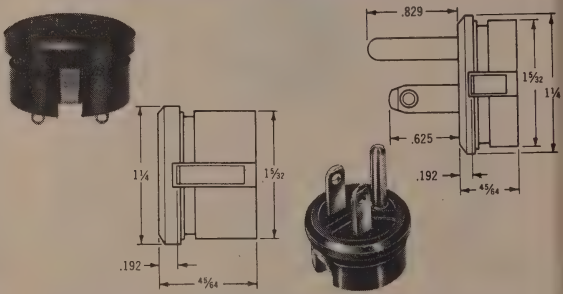


Consists of 160-10 and 160-11 inserts (below) with sturdy steel plug caps finished in black epoxy. Caps are 1 1/16" long. End rubber grommet has 7/16" I.D. Cable clamp fits cable up to 3/8" O.D. All plugs and receptacles are U/L Listed.

ORDERING INFORMATION

160-6-N	2-pole Shielded Receptacle with Rubber Grommet
160-7-N	2-pole Shielded Plug with Rubber Grommet
160-8-N	2-pole Shielded Receptacle with Cable Clamp
160-9-N	2-pole Shielded Plug with Cable Clamp

PLUG AND RECEPTACLE INSERTS



Inserts have high-temperature-resistant thermoplastic bodies with cadmium-plated carbon-steel retainer rings. Contacts and grounding prong are copper alloy. Mount in 1 11/64"-dia. keyed hole. Unless specified otherwise, both plug and receptacle inserts are grooved to fit .031" to .050"-thick panels, but they can be furnished on special order to fit panels or chassis up to .125" thick. Plug and receptacle are **not** U/L approved, since ground connection after installation requires U/L approval.

ORDERING INFORMATION

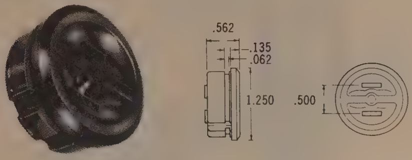
160-10-N	2-pole Receptacle Insert
160-11-N	2-pole Plug Insert

POWER-CORD PLUGS

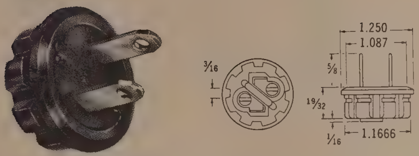
BUNKER RAMO AMPHENOL

U/L LISTED 60 AND 61 SERIES TWO- AND THREE-POLE CONNECTORS

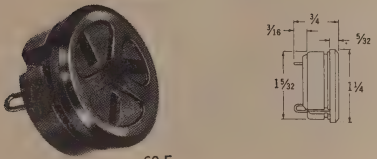
U/L File no. 12869



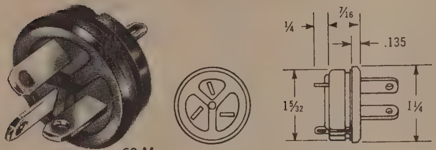
61-F



61-M

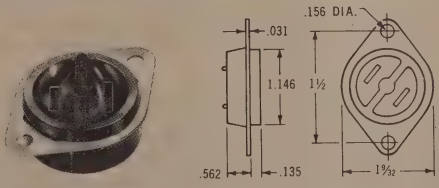


60-F



60-M

MOLDED-IN-PLATE RECEPTACLE



Quality 110-volt receptacle identical to 60-F (above) except that steel mounting plate is molded directly into phenolic body. Mounts in 1 3/16"-dia. hole. Mounting holes are 5/32"-dia. on 1 1/2" centers. Receptacle is at angle to plate for close spacing or vertical mounting.

ORDERING INFORMATION

61-MIP-61F	2-pole Molded-in-Plate Receptacle

PLUG AND RECEPTACLE INSERTS

All dual rated at either 15 amp., 125 volts or 10 amp,. 250 volts and constructed to meet U/L standards. These compact plug and receptacle bodies are ruggedly molded in general-purpose black phenolic. They are available in either retainer-ring or already-assembled mounting-plate types. All sockets have dual termination, with both solder eyelets and terminal screws.

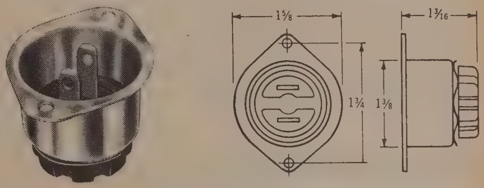
Assemble retainer-ring type plugs and receptacles to panels or chassis with the Amphenol Retainer-Ring Hand Tool (p. **2**•513) or to plug caps (p. **2**•521). They mount in 1 11/64"-dia. keyed holes in chassis. Standard parts are grooved to fit .031" to .050" thick panels but they can be furnished on special order to fit panels up to .125" thick. The mounting-plate style requires a 1 3/32"-dia. hole with holding screws or rivets on 1 1/2" to 1 55/64" centers.

Two-pole receptacles accept all standard 125 volt plugs. Contacts for three-pole receptacles are arranged so that 60-M and 60-M1 plugs can be inserted only one way.

ORDERING INFORMATION

Part no.		
Retainer Ring Type	**Mounting Plate Type**	**Description**
PLUGS		
61-M	61-M1	2-pole, Standard
60-M	60-M1	3-pole, Polarized
RECEPTACLES		
61-F	61-F1	2-pole, Universal
60-F	60-F1	3-pole, Polarized

FLUSH MOTOR PLUG AND RECEPTACLE



Compact plug or receptacle already assembled in No. 61-61 steel shell for below-surface mounting. Mounts in 1 7/16"-dia. hole; has two 5/32" screw holes on 1 3/4" centers.

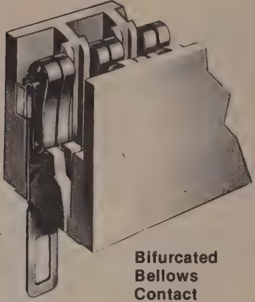
ORDERING INFORMATION

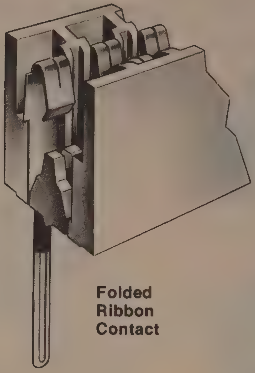
Part no.	Description
60-F10	3-pole Polarized Receptacle
60-M10	3-pole Polarized Plug
61-F10	2-pole Universal Receptacle
61-M10	2-pole Standard Plug

PRINTED CIRCUIT CONNECTORS

BUNKER RAMO AMPHENOL

225 Series


Bifurcated Bellows Contact


Folded Ribbon Contact

Low Contact Resistance

225 Series Connectors assure positive contact with regular or irregular board surfaces. Two types of contacts are employed.

225 Series Industrial and Military Types utilize a bifurcated bellows contact that incorporates two important features—bifurcation and convexity. Bifurcation (slotting) assures two points of contact at all times. The convex face concentrates bearing pressure on the mating surface and assures a positive wiping action that removes semi-conductive films on insertion.

225 Series solder-type Commercial Connectors use a slotted, folded-ribbon contact that flexes into the connector-block cavity on insertion. The wide ribbon provides a large contact area and excellent conductivity.

Excellent Protection for Mating Surfaces

A wide flexing range gives 225 Series contacts in both bellows and ribbon types an extremely low-friction mating with printed circuit surfaces—enables them to withstand repeated insertions and withdrawals. Double plating the contact surface with two dense metals provides protection against wear from hard usage.

Will Not Deform Under Stress

Because these contacts have an excellent compliance, they will not deform or "set" under hard usage. Warped or rocked boards will not permanently deform the contact by squeezing it against a stop and exceeding the elastic limits of the material.

Rugged, One-Piece Connector Body

The industrial- and military-type connector body is molded from flame-retardant diallyl phthalate which is glass-fiber reinforced to resist physical and thermal shock. Commercial 225 Series Connectors are molded from electrical-grade phenolic which gives excellent service in most applications. Both are produced by Amphenol's process of controlled-transfer molding, insuring uniformity and dimensional stability.

The card slot is designed to provide easy guidance for mis-aligned boards and permits fast entry even in blind applications where visual alignment is not possible.

Get Almost Any Combination You Need

Amphenol 225 Series Connectors offer an extreme range of options to meet your individual requirements:

Application Types: Commercial, Industrial, Military

Contact Styles: Removable (Crimp) or permanent; two contact rows for independent opposed circuits or single row for single circuits; two rows bridged for redundant PC boards.

Contact Positions: 6, 10, 12, 15, 18, 22, 25, 28, 30, 36, 43, 50.

Terminations: Solder (closed eyelet; open eyelet; long, medium, short, right-angle dip), Wire-wrappable, Crimp Poke-Home®, Taper Pin.

Contacts: Copper-alloy base metal with .000020 (0,000508) minimum gold or bright tin-lead* over copper flash; Phospor-bronze base metal with .000020 (0,000508), .000030 (0,000762), .000050 (0,00127) minimum gold or bright tin-lead* over copper flash; Beryllium-copper base metal with .000030 (0,000762), .000050 (0,00127) minimum gold over copper flash.

Mounting Provisions: Clearance hole .128 (3,25) and .142 (3,61). Float bushing clearance for #4 screw. Molded-in threaded bushing for 4-40 screw.

Polarization: Between-the-contact keying; over-the-contact keying.

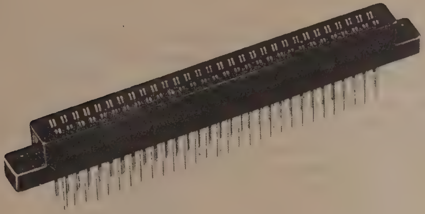
**Bright tin-lead-plated contacts require use of bright tin-lead-plated pads on printed circuit board.*

COMMERCIAL CONNECTORS

BUNKER RAMO AMPHENOL

225 Series

Wire-Wrappable Terminations
Bifurcated Bellows Contacts



AMPHENOL 225 Series Printed Circuit Commercial Connectors with wire-wrappable terminations provide an economical and reliable connector for either automatic or hand-wire-wrapping applications.

Contacts are on a .100 x .200 (2,54 mm x 5,08 mm) or .125 x .250 (3,18 mm x 6,35 mm) grid spacing. Connectors are available in 22-, 30-, 40-, 43- and 50-position models with either grid spacing. The .025 (0,64 mm) square posts will accept a minimum of 3 wraps of #26 AWG wire.

SPECIFICATIONS

Operating Voltage:	600 VAC (RMS) at sea level 150 VAC (RMS) at 70,000 ft.
Current Rating:	5 amps
Dielectric Material:	Electrical Grade Phenolic, Black
Insulation Resistance:	5,000 megohms minimum
Contact Material:	Phosphor bronze plated .000020 (0,000508) min. gold over copper
Contact Resistance:	30 millivolts maximum at rated current
Board Thickness:	.054 (1,37) to .071 (1,80)

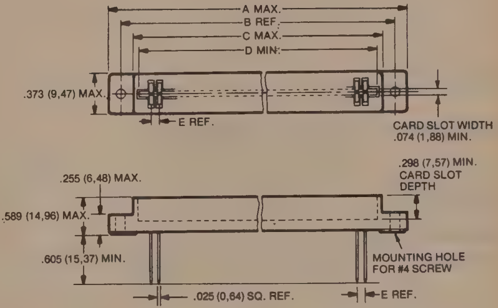
POLARIZING KEYS

225-645

Over contact key can be used with 225 Series wire-wrappable connectors on .100 (2,54) and .125 (3,18) centers.

225-594

Between contact key may be used with .125 (3,18) center wire-wrappable connectors.



ALL DIMENSIONS REFERENCE ONLY

DIMENSIONS AND ORDERING INFORMATION

Part Number	Positions/Contacts	A Max.	B Ref.	C Max.	D Min.	E Ref.
		.125 (3,18) CONTACT CENTERS				
225-804-22	22/44	3.690 (93,73)	3.380 (85,85)	3.090 (78,49)	2.940 (74,68)	.125 (3,18)
225-804-30	30/60	4.690 (119,13)	4.380 (111,25)	4.090 (103,89)	3.940 (100,08)	.125 (3,18)
225-804-40	40/80	5.815 (147,70)	5.545 (140,84)	5.295 (134,49)	5.120 (130,05)	.125 (3,18)
225-804-43	43/86	6.318 (160,48)	6.005 (152,53)	5.715 (145,16)	5.565 (141,35)	.125 (3,18)
225-804-50	50/100	7.190 (182,63)	6.880 (174,75)	6.590 (167,39)	6.440 (163,58)	.125 (3,18)
		.100 (2,54) CONTACT CENTERS				
225-805-22	22/44	3.165 (80,39)	2.855 (72,52)	2.565 (65.15)	2.415 (61,34)	.100 (2,54)
225-805-30	30/60	3.965 (100,71)	3.653 (92,79)	3.365 (85,47)	3.215 (81,66)	.100 (2,54)
225-805-40	40/80	4.845 (123,06)	4.575 (116,21)	4.270 (108,46)	4.095 (104,01)	.100 (2,54)
225-805-43	43/86	5.265 (133,73)	4.955 (125,86)	4.665 (118,49)	4.515 (114,68)	.100 (2,54)
225-805-50	50/100	5.958 (151,33)	5.655 (143,64)	5.365 (136,27)	5.215 (132,46)	.100 (2,54)

NOTE: For 4-40 NC Threaded Hole Mounting use Deviation (122). Example: 225-8XX-XX(122).

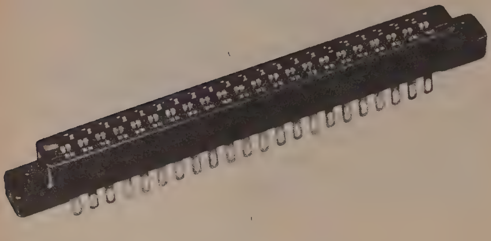
FOR LOCAL SOURCE OF SUPPLY SEE EEM VOL. 2 PAGE 462

COMMERCIAL CONNECTORS

BUNKER RAMO AMPHENOL

225 Series

Solder Terminations



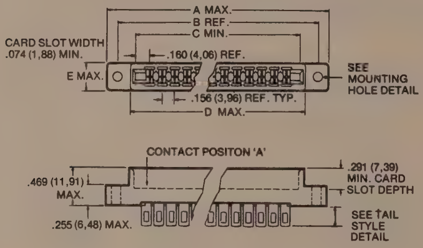
225 Series Printed Circuit Commercial Connectors with solder terminations are intended for flush installation on printed circuit boards with pads and spacer barriers that permit thorough flux washing.

Four different tail styles provide unusual termination flexibility—one eyelet and three straight tails. The eyelet accepts up to three #20 AWG wires at each terminal; the others are for dip or flow soldering. With 2-tail bridged or common contacts, you can connect 6 wires to one point on a printed circuit board. You can also obtain two 2-tail configurations—one with bridged terminals for single or common-contact (redundant) boards; the other with dual contact terminals for independent opposing circuits.

All dip-solder terminals are designed for .043 (1,09 mm) min. diameter holes.

SPECIFICATIONS

Operating Voltage:	600 VAC (RMS) at sea level 150 VAC (RMS) at 70,000 ft.
Current Rating:	5 amps
Dielectric Material:	Electrical Grade Phenolic, Black
Insulation Resistance:	5,000 megohms minimum
Contact Material:	Copper alloy with .000020 (0,000508) min. gold over copper
Contact Resistance:	30 millivolts maximum at rated current
Board Thickness:	.054 (1,37) to .071 (1,80)



ALL DIMENSIONS REFERENCE ONLY

DIMENSIONS

SIZES	A MAX.	B REF.	C MIN.	D MAX.	E MAX.
06	1.854 (47,09)	1.532 (38,91)	1.095 (27,81)	1.240 (31,50)	.346 (8,79)
10	2.478 (62,94)	2.156 (54,76)	1.719 (43,66)	1.864 (47,35)	.346 (8,79)
12	2.790 (70,87)	2.468 (62,69)	2.034 (51,66)	2.176 (55,27)	.346 (8,79)
15	3.258 (82,75)	2.938 (74,63)	2.499 (63,47)	2.646 (67,21)	.346 (8,79)
18	3.726 (94,64)	3.406 (86,51)	2.967 (75,36)	3.115 (79,12)	.346 (8,79)
22	4.360 (110,74)	4.032 (102,41)	3.584 (91,03)	3.750 (95,25)	.350 (8,89)
25	4.820 (122,43)	4.500 (114,30)	4.054 (102,97)	4.204 (106,78)	.346 (8,79)
28	5.274 (133,96)	4.969 (126,21)	4.512 (114,60)	4.662 (118,41)	.503 (12,78)
36	6.522 (165,66)	6.219 (157,96)	5.765 (146,43)	5.910 (150,11)	.503 (12,78)
43	7.610 (193,29)	7.302 (185,47)	6.854 (174,09)	7.010 (178,05)	.506 (12,85)

FOR LOCAL SOURCE OF SUPPLY SEE EEM VOL. 2 PAGE 462

225 Series
Folded-Ribbon Contacts

ORDERING INFORMATION

To order the specific 225 Series connector you want, put together the part number as per the following example:

2 2 5 - 2 0 6 2 1 - 4 01 (117)

SERIES NUMBER
225-

DEVIATIONS
(117) Commercial Type

TERMINATION CLASS

Digit	Termination
2	Solder

CONTACT POSITIONS

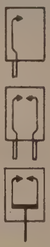
Digit Group	No. of Contacts
06	6 or 12
10	10 or 20
12	12 or 24
15	15 or 30
18	18 or 36
22	22 or 44
25	25 or 50
28	28 or 56
36	36 or 72
43	43 or 86

CONTACT CONFIGURATION

1 Single row connector with back-up springs.

2 Two rows of independent contacts.

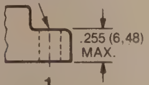
5* Two rows of bridged contacts with one tail.



*Available in Solder Eyelet (01) and .235 (5,97) Dip Solder (04) Terminations only

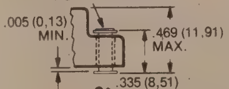
MOUNTING PROVISIONS

MOUNTING HOLE FOR #4 SCREW



1

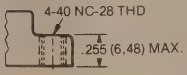
FLOAT MOUNTING FOR #4 SCREW


.005 (0,13) MIN.
.469 (11,91) MAX.
.335 (8,51) MAX.

2*

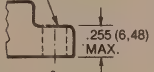
.010 (0,25) min. radial float

THREADED HOLE


4-40 NC-28 THD
.255 (6,48) MAX.

3

MOUNTING HOLE FOR # 6 SCREW

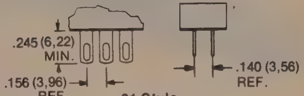


4

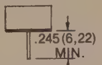
*Available in Solder Eyelet (01) Termination only

TAIL STYLE

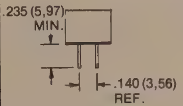
All contacts on .156 (3,96) REF. centers


.245 (6,22) MIN.
.156 (3,96) REF.
.140 (3,56) REF.

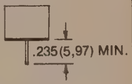
01 Style
Eyelet Type Solder Termination



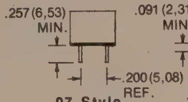
01 Style
Eyelet Type
Down-the-Center


.235 (5,97) MIN.
.140 (3,56) REF.

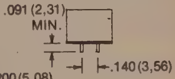
04
Dip Solder



04
Down-the-Center


.257 (6,53) MIN.
.200 (5,08) REF.

07 Style


.091 (2,31) MIN.
.140 (3,56)

10 Style

CONTACT PLATING

Digit	Plating
4	.000020(0,000508) min. Gold over Copper
6	Bright Tin/Lead

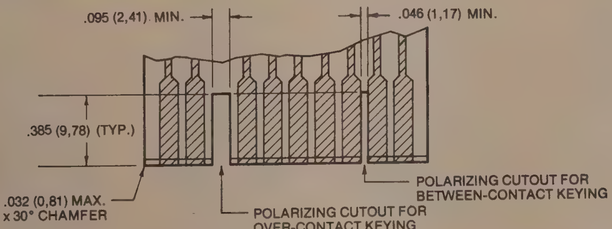
POLARIZING KEYS

225-559
Over contact key must be ordered separately.

225-594
Between contact key. One included for each connector. Packed separately in bulk.

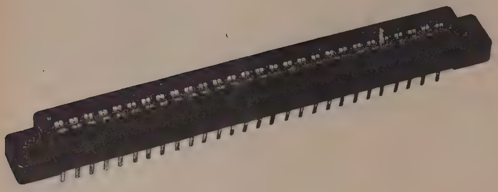
Polarization can be achieved by using either of these types of polarizing keys on all eyelet and dip solder 225 Series Connectors.

RECOMMENDED 225 SERIES PC BOARD CUTOUTS


.095 (2,41) MIN.
.046 (1,17) MIN.
.385 (9,78) (TYP.)
.032 (0,81) MAX. x 30° CHAMFER
POLARIZING CUTOUT FOR BETWEEN-CONTACT KEYING
POLARIZING CUTOUT FOR OVER-CONTACT KEYING

FOR LOCAL SOURCE OF SUPPLY SEE EEM VOL. 2 PAGE 462

225 Series
Solder Terminations

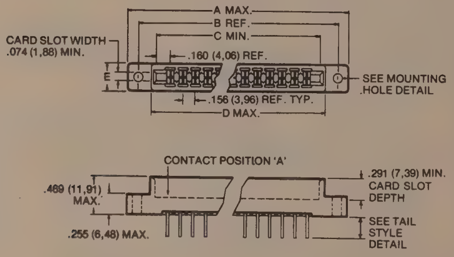


Here is real flexibility in termination with six different tail styles—three straight, one right-angle and two eyelet (open and closed) tails. All are intended for flush installation on PC boards with pads and spacer barriers that permit complete flux washing. The straight and right-angle types are intended for dip or flow soldering; eyelet types will accept up to three #20 AWG wires at each terminal.

Two tail configurations include bridged terminals for common-contact PC boards and dual-contact terminals for independent opposing circuits.

SPECIFICATIONS

Operating Voltage:	600 VAC (RMS) at sea level 150 VAC (RMS) at 70,000 feet.
Current Rating:	5 amps continuous.
Dielectric Material:	Glass-fiber-reinforced diallyl phthalate. Type SDG-F per MIL-M-14.
Insulation Resistance:	5,000 megohms minimum.
Contact Material:	All beryllium copper except phosphor bronze for bridged contact with one tail.
Contact Resistance:	30 millivolts maximum at rated current.
Board Thickness:	Accepts P.C. boards .054 (1,37) to .071 (1,80) thick.



ALL DIMENSIONS REFERENCE ONLY

DIMENSIONS

SIZES	A Max.	B Ref.	C Min.	D Max.	E Max.
06	1.854 (47,09)	1.532 (38,91)	1.095 (27,81)	1.240 (31,50)	.346 (8,79)
10	2.478 (62,94)	2.156 (54,76)	1.719 (43,66)	1.864 (47,35)	.346 (8,79)
12	2.790 (70,87)	2.468 (62,69)	2.034 (51,66)	2.176 (55,27)	.346 (8,79)
15	3.258 (82,75)	2.938 (74,63)	2.499 (63,47)	2.646 (67,21)	.346 (8,79)
18	3.726 (94,64)	3.406 (86,51)	2.967 (75,36)	3.115 (79,12)	.346 (8,79)
22	4.360 (110,74)	4.032 (102,41)	3.584 (91,03)	3.750 (95,25)	.350 (8,89)
25	4.820 (122,43)	4.500 (114,30)	4.054 (102,97)	4.204 (106,78)	.346 (8,79)
28	5.274 (133,96)	4.969 (126,21)	4.512 (114,60)	4.662 (118,41)	.503 (12,78)
36	6.522 (165,66)	6.219 (157,96)	5.765 (146,43)	5.910 (150,11)	.503 (12,78)
43	7.610 (193,29)	7.302 (185,47)	6.854 (174,09)	7.010 (178,05)	.506 (12,85)

FOR LOCAL SOURCE OF SUPPLY SEE EEM VOL. 2 PAGE 462

PRINTED CIRCUIT CONNECTORS BUNKER RAMO AMPHENOL

225 Series

Bifurcated Bellows Contacts

2 2 5 - 2 0 6 2 1 - 1 01

SERIES NUMBER

225-

TERMINATION CLASS

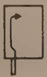
Digit	Termination
2	Solder

CONTACT POSITIONS

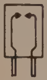
Digit Group	No. of Contacts
06	6 or 12
10	10 or 20
12	12 or 24
15	15 or 30
18	18 or 36
22	22 or 44
25	25 or 50
28	28 or 56
36	36 or 72
43	43 or 86

CONTACT CONFIGURATION

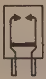
1 Single row connector with back-up springs.



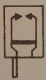
2 Two rows of independent contacts.



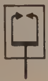
3* Two rows of bridged contacts with two tails.



4 Two rows of bridged contacts with one tail.



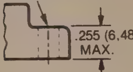
5** Two rows of bridged contacts with one tail.



*Available in Solder Eyelet Tail style only.
**Available in Phosphor Bronze only

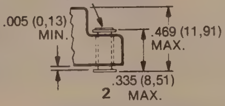
MOUNTING PROVISIONS

MOUNTING HOLE FOR #4 SCREW



1

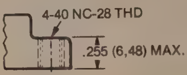
FLOAT MOUNTING FOR #4 SCREW


.005 (0,13) MIN.
.469 (11,91) MAX.
.335 (8,51) MAX.

2

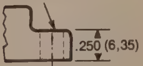
.010 (0,25) min. radial float

THREADED HOLE


4-40 NC-28 THD
.255 (6,48) MAX.

3

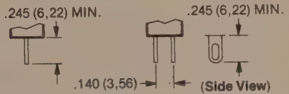
MOUNTING HOLE FOR # 6 SCREW



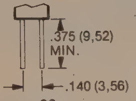
4

TAIL STYLES

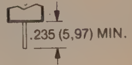
All contacts on .156 (3,96) REF. centers


.245 (6,22) MIN.
.245 (6,22) MIN.
.140 (3,56)
(Side View)

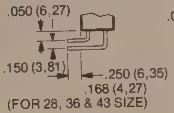
01
Solder Eyelet


.375 (9,52) MIN.
.140 (3,56)

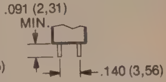
03
Long Dip Solder



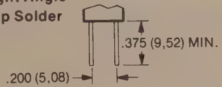
04
Down-the-Center Dip Solder


.050 (6,27)
.150 (3,81)
.250 (6,35)
.168 (4,27)
(FOR 28, 36 & 43 SIZE)

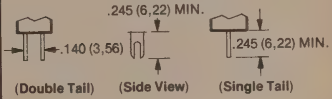
05
Right Angle Dip Solder


.091 (2,31) MIN.
.140 (3,56)

10
Short Dip Solder


.375 (9,52) MIN.
.200 (5,08)

11
Long Dip Solder

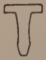

.245 (6,22) MIN.
.140 (3,56)
.245 (6,22) MIN.
(Double Tail)
(Side View)
(Single Tail)

12
Open Solder Eyelet

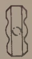
CONTACT PLATING

Digit	
1	.000030 (0,000762) min. Gold over Copper
2	.000050 (0,00127) min. Gold over Copper

POLARIZING KEYS



225-559
Over-contact key must be ordered separately.



225-594
Between-contact key. One included for each connector. Packed separately in bulk.

Polarization can be achieved by using either of these types of polarizing keys on all eyelet and dip solder 225 Series Connectors.

225 Series

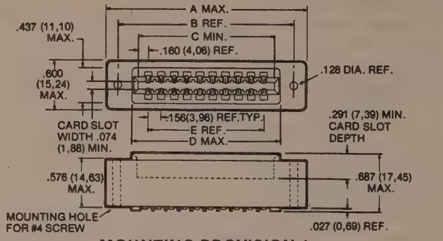
Taper Pin and Crimp Poke-Home® Terminations

TAPER PIN TERMINATION

Taper pin terminations provide fast, flexible assembly along with simple circuit modification and repair.

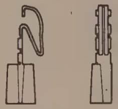
Contacts are fixed in the dielectric material, but wired taper pins can easily be installed, removed and reinserted. Taper pins are securely seated with an impact tool setting of only 13 lb. (5.9 kg.). Average pin retention for the #53 standard pin is 20 lb. (9.1 kg.).

Dielectric is blue dially phthalate only.


A MAX.
B REF.
C MIN.
.160 (4,06) REF.
.437 (11,10) MAX.
.600 (15,24) MAX.
.128 DIA. REF.
.156(3,96) REF.TYP.
E REF.
D MAX.
CARD SLOT WIDTH .074 (1,88) MIN.
.291 (7,39) MIN. CARD SLOT DEPTH
.576 (14,63) MAX.
.687 (17,45) MAX.
MOUNTING HOLE FOR #4 SCREW
.027 (0,69) REF.

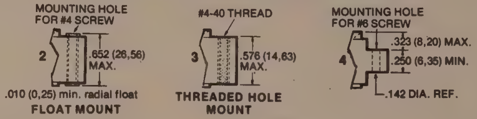
MOUNTING PROVISION 1

Polarizing key for taper pin termination P/N 225-529



Tail style 00 accepts #53 pins. Contacts available in beryllium copper only.

ADDITIONAL MOUNTING PROVISIONS


MOUNTING HOLE FOR #4 SCREW
2
.652 (26,56) MAX.
.010 (0,25) min. radial float
FLOAT MOUNT
#4-40 THREAD
3
.576 (14,63) MAX.
THREADED HOLE MOUNT
MOUNTING HOLE FOR #6 SCREW
4
.323 (8,20) MAX.
.250 (6,35) MIN.
.142 DIA. REF.

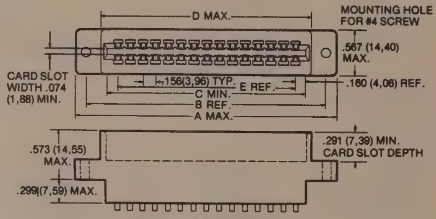
CRIMP POKE-HOME® TERMINATION

Here's the economy of crimp termination with the flexibility of removable contacts.

Termination is separate from the connector body—a convenient and time-saving arrangement in many cases. Each contact accepts one #18 or #20, one or two #22 or #24 or two #26 or #28 AWG wires. The wire is crimped and the insulation securely gripped.

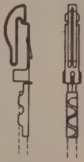
Available blue diallyl phthalate or black phenolic (117 deviation).

See opposite page for Amphenol's complete line of crimping accessories.


D MAX.
MOUNTING HOLE FOR #4 SCREW
.567 (14,40) MAX.
CARD SLOT WIDTH .074 (1,88) MIN.
.156(3,96) TYP.
E REF.
C MIN.
B REF.
A MAX.
.160 (4,06) REF.
.573 (14,55) MAX.
.291 (7,39) MIN. CARD SLOT DEPTH
.299(7,59) MAX.

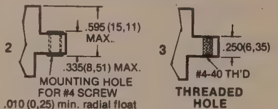
MOUNTING PROVISION 1

Polarizing key for Crimp termination P/N 225-529



Tail style 00 available in beryllium copper only.

ADDITIONAL MOUNTING PROVISIONS


2
.595 (15,11) MAX.
.335(8,51) MAX.
3
.250(6,35)
#4-40 TH'D

MOUNTING HOLE FOR #4 SCREW
.010 (0,25) min. radial float
FLOAT MOUNT

THREADED HOLE MOUNT

CRIMP CONTACT ORDERING INFORMATION

Crimp contacts are available in standard beryllium copper with .000030 (0,000762) gold plating either in bulk or on reels.

Loose contacts—Order part number 225-676-xx.*

Reel contacts (4000 contacts on reel) Order part number 225-676-54000-xx.*

**Contact factory for plating desired.*

DIMENSIONS

SIZE	A MAX.	B REF.	C MIN.	D MAX.	E REF.
06	1.842 (46,79)	1.532 (38,91)	1.093 (27,76)	1.230 (31,24)	.780 (19,81)
10	2.465 (62,61)	2.156 (54,76)	1.718 (43,64)	1.854 (47,09)	1.404 (35,66)
15	3.246 (82,45)	2.938 (74,63)	2.497 (63,42)	2.634 (66,90)	2.184 (55,47)
18	3.714 (94,34)	3.406 (86,51)	2.955 (75,06)	3.102 (78,79)	2.652 (67,36)
22	4.338 (110,19)	4.032 (102,41)	3.592 (91,24)	3.726 (94,64)	3.226 (83,21)
28	5.274 (133,96)	4.969 (126,21)	4.535 (115,19)	4.662 (118,41)	4.212 (106,98)
36	6.522 (165,66)	6.219 (157,96)	5.773 (146,63)	5.910 (150,11)	5.460 (138,68)
43	7.615 (193,42)	7.302 (185,47)	6.866 (174,40)	7.010 (178,05)	6.552 (166,42)

PRINTED CIRCUIT CONNECTORS

BUNKER RAMO AMPHENOL

225 Series
Bifurcated Bellows Contacts

ORDERING INFORMATION

To order the specific 225 Series connector you want, put together the part number as per the following example:

2 2 5 - 4 0 6 2 1 - 1 00 (117)

SERIES NUMBER
225-

TERMINATION CLASS

Digit	Termination
3	Taper Pin
4	Crimp

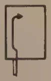
CONTACT POSITIONS

Digit Group	No. of Contacts
06	6 or 12
10	10 or 20
15	15 or 30
18	18 or 36
22	22 or 44
28	28 or 56
36	36 or 72
43	43 or 86

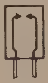
CONTACT CONFIGURATION

Digit	Poke-Home Type	Taper Pin Type
0	Insert less contacts.	—
1	Insert plus loose contacts for one row plus back-up springs.	Single row connector with back-up springs.
2	Insert plus loose contacts for two rows.	Two rows of independent contacts.

1



2



DEVIATION

(117) Black Phenolic. Copper Alloy Contact with .000020 (0,000508) min. gold plating. Crimp Poke-Home only.

POLARIZATION (optional)

If factory insertion of polarizing key is desired, add position of key as suffix here. Key will be inserted to right of contact position shown. Example: 225-40621-10003. Key to right of contact #3.

TAIL STYLE

Digit Group	Style
00	Taper Pin or Crimp

CONTACT PLATING

Digit	Plating
1	000030 (0,000762) min. gold over copper (industrial)
2	.000050 (0,00127) min, gold over copper

MOUNTING PROVISIONS

Digit	Provision
1	Mounting hole for #4 screw
2	Float bushings for #4 screws
3	Threaded bushings (4-40)
4	.250 (6,35) mounting ears (taper pin)

ACCESSORY TOOLS FOR 225 SERIES CRIMP CONTACTS

356-201 CONTACT REMOVAL TOOL

Permits easy removal of crimp contacts without damage. Allows repairs or circuit modifications without costly unsoldering or replacing connector.

357-550
HAND CRIMPING TOOL

Two-position tool accommodates all 225 Series Crimp Contacts. Contacts are positioned, then locked in the tool to facilitate insertion of the pre-stripped wire. Positive stops and easy contact release prevent contact damage and assure better crimps. First position crimps #18, #20, #22 or two #22 AWG wires. Second position crimps one #24, two #24, two #26 or two #28 AWG wires.

BUNKER RAMO
AMPHENOL

359-205
SEMI-AUTOMATIC CRIMPING MACHINE

Even an unskilled operator can crimp over 1,000 contacts per hour. Simply insert pre-stripped wire into the safety wire-feed slot and press a pedal—the machine does the rest. Contacts are furnished on integral carrier strips in reels of 4,000 for easy, convenient loading. Will crimp one each of #18, #20, #22, or #24, or two #22, #24, #26 or #28 AWG wires.

359-102
PNEUMATIC HAND CRIMPING MACHINE

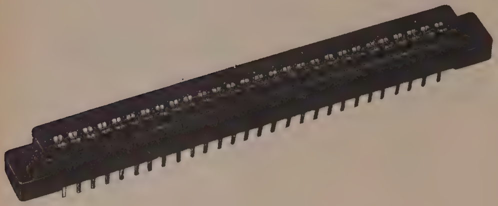
Full-cycle, double-action hand tool assures a positive crimp to required specifications. Crimps 400-500 contacts per hour. Loose contacts are placed in unit, pre-stripped wire inserted and the trigger operated either by hand or optional foot pedal. Can be set to crimp #18, #20, one or two #22 or #24, or two #26 or #28 AWG wires (please specify when ordering). Can be hand held or optionally bench mounted as shown. For bench mount, order 359-102 tool and 359-1000 bench-mount assembly.

FOR LOCAL SOURCE OF SUPPLY SEE EEM VOL. 2 PAGE 462

MILITARY CONNECTORS

BUNKER RAMO AMPHENOL

225 Series
Qualified to MIL-C-21097 C/21



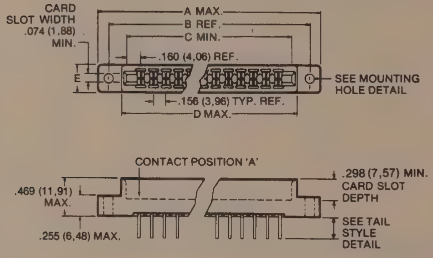
Series 225 PC Connectors that conform to military specifications are available in two solder terminations—solder eyelet and medium tail for dip or flow soldering. Row spacing for the military dip solder connector is .200 (5,08) as opposed to .140 (3,56) for most industrial and commercial connectors.

The solder eyelet termination provides a choice of two tail configurations—a bridged terminal for single or common contacts (redundant) PC boards, and dual contact terminals for independent opposing circuits.

The facing page cross references 225 Series Amphenol part numbers with corresponding MIL-C-21097C/21 numbers.

SPECIFICATIONS

Operating Voltage:	600 VAC (RMS) at sea level 150 VAC (RMS) at 70,000 feet.
Current Rating:	5 amps continuous.
Dielectric Material:	Glass-fiber-reinforced diallyl phthalate. Type SDG-F per MIL-M-14.
Insulation Resistance:	5,000 megohms minimum.
Contact Material:	All beryllium copper except phosphor bronze for bridged contact with one tail.
Contact Resistance:	30 millivolts maximum at rated current.
Board Thickness:	Accepts P.C. boards .054 (1,37) to .071 (1,80) thick.



ALL DIMENSIONS REFERENCE ONLY

DIMENSIONS

Sizes	A Max.	B Ref.	C Min.	D Max.	E Max.
06	1.854 (47,09)	1.532 (38,91)	1.095 (27,81)	1.204 (31,50)	.346 (8,79)
10	2.478 (62,94)	2.156 (54,76)	1.719 (43,66)	1.864 (47,35)	.346 (8,79)
15	3.258 (82,75)	2.938 (74,63)	2.499 (63,47)	2.646 (67,21)	.346 (8,79)
18	3.726 (94,64)	3.406 (86,51)	2.967 (75,36)	3.115 (79,12)	.346 (8,79)
22	4.360 (110,74)	4.032 (102,41)	3.584 (91,03)	3.750 (95,25)	.350 (8,89)
28	5.274 (133,96)	4.969 (126,21)	4.512 (114,60)	4.662 (118,41)	.503 (12,78)
36	6.522 (165,66)	6.219 (157,96)	5.765 (146,43)	5.910 (150,11)	.503 (12,78)
43	7.610 (193,29)	7.302 (185,47)	6.854 (174,09)	7.010 (178,05)	.506 (12,85)

FOR LOCAL SOURCE OF SUPPLY SEE EEM VOL. 2 PAGE 462

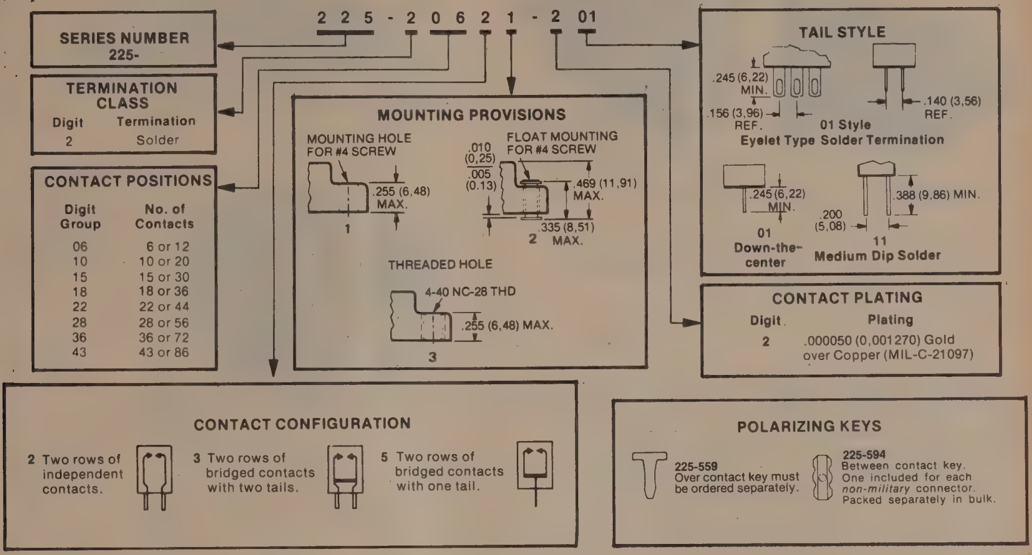
PRINTED CIRCUIT CONNECTORS

BUNKER RAMO AMPHENOL

225 Series
Bifurcated Bellows Contacts

ORDERING INFORMATION

To order the specific 225 Series connector you want, put together the part number as per the following example:


2 2 5 - 2 0 6 2 1 - 2 01
.255 (6,48) MAX.
1
.010 (0,25)
.005 (0.13)
.469 (11,91) MAX.
.335 (8,51) MAX.
2
4-40 NC-28 THD
.255 (6,48) MAX.
3
.245 (6,22) MIN.
.156 (3,96) REF.
.140 (3,56) REF.
.245 (6,22) MIN.
.200 (5,08)
.388 (9,86) MIN.
01
11
225-559
225-594

SERIES NUMBER
225-

TERMINATION CLASS

Digit	Termination
2	Solder

CONTACT POSITIONS

Digit Group	No. of Contacts
06	6 or 12
10	10 or 20
15	15 or 30
18	18 or 36
22	22 or 44
28	28 or 56
36	36 or 72
43	43 or 86

MOUNTING PROVISIONS

MOUNTING HOLE FOR #4 SCREW

FLOAT MOUNTING FOR #4 SCREW

THREADED HOLE

TAIL STYLE

01 Style Eyelet Type Solder Termination

01 Down-the-center

11 Medium Dip Solder

CONTACT PLATING

Digit	Plating
2	.000050 (0,001270) Gold over Copper (MIL-C-21097)

CONTACT CONFIGURATION

2 Two rows of independent contacts.

3 Two rows of bridged contacts with two tails.

5 Two rows of bridged contacts with one tail.

POLARIZING KEYS

225-559 Over contact key must be ordered separately.

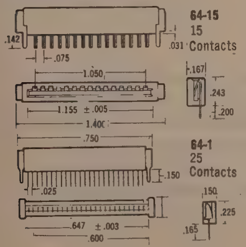
225-594 Between contact key. One included for each *non-military* connector. Packed separately in bulk.

64 Series Micro-Edge® Edge Board Receptacles

Micro-Edge contacts will not set. The Micro-Edge will accept even warped boards with firm contact action. Contacts are rounded and will not scrape or injure delicate circuits.

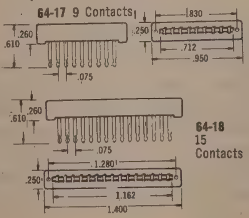
	64-1	64-15	Economy Units 64-17	64-18
No. of Contacts	25	15	9	15
Overall Length	.75	1.40	.950	1.40
Contact Centers	.025″	.075″	.075″	.075″
Contact Diameter	.008″	.010″		
Contact Resistance, Ohms	.020-.030	.010-/.020	.010	.010
P.C. Board Width Thickness	.647 .020 ±.003	1.155 .032 ±.004	.712 1/32	1.162 1/32
Current Rating, Amperes	.5	.5	1	1
Voltage Rating	200 V AC (RMS) at sea level		750 V VAC (RMS) at sea level	
Contact Material	.008″ and .010″ gold plated copper alloy wire		.00002″ gold over copper strike, heat treated bryllium copper	
Dielectric Material	Glass-filled diallyl phthalate, Type GDI-30 per MIL-M-19833		Mineral-filled diallyl phthalate per MIL-M-14E-MDG	

REGULAR TYPE

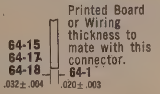

64-15
15
Contacts
.142
.031
.075
1.050
.167
.243
.200
1.155 ± .005
1.400
.750
64-1
25
Contacts
.150
.025
.150
.225
.165
.647 ± .003
.600

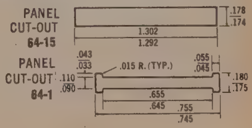
ECONOMY TYPE

(For .032″ ±.004″ Thick Boards)


64-17 9 Contacts
.830
.260
.610
.250
.712
.950
.075
.260
.610
64-18
15
Contacts
.075
1.280
.250
1.162
1.400

BOARD SIZE


Printed Board or Wiring thickness to mate with this connector.
64-15
64-17
64-18
.032± .004
64-1
.020± .003


PANEL CUT-OUT 64-15
.178
.174
1.302
1.292
PANEL CUT-OUT 64-1
.043
.033
.015 R. (TYP.)
.055
.045
.110
.090
.180
.175
.655
.645
.755
.745

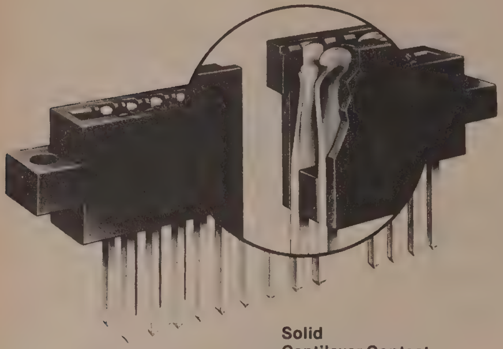
FOR LOCAL SOURCE OF SUPPLY SEE EEM VOL. 2 PAGE 462

COMMERCIAL CARD EDGE CONNECTORS

BUNKER RAMO AMPHENOL

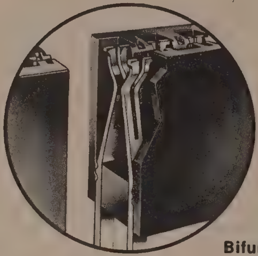
261 Series

Solid and Bifurcated Cantilever Contacts



Solid Cantilever Contact

Accurate Positioning for Solderless-Wrap Termination by hand or on Semi-Automatic Wrapping Machines



Bifurcated Cantilever Contact

These edgeboard connectors provide single or dual readout of double-sided PC boards. Pre-loaded solid or bifurcated cantilever contacts are assembled in the dielectric with precise spacing to permit trouble-free semi-automatic solderless-wrap termination. Low contact resistance is assured by a minimum of .000030 (0,00076) gold at the contact area for the solid contact and .000050 (0,00127) gold for the bifurcated. The solid cantilever contact is designed to provide more than 500 insertions and withdrawal without loss of continuity or significant increase in resistance. Where many insertion and withdrawal cycles are required, the bifurcated contact is recommended.

DEPENDABLE

Both types of contacts will give long service—will not "set" even under repeated use. In addition, there is always a definite contact separation between rows with both solid and bifurcated types to prohibit shorting.

EASY, ECONOMICAL APPLICATION

Close dimensional tolerances minimize mounting and automatic terminating problems. Contacts exert sufficient wiping pressure to break through surface contaminating films and assure good electrical continuity, yet not so much as to damage board lands.

SPACE-SAVING

High contact density—with contacts spaced as close as .100 (2,54) on center—permits a large number of contacts in a small space. In addition, connector blocks can be stacked side-by-side in frames and the connectors back-wired or flow-soldered to a motherboard.

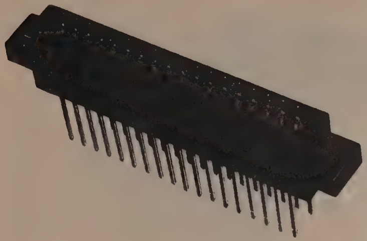
VERSATILE APPLICATION

261 Series Connectors offer a wide variety of sizes, five different contact center spacings, choice of bifurcated or solid cantilever contacts, and large selection in number of positions to make them useful in almost any PC board application. 261 Series Connectors are also available in factory-produced plate assemblies, completely wired, if desired. Contact the factory for full information.

PRINTED CIRCUIT CONNECTORS

BUNKER RAMO AMPHENOL

261 Series



AN EXTENSIVE LINE

- ☐ 15 to 43 positions providing up to 86 contacts
- ☐ Choice of .100 (2,54), .125 (3,18), .150 (3,81), .156 (3,96) or .200 (5,08) spacing
- ☐ Choice of tail sizes: .025 (0,64) sq., .035 (0,89) sq., or .035 (0,89) x .050 (1,27)
- ☐ Solid or bifurcated contacts.
- ☐ Accepts boards .054 (1,37) to .071 (1,80) thick

SPECIFICATIONS

Dielectric Material:	Electrical grade phenolic, medium impact, black.
Contact Materials:	.100 (2,54) and .125 (3,18) centers utilize phosphor-bronze base metal with tin tintalate plate and a Precious Metal Tip (PMT) on the contacting surface. .150 (3,81), .156 (3,96) and .200 (5,08) centers use phosphor-bronze base with copper flash and .000030 (0,00076) min. gold plate overall.
Tail Length:	Sufficient for three wire wraps, plus space for bussing or PC board next to block (see dimension G). Tails may be cut as short as .100 (2,54) at the factory for wave-solder applications.
Polarization:	Polarizing key (P/N 261-70005) may be used on all 261 Series. Fits between contacts on .150 (3,81), .156 (3,96) and .200 (5,08) centers; replaces one pair of contacts on .100 (2,54) and .125 (3,18) centers.

ELECTRICAL CHARACTERISTICS

Contact Spacing	Current Rating (Max.) Amps	Contact Resistance (Max.) Milliohms	Voltage Rating (Sea Level)	Voltage Breakdown (Min.)
.100 (2,54) on Center	5.0	6.0	300 V RMS	1800 V RMS
.125 (3,18) on Center	5.0	6.0	350 V RMS	2000 V RMS
.150 (3,81) on Center	6.0	5.5	400 V RMS	2500 V RMS
.156 (3,96) on Center	7.5	5.0	400 V RMS	2500 V RMS
.200 (5,08) on Center	7.5	4.5	500 V RMS	4500 V RMS

ORDERING INFORMATION

To order the specific 261 Series Connector you want, put together the part number as per the following example:

261 - 1 5 6 3 6 - 2 (110)

SERIES NUMBER

261

CONTACT CENTERS

.100 (2,54)
.125 (3,18)
.150 (3,81)
.156 (3,96)
.200 (5,08)

NUMBER OF CONTACT POSITIONS

15	28	36
18	30	43
22		

See chart on page 17 for availability

DEVIATIONS

(110) Bifurcated Contact Available .156 (3,96) and .200 (5,08) contact centers only

CONTACT CONFIGURATION

1	Single Row of Contacts (odd numbered positions)
2	Double Row of Contacts

FOR LOCAL SOURCE OF SUPPLY SEE EEM VOL. 2 PAGE 462

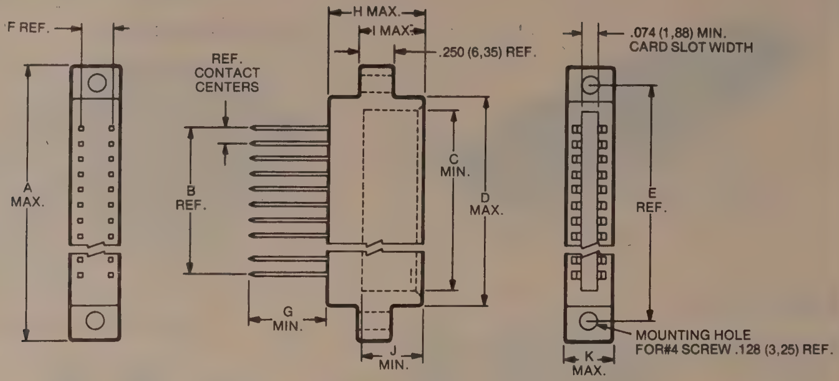
PRINTED CIRCUIT CONNECTORS

BUNKER RAMO AMPHENOL

261 Series

Solid and Bifurcated Cantilever Contacts

DIMENSIONS



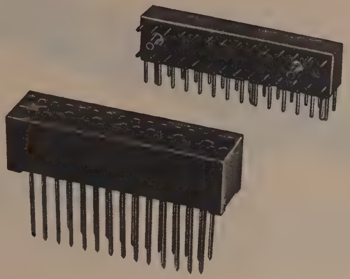
Ref. Contact Centers	Contact Description	No. Contact Positions	A Max.	B Ref.	C Min.	D Max.	E Ref.	F Ref.	G Min.	H Max.	I Max.	J Min.	K Max.
.100 (2,54)	Single Cantilever PMT .025 (0,64) square tail	15	2.479 (62,97)	1.400 (35,56)	1.714 (43,54)	1.884 (47,85)	2.156 (54,76)	.200 (5,08)	.615 (15,62)	.735 (18,67)	.494 (12,55)	.460 (11,68)	.348 (8,84)
		18	2.779 (70,59)	1.700 (43,18)	2.014 (51,16)	2.184 (55,47)	2.456 (62,38)						
		22	3.179 (80,75)	2.100 (53,34)	2.414 (61,32)	2.574 (65,38)	2.856 (72,54)						
		30	3.979 (101,07)	2.900 (73,66)	3.214 (81,64)	3.389 (86,08)	3.656 (92,86)						
		36	4.585 (116,46)	3.500 (88,90)	3.690 (93,73)	3.994 (101,45)	4.256 (108,10)			.740 (18,80)	.498 (12,65)		
		43	5.279 (134,09)	4.200 (106,68)	4.514 (114,66)	4.684 (118,97)	4.956 (125,88)			.735 (18,67)	.494 (12,55)		
.125 (3,18)	Single Cantilever PMT .025 (0,64) square tail	15	2.829 (71,86)	1.750 (44,45)	2.064 (52,43)	2.234 (56,74)	2.506 (63,65)	.246 (6,25)		.738 (18,75)	.496 (12,60)		.370 (9,40)
		18	3.204 (81,38)	2.125 (53,98)	2.439 (61,95)	2.609 (66,27)	2.881 (73,18)						
		22	3.704 (94,08)	2.625 (66,68)	2.939 (74,65)	3.109 (78,97)	3.381 (85,88)						
		28	4.454 (113,13)	3.375 (85,72)	3.689 (93,70)	3.859 (98,02)	4.131 (104,93)						
		36	5.454 (138,53)	4.375 (111,13)	4.689 (119,10)	4.859 (123,42)	5.131 (130,33)						
		43	6.329 (160,76)	5.250 (133,35)	5.564 (141,33)	5.734 (145,64)	6.006 (152,55)						
.150 (3,81)	Single Cantilever Gold Plated .035 (0,89) square tail	18	3.629 (92,18)	2.550 (64,77)	2.866 (72,80)	3.038 (77,17)	3.306 (83,97)	.296 (7,52)	.750 (19,05)	.770 (19,56)	.512 (13,00)	.495 (12,57)	.448 (11,38)
		28	5.129 (130,28)	4.050 (102,87)	4.364 (110,85)	4.534 (115,16)	4.806 (122,07)						
		43	7.379 (187,43)	6.300 (160,02)	6.614 (168,00)	6.784 (172,31)	7.056 (179,22)						
.156 (3,96)	Single Cantilever Gold Plated or Bifurcated .035 (0,89) x .050 (1,27) tail	15	3.263 (82,88)	2.184 (55,47)	2.498 (63,45)	2.675 (67,94)	2.940 (74,68)	.196 (4,98)					.348 (8,84)
		18	3.731 (94,77)	2.652 (67,36)	2.966 (75,34)	3.136 (79,65)	3.408 (86,56)						
		22	4.355 (110,62)	3.276 (83,21)	3.590 (91,19)	3.760 (95,50)	4.032 (102,41)						
		28	5.291 (134,39)	4.212 (106,98)	4.526 (114,96)	4.696 (119,28)	4.968 (126,19)						
		36	6.549 (166,34)	5.460 (138,68)	5.774 (146,66)	5.944 (150,98)	6.216 (157,89)						
		43	7.631 (193,83)	6.552 (166,42)	6.866 (174,40)	7.036 (178,71)	7.308 (185,62)						
.200 (5,08)		22	5.279 (134,09)	4.200 (106,68)	4.516 (114,71)	4.684 (118,97)	4.956 (125,88)						
		36	8.079 (205,21)	7.000 (177,80)	7.314 (185,78)	7.484 (190,09)	7.756 (197,00)						

FOR LOCAL SOURCE OF SUPPLY SEE EEM VOL. 2 PAGE 462

HIGH-DENSITY CONNECTORS

BUNKER RAMO AMPHENOL

127 Series
Box Contacts



PIN AND SOCKET CONNECTORS WITH MIL-C-55302 PERFORMANCE

These compact, sturdy plugs and receptacles are designed for numerous printed circuit applications that require the space-saving advantages of multiple-row direct entry connectors. Though small in size, they provide 28 contact positions to meet the requirements of a wide range of communications, computer, and airborne applications. They also meet or exceed the electrical and physical requirements of MIL-C-55302.

127 Series plugs have molded-in pin contacts with dip solder terminations and two rivets for secure and positive attachment to the printed circuit board. Contacts are spaced at .100 (2,54) intervals on .150 (3,81) row spacing. Three molded-in guide pins and provision for up to five polarizing pins assure correct mating every time.

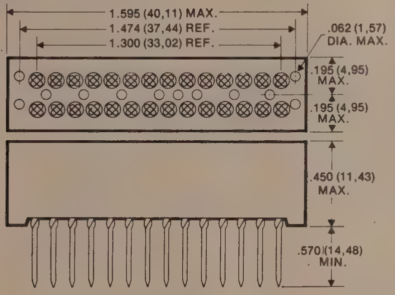
127 Series receptacles have replaceable socket contacts with solderless wrap or flow solder terminations. The socket contacts provide excellent performance even under conditions of severe physical stress and vibration.

Connector blocks are formed of glass-fiber-filled diallyl phthalate. Contact numbers and guide pin letters are molded prominently on both connectors.

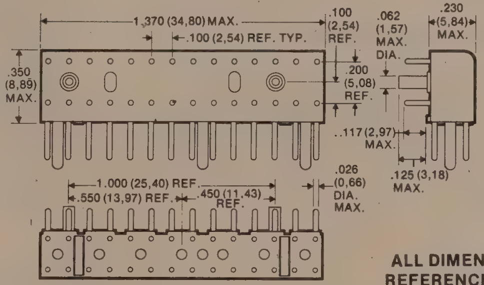
SPECIFICATIONS
(Conform to MIL-C-55302)

Current Rating:	3 amperes, max.
Operating Voltage:	500 VAC(RMS), max.
Dielectric Withstanding Voltage:	Sea Level—1,500 VAC(RMS), 60 Hz High Altitude—750 VAC(RMS), 60 Hz
Contact Resistance:	Less than .010 ohm average for all contact pairs, and less than .020 ohm any individual contact pair.

DIMENSIONS


1.595 (40,11) MAX.
1.474 (37,44) REF.
1.300 (33,02) REF.
.062 (1,57) DIA. MAX.
.195 (4,95) MAX.
.195 (4,95) MAX.
.450 (11,43) MAX.
.570 (14,48) MIN.

127 SERIES RECEPTACLE


1.370 (34,80) MAX.
.100 (2,54) REF. TYP.
.100 (2,54) REF.
.062 (1,57) MAX. DIA.
.230 (5,84) MAX.
.350 (8,89) MAX.
.200 (5,08) REF.
.117 (2,97) MAX.
.026 (0,66) DIA. MAX.
.125 (3,18) MAX.
1.000 (25,40) REF.
.550 (13,97) REF.
.450 (11,43) REF.

127 SERIES PLUG

ALL DIMENSIONS REFERENCE ONLY

ORDERING INFORMATION

To order the 127 Series connector you want, put together the part number as per the following example:

127 — 228 — 044P

SERIES NUMBER
127-

NUMBER OF ROWS
2

NUMBER OF CONTACTS
28

TYPE OF CONTACT
02 Socket Contact with Solderless Wrap Termination
04 Pin Contact with Right-Angle Dip Solder Termination

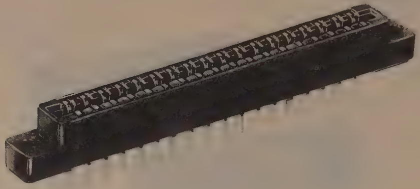
CONTACT PLATING
4 .000020" (0,00051) min. gold over .000040" (0,00102) min. copper

TYPE OF CONNECTOR
P Plug (04 contacts only)
S Receptacle (02 contacts only)

COMMERCIAL AND INDUSTRIAL CONNECTORS

BUNKER RAMO AMPHENOL

133/143 Series



Here are sturdy, reliable, highly-efficient connectors that help prolong the life of printed circuit boards. 133 Series Connectors are essentially male plug adapters for PC boards. They are especially useful in situations ininvolving other than normal 1/16 (1,57 mm) thick PC boards. 143 Series Connectors are receptacles that accept either .054 to .070 (1,37 mm to 1,78 mm) PC boards or 133 Series Plugs.

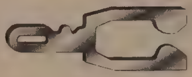
133/143 Series Industrial Connectors are molded from mineral-filled diallyl phthalate. 133/143 Series Commercial Connectors (117 deviation) are molded from mineral-filled electrical-grade black phenolic.

These connectors are manufactured to Amphenol rather than military specifications. They can, therefore, be readily modified to your special requirements. Many combinations of dielectric materials, number of contacts, tail styles, platings and polarization methods are available.

LONG-LIFE, TUNING-FORK-TYPE CONTACTS

The tuning-fork-type contact used for 143 Series Connectors offers an exceptional combination of reliability, durability, versatility and performance. The extra-long spring base of the contact and resiliance of the contact material provide a wide flexing range with sufficient elastic reserve to prevent the contacts from being "set".

Contacts have excellent protection against corrosion through deposition of two dense metals over all contact surfaces—a base plating of copper followed by an overplate of gold.



EASY INSERTION AND WITHDRAWAL

The rounded 143 Series contact surface provides easy, smooth, low-force insertions and withdrawals. Controlled lateral float of the contacts permits the accommodation of warped boards while maintaining positive continuity of all circuits.

UNUSUALLY LOW CONTACT RESISTANCE

The contact spring design assures uniform distribution of contact forces and firm contact action, even on PC boards at the extremes of thickness tolerance. The wiping action of the contact cleans the mating surface to provide more positive contact—and voltage losses are held to a minimum. For example, at 5 amperes, the average voltage drop is less than 25 millivolts.

SPECIFICATIONS

Current Rating:	5 amp
Operating Voltage Rating:	600 VAC (RMS) at sea level
Dielectric Resistance:	5000 megohms min.
Contact Resistance (Voltage Drop):	25 millivolts at rated current
Dielectric Material:	Industrial type – mineral-filled diallyl phthalate per MIL-M-14 Type MDG, color blue Commercial type (117 deviation) – Mineral-filled phenolic, electrical grade, color black
Contact Material:	133 - Brass 143 - Phosphor bronze
Contact Plating:	Standard – .000020 (0,000508) min. gold over copper (101 deviation) – .00010 (0,00254) min. gold over copper Gold Plating is per MIL-G-45204 (Type I on 143 Series, Type II on 133 Series) Copper Plating is per MIL-C-14550, Class 3 (102 deviation) – .000030 (0,000762) min. gold over nickel
Guide Pin Material:	Cadmium-plated brass
End-Cap Material:	Stainless Steel (Passivated)

PLUGS

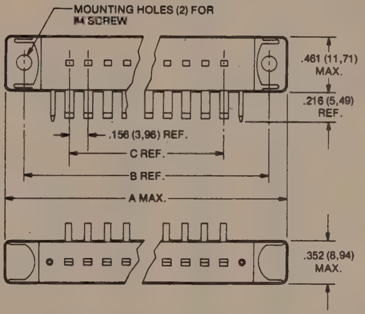
BUNKER RAMO AMPHENOL

133 Series

Amphenol 133 Series Plugs combine excellent electrical performance with mechanical sturdiness. Repeated matings, even at an angle, will not cause deformation of the rugged contacts. Amphenol's process of controlled-transfer molding assures uniformity and dimensional stability. The assembled body is rigidly held together by the rolled-over ends of the guide pins. End caps prevent damage to mounting holes when mounting screws are tightened. Contact identification is prominently molded into both front and rear body surfaces.

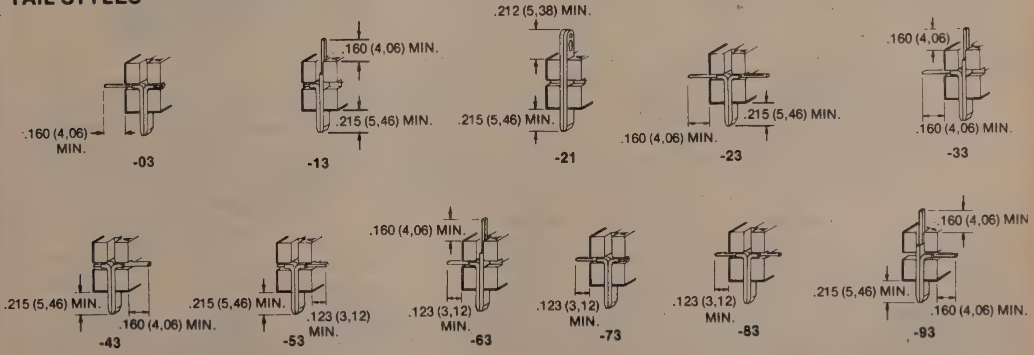
DIMENSIONS

No. of Contact Positions	A Max.	B Ref.	C Ref.
6	1.852 (47,04)	1.531 (38,89)	0.781 (19,84)
10	2.477 (62,92)	2.156 (54,76)	1.406 (35,91)
12	2.790 (70,87)	2.468 (62,69)	1.718 (43,64)
15	3.257 (82,73)	2.937 (74,60)	2.187 (55,55)
18	3.727 (94,67)	3.406 (86,51)	2.656 (67,46)
22	4.352 (110,54)	4.031 (102,39)	3.281 (83,38)


MOUNTING HOLES (2) FOR #4 SCREW
.461 (11,71) MAX.
.216 (5,49) REF.
.156 (3,96) REF.
C REF.
B REF.
A MAX.
.352 (8,94) MAX.

ALL DIMENSIONS REFERENCE ONLY

TAIL STYLES

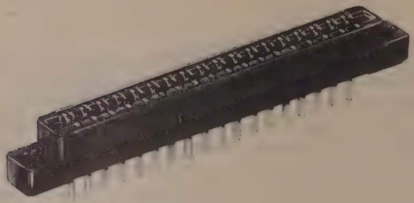

.160 (4,06) MIN.
-03
.160 (4,06) MIN.
.215 (5,46) MIN.
-13
.212 (5,38) MIN.
.215 (5,46) MIN.
-21
.160 (4,06) MIN.
.215 (5,46) MIN.
-23
.160 (4,06)
.160 (4,06) MIN.
-33
.215 (5,46) MIN.
.160 (4,06) MIN.
-43
.215 (5,46) MIN.
.123 (3,12) MIN.
-53
.160 (4,06) MIN.
.123 (3,12) MIN.
-63
.123 (3,12) MIN.
-73
.123 (3,12) MIN.
-83
.160 (4,06) MIN
.215 (5,46) MIN.
.160 (4,06) MIN.
-93

FOR LOCAL SOURCE OF SUPPLY SEE EEM VOL. 2 PAGE 462

RECEPTACLES

BUNKER RAMO AMPHENOL

143 Series



Even at extremes of temperature and vibration, 143 Series Connectors keep voltage losses at an absolute minimum through the strong, firm action of their tuning-fork-type contacts. With their connector-body design and contact "float", 143 Series Connectors prevent board rocking. In addition, the design assures that warped boards will not affect performance.

Extra-strong contact faces slide readily over the mating surfaces of the PC board and conductivity remains virtually unaffected for at least 500 cycles of insertion and withdrawal. Where more cycling is anticipated, a 133 Series Plug can be attached to the board and mated with a 143 Series Connector.

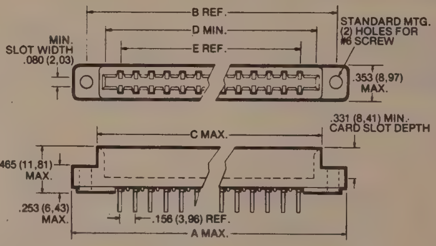
The molded connector body in either mineral-filled diallyl phthalate or phenolic (117 deviation) is dimensionally stable. It is designed for flush mounting and can be mounted either on the front or rear of the panel. Contact identification letters are molded in both the top face and terminal surface. See page 27 for ordering information.

DIMENSIONS

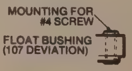
No. of Contact Positions	A Max.	B Ref.	C Max.	D Min.	E Ref.
6	1.784 (45,31)	1.531 (38,89)	1.242 (31,55)	1.093 (27,76)	.781 (19,84)
10	2.411 (61,24)	2.156 (54,76)	1.868 (47,45)	1.719 (43,66)	1.406 (35,71)
12	2.724 (69,19)	2.468 (62,69)	2.181 (55,40)	2.031 (51,59)	1.718 (43,64)
15	3.194 (81,13)	2.937 (74,60)	2.650 (67,31)	2.500 (63,50)	2.187 (55,55)
18	3.664 (93,07)	3.406 (86,51)	3.120 (79,25)	2.968 (75,36)	2.656 (67,46)
22	4.291 (108,99)	4.031 (102,39)	3.747 (95,17)	3.593 (91,26)	3.281 (83,34)
*28	5.227 (132,77)	4.968 (126,19)	4.683 (118,95)	4.529 (115,04)	4.219 (107,16)
**36	6.475 (164,46)	6.210 (157,73)	5.928 (150,57)	5.766 (146,46)	5.490 (139,45)

*Also available in this size on .125 (3,18) centers.

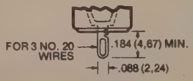
**.36 card slot contains two .056 (1,42) barriers: one between contacts N&P, and one between contacts b&c.


B REF.
D MIN.
E REF.
MIN. SLOT WIDTH .080 (2,03)
STANDARD MTG. (2) HOLES FOR #6 SCREW
.353 (8,97) MAX.
.331 (8,41) MIN. CARD SLOT DEPTH
C MAX.
.465 (11,81) MAX.
.253 (6,43) MAX.
.156 (3,96) REF.
A MAX.

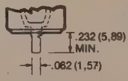
OTHER MOUNTING PROVISIONS


MOUNTING FOR #4 SCREW
FLOAT BUSHING (107 DEVIATION)

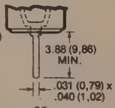
TAIL STYLES


FOR 3 NO. 20 WIRES
.184 (4,67) MIN.
.088 (2,24)

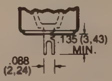
-01
SOLDER EYELET


.232 (5,89) MIN.
.062 (1,57)

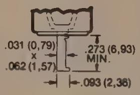
-02
SINGLE-WIRE-WRAP


3.88 (9,86) MIN.
.031 (0,79) x .040 (1,02)

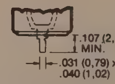
-03
DIP SOLDER


.135 (3,43) MIN.
.088 (2,24)

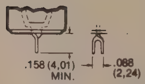
-04
OPEN EYELET
(Permits fast commoning)


.031 (0,79) x .062 (1,57)
.273 (6,93) MIN.
.093 (2,36)

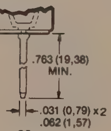
-06
SOLDER WRAP


.107 (2,72) MIN.
.031 (0,79) x .040 (1,02)

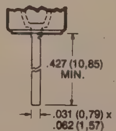
-07
SHORT DIP SOLDER


.158 (4,01) MIN.
.088 (2,24)

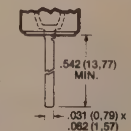
-08
PRODUCTION SOLDER OR BUSSING


.763 (19,38) MIN.
.031 (0,79) x2 .062 (1,57)

-09
3-WIRE WRAP


.427 (10,85) MIN.
.031 (0,79) x .062 (1,57)

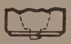
-12
2-WIRE WRAP


.542 (13,77) MIN.
.031 (0,79) x .062 (1,57)

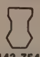
-13
2-WIRE WRAP

POLARIZATION

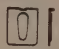
FIELD SERVICEABLE POLARIZING KEYS



PERMANENT POLARIZING KEY (Factory Installed)



143-754 BETWEEN-THE-CONTACT PLASTIC KEY (Available for 15, 18, 22 or 28 sizes on (114) deviation)



143-963 OVER-THE-CONTACT METAL KEY

PRINTED CIRCUIT CONNECTORS

BUNKER RAMO AMPHENOL

133/143 Series

ORDERING INFORMATION

To get the specific connector you want, put together the part number as per the following example.

133-015-21-1005-(101)

SERIES NUMBER
133 Plug
143 Receptacle

NUMBER OF CONTACT POSITIONS

Digit Group	No. of Contacts
006-	6
010-	10
012-	12
015-	15
018-	18
022-	22
*028-	28
036-	36

The 28 and 36 position connectors are available only in the 143 Series.

* Also available on .125 (3,18) centers (143-865-XX)

TAIL STYLES
143 Series
See page 26
133 Series
See page 25

CONTACT OMISSION
(on 133 Series)

POLARIZING KEY LOCATION
(on 143 Series)

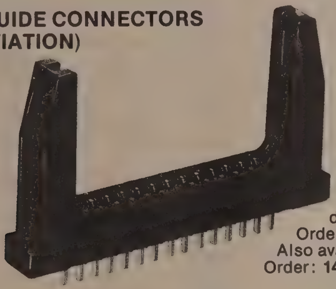
A	1001-	P	1013-	c	1025-
B	1002-	R	1014-	d	1026-
C	1003-	S	1015-	e	1027-
D	1004-	T	1016-	f	1028-
E	1005-	U	1017-	g	1029-
F	1006-	V	1018-	h	1030-
H	1007-	W	1019-	j	1031-
J	1008-	X	1020-	k	1032-
K	1009-	Y	1021-	m	1033-
L	1010-	Z	1022-	n	1034-
M	1011-	a	1023-	p	1035-
N	1012-	b	1024-	r	1036-

If no polarization is desired, omit this digit group.

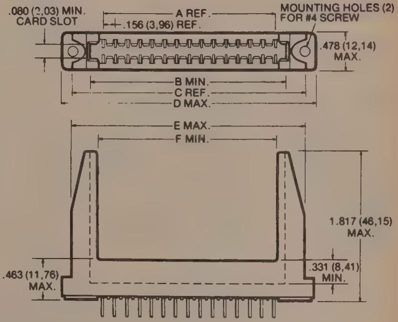
COMMON DEVIATIONS

(101) .0001 (0,00254) min. gold-over-copper contact plating
(102) .00003 (0,00086) gold-over-nickel contact plating
(103) (for plug) End caps and guide pins gold-colored chromate
(107) (for receptacle) stainless-steel float bushings
(109) (for receptacle) green insert glass-filled body per MIL-M-14 type SDG-F
(109) (for plug) stainless-steel guide pins
(110) (for receptacle) card guide, 15, 18 & 22 size only
(111) .000050 (0,001270) min. gold over copper contact plating
(114) (for receptacle) between-contact keying, 15, 18, 22, 28 size only. Order key 143-754 separately
(117) commercial grade. Mineral and flock-filled electrical-grade black phenolic

CARD-GUIDE CONNECTORS (110 DEVIATION)



Blue mineral-filled diallyl phthalate
Order: **143-0XX-XX (110)**
Also available black phenolic
Order: **143-0XX-XX (110)(117)**



Card guides extend 1-3/8" (34,92 mm) above main body of connector. These integral card guides provide positive alignment in blind installations and prevent board rocking. Has .100 (2,54 mm) more block width than standard 143 line. Available in 15, 18 and 22 position sizes with slots between contacts for plastic keys (P/N 143-754) to permit polarization without loss of contacts.

DIMENSIONS

Positions	A Ref.	B Min.	C Ref.	D Max.	E Max.	F Min.
15	2.184 (55,47)	2.500 (63,50)	2.937 (74,60)	3.201 (81,31)	2.645 (67,18)	2.250 (57,15)
18	2.652 (67,36)	2.968 (75,39)	3.406 (87,51)	3.664 (93,07)	3.114 (79,10)	2.728 (69,29)
22	3.276 (83,21)	3.593 (91,26)	4.031 (102,39)	4.291 (108,99)	3.739 (94,97)	3.350 (85,09)

MINIATURE CONNECTORS

BUNKER RAMO AMPHENOL

223 Series Tiny Tim® Connectors

5 TO 33 CONTACTS
POLY CARBONATE OR NYLON CONSTRUCTION

Plug Receptacle
(Relia-Tac Contacts Illustrated)

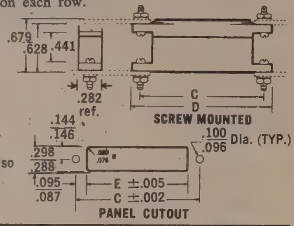
Exceptional interconnections for circuit modules, either potted-in or surface mounted, and can also be used as micro-miniature rack-and-panel, cable-to-cable, and cable-to-panel connectors.

The positive mating is the result of the snap latch engagement locking device molded into the connector body. Contact identification numbers are also molded in.

Trapezoidal mating faces are used for polarization. Guide pins provide keying. Contact spacing is .100″ on centers on each row.

SPECIFICATIONS

Temperature Range:
−55°C to +125°C
Current Rating:
5 amps
Voltage Rating:
1500 VAC (RMS) at sea level.
375 VAC (RMS) at 70,000 ft.
Dielectric:
Polycarbonate resin. (Nylon also available).
Contact factor for performance specifications



No. of Contacts	E Length of Cutout	C Mounting Centers	D ref. Overall Length
5	.410	.593	.843
9	.610	.793	1.043
17	1.015	1.193	1.443
25	1.410	1.593	1.843
33	1.810	1.993	2.243

Strain Relief

Thermoplastic cable clamp strain relief housings for use with above connectors:

Contact Size	Part No.	Contact Size	Part No.
9	223-714-09	25	223-714-25
17	223-714-17	33	223-714-33

Ordering Information

223- 1 1 17

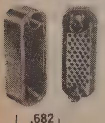
Series Designation 223
Method of Mounting 1—Screw Mount
Number of Contacts 05, 09, 17, 25, 33
Insert Style
1—Plug, Lexan (Green)
2—Receptacle, Lexan (Green)
5—Plug, Nylon (Black)
6—Receptacle, Nylon (Black)

NOTE: Order Contacts Separately

Use Relia-Tac pin contacts for receptacles, socket contacts for plugs.

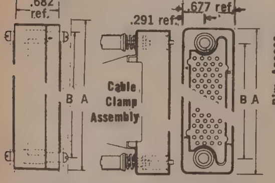
220 Series Micro-Rac®

RACK AND PANEL APPLICATIONS: 52 AND 104 CONTACTS
FLOAT MOUNTED: LOW COST HIGH CONTACT DENSITY

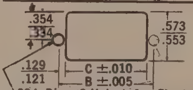


Mono-block construction. Contact identification numbers are molded in. Polarization is achieved by a trapazoidal mating area and keying with the use of guide pins or keying by molded-in slot-and-key arrangements.

Cable clamp assemblies are available for both sizes. Special size connectors can be supplied if needed. Environmental resistance can be added.



		No. of Contacts 52	104
Access.	Potting Mold	220-635	220-634
	Cable Clamp	220-5	220-6
Dim	Max. Length A	1.888	3.017
	Mtg. Ctrs. B	1.492	2.611
	Cutout C	1.250	2.359



.094 Dia. (2 Holes) for Float Mtg. Only. .172 Dia. (2 Holes) for Mtgs. Other Than Float.

NOTE: Order Contacts Separately

Use Relia-Tac pin contacts for receptacles, socket contacts for plugs.

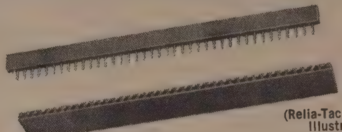
Ordering Information

220- 1 N 104

Series Designation
Insert Style
1—Plug (Lexan)
2—Receptacle (Lexan)
(Includes Hardware)
Number of Contacts 052, 104
Connector Class
N—Non-environmental

221 Series Strip Connectors

ADAPTABLE TO ANY SHAPE: STACK, CUT, CUT AND STACK, USE AS IS... HIGH CONTACT DENSITY,

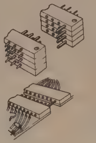


(Relia-Tac Contacts Illustrated)

AMPHENOL Strip Connectors are highly reliable, low cost micro-miniatures with great application versatility. They are furnished in 4″ and 6″ lengths, but you can cut and stack them to whatever configuration you need to satisfy your various application requirements.

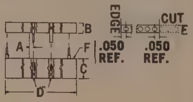
Strip connectors use Poke-Home contacts and perform superbly. Where keying is desired, guide pins are inserted in two or more plug strip contact holes.

Because Strip connectors are injection molded, special configurations can be produced quickly and inexpensively.



Strips can be used in stacked arrangement. Should be stacked parallel only.

PC board application using strip connectors.



CUSTOM LENGTH
Number of holes multiplied by contact center dimension equals approximate length of strip.

Description	A Contact Centers	B	C	D	E	F Contact Positions
6″ Plug Strip	.100	—	.456	6.00	.105	60
6″ Receptacle Strip	.100	.230	—	6.00	.105	60
4″ Plug Strip	.075	—	.456	4.00	.105	53
4″ Receptacle Strip	.075	.230	—	4.00	.105	53
4″ Plug Strip	.050	—	.281	4.00	.075	80
4″ Receptacle Strip	.050	.218	—	4.00	.075	80

Ordering Information

Standard and custom lengths.

221 - 1 5 02

Series Designation
Contact Centers
1—.100 in.
2—.075 in.
3—.050 in. (only Nylon)
Insert Style
1—Plug, polycarbonate
2—Receptacle, polycarbonate
5—Plug, Nylon
6—Receptacle, Nylon
Number of Contact Holes needed: from 02 to 60 on .100 centers (standard 6″ strip contains 60 holes); from 02 to 53 on .075 centers (standard 4″ strip contains 53 holes); from 02 to 80 on .050 centers (standard 4″ strip contains 80 holes).
Note: Must use 2 digits.

Note: Order Contacts Separately

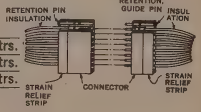
Use Relia-Tac pin contacts for receptacles; socket contacts for plugs.

Strain Relief Strips Protect Wire

AMPHENOL has a solution to the problem of excessive flexing that breaks wire strands in cable-terminated applications. Strain relief strips are available to encase and protect the wire in the crimp area at the rear of the strips. Molded in black Nylon 6/6 material, the strips can be ordered to match any Amphenol strip connector. Held in place by retention pins, which can also be used as a guide pin.

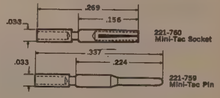
Ordering Information

221-9160—for use with strip connectors on .100 ctrs.
221-9253—for use with strip connectors on .075 ctrs.
221-9380—for use with strip connectors on .050 ctrs.



Mini-Tac Contacts

(Sub-miniature Relia-Tac contacts for .050″ center mini-strip connectors only).
Current Rating: 3 Amps.
Wire Size: 26 to 32 ga. stranded wire.



Poke-Home® Guide Pins

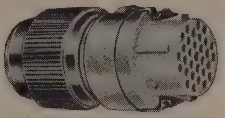
Poke-Home guide pins when seated in plug inserts serve functions of polarizing, keying or connector alignment. They can be used in conjunction with Relia-Tac contacts. Contact factory for information.

CIRCULAR INDUSTRIAL CONNECTORS

BUNKER RAMO AMPHENOL

222 Series Mighty-Mite® Connectors

7 to 61 Contacts — .085 Contact Centers
CABLE APPLICATIONS — 222-11N31



222-519

222-22N31

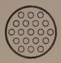
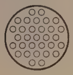
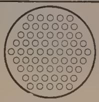
Superior Performance at Low Cost

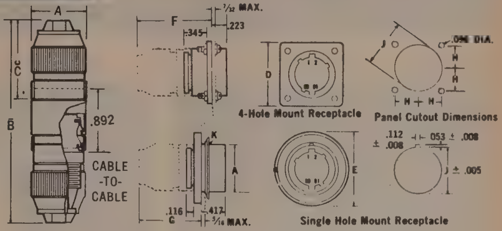
AMPHENOL Mighty-Mite connectors are low cost, highly reliable micro-miniature connectors designed to serve an exceptionally wide range of cable-to-cable and cable-to-chassis applications.

Mighty-Mite connectors are available as straight plugs, single hole mounting, square flange, and cable receptacles. Standard connectors are molded of one-piece, rugged polycarbonate.

ARRANGEMENTS

INSERTS AVAILABLE (Showing front face of plug insert)

Shell Size	10	12	14	18
Size 22 contacts rated 5 amperes for wire sizes 22-24-26-28 solid and 24-26-28 stranded				
	7 contacts 10-7	19 contacts 12-19	31 contacts 14-31	61 contacts 18-61


A
C
B
.892
CABLE
-TO-
CABLE
F
1/32 MAX.
.345
.223
K
A
.116
G
.417
5/16 MAX.
D
4-Hole Mount Receptacle
J
.096 DIA.
H
H
H
H
Panel Cutout Dimensions
E
Single Hole Mount Receptacle
.112 ± .008
.053 ± .008
J ± .005

		No. of Contacts			
		7	19	31	61
DIMENSIONS	A ref. diameter	.496	.621	.746	.996
	B ref. length	2.402	2.618	2.948	3.530
	C ref. length	.854	.962	1.134	1.418
	D ref. square	.750	.875	1.000	1.250
	E ref. diameter	.940	1.065	1.189	1.444
	F ref. length	1.170	1.278	1.450	1.734
	G ref. length	.976	1.084	1.256	1.540
	H length	.250	.312	.375	.500
	J diameter	.511	.636	.761	1.011
ACC	Strain Relief Assembly No.	222-517	222-518	222-519	222-520
	Retaining Ring No.	2-310	2-311	2-312	2-313

Ordering Information

222- 1 1 N 61

Series Designation 222

Method of Mounting
1—Flangeless
2—4 hole mount receptacle
3—Single hole mount Receptacle (includes retaining ring)

Number of Contacts 07, 19, 31, 61

Connector Class: N—Non-environmental

Insert Style
1—Plug (Lexan)
2—Receptacle (Lexan)

NOTE: Order Contacts Separately.
Use Relia-Tac pin contacts for receptacles, socket contacts for plugs.

220 Series Contacts

FOR 220, 221, 222, 223 SERIES CONNECTOR

Ultra-Tac Contacts

Top quality micro-miniature contacts. The socket contacts are hooded to resist test prod damage.

Relia-Tac Contacts

Durable, customer-proven contacts.

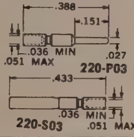
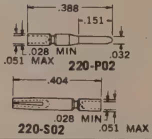
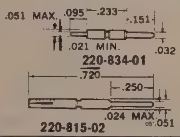
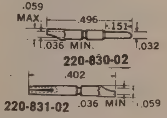
Part Number	Description
220-P02 (Pin) 220-S02 (Socket)	Standard, See specifications below
220-844-02 (Pin) 220-845-02 (Socket)	Same as above, except heavy gold plating and inspection hole in crimp area

Pin Tail Contacts

Pin Tail Relia-Tac contacts may be used for mounting con tors directly to printed circuit boards. Can be provided right angle bend. They cannot be used in 224 Series connec

Solder Cup Contacts

Can be soldered to leads before insertion or, with proper sink, after contacts are assembled.

	ULTRA-TAC	RELIA-TAC	PIN TAIL	SOLDER CUP
Specifications				
Current (Amps) Rating	5	5	5	5
Contact Resistance* (ohms)	.0060	.0060	.0050 to .0060	.0060
Wire Range (Ga.) (Solid & Stranded)	22, 24, 26	24, 26, 28	N/A	24, 26, 28
Contact Finish	Gold-over-Copper on Copper Alloy Bodies	Gold-over-Copper on Copper Alloy Bodies	Gold-over-Copper on Copper Alloy Bodies	Gold-over-Copper on Copper Alloy Bodies

.388
.151
.036 MIN
.051 MAX
.027
220-P03
.433
.036 MIN
220-S03
.051 MAX
.388
.151
.028 MIN
.051 MAX
.032
220-P02
.404
.028 MIN
220-S02
.051 MAX
.051 MAX.
.095
.233
.151
.021 MIN.
.032
220-834-01
.720
.250
.024 MAX.
220-815-02
.051
.059 MAX.
.496
.151
.036 MIN.
.032
220-830-02
.402
220-831-02
.036 MIN
.059

* Constant to a minimum of 100 cycles of insertion and withdrawal.

Ordering Information

Minimum order quantity is 100 pieces. Contacts can be supplied on reels for use in semi-automatic crimp machines. Contact factory.

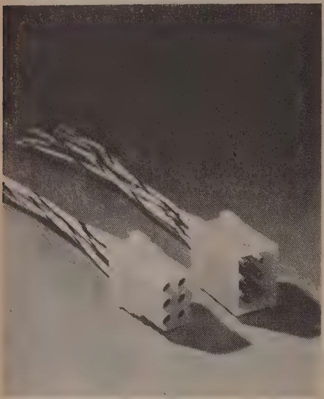
NOTE: All socket contacts are completely shrouded within the plug inserts for optimum protection against damage. Pin contacts are normally exposed when assembled into receptacle inserts.

FOR LOCAL SOURCE OF SUPPLY SEE EEM VOL. 2 PAGE 462

COMMERCIAL ELECTRONIC CONNECTORS

BUNKER RAMO AMPHENOL

32 Series Connectors



- Flame Retardant Material
- Low Cost
- Rugged and Reliable
- 3-6-9-12-15 contact sizes
- Intermateable and interchangeable with competitive connectors
- Panel mount and cable connector styles

Amphenol's Commercial Electronics Connector provides reliable interconnections with real cost saving potential. Low initial procurement cost; automatic crimp contact termination; fast, easy assembly into panels; and quick, simple removal and replacement for field servicing, if necessary. They are ideal for appliances, home entertainment equipment, coin operated machines, business machines . . . anywhere.

The rugged connector housings are single-piece molded nylon meeting UL Class SE-O flammability requirements. Also available in regular SE-2 nylon for greater economy. They are polarized to prevent mismating. Contact wire pockets are recessed to prevent exposed wires and possible electrical failure or shock hazard. Available in 3, 6, 9, 12, and 15 contact sizes. Fully intermateable and intermountable with many competitive types.

Panel mounted connectors have a unique locking feature that provides simple, secure mounting in panels from .032" to .093" thick. A simple push sets the connector automatically, no tools, no struggle. The locking wings hold it firmly in place. If necessary to remove the connector, simple press the locking tab from the rear and the connector slips out. The sturdy wings do not break off or come loose, even after repeated mounting cycles.

To conserve space and improve appearance, cable to cable connectors do not have panel mounting wings. Fully mated connectors lock together to prevent loosening under vibration.

32 Series contacts are furnished on reels for use with high volume semi-automatic production crimping presses, or individually in small quantities for manual wire termination. The contacts can be crimped to 14 through 30 gauge insulated wire. There are three wire barrel sizes to assure the correct combination of wire and contact for the strongest and most reliable crimp termination. Contacts are easily inserted into the housing by hand and locked in place. No tool is required. The contacts can be removed using an inexpensive extraction tool.

The standard-size .093" diameter contacts are completely interchangeable with other contacts. Pin and socket contacts can be assembled in either the plug or the receptacle for quick "hot side" changes or for additional polarization. Normally the pin contacts are used in the plug and socket contacts are used in the mating receptacle.

ORDERING INFORMATION

FLAME RETARDANT NYLON. Contact Factory for Regular Nylon Material.

Receptacles

Number of Contacts	With Panel Mounting Wings	Cable Connector
3	32-03S22-11	32-03S22-21
6	32-06S22-11	32-06S22-21
9	32-09S22-11	32-09S22-21
12	32-12S22-11	32-12S22-21
15	32-15S22-11	32-15S22-21

Plugs

Number of Contacts	With Panel Mounting Wings	Cable Connector
3	32-03P22-11	32-03P22-21
6	32-06P22-11	32-06P22-21
9	32-09P22-11	32-09P22-21
12	32-12P22-11	32-12P22-21
15	32-15P22-11	32-15P22-21

PIN AND SOCKET TERMINALS

(Tin plated. Gold plating available on request.)

Wire Size	Type	Reel	Bag
14-16	Pin	32-1416P-05000RT	32-1416P-00100BT
14-16	Socket	32-1416S-05000RT	32-1416S-00100BT
16-20	Pin	32-1620P-06000RT	32-1620P-00100BT
16-20	Socket	32-1620S-06000RT	32-1620S-00100BT
22-30	Pin	32-2230P-10000RT	32-2230P-00100BT
22-30	Socket	32-2230S-10000RT	32-2230S-00100BT

COMMERCIAL ELECTRONIC CONNECTORS SPECIFICATIONS

Temperature Range: —55°C to 105°C

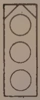
Voltage Rating: 250 Volts AC

Current Rating: 14-16 ga. wire, 12 amps; 16-20 ga. wire, 9 amps; 22-30 ga. wire 7½ amps

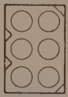
Contact Resistance: 3 milliohms max.

See p. 2•559 for crimping equipment.

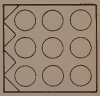
CONTACT ARRANGEMENTS



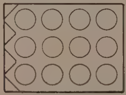
3 CONTACT



6 CONTACT

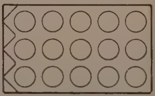


9 CONTACT



12 CONTACT

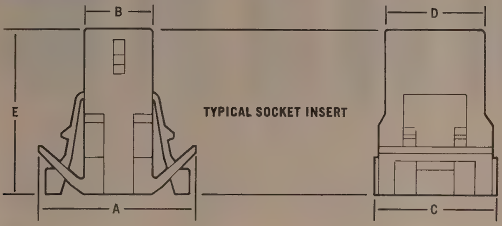
FOR LOCAL SOURCE OF SUPPLY
SEE EEM VOL. 2 PAGE 462



15 CONTACT

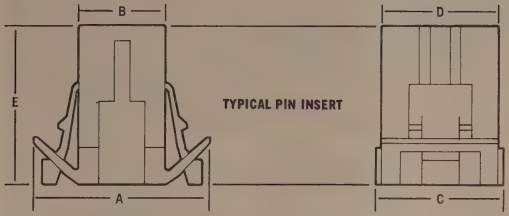
32 Series Connectors (Cont'd)

DIMENSIONS

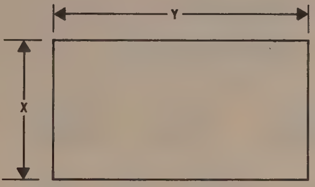


TYPICAL SOCKET INSERT

No. of Pins		Dimension					Panel Cutout	
		A	B	C	D	E	X	Y
SOCKET	3	1.225	.676	.420	.234	1.060	.312	.840
	6	.998	.434	.772	.632	1.060	.600	.718
	9	1.220	.666	.772	.621	1.060	.828	.725
	12	1.424	.870	.772	.633	1.060	1.050	.655
	15	1.621	1.067	.772	.632	1.060	1.240	.655
PIN	3	1.327	.773	.420	.338	1.035	.375	.933
	6	1.090	.536	.802	.734	1.035	.695	.750
	9	1.329	.775	.772	.713	1.035	.937	.725
	12	1.529	.975	.819	.737	1.035	1.155	.760
	15	1.723	1.169	.822	.737	1.035	1.343	.760

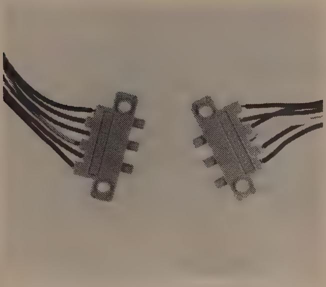


TYPICAL PIN INSERT



PANEL CUT-OUT

223 Series Hermaphroditic Connector



- Miniature, Modular Connector serves as plug or receptacle
- Six contacts — 3 male — 3 female in each module
- Can be stacked in multiples
- Saves assembly time
- Only 3 parts to stock

Amphenol's new 223 Series Connector features a unique design which serves as either plug or receptacle. Each module houses 3 male and 3 female contacts. Contacts are standard #24 crimp Poke-Home® type. Individual six contact modules can be snapped together to form larger assemblies, if desired.

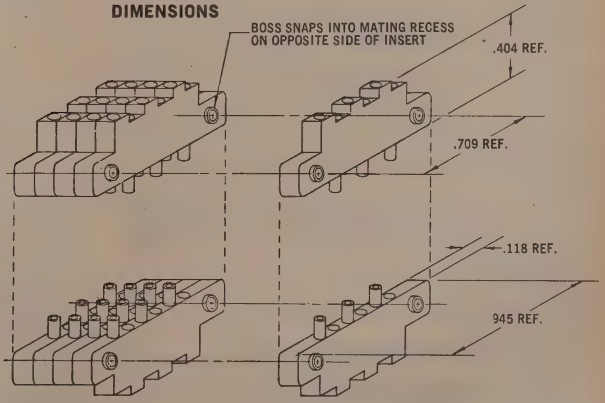
Only 3 parts need be stocked to perform a multitude of connecting tasks. Assembly is simple, fast and foolproof.

Dielectric is glass-filled thermoplastic. Contacts are copper alloy with gold plating.

ORDERING INFORMATION

Description	Part Number
Connector Housing Only	223-716
Male Contact	220-P03
Female Contact	223-715-02
Packaged Assembly: Includes 1 connector, 3 male & 3 female contacts	223-2706

DIMENSIONS



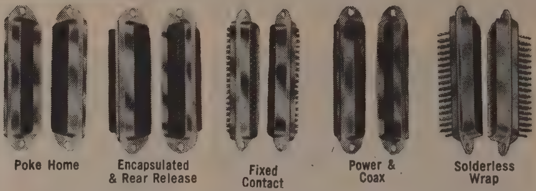
FOR LOCAL SOURCE OF SUPPLY
SEE EEM VOL. 2 PAGE 462

MIN RAC CONNECTORS

BUNKER RAMO AMPHENOL

17 Series Min Rac® Connectors

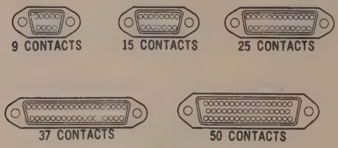
- Sub Miniature Rack and Panel
- Choice of Fixed or Removable Contacts.
- Eight Styles — Unlimited Variety
- Intermates with all "D" Shaped Sub Miniatures.


Poke Home
Encapsulated & Rear Release
Fixed Contact
Power & Coax
Solderless Wrap

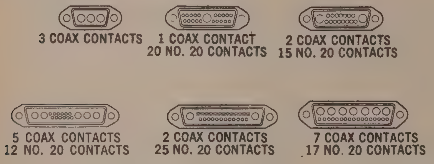
A complete line of versatile connectors offering 9 to 50 contacts in a choice of arrangements and dielectrics. Cable housings are available for cable-to-panel or cable-to-cable applications, and several locking devices are offered. These lightweight, miniature connectors are ideal for computers, telecommunications, instrumentation and avionics systems not requiring environmental capability. Meets EIA Standard RS-232C for data communications input output connectors.

Contact Arrangements

FOR ORIGINAL POKE HOME, REAR RELEASE, FIXED CONTACT, SOLDERLESS WRAP AND ENCAPSULATED CONTACT


9 CONTACTS
15 CONTACTS
25 CONTACTS
37 CONTACTS
50 CONTACTS

FOR POWER AND COAX COMBINATION


3 COAX CONTACTS
1 COAX CONTACT
20 NO. 20 CONTACTS
2 COAX CONTACTS
15 NO. 20 CONTACTS
5 COAX CONTACTS
12 NO. 20 CONTACTS
2 COAX CONTACTS
25 NO. 20 CONTACTS
7 COAX CONTACTS
17 NO. 20 CONTACTS

Additional insert configurations are available. Refer to factory for information.

Specifications

ORIGINAL POKE HOME & ENCAPSULATED CONTACT

Temperature Range: −55°C to +125°C.
Current Rating: 7.5 Amps.
Voltage Rating: 500 VAC (RMS) at sea level. 150 VAC (RMS) at 90,000 ft.
Dielectric: Zytel 101 nylon per Mil-P-20693.
Shells: Cadmium-plated cold-rolled steel with clear chromate finish.

Contacts: Crimp Type — .00002″ min. gold over copper plated silnic bronze. Solder type — .00002″ min. gold over copper plated brass.
Wire Size: Solder: Up to #20; crimp #20, #22 and #24 AWG.

FIXED CONTACTS and POWER & COAX.

Temperature Range: −55°C to +125°C.
Current Rating: 7.5 Amps.
Voltage Rating: 500 VAC (RMS) at sea level. 150 VAC (RMS) at 70,000 ft.
Dielectric: Glass-filled nylon.
Shells: Same as above.
Contacts: Power; Screw machine type — .00002″ min. gold over copper plated brass. Punch press type — Stamped from phosphor bronze and plated .00002″ gold over copper flash. Wire wrap type — .00002″ min. gold over copper plated brass. .500″ Lg. x .025″ Sq. Coax.; #1 Shielded contacts are gold plated.
Wire Size: Up to #20 wire.

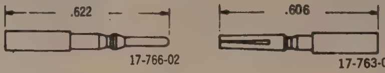
Rear Removable Contacts

Temperature Range: −55°C to +125°C.
Current Rating: 7.5 amps.
Voltage Rating: 500 VAC at sea level. 125 VAC at 70,000 ft.
Dielectric: Glass-filled nylon.
Shells: Same as above.
Contact Type: Crimp Poke-Home, rear insertion, rear release.
Contact Material: Machined contacts — silnic bronze. Strip formed contacts — beryllium copper.
Contact Finish: .000030″ gold over copper plating
Contact Wire Sizes: Machined contacts — 20 to 24 AWG. Strip formed contacts — 22 to 26 AWG.

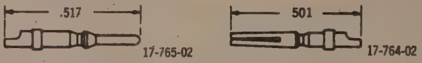
Contacts

For Original Poke Home Line Only

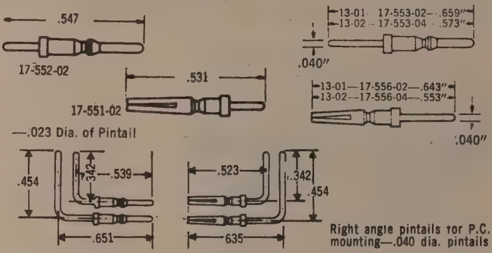
Standard Crimp Type Contacts


.622
17-766-02
.606
17-763-02

Standard Solder Type Contacts

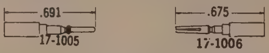

.517
17-765-02
501
17-764-02

Pintail Contacts for P.C. Mounting


.547
17-552-02
.531
17-551-02
—.023 Dia. of Pintail
13-01 17-553-02 .659″
13-02 17-553-04 .573″
.040″
13-01—17-556-02—.643″
13-02—17-556-04—.553″
.040″
.454
.342
.539
.651
.523
.342
.454
635

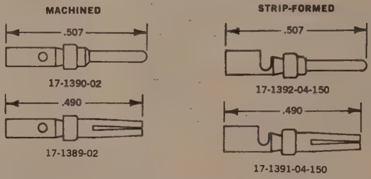
Right angle pintails for P.C. mounting—.040 dia. pintails

Optional Contacts


.691
17-1005
.675
17-1006

Over-size crimp barrel contacts for 16 ga. wire

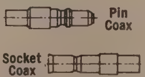
For Rear Release Contact Line Only


MACHINED
.507
17-1390-02
.490
17-1389-02
STRIP-FORMED
.507
17-1392-04-150
.490
17-1391-04-150

Machined — Included when connectors ordered by deviation —17. Order bulk quantities separately for use with connector bodies ordered by deviation —18.

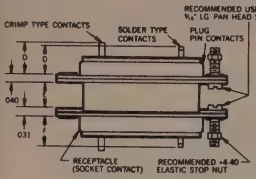
Stamped and Formed — Available only on reels of 15,000 contacts for use with connector bodies ordered by deviation —18.

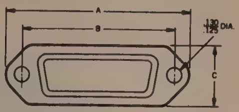
For Power & Coax Combination Only

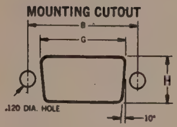

Pin Coax
Socket Coax

Pin	Cables	Socket
17-1112-01	For RG195/U and RG195A/U cable	17-1113-01
17-1132-01	For RG178B/U, RG196/U and RG196A/U cable	17-1130-01
17-1264-01	For RG58/U, RG141/U, RG141A/U, and RG303/U	17-1265-01

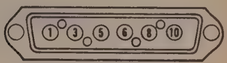
17 Series Min Rac® Connectors


RECOMMENDED USE OF #4-40 NC 2 5/16" LG PAN HEAD SCREW
CRIMP TYPE CONTACTS
SOLDER TYPE CONTACTS
PLUG PIN CONTACTS
D
D
E
F
040
031
RECEPTACLE (SOCKET CONTACT)
RECOMMENDED #4-40 ELASTIC STOP NUT





HIGH VOLTAGE CONNECTOR



10 #20 Contacts—Size 37 Shell

ORDERING INFORMATION

17-800 Plug　　17-801 Receptacle

DIMENSIONS

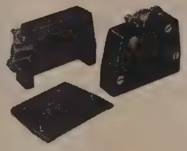
Con-nector Size	All Lines A Max.	All Lines B	All Lines C Max.	D (1)	D (2)	D (3)	D Encapsu-lated Contact Line Only	D Rear Release	D Power & Coax. Comb. Only	E All Lines	F (1)	F (2)	F (3)	F Encapsu-lated Contact Line Only	F Rear Release	F Power & Coax. Comb. Only	Mounting Dimensions—All Lines G (Min.) Back Mtg.	G (Min.) Front Mtg.	H (Min.) Back Mtg.	H (Min.) Front Mtg.
9	1.239	.984	.515	25/64	9/32	43/64	29/64	23/64	11/16	15/64	13/32	19/64	11/16	29/64	23/64	3/4	.798	.830	.448	.505
15	1.567	1.312	.515	25/64	9/32	43/64	29/64	23/64	11/16	15/64	13/32	19/64	11/16	29/64	23/64	3/4	1.116	1.161	.448	.505
25	2.114	1.852	.515	25/64	9/32	43/64	29/64	23/64	11/16	15/64	13/32	19/64	11/16	29/64	23/64	3/4	1.654	1.701	.448	.505
37	2.754	2.500	.515	25/64	9/32	43/64	29/64	23/64	23/32	15/64	13/32	19/64	11/16	29/64	23/64	3/4	2.304	2.348	.448	.505
50	2.661	2.406	.626	25/64	9/32	43/64	29/64	23/64	23/32	15/64	13/32	19/64	11/16	29/64	23/64	3/4	2.210	2.285	.559	.645

(1) Original Poke-Home with Crimp Contacts.
(2) Original Poke-Home and Fixed Contacts with Solder Contacts.
(3) Fixed Contacts with Solderless wrap tails only.

17 Series Min Rac Accessories

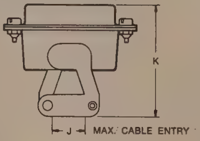
Plastic Backshell

A versatile accessory for all Min Rac connectors. Protects connector terminations and provides cable strain relief. Unique removable side panel allows attachment even after cable has been terminated. Can easily be removed for servicing in field. Deep recess accepts all connector styles, even encapsulated and power and coax lines. Interchangeable insert and cable clamp allows choice of top or side cable entry. Made of glass-filled nylon with cadmium plated steel clamp.



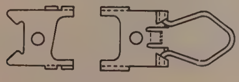
Metal Cable Housing

Used to adapt connector for cable to panel or cable to cable applications. Easily attached to connector by two screws. Available in clear chromate or gold iridite finish to match connector shells.

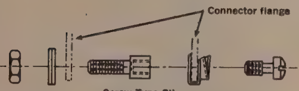


DIMENSIONS

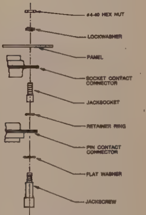
	Size 9	15	25	37	50
J	13/32	13/32	19/32	23/32	23/32
K	1 23/64	1 23/64	1 25/64	1 25/64	1 25/64



Spring Latch



Screw Type Clip



Jack Screw & Jack Socket Assembly

PART NUMBERS

Shell Size	Backshell & Cable Housings Plastic	Metal Clear Chromate	Metal Gold Iridite	Spring Latch Locking Device Clear Chromate	Spring Latch Locking Device Gold Iridite	Screw Latch Locking Device Clear Chromate	Screw Latch Locking Device Gold Iridite	Jackscrew & Socket Assembly Clear Finish Only	Potting Molds
9	17-1370	17-310-01	17-310-02	17-529	17-847	17-768	17-848	17-895	17-886-09
15	17-1371	17-311-01	17-311-02	17-529	17-847	17-768	17-848	17-895	17-886-15
25	17-1372	17-312-01	17-312-02	17-529	17-847	17-768	17-848	17-895	17-886-25
37	17-1373	17-313-01	17-313-02	17-529	17-847	17-768	17-848	17-895	17-886-37
50	17-1374	17-314-01	17-314-02	17-770	17-850	17-768	17-848	17-895	17-886-50

How to Order 17 Series Min Rac Connectors

17—1 1 09 0—1

DEVIATIONS
- 0 Solder Contacts
- 1 Crimp Contacts, Male or Female
- 5 Solder Contact and Float Mtd. (Female only)
- 6 Crimp Contact and Float Mtd. (Female only)
- 11 .023 Dia. .138 Pin Tail Contacts for Nylon inserts only
- 13-01 .040" Dia. Pin Tail Contacts with .225" usable tail length (for orig. Poke-Home Line only)
- 13-02 .040" Dia. Pin Tail Contacts with .140" usable tail length (for orig. Poke-Home Line only)
- 15 Low cost punch press type fixed contacts
- 16 Screw machine type fixed contacts
- 17 Rear Release Connectors with screw machined Poke-Home contacts
- 18 Rear Release Connector body only
- 19 01 Wire wrap type tails .300" Lg. x .025" Sq.
- 19 02 Wire wrap type tails .500" Lg. x .025" Sq.

COAX CONTACTS
(Must be ordered separately).
- 0 - None
- 1 - 1 Coax.
- 2 - 2 Coax.
  Etc.

NUMBER OF POWER CONTACTS
- 09 - 9 contacts
- 15 - 15 contacts

FINISH
- 0 Cadmium w/clear chromate
- 1 Cadmium w/gold iridite

CONNECTOR TYPE
- 1 Receptacle (Zytel) Socket Contacts
- 2 Plug (Zytel) Pin Contacts
- 8 Receptacle (Glass-Filled Nylon) Socket Contacts
- 9 Plug (Glass-Filled Nylon) Pin Contacts

SERIES NUMBER 17

**FOR LOCAL SOURCE OF SUPPLY
SEE EEM VOL. 2 PAGE 462**

Crimping and Insertion Tools for 17 Series Min Rac and 220 Series Micro-Miniature Contacts

NO. 357-100 — HAND CRIMPING TOOL

Adjustable 4-indent miniature to MIL-T-22520. Requires contact locator bushing for specific contact used. (See below.)

17 Series		Micro-Miniature	
Contact Locator	Contact	Contact Locator	Contact
357-300-2	17-763, 766, 1037,1038	357-300-01	220-S01, 220-S02, 220-P01
357-300-5	17-1105, 1108	357-300-03	220-S03
357-300-11	17-1389, 1390	357-300-08	220-P02, 220-P03

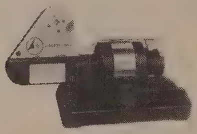
No. 357-552 — Hand Crimp Tool for Coax Connectors

Cycle-controlled hexagon crimp action for reliable termination of outer ferrule of coax contacts. Used for 17-1130 and 17-1132 coax contacts, with RG 178/U cable. (357-100 or 357-104 crimp tool required to terminate center conductor of coax cables.)

No. 357-553 — Hand Crimp Tool

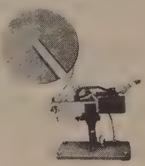
Same as above except for 17-1112 and 17-1113 coax contacts used with RG 195/U cable.

No. 359-400 — Manual Feed, Pneumatic Crimp Tool



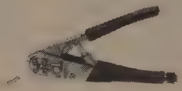
4-indent cycle-controlled crimping tool. Consult factory for correct settings, nest bushings and accessories.

No. 359-900 — Semi-Automatic Feed Crimp Tool



4-indent cycle-controlled crimping. Contacts supplied on carrier strips wound on reel for fast, easy crimping. Consult factory for available contacts and accessories.

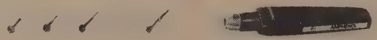
NO. 357-104 — HAND CRIMPING TOOL



Miniature step adjustable. Requires contact locator. (See below.)

17 Series		Micro-Miniature	
Contact Locator	Contact	Contact Locator	Contact
357-304-6	17-763, 766, 1037, 1038	357-304-02	220-S01, 220-S02, 220-P01
357-304-7	17-1105, 1108, Coax Contact Center Cond.	357-304-03	220-S03
357-304-11	17-1389, 1390	357-304-10	220-P02, 220-P03

No. 356-200 — Insertion and Removal Tool Handle



Select correct insertion bit or removal bit to accommodate desired contact.

17 Series		
Contact	Insertion Bit	Removal Bit
17-763	356-400-1	356-400-5
17-766	356-400-1	356-400-6
17-1005	356-400-2	356-400-6
17-1006	356-400-2	356-400-5
17-1112	356-400-3	356-400-7
17-1113	356-400-3	356-400-8
17-1130	356-400-19	356-400-8
17-1132	356-400-19	356-400-7
17-1389	———	356-214
17-1390	———	356-214
17-1391	———	356-214
17-1392	———	356-214

Micro-Miniature		
Contact	Insertion Bit	Removal Bit
220-S02 (Relia-Tac) and 220-S03 (Ultra-Tac) 220-831-02, 220-815-00.	356-400-11	356-400-14
220-P02 (Relia-Tac) and 220-P03 (Ultra-Tac) 220-830-02, 220-834-07.	356-400-11	356-400-15
221-756-01	None	356-400-17 (Plug strips)
221-756-01	None	356-400-18 (Receptacle strips)
221-756-02	None	356-400-16 (Receptacle strips only)

FOR LOCAL SOURCE OF SUPPLY
SEE EEM VOL. 2 PAGE 462

No. 357-557 — Hand Crimp Tool

For crimping stamped and formed rear release contacts 18-1391; 17-1392.

CRIMPING MACHINES

BUNKER RAMO AMPHENOL

Production Contact Crimping Machine

AUTOMATIC FEEDING, SEMI-AUTOMATIC OPERATION

AMPHENOL
AMPHENOL INDUSTRIAL DIVISION
POWER
FEED

HIGH VOLUME PRODUCTION CRIMPING

Compact, economical, and simple to use, Amphenol's production crimping machine provides automatic contact feeding and semi-automatic operation. The unit produces eight-indent crimped terminations of consistently high quality as fast as the operator can insert the wires and press a pedal switch.

The machine features a vibratory contact feed system that automatically arranges the contacts in the correct crimping position and feeds them to the crimp mechanism. A dependable pneumatic system completes the crimping cycle. Up to four thousand bulk-packaged contacts may be poured into the vibratory bowl at one time, depending on the size and shape of the contacts.

MINIMUM OPERATOR TRAINING

No special skills are required to perform the fast 1-2-3 procedure: insert the wire, operate the pedal switch, and remove the terminated wire. It's as easy as that.

To meet specific applications, the crimp depth adjustment may be preset to accommodate different wire sizes.

SPECIFICATIONS

CRIMPING SPEED: Up to 1600 terminations per hour

CONTACTS: 17-766-02 and 17-763-02

WIRE SIZES: #20 — #24 AWG

DIMENSIONS: 16″ wide x 18″ deep x 14″ high

WEIGHT: 54 lbs.

EXTERNAL AIR LINE: 80 - 100 PSI

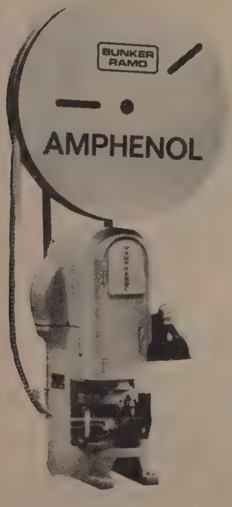
ELECTRICAL POWER: 117V AC, standard 3-wire grounded supply

ORDERING INFORMATION

359-801: For crimping standard 17-766 and 17-763 contacts

Semi-Automatic Reel-Fed Crimping Press

For Stamped and Formed Contacts for 17 and 32 Series



This press is similar to those used to crimp wire terminals. It comes with an applicator designed to crimp Stamped and Formed Contacts on a carrier strip. Capable of operating at over 1,000 terminations per hour, the press firmly attaches Contacts onto pre-stripped wire. Use of the reel-fed press and applicator permits even greater economy from Amphenol's low cost stamped and formed contacts.

SPECIFICATIONS

CRIMPING SPEED: Up to 1,000 terminations per hour.

CONTACTS: 17-1391 and 17-1392 stamped and formed rear release contacts. 32 Series contacts see p. 2•554.

WIRE SIZES: 14 to 30 AWG.

CONNECTIONS REQUIRED: 110 V AC standard 3 wire grounded supply.

ORDERING INFORMATION

359-201: Reel-fed Press and Applicator for 17 Series Stamped and Formed Rear Release Contacts.

359-202: Press and applicator for 32-1416 P or S 0500 RT Contacts.

359-203: Press and Applicator for 32-1620 P or S 0600 RT Contacts.

359-204: Press and Applicator for 32-2230 P or S 10000 RT Contacts.

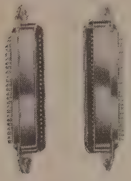
FOR LOCAL SOURCE OF SUPPLY
SEE EEM VOL. 2 PAGE 462

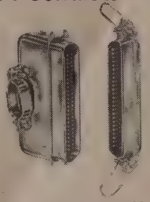
MICRO RIBBON® CONNECTORS

BUNKER RAMO AMPHENOL

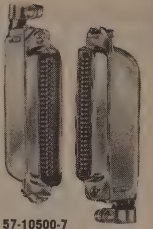
57 Series Micro-Ribbon® Connectors

High Contact Density — 14 to 64 Contacts Protective Polarized Shell


57-10500 57-20500
RACK & PANEL


57-50500 57-40500
SIDE CABLE ENTRY

57-30360 57-60360
TOP CABLE ENTRY


57-10500-7 57-20500-7
LOW PROFILE HOOD

All of the advantages of ribbon contacts apply to Micro Ribbon Connectors. This includes the self-cleaning, self-wiping action of the contacts and extremely low insertion and withdrawal forces. Dielectric is improved diallyl phthalate with high impact strength and low moisture absorbency characteristics. Trapezoidal shells provide polarization, and are made of zinc plated brass with a clear chromate conversion seal. Small size makes the Amphenol Micro Ribbon Connector ideal for high density miniature modules as well as rack and panel applications. Connectors may be top or bottom mounted. Rated 700V DC at sea level; 200 VDC at 70,000 feet.

Rack and Panel and Module Applications. Receptacle mounting plate includes float bushings to allow a float of .020 in each direction. This facilitates blind mating and minimizes the need for critical mounting dimensions.

Cable-To-Panel Application. Panel receptacles are equipped with sturdy spring latches which are guided and retained by cutouts in the plug's flanges. Receptacles must be top mounted. Cable entry at top side, as desired.

SPECIFICATIONS

(Meets requirements of SCL-6020A)

Current Capacity — 5 amps per contact.

Voltage Rating — 700 volts D.C. at sea level.
200 volts D.C. at 70,000 ft.

Operating Temperature — −55°C to +105°C
−67°F to +221°F

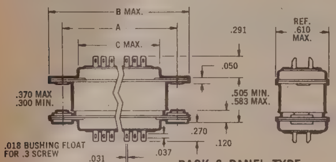
Wire Sizes — Solid — 22 gauge max.
Stranded — 24 gauge max.

Contacts — .000030″ gold plated over copper flash on cadmium copper base.

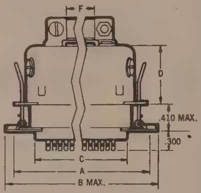
Dielectric — Diallyl phthalate per Mil-M-14F Type MDG

Shells — Zinc plated brass with clear chromate coating, trapezoidal shape for polarization. Gold iridescent chromate finish also available.

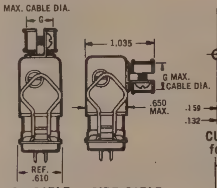
DIMENSIONS


B MAX.
A
C MAX.
.291
REF. .610 MAX.
.050
.370 MAX .300 MIN.
.505 MIN. .583 MAX.
.270
.120
.018 BUSHING FLOAT FOR .3 SCREW
.031
.037

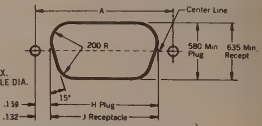
RACK & PANEL TYPE


F
D
.410 MAX.
.300
C
A
B MAX.

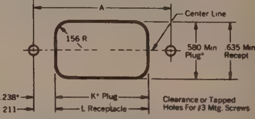
CABLE-TO-PANEL TYPE


MAX. CABLE DIA.
G
1.035
G MAX. CABLE DIA.
.650 MAX.
REF. .610

TOP CABLE ENTRY   SIDE CABLE ENTRY

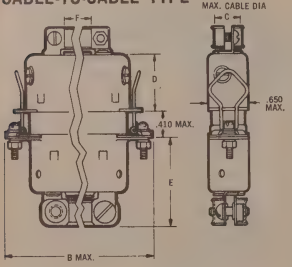

A
Center Line
200 R
580 Min Plug
635 Min Recept
15°
.159
.132
H Plug
J Receptacle

CUTOUT—BOTTOM MOUNTING
for rack and panel type only


A
Center Line
156 R
580 Min Plug*
635 Min Recept
.238*
.211
K* Plug
L Receptacle
Clearance or Tapped Holes For #3 Mtg. Screws

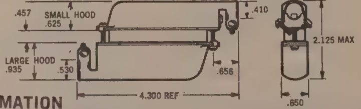
CUTOUT—TOP MOUNTING
for both types

CABLE-TO-CABLE TYPE


MAX. CABLE DIA
F
C
D
.650 MAX.
.410 MAX.
E
B MAX.

TOP CABLE ENTRY

LOW PROFILE HOOD


.457
SMALL HOOD .625
.410
LARGE HOOD .935
.530
.656
2.125 MAX
4.300 REF
.650

DIMENSIONS

		14 Contacts	24 Contacts	36 Contacts	50 Contacts	64 Contacts
BOTH TYPES	A MAX. B MAX C	1.417 1.750 .910	1.842 2.175 1.335	2.352 2.685 1.845	2.947 3.270 2.440	3.542 3.875 3.035
CABLE TO CHASSIS TYPE ONLY	D E F G	.843 1.243 .301 .412	.825 1.225 .468 .468	.905 1.305 .629 .468	.995 1.395 .756 .468	— — — —
BOTTOM MOUNTING FOR RACK & PANEL TYPE ONLY	H J	1.098 1.153	1.523 1.578	2.033 2.088	2.628 2.683	3.224 3.278
TOP MOUNTING FOR BOTH TYPES	K L	.940 .955	1.365 1.420	1.875 1.930	2.470 2.525	3.065 3.120

ORDERING INFORMATION

Contacts	Rack and Panel Module Applications — Stand. Solder Cup Tails — Plugs	Stand. Solder Cup Tails — Receptacles	Tapered P.C. Tails — Plugs	Tapered P.C. Tails — Receptacles	Cable to Panel Applications — Top Entry Cable Plugs	Side Entry Cable Plugs	Receptacles	Cable-To-Cable Application — Plugs	Cable-To-Cable Application — Receptacles	Low Profile
14	57-10140	57-20140	57-10140-4	57-20140-8	57-30140	57-50140	57-40140	See Cable to Panel Listing	57-60140	50 contacts only. Receptacle — 57-20500-7 Plug — 57-10500-7
24	57-10240	57-20240	57-10240-3	57-20240-8	57-30240	57-50240	57-40240		57-60240	
36	57-10360	57-20360	57-10360-13	57-20360-9	57-30360	57-50360	57-40360		57-60360	
50	57-10500	57-20500	57-10500-27	57-20500-31	57-30500	57-50500	57-40500		57-60500	
64	57-10640	57-20640	—	—	—	—	—		—	

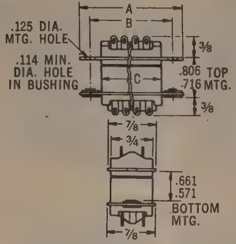
BLUE RIBBON® CONNECTORS BUNKER RAMO **AMPHENOL**

26 Series Blue Ribbon Connectors

Barrier Polarization

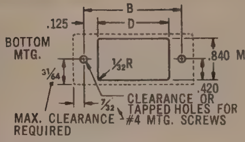
26-4200-24S

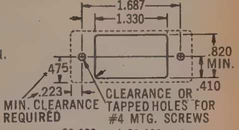
26-4100-24P


A
B
.125 DIA. MTG. HOLE
.114 MIN. DIA. HOLE IN BUSHING
C
3/8
.806 TOP
.716 MTG.
3/8
7/8
3/4
.661
.571
BOTTOM MTG.
7/8

Tapered design of plug body provides pre-alignment of mating contacts. Dielectric barriers between contacts vary in thickness by minute dimensions to provide polarization. Float bushings allow a float of up to .02 in each direction, facilitating the blind mating common in rack and panel applications. Requires simple rectangular panel cutout.

The eight contact size is also available with a molded key and keyway for polarization. Catalog numbers, 26-182 plug and 26-183 receptacle.


B
D
.125
BOTTOM MTG.
1/32R
.840 MIN.
3 1/64
.420
7/32
MAX. CLEARANCE REQUIRED
CLEARANCE OR TAPPED HOLES FOR #4 MTG. SCREWS


1.687
1.330
.475
.820 MIN.
.410
.223
MIN. CLEARANCE REQUIRED
CLEARANCE OR TAPPED HOLES FOR #4 MTG. SCREWS

26-182 and 26-183 only

Contacts	Plugs	Mating Receptacles	DIMENSIONS A	B	C	D
8	26-4100-8P	26-4200-8S	1.719	1.375	1.036	1.120
16	26-4100-16P	26-4200-16S	2.469	2.125	1.784	1.868
24	26-4100-24P	26-4200-24S	3.219	2.875	2.536	2.620
32	26-4100-32P	26-4200-32S	3.969	3.625	3.286	3.370
8	26-182	26-183	—	—	—	—

SPECIFICATIONS (Exceed requirements of SCL-6020A)

Current Capacity — 5 Amps per contact

Voltage Rating — 750 volts D.C. at sea level.
300 volts D.C. at 60,000 feet

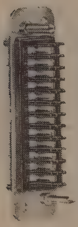
Operating Temperature — −55°C to +125°C
−67°F to +257°F

Contact Plating — .00002″ gold over copper base

Maximum Wire Size — 16 gauge

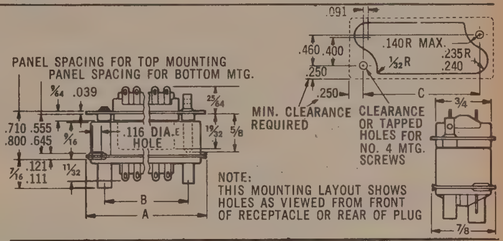
Plugs and receptacles are molded of high impact diallyl phthalate dielectric with molded-in mounting plates of corrosion resistant passivated stainless steel.

Pin Polarization


26-190-24

26-159-24

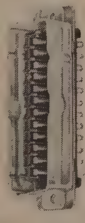
Sturdy guide pins pre-align connectors before contact engagement. Pins are of dissimilar size to avoid reverse mating. Float bushings on receptacle allow a float in all directions of .02″ to minimize the need for close mounting dimensions and to assist in blind matings. Rated 5 amperes, 750V DC at sea level; 300V DC at 60,000 feet.


.091
.460
.400
.140R MAX.
.235R
.240
1/32R
.250
.250
C
3/4
PANEL SPACING FOR TOP MOUNTING
PANEL SPACING FOR BOTTOM MTG.
3/64
.039
25/64
.710
.555
.800
.645
9/16
.116 DIA. HOLE
19/32
5/8
.121
11/32
7/16
.111
B
A
MIN. CLEARANCE REQUIRED
CLEARANCE OR TAPPED HOLES FOR NO. 4 MTG. SCREWS
NOTE: THIS MOUNTING LAYOUT SHOWS HOLES AS VIEWED FROM FRONT OF RECEPTACLE OR REAR OF PLUG
7/8

Contacts	Plug	Receptacle	DIMENSIONS A	B	C
16	26-159-16	26-190-16	2.442	1.842	2.024
24	26-159-24	26-190-24	3.118	2.522	2.704
32	26-159-32	26-190-32	3.798	3.202	3.384

Keyed Shells

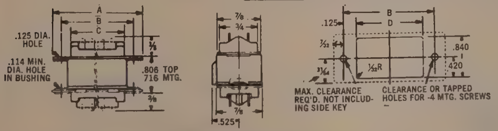
26-4201-24P


26-4101-24S

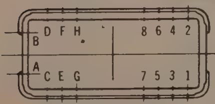
Similar to barrier polarization type, but with keyed aluminum shells to provide a large assortment of alternate positions. Mounting plates are stainless steel and receptacle includes float bushings which allow a float of .02 in all directions. Rated 5 amperes, 800 V DC at sea level; 300 V DC at 70,000 feet.

DIMENSIONS

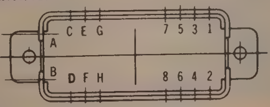
	A	B	C	D
8 contact	1.719	1.375	1.036	1.120
16 contact	2.469	2.125	1.784	1.868
24 contact	3.219	2.875	2.536	2.620
32 contact	3.969	3.625	3.286	3.370


A
B
C
.125 DIA. HOLE
.114 MIN. DIA. HOLE IN BUSHING
3/8
.806 TOP
.716 MTG.
3/8
7/8
3/4
7/8
.525
.125
B
D
7/32
.840
1/32R
.420
3 1/64
MAX. CLEARANCE REQ'D. NOT INCLUDING SIDE KEY
CLEARANCE OR TAPPED HOLES FOR #4 MTG. SCREWS

KEYING IDENTIFICATION


B
D F H
8 6 4 2
A
C E G
7 5 3 1

Plug Front Shell


A
C E G
7 5 3 1
B
D F H
8 6 4 2

Receptacle Front Shell

Ordering Information

Contacts	Plug	Receptacle	Position	Shell Keys Letters	Shell Keys Numbers
8	26-4101-8P	26-4201-8S	1	A	1
	26-4102-8P	26-4202-8S	2	A	2
	26-4103-8P	26-4203-8S	3	B	1
	26-4104-8P	26-4204-8S	4	B	2
16	26-4101-16P	26-4201-16S	1	A-C	3-6
	26-4102-16P	26-4202-16S	2	A-D	2-5
	26-4103-16P	26-4203-16S	3	A-E	5-6
	26-4104-16P	26-4204-16S	4	A-F	4-5
	26-4105-16P	26-4205-16S	5	B-C	1-6
	26-4106-16P	26-4206-16S	6	B-D	1-2
	26-4107-16P	26-4207-16S	7	B-E	1-4
	26-4108-16P	26-4208-16S	8	B-F	2-3
24	26-4101-24P	26-4201-24S	1	A-C	3-6
	26-4102-24P	26-4202-24S	2	A-D	4-7
	26-4103-24P	26-4203-24S	3	A-E	5-6
	26-4104-24P	26-4204-24S	4	A-F	4-5
	26-4105-24P	26-4205-24S	5	A-G	6-7
	26-4106-24P	26-4206-24S	6	A-H	1-6
	26-4107-24P	26-4207-24S	7	B-C	2-7
	26-4108-24P	26-4208-24S	8	B-D	1-2
	26-4109-24P	26-4209-24S	9	B-E	1-4
	26-4110-24P	26-4210-24S	10	B-F	2-3
	26-4111-24P	26-4211-24S	11	B-G	3-4
	26-4112-24P	26-4212-24S	12	B-H	2-5
32	26-4101-32P	26-4201-32S	1	A-C	3-6
	26-4102-32P	26-4202-32S	2	A-D	4-7
	26-4103-32P	26-4203-32S	3	A-E	5-6
	26-4104-32P	26-4204-32S	4	A-F	4-5
	26-4105-32P	26-4205-32S	5	A-G	6-7
	26-4106-32P	26-4206-32S	6	A-H	1-6
	26-4107-32P	26-4207-32S	7	B-C	2-7
	26-4108-32P	26-4208-32S	8	B-D	1-2
	26-4109-32P	26-4209-32S	9	B-E	1-4
	26-4110-32P	26-4210-32S	10	B-F	2-3
	26-4111-32P	26-4211-32S	11	B-G	3-4
	26-4112-32P	26-4212-32S	12	B-H	2-5

BLUE RIBBON CONNECTORS BUNKER RAMO **AMPHENOL**

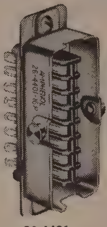
26 Series Cable to Panel and Cable to Cable Types

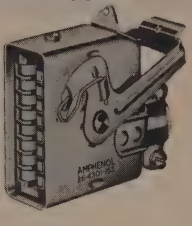
- **Low Withdrawal Force**
- **Secure Spring Latch**
- **Low Insertion Force**
- **Alternate Positions**
- **Provisions for Safety Wiring**

Cable-to-Panel Blue Ribbon Connectors include a straight plug, right angle plug, and panel receptacle. The plug is equipped with a spring tension swivel latch to insure mating, even in vibration applications. Provision for safety wiring provides additional reliability.

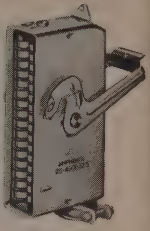
The nickel plated brass shells are notched to provide keying for alternate positions. The large number of alternate positions available is effectively doubled since the plug and receptacles are available with either a male or a female insert. Add P to the catalog number for a male insert; S for a female insert.

FOR LOCAL SOURCE OF SUPPLY
SEE EEM VOL. 2 PAGE 462


26-4401

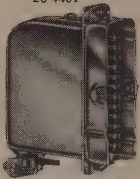

26-4301

26-4401


26-4501

26-4301

26-4601


26-4701

26-4501

DIMENSIONS

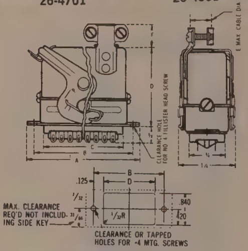
	A	B	C	D	E	F	G	H	J	K	L	M	N
8 contact plug and receptacle mated	1.719	1.375	1.036	1.593	.312	.438	1.593	.455	1.120	2.059	1.697	4.046	3.322
16 contact plug and receptacle mated	2.469	2.125	1.784	1.719	.625	.517	1.797	.517	1.868	2.246	1.822	4.420	3.572
24 contact plug and receptacle mated	3.219	2.875	2.536	1.844	.625	.517	1.922	.517	2.620	2.371	1.947	4.670	3.822
32 contact plug and receptacle mated	3.969	3.625	3.286	1.906	.625	.517	1.984	.517	3.370	2.434	2.025	4.796	3.978

Ordering Information

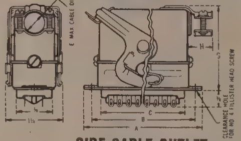
CABLE-TO-PANEL AND CABLE-TO-CABLE

Contact	Plugs		Mating Panel Receptacles	Mating Receptacles with Back Shell		Position No.	Shell Keys	
	End Cable Outlet	Side Cable Outlet		Outlet End Cable	Outlet Side Cable		Letters	Numbers
8	26-4301-8 S or P	26-4501-8 S or P	26-4401-8 P or S	26-4601-8	26-4701-8	1	A	1
	26-4302-8 S or P	26-4502-8 S or P	26-4402-8 P or S	26-4602-8	26-4702-8	2	A	2
	26-4303-8 S or P	26-4503-8 S or P	26-4403-8 P or S	26-4603-8	26-4703-8	3	B	1
	26-4304-8 S or P	26-4504-8 S or P	26-4404-8 P or S	26-4604-8	26-4704-8	4	B	2
16	26-4301-16 S or P	26-4501-16 S or P	26-4401-16 P or S	26-4601-16	26-4701-16	1	A-C	3-6
	26-4302-16 S or P	26-4502-16 S or P	26-4402-16 P or S	26-4602-16	26-4702-16	2	A-D	2-5
	26-4303-16 S or P	26-4503-16 S or P	26-4403-16 P or S	26-4603-16	26-4703-16	3	A-E	5-6
	26-4304-16 S or P	26-4504-16 S or P	26-4404-16 P or S	26-4604-16	26-4704-16	4	A-F	4-5
	26-4305-16 S or P	26-4505-16 S or P	26-4405-16 P or S	26-4605-16	26-4705-16	5	B-C	1-6
	26-4306-16 S or P	26-4506-16 S or P	26-4406-16 P or S	26-4606-16	26-4706-16	6	B-D	1-2
	26-4307-16 S or P	26-4507-16 S or P	26-4407-16 P or S	26-4607-16	26-4707-16	7	B-E	1-4
	26-4308-16 S or P	26-4508-16 S or P	26-4408-16 P or S	26-4608-16	26-4708-16	8	B-F	2-3
24	26-4301-24 S or P	26-4501-24 S or P	26-4401-24 P or S	26-4601-24	26-4701-24	1	A-C	3-6
	26-4302-24 S or P	26-4502-24 S or P	26-4402-24 P or S	26-4602-24	26-4702-24	2	A-D	4-7
	26-4303-24 S or P	26-4503-24 S or P	26-4403-24 P or S	26-4603-24	26-4703-24	3	A-E	5-6
	26-4304-24 S or P	26-4504-24 S or P	26-4404-24 P or S	26-4604-24	26-4704-24	4	A-F	4-5
	26-4305-24 S or P	26-4505-24 S or P	26-4405-24 P or S	26-4605-24	26-4705-24	5	A-G	6-7
	26-4306-24 S or P	26-4506-24 S or P	26-4406-24 P or S	26-4606-24	26-4706-24	6	A-H	1-6
	26-4307-24 S or P	26-4507-24 S or P	26-4407-24 P or S	26-4607-24	26-4707-24	7	B-C	2-7
	26-4308-24 S or P	26-4508-24 S or P	26-4408-24 P or S	26-4608-24	26-4708-24	8	B-D	1-2
	26-4309-24 S or P	26-4509-24 S or P	26-4409-24 P or S	26-4609-24	26-4709-24	9	B-E	1-4
	26-4310-24 S or P	26-4510-24 S or P	26-4410-24 P or S	26-4610-24	26-4710-24	10	B-F	2-3
	26-4311-24 S or P	26-4511-24 S or P	26-4411-24 P or S	26-4611-24	26-4711-24	11	B-G	3-4
	26-4312-24 S or P	26-4512-24 S or P	26-4412-24 P or S	26-4612-24	26-4712-24	12	B-H	2-5
32	26-4301-32 S or P	26-4501-32 S or P	26-4401-32 P or S	26-4601-32	26-4701-32	1	A-C	3-6
	26-4302-32 S or P	26-4502-32 S or P	26-4402-32 P or S	26-4602-32	26-4702-32	2	A-D	4-7
	26-4303-32 S or P	26-4503-32 S or P	26-4403-32 P or S	26-4603-32	26-4703-32	3	A-E	5-6
	26-4304-32 S or P	26-4504-32 S or P	26-4404-32 P or S	26-4604-32	26-4704-32	4	A-F	4-5
	26-4305-32 S or P	26-4505-32 S or P	26-4405-32 P or S	26-4605-32	26-4705-32	5	A-G	6-7
	26-4306-32 S or P	26-4506-32 S or P	26-4406-32 P or S	26-4606-32	26-4706-32	6	A-H	1-6
	26-4307-32 S or P	26-4507-32 S or P	26-4407-32 P or S	26-4607-32	26-4707-32	7	B-C	2-7
	26-4308-32 S or P	26-4508-32 S or P	26-4408-32 P or S	26-4608-32	26-4708-32	8	B-D	1-2
	26-4309-32 S or P	26-4509-32 S or P	26-4409-32 P or S	26-4609-32	26-4709-32	9	B-E	1-4
	26-4310-32 S or P	26-4510-32 S or P	26-4410-32 P or S	26-4610-32	26-4710-32	10	B-F	2-3
	26-4311-32 S or P	26-4511-32 S or P	26-4411-32 P or S	26-4611-32	26-4711-32	11	B-G	3-4
	26-4312-32 S or P	26-4512-32 S or P	26-4412-32 P or S	26-4612-32	26-4712-32	12	B-H	2-5

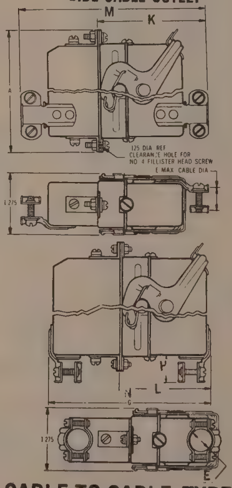
INSERTS: The plug and receptacle are available with either male or female inserts. Add the Suffix P for male inserts; S for female inserts.


E MAX CABLE DIA
D
CLEARANCE HOLE FOR NO 4 FILLISTER HEAD SCREW
A
B
C
1/4
.125
B
D
MAX. CLEARANCE REQ'D NOT INCLUDING SIDE KEY
.840
.120
CLEARANCE OR TAPPED HOLES FOR 4 MTG. SCREWS

*END CABLE OUTLET



SIDE CABLE OUTLET



CABLE-TO-CABLE TYPE

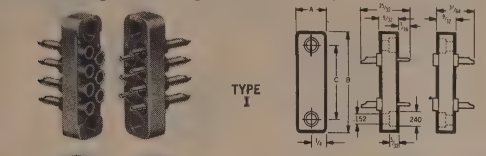
RACK AND PANEL CONNECTORS

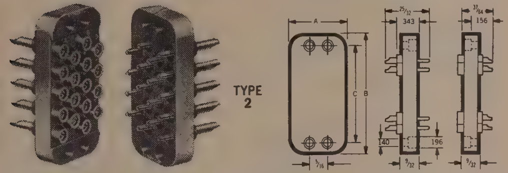
BUNKER RAMO AMPHENOL

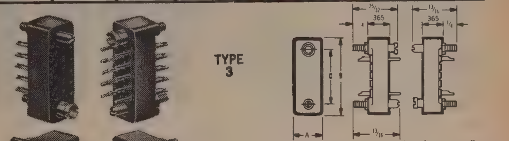
126 Series Miniature Rack and Panel Connectors

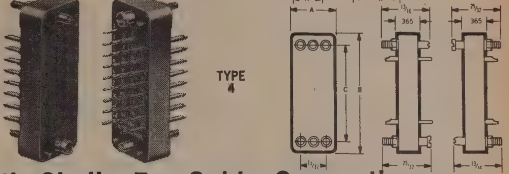
Heavy duty, reliable, time proven connectors. Dielectric is of melamine. Contacts are gold over silver plated. Voltage rating of types 1 and 2 is 700V RMS between contacts and 600V RMS between contacts and ground with a current rating of 17 amperes. Voltage rating of types 3 and 4 is 600V RMS with a current rating of 7½ amperes.

Connectors Type	Pin Part Number	Socket Part Number	No. of Contacts	Amps	Wire Gauge Solid	Wire Gauge Strand.	Width A	Length B	Mount'g Centers C
1	126-016	126-017	7	17	12	14	.500	1.625	1.250
	126-204	126-205	15	17	12	14	.500	2.600	2.225
2	126-206	126-207	18	17	12	14	1.000	2.000	1.688
3	126-173	126-174	14	7½	18	20	.437	1.250	.937
	126-199	126-189	18	7½	18	20	.562	1.312	1.000
	126-171	126-172	21	7½	18	20	.375	2.250	1.937
4	126-188	126-187	34	7½	18	20	.750	2.000	1.687

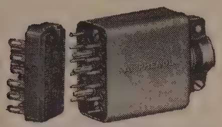

TYPE I
A
25/32
9/32
3/16
31/64
9/32
C
B
.152
.240
1/4
5/32


TYPE 2
A
25/32
343
31/64
156
C
B
140
196
5/16
9/32
9/32


TYPE 3
25/32
365
13/16
365
1/4
C
B
A
13/16


TYPE 4
A
13/16
365
25/32
365
C
B
13/32
25/32
13/16

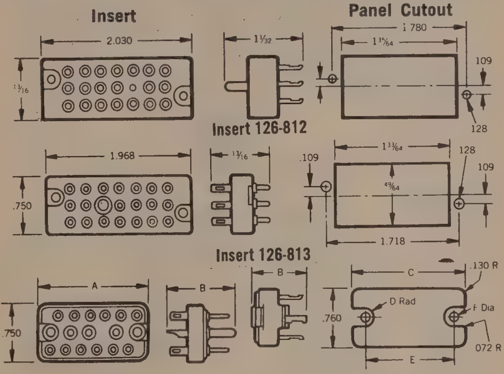
126 Series Rectangular Rack & Panel with Shells For Cable Connections



Rated a full 900V RMS, contacts are gold, over silver. Four contact configurations are available with 3 contact sizes. Contact size 12 is rated 23 amperes; size No. 16 is rated 13 amperes; size 20 is 7½ amperes. Dielectric is mica filled phenolic. Aluminum housing with mechanical strain relief is available for cable applications. Gold over silver plated contacts.

No. of Contacts Size 12	No. of Contacts Size 16	No. of Contacts Size 20	Pin Contacts Insert Only	Pin Contacts With Housing	Socket Contacts Insert Only	Socket Contacts With Housing	Mounting Screw Size No.	Shell Height
2	—	9	126-804	126-809	126-805	126-808	4	1.75
3	—	12	126-151	126-152	126-150	126-153	6	2.06
4	—	16	126-806	126-811	126-807	126-810	4	2.06
—	20	—	126-813	—	126-812	—	4	—

INSERTS	A	B	C	D	E	F
126-804	1.171	.937	1.181	.120	.864	.120
126-805	1.171	49/64	1.181	.120	.864	.120
126-151	1.500	.937	1.510	.115	1.188	.145
126-150	1.500	49/64	1.510	.115	1.188	.145
126-806	1.932	.937	1.947	.120	1.620	.120
126-807	1.937	49/64	1.947	.120	1.620	.120

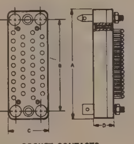

Insert
Panel Cutout
2.030
1 3/16
1 1/32
1.780
1 35/64
109
128
Insert 126-812
1.968
.750
1 3/16
.109
1 33/64
128
109
49/64
1.718
Insert 126-813
A
B
B
C
.130 R
D Rad
F Dia
.750
.760
072 R
E
All Others

Military Version

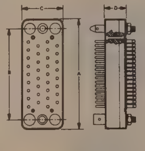
A family of miniature connectors which meets MIL-C-8384.

SPECIFICATIONS

Current Rating: 7.5 amps.
Voltage Rating: 500V A.C. (RMS).
Temperature Range: −55°C to +125°C.
Dielectric: Molded epoxy type thermo-set plastic.
Pin Contacts: Brass alloy with gold over nickel plating.
Socket Contacts: Beryllium copper with gold over silver plating.
Guide Hardware: Gold-plated brass with 4-40 thread.
Wire Size: 18AWG solid - 20AWG stranded.



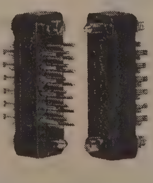
SOCKET CONTACTS



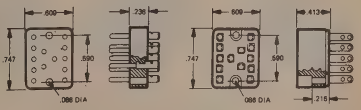
PIN CONTACTS

DIMENSIONS AND ORDERING INFORMATION

No. of Contacts	Part Numbers Pin Contacts	Part Numbers Socket Contacts	Dimensions A	Dimensions B	Dimensions C	Dimensions D
7	126-T-2628	126-T-2629	1.218	.904	.381	.362
9	126-T-2630	126-T-2631	1.309	.998	.381	.362
14	126-T-2626	126-T-2627	1.248	.935	.439	.362
20	126-T-2619	126-T-2620	1.556	1.248	.439	,362
26	126-T-2632	126-T-2633	1.627	1.312	.558	.362
34	126-T-2621	126-T-2622	1.996	1.684	.749	.362

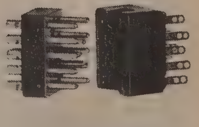


Cubic Connector


.600
.236
.747
.590
.086 DIA
.609
.413
.747
.590
.086 DIA
.216

SPECIFICATIONS

Current Rating: 3 amps.
Voltage Rating: 125 volts A.C. (RMS).
Temperature Range: −25°C to +85°C.
Dielectric: Black Phenolic.
Pin Contacts: Brass alloy with nickel plating.
Socket Contacts: Phosphor bronze with silver plating.
Wire Size: 20 AWG solid — 22AWG stranded.



Contacts	Part Numbers Pin	Part Numbers Socket
13	126-T-2655	126-T-2656-3

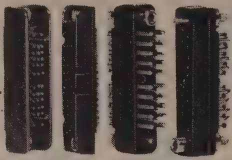
RACK AND PANEL CONNECTORS

BUNKER RAMO AMPHENOL

126 Series

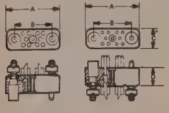
Micro Miniature Rectangular

This group of four connectors provides more contacts in less space than the 126 Series miniatures. A unique spring type socket contact is used which provides excellent wiping action and firm pressure on 6 points along the pin to insure a positive electrical connection everytime.

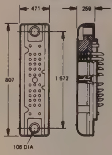


SPECIFICATIONS

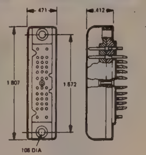
Current Rating: 3 amps.
Voltage Rating: 60 volts. A.C. (RMS)
Temperature Range: −55°C to +125°C.
Dielectric: Molded epoxy type thermo-set plastic.
Pin Contacts: Brass alloy with gold over nickel plating.
Socket Contacts: Beryllium copper with gold over silver plating.
Guide Pins: Nickel-plated brass.
Wire Size: 22 AWG solid. 24 AWG stranded.



ALL OTHERS



126-T-2669-1 ONLY



126-T-2668 ONLY

Number of Contacts	Part Numbers		Dimensions			
	Pin Contacts	Socket Contacts	A	B	C	D
10	126-T-2609	126-T-2610-1	.746	.530	.275	.235
16	126-T-2664	126-T-2665-1	.904	.687	.275	.235
28	126-T-2666	126-T-2667-1	1.218	1.002	.275	.235
34	126-T-2668	126-T-2669-1	1.807	1.572	.471	.412

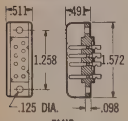
Cable Connector

SPECIFICATIONS

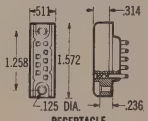
Current Rating: 3 amps.
Voltage Rating: 380V. A.C. (RMS)
Temperature Range: −40°C to +85°C.
Dielectric: Black nylon thermo-plastic.
Pin Contacts: Brass alloy with silver plating.
Socket Contacts: Phosphor bronze with silver plating.
Wire Sizes: 18 AWG solid. 20 AWG stranded.
Housing: Gray polycarbonate plastic.

Contacts	Part Numbers		
	Plug	Receptacle	Housing
9	126-T-2560	126-T-2561	126-T-2870

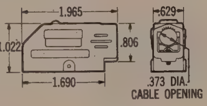
DIMENSIONS AND ORDERING INFORMATION



PLUG



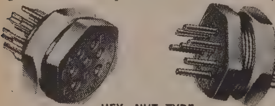
RECEPTACLE

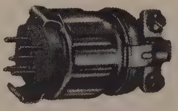


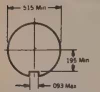
HOUSING

126 Series Hex Connectors 4 to 9 Contacts

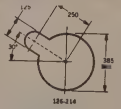
Popular hexagon rack and panel connectors. Diallyl phthalate dielectric, gold over silver plated contacts. 500 V (RMS) at sea level.

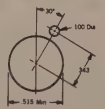

HEX. NUT TYPE


HOOD & CLAMP TYPE

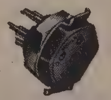


Hex Nut Type Mounting Holes





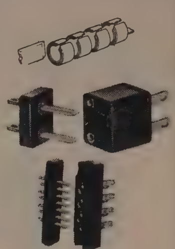
All Others


LOCKING CLIP TYPE

Contacts	Hex Nut Panel Mount	Panel Mount With Locking Clip	With Hood and Cable Clamp
4 Pin	126-1431	126-214	126-214 - 1000
4 Socket	126-3815	126-233	126-215 (Hood Only)
5 Pin	126-010	126-216	126-217
5 Socket	126-011	126-218	126-223
7 Pin	126-191	126-197	126-195
7 Socket	126-192	126-198	126-196
9 Pin	126-012	126-219	126-220
9 Socket	126-013	126-221	126-222

115 Series Blade & Spring Contact Line

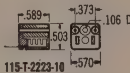
A complete line of rugged connectors utilizing a flat blade male contact and a female spring contact with multiple rows of gripping fingers. The blade enters the opening in the "C" shaped spring, forcing it apart.



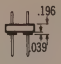
SPECIFICATIONS

Current Rating: 10 amps (2 contact model, 8 amps).
Voltage Rating: 2, 6, 8 contacts 125V. A.C. (RMS). 4, 7, (8 with guide pins) 12, 16, 30 380V. A.C. (RMS). 26 contact 127V. A.C. (RMS).
Temperature Range: −20°C to +85°C.
Dielectric: Black phenolic.
Pin Contacts: Flat brass blade with silver plating.
Socket Contacts: Phosphor bronze with silver plating.
Wire Size: 16 AWG solid. 18 AWG stranded.

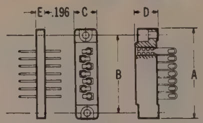
Single Row



115-T-2223-10
115-T-2223-11
(with bent tail)



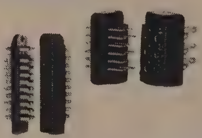
115-T-2222-10

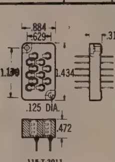


4, 6, 7 or 8 CONTACT MODELS

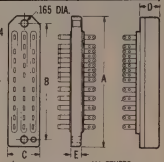
Contacts	Part Numbers		Dimensions				
	Blade Contacts	Socket Contacts	A	B	C	D	E
2	115-T-2222-10	115-T-2223-10	.570	.295	.503	.589	.196
4	115-T-2301	115-T-2302	1.611	1.364	.550	.550	.118
6	115-T-2410	115-T-2411	1.611	1.364	.550	.550	.118
7	115-T-2060	115-T-2061	1.886	1.611	.472	.483	.196
8	115-T-2014	115-T-2015	1.709	1.454	.590	.550	.118
8	115-T-2002 (with polarizing guide pins)	115-T-2001	2.130	1.886	.479	.472	.393

Multi-Row





115-T-2011 ONLY



ALL OTHERS

Contacts	Part Numbers		Dimensions				
	Blade Contacts	Socket Contacts	A	B	C	D	E
8	115-T-2024-8	115-T-2025-8	1.847	1.493	.590	.491	.236
12 (2 rows)	115-T-2008-12	115-T-2009-12	2.319	1.965	.590	.491	.236
12 (3 rows)	115-T-2010	115-T-2011	1.434	1.179	.884	.472	.314
16	115-T-2670-16	115-T-2671-16	2.790	2.437	.590	.491	.236
20	115-T-2660-20	115-T-2661-20	3.262	2.908	.590	.491	.236
26	115-T-2056-26	115-T-2057-26	3.262	2.908	.590	.491	.236
30	115-T-2070-30	115-T-2071-30	3.262	2.908	.786	.491	.236

115 Series Hinge Action Mating

115-31S 115-30P

Amphenol 115 Series connectors accommodate 50 or 100 No. 16 wires and are nominally rated at 750 volts RMS 60CPS at sea level.

The vise action of the screw lock provides the leverage for easy attaching and disengaging of the plug. The two-piece inserts have molded-in numbers to facilitate wiring and checking of circuits.

100 CONTACTS	Crimp-On Contacts	Taper Pin Contacts	Solder Cup Contacts
Male Plug	115-30P	115-30P(432)	115-30P-1000
Female Receptacle	115-31S	115-31S(432)	115-31C-1000
Female Plug	115-30S	115-30S(432)	115-32S
Male Receptacle	115-31P	115-31P(432)	115-32P

50 CONTACTS	Taper Pin Contacts	Solder Cup Contacts
Male Plug	115-114P(432)	115-114P
Female Receptacle	115-115S(432)	115-115S
Female Plug	115-114S(432)	115-114S
Male Receptacle	115-115P(432)	115-115P

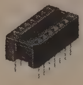
PRODUCTION SOCKETS

BUNKER RAMO AMPHENOL

Dual-In-Line IC Production Sockets

The 821-25, 821-20 and 821-40 Series are high reliability production mounting sockets for Dual-In-Line I.C. devices. They are most useful in production applications where it is desirable to provide easy replacement of individual DIP devices without the risk of unsoldering them from P.C. boards or the expense of replacing entire boards.

Standard Profile DIP Sockets



Standard profile sockets have replaceable, one piece contacts with dual-wiping action for round or flat I.C. leads. Removable lid provides closed entry and chamfered lead-in. Available in anti-wicking solder tab or solid square post for solderless wrap termination.

SPECIFICATIONS

Contact Material: 30 micro inch gold over 50 micro inch nickel over phosphor bronze

Contact Resistance: 5 milliohms

Contact Rating: 1 amp

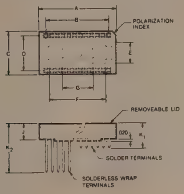
Voltage Breakdown: 1800 volts

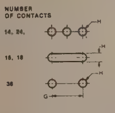
Terminations: Choice of solderless wrap with up to 3 complete wraps of 30 AWG wire, short solderless wrap for 2 wraps, or solder tab.

Body Material: Molded glass filled nylon

Temperature Rating: —55° to +125°C

Mounting: Press fit, hex nut and screw, direct solder, or epoxy





Mounting Hole Diagrams

DIMENSIONS

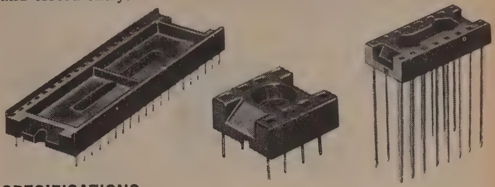
Number of Contacts	A	B	C	D	E	F	G	H	J	K1 Solder Terminals	K2 Solderless Terminals
14	.795	.600	.395	.300	.160	.630	.312	.078	.230	.390	.930
16	.895	.700	.395	.300	.160	.730	.412	.078	.230	.390	.930
18	1.000	.800	.395	.300	.160	.830	.512	.078	.230	.390	.930
24	1.290	1.100	.695	.500	.330	.975	.500	.120	.260	.340	.980
24	1.290	1.100	.695	.600	.330	.975	.500	.120	.260	.340	.980
36	1.890	1.700	.695	.600	.330	1.575	.900	.120	.260	.340	.980

ORDERING INFORMATION

Amphenol Number	Number of Contacts	Lead Row Spacing	Termination
821-25011-144	14	.300	Solder
821-25011-164	16	.300	Solder
821-25011-184	18	.300	Solder
821-25012-144	14	.300	Solderless Wrap
821-25012-164	16	.300	Solderless Wrap
821-25012-184	18	.300	Solderless Wrap
821-40002-244	24	.500	Solderless Wrap
821-40004-244	24	.600	Solderless Wrap
821-40012-244	24	.500	Solder
821-40014-244	24	.600	Solder
821-40021-364	36	.600	Solderless Wrap
821-40023-364	36	.600	Solder

Low Profile DIP Sockets

Designed for low cost, reliable, high density connections. Overall height is only .160″ above board, allowing closer stacking. Also permits side-by-side mounting on .100″ x .300″ and with no wasted space between sockets. Large sockets include lead guides and closed entry.



SPECIFICATIONS

Contact Material: 30 micro inch gold over 50 micro inch nickel over phosphor bronze, or beryllium copper

Contact Resistance: .005 ohms

Contact Rating: 1 amp max.

Voltage Breakdown: 1800 volts

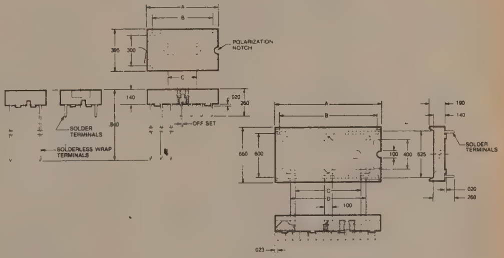
Terminations: Choice of solderless wrap with up to 3 complete wraps of 30 AWG wire, or solder tab

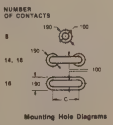
Body Material: Molded glass filled nylon

Temperature Rating: —55° to +125°C

Mounting: Press fit, hex nut and screw, direct solder, or epoxy

Mating Leads: Contacts accept standard IC leads up to .024″ square, rectangular or .024″ diameter





Mounting Hole Diagrams

Number of Contacts	A	B	C
8	.395	.300	—
14	.695	.600	.312
16	.795	.700	.312
18	.895	.800	.400

Number of Contacts	A	B	C	D
24	1.190	1.100	.700	.820
28	1.390	1.300	.900	1.020
40	1.990	1.900	1.500	1.620

ORDERING INFORMATION

Amphenol Number	No. of Contacts	Lead Row Spacing	Termination	Contact Material
821-20012-084	8	.300	Solder	Beryllium Copper
821-20011-144	14	.300	Solder	Phosphor Bronze
821-20012-144	14	.300	Solder	Beryllium Copper
821-20013-144	14	.300	Solderless Wrap	Beryllium Copper
821-20011-164	16	.300	Solder	Phosphor Bronze
821-20012-164	16	.300	Solder	Beryllium Copper
821-20013-164	16	.300	Solderless Wrap	Beryllium Copper
821-20041-184	18	.300	Solderless Wrap	Beryllium Copper
821-20042-184	18	.300	Solder	Phosphor Bronze
821-23011-244	24	.600	Solder	Phosphor Bronze
821-23013-244	24	.600	Solder	Beryllium Copper
821-23011-284	28	.600	Solder	Phosphor Bronze
821-23013-284	28	.600	Solder	Beryllium Copper
821-23011-404	40	.600	Solder	Phosphor Bronze
821-23013-404	40	.600	Solder	Beryllium Copper

FOR LOCAL SOURCE OF SUPPLY SEE EEM VOL. 2 PAGE 462

PRODUCTION SOCKETS

BUNKER RAMO AMPHENOL

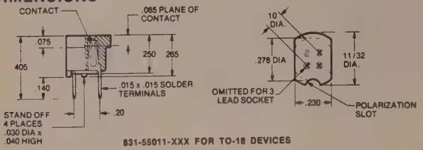
TO-5 and TO-18 Production Sockets

Economical sockets for TO-5 and TO-18 I.C. packages. Dual-wipe tuning fork contacts with chamfered lead entries for fast insertion, low contact resistance, and long life. Anti-wicking solder tab or solderless wrap termination. Mount in circular or double "D" shaped hole.

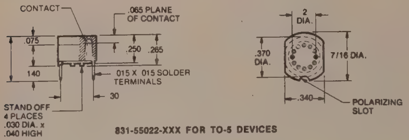
SPECIFICATIONS

Contact Rating: 1 amp
Body Material: Nylon 6/6
Contact Material: Phosphor bronze or beryllium copper, plated gold over nickel

DIMENSIONS


CONTACT
.065 PLANE OF CONTACT
.075
405
.140
250
265
.015 x .015 SOLDER TERMINALS
STAND OFF 4 PLACES .030 DIA x .040 HIGH
.20
10 DIA.
.276 DIA
11/32 DIA.
OMITTED FOR 3 LEAD SOCKET
.230
POLARIZATION SLOT

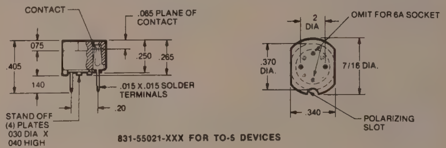
831-55011-XXX FOR TO-18 DEVICES


CONTACT
.065 PLANE OF CONTACT
.075
140
.250
.265
015 X 015 SOLDER TERMINALS
30
STAND OFF 4 PLACES .030 DIA. x .040 HIGH
2 DIA.
.370 DIA.
7/16 DIA.
.340
POLARIZING SLOT

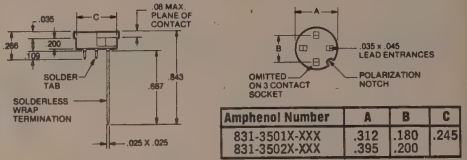
831-55022-XXX FOR TO-5 DEVICES

ORDERING INFORMATION

Amphenol Number	No. of Leads	Pin Circle	Terminal Circle	Contact Material	Termination
831-35011-034	3	.180	.180	Phosphor Bronze	Solder Tab
831-35011-044	4	.180	.180	Phosphor Bronze	Solder Tab
831-35012-034	3	.180	.180	Beryllium Copper	Solderless Wrap
831-35012-044	4	.180	.180	Beryllium Copper	Solderless Wrap
831-35021-034	3	.200	.200	Phosphor Bronze	Solder Tab
831-35021-044	4	.200	.200	Phosphor Bronze	Solder Tab
831-35022-034	3	.200	.200	Beryllium Copper	Solderless Wrap
831-35022-044	4	.200	.200	Beryllium Copper	Solderless Wrap
831-55011-034	3	.100	.200	Phosphor Bronze	Solder Tab
831-55011-044	4	.100	.200	Phosphor Bronze	Solder Tab
831-55021-034	3	.200	.200	Phosphor Bronze	Solder Tab
831-55021-044	4	.200	.200	Phosphor Bronze	Solder Tab
831-55021-064	6A	.200	.200	Phosphor Bronze	Solder Tab
831-55021-084	8	.200	.200	Phosphor Bronze	Solder Tab
831-55022-034	3	.200	.300	Phosphor Bronze	Solder Tab
831-55022-044	4	.200	.300	Phosphor Bronze	Solder Tab
831-55022-064	6A	.200	.300	Phosphor Bronze	Solder Tab
831-55022-084	8	.200	.300	Phosphor Bronze	Solder Tab
831-55022-104	10	.200	.300	Phosphor Bronze	Solder Tab
831-55022-124	12	.200	.300	Phosphor Bronze	Solder Tab


CONTACT
.065 PLANE OF CONTACT
075
.405
140
.250
.265
.015 X .015 SOLDER TERMINALS
.20
STAND OFF (4) PLATES 030 DIA X 040 HIGH
2 DIA
OMIT FOR 6A SOCKET
.370 DIA.
7/16 DIA.
.340
POLARIZING SLOT

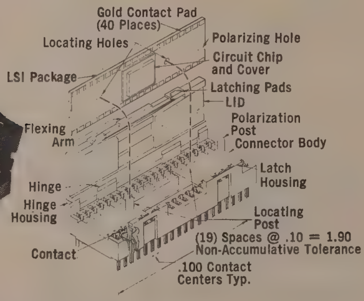
831-55021-XXX FOR TO-5 DEVICES


.035
C
.08 MAX. PLANE OF CONTACT
.266
.200
.109
SOLDER TAB
SOLDERLESS WRAP TERMINATION
.687
.843
.025 X .025
A
B
.035 x .045 LEAD ENTRANCES
OMITTED ON 3 CONTACT SOCKET
POLARIZATION NOTCH

Amphenol Number	A	B	C
831-3501X-XXX 831-3502X-XXX	.312 .395	.180 .200	.245

831-350XX FOR TO-5 DEVICES

851 Series PPI — Planar Plug-In Connector


Gold Contact Pad (40 Places)
Locating Holes
Polarizing Hole
Circuit Chip and Cover
LSI Package
Latching Pads
LID
Polarization Post
Flexing Arm
Connector Body
Latch Housing
Hinge
Hinge Housing
Locating Post
(19) Spaces @ .10 = 1.90 Non-Accumulative Tolerance
Contact
.100 Contact Centers Typ.

- For Leadless MOS/LSI Planar Packages
- 40 Contacts — Chip up or Chip down
- Unitized Construction — no hardware or tools needed
- Improved performance at lower total cost

SPECIFICATIONS

Temperature Range: −65°C to +125°C
Voltage Rating: 500V DC at sea level

Amphenol's Planar Plug-in Connector provides a low cost, reliable means of interconnecting 40 contact leadless MOS/LSI planar ceramic packages. The IC packages are held firmly but gently, with excellent electrical contact, yet can easily be removed and replaced, for field servicing.

Planar I.C. packages cost less, offsetting the cost of the connector, a net reduction in total system cost.

The PPI Connector can be soldered to the board by automatic, high speed production processes without danger to delicate I.C. devices. Insertion of the package is fast and easy, requiring no force or effort.

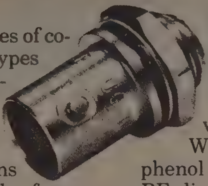
The hinged lid is permanently attached to the glass-filled nylon body. No screws or clips. Latch allows the lid to snap into place, hold firmly and pop open without tools. Contacts are located on .100" centers and .600" row spacing. The chevron shaped contact tails are .150" long and fit into a .042" diam. plated hole. Eight standoffs provide .020" clearance.

Current Rating: 1 amp per contact
Dielectric Material: Glass filled nylon
Contacts: Beryllium copper alloy
Plating: .000020" gold over .000050" nickel
Device Accepted: 40 contact leadless ceramic package

ORDERING INFORMATION

851-10012-404..Planar Plug-In Connector — for use with .060" thick 40 contact ceramic substrates

FOR LOCAL SOURCE OF SUPPLY SEE EEM VOL. 2 PAGE 462



We stock more than 1,000 different types of coaxial connectors. From low-cost UHF types to the latest MIL-C-39012 designs. Subminiature SMA and SUB-Minax 27 Series, BNC, TNC and N Series.

But if that doesn't solve your problem, we've got more designs and options available than anyone else. Our vast file of engineering drawings and design variations means that a call to us can literally put you in touch with as many as 90,000 different microwave interconnections. And if you still need something special, we'll custom-design it for you.

We mean business. Call your local Amphenol sales office, distributor or Amphenol RF division, Bunker Ramo Corporation, Danbury, Connecticut 06810. 203/743-9272.

BUNKER RAMO AMPHENOL

One call will put you in touch with 90,000 different RF connectors.

RF CONNECTORS

BUNKER RAMO AMPHENOL

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SUB-Minax 27 .... 2•575
SMA/Stainless Steel .... 2•577
SMA/Beryllium Copper .... 2•578
MB SERIES .... 2•581
BNC/Isolated Receptacle .... 2•583
BNC SERIES .... 2•584
TNC SERIES .... 2•590
PLUG-IN .... 2•593
MHV SERIES .... 2•593
UHF SERIES .... 2•595
N SERIES .... 2•598
BN SERIES .... 2•602
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MILITARY TO AMPHENOL CROSS REFERENCE GUIDE

CW-( )/U No.	Amphenol No.	Type	Description	Page
123	31-006	BNC	Male Cap	589
123A		Replaced by M39012/25-0006		589
155	31-007	BNC	Male Cap	589
155A	31-027	BNC	Male Cap	589
159	31-017	BNC	Male Sh. Cap	589
282	31-210	BNC	Female Cap	589

DA-( )/U No.	Amphenol No.	Type	Description	Page
12	9550	HN	Res. Term. Cap	*

NT-( ) No.	Amphenol No.	Type	Description	Page
49188	83-2SP	TWIN	See UG-1060/U	608
49189	83-2J	TWIN	See UG-1059/U	609
49190	83-1SP	UHF	See PL-259	595
49190	83-822	UHF	See PL-259	595
49191	83-1J	UHF	See PL-258	596
49192	83-1AP	UHF	See UG-646/U	596
49192A	83-58	UHF	See M-359A	596
49193	83-1H	UHF	See UG-106/U	597
49194	83-1RTY	UHF	See SO-239	595
49194	83-1R	UHF	See SO-239	595
49195	83-1SPN	UHF	See PL-259A	595
49195	83-756	UHF	See PL-259A	595
49196	83-2R	TWIN	See UG-1057/U	608
49199	83-1T	UHF	See M-358	596
49287	3500	N	See UG-19/U	*
49298	48000	N	See UG-23/U	*
49299	42000	N	See UG-20/U	*
49451	15000	N	See UG-29/U	*
49482	83-776	UHF	See UG-203/U	*
491049	83-1F	UHF	See UG-363/U	*

M-( ) No.	Amphenol No.	Type	Description	Page
358	83-1T	UHF	Tee Adapter	596
359A	83-58	UHF	Angle Adapter	596

MT-( )/U No.	Amphenol No.	Type	Description	Page
412	1600	BNC	Nut Strap	589

MX-( )/U No.	Amphenol No.	Type	Description	Page
103	103-301	—	Taper Tool	*
195	10900	BNC	Hood	589
195A	87175	BNC	Hood	589
367	10925	BNC	Hood	589
539	5375	UHF	Hood	597
543	5475	UHF	Hood	597
554	4700	BNC	Res. Term. Cap	589
554A	39575	BNC	Res. Term. Cap	589
564	82-48	HN/N	Armor Clamp	*
564A	82-109	HN/N	Armor Clamp	602
913	82-106	N	Male Cap	602
1142	82-512	C	Male Cap	607
1143	82-513	C	Female Cap	607
1286	82-517	C/N/HN	Armor Clamp	*
1441	92100	C/N/HN	Armor Clamp	*
1462	16850	C/N/HN	Armor Clamp	602
1530	1050	TERM.	Blkh. Cable Term.	*
1530A	78525	TERM.	Blkh. Cable Term.	*
1531	4275	TERM.	Strap Cable Term.	*
1554	1075	TERM.	Blkh. Cable Term.	*
1684	1025	TERM.	Blkh. Cable Term.	*
1684A	20475	TERM.	Blkh. Cable Term.	*
1744	3975	TERM.	Strap Cable Term.	*
1744A	21100	TERM.	Strap Cable Term.	*
1801	4025	TERM.	Strap Cable Term.	*
1802	6375	TERM.	Strap Cable Term.	*
1802A	55950	TERM.	Strap Cable Term.	*

PL-( ) No	Amphenol No.	Type	Description	Page
275	83-22F	TWIN	Blkh. Adapter	609
258	83-1J	UHF	Adapter	596
259	83-1SP	UHF	Plug	595
259	83-822	UHF	Plug	595
259A	83-1SPN	UHF	Plug	595
259A	83-756	UHF	Plug	595

SO-( ) No.	Amphenol No.	Type	Description	Page
239	83-1R	UHF	Panel Recept.	595
239	83-1RTY	UHF	Panel Recept.	595
239A	83-798	UHF	Panel Recept.	595

UG-( )/U No.	Amphenol No.	Type	Description	Page
18	3400	N	Plug	*
18B	82-86	N	Plug	*
18C	82-203	N	Plug	*
18D	82-3203	N	Plug	*
18F		Replaced by M39012/01-0001		598
19	3500	N	Panel Jack	*
19B	82-87	N	Panel Jack	*
19C	82-207	N	Panel Jack	*
19D	82-3207	N	Panel Jack	*
19F		Replaced by M39012/02-0004		600
20	42000	N	Jack	*
20B	82-88	N	Jack	599
20C	82-210	N	Jack	*
20D	82-3210	N	Jack	*
20F		Replaced by M39012/02-0001		599
21	3900	N	Plug	*
21B	82-61	N	Plug	598
21C	82-96	N	Plug	*
21D	82-202	N	Plug	598
21E	82-3202	N	Plug	598

*Available but not shown.

RF CONNECTORS

BUNKER RAMO **AMPHENOL**

UG-( )/U No.	Amphenol No.	Type	Description	Page
21H		Replaced by M39012/01-0002		*
22B	82-62	N	Panel Jack	*
22C	82-95	N	Panel Jack	*
22D	82-208	N	Panel Jack	*
22E	82-3208	N	Panel Jack	600
22G		Replaced by M39012/02-0005		*
23	48000	N	Jack	*
23A	7600	N	Jack	*
23B	82-63	N	Jack	599
23C	82-94	N	Jack	*
23D	82-209	N	Jack	599
23E	82-3209	N	Jack	599
23G		Replaced by M39012/02-0002		599
27A	82-64	N	Angle Adapter	601
27B	82-98	N	Angle Adapter	*
27C	82-213	N	Angle Adapter	601
28A	82-99	N	Tee Adapter	601
29	15000	N	Adapter	*
29A	82-65	N	Adapter	*
29B	82-101	N	Adapter	601
30	82-66	N	Blkh. Adapter	601
30C	82-201	N	Blkh. Adapter	*
30D	91100	N	Blkh. Adapter	601
57A	45250	N	Adapter	*
57B	82-100	N	Adapter	601
58	82-24	N	Panel Recept.	601
58A	82-97	N	Panel Recept.	601
58B		Replaced by M39012/04-0002		601
59A	82-38	HN	Plug	*
59B	82-804	HN	Plug	603
59D	17900	HN	Plug	*
60A	82-39	HN	Jack	*
60B	82-814	HN	Jack	603
61A	82-40	HN	Panel Jack	*
61B	82-815	HN	Panel Jack	603
61C	11150	HN	Panel Jack	*
83	14000	N/UHF	Adapter	612
83B	34125	N/UHF	Adapter	612
85	82-21	BN	Plug	602
87	82-42	BN	Panel Recept.	602
88	31-002	BNC	Plug	584
88A	14525	BNC	Plug	584
88B	31-018	BNC	Plug	584
88C	31-202	BNC	Plug	584
88D	31-2202	BNC	Plug	584
88E	31-3202	BNC	Plug	584
88G		Replaced by M39012/16-0001		584
89	31-005	BNC	Jack	585
89A	31-019	BNC	Jack	585
89B	31-205	BNC	Jack	585
89C	31-2205	BNC	Jack	585
89D		Replaced by M39012/17-0001		585
90	1300	BNC	Panel Jack	586
91A	7200	N	Plug	598
92A	7700	N	Jack	599
93A	7800	N	Panel Jack	600
94A	82-84	N	Plug	598
95A	82-89	N	Jack	599
96A	82-90	N	Panel Jack	600
102	83-22SP	TWIN	Plug	608
103	83-22R	TWIN	Panel Recept.	608
104	83-22AP	TWIN	Angle Adapter	609
105	83-22J	TWIN	Adapter	609
106	83-1H	UHF	Hood	597
107	4800	N	Tee Adapter	*
107A	82-36	N	Tee Adapter	*
107B	82-102	N	Tee Adapter	601
111	83-750	UHF	Plug	595
119A/UP	2850	CRY. HOLDER	Adapter	*
146	4400	N/UHF	Adapter	612
154	82-59	LC	Plug	611
155	8325	LC	Adapter	*
159B	15550	N	Blkh. Jack	*
159D		Replaced by M39012/03-0001		600
160A	82-67	N	Blkh. Jack	*
160B	82-93	N	Blkh. Jack	600
160D	91025	N	Blkh. Jack	*
160E		Replaced by M39012/03-0002		600
167A	82-104	N	Plug	598
167D	82-215	N	Plug	598
167F	82-3215	N	Plug	598
175	83-185	UHF	Reducing Adapter	597
176	83-168	UHF	Reducing Adapter	597
177	83-765	UHF	Hood	597
177	83-765-1000	UHF	Hood	*
181A	5450	PULSE	Blkh. Jack	*
182A	5550	PULSE	Plug	*
185	4500	BNC	Panel Recept.	587
188	23250	N	Plug	*
196	83-22T	TWIN	Tee Adapter	609
201	31-830	BNC/N	Adapter	612
201A	31-216	BNC/N	Adapter	612
203	83-776	UHF	Plug	595
204A	82-105	N	Plug	*
204C	82-214	N	Plug	598
212A	82-91	HN	Angle Adapter	*
212B	12100	HN	Angle Adapter	*
212C	82-115	HN	Angle Adapter	604
215	3000	LC	Adapter	611
216	4350	LC	Angle Adapter	611
224	29500	UHF	Blkh. Adapter	596
231	2750	N	Panel Recept.	*
252	2625	HN/LC	Adapter	612
254A	31-016	BNC	Blkh. Recept.	587
255	2900	BNC/UHF	Adapter	612
259A	2500	HN/LC	Adapter	613
260	31-012	BNC	Plug	584
260A	31-021	BNC	Plug	584
260B	31-212	BNC	Plug	584
260C	31-2212	BNC	Plug	584
260D	31-3212	BNC	Plug	584

*Available but not shown.

UG-( )/U No.	Amphenol No.	Type	Description	Page
260F		Replaced by M39012/16-0002		*
261	31-015	BNC	Jack	585
261A	31-022	BNC	Jack	585
261B	31-215	BNC	Jack	585
261C	31-2215	BNC	Jack	585
261D		Replaced by M39012/17-0002		585
262	31-011	BNC	Panel Jack	586
262A	31-023	BNC	Panel Jack	*
262B	31-211	BNC	Panel Jack	586
262C	31-2211	BNC	Panel Jack	586
262D		Replaced by M39012/18-0001		586
264	25750	PULSE	Panel Recept.	*
266	4575	UHF	Blkh. Recept.	596
271A	55000	LC/N	Adapter	613
273	31-028	BNC/UHF	Adapter	612
274	31-008	BNC	Tee Adapter	588
274A	31-208	BNC	Tee Adapter	588
274B	31-2208	BNC	Tee Adapter	588
287	43000	LC	Panel Adapter	*
287B	51525	LC	Panel Adapter	611
290	31-003	BNC	Panel Recept.	587
290A	31-203	BNC	Panel Recept.	587
290B		Replaced by M39012/22-0001		587
291	31-001	BNC	Panel Jack	586
291A	31-020	BNC	Panel Jack	586
291B	31-201	BNC	Panel Jack	586
291C	31-2201	BNC	Panel Jack	586
291D		Replaced by M39012/18-0002		586
306	31-009	BNC	Angle Adapter	588
306A	31-209	BNC	Angle Adapter	588
306B	31-2209	BNC	Angle Adapter	588
309	8900	BNC/HN	Adapter	612
318	26700	N/UHF	Adapter	612
332	58000	UHF	Binding Post	597
333	82-56	HN	Jack	603
333A	82-107	HN	Jack	603
333B	44025	HN	Jack	*
334	82-57	HN	Panel Jack	603
334A	82-108	HN	Panel Jack	603
335	3025	BNC/N	Adapter	613
347A	7250	PLUG-IN	Plug	*
348A	7350	PLUG-IN	Jack	*
349	2975	BNC/N	Adapter	612
349A	31-217	BNC/N	Adapter	612
352	82-80	LC	Panel Recept.	611
352A	82-110	LC	Panel Recept.	611
352B	850	LC	Panel Recept.	*
357	83-21R	UHF	Panel Recept.	595
358	83-21SP	UHF	Plug	595
360	83-21J	UHF	Adapter	596
363	83-1F	UHF	Blkh. Adapter	596
372	83-1HP	UHF	Hood	597
413	9950	HN	Tee Adapter	*
414	47000	BNC	Panel Adapter	588
414A	47025	BNC	Panel Adapter	588
421	6275	TWIN	Plug	*
421B	32225	TWIN	Plug	608
422	6225	TWIN	Panel Recept.	608
423	6175	TWIN	Panel Jack	*
423B	32200	TWIN	Panel Jack	608
447	31-817	BNC	Panel Recept.	587
491	8425	BNC	Adapter	588
491A	31-218	BNC	Adapter	588
491B	31-2218	BNC	Adapter	588
492A	31-220	BNC	Blkh. Adapter	588
492B	31-2220	BNC	Blkh. Adapter	588
492D	31-3220	BNC	Blkh. Adapter	588
493A	7925	TWIN	Blkh. Adapter	609
494	8125	HN	Plug	603
495A	82-111	HN	Plug	*
495D	30350	HN	Plug	*
496	82-92	HN	Panel Recept.	604
498	6050	PLUG-IN	Jack	*
499A	7650	PLUG-IN	Plug	*
535	5675	BNC	Angle Panel Recept	587
536	34000	N	Plug	*
536B	34025	N	Plug	598
544	22225	TWIN	Plug	*
556	35250	N	Blkh. Jack	*
556B	35275	N	Blkh. Jack	600
559	17750	BNC/HN	Adapter	613
560	82-805	HN	Panel Recept.	604
564	82-508	C/N	Adapter	612
565A	82-540	C/N	Adapter	612
566A	82-536	C	Tee Adapter	607
567A	82-535	C	Angle Adapter	607
568	82-504	C	Panel Recept.	606
569	82-505	C	Blkh. Recept.	606
570	82-502	C	Blkh. Jack	606
570A	82-614	C	Blkh Jack	*
571	82-501	C	Panel Jack	606
572	82-503	C	Jack	606
573A	82-530	C	Plug	605
573B	28650	C	Plug	*
593	35500	N	Panel Jack	600
594A	15425	N	Angle Plug	599
594C		Replaced by M39012/05-0001		599
602	36500	N	Jack	599
603	34500	N	Plug	*
603A	34525	N	Plug	598
624	2075	BNC	Blkh. Jack	586
625	5575	BNC	Blkh. Recept.	587
625B	31-236	BNC	Blkh. Recept.	587
625C		Replaced by M39012/21-0001		587
626A	80025	C	Plug	605
627A	82-548	C	Plug	605
628A	82-532	C	Plug	605
632	82-521	C	Blkh. Jack	606
634	82-515	C	Blkh. Recept.	606
635	83175	BNC/C	Adapter	612
636A	83200	BNC/C	Adapter	612

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637	83225	C/UHF	Adapter	612
642A	83150	C	Adapter	607
643	82-514	C	Adapter	607
646	83-1AP	UHF	Angle Adapter	596
657	31-102	BNC	Blkh. Recept.	587
657A	31-239	BNC	Blkh. Recept.	587
680	82-811	N	Blkh. Recept.	601
680B		Replaced by M39012/04-0001		601
691	89250	BNC/SM	Adapter	613
692	89125	SM	Plug	*
693	89000	SM	Plug	*
697	89025	SM	Blkh. Recept.	*
699	89175	SM	Plug	*
700	89200	SM	Blkh. Jack	*
701	83050	C	Blkh. Adapter	607
702	83350	C/HN	Adapter	612
703A	83400	C/HN	Adapter	612
704	81175	C	Blkh. Jack	606
704A	74475	C	Blkh. Jack	*
705	82-511	C	Blkh. Recept.	606
706	82125	C	Blkh. Recept.	606
707A	82-533	C	Plug	605
708A	80075	C	Plug	605
709A	82-534	C	Plug	605
710A	82-531	C	Angle Plug	605
711A	80200	C	Plug	605
909	31-206	BNC	Blkh. Jack	586
909A	31-2206	BNC	Blkh. Jack	*
909B	31-3206	BNC	Blkh. Jack	586
909C		Replaced by M39012/19-0001		586
910	31-207	BNC	Blkh. Jack	586
910A	31-2207	BNC	Blkh. Jack	*
910B	31-3207	BNC	Blkh. Jack	586
910C		Replaced by M39012/19-0002		586
911A	31-237	BNC	Blkh. Recept.	*
912	31-238	BNC	Blkh. Recept.	587
912A	31-2238	BNC	Blkh. Recept.	*
913	31-204	BNC	Angle Plug	585
913A	31-2204	BNC	Angle Plug	585
913B		Replaced by M39012/20-0001		585
914	31-219	BNC	Adapter	588
925	9375	HN	Plug	603
927	33250	HN	Jack	603
928	1100	BNC	Panel Recept.	587
931	27000	MHV	Panel Recept.	594
932	28000	MHV	Plug	593
932A	27975	MHV	Plug	593
935A	82-211	N	Panel Jack	*
935B	82-3211	N	Panel Jack	600
937	82-522	C	Blkh. Jack	606
938	82-523	C	Panel Jack	606
940A	82-212	N	Jack	599
940B	82-3212	N	Jack	*
941A	82-204	N	Plug	*
941B	82-3204	N	Plug	598
943A	82-538	C	Plug	605
959	6775	BNC	Plug	584
961	28225	MHV	Panel Jack	594
961A	28175	MHV	Panel Jack	*
981	4775	TWIN	Angle Adapter	609
982	92125	N	Plug	598
997A	8975	N	Angle Panel Recept	601
1003	12400	N	Plug	598
1016	28250	MHV	Jack	*
1016A	27075	MHV	Jack	594
1019	11050	HN	Blkh. Adapter	604
1033	84975	BNC	Plug	584
1033G		Replaced by M39012/16-0003		584
1034	5225	BNC/N	Adapter	612
1050	2225	PLUG-IN	Plug	*
1050A	30775	PLUG-IN	Plug	*
1051	2175	PLUG-IN	Jack	*
1052	36000	N	Panel Jack	*
1055		Replaced by M39012/18-0003		586
1056	84650	BNC	Jack	*
1057	83-2R	TWIN	Panel Recept.	608
1059	83-2J	TWIN	Adapter	609
1060	83-2SP	TWIN	Plug	608
1094	31-221	BNC	Blkh. Recept.	587
1094A	31-2221	BNC	Blkh. Recept.	587
1094B		Replaced by M39012/21-0002		587
1095A	36250	N	Panel Jack	600
1098	31-222	BNC	Blkh. Angle Rec	587
1098A	31-2222	BNC	Blkh. Angle Rec	587
1185	82-312	N	Plug	598
1185A	82-3312	N	Plug	598
1185B		Replaced by M39012/01-0005		*
1186	82-313	N	Jack	599
1186B		Replaced by M39012/02-0003		599
1187	82-314	N	Panel Jack	600
1187B		Replaced by M39012/02-0006		*
1213	82-320	HN	Plug	*
1214	82-321	HN	Jack	*
1215	82-324	HN	Panel Jack	*
1460	27-104	SUB.27	Plug	575
1462	27-107	SUB.27	Jack	575
1463	27-102	SUB.27	Blkh. Jack	575
1464	27-108	SUB.27	Blkh. Recept.	576
1465	27-106	SUB.27	Plug	575
1467	27-105	SUB.27	Jack	575
1468	27-103	SUB.27	Blkh. Jack	575
1619	27-101	SUB.27	Blkh. Recept.	576
1680		Replaced by M39012/01-0006		*
1681		Replaced by M39012/01-0007		*
1682		Replaced by M39012/01-0008		*
1687		Replaced by M39012/02-0007		599
1688		Replaced by M39012/02-0008		*
1689		Replaced by M39012/02-0009		*
1694		Replaced by M39012/02-0014		599
1695		Replaced by M39012/01-0013		598
1696		Replaced by M39012/02-0015		600
1697		Replaced by M39012/02-0016		*
1698		Replaced by M39012/02-0017		*
1699		Replaced by M39012/03-0003		600
1700		Replaced by M39012/03-0004		*
1701		Replaced by M39012/03-0005		*
1706		Replaced by M39012/03-0010		600
1707		Replaced by M39012/05-0002		*
1708		Replaced by M39012/05-0003		*
1812		Replaced by M39012/20-0002		585
1813		Replaced by M39012/20-0003		585

M22520/( ) No.	Amphenol No.	Type	Description	Page
5-01	227-944	Tool	Frame Only	614
5-09	227-1221-09	Die Set	BNC/TNC/SMA	614
5-11	227-1221-11	Die Set	BNC/TNC/MHV/UHF/SMA	614
5-13	227-1221-13	Die Set	BNC/TNC/UHF	614
5-15	227-1221-15	Die Set	BNC/TNC	614
5-23	227-1221-23	Die Set	UHF	614
5-25	227-1221-25	Die Set	N	614
5-29	227-1221-29	Die Set	N	614
5-57	227-1221-57	Die Set	N	614
5-59	227-1221-59	Die Set	N	614

M23329/( ) No.	Amphenol No.	Type	Description	Page
3-01-03	31-320	BNC	Plug	*
3-02-04	31-326	BNC	Plug	*
3-05	31-321	BNC	Plug	*
3-06	31-324	BNC	Plug	*
3-07	31-323	BNC	Plug	584
3-08	31-327	BNC	Jack	*
3-09	31-333	BNC	Jack	*
3-12	31-328	BNC	Jack	*
3-13	31-331	BNC	Jack	*
3-14	31-330	BNC	Jack	585
3-15	31-342	BNC	Blkh. Jack	*
3-16	31-341	BNC	Blkh. Jack	*
3-19	31-343	BNC	Blkh. Jack	*
3-20	31-346	BNC	Blkh. Jack	*
3-21	31-345	BNC	Blkh. Jack	586
4-01-03	31-2367	TNC	Plug	590
4-02-04	31-2373	TNC	Plug	590
4-05	31-2368	TNC	Plug	590
4-06	31-2370	TNC	Plug	590
4-07	31-2374	TNC	Jack	591
4-08-10	31-2380	TNC	Jack	591
4-11	31-2375	TNC	Jack	591
4-12	31-2377	TNC	Jack	591
4-13	31-2389	TNC	Blkh. Jack	591
4-14	31-2388	TNC	Blkh. Jack	591
4-17	31-2390	TNC	Blkh. Jack	591
4-18	31-2392	TNC	Blkh. Jack	591

M39012/( ) No.	Amphenol No.	Type	Description	Page
01-0001	82-354	N	Plug	598
01-0002	82-352-1	N	Plug	598
01-0003	82-4365	N	Plug	*
01-0004	82-4366	N	Plug	*
01-0005	82-352	N	Plug	598
01-0005	82-4352	N	Plug	*
01-0006	82-341	N	Plug	*
01-0007	82-340	N	Plug	*
01-0008	82-332	N	Plug	*
01-0011	82-391	N	Plug	*
01-0012	82-392	N	Plug	*
01-0013	82-342	N	Plug	598
01-0015	82-4368	N	Plug	*
01-0025	82-4367	N	Plug	*
01-0501	82-4425	N	Plug	*
01-0502	82-4426	N	Plug	*
01-0503	82-4427	N	Plug	*
02-0001	82-358	N	Jack	599
02-0002	82-356-1	N	Jack	599
02-0002	82-4356-1	N	Jack	*
02-0003	82-356	N	Jack	599
02-0003	82-4356	N	Jack	*
02-0004	82-362	N	Panel Jack	600
02-0005	82-360-1	N	Panel Jack	600
02-0005	82-4360-1	N	Panel Jack	600
02-0006	82-360	N	Panel Jack	600
02-0006	82-4360	N	Panel Jack	*
02-0007	82-338	N	Jack	599
02-0008	82-337	N	Jack	*
02-0009	82-333	N	Jack	*
02-0012	82-394	N	Jack	*
02-0013	82-385	N	Jack	*
02-0014	82-339	N	Jack	599
02-0015	82-344	N	Panel Jack	600
02-0016	82-343	N	Panel Jack	*
02-0017	82-334	N	Panel Jack	*
02-0020	**82-4337**	**N**	**Jack**	599
02-0501	82-4429	N	Jack	*
02-0502	82-4430	N	Jack	*
02-0503	82-4431	N	Jack	*
02-0511	82-4432	N	Panel Jack	*
02-0512	82-4433	N	Panel Jack	*
02-0513	82-4434	N	Panel Jack	*
03-0001	82-366	N	Bulkhead Jack	600
03-0002	82-364	N	Bulkhead Jack	600
03-0002	82-4364	N	Bulkhead Jack	*
03-0003	82-347	N	Bulkhead Jack	600
03-0004	82-346	N	Bulkhead Jack	*
03-0005	82-335	N	Bulkhead Jack	*
03-0008	82-397	N	Bulkhead Jack	*
03-0009	82-398	N	Bulkhead Jack	*
03-0010	82-348	N	Bulkhead Jack	600
03-0012	82-4369	N	Bulkhead Jack	*
03-0501	82-4436	N	Bulkhead Jack	*
03-0502	82-4437	N	Bulkhead Jack	*

*Available but not shown.

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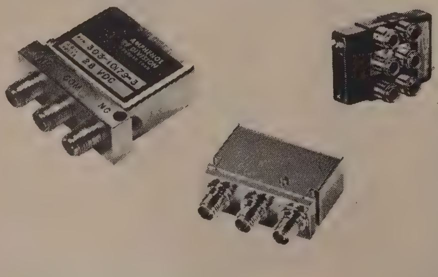
M39012/( ) No.	Amphenol No.	Type	Description	Page
03-0503	82-4438	N	Bulkhead Jack	*
04-0001	82-369	N	Bulkhead Recept.	601
04-0002	82-368	N	Panel Receptacle	601
05-0001	82-357	N	Angle Plug	599
05-0002	82-349	N	Angle Plug	*
05-0003	82-336	N	Angle Plug	*
05-0501	82-4440	N	Angle Plug	*
05-0502	82-4441	N	Angle Plug	*
05-0503	82-4442	N	Angle Plug	*
16-0001	31-3301	BNC	Plug	584
16-0002	31-3302	BNC	Plug	584
16-0003	31-3303	BNC	Plug	584
16-0004	31-4320-2000	BNC	Plug	*
16-0005	31-4326-2000	BNC	Plug	*
16-0006	31-4320-2001	BNC	Plug	*
16-0007	31-4326-2001	BNC	Plug	*
16-0008	31-4321-2000	BNC	Plug	*
16-0009	31-4324-2000	BNC	Plug	*
16-0012	31-4322-2000	BNC	Plug	*
16-0013	31-4320	BNC	Plug	584
16-0014	31-4326	BNC	Plug	584
16-0015	31-4321	BNC	Plug	584
16-0016	31-4324	BNC	Plug	584
16-0017	31-4322	BNC	Plug	584
16-0019	31-4240-2000	BNC	Plug	*
16-0020	31-4240	BNC	Plug	*
16-0501	31-4425	BNC	Plug	*
16-0502	31-4426	BNC	Plug	*
16-0503	31-4427	BNC	Plug	*
17-0001	31-3319	BNC	Jack	585
17-0002	31-3320	BNC	Jack	585
17-0003	31-3321	BNC	Jack	585
17-0004	31-4327-2000	BNC	Jack	*
17-0005	31-4333-2000	BNC	Jack	*
17-0006	31-4327-2001	BNC	Jack	*
17-0007	31-4333-2001	BNC	Jack	*
17-0008	31-4328-2000	BNC	Jack	*
17-0009	31-4331-2000	BNC	Jack	*
17-0012	31-4329-2000	BNC	Jack	*
17-0013	31-4327	BNC	Jack	585
17-0014	31-4333	BNC	Jack	585
17-0015	31-4328	BNC	Jack	585
17-0016	31-4331	BNC	Jack	585
17-0017	31-4329	BNC	Jack	585
17-0019	31-4241-2000	BNC	Jack	*
17-0020	31-4241	BNC	Jack	*
17-0501	31-4429	BNC	Jack	*
17-0502	31-4430	BNC	Jack	*
17-0503	31-4431	BNC	Jack	*
18-0001	31-3334	BNC	Panel Jack	586
18-0002	31-3333	BNC	Panel Jack	586
18-0003	31-3335	BNC	Panel Jack	586
18-0004	31-4242-2000	BNC	Panel Jack	*
18-0005	31-4243-2000	BNC	Panel Jack	*
18-0006	31-4242-2001	BNC	Panel Jack	*
18-0007	31-4243-2001	BNC	Panel Jack	*
18-0008	31-4244-2000	BNC	Panel Jack	*
18-0009	31-4245-2000	BNC	Panel Jack	*
18-0012	31-4246-2000	BNC	Panel Jack	*
18-0013	31-4242	BNC	Panel Jack	*
18-0014	31-4243	BNC	Panel Jack	*
18-0015	31-4244	BNC	Panel Jack	*
18-0016	31-4245	BNC	Panel Jack	*
18-0017	31-4246	BNC	Panel Jack	*
18-0019	31-4247-2000	BNC	Panel Jack	*
18-0020	31-4247	BNC	Panel Jack	*
18-0501	31-4433	BNC	Panel Jack	*
18-0502	31-4434	BNC	Panel Jack	*
18-0503	31-4435	BNC	Panel Jack	*
19-0001	31-3347	BNC	Bulkhead Jack	586
19-0002	31-3348	BNC	Bulkhead Jack	586
19-0003	31-4342-2000	BNC	Bulkhead Jack	*
19-0004	31-4341-2000	BNC	Bulkhead Jack	*
19-0005	31-4342-2001	BNC	Bulkhead Jack	*
19-0006	31-4341-2001	BNC	Bulkhead Jack	*
19-0007	31-4343-2000	BNC	Bulkhead Jack	*
19-0008	31-4346-2000	BNC	Bulkhead Jack	*
19-0010	84725	BNC	Bulkhead Jack	586
19-0012	31-4344-2000	BNC	Bulkhead Jack	*
19-0013	31-4342	BNC	Bulkhead Jack	586
19-0014	31-4341	BNC	Bulkhead Jack	586
19-0015	31-4343	BNC	Bulkhead Jack	586
19-0016	31-4346	BNC	Bulkhead Jack	586
19-0017	31-4344	BNC	Bulkhead Jack	586
19-0019	31-4248-2000	BNC	Bulkhead Jack	*
19-0020	31-4248	BNC	Bulkhead Jack	*
19-0501	31-4437	BNC	Bulkhead Jack	*
19-0502	31-4438	BNC	Bulkhead Jack	*
19-0503	31-4439	BNC	Bulkhead Jack	*
20-0001	31-3361	BNC	Angle Plug	585
20-0002	31-3364	BNC	Angle Plug	585
20-0003	31-3365	BNC	Angle Plug	585
20-0501	31-4444	BNC	Angle Plug	*
20-0502	31-4445	BNC	Angle Plug	*
20-0503	31-4446	BNC	Angle Plug	*
21-0001	31-3375	BNC	Bulkhead Receptacle	587
21-0002	31-3376	BNC	Bulkhead Receptacle	587
21-0003	31-3312	BNC	Bulkhead Receptacle	*
22-0001	31-3377	BNC	Panel Receptacle	587
24-0001	31-4237	BNC	Bulkhead Receptacle	587
24-0002	31-4238	BNC	Bulkhead Receptacle	587
25-0001	82-51	C	Male Cap	*
25-0003	82-49	C	Female Cap	*
25-0006	31-026	BNC	Male Cap	589
25-0008	31-3210	BNC	Female Cap	*
25-0010	99150	BNC	Hood	*
25-0011	82-3106	N	Male Cap	*
25-0013	82-3517	C-HN-N	Armor Clamp	602
25-0014	99175	C-HN-N	Armor Clamp	602
25-0015	31-3027	BNC	Male Cap	*
25-0016	31-3017	BNC	Male Shorting Cap	*
26-0010	31-2252	TNC	Plug	*
26-0011	31-2253	TNC	Plug	*
26-0012	31-2254	TNC	Plug	*
26-0013	31-3414	TNC	Plug	*
26-0014	31-3415	TNC	Plug	*
26-0501	31-4450	TNC	Plug	*
26-0502	31-4451	TNC	Plug	*
26-0503	31-4452	TNC	Plug	*
27-0010	31-2257	TNC	Jack	*
27-0011	31-2258	TNC	Jack	*
27-0012	31-2259	TNC	Jack	*
27-0013	31-3416	TNC	Jack	*
27-0014	31-3417	TNC	Jack	*
27-0501	31-4454	TNC	Jack	*
27-0502	31-4455	TNC	Jack	*
27-0503	31-4456	TNC	Jack	*
28-0010	31-2262	TNC	Bulkhead Jack	*
28-0011	31-2263	TNC	Bulkhead Jack	*
28-0012	31-2264	TNC	Bulkhead Jack	*
28-0013	31-3418	TNC	Bulkhead Jack	*
28-0014	31-3419	TNC	Bulkhead Jack	*
28-0501	31-4458	TNC	Bulkhead Jack	*
28-0502	31-4459	TNC	Bulkhead Jack	*
28-0503	31-4460	TNC	Bulkhead Jack	*
29-0010	31-2267	TNC	Panel Jack	*
29-0011	31-2268	TNC	Panel Jack	*
29-0012	31-2269	TNC	Panel Jack	*
29-0013	31-3420	TNC	Panel Jack	*
29-0014	31-3421	TNC	Panel Jack	*
29-0501	31-4462	TNC	Panel Jack	*
29-0502	31-4463	TNC	Panel Jack	*
29-0503	31-4464	TNC	Panel Jack	*
30-0010	31-2272	TNC	Angle Plug	*
30-0011	31-2273	TNC	Angle Plug	*
30-0012	31-2274	TNC	Angle Plug	*
30-0013	31-4200	TNC	Angle Plug	*
30-0014	31-4201	TNC	Angle Plug	*
30-0501	31-4473	TNC	Angle Plug	*
30-0503	31-4474	TNC	Angle Plug	*
31-0001	31-2275	TNC	Bulkhead Recept.	*
31-0002	31-2276	TNC	Bulkhead Recept.	*
32-0001	31-2277	TNC	Bulkhead Recept.	*
34-0001	31-2278	TNC	Bulkhead Recept.	*
34-0002	31-2279	TNC	Bulkhead Recept.	*
35-0006	82-4509-2001	SC	Plug	*
35-0007	82-4551-2001	SC	Plug	*
35-0008	82-4510-2001	SC	Plug	*
35-0009	82-4511-2000	SC	Plug	*
35-0023	82-4509-2000	SC	Plug	*
35-0024	82-4551-2000	SC	Plug	*
35-0025	82-4510-2000	SC	Plug	*
35-0026	82-4511-2001	SC	Plug	*
35-0027	82-4512-2000	SC	Plug	*
35-0501	82-4450	SC	Plug	605
35-0503	82-4451	SC	Plug	605
36-0003	82-4552-2001	SC	Jack	*
36-0004	82-4513-2000	SC	Jack	*
36-0005	82-4514-2000	SC	Jack	*
36-0006	82-4515-2000	SC	Jack	*
36-0022	82-4552-2000	SC	Jack	*
36-0023	82-4513-2001	SC	Jack	*
36-0024	82-4514-2001	SC	Jack	*
36-0025	82-4515-2001	SC	Jack	*
36-0026	82-4516-2000	SC	Jack	*
36-0501	82-4457	SC	Jack	605
36-0502	82-4458	SC	Jack	605
38-0003	82-4553-2001	SC	Panel Jack	*
38-0004	82-4517-2000	SC	Panel Jack	*
38-0005	82-4518-2000	SC	Panel Jack	*
38-0014	82-4553-2000	SC	Panel Jack	*
38-0015	82-4517-2001	SC	Panel Jack	*
38-0016	82-4518-2001	SC	Panel Jack	*
38-0017	82-4519-2000	SC	Panel Jack	*
38-0501	82-4460	SC	Panel Jack	*
38-0503	82-4461	SC	Panel Jack	*
39-0002	82-4554-2000	SC	Angle Plug	*
39-0003	82-4520-2000	SC	Angle Plug	*
39-0008	82-4521-2000	SC	Angle Plug	*
39-0501	82-4474	SC	Angle Plug	605
39-0503	82-4475	SC	Angle Plug	605
40-0001	82-4522-2000	SC	Bulkhead Jack	*
40-0007	82-4555-2001	SC	Bulkhead Jack	*
40-0008	82-4523-2000	SC	Bulkhead Jack	*
40-0009	82-4525-2000	SC	Bulkhead Jack	*
40-0012	82-4527-2000	SC	Bulkhead Jack	*
40-0013	82-4524-2000	SC	Bulkhead Jack	*
40-0029	82-4522-2001	SC	Bulkhead Jack	*
40-0030	82-4555-2000	SC	Bulkhead Jack	*
40-0031	82-4523-2001	SC	Bulkhead Jack	*
40-0032	82-4525-2001	SC	Bulkhead Jack	*
40-0033	82-4527-2001	SC	Bulkhead Jack	*
40-0034	82-4524-2001	SC	Bulkhead Jack	*
40-0035	82-4528-2000	SC	Bulkhead Jack	*
40-0501	**82-4454**	**SC**	**Bulkhead Jack**	**605**
40-0502	82-4455	SC	Bulkhead Jack	*
55-4001	901-242-12	SMA	Plug	*
55-4002	901-128-12	SMA	Plug	*
55-4003	901-243-12	SMA	Plug	*
55-4004	901-103-12	SMA	Plug	*
55-4005	901-244-12	SMA	Plug	*
55-4006	901-242-11	SMA	Plug	*
55-4007	901-128-11	SMA	Plug	*
55-4008	901-243-11	SMA	Plug	*
55-4009	901-103-11	SMA	Plug	*
55-4010	901-244-11	SMA	Plug	*
55-4011	901-245-12	SMA	Plug	*
55-4012	901-155-12	SMA	Plug	*
55-4013	901-246-12	SMA	Plug	*

*Available but not shown.

M39012/( ) No.	Amphenol No.	Type	Description	Page
55-4014	901-109-12	SMA	Plug	*
55-4015	901-101-12	SMA	Plug	*
55-4016	901-101-14	SMA	Plug	*
55-4017	901-109-14	SMA	Plug	*
55-4018	901-245-11	SMA	Plug	*
55-4019	901-155-11	SMA	Plug	*
55-4020	901-246-11	SMA	Plug	*
55-4021	901-109-11	SMA	Plug	*
55-4022	901-101-11	SMA	Plug	*
55-4024	901-109-13	SMA	Plug	*
55-4025	901-109-15	SMA	Plug	*
55-4026	901-155-11	SMA	Plug	*
55-4027	901-246-11	SMA	Plug	*
55-4028	901-101-11	SMA	Plug	*
55-4029	901-109-11	SMA	Plug	*
55-4502	901-101-15	SMA	Plug	*
56-4001	901-367-12	SMA	Angle Plug	*
56-4002	901-368-12	SMA	Angle Plug	*
56-4003	901-369-12	SMA	Angle Plug	*
56-4004	901-130-12	SMA	Angle Plug	*
56-4005	901-370-12	SMA	Angle Plug	*
56-4006	901-367-11	SMA	Angle Plug	*
56-4007	901-368-11	SMA	Angle Plug	*
56-4008	901-369-11	SMA	Angle Plug	*
56-4009	901-130-11	SMA	Angle Plug	*
56-4010	901-370-11	SMA	Angle Plug	*
56-4502	901-148-15	SMA	Angle Plug	*
57-4001	901-247-12	SMA	Jack	*
57-4002	901-129-12	SMA	Jack	*
57-4003	901-248-12	SMA	Jack	*
57-4004	901-104-12	SMA	Jack	*
57-4005	901-249-12	SMA	Jack	*
57-4006	901-247-11	SMA	Jack	*
57-4007	901-129-11	SMA	Jack	*
57-4008	901-248-11	SMA	Jack	*
57-4009	901-104-11	SMA	Jack	*
57-4010	901-249-11	SMA	Jack	*
57-4011	901-250-12	SMA	Jack	*
57-4012	901-156-12	SMA	Jack	*
57-4013	901-251-12	SMA	Jack	*
57-4014	901-110-12	SMA	Jack	*
57-4015	901-102-12	SMA	Jack	*
57-4016	901-102-14	SMA	Jack	*
57-4017	901-110-14	SMA	Jack	*
57-4018	901-250-11	SMA	Jack	*
57-4019	901-156-11	SMA	Jack	*
57-4020	901-251-11	SMA	Jack	*
57-4021	901-110-11	SMA	Jack	*
57-4022	901-102-11	SMA	Jack	*
57-4023	901-102-13	SMA	Jack	*
57-4024	901-110-13	SMA	Jack	*
57-4025	901-250-11	SMA	Jack	*
57-4026	901-156-11	SMA	Jack	*
57-4027	901-251-11	SMA	Jack	*
57-4028	901-102-11	SMA	Jack	*
57-4029	901-110-11	SMA	Jack	*
57-4502	901-102-15	SMA	Jack	*
58-4001	901-252-12	SMA	Panel Jack	*
58-4002	901-150-12	SMA	Panel Jack	*
58-4003	901-253-12	SMA	Panel Jack	*
58-4004	901-121-12	SMA	Panel Jack	*
58-4005	901-254-12	SMA	Panel Jack	*
58-4006	901-252-11	SMA	Panel Jack	*
58-4007	901-150-11	SMA	Panel Jack	*
58-4008	901-253-11	SMA	Panel Jack	*
58-4009	901-121-11	SMA	Panel Jack	*
58-4010	901-254-11	SMA	Panel Jack	*
58-4502	901-152-15	SMA	Panel Jack	*
59-4001	901-255-12	SMA	Bulkhead Jack	*
59-4002	901-256-12	SMA	Bulkhead Jack	*
59-4003	901-257-12	SMA	Bulkhead Jack	*
59-4004	901-122-12	SMA	Bulkhead Jack	*
59-4005	901-258-12	SMA	Bulkhead Jack	*
59-4006	901-255-11	SMA	Bulkhead Jack	*
59-4007	901-256-11	SMA	Bulkhead Jack	*
59-4008	901-257-11	SMA	Bulkhead Jack	*
59-4009	901-122-11	SMA	Bulkhead Jack	*
59-4010	901-258-11	SMA	Bulkhead Jack	*
59-4502	901-291-15	SMA	Bulkhead Jack	*
60-4001	901-112	SMA	Panel Receptacle	*
61-4001	901-116	SMA	Bulkhead Receptacle	*
61-4002	901-117	SMA	Bulkhead Receptacle	*
62-4001	901-161	SMA	Bulkhead Receptacle	*
62-4002	901-162	SMA	Bulkhead Receptacle	*

*Available but not shown.

FOR AMPHENOL RF SWITCHES
SEE EEM VOL. 1 PAGE 1928



When you can connect it
and forget it,
that's quality.

AMPHENOL

BUNKER
RAMO

RF CONNECTORS

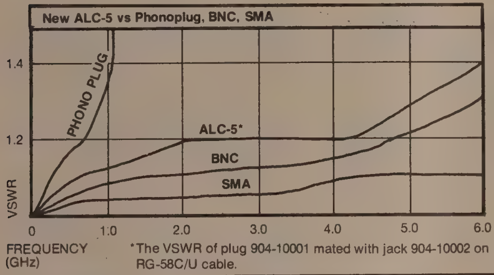
BUNKER RAMO AMPHENOL

New Cost Efficient Sub-Miniature Coax Connector...the ALC-5

Here is the first sub-miniature connector family (under 1″ long mated) to combine low price with top performance. Designed for medium to high frequency mobile radio, test equipment and telecommunications applications, the ALC-5 rivals the phono plug in assembled cost and the SUB-Minax 27 Series in size and low reflection performance. VSWR for a mated pair with 2′ of RG-58C/U cable is less than 1.22:1 at 1 GHz and under 1.40:1 at 6 GHz.

All ALC-5 cable connectors are crimped to cable. Center contact can be crimped or soldered making possible the use of automated procedures eliminating time-consuming soldering. Hand crimp tools are available incorporating both outer ferrule and center contact dies.

You may have your choice of push-on or snap-on style mating. And, because of the universal design of the ALC-5 jack and receptacle mating faces, they can either slide or lock into position depending upon the plug chosen.



*The VSWR of plug 904-10001 mated with jack 904-10002 on RG-58C/U cable.

ELECTRICAL

Impedance	50 Ohm nominal
Frequency	0-6. GHz
Voltage Rating	500 VRMS
Dielectric Withstanding Voltage	1500 Volts RMS
VSWR typical mated cable assemblies	0 -2. GHz 1.20 2.-4. GHz 1.25 4.-6. GHz 1.40
Insulation Resistance	500 Megohms

ENVIRONMENTAL

Thermal Limits	−67° to 390°F (−55° to 199°C)
Shock (Snap-ons)	MIL-STD-202 Method 107

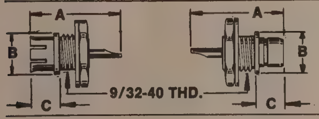
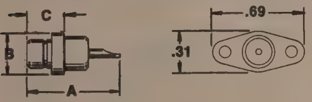
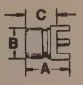
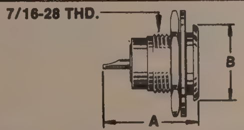
MECHANICAL

Mating	Push-on or snap-on
Cable affixment to braid or jacket	Crimp
Cable affixment to center conductor	Crimp or solder
Captivated contact	Yes
Cable Assembly	Use Amphenol crimp tool 227-525 Outer ferrule cavity A Center contact cavity B

MATERIAL

Contacts	Male-Brass Female-Beryllium Copper
Other metal parts	Half hard brass
Plating	Center contacts—tin plate Other metal parts—Astroplate
Insulators	Teflon
Crimp Ferrules	Copper—Astroplate

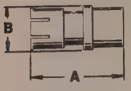
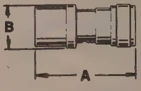
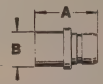
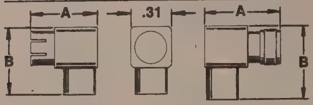
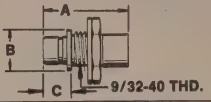
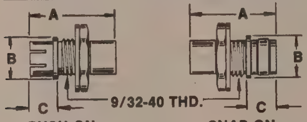
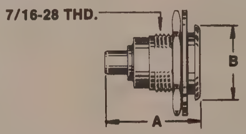
ALC-5 Receptacles

	DESCRIPTION	PART NUMBER	DIMENSIONS INCHES			MAX. PANEL	MTG. HOLE OR DIA.
			A	B	C		
	**BLKH. RECEPTACLE**						
	PUSH-ON (Plug)	904-10007	.760	.312	.250	.125	W
	FEMALE (Jack)	904-10006	.730	.312	.250	.125	W
	SNAP-ON (Plug)	904-11007	.760	.312	.250	.125	W
	**PANEL RECEPTACLE OVAL FLANGE 2 HOLE MOUNT**						
	FEMALE CONTACT	904-10010	.730	.312	.310	—	Y
	**PRINTED CIRCUIT RECEPTACLE**						
	FEMALE CONTACT	904-10008	.350	.210	.260	.050	Z
	**FLUSH MOUNT MALE BLKH. RECEPTACLES**						
	PUSH-ON	904-10027	.814	.500	—	.188	.453
	SNAP-ON	904-11027	.814	.500	—	.188	.453

RF CONNECTORS

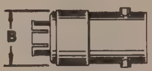
BUNKER RAMO AMPHENOL

ALC-5 Cable Connectors

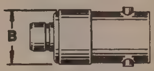
	DESCRIPTION	PART NUMBER	DIMENSIONS INCHES			MAX. PANEL	MTG. HOLE OR DIA.
			A	B	C		
 PUSH-ON PLUG  SNAP-ON PLUG	**STRAIGHT PLUGS**						
	PUSH-ON RG-58	904-10001	.725	.281	—	—	—
	PUSH-ON RG-188	904-10018	.725	.281	—	—	—
	SNAP-ON RG-58	904-11001	.725	.281	—	—	—
	SNAP-ON RG-188	904-11018	.725	.281	—	—	—
JACK 	**STRAIGHT JACK**						
	RG-58	904-10002	.530	.281	—	—	—
	RG-188	904-10019	.565	.281	—	—	—
 RIGHT ANGLE PUSH-ON RIGHT ANGLE SNAP-ON	**RIGHT ANGLE PLUG**						
	PUSH-ON RG-58	904-10009	.550	.580	—	—	—
	PUSH-ON RG-188	904-10020	.550	.612	—	—	—
	SNAP-ON RG-58	904-11009	.550	.580	—	—	—
	SNAP-ON RG-188	904-11020	.550	.612	—	—	—
BLKH. JACK  A B C 9/32-40 THD.	**BULKHEAD JACK**						
	RG-58	904-10004	.755	.312	.250	.125	W
	RG-188	904-10022	.790	.312	.250	.125	W
 A B C 9/32-40 THD. A B C PUSH-ON SNAP-ON	**BULKHEAD PLUG**						
	PUSH-ON RG-58	904-10005	.915	.312	.250	.125	W
	PUSH-ON RG-188	904-10021	.950	.312	.250	.125	W
	SNAP-ON RG-58	904-11005	.915	.312	.250	.125	W
	SNAP-ON RG-188	904-11021	.950	.312	.250	.125	W
 7/16-28 THD. B A	**FLUSH MOUNT BULKHEAD PLUGS**						
	PUSH-ON RG-58	904-10026	.970	.500	—	.188	.453
	PUSH-ON RG-188	904-10028	1.010	.500	—	.188	.453
	SNAP-ON RG-58	904-11026	.970	.500	—	.188	.453
	SNAP-ON RG-188	904-11028	1.010	.500	—	.188	.453

Adapters

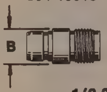
904-10011



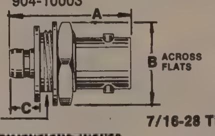
904-10012



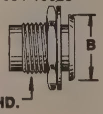
904-10013



904-10003

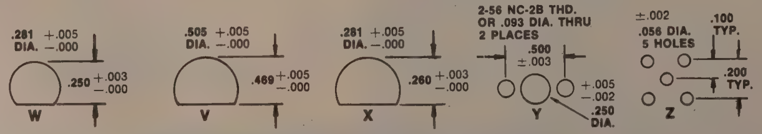

A
B ACROSS FLATS
C
1/2-28 THD.

904-10025



DESCRIPTION	PART NUMBER	DIMENSIONS INCHES A	B	C	MAX PANEL THICKNESS	MTG. HOLE
ALC-5 PLUG—BNC JACK	904-10011	.920	.390	—	—	—
ALC-5 JACK—BNC JACK	904-10012	.960	.390	—	—	—
ALC-5 JACK—SMA JACK	904-10013	.570	.250	—	—	—
ALC-5 JACK—BNC BULKHEAD JACK	904-10003	.950	.620	.250	.125	V
FLUSH MOUNT BLKH. ADAPTER	904-10025	.500	.500	—	.188	.453 DIA.

MOUNTING HOLE DIMS.


.281 +.005 DIA. −.000
.250 +.003 −.000
W
.505 +.005 DIA. −.000
.469 +.005 −.000
V
.281 +.005 DIA. −.000
.260 +.003 −.000
X
2-56 NC-2B THD. OR .093 DIA. THRU 2 PLACES
.500 ±.003
+.005 −.002 .250 DIA.
Y
±.002 .056 DIA. 5 HOLES
.100 TYP.
.200 TYP.
Z

RF CONNECTORS

BUNKER RAMO AMPHENOL

Subminax 27 series connectors are constant impedance (50 or 75 ohm) types with a voltage rating of 500 volts peak and a frequency limit of 10GHZ.

Two types of coupling mechanisms are available: snap-on (push-on) for frequent fast mating and limited space; and screw-on, for vibration type applications, or where maintaining contact is critical. The two types do do not intermate nor do 50 and 75 ohm types intermate.

STRAIGHT PLUGS/Teflon Insulation • Female Contacts • Gold Plated

RG-( )/U Cables	Military Part Number	Dimensions, inches a	b	Max. Cable O.D. c	Impedance (ohms)	Type	Stock Code *	Notes	Amphenol Part Number
174, 179, 187, 188	—	19/32	3/16	.120	50	Snap-on	S	Radial Crimp	27-1
	—	19/32	1/4	.120	50	Screw-on	S	Radial Crimp	27-7
	UG1465/U	27/32	1/4	.120	50	Screw-on	S	Field Serviceable	27-106
180, 195	—	5/8	9/32	.165	75	Snap-on	S	Radial Crimp	27-13
	—	19/32	3/8	.165	75	Screw-on	S	Radial Crimp	27-19
178, 196	—	25/32	7/32	.090	50	Snap-on	S	Field Serviceable	27-30
	—	25/32	1/4	.090	50	Screw-on	S	Field Serviceable	27-34
	UG1460/U	27/32	1/4	.090	50	Screw-on	S	Field Serviceable	27-104

ANGLE PLUGS/Teflon-Kel-F Insulation • Female contacts • Gold Plated

RG-( )/U Cables	Dimensions, inches a	b	Max. Cable O.D. c	d	Impedance (ohms)	Type	Stock Code *	Notes	Amphenol Part Number
174, 179, 187, 188	9/16	3/16	.120	15/32	50	Snap-on	S	Radial Crimp	27-6
	35/64	1/4	.120	15/32	50	Screw-on	S	Radial Crimp	27-26
180, 195	39/64	9/32	.165	17/32	75	Snap-on	S	Radial Crimp	27-18
	5/8	3/8	.165	17/32	75	Screw-on	S	Radial Crimp	27-25
178, 196	9/16	3/16	.090	9/16	50	Snap-on	S	Field Serviceable	27-33
	35/64	1/4	.090	9/16	50	Screw-on	S	Field Serviceable	27-37

STRAIGHT JACKS/Teflon Insulation • Male Contacts • Gold Plated

RG-( )/U Cables	Military Part Number	Dimensions, inches a	b	Max. Cable O.D. c	Impedance (ohms)	Type	Stock Code *	Notes	Amphenol Part Number
174, 179 187, 188	—	35/64	9/64	.120	50	Snap-on	S	Radial Crimp	27-2
	—	19/32	3/16	.120	50	Screw-on	S	Radial Crimp	27-8
	UG1467/U	3/4	1/4	.120	50	Screw-on	S	Field Serviceable	27-105
180, 195	—	9/16	1/4	.165	75	Snap-on	S	Radial Crimp	27-14
	—	19/32	5/16	.165	75	Screw-on	S	Radial Crimp	27-20
178, 196	—	47/64	9/64	.090	50	Snap-on	S	Field Serviceable	27-31
	—	3/4	3/16	.090	50	Screw-on	S	Field Serviceable	27-35
	UG1462/U	3/4	1/4	.090	50	Screw-on	N	Field Serviceable	27-107

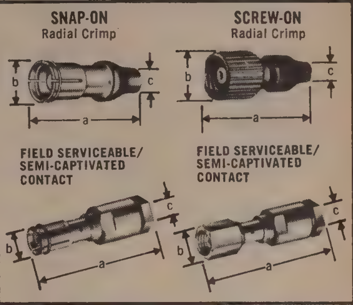
BULKHEAD JACKS

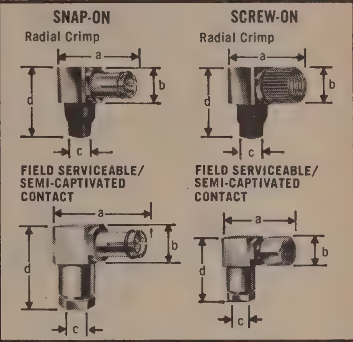
Teflon Insulation • Male Contacts • Gold Plated • 3/32″ Max. Panel Thickness (e Dim.)

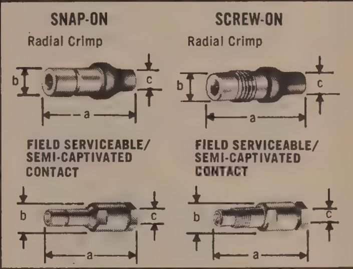
RG-( )/U Cables	Military Part Number	Dimensions, inches a	b	Max. Cable O.D. c	Impedance (ohms)	Type	Mtg. Hole	Stock Code *	Notes	Amphenol Part Number
174, 179, 187, 188	—	41/64	1/4	.120	50	Snap-on	U	S	Radial Crimp	27-4
	—	21/32	15/64	.120	50	Screw-on	U	S	Radial Crimp	27-10
	UG1468/U	7/8	1/4	.120	50	Screw-on	W	S	Field Serviceable	27-103
180, 195	—	41/64	3/8	.165	75	Snap-on	V	S	Radial Crimp	27-16
	—	21/32	3/8	.165	75	Screw-on	V	S	Radial Crimp	27-22
178, 196	—	13/16	15/64	.090	50	Snap-on	U	S	Field Serviceable	27-32
	—	53/64	15/64	.090	50	Screw-on	U	S	Field Serviceable	27-36
	UG1463/U	7/8	1/4	.090	50	Screw-on	W	N	Field Serviceable	27-102

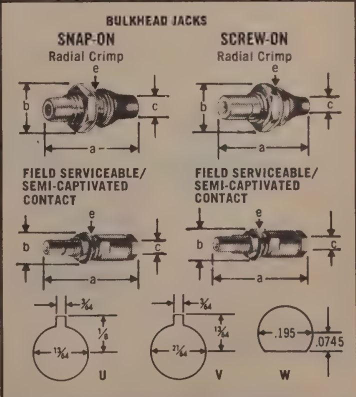
*Stock Code: S = Stock N = Non Stock

SUBMINAX 27

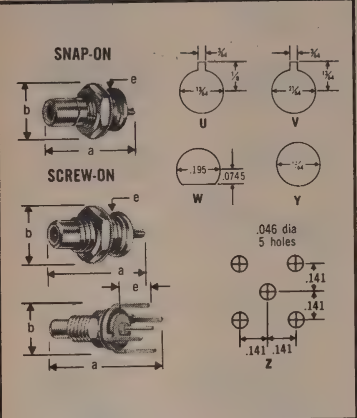

SNAP-ON
Radial Crimp
SCREW-ON
Radial Crimp
b
c
a
FIELD SERVICEABLE/ SEMI-CAPTIVATED CONTACT
FIELD SERVICEABLE/ SEMI-CAPTIVATED CONTACT

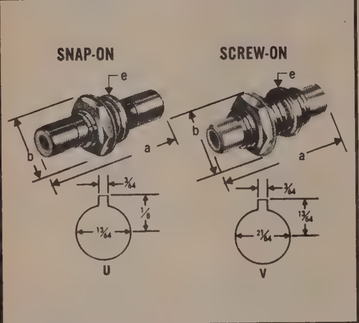

SNAP-ON
Radial Crimp
SCREW-ON
Radial Crimp
a
b
c
d
FIELD SERVICEABLE/ SEMI-CAPTIVATED CONTACT
FIELD SERVICEABLE/ SEMI-CAPTIVATED CONTACT

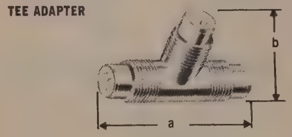

SNAP-ON
Radial Crimp
SCREW-ON
Radial Crimp
a
b
c
FIELD SERVICEABLE/ SEMI-CAPTIVATED CONTACT
FIELD SERVICEABLE/ SEMI-CAPTIVATED CONTACT


BULKHEAD JACKS
SNAP-ON
Radial Crimp
SCREW-ON
Radial Crimp
a
b
c
e
FIELD SERVICEABLE/ SEMI-CAPTIVATED CONTACT
FIELD SERVICEABLE/ SEMI-CAPTIVATED CONTACT
3/64
1/8
13/64
U
3/64
13/64
21/64
V
.195
.0745
W

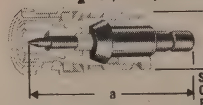
SUBMINAX 27



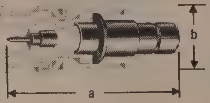




Note: Order Connector Separately



STANDARD: REPLACES CONTACT AND BRAID CLAMP



IMPROVED: REPLACES CONTACT AND WASHER

BULKHEAD RECEPTACLES

Teflon Insulation • Male Contacts • Gold Plated • Rear Mount

Military Part Number	Dimensions, inches a	b	Max. Panel Thickness e	Impedance (Ohms)	Type	Mtg. Hole	Stock Code *	Notes	Amphenol Part Number
—	37/64	1/4	3/32	50	Snap-on	U	S	—	27-3
—	45/64	11/32	3/32	50	Snap-on	Y	S	Hermetically Sealed	27-27
—	19/32	15/64	3/32	50	Screw-on	U	S	—	27-9
—	47/64	11/32	3/32	50	Screw-on	Y	S	Hermetically Sealed	27-12
UG1619/U	5/8	1/4	3/32	50	Screw-on	W	S	—	27-101
—	37/64	3/8	3/32	75	Snap-on	V	S	—	27-15
—	23/32	15/32	3/32	75	Snap-on	—	S	Hermetically Sealed Mtg. Hole 21/64 dia.	27-45
—	19/32	3/8	3/32	75	Screw-on	V	S	—	27-21
—	11/16	15/32	3/32	75	Screw-on	—	S	Hermetically Sealed Mtg. Hole 21/64 dia.	27-24
UG1464/U	41/64	1/4	3/32	50	Screw-on	W	S	Front Mount	27-108
—	43/64	19/64	3/16	50	Screw-on	Z	S	Printed Circuit	27-800

BULKHEAD ADAPTERS/Teflon Insulation • Gold Plated

Dimensions, inches a	b	Max. Panel Thickness e	Impedance (Ohms)	Type	Adapter Ends	Mtg. Hole	Stock Code *	Notes	Amphenol Part Number
5/8	1/4	3/32	50	Snap-on	Jack-Jack	U	S	—	27-5
21/32	15/64	3/32	50	Screw-on	Jack-Jack	U	S	—	27-11
5/8	3/8	3/32	75	Snap-on	Jack-Jack	V	S	—	27-17
21/32	3/8	3/32	75	Screw-on	Jack-Jack	V	S	—	27-23

TEE ADAPTERS/Teflon Insulation • Male Contacts • Gold Plated

Dimensions, inches a	b	Impedance (Ohms)	Type	Adapter Ends	Stock Code *	Notes	Amphenol Part Number
1.050	.681	75	Screw-on	Jack-Jack-Jack	S	—	27-70

SUBMINAX 27 TO BNC & TNC ADAPTERS/Teflon Insulation

Dimensions, inches a	b	Adapter Ends Subminax Jack	To	Use With Connector No.	Construction	Stock Code *	Notes	Amphenol Part Number
1 5/16	.333	50 Ohm Screw-on	BNC Plug	31-002(UG88/U)	UG Standard	S	—	27-28
1 5/16	.333		BNC Jack	31-005(UG89/U)	UG Standard	S	—	27-40
1 5/16	.333		BNC Panel Jack	31-001(UG291/U)	UG Standard	S	—	27-40
1 5/16	.333	50 Ohm Snap-on	BNC Plug	31-002(UG88/U)	UG Standard	S	—	27-29
1 17/64	7/16	75 Ohm Screw-on	BNC Plug	31-212(UG260B/U)	Improved	S	—	27-805
1.355	.393		BNC Jack	31-215(UG261B/U)	Improved	N	—	27-42
1.355	.393		BNC Panel Jack	31-211(UG262B/U)	Improved	N	—	27-42
1 17/64	7/16		TNC Plug	79525	Improved	S	—	27-805
1.355	.393		TNC Jack	79500	Improved	N	—	27-42
1 1/4	.395	75 Ohm Snap-on	BNC Plug	31-212(UG260B/U)	Improved	S	—	27-41
1 1/4	.395		TNC Jack	79525	Improved	S	—	27-41

AMPHENOL SUBMINAX 27 Series adapters quickly convert standard or improved type BNC and TNC plugs and jacks into between series adapters. The adapter replaces the contact and braid clamp in connectors with standard-type clamping parts. In the improved versions, the adapter replaces the contact and washer. No solder or crimping is required . . . modification is quick and easy.

*Stock Code: S = Stock N = Non Stock

FOR LOCAL SOURCE OF SUPPLY SEE EEM VOL. 2 PAGE 462

RF CONNECTORS

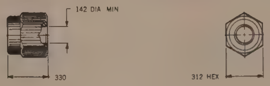
BUNKER RAMO AMPHENOL

SMA SERIES

SMA's are 50 ohm, semi-precision, subminiature (3mm), high-frequency (0-18 GHz) connectors with ¼-36 threaded coupling. They meet all MIL-C-39012 requirements for SMA connectors and are available in stainless steel or beryllium copper.

CABLE CONNECTORS/Stainless Steel

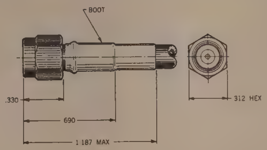
.141 Dia. Semi-Rigid Cable


142 DIA MIN
330
312 HEX

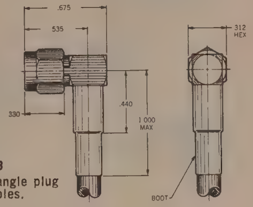
STRAIGHT PLUG
P/N 901-9183-1

A unique solder-type plug for copper jacketed cable. It is extremely short, designed for applications where space is critical and minimum bend radius is required. This connector uses the cable center conductor and TFE insulation as its mating face.

RG-174, 188A, 316/U CABLE/Solder Type • Captivated Contact

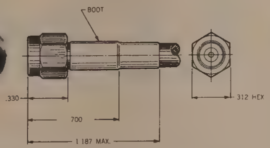

BOOT
.330
690
1 187 MAX
312 HEX

STRAIGHT PLUG
P/N 901-9501-3
A solder type plug for flexible cables.

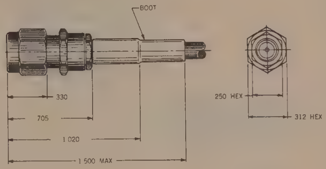

.675
535
330
.440
1 000 MAX
312 HEX
BOOT

ANGLE PLUG
P/N 901-9521-3
A solder type angle plug for flexible cables.

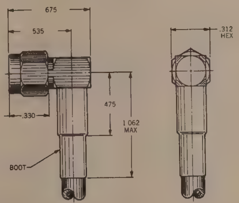
RG-174, 188A, 316/U CABLE/Crimp Type • Captivated Contact


BOOT
.330
700
1 187 MAX.
312 HEX

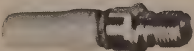
STRAIGHT PLUG
P/N 901-9511-3
A crimp type plug for flexible cables.

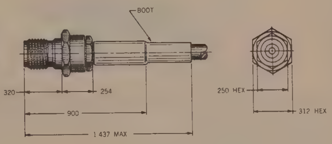

BOOT
330
705
1 020
1 500 MAX
250 HEX
312 HEX

STRAIGHT PLUG
P/N 901-9601-3
A crimp type plug for flexible cables.


675
535
.330
475
1 062 MAX
BOOT
.312 HEX

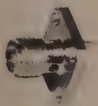
ANGLE PLUG
P/N 901-9531-3
A crimp type angle plug for flexible cables.




BOOT
320
254
900
1 437 MAX
250 HEX
312 HEX

STRAIGHT JACK
P/N 901-9602-3
A crimp type jack for flexible cables.

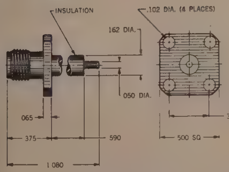
RECEPTACLES/Stainless Steel • Epoxy Captivated Contacts

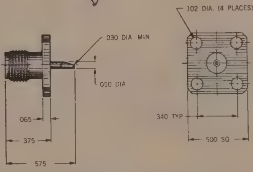


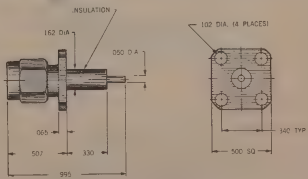
SQ. FLANGE MTD.
P/N 901-9204CC
TFE insulation and blunt terminal exposed in rear for direct substrate or circuit board affixment.

SQ. FLANGE MTD.
P/N 901-9215
Solder cup terminal exposed in rear for direct wire or cable affixment.

SQ. FLANGE MTD.
P/N 901-9214CC
TFE insulation and blunt terminal exposed in rear for direct substrate or circuit board affixment.


INSULATION
.102 DIA. (4 PLACES)
162 DIA.
050 DIA.
065
375
590
1 080
340 TYP
500 SQ


030 DIA MIN
050 DIA
065
375
575
102 DIA. (4 PLACES)
340 TYP
500 SQ

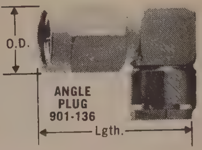

INSULATION
162 DIA
050 DIA
065
507
330
995
102 DIA. (4 PLACES)
340 TYP
500 SQ

FOR LOCAL SOURCE OF SUPPLY SEE EEM VOL. 2 PAGE 462

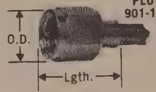
RF CONNECTORS

BUNKER RAMO AMPHENOL

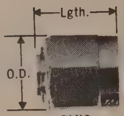
SMA SERIES



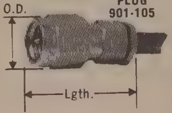
ANGLE PLUG 901-136



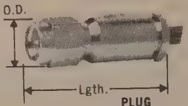
PLUG 901-113



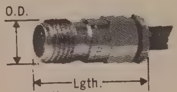
PLUG 901-183



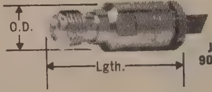
PLUG 901-105



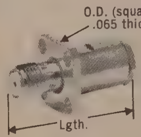
PLUG 901-107



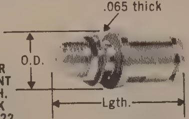
JACK 901-106



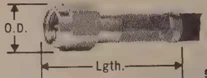
JACK 901-108



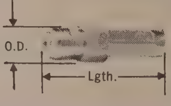
PANEL JACK 901-121



REAR MOUNT BLKH. JACK 901-122



PLUG 901-101



JACK 901-102

CABLE CONNECTORS/Beryllium Copper

.085″ DIA. SEMI-RIGID CABLE

Dimensions, inches		Cable Entry	Mtg. Hole	Config-uration	Cable Affixment	Description	Amphenol Part Number
Length	O.D.						
43/64	5/16 hex	.088	—	Plug	Solder	With contact & insulator	901-126
11/16	5/16 hex	.088	—	Plug	Solder	Angle	901-136■
41/64	1/4 hex	.088	—	Jack	Solder	Straight	901-127
41/64	1/2 sq.	.088	Y	Jack	Solder	Panel mounted	901-151
41/64	7/16 hex	.088	Z	Jack	Solder	Bulkhead mounted, rear	901-158
57/64	3/8 hex	.088	X	Jack	Solder	Bulkhead mounted, rear	901-193

.141″ DIA. SEMI-RIGID CABLE

Dimensions, inches		Cable Entry	Mtg. Hole	Config-uration	Cable Affixment	Description	Amphenol Part Number
Length	O.D.						
1/2	5/16 hex	.144	—	Plug	Solder	Less contact & insulator	901-113■
21/64	5/16 hex	.144	—	Plug	Solder	Less C & I, short skirt	901-183■
43/64	5/16 hex	.144	—	Plug	Solder	With contact & insulator	901-105■
21/32	5/16 hex	.144	—	Plug	Solder	Angle, with C & I	901-142
63/64	11/32 dia.	.144	—	Plug	Clamp	Less contact & insulator	901-111
63/64	11/32 dia.	.144	—	Plug	Clamp	With contact & insulator	901-107■
41/64	1/4 hex	.144	—	Jack	Solder	Straight	901-106■
41/64	1/2 sq.	.144	Y	Jack	Solder	Panel mounted	901-141
41/64	7/16 hex	.144	Z	Jack	Solder	Bulkhead mounted, rear	901-157
57/64	3/8 hex	.144	X	Jack	Solder	Bulkhead mounted, rear	901-195
59/64	11/32 dia.	.144	—	Jack	Clamp	Straight	901-108■
59/64	7/16 dia.	.144	Z	Jack	Clamp	Bulkhead mounted, rear	901-159

RG-55, 58, 141, 142, 223/U CABLE (Clamp Type)

Dimensions, inches		Cable Entry	Mtg. Hole	Config-uration	Cable Affixment	Description	Amphenol Part Number
Length	O.D.						
31/32	11/32 dia.	.219	—	Plug	Clamp	Straight	901-103
11/16	5/16 hex	.220	—	Plug	Clamp	Angle	901-130
15/16	11/32 dia.	.219	—	Jack	Clamp	Straight	901-104
15/16	1/2 sq.	.219	Y	Jack	Clamp	Panel mounted	901-121■
15/16	7/16 dia.	.219	Z	Jack	Clamp	Bulkhead mounted, rear	901-122■

RG-55, 142, 223/U CABLE (Crimp Type)

Dimensions, inches		Cable Entry	Mtg. Hole	Config-uration	Cable Affixment	Description	Amphenol Part Number
Length	O.D.						
1 1/32	5/16 hex	.220	—	Plug	Crimp	Straight	901-101■
1	1/4 hex	.220	—	Jack	Crimp	Straight	901-102■
1	1/2 sq.	.220	Y	Jack	Crimp	Panel mounted	901-152

RG-58, 141, 303/U CABLE (Crimp Type)

Dimensions, inches		Cable Entry	Mtg. Hole	Config-uration	Cable Affixment	Description	Amphenol Part Number
Length	O.D.						
29/32	5/16 hex	.206	—	Plug	Crimp	Straight	901-109
7/8	1/4 hex	.206	—	Jack	Crimp	Straight	901-110
1	1/2 sq.	.206	Y	Jack	Crimp	Panel mounted	901-153

RG-174, 188, 316/U CABLE

Dimensions, inches		Cable Entry	Mtg. Hole	Config-uration	Cable Affixment	Description	Amphenol Part Number
Length	O.D.						
15/16	11/32 dia.	.114	—	Plug	Clamp	Straight	901-129
63/64	11/32 dia.	.114	—	Plug	Clamp	Straight	901-128
11/16	5/16 hex	.114	—	Plug	Clamp	Angle	901-140

RG-180, 195/U CABLE

Dimensions, inches		Cable Entry	Mtg. Hole	Config-uration	Cable Affixment	Description	Amphenol Part Number
Length	O.D.						
63/64	11/32 dia.	.158	—	Plug	Clamp	Straight	901-139
3/4	5/16 hex	.175	—	Plug	Crimp	Straight	901-192
15/16	1/2 sq.	.158	Y	Jack	Clamp	Panel mounted	901-220

DOUBLE BRAIDED RG-188 TYPE (.126 Max. Dia.)

Dimensions, inches		Cable Entry	Mtg. Hole	Config-uration	Cable Affixment	Description	Amphenol Part Number
Length	O.D.						
63/64	11/32 dia.	.130	—	Plug	Clamp	Straight	901-174
11/16	5/16 hex	.130	—	Plug	Clamp	Angle	901-172
1 3/32	3/8 hex	.130	X	Jack	Clamp	Bulkhead mounted, rear	901-173

■ Illustrated

FOR LOCAL SOURCE OF SUPPLY SEE EEM VOL. 2 PAGE 462

RF CONNECTORS

BUNKER RAMO AMPHENOL

RECEPTACLES Beryllium Copper

Dimensions, inches			☐		
Length	O.D.	Max. Panel Thickness	Mtg. Hole	Description	Amphenol Part Number

STRIP TRANSMISSION LINE

.548	9/16 dia.	—	U	Plug for .031 board	901-132-1
.580	9/16 dia.	—	U	Plug for .063 board	901-132-2
.642	9/16 dia.	—	U	Plug for .125 board	901-132-3
47/64	1/4 dia.	—	U	Angle jack .031 board	901-133-1
47/64	1/4 dia.	—	U	Angle jack .063 board	901-133-2
47/64	1/4 dia.	—	U	Angle jack .125 board	901-133-3
.416	9/16 dia.	—	U	Jack for .031 board	901-131-1
.448	9/16 dia.	—	U	Jack for .063 board	901-131-2
.510	9/16 dia.	—	U	Jack for .125 board	901-131-3
.416	13/32 dia.	—	V	Jack for .031 board	901-182-1
.448	13/32 dia.	—	V	Jack for .063 board	901-182-2■
.510	13/32 dia.	—	V	Jack for .125 board	901-182-3

PRINTED CIRCUIT RECEPTACLES

17/32	1/4 sq.	5/32 pins	T	Straight receptacle	901-144
.585	1/4 sq.	5/32 pins	T	Angle receptacle	901-143

RECEPTACLES/PANEL MOUNTED (Standard Square Flange)

1 5/64	1/2 sq.	—	Y	.590 insulated blunt terminal	901-176-1
1 5/64	1/2 sq.	—	Y	with captivated contact	901-176-2
1	1/2 sq.	—	Y	Plug, .330 insulated blunt terminal	901-196-1
1	1/2 sq.	—	Y	with captivated contact	901-196-2
15/32	1/2 sq.	—	Y	Tab terminal	901-197-1
15/32	1/2 sq.	—	Y	with captivated contact	901-197-2
9/16	1/2 sq.	—	Y	Solder cup, captivated contact	901-112■
45/64	1/2 sq.	—	Y	Angle solder cup	901-124

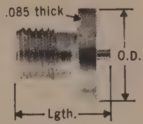
RECEPTACLES/PANEL MOUNTED (Trim-Line Flange)

5/8	5/8	—	W	Slotted terminal	901-213
37/64	5/8	—	W	Solder cup, captivated contact	901-214
15/32	5/8	—	W	Tab terminal	901-215-1■
15/32	5/8	—	W	with captivated contact	901-215-2

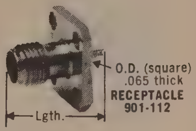
RECEPTACLES/BULKHEAD MOUNTED

21/32	7/16 dia.	.103	Z	Rear, solder cup, gasket	901-116■
21/32	7/16 dia.	.103	Z	Rear, solder cup	901-134
43/64	5/16 hex	.125	X	Rear, solder cup	901-190
21/32	7/16 dia.	.103	Z	Rear, hermetic, flat & pierced	901-161
11/16	7/16 dia.	.103	Z	Front, hermetic, flat & pierced	901-162
11/16	7/16 dia.	.103	Z	Front, solder cup, gasket, cc	901-117■
21/32	5/16 hex	—	1/4-36	Front, blunt terminal, 1/4-36 thread, cc	901-206

SMA SERIES

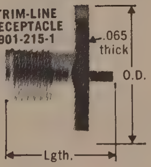


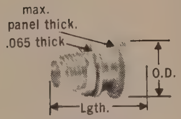
STRIPLINE JACK 901-182-2



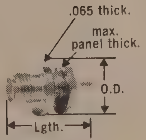
RECEPTACLE 901-112

TRIM-LINE RECEPTACLE 901-215-1





REAR MOUNT RECEPTACLE 901-116

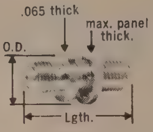


FRONT MOUNT RECEPTACLE 901-117

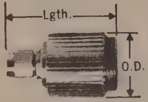
☐ Mtg. Hole Dimensions on Following Page.

FOR LOCAL SOURCE OF SUPPLY
SEE EEM VOL. 2 PAGE 462

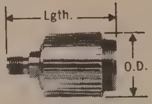
SMA SERIES


.065 thick
max. panel thick.
O.D.
Lgth.

ADAPTER
901-120

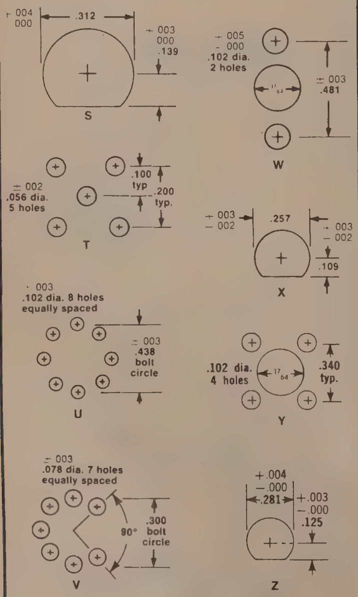


APC-7
ADAPTER
131-1028



APC-7
ADAPTER
131-1038

SMA MTG. HOLE DIMENSIONS


+ .004
.000
.312
+ .003
.000
.139
S
+ .005
− .000
.102 dia.
2 holes
17/64
± .003
.481
W
± .002
.056 dia.
5 holes
.100
typ
.200
typ.
T
+ .003
− .002
.257
+ .003
− .002
.109
X
± .003
.102 dia. 8 holes
equally spaced
± .003
.438
bolt
circle
U
.102 dia.
4 holes
17/64
.340
typ.
Y
± .003
.078 dia. 7 holes
equally spaced
90°
.300
bolt
circle
V
+ .004
− .000
.281
+ .003
− .000
.125
Z

ADAPTERS

ADAPTERS WITHIN SERIES

Dimensions, inches			Mtg. Hole	Description	Amphenol Part Number
Length	O.D.	Max. Panel Thickness			
57/64	5/16 hex	—	—	Straight, plug-plug	901-118
19/32	1/4 dia.	—	—	Straight, jack-jack	901-119
13/16	3/8 dia.	.103	Z	Bulkhead, jack-jack	901-120■
7/8	3/8 hex	.250	Z	Bulkhead, jack-jack	901-191
7/8	7/16 hex	.187	S	Bulkhead, herm., jack-jack	901-160
5/8	5/16 hex	—	—	Angle, plug-jack	901-125

ADAPTERS BETWEEN SERIES

Dimensions, inches			Mtg. Hole	Description	Amphenol Part Number
Length	O.D.	Max. Panel Thickness			
1 11/32	13/16	—	—	APC-7 — SMA jack	131-1028■
1 3/8	13/16	—	—	APC-7 — SMA plug	131-1038■
1 3/4	13/16	—	—	APC-N plug — SMA plug	131-1074
1 5/8	13/16	—	—	APC-N plug — SMA jack	131-1075
1 23/64	5/8	—	—	APC-N-jack — SMA plug	131-1076
1 19/32	5/8	—	—	APC-N jack — SMA jack	131-1077
1 3/32	9/16	—	—	BNC plug — SMA plug	901-164
1 1/16	9/16	—	—	BNC plug — SMA jack	901-165
1 5/32	9/16	—	—	BNC jack — SMA plug	901-166
1 1/8	9/16	—	—	BNC jack — SMA jack	901-167
1 1/8	19/32	—	—	TNC plug — SMA plug	901-168
1 3/32	19/32	—	—	TNC plug — SMA jack	901-169
1 5/32	9/16	—	—	TNC jack — SMA plug	901-170
1 1/8	9/16	—	—	TNC jack — SMA jack	901-171

ACCESSORIES

CAP AND CHAIN P/N 901-163. Non shorting, plug, 29/64 long by 5/16 hex, 2″ long chain with .130 dia. eyelet.

TOOL KIT P/N 901-2500. Contains recommended jacket and dielectric trim tools for precise cable preparation required to obtain the electrical performance specified. Accessory Tool P/N 901-2400 available for Cujak center conductor trimming.

CABLE ASSEMBLIES. Custom semi-precision cable assemblies are available with .141″ and .085″ dia. semi-rigid Cujak cable fitted with SMA connectors. Contact factory with your specifications.

■ Illustrated

FOR LOCAL SOURCE OF SUPPLY SEE EEM VOL. 2 PAGE 462

RF CONNECTORS

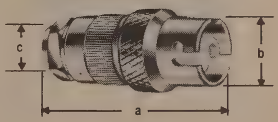
BUNKER RAMO AMPHENOL

MB SERIES

MB series are very small bayonet-lock connectors which are used with subminiature and miniature cables. These connectors offer good electrical and mechanical performance at low cost. They are non-constant impedance connectors and have a peak voltage rating of 500 V and a frequency limit of 500 MHZ.

Solderless contacts are available in some connectors, as noted and are merely assembled to the center conductor (friction fit).

Crimp designs are offered which require only a simple pair of standard pliers for the crimping operation.



STRAIGHT PLUGS

Non-constant impedance • Female contacts • Non-weatherproof

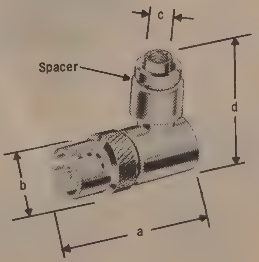
RG-( )/U Cable	Dimensions, inches			Construction	Insulation	Stock Code *	Notes	Amphenol Part Number
	a	b	Max. Cable O.D. c					
55, 58, 141, 152	31/32	3/8	.214	Jacket Clamp	Kel-F	S	—	49200
58, 141	23/32	3/8	.203	Standard Clamp	Nylon	S	—	45050
	23/32	3/8	.203	Standard Clamp	Kel-F	S	—	45525
58	23/32	3/8	.203	Standard Clamp	Nylon	S	Solderless Contact	45000
59, 62, 140, 210	27/32	3/8	.255	Standard Clamp	Kel-F	N	—	44800
	27/32	3/8	.255	Hooded Clamp	Kel-F	S	—	45550
59, 140	31/32	3/8	.255	Jacket Clamp	Kel-F	N	Solderless Contact	47800
122, 180, 195	23/32	3/8	.177	Standard Clamp	Nylon	S	—	45075
180	23/32	3/8	.148	Standard Clamp	Kel-F	S	—	45700
180, 195	25/32	3/8	.158	Crimp	Kel-F	S	—	48850
174, 179, 187, 188	13/16	3/8	.126	Crimp	Kel-F	S	—	44950
	23/32	3/8	.126	Crimp	Nylon	S	—	45125
	25/32	3/8	.119	Crimp	Kel-F	S	—	48825
174, 179	23/32	3/8	.104	Crimp	Nylon	S	—	45650
179, 187, 188	47/64	3/8	.128	Crimp	Kel-F	S	—	47750
178, 196	25/32	3/8	.081	Crimp	Nylon	S	—	45100
	23/32	3/8	.091	Crimp	Nylon	S	—	45175

ANGLE PLUGS

Non-constant Impedance • Female Captivated Contacts • Non-weatherproof

RG-( )/U Cable	Dimensions, inches				Construction	Insulation	Stock Code *	Notes	Amphenol Part Number
	a	b	Max. Cable O.D. c	d					
55, 58, 141, 142	3/4	3/8	.214	1	Jacket Clamp	Kel-F	S	—	49225
58, 141	3/4	3/8	.197	27/32	Standard Clamp	Kel-F	N	—	45350
	3/4	3/8	.207	25/32	Hooded Clamp	Nylon	S	—	53000
59, 62, 140, 210	3/4	3/8	.255	31/32	Jacket Clamp	Kel-F	S	—	48150
	3/4	3/8	.255	13/16	Hooded Clamp	Kel-F	S	—	53525
174	3/4	3/8	.104	25/32	Crimp	Kel-F	S	—	45775
174, 179, 187, 188	3/4	3/8	.119	25/32	Crimp	Kel-F	S	—	48800
178, 196	3/4	3/8	.091	27/32	Crimp	Kel-F	N	—	45400
180, 195	3/4	3/8	.158	23/32	Crimp	Kel-F	S	—	49600

*Stock Code: S = Stock N = Non Stock

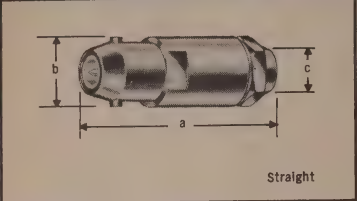


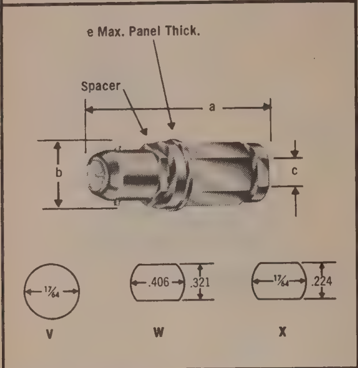
FOR LOCAL SOURCE OF SUPPLY
SEE EEM VOL. 2 PAGE 462

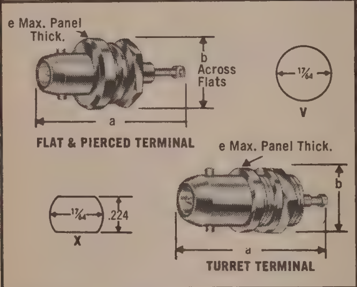
RF CONNECTORS

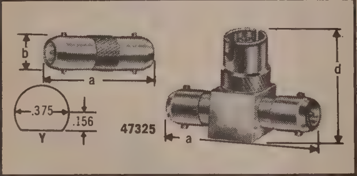
BUNKER RAMO AMPHENOL

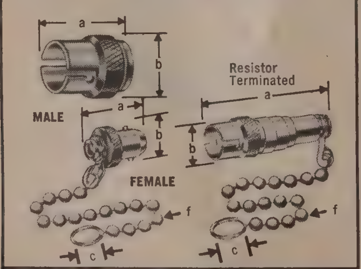
MB SERIES











STRAIGHT JACKS

Non-constant Impedance • Male Contacts • Non-weatherproof

RG-( )/U Cable	Dimensions, inches a	b	Max. Cable O.D. c	Construction	Insulation	Stock Code *	Notes	Amphenol Part Number
55, 58, 141, 142	15/16	5/16	.214	Jacket Clamp	Kel-F	N	—	49825
58, 141	3/4	5/16	.203	Standard Clamp	Kel-F	N	—	46700
59, 62, 140, 210	1 55/64	5/16	.255	Hooded Clamp	Kel-F	N	—	46775
174, 179, 187, 188	3/4	5/16	.119	Crimp	Kel-F	N	—	48950
180, 195	3/4	5/16	.157	Crimp	Kel-F	S	—	48975

BULKHEAD JACKS

Non-constant Impedance • Male Contacts • Non-weatherproof • Rear Mounting

RG-( )/U Cable	Dimensions, Inches a	b	Max. Cable O.D. c	With Spacer e	W.O. Spacer e	Construction	Insulation	Mtg. Hole	Stock Code *	Notes	Amphenol Part Number
55, 58, 141, 142	1 5/64	7/16	.214	.171	—	Jacket Clamp	Kel-F	W	N	—	49300
58,141	25/32	5/16	.203	.080	.130	Std. Clamp	Nylon	V	N	—	46200
59, 62, 140, 210	1 5/64	11/32	.255	.080	.130	Jacket Clamp	Kel-F	X	N	—	46875
122, 180, 195	25/32	5/16	.177	.080	.130	Std. Clamp	Nylon	V	N	Split Mount	46375
174	25/32	5/16	.104	.080	.130	Crimp	Kel-F	X	S	—	46625
178, 196	37/64	5/16	.091	.080	.130	Crimp	Kel-F	X	N	Split Mount	46475
180	25/32	7/16	.148	—	.150	Crimp	Kel-F	W	N	—	49775
180, 195	13/16	9/32	.119	.080	.130	Crimp	Kel-F	V	N	Capt. Cont.	48925
174, 179, 187, 188	27/32	7/16	.158	.171	—	Crimp	Kel-F	W	S	—	49700

*Stock Code: S = Stock N = Non Stock

BULKHEAD RECEPTACLES

Non-constant Impedance • Male Contacts • Non-weatherproof • Front Mounted

Dimensions, inches a	b	e	Insulation	Terminal	Mtg. Hole	Stock Code *	Notes	Amphenol Part Number
11/16	5/16	.125	Kel-F	Turret	V	S	—	45925
29/32	7/16	.156	Glass-Teflon	Flat & Pierce	V	S	Hermetically Sealed	45975
11/16	5/16	.140	Nylon	Turret	V	S	—	46000
11/16	5/16	.125	Kel-F	Turret	X	S	—	46025
11/16	5/16	.140	Nylon	Turret	V	S	—	46175
11/16	5/16	.125	Teflon	Turret	V	S	—	53475

ADAPTERS/ Non-constant Impedance • Non-weatherproof

Dimensions, inches a	b	d	e	Insulation	Adapter Ends	Mtg. Hole	Stock Code *	Notes	Amphenol Part Number
13/16	5/16	—	—	Nylon	Jack-Jack	—	S	Straight	47225
15/16	9/16	—	—	Glass-Teflon	Jack-Jack	Y	S	Blkd. Mount, Hermetic	47300
1 1/32	3/4	—	—	Kel-F	Jack-Plug-Jack	—	S	Tee	47325

CAPS/ Non-weatherproof

Dimensions, inches a	b	c	Chain Length f	Stock Code *	Notes	Amphenol Part Number
1 1/32	3/8	.144	3 1/4	N	Resistor Terminated, See Note Below	48600
9/16	3/8	.281	1 1/2	S	Male	48225
23/32	3/8	.281	1 1/2	N	Male, Shorting Male Contact	48250
1/2	3/8	.130	1 1/2	N	Female	47550

For resistor terminated cap: to order without resistor, add -1 to part number; to order with resistor, add resistor value to part number. 1/2 watt ±5% resistor values (ohms) stocked: 47, 51, 68, 75, 82, 91, 100, 120, 130, 150, 180, 240, 270, 300, 470, 510, 560, 680, 750, 820, 1000, 1500, 3900, 4700, 10000, 150000.

*Stock Code: S = Stock N = Non Stock

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NEW ISOLATED BNC RECEPTACLE

BNC SERIES

AMPHENOL
P/N 31-010

APPLICATION NOTES

Amphenol's new BNC receptacle, part number 31-010*, was designed for applications requiring isolation of the cable braid from the chassis ground. Dimensionally equivalent to the popular UG-1094/U and UG-1094A/U receptacles, the new 31-010 unit has a molded thermoplastic body which prevents metallic contact between the body of the connector and the panel. An extra contact, i.e., braid grounding tab, is molded into the insulating body and provides a convenient means by which the cable braid can be neatly secured and connected directly to the connector outer conductor, thus bypassing the mounting panel or ground.

Installations of this type usually employ the standard UG receptacle noted above separated from the surrounding panel by a special insulating bushing and washer. In addition to the extra parts to be purchased and handled, an oversize, non-standard hole must be cut in the panel to accommodate the larger diameter of the insulating bushing accompanied by an appropriate reduction in allowable panel thickness.

ADVANTAGES

The new 31-010 incorporates many economies: lower initial cost, nearly equal to that of the standard UG-1094/U and one fourth the cost of functionally equivalent types, plus lower installed cost. And, once installed, the assembly will have a more workmanlike appearance coupled with the convenience of silver plating on parts involving solder operations and long life luster of Amphenol's tarnish-free finish, ASTROplate, on all other external metal surfaces.

Your equipment will look better longer, and your component cost will decrease dramatically... Specify Amphenol's 31-010 isolated BNC receptacle. Contact your local Amphenol sales office, distributor or the factory direct. Available for immediate delivery.

ELECTRICAL

Impedance	Non-Constant
Voltage Rating	500 Volts peak

ENVIRONMENTAL

Thermal limits	−50° to 250°F −45.6° to 121°C
Shock	MIL-Std-202 method 202
Vibration	MIL-Std-202 method 204 (test cond. D)
Moisture Resistance	MIL-Std-202 method 106
Corrosion	MIL-Std-202 method 101 (test cond. B)
Altitude	MIL-Std-202 method 105 (test cond. C)

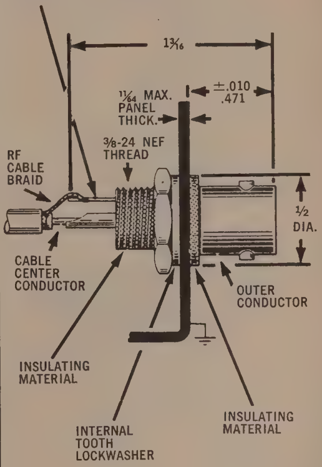
MECHANICAL

Mating	2-stud bayonet lock
Cable Affixment	See Illustration
Terminal Style	Solder Cup
Panel Mounting	Front Mounted (torque of 12 inch-pounds max. may be applied to hex nut)
Lockwasher	Internal Tooth

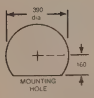
MATERIAL & PLATING

Threaded Rear Body & Connector Insulation (one-piece construction)	White, thermoplastic, UL Class SE-1 flammability rating
Center Contact	Beryllium copper, silver plated
Braid Grounding Tab	Brass, silver plated
Other Metal Parts	Brass with ASTROplate

BRAID GROUNDING TAB CONNECTS CABLE BRAID THROUGH INSULATING MATERIAL TO CONNECTOR OUTER CONDUCTOR. CHASSIS AND BRAID ARE ELECTRICALLY SEPARATE.



(CABLE SHOWN FOR REFERENCE)

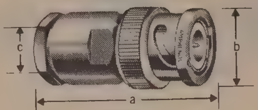


FOR LOCAL SOURCE OF SUPPLY
SEE EEM VOL. 2 PAGE 462

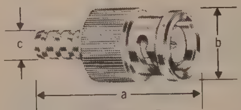
RF CONNECTORS

BUNKER RAMO AMPHENOL

BNC SERIES



CLAMP TYPE
(TYPICAL UG STANDARD)
(IMPROVED)



CRIMP TYPE
a DIM. INCLUDES OUTER FERRULE NOT SHOWN ON ILLUSTRATION

BNC connectors are small, light in weight, and have a quick disconnect bayonet lock coupling arrangement particularly useful for test equipment.

CRIMP TYPE

MIL-Crimps are recommended as the optimum BNC connector, giving optimum operating performance at low installed cost. Using standard crimping tools, these units can be assembled in a fraction of the time usually required for braid clamp type connectors by eliminating critical assembly and soldering operations and reducing the parts to handle. These connectors are weatherproof and have completely captivated gold-plated contacts.

IMPROVED TYPE

Constant 50 ohm impedance connectors which provide excellent performance through X-band frequencies. Mechanically sturdier than unimproved types. The improved clamping mechanism utilizes a threaded nut, flat washer, "V" groove gasket and peaked braid clamping, providing a superior metal-to-metal clamp.

CLAMP TYPE (UG-STANDARD)

Non-constant impedance connectors that can be used effectively at lower frequencies (below 300 MHZ) where no serious mismatch is introduced by the connectors. The clamping mechanism utilizes a threaded nut, flat compression gasket and a tapered braid clamp.

* Patent Pending

STRAIGHT PLUGS

Teflon Insulation • Male Contacts • Weatherproof • 50 Ohm Impedance

RG-( )/U Cable	Military Part Number	Dimensions, inches Length a	O.D. b	Max. Cable O.D. c	Construction	Stock Code *	Notes	Amphenol Part Number
6	—	1 1/4	9/16	.348	UG Std.	S	Rexolite Insulator	9350
8, 9	UG959/U	1 21/32	11/16	.437	UG Std.	S	"B" Dim. is body O.D.	6775
55, 142, 223	M39012/16-0014	1 3/32	9/16	.220	Crimp	S	—	31-4326
55, 58, 141, 142	UG88/U	31/32	9/16	.212	UG Std.	S	—	31-002
	UG88A/U	1	9/16	.212	UG Std.	S	—	14525
	UG88B/U	31/32	9/16	.212	UG Std.	S	Non-weatherproof	31-018
	—	1	5/8	.212	UG Std.	S	Female Contact (Polarized)	14625
55, 55A, 58, 141, 142, 223	UG88C/U	1 1/16	9/16	.224	Imp	S		31-202
	UG88D/U	1 3/32	9/16	.224	Imp	S	Beryl. Outer Contact	31-2202
	UG88E/U	1 3/32	9/16	.224	Imp	S	Beryl. Outer Contact	31-3202
	—	1 5/32	9/16	.219	Imp	S	Capt. Contact	31-301
	M39012/16-0001	1 1/16	9/16	.224	Clamp	S	—	31-3301
58, 141, 303	M39012/16-0013	1 3/32	9/16	.206	Crimp	S	—	31-4320
59, 62, 140, 210	M39012/16-0015	1 3/32	9/16	.261	Crimp	S	—	31-4321
59, 62, 71, 140, 210.	UG260/U	31/32	9/16	.258	UG Std.	S	Rexolite Insulator	31-012
	UG260A/U	1	9/16	.258	UG Std.	S	Rexolite Insulator Non-weatherproof	31-021
	UG260B/U	1 1/16	9/16	.255	Imp	S		31-212
	UG260C/U	1 3/32	9/16	.255	Imp	S	Beryl. Outer Contact	31-2212
	UG260D/U	1 3/32	9/16	.255	Imp	S	Beryl. Outer Contact	31-3212
	—	1 5/32	9/16	.255	Imp	S	Capt. Contact	31-304
	—	1 1/16	9/16	.257	Imp	S	75 Ohm	86475
	M39012/16-0002	1 1/16	9/16	.255	Clamp	S	—	31-3302
71	M39012/16-0017	1 3/32	9/16	.275	Crimp	N	—	31-4322
114A	—	1 21/32	11/16	.437	UG Std.	S	"B" Dim. is body O.D.	17400
122	M39012/16-0016	1 3/32	9/16	.175	Crimp	N	—	31-4324
122, 195	UG1033/U	1 1/16	9/16	.177	Imp	S	—	84975
180, 195	—	1 13/64	9/16	.175	Crimp	S	—	31-323
122, 180, 195	M39012/16-0003	1 5/32	9/16	.177	Clamp	S	—	31-3303
174, 188	—	1 13/16	9/16	.115	Crimp	S	—	31-315
179, 187	—	1 13/16	9/16	.115	Crimp	S	—	31-242
174, 179, 187, 188	—	1 1/16	9/16	.116	Imp	S	—	69475
178, 196	—	1	9/16	.094	UG Std.	S	—	15875
180	—	1	9/16	.150	UG Std.	S	—	16300
Essex 21-597	—	1 13/64	9/16	.175	Crimp	S	—	31-325

*Stock Code: S = Stock N = Non Stock

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RF CONNECTORS

BUNKER RAMO AMPHENOL

BNC SERIES

ANGLE PLUGS

Teflon Insulation • Male Contacts • Weatherproof • 50 Ohm Impedance

RG-( )/U Cable	Military Part Number	Dimensions, inches a	b	Max. Cable O.D. c	d	Construction	Fig.	Stock Code *	Notes	Amphenol Part Number
55, 142, 223	M39012/ 20-0003	1 3/32	9/16	.220	1 21/32	Crimp	B	S	—	31-3365
55, 58, 141, 142	—	1 1/4	9/16	.212	1	UG Std.	C	S	—	8525
55, 55A, 58, 141, 142, 223	UG913/U	1 3/32	9/16	.224	1 11/16	UG Std.	A	S	—	31-204
	UG913A/U	1 3/32	9/16	.224	1 5/8	Imp	A	S	Beryl. Outer Contact	31-2204
	M39012/ 20-0001	1 3/32	9/16	.224	1 5/8	Clamp	A	S	—	31-3361
58, 141	M39012/ 20-0002	1 1/8	9/16	.206	1 21/32	Crimp	B	S	—	31-3364
59, 62, 140, 210	—	1 3/16	9/16	.261	1 19/32	Crimp	B	S	—	31-336
59, 62, 71, 140, 210	—	1 1/4	9/16	.258	1 1/32	UG Std.	C	S	Rexolite Insulator	31-850
	—	1 1/4	9/16	.259	1	UG Std.	C	S	—	8575
	—	1 1/16	9/16	.257	1 9/16	Imp	A	S	—	86225
71	—	1 3/16	9/16	.275	1 19/32	Crimp	B	N	—	31-337
122	—	1 3/16	9/16	.175	1 19/32	Crimp	B	S	—	31-339
122, 180, 195	—	1 3/16	9/16	.175	1 19/32	Crimp	B	S	—	31-338
174, 188	—	1 3/16	9/16	.115	1 19/32	Crimp	B	S	—	31-316
179, 187	—	1 3/16	9/16	.115	1 19/32	Crimp	B	N	—	31-243
174, 179, 187, 188	—	1 1/4	9/16	.115	1	UG Std.	C	S	—	33275
178, 196	—	1 1/4	9/16	.096	1	UG Std.	C	N	—	21975
Essex 21-597	—	1 3/16	9/16	.175	1 19/32	Crimp	B	N	—	31-340

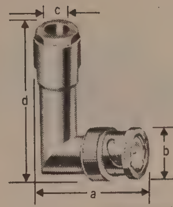
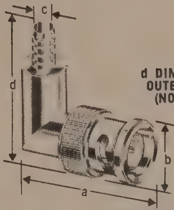


FIG. A: MITRE CONFIGURATION



d DIM. INCLUDES OUTER FERRULE (NOT SHOWN)

FIG. B: MIL-CRIMP CONFIGURATION

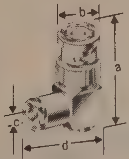


FIG. C: CUBIC CONFIGURATION

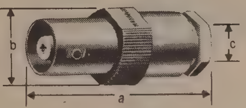
STRAIGHT JACKS

Teflon Insulation • Female Contacts • Weatherproof • 50 Ohm Impedance

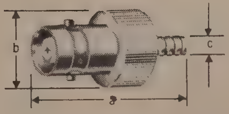
RG-( )/U Cable	Military Part Number	Dimensions, inches a	b	Max. Cable O.D. c	Construction	Stock Code *	Notes	Amphenol Part Number
55, 142, 223	M39012/17-0014	1 11/64	9/16	.220	Crimp	S	—	31-4333
55, 58, 141, 142	UG89/U	1 1/8	9/16	.212	UG Std.	S	—	31-005
	UG89A/U	1 5/64	9/16	.212	UG Std.	S	Non-weatherproof	31-019
55, 55A, 58, 141, 142, 223	UG89B/U	1 9/64	9/16	.224	Imp	S	—	31-205
	UG89C/U	1 9/64	9/16	.224	Imp	S	—	31-2205
	M39012/17-0001	1 9/64	9/16	.212	Clamp	S	—	31-3319
58, 141, 303	M39012/17-0013	1 11/64	9/16	.206	Crimp	S	—	31-4327
59, 62, 140, 210	M39012/17-0015	1 11/64	9/16	.261	Crimp	S	—	31-4328
59, 62, 71, 140, 210	UG261/U	1 1/8	9/16	.258	UG Std.	S	Rexolite insulator 70 Ohm	31-015
	UG261A/U	1 5/64	9/16	.258	UG Std.	S	Rexolite insulator, 70 Ohm, Non-weatherproof	31-022
	UG261B/U	1 9/64	9/16	.258	Imp	S	—	31-215
	UG261C/U	1 9/64	9/16	.258	Imp	S		31-2215
	M39012/17-0002	1 9/64	9/16	.258	Clamp	S	—	31-3320
71	M39012/17-0017	1 11/64	9/16	.275	Crimp	N	—	31-4329
122	M39012/17-0016	1 11/64	9/16	.175	Crimp	N	—	31-4331
122, 180, 195	M39012/17-0003	1 9/64	9/16	.175	Clamp	S	—	31-3321
180, 195	—	1 25/64	9/16	.175	Crimp	S	—	31-330
174, 188	—	1 25/64	9/16	.115	Crimp	S	—	31-317
179, 187	—	1 25/64	9/16	.115	Crimp	S	—	31-244
Essex 21-597	—	1 25/64	9/16	.175	Crimp	S	—	31-332

*Stock Code: S = Stock N = Non Stock

FOR LOCAL SOURCE OF SUPPLY SEE EEM VOL. 2 PAGE 462



TYPICAL UG STANDARD CLAMP (IMPROVED)

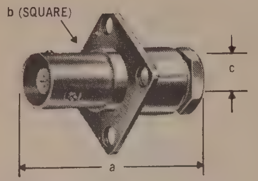


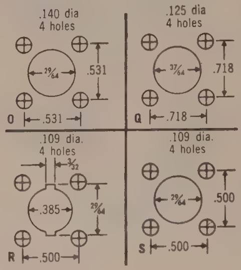
a DIM. INCLUDES OUTER FERRULE (NOT SHOWN)

MIL-CRIMP

BUNKER RAMO AMPHENOL

BNC SERIES




.140 dia
4 holes
29/64
.531
O
.531
.125 dia
4 holes
37/64
.718
Q
.718
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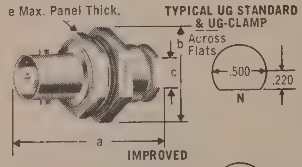
e Max. Panel Thick.
TYPICAL UG STANDARD
& UG-CLAMP
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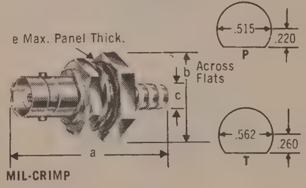
e Max. Panel Thick.
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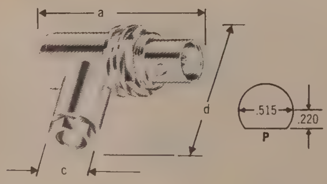
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PANEL JACKS

**Teflon Insulation • Female Contacts • Weatherproof • 50 Ohm Impedance
#3-56 Tapped Flange Holes • Rear Mounted**

RG-( )/U Cable	Military Part Number	Dimensions, inches a	b	Max. Cable O.D. c	Construction	Mtg. Hole	Stock Code *	Notes	Amphenol Part Number
8	—	1 15/32	1	.438	UG Std.	Q	S	.125 dia. Flange Holes	6750
55, 58, 141, 142	UG291/U	1⅛	11/16	.214	UG Std.	R or S	S	—	31-001
	UG291A/U	1 5/64	11/16	.214	UG Std.	R or S	S	Non-weather-proof	31-020
	UG291B/U	1 9/64	11/16	.214	Imp.	S	S	—	31-201
	UG90/U	1 5/64	¾	.214	UG Std.	O	S	.136 dia. Flange Holes	1300
55, 55A, 58, 141, 142, 223	UG291C/U	1 9/64	11/16	.221	Imp.	S	S	—	31-2201
	M39012/18-0002	1 9/64	11/16	.221	MIL Clamp	R or S	S	—	31-3333
59, 62, 71, 140, 210	UG262/U	1⅛	11/16	.259	UG Std.	R or S	S	Rexolite Insulator	31-011
	UG262B/U	1 9/64	11/16	.258	Imp.	S	S	—	31-211
	UG262C/U	1 9/64	11/16	.258	Imp.	S	S	—	31-2211
	M39012/18-0001	1 9/64	11/16	.258	MIL Clamp	R or S	S	—	31-3334
122, 180, 195	M39012/18-0003	1 9/64	11/16	.177	MIL Clamp	R or S	S	—	31-3335
174, 179, 187, 188	—	1 9/64	11/16	.177	Imp.	S	S	—	86425

BULKHEAD JACKS

Teflon Insulation • Female Contacts • Weatherproof • 50 Ohm Impedance • Rear Mounted

RG-( )/U Cable	Military Part Number	Dimensions, inches a	b	Max. Cable O.D. c	e	Construction	Mtg. Hole	Stock Code *	Notes	Amphenol Part Number
55, 142, 223	M39012/19-0014	1 13/32	11/16	.220	.127	Crimp	N	S	—	31-4341
55, 58, 141, 142	UG909/U	1⅛	11/16	.212	.114	Imp	P	S	—	31-206
	—	1 1/16	⅝	.212	.135	UG Std.	T	S	Front Mount	2475
55, 55A, 58, 141, 142, 223	UG909B/U	1 9/64	¾	.224	.221	Imp	P	S	—	31-3206
	—	1 49/64	⅝	.219	.171	Imp	P	N	Herm. Sealed	17725
	M39012/19-0001	1 11/64	11/16	.224	.221	Clamp	N	S	—	31-3347
58, 141	M39012/19-0013	1 13/32	11/16	.206	.115	Crimp	N	S	—	31-4342
59, 62, 140, 210	M39012/19-0015	1 13/32	11/16	.261	.115	Crimp	N	S	—	31-4343
59, 62, 71, 140, 210	UG910/U	1⅛	11/16	.258	.096	Imp	P	S	—	31-207
	UG910B/U	1 9/64	11/16	.258	.221	Imp	P	S	—	31-3207
	M39012/19-0002	1 11/64	11/16	.258	.221	Clamp	N	S	—	31-3348
	UG624/U	1 1/16	⅝	.258	.135	UG Std.	T	S	Front Mount Rexolite Insulator	2075
71	M39012/19-0017	1 13/32	11/16	.275	.115	Crimp	N	N	—	31-4344
122	M39012/19-0016	1 13/32	11/16	.175	.125	Crimp	N	N	—	31-4346
122, 180, 195	—	1 9/64	11/16	.177	.240	Imp	N	S	—	84725
180, 195	—	1⅜	11/16	.175	.125	Crimp	N	S	—	31-345
174, 188	—	1⅜	11/16	.115	.125	Crimp	N	S	—	31-318
179, 187	—	1⅜	11/16	.115	.125	Crimp	N	S	—	31-245
174, 179, 187, 188	—	1 9/64	11/16	.126	.240	UG Std.	N	S	—	86350
178, 196	—	1 9/64	11/16	.098	.240	Imp	N	N	—	86850
179	—	1 5/64	⅝	.094	.135	UG Std.	T	S	Front Mount	17825
Essex 21-597	—	1⅜	11/16	.175	.115	Crimp	N	S	—	31-347

*Stock Code: S = Stock N = Non Stock

FOR LOCAL SOURCE OF SUPPLY SEE EEM VOL. 2 PAGE 462

RF CONNECTORS

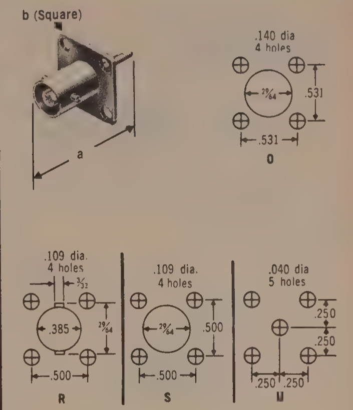
BUNKER RAMO **AMPHENOL**

BNC SERIES

PANEL RECEPTACLES

Female Contacts • Weatherproof • 50 Ohm Impedance • #3-56 Tapped Flange Holes

Military Part Number	Dimensions, inches a	Dimensions, inches b	Mtg. Hole	Stock Code *	Notes	Insulation	Amphenol Part Number
UG290/U	1 1/32	11/16	R or S	S	—	Rexolite	31-003
UG290A/U	1 1/16	11/16	R or S	S	—	Teflon	31-203
M39012/22-0001	1 1/16	11/16	R or S	S	—	Teflon	31-3377
—	1 1/32	11/16	R or S	S	.120 dia. Flange Holes	Rexolite	31-105
UG447/U	1 1/32	11/16	R or S	S	.109 dia. Flange Holes	Rexolite	31-817
UG928/U	27/32	3/4	0	S	Spade Terminal	Rexolite	1100
—	1 1/4	3/4	0	S	.136 dia. Flange Holes, Male Receptacle	Teflon	3150
UG185/U	1 5/64	3/4	0	S	.136 dia. Flange Holes, Turret Terminal	Rexolite	4500
—	25/32	11/16	U	S	.092 dia. Flange Holes, Printed Circuit	Teflon	18225

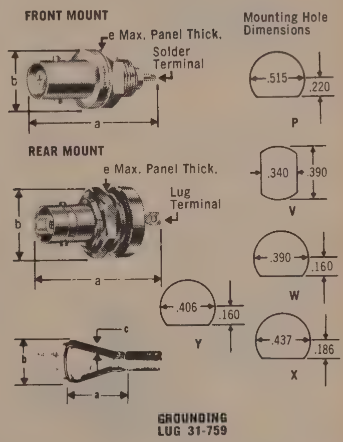


b (Square)
a
.140 dia
4 holes
29/64
.531
.531
O
.109 dia.
4 holes
3/32
.385
29/64
.500
R
.109 dia.
4 holes
29/64
.500
.500
S
.040 dia
5 holes
.250
.250
.250
.250
U

BULKHEAD RECEPTACLES/ Female Contacts • Weatherproof • 50 Ohm Impedance

Military Part Number	Dimensions, inches a	Dimensions, inches b	Dimensions, inches e	Mtg. Hole	Stock Code *	Notes	Mount	Insulation	Amphenol Part Number
UG625/U	1 1/32	1/2	.155	X	S	—	Front	Rexolite	5575
UG625B/U	1 1/16	1/2	.125	X	S	—	Front	Teflon	31-236
M39012/21-0001	1 1/16	1/2	.125	X	S	Gold Plated Contact	Front	Teflon	31-3375
UG657/U	1 19/64	37/64	.200	V	S	Pressurized	Front	Rexolite	31-102
UG657A/U	1 19/64	37/64	.234	V	S	Pressurized	Front	Teflon	31-239
UG912/U	1 13/64	19/32	.250	Y	S	Herm. Seal, Lug Term.	Front	Glass-Teflon	31-238
M39012/24-0002	1 13/64	19/32	.250	W	S	Herm. Seal, Lug Term.	Front	Teflon	31-4238
UG1094/U	1 1/16	1/2	.104	W	S	—	Front	Teflon	31-221
UG1094A/U	1 3/16	1/2	.155	W	S	—	Front	Teflon	31-2221
M39012/21-0002	1 1/16	1/2	.250	W	S	Gold Plated Contact	Front	Teflon	31-3376
—	1 1/32	1/2	.155	X	S	—	Front	Teflon	11300
—	1 1/32	1/2	.155	X	S	Male Contact (Polarized)	Front	Teflon	11325
—	1 13/32	9/16	.148	W	S	Herm. Seal, Plug (Male) Receptacle	Front	Glass-Teflon	86250
—	1 13/32	3/4	.323	V	S	Herm. Seal. Lug Term.	Front	Glass-Teflon	87225
UG254A/U	1 15/32	13/16	.152	.516 dia.	S	Pressurized	Rear	Rexolite	31-016
M39012/24-0001	1 13/64	11/16	.250	P	S	—	Rear	Teflon	31-4237

To ground cable shield specify Amphenol accessory lug 31-759 as shown (front mount only)

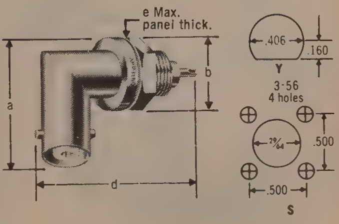


FRONT MOUNT
e Max. Panel Thick.
Solder Terminal
b
a
REAR MOUNT
e Max. Panel Thick.
Lug Terminal
b
a
c
b
a
GROUNDING LUG 31-759
Mounting Hole Dimensions
.515
.220
P
.340
.390
V
.390
.160
W
.406
.160
Y
.437
.186
X

ANGLE RECEPTACLES

Teflon Insulation • Female Contacts • Weatherproof • 50 Ohm • Front Mount

Military Part Number	Dimensions, inches a	Dimensions, inches b	Dimensions, inches d	Dimensions, inches e	Mtg. Hole	Stock Code *	Mounting Type	Notes	Amphenol Part Number
UG1098/U	29/32	19/32	1 9/32	.168	Y	S	Bulkhead	—	31-222
UG1098A/U	29/32	19/32	1 3/8	.313	Y	S	Bulkhead	—	31-2222
—	1 1/16	11/16	15/16	.150	S	S	Panel	.140 dia. Flange Holes	5675
UG535/U	1 3/32	3/4	15/16	.150	S	S	Panel	#3-56 Flange Holes	5075



e Max. panel thick.
b
a
d
.406
.160
Y
3-56
4 holes
29/64
.500
.500
S

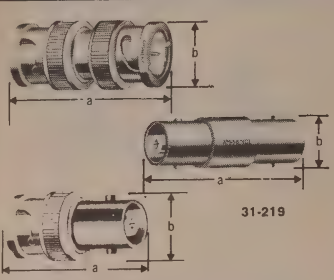
*Stock Code: S = Stock N = Non Stock

FOR LOCAL SOURCE OF SUPPLY SEE EEM VOL. 2 PAGE 462

RF CONNECTORS

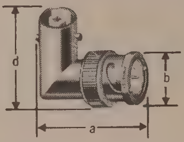
BUNKER RAMO AMPHENOL

BNC SERIES



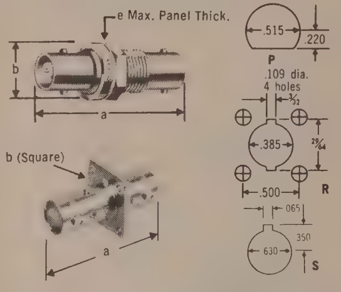
STRAIGHT ADAPTERS/Teflon Insulation • Weatherproof • 50 Ohm Impedance

Military Part Number	Dimensions, inches		Stock Code *	Adapter Ends	Notes	Amphenol Part Number
	a	b				
UG491A/U	1 1/4	9/16	S	Plug-Plug	—	31-218
UG914/U	1 9/32	7/16	S	Jack-Jack	—	31-219
UG491B/U	1 1/4	9/16	S	Plug-Plug	Beryl. Outer Contact	31-2218
UG491/U	1 1/4	9/16	S	Plug-Plug	—	8425
—	1 17/32	9/16	S	Plug-Jack	—	21925
—	1 9/32	7/16	S	Jack-Jack	—	75000



ANGLE ADAPTERS/Teflon Insulation • Weatherproof • 50 Ohm Impedance

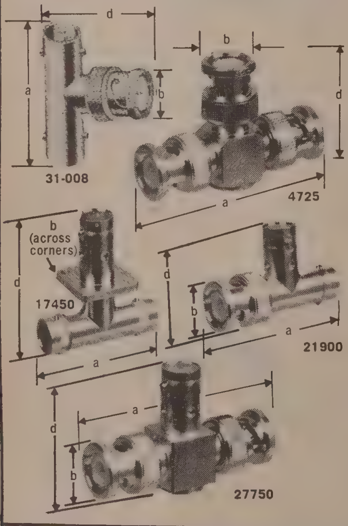
Military Part Number	Dimensions, inches			Stock Code *	Adapter Ends	Notes	Amphenol Part Number
	a	b	d				
UG306/U	1	9/16	31/32	S	Jack-Plug	Beryl. Outer Contact	31-2209
UG306A/U	1 1/16	9/16	57/64	S	Jack-Plug	—	31-009
UG306B/U	1 1/16	9/16	57/64	S	Jack-Plug	Beryl. Outer Contact	31-209



BULKHEAD & PANEL ADAPTERS/Weatherproof • 50 Ohm Impedance

Military Part Number	Dimensions, inches			Stock Code *	Mtg. Hole	Adapter Ends	Notes	Amphenol Part Number
	a	b	e					
UG492A/U	1 13/32	11/16	.181	S	P	Jack-Jack	Herm. Sealed	31-220
UG492B/U	1 25/64	11/16	.163	S	P	Jack-Jack	Herm. Sealed/O Ring	31-2220
UG492D/U	1 17/32	11/16	.275	S	P	Jack-Jack	Herm. Sealed/O Ring	31-3220
UG414/U	1 9/32	11/16	.250	S	R	Jack-Jack	Panel Mount	47000
UG414A/U	1 9/32	11/16	.260	S	R	Jack-Jack	Panel Mount	47025
—	1 11/16	13/16	.185	N	S	Plug-Plug	Herm. Sealed	75500

Insulation: Panel Mount Type — Teflon. Bulkhead Mount Type — Glass-Teflon



TEE ADAPTERS/Teflon Insulation • Weatherproof • 50 Ohm Impedance

Military Part Number	Dimensions, inches			Stock Code *	Adapter Ends	Notes	Amphenol Part Number
	a	b	d				
UG274/U	1 9/32	9/16	1 3/32	S	Jack-Plug-Jack	Rexolite Insulator	31-008
UG274A/U	1 9/32	9/16	1 1/16	S	Jack-Plug-Jack	Beryl. Outer Contact	31-208
UG274B/U	1 9/32	9/16	1 1/16	S	Jack-Plug-Jack	Beryl. Outer Contact	31-2208
—	1 13/16	9/16	1 7/32	S	Plug-Plug-Plug	—	4725
—	1 9/32	11/16	1 7/16	S	Jack-Jack-Jack	Panel Mt., Mtg. Hole R Rexolite Insulator	17450
—	1 17/32	9/16	1	S	Plug-Jack-Jack	—	21900
—	1 13/16	9/16	1 3/16	S	Plug-Jack-Plug	—	27750
—	1 3/4	9/16	29/32	S	Cable-Plug-Cable	RG58/U Cable Syn. Rubber Clamp	33725

*Stock Code: S = Stock N = Non Stock

FOR LOCAL SOURCE OF SUPPLY SEE EEM VOL. 2 PAGE 462

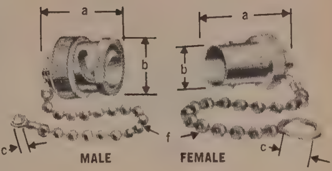
RF CONNECTORS

BUNKER RAMO AMPHENOL

BNC SERIES

CAPS/ Weatherproof

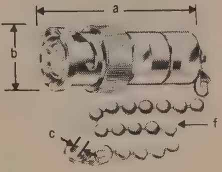
Military Part Number	Dimensions, inches a	b	c	Chain Length f	Stock Code *	Notes	Amphenol Part Number
MALE							
CW123/U	11/16	9/16	.142	2¼	S	—	31-006
CW155/U	37/64	9/16	—	—	S	—	31-007
CW159/U	11/16	9/16	.144	2¼	S	Shorting Male Contact	31-017
M39012/25-0006	45/64	9/16	.130	2¼	S	—	31-026
CW155A/U	37/64	9/16	—	—	S	—	31-027
—	23/32	9/16	3/8	3½	S	—	900
—	19/32	9/16	—	—	S	Shorting Male Contact	5275
—	23/32	9/16	.510	2½	S	Solder Lug	87300
FEMALE							
CW282/U	11/16	½	9/32	3	S	—	31-210
—	25/32	9/16	—	—	N	—	1750
—	25/32	9/16	—	—	S	Shorting Female Contact	15300



RESISTOR TERMINATED CAPS/ Male Contacts ● Weatherproof

Military Part Number	Dimensions, inches a	b	c	Chain Length f	Stock Code *	Notes	Amphenol Part Number
MX554	1¼	9/16	.144	3½	S	▲	4700
MX554A	1¼	9/16	.144	3½	S	100 Ohm Resistor	39575
—	1¼	9/16	.144	3½	S	▲	35650
—	1 13/64	9/16	—	—	S	▲	35725
—	1½	9/16	—	—	S	51 or 75 Ohm, 1 Watt Resistor	46650

▲To order without resistor, add -1 to part number; to order with resistor, add resistor value to part number. ½ watt 5% resistor values (ohms) 47, 51, 68, 75, 82, 91, 100, 120, 130, 150, 180, 240, 270, 300, 470, 510, 560, 680, 750, 820, 1000, 1500, 3900, 4700, 10000, 100000, 150000

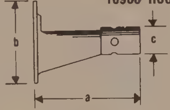


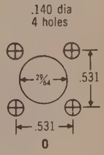
HOODS & ACCESSORIES/ Non-Weatherproof

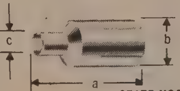
Military Part Number	Dimensions, inches a	b	c	d	Mtg. Hole	Stock Code *	Notes	Amphenol Part Number
HOODS								
MX195	7/8	11/16	7/32	—	R or S	S	RG55, 58, 59, 62/U Cables, Plug-in	87175
MX367	7/8	11/16	17/64	—	R or S	S	RG55, 62/U Cable, Square Flange	10925
MX195A	13/16	11/32	3/16	—	—	N	RG55, 58/U Cable, Square Flange	10900
NUT STRAP								
MT412	¾	.081	7/16	.200	0	S	4 Holes with 4-40 NC-28 threads	1600
SHIELD GROUNDING LUG								
—	29/32	25/64	1/8	—	—	S	Use on Front Mount Receptacle	31-759
CUJAK ADAPTER KIT for 421-668 cable (.141 dia.)								
—	Includes clamp nut, gasket, compression clamp, and bushing to replace standard clamping components of improved type BNC connectors					N	—	31-885

*Stock Code: S = Stock N = Non Stock

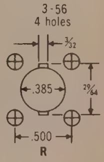
10900 HOOD

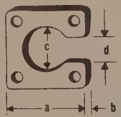




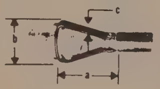


87175 HOOD

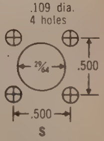




1600 NUT STRAP



31-759 LUG



FOR LOCAL SOURCE OF SUPPLY SEE EEM VOL. 2 PAGE 462

RF CONNECTORS

BUNKER RAMO AMPHENOL

TNC SERIES

Threaded coupling TNC Connectors are designed for aircraft, missile and other applications in which extreme vibration may be encountered. They are small, weatherproof types and have a constant impedance of 50 ohms.

Mil-Crimps are recommended as the optimum TNC connector, especially for high-volume production assemblies. They are designed to give maximum operating performance at lowest possible installed cost. These units assemble in a fraction of the time normally required for standard braid-clamp type connectors by eliminating critical assembly and soldering operation and reducing the number of parts to handle. The cable retention of the crimps are superior to the field serviceable types.

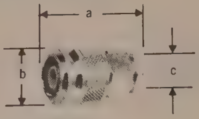
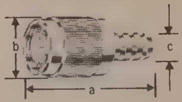


FIG. A

FIG. B

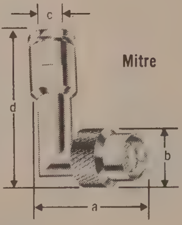


a DIM. INCLUDES OUTER FERRULE NOT SHOWN ON ILLUSTRATION

STRAIGHT PLUGS

Teflon Insulation • Male Contacts • Weatherproof • 50 Ohm Impedance

RG-( )/U Cable	Military Part Number	Dimensions, inches a	b	Max. Cable O.D. c	Fig.	Stock Code *	Notes	Amphenol Part Number
55, 142, 223	M23329/4-02-04	1 7/32	9/16	.220	B	S	Mil Crimp△	31-2373
55, 58, 141, 142, 223	—	1 1/8	5/8	.219	A	S	Gold Plated Contact Safety Wiring	76175
	—	1 1/8	5/8	.219	A	S	—	77175
	—	1 1/8	5/8	.219	A	S	Female Contact (Polarized)	79050
58, 141	M23329/4-01-03	1 7/32	9/16	.206	B	S	Mil Crimp△	31-2367
59, 62, 140, 210	M23329/4-05	1 7/32	9/16	.261	B	S	Mil Crimp△	31-2368
59, 62, 71 140, 210	—	1 1/8	5/8	.257	A	S	Female Contact (Polarized)	79475
71	—	1 7/32	9/16	.257	B	S	Mil Crimp△	31-2369
122	—	1 7/32	9/16	.175	B	N	Mil Crimp△	31-2371
122, 195	—	1 1/8	5/8	.177	A	N	—	79725
180, 195	M23349/4-06	1 7/32	9/16	.175	B	S	Mil Crimp△	31-2370
174, 188	—	1 7/32	9/16	.115	B	S	Mil Crimp△	31-2315
174, 179, 187, 188	—	1 1/16	19/32	.126	A	S	Spring Brass Outer Contact	73475
179, 187	—	1 7/32	9/16	.115	B	N	Mil Crimp△	31-2242
180	—	1	19/32	.150	A	N	Spring Brass Outer Contact	78625
Essex 21-597	—	1 7/32	9/16	.175	B	N	Mil Crimp△	31-2372



Mitre

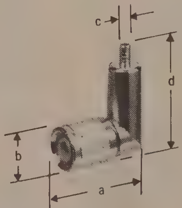
ANGLE PLUGS

Teflon Insulation • Male Contacts • Weatherproof • 50 Ohm Impedance • Capt. Contact, Gold Plated

RG-( )/U Cable	Military Part Number	Dimensions, inches a	b	Max. Cable O.D. c	d	Stock Code *	Notes	Amphenol Part Number
55, 142, 223	—	1 3/16	9/16	.220	1 37/64	S	MIL Crimp△	31-2381
55, 58, 141, 142, 223	—	1 1/8	19/32	.219	1 37/64	S	Mitre	79075
58, 141	—	1 3/16	9/16	.206	1 37/64	S	MIL Crimp△	31-2382
59, 62, 140, 210	—	1 3/16	9/16	.261	1 37/64	N	MIL Crimp△	31-2383
59, 62, 71, 140, 210	—	1 3/32	5/8	.257	1 29/32	N	Mitre	79400
71	—	1 3/16	9/16	.275	1 37/64	N	MIL Crimp△	31-2384
122	—	1 3/16	9/16	.175	1 37/64	N	MIL Crimp△	31-2386
174, 188	—	1 3/16	9/16	.115	1 37/64	S	MIL Crimp△	31-2316
179, 187	—	1 3/16	9/16	.115	1 37/64	N	MIL Crimp△	31-2243
180, 195	—	1 3/16	9/16	.175	1 37/64	N	MIL Crimp△	31-2385
Essex 21-597	—	1 3/16	9/16	.175	1 37/64	N	MIL Crimp△	31-2387

△ Add -1000 to Part Number for safety wiring holes. b dimension increases to 11/16

*Stock Code: S = Stock N = Non Stock



MIL-CRIMP
d DIM. INCLUDES
OUTER FERRULE
(NOT SHOWN)

FOR LOCAL SOURCE OF SUPPLY SEE EEM VOL. 2 PAGE 462

RF CONNECTORS

BUNKER RAMO AMPHENOL

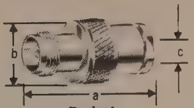
TNC SERIES

STRAIGHT JACKS

Teflon Insulation • Female Contacts • Weatherproof • 50 Ohm Impedance

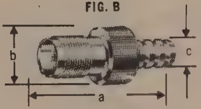
RG-( )/U Cable	Military Part Number	Dimensions, inches a	b	Max. Cable O.D. c	Fig.	Stock Code *	Notes	Amphenol Part Number
55, 142, 223	M23329/4-08	1⅜	9/16	.220	B	S	MIL Crimp	31-2380
55, 58, 141, 142, 223	—	1¼	⅝	.219	A	S	Gold Pltd. Cont.	79600
58, 141	M23329/4-07	1⅜	9/16	.206	B	S	MIL Crimp	31-2374
59, 62, 140, 210	M23329/4-11	1⅜	9/16	.261	B	N	MIL Crimp	31-2375
59, 62, 71, 140, 210	—	1 9/64	⅝	.257	A	N	Male Contact (Polarized)	79450
122	—	1⅜	9/16	.175	B	N	MIL Crimp	31-2378
174, 188	—	1⅜	9/16	.115	B	S	MIL Crimp	31-2317
179, 187	—	1⅜	9/16	.115	B	N	MIL Crimp	31-2244
180, 195	M23329/4-12	1⅜	9/16	.175	B	S	MIL Crimp	31-2377
180	—	1 9/64	⅝	.150	A	N	—	77050
Essex 21-597	—	1⅜	9/16	.175	B	N	MIL Crimp	31-2379

FIG. A



Typical

FIG. B



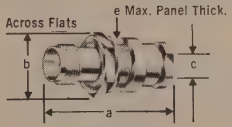
MIL-CRIMP
a DIM. INCLUDES
OUTER FERRULE
(NOT SHOWN)

BULKHEAD JACKS

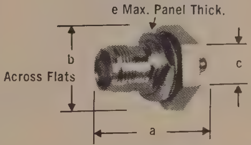
Teflon Insulation • Female Contacts • Weatherproof • 50 Ohm Impedance • Rear Mounted

RG-( )/U Cable	Military Part Number	Dimensions, inches a	b	Max. Cable O.D. c	e	Mtg. Hole	Stock Code *	Notes	Amphenol Part Number
55, 142, 223	M23329/4-14	1 5/16	11/16	.220	.115	N	S	MIL Crimp	31-2388
55, 58, 141, 142, 223	—	1 9/64	11/16	.224	.109	W	S	Gold Pltd. Cont.[1]	79425
58, 141	M23329/4-13	1 5/16	11/16	.206	.115	N	S	MIL Crimp	31-2389
59, 62, 141, 210	M23329/4-17	1 5/16	11/16	.261	.115	N	S	MIL Crimp	31-2390
59, 62, 71, 141, 210	—	1 27/32	¾	.257	.171	W	N	Herm. Sealed[1]	77350
122	—	1 5/16	11/16	.175	.115	N	N	MIL Crimp	31-2393
180, 195	M23329/4-18	1 5/16	11/16	.175	.115	N	S	MIL Crimp	31-2392
174, 188	—	1 5/16	11/16	.115	.115	N	S	MIL Crimp	31-2318
179, 187	—	1 5/16	11/16	.115	.115	N	S	MIL Crimp	31-2245
180	—	1 7/32	19/32	.150	.187	W	N	—	77100
Essex 21-597	—	1 5/16	11/16	.175	.115	N	N	MIL Crimp	31-2394

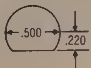
[1] TYPICAL



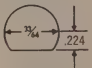
TYPICAL



MIL-CRIMP
a DIM. INCLUDES
OUTER FERRULE
(NOT SHOWN)



N

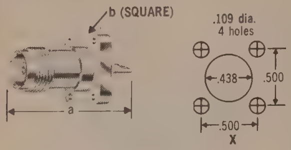


W

△ Add -1000 to part number for safety wiring holes, b dimension increases to 11/16
*Stock Code: S = Stock N = Non Stock

FOR LOCAL SOURCE OF SUPPLY SEE EEM VOL. 2 PAGE 462

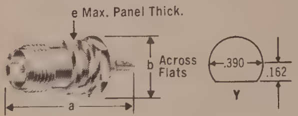
TNC SERIES



PANEL RECEPTACLES / MTG. HOLE X

Teflon Insulation • Female Contacts • Weatherproof • 50 Ohm Impedance
#3-56 Tapped Flange Holes

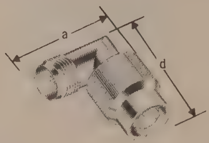
Military Part Number	Dimensions, inches		Stock Code *	Notes	Amphenol Part Number
	a	b			
—	1¹⁄₁₆	¹¹⁄₁₆	S	Gold Plated Contact	31-2300
—	1¹⁄₁₆	¹¹⁄₁₆	N	Male, Silver Plated Contact (Polarized)	78200
—	¾	¹¹⁄₁₆	S	Silver Plated Contact, Herm. Sealed	79750



BULKHEAD RECEPTACLES / MTG. HOLE Y

Teflon Insulation • Female Contacts • Weatherproof • 50 Ohm Impedance • Front Mounting

Military Part Number	Dimensions, inches			Stock Code *	Notes	Amphenol Part Number
	a	b	e			
—	1¹⁄₁₆	½	.140	S	Gold Plated Contact	31-2301
—	²⁷⁄₃₂	½	.109	S	Gold Plated Contact & Body	77300
—	1¹⁄₁₆	⅝	.187	S	Silver Plated Contact, Herm. Sealed	79800

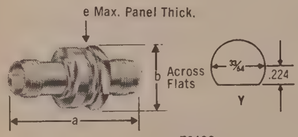


79125

ANGLE ADAPTERS

Teflon Insulation • Weatherproof • 50 Ohm Impedance

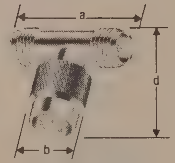
Military Part Number	Dimensions, inches		Stock Code *	Adapter Ends	Notes	Amphenol Part Number
	a	d				
—	1¹⁄₃₂	1¹⁄₃₂	S	Plug-Jack	—	79125



79100

BULKHEAD ADAPTER/50 Ohm Impedance

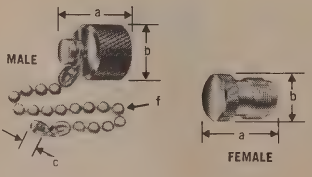
Military Part Number	Dimensions, inches			Stock Code *	Adapter Ends	Notes	Amphenol Part Number
	a	b	e				
—	1¹³⁄₃₂	¾	.171	S	Jack-Jack	Hermetically Sealed	79100



79700

TEE ADAPTER/Teflon Insulation • Weatherproof • 50 Ohm Impedance

Military Part Number	Dimensions, inches			Stock Code *	Adapter Ends	Notes	Amphenol Part Number
	a	b	d				
—	1⁹⁄₃₂	⅝	1³⁄₁₆	S	Jack-Plug-Jack	—	79700



CAPS/Weatherproof

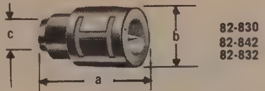
Military Part Number	Dimensions, inches				Stock Code *	Notes	Amphenol Part Number
	a	b	c	Chain Length f			
—	⅜	⁹⁄₁₆	.130	4	S	Male	78750
—	³⁷⁄₆₄	½	—	—	S	Female	78400

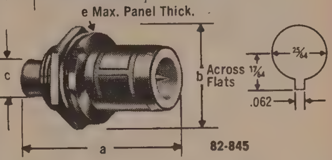
*Stock Code: S = Stock N = Non Stock

RF CONNECTORS

BUNKER RAMO AMPHENOL

PLUG-IN

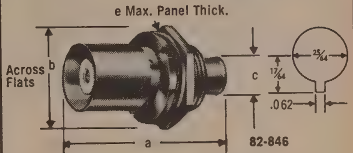

c
b
a
82-830
82-842
82-832


e Max. Panel Thick.
c
b
Across Flats
25/64
17/64
.062
a
82-845

PATCH-CORD PLUGS

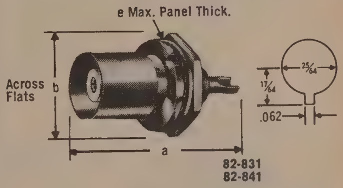
Non-constant Impedance • Male Contacts • Non-weatherproof

RG-( )/U Cables	Dimensions, inches a	b	Max. Cable O.D. c	e	Insulation	Stock Code *	Notes	Amphenol Part Number
58, 141	⅝	21/64	.150	—	Rexolite	S	—	82-830
	⅝	21/64	.150	—	Teflon	S	—	82-842
	11/16	½	.150	.093	Teflon	S	Bulkhead Plug	82-845
59, 62, 71	⅝	21/64	.150	—	Rexolite	S	—	82-832


e Max. Panel Thick.
Across Flats
b
c
25/64
17/64
.062
a
82-846

PATCH-CORD BULKHEAD JACKS/Teflon Insulation • Non-weatherproof

RG-( )/U Cables	Dimensions, inches a	b	Max. Cable O.D. c	e	Stock Code *	Notes	Amphenol Part Number
58, 141	49/64	½	.150	.093	S	—	82-846


e Max. Panel Thick.
Across Flats
b
25/64
17/64
.062
a
82-831
82-841

PATCH-CORD BULKHEAD RECEPTACLES/

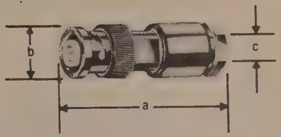
Non-constant Impedance • Female contacts • Non-weatherproof

Dimensions, inches a	b	e	Insulation	Stock Code *	Notes	Amphenol Part Number
15/16	½	.093	Rexolite	S	—	82-831
15/16	½	.093	Teflon	S	—	82-841

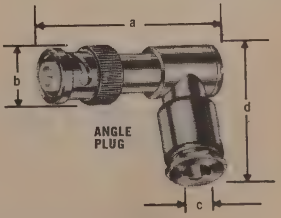
*Stock Code: S = Stock N = Non Stock

MHV SERIES

Bayonet-lock coupling MHV series connectors are small, high voltage types which may be used up to 5000 volts peak at frequencies up to 50 MHZ. Impedance is non-constant. These series are similar to the BNC series; however, they are not designed to intermate.



STRAIGHT PLUG



ANGLE PLUG

PLUGS

Teflon Insulation • Non-constant Impedance • Male Contacts • Weatherproof

RG-( )/U Cable	Military Part Number	Dimensions, inches a	b	Max. Cable O.D. c	d	Stock Code *	Notes	Amphenol Part Number
54A	—	1 33/64	½	.257	—	S	Improved Straight Plug	28375
55, 58, 141, 142	—	1½	9/16	.212	—	S	Straight Plug	29100
59, 62, 71,	UG932/U	1½	9/16	.257	—	S	Straight Plug	28000
140, 210	UG932A/U	1 33/64	½	.257	—	S	Improved Straight Plug	27975
55, 58, 141, 142	—	1 9/16	9/16	.212	1 15/64	S	Angle Plug, 2000 Volts Peak	28100
59, 62, 71, 140, 210	—	1 9/16	9/16	.258	1 15/64	S	Angle Plug, 2000 Volts Peak	28125

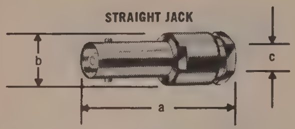
*Stock Code: S = Stock N = Non Stock

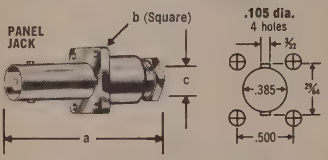
FOR LOCAL SOURCE OF SUPPLY SEE EEM VOL. 2 PAGE 462

RF CONNECTORS

BUNKER RAMO AMPHENOL

MHV SERIES


STRAIGHT JACK
b
c
a

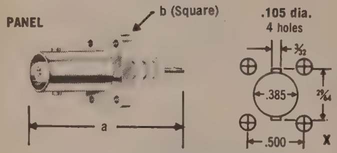

PANEL JACK
b (Square)
c
a
.105 dia.
4 holes
3/32
.385
23/64
.500

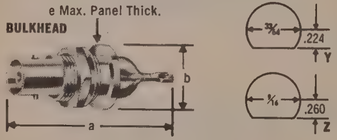
JACKS

Teflon Insulation ● Non-constant Impedance ● Male Contacts ● Weatherproof

RG-( )/U Cable	Military Part Number	Dimensions, inches a	b	Max. Cable O.D. c	Stock Code *	Notes	Amphenol Part Number
55, 58, 141, 142	—	1 15/32	9/16	.212	S	Straight Jack	28325
59, 62, 71, 140, 210	UG1016A/U	1 7/16	1/2	.257	S	Improved Straight Jack	27075
55, 58, 141, 142	—	1 7/16	11/16	.212	S	Panel Jack▲	28275
59, 62, 71, 140, 210	UG961/U	1 7/16	11/16	.257	S	Panel Jack▲	28225

▲Panel Jacks have #3-56 tapped flange holes; rear mounted

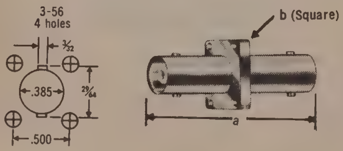

PANEL
b (Square)
a
.105 dia.
4 holes
3/32
.385
23/64
.500
X

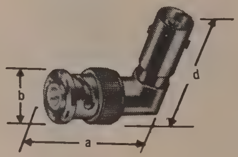

e Max. Panel Thick.
BULKHEAD
b
a
23/64
.224
Y
9/16
.260
Z

RECEPTACLES

Teflon Insulation ● Non-constant Impedance ● Female Contacts ● Weatherproof ● Rear Mounted

Military Part Number	Dimensions, inches a	b	e	Mtg. Hole	Stock Code *	Notes	Amphenol Part Number
UG931/U	1 7/16	11/16	—	X	S	Panel Type, #3-56 Tapped Flange Holes	27000
—	1 11/16	11/16	.250	Y	S	Bulkhead Type, Hermetically Sealed	10400
—	1 1/16	5/8	.109	Z	S	Bulkhead Type	27025
—	1 11/16	11/16	.328	Y	S	Bulkhead Type, Hermetically Sealed	28400


3-56
4 holes
3/32
.385
23/64
.500
b (Square)
a



ADAPTERS

Teflon Insulation ● Non-constant Impedance ● Weatherproof

Military Part Number	Dimensions, inches a	b	d	Stock Code *	Adapter Ends	Notes	Amphenol Part Number
—	1 1/2	11/16	—	S	Plug-Jack	Panel Mount Adapter	12650
—	1 7/32	9/16	1 1/16	S	Jack-Jack	Angle Adapter	10425

*Stock Code: S = Stock N = Non Stock

NOTE: Use BNC Caps for MHV Connectors.

FOR LOCAL SOURCE OF SUPPLY SEE EEM VOL. 2 PAGE 462

RF CONNECTORS

BUNKER RAMO AMPHENOL

Threaded coupling UHF series are low-cost, general purpose connectors used in applications at lower frequency where no serious mismatch is introduced. They will operate satisfactorily at frequencies up to 300 MHZ and have a peak voltage rating of 500 volts.

While most UHF Connectors have conventional solder-type cable affixement, Quick-Crimp* connectors feature Amphenol's patented hex crimp design which permits faster, easier and more reliable assembly.

Except as noted, UHF connectors have small size bodies; large sizes are noted, and will **not** mate with the small connectors.

* U.S. Patent 3,054,981

STRAIGHT PLUGS

Non-constant Impedance • Male Contacts • Non-weatherproof

RG-( )/U Cable	Military Part Number	Dimensions, inches Length a	Largest O.D. b	Max. Cable O.D. c	Insulation	Stock Code *	Notes	Amphenol Part Number
8, 11, 149, 213	—	1 11/32	¾	.418	Bakelite	S	Crimp	83-8SP
8,9, 11, 13, 63, 87, 149, 213, 214, 216, 225	PL-259	1½	¾	.444	Filled Bakelite	S	UG Standard	83-1SP
	PL-259	1½	11/16	.437	Teflon	S	UG Standard	83-822
	PL-259A	1 9/16	23/32	.444	Filled Bakelite	S	Clamp Set Screw	83-1SPN
	PL-259A	1 9/16	13/16	.450	Teflon	S	Clamp Set Screw	83-756
	—	1½	¾	.444	Filled Bakelite	N	UG Standard, Dip Solder Contact	83-1SP-1002
	—	1 43/64	¾	.444	Filled Bakelite	S	Solderless Braid Clamp	83-851
	—	1½	23/32	.444	Filled Bakelite	S	Push-on	83-5SP
11,149	—	1 43/64	¾	.437	Filled Bakelite	S	Solderless Braid Clamp & Contact	83-850
17, 218	—	2⅛	1 5/16	.625	Teflon	S	UG Standard	83-86
	—	2⅛	1 5/16	.625	Rexolite	S	UG Standard	10450
34	UG358/U	1 13/16	1⅛	.625	Filled Bakelite	S	Large Body, Weatherproof	83-21SP
55, 142, 223	—	1 11/32	¾	.220	Bakelite	N	Crimp	83-55SP
58, 141	—	1 11/32	¾	.206	Bakelite	S	Crimp	83-58SP
	UG203/U	1 9/16	23/32	.214	Filled Bakelite	S	Clamp Set Screw	83-776
59, 62, 71, 140, 210	UG111/U	1 11/16	25/32	.257	Filled Bakelite	S	UG Standard	83-750
59, 62, 140, 210	—	1 11/32	¾	.251	Bakelite	N	Crimp	83-59SP

ANGLE PLUGS/Non-constant Impedance • Male Contacts • Non-weatherproof

RG-( )/U Cable	Dimensions, inches a	b	Max. Cable O.D. c	d	Insulation	Stock Code *	Notes	Amphenol Part Number
8, 9, 11, 13, 63, 87,	1⅜	¾	.444	1 35/64	Teflon	S	—	83-67
149, 213, 214, 216, 225	1⅜	¾	.444	1 35/64	Polystyrene	S	—	83-59

PANEL RECEPTACLES

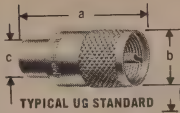
Non-constant Impedance • Female Contacts • Non-weatherproof • .125 Dia. Flange Holes

Military Part Number	Dimensions, inches a	b	Mtg. Hole	Insulation	Stock Code *	Notes	Amphenol Part Number
SO-239	1 1/16	1	X	Filled Bakelite	S	Square Flange	83-1R
SO-239	1 1/16	1	X	Polystyrene	S	Square Flange	83-1RTY
SO-239	1 1/16	1	X	Teflon	S	Square Flange	83-798
—	1 3/16	1	X	Ceramic	S	Square Flange, Pressurized	83-716
—	1 1/16	1 19/64	Z	Filled Bakelite	N	Oval Flange	83-876
UG357/U	1 5/64	1 9/32	Y	Filled Bakelite	S	Large Body	83-21R

*Stock Code: S = Stock N = Non Stock

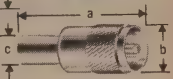
FOR LOCAL SOURCE OF SUPPLY SEE EEM VOL. 2 PAGE 462

UHF SERIES

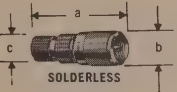


TYPICAL UG STANDARD

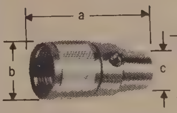
A DIM. INCLUDES OUTER FERRULE



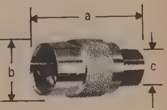
CRIMP



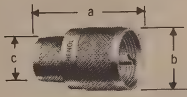
SOLDERLESS



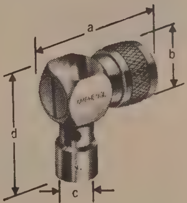
CLAMP SET SCREW

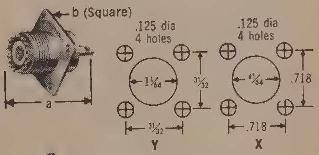


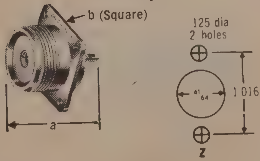
PUSH-ON PL259



LARGE SIZE 83-21SP





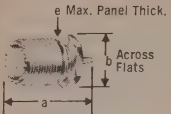


LARGE SIZE 83-21R

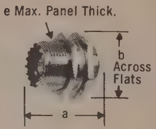
RF CONNECTORS

BUNKER RAMO AMPHENOL

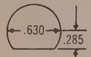
UHF SERIES



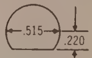
FRONT PANEL MOUNT



REAR PANEL MOUNT



V



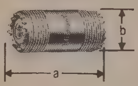
W

BULKHEAD RECEPTACLES

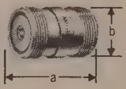
Non-constant Impedance • Female Contacts • Non-weatherproof

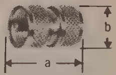
Military Part Number	Dimensions, inches			Mtg. Hole	Insulation	Stock Code *	Notes	Amphenol Part Number
	a	b	e					
—	1 3/32	9/16	.156	W	Rexolite-Teflon	S	Front Panel Mount	83-875
—	1 3/32	9/16	.156	W	Filled Bakelite	S	Front Panel Mount	83-875-1002
—	1 1/16	3/4	.093	V	Filled Bakelite	S	Rear Panel Mount	83-878
UG266/U	1 13/32	7/8	.515	41/64 Dia.	Rexolite	S	Rear Panel Mount, Pressurized	4575
—	1 13/32	7/8	.515	41/64 Dia.	Glass-Teflon	S	Rear Panel Mount, Hermetic	74525

83-1J



83-21J

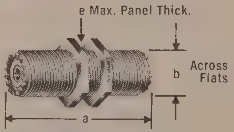




83-877

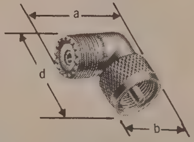
STRAIGHT ADAPTERS/Non-constant Impedance • Non-weatherproof

Military Part Number	Dimensions, inches		Insulation	Adapter Ends	Stock Code *	Notes	Amphenol Part Number
	a	b					
PL-258	1 1/8	5/8	Polystyrene	Jack-Jack	S	—	83-1J
—	1 1/8	5/8	Teflon	Jack-Jack	S	—	11850
—	1 5/16	25/32	Polystyrene	Plug-Plug	S	—	83-877
UG360/U	1 1/8	1	Polystyrene	Jack-Jack	N	Large Body	83-21J



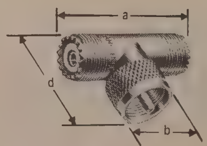
BULKHEAD ADAPTERS/Non-constant Impedance • Non-weatherproof

Military Part Number	Dimensions, inches			Mtg. Hole Diameter	Insulation	Adapter Ends	Stock Code *	Notes	Amphenol Part Number
	a	b	e						
UG363/U	2	5/8	57/64	41/64	Polystyrene	Jack-Jack	S	—	83-1F
UG224/U	1 3/8	5/8	9/32	41/64	Rexolite	Jack-Jack	S	—	29500



ANGLE ADAPTERS/Non-constant Impedance • Non-weatherproof

Military Part Number	Dimensions, inches			Insulation	Adapter Ends	Stock Code *	Notes	Amphenol Part Number
	a	b	d					
UG646/U	1 9/32	3/4	1 3/16	Polystyrene	Jack-Plug	S	—	83-1AP
M-359A	1 7/32	3/4	1 1/16	Polystyrene	Jack-Plug	S	—	83-58



TEE ADAPTERS/Non-constant Impedance • Non-weatherproof

Military Part Number	Dimensions, inches			Insulation	Adapter Ends	Stock Code *	Notes	Amphenol Part Number
	a	b	d					
M-358	1 5/8	3/4	1 13/64	Polystyrene	Jack-Plug-Jack	S	—	83-1T

*Stock Code: S = Stock N = Non Stock

FOR LOCAL SOURCE OF SUPPLY SEE EEM VOL. 2 PAGE 462

RF CONNECTORS

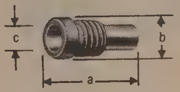
BUNKER RAMO AMPHENOL

UHF SERIES

REDUCING ADAPTERS

Non-weatherproof • For use with 83-1SP, -1SP-1002, -59, -67, -750, -822, -850, -851

RG-( )/U Cables	Military Part Number	Dimensions, inches			Stock Code *	Notes	Amphenol Part Number
		a	b	Max. Cable O.D. c			
55, 58, 141, 142 (except 55A)	UG175/U	1	7⁄16	.209	S	—	83-185
59, 62, 71, 140, 210	UG176/U	1	7⁄16	.257	S	—	83-168

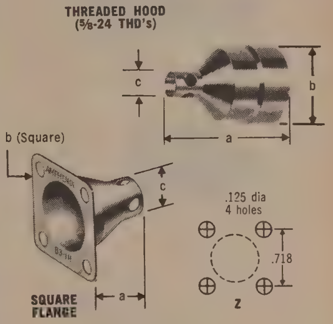


HOODS

Non-weatherproof

RG-( )/U Cables	Military Part Number	Dimensions, inches			Mtg. Hole	Stock Code *	Notes	Amphenol Part Number
		a	b	Max. Braid Dia. c				
8, 10, 11, 12, 63, 79, 115, 149, 213, 215	UG106/U	¾	1	.345	Z	S	Sq. Flange	83-1H
8, 9, 10, 11, 12, 63, 79, 87, 115, 149, 213, 215	UG372/U	⅞	1	.360	Z	S	Sq. Flange	83-1HP
	MX-543	1	11⁄16	.359	▲	N	Threaded	5475
58, 141	UG177/U	¾	1	.155	Z	S	Sq. Flange	83-765
55, 59, 140, 142, 223	MX-539	1	11⁄16	.201	▲	S	Gold Plate Thd.	5375

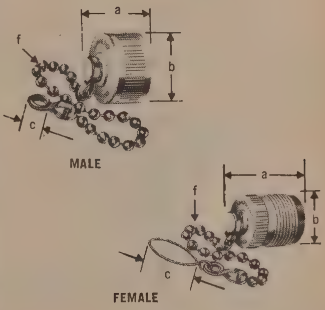
▲ Threaded for mounting on bulkhead receptacles p/n 4575 and 74525



CAPS

Weatherproof

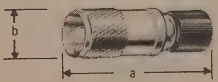
Dimensions, inches				Stock Code *	Notes	Amphenol Part Number
a	b	c	Chain Length f			
15⁄32	¾	.130	49⁄16	S	Male Cap	83-1AC
11⁄16	⅝	9⁄16	4¼	S	Female Cap	83-1BC



BINDING POSTS

Non-Weatherproof • Male Contact

Military Part Number	Dimensions, inches		Insulation	Stock Code *	Notes	Amphenol Part Number
	a	b				
UG332/U	1⅞	23⁄32	Rexolite	S	—	58000



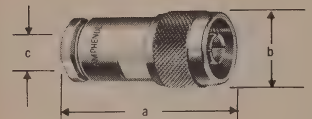
*Stock Code: S = Stock N = Non Stock

FOR LOCAL SOURCE OF SUPPLY SEE EEM VOL. 2 PAGE 462

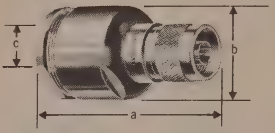
RF CONNECTORS

BUNKER RAMO AMPHENOL

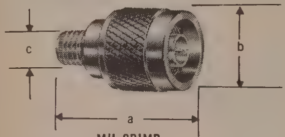
N SERIES



TYPICAL UG STANDARD



TYPICAL UG STANDARD FOR LARGE CABLES



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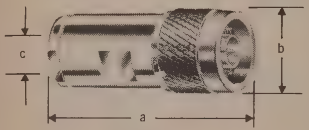

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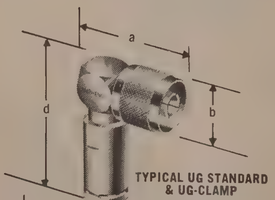
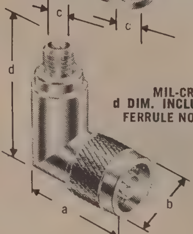


TYPICAL UG STANDARD & UG-CLAMP



MIL-CRIMP
d DIM. INCLUDES OUTER FERRULE NOT SHOWN

(See Next Page)

Series N connectors are medium size, weatherproof, threaded coupling units with a frequency limit of 11GHZ. They have a peak voltage rating of 1500 volts and are impedance matched to either 50 or 70 ohm cables as listed.

Clamp type as well as crimp type designs are available.

STRAIGHT PLUGS

Teflon Insulation • Male Contacts • Weatherproof • 50 Ohm Impedance

RG-( )/U Cables	Military Part Number	Dimensions, inches a	b	Max. Cable O.D. c	Configu-ration	Stock Code *	Notes	Amphenol Part Number
5, 21, 143, 212, 222	—	$1\frac{29}{64}$	$\frac{13}{16}$	.342	MIL Crimp	N	—	82-4341
	UG18F/U	$1\frac{25}{32}$	$\frac{13}{16}$	.346	MIL Clamp	S	—	82-354
6	UG-91A/U	$1\frac{3}{4}$	$\frac{13}{16}$	.357	UG Std.	S	70 Ohm Impedance	7200
8, 213	—	$1\frac{29}{64}$	$\frac{13}{16}$	.418	MIL Crimp	N	—	82-4340
9, 214	—	$1\frac{29}{64}$	$\frac{13}{16}$	.438	MIL Crimp	N	—	82-4332
8, 9, 213, 214	M39012/ 01-0005	$1\frac{25}{32}$	$\frac{13}{16}$	.444	MIL Clamp	S	—	82-352
	M39012/ 01-0002	$1\frac{25}{32}$	$\frac{13}{16}$	.444	MIL Clamp	S	—	82-352-1
8, 9, 87, 213, 214, 225	UG21B/U	$1\frac{7}{8}$	$\frac{13}{16}$	.444	UG Std.	S		82-61
	UC21D/U	$1\frac{1}{2}$	$\frac{25}{32}$	.444	UG Std.	S	Safety Wire Holes	82-202
	UG21E/U	$1\frac{1}{2}$	$\frac{13}{16}$	.444	UG Std.	S	Safety Wire Holes	82-3202
	UG1185/U	$1\frac{1}{2}$	$\frac{25}{32}$	.444	UG Std.	S	Capt. Cont.	82-312
	UG1185A/U	$1\frac{1}{2}$	$\frac{25}{32}$	.444	UG Std.	S	Capt. Cont.	82-3312
10, 12, 116, 215, 227	UG941B/U	$2\frac{1}{8}$	$\frac{13}{16}$	.511	UG Std.	S	Armor Clamp	82-3204
11, 149	UG1695/U	$1\frac{31}{64}$	$\frac{13}{16}$	.418	MIL Crimp	S	—	82-342
11, 13, 149, 216	UG94A/U	$1\frac{7}{8}$	$\frac{13}{16}$	.444	UG Std.	S	70 Ohm Impedance	82-84
14, 217	UG204C/U	$1\frac{21}{32}$	$\frac{7}{8}$	.557	UG Std.	S	—	82-214
17, 218	UG167A/U	$2\frac{3}{8}$	$1\frac{5}{16}$	.900	UG Std.	S	—	82-104
	UG167D/U	$2\frac{1}{8}$	$1\frac{5}{16}$	.900	UG Std.	S	Safety Wire Holes	82-215
	UG167F/U	$2\frac{1}{8}$	$1\frac{5}{16}$	.900	UG Std.	S	Safety Wire Holes	82-3215
18, 219	UG982/U	3	$1\frac{5}{16}$	.963	UG Std.	N	Armor Clamp	92125
35	—	$2\frac{3}{8}$	$1\frac{5}{16}$	.900	UG Std.	N	Armor Clamp, 70 Ohm Impedance	82-113
55, 142, 223	—	$1\frac{31}{64}$	$\frac{13}{16}$	.220	MIL Crimp	S	—	82-5370
58, 141	—	$1\frac{31}{64}$	$\frac{13}{16}$	.206	MIL Crimp	S	—	82-5375
55, 58, 141, 142 (except 55A)	UG536B/U	$1\frac{3}{8}$	$\frac{13}{16}$	.214	UG Std.	S	—	34025
55, 58, 141, 142, 223	—	$1\frac{25}{32}$	$\frac{13}{16}$	.219	MIL Clamp	S	—	82-5381
59, 62, 71, 140, 210	—	$1\frac{31}{64}$	$\frac{13}{16}$	.261	MIL Crimp	S	—	82-5380
	UG603A/U	$1\frac{3}{8}$	$\frac{13}{16}$	.257	UG Std.	S	—	34525
	—	$1\frac{5}{8}$	$\frac{13}{16}$	.257	UG Std.	S	70 Ohm Impedance	34750
63, 114	UG1003/U	$1\frac{3}{4}$	$\frac{13}{16}$	.435	UG Std.	S	—	12400

ANGLE PLUGS

Teflon Insulation • Male Contacts • Weatherproof • 50 Ohm Impedance

RG-( )/U Cable	Military Part Number	Dimensions, inches a	b	Max. Cable O.D. c	d	Configu-ration	Stock Code *	Notes	Amphenol Part Number
5, 21, 143, 212, 222	—	$1\frac{9}{16}$	$\frac{13}{16}$	.342	$2\frac{1}{64}$	MIL Crimp	N	—	82-5350
	—	$1\frac{3}{8}$	$\frac{13}{16}$	.343	$1\frac{5}{8}$	UG Std.	S	—	15950
8, 213	—	$1\frac{9}{16}$	$\frac{13}{16}$	.418	$2\frac{1}{64}$	MIL Crimp	N	—	82-4349
9, 214	—	$1\frac{9}{16}$	$\frac{13}{16}$	.438	$2\frac{1}{64}$	MIL Crimp	N	—	82-4336

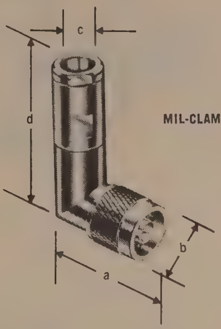
*Stock Code: S = Stock N = Non Stock

FOR LOCAL SOURCE OF SUPPLY SEE EEM VOL. 2 PAGE 462

N SERIES

ANGLE PLUGS (Cont'd)

RG-( )/U Cable	Military Part Number	Dimensions, inches a	b	Max. Cable O.D. c	d	Configuration	Stock Code *	Notes	Amphenol Part Number
8, 9, 213, 214	M39012/ 05-0001	1½	13/16	.444	2¼	Mil Clamp	S	—	82-357
8, 9, 87, 213, 214, 225	—	1 19/64	13/16	.444	1 15/16	UG Std.	S	Capt. Cont.	82-326
	—	1 7/16	13/16	.437	1⅞	UG Std.	S		82-835
	—	1⅝	13/16	.437	1 11/16	UG Std.	S	—	6875
	UG594A/U	1 7/16	13/16	.437	2 1/32	UG Std.	S	—	15425
11, 149	—	1 9/16	13/16	.418	2 1/64	MIL Crimp	N	—	82-5351
11, 13, 149, 216	—	1½	13/16	.444	2¼	Mil Clamp	N	—	82-5353
	—	1⅝	13/16	.437	1 11/16	UG Std.	S	70 Ohm Impedance	17025
55, 142, 223	—	1 9/16	13/16	.220	2 1/64	Mil Crimp	S	—	82-5374
58, 141	—	1 9/16	13/16	.206	2 1/64	Mil Crimp	S	—	82-5379
55, 58, 141, 142 except 55A	—	1⅝	13/16	.210	1 7/32	UG Std.	S	—	18750
59, 62, 71, 140, 210	—	1⅝	13/16	.257	1 7/32	UG Std.	S	—	19250



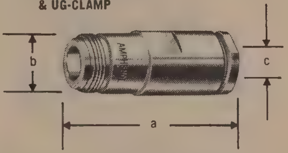
STRAIGHT JACKS

Teflon Insulation • Female Contacts • Weatherproof • 50 Ohm Impedance

RG-( )/U Cable	Military Part Number	Dimensions, inches a	b	Max. Cable O.D. c	Configuration	Stock Code *	Notes	Amphenol Part Number
5, 21, 143, 212, 222	UG1687/U	1 9/16	11/16	.342	MIL Crimp	N	—	82-338
	UG20B/U	1 15/16	11/16	.357	UG Std.	S	—	82-88
	UG20F/U	1⅞	11/16	.346	MIL Clamp	S	—	82-358
6	UG92A/U	1⅞	11/16	.357	UG Std.	S	70 Ohm Imp.	7700
8, 213	M39012/ 02-0020	1 17/32	11/16	.418	MIL Crimp	N	—	82-4337
9, 214	—	1 17/32	11/16	.438	MIL Crimp	N	—	82-4333
8, 9, 213, 214	M39012/ 02-0003	1⅞	11/16	.444	MIL Clamp	S	—	82-356
	M39012/ 02-0002	1⅞	11/16	.444	MIL Clamp	S	—	82-356-1
8, 9, 87, 213, 214, 225	UG23B/U	1 15/16	11/16	.437	UG Std.	S		82-63
	UG23D/U	1 9/16	¾	.444	UG Std.	S		82-209
	UG23E/U	1 9/16	¾	.444	UG Std.	S		82-3209
	UG1186/U	1 9/16	¾	.444	UG Std.	S	Capt. Cont.	82-313
10, 12, 116, 215, 227	UG940A/U	2¼	¾	.444	UG Std.	S	Armor Clamp	82-212
11, 149	UG1694/U	1 9/16	11/16	.418	MIL Crimp	N	—	82-339
11, 13, 149, 216	—	1⅞	11/16	.444	MIL Clamp	N	—	82-5359
	UG95A/U	1 15/16	11/16	.437	UG Std.	S	70 Ohm Imp.	82-89
17	—	2 3/16	1 5/16	.900	UG Std.	S	—	14850
55, 142, 223	—	1 9/16	11/16	.220	MIL Crimp	S	—	82-5371
55, 58, 141, 142, 223	—	1⅞	11/16	.219	MIL Clamp	S	—	82-5382
55, 58, 141, 142 (except 55A)	—	1½	⅝	.214	UG Std.	S	—	35025
58, 141	—	1 9/16	11/16	.206	MIL Crimp	S	—	82-5376
59, 62, 71, 140, 210	UG602/U	1⅝	11/16	.257	UG Std.	S	Rexolite Insul.	36500

*Stock Code: S = Stock N = Non Stock

TYPICAL UG STANDARD & UG-CLAMP



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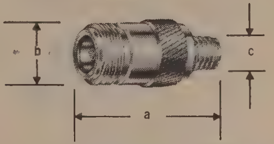
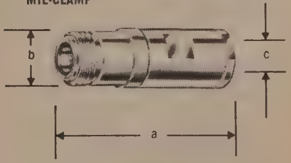


a DIM. INCLUDES OUTER FERRULE NOT SHOWN

MIL-CLAMP



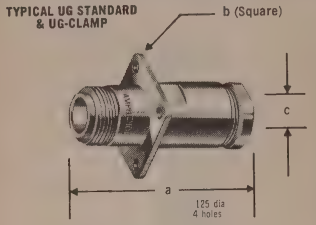
FOR LOCAL SOURCE OF SUPPLY SEE EEM VOL. 2 PAGE 462

RF CONNECTORS

BUNKER RAMO AMPHENOL

N SERIES

TYPICAL UG STANDARD & UG-CLAMP



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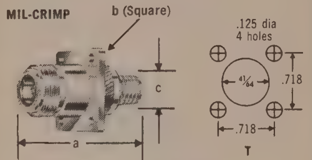

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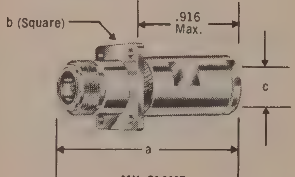

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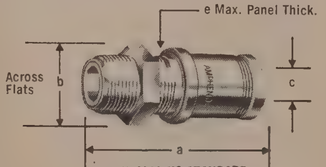
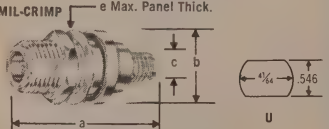
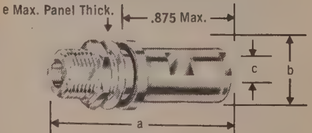


TYPICAL UG STANDARD & UG-CLAMP

MIL-CRIMP



a DIM. INCLUDES OUTER FERRULE NOT SHOWN



MIL-CLAMP

PANEL JACKS

Teflon Insulation • Female Contacts • Weatherproof • 50 Ohm • .125 Dia. Flange Holes Mounting Hole "T" • Rear Mounted

RG-( )/U Cable	Military Part Number	Dimensions, inches a	b	Max Cable O.D. c	Configu-ration	Stock Code *	Notes	Amphenol Part Number
5, 21, 143, 212, 222	UG1696/U	1 9/16	1	.342	MIL Crimp	N	—	82-344
	UG19F/U	1 17/32	1	.346	MIL Clamp	S	—	82-362
6	UG93A/U	1 7/8	1	.357	UG Std.	S	70 Ohm Imp.	7800
8, 213	—	1 17/32	1	.418	MIL Crimp	N	—	82-4343
8, 9, 213, 214	M39012/ 02-0006	1 17/32	1	.444	MIL Clamp	S	—	82-360
	M39012/ 02-0005	1 17/32	1	.444	MIL Clamp	S	—	82-360-1
9, 214	—	1 17/32	1.	.438	MIL Crimp	N	—	82-4334
8, 9, 87, 213, 214, 225	UG22E/U	1 9/16	1	.444	UG Std.	S		82-3208
	UG1187/U	1 9/16	1	.444	UG Std.	S	Capt. Cont.	82-314
10, 12, 116, 215, 227	UG935B/U	2¼	1	.444	UG Std.	N	Armor Clamp	82-3211
11, 149	—	1 9/16	1	.418	MIL Crimp	N	—	82-5345
11, 13, 149, 216	—	1 17/32	1	.444	MIL Clamp	N	—	82-5363
	UG96A/U	1 13/16	1	.437	UG Std.	S	70 Ohm Imp.	82-90
55, 142, 223	—	1 9/16	1	.220	MIL Crimp	S	—	82-5372
55, 58, 141, 142, 223	—	1 17/32	1	.219	MIL Clamp	N	—	82-5383
	UG1095A/U	1½	1	.224	UG Std.	S	—	36250
58, 141	—	1 9/16	1	.206	MIL Crimp	N	—	82-5377
59, 62, 71, 140, 210	UG593/U	1 13/16	1	.257	UG Std.	S	Rexolite Insul.	35500
	—	1½	1	.257	UG Std.	N	70 Ohm Imp.	91250

BULKHEAD JACKS

Female Contacts • Weatherproof • 50 Ohm Impedance • Mounting Hole "U" • Rear Mounted

RG-( )/U Cable	Military Part Number	Dimensions, inches a	b	Max. Cable O.D. c	e	Configu-ration	Stock Code *	Notes	Amphenol Part Number
5, 21, 143, 212, 222	UG1699/U	1 27/32	7/8	.342	.250	MIL Crimp	N	—	82-347
	UG159D/U	1 51/64	7/8	.346	.250	MIL Clamp	N	—	82-366
8, 213	—	1 15/64	7/8	.418	.250	MIL Crimp	N	—	82-4346
8, 9, 213, 214	M39012/ 03-0002	1 51/64	7/8	.444	.250	MIL Clamp	S	—	82-364
9, 214	—	1 15/64	7/8	.438	.250	MIL Crimp	N	—	82-4335
8, 9, 87, 213, 214, 225	UG160B/U	1 13/16	13/16	.437	.343	UG Std.	S		82-93
11, 149	UG1706/U	1 27/32	7/8	.418	.250	MIL Crimp	N	—	82-348
11, 13, 149, 216	—	1 51/64	7/8	.444	.250	MIL Clamp	N	—	82-5365
55, 142, 223	—	1 27/32	7/8	.220	.250	MIL Crimp	S	—	82-5373
55, 58, 141, 142, 223	—	1 51/64	7/8	.219	.250	MIL Clamp	N	—	82-5384
	UG556B/U	1 43/64	13/16	.222	.317	UG Std.	S	—	35275
58, 141	—	1 27/32	7/8	.206	.250	MIL Crimp	N	—	82-5378
59, 62, 71, 140, 210	—	1 27/32	13/16	.257	.294	UG Std.	S	Rexolite Insul.	18250

*Stock Code: S = Stock N = Non Stock

FOR LOCAL SOURCE OF SUPPLY SEE EEM VOL. 2 PAGE 462

RF CONNECTORS

BUNKER RAMO AMPHENOL

PANEL RECEPTACLES

Teflon Insulation • Female Contacts • Weatherproof • 50 Ohm Impedance • Front Mount

Military Part Number	Dimensions, inches a	b	Mtg. Hole	Stock Code *	Notes	Amphenol Part Number
UG58/U	1 7/64	1	T	S	—	82-24
UG58A/U	1 7/64	1	T	S	—	82-97
M39012/04-0002	1 7/64	1	T	S	—	82-368
—	1⅛	1	T	S	70 Ohm Impedance	82-112
—	1 7/64	¾	W	S	.100 Flange Holes	9575
—	1 3/32	1	V	S	Male Receptacle, Male Contact, Rexolite Ins.	49000

BULKHEAD RECEPTACLES

Hermetically Sealed • 50 Ohm Impedance • Front Mount

Military Part Number	Dimensions, inches a	b	c	Stock Code *	Notes	Amphenol Part Number
UG680/U	1 37/64	13/16	.209	S	Female Receptacle, Female Contact☐	82-811
M39012/04-0001	1 37/64	13/16	.250	S	Female Receptacle, Female Contact☐	82-369
—	1 7/16	13/16	—	S	Male Receptacle, Male Contact	19550

☐ To ground cable shield specify Amphenol accessory lug 82-1275

ANGLE PANEL RECEPTACLES

Teflon Insulation • Female Contacts • 50 Ohm Impedance • .125 Dia. Flange Holes

Military Part Number	Dimensions, inches a	b	d	Stock Code *	Notes	Amphenol Part Number
UG997A/U	1 7/16	1	1 29/64	S	1 1/16″ Above Panel Clearance	8975
—	1 7/16	1	1 29/64	N	¾″ Above Panel Clearance	23775

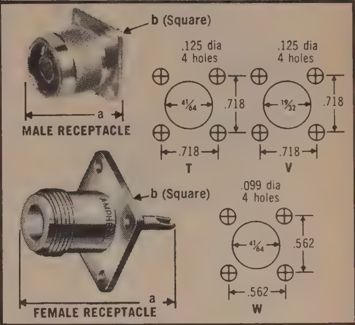
ADAPTERS/Teflon Insulation • Weatherproof • 50 Ohm Impedance

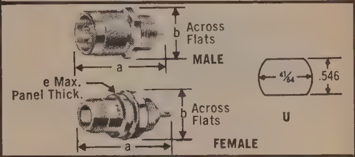
Military Part Number	Dimensions, inches a	b	d	e	Configuration	Adapter Ends	Stock Code *	Notes	Amphenol Part Number
UG57B/U	1 19/32	13/16	—	—	Straight	P-P	S	—	82-100
UG29B/U	1¾	21/32	—	—	Straight	J-J	S	—	82-101
—	1 19/32	13/16	—	—	Straight	P-P	S	70 Ohm Impedance	17075
—	1¾	21/32	—	—	Straight	J-J	S	70 Ohm Impedance	21650
UG27A/U	1 7/16	13/16	—	1⅜	Angle	J-P	S	Mitre	82-64
UG27C/U	1 5/16	13/16	—	1 13/32	Angle	J-P	S	Cubic	82 213
UG30/U	1⅝	13/16	—	.312	Bulkhead	J-J	S	Rexolite Insulation Pressurized	82-66
UG30D/U	1 17/32	⅞	—	.339	Bulkhead	J-J	S	Hermetically Sealed "O" Ring	91100
UG28A/U	1¾	—	1 7/32	—	Tee	J-J-J	S	—	82-99
UG107B/U	1¾	—	1 31/64	—	Tee	J-P-J	S	—	82-102
—	2 11/32	—	1 37/64	—	Tee	P-P-P	N	—	4850
—	2¼	—	2¼	—	Cross	J-J-J-J	N	—	17125

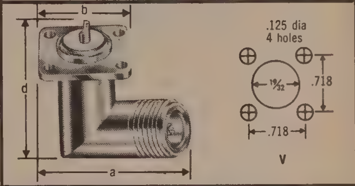
*Stock Code: S = Stock N = Non Stock

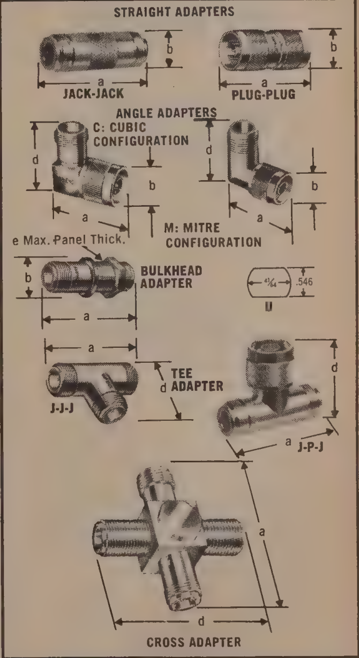
FOR LOCAL SOURCE OF SUPPLY SEE EEM VOL. 2 PAGE 462

N SERIES


b (Square)
.125 dia
4 holes
.125 dia
4 holes
41/64
.718
19/32
.718
a
MALE RECEPTACLE
.718
T
.718
V
b (Square)
.099 dia
4 holes
41/64
.562
.562
W
a
FEMALE RECEPTACLE


b Across Flats
a
MALE
e Max. Panel Thick.
b Across Flats
a
FEMALE
41/64
.546
U

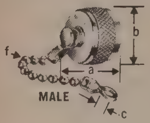

b
d
a
.125 dia
4 holes
19/32
.718
.718
V


STRAIGHT ADAPTERS
b
a
JACK-JACK
b
a
PLUG-PLUG
ANGLE ADAPTERS
C: CUBIC CONFIGURATION
d
b
a
d
b
a
M: MITRE CONFIGURATION
e Max. Panel Thick.
b
BULKHEAD ADAPTER
a
41/64
.546
U
a
TEE ADAPTER
d
J-J-J
d
a
J-P-J
a
d
CROSS ADAPTER

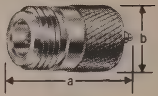
RF CONNECTORS

BUNKER RAMO AMPHENOL

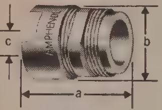
N SERIES



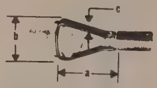
MALE



FEMALE



ARMOR CLAMP



LUG

CAPS/ Weatherproof

Military Part Number	Dimensions, inches a	b	c	Chain Length f	Stock Code *	Notes	Amphenol Part Number
MX913	9/16	3/4	.144	1 3/4	S	Male Cap	82-106
—	27/32	13/16	.144	2 1/2	S	Male Cap, Shorting Male Contact	13700
—	31/32	5/8	3/16	2 1/4	S	Female Cap	6950
—	1	5/8	—	—	S	Female Cap, Shorting Female Contact	13675

ARMOR CLAMPS

Assemble to Connectors Designed for Identical Cable Without Armor

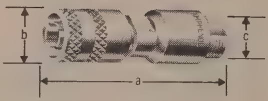
RG-( )/U Cables	Military Part Number	Dimensions, inches a	b	Max. Cable O.D. c	Stock Code *	Notes	Amphenol Part Number
10, 12, 79,	MX-564A	1 1/16	11/16	.511	S	—	82-109
116, 215, 227	M39012/25-0013	1 1/8	3/4	.511	N	—	82-3517
18, 219	M39012/25-0014	1 3/8	1 5/16	.963	N	—	99175
74, 224	MX-1462	1 3/16	7/8	.625	N	—	16850

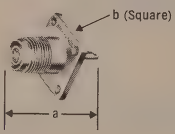
SHIELD GROUNDING LUG

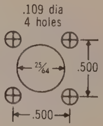
Dimensions, inches a	b	c	Stock Code *	Notes	Amphenol Part Number
1	37/64	1/8	S	Used on Front Mount Receptacles as Shown	82-1275

*Stock Code: S = Stock N = Non Stock

BN SERIES







MTG. HOLE

Threaded coupling BN Series connectors are used in video, trigger-pulse and other low-power RF applications. They are not recommended for use at frequencies above 200 MHZ. They may be used at peak voltages up to 250 volts. Impedance is non-constant.

STRAIGHT PLUG/Rexolite Insulation • Male Contacts • Weatherproof

RG-( )/U Cable	Military Part Number	Dimensions, inches a	b	Max. Cable O.D. c	Stock Code *	Notes	Amphenol Part Number
55, 58, 59, 62, 71, 140, 141, 142, 210, 223	UG85/U	1 11/16	15/32	.257	S	—	82-21

PANEL RECEPTACLE/Female Contacts • Non-weatherproof

Military Part Number	Dimensions, inches a	b	Stock Code *	Notes	Amphenol Part Number
UG87/U	55/64	11/16	S	—	82-42

*Stock Code: S = Stock N = Non Stock

FOR LOCAL SOURCE OF SUPPLY SEE EEM VOL. 2 PAGE 462

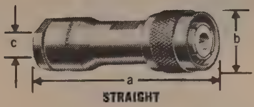
HN SERIES

Series HN connectors are medium sized, 50 ohm constant impedance, high voltage, threaded coupling types. This series has a frequency limit of 4GHZ and a voltage rating of 1500 volts peak. Dielectric withstanding voltage is 5000 volts RMS.

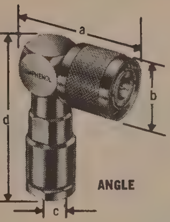
STRAIGHT/ANGLE PLUGS

Male Contacts • Weatherproof • 50 Ohm Impedance

RG-( )/U Cables	Military Part Number	Dimensions, inches a	b	Max. Cable O.D. c	d	Insulation	Configu-ration	Stock Code *	Notes	Amphenol Part Number
8, 9, 87, 213, 214, 225	UG59B/U	2⅜	⅞	.444	—	Teflon	Straight	S	▲	82-804
	—	1½	⅞	.444	2 5/16	Rexolite	Angle	S	—	82-833
	—	1½	⅞	.444	2 5/16	Teflon	Angle	S	—	82-856
10, 12, 116, 215, 227	UG925/U	2 49/64	27/32	.511	—	Teflon	Straight	N	Armor Clamp	9375
14, 217	UG494/U	2	1	.562	—	Rexolite	Straight	S	—	8125
17	—	2 11/16	1 5/16	.900	—	Rexolite	Straight	S	Capt. Cont.	82-325
54A	—	1 13/16	⅞	.257	—	Teflon	Straight	S	—	82-816
55, 58, 141, 142	—	1 13/16	27/32	.214	—	Teflon	Straight	S	—	16750
	—	1⅜	⅞	.214	1 5/32	Teflon	Angle	N	1500 VRMS	19625



STRAIGHT



ANGLE

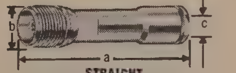
STRAIGHT/PANEL JACKS

Female Contacts • Weatherproof • 50 Ohm Impedance

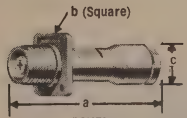
RG-( )/U Cables	Military Part Number	Dimensions, inches a	b	Max. Cable O.D. c	Insula-tion	Configu-ration	Mtg. Hole	Stock Code *	Notes	Amphenol Part Number
8, 9, 87, 213, 214, 225	UG60B/U	2½	11/16	.444	Teflon	Straight	—	S	▲	82-814
	UG61B/U	2½	1 3/16	.444	Teflon	Panel	U	S	▲	82-815
10, 12, 116, 215, 227	UG927/U	3	¾	—	Teflon	Straight	—	N	Armor Clamp	33250
17	UG333A/U	2 7/16	1 5/16	.960	Rexolite	Straight	—	S	—	82-107
	UG334A/U	2 7/16	1 5/16	.900	Rexolite	Panel	U	N	—	82-108
18	UG333/U	2¾	1⅜	.900	Rexolite	Straight	—	N	Armor Clamp	82-56
	UG334/U	2¾	2	.984	Rexolite	Panel	V	N	Armor Clamp	82-57

▲Amphenol adapter kit 82-887 will adapt connector for use with ALJAK/CUJAK metal jacketed cables

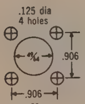
*Stock Code: S = Stock N = Non Stock



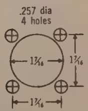
STRAIGHT



PANEL



U



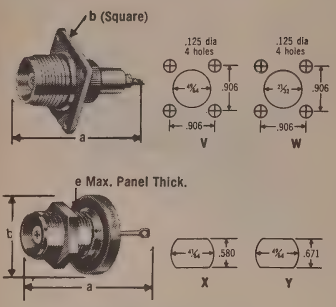
V

FOR LOCAL SOURCE OF SUPPLY SEE EEM VOL. 2 PAGE 462

RF CONNECTORS

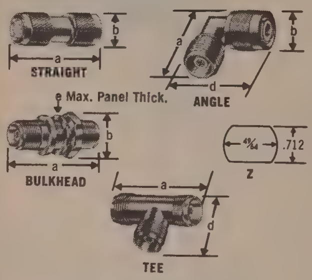
BUNKER RAMO AMPHENOL

HN SERIES


b (Square)
.125 dia
4 holes
49/64
.906
.906
V
.125 dia
4 holes
23/32
.906
.906
W
a
e Max. Panel Thick.
b
a
41/64
.580
X
45/64
.671
Y

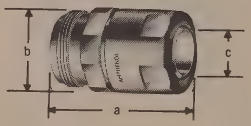
RECEPTACLES/Female Contacts • Weatherproof • 50 Ohm Impedance

Military Part Number	Dimensions, inches			Insulation	Configuration	Mtg. Hole	Stock Code *	Notes	Amphenol Part Number
	a	b	e						
UG496/U	1 17/32	1 3/16	—	Rexolite	Panel	V	S	—	82-92
UG560/U	1⅞	1 3/16	—	Teflon	Panel	W	S	—	82-805
—	1¾	13/16	.187	Glass-Teflon	Bulkhead	X	S	Hermetic, Front Mtg.	82-836
—	1 49/64	1¼	.187	Glass-Teflon	Bulkhead	Y	S	Hermetic, Rear Mtg.	82-843


b
a
STRAIGHT
a
b
d
ANGLE
e Max. Panel Thick.
b
a
BULKHEAD
45/64
.712
Z
a
d
TEE

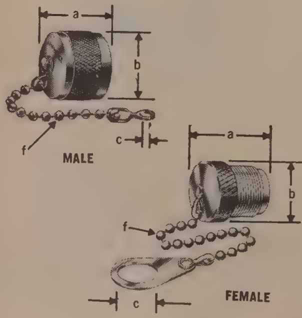
ADAPTERS/Teflon Insulation • Weatherproof • 50 Ohm Impedance

Military Part Number	Dimensions, inches				Configuration	Adapter Ends	Stock Code *	Notes	Amphenol Part Number
	a	b	d	e					
—	2⅛	⅞	—	—	Straight	Plug-Plug	S	—	16800
UG212C/U	1 15/32	⅞	1½	—	Angle	Jack-Plug	S	—	82-115
UG1019/U	1 31/32	1	—	.343	Bulkhead	Jack-Jack	S	Use Mtg. Hole Z	11050
—	1 15/16	—	1 5/16	—	Tee	Jack-Jack-Jack	S	—	11950



ARMOR CLAMPS/Assemble to Connectors Designed for Identical Cable Without Armor

RG-( )/U Cables	Military Part Number	Dimensions, inches			Stock Code *	Notes	Amphenol Part Number
		a	b	Max. Cable O.D. c			
10, 12, 79, 116, 215, 227	MX-564A	1 1/16	11/16	.511	S	—	82-109
18, 219	M39012/25-0014	1⅜	1 5/16	.963	N	—	99175


a
b
f
c
MALE
a
b
f
c
FEMALE

CAPS/Weatherproof

Dimensions, inches				Stock Code *	Notes	Amphenol Part Number
a	b	c	Chain Length f			
19/32	⅞	.144	2 9/16	S	Male Cap	82-130
29/32	⅞	1 3/16	4	S	Female Cap	13650

*Stock Code: S = Stock N = Non Stock

FOR LOCAL SOURCE OF SUPPLY SEE EEM VOL. 2 PAGE 462

RF CONNECTORS

BUNKER RAMO AMPHENOL

SC SERIES

Series SC are medium size, weatherproof constant 50 ohm impedance connectors with threaded coupling. Standard connectors have a peak voltage rating of 1500 volts and provide good electrical performance up to 10 GHz.

These connectors are manufactured to M39012/35 meeting mechanical and electrical requirements of Limited Coordination Specification as generated by the Air Force.

STRAIGHT PLUGS

Captivated Contacts • Crimp-Crimp • Teflon Insulation • Safety Wire Holes

RG-( )/U Cable	Military Part Number	Dimensions, inches a	b	Max. Cable O.D. c	Stock Code *	Notes	Amphenol Part Number
9, 214, 225, 393	M39012/35-0501	1 11/16	53/64	.444	N	Crimp with 227-944/1221-25	82-4450
142B, 400	M39012/35-0503	1 11/16	53/64	.195	N	Crimp with 227-944/1221-57	82-4451

ANGLE PLUGS

Captivated Contacts • Crimp-Crimp • Teflon Insulation • Safety Wire Holes

RG-( )/U Cable	Military Part Number	a	b	Max. Cable O.D. c	Stock Code *	Notes	Amphenol Part Number
9, 214, 225, 393	M39012/39-0501	1 1/2	53/64	.444	N	2 1/8" long. Crimp with 227-944/1221-25	82-4474
142B, 400	M39012/39-0503	1 1/2	53/64	.195	N	2 1/8" long. Crimp with 227-944/1221-57	82-4475

STRAIGHT JACKS

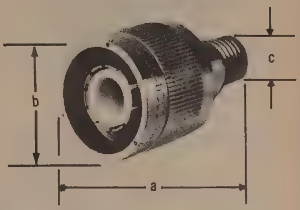
Captivated Contacts • Crimp-Crimp • Teflon Insulation

RG-( )/U Cable	Military Part Number	a	b	Max. Cable O.D. c	Stock Code *	Notes	Amphenol Part Number
9, 214, 225, 393	M39012/36-0501	1 9/16	11/16	.444	N	Crimp with 227-944/1221-25	82-4457
142B, 400	M39012/36-0502	1 9/16	11/16	.195	N	Crimp with 227-944/1221-57	82-4458

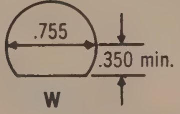
BULKHEAD JACKS

Captivated Contacts • Crimp-Crimp • Teflon Insulation

RG-( )/U Cable	Military Part Number	a	b	Max. Cable O.D. c	Stock Code *	Notes	Amphenol Part Number
9, 214, 225, 393	M39012/40-0501	1 31/32	11/16	.444	N	5/16" max. panel thickness, mtg. hole W. Crimp with 227-944/1221-25	82-4454



a Dim. includes outer ferrule not on illustration



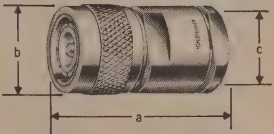
C SERIES

Series C connectors are medium size, weatherproof types of constant 50 ohm impedance with two-stud bayonet lock coupling. Standard connectors have a peak voltage rating of 1500 volts and provide good electrical performance up to 10GHz. As noted, 4000 volt units are available with good performance up to 2GHz.

STRAIGHT PLUGS

Teflon Insulation • Male Contacts • Weatherproof • 50 Ohm Impedance

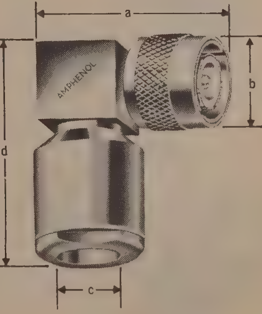
RG-( )/U Cable	Military Part Number	Dimensions, inches a	b	Max. Cable O.D. c	Stock Code *	Notes	Amphenol Part Number
5, 21, 143, 212, 222	UG626A/U	1 31/64	3/4	.343	N	—	80025
6	—	1 31/64	3/4	.342	N	75 Ohm Impedance	74775
8, 9, 87, 213, 214, 225	UG573A/U	1 31/64	3/4	.444	S	▲	82-530
	UG628A/U	1 3/4	3/4	.444	S	4000 Volts Peak▲	82-532
10, 12, 116, 215, 227	UG943A/U	2 1/8	3/4	—	N	MX-1286/U Armor Clamp▲	82-538
14, 217	UG707A/U	1 9/16	7/8	.569	S	—	82-533
17, 218	UG708A/U	2 5/32	1 5/16	.900	N	—	80075
55, 58, 141, 142, 223	UG709A/U	1 3/8	3/4	.219	S	—	82-534
59, 62, 71, 140, 210	—	1 9/16	3/4	.257	S	4000 Volts Peak	80375
	UG627A/U	1 11/32	3/4	.257	S	—	82-548
63, 114	—	1 31/64	3/4	.444	S	—	80300
117, 118	UG711A/U	2 5/32	1 5/16	.750	N	—	80200



ANGLE PLUGS

Teflon Insulation • Male Contacts • Weatherproof • 50 Ohm Impedance

RG-( )/U Cable	Military Part Number	a	b	Max. Cable O.D. c	Stock Code *	Notes	Amphenol Part Number
8, 9, 87, 213, 214, 225	UG710A/U	1 3/8	3/4	.444	S	▲	82-531
55, 58, 141, 142, 143	—	1 5/16	3/4	.219	S	—	80775

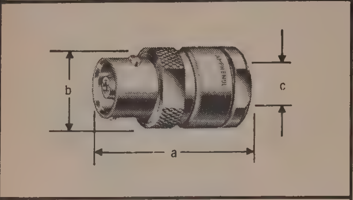


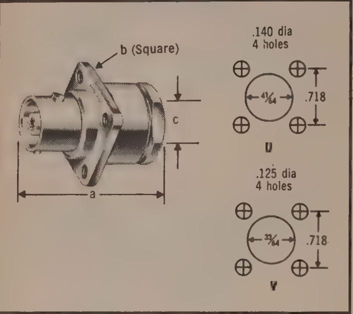
*Stock Code: S = Stock N = Non Stock

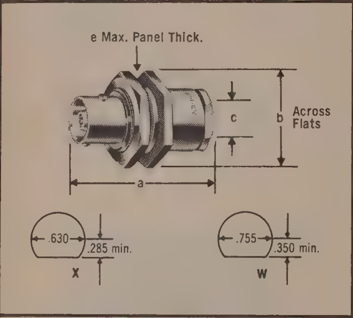
RF CONNECTORS

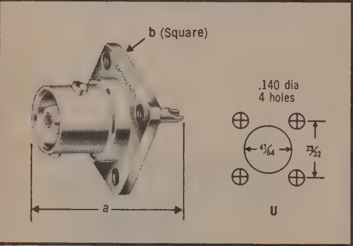
BUNKER RAMO AMPHENOL

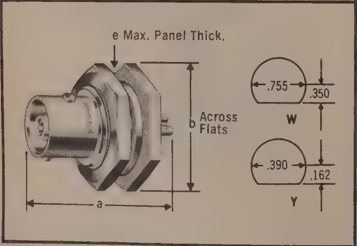
C SERIES











STRAIGHT JACKS

Teflon Insulation • Female Contacts • Weatherproof • 50 Ohm Impedance

RG-( )/U Cable	Military Part Number	Dimensions, inches a	b	Max. Cable O.D. c	Stock Code *	Notes	Amphenol Part Number
8, 9, 87, 213, 214, 225	UG572/U	1 13⁄32	¾	.444	S	▲	82-503
55, 58, 141, 142, 223	—	1¼	⅝	.219	N	—	81575
59, 62, 71, 140, 210	—	1¼	⅝	.257	N	—	81550

PANEL JACKS

Teflon Insulation • Female Contacts • Weatherproof • 50 Ohm Impedance
#6-32 Tapped Flange Holes • Rear Mounted

RG-( )/U Cable	Military Part Number	Dimensions, inches a	b	Max. Cable O.D. c	Stock Code *	Mtg. Hole	Notes	Amphenol Part Number
8, 9, 87, 213, 214, 225	UG571/U	1 13⁄32	1	.444	S	U	▲	82-501
10, 12, 116, 215, 227	UG938/U	2	1	—	N	U	MX-1286/U Armor Clamp▲	82-523
14, 217	—	2	1	.564	S	U	—	81275
55, 58, 141,142	—	1¼	1	.212	S	U	—	74675
	—	1¼	1	.212	S	V	.125 dia. Flange Holes Front Mounting	81150
59, 62, 71, 140, 210	—	1¼	1	.257	S	V	.125 dia. Flange Holes Front Mounting	81100

BULKHEAD JACKS

Teflon Insulation • Female Contacts • Weatherproof • 50 Ohm Impedance • Rear Mounted

RG-( )/U Cable	Military Part Number	Dimensions, inches a	b	Max. Cable O.D. c	e	Stock Code *	Mtg. Hole	Notes	Amphenol Part Number
8, 9, 87, 213, 214, 225	UG570/U	1 19⁄32	1	.444	.140	S	W	▲	82-502
	UG632/U	1 11⁄16	1	.444	.140	S	W	4000 Volts Peak▲	82-521
10, 12, 116, 215, 227	UG937/U	2	1	.521	.140	N	W	MX-1286/U Armor Clamp	82-522
55, 58, 141, 142	UG704/U	1¼	¾	.214	.203	S	X	Front Mounting	81175
	—	1⅞	1	.214	.140	N	W	Herm. Sealed Glass-Teflon Insul.	81425
59, 62, 71, 140, 210	—	1 15⁄32	¾	.257	.203	N	X	4000 Volts Peak Front Mounting	81600

PANEL RECEPTACLES

Teflon Insulation • Female Contacts • Weatherproof • 50 Ohm Impedance

Military Part Number	Dimensions, inches a	b	Stock Code *	Mtg. Hole	Notes	Amphenol Part Number
UG568/U	1 3⁄32	1	S	U	#6-32 Tapped Flange Holes	82-504
—	1 5⁄16	1	S	U	4000 Volts Peak/.152 dia. Flange Holes	82275

BULKHEAD RECEPTACLES

Teflon Insulation • Female Contacts • Weatherproof • 50 Ohm Impedance • Rear Mounted

Military Part Number	Dimensions, inches a	b	e	Stock Code *	Mtg. Hole	Notes	Amphenol Part Number
UG569/U	1 3⁄32	1	.156	S	W	—	82-505
UG705/U	1 7⁄16	1	.218	S	W	Herm. Sealed/Glass-Teflon Insul.	82-511
UG634/U	1 5⁄16	1	.156	S	W	4000 Volts Peak	82-515
UG706/U	1 5⁄32	9⁄16	.140	S	Y	Front Mounting	82125

▲Amphenol adapter kit. ▲82-888 will adapt connector for use with ALJAK/CUJAK metal jacketed cables.
*Stock Code: S = Stock N = Non Stock

FOR LOCAL SOURCE OF SUPPLY SEE EEM VOL. 2 PAGE 462

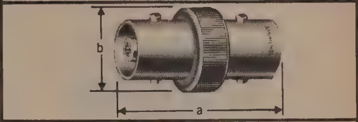
RF CONNECTORS

BUNKER RAMO AMPHENOL

C SERIES

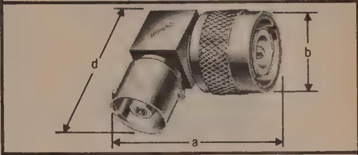
STRAIGHT ADAPTERS/Teflon Insulation • Weatherproof • 50 Ohm Impedance

Military Part Number	Dimensions, inches a	b	Stock Code *	Adapter Ends	Notes	Amphenol Part Number
UG643/U	1 9/32	¾	S	Jack-Jack	Non-Weatherproof	82-514
UG642A/U	1 29/64	¾	S	Plug-Plug	—	83150



ANGLE ADAPTERS/Teflon Insulation • Non-weatherproof • 50 Ohm Impedance

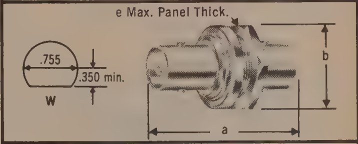
Military Part Number	Dimensions, inches a	b	d	Stock Code *	Adapter Ends	Notes	Amphenol Part Number
UG567A/U	1¼	49/64	1¼	S	Jack-Plug	—	82-535



BULKHEAD ADAPTERS

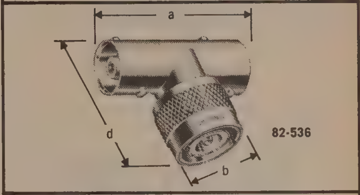
Glass/Teflon Insulation • Hermetically Sealed • 50 Ohm Impedance

Military Part Number	Dimensions, inches a	b	e	Stock Code *	Mtg. Hole	Adapter Ends	Notes	Amphenol Part Number
—	2 1/32	1	.203	S	49/64	Jack-Jack	4000 Volts Peak	82250
UG701/U	1 9/16	1	.203	S	W	Jack-Jack	—	83050



TEE ADAPTERS/Teflon Insulation • Weatherproof • 50 Ohm Impedance

Military Part Number	Dimensions, inches a	b	d	Stock Code *	Adapter Ends	Notes	Amphenol Part Number
UG566A/U	1 33/64	49/64	1 21/64	S	Jack-Plug-Jack	—	82-536



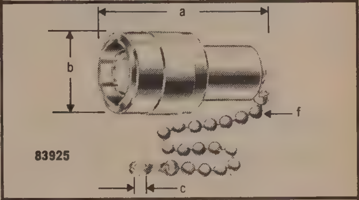
82-536

RESISTOR TERMINATED CAP

Teflon Insulation • ½ Watt 5% Resistor • Male Contacts

Military Part Number	Dimensions, inches a	b	c	f	Stock Code *	Notes	Amphenol Part Number
—	1 5/16	¾	.144	3½	N	▲	83925

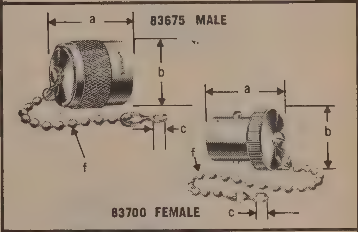
▲To order without resistor, add -1 to part number; to order with resistor, add resistor value to part number. ½ watt 5% resistor values (ohms) stocked: 47, 51, 75, 82, 91, 100, 120, 130, 150, 180, 240, 270, 300, 470, 510, 560, 680, 750, 820, 1000, 1500, 3900, 4700, 10000, 150000



83925

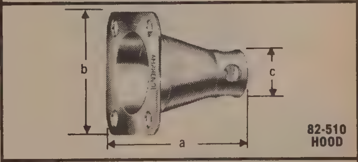
CAPS/Weatherproof

Military Part Number	Dimensions, inches a	b	c	f	Stock Code *	Notes	Amphenol Part Number
MALE							
MX1142	51/64	¾	.144	2½	S	—	82-512
—	⅞	¾	.144	3½	N	Shorting Male Contact	83675
FEMALE							
MX1143	27/32	¾	.144	3½	S	—	82-513
—	13/16	⅝	.144	3½	N	Shorting Female Contact	83700



HOODS/Non-weatherproof

Military Part Number	Dimensions, inches a	b	c	Stock Code *	Notes	Amphenol Part Number
—	¾	1	11/32	S	Four .149 dia. Holes, .719 Centers	82-510



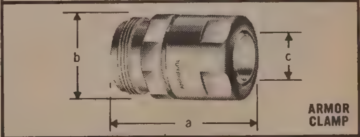
82-510
HOOD

ARMOR CLAMPS

Improved • Assemble to Connectors Designed for Identical Cable Without Armor

RG-( )/U Cable	Military Part Number	Dimensions, inches a	b	c	Stock Code *	Notes	Amphenol Part Number
10, 12, 79, 116, 215, 227	M39012/25-0013	1⅛	¾	.511	N	—	82-3517
18, 219	M39012/25-0014	1⅜	1 5/16	.963	N	—	99175
74, 224	MX1462	1 3/16	⅞	.625	N	—	16850

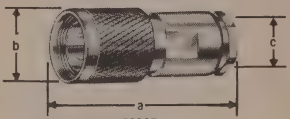
*Stock Code: S = Stock N = Non Stock



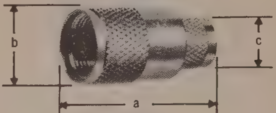
ARMOR
CLAMP

FOR LOCAL SOURCE OF SUPPLY SEE EEM VOL. 2 PAGE 462

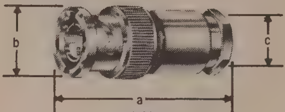
TWIN



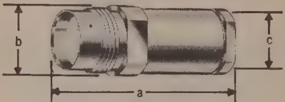
32225
TWINAX



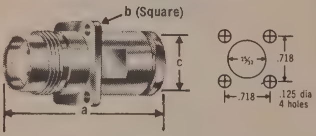
83-22SP
UHF-TYPE

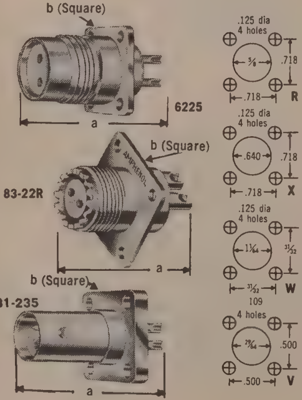


31-224
BNC-TYPE



6975





TWIN CONTACT connectors are used with 78 and 95 ohm twin conductor cables. These connectors are generally used in balanced low level and high sensitivity circuits, due to the improved shielding characteristics possible (> 30 db).

Three different constructions are available. They do **not** intermate.

TWINAX — Has polarized key and keyway construction. Frequency limit is 200MHZ and voltage rating is 500 volts peak.

UHF TYPE — Non-polarized, these connectors provide an inexpensive connecting device for laboratory and radio equipment devices. Frequency limit is 200MHz and voltage rating is 500 volts peak.

BNC TYPE — These connectors utilize a polarized contact design in which plugs and mating receptacles each have one male and one female contact. Frequency limit is 100MHZ and voltage rating is 100 volts peak.

STRAIGHT PLUGS/Non-constant Impedance • Twin Male Contacts • Weatherproof

RG-( )/U Cables	Military Part Number	Dimensions, inches			Insulation	Polarization (degrees from key)	Stock Code *	Notes	Amphenol Part Number
		a	b	Max. Cable O.D. c					
22	UG421B/U	1¾	⅞	.444	Rexolite	Keyed 90°	S	—	32225
22 except 22A, 22B	UG102/U	1½	¾	.437	Filled Bakelite	—	S	Small, Non-weatherproof	83-22SP
	—	1½	11/16	.437	Teflon	—	S	Small, Non-weatherproof	83-821
57, 130	UG1060/U	1 13/16	1⅛	.625	Filled Bakelite	—	S	Large	83-2SP
108A	—	1⅞	⅞	.260	Rexolite	Keyed 90°	S	—	22275
	—	1 5/32	9/16	.255	Rexolite	Contact Polar.	S	1 Male, 1 Female Cont.	31-224
	—	1 5/32	9/16	.255	Teflon	Contact Polar.	S	1 Male, 1 Female Cont.	31-2226

Mating Notes:

31- prefix plugs (BNC-type) mate only with receptacles and adapters bearing the same prefix.

83- prefix plugs (UHF-type) mate only with receptacles and adapters of the same size; i.e., "small" or "large" as indicated in "exceptions/notes" column.

All other plugs (TWINAX) mate with jacks/receptacles/adapters possessing the same polarization as indicated in "polarization" column.

JACKS

Rexolite Insulation • Twin Female Contacts • Weatherproof • Non-constant Impedance

RG-( )/U Cables	Military Part Number	Dimensions, inches			Polarization	Stock Code *	Notes	Amphenol Part Number
		a	b	Max. Cable O.D. c				
22	—	1¾	¾	.437	Keyed 90°	S	Straight Jack	6975
22	UG423B/U	1¾	1	.444	Keyed 90°	S	Bulkhead Jack	32200

PANEL RECEPTACLES

Twin Female Contacts • Weatherproof • Non-constant Impedance

Military Part Number	Dimensions, inches		Mtg. Hole	Insulation	Polarization	Stock Code *	Notes	Amphenol Part Number
	a	b						
UG422/U	1 3/16	1	R	Rexolite	Keyed 90°	S	—	6225
UG-103/U	1 1/32	1	X	Filled Bakelite	—	S	Small, Non-weatherproof	83-22R
UG1057/U	1 1/16	1 9/32	W	Filled Bakelite	—	N	Large, Non-weatherproof	83-2R
—	1 1/32	11/16	V	Rexolite	Contact Polar.	S	1 Female, 1 Male Contact	31-235

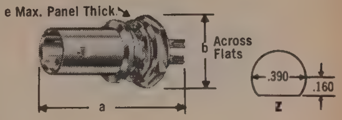
*Stock Code: S = Stock N = Non Stock

FOR LOCAL SOURCE OF SUPPLY SEE EEM VOL. 2 PAGE 462

RF CONNECTORS

BUNKER RAMO AMPHENOL

TWIN



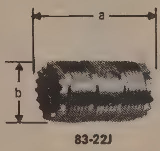
BULKHEAD RECEPTACLES

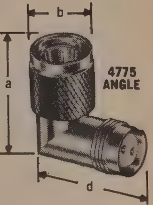
Contact Polarization • Weatherproof • Non-constant Impedance • Front Mounted

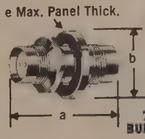
Dimensions, inches			Insulation	Polarization	Stock Code *	Notes	Amphenol Part Number
a	b	e					
1 1/32	1/2	.106	Rexolite	Contact Polar.	S	1 Female, 1 Male Contact	31-223
1 1/32	1/2	.106	Teflon	Contact Polar.	S	1 Female, 1 Male Contact	31-2225

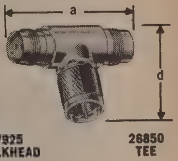
ADAPTERS/Rexolite Insulation • Non-constant Impedance • Weatherproof

Military Part Number	Dimensions, inches				Polarization	Configuration	Stock Code *	Notes	Amphenol Part Number
	a	b	d	e					
UG981/U	1 19/32	7/8	1 27/64	—	Keyed 90°	Angle	S	—	4775
UG493A/U	1 5/8	1	—	.343	Keyed 90°	Blkd.	S	Mounting Hole dia. 49/64	7925
—	2 13/64	—	1 7/8	—	Keyed 90°	Tee	S	Teflon Insulation	26850
UG105/U	1 1/8	5/8	—	—	—	Straight	S	Small, Non-weatherproof	83-22J
UG104/U	1 7/32	3/4	1 1/16	—	—	Angle	S	Small, Non-weatherproof	83-22AP
PL-275	2	5/8	—	1 1/2	—	Blkd.	S	Small, Non-weatherproof	83-22F
UG196/U	1 5/8	—	1 13/64	—	—	Tee	S	Small, Non-weatherproof	83-22T
UP1059/U	1 1/8	1	—	—	—	Straight	S	Large, Non-weatherproof	83-2J



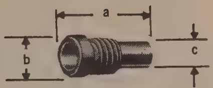






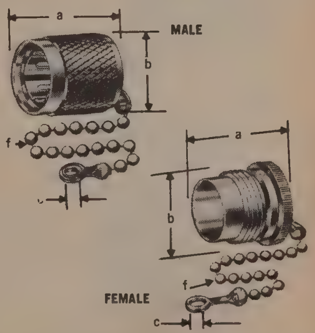
REDUCING ADAPTERS/Non-weatherproof

RG-( )/U Cable	Dimensions, inches			Stock Code *	Notes	Amphenol Part Number
	a	b	Max. Cable O.D. c			
108A	1	7/16	.257	S	Use With 82-22SP and 83-821	83-65



CAPS/Weatherproof

Dimensions, inches				Stock Code *	Notes	Amphenol Part Number
a	b	c	f			
1 1/16	27/32	.144	3 1/2	S	Male, Shorting Male Contacts	6350
27/32	13/16	.144	3 1/2	S	Female	22250



Mating Notes:

31- prefix plugs (BNC-type) mate only with receptacles and adapters bearing the same prefix.

83- prefix plugs (UHF-type) mate only with receptacles and adapters of the same size; i.e., "small" or "large" as indicated in "exceptions/notes" column.

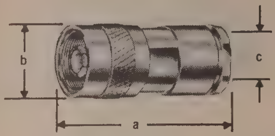
All other plugs (TWINAX) mate with jacks/receptacles/adapters possessing the same polarization as indicated in "polarization" column.

*Stock Code: S = Stock N = Non Stock

FOR LOCAL SOURCE OF SUPPLY SEE EEM VOL. 2 PAGE 462

TRIAX

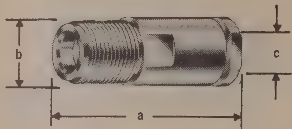
TRIAX connectors are used in transmission line applications where maximum RF shielding and minimum noise radiation are required. They are used with triaxial cables. These connectors have an impedance of 50 ohms, but can be used, and are so listed, with 75 ohm cable where impedance matching is not critical. Connector mating ends have different threading, as listed, and will not intermate. Frequency limit is 10GHZ and voltage rating is 1900-5000 volts depending on cable being used.



STRAIGHT PLUGS

Teflon Insulation • 50 Ohm Impedance • Male Contacts • Weatherproof

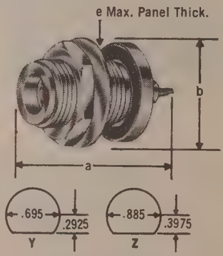
RG-( )/U Type Cable	Dimensions, inches a	b	Max. Cable O.D. c	Mating Threads	Stock Code *	Notes	Amphenol Part Number
RG-8 type	2 3/64	1	.505	7/8-20	S	—	53250
RG-11 type	2 3/64	1	.475	7/8-20	S	—	53175
RG-58A type	1 21/32	25/32	.296	11/16-24	S	Gold Plated Contact	53150
RG-59 type	1 21/32	25/32	.332	11/16-24	S	—	53100



STRAIGHT JACKS

Teflon Insulation • 50 Ohm Impedance • Female Contacts • Weatherproof

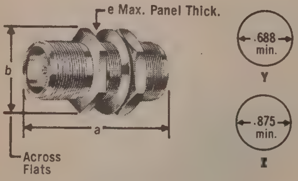
RG-( )/U Type Cable	Dimensions, inches a	b	Max. Cable O.D. c	Mating Threads	Stock Code *	Notes	Amphenol Part Number
RG-8 type	2	7/8	.505	7/8-20	N	Rexolite Insulator	34425
RG-11 type	2	7/8	.475	7/8-20	S	—	52975
RG-58A type	1 3/4	3/4	.296	11/16-24	S	—	34375
RG-59 type	1 3/4	3/4	.332	11/16-24	N	—	34400



BULKHEAD RECEPTACLES

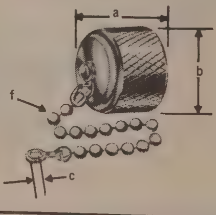
Teflon Insulation • 50 Ohm Impedance • Female Contacts • Weatherproof • Rear Mounted

Dimensions, inches a	b	e	Mating Threads	Mtg. Hole	Stock Code *	Notes	Amphenol Part Number
1 9/32	1	.156	11/16-24	Y	S	—	34450
1 9/32	1 1/4	.156	7/8-20	Z	S	—	34475



BULKHEAD ADAPTERS/Teflon Insulation • 50 Ohm Impedance • Weatherproof

Dimensions, inches a	b	e	Mating Threads	Mtg. Hole	Adapter Ends	Stock Code *	Notes	Amphenol Part Number
1 3/4	1 1/4	.709	7/8-20	Z	Jack-Jack	S	—	53200
1 3/4	15/16	.709	11/16-24	Y	Jack-Jack	S	—	53225



MALE CAPS/Weatherproof

Dimensions, inches a	b	c	Chain Length f	Mating Threads	Stock Code *	Notes	Amphenol Part Number
13/16	1	.144	5	7/8-20	N	—	34275
25/32	13/16	.144	5	11/16-24	S	—	34300

*Stock Code: S = Stock N = Non Stock

FOR LOCAL SOURCE OF SUPPLY SEE EEM VOL. 2 PAGE 462

RF CONNECTORS

BUNKER RAMO AMPHENOL

LC SERIES

Series LC connectors are large, 50 ohm constant impedance, weatherproof types designed for high voltage applications. Frequency range is 1GHz and voltage rating is 5000 volts peak.

STRAIGHT PLUGS/Male Contacts • Weatherproof • 50 Ohm Impedance

RG-( )/U Cables	Military Part Number	Dimensions, inches a	b	Max. Cable O.D. c	Clamp Gasket	Stock Code *	Notes	Amphenol Part Number
17, 18	UG154/U	$3\frac{1}{16}$	1½	1	Syn. Rubber	S	Uses Cable Center Conductor and Insulation	82-59

PANEL RECEPTACLES/Female Contacts • Weatherproof • 50 Ohm Impedance

Military Part Number	Dimensions, inches a	b	Insulation	Stock Code *	Notes	Amphenol Part Number
UG352/U	2¼	2	Teflon	S	—	82-80
UG352A/U	$3\frac{3}{16}$	2	Rexolite	S	Pressurized	82-110

STRAIGHT ADAPTERS

Polystyrene Insulation • Weatherproof • 50 Ohm Impedance

Military Part Number	Dimensions, inches a	b	Adapter Ends	Stock Code *	Notes	Amphenol Part Number
UG215/U	2½	$1\frac{5}{32}$	Jack-Jack	S	—	3000

ANGLE ADAPTERS

Polystyrene Insulation • Weatherproof • 50 Ohm Impedance

Military Part Number	Dimensions, inches a	b	Adapter Ends	Stock Code *	Notes	Amphenol Part Number
UG216/U	2¾	2½	Plug-Jack	S	—	4350

PANEL ADAPTERS/Polystyrene Insulation • Weatherproof • 50 Ohm Impedance

Military Part Number	Dimensions, inches a	b	Adapter Ends	Stock Code *	Notes	Amphenol Part Number
UG287B/U	2½	2	Jack-Jack	N	—	51525

TEE ADAPTERS/Polystyrene Insulation • Weatherproof • 50 Ohm Impedance

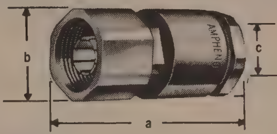
Dimensions, inches a	b	Adapter Ends	Stock Code *	Notes	Amphenol Part Number
2¾	$3\frac{5}{32}$	Jack-Plug-Jack	N	—	28800

MALE CAP/Weatherproof

Dimensions, inches a	b	c	Chain Length f	Stock Code *	Notes	Amphenol Part Number
$\frac{23}{32}$	1⅜	.281	4¾	S	—	14825

*Stock Code: S = Stock N = Non Stock

FOR LOCAL SOURCE OF SUPPLY SEE EEM VOL. 2 PAGE 462



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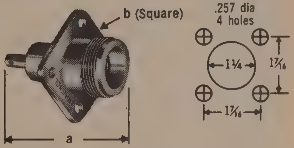

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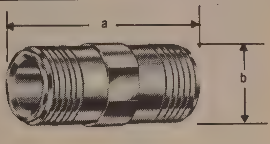

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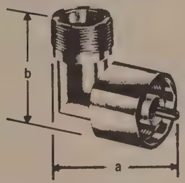

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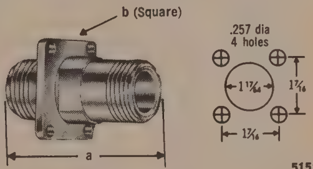

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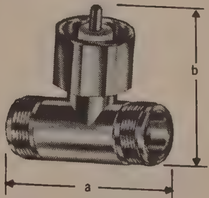

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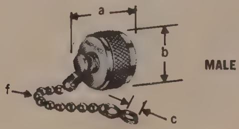


14825

BUNKER RAMO AMPHENOL

Many different combinations of between series adapters are made by Amphenol. They are of non-constant impedance, but designed so that inherent electrical discontinuities are minimal.

ADAPTERS BETWEEN SERIES

STRAIGHT ADAPTERS/Weatherproof

Adapter Ends		Military Part Number	Dimensions, inches		Insulation	Impedance (ohms)	Stock Code*	Notes	Amphenol Part Number
			Length a	Largest O.D. b					
BNC Plug	C Jack	UG635/U	1 9/32	19/32	Teflon	50	S	—	83175
BNC Plug	HN Jack	—	1 21/32	3/4	Rex./Teflon	—	S	—	32750
BNC Plug	MB Jack	—	1	9/16	Kel-F	50	S	—	47275
BNC Plug	N Jack	UG349A/U	1 9/16	39/64	Teflon	—	S	—	31-217
BNC Plug	N Jack	UG349/U	1 3/4	5/8	Rex./Teflon	50	S	—	2975
BNC Plug	SMA Jack	—	1 1/16	9/16	Teflon	50	S	—	901-165
BNC Plug	TNC Jack	—	1 1/4	5/8	Teflon	50	S	—	79025
BNC Plug	UHF Jack	UG255/U	1 5/16	5/8	Rexolite	50	S	—	2900
BNC Plug	UHF Jack	—	1 5/16	5/8	Teflon	50	S	—	2925
C Plug	BNC Jack	UG636A/U	1 15/64	3/4	Teflon	50	S	—	83200
C Plug	HN Jack	UG703A/U	1 1/2	3/4	Teflon	—	N	—	83400
C Plug	N Jack	UG565A/U	1 17/32	3/4	Teflon	50	S	—	82-540
HN Plug	BNC Jack	UG309/U	1 1/2	27/32	Teflon	50	S	—	8900
HN Plug	C Jack	UG702/U	1 1/2	27/32	Teflon	—	S	—	83350
HN Plug	MHV Jack	—	1 1/2	27/32	Teflon	50	S	—	20625
HN Plug	N Jack	—	1 9/16	7/8	Teflon	50	S	—	16050
LC Plug	HN Jack	UG252/U	2 9/32	1 5/8	Polystyrene	—	N	—	2625
MB Plug	BNC Jack	—	15/16	9/16	Kel-F	50	S	—	47250
MHV Plug	UHF Jack	—	1 3/8	5/8	Teflon	—	S	—	28075
N Plug	BNC Jack	UG201A/U	1 5/16	13/16	Teflon	—	S	—	31-216
N Plug	BNC Jack	UG201/U	1 15/32	13/16	Teflon	—	S	—	31-830
N Plug	BNC Jack	—	1 9/16	3/4	Teflon	70	S	—	4250
N Plug	C Jack	UG564/U	1 3/8	13/16	Teflon	50	S	—	82-508
N Plug	HN Jack	—	1 9/16	13/16	Teflon	50	S	—	16075
N Plug	SMA Jack	—	1 17/32	13/16	Teflon	50	S	—	901-294
N Plug	TNC Jack	—	1 5/16	13/16	Teflon	50	S	—	78800
N Plug	UHF Jack	UG146/U	1 13/32	13/16	Rexolite	—	S	Non-Weatherproof	4400
N Plug	UHF Jack	—	1 13/32	13/16	Teflon	—	S	Non-Weatherproof	14650
SMA Plug	BNC Jack	—	1 5/32	9/16	Teflon	50	S	—	901-166
SMA Plug	N Jack	—	1 45/64	5/8	Teflon	50	S	—	901-293
SMA Plug	TNC Jack	—	1 5/32	9/16	Teflon	50	S	—	901-170
TNC Plug	BNC Jack	—	1 1/4	5/8	Teflon	50	S	—	79675
TNC Plug	N Jack	—	1 21/32	5/8	Teflon	50	S	—	79825
TNC Plug	SMA Jack	—	1 3/32	19/32	Teflon	50	S	—	901-169
UHF Plug	BNC Jack	UG273/U	1 3/16	23/32	Rexolite	—	S	—	31-028
UHF Plug	BNC Jack	—	1 9/32	3/4	Teflon	50	S	—	12025
UHF Plug	C Jack	UG637/U	1 3/8	13/16	Teflon	—	S	Non-Weatherproof	83225
UHF Plug	MB Jack	—	1 11/32	3/4	Teflon	—	N	Non-Weatherproof	47400
UHF Plug	MHV Jack	—	1 9/32	3/4	Teflon	—	S	—	28050
UHF Plug	N Jack	UG83/U	1 9/16	3/4	Teflon-Rex.	—	S	—	14000
UHF Plug	N Jack	UG83B/U	1 13/16	13/16	Teflon	—	S	—	34125
BNC Plug	N Plug	UG1034/U	1 1/2	13/16	Teflon	50	S	—	5225
BNC Plug	SMA Plug	—	1 3/32	9/16	Teflon	50	S	—	901-164
N Plug	SMA Plug	—	1 45/64	13/16	Teflon	50	S	—	901-292
N Plug	TNC Plug	—	1 9/32	13/16	Teflon	50	S	—	78875
N Plug	UHF Plug	UG318/U	1 47/64	3/4	Rexolite	—	S	—	26700
SMA Plug	TNC Plug	—	1 1/8	19/32	Teflon	50	S	—	901-168
TNC Plug	N Plug	—	1 9/16	13/16	Teflon	50	S	—	79850
BNC Jack	SMA Jack	—	1 1/8	9/16	Teflon	50	S	—	901-167
BNC Jack	TNC Jack	—	1 9/32	7/16	Teflon	50	S	—	76400
C Jack	LC Jack	—	3 29/64	1 1/4	Teflon	—	N	—	82350
HN Jack	N Jack	—	1 49/64	3/4	Rex./Teflon	50	S	—	16100
MB Jack	N Jack	—	1 1/4	5/8	Teflon	50	N	—	47375
N Jack	SMA Jack	—	1 21/32	5/8	Teflon	50	S	—	901-295
N Jack	TNC Jack	—	1 25/64	5/8	Teflon	50	S	—	78825
SMA Jack	TNC Jack	—	1 1/8	9/16	Teflon	50	S	—	901-171

*Stock Code: S = Stock N = Non Stock

FOR LOCAL SOURCE OF SUPPLY SEE EEM VOL. 2 PAGE 462

RF CONNECTORS

BUNKER RAMO AMPHENOL

PANEL MOUNT ADAPTERS

Weatherproof

Adapter Ends — To —		Military Part Number	Dimensions, inches			Insulation	Impedance (Ω)	Stock Code *	Notes	Amphenol Part Number
			a	b	Mtg. Hole					
BNC Jack	HN Jack	—	1⅜	¾	K	Teflon	50	S	Front or Rear Mtg.	35050
BNC Jack	MB Jack	—	1⁵⁄₃₂	.377	O	Kel-F	50	S	Front or Rear Mtg.	33200
BNC Jack	N Jack	—	1⁷⁄₁₆	1	M	Teflon	50	S	Angle/Rear Mtg.	2800
BNC Plug	N Jack	UG335/U	1¾	1	M	Rexolite-Teflon	50	S	Rear Mtg.	3025
BNC Jack	N Jack	—	1½	1	M	Rexolite	50	S	Rear Mtg.	21850
HN Jack	LC Jack	UG259A/U	2¹³⁄₆₄	1¼	ZZ	Teflon	—	S	—	2500
LC Jack	N Jack	UG271A/U	2¹³⁄₆₄	1⁹⁄₁₆	X	Polyethylene	50	N	—	55000
SMA Plug	N Jack	—	1⁴⁵⁄₆₄	1	Q	Teflon	50	S	—	901-278
SMA Plug	TNC Jack	—	1¹⁵⁄₃₂	¹¹⁄₁₆	R	Teflon	50	S	—	901-279
SMA Jack	TNC Jack	—	1²⁷⁄₆₄	¹¹⁄₁₆	R	Teflon	50	S	—	901-280

BULKHEAD MOUNT ADAPTERS

Weatherproof

Adapter Ends — To —		Military Part Number	Dimensions, inches			Insulation	Impedance (Ω)	Stock Code *	Notes	Amphenol Part Number
			a	b	Mtg. Hole					
BNC Jack	N Jack	—	1²⁷⁄₃₂	¹³⁄₁₆	Z	Rexolite-Teflon	50	S	Front Mtg., Pressurized	5850
BNC Jack	N Jack	—	1¹¹⁄₁₆	¹³⁄₁₆	L	Glass-Teflon	—	S	Herm. Sealed	93075
BNC Jack	SM Jack	UG691/U	1⅛	¹⁹⁄₃₂	Y	Glass-Teflon	—	N	Herm. Sealed Rear Mtg.	89250
C Jack	MB Jack	—	1⁷⁄₃₂	¾	X	Glass-Teflon	—	N	Herm. Sealed	83950
BNC Jack	MB Jack	—	1⅛	.595	Y	Glass-Teflon	50	S	Herm. Sealed Rear Mtg.	47200

ANGLE ADAPTERS

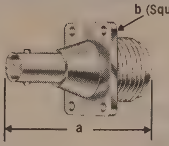
Weatherproof

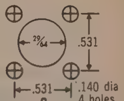
Adapter Ends — To —		Military Part Number	Dimensions, inches		Insulation	Impedance (Ohms)	Stock Code *	Notes	Amphenol Part Number
			a	b					
BNC Plug	HN Jack	UG559/U	1½	¹⁹⁄₃₂	Rexolite	50	N	—	17750
N Plug	C Jack	—	1⁹⁄₃₂	1⁹⁄₃₂	Teflon	50	S	—	83875
BNC Jack	N Jack	—	1⁷⁄₁₆	1	Teflon	50	S	Panel Mount	2800

*Stock Code: S = Stock N = Non Stock

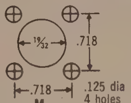
FOR LOCAL SOURCE OF SUPPLY SEE EEM VOL. 2 PAGE 462

ADAPTERS BETWEEN SERIES

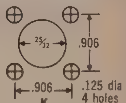



²⁹⁄₆₄
.531
.531
.140 dia
4 holes

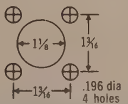
O


¹⁹⁄₃₂
.718
.718
.125 dia
4 holes

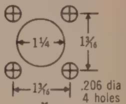
M


²⁵⁄₃₂
.906
.906
.125 dia
4 holes

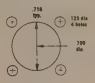
K


1⅛
1³⁄₁₆
1³⁄₁₆
.196 dia
4 holes

ZZ


1¼
1³⁄₁₆
1³⁄₁₆
.206 dia
4 holes

X


.718 typ.
.125 dia
4 holes
.700 dia

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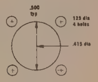
.500 typ
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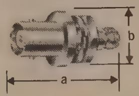
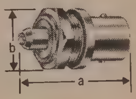
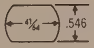
4 holes
.415 dia

R







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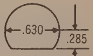

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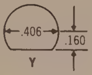

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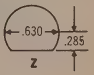

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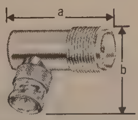

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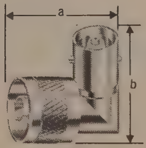

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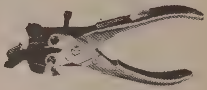
CRIMP TOOLS

227-944 FRAME
SHOWN WITH DIE



227-900 (227-901)
RADIAL CRIMP TOOL

227-911
INNER BRAID TOOL

227-926
CENTER CONTACT TOOL

R F CRIMP TOOLS

Amphenol crimp connectors incorporate the latest technique in connector design, and are readily available in many series. Amphenol MIL-Crimps are the highest quality crimps available and are presently offered in the N, BNC and TNC Series. In addition to providing superior performance, Amphenol crimp connectors are quick and easy to assemble. Using standard crimping tools, they assemble in approximately one-tenth the time normally needed for connectors requiring conventional cable clamping techniques. Crimp force is controlled automatically by the tool. Tedious braid combing, trimming, forming operations and soldering are eliminated as is the need for a specially skilled operator. Connectors are assembled uniformly from day-to-day and from worker to worker. Most of these connectors are also designed and tested to the applicable military specifications, including MIL-C-39012, the military specification which will eventually obsolete most existing RF connector specs.

In general, cable retention is significantly improved through the use of back-end crimping. This is most frequently accomplished by crimping directly to the cable braid rather than the cable jacket. Crimping to the braid also assures improved electrical conductivity of the cable shield to the connector. Most braid crimps are of a hex configuration. Crimping of center contacts provides equally fast assembly and in many cases provides SWR results equivalent to those of soldered contacts. Most center contact crimps are of a four-indent configuration, although center contact hex crimps are also available.

R F CRIMP TOOLS

		Hex Size Across Flats (.003)			
Connector Series	For Use With RG-( )/U Cables	Cavity A (Braid)	Cavity B (Contact)	Military Part Number	Amphenol Part Number
Various	Frame Only for All 227-1221-XX Die Sets			M22520/5-01	227-944
N (Braid & Contact)	55, 58, 141, 142, 223, 303, 400	.213	.100	M22520/5-57	227-1221-57
	59, 62, 140, 210	.255	.100	M22520/5-59	227-1221-59
	5, 6, 21, 143, 212, 222, 304	.324	.100	M22520/5-29	227-1221-29
	8, 9, 11, 87A, 149, 165, 213, 214, 216, 225, 393	.429	.100	M22520/5-25	227-1221-25
BNC/TNC (Braid & Contact)	122, 174, 179, 180, 187, 188, 195, Essex 21-597	.178	.068	M22520/5-09	227-1221-09
	55, 58, 141, 142, 223, 303, 400	.213	.068	M22520/5-11	227-1221-11
	59, 62, 140, 210	.255	.068	M22520/5-13	227-1221-13
	71	.263	.068	M22520/5-15	227-1221-15
MHV (Braid Only)	55, 58, 141, 142, 223, 303, 400	.213	Solder Contact	M22520/5-11	227-1221-11
UHF (Braid Only)	55, 58, 141, 142, 223, 303, 400	.213	Solder Contact	M22520/5-11	227-1221-11
	59, 62, 140, 210	.255	Solder Contact	M22520/5-13	227-1221-13
	8, 11, 149, 213	.384	Solder Contact	M22520/5-23	227-1221-23
SMA (Braid Only)	122, 174, 179, 180, 187, 188, 195	.178	Solder Contact	M22520/5-09	227-1221-09
	55, 58, 141, 142, 223, 303, 400	.213	Solder Contact	M22520/5-11	227-1221-11
ALC-5 (Braid & Contact)	58, 188	—	—	—	227-1228
	Economy Tool	—	—	—	227-525
27 (Braid Only)	174, 179, 187, 188	—	Solder Contact	—	227-900
	180, 195	—	Solder Contact	—	227-901
	Adapter for Part Number 27-14 (Only)			—	227-902
	Adapter for Part Number 27-4, 27-8, 27-10			—	227-913
	Adapter for Part Number 27-16, 27-20, 27-22			—	227-914
5116 (Braid Only)	180, 195	Cavity A		—	227-911
	174, 179, 187, 188	Cavity B		—	227-911
	178, 196	Cavity C		—	227-911
5116 (Contact Only)	174, 178, 179, 180, 187, 188, 195, 196	.034	N/A	—	227-926

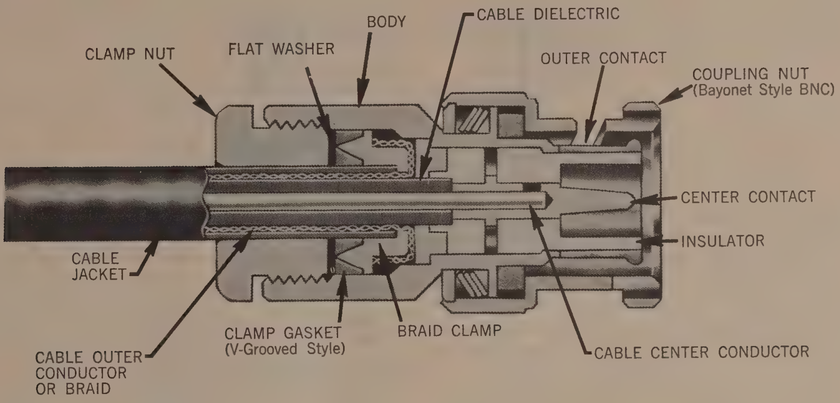
FOR LOCAL SOURCE OF SUPPLY SEE EEM VOL. 2 PAGE 462

COAXIAL CONNECTOR SELECTION & ASSEMBLY

THE VITAL LINK TO TOP PERFORMANCE

When selecting connectors, there are several important considerations: the physical and electrical size of the cable; the connector type, mating interface or coupling style; and, finally, the method of cable retention and assembly.

TYPICAL CONNECTOR CROSS-SECTION
(Clamp Type with Captivated Contact)



CABLE

Coaxial cable consists of two concentric conductors separated by a dielectric layer (insulating material). An outer covering, or jacket, protects the cable from physical environmental damage.

The cable center conductor can be a single solid wire or many thin strands twisted together. In flexible cables, the outer conductor, or shield is a layer of thin strands of braided wire between the dielectric and jacket. In semi-rigid cables, the outer conductor and jacket layer are combined into a thin sheath of copper or aluminum to which a termination is usually soldered.

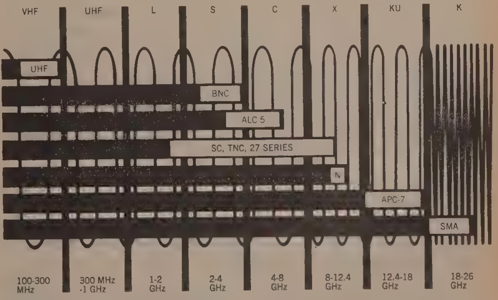
Each cable package is designed to carry a signal with predictable efficiency. Military nomenclature, such as RG-58/U, is usually used to identify one cable from another. Some cables are designated by their outer dimension such as .141″ diameter semi-rigid metal jacketed cable. Other special application cables are described by their manufacturer's part number.

The physical size of the cable and the signal carrying capacity required for your application are the first parameters to evaluate before an appropriate termination or interconnection can be selected.

CONNECTOR TYPE OR SERIES

The chart below shows the popular connector types or series categorized by the optimum frequency range across which the units were designed to operate. The chart is further subdivided into convenient band widths with associated designations assigned by the FCC. Generally, as the optimum frequency range of operation increases, so does the cost. Therefore, it is important to observe certain disciplines in the selection process to avoid burdening your product with the excessive costs of performance for which there will be no foreseeable demand.

CONNECTOR SELECTION GUIDE



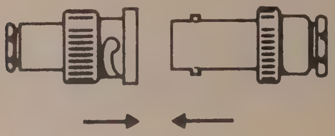
FOR LOCAL SOURCE OF SUPPLY SEE EEM VOL. 2 PAGE 462

RF CONNECTORS

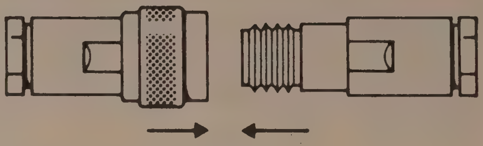
BUNKER RAMO AMPHENOL

COUPLING METHOD

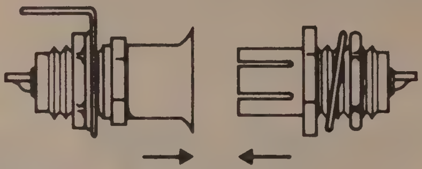
Connectors mate or couple to each other in three basic ways: twist-lock bayonet, screw threads and push-pull action.



BAYONET



THREADED



PUSH ON

Twist Lock. Bayonet coupling provides a push-twist-lock connection. The jacks and receptacles have two or three circular protrusions on the exterior of the body, referred to as bayonet ears or studs. The plugs have slanted slots on the coupling nut into which the studs slide and lock.

Threaded. Jacks and receptacles have external screw-threads on the body. Plugs have matching internal threads in the coupling nut.

Push-Pull. Called by several names, push-on, snap-on, and plug-in, this method simply pushes to mate and pulls to unmate. The connectors are held together by the pressure of a press fit, by spring fingers, or by a spring-loaded detent.

In some cases, a connector series has its own distinctive mating style. BNC, for instance, has twist-lock bayonet type coupling as opposed to the TNC series which is held together by means of screw threads. Where time is a factor, the BNC would be chosen. It is quick to couple and uncouple and very strong once joined. But, if your piece of equipment were to be subjected to excessive movement or vibration, the TNC would be a better choice to avoid any circuit noise that might be generated by the two-stud bayonet arrangement of the BNC. Other connector series offer a choice of coupling styles. For example, the new sub-miniature ALC-5 series offers a push-on version and a snap-on version for applications where a more secure mechanical joint is desirable.

CABLE RETENTION METHODS

Again, there are three basic methods of securing or attaching the cable to the connector: soldering, clamping and crimping.

Soldering. The relatively unsophisticated procedure of soldering the connector body directly to the braid of flexible cable can still be found in the UHF series. For semi-rigid metal jacketed cable, however, the solder-type cable retention method employed reflects appropriate state-of-the-art advances. Applying too much heat that might deform the cable dielectric is a real danger. Amphenol endeavors to minimize this problem by incorporating appropriate safeguards in its connector design and cable assembly instructions. With SMA solder-type connectors, the design is such that the dielectric is trimmed after the solder operation is completed.

Clamping. This method employs the braid clamp, the sealing gasket, (originally a flat rubber gasket but improved to a V-grooved gasket or chevron seal), a flat washer and the clamp nut. This is the part that gives the force needed to secure the cable to the connector.

The old style clamps sealed and clamped by compressing the flat gasket, giving a fairly adequate seal but cable retention, being dependent on a rubber gasket, was weak. In the improved clamp, the V gasket is split as the clamp nut is tightened to the peaked portion of the braid clamp. This gasket shearing gives a better moisture seal and provides strong metal-to-metal cable retention.

Crimping. The latest cable retention method is crimping. With this method the braid clamp, gasket, washer, and clamp nut are replaced by a ferrule clamp nut assembly or a ferrule that's an extension of the connector body. The cable dielectric and center conductor are inserted into the ferrule, which is then crimped to the cable braid by a special tool. The inner ferrule is brass but the outer ferrule is a soft copper alloy because it must be deformed.

The crimping assembly method is much easier to perform than clamping. Connectors are assembled uniformly from day to day and from worker to worker. Cable stripping dimensions are not as critical and braid combing isn't required. The problems of torque tightening, necessary to obtain satisfactory cable retention with the clamp method, are eliminated. While special tools are required, the repeatable performance crimped assemblies demonstrate and the speed with which the assembly operation can be performed (approximately one-tenth the time required for clamping techniques) is well worth the relatively small tool investment.

CABLE-TO-CONNECTOR ASSEMBLY

Assuming a connector is properly designed and manufactured to the required tolerances, the most important contributions to high VSWR are those variables associated with the assembly of the connector to the cable. The importance of this operation cannot be over-emphasized. Any air gap between the cable core and the connector insulator introduces an impedance discontinuity that can greatly increase the VSWR of the assembly. Similar effects are present when the connector contact is not butted against a square cut of the cable dielectric. In high voltage cable assemblies, air pockets reduce the peak voltage capability.

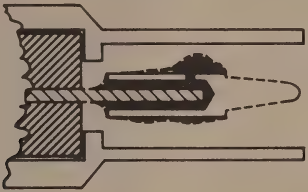
Precautions should be taken during assembly to be certain the center contact of the connector is at the proper lateral position. In most connectors, the lateral distance between a point on the connector shell and the pin is important to maintain an electrical match. Lateral misalignment is a common assembly problem resulting from assembling connectors to both ends of a relatively long cable while the cable is still coiled. When uncoiled, the ends of the center conductor assume a different position with respect to the ends of the outer braid. For similar reasons, a connector should not be assembled to cable exposed to temperature extremes.

When soldered center pins are used, two major problems occur; not enough solder inside the pin, or too much solder on the outside. The first lengthens the path of current in the center conductor and increases inductance. The latter enlarges the diameter of the center pin, increasing the connectors' shunt capacitance. Both affect high frequency performance by changing the connectors' impedance.

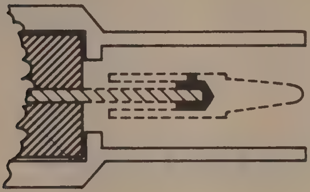
Small sized connectors are troubled most by this change in pin size. Since the thickness of an excess solder film is relatively constant, and the connectors' dimensions are reduced, the diameter ratio variation has a greater impact on the connectors' impedance. Subminiature connectors are particularly susceptible to this assembly problem. They are also sensitive to cable deformations. Off-centered coax, or cable with pinched dielectric, is often the cause of poor performance. These troubles start with the choice of assembly method.

Connector assembly methods vary widely among users. For many, it's the most costly step in making their product. Trading up in acquisition cost to an improved clamp or crimp connector that gives speedier assembly and fewer operations, can lower the actual total connector cost.

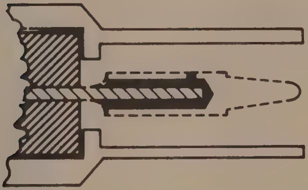
Wherever possible, the assembly operation should be automated to reduce variations caused by hand assembly. It's best to make up in-house operating procedures based on the connector manufacturer's assembly instructions. Cutting guides, the choice of thermal or knife-edge stripping of insulation, etc., should depend on the tooling at hand and the skill level of the operators. Greater care and planning at the assembly stations result in a more reliable and better performing connector.



A) Too much solder increases center conductor diameter, thus increasing shunt capacitance.



B) Too little solder increases the current path, thus increasing series inductance.



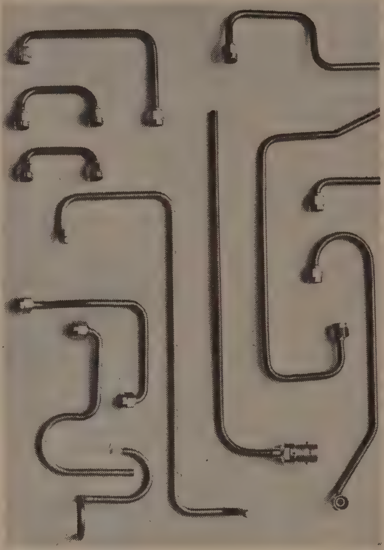
C) The proper amount of solder is needed to wring the maximum high frequency performance from a connector.

SOLDER IMPEDES RF

RF CONNECTORS

BUNKER RAMO AMPHENOL

CUSTOM CONTOURED CABLE ASSEMBLIES TERMINATED TO YOUR SPECIFICATIONS



Amphenol has recognized the rapidly growing need for engineered cable assemblies. Not connectors casually hung on the ends of a length of cable. But units that are capable of passing sophisticated mechanical and electrical tests. Engineered to do a specific job well. Manufactured and assembled under the kind of controlled conditions that assure repeatable performance.

Total capability. Total responsibility. Total accountability. One complete job in one plant for increased efficiency, closer coordination and better quality.

Every Amphenol cable assembly is precisely assembled and 100% tested mechanically and electrically by highly skilled personnel providing the ultimate in RF quality and reliability.

More important. Known total cost. No unexpected surprises. No hidden costs. No unplanned in-house burden rates. Call your nearest Amphenol sales engineer or the RF division for additional information.

OTHER PRODUCTS AND CAPABILITIES

Amphenol RF Division of The Bunker-Ramo Corporation manufactures components and sub-systems for the generation, transmission, reception and utilization of RF and microwave energy. Coaxial connectors, coaxial switches, and custom microwave components comprise our major areas of product activity.

Divisional general offices, manufacturing and assembly facilities occupy 140,000 square feet in Danbury, Connecticut.

This coordinated complex aided by a distribution and warehousing facility in Broadview, Illinois, permits a unique and often instantaneous reaction to the coaxial connector market's demands.

Our capability is further strengthened by automated high-speed manufacturing equipment in conjunction with a consistent uncompromising attitude toward quality.

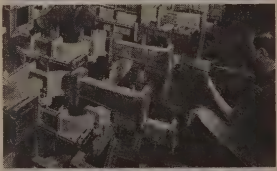
Not only is pin-point surveillance exercised at every phase of fabrication, but most sub-components are manufactured by Amphenol itself from raw stock. Even plastic dielectric insulators are produced by the RF Division in its own injection molders.

Procedures like these make for maximum design flexibility and fast delivery. They also give us positive control at every step, assuring that all sub-components are perfectly matched from electrical and mechanical standpoints.

Extensive facilities for the measurement and analysis of Amphenol connectors under all applicable environmental and electrical parameters, backed by built-in quality assurance controls at each step of fabrication, recommend the highest degree of confidence in the reliability of these components.

Broadband Capability
Amphenol RF Division capability is diverse and deep. It ranges from a fundamental RF component like coaxial connectors to development and production of advanced microwave devices. Whatever the product, the job or the service — all are unified by their common base in RF theory and practice.

Custom Microwave Components
For over a decade Amphenol RF Division has been one of the nation's largest producers of microwave hardware and apparatus for large commercial and military systems.



Coaxial Switches
Amphenol RF Division designs, manufactures and sells more coaxial switches than anyone else in the world. Whether complex phased array types or simple antenna switches, you can be sure of rugged design and precision performance. Scores of models in miniature, hermetically-sealed and multi-position designs are available.

FOR LOCAL SOURCE OF SUPPLY SEE EEM VOL. 2 PAGE 462

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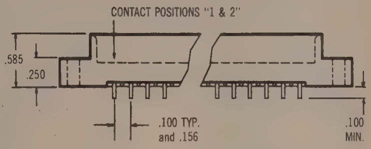
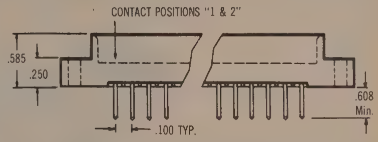
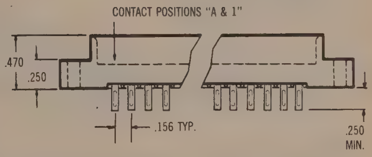
CONNECTORS

GOLD OR ULTRAPLATE P.C. BOARD, SOLDER EYE OR WIRE WRAP TERMINATIONS

- Glass filled polyester type SE-0 body.
- Contact spacing either .100 or .156.
- Standard number of contacts 15/30; 22/44; 36/72; 43/86; 50/100.
- **VOLTAGE RATING:** 600 VAC
- **CURRENT RATING:** .100 spacing 3 amps
  .156 spacing 5 amps
- **VOLTAGE DROP:** 30 millivolts @ rated current
- **TEMPERATURE RANGE:** −65°C to +125°C.
- Polarizing keys available
- Connectors accommodates standard .054" to .071" thick printed circuit boards.
- Features pre-loaded bifurcated contacts.
- Low insertion forces and high contact forces.
- Various mounting styles.







Competitive with:
Amphenol 225 Cinch 50; Burndy PSC
Elco 00; Viking 2VH, 3PN, Winchester 8BD, HKD, HW.

ULTRAPLATE:

Plating:

These connectors feature **"ULTRAPLATE"**, a totally new plating alloy and plating process specifically designed for wiping contacts that permit connector performance comparable to that of gold plated contacts. The contact resistance is less than 10 millivolts making it suitable for use in all non "Dry Circuit" applications.

FEATURES

- low contact resistance
- excellent corrosion resistance
- low insertion forces
- excellent solderability
- low cost

SEE OUR OTHER PAGE ON CONNECTOR PRODUCTS PAGE 2•39

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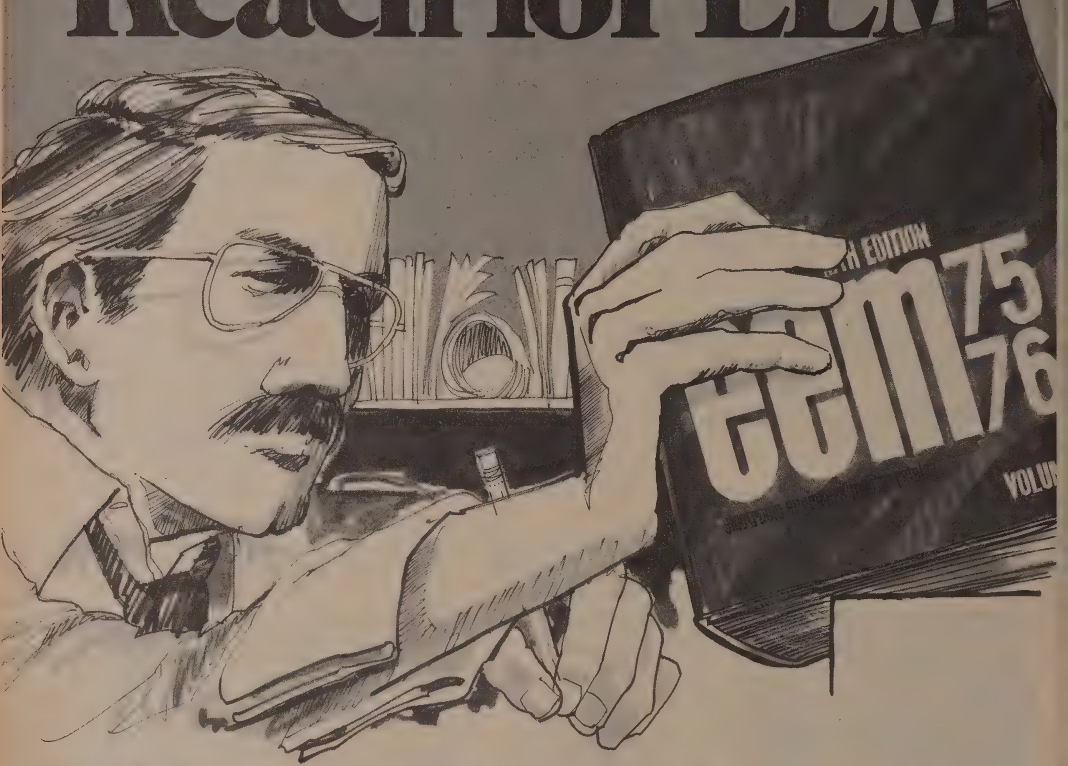

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Most important consideration in the data presentation is the arrangement of product groupings to assure easy product selection.

SETTING THE PACE

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The following pages include locking and non-locking receptacles, caps, connectors, inlets, and outlets that meet the 1975 National Electrical Code and NEMA Configuration requirements.

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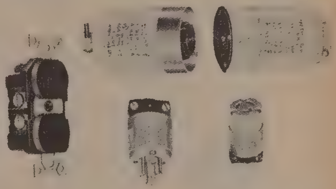
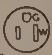
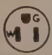
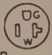
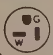
DON'T MISS THESE OTHER A-H PRODUCTS IN EEM

Relays	p. 1•1580
Contactors	p. 1•1584
Switches	p. 1•1934
Timers	p. 1•233

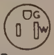
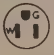
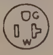
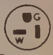


SELECTION GUIDE FOR ARROW-HART DEVICES PUBLISHED IN EEM*

NEMA NON-LOCKING PLUGS AND RECEPTACLES

		15 AMP		20 AMP	
		RECEPTACLES	PLUGS	RECEPTACLES	PLUGS
2 POLE / 3 WIRE GROUNDING	125V	 5-15R	 5-15P	 5-20R	 5-20P
		PAGE 2•622	PAGE 2•622	PAGE 2•622	PAGE 2•622

HOSPITAL GRADE / NON-LOCKING

15 AMP		20 AMP	
RECEPTACLES	PLUGS	RECEPTACLES	PLUGS
 5-15R	 5-15P	 5-20R	 5-20P
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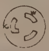
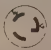
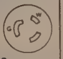
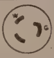
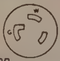
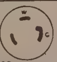
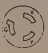
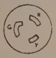
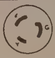
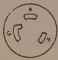
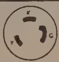
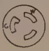
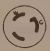
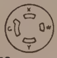
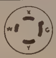
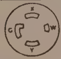
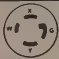
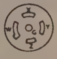
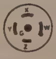
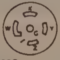
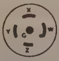
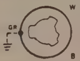
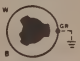
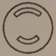
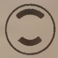
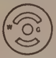
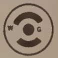
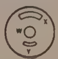
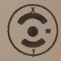
NEMA LOCKING TYPE PLUGS AND RECEPTACLES

		15 AMP		20 AMP		30 AMP	
		RECEPTACLES	PLUGS	RECEPTACLES	PLUGS	RECEPTACLES	PLUGS
2 POLE / 3 WIRE GROUNDING	125V	 L5-15R	 L5-15P	 L5-20R	 L5-20P	 L5-30R	 L5-30P
		PAGE 2•623	PAGE 2•623	PAGE 2•624	PAGE 2•624	PAGE 2•625	PAGE 2•625
	250V	 L6-15R	L6-15P	 L6-20R	 L6-20P	 L6-30R	 L6-30P
		PAGE 2•623	PAGE 2•623	PAGE 2•624	PAGE 2•624	PAGE 2•625	PAGE 2•625
	277 VAC	 L7-15R	 L7-15P	—	—	—	—
		PAGE 2•623	PAGE 2•623	PAGE —	PAGE —	PAGE —	PAGE —
3 POLE / 4 WIRE GROUNDING	125/ 250V	—	—	 L14-20R	 L14-20P	 L14-30R	 L14-30P
		PAGE —	PAGE —	PAGE 2•626	PAGE 2•626	PAGE 2•626	PAGE 2•626
4 POLE / 5 WIRE GROUNDING	120V 208V 3φY	—	—	 L23-20R	 L23-20P	 L23-30R	 L23-30P
		PAGE —	PAGE —	PAGE 2•627	PAGE 2•627	PAGE 2•627	PAGE 2•627

HOSPITAL ONLY / LOCKING

20 AMP	
RECEPTACLES	PLUGS
	
PAGE 2•629	PAGE 2•629

NEMA MIDGET / LOCKING TYPE

		15 AMP	
		RECEPTACLES	PLUGS
2 POLE / 2 WIRE	125V	 ML1-R	 ML1-P
		PAGE 2•628	PAGE 2•628
2 POLE / 3 WIRE GROUNDING	125V	 ML2-R	 ML2-P
		PAGE 2•628	PAGE 2•628
3 POLE / 3 WIRE	125/ 250V	 ML3-R	 ML3-P
		PAGE 2•628	PAGE 2•628

*For complete identification of all NEMA devices from Arrow-Hart see pages 2•630 and 2•631.

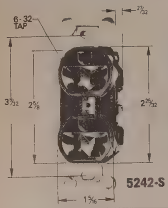
Arrow Hart WIRING DEVICES

NON-LOCKING / 2 POLE — 3 WIRE GROUNDING

RECEPTACLES

15A/125V — DUPLEX

NEMA 5-15R


6-32 TAP
27⁄32
3³⁄₃₂
2⅝
2²⁵⁄₃₂
1⁵⁄₁₆

5242-S

BINDING SCREW TYPE FOR SIDE WIRING

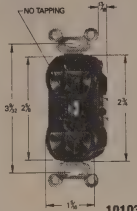
5242-S* — Brown

5242-SI — Ivory

QUICK-CONNECT TERMINALS

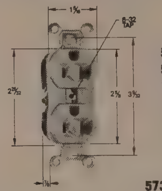
10103 — Brown with 4 .250-.032 Male Tabs

*For other colors, add Suffix BL for Black; GRY for Gray; W for White.


NO TAPPING
3⁵⁄₃₂
2⅝
2¾
1⅝

10103

20A/125V — DUPLEX


1⅜
6-32 TAP
2²⁵⁄₃₂
2⅝
3⁵⁄₃₂

5735-SI

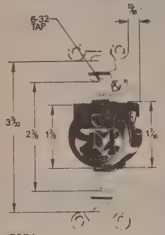
5735-S* — Brown

5735-SI — Ivory

*For other colors, add Suffix BL for Black; GRY for Gray; W for White; RED for Red.

NEMA 5-20R

15A/125V — SINGLE


6-32 TAP
3³⁄₃₂
2⅝
1⅜
1⅞

5251

NEMA 5-15R

5251* — Brown

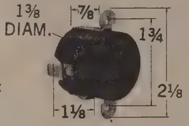
5251-I* — Ivory

5258 — Brown on Short Strap, 1¾" Screw. Spacing with No. 8-32 Screws.

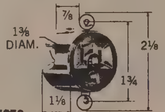
For other colors, add suffix BL for Black, GRY for Gray, W for White, RED for Red. (Red not available on Cat. No. 5251)

QUICK-CONNECT TERMINALS

10118 — Same as 5258 .250 x .032 Male Tabs


1⅜ DIAM.
7⁄8
1¾
2⅛
1⅛

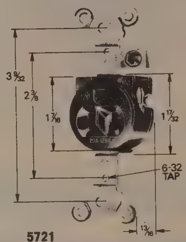
10118


7⁄8
1⅜ DIAM.
2⅛
1¾
1⅛

5258

20A/125V — SINGLE

NEMA 5-20R


3⁵⁄₃₂
2⅝
1⅞
1⁷⁄₃₂
6-32 TAP
1⅜

5721

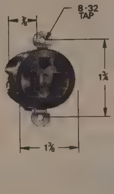
5721* — Brown

5721-1 — Ivory

5733 — Brown on Short strap, 1¹⁵⁄₁₆" Screw Hole, Spacing with 8-32 Screw

5777 — Brown on Short Strap, 1¾" Screw Hole, Spacing with 8-32 Screw

For other colors, add suffix BL for Black, GRY for Gray, W for White, RED for Red. (Red not available on Cat. No. 5721)

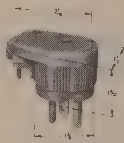


5777

CAPS

15A/125V — "DEAD FRONT"

NEMA 5-15P



6265

BACK-WIRED

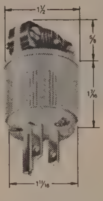
6266 — Gray Nylon/Lexan, Safety-Grip Type

5212 — Black Neoprene, Finger Grip Type, with Nylon Cord Grip

ANGLE TYPE — 4 POSITION

6265-CL — Clear Lexan, Safety-Grip Type

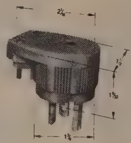
6265-LL — Clear Lexan, Safety-Grip Type



6266

20A/125V

NEMA 5-20P



6765

BACK-WIRED

6766 — Gray Nylon/Lexan, Safety-Grip Type

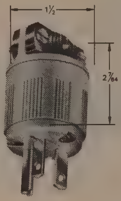
5775 — Black Rubber,

5776 — Finger Grip Type with Cord Grip

ANGLE TYPE — 4 POSITION

6765 — Gray Nylon/Lexan Safety-Grip Type

6765-CL — Clear Lexan, Safety-Grip Type



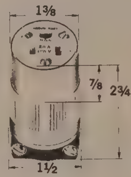
6766

CONNECTORS

15A/125V

NEMA 5-15R

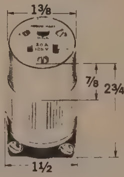
6269 — Cord Hole .250-.656. Gray Nylon/Lexan, Safety-Grip Type.



20A/125V

NEMA 5-20R

6769 — Cord Hole .250-.656 Gray Nylon/Lexan, Safety-Grip Type.

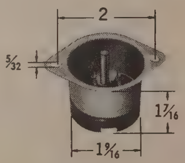


INLET

15A/125V

5278 — Flanged Inlet.

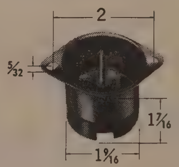
NEMA 5-15P


2
5⁄32
1⁷⁄₁₆
1⁹⁄₁₆

20A/125V

NEMA 5-20P

5778 — Flanged Inlet

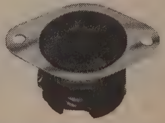

2
5⁄32
1⁷⁄₁₆
1⁹⁄₁₆

OUTLET

15A/125V

5246 — Flanged Outlet Side Wired

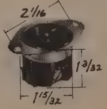
NEMA 5-15R



20A/125V

NEMA 5-20R

5787 — Flanged Outlet

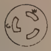

2¹⁄₁₆
1³⁄₃₂
1¹⁵⁄₃₂

Arrow Hart WIRING DEVICES

LOCKING / 2 POLE — 3 WIRE GROUNDING / STANDARD SIZE / 15 AMP

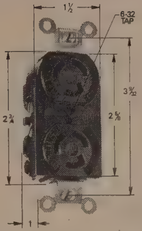
RECEPTACLES

15A/125V — DUPLEX



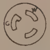
NEMA L5-15R

- **4700** — Brown Bakelite
- **4700-I** — Ivory
- **4702** — Brown Bakelite, 2-Circuit, 2 Feeds, 1 Return.
- **4703** — Brown Bakelite, 2-Circuit, 2 Feeds, 2 Returns.


1½
6-32 TAP
3 3/32
2¼
2⅝
1

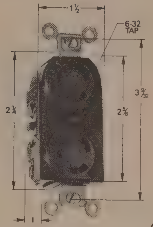
4700

15A/277VAC — DUPLEX



NEMA L7-15R

- **4750** — Brown Bakelite
- **4752** — Brown Bakelite, 2-Circuit, 2 Feeds, 1 Return.
- **4753** — Brown Bakelite, 1-Circuit, 2 Feeds, 2 Returns.

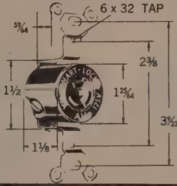

1½
6-32 TAP
3 3/32
2¼
2⅝
1

4750

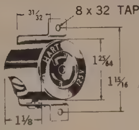
15A/125V — SINGLE

NEMA L5-15R

- **4710** — Brown Bakelite
- **4711** — Brown Bakelite on 4″ Cover.
- **4712** — Same as 4762
- **4713** — Same as 4763


6 x 32 TAP
59/64
2⅜
1½
1 25/64
3 3/32
1⅛

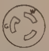
4710


8 x 32 TAP
31/32
1 25/64
1 15/16
1⅛

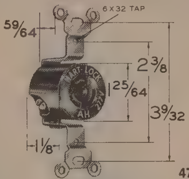
4712

15A/277VAC — SINGLE

- **4760** — Brown Bakelite
- **4761** — With 4″ Metal Cover.
- **4762** — With Short Mtg. Strap 1 15/16″ Screw Spacing
- **4763** — With Short Mtg. Strap 1¾″ Screw Spacing



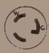
NEMA L7-15R


6 X 32 TAP
59/64
2⅜
1 25/64
3 9/32
1⅛

4760

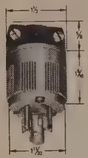
CAPS

15A/125V — "DEAD FRONT"



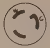
NEMA L5-15P

4721 — Cord Hole .250-.656 Gray Nylon/Lexan



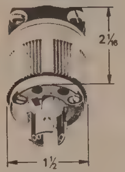
4721

15A/277VAC — "DEAD FRONT"



NEMA L7-15P

4771 — Cord Hole .250-.656 Gray Nylon/Lexan.



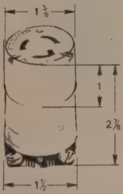
4771

CONNECTORS

15A/125V

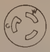
NEMA L5-15R

- **4731** — Cord Hole .250-.656 Gray Nylon/Lexan
- **4730** — Cord Hole .296-.625 Brown Bakelite with Cord Grip



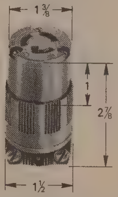
4731

15A/277VAC



NEMA L7-15R

- **4772** — Cord Hole .250-.656 Gray Nylon/Lexan
- **4780** — Cord Hole .296-.625 Brown Bakelite with Cord Grip



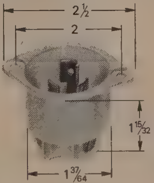
4772

INLET

15A/125V

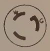
NEMA L5-15P

4716 — Flanged Inlet


2½
2
1 15/32
1 37/64

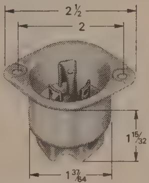
4716

15A/277VAC



NEMA L7-15P

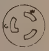
4785 — Flanged Inlet


2½
2
1 15/32
1 37/64

4786

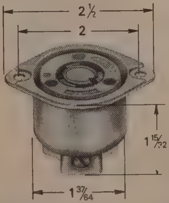
OUTLET

15A/125V



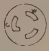
NEMA L5-15R

4715 — Flanged Outlet


2½
2
1 15/32
1 37/64

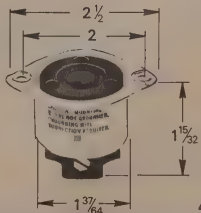
4715

15A/277VAC



NEMA L5-15R

4785 — Flanged Outlet


2½
2
1 15/32
1 37/64

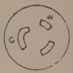
4785

Arrow Hart WIRING DEVICES

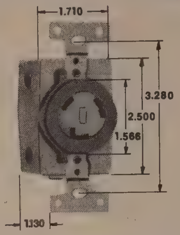
LOCKING / 2 POLE — 3 WIRE GROUNDING / STANDARD SIZE / 20 AMP

RECEPTACLES

20A/125V — SINGLE



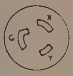
NEMA L5-20R

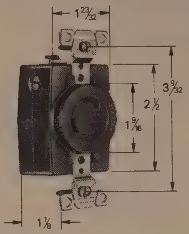

1.710
3.280
2.500
1.566
1130

6200 — Black Melamine, Back Wired

20A/250V — SINGLE

NEMA L6-20R

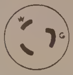



1 23/32
3 9/32
2 1/2
1 9/16
1 1/8

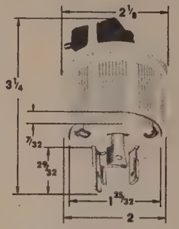
6210 — Black Melamine, Back Wired

CAPS

20A/125V — "DEAD FRONT"



NEMA L5-20P

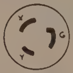

2 1/8
3 1/4
7/32
29/32
1 25/32
2

6202

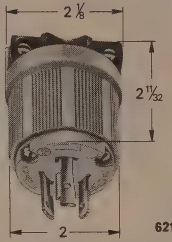
6201 — Cord Hole .375-1.000 Nylon/Lexan

6202 — Cord Hole .375-1.000 Nylon/Lexan with Neoprene Seal.

20A/250V — "DEAD FRONT"



NEMA L6-20P



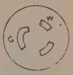
6212

6211 — Cord Hole .375-1.000 Nylon/Lexan

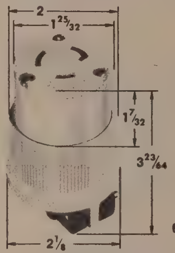
6212 — Cord Hole .375-1.000 Nylon/Lexan with Neoprene Seal.

CONNECTORS

20A/125V



NEMA L5-20R

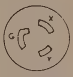

2
1 25/32
1 7/32
3 23/64
2 1/8

6204

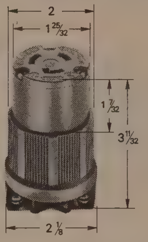
6203 — Cord Hole .375-1.000 Nylon/Lexan

6204 — Cord Hole .375-1.000 Nylon/Lexan with Neoprene Seal

20A/250V



NEMA L6-20R


2
1 25/32
1 7/32
3 11/32
2 1/8

6214

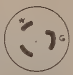
6213 — Cord Hole .375-1.000 Nylon/Lexan

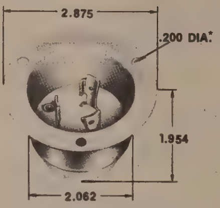
6214 — Cord Hole .375-1.000 Nylon/Lexan with Neoprene Seal

INLET

20A/125V

NEMA L5-20P



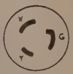

2.875
.200 DIA.*
1.954
2.062

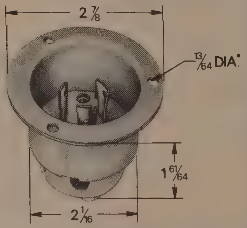
6205 — Flanged Inlet

*3 Holes Equally Spaced on 2½" Dia. Bolt Circle

20A/250V

NEMA L6-20P




2 7/8
13/64 DIA.*
1 61/64
2 1/16

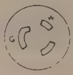
6215 — Flanged Inlet

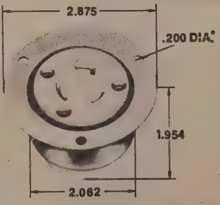
*3 Holes Equally Spaced on 2½" Dia. Bolt Circle

OUTLET

20A/125V

NEMA L5-20R



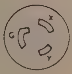

2.875
.200 DIA.*
1.954
2.062

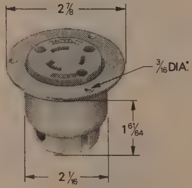
6206 — Flanged Outlet

*3 Holes Equally Spaced on 2½" Dia. Bolt Circle

20A/250V

NEMA L6-20R




2 7/8
3/16 DIA.*
1 61/64
2 1/16

6216 — Flanged Outlet

*3 Holes Equally Spaced on 2½" Dia. Bolt Circle

ARROW-HART INC. / WIRING DEVICE PRODUCTS / 103 HAWTHORN STREET / HARTFORD, CONN. 06106 / (203) 249-8471

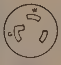
Arrow Hart WIRING DEVICES

LOCKING / 2 POLE — 3 WIRE GROUNDING / STANDARD SIZE / 30 AMP

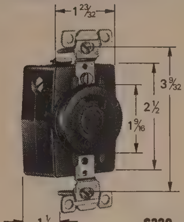
RECEPTACLES

30A/125V

6330 — Black Melamine
Back Wired
3120 — Black Porcelain
Side Wired



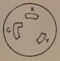
NEMA L5-30R


1 23/32
3 9/32
2 1/2
1 9/16
1 1/8

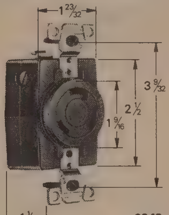
6330

30A/250V

6340 — Black Melamine
Back Wired



NEMA L6-30R

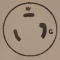

1 23/32
3 9/32
2 1/2
1 9/16
1 1/8

6340

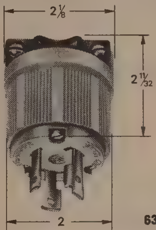
CAPS

30A/125V

6331 — Cord Hole .375-
1.000 Nylon/Lexan
6332 — Cord Hole .375-
1.000 Nylon/Lexan
with Neoprene Seal



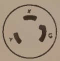
NEMA L5-30P



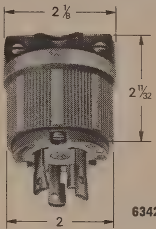
6332

30A/250V

6341 — Cord Hole .375-
1.000 Nylon/Lexan
6342 — Cord Hole .375-
1.000 Nylon/Lexan
with Neoprene Seal



NEMA L6-30P

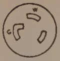


6342

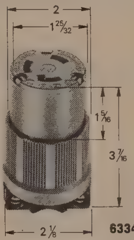
CONNECTORS

30A/125V

6333 — Cord Hole .375-
1.000 Nylon/Lexan
6334 — Cord Hole .375-
1.000 Nylon/Lexan
with Neoprene Seal



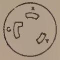
NEMA L5-30R


2
1 25/32
1 5/16
3 7/16
2 1/8

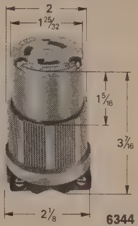
6334

30A/250V

6343 — Cord Hole .375-
1.000 Nylon/Lexan
6344 — Cord Hole .375-
1.000 Nylon/Lexan
with Neoprene Seal



NEMA L6-30R

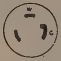

2
1 25/32
1 5/16
3 7/16
2 1/8

6344

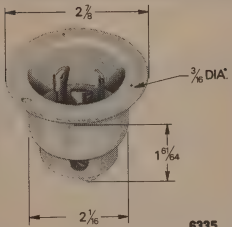
INLET

30A/125V

NEMA L5-30P



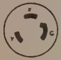
6335 — Flanged Inlet
6336 — Flanged Outlet
*3 Holes Equally Spaced
on 2½" Dia. Bolt Circle.


2 7/8
3/16 DIA.*
1 61/64
2 1/16

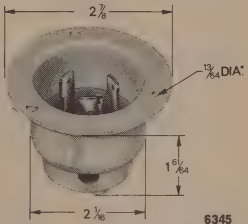
6335

30A/250V

NEMA L6-30P



6345 — Flanged Inlet
*3 Holes Equally Spaced
on 2½" Dia. Bolt Circle.

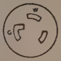

2 7/8
13/64 DIA.*
1 61/64
2 1/16

6345

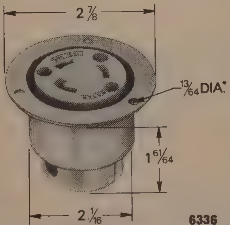
OUTLET

30A/125V

NEMA L5-30R



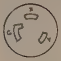
6336 — Flanged Outlet
*3 Holes Equally Spaced
on 2½" Dia. Bolt Circle.


2 7/8
13/64 DIA.*
1 61/64
2 1/16

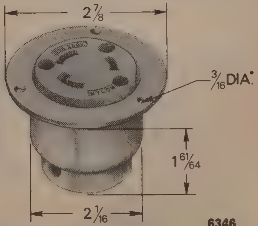
6336

30A/250V

NEMA L6-30R



6346 — Flanged Outlet
*3 Holes Equally Spaced
on 2½" Dia. Bolt Circle


2 7/8
3/16 DIA.*
1 61/64
2 1/16

6346

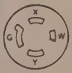
ARROW-HART INC. / WIRING DEVICE PRODUCTS / 103 HAWTHORN STREET / HARTFORD, CONN. 06106 / (203) 249-8471

Arrow Hart WIRING DEVICES

LOCKING / 3 POLE — 4 WIRE GROUNDING / STANDARD SIZE

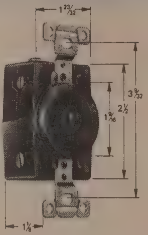
RECEPTACLES

20A/125V/250V



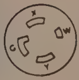
NEMA
L14-20R

6400 — Black Melamine
Back Wired


1 23/32
3 9/32
2 1/2
1 9/16
1 1/8

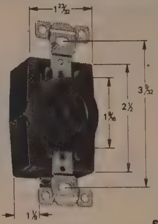
6400

30A/125V/250V



NEMA
L14-30R

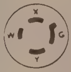
6510 — Black Melamine
Back Wired


1 23/32
3 9/32
2 1/2
1 9/16
1 1/8

6510

CAPS

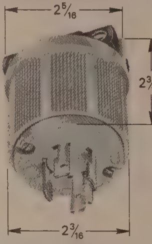
20A/125V/250V



NEMA
L14-20P

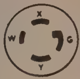
6401 — Cord Hole .625-
1.156 Nylon/Lexan

6402 — Cord Hole .625-
1.156 Nylon/Lexan with
Neoprene Seal


2 5/16
2 3/4
2 3/16

6402

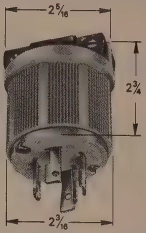
30A/125V/250V



NEMA
L14-30P

6511 — Cord Hole .625-
1.156 Nylon/Lexan

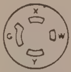
6512 — Cord Hole .625-
1.156 Nylon/Lexan with
Neoprene Seal


2 5/16
2 3/4
2 3/16

6512

CONNECTORS

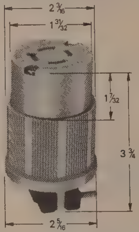
20A/125V/250V



NEMA
L14-20R

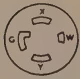
6403 — Cord Hole .625-
1.156 Nylon/Lexan

6404 — Cord Hole .625-
1.156 Nylon/Lexan with
Neoprene Seal


2 3/16
1 31/32
1 7/32
3 3/4
2 5/16

6404

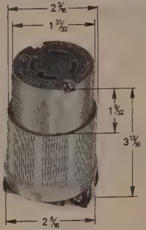
30A/125V/250V



NEMA
L14-30R

6513 — Cord Hole .625-
1.156 Nylon/Lexan

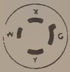
6514 — Cord Hole .625-
1.156 Nylon/Lexan with
Neoprene Seal


2 3/16
1 31/32
1 9/32
3 13/16
2 5/16

6514

INLET

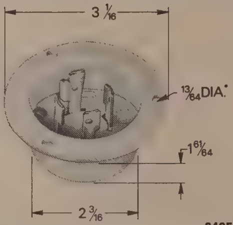
20A/125V/250V



NEMA
L14-20P

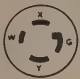
6405 — Flanged Inlet

*3 holes equally spaced
on 2 11/16" dia. bolt circle


3 1/16
13/64 DIA.*
1 61/64
2 3/16

6405

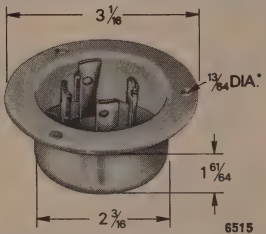
30A/125V/250V



NEMA
L14-30P

6515 — Flanged Inlet

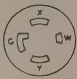
*3 holes equally spaced
on 2 11/16" dia. bolt circle


3 1/16
13/64 DIA.*
1 61/64
2 3/16

6515

OUTLET

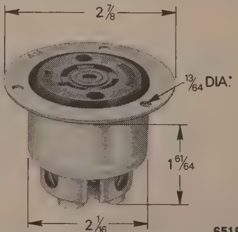
20A/125V/250V



NEMA
L14-30R

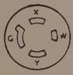
6516 — Flanged Outlet

*3 holes equally spaced
on 2 11/16" dia. bolt circle


2 7/8
13/64 DIA.*
1 61/64
2 1/16

6516

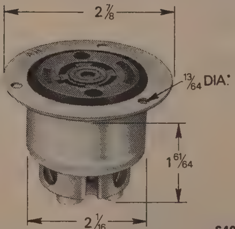
30A/125V/250V



NEMA
L14-20R

6405 — Flanged Outlet

*3 holes equally spaced
on 2 11/16" dia. bolt circle


2 7/8
13/64 DIA.*
1 61/64
2 1/16

6405

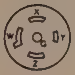
Arrow Hart WIRING DEVICES

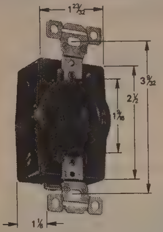
LOCKING / 4 POLE — 5 WIRE GROUNDING / STANDARD SIZE

RECEPTACLES

20A/120/208V 3φY

NEMA L21-20R

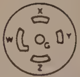


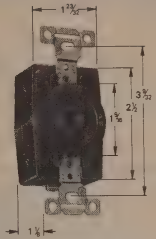

1 23/32
3 9/32
2 1/2
1 9/16
1 1/8

6470 — Black Melamine Back Wired

30A/120/208V 3φY

NEMA L21-30R



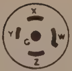

1 23/32
3 9/32
2 1/2
1 9/16
1 1/8

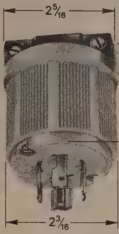
6610 — Black Melamine Back Wired

CAPS

20A/120/208V 3φY

NEMA L21-20P




2 5/16
2 3/4
2 3/16

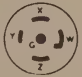
6472

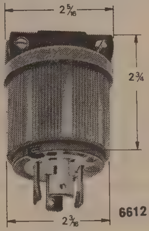
6471 — Cord Hole .625-1.156 Nylon/Lexan

6472 — Cord Hole .625-1.156 Nylon/Lexan with Neoprene Seal

30A/120/208V 3φY

NEMA L21-30P




2 5/16
2 3/4
2 3/16

6612

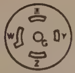
6611 — Cord Hole .625-1.156 Nylon/Lexan

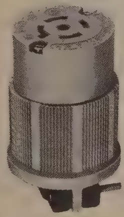
6612 — Cord Hole .625-1.156 Nylon/Lexan with Neoprene Seal

CONNECTORS

20A/120/208V 3φY

NEMA L21-20R





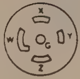
6474

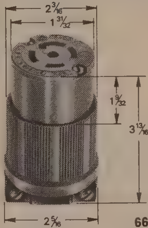
6473 — Cord Hole .625-1.156 Nylon/Lexan

6474 — Cord Hole .625-1.156 Nylon/Lexan with Neoprene Seal

30A/120/208V 3φY

NEMA L21-30R




2 3/16
1 31/32
1 9/32
3 13/16
2 5/16

6614

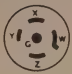
6613 — Cord Hole .625-1.156 Nylon/Lexan

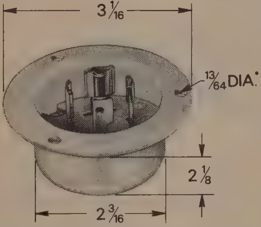
6614 — Cord Hole .625-1.156 Nylon/Lexan with Neoprene Seal

INLET

20A/120/208V 3φY

NEMA L21-20P

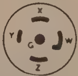


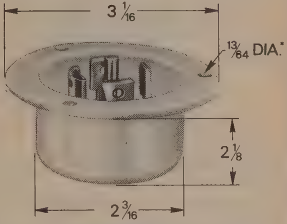

3 1/16
13/64 DIA.*
2 1/8
2 3/16

6475 — Flanged Inlet

30A/120/208V 3φY

NEMA L21-30P



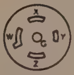

3 1/16
13/64 DIA.*
2 1/8
2 3/16

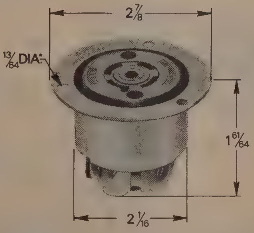
6615 — Flanged Inlet

OUTLET

20A/120/208V 3φY

NEMA L21-20R

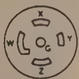


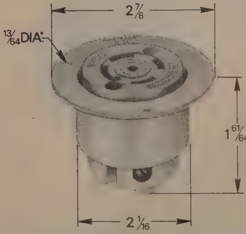

2 7/8
13/64 DIA.*
1 61/64
2 1/16

6476 — Flanged Outlet

30A/120/208V 3φY

NEMA L21-30R

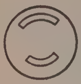
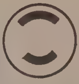
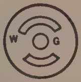
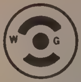
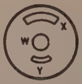
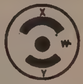
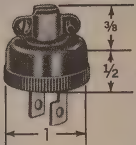
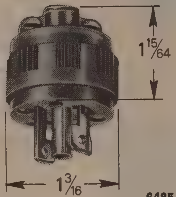
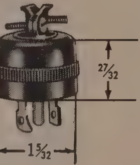
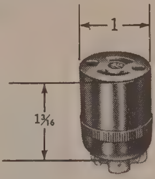
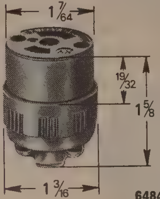
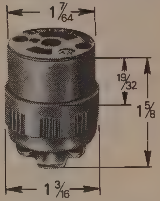
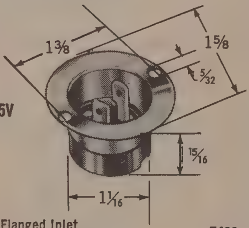
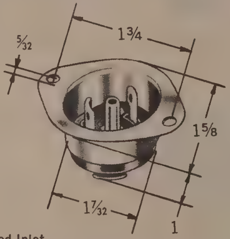
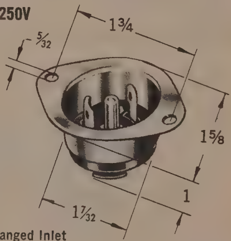
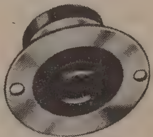
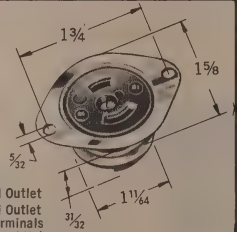
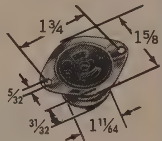



2 7/8
13/64 DIA.*
1 61/64
2 1/16

6616 — Flanged Outlet

Arrow Hart WIRING DEVICES

MIDGET / LOCKING

2 POLE / 2 WIRE	2 POLE / 3 WIRE GROUNDING	3 POLE / 3 WIRE
 NEMA ML1-R  NEMA ML1-P	 NEMA ML2-R  NEMA ML2-P	 NEMA ML3-R  NEMA ML3-P
CAPS 15A/125V  7465 **7465** — Cord Hole .218-.312 Black Bakelite @ Cord Grip **7428** — Cord Hole .312-.500 Black Bakelite @ Cord Grip **7479** — Cord Hole .218-.312 Black Bakelite, Polarized @ Cord Grip **7429** — Cord Hole .312-.500 Black Bakelite, Polarized @ Cord Grip	15A/125V  6485 **6482** — Cord Hole .500, Black Bakelite **6485** — Cord Hole .281-.421 Black Bakelite with Cord Grip	15A/125/250V  7485 **7482** — .500 Cord Hole, Black Bakelite **7485** — .281-.421 Cord Hole Black Bakelite with Cord Grip
CONNECTORS 15A/125V  7464 **7464** — Cord Hole .218-312 Black Bakelite with Cord Grip **7427** — Cord Hole .312-.500 Black Bakelite with Cord Grip	15A/125V  6484 **6481** — Cord Hole .500 Black Bakelite **6484** — Cord Hole .281-.421 Black Bakelite with Cord Grip	15A/125/250V  7484 **7481** — Cord Hole .500 Black Bakelite **7484** — Cord Hole .281-.421 Black Bakelite with Cord Grip
INLET 15A/125V  7466 **7466** — Flanged Inlet **7467** — Flanged Inlet, Polarized	15A/125V  **6486** — Flanged Inlet	15A/125/250V  **7486** — Flanged Inlet
OUTLET 15A/125V  7468 **7468** — Flanged Outlet **7471** — Flanged Outlet, Covered Terminals without Cord Grip **7472** — Flanged Outlet, Covered Terminals with Cord Grip .218-.312 Range	15A/125V  6487 **6487** — Flanged Outlet **6489** — Flanged Outlet with Covered Terminals and Cord Grip; Cord Hole .281-.421 **6488** — No. 6489 Less Cord Grip Cord Hole .500	15A/125/250V 7487  **7487** — Flanged Outlet **7489** — Flanged Outlet with Covered Terminals and Cord Grip; Cord Hole .281-.421 **7487-A** — Flanged Outlet with Binding Screws in Bulk **7487-GA** — Flanged Outlet with 2 No. 6-32 Mounting Bushings in Dull Nickel Shell, Binding Screws in Bulk **7487-C** — 7487 Flanged Outlet with Binding Screws not Staked

Arrow Hart WIRING DEVICES

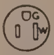
HOSPITAL GRADE

NON-LOCKING / 2 POLE 3 WIRE GROUNDING

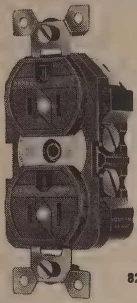
All of the units listed below are verified by U.L. Inc. as complying with Federal Spec. W-C-596-C and meet NEMA WD1-1971. Devices are listed as "Hospital Grade" by U.L. and meet U.L. 544 and U.L. 498 Standards.

RECEPTACLES

15A/125V



NEMA
5-15R

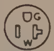


8200

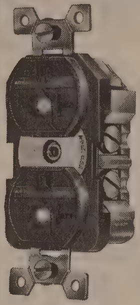
8200* — Brown
8200-I — Ivory

Available in colors.
Add suffix RED for Red, GRY for Gray, W for White, BL for Black.

20A/125V



NEMA
5-20R



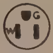
8300

8300* — Brown
8300-I — Ivory

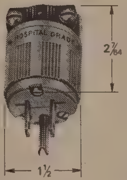
Available in colors.
Add suffix RED for Red, GRY for Gray, W for White, BL for Black.

CONNECTORS

15A/125V

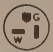


NEMA
5-15P

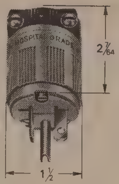

HOSPITAL GRADE
2 7/64
1½

6266 HG — Gray, Cord Hole .250-.656

20A/125V



NEMA
5-20P


HOSPITAL GRADE
2 7/64
1½

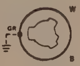
6766-HG — Gray, Cord Hole .250-.656

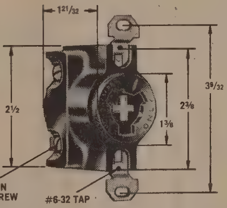
LOCKING / 2 POLE, 3 WIRE GROUNDING / POWER-LOCK

"Hospital Only" type — these units are designed for use in non-hazardous hospital locations.

RECEPTACLES

20A/125V

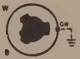


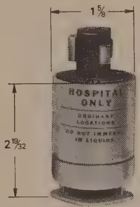

1 21/32
3 9/32
2½
2⅜
1⅜
GREEN HEX SCREW
#6-32 TAP

23050 — Black Bakelite

CAPS

20A/125V

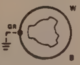


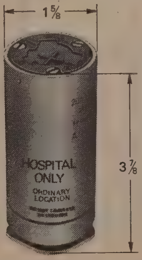

1⅝
HOSPITAL ONLY
ORDINARY LOCATIONS
DO NOT IMMERSE IN LIQUIDS
2 19/32

23056 — Armored Steel Shell with Rubber Cord Grip

CONNECTORS

20A/125V



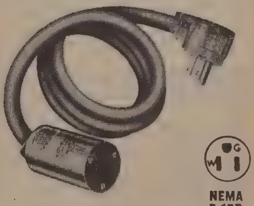

1⅝
HOSPITAL ONLY
ORDINARY LOCATION
3⅞

23054 — Armored Steel Shell with Rubber Cord Grip

ADAPTER

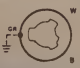
215A/125V to 20A/125V

Converts standard 2-pole, 3-wire, 15A, 125V receptacle to 20A, 125V, 2-pole, 3-wire "HOSPITAL ONLY" configuration. Allows equipment with "HOSPITAL ONLY" plug configuration to be used in other locations.



NEMA
5-15P

23058 — Cord Set Consisting of Cat. No. 6265-CL Angle Cap and Cat. No. 23054 Connector with 6 Ft. of Yellow Cord.



Arrow Hart

WIRING DEVICES

NEMA GENERAL-PURPOSE NONLOCKING PLUGS AND RECEPTACLES

			15 AMPERE		20 AMPERE		30 AMPERE		50 AMPERE	
			▲ RECEPTACLE	▲ PLUG	▲ RECEPTACLE	▲ PLUG	▲ RECEPTACLE	▲ PLUG	▲ RECEPTACLE	▲ PLUG
2-POLE 2-WIRE	125V	1	D/9754 1-15R	C/3486 1-15P						
	250V	2		2-15P	A/8245 D/8283 2-20R	C/7847＊ 2-20P	A/8345 2-30R	C/LH＊ 2-30P		
2-POLE 3-WIRE GROUNDING	125V	5	A/5261 B/5262-S or 8200 Hosp.Grade D/6269 F/5246 5-15R	C/6266 or 6266-HG Hosp. Grade E/5278 5-15P	A/5361 B/5739-S or 8300 Hosp.Grade D/6769 F/5787 5-20R	C/6766 or 6766-H G Hosp. Grade E/5778 5-20P	A/5716 D/6716 5-30R	C/5717 5-30P	A/5711 D/6711 5-50R	C/5712 5-50P
	250V	6	A/5661 B/5662-S D/6669 6-15R	C/6666 E/5678 6-15P	A/5861 B/5862-S D/6869 6-20R	C/6866 E/5878 6-20P	A/5700 D/6700 6-30R	C/5701 6-30P	A/5709 D/6709 6-50R	C/5710 6-50P
	277VAC	7	B/5718 7-15R	C/5766 7-15P	A/7621 D/7625 7-20R	C/7626＊ 7-20P	A/5795 D/6795 7-30R	C/5703 7-30P	A/5796 D/6796 7-50R	C/5705 7-50P
3-POLE 3-WIRE	125/250V	10			A/9140 D/9168 10-20R	C/9151＊ 10-20P	A/9344 D/9341 10-30R	C/9337 10-30P	A/7985 D/4526 10-50R	C/4524 10-50P
	3ø 250V	11	11-15R	11-15P	11-20R	11-20P	11-30R	11-30P	11-50R	11-50P
3-POLE 4-WIRE GROUNDING	125/250V	14	14-15R	14-15P	A/5759 14-20R	C/5757＊ 14-20P	A/5744 14-30R	C/5746 14-30P	A/5754 14-50R	C/5745 14-50P
	3ø 250V	15	15-15R	15-15P	A/5781 15-20R	C/5783＊ 15-20P	A/8430 15-30R	C/8432 15-30P	A/8450 15-50R	C/8452 15-50P
4-POLE 4-WIRE	3øY 120/208V	18	18-15R	18-15P	A/7250 18-20R	C/7251＊ 18-20P	18-30R	18-30P	18-50R	18-50P

ARROW-HART LOCKING TYPE PLUGS AND RECEPTACLES

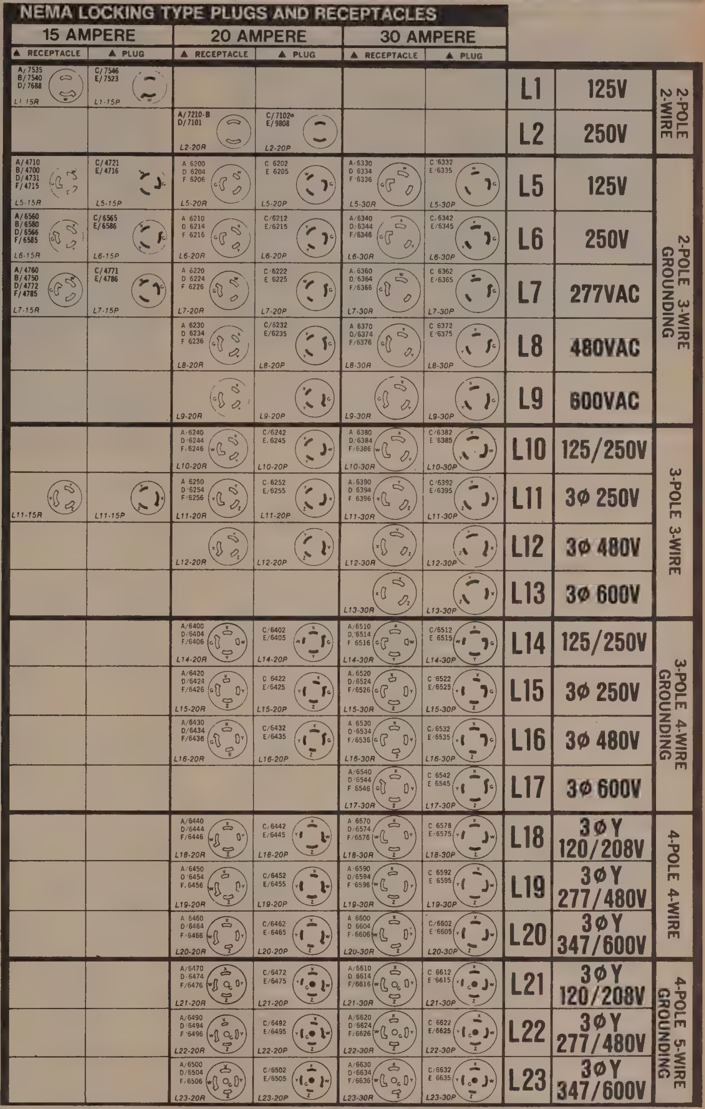
	RATINGS	▲ RECEPTACLE	▲ PLUG
2-POLE 3-WIRE GROUNDING	20A, 125V AC-DC "Hospital Only"	A/23050 D/23054	C/23056
	20A, 125V AC-DC	A/23030 D/23032	C/23035
	50A. 250 V.D.C. 600 V .A.C.	A/ 7381 D/ 7762	C/ 7763 E/ 7961
	50A. 250 V.D.C. 600 V.A.C.	A/ 3771 D/ 3762	C/ 3763 E/ 3777
	50A. 125V. Marine Devices	A/ 63CR70 D/ 63CR60	C/ 63CR61 E/ 63CR72
	50A. 250V. Construction Site Devices	A/ CS8269 D/ CS8264	C/ CS8265 E/ CS8275
3-POLE 3-WIRE	10A, 250V DC, 460V AC, 20A 125V AC-DC	A/23000 D/23002	C/23005
	20A, 125/250V	A 7310-B D 6314 F 3326	C 6312 F 7327
	30A 250V	A/3330 D 3333	C 3331 F 3337
	50A. 250 V .D.C. 600 V .A.C.	A/3770 D/3760	C/3761 E/3776
	50A. 250 V .D.C. 600 V .A.C.	A/7380 D/7760	C/7761 E/7960

	RATINGS	▲ RECEPTACLE	▲ PLUG
3-POLE 4-WIRE EQUIP. GROUND	20A, 250V DC, 30A 600V AC	A/20403 D/20414	C/20415 E/20418
	30A, 480V AC	A/20443 D/20444	C/20445
	50A. 250 V .D.C. 600 V .A.C.	A/ 3769 D/ 3764	C/ 3765 E/ 3775
	50A. 250 V .D.C. 600 V .A.C.	A/ 7379 D/ 7764	C/ 7765 E/ 7958
	50A. 125/250V. Marine Devices	A/ 63CR69 D/ 63CR64	C/ 63CR65 E/ 63CR74
	50A. 480V. 3ø Construction Site Devices	A/ CS8169 D/ CS8164	C/ CS8165 E/ CS8175
	50A. 125/250V. Construction Site Devices	A/ CS6369 D/ CS6364	C/ CS6365 E/ CS6375
	60A, 600V AC	A/26420 D/26414 F/26414-A	C/26415 E/26415-A
4-POLE 4-WIRE	20A, 250V AC-DC, 10A 600V AC	A 7410-B D 6414 F 7409	C 6418 E 7408
	30A, 250V AC-DC, 30A 600V AC	A/3430 D/3433	C/3431 E/3434
4-POLE 5-WIRE EQUIP. GROUND	20A, 250V DC, 30A 600V AC	A/25250 D/25414 F/25403	C/25415 E/25418
	60A, 600V AC	A/26520 D/26514 F/26514-A	C/26515 E/26515-A

ARROW-HART INC. / WIRING DEVICE PRODUCTS / 103 HAWTHORN STREET / HARTFORD, CONN. 06106 / (203) 249-8471

Arrow Hart

WIRING DEVICES



NEMA LOCKING TYPE PLUGS AND RECEPTACLES

15 AMPERE ▲ RECEPTACLE	15 AMPERE ▲ PLUG	20 AMPERE ▲ RECEPTACLE	20 AMPERE ▲ PLUG	30 AMPERE ▲ RECEPTACLE	30 AMPERE ▲ PLUG			
A/7535 B/7540 D/7688 L1-15R	C/7546 E/7523 L1-15P					L1	125V	2-POLE 2-WIRE
		A/7210-B D/7101 L2-20R	C/7102* E/9808 L2-20P			L2	250V	
A/4710 B/4700 D/4731 F/4715 L5-15R	C/4721 E/4716 L5-15P	A/6200 D/6204 F/6206 L5-20R	C/6202 E/6205 L5-20P	A/6330 D/6334 F/6336 L5-30R	C/6332 E/6335 L5-30P	L5	125V	2-POLE 3-WIRE GROUNDING
A/6560 B/6580 D/6566 F/6585 L6-15R	C/6565 E/6586 L6-15P	A/6210 D/6214 F/6216 L6-20R	C/6212 E/6215 L6-20P	A/6340 D/6344 F/6346 L6-30R	C/6342 E/6345 L6-30P	L6	250V	
A/4760 B/4750 D/4772 F/4785 L7-15R	C/4771 E/4786 L7-15P	A/6220 D/6224 F/6226 L7-20R	C/6222 E/6225 L7-20P	A/6360 D/6364 F/6366 L7-30R	C/6362 E/6365 L7-30P	L7	277VAC	
		A/6230 D/6234 F/6236 L8-20R	C/6232 E/6235 L8-20P	A/6370 D/6374 F/6376 L8-30R	C/6372 E/6375 L8-30P	L8	480VAC	
		L9-20R	L9-20P	L9-30R	L9-30P	L9	600VAC	
		A/6240 D/6244 F/6246 L10-20R	C/6242 E/6245 L10-20P	A/6380 D/6384 F/6386 L10-30R	C/6382 E/6385 L10-30P	L10	125/250V	3-POLE 3-WIRE
L11-15R	L11-15P	A/6250 D/6254 F/6256 L11-20R	C/6252 E/6255 L11-20P	A/6390 D/6394 F/6396 L11-30R	C/6392 E/6395 L11-30P	L11	3ø 250V	
		L12-20R	L12-20P	L12-30R	L12-30P	L12	3ø 480V	
				L13-30R	L13-30P	L13	3ø 600V	
		A/6400 D/6404 F/6406 L14-20R	C/6402 E/6405 L14-20P	A/6510 D/6514 F/6516 L14-30R	C/6512 E/6515 L14-30P	L14	125/250V	3-POLE 4-WIRE GROUNDING
		A/6420 D/6424 F/6426 L15-20R	C/6422 E/6425 L15-20P	A/6520 D/6524 F/6526 L15-30R	C/6522 E/6525 L15-30P	L15	3ø 250V	
		A/6430 D/6434 F/6436 L16-20R	C/6432 E/6435 L16-20P	A/6530 D/6534 F/6536 L16-30R	C/6532 E/6535 L16-30P	L16	3ø 480V	
				A/6540 D/6544 F/6546 L17-30R	C/6542 E/6545 L17-30P	L17	3ø 600V	
		A/6440 D/6444 F/6446 L18-20R	C/6442 E/6445 L18-20P	A/6570 D/6574 F/6576 L18-30R	C/6578 E/6575 L18-30P	L18	3øY 120/208V	4-POLE 4-WIRE
		A/6450 D/6454 F/6456 L19-20R	C/6452 E/6455 L19-20P	A/6590 D/6594 F/6596 L19-30R	C/6592 E/6595 L19-30P	L19	3øY 277/480V	
		A/6460 D/6464 F/6466 L20-20R	C/6462 E/6465 L20-20P	A/6600 D/6604 F/6606 L20-30R	C/6602 E/6605 L20-30P	L20	3øY 347/600V	
		A/6470 D/6474 F/6476 L21-20R	C/6472 E/6475 L21-20P	A/6610 D/6614 F/6616 L21-30R	C/6612 E/6615 L21-30P	L21	3øY 120/208V	4-POLE 5-WIRE GROUNDING
		A/6490 D/6494 F/6496 L22-20R	C/6492 E/6495 L22-20P	A/6620 D/6624 F/6626 L22-30R	C/6622 E/6625 L22-30P	L22	3øY 277/480V	
		A/6500 D/6504 F/6506 L23-20R	C/6502 E/6505 L23-20P	A/6630 D/6634 F/6636 L23-30R	C/6632 E/6635 L23-30P	L23	3øY 347/600V	

HOW TO USE THIS CHART:

ARROW-HART catalog designation indicated by number. Letter indicates product classification. See product classification index.

EXAMPLE

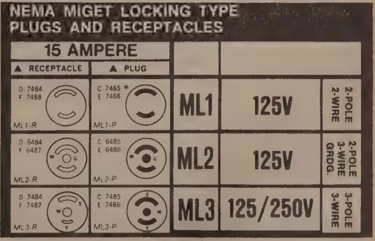
A/5261
B/5262-S
or 8200 Hosp. Grade
D/6269
F/5246
5-15R

NEMA configuration

▲ PRODUCT CLASSIFICATION—MASTER INDEX

A/ = SINGLE RECEPTACLE	D/ = CONNECTOR
B/ = DUPLEX RECEPTACLE	E/ = FLANGED INLET
C/ = CAP	F/ = FLANGED OUTLET

*FRONT WIRED CAPS. ALL OTHER CAPS ARE BACK WIRED "DEAD FRONT" DESIGN



NEMA MIGET LOCKING TYPE PLUGS AND RECEPTACLES

15 AMPERE ▲ RECEPTACLE	15 AMPERE ▲ PLUG			
D 7464 F 7468 ML1-R	C 7465 * E 7466 ML1-P	ML1	125V	2-POLE 2-WIRE
D 6484 F 6487 ML2-R	C 6485 E 6486 ML2-P	ML2	125V	2-POLE 3-WIRE GRDG.
D 7484 F 7487 ML3-R	C 7485 E 7486 ML3-P	ML3	125/250V	3-POLE 3-WIRE

ARROW-HART INC. / WIRING DEVICE PRODUCTS /
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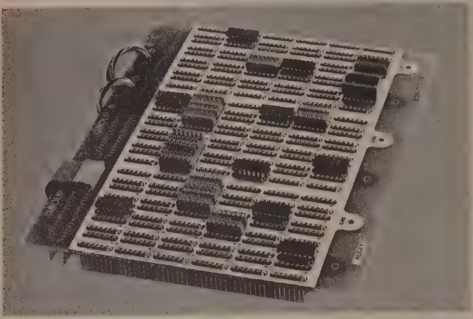
AUGAT® Panels



P-Series: • Accepts 14 and 16 lead dip I.C.'s • Plane mounted • Modular construction, multiple of 30 patterns (up to 180 patterns) • Each 30 pattern section accepts 3 interfacing plugs or two 26 position flat cable plug for I.O. connections.

OVERALL SIZE: (30 pattern section) approx.

$\frac{177.80 \pm 0.63\text{mm}}{7.000 \pm .025} \times \frac{67.94 \pm 0.63\text{mm}}{2.675 \pm .025}$

HOW TO ORDER: Socket/terminal options – for wrap length and plating, see table below.

*Part Number	Suffix Added to Number	Socket/Terminal Length	Plating: Gold Contact Gold Sleeve	Plating: Gold Contact Tin Sleeve
8136-PG1-30	None	12.95mm/.510in. (3 level)	X	
8136-PG1-30-TG	-TG	12.95mm/.510in. (3 level)		X
8136-PG1-30-2	-2	9.40mm/.370in. (2 level)	X	
8136-PG1-30-2TG	-2TG	9.40mm/.370in. (2 level)		X

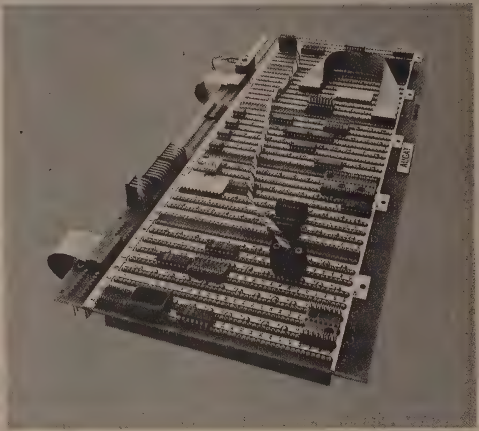
*May be purchased in any multiples of 30 patterns (up to 180 patterns) indicated by suffix number.

EXAMPLE: 8136-PG1-90 90 patterns.

Part Number *Series	Socket/Terminals Per Pattern	Voltage and Gnd. Connections	I.O. Termination
8136-PG1	14 .300″ x .100″ spacing	7 & 14 Socket/Terminal	Socket/Terminal
8136-PG18			Feed Thru
8136-PG3	14 + 2 (V & G) .300″ x .100″ spacing	V & G Dummy Terminal	Socket/Terminal
8136-PG122		V & G Socket/Terminal	Socket/Terminal
8136-PG19		V & G Dummy Terminal	Feed Thru
8136-PG113		V & G Socket/Terminal	Feed Thru
8136-PG5	16 .300″ x .100″ spacing	8 & 16 Socket/Terminal	Socket/Terminal
8136-PG20			Feed Thru
8136-PG13	16 + 2 (V & G) .300″ x .100″ spacing	V & G Dummy Terminal	Socket/Terminal
8136-PG29		V & G Socket/Terminal	Socket/Terminal
8136-PG21		V & G Dummy Terminal	Feed Thru
8136-PG51		V & G Socket/Terminal	Feed Thru

Materials: BOARD: ⅛″ glass epoxy, 2 oz. copper Circuitry, both sides tin plated

Socket/Terminal: TERMINAL: Brass, gold over nickel or tin plated. FEMALE CONTACT: Beryllium copper, gold over nickel plated.



U-Series: • Accepts any combination of 14 thru 40 lead dip I.C.'s • Multiple of nine rows up to 54 rows • Each 9 row section accepts 3 interfacing plugs or two 26 position flat cable plugs for I.O. connections.

OVERALL SIZE: (9 row section)

$\frac{174.62 \pm 0.63\text{mm}}{6.875 \pm .025} \times \frac{67.94 \pm 0.63\text{mm}}{2.675 \pm .025}$

HOW TO ORDER: Socket/terminal options – for wrap length and plating, see table below.

*Part Number	Suffix Added to Number	Socket/Terminal Length	Plating: Gold Contact Gold Sleeve	Plating: Gold Contact Tin Sleeve
8136-UG1-18	None	12.95mm/.510in. (3 level)	X	
8136-UG1-18-TG	-TG	12.95mm/.510in. (3 level)		X
8136-UG1-18-2	-2	9.40mm/.370in. (2 level)	X	
8136-UG1-18-2TG	-2TG	9.40mm/.370in. (2 level)		X

*May be purchased in any multiple of 9 rows (up to 54 rows) indicated by suffix number.

EXAMPLE: 8136-UGI-27 27 rows

NOTE: Rows are .300″ on center.

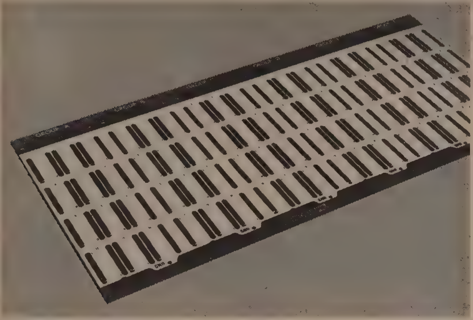
Part Number *Series	Voltage and Gnd. Connections	I.O. Termination
8136-UG1	Dummy Terminal	Socket/Terminal
8136-UG56	Socket/Terminal	
8136-UG6	Dummy Terminal	Feed Thru
8136-UG61	Socket/Terminal	

Materials: BOARD: ⅛″ glass epoxy, 2 oz. copper Circuitry, both sides tin plated.

Socket/Terminal: TERMINAL: Brass, gold over nickel or tin plated. FEMALE CONTACT: Beryllium copper, gold over nickel plated.

Augat Inc., 33 Perry Avenue, Attleboro, Massachusetts 02703 / 617-222-2202. Note: Request Augat Catalog No. 266

AUGAT® Panels



LSI Series: • Accepts 24 lead dip I.C.'s • Plane mounted • Modular construction, multiple of 12 patterns (up to 72 patterns) • Each 12 pattern section accepts 3 interfacing plugs or two 26 position flat cable plugs for I.O. connections.

OVERALL SIZE: (12 pattern section)

189.9 ± 0.63mm / 7.475 ± .025 × 67.94 ± 0.63mm / 2.675 ± .025

HOW TO ORDER: Socket/terminal options – for wrap length and plating, see table below.

*Part Number	Suffix Added to Number	Socket/Terminal Length	Plating: Gold Contact Gold Sleeve	Plating: Gold Contact Tin Sleeve
8136-PG142-72	None	12.95mm/.510in. (3 level)	X	
8136-PG142-72-TG	-TG	12.95mm/.510in. (3 level)		X
8136-PG142-72-2	-2	9.40mm/.370in. (2 level)	X	
8136-PG142-72-2TG	-2TG	9.40mm/.370in. (2 level)		X

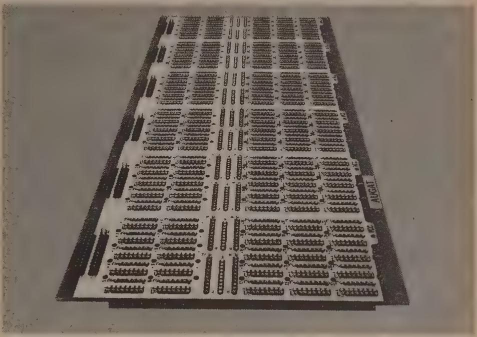
*May be purchased in any multiple of 12 patterns (up to 72 patterns) indicated by suffix number.

Example: 8136-PG142-24 24 patterns

Part Number *Series	Socket/Terminals Per Pattern	Voltage and Gnd. Connections	I.O. Termination
8136-PG142	24 .600" x .100" spacing	12 & 24	Socket/ Terminal
8136-PG173			Feed Thru

Materials: BOARD: ⅛" glass epoxy, 2 oz. copper circuitry, both sides tin plated.

Socket/Terminal: TERMINAL: Brass, gold over nickel or tin plated FEMALE CONTACT: Beryllium copper, gold over nickel plated.



E.C.L. Logic: Accepts 16 lead dip E.C.L. 10K logic • Vcc, Vee and Vtt planes • Modular construction, multiple of 30 patterns (up to 180 patterns) • Provisions for line terminating resistors and decoupling capacitors • Panels also available for Schottky logic.

OVERALL SIZE: (30 pattern section)

189.9 ± 0.635mm / 7.475 ± .025 × 67.94 ± 0.635mm / 2.675 ± .025

HOW TO ORDER: Plating Options – See table below.

*Part Number	Suffix Added to Number	Socket/Terminal Length	Plating: Gold Contact Gold Sleeve	Plating: Gold Contact Gold Sleeve
8136-ECL1-60-2	None	9.40mm/.370in. (2 level)	X	
8136-ECL1-60-2TG	-2TG	9.40mm/.370in. (2 level)		X

*ECL1 and ECL6 Series may be purchased in any multiple of 30 patterns (up to 180 patterns) indicated by suffix number.

EXAMPLE: 8136-ECL1-60-2 60 patterns

*ECL5 may be purchased in any multiple of 27 patterns (up to 162 patterns).

Part Number *Series	Socket/Terminals Per Pattern	Voltage and Gnd. Connections	I.O. Termination
8136-ECL1 8136-ECL6	16 .300" x .100" spacing	(Vcc) 1 + 16 (Vee) 8	Feed Thru
8136-ECL5	16 and 24 300" x .100" spacing	(Vcc) 1 + 16 (Vee) 8 (Vcc) 1 + 24 (Vee) 12	Feed Thru

Materials: BOARD: ⅛" glass epoxy, 2 oz. copper circuitry (3 layers) tin plated.

Socket/Terminal: TERMINAL: Brass, gold over nickel or tin plated FEMALE CONTACT: Beryllium copper, gold over nickel plated.

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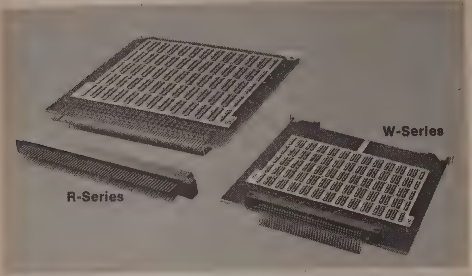
AUGAT® Panels



R-Series: • Accepts 14 and 16 lead dip I.C.'s • 60 patterns standard • Edge connector take-off (60 dual contact, 120 termination) ⅛ inch or 1/16 inch panel thickness • Universal style.

OVERALL SIZE: 186.86 ± 0.38mm / 7.353 ± .015 × 177.80 ± 0.38mm / 7.000 ± .015

HOW TO ORDER: Socket/terminal options – for wrap length and plating, see table below.

*Part Number	Suffix Added to Number	Socket/Terminal Length	Plating: Gold Contact Gold Sleeve	Plating: Gold Contact Tin Sleeve
8136-RG1	None	12.95mm/.510in. (3 level)	X	
8136-RG1-TG	-TG	12.95mm/.510in. (3 level)		X
8136-RG1-2	-2	9.40mm/.370in. (2 level)	X	
8136-RG1-2TG	-2TG	9.40mm/.370in. (2 level)		X

Part Number *Series	Socket/Terminals Per Pattern	Board Thickness	Voltage and Gnd. Connections
8136-RG1	14 .300″ x .100″ spacing	⅛″	7 + 14 socket/terminal
8136-RG2			V + G dummy terminal
8136-RG14			V + G socket/terminal
8136-RG7		1/16″	7 + 14 socket/terminal
8136-RG8			V + G dummy terminal
8136-RG16			V + G socket/terminal
8136-RG3	16 .300″ x .100″ spacing	⅛″	8 + 16 socket/terminal
8136-RG4			V + G dummy terminal
8136-RG13			V + G socket/terminal
8136-RG9		1/16″	8 + 16 socket/terminal
8136-RG10			V + G dummy terminal
8136-RG15			V + G socket/terminal
8136-RG58	Blank card	⅛″	
8136-RG85		1/16″	
8136-138G1	Extender card	⅛″	
8136-RG86		1/16″	

Universal Type			
Part Number Series	**No. of Rows**	**Board Thickness**	**Voltage and Gnd. Connection**
8136-URG1	20 rows of 50 contacts on .300″ centers	⅛″	V + G socket/terminal
8138-URG14		1/16″	

NOTE: Same blank and extender cards as R-Series.

Materials: BOARD: Glass epoxy, 2 oz. copper circuitry both sides. Tin plated connector fingers – gold over nickel plated.

Socket/Terminal: TERMINAL: Brass, gold over nickel or tin plated. FEMALE CONTACT: Beryllium copper, gold over nickel plated. EJECTOR KEYS: Nylon.

W-Series: • Accepts 14 and 16 lead dip I.C.'s • 60 and 72 patterns standard • Pin and socket take off • ⅛ inch or 1/16 inch panel thickness • Universal style.

OVERALL SIZE: 186.86 ± 0.38mm / 7.353 ± .015 × 176.53 ± 0.38mm / 6.950 ± .015

Part Number *Series	No. of Patterns	Socket/Terminals Per Pattern	Board Thickness	Voltage and Gnd. Connections
8136-WG1	60	14 .300″ x .100″ spacing	⅛″	7 + 14 socket/terminal
8136-WG2				V + G dummy terminal
8136-WG14				V + G socket/terminal
8136-WG3		16 .300″ x .100″ spacing		8 + 16 socket/terminal
8136-WG4				V + G dummy terminal
8136-WG13				V + G socket/terminal
8136-WG7	60	14 .300″ x .100″ spacing	1/16″	7 + 14 socket/terminal
8136-WG8				V + G dummy terminal
8136-WG16				V + G socket/terminal
8136-WG9		16 .300″ x .100″ spacing		8 + 16 socket/terminal
8136-WG10				V + G dummy terminal
8136-WG15				V + G socket/terminal
8136-WG201	72	14 .300″ x .100″ spacing	⅛″	7 + 14 socket/terminal
8136-WG202				V + G dummy terminal
8136-WG214				V + G socket/terminal
8136-WG203		16 .300″ x .100″ spacing		8 + 16 socket/terminal
8136-WG204				V + G dummy terminal
8136-WG213				V + G socket/terminal
8136-WG207	72	14 .300″ x .100″ spacing	1/16″	7 + 14 socket/terminal
8136-WG208				V + G dummy terminal
8136-WG216				V + G socket/terminal
8136-WG209		16 .300″ x .100″ spacing		8 + 16 socket/terminal
8136-WG210				V + G dummy terminal
8136-WG215				V + G socket/terminal
8136-WG58 8136-WG85	Blank card		⅛″ 1/16″	
8136-WG53 8136-WG86	Extender card		⅛″ 1/16″	

Universal Type				
Part Number Series	**No. of Rows**	**Socket/Terminals Per Row**	**Board Thickness**	**Voltage and Gnd. Connections**
8136-UWG1	20 on .300″ x .100″ spacing	50	⅛″	V + G socket/terminal
8136-UWG12		58	⅛″	
8136-UWG18		58	1/16″	

NOTE: Same blank and extender cards as W-SERIES.

Materials: BOARD: Glass epoxy, 2 oz. copper circuitry, both sides tin plated

Socket/Terminal: TERMINAL: Brass, gold over nickel or tin plated. FEMALE CONTACT: Beryllium copper, gold over nickel plated.

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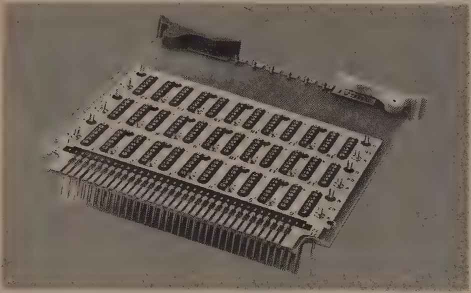
AUGAT® Panels



M-Series: • Accepts 14 and 16 lead dip I.C.'s • 12, 18, or 24 patterns, also universal style • Designed for mini rack standard assemblies • Additional pins for mounting discrete components.

OVERALL SIZE: $\frac{111.12 \pm 0.38\text{mm}}{4.375 \ \pm .015} \times \frac{123.49 \pm 0.38\text{mm}}{4.862 \ \pm .015}$

HOW TO ORDER: Socket/terminal options – for wrap length and plating, see table below.

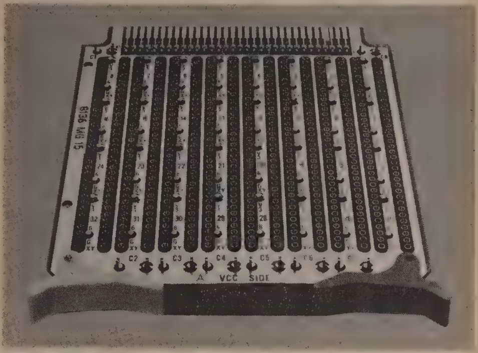
*Part Number	Suffix Added to Number	Socket/Terminal Length	Plating Gold Contact Gold Sleeve	 Gold Contact Tin Sleeve
8136-MG1	None	12.95mm/.510in. (3 level)	X	
8136-MG1-TG	-TG	12.95mm/.510in. (3 level)		X
8136-MG1-2	-2	9.40mm/.370in. (2 level)	X	
8136-MG1-2TG	-2TG	9.40mm/.370in. (2 level)		X

Part Number *Series	Socket/Terminals Per Pattern	Patterns Per Panel	Voltage and Gnd. Connections
8136-MG1	14 .300″ x .100″ spacing	24	7 + 14 socket/terminal
8136-MG2			V + G socket/terminal
8136-MG3	16 .300″ x .100″ spacing		8 + 16 socket/terminal
8136-MG4			V + G socket/terminal
8136-MG5	14 .300″ x .100″ spacing	18	7 + 14 socket/terminal
8136-MG6			V + G socket/terminal
8136-MG7	16 .300″ x .100″ spacing		8 + 16 socket/terminal
8136-MG8			V + G socket/terminal
8136-MG9	14 .300″ x .100″ spacing	12	7 + 14 socket/terminal
8136-MG10			V + G socket/terminal
8136-MG11	16 .300″ x .100″ spacing		8 + 16 socket/terminal
8136-MG12			V + G socket/terminal
8136-MG13	Extender card		
8136-MG14	Blank card		

Part no. 8136-UMG1 (Universale style) 12 rows of 35 contacts on .300″ centers.

Materials: BOARD: 1/16″ Glass epoxy, 2 oz. copper circuitry both sides tin plated. Connector fingers – gold over nickel plated.

Socket/Terminal: TERMINAL: Brass, gold over nickel or tin plated.
FEMALE CONTACT: Beryllium copper, gold over nickel plated.
EJECTOR KEYS: Nylon
I.O. PINS: Phosphor bronze gold over (2 rows of 36) nickel plated.



High Density Socket Panels: • Accepts 14, 16 and 18 lead dips I.C.'s • Additional slotted pins for mounting discrete components • Edge connector take off • UMG3-V + G connections are preselected in each I.C. row, MG15-V + G connections located outside of I.C. row.

OVERALL SIZE: $\frac{111.12 \pm 0.38\text{mm}}{4.375 \ \pm .015} \times \frac{123.49 \pm 0.38\text{mm}}{4.862 \ \pm .015}$

HOW TO ORDER: Socket/terminal options – for wrap length and plating, see table below.

*Part Number	Suffix Added to Number	Socket/Terminal Length	Plating Gold Contact Gold Sleeve	 Gold Contact Tin Sleeve
8136-MG15	None	12.95mm/.510in. (3 level)	X	
8136-MG15-TG	-2	12.95mm/.510in. (3 level)		X
8136-MG15-2	-TG	9.40mm/.370in. (2 level)	X	
8136-MG15-2TG	-2TG	9.40mm/.370in. (2 level)		X

Part Number *Series	No. of Rows	Socket/Terminals Per Row	Voltage and Gnd. Connections
8136-MG15	8 on .300″ x .100″ spacing	35	V + G socket/terminal
8136-UMG3	10 on .300″ x .100″ spacing	35	

Materials: BOARD: 1/16″ Glass epoxy, 2 oz. copper circuitry both sides tin plated. Connector pads – gold over nickel plated.

Socket/Terminal: TERMINAL: Brass, gold over nickel or tin plated.
FEMALE CONTACT: Beryllium copper, gold over nickel plated.
EJECTOR KEY: Nylon
I.O. PINS: Phosphor bronze gold over nickel plated. (2 rows of 27)

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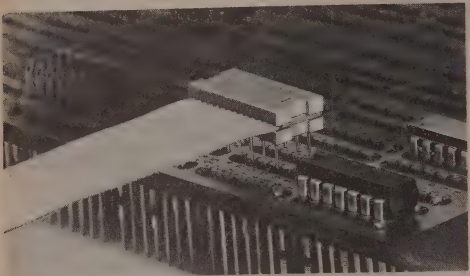
AUGAT® Panel Accessories



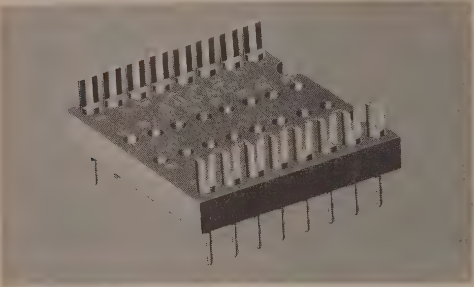
Flat Cable Plug Assemblies: • Plugs directly into I.C. patterns • Unique contact design eliminates cutting and stripping of cable • 14 and 16 pin terminator • Cable is stranded copper wire, P.V.C. insulated.

Part Number	No. of Pins	Cable Length
2P14-1R12-1	14	12 in.
2P14-1R24-1	14	24 in.
2P14-1R36-1	14	36 in.

.300″ x .100″ Pin Spacing

For double ended assemblies, replace -1 suffix with -2.
EXAMPLE: 2P14-1R12 -2

For 16 pin assemblies, replace 14 with 16
EXAMPLE: 2P16

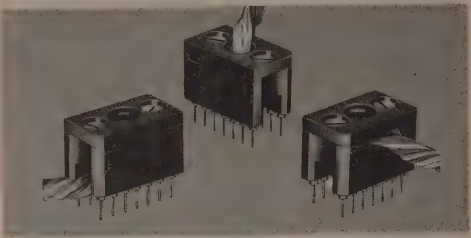


Adaptor Plugs: • 14 thru 40 pin with round, solder pocket or slotted connection • same dimension as I.C. pattern.

Standard Type			
Part Number*	**No. of Pins**	**Pin Spacing**	**Pin Style**
614-AG1	14	.300″ x .100″	Round
616-AG1	16		
628-AG1	28	two .300″ x .100″	
632-AG1	32		
614-AG2	14	.800″ x .100″	
616-AG2	16		

*Substitute correct letter in part number for pin style variations (A – Round, B – Solder Pocket, C – Slotted).
EXAMPLE: (Solder Pocket Style) 614-BG1

Universal Type			
Part Number*	**No. of Pins**	**Pin Spacing**	**Pin Style**
614-AG3	14	.600″ x .100″	Round
616-AG3	16		
624-AG1	24		
628-AG2	28		
636-AG1	36		
640-AG1	40		



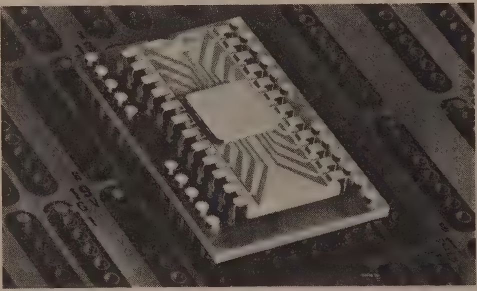
Interfacing Plug Assemblies: • For I.O. connections, interfacing and testing • Same dimensions as I.C. pattern • 14 and 16 pin • Top, side or bottom entry of wires • Stranded wire; Teflon insulated • Pat. No. 3506945.

Part Number	No. of Pins	Pin Dia.	Wire Length
1P14-3T12-1	14	.018	12 in.
1P14-3T24-1			24 in.
1P14-3T36-1			36 in.
1P14-4T12-1	14	.023	12 in.
1P14-4T24-1			24 in.
1P14-4T36-1			36 in.

.300″ x .100″ pin spacing

For double ended assemblies, replace -1 suffix with -2.
EXAMPLE: 1P14-3T12 -2

For 16 pin assemblies, replace 14 and 16
EXAMPLE: 1P16



L.S.I. Adaptor Plug: • Accepts up to 40 lead L.S.I. dip I.C.'s • Interposing L.S.I. circuits on 14 and 16 pattern Augat panels • Dips are soldered into adaptor which plugs into panel • Adaptor pins are located to prevent improper positioning on panel.

Part Number	Application
628-HG16	Up to 28 pins .600″ x .100″ spacing
640-HG16	Up to 40 pins .600″ x .100″ spacing

Materials: BOARD: 1⁄16″ glass epoxy, electro tin plated.
PIN: Phosphor bronze, gold over nickel plated.

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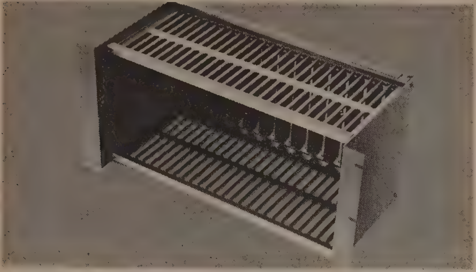
AUGAT® Rack Assemblies



R-Series Rack Assembly: • Mounts up to 13 R or UR type panels • Designed for 19″ relay rack mounting • Back panel removable for automatic wire wrapping • Provisions for mounting additional panels or P.C. boards on .600″ spacing • Enclosure available.

OVERALL SIZE:

Enclosure

431.80 ± 0.76mm / 17.000 ± .030 × 463.55 ± 0.76mm / 18.250 ± .030 × 222.25 ± 0.76mm / 8.750 ± .030

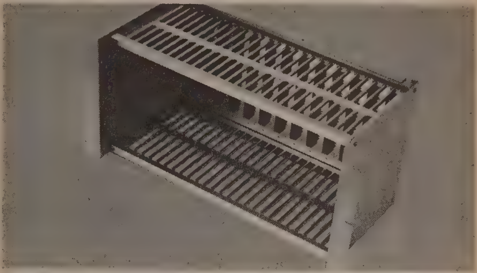
Rack

482.60 ± 0.76mm / 19.000 ± .030 × 215.90 ± 0.76mm / 8.500 ± .030 × 220.64 ± 0.76mm / 8.687 ± .030

Part Number	Accepts Panel Thk.	Description
8170-EG1	⅛″ or 1⁄16″	Enclosure Only
8160-EG10	⅛″	Back Panel Only (with 13 connectors)
8160-EG21	1⁄16″	
8170-RG1	⅛″	Panel Rack with back panel and mounting ears on side plates.
8170-RG14	1⁄16″	
8170-RG3	⅛″	Same as RG1 or RG14, except without back panel.
8170-RG16	1⁄16″	
8170-RG2	⅛″	Panel Rack with back panel and side plates for enclosure mounting.
8170-RG15	1⁄16″	
8170-RG4	⅛″	Same as RG2 or RG15 except without back panel.
8170-RG17	1⁄16″	

NOTE: Connector Only – Part No. 14005-1P1 (⅛″) 14005-19P1 (1⁄16″) (120 contact – 60 dual row).

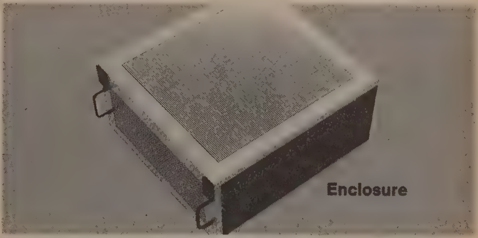
Materials: (R&W Back and Enclosure)
ENCLOSURE – Aluminum, painted blue
RACK – End plate – aluminum, gold iridite
(R&W) Guide plate – steel, cad.-plate, gold iridite
BACK PANEL – Glass epoxy
SOLDER LUGS – Brass, tin plated

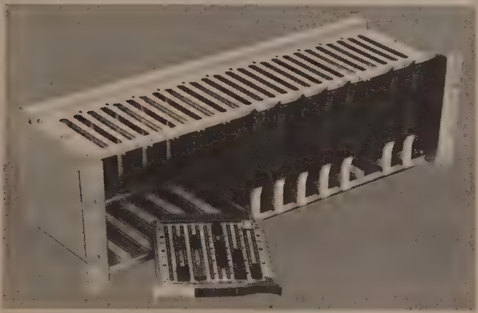


W-Series Rack Assembly: • Same design features as R-Series rack except back panel has pin and socket type connectors.

Part Number	Accepts Panel Thk.	Description
8170-EG1	⅛″ or 1⁄16″	Enclosure Only
8160-WG1	⅛″	Back Panel Only (with 13 connectors)
8160-WG3	1⁄16″	
8170-RG6	⅛″	Panel Rack with back panel and side plates for enclosure mounting.
8170-RG18	1⁄16″	
8170-RG4	⅛″	Same as RG6 or RG18 except without back panel.
8170-RG17	1⁄16″	
8170-RG7	⅛″	Panel Rack with back panel and mounting ears on side plates.
8170-RG19	1⁄16″	
8170-RG3	⅛″	Same as RG7 or RG19 except without back panel.
8170-RG16	1⁄16″	

NOTE: Connector Only – Part No. 14005-13P1 (Male)
(⅛ or 1⁄16) 14005-14P1 (Female)
120 Contact (3 rows of 40)





M-Series Rack Assembly: • Accepts up to 13 M-series Logic Panels • Provision for mounting additional panels or P.C. boards on .600″ center • Removable back panel for automatic wire wrapping. Designed for 19″ relay rack mounting.

OVERALL SIZE:

482.60 ± 0.76mm / 19.000 ± .030 × 152.40 ± 0.76mm / 6.000 ± .030 × 127.79 ± 0.76mm / 5.110 ± .030

Part Number	Description
8160-EG20	Back Panel Only (with 13 connectors)
8170-MG1	Panel Rack with back panel and mounting ears on side plates.

NOTE: Connector Only – Part No. 14005-17P3 (1⁄16″ only) (72 Contact – 36 dual row)

Materials: RACK – Aluminum, gold iridite.
GUIDES – Nylon.
BACK PANEL – 1⁄16″ glass epoxy.
SOLDER LUGS – Brass, tin plated.

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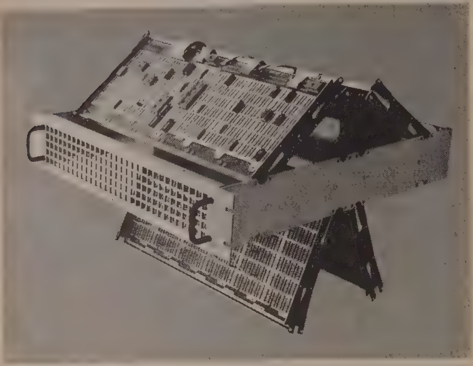
AUGAT® Drawers Sockets



Full Drawer Assembly: • Accepts up to four plane mount panels, up to 720 dip I.C.'s • Frames are hinged either side for accessibility and easy removal • Dust covers furnished • Designed for 19" rack mounting • Optional perforated or solid end plates.

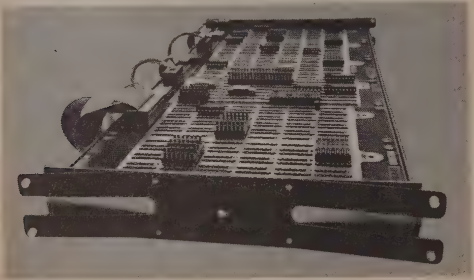
OVERALL SIZE:

$$\frac{482.60 \pm 0.38\text{mm}}{19.000 \pm .015} \times \frac{518.79 \pm 0.76\text{mm}}{20.425 \pm .030} \times \frac{88.90 \pm 0.76\text{mm}}{3.500 \pm .030}$$

Part Number	Description
8170-DG1	Drawer assembly with fan cutout rear plate and perforated front plate. (Accepts 4 panel frames)
8170-DG2	Drawer assembly with rear blank plate and front blank plate. (Accepts 4 panel frames)

NOTE: Order panel frames separately.

Materials: (Full drawer & half drawer)
All Frame members are aluminum, gold iridite, Front plate is painted blue.



Panel Frames: • Hinged at both ends with spring latch permitting accessibility and removal. Mounts full 180 pattern panel or a combination of panel styles up to 180 patterns. (16.175 ± .025) 410.84 ± 0.63mm.

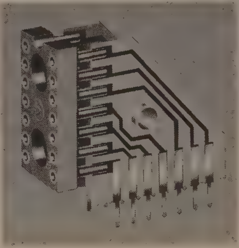
Part No. 8170-14G1 accepts the following panel series:

8136 – PG1	8136 – PG113
PG18	PG5
PG3	PG20
PG122	8136 – UG1
PG19	UG56
	UG6
	UG61

Part No. 8170-14G2 accepts the following panel series:

8136 – PG13	8136 – PG21
PG29	PG51

45°, 60° and 90° L.E.D. Numeric Display Socket
(.300" between rows)



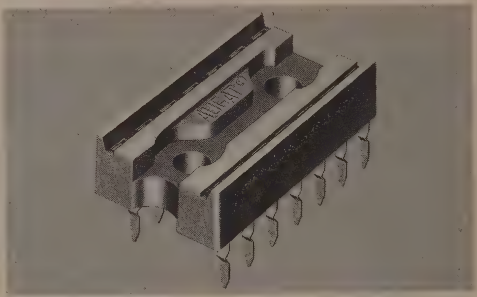
Material: SOCKET – Glass filled nylon

Socket/Terminal: CONTACT – Beryllium Copper, gold over nickel plated
SLEEVE – Brass, tin plated

P.C. Board/Terminal Assembly:
BOARD – Glass epoxy, tin plated copper circuitry
TERMINAL – Phosphor bronze, solder coated
SPACER – Delrin

Part Number	No of Contacts	Angle of Socket
514-AG21D	14	90°
514-AG25D		45°
514-AG26D		60°
516-AG21D	16	90°
516-AG25D		45°
516-AG26D		60°

NEW LOW PROFILE DIP SOCKET (.300" between rows)



- Low cost.
- Low profile – .160 (4.06mm) above PC board (I.C. Seating Plane)
- Continuous X & Y .100 (2.54mm) grid spacing.
- P.C. tail retains the socket in 1/16 (1.58mm) board during wave soldering.
- Designed for automatic board insertion.
- .020 (.508mm) between insulator and P.C. board for cleaning and proper clearance.
- Recommended mounting hole .035 ± .002 (.889 ± .050mm) dia.
- U.L. rated, SE-O glass filled thermoplastic.
- Gold or tin plated contacts.

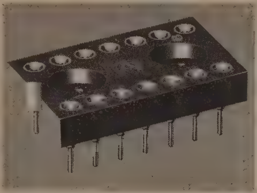
Part Number	No of Contacts	Contact Plating	Termination
314-AG25D	14	Tin over Copper	Printed Circuit
314-AG26D		Gold over Nickel	
316-AG25D	16	Tin over Copper	
316-AG26D		Gold over Nickel	

Material: INSULATOR – Glass filled Thermoplastic
CONTACT – Beryllium Copper, gold over nickel or tin over copper plated (see part block)

Augat Inc., 33 Perry Avenue, Attleboro, Massachusetts 02703 / 617-222-2202. Note: Request Augat Catalog No. 266

AUGAT® Sockets

8, 14, 16, 18 (.300″ between rows) and 22 Contact (.400″ between rows)



Ultra Low Profile – Precision Machined Contact

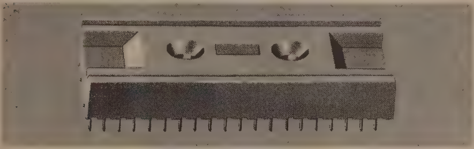
- Two piece socket terminal. Machined inner contact – beryllium copper, gold plated. Machined outer sleeve – brass, gold or tin plated.

Part Number	No. of Contacts	Contact Plating	Sleeve Plating	Termination
508-AG1D	8	Gold	Gold	Printed Circuit
508-AG11D		Gold	Tin	
508-AG1F		Gold	Gold	Wire Wrap
508-AG11F		Gold	Tin	
514-AG10D	14	Gold	Gold	Printed Circuit
514-AG11D		Gold	Tin	
514-AG10F		Gold	Gold	Wire Wrap
514-AG11F		Gold	Tin	
516-AG10D	16	Gold	Gold	Printed Circuit
516-AG11D		Gold	Tin	
516-AG10F		Gold	Gold	Wire Wrap
516-AG11F		Gold	Tin	
518-AG1D	18	Gold	Gold	Printed Circuit
518-AG11D		Gold	Tin	
518-AG1F		Gold	Gold	Wire Wrap
518-AG11F		Gold	Tin	
522-AG10D	22	Gold	Gold	Printed Circuit
522-AG11D		Gold	Tin	
522-AG10F		Gold	Gold	Wire Wrap
522-AG11F		Gold	Tin	

Material: INSULATOR – Glass filled nylon

Socket/Terminal: CONTACT – Beryllium copper, gold over nickel plated
SLEEVE – Brass, gold over nickel or tin plated (see part block)

24, 36 and 40 Contact LSI Sockets (.600″ between rows)



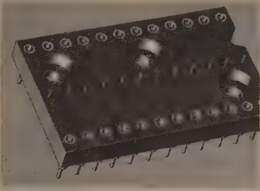
- Available in printed circuit, solder pocket or wire wrap termination.

Part Number	No. of Contacts	Termination
324-AG2A	24	Solder Pocket
324-AG2D		Printed Circuit
324-AG2F		Wire Wrap
336-AG2A	36	Solder Pocket
336-AG2D		Printed Circuit
336-AG2F		Wire Wrap
340-AG5A	40	Solder Pocket
340-AG5D		Printed Circuit
340-AG5F		Wire Wrap

Materials: INSULATOR – (24+36 Contact) Diallyl Phthalate (40 Contact) Glass filled polyester

CONTACT – (wire wrap) Phosphor Bronze, gold over nickel plated (printed circuit & solder pocket) Beryllium copper, gold over nickel plated

24, 28, 36 and 40 Contact, Low Profile LSI Sockets (.600″ between rows)



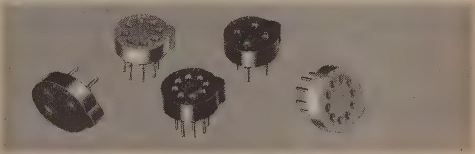
- Socket accepts flat I.C. leads or round leads .016″-.020″ diameter.

Part Number	No. of Contacts	Contact Plating	Sleeve Plating	Termination
524-AG1D	24	Gold	Gold	Printed Circuit
524-AG11D		Gold	Tin	
524-AG1F		Gold	Gold	Wire Wrap
524-AG11F		Gold	Tin	
528-AG1D	28	Gold	Gold	Printed Circuit
528-AG11D		Gold	Tin	
528-AG1F		Gold	Gold	Wire Wrap
528-AG11F		Gold	Tin	
536-AG1D	36	Gold	Gold	Printed Circuit
536-AG11D		Gold	Tin	
536-AG1F		Gold	Gold	Wire Wrap
536-AG11F		Gold	Tin	
540-AG1D	40	Gold	Gold	Printed Circuit
540-AG11D		Gold	Tin	
540-AG1F		Gold	Gold	Wire Wrap
540-AG11F		Gold	Tin	

Material: INSULATOR – Glass filled nylon

Socket/Terminal: CONTACT – Beryllium copper, gold over nickel plated
SLEEVE – Brass, gold over nickel or tin plated (see part block)

Transistor and IC Sockets (accept .016″-.020″ diameter leads)



- Sockets accept .016″-.020″ diameter leads.
- Molded insulator and automated contact assembly – save you money.
- Ultra low profile – precision machined contact assembly.
- Various insulator colors available.

Part Number	Pin Circle Diameter	No. of Contacts	Contact Plating	Sleeve Plating	Insulator Color
8059-2G1	.200″	3	Gold	Gold	Red
8059-2G2			Gold	Tin	
8059-2G3	.200″	4	Gold	Gold	Blue
8059-2G4			Gold	Tin	
8059-2G5	.200″	8	Gold	Gold	Green
8059-2G6			Gold	Tin	
8059-2G7	.230″	8	Gold	Gold	Orange
8059-2G8			Gold	Tin	
8059-2G9	.230″	10	Gold	Gold	Yellow
8059-2G10			Gold	Tin	

NOTE: All sockets printed circuit termination.

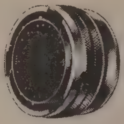
Material: INSULATOR – Glass filled nylon

Socket/Terminal: CONTACT – Beryllium copper, gold over nickel plated
SLEEVE – Brass, gold over nickel or tin plated (see part block)

Augat Inc., 33 Perry Avenue, Attleboro, Massachusetts 02703 / 617-222-2202. Note: Request Augat Catalog No. 166

Bendix Electrical Connectors

SUBMINIATURE MIL-C-38999, MIL-C-27599 types



Design Characteristics

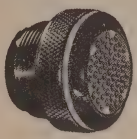
- lightweight, compact, hi-contact density
- environmental resistant
- quick positive coupling
- visual coupling confirmation
- mismating eliminated by 5 key/keyway design
- error proof alternate positioning

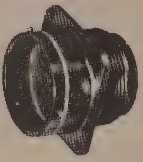
Customer Options

- five mounting styles
- 56 different contact arrangements, 3 to 128 circuits
- solder or crimp rear release contacts
- accept 26 - 12 AWG wire
- eight protective finishes
- coaxial (shielded) contacts available
- hermetic seal (glass fusion) receptacles available

JT, MS-JT	LJT	SJT
For applications requiring maximum weight/space savings and reliability. Also available in MIL-C-38999 (crimp) and MIL-C-27599 (solder) types. Catalog 12-090	Popular 100% "scoop-proof" (recessed pins) version of the JT family. Offers maximum contact protection against bending. Available in MIL-C-38999 and MIL-C-27599 types. Catalog 12-090	Further expansion of the basic JT family incorporating the 100% LJT scoop-proof feature and standard JT/PT mounting dimensions. Catalog 12-091

MINIATURE MIL-C-26482, MIL-C-83723 types





Design Characteristics

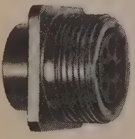
- medium sized, widely used
- environmental resistant
- quick positive coupling
- mismating eliminated by 5 key/keyway design

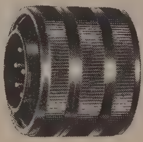
Customer Options

- 7 mounting styles
- solder or crimp front and rear release contacts
- accept 20 - 12 AWG wire
- 6 protective finishes
- coaxial (shielded) and thermocouple contacts available
- hermetic seal (glass fusion) receptacles available
- alternate positioning

PT, MS-PT	PT-CE	PTS-DR, MS-PTS-DR	PT-SE, MS-PT-SE
Basis of popular Bendix PYGMY line incorporating bayonet coupling and solder contacts. Approved to MIL-C-26482. Catalog 12-072	Lowest cost PYGMY type, featuring crimp front release contacts and a voidless insert and grommet assembly, offering continuous dielectric separation between contacts. Catalog 12-075	Featuring the latest innovations in connector technology including dielectric retention, crimp rear release contacts and closed entry socket design. Catalog 12-076	A derivative of the PYGMY line incorporating crimp, front release contacts with a metal clip retention system. Catalog 12-075

HEAVY DUTY MIL- C-22992 types





Design Characteristics

- 9 mounting styles
- multiple contact arrangements, 1-104 circuits
- solder or crimp contacts
- accept 20-0 AWG wire
- designed for use with jacketed cable
- alternate positioning

Customer Options

- largest size cylindrical
- environmental resistant
- quick mating, vibration resistant, easily maintainable threaded coupling

QWLD	QWL	QDP	Accessories
Waterproof series for power and control circuits, with 5 key polarization. Catalog 12-052	Compact heavy duty connector with single key polarization. Catalog 12-052	Crimp contacts in heavy shells. Product Data Sheet 65	Complete line of cable adapters, protection caps, and application tools for heavy duty type connectors. Catalog 12-052

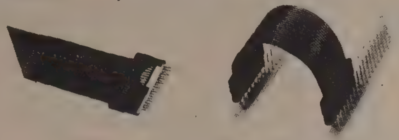
Contact Sidney Plant for referenced catalogs. (607) 563-9511
Request Brochure SL-100 for a description of the complete Bendix Connector line.

Bendix

Electrical Components Division
Sidney, N. Y. 13838

Bendix Electrical Connectors

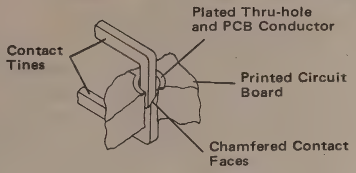
RECTANGULAR, NEW DEVELOPMENTS



Flat Cable

Low profile, highly reliable connector and a new terminating technique allows simultaneous gang termination without stripping or other wire preparation. True compatibility between flat cable usage and interconnection method now exists.

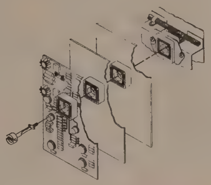
Brochure SL-287



Board Grabber

A unique concept for connection to printed circuit boards. The BOARD GRABBER contact utilizes plated thru-holes thus eliminating the need for gold plated board fingers, while offering zero card insertion force. Multipoint electrical contact and positive card retention offer excellent integrity and reliability even under vibration and shock.

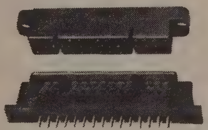
Consult Sidney Plant



Centre

A printed circuit board connector series designed to mount at or near the center of printed circuit boards to provide a greater number of electrical connections between boards, shorter PCB conductor runs, eliminate cross-overs and minimize multi-layer buildups. The Centre packaging concept offers a simple, rugged method of mounting and interconnecting boards and chassis, reduces back panel wiring, and acts as an exit/entry point for external interconnections.

Brochure SL-286



Automotive

A developing line of connectors for transportation, commercial, and industrial markets designed to provide excellent electrical/mechanical characteristics and reliability at low cost.

Consult Sidney Plant

Brush Contact

A totally new idea in contact design, offering low mating forces, redundant circuits and wide positional error allowances. Each contact is comprised of a number of small wires, forming a brush like unit applicable to virtually any application where pin and socket contacts are used. The meshing of the brush like contacts provides a multiplicity of circuit paths and low contact resistance.

Product Data Sheet 91

RECTANGULAR, RACK AND PANEL

Designed for use when the coupling requirements of cylindrical connectors are impractical, such as blind or inaccessible mating applications. Available in a variety of shell styles and mounting options, with crimp and solder contacts in various insert arrangements. MIL, ARINC, AIMS and filtered types are also available.

Catalog 12-032

RECTANGULAR, PRINTED CIRCUIT BOARD

Designed to provide reliable interconnection means with printed circuit boards. Available in a variety of contact spacings with crimp, solder or printed circuit contacts. Accessory polarization, floating contacts and other options are available to extend versatility.

Catalog 12-032

Contact Sidney Plant for referenced catalogs. (607) 563-9511
Request Brochure SL-100 for a description of the complete Bendix Connector line.

Bendix
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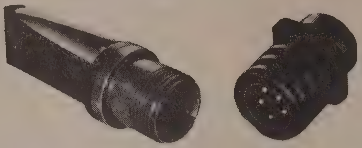
Bendix Electrical Connectors

SPECIAL PURPOSE CYLINDRICAL



Heavy Power

Power "L", designed with safety in mind for heavy power interconnections in commercial, industrial or military applications. Features arc quencing capabilities, non-mating of incompatible power sources, and other safety assurances to make this an ideal connector for power applications up to 200 amp. Meets requirements of MIL-C-22992, Class L.

Catalog 12-052

Immersible

The Aquacon connector series is designed for oceanic or fluid immersion applications; offering 1500 PSI capability, metal to metal coupling, visual mating indicator and design flexibility, at low cost. Available in a wide range of circuit configurations.

Brochure SL-280

Filter

Designed to provide EMI protection for circuitry. Each circuit is individually filtered within the connector, eliminating the need for costly and bulky exterior network filters. Filter contacts in MF, HF, VHF and UHF ranges are available for a wide selection of connector types.

Catalog 12-120

High Temperature

Firewall connectors suitable for applications requiring continuous temperature operation to 1000°F. Components also provide suitable resistance to radiation and oxidizing environments.

Catalog 12-101

Breakaway

Designed to provide quick disconnect of a connector plug and receptacle, with axial pull. Mating is accomplished in normal fashion while disconnect is by axial pull on the coupling nut (via lanyard or other means) or manual rotational unmating.

Brochure SL-102

CUSTOM CABLING

The Electrical Components Division maintains a custom cabling department to design and manufacture high quality cabling for industrial, commercial, aerospace, oceanic and military applications. Skilled, experienced personnel are available to assist you with your cabling needs; with careful consideration given to all aspects of a particular installation.

Consult Sidney Plant

Contact Sidney Plant for referenced catalogs. (607) 563-9511
Request Brochure SL-100 for a description of the complete Bendix Connector line.

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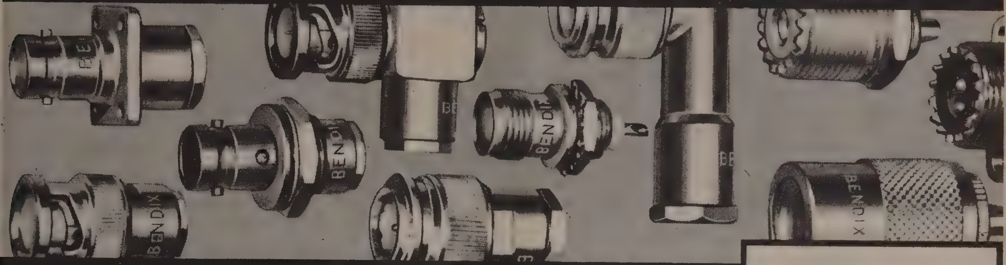
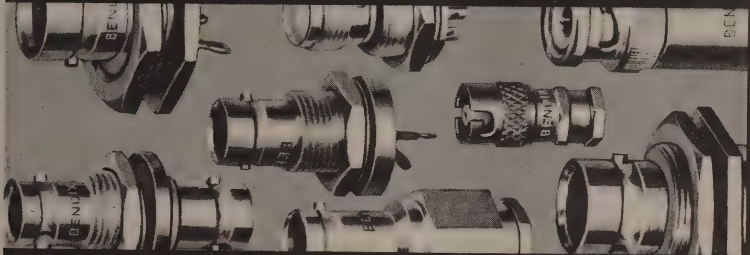
RF CONNECTORS

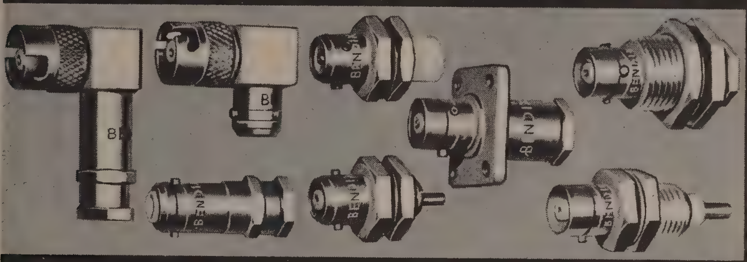
STANDARD—BNC / TNC / N / C / SC / UHF / UG



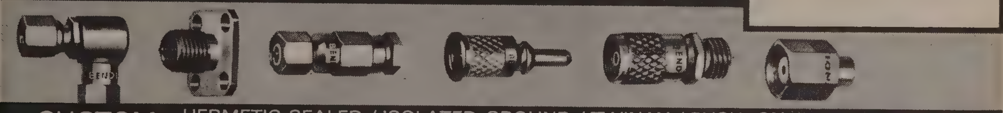
TRIAX—BNC / TNC / C / DM



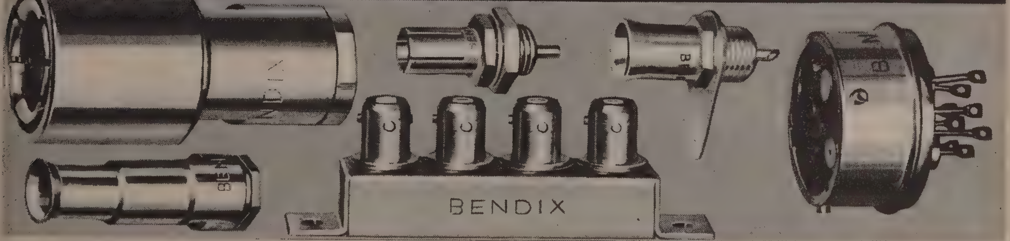
MINIATURE—TPS / DM / ADM



SUB-MINIATURE—SMMA / SMA / SMB / SMC



CUSTOM—HERMETIC SEALED / ISOLATED GROUND / TWINAX / PUSH-ON SNAP-ON / HI-VOLTAGE / CABLE ASSEMBLIES / JUNCTIONS



MILITARY SPECIFICATIONS:

MIL-C-39012

MIL-C-25516

MIL-C-22557

MIL-C-55235

MIL-A-55339

•

FEATURES:
(All Series)

CLAMPING HARDWARE

CRIMP-ON

SQUARE CUT

For information call your representative or write direct to Microwave Devices. The Bendix Corporation, Hurricane Road, Franklin, Indiana 46131. Phone (317) 736-6136.

Bendix

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Berg/product review

100
BULLETIN

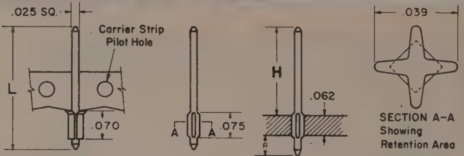
INTERCONNECTION SYSTEMS
COMPONENT TERMINALS
P.C. BOARD PRODUCTS
WIRE AND CABLE CONNECTORS
SOCKETS
ASSEMBLY MACHINES

BERG
ELECTRONICS
[illegible]

NEW CUMBERLAND, PENNSYLVANIA 17070 • TELEPHONE (717) 938-6711 / IN EUROPE; 's-HERTOGENBOSCH, NETHERLANDS • TELEPHONE 073-123432

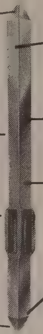
BergCon™ .025" SQUARE MODULAR INTERCONNECTION SYSTEM

BergCon is a complete, versatile system offering high density .100" grid stacking . . . end-to-end or side-to-side . . . across a wide range of connector types.



BergPin MALE TERMINALS FOR DISCONNECT AND WIRE-WRAPPING

System provides a fast, reliable method for staking pins in circuitboard. Here are the features that distinguish BergPin terminals from ordinary wire-wrapping pins:


Pin tip is designed to facilitate wire-wrapping or disconnect lead-in.

Uniform cross-section. Made from drawn, not stamped, material. Result: smooth, flat contact surfaces.

Available in six types of surface platings.

Sharp corners held to .003" maximum radius.

Star-wedge shape provides 8 lbs. retention (at nominal hole size) before soldering; up to 50 lbs. retention after soldering.

Pins are ¾-hard phosphor bronze.

Tapered lead-in will not damage plated through hole or multi-layer construction.

Pin tip is designed to facilitate lead-in when staking.

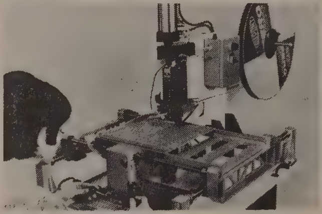
Part Number	Plating	Underplating	Material
75401-	30 mill min. gold*	50 mill min. nickel	Phosphor-bronze (¾ hard) ASTM B159-66
75402-	50 mill min. gold**	10 mill copper flash	Phosphor-bronze (¾ hard) ASTM B159-66
75403-	50 mill min. gold**	50 mill min. nickel	Phosphor-bronze (¾ hard) ASTM B159-66
75404-	150 min. acid tin***	none	Phosphor-bronze (¾ hard) ASTM B159-66
75405-	100 mill min. gold	50 mill min. nickel	Phosphor-bronze (¾ hard) ASTM B159-66
75406-	100 min. gold	100 min. copper	Phosphor-bronze (¾ hard) ASTM B159-66
75407-	PLAIN	none	Phosphor-bronze (¾ hard) ASTM B159-66
75408-	PLAIN	none	Phosophor-bronze Cupro-Nickel C.D.A. No 725

*MIL-G-45204 Type 2 **MIL-G-45204 Type 1 Class 1 ***MIL-T-10727A Type 1

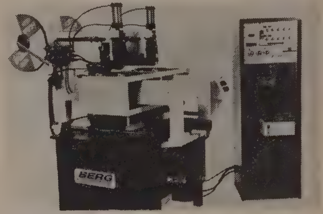
This listing gives the material, plating and underplating; it does not show the pin length or height above board. For these dimensions, we refer you to Berg Bulletin 105 which is available upon request.

BergPin STAKING MACHINES CUT COSTS, CONTROL QUALITY

PRODUCTION MACHINE (Model BP-161)
For staking boards with limited number of pins or boards with varying pin configurations. Operator manually locates hole position and initiates staking cycle for up to 2000 insertions per hour.

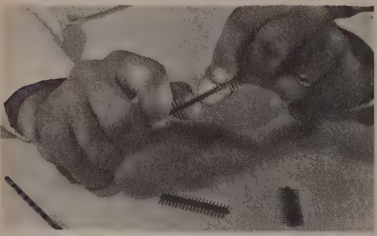


PANTOGRAPH MACHINE (Model BP-151)
Ideal for straight-line insertion in boards or for high quantities of identical boards. Stakes up to 3500 pins per hour.



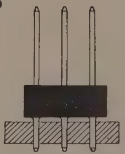
NUMERICALLY-CONTROLLED MACHINE (Model NC)
For high-speed automatic staking. Features a numerically-controlled, X-Y positioning system for programming pin-to-pin spacing and row patterns. Twin insertion heads simultaneously stake two identical boards at rates up to 12,000 per hour.

BergStik STRAIGHT AND RIGHT ANGLE HEADERS ON .100", .125" AND .150" CENTERS

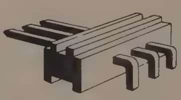


IT'S A SNAP! Headers can be broken to desired length by hand.

An inexpensive new method for inserting .025" sq. pins in boards for wire-wrapping or input/output usage. Suitable for high-volume production as well as prototyping. Supplied in many lengths and in choice of platings. Stackable to grid pattern on their respective pin centers. BergStik Headers are notched to allow user to break to any desired number of positions.



Straight Header



Right Angle Header

See Bulletin 140 for complete deails.

BERG ELECTRONICS/DIV. E. I. du PONT de NEMOURS & CO., INC./NEW CUMBERLAND, PA. 17070/TEL.: (717) 938-6711

BergCon™ .025" SQUARE MODULAR INTERCONNECTION SYSTEM

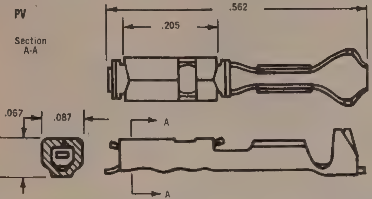
DUAL-METAL PV RECEPTACLES PROVIDE SUPERIOR ELECTRICAL AND MECHANICAL PROPERTIES

(Beryllium copper spring; ¼-hard brass body)

PV RECEPTACLES

. . . mate with .025" square pins on .125" grid or greater

The Berg "PV" connector is the most reliable .025" post receptacle in use today. This unique terminal provides a virtually constant retention force even after repeated cycles on a male pin. The spring of the PV is available in a choice of thicknesses enabling you to "design in" a retention force that is tailored to the application.



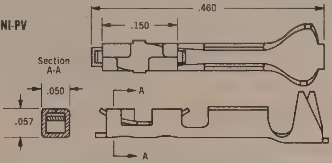
PV RECEPTACLE PART NUMBERS (CONTINUOUS STRIP)

Wire Gage, AWG	#18, #20, or two #22, two #24			#22, #24, #26, or two #26			#28, #30, #32		
Spring thickness	.005"	.006"	.008"	.005"	.006"	.008"	.005"	.006"	.008"
Finish:									
Gold, 40 u-in. over **Ni**	46226	46221	46223	46236	46231	46233	46246	46241	46243
Gold, 75 u-in. over **Ni**	46228	46220	46222	46238	46230	46232	46248	46240	46242
BERGflo solder coat	47736	47388	46580	47737	47389	46590	47738	47390	46600
SPOT O' GOLD	75694 -001	75694 -002	75694 -003	75694 -004	75694 -005	75694 -006	75694 -007	75694 -008	75694 -009

MINI-PV RECEPTACLES

. . . mate with .025" square pins on .100" grid spacing

The smaller version of the PV is of similar two-piece design for lasting retention after repeated disconnects. The Mini-PV is available in 4 varieties of platings including SPOT O' GOLD. (The latter gives you the electrical and mechanical properties of gold where you need it — in the contact area and in the spring.) Install the Mini-PV in a latch housing for 1 through 72 simultaneous connections. See application machines below.



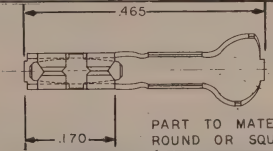
Sizes shown are representative of line. See Bulletin 101 for additional listings.

MINI-PV RECEPTACLE PART NUMBERS (CONTINUOUS STRIP)

Wire Gage, AWG	#20, or two #22, two #24		#22, #24, #26, or two #26, two #28			#28, #30, #32, two #30, two #32		
Spring thickness	.005"	.0065"	.0035"	.005"	.0065"	.0035"	.005"	.0065"
Finish:								
Gold, 40 u-in. over **Ni**	47441	47566	47457	47439	47565	47456	47437	47564
Gold, 75 u-in. over **Ni**	47220	—	47784	47216	—	47883	47212	—
BERGflo solder coat	47221	47648	47445	47217	47649	47446	47213	47650
SPOT O' GOLD	48047	48052	48049	48046	48051	48048	48045	48050

JUMBO-PV RECEPTACLES

This female disconnect is designed for use with .040" (1MM) or .045" square or round pins. Maximum contact resistance: 1.5 milliohms. Current rating: 7 amperes minimum. Standard spring thickness — .0065"



PART TO MATE WITH .040 ROUND OR SQUARE PIN.

MATES WITH .040" (1mm) PIN			
Wire Gage, AWG	#18, #20, #22	#22, #24, #26	#28, #30, #32
Spring Thickness	.0065"	.0065"	.0065"
Finish:			
Gold, 40 u-in.	75369-003	74369-002	75369-001
Tin Lead, 20 u-in.	75369-006	75369-005	75369-004

MATES WITH .045" (1mm) PIN			
Wire Gage, AWG	#18, #20, #22	#22, #24, #26	#28, #30, #32
Spring Thickness	.0065"	.0065"	.0065"
Finish:			
Gold, 40 u-in.	75375-003	75375-002	75375-001
Tin Lead, 20 u-in.	75375-006	75375-005	75375-004

Insertion Force* — Series 75369 — 750 grams max. Series 75375 — 700 grams max.
Withdrawal force* — Series 75369 — 200 grams max. Series 75375 — 300 grams max.

*Gold Contacts Only
For complete details, contact your local Berg Sales Engineer.

APPLYING PV RECEPTACLES

MODEL 200 PV CRIMPER

This electrically-operated bench press provides 1500 or more quality crimps per hour. Machine has 2½ ton capacity and features a short press stroke and direct clutch linkage. Size: 29" high x 26" long x 16" wide. Weight: 150 lbs. Power Requirements: 80-100 psi air; 120 V electrical.

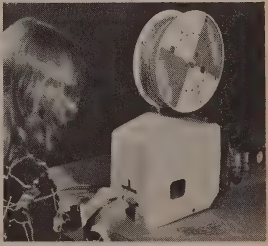
SEE BULLETIN 101 FOR ADDITIONAL INFORMATION

MODEL 250 PV CRIMPER

Air-powered unit is compact, delivers approximately 1000 terminals per hour (depending on operator dexterity.) Operates on 80 psi air. Uses 110 V for light source. Size: 26½" high x 18" long x 10" wide. Weight 50 lbs.

HAND TOOL (not shown)

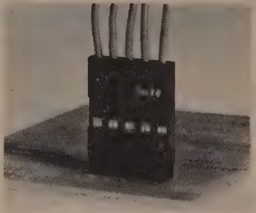
Sturdy. Duplicates the quality of crimping machines. Features a positive ratchet that does not release until full crimping pressure is applied to a terminal.



BERG ELECTRONICS/DIV. E. I. du PONT de NEMOURS & CO., INC./NEW CUMBERLAND, PA. 17070/TEL.: (717) 938-6711

BergCon™ .025" SQUARE MODULAR INTERCONNECTION SYSTEM

HOUSING (LATCH OR ROD TYPE)

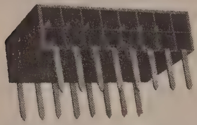


Berg Mini-Latch Housings allow simultaneous connection of as many as 72 Mini-PV terminated conductors; are available in many standard sizes.

Berg Lock-Rod Housings employ a lock rod to retain the terminal; ideal for applications requiring frequent wiring changes or for prototyping. Lock-Rod Housings connect as many as 31 Mini-PV terminated conductors in a single row — up to 62 in twin rows on .001" grid. Supplied 31 single row for .150" centers.

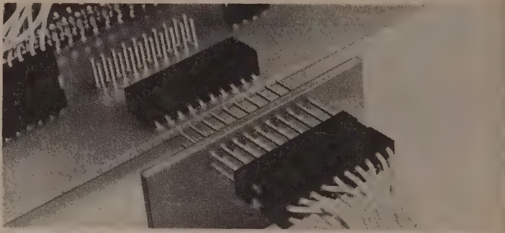
(See Bulletin 101 for complete details.)

PV CARD CONNECTORS — HORIZONTAL



These PV card connector blocks are right-angle designs precisely molded to mate with .100" or .150" grids of .025" square pins. They are suitable for horizontal mounting and are available in single or double row configurations. For example, the Berg card connector for .100" spacing accepts 5 through 52 terminations in a single row or up to 130 in double row. Housings for .150" spacing accepts 5 through 30 terminations in a single row of 10 through 86 in double row.

(For complete details on this complete line, request Bulletin 112.)



BergPin .025" square post and ferrule assemblies mate with Berg PV card connectors.

VERTICAL STAKE-TO-BOARD PV RECEPTACLE

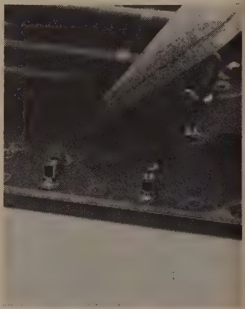
Receptacle stakes to PC board allowing dense packaging configuration by parallel mounting 1/16" glass-epoxy circuit boards. Features top or bottom entry which gives greater flexibility in placement on circuit board. Two-piece design provides lasting retention even after repeated cycling. Reliable application machines substantially reduce applied cost.

(See Bulletin 118 for additional information.)

HORIZONTAL STAKE-TO-BOARD PV RECEPTACLE

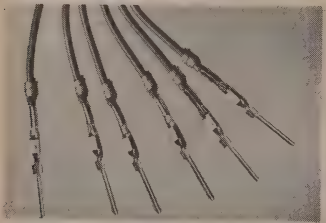
This version of the Berg PV receptacle is staked to the PC board, then wave soldered. Its design allows for dense packaging configurations in vertical mounting 1/16" glass-epoxy circuit boards. Horizontal PV receptacles can be employed with BergPin terminals to provide quick pluggability. Receptacles are supplied in strip form for high-speed machine staking. **(Write for additional information.)**

VERTICAL PV RECEPTACLE



HORIZONTAL PV RECEPTACLE

CRIMP-TO-WIRE MALE PIN



Compatible with BergCon .025" square interconnection system. Makes flying-type connector when mated with Berg Mini-PV receptacle and used with Mini-latch housing. Maximum current rating: 5 amperes. 5.0 milliohms maximum contact resistance when mated with a Mini PV contact. **(Write for additional information.)**

DAISY CHAIN FOR PRE-TESTING LAYOUTS

Here's a back-panel wiring system in easy-to-handle reel form. Consists of a continuous length of #28 gauge stranded wire with 250 insulated PV's crimped at constant intervals (2½" to 5" center-to-center spacing). Eliminates wire measuring, stripping, soldering, or expensive handtool terminating in your plant. **(See Bulletin 101.)**

MINI-JUMP CONNECTOR

MINI-JUMP, provides flexibility in circuit programming of mini-computers, card readers, printers, modems, and POS equipment. It allows for high density packaging; is stackable in both directions on .100" centers and up. Low-profile design permits tight packaging in the vertical plane. Mates with industry standard .025" square pins or .028" round pins. MINI-JUMP, which features Berg dual-metal receptacles, is supplied in a variety of package sizes. **(See your Berg Sales Engineer for additional information.)**

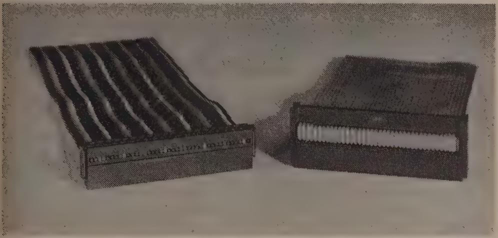
BERG ELECTRONICS/DIV. E. I. du PONT de NEMOURS & CO., INC./ NEW CUMBERLAND, PA. 17070/TEL.: (717) 938-6711

POSITIVE-LATCH Quickie

CONNECTORS TERMINATE MULTI-LEAD CABLE IN ABOUT 10 SECONDS

The Berg QUICKIE series of connectors is designed to interface with flat, flexible round conductor cable on .050″ centers. Connectors in this series eliminate the time problems and expense of pre-stripping.

STANDARD FEMALE CONNECTOR



This form is used to interface flat flexible round conductor cable on .050″ centers to .025 square wire-wrapping pins on .100″ square grid. (It also mates with .028″ round pins.) The standard QUICKIE Connector consists of two basic parts — the housing and the cover. A third part — the strain relief — is not essential in all uses.

QUICKIE ASSEMBLIES SUPPLIED WITH STRAIN RELIEFS

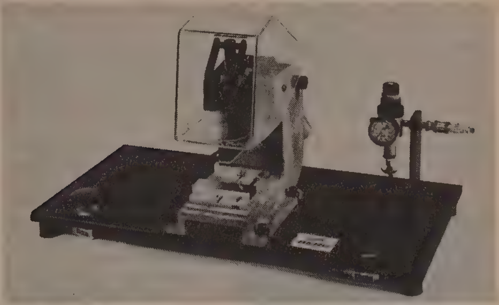
Type	Part Number	Cover Style
2 X 10	65484-005	A
2 X 10	65484-007	B
2 X 13	65484-009	A
2 X 13	65484-011	B
2 X 17	65484-013	A
2 X 17	65484-015	B
2 X 20	65484-017	A
2 X 20	65484-019	B
2 X 15	65484-021	A
2 X 15	65484-023	B

QUICKIE ASSEMBLIES SUPPLIED WITHOUT STRAIN RELIEF

Type	Part Number	Cover Style
2 X 10	65485-005	A
2 X 10	65485-007	B
2 X 13	65485-009	A
2 X 13	65485-011	B
2 X 17	65485-013	A
2 X 17	65485-015	B
2 X 20	65485-017	A
2 X 20	65485-019	B
2 X 25	65485-021	A
2 X 25	65485-023	B

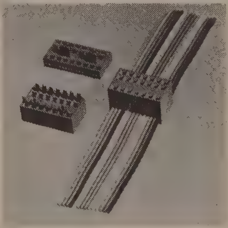
Notes: A — Closed end cover style
B — Thru end cover style

QUICKIE ASSEMBLY EQUIPMENT



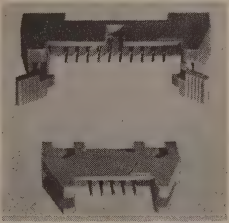
A hand-powered assembly tool and an air-powered machine are available to meet your specific production requirements. Both machines accommodate the various forms of the QUICKIE Connector.

QUICKIE DIP AND IC CONNECTORS



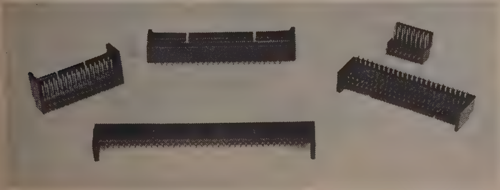
Female IC and Male DIP versions of the QUICKIE Connector are useful for system wiring interconnections and for test applications. Both types incorporate the same cable piercing action as the standard female QUICKIE Connector. For complete details, contact your Berg Electronics Sales Engineer.

QUICKIE SHIELDED RIGHT-ANGLE HEADERS



These headers which feature a positive-latch design, mate with standard female QUICKIE to provide round-pin termination on a .100″ grid. Shielding protects contact from damage while disconnected. Supplied in six sizes. (Also available without latches but with mounting holes.)

See Bulletin 131 for a comprehensive listing of the various forms of the QUICKIE Connector.



SHIELDED RIGHT ANGLE HEADERS FOR .100″, .125″ OR .150″ GRID

Headers consist of glass-reinforced Nylon housings having .025″ square pins on .100 grid which are molded in position for maximum strength. The configuration provides an integral top shield that serves to protect the pins from damage, plus side shields that prevent pin bending when female housings are removed. **See Bulletin 150.**

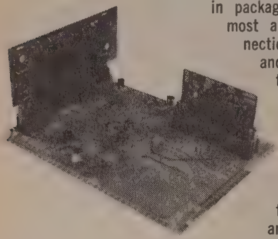
BERG ELECTRONICS/DIV. E. I. du PONT de NEMOURS & CO., INC./NEW CUMBERLAND, PA. 17070/TEL.: (717) 938-6711

BergLok MODULAR INTERCONNECTION BLOCKS

. . . A SIMPLE, RELIABLE WAY TO MOUNT REPLACEABLE DAUGHTER-BOARD MODULES IN ELECTRONIC ASSEMBLIES

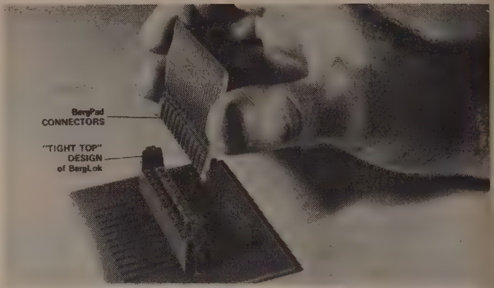
BergLok Connector Blocks provide a vertical mounting system for logic cards, ceramic substrates, and printed circuit cards, single or double sided. These blocks afford complete pluggability of modules into any conventional PC mother board, 1/16″ thick. Standard center-to-center spacing is .200″.

These connector blocks can be mounted in any position on the mother board and, thus, permit complete flexibility in packaging design and assembly. In most applications, BergLok Interconnection Blocks resist impact, shock and vibration without **supplementary support devices.**



Blocks have snap-lock base to anchor connectors firmly in mother board prior to wave soldering. No tools or fixtures needed. End-block latches lock daughter-boards firmly in place during handling and shipping. Yet boards can be easily removed for servicing or replacement.

(For complete details, request Bulletin 116.)



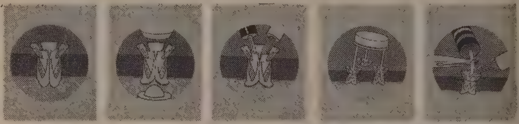
The tightly-controlled card guide that guarantees the stabilization of .062″ daughter board in BergLok blocks is known as **"Tight-Top."**

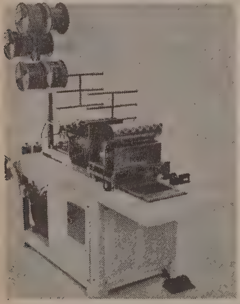
"BergPad," a terminal which is applied to the edge of P.C. board to replace copper-clad fingers, eliminates the problems of peel strength and wave solder thickness control. BergPad terminals can be applied to one side of the standard .062″ board or to both sides of .031″ to .045″ board. (Write for details or see your local Berg Electronics Sales Engineer.)

Griplet® LEAD-HOLDING CONNECTOR FOR PC BOARDS...

. . . MACHINE-INSERTABLE AT RATES UP TO 100,000 PER HOUR

The Griplet connector is inserted into holes in a PC board in order to hold component leads or wires at a desired depth. It protects the pads, firmly retains the inserted conductor and promotes a more reliable solder joint . . . while providing faster circuit assembly. Griplets are also used as a mechanical means of obtaining an electrical connection between two sides of a PC board.





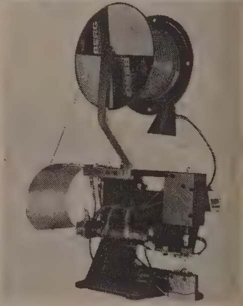
MULTIGRIP MACHINE

The Multigrip is designed for multiple inserting and staking of Griplet connectors in large quantities of identical boards. Rate: approximately eight boards per minute; inserts up to 70,000 Griplet connectors per hour. Berg also has several other Griplet model machines. **(See applicable product bulletin for complete details.)**

MODEL K

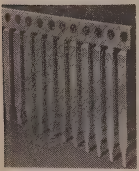
Semi-Automatic Machine. Designed for economy and reliability. Inserts and stakes one connector per cycle. Rate: approximately 1,800 per operator-hour.

(See Bulletin 301 for complete listing.)



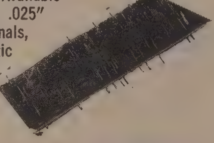
BergLance LOW-COST WIRE-WRAPPING POSTS...

. . . FOR RAPID, RELIABLE STAKING IN CIRCUIT BOARD



BergLance posts and application machines provide high-speed staking of termination points in circuit boards for radio, TV, electronic organ, and similar consumer electronic products. Available in 2 basic cross-sections (.025″ x .061″ and .025″ square) and with choice of lengths. Terminals, which are supplied in strip form for automatic insertion, have solder pre-coat and high-quality 60-40 tin lead finish.

(See Bulletin 107 for additional information.)



Berg "Shotgun" Machine has staking potential of up to 150,000 pins/day. Board area — 11″ x 12″. Many other machines available to meet prodution needs.

BERG ELECTRONICS/DIV. E. I. du PONT de NEMOURS & CO., INC./NEW CUMBERLAND, PA. 17070/TEL.: (717) 938-6711

Minisert™ LOW PROFILE, MINIATURE PC SOCKET

PROVIDES REPEATED PLUGGABILITY

The Berg MINISERT is a superior pluggable socket that assures positive retention in the circuit board prior to soldering, and spring-to-board electrical contact after soldering. The unique design of the MINISERT cup and spring extension allows solder to be drawn to the top surface of a two-sided board, producing a solder fillet on the top pad without overflow into the socket.

An elastomeric seal keeps foreign matter out of the socket before and after the component lead has been inserted. This seal remains in place throughout the life of the socket.

The MINISERT accepts round leads ranging from .012″ to .022″ diameter, or flat leads .008″ to .015″ thick by .015″ to .023″ wide. Sockets will fit a hole size ranging from .050″ to .058″ and are furnished on a metal carrier strip for insertion by the Berg MS-105 Machine. This machine provides substantial savings in time and in total applied cost.

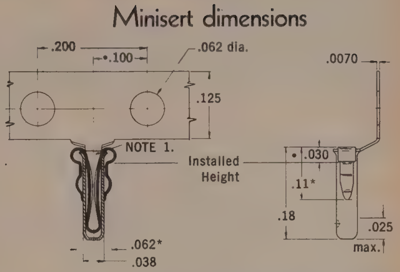
The MINISERT socket is also supplied in Kapton tape; it can be clipped to length for manual insertion in dual-in-line pattern or for terminating flat cable PC board jumpers. Those sockets are on .100″ centers. Supplied on reels of 25,000 or 5,000 socket quantities.

FEATURES

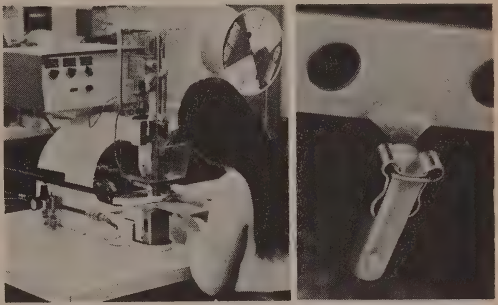
- Low-Profile — Extends only .030″ above and .088″ below a 1/16″ board.
- Fits wide range of hole sizes; accepts many sizes of round or flat leads.
- Provides repeated pluggability for dual-in-line packages, LED's, lamps, transistors, etc.

Part Number	Standard Packaging	Recommended Applicator
75060-007	25M per reel	MS-105
75060-008	5M per reel	MS-100
75315-001	Loose piece	Hand Tool
75540-001	25M reel (KAPTON)	Hand Inserted
75540-002	5M reel (KAPTON)	Hand Inserted

(See Bulletin 120 for complete details.)



NOTE 1. Elastomeric Seal keeps foreign matter out of the socket before and after component lead has been inserted. This seal remains in place throughout the life of the socket.



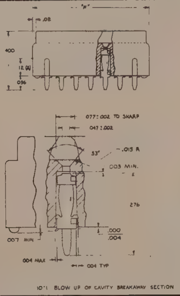
Berg pneumatically operated MS-105 machine inserts approximately 2,000 sockets per hour. A hand-operated (MS-100) insertion device is available for small runs; rate 800-1,000 per hour. A handtool kit can be purchased for prototyping purposes.

DUAL-IN-LINE SOCKET FOR IC PACKAGING ON .600″ CENTERS

Designed for low-cost, high-density production packaging, these sockets have universal mounting and packaging capabilities. They are available in solder-tail with 14, 16, 18, 22, 24, 28 and 40-lead configurations. Sockets will fit .040″ to .045″ diameter board holes.

Terminal material is .006 ASTM, 510 Phos. Bronze ¾-hard. Terminal platings are available in .0001-.0003 thick bright acid-tin pre-plating, or 13K gold inlay .0005 thick over .0005 nickel underplate with .00010 gold-flash over all.

One-piece socket bodies are precision molded of thermo-set phenolic resin which has excellent electrical, mechanical and thermal characteristics. A notch at one end of the body provides polarization. Standard color: black. Sockets are packaged in special IC tube carrier to facilitate feed to automatic equipment.



Dual-In-Line Sockets are packaged in special plastic tube carriers which serve to protect the sockets and to facilitate feed to automatic equipment. (Tubes can be used with Universal and Gardner-Denver Equipment).

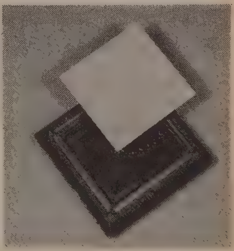
LOW-PROFILE DUAL-BEAM IC SOCKET

This new dual-in-line receptacle is compact and of low-profile design. It meets EIA standard RS-415; is low cost and available with Tin or Gold plating. It is designed to prevent solder wicking and to accept .015 x .040 leads. Features include press-fit terminal leg .033 ±.003 diameter-ventilated molding with dimples to allow easy cleaning of the completed PC board assembly.

(Write for complete details.)

LEADLESS RECEPTACLES

Berg Electronics is active in packaging designs which mate a leadless package to the mother-board thus giving a "wiping-pressure" type connection surface. This leadless receptacle system avoids "plated-thru-holes" in a board, and allows for the widest choice interconnection media. These packages simplify component assembly and/or replacement and eliminate the danger of damaging costly components with hot solder.



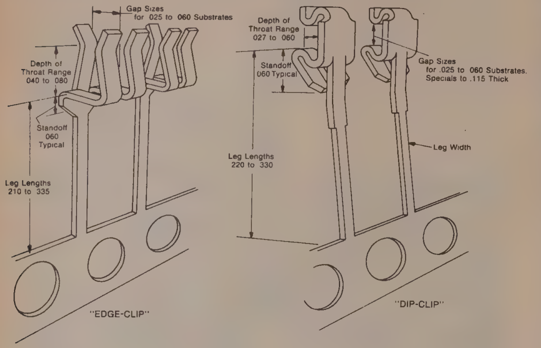
Write for additional information.

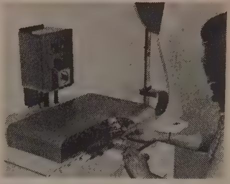
*Solok** TERMINATIONS FOR CERAMIC HYBRID MICROCIRCUITS

Solok* Terminations clip onto substrate rather than into holes drilled through it. They mechanically hold their position until soldered for a permanent connection. Berg offers a complete terminal application machine system. Its broad standard line is backed by an unusual custom design capability.

*DuPont Trademark

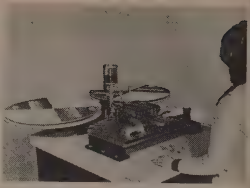
TWO BASIC TYPES . . . MANY CONFIGURATIONS





EDGE-CLIP MACHINE

This machine is used for single edge-mounted terminals. It can be programmed to install terminals at any given pad location or to skip terminals in an area where there is no pad. Rate: Up to 1500 packages per hour.



DIP-CLIP MACHINE

This semi-automatic machine is used for DIP type terminations; it, too, operates at rates up to 1500 substrates per hour. (Terminals must be ordered "left" and "right" handed for this machine.)

DEFINITION OF TERMS

1. **Depth of Throat** — Distance from edge of substrate to point where terminal contacts pad.
2. **Standoff** — Distance that terminal will hold substrate away from mounting board.
3. **Leg Length** — Distance from substrate to end of leg **with carrier strip removed.**
4. **Gap Size** — Opening in clip area of terminal designed to assure a mechanical hold on the substrate.

For complete details and specifications, contact your local Berg Sales Engineer or request Bulletin 124.

Lugs and Tie Points

FOR BOBBINS, COIL FORMS, SHIELD CANS, ETC.

Strip terminals and machines matched for rapid and uniform staking

THRU-LUG TERMINALS — are precision stamped with sections that, when staked, clinch the terminal securely to both sides of the board. Catalog Section #406.

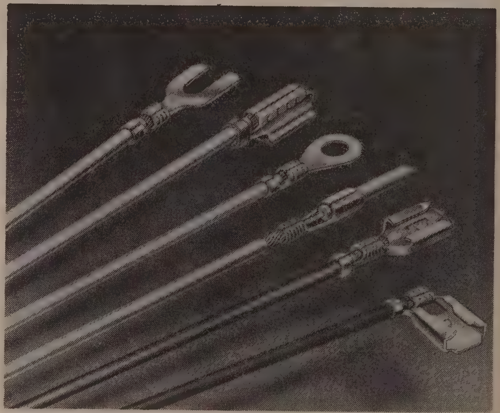
EXTRUDED COLUMN LUGS — designed for high-strength retention in circuit and terminal boards. Job-matched machines rapidly stake as many as six lugs simultaneously. Catalog Section #407.

COIL FORM AND BUTTERFLY TERMINALS — feature specially designed tips for rapid insertion and immediate retention in circuit boards. Provide wrapping and soldering points for coil winding wire. Catalog Section #202.

CAN LUGGING SYSTEMS — Berg offers a complete line of lugs for mounting shield cans to circuit boards. Designs include flat-sided or cylindrical can types for flush or elevated mounting and four styles to automatically key cans. Catalog Section #203.

BOBBIN TERMINATIONS — Berg's system for inserting lugs into molded bobbins eliminates costly insert molding and provides secure connection points. Available in thru-lug and blind-pocket types. Catalog Section #204.

Truon™ CRIMP-TO-WIRE TERMINALS AND SPLICES



Berg's Truon™ terminals are available in a full range of designs, including: straight and flag female receptacles, male tabs, rings, spades, taper pins and splices. All styles have matched application tooling for high-rate production with uniform, highly-reliable crimping with a gas-tight connection. See Bulletin #201.

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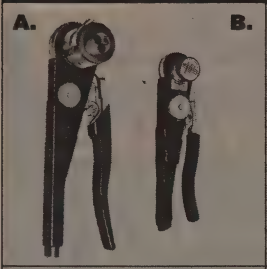
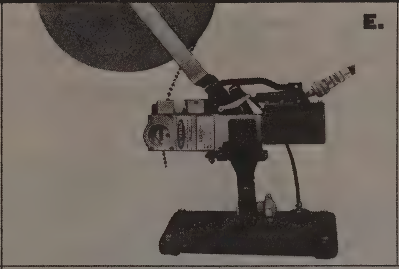
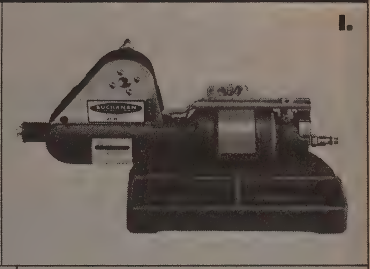
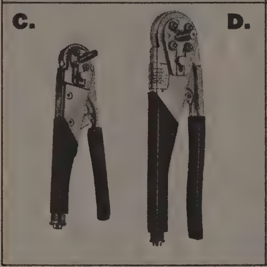
Headquarters for universal crimping tools









8-STEP ADJUSTABLE HAND TOOLS

Available in Standard and Miniature sizes which meet all the design and performance requirements of MIL-C-22520. Reliable, cycle-controlled tools with turret/positioner or "eyeball" operation, 8 crimp depths and octadent crimp.

A. Standard Tool (Cat. No. 615708) for wire barrel sizes #12 through #22 and wire sizes #12 through #26 AWG.

B. Miniature Tool (Cat. No. 615717) for barrel sizes 20 through 28 and wire sizes 20 through 32 AWG.

MICROCRIMP TOOLS

Available in Standard and Miniature sizes which meet all the performance requirements of MIL-C-22520. Infinitely adjustable cycle-controlled tools with direct reading indicators and octadent crimp.

C. Miniature Microcrimp Tool (Cat. No. 612118) for most miniature pin and socket contacts #20 and smaller and wire sizes #20 through #30 AWG.

D. Standard Microcrimp Tool (Cat. No. 612548) for pin and socket contacts #12 and smaller and wire sizes #12 through #26 AWG.

E. AUTOMATIC FEED PNEUMATIC CRIMP TOOL

Meets performance requirements of MIL-C-22520.
An octadent tool that automatically feeds contacts from disposable carriers. For portable or bench applications with proprietary or military contacts. Wire sizes #12 through #28 AWG. Contacts #12 through #20. Available with standard or miniature indenters.
Standard—Cat. No. 11148
Mini—Cat. No. 612916

C-FRAME TOOLS

Light weight, easy to operate, compact, cycle controlled. Available with various dies.

CTS Standard Size, Cat. No. 11545, for terminals 12-10 through 26-24. Meets performance requirements of MIL-T-22910.

F. CTM Miniature, Cat. No. 11707-1, for sizes 16-14 through 26-24. MS 90413-1A. Listed under QPL MIL-T-22910 CLASS 1.

G. CHS Standard Size, Cat.No.612648. Pop-in die. M22910/7-1. Listed under QPL MIL-T-22910 CLASS 1.

H. CHM Miniature, Cat. No. 612845. Fixed die. MS 90487. Listed under QPL MIL-T-22910 CLASS 1.

CD Tools. Special dies for special custom applications. Standard size (CDS) and miniature size (CDM). C-Frame or closed frame models.

I. EXTERNALLY ADJUSTABLE MANUAL FEED PNEUMATIC CRIMP TOOL

Meets performance requirements of MIL-C-22520.
Manual, cycle-controlled portable tool can be bench mounted (with a foot pedal). Octadent crimp. Wire sizes #12 through #30 AWG. Contacts #12 through #22. Size 8 contacts accommodated on application. Available with standard or miniature indenters. Uses MS 3191 or M22520/1 turrets for locating contacts. **Standard**—Cat. No. 612141
Mini—Cat. No. 615250

J. POSITIONER CONTROLLED TOOL

Conforms to MS 3191. This MIL Standard, non-operator adjustable, 4-indent cycle controlled tool crimps most proprietary and MS contacts, using inexpensive positioners.

Standard Positioner Controlled Tool Frame, MS 3191-A (Cat.No. 11210) wire sizes #12 through #26 AWG, for contacts #12 through 22.

MS 3191-1 and MS 3191-2 (Cat. Nos. 10692 and 11234) also available.

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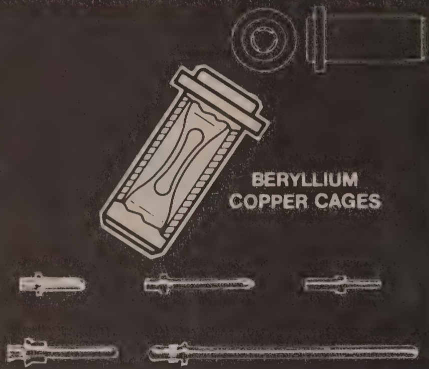

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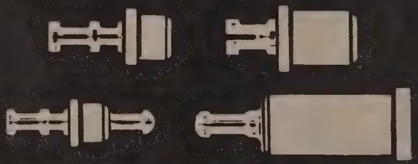

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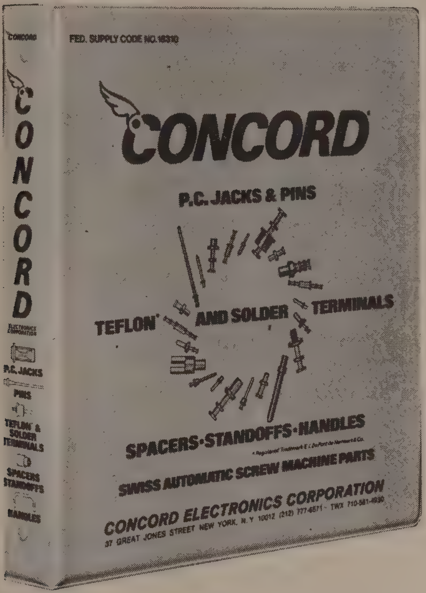
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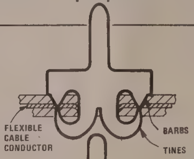
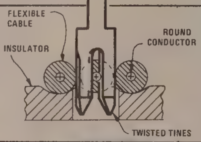
CONTACT TAIL CLINCHED TO CABLE



SERIES FOR FLAT FLEXIBLE CABLE WITH FLAT CONDUCTORS*

Contact is a special alloy stamping. Initially, the tines are vertical and unbent. A tool presses them through the cable. Contact is "in line" with conductor. A double clinch (from the two tines) is achieved for reliability. Very close (adjacent) centers possible.

CONTACT TAIL CUT INTO CABLE

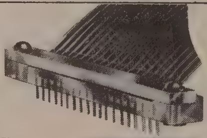


SERIES FOR FLAT FLEXIBLE CABLE WITH ROUND CONDUCTORS*

Tine edge bites through cable and into conductor for a good, clean contact. Conductor is thus twisted and placed in tension. Reaction forces assure continued additional firm contact of tines against conductor.

*Pat. applied for

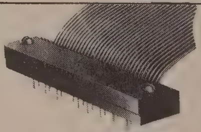
CF002-01



CF002-01 SERIES FOR FLAT FLEXIBLE CABLE WITH FLAT CONDUCTORS

Standard centers are .100"; closer centers are obtainable. Each contact tail makes multi-connections above and below each conductor.

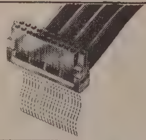
CF006-01



CF006-01 SERIES FOR RIBBON CABLE WITH ROUND CONDUCTORS

Standard centers are .050"; closer centers are achievable. Specially shaped contact tails assure constant reaction forces for reliable connections.

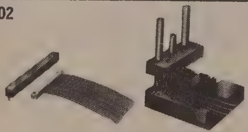
CF008-01



CF008-01 SERIES FOR RIBBON CABLE WITH ROUND CONDUCTORS ON .050" CENTERS

Tail uses standard CEE WEE pretwisted tines for connecting to Ribbon Cable. Contact nose has double leaf to accept .025" x .025" pins and .020 diameter pins. Built-in strain relief allows cable to come off vertically or horizontally.

CT002



UNIVERSAL FLAT CABLE ASSEMBLY TOOL — CT002

Compact, rugged, low-priced. Interchangeable parts adapt it to flat and round cable connectors. Fits standard arbor presses. Similar geared CT003 has built-in device to actuate upper ram.

Other components manufactured by CW INDUSTRIES include Slide, Toggle and Rocker Switches which are described in EEM Section 5100 and fully detailed in Catalog 2096. These include multi-purpose switches featuring miniaturization, having from 1 to 6 poles designed for loads up to 15.0 amps at 125 volts. Other CW components are Wire Wound Potentiometers detailed in Bulletin 2080 (3/4" diameter) and Precision Film Resistors available in 1/10 watt through 1/4 watt (RN55, RN60) and RN65). CW research and engineering facilities are always at your service, for consultation on any engineering or development problem.

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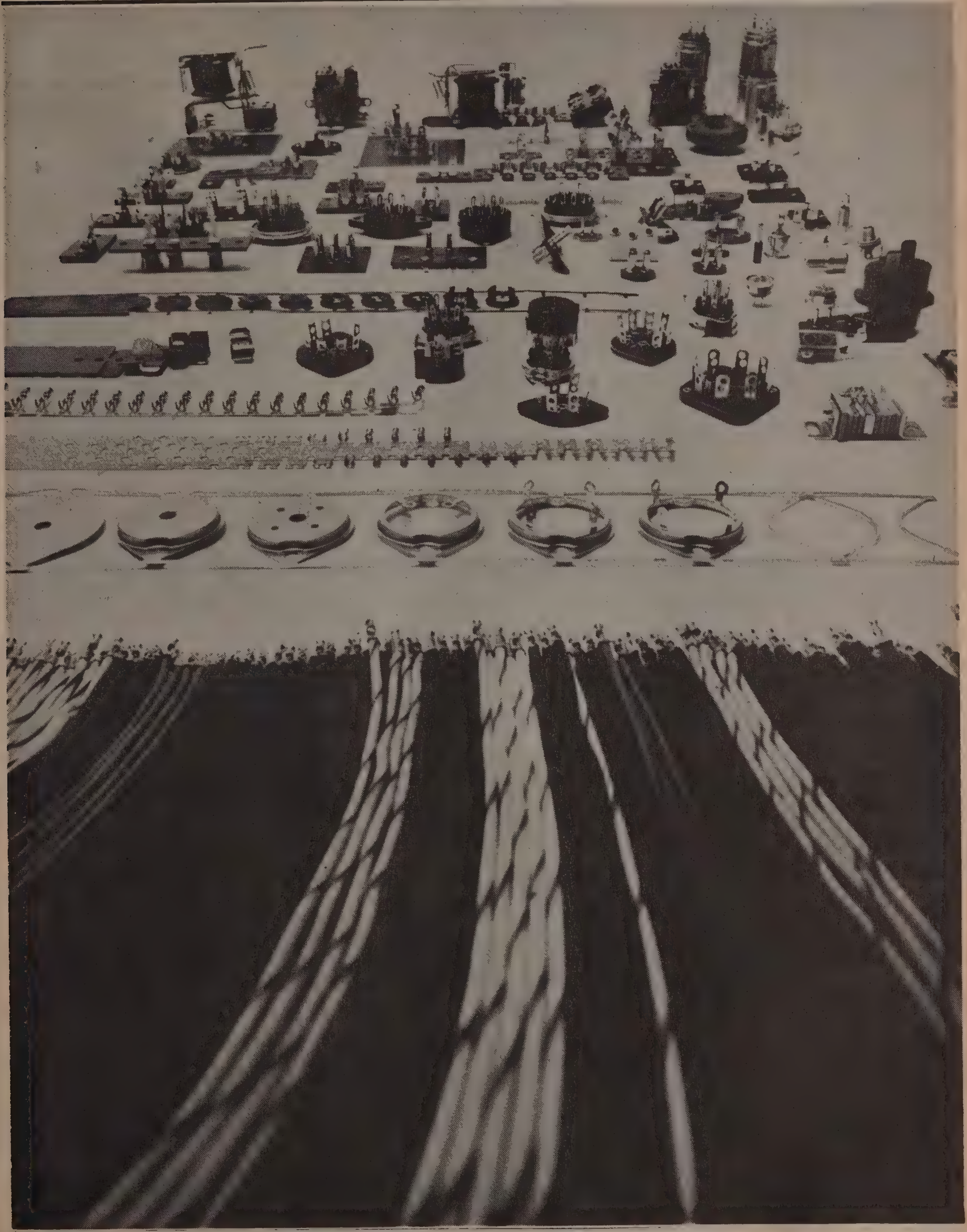

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For many years the electronic industry has relied on the wide range of products, engineering services and consistent production quality of Connector Corporation.

A limited cross section of Connector Corporation's line is illustrated. Your specific requirement can be exactly met and mass produced with good delivery. Many items can be supplied with leads attached and color coded, offering production savings for your assembly. Special items can be designed or developed at relatively low cost. Just let us know what you need.

Products are available in a wide range of insulations and contact materials:

Insulations include: general purpose or mica-filled low loss Phenolic, glass filled alkyd, polypropolene, ceramic,etc., in molded versions. Laminated types include XP, XXP, XXXP Phenolics, X2B Hard Rubber, Glass Epoxy, Glass alkyd.

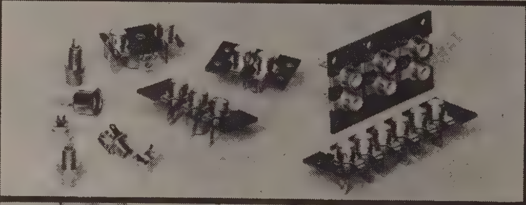
Contacts and Platings include: High tensile brass, phosphor bronze or beryllium copper with cadmium, electro tin, silver, hot tin dipped, silver-gold flash, gold plating, etc.

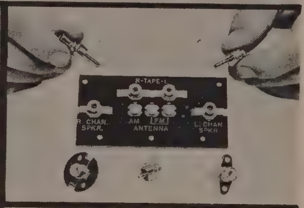
TUBE SOCKETS

Most standard and many special molded & ceramic configurations available as well as laminated socket types. Fixed or collapsible types of shielding are available.

MULTI PURPOSE PHONO CONNECTORS

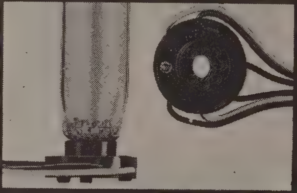
Sockets available in multiples up to 12 per section. Broad line of individual male and female types in a variety of mountings. Highly reliable for dependable repeated use.





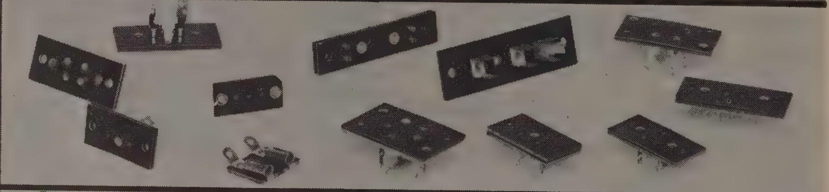
KINESCOPE SOCKET ASSEMBLIES

Include: Miniature Di Heptal Socket for 90° color tubes, 110° Eightar CRT sockets, miniature types for JEDEC E7-91, B7-247 basing (HEPTAL). Many special configurations and types may be furnished in quantity lots.



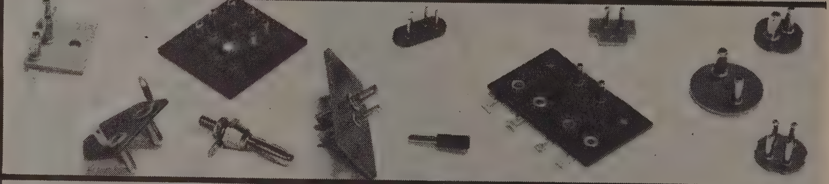
RECEPTACLES

Numerous varieties. Available in molded or laminated construction. Reliable contacts offer positive electrical and mechanical mating.



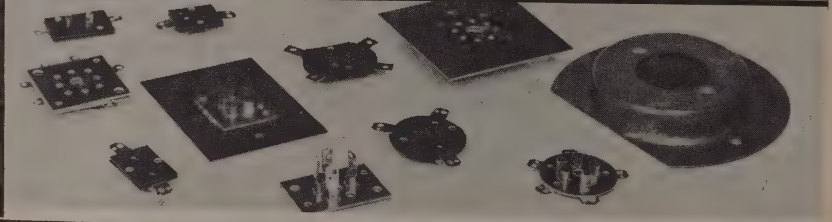
PLUGS

Numerous types available, with molded or laminated phenolic insulations. Leads may be supplied to specification.



BATTERY SOCKETS

Complete line for commercial & military batteries. Custom designed to your requirements.



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TRANSISTOR SOCKETS

3- or 4-pin on .100 or .200 centers. TO3 power transistors.

NUVISTOR SOCKETS

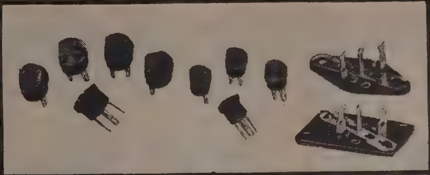
Miniature positive contact.

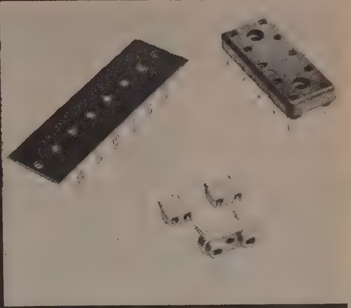
IC SOCKETS

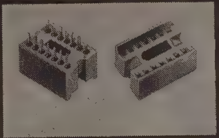
14-pin dual in-line on .100 centers.

CRYSTAL SOCKETS

Accommodate single and multiple crystals. Both p.c. and solder lug versions for crystals with .486, .273 and .192 pin centers and with .050 or .040 pin diameters. Available to MIL Specs.





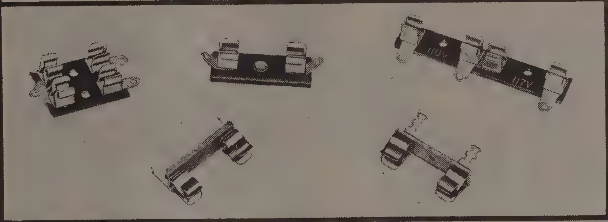


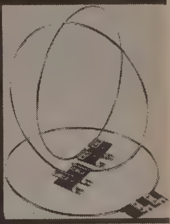
FUSE HOLDERS

Positive grip open type. Features: easy solderability, and versatility of construction which permit multiples or variations to your spec at reasonable cost.

UHF TV ANTENNAE

Attaches easily. Can be rotated in many different planes for optimum performance. Long life, trouble-free operation.



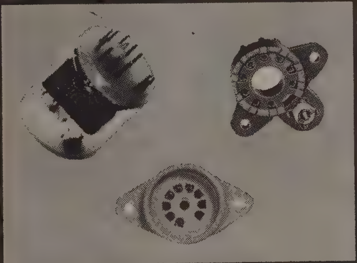


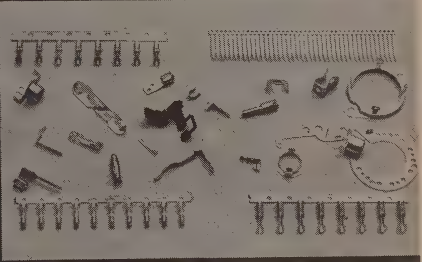
TRANSMITTER & HIGH VOLTAGE TUBE SOCKETS

Low loss at very high frequencies. Vented for maximum cooling of tube base and anode contact area by convection. Voltage breakdown characteristics are enhanced by barriers between contact positions.

PRECISION METAL STAMPINGS

Bulk or chain type contacts, terminals and flat stampings for your high production needs.



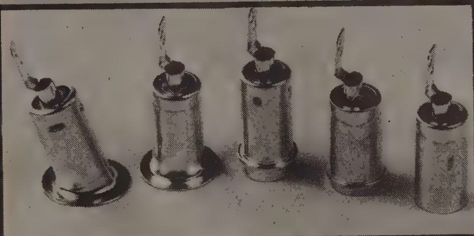


RF COAXIAL ANTENNA CONNECTORS

For auto receivers & similar applications. Rugged construction. Excellent contact resistance and retention.

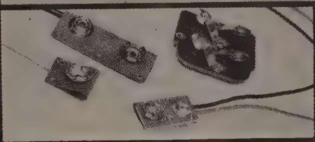
MULTI-PIN MALE/FEMALE CONNECTORS

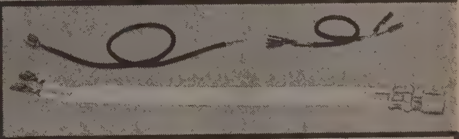
Provide quick reliable connect and disconnect for cable assemblies. Insert and extract easily, yet have reliable contact retention and resistance.



BATTERY CONNECTORS AND WIRE ASSEMBLIES

Snap-on and positive contact types available with wired leads if desired. Wire assemblies furnished to your specifications as to type of wire, length and termination attachments.





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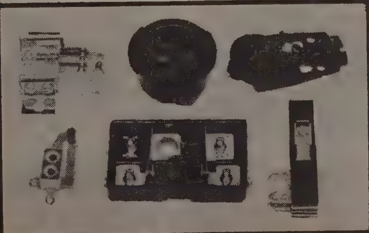

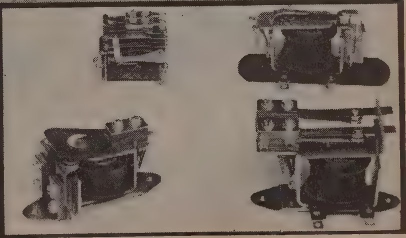

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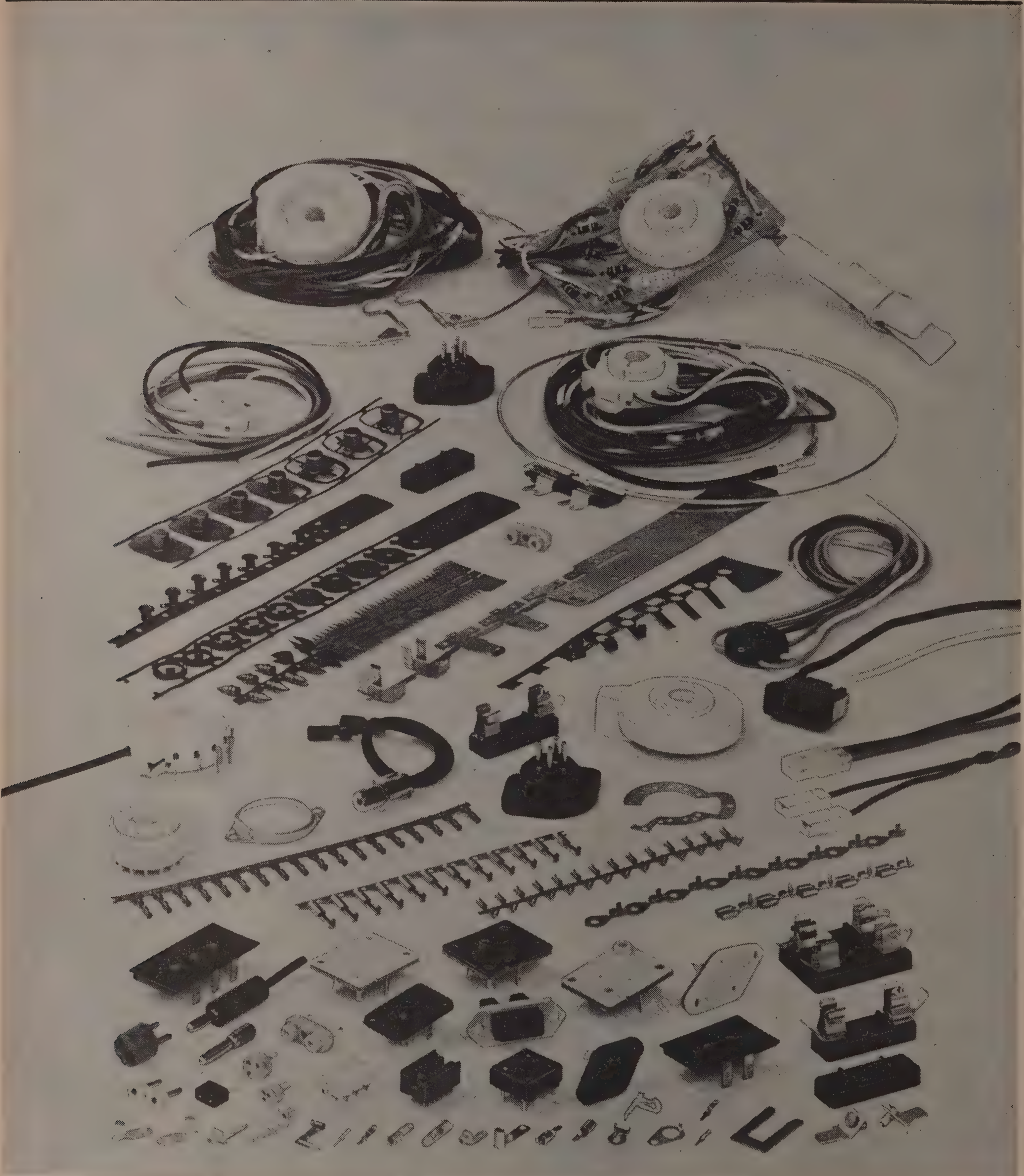
Pictured below are additional items from our extensive standard product line, including some of our more recent designs and developments.

Just couple your requirements with our engineering expertise and precision tool, molding, metal and plastic fabricating capabilities.

The design and resulting product will fulfill your needs at the lowest possible cost. Either we'll modify one of our existing products for you, or design a new one to your specs — whichever meets your needs best.

The final product will be 100% produced in our own complete manufacturing facility with consistent quality control throughout.

For several decades, we have satisfied industry's needs for engineering expertise and manufacturing to precision quality at lowest cost.



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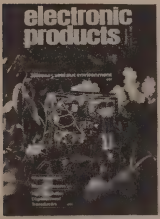

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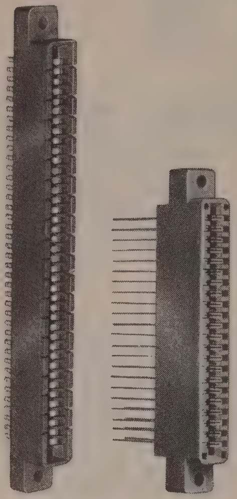
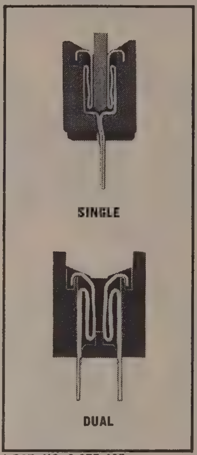
SERIES 600 CARD-EDGE CONNECTORS FOR PRINTED CIRCUITRY



BELLOWFORM CONTACTS*



* PAT. NO. 2,875,425

Connector body molding material is made of a variety of compounds such as Diallyl Phthalate, for commercial and military applications. Contacts are gold plated phosphor bronze of beryllium copper with optional plating in accordance with all MIL SPECS or special customer requirements. These contacts, with "bellowform" construction, are durable and capable of withstanding thousands of insertions and withdrawals without failure; they are virtually indestructible.

Series 600 printed circuit connectors represent one of the most extensive lines of receptacle or card-edge types. A wide variety of single readout and double readout construction, with sizes from three to 210 contacts are available.

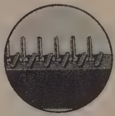
CONTACT CENTERS:
.050″, .075″, .100″, .125″, .140″, .150″, .156″ and .200″

BOARD THICKNESS:
1/32″, 3/64″, 1/16″, 3/32″ and 1/8″

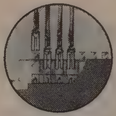
WIRING STYLES:
Eyelet lug for soldering, solderless-wrap terminations for wire-wrapping technique, contacts for dip or flow soldering and taper tab solderless wiring

EYELET LUG

SOLDERLESS-WRAP



DIP SOLDER

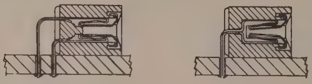


TAPER TAB

MIL SPECS:
Continental Printed Circuit Connectors meet or exceed applicable MIL-C-21097 specifications. They withstand a 50-hour salt spray test and ambient temperature range of −55°C to +125°C.

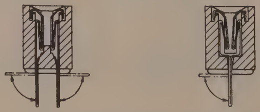
SELECTIVE PLATING — Continental's continuous process selective plating deposits an equal amount of gold on each contact. The contacts pass through various cleaning and plating baths, resulting in a controlled amount of gold uniformly deposited on the critical contact area. By plating gold on the contact surface only, selective plating automatically brings down your connector cost enormously.

PRINTED CIRCUIT APPLICATIONS



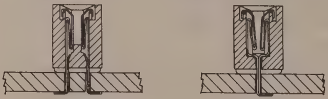
DUAL SINGLE

RIGHT ANGLE MOUNTING WITH CONTACTS FOR DIP SOLDERING TO UNDERSIDE OF PC BOARD



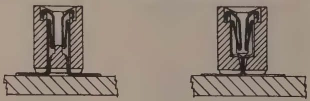
DUAL SINGLE

VERTICAL MOUNTING WITH CONTACTS FOR SRAIGHT OR RIGHT ANGLE HARNESS WIRING



DUAL SINGLE

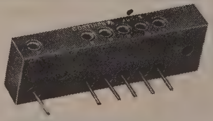
VERTICAL MOUNTING WITH CONTACTS FOR DIP SOLDERING TO UNDERSIDE OF PC BOARD



DUAL SINGLE

VERTICAL MOUNTING WITH CONTACTS SOLDERED TO TOP SIDE OF PRINTED CIRCUIT BOARD

PC TEST POINT



SERIES 672. Provide conveniently located test points to check printed circuitry. Available with 4, 5, 6, 8, 10, 11, 20, 21, 28, 30, 42 and 63 contacts which grip and hold securely a standard .080″ test probe. Connectors have recessed and floating pin terminals mounted at right angle to the test socket. Pins dip solder to printed circuit board.

FOR COMPLETE CATALOG ON ANY SERIES WRITE OR PHONE:
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CONTINENTAL CONNECTORS

Precision Electronic Connectors For Commercial & Military Applications

SERIES 600 CARD-EDGE CONNECTORS FOR PRINTED CIRCUITRY

.025″ or .045″ SQUARE SOLDERLESS-WRAP TERMINALS

CONTACT CENTERS:
.100″, .125″, .156″, .200″

WIRING STYLES:
.025″ and .045″ square wire-wrapping terminals

BOARD THICKNESS:
Accepts .054″ to .071″ (1/16″) board

TERMINATION:
Dual readout with various sizes from four to 100 contacts

PLATING:
Gold or tin

SERIES 600-100. .025″ SQUARE TERMINATIONS
12 to 100 terminals with .100″ contact centers

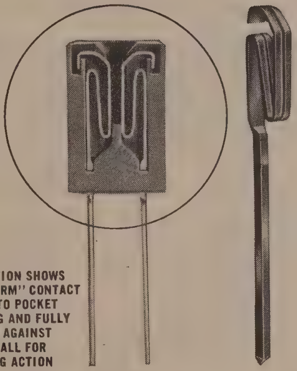
SERIES 6125-250. .025″ SQUARE TERMINATIONS
Four to 100 terminals with .125″ contact centers

SERIES 600-156. .045″ SQUARE TERMINATIONS
56, 60, 72 terminals with .156″ contact centers

SERIES 600-83. .045″ SQUARE TERMINATIONS
36, 56, 64 terminals with .200″ contact centers

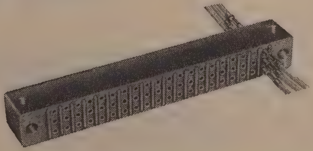
"Bellowform" Contacts have a coil spring action grip that clasps board firmly over 100% of the contact area. Exclusive design permits use of undersized or oversized board tolerances while maintaining low contact resistance. The contact "rides" with the pc board under extreme vibration conditions or misalignment. Our patented "bellowform" contacts are also ideal for microelectronic circuits where damage can occur with frequent insertions into cantilever type pc connectors, and for circuits with ceramic substrates that can wear conventional contacts.

Contacts are held in place mechanically with a 90° twist at the base of the molding. They can be replaced easily with a simple tool supplied by Continental Connector. We are the only company that manufactures printed circuit connectors with "bellowform" contacts for wire-wrapping applications using either .025″ or .045″ square terminations.



CROSS-SECTION SHOWS "BELLOWFORM" CONTACT HOOKED INTO POCKET OF MOLDING AND FULLY SUPPORTED AGAINST MOLDING WALL FOR COIL SPRING ACTION

TERMINAL BLOCKS



SERIES 145-58, 145-50 AND 145-48. Precision reamed solderless taper pin receptacles in single, dual and triple row construction, molded-in for highest durability. Available in any combination of feedthru individual or shorting terminals. Internal bus between any combination of terminals eliminates external wiring. Mounting holes for stacking, right angle and perpendicular mounting. Molding is glass filled Diallyl Phthalate, Type GDI-30 per MIL-M-14 specifications.

FOR COMPLETE CATALOG ON ANY SERIES WRITE OR PHONE:
CONTINENTAL CONNECTOR CORPORATION / 34-63 56th STREET, WOODSIDE, NEW YORK 11377 / PHONE SALES: (212) 899-4422

CONTINENTAL CONNECTORS

Precision Electronic Connectors For Commercial & Military Applications

RIGHT ANGLE SERIES PLUG & SOCKET TYPES FOR PRINTED CIRCUITRY

IN ACCORDANCE WITH MIL-C-55302, MIL-E-5400, MIL-C-28747 SPECIFICATIONS

.050″, .100″, .156″, .200″ CONTACT CENTERS

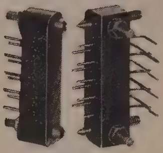
SERIES 145-5. 7, 9, 11, 15, 19, 23 contacts. Solder cup on socket, dip solder pin for plug. For use in airborne electronic equipment in accordance with MIL-C-55302 specs.

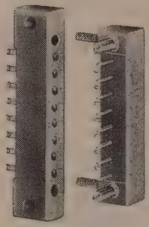
SERIES 600-1-45. 45 contacts on .050″ center spacing. Right angle configuration of three rows of dip solder contacts.

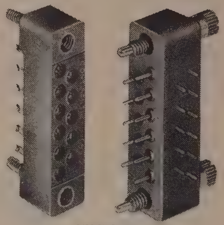
SERIES 600-1-50. 50 contacts on .100″ center spacing.

SERIES 600-70. 4, 8, 10, 12, 13, 22, 28 single row contacts on .156″ center spacing. Guide pins in plug and guide bushings in socket provide polarized mating of parts.

SERIES 683. 11, 18, 19, 23, 33, 38 with polarizing screwlocks or guidepins and guide sockets. Meet aircraft requirements for vibration and high altitude.


SERIES 145-5


SERIES 600-70


SERIES 683

SERIES J RIGHT ANGLE OR STRAIGHT THRU WIRING — .100″ CONTACT CENTERS

11, 21, 31, 51 CONTACTS

IN ACCORDANCE WITH MIL-E-5400 SPECS

These plug and socket connectors are widely used in all electronic systems. Their small size and rugged construction make them particularly adaptable to aircraft applications. They can be used for mounting on single or dual sided printed circuit boards of varying thickness. The contact configuration is excellent for flat cable use. Plug contacts are integrally molded into the rugged body material and are protected by a high strength, single piece molded shell of glass fiber reinforced phenolic. Molding configuration prevents mismatching of plug and socket.

Socket contacts are wire crimp removable and free floating. They feature a self-wiping action that eliminates the need for precious metal plating such as gold. Excellent conductivity and a low millivolt drop that meets MIL-SPEC requirements are assured.

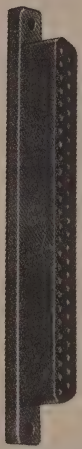
ELECTRICAL AND MECHANICAL RATINGS:

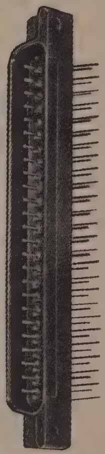
Voltages	Breakdown	Recommended Test
At Sea Level	2000V. RMS	1325V. RMS
At 70,000 Ft.	400V. RMS	300V. RMS

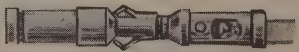
Current Rating: 3 Amps Continuous .... 5 Amps Max.
Minimum Creepage Between Contacts .... .047″
Minimum Air Space Between Contacts .... .047″
Male Contact Pin Diameter .... .030″
Crimp Barrel for Socket Contact: Accommodates #22, #24, #26 AWG Wire

NOTES:

1. Body Material: Glass fiber reinforced phenolic Type MFE per MIL-M-14F.
2. Contact Material: Copper alloy, gold plated.
3. Socket contact 2500-S2A22-39 must be ordered separately.
4. For electroplated tin contact add suffix "SN" to connector part number (J21P90-15-SN).


J51S RECEPTACLE
USES REMOVABLE
SOCKET CONTACTS


J51P90-15 PLUG
RIGHT ANGLE
WIRING & MOUNTING


ENLARGED VIEW OF REMOVABLE
SOCKET CONTACT SHOWS DETAIL
OF CLOSED ENTRY CONSTRUCTION

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CONTINENTAL CONNECTOR CORPORATION / 34-63 56th STREET, WOODSIDE, NEW YORK 11377 / PHONE SALES: (212) 899-4422

CONTINENTAL CONNECTORS

Precision Electronic Connectors For Commercial & Military Applications

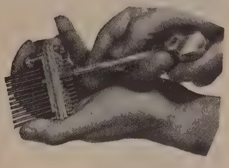
RACK AND PANEL CONNECTORS FOR VARIOUS EQUIPMENT

A complete line of high-reliability connectors for computers, missile, aircraft, communications and other critical electronic applications. In addition to standard specifications, these connectors can be supplied with such optional accessories as aluminum hoods, protective shells, polarizing screwlocks* and solder filled contacts. Various molding compounds are also available.

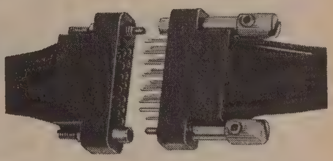
* PATENT NO. 2,746,022

MICROMINIATURE AND MINIATURE WITH CRIMP REMOVABLE CONTACTS

AVAILABLE WITH 7, 9, 14, 18, 20, 26, 34, 42, 50, 66, 75, 104 & 152 CONTACTS CONFORM TO MIL-C-22857 SPECIFICATIONS



Continental Connector's removable contacts and wire crimp terminations eliminate all connector soldering operations. Contacts are supplied separately and wired independently of connector body, and can be readily replaced with simple, low cost hand tools. Connectors are available with guide pins and sockets or screwlock hardware.

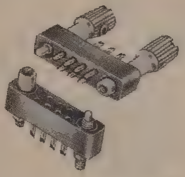


SERIES 25. Removable contact connectors are interchangeable with our Series 20 fixed contact types. .025″ and .045″ square solderless-wrap terminations with .062″ or .040″ pin diameters are also available. Optional aluminum hoods, protective shells and mounting plates can be supplied. Shielded crimp removable contacts for RG-178B/U and RG-196A/U coaxial cable can be intermixed in any combination with the standard type contacts. Select guide pins and sockets or polarizing screwlocks for mating hardware.

SERIES MMM. Five thru 75 contact sizes. Interchangeable with Series MM-22 fixed contact types. Can be supplied with guide pins and guide sockets, polarizing screwlocks and aluminum hoods.

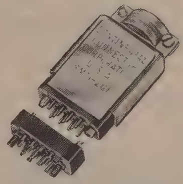
SERIES 25MM. Center screwlock locking device. Available with 50, 76, 100 and 200 contact sizes. Contacts are on .100″ centers.

FIXED CONTACT MICROMINIATURE, SUBMINIATURE, MINIATURE



SERIES MM-22 MICROMINIATURE. Five to 104 contacts. Ruggedized to withstand shock and vibration extremes. Meet MIL-C-28748 specs or commercial type. Available with guide pins and guide sockets, polarizing screwlocks, cable brackets and aluminum hoods.

Breakdown Voltage (sea level), 2000V. RMS • Current Rating, 3A • Minimum Creepage Between Contacts, .070″ • Minimum Air Space Between Contacts, .040″ • Contact Center Spacing, .093″ • Pin Diameter, .030″ • Solder Cup, #22 AWG wire.



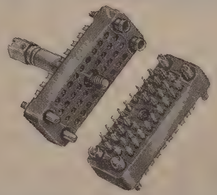
SERIES SM-20 SUBMINIATURE. Five to 104 contacts. Meet MIL-C-28748 specs or commercial type. Optional features include guide pins and guide sockets, polarizing screwlocks, protective shells and aluminum hoods.

Breakdown Voltage (sea level), 2000V. RMS • Current Rating, 5A Continuous, 7.5A Maximum • Minimum Creepage Between Contacts, .078″ • Minimum Air Space Between Contacts, .045″ • Contact Center Spacing, .125″ • Pin Diameter, .040″ • Solder Cup, #20 AWG wire.

SERIES 20 MINIATURE. Five to 104 contacts. Similar to above except larger size. Meet MIL-C-28748 specs or commercial type. Hexagonal configuration with 1, 4, 5, 7, 9 and 10 contacts is also available.

Breakdown Voltage (sea level), 3000V. RMS • Current Rating, 5A Continuous, 7.5A Maximum • Minimum Creepage Between Contacts, .125″ • Minimum Air Space Between Contacts, .070″ • Contact Center Spacing, .150″ • Pin Diameter, .040″ • Solder Cup, #20 AWG wire.

CENTER SCREWLOCK



SERIES 1900. 10, 22, 34, 50, 78, 104 and 152 contacts. Double lead thread action screwlock, stainless steel side channels and closed entry contacts for maximum reliability. Series 2500 available with 152 removable contacts.

Breakdown Voltage (sea level), 3000V. RMS • Current Rating, 10A Continuous, 13A Maximum • Pin Diameter, .062″ • Minimum Creepage Between Contacts, .110″ • Minimum Air Space Between Contacts, .050″ • Contact Center Spacing, .150″ • Solder Cup (also solderless-wrap and taper pin) #16 AWG wire.

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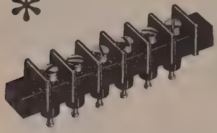
Curtis® terminal blocks

low, medium, high current types-hundreds of variations for electronic and electrical control applications.

GFT Series

*



fully insulated feed-thru terminal blocks

GB Series

*

feed-thru, printed circuit and surface connection terminal blocks

FT Series

modular feed-thru terminal blocks

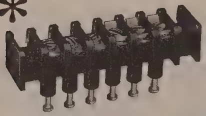
E Series

*

feed-thru, printed circuit and surface connection terminal blocks

SEI Series

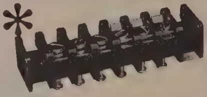
*



fully insulated miniature feed-thru terminal blocks

SE Series

*



miniature feed-thru printed-circuit and surface-connection terminal blocks

W Series

*

versatile labor saving, snap-in track-type terminal blocks

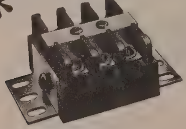
Types SW and SWI

*

high density, labor saving, snap in track-type terminal blocks

Types CDM, CDMQ and CT

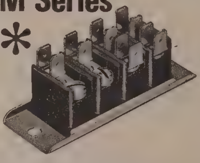
*



versatile medium power terminal blocks

M Series

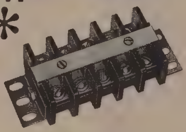
*



compact modular terminal blocks for low power circuits

Types H and BT

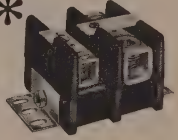
*



modular, high and medium power terminal blocks

Types T and U

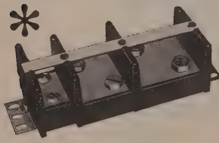
*



high current terminal blocks

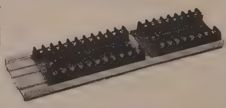
Types L ,O and S

*



high current terminal blocks

PS Series



printed-circuit board edge-connector assemblies

CFT Series

NEW!

unbreakable, compact, fully insulated feed-thru terminal blocks

CB Series

NEW!

compact, unbreakable feed-thru, printed circuit and surface connection terminal blocks

*Some units within these series are recognized under the Components Program of Underwriter's Laboratories, Inc.

CURTIS INDUSTRIES, INC.

8000 West Tower Avenue, Milwaukee, Wisconsin 53223 Phone (414) 354-1500

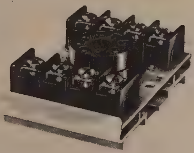
Curtis® relay socket assemblies

TYPES RS2, RS4 AND RS6

For popular cradle relays. Designed for applications with relatively low power requirements, Curtis type RS2, 4 and 6 relay sockets are rated for 5 amps at 125 volts. These compact relay sockets feature a maximum profile of only 29/32″. Relay sockets are mounted on high quality printed circuit board material. Barrier type terminal blocks have #2-56 terminal screws with surface clamps handling up to #16 wire, AWG. Track is type TR1, pre-punched vinyl.

SPECIFICATIONS

Model	Overall Dimension (OD)	Units per 48″ Track	Receptacle Type	For Use With
RS2	2″	24	10-pin	2 P.D.T. relays with 2 coil leads
RS4	2¼″	21	16-pin	4 P.D.T. relays with 2 coil leads
RS6	3″	16	22-pin	6 P.D.T. relays with 2 coil leads



TYPES RS8 AND RS11

Octal base and 11-pin relay socket assemblies in TR2, pre-punched, vinyl track save mounting time — tracks need just 2 or 3 mounting screws per 4-foot length. Recessed, slotted center chamber permits rocking relay without fracturing center post. Clearance hole in printed circuit board accommodates relay center posts. Barrier type blocks have #6-32 screws for #12 wire. Ratings are 10 amps, 250 volts.

SPECIFICATIONS

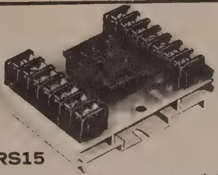
Model	Overall Dimension (OD)	Units per 48″ Track	Receptacle Type	For Use With
RS8	2″	24	Octal	Standard industrial 2 pole relays
RS11	2⅞″	16	11-pin	Standard industrial 3 pole relays

TYPES RS12 AND RS16

Accommodates modern, blade terminal relays. Mounted in TR3, pre-punched, vinyl track, these 8-pin and 11-pin socket assemblies can be snapped in or removed vertically without disturbing adjacent units. Capacity of RS12 and RS16 relay socket assemblies is 10 amps at 250 volts. Wave-soldered, coated circuit boards terminate in barrier type blocks with #6-32, nickel-plated screws to handle #12 AWG wire. Center distance of connectors is 7/16″.

SPECIFICATIONS

Model	Overall Dimension (OD)	Units per 48″ Track	Receptacle Type	For Use With
RS12	2⅞″	16	11-pin	3 P.D.T. relays with 2 coil leads
RS16	2¼″	22	8-pin	2 P.D.T. relays with 2 coil leads



TYPES RS14 AND RS15

Miniature relay sockets RS14 and RS15 incorporate miniature, SE series, barrier type terminal blocks. #2-56 screws and clamps for up to #16 wire (AWG) eliminate lugging and looping. Capacity is 5 amps, 125 volts. Terminal center-to-center distance is ¼″. Assemblies mount in pre-punched, vinyl track — RS15 in TR1, RS14 in TR2. As with all Curtis relay socket assemblies, the base is high quality printed circuit board material, wave-soldered and coated.

SPECIFICATIONS

Model	Overall Dimension (OD)	Units per 48″ Track	Receptacle Type	For Use With
RS14	2″	24	14-pin	Miniature 4 P.D.T. relays with 2 coil leads (no ground)
RS15	2¼″	21	15-pin	Miniature 4 P.D.T. relays with 2 coil leads and ground

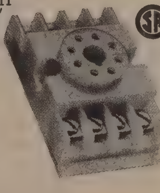
TRACK

Type TR1
Vinyl track 2 3/16″ wide with mounting holes 3/16″ x 5/8″ on 2″ centers. For relay socket types RS2, RS4, RS6 and RS15. 48″ lengths.

Type TR2
For relay socket types RS8, RS11 and RS14. 48″ lengths, vinyl with 3/16″ x 5/8″ holes on 2″ centers. 2⅞″ width.

Type TR3
Heavy vinyl track, 3⅜″ wide, with 3/16″ x 5/8″ holes on 2″ centers. Used with relay sockets RS12 and RS16.

NEW! CUS 8, 12 and 16
RELAY SOCKET ASSEMBLIES



- For octal-base or square-base, barrier type plug-in relays and timers
- Economical, yet virtually unbreakable (Molded of UL recognized white nylon)
- Compact, unitized design saves space
- 10 amp, 250/300 volt ratings
- Base mount or snap into TR2 or TR3 track
- Handles wire sizes up to No. 12AWG, without lugging

CURTIS INDUSTRIES, INC.
8000 West Tower Avenue, Milwaukee, Wisconsin 53223 Phone (414) 354-1500

DEPENDABLE DALE® CONNECTORS

SERIES EBT 156

PHYSICAL and ELECTRICAL
Number of Contacts: 6, 8, 10, 12, 15, 18 or 22
Contact Spacing: .156″
Board Thickness: .054″ to .070″
Board Slot Depth: .330″ **Current Rating:** 5 amps
Test Voltage between Contacts: At Sea Level: 1800 VRMS
At 70,000 feet: 450 VRMS
Insulation Resistance: 5000 meg. min.
Contact Resistance: 30 millivolts max. at rated current

COMPONENT MATERIAL
Body: Glass-filled phenolic per MIL-M-14, Type MFH, black
Contacts: Nickel silver per QQ-C-585, alloy 770, spring temper. Gold flash or tin plate optional.
Polarizing Key: Glass-filled nylon
Optional Threaded Mounting Insert: Nickel plated brass. (Type Y)
Optional Floating Mounting Bushing: Cadmium plated brass. (Type Z)

APPLICATION For use with 1/16″ printed circuit boards requiring an edgeboard type connector on .156″ centers.

SERIES SPC 155

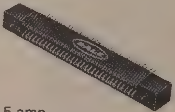
(Choice of even or staggered contacts)

PHYSICAL and ELECTRICAL
Number of Contacts: 33 per side
Contact Spacing: .100″
Card Thickness: .056″-.068″ (1/16″)
Card Slot Depth: .200″
Current Rating: 0.5 amp.
Test Voltage between Contacts: At Sea Level: 1200 VRMS
At 50,000 feet: 675 VRMS
Insulation Resistance: 5000 megohms min. at 100 VDC
Contact Resistance: 20 millivolts max. at rated current with gold plating

COMPONENT MATERIAL
Body: Glass-filled phenolic per MIL-M-14, Type MFH, black
Contacts: Beryllium copper, gold plate per MIL-G-45204; gold flash or tin plate per MIL-T-10727

APPLICATION For use with 1/16″ printed circuit boards. Contacts can be located opposite each other or staggered. Ideal for "mother board" applications.

SERIES EBTL 050

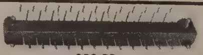


PHYSICAL and ELECTRICAL
Number of Contacts: 8, 16, 20, 25, 32, 50 or 64 per side
Contact Spacing: .050″
Board Thickness: Size 1 = .027″-.035″
Size 2 = .056″-.068″
Board Slot Depth: .200″ **Current Rating:** 0.5 amp
Test Voltage between Contacts: At Sea Level: 1200 VRMS
At 50,000 feet: 675 VRMS
Insulation Resistance: 5000 meg. min.
Contact Resistance: 10 millivolts max. at rated current

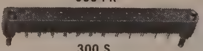
COMPONENT MATERIAL
Body: Glass-filled phenolic per MIL-M-14, Type MFH, black
Contact Backer Strips: Epoxy glass laminate per MIL-P-18177, Type GEE, black
Contacts: Beryllium copper per QQ-C-533, alloy 172. Gold plate per MIL-G-45204.
Polarizing Key: Polycarbonate

APPLICATION For use with 1/32″ and 1/16″ printed circuit boards in integrated thin film, and semiconductor circuitry with .050″ contact spacing.

SERIES 300



300 PR



300 S

PHYSICAL and ELECTRICAL
Number of Contacts: 7, 15, 19 and 25
Contact Spacing: 0.250″, staggered rows provide a .125″ grid.
Contact Gauge: #20 AWG
Minimum Creepage Path between Contacts: 5/32″
Minimum Air Space between Contacts: 7/64″ **Current Rating:** 7.5 amps
Breakdown Voltage: At Sea Level: 3600 VRMS
At 70,000 feet: 975 VRMS

COMPONENT MATERIAL
Contact Pin: Phosphor Bronze
Contact Socket: Phosphor Bronze
Contact Plating: Gold Plated
Guide Pins: Stainless steel, passivated
Standard Body: Glass-filled diallyl phthalate per MIL-P-19833, Type GDI-30F, green. Other body material supplied upon request.

APPLICATION Where permanent mounting of male connector to a printed circuit board is required with mating female connector available.

SERIES 303

303S-45

303PR-45

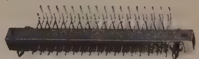
PHYSICAL and ELECTRICAL
Number of Contacts: 45
Contact Gauge: #22 AWG
Minimum Creepage between Contacts: 1/16″
Minimum Air Space between Contacts: 1/64″
Contacts, Center to Center: .050″
Voltage Breakdown, Contact to Contact and Contact to Ground: At Sea Level: 1200 VRMS • At 70,000 feet: 325 VRMS
Current Rating: 3 amps

COMPONENT MATERIAL
Contact: Phosphor Bronze, Gold Plated
Contact Plating: Gold Plated
Studs, Pilot Pins, Washers, Nuts: Corrosion-resistant steel, passivated
Standard Body: Glass-filled diallyl phthalate per MIL-M-19833, Type GDI-30F, green

APPLICATION For use in equipment requiring printed circuit connectors of the dip solder type with mating female connector.

SERIES 315

315 PR-50



315 S-50

PHYSICAL and ELECTRICAL
Number of Contacts: 50
Contact Termination: Male contacts available in right angle dip solder, or solder cup termination
Contact Spacing: 0.200″, staggered rows provide a 0.100″ grid
Contact Gauge: #20 AWG
Minimum Creepage Path between Contacts: 7/64″
Minimum Air Space between Contacts: 1/16″
Current Rating: 7.5 amps
Breakdown Voltage, Contact to Contact: At Sea Level: 2500 VRMS
At 70,000 feet: 600 VRMS

COMPONENT MATERIAL
Contact Pin: Phosphor Bronze, Gold Plated
Contact (closed entry) Socket: Phosphor Bronze, Gold Plated
Guides and Hardware: Stainless steel, passivated
Body: Glass-filled diallyl phthalate per MIL-P-19833, Type GDI-30F, green

APPLICATION Designed for dip solder printed circuit applications requiring 50 contacts. Also available with solder cup termination for rack and panel applications.

SERIES 330

330 PR-12-3

330 S-12

PHYSICAL and ELECTRICAL
Number of Contacts: 12
Contact Spring: .150″
Contact Size: .040″ dia.
Minimum Creepage Path between Contacts: 7/64″
Minimum Air Space between Contacts: 7/64″
Current Rating: 7.5 amps
Breakdown Voltage: At Sea Level: 2500 VRMS
At 70,000 feet: 600 VRMS

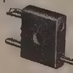
COMPONENT MATERIAL
Contact Pin: Phosphor Bronze, Gold Plated
Contact Socket: Phosphor Bronze, Gold Plated
Eyelets: Brass, Cadmium Plated
Body: Phenolic, CFG (black)

APPLICATION Where permanent mounting of male connector to a printed circuit board is required with mating female connector available. Polarization available.

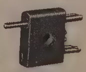
SERIES G20 & G16

PHYSICAL and ELECTRICAL
Minimum Creepage Path between Contacts: G20 = 1/4″; G16 = 13/64″
Minimum Air Space between Contacts: G20 = 3/16″; G16 = 5/32″
Breakdown Voltage:
At Sea Level – 6100 VRMS (G20); 4900 VRMS (G16)
At 70,000 feet – 1100 VRMS (G20); 950 VRMS (G16)
Current Rating: G20 = 7.5 amps; G16 = 13 amps

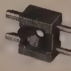
COMPONENT MATERIAL
Standard Body: Glass-filled diallyl phthalate per MIL-M-19833, Type GDI-30 green
Pin Contacts: Brass
Socket Contacts: Phosphor Bronze
Contact Plating: Gold over Nickel



GP20-2DG



GS20-2DG



GP16-2DG

GS16-2DG

APPLICATIONS Broad...thru hole permits use of building block technique or flat mounting. Locking device on G16 permits secure mounting. Optional G16 hood provides "short out" protection.

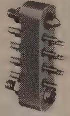
DEPENDABLE DALE® CONNECTORS

SERIES SM20

PHYSICAL and ELECTRICAL

Number of Contacts: 5, 7, 11, 14, 20, 26, 34, 42, 50, 75
Contact Spacing: 0.125″
Contact Gauge: #20 AWG
Minimum Creepage Path between Contacts: 5/64″
Minimum Air Space between Contacts: 3/64″
Current Rating: 7.5 amps
Breakdown Voltage: At Sea Level: 2000 VRMS
At 70,000 feet: 500 VRMS

SMS20


SMP20

COMPONENT MATERIAL

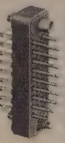
Contact Pin: Brass
Contact Socket: Phosphor Bronze. Beryllium copper also available.
Contact Plating: Gold Plated
Guides: Stainless steel, passivated
Screwlocks: Stainless steel, passivated
Standard Body: Glass-filled diallyl phthalate per MIL-P-19833, Type GDI-30F, green. Other body material supplied upon request.

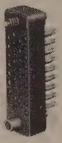
APPLICATIONS For use wherever space is at a premium and a high quality connector is required in avionics, automation, communications, controls, instrumentation, missiles, computers and guidance systems.

SERIES MM22 and MM24

PHYSICAL and ELECTRICAL

Number of Contacts: 5, 7, 9, 11, 14, 20, 26, 29, 34 and 44
Contact Spacing: 3/32″
Contact Gauge: MM22 Series = 22 gauge. • MM24 = 24 gauge
Minimum Creepage Path between contacts: 5/64″
Minimum Air Space between contacts: 3/64″
Current Rating: MM22 Series = 5 amps
MM24 Series = 3 amps
Breakdown Voltage: At Sea Level: 2000 VRMS
At 70,000 feet: 500 VRMS


MMP22-34SL


MMS22-34SL

MMP22-5

MMS22-5

COMPONENT MATERIAL

Contact Pin: Phosphor Bronze
Contact Socket: Phosphor Bronze
Contact Plating: Gold Plated
Screwlocks: Stainless steel, passivated
Guides: Brass, gold plated
Standard Body: Glass-filled diallyl phthalate per MIL-P-19833, Type GDI-30F, green. Other body material supplied upon request.

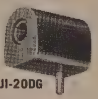
APPLICATIONS Especially suited for use in airborne, instrumentation and portable equipment applications or wherever the following requirements must be met: Minimum space and weight without sacrifice of performance, high quality materials, long service life, high vibration and shock resistance, and positive locking.

SERIES PJ

PHYSICAL and ELECTRICAL

Current Rating: 7.5 amps
Socket Contact Engages: 0.080″ dia. probe

PJEI-20DG


PJI-20DG

COMPONENT MATERIAL

Standard Body: Glass-filled diallyl phthalate per MIL-M-19833, Type GDI-30F, green.
Pin Contacts: Brass
Socket Contacts: Phosphor Bronze
Contact Plating: Gold Plated

APPLICATION Printed circuit checkout and testing.

MODEL 500 SR5

PHYSICAL and ELECTRICAL

Number of Contacts: 5
Contact Spacing: 0.150″
Contact: Accepts .080″ dia. probe
Current Rating: 5 amps
Breakdown Voltage: At Sea Level: 3000 VRMS
At 70,000 feet: 676 VRMS

COMPONENT MATERIAL

Contact Socket: Phosphor Bronze
Contact Plating: Gold Plated
Standard Body: Glass-filled diallyl phthalate per MIL-P-19833, Type GDI-30F, green. Other materials available upon request.

APPLICATION Permanent or semi-permanent test points for checkout and testing of printed circuits.

For complete information, write or phone:

DALE ELECTRONICS, INC.
P. O. Box 180 • YANKTON, SOUTH DAKOTA 57078
PHONE: 605-665-9301

SERIES QX32

PHYSICAL and ELECTRICAL

Minimum Creepage between Contacts: 9/64″
Minimum Air Space between Contacts: 7/64″
All male contacts are .093″ in diameter. Current ratings vary only because some solder cups are made for #12 AWG and others for #16 AWG.

QX32S-1

QX32P

QX32S

Voltage Breakdown Contact to Contact (#12 AWG solder cup): At Sea Level: 3300 VRMS
At 70,000 feet: 712 VRMS
Current Rating: 23 amps #12 AWG • 13 amps #16 AWG
Voltage Breakdown Contact to Contact (#16 AWG solder cup): At Sea Level: 3600 VRMS • At 70,000 feet: 750 VRMS

COMPONENT MATERIAL

Closed Entry Socket Contacts: Phosphor Bronze*, Gold Plated
Inserts and Hardware: Stainless steel, passivated*
"O" Ring: Synthetic rubber **Boot:** Neoprene
Body Material: Glass-filled diallyl phthalate per MIL-M-19833, Type GDI-30F, green. Consult factory for other materials.

For use with QX32S, a shorting plug to ground static electricity is available. Contact factory for details.

*Contact factory. Beryllium copper can be specified to ordinance drawing 10182288.

APPLICATION Used in the firing system of missiles.

SERIES 400 and 401

PHYSICAL and ELECTRICAL

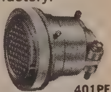
Voltage Breakdown, contact to contact:
At Sea Level: 2000 VRMS
At 70,000 feet: 500 VRMS
Minimum Creepage Path between Contacts: 5/64″
Minimum Air Space between Contacts: 3/32″
Contacts, center to center: .150″

400PF

400RM

COMPONENT MATERIAL

Molded Body: Glass-filled diallyl phthalate per MIL-M-19833, Type GDI-30F, green. For other materials, contact factory.
Hood: Aluminum, anodized (on 401PF)
Shells, Mounting Nut and Coupling Nut: Aluminum, clear anodized.
Contact Pins: Brass, Gold Plated
Contact Socket: Phosphor Bronze, Gold Plated
Lock Ring: Brass, cadmium plated
Retaining Ring: Stainless steel **Protective Cap:** Polyvinyl


401PF
Mates with
Series 400RM

APPLICATION Series 400: For use in equipment requiring a 41, 51 cr 55 pin sealed connector, with a mating non-sealed female connector. **Series 401:** For identical applications where hood is required. Mates with Series 400RM connectors.

SERIES S20

COMPONENT MATERIAL

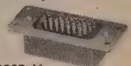
Molded Body: Orlon-filled diallyl phthalate per MIL-M-14F, Type SDI-5 (blue), furnished as standard.
Contact Pin: Brass, Gold Plated
Contact Socket: 4 tine beryllium copper, gold plated
Coaxial Insulator: Teflon
Coaxial Socket Body: Brass, silver plating standard. Gold also available.
Coaxial Socket Contact: Beryllium copper, gold plated
Shell and Retaining Plate: Aluminum, cadmium plated and gold iridited

Coaxial Contacts are for use with Adapter No. 2710-10 by Cannon or No. 5988 by Greymar and fit RG 188/U cable.

S20P-41 and S20S-41

PHYSICAL and ELECTRICAL

Minimum Creepage Path between Contacts: 1/8″
Minimum Air Space between Contacts: 1/16″
Contacts, center to center: 3/32″
Ambient Temperature Range: −67° F to +250° F
Approximate Weight: S20S-41 = 1.5 oz.
S20P-41 = 1.0 oz.


S20P-41

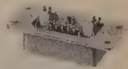
S20S-41

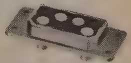
Voltage Breakdown, contact to contact: At Sea Level: 2500 VRMS
At 70,000 feet: 600 VRMS
Current Rating: 10 amps

S20P-13-4R and S20S-13-4R

PHYSICAL CHARACTERISTICS

Minimum Creepage Path between Contacts: 7/64″
Minimum Air Space between Contacts: 1/16″
Contacts, center to center: .150″
Ambient Temperature Range: −67° F to +250° F
Approximate Weight: S20P-13-4R = 1.8 oz.
S20S-13-4R = 1.3 oz.


S20P-13-4R

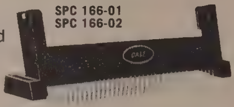

S20S-13-4R

DEPENDABLE DALE® CONNECTORS

SPECIAL DISPLAY STYLES

SERIES SPC 166

Liquid Crystal Digital Display (LCD) Connectors



- Compatible with 8 Digit LCD displays manufactured by Rockwell International Microelectronics, Inc., American Microsystems, Inc., and Hamlin Inc.

SPC 166-03
DALE

- Integral card guides for support of LCD
- Guide spring to provide LCD registration at right edge of connectors
- Custom height and angle variations can be provided at moderate tooling cost
- Low unit cost. Specifically developed for high volume calculator applications
- Staggered grid termination (.100 x .100) for ease of wave soldering.

PHYSICAL CHARACTERISTICS

Number of Contacts: 80 maximum

Contact Spacing: .050″

Slot Depth: .230″

Display Thickness: Connector accommodates LCD with an overall thickness of .125″ ± .015″ and a thickness of .057″ to .065″ in the insertion area.

ELECTRICAL CHARACTERISTICS

Current Rating: .5 amp.

Test Voltage between Contacts:
Sea Level – 1,200 VRMS
50,000 feet – 675 VRMS

Insulation Resistance: 5,000 Megohms at 100 VDC

COMPONENT MATERIAL

Body: Glass-filled phenolic per MIL-M-14, Type MFH, black

Contacts: Beryllium copper

Contact Plating: Electro-deposited tin, 200 micro-inches minimum.

SERIES SPC-173

Gas Discharge Display Connectors
Accepts NDP 1252-8 Display

- Compatible with 8 Digit gas discharge displays manufactured by National Electronics, Inc., Geneva, Illinois
- Models available with flange or without mounting flange
- Low unit cost. Specifically developed for high volume calculator applications.

PHYSICAL CHARACTERISTICS

Number of Contacts: 21

Contact Spacing: .156″

Slot Depth: .300″

Display Thickness: Connector accommodates display .050″ to .068″

ELECTRICAL CHARACTERISTICS

Current Rating: .5 amp.

Test Voltage between Contacts:
Sea Level – 1,200 VRMS
50,000 feet – 675 VRMS

Insulation Resistance: 5,000 Megohms at 100 VDC

COMPONENT MATERIAL

Body: Glass-filled nylon, black

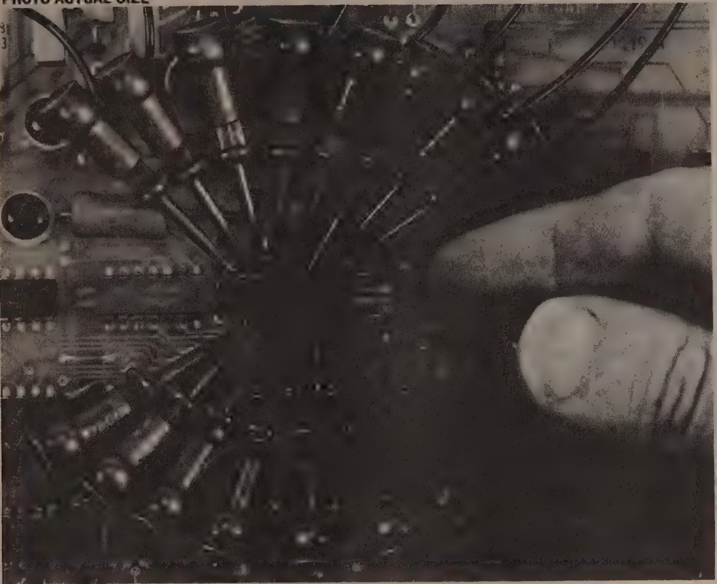
Contacts: Beryllium copper

Contact Plating: Electro-deposited tin, 200 micro-inches minimum.

For complete information, write or phone:
DALE ELECTRONICS, INC.
P.O. Box 180 • Yankton, South Dakota 57078 • Phone: 605-665-9301

E-Z-HOOK® ...THE PROBLEM SOLVERS

PHOTO ACTUAL SIZE

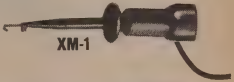


THE NEW MICRO XM-1 TROUBLE SHOOTER ADDS A LITTLE LENGTH TO OUR LINE

(1.75" — 4.45 cm) long and VERY little weight (less than 1 gram). Ideal for difficult IC testing. Connect DIRECT to IC... Reduce resistance build-up. Same high quality construction as our models X-100W. (2.25" — 5.7 cm) and XL-1, (5" — 12.7 cm): Durable heat and chemical resistant nylon body, Gold-plated Beryllium copper contact, Stainless steel spring. Single contact point makes fast, safe, short-free connections... assures accurate readings.

AVAILABLE IN 10 RETMA COLORS:
Red, Black, Blue, Green, Orange, Yellow, White, Violet, Brown or Gray.

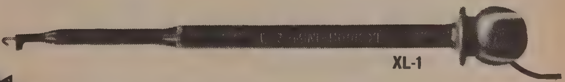
INDIVIDUAL TEST CONNECTORS



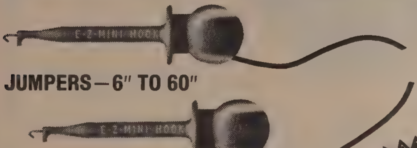
XM-1

E-Z-MINI-HOOK

X-100W



XL-1



JUMPERS—6" TO 60"

E-Z-HOOK
COMPONENTS
FEATURE
COMPLETE
FIELD
SERVICING

SCOPE CABLE PROBES

E-Z-HOOK
E-Z-MINI-HOOK

NEW
PISTOL-GRIP PROBE
with terminal board for easy addition of circuitry. Available pre-cabled to all popular interface connectors. No. XP uses X-100W body. No. XLP uses XL-1 body.

No. 5400 SERIES
Pen style probe with inside terminal board. Pre-cabled to all popular interface connectors.

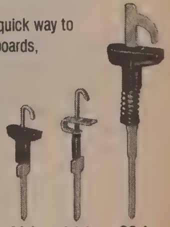
TEST LEADS to popular interface connectors.
No. 200 SERIES with thermoplastic lead
No. 300 SERIES with teflon lead

E-Z-MINI-HOOK

NAILCLIPS The quick way to Breadboards, Harnessboards, Pretest Boards, Burn-in Boards.

Perf-eze adaptors available for 81-1 & 84-1 styles.

86-1, heavy-duty drives like a nail.



THE FULL-LINE SOURCE FOR ALL YOUR TEST CONNECTION PROBLEMS

FOR COMPLETE INFORMATION, WRITE OR CALL FOR CATALOG AND PRICE LIST

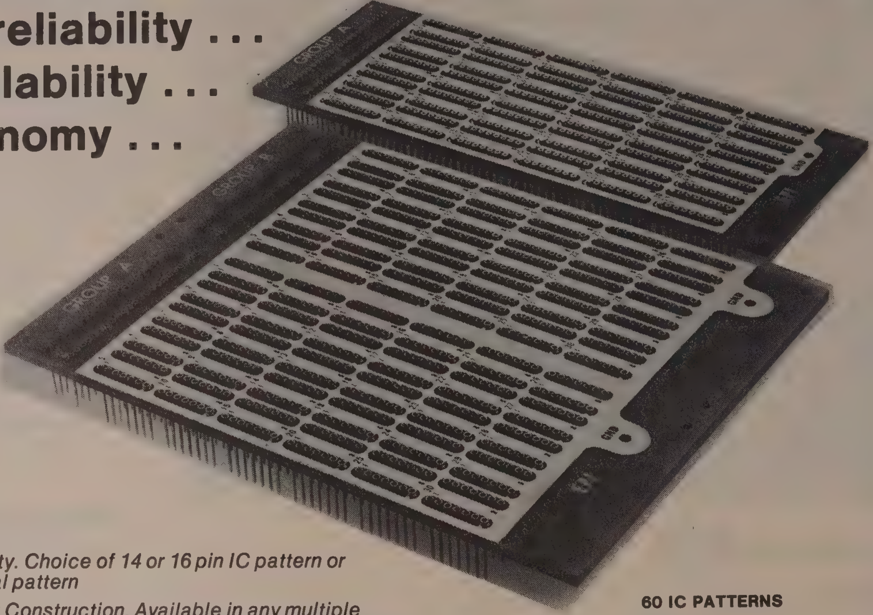
E-Z-HOOK®

P. O. BOX 450, ARCADIA, CALIFORNIA 91006
PHONE: (213) 446-6175 TWX 910 582 1614

IC PACKAGE PANELS

epi

for reliability . . . availability . . . economy . . .



60 IC PATTERNS

- *Flexibility. Choice of 14 or 16 pin IC pattern or universal pattern*
- *Modular Construction. Available in any multiple of 30 IC patterns, up to 240 patterns, or from 9 to 54 rows of the universal pattern*
- *Ground and power distributed to each IC pattern*
- *Gold plated beryllium copper contacts for reliable retention of IC leads*

Electro Packaging, Inc. manufactures a complete line of standard and custom IC panels for a wide variety of applications in the OEM industry. As a subsidiary of Electro Circuits, Inc., a long established PC board manufacturer, EPI has extensive capability for custom service, large inventories of standard augat compatible panels, excellent quality, competitive pricing and excellent delivery. Pricing and other information may be obtained by contacting your nearest EPI representative or call direct to our factory.

DETAILED SPECIFICATIONS AND ORDERING INFORMATION OF FOLLOWING PAGES

ELECTRO PACKAGING, INC

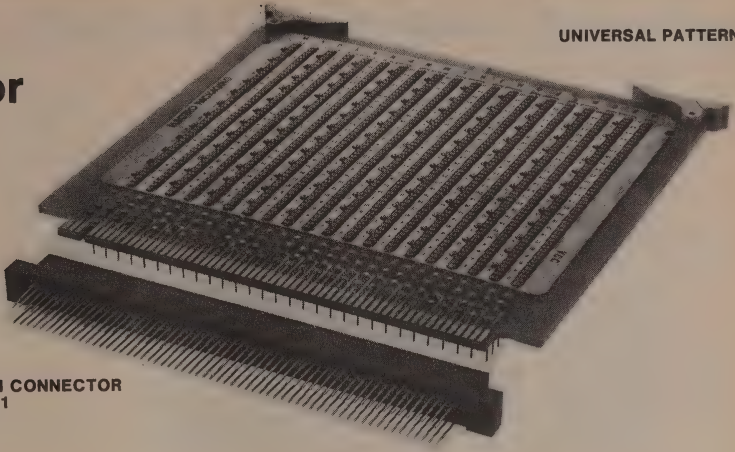
176 Walker Street, Lowell, Massachusetts 01854
Phone Area Code (617) 459-3731

epi

IC PACKAGE PANELS

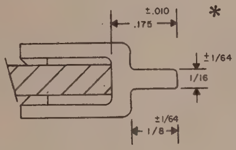
edge connector type

UNIVERSAL PATTERN



60 POSITION CONNECTOR
9014-S-120-1

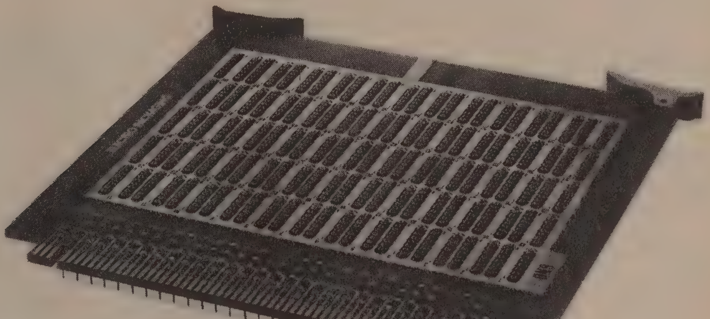
- *Flexibility. Standard 60 IC pattern (14 or 16 pin) or 20 ROW universal pattern (accepts any combination of 14 thru 40 pin IC's)*
- *Ground and power distributed to each IC pattern*
- *Gold plated beryllium copper contacts for reliable retention of IC leads*
- *Edge connector take off (accepts 9014-S-120-1 edge connector, 60 dual position, 120 terminations)*



CARD GUIDE ADAPTER

Supplied on all 1/8 inch panels. For use with Standard Card Guides. Plastic extrusion may be removed if not required.

Part No. 9014-PGI



60 IC PATTERNS

ELECTRO PACKAGING, INC

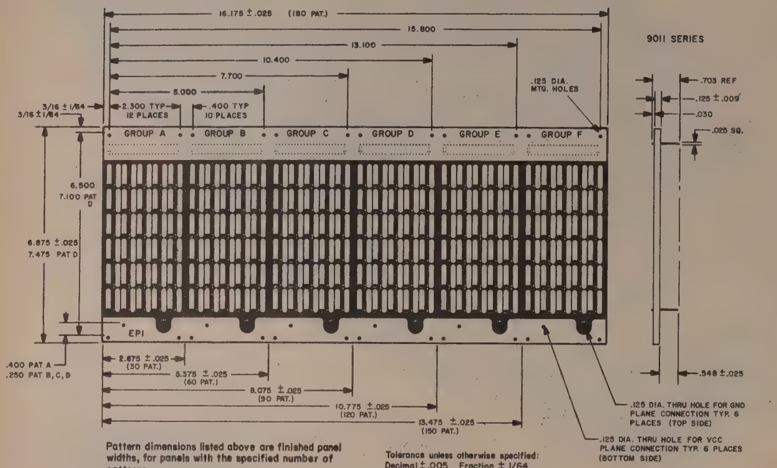
176 Walker Street, Lowell, Massachusetts 01854
Phone Area Code (617) 459-3731

IC PACKAGE PANELS

epi

series 9011/9012

9011—with socket terminal input/output
9012—with feed thru terminal input/output

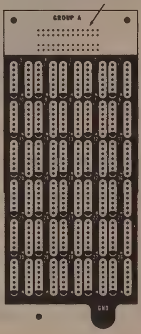

16.175 ± .025 (180 PAT.)
15.800
13.100
10.400
7.700
5.000
3/16 ± 1/64
3/16 ± 1/64
2.300 TYP 12 PLACES
.400 TYP 10 PLACES
.125 DIA. MTG. HOLES
GROUP A
GROUP B
GROUP C
GROUP D
GROUP E
GROUP F
6.500
7.100 PAT D
6.875 ± .025
7.475 PAT D
EPI
.400 PAT A
.250 PAT B, C, D
2.675 ± .025 (30 PAT.)
5.375 ± .025 (60 PAT.)
8.075 ± .025 (90 PAT.)
10.775 ± .025 (120 PAT.)
13.475 ± .025 (150 PAT.)
9011 SERIES
.703 REF
.125 ± .009
.030
.025 SQ.
.548 ± .025
.125 DIA. THRU HOLE FOR GND PLANE CONNECTION TYP. 6 PLACES (TOP SIDE)
.125 DIA. THRU HOLE FOR VCC PLANE CONNECTION TYP. 6 PLACES (BOTTOM SIDE)

Pattern dimensions listed above are finished panel widths, for panels with the specified number of patterns.

Tolerance unless otherwise specified:
Decimal ± .005 Fraction ± 1/64

9012 SERIES (INPUT/OUTPUT DETAIL)

2 sets of 26 Feed Thru Terminals for I/O Connector



series 9014

with Edge Connector take off

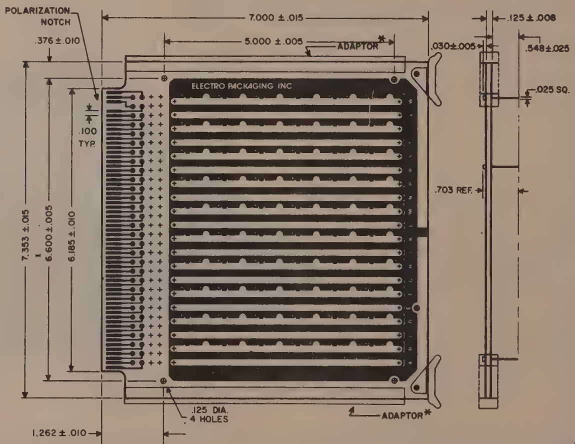
MATERIALS:

P/C Board 1/8 or 1/16 thick glass epoxy. 2 oz. copper circuitry, both sides solder plated.

Socket Terminal Assembly:

Socket Terminal: Brass, gold over nickel plated. Note: Tine plating also available. To order, add suffix "T" to part no.

Female Contact Insert: Beryllium copper, gold (MIL-G-45204) over nickel (QQ-N-290) plated. Accepts .016 to .023 leads.


POLARIZATION NOTCH
.376 ± .010
7.000 ± .015
5.000 ± .005
ADAPTOR*
.125 ± .008
.030 ± .005
.548 ± .025
.025 SQ.
ELECTRO PACKAGING INC
.100 TYP.
7.353 ± .015
6.600 ± .005
6.185 ± .010
.703 REF.
.125 DIA. 4 HOLES
ADAPTOR*
1.262 ± .010

ELECTRO PACKAGING, INC

176 Walker Street, Lowell, Massachusetts 01854
Phone Area Code (617) 459-3731

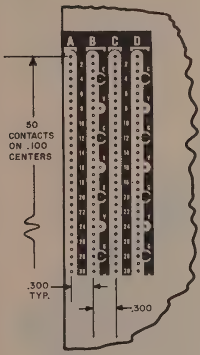
IC PACKAGE PANELS

ORDERING INFORMATION

SERIES 9014—PART NUMBER DATA

PATTERN	BOARD TH.	2 WRAP LEVELS	3 WRAP LEVELS
A*	1/8"	9014-A-12	9014-A-13
	1/16"	9014-A-22	9014-A-23
B	1/8"	9014-B-12	9014-B-13
	1/16"	9014-B-22	9014-B-23
C	1/8"	9014-C-12	9014-C-13
	1/16"	9014-C-22	9014-C-23
D	1/8"	9014-D-12	9014-D-13
	1/16"	9014-D-22	9014-D-23
UNIVERSAL	1/8"	9014-U-12	9014-U-13
	1/16"	9014-U-22	9014-U-23
MATING EDGE CONNECTOR	1/8"	9014-S-120-1	
(Supplied Separately)	1/16"	9014-S-120-2	

*Note: Pattern A also available with 1 row of pattern C.
Specify M in place of A in part no.


A
B
C
D
50 CONTACTS ON .100 CENTERS
.300 TYP.
.300

UNIVERSAL PATTERN

Additional wire wrap terminals are connected to ground and power planes outside of contact rows.

SERIES 9011/9012—PART NUMBER DATA

PART NUMBER	PINS PER PATTERN	POWER AND GND. PINS	I.O. TERMINATION
9011-A	14	7 + 14	Female Contact
9012-A			W/W Feed Thru
9011-B		V + G Dummies	Female Contact
9012-B			W/W Feed Thru
9011-C	16	8 + 16	Female Contact
9012-C			W/W Feed Thru
9011-D		V + G Dummies	Female Contact
9012-D			W/W Feed Thru
9011-U	Universal Pattern		Female Contact
9012-U	50 Pins Per Row, Separate V&G Pins		W/W Feed Thru

Note: For TIN PLATED Socket Terminals (with gold plated contacts) on Series 9011, 9012, 9014, add suffix "T" to part number.

Boards may be purchased in any multiple of 30 IC patterns (up to 240) or any multiple of 9 rows of the Universal pattern (up to 54) indicated by suffix number.

EXAMPLE: **9011-B-120**

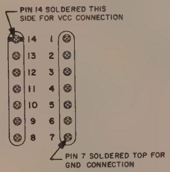
- Series
- Pattern Type
- Patterns on Panel

PARTIAL INTERCHANGEABILITY LIST—AUGAT/EPI

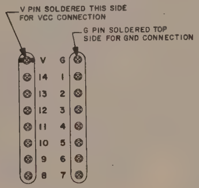
AUGAT	EPI	AUGAT	EPI
8136-PG1-30	**9011-A-30**	8136-RG1	**9014-A-13**
8136-PG3-30	**9011-B-30**	8136-RG2	**9014-B-13**
8136-PG5-30	**9011-C-30**	8136-RG3	**9014-C-13**
8136-PG13-30	**9011-D-30**	8136-RG4	**9014-D-13**
8136-PG18-30	**9012-A-30**	8136-URG1	**9014-4-13**
8136-PG19-30	**9012-B-30**	8136-MRG1	**9014-M-13**
8136-PG20-30	**9012-C-30**	8136-140P4	**9014-PG1**
8136-PG21-30	**9012-D-30**	14005-IPI	**9014-S-120-1**
8136-UG1-9	**9011-U-9**	1400S-19PI	**9014-S-120-2**
8136-UG6-9	**9012-U-9**	8160-EG10	**9016BP-1**
		8170-RG1	**9017BP-1**
		8170-RG2	**9017BP-2**

For pricing, delivery and any other information, contact your nearest EPI representative or factory.

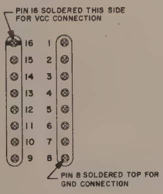
VCC (BOTTOM) SIDE SHOWN


PIN 14 SOLDERED THIS SIDE FOR VCC CONNECTION
14 1
13 2
12 3
11 4
10 5
9 6
8 7
PIN 7 SOLDERED TOP FOR GND CONNECTION

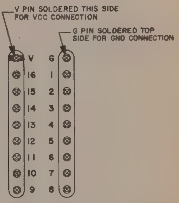
PATTERN A


V PIN SOLDERED THIS SIDE FOR VCC CONNECTION
G PIN SOLDERED TOP SIDE FOR GND CONNECTION
V G
14 1
13 2
12 3
11 4
10 5
9 6
8 7

PATTERN B


PIN 16 SOLDERED THIS SIDE FOR VCC CONNECTION
16 1
15 2
14 3
13 4
12 5
11 6
10 7
9 8
PIN 8 SOLDERED TOP FOR GND CONNECTION

PATTERN C


V PIN SOLDERED THIS SIDE FOR VCC CONNECTION
G PIN SOLDERED TOP SIDE FOR GND CONNECTION
V G
16 1
15 2
14 3
13 4
12 5
11 6
10 7
9 8

PATTERN D

ELECTRO PACKAGING, INC

176 Walker Street, Lowell, Massachusetts 01854
Phone Area Code (617) 459-3731

EMC
Interconnection Specialists

CUSTOMIZED WIRE-WRAP® PANELS for any application...

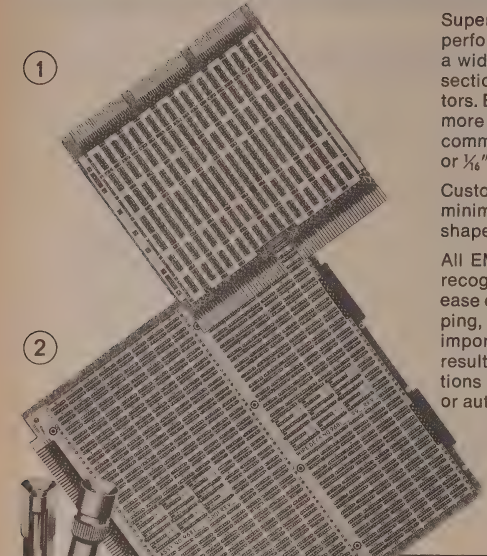
Superior design and superb construction result in EMC's unsurpassed performance in pin-in-board packaging panels. The EMC line includes a wide selection of hi-density Wire-Wrap® panels, with input/output sections for male/female cable assemblies or plug-in edge connectors. EMC panels are available in 2 or 3 levels of wrap, with 12 to 180 or more positions. Five patterns are standard (14 or 16 pin, with V and G committed or uncommitted, plus universal). Board thicknesses of ⅛" or 1/16", as well as a variety of terminal plating styles, are available.

Custom panels are designed to reduce wrapping costs to an absolute minimum, to conform to special I/O requirements, and in layouts and shapes to complement existing systems.

All EMC panels utilize patented* Nurl-Loc® Funnel-Entry terminals, recognized throughout the industry for superior holding power and ease of assembly. The Nurl-Loc design prevents twisting during wrapping, and greatly simplifies terminal replacement, if needed. Most important, Nurl-Loc spreads stress evenly throughout the board, resulting in flatter non-warping panels with more accurate true positions of terminals. The Funnel-Entry feature vastly simplifies manual or automatic I.C. lead insertion.

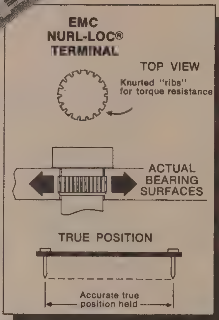
*U.S. Pat. No. D-223,109 Nurl-Loc® Electronic Molding Corp.
Wire-Wrap® Gardner-Denver Co.

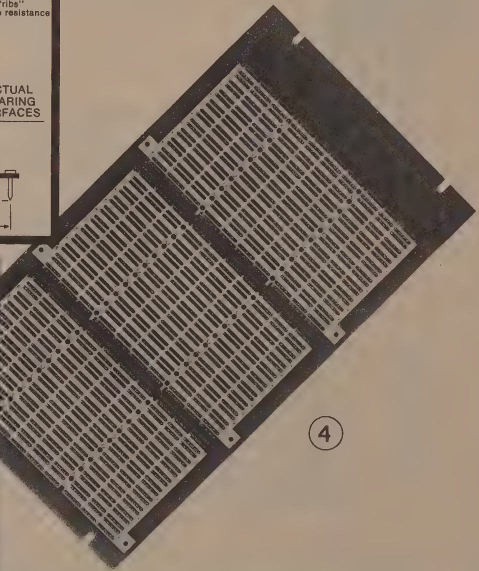
1. 1/16" P.C.B., 9.9" X 10.2", 2,703 TERMINALS, 140 POSITIONS
2. 1/16" P.C.B., 14" X 14.6", 5,648 TERMINALS, 352 POSITIONS
3. 1/8" P.C.B., 13.9" X 16.4", 6,748 TERMINALS, 376 POSITIONS
4. 1/8" P.C.B., 10.48" X 19", 4,800 TERMINALS, 320 POSITIONS

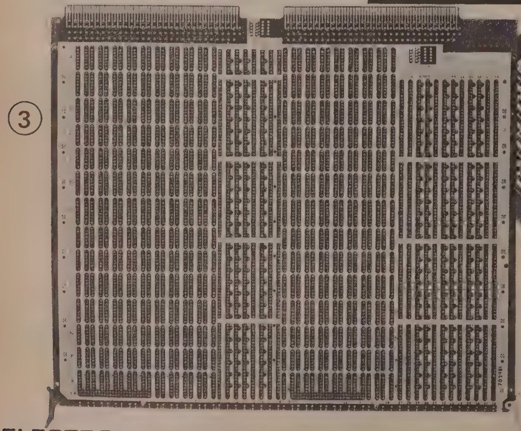


PATENTED *Nurl-Loc*®
MAKES THE DIFFERENCE

HERE'S WHY IT'S
TECHNICALLY SUPERIOR







If you are packaging IC's in any volume, contact EMC for a fast engineering appraisal.

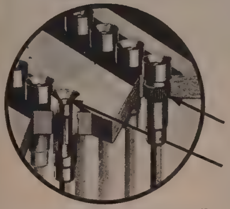
ELECTRONIC MOLDING CORPORATION 96 MILL STREET/WOONSOCKET, R. I. 02895 (401) 769-3800

EMC

Interconnection Specialists

HIGH DENSITY NURL-LOC® I.C. PANEL

IN 2 & 3 LEVELS OF WIRE-WRAP®



EMC Panels utilize non-warping, glass-epoxy board, in 1/16" or 1/8" thicknesses, 30 to 360 IC positions, with I/O sections of edgeboard tabs or connector clusters, power and ground planes, in many combinations.

NURL-LOC® Terminals (patented) prevent twisting during wrapping.

Funnel-Entry simplifies manual or automatic insertion of I.C. leads.

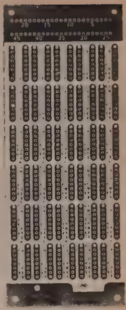
Consult factory for Customized Panels for any application.

MATERIALS

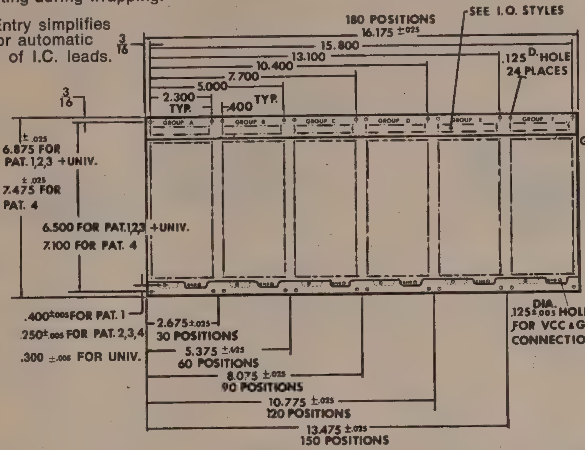
P/C BOARD — Glass Epoxy, NEMA Grade G-10 2 oz. Copper Finished Both Sides. Tin Plated

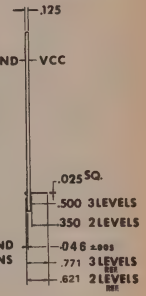
CONTACT — Beryllium Copper Gold Plated .000030 Over Nickel

TERMINAL — Brass Gold Plated .000030 or .000010 Over Nickel, or Brass Tin Plated



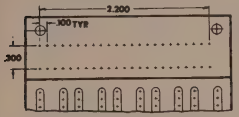
TYP. GROUP


180 POSITIONS
16.175 ±.025
SEE I.O. STYLES
3/16
15.800
13.100
10.400
7.700
5.000
2.300 TYP.
.400 TYP.
.125 D. HOLE 24 PLACES
3/16
GROUP A
GROUP B
GROUP C
GROUP D
GROUP E
GROUP F
6.875 ±.025 FOR PAT. 1,2,3 +UNIV.
7.475 ±.025 FOR PAT. 4
6.500 FOR PAT. 1,2,3 +UNIV.
7.100 FOR PAT. 4
.400±.005 FOR PAT. 1
.250±.005 FOR PAT. 2,3,4
.300 ±.005 FOR UNIV.
2.675±.025 30 POSITIONS
5.375 ±.025 60 POSITIONS
8.075 ±.025 90 POSITIONS
10.775 ±.025 120 POSITIONS
13.475 ±.025 150 POSITIONS
.125±.005 DIA. HOLE FOR VCC & GND CONNECTIONS


.125
GND
VCC
.025 SQ.
.500 3 LEVELS
.350 2 LEVELS
.046 ±.003
.771 3 LEVELS REF
.621 2 LEVELS REF

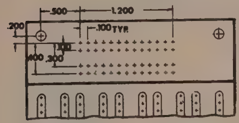
TYPE A I/O SHOWN

INPUT / OUTPUT PINS


2.200
.100 TYP.
.300

TYPE 'A' INPUT-OUTPUT CLUSTERS
46 PINS PER GROUP

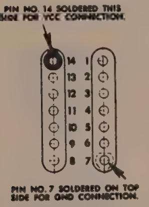
TYPE 'A' PIN


.500
1.200
.200
.100 TYP.
.100
.400
.300

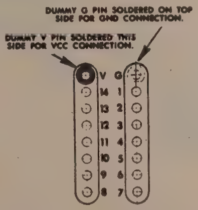
TYPE 'B' INPUT-OUTPUT CLUSTERS
52 PINS PER GROUP

TYPE 'B' PIN

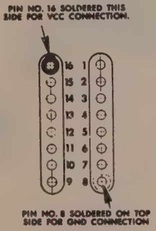
PATTERN STYLES: VCC (Bottom) Side Shown


PIN NO. 14 SOLDERED THIS SIDE FOR VCC CONNECTION.
14 1
13 2
12 3
11 4
10 5
9 6
8 7
PIN NO. 7 SOLDERED ON TOP SIDE FOR GND CONNECTION.

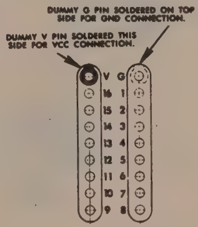
PATTERN #1


DUMMY G PIN SOLDERED ON TOP SIDE FOR GND CONNECTION.
DUMMY V PIN SOLDERED THIS SIDE FOR VCC CONNECTION.
V G
14 1
13 2
12 3
11 4
10 5
9 6
8 7

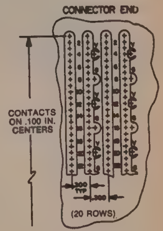
PATTERN #2


PIN NO. 16 SOLDERED THIS SIDE FOR VCC CONNECTION.
16 1
15 2
14 3
13 4
12 5
11 6
10 7
9 8
PIN NO. 8 SOLDERED ON TOP SIDE FOR GND CONNECTION

PATTERN #3


DUMMY G PIN SOLDERED ON TOP SIDE FOR GND CONNECTION.
DUMMY V PIN SOLDERED THIS SIDE FOR VCC CONNECTION.
V G
16 1
15 2
14 3
13 4
12 5
11 6
10 7
9 8

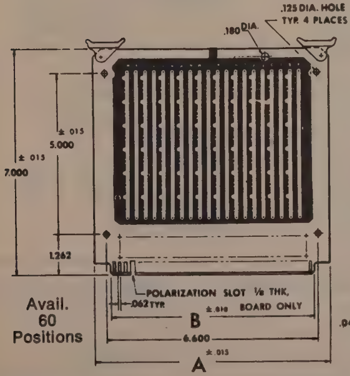
PATTERN #4


CONNECTOR END
CONTACTS ON .100 IN. CENTERS
.300 TYP
.300
(20 ROWS)

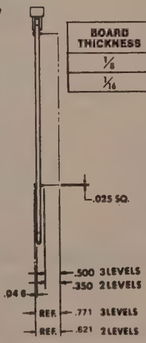
UNIVERSAL

PLUG-IN WIRE-WRAP I.C. PACKAGING PANELS

EDGE CONNECTOR SERIES with 120 contact fingers


.125 DIA. HOLE TYP. 4 PLACES
.180 DIA.
5.000 ±.015
7.000 ±.015
1.262
POLARIZATION SLOT 1/8 THK. BOARD ONLY
.062 TYP
B ±.010
6.600
A ±.015

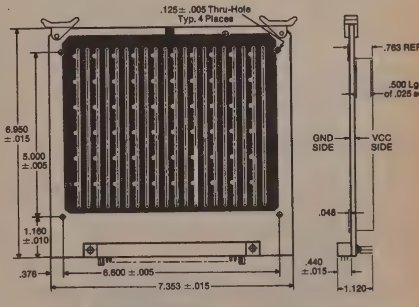
Avail.
60
Positions


.025 SQ.
.500 3 LEVELS
.350 2 LEVELS
.046
REF. .771 3 LEVELS
REF. .621 2 LEVELS

BOARD THICKNESS	A	B
1/8	7.353	6.180
1/16	7.718	6.080

Patterns (Universal shown) and specifications as above. Mating connectors are available.

MOLDED 120-PIN CONNECTOR SERIES


.125± .005 Thru-Hole Typ. 4 Places
6.950 ±.015
5.000 ±.005
1.160 ±.010
.378
6.600 ±.005
7.353 ±.015
.763 REF.
.500 Lg. of .025 sq.
GND SIDE
VCC SIDE
.048
.440 ±.015
1.120

Avail. 60 or 72 Positions

ELECTRONIC MOLDING CORP. 96 Mill St., Woonsocket, R. I. 02895

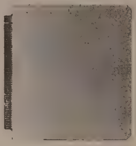
EMC PANEL ACCESSORIES

PANEL RACKS

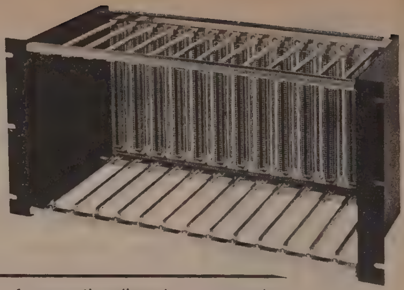
for 1/8" and 1/16" IC Panels

Accommodate up to 13 IC Panels. Available as complete assemblies or separate elements. Back Panels include Nurl-Loc® Wire-Wrap® Terminals. Choice of flat or flanged (shown) end plates.

RACK MATERIALS: Side plates aluminum, black anodized. Guides steel, nickel plated. Bars steel, cadmium plated, gold iridite.


BLANK CARD

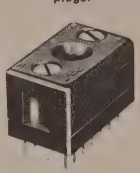
EXTENSION CARD



I.C. EXTRACTOR TOOL

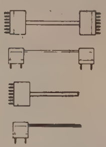
INTERFACING PLUGS

Top (shown) or side entry interconnect plugs.



CABLE ASSEMBLIES

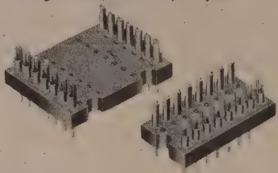
Using top or side entry plugs, 14 or 16 pins. Std. lengths 12", 18", 24" or 36". Custom assem. avail.

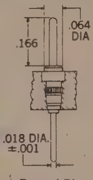


ADAPTOR PLUGS

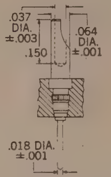
for mounting discrete components into all EMC panels.

Glass-filled phenolic insulation will not melt during soldering. Six body configurations, each in 3 pin styles.

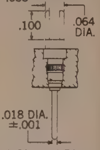



.064
DIA
.166
.018 DIA.
±.001

* Round Pin
No. 7341-P23


.037
DIA.
±.003
.150
.064
DIA.
±.001
.018 DIA.
±.001

* Solder Pocket
No. 7324-P23

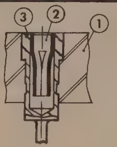

.033
.100
.064
DIA.
.018 DIA.
±.001

* Slotted Pin
No. 7342-P23

LO-PAC TRANSISTOR, IC DIP, AND OP AMP SOCKETS

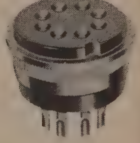
MATERIALS

1. **INSULATION** — Glass Filled Phenolic
2. **CONTACT** — Beryllium Copper .000030 Gold Over Nickel
3. **TERMINAL** — Brass .000030 Min. Gold Over Nickel, or Brass, Tin Plated



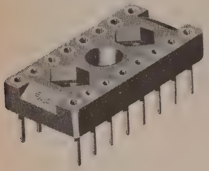
PRESS-IN TYPE NURL-LOC® MOUNTINGS

TO-5 Sockets Avail. with 3 to 12 pins



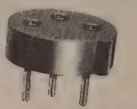
DIP SOCKETS

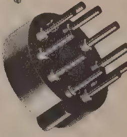
Avail. with 8 to 36 pins



TO-5 OP AMP SOCKETS

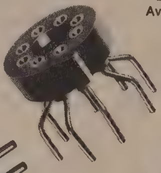
Avail. with 3 to 12 pins

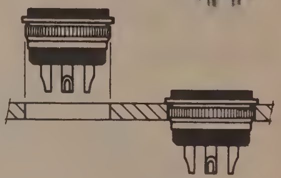


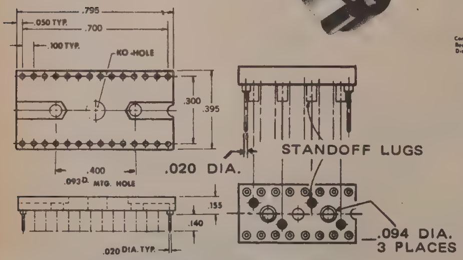


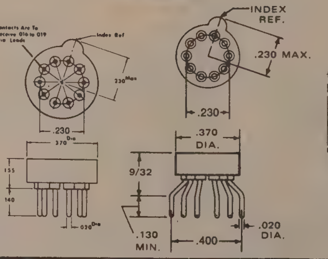
TO-5 TO-18 BENT LEAD SOCKETS

Avail. with 3 to 12 pins

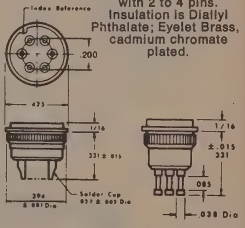





.795
.050 TYP.
.700
.100 TYP.
KO-HOLE
.300
.395
.400
.093D. MTG. HOLE
.020 DIA.
STANDOFF LUGS
.155
.140
.020 DIA. TYP.
.094 DIA.
3 PLACES


Contacts Are To Receive .016 to .019 Dia Leads
Index Ref
.230 Max
.230
.370 Dia
.155
.140
.020 Dia
INDEX REF.
.230 MAX.
.230
.370
DIA.
9/32
.130
MIN.
.400
.020
DIA.

TO-18 Sockets avail. with 2 to 4 pins. Insulation is Diallyl Phthalate; Eyelet Brass, cadmium chromate plated.

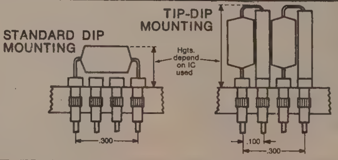

Index Reference
.200
.425
1/16
.331 ± .015
.394
± .001 Dia
Solder Cup
.027 ± .002 Dia
1/16
±.015
.331
.085
.038 Dia

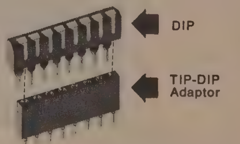
NEW *TIP-DIP*™ IC PANELS

Pat Pending

for Ultra-High Density Wire-Wrap® Packaging

Add new IC's without redesigning or tooling for new pc panel. Tip-Dip Panels fit existing racks. Press available for bending dip leads. Contact factory for complete details.


STANDARD DIP
MOUNTING
TIP-DIP
MOUNTING
Hgts. depend on IC used
.300
.100
.300


DIP
TIP-DIP
Adaptor

EMC
Interconnection Specialists

ELECTRONIC MOLDING CORPORATION

96 MILL STREET/WOONSOCKET, R. I. 02895 U.S.A.
PHONE (401) 769-3800 TWX 710-387-1350

Nurl-Loc ®Trademark Electronic Molding Corporation WIRE-WRAP ®Trademark Gardner-Denver Co.

EMC
Interconnection Specialists

ELECTRONIC MOLDING CORPORATION
96 MILL STREET/WOONSOCKET, R. I. 02895 U.S.A.
PHONE (401) 769-3800 TWX 710-387-1350

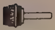
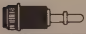
SUPPLEMENT TO TERMINALS CATALOG NO. 73

This ready-reference lists the most widely applied components from the catalog. For convenience in selection, each popular item is both pictorially shown and tabulated according to its specific plating, material and color combinations available for immediate delivery from stock.

For detailed specifications on components consult the catalog page called out in the tabulation. Information on mounting tools is found on Page 3 of Catalog No. 73.

Contact the factory for details and catalog.

STANDOFF TERMINALS

	TYPE NO.	PART NO.	MTG. TOOL	PAGE
	1	2772-4-1	2873-2	8
		2772-14-1	2873-2	8
		4632-14-1	2873-1	8
	12	2938-14-1	2873-5	11
		2938-17-1	2873-5	11
		2939-14-1	2873-5	11
		2940-14-1	2873-5	11
	105	5144-5-1	4408	16

FEED THRUS

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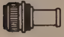	119	5446-4-1	2873-1	15

FEED THRU-THRU HOLE

	TYPE NO.	PART NO.	MTG. TOOL	PAGE
	2	2497-4-1,-9	2873-1	8
		2598-4-1	2873-2	8
	10	2894-14-1	2873-3	14
		2925-4-1	2873-3	14
		2927-4-1	2873-3	14
		3097-4-1	2873-3	14
		4479-16-1	2873-3	14
		4487-4-1	2873-3	14

FEED THRUS

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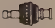
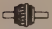
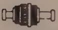
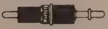
	3	4639-4-1	2873-2	9
	7	4616-4-1	2873-3	12
		4616-16-1	2873-3	12
		5129-4-1	2873-1	12
	13	5979-4-1	2873-5	11
	9	2819-5-1	2873-4	18
		2819-8-1	2873-4	18
	135	5141-5-1	4408	18

ULTRA MINIATURE

	TYPE NO.	PART NO.	MTG. TOOL	PAGE
	10	4547-4-1	4126	17
		4547-14-1	4126	17
	12	3337-4-1	4127	17
	117	5428-17-1	4126	17

FEED THRU END HOLE

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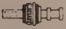
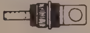
	6	2803-14-1	2873-3	10
	8	2795-4-1	2873-1	13
		5128-4-1	2873-1	13
	51	4338-67-0,-1	4665	18

THREADED NURL-LOC FEED THRUS

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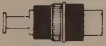
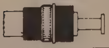
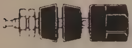
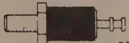
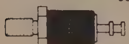
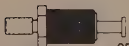
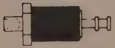
	37	4179-148-1	4648	20
	70	4806-165-1	4799	20

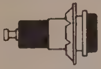
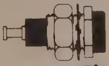
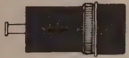
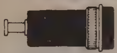
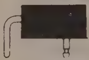
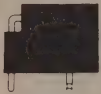
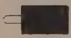
BINDING POSTS

	TYPE NO.	PART NO.	MTG. TOOL	PAGE
		5595-175-0,-2	—	21

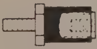
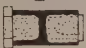
MOLDED STANDOFF TERMINALS

	TYPE NO.	PART NO.	MTG. TOOL	PAGE
	93	2385-91-5	—	40
		2376-87-1	—	40
		2055-52-5	—	40
		4024-91-1	—	41
		2522-91-1	—	41
		2162-91-1	—	41
	94	5627-7-1	—	42
		5629-52-6	—	43
		4077-91-6	—	43
		2723-186-1	—	43
		4662-87-1	—	43
	95	5702-52-6	—	36
	92	4551-91-1	—	44

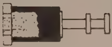
TEST JACKS

	TYPE NO.	PART NO.	MTG. TOOL	PAGE
	158	6220-217-2	4882	23
		Also -3,-4,-5,-6	4882	23
	85	6304-243-2 Also -3,-4,-5,-6,-8 & -9	—	26
	76	4836-165-0	4883	22
		Also -2,-4,-6		22
	78	4928-113-9	4644	22
	77	4879-125-0 Also -2,-3,-4,-5,-6 & -9	—	24
	104	5173-125-0 Also -2,-5 & -9 5173-143-2	—	24
	88	5075-139-1 & -5	—	24

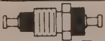
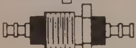
INSULATED SPACERS

	TYPE NO.	PART NO.	MTG. TOOL	PAGE
	83	3329-53-5	—	53
	84	3328-53-5	—	53

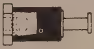
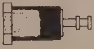
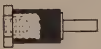
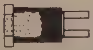
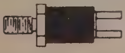
MIL-T-55155 TERMINALS

	TYPE NO.	PART NO.	MTG. TOOL	PAGE
	91M	2989-52-0 Also -1,-5,-6 & -9	—	30
		2990-52-5	—	30

THREADED FEED THRUS

	TYPE NO.	PART NO.	MTG. TOOL	PAGE
	32	4363-54-5	—	30
	33	3376-67-1	—	30

MOLDED STANDOFF TERMINALS (cont.)

	TYPE NO.	PART NO.	MTG. TOOL	PAGE
	89 Single turret	2014-91-1	—	31
		2014-67-1	—	31
		2020-5-1	—	31
		2503-186-6	—	32
	91 Double turret	2310-67-1	—	38
		2333-91-1	—	38
		2013-91-1 & -5	—	38
		2019-91-1 & -5	—	38
		5684-52-6 & -9	—	38
		5684-186-6	—	38
		5685-52-6	—	38
		2321-91-5	—	38
		2037-91-1	—	38
	98 Straight pin	2003-91-1	—	45
		2003-255-1	—	45
		2762-255-1	—	45
		6051-52-6	—	45
		4602-255-1	—	45
		4604-255-1	—	45
	101 Bifurcated	2304-91-1	—	48
		Also -4,-5	—	48
		2840-91-1 &-5	—	48
		2308-91-1	—	48
		Also -4 & -5	—	48
		2308-209-1	—	48
		3340-91-1	—	48
		3340-52-1	—	48
		4999-33-1	—	48
		2871-91-5	—	48
	100	5774-52-6	—	51

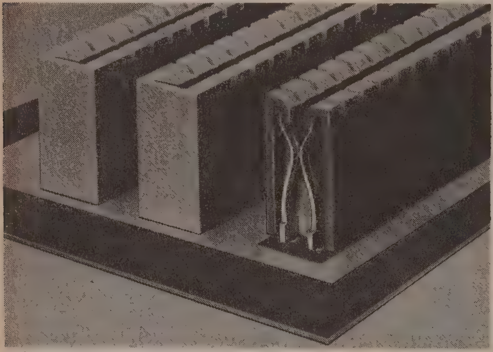
BACKPANEL CONNECTOR SYSTEMS

PACKAGING WITH EDGE-PAC® AND MULTI-PAC®

ELFAB CORPORATION exemplifies the concept of total backpanel packaging. Utilizing its own resources and technological development, ELFAB stands out as an innovative leader in solderless press-fit glass planar systems. All the elements of the back plane — printed circuit boards, contacts, plating and molding of insulators — are controlled and produced in our modern facility. Our patented EDGE-PAC® and MULTI-PAC® P.C. connector backpanels were developed during 1968-69 and have been in production since early 1970. Our connector grid systems offer maximum design flexibility in replacing your existing discrete or metal plate connector assemblies.

EDGE-PAC® SYSTEMS

The ELFAB EDGE-PAC® SYSTEM is a card edge backpanel concept which offers a bifurcated, pre-loaded, precision stamped contact rigidly mounted into a printed circuit board. The insulator is designed to lay over the contacts and is of a nature which permits unlimited sizes of connectors to be specified.



MULTI-PAC® SYSTEMS

The use of the MULTI-PAC® PROCESS on backpanels results in cost savings by the reduction or elimination of external wiring. The backpanel material is glass-epoxy board so that wiring can be etched on the surface in place of the external point-to-point wiring, thereby reducing costs. The MULTI-PAC® PACKAGING SYSTEM permits using up to eight planes of circuitry without the cost and problems of conventional multilayer boards. Discrete two-sided, plated-thru boards are used and sandwiched together utilizing high force press-fit contacts, offering gas tight interfaces between the contacts and the plated-thru hole, in each board.

The EDGE-PAC® Connector is designed to accept a .062 thick printed circuit card and terminates with a .025 square post on a .100, .125, .150, and .156 grid for automatic and semi-automatic wiring. Custom designed Backpanel Interconnect Systems can be specified using the design information shown below.

FEATURES

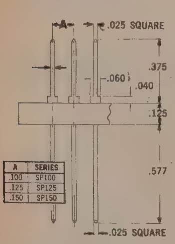
1. Contacts are press-fitted directly into a P.C. board, making the board or boards a structural part of the connector.
2. Contact is preloaded to guarantee minimum contact pressure under worst case conditions.
3. Ground planes, voltage buses and signal lands can be etched directly into the structural P.C. board member.
4. All or part of the wiring can be eliminated by etched circuits. See Multi-Pac® features.
5. Insulator is held on by interference fit with the base shoulder of each contact, therefore, allowing modular construction to give any length of connector desired without tooling.
6. Insulator design provides closed entry for complete protection of contacts.
7. Electrical connection is made between P.C. board and contact by press-fitting into plated-thru holes (no soldering required). Result is a highly reliable gas tight connection.
8. Connectors can be spaced at .375 minimum center to center for 1212, 1515 and 1562 Series.
9. The .025 square tail is positioned accurately for automatic wiring of backpanel assembly.
10. Total cost reduction.

CONNECTOR DESIGN PARAMETERS

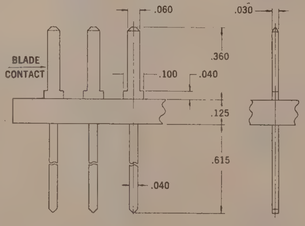
SPACING AVAILABLE		DIMENSIONS								
Series	Grid Spacing	A	B	C	D	E	F	G	H	Polarizing Tab Part No.
EP1020	.100x.200	No. of Contacts Minus One Times E	A + (2 Times D)	A + (2 Times F)	.100	.100	.180	.382	.200	EP1022
EP1212	.125x.125				.115	.125	.180	.294	.125	EP1002
EP1225	.125x.250				.125	.125	.180	.354	.250	EP1227
EP1515	.150x.150				.145	.150	.210	.315	.150	EP1502
EP1562	.156x.200				.156	.156	.218	.294	.200	EP1563

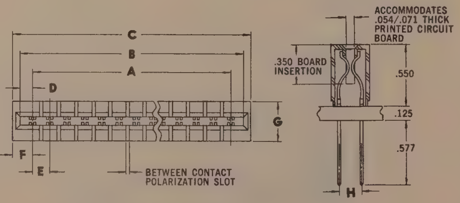
SP SERIES I/O FEED THRU POSTS

SP 100/125/150



SP3040




C
B
A
D
G
F
E
BETWEEN CONTACT POLARIZATION SLOT
ACCOMMODATES .054/.071 THICK PRINTED CIRCUIT BOARD
.350 BOARD INSERTION
.550
.125
.577
H

Patent No. 3,660,726 3,676,926 3,671,917

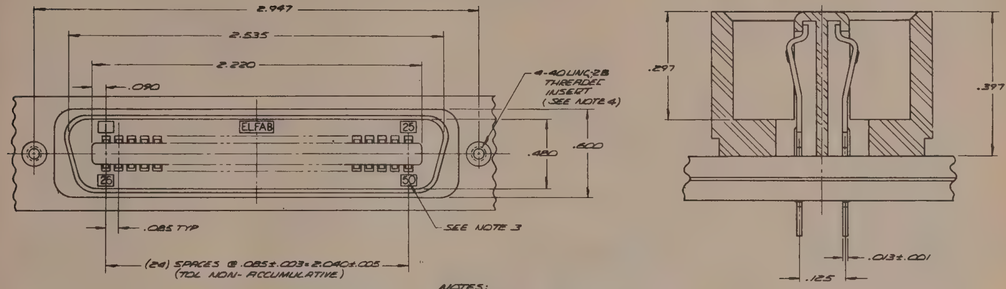
ELFAB 762 WILEY POST ROAD / P.O. BOX 34555 / DALLAS, TEXAS 75234 / PHONE: (214) 233-3033

TELE-PAC™ 8500 Series

Telephone and Communications I/O Connectors

Developed by ELFAB as an extension of our reliable press-fit contact system, the 8500 series receptacle is mateable with standard telephone 25 pair connectors. Utilizing similar design features of EDGE-PAC®, the contacts make solderless, gas tight connections with the plated-thru hole. Can be used with single, two and three board MULTI-PAC® SYSTEM assemblies.

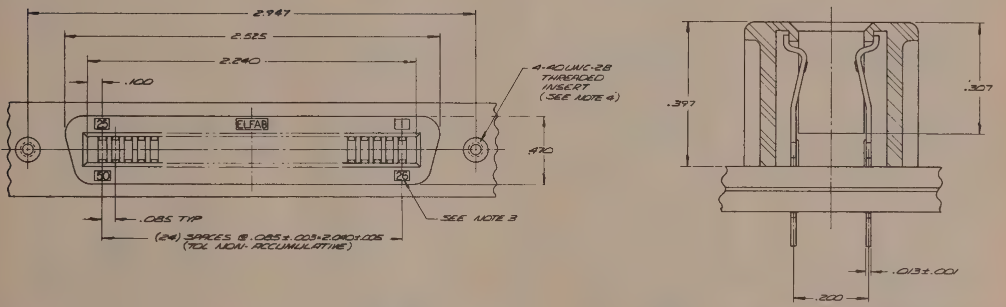
TP 8500-M


2.947
2.535
2.220
.090
4-40UNC-2B THREADEC INSERT (SEE NOTE 4)
ELFAB
1
25
26
50
.480
.600
.085 TYP
SEE NOTE 3
(24) SPACES @ .085±.003=2.040±.005 (TOL NON-ACCUMULATIVE)
.297
.397
.013±.001
.125

NOTES:

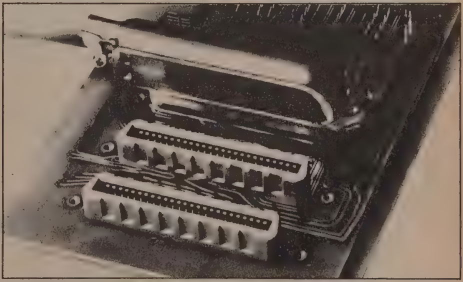
1. INSULATOR MATERIAL: THERMOPLASTIC, POLYCARBONATE COLOR-GRAY
2. CONTACT MATERIAL & FINISH:
   MATERIAL: PHOS BRONZE PER QQ-B-750
   FINISH: GOLD PER MIL-G-45204 TYPE II (.000010 MIN THK) GRADE C, OVER NICKEL (.00003 MIN THK)
3. CHARACTERS ARE TO BE MOLDED (.06 HIGH, RAISED .003/.008) ON A .010 DEPRESSED SURFACE. TO BE LOCATED AS SHOWN
4. MOUNTING OPTION FOR MATING PLUS CONNECTORS IS THREADED INSERTS NO. 4-40 INTO P/C SUBSTRATE

TP 8500-F


2.947
2.525
2.240
.100
4-40UNC-2B THREADED INSERT (SEE NOTE 4)
ELFAB
25
1
50
26
.470
.085 TYP
SEE NOTE 3
(24) SPACES @ .085±.003=2.040±.005 (TOL NON-ACCUMULATIVE)
.397
.307
.013±.001
.200

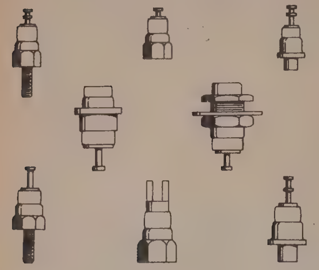
Features

- Mates with telephone 25 pair connectors.
- Eliminates external wiring.
- Solderless interconnects.
- Complete repair of contacts and insulator.
- Reliable gas tight interface of contact and plated-thru hole.



HIRAM JONES *manufacture and design of circuit components*

Teflon† Insulated * One-Piece * Terminals and Test Jacks



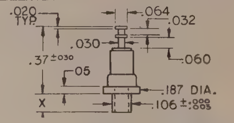
*** DELIVERY** Immediate — from stock on catalog items.

*** QUALITY** QPL facility, insuring highest product reliability. Complete traceability on all raw material and processes.

*** PRODUCTION** Precision Swiss automatic machines — long or short runs to customer design and specifications.

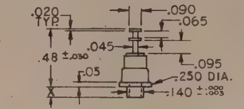
* ONE-PIECE *

Teflon† Insulated Terminals
Male-Female Threads and Swage Types and Test Jacks


.020 TYP.
.064
.032
.030
.060
.37 ±.030
.05
.187 DIA.
X
.106 +.000 −.003

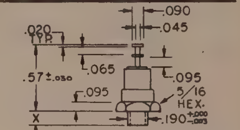
Single Turret also available
O/A Height above Board: .30 ±.030
P/N TS-111-A/-4

Part No.	X	Board Thickness
TS-112-A	.055	1/64
TS-112-0	.075	1/32
TS-112-1	.095	.050
TS-112-2	.105	1/16
TS-112-3	.135	3/32
TS-112-4	.165	1/8


.020 TYP.
.090
.065
.045
.48 ±.030
.095
.05
.250 DIA.
X
.140 +.000 −.003

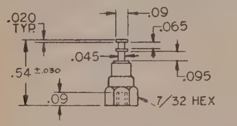
Single Turret also available
O/A Height above Board: .39 ±.030
P/N TS-231-0/-4

Part No.	X	Board Thickness
TS-232-0	.075	1.32
TS-232-1	.095	.050
TS-232-2	.105	1/16
TS-232-3	.135	3/32
TS-232-4	.175	1/8


.020 TYP.
.090
.045
.065
.57 ±.030
.095
.095
5/16 HEX.
X
.190 +.000 −.003

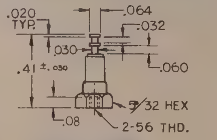
Single Turret also available
O/A Height above Board: .50 ±.030
P/N TS-351-0/-4

Part No.	X	Board Thickness
TS-352-0	.075	1/32
TS-352-1	.095	.050
TS-352-2	.105	1/16
TS-352-3	.135	3/32
TS-352-4	.165	1/8


.020 TYP.
.09
.065
.045
.54 ±.030
.095
.09
7/32 HEX

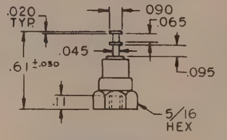
Part No.	Thread
TS-232-8F	4-40
TS-232-9F	6-32

Single Turret also available
O/A Length: .47 ±.030
P/N TS-231-8F/-9F


.020 TYP.
.064
.032
.030
.41 ±.030
.060
5/32 HEX
.08
2-56 THD.

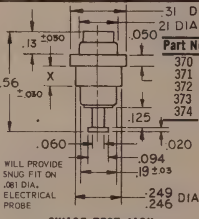
Part No.	Thread
TS-112-6F	2-56

Single Turret also available
O/A Length: .35 ±.030
P/N TS-111-6F


.020 TYP.
090
.065
.045
.61 ±.030
.095
.11
5/16 HEX

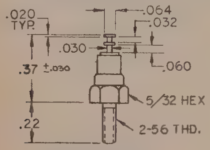
Part No.	Thread
TS-352-8F	4-40
TS-352-9F	6-32

Single Turret also available
O/A Length: .54 ±.030
P/N TS-351-8F/-9F


.31 DIA.
.21 DIA.
.13 ±.030
.050
X
.56 ±.030
.125
.060
.020
.094
.19 ±.03
.249 .246 DIA.
WILL PROVIDE SNUG FIT ON .081 DIA. ELECTRICAL PROBE

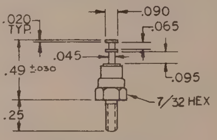
Part No.	X	T
370	.075	1/32
371	.095	.050
372	.105	1/16
373	.135	3/32
374	.165	1/8

SWAGE TEST JACK
Available in 10 Standard E.I.A. colors


.020 TYP.
.064
.032
.030
.37 ±.030
.060
5/32 HEX
.22
2-56 THD.

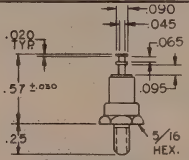
Part No.	Thread
TS-112-6M	2-56

Single Turret also available
O/A Height above Board: .34 ±.030
P/N TS-111-6M


.020 TYP.
.090
.065
.045
.49 ±.030
.095
7/32 HEX
.25

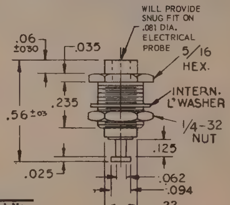
Part No.	Thread
TS-232-8M	4-40
TS-232-9M	6-32

Single Turret also available
O/A Height above Board: .42 ±.030
P/N TS-231-8M/-9M


.090
.045
.020 TYP.
.065
.57 ±.030
.095
.25
5/16 HEX.

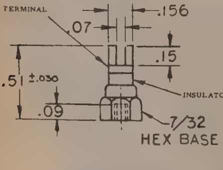
Part No.	Thread
TS-352-8M	4-40
TS-352-9M	6-32

Single Turret also available
O/A Height above Board: .50 ±.030
P/N TS-351-8M/9M

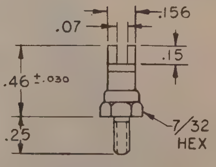

WILL PROVIDE SNUG FIT ON .081 DIA. ELECTRICAL PROBE
.06 ±.030
.035
5/16 HEX.
INTERN. L' WASHER
.235
.56 ±.03
1/4-32 NUT
.125
.025
.062
.094
.22

Part No.
375

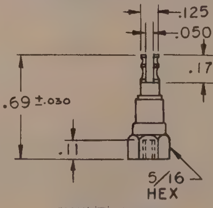
THREADED TEST JACK


TERMINAL
.07
.156
.15
.51 ±.030
INSULATOR
.09
7/32 HEX BASE

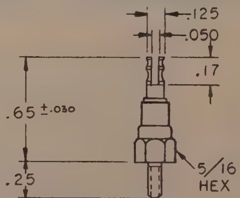
Part No.	Thread
TS-233-8F	4-40
TS-233-9F	6-32


.07
.156
.15
.46 ±.030
.25
7/32 HEX

Part No.	Thread
TS-233-8M	4-40
TS-233-9M	6-32


.125
.050
.17
.69 ±.030
.11
5/16 HEX

Part No.	Thread
338-2050	6-32


.125
.050
.17
.65 ±.030
.25
5/16 HEX

Part No.	Thread
335-2050	6-32

HIRAM JONES

Teflon† Insulated * Press-Type * Terminals and Test Jacks

TEFLON†

(TFE-FLUOROCARBON) per MIL-P-19468 has outstanding mechanical and electrical properties over a wide range of frequencies and temperatures (−100°C to +250°C), extreme chemical inertness, high heat resistance, zero water absorption and complete anti-hesiveness which make it a superior insulation.

TERMINALS

MATERIAL: Half-hard Brass per QQ-B-626, Comp 22.
FINISH: Standard plating is Gold per MIL-G-45204. Other finishes supplied on request.

INSTALLATION TOOLS

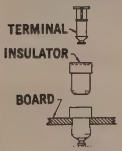
Tools are available for all HIRAM JONES components. Specify Part Number and prefix "S." Example: S-602 Assembly Tool.

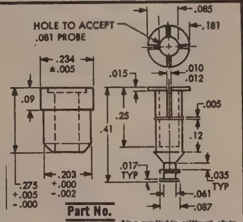
* PRESS-TYPE *

For simple, fast economical installation

* PRESS-TYPE *

Teflon† Insulated Test Jacks


TERMINAL
INSULATOR
BOARD


HOLE TO ACCEPT .081 PROBE
.085
.181
.234 ±.005
.015
.010
.012
.005
.09
.25
.41
.12
.017 TYP
.035 TYP
.275 +.005 -.000
.203 +.000 -.002
.061
.087

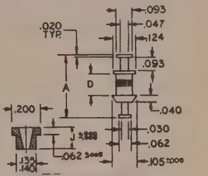
Part No. L-606

Also available without slots (non-gripping) P/N 606

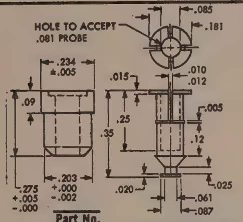
* PRESS-TYPE *

Teflon† Insulated Feed-Thrus and Standoffs

Available in Ten Standard E.I.A. Colors

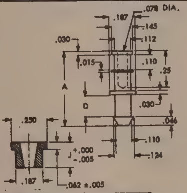

.093
.047
.124
.093
.020 TYP.
A
D
.200
.040
J ±.000
.030
.062
.062 ±.005
.135
.140
.105 ±.005

Part No.	A	D	J	Board Thickness
625-A	.41	.147	.147	1/32-.050
625-G	.42	.157	.157	1/16

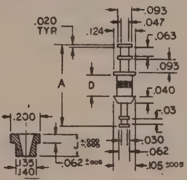

HOLE TO ACCEPT .081 PROBE
.085
.181
.234 ±.005
.015
.010
.012
.005
.09
.25
.35
.12
.275 +.005 -.000
.203 +.000 -.002
.020
.025
.061
.087

Part No. L-602

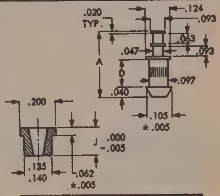
Also available without slots (non-gripping) P/N 602


.078 DIA.
.187
.145
.112
.030
.015
.110
.25
A
D
.030
.046
.250
.110
J +.000 -.005
.124
.187
.062 ±.005

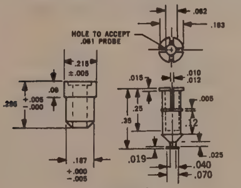
Part No.	A	D	J	Board Thickness
630-A	.51	.150	.150	1/32-.050
630-G	.52	.160	.160	1/16


.093
.047
.020 TYP.
.124
.063
.093
A
D
.040
.03
.200
J ±.000
.030
.062
.062 ±.005
.135
.140
.105 ±.005

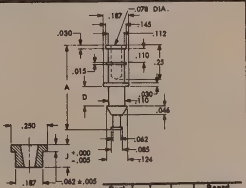
Part No.	A	D	J	Board Thickness
622-A	.55	.147	.147	1/32-.050
622-G	.56	.157	.157	1/16
622-H	.59	.189	.189	1/8


.020 TYP.
.124
.093
.063
.093
.047
A
D
.097
.040
.200
.105 ±.005
J +.000 -.005
.135
.140
.062 ±.005

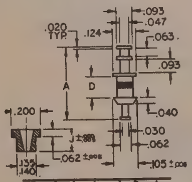
No.	A	D	J	Thickness
626-A	.40	.147	.147	1/32-.050
626-G	.41	.157	.157	1/16


HOLE TO ACCEPT .081 PROBE
.062
.183
.218 ±.005
.015
.010
.012
.005
.09
.286 +.005 -.000
.25
.35
.12
.187 +.000 -.005
.019
.025
.040
.070

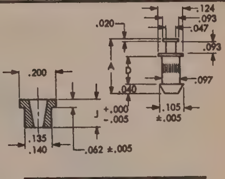
Part No. 605


.078 DIA.
.187
.145
.112
.030
.110
.25
.015
A
D
.030
.110
.046
.250
.062
.085
.124
J +.000 -.005
.187
.062 ±.005

Part No.	A	D	J	Board Thickness
632-A	.61	.150	.150	1/32-.050
632-G	.62	.160	.160	1/16
632-H	.69	.220	.220	1/8


.093
.047
.020 TYP.
.124
.063
.093
A
D
.040
.200
J ±.000
.030
.062
.062 ±.005
.135
.140
.105 ±.005

Part No.	A	D	J	Board Thickness
623-A	.50	.147	.147	1/32-.050
623-G	.51	.157	.157	1/16


.124
.093
.047
.020
.093
A
D
.040
.097
.200
J +.000 -.005
.105 ±.005
.135
.140
.062 ±.005

Part No.	A	D	J	Board Thickness
627-A	.32	.147	.147	1/32-.050
627-G	.33	.157	.157	1/16

Other Hiram Jones Products:

Non-Insulated Terminals, Test Jacks and Contacts
Printed Circuit, MS and MIL-T-55155 Terminals

HIRAM JONES
11607 Vanowen Street
North Hollywood, California. 91605
(213) 875-0213

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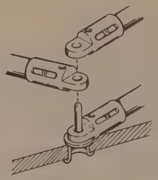
†Reg. Trademark, E.I. DuPont de Nemours and Co.

HIRAM JONES

manufacture and design of circuit components

WIRE TERMINATION SYSTEM



Design Features

SOLDER-WICKING BARRIER

The design of HIRAM JONES 9W Wire Termination Systems provides a solder-wicking barrier, assuring flexibility of the wire and thus minimizing wire failures due to fatigue.

Wires are inserted in the 9W Crimp Terminals and crimped in place. Full engagement of the wire is determined by means of the inspection hole provided in each crimp terminal. The 9W Crimp Terminals are then attached to their mating Terminal Posts and soldered in place.

The entire termination is made without application of solder to the wire itself. It is, therefore, impossible for solder to "wick" up the wire.

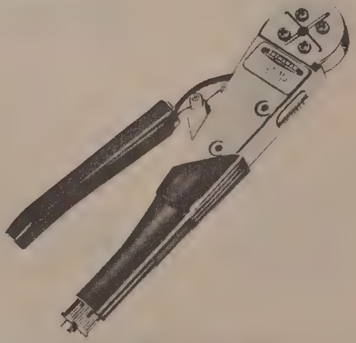
EQUIPMENT SERVICEABILITY

HIRAM JONES 9W Wire Termination System provides all the advantages of a hard wired system without the disadvantages of foreshortening of the service loop when disconnection and reconnection is required. The ease with which connections are made is a feature which is particularly advantageous in systems where connectors are undesirable, yet assemblies or sub-assemblies must be disconnected from time to time for service or replacement. To disconnect HIRAM JONES 9W Crimp Terminals, simply heat and lift off the mating terminal post. Reconnect by resoldering the 9W Crimp Terminals to the terminal post. Neither the mechanical nor electrical joint is affected by repeated removal and resoldering.

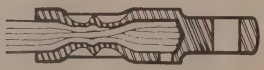
Increased Production Efficiency

By permitting pre-assembly of wires by unskilled operators, HIRAM JONES 9W Wire Termination Systems reduce production costs. Wires may be cut to length, stripped, and the 9W Crimp Terminals crimped in place. Final assembly consists of simply laying the pre-assembled Crimp Terminal on its mating terminal post and soldering in place.

MINIATURE MICROCRIMP TOOL



CROSS-SECTION OCTADENT CONFIGURATION



The 9W Miniature Microcrimp Tool (Buchanan No. 612118) is cycle-controlled to assure crimping to the selected depth. Once the crimping operation is started, the tool cannot be opened without completing its cycle.

9W LOCATORS — Specially designed locators are available for each of HIRAM JONES 9W Crimp Terminals. The use of one 9W Miniature Microcrimp Tool and the custom-designed 9W Locators is recommended to guarantee the precise crimp depth setting for each Crimp Terminal. When ordering, specify part number — i.e., 9W-206 Locator.

OCTADENT CRIMP — The 9W Miniature Microcrimp Tool produces an octadent configuration which provides uniform displacement of wire and crimp terminal material. The wire strands and the crimp terminal material are formed together in a solid mass with little or no reduction of the mil area of the wire strands.

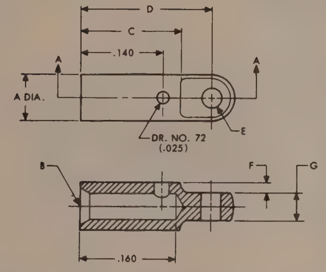
HIRAM JONES
11607 Vanowen Street, North Hollywood, California 91605

9W WIRE TERMINATION SYSTEM COMPONENTS

CRIMP TERMINAL	AWG WIRE SIZES	MATING TERMINAL POST
9W-206 9W-207	NO. 20 AND NO. 22 NO. 24 AND NO. 26	9W-507-1 STANDOFF 9W-507-5 STANDOFF 9W-510-1 FEED-THRU 9W-510-3 FEED-THRU
9W-230	NO. 16 AND NO. 18	9W-507-3 STANDOFF 9W-507-7 STANDOFF 9W-510-2 FEED-THRU 9W-510-4 FEED-THRU

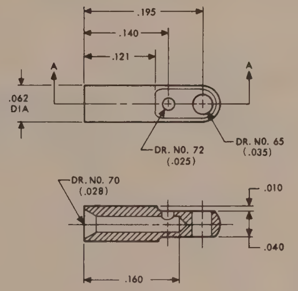
MATERIAL: Brass per QQ-B-626, ½ Hard, Composition 22.
FINISH: Electrodeposited Solder Plate over Copper Plate.

CRIMP TERMINAL


D
C
.140
A
A
A DIA.
DR. NO. 72
(.025)
E
B
F
G
.160

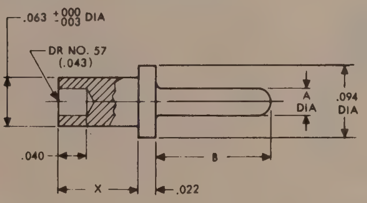
Part No.	A DIA.	B DRILL	C	D	E DRILL	F	G
9W-206	.078	3/64	.170	.220	.035	.017	.044
9W-230	.094	1/16	.175	.235	.046	.020	.054

CRIMP TERMINAL


.195
.140
.121
A
A
.062
DIA
DR. NO. 72
(.025)
DR. NO. 65
(.035)
DR. NO. 70
(.028)
.010
.040
.160

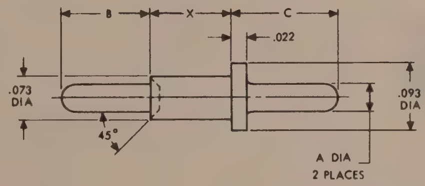
PART NO.
9W-207

STANDOFF TERMINAL


.063 +.000 -.003 DIA
DR NO. 57
(.043)
A
DIA
.094
DIA
.040
B
X
.022

Part No.	A ±.001	B ±.010	X +.004 −.000	T
9W-507-1	.031	.187	.115	3/32″
9W-507-3	.041	.225	.115	3/32″
9W-507-5	.031	.187	.084	1/16″
9W-507-7	.041	.225	.084	1/16″

FEED-THRU TERMINAL


B
X
C
.022
.073
DIA
.093
DIA
45°
A DIA
2 PLACES

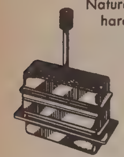
Part No.	A ±.001	B ±.010	C ±.010	X +.004 −.000	T
9W-510-1	.031	.187	.209	.115	3/32″
9W-510-2	.041	.225	.247	.115	3/32″
9W-510-3	.031	.187	.209	.084	1/16″
9W-510-4	.041	.225	.247	.084	1/16″

TOLERANCES: ±.005 Unless Otherwise Noted.
X = Shank Length
T = Board Thickness

Other Sizes Available.
Contact Factory.

HUGHES HIGH TECHNOLOGY CONNECTORS and CABLES FOR THE TOUGHEST JOBS.

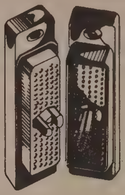
MINIATURE SERIES



Nature gives armadillos hard shell protection. We give it to our D series connectors. Stainless steel armor to keep 'em foolproof. They align perfectly. Fully environmental. 5 sizes.

- High density miniature using 20 gauge contacts.
- "Wrap-around" stainless steel shell for maximum protection in a minimum profile.
- Flanged or unflanged configuration.
- Contact arrangements of 18, 38, 66, 90, and 138 contacts.
- One-piece diallyl phthalate body.
- Silicone seals.
- Proven PolarHex center jackscrew.
- Available in non-environmental, environmental, and potting versions.

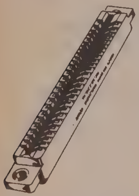
SUBMINIATURE SERIES



The way we make subminiatures, they're more subminiature. More fully packed. Same contact size and spacing, only we get 110 contacts to the inch.

- Highest contact density available — 110 size 22 contacts per square inch.
- Proven PolarHex center jackscrew coupling mechanism.
- Contact arrangement of 38, 88, 108, 132, and 244 contacts.
- Crimp removable front release, rear release, fixed contact and fixed filter contact — all intermatable.
- Available in non-environmental, environmental, and potting versions.

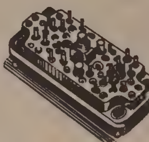
PRINTED CIRCUIT CONNECTORS



Miniature and subminiature printed circuit connectors in 10 sizes with 10 to 96 contacts. We're good at the numbers game.

- Withstand vibration, shock, and warping without losing electrical continuity.
- Bifurcated dual-socket contacts.
- 50 mil, 100 mil and 156 mil centers.
- Contact arrangements of 10, 20, 30, 40, and 50 positions, double readout (EPC submin. version).
- Contact arrangements of 15, 20, 30, 43, 48, and 68 positions, dbl. readout (EMS miniature, 100 mil ctrs; ERS miniature 156 mil ctrs).
- Bussing characteristics.
- Through or threaded mounting inserts available.
- PC board keying capabilities.

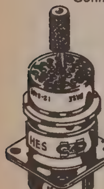
UNIVERSAL SERIES



You decide what goes where. The crimp removable contacts are interchangeable in either body. The big difference at Hughes is the positive way they get together. The PolarHex way.

- Pin and/or socket contacts in the same body.
- Proven PolarHex center jackscrew.
- Glass-filled diallyl phthalate body.
- Standard contacts and coax contacts in same body.
- 12 available configurations with up to a maximum of 321 contacts in a variety of combinations of #16, #18 and #20 gauge contacts and coax (or #8 gauge) contacts.

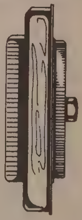
SUBMINIATURE BULLS-EYE SERIES



We invented the Bulls-Eye™ Connector and created a reputation as circular subminiature specialists. Shows you what a little concentration can do: 102 contacts in a #18 shell.

- Highest contact density in a circular subminiature with no decrease in contact spacing — 50% to 200% higher density than comparable connectors.
- Mounts in standard MS cutouts.
- Proven PolarHex center jackscrew.
- Lightweight stainless steel shell; diallyl phthalate body.
- Standard MS configurations. But with differences in contact density: Six shell sizes/contact density arrangements: 8/14, 10/30, 12/48, 14/66, 16/72 and 18/102.
- Cable or flanged configurations.
- Crimp snap-in size 22 contacts.
- Available in non-environmental, environmental, and potting versions.

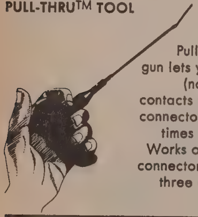
SUBMINIATURE FILTER CONNECTORS



Filter pin connectors in both rectangular and circular subminiatures. Nobody else guarantees a 100,000 to 1 reduction of RF energy.

- High contact density — 110 size 22 crimp removable contacts/sq. in.
- Complete RFI protection.
- Glass-filled diallyl phthalate bodies.
- Proven PolarHex center jackscrew.
- Contact arrangements of 38, 88, 108, 132, and 244 contacts.
- Working voltage: 200 vdc (25° & 85°C) 150 vdc (—55° & 125°C) Dielectric Withstanding Voltage (Hi-Pot): 500 vdc (for 5 sec, 50 ma max charging current). Feed-Thru Current: 3.0 amp. RF Current: 0.25 amp max. Insul. Resist.: 10,000 megohms, min. (After 2 min electrification at 200 vdc, 1 megohm current limiting resistor.); Capacitance: 1750 pf, nominal. Atten., min.: 40 db @ 100 MHz, 50 db @ 200 MHz to 10 GHz.

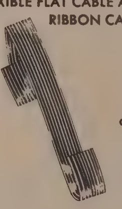
PULL-THRU™ TOOL



New Pull-Thru™ gun lets you pull (not push) contacts through connectors. Four times as fast. Works on many connectors. With three contact sizes.

- Covers three contact sizes: 16, 20, and 22 gauges.
- Permits desired contact cavity to be loaded from front face of connector.
- Grasps the contact body . . . not the wire — eliminating damage during insertion.
- Positive contact alignment through seals and block.
- Can use wire sizes equal in diam. to rear of the contact.
- Allows connector wiring at least four times faster than with conventional tools.

FLEXIBLE FLAT CABLE AND RIBBON CABLE



Contour Cable™ happened here first: Flexible circuits. Flat, conductor cable. Ribbon cable. Custom cable/ harness assemblies.

- Flat conductor cable in similar or varied cross sections — with uniform or non-uniform spacing, varying insulation thickness, with different insulation materials on the two sides.
- Flexible circuitry ideal for conductor system requiring circuits with 3-dimensional routing in a flat medium, or when point-to-point wiring must exhibit simple or complex flexibility in a flat plan — or both.
- Ribbon cable in 2 to 100 conductors wide. Sizes 22 to 28 AWG, solid or stranded, with color-coded PVC insulation.

A lot of companies can provide you with cables and connectors to solve your simple requirements. Including Hughes.

But if you're not sure about your needs, or if you require quality, don't gamble. Involve Hughes.

High technology through design excellence is our specialty. And it may even cost less in the long run.

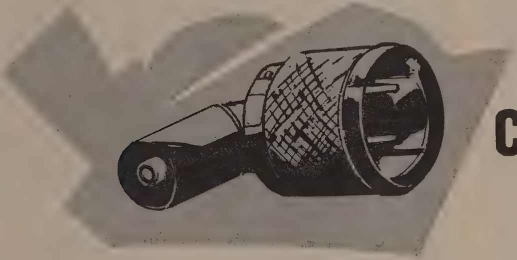
Hughes Connecting Devices, 17150 Von Karman Avenue, Irvine, CA 92705. (714) 549-5701.

HUGHES
HUGHES AIRCRAFT COMPANY
CONNECTING DEVICES DIV.

CONNECTOR SELECTION GUIDE

This guide lists some of the more popular connector configurations, both standard and special.

It is designed to help you select the proper connector series and the appropriate catalog from which to specify your requirements. Determine your basic application: Rectangular, Rack/Panel, Circular, Microminiature, Printed Circuit, Input/Output, Filters, or Special Application connectors.



CANNON ITT

Go to the appropriate heading in the chart. Below each heading are several blocks listing the various connector series. Check these requirements with the data on the right side of each block. Write or telephone ITT Cannon Electric, 666 E. Dyer Rd., Santa Ana, California 92702, (714) 557-4700, for the proper catalog for detailed product data and ordering information, or consult your nearest ITT Cannon sales office.

Your Application Requirement

Rectangular Rack/Panel

**D Subminiature Series
economical D subminiatures for
commercial/industrial application**

D* — original D, solder contacts
D*C — general purpose economy version of popular D Subminiature; rear release of crimp snap-in contacts

D*C CATALOG

9-50 CONTACTS
Contact/Wire Size
20
Size 18-20 contacts one #18 or two #20
CRIMP TERMINATION

For general military/aerospace application

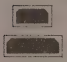
D*M — monobloc insulator, solder contacts
D*MA — rear release of crimp snap-in contacts.
MIL-C-24308 — Full QPL

●

DM/DMA CATALOG

9-50 CONTACTS
Contact/Wire Size
20
Coax. contacts avail.
SOLDER OR CRIMP TERMINATION

DPGM/DPJM — general purpose, environmental



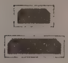
DPGM — short shell, economical ring-type contact retention
DPJM — same as DPGM except shell is longer
DPJMB — rear insertion/release of crimp snap-in contacts

■

DPGM/DPJM CATALOG

12-98 CONTACTS
Contacts/Wire Size
20
16
12
Coax. contacts avail.
CRIMP TERMINATION

DPK — high performance, environmental, MIL-C-83733



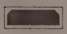
Environmental sealing, thermal resistant connector with rear release of crimp snap-in contacts per PV/KJ circular series.

■ ●

DPK CATALOG

18-185 CONTACTS
Contact/Wire Size
12
16
20
22
22D
Coax. contacts avail.
CRIMP TERMINATION

DJS — environmental, high density, rugged



Single gang, two gang, size 22D KJ crimp snap-in contacts, miniature

■

DJS CATALOG

78-128 CONTACTS
Contact/Wire Size
22
24
26
28
CRIMP TERMINATION

DPX Series — small, rugged, general purpose, single gang

DPXA — single shell
DPXAF — float mount DPXA
DPXB — polarized ARINC shell
DPXL — large flange
DPXLF — float mount DPXL
DPXAMA — LITTLE CAESAR® contact assembly
DPXAME — LITTLE CAESAR® contact assembly environmental

■

2-106 CONTACTS
Contact/Wire Size
22
20
16
2
8
4
Coax. contacts avail.
SOLDER OR CRIMP TERMINATION

DPX2 — two gang DPX

DPX2 — two gang DPX
DPX2A — ARINC A shell
DPX2B — ARINC B shell
DPX2MA — LITTLE CAESAR® contact assembly
DPX2ME — LITTLE CAESAR® contact assembly environmental

■

4-212 CONTACTS

DPX3 — three gang DPX

DPX3 — three gang DPX
DPX3MA — LITTLE CAESAR® contact assembly
DPX3ME — LITTLE CAESAR® contact assembly environmental

■

6-318 CONTACTS

DPX4 — four gang DPX

DPX4 — four gang DPX
DPX4MA — LITTLE CAESAR® contact assembly
DPX4ME — LITTLE CAESAR® contact assembly environmental

8-424 CONTACTS

■

DPX CATALOG

DPD Series — general purpose single gang

DPD — standard rack/panel connector with widest range of contact arrangements
DPDMA — rear release of crimp snap-in contacts

— two gang DPD

DPD2 — two gang DPD
DPD2MA — two gang DPD with rear release of crimp snap-in contacts

DPD CATALOG

2-128 CONTACTS (single gang)
4-256 CONTACTS (two gang)
Contact/Wire Size
20
16
14
10
8
6
4
2
0
Coax. contacts avail.
SOLDER OR CRIMP TERMINATION

LEGEND
☐ Environmental version only
■ Environmental versions available. Consult factory.
● Hermetic versions available. For information please write for applicable hermetic catalogs, or consult the factory.

Circular

KJ — subminiature high density, MIL-C-38999

Bayonet Coupling

High performance, high density, lightweight, compact, environment-resistant connectors; rear release of crimp snap-in contacts.

□ ●

KJ CATALOG

3-128 CONTACTS

Contact/Wire Size
22M
22D
22
20
16

CRIMP TERMINATION

PV — miniature circular MIL-C-83723/MIL-C-0026482F

Bayonet Coupling

Mates with MIL-C-0026482F and NAS 1599 bayonet coupled connectors. High performance, environmentally sealed; fluid resistant; rear release crimp snap-in contacts

□ ●

PV CATALOG

3-61 CONTACTS

Contact/Wire Size
20
16
12

CRIMP TERMINATION

KPT/KPTM/KPSE — miniature general purpose, MIL-C-0026482F Series I

Bayonet Coupling

KPT — Solder termination
KPTM — Crimp contacts in DUAL-SHORE® insulator
KPSE — Crimp contacts in integrally molded insulator, front release

□ ●

KPT/KPTM/KPSE CATALOG

2-61 CONTACTS

Contact/Wire Size
20
16

SOLDER OR CRIMP TERMINATION

MIL-C-005015F — standard circular, crimp

The latest military design, high performance 5015 connectors with crimp removable contacts.

■ Threaded Coupling

MS-005015 CATALOG

1-48 CONTACTS

Contact/Wire Size
16
12
[illegible]
4
0

CRIMP TERMINATION

MS — general purpose, MIL-C-5015

Threaded Coupling

MS-A — solid shell
MS-B — split shell
MS-E — environmental, cable clamp
MS-F — MSE with "O" ring
MS-R — environmental, endbell, and "O" ring

MS CATALOG

Note: Catalog also includes connectors for potting, bulkhead, quick disconnect and weatherproof applications.

■ ●

1-100 CONTACTS

Contact/Wire Size
16
12
8
4
0

SOLDER TERMINATION

Crimp Term. Avail. High Voltage Cartridges and Coax. Cartridges available.

CV — general purpose connector

High performance connectors designed to MIL-C-5015; rear release crimp snap-in contacts.

□ Threaded Coupling

CV CATALOG

1-48 CONTACTS

Contact/Wire Size
16
12
8
4
0

CRIMP TERMINATION

CVA — standard circular MIL-C-83723

Threaded Coupling

High performance, intermates with MIL-C-5015 thread coupled connectors. Environment and fluid resistant, rear release crimp snap-in contacts.

□

CVA/83723 CATALOG

1-48 CONTACTS

Contact/Wire Size
16
12
8
4
0

CRIMP TERMINATION

K — standard lightweight, rugged general purpose

Quick Coupling

K — with special Acme thread coupling nut

●

K CATALOG

1-75 CONTACTS

Contact/Wire Size
20
16
14
10
8
6
4
2
[illegible]

Coax. contacts avail.
SOLDER TERMINATION

KO — rugged lightweight

Acme Threads

Miniature environmental version of standard K connector with special Acme threads.

□ ●

MC CATALOG

3-50 CONTACTS

Contact/Wire Size
20
16
12

SOLDER TERMINATION

MC — subminiature, sealed connectors

Rugged

Designed to withstand severe handling and environmental conditions.

□ ●

MC CATALOG

3-12 CONTACTS

Contact/Wire Size
20

SOLDER TERMINATION

Microminiature

ALL MICROMINIATURE CONNECTORS USE TWIST PIN CONTACTS*

MICRO-D connectors

plastic shells

.050″ Centers

MD — Clip mounting, diallyl phthalate insulator
MDA — Clip mounting, polycarbonate insulator
MDB — Screw mounting, diallyl phthalate insulator
MDC — Screw mounting, polycarbonate insulator
MDN — Clip mounting, nylon insulator
MDNB — Screw mounting, nylon insulator

MD CATALOG

9-51 CONTACTS
Amps
3
SOLID OR STRANDED LEADS
SOLDER POT TERMINATION
(Fixed Contacts)

MICRO-D connectors metal shells

.050″ Centers

MDM — Screw mounting, diecast aluminum shell, diallyl phthalate insulator, interfacial sealing printed circuit board, coaxial and power combination layouts available

MDM CATALOG

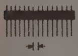
9-51 CONTACTS
Amps
3
SOLID OR STRANDED LEADS
SOLDER POT TERMINATION
(Fixed Contacts)

2D — double density D

D subminiature shell and hardware; 19, 31, 52, 79 or 100 crimp removable contacts on .075″ centers.

19-100 CONTACTS
Wire Size
22 thru 30
CRIMP REMOVABLE

CENTI-LOC ® connectors — strip


.075″ or .100″ Centers

Low cost, commercial strip connector available in "yardage" form for up to 53 crimp snap-in contacts on .075″ centers and up to 60 contacts on .100″ centers.

CTA-2D CATALOG

1-60 CONTACTS
Contact/Wire Size
22 thru 30
(P.C. tails avail.)
CRIMP REMOVABLE

MICRO-K connectors — circular

Threaded Couplings

High density connectors on .050″ centers; 75% smaller/80% lighter per contact than MIL-C-26482 types.
MIK — Metal plug, plastic receptacle
MIKM — Metal shell

7-55-85 CONTACTS
Amps
3
SOLID OR STRANDED LEADS
(Fixed Contacts)

Push Pull Couplings

High density miniature circular connectors on .050″ centers with cable grip and grounding clamp.
MIKQ

MIK CATALOG

7-19 CONTACTS
Amps
3
SOLID OR STRANDED LEADS
(Fixed Contacts)

NANO connectors — strip and center jack screw

.025″ Centers

A high density connector using twist pins on .025″ centers. Available in various configurations including center jackscrew version.

NC CATALOG

1-40 CONTACTS
Amps
1
SOLID OR STRANDED LEADS
WIRE SIZE #32 and smaller
(Fixed Contacts)

CENTI-K connectors — circular

Environmental

Bayonet Coupling

.100″ Centers

20% smaller/50% lighter than MIL-C-26482 type with same number of contacts. A high density connector using MIL-C-26482 hardware with contacts on .100″ centers. Rear release.

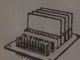
Non-environmental versions are available; consult factory.

CK CATALOG

10-92 CONTACTS
Amps
5
CRIMP REMOVABLE TERMINATION
Wire Size
22 thru 30

Printed Circuit/Input Output

ADAPTA-CON connectors



Low-force receptacle and post interconnections for P.C. and I/O applications, custom made to any size or configuration, .025″ square tail mounting plate posts for wire-wrapping termination.

ACBP CATALOG

UBC UP TO 130 CONTACTS
UBC UP TO 86 CONTACTS
Contact/Wire Size
24 thru 28
SOLDER, CRIMP, WIRE-WRAPPING TERMINATIONS

EC connectors

Economical, versatile, high reliability, pre-loaded removable "bifurcated" contacts and .025″ square tails on .100″ centers.

EC CATALOG

CONTACTS
22/24, 25/50, 30/60, 36/72, 43/86, 48/96
WIRE-WRAPPING TERMINATION

ECS connectors

Single-beam preloaded contacts on .100″, .125″ and .156″ centers, mounted on custom-made precision-punched aluminum panels. Integrally molded card guides of ¾″ and 2″ heights.

ECS CATALOG

CONTACTS
Any number of contacts available
WIRE-WRAPPING TERMINATION

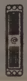
PRESS-T-MATE™ — backpanel packaging system

Custom backpanel packaging using inherent reliability of P.C. interconnections with latest cardedge connectors, contacts in .100″ x .100″, .100″ x .200″, .125″ x .125″ and .125″ x .250″ center spacings feed-thru .025″ post contacts are available.

PTM CATALOG

CONTACTS
By Request
WIRE-WRAPPING TERMINATION

DL connectors

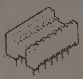


Low mating force, high performance, cam-actuated spring contacts on .100″ centers. I/O, cord-to-cord, cord-to-panel applications.

DL CATALOG

UP TO 156 CONTACTS
Contact/Wire Size
18 thru 30
CRIMP OR WIRE-WRAPPING TERMINATION

Dual In-Line Sockets for IC's



Economically designed, low cost, low profile sockets that unplug. Size 14, 16, 24, 28, and 40 contact layouts in solder pin versions. Size 14 and 16 contact layouts with wire-wrapping terminations.

DICA CATALOG

14-40 CONTACTS
Amps
3
SOLDER OR WIRE-WRAPPING TERMINATIONS

MEB connectors — 2 pc. edgecard metal shells

Mother/Daughter board, diecast aluminum shell on .050″ centers for printed circuit edgecard applications to meet MIL-E-5400"K"

MEB CATALOG

128 and 184 CONTACTS
Amps
3
SOLID OR STRANDED LEADS
PRINTED CIRCUIT TERMINATIONS
WIRE WRAP TAILS
(Fixed Contacts)

50-MIL STRIP connectors

.050″ or .100″ Centers

For edge mounting on PC boards and encapsulation in modules.
MTA — polycarbonate insulator (up to 120 contacts)
MTB — diallyl phthalate (up to 81 contacts)
MTN — Nylon insulation, up to 120 contacts (special configurations are available; consult factory)

MTA CATALOG

UP TO 120 CONTACTS
Amps
3
SOLID OR STRANDED LEADS
(Fixed Contacts)

---

*Licensed by New Twist.

Special Applications

AUDIO/ELECTRONIC connectors

Used on microphones, tape recorders, amplifiers, test instrumentation, computers and other low level circuit applications.

AUD CATALOG

2-8 CONTACTS
Contact/Wire Size
10
14
16
Coax. contacts avail.
SOLDER OR CRIMP TERMINATION

CABLE TELEVISION connectors

All-weather resistant coaxial connectors used for CATV application. Exceptional long-life RFI leakage provided.

CATV CATALOG

Cable Sizes
.412, .500, .750
SOLDER OR CLAMP TERMINATION

LKTMA/B connectors

Designed for use in combination color/monochrome television cameras.

LKTMA/B CATALOG

UP TO 85 CONTACTS
Contact/Wire Size
20
12
Coax. contacts avail.
CRIMP TERMINATION

MR — standard weatherproof, submersible

Submersible

Rugged environmental MIL-C-5015 type, designed to MIL-C-12520B

□

MR CATALOG

1-56 CONTACTS
Contact/Wire Size
16
12
8
4
0
SOLDER TERMINATION

HIGH TEMPERATURE connectors

HRM — 1300° F, nuclear radiation-resistant miniature circular connector

CA-HR — 650° & 1000° F, radiation-resistant

Threaded Coupling

HT CATALOG

1-73 CONTACTS
Contact/Wire Size
16
12
8
4
0
CRIMP OR WELD TERMINATIONS

FIREWALL CONNECTORS

MS-K — 350° F, meets MIL-C-5015 fireproof test, crimp contacts

CA-KE — 350° F, moisture-resistant, for sealable wires, meets MIL-C-5015 fireproof test or 350° F continuous

FRF — Firewall connector with front release crimp snap-in MS90453, MS90454 contacts; moisture sealed, exceeds MIL-C-5015 fireproof requirements; 400°F continuous, 800°F shorter term.

Threaded Coupling

■

FW CATALOG

1-47 CONTACTS
Contact/Wire Size
16
12
8
4
0
CRIMP TERMINATION

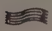
RF COAXIAL connectors

RF CATALOG

Plugs, jacks, receptacles, adapters, and terminations, microwave components, coaxial components, special cable assemblies.

FLEXIBLE ETCHED CIRCUIT CABLE systems

FDG CATALOG



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FLAT FLEXIBLE CABLE terminations

FCT CATALOG

Highly reliable, vibration-resistant cable assembly. Long flex life, effective shielding. Space and weight savings.

SURE SEAL™ connectors

SS CATALOG

High performance, low cost environmentally sealed connectors with rugged multiple moisture seals. Meets automotive/industrial standards including vibration, shock, temp. cycling, salt water spray and immersion, petroleum derivitives, and industrial gases.

Filters – RFI/EMI

DPXJ

Rack/panel filter connectors in single, two, three or four gang shells interchangeable with standard DPX, DPXMA, DPXME and meets requirements of ARINC 404. Provide optimum attenuation of RFI/EMI.

FDPXJ CATALOG

CONTACTS
Contact/Wire Size
22
20
16
Coax. contacts avail.
SOLDER TERMINATION
Consult factory for availability of crimp filter contacts.

D*J

Rectangular subminiature filter connectors intermateable with standard D subminiature and MIL-C-24308 types. Optimum RFI/EMI attenuation provided.

FDJ CATALOG

CONTACTS
Contact/Wire Size
20
Coax contacts avail.
SOLDER TERMINATION
Consult factory for availability of crimp filter contacts.

PVJ

Bayonet Coupling

Miniature circular filter connectors provide optimum attenuation of RFI/EMI. KPJ equivalents to MIL-C-26482 types, KPAJ equivalents to MIL-C-83723 types for existing programs. PVJ new nomenclature

PVJ CATALOG

CONTACTS
Contact/Wire Size
20
16
SOLDER TERMINATION
Consult factory for availability of crimp filter contacts.

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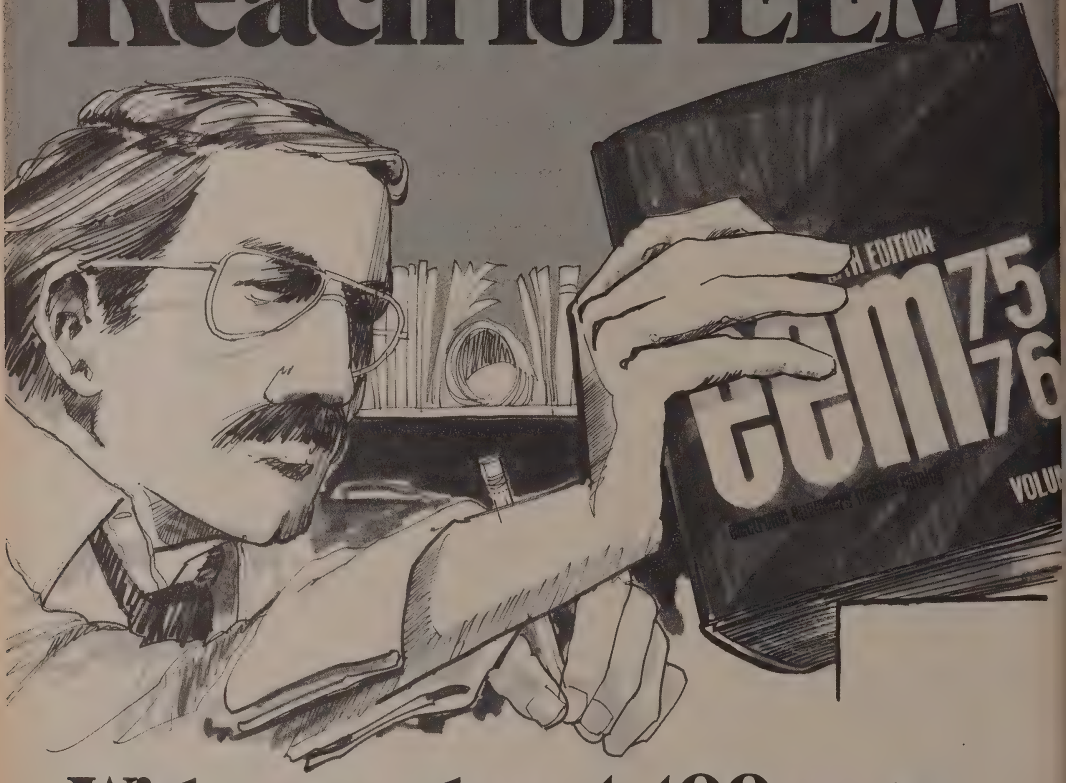
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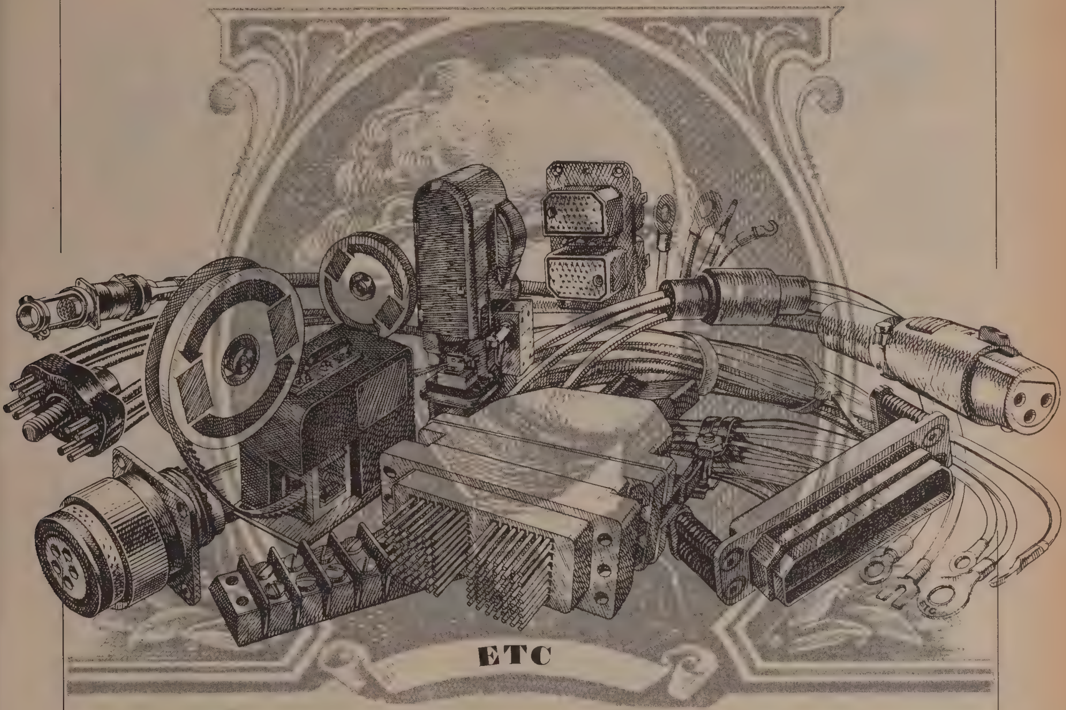

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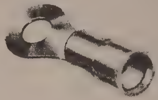


AVIKRIMP® — Tin-plated brass sleeve strengthens barrel. Color coded Nylon insulating sleeve adds more wire protection. Operating temperatures: continuous duty — −40°F to 250°F, intermittent duty — to 350°F. WIRE RANGE: #26-10
Also available on tape.

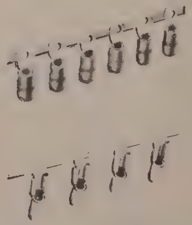
INSULKRIMP® — PVC insulation sleeve permanently attached to butted seam barrel (#22-10) or brazed seam barrel (#8-2). Operating temperatures: continuous duty— −40°F to 167°F, intermittent — to 300°F.
WIRE RANGE: #22-2
Also available on tape.

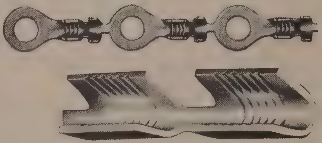
NYLAKRIMP™ — Ideal for larger wire applications involving temperature extremes and vibration. Rigid, overhanging Nylon insulating sleeve covers silver-brazed barrel. Withstands continuous duty temperatures from −60°F to 250°F.
WIRE RANGE: #8-4/0

VIBRAKRIMP® — Made for excessive vibration applications. Seamless tin-plated brass sleeve covers basic KRIMPTITE barrel. Its overhang prevents wire flex. Single crimp terminates wire.
WIRE RANGE: #22-10
Also available on tape.

VERSAKRIMP™ — Has silver brazed barrel. Seam will not open under stress or wire pull. Crimps using many types of tooling. Ideal for solid or stranded wires.
WIRE RANGE: #22-4/0
Also available on tape.

KRIMPTITE® — One piece, non-insulated design. Ideal general purpose terminal for uses where special features are unnecessary. Full length barrel makes crimping easy.
WIRE RANGE: #26-10
Also available on tape.





AUTOMATED STRIP AND TAPED TERMINALS, quick disconnects and magnet wire splices from #26 thru #10 AWG sizes. Popular tongue types, barrels insulated or open with insulation support. Quick disconnects available in straight or flag designs.

Quick Connects

- Female Receptacles and Male Tabs

PDQ™ quick connect receptacle terminals handle 26-12 AWG wires and .110 x .020, .110 x .032, .187 x .020 and .250 x .032 inch male tabs. Insulated or non-insulated barrels. Available loose piece, on tape or continuous strip. Meet N.E.M.A. and U.L. standards. Male tabs and single or twin tab lugs are .250 thru .110 inches wide for PDQ female receptacles.

Cable Ties

NYLON CABLE TIES are one-piece self-locking straps that quickly and safely speed harness assemblies. Different sizes handle bundle diameters up to 4″. Rugged application tools provide the right tension and cut ties flush with tie heads.

Connectors & Splices

GENERAL PURPOSE CONNECTORS quickly connect 1 to 36 circuits. Snap-in pin/socket contacts for #30-14 AWG wire sizes. .093 and .062 pin diameters. Molded nylon housing. Panel mounted or free hanging.

CLOSED-END CONNECTORS feature tin-plated connector insert protected by a translucent nylon insulation. A single crimp secures stripped wire. WIRE RANGE: #22-10

BUTT AND PARALLEL SPLICES — Stripped wires insert at each end of splice. A crimp at each end on butt splices, a single center crimp on parallel splices, provides a secure connection. Available in insulated and non-insulated styles. WIRE RANGE: #22-4/0.

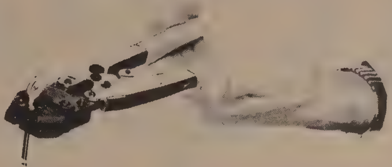
ETC Terminal Products Unit

CANNON ITT

Connecting devices for every need

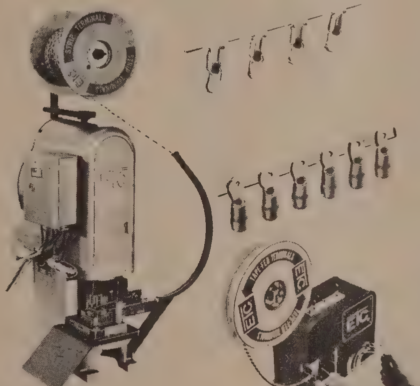
Crimping Tools

- Hand Operated and Semi-automatic . . . Matched-to-terminal Designs . . . Free 30-day Evaluation Trials



RATCHET HAND TOOLS — Special ratchet mechanism won't allow terminal to be released until fully crimped. Handles terminals and splices from #26 thru #10 AWG.

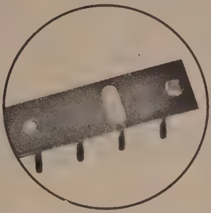
PORTABLE AIR TOOLS — 27 oz. AT-200 hand tool uses standard air pressure to crimp #26 thru #6 AWG terminals and splices. Bench adapter accessories available.



AUTOMATIC FEED TAPE AND STRIP PRESSES — Terminals are loaded into crimping dies automatically. Cycled for up to 3,600 terminations per hour. Crimps #26 thru #10 AWG sizes. Air and electrically operated models.

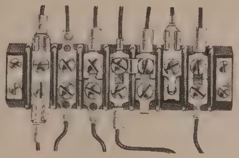
Terminal Blocks

- Closed Back . . . Open Back . . . Military Blocks



Closed Back

Open Back



TWIN SCREW — Choose closed back design with molded-in plates and protected mounting holes. Or open back design. Rated 5 to 30 amps. Complete selection of lugs and hardware.

SINGLE SCREW — These blocks weigh less and occupy less space. Same design features as their twin screw counterparts. 5 to 30 amp. rating. Full selection of lugs and hardware.

TERMINAL BLOCK TERMINALS — Match-fitting to blocks assures reliability in sizes 26 thru 10 AWG. Spade, Flanged Spade and Rectangular tongues are 3/16", 19/64", 21/64" or 27/64" wide.

ETC Terminal Products Unit

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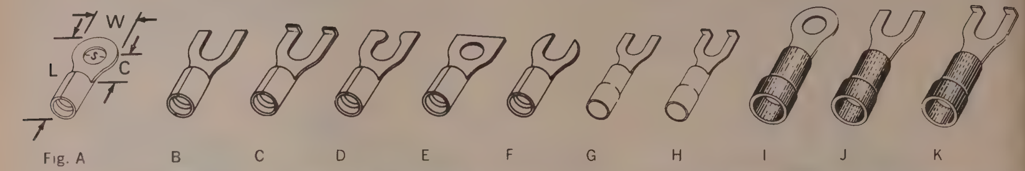
ETC® SOLDERLESS TERMINALS



UNINSULATED TERMINALS

KRIMPTITE® BUTTED SEAM BARREL RING TONGUE (Fig. A)

ETC Part No.	Stud Size S	Dimen., Inches Width W	Clear-ance C	Length L
#26-24 AWG wire.				
M-1122-02	2	9/64	1/8	23/64
M-1113-04	4	13/64	7/32	31/64
M-1113-06	6	13/64	7/32	31/64
M-1118-06	6	1/4	19/64	37/64
M-1118-08	8	1/4	19/64	37/64
M-1118-10	10	1/4	19/64	37/64
#22-18 AWG wire.				
AA-120-04	4	7/32	5/32	27/64
AA-132-04	4	1/4	1/4	35/64
AA-120-06	6	7/32	5/32	27/64
AA-132-06	6	1/4	1/4	35/64
AA-132-08	8	1/4	1/4	35/64
AA-121-08	8	5/16	5/16	5/8
AA-121-10	10	5/16	5/16	5/8
#16-14 AWG wire.				
BB-123-06	6	1/4	7/32	1/2
BB-139-08	8	11/32	5/16	41/64
BB-137-10	10	5/16	9/32	39/64
BB-139-10	10	11/32	5/16	41/64
BB-125-14	1/4	15/32	13/32	51/64
BB-125-56	5/16	15/32	13/32	51/64
#12-10 AWG wire.				
C-128-10	10	3/8	5/16	3/4
C-130-14†	1/4	17/32	13/32	59/64
C-130-56†	5/16	17/32	13/32	59/64
C-140-38°	3/8	19/32	31/64	1-1/32

SPADE TONGUE (Fig. B)

#26-24 AWG wire				
M-1123-00	0	9/64	1/8	11/32
M-1116-02	2	3/16	7/32	31/64
M-1121-04	4	13/64	7/32	31/64

FLANGED SPADE TONGUE (Fig. C)

#22-18 AWG wire.				
AA-115-06	6	19/64	7/32	17/32
AA-115-08	8	19/64	7/32	17/32

SNAP SPADE TONGUE (Fig. D)

#22-18 AWG wire.				
AA-1190-06	6	1/4	1/4	5/8
AA-1191-08	8	9/32	1/4	5/8
AA-1192-10	10	21/64	1/4	11/16
#16-14 AWG wire.				
BB-1193-06	6	1/4	1/4	5/8
BB-1194-08	8	9/32	1/4	5/8
BB-1195-10	10	21/64	1/4	11/16

RECTANGULAR TONGUE (Fig. E)

#22-18 AWG wire.				
AA-114-06	6	19/64	7/32	9/16
AA-114-08	8	19/64	7/32	9/16
#16-14 AWG wire.				
BB-113-06	6	19/64	7/32	49/64
BB-113-08	8	19/64	7/32	49/64
BB 188-10	10	21/64	1/4	5/8

SLOTTED RING TONGUE (Fig. F)

#26-24 AWG wire.				
M 1120-06	6	1/4	19/64	37/64

VERSAKRIMP$^{T.M.}$ BRAZED SEAM BARREL RING TONGUE (Fig. A)

#22-18 AWG wire.				
A-320-04	4	7/32	5/32	33/64
AA-320-04	4	7/32	5/32	27/64
A-332-04	4	1/4	1/4	41/64
AA 332-04	4	1/4	1/4	35/64
A-320-06	6	7/32	5/32	33/64
AA 320-06	6	7/32	5/32	27/64
A-332-06	6	1/4	1/4	41/64
AA 332-06	6	1/4	1/4	35/64
A-332-08	8	1/4	1/4	41/64
AA-332-08	8	1/4	1/4	35/64
A-321-08	8	5/16	5/16	23/32
AA-321-08	8	5/16	5/16	5/8
A 321-10	10	5/16	5/16	23/32
AA-321-10	10	5/16	5/16	5/8
A 322-14	1/4	15/32	13/32	57/64
A 322 56	5/16	15/32	13/32	57/64

VERSAKRIMP$^{T.M.}$ RING TONGUE

ETC Part No.	Stud Size S	Dimen., Inches Width W	Clear-ance C	Length L
#16-14 AWG wire.				
B-323-06	6	1/4	7/32	19/32
BB-323-06	6	1/4	7/32	1/2
B-337-08	8	5/16	9/32	45/64
BB-339-08	8	11/32	5/16	41/64
B-337-10	10	5/16	9/32	45/64
BB-337-10	10	5/16	9/32	39/64
B-339-10	10	11/32	5/16	47/64
BB-339-10	10	11/32	5/16	41/64
B-325-14	1/4	15/32	13/32	57/64
BB-325-14	1/4	15/32	13/32	51/64
B-325-56	5/16	15/32	13/32	57/64
BB-325-56	5/16	15/32	13/32	51/64
#12-10 AWG wire.				
C-328-10	10	3/8	5/16	3/4
C-330-14†	1/4	17/32	13/32	59/64
C-330-56	5/16	17/32	13/32	59/64
C-340-38	3/8	19/32	31/64	1-1/32
#8 AWG wire.				
D-350-10°	10	15/32	11/32	61/64
D-350-14°	1/4	15/32	11/32	61/64

SPADE TONGUE (Fig. B)

#22-18 AWG wire.				
AA-3109-02	2	3/16	13/64	1/2
AA-338-04	4	1/4	7/32	17/32
A-338-06	6	1/4	7/32	5/8
AA-338-06	6	1/4	7/32	17/32
A-334-06	6	19/64	7/32	5/8
AA-334-06	6	19/64	7/32	17/32
A-335-06	6	5/16	5/16	3/4
AA-334-08	8	19/64	7/32	17/32
A-335-08	8	5/16	5/16	3/4
A-335-10	10	5/16	5/16	3/4
#16-14 AWG wire.				
B-324-06	6	19/64	7/32	5/8
BB-324-06	6	19/64	7/32	17/32
B-324-08	8	19/64	7/32	5/8
BB-324-08	8	19/64	7/32	17/32
B-327-10	10	23/64	9/32	3/4
BB-327-10	10	23/64	9/32	21/32
#12-10 AWG wire.				
C-341-08	8	3/8	5/16	25/32
C-341-10	10	3/8	5/16	25/32

FLANGED SPADE TONGUE (Fig. C)

#22-18 AWG wire.				
A-315-06	6	19/64	7/32	5/8
AA-315-06	6	19/64	7/32	17/32
A-315-08	8	19/64	7/32	5/8
AA-315-08	8	19/64	7/32	17/32
#16-14 AWG wire.				
B-316-06	6	19/64	7/32	5/8
B-316-08	8	19/64	7/32	5/8
B-383-10	10	3/8	1/4	23/32

RECTANGULAR TONGUE (Fig. E)

#22-18 AWG wire.				
A-314-06	6	19/64	7/32	5/8
A-314-08	8	19/64	7/32	5/8

VIBRAKRIMP® INSULATION SUPPORT TIN PLATED BRASS SLEEVE SPADE TONGUE (Fig. G)

#22-18 AWG wire.				
AA-434-06	6	19/64	7/32	11/16
AA-434-08	8	19/64	7/32	11/16

FLANGED SPADE TONGUE (Fig. H)

#16-14 AWG wire.				
BB-416-06	6	19/64	7/32	11/16
BB 416-08	8	19/64	7/32	11/16
BB-483-10	10	3/8	1/4	25/32

† 500 terminals per reel.
° Parts not available on tape.

INSULATED TERMINALS

INSULKRIMP® PVC INSULATION RING TONGUE (Fig. I)

ETC Part No.	Stud Size S	Dimen., Inches Width W	Clear-ance C	Length L
#22-18 AWG wire.				
A-220-04X	4	7/32	5/32	45/64
AA-220-04X	4	7/32	5/32	5/8
A-232-04X	4	1/4	1/4	53/64
AA-232-04X	4	1/4	1/4	3/4
A-220-06X	6	7/32	5/32	45/64
AA-220-06X	6	7/32	5/32	5/8
A-232-06X	6	1/4	1/4	53/64
AA-232-06X	6	1/4	1/4	3/4
A-232-08X	8	1/4	1/4	53/64
AA-232-08X	8	1/4	1/4	3/4
A-221-08X	8	5/16	5/16	29/32
AA-221-08X	8	5/16	5/16	53/64
A-221-10X	10	5/16	5/16	29/32
AA-221-10X	10	5/16	5/16	53/64
A-222-14X	1/4	15/32	13/32	1-5/64
A-222-56X	5/16	15/32	13/32	1-5/64
#16-14 AWG wire.				
B-223-06X	6	1/4	7/32	25/32
BB-223-06X	6	1/4	7/32	45/64
B-237-08X	8	5/16	9/32	57/64
BB-239-08X	8	11/32	5/16	27/32
B-228-08HDX†	8	3/8	5/16	1-1/16
B-237-10X	10	5/16	9/32	57/64
BB-237-10X	10	5/16	9/32	13/16
B-239-10X	10	11/32	5/16	59/64
BB-239-10X	10	11/32	5/16	27/32
B-228-10HDX†	10	3/8	5/16	1-1/16
B-225-14X	1/4	15/32	13/32	1-5/64
BB-225-14X	1/4	15/32	13/32	1
B-225-56X	5/16	15/32	13/32	1-5/64
BB-225-56X	5/16	15/32	13/32	1
#12-10 AWG wire.				
C-228-10X	10	3/8	5/16	1-1/16
C-230-14X†	1/4	17/32	13/32	1-15/64
C-230-56X†	5/16	17/32	13/32	1-15/64
C-240-38X	3/8	19/32	31/64	1-11/32
#8 AWG wire.				
D-650-10°	10	15/32	11/32	1-17/64
D-656-10°	10	3/8	11/32	1-7/32
D-650-14°	1/4	15/32	11/32	1-17/64
D-656-14°	1/4	3/8	11/32	1-7/32

SPADE TONGUE (Fig. J)

#16-14 AWG wire.				
B-224-06X	6	19/64	7/32	13/16
B-224-08X	8	19/64	7/32	13/16
B-227-10X	10	23/64	9/32	15/16

FLANGED SPADE TONGUE (Fig. K)

#22-18 AWG wire.				
AA-215-06X	6	19/64	7/32	47/64
AA-215-08X	8	19/64	7/32	47/64
#16-14 AWG wire.				
B 216-06X	6	19/64	7/32	13/16
B-216-08X	8	19/64	7/32	13/16
B-283-10X	10	3/8	1/4	29/32

ETC copper terminals and splices are electroplated with tin, made from .032 stock, feature V-notch serrations in barrel for best wire grip. Insulated terminals are color-coded for easy wire identification. Where applicable, terminals are covered by UL, CSA and Military specification approvals. Quick disconnect terminals are tinplated brass construction.

Heavy Duty parts (HDX at end of part number) have .050" Copper stock in #16-14 wire range and should be crimped by 12-10 tooling.

ETC Terminal Products Unit

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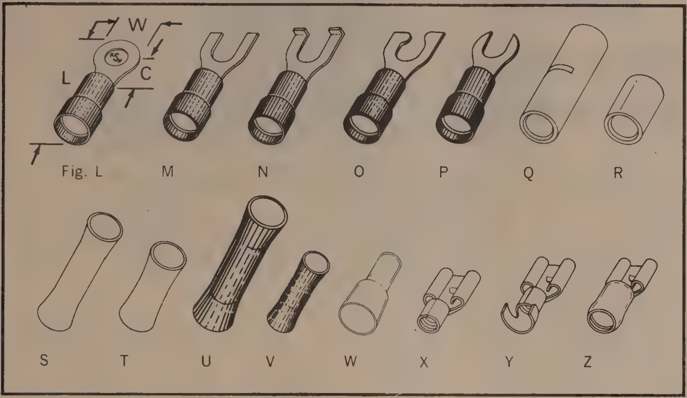
ETC® SOLDERLESS TERMINALS, SPLICES



INSULATED TERMINALS

AVIKRIMP® NYLON INSULATED VIBRATION SUPPORT RING TONGUE (Fig. L)

#26-24 AWG wire.

ETC Part No.	Stud Size S	Dimen., Inches Width W	Clear-ance C	Length L
M-8122-02	2	9/64	1/8	33/64
M-8113-04	4	13/64	7/32	21/32
M-8113-06	6	13/64	7/32	21/32
M-8118-06	6	1/4	19/64	3/4
M-8118-08	8	1/4	19/64	3/4
M-8118-10	10	1/4	19/64	3/4
#22-18 AWG wire.				
A-520-04	4	7/32	5/32	45/64
AA-820-04	4	7/32	5/32	5/8
A-532-04	4	1/4	1/4	53/64
AA-832-04	4	1/4	1/4	3/4
A-520-06	6	7/32	5/32	45/64
AA-820-06	6	7/32	5/32	5/8
A-532-08	8	1/4	1/4	53/64
AA-832-08	8	1/4	1/4	3/4
A-521-08	8	5/16	5/16	29/32
AA-821-08	8	5/16	5/16	53/64
A-521-10	10	5/16	5/16	29/32
AA-821-10	10	5/16	5/16	53/64
A-522-14	1/4	15/32	13/32	1- 5/64
A-522-56	5/16	15/32	13/32	1- 5/64
#16-14 AWG wire.				
B-523-06	6	1/4	7/32	25/32
BB-823-06	6	1/4	7/32	45/64
B-537-08	8	5/16	9/32	57/64
BB-839-08	8	11/32	5/16	27/32
B-537-10	10	5/16	9/32	57/64
BB-837-10	10	5/16	9/32	13/16
B-539-10	10	11/32	5/16	59/64
BB-839-10	10	11/32	5/16	27/32
B-525-14	1/4	15/32	13/32	1- 5/64
BB-825-14	1/4	15/32	13/32	1
B-525-56	5/16	15/32	13/32	1- 5/64
BB-825-56	5/16	15/32	13/32	1
#12-10 AWG wire.				
C-828-10	10	3/8	5/16	1- 3/64
C-830-14†	1/4	17/32	13/32	1-21/64
C-830-56†	5/16	17/32	13/32	1- 7/32
C-840-38*	3/8	19/32	31/64	1-21/64

SPADE TONGUE (Fig. M)

#26-24 AWG wire.				
M-8123-00	0	9/64	1/8	1/2
M-8116-02	2	3/16	7/32	21/32
M-8121-04	4	13/64	7/32	41/64
#22-18 AWG wire.				
AA-8109-02	2	3/16	13/64	45/64
AA-838-04	4	1/4	7/32	47/64
A-538-06	6	1/4	7/32	13/16
AA-838-06	6	1/4	7/32	47/64
A-534-06	6	19/64	7/32	13/16
AA-834-06	6	19/64	7/32	47/64
A-535-06	6	5/16	5/16	15/16
A-535-08	8	5/16	5/16	15/16
A-535-10	10	5/16	5/16	15/16
#16-14 AWG wire.				
B-524-06	6	19/64	7/32	13/16
BB-824-06	6	19/64	7/32	47/64
B-524-08	8	19/64	7/32	13/16
BB-824-08	8	19/64	7/32	47/64
B-527-10	10	23/64	9/32	15/16
BB-827-10	10	23/64	9/32	55/64
#12-10 AWG wire.				
C-841-08	8	3/8	5/16	1- 5/64
C-841-10	10	3/8	5/16	1- 5/64

FLANGED SPADE TONGUE (Fig. N)

ETC Part No.	Stud Size S	Dimen., Inches Width W	Clear-ance C	Length L
#22-18 AWG wire.				
A-515-06	6	19/64	7/32	13/16
AA-815-06	6	19/64	7/32	47/64
A-515-08	8	19/64	7/32	13/16
AA-815-08	8	19/64	7/32	47/64
#16-14 AWG wire.				
B-516-06	6	19/64	7/32	13/16
BB-816-06	6	19/64	7/32	47/64
B-516-08	8	19/64	7/32	13/16
BB-816-08	8	19/64	7/32	47/64
B-583-10	10	3/8	1/4	29/32
BB-883-10	10	3/8	1/4	53/64

SNAP SPADE (Fig. O)

#22-18 AWG wire.				
AA-5190-06	6	1/4	1/4	53/64
AA-5191-08	8	9/32	1/4	53/64
AA-5192-10	10	21/64	1/4	57/64
#16-14 AWG wire.				
BB-5193-06	6	1/4	1/4	53/64
BB-5194-08	8	9/32	1/4	53/64
BB-5195-10	10	21/64	1/4	57/64

SLOTTED RING (Fig. P)

#26-24 AWG wire.				
M-8120-06	6	1/4	19/64	3/4

Max. Wire Insul. Dia.

#26-24:.075 #16-14:.170
#22-18:.140 #12-10:.235

UNINSULATED SPLICES

VERSAKRIMP^T.M. SEAMLESS BUTT SPLICE (Fig. Q)

ETC Number	Wire Range	Length Inch
AS-345*	22-18	21/32
BS-331*	16-14	21/32
CS-346*	12-10	13/16

PARALLEL SPLICE (Fig. R)

AS-302*	22-18	5/16
BS-304*	16-14	5/16
CS-303*	12-10	5/16

CRIMPING TOOL

ABC-550 for #22-10 AWG, insulated and non-insulated terminals. Strips and cuts wire; slices bolts.

Parts not available on tape.
+ Heavy duty parts have .050 copper stock in #16-14 wire range and should be crimped by tooling.
† 500 terminals per reel.

INSULATED SPLICES

INSULKRIMP® PVC INSULATED BUTT SPLICE (Fig. S)

ETC Number	Wire Range	Length Inch	Max. Wire Insul. Dia.
A-245X†	22-18	1- 1/64	.145
B-231X†	16-14	1- 1/16	.175
C-246X†	12-10	1-15/16	.255

PARALLEL SPLICE (Fig. T)

A-202X*	22-18	11/16	.145
B-204X*	16-14	11/16	.175
C-203X*	12-10	25/32	.255

NYLAKRIMP^T.M. NYLON INSULATED BUTT SPLICE (Fig. U)

AS-N-345†	22-18	1- 1/64	.120
BS-N-331†	16-14	1- 1/16	.150
CS-N-346†	12-10	1-15/64	.210

PARALLEL SPLICE (Fig. V)

AS-N-302*	22-18	5/8	.120
BS-N-304*	16-14	5/8	.150
CS-N-303*	12-10	5/8	.210

NYLON CLOSED END CONNECTORS (Fig. W)

ETC Number	Wire Range	Circular Mil Area
NC-2214*	22-14	600— 5,180
NC-1610*	16-10	2400—13,100

QUICK DISCONNECTS

KRIMPTITE® UNINSULATED BUTTED SEAM BARREL (Fig. X)

ETC Number	Wire Range	Fits Tab Size,
AA-1140	22-18	.250 x .032
BB-1141	16-14	.250 x .032
P-1142	14-12	.250 x .032
AA-1137	22-18	.187 x .020
BB-1138	16-14	.187 x .020

VIBRAKRIMP® VIBRATION SUPPORT BARREL (Fig. Y)

AA-4176	22-18	.250 x .032
BB-4177	16-14	.250 x .032
P-4178	14-12	.250 x .032
AA-4173	22-18	.187 x .020
BB-4174	16-14	.187 x .020

Max. Wire Insul. Dia.:

#22-18:.060/.125
#16-14:.085/.145
#14-12:.100/.175

AVIKRIMP® NYLON INSULATED AND VIBRATION SUPPORT (Fig. Z)

AA-8140	22-18	.250 x .032
BB-8141	16-14	.250 x .032
P-8142	14-12	.250 x .032
AA-8137	22-18	.187 x .020
BB-8138	16-14	.187 x .020

Max. Wire Insul. Dia.:

#22-18:.125
#16-14:.142
#14-12:.170

TAPE-FED PARTS

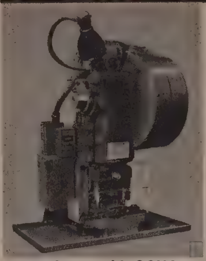
Terminals, Splices and Quick Disconnects are available on Tape for automated crimping. To order Tape-Fed parts, suffix the part number with a "T". Example: A-320-04-T.

ETC Terminal Products Unit

CANNON ITT

Here's a sampling of Connecting Devices from Cannon...

and there's more where these came from!



Customer Tooling

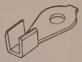
Lower your *total installed cost* by installing a high speed crimping press and using continuous strip terminals, quick connects, blades, tabs and the other wire connecting devices shown.

Press shown with OSHA required guards and protective devices.

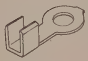
TERMINALS

#10 to #24 AWG. Non-insulated or with insulation supports where vibration is excessive. Tin and other platings available.

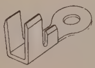
Ring Tongues



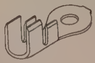
Part No. RX-20
Basic part: .020 brass,
#16-20 AWG.



Part No. RX-100
Basic part: .030 brass,
#14-18 AWG.

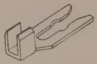


Part No. R-81
Basic part: .020 brass,
Insul. Range: .120-.170, #14-18 AWG.

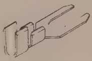


Part No. R-98
Basic part: .030 brass,
Insul. Range: .140-.200, #10-12 AWG.

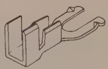
Spade Tongues



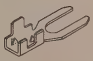
Part No. S-300
Marine Application
Basic part: .032 brass,
#12-16 AWG.



Part No. S-2
Standard Spade,
Basic part: .020 brass,
Insul. Range: .060-.100, #18-20 AWG.



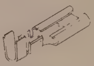
Part No. SG-17
Grip design tongue
Basic part: .025 brass,
Insul. Range: .130-.180, #14-18 AWG.



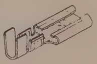
Part No. SP-60
Insulation Piercing for Tele/Communication Equip., Insul. Range: .055-.090,
#20-24 AWG.

Quick Connects

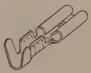
General use on appliances: fits .187 and .250 mating tabs.



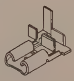
Part No. Q-6
For .032 x .250 tab,
Insul. Range: .120-.170, #14-18 AWG.



Part No. Q-95
For .188 x .020 tab,
Insul. Range: .090-.130, #16-20 AWG.



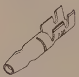
Part No. QJ11
For .020 x .205 tab,
Insul. Range: .085-.125, #18-22 AWG.



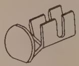
Part No. Q-25R
For .250 x .020 tab,
Insul. Range: .090-.170, #16-20 AWG.

Automotive Connecting Devices

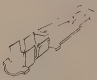
Wide range of devices in wire ranges to cover most applications.



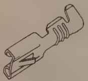
Part No. MT-740
Multiple Connector
Insul. Range: .090-.190, #12-18 AWG.



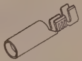
Part No. BC-55
Bulb Contact for head/stop lights.
Insul. Range: .075-.121, #18-16 AWG.



Part No. 89
Multiple Connector
Insul. Range: .075-.160, #14-20 AWG.



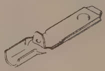
Part No. Q-220
Multiple Connector for .250 x .032 tab,
Insul. Range: .109-.187, #12-18 AWG.



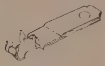
Part No. F-60
Multiple Connector
Insul. Range: .090-.190; #12-20 AWG.

Blades

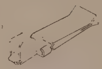
Male, female and grounding contact blades for cord and live set mfgs; #14-20 AWG. Male blades are available polarized.



Part No.
6MBHX44-247
Material: Brass
#16-20 AWG.

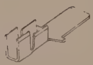


Part No.
11MBH44-250
Material: Brass
#18-20 AWG.

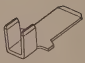


Part No. F-288
Wiper Blade, Material: Brass, #14-18 AWG.

Tabs

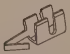


Part No. T-80
1/4 Male Tab,
with or without insulation supports,
#14-18 AWG.

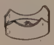


Part No. TX-83
.187 Male Tab,
with or without insulation supports,
#14-18 AWG.

OTHER CONNECTING DEVICES



Part No. PF-401
Printed Circuit Contact
Insul. Dia: .065
#22 AWG.

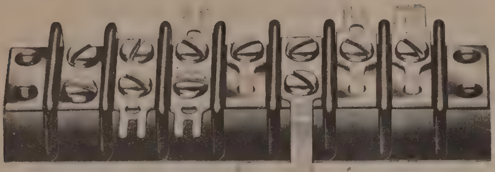


Part No. CC-140
Crown Crimp
Screw Sizes: 6, 8, 10
#16-18 AWG.

ETC Terminal Products Unit

CANNON ITT

ETC® TERMINAL BLOCKS–CLOSED and OPEN BACK



- **STYLE A** Standard Twin Screw
- **STYLE B** Single Solder Lug
- **STYLE C** Double Solder Lug
- **STYLE D** Internal Feedthru
- **STYLE E** External Feedthru
- **STYLE F** Solder/Internal Feedthru
- **STYLE G** Push-on/Internal Feedthru

ETC Terminal Blocks are available with closed or open backs. The part number tables on these pages show the closed back number. See tables for ordering open back version. Standard block material is general purpose phenolic. Other materials available that meet or exceed Mil. Spec. requirements: MIL-M-14F and MIL-M-19833.

Open Back Blocks are available with Lugs and Quick Disconnect Blades permanently riveted to the Block. Lugs available with rivets are: Double Solder Lug; Solder/Internal Feedthru; Push-on Internal Feedthru. To order riveted version, change first digit of Open Back Block from "2" to "1".

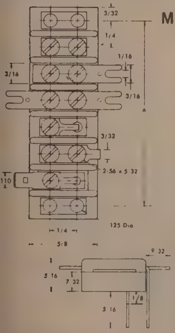
57000 SERIES: A 6-32 x 3/16" binder head screw version of the 27000 Series is available. Use 57000 in place of 27000.

67000 SERIES: A 6-32 x 3/16" binder head screw version of the 37000 Series is available. Use 67000 in place of 37000.

5 amp Twin Screw

CLOSED BACK ONLY: 1 to 26 terminal sections. (52 screws). Standard screws are 2-56 x 5/32" binder head brass nickel-plated.

No. Sections	STYLE A	B	C	D	E	G
1	33001	33101	33201	33301	33401	33601
2	33002	33102	33202	33302	33402	33602
3	33003	33103	33203	33303	33403	33603
4	33004	33104	33204	33304	33404	33604
5	33005	33105	33205	33305	33405	33605
6	33006	33106	33206	33306	33406	33606
7	33007	33107	33207	33307	33407	33607
8	33008	33108	33208	33308	33408	33608
9	33009	33109	33209	33309	33409	33609
10	33010	33110	33210	33310	33410	33610
11	33011	33111	33211	33311	33411	33611
12	33012	33112	33212	33312	33412	33612
13	33013	33113	33213	33313	33413	33613
14	33014	33114	33214	33314	33414	33614
15	33015	33115	33215	33315	33415	33615
16	33016	33116	33216	33316	33416	33616
17	33017	33117	33217	33317	33417	33617
18	33018	33118	33218	33318	33418	33618
19	33019	33119	33219	33319	33419	33619
20	33020	33120	33220	33320	33420	33620
21	33021	33121	33221	33321	33421	33621
22	33022	33122	33222	33322	33422	33622
23	33023	33123	33223	33323	33423	33623
24	33024	33124	33224	33324	33424	33624
25	33025	33125	33225	33325	33425	33625
26	33026	33126	33226	33326	33426	33626



MOUNTING DIMENSIONS

No. of Sections	"A" Dimen.
1	1/2
2	3/4
3	1
4	1-1/4
5	1-1/2
6	1-3/4
7	2
8	2-1/4
9	2-1/2
10	2-3/4
11	3
12	3-1/4
13	3-1/2
14	3-3/4
15	4
16	4-1/4
17	4-1/2
18	4-3/4
19	5
20	5-1/4
21	5-1/2
22	5-3/4
23	6
24	6-1/4
25	6-1/2
26	6-3/4

ELECTRICAL RATING

- Breakdown Volts RMS Closed Back . . . 2500
- Rated Current (Amps) 5
- Rated Volts 100
- Suggested Wire Range with ETC Lug . . . . #26-22 AWG

15 amp Twin Screw

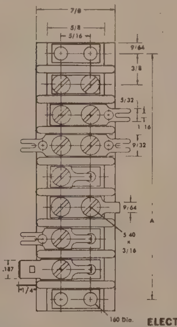
CLOSED BACK Part Numbers shown in table below. To order OPEN BACK version, replace first digit (3) with a "2". Standard screw is 5-40 x 3/16" binder head brass nickel-plated.

No. Sections	STYLE A	B	C	D	E	F	G
1	37001	37101	37201	37301	37401	37501	37601
2	37002	37102	37202	37302	37402	37502	37602
3	37003	37103	37203	37303	37403	37503	37603
4	37004	37104	37204	37304	37404	37504	37604
5	37005	37105	37205	37305	37405	37505	37605
6	37006	37106	37206	37306	37406	37506	37606
7	37007	37107	37207	37307	37407	37507	37607
8	37008	37108	37208	37308	37408	37508	37608
9	37009	37109	37209	37309	37409	37509	37609
10	37010	37110	37210	37310	37410	37510	37610
11	37011	37111	37211	37311	37411	37511	37611
12	37012	37112	37212	37312	37412	37512	37612
13	37013	37113	37213	37313	37413	37513	37613
14	37014	37114	37214	37314	37414	37514	37614
15	37015	37115	37215	37315	37415	37515	37615
16	37016	37116	37216	37316	37416	37516	37616
17	37017	37117	37217	37317	37417	37517	37617
18	37018	37118	37218	37318	37418	37518	37618
19	37019	37119	37219	37319	37419	37519	37619
20	37020	37120	37220	37320	37420	37520	37620
21	37021	37121	37221	37321	37421	37521	37621
22	37022	37122	37222	37322	37422	37522	37622
23	37023	37123	37223	37323	37423	37523	37623
24	37024	37124	37224	37324	37424	37524	37624
25	37025	37125	37225	37325	37425	37525	37625
26	37026	37126	37226	37326	37426	37526	37626
27	37027	37127	37227	37327	37427	37527	37627
28	37028	37128	37228	37328	37428	37528	37628
29	37029	37129	37229	37329	37429	37529	37629
30	37030	37130	37230	37330	37430	37530	37630
31	37031	37131	37231	37331	37431	37531	37631

15 amp Single Screw

Table shows CLOSED BACK. Double solder lug style block comes in OPEN BACK with rivets. To order, replace 1st digit (3) with "1".

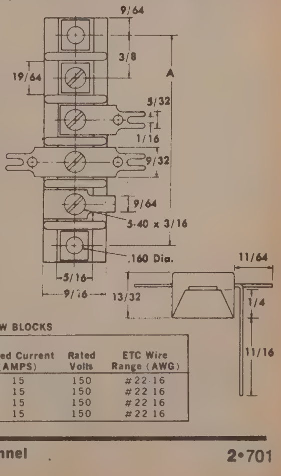
No. Sections	STYLE A	B	C	E
1	34001	34101	34201	34401
2	34002	34102	34202	34402
3	34003	34103	34203	34403
4	34004	34104	34204	34404
5	34005	34105	34205	34405
6	34006	34106	34206	34406
7	34007	34107	34207	34407
8	34008	34108	34208	34408
9	34009	34109	34209	34409
10	34010	34110	34210	34410
11	34011	34111	34211	34411
12	34012	34112	34212	34412
13	34013	34113	34213	34413
14	34014	34114	34214	34414
15	34015	34115	34215	34415
16	34016	34116	34216	34416
17	34017	34117	34217	34417
18	34018	34118	34218	34418
19	34019	34119	34219	34419
20	34020	34120	34220	34420
21	34021	34121	34221	34421
22	34022	34122	34222	34422
23	34023	34123	34223	34423
24	34024	34124	34224	34424
25	34025	34125	34225	34425
26	34026	34126	34226	34426
27	34027	34127	34227	34427
28	34028	34128	34228	34428
29	34029	34129	34229	34429
30	34030	34130	34230	34430
31	34031	34131	34231	34431



TWIN/SINGLE SCREW MOUNTING DIMENSIONS

No. of Sec.	"A" Dim.
1	3/4
2	1-1/8
3	1-1/2
4	1-7/8
5	2-1/4
6	2-5/8
7	3
8	3-3/8
9	3-3/4
10	4-1/8
11	4-1/2
12	4-7/8
13	5-1/4
14	5-5/8
15	6
16	6-3/8

No. of Sec.	"A" Dim.
17	6-3/4
18	7-1/8
19	7-1/2
20	7-7/8
21	8-1/4
22	8-5/8
23	9
24	9-3/8
25	9-3/4
26	10-1/8
27	10-1/2
28	10-7/8
29	11-1/4
30	11-5/8
31	12



ELECTRICAL RATING FOR TWIN AND SINGLE SCREW BLOCKS

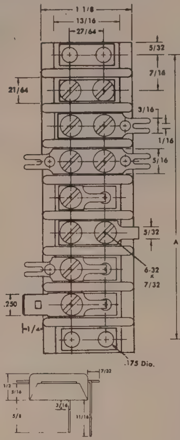
Term. Block Series	Breakdown Volts RMS Without Marker Strip	Breakdown Volts RMS With Marker Strip	Breakdown Volts RMS—Closed Back	Rated Current (AMPS)	Rated Volts	ETC Wire Range (AWG)
14000	1100	1200	—	15	150	#22-16
27000	1100	1200	—	15	150	#22 16
34000	—	—	3000	15	150	#22 16
37000	—	—	3000	15	150	#22 16

ETC® TERMINAL BLOCKS–CLOSED and OPEN BACK

20 amp Twin Screw

Closed back part nos. shown in table below. To order open back version, replace first digit (3) with a "2". Standard screw is 6-32x7/32" binder head brass nickel-plated. See previous page for rivet information.

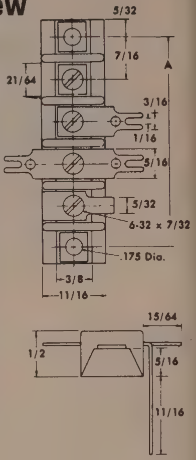
No. Sections	STYLE*						
	A	B	C	D	E	F	G
1	38001	38101	38201	38301	38401	38501	38601
2	38002	38102	38202	38302	38402	38502	38602
3	38003	38103	38203	38303	38403	38503	38603
4	38004	38104	38204	38304	38404	38504	38604
5	38005	38105	38205	38305	38405	38505	38605
6	38006	38106	38206	38306	38406	38506	38606
7	38007	38107	38207	38307	38407	38507	38607
8	38008	38108	38208	38308	38408	38508	38608
9	38009	38109	38209	38309	38409	38509	38609
10	38010	38110	38210	38310	38410	38510	38610
11	38011	38111	38211	38311	38411	38511	38611
12	38012	38112	38212	38312	38412	38512	38612
13	38013	38113	38213	38313	38413	38513	38613
14	38014	38114	38214	38314	38414	38514	38614
15	38015	38115	38215	38315	38415	38515	38615
16	38016	38116	38216	38316	38416	38516	38616
17	38017	38117	38217	38317	38417	38517	38617
18	38018	38118	38218	38318	38418	38518	38618
19	38019	38119	38219	38319	38419	38519	38619
20	38020	38120	38220	38320	38420	38520	38620
21	38021	38121	38221	38321	38421	38521	38621
22	38022	38122	38222	38322	38422	38522	38622
23	38023	38123	38223	38323	38423	38523	38623
24	38024	38124	38224	38324	38424	38524	38624
25	38025	38125	38225	38325	38425	38525	38625
26	38026	38126	38226	38326	38426	38526	38626



20 amp Single Screw

Table shows closed back. Double solder lug style block comes in open back with rivets. To order, replace 1st digit (3) with "1".

No. Sections	STYLE*			
	A	B	C	E
1	35001	35101	35201	35401
2	35002	35102	35202	35402
3	35003	35103	35203	35403
4	35004	35104	35204	35404
5	35005	35105	35205	35405
6	35006	35106	35206	35406
7	35007	35107	35207	35407
8	35008	35108	35208	35408
9	35009	35109	35209	35409
10	35010	35110	35210	35410
11	35011	35111	35211	35411
12	35012	35112	35212	35412
13	35013	35113	35213	35413
14	35014	35114	35214	35414
15	35015	35115	35215	35415
16	35016	35116	35216	35416
17	35017	35117	35217	35417
18	35018	35118	35218	35418
19	35019	35119	35219	35419
20	35020	35120	35220	35420
21	35021	35121	35221	35421
22	35022	35122	35222	35422
23	35023	35123	35223	35423
24	35024	35124	35224	35424
25	35025	35125	35225	35425
26	35026	35126	35226	35426



ELECTRICAL RATING FOR TWIN AND SINGLE SCREW BLOCKS

Term. Block Series	Breakdown Volts RMS Without Marker Strip	Breakdown Volts RMS With Marker Strip	Breakdown Volts RMS—Closed Back	Rated Current (AMPS)	Rated Volts	ETC Wire Range (AWG)
15000	1100	1600	—	20	250	#16 14
28000	1100	1600	—	20	250	#16-14
35000	—	—	3400	20	250	#16 14
38000	—	—	3400	20	250	#16 14

TWIN/SINGLE SCREW MOUNTING DIMENSIONS

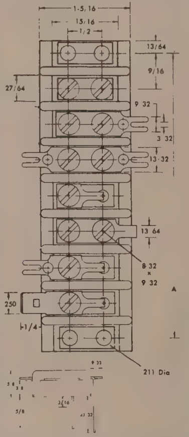
No. of Sections	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
"A" Dimension	7/8	1-5/16	1-3/4	2-3/16	2-5/8	3-1/16	3-1/2	3-15/16	4-3/8	4-13/16	5-1/4	5-11/16	6-1/8	6-9/16	7	7-7/16

No. of Sections	17	18	19	20	21	22	23	24	25	26
"A" Dimension	7-7/8	8-5/16	8-3/4	9-3/16	9-5/8	10-1/16	10-1/2	10-15/16	11-3/8	11-13/16

30 amp Twin Screw

Closed back part nos. shown in table below. To order open back version, replace first digit (3) with a "2". Standard screw is 8-32x9/32" binder head brass nickel-plated.

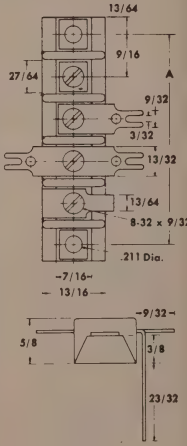
No. Sections	STYLE*						
	A	B	C	D	E	F	G
1	39001	39101	39201	39301	39401	39501	39601
2	39002	39102	39202	39302	39402	39502	39602
3	39003	39103	39203	39303	39403	39503	39603
4	39004	39104	39204	39304	39404	39504	39604
5	39005	39105	39205	39305	39405	39505	39605
6	39006	39106	39206	39306	39406	39506	39606
7	39007	39107	39207	39307	39407	39507	39607
8	39008	39108	39208	39308	39408	39508	39608
9	39009	39109	39209	39309	39409	39509	39609
10	39010	39110	39210	39310	39410	39510	39610
11	39011	39111	39211	39311	39411	39511	39611
12	39012	39112	39212	39312	39412	39512	39612
13	39013	39113	39213	39313	39413	39513	39613
14	39014	39114	39214	39314	39414	39514	39614
15	39015	39115	39215	39315	39415	39515	39615
16	39016	39116	39216	39316	39416	39516	39616
17	39017	39117	39217	39317	39417	39517	39617
18	39018	39118	39218	39318	39418	39518	39618
19	39019	39119	39219	39319	39419	39519	39619
20	39020	39120	39220	39320	39420	39520	39620
21	39021	39121	39221	39321	39421	39521	39621
22	39022	39122	39222	39322	39422	39522	39622
23	39023	39123	39223	39323	39423	39523	39623
24	39024	39124	39224	39324	39424	39524	39624
25	39025	39125	39225	39325	39425	39525	39625
26	39026	39126	39226	39326	39426	39526	39626



30 amp Single Screw

Table shows closed back. Double solder lug style block comes in open back with rivets. To order, replace 1st digit (3) with "1".

No. Sections	STYLE*			
	A	B	C	E
1	36001	36101	36201	36401
2	36002	36102	36202	36402
3	36003	36103	36203	36403
4	36004	36104	36204	36404
5	36005	36105	36205	36405
6	36006	36106	36206	36406
7	36007	36107	36207	36406
8	36008	36108	36208	36408
9	36009	36109	36209	36409
10	36010	36110	36210	36410
11	36011	36111	36211	36411
12	36012	36112	36212	36412
13	36013	36113	36213	36413
14	36014	36114	36214	36414
15	36015	36115	36215	36415
16	36016	36116	36216	36416
17	36017	36117	36217	36417
18	36018	36118	36218	36418
19	36019	36119	36219	36419
20	36020	36120	36220	36420
21	36021	36121	36221	36421
22	36022	36122	36222	36422
23	36023	36123	36223	36423
24	36024	36124	36224	36424
25	36025	36125	36225	36425
26	36026	36126	36226	36426



ELECTRICAL RATING FOR TWIN AND SINGLE SCREW BLOCKS

Term. Block Series	Breakdown Volts RMS Without Marker Strip	Breakdown Volts RMS With Marker Strip	Breakdown Volts RMS—Closed Back	Rated Current (AMPS)	Rated Volts	ETC Wire Range (AWG)
16000	1600	2500	—	30	600	#14-12
29000	1600	2500	—	30	600	#14-12
36000	—	—	4000	30	600	#14 12
39000	—	—	4000	30	600	#14 12

TWIN/SINGLE SCREW MOUNTING DIMENSIONS

No of Sections	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
"A" Dimension	1 1/8	1-11/16	2-1/4	2-13/16	3-3/8	3 15/16	4-1/2	5-1/16	5-5/8	6-3/16	6 3/4	7-5/16	7-7/8	8-7/16	9	9-9/16

No of Sections	17	18	19	20	21	22	23	24	25	26
"A" Dimension	10 1/8	10 11/16	11-1/4	11-13/16	12-3/8	12 15/16	13-1/2	14-1/16	14-5/8	15-3/16

*See previous page for available block styles.

See YELLOW SECTION for Local Sales Offices and Key Personnel

ETC® TERMINAL BLOCK LUGS, QUICK DISCONNECTS

Lugs available loose-piece. Prime quality brass. per Mil Spec QQ-B-613, hot-dip plated in electrolytic tin for easy soldering. Note in tables below that Lugs are for both Open and Closed back blocks.

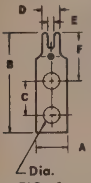


FIG. 1

SINGLE SOLDER LUG, FIG. 1
FITS TWIN AND SINGLE SCREW BLOCKS

Fits Block No.	Lug No.	Dia.	A	B	C	D	E	F
14000, 34000	3401	156	9/32	37/64	—	1/16	5/32	29/64
15000, 35000	3501	.162	5/16	47/64	—	1/16	3/16	37/64
16000, 36000	3601	192	13/32	7/8	—	3/32	9/32	11/16
27000, 37000	3701	.156	9/32	57/64	5/16	5/32	1/16	29/64
28000, 38000	3801	.162	5/16	1- 5/32	27/64	3/16	1/16	37/64
29000, 39000	3901	.192	13/32	1 3/8	1/2	9/32	3/32	11/16
33000.	3301	.095	—	13/16	1/4	3/16	1/16	15/32

DOUBLE SOLDER LUG, FIG. 2
FITS TWIN AND SINGLE SCREW BLOCKS

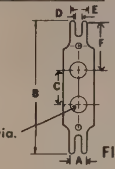


FIG. 2

Fits Block No.	Lug No.	Dia.	A	B	C	D	E	F
14000, 34000	3402	156	9/32	29/32	—	1/16	5/32	29/64
15000, 35000	3502	162	5/16	1 5/32	—	1/16	3/16	37/64
16000, 36000	3602	.192	13/32	1 3/8	—	3/32	9/32	11/16
27000, 37000	3702	156	9/32	1 7/32	5/16	5/32	1/16	29/64
28000, 38000	3802	162	5/16	1 37/64	27/64	3/16	1/16	37/64
29000, 39000	3902	192	13/32	1 7/8	1/2	9/32	3/32	11/16
33000	3302	095	—	1 3/16	1/4	3/16	1/16	15/32

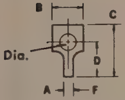
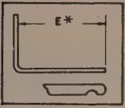


FIG. 3



INTERNAL FEEDTHRU LUG, FIG. 3

Fits Block No.	Lug No.	Dia.	A	B	C	D	E*
27000, 37000	3703	156	3/32	9/32	29/64	21/64	23/32
	3734	156	3/32	9/32	29/64	21/64	13/32
	3735	.156	3/32	9/32	29/64	21/64	15/32
	3736	.156	3/32	9/32	29/64	21/64	31/32
28000, 38000	3803	.162	7/64	5/16	19/32	7/16	31/32
	3834	.162	7/64	5/16	19/32	7/16	15/32
	3835	.162	7/64	5/16	19/32	7/16	17/32
	3836	.162	7/64	5/16	19/32	7/16	1- 1/16
29000 39000	3903	192	1/8	13/32	45/64	33/64	1- 1/32
33000	3303	.095	1/16	3/16	23/64	17/64	9/16

EXTERNAL FEEDTHRU LUG, FIG. 4
FITS TWIN AND SINGLE SCREW BLOCKS

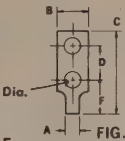


FIG. 4

Fits Block No.	Lug No.	Dia.	A	B	C	D	E*	F
14000, 34000	3404	156	9/64	9/32	15/32	—	31/32	11/32
15000, 35000	3504	.162	5/32	5/16	37/64	—	1 1/32	25/64
16000, 36000	3604	.192	13/64	13/32	21/32	—	1 1/8	15/32
27000, 37000	3704	156	9/64	9/32	25/32	5/16	31/32	11/32
28000, 38000	3804	162	5/32	5/16	1	27/64	1 1/32	27/64
29000, 39000	3904	192	13/64	13/32	1 5/32	1/2	1 1/8	15/32
33000	3304	.095	3/32	3/16	37/64	1/4	9/16	15/64

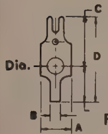


FIG. 5

SOLDER INTERNAL FEED THRU LUG, FIG. 5

Fits Block No.	Lug No.	Dia.	A	B	C	D	E*	F
27000,37000	3705	.156	9/32	3/32	29/64	25/32	23/32	21/64
28000,38000	3805	.162	5/16	7/64	37/64	1- 1/64	31/32	7/16
29000,39000	3905	.192	13/32	1/8	11/16	1-13/64	1- 1/32	33/64

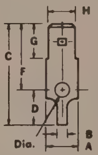


FIG. 6

PUSH-ON INTERNAL FEEDTHRU LUG, FIG. 6

Fits Block No.	Lug No.	Dia.	A	B	C	D	E*	F	G	H
27000, 37000	3706	156	9/32	3/32	55/64	21/64	15/32	17/32	1/4	.187
28000, 38000	3806	162	5/16	7/64	1 3/64	7/16	17/32	39/64	5/16	250
29000, 39000	3906	192	13/32	1/8	1-11/64	33/64	19/32	21/32	5/16	.250
33000	3306	095	3/16	1/16	47/64	1/4	3/8	15/32	1/4	.110

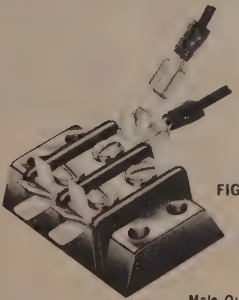
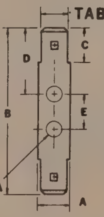
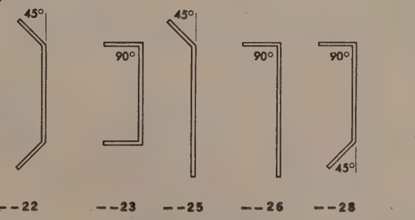


FIG. 1





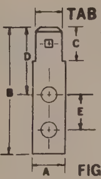
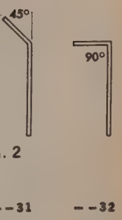


FIG. 2



Male Quick Disconnect Blades are brass electroplated with tin. Complete last two digits of Blade series in chart based on illustrations and corresponding last two digits above. To order, suffix the number to the Block number, e.g., 27012-3722.

FIG. 1

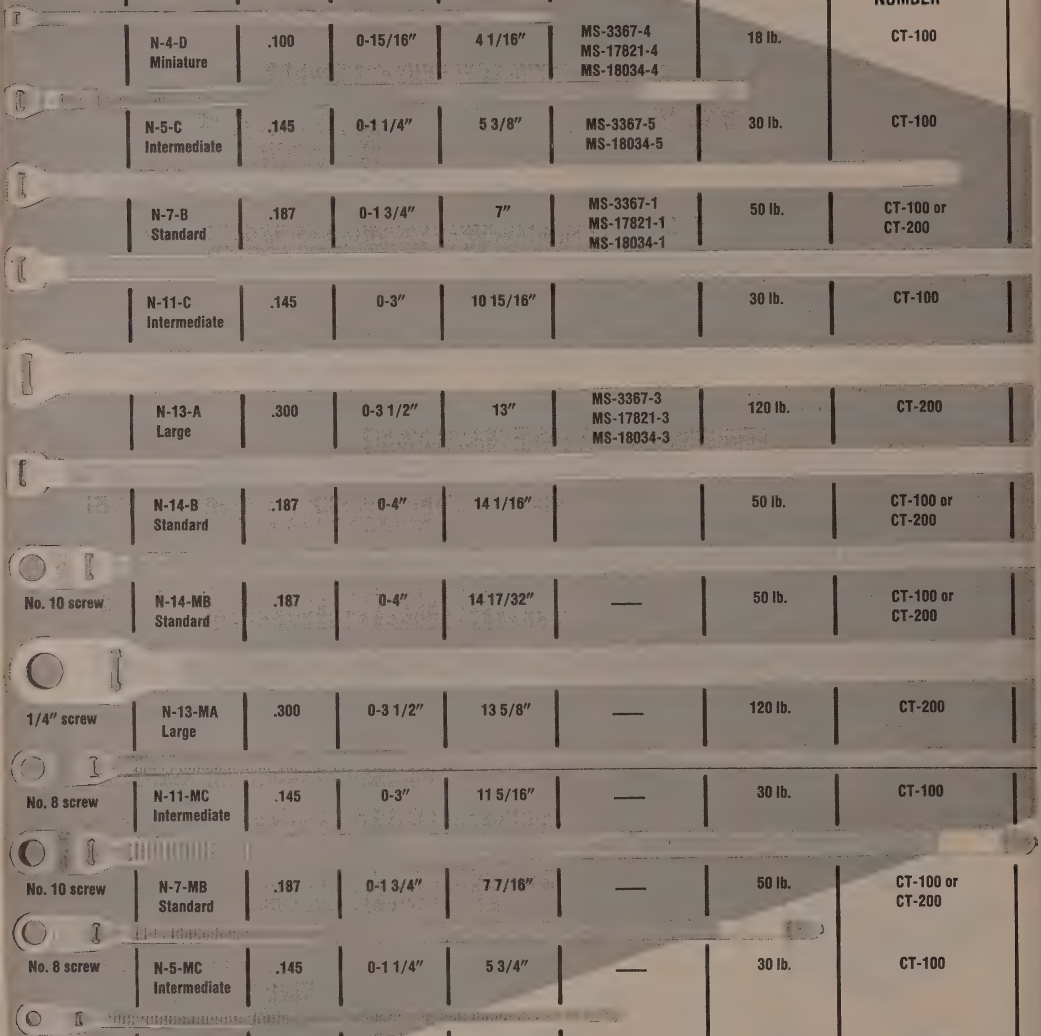
Fits Block No.	Tab Size	Blade Series	Dia.	A	B	C	D	E
14000,34000	.187	34--	.156	9/32	21/32	1/4	17/32	—
15000,35000	.250	35--	.162	5/16	1-7/32	5/16	39/64	—
16000,36000	.250	36--	.192	13/32	1-5/16	5/16	21/32	—
27000,37000	.187	37--	156	9/32	1-3/8	1/4	17/32	5/16
28000,38000	.250	38--	.162	5/16	1-41/64	5/16	39/64	27/64
29000,39000	.250	39--	.192	13/32	1-13/16	5/16	21/32	1/2
33000	.110	33--	.095	3/16	1-3/16	1/4	15/32	1/4

FIG. 2

Fits Block No.	Tab Size	Blade Series	Dia.	A	B	C	D	E
14000, 34000	.187	34--	.156	9/32	21/32	1/4	17/32	—
15000, 35000	.250	35--	162	5/16	49/64	5/16	39/64	—
16000, 36000	.250	36--	192	13/32	27/32	5/16	21/32	—
27000, 37000	187	37--	156	9/32	31/32	1/4	17/32	5/16
28000, 38000	250	38--	.162	5/16	1-3/16	5/16	39/64	27/64
29000,39000	.250	39--	.192	13/32	1 11/32	5/16	21/32	1/2
33000	.110	33--	095	3/16	1-3/16	1/4	15/32	1/4

SELF-LOCKING NYLON CABLE TIES

STANDARD SELF-LOCKING



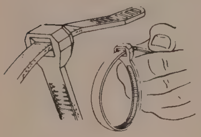
PART NO.	WIDTH	BUNDLE DIA.	LENGTH	MILITARY STANDARDS	MINIMUM LOOP TENSILE STRENGTH	USE CABLE TYING TOOL CATALOG NUMBER
N-4-D Miniature	.100	0-15/16"	4 1/16"	MS-3367-4 MS-17821-4 MS-18034-4	18 lb.	CT-100
N-5-C Intermediate	.145	0-1 1/4"	5 3/8"	MS-3367-5 MS-18034-5	30 lb.	CT-100
N-7-B Standard	.187	0-1 3/4"	7"	MS-3367-1 MS-17821-1 MS-18034-1	50 lb.	CT-100 or CT-200
N-11-C Intermediate	.145	0-3"	10 15/16"		30 lb.	CT-100
N-13-A Large	.300	0-3 1/2"	13"	MS-3367-3 MS-17821-3 MS-18034-3	120 lb.	CT-200
N-14-B Standard	.187	0-4"	14 1/16"		50 lb.	CT-100 or CT-200
N-14-MB Standard	.187	0-4"	14 17/32"	—	50 lb.	CT-100 or CT-200
N-13-MA Large	.300	0-3 1/2"	13 5/8"	—	120 lb.	CT-200
N-11-MC Intermediate	.145	0-3"	11 5/16"	—	30 lb.	CT-100
N-7-MB Standard	.187	0-1 3/4"	7 7/16"	—	50 lb.	CT-100 or CT-200
N-5-MC Intermediate	.145	0-1 1/4"	5 3/4"	—	30 lb.	CT-100
N-4-MD Miniature	.100	0-15/16"	4 3/8"	—	18 lb.	CT-100

LOCKING MOUNTING CLAMPS

TIES CAN BE COLOR CODED AS PER MILITARY SPECIFICATION. CONSULT FACTORY FOR COLOR CODING INFORMATION.

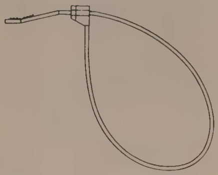
The *"Can Do"* Cable Ties*...With These Quality Features

SELF-LOCKING HEAD



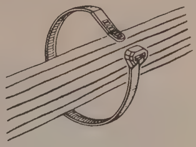
Easy application by tool or by hand.
Will not loosen when pulled tight.

COMPACT, ONE-PIECE DESIGN



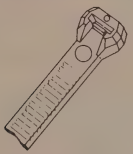
Rugged Nylon with no metal parts. Designed to exceed MIL-S-23190C. Installation tool cuts off excess tie automatically, for low-profile configuration with no protruding edges.

RELEASABLE LOCATING TIP



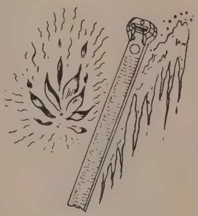
Double-bend tip locates around wires. Guides operator's hand for easy 90° insertion, even in confined areas. Second bend prevents snagging. Tip can be inserted in head and later released. Makes for easier positioning of ties on bundle.

WIDE BUNDLE-GRIPPING SERRATIONS



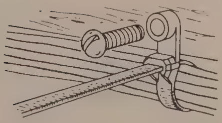
Hug wires tightly. Won't pierce wire insulation as with string, or narrower ties.

ALL-ENVIRONMENT NYLON



100% Nylon (MIL-M-20693). Tough, resistent to temperature extremes, diluted acids, solvents, grease, alkalies, and fungus growth.

SINGLE-UNIT MOUNTING HEAD

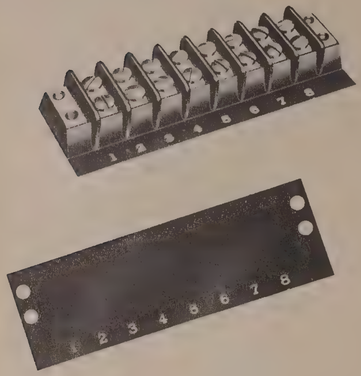


Mounting clamp is integral part of tie head for quick attachment to panel or chassis with screw, rivet or bolt.

*Patents Pending

ETC Terminal Products Unit
ITT CANNON ELECTRIC
29000 AURORA ROAD, SOLON, OHIO 44139
A DIVISION OF INTERNATIONAL TELEPHONE AND TELEGRAPH CORPORATION
TELEPHONE: (216) 248-8800

ETC® MARKER STRIPS



ETC Marker Strips serve the dual purpose of affording additional insulation protection and serving as a method of terminal identification. Numbers are ⅛" high and are imprinted in white on a dark surface. Twin or Single Screw Blocks.

Insulating Strips — Open-back blocks are available with permanently bonded insulating strips. Suffix "-88" to block part number. To order unbonded insulating strip, do not suffix printing style code (see ordering system below).

Permanently Bonded Marker Strips: To order, suffix "-91" for a printed marker strip bonded to block. Suffix "-92" for an unprinted marker strip bonded to block.

Available material:

XP	Paper base phenolic (black)
VF	Comm. grade vulcanized fiber (black): MIL-F-1148
XXXP	Paper base phenolic (black): L-P-513
NPG	Nylon cloth phenolic: MIL-P-15047
GMG	Fiberglass, Melamine: MIL-P-15037
GEE	Fiberglass, Epoxy: MIL-P-18177

NOTE: A special moisture and fungus-proof varnish can be provided to seal the surfaces and edges of the Marker Strips, in accordance with MIL-V-173A.

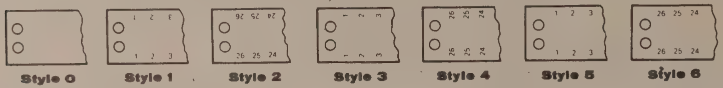
ORDERING SYSTEM (Example: 2772-18-XP—Style 5)

TERMINAL BLOCK SERIES	70 — Double Side Marking — Std. Block 71 — Double Side Marking — Feedthru 72 — Single Side Marking — Std. Block 73 — Single Side Marking — Feedthru 74 — Single Side Marking — Feedthru	NO. OF TERMINALS	MATERIAL	PRINTING STYLE
27	72	18	XP	5

STRIP WIDTH

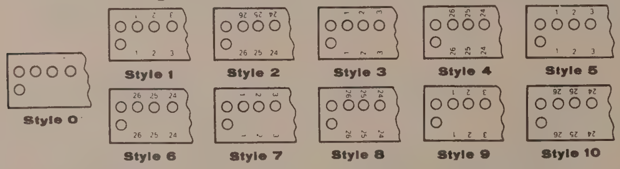
BLOCK SERIES	STRIP NO. 70	71	72	73	74
33	1⅛	1⅛	⅞	⅞	⅞
34	1¹⁄₁₆		¹³⁄₁₆		
35	1³⁄₁₆		¹⁵⁄₁₆		
36	1⁵⁄₁₆		1¹⁄₁₆		
37 & 27	1⅜	1⅜	1⅛	1⅛	1⅛
38 & 28	1⅝	1⅝	1⅜	1⅜	1⅜
39 & 29	1¹³⁄₁₆	1¹³⁄₁₆	1⁹⁄₁₆	1⁹⁄₁₆	1⁹⁄₁₆

Double Side Marking—Standard Block___70 (Fill in First Two Digits with Series Block No., examples: **2770, 2870**, etc.)



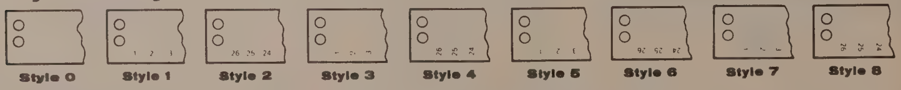
Style 0 Style 1 Style 2 Style 3 Style 4 Style 5 Style 6

Double Side Marking—Feedthru Block___71 (Fill in First Two Digits with Series Block No., examples: **2771, 2871**, etc.)



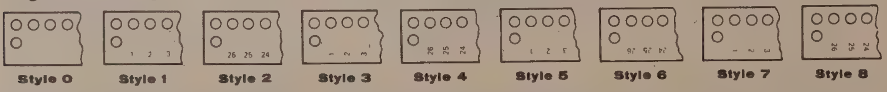
Style 0 Style 1 Style 2 Style 3 Style 4 Style 5 Style 6 Style 7 Style 8 Style 9 Style 10

Single Side Marking—Standard Block___72 (Fill in First Two Digits with Series Block No., examples **2772, 2872**, etc.)



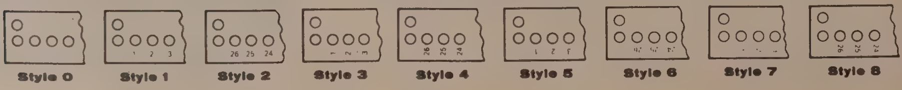
Style 0 Style 1 Style 2 Style 3 Style 4 Style 5 Style 6 Style 7 Style 8

Single Side Marking—Feedthru Block___73 (Fill in First Two Digits with Series Block No., examples **2773, 2873**, etc.)



Style 0 Style 1 Style 2 Style 3 Style 4 Style 5 Style 6 Style 7 Style 8

Single Side Marking—Feedthru Block___74 (Fill in First Two Digits with Series Block No., examples **2774, 2874**, etc.)



Style 0 Style 1 Style 2 Style 3 Style 4 Style 5 Style 6 Style 7 Style 8

CONNECTORS
E. F. JOHNSON COMPANY

COAXIAL CONNECTORS

The JCM is a miniature (3mm) connector that is fully compatible with SMA types, at a fraction of SMA prices.

The JCM is designed for commercial and industrial applications where low cost is a major factor, and SMA compatibility is required.

The non-galling gold finish is resistant to wear and abrasion.

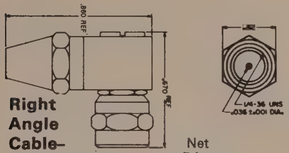
Cable clamp JCM plugs and jacks consist of 5 or fewer parts which are easily assembled. Only one set of stripping dimensions is required for all cables from 0.075 to 0.216" overall diameter. Panel, bulkhead, and PC mounting receptacles are preassembled.

Beryllium copper center contacts assure superior spring qualities and lowest contact resistance.

Available on special order basis with nickel plating for especially cost conscious applications.

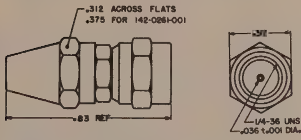
ELECTRICAL, TYPICAL

Impedance	50 ohms
Frequency	DC - 6 GHz or more
Voltage Rating	500 V RMS @ sea level
Dielectric Withstanding Voltage	1000 V RMS @ sea level
VSWR	1.15 : 1 to 6 GHz
Contact Resistance	3.0 milliohms or less
Insulation Resistance	5000 megohms


.860 REF
.670 REF
1/4-36 UNS
.036±.001 DIA.

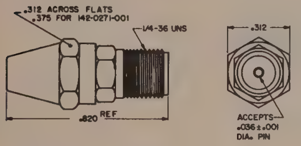
Right Angle Cable–Male Plug

Cable Group	Net Price	
I	(2)	142-0202-001
II	$2.80 (1)	142-0222-001
III	$2.90 (1)	142-0262-001


.312 ACROSS FLATS
.375 FOR 142-0261-001
.83 REF
.312
1/4-36 UNS
.036±.001 DIA.

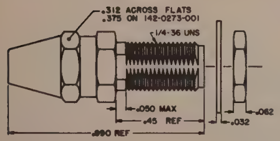
Plug—Clamp Type

Cable Group	Net Price	
I	$1.80 (1)	142-0201-001
II	$1.75 (1)	142-0221-001
III	$2.00 (1)	142-0261-001


.312 ACROSS FLATS
.375 FOR 142-0271-001
1/4-36 UNS
.820 REF
.312
ACCEPTS .036±.001 DIA. PIN

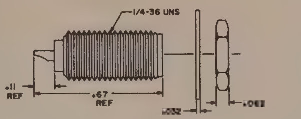
Jack—Clamp Type

Cable Group	Net Price	
I	$1.55 (1)	142-0211-001
II	$1.50 (1)	142-0231-001
III	$1.85 (1)	142-0271-001


.312 ACROSS FLATS
.375 ON 142-0273-001
1/4-36 UNS
.050 MAX
.45 REF
.062
.032
.890 REF

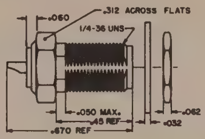
Bulkhead Jack—Clamp Type

Cable Group	Net Price	
I	$1.90 (1)	142-0213-001
II	$1.90 (1)	142-0233-001
III	$2.10 (1)	142-0273-001


1/4-36 UNS
.11 REF
.67 REF
.032
.062

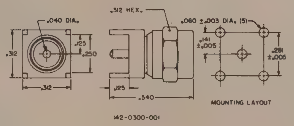
Bulkhead Feedthrough Receptacle

142-0293-001 Net Price $1.40 (1)


.060
.312 ACROSS FLATS
1/4-36 UNS
.050 MAX.
.45 REF
.670 REF
.062
.032

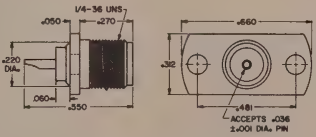
Bulkhead Receptacle, Rear Mount

142-0294-001 Net Price $1.45 (1)


.040 DIA.
.312 HEX.
.060 ±.003 DIA. (5)
.141 ±.005
.125
.250
.312
.281 ±.005
.125
.540
MOUNTING LAYOUT
142-0300-001

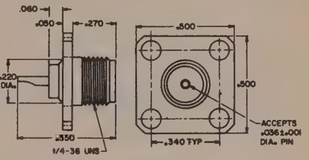
PC Male Plug

142-0300-001 Net Price (2)


1/4-36 UNS
.050
.270
.220 DIA.
.060
.550
.660
.312
.481
ACCEPTS .036 ±.001 DIA. PIN

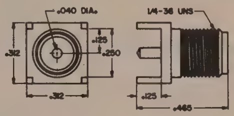
2-hole Panel Receptacle, Front Mount

142-0296-001 Net Price $1.80 (1)


.060
.050
.270
.500
.220 DIA.
.500
.550
1/4-36 UNS
.340 TYP
ACCEPTS .036±.001 DIA. PIN

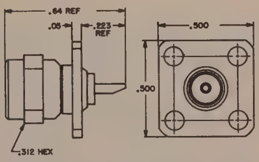
4-hole Panel Receptacle, Front Mount

142-0297-001 Net Price $1.90 (1)


.040 DIA.
1/4-36 UNS
.312
.125
.250
.312
.125
.465

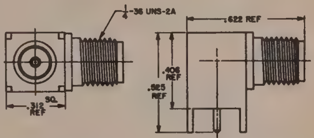
PC Receptacle

142-0298-001 Net Price $1.25 (1)


.64 REF
.05
.223 REF
.500
.500
.312 HEX

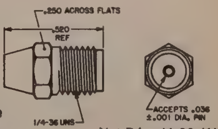
4-hole flange mount, male plug

142-0287-001 Net Price $2.25 (1)


1/4-36 UNS-2A
.622 REF
.406 REF
.525 REF
.312 SQ. REF

Right angle PC mount, receptacle

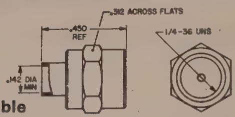
142-0299-001 Net Price $2.10 (1)


.250 ACROSS FLATS
.520 REF
1/4-36 UNS
ACCEPTS .036 ±.001 DIA. PIN

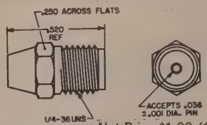
Jack/Cable

142-0284-001 Net Price $1.00 (1)

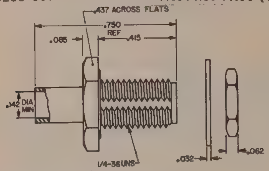
CONNECTORS
E. F. JOHNSON COMPANY


.312 ACROSS FLATS
.450 REF
1/4-36 UNS
.142 DIA MIN

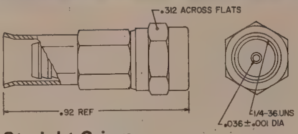
Plug/Cable
142-0281-001 Net Price $0.70 (1)


.250 ACROSS FLATS
.520 REF
1/4-36 UNS
ACCEPTS .036 ±.001 DIA. PIN

Jack/Cable
142-0283-001 Net Price $1.00 (1)

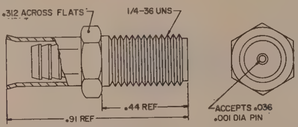

.437 ACROSS FLATS
.750 REF
.085
.415
.142 DIA MIN
1/4-36 UNS
.032
.062

Bulkhead feed thru with gasket, jack/cable
142-0285-001 Net Price $2.00 (1)


.312 ACROSS FLATS
.92 REF
1/4-36 UNS
.036±.001 DIA

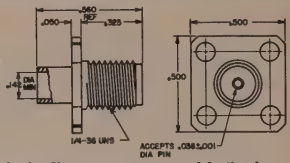
Straight Crimp Type Cable Plug

Cable Group	Net Price	
I	(2)	142-0301-001
II	$1.70 (1)	142-0321-001
III	$1.80 (1)	142-0361-001

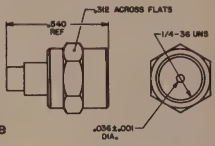

.312 ACROSS FLATS
1/4-36 UNS
.44 REF
.91 REF
ACCEPTS .036 .001 DIA PIN

Straight Crimp Type Cable Jack

Cable Group	Net Price	
I	(2)	142-0311-001
II	$1.70 (1)	142-0331-001
III	$1.80 (1)	142-0371-001


.560 REF
.050
.325
.142 DIA MIN
1/4-36 UNS
.500
.500
ACCEPTS .036±.001 DIA PIN

4-hole flange mount, cable/jack
142-0286-001 Net Price $1.35 (1)


.312 ACROSS FLATS
.540 REF
1/4-36 UNS
.036±.001 DIA.

Plug/Cable
142-0282-001 Net Price $1.30 (1)

1) 1000 pc price approximately 40% off list; 5000 pc price approximately 50% off list. Contact factory for complete pricing.
2) Prices available on request.

MATERIAL

Center Contact		Beryllium Copper, heat treated
Other metal parts		Half hard brass
Insulators		TFE Fluorocarbon per MIL-P-19468
Plating:	Center contact	copper flash, gold plated. 000025
	Other metal parts	copper flash, gold plated. 000025 or copper flash, nickel plated. 0001

*Electrical performance depends on cable size, frequency, and connector type. For JCM mated pair connecting RG 58 A/U cable, VSWR averages less than 1.15 at 4GHz. Test reports available on request.

CRIMP EQUIPMENT

Buchanan Elec Prod. Corp.
1065 Floral Ave.
Union, N.J. 07083

Daniels Mfg. Corp.
2266 Franklin Rd.
Bloomfield Hills, Mich. 48013

	Buchanan Part Number	E.F. Johnson Part Number	Daniels Part Number	E.F. Johnson Part Number
Crimp Tool	612648	251-0118-024	HX4	251-0118-020
Crimp Dies				
Group I (1)	612734	251-0118-025	Y192	251-0118-021
Group II (1)	612778	251-0118-026	Y187	251-0118-022
Group III (1)	712763	251-0118-027	Y188	251-0118-023

Tools and dies can be purchased directly from Buchanan or Daniels. (1) See below for cable groupings.

CABLE GROUPS

GROUP I

RG-178/U	0.079″ O.D.
RG-178A/U	0.075″ O.D.
RG-178B/U	0.075″ O.D.
RG-196/U	0.080″ O.D.
RG-196A/U	0.080″ O.D.

GROUP II

RG-174/U	0.100″ O.D.
RG-188/U	0.110″ O.D.
RG-188A/U	0.110″ O.D.
RG-316/U	0.102″ O.D.

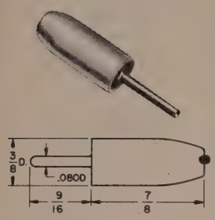
GROUP III

RG-55/U	0.206″ O.D.
RG-55A/U	0.216″ O.D.
RG-55B/U	0.206″ O.D.
RG-58/U	0.195″ O.D.
RG-58A/U	0.195″ O.D.
RG-58B/U	0.195″ O.D.
RG-58C/U	0.195″ O.D.
RG-141/U	0.190″ O.D.
RG-141A/U	0.190″ O.D.
RG-142/U	0.206″ O.D.
RG-142A/U	0.206″ O.D.
RG-142B/U	0.195″ O.D.
RG-223/U	0.216″ O.D.

E. F. JOHNSON COMPANY®

Tip plugs and Printed circuit connectors

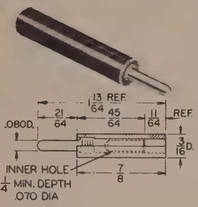
Tip plugs



Solderless Tip Plug

Completely insulated, molded sleeve. Recessed metal head prevents exposure of metal surfaces when engaged in any standard tip jack. All metal parts are nickel-plated brass. Designed for solderless connection of up to 16 gauge stranded wire. Fits all standard tip jacks. Current rating: 10 amps.

Cat. No. 105-0300-001 . Net $0.25
(See color chart under Tip Jacks)



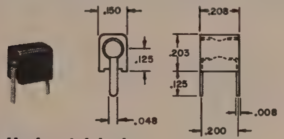
Sub-miniature Tip Plug

For use with miniature jack, .080" dia. tip. Nickel-plated machined brass body, solder type lead connection.

Cat. No. 105-0770-001 . Net $0.25
(See color chart under Tip Jacks)

Printed circuit connectors

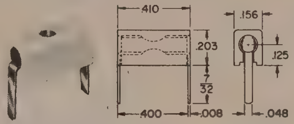
The sub-miniature Tip Jacks and Tip Plugs described below are rated at 5 amperes maximum current capacity. Operating voltage is 1500 volts RMS at sea level and 350 volts RMS at 50,000 feet. Contact resistance is less than 2 milliohms; capacitance between two adjacent jacks less than one pF. at 1 MHz. Body material is made of tough, low-loss polyamide per MIL-M-20693A; able to stand extremely hard usage. Tip Plugs have a one-piece machined contact. Jacks equipped with beryllium copper contacts. Jack contacts and terminals are silver-plated.



New Horizontal Jack

New design accepts 0.080" diameter tip plug in either end. Silver-plated and Irridited beryllium-copper formed contact. Two terminals. Approximately one-half size of standard Tip Jack.

Cat. No. 105-1100-001 . . . . Net $0.10
(See color chart under Tip Jacks)

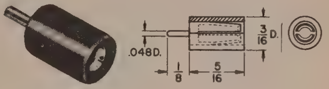


Horizontal Jack
(U.S. Patent No. 3,208,027)

Unique design accepts .080" diameter tip plug in either end, or from top or bottom! Silver-plated beryllium copper formed contact. Two terminals.

Note: Available as a special in production quantities without cross hole.

Cat. No. 105-0750-001 . . . . . . Net $0.12
(See color chart under Tip Jacks)



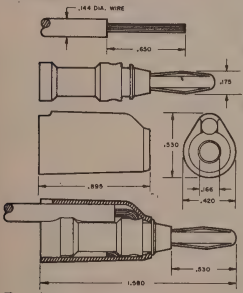
Vertical Jack

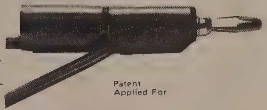
Mounts through single .052" hole, requires minimum mounting area. Silver-plated, machined beryllium copper contact.

Cat. No. 105-0850-001 . . . . . . Net $0.18
(See color chart under Tip Jacks)

Patchcord Stacking Plugs

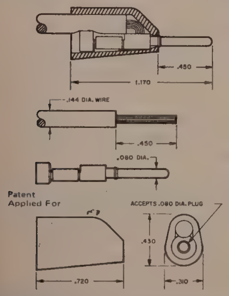
Developed for custom patchcord assembly and replacement of damaged molded patchcord plugs. Allows assembly of patchcords with any length and color. Used with standard 0.144" diameter rubber or extra-flexible polyvinyl insulated wire. Plug body precision machined brass with 0.0002" nickel plating. Polyamide housing available in 6 colors. Operating temperature range −55°C to +105°C.

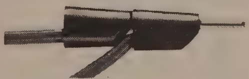




Patent Applied For

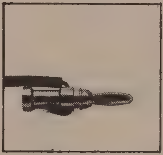
Stacking Standard Banana Plugs
Current rating: 15 amps. Assembly with special tool and fixture is recommended. 6 colors.
Cat. No. 108-1080-001
Net $0.46
(See color chart under Tip Jacks)



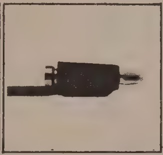


Stacking .080 Standard Tip Plugs
Current rating: 10 amps.
Cat. No. 105-1200-001
Net $0.45
(See color chart under Tip Jacks)

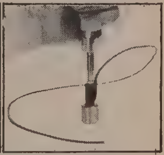
ASSEMBLY PROCEDURE



1. Feed stripped wire through cross-hole of metal contact.



2. Insert contact and wire into housing.



3. Place into fixture. Place tip of tool into rear of contact. Snap contact into place.

Engineering Kits available containing material to assemble 30 patchcords in six colors from E. F. Johnson Company.

Standard Banana Patchcord Stacking Plug Engineering Kit
Cat. No. 108-1299-001
Net $24.95

Standard .080 Tip Patchcord Stacking Plug Engineering Kit
Cat. No. 105-1299-001
Net $24.95

E. F. JOHNSON COMPANY®

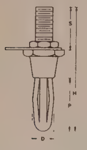
Banana jacks and plugs

108-0750-001

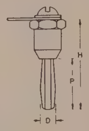
108-0753-001

108-0754-001

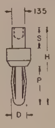
108-0770-001



A



B



C

108-0771-001

STANDARD BANANA PLUGS

This group of standard banana plugs has accurately machined brass studs which extend the full length of the plugs, providing extra strength. Springs are nickel-silver—highly resistant to corrosion. Bodies and hardware .0001 nickel-plated. All banana plugs listed below are available with beryllium copper springs and nickel, cadmium, or silver plating, when desired. A wide selection of miniature solder-type plugs is also available on special order—however, quantities in special platings or plugs should be sufficiently large for economical production runs. Solder terminal and nut or screw furnished.

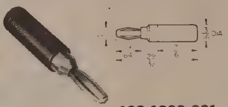
Cat. No.	Dwg.	S	P	D	H	Thread	Net Price
108-0750-001	A	3/8"	17/32"	.175"	1 1/8"	6-32	**$0.25**
108-0750-002	A	3/4"	17/32"	.175"	1 1/2"	6-32	**.26**
108-0753-001	B	—	17/32"	.175"	15/16"	6-32	**.28**

This banana plug is similar to the standard types listed above, except that it is designed for riveting. Springs are beryllium copper, cadmium-plated.

Cat. No.	Dwg.	S	P	D	H	Thread	Net Price
108-0754-001	C	7/32"	13/32"	.155"	13/16"	—	**$0.21**

Jumbo type banana plugs with accurately machined brass studs extending full length of the pins. Nickel-silver springs. Bodies and hardware .0001 nickel-plated. With solder lug and nut or screw.

Cat. No.	Dwg.	S	P	D	H	Thread	Net Price
108-0770-001	A	5/8"	3/4"	.300"	1 25/32"	1/4"-28	**$0.60**
108-0771-001	B	—	3/4"	.300"	1 1/8"	10-32	**.90**

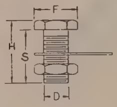


108-1000-001

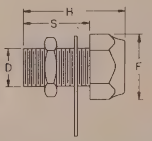
MINIATURE BANANA PLUGS

Extremely small insulated banana plugs with precision machined phosphor bronze body, nickel-plated. One-piece springs are beryllium copper, nickel-plated, .120" dia. Polyamide sleeve. Current rating: 5 amps.

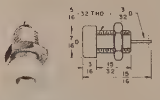
Cat. No. 108-1000-001............................**Net Price $0.42**
(6 colors—see chart)



108-0740-001



108-0760-001



108-0900-001

STANDARD BANANA JACKS

High quality, machined brass banana jack. Nickel-plated. Furnished complete with solder terminal and nut.

Cat. No.	F	D	S	H	Hole Dia.	Thread	Net Price
108-0740-001	3/8"	1/4"	17/32"	5/8"	.166"	1/4"-28	**$0.24**

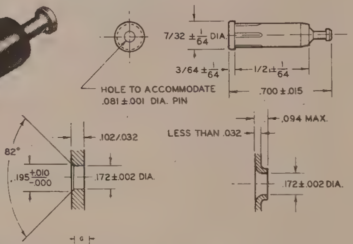
This jumbo banana jack will accommodate plugs such as the 108-0770-001 and the 108-0771-001 listed above. Machined brass, nickel-plated. Furnished complete with solder terminal and nut.

Cat. No.	F	D	S	H	Hole Dia.	Thread	Net Price
108-0760-001	9/16"	3/8"	21/32"	1"	.277"	3/8"-32	**$0.76**

BANANA JACK

Completely insulated molded body with cadmium-plated insert. Accommodates banana plugs of nominal .175" diameter. Voltage breakdown: 10,000 volts DC. Capacity to 1/16" panel: 2.4 mmf. nominal. Mounts in 21/64" diameter circular, "D", or double flat hole (1/4" across flats). Single nut furnished for mounting—no other mounting hardware needed.

Cat. No. 108-0900-001............................**Net Price $0.16**
(See Color Chart under tip jacks)

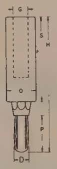


108-1100-001

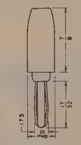
RIB-LOC® PRESS-IN BANANA JACKS

Johnson RIB-LOC design permits substantial production line savings—no mounting hardware to handle and assemble. RIB-LOC banana jacks install by pressing into proper size chassis hole. Accept .120" tip plug in recessed contact. Silver-plated brass contact. Brass solder terminal silver-plated and Iridited for good solderability. Insulating body molded of low-loss polyamide. Current rating: 10 amps. Peak withstanding voltage: 5,000 volts. Capacity to 1/8" panel: 1.4 pF nominal.

Cat. No. 108-1100-001............................**Net Price $0.13**
(6 colors—see chart)



108-0772-001



108-0300-001

JUMBO INSULATED BANANA PLUGS

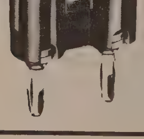
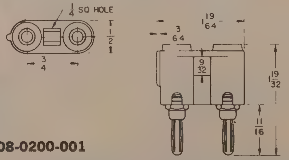
These jumbo size insulated banana plugs are similar in design to the standard types listed above, but are somewhat larger in size. With brass nickel-plated bodies, and nickel-silver springs. The 108-0772-001 has a black plastic handle—the 108-0772-002 has a red plastic handle.

Cat. No.	S	P	D	H	G	O	Net Price
108-0772-001	1 3/4"	3/4"	.300"	2 25/32"	3/8"	5/8"	**$1.35**
108-0772-002	1 3/4"	3/4"	.300"	2 25/32"	3/8"	5/8"	**1.35**

SOLDERLESS BANANA PLUGS

Compact, high voltage insulated plug for a wide variety of applications. Designed for fast, solderless connection of up to 16 gauge stranded wire. Body and pin are constructed of one-piece, nickel-plated brass with high grade nickel-silver springs. Sleeve is molded. Current rating: 15 amps.

Cat. No. 108-0300-001............................**Net Price $0.29**
(See Color Chart under tip jacks)

108-0200-001

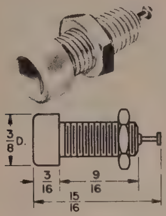
DUAL BANANA PLUGS

Extremely versatile dual banana plug for solderless connection. Molded body incorporates polarity indication and strain relief hole for wire leads. Springs are high quality nickel-silver—bodies are nickel plated. Accurately machined brass studs extend full length of pins for extra strength. Voltage breakdown: 10,000 VDC. Capacity plug to plug: 1.3 pf. Current rating: 15 amps.

Cat. No. 108-0200-001 (solderless)................**Net Price $1.15**
(See Color Chart under tip jacks)

E. F. JOHNSON COMPANY®

Tip jacks



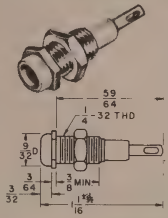
DELUXE TIP JACK

(U.S. Patent No. 2,704,357)

Molded body with recessed closed entry design contact. Silver-plated beryllium copper contact spring. Brass solder terminal is hot tin dipped. Current rating: 10 amps. Voltage breakdown: 11,000 VDC. Capacity to ⅛" panel: 2.0 pf. ¼-32 nut furnished.

Cat. No. 105-0600-001. Net Price $0.27

(See color chart below)

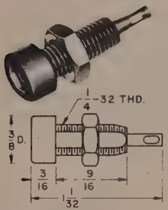


METAL-CLAD TIP JACKS—STANDARD

Molded body, nickel-plated machined brass jacket. Formed, silver-plated phosphor bronze contact. Current rating: 10 amps. Voltage breakdown: 7,000 volts DC. Capacity to ⅛" panel: 3.8 pf. ¼"-32 nut furnished.

Cat. No. 105-0250-001. Net Price $0.25

(See color chart below)

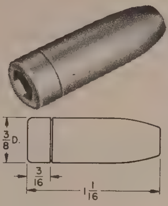


STANDARD TIP JACK

Molded body with recessed, cadmium-plated formed phosphor bronze contact. Current rating: 10 amps. Voltage breakdown: 9,000 volts DC. Capacity to ⅛" panels: 2.0 mmf. ¼"-32 nut furnished.

Cat. No. 105-0800-001. Net Price $0.16

(See color chart below)



JACK AND SLEEVE ASSEMBLY

(U.S. Pat. No. 2,704,357)

Includes Deluxe Tip Jack (105-0601-001 to 105-0613-001), less mounting nut, with inside threaded molded sleeve. Ideal for patch cords, or insulated rear connection of panel mounted tip jack.

Cat. No. 105-0700-001. Net Price $0.35

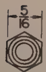
(See color chart below)

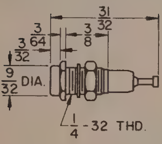
METAL-CLAD TIP JACKS—MILITARY

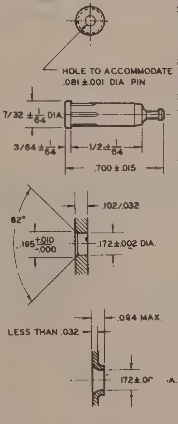
High reliability tip jack for military use or demanding industrial applications. Highest quality materials — withstand severe environmental temperature, vibration and salt spray conditions. Complies with MS-16108, Rev. F of MIL-STD-242A. Closed entry contact design prohibits entry of tip plug .085" or larger—prevents accidental contact damage by careless probe insertion. Heavy nickel-plated brass jacket. Gold-plated beryllium copper contact spring greatly exceeds minimum insertion/withdrawal cycle requirements of MS-16108. Current rating: 5 amps. Voltage breakdown: 8,000 volts DC. Capacity to ⅛" panel: 3.8 pf. ¼"-32 nut and lock washer furnished. Terminal Style: "A". (Terminal Style "C" per MS-16108 available on special order in production quantities.) Brass solder terminal is gold-plated.

Cat. No. 105-0200-200. Net Price $0.56

Mil. Std. Number	Color	E. F. Johnson Number
MS16108-1A	White	105-0201-200
MS16108-2A	Red	105-0202-200
MS16108-3A	Black	105-0203-200
MS16108-4A	Brown	105-0208-200
MS16108-5A	Green	105-0204-200
MS16108-6A	Orange	105-0206-200
MS16108-7A	Blue	105-0210-200
MS16108-8A	Yellow	105-0207-200
MS16108-9A	Gray	105-0213-200
MS16108-10A	Violet	105-0212-200







RIB-LOC™ PRESS-IN TIP JACKS

Johnson Rib-Loc design permits substantial production line savings—no mounting hardware to handle and assemble. Rib-Loc tip jacks install by pressing into proper size chassis hole. Accept .080" tip plug in recessed, closed-entry type contact that rejects plugs .085" or larger to prevent accidental contact damage. Silver-plated beryllium copper contact spring. Brass solder terminal silver-plated and Iridited for good solderability. Insulating body molded of low-loss polyamide. Current rating: 10 amps. Voltage breakdown: 5,000 VDC. Capacity to ⅛" panel: 1.4 pf nominal.

Cat. No. 105-1040-001. Net Price $0.20

(See color chart below)

COLOR CHART

NOTE: Connectors, unless otherwise specified, are available in 6 molded colors to Federal Standard 595. Other colors listed are available as specials. Catalog number for color desired is determined by adding color numbers on chart below to 6th and 7th digits of catalog number listed for series. EXAMPLE: 105-0800-001 in Violet, add color number for Violet (12) to 6th and 7th digits of series number, and order 105-0812-001. To order 105-1040-001 in Violet, add 12 to 6th and 7th digits of series number and order 105-1052-001.

Color	No.	Color	No.	Color	No.
White*	01	Orange	06	Violet	12
Red*	02	Yellow*	07	Grey	13
Black*	03	Brown	08		
Green*	04	Blue*	10		

*Indicates colors available from stock. Other colors listed are, for some items, available as specials.

E. F. JOHNSON COMPANY®

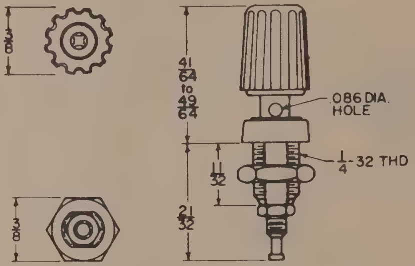
Binding posts

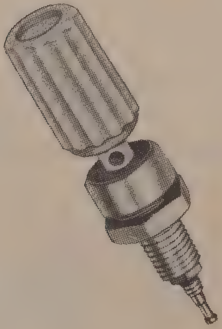
Compact, insulated, pre-assembled binding posts with molded body and silver-plated shank. Fluted thumb nut self-captivated. Connection made at solder stud, or lug may be slipped over threaded portion and secured with a nut. Single tip plug fits hole in top of miniature binding post; banana plug accepted by two larger binding posts. Insulation resistance greater than 200 meg. after MIL-T-5422B humidity test. (U.S. Pat. No. 2,806,999.)

New miniature binding post designed for compact test equipment applications. Rated at 15 amps. thumb nut to terminal, 5 amps. tip jack to terminal. Voltage breakdown: 5,000 volts DC. Capacitance to ⅛" panel; 3 pf. Mounts in 17/64" diameter circular hole; "D" or double flat hole—.219" across flats. Equipped with single ¼"-32 nut for fast mounting—no time-consuming spacers or mounting hardware required. No. 111-0200 accepts .080" dia. pin probe. No. 111-0400 accepts .120" dia. banana plug.

Available in 6 colors: white, red, black, green, yellow, and blue.

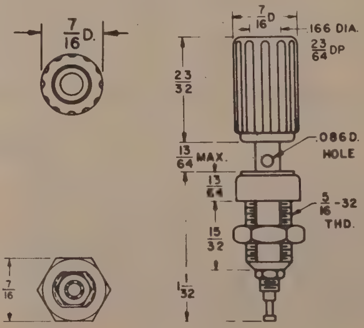
Cat. No. 111-0200-001	**Net Price $0.80**
Cat. No. 111-0400-001	**Net Price .58**





Rated at 15 amps. Current carrying capacity. Voltage breakdown: 8,000 volts DC. Capacitance to ⅛ panel: 3.3 pf. Mounts in 21/64" diameter circular hole; "D" or double flat hole—¼" across flats. Single 5/16-32 mounting nut furnished—no other hardware required.

Cat. No. 111-0100-001..**Net Price $0.50**
(10 colors available—see color chart)



STANDARDIZED TERMINAL BOARDS

STANDARDIZED TURRET TERMINAL BOARDS

Cut your production cost by eliminating the tooling and setup charge usually applied to nonstandardized boards. Terminals are securely riveted and hot tinned for easy soldering.

TERMINALS: Your choice of most popular types.
Made of Brass: QQ-626, comp. 22, ½ hard.
Hot Dip Solder finish: Mil-F-14072 Type 221.

Material: Your choice of either PBE or GEE Phenolic.

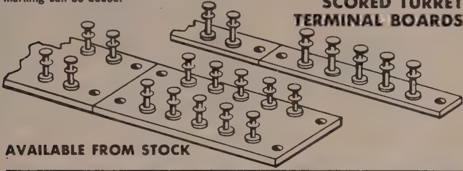
PBE: Paper base electrical, Mil-P-3115C, Temp. 250° F max. Type XXXP.

GEE: Glass Epoxy, Mil-P-18177, Temp. 300° F max. Type G-10.

Five sections **SCORED** for easy **separation** M'tg. holes in each section.

These boards **CAN BE MODIFIED** with terminals staked in all holes, scoring eliminated. Marking can be added.

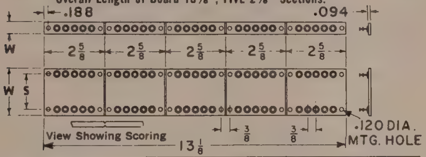
SCORED TURRET TERMINAL BOARDS



AVAILABLE FROM STOCK

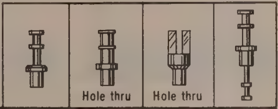
3/8" SPACING AND SCORED

3/32" THICK PHENOLIC — Choice of 4 Types of Terminals
Overall Length of Board 13⅛", FIVE 2⅝" Sections.



Five sections **SCORED** for easy operation.
M'tg. holes in each section.

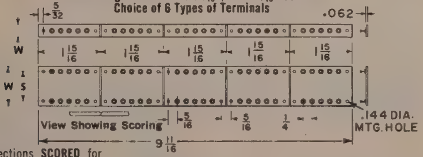
CHOICE OF TERMINALS



W	S	No. of Terms.	Material	With 1503 Term. Cat. No.	With 1509 Term. Cat. No.	With 1507 Term. Cat. No.	With 1545 Term. Cat. No.
½	Single Row	25	PBE	15031	15091	15071	15041
			GEE	15231	15291	15271	15241
1½	1	50	PBE	15032	15092	15072	15042
			GEE	15232	15292	15272	15242
1½	1³⁄₁₆	50	PBE	15036	15096	15076	15046
			GEE	15236	15296	15276	15246
2	1½	50	PBE	15033	15093	15073	15043
			GEE	15233	15293	15273	15243
2½	2	50	PBE	15034	15094	15074	15044
			GEE	15234	15294	15274	15244
3	2½	50	PBE	15035	15095	15075	15045
			GEE	15235	15295	15275	15245

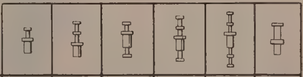
MINIATURE TURRET TERMINAL BOARDS

1/4" SPACING AND SCORED — 1/16" THICK PHENOLIC
Overall Length of Board Is 9¹¹⁄₁₆", Five 1¹⁵⁄₁₆" Sections
Choice of 6 Types of Terminals



Five sections **SCORED** for easy operation.
M'tg. holes in each section.

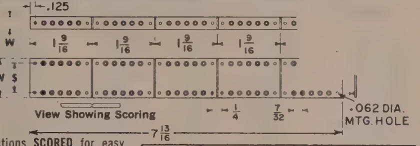
CHOICE OF TERMINALS



W	S	No. of Terms.	Material	With 1572 Term. Cat. No.	With 1573 Term. Cat. No.	With 1574 Term. Cat. No.	With 1575 Term. Cat. No.	With 1583 Term. Cat. No.	With 1559 Term. Cat. No.
5/16	Single Row	25	PBE	15047	15057	15067	15077	15087	15097
			GEE	15247	15257	15267	15277	15287	15297
7/8	9/16	50	PBE	15048	15058	15068	15078	15088	15098
			GEE	15248	15258	15268	15278	15288	15298
1⅛	13/16	50	PBE	15049	15059	15069	15079	15089	15099
			GEE	15249	15259	15269	15279	15289	15299

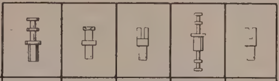
MINIATURE TURRET TERMINAL

7/32" SPACING AND SCORED — 1/16" THICK
Overall Length of Board 7¹³⁄₁₆". Five 1⁹⁄₁₆" Sections Choice



Five sections **SCORED** for easy operation.
M'tg. holes in each section

CHOICE OF TERMINALS



W	S	No. of Terms.	Material	With 1502 Term. Cat. No.	With 1562 Term. Cat. No.	With 1526 Term. Cat. No.	With 1512 Term. Cat. No.	With 1533 Term Cat. No.
5/16	Single Row	25	PBE	15021	15023	15025	15063	15053
			GEE	15221	15223	15225	15263	15253
3/4	½	50	PBE	15028	15029	15026	15064	15054
			GEE	15228	15229	15226	15264	15254
1	3/4	50	PBE	15022	15024	15030	15065	15056
			GEE	15222	15224	15230	15265	15256

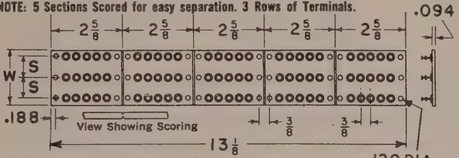
UNIVERSAL TERMINAL BOARDS

Designed for production or experimental use, these **standardized boards** are well suited for any electronic application requiring a sturdy mounting surface for resistors, condensers and components.

TERMINAL: 1503-3 HOT TIN DIP finish for easier soldering and infinite shelf life.

MATERIALS: PBE (Paper Base Elect. Mil-P-3115C type XXXP)
GEE (Glass Epoxy Mil-P-18177 type G-10)

NOTE: 5 Sections Scored for easy separation. 3 Rows of Terminals.



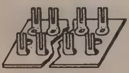
MODIFICATIONS: Other materials and terminals of your choice supplied. Marking may be added.

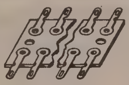
Assembled. with **TERMINAL** 1503-3

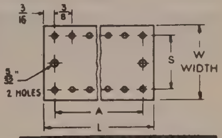
W	S	Total No. of Terms.	Material	Cat. No.
2½	1	75	PBE	15332
			GEE	15342
3½	1½	75	PBE	15333
			GEE	15343

READI-MADE TERMINAL BOARDS

- ECONOMICAL
- SAVE TOOLING COST
- DELIVERY FROM STOCK
- RANGE OF SIZES
- APPROVED MATERIALS







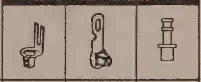
Readi-Made Terminal Boards are ideal for General Use. Excellent for mounting resistors, condensers, etc. Choice of Terminals.

MATERIAL: 1/16" thick Bakelite (Mil Spec 3115C-Pbe-P grade).

TERMINALS: 1204 and 1268 are stamped from .023 thick brass. 1539 is turned from 3/16" dia. brass rod.

PLATING: 1204 is Cadmium plated. 1268 and 1539 are Hot Tinned for easy soldering.

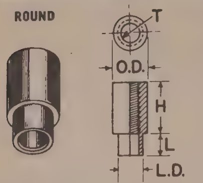
CHOICE OF TERMINALS



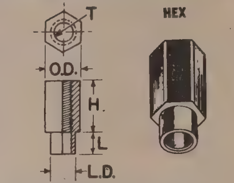
W	L	S	A	Terminals Each Side	With 1268 Term. Cat. No.	With 1204 Term. Cat. No.	With 1539 Term. Cat. No.
1	1⅞	¹¹⁄₁₆	1½	5	1268-10	1204-10	1239-10
1	2¼	¹¹⁄₁₆	1⅞	6	1268-12	1204-12	1239-12
1	5¼	¹¹⁄₁₆	4⅞	14	1268-28	1204-28	1239-28
1¾	3¾	1⁷⁄₁₆	3⅜	10	1268-20	1204-20	1239-20
1¾	4⅛	1⁷⁄₁₆	3¾	11	1268-22	1204-22	1239-22
1¾	7⅛	1⁷⁄₁₆	6¾	19	1268-38	1204-38	1239-38
½	7⅛	Single Row	6¾	19	1268-19	1204-19	1239-19

STANDOFFS & SPACERS

SWAGE TYPE THREADED STANDOFFS



Nickel Plate Mil-F-14072 QQ-N-290 Type VII.



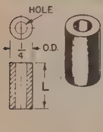
Cadmium plate per QQ-P-416 Type 2 Class B and clear chromate.

Material: MADE OF: BRASS MIL SPEC. QQ-B-626A COMP. 22—½ HARD.

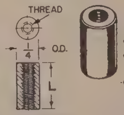
ROUND Nickel Plated Cat. No.	H Height Above Panel	L	For Panel Thickness	LD	OD	T Thread	HEX Cadmium Plated Cat. No.
1589-2	⅛	.109	1/16	.125	5/32	2-56	—
1589-3	⅛	.140	3/32	.125	5/32	2-56	—
1590-2	3/16	.109	1/16	.125	5/32	2-56	—
1590-3	3/16	.140	3/32	.125	5/32	2-56	—
1591-2	¼	.109	1/16	.125	5/32	2-56	—
1591-3	¼	.140	3/32	.125	5/32	2-56	—
1596-2	⅜	.109	1/16	.125	5/32	2-56	—
1596-3	⅜	.140	3/32	.125	5/32	2-56	—
1560 A	⅛	.109	1/16	.187	¼	4-40	1653-2
1560 F	⅛	.140	3/32	.187	¼	4-40	1653-3
1650-2	¼	.109	1/16	.187	¼	4-40	1627-2
1650-3	¼	.140	3/32	.187	¼	4-40	1627-3
1651-2	⅜	.109	1/16	.187	¼	4-40	1628-2
1651-3	⅜	.140	3/32	.187	¼	4-40	1628-3
1623-2	½	.109	1/16	.187	¼	4-40	1629-2
1623-3	½	.140	3/32	.187	¼	4-40	1629-3
1624-2	⅝	.109	1/16	.187	¼	4-40	1654-2
1624-3	⅝	.140	3/32	.187	¼	4-40	1654-3
1625-2	¾	.109	1/16	.187	¼	4-40	1655-2
1625-3	¾	.140	3/32	.187	¼	4-40	1655-3
1652-2	1	.109	1/16	.187	¼	4-40	1630-2
1652-3	1	.140	3/32	.187	¼	4-40	1630-3
1560 B	⅛	.109	1/16	.187	¼	6-32	1620-2
1560 C	⅛	.140	3/32	.187	¼	6-32	1620-3
1560 D	⅛	.171	⅛	.187	¼	6-32	1620-4
1612-2	3/16	.109	1/16	.187	¼	6-32	—
1612-3	3/16	.140	3/32	.187	¼	6-32	—
1612-4	3/16	.171	⅛	.187	¼	6-32	—
1546	¼	.109	1/16	.187	¼	6-32	1621-2
1546 B	¼	.140	3/32	.187	¼	6-32	1621-3
1546 D	¼	.171	⅛	.187	¼	6-32	1621-4
1561 B	⅜	.109	1/16	.187	¼	6-32	1622-2
1561 C	⅜	.140	3/32	.187	¼	6-32	1622-3
1561 D	⅜	.171	⅛	.187	¼	6-32	1622-4
1604-2	½	.109	1/16	.187	¼	6-32	—
1604-3	½	.140	3/32	.187	¼	6-32	—
1604-4	½	.171	⅛	.187	¼	6-32	—
1605-2	⅝	.109	1/16	.187	¼	6-32	—
1605-3	⅝	.140	3/32	.187	¼	6-32	—
1605-4	⅝	.171	⅛	.187	¼	6-32	—
1608-2	¾	.109	1/16	.187	¼	6-32	—
1608-3	¾	.140	3/32	.187	¼	6-32	—
1608-4	¾	.171	⅛	.187	¼	6-32	—
1609-2	1	.109	1/16	.187	¼	6-32	—
1609-3	1	.140	3/32	.187	¼	6-32	—
1609-4	1	.171	⅛	.187	¼	6-32	—

ALUMINUM SPACERS

WITH IRIDITE FINISH PER SPEC MIL-C-5541



- Lightweight
- Round — Clear Hole
- Spacers — Drilled Hole Only



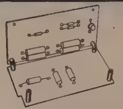
- Non-magnetic
- Round — Tapped Hole
- Spacers — with Tapped Hole

SPACERS — DRILLED HOLE ONLY | SPACERS — WITH TAPPED HOLE

Length Inches	For #4 Screw .120 Hole Cat. No.	For #6 Screw .140 Hole Cat. No.	For #8 Screw .171 Hole Cat. No.		Length Inches	4-40 Thread Cat. No.	6-32 Thread Cat. No.	8-32 Thread Cat. No.
¼ (.250)	3457	3464	3471		¼ (.250)	3478	3485	3492
⅜ (.375)	3458	3465	3472		⅜ (.375)	3479	3486	3493
½ (.500)	3459	3466	3473		½ (.500)	3480	3487	3494
¾ (.750)	3460	3467	3474		¾ (.750)	3481	3488	3495
1 (1.000)	3461	3468	3475		1 (1.000)	3482	3489	3496
1½ (1.500)	3462	3469	3476		1½ (1.500)	3483	3490	3497
2 (2.000)	3463	3470	3477		2 (2.000)	3484	3491	3498

1.500 and 2″ are tapped ⅜ deep each end

HINGED STANDOFFS FOR TERMINAL BOARDS

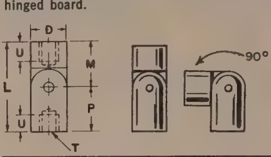


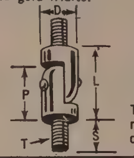
Only 2 screws used to fasten board in place or open the hinged board.

- APPLICATIONS UNLIMITED
- TIME SAVER
- CUT COST OF SERVICING
- SPACE SAVER
- INTERCONNECT CIRCUITS OR SERVICES WITHOUT DANGER OF SHORTING
- WIRING EXPOSED FOR EASY TEST

Material: Made of Brass MIL Spec. QQ-B-626A Comp. 22—½ Hard.

Finishes: Cadmium plate per QQ-P-416 Type 2 Class 2 and gold Iridite.





These standoffs mount at front of the board.

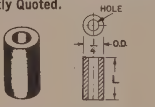
Hinge Cat. No.	T Thread	D Diam.	L Length	U	M	P	Standoff Only Cat. No.
351	4-40	.187	¾	.172	.375	.375	1657A
352	4-40	.187	1	.250	.375	.625	1657B
353	6-32	.250	¾	.172	.375	.375	1548E
354	6-32	.250	1	.250	.375	.625	1548F
355	8-32	.250	¾	.172	.375	.375	1692D
356	8-32	.250	1	.250	.375	.625	1692E

Hinge Cat. No.	T Thread	L Length	D Diam.	S	P	Standoff Only For Front of Board Cat. No.
357	4-40	½	.187	¼	¼	1657
358	6-32	½	.250	5/16	¼	1548C
359	8-32	½	.250	5/16	¼	1692C

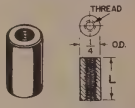
PHENOLIC SPACERS

- GOOD MECHANICAL STRENGTH
- RESISTS ABRASIONS & CHEMICALS
- EXCELLENT DIELECTRIC
- LOW MOISTURE ABSORPTION

Material: PBE Grade MIL-P-79A Natural Color Phenolic — Special Sizes Made to Order — Promptly Quoted.



SPACERS — DRILLED HOLE ONLY



SPACERS — WITH TAPPED HOLE

Length Inches	For #4 Screw .120 Hole Cat. No.	For #6 Screw .140 Hole Cat. No.	For #8 Screw .171 Hole Cat. No.	4-40 Thread Cat. No.	6-32 Thread Cat. No.	8-32 Thread Cat. No.
¼ (.250)	360	367	1490	376	383	390
⅜ (.375)	361	368	1491	377	384	391
½ (.500)	362	369	1492	378	385	392
¾ (.750)	363	370	1493	379	386	393
1 (1.000)	364	371	1494	380	387	394
1½ (1.500)	365	372	374	381	389	395
2 (2.000)	366	373	375	382	389	396

1.500 and 2″ are tapped ⅜ deep each end.

ALUMINUM ECONOMY SPACERS

FOR No. 4, 6 or 8 SCREWS

- PRECISION FORMED
- NO BURRS

Made of flat strip aluminum and rolled on precision equipment. Assures maximum bearing surface, square ends.

Description and Tolerance

Spacer For	I.D. ±.005	O.D. ±.007
#4	.125	.167
#6	.151	.193
#8	.178	.232

L Length Inches	For #4 Cat. No.	For #6 Cat. No.	For #8 Cat. No.		L Length Inches	For #4 Cat. No.	For #6 Cat. No.	For #8 Cat. No.
3/16	397	—	—		¾	418	425	432
¼	398	405	412		⅞	419	426	433
5/16	399	406	413		1	420	427	434
⅜	400	407	414		1¼	421	428	435
7/16	401	408	415		1½	422	429	436
½	402	409	416		1¾	—	430	437
⅝	403	410	417		2	—	—	438

KEYSTONE ELECTRONICS CORP., 49 BLEECKER ST., NEW YORK, N. Y. 10012 • (212) 475-4600

ELECTRONIC COMPONENTS

PLUG IN HOUSINGS

Enhance the appearance and give that professional look to your products using these molded housings. Ideally suited for packaging relays, logic packages, networks and miniature circuitry. Durable, lightweight covers that will withstand vibrations and rough usage.

HEADERS: Molded of GP black phenolic and fit standard sockets. Pins are brass. Nickel plated guide hole tapped 8-32 for terminal board mounting stud.

- **Variety of molded materials**
- **Good chemical resistance**

MATERIAL CHARACTERISTICS:

Polystyrene: For general purpose use where high impact strength is not required and temperature would not exceed 170°F.

Butyrate: 3 times the impact strength of Polystyrene and excellent electrical properties, use wherever temperatures of 210°F exist.

Nylon: Impact strength slightly less than Butyrate but recommended for use where temperatures are as high as 300°F.

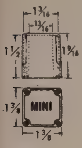


FIG. 1

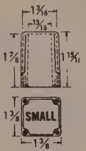


FIG. 2

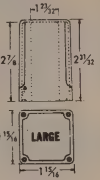


FIG. 3

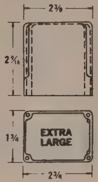


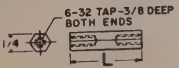
FIG. 4

Housing with Octal Header & 4 Screws Cat. No.	Housing Only Cat. No.	Fig. No.	Type	Material	Color
660	670	1	Mini	Butyrate	Clear
661	671	1	Mini	Nylon	White
662	672	1	Mini	Polystyrene	Clear
641	645	1	Mini	Polystyrene	Opaque Black
642	646	1	Mini	Polystyrene	Transp Red
663	673	2	Small	Butyrate	Clear
664	674	2	Small	Nylon	White
665	676	2	Small	Polystyrene	Clear
643	647	2	Small	Polystyrene	Opaque Black
644	648	2	Small	Polystyrene	Transp Red
650	649	3	Large	Butyrate	Clear
668	679	3	Large	Polystyrene	Clear
677	686	3	Large	Polystyrene	Opaque Black
678	667	3	Large	Polystyrene	Transp Red
639	640	4	Xtra-Lge	Polystyrene	Clear
710	711	4	Xtra-Lge	Polystyrene	Opaque Black
712	713	4	Xtra-Lge	Butyrate	Clear

HEX SPACERS 6-32 TAPPED BOTH ENDS

Extra long length spacers ideal as standoff legs for Keystone pre-punched boards or your special application.

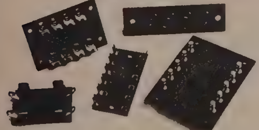
Brass cadmium plated and chromate. ¼″ O.D. with 6-32 x ⅜″ deep tapped holes both ends.



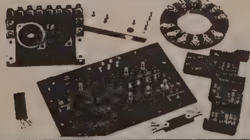
Cat. No.	Length
1635	1
1636	1¼
1637	1½
1638	1¾
1639	2
1642	2¼
1643	2½

TERMINAL BOARDS

READI-MADE

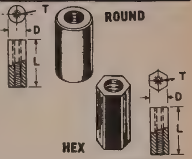


CUSTOM FABRICATED



NEW FREE
CATALOG
ON REQUEST

THREADED SPACERS



Material: ALL HARDWARE ON THIS PAGE IS MADE OF: BRASS MIL SPEC. QQ-B-626A COMP. 22 — ½ HARD.

Finishes: Nickel Plate Mil-F-14072 QQ-N-290 Type V.

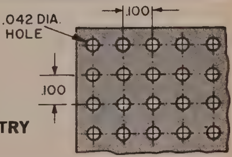
Cadmium plate per QQ-P-416 Type 2 Class B and clear chromate. Other finishes available on special order.

Threaded spacers ¼″ O.D. threaded 4-40, 6-32, 8-32 available either in round or hex. Round type is nickel plated, hex type is cadmium.

HEX Cadmium Plated Cat. No.	D	L	T Thread	ROUND Nickel Plated Cat. No.
1450	3/16	¼	4-40	1547
1656	3/16	½	4-40	1657
1656A	3/16	¾	4-40	1657A
1656B	3/16	1	4-40	1657B
1450A	¼	¼	4-40	1547A
1450B	¼	⅜	4-40	1547B
1450C	¼	½	4-40	1547C
1450D	¼	¾	4-40	1547D
1450E	¼	1	4-40	1547E
1451A	¼	¼	6-32	1548A
1451B	¼	⅜	6-32	1548B
1451C	¼	½	6-32	1584C
1451D	¼	⅝	6-32	1548D
1451E	¼	¾	6-32	1548E
1635	¼	1	6-32	1548F
1474A	¼	¼	8-32	1692A
1474B	¼	⅜	8-32	1692B
1474C	¼	½	8-32	1692C
1474D	¼	¾	8-32	1692D
1474E	¼	1	8-32	1692E
1452A	⅜	⅜	8-32	1549A
1452B	⅜	½	8-32	1549B
1452C	⅜	⅝	8-32	1549C
1452D	⅜	¾	8-32	1549D
1452E	⅜	1	8-32	1549E

MICRO-MINIATURE KEYBOARDS

- FOR MODULE STACKS
- SMALLER PLUG-IN CARDS POSSIBLE
- PERMITS HIGHER COMPONENT DENSITY FOR SUBMINIATURE CIRCUITRY

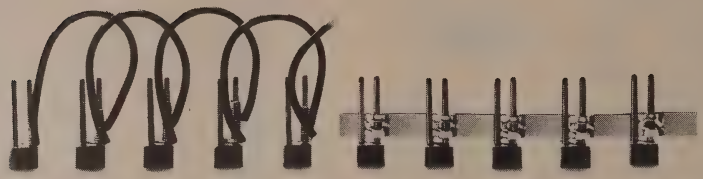


"P" PATTERN .042 HOLES .100 x .100

Width & Length	No. Holes W & L	Glass Epoxy	Glass Epoxy Cop. Clad (1 Side)	XXXP Natural Phenolic
1/32 THICK MATERIAL		Cat. No.	Cat. No.	Cat. No.
2 x 4½	19 x 44	4225	4234	—
2 x 6	19 x 59	4226	4235	—
4½ x 6	44 x 59	4227	4236	—
6 x 17	59 x 169	4228	4237	—
3/64 THICK MATERIAL		Cat. No.	Cat. No.	Cat. No.
2 x 4½	19 x 44	4229	4238	—
2 x 6	19 x 59	4230	4239	—
4½ x 6	44 x 59	4231	4240	—
6 x 17	59 x 169	4232	4241	—
1/16 THICK MATERIAL		Cat. No.	Cat. No.	Cat. No.
2 x 4½	19 x 44	3405	3415	3396
2 x 6	19 x 59	3406	3416	3397
2.73 x 17	26 x 169	3407	3417	3398
3 x 4½	29 x 44	3408	3418	3399
4½ x 6	44 x 59	3409	3419	3400
4½ x 6½	44 x 64	3410	3420	3404
4½ x 8½	44 x 84	3411	3421	3425
4½ x 17	44 x 169	3412	3422	3426
6 x 17	59 x 169	3413	3423	3427

KEYSTONE ELECTRONICS CORP., 49 BLEECKER ST., NEW YORK, N. Y. 10012 • (212) 475-4600

One termination method is surer, faster and costs less.



Obviously.

Engineers nationwide are switching from wire wrap to a new, simpler way of connecting common spaced pins in electronic chassis. The Lear Siegler Pin Bar.

The reasons are clear:

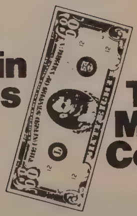
Terminations are surer because each Pin Bar is "spec" built to fit your pins precisely. No chance for human error. Pin Bars mean 100 percent reliable gas tight terminations that will outlast the life of the chassis.

Assembly is faster because each bus terminates all pins at once – with a remarkably simple tool.

That adds up to low cost terminations. Pin Bars can cut your wire wrap costs in half. Typically from 10 cents down to 3-6 cents per pin. One major manufacturer has already demonstrated a $68 savings per chassis using Pin Bars. You may, too. Write for more information and free Pin Bar samples to:

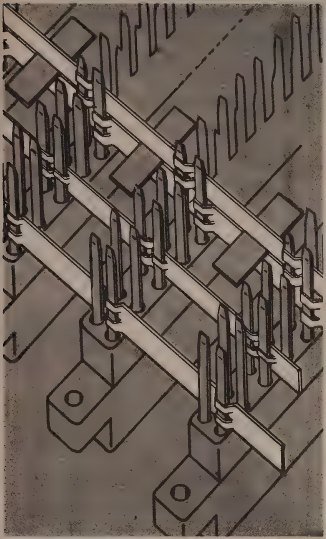
LEAR SIEGLER, INC.
ELECTRONIC INSTRUMENTATION DIVISION
714 N. Brookhurst St.
Anaheim, Calif. 92803
TWX 910-591-1157
Telephone: (714) 774-1010

Pin Bars



The Money-Saving Connection

LSi Pin Bar® means:



- Thousands of "hi-rel" solderless bussing connections per hour at a fraction the cost of your present busing method.
- Fast, simple, "foolproof" connections that lower production costs — eliminate continuity checks.
- Low uniform contact resistance that will electrically enhance any circuit — especially frequency applications.
- Efficient back panel design (greater pin exposure, increased discrete wiring area and easier checkout).
- A "spec" performance electrical component produced to your exact requirements.

solderless bus bar for common connections

SPECIFICATIONS

Terminal Spacing and Length: Selectable.

Spacing Tolerance: ±0.010″ between terminals — ±0.020/foot cumulative.

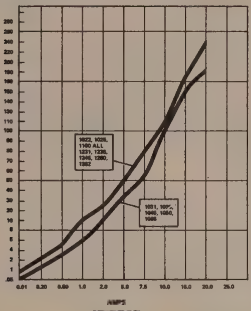
Material: 1000, 1200 Series: Beryllium Copper Alloy #172 per QQ-C-533.
1100 Series: Beryllium Copper Alloy #175 per QQ-C-533.

Standard Finishes:
Tin: Electro-tin plate, fused, per MIL-T-10727, Type I, 0.0003″ thickness.
Gold: Gold plate per MIL-G-45204, Type II, 0.000050″ minimum thickness over nickel plate per QQ-N290, 0.000050″ minimum thickness.

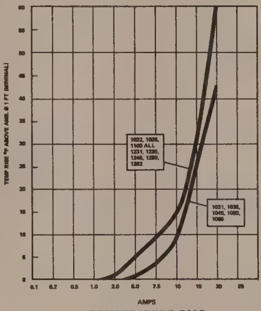
Options: Insulation, special finishes, unique end configurations.

Insertion: Manual or semi-automatic insertion equipment available.

PERFORMANCE DATA



IR DROP



TEMPERATURE RISE

The following performance data meets or exceeds MIL-STD-202 "D" (Full Report Available).

Thermal Shock: Method 107, Condition A.

Mechanical Shock: Method 213, Condition H.

Vibration: Method 201.

Corrosion Resistance: Method 101, Condition B 48 Hour Exposure Salt Spray.

Contact Voltage Drop: 0.533 millivolts maximum per amp.

Gas Tight Contact: 10 minutes of 1:1 hydrochloric/nitric acid followed by 10 minutes of ammonium sulfide fumes.

DESIRED PIN BAR CONFIGURATION

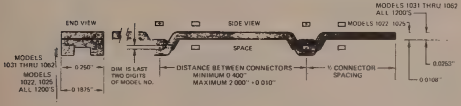
Alternate Pins (Series 1000 & 1200)		Connector Pin Size	Adjacent Pins (Series 1100)
	1022	.022″ x .036″	1122
	1025	.025″ x .025″	1125
1031	1231	.031″ x .062″	1131
1035	1235	.035″ x .050″	1135
1045	1245	.045″ x .045″	1145
1050	1250	.050″ x .035″	1150
1062	1262	.062″ x .031″	1162

HOW TO ORDER

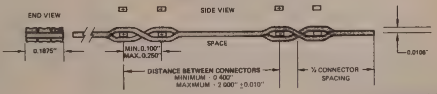
An 11-digit number is used for ordering. An example would be as follows:

1031	— 0.500 —	32 —	G or	T
Model No.	Connector Spacing 0.500″	No. of Connectors	gold finish	tin finish

MODEL 1000 & 1200 SERIES ALTERNATE PIN BUSS


END VIEW
SIDE VIEW
SPACE
MODELS 1031 THRU 1062 ALL 1200'S
MODELS 1022 1025
MODELS 1031 THRU 1062
MODELS 1022, 1025 ALL 1200'S
0.250″
0.1875″
DIM IS LAST TWO DIGITS OF MODEL NO.
DISTANCE BETWEEN CONNECTORS MINIMUM 0.400″ MAXIMUM 2.000″ +0.010″
½ CONNECTOR SPACING
0.0253″
0.0108″

MODEL 1100 SERIES ADJACENT PIN BUSS


END VIEW
SIDE VIEW
SPACE
0.1875″
MIN. 0.100″ MAX. 0.250″
DISTANCE BETWEEN CONNECTORS MINIMUM · 0.400″ MAXIMUM · 2.000″ ±0.010″
½ CONNECTOR SPACING
0.0108″

NOTE 1100 0.400 MODELS WILL PICK UP A PIN EVERY 0.200″ ON CENTER

LEAR SIEGLER, INC.

LSi **LSI Pin Bar Products**

ELECTRONIC INSTRUMENTATION DIVISION
714 NORTH BROOKHURST STREET • ANAHEIM, CALIFORNIA 92803
(714) 774-1010 TWX — 910-591-1157 • TLX — 65-5444

mueller clips

a complete line of

ALLIGATOR TEST & BATTERY CLIPS

Mueller Electric Co. CLEVELAND, OHIO 44114

"60 SERIES" ALLIGATOR CLIPS

U.S. Patent No. 3,321,736

No. 60—CONVENTIONAL TYPE

New slim design with full-meshing teeth. Convenient, round thumb grip, barrel connection for banana plug. Equipped with small soldering lip. Strong spring with a hard bite. Cadmium plated. 2" long.

EACH NET.......................... $0.14 LOTS OF 10.......................... $0.102

No. 60-S—SCREW CONNECTION

Eliminates necessity for soldering. Otherwise same as No. 60.

EACH NET....$0.16 LOTS OF 10... $0.118

No. 60-NS—ALLIGATOR NEEDLE CLIP

Like No. 60-S, but with insulation piercing needle in one jaw. Screw connection. 2" long. 10 per box.

EACH NET.......................... $0.30 LOTS OF 10.......................... $0.228

No. 60-CS—COPPER ALLIGATOR CLIP

Solid copper version of No. 60-S. Screw connection. 2" long. 10 per box.

EACH NET.......................... $0.25 LOTS OF 10.......................... $0.187

No. 60PR-2—SPECIAL BARREL FOR TEST PROD OR PHONE TIP

Barrel crimped to provide friction fit on standard test prod or phone tip. Holds prod on test, frees hand for other work.

EACH NET.......................... $0.20 LOTS OF 10.......................... $0.151

No. 62 FLEXIBLE VINYL INSULATOR

Red and black insulators for Alligator Clips 60, 60-S, 60-CS, 60PR-2, 60-NS.

EACH NET..........................$0.09 LOTS OF 10.......................... $0.071

No. 60-HS—STEEL ALLIGATOR CLIP WITH INSULATED HANDLE

Same as No. 60-S except equipped with red and black insulating sleeves on end. Very convenient for distinguishing leads. Has screw connection also. Cadmium plated. 2 11/32" long. Shipped half red, half black.

EACH NET.......................... $0.22 LOTS OF 10..........................$0.164

No. 60-CHS—COPPER ALLIGATOR CLIP, INSULATED HANDLE

Solid copper version of No. 60-HS. Screw connection. Shipped with half red, half black insulating sleeves. 10 per box.

EACH NET.......................... $0.30 LOTS OF 10.......................... $0.228

"70 SERIES" ALLIGATOR CLIPS

U.S. Patent No. 2,762,028

Features simplified design, fast connection of wire with cord strain relief ears, patented hinge construction and lower cost.

No. 70—FOR SOLDERED CONNECTION

Steel, cadmium plated. 1¾" long.

EACH NET..... $0.11 LOTS OF 10...... $0.081

No. 70-S—SCREW CONNECTION

Otherwise same as No. 70.

EACH NET..... $0.13 LOTS OF 10...... $0.098

No. 70-CS—COPPER SCREW CONNECTION

Solid copper version of No. 70-S.

EACH NET...... $0.22 LOTS OF 10..... $0.168

No. 72— SKIN-TIGHT INSULATOR FOR 70 SERIES ALLIGATOR CLIPS!

For the first time complete, skin-tight, one-piece insulation for a standard size Alligator Clip! Covers entire clip right down to nose. Special tip slot permits full jaw opening without exposing teeth.

EACH NET.......................... $0.08 LOTS OF 10.......................... $0.061

MICRO-GATOR CLIP

(Smallest Insulated Clip Ever Made)

U.S. Patent No. 2,762,028 Trademark Reg.

Micro-Gator

Micro-Gator with Insulator

The alligator clip with the microscopic tip! This is the alligator clip you now can use where no other clip will do . . . on printed circuits, in tight spots and on tiny terminals too crowded for anything but its microscopic tip. Including separate skin-tight insulator the tip is no bigger than the head of a pin! Yet the Micro-gator has ample thumb grip, and plenty of bite to stand up straight on the smallest terminals. Ample 7/32" jaw spread. 1 3/32" long. Solder connection. Skin-tight flexible vinyl insulator (sold separately) has "lip-action" tip slot so that jaws stay covered whether open or closed.

No. 34 (Steel, cadmium plated)

EACH NET.......................... $0.09 LOTS OF 10.......................... $0.066

No. 34-C (Solid Copper)

EACH NET.......................... $0.12 LOTS OF 10.......................... $0.086

No. 36 (Insulator for Nos. 34 and 34-C)

EACH NET.......................... $0.06 LOTS OF 10.......................... $0.044

MINI-GATOR CLIP

U.S. Patent No. 3,321,736

Trademark Reg.

Mini-gator

Mini-gator with Insulator

Indispensable for testing or incorporation into miniaturized equipment. New design features rivet hinge for greater strength, full-meshing teeth to grip finest wires. Skin-tight flexible Vinyl insulator (sold separately) covers completely — has slotted "lip action" tip. Clip weighs 1/20th oz., has tiny 11/64" O.D. nose, but ample 3/16" jaw spread 1 3/32" long. Crimping ears. Solder connection. Surprisingly strong bite penetrates corrosion and coatings.

No. 30 (Steel, cadmium plated)

EACH NET.......................... $0.11 LOTS OF 10.......................... $0.082

No. 30-C (Solid Copper)

EACH NET.......................... $0.13 LOTS OF 10.......................... $0.10

No. 32 (Insulator for Nos. 30 and 30-C)

EACH NET.......................... $0.06 LOTS OF 10..........................$0.044

COMPLETELY INSULATED ALLIGATOR CLIPS

Patent Pending

No. 63 or 63-C Clip

Sold only as a unit, with factory-applied insulators.

Completely insulated right down to the nose. Flexible 2-piece skin-type vinyl insulator of high dielectric strength, with "lip action" slotted tip that permits opening of clip without exposing metal. Insulator nose is only 13/64" O.D. The tight fitting sheath preserves all the slimness of the Alligator Clip, still giving complete protection against shorts in even the tightest spots. Screw connection easily made by slipping insulator forward. 2⅛" long.

No. 63—INSULATED ALLIGATOR CLIP (STEEL)

Composed of Mueller No. 60-S Alligator Clip steel, cadmium plated, screw connection, complete with 2-piece vinyl insulator. Shipped half with red insulators, half black. 10 per box.

EACH NET..........................$0.30 LOTS OF 10..........................$0.228

No. 63-C—INSULATED ALLIGATOR CLIP (COPPER)

Composed of Mueller No. 60-CS Alligator Clip, solid copper, screw connection. Shipped half with red insulators, half black. 10 per box.

EACH NET.......................... $0.36 LOTS OF 10.......................... $0.273

CROCODILE CLIPS

No. 85 or 85-C Clip with No. 87 Insulator

No. 85-T Clip

No. 85—A very small clip with slender, elongated jaws for getting into tight places in radio or electrical test work. Screw connection. 2⅛" long.

EACH NET.......................... $0.16 LOTS OF 10.......................... $0.12

No. 85-C—Same as No. 85,, except solid copper with phosphor bronze spring, brass screw. A radio frequency, entirely non-ferrous test clip. 10 per box.

EACH NET.......................... $0.32 LOTS OF 10.......................... $0.243

No. 85-T—Crocodile "Tip-Clip"—equipped with standard phone tip on one jaw, otherwise same as No. 85. Ideal for use as a prod, for ordinary clip connections and for connections to insulated binding posts having nonremovale heads. 2⅝" long. 10 per box.

EACH NET.......................... $0.42 LOTS OF 10.......................... $0.314

Use No. 87 Insulators for clips 85, 85-C and 85-T. Red and Black. Cover entire clip except nose. Protect against short and shock. Help to distinguish leads.

mueller clips

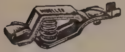
a complete line of

ALLIGATOR TEST & BATTERY CLIPS

Mueller Electric Co. CLEVELAND, OHIO 44114

TEST CLIPS

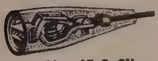
No. 45 PEE WEE



A very small test clip for radio, ignition, meter and similar work. 1½" long. Jaw spread 5/16". Steel, cadmium plated.

EACH NET..........................$0.14 LOTS OF 10.........................$0.104

No. 45-C
Solid Copper R.F. Test Clip



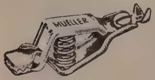
No. 45-C Clip
No. 47 Insulator

Solid copper radio frequency test clip. Phosphor bronze spring, brass screw. Will not heat up in high frequency test work, entirely non-ferrous. 1½" long. 10 per box.

EACH NET........................ $0.26 LOTS OF 10....................... $0.196

Use No. 47 Insulator for clips 45 and 45-C.

No. 48-B



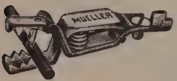
A small test and battery clip for radio use and general testing purposes. 2" long. Jaw spread ½". Steel, cadmium plated. 10 per box.

EACH NET......$0.22 LOTS OF 10..... $0.168

No. 48C—Solid Copper. Same size as 48-B.

EACH NET..........................$0.32 LOTS OF 10........................ $0.238

No. 50-C Needle Clip



Solid copper. Needle pierces insulation of wire for quick test contact. 2¼" long. 10 per box.

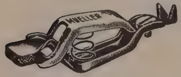
EACH NET.... $0.50 LOTS OF 10..$0.374

No. 51-C—Large crocodile clip. Same as 50-C but without needle. 10 per box.

EACH NET.... $0.36 LOTS OF 10.... $0.272

Use No. 49 insulator for Clips 48-B, 48-C, 50-C and 51-C.

No. 27



A high grade test clip with meshing teeth on three sides of jaws. For laboratory and shop test work 2 7/16" long. Jaw spread ⅝". Steel, cadmium plated. 10 per box.

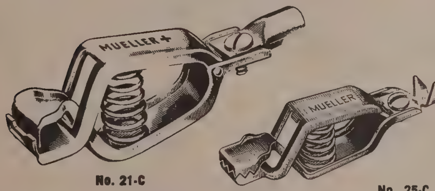
EACH NET..........................$0.26 LOTS OF 10........................$0.196

No. 27-C—Solid copper. Same size as No. 27. 10 per box.

EACH NET......................... $0.46 LOTS OF 10......................... $0.342

Use No. 29 Insulator for clips 27 and 27-C.

LARGER SIZES OF CLIPS



No. 21-C

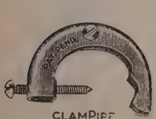
No. 25-C

All packed 10 per box.

	Each Net	Lots of 10
No. 24-A — 25 Amp. Steel, lead plated, 2⅞" long	$0.44	$0.33
No. 25 — 40 Amp. Steel, cadmium plated, 3" long	.39	.29
No. 25-C — 75 Amp. Solid Copper, 3" long	.76	.57
No. 21-A — 50 Amp. Steel, lead plated, 4" long	.78	.59
No. 21-C*—100 Amp. Solid Copper, 4½" long	1.92	1.44
No. 11-A*—100 Amp. Steel, lead plated, 6" long	2.22	1.66
No. 11-C*—200 Amp. Solid Copper, 6" long	3.88	2.91
No. 33-C*—300 Amp. Solid Copper, 7¾" long	7.25	5.45

(*Furnished with detachable lug connection for easy securing to large cables.)

GROUND CLAMP

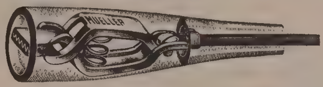


CLAMPIPE
No. 58

The ClamPipe will not spread, bend or lop over when applied. Point of large screw bites through corrosion into clean metal to insure good contact. Applicable to pipe ⅜" to 1⅜" O.D. The best ground clamp on the market!

EACH NET......$0.44 LOTS OF 10..... $0.328

FLEXIBLE INSULATORS FOR CLIPS



A convenient protection against short circuit and electric shock. Colors help to distinguish leads. Packed half red and half black to indicate polarity. Long tail prevents breakage of wire. Constructed so that clip is held in firmly. NOW AVAILABLE also in blue, white, yellow and green at 10% above regular price are insulators marked * below.

Insulator No.	For Use with Clip No.	Each Net	Lots of 10
13*	11-A, 11-C	$1.39	$1.05
23*	21-A, 21-C	.71	.53
26*	24-A, 25, 25-C	.49	.366
29*	27, 27-C	.30	.227
32*	30, 30-C	.06	.044
35	33-C	3.99	2.99
36*	34, 34-C	.06	.044
47*	45, 45-C	.11	.086
49*	48-B, 48-C, 50-C, 51-C	.21	.159
62*	60, 60-S, 60-CS, 60PR-2, 60-NS (also 70 Series)	.09	.071
72*	70, 70-S, 70-CS	.08	.061
87*	85, 85-C, 85-T	.11	.082

*Also available in blue, white yellow and green.

MUELLER *QUALITY* BATTERY BOOSTER CABLES

Highest quality cables, equipped with famous Hippo-Clips, for boosting "dead" 6 or 12-volt vehicle batteries with an external battery. Cables are pure copper, finely stranded for high flexibility and covered with rubber insulation which stays flexible in the coldest weather and resists oil, grease and acid. 413 strands of No. 30 wire in the 4-gauge cable and 259 strands of No. 30 wire in the 6-gauge cable. The many fine features of the Hippo-Clips alone are listed elsewhere on this page. The clips are both soldered to the cable and clinched around the cable insulation by means of clinching ears.

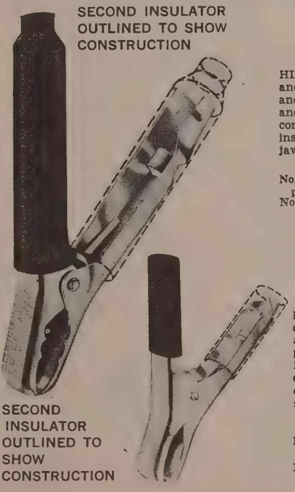
Packaged: pair of cables with clips in a bright, attractive display carton. Standard shipping container 10 cartons.

No. 8A6—8 ft., 6-gauge, with No. 41A Hippo-Clips (Steel, bright copper plated)
NET PRICE PER PAIR......$11.10

No. 12A6—12 ft., 6-gauge, with No. 41A Hippo-Clips (Steel, bright copper plated)
NET PRICE PER PAIR..............$14.70

Mueller Quality
BATTERY
BOOSTER CABLES
with famous Mueller Hippo Clips
12C4
DISPLAY CARTON

No. 12C4—12 ft., 4-gauge, with No. 41C Hippo-Clips (Solid Copper)
NET PRICE PER PAIR..................$24.00


SECOND INSULATOR OUTLINED TO SHOW CONSTRUCTION
SECOND INSULATOR OUTLINED TO SHOW CONSTRUCTION

HIPPO-CLIP

HIPPO-CLIP—For battery booster cables and fast chargers. Proved higher quality and superior design. Built-in solder strap and clinching ears for fast, sure cable connection. Supplied with vinyl handle insulators in red or black. Full 1-9/16" jaw spread. 6" long.

	Net price ea.
No. 41-A Steel, bright copper plated, 100 amp.	$0.90
No. 41-C Solid Copper, 200 amp.	2.40

PIGMY HIPPO-CLIP

PIGMY HIPPO-CLIP—A new small plier clip for battery operated equipment and automotive test. Flat, wide handle allows positive grip. Won't "squirt away". Built-in solder strap and wire clinching ears. Supplied with vinyl handle insulators in red or black. Ample 1⅛" jaw spread. 3" long.

	Net price ea.
No. 46-A Steel, bright copper plated, 50 amp.	$0.26
No. 46-C Solid Copper, 75 amp.	.44

3-1-75

NATIONAL TEL-TRONICS

ntt

STATE ROAD HILL, MEADVILLE, PA. 16325
A division of Electro-Audio Dynamics, Inc. (814) 724-6440

For all your connector and component needs, there is no larger or more reliable source than National Tel-Tronics. Having produced parts for over twenty-five years for all the major OEM equipment manufacturers, National Tel-Tronics has a vast background of component and connector experience on which to draw. Complete tool shop, stamping facilities and in house production capability enable us to have the flexibility to rapidly produce a vast range of electronic connectors and components, either standard or to the customer's specific requirements. Many of our standard parts are listed here. If you don't see your specific requirement, contact our company for a fast and reliable quotation.

PHONO PLUGS AND JACKS

Choose from the largest selection of types; solder, all-crimp, shielded, short and long shell, handled and insulated versions.

36A

39C

333

329

49C

60A

5005

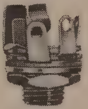
PHONE PLUGS AND JACKS

All standard 2 and 3 circuit jacks and plugs including stereo circuit types are stock items. Ultra-miniature, miniature and standard size jacks are available in both enclosed and standard wafer types. Phone Plugs include both screw and solder type and are available in military versions per MIL-P-642.

300

308

309


311

335

336

338

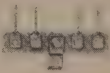
TERMINAL STRIPS

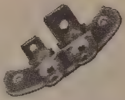
Thousands of configurations available in XP phenolic or UL approved flame retardant materials. ⅜″ or ½″ spacing is standard. Solder-type, wrap-around, quick disconnect, miniature and sub-miniature types are all standard.

CLIP-ON

WWSWW

131

WW7WW




BINDING POST BOARDS

6-32 screw type binding post boards manufactured to standard and custom configurations. Standards include 1 through 12 lug positions in 7/16″ or ½″ spacing. Heavy-duty ⅛″ boards and heavy-duty binding post lugs also available. Can be manufactured to custom configurations with silk-screening, hot stamping, fungus resistant finishes and other special requirements.

2554

2404

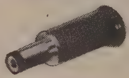
2704

001-3

001-7

COAXIAL PLUG AND JACKS, INCLUDING F CONNECTORS

Standard coaxial connectors for battery chargers, AC adapters, calculators, etc. Available in .218 and .195 O.D.'s. Male mating plugs also available. F connectors available in both male and female versions for RG cable. Also have solderless type for RG 58 and 59 versions and PL-259 variations.


6-200

6-200P

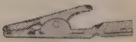
6-72M

6-72F

6-202

ALLIGATOR CLIPS

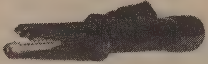
Available in both standard high-grade plated steel and in copper construction for extra low resistance. Standard type have ⅜″ jaw opening and will accept banana plug in the rear. Both screw and solder versions are standard. Also available in insulated handle versions and in screw and solder types, tip plug adapters, miniature versions for space saving applications and vinyl insulators in six colors for both the standard and the miniature versions.


740

743

748

741


745

749

4 AND 5 WAY BINDING POSTS

All metal and insulated molded posts are standard items. Available in nickle and gold plating in both 10-32 and 8-32 threads. Dual binding posts in red or black combinations and ¾″ spring also standard.

875

876

4-876

877

878

880

TIP PLUGS AND JACKS

.080 tip plugs are available in a full selection of both solder and solderless types, insulated and non-insulated, including the needle tip and chuck versions. Fully insulated push button meter type plug is also standard for rapid assembly. Molded handles in 1″, 4″ and 5½″ lengths, both threaded and force fit are standard for creating insulated plugs or test probes. Tip jacks are available in insulated and non-insulated types in a variety of colors. Molded nylon tip jacks with metal shell or all nylon shells are also available, including a speed clip type for inexpensive and rapid assembly.

801

837

855

857

868

810

848

883

888

889

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BANANA PLUGS AND JACKS

A full variety of standard and miniature banana plugs with nickle-plated brass bodies and phosphor bronze springs are standard, including side screw and top hex stud mounting version. Insulated handles are available for all plugs. Insulated push-button meter type plug is also standard. Included in the standard line are stacking banana plugs in both single and dual fully molded versions. Banana jacks are available in insulated and non-insulated types in a variety of colors.

809

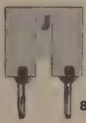
836

852

813

848

819


841

851

844

ANTENNA PLUGS AND JACKS

National Tel-Tronics is a prime supplier to the major automotive car radio manufacturers as well as to CATV-MATV industry. All standard antenna plugs and jacks are available. The standard 4 prong Motorola type plug as well as less expensive 2 and 3 prong plugs are manufactured to exacting standards. A great variation in shell and contact design on the antenna jacks is available from our inventory.

6-68

6-69

6-70

6-71

6-74

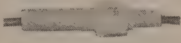
6-75

6-77

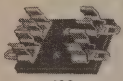
FUSE MOUNTING BASES AND HOLDERS

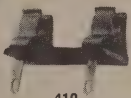
Designed for 3AG type fuses, fuse mounting bases are available in a variety of materials from 1/16" to 3/16" XP phenolic and UL rated FR materials, in both single and multiple configurations. Panel mount fuse holders for 3AG short type fuses are available in both straight and space-saving right-angle configurations with ribbed and fluted caps. The panel mounted fuse holder parts are CSA and UL approved.

408


449

450F


403


410

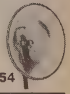
450RA

ANODE AND HIGH VOLTAGE CONNECTORS

Anode connectors to 40 KV rating for BW and color television, and oscilloscopes, are available in a variety of configurations. Spring clips and solderless stainless-steel clips assure continuity. Anode cups are standard in neoprene rubber, flame retardant grade PVC or silicone rubber variations in sizes of 1½", 1¾" and 3". Anode connectors are UL approved.

250

239

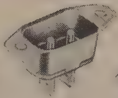

254

INTERLOCK RECEPTACLES

Both flush and bathtub type receptacles for AC connections are standard in a variety of materials from XP phenolic through UL approved flame retardant materials. Solder type, polarized and quick disconnect type pins are standard. Molded snap-in types are also available in flame retardant materials. All the interlocks are approved by Underwriter's Laboratories and Canadian Standard Assn.

712

716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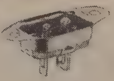
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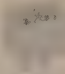
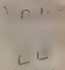
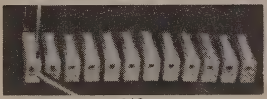

60-740

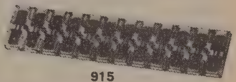

60-746

MOLDED TERMINAL BLOCKS

A variety of molded terminal blocks in flexible PVC are available as standard items. Screw type connections, screw driver slot, and .250 quick disconnect connections are standard. Standard size blocks are in a 12 position configuration but can be cut to smaller size if desired.

905


910


915

COMPRESSION TYPE TERMINAL BOARDS AND BLOCKS

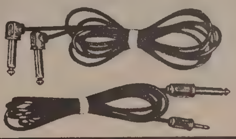
Two types of compression type boards are available from stock. Series 927 features push-button multi-covered terminals which are mounted on phenolic or FR type boards. Available in six different colors in single or multi-roll configurations. A white molded PVC terminal block with red push-button is also available in a 12 position length. This can also be cut to smaller sizes if desired.

900

927

MOLDED CABLE AND HARNESS ASSEMBLIES

A complete molding facility allows great flexibility in providing the audio and electronics industry with a variety of molded cable assemblies. Standard molds includes phone plugs and jacks in 2 and 3 conductor configurations, phono plugs and jacks, miniature phono plugs and miniature jacks, mike connectors, ultra-miniature plugs, coaxial connectors and various adapters. Coaxial and zip cord cables are readily available as well as those for more special applications. Custom assemblies include molds designed to customer specifications and also include capability of amp and molex crimp type assemblies, wire harnesses and multiple conductor assemblies.



DIN CONNECTORS

NTT European style "Europlugs" are available in two, three and five contact arrangements in both male and female versions. In-line and panel mounted types are standard in both flush and extended barrel configurations.

FSN-2

F51B

F51S

F5K

This listing will give you some indication of the capabilities of National Tel-Tronics.
For more details and specifications, send for our complete catalog.

ntt **NATIONAL TEL-TRONICS**

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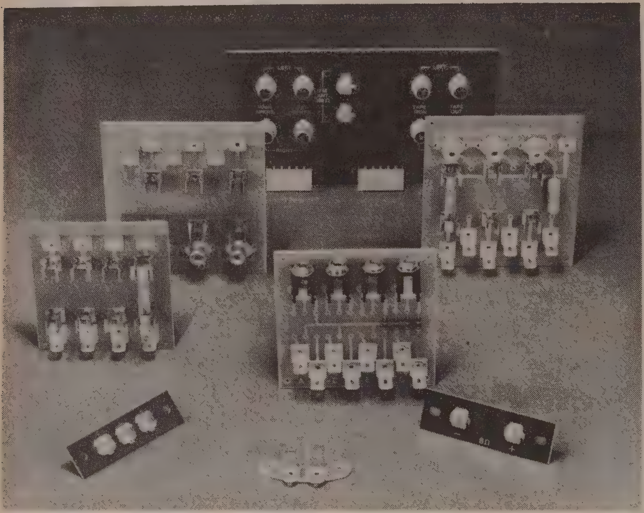
PRINTED CIRCUIT BOARDS AND ASSOCIATED HARDWARE SUPPLIED COMPLETELY ASSEMBLED



One-call, one-source for your printed circuit boards completely assembled with your choice of hardware... delivered to you all ready for component insertion. This unique exclusive single-source service saves you valuable dollars in costs and countless hours in long lead times. Prototypes can be supplied in as little as *48 hours if standard hardware is specified.

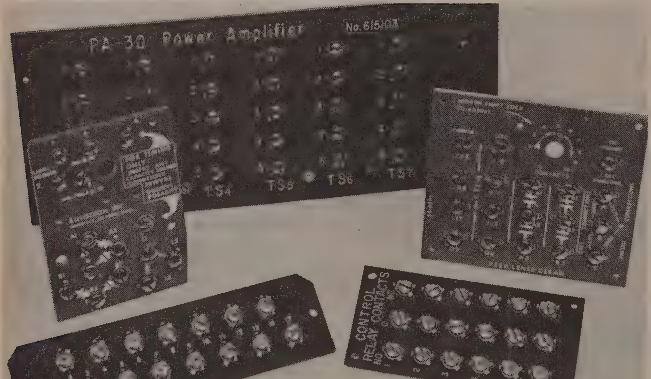
F A E P ©

You get superior quality printed circuit boards manufactured to the highest industry standards by Astro Circuit's new F.E.P.© "Fast-Etch-Process." Simple or extremely complex PC boards to your exact requirements including single-sided, double-sided, plated through holes and infra-red reflow.

Completely assembled terminal boards in any combination of insulating materials and hardware can be supplied in *rapid time and at very competitive prices. All grades of laminated phenolics and fibers including UL/FR materials can be supplied.

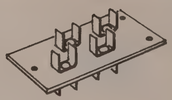
* S.O.S. — Speed Order Service

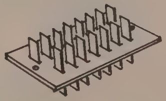
TERMINAL BOARD ASSEMBLIES

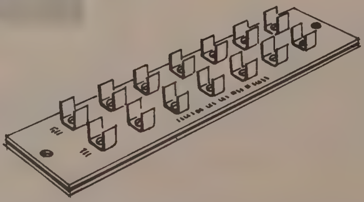


Whether it be for an existing part, or a new design, NT-T is your best source for total service for terminal board assemblies. Faster deliveries and cost savings are yours because of our years of engineering know-how and manufacturing experience.

We offer a wide selection of stock tooling configurations to produce terminal boards to your requirements. For special configurations and designs our special tooling charges are nominal. Board materials are stocked in most grades of paper based materials up to XXXP. Glass epoxy, glass polyester, glass melamine and FR grades are available upon request. Boards can be printed or embossed to your requirements. A wide variety of quick connect/disconnect terminals, screw-terminals, lugs and clips are available and can be provided in any combination desired.







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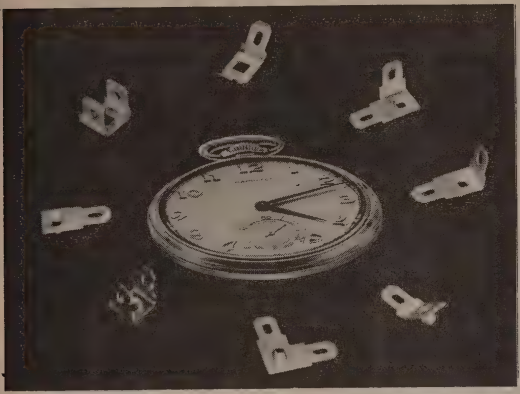
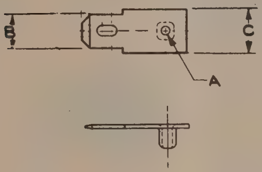


QUICK-DISCONNECT TYPE TERMINALS AND TERMINAL BOARD ASSEMBLIES

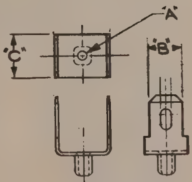
Choose from a virtually limitless selection of National Tel-Tronics quick-connect/disconnect terminals and other component holding and/or mounting hardware. Standard configurations include multiple blade terminals. All terminals are available in .020″ and .032″ thicknesses with electro-tin plating over brass. Special terminal designs available to your exact specifications including special plating, etc. All variations can be assembled on standard size strips as well as panels to customers specifications.

QUICK-DISCONNECT TYPE TERMINALS

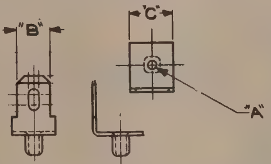
		"A"	"B"	"C"
4201	.020 Brass	7/64 Sq. Barrel	.205	.270
4220	.020 Brass	7/64 Sq. Hole	.205	.270
4231	.020 Brass	7/64 Sq. Barrel	.250	.312
4236	.020 Brass	7/64 Sq. Hole	.250	.312
4250	.032 Brass	7/64 Sq. Hole	.205	.270
4258	.032 Brass	7/64 Sq. Hole	.250	.312
4450	.020 Brass	7/64 Sq. Barrel	.187	.270
4455	.020 Brass	7/64 Sq. Hole	.187	.270
4466	.032 Brass	7/64 Sq. Hole	.187	.270



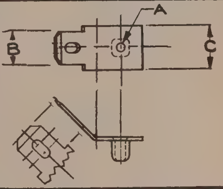
		"A"	"B"	"C"
4205	.020 Brass	7/64 Sq. Barrel	.205	.270
4224	.020 Brass	7/64 Sq. Hole	.205	.270
4235.	.020 Brass	7/64 Sq. Barrel	.250	.312
4240	.020 Brass	7/64 Sq. Hole	.250	.312
4254	.032 Brass	7/64 Sq. Hole	.205	.270
4262	.032 Brass	7/64 Sq. Hole	.250	.312
4270	.032 Brass	7/64 Sq. Hole	.187	.270
4454	.020 Brass	7/64 Sq. Barrel	.187	.270
4459	.020 Brass	7/64 Sq. Hole	.187	.270



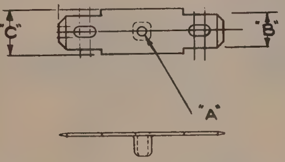
		"A"	"B"	"C"
4202	.020 Brass	7/64 Sq. Barrel	.205	.270
4221	.020 Brass	7/64 Sq. Hole	.205	.270
4232	.020 Brass	7/64 Sq. Barrel	.250	.312
4237	.020 Brass	7/64 Sq. Hole	.250	.312
4251	.032 Brass	7/64 Sq. Hole	.205	.270
4259	.032 Brass	7/64 Sq. Hole	.250	.312
4451	.020 Brass	7/64 Sq. Barrel	.187	.270
4456	.020 Brass	7/64 Sq. Hole	.187	.270
4467	.032 Brass	7/64 Sq. Hole	.187	.270



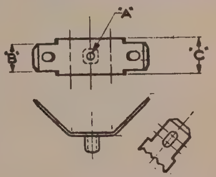
		"A"	"B"	"C"
4225	.020 Brass	7/64 Sq. Barrel	.205	.270
4228	.020 Brass	7/64 Sq. Hole	.205	.270
4241	.020 Brass	7/64 Sq. Barrel	.250	.312
4245	.020 Brass	7/64 Sq. Hole	.250	.312
4255	.032 Brass	7/64 Sq. Hole	.205	.270
4263	.032 Brass	7/64 Sq. Hole	.250	.312
4271	.032 Brass	7/64 Sq. Hole	.187	.270
4460	.020 Brass	7/64 Sq. Barrel	.187	.270
4463	.020 Brass	7/64 Sq. Hole	.187	.270



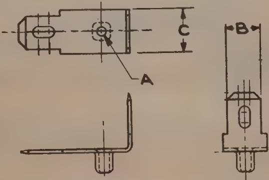
		"A"	"B"	"C"
4203	.020 Brass	7/64 Sq. Barrel	.205	.270
4222	.020 Brass	7/64 Sq. Hole	.205	.270
4233	.020 Brass	7/64 Sq. Barrel	.250	.312
4238	.020 Brass	7/64 Sq. Hole	.250	.312
4252	.032 Brass	7/64 Sq. Hole	.205	.270
4260	.032 Brass	7/64 Sq. Hole	.250	.312
4452	.020 Brass	7/64 Sq. Barrel	.187	.270
4457	.020 Brass	7/64 Sq. Hole	.187	.270
4268	.032 Brass	7/64 Sq. Hole .	.187	.270



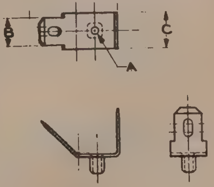
		"A"	"B"	"C"
4226	.020 Brass	7/64 Sq. Barrel	.205	.270
4229	.020 Brass	7/64 Sq. Hole	.205	.270
4242	.020 Brass	7/64 Sq. Barrel	.250	.312
4246	.020 Brass	7/64 Sq. Hole	.250	.312
4256	.032 Brass	7/64 Sq. Hole	.205	.270
4264	.032 Brass	7/64 Sq. Hole	.250	.312
4272	.032 Brass	7/64 Sq. Hole	.187	.270
4461	.020 Brass	7/64 Sq. Barrel	.187	.270
4464	.020 Brass	7/64 Sq. Hole	.187	.270



		"A"	"B"	"C"
4204	.020 Brass	7/64 Sq. Barrel	.205	.270
4223	.020 Brass	7/64 Sq. Hole	.205	.270
4234	.020 Brass	7/64 Sq. Barrel	.250	.312
4239	.020 Brass	7/64 Sq. Hole	.250	.312
4253	.032 Brass	7/64 Sq. Hole	.205	.270
4261	.032 Brass	7/64 Sq. Hole	.250	.323
4269	.032 Brass	7/64 Sq. Barrel	.187	.270
4453	.020 Brass	7/64 Sq. Hole	.187	.270
4458	.020 Brass	7/64 Sq. Hole	.187	.270



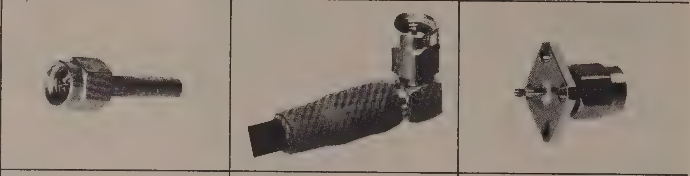
		"A"	"B"	"C"
4227	.020 Brass	7/64 Sq. Barrel	.205	.270
4230	.020 Brass	7/64 Sq. Hole	.205	.270
4243	.020 Brass	7/64 Sq. Barrel	.250	.312
4247	.020 Brass	7/64 Sq. Hole	.250	.312
4257	.032 Brass	7/64 Sq. Hole	.205	.270
4285	.032 Brass	7/64 Sq. Hole	.250	.312
4273	.032 Brass	7/64 Sq. Hole	.187	.270
4462	.020 Brass	7/64 Sq. Barrel	.187	.270
4465	.020 Brass	7/64 Sq. Hole	.187	.270
4484	.032 Brass	7/64 Sq. Barrel	.250	



OSM COAXIAL CONNECTORS and ADAPTERS

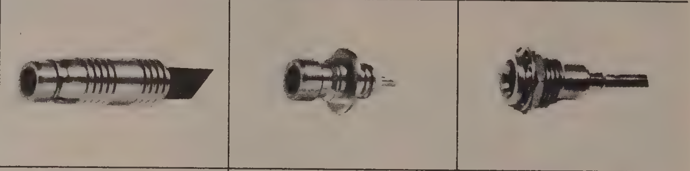
OSM

Miniature, high performance, reliable, low VSWR connectors. Dc to 26 GHz. For use on 50 ohm small and medium size semi-rigid and flexible cable. Military designation is SMA.



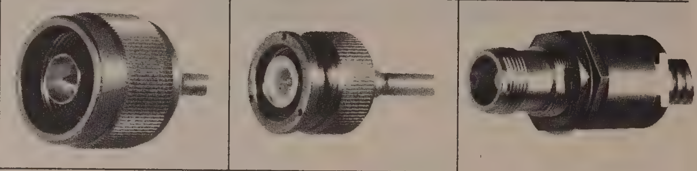
OMQ/OSQ

New miniature and subminiature quick connect, positive interlock series, Dc to 5.0 GHz. Low cost. All crimp assembly. For use on both semi-rigid and 50, 75 and 95 ohm flexible cable.



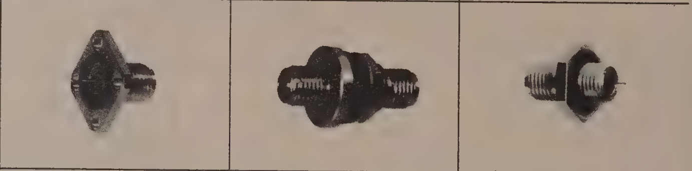
TYPES N, TNC, SC

Reliable, low VSWR connectors designed to maximize performance at higher frequencies. For use on 50 ohm semi-rigid cables. Bulkhead feedthrough and right angle models available.



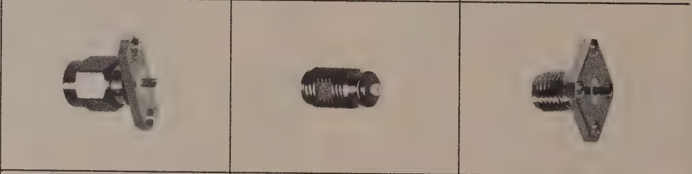
HERMETIC SEAL TYPES

OSM and OSSM connectors meet many applications including launches to microstrip in sealed packages. Flange mount, bulkhead feedthrough, MIC and in-series adapters.



MIC TYPES (OSM & OSSM)

Low VSWR connectors for use with microstrip integrated circuits. Also usable with strip transmission line. Many configurations available to provide design versatility.



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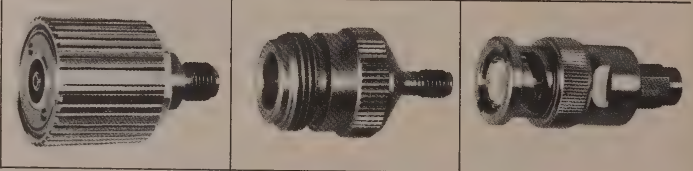

Send for 1975 catalogs of OSM Connectors, Adapters and Components. Included are specifications, detailed outline drawings and applications data.

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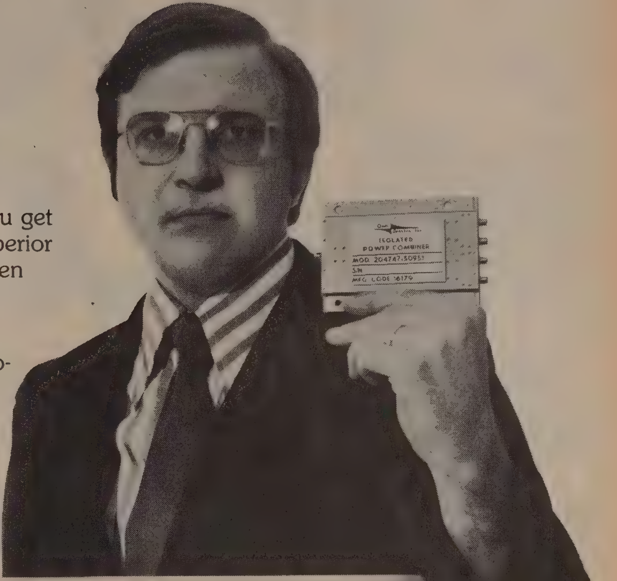
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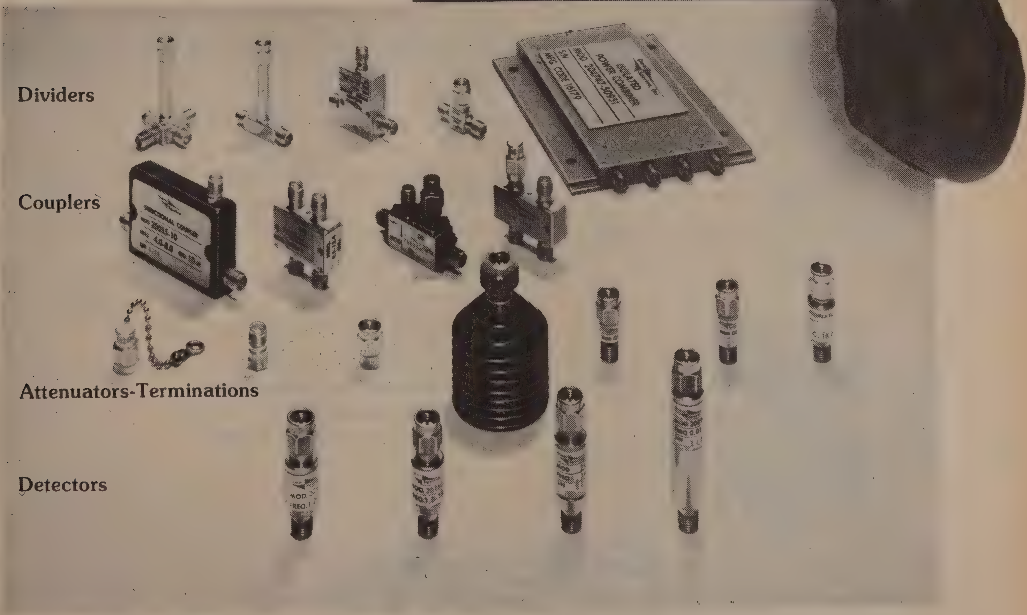
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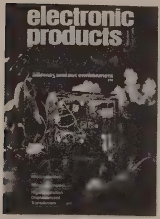

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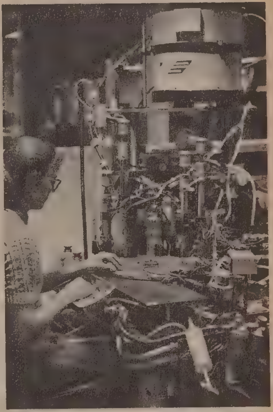

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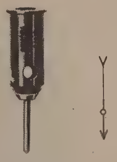
ADAPTER



MODEL 1432
(Specify Color)

BANANA JACK TO PIN TIP

Permits standard single banana plug patch cords to be used with equipment having tip jacks.

UPPER: Banana jack, .166 dia. Brass, nickel plated.

LOWER: Pin tip, .080 dia. Brass, nickel plated. Cross hole (.166 dia.) in body provides side Stack Up connection.

COLORS: Black, Red.

QUANTITY DISC. CODE A

Standard Package: 10 (per color)

NET .20

NET PRICES	Ⓐ				Ⓑ			
	1-24	25-49	50-99	100-249	1-9	10-24	25-49	50-99
.10	.10	.09	.08	.07				
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.20	.20	.18	.17	.14				
.22	.22	.20	.19	.15				
.25	.25	.23	.21	.18				
.29	.29	.26	.25	.20				
.35	.35	.32	.30	.25				
.45	.45	.41	.38	.32				

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3/4" SPACED MOLDED BANANA PLUGS

POMONA ELECTRONICS

General Specifications listed below apply to items using banana plugs in this catalog.

FEATURES . . .

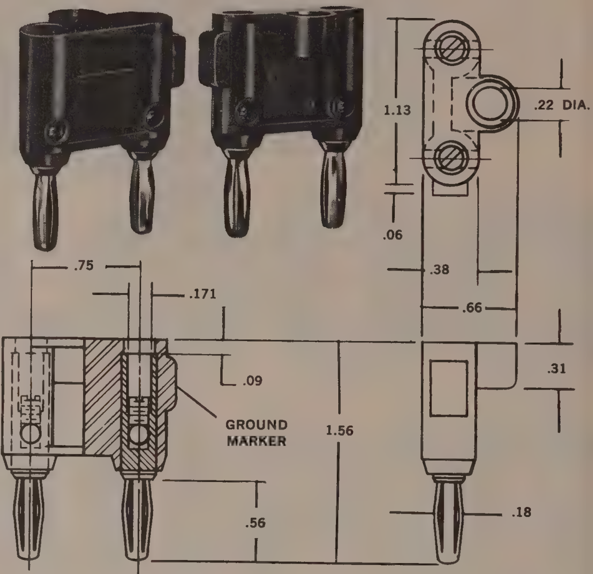
- One piece beryllium copper heat treated spring for maximum long life.
- Rounded spring design results in maximum contact area.
- STACK-UP feature allows an unlimited number of connections at the same electrical point.
- Tough thermoplastic molded directly on to the metal body of the plugs and connectors.

SPECIFICATIONS . . .

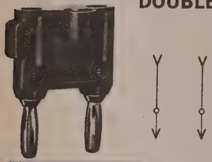
- Fits standard 0.166 dia. banana jacks.
- Spring, beryllium copper alloy 170 per QQ-C-533.
- Plug body, Brass per QQ-B-626, Alloy #360.
- Nickel plated per QQ-N-290, Class 2.
- Contact resistance less than 0.001 ohms per banana plug.

RATINGS	Models: MDP; MDP-ST; 1330; 1330-ST; 2970
■ Capacity :	0.8 pf to 10 MC
■ Current :	15 Amps. Cont., 30 Amps. Int.
■ Voltage :	5000 W.V. D.C.
■ Temperature :	—25°C to +85°C, operating temp.

ACTUAL SIZE



DOUBLE BANANA PLUG

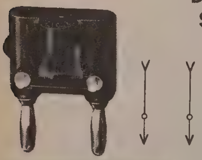


Double banana plug on 3/4" centers; set screws secure leads; simplifies cable construction or component mounting; banana jacks permit top Stack-Up for multiple connections.

COLORS: Black, Brown, Red, Orange, Yellow, Green, Blue, Violet, Gray, White.

MODEL MDP (Specify Color) QUANTITY DISC. CODE Ⓐ **NET .85**

DOUBLE BANANA PLUG WITH SOLDER TURRET TERMINALS

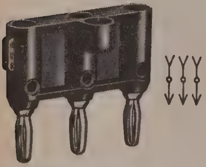


Similar to Model MDP, except has solder turret terminals for permanent noise-free connections of cables and components. Double banana plug on 3/4" centers; banana jacks permit top Stack-Up for multiple connections.

COLOR: Black

MODEL MDP-ST QUANTITY DISC. CODE Ⓐ **NET 1.00**

TRIPLE BANANA PLUG

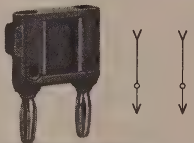


Triple banana plug on 3/4" centers; set screws secure leads. Ideal for balanced line 2 conductor shielded cable assemblies. Banana jacks permit top Stack-up for multiple connections.

COLORS: Black, Red.

MODEL 2970 (Specify Color) QUANTITY DISC. CODE Ⓐ **NET 1.75**

COMPONENT MOUNTING DOUBLE BANANA PLUG

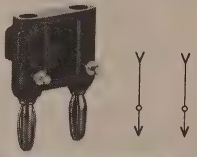


Double banana plug on 3/4" centers; set screws secure leads; features recess for mounting small components; banana jacks permit top Stack-Up for multiple connections.

COLORS: Black, Red

MODEL 1330 (Specify Color) QUANTITY DISC. CODE Ⓐ **NET .85**

COMPONENT PLUG WITH SOLDER TURRET TERMINALS

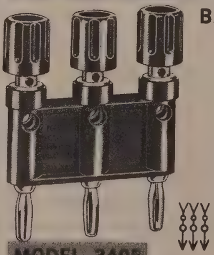


Similar to Model 1330, except has solder turret terminals for permanent noise-free connections of components, etc. Double banana plug on 3/4" centers: Banana jacks permit top Stack-Up for multiple connections.

COLORS: Black, Red.

MODEL 1330-ST (Specify Color) QUANTITY DISC. CODE Ⓐ **NET 1.00**

BINDING POSTS TO TRIPLE BANANA PLUG



Features insulated binding posts on 3/4" centers for rapid mounting and interchangeability of components. Binding posts allow top Stack-Up for multiple connections. Side Stack-Up provided by thru-holes in plug body.

UPPER: Insulated Triple binding posts, on 3/4" centers. Cross holed (.166 dia.) in body provide side Stack-Up connections.

LOWER: Triple banana plug, on 3/4" centers.

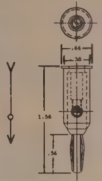
COLORS: Body, Black. Binding Posts, Red/Black/Black.

MODEL 3405 QUANTITY DISC. CODE Ⓐ **NET 4.95**

BANANA PLUG ACCESSORIES

POMONA
ELECTRONICS

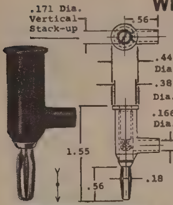
SOLDERLESS BANANA PLUG—STACK-UP



Wire firmly held in place with internal set screw, eliminating soldering. Assembly of test leads simplified.
UPPER: Banana jack, .171 dia.; Brass, nickel plated.
LOWER: Banana plug, one piece nickel plated beryllium copper spring for use with standard 0.166 dia. banana jack.
COLORS: Black, Brown, Red, Orange, Yellow, Green, Blue, Violet, Gray, White.

MODEL 1325 (Specify color) QUANTITY DISC. CODE Ⓐ **NET .60**

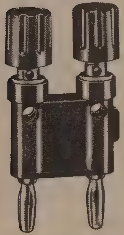
SOLDERLESS BANANA PLUG WITH SAFETY COLLAR—STACK-UP

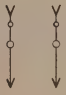


Features: Integral safety collar insulates exposed wire leads. Wire firmly held in place with internal set screw, eliminating soldering. Assembly of test leads simplified.
UPPER: Banana jack, .166 dia.; Brass, nickel plated.
LOWER: Banana plug, one piece nickel plated beryllium copper spring for use with standard 0.166 dia. banana jack.
COLORS: Black, Brown, Red, Orange, Yellow, Green, Blue, Violet, Gray, White.

MODEL 1825 (Specify Color) QUANTITY DISC. CODE Ⓐ **NET .60**

BINDING POSTS TO DOUBLE BANANA PLUG





Features insulated binding posts on ¾″ centers for rapid mounting and interchangeability of components. Binding posts allow top Stack-Up for multiple connections. Side Stack-Up provided by thru-holes in plug body.
UPPER: Insulated double binding posts, on ¾″ centers. Cross holes (.166 dia.) in body provide side Stack-Up connections.
LOWER: Double banana plug, on ¾″ centers.
COLORS: Body, Black. Binding Posts, Black/Red.

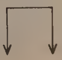
MODEL 1286 QUANTITY DISC. CODE Ⓐ **NET 2.75**

BINDING POST TO SINGLE BANANA PLUG

Features insulated binding post. Binding post allows top Stack-Up for multiple connections. Side Stack-Up provided by thru-hole in plug body.
UPPER: Insulated binding post. Cross hole (.166 dia.) in body provides side Stack-Up connections.
LOWER: Single banana plug, one piece nickel plated beryllium copper spring for use with standard 0.166 dia. banana jack.
COLORS: Black, Red.

MODEL 2894 (Specify color) QUANTITY DISC. CODE Ⓐ **NET 1.75**

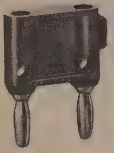
METAL SHORTING BAR

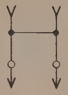


Low profile, nickel plated brass shorting bar. Double banana plugs on ¾″ centers swaged to 3/32″ thick brass bar. Resistance, less than 1.5 milliohms installed. Current rating: 15 Amps. Cont., 30 Amps. Int.

MODEL 1855 QUANTITY DISC. CODE Ⓐ **NET 1.25**

INSULATED SHORTING BAR

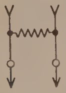




Ideal as a connecting link for use with ¾″ spaced banana jacks. Banana plugs internally solder-bonded with #14 AWG wire. Banana jacks provide top Stack-Up. Cross holes (.166 dia.) in body provide side Stack-Up connections. Resistance less than 1.5 milliohms installed. Current rating 15 Amps. Cont., 30 Amps. Int. "Shorting Bar" marked on top of plug.
COLORS: Natural, Black, Red.

MODEL MDP-S (Specify Color) QUANTITY DISC. CODE Ⓐ **NET 1.25**

MOLDED PRECISION RESISTOR

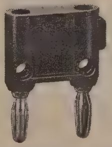


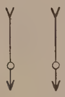
Ideal where rapid interchange of resistance values is required. Used in breadboarding, R & D labs., Standards, Terminations, etc. Deposited carbon 1% resistor, ½ watt, molded internally. Resistor soldered to double banana plug, on ¾″ centers. Top Stack-Up provided for multiple connections. Cross holes (.166 dia.) in body provide side Stack-Up connections. Resistance value stamped on top of plug.

(OHMS)					
	50	200	1K	100K	1 Meg.
	75	250	5K	200K	2 Meg.
	120	500	10K	250K	5 Meg.
	130	600	20K	500K	10 Meg.
	150	900	50K		

MODEL MDP-R (Specify Value) QUANTITY DISC. CODE Ⓐ **NET 3.25**

ADAPTER—.080 TIP JACKS TO DOUBLE BANANA PLUG

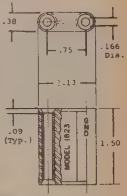




Permits .080 Tip plugs to be used with equipment having banana jacks.
UPPER: Tip jacks, beryllium copper, gold flashed; spaced on ¾″ centers to accept .080 dia. pin tip plugs.
LOWER: Double banana plug, on ¾″ centers, nickel plated. Cross holes (.166 dia.) in body provide side Stack-Up connections.
COLOR: Black.

MODEL 1845 QUANTITY DISC. CODE Ⓐ **NET 1.25**

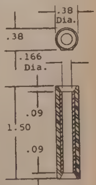
DOUBLE BANANA PLUG SPLICE



Provides rapid method for splicing cables. Reduces necessity of storing extra long cables. Molded thermoplastic body eliminates shock hazard by completely enclosing banana plug contact. Brass, nickel plated banana jacks. .166 dia., on ¾″ centers.
COLORS: Black, Red.

MODEL 1823 (Specify color) QUANTITY DISC. CODE Ⓐ **NET .75**

SINGLE BANANA PLUG SPLICE



Provides rapid method for splicing single banana plug patch cords. Reduces the necessity of storing extra long patch cords. Molded thermo-plastic body eliminates shock hazard by completely enclosing banana plug contact. Brass, nickel plated banana jack, .166 dia.
COLORS: Black, Red.

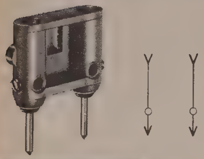
Standard Package: 10 Black
or 10 Red (Specify)

MODEL 1829 (Specify color) QUANTITY DISC. CODE Ⓐ **NET .40**

.080 PIN TIP PLUG ACCESSORIES

POMONA
ELECTRONICS

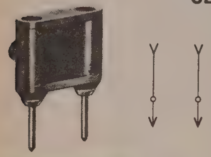
COMPONENT MOUNTING — TIP JACKS TO DOUBLE PIN TIP PLUG — SET SCREWS



Features set screws on side of body to secure leads or components. Recess permits mounting of small component parts.
UPPER: Tip jacks, beryllium copper, gold flashed, spaced on ¾″ centers, to accept .080 dia. pin tip plugs.
LOWER: Pin tips, .080 dia. on ¾″ centers. Brass, nickel plated.
COLORS: Black, Red.

MODEL 2192 (Specify color) QUANTITY DISC. CODE Ⓐ NET 2.25

COMPONENT MOUNTING PLUG— BANANA JACKS TO DOUBLE PIN TIP —SET SCREWS

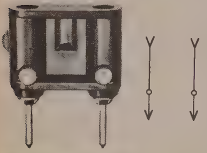


Permits single or double banana plugs to be used in equipment having tip jacks. Features recess for component mounting. Internal set screws firmly secure wire leads.

UPPER: Banana jacks, .166 dia., on ¾″ centers. Brass, nickel plated.
LOWER: Pin tips .080 dia. on ¾″ centers. Brass, nickel plated.
COLOR: Black.

MODEL 1858 QUANTITY DISC. CODE Ⓐ NET .95

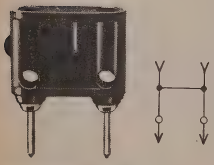
PLUG — COMPONENT MOUNTING — DOUBLE PIN TIP PLUG—SOLDER TURRETS



Features recess for mounting components. Gold flashed solder turrent terminals for permanent noise-free connections.
UPPER: Tip jacks, beryllium copper, gold flashed; spaced on ¾″ centers to accept .080 dia. pin tip plugs.
LOWER: Pin tips, .080 dia. brass, nickel plated.
COLORS: Black, Red.

MODEL 1904 (Specify color) QUANTITY DISC. CODE Ⓐ NET 1.75

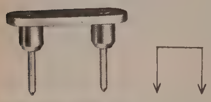
INSULATED SHORTING BAR



Used as a connecting link with equipment having tip jacks. Plugs internally solder bonded with 14 AWG wire. Top stack-up feature.
Current rating: 5 AMPS. cont., 10 AMPS. int. "Shorting Bar" marked on top of plug.
UPPER: Banana jacks, .166 dia. on ¾″ centers. Brass, nickel plated.
LOWER: Pin tips, .080 dia. on ¾″ centers. Brass, nickel plated. Cross holes (.166 dia.) in body provide side Stack-Up connections.
COLORS: Black, Red.

MODEL 1730
(Specify color) QUANTITY DISC. CODE Ⓐ NET 1.50

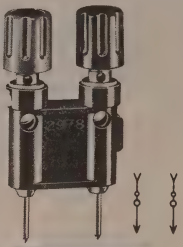
METAL SHORTING BAR



Used as a connecting link with equipment having tip jacks. Low profile, nickel plated brass shorting bar. Double pin tip plugs on ¾″ centers swaged to 3/32″ thick brass bar.
RESISTANCE: Less than 1.5 milliohms installed.
CURRENT RATING: 5 Amps Cont., 10 Amps Int.

MODEL 2072 QUANTITY DISC. CODE Ⓐ NET 1.25

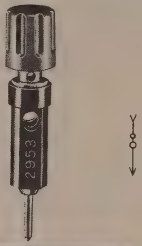
BINDING POSTS TO DOUBLE PIN TIP PLUG



Features insulated binding posts on ¾″ centers for rapid mounting and interchangeability of components. Binding posts allow top Stack-Up for multiple connections. Side Stack-Up provided by thru-holes in plug body.
UPPER: Insulated double binding posts on ¾″ centers. Top and side stack-up connectors (.166 dia.). Cross holes (.166 dia.) in body provide side Stack-Up connections.
LOWER: Pin tips, .080 dia. on ¾″ centers. Brass, nickel plated.
COLORS: Body, Black, Binding Posts, Black/Red.

MODEL 2978 QUANTITY DISC. CODE Ⓐ NET 2.95

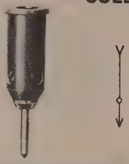
BINDING POST TO SINGLE PIN TIP PLUG



Features insulated binding post. Binding post allows top Stack-Up for multiple connections. Side Stack-Up provided by thru-holes in plug body.
UPPER: Insulated binding post. Top and side Stack-Up connectors (.166 dia.). Cross hole (.166 dia.) in body provide side Stack-Up connections.
LOWER: Pin tip, .080 dia. brass, nickel plated.
COLORS: Black, Red.

MODEL 2953 (Specify color) QUANTITY DISC. CODE Ⓐ NET 1.50

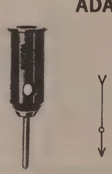
SOLDERLESS PIN TIP PLUG—STACK-UP



Wire firmly held in place with internal set screw, eliminating soldering. Assembly of test leads simplified.
UPPER: Tip jack, beryllium copper, gold flashed; accepts .080 dia. pin.
LOWER: Pin tip, .080 dia., brass, nickel plated.
COLORS: Black, Red.

MODEL 1922 (Specify color) QUANTITY DISC. CODE Ⓐ NET 1.25

ADAPTER — BANANA JACK TO PIN TIP

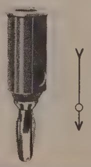


Permits standard single banana plug patch cords to be used with equipment having tip jacks.
UPPER: Banana jack, .166 dia. Brass, nickel plated.
LOWER: Pin tip, .080 dia. Brass, nickel plated. Cross hole (.166 dia.) in body provides side Stack-Up connection.
COLORS: Black, Red.

Standard Package:
10 Black or 10 Red
(Specify)

MODEL 1432 (Specify Color) QUANTITY DISC. CODE Ⓐ NET .35 ea.

ADAPTER — .080 TIP JACK TO BANANA PLUG



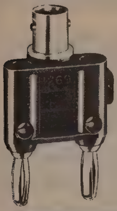
Permits .080 dia. pin tip patch cords to be used with equipment having banana jacks. Insulation molded to plug body.
UPPER: Tip jack, beryllium copper, gold flashed. Accepts .080 dia. pin.
LOWER: Banana plug, one piece nickel plated beryllium copper spring for use with standard 0.166 dia. banana jack. Cross hole (.166 dia.) in body provides side Stack-Up connection.
COLORS: Black, Red.

MODEL 1809 (Specify Color) QUANTITY DISC. CODE ● NET .75

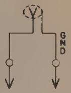
See YELLOW SECTION for Local Sales Offices and Key Personnel

BNC TEST ADAPTERS

POMONA ELECTRONICS



ADAPTER — BNC RECEPTACLE TO DOUBLE BANANA PLUG



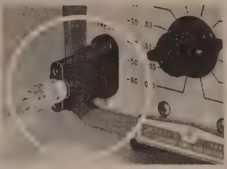
Permits BNC plug to be used with equipment having banana jacks. Excellent for adapting laboratory VTVM, oscilloscopes and signal generator inputs to readily available coaxial cables.

UPPER: BNC receptacle.

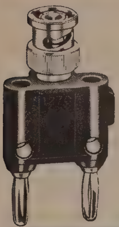
LOWER: Double banana plug, on ¾″ centers. Cross holes (.166 dia.) in body provide side Stack-Up connections.

COLOR: Black.

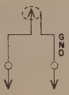
MODEL 1269 QUANTITY DISC. CODE Ⓐ **NET 3.50**



Now! Increase the flexibility of your laboratory with the use of POMONA Molded test accessories. Minimize the necessity of stocking a large quantity and variety of coaxial cables by using POMONA molded adapters. Tough thermo-plastic material molded to plug body or connectors insures maximum strength, moisture resistance and excellent insulative properties.



ADAPTER — BNC PLUG TO DOUBLE BANANA PLUG



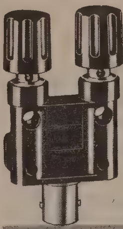
Permits BNC receptacle to be used with equipment having banana jacks. Minimizes number of coaxial connections for maximum efficiency.

UPPER: BNC plug.

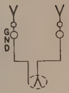
LOWER: Double banana plug, on ¾″ centers. Cross holes (.166 dia.) in body provide side Stack-Up connections.

COLOR: Black.

MODEL 1270 QUANTITY DISC. CODE Ⓐ **NET 4.25**



ADAPTER — BINDING POSTS TO BNC RECEPTACLE



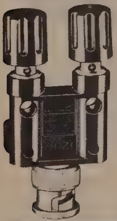
Permits single or double banana plugs to be used with equipment having BNC plug.

UPPER: Insulated binding posts, on ¾″ centers with .166 dia. banana jacks. Cross holes (.166 dia.) in body provide side Stack-Up connections.

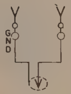
LOWER: BNC receptacle.

COLOR: Body, Black. Binding Posts: Black/Red.

MODEL 1452 QUANTITY DISC. CODE Ⓐ **NET 4.95**



ADAPTER — BINDING POSTS TO BNC PLUG



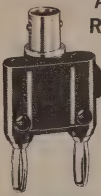
Permits single or double banana plugs to be used with equipment having BNC receptacle. Excellent for use with laboratory oscilloscopes.

UPPER: Insulated binding posts, on ¾″ centers with .166 dia. banana jacks. Cross holes (.166 dia.) in body provide side Stack-Up connections.

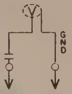
LOWER: BNC plug.

COLOR: Body, Black. Binding Posts: Black/Red.

MODEL 1296 QUANTITY DISC. CODE Ⓐ **NET 5.25**



ADAPTER — SIGNAL ISOLATOR — BNC RECEPTACLE TO DOUBLE BANANA PLUG



Permits BNC male connector to be used with equipment having banana jacks. General purpose ceramic capacitor molded internally. Rated @ .01 mfd ±20%, 200 WVDC. Insulation resistance 10,000 megohms min. Ideal for isolating DC signals from VTVM inputs and signal generator outputs.

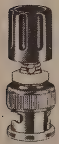
UPPER: BNC receptacle.

LOWER: Double banana plug, on ¼″ centers. Cross holes (.166 dia.) in body provide side Stack-Up connections.

COLOR: Blue.

MODEL 1868 QUANTITY DISC. CODE Ⓐ **NET 8.50**

ADAPTER — SINGLE BINDING POST TO BNC PLUG



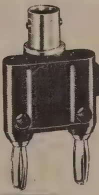
Permits single banana plug to be used with equipment having a BNC receptacle. Connector body features a Non-Tarnish finish.

UPPER: Insulated binding post for multiple stacking.

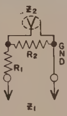
LOWER: BNC Plug.

COLOR: Binding Post: Black or Red (specify)

MODEL 3430 (Specify color) QUANTITY DISC. CODE Ⓐ **NET 2.50**



ADAPTER — BNC MATCHING PAD



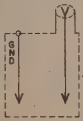
Adapts 600 OHM sources to 50, 75 or 93 OHM cables. Excellent for matching signal generators and VTVM's to standard coaxial cables. Ideal for receiver alignment. Molded in deposited carbon resistors 1%, ¼W.

UPPER: BNC receptacle.

LOWER: Double banana plug, on ¾″ centers. Cross holes (.166 dia.) in body provide side Stack-Up connections.

MODEL	COLOR	RANGE — OHMS	NET	QUANTITY DISC. CODE
1656-1	Yellow	600 to 50	12.50	Ⓐ
1656-2	Red	600 to 75	12.50	
1656-3	White	600 to 93	12.50	
1656-4	Blue	300 to 50	12.50	

ADAPTER — BNC RECEPTACLE TO SHIELDED BANANA PLUGS

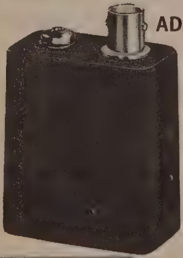


Permits BNC plug to be used with equipment having banana jack binding posts. Black anodized aluminum shield reduces noise Pick-up more than 70 DB. Ideal for low level inputs to oscilloscopes, wave analyzers, etc.

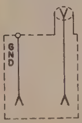
UPPER: BNC receptacle.

LOWER: Shielded double banana plug, on ¾″ centers.

MODEL 1645 QUANTITY DISC. CODE Ⓐ **NET 4.85**



ADAPTER — BNC RECEPTACLE TO SHIELDED BANANA JACKS



Permits BNC plug to be used with equipment having banana plugs. Black anodized aluminum shield reduces noise pick-up more than 70 DB. Ideal for low level inputs to oscilloscopes, wave analyzers, etc.

UPPER: BNC receptacle.

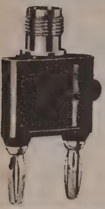
LOWER: Shielded double banana jacks, on ¾″ centers.

COLOR: Black.

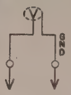
MODEL 1681 QUANTITY DISC. CODE Ⓐ **NET 4.85**

TNC & TYPE N ADAPTERS

POMONA ELECTRONICS



ADAPTER — TNC RECEPTACLE TO DOUBLE BANANA PLUG



Permits TNC plug to be used with equipment having banana jacks. Perfect for connecting modern control systems to laboratory test equipment.

UPPER: TNC receptacle.

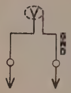
LOWER: Double banana plug, on ¾″ centers. Cross holes (.166 dia.) in body provide side Stack-Up connections.

COLOR: Black.

MODEL 1340

QUANTITY DISC. CODE Ⓐ **NET 8.85**

ADAPTER — TYPE "N" RECEPTACLE TO DOUBLE BANANA PLUG



Permits Type "N" plug to be used with equipment having banana jacks. Ideal for connecting R.F. equipment to conventional test equipment.

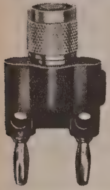
UPPER: Type "N" receptacle.

LOWER: Double banana plug, on ¾″ centers. Cross holes (.166 dia.) in body provide side Stack-Up connections.

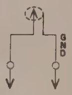
COLOR: Black.

MODEL 1740

QUANTITY DISC. CODE Ⓐ **NET 7.50**



ADAPTER — TNC PLUG TO DOUBLE BANANA PLUG



Permits TNC receptacle to be used with equipment having banana jacks. Minimizes your stock of coaxial cables.

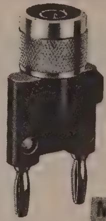
UPPER: TNC plug.

LOWER: Double banana plug, on ¾″ centers. Cross holes (.166 dia.) in body provide side Stack-Up connections.

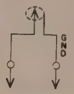
COLOR: Black.

MODEL 1981

QUANTITY DISC. CODE Ⓐ **NET 8.85**



ADAPTER — TYPE "N" PLUG TO DOUBLE BANANA PLUG



Permits type "N" receptacle to be used with equipment having banana jacks.

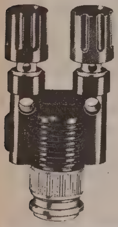
UPPER: Type "N" plug.

LOWER: Double banana plug, on ¾″ centers. Cross holes (.166 dia.) in body provide side Stack-Up connections.

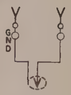
COLOR: Black.

MODEL 1770

QUANTITY DISC. CODE Ⓐ **NET 9.50**



ADAPTER — BINDING POSTS TO TNC PLUG



Permits single or double banana plugs to be used with equipment having a TNC receptacle. Exceptional for signal insertion with rapid interchangeability of terminations.

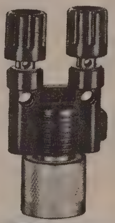
UPPER: Insulated binding posts, on ¾″ centers with .166 dia. banana jacks. Cross holes (.166 dia.) in body provide side Stack-Up connections.

LOWER: TNC plug.

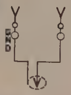
COLOR: Body, Black. Binding Posts: Black/Red.

MODEL 1982

QUANTITY DISC. CODE Ⓐ **NET 8.85**



ADAPTER — BINDING POSTS TO TYPE "N" PLUG



Permits single or double banana plugs to be used with equipment having Type "N" receptacle. Binding posts allow component insertion.

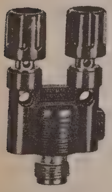
UPPER: Insulated binding posts, on ¾″ centers with .166 dia. banana jacks. Cross holes (.166 dia.) in body provide side Stack-Up connections.

LOWER: Type "N" plug.

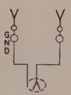
COLOR: Black. Binding Posts: Black/Red.

MODEL 1796

QUANTITY DISC. CODE Ⓐ **NET 9.50**



ADAPTER — BINDING POSTS TO TNC RECEPTACLE



Permits single or double banana plugs to be used with equipment having TNC plug. Useful for rapid interconnection of systems and components.

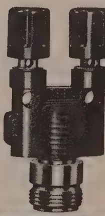
UPPER: Insulated binding posts, on ¾″ centers with .166 dia. banana jacks. Cross holes (.166 dia.) in body provide side Stack-Up connections.

LOWER: TNC receptacle.

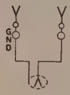
COLOR: Body, Black. Binding Posts: Black/Red.

MODEL 1976

QUANTITY DISC. CODE Ⓐ **NET 7.85**



ADAPTER — BINDING POSTS TO TYPE "N" RECEPTACLE



Permits single or double banana plugs to be used with equipment having type "N" plug. Useful for rapid interconnection of systems and components.

UPPER: Insulated binding posts, on ¾″ centers with .166 dia. banana jacks. Cross holes (.166 dia.) in body provide side Stack-Up connections.

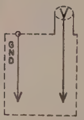
LOWER: Type "N" receptacle.

COLOR: Body, Black. Binding Posts: Black/Red.

MODEL 1992

QUANTITY DISC. CODE Ⓐ **NET 7.85**

ADAPTER — TNC RECEPTACLE TO SHIELDED BANANA PLUGS



Permits TNC plug to be used with equipment having banana jack binding posts. Black anodized aluminum shield reduces noise pick-up more than 70 DB.

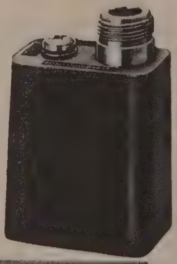
UPPER: TNC receptacle.

LOWER: Double banana plug, on ¾″ centers.

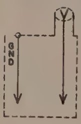
COLOR: Black.

MODEL 1975

QUANTITY DISC. CODE Ⓐ **NET 7.85**



ADAPTER — TYPE "N" RECEPTACLE TO SHIELDED BANANA PLUGS



Permits type "N" plug to be used with equipment having banana jack binding posts. Black Anodized aluminum shield reduces noise pick-up more than 70 DB.

UPPER: Type "N" receptacle.

LOWER: Double banana plug, on ¾″ centers.

COLOR: Black.

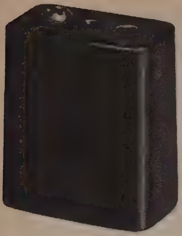
MODEL 1983

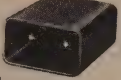
QUANTITY DISC. CODE Ⓐ **NET 7.85**

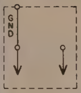
SHIELDED BANANA PLUGS & UHF ADAPTERS

POMONA ELECTRONICS

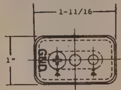
SHIELDED DOUBLE BANANA PLUG IN-LINE CABLE ENTRY

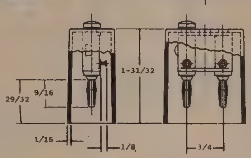






RATED: 15A CONTINUOUS
1200 WVDC
3400 VDC BREAKDOWN
2.5 PF @ 1 MC





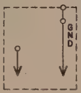
- Shielded double plug ¾″ spaced
- Die cast aluminum shell, black anodized
- Noise pick-up reduced 70 DB
- Gold flashed solder turret terminals for positive reliable cable connections
- One piece nickel plated beryllium copper springs for use with standard 0.166 dia. banana jack binding posts.
- Rounded banana spring design results in maximum contact area and minimum contact resistance
- GND clearly molded in shell
- Cable opening, 7/32″ diameter

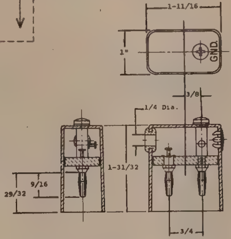
QUANTITY DISC. CODE A NET 3.95

MODEL 1433

SHIELDED DOUBLE BANANA PLUG RIGHT ANGLE CABLE ENTRY

RATED: 15A CONTINUOUS
2800 PEAK WV
5000 VDC BREAKDOWN
2.0 PF @ 1 MC.





- Shielded double plug, ¾″ spaced
- Polycarbonate insulating base
- Die cast aluminum shell, black anodized
- GND clearly molded in shell
- Noise pick-up reduced 70 DB
- One piece nickel plated beryllium copper springs for use with 0.166 diameter banana jack binding posts.
- Rounded banana spring design results in maximum contact area and minimum contact resistance
- Vinyl grommet and nickel plated snap button supplied

QUANTITY DISC. CODE A NET 4.95

MODEL 1791

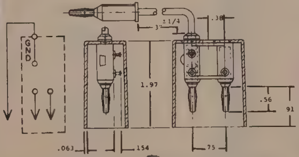
BALANCED LINE SHIELDED DOUBLE BANANA PLUG

- Unique 3 terminal design allows connection to shielded two conductor cable while maintaining balanced conditions
- Minimizes ground loop errors in low signal level applications
- Die cast aluminum shell, black anodized
- Noise pick-up reduced at least 70 DB
- Gold flashed solder turret terminals for reliable noise free connections
- One piece nickel plated beryllium copper springs for use with standard 0.166 dia. banana jack binding posts.

RATED:

15A Continuous
1000 WV Peak; line to shield
2000 WV peak; line to line
2500 V peak breakdown; line to shield

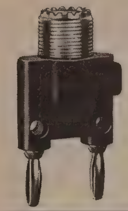
5000 V peak breakdown, line to line
2.0 pf @ 1 MC Capacity; line to line
3.0 pf @ 1 MC. capacity; both lines to shield.

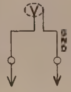


QUANTITY DISC. CODE A NET 7.50

MODEL 1921

ADAPTER — UHF RECEPTACLE TO DOUBLE BANANA PLUG



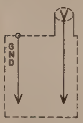


Permits UHF plug to be used with equipment having banana jacks.
UPPER: UHF receptacle, ⅝″ dia.
LOWER: Double banana plug, on ¾″ centers. Cross holes (.166 dia.) in body provide side Stack-Up connections.
COLOR: Black.

MODEL 1707

QUANTITY DISC. CODE A NET 5.85

ADAPTER — UHF RECEPTACLE TO SHIELDED BANANA PLUGS

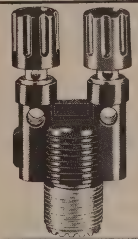


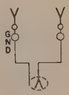
Permits UHF plug to be used with equipment having banana jack binding posts. Black anodized shield reduces noise pick-up at least 70 DB.
UPPER: UHF receptacle, ⅝″ dia.
LOWER: Double banana plug on ¾″ centers.
COLOR: Black.

MODEL 1708

QUANTITY DISC. CODE A NET 7.50

ADAPTER — BINDING POSTS TO UHF RECEPTACLE



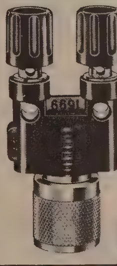


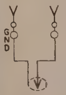
Permits single or double banana plugs to be used with equipment having UHF plug.
UPPER: Insulated binding posts, on ¾″ centers with .166 dia. jacks. Cross holes (.166 dia.) in body provide side Stack-Up connections.
LOWER: UHF receptacle, ⅝″ dia.
COLOR: Body, Black. Binding posts: Black/Red.

MODEL 1792

QUANTITY DISC. CODE A NET 7.50

ADAPTER — BINDING POSTS TO UHF PLUG





Permits single or double banana plugs to be used with equipment having a UHF receptacle, ⅝″ dia. Convenient for use with modern oscilloscopes. Center conductor binding post Red; Ground, Black.
UPPER: Insulated binding posts, on ¾″ centers with .166 dia. jacks.
LOWER: UHF plug.

MODEL 1699 QUANTITY DISC. CODE A NET 5.85

ADAPTER — BINDING POST TO UHF PLUG

Permits single banana plug to be used with equipment having a UHF receptacle, ⅝″ dia. Adds flexibility to your oscilloscope.
UPPER: Insulated binding post with .166 dia. banana jack.
LOWER: UHF plug.

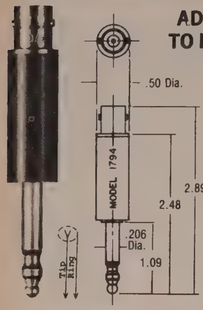
MODEL 1698

QUANTITY DISC. CODE A NET 4.85

PHONE PLUG TEST ADAPTERS

POMONA ELECTRONICS

ADAPTER — BNC RECEPTACLE TO PJ-068/WE-309* PHONE PLUG



Permits BNC plug to be used with equipment having three circuit phone jacks for .206 dia. phone plugs. Readily adapts equipment to available BNC coaxial cables. Tip connected to inner contact of connector and Ring connected to shell. Sleeve, no connection.

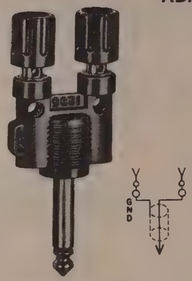
UPPER: BNC receptacle, UG1094/U.
LOWER: Phone Plug, PJ-068/WE-309*
COLOR: Black.

*WE-309 Interchangeable with PJ-068.

MODEL 1794

QUANTITY DISC. CODE Ⓐ **NET 8.85**

ADAPTER — BINDING POSTS TO PHONE PLUG



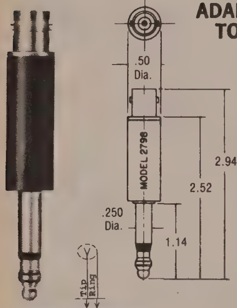
Permits single or double banana plug to be used with equipment having phone jacks. Ideal for rapid mounting of components and test leads.

UPPER: Insulated binding posts, on ¾" centers with .166 dia. banana jacks. Cross holes (.166 dia.) in body provide side stack-up connections.
LOWER: Standard ¼" dia. phone plug, 1⅜" long.
COLOR: Body, Black.
BINDING POSTS: Black/Red.

MODEL 1265

QUANTITY DISC. CODE Ⓐ **NET 4.85**

ADAPTER — BNC RECEPTACLE TO PJ-051* PHONE PLUG



Permits BNC plug to be used with equipment having three circuit phone jacks for .250 dia. phone plugs. Readily adapts equipment to available BNC coaxial cables. Tip connected to inner contact of connector and Ring connected to shell. Sleeve, no connection.

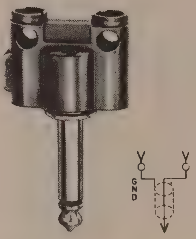
UPPER: BNC receptacle, UG1094/U.
LOWER: Phone Plug, PJ-051*
COLOR: Black.

*PJ-051 Interchangeable with WE-310

MODEL 2798

QUANTITY DISC. CODE Ⓐ **NET 7.85**

ADAPTER — BANANA JACKS TO PHONE PLUG



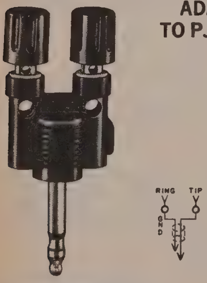
Permits single or double banana plugs to be used with equipment having phone jacks.

UPPER: Double banana jack, on ¾" centers. Cross holes (.166 dia.) in body provide side stack-up connections.
LOWER: Standard ¼" dia. phone plug, 1⅜" long.
COLOR: Black.

MODEL 1580

QUANTITY DISC. CODE Ⓐ **NET 4.50**

ADAPTER — BINDING POSTS TO PJ-068/WE-309* PHONE PLUG



Permits single or double banana plug to be used with equipment having three circuit phone jacks for .206 dia. phone plugs. Ideal for rapid mounting of components and test leads. The PJ-068 and WE-309 Plug have the same mechanical dimensions.

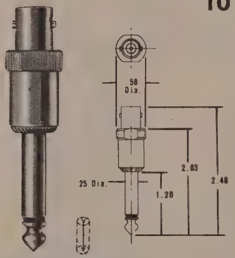
UPPER: Insulated binding posts on ¾" centers with .166 dia. banana jacks. Cross holes (.166 dia.) in body provide side stack-up.
LOWER: Phone Plug, PJ-608/WE-309*
COLOR: Body, Black. Binding Posts: Black/Red.

*WE-309 Interchangeable with PJ-068.

MODEL 3365

QUANTITY DISC. CODE Ⓐ **NET 8.85**

ADAPTER — BNC RECEPTACLE TO PHONE PLUG



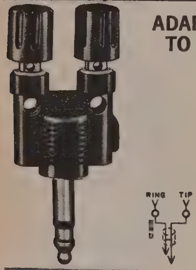
Permits BNC plug to be used with equipment having standard ¼" dia. phone jacks. Readily adapts equipment to available BNC coaxial cables. All metal construction to insure proper shielding.

UPPER: BNC receptacle, UG1094/U.
LOWER: Standard ¼" dia. phone plug, 1³⁄₁₆" Long.

MODEL 1297

QUANTITY DISC. CODE Ⓐ **NET 5.85**

ADAPTER — BINDING POSTS TO PJ-051* PHONE PLUG



Permits single or double banana plugs to be used with equipment having three circuit phone jacks for .250 dia. phone plugs. Tip connected to hot side of adapter and Ring connected to ground side. Sleeve, no connection.

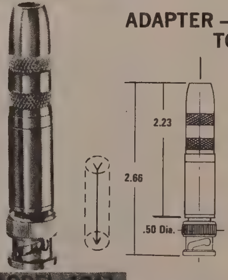
UPPER: Insulated binding posts on ¾" centers with .166 dia. banana jacks. Cross holes (.166 dia.) in body provide side stack-up.
LOWER: Phone Plug, PJ-051*
COLOR: Black

*PJ-051 interchangeable with WE-310

MODEL [illegible]

QUANTITY DISC. CODE Ⓐ **NET 7.85**

ADAPTER — PHONE PLUG JACK TO BNC PLUG



Permits a standard 2 conductor ¼" dia. phone plug to be used with equipment having BNC receptacle. All metal construction to insure proper shielding.

UPPER: Phone plug jack, accepts standard ¼" dia. phone plug, 1⅜" long.
LOWER: BNC Plug.

MODEL [illegible]

QUANTITY DISC. CODE Ⓐ **NET 7.85**

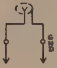
MISCELLANEOUS TEST ADAPTERS

POMONA
ELECTRONICS

ADAPTER — PHONE PLUG JACK TO DOUBLE BANANA PLUG

Permits a standard 2 conductor ¼″ dia. phone plug to be used with equipment having banana jacks or binding posts.

UPPER: Phone plug jack, accepts standard ¼″ dia. phone plug, 1³⁄₁₆″ long.

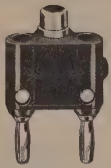


LOWER: Double banana plug on ¾″ centers. Cross holes (.166 dia.) in body provide side stack-up connections.

COLOR: Black.

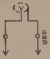
MODEL 4044

QUANTITY DISC. CODE Ⓐ **NET 6.85**



ADAPTER – PHONO JACK TO DOUBLE BANANA PLUG

Permits Phono plug to be used with equipment having banana jacks or binding posts. Quickly converts a cable with a phono plug to a double banana plug.



UPPER: Phono jack.

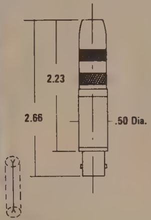
LOWER: Double Banana plug, on ¾″ centers. Cross holes (.166 dia.) in body provide Side Stack-Up connections.

COLOR: Black.

MODEL 1442

QUANTITY DISC. CODE Ⓐ **NET 4.85**

ADAPTER — PHONE PLUG JACK TO BNC RECEPTACLE



This adapter allows a cable with a 2 conductor ¼″ dia. phone plug to be attached to a cable with a BNC plug. All metal construction for proper shielding.

UPPER: Phone plug jack, accepts standard ¼″ dia. phone plug, 1³⁄₁₆″ long.

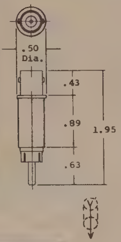
LOWER: BNC receptacle UG1094/U.

MODEL 4026

QUANTITY DISC. CODE Ⓐ **NET 6.85**

ADAPTER – BNC RECEPTACLE TO PHONO PLUG

ELECTRONA
2957



Permits BNC plug to be used with equipment having phono jacks. Readily adapts equipment to available BNC coaxial cables. All metal construction to insure proper shielding.

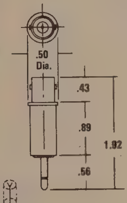
UPPER: BNC receptacle UG1094/U.

LOWER: Phono plug.

MODEL 2957

QUANTITY DISC. CODE Ⓐ **NET 3.95**

ADAPTER — BNC RECEPTACLE TO TINI-PLUG



Permits BNC plugs to be used with equipment having Tini-Jacks. Readily adapts equipment to available BNC coaxial cables. All metal construction to insure proper shielding.

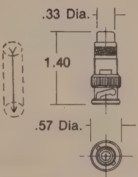
UPPER: BNC receptacle UG1094/U.

LOWER: 2 conductor Tini-Plug.

MODEL 3857

QUANTITY DISC. CODE Ⓐ **NET 4.85**

ADAPTER — PHONO JACK TO BNC PLUG



Permits phono plug to be used with equipment having BNC receptacles. Quickly converts a cable with a phono plug to a BNC plug. All metal construction to insure proper shielding.

UPPER: Phono jack.

LOWER: BNC plug.

MODEL 4054

QUANTITY DISC. CODE Ⓐ **NET 3.85**

ADAPTER — TWO BNC JACKS TO BNC PLUG — "IN LINE T"

Excellent for use where space requires cables to come straight out instead of at a right angle. Die cast aluminum housing with baked enamel finish. All metal construction to insure proper shielding.

UPPER: (2) BNC receptacles UG1094/U.

LOWER: BNC plug UG1104A/U.

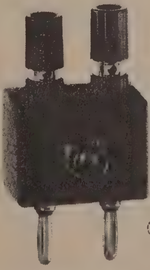
COLOR: Blue.

MODEL [illegible]

QUANTITY DISC. CODE Ⓐ **NET 14.85**

ADAPTER — BINDING POSTS TO DOUBLE BANANA PLUG WITH BNC JACK

With this combination adapter it is possible to connect to equipment, cables with both, double banana plugs and BNC plugs. Excellent for use with signal generators. Die cast aluminum housing with baked enamel finish.



UPPER: Insulated binding posts on ¾″ centers. Black/Red.

CENTER: BNC receptacle, UG1094/U.

LOWER: Banana plugs on ¾″ centers, nickel plated.

Color: Blue.

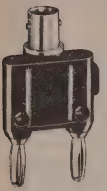
MODEL [illegible]

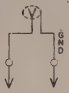
QUANTITY DISC. CODE Ⓐ **NET 14.85**

MISCELLANEOUS TEST ACCESSORIES

POMONA ELECTRONICS

ADAPTER—MHV RECEPTACLE TO DOUBLE BANANA PLUG





This adapter allows an MHV Plug to be used with equipment having ¾″ spaced banana jacks.

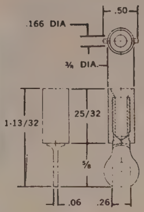
UPPER: MHV receptacle.
LOWER: Double banana plug, on ¾″ centers. Cross holes (.166 Dia.) in body provide side Stack-Up connections.

VOLTAGE RATING: 5,000 Volts Peak

COLOR: Black.

MODEL 3290 QUANTITY DISC. CODE A NET 8.85

INSULATED SPADE LUG ADAPTER

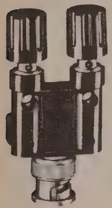


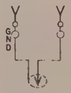
Permits single banana plug to be used with equipment having binding posts. Tough thermoplastic molded to body for maximum reliability and low shock hazard. Spade lug body, one piece machined brass, nickel plated.

UPPER: Banana jack, .166 dia.
LOWER: Spade lug, .26 opening.
COLORS: Black, Red.

MODEL 1614 (Specify color) QUANTITY DISC. CODE A NET .45

ADAPTER—BINDING POSTS TO MHV PLUG





This adapter converts a MHV Receptacle to standard ¾″ 5 way binding posts.

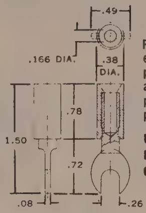
UPPER: Insulated binding posts on ¾″ centers with (.166 dia.) banana jacks. Cross holes (.166 dia.) in body provide side Stack-Up connections.
LOWER: MHV plug.

VOLTAGE RATING: 5,000 Volts Peak

COLOR: Black.

MODEL 3291 QUANTITY DISC. CODE A NET 11.85

TELLURIUM COPPER INSULATED SPADE LUG ADAPTER

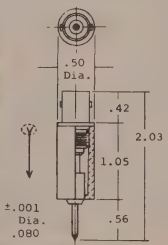


Permits single banana plug to be used with equipment having binding posts. Tough thermoplastic molded to body for maximum reliability and low shock hazard. Spade lug body, one piece machined tellurium copper, gold plated per MIL-G-45204, Type 11, Class 1.

UPPER: Banana jack, .166 dia.
LOWER: Spade lug, .26 opening.
COLORS: Black, Red.

MODEL 2305 (Specify Color) QUANTITY DISC. CODE A NET 1.25

ADAPTER—BNC RECEPTACLE TO SINGLE PIN TIP PLUG

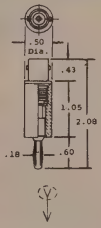


Permits BNC plug to be used with equipment having .080 dia. pin tip jacks. Inner conductor connected only. Excellent for adapting laboratory VTVM, oscilloscopes and signal generator inputs to readily available coaxial cables.

UPPER: BNC receptacle, UG1094/U.
LOWER: Single Pin Tip Plug .080 dia.
COLOR: Black.

MODEL 3415 QUANTITY DISC. CODE A NET 2.85

ADAPTER—BNC RECEPTACLE TO SINGLE BANANA PLUG

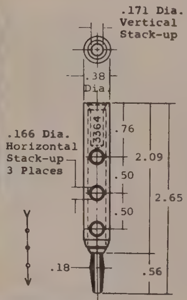


Permits BNC plug to be used with equipment having banana jacks. Inner conductor connected only. Excellent for adapting laboratory VTVM, oscilloscopes and signal generator inputs to readily available coaxial cables.

UPPER: BNC receptacle, UG1094/U.
LOWER: Single Banana Plug.
COLOR: Black.

MODEL 1894 QUANTITY DISC. CODE A NET 2.75

QUAD STACKING PLUG

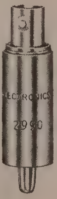

.171 Dia. Vertical Stack-up
.38 Dia.
.166 Dia. Horizontal Stack-up 3 Places
.76
2.09
.50
2.65
.50
.18
.56
3364

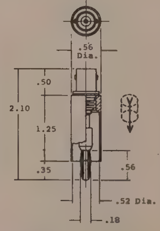
Features four parallel connectors to the same point. Excellent for use when many test points must be tied together.

UPPER: Banana jack, .166 dia. Brass, nickel plated.
CENTER: 3 Crossholes, .166 dia. in body provide side stack-up connection.
LOWER: Banana plug, one piece heat treated beryllium copper spring, nickel plated, for use with .166 dia. banana jack.
COLORS: Black, Red.

MODEL 3364 (Specify color) QUANTITY DISC. CODE A NET 1.25

ADAPTER — BNC RECEPTACLE TO SHIELDED BANANA PLUG





Permits BNC plug to be used with equipment having banana jacks or binding posts. Ideal for use when shielding of single banana jacks is needed. All metal construction for proper shielding.

UPPER: BNC Receptacle, UG1094/U.
LOWER: Shielded single banana plug.

MODEL 2990 QUANTITY DISC. CODE A NET 2.95

COAXIAL TEST ACCESSORIES

POMONA ELECTRONICS

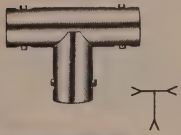
ADAPTER — BNC JACK TO JACK

Allows the interconnection of two coaxial cables with BNC plugs.

FEATURES:
- Non-Tarnish finish.
- 50 Ohm impedance.
- Teflon insulation.
- Gold flashed beryllium copper contacts.

MODEL 3283 QUANTITY DISC. CODE A NET 1.85

ADAPTER — BNC "T" — 3 JACKS

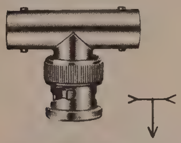


Allows the interconnection of three coaxial cables with BNC plugs.

FEATURES:
- Non-Tarnish finish.
- 50 Ohm impedance.
- Teflon insulation.
- Gold flashed beryllium copper contacts.

MODEL 3284 QUANTITY DISC. CODE A NET 6.25

ADAPTER — BNC "T" JACK — PLUG — JACK

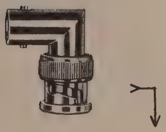


With this adapter, equipment or coaxial cables having a single BNC jack are changed to two BNC jacks.

FEATURES:
- Non-Tarnish finish.
- 50 Ohm impedance.
- Teflon insulation.
- Gold flashed beryllium copper female and outer male contact.

MODEL 3285 QUANTITY DISC. CODE A NET 4.50

ADAPTER — RIGHT ANGLE BNC JACK TO BNC PLUG



Adapts straight BNC plug to right angle BNC plug.

FEATURES:
- Non-Tarnish finish.
- 50 Ohm impedance.
- Teflon insulation.
- Beryllium copper female and outer finger contact.
- Gold flashed female and male contact.

MODEL 3534 QUANTITY DISC. CODE A NET 3.95

NEW

BNC CAP FOR PLUGS — WITH BEAD CHAIN

Female dust cap for protection of BNC plugs from dirt and accidental shorting.

FEATURES:
- Non-Tarnish Finish
- 3⅛" Bead Chain
- .28 Dia. hole in lug

MODEL 4157 QUANTITY DISC. CODE A NET 1.50

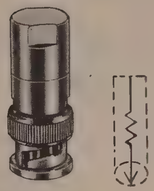
BNC CAP FOR JACKS — WITH BEAD CHAIN

Male dust cap for protection of BNC jacks from dirt and accidental shorting.

FEATURES:
- Non-Tarnish finish.
- 2¼" Bead Chain.
- .14" Dia. hole in lug.

MODEL 3839 QUANTITY DISC. CODE A NET 1.25

RESISTOR TERMINATED PLUG



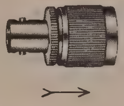
Ideal for terminating coaxial lines etc.

FEATURES:
- 1% resistor, ½ watt.
- Resistance value stamped on body.
- Non-Tarnish finish.
- Teflon insulation.
- Gold plated male contact.

(Ohms) 50, 75, 93, 100, 600

MODEL 3840 (Specify Value) QUANTITY DISC. CODE A NET 4.50

ADAPTER — BNC JACK TO UHF PLUG

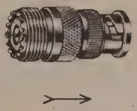


Allows the use of a BNC plug on equipment having a UHF Jack.

FEATURES:
- Non-Tarnish finish.
- Rexolite insulation.
- Gold flashed beryllium copper female contact.
- Gold flashed male contact.

MODEL 3286 QUANTITY DISC. CODE A NET 2.50

ADAPTER — UHF JACK TO BNC PLUG



Allows the use of a UHF Plug on equipment having a BNC Jack.

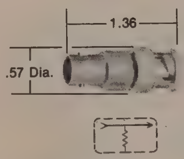
FEATURES:
- Non-Tarnish finish.
- 50 Ohm impedance.
- Rexolite insulation.
- Gold flashed Phosphor Bronze female UHF and male BNC contacts.

MODEL 3287 QUANTITY DISC. CODE A NET 3.85

BNC 50-OHM FEED-THRU TERMINATION

NEW

Ideal for terminating PULSE, MICROWAVE or UHF instruments in their characteristic impedance.



1st end: Female BNC
2nd end: Male BNC
50-Ohm termination resistor, 1%, ½W.

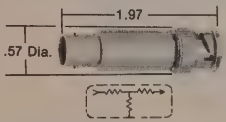
FEATURES:
- Non-Tarnish Finish.
- Teflon Insulation.
- Gold Plated Contacts.
  Maximum VSWR: DC to 250 MHz: 1.1
  250 MHz to 500 MHz: 1.2

MODEL 4119 QUANTITY DISC. CODE A NET 14.85

BNC 50-OHM ATTENUATORS

NEW

For use with PULSE, MICROWAVE, or UHF instruments.



1st end: Female BNC
2nd end: Male BNC
50-Ohm, 2-Watt T-Pad Network

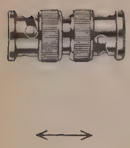
FEATURES:
- Non-Tarnish Finish
- Teflon Insulation
- Gold Plated Contacts

MODEL	ATTENUATION	VSWR	ATTENUATION (LIMITS)
4108-1	3 db	1.1 to 1 GHz	±0.4 db to 1 GHz
4108-2	6 db	1.2 to 2 GHz	±0.45 db to 2 GHz
4108-3	10 db	1.35 to 4 GHz	±0.65 db to 4 GHz
4108-4	14 db	1.45 to 6 GHz	±0.75 db to 6 GHz
4108-5	20 db	1.65 to 8 GHz	±0.9 db to 8 GHz

MODEL 4108 QUANTITY DISC. CODE A NET 24.95

POMONA
ELECTRONICS

ADAPTER — BNC PLUG TO PLUG



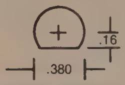
Allows the interconnection of two coaxial cables with BNC Jacks.

FEATURES:
- Non-Tarnish finish.
- 50-Ohm impedance.
- Teflon insulation.
- Beryllium copper outer finger contacts.
- Gold flashed male contacts.

MODEL 3533 QUANTITY DISC. CODE A **NET 3.75**

BNC PRESSURIZED BULKHEAD RECEPTACLE

NEW



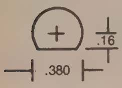
Excellent for use with equipment which requires pressure differences. Front hole mounting.

FEATURES:
- Non-Tarnish finish.
- 50-Ohm impedance.
- Teflon insulation.
- Gold flashed Beryllium copper contacts.
- Silicone rubber O-Ring.
- Mounts in panels up to .242 thick.

MODEL 4158 QUANTITY DISC. CODE A **NET 4.25**

BNC HERMETIC SEALED BULKHEAD RECEPTACLE

NEW



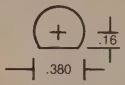
Excellent for use with equipment which requires a hermetic seal for pressure differences. Front hole mounting.

FEATURES:
- Non-Tarnish finish.
- 50-Ohm impedance.
- Teflon insulation.
- Gold flashed Beryllium copper contacts.
- Mounts in panels up to .369 thick.

MODEL 4159 QUANTITY DISC. CODE A **NET 4.95**

BNC BULKHEAD RECEPTACLE

NEW



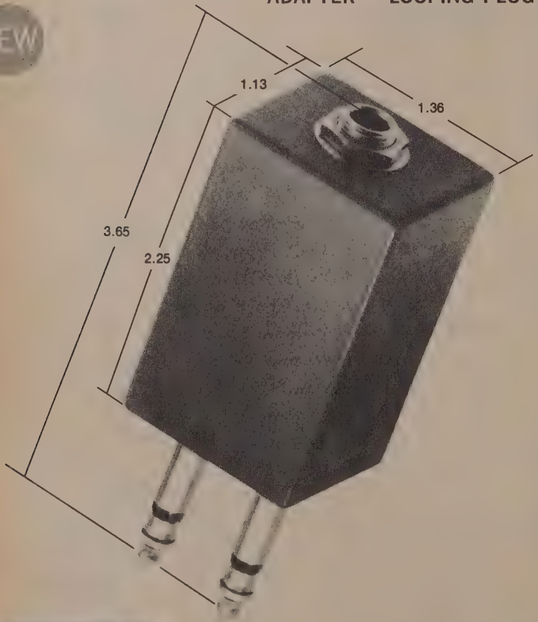
Ideal for use where space requirements between connectors are at a premium.

FEATURES:
- Non-Tarnish finish.
- 50-Ohm impedance.
- Teflon insulation.
- Gold flashed Beryllium copper contacts.
- Mounts in panels up to .134 thick.

MODEL 4160 QUANTITY DISC. CODE A **NET 1.50**

ADAPTER — LOOPING PLUG WITH MONITOR JACK

NEW

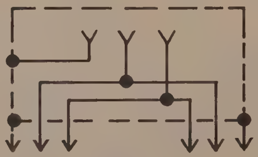


With this combination adapter it is possible to monitor the looping plug circuit. Die cast aluminum housing with baked enamel finish.

UPPER: Phone Jack (Accepts ¼″ Dia. PJ-051 Plug).

LOWER: (2) Phone Plugs, PJ-051 on ⅝″ Centers (Equivalent to WE-310).

COLOR: Blue



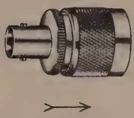
SCHEMATIC

MODEL 4104 QUANTITY DISC. CODE A **NET 24.95**

COAXIAL TEST ADAPTERS

POMONA
ELECTRONICS

ADAPTER — BNC JACK TO TYPE "N" PLUG

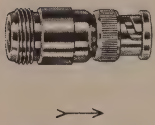


Allows the use of a BNC Plug on equipment having a type "N" jack.

FEATURES:
- Non-Tarnish finish.
- Teflon insulation.
- Gold flashed contacts.

MODEL 3288 QUANTITY DISC. CODE Ⓐ **NET 2.50**

ADAPTER — TYPE "N" JACK TO BNC PLUG

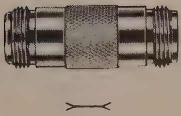


Allows the use of a Type "N" plug on equipment having a BNC jack.

FEATURES:
- Non-Tarnish finish.
- Teflon insulation.
- Beryllium copper female "N" contact and BNC outer finger contact.
- Gold flashed female "N" and male BNC contact.

MODEL 3535 QUANTITY DISC. CODE Ⓐ **NET 3.95**

ADAPTER — TYPE "N" JACK TO JACK

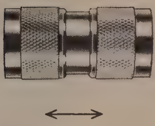


Allows the interconnection of two coaxial cables with Type "N" Plugs.

FEATURES:
- Non-Tarnish finish.
- 50 Ohm impedance.
- Teflon insulation.
- Gold flashed beryllium copper contacts.

MODEL 3841 QUANTITY DISC. CODE Ⓐ **NET 2.75**

ADAPTER — TYPE "N" PLUG TO PLUG

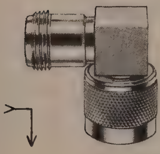


Allows the interconnection of two coaxial cables with type "N" Jacks.

FEATURES:
- Non-Tarnish finish.
- 50 Ohm impedance.
- Teflon insulation.
- Phosphor Bronze outer finger contacts. Gold flashed male contacts.

MODEL 3842 QUANTITY DISC. CODE Ⓐ **NET 3.50**

ADAPTER — RIGHT ANGLE TYPE "N" JACK TO TYPE "N" PLUG

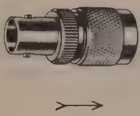


Adapts straight type "N" plug to right angle type "N" plug.

FEATURES:
- Non-Tarnish finish.
- 50 Ohm impedance.
- Teflon insulation.
- Phosphor Bronze outer finger contact.
- Gold flashed beryllium copper female and male contact.

MODEL 3843 QUANTITY DISC. CODE Ⓐ **NET 4.95**

ADAPTER — BNC JACK TO TNC PLUG

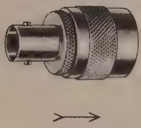


Allows the use of a BNC plug on equipment having a TNC jack.

FEATURES:
- Non-Tarnish finish.
- 50 Ohm impedance.
- Teflon insulation.
- Beryllium copper outer finger TNC contact.
- Gold flashed beryllium copper female BNC and TNC male contact.

MODEL 3844 QUANTITY DISC. CODE Ⓐ **NET 6.85**

ADAPTER — BNC JACK TO TYPE "C" PLUG

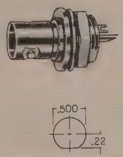


Allows the use of a BNC plug on equipment having a type "C" jack.

FEATURES:
- Non-Tarnish finish.
- 50 Ohm impedance.
- Teflon insulation.
- Beryllium copper type "C" outer finger contact.
- Gold flashed beryllium copper female BNC and TNC male contact.

MODEL 3845 QUANTITY DISC. CODE Ⓐ **NET 4.95**

BNC — ISOLATED GROUND BULKHEAD RECEPTACLE

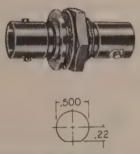


This connector has the outer conductor isolated from the panel. Excellent for use with equipment requiring a floating input.

FEATURES:
- Non-Tarnish finish.
- 50 Ohm impedance.
- Teflon insulation.
- Gold flashed beryllium copper contact.
- Mounts in panels up to .175" thick.

MODEL 3778 QUANTITY DISC. CODE Ⓐ **NET 4.95**

ADAPTER — ISOLATED GROUND BNC JACK TO JACK

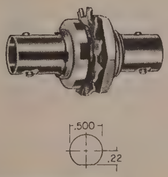


Outer conductor is isolated from the panel. Excellent for feeding through panels which require a floating shield.

FEATURES:
- Non-Tarnish finish.
- 50-Ohm impedance.
- Teflon insulation.
- Gold flashed beryllium copper contacts.
- Mounts in panels up to .175" thick.

MODEL 3846 QUANTITY DISC. CODE Ⓐ **NET 8.25**

ADAPTER — HERMETIC SEALED BNC JACK TO JACK



Excellent for use with equipment which requires a hermetic seal for pressure differences.

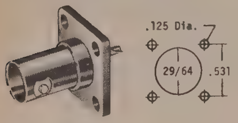
FEATURES:
- Non-Tarnish finish.
- 50 Ohm impedance.
- Teflon insulation.
- Gold flashed beryllium copper contacts.
- Silicone rubber O-ring. Mounts in panels up to .279" thick.

MODEL 3847 QUANTITY DISC. CODE Ⓐ **NET 4.95**

PANEL RECEPTACLES— TWINAX JACKS, PLUGS & PATCH CORDS

POMONA ELECTRONICS

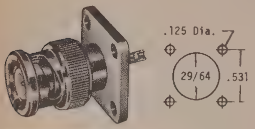
BNC FEMALE PANEL RECEPTACLE



FEATURES:
- Non-Tarnish finish.
- 50 Ohm impedance.
- Teflon insulation.
- Gold flashed beryllium copper contact.
- Beryllium copper outer finger contact.
- Solder cup connection.

MODEL 2451 QUANTITY DISC. CODE Ⓐ **NET 1.65**

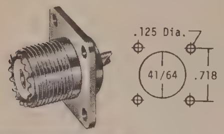
BNC MALE PANEL RECEPTACLE



FEATURES:
- Non-Tarnish finish.
- 50 Ohm impedance.
- Teflon insulation.
- Beryllium copper outer finger contact.
- Gold flashed male contact.
- Solder cup connection.

MODEL 2447 QUANTITY DISC. CODE Ⓐ **NET 3.25**

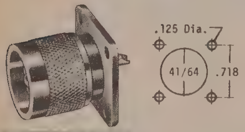
UHF FEMALE PANEL RECEPTACLE



FEATURES:
- Non-Tarnish finish.
- Teflon insulation.
- Gold flashed phosphor bronze contact.
- Solder cup connection.

MODEL 2449 QUANTITY DISC. CODE Ⓐ **NET 3.50**

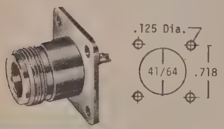
UHF MALE PANEL RECEPTACLE



FEATURES:
- Non-Tarnish finish.
- Teflon insulation.
- Gold flashed male contact.
- Solder cup connection.

MODEL 2450 QUANTITY DISC. CODE Ⓐ **NET 6.50**

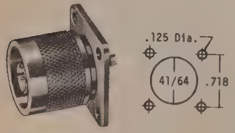
TYPE "N" FEMALE PANEL RECEPTACLE



FEATURES:
- Non-Tarnish finish.
- 50 Ohm impedance.
- Teflon insulation.
- Gold flashed beryllium copper contact.
- Solder cup connection.

MODEL 2455 QUANTITY DISC. CODE Ⓐ **NET 2.95**

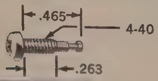
TYPE "N" MALE PANEL RECEPTACLE



FEATURES:
- Non-Tarnish finish.
- 50 Ohm impedance.
- Teflon insulation.
- Beryllium copper outer finger contact.
- Gold flashed male contact.
- Solder cup connection.

MODEL 2454 QUANTITY DISC. CODE Ⓐ **NET 5.85**

SOLDER TURRET TERMINAL SCREW



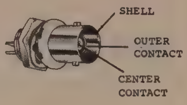
Excellent for mounting of panel receptacles. Turret on end of screw for soldering. #4-40, Phillips head, steel, cadmium plated.

MODEL 2352 Std. Pkg. 100 **NET per Pkg. 10.00**

TWINAX JACKS, PLUGS AND PATCH CORDS

Due to the ever increasing need for low level signal patching and balanced line applications, Pomona introduces Twinax Patch cords and jacks. For use with 2 conductor shielded cable.

These connectors feature a concentric design with a center contact, outer contact and outer shell (see dwg.). This concentric design does not require matching of halves such as the Polarized stepped insulator connectors.

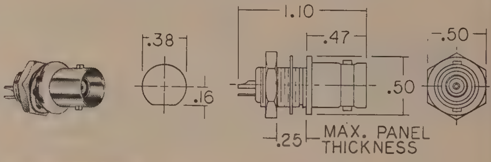


MATERIAL:
- Bodies and Fittings: Brass per QQ-B-626, Alloy #360.
- Insulators: Teflon per MIL-P-19468.
- Center Contacts:
  - Female — Beryllium copper per QQ-C-530 Cond. H.
  - Male — Brass per QQ-B-626, Alloy #360.
- Outer Contacts: Beryllium copper per QQ-C-530 Cond. H.

FINISH:
- Bodies and Fittings: Non-Tarnish.
- Center Contacts: Gold over copper plate.
- Outer Contacts: Gold over copper plate.

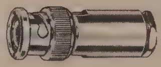
RATING:
- 500 VRMS

BULKHEAD RECEPTACLE

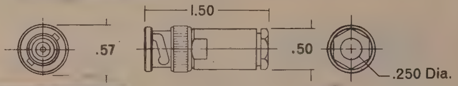


MODEL 3580 QUANTITY DISC. CODE Ⓐ **NET 6.95**

CABLE PLUG

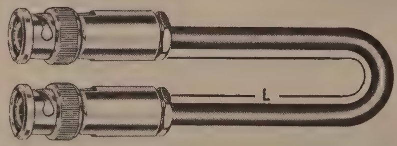


For use with RG 108A/U and Belden 9272.



MODEL 3600 QUANTITY DISC. CODE Ⓐ **NET 7.50**

TWINAX CABLE PLUG BOTH ENDS



CABLE DESCRIPTION:
- Belden 9272.
- Impedance — 78 Ohm.
- 2 Conductor shielded.
- Conductors — 20 AWG (7 x 28) with polyethylene insulation.
- Shield — tinned copper.
- Jacket — Blue vinyl, .242" O.D.
- Capacitance—Between conductors, 19 Pf/ft.

QUANTITY DISC. CODE Ⓑ

MODEL	LENGTH	NET
3581-CC-18	18"	19.95
3581-CC-24	24"	19.95
3581-CC-36	36"	19.95
3581-CC-48	48"	19.95
3581-CC-60	60"	19.95

MODEL 3581

COMPONENT MOUNTING ISOLATION PLUGS

POMONA
ELECTRONICS

CREATE passive and active networks, voltage dividers, isolation networks or attenuators with the Split-Terminal isolation plugs described below.

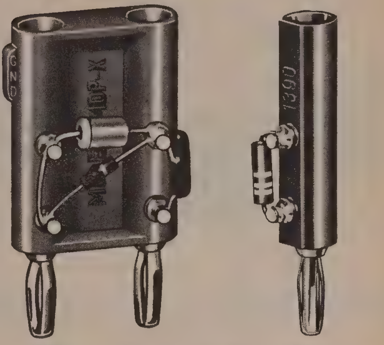
Gold flashed solder turret terminals provide permanent, reliable noise-free connections for component mounting.

Tough thermo-plastic material molded to plug body and connectors insures maximum strength, moisture resistance and excellent insulative properties.

Specifications for MDP-X, 1390, 1837, 1468:

- Fits standard 0.166 dia. banana jack.
- Spring, heat treated beryllium copper alloy 170 per QQ-C-533.
- Plug body, Brass per QQ-B-626, Alloy #360.
- Nickel plated per QQ-N-290, Class 2.
- Contact resistance less than 0.001 ohms per banana plug.

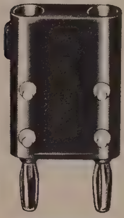
TYPICAL APPLICATION



ACTUAL SIZE

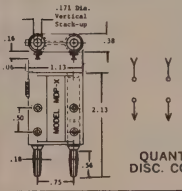
MODEL MDP-X **MODEL 1390**

DOUBLE BANANA PLUG, FOUR TERMINAL ISOLATION



MODEL MDP-X

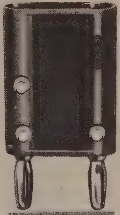
Provides four terminal isolation. Top Stack-Up receptacles isolated from lower plugs. Ideal for insertion of matching networks in laboratory VTVM's, signal generators, etc. Gold flashed solder turret terminals for permanent noise-free connections.



UPPER: Double banana jacks, .166 dia., on ¾″ centers.
LOWER: Double banana plug on ¾″ centers.
COLOR: Red.

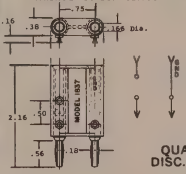
QUANTITY DISC. CODE Ⓐ **NET 3.50**

DOUBLE BANANA PLUG, THREE TERMINAL ISOLATION



MODEL 1837

Provides three terminal isolation. Excellent for "L" and "Pi" networks. Plug and receptacle nickel plated. Gold flashed solder turret terminals for permanent noise-free connections. "Ground" is straight feed-thru. Hot side isolated.

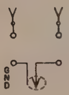


UPPER: Banana jacks, .166 dia. on ¾″ centers.
LOWER: Double banana plug on ¾″ centers.
COLOR: Blue.

QUANTITY DISC. CODE Ⓐ **NET 2.75**

ADAPTER — BINDING POSTS TO BNC PLUG, ISOLATION

MODEL 1459

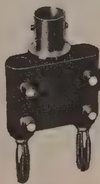


Permits single or double banana plugs to be used with equipment having BNC receptacle. Provides isolation for a four terminal network. Binding posts facilitate connections of test leads or additional components. Gold flashed solder turret terminals provide permanent noise-free connections.

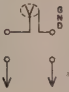
UPPER: Insulated binding posts, on ¾″ centers with .166 dia. jacks.
LOWER: BNC plug.
COLOR: Body, Black.
Binding Posts: Black/Red.

QUANTITY DISC. CODE Ⓐ **NET 10.85**

ADAPTER — BNC RECEPTACLE TO DOUBLE BANANA PLUG, ISOLATION



MODEL 1468

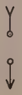


Permits BNC plug to be used with equipment having banana jacks. Provides isolation for a four terminal network. Excellent for matching pad networks. Gold flashed solder turret terminals for permanent noise-free connnections.

UPPER: BNC receptacle.
LOWER: Double banana plug, on ¾″ centers.
COLOR: Black.

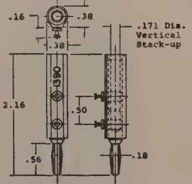
QUANTITY DISC. CODE Ⓐ **NET 9.85**

PLUG — SINGLE BANANA, ISOLATION



Provides two terminal isolation. Top Stack-Up receptacle is isolated from lower plug to permit addition of series resistors, diodes, etc. Ideal for computers, lab. circuit design and testing. Gold flashed solder turret terminals for permanent noise-free connections.

UPPER: Banana jack, .166 dia.
LOWER: Banana plug.
COLORS: Black, Red.

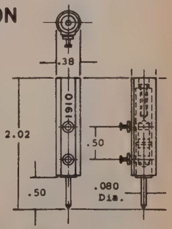


MODEL 1390 (Specify color) QUANTITY DISC. CODE Ⓐ **NET 1.80**

PLUG — PIN TIP, ISOLATION

Pin tip jack is isolated from .080 pin tip plug. Provides for addition of series components. Ideal for use with computer boards, lab circuit designs, etc. Gold flashed solder turret terminals for permanent noise-free connections.

UPPER: Tip jack, beryllium copper, gold flashed; accepts .080 dia. pin.
LOWER: Pin tip, .080 dia. Brass, nickel plated.
COLORS: Black Red.

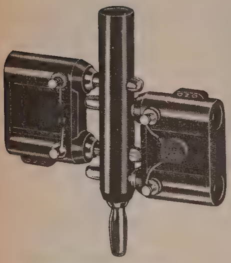


MODEL 1910 (Specify color) QUANTITY DISC. CODE Ⓐ **NET 1.95**

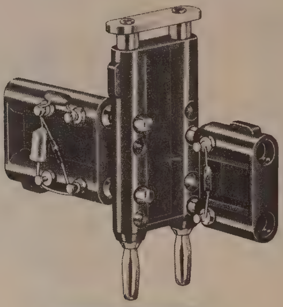
SERIES PARALLEL ISOLATION PLUGS & CONNECTOR TEST ADAPTERS

POMONA ELECTRONICS

SERIES PARALLEL ISOLATION PLUGS



MODEL 3501



MODEL 3502

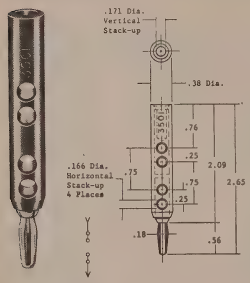
These plugs enable you to build unlimited combinations of series parallel networks eg., voltage dividers attenuator and etc.

Upper crossholes spaced ¾″ on centers from lower crossholes to allow connection of double banana plugs. Double banana plugs may be plugged in from both sides.

FEATURES:

- Fits .166 dia. Banana jacks.
- Spring, heat treated beryllium copper alloy 170 per QQ-C-533.
- Plug bodies and jacks, Brass, nickel plated per QQ-N-290 class 2.
- Tough thermoplastic molded to banana jacks and plug bodies.

SERIES-PARALLEL ISOLATION PLUG

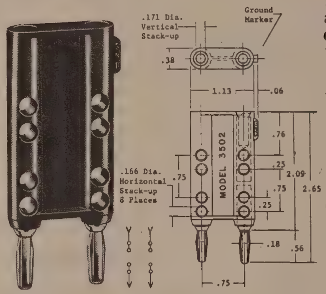

.171 Dia.
Vertical
Stack-up
.38 Dia.
3501
.76
.25
.75
.25
2.09
2.65
.166 Dia.
Horizontal
Stack-up
4 Places
.75
.18
.56

Top banana jack and upper pair of crossholes isolated from lower pair of crossholes and banana plug.

UPPER: Banana jack .166 dia.
CENTER: 4 crossholes .166 dia.
LOWER: Banana Plug.
COLOR: Red.

MODEL 3501 QUANTITY DISC. CODE A **NET 2.25**

DUAL SERIES-PARALLEL ISOLATION PLUG

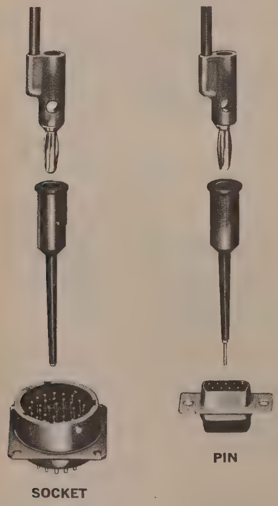

.171 Dia.
Vertical
Stack-up
Ground
Marker
.38
1.13
.06
MODEL 3502
.76
.25
.75
.25
2.09
2.65
.166 Dia.
Horizontal
Stack-up
8 Places
.75
.18
.56
.75

Excellent for building attenuators, voltage dividers, isolation networks, etc. Top banana jacks and upper pair of crossholes isolated from lower pair of crossholes and banana plugs.

UPPER: Double banana jack .166 dia., on ¾″ centers.
CENTER: 8 crossholes .166 dia.
LOWER: Double banana plug on ¾″ centers.
COLOR: Red.

MODEL 3502 QUANTITY DISC. CODE A **NET 3.95**

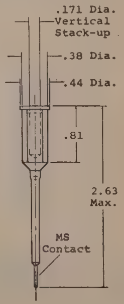
TYPICAL APPLICATION



CONNECTOR TEST ADAPTERS

An ideal test adapter for the rapid testing of the hard to get at contacts of multi-pin MS type connectors such as miniature circular, standard circular and rack and panel. Excellent for testing of continuity, voltage and signal on individual contacts. Test adapter available in Pin and socket contacts sizes of 20, 16 and 12.

- Gold flashed contacts conform to "MS" Dimensions.
- Flexible tip prevents damage to connector contacts if test adapter is accidently bent.
- Flexible tip allows testing of adjacent contacts.
- Fully insulated to prevent accidental shorting.
- Accepts standard banana plug.


.171 Dia.
Vertical
Stack-up
.38 Dia.
.44 Dia.
.81
2.63
Max.
MS
Contact

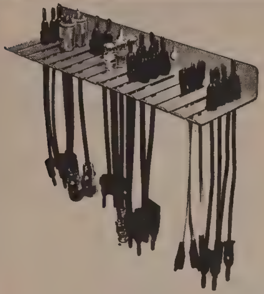
UPPER: Banana jack, .166 dia., brass, nickel plated.
LOWER: "MS" style contact, gold flashed, see tab block.
Color: See tab block. (Specify Color).

MODEL (Specify color)	CONTACT SIZE	TYPE	COLOR (Specify color)	NET
3560	20	Pin	Red, Black	1.50
3561	20 (.040 dia.)	Socket	Red, Black	1.50
3562	16	Pin	Red, Black	1.75
3563	16 (.063 dia.)	Socket	Red, Black	1.50
3564	12	Pin	Red, Black	2.50
3565	12 (.093 dia.)	Socket	Red, Black	1.50

QUANTITY DISC. CODE A

MISCELLANEOUS ACCESSORIES

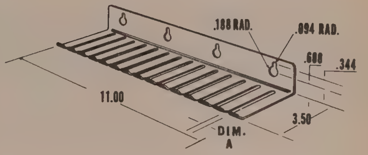
POMONA
ELECTRONICS



TEST LEAD HOLDER

No need to spend time searching for a particular test lead. With this new rack, all of your patch cords and cable assemblies can be conveniently filed for instant selection — within easy reach. Holder mounts quickly on any vertical surface. Test leads are easy to store, easy to remove. Two models to choose from for different size cables.

MATERIAL: Cold Rolled Steel.
FINISH: Baked Enamel.



	MAX. CABLE DIA. (DIM. A)	COLOR	NET
MODEL 1508	.210"	Orange	3.85
MODEL 2708	.450"	Blue	3.85

QUANTITY DISC. CODE A

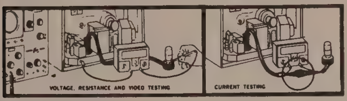
SEE PAGE 66 FOR TEST SOCKET ADAPTER HOLDER

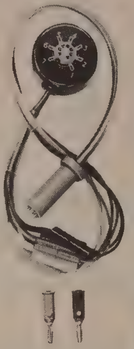
Universal Harness

TESTING ADAPTER

Takes the Trouble out of Trouble Shooting!

TEST SOCKET: Extended test tabs, phosphor bronze contacts, heavy duty molded phenolic base with easy-to-read socket connections. **CURRENT MEASUREMENT CONNECTIONS:** Fully insulated, molded .080 phone tip plugs. **INSULATED PLUG:** Fits either shielded or unshielded tube sockets.


VOLTAGE, RESISTANCE AND VIDEO TESTING
CURRENT TESTING

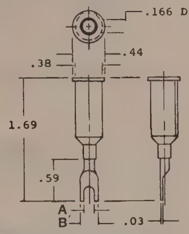


MODEL 1737 (7 Pin)
MODEL 1738 (8 Pin)
MODEL 1739 (9 Pin)

QUANTITY DISC. CODE D

NET 14.95

INSULATED BARRIER STRIP SPADE LUG ADAPTERS



Permits single banana plug to be used with equipment having barrier strips. Lugs fit a No. 4, 5, 6, 8, or 10 screw (see listing). Tough Thermoplastic molded to body for maximum reliability.

UPPER: Banana Jack, .166 dia. Brass, nickel plated.

LOWER: Spade lug, (see listing). Copper, electro-tin plated.

COLORS: Black, Red.

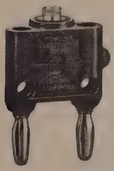
*(Specify Color)

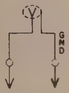
MODEL	LUG SIZE	DIM A	DIM B
3744	4, 5 & 6	.15	.24
3777	8 & 10	.19	.30

QUANTITY DISC. CODE A

NET .75

ADAPTER — MICRODOT RECEPTACLE TO DOUBLE BANANA PLUG





Permits Microdot miniature coaxial plug to be used with equipment having banana jacks. Cross holes in body provide side Stack-Up connections.

UPPER: Microdot receptacle, Screw-On Type.

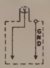
LOWER: Double banana plug, on ¾" centers. Cross holes (.166 dia.) in body provide side Stack-Up connections.

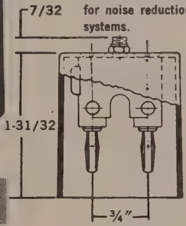
MODEL	TYPE (Ohms)	BODY COLOR	RECEPTACLE TYPE	NET
1275	50	Green	10-32 thread	12.50
1276	50	Black	Slide-on	12.50
1277	70	Violet	12-32 thread	12.50
1279	93	White	¼-32 thread	12.50

QUANTITY DISC. CODE A

ADAPTER—MICRODOT RECEPTACLE TO SHIELDED BANANA PLUGS

Permits Microdot miniature coaxial plug, 50 ohm, to be used with equipment having banana jack binding posts. Black anodized aluminum shield reduces noise pick-up more than 70 DB. Ideal for noise reduction in low level acceleration systems.





UPPER: Microdot Receptacle, Screw-On Type, Receptacle Thread 10-32.

LOWER: Shielded Double banana plug, on ¾" centers.

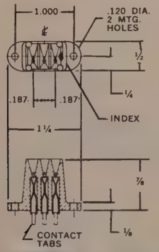
COLOR: Black.

MODEL 1575

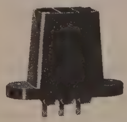
QUANTITY DISC. CODE A

NET 14.85

TRANSISTOR SOCKET



For use in testing 3 lead transistors with .017 dia. leads. Beryllium copper springs for long life. Ideal for aging racks, incoming inspection, life testing, etc.

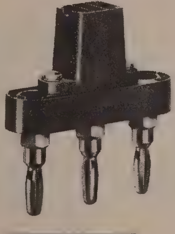


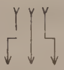
MODEL TS-187

QUANTITY DISC. CODE A

MODEL	TEMP. RANGE	INSULATION RESISTANCE	COLOR	NET
TS187	—100°C To +200°C.	1 x 10^5 Megohms Min. @ 500 V.D.C. @ 40% R.H., 24°C.	Black	2.50

ADAPTER — TRANSISTOR TEST SOCKET





Permits the insertion of transistors with .017 dia. leads into equipment having banana jacks on ¾" centers. Ideal for incoming inspection. Transistor socket contact and banana spring made of beryllium copper. Heavy duty phenolic construction. Insulation resistance: 1 x 10^5 megohms min. @ 500 V.D.C., at 40% R.H., 24°C.

MODEL 1472

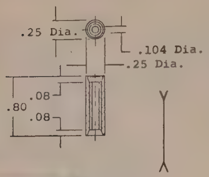
QUANTITY DISC. CODE A

NET 7.85

SPLICES & MINIATURE TEST PROBES

POMONA ELECTRONICS

SINGLE MINIATURE BANANA PLUG SPLICE



Permits splicing of single miniature banana plugs. Tough Thermoplastic molded onto the body eliminates shock hazard by enclosing plugs.

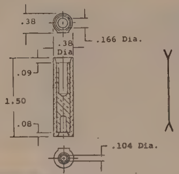
UPPER: Miniature banana jack, .104 dia. Brass, nickel plated.

LOWER: Same as upper.

COLORS: Black, Red.

MODEL 3833 (Specify Color) QUANTITY DISC. CODE A NET .95

STANDARD BANANA PLUG TO MINIATURE BANANA PLUG SPLICE



This splice accepts a standard banana plug on one end and a miniature banana plug on the other end. Tough Thermoplastic molded onto the body eliminates shock hazard by enclosing the plugs.

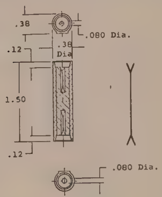
UPPER: Standard banana jack, .166 dia. Brass, nickel plated.

LOWER: Miniature banana jack, .104 dia. Brass, nickel plated.

COLORS: Black, Red.

MODEL 3835 (Specify Color) QUANTITY DISC. CODE A NET .50

SINGLE .080 PIN TIP PLUG SPLICE



Permits splicing of single .080 dia. pin tip patch cords. Tough Thermoplastic molded onto the body eliminates shock hazard by enclosing plugs.

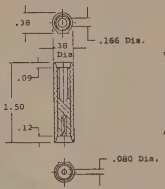
UPPER: Tip jack, beryllium copper, gold plated, accepts .080 dia. pin.

LOWER: Same as upper.

COLORS: Black, Red.

MODEL 3832 (Specify Color) QUANTITY DISC. CODE A NET .95

STANDARD BANANA PLUG TO .080 PIN TIP PLUG SPLICE



This splice accepts a standard banana plug on one end and a .080 pin tip plug on the other end. Tough Thermoplastic molded onto the body eliminates shock hazard by enclosing plugs.

UPPER: Standard banana jack, .166 dia. Brass, nickel plated.

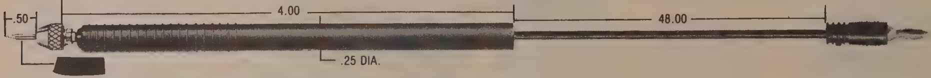
LOWER: Tip jack, beryllium copper, gold plated, accepts .080 dia. pin.

COLORS: Black, Red.

MODEL 3834 (Specify Color) QUANTITY DISC. CODE A NET .65

NEW

MINIATURE NEEDLE TIP PROBE TO MINIATURE BANANA PLUG



This slim miniature test probe features a sharp replaceable needle tip. The tip easily pierces varnish or plating to give a good electrical reading. Tough Thermoplastc is molded directly onto probe tip and wire lead providing a strong, reliable integral unit.

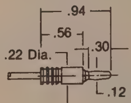
NEEDLE TIP: Replaceable, stainless steel.

WIRE: 20 AWG, strand 41 x 36 T.C. extra flexible polyvinyl insulation .087″ O.D.

MINIATURE BANANA PLUG: Fits 0.104 dia. miniature banana jacks. Spring, one piece heat treated beryllium copper. Plug body, brass per QQ-B-626, Alloy #360. Gold plated. Tough Thermoplastic molded onto plug body and wire.

OPERATING TEMP.: —0° C to +105° C.

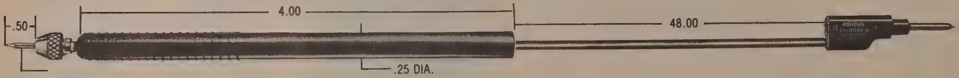
COLORS: Black, Red.



MODEL	LENGTH	COLOR
4071-48	48″	(Specify)

QUANTITY DISC. CODE A NET 2.50

MINIATURE NEEDLE TIP PROBE TO STACKING .080 PIN TIP PLUG



This slim miniature test probe features a sharp replaceable needle tip. The tip easily pierces varnish or plating to give a good electrical reading. Tough Thermoplastic is molded directly onto probe tip and wire lead providing a strong, reliable integral unit.

NEEDLE TIP: Replaceable, stainless steel.

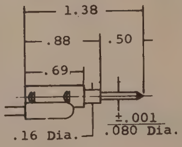
WIRE: 20 AWG, strand 41 x 36 T.C. extra flexible polyvinyl insulation .087″ O.D.

PIN TIP PLUG: .080 dia. Brass, gold plated. Tough Thermoplastic molded onto plug body and wire.

STACK-UP: Beryllium copper spring, gold plated, accepts .080 dia. pin.

OPERATING TEMP.: —25° C to +105° C.

COLORS: Black, Red.

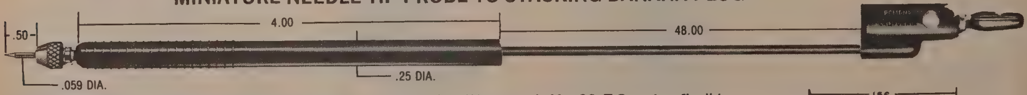


STACK-UP

MODEL	LENGTH	COLOR
3860-48	48″	(Specify)

QUANTITY DISC. CODE A NET 2.50

MINIATURE NEEDLE TIP PROBE TO STACKING BANANA PLUG



This slim miniature test probe features a sharp replaceable needle tip. The tip easily pierces varnish or plating to give a good electrical reading. Tough Thermoplastic is molded directly onto probe tip and wire lead providing a strong, reliable integral unit.

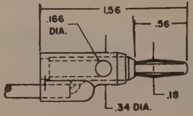
NEEDLE TIP: Replaceable, stainless steel.

WIRE: 20 AWG, strand 41 x 36 T.C. extra flexible polyvinyl insulation .087″ O.D.

BANANA PLUG: Spring one piece beryllium copper, heat treated, nickel plated. Tough Thermoplastic molded onto plug body and wire.

OPERATING TEMP.: —25° C. to +105° C.

COLORS: Black, Red.



MODEL	LENGTH	COLOR
3861-48	48″	(Specify)

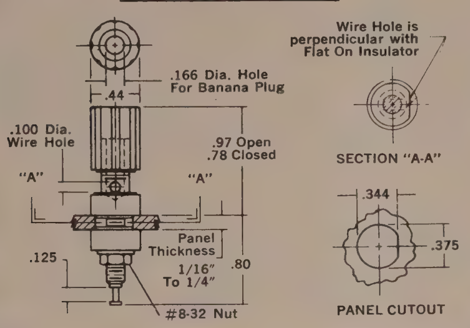
QUANTITY DISC. CODE A NET 2.50

INSULATED BINDING POSTS AND RELAY SOCKETS

POMONA
ELECTRONICS

INSULATED LEXAN* POLYCARBONATE BINDING POSTS

The insulated Lexan* Binding Posts fill the needs of most critical requirements. The plastic molding on these units is Lexan* Polycarbonate which has high impact strength, low loss, low power factor and high insulation resistance. Thin line design for hi-density packaging.


.44
.166 Dia. Hole
For Banana Plug
Wire Hole is perpendicular with Flat On Insulator
.100 Dia.
Wire Hole
.97 Open
.78 Closed
"A"
"A"
SECTION "A-A"
.344
.375
Panel
Thickness
1/16"
To 1/4"
.125
.80
#8-32 Nut
PANEL CUTOUT

FEATURES:

- Polycarbonate insulation.
- Thin line design.
- Standard and low thermal EMF types available.
- 5 way Binding Post.
- Accepts std. Banana Plug.
- Captive thumb nut.
- Gold or nickel plated.

RATINGS:

- Operating Temp.: —65°C. to +150°C.
- Working Voltage: 1500 VDC.
- Current: 15 Amps Cont., 30 Amps Int.

LOW THERMAL EMF STANDARD TYPE

Copper Body and Thumb nut insert, GOLD FLASHED per MIL-G-45204. Excellent for use when thermoplastic effects are a significant source of error. Gold flashed for high conductivity.

COLORS: Black Brown, Red, Orange, Yellow, Green, Blue, Violet, Gray, White.

MODEL 3770 (Specify Color) QUANTITY DISC. CODE A **NET 2.50**

STANDARD TYPE

BRASS body and thumb nut insert, available GOLD FLASHED per MIL-G-45204 (or) NICKEL PLATED per QQ-N-290 class 2.

COLORS: Black, Brown, Red, Orange, Yellow, Green, Blue, Violet, Gray, White.

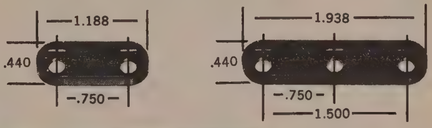
MODEL 3750
(Specify Color)
Gold Flashed
NET 1.35

QUANTITY DISC. CODE A

MODEL 3760
(Specify Color)
Nickel plated
NET 1.10

DOUBLE AND TRIPLE MOUNTING BASES

Lexan *Polycarbonate bases which may be used with models 3750, 3760 or 3770. Colors: Black, Red.


1.188
.440
.750
1.938
.440
.750
1.500

MODEL 3862-Double (Specify Color)
MODEL 3863-Triple (Specify Color)

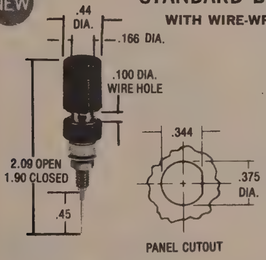
QUANTITY DISC. CODE A

NET .25
NET .30

NEW

STANDARD BINDING POST

WITH WIRE-WRAP TERMINAL


.44
DIA.
.166 DIA.
.100 DIA.
WIRE HOLE
.344
2.09 OPEN
1.90 CLOSED
.375
DIA.
.45
PANEL CUTOUT

Excellent for rapid connection of wires using Wire Wrapping tools or machines.

FEATURES:

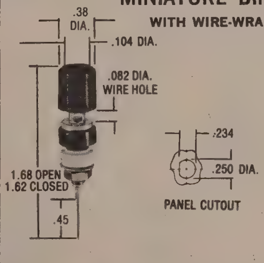
- Lexan Polycarbonate Insulation.
- 5 Way Binding Post.
- Accepts Standard Banana Plug.
- Captive thumb nut and body, brass, nickel plated.
- Mounts in Panels 1/16 to 1/4" thick.
- 8-32 Hex Nut and Lockwasher included.
- Gold plated Beryllium copper .025 wire wrap terminal.
- Colors: Black, Red, Yellow, Green, Blue, Gray, White.
- Rated: 1500 VDC, 15A Cont., 30A Int.
- Operating Temp: —65°C. to +150°C.

MODEL 4098 QUANTITY DISC. CODE A **NET 1.50**

NEW

MINIATURE BINDING POST

WITH WIRE-WRAP TERMINAL


.38
DIA.
.104 DIA.
.082 DIA.
WIRE HOLE
.234
.250 DIA.
1.68 OPEN
1.62 CLOSED
.45
PANEL CUTOUT

Excellent for rapid connection of wires using Wire Wrapping tools or machines.

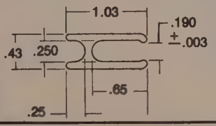
FEATURES:

- Lexan Polycarbonate Insulation.
- 5 Way Binding Post.
- Accepts Miniature Banana Plug.
- Captive Thumb Nut and Body, Brass, Nickel Plated.
- Mounts in Panels up to 3/16" thick.
- 8-32 Hex Nut and Lockwasher included.
- Gold plated Beryllium Copper .025 wire wrap terminal.
- Colors: Black, Red, Yellow, Green, Blue, Gray, White.
- Rated: 1500 VDC, 5A Cont., 10A Int.
- Operating Temp: —65°C. to +150°C.

MODEL 4101 QUANTITY DISC. CODE **NET 1.25**

NEW

SHORTING LINK FOR STANDARD BINDING POSTS


1.03
.190
±.003
.43
.250
.65
.25

Shorting Link for Standard Binding Posts on ¾" centers. A snap-on feature holds Link on post when short not needed. **MATERIAL:** Brass .031 thick. **FINISH:** Nickel Plated per QQ-N-290 class 2.

MODEL 4115

QUANTITY DISC. CODE

Std. Pkg. 10

(Nickel Plated) **NET .15**

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* Lexan is a trademark of General Electric

INSULATED BANANA JACKS, PIN TIP JACKS AND BANANA POSTS ADAPTERS

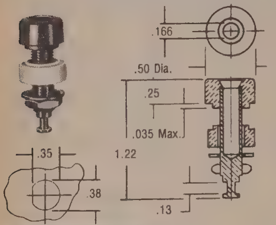
POMONA ELECTRONICS

INSULATED LEXAN POLYCARBONATE BANANA JACKS AND .080 PIN TIP JACKS

These jacks are molded of Lexan Polycarbonate thermoplastic which has high impact strength, low loss, low power factor and high insulation resistance.

FEATURES: (All Models)
- Insulator head molded directly to one piece brass body.
- Panel insulator molded of Lexan Polycarbonate.
- Solder turret or Wire-Wrap terminal.
- Nickel plated lockwasher and hex nut included unassembled.

BANANA JACK — SILVER PLATED



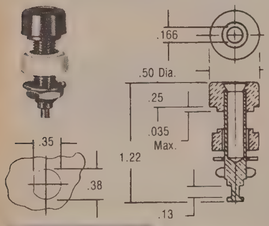
- Silver plated brass body.
- Closed entry receptacle, .166 dia.
- Rated 2,500 WVDC 15 AMPS. cont., 30 AMPS. int.
- Mounts in panels from .035" to .375" thick.
- ¼-32 thread.

COLORS: Black, Brown, Red, Orange, Yellow, Green, Blue, Violet, Gray, White.

STD. PKG. 10 (per color) unassembled.

MODEL 1581 (Specify color) QUANTITY DISC. CODE **A** NET .35 ea.

BANANA JACK — GOLD PLATED



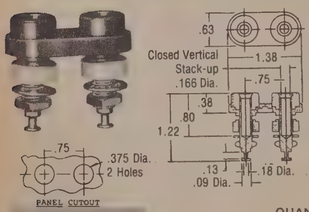
- Gold plated brass body.
- Closed entry receptacle, .166 dia.
- Rated 2,500 WVDC 15 AMPS. cont., 30 AMPS. int.
- Mounts in panels from .035" to .375" thick.
- ¼-32 thread.

COLORS: Black, Brown, Red, Orange, Yellow, Green, Blue, Violet, Gray, White.

STD. PKG. 10 (per color) unassembled.

MODEL 2854 (Specify color) QUANTITY DISC. CODE **A** NET .50 ea.

DOUBLE BANANA JACK — SILVER PLATED

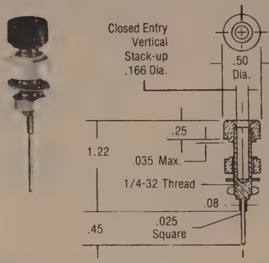


- Silver plated brass bodies.
- Closed entry receptacles, .166 dia.
- Rated 2,500 WVDC 15 AMPS. cont., 30 AMPS. int.
- Mounts in panels from .035" to .275" thick.
- One Red and one Black jack.
- Choice of Black or Red plate.
- ¼-32 thread.

MODEL 2269	**Black Plate**
MODEL 2269-2	**Red Plate**

MODEL 2269 (Specify color) QUANTITY DISC. CODE **A** NET .95

BANANA JACK — WITH WIRE-WRAP TERMINAL



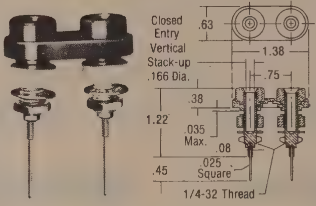
Excellent for rapid connection of wires using wire wrapping tools or machines.
- Gold plated beryllium copper .025 wire wrap terminal.
- Nickel plated brass body.
- Closed entry receptacle .166 dia.
- Rated 2,500 WVDC 15 AMPS. cont., 30 AMPS. int.
- Mounts in panels from .035" to .375" thick.
- ¼-32 thread.

COLORS: Black, Red, Yellow, Green, Blue, Gray, White.

STD. PKG. 10 (per color) unassembled.

MODEL 4005 (Specify Color) QUANTITY DISC. CODE **A** NET .75 ea.

DOUBLE BANANA JACK — WITH WIRE-WRAP TERMINAL

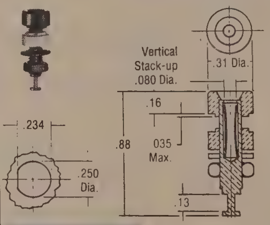


Excellent for rapid connection of wires using wire wrapping tools or machines.
- Gold plated beryllium copper .025 wire wrap terminal.
- Nickel plated brass bodies.
- Closed entry receptacles, .166 dia.
- Rated 2,500 WVDC 15 AMPS. cont., 30 AMPS. int.
- Mounts in panels from .035" to .275" thick.
- One Red and one Black jack.
- Choice of Black or Red plate.
- ¼-32 thread.

MODEL 4069	Black Plate
MODEL 4069-2	Red Plate

MODEL 4069 (Specify color) QUANTITY DISC. CODE **A** NET 1.75

.080 DIA. PIN TIP JACK



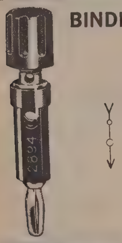
- Gold plated brass body.
- Contact spring, heat treated beryllium copper, gold flashed.
- Rated 1,500 WVDC 5 AMPS. cont., 10 AMPS. int.
- Mounts in Panels from .035" to .250" thick.
- 8-32 thread.

COLORS: Black, Brown, Red, Orange, Yellow, Green, Blue, Violet, Gray, White.

STD. PKG. 10 (per color)

MODEL 3542 (Specify color) QUANTITY DISC. CODE **A** NET .45 ea.

BINDING POST TO SINGLE BANANA PLUG



Features insulated binding post. Binding post allows top Stack-Up for multiple connections. Side Stack-Up provided by thru-hole in plug body.

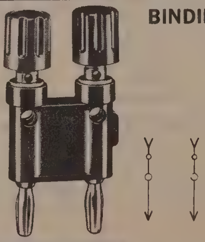
UPPER: Insulated binding post. Cross hole (.166 dia.) in body provides side Stack-Up connections.

LOWER: Single banana plug, one piece nickel plated beryllium copper spring for use with standard 0.166 dia. banana jack.

COLORS: Black, Red.

MODEL 2894 (Specify color) QUANTITY DISC. CODE **A** NET 1.75

BINDING POSTS TO DOUBLE BANANA PLUG



Binding posts on ¾" centers for rapid mounting of components and top Stack-up for multiple connections.

UPPER: Insulated double binding posts, on ¾" centers. Cross holes (.166 dia.) in body provide side Stack-up connections.

LOWER: Double banana plug, on ¾" centers.

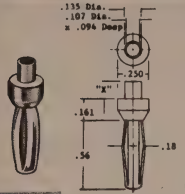
COLORS: Body, Black. Binding Posts, Black/Red.

MODEL 1286 QUANTITY DISC. CODE **A** NET 2.75

STANDARD & MINIATURE BANANA PLUGS & JACKS

POMONA ELECTRONICS

RIVET TYPE BANANA PLUG



Excellent for riveting to panels or boards. Used with standard .166 dia. banana jacks.

- Spring, one piece heat treated beryllium copper, alloy 170 per QQ-C-533.
- Jack body, Brass per QQ-B-626, Alloy #360.
- Plating, Nickel per QQ-N-290 class 2.
- Rated, 15A, Cont., 30A. Int.

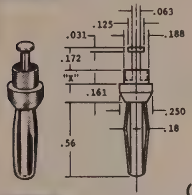
(SWAGING TOOL NO. 3518 NET 23.95)

MODEL	"X" DIM.	PANEL
3257	.094	1/16"
3258	.125	3/32"
3259	.156	1/8"

Std. Pkg. 10

QUANTITY DISC. CODE Ⓐ NET .37 ea.

RIVET TYPE BANANA PLUG WITH TURRET



Excellent for riveting to panels or boards. Solder turret for rapid attachment of wires. Used with standard .166 dia. banana jacks.

- Spring, one piece heat treated beryllium copper, alloy 170 per QQ-C-533.
- Plug body, Brass per QQ-B-626, Alloy #360.
- Plating, Nickel per QQ-N-290, class 2.
- Rated, 15A, Cont., 30A. Int.

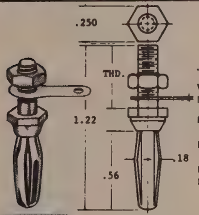
(SWAGING TOOL NO. 3519 NET 23.95)

MODEL	"X" DIM.	PANEL
3260	.105	1/16"
3261	.135	3/32"
3262	.165	1/8"

Std. Pkg. 10

QUANTITY DISC. CODE Ⓐ NET .37 ea.

BANANA PLUG WITH THREADED STUD



Threaded stud for rapid mounting. Used with standard .166 dia. banana jacks. Furnished with hex nut and solder lug.

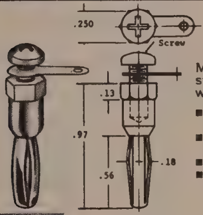
- Spring, one piece heat treated beryllium copper, alloy 170 per QQ-C-533.
- Plug body, Brass per QQ-B-626, Alloy #360.
- Plating, Nickel per QQ-N-290, class 2.
- Rated, 15A, Cont., 30A. Int.

Standard Package 10
Unassembled

MODEL	THREAD
3263	6-32 x ½"
3264	8-32 x ½"

QUANTITY DISC. CODE Ⓐ NET .42 ea.

BANANA PLUG WITH SCREW



Mounts to various size panels. Used with standard .166 dia. banana jacks. Furnished with screw and solder lug.

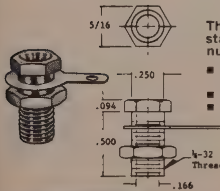
- Spring, one piece heat treated beryllium copper, alloy 170 per QQ-C-533.
- Plug body, Brass per QQ-B-626, Alloy #360.
- Plating, Nickel per QQ-N-290, class 2.
- Rated, 15A, Cont., 30A. Int.

Standard Package 10
Unassembled

MODEL	SCREW
3265	6-32 x ¼"
3266	8-32 x ¼"

QUANTITY DISC. CODE Ⓐ NET .42 ea.

UNINSULATED—BANANA JACK



Threaded for rapid mounting. Used with standard banana plugs. Furnished with hex nut and solder lug.

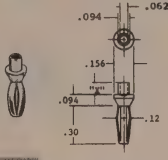
- Jack body, Brass per QQ-B-626, Alloy #360.
- Plating, Nickel per QQ-N-290, class 2.
- Rated, 15A, Cont., 30A. Int.

Standard Package 10
Unassembled

MODEL 3267

QUANTITY DISC. CODE Ⓐ NET .25 ea.

MINIATURE — RIVET TYPE BANANA PLUG



Excellent for riveting to panels or boards. Used with miniature .104 dia. banana jacks.

- Spring, one piece heat treated beryllium copper, alloy 170 per QQ-C-533.
- Plug body, Brass per QQ-B-626, Alloy #360.
- Plating, Gold flashed per MIL-G-45204 Type II (.00001/.00002).
- Rated, 5A. Cont., 10A. Int.

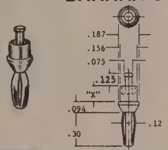
(SWAGING TOOL NO. 3520 NET 23.95)

MODEL	"X" DIM.	PANEL
3268	.094	1/16"
3271	.125	3/32"
3272	.156	1/8"

Std. Pkg. 10

QUANTITY DISC. CODE Ⓐ NET .32 ea.

MINIATURE — RIVET TYPE BANANA PLUG WITH TURRET



Excellent for riveting to panels or boards. Solder turret for rapid attachment of wires. Used with miniature .104 dia. banana jacks.

- Spring, one piece heat treated beryllium copper, alloy 170 per QQ-C-533.
- Plug body, Brass per QQ-B-626, Alloy #360.
- Plating, Gold flashed per MIL-G-45204 Type II (.00001/.00002).
- Rated, 5A. Cont., 10A. Int.

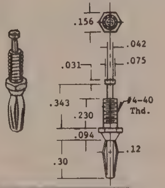
(SWAGING TOOL NO. 3521 NET 23.95)

MODEL	"X" DIM.	PANEL
3273	.105	1/16"
3274	.135	3/32"
3275	.165	1/8"

Std. Pkg. 10

QUANTITY DISC. CODE Ⓐ NET .42 ea.

MINIATURE — BANANA PLUG WITH THREADED STUD



Threaded stud for rapid mounting. Solder turret for attachment of wires. Used with .104 dia. miniature banana jacks.

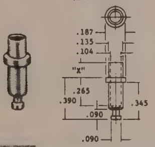
- Spring, one piece heat treated beryllium copper, alloy 170 per QQ-C-533.
- Plug body, Brass per QQ-B-626, Alloy #360.
- Plating, Gold flashed per MIL-G-45204 Type II (.00001/.00002).
- Rated, 5A. Cont., 10A. Int.

Standard Package 10

MODEL 3276

QUANTITY DISC. CODE Ⓐ NET .32 ea.

MINIATURE — RIVET TYPE BANANA JACK WITH TURRET



Excellent for riveting to panels or boards. Solder turret for rapid attachment of wires. .104 dia. jack accepts miniature banana plug.

- Jack body, Brass per QQ-B-626, Alloy #360.
- Plating, Gold flashed per MIL-G-45204 Type II (.00001/.00002).
- Rated, 5A. Cont., 10A. Int.

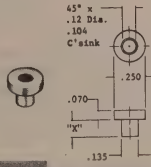
(SWAGING TOOL NO. 3522 NET 23.95)

MODEL	"X" DIM.	PANEL
3277	.105	1/16"
3278	.135	3/32"
3279	.165	1/8"

Std. Pkg. 10

QUANTITY DISC. CODE Ⓐ NET .22 ea.

MINIATURE — RIVET TYPE BANANA JACK



Excellent for riveting to panels or boards. .104 dia. jack accepts miniature banana plug.

- Jack body, Brass per QQ-B-626, Alloy #360.
- Plating, Gold flashed per MIL-G-45204 Type II (.00001/.00002).
- Rated, 5A. Cont., 10A. Int.

(SWAGING TOOL NO. 3523 NET 23.95)

MODEL	"X" DIM.	PANEL
3280	.105	1/16"
3281	.135	3/32"
3282	.165	1/8"

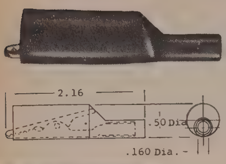
Std. Pkg. 10

QUANTITY DISC. CODE Ⓐ NET .15 ea.

TEST CLIPS & ½" SPACED PIN TIP PLUGS

POMONA ELECTRONICS

INSULATED ALLIGATOR CLIP TO BANANA JACK

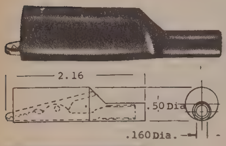


Clip, No. 60 Mueller, Steel, Cadmium Plated Vinyl insulators, No. 62 (5 Red, 5 Black). Unassembled.

Standard Package of 10 clips and 10 insulators.

MODEL 2240 QUANTITY DISC. CODE A NET .25 ea.

GOLD PLATED—INSULATED ALLIGATOR CLIP TO BANANA JACK

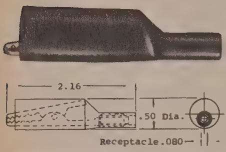


Alligator Clip, solid Copper, Gold plated. Vinyl insulators (5 Red, 5 Black). Unassembled.

Standard Package of 10 clips and 10 insulators.

MODEL 3289 QUANTITY DISC. CODE A NET .85 ea.

INSULATED ALLIGATOR CLIP TO PIN TIP JACK

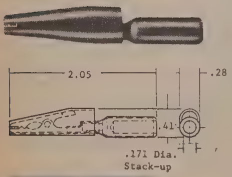


Alligator Clip, Steel, Cadmium Plated. Tip Jack, Beryllium Copper, Gold Flashed, accepts .080 dia. Pin tip plug. Vinyl insulators (5 Red, 5 Black). Unassembled.

Standard Package of 10 clips and 10 insulators.

MODEL 1437 QUANTITY DISC. CODE A NET .95 ea.

INSULATED MINIGATOR CLIP TO BANANA JACK

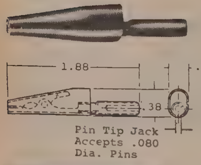


This minigator clip accepts a standard banana plug in the rear. Clip is steel, cadmium plated. Banana jack, brass, nickel plated. Pinned hinge construction with full-meshing jaws for small wires. Vinyl insulators (5 red, 5 black). Unassembled.

Standard Package of 10 clips and 10 insulators.

MODEL 3448 QUANTITY DISC. CODE A NET .95 ea.

INSULATED MINIGATOR CLIP TO PIN TIP JACK



This Minigator clip accepts a .080 dia. pin tip plug. Clip is steel, cadmium plated. Tip jack, Beryllium copper, gold flashed. Pinned hinge construction with full-meshing jaws for small wires. Vinyl insulators (5 red, 5 black). Unassembled.

Standard Package of 10 clips and 10 insulators.

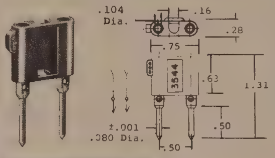
MODEL 3491 QUANTITY DISC. CODE A NET 1.25 ea.

½" SPACED MINIATURE PIN TIP PLUGS

FEATURES:
- Fits .080 dia. pin tip jacks.
- Plug Bodies brass, Gold flashed per MIL-G-45204 Type 2 (.00001/.00002).
- Stack-up spring, beryllium copper alloy 170 per QQ-C-533, Gold flashed.
- Tough Thermoplastic molded directly to plug bodies.

RATINGS:
- Operating Temp.: −25°C to +85°C.
- Working Voltage: 2500 VDC.
- Current: 5 amps cont., 10 amps. int.

MINIATURE — DOUBLE PIN TIP PLUG WITH SET SCREWS

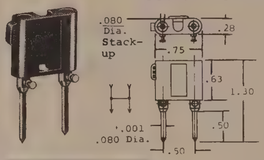


Miniature double pin tip plug on ½" centers. Set screws secure cable or component leads.
COLORS: Black, Red.

(Screwdriver No. 3736 NET .50)

MODEL 3544 (Specify color) QUANTITY DISC. CODE A NET 1.25

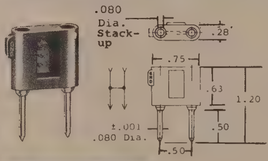
MINIATURE — DOUBLE PIN TIP PLUG WITH SOLDER TURRET TERMINALS



Miniature double Pin Tip plug on ½" centers. Gold flashed solder turret terminals for permanent noise-free connection of cables. .080 Tip jacks on ½" centers permit top stacking.
COLORS: Black, Red.

MODEL 3545 (Specify color) QUANTITY DISC. CODE A NET 1.50

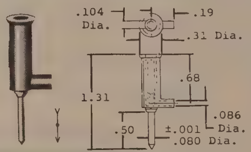
MINIATURE — DOUBLE PIN TIP PLUG WITH SHORTING BAR



Ideal as a connecting link for use with ½" spaced pin tip jacks. .080 dia. Tip jacks on ½" center permit top stacking. Banana plugs internally solder-bonded with #20 AWG wire. "Shorting Bar" stamped on plug.
COLORS: Black, Red.

MODEL 3452 (Specify color) QUANTITY DISC. CODE A NET 1.75

MINIATURE — SOLDERLESS PIN TIP PLUG WITH SAFETY COLLAR

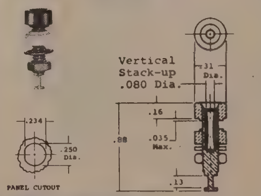


This integral collar insulates exposed wire leads and acts as a strain relief by preventing the flexing of the lead at the set screw. Wire firmly held in place with internal set screw, eliminating soldering.
COLORS: Black, Red.

(Screwdriver No. 3736 NET .50)

MODEL 3548 (Specify color) QUANTITY DISC. CODE A NET .75

MINIATURE — PIN TIP JACK .080 DIA.



Miniature jack accepts .080 dia. pin tip plugs. Polycarbonate Thermoplastic insulated head molded directly to gold flashed brass body. Contact spring, heat treated beryllium copper, gold flashed. 8-32 Hex Nut and Lockwasher included unassembled.
COLORS: Black, Brown, Red, Orange, Yellow, Green, Blue, Violet, Gray, White.
Panels .035" to .250" thick.

Std. Pkg. (10 per color).

MODEL 3542 (Specify color) QUANTITY DISC. CODE A NET .45 ea.

½ SPACED MINIATURE BANANA PLUGS

POMONA ELECTRONICS

ONE-THIRD SMALLER Miniature Banana Plugs, a state-of-the-art development for the ever increasing demand for miniaturized test equipment.

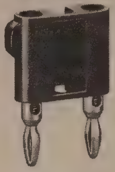
Banana plug springs are precision formed of one-piece beryllium copper, heat treated for maximum life and low contact resistance. Tough thermoplastic molded to plug bodies.

SPECIFICATIONS:

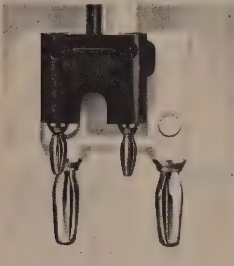
- Fits 0.104 dia. miniature banana jacks.
- Plug body brass, per QQ-B-626, Alloy #360.
- Gold flashed per MIL-G-45204 Type 11 (.00001/.00002).
- Spring, beryllium copper alloy 170 per QQ-C-533.

RATINGS:

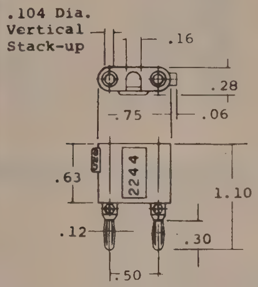
- Operating temp.: —25°C to +85°C.
- Working voltage: 2500 VDC.
- Current: 5 amps cont., 10 amps. int.



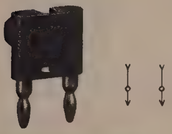
ACTUAL SIZE



ACTUAL SIZE



MINIATURE—DOUBLE BANANA PLUG WITH SET SCREWS



Miniature double banana plug on ½" centers. Internal set screws to secure cable or component leads. .104 dia. banana jacks on ½" centers permit top Stack-Up for multiple connections.

COLORS: Black, Red.

MODEL 2244 Black
MODEL 2244-2 Red

MODEL 2244 QUANTITY DISC CODE **A** **NET 1.25**

MINIATURE—DOUBLE BANANA PLUG WITH SOLDER TURRET TERMINALS

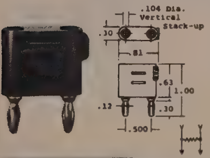
Miniature double banana plug on ½" centers. Solder turret terminals for permanent noise-free connections of cables or components. .104 dia. banana jacks on ½" centers permit top Stack-Up for multiple connections.

COLORS: Black, Red

MODEL 2245 Black
MODEL 2245-2 Red

MODEL 2245 QUANTITY DISC. CODE **A** **NET 1.50**

MINIATURE—DOUBLE BANANA PLUG WITH MOLDED PRECISION RESISTOR



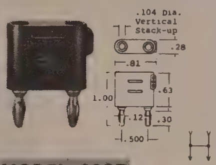
Ideal where rapid interchange of resistance values is required. Deposited carbon 1% ¼ watt, molded internally. .104 dia. banana jacks on ½" centers permit top Stack-Up for multiple connections. Resistance value stamped on plug.

COLOR: Blue

(OHMS)	50	10K	200K
	600	20K	250K
	1K	50K	500K
	5K	100K	1 MEG

MODEL 2246 (Specify Value) QUANTITY DISC. CODE **A** **NET 4.95**

MINIATURE—DOUBLE BANANA PLUG WITH SHORTING BAR



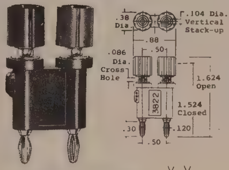
Ideal as a connecting link for use with ½" spaced banana jacks. .104 dia. banana jacks on ½" centers permit top Stack-Up for multiple connections. Banana plugs internally solder-bonded with #18 AWG wire. "Shorting Bar" stamped on plug.

COLORS: Black, Red.

MODEL 2035 Black
MODEL 2035-2 Red

MODEL 2035 QUANTITY DISC. CODE **A** **NET 1.50**

ADAPTER — MINIATURE BINDING POSTS TO MINIATURE DOUBLE BANANA PLUG

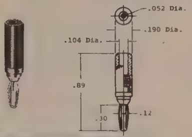


This adapter converts miniature Banana Jacks to miniature Binding Posts. Excellent for attaching wires or components. Insulated gold flashed 5 way Binding Posts. Gold flashed one piece heat treated beryllium copper spring.

COLOR: Body, Black. Binding Posts, Black/Red.

MODEL 3822 QUANTITY DISC. CODE **A** **NET 4.25**

MINIATURE SOLDER TYPE BANANA PLUG



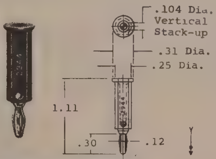
Miniature in line plug for use with miniature binding posts or banana jacks. Wire is soldered directly to the threaded plug. Nylon insulated handle.

COLORS: Black, Red.

MODEL 3690-0 Black
MODEL 3690-2 Red

MODEL 3690 QUANTITY DISC. CODE **A** **NET .55**

MINIATURE SOLDERLESS BANANA PLUG-STACK-UP

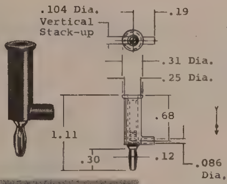


Miniature banana plug for rapid assembly of test leads. For use with miniature binding posts or banana jacks. Wire firmly held in place with internal set screw, eliminating soldering.

MODEL 2944-0 Black
MODEL 2944-2 Red

MODEL 2944 QUANTITY DISC. CODE **A** **NET .85**

MINIATURE SOLDERLESS BANANA PLUG WITH SAFETY COLLAR-STACK-UP



This integral collar insulates exposed wire leads and acts as a strain relief by preventing the flexing of the lead at the set screw. Wire firmly held in place with internal set screw, eliminating soldering.

MODEL 2945-0 Black
MODEL 2945-2 Red

MODEL 2945 QUANTITY DISC. CODE **A** **NET .85**

MINIATURE SCREWDRIVER FOR SET SCREWS

A specially designed screwdriver with slender tip for tightetning of set screws on miniature Plugs.

MODEL 3736 **NET .75**

½" SPACED MINIATURE BINDING POSTS & JACKS

POMONA ELECTRONICS

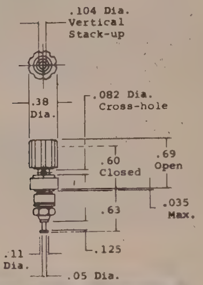
MINIATURE BINDING POSTS

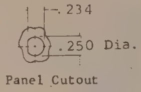
A complete 5-way Binding Post in "Miniature." Captive Thumb Nut and Binding Post Body, machined brass; gold or nickel plated. Thumb Nut, Mounting Base and Shouldered Insulation molded of High Impact Polycarbonate Thermoplastic. 8-32 Hex Nut and Lockwasher included, unassembled, nickel plated.

SPECIFICATIONS:
■ 5-way Binding Post ■ Mounts ¼" dia. "D" hole ■ Panels up to 3⁄16" thick ■ Captive Thumb Nut ■ .082 dia. Cross hole ■ Thumb Nut and Binding Post Body — Gold Flashed per MIL-G-45204 Type 2 OR Nickel Plated per QQ-N-290 Class 2.

RATINGS:
■ Operating Temp.: —65°C to +150°C.
■ Working Voltage: 1500 VDC.
■ Current: 5 Amps Cont., 10 Amps Int.

MINIATURE—INSULATED BINDING POST


.104 Dia.
Vertical
Stack-up
.38
Dia.
.082 Dia.
Cross-hole
.60
Closed
.69
Open
.63
.035
Max.
.11
Dia.
.125
.05 Dia.


.234
.250 Dia.
Panel Cutout

QUANTITY DISC. CODE **A**

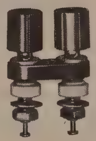
MODEL 2382-*
*(Specify Color)
Gold Flashed Assembly
NET 1.15

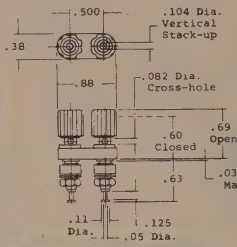
MODEL 2439-*
*(Specify Color)
Nickel Plated Assembly
NET .85

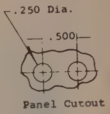
(*) COLORS
-0 Black
-1 Brown
-2 Red
-3 Orange
-4 Yellow
-5 Green
-6 Blue
-7 Violet
-8 Gray
-9 White

MINIATURE—INSULATED DOUBLE BINDING POST

Double binding post body on ½" centers with one Red and one Black binding post. Choice of Black or Red plate.




.500
.104 Dia.
Vertical
Stack-up
.38
.88
.082 Dia.
Cross-hole
.60
Closed
.69
Open
.63
.035
Max.
.11
Dia.
.125
.05 Dia.


.250 Dia.
.500
Panel Cutout

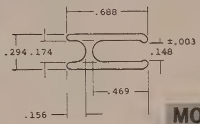
MODEL 2383-*
*(Specify Color)
Gold Flashed Assembly
NET 2.25

MODEL 2440-*
*(Specify Color)
Nickel Plated Assembly
NET 1.70

QUANTITY DISC. CODE **A**

(*) COLORS
-0 Black Plate
-2 Red Plate

SHORTING LINK FOR MINIATURE BINDING POSTS


.688
±.003
.294
.174
.148
.469
.156

Shorting Link for miniature Binding Posts on ½" centers. A snap-on feature holds Link on post when short not needed. **MATERIAL:** Brass .031 thick. **FINISH:** Nickel Plated per QQ-N-290 class 2 or Gold Flashed per MIL-G-45204 Type 2.

QUANTITY DISC. CODE **A**

MODEL 3478 (Gold Flashed) Std. Pkg. 10 **NET .25 ea.**

MODEL 3479 (Nickel Plated) Std. Pkg. 10 **NET .15 ea.**

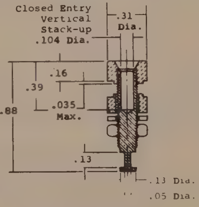
MINIATURE BANANA JACKS

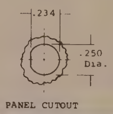
Insulator head and Shouldered Washer molded of High Impact Polycarbonate Thermoplastic. Banana Jack body, machined brass, gold flashed on 2142 and 2143, nickel plated on 4022. 8-32 Hex Nut and Lockwasher included, unassembled, nickel plated.

SPECIFICATIONS:
- Closed entry jack .104 dia. ▪ Insulator head molded to body.
- Mounts in ¼" dia. hole. Model 2142 and 4022, Panels up to ¼" thick. Model 2143, Panels up to 3⁄16" thick. Solder turret or wire wrap terminal.

RATINGS:
- Operating Temp.: −65°C to +150°C.
- Working Voltage: 1500 VDC.
- Current: 5 Amps Cont., 10 Amps Int.

MINIATURE—INSULATED BANANA JACK

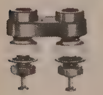

Closed Entry
Vertical
Stack-up
.104 Dia.
.31
Dia.
.16
.39
.035
Max.
.88
.13
.13 Dia.
.05 Dia.

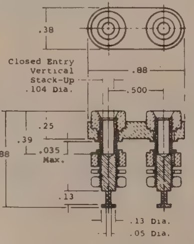

.234
.250
Dia.
PANEL CUTOUT

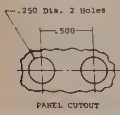
2142 —BLACK
2142-1—BROWN
2142-2—RED
2142-3—ORANGE
2142-4—YELLOW
2142-5—GREEN
2142-6—BLUE
2142-7—VIOLET
2142-8—GRAY
2142-9—WHITE

MODEL 2142 Standard Package: 10 (per color) QUANTITY DISC. CODE **A** **NET .35 ea.**

MINIATURE—INSULATED DOUBLE BANANA JACK




.38
Closed Entry
Vertical
Stack-Up
.104 Dia.
.88
.500
.25
.39
.035
Max.
.88
.13
.13 Dia.
.05 Dia.


.250 Dia. 2 Holes
.500
PANEL CUTOUT

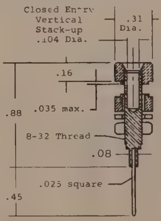
Double banana jack on ½" centers with one red and one black jack. Choice of Black or Red plate.

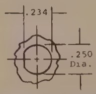
MODEL 2143 (Black Plate)

MODEL 2143-2 (Red Plate)

MODEL 2143 QUANTITY DISC. CODE **A** **NET .95**

MINIATURE—INSULATED BANANA JACK WITH WIRE-WRAP TERMINAL


Closed Entry
Vertical
Stack-up
.104 Dia.
.31
Dia.
.16
.88
.035 max.
8-32 Thread
.08
.025 square
.45



Excellent for rapid connection of wires using wire wrapping tools or machines. Gold plated beryllium copper .025" square wire-wrap terminal. Nickel plated brass bodies.

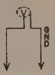
(*) COLORS
—0 Black
—2 Red
—4 Yellow
—5 Green
—6 Blue
—8 Gray
—9 White

MODEL 4022* Standard Package: 10 (per color) QUANTITY DISC. CODE **A** **NET .75 ea.**

½″ SPACED MINIATURE BANANA PLUG ADAPTERS & ACCESSORIES

POMONA ELECTRONICS

ADAPTER — BNC RECEPTACLE TO MINIATURE DOUBLE BANANA PLUG



This adapter allows a BNC plug to be used with equipment having ½″ spaced miniature .104 dia. banana jacks. Excellent for adapting test equipment to standard coaxial cables.

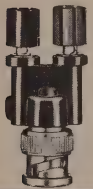
UPPER: BNC receptacle, UG 1094/U.

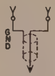
LOWER: Miniature double banana plug on ½″ centers, for use with .104 dia. miniature jacks. Gold flashed one piece heat treated beryllium copper springs.

COLOR: Black.

MODEL 3269 QUANTITY DISC. CODE A NET 4.25

ADAPTER — MINIATURE BINDING POSTS TO BNC PLUG





This adapter converts a BNC receptacle to miniature ½″ spaced 5 way binding posts.

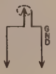
UPPER: Insulated, gold flashed miniature 5 way binding posts on ½″ centers with .104 dia. miniature banana jacks.

LOWER: BNC plug.

COLOR: Black.

MODEL 3296 QUANTITY DISC. CODE A NET 5.85

ADAPTER — BNC PLUG TO MINIATURE DOUBLE BANANA PLUG



Allows a BNC cable jack to be used on equipment having ½″ spaced .104 dia. banana jacks.

UPPER: BNC plug.

LOWER: Miniature double banana plug on ½″ centers, for use with .104 dia. miniature jacks. Gold flashed one piece heat treated beryllium copper springs.

COLOR: Black.

MODEL 3270 QUANTITY DISC. CODE A NET 5.85

ADAPTER — STANDARD DOUBLE BANANA JACK TO MINIATURE DOUBLE BANANA PLUG

Permits standard double banana plug on ¾″ centers to be used with equipment having miniature double banana jacks on ½″ centers.

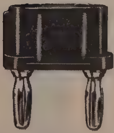
UPPER: Standard double banana jacks .166 dia. on ¾″ centers. Brass, nickel plated.

LOWER: Miniature double banana plug on ½″ centers. One piece nickel plated beryllium copper spring for use with .104 dia. miniature banana jacks.

COLOR: Black.

MODEL 2952 QUANTITY DISC. CODE A NET 1.95

ADAPTER — MINIATURE DOUBLE BANANA JACK TO STANDARD DOUBLE BANANA PLUG



Permits miniature double banana plug on ½″ centers to be used with equipment having standard double banana jacks on ¾″ centers.

UPPER: Miniature double banana jacks, .104 dia. on ½″ centers. Brass, nickel plated.

LOWER: Standard double banana plug on ¾″ centers. One piece nickel plated beryllium copper spring for use with .166 dia. standard banana jacks.

COLOR: Black.

MODEL 2943 QUANTITY DISC. CODE A NET 1.95

ADAPTER—STANDARD BANANA JACK TO MINIATURE BANANA PLUG

Permits standard banana plug to be used with equipment having miniature banana jacks.

UPPER: Banana jack, .166 dia.; Brass, nickel plated.

LOWER: Miniature banana plug, one piece nickel plated beryllium copper spring for use with .104 dia. miniature banana jacks.

COLORS: Black, Red.

MODEL 2138
2138-0 Black
2138-2 Red
NET .75
QUANTITY DISC. CODE A

ADAPTER—MINIATURE BANANA JACK TO STANDARD BANANA PLUG

Permits miniature banana plugs to be used with equipment having standard banana jacks.

UPPER: Miniature banana jack, .104 dia.; Brass, nickel plated.

LOWER: Standard banana plug, one piece nickel plated beryllium copper spring for use with .166 dia. banana jacks.

COLORS: Black, Red.

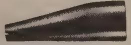
MODEL 2477
2477-0 Black
2477-2 Red
NET .65
QUANTITY DISC. CODE A

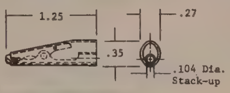
MINIATURE — METAL SHORTING BAR

Low profile, gold flashed, brass shorting bar. Miniature banana plugs on ½″ centers swaged to 1/16″ thick brass bar. Center hole accepts #4-40 screw for easy removal. Current rating 5 Amps. cont., 10 Amps INT.

MODEL 3030 QUANTITY DISC. CODE A NET 1.10

INSULATED MINIGATOR CLIP TO MINIATURE BANANA JACK



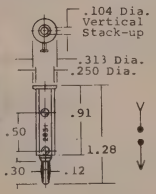


This Minigator clip accepts a miniature banana plug in the rear. Clip is steel, cadmium plated. Pinned hinge construction with full-meshing jaws for small wires. Vinyl insulators (5 red, 5 black). Unassembled.

Standard Package of 10 clips and 10 insulators.

MODEL 3217 QUANTITY DISC. CODE A NET .22 ea.

MINIATURE — SINGLE BANANA PLUG ISOLATION



Provides two terminal isolation. Allows for addition of series components. Excellent for circuit design and testing. Gold flashed solder turret terminals for permanent noise-free connections.

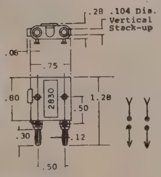
UPPER: Miniature banana jack, .104 dia. Brass, gold flashed.

LOWER: Miniature banana plug, one piece gold flashed beryllium copper spring.

COLOR: Black, Red.

MODEL 2831 (specify color) QUANTITY DISC. CODE A NET 1.95

MINIATURE — DOUBLE BANANA PLUG — 4 TERMINAL ISOLATION



Provides four terminal isolation. Top Stack-up receptacles isolated from lower plugs. Ideal for insertion of matching networks in computer boards, circuit design and testing. Gold flashed solder turret terminals for permanent noise-free connections.

UPPER: Miniature double banana jack, .104 dia. Brass, gold flashed.

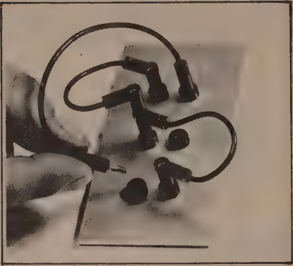
LOWER: Miniature double banana plug on ½″ centers. Gold flashed one piece beryllium copper spring.

COLOR: Red.

MODEL 2830 QUANTITY DISC. CODE A NET 3.85

MINIATURE BANANA PLUG PATCH CORDS

POMONA ELECTRONICS



Miniature patch cords for use with .104 dia. miniature banana jacks. Excellent for miniaturization of test equipment and high density packaging for patch systems.

Banana plug springs precision formed of one piece beryllium copper, heat treated for maximum life and low contact resistance. Tough thermoplastic molded to plug body and wire.

FEATURES:

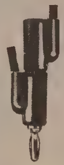
■ Fits .104 dia. miniature banana jacks ■ Plug body brass, per QQ-B-626, Alloy #360. ■ Gold flashed per MIL-G-45204 Type II (.00001/.00002). ■ Spring, one piece heat treated beryllium copper, alloy 170 per QQ-C-533.

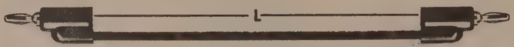
SPECIFICATIONS:

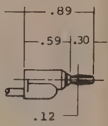
■ WIRE: 20 AWG, Strand. 41 x 36 T.C. Extra flexible polyvinyl insulation .087" O.D. ■ RATED: 5 A. Cont., 10 A. Int., 5,000 V.D.C. ■ OPERATING TEMP.: —0°C to +105 C°

MINIATURE — BANANA PLUG STACK-UP PATCH CORD

MODEL	LENGTH	NET
1081-4	4"	1.80
1081-8	8"	1.80
1081-12	12"	1.80
1081-18	18"	1.80
1081-24	24"	1.80
1081-36	36"	1.80
1081-48	48"	1.90
1081-60	60"	2.00





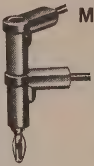


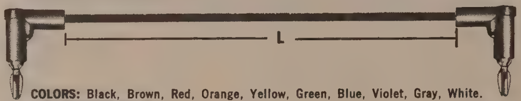
COLORS: Black, Brown, Red, Orange, Yellow, Green, Blue, Violet, Gray, White.

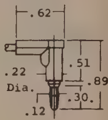
MODEL 1081 (Specify Color) ★QUANTITY DISC. CODE Ⓐ

MINIATURE — RIGHT ANGLE BANANA PLUG PATCH CORD STACK-UP

MODEL	LENGTH	NET
2860-4	4"	1.80
2860-8	8"	1.80
2860-12	12"	1.80
2860-18	18"	1.80
2860-24	24"	1.80
2860-36	36"	1.80
2860-48	48"	1.90
2860-60	60"	2.00





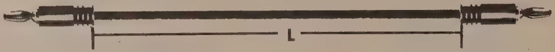


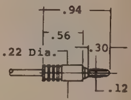
COLORS: Black, Brown, Red, Orange, Yellow, Green, Blue, Violet, Gray, White.

MODEL 2860 (Specify Color) ★QUANTITY DISC. CODE Ⓐ

MINIATURE — BANANA PLUG PATCH CORD

MODEL	LENGTH	NET
2842-4	4"	1.50
2842-8	8"	1.50
2842-12	12"	1.50
2842-18	18"	1.50
2842-24	24"	1.50
2842-36	36"	1.50
2842-48	48"	1.60
2842-60	60"	1.70

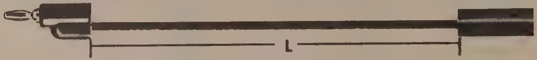


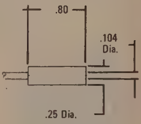


MODEL 2842 (Specify Color) ★QUANTITY DISC. CODE Ⓐ

MINIATURE — BANANA PLUG TO IN LINE JACK PATCH CORD

MODEL	LENGTH	NET
3969-12	12"	2.25
3969-24	24"	2.25
3969-36	36"	2.25
3969-48	48"	2.35
3969-60	60"	2.45



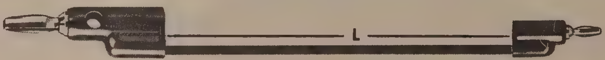


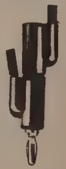
Tough thermoplastic molded to gold plated brass jack and wire.
COLORS: Black, Red.

MODEL 3969 (Specify Color) ★QUANTITY DISC. CODE Ⓐ

STANDARD BANANA PLUG TO MINIATURE BANANA PLUG PATCH CORD

MODEL	LENGTH	NET
3014-12	12"	1.80
3014-18	18"	1.80
3014-24	24"	1.80
3014-36	36"	1.80
3014-48	48"	1.90
3014-60	60"	2.00



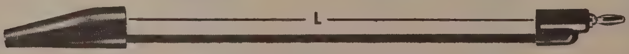


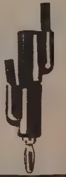
STANDARD BANANA PLUG: Spring, Beryllium copper, nickel plated.
COLORS: Black, Red.

MODEL 3014 (Specify Color) ★QUANTITY DISC. CODE Ⓐ

INSULATED MINIGATOR CLIP TO MINIATURE BANANA PLUG

MODEL	LENGTH	NET
3222-12	12"	1.50
3222-18	18"	1.50
3222-24	24"	1.50
3222-36	36"	1.50
3222-48	48"	1.60
3222-60	60"	1.70





CLIP: Minigator, steel, cadmium plated. **INSULATOR:** Vinyl, red with red wire, black with black wire.
COLORS: Black, Red.

MODEL 3222 (Specify Color) ★QUANTITY DISC. CODE Ⓐ

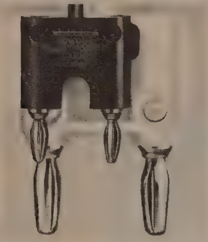
★ Various lengths may be aggregated for best quantity price. Other lengths available to order.

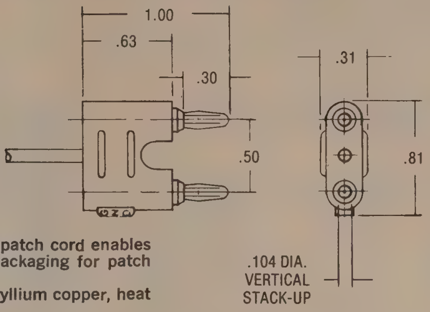
½" SPACED MINIATURE DOUBLE BANANA PLUG PATCH CORDS

POMONA ELECTRONICS

MOLDED MINIATURE DOUBLE BANANA PLUG PATCH CORDS

ACTUAL SIZE





STACK-UP

⅓ smaller...

A miniature double banana plug on ½" centers. This patch cord enables miniaturization of test equipment and high density packaging for patch systems.
Banana plug springs precision formed of one piece beryllium copper, heat treated for maximum life and low contact resistance.

FEATURES...

- One piece beryllium copper heat treated spring for long life.
- Rounded spring design results in maximum contact area.
- GND., clearly molded on plug body and shell.
- Solder-bonded noise-free connections.

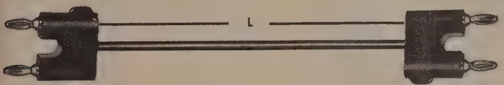
SPECIFICATIONS . . .

- Fits standard 0.104 dia. banana jacks, on ½" centers.
- Spring beryllium copper alloy 170 per QQ-C-533.
- Plug body brass per QQ-B-626, Alloy #360.
- Gold flashed per MIL-G-45204, type II.

CABLE DESCRIPTION:
Shielded coax., RG174/U. Polyethylene insulation, Vinyl jacket. Nom. cap. 29.5 pf/ft. Nom. Imp. 50 Ohms. Nom. O.D. .100". **Color: Black.**

NOTE: Molded double plug matches color of cable.

MINIATURE — DOUBLE BANANA PLUG BOTH ENDS



CONN: 1st END Miniature Double Banana plug on ½" centers.

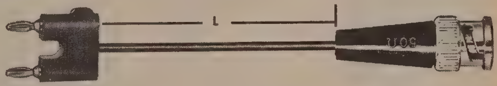
CABLE: Shielded Coax., RG174/U.

CONN: 2nd END Miniature double banana plug on ½" centers.

MODEL	LENGTH
2247-K-12	12"
2247-K-24	24"
2247-K-36	36"
2247-K-48	48"
2247-K-60	60"

MODEL 2247 QUANTITY DISC. CODE Ⓑ NET 5.95

MINIATURE-DOUBLE BANANA PLUG TO BNC MALE



CONN: 1st END Miniature Double Banana Plug on ½" centers

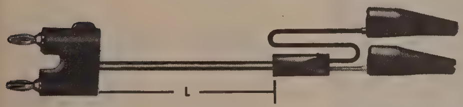
CABLE: Shielded Coax., RG174/U

CONN: 2nd END Male BNC

MODEL	LENGTH
2248-K-12	12"
2248-K-24	24"
2248-K-36	36"
2248-K-48	48"
2248-K-60	60"

MODEL 2248 QUANTITY DISC. CODE Ⓑ NET 6.95

MINIATURE — DOUBLE BANANA PLUG TO MINIGATOR CLIPS



CONN: 1st END Miniature Double Banana plug on ½" centers.

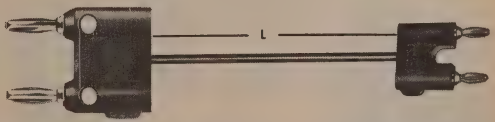
CABLE: Shielded Coax., RG174/U.

CONN: 2nd END Minigator Clips, Steel, cad plated Insulators, Vinyl: Black/Red.

MODEL	LENGTH
3027-K-12	12"
3027-K-24	24"
3027-K-36	36"
3027-K-48	48"
3027-K-60	60"

MODEL 3027 QUANTITY DISC. CODE Ⓑ NET 6.50

DOUBLE BANANA PLUG TO MINIATURE DOUBLE BANANA PLUG



CONN: 1st END Double Banana Plug, on ¾" Centers.

CABLE: Shielded Coax., RG174/U.

CONN: 2nd END Miniature double banana plug on ½" Centers.

MODEL	LENGTH
2443-K-12	12"
2443-K-24	24"
2443-K-36	36"
2443-K-48	48"
2443-K-60	60"

MODEL 2443 QUANTITY DISC. CODE Ⓑ NET 5.85

PHENOLIC "BLACK BOXES"

POMONA
ELECTRONICS

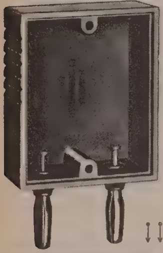
CREATE passive and active networks, voltage dividers, isolation networks or attenuators with these units. Solder turret terminals for permanent noise-free connection of components, etc. Entire unit may be potted or encapsulated.

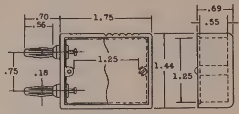
Housing molded of thermosetting electrical grade phenolic. Cover, punched XXP laminated paper base phenolic. Color, housing and cover, BLACK. Cover plate and 2 each #2-56 cover screws included.

APPLICABLE SPECIFICATIONS:

Operating Temp: —25°C to +125°C. Working Voltage: 5000 VDC. Current: 15 Amps Cont., 30 Amps Int.

COMPONENT MOUNTING—ACROSS BANANA PLUGS





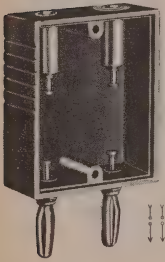
UPPER: No Connection.

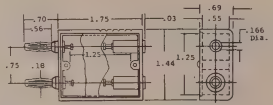
LOWER: Banana plugs on ¾" centers. One piece beryllium copper spring, heat treated, nickel plated. Plug body and solder turret terminals, brass, nickel plated. For use with standard .166" dia. banana jacks.

MODEL 2096

QUANTITY DISC. CODE Ⓐ **NET 2.50**

COMPONENT MOUNTING—BANANA JACKS TO DOUBLE BANANA PLUG—JUNIOR SIZE





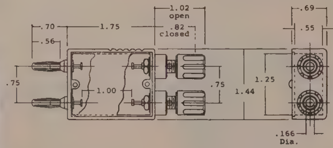
UPPER: Banana jacks, .166" dia. and solder turret terminals on ¾" centers. Brass, nickel plated. Polarity indicator on top, color, RED.

LOWER: Banana plugs on ¾" centers. One piece beryllium copper spring, heat treated, nickel plated. Plug body and solder turret terminals, brass, nickel plated. For use with standard .166" dia. banana jacks.

MODEL 2098

QUANTITY DISC. CODE Ⓐ **NET 4.25**

COMPONENT MOUNTING—BINDING POSTS TO DOUBLE BANANA PLUG—JUNIOR SIZE



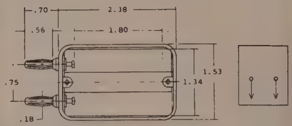
UPPER: Banana jack binding posts with solder turret terminals, on ¾" centers. Red and Black.

LOWER: Banana plugs on ¾" centers. One piece beryllium copper spring, heat treated, nickel plated. Plug body and solder turret terminals, brass, nickel plated. For use with standard .166" dia. banana jacks.

MODEL 2259

QUANTITY DISC. CODE Ⓐ **NET 5.95**

COMPONENT MOUNTING — ACROSS BANANA PLUGS — KING SIZE



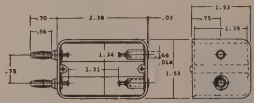
UPPER: No Connection.

LOWER: Banana plugs on ¾" centers. One piece beryllium copper spring, heat treated, nickel plated. Plug body and solder turret terminals, brass, nickel plated. For use with standard .166" dia. banana jacks.

MODEL 1177

QUANTITY DISC. CODE Ⓐ **NET 2.50**

COMPONENT MOUNTING—BANANA JACKS TO DOUBLE BANANA PLUG— KING SIZE



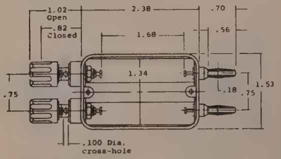
UPPER: Banana jacks, .166" dia. and solder turret terminals on ¾" centers. Brass, nickel plated. Polarity indicator on top, color, RED.

LOWER: Banana plugs on ¾" centers. One piece beryllium copper spring, heat treated, nickel plated. Plug body and solder turret terminals, brass, nickel plated. For use with standard .166" dia. banana jacks.

MODEL 2224

QUANTITY DISC. CODE Ⓐ **NET 3.85**

COMPONENT MOUNTING—BINDING POSTS TO DOUBLE BANANA PLUG—KING SIZE



UPPER: Banana jack binding posts with solder turret terminals, on ¾" centers. Red and Black.

LOWER: Banana plugs on ¾" centers. One piece beryllium copper spring, heat treated, nickel plated. Plug body and solder turret terminals, brass, nickel plated. For use with standard .166" dia. banana jacks.

MODEL 2262

QUANTITY DISC. CODE Ⓐ **NET 5.95**

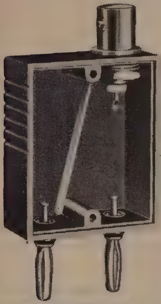
PHENOLIC "BLACK BOXES"

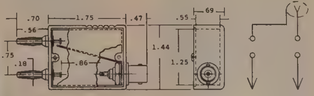
POMONA
ELECTRONICS

CREATE passive and active networks, voltage dividers, isolation networks or attenuators with these units. Solder turret terminals for permanent noise-free connection of components, etc. Entire unit may be potted or encapsulated.

Housing molded of thermosetting electrical grade phenolic. Cover, punched XXP laminated paper base phenolic. Color, housing and cover, BLACK. Cover plate and 2 each #2-56 cover screws included.

COMPONENT MOUNTING—BNC RECEPTACLE TO DOUBLE BANANA PLUG





UPPER: BNC Receptacle UG1094/U

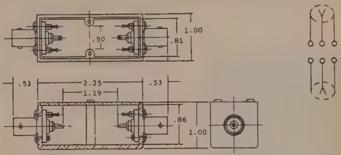
LOWER: Banana plugs on ¾" centers. One piece beryllium copper spring, heat treated, nickel plated. Plug body and solder turret terminals, brass, nickel plated. For use with standard .166" dia. banana jacks.

APPLICABLE SPECIFICATIONS:
Operating Temp: −25°C to +125°C.
Working Voltage: 500 V Peak.

MODEL 2097 QUANTITY DISC. CODE **A** NET 4.95

COMPONENT MOUNTING—BNC RECEPTACLE BOTH ENDS

POMONA ELECTRONICS CALIF.



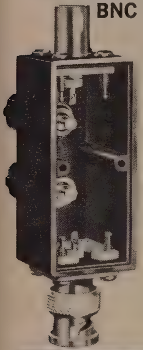
UPPER: BNC Receptacle UG290A/U

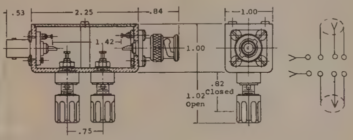
LOWER: BNC Receptacle UG290A/U

APPLICABLE SPECIFICATIONS:
Operating Temp: −25°C to +125°C.
Working Voltage: 500 V Peak.

MODEL 2101 QUANTITY DISC. CODE **A** NET 8.50

COMPONENT MOUNTING—BNC RECEPTACLE TO BNC PLUG WITH BINDING POSTS





UPPER: BNC Receptacle UG290A/U

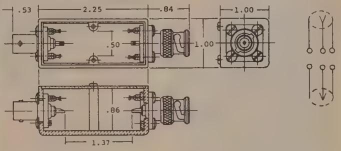
CENTER: Banana jack binding posts with solder turret terminals. Red and Black.

LOWER: BNC Plug. UG1104A/U.

APPLICABLE SPECIFICATIONS:
Operating Temp: −25°C to +125°C.
Working Voltage: 500 V Peak.

MODEL 2100 QUANTITY DISC. CODE **A** NET 12.85

COMPONENT MOUNTING—BNC RECEPTACLE TO BNC PLUG



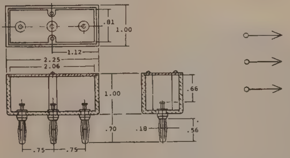
UPPER: BNC Receptacle UG290A/U

LOWER: BNC Plug UG1104A/U

APPLICABLE SPECIFICATIONS:
Operating Temp: −25°C to +125°C.
Working Voltage: 500 V Peak.

MODEL 2099 QUANTITY DISC. CODE **A** NET 9.85

COMPONENT MOUNTING—(3) ¾" SPACED BANANA PLUGS

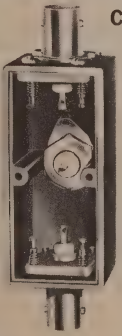


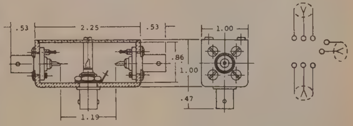
Three-in-line ¾" Spaced Banana Plugs. One piece beryllium copper spring, heat treated, nickel plated. Plug body and solder turret terminals, brass, nickel plated. For use with standard .166" dia. banana jacks.

APPLICABLE SPECIFICATIONS:
Operating Temp: −25°C to +125°C.
Working Voltage: 5000 VDC.
Current: 15 Amps Cont., 30 Amps Int.

MODEL 2095 QUANTITY DISC. CODE **A** NET 2.95

COMPONENT MOUNTING—BNC RECEPTACLE "T"





UPPER: BNC Receptacle UG290A/U

CENTER: BNC Receptacle UG1094/U

LOWER: BNC Receptacle UG290A/U

APPLICABLE SPECIFICATIONS:
Operating Temp: −25°C to +125°C.
Working Voltage: 500 V Peak.

MODEL 2102 QUANTITY DISC. CODE **A** NET 11.50

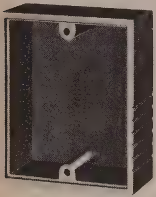
PHENOLIC & THERMOPLASTIC "BLACK BOXES"

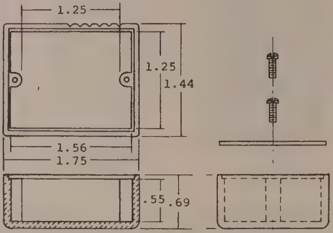
POMONA
ELECTRONICS

Boxes of unlimited uses for packaging of components and circuitry. Also ideal for potting and encapsulating. Available in three sizes as shown below. Housing molded of thermosetting electrical grade phenolic. Cover, punched XXP laminated paper base phenolic. Color, Housing: Black, Red or Green (specify). Cover, Black. Cover plate and 2 each #2-56 cover screws included.

Operating Temperature: —25°C to +125°C.

BLACK BOX—JUNIOR SIZE

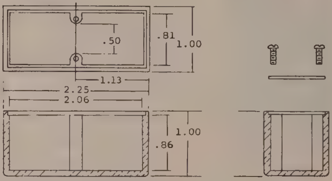




MODEL	COLOR
2105	Black
3720	Red
3721	Green

QUANTITY DISC. CODE **A** NET .95

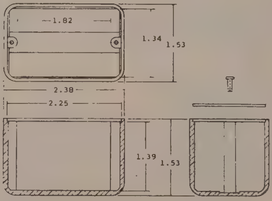
BLACK BOX—QUEEN SIZE



MODEL	COLOR
2103	Black
3722	Red
3723	Green

QUANTITY DISC. CODE **A** NET .95

BLACK BOX—KING SIZE

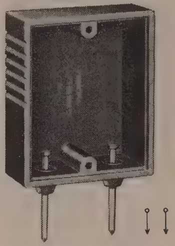


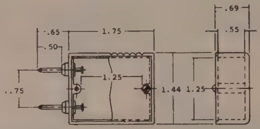
MODEL	COLOR
2104	Black
3724	Red
3725	Green

QUANTITY DISC. CODE **A** NET .95

CREATE passive and active networks, voltage dividers, isolation networks or attenuators with these units. Solder turret terminals for permanent noise-free connection of components, etc. Entire unit may be potted or encapsulated.

COMPONENT MOUNTING—ACROSS PIN TIP PLUGS





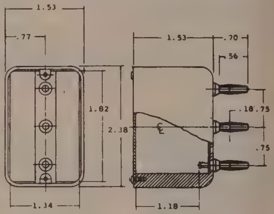
UPPER: No Connection.

LOWER: Pin tip plugs, .080 dia. on ¾" centers. Plug bodies and solder turret terminals, brass, nickel plated.

APPLICABLE SPECIFICATIONS:
Operating Temp.: —25°C to +125°C.
Working Voltage: 5000 VDC.
Current: 5 Amps Cont., 10 Amps Int.

MODEL 2268 QUANTITY DISC. CODE **A** NET 2.25

COMPONENT MOUNTING — (3) ¾" SPACED BANANA PLUGS — KING SIZE



Three-in-line ¾" Spaced Banana Plugs.

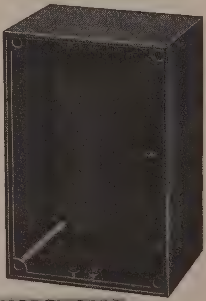
One piece beryllium copper spring, heat treated, nickel plated. Plug body and solder turret terminals, brass, nickel plated. For use with standard .166" dia. banana jacks.

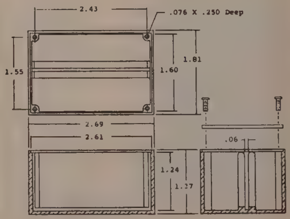
APPLICABLE SPECIFICATIONS:
Operating Temp: —25°C to +125°C.
Working Voltage: 5000 VDC.
Current: 15 Amps Cont., 30 Amps In.

MODEL 1943 QUANTITY DISC. CODE **A** NET 3.75

MOLDED ABS THERMOPLASTIC BOX WITH CARD GUIDE

The box and cover are molded of high impact ABS Thermoplastic and are almost unbreakable under normal use. Box and cover are easily machined. A single slot is provided for 1⁄16" circuit board. Color: Box and cover, Blue. Cover and 4 each #2-56 cover screws included.

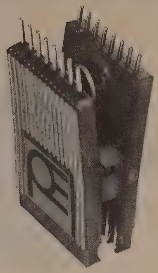




MODEL 3850 QUANTITY DISC. CODE **A** NET .95

"DIP CLIP" T.M. IC TEST CLIP

POMONA ELECTRONICS


ACTUAL SIZE

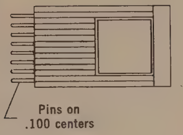
FOR 14 OR 16 DUAL-IN-LINE PACKAGES

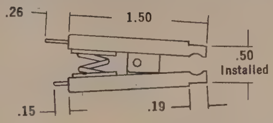
The "Dip-Clip" is specially designed to allow the attachment of test-probes to 14 or 16 lead DIPS. The clip greatly reduces the possibility of accidental shorting while testing live circuits. Numerous test probes may be quickly connected for hands-free testing.

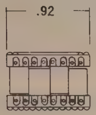
FEATURES:

- Used on 14 or 16 pin lead DIP.
- Nickel Silver contacts.
- Spring loaded wiping action of contact pins gives good electrical connection.
- Provides hands-free testing of DIP.
- Special contact design gives positive positioning, preventing accident shorting of adjacent leads.
- Special friction-grip contacts.

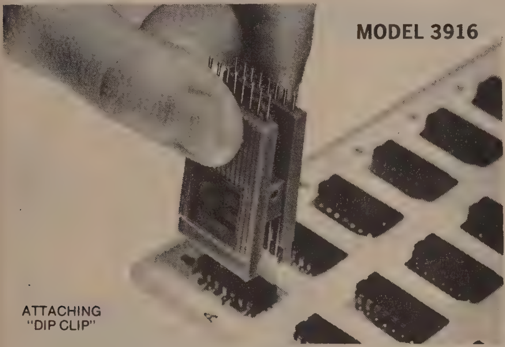
MODEL 3916 QUANTITY DISC. CODE **C** NET 5.75



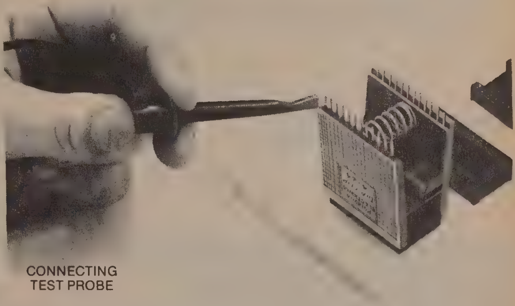




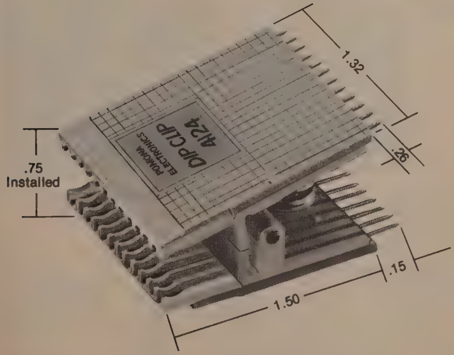
MODEL 3916


ATTACHING "DIP CLIP"

MODEL 4124


CONNECTING TEST PROBE

NEW



FOR 24 PIN DUAL-IN-LINE PACKAGES

The "Dip-Clip" is specially designed to allow the attachment of test probes to 24 Pin lead DIPS. The clip greatly reduces the possibility of accidental shorting while testing live circuits. Numerous test probes may be quickly connected for hands-free testing.

FEATURES:

- Used on 24 pin lead DIP.
- Nickel Silver contacts.
- Spring loaded wiping action of contact pins gives good electrical connection.
- Provides hands-free testing of DIP.
- Special contact design gives positive positioning, preventing accident shorting of adjacent leads.
- Special friction-grip contacts.

MODEL 4124 QUANTITY DISC. CODE **C** NET 13.85

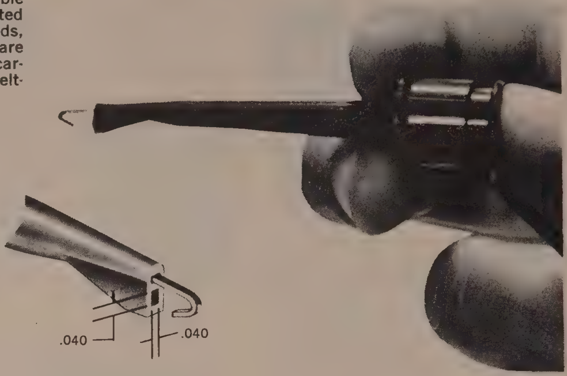
DO IT YOURSELF GRABBER

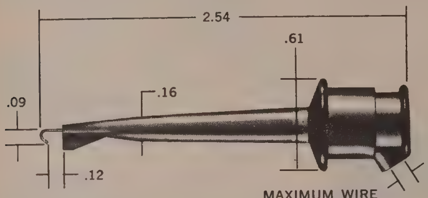
POMONA ELECTRONICS

This Do-It-Yourself Grabber provides the user with the ability to build his own leads. The unit is completely field serviceable and features a simplified assembly procedure. The gold plated contact hook can be connected rapidly to component leads, and the specially designed tip slides down over .025 square Wire-Wrap pins. The entire unit is molded of Lexan* Polycarbonate thermoplastic for strength and less chance of melting when soldering lead.

FEATURES:
- Plunger type action between thumb and two fingers
- Comfortable finger grip operation.
- Positive connection that won't pop off.
- No sharp teeth to damage or nick wires.
- Simplified assembly procedure.
- High temperature material that resists melting when soldering.
- Accepts wire up to .090" Dia.

MATERIALS:
- Molded Lexan* Polycarbonate body.
- Beryllium copper contact per QQ-C-533, Alloy 170.
- Gold plated per MIL-G-45204 type 1.
- Stainless steel spring.



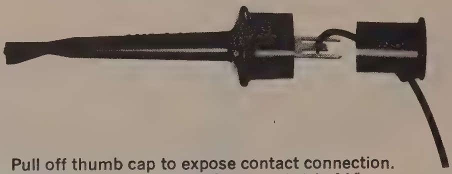


MAXIMUM WIRE SIZE .090" DIA.

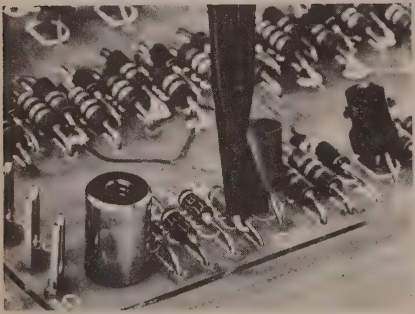
COLORS: Black, Red, Yellow, Green, Blue, White.

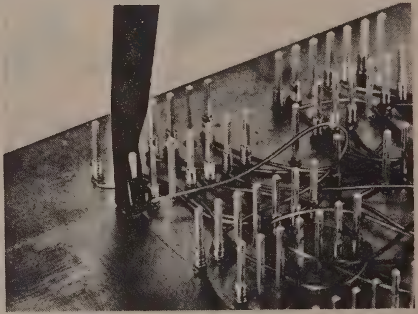
MODEL 3925 (Specify Color) QUANTITY DISC. CODE **A** NET .85

SIMPLIFIED ASSEMBLY PROCEDURE

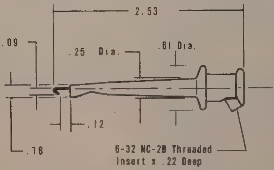


1. Pull off thumb cap to expose contact connection.
2. Thread wire through thumb cap and strip ⅛".
3. Insert stripped end through tapered hole on contact, and solder.
   NOTE: Stripped end should be placed into the large opening of the tapered hole.
4. Slide thumb cap back onto contact.





"GRABBER" WITH 6-32 THREAD



This "Grabber" can be used with oscilloscopes and leads equipped with a 6-32 screw on tip.
- Gold plated hook tip and threaded insert.
- Stainless steel spring.
- Molded nylon body per MIL-P-20693.
- COLORS: Black, Red.

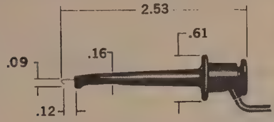
MODEL 4011 (Specify Color) QUANTITY DISC. CODE **A** NET 1.50

MINI TEST CLIP GRABBER

POMONA ELECTRONICS

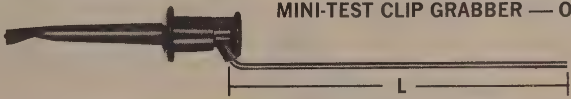
These plunger type action clips are called "grabbers." The gold plated contact hook can be connected rapidly to component leads and the specially designed tip slides down over .025 square Wire-Wrip pins. Nylon insulation molded directly onto clip and wire providing a strong, reliable integral unit. Clip is completely insulated to point of connection.

FEATURES:
- Plunger type action between thumb and two fingers.
- Comfortable finger grip operation.
- Positive connection that won't pop off.
- No sharp teeth to damage or nick wires.
- Beryllium copper conductor alloy 170 per QQ-C-533; gold plated per MIL-G-45204 Type I.
- Stainless steel spring.
- Molded nylon insulator per MIL-P-20693.



MINI-TEST CLIP GRABBER — ONE END ONLY

MODEL	LENGTH	NET
3780-8	8"	1.00
3780-12	12"	1.00
3780-24	24"	1.00
3780-36	36"	1.00
3780-48	48"	1.05
3780-60	60"	1.10



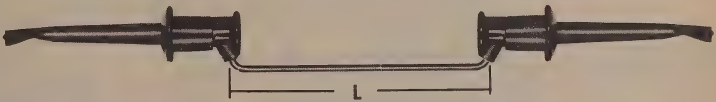
Miniature Test Clip with wire connected one end only. No connector on opposite end allows connection of various components. Nylon insulation is molded directly onto clip and wire.

MINI-TEST CLIP: Beryllium copper gold plated hook tip. Nylon insulation molded directly onto clip and wire.
WIRE: 20 AWG, stranded 41 x 36 T.C. Extra flexible polyvinyl insulation .087" O.D.
OPERATING TEMP.: –25°C. to +105°C.
COLORS: Black, Red.

MODEL 3780 (Specify Color) QUANTITY DISC. CODE Ⓐ ★

MINI-TEST CLIP GRABBER — BOTH ENDS

MODEL	LENGTH	NET
3781-8	8"	1.65
3781-12	12"	1.65
3781-18	18"	1.65
3781-24	24"	1.65
3781-36	36"	1.65
3781-48	48"	1.70
3781-60	60"	1.75



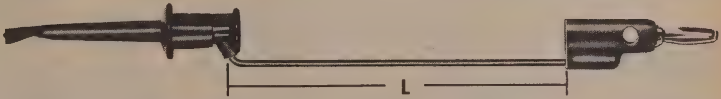
Miniature test clip on both ends for rapid interconnection of test points. Connects quickly and gently to test points without damage from sharp teeth.

MINI-TEST CLIP: Beryllium copper gold plated hook tip. Nylon insulation molded directly onto clip and wire.
WIRE: 20 AWG, stranded 41 x 36 T.C. Extra flexible polyvinyl insulation .087" O.D.
OPERATING TEMP.: –25°C. to +105°C.
COLORS: Black, Red.

MODEL 3781 (Specify Color) QUANTITY DISC. CODE Ⓐ ★

MINI-TEST CLIP GRABBER — TO STACKING BANANA PLUG

MODEL	LENGTH	NET
3782-12	12"	1.65
3782-24	24"	1.65
3782-36	36"	1.65
3782-48	48"	1.70
3782-60	60"	1.75



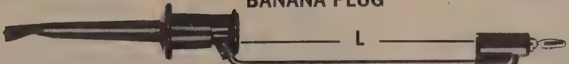
Miniature Test Clip lead adapts to equipment using standard banana jacks.
MINI-TEST CLIP: Beryllium copper gold plated hook tip. Nylon insulation molded directly onto clip and wire.

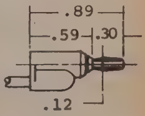
WIRE: 20 AWG, stranded 41 x 36 T.C. Extra flexible polyvinyl insulation .087" O.D.
BANANA PLUG: Spring, one piece beryllium copper, heat treated, nickel plated. Tough Thermoplastic molded to plug body and wire.
OPERATING TEMP.: –25°C. to +105°C.
COLORS: Black, Red.

MODEL 3782 (Specify Color) QUANTITY DISC. CODE Ⓐ ★

MINI-TEST CLIP GRABBER — TO STACKING MINIATURE BANANA PLUG

MODEL	LENGTH	NET
3784-12	12"	1.85
3784-24	24"	1.85
3784-36	36"	1.85
3784-48	48"	1.95
3784-60	60"	2.05





Miniature test clip adapts to equipment using miniature banana jacks.
MINI-TEST CLIP: Beryllium copper gold plated hook tip. Nylon insulation molded directly onto clip and wire.

WIRE: 20 AWG, stranded 41 x 36 T.C. Extra flexible polyvinyl insulation .087" O.D.
MINIATURE BANANA PLUG: Spring, one piece beryllium copper, heat treated, gold flashed. Tough thermoplastic molded to plug body and wire.
OPERATING TEMP.: —25°C. to +105°C.
COLORS: Black, Red.

MODEL 3784 (Specify Color) QUANTITY DISC. CODE Ⓐ ★

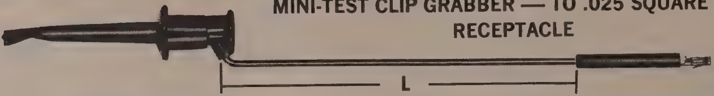
★ Various lengths may be aggregated for best quantity price. Other lengths available to order.

MINI TEST CLIP GRABBER

POMONA ELECTRONICS

MINI-TEST CLIP GRABBER — TO .025 SQUARE PIN RECEPTACLE

MODEL	LENGTH	NET
3783-12	12″	2.25
3783-24	24″	2.25
3783-36	36″	2.25
3783-48	48″	2.35
3783-60	60″	2.45



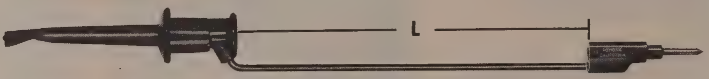
This miniature test clip lead has a .025 square pin receptacle which slides over .025 square pins.
MINI-TEST CLIP: Beryllium copper gold plated hook tip. Nylon insulation molded directly onto clip and wire.

WIRE: 20 AWG, stranded 41 x 36 T.C. Extra flexible polyvinyl insulation .087″ O.D.
.025 PIN RECEPTACLE: Gold plated phosphor bronze contact.
OPERATING TEMP.: —25°C. to +105°C.
COLORS: Black, Red.

MODEL 3783 (Specify Color) QUANTITY DISC. CODE Ⓐ ★

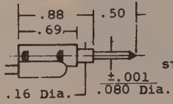
MINI-TEST CLIP GRABBER — TO STACKING PIN TIP PLUG

MODEL	LENGTH	NET
3785-12	12″	1.85
3785-24	24″	1.85
3785-36	36″	1.85
3785-48	48″	1.95
3785-60	60″	2.05



Miniature test clip adapts to equipment using standard pin tip jacks.
MINI-TEST CLIP: Beryllium copper gold plated hook tip. Nylon insulation molded directly onto clip and wire.

WIRE: 20AWG, stranded 41 x 36 T.C. Extra flexible polyvinyl insulation .087″ O.D.
PIN TIP PLUG: .080 dia., ½″ long, brass, gold flashed. **STACK-UP:** Beryllium copper, gold flashed. Accepts .080 dia. pin.
OPERATING TEMP.:—25°C. to +105°C.
COLORS: Black, Red.



MODEL 3785 (Specify Color) QUANTITY DISC. CODE Ⓐ ★

MINI-TEST CLIPS GRABBER — TO DOUBLE BANANA PLUG

MODEL	LENGTH	NET
3786-C-18	18″	6.50
3786-C-24	24″	6.50
3786-C-36	36″	6.50
3786-C-48	48″	6.50
3786-C-60	60″	6.50

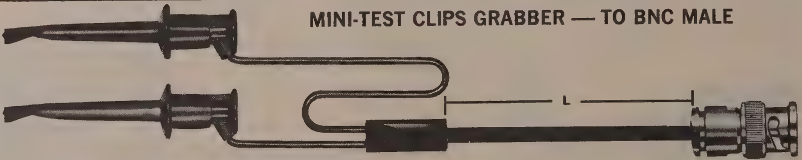
For use with equipment having standard binding posts or banana jacks.
MINI-TEST CLIPS: Beryllium copper gold plated hook tip. Nylon insulation molded directly onto clip and wire: One red, one black.

CABLE: Shielded coax., RG58C/U, .195″ O.D., Nom. Cap. 28.5 pf/ft. Color, black.
DOUBLE BANANA PLUG: On ¾″ center. Spring, one piece beryllium copper, heat treated, nickel plated. Tough thermoplastic molded onto double plug body and cable. Color, black.

MODEL 3786 QUANTITY DISC. CODE Ⓑ ★

MINI-TEST CLIPS GRABBER — TO BNC MALE

MODEL	LENGTH	NET
3787-C-18	18″	6.50
3787-C-24	24″	6.50
3787-C-36	36″	6.50
3787-C-48	48″	6.50
3787-C-60	60″	6.50

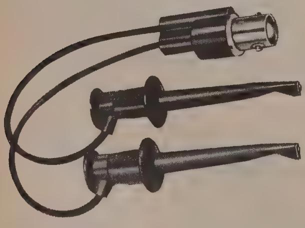


For use with equipment having BNC Receptacles.
MINI-TEST CLIPS: Beryllium copper gold plated hook tip. Nylon insulation molded directly onto clip and wire: One red, one black.

CABLE: Shielded coax., RG58C/U, .195″ O.D., Nom. Cap. 28.5 pf/ft. Color, black.
CONNECTOR: BNC Male, M39012/16-0001 with non-tarnish finish.

MODEL 3787 QUANTITY DISC. CODE Ⓑ ★

MINI-TEST CLIPS GRABBER — TO BNC RECEPTACLE

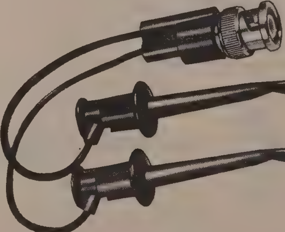


This molded breakout converts a coaxial cable with a male plug to a test cable with clips.
MINI-TEST CLIPS: Beryllium copper gold plated hook tip. Nylon insulation molded directly onto clip and wire. 1 Black, 1 Red.
WIRE: 20 AWG, Stranded 41 x 36 T.C. PVC insulation .087″ O.D.
CONNECTOR: BNC Receptacle UG1094/U with non-tarnish finish.
INSULATION: Tough thermoplastic molded to connector and wire.

OVERALL LENGTH 7″

MODEL 3788 QUANTITY DISC. CODE Ⓐ **NET 3.95**

MINI-TEST CLIPS GRABBER — TO BNC PLUG



This molded breakout converts a coaxial cable with a BNC Receptacle to a test cable with clips.
MINI-TEST CLIPS: Beryllium copper gold plated hook tip. Nylon insulation molded directly onto clip and wire. 1 Black, 1 Red.
WIRE: 20 AWG, Stranded 41 x 36 T.C. PVC insulation .087″ O.D.
CONNECTOR: BNC Plug with non-tarnish finish.
INSULATION: Tough thermoplastic molded to connector and wire.

OVERALL LENGTH 7″

MODEL 3789 QUANTITY DISC. CODE Ⓐ **NET 4.95**

★ Various lengths may be aggregated for best quantity price. Other lengths available to order.

SHIELDED "BLACK BOXES" MINIATURE SIZE

POMONA ELECTRONICS

NOW AVAILABLE, *SHIELDED* "BLACK BOXES." Boxes that fulfill the requirement for RF applications.

Ideal for compact packaging, eg., voltage dividers, isolation networks, impedance matching networks, and other varied uses.

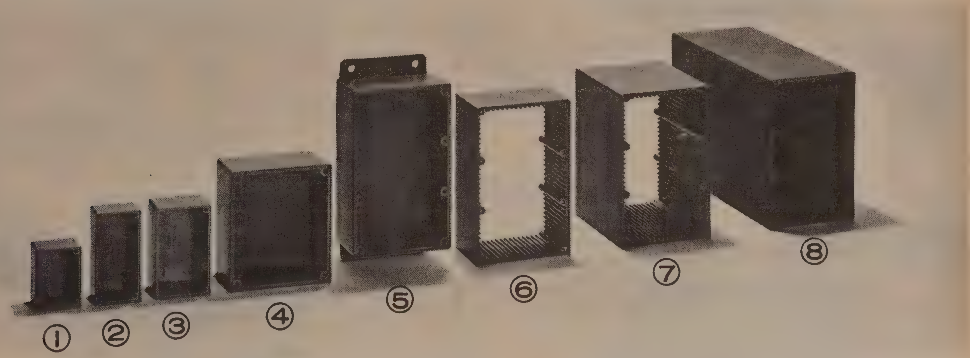
Cover and self-tapping screws included.

APPLICABLE SPECIFICATIONS: (ALL MODELS)

Operating Temp.: −55°C to +150°C.
Working Voltage: 500 V Peak (Model 2415, 1500 V Peak).
Noise Rejection: Greater than 70DB.

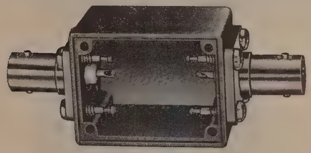
FEATURES:

- SHIELDED HOUSING; Die Cast Aluminum. FINISH: BLUE baked enamel per Federal Standard 595 #25109 over phosphoric etch per MIL-C-15328A.
- COVER; .040 Thick Aluminum #6061-T6 with clear anodized finish per MIL-A-8625A.
- Four screws secure cover for proper shielding.
- Solder turret terminals for permanent noise free connection of components.



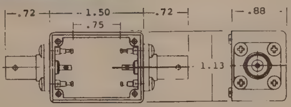
① MINIATURE SIZE—**Page 39** ② SIZE "A"—**Pages 40 & 44** ③ SIZE "B"—**Pages 41, 42, 43 & 44** ④ SIZE "D"—**Page 46** ⑤ SIZE "C"—**Page 45** ⑥ CARD GUIDE 1½" Deep—**Pages 47 & 48** ⑦ CARD GUIDE 3" Deep—**Page 49** ⑧ CARD GUIDE 6" Deep—**Page 49**

COMPONENT MOUNTING— BNC RECEPTACLE BOTH ENDS



CONN: 1st END } BNC Receptacle Jack, UG290A/U.

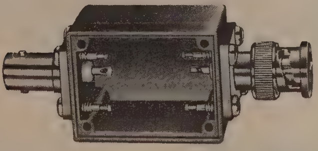
CONN: 2nd END } BNC Receptacle Jack, UG290A/U.



MODEL 3751

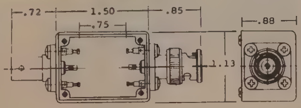
QUANTITY DISC. CODE Ⓐ NET 8.95

COMPONENT MOUNTING— BNC RECEPTACLE TO BNC PLUG



CONN: 1st END } BNC Receptacle Jack, UG290A/U.

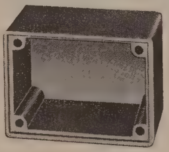
CONN: 2nd END } BNC Receptacle Plug, UG1104A/U.



MODEL 3752

QUANTITY DISC. CODE Ⓐ NET 9.95

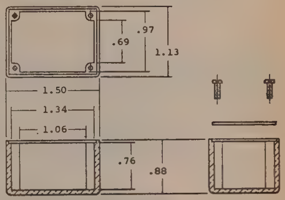
EMPTY — SHIELDED "BLACK BOX"



MINIATURE SIZE

MODEL 3753
FINISH: Blue Baked Enamel.
Includes cover with part number on cover and four cover screws.

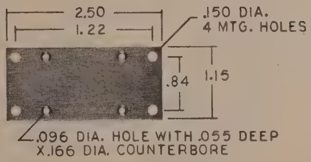
MODEL 3754
FINISH: None
Includes unmarked cover and four cover screws.



MODEL 3753
MODEL 3754

QUANTITY DISC. CODE Ⓐ NET 1.95

LARGER COVER PLATE FOR MOUNTING MINIATURE SIZE BOXES



This larger plate, when attached to the box, provides flanges for mounting.

MATERIAL: .080 Aluminum #6061-T6, clear anodized per MIL-A-8625A.

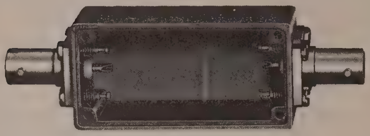
MODEL 3729 (plate only)

QUANTITY DISC. CODE Ⓐ NET .85

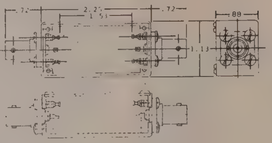
SHIELDED "BLACK BOXES"—SIZE "A"

POMONA ELECTRONICS

COMPONENT MOUNTING—BNC RECEPTACLE BOTH ENDS



CONN: 1st END BNC Receptacle Jack, UG290A/U.
CONN: 2nd END BNC Receptacle Jack, UG290A/U.

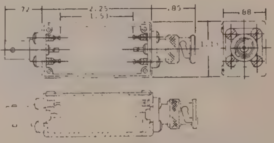


.72
2.25
1.51
.72
.88
1.13

MODEL 2390 QUANTITY DISC. CODE Ⓐ NET 8.85

COMPONENT MOUNTING—BNC RECEPTACLE TO BNC PLUG

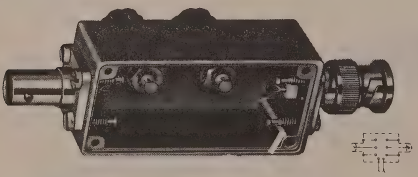
CONN: 1st END BNC Receptacle Jack, UG290A/U.
CONN: 2nd END BNC Receptacle Plug, UG1104A/U.



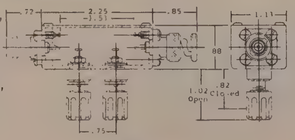
.72
2.25
1.51
.85
.88
1.13

MODEL 2391 QUANTITY DISC. CODE Ⓐ NET 9.85

COMPONENT MOUNTING—BNC RECEPTACLE TO BNC PLUG WITH BINDING POSTS



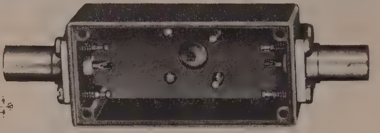
CONN: 1st END BNC Receptacle Jack, UG290A/U.
CENTER: Banana jack binding posts with solder turret terminals. Red and Black.
CONN: 2nd END BNC Receptacle Plug, UG1104A/U.



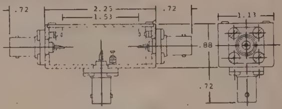
.72
2.25
1.51
.85
1.11
.88
.82
1.02 Closed
Open
.75

MODEL 2393 QUANTITY DISC. CODE Ⓐ NET 12.85

COMPONENT MOUNTING—BNC RECEPTACLE "T"



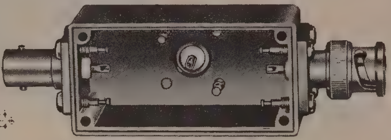
CONN: 1st END BNC Receptacle Jack, UG290A/U.
CENTER: BNC Receptacle Jack, UG290A/U.
CONN: 2nd END BNC Receptacle Jack, UG290A/U.



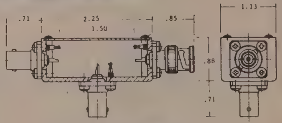
.72
2.25
1.51
.72
1.11
.88
.72

MODEL 2392 QUANTITY DISC. CODE Ⓐ NET 11.50

COMPONENT MOUNTING—"T" TWO BNC RECEPTACLES TO BNC PLUG



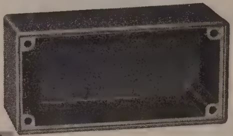
CONN: 1st. END BNC Receptacle Jack, UG290A/U.
CENTER: BNC Receptacle Jack, UG290A/U.
CONN: 2nd END BNC Receptacle Plug, UG1104A/U.



.71
2.25
1.50
.85
1.13
.88
.71

MODEL 2401 QUANTITY DISC. CODE Ⓐ NET 12.85

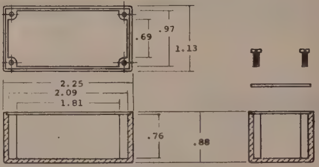
EMPTY—SHIELDED "BLACK BOX"



SIZE "A"

MODEL 2397

FINISH: Blue Baked Enamel. Includes cover with part number on cover and four cover screws.



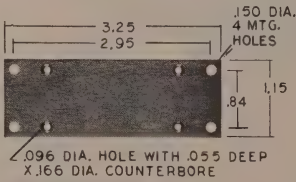
.97
.69
1.13
2.25
2.09
1.81
.76
.88

MODEL 2400

FINISH: None Includes unmarked cover and four cover screws.

QUANTITY DISC. CODE Ⓐ NET 1.95

LARGER COVER PLATE FOR MOUNTING SIZE "A" BOXES



3.25
2.95
.150 DIA. 4 MTG. HOLES
1.15
.84
.096 DIA. HOLE WITH .055 DEEP X .166 DIA. COUNTERBORE

This larger plate, when attached to the box, provides flanges for mounting.

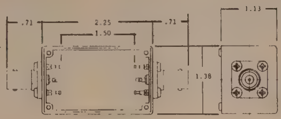
MATERIAL: .080 Aluminum #6061-T6, clear anodized per MIL-A-8625A.

MODEL 3728 (plate only) QUANTITY DISC. CODE Ⓐ NET .85

SHIELDED "BLACK BOXES"—SIZE "B"

POMONA ELECTRONICS

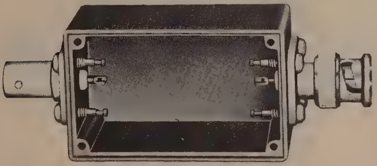
COMPONENT MOUNTING — BNC RECEPTACLE BOTH ENDS

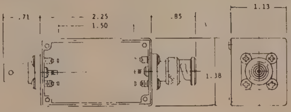

.71
2.25
.71
1.50
1.13
1.38

CONN: 1st END BNC Receptacle Jack, UG290A/U.
CONN: 2nd END BNC Receptacle Jack, UG290A/U.

MODEL 3230 QUANTITY DISC. CODE Ⓐ NET 8.85

COMPONENT MOUNTING — BNC RECEPTACLE TO BNC PLUG

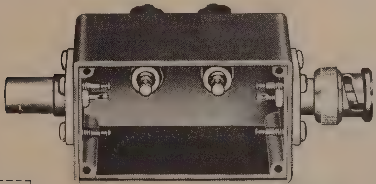


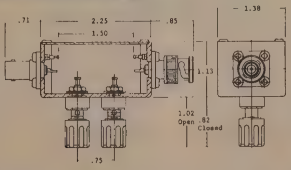

.71
2.25
1.50
.85
1.13
1.38

CONN: 1st END BNC Receptacle Jack, UG290A/U.
CONN: 2nd END BNC Receptacle Plug, UG1104A/U.

MODEL 3231 QUANTITY DISC. CODE Ⓐ NET 9.85

COMPONENT MOUNTING — BNC RECEPTACLE TO BNC PLUG WITH BINDING POSTS

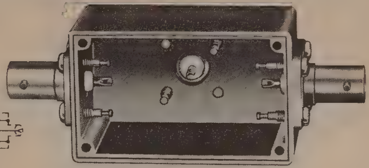



.71
2.25
.85
1.50
1.38
1.13
1.02 Open
.82 Closed
.75

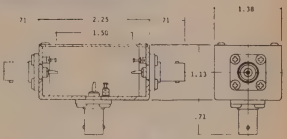
CONN. 1st. END BNC Receptacle Jack, UG290A/U.
CENTER: Banana jack binding posts with solder turret terminals. Red and Black.
CONN: 2nd END BNC Receptacle Plug, UG1104A/U.

MODEL 3233 QUANTITY DISC. CODE Ⓐ NET 12.85

COMPONENT MOUNTING — BNC RECEPTACLE "T"

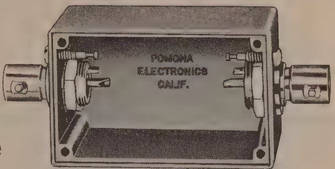


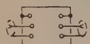
CONN: 1st. END BNC Receptacle Jack, UG290A/U.
CENTER: BNC Receptacle Jack, UG290A/U.
CONN: 2nd END BNC Receptacle Jack, UG290A/U.


.71
2.25
.71
1.50
1.38
1.13
.71

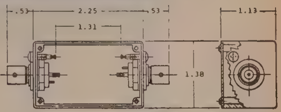
MODEL 3232 QUANTITY DISC. CODE Ⓐ NET 11.50

COMPONENT MOUNTING — ISOLATED BNC RECEPTACLE BOTH ENDS


POMONA
ELECTRONICS
CALIF.

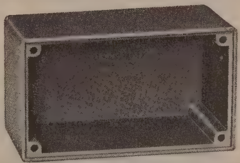


CONN: 1st END *Isolated* BNC Receptacle Jack
CONN: 2nd END *Isolated* BNC Receptacle Jack


.53
2.25
.53
1.31
1.13
1.38

MODEL 3239 QUANTITY DISC. CODE Ⓐ NET 14.85

EMPTY — SHIELDED "BLACK BOX"



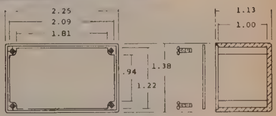
SIZE "B"

MODEL 2417

FINISH: Blue Baked Enamel. Includes cover with part number on cover and four cover screws.

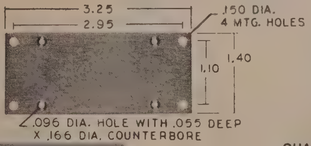
MODEL 2428

FINISH: None Includes unmarked cover and four cover screws.


2.25
2.09
1.81
1.13
1.00
.94
1.38
1.22

QUANTITY DISC. CODE Ⓐ NET 1.95

LARGER COVER PLATE FOR MOUNTING SIZE "B" BOXES


3.25
2.95
.150 DIA.
4 MTG. HOLES
1.40
1.10
.096 DIA. HOLE WITH .055 DEEP X .166 DIA. COUNTERBORE

This larger plate, when attached to the box, provides flanges for mounting.

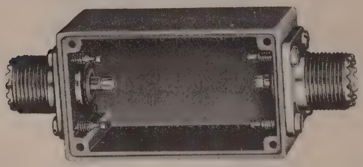
MATERIAL: .080 Aluminum #6061-T6, clear anodized per MIL-A-8625A.

MODEL 3719 (plate only) QUANTITY DISC. CODE Ⓐ NET .95

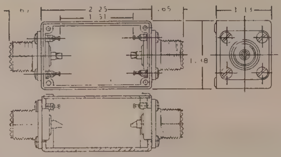
SHIELDED "BLACK BOXES"—SIZE "B"

POMONA ELECTRONICS

COMPONENT MOUNTING—UHF RECEPTACLE BOTH ENDS



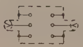
CONN: 1st END UHF Receptacle Jack.
CONN: 2nd END UHF Receptacle Jack.

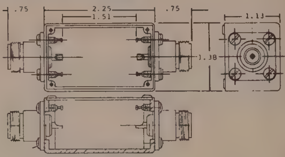


MODEL 2412 QUANTITY DISC. CODE A NET 9.85

COMPONENT MOUNTING—TYPE "N" RECEPTACLE BOTH ENDS

CONN: 1st END Type "N" Receptacle Jack, UG58A/U.
CONN: 2nd END Type "N" Receptacle Jack, UG58A/U.

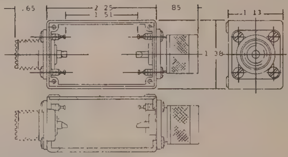




MODEL 2410 QUANTITY DISC. CODE A NET 9.85

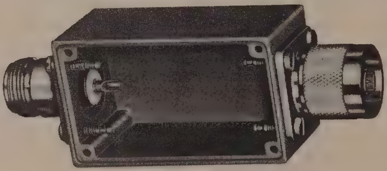
COMPONENT MOUNTING—UHF RECEPTACLE TO UHF PLUG

CONN: 1st END UHF Receptacle Jack.
CONN: 2nd END UHF Receptacle Plug.

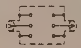


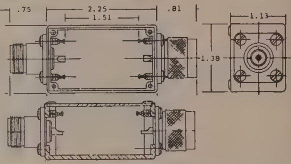
MODEL 2413 QUANTITY DISC. CODE A NET 12.85

COMPONENT MOUNTING—TYPE "N" RECEPTACLE TO TYPE "N" PLUG



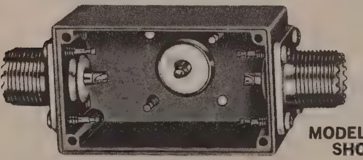
CONN: 1st END Type "N" Receptacle Jack, UG58A/U.
CONN: 2nd END Type "N" Receptacle Plug.



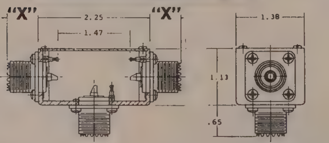


MODEL 2411 QUANTITY DISC. CODE A NET 12.85

COMPONENT MOUNTING—UHF AND TYPE "N" RECEPTACLE "T"

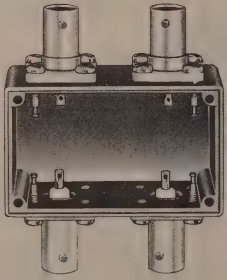


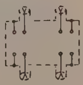
MODEL 2418 SHOWN

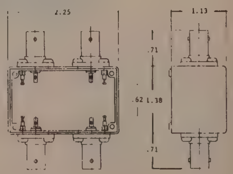


MODEL	CONNECTORS	"X" DIM.	Quantity Disc. Code	NET
2418	(3) UHF Receptacle Jacks.	.65	A	13.85
2419	(3) Type "N" Receptacle Jacks, UG58A/U.	.75	A	12.50

COMPONENT MOUNTING — CROSS CONNECTIONS







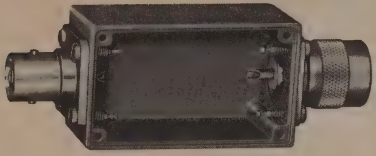
CONN: 4 each BNC Receptacle Jacks, UG290A/U.

MODEL 3234 QUANTITY DISC. CODE A NET 12.50

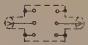
SHIELDED "BLACK BOXES"—SIZE "B"

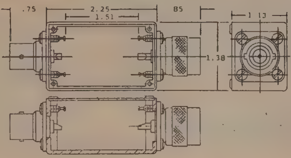
POMONA ELECTRONICS

COMPONENT MOUNTING— TYPE "C" RECEPTACLE TO TYPE "C" PLUG



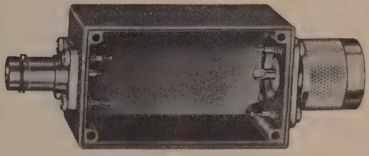
CONN: 1st END Type "C" Receptacle Jack, UG568/U.
CONN: 2nd END Type "C" Receptacle Plug.



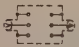

.75
2.25
1.51
.85
1.13
1.38

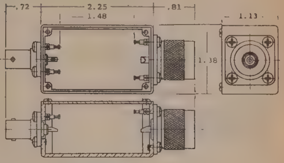
MODEL 2415 QUANTITY DISC. CODE A NET 19.95

COMPONENT MOUNTING — BNC RECEPTACLE TO TYPE "N" PLUG



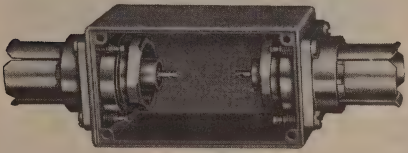
CONN: 1st END BNC Receptacle Jack, UG290A/U.
CONN: 2nd END Type "N" Receptacle Plug.



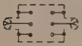

.72
2.25
1.48
.81
1.13
1.38

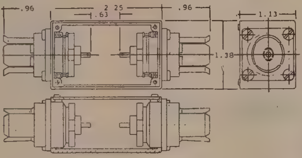
MODEL 2420 QUANTITY DISC. CODE A NET 11.85

COMPONENT MOUNTING— GR-874 CONNECTOR BOTH ENDS



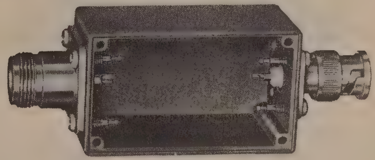
CONN: 1st END Type GR-874 Connector.
CONN: 2nd END Type GR-874 Connector.



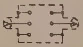

.96
2.25
.63
.96
1.13
1.38

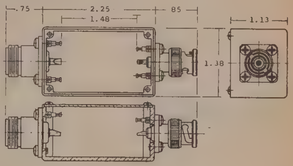
MODEL 2416 QUANTITY DISC. CODE D NET 34.50

COMPONENT MOUNTING — TYPE "N" RECEPTACLE TO BNC PLUG



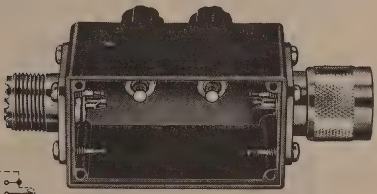
CONN: 1st END Type "N" Receptacle Jack, UG58A/U.
CONN: 2nd END BNC Receptacle Plug, UG1104A/U.

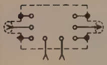



.75
2.25
1.48
.85
1.13
1.38

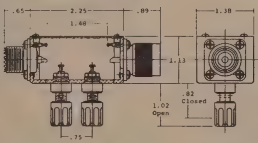
MODEL 2421 QUANTITY DISC. CODE A NET 9.85

COMPONENT MOUNTING — UHF RECEPTACLE TO UHF PLUG WITH BINDING POSTS



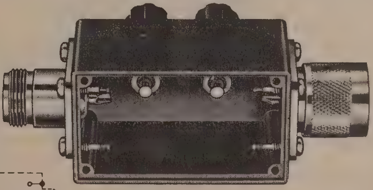


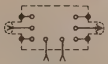
CONN: 1st END UHF Receptacle Jack.
CENTER: Banana jack binding posts with solder turret terminals. Red and Black.
CONN: 2nd END UHF Receptacle Plug.


.65
2.25
1.48
.89
1.38
1.13
.82 Closed
1.02 Open
.75

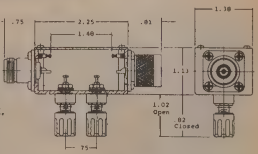
MODEL 2422 QUANTITY DISC. CODE A NET 14.85

COMPONENT MOUNTING TYPE "N" RECEPTACLE TO TYPE "N" PLUG WITH BINDING POSTS





CONN: 1st END Type "N" Receptacle Jack, UG58A/U.
CENTER: Banana jack binding posts with solder turret terminals. Red and Black.
CONN: 2nd END Type "N" Receptacle Plug.

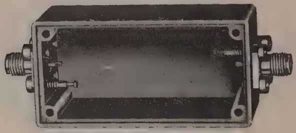

.75
2.25
1.48
.81
1.38
1.13
1.02 Open
.82 Closed
.75

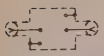
MODEL 2423 QUANTITY DISC. CODE A NET 16.85

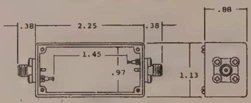
SHIELDED "BLACK BOXES"

POMONA ELECTRONICS

COMPONENT MOUNTING — OSM* RECEPTACLE BOTH ENDS





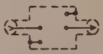

.38
2.25
.38
.88
1.45
.97
1.13

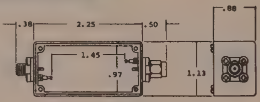
CONN: 1st END } OSM Receptacle Jack.
CONN: 2nd END } OSM Receptacle Jack.

MODEL 2399

QUANTITY DISC. CODE A **NET 19.95**

COMPONENT MOUNTING — OSM* RECEPTACLE TO OSM* PLUG




.38
2.25
.50
.88
1.45
.97
1.13

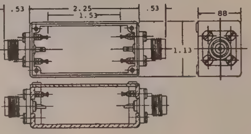
CONN: 1st END } OSM Receptacle Jack.
CONN: 2nd END } OSM Receptacle Plug.

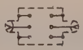
MODEL [illegible]

QUANTITY DISC. CODE ● **NET 24.95**

COMPONENT MOUNTING— TNC RECEPTACLE BOTH ENDS

CONN: 1st END } TNC Receptacle Jack.
CONN: 2nd END } TNC Receptacle Jack.


.53
2.25
1.53
.53
.88
1.13

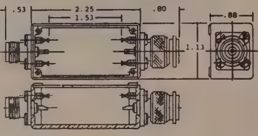


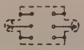
MODEL 2396

QUANTITY DISC. CODE ● **NET 10.85**

COMPONENT MOUNTING— TNC RECEPTACLE TO TNC PLUG

CONN: 1st END } TNC Receptacle Jack.
CONN: 2nd END } TNC Receptacle Plug.

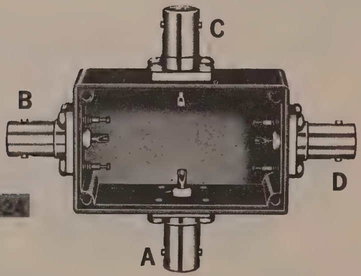

.53
2.25
1.53
.80
.88
1.13



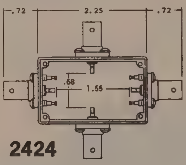
MODEL [illegible]

QUANTITY DISC. CODE ● **NET 13.85**

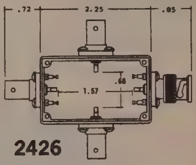
COMPONENT MOUNTING — CROSS CONNECTIONS



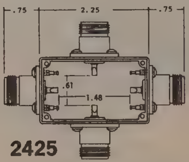
MODEL 2424


.72
2.25
.72
.68
1.55

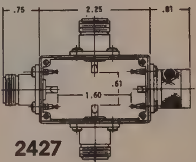
2424


.72
2.25
.85
1.57
.68

2426

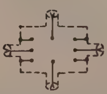

.75
2.25
.75
.61
1.48

2425

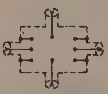

.75
2.25
.81
1.60
.61

2427

MODEL	CONNECTION A, B AND C	CONNECTION D	Quantity Disc. Code	NET
2424	BNC Receptacle Jack, UG290A/U.	BNC Receptacle Jack, UG290A/U.	●	12.50
2425	Type "N" Receptacle Jack, UG58A/U.	Type "N" Receptacle Jack, UG58A/U.	●	13.85
2426	BNC Receptacle Jack, UG290A/U.	BNC Receptacle Plug, UG1104A/U.	●	13.85
2427	Type "N" Receptacle Jack, UG58A/U.	Type "N" Receptacle Plug.	●	16.85



2424, 2425



2426, 2427

*OSM is a registered trademark of OMNI Spectra, Inc.

SHIELDED "BLACK BOXES"—SIZE "C"

POMONA
ELECTRONICS

MODEL 2903

(Shown 2/3
actual size)

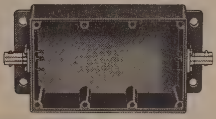
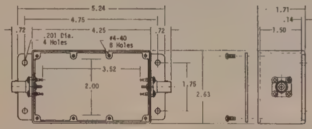
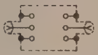
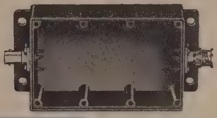
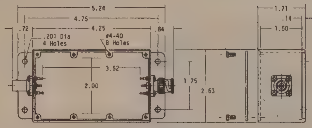
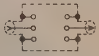
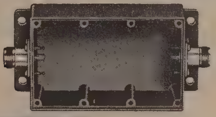
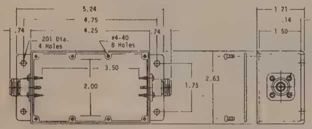
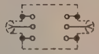
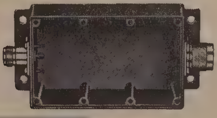
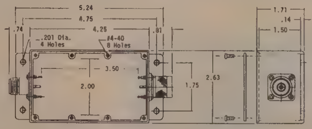
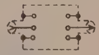
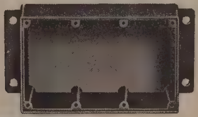
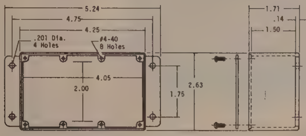
A **NEW** Series of **LARGER** shielded "BLACK BOXES."

These larger boxes are excellent for compact packaging of voltage dividers, isolation networks and many other applications.

APPLICABLE SPECIFICATIONS: (All Models)
Operating Temp.: —55°C to +150°C.
Working Voltage: 500 Peak.
Noise Rejection: Greater than 70DB

FEATURES:

- SHIELDED HOUSING; Die Cast Aluminum, Alloy #A380, FINISH: BLUE baked enamel per Federal Standard 595 #25109 over phosphoric etch per MIL-C-15328A.
- COVER: .080 Thick Aluminum #6061-T6 with clear anodized finish per MIL-A-8625A.
- 8 ea. #4-40 x ¼″ screws secure cover for proper shielding.
- Solder turret terminals for permanent noise free connection of components.
- 2 flanges for easy mounting of box.

MODEL	CONN. 1st END	CONN. 2nd END			
 **MODEL 2902**	BNC Receptacle Jack UG290A/U	BNC Receptacle Jack UG290A/U		 QUANTITY DISC. CODE A	NET 10.85
 **MODEL 2903**	BNC Receptacle Jack UG290A/U	BNC Receptacle Plug UG1104A/U		 QUANTITY DISC. CODE A	NET 11.85
 **MODEL 2904**	TYPE "N" Receptacle Jack UG58A/U	TYPE "N" Receptacle Jack UG58A/U		 QUANTITY DISC. CODE A	NET 12.85
 **MODEL 2905**	TYPE "N" Receptacle Jack UG58A/U	TYPE "N" Receptacle Plug		 QUANTITY DISC. CODE A	NET 16.85
 **MODEL 2901**	NONE	NONE		QUANTITY DISC. CODE A	NET 6.50
MODEL 2906 SEE 2901	NONE	NONE	Same as Model 2901 except box is unpainted and cover is unmarked.	QUANTITY DISC. CODE A	NET 6.50

SHIELDED "BLACK BOXES"—SIZE "D"

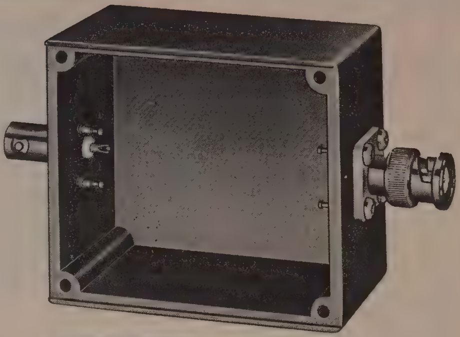
POMONA
ELECTRONICS

Another new series of shielded "Black Boxes." These boxes fill the need between the size "B" and "C" boxes. These boxes are excellent for compact packaging of voltage dividers, isolation networks and many other applications.

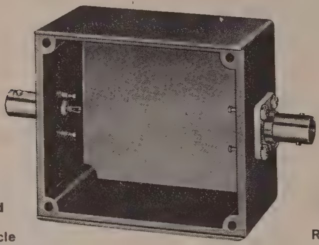
APPLICABLE SPECIFICATIONS: (All Models)
Operating Temp.: —55°C to +150°C.
Working Voltage: 500 Peak.
Noise Rejection: Greater than 70DB

FEATURES:

- **SHIELDED HOUSING:** Die Cast Aluminum, Alloy #A380, FINISH: BLUE baked enamel per Federal Standard 595 #25109 over phosphoric etch per MIL-C-15328A.
- **COVER:** .063 Thick Aluminum #6061-T6 with clear anodized finish per MIL-A-8625A.
- 4 ea. #4-40 x 1/4" screws secure cover for proper shielding.
- Solder turret terminals for permanent noise free connection of components.



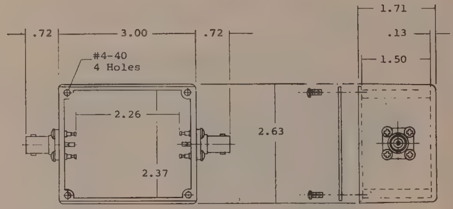
MODEL 3603 (Shown 2/3 actual size)



CONN:
1st End
BNC
Receptacle
Jack
UG290A/U

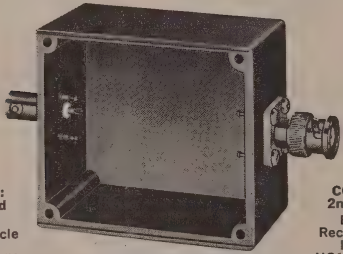
CONN:
2nd End
BNC
Receptacle
Jack
UG290A/U

MODEL 3602



QUANTITY DISC. CODE Ⓐ

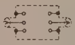
NET 9.85

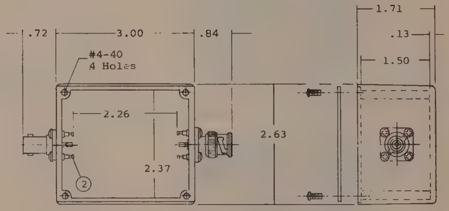


CONN:
1st End
BNC
Receptacle
Jack
UG290A/U

CONN:
2nd End
BNC
Receptacle
Plug
UG1104A/U

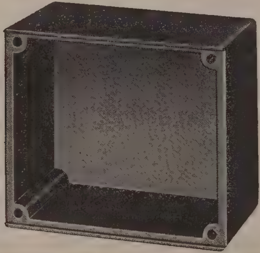
MODEL 3603





QUANTITY DISC. CODE Ⓐ

NET 10.85



CONN:
1st End
None

CONN:
2nd End
None

NET 4.50

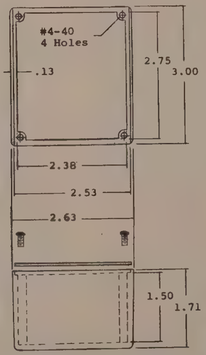
QUANTITY DISC. CODE Ⓐ

MODEL 3601

FINISH: Blue Baked Enamel. Includes cover with part number on cover and four cover screws.

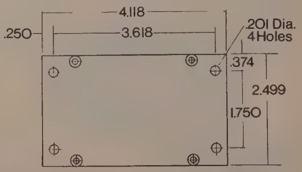
MODEL 3606

FINISH: None. Includes unmarked cover and four cover screws.



LARGER BOTTOM PLATE FOR MOUNTING

This larger plate, when attached to the box provides flanges for mounting. Four #4-40 flat head screws included. **MATERIAL:** .080 Aluminum #6061-T6, clear anodized per MIL-A-8625A.



QUANTITY DISC. CODE Ⓐ

MODEL 3958

NET 1.50

SHIELDED "BLACK BOXES" WITH CARD GUIDES—1½" DEEP

POMONA
ELECTRONICS

SHIELDED "BLACK BOXES" WITH CARD GUIDES

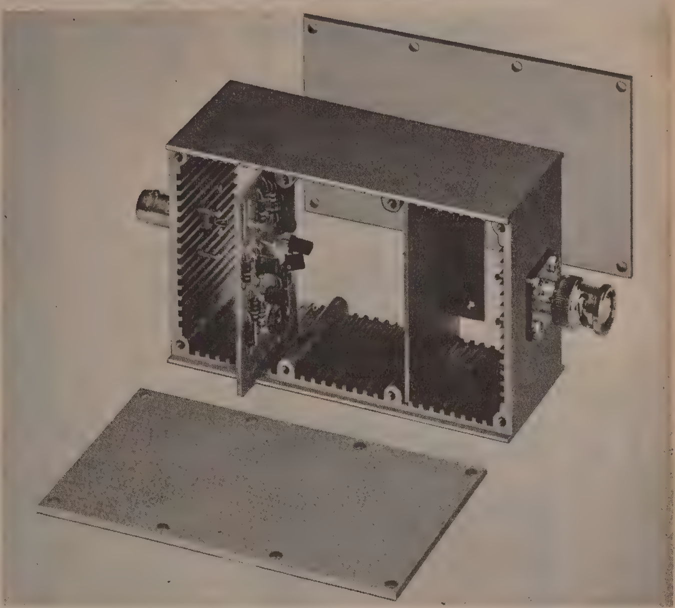
Aluminum boxes, slotted to accept 1/16" circuit boards and shielding dividers. Excellent for packaging electronic circuitry. Boxes have removable top and bottom covers. Useable inside space: 4" x 2" x 1½".

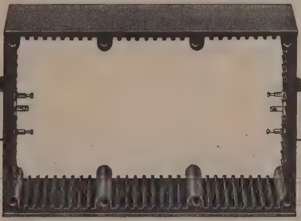
APPLICABLE SPECIFICATIONS:
(All Models)

Operating Temp.: —55°C to +150°C.
Working Voltage: 500 Peak.
Noise Rejection: Greater than 70DB

FEATURES:

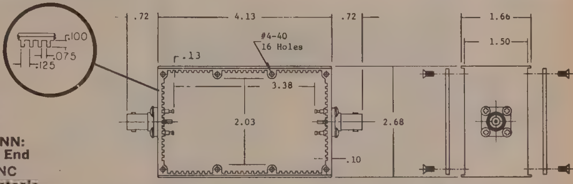
- **SHIELDED HOUSING:** Extruded Aluminum, Alloy #6061-T6. FINISH: BLUE baked enamel per Federal Standard 595 #25109 over phosphoric etch per MIL-C-15328A.
- **COVERS:** Top and bottom, .080 thick Aluminum #6061-T6 with clear anodized Finish per MIL-A-8625A.
- **COVER SCREWS:** 16 EA #4-40x¼" screws secure top and bottom cover for proper shielding.
- Solder turret terminals for permanent noise free connection of components.



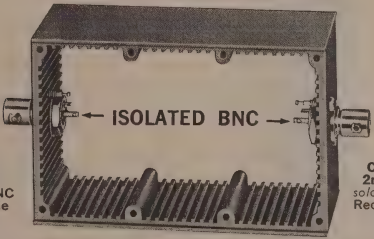


CONN:
1st End
BNC
Receptacle
Jack
UG290A/U

CONN:
2nd End
BNC
Receptacle
Jack
UG290A/U

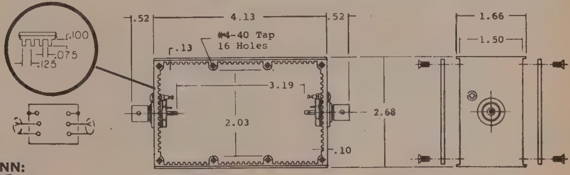

.100
.075
.125
.72
4.13
.72
#4-40
16 Holes
.13
3.38
2.03
2.68
.10
1.66
1.50

MODEL 3302 QUANTITY DISC. CODE **A** **NET 13.50**


ISOLATED BNC

CONN:
1st End
Isolated BNC
Receptacle
Jack

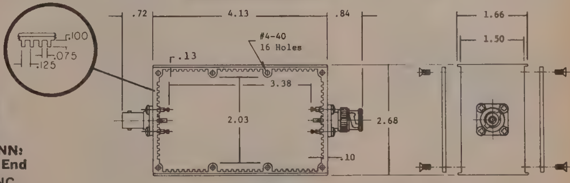
CONN:
2nd End
solated BNC
Receptacle
Jack


.100
.075
.125
.52
4.13
.52
#4-40 Tap
16 Holes
.13
3.19
2.03
2.68
.10
1.66
1.50

MODEL 3307 QUANTITY DISC. CODE **A** **NET 22.95**

CONN:
1st End
BNC
Receptacle
Jack
UG290A/U

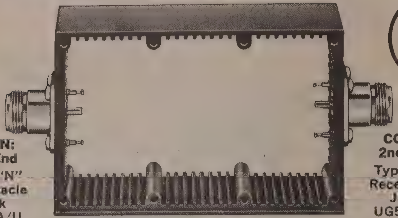
CONN:
2nd End
BNC
Receptacle
Plug
UG1104A/U


.100
.075
.125
.72
4.13
.84
#4-40
16 Holes
.13
3.38
2.03
2.68
.10
1.66
1.50

MODEL 3303 QUANTITY DISC. CODE **A** **NET 14.85**

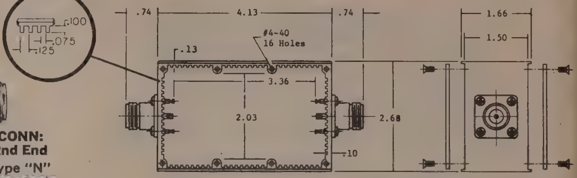
SHIELDED "BLACK BOXES" WITH CARD GUIDES—1½" DEEP

POMONA ELECTRONICS



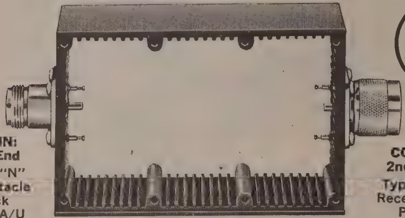
CONN:
1st End
Type "N"
Receptacle
Jack
UG58A/U

CONN:
2nd End
Type "N"
Receptacle
Jack
UG58A/U



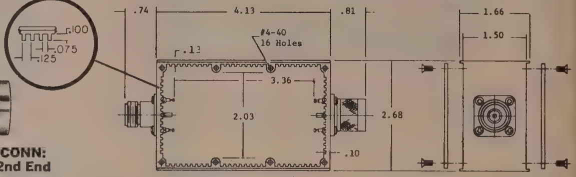
.100
.075
.125
.74
4.13
.74
#4-40
16 Holes
.13
3.36
2.03
2.68
.10
1.66
1.50

MODEL 3304 QUANTITY DISC. CODE **A** NET 16.85



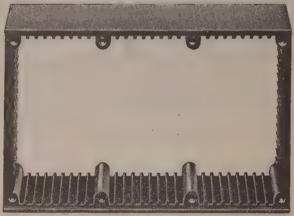
CONN:
1st End
Type "N"
Receptacle
Jack
UG58A/U

CONN:
2nd End
Type "N"
Receptacle
Plug



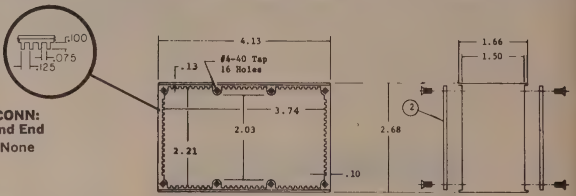
.100
.075
.125
.74
4.13
.81
#4-40
16 Holes
.13
3.36
2.03
2.68
.10
1.66
1.50

MODEL 3305 QUANTITY DISC. CODE **A** NET 17.85



CONN:
1st End
None

CONN:
2nd End
None



.100
.075
.125
4.13
.13
#4-40 Tap
16 Holes
3.74
2.03
2.21
2.68
.10
1.66
1.50
2

MODEL 3301
FINISH: Blue Baked Enamel. Includes top and bottom covers with part number on one and 16 cover screws.

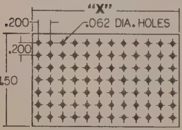
MODEL 3306
FINISH: None. Includes unmarked top and bottom covers with 16 cover screws.

QUANTITY DISC. CODE **A** NET 9.50

CIRCUIT MOUNTING BOARDS

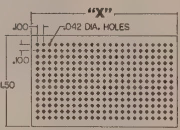
Two sizes of various types of punched and blank circuit boards for rapid assembly of components. Pre-cut to the proper size. Boards slide easily into the box card guides. All boards are ¹⁄₁₆" thick.

- Boards 1.50 x 2.39 used laterally.
- Boards 1.50 x 3.90 used lengthwise.



"X"
.200
.062 DIA. HOLES
.200
1.50

BOARD A

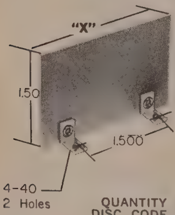


"X"
.100
.042 DIA. HOLES
.100
1.50

BOARD B

QUANTITY DISC. CODE **A**

BRD.	MODEL	NO. OF HOLES	"X" DIM.	MATERIAL	NET
A	3321	12 x 7	2.39	Paper-Epoxy (PEE)	.60
A	3322	NONE	2.39	Paper-Epoxy (PEE)	.45
A	3323	12 x 7	2.39	Glass-Epoxy (GEE)	.75
A	3324	NONE	2.39	Glass-Epoxy (GEE)	.55
A	3325	12 x 7	2.39	Glass-Epoxy (GEE) COP. CLAD 1 Side	.95
B	3326	24 x 15	2.39	Glass-Epoxy (GEE)	.95
A	3330	19 x 7	3.90	Paper-Epoxy (PEE)	.75
A	3331	19 x 7	3.90	Glass-Epoxy (GEE)	.95
A	3332	19 x 7	3.90	Glass-Epoxy (GEE) COP. CLAD 1 Side	1.50
B	3333	38 x 15	3.90	Glass-Epoxy (GEE)	1.25



"X"
1.50
1.500
4-40
2 Holes

SHIELDING DIVIDERS

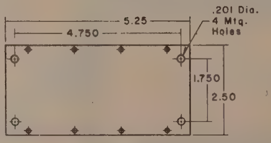
Two sizes of Aluminum dividers for dividing the box into shielded compartments. **MATERIAL:** .063 Aluminum, clear anodized per MIL-A-8625A.

- Divider 1.50 x 2.39 used laterally.
- Divider 1.50 x 3.90 used lengthwise.

QUANTITY DISC. CODE **A**

MODEL	"X" DIM.	NET
3327	2.39	1.30
3334	3.90	1.60

LARGER BOTTOM PLATE FOR MOUNTING



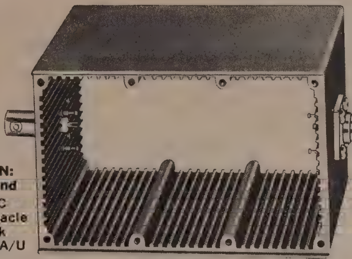
5.25
4.750
.201 Dia.
4 Mtg.
Holes
1.750
2.50

This larger plate, when attached to the box, provides flanges for mounting. **MATERIAL:** .080 Aluminum #6061-T6, clear anodized per MIL-A-8625A.

MODEL 3328 (Plate only) QUANTITY DISC. CODE **A** NET 1.50

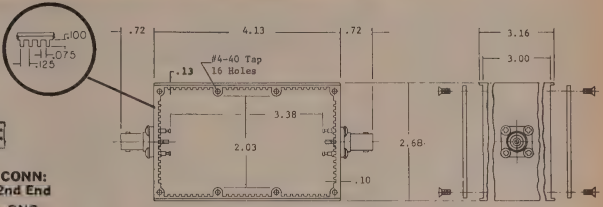
SHIELDED "BLACK BOXES" WITH CARD GUIDES—3" & 6" DEEP

POMONA ELECTRONICS



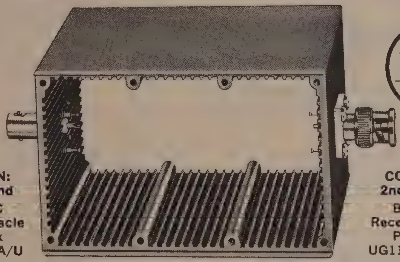
CONN: 1st End
BNC Receptacle Jack
UG290A/U

CONN: 2nd End
BNC Receptacle Jack
UG290A/U



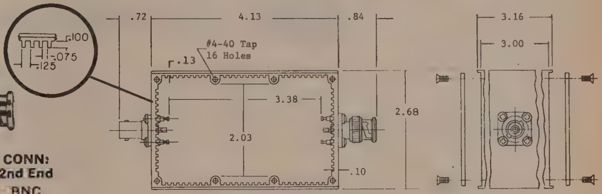
.100
.075
.125
.72
4.13
.72
#4-40 Tap
16 Holes
.13
3.38
2.03
2.68
.10
3.16
3.00

MODEL 3312 QUANTITY DISC. CODE A **NET 14.85**



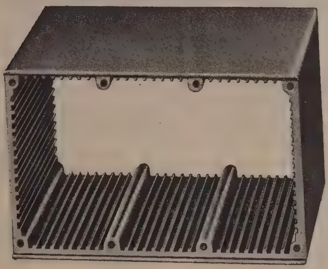
CONN: 1st End
BNC Receptacle Jack
UG290A/U

CONN: 2nd End
BNC Receptacle Plug
UG1104A/U



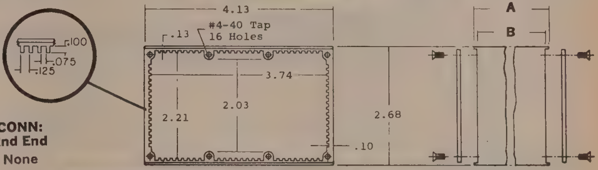
.100
.075
.125
.72
4.13
.84
#4-40 Tap
16 Holes
.13
3.38
2.03
2.68
.10
3.16
3.00

MODEL 3313 QUANTITY DISC. CODE A **NET 16.85**



CONN: 1st End
None

CONN: 2nd End
None



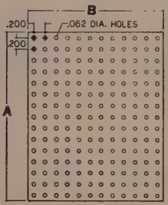
.100
.075
.125
4.13
#4-40 Tap
16 Holes
.13
3.74
2.03
2.21
2.68
.10
A
B

MODEL 3311 & 3742
FINISH: Blue baked enamel. Includes top and bottom cover with part no. on one.

MODEL 3316 & 3743
FINISH: None. Unmarked covers.

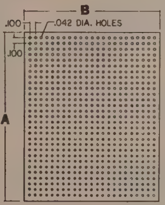
QUANTITY DISC. CODE A

MODEL	DIM. A	DIM. B	NET
3311	3.16	3.00	10.85
3316	3.16	3.00	10.85
3742	6.16	6.00	13.85
3743	6.16	6.00	13.85



B
.200
.062 DIA. HOLES
.200
A

BOARD A



B
.100
.042 DIA. HOLES
.100
A

BOARD B

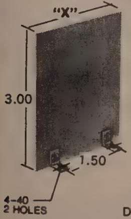
3" AND 6" BOX CIRCUIT MOUNTING BOARDS

Various sizes and types of punched and blank circuit boards for rapid assembly of components. Pre-cut to the proper size. Boards slide easily into the box card guides. All boards are 1/16" thick.

- ■ Boards 3.00 & 6.00 x 2.39 used laterally.
- ■ Boards 3.00 & 6.00 x 3.90 used lengthwise.

QUANTITY DISC. CODE A

BRD.	MODEL	NO. OF HOLES	DIM. A	DIM. B	MATERIAL	NET
A	3550	12 x 15	3.00	2.39	Paper Epoxy (PEE)	1.15
A	3551	12 x 15	3.00	2.39	Glass-Epoxy (GEE)	1.50
A	3552	12 x 15	3.00	2.39	Glass-Epoxy (GEE) COP. CLAD 1 Side	1.95
B	3553	23 x 30	3.00	2.39	Glass-Epoxy (GEE)	1.95
A	3554	19 x 15	3.00	3.90	Paper Epoxy (PEE)	1.15
A	3556	19 x 15	3.00	3.90	Glass-Epoxy (GEE) COP. CLAD 1 Side	1.95
B	3557	39 x 30	3.00	3.90	Glass-Epoxy (GEE)	1.95
B	3726	23 x 60	6.00	2.39	Glass-Epoxy (GEE)	3.25
B	3727	39 x 60	6.00	3.90	Glass-Epoxy (GEE)	3.25



"X"
3.00
1.50
4-40
2 HOLES

3" BOX SHIELDING DIVIDERS

Two sizes of Aluminum dividers for dividing the box into shielded compartments. **MATERIAL:** .063 Aluminum, clear anodized per MIL-A-8625A.

- ■ Divider 3.00 x 2.39 used laterally.
- ■ Divider 3.00 x 3.90 used lengthwise.

MODEL	"X" DIM.	NET
3558	2.39	1.75
3559	3.90	1.95

QUANTITY DISC. CODE A

.080 PIN TIP PATCH CORDS

POMONA ELECTRONICS

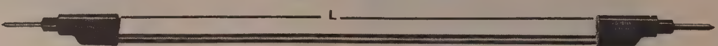
PIN TIP VERTICAL STACKING PATCH CORD

MODEL	LENGTH	NET
P-4	4″	1.85
P-8	8″	1.85
P-12	12″	1.85
P-18	18″	1.85
P-24	24″	1.85
P-36	36″	1.85
P-48	48″	1.95
P-60	60″	2.05

MODEL P

(Specify Color)

★QUANTITY DISC. CODE **A**



A must in circuit designing and testing, with instruments that utilize tip jacks.

PIN TIP: .080 dia., ½″ long, brass, gold flashed.

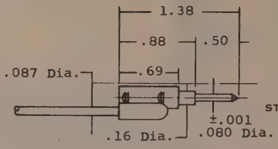
TIP JACK, STACK-UP: Beryllium copper, gold flashed. Accepts .080 dia. pin.

WIRE: 20 AWG, Strand. 41 x 36 T.C. Extra flexible polyvinyl insulation .087″ O.D.

RATED: 5 A. Cont., 10 A. Int. 5,000 W.V.D.C.

OPERATING TEMP.: —0°C to +105°C.

COLORS: Black, Brown, Red, Orange, Yellow, Green, Blue, Violet, Gray, White.



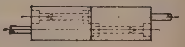
PIN TIP EXTENSION STACKING PATCH CORD

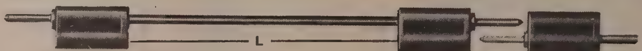
MODEL	LENGTH	NET
1727-4	4″	1.95
1727-8	8″	1.95
1727-12	12″	1.95
1727-18	18″	1.95
1727-24	24″	1.95
1727-36	36″	1.95
1727-48	48″	2.05
1727-60	60″	2.15

MODEL 1727

(Specify Color)

★QUANTITY DISC. CODE **A**





Dual purpose, insulates exposed leads when used as an extension cord. Endless extension coupling possible. Also provides stacking from .080 jack.

PIN TIP: .080 dia., ½″ long, brass, gold flashed.

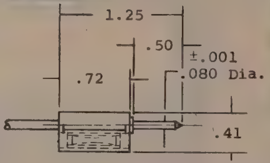
TIP JACK: Beryllium copper, gold flashed. Accepts .080 dia. pin.

WIRE: 20 AWG, Strand. 41 x 36 T.C. Extra flexible polyvinyl insulation .087″ O.D.

RATED: 5 A. Cont., 10 A. Int. 5,000 W.V.D.C.

OPERATING TEMP.: —0°C to +105°C.

COLORS: Black, Brown, Red, Orange, Yellow, Green, Blue, Violet, Gray, White.

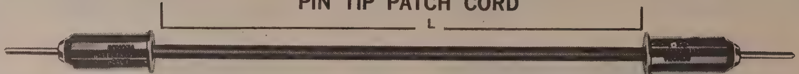


PIN TIP PATCH CORD

MODEL	LENGTH	NET
1990-4	4″	1.60
1990-8	8″	1.60
1990-12	12″	1.60
1990-18	18″	1.60
1990-24	24″	1.60
1990-36	36″	1.60
1990-48	48″	1.70
1990-60	60″	1.80

MODEL 1990

(Specify Color)



Heavy Duty patch cord. Excellent for general lab work. Permits interconnection between test instruments that utilize tip jacks.

PIN TIP: .080 dia., ½″ long, brass, nickel plated.

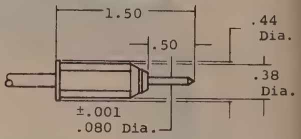
WIRE: 18 AWG, Strand. 65 x 36 T.C. Extra flexible polyvinyl insulation .144″ O.D.

RATED: 5 A. Cont., 10 A. Int. 10,000 W.V.D.C.

OPERATING TEMP.: —0°C to +105°C.

COLORS: Black, Brown, Red, Orange, Yellow, Green, Blue, Violet, Gray, White.

★QUANTITY DISC. CODE **A**



.040 AND .080 PIN TIP PATCH CORDS

MODEL			LENGTH	NET
3959-4	PT080-4	PM080-4	4″	1.05
3959-8	PT080-8	PM080-8	8″	1.05
3959-12	PT080-12	PM080-12	12″	1.05
3959-18	PT080-18	PM080-18	18″	1.05
3959-24	PT080-24	PM080-24	24″	1.05
3959-36	PT080-36	PM080-36	36″	1.05
3959-48	PT080-48	PM080-48	48″	1.15
3959-60	PT080-60	PM080-60	60″	1.25

COLORS: 3959 and PM080-Red and Black only.

PT080 — Black, Brown, Red, Orange, Yellow, Green, Blue, Violet, Gray, White.

MODEL 3959, PT & PM

(Specify Color)

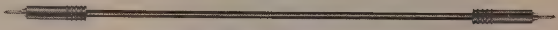
PIN TIP: 3959-Leaded Copper. PT080 & PM080 — Brass. All pins gold flashed.

WIRE: 22 AWG, Strand. 19 x 34 T.C. Insulation, polyvinyl .064″ O.D.

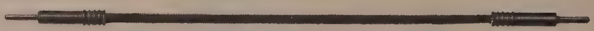
RATED: 3 A. Cont., 7.5 A. Int. 1,000 W.V.D.C.

OPERATING TEMP.: —0°C to +105°C.

★QUANTITY DISC. CODE **A**



MODEL 3959-PIN .040 DIA. x 3/16″ LONG



MODEL PT 080 — PIN .080 DIA. X ½″ LONG

MODEL PM 080 — PIN .080 DIA. X ¼″ LONG

Small body style permits usage in equipment having receptacles spaced closely together. Three models shown.

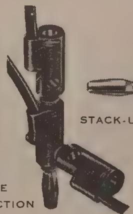
BANANA PLUG TO PIN TIP STACK-UP PATCH CORD

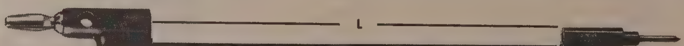
Adapts to equipment using banana jacks and pin jacks. Banana plug and pin tip allow vertical stack-up.

MODEL	LENGTH	NET
1126-4	4″	1.95
1126-8	8″	1.95
1126-12	12″	1.95
1126-18	18″	1.95
1126-24	24″	1.95
1126-36	36″	1.95
1126-48	48″	2.05
1126-60	60″	2.15

MODEL 1126

(Specify Color)





BANANA PLUG: Spring, one piece beryllium copper, heat treated, nickel plated.

PIN TIP: .080 dia. ½″ long, brass, gold flashed.

TIP JACK, STACK-UP: Beryllium copper, gold flashed. Accepts .080 Dia. pin.

WIRE: 20 AWG, Strand. 41 x 36 T.C. Extra flexible polyvinyl insulation .087″ O.D.

RATED: 5 A. Cont., 10 A. Int. 5,000 W.V.D.C.

OPERATING TEMP.: —0°C to +105°C.

COLORS: Black, Red.

★QUANTITY DISC. CODE **A**

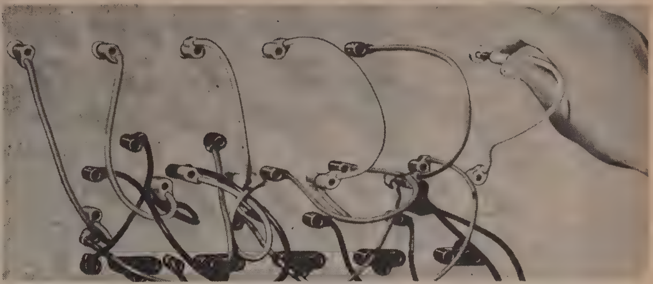
★ Various lengths may be aggregated for best quantity price. Other lengths available to order.

STANDARD BANANA PLUG PATCH CORDS

POMONA ELECTRONICS

POMONA BANANA PLUG PATCH CORDS

Tough thermoplastic insulation molds the plug and leads into a strong moisture resistant integral unit. Excellent for computer board and test equipment applications. Used by leading industries in applications where extreme reliability is of prime importance.



FEATURES

- One piece beryllium copper heat treated spring for maximum long life.
- Rounded spring design results in maximum contact area.
- Extra flexible polyvinyl insulation used on all leads.

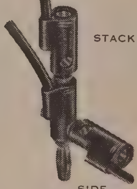
SPECIFICATIONS

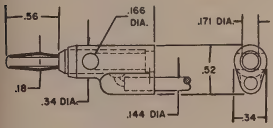
- Fits standard 0.166 dia. banana jacks.
- Spring, beryllium copper alloy 170 per QQ-C-533.
- Plug body, brass per QQ-B-626, Alloy #360.
- Nickel plated per QQ-N-290, Class 2.
- Contact resistance less than 0.001 ohms per banana plug.
- Operating Temp.: —0°C to +105°C.
- Wire, 18 AWG, stranding 65 x 36 T.C.
- Insulation, polyvinyl .144″ O.D.
- Ratings: 15 A. Cont., 30 A. Int. 10,000 W.V.D.C.

MODEL	LENGTH	NET
B-4	4″	1.80
B-8	8″	1.80
B-12	12″	1.80
B-18	18″	1.80
B-24	24″	1.80
B-36	36″	1.80
B-48	48″	1.90
B-60	60″	2.00

STACK-UP BANANA PLUG PATCH CORD

POMONA CALIFORNIA
L
POMONA CALIFORNIA





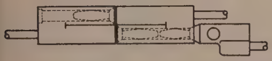
Multiple stacking feature accommodates the most complex stacking; keeps circuitry neater. Greatly simplifies circuit connections and changes. Reliable solder-bonded connections withstand pull test in excess of 50 lbs. Banana plugs both ends.

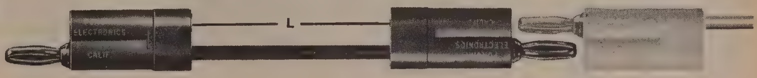
COLORS: Black, Brown, Red, Orange, Yellow, Green, Blue, Violet, Gray, White.

MODEL B (Specify Color) QUANTITY DISC. CODE **A** ★

MODEL	LENGTH	NET
HB-4	4″	2.25
HB-8	8″	2.25
HB-12	12″	2.25
HB-18	18″	2.25
HB-24	24″	2.25
HB-36	36″	2.25
HB-48	48″	2.35
HB-60	60″	2.45

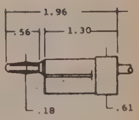
EXTENSION STACKING BANANA PLUG PATCH CORD





Dual purpose. Insulates all hot leads when used as an extension cord. Endless extension couplings possible with any banana plug patch cord. Provides vertical stacking from any jack. Reliable solder-bonded connections withstand pull test in excess of 50 lbs. Banana plugs both ends.

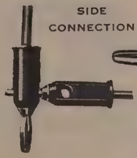
COLORS: Black, Brown, Red, Orange, Yellow, Green, Blue, Violet, Gray, White.

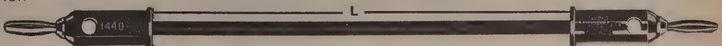


MODEL HB (Specify Color) QUANTITY DISC. CODE **A** ★

MODEL	LENGTH	NET
1440-4	4″	1.60
1440-8	8″	1.60
1440-12	12″	1.60
1440-18	18″	1.60
1440-24	24″	1.60
1440-36	36″	1.60
1440-48	48″	1.70
1440-60	60″	1.80

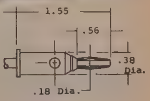
HORIZONTAL STACKING BANANA PLUG PATCH CORD





Ideal as an interconnecting lead between power supplies, test equipment, etc. Horizontal stacking feature. Banana plugs on both ends.

COLORS: Black, Brown, Red, Orange, Yellow, Green, Blue, Violet, Gray, White.



MODEL 1440 (Specify Color) QUANTITY DISC. CODE **A** ★

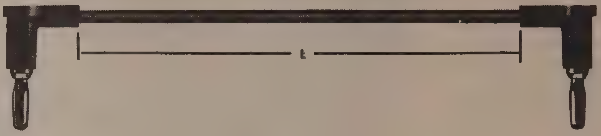
★ Various lengths may be aggregated for best quantity price. Other lengths available to order.

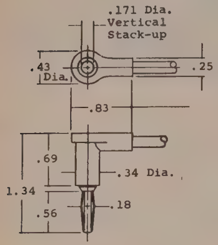
STANDARD BANANA PLUG PATCH CORDS

POMONA ELECTRONICS

STACK-UP RIGHT ANGLE BANANA PLUG PATCH CORD

MODEL	LENGTH	NET
2864-4	4"	1.80
2864-8	8"	1.80
2864-12	12"	1.80
2864-18	18"	1.80
2864-24	24"	1.80
2864-36	36"	1.80
2864-48	48"	1.90
2864-60	60"	2.00





Vertical Stacking feature allows endless circuit connections and the right angle design keeps wires close to the chassis. An oversize shoulder allows easy connect and disconnect.

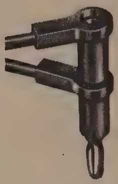
BANANA PLUGS: Spring, one piece beryllium copper, heat treated, nickel plated. Tough thermoplastic molded to plug body and wire.

WIRE: 18 AWG, Strand. 65 x 36 T.C. Extra flexible polyvinyl insulation, .144" O.D.

OPERATING TEMP.: —0°C to +105°C.

RATED: 15 A. Cont., 30 A. Int. 10,000 W.V.D.C.

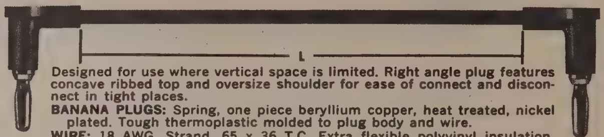
COLORS: Black, Brown, Red, Orange, Yellow, Green, Blue, Violet, Gray, White.



[redacted] (Specify Color) QUANTITY DISC. CODE ● ★

RIGHT ANGLE BANANA PLUG PATCH CORD

MODEL	LENGTH	NET
2700-4	4"	1.50
2700-8	8"	1.50
2700-12	12"	1.50
2700-18	18"	1.50
2700-24	24"	1.50
2700-36	36"	1.50
2700-48	48"	1.60
2700-60	60"	1.70



Designed for use where vertical space is limited. Right angle plug features concave ribbed top and oversize shoulder for ease of connect and disconnect in tight places.

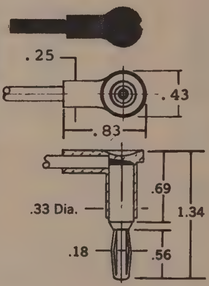
BANANA PLUGS: Spring, one piece beryllium copper, heat treated, nickel plated. Tough thermoplastic molded to plug body and wire.

WIRE: 18 AWG, Strand. 65 x 36 T.C. Extra flexible polyvinyl insulation, .144" O.D.

OPERATING TEMP.: –0°C to +105°C.

RATED: 15 A. Cont., 30 A. Int. 10,000 W.V.D.C.

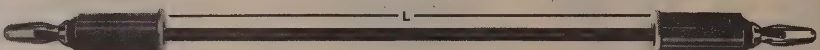
COLORS: Black, Red



[redacted] (Specify Color) QUANTITY DISC. CODE ● ★

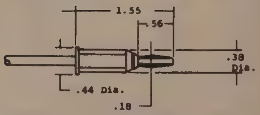
BANANA PLUG PATCH CORD

MODEL	LENGTH	NET
1985-4	4"	1.60
1985-8	8"	1.60
1985-12	12"	1.60
1985-18	18"	1.60
1985-24	24"	1.60
1985-36	36"	1.60
1985-48	48"	1.70
1985-60	60"	1.80



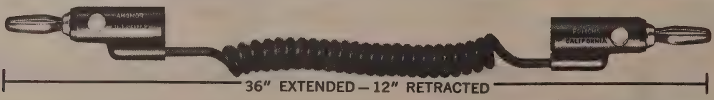
Excellent for general lab work. Permits interconnection between test instruments, etc. Banana plugs both ends.

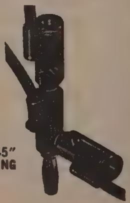
COLORS: Black, Brown, Red, Orange, Yellow, Green, Blue, Violet, Gray, White.



[redacted] (Specify Color) QUANTITY DISC. CODE ● ★

RETRACTILE (COILED) PATCH CORD—WITH STACK-UP BANANA PLUGS





Permits the use of one size patch cord in place of many various lengths. **BANANA PLUGS:** Spring, one piece beryllium copper heat treated, nickel plated. Tough thermoplastic molded to body and wire. **WIRE:** 20 AWG; Stranding 41 x 36 tinned copper; rubber insulation .145" O.D. **RATED:** 4 A. Cont., 10 A Int./5000 WVDC. **OPERATING TEMP.:** —20°C to +60°C. **COLOR:** Black, Red.

[redacted] (Specify Color) QUANTITY DISC. CODE ●

NET 3.85

★ Various lengths may be aggregated for best quantity price. Other lengths available to order.

LOW THERMAL E.M.F. SPADE LUG JUMPERS

POMONA ELECTRONICS

TELLURIUM COPPER LEADS FOR PRECISION MEASUREMENTS

POMONA ELECTRONICS has advanced the state of the art in measurements where Thermoelectric Effects are significant sources of error. Comparators designed for use with the Kelvin-Varley voltage divider and microvolt leads were tested with Primary Standards Laboratory equipment.

Thermoelectric voltages were not detected until the most sensitive galvanometer range was used.

THERMOELECTRIC PROPERTIES—Tellurium copper gold plated spade lugs cold-staked to multi-stranded 12 gauge COPPER wire minimize thermoelectric effects—an absolute necessity for low voltage, high precision measurements.

LOW RESISTANCE—12 gauge multi-stranded COPPER wire results in extremely low cable resistance. Spade lugs plated with 50 micro inches gold for minimum contact resistance and minimum thermal EMF when using copper binding posts. (Less than 0.01 μv/c°).

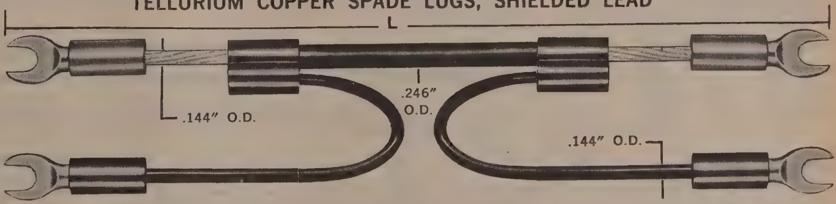
TELLURIUM COPPER SPADE LUGS, SHIELDED LEAD

MODEL	LENGTH
1756-24	24"
1756-48	48"

MODEL 1756
(Specify Length)

★ QUANTITY DISC. CODE Ⓐ

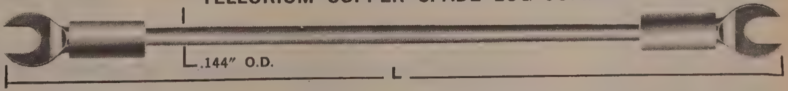
NET 14.85



Designed for use with Kelvin Varley voltage dividers where extreme precision is required for low voltage measurements. Features guard shield to effectively reduce shunt resistance. Tough thermo-plastic molded to spade lug body, color; center conductor lug red, shield lug black. Tellurium copper heavy duty one piece machined spade lug gold plated per MIL-G-45204, Type II, Class I. Center conductor 12 AWG multi-stranded bare copper, shield lead wire, 18 AWG, stranded. Polyethylene primary insulation. Braided shield bare copper. Polyvinyl jacket, color black, per MIL-C-17C Type IIA.

TELLURIUM COPPER SPADE LUG JUMPER

MODEL	LENGTH	NET
1693-12	12"	3.85
1693-18	18"	3.85
1693-24	24"	3.85
1693-36	36"	3.85
1693-48	48"	3.85
1693-60	60"	3.85



Single conductor tellurium copper spade lug jumper used in applications where guard shield is not required. Tough thermoplastic molded to spade lug body: Color matches wire. Tellurium Copper heavy duty one piece machined spade lug gold plated per MIL-G-45204. Type II, Class I. Conductor, 12 AWG multi-stranded bare copper. Insulation polyvinyl, 105°C, .144" O.D.

COLORS: Black, Red, Green.

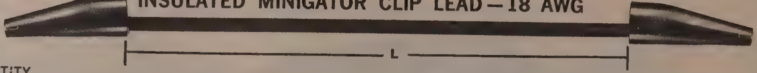
MODEL 1693 (Specify Color) ★ QUANTITY DISC. CODE Ⓐ

★ Various lengths may be aggregated for best quantity price.

CLIP LEADS & SPADE LUG JUMPERS

POMONA ELECTRONICS

INSULATED MINIGATOR CLIP LEAD—18 AWG



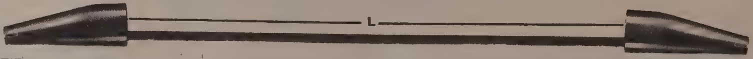
MODEL	LENGTH	NET
MG-B-4	4″	1.25
MG-B-8	8″	1.25
MG-B-12	12″	1.25
MG-B-24	24″	1.25
MG-B-36	36″	1.25
MG-B-48	48″	1.35
MG-B-60	60″	1.45

MODEL MG-B (Specify Color) QUANTITY DISC. CODE Ⓐ ★

CLIP: Minigator, steel, cad plated.
WIRE: 18 AWG, Strand. 65 x 36 T.C. Extra flexible polyvinyl insulation .144″ O.D.

INSULATOR: Red vinyl with red wire. Black on all other colors.
OPERATING TEMP.: —25°C to +105°C.
COLORS: Black, Red.

INSULATED MINIGATOR CLIP LEAD—20 AWG



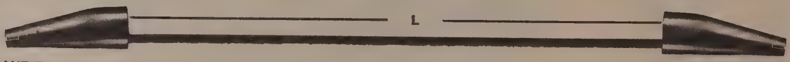
MODEL	LENGTH	NET
1236-4	4″	1.25
1236-8	8″	1.25
1236-12	12″	1.25
1236-24	24″	1.25
1236-36	36″	1.25
1236-48	48″	1.35
1236-60	60″	1.45

MODEL 1236 (Specify Color) QUANTITY DISC. CODE Ⓐ ★

CLIP: Minigator, steel, cad. plated.
WIRE: 20 AWG, Strand. 41 x 36 T.C. Extra flexible polyvinyl insulation, .087″ O.D.

INSULATOR: Red Vinyl with Red Wire. Black on all other colors.
OPERATING TEMP.: —25°C to +105°C.
COLORS: Black, Red.

INSULATED MICROGATOR CLIP LEAD—20 AWG



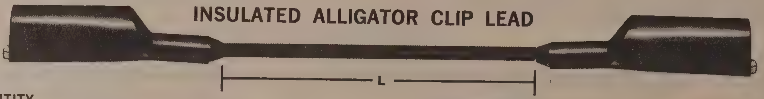
MODEL	LENGTH	NET
1613-4	4″	1.25
1613-8	8″	1.25
1613-12	12″	1.25
1613-24	24″	1.25
1613-36	36″	1.25
1613-48	48″	1.35
1613-60	60″	1.45

MODEL 1613 (Specify Color) QUANTITY DISC. CODE Ⓐ ★

CLIP: Microgator, solid copper.
WIRE: 20 AWG, Strand. 41 x 36 T.C. Extra flexible polyvinyl insulation, .087″ O.D.

INSULATOR: Red Vinyl with Red Wire. Black on all other colors.
OPERATING TEMP.: —25°C to +105°C.
COLORS: Black, Red.

INSULATED ALLIGATOR CLIP LEAD



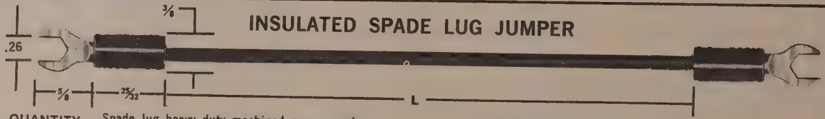
MODEL	LENGTH	NET
AL-B-4	4″	1.40
AL-B-8	8″	1.40
AL-B-12	12″	1.40
AL-B-24	24″	1.40
AL-B-36	36″	1.40
AL-B-48	48″	1.50
AL-B-60	60″	1.60

MODEL AL-B (Specify Color) QUANTITY DISC. CODE Ⓐ ★

CLIP: Alligator, steel, cad plated.
WIRE: 18 AWG, Strand. 65 x 36 T.C. Extra flexible polyvinyl insulation .144″ O.D.

INSULATOR: Red vinyl with red wire. Black on all other colors.
OPERATING TEMP.: —25°C to +105°C.
COLORS: Black, Red.

INSULATED SPADE LUG JUMPER



MODEL	LENGTH	NET
1743-12	12″	1.80
1743-24	24″	1.80
1743-36	36″	1.80
1743-48	48″	1.90
1743-60	60″	2.00

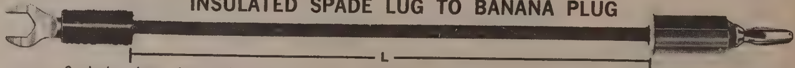
(Typical Dimensions spade lug)

MODEL 1743 (Specify Color) QUANTITY DISC. CODE Ⓐ ★

Spade lug heavy duty machined one piece brass. Tough thermo-plastic molded to spade lug body.
SPADE LUGS: Brass 1/16″ thick, nickel plated.
WIRE: 18 AWG, Strand. 65 x 36 T.C. Extra flexible polyvinyl insulation .144″ O.D.

RATED: 15 A. Cont., 30 A Int. 10,000 W.V.D.C.
OPERATING TEMP.: —25°C to +105°C.
COLORS: Black, Red, Green, White.

INSULATED SPADE LUG TO BANANA PLUG



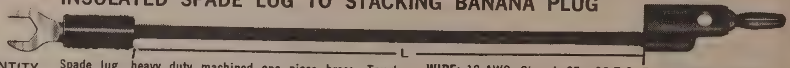
MODEL	LENGTH	NET
1987-12	12″	1.80
1987-24	24″	1.80
1987-36	36″	1.80
1987-48	48″	1.90
1987-60	60″	2.00

MODEL 1987 (Specify Color) QUANTITY DISC. CODE Ⓐ ★

Spade lug, heavy duty machined one piece brass. Tough thermo-plastic molded to spade lug and banana plug body.
SPADE LUG: Brass 1/16″ thick, nickel plated.
BANANA PLUG: Spring one piece beryllium copper heat treated, nickel plated.

WIRE: 18 AWG, Strand. 65 x 36 T.C. Extra flexible polyvinyl insulation .144″ O.D.
RATED: 15 A. Cont., 30 A. Int. 10,000 W.V.D.C.
OPERATING TEMP.: —25°C to +105°C.
COLORS: Black, Red

INSULATED SPADE LUG TO STACKING BANANA PLUG



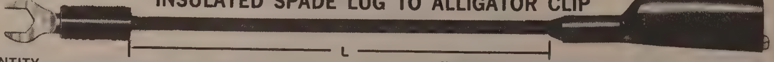
MODEL	LENGTH	NET
1370-12	12″	1.80
1370-24	24″	1.80
1370-36	36″	1.80
1370-48	48″	1.90
1370-60	60″	2.00

MODEL 1370 (Specify color) QUANTITY DISC. CODE Ⓐ ★

Spade lug, heavy duty machined one piece brass. Tough thermo-plastic molded to spade lug and banana plug body.
SPADE LUG: Brass 1/16″ thick, nickel plated.
BANANA PLUG: Spring one piece beryllium copper heat treated, nickel plated.

WIRE: 18 AWG, Strand. 65 x 36 T.C. Extra flexible polyvinyl insulation .144″ O.D.
RATED: 15 A. Cont., 30 A. Int. 10,000 W.V.D.C.
OPERATING TEMP.: —25°C to +105°C.
COLORS: Black, Red, Green, White.

INSULATED SPADE LUG TO ALLIGATOR CLIP



MODEL	LENGTH	NET
1960-12	12″	1.80
1960-24	24″	1.80
1960-36	36″	1.80
1960-48	48″	1.90
1960-60	60″	2.00

MODEL 1960 (Specify color) QUANTITY DISC. CODE Ⓐ ★

Spade lug, heavy duty machined one piece brass. Tough thermo-plastic molded to spade lug body.
SPADE LUG: Brass 1/16″ thick, nickel plated.
CLIP: Alligator, steel, cad plated.

INSULATOR: Red vinyl with red wire. Black on all other colors.
WIRE: 18 AWG, Strand. 65 x 36 T.C. Extra flexible polyvinyl insulation .144″ O.D.
OPERATING TEMP.: —25°C to +105°C.
COLORS: Black, Red

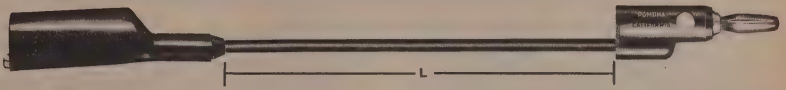
★ Various lengths may be aggregated for best quantity price. Other lengths available to order.

CLIP LEADS & TEST PROBES

POMONA ELECTRONICS

ALLIGATOR CLIP TO STACKING BANANA PLUG

MODEL	LENGTH	NET
1166-4	4″	1.75
1166-8	8″	1.75
1166-12	12″	1.75
1166-24	24″	1.75
1166-36	36″	1.75
1166-48	48″	1.85
1166-60	60″	1.95



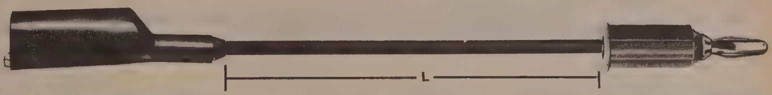
Adapts to equipment using standard banana jacks.
CLIP: Alligator, Steel, cadmium plated
BANANA PLUG: Spring, one piece beryllium copper, heat treated, nickel plated. Tough thermoplastic molded to plug body and wire.

INSULATOR: Red vinyl with red wire. Black on all other colors.
WIRE: 18 AWG, Strand. 65 x 36 T.C. Extra flexible polyvinyl insulation .144″ O.D.
OPERATING TEMP.: −25°C to +105°C.
COLORS: Black, Red.

MODEL 1166 (Specify Color) QUANTITY DISC. CODE Ⓐ ★

ALLIGATOR CLIP LEAD TO BANANA PLUG

MODEL	LENGTH	NET
1959-4	4″	1.75
1959-8	8″	1.75
1959-12	12″	1.75
1959-24	24″	1.75
1959-36	36″	1.75
1959-48	48″	1.85
1959-60	60″	1.95



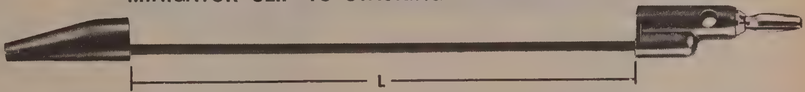
Adapts to equipment using standard banana jacks.
CLIP: Alligator, Steel, cadmium plated
BANANA PLUG: Spring, one piece beryllium copper, heat treated, nickel plated. Tough thermoplastic molded to plug body.

INSULATOR: Red vinyl with red wire. Black on all other colors.
WIRE: 18 AWG, Strand. 65 x 36 T.C. Extra flexible polyvinyl insulation .144″ O.D.
OPERATING TEMP.: −25°C to +105°C.
COLORS: Black, Red.

MODEL 1959 (Specify Color) QUANTITY DISC. CODE Ⓐ ★

MINIGATOR CLIP TO STACKING BANANA PLUG

MODEL	LENGTH	NET
3220-4	4″	1.50
3220-8	8″	1.50
3220-12	12″	1.50
3220-24	24″	1.50
3220-36	36″	1.50
3220-48	48″	1.60
3220-60	60″	1.70

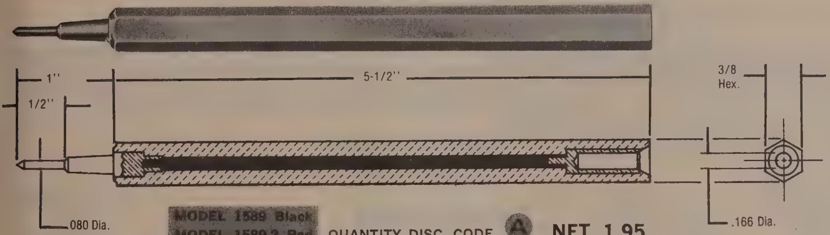


Adapts to equipment using standard banana jacks.
CLIP: Minigator, Steel, cadmium plated.
BANANA PLUG: Spring, one piece beryllium copper, heat treated, nickel plated. Tough thermoplastic molded to plug body and wire.

INSULATOR: Red vinyl with red wire. Black on all other colors.
WIRE: 20 AWG, Strand. 41 x 36 T.C. Extra flexible polyvinyl insulation .087″ O.D.
OPERATING TEMP.: −25°C to +105°C.
COLORS: Black, Red.

MODEL 3220 (Specify Color) QUANTITY DISC. CODE Ⓐ ★

TEST PROBE TO BANANA JACK



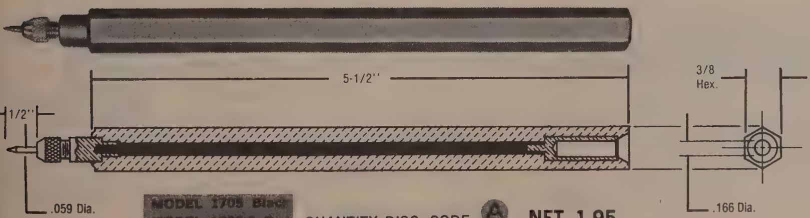
Banana jack in handle connected to tip. Permits use of standard banana plugs for circuit testing as a test prod. Heavy duty insulated handle molded to banana jack and tip.

PIN TIP: .080 dia. x ½″ long, brass nickel plated.

BANANA JACK: .166 dia. Brass nickel plated. Accepts standard banana plug.

MODEL 1589 Black
MODEL 1589-2 Red QUANTITY DISC. CODE Ⓐ **NET 1.95**

NEEDLE TIP PROBE TO BANANA JACK



Sharp replaceable needle tip allows testing of encapsulated circuits. Banana jack in handle connected to tip. Permits use of standard banana plugs for circuit testing as a test prod. Heavy duty insulated handle molded to banana jack and tip.

PIN TIP: Replaceable needle tip, stainless steel.

BANANA JACK: .166 dia. Brass nickel plated. Accepts standard banana plug.

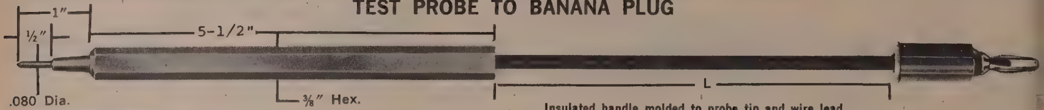
MODEL 1705 Black
MODEL 1705-2 Red QUANTITY DISC. CODE Ⓐ **NET 1.95**

★ Various lengths may be aggregated for best quantity price. Other lengths available to order.

TEST PROBES

POMONA ELECTRONICS

TEST PROBE TO BANANA PLUG

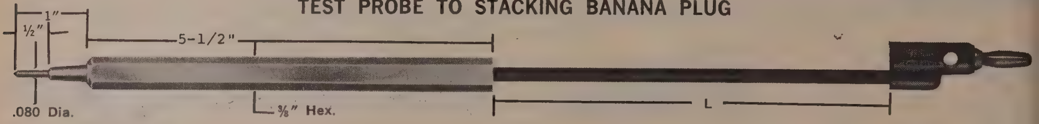


MODEL 1986-36-B	36" Long	Black	NET 2.25
MODEL 1986-36-R	36" Long	Red	NET 2.25
MODEL 1986-48-B	48" Long	Black	NET 2.25
MODEL 1986-48-R	48" Long	Red	NET 2.25

QUANTITY DISC. CODE Ⓐ

Insulated handle molded to probe tip and wire lead.
PROBE PIN TIP: .080 dia. x ½" long. Brass nickel plated.
WIRE: 18 AWG, Strand. 65 x 36 T.C. Extra flexible polyvinyl insulation, .144" O.D.
BANANA PLUG: Spring, one piece beryllium copper, heat treated, nickel plated. Tough thermo-plastic molded to body.
COLORS: Black, Red.

TEST PROBE TO STACKING BANANA PLUG

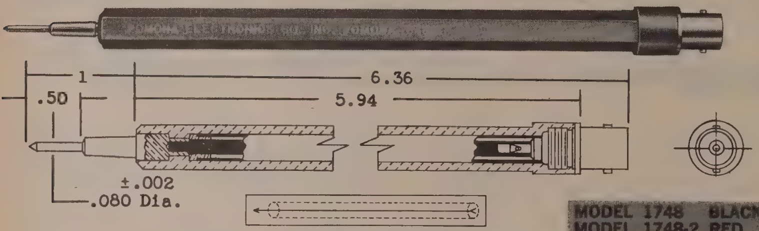


MODEL 1382-36-B	36" Long	Black	NET 2.25
MODEL 1382-36-R	36" Long	Red	NET 2.25
MODEL 1382-48-B	48" Long	Black	NET 2.25
MODEL 1382-48-R	48" Long	Red	NET 2.25

QUANTITY DISC. CODE Ⓐ

Insulated handle molded to probe tip and wire lead.
PROBE PIN TIP: .080 dia. x ½" long. Brass nickel plated
WIRE: 18 AWG, Strand. 65 x 36 T.C. Extra flexible polyvinyl insulation, .144" O.D.
BANANA PLUG: Spring, one piece beryllium copper, heat treated, nickel plated. Tough thermo-plastic molded to plug body and wire.
COLORS: Black, Red.

TEST PROBE TO BNC RECEPTACLE



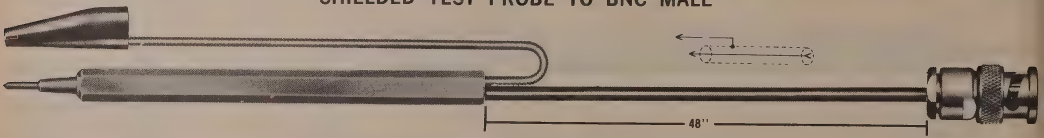
BNC receptacle in handle connected to tip. Permits the use of coaxial cables with BNC plug for circuit testing as a test prod. Tough thermoplastic molded to BNC receptable and tip. Shield extends to within 1½" of the probe tip end.
PIN TIP: .080" dia. x ½" long, brass, nickel plated.
RECEPTACLE: BNC, UG1094/U.

MODEL 1748 BLACK
MODEL 1748-2 RED

QUANTITY DISC. CODE Ⓐ

NET 6.50

SHIELDED TEST PROBE TO BNC MALE



A shielded test probe with the shield extending to within 1½" of the probe tip end. One piece molded construction. Insulated handle molded to probe tip and cable. Insulated minigator clip connected to shield lead.
PROBE PIN TIP: .080 dia. x ½" long. Brass, nickel plated.
CONNECTOR: BNC Male, UG88E/U.

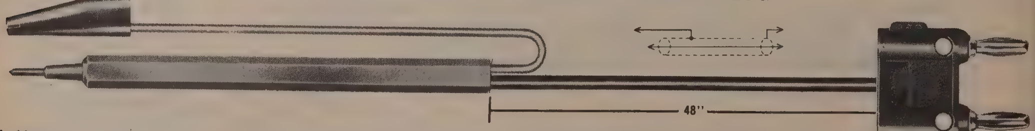
CLIP: Minigator, steel, cad. plated.
INSULATOR, VINYL: Color, Black.
CABLE: Shielded coax., RG58C/U, Polyethylene insulation. Vinyl jacket, .195" O.D., Nom. Cap. 28.5 pf/ft.
HANDLE: Color, red, molded of tough thermo-plastic.

QUANTITY DISC. CODE Ⓑ

MODEL 2739-C-48 . . . . .48" long

NET 8.50

SHIELDED TEST PROBE TO DOUBLE BANANA PLUG



A shielded test probe with the shield extending to within 1½" of the probe tip end. One piece molded construction. Insulated handle molded to probe tip and cable. Insulated minigator clip connected to shield lead.

PROBE PIN TIP: .080 dia. x ½" long. Brass nickel plated.

DOUBLE BANANA PLUG: On ¾" centers. Spring, one piece beryllium copper, heat treated, nickel plated. Tough thermo-plastic molded to double plug body. Color, Black.

CLIP: Minigator, steel, cad. plated.
INSULATOR, VINYL: Color, Black.
CABLE: Shielded coax., RG58C/U, Polyethylene insulation. Vinyl jacket, .195" O.D., Nom. Cap. 28.5 pf/ft.
HANDLE: Color, red, molded of tough thermo-plastic.

QUANTITY DISC. CODE Ⓑ

MODEL [illegible] . . . . .48" long

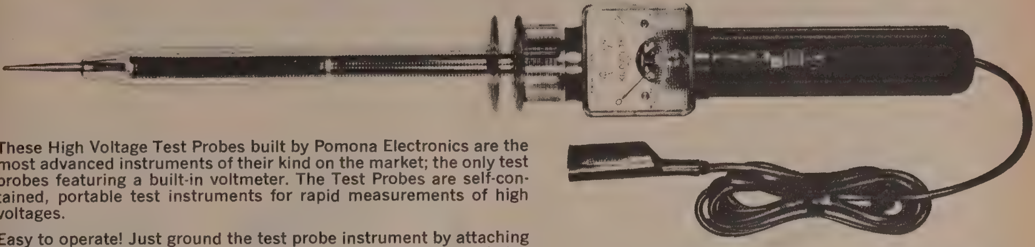
NET 8.50

Other lengths available to order.

HIGH VOLTAGE TEST PROBES

POMONA
ELECTRONICS

DC HIGH VOLTAGE TEST PROBES WITH BUILT-IN METER



These High Voltage Test Probes built by Pomona Electronics are the most advanced instruments of their kind on the market; the only test probes featuring a built-in voltmeter. The Test Probes are self-contained, portable test instruments for rapid measurements of high voltages.

Easy to operate! Just ground the test probe instrument by attaching alligator clip to chassis, contact test probe tip to high voltage being measured and read voltage from the built-in meter. No warm-up time. No batteries.

SPECIFICATIONS:

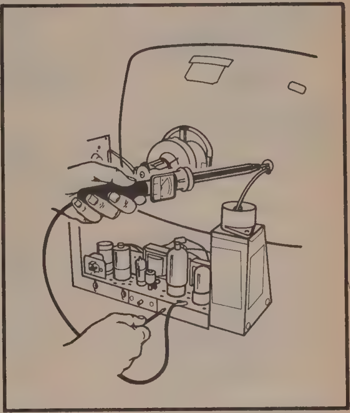
RANGE: See below. **SENSITIVITY:** 20,000 ohms/volt (50 ua) movement. **ACCURACY:** ± 3% full scale. **MULTIPLIER RESISTANCE:** See below. **MATERIAL:** Handle—high impact thermoplastic. Probe—high impact polystyrene. **LENGTH:** 14¾″ overall. **WEIGHT:** 8 ounces.

REPLACEMENT PARTS LIST
FOR MODEL 4000

Description	Net	Part Number
Clear plastic Probe Body	3.95	2872
Black Handle Assembly	4.25	3997
Meter (0-50 ua. DC)	9.85	3995
Clear plastic Meter Cover	.75	3493
Multiplier resistor (720 megohms ± 2%)	4.25	3996

MODEL	VOLTS Full Scale	MULTIPLIER RESISTANCE	NET
4000	36,000	720 Megohm	24.95
3157(*)	15,000	300 Megohm	34.50
3163(*)	6,000	120 Megohm	34.50
4036(**)	36,000	720 Megohm	14.50

QUANTITY DISC. CODE C



*Models 3157 and 3163 are supplied with Model 3295 carrying case.
**Model 4036 MODIFICATION KIT — For Converting Model 2900 D.C. High Voltage Test Probe 30K.V. To 36K.V.

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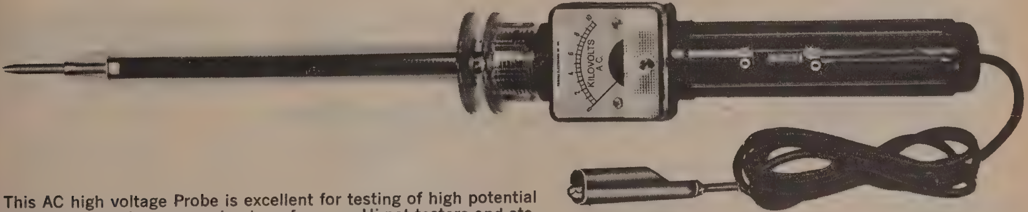
10 KV AC HIGH VOLTAGE TEST PROBE WITH BUILT-IN METER



This AC high voltage Probe is excellent for testing of high potential AC voltages such as neon sign transformers, Hi-pot testers and etc. Shielded meter movement for protection from stray magnetic fields. PROBE IS SUPPLIED WITH MODEL 3295 CARRYING CASE.

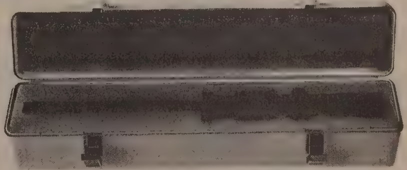
Easy to operate! Just ground the test probe instrument by attaching alligator clip to chassis, contact test probe tip to high voltage being measured and read voltage from the built-in meter. No warm-up time. No batteries.

SPECIFICATIONS:

RANGE: 10,000 Volts AC. **SENSITIVITY:** 2,000 Ohms/Volt (500 UA) movement. **ACCURACY:** ± 3% 30 cps to 1000 cps. **MULTIPLIER RESISTANCE:** 20 Megohm ± 2%. **MATERIAL:** Handle—high impact thermoplastic. Probe — high impact polystyrene. **LENGTH:** 14¾″ overall. **WEIGHT:** 8 ounces.

MODEL 3209 QUANTITY DISC. CODE C NET 34.50

CARRYING CASE FOR HIGH VOLTAGE PROBES



A quality built carrying case for protection of your high voltage probe. The case is made of tough thermoplastic. The inside is lined with soft, shock absorbing material.

MODEL 3295 QUANTITY DISC. CODE D NET 5.95

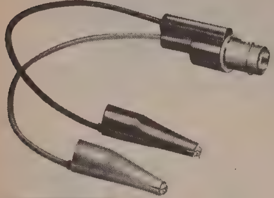
MOLDED BREAKOUTS

POMONA ELECTRONICS

A new series of "Breakouts", designed to convert standard coaxial cables to test cables.
By connecting proper Breakout receptacle or plug to corresponding cable plug or receptacle, any standard coaxial cable becomes a test cable equipped with clip leads.
All connections feature a non-tarnish finish, and tough molded thermoplastic insulation molded to connector and wire.

APPLICABLE SPECIFICATIONS:
Wire: (With Alligator Clips) 18 AWG, Strand. 65 x 36 T.C. Extra flexible polyvinyl insulation, .144" O.D.
Wire: (With Minigator Clips) 20 AWG, Strand. 41 x 36 T.C. Extra flexible polyvinyl insulation, .087" O.D.
Operating Temp.: —25°C to +85°C.
Working Voltage: 500 V Peak.

BNC RECEPTACLE TO TEST CLIPS

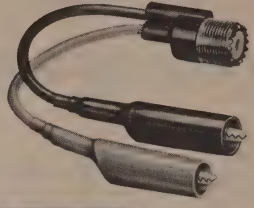


CONNECTOR: BNC Receptacle, UG1094/U.
INSULATION: Tough thermoplastic molded to connector and wire.
WIRE: See above.
TEST CLIPS: Minigator or Alligator, Steel, cad. plated. Insulators, Vinyl: 1 Black, 1 Red.

OVERALL LENGTH 7"

MODEL 2630 (ALLIGATOR CLIPS)
MODEL 2631 (MINIGATOR CLIPS)
QUANTITY DISC. CODE Ⓐ **NET 3.75**

UHF RECEPTACLE TO TEST CLIPS

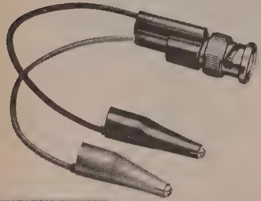


CONNECTOR: UHF Receptacle Jack.
INSULATION: Tough thermoplastic molded to connector and wire.
WIRE: See above.
TEST CLIPS: Alligator, Steel, cad. plated. Insulators, Vinyl: 1 Black, 1 Red.

OVERALL LENGTH 7"

MODEL 2632
QUANTITY DISC. CODE Ⓐ **NET 4.50**

BNC PLUG TO TEST CLIPS

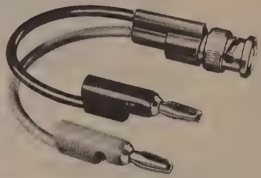


CONNECTOR: BNC Plug.
INSULATION: Tough thermoplastic molded to connector and wire.
WIRE: See above.
TEST CLIPS: Minigator or Alligator, Steel, cad. plated. Insulators, Vinyl: 1 Black, 1 Red.

OVERALL LENGTH 7"

MODEL 2885 (ALLIGATOR CLIPS)
MODEL 2886 (MINIGATOR CLIPS)
QUANTITY DISC. CODE Ⓐ **NET 4.50**

BNC PLUG TO STACKING BANANA PLUGS

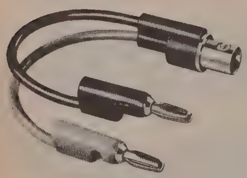


CONNECTOR: BNC Plug.
INSULATION: Tough thermoplastic molded to connector and wire.
WIRE: See above, 18 AWG.
STACKING BANANA PLUGS: Spring, one piece heat-treated beryllium copper, nickel plated: 1 Black, 1 Red.

OVERALL LENGTH 7"

MODEL 3957
QUANTITY DISC. CODE Ⓐ **NET 4.95**

BNC RECEPTACLE TO STACKING BANANA PLUGS

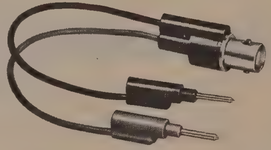


CONNECTOR: BNC Receptacle, UG1094/U.
INSULATION: Tough thermoplastic molded to connector and wire.
WIRE: See above, 18 AWG.
STACKING BANANA PLUGS: Spring, one piece heat-treated beryllium copper, nickel plated: 1 Black, 1 Red.

OVERALL LENGTH 7"

MODEL 3073
QUANTITY DISC. CODE Ⓐ **NET 3.85**

BNC RECEPTACLE TO STACKING PIN TIP PLUGS

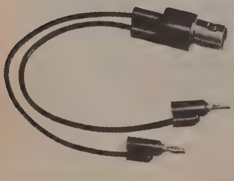


CONNECTOR: BNC Receptacle, UG1094/U.
INSULATION: Tough thermoplastic molded to connector and wire.
WIRE: See above, 20 AWG
STACKING PIN TIP PLUGS: 2 single plugs, .080 dia.: 1 Black, 1 Red.

OVERALL LENGTH 7"

MODEL 3211
QUANTITY DISC. CODE Ⓐ **NET 3.85**

BNC RECEPTACLE TO MINIATURE STACKING BANANA PLUGS

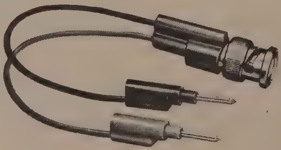


CONNECTOR: BNC Receptacle, UG1094/U.
INSULATION: Tough thermoplastic molded to connector and wire.
WIRE: See above, 20 AWG.
MINIATURE STACKING BANANA PLUGS: For use with .104 dia. jacks. Spring, one piece beryllium copper, gold plated: 1 Black, 1 Red.

OVERALL LENGTH 7"

MODEL [illegible]
QUANTITY DISC. CODE Ⓐ **NET 4.50**

BNC PLUG TO STACKING PIN TIP PLUGS



CONNECTOR: BNC Plug.
INSULATION: Tough thermoplastic molded to connector and wire.
WIRE: See above, 20 AWG.
STACKING PIN TIP PLUGS: 2 single plugs, .080 dia.: 1 Black, 1 Red.

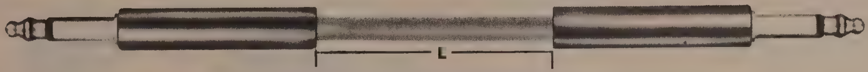
OVERALL LENGTH 7"

MODEL 3901
QUANTITY DISC. CODE Ⓐ **NET 4.95**

PATCH CORDS & CABLE ASSEMBLIES

POMONA
ELECTRONICS

PJ-051* PHONE PLUG BOTH ENDS



*PJ-051 INTERCHANGEABLE WITH WE310

WIRED TIP AND RING BOTH ENDS

CABLE DESCRIPTION
Two Cond. Twisted pair, 18 AWG, Strand. 65 x 36 T.C. Vinyl Insulation, Vinyl Jacket .250″ O.D., Nom. Cap. 30 pf/ft.
COLOR: Cable, Gray. Phone Plug Handle, Red.

MODEL	LENGTH	NET
2524-A-18	18″	9.85
2524-A-24	24″	9.85
2524-A-36	36″	9.85
2524-A-48	48″	9.85
2524-A-60	60″	9.85

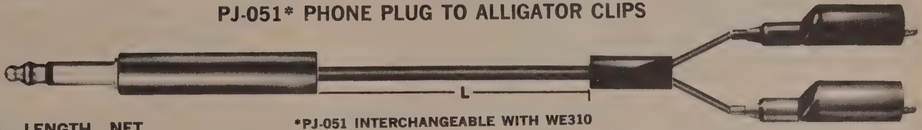
WIRED TIP, RING AND SLEEVE BOTH ENDS

CABLE DESCRIPTION
2 Cond. shielded microphone cable. Polyethylene insulation. Vinyl jacket, .231″ O.D. Nom. Cap. between cond. 18 pf/ft. Nom. Cap. between one cond. and remaining cond. connected to shield, 32 pf/ft.
COLOR: Cable, Gray. Phone Plug Handle Red.

MODEL	LENGTH	NET
2524-J-18	18″	12.85
2524-J-24	24″	12.85
2524-J-36	36″	12.85
2524-J-48	48″	12.85
2524-J-60	60″	12.85

MODEL 2524 ★QUANTITY DISC. CODE B

PJ-051* PHONE PLUG TO ALLIGATOR CLIPS



*PJ-051 INTERCHANGEABLE WITH WE310

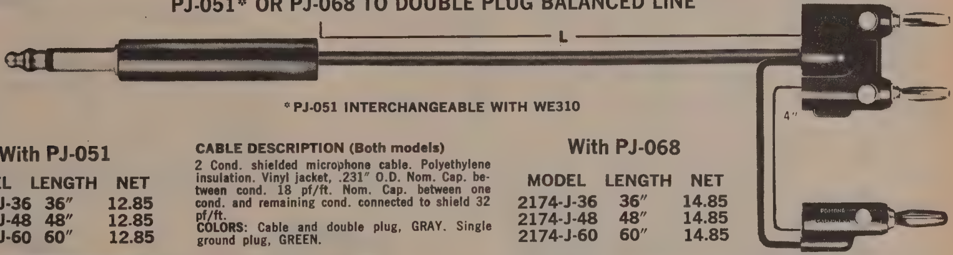
MODEL	LENGTH	NET
3352-A-36	36″	11.50
3352-A-60	60″	11.50
3352-A-84	84″	13.50
3352-A-120	120″	14.85

Plug wired Tip to Red Alligator and Ring to black alligator.
PHONE PLUG: PJ-051 with red handle.
CLIPS: Alligator, steel, cadmium plated.
INSULATORS: Vinyl, 1 red and 1 black.

CABLE DESCRIPTION:
Two Cond. Twisted pair, 18 AWG, Strand. 65 x 36 T.C. Vinyl Insulation, Vinyl Jacket .250″ O.D., Nom. Cap. 30 pf/ft.
COLOR: Cable, Gray.

MODEL 3352 ★QUANTITY DISC. CODE B

PJ-051* OR PJ-068 TO DOUBLE PLUG BALANCED LINE



*PJ-051 INTERCHANGEABLE WITH WE310

With PJ-051

MODEL	LENGTH	NET
2977-J-36	36″	12.85
2977-J-48	48″	12.85
2977-J-60	60″	12.85

CABLE DESCRIPTION (Both models)
2 Cond. shielded microphone cable. Polyethylene insulation. Vinyl jacket, .231″ O.D. Nom. Cap. between cond. 18 pf/ft. Nom. Cap. between one cond. and remaining cond. connected to shield 32 pf/ft.
COLORS: Cable and double plug, GRAY. Single ground plug, GREEN.

With PJ-068

MODEL	LENGTH	NET
2174-J-36	36″	14.85
2174-J-48	48″	14.85
2174-J-60	60″	14.85

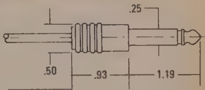
MODEL 2977 & 2174 ★QUANTITY DISC. CODE B

STANDARD PHONE PLUG BOTH ENDS

MODEL	LENGTH	NET
4053-B-12	12″	4.50
4053-B-24	24″	4.50
4053-B-36	36″	4.50
4053-B-48	48″	4.50
4053-B-60	60″	4.50

STANDARD 2 CONDUCTOR PLUG: Tip and sleeve, brass, nickel plated.
INSULATION: Polypropylene molded directly to handle and cable.

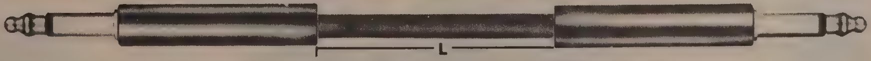
CABLE: Shielded microphone coax., Polyethylene insulation. Gray vinyl jacket .205″ O.D. Nom. Cap. 25 Pf/ft.
COLOR: Plug handle and cable, Gray.



MODEL 4053 ★QUANTITY DISC. CODE B

PJ-068* PHONE PLUG BOTH ENDS

NEW



*PJ-068 INTERCHANGEABLE WITH WE-309

MODEL NO.	LENGTH	NET
4095-J-18	18″	12.85
4095-J-24	24″	12.85
4095-J-36	36″	12.85
4095-J-48	48″	12.85
4095-J-60	60″	12.85

CABLE DESCRIPTION
2 Cond. shielded microphone cable. Polyethylene insulation. Vinyl jacket, .231″ O.D. Nom. Cap. between cond. 18 pf/ft. Nom. Cap. between one cond, and remaining cond. connected to shield, 32 pf/ft.
COLOR: Cable, Gray. Phone Plug Handle, Red.

MODEL 4095 ★QUANTITY DISC. CODE B

¾ DOUBLE BANANA PLUG PATCH CORDS

POMONA ELECTRONICS

These patch cords are indispensable for bridge transformer connections, three terminal capacitor measurements and general hook-up for two wire systems. They are horizontally and vertically stackable in parallel.

Tough thermoplastic material molded to plug body and cable insures maximum strength, moisture resistance and excellent insulative properties.

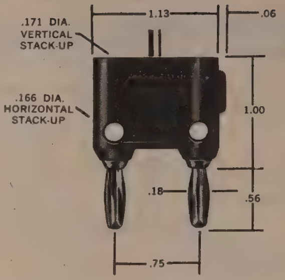
Used by leading industries in applications where extreme reliability is of prime importance.

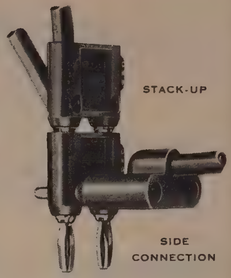
FEATURES . . .

- One piece beryllium copper heat treated spring for long life.
- Rounded spring design results in maximum contact area.
- GND., clearly molded on plug body and shell.
- Solder-bonded noise-free connections.

SPECIFICATIONS . . .

- Fits standard 0.166 dia. banana jacks, on ¾″ centers.
- Contact resistance less than 0.001 ohms per plug.
- Spring beryllium copper alloy 170 per QQ-C-533.
- Plug body brass per QQ-B-625, Alloy #360.
- Nickel plated per QQ-N-290, Class 2.





CABLE TYPE DESCRIPTION

TWO COND. TWISTED PAIR: 18 AWG, Strand. 65 x 36 T.C. Vinyl insulation. Vinyl jacket, .250″ O.D. Nom. Cap. 30 pf/ft. **COLOR:** Gray.

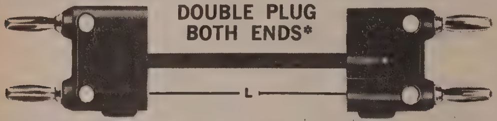
SHIELDED MICROPHONE CABLE: Polyethylene insulation. Vinyl jacket, .205″ O.D. Nom. Cap. 25 pf/ft. **COLOR:** Gray

NOTE: Molded double plug matches color of cable. Two cond. Twisted pair, GRAY. Shielded mic. cable, GRAY. Coaxial RG58C/U Cable, BLACK.

SHIELDED COAXIAL CABLE
Polyethylene insulation, Vinyl jacket

TYPES	RG58C/U	RG59B/U	RG62A/U
Color	Black	Black	Black
Nom. Imp.	50	75	93
CAP. pf./ft.	30	21	13.5
O.D.	.195	.242	.242

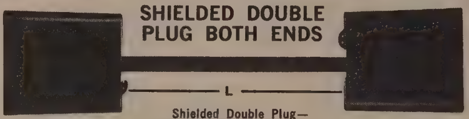
DOUBLE PLUG BOTH ENDS*



TWO COND. TWISTED PR.	SHIELDED MIC. CABLE	RG58C/U	RG59B/U	LENGTH	NET
2BA-18	2BB-18	2BC-18	2BE-18	18″	5.95
2BA-24	2BB-24	2BC-24	2BE-24	24″	5.95
2BA-30	2BB-30	2BC-30	2BE-30	30″	5.95
2BA-36	2BB-36	2BC-36	2BE-36	36″	5.95
2BA-48	2BB-48	2BC-48	2BE-48	48″	5.95
2BA-60	2BB-60	2BC-60	2BE-60	60″	5.95

★ QUANTITY DISC. CODE ●

SHIELDED DOUBLE PLUG BOTH ENDS

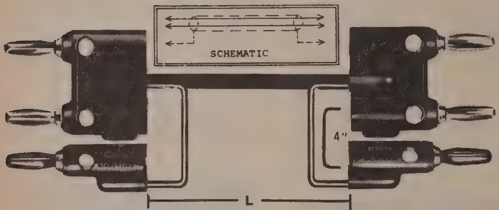


Shielded Double Plug—
black anodized aluminum

SHIELDED COAX. CABLE	LENGTH	NET
1550-C-18	18″	9.85
1550-C-24	24″	9.85
1550-C-30	30″	9.85
1550-C-36	36″	9.85
1550-C-48	48″	9.85
1550-C-60	60″	9.85

★ QUANTITY DISC. CODE ●

TWO COND. SHIELDED BALANCED LINE



NOTE: For BNC type TWINAX Patch cords and jacks, see Page 16.

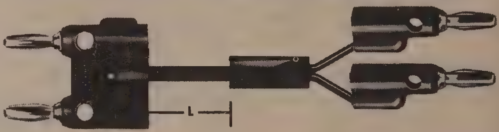
CABLE DESCRIPTION

2-Cond. shielded mic. cable. Polyethylene insulation. Vinyl jacket, .231″ O.D. Nom. Cap. between cond. 18 pf./ft. Nom. Cap. between one cond. and remaining cond. connected to shield, 32 pf./ft. COLOR: Cable and double plug, Gray. Single ground plug, Green.

★ QUANTITY DISC. CODE ●

MODEL	LENGTH	NET
1167-18	18″	9.85
1167-24	24″	9.85
1167-30	30″	9.85
1167-36	36″	9.85
1167-48	48″	9.85
1167-60	60″	9.85

DOUBLE PLUG TO SINGLE BANANA PLUGS



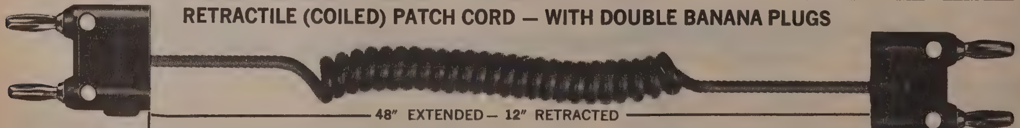
CABLE DESCRIPTION

TWO COND. TWISTED PAIR — 18 AWG, Strand. 65 x 36 T.C. Vinyl insulation. Vinyl jacket, .250″ O.D. Nom. Cap. 30 pf/ft. **COLOR:** Double Plug: Gray Single Plugs: Red, Black

MODEL	LENGTH	NET
1368-A-18	18″	7.50
1368-A-24	24″	7.50
1368-A-30	30″	7.50
1368-A-36	36″	7.50
1368-A-48	48″	7.50
1368-A-60	60″	7.50

★ QUANTITY DISC. CODE ●

RETRACTILE (COILED) PATCH CORD — WITH DOUBLE BANANA PLUGS



This one size cord can be used in place of many various lengths. Staking double plug on both ends with a shielded microphone cable. **DOUBLE BANANA PLUGS:** On ¾″ centers. Spring, one piece beryllium copper, heat treated, nickel plated. Tough Thermoplastic molded to plug bodies and cable. Color: Black.

CABLE: Shielded microphone. Center conductor 24 AWG (45 x 40), rubber insulated. Spiral T.C. shield with neoprene jacket .160 O.D. Color: Black.

QUANTITY DISC. CODE ●

NET 9.85

★ Various lengths may be aggregated for best quantity price.

BNC CABLE ASSEMBLIES & PATCH CORDS

POMONA
ELECTRONICS

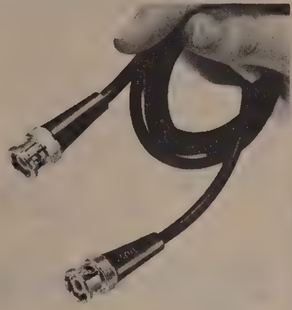
STRESS RELIEVED AND WEATHERPROOFED CRIMP BNC CABLE ASSEMBLIES

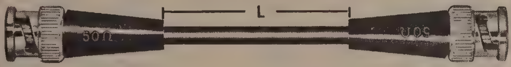
These new cable assemblies feature polyethylene collars which are injection molded directly onto cable jacket and connector body. The resulting encapsulation offers two outstanding advantages.

STRESS PROTECTION against failure from excess bending, flexing, and twisting.

WEATHERPROOF SEAL between cable and connector.

Connectors have non-tarnish finish and conform to MIL-C-39012.





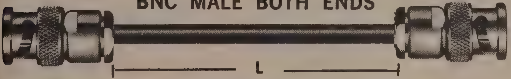
CONN: 1st END } Crimp Male BNC (Comparable to UG88E/U) **CABLE:** Shielded Coax., RG58C/U. **CONN: 2nd END** } Crimp Male BNC (Comparable to UG88E/U)

CONN: 1st END } Crimp Male BNC (Comparable to UG260B/U) **Cable:** Shielded Coax., RG59B/U or RG62A/U **CONN: 2nd END** } Crimp Male BNC (Comparable to UG260B/U)

RG58C/U 50 OHM	RG59B/U 75 OHM	NET	RG62A/U 93 OHM	NET	LENGTH
2249-C-12	2249-E-12	5.95	2249-M-12	6.85	12″
2249-C-24	2249-E-24	5.95	2249-M-24	6.85	24″
2249-C-36	2249-E-36	5.95	2249-M-36	6.85	36″
2249-C-48	2249-E-48	5.95	2249-M-48	6.85	48″
2249-C-60	2249-E-60	5.95	2249-M-60	6.85	60″

★ QUANTITY DISC. CODE L

BNC MALE BOTH ENDS



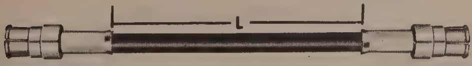
CONN: 1st END } M39012/16-0001 Male BNC **CABLE:** Shielded Coax., RG58C/U **CONN: 2nd END** } M39012/16-0001 Male BNC

CONN: 1st END } M39012/16-0002 Male BNC **CABLE:** Shielded Coax., RG59B/U or RG62A/U **CONN: 2nd END** } M39012/16-0002 Male BNC

SHIELDED MIC. CABLE 50 OHM	RG58C/U 50 OHM	RG59B/U 75 OHM	NET	RG62A/U 93 OHM	NET	LENGTH
BNC-B-18	BNC-C-18	BNC-E-18	6.50	BNC-M-18	6.95	18″
BNC-B-24	BNC-C-24	BNC-E-24	6.50	BNC-M-24	6.95	24″
BNC-B-30	BNC-C-30	BNC-E-30	6.50	BNC-M-30	6.95	30″
BNC-B-36	BNC-C-36	BNC-E-36	6.50	BNC-M-36	6.95	36″
BNC-B-48	BNC-C-48	BNC-E-48	6.50	BNC-M-48	6.95	48″
BNC-B-60	BNC-C-60	BNC-E-60	6.50	BNC-M-60	6.95	60″

★QUANTITY DISC. CODE B

"PUSH ON" BNC MALE BOTH ENDS



CONN: 1st END { Crimp "PUSH ON" BNC, Male. **CABLE:** Shielded Coax., RG58C/U. **CONN: 2nd END** { Crimp "PUSH ON" BNC, Male.

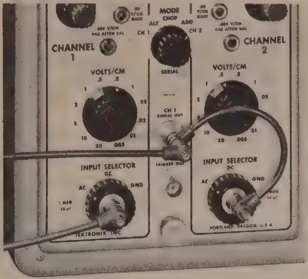
A test cable for rapid interconnection of equipment. Connector is pushed on and requires no twisting. Beryllium copper outer fingers maintain continuity of shield. Excellent for those hard to get at places.

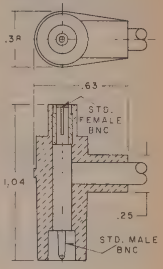
MODEL	LENGTH
3199-C-12	12″
3199-C-24	24″
3199-C-36	36″
3199-C-48	48″
3199-C-60	60″

MODEL 3199 ★ QUANTITY DISC. CODE B NET 5.50

"PUSH ON" STACKING BNC PATCH CORDS

These multiple stacking patch cords connect the center conductors of BNC jacks having a common chassis. Excellent for use with instruments such as oscilloscopes. Stacking feature enables an endless number of connections to the same point.

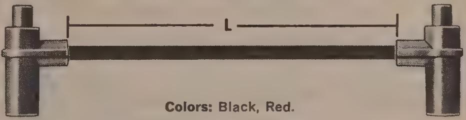




FEATURES:

- **CONTACT:** Male and Female, one piece heat treated beryllium copper, gold flashed.
- **WIRE:** 18 AWG., stranded 65 x 36 T.C., polyvinyl insulation.
- **INSULATION:** Tough thermoplastic, polypropylene, molded around contact and wire.
- **OPERATING TEMP.:** —25° C to + 125° C.

"PUSH ON" STACKING BNC MALE BOTH ENDS



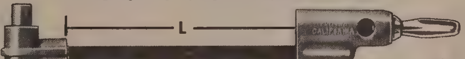
Colors: Black, Red.

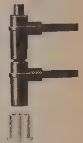
MODEL	LENGTH	MODEL	LENGTH
3201-4	4″	3201-24	24″
3201-8	8″	3201-36	36″
3201-12	12″	3201-48	48″
3201-18	18″	3201-60	60″

★ QUANTITY DISC. CODE L

MODEL 3201 (Specify Color) NET 2.50

"PUSH ON" STACKING BNC MALE TO STACKING BANANA PLUG



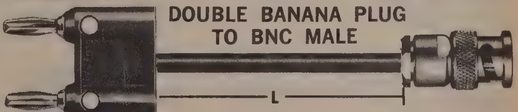


Colors: Black, Red.

MODEL	LENGTH	MODEL	LENGTH
3202-4	4″	3202-24	24″
3202-8	8″	3202-36	36″
3202-12	12″	3202-48	48″
3202-18	18″	3202-60	60″

MODEL 3202 (Specify Color) ★QUANTITY DISC. CODE B NET 2.50

DOUBLE BANANA PLUG TO BNC MALE



CONN.: 1ST END } Double Banana Plug, on ¾″ Centers. **CABLE:** Shielded coax., RG58C/U **CONN.: 2ND END** } M39012/16-0001 Male BNC

SHIELDED MIC. CABLE	SHIELDED COAX. CABLE	LENGTH	NET
2BB-BNC-18	2BC-BNC-18	18″	6.95
2BB-BNC-24	2BC-BNC-24	24″	6.95
2BB-BNC-30	2BC-BNC-30	30″	6.95
2BB-BNC-36	2BC-BNC-36	36″	6.95
2BB-BNC-48	2BC-BNC-48	48″	6.95
2BB-BNC-60	2BC-BNC-60	60″	6.95

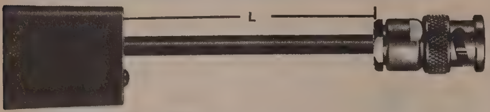
★QUANTITY DISC. CODE B

★ Various lengths may be aggregated for test quantity price. Other lengths available to order.

BNC CABLE ASSEMBLIES & PATCH CORDS

POMONA ELECTRONICS

SHIELDED DOUBLE PLUG TO BNC MALE



Shielded Double plug, on ¾″ centers. Black anodized aluminum.

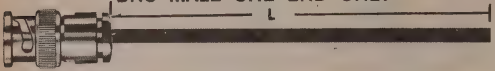
CABLE: Shielded coax., RG58C/U

CONN.: 2ND END UG88E/U, Male BNC

SHIELDED COAX. CABLE	LENGTH	SHIELDED COAX. CABLE	LENGTH
1555-C-18	18″	1555-C-36	36″
1555-C-24	24″	1555-C-48	48″
1555-C-30	30″	1555-C-60	60″

MODEL 1555 ★QUANTITY DISC. CODE [illegible] **NET 9.85**

BNC MALE ONE END ONLY



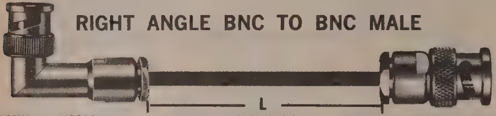
CONN: 1st END M39012/16-0001 Male BNC **CABLE:** Shielded Coax., RG58C/U **CONN: 2nd END** None

CONN: 1st END UG260B/U Male BNC Cable: Shielded Coax., RG59B/U or RG62A/U **CONN: 2nd END** None

RG58C/U	RG59B/U	NET	RG62A/U	NET	LENGTH
1661-C-12	1661-E-12	3.95	1661-M-12	4.60	12″
1661-C-24	1661-E-24	3.95	1661-M-24	4.60	24″
1661-C-36	1661-E-36	3.95	1661-M-36	4.60	36″
1661-C-48	1661-E-48	3.95	1661-M-48	4.60	48″
1661-C-60	1661-E-60	3.95	1661-M-60	4.60	60″

[illegible] ★QUANTITY DISC. CODE

RIGHT ANGLE BNC TO BNC MALE

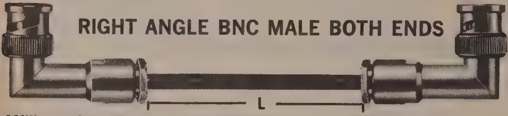


CONN.: 1ST END UG913A/U, Angle Male BNC **CABLE:** Shielded Coax., RG58C/U **CONN.: 2ND END** M39012/16-0001 Male BNC

SHIELDED COAX. CABLE	LENGTH	SHIELDED COAX. CABLE	LENGTH
1383-C-18	18″	1383-C-36	36″
1383-C-24	24″	1383-C-48	48″
		1383-C-60	60″

MODEL 1383 ★QUANTITY DISC. CODE [illegible] **NET 9.95**

RIGHT ANGLE BNC MALE BOTH ENDS

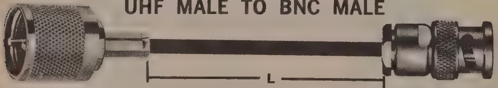


CONN.: 1ST END UG913A/U, Angle Male BNC **CABLE:** Shielded Coax., RG58C/U **CONN.: 2ND END** UG913A/U, Angle Male BNC

SHIELDED COAX. CABLE	LENGTH	SHIELDED COAX. CABLE	LENGTH
1155-C-18	18″	1155-C-36	36″
1155-C-24	24″	1155-C-48	48″
		1155-C-60	60″

MODEL 1155 ★QUANTITY DISC. CODE [illegible] **NET 12.85**

UHF MALE TO BNC MALE

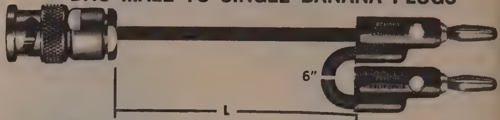


CONN.: 1ST END CRIMP UHF Male **CABLE:** Shielded Coax., RG58C/U. **CONN.: 2ND END** M39012/16-0001 Male BNC

SHIELDED COAX. CABLE	LENGTH	SHIELDED COAX. CABLE	LENGTH
1367-C-18	18″	1367-C-36	36″
1367-C-24	24″	1367-C-48	48″
		1367-C-60	60″

MODEL 1367 ★QUANTITY DISC. CODE [illegible] **NET 6.95**

BNC MALE TO SINGLE BANANA PLUGS



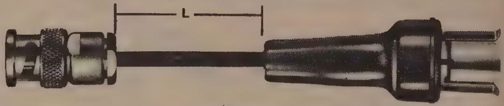
CONN: 1st END M39012/16-0001 Male BNC **CABLE:** Shielded Coax., RG58C/U **CONN: 2nd END** Single Banana Plugs Color: 1 Black, 1 Red.

CABLE DESCRIPTION:
Shielded coax., RG58C/U, Polyethylene insulation. Vinyl jacket, .195″ O.D. Nom. Cap. 28.5 pf/ft.

★QUANTITY DISC. CODE [illegible]

MODEL	LENGTH	NET
2241-C-18	18″	7.50
2241-C-24	24″	7.50
2241-C-36	36″	7.50
2241-C-48	48″	7.50

BNC MALE TO GR-874



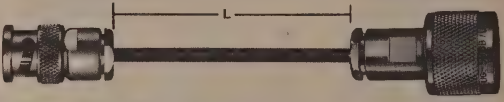
CONN: 1st END M39012/16-0001 Male BNC **CABLE:** Shielded Coax., RG58C/U **CONN: 2nd END** GR-874

CABLE DESCRIPTION:
Shielded coax., RG58C/U, Polyethylene Insulation. Vinyl jacket, .195″ O.D., Nom. Cap. 28.5 pf/ft.

★QUANTITY DISC. CODE [illegible]

MODEL	LENGTH	NET
1703-C-24	24″	14.85
1703-C-36	36″	14.85
1703-C-48	48″	14.85

BNC MALE TO SERIES "N" MALE



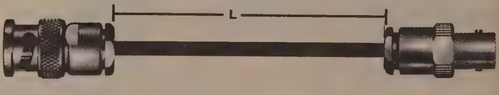
CONN: 1st END M39012/16-0001 Male BNC **CABLE:** Shielded coax., RG58C/U **CONN: 2nd END** UG536B/U "N" Male

CABLE DESCRIPTION:
Shielded coax., RG58C/U, Polyethylene Insulation. Vinyl jacket, .195″ O.D., Nom. Cap. 28.5 pf/ft.

★QUANTITY DISC. CODE [illegible]

MODEL	LENGTH	NET
1366-C-24	24″	7.85
1366-C-36	36″	7.85
1366-C-48	48″	7.85

BNC MALE TO BNC FEMALE



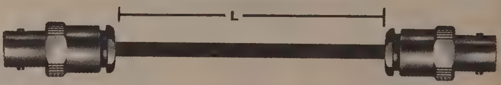
CONN: 1st END M39012/16-0001 Male BNC **CABLE:** Shielded coax., RG58C/U **CONN: 2nd END** UG89C/U Female BNC

CABLE DESCRIPTION:
Shielded Coax., RG58C/U, Polyethylene Insulation. Vinyl jacket, .195″ O.D., Nom. Cap. 28.5 pf/ft.

★QUANTITY DISC. CODE [illegible]

MODEL	LENGTH	NET
2223-C-12	12″	7.50
2223-C-24	24″	7.50
2223-C-36	36″	7.50
2223-C-48	48″	7.50
2223-C-60	60″	7.50

BNC FEMALE BOTH ENDS



CONN: 1st END UG89C/U Female BNC **CABLE:** Shielded Coax., RG58C/U **CONN: 2nd END** UG89C/U Female BNC

CABLE DESCRIPTION:
Shielded coax., RG58C/U, Polyethylene Insulation. Vinyl jacket, .195″ O.D., Nom. Cap. 28.5 pf/ft.

★QUANTITY DISC. CODE F

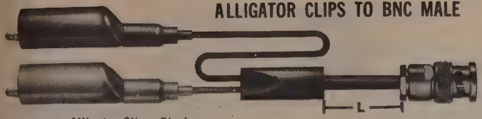
MODEL	LENGTH	NET
1808-C-12	12″	7.50
1808-C-24	24″	7.50
1808-C-36	36″	7.50
1808-C-48	48″	7.50
1808-C-60	60″	7.50

★ Various lengths may be aggregated for best quantity price. Other lengths available to order.

PATCH CORDS & CABLE ASSEMBLIES

POMONA
ELECTRONICS

ALLIGATOR CLIPS TO BNC MALE



CONN.: 1ST END Alligator Clips, Steel, cad plated. Insulators, Vinyl: Black/Red.

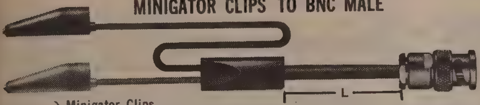
CABLE: Shielded Mic. or Shielded Coax, RG58C/U

CONN.: 2ND END M39012/16-0001 BNC, Male.

SHIELDED MIC. CABLE	SHIELDED COAX. CABLE	LENGTH	NET
AL-B-BNC-18	AL-C-BNC-18	18″	6.50
AL-B-BNC-24	AL-C-BNC-24	24″	6.50
AL-B-BNC-30	AL-C-BNC-30	30″	6.50
AL-B-BNC-36	AL-C-BNC-36	36″	6.50
AL-B-BNC-48	AL-C-BNC-48	48″	6.50
AL-B-BNC-60	AL-C-BNC-60	60″	6.50

★ QUANTITY DISC. CODE B

MINIGATOR CLIPS TO BNC MALE



CONN.: 1ST END Minigator Clips, Steel, cad plated Insulators, Vinyl: Black/Red.

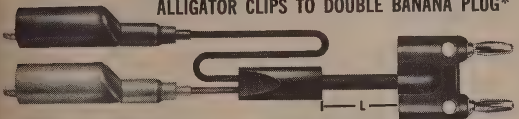
CABLE: Shielded Mic. or Shielded Coax, RG58C/U.

CONN.: 2ND END M39012/16-0001 BNC, Male Male

SHIELDED MIC. CABLE	SHIELDED COAX. CABLE	LENGTH	NET
MG-B-BNC-18	MG-C-BNC-18	18″	6.50
MG-B-BNC-24	MG-C-BNC-24	24″	6.50
MG-B-BNC-30	MG-C-BNC-30	30″	6.50
MG-B-BNC-36	MG-C-BNC-36	36″	6.50
MG-B-BNC-48	MG-C-BNC-48	48″	6.50
MG-B-BNC-60	MG-C-BNC-60	60″	6.50

★ QUANTITY DISC. CODE B

ALLIGATOR CLIPS TO DOUBLE BANANA PLUG*



CONN.: 1ST END Alligator Clips, Steel, cad plated Insulators, Vinyl: Black/Red.

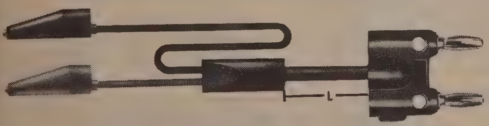
CABLE: Two Cond. Twisted Pair, Shielded Mic. or Shielded Coax, RG58C/U.

CONN.: 2ND END Double Banana Plug, on ¾″ centers.

TWO COND. TWISTED PAIR	SHIELDED MIC. CABLE	SHIELDED COAX. CABLE	LENGTH	NET
2BA-AL-18	2BB-AL-18	2BC-AL-18	18″	6.95
2BA-AL-24	2BB-AL-24	2BC-AL-24	24″	6.95
2BA-AL-30	2BB-AL-30	2BC-AL-30	30″	6.95
2BA-AL-36	2BB-AL-36	2BC-AL-36	36″	6.95
2BA-AL-48	2BB-AL-48	2BC-AL-48	48″	6.95
2BA-AL-60	2BB-AL-60	2BC-AL-60	60″	6.95

★ QUANTITY DISC. CODE B

MINIGATOR CLIPS TO DOUBLE BANANA PLUG*



CONN.: 1ST END Minigator Clips, Steel, cad plated Insulators, Vinyl: Black/Red.

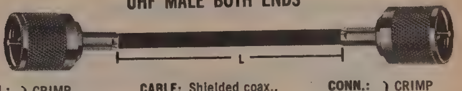
CABLE: Two Cond. Twisted pair, Shielded Mic. or Shielded Coax, RG58C/U.

CONN.: 2ND END Double Banana Plug, on ¾″ centers.

TWO COND. TWISTED PAIR	SHIELDED MIC. CABLE	SHIELDED COAX. CABLE	LENGTH	NET
2BA-MG-18	2BB-MG-18	2BC-MG-18	18″	6.95
2BA-MG-24	2BB-MG-24	2BC-MG-24	24″	6.95
2BA-MG-30	2BB-MG-30	2BC-MG-30	30″	6.95
2BA-MG-36	2BB-MG-36	2BC-MG-36	36″	6.95
2BA-MG-48	2BB-MG-48	2BC-MG-48	48″	6.95
2BA-MG-60	2BB-MG-60	2BC-MG-60	60″	6.95

★ QUANTITY DISC. CODE B

UHF MALE BOTH ENDS



CONN.: 1ST END CRIMP UHF, Male

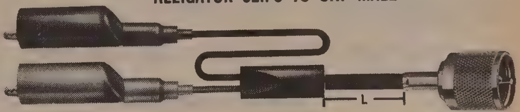
CABLE: Shielded coax., RG58C/U

CONN.: 2ND END CRIMP UHF, Male

SHIELDED COAX. CABLE	LENGTH	NET
UHF-C-18	18″	6.85
UHF-C-24	24″	6.85
UHF-C-36	36″	6.85
UHF-C-48	48″	6.85
UHF-C-60	60″	6.85

★ QUANTITY DISC. CODE B

ALLIGATOR CLIPS TO UHF MALE



CONN.: 1ST END Alligator Clips, Steel, cad plated Insulators, Vinyl: Black/Red.

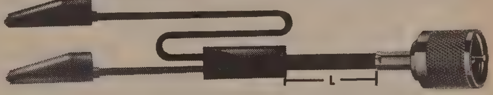
CABLE: Shielded coax., RG58C/U

CONN.: 2ND END CRIMP UHF, Male

SHIELDED COAX. CABLE	LENGTH	NET
AL-C-UHF-18	18″	6.50
AL-C-UHF-24	24″	6.50
AL-C-UHF-36	36″	6.50
AL-C-UHF-48	48″	6.50
AL-C-UHF-60	60″	6.50

★ QUANTITY DISC. CODE B

MINIGATOR CLIPS TO UHF MALE



CONN.: 1ST END Minigator Clips, Steel, cad plated Insulators, Vinyl: Black/Red.

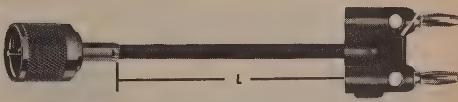
CABLE: Shielded Coax., RG58C/U

CONN.: 2ND END CRIMP UHF, Male

SHIELDED COAX. CABLE	LENGTH	NET
MG-C-UHF-18	18″	6.50
MG-C-UHF-24	24″	6.50
MG-C-UHF-36	36″	6.50
MG-C-UHF-48	48″	6.50
MG-C-UHF-60	60″	6.50

★ QUANTITY DISC. CODE B

UHF MALE TO DOUBLE BANANA PLUG*



CONN.: 1ST END CRIMP UHF, Male

CABLE: Shielded Coax., RG58C/U

CONN.: 2ND END Double Banana Plug, on ¾″ centers.

SHIELDED COAX. CABLE	LENGTH	NET
2BC-UHF-18	18″	6.95
2BC-UHF-24	24″	6.95
2BC-UHF-36	36″	6.95
2BC-UHF-48	48″	6.95
2BC-UHF-60	60″	6.95

★ QUANTITY DISC. CODE B

***NOTE:** Molded double plug matches color of cable. Two cond. Twisted pair, GRAY. Shielded mic. cable, GRAY. Coaxial RG58C/U cable, BLACK.

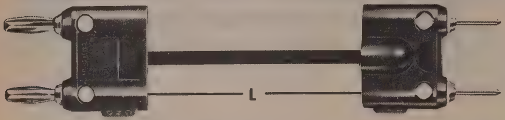
1. Other CABLE COLORS available to order on the Two Cond. Twisted Pair and Shielded Mic. cable models, with plug to match. COLORS: Black, Brown, Red, Orange, Yellow, Green, Blue, Violet, Gray, White.
2. Other lengths and cable types available to order.

★ Various lengths may be aggregated for best quantity price.

PATCH CORDS & CABLE ASSEMBLIES

POMONA ELECTRONICS

DOUBLE BANANA PLUG TO DOUBLE PIN TIP PLUG



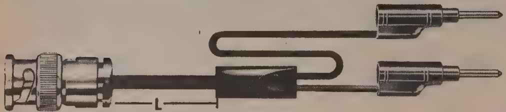
CONN: 1st END Double Banana Plug, on ¾″ Centers **CABLE:** Shielded Coax., RG58C/U **CONN: 2nd END** Double Pin Tip Plug, .080 Dia. on ¾″ Centers

CABLE DESCRIPTION:
Shielded coax., RG58C/U, Polyethylene insulation. Vinyl jacket, .195″ O.D., Nom. Cap. 28.5 pf/ft.

MODEL	LENGTH
2288-C-18	18″
2288-C-24	24″
2288-C-36	36″
2288-C-48	48″
2288-C-60	60″

MODEL 2288 ★QUANTITY DISC. CODE B **NET 5.95**

BNC MALE TO STACK-UP PIN TIPS



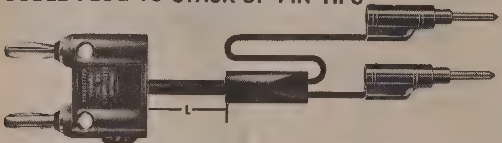
CONN: 1st END M39012/16-0001 Male BNC **CABLE:** Shielded Coax., RG58C/U **CONN: 2nd END** Single Stack-Up Pin Tip Plugs, .080 Dia.; Color: 1 Black, 1 Red.

CABLE DESCRIPTION:
Shielded coax., RG58C/U, Polyethylene insulation. Vinyl jacket, .195″ O.D., Nom. Cap. 28.5 pf/ft.

MODEL	LENGTH
2882-C-18	18″
2882-C-24	24″
2882-C-36	36″
2882-C-48	48″
2882-C-60	60″

MODEL 2882 ★ QUANTITY DISC. CODE B **NET 7.50**

DOUBLE PLUG TO STACK-UP PIN TIPS



CONN: 1st END Double Banana Plug, on ¾″ Centers. **CABLE:** Shielded Coax., RG58C/U **CONN: 2nd END** Single Stack-Up Pin Tip Plugs, .080 Dia. Color: 1 Black, 1 Red.

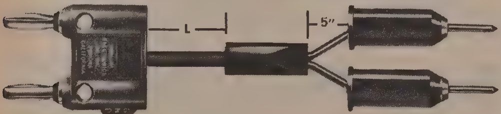
CABLE DESCRIPTION
Shielded coax., RG58C/U, Polyethylene insulation. Vinyl jacket, .195″ O.D., Nom. Cap. 28.5 pf/ft.

COLOR: Cable and Double Plug, Black.

MODEL	LENGTH	NET
2BC-PP-18	18″	7.50
2BC-PP-24	24″	7.50
2BC-PP-36	36″	7.50
2BC-PP-48	48″	7.50
2BC-PP-60	60″	7.50

★ QUANTITY DISC. CODE B

DOUBLE PLUG TO SINGLE PIN TIPS



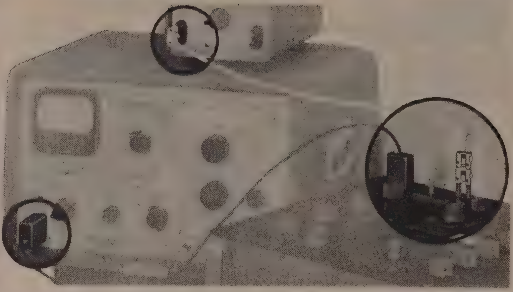
CONN: 1st END Double Banana Plug, on ¾″ Centers. **CABLE:** Two Cond. Twisted Pair **CONN: 2nd END** Single Pin Tip Plugs, .080 Dia. Color: 1 Black, 1 Red

CABLE DESCRIPTION
Two Cond. Twisted pair. 18 AWG, Strand. 65 x 36 T.C. Vinyl insulation, vinyl jacket, .250″ O.D. Nom. Cap. 30 pf/ft.

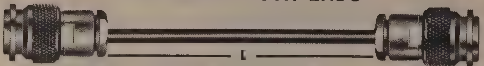
MODEL	LENGTH	NET
2184-A-24	24″	7.85
2184-A-36	36″	7.85
2184-A-48	48″	7.85
2184-A-60	60″	7.85

COLOR: Cable and Double plug, Gray.

★ QUANTITY DISC. CODE B



TNC MALE BOTH ENDS



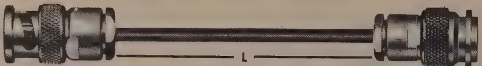
CONN: 1st END Male TNC **CABLE:** Shielded coax., RG58C/U **CONN: 2nd END** Male TNC

CABLE DESCRIPTION
Shielded coax., RG58C/U, Polyethylene Insulation. Vinyl jacket, .195″ O.D., Nom. Cap. 28.5 pf/ft.

MODEL	LENGTH	NET
1944-C-12	12″	8.85
1944-C-24	24″	8.85
1944-C-36	36″	8.85
1944-C-48	48″	8.85
1944-C-60	60″	8.85

★QUANTITY DISC. CODE B

BNC MALE TO TNC MALE



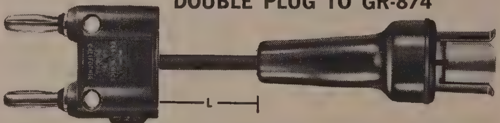
CONN: 1st END M39012/16-0001 Male BNC **CABLE:** Shielded coax., RG58C/U **CONN: 2nd END** Male TNC

CABLE DESCRIPTION:
Shielded Coax., RG58C/U, Polyethylene Insulation. Vinyl jacket, .195″ O.D., Nom. Cap. 28.5 pf/ft.

MODEL	LENGTH	NET
1948-C-12	12″	7.85
1948-C-24	24″	7.85
1948-C-36	36″	7.85
1948-C-48	48″	7.85
1948-C-60	60″	7.85

★QUANTITY DISC. CODE B

DOUBLE PLUG TO GR-874



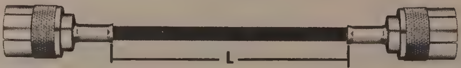
CONN: 1st END Double Banana Plug, on ¾″ Centers. **CABLE:** Shielded Coax., RG58C/U **CONN: 2nd END** GR-874

CABLE DESCRIPTION
Shielded coax., RG58C/U, Polyethylene Insulation. Vinyl jacket, .195″ O.D., Nom. Cap. 28.5 pf/ft.

MODEL	LENGTH	NET
2243-C-24	24″	14.85
2243-C-36	36″	14.85
2243-C-48	48″	14.85

COLOR: Cable and double plug, Black. ★ QUANTITY DISC. CODE D

PUSH ON UHF MALE BOTH ENDS



CONN: 1st END Crimp Push on UHF, Male. **CABLE:** Shielded Coax., RG58C/U **CONN: 2nd END** Crimp Push on UHF, Male.

A test cable for rapid interconnection of equipment. Connector is pushed on and requires no screwing on of shell. Continuity of shield is maintained. Excellent for those hard to get at places.

MODEL	LENGTH
3137-C-12	12″
3137-C-24	24″
3137-C-36	36″
3137-C-48	48″
3137-C-60	60″

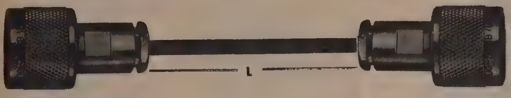
MODEL 3137 ★QUANTITY DISC. CODE B **NET 7.85**

★ Various lengths may be aggregated for best quantity price. Other lengths available to order.

PATCH CORDS & CABLE ASSEMBLIES

POMONA
ELECTRONICS

SERIES "N" MALE BOTH ENDS



CONN: 1st END UG536B/U "N" Male

CABLE: Shielded Coax., RG58C/U.

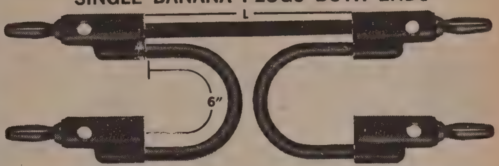
CONN: 2nd END UG536B/U "N" Male

CABLE DESCRIPTION:
Shielded coax., RG58C/U Polyethylene insulation. Vinyl jacket, .195" O.D., Nom. Cap. 28.5 pf/ft.

MODEL	LENGTH
2256-C-24	24"
2256-C-36	36"
2256-C-48	48"
2256-C-60	60"

[redacted] ★ QUANTITY DISC. CODE ● **NET 8.50**

SINGLE BANANA PLUGS BOTH ENDS



CONN: 1st END Single Banana Plugs Colors: Inner Conductor plug, Red. Ground Plug, Black.

CABLE: Shielded Coax., RG122/U

CONN: 2nd END Single Banana Plugs. Colors: Inner Conductor Plug, Red. Ground Plug, Black.

CABLE DESCRIPTION:
Shielded coax., RG122/U polyethylene insulation. Vinyl jacket, .160" O.D., Nom. Cap. 29.5 pt/ft.

MODEL	LENGTH
2239-R-24	24"
2239-R-36	36"
2239-R-48	48"
2239-R-60	60"

[redacted] ★ QUANTITY DISC. CODE ● **NET 7.85**

SERIES "N" MALE BOTH ENDS

CONN: 1st END UG21E/U "N" Male

CABLE: Coax., RG213/U or RG214/U

CONN: 2nd END UG21E/U "N" Male

RG213/U	NET	CABLE TYPES LENGTH	RG214/U	NET
1658-S-18	12.50	18"	1658-T-18	16.85
1658-S-24	12.50	24"	1658-T-24	16.85
1658-S-36	12.50	36"	1658-T-36	16.85
1658-S-48	13.25	48"	1658-T-48	18.60
1658-S-60	14.00	60"	1658-T-60	20.35

[redacted] ★ QUANTITY DISC. CODE ●

ALLIGATOR CLIPS BOTH ENDS

CONN: 1st END Alligator Clips, Steel, cad plated Insulators, Vinyl: Black/Red.

CABLE: Shielded Coax., RG58C/U

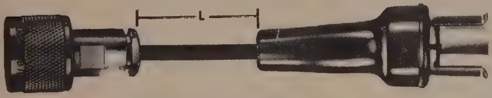
CONN: 2nd END Alligator Clips, Steel, cad plated Insulators, Vinyl: Black/Red.

CABLE DESCRIPTION:
Shielded coax., RG58C/U, Polyethylene Insulation Vinyl jacket, .195" O.D. Nom. Cap. 28.5 pf/ft.

MODEL	LENGTH
1152-C-12	12"
1152-C-24	24"
1152-C-36	36"
1152-C-48	48"
1152-C-60	60"

[redacted] ★ QUANTITY DISC. CODE ● **NET 7.50**

SERIES "N" MALE TO GR-874



CONN: 1st END UG536B/U "N" Male

CABLE: Shielded Coax., RG58C/U

CONN: 2nd END GR-874

CABLE DESCRIPTION:
Shielded coax., RG58C/U, Polyethylene Insulation. Vinyl jacket, .195" O.D., Nom. Cap. 28.5 pf/ft.

MODEL	LENGTH
2438-C-24	24"
2438-C-36	36"
2438-C-48	48"
2438-C-60	60"

[redacted] ★ QUANTITY DISC. CODE ● **NET 16.85**

GR-874 TO GR-874

CONN: 1st END GR-874

CABLE: Shielded coax., RG58C/U

CONN: 2nd END GR-874

CABLE DESCRIPTION:
Shielded coax., RG58C/U, Polyethylene Insulation. Vinyl jacket, .195" O.D., Nom. Cap. 28.5 pf/ft.

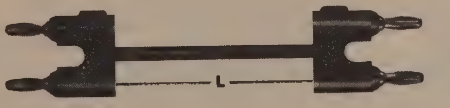
MODEL	LENGTH
2316-C-24	24"
2316-C-36	36"
2316-C-48	48"
2316-C-60	60"

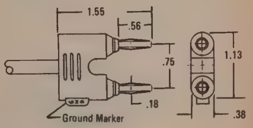
[redacted] ★ QUANTITY DISC. CODE ● **NET 29.95**

NON-STACKING DOUBLE PLUG BOTH ENDS

This non-stacking cable is excellent for those applications requiring no exposed metal when inserted. There is no side or top stacking.

DOUBLE BANANA PLUG: On ¾" center. Spring, one-piece beryllium copper, heat treated, nickel plated. Tough thermoplastic molded onto double plug body and cable.





A—CABLE DESCRIPTION
Two Cond. Twisted pair, 18 AWG, Strand. 65 x 36 T.C. Vinyl Insulation, Vinyl Jacket .250" O.D., Nom. Cap. 30 pf/ft.
COLOR: Cable and Double Plug, Gray.

C—CABLE DESCRIPTION
Shielded coax., RG58C/U, Polyethylene insulation, Vinyl jacket, .195" O.D., Nom. Cap. 30 pf/ft.
COLOR: Cable & Double Plug, Black.

E—CABLE DESCRIPTION
Shielded coax. RG59B/U, Polyethylene insulation, Vinyl jacket, .242 O.D. Nom. Cap. 21 pf/ft.
COLOR: Cable & Double Plug, Black.

[redacted]

★QUANTITY DISC. CODE ●

NEW

MODEL	LENGTH
4059-A-12	12"
4059-A-24	24"
4059-A-36	36"
4059-A-48	48"
4059-A-60	60"

MODEL	LENGTH
4059-C-12	12"
4059-C-24	24"
4059-C-36	36"
4059-C-48	48"
4059-C-60	60"

NEW

MODEL	LENGTH	NET
4059-E-12	12"	5.45
4059-E-24	24"	5.45
4059-E-36	36"	5.45
4059-E-48	48"	5.45
4059-E-60	60"	5.45

★ Various lengths may be aggregated for best quantity price. Other lengths available to order.

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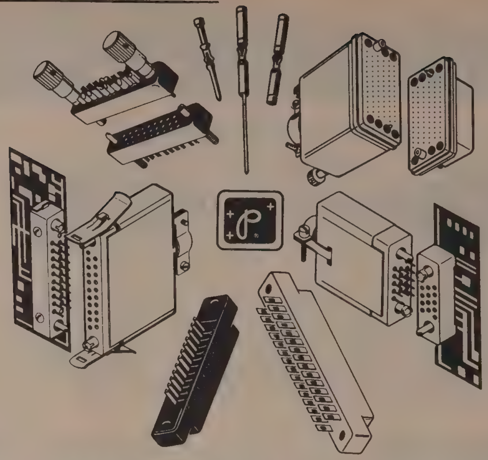
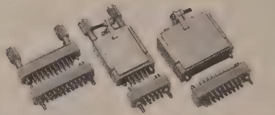
Positronics' complete in-house manufacturing and design capabilities offer the best price, product and delivery in the industry. Send for free samples and catalogs.
10 day delivery.



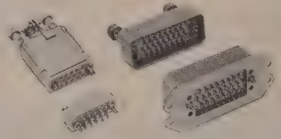
STANDARD CONNECTORS

RECTANGULAR, RACK & PANEL CONNECTORS



SGM AND SLM, SUB-MINIATURE RECTANGULAR CONNECTORS

Number of Contacts — 5, 7, 9, 14, 20, 26, 29, 34, 44, & 50.
Contacts — Copper Alloy, Gold Plated, 5 & 3 AMP Rated.
Insulator — Glass Filled DAP, SDG-F
Polarization — Guides or Rotating and Fixed Threadlocks, as Desired.
Termination — Solder Cup, Accepts 22 AWG Wire
Hoods — Available for Most Sizes

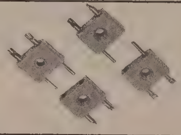


GM AND XGM SERIES, MINIATURE RECTANGULAR

Number of Contacts — 7, 8, 9, 14, 18, 20, 21, 26, 34, 41, & 50.
Contacts — Copper Alloy, Gold Plated, 7.5 AMP Rated.
Insulator — Glass Filled DAP, SDG-F
Polarization — Guides or Rotating and Fixed Threadlocks, as Desired.
Termination — Solder Cup, 20 AWG Wire, and Turret Style.
Hoods & Shells — Available on All Size Connectors. Hoods Have Both Top & Side Cable Opening:
Underwriters' Laboratory Listed*

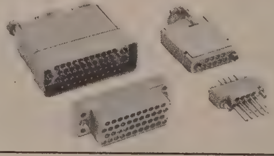
GH & MGH SERIES, MINIATURE AND SUB-MINIATURE HEXAGONAL

Number of Contacts — 4, 5, 7, 9, and 10, Miniature, 3 for Sub-Miniature.
Contacts — Copper Alloy, Gold Plated, 5 & 7.5 AMPS.
Termination — Solder Cup Accepts 20 & 22 AWG Wire
Insulator — Glass filled DAP, SDG-F
Polarization — Contact Placement Permits Proper Engagement.
Hoods — Glass Filled DAP, SDG-F & Aluminum. Order With or Without Strain Relief.
Accessories — Vibration Locks, Mounting Nuts and Lock Washers.



GF SERIES, MINIATURE, SIDE MOUNTING

Number of Contacts — 2 and 4.
Contacts — Copper Alloy, Gold Plated, 7.5 AMP Rated.
Termination — Solder Cup, Accepts 20 AWG Wire, Dip Solder, .025 Dia. for P.C. Mount.
Insulator — Glass Filled DAP, SDG-F and Glass Phenolic.
Polarization — Contact Arrangement Provides Polarization
Optional — Closed Entry Contacts



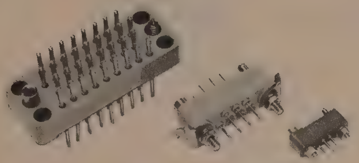
GMCT SERIES, MINIATURE RECTANGULAR REMOVABLE CONTACT CONNECTORS

Number of Contacts — 9, 14, 18, 20, 26, 34, 42, 50, 66, 75 & 104.
Removable Contacts — Copper Alloy, Gold Plated, 13 & 7.5 AMP Rated
Contact Termination — Solder, Dip Solder, Crimp and Wire Wrap Wire Size, 14 to 30 AWG
Insulator — Glass Filled DAP, SDG-F
Polarization — Guides or Fixed and Rotating Threadlocks, as Desired
Hoods & Shells — Aluminum, Available for all Sizes.
Underwriters' Laboratory Listed*

CONTACTS, REMOVABLE, SOLDER, DIP SOLDER, CRIMP AND WIRE WRAP

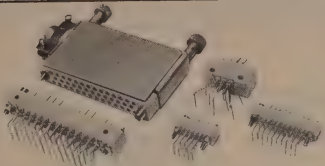
Removable contacts are for use with GMCT Series connector bodies. Contacts are machined copper alloy, gold plated over copper flash. Crimp and solder styles are sized to accept 14 to 30 AWG wire. Wire wrap terminations are .045 and .025 Sq.-dip solder terminations are .026 dia. Crimp and solder styles are available in both .062 and .040 pin diameters. Wire wrap and dip solder are .062 dia. Contacts may be purchased on reels of 2,000 for automatic installation. Contact crimping tools, insertion tools, and removal tools are available from stock.

PRINTED CIRCUIT CONNECTORS



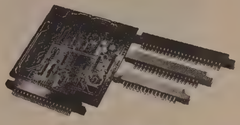
GM AND SGM SERIES, PERPENDICULAR MOUNTED ON P.C. BOARD, PIN OR SOCKET

Number of Contacts — 7, 8, 9, 14, 18, 20, 21, 26, 34, 41, and 50, GM Series.
— 5, 7, 9, 14, 20, 26, 29, 34, 44 and 50, SGM Series.
Contacts — Rated 5 AMPS for GM Series, and 3 AMPS for SGM Series. Copper Alloy, Gold Plated, Available Pin or Socket Type.
Termination — Dip Solder, .025 Dia. Tails, 4/32, 5/32 and 6/32 Long.
Spacing — .150 Between Contact Spacing for GM Series and .094 between Contacts on SGM Series.
Insulator — Glass filled DAP, SDG-F
Polarization — Guides and Threadlocks, Also May Be Used For Mechanical Mounting of Connector P.C. Board
Hoods — Available for Most Sizes of Mating Cable Connector
Underwriters' Laboratory Listed for GM Series*



GMPL AND SMPL SERIES, PARALLEL MOUNTED ON P.C. BOARD

Number of Contacts — 7, 8, 10, 14, 16, 19, 24, and 37 for GMPL Series.
— 5, 7, 9, 14, 20, 26, and 29 for SMPL Series.
Contacts — Available in Pin Type Only. 5 AMP Rating for GMPL Series and 3 AMPS for SMPL Series. Copper Alloy, Gold Plated.
Termination — Dip Solder, .040 and .025 Dia. for GMPL, .020 Dia. for SMPL Series
Spacing — .150 Between contact Spacing on Board for GMPL Series, and .094 Between Contacts for SMPL Series.
Insulator — Glass Filled, DAP, SDG-F.
Polarization — Guides and Threadlocks for Positive Alignment and Lock.
Mounting — Holes In Connector Body Allow For Fastener Mounting to P.C. Board. Also May Be Cemented to Board.
Mating Connector — Socket Cable. Select from GM or GMCT Series for GMPL and SGM Series for SMPL.



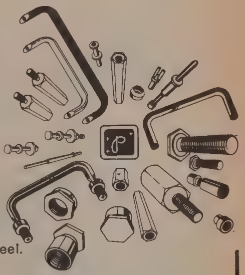
GDP, GKD, AND GQD SERIES, DOUBLE ROW, CARD RECEPTACLE, .156 CENTERS

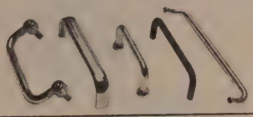
Number of Contacts — 10/20, 15/30, 18/36 and 22/44.
Contacts — Bellows, Gold Plated, Phosphor Bronze for GPD Series and Beryllium Copper for GKD and GQD Series. 5 AMP Rated.
Termination — Dip Solder or Eyelet Styles
Insulator — Glass Filled DAP, SDG-F For GPD and GQD Series. Phenolic For GKD Series.
Board Thickness — To Accommodate .054 through .071 P.C. Board Thickness.
Polarization — Between Contact Keys
Mounting — .128 Clearance Holes, Bushings or Threaded Inserts.

GPC SERIES, SINGLE ROW CARD RECEPTACLE, .156 CENTERS

Number of Contacts — 6, 10, 12, 15 and 22.
Contacts — Leaf Type, Gold Plated, Beryllium Copper. 5 AMP Rated.
Termination — Dip Solder or Eyelet Styles
Insulator — Glass Filled Phenolic.
Board Thickness — To Accommodate .054 Through .071 P.C. Board Thickness.
Polarization — In Contact and Between Contact Keys
Mounting — .128 Clearance Holes and Floating Bushings.

ELECTRONIC HARDWARE



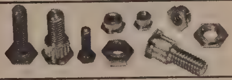


HANDLES — INTERNALLY THREADED. ROUND, OVAL FOLDING 90° AND 180°, 45° OFFSET AND SLANT STYLE.

Material — Aluminum, Brass and Stainless Steel
Finish — Anodize, Oxide, Nickel and Passivate.
Lengths — Sixteenth Inch Increments.
Leg Height — 1 Inch Minimum
(Specials Will Be Considered)

SPACERS — CLEARANCE HOLE, THREADED, STANDOFFS, MOUNTING POST, HEX and ROUND

Material — Aluminum, Brass, Nylon, and Stainless Steel.
Finish — Anodize, Cadmium, Nickel and Passivate.
Lengths — Based on Sixteenth Inch Increments
(Most Sizes, Lengths and Threads are Stocked)

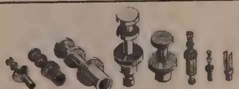


CLINCHON NUTS AND STUDS. FLUSH, STANDOFF, EXTENSION AND STANDARD

Material — Stainless Steel
Finish — Passivate
Diameters — 3/16", 1/4", 5/16" and 7/16".
Panel Thickness — .040, .062, .093, .125, .156, .187, .250 and .312

CONTACTS — PIN AND SOCKET, FLEXIBLE CIRCUIT AND PRINTED CIRCUIT

Material — Copper Alloy
Finish — Gold, Electrolytic Tin & Silver.
Termination — Swage, Solder, Crimp, Dip Solder and *Wire Wrap*
(Specials Will Be Considered)



TERMINALS — TURRET, FEED-THRU, BIFURCATED AND HOLLOW, NON-INSULATED

Applications — MIL-T55155, Industrial Standards. Micro-Miniature, Sub-Miniature, Miniature and Standard Sizes. NAS Also Available
Material — Copper Alloy
Finish — Electro-Tin, Silver, Tin-Lead and Hot Solder Dip
Termination — Solder and Swage.

***Wire Wrap* is Regis. Mark of Garner-Denver Corp.**

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DUAL CONTACT RELAY TEST SOCKETS

FOR USE WITH

RELAYS, SWITCHES, TRANSFORMERS, LAMPS, TRANSISTORS, HYBRIDS, ETC.

GENERAL INFORMATION

These test sockets are dual-contact (Kelvin type) with two mutually insulated contacts for each terminal. They permit precise contact resistance measurements by the four terminal method.

Qualco is now the sole manufacturer of this line of dual-contact relay test sockets and the model RT-905 Relay Tester.....formerly manufactured by Electronic Engineering Company of California (EECO) and, then, Photologic Company. We are manufacturing all of the old EECO and Photologic part numbers, as well as adding new types to keep up with today's demands. Some of the new standard types available are dual-contact sockets to fit most of the popular 0.100 in. grid relays, and some of the TO-5 transistor case relays. Also, some of the new DIP packages are available.

The socket line now includes more than 500 different configurations. Since 1960, the AS series sockets have been used by many of the major relay manufacturers, as well as relay users. Areas of use include QC, receiving inspection, production test and evaluation. Environmental testing is being done with the high temperature sockets.

Many standard sockets are maintained in stock for immediate delivery, and all standard sockets are available in two weeks or less. Should you desire a socket not shown on our list....that is, a special....it requires about 30 days and a small set-up charge.

SOCKET FEATURES

- Available in more than 500 different configurations.
- Accepts all types of terminals including solder hooks, flattened and pierced, rectangular, round, turret, etc.
- Permits precise relay contact resistance measurement by the four terminal method.
- Plug-in testing of any type solder terminal component.
- 0.1 inch grid dual contact sockets are now available.

SOCKET SPECIFICATIONS

CONTACTS=Gold plated beryllium copper. Two mutually insulated contacts for each terminal on the relay header.

BODY MAT'L=Molded epoxy.

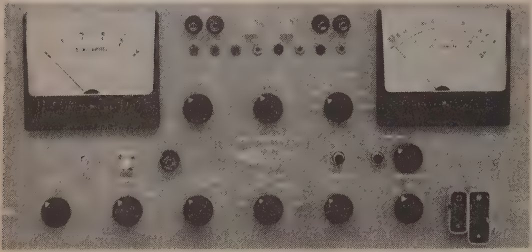
OPERATING=—40 to 175 degrees F (standard)
TEMPERATURE=—100 to 350 degrees F (extra cost).

SERVICE LIFE=More than 30,000 insertions.

CURRENT HANDLING=Up to ten amperes.

DIELECTRIC STRENGTH=400 volts.mil.

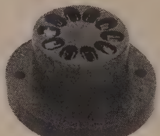
MODEL RT-905 RELAY TESTER



The RT-905 is a versatile and economical test set for checking moderate quantities of relays. It is ideal for incoming inspection service where tests must be made on many different types and styles of relays with a minimum of set-up time. Measures pull-in and drop-out voltage and current, contact resistance, coil resistance and contact operation. Provides automatic operation of the relay under test with outputs for oscilloscope measurement of contact bounce and pull-in and drop-out times. Also provides switching for insulation resistance tests. Complete specifications are available on request.

SOME TYPICAL SOCKETS SELECTED FROM MORE THAN 500 DIFFERENT CONFIGURATIONS.

Relay Manufacturer	Manufacturers Part Number and/or Description
Allied Control	WA-6D, 8 pin plugin
Allied Control	WA-6D, 8 pin 1½ inch leads
Babcock Relays	BR10, Term. Code A,C,E,G,plug
Babcock Relays	BR10, Term. Code B, F, hooks
Babcock Relays	BR10, Term. Code D,H, 1½ leads
Bourns, Inc.	3111, Term. Type H, plugin
Bourns, Inc.	3111, Term. Type J, hooks
Bourns, Inc.	3111, Term. Type L, 1½ leads
C. P. Clare	MF Type, 8 pin hook
C. P. Clare	MF Type, 8 pin plugin
C. P. Clare	MF Type, 8 pin, 1½ inch leads
Couch Ordnance	Type 1X, Term. Type B, plugin
Couch Ordnance	Type 1X, Term. Type C, 1½ leads
Couch Ordnance	Type 1X, Term. Type A, hooks
Couch Ordnance	Type 2X, Term. Type A, hooks
Couch Ordnance	Type 2X, Term. Type B, plugin
Couch Ordnance	Type 2X, Term. Type C, 1½ inch
Hi-Spec Electronics	HD Style, 8 pin, 1½ inch
WABCO	Model 900, 5 pin solder hook
WABCO	Model 900, 5 pin plugin
WABCO	Model 900, 5 pin, 1½ inch leads



TYPICAL DUAL-CONTACT SOCKET

Qualco Part Number: AS-280-10
Mates with .040 inch diameter pin or solder hook terminals, 10-pin, such as Electrical Industries 73SF/40W-HP-10 header or A. W. Haydon A32662.

QUALCO

PHONE OR WRITE
FOR
LISTING OF OVER 500 SOCKETS

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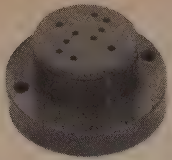
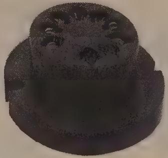
415-964-7666

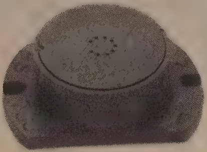
SOME TYPICAL TEST SOCKETS FROM OUR MORE THAN 500 DIFFERENT CONFIGURATIONS



Qualco Part Number: AS-109-8X
Mates with: 8-pin lazy S, .030 dia. straight pin terminals, such as: Electronic Specialties 68 Series.

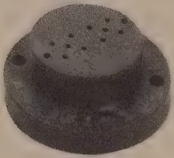
Qualco Part Number: AS-607-9
Mates with: 9-pin, .040 solder hooks, located every 36 degrees, such as: Fusite S3-800-40H/FP/9A





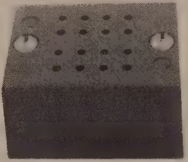
Qualco Part Number: AS-700-9X
Mates with: TO-5 type transistor case, 9-pin, .017 wire leads, 1½, inch long, such as: Teledyne 420.

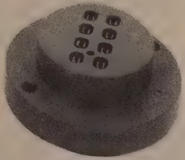
Qualco Part Number: AS-181-10X
Mates with: 9.2 inch grid, 10-pin, .030 dia. straight pin terminals, such as: Electronic Specialties Series 55R.



Qualco Part Number: AS-334-8X
Mates with: 0.2 inch grid, 8-pin, .040 wire leads, 1½ inch long, such as: General Electric 3SAF.

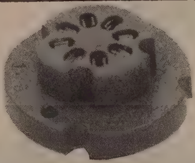
Qualco Part Number: AS-1202-16X
Mates with: 0.2 inch grid, 16-pin, .050 dia. straight pin terminals, such as: Babcock BR14-D13.





Qualco Part Number: AS-101-8
Mates with: 0.2 inch grid, 8-pin, .030 dia. in-line solder hooks, such as: Babcock BR-7, header code B.

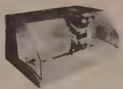
Qualco Part Number: AS-231-8
Mates with: 8-pin, .040 dia. solder hooks, located at 45 degrees, such as: Automatic Electric FP6603.2.



UNIQUE PRODUCTS

FOR THE MICROELECTRONICS INDUSTRY

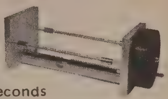
TC BONDER HOODS



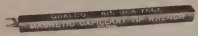
Solves Torch Problems Caused By Air Conditioning And Drafts

WAFER-FLAT ORIENTERS

Aligns All Wafer Flats In A Cassette In Less Than 3 Seconds



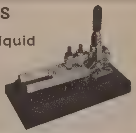
MAGNETIC WRENCH



Prevents Capillary Tip Breakage Due To Dropping . . . Can't Fall Out

LCD CONTACTORS

Makes Testing Of Liquid Crystal Displays A Snap . . . Long-lived, Reliable

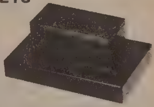


CUSTOM CONTACTORS

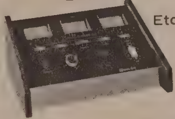
Provides You A Source For Custom Testers For Hybrids and IC Packages

DIP TEST SOCKETS

Gives Dual Contacts For Each Terminal . . Kelvin-Type Measurements Possible



ELECTROLYTIC ETCHERS



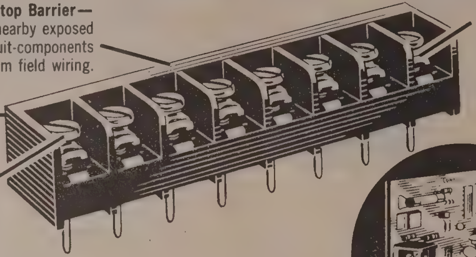
Etches Aluminum Automatically With Superior Edge Definition

QUALCO

ONE FIRST STREET
P. O. BOX 1319S
LOS ALTOS, CALIF. 94022
415-964-7666

RDI/Reed Devices Inc.

A fresh approach to field wiring . . . RDI Barrier Terminal Strips



Wire-Stop Barrier—protects nearby exposed P.C.B. circuit-components from field wiring.

Break Resistant Resilient U.L. Grade Insulating Material.

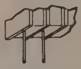
Screws raised—reduces wiring time because the screws are "backed out" at the factory.

Captive (travels with screw) Wire Clamps . . . for fast, secure wire connection without auxiliary terminals. Holds two different size wires under one clamp.

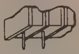
3 SIZES: #4 Screws on .325" ctrs.
#6 Screws on .375" ctrs.
#8 Screws on .4375" ctrs.

Featuring Right Angle mount option

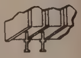
Wide Choice of Styles . . .



Solderless Wrap



P.C. Pins

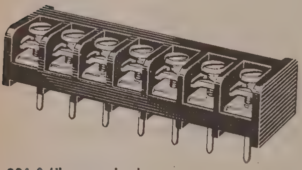


Solder Turret

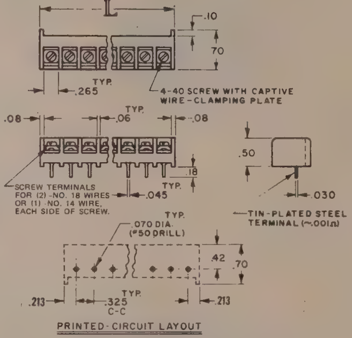
A choice of standard and right angle mounting offers new packaging design opportunities. Molded of flame retardant polypropylene. Standard terminals are bright-tin plated steel; brass for certain U.L. applications. Standard screws feature captive wire-clamps. Dielectric is 2500V.

SPACE SAVING 4PCV SERIES— P.C. PINS

#4 Screws on .325" centers.
Rated 10A., 300V.



CSA & UL recognized

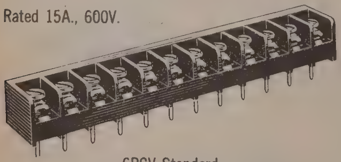

L
.10
70
TYP.
.265
4-40 SCREW WITH CAPTIVE WIRE-CLAMPING PLATE
TYP.
.08
.06
.08
.18
SCREW TERMINALS FOR (2) -NO. 18 WIRES OR (1) -NO. 14 WIRE, EACH SIDE OF SCREW.
TYP.
.045
.50
.030
TIN-PLATED STEEL TERMINAL (~.001Ω)
TYP.
.070 DIA. (#50 DRILL)
.42
.70
.213
TYP.
.325 C-C
.213
PRINTED-CIRCUIT LAYOUT

No. of Positions	L Length (Inches)	Catalog Number
4	1.400	4PCV-04
5	1.725	4PCV-05
6	2.050	4PCV-06
7	2.375	4PCV-07
8	2.700	4PCV-08
9	3.025	4PCV-09
10	3.350	4PCV-10
11	3.675	4PCV-11

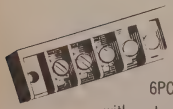
Also available without clamping plates. Consult factory.

UNIVERSAL 6PCV SERIES—P.C. PINS

#6 Screws on 3/8" centers.
Rated 15A., 600V.

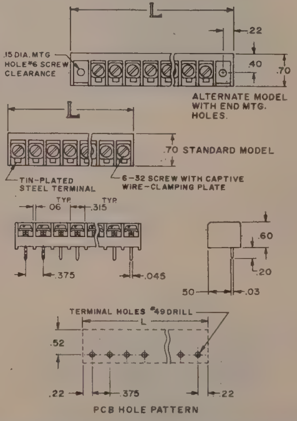


6PCV Standard



6PCV Series with end mounting.

CSA & UL recognized


L
.22
.15 DIA. MTG HOLE #6 SCREW CLEARANCE
.40
.70
ALTERNATE MODEL WITH END MTG. HOLES.
L
.70 STANDARD MODEL
TIN-PLATED STEEL TERMINAL
6-32 SCREW WITH CAPTIVE WIRE-CLAMPING PLATE
TYP.
06
TYP.
.315
.375
.045
.60
.20
50
.03
TERMINAL HOLES #49 DRILL
L
.52
.22
.375
.22
PCB HOLE PATTERN

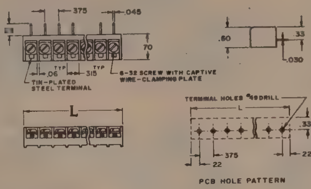
	STANDARD		END MOUNTING	
No. of Posi-tions	L Length (Inches)	Catalog Number	L Length (Inches)	Catalog Number
2	.815	6PCV-02	1.565	6PCV-02-004
3	1.190	6PCV-03	1.940	6PCV-03-004
4	1.565	6PCV-04	2.310	6PCV-04-004
5	1.940	6PCV-05	2.685	6PCV-05-004
6	2.310	6PCV-06	3.060	6PCV-06-004
7	2.685	6PCV-07	3.44	6PCV-07-004
8	3.060	6PCV-08	3.81	6PCV-08-004
9	3.44	6PCV-09	4.19	6PCV-09-004
10	3.81	6PCV-10	4.56	6PCV-10-004
11	4.19	6PCV-11	4.94	6PCV-11-004
12	4.56	6PCV-12	5.31	6PCV-12-004
13	4.94	6PCV-13	5.69	6PCV-13-004
14	5.31	6PCV-14	6.06	6PCV-14-004
15	5.69	6PCV-15	6.44	6PCV-15-004
16	6.06	6PCV-16	6.81	6PCV-16-004
17	6.44	6PCV-17	7.19	6PCV-17-004
18	6.81	6PCV-18	7.56	6PCV-18-004
19	7.19	6PCV-19	7.94	6PCV-19-004
20	7.56	6PCV-20	8.31	6PCV-20-004
21	7.94	6PCV-21	8.69	6PCV-21-004
22	8.31	6PCV-22	9.08	6PCV-22-004
23	8.69	6PCV-23	—	—
24	9.08	6PCV-24	—	—
To specify no-clamp plates, add suffix -001 to Cat. No., e.g. 6PCV-03-001.			To specify no-clamp plates, substitute -005 for -004 in Cat. No. suffix.	

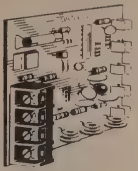
RDI/Reed Devices Inc., 21W183 Hill Ave., Glen Ellyn, IL. 60137 • 312/858-2050

RDI/Reed Devices Inc.

RIGHT ANGLE—6PCR SERIES—P.C. PINS

#6 Screws on 3/8" centers.
Rated 15A., 600V.


.375
.045
.70
.06 TYP
.315 TYP
TIN-PLATED STEEL TERMINAL
6-32 SCREW WITH CAPTIVE WIRE-CLAMPING PLATE
.60
.33
.030
L
TERMINAL HOLES #49 DRILL
L
.33
.375
.22
.22
PCB HOLE PATTERN



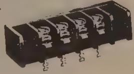
CSA & UL recognized

No. of Positions	L Length (Inches)	Catalog Number	No. of Positions	L Length (Inches)	Catalog Number
2	.815	6PCR-02	14	5.31	6PCR-14
3	1.190	6PCR-03	15	5.69	6PCR-15
4	1.565	6PCR-04	16	6.06	6PCR-16
5	1.940	6PCR-05	17	6.44	6PCR-17
6	2.310	6PCR-06	18	6.81	6PCR-18
7	2.685	6PCR-07	19	7.19	6PCR-19
8	3.060	6PCR-08	20	7.56	6PCR-20
9	3.44	6PCR-09	21	7.94	6PCR-21
10	3.81	6PCR-10	22	8.31	6PCR-22
11	4.19	6PCR-11	23	8.69	6PCR-23
12	4.56	6PCR-12	24	9.08	6PCR-24
13	4.94	6PCR-13			

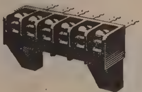
Also available without wire clamp plates on special order. To specify add suffix -001 to Cat. No., e.g. 6PCR-03-**001**.

SOLDER TURRET TERMINALS

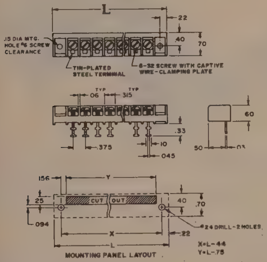
#6 Screws on 3/8" centers.
Rated 15A., 600V.

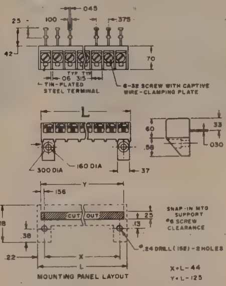


6STV Series
Standard



6STR Series
Right Angle


L
.22
.15 DIA MTG. HOLE #6 SCREW CLEARANCE
.40
.70
TIN-PLATED STEEL TERMINAL
6-32 SCREW WITH CAPTIVE WIRE-CLAMPING PLATE
.06 TYP
.315 TYP
.60
.33
.375
.10
.045
.50
.03
.156
Y
.25
CUT OUT
.40
.70
.094
X
#24 DRILL-2 HOLES
.22
L
MOUNTING PANEL LAYOUT
X=L-.44
Y=L-.75


.25
.100
.045
.375
.42
.70
.06 TYP
.315 TYP
TIN-PLATED STEEL TERMINAL
6-32 SCREW WITH CAPTIVE WIRE-CLAMPING PLATE
L
.60
.56
.33
.030
.300 DIA
.160 DIA
.37
Y
.156
CUT OUT
.25
.13
1.18
.38
SNAP-IN MTG SUPPORT #6 SCREW CLEARANCE
#24 DRILL (.152) - 2 HOLES
.22
X
L
MOUNTING PANEL LAYOUT
X=L-.44
Y=L-.125

CSA & UL recognized

	STANDARD		RIGHT ANGLE MOUNT	
No. of Positions	L Length (Inches)	Catalog Number	L Length (Inches)	Catalog Number
2	1.565	6STV-02	.815	6STR-02
3	1.940	6STV-03	1.190	6STR-03
4	2.310	6STV-04	1.565	6STR-04
5	2.685	6STV-05	1.940	6STR-05
6	3.060	6STV-06	2.310	6STR-06
7	3.44	6STV-07	2.685	6STR-07
8	3.81	6STV-08	3.060	6STR-08
9	4.19	6STV-09	3.44	6STR-09
10	4.56	6STV-10	3.81	6STR-10
11	4.94	6STV-11	4.19	6STR-11
12	5.31	6STV-12	4.56	6STR-12
13	5.69	6STV-13	4.94	6STR-13
14	6.06	6STV-14	5.31	6STR-14
15	6.44	6STV-15	5.69	6STR-15
16	6.81	6STV-16	6.06	6STR-16
17	7.19	6STV-17	6.44	6STR-17
18	7.56	6STV-18	6.81	6STR-18
19	7.94	6STV-19	7.19	6STR-19
20	8.31	6STV-20	7.56	6STR-20
21	8.69	6STV-21	7.94	6STR-21
22	9.08	6STV-22	8.31	6STR-22
23	—	—	8.69	6STR-23
24	—	—	9.08	6STR-24

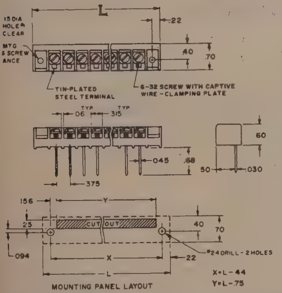
SOLDERLESS-WRAP TERMINALS

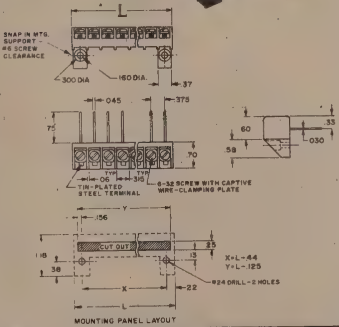
#6 Screws on 3/8" centers.
Rated 15A., 600V.

CSA & UL recognized

6WWV Series
Standard

6WWR Series
Right Angle

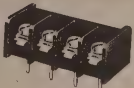

L
.22
.15 DIA HOLE # CLEAR MTG & SCREW ANCE
.40
.70
TIN-PLATED STEEL TERMINAL
6-32 SCREW WITH CAPTIVE WIRE-CLAMPING PLATE
.06 TYP
.315 TYP
.60
.045
.68
.50
.030
.375
.156
Y
.25
CUT OUT
.40
.70
.094
X
#24 DRILL - 2 HOLES
.22
L
MOUNTING PANEL LAYOUT
X=L-.44
Y=L-.75


L
SNAP IN MTG. SUPPORT #6 SCREW CLEARANCE
.300 DIA
.160 DIA.
.37
.045
.375
.75
.70
.06 TYP
.315 TYP
TIN-PLATED STEEL TERMINAL
6-32 SCREW WITH CAPTIVE WIRE-CLAMPING PLATE
.60
.58
.33
.030
Y
.156
CUT OUT
.25
.13
1.18
.38
X=L-.44
Y=L-.125
#24 DRILL-2 HOLES
.22
X
L
MOUNTING PANEL LAYOUT

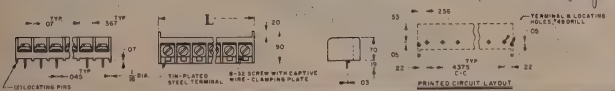
	STANDARD		RIGHT ANGLE MOUNT	
No. of Positions	L Length (Inches)	Catalog Number	L Length (Inches)	Catalog Number
2	1.565	6WWV-02	.815	6WWR-02
3	1.940	6WWV-03	1.190	6WWR-03
4	2.310	6WWV-04	1.565	6WWR-04
5	2.685	6WWV-05	1.940	6WWR-05
6	3.060	6WWV-06	2.310	6WWR-06
7	3.44	6WWV-07	2.685	6WWR-07
8	3.81	6WWV-08	3.060	6WWR-08
9	4.19	6WWV-09	3.44	6WWR-09
10	4.56	6WWV-10	3.81	6WWR-10
11	4.94	6WWV-11	4.19	6WWR-11
12	5.31	6WWV-12	4.56	6WWR-12
13	5.69	6WWV-13	4.94	6WWR-13
14	6.06	6WWV-14	5.31	6WWR-14
15	6.44	6WWV-15	5.69	6WWR-15
16	6.81	6WWV-16	6.06	6WWR-16
17	7.19	6WWV-17	6.44	6WWR-17
18	7.56	6WWV-18	6.81	6WWR-18
19	7.94	6WWV-19	7.19	6WWR-19
20	8.31	6WWV-20	7.56	6WWR-20
21	8.69	6WWV-21	7.94	6WWR-21
22	9.08	6WWV-22	8.31	6WWR-22
23	—	—	8.69	6WWR-23
24	—	—	9.08	6WWR-24

RUGGED 8PCV SERIES—P.C. PINS

#8 Screws on 7/16" centers.
Rated 20A., 600V.



CSA & UL recognized


.07 TYP
.367 TYP
.07
.045 TYP
1/16 DIA.
(2) LOCATING PINS
L
.20
.90
TIN-PLATED STEEL TERMINAL
8-32 SCREW WITH CAPTIVE WIRE-CLAMPING PLATE
.70
.19
.03
.53
.256
TERMINAL & LOCATING HOLES #49 DRILL
.05
.05
.22
.4375 TYP C-C
.22
PRINTED CIRCUIT LAYOUT

No. of Positions	L Length (Inches)	Catalog Number
3	1.40	8PCV-03
4	1.82	8PCV-04
5	2.26	8PCV-05
6	2.70	8PCV-06

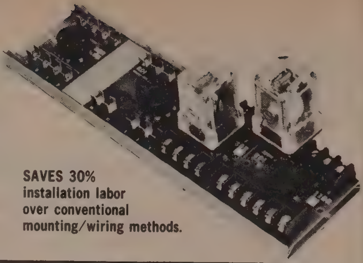
Available without wire clamp plates on special order. To specify, add 001 to Cat. No., e.g. 8PCV-03-**001**.

RDI/ Reed Devices Inc., 21W183 Hill Ave., Glen Ellyn, IL. 60137 • 312/858-2050

RDI/Reed Devices Inc.

SNAPTRACK™ MOUNTING SYSTEM

The **SNAPTRACK™** mounting system provides a low cost convenient method for installing plug-in relays, timers and tubes in control equipment. Socket assemblies snap into position along continuous sections of SNAPTRACK, an extruded PVC, non-conductive mounting track, 3-5/32" wide and new 2-7/8" wide. The track may be installed with rivets or screws. Socket assemblies consist of a socket mounted to a G-10 epoxy glass P.C. board with choice of specially designed U.L. grade P.P. barrier type screw terminal blocks or 1/4" quick-connect tabs. The assembly is then wave soldered for circuit reliability. Terminal points are clearly numbered with epoxy ink. Screws are in the raised position and feature captive wire clamps which eliminate need for bending of, or attaching hook or ring terminals to wires. Wired-in 120V, 240V neon lamp to indicate power at coil terminals available as option. Add "1" or "2" to Catalog Number.



SAVES 30% installation labor over conventional mounting/wiring methods.

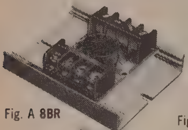


Fig. A **8BR**

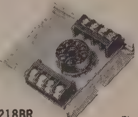


Fig. D **218BR**

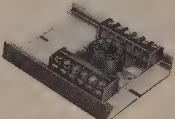


Fig. H **211BR, 311BR**

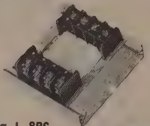


Fig. L **8BS**

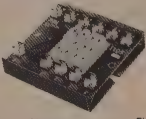


Fig. O **11QS**

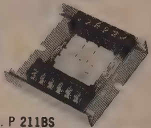


Fig. P **211BS**

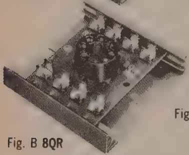


Fig. B **8QR**

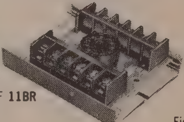


Fig. F **11BR**

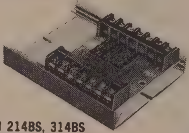


Fig. J **214BS, 314BS**

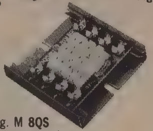


Fig. M **8QS**

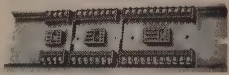


Fig. Q

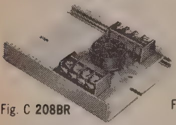


Fig. C **208BR**

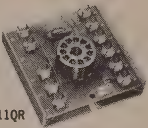


Fig. G **11QR**

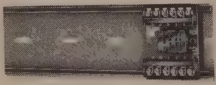


Fig. K **312BS**

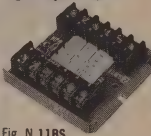


Fig. N **11BS**

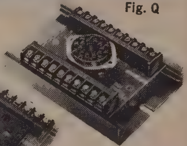


Fig. R

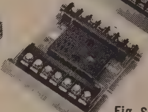


Fig. S

RDI Cat. No.	Fig.	Description	Length (Inches)	Fits Track Series
Octal (8-Pin) Socket Assemblies				
8BR	A	#8-32 screws, 10A, 250 VAC	2	TK
8BR-1	A	Same, 120 VAC Neon Lamp	2	TK
8BR-2	A	Same, 240 VAC Neon Lamp	2	TK
8QR	B	1/4" Double Quick Connect Tabs	2	TK
8QR-1	B	Same except 120 VAC Neon Lamp	2	TK
8QR-2	B	Same except 240 VAC Neon Lamp	2	TK
208BR	C	#4-40 screws, holes for bails	2	TK
208BR-1	C	Same, 120 VAC Neon Lamp	2	TK
218BR	D	Space Saver—#4-40 screws	1.5	TK
218BR-1	D	Same, 120 VAC Neon Lamp	1.5	TK
228BR	—	Double octal sockets	3	TK
318BR	D	Space Saver—narrow track	1.5	2TK
318BR-1	D	Same except 120 VAC Neon Lamp	1.5	2TK
11-Pin Round Socket Assemblies				
11BR	F	#8-32 screws, 10A, 240 VAC	3	TK
11BR-1	F	Same, 120 VAC Lamp	3	TK
11BR-2	F	Same, 240 VAC Lamp	3	TK
11QR	G	1/4" Double Quick Connect Tabs	3	TK
11QR-1	G	Same, 120 VAC Lamp	3	TK
11QR-2	G	Same, 240 VAC Lamp	3	TK
211BR	H	Space Saver—#4-40 screws	2-1/8	TK
211BR-1	H	Same, 120 VAC Lamp	2-1/8	TK
311BR	H	Space Saver—narrow track	2-1/8	2TK
311BR-1	H	Same, 120 VAC Lamp	2-1/8	2TK
Miniature Relay Socket Assemblies 5A, 150 VAC				
214BS	J	4PDT	2.5	TK
214BS-1	J	Same, 120 VAC Lamp	2.5	TK
312BS	K	Two N.O., two SPDT contact forms	2-1/8	2TK
312BS-1	K	Same, 120 VAC Lamp	2-1/8	2TK
314BS	J	4 PDT	2.5	2TK
314BS-1	J	Same, 120 VAC Lamp	2.5	2TK

RDI Cat. No.	Fig.	Description	Length (Inches)	Fits Track Series
Square Base Socket Assemblies				
8BS	L	2PDT #8-32 screws, 10A, 250 VAC	2	TK
8QS	M	1/4" Double Quick Connect tabs	2	TK
8QS-1	M	Same, 120 VAC Lamp	2	TK
8QS-2	M	Same, 240 VAC Lamp	2	TK
11BS	N	3PDT, #8-32 screws, 10A, 250 VAC	3	TK
11BS-1	N	Same, 120 VAC Lamp	3	TK
11BS-2	N	Same, 240 VAC Lamp	3	TK
11QS	O	1/4" Double Quick Connect tabs	3	TK
11QS-1	O	Same, 120 VAC Lamp	3	TK
11QS-2	O	Same, 240 VAC Lamp	3	TK
211BS	P	Space Saver #4-40 screws	2-1/8	TK
211BS-1	P	Same, 120 VAC Lamp	2-1/8	TK
Sub-Miniature Relay Socket Assemblies 5A, 150 VAC				
202BS	Q	2PDT	1.5	TK
202BS-1	Q	Same, 120 VAC Lamp	1.5	TK
204BS	Q	4PDT	2.5	TK
204BS-1	Q	Same, 120 VAC Lamp	2.5	TK
206BS	Q	6PDT	3-3/4	TK
206BS-1	Q	Same, 120 VAC Lamp	3-3/4	TK
Specialty Assemblies				
220BR	R	20-Pin Round	3.5	TK
220BR-1	R	Same, 120 VAC Lamp	3.5	TK
414BS	S	Telephone Type 4PDT	2.5	TK
414BS-1	S	Same, 120 VAC Lamp	2.5	TK
416BS	S	Telephone Type 6PDT	2-13/16	TK
416BS-1	S	Same, 120 VAC Lamp	2-13/16	TK

SNAPTRACK™ MOLDED SOCKET ASSEMBLIES

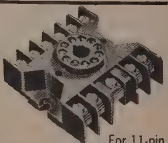
FEATURES

- **Rugged.** Molded of break and chip resistant U.L. recognized Lexan.
- **Positive Contact.** Phosphor bronze socket contacts.
- **Fast Wiring.** Screws feature captive wire-clamp plates, eliminate need for crimp-on terminals.
- **Versatile Mounting.** Mount singly or gang via optional 5TK2 series SNAPTRACK.

Rated 10 Amp., 300 Volts. Wire Range: 12 through 20 AWG.

For octal relays and timers. **SM8-C** (Screws w/wire-clamps) **SM8-A** w/binder head screws.

Save 30% labor over mounting singly by using **5TK2** series SNAPTRACK.



For 11-pin relays and timers. **SM11-C.** Screws have wire clamps.

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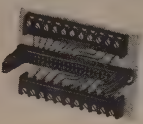
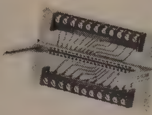
EDGE CONNECTOR ASSEMBLIES

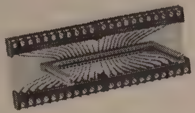
22PC
For single-sided straight cards. Utilizes Amphenol type 143 22-pin connector.



22PCB
For single-sided, notched cards. Utilizes Elco type 6022 22-pin connector.



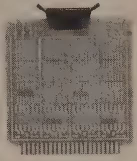
44PCB & 44PCA
For double-sided, notched cards with 44 output pins. Utilizes Elco type 6022 connector. **44PCB** has terminals numbered thru 44; **44PCA**, A thru Z and 1 thru 22.



Designed to conveniently panel mount 22-pin single and double-sided printed circuit cards with pins on .158" ctrs. Convert edge connectors to screw terminal wiring. The assemblies mount into SNAPTRACK mounting channel which also serve to insulate the board.

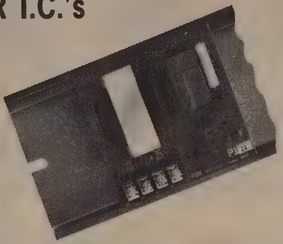
KLUGE CARD

A 22-pin universal G10 pcb compatible with the 22PCB assembly. Ideal for one-of-a-kind circuits requiring up to 12 I.C.'s (14-pin DIP) and 8 transistors. Handle included. Size: 4.5" w x 4.5" h x 1/16" th. Cat. No. **KB22.**



D.C. POWER SUPPLIES FOR I.C.'s

- DRIVE I.C.'s, REED RELAYS
- REGULATED
- MOUNT ON SNAPTRACK MOUNTING PANEL



Designed to drive small I.C. interface circuits, reed relays, photoelectric controls, etc. requiring regulated D.C. to 1.5 watts. Built-in overload and short circuit protection. Snaps into TK2 series SNAPTRACK for fast installation.

SPECIFICATIONS

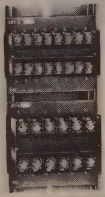
Input: 105-135 VAC, 50/60 Hz., 80mA.
Regulation: ±1% for 10% line/load.
Overload Protection: Twice current.
Size: 3 x 3 x 2-7/8" high.

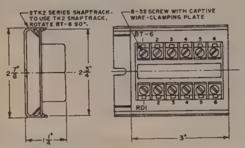
ORDERING INFORMATION

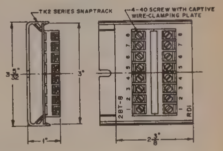
VOLTS DC ± 5%	OUTPUT AMPS (Max.)	Surge Current	RDI Cat. No.
5	250mA	300mA	P105
6	250mA	300mA	P106
10	125mA	175mA	P110
12	125mA	175mA	P112
15	75mA	90mA	P115
24	63mA	75mA	P124

SNAPTRACK™ TERMINAL BLOCKS

Designed to snap into either of two SNAPTRACK widths, the BT series offer a choice of two screw sizes to fit all wire sizes from 22 to 12 AWG. Captive wire-clamp plates provide fast, secure connection without need for auxiliary terminals.
Terminal strips are wave soldered to a G-10 epoxy glass pcb. Space is provided for terminal identification between strips. **BT-6** provides 6 pairs of terminals utilizing #8-32 screws. **2BT-8** provides 8 pairs of terminals utilizing #4-40 screws. See Page 6 to order SNAPTRACK mounting channel.

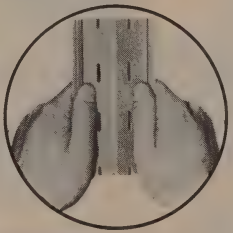


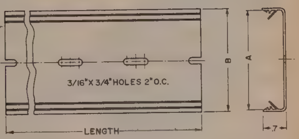

2TK2 SERIES SNAPTRACK. TO USE TK2 SNAPTRACK, ROTATE BT-6 90°.
8-32 SCREW WITH CAPTIVE WIRE-CLAMPING PLATE
BT-6
1 2 3 4 5 6
RDI
2 7/8"
2 3/4"
1 1/4"
3"



SNAPTRACK™ MOUNTING CHANNEL

Patented Wings hold pcb securely.





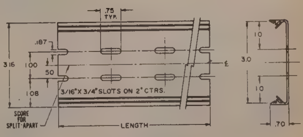
TK2, 2TK2 & 3TK2.

SNAPTRACK is a non-conductive, rigid extruded PVC chassis for mounting custom circuit boards. Available in a variety of fixed widths and a new Split-Apart model for wider pcb's, SNAPTRACK mounts to panels quickly with rivets or screws. P.C. Boards are simply snapped-in from front and are held securely via patented wings which also act as shock absorbers when pcb's are flexed. P.C.B.'s can be quickly removed from SNAPTRACK for field service. Slots on 2-inch centers are provided for fast, easy installation.

ORDERING INFORMATION

Dim. A Nominal P.C.B. Width (inches)	Dim. B Overall Track Width (inches)	RDI Cat. No. (48" lg.)
2.75	2.90	2TK2-48
3.00	3.16	TK2-48
3.25	3.40	3TK2-48
Split-Apart		4TK2-48

To specify lengths of 6, 12, or 24 inches, substitute **6**, **12**, or **24** in place of **"48"**.
Example: TK2-24 is 24 inches long.



4TK2-48

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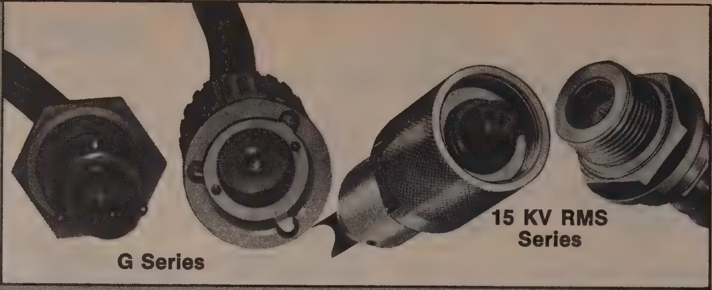
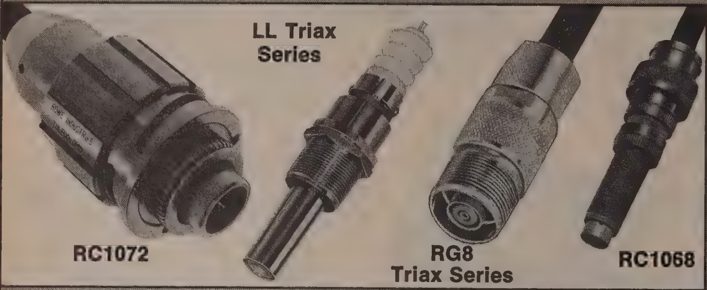
Rowe
Coaxial
Connectors and Cable Assemblies

Employ high-voltage, corona-free design techniques. They are ideal for use in pulse as well as DC voltage applications, through 150 KV. A wide variety of molded-on or field assembly types are offered. Available in quick disconnect or screw couplings.


G Series
15 KV RMS Series

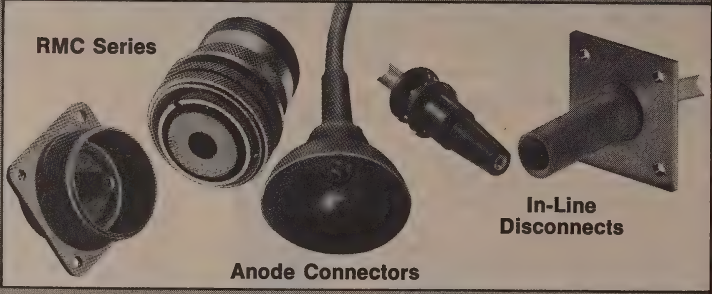
Rowe
Triaxial
Connectors and Cable Assemblies

A full spectrum of both molded-on and field assembly types are available for a wide variety of cable types such as the triaxial version of RG-8, up through and including specialized construction for operation in excess of 100 KV.


LL Triax Series
RC1072
RG8 Triax Series
RC1068

Rowe
Single Contact
Connectors and Cable Assemblies

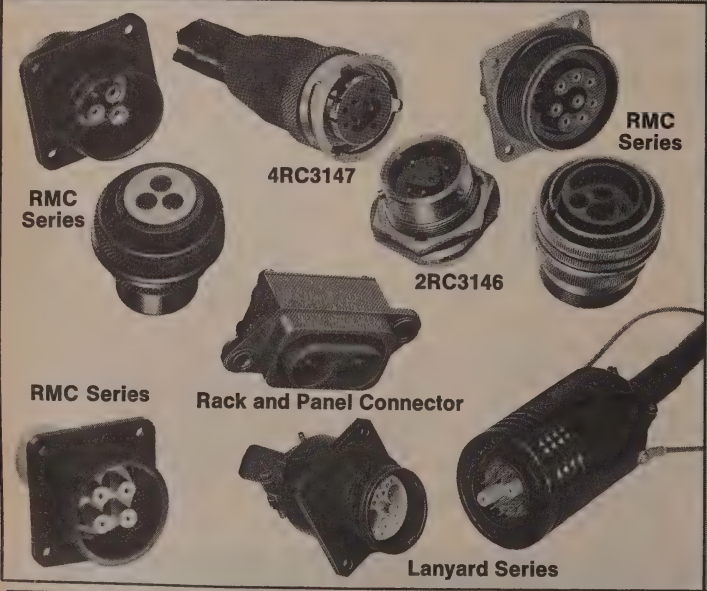
Offered is an extensive listing of single contact high-voltage assemblies, which include anode connectors, in-line disconnects and others which are used unshielded to solve your simple high-voltage interconnection problems.


RMC Series
In-Line Disconnects
Anode Connectors

Rowe
Multiple Contact
Connectors and Cable Assemblies

Offer contact arrangements from one to thirty contacts, panel receptacles, cable plugs, rack and panel combinations, in-line types and many others. Both field assemblies and molded-on types are standard in this line.

Rowe Industries has designed and developed over 700 specialized interconnections for which tooling is available.


RMC Series
4RC3147
RMC Series
2RC3146
RMC Series
RMC Series
Rack and Panel Connector
Lanyard Series

World's Leader in High-Voltage

(through 200 KV)

Corona-Free CONNECTORS and CABLE ASSEMBLIES

"FOREMOST IN SPECIALIZED INTERCONNECTIONS"

ROWE INDUSTRIES

6100 BENORE ROAD, TOLEDO, OHIO 43612
PHONE (419) 729-9761 TWX 810-442-1734
or contact rep (listed under "Sales Offices")
(West Coast, phone (213) 235-2070)

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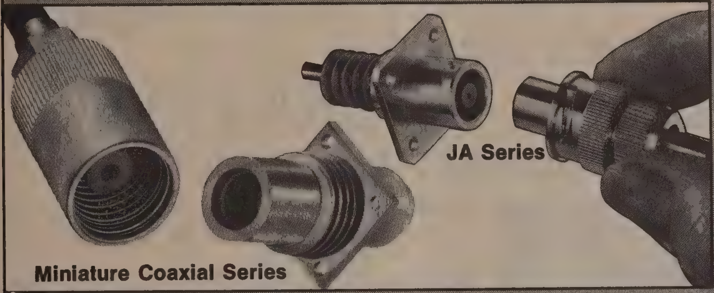


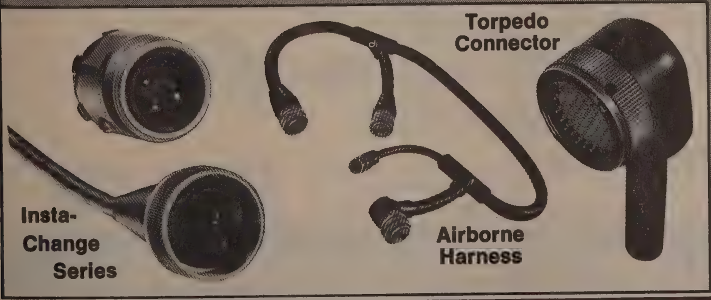
Rowe Miniature Coaxial Connectors and Cable Assemblies

Employ the same high-voltage design techniques as the coaxial series, but are much smaller in size for use in restricted spaces. Available in quick disconnect and screw couplings (the JA Series can be adapted to such standard type cables as RG 58 and RG 59).

Rowe Subminiature Coaxial Connectors and Cable Assemblies

Are ideally suited for use where space is at a premium. Employing the traditional Rowe high capability features, the subminiature sizes offer unusually high voltage operating capabilities, through 20 KV.

Subminiature Coaxial Series
Pancake Series



Rowe Low-Voltage, Molded-On Connectors and Cable Assemblies

For use in severe environments. We can mold standard connectors to cable for an environmental seal and provide a molded strain relief. Our exclusive Insta-Change series was designed for factory, mining, nuclear and oil well use.

● Design ● Development ● Manufacturing ● Testing of

Specialized Connectors and Cable Assemblies

"FOREMOST IN HIGH VOLTAGE CONNECTORS"

ROWE INDUSTRIES

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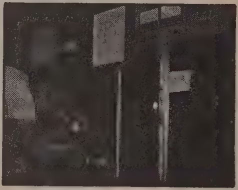
or contact rep (listed under "Sales Offices")
(West Coast, phone (213) 235-2070)

Since 1947, Rowe Industries has been foremost in the design and manufacture of high voltage, corona free and other specialized connectors and cable assemblies. So far, Rowe engineers have expanded the state of the art by designing and developing over 700 specialized interconnections for which tooling is available.

Modern facilities coupled with excellent engineering capabilities provide you with the fastest, most exacting and up-to-date specifications in the industry. Production equipment operated by skilled personnel provide you with quality components to exacting specifications.

Call us today — your specialized problem is our specialized challenge.

World's Leader in HIGH-VOLTAGE, CORONA-FREE INTERCONNECTIONS



ELECTRIC TESTING: Dielectric strength, Corona inception/extinction, Contact resistance, Continuity, RFI/EMI, DIT-MCO random access testing.

MECHANICAL TESTING: Insertion/withdrawal forces, Pressure/vacuum tests, Shock/vibration, X-Ray.

ENVIRONMENTAL TESTING: Altitude, Temperature/humidity, Corrosive atmospheres, Hydrostatic pressure

. . . and many other related aspects.

APPLICATIONS:

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Rowe Industries can supply any type of connective device with molded, crimped or soldered type terminations.

APPLICATIONS:

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Nuclear Reactor
Deep Submergence
Hydrophone
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Mining

Phone Rowe (419-729-9761) for information

5-way® BINDING POSTS

5 WAYS TO CONNECT ● GOLD-PLATED BRASS PARTS ● RANGE OF COLORS

FLUTED NUT TYPES

Plastic parts of standard (not miniature) size types molded of Lexan polycarbonate resin; brass parts are gold-plated. Rated for 30 amperes, 1000 volts working. Nickel-plated brass types available on special order.

HEX NUT TYPES

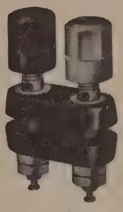
Rated for 30 amperes, 1000 volts working. Brass parts are gold-plated; plastic parts are of nylon compounded to meet military specifications MIL-P-20693A, Type IV. Nickel-plated brass types available on order.

GROUNDING TYPE

For making rapid connections to ground. Made of finely machined brass nickel-plated and polished. Panel grounding collar frozen to shaft has "D" type shoulder for locking in keyed panel hole.

MINIATURE TYPES

Fluted nut design only. Rated for 15 amperes, 1000 volts working. Gold-plated brass parts; nylon plastic parts compounded to meet military specification MIL-P-20693A, Type IV. Types with nickel-plated brass available also.



DOUBLE ASSEMBLY TYPES

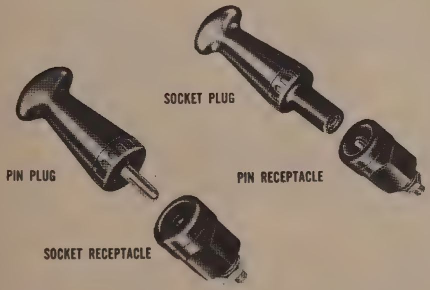
For instrument and equipment panels requiring binding posts mounted on ¾" centers. Rated for a current capacity of 30 amperes and a working voltage of 1000 volts. Brass parts are gold-plated; panel insulators in black only. Rugged, self-contained assembly makes mounting more accurate, faster and easier than two individual binding posts and gives maximum strength where connections are frequently made.

STYLE	TYPE
BINDING POSTS	
FLUTED NUT — STANDARD	DF31*
HEX NUT — STANDARD	DF30*
GROUNDING — ALL METAL	GP30NC
FLUTED NUT — MINIATURE	DF21*

STYLE	TYPE
DOUBLE ASSEMBLY TYPES	
BLACK & RED HEX NUTS	DF30-2-BRC

*Add desired color suffix to series designation number: BC (black), BLC (blue), RC (red), WTC (white), YC (yellow), GNC (green). For example: DF21BLC.

SUPERCON®
ELECTRICAL CONNECTORS



Nylon plastic parts; gold-plated brass current-carrying parts. Wiring connections to the same plug can be either soldered or solderless. Plug cable-fastening screws permit a wide range of cable sizes. Plug grips are of a simple, two-piece threaded construction for quick assembly. All receptacle plastic parts are molded of the same color to permit more rapid and accurate circuit identification front and back of panel when installed. The 25, 50 and 100 ampere types are listed by Underwriters' Laboratories, Inc.

AMPERES	PIN PLUGS TYPE†	SOCKET RECEPTACLES TYPE†	SOCKET PLUGS TYPE†	PIN RECEPTACLES TYPE†
25	PP25G	RS25G	PS25G	RP25G
50	PP50G	RS50G	PS50G	RP50G
100	PP100G	RS100G	PS100G	RP100G
250	PP250G	RS250G	PS250G	RP250G

†Add desired color suffix to series designation number: B (black), BL (blue), R (red), WT (white), Y (yellow), GN (green). For example: PS25GWT.

THE SUPERIOR ELECTRIC COMPANY
1000 MIDDLE STREET • BRISTOL, CONN. 06010 • PHONE: (203) 582-9561

SEALECTRO PRESS-FIT® TEFLON* TERMINALS

*Reg. Trademark, E. I. Du Pont de Nemours & Co.

STAND-OFFS

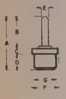


Fig. 1

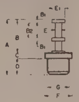


Fig. 3

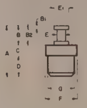


Fig. 4

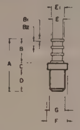


Fig. 7

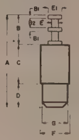


Fig. 101

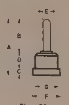


Fig. 51

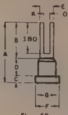


Fig. 52

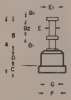


Fig. 54

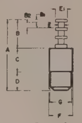


Fig. 102

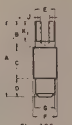


Fig. 105

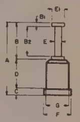


Fig. 55

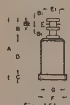


Fig. 151

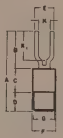


Fig. 106

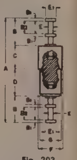


Fig. 203

STAND-OFFS

Fig.	Old Part No.	New Part No.	Tool No.	Capacitance mmf	V,RMS 60 Hz		A	B	B₁	B₂	C	D	E Dia.	E₁ Dia.	F Dia.	+.002 −.000 G Dia.
					Nominal Rating	Flashover Sea Level										
1	ST-SM-1	013-1000	B-8	0.45	1000	3000	.350	.210			.040	.100	.040		.172	.148
1	ST-SM-1C2	013-1001	B-8	0.50	1000	3000	.410	.210			.040	.160	.040		.172	.148
1	ST-SM-1L10	013-1009	B-8	0.50	1000	3000	.590	.450			.040	.100	.040		.172	.148
1	ST-SM-1L12	013-1010	B8	0.40	1000	3000	.460	.320			.040	.100	.040		.172	.148
1	ST-SM-2C4	013-1014	B8	0.40	1000	3000	.370	.210			.050	.110	.040		.172	.148
1	ST-SM-3C1-L6	003-1004	B3-10	0.35	750	2500	.213	.093			.031	.089	.040		.125	.093
1	ST-SM-7	003-1007	B3-1	0.30	1000	3000	.262	.147			.040	.075	.040		.125	.093
1	ST-SM-7L2	003-1008	B3-1	0.40	1000	3000	.299	.174			.040	.085	.040		.125	.093
1	ST-SM-8	013-1023	B-8	0.45	1000	3000	.370	.210			.040	.120	.040		.172	.148
1	ST-SM-16	003-1009	B3-1	0.60	1000	3000	.350	.210			.040	.100	.040		.125	.093
1	ST-SM-19	013-1028	B-8	0.45	1000	3000	.365	.193			.040	.132	.040		.172	.148
3	ST-MM-10TUR	003-2000	B3-2C	0.40	1000	3000	.310	.170	.020	.060	.040	.100	.030	.060	.125	.093
3	ST-SM-1TUR	013-2001	B-8	0.40	1000	3000	.350	.210	.020	.100	.040	.100	.040	.080	.172	.148
3	ST-SM-1TUR-C2	013-2003	B-8	0.50	1000	3000	.375	.210	.020	.100	.040	.125	.040	.080	.172	.148
3	ST-SM-1TUR-C4	013-2004	B-8	0.40	1000	3000	.360	.210	.020	.100	.040	.110	.040	.080	.172	.148
3	ST-SM-16TUR	003-2003	B3-2B	0.60	1000	3000	.350	.210	.020	.100	.040	.100	.040	.080	.125	.093
3	ST-SM-19TUR-C2	013-2007	B-8	0.55	1000	3000	.500	.210	.020	.100	.040	.250	.040	.080	.172	.148
3	ST-SM-21TUR	013-2009	B-18	0.40	1000	3000	.375	.210	.020	.100	.040	.125	.040	.080	.218	.185
3	ST-SM-22TUR	013-2011	B-8	0.50	1700	4500	.428	.210	.020	.100	.093	.125	.040	.080	.172	.148
3	ST-SM-22TUR-C2	013-2013	B-8	0.30	1700	4500	.461	.210	.020	.100	.093	.158	.040	.080	.172	.148
3	ST-SM-25TUR	013-2016	B-8	0.50	1000	3000	.334	.154	.020	.047	.040	.140	.046	.093	.172	.148
3	ST-SM-25TUR-C2	013-2017	B-8	0.35	1000	3000	.254	.154	.020	.047	.040	.060	.046	.093	.172	.148
3	ST-SM-29TUR	013-2019	B-8	0.50	1000	3000	.455	.250	.020	.093	.040	.165	.040	.093	.172	.148
3	ST-SM-29TUR-C2	013-2020	B-8	0.60	1000	3000	.540	.250	.020	.093	.040	.250	.040	.093	.172	.148
4	ST-SM-352TUR	013-2041	B-8	0.30	1000	3000	.250	.110	.020	.080	.040	.100	.040	.080	.172	.148
7	ST-SM-42TUR	003-2004	B3-2A	0.40	1000	3000	.334	.153	.015	.031	.041	.140	.068	.078	.125	.093
*101	ST-210	003-2007	B3-A	0.50	1500	4000	.346	.156	.020	.046	.103	.087	.046	.093	.125	.104
*101	ST-230L2	013-2045	B9-3	0.50	2500	6000	.482	.250	.020	.093	.125	.110	.040	.093	.172	.148
*101	ST-250	013-2046	B12	0.30	2500	6000	.431	.156	.020	.046	.125	.150	.046	.093	.187	.165
*101	ST-250L2	013-2048	B12	0.50	2500	6000	.522	.246	.020	.093	.125	.150	.040	.093	.187	.165
*101	ST-250L3	013-2049	B12-2	0.60	2000	5000	.556	.281	.031	.093	.125	.150	.046	.125	.187	.165
*101	ST-250L4	013-2051	B12-2	0.60	2000	5000	.556	.281	.031	.093	.125	.150	.062	.125	.187	.171
*101	ST-250L5	013-2053	B12	0.50	2500	6000	.485	.210	.020	.100	.125	.150	.040	.080	.218	.171
*101	ST-1000	013-2058	B13	0.20	2800	6700	.493	.156	.020	.046	.187	.150	.046	.093	.187	.165
*101	ST-1000C1	013-2059	B13	0.20	2800	6700	.493	.156	.020	.046	.187	.150	.046	.093	.187	.171
*101	ST-1000L2	013-2060	B13	0.30	2800	6700	.583	.246	.020	.093	.187	.150	.040	.093	.187	.165
*101	ST-1000L2-C1	013-2061	B13	0.35	2800	6700	.584	.250	.020	.093	.187	.147	.040	.093	.187	.171
*101	ST-1000L3	013-2062	B13-3B	0.65	2500	6000	.618	.281	.031	.093	.187	.150	.046	.125	.187	.165
*101	ST-1050DTUR	023-2004	B-24	0.30	2800	6700	.649	.250	.020	.093	.187	.212	.050	.093	.250	.204
*101	ST-1175L2	013-2065	B9-3	0.30	3200	7500	.598	.250	.020	.093	.187	.165	.040	.093	.172	.148
*101	ST-1500	013-2069	B12-3	0.20	3100	7300	.556	.156	.020	.046	.250	.150	.046	.093	.187	.165

* Plating: Silver

Fig.	Old Part No.	New Part No.	Tool No.	Capacitance mmf	V,RMS 60 Hz		A	B	B₁	B₂	C	D	E Dia.	E₁ Dia.	F DIA.	+.002 −.000 G Dia.	J Dia.	K	K₁
					Nominal Rating	Flashover Sea Level													
102	ST-1150	013-2064	B12	0.60	2500	6000	.555	.218	.020	.046	.187	.150	.046	.093	.187	.171			
105	ST-250SL	013-3005	B11	0.70	2000	5000	.478	.203			.125	.150	.148		.187	.171	.078		.156
105	ST-1000SL	013-3007	B11	0.70	2300	5600	.540	.203			.187	.150	.148		.187	.171	.078		.156
105	ST-1000SL-1L	013-3008	B11	0.70	2300	5600	.540	.203			.187	.150	.148		.187	.171	.046		.156
105	ST-1500SL	013-3013	B11	0.45	2700	6500	.603	.203			.250	.150	.148		.187	.171	.078		.156
105	ST-2000SL	013-3016	B11	0.30	4200	9500	.753	.203			.400	.150	.148		.187	.171	.078		.156
106	ST-35ML	013-3019	B11-C	0.85	2000	5000	.633	.296			.187	.150	.150		.187	.171		.090	.234
151	RST-1	014-2020	B18-1B	0.40	3000	7000	.487	.154	.020	.047	.046	.287	.047	.094	.218	.185†			
151	RST-1L2	014-2021	B18-1B	0.20	3000	7000	.583	.250	.020	.094	.046	.287	.047	.094	.218	.185†			
203	DST-1000C2	015-2003	B13	0.20	2000	5000	.819	.210	.020	.100	.187	.212	.040	.080	.187	.148			
203	DST-SM-105TUR*	$15-2000	B17	0.20	1000	3000	.640	.210	.020	.100	.050	.170	.040	.080	.205	.169			

Standard Plating: Silver. * Plating: Tin or Tin/Lead. † ±.001.

REVERSE STAND-OFFS

Fig.	Old Part No.	New Part No.	Tool No.	Capacitance mmf	V,RMS 60 Hz		A	B	B₁	B₂	C	D	E Dia.	E₁ Dia.	F Dia.	+.002 −.000 G Dia.
					Nominal Rating	Flashover Sea Level										
51	RST-SM-1	014-1000	B8-X1	0.40	1200	3500	.350	.210			.040	.100	.040		.172	.148
51	RST-SM-1C6	014-1004	B8-X1	0.40	2000	5000	.500	.210			.040	.250	.040		.172	.148
51	RST-SM-3-C1	004-1001	B-3-B	0.40	500	2000	.250	.130			.031	.089	.040		.125	.093
51	RST-SM-16	004-1007	B-3-2X	0.40	500	2000	.350	.210			.040	.100	.040		.125	.093
52	RST-SM-3SL	004-3000	B3-2X	0.50	500	2000	.350	.210			.040	.100	.080		.125	.104
54	RST-MM-10TUR	004-2000	B1-2	0.40	500	2000	.310	.170	.020	.060	.040	.100	.030	.060	.125	.093
54	RST-SM-1TUR	014-2001	B8-X-1	0.40	1200	3500	.350	.210	.020	.100	.040	.100	.040	.080	.172	.148
54	RST-SM-21TUR	014-2007	B18	0.30	1700	4500	.375	.210	.020	.100	.040	.125	.040	.080	.218	.185
54	RST-SM-25TUR-C4	014-2009	B8-X-1	0.40	1500	4000	.296	.156	.020	.046	.040	.100	.046	.093	.172	.148
54	RST-SM-38TUR	014-2015	B10-X	0.40	1500	4000	.405	.210	.020	.100	.040	.155	.040	.080	.188	.171
55	RST-SM-31TUR	014-2011	B8-X-1	0.50	1700	4500	.455	.227	.020	.187	.040	.187	.040	.080	.172	.148

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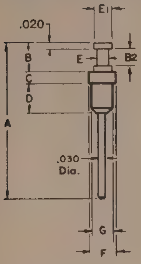
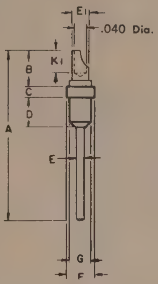

E1
.020
B
E
B2
C
D
A
.030 Dia.
G
F

Fig. 302


E1
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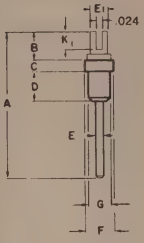
K1
B
C
D
A
E
G
F

Fig. 305


E1
.024
K1
B
C
D
A
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G
F

Fig. 303

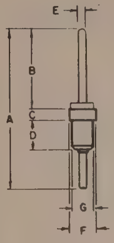

Fig. 306

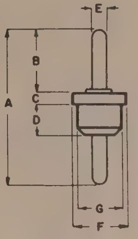

Fig. 351

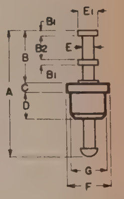
E1
B1
B2
E
B
B1
A
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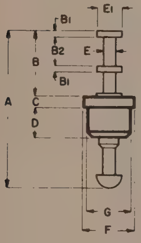
Fig. 360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G
F

Fig. 362

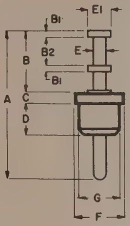
B1
E1
B2
E
B
B1
A
C
D
G
F

Fig. 363

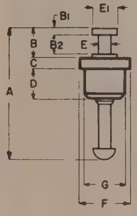
B1
E1
B
B2
E
C
D
A
G
F

Fig. 364

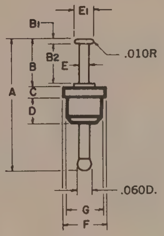
B1
E1
B2
E
.010R
B
A
C
D
.060D.
G
F

Fig. 364 A

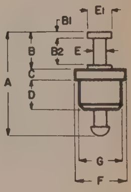
B1
E1
B
B2
E
A
C
D
G
F

Fig. 365

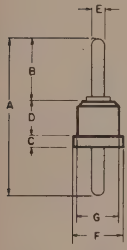

Fig. 452

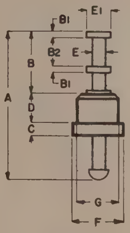
B1
E1
B2
E
B
B1
A
D
C
G
F

Fig. 454

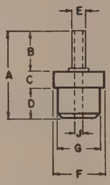

Fig. 501

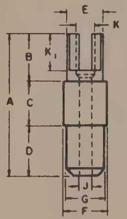
E
K
K1
B
A
C
D
J
G
F

Fig. 506

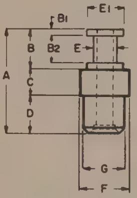
E1
B1
B
B2
E
A
C
D
G
F

Fig. 511

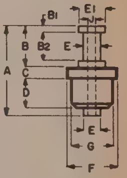
B1
E1
J
B
B2
E
A
C
D
E
G
F

Fig. 512

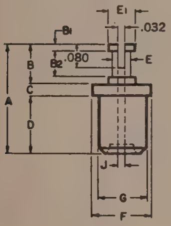
E1
.032
B1
B
B2
.080
E
C
A
D
J
G
F

Fig. 513

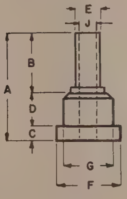

Fig. 551

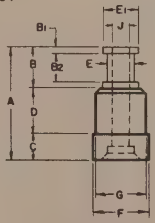
E1
J
B1
B
B2
E
A
D
C
G
F

Fig. 554

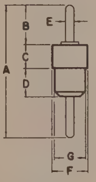

Fig. 601

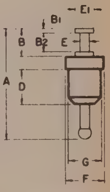
E1
B1
B
B2
E
A
D
G
F

Fig. 605A

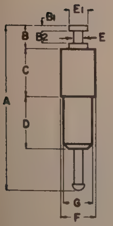
B1
E1
B
B2
E
C
A
D
G
F

Fig. 607

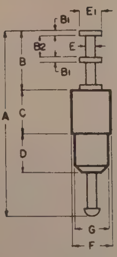
B1
E1
B2
E
B
B1
A
C
D
G
F

Fig. 608

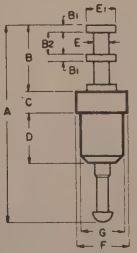
B1
E1
B2
E
B
B1
A
C
D
G
F

Fig. 609

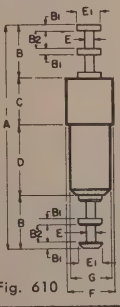
B1
E1
B2
E
B
B1
C
A
D
B1
B
B2
E
B1
E1
G
F

Fig. 610

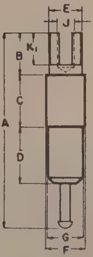
E
J
K1
B
C
A
D
G
F

Fig. 616

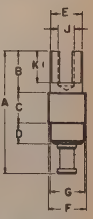
E
J
K1
B
A
C
D
G
F

Fig. 617

SEALECTRO PRESS-FIT® TEFLON* TERMINALS

*Reg. Trademark, E. I. Du Pont de´ Nemours & Co.

FEED-THRUS

Fig.	Old Part No.	New Part No.	Tool No.	Capacitance mmf	V,RMS 60 Hz Nominal Rating	V,RMS 60 Hz Flashover Sea Level	A	B	B_1	B_2	C	D	E Dia.	E_1 Dia.	F Dia.	+.002 −.000 G Dia.	J Dia.	K	K_1
302	FT-MM-5TUR	001-2013	B0	0.70	400	1800	.510	.100		.060	.040	.100	.040	.060	.093	.075			
303	FT-MM-5SL	001-3012	B0-1	0.70	400	1800	.510	.100			.040	.100	.030	.060	.093	.075			.080
305	FT-MM-7ML	001-6024	B0-1	0.70	400	1800	.588	.120			.040	.100	.030	.060	.093	.075			.080
306	FT-MM-16L2	001-1038	B0-2	0.70	400	1800	.550	.275			.040	.100	.030		.093	.075			
351	FT-SM-022	011-1001	B8	0.65	1000	3000	.630	.210			.040	.170	.040		.172	.148			
351	FT-SM-1	011-1004	B8-16	0.50	1000	3000	.515	.210			.040	.100	.040		.172	.148			
351	FT-SM-1C6	011-1006	B8	0.70	1000	3000	.710	.210			.040	.250	.040		.172	.148			
351	FT-SM-1L2	011-1008	B8-16	0.50	1000	3000	.443	.210			.040	.100	.040		.172	.148			
351	FT-SM-1L3	011-1009	B8-16	0.70	1000	3000	.725	.210			.040	.100	.040†		.172	.148			
351	FT-SM-1L6	011-1011	B8-16	0.55	1000	3000	.562	.210			.040	.100	.040		.172	.148			
351	FT-SM-2C4	011-1015	B8-18	0.50	1200	3500	.535	.210			.050	.110	.040		.172	.148			
351	FT-SM-5	021-1000	B22	0.50	1200	3500	.515	.210			.040	.100	.040		.250	.218			
351	FT-SM-7	001-1002	B3-1	0.50	500	2000	.375	.147			.040	.075	.040		.125	.093			
351	FT-SM-8	011-1021	B8-16	0.60	1000	3000	.535	.210			.040	.120	.040		.172	.148			
351	FT-SM-9	011-1023	B8-16	0.50	1000	3000	.535	.210			.040	.132	.040		.172	.148			
351	FT-SM-9L2	011-1025	B8-16	0.50	1000	3000	.407	.125			.040	.132	.040		.172	.148			
351	FT-SM-14	011-4021	B8-16	0.50	1000	3000	.375	.125			.040	.100	.040*		.172	.148			
351	FT-SM-16	001-1007	B3-1	0.75	500	2000	.515	.210			.040	.100	.040		.125	.093			
351	FT-SM-16L2	001-1008	B3-1	0.65	500	2000	.453	.156			.040	.100	.040		.125	.093			
351	FT-SM-19	011-1038	B8-16	0.60	1000	3000	.535	.210			.040	.160	.040		.172	.148			
360	FT-SM-028TUR	011-2002	B8	0.60	1000	3000	.550	.245	.020	.070	.040	.125	.040	.080	.172	.148			
360	FT-SM-029TUR	011-2003	B8	0.50	1000	3000	.812	.210	.020	.100	.040	.165	.040	.080	.172	.148			
360	FT-SM-1TUR	011-2004	B8	0.50	1000	3000	.500	.210	.020	.100	.040	.100	.040	.080	.172	.148			
360	FT-SM-1TUR-C4	011-2007	B8	0.50	1000	3000	.500	.210	.020	.100	.040	.100	.040	.080	.172	.148			
360	FT-SM-16TUR	001-2004	B-3-2B	0.70	500	2000	.500	.210	.020	.100	.040	.165	.040	.080	.125	.093			
362	FT-SM-025TUR	011-2000	B8	0.65	1000	3000	.609	.210	.020	.100	.040	.165	.040	.080	.172	.148			
362	FT-SM-2TUR	011-2013	B8	0.70	1000	3000	.531	.210	.020	.100	.040	.100	.040	.080	.172	.148			
362	FT-SM-2TUR-C2	011-2014	B8	0.70	1000	3000	.531	.210	.020	.100	.040	.125	.040	.080	.172	.148			
362	FT-SM-21TUR	011-2022	B18	0.65	1200	3500	.531	.210	.020	.100	.040	.125	.040	.080	.218	.185			
362	FT-SM-22TUR	011-2023	B9	0.65	1200	3500	.609	.210	.020	.100	.093	.125	.040	.080	.172	.148			
363	FT-04-9-B-02A	011-2103	B9-3	0.85	1500	4000	.836	.250	.020	.093	.125	.230	.040	.093	.172	.148			
363	FT-SM-1TUR-L4	011-2011	B8	0.50	1000	3000	.500	.210	.020	.100	.040	.100	.040	.080	.172	.148			
364	FT-SM-18TUR	011-2017	B8	0.60	1000	3000	.443	.093	.020	.062	.040	.100	.040	.080	.172	.148			
364A	FT-SM-18TUR-L3	011-2019	B8	0.60	1000	3000	.520	.190	.020	.160	.040	.100	.040	.080	.172	.148			
364	FT-SM-36TUR	011-2028	B16	0.60	1200	3500	.500	.120	.020	.080	.075	.125	.048	.090	.200	.172			
365	FT-SM-16TUR-L2	001-2005	B3-5	0.60	500	2000	.350	.125	.020	.085	.040	.100	.040	.080	.125	.093			
365	FT-SM-32TUR	011-2025	B8	0.50	1000	3000	.350	.125	.020	.095	.040	.100	.040	.080	.172	.148			
452	RFT-SM1	012-1000	B8	0.50	1000	3000	.515	.210			.040	.100	.040		.172	.148			
454	RFT-SM-1TUR	012-2000	B8	0.50	1000	3000	.500	.210	.020	.100	.040	.100	.040	.080	.172	.148			
454	RFT-SM-16TUR	002-2000	B3-12	0.85	500	2000	.500	.210	.020	.100	.040	.100	.040	.080	.125	.093			
501	FT-SM-54	001-6001	B4-1	0.40	750	2500	.310	.207			.050	.053	.040		.130	.120	.030		
501	FT-SM-59	001-6033	B3-1	0.40	500	2000	.225	.125			.040	.060	.040		.125	.093	.030		
501	FT-SM-60	011-6011	B18-1	0.70	1000	3000	.367	.207			.050	.110	.085		.218	.171	.063		
501	FT-SM-62	011-6015	B8-13-A	0.75	750	2500	.367	.207			.050	.110	.085		.172	.148	.063		
506	FT-1025SL¶	011-3017	B11	0.90	2000	5000	.602	.203			.187	.212	.148		.187	.171	.052	.078	.156
511	FT-SM-74	011-6033	B9-1	0.75	1000	3000	.351	.133	.020	.093	.093	.125	.082	.125	.172	.148	.062		
512	FT-SM-71	011-6022	B8	0.50	1000	3000	.303	.133	.020	.093	.040	.100	.060	.090	.172	.148	.030		
513	FT-SM-76SL	011-3007	B17	0.75	1200	3500	.333	.133	.020	.093	.040	.160	.060	.093	.205	.169	.030		

¶ Plating: Silver plated.

* ±.002 † ±.001

MINIATURE FEED-THRUS

Fig.	Old Part No.	New Part No.	Tool No.	Capacitance mmf	V,RMS 60 Hz Nominal Rating	V,RMS 60 Hz Flashover Sea Level	A	B	B_1	B_2	C	D	E Dia.	E_1 Dia.	F Dia.	+.002 −.000 G Dia.	J Dia.	K	K_1
551	RFT-SM-40	002-6000	B6-C	0.30	750	2500	.193	.105			.025	.063	.050		.150	.125	.030		
551	RFT-SM-62	012-6004	B8-X-2	0.70	1000	3000	.367	.207			.050	.110	.085		.172	.148	.063		
554	RFT-SM-77	012-6014	B10	0.60	1200	3500	.381	.133	.020	.093	.093	.155	.090	.125	.188	.177	.062		
601	FT-800-L5‡	011-1065	B12	0.60	1700	4500	.675	.200			.125	.150	.040		.187	.165			
605A	FT-310	011-2049	B10	0.75	1700	4500	.540	.133	.020	.093	.063	.171	.046	.093	.187	.171			
607	FT-400	011-2053	B19-A	0.80	2000	5000	.640	.133	.020	.093	.093	.210	.046	.093	.215	.185*			
607	FT-1000	011-2062	B13	0.70	2200	5500	.740	.125	.031	.062	.187	.212	.050	.093	.187	.171			
607	FT-1500	011-2072	B12-3	0.70	3000	7000	.865	.125	.031	.062	.250	.275	.050	.093	.187	.171			
608	FT-990-DTUR	011-2059	B9-3	0.80	1500	4000	.836	.250	.020	.093	.187	.165	.050	.093	.172	.148			
608	FT-995-DTUR	011-2061	B9-3	0.85	1500	4000	.836	.250	.020	.093	.125	.230	.050	.093	.172	.148			
608	FT-996-DTUR	021-2006	B19-A	1.00	2500	6000	.828	.281	.031	.093	.187	.212	.062	.125	.218	.187			
608	FT-1000-DTUR	011-2064	B13-3B	0.80	2000	5000	.836	.250	.020	.093	.187	.212	.050	.093	.187	.171			
609	FT-940-DTUR	011-2055	B19-A	1.00	1200	3500	.828	.281	.031	.093	.094	.210	.062	.125	.218	.185*			
609	FT-950-DTUR	011-2057	B12	1.00	1500	4000	.828	.281	.032	.093	.125	.200	.062	.125	.187	.171			
610	FT-1550-DTUR	021-2010	B24-A	1.25	3000	7000	1.187	.281	.031	.093	.250	.375	.062	.125	.250	.218			
616	FT-1000SL	011-3014	B11	0.80	2000	5000	.821	.203			.187	.212	.148		.187	.171	.078		.156
617	FT-900SL	011-3028	B11	0.90	1000	3000	.594	.203			.150	.100	.148		.187	.171	.078		.156

‡ Plating: Tin or Tin/Lead. Terminal Lug: Brass, Standard Plating Silver. Other platings available on special order. * ±.001

PROBES AND PLUGS

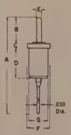

Fig. 801

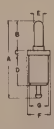

Fig. 804

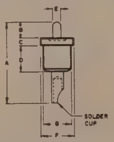

Fig. 807

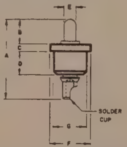

Fig. 808

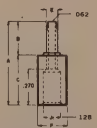

Fig. 809

Fig.	Old Part No.	New Part No.	Tool No.	Capacitance mmf	V,RMS 60 Hz Nominal Rating	V,RMS 60 Hz Flashover Sea Level	A	B	B_1	B_2	C	D	E Dia.	E_1 Dia.	F Dia.	+.002 −.000 G Dia.	J Dia.	K	K_1
801	FT-M-9L6	011-4037	B18-1B	1.00	1000	3000	1.500	.250			.046	.141	.050*		.218	.185*			
804	FT-M-7	011-4029	B18-1B	0.80	1000	3000	.739	.281			.046	.287	.081*		.218	.185*			
804	FT-M-8	011-4031	B18-1B	0.90	1000	3000	.562	.250			.046	.141	.050*		.218	.185			
807	PR-10	011-4000	B8-14	0.70	1000	3000	.538	.130			.046	.175	.040*		.172	.148			
808	PR-800■	011-4605	B-23A	0.70	1200	3500	.559	.187			.065	.169	.080*		.250	.185*			
809	PR-300§	021-4002					.645	.270			.375		.080*		.218				

Terminal Lug: Brass, Standard Plating: Gold over Silver. Other platings available on special order.

■ Floating Probe. § Nickel plated. * ±.001

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*Reg. Trademark, E. I. Du Pont de Nemours & Co.

TEST POINT JACKS

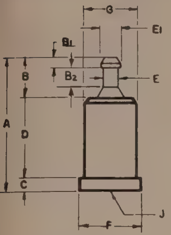


Fig. 701

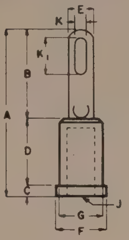


Fig. 703

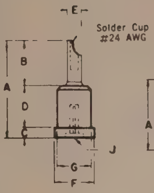


Fig. 706

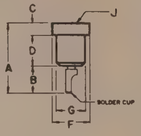


Fig. 713

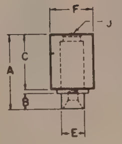


Fig. 714

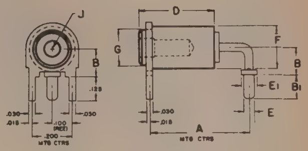


Fig. 732

Fig.	Old Part No.	New Part No.	Tool No.	Capacitance mmf	V,RMS 60 Hz Nominal Rating	V,RMS 60 Hz Flashover Sea Level	Ref. A	B	B1	B2	C	D	E Dia.	E1 Dia.	F Dia.	+.002 −.000 G Dia.	±.001 J Probe Dia.	Probe Length	K	K1
701	SKT-2BC	016-2025	S2	0.70	1000	3000	.437	.120	.037	.046	.046	.271	.054	.074	.218	.185*	.090	.195		
701	SKT-5BC	016-2000	S2	0.60	1000	3000	.437	.120	.037	.046	.046	.271	.054	.074	.218	.185*	.080	.195		
701	SKT-10	016-2003	S1	0.70	1200	3500	.640	.187	.037	.111	.050	.400	.054	.074	.218	.185*	.080	.280		
701	SKT-13C3	006-2000	S13-1	0.45	500	2000	.203	.060	.010	.040	.030	.113	.046	.080	.150	.120	.040	.078		
701	SKT-14	016-2008	S5	0.35	1000	3000	.345	.120	.023	.071	.046	.179	.040	.060	.172	.148	.040	.140		
701	SKT-22	006-2001	S4	0.20	1500	4000	.449	.120	.023	.071	.046	.283	.040	.060	.142	.120	.040	.245		
701	SKT-22C2	006-2002	S22	0.30	1500	4000	.410	.120	.023	.071	.046	.244	.040	.060	.142	.120	.040	.205		
701	SKT-41	016-2016	S2	0.55	1200	3500	.467	.120	.035	.047	.046	.301	.054	.074	.218	.185*	.080	.225		
701	SKT-0930	026-2006	S37	1.10	3200	7500	.834	.187	.035	.114	.230	.417	.054	.074	.375	.200	.093	.518		
703	SKT-1	016-8000	S31	0.55	1200	3500	.687	.354			.046	.287	.115		.218	.185*	.050	.250	.062	.156
703	SKT-4	016-8001	S30	0.40	1200	3500	.687	.354			.046	.287	.104		.218	.185*	.041	.250	.052	.140
706	SKT-31	016-6001	S17	0.45	1000	3000	.408	.187			.046	.175	.060		.172	.148	.040	.135		
713	SKT-400‡	016-6600	S17	0.50	1000	3000	.359	.140			.065	.154			.187	.148	.040	.125		
713	SKT-401‡	016-6601	S17	0.50	1000	3000	.359	.140			.065	.154			.172	.148	.040	.125		
713	SKT-800‡	016-6606	S18	0.60	1200	3500	.437	.156			.065	.216			.250	.185*	.080	.187		
714	SKT-113PC¶	026-4011					.381	.090			.281		.062		.187		.080	.250		
714	SKT-114PC¶	026-4012					.376	.085			.281		.066		.187		.080	.200		
732	SKT-102PC¶	026-4003		0.45	1200	3500	.500	.140	.125			.378	.050	.080	.218	.187†	.080	.250		
732	SKT-103PC¶	026-4005		0.50	1200	3500	.400	.140	.125			.378	.050	.080	.218	.187†	.080	.250		
732	SKT-103PC-L1¶	026-4006		0.50	1200	3500	.400	.140	.187			.378	.035	.080	.218	.187†	.080	.250		

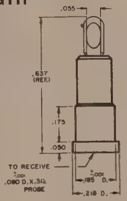
Terminal Lug: Beryllium Copper. Standard plating: Gold over Silver. Other platings available on special order.
‡ Floating contact ¶ For printed circuit application. * ±.001 † Tolerance ±.005

SKT-0804/016-8010 GUIDED ENTRY TEST POINT JACK FOR INCREASED CHASSIS PULL-OUT STRENGTH

Featuring a beryllium-copper formed lug, the SKT-0804 test point jack offers greater pull-out strength and high torque resistance. The jack is designed to provide guided-entry for an .080″ diameter probe.

Cap. 0.75 mmf. Nominal: 1000 V,RMS
Flashover S.L.: 3000 V,RMS

INSERTION TOOL NO. S-38



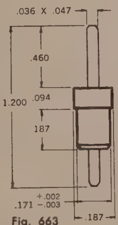


Fig. 663

FEED-THRUS AND STAND-OFFS FOR WIREWRAP APPLICATIONS

Fig.	Old Part No.	New Part No.	Tool No.	Capacitance mmf	V,RMS 60 Hz Nominal Rating	V,RMS 60 Hz Flashover Sea Level
663	FT-WJ-200	011-8000	B-13-5	0.90	1500	4000

Material: Phosphor Bronze. Plating: Tin or Tin/Lead.

METAL BASED INSULATED TEFLON STAND-OFFS

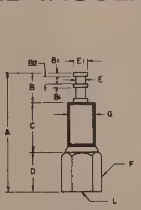


Fig. 902

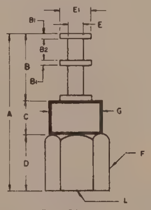


Fig. 904

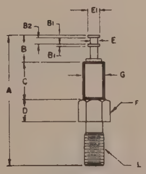


Fig. 907

Fig.	Old Part No.	New Part No.	Capacitance mmf	V,RMS 60 Hz Nominal Rating	V,RMS 60 Hz Flashover Sea Level	A	B	B1	B2	C	D	E Dia.	E1 Dia.	F Hex	G Dia.	L Thrd.	Depth of Thrd.
902	TF-304TUR	003-5701	0.50	1700	4500	35/64	.136	.018	.031	.229	.181	.045	.066	5/32	.125	4-40	.093
904	TF-302TUR-T1	023-5702	0.60	2200	5500	23/32	.305	.025	.100	.156	.258	.069	.140	1/4	.245	6-32	.156
907	TM-300TUR	003-5700	0.55	2200	5500	3/4	.156	.018	.031	.218	.218	.045	.066	5/32	.125	4-40	
907	TM-301TUR-C1	023-5701	0.65	2200	5500	57/64	.295	.025	.100	.165	.180	.069	.140	1/4	.245	6-32	
907	SE9-09-E01**	003-5707	0.55	2200	5500	3/4	.156	.018	.031	.218	.218	.045	.066	5/32	.125	4-40	
907	SE9-09-E02**	023-5705	0.65	2200	5500	57/64	.295	.025	.100	.165	.180	.069	.140	1/4	.245	6-32	

Insulation: Teflon. Lug: Brass. Plating: Lug: Standard Plating Tin or Tin/Lead. Other Platings on special order. Base: Brass, Cadmium with Chromate Coating.
** Supplied with Military Specifications Mounting Hardware.

SEALECTRO PRESS-FIT® TEFLON* TERMINALS

*Reg. Trademark, E. I. Du Pont de Nemours & Co.

TEFLON BUSHINGS

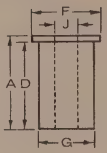
SINGLE SHOULDER

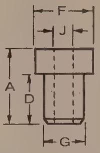
Descrip.	Part No.	G	A	D	J	F
B-1585	019-0187	.203	.062	.031	.144	.320

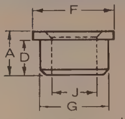
Descrip.	Part No.	G	A	D	J	F
B-1440	019-0040	.093	.140	.100	.040	.125
B-1440-1	019-0041	.093	.140	.100	.035	.125
B-1441	019-0042	.093	.100	.060	.037	.125
B-1464	019-0066	.093	.100	.080	.038	.125
B-1553	019-0155	.093	.100	.080	.048	.125
B-1414	019-0014	.148	.140	.100	.060	.172
B-1475	019-0078	.148	.140	.100	.073	.172

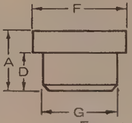
SINGLE SHOULDER, COUNTER-SUNK HOLE

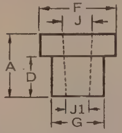
Descrip.	Part No.	G	A	D	J	F
B-1522	019-0124	.185	.250	.204	.140	.250
B-1565	019-0167	.185	.108	.083	.120	.218











SINGLE SHOULDER, NO HOLE

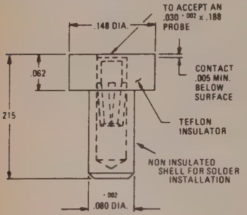
Descrip.	Part No.	G	A	D	J	F
B-1541	019-0143	.185	.672	.626		.218

SINGLE SHOULDER, TAPERED HOLE

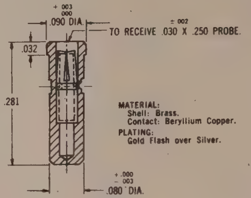
Descrip.	Part No.	G	A	D	F	J	J1
B-1505	019-0107	.156	.153	.108	.200	.102	.064

Description	Part No.	A	C	Insert Tool
227298	019-0710	1.021	.750	B-44-4
227294	019-0709	.958	.687	B-44-4
227290	019-0708	.896	.625	B-44-3
227286	019-0707	.833	.562	B-44-3
227282	019-0706	.771	.500	B-44-3
227278	019-0705	.708	.437	B-44-2
227274	019-0704	.646	.375	B-44-2
227270	019-0703	.583	.312	B-44-2
227266	019-0702	.521	.250	B-44-1
227262	019-0701	.458	.187	B-44-1
227258	019-0700	.396	.125	B-44-1

SEALECTRO NON-INSULATED TEST POINTS

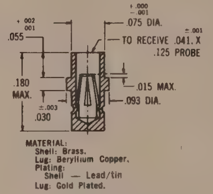

.148 DIA.
TO ACCEPT AN .030 +.002 x .188 PROBE
.062
CONTACT .005 MIN. BELOW SURFACE
215
TEFLON INSULATOR
NON INSULATED SHELL FOR SOLDER INSTALLATION
+.002
.080 DIA.

016-0700


+.003 .000
.090 DIA.
± .002
TO RECEIVE .030 X .250 PROBE.
.032
.281
+.000 −.003
.080 DIA.

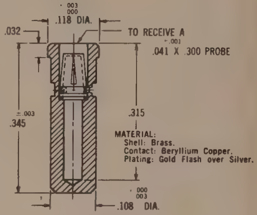
MATERIAL:
Shell: Brass.
Contact: Beryllium Copper.
PLATING:
Gold Flash over Silver.

006-4000
SKT-00300PC


+.002 .001
.055
+.000 −.001
.075 DIA.
±.001
TO RECEIVE .041. X .125 PROBE
.180 MAX.
±.003
.030
.015 MAX.
.093 DIA.

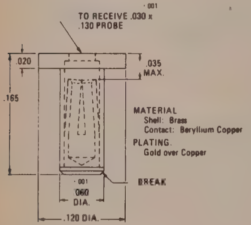
MATERIAL:
Shell: Brass.
Lug: Beryllium Copper.
Plating:
Shell — Lead/tin
Lug: Gold Plated.

006-4001
SKT-00400PC


+.003 .000
.118 DIA.
.032
TO RECEIVE A +.001 .041 X .300 PROBE
±.003
.345
.315
+.000 .003
.108 DIA.

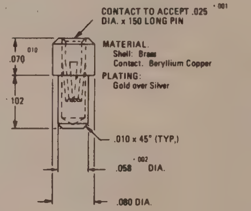
MATERIAL:
Shell: Brass.
Contact: Beryllium Copper.
Plating: Gold Flash over Silver.

006-4002
SKT-00401PC


+.001
TO RECEIVE .030 x .130 PROBE
.020
.035 MAX.
.165
BREAK
+.001
.060 DIA.
.120 DIA.

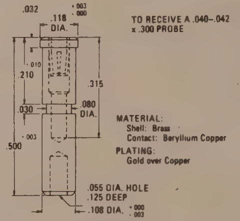
MATERIAL
Shell: Brass
Contact: Beryllium Copper
PLATING.
Gold over Copper

006-4004


CONTACT TO ACCEPT .025 +.001 DIA. x 150 LONG PIN
010
.070
102
.010 x 45° (TYP.)
+.002
.058 DIA.
.080 DIA.

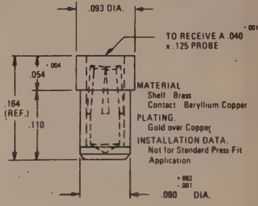
MATERIAL.
Shell: Brass
Contact. Beryllium Copper
PLATING:
Gold over Silver

006-4006


.032
+.003 −.000
.118 DIA.
TO RECEIVE A .040–.042 x .300 PROBE
+.010
.210
.315
.030
.080 DIA.
+.003
.500
.055 DIA. HOLE .125 DEEP
.108 DIA. +.000 −.003

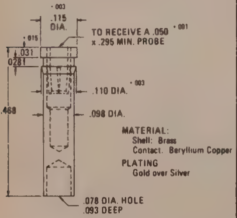
MATERIAL:
Shell: Brass
Contact: Beryllium Copper
PLATING:
Gold over Copper

006-4007


.093 DIA.
TO RECEIVE A .040 +.001 x .125 PROBE
+.004
.054
.164 (REF.)
.110
+.002 −.001
.080 DIA.

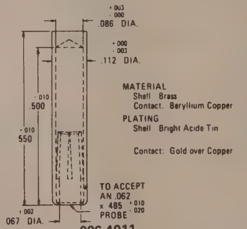
MATERIAL
Shell Brass
Contact Beryllium Copper
PLATING.
Gold over Copper
INSTALLATION DATA.
Not for Standard Press-Fit Application

006-4008


+.003
.115 DIA.
TO RECEIVE A .050 +.001 x .295 MIN. PROBE
+.015
.031
.0281
.110 DIA. +.003
.468
.098 DIA.
.078 DIA. HOLE .093 DEEP

MATERIAL:
Shell: Brass
Contact. Beryllium Copper
PLATING
Gold over Silver

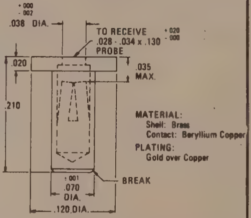
006-4010


+.003 −.000
.086 DIA.
+.000 −.003
.112 DIA.
+.010
.500
+.010
550
TO ACCEPT AN .062 x 485 +.010 −.020 PROBE
+.002
067 DIA.

MATERIAL
Shell Brass
Contact. Beryllium Copper
PLATING
Shell Bright Acide Tin

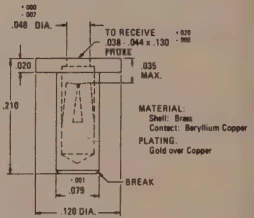
Contact: Gold over Copper

006-4011


+.000 −.002
.038 DIA.
TO RECEIVE .028 - .034 x .130 +.020 −.000 PROBE
.020
.035 MAX.
.210
BREAK
+.001
.070 DIA.
.120 DIA.

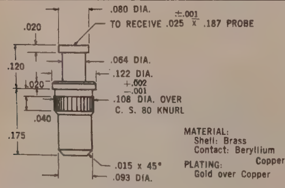
MATERIAL:
Shell: Brass
Contact: Beryllium Copper
PLATING:
Gold over Copper

006-4013


+.000 −.007
.048 DIA.
TO RECEIVE .038 - .044 x .130 +.020 −.000 PROBE
.020
.035 MAX.
.210
BREAK
+.001
.079
.120 DIA.

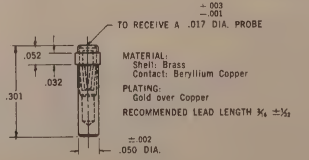
MATERIAL:
Shell: Brass
Contact: Beryllium Copper
PLATING.
Gold over Copper

006-4014


.080 DIA.
±.001
TO RECEIVE .025 X .187 PROBE
.020
.120
.064 DIA.
.122 DIA.
+.002 −.001
.020
.108 DIA. OVER C. S. 80 KNURL
.040
.175
.015 x 45°
.093 DIA.

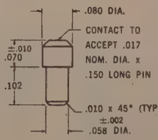
MATERIAL:
Shell: Brass
Contact: Beryllium Copper
PLATING:
Gold over Copper

006-4015


+.003 −.001
TO RECEIVE A .017 DIA. PROBE
.052
.032
.301
±.002
.050 DIA.

MATERIAL:
Shell: Brass
Contact: Beryllium Copper
PLATING:
Gold over Copper
RECOMMENDED LEAD LENGTH 3/16 ±1/32

006-4016


.080 DIA.
CONTACT TO ACCEPT .017 NOM. DIA. x .150 LONG PIN
±.010
.070
.102
.010 x 45° (TYP.)
±.002
.058 DIA.

MATERIAL:
Shell: Brass
Contact: Beryllium Copper
PLATING: Gold over Silver
INSTALLATION DATA:
Not for standard Press-Fit application

TOTALS:
Fraction ±1/64
Decimal ±.005
Angle ±1°

SCALE: 10:1

006-4017

SEALECTRO® PRESS-FIT® TEFLON* TERMINALS

*Reg. Trademark, E. I. Du Pont de Nemours & Co.

NEW! For chamfered or non-chamfered holes

Rivet-Loc™

patented

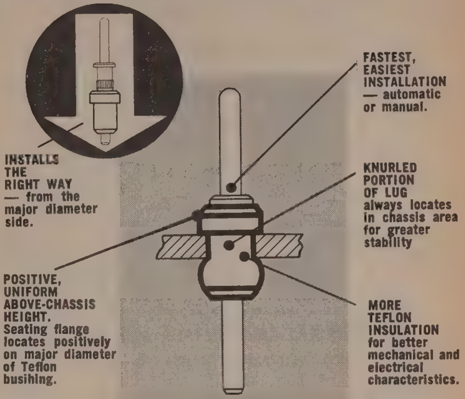
TEFLON INSULATED TERMINALS

Rivet-Loc terminals overcome all the inherent shortcomings of the older semi-assembled design which assembles by pushing the metal lug into the minor diameter of the Teflon bushing. Whereas the original semi-assembled design depended upon the mass of the metal lug displacing the Teflon, the Rivet-Loc employs a simple **Riveting** and **Locking** of the Teflon bushing assuring a better finished installation.

Rivet-Loc is installed in one simple, smooth operation with all insertion forces working together, instead of against each other as in the case of the previous semi-assembled design. Thus, the final seating and locking of the terminal in the chassis is uniform, even with wide parameters of tool settings.

Proved in millions of installations, Rivet-Loc not only offers far superior mechanical characteristics, it also has proved more dependable electrically. The smaller metal lug mass in proportion to the Teflon bushing provides far better dielectric strength. This extra protection of pure virgin Teflon enhances the dependability and performance of your equipment.

The numbers listed here are currently considered standard. However, new numbers are being added constantly. Virtually any terminal configuration or requirement can be met with the Rivet-Loc concept. Submit your requirements to Sealectro.



INSTALLS THE RIGHT WAY — from the major diameter side.

FASTEST, EASIEST INSTALLATION — automatic or manual.

KNURLED PORTION OF LUG always locates in chassis area for greater stability.

POSITIVE, UNIFORM ABOVE-CHASSIS HEIGHT. Seating flange locates positively on major diameter of Teflon busihing.

MORE TEFLON INSULATION for better mechanical and electrical characteristics.

FEED-THRUS Rivet-Loc™

patented

Fig.	Part No.	Insertion Tool Number	A	B	C	D	E Dia.	F Dia.	±.002 G Dia.	±.015 R	Insertion Hole ±.002
1	001-3400	R3-A3	.387	.140	.040	.125	.040	.130	.107	.045	.109
1	001-3401	R3-A3	.434	.140	.040	.172	.040	.130	.107	.075	.109
2	001-1401	R4-A2	.515	.210	.040	.125	.040	.125	.084	.045	.086
2	001-1400	R2-A4	.656	.235	.040	.125	.030	.135	.113	.040	.117
2	011-1400	R5-A1	.687	.265	.075	.160	.050	.172	.134	.045	.136
2	011-1401	R5-A1	.887	.465	.075	.160	.050	.172	.134	.045	.136
2	011-1402	R5-A1	.730	.465	.075	.160	.050	.172	.134	.045	.136
2	011-1403	R4-A1	.570	.210	.040	.150	.040	.172	.134	.045	.136
2	011-1404	R4-A1	.515	.210	.040	.180	.040	.172	.134	.075	.136
3	011-2400	R1-A1	.500	.210	.040	.150	.040	.172	.134	.045	.136
3	011-2401	R1-A1	.530	.210	.040	.180	.040	.172	.134	.075	.136
3	011-2402	R1-A1	.458	.210	.040	.150	.040	.172	.134	.045	.136

Plating: Bright electro-tin a smooth finish featuring extraordinary soldering characteristics and shelf life is standard. Other finishes including all MIL-Spec numbers, are available upon special order.

***T. M., E. I. Dupont DeNemours & Co.**

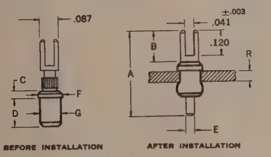

.087
±.003
.041
.120
B
A
R
C
F
D
G
E
BEFORE INSTALLATION
AFTER INSTALLATION

FIG. 1

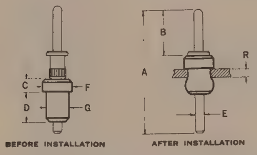

B
A
R
C
F
D
G
E
BEFORE INSTALLATION
AFTER INSTALLATION

FIG. 2

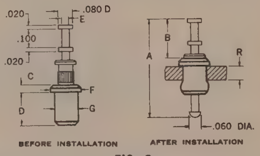

.020
.080 D
E
.100
.020
C
F
D
G
B
A
R
.060 DIA.
BEFORE INSTALLATION
AFTER INSTALLATION

FIG. 3

STAND-OFFS Rivet-Loc™

Fig.	Part No.	Insertion Tool Number	A	B	C	D	E Dia.	F Dia.	±.002 G Dia.	±.015 R	Insertion Hole ±.002
4	003-3400	R3-A3	.275	.140	.040	.125	.087	.130	.107	.075	.109
4	003-3401	R3-A3	.322	.140	.040	.172	.087	.130	.107	.075	.109
5	003-1400	R4-A2	.345	.210	.040	.125	.040	.125	.084	.045	.086
5	013-1400	R4-A1	.370	.210	.040	.150	.040	.172	.134	.045	.136
5	013-1401	R4-A1	.405	.210	.040	.180	.040	.172	.134	.075	.136
6	013-2400	R1-A1	.370	.210	.040	.150	.040	.172	.134	.045	.136
6	013-2401	R1-A1	.400	.210	.040	.180	.040	.172	.134	.075	.136

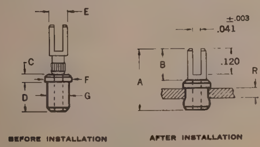

E
±.003
.041
.120
C
B
A
R
F
D
G
BEFORE INSTALLATION
AFTER INSTALLATION

FIG. 4

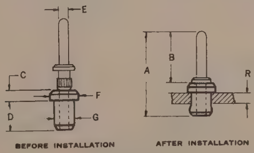

E
C
B
A
R
F
D
G
BEFORE INSTALLATION
AFTER INSTALLATION

FIG. 5

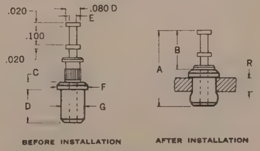

.020
.080 D
E
.100
.020
C
F
D
G
B
A
R
BEFORE INSTALLATION
AFTER INSTALLATION

FIG. 6

SEALECTRO PRESS-FIT® TEFLON* TERMINALS

*Reg. Trademark, E. I. Du Pont de Nemours & Co.

Sealectro MIL Spec Terminals and Transistor/IC Hardware

•MIL-T-55155 Terminals

TEFLON** INSULATED

MIL Part No.	New Sealectro Part No.	Old Part No.
FT-03-9-B-01A	011-4021	FT-SM-14
FT-03-9-B-02A	011-1004	FT-SM-1
FT-03-9-B-03A	011-1065	FT-800-L5
FT-03-9-B-04A	001-1007	FT-SM-16
FT-03-9-B-05A	001-1015	FT-SM-16-L16
FT-04-9-B-01A	011-2011	FT-SM-1TUR-L4
FT-04-9-B-02A	011-2103	011-2103
FT-04-9-B-03A	001-2004	FT-SM-16-TUR
FT-05-9-B-01	001-6033	FT-SM-59
FT-05-9-B-02	001-6001	FT-SM-54
FT-05-9-B-03	011-6015	FT-SM-62
FT-06-9-B-01	002-6000	RFT-SM-40
FT-06-9-B-02	012-6004	RFT-SM-62
SE-07-9-B-01	013-2004	ST-SM-1-TUR-C4
SE-07-9-B-02	013-2046	ST-250
SE-07-9-B-03	003-2003	ST-SM-16-TUR
SE-08-9-B-01	013-1000	ST-SM-1
SE-08-9-B-02	003-1009	ST-SM-16
SE-09-9-E-01	003-5707	003-5707*
SE-09-9-E-02	023-5705	023-5705*
SE-10-9-D-01	003-5701	TF-304-TUR
SE-10-9-D-02	023-5702	TF-302-TUR-T1

NON-INSULATED

MIL Part No.	Sealectro Part No.	MIL Part No.	Sealectro Part No.	MIL Part No.	Sealectro Part No.
SE-11 x CO1	229-2015	SE-14 x CO1A	229-2036	SE-17 x CO1A	229-6012
SE-11 x CO2	229-2016	SE-14 x CO2A	229-2037	SE-17 x CO2A	229-6013
SE-11 x CO3	229-2017	SE-14 x CO3A	229-2038	SE-17 x CO3A	229-6014
SE-12 x CO1A	229-2018	SE-14 x CO4A	229-2039	SE-23 x CO1	229-2027
SE-12 x CO2A	229-2019	SE-14 x CO5A	229-2040	SE-23 x CO2	229-2014
SE-12 x CO3A	229-2020	SE-14 x CO6A	229-2041	SE-23 x CO3	229-2028
SE-12 x CO4A	229-2021	SE-15 x CO1A	229-2042	SE-23 x CO4	229-2029
SE-12 x CO5A	229-2022	SE-15 x CO2A	229-2043	SE-24 x CO1	229-6036
SE-12 x CO6A	229-2023	SE-15 x CO3A	229-2044	SE-24 x CO2	229-6037
SE-12 x CO7A	229-2024	SE-15 x CO7A	229-2048	SE-24 x CO3	229-6038
SE-12 x CO8A	229-2025	SE-15 x CO8A	229-2049	SE-24 x CO4	229-6039
SE-12 x CO9A	229-2026	SE-15 x CO9A	229-2050	SE-25 x CO1	229-2056
SE-13 x CO1A	229-2030	SE-16 x CO1A	229-6006	SE-25 x CO2	229-2057
SE-13 x CO2A	229-2031	SE-16 x CO2A	229-6010	SE-25 x CO3	229-2058
SE-12 x CO3A	229-2032	SE-16 x CO3A	229-6011	SE-25 x CO4	229-2059
SE-13 x CO4A	229-2033				
SE-13 x CO5A	229-2034				
SE-13 x CO6A	229-2035				

* Supplied with MIL Spec. mounting hardware. If desired without mounting hardware: please specify;

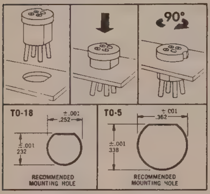
SE-099E-01	TM-300-TUR
SE-099E-02	TM-301-TUR-C1

•Transistor and IC Hardware

Needs no mounting hardware. Provides full insulation from metal chassis.

PRESS-FIT® ¼ TURN *Supercon* TRANSISTOR AND IC SOCKETS

- **Supercon high retention precision Contacts.**
- **D-hole mounting without interference fit or loose hardware.**



An exclusive Sealectro design that can save tremendous time and money on the assembly line. Merely drop ¼ turn unit through D-hole and manual or automatic tooling automatically turns it 90°. Flatted portion turns free, while rounded area is grooved against D-Flat, producing a positive locking action in chassis.

MATERIAL:

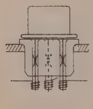
Insulator: Teflon

Shell: Brass

Contact: Beryllium Copper

Std. Plating: Gold over Copper

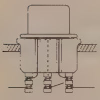
Supercon transistor and I.C. hardware features high-retention precision contacts. Allows fast easy replacement of transistor or I.C. Maintains retention, in excess of 50 grams per lead, through shock and vibration and repeated component insertions. Permits transistor or I.C. device interface into associated circuitry without electrical noise or signal dissipation due to contact resistance build-up.



PRESS-FIT SERIES 60:

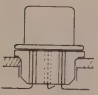
Transistor and I.C. sockets

Low-cost, high precision series 60 sockets. Permit plug-in and removal of TO-5, TO-18 cans and I.C. packages at will. Precise contact design provides a positive mechanical grip while making electrical contact with minimum resistance.



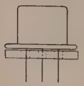
PRESS-FIT TRANSISTOR AND IC HOLDERS

Provides insulated chassis mounting with thru holes and soldering lugs for transistor leads and circuit connections.



PRESS-FIT TRANSISTOR AND IC BUSHINGS

Press-fit or grommet-type chassis mounting. Provides support for transistor can and thru-chassis hole plus strain relief for leads.



PRESS-FIT TRANSISTOR AND IC PADS

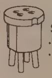
Provides insulation from mounting surface and strain relief for glass seals.

Sealectro Transistor and IC Socket and mounting devices provide the excellent electrical and mechanical characteristics of Teflon, and eliminate the need for loose mounting hardware such as quick-nuts, seating rings, screws, washers, etc.

Electrically, only the finest contact metals and platings are employed to assure lowest electrical noise, maximum contact retention and longest service life.

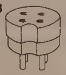
—Free 12 page catalog details all above transistor and IC hardware.

A



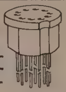
SPREAD
.043 dia.
.160 L

B

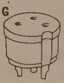


SOLDER POST
.043 dia.
.160 L

DIRECT or PC WIRING
C — 1.5 L
D — .110 L
E — .160 L
F — .315 L
.020 dia.

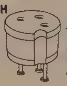


G



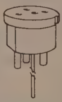
SOLDER CUP
.051 dia.,
.038 dia. hole
X .150 deep
.160 L

H



TURRETED
.035 dia.
.051 dia.
.160 L

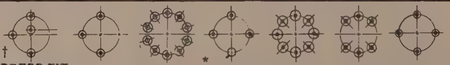
J



COMBINATION
.043 dia.
.150 L
.020 dia.
1.5 L

SUPERCON TRANSISTOR AND IC SOCKETS

Part No.	Leads	Pitch Circle	Contacts	Fig.	Mtg. Hole
¼ TURN					
027-1705	4	.100	4	A	I
027-1706	3	.100	4*	A	I
027-1700	4	.200	4	B	II
027-1701	3	.200	3	B	II
027-1702	3	.200	4*	B	II
027-1703	4	.200	4†	J	II
027-1707	8	.200	8	C	II
027-1708	6	.200	6	C	II
027-1709	10	.230	10	C	II
027-1704	3	.100	3	A	I
PRESS FIT					
027-1712	3	.100	3	E	.215
027-1727	4	.100	4	E	.215
027-1728	3	.100	3	A	.250
027-1729	4	.100	4	A	.250
027-1730	3	.100	4*	A	.250
027-1731	3	.100	3	E	.215
027-1732	4	.100	4	E	.215
027-6700	3	.100	3	G	.215
027-6701	3	.100	3	G	.215
027-6702	4	.100	4	G	.215
027-1713	3	.200	3	D	.360
027-1716	4	.200	4	B	.360
027-1717	3	.200	3	B	.360
027-1718	3	.200	4*	B	.360
027-1719	4	.200	4†	J	.360
027-1720	4	.200	4	F	.360
027-1721	3	.200	3	F	.360
027-2700	3	.200	3	H	.360
027-2701	4	.200	4	H	.360
027-6710	4	.200	4	G	.360
027-6703	3	.200	3	G	.360
027-6711	3	.200	3	H	.360
027-6712	4	.200	4	H	.360
027-1714	10	.230	10	D	.360
027-1715	8	.200	8	F	.360
027-1722	6	.200	6	F	.360
027-1723	10	.230	10	F	.360
027-1724	8	.200	8	C	.360
027-1725	6	.200	6	C	.360
027-1726	10	.230	10	C	.360
027-2702	6	.200	6	H	.360
027-2703	8	.200	8	H	.360
027-2704	10	.230	10	H	.360
027-6704	8	.200	8	G	.360
027-6705	6	.200	6	G	.360
027-6713	10	.230	10	G	.360
027-6714	6	.200	6	H	.360
027-6715	8	.200	8	H	.360
027-6716	10	.230	10	H	.360



PRESS-FIT:

For chassis thickness .040" and over use 60° countersink. Use 82° countersink under .040".

Hole Dia.	Entrance Dia.
.215	.234
.250	.280
.360	.380

SEALECTRO® CONHEX®

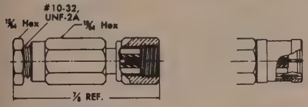
CONHEX SUBMINIATURE R.F. CONNECTORS

50 OHM SCREW-ON & SNAP-ON CABLE CONNECTORS

"-0000" CLAMP-TYPE connectors accept RG-161/U, 174/U, 188/U and 316/U cables.

"-3196" CLAMP-TYPE and CRIMP-TYPE connectors accept RG-178/U and 196/U cables.

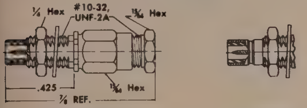
"-0000" CRIMP-TYPE connectors accept RG-161/U, 174/U, 179/U, 187/U, 188/U and 316/U cables.


#10-32, UNF-2A
13/64 Hex
15/64 Hex
7/8 REF.

SCREW-ON
50-007-0000
50-007-3196

SNAP-ON
51-007-0000
51-007-3196

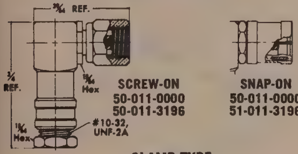
CLAMP-TYPE
Straight Plugs


1/4 Hex
#10-32, UNF-2A
15/64 Hex
.425
15/64 Hex
7/8 REF.

SCREW-ON
50-010-0000
50-010-3196

SNAP-ON
51-010-0000
51-010-3196

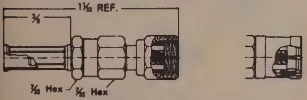
CLAMP-TYPE
Bulkhead Jacks


29/64 REF.
3/4 REF.
15/64 Hex
15/64 Hex
#10-32, UNF-2A

SCREW-ON
50-011-0000
50-011-3196

SNAP-ON
50-011-0000
51-011-3196

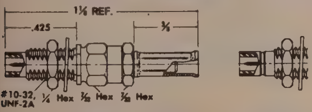
CLAMP-TYPE
Right Angle Plugs


1 1/32 REF.
3/8
7/32 Hex
7/32 Hex

SCREW-ON
50-024-0000
50-024-3196

SNAP-ON
51-024-0000
51-024-3196

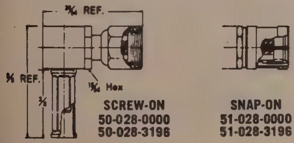
CRIMP-TYPE
Straight Plugs


1 1/8 REF.
.425
3/8
#10-32, UNF-2A
1/4 Hex
7/32 Hex
7/32 Hex

SCREW-ON
50-027-0000
50-027-3196

SNAP-ON
51-027-0000
51-027-3196

CRIMP-TYPE
Bulkhead Jacks


29/64 REF.
5/8 REF.
3/8
15/64 Hex

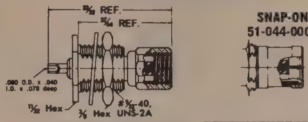
SCREW-ON
50-028-0000
50-028-3196

SNAP-ON
51-028-0000
51-028-3196

CRIMP-TYPE
Right Angle Plugs

50 OHM SCREW-ON & SNAP-ON RECEPTACLES

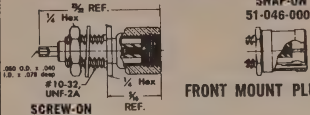
BULKHEAD MOUNT


23/32 REF.
31/64 REF.
.060 O.D. x .040 I.D. x .078 deep
11/32 Hex
3/8 Hex
#5/32-40, UNS-2A

SNAP-ON 51-044-0000

SCREW-ON 50-044-0000

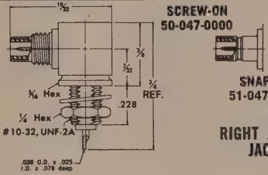
REAR MOUNT PLUG


23/32 REF.
1/4 Hex
.060 O.D. x .040 I.D. x .078 deep
#10-32, UNF-2A
1/4 Hex
5/16 REF.

SNAP-ON
51-046-0000

SCREW-ON
50-046-0000

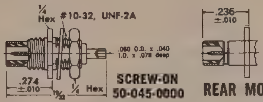
FRONT MOUNT PLUG


19/32
3/8
7/32
3/4 REF.
.228
5/16 Hex
1/4 Hex
#10-32, UNF-2A
.038 O.D. x .025 I.D. x .078 deep

SCREW-ON
50-047-0000

SNAP-ON
51-047-0000

RIGHT ANGLE JACK


1/4 Hex
#10-32, UNF-2A
.060 O.D. x .040 I.D. x .078 deep
.274 ±.010
19/32
1/4 Hex
.236 ±.010

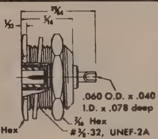
SNAP-ON
51-045-0000

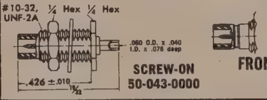
SCREW-ON
50-045-0000

REAR MOUNT JACK

RECESSED JACK

SNAP-ON
51-049-0000

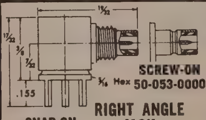

1/32
5/16
29/64
.060 O.D. x .040 I.D. x .078 deep
7/16 Hex
#3/8-32, UNEF-2A
7/16 Hex


#10-32, UNF-2A
1/4 Hex
1/4 Hex
.060 O.D. x .040 I.D. x .078 deep
.426 ±.010
19/32

SNAP-ON
51-043-0000

SCREW-ON
50-043-0000

FRONT MOUNT JACK

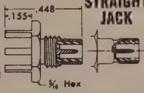

19/32
17/32
3/8
7/32
.155
5/16 Hex

SCREW-ON
50-053-0000

SNAP-ON
51-053-0000

RIGHT ANGLE JACK

STRAIGHT JACK

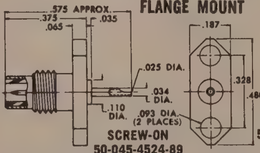

.155
.448
5/16 Hex

SCREW-ON
50-051-0000

SNAP-ON
51-051-0000

PRINTED CIRCUIT MOUNT

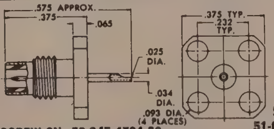
FLANGE MOUNT


.575 APPROX.
.375
.065
.035
.025 DIA.
.034 DIA.
.110 DIA.
.093 DIA. (2 PLACES)
.187
.328
.480

NARROW FLANGE JACK

SCREW-ON
50-045-4524-89

SNAP-ON
51-045-4524-89


.575 APPROX.
.375
.065
.025 DIA.
.034 DIA.
.093 DIA. (4 PLACES)
.375 TYP.
.232 TYP.

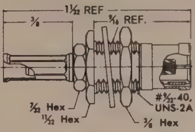
SQUARE FLANGE JACK

SCREW-ON 50-045-4504-89

SNAP-ON
51-045-4504-89

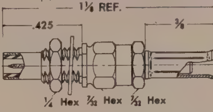
50 OHM SLIDE-ON CABLE CONNECTORS & RECEPTACLES

"-0000" CRIMP-TYPE connectors accept RG-161/U, 174/U, 179/U, 188/U and 316/U cables.


1 1/32 REF
3/8
9/16 REF.
7/32 Hex
11/32 Hex
#5/32-40, UNS-2A
3/8 Hex

CRIMP-TYPE
Bulkhead Plug

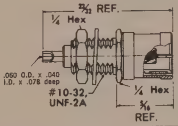
SLIDE-ON
52-026-0000


1 1/8 REF.
.425
3/8
1/4 Hex
7/32 Hex
7/32 Hex

CRIMP-TYPE
Bulkhead Jack

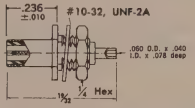
SLIDE-ON
52-027-0000

BULKHEAD RECEPTACLES


23/32 REF.
1/4 Hex
.060 O.D. x .040 I.D. x .078 deep
#10-32, UNF-2A
1/4 Hex
5/16 REF.

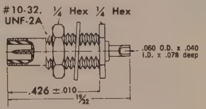
PLUG

SLIDE-ON
52-046-0000


.236 ±.010
#10-32, UNF-2A
.060 O.D. x .040 I.D. x .078 deep
1/4 Hex
19/32

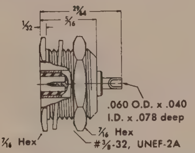
JACK

SLIDE-ON
52-045-0000


#10-32, UNF-2A
1/4 Hex
1/4 Hex
.060 O.D. x .040 I.D. x .078 deep
.426 ±.010
19/32

JACK

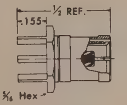
SLIDE-ON
52-043-0000


29/64
1/32
5/16
.060 O.D. x .040 I.D. x .078 deep
7/16 Hex
7/16 Hex
#3/8-32, UNEF-2A

JACK

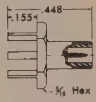
SLIDE-ON
52-049-0000

PRINTED CIRCUIT RECEPTACLES


1/2 REF.
.155
5/16 Hex

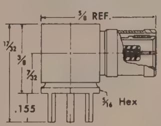
PLUG

SLIDE-ON
52-052-0000


.155
.448
5/16 Hex

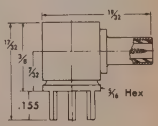
JACK

SLIDE-ON
52-051-0000


5/8 REF.
17/32
3/8
7/32
.155
5/16 Hex

PLUG

SLIDE-ON
52-054-0000


19/32
17/32
3/8
7/32
.155
5/16 Hex

JACK

SLIDE-ON
52-053-0000

SEALECTRO® CONHEX®

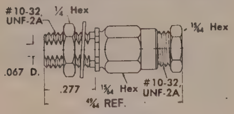
CONHEX SUBMINIATURE R.F. CONNECTORS

50 OHM ACCESSORIES

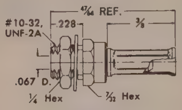
"-0000" CLAMP-TYPE connectors accept RG-161/U, 174/U, 188/U and 316/U cables.

"-0000" CRIMP-TYPE connectors accept RG-161/U, 174/U, 179/U, 187/U, 188/U and 316/U cables.

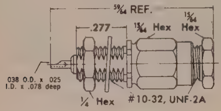
BULKHEAD CABLE FEED-THRUS


#10-32, UNF-2A
¼ Hex
13/64 Hex
.067 D.
.277
13/64 Hex
#10-32, UNF-2A
49/64 REF.

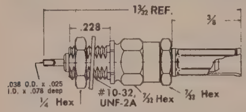
CLAMP-TYPE
55-013-0000


47/64 REF.
#10-32, UNF-2A
.228
⅜
.067 D.
¼ Hex
7/32 Hex

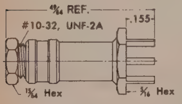
CRIMP-TYPE
55-031-0000


59/64 REF.
.277
13/64 Hex
13/64 Hex
.038 O.D. x .025 I.D. x .078 deep
¼ Hex
#10-32, UNF-2A

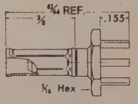
CLAMP-TYPE
55-018-0000


1 3/32 REF.
.228
⅜
.038 O.D. x .025 I.D. x .078 deep
#10-32, UNF-2A
¼ Hex
7/32 Hex
7/32 Hex

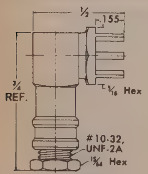
CRIMP-TYPE
55-036-0000


49/64 REF.
#10-32, UNF-2A
.155
13/64 Hex
5/16 Hex

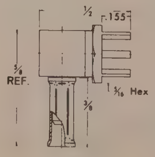
CLAMP-TYPE
55-020-0000


49/64 REF.
⅜
.155
5/16 Hex

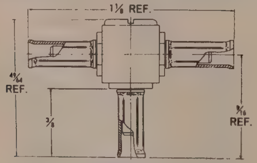
CRIMP-TYPE
55-038-0000


½
.155
¾ REF.
5/16 Hex
#10-32, UNF-2A
13/64 Hex

CLAMP-TYPE
55-021-0000


½
.155
⅝ REF.
5/16 Hex
⅜

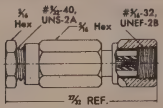
CRIMP-TYPE
55-039-0000


1⅛ REF.
49/64 REF.
⅜
9/16 REF.

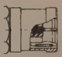
CRIMP-TYPE
55-069-0000

75 OHM CABLE CONNECTORS & RECEPTACLES

75 ohm "-0000" connectors accept RG-180/U, 195/U and Surprenant #9872 cables.

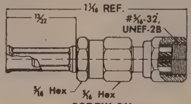

5/16 Hex
#5/32-40, UNS-2A
5/16 Hex
#5/16-32, UNEF-2B
27/32 REF.

SCREW-ON
50-107-0000

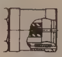


SNAP-ON
51-107-0000

CLAMP-TYPE
Straight Plugs

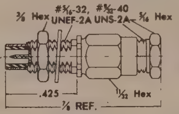

1⅛ REF.
13/32
#5/16-32, UNEF-2B
5/16 Hex
5/16 Hex

SCREW-ON
50-124-0000

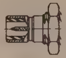


SNAP-ON
51-124-0000

CRIMP-TYPE
Straight Plugs

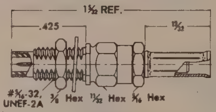

⅜ Hex
#5/16-32, UNEF-2A
#5/32-40 UNS-2A
5/16 Hex
.425
11/32 Hex
⅞ REF.

SCREW-ON
50-110-0000



SNAP-ON
51-110-0000

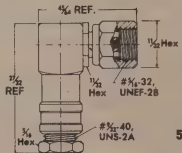
CLAMP-TYPE
Bulkhead Jacks


1⅜ REF.
.425
13/32
#5/16-32, UNEF-2A
⅜ Hex
11/32 Hex
5/16 Hex

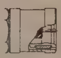
SCREW-ON
50-127-0000

SNAP-ON
51-127-0000

CRIMP-TYPE
Bulkhead Jacks

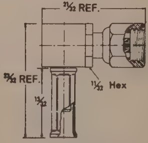

45/64 REF.
11/32 Hex
27/32 REF
11/32 Hex
#5/16-32, UNEF-2B
#5/32-40, UNS-2A
5/16 Hex

SCREW-ON
50-111-0000

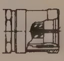


SNAP-ON
51-111-0000

CLAMP-TYPE
Right-Angle Plugs


21/32 REF.
23/32 REF.
11/32 Hex
13/32

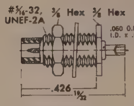
SCREW-ON
50-128-0000



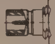
SNAP-ON
51-128-0000

CRIMP-TYPE
Right-Angle Plugs

BULKHEAD RECEPTACLES

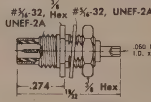

#5/16-32, UNEF-2A
⅜ Hex
⅜ Hex
.060 O.D. x .040 I.D. x .078 deep
.426
19/32

SCREW-ON
50-143-0000

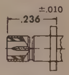


SNAP-ON
51-143-0000

REAR MOUNT

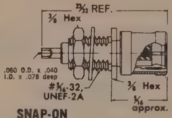

#5/16-32, UNEF-2A
⅜ Hex
#5/16-32, UNEF-2A
.060 O.D. x .040 I.D. x .078 deep
.274
19/32
⅜ Hex

SCREW-ON
50-145-0000



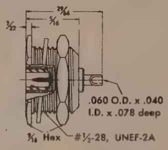
SNAP-ON
51-145-0000

FRONT MOUNT


23/32 REF.
⅜ Hex
.060 O.D. x .040 I.D. x .078 deep
#5/16-32, UNEF-2A
⅜ Hex
5/16 approx.

SNAP-ON
51-146-0000

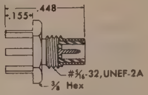
FRONT MOUNT PLUG


½
25/64
5/16
.060 O.D. x .040 I.D. x .078 deep
5/16 Hex
#½-28, UNEF-2A

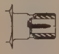
SNAP-ON
51-149-0000

RECESSED JACK

PRINTED CIRCUIT RECEPTACLES

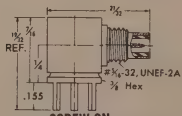

.448
.155
#5/16-32, UNEF-2A
⅜ Hex

SCREW-ON
50-151-0000

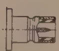


SNAP-ON
51-151-0000

STRAIGHT JACK


21/32
5/16
19/32 REF.
¼
.155
#5/16-32, UNEF-2A
⅜ Hex

SCREW-ON
50-153-0000



SNAP-ON
51-153-0000

RIGHT ANGLE JACK

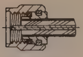
SEALECTRO® SRM®

3mm MINIATURE R.F. CONNECTORS

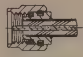
DIRECT SOLDER TYPE FOR .141″ SEMI-RIGID COAX

The **Direct-Solder Type** straight plugs shown below utilize the .036″ (.914mm) diameter center conductor of the cable as the male contact for optimum electrical performance.

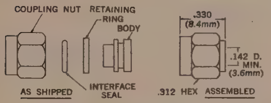
STANDARD For .141″ Cable



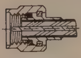
THIN-WALL
55-607-3703-31



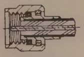
THICK-WALL
55-624-3703-31


COUPLING NUT
RETAINING RING
BODY
INTERFACE SEAL
AS SHIPPED
.330 (8.4mm)
.142 D. MIN. (3.6mm)
.312 HEX
ASSEMBLED

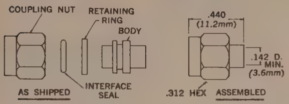
RECOMMENDED For .141″ Cable



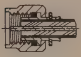
THIN-WALL
55-607-2003-31



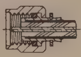
THICK-WALL
55-624-2003-31


COUPLING NUT
RETAINING RING
BODY
INTERFACE SEAL
AS SHIPPED
.440 (11.2mm)
.142 D. MIN. (3.6mm)
.312 HEX
ASSEMBLED

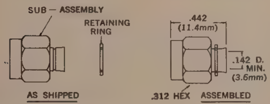
RETRACTABLE NUT For .141″ Cable



THIN-WALL
55-607-3073-31

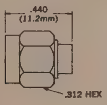


THICK-WALL
55-624-3073-31


SUB — ASSEMBLY
RETAINING RING
AS SHIPPED
.442 (11.4mm)
.142 D. MIN. (3.6mm)
.312 HEX
ASSEMBLED

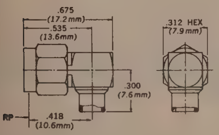
CABLE CONNECTORS FOR SEMI-RIGID CABLE

* For .1400/.1420 diameter 50 ohms cable.
** For .0840/.0875 diameter 50 ohm cable.


.440 (11.2mm)
.312 HEX

STANDARD With Contact

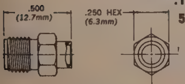
55-607-2203-31*
55-607-3702-31**


.675 (17.2mm)
.535 (13.6mm)
.312 HEX (7.9mm)
.300 (7.6mm)
RP
.418 (10.6mm)

RIGHT ANGLE PLUG

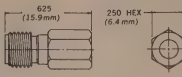
55-611-3702-31**
55-611-3703-31*

RECOMMENDED CABLE JACK .141″ Cable


.500 (12.7mm)
.250 HEX (6.3mm)

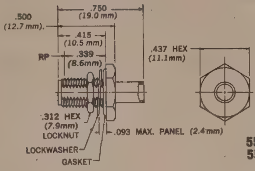
55-608-2003-31*

CABLE CONNECTORS FOR SEMI-RIGID CABLE (Cont'd)


.625 (15.9mm)
.250 HEX (6.4mm)

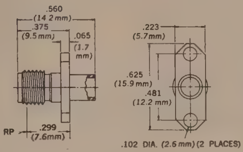
STANDARD CABLE JACK .141″ Cable

55-608-3703-31*


.500 (12.7mm)
.750 (19.0mm)
.415 (10.5mm)
.339 (8.6mm)
RP
.437 HEX (11.1mm)
.312 HEX (7.9mm) LOCKNUT
.093 MAX. PANEL (2.4mm)
LOCKWASHER
GASKET

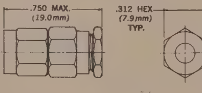
BULKHEAD JACK

55-610-3703-31*
55-610-3702-31**


.560 (14.2mm)
.375 (9.5mm)
.065 (1.7mm)
.223 (5.7mm)
.625 (15.9mm)
.481 (12.2mm)
RP
.299 (7.6mm)
.102 DIA. (2.6mm) (2 PLACES)

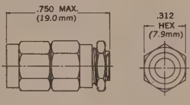
PANEL JACK .141″ Cable

55-604-9073-31*


.750 MAX. (19.0mm)
.312 HEX (7.9mm) TYP.

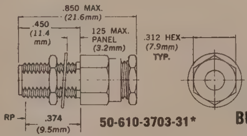
CLAMP-TYPE STRAIGHT PLUG .141″ Cable

50-607-3703-31*


.750 MAX. (19.0mm)
.312 HEX (7.9mm)

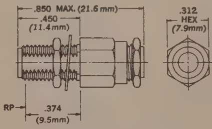
SOLDER-CLAMP-TYPE STRAIGHT PLUG .141″ Cable

50-607-9703-31*


.850 MAX. (21.6mm)
.450 (11.4 mm)
.125 MAX. PANEL (3.2mm)
.312 HEX (7.9mm) TYP.
RP
.374 (9.5mm)

50-610-3703-31*

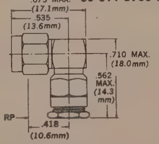
CLAMP-TYPE BULKHEAD JACK .141″ Cable


.850 MAX. (21.6mm)
.450 (11.4mm)
.312 HEX (7.9mm)
RP
.374 (9.5mm)

SOLDER-CLAMP-TYPE BULKHEAD JACK .141″ Cable

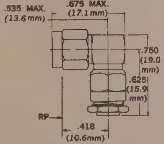
50-610-9703-31*

50-611-3703-31*


.675 MAX. (17.1mm)
.535 (13.6mm)
.710 MAX. (18.0mm)
.562 MAX. (14.3 mm)
RP
.418 (10.6mm)

CLAMP-TYPE RIGHT ANGLE PLUG .141″ Cable

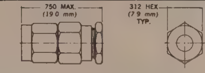
50-611-9703-31*


.535 MAX. (13.6mm)
.675 MAX. (17.1mm)
.750 (19.0 mm)
.625 (15.9 mm)
RP
.418 (10.6mm)

SOLDER-CLAMP-TYPE RIGHT ANGLE PLUG .141″ Cable

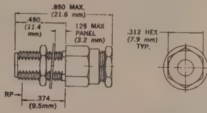
CABLE CONNECTORS FOR BRAIDED COAXIAL CABLE

All contacts are captivated unless otherwise specified.
* RG-55/U, -58/U, -141/U, -142/U, -233/U, -303/U.
** RG-174/U, -179/U, -187/U, -188/U, -316/U.


.750 MAX. (19.0 mm)
.312 HEX (7.9 mm) TYP.

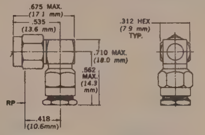
CLAMP-TYPE Straight Plug

50-607-3141-31*
50-607-3188-31**


.850 MAX. (21.6 mm)
.450 (11.4 mm)
.125 MAX PANEL (3.2 mm)
.312 HEX (7.9 mm) TYP.
RP
.374 (9.5mm)

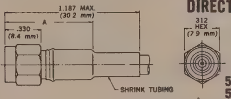
CLAMP-TYPE Bulkhead Jacks

50-610-3141-31*
50-610-3188-31**


.675 MAX. (17.1 mm)
.535 (13.6 mm)
.312 HEX (7.9 mm) TYP.
.710 MAX. (18.0 mm)
.562 MAX. (14.3 mm)
RP
.418 (10.6mm)

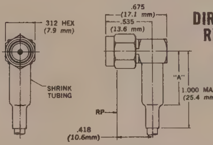
CLAMP-TYPE Right Angle Plug

50-611-3141-31*
50-611-3188-31**


1.187 MAX. (30.2 mm)
A
.330 (8.4 mm)
.312 HEX (7.9 mm)
SHRINK TUBING

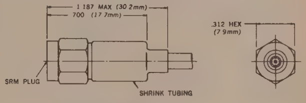
DIRECT-SOLDER-TYPE Straight Plug Non-captive Contact

55-622-9141-31*
55-622-9188-31**


.312 HEX (7.9 mm)
.675 (17.1 mm)
.535 (13.6 mm)
SHRINK TUBING
"A"
1.000 MAX. (25.4 mm)
RP
.418 (10.6mm)

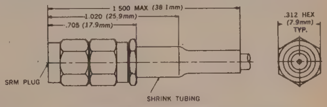
DIRECT-SOLDER-TYPE Right Angle Plug

55-628-9141-31*
55-628-9188-31**


1.187 MAX (30.2mm)
.700 (17.7mm)
.312 HEX (7.9mm)
SRM PLUG
SHRINK TUBING

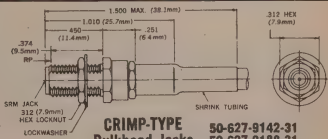
CRIMP-TYPE Straight Plug Non-captive Contact

50-622-9142-31
50-622-8188-31


1.500 MAX (38.1mm)
1.020 (25.9mm)
.705 (17.9mm)
.312 HEX (7.9mm) TYP.
SRM PLUG
SHRINK TUBING

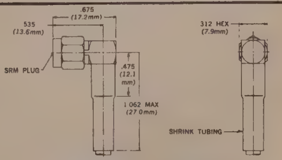
CRIMP-TYPE Straight Plug

50-624-9142-31
50-624-9188-31


1.500 MAX. (38.1mm)
1.010 (25.7mm)
.450 (11.4mm)
.251 (6.4mm)
.374 (9.5mm)
RP
.312 HEX (7.9mm)
SRM JACK
.312 (7.9mm) HEX LOCKNUT
LOCKWASHER
SHRINK TUBING

CRIMP-TYPE Bulkhead Jacks

50-627-9142-31
50-627-9188-31


.675 (17.2mm)
.535 (13.6mm)
.312 HEX (7.9mm)
SRM PLUG
.475 (12.1 mm)
1.062 MAX (27.0mm)
SHRINK TUBING

CRIMP-TYPE Right Angle Plug

50-628-9142-31
50-628-9188-31

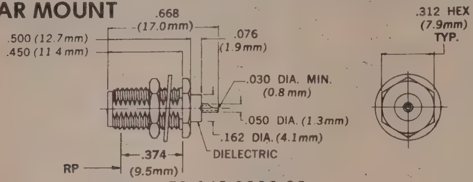
SEALECTRO ® **SRM**

3mm MINIATURE R.F. CONNECTORS

*BULKHEAD AND PANEL RECEPTACLES

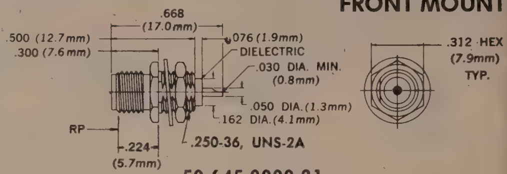
All contacts are captivated unless otherwise specified.

REAR MOUNT


.668
(17.0mm)
.500 (12.7mm)
.450 (11.4mm)
.076
(1.9mm)
.312 HEX
(7.9mm)
TYP.
.030 DIA. MIN.
(0.8mm)
.050 DIA. (1.3mm)
.162 DIA. (4.1mm)
DIELECTRIC
.374
(9.5mm)
RP

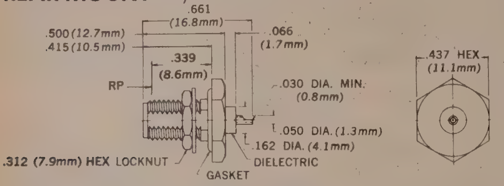
50-643-0000-31

FRONT MOUNT


.668
(17.0mm)
.500 (12.7mm)
.300 (7.6mm)
.076 (1.9mm)
DIELECTRIC
.030 DIA. MIN.
(0.8mm)
.050 DIA. (1.3mm)
.162 DIA. (4.1mm)
.250-36, UNS-2A
.224
(5.7mm)
RP
.312 HEX
(7.9mm)
TYP.

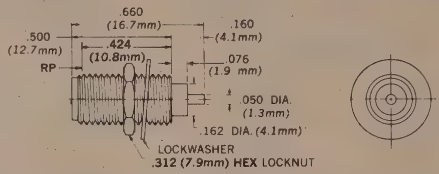
50-645-0000-31

REAR MOUNT W/Gasket


.661
(16.8mm)
.500 (12.7mm)
.415 (10.5mm)
.066
(1.7mm)
.339
(8.6mm)
RP
.030 DIA. MIN.
(0.8mm)
.050 DIA. (1.3mm)
.162 DIA. (4.1mm)
DIELECTRIC
GASKET
.312 (7.9mm) HEX LOCKNUT
.437 HEX
(11.1mm)

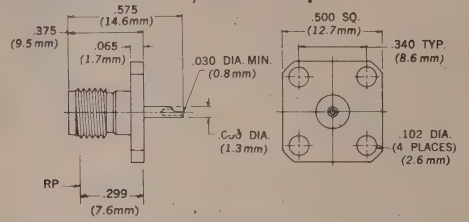
50-643-5005-31

STUB CONTACT


.660
(16.7mm)
.500
(12.7mm)
.424
(10.8mm)
RP
.160
(4.1mm)
.076
(1.9 mm)
.050 DIA.
(1.3mm)
.162 DIA. (4.1mm)
LOCKWASHER
.312 (7.9mm) HEX LOCKNUT

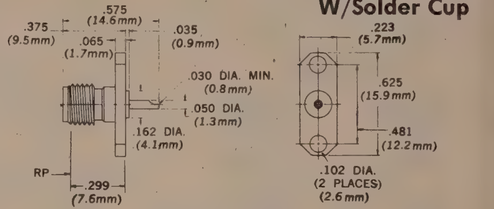
50-643-4310-31

SQUARE FLANGE W/Solder Cup


.575
(14.6mm)
.375
(9.5mm)
.065
(1.7mm)
.030 DIA. MIN.
(0.8mm)
.050 DIA.
(1.3mm)
RP
.299
(7.6mm)
.500 SQ.
(12.7mm)
.340 TYP.
(8.6mm)
.102 DIA.
(4 PLACES)
(2.6mm)

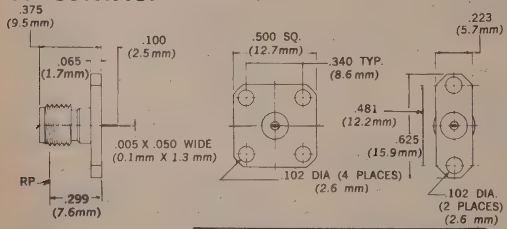
50-645-4504-31

NARROW FLANGE W/Solder Cup


.575
(14.6mm)
.375
(9.5mm)
.065
(1.7mm)
.035
(0.9mm)
.030 DIA. MIN.
(0.8mm)
.050 DIA.
(1.3mm)
.162 DIA.
(4.1mm)
RP
.299
(7.6mm)
.223
(5.7mm)
.625
(15.9mm)
.481
(12.2mm)
.102 DIA.
(2 PLACES)
(2.6mm)

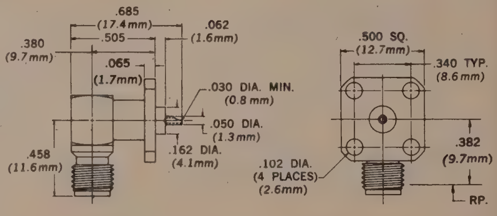
50-645-4524-31

TAB CONTACT


.375
(9.5mm)
.100
(2.5mm)
.065
(1.7mm)
.005 X .050 WIDE
(0.1mm X 1.3mm)
RP
.299
(7.6mm)
.500 SQ.
(12.7mm)
.340 TYP.
(8.6mm)
.481
(12.2mm)
.625
(15.9mm)
.102 DIA (4 PLACES)
(2.6 mm)
.223
(5.7mm)
.102 DIA.
(2 PLACES)
(2.6 mm)

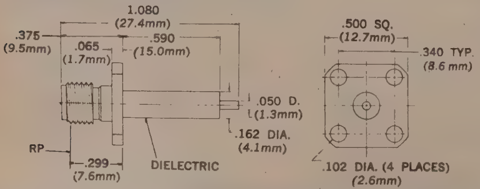
	SQUARE FLANGE	NARROW FLANGE
Removable Contact	50-645-4575-31	50-645-4528-31
Captivated Contact	50-645-4576-31	50-645-4518-31

RIGHT ANGLE


.685
(17.4mm)
.505
.062
(1.6mm)
.380
(9.7mm)
.065
(1.7mm)
.030 DIA. MIN.
(0.8mm)
.050 DIA.
(1.3mm)
.162 DIA.
(4.1mm)
.458
(11.6mm)
.500 SQ.
(12.7mm)
.340 TYP.
(8.6mm)
.102 DIA.
(4 PLACES)
(2.6mm)
.382
(9.7mm)
RP.

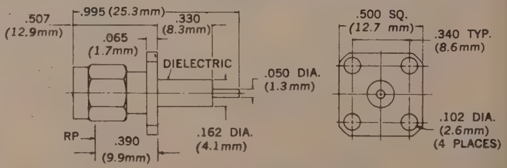
50-647-4504-31

EXTENDED DIELECTRIC JACK


1.080
(27.4mm)
.375
(9.5mm)
.065
(1.7mm)
.590
(15.0mm)
.050 D.
(1.3mm)
.162 DIA.
(4.1mm)
RP
.299
(7.6mm)
DIELECTRIC
.500 SQ.
(12.7mm)
.340 TYP.
(8.6mm)
.102 DIA. (4 PLACES)
(2.6mm)

50-645-4520-31

EXTENDED DIELECTRIC PLUG

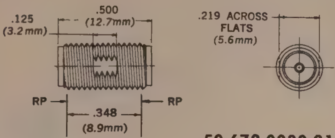

.995 (25.3mm)
.507
(12.9mm)
.330
(8.3mm)
.065
(1.7mm)
DIELECTRIC
.050 DIA.
(1.3mm)
RP
.390
(9.9mm)
.162 DIA.
(4.1mm)
.500 SQ.
(12.7 mm)
.340 TYP.
(8.6mm)
.102 DIA.
(2.6mm)
(4 PLACES)

50-646-4520-31

ADAPTORS

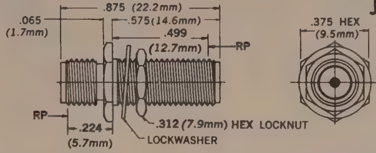
In-Series

JACK-JACK


.500
(12.7mm)
.125
(3.2mm)
.219 ACROSS
FLATS
(5.6mm)
RP
RP
.348
(8.9mm)

50-672-0000-31

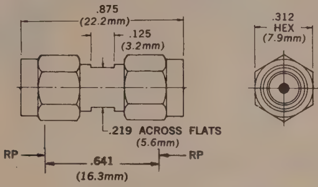
BULKHEAD Jack-Jack


.875 (22.2mm)
.065
(1.7mm)
.575 (14.6mm)
.499
(12.7mm)
RP
.375 HEX
(9.5mm)
RP
.224
(5.7mm)
.312 (7.9mm) HEX LOCKNUT
LOCKWASHER

50-675-0000-31

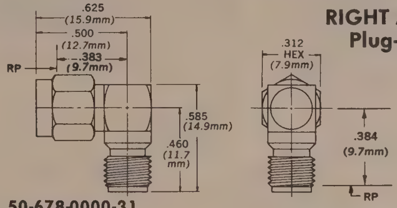
For .265" round hole mounting

PLUG-PLUG


.875
(22.2mm)
.125
(3.2mm)
.312
HEX
(7.9mm)
.219 ACROSS FLATS
(5.6mm)
RP
RP
.641
(16.3mm)

50-673-0000-31

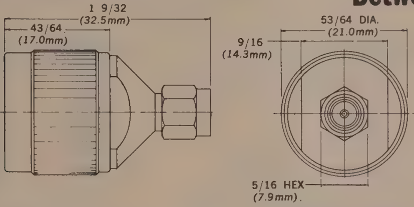
RIGHT ANGLE Plug-Jack


.625
(15.9mm)
.500
(12.7mm)
.383
(9.7mm)
RP
.312
HEX
(7.9mm)
.585
(14.9mm)
.460
(11.7
mm)
.384
(9.7mm)
RP

50-678-0000-31

Between-Series

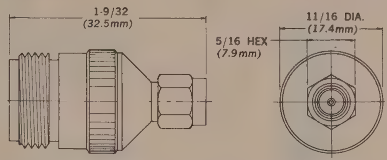
SRM PLUG/N-PLUG


1 9/32
(32.5mm)
43/64
(17.0mm)
9/16
(14.3mm)
53/64 DIA.
(21.0mm)
5/16 HEX
(7.9mm)

VSWR = 1.04 +.005 f(GHz) 0-11 GHz

50-673-6700-89

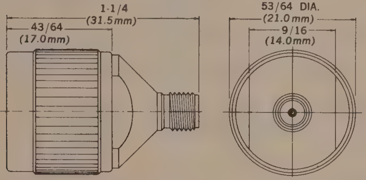
SRM PLUG/N-JACK


1-9/32
(32.5mm)
5/16 HEX
(7.9mm)
11/16 DIA.
(17.4mm)

50-674-6701-89

VSWR = 1.04 +.005 f(GHz) 0-11 GHz

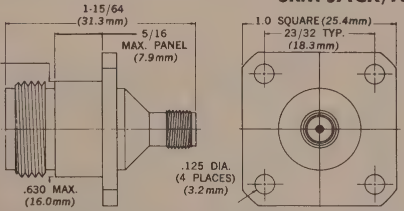
SRM JACK/N-PLUG


1-1/4
(31.5mm)
43/64
(17.0mm)
53/64 DIA.
(21.0mm)
9/16
(14.0mm)

VSWR = 1.06 +.005 f(GHz) 0-11 GHz

50-674-6700-89

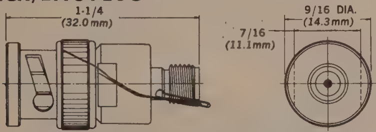
SRM JACK/N-JACK


1-15/64
(31.3mm)
5/16
MAX. PANEL
(7.9mm)
1.0 SQUARE (25.4mm)
23/32 TYP.
(18.3mm)
.125 DIA.
(4 PLACES)
(3.2mm)
.630 MAX.
(16.0mm)

50-675-6701-89

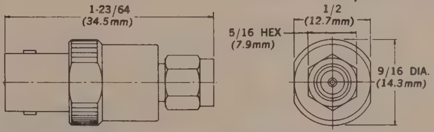
VSWR = 1.06 +.005 f(GHz) 0-11 GHz

SRM JACK/BNC PLUG


1-1/4
(32.0mm)
9/16 DIA.
(14.3mm)
7/16
(11.1mm)

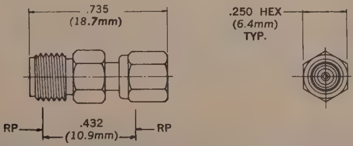
50-674-6800-89

SRM PLUG/BNC JACK


1-23/64
(34.5mm)
5/16 HEX
(7.9mm)
1/2
(12.7mm)
9/16 DIA.
(14.3mm)

50-674-6801-89

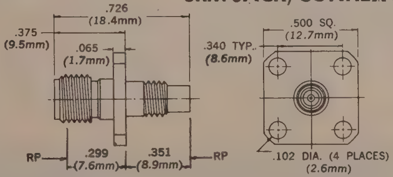
SRM JACK/ConheX PLUG


.735
(18.7mm)
.250 HEX
(6.4mm)
TYP.
RP
.432
(10.9mm)
RP

VSWR = 1.04 +.007 f(0-12.4 GHz)

50-074-6201-31

SRM JACK/CONHEX JACK


.726
(18.4mm)
.375
(9.5mm)
.065
(1.7mm)
.500 SQ.
(12.7mm)
.340 TYP.
(8.6mm)
RP
.299
(7.6mm)
.351
(8.9mm)
RP
.102 DIA. (4 PLACES)
(2.6mm)

50-075-6201-31

VSWR = 1.04 +.007 f(0-12.4 GHz)

SPECIFY SMITH INSULATED BINDING POSTS

MOLDED LEXAN* MEETS FED. SPEC. L-P-393A

STOCKED BY LEADING DISTRIBUTORS NATIONWIDE

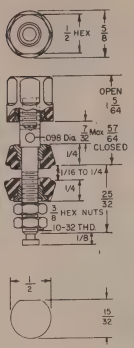
*Lexan is a GE Trademark

LEXAN 5-WAY BINDING POSTS

HEX AND FLUTED HEADS

HEX HEAD

257

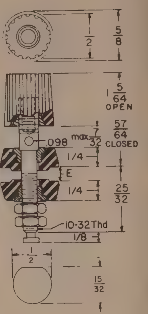


HEAD: CAPTIVE MOLDED LEXAN, WITH BRASS, GOLD PLATED INSERT.
BODY: Brass, Gold Plated
WASHERS: Molded Lexan, with Gold-Plated Brass insert.
RATINGS: 30 Amps AC for 10°C Temp. rise, continuous duty. 2 KV AC, 60 Hertz, continuous working voltage. 5.0 pf. capacitance to 1/8" thick aluminum panel.
ACCEPTS: Phone tip plug, spade lug, banana plug, alligator cip, stranded or solid wire up to 14 awg.
DESCR: Captivated Lexan head to prevent loss. Keyed, Lexan base washers completely insulate post from panel and prevent turning. Mounts in 1/2" round or single "D" hole as indicated. Wires directly to wrap-around solder turret, or to solder lug (not supplied) between nuts.
COLORS: Red, black, yellow, green, blue, white. Std. Pkg. 100

No.	Type	NET Per C
257	Hex Head	$65.00
459	Fluted Head	65.00

FLUTED HEAD

459



MIL-SPEC BINDING POSTS per MIL-P-55149/1

Same as Types 257 and 459 above, except meets requirements of MIL-P-55149/1, Dtd. 1 Nov. 1961. Brass per QQ-B-626, Comp. 22. Includes gold-plated flat washer and internal tooth lockwasher. Std. Pkg. 100

No.	Type	Head	NET Per C
267-102 (Red)	PBOIFAO3	Hex	$70.00
267-103 (Black)	PBOIFAO4	Hex	70.00
495-102 (Red)	PBOIFAO3	Fluted	70.00
495-103 (Black)	PBOIFAO4	Fluted	70.00

ECONOMY TYPE BINDING POSTS

Same as Types 257 and 459, except utilizes solid molded lexan keyed back-up washer, instead of brass-insert washer. Provides same usage and features with added economy. Colors: Red, black, yellow, green, blue and white. Std. Pkg. 100

No.	Type	NET Per C
1257	Hex Head	$55.00
1259	Fluted Head	55.00

COMMERCIAL TYPE BINDING POSTS

Same as Types 257 and 459, except all metal parts are nickel plated, instead of gold. Supplied in red and black only. Std. Pkg. 100

No.	Type	NET Per C
899	Hex Head	$50.00
799	Fluted Head	50.00

COMMERCIAL TYPE with LEXAN WASHER

Same as Types 257 and 459, except all metal parts are nickel plated instead of gold, and utilizes solid molded lexan keyed back-up washer, instead of brass-insert washer. Provides same usages and features with maximum economy. Supplied in red and black only. Std. Pkg. 100

No.	Type	NET Per C
898	Hex Head	$48.00
897	Fluted Head	48.00

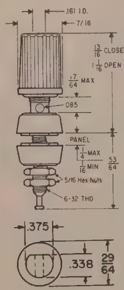
1257
898

899

1259
897

799

LEXAN BINDING POST



1517
1514

HEAD: CAPTIVE, MOLDED LEXAN, with brass Gold-Plated insert.
BODY: Brass, Gold Plated.
WASHERS: MOLDED LEXAN, with brass Gold-plated inserts.
ACCEPTS: Phone tip plug, spade lug, banana plug, alligator clip, or wire strand.
RATING: 15 Amps AC for 10°C Temp. rise, continuous duty. 1 KV Volts 60 cycle AC continuous working voltage. CAPACITANCE 3.0 pf.
DESCR.: Molded washers completely insulate post from panel. Miniature washers and narrow fluted head require minimum panel space. Mounts in 3/8" round or "D" hole in panel as indicated. Wrap-around solder terminal on stud for direct connection.
COLORS: Red, Black, Yellow, Green, Blue, White. SPECIFY COLOR Std. Pkg. 100

No.	NET Per C
1517	$65.00

MIL-SPEC BINDING POSTS per MIL-P-55149/1

Same as Type 1517 above, except meets requirements of MIL-P-55149/1, Dtd. 1 Nov. 1961. Brass per QQ-B-626, Comp. 22. Includes gold-plated flat washer and internal tooth lockwasher. Behind-panel length is .690" instead of 53/64". Std. Pkg. 100

No.	Type No.	NET Per C
1514-102 (Red)	PBOIFAO1	$70.00
1514-103 (Black)	PBOIFAO2	70.00

ECONOMY TYPE BINDING POSTS

Same as Type 1517, except utilizes solid molded lexan keyed back-up washer, instead of brass-insert washer. Provides same usage and features with added economy. Red, black, yellow, green, blue, and white. Specify color, as coded above. Std. Pkg. 100

No.	NET Per C
1277	$55.00

COMMERCIAL TYPE BINDING POSTS

Same as Type 1517, except all metal parts are nickel plated, instead of gold. Supplied in red and black only. Std. Pkg. 100

No.	NET Per C
1275	$50.00

1276
1277

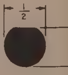
COMMERCIAL TYPE LEXAN WASHER

Same as Type 1517, except all metal parts are nickel plated, instead of gold, and utilizes solid molded lexan keyed backup washer, instead of brass-insert washer. Provides same usages and features with maximum economy. Supplied in red and black only.

No.	NET Per C
1276	$48.00

"D" PUNCH

Designed to punch a "D" HOLE 1/2" x 15/32" for use with all binding posts on top half of page.
No. 3837 *8.35 Ea.

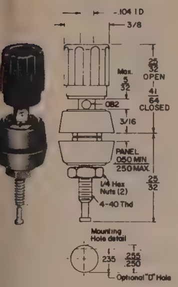


IT'S SOUND PLANNING TO **"SPECIFY SMITH"** WHEN DESIGNING OR PURCHASING

STOCKED BY
LEADING
DISTRIBUTORS
NATIONWIDE

INSULATED BINDING POSTS SPECIFY SMITH

MINIATURE BINDING POST



HEAD: CAPTIVE, MOLDED NYLON, per Mil-P-20693A, with Brass, Gold plated insert.

BODY: Brass, Gold Plated.

WASHERS: MOLDED NYLON, per Mil-P-20693A, with Brass, Gold plated inserts.

ACCEPTS: Standard .080″ phone tip, #6 spade lug, miniature Banana plug, Alligator clip or wire.

RATING: 5 Amps AC for 10 C Temp. rise, continuous duty. 1 KV, 60 cycle AC, continuous working voltage. Capacitance 2.5 pf.

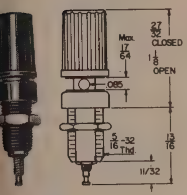
DESCR.: Compact Binding post designed for use with miniaturized equipment. Molded washers completely insulate post from panel. Mounts in ¼ round or "D" hole in panel as indicated. Wrap-around solder turret for direct wire connection.

COLORS: Available in Red, Black, Yellow, Green, Blue, and White. SPECIFY COLOR by adding Color Code suffix to basic catalog No.

Std. Pkg. 100

No.	Net per C
3015	$60.00

ALL-INSULATED BINDING POST



1463
1464

HEAD: Captive molded Lexan, per MIL-P-20693A, with brass, gold plated insert.

BODY: Brass, gold plated

BUSHING: Molded Lexan, with brass gold plated insert

NUT: Brass, nickel plated; 5⁄16-32, 3⁄32 thick, 7⁄16 A.F.

ACCEPTS: Phone tip plug, banana plug, alligator clip, spade lug, or wire strand.

RATING: 15 amps AC for 10°C temp. rise, continuous duty. 5 KV, 60 Hz. Continuous working voltage. Capacitance 3.3 PF.

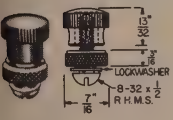
DESCR: Single threaded body mounts in 5⁄16 round, or double D hole without loose washers or nuts. Bushing dimensions similar to our No. 1509. Wrap-around solder terminal on stud for direct connection.

COLORS: Red, Black, Yellow, Green, Blue, White. Specify color as coded above.

Std. Pkg. 100

No.	Type	NET Per C
1463	Round	$38.00
1464	Double ' D"	$38.00

BINDING POST



HEAD: MOLDED PHENOLIC plastic, with molded-in brass threaded insert, Red or Black. SPECIFY COLOR

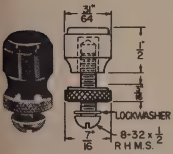
WASHER: Brass, nickel plated.

RATING: 15 Amps AC for 10°C Temp. rise continuous duty.

DESCR.: Supplied complete with screw and lockwasher. **Std. Pkg. 100**

No.	NET Per C
265	$30.00

BINDING POST



HEAD: MOLDED PHENOLIC plastic, with molded-in brass threaded insert, Red or Black. SPECIFY COLOR

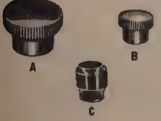
WASHER: Brass, nickel plated.

RATING: 15 Amps AC for 10°C Temp. rise continuous duty.

DESCR.: Supplied complete with screw and lockwasher. **Std. Pkg. 100**

No.	NET Per C
266	$30.00

BINDING POST KNOBS

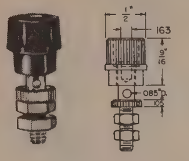


threaded 8-32 brass inserts Std. Pkg. 50

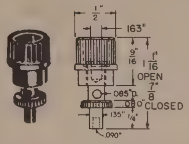
No.	Style	O.D.	Height	Color	NET per C
2271	A	¾″	½″	Black	$14.00
2272	A	¾″	½″	Red	15.80
2285	B	½″	7⁄16″	Red	11.00
2286	B	½″	7⁄16″	Black	11.00
2287	C	½″	½″	Red	11.00
2288	C	½″	½″	Black	11.00

BINDING POST

Grounded



Rivet Type



HEAD: CAPTIVE: MOLDED BUTYRATE, per Fed. Spec. L-P349A, Type 3, Class MS. Red or Black. SPECIFY COLOR

BODY: Brass, nickel plated.

ACCEPTS: Phone tip plug, spade lug, banana plug, alligator clip or wire strand.

RATING: 15 Amps AC for 10°C Temp. rise, continuous duty. 1 K Volts 60 cycle AC continuous working voltage, when insulated from panel as recommended. CAPACITANCE 5.0 pf.

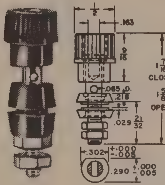
DESCR.: Supplied with 2 hex nuts. Can be completely insulated from panel by using our 2155 and 2163 washers. **Std. Pkg. 100**

No.	Description	Net Per C
220	8-32 x ½ Stud	$34.00
230	6-32 x ⅜ Stud	$34.00
391	Rivet Type	$32.00
With brass nickel plated insert in head		
280	8-32 Stud	$49.00
264	6-32 Stud	$49.00
394	Rivet Type	$45.00

No. 3875 Staking Tool Net Ea. $1.50

BINDING POST

Insulated



HEAD: CAPTIVE: MOLDED BUTYRATE, per Fed. Spec. L-P349A, Type 3, Class MS. Red or Black. SPECIFY COLOR

BODY: Brass, nickel plated.

WASHERS: MOLDED BUTYRATE, per MIL-L-P349A, Type 3, Class MS. With brass inserts.

ACCEPTS: Phone tip plug, spade lug, banana plug, alligator clip or wire strand.

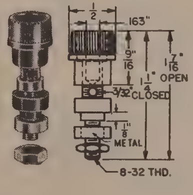
RATING: 15 Amps AC for 10°C Temp. rise, continuous duty. 1 K Volts 60 cycle AC continuous working voltage. CAPACITANCE 3.0 pf.

DESCR.: Mounts in 5/16" hole in panel with milled slot for locking, supplied with two hex nuts. **Std. Pkg. 100**

No.	Description	Net Per C
260	8-32 Stud	$55.00
259	6-32 Stud	55.00
With brass nickel plated insert in head		
290	8-32 Stud	$75.00
231	6-32 Stud	$75.00

BINDING POST

Grounded



HEAD: CAPTIVE: MOLDED BUTYRATE, per Fed. Spec. L-P349A, Type 3, Class MS. Red or Black. SPECIFY COLOR

BODY: Brass, nickel plated.

WASHERS: MOLDED BUTYRATE, per Fed. Spec. L-P349A, Type 3, Class MS. Mounting Washer—Molded plastic. Back-up Washer—Brass, nickel plated.

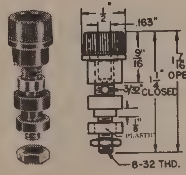
RATING: 15 Amps AC for 10°C Temp. rise, co tinuous duty.

DESCR.: Mounts in ¼″ hole in panel. Grounded to panel by back-up washer. Supplied with one hex nut. **Std. Pkg. 100**

No.	NET Per C
387	$33.00

BINDING POST

Insulated



HEAD: CAPTIVE: MOLDED BUTYRATE, per Fed. Spec. L-P349A, Type 3, Class MS. Red or Black. SPECIFY COLOR

BODY: Brass, nickel plated.

WASHERS: MOLDED BUTYRATE, per Fed. Spec. L-P349A, Type 3, Class MS.

ACCEPTS: Phone tip plug, spade lug, banana plug, alligator clip or wire strand.

RATING: 15 Amps AC for 10°C Temp. rise, continuous duty. 1 K Volts 60 cycle AC continuous working voltage. CAPACITANCE 5.0 pf.

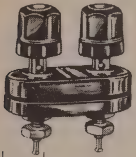
DESCR.: Mounts in ¼″ hole in panel. Supplied with one hex nut. **Std. Pkg. 100**

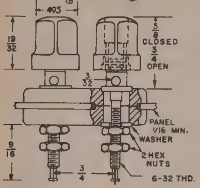
No.	NET Per C
386	$36.00

IT'S SOUND PLANNING TO **"SPECIFY SMITH"** WHEN DESIGNING OR PURCHASING

SPECIFY SMITH DUAL BINDING POSTS

STOCKED BY LEADING DISTRIBUTORS NATIONWIDE





DUAL ASSEMBLY
Nylon

INSUL.: MOLDED black STYRENE, cross slotted (+) to accept standard phone tips in post either forward, or sideways.

BODY: Brass, nickel plated.

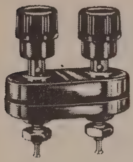
HEAD: Captive: MOLDED LEXAN

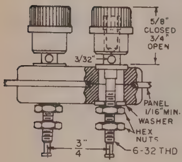
RATING: 15 Amps AC for 10°C Temp., rise, continuous duty. 2 K Volts 60 cycle AC continuous working voltage. CAPACITANCE 2.0 pf. between conductors, 3.0 pf. to panel.

DESCR.: Mounts in two ½″ holes on ¾″ mounting centers in panels up to ¼″ thick. Accommodates single or dual banana plugs. Supplied with 4 hex nuts, 2 flat washers.

Std. Pkg. 25

No.	Description	NET PER C
269BB	Two Black Heads	$115.00
269RR	Two Red Heads	115.00
269RB	One Red, One Black Head	115.00





DUAL BINDING POST

INSUL.: MOLDED black STYRENE, cross slotted (+) to accept standard phone tips in post either forward, or sideways.

BODY: Brass, nickel plated.

HEAD: CAPTIVE: MOLDED BUTYRATE, per Fed. Spec. L-P349A, Type 3, Class MS. Red or Black. SPECIFY COLOR

RATING: 15 Amps AC for 10°C Temp. rise, continuous duty. 2 K Volts 60 cycle AC continuous working voltage. CAPACITANCE 2.0 pf. between conductors, 3.0 pf. to panel.

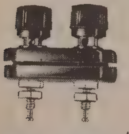
DESCR.: Mounts in two ½″ holes on ¾″ mounting centers in panels up to ¼″ thick. Accommodates single or dual banana plugs. Supplied with 4 hex nuts, 2 flat washers.

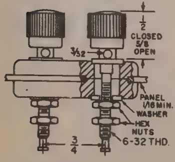
Std. Pkg. 25

No.	Description	NET PER C
224BB	Two Black Heads	$95.00
224RR	Two Red Heads	$95.00
224RB	One Red, One Black Head	$95.00

Same as above with brass nickel plated insert in head

No.	Description	NET PER C
263BB	Two Black Heads	$125.00
263RR	Two Red Heads	$125.00
263RB	One Red, One Black Head	$125.00





DUAL NYLON BINDING POST

INSUL.: MOLDED black STYRENE, cross slotted (+) to accept standard phone tips in post either forward, or sideways.

BODY: Brass, nickel plated.

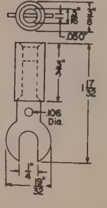
HEAD: Captive: MOLDED NYLON, per MIL-P-20693A, with molded in brass insert.

RATING: 15 Amps AC for 10°C Temp., rise, continuous duty. 2 K Volts 60 cycle AC continuous working voltage. CAPACITANCE 2.0 pf. between conductors, 3.0 pf. to panel.

DESCR.: Mounts in two ½″ holes on ¾″ mounting centers in panels up to ¼″ thick. Supplied with 4 hex nuts, 2 flat washers.

Std. Pkg. 25

No.	Description	NET PER C
284BB	Two Black Heads	$95.00
284RR	Two Red Heads	$95.00
284RB	One Red, One Black Head	$95.00



INSULATED SPADE LUG

HANDLE: MOLDED BUTYRATE, per Fed. Spec. L-P349A, Type 3, Class MS. Red and Black. SPECIFY COLOR

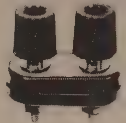
LUG: Brass, .050 thick, nickel plated.

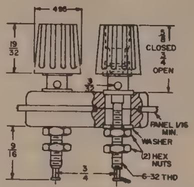
RATING: 30 Amps AC for 10°C Temp. rise, continuous duty.

DESCR.: ¼″ I.D. fits all standard Multi-purpose binding posts. Accepts up to #10 insulated wire, which solders in front hole.

Std. Pkg. 100

No.	NET Per C
400	$15.00





DUAL ASSEMBLY
Nylon

INSUL.: MOLDED black STYRENE, cross slotted (+) to accept standard phone tips in post either forward, or sideways.

BODY: Brass, Gold finish.

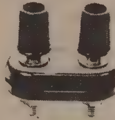
HEAD: Captive: MOLDED LEXAN

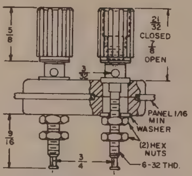
RATING: 15 Amps AC for 10°C Temp., rise, continuous duty. 2 K Volts 60 cycle AC continuous working voltage. CAPACITANCE 2.0 pf. between conductors, 3.0 pf. to panel.

DESCR.: Mounts in two ½″ holes on ¾″ mounting centers in panels up to ¼″ thick. Accommodates single or dual banana plugs. Supplied with 4 hex nuts, 2 flat washers.

Std. Pkg. 25

No.	Description	NET Per C
1813BB	Two Black Heads	$115.00
1813RR	Two Red Heads	$115.00
1813RB	One Red, One Black Head	$115.00





DUAL ASSEMBLY
Nylon

INSUL.: MOLDED black STYRENE, cross slotted (+) to accept standard phone tips in post either forward, or sideways.

BODY: Brass, Gold finish.

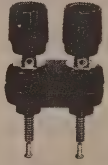
HEAD: Captive: MOLDED LEXAN

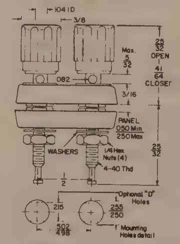
RATING: 15 Amps AC for 10°C Temp., rise, continuous duty. 2 K Volts 60 cycle AC continuous working voltage. CAPACITANCE 2.0 pf. between conductors, 3.0 pf. to panel.

DESCR.: Mounts in two ½″ holes on ¾″ mounting centers in panels up to ¼″ thick. Accommodates single or dual banana plugs. Supplied with 4 hex nuts, 2 flat washers.

Std. Pkg. 25

No.	Description	NET Per C
1814BB	Two Black Heads	$115.00
1814RR	Two Red Heads	$115.00
1814RB	One Red, One Black Head	$115.00





MINIATURE DUAL BINDING POST ASSEMBLY

INSUL.: MOLDED Black STYRENE, octagonal-keyed to align cross-holes at alternate 90° positions.

BODIES: Brass, Gold plated.

HEADS: CAPTIVE, MOLDED NYLON, per Mil-P-20693A, with Brass Gold plated inserts.

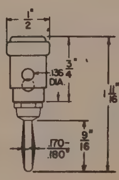
HARDWARE: Brass, Gold plated.

RATING: 5 Amps AC for 10 C Temp. rise, continuous duty. 2 KV 60 cycle AC, continuous working voltage. Capacitance 3.5 pf between conductors, 3.0 pf to panel.

DESCR.: Compact Dual Binding Post designed for use with miniaturized equipment. Mounts in two ¼ round, single or double "D" holes on ½″ centers, in panels up to ¼ thick. ½″ center spacing designed for use with miniature dual connectors. Also accepts single miniature banana plugs, .080″ phone tips, #6 spade lugs, alligator clips or wire. Wrap-around solder turret for direct wire connections. Supplied with two hex nuts and flat washers.

Std. Pkg. 25

No.	Description	Net per C
3016BB	Two Black Heads	$115.00
3016RR	Two Red Heads	$115.00
3016RB	One Red, One Black Head	$115.00



COMBINATION POST- PLUG

HEAD: Captive, brass nickel plated.

CAP: Molded Styrene, black.

BODY: Brass, nickel plated.

SPRING: Four-leaved Phosphor bronze, nickel plated.

RATING: 15 Amps AC for 10°C Temp. rise, continuous duty.

DESCR.: Converts any panel-mounted banana jack into a spring loaded push-post. Accepts standard phone tip, solid or stranded wire, and locks them in place on release of pressure on cap.

Std. Pkg. 25

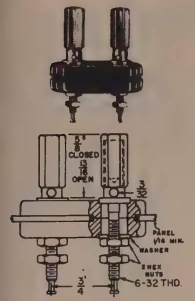
No.	NET Per C
2714	$83.00

IT'S SOUND PLANNING TO **"SPECIFY SMITH"** WHEN DESIGNING OR PURCHASING

STOCKED BY
LEADING
DISTRIBUTORS
NATIONWIDE

ECONOMY BINDING POSTS

SPECIFY **SMITH**



DUAL METAL BINDING POST

INSUL.: MOLDED black STYRENE, cross slotted (+) to accept standard phone tips in post either forward, or sideways.

BODY: Brass, nickel plated.

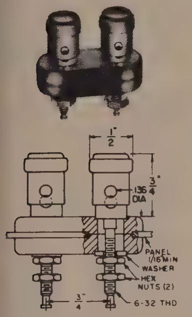
HEAD: Captive: Hex brass, nickel plated.

RATING: 15 Amps AC for 10°C Temp. rise, continuous duty. 2 K Volts 60 cycle AC continuous working voltage. CAPACITANCE 2.0 pf. between conductors, 3.0 pf. to panel.

DESCR.: Mounts in two ½″ holes on ¾″ mounting centers in panels up to ¼″ thick. Accommodates single or dual banana plugs. Supplied with 4 hex nuts, 2 flat washers.

Std. Pkg. 25

No.	NET Per C
209	$135.00



DUAL SPRING-LOADED BINDING POST

INSUL.: MOLDED black STYRENE, cross slotted (+) to accept standard phone tips in post either forward or sideways. Supplied in colors on special order.

HEAD: Captive, brass, nickel plated.

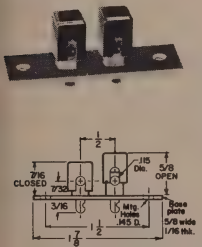
CAP: Molded black styrene.

BODY: Brass, nickel plated.

RATING: 15 Amps AC for 10°C Temp. rise, continuous duty. 5 KV 60 cycle AC continuous working voltage. CAPACITANCE 4.0 pf. between conductors, 3.0 pf. to panel.

DESCR.: Mounts in two ½″ holes on ¾″ mounting centers in panels up to ¼″ thick. Accepts standard phone tips or wires in side holes, and locks them in place when pressure on cap is released. Supplied with 4 hex nuts, 2 flat washers. **Std. Pkg. 25**

No.	NET Per C
2713	$175.00



DUAL ECONOMY PUSH-POST

CAPS: Red or black ABS, 11/32" square.

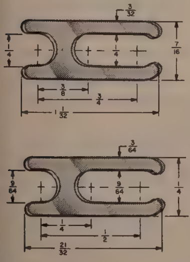
BASE: XP Bakelite.

BODY: Stamped Brass, nickel plate.

RATING: 10 Amps AC for 10°C temp. rise, continuous duty. 5 Kv 60 Hz continuous working voltage. Capacitance 5 pf between posts, 2 pf to panel.

DESCR.: Mounts over 3/8" x 1" slot or two 3/8" holes on 1/2" centers in panel. Accepts wires up to 14 gauge, or phone tips, locking in place when pressure is released. Excellent for speaker connections, bridge test points, etc. Std.Pkg.50

No.	Description	Net Per C
1815BB	Two Black Heads	$50.00
1815RR	Two Red Heads	50.00
1815RB	One Red One Black Head	50.00



SLIDE-TYPE SHORTING LINK

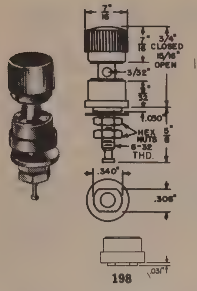
MATERIAL: Spring brass, nickel plated, .031 thick.

RATING: 50 Amps A.C. continuous duty, for 10° C Temp. rise (#1828)
25 Amps A.C. continuous duty, for 10° C Temp. rise (#1829)

DESCR: Snaps over contact barrels of standard (¾″ centers) or miniature (½″ centers) dual binding posts for positive shorting. Retaining feature allows link to slide on one post for temporary un-shorting without falling while loose.

STD. PKG. 100

No.	Descr.	NET Per C
1828	Standard for ¾″ Posts	$7.00
1829	Miniature for ½″ Posts	7.00



NYLON BINDING POST

Insulated

HEAD: CAPTIVE: MOLDED NYLON, per MIL-L-20693A. Red or Black with brass nickel plated insert. SPECIFY COLOR

WASHER: Molded nylon with brass nickel plated insert.

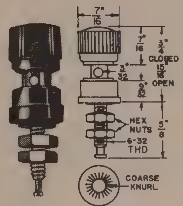
BODY: Brass, nickel plated.

RATING: 15 Amps AC for 10°C Temp. rise, continuous duty. 1 K Volts 60 cycle AC continuous working voltage. CAPACITANCE 4.0 pf.

DESCR.: Supplied with two hex nuts. Boss washer insulates post from chassis when used with bakelite washer supplied.

Std. Pkg. 100

No.	Min. Panel Thickness	NET per C
378	1/16″	$60.00
198	1/32″	$60.00



NYLON BINDING POST

Grounded

HEAD: CAPTIVE: MOLDED NYLON, per MIL-P-20693A. Red or Black with brass nickel plated insert. SPECIFY COLOR

WASHER: Molded nylon with brass nickel plated insert.

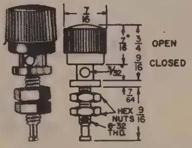
BODY: Brass, nickel plated.

RATING: 15 Amps AC for 10°C Temp. rise, continuous duty. 1 K Volts 60 cycle AC continuous working voltage, when insulated from panel as recommended. CAPACITANCE 6.0 pf.

DESCR.: Supplied with 2 hex nuts. Grounds to panel but supplied with nylon washer for uniformity of height with No. 378 when used on same panel. Can be insulated from panel by using our No. 2150 shoulder washer.

Std. Pkg. 100

No.	NET Per C
377	$60.00



NYLON BINDING POST

Grounded

HEAD: CAPTIVE: MOLDED NYLON, per MIL-P-20693A. Red or Black with brass nickel plated insert. SPECIFY COLOR

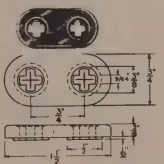
BODY: Brass, nickel plated.

RATING: 15 Amps AC for 10°C Temp. rise, continuous duty. 1 K Volts 60 cycle AC continuous working voltage, when insulated from panel as recommended. CAPACITANCE 7.0 pf.

DESCR.: Supplied with two hex nuts. Can be insulated from panel by using our No. 2150 shoulder washer and 2162 flat washer.

Std. Pkg. 100

No.	NET Per C
379	$55.00



BLACK STYRENE INSULATOR

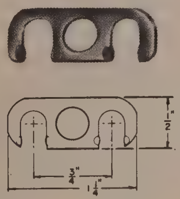
INSUL.: STYRENE, Black.

RATING: 2 K Volts 60 cycle AC continuous working voltage.

DESCR.: Mounts in two ½″ holes on ¾″ mounting centers in panels up to ¼″ thick.

Std. Pkg. 100

No.	NET Per C
207	$ 7.00



SHORTING LINK

MATERIAL: Spring brass, nickel plated, .033″ thick.

RATING: 50 Amps. AC continuous duty, for 10°C Temp. rise.

DESCR.: Snaps over contact barrels of dual binding posts with standard ¾″ mounting centers for positive shorting. Snap-in feature allows use in any position without falling off. Rotates on either post for open-circuit use, retaining snap-in feature. Center hole allows easy insertion or removal.

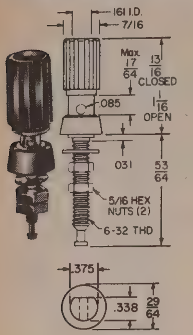
Std. Pkg. 100

No.	NET Per C
327	$7.00

IT'S SOUND PLANNING TO **"SPECIFY SMITH"** WHEN DESIGNING OR PURCHASING

SPECIFY SMITH METAL BINDING POSTS

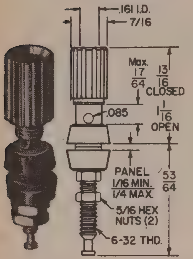
STOCKED BY
LEADING
DISTRIBUTORS
NATIONWIDE


.161 I.D.
7/16
Max. 17/64
13/16 CLOSED
.085
1 1/16 OPEN
.031
53/64
5/16 HEX NUTS (2)
6-32 THD
.375
.338
29/64

METAL BINDING POST
Grounded

HEAD: CAPTIVE, Fluted Brass, Gold-plated.
BODY: Brass, Gold-plated.
WASHER: MOLDED BLACK NYLON, per MIL-P-20693A, with brass Gold-plated insert.
ACCEPTS: Phone tip plug, spade lug, banana plug, alligator clip, or wire strand.
RATING: 15 Amps AC for 10°C temp. rise, continuous duty.
DESCR.: Fluted-head metal post to match our No. 1517. For use where direct ground connection is made to panel or chassis. Supplied with brass, gold-plated flat metal washer for grounding. **Std. Pkg. 100**

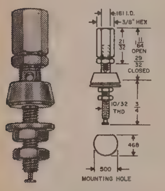
No.	NET Per C
1518	$90.00


.161 I.D.
7/16
Max. 17/64
13/16 CLOSED
.085
1 1/16 OPEN
PANEL 1/16 MIN. 1/4 MAX.
53/64
5/16 HEX NUTS (2)
6-32 THD.

METAL BINDING POST
Insulated

HEAD: CAPTIVE, Fluted Brass, Gold-plated.
BODY: Brass, Gold-plated.
WASHER: MOLDED BLACK NYLON, per MIL-P-20693A, with brass Gold-plated insert.
ACCEPTS: Phone tip plug, spade lug, banana plug, alligator clip, or wire strand.
RATING: 15 Amps AC for 10°C temp. rise, continuous duty. 1 K Volts, 60 cycle AC continuous working voltage. CAPACITANCE 3.0 pf.
DESCR.: Fluted-head metal post to match our No. 1517. Mounts in 3/8" round or "D" hole in panel. Molded washers insulate post from panel for use where internal ground circuit is isolated from chassis or panel. **Std. Pkg. 100**

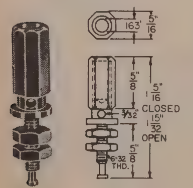
No.	NET Per C
1519	$95.00


.161 I.D.
3/8" HEX
21/32
1 1/64 OPEN
29/32 CLOSED
10/32 THD
3/4
.468
.500
MOUNTING HOLE

METAL BINDING POST

HEAD: Captive, Hex Brass, Nickel plated.
BODY: Brass, Nickel plated.
ACCEPTS: Phone tip plug, spade lug, banana plug, alligator clip or wire strand.
RATING: 30 Amps AC for a 10°C temp. rise, continuous duty.
DESCR.: Mounts in a 1/2" round or "D" hole. For use where direct ground connection is made to panel or chassis 1/32 to 3/8 max. thickness. Supplied with Nickel plated flat metal washer for grounding and 2—10/32 Nickel plated nuts. **Std. Pkg. 100**

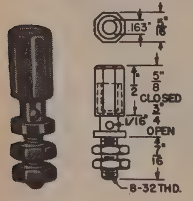
No.	NET per C
1835	$65.00


.163
5/16
5/8
5/16 CLOSED
1/32
1 15/32 OPEN
5/8
6-32 THD.

METAL BINDING POST

HEAD: CAPTIVE: Octagonal, nickel plated.
BODY: Brass, nickel plated.
ACCEPTS: Phone tip, spade lug, banana plug, alligator clip or wire strand.
RATING: 15 Amps AC for 10°C Temp. rise, continuous duty. 1 K Volts 60 cycle AC continuous working voltage, when insulated from panel as recommended. CAPACITANCE 5.0 mmfd.
DESCR.: Can be completely insulated from panel by using our 2150 and 2162 fibre washers. Supplied with two hex nuts. **Std. Pkg. 100**

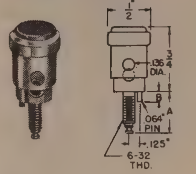
No.	Description	Net Per C
208	Wrap-around	$65.00


.163
5/16
5/8
2 CLOSED
1/16
3/4 OPEN
7/16
8-32 THD.

METAL BINDING POST

HEAD: CAPTIVE: Octagonal, nickel plated.
BODY: Brass, nickel plated.
ACCEPTS: Phone tip, spade lug, banana plug, alligator clip or wire strand.
RATING: 15 Amps AC for 10°C Temp. rise, continuous duty. 1 K Volts 60 cycle AC continuous working voltage, when insulated from panel as recommended. CAPACITANCE 5.0 mmfd.
DESCR.: Can be completely insulated from panel by using our 2155 and 2163 fibre washers. Supplied with two hex nuts. **Std. Pkg. 100**

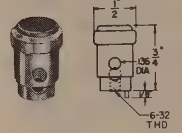
No.	Description	Net Per C
137	Standard	$50.00


1/2"
.136 DIA.
3/4
B
A
.064" PIN
.125"
6-32 THD.

BINDING POST
Spring Loaded

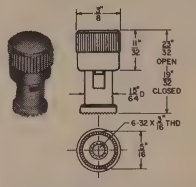
HEAD: Captive, Brass nickel plated.
CAP: STYRENE, Red or Black. SPECIFY COLOR
BODY: Brass, nickel plated.
PIN: Nickel Silver.
ACCEPTS: Standard phone tip or wire in side hole and locks them in place on release of pressure on cap.
RATING: 15 Amps AC for 10°C Temp. rise, continuous duty.
DESCR.: Side dowel pin locates and prevents post from turning when mounted in panel. **Std. Pkg. 100**

		WITH DOWEL PIN	NET	LESS DOWEL PIN	NET
A	B	No.	Per C	No.	Per C
5/16"	1/8"	2701	$65.00	2801	$60.00
3/8"	1/8"	2702	$67.00	2802	$62.00
1/2"	1/4"	2703	$69.00	2803	$64.00
3/4"	1/4"	2704	$71.00	2804	$68.00
1"	3/8"	2705	$75.00	2805	$70.00


1/2"
.136 DIA
3/4"
1/8
6-32 THD

Same as above less threaded stud. Supplied with 6-32 internal mounting thread.

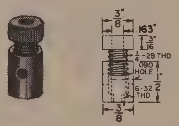
No.	Description	NET Per C
2709	With 1/8" lg. Dowel Pin	$52.00
2809	Without Dowel Pin	$50.00


3/8"
11/32
23/32 OPEN
19/32 CLOSED
15/64 D
6-32 x 3/16 THD
5/16

BINDING POST
Compression Type

HEAD: Captive, brass, nickel plated. Straight knurled for finger grip.
BODY: Brass, nickel plated.
ACCEPTS: Phone tips or wire (up to #10 gauge).
DESCR.: Head screws down to compress wire between body and sliding contact. Internally threaded for 6-32 mounting screw. Base knurled for positive grip to panel. **Std. Pkg. 100**

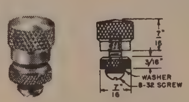
No.	NET Per C
159	$30.00


3/8"
.163"
3/16
1/4-28 THD
.090 HOLE
6-32 THD
3/8"

METAL BINDING POST

HEAD: BRASS, nickel plated.
BODY: Brass, nickel plated.
RATING: 15 Amps AC for 10°C Temp. rise continuous duty.
DESCR.: Accepts standard phone tips or banana plugs. **Std. Pkg. 100**

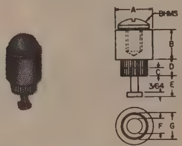
No.	NET Per C
136	$35.00


7/16
3/16"
WASHER
8-32 SCREW
7/16

METAL BINDING POST

HEAD: BRASS, nickel plated.
WASHER: Brass, nickel plated.
RATING: 15 Amps AC for 10°C Temp. rise continuous duty.
DESCR.: Supplied complete with screw and lockwasher. **Std. Pkg. 100**

No.	NET Per C
110	$35.00


A
BHMS
B
D
C
3/64
E
F
G

COMBINATION TERMINALS

MATERIAL: BRASS, alloy plate.
DESCR.: Combination Screw and Turret Terminal. Knurled shank prevents turning. Supplied complete with BHMS and Internal Tooth Lockwasher, unassembled. **Std. Pkg. 100**

NO.	A	B	C	D	E	F	G	BHMS	PANEL THK.	Net Per C
2045	5/16	1/4	1/16	9/64	11/64	1/8	.220	6-32	3/32	$20.00
2046	11/32	5/16	5/64	11/64	13/64	9/64	.250	8-32	1/8	20.00
2047	3/8	3/8	3/32	15/64	13/64	5/32	.257	10-32	3/16	20.00

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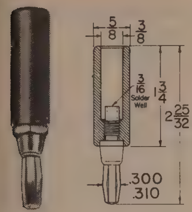
GIANT PLUGS & JACKS

SPECIFY **SMITH**

INS. GIANT BANANA PLUG



HANDLE: MACHINED PHENOLIC plastic, Red or Black. SPECIFY COLOR

BODY: Brass, nickel plated.

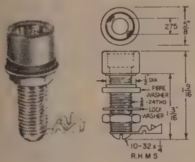
SPRING: Six-leaved, phosphor bronze, nickel plated.

RATING: 25 Amps AC for 10°C Temp. rise, continuous duty.

DESCR.: Large deep internal well for soldering heavy duty wire. Recessed so that no metal portions are exposed when plugged into mating jack, in order to prevent shocks or grounding. **Std. Pkg. 50**

No.	NET PER C
285	$130.00

INS. GIANT BANANA JACK



HEAD: MACHINED BUTYRATE, per Fed. Spec. L-P344, Type I, class MH. Red or Black. SPECIFY COLOR

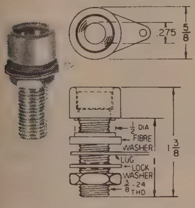
BODY: Hex brass, nickel plated.

RATING: 25 Amps AC for 10°C Temp. rise, continuous duty. 1 K Volts 60 cycle AC continuous working voltage. CAPACITANCE 7.0 pf.

DESCR.: Supplied with hex nut, fibre washer, lockwasher, screw and tinned copper lug. Jack body recessed for snug contact. Mounts in ½" hole in panel up to ¾" thick. **Std. Pkg. 50**

No.	NET Per C
286	$95.00

INS. GIANT BANANA JACK



HEAD: MACHINED BUTYRATE, per Fed. Spec. L-P344, Type I, class MH. Red or Black. SPECIFY COLOR

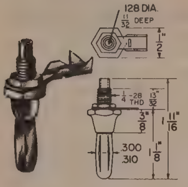
BODY: Brass, nickel plated.

RATING: 25 Amps AC for 10°C Temp. rise, continuous duty. 1 K Volts 60 cycle AC continuous working voltage. CAPACITANCE 7.0 pf.

DESCR.: Supplied with hex nut, fibre washer, lockwasher, and brass tinned lug. Jack body recessed for snug contact. Mounts in ½" hole in panel up to ¾" thick. **Std. Pkg. 50**

No.	NET Per C
287	$95.00

GIANT BANANA PLUG



BODY: HEX BRASS, nickel plated.

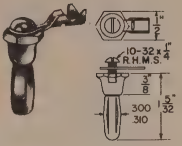
SPRING: Six-leaved phosphor bronze, nickel plated.

RATING: 25 Amps AC for 10°C Temp. rise, continuous duty.

DESCR.: Supplied with hex nut and brass tinned lug. Large deep internal well for soldering heavy duty wire. **Std. Pkg. 50**

No.	NET Per C
185	$90.00

GIANT BANANA PLUG



BODY: HEX BRASS, nickel plated.

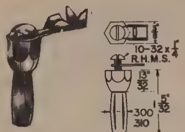
SPRING: Six-leaved phosphor bronze, nickel plated.

RATING: 25 Amps AC for 10°C Temp. rise, continuous duty.

DESCR.: Supplied with screw and brass tinned lug. Internal female thread permits use on all size panels. **Std. Pkg. 50**

No.	NET Per C
186	$80.00

GIANT BANANA PLUG



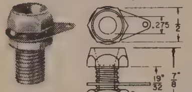
BODY: HEX BRASS, nickel plated.

SPRING: Six-leaved phosphor bronze, nickel plated.

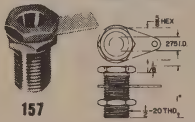
RATING: 25 Amps AC for 10°C Temp. rise, continuous duty.

DESCR.: Supplied with screw and brass tinned lug. Internal female thread permits use on all size panels. **Std. Pkg. 50**

No.	NET Per C
188	$65.00



187



157

GIANT BANANA JACK

BODY: HEX BRASS, nickel plated.

RATING: 25 Amps AC for 10°C Temp. rise, continuous duty.

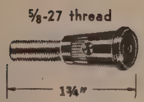
DESCR.: Supplied with hex nut and brass tinned lug. **Std. Pkg. 50**

No.	Mtg. Hole	Panel	NET Per C
187	⅜"	½"	$60.00
157	½"	⅝"	$70.00

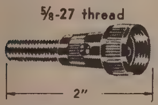
MICROPHONE CONNECTORS

MICROPHONE CONNECTORS

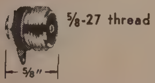
115



116



117



BODY: BRASS, chrome plated.

SPRING: Steel, cadmium plated.

INSUL.: XXXP PHENOLIC.

EYELET: Brass, hot tinned for easy soldering.

DESCR.: Designed for use with single conductor cable. Microphone connectors provided with flexible protector spring. Cable clamped firmly to connector by hollow point set screw. **Std. Pkg. 50**

MICROPHONE CONNECTORS

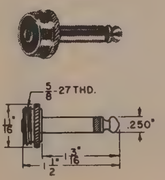
No.	Type	NET Per C
115	Single Contact Male	$39.00
116	Single Contact Female	65.00

CHASSIS CONNECTORS

Mount in .385 hole grounded; .500 hole insulated with shoulder washer.

No.	Type	Std. Pkg.	NET Per C
117	Single Contact Male	25	$60.00

PHONE PLUG ADAPTER



BODY: Body, tip, sleeve—Brass, nickel plated.

INSUL.: XXXP PHENOLIC.

RATING: 5 Amps AC for 10°C Temp. rise, continuous duty. 750 Volts 60 cycle AC continuous working voltage.

DESCR.: Assembled to insure positive contact with input wire of mating microphone connector. Molded styrene separator insures maximum insulation between conductors. Mates with No. 116 microphone connector. Fits standard phone jacks. **Std. Pkg. 25**

No.	NET Per C
113	$47.00

CAP and CHAIN

Brass Nickle Plated

Std. Pkg. 25

No.	NET Per C
118	$110.00

"Your SPECIALS are STANDARD with SMITH!"

The Jacks, Plugs and Binding Posts shown on this and other pages are considered "standard" catalog items, and are available for immediate delivery in quantity.

For VARIATIONS of these standard parts to meet your SPECIAL requirements, or for entirely NEW parts made to your specifications, WE WELCOME YOUR INQUIRY!

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SPECIFY SMITH INSULATED BANANA PLUGS

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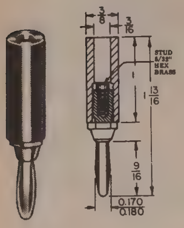


INSULATED BANANA PLUG

HANDLE: MOLDED PHENOLIC plastic, Red, Black Yellow, Green, Blue, White. SPECIFY COLOR

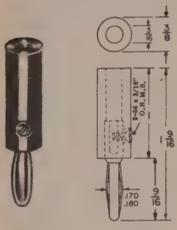
PLUG: Hex brass, nickel or silver plated.

SPRING: Four-leaved phosphor bronze or beryllium copper, nickel or silver plated.

RATING: 15 Amps AC for 10°C Temp. rise, continuous duty.

DESCR.: Wire can be soldered to brass stud or directly into plug itself. Stud also locks wire to plug for solderless connection. Fits standard banana jacks. **Std. Pkg. 100**

No.	Spring Material	Plating	NET Per C
212	Phosphor Bronze	Nickel	$35.00
232	Phosphor Bronze	Silver	$39.00
242	Beryllium Copper	Nickel	$41.00
262	Beryllium Copper	Silver	$44.00



INSULATED BANANA PLUG

With Side Screw

HANDLE: MOLDED PHENOLIC plastic, Red, Black, Yellow, Green, Blue, White. SPECIFY COLOR

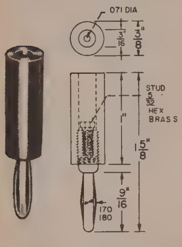
PLUG: Brass, nickel plated.

SPRING: Four-leaved phosphor bronze or beryllium copper, nickel plated.

RATING: 15 Amps AC for 10°C Temp. rise, continuous duty.

DESCR.: Set screw secures wire without soldering. Fits standard banana jacks. **Std. Pkg. 100**

No.	Spring	NET Per C
204	Phosphor Bronze	$30.00
254	Beryllium Copper	$35.00



INSULATED BANANA PLUG

HANDLE: MOLDED PHENOLIC plastic, Red, Black, Yellow, Green, Blue, White. SPECIFY COLOR

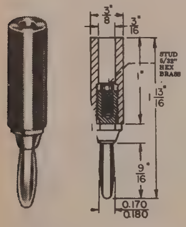
PLUG: Brass, nickel or silver plated.

SPRING: Four-leaved phosphor bronze or beryllium copper, nickel or silver plated.

RATING: 15 Amps AC for 10°C Temp. rise, continuous duty.

DESCR.: Wire can be soldered to brass stud or directly into plug itself. Stud also locks wire to plug for solderless connection. Fits standard banana jacks. **Std. Pkg. 100**

No.	Spring Material	Plating	NET Per C
211	Phosphor Bronze	Nickel	$30.00
261	Phosphor Bronze	Silver	33.00
271	Beryllium Copper	Nickel	35.00
281	Beryllium Copper	Silver	39.00



HIGH TEMPERATURE BANANA PLUG

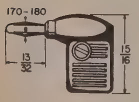
HANDLE: MOLDED PHENOLIC plastic, Red, Black Yellow, Green, Blue, White. SPECIFY COLOR

PLUG: Hex brass, nickel plated.

RATING: 15 Amps AC for 10°C Temp. rise, continuous duty.

DESCR.: Withstands temperature to 1200 degrees F. Full resiliency—non-oxidizing. Excellent for thermo-couple connection on plastic extruding die heads. **Std. Pkg. 10**

No.	NET Per C
388	$120.00



METER BANANA PLUG

HANDLE: MOLDED PHENOLIC plastic, Red and Black. SPECIFY COLOR

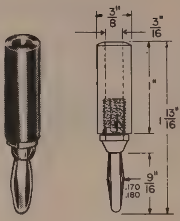
PLUG: Brass, nickel plated.

SPRING: Four-leaved phosphor bronze, nickel plated.

RATING: 10 Amps AC for 10°C Temp. rise, continuous duty.

DESCR.: Molded in two halves for easy assembly with screw and nut. Fits standard banana jacks. **Std. Pkg. 50**

No.	Type	NET Per C
255		$48.00



INSULATED BANANA PLUG

Solderless

HANDLE: MOLDED PHENOLIC plastic, Red, Black, Yellow, Green, Blue, White. SPECIFY COLOR

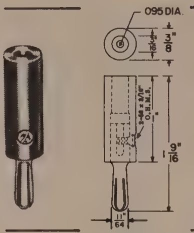
PLUG: Hex brass, nickel or silver plated.

SPRING: Four-leaved phosphor bronze or beryllium copper, nickel or silver plated.

RATING: 15 Amps AC for 10°C Temp. rise, continuous duty.

DESCR.: Solderless: Wire fits through handle and body of tip then wrapped around screw portion. Fits standard banana jacks. **Std. Pkg. 100**

No.	Spring Material	Plating	NET Per C
295	Phosphor Bronze	Nickel	$42.00
296	Phosphor Bronze	Silver	$46.00
297	Beryllium Copper	Nickel	$48.00
298	Beryllium Copper	Silver	$51.00



INSULATED BANANA PLUG

Split Type With Side Screw

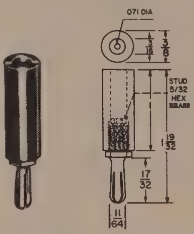
HANDLE: MOLDED PHENOLIC plastic, Red, Black, Yellow, Green, Blue, White. SPECIFY COLOR

PLUG: Brass, nickel plated.

RATING: 15 Amps AC for 10°C Temp. rise, continuous duty.

DESCR.: Cross-slotted for spring tension. Set screw secures wire, without soldering. Fits standard banana jacks. **Std. Pkg. 100**

No.	NET Per C
213	$28.00



INSULATED BANANA PLUG

Split Type With Internal Stud

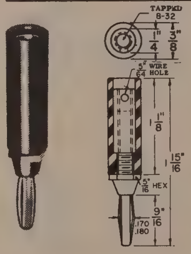
HANDLE: MOLDED PHENOLIC plastic, Red, Black, Yellow, Green, Blue, White. SPECIFY COLOR

PLUG: Brass, nickel plated.

RATING: 15 Amps AC for 10°C Temp. rise, continuous duty.

DESCR.: Cross-slotted for spring tension. Wire can be soldered to brass stud or directly into plug itself. Stud also locks wire to plug for solderless connection. Fits standard banana jacks. **Std. Pkg. 100**

No.	NET Per C
253	$32.00



INSULATED BANANA PLUG

Solderless

HANDLE: MACHINED BUTYRATE, per Mil-P-10408A, Type I, Class II. Red or Black. SPECIFY COLOR

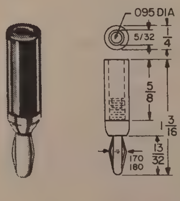
PLUG: Hex brass, nickel plated with mating brass spacer.

SPRING: Four-leaved phosphor bronze, nickel plated.

RATING: 15 Amps AC for 10°C Temp. rise, continuous duty.

DESCR.: Cross drilled hole in spacer enables quick solderless connection of wire to plug. Fits standard banana jacks. **Std. Pkg. 100**

No.	NET Per C
236	$62.00



INSULATED BANANA PLUG

Midget Type

HANDLE: MACHINED BUTYRATE, per Mil-P-10408A, Type I, Class II. Red or Black. SPECIFY COLOR

PLUG: Brass, nickel or silver plated.

SPRING: Phosphor bronze or beryllium copper, nickel or silver plated.

RATING: 10 Amps AC for 10°C Temp. rise, continuous duty.

DESCR.: Wire soldered directly into stud. Fits standard banana jacks. **Std. Pkg. 100**

No.	Spring Material	Plating	NET Per C
291	Phosphor Bronze	Nickel	$30.00
292	Phosphor Bronze	Silver	$33.00
293	Beryllium Copper	Nickel	$35.00
294	Beryllium Copper	Silver	$39.00

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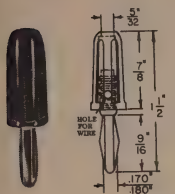
SPECIFY **SMITH**

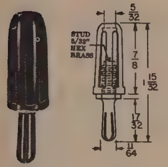
NYLON BANANA PLUG



HANDLE: MOLDED NYLON, per MIL-P-20693A.
COLORS: Available in 10 std. colors as coded above. (Specify color)
PLUG: Brass, nickel plated.
SPRING: Phosphor bronze or beryllium copper nickel or silver plated.
RATING: 15 Amps AC for 10°C Temp. rise, continuous duty.
DESCR.: Wire can be soldered to brass stud or directly into plug itself. Stud also locks wire to plug for solderless connection. Fits standard banana jacks. **Std. Pkg. 100**

No.	Spring Material	Plating	NET Per C
476	Phosphor Bronze	Nickel	$31.00
477	Phosphor Bronze	Silver	$34.00
478	Beryllium Copper	Nickel	$37.00
479	Beryllium Copper	Silver	$40.00

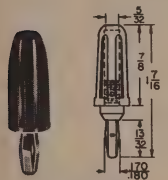
NYLON BANANA PLUG
Split Type



HANDLE: MOLDED NYLON, per MIL-P-20693A.
COLORS: Available in 10 std. colors as coded above. (Specify color)
PLUG: Brass, nickel plated.
RATING: 15 Amps AC for 10°C Temp. rise, continuous duty.
DESCR.: Cross-slotted for spring tension. Wire can be soldered to brass stud or directly into plug itself. Stud also locks wire to plug for solderless connection. Fits standard banana jacks. **Std. Pkg. 100**

No.	NET Per C
494	$28.00

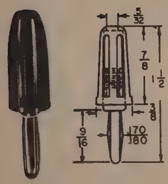
NYLON BANANA PLUG
Short Spring



HANDLE: MOLDED NYLON, per MIL-P-20693A.
COLORS: Available in 10 std. colors as coded above. (Specify color)
PLUG: Brass, nickel or silver plated.
SPRING: Phosphor bronze or beryllium copper nickel or silver plated.
RATING: 15 Amps AC for 10°C Temp. rise, continuous duty.
DESCR.: Wire soldered directly into stud. Fits standard banana jacks. **Std. Pkg. 100**

No.	Spring Material	Plating	NET Per C
426	Phosphor Bronze	Nickel	$28.00
427	Phosphor Bronze	Silver	$31.00
428	Beryllium Copper	Nickel	$33.00
429	Beryllium Copper	Silver	$37.00

NYLON BANANA PLUG
Solderless

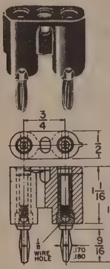


HANDLE: MOLDED NYLON, per MIL-P-20693A.
COLORS: Available in 10 std. colors as coded above. (Specify color)
PLUG: Brass, nickel or silver plated.
SPRING: Phosphor bronze or beryllium copper nickel or silver plated.
RATING: 15 Amps AC for 10°C Temp. rise, continuous duty.
DESCR.: Solderless: Wire fits through handle and body of tip then wrapped around screw portion. Inserts flush to handle, no metal exposed, eliminates possibility of shock or grounding. Fits standard banana jacks. **Std. Pkg. 100**

No.	Spring Material	Plating	NET Per C
455	Phosphor Bronze	Nickel	$31.00
456	Phosphor Bronze	Silver	$34.00
457	Beryllium Copper	Nickel	$37.00
458	Beryllium Copper	Silver	$40.00

USE OUR MANUFACTURING AND ENGINEERING FACILITIES for variations and for special parts which we will be happy to manufacture TO YOUR SPECIFICATIONS!

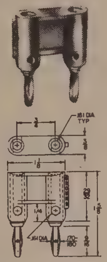
DUAL BANANA PLUG



BODY: MOLDED POLYSTYRENE, Red or Black. SPECIFY COLOR
PLUG: Brass, nickel plated.
SPRING: Four-leaved phosphor bronze, nickel plated.
SCREW: Steel, cadmium plated.
RATING: 15 Amps AC for 10°C Temp. rise, continuous duty. 5K Volts 60 cycle AC continuous working voltage. CAPACITANCE 1.0 pf. between conductors.
DESCR.: Mates with standard dual binding post ¾" centers. Polarity indicated on top and side. Wire held with internal set screw. Can be stacked for multiple connections. **Std. Pkg. 25**

No.	NET Per C
210	$100.00

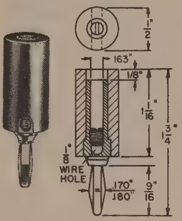
DUAL SHORTING PLUG



HANDLE: MOLDED BUTYRATE, per Fed. Spec. L-P349A, Type 3, Class MS. Red, Black, Yellow, Green, Blue, White Assemblies. SPECIFY COLOR
PLUG: Brass, nickel plated.
SPRING: Four-leaved beryllium copper, nickel plated.
RATING: 15 Amps. AC for 10°C Temp. rise, continuous duty. 5 KV 60 cycle AC continuous working voltage.
DESCR.: Internally shorted plug mates with standard dual binding posts on ¾" centers. Used for grounding or shorting input and output connections. Can be stacked for additional current rating. Rear banana jack holes allow connection to shorted posts. **Std. Pkg. 25**

No.	NET Per C
1516	$120.00

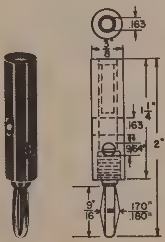
STACK BANANA PLUG



BODY: MOLDED POLYSTYRENE, Red or Black. SPECIFY COLOR
PLUG: Brass, nickel plated.
SPRING: Four-leaved phosphor bronze, nickel plated.
SCREW: Steel, cadmium plated.
RATING: 15 Amps AC for 10°C Temp. rise, continuous duty.
DESCR.: Internal set screw for wire or phone tip connection. Can be stacked for multiple connections. **Std. Pkg. 50**

No.	NET Per C
324	$58.00

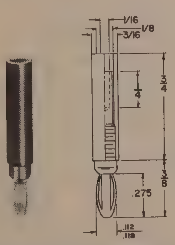
STACK BANANA PLUG
Solderless



HANDLE: MACHINED BUTYRATE, per MIL-P-10408A, Type I, Class II. Red Black, Yellow or Green. SPECIFY COLOR
BODY: Brass, nickel plated.
SPRING: Four-leaved phosphor bronze or beryllium copper, nickel plated.
RATING: 15 Amps AC for 10°C Temp. rise, continuous duty.
DESCR.: Solderless connection. Accepts standard banana plugs in top and side. Interconnects unlimited amount of multiple circuits. **Std. Pkg. 50**

No.	Spring Material	NET Per C
1511	Phosphor Bronze	$65.00
1512	Beryllium Copper	$73.00

MINIATURE INSULATED BANANA PLUG
Midget Type

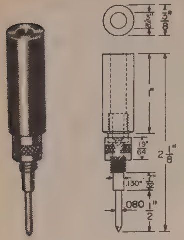


HANDLE: MACHINED BUTYRATE, per Mil-P-10408A, Type I, Class II. Red or Black. SPECIFY COLOR
PLUG: Brass, nickel plated.
SPRING: Beryllium Copper, nickel plated.
RATING: 2 Amps AC for 10°C Temp. rise, continuous duty.
DESCR.: Wire soldered directly into stud. Fits miniature banana jacks. **Std. Pkg. 100**

No.	NET Per C
268	$30.00

IT'S SOUND PLANNING TO **"SPECIFY SMITH"** WHEN DESIGNING OR PURCHASING

SPECIFY SMITH INSULATED PHONE TIP PLUGS



INSULATED TIP PLUG
Solderless

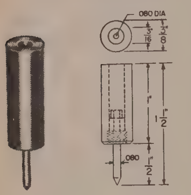
HANDLE: MOLDED PHENOLIC plastic, Red, Black, Yellow, Green, Blue, White. SPECIFY COLOR

PLUG: Brass, nickel plated.

RATING: 12 Amps AC for 10°C Temp. rise, continuous duty.

DESCR.: Solderless: wire fits through body of tip then wrapped around screw portion and tightened with knurled collar. Threaded type. Fits standard phone tip jacks. **Std. Pkg. 100**

No.	Type	NET Per C
200	Senior	$25.00



INSULATED SHORT TIP PLUG

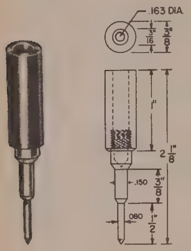
HANDLE: MOLDED PHENOLIC plastic, Red, Black Yellow, Green, Blue, White. SPECIFY COLOR

PLUG: Brass, nickel plated.

RATING: 12 Amps AC for 10°C Temp. rise, continuous duty.

DESCR.: Inserts flush to insulated handle, no metal exposed; eliminates possibility of shock or grounding. Fits standard phone tip jacks. **Std. Pkg. 100**

No.	NET Per C
203	$22.00



INSULATED TIP PLUG
Heavy Duty Type

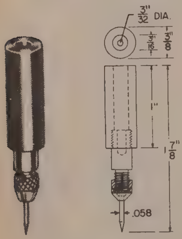
HANDLE: MOLDED PHENOLIC plastic, Red, Black Yellow, Green, Blue, White. SPECIFY COLOR

PLUG: Brass, nickel plated.

RATING: 12 Amps AC for 10°C Temp. rise, continuous duty.

DESCR.: Large diameter well enables soldering of heavy duty wire directly into plug. Fits standard phone tip jacks. **Std. Pkg. 100**

No.	NET Per C
229	$26.00



INSULATED TIP PLUG
Phono Needle

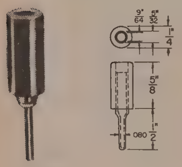
HANDLE: MOLDED PHENOLIC plastic, Red, Black, Yellow, Green, Blue, White. SPECIFY COLOR

PLUG: Brass, nickel plated.

RATING: 12 Amps AC for 10°C Temp. rise, continuous duty.

DESCR.: Removable chuck for easy replacement of broken needle. Needle pierces corrosion or plating for positive reading. **Std. Pkg. 100**

No.	Net Per C
216	$34.00



INSULATED TIP PLUG
Solder Type

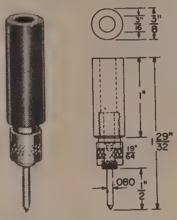
HANDLE: MOLDED BUTYRATE, per Fed. Spec. L-P349A, Type 3, Class MS. Red and Black. SPECIFY COLOR

PLUG: Brass, nickel plated our No. 158.

RATING: 12 Amps AC for 10°C Temp. rise, continuous duty.

DESCR.: Drawn hollow tip for easy soldering. Fits standard phone tip jack. **Std. Pkg. 100**

No.	NET Per C
237	$10.00



INSULATED TIP PLUG
Solderless

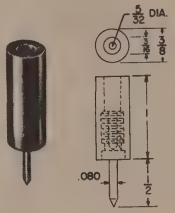
HANDLE: MOLDED PHENOLIC plastic, Red, Black, Yellow, Green, Blue, White. SPECIFY COLOR

PLUG: Brass, nickel plated.

RATING: 12 Amps AC for 10°C Temp. rise, continuous duty.

DESCR.: Solderless: wire fits through body of tip then wrapped around screw portion and tightened with knurled collar. Threaded type. Fits standard phone tip jacks. **Std. Pkg. 100**

No.	Type	NET Per C
201	Junior	$25.00



INSULATED SHORT TIP PLUG
Solderless

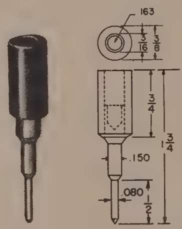
HANDLE: MOLDED PHENOLIC plastic, Red, Black Yellow, Green, Blue, White. SPECIFY COLOR

PLUG: Brass, nickel plated.

RATING: 12 Amps AC for 10°C Temp. rise, continuous duty.

DESCR.: Solderless: wire fits through handle and body of tip then wrapped around screw portion. Inserts flush to insulated handle, no metal exposed, eliminates possibility of shock or grounding. Fits standard phone tip jacks. **Std. Pkg. 100**

No.	NET Per C
283	$22.00



ADAPTER
Banana Plug to Tip Plug

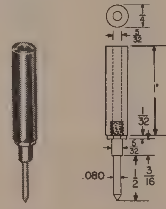
HANDLE: MOLDED BUTYRATE, per Fed. Spec. L-P349A, Type 3. Class MS. Red and Black. SPECIFY COLOR

PLUG: Brass, nickel plated.

RATING: 12 Amps AC for 10°C Temp. rise, continuous duty.

DESCR.: Accepts standard banana plugs, adapts to standard tip plug. **Std. Pkg. 100**

No.	NET Per C
215	$26.00



SUB-MINIATURE TIP PLUG

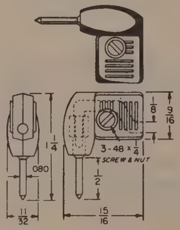
HANDLE: FIBRE, per MIL-F-1148A, Grade CH. Red, Black. SPECIFY COLOR

PLUG: Brass, nickel plated.

RATING: 12 Amps AC for 10°C Temp. rise, continuous duty.

DESCR: Ideally suited for checking sub-miniature equipment. Fits standard phone tip jacks. **Std. Pkg. 100**

No.	NET Per C
270	$30.00



METER TIP PLUG

HANDLE: MOLDED PHENOLIC plastic, Red and Black. SPECIFY COLOR

PLUG: Brass, nickel plated.

RATING: 12 Amps AC for 10°C Temp. rise, continuous duty.

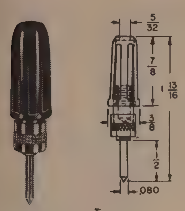
DESCR.: Molded in two halves for easy assembly with screw and nut. Fits standard phone tip jacks. **Std. Pkg. 50**

No.	NET Per C
235	$35.00

IT'S SOUND PLANNING TO **"SPECIFY SMITH"** WHEN DESIGNING OR PURCHASING

INSULATED PHONE TIP PLUGS

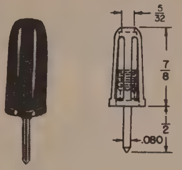
SPECIFY SMITH



NYLON TIP PLUG
Solderless

HANDLE: MOLDED NYLON, per MIL-P-20693A. Specify color as coded above.
PLUG: Brass, nickel plated.
RATING: 12 Amps AC for 10°C Temp. rise, continuous duty.
DESCR.: Solderless: wire fits through body of tip then wrapped around screw portions and tightened with knurled collar. Threaded type. Fits standard phone tip jacks. **Std. Pkg. 100**

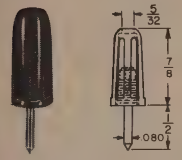
No.	NET Per C
490	$25.00



NYLON SHORT TIP PLUG
Solderless

HANDLE: MOLDED NYLON, per MIL-P-20693A. Specify color as coded above.
PLUG: Brass, Nickel plated.
RATING: 12 Amps AC for 10°C Temp. rise, continuous duty.
DESCR.: Solderless: Wire fits through handle and body of tip then wrapped around screw portion. Inserts flush to handle, no metal exposed, eliminates possibility of shock or grounding. Fits standard phone tip jacks. **Std. Pkg. 100**

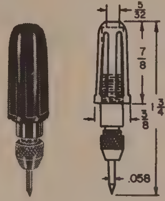
No.	NET Per C
492	$23.00



NYLON SHORT TIP PLUG

HANDLE: MOLDED NYLON, per MIL-P-20693A. Specify color as coded above.
PLUG: Brass, nickel plated.
RATING: 12 Amps AC for 10°C Temp. rise, continuous duty.
DESCR.: Inserts flush to insulated handle, no metal exposed; eliminates possibility of shock or grounding. Fits standard phone tip jacks. **Std. Pkg. 100**

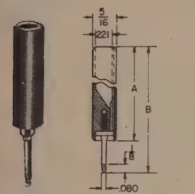
No.	NET Per C
491	$23.00



NYLON TIP PLUG
Phono Needle

HANDLE: MOLDED NYLON, per MIL-P-20693A. Specify color as coded above.
PLUG: Brass, nickel plated.
RATING: 15 Amps AC for 10°C Temp. rise, continuous duty.
DESCR.: Removable chuck for easy replacement of broken needles. Needle pierces corrosion or plating for positive reading. **Std. Pkg. 100**

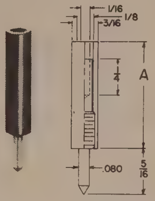
No.	NET Per C
493	$35.00



MINIATURE TIP PLUG AND TEST PROD

HANDLE: Molded Nylon, per MIL-P-20693A. Available in Red or Black. SPECIFY COLOR
TIP: Brass, Silver plated.
DESCR.: Solderless assembly. Ideal for use with sub-miniature printed-circuit tip jacks. Sharp tip breaks flux or oxide coating on printed-circuit pattern for positive contact when used as prod. Grooved head of prod makes positive contact when laid across wires. Fits all standard .080" tip jacks.

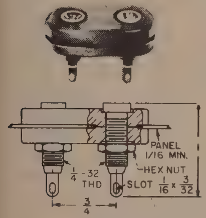
No.	Handle (A)	Overall (B)	Std. Pkg.	NET Per C
348	1 inch	1 5/16"	100	$40.00
349	4 inches	4 5/16"	25	50.00



MINIATURE TIP PLUG AND TEST PROD

HANDLE: MACHINED BUTYRATE, per Mil-P-10408A, Type I, Class II. Red or Black. SPECIFY COLOR
PLUG: Brass, nickel plated.
RATING: 2 Amps AC for 10°C Temp. rise, continuous duty.
DESCR.: Ideally suited for checking sub-miniature equipment. Fits standard phone tip jacks.

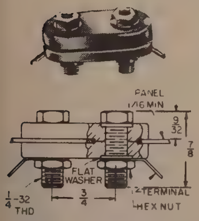
No.	Length (A)	Std. Pkg.	NET Per C
244	3/4"	100	$20.00
666	3"	25	33.00



STANDARD (¾" CENTERS) DUAL TIP JACK ASSEMBLY

INSULA.: MOLDED black STYRENE.
BODY: Recessed, brass, nickel plated.
CONTACT: Phosphor bronze.
RATING: 15 Amps AC for 10°C Temp. rise, continuous duty. 2 K Volts 60 cycle AC continuous working voltage. CAPACITANCE 2.0 pf. between conductors, 4.0 pf. to panel.
DESCR.: Mounts in two ½" holes on ¾" mounting centers in panels up to ¼" thick. Accommodates standard phone tip plugs. Supplied with two hex nuts. **Std. Pkg. 10**

No.	NET Per C
488	$65.00

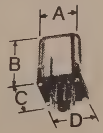


DUAL BANANA JACK ASSEMBLY

INSULA.: MOLDED black STYRENE.
BODY: Brass, nickel plated.
RATING: 15 Amps AC for 10°C Temp. rise, continuous duty. 2 K Volts 60 cycle AC continuous working voltage. CAPACITANCE 2.0 pf. between conductors, 4.0 pf. to panel.
DESCR.: Mounts in two ½" holes on ¾" mounting centers in panels up to ¼" thick. Accommodates standard and dual banana plugs. Supplied with two hex nuts, 4 flat washers and brass tinned lugs. **Std. Pkg. 10**

No.	NET Per C
489	$65.00

PLUG-IN MODULE HOUSINGS



Molded plastic housings and pin headers fit standard tube sockets. For use in packaging relays, networks, miniature interchangeable circuits in plug-in, replaceable modules. Available in three sizes and materials for a wide range of temperature and environmental applications. **Std. Pkg. 25**

HEADERS	A	B	C	D
MIN.	1 3/16	1 9/16	1 3/8	1 3/8
STD.	1 3/16	1 15/16	1 3/8	1 3/8
LGE.	1 3/4	2 15/16	1 31/32	1 31/32

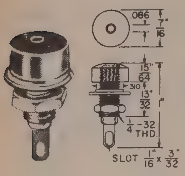
HEADER BLACK	STYRENE BLACK Cat. No.	STYRENE BLACK Net. Ea.	BUTYRATE BLACK Cat. No.	BUTYRATE BLACK Net Ea.	NYLON NATURAL Cat. No.	NYLON NATURAL Net Ea.
MINIATURE						
8 Pin	2437-08	$ .75	2421-08	$ .90	2424-08	$ .80
9 Pin	2437-09	.90	2421-09	1.00	2424-09	1.00
11 Pin	2437-11	.90	2421-11	1.00	2424-11	1.00
20 Pin	2437-20	1.00	2421-20	1.15	2424-20	1.15
STANDARD						
8 Pin	2438-08	$ .75	2422-08	$ .75	2432-08	$ .90
9 Pin	2438-09	.80	2422-09	.90	2432-09	1.00
11 Pin	2438-11	.80	2422-11	.90	2432-11	1.00
20 Pin	2438-20	1.00	2422-20	1.00	2432-20	1.15
LARGE						
8 Pin	2439-08	$ .95	2423-08	$1.40	----------	
11 Pin	2439-11	1.00	2423-11	1.45	----------	
20 Pin	2439-20	1.35	2423-20	1.70	----------	

For VARIATIONS of these standard parts to meet your SPECIAL requirements, or for entirely NEW parts made to your specifications, WE WELCOME YOUR INQUIRY!

IT'S SOUND PLANNING TO **"SPECIFY SMITH"** WHEN DESIGNING OR PURCHASING

SPECIFY SMITH INSULATED PHONE TIP JACKS

INSULATED PHONE TIP JACK



HEAD: MOLDED PHENOLIC plastic, Red, Black Yellow, Green, Blue, White. SPECIFY COLOR

BODY: Brass, nickel plated.

CONTACT: Phosphor bronze.

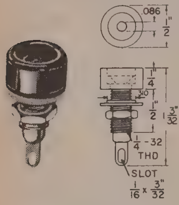
RATING: 15 Amps AC for 10°C Temp. rise, continuous duty. 750 Volts 60 cycle AC continuous working voltage. CAPACITANCE 4.0 pf.

DESCR.: Positive contact with standard phone tip plugs. Supplied complete with hex nut and fibre washer. Mounts in 5/16" hole in panels up to ⅜" thick. Accepts standard phone tip plugs. **Std. Pkg. 100**

No.	NET Per C
202	$24.00

INSULATED TIP JACK

Meter Type



HEAD: MOLDED PHENOLIC plastic, Red, Black, Yellow, Green, Blue, White. SPECIFY COLOR

BODY: Brass, nickel plated.

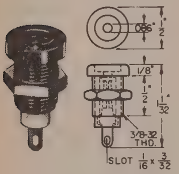
CONTACT: Phosphor bronze.

RATING: 15 Amps AC for 10°C Temp. rise, continuous duty. 750 Volts 60 cycle AC continuous working voltage. CAPACITANCE 4.0 pf.

DESCR.: Supplied complete with hex nut and fibre washer. Mounts in 5/16" hole in panels up to ⅜" thick. Recessed jack body prevents possibility of shock or grounding. Accepts standard phone tip plugs. **Std. Pkg. 100**

No.	NET Per C
282	$35.00

NYLON PHONE TIP JACK



BODY: MOLDFD NYLON, per MIL-P-20693A. Red, Black. SPECIFY COLOR

CONTACT: Phosphor bronze.

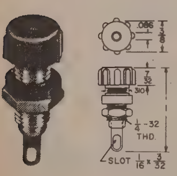
CAP: Brass, nickel plated.

RATING: 10 Amps AC for 10°C Temp. rise, continuous duty. 5 K Volts 60 cycle AC continuous working voltage. CAPACITANCE 3.0 pf.

DESCR.: Mounts in ⅜" hole in panels up to 5/16" thick. Accepts standard phone tip plugs. **Std. Pkg. 100**

No.	NET Per C
240	$25.00

NYLON PHONE TIP JACK



HEAD: MOLDED NYLON, per MIL-P-20693A. With molded nylon washer. Red, Black, Yellow, Green, Blue. SPECIFY COLOR

BODY: Brass, nickel plated.

CONTACT: Phosphor bronze.

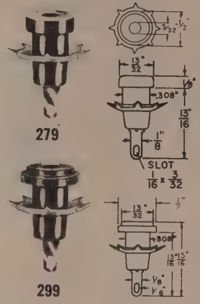
RATING: 12 Amps AC for 10°C Temp. rise, continuous duty. 750 Volts 60 cycle AC continuous working voltage. CAPACITANCE 4.0 pf.

DESCR.: Extruded portion of head and washer provides excellent insulation from panel. Supplied with hex nut. Mounts in 5/16" hole in panels up to ¼" thick. Accepts standard tip plugs. **Std. Pkg. 100**

No.	NET Per C
241	$38.00

SEE OUR COMPLETE LINE OF TEFLON TERMINALS AND TEST JACKS STARTING ON PAGE 2·885

"SPEEDI-MOUNT" TIP JACKS



BODY: MOLDED PHENOLIC plastic, Red, Black, Yellow, Green, Blue, White. SPECIFY COLOR

CONTACT: Phosphor bronze.

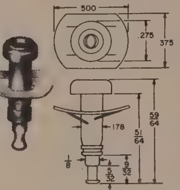
WASHER: Steel cadmium plated, internal and external tooth.

RATING: 12 Amps AC for 10°C Temp. rise, continuous duty. 3 K Volts 60 cycle AC continuous working voltage. CAPACITANCE 3.0 pf.

DESCR.: Unusual dished lockwasher permits fast assembly. Teeth embed into jack and panels, prevents pulling out and turning. Mounts in 5/16" hole in panels up to 3/16" thick. Accepts standard phone tip plugs. **Std. Pkg. 100**

No.	Description	NET Per C
279	Small Head 13/32" Dia.	$10.00
299	Large Head ½" Dia.	$10.00

NYLON TEST TIP JACK



BODY: Nylon, Grade FM 10001. Specify color as coded above, 10 colors.

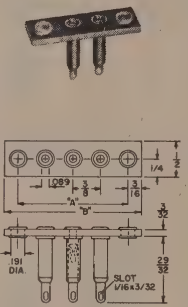
CONTACT: phosphor bronze, gold plated.

RATING: 15 Amps AC for 10°C. Temp. rise, continuous duty. 3 KV 60 cycle AC continuous working voltage. CAPACITANCE 4.0 pf.

DESCR.: Mounts in 3/16" hole, with Tinnerman Speed Nut for fast permanent assembly. Teeth embed into jack body, preventing pulling out and turning. Accepts standard phone tip plugs. **Std. Pkg. 25**

No.	NET Per C
1598	$17.00

PIN JACK STRIPS



STRIP: LAMINATED PHENOLIC, XP, Black.

BODY: Brass, nickel plated.

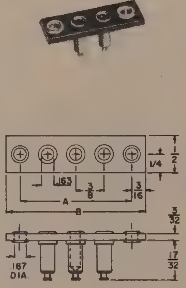
SPRING: Phosphor bronze.

RATING: 15 Amps AC for 10°C Temp. rise, continuous duty. 1 KV, 60 cycle AC continuous working voltage.

DESCR.: From 2 to 10 pin jacks assembled on ⅜" centers on a heavy-duty board. Provides positive contact with standard phone tip plugs. Mounting holes accept screws up to #8. **Std. Pkg. 25**

No.	Jacks	Mtg. Ctrs. ("A")	Length ("B")	NET Per C
1982	2	1⅛"	1½"	$36.00
1983	3	1½"	1⅞"	$47.00
1984	4	1⅞"	2¼"	$61.00
1985	5	2¼"	2⅝"	$75.00
1986	6	2⅝"	3"	$83.00
1987	7	3"	3⅜"	$98.00
1988	8	3⅜"	3¾"	$112.00
1989	9	3¾"	4⅛"	$121.00
1990	10	4⅛"	4½"	$135.00

BANANA JACK STRIPS



STRIP: LAMINATED PHENOLIC, XP, Black.

BODY: Brass, nickel plated.

SPRING: Phosphor bronze.

RATING: 15 Amps AC for 10°C Temp. rise, continuous duty. 1 KV, 60 cycle AC continuous working voltage.

DESCR.: From 2 to 10 Banana jacks assembled on ⅜" centers on a heavy-duty board. Provides positive contact with standard banana plugs. Mounting holes accept screws up to #8. **Std. Pkg. 25**

No.	Jacks	Mtg. Ctrs. ("A")	Length ("B")	NET Per C
1972	2	1⅛"	1½"	$34.00
1973	3	1½"	1⅞"	$43.00
1974	4	1⅞"	2¼"	$57.00
1975	5	2¼"	2⅝"	$71.00
1976	6	2⅝"	3"	$80.00
1977	7	3"	3⅜"	$105.00
1978	8	3⅜"	3¾"	$109.00
1979	9	3¾"	4⅛"	$118.00
1980	10	4⅛"	4½"	$134.00

IT'S SOUND PLANNING TO **"SPECIFY SMITH"** WHEN DESIGNING OR PURCHASING

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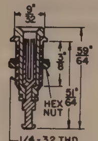
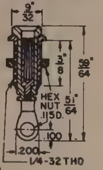
NYLON TIP & P.C. TEST JACKS

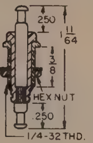
SPECIFY **SMITH**



1501
Wrap Around



1502
Spade Terminal



1503
Feed Through

NYLON TIP JACK

With Metal Shell

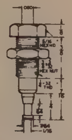
Made to Meet MS-16108 Rev. C.

COLORS: Available in White, Red, Black, Green, Blue, Orange, Yellow, Brown, Purple and Grey. Specify color as coded above.

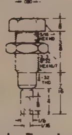
Molded Nylon Tip Jack. Metal shell eliminates possibility of stripping threads during assembly. Meets following requirements:

1. Salt Spray Test — Withstands 100 hours
2. Rating — 15 Amps AC for 10°C Temp. rise, continuous duty. 2 K Volts 60 cycle AC continuous working voltage. CAPACITANCE 10.0 pf.
3. Insulation Resistance — 5000 megohms
4. Operating Conditions —
   A. Continuous: 23 hours on, 1 hour off
   B. Elevation: Up to 5,000 feet
   C. Temperature: −55 to +85°C
   D. Humidity: Up to 95%
5. Material Specifications —
   A. Insulator: Molded Nylon, per MIL-P-20693A. Specify color as coded above.
   B. Shell and Nut: Brass Nickel Plated Per QQ-N-290, type V (FC).
   C. Lockwasher: Phosphor Bronze Nickel Plated Per QQ-N-290, type V (FC).
   D. Center Contact: Heat treated Beryllium Copper, Silver plated per QQ-S-365, Gold plated overall.
6. Non-Operating Conditions —
   A. Elevation: Up to 50,000 feet
   B. Temperature: Continuous exposure for 72 hours at +160°F and 240 hours at −80°F.
   C. Humidity: Up to 100%

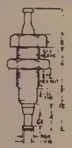
No.	Type	Std. Pkg.	NET Per C
1501	Wrap Around	100	**$36.00**
1502	Spade Terminal	50	**$50.00**
1503	Feed Through	50	**$47.00**



1505
Wrap Around



1506
Spade Terminal



1507
Feed Through

ALL NYLON TIP JACKS

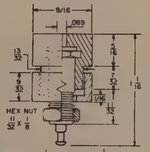
Completely Molded Nylon Jack. Fits all standard phone tip plugs. Contact recessed in head for safe contact. Hexagon head for grip in tightening. Mounts in ¼" hole in panels up to ¼" thick. Meets following requirements:

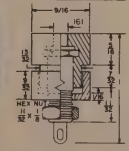
1. Salt Spray Test — Withstands 100 hours
2. Rating: 15 Amps AC for 10°C Temp. rise, continuous duty. 5 K Volts 60 cycle AC continuous working voltage. CAPACITANCE 3.0 pf.
3. Insulation Resistance — 5000 megohms
4. Operating Temperature — —55° to +85° C.
5. Material Specifications —
   A. Body: Molded Nylon, per MIL-P-20693A. Specify Color as coded above.
   B. Center contact: Heat treated phosphor bronze, Silver plated per QQ-S-365, Gold plated overall. No. 1507 Brass, per QQ-B-626, Comp. 22, plated as above.
   C. Hex Nut: Brass Nickel Plated.

COLORS: Available in White, Red, Black, Green, Blue, Orange, Yellow, Brown, Purple and Grey. Specify color as coded above.

No.	Type	Std. Pkg.	NET Per C
1505	Wrap Around	100	**$27.00**
1506	Spade Terminal	50	**$36.00**
1507	Feed Through	50	**$34.00**

1521





1522

HIGH VOLTAGE NYLON JACKS

Made to meet MS-16107 Spec.

Heavy molded nylon body and cup washer prevent high-voltage flashover to panel. Meets following requirements:

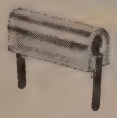
1. Salt Spray Test—Withstands 100 hours.
2. Electrical Rating—15 Amps AC for 10°C Temp. rise, continuous duty. 5 KV 60 cycle AC continuous working voltage. Millivolt drop per MIL-J-6751. CAPACITANCE 2.0 pf.
3. Material Specifications—
   A. Insulator and Washer: — Molded Nylon, per MIL-P-20693A. Colors to Fed. Std. 595. Specify color as coded above.
   B. Insert Shell and Nut: Brass, Nickel plated per QQ-N-290, type V (FC).
   C. Contact: Phosphor bronze, Silver plated .0002" per QQ-S-365, Gold plated overall.

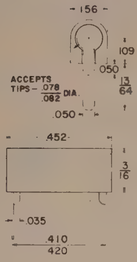
Specify color as coded above, 10 colors.

Std. Pkg. 25

No.		NET Per C
1521	Phone Tip	**$60.00**
1522	Banana	**$60.00**

RIGHT ANGLE PRINTED CIRCUIT TEST JACK





ADDITIONAL
PRINTED CIRCUIT
TEST JACKS, PAGE 7

DESCR.: Double-entry design, probe inserts from either end of jack. Closed entry construction will not accept probes larger than .084", will contact probes down to .074". Closed bottom construction keeps jack from fouling with solder or flux. Locking ears hold jack firmly in board until soldered. Precise dimensions allow for automated assembly on boards.

COMMERCIAL TYPES

BODY: MOLDED NYLON, PER MIL-P-20693A. 10 colors, specify color as coded.

SPRING: Beryllium Copper, per QQ-C-533.

FINISH: Silver underplate, .0002" min., per QQ-S-365, Type I, with .00003" Gold overplate; per MIL-F-14072, M-310.

RATINGS: 5 Amps AC for 10°C Temp. rise, continuous duty. 1.5 KV. 60 cycle AC continuous working voltage. Contact resistance 5 milliohms max. at rated current. Capacitance less than 5 MHz, at 1 pf.

MOUNTING: Mounts in .052" dia. holes, on .400" centers, in boards up to 3⁄16" thick. Can be spaced side-by-side .160" on centers min.

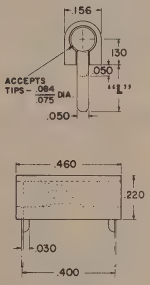
MECHANICAL DATA: Thermal shock, vibration, humidity, insulation resistance, and salt spray tests per MIL-STD-202B. Solderability per MIL-S-6872. Insertion and withdrawal force: 8 oz. min., 5 lbs. max. with .080" (±.001") dia. probe.

St. Pkg. 100

No.	NET per C
430	$15.00

ECONOMY TYPES

499	Spring—gold flash over .0002 silver.	$13.00
498	Spring—.0002 silver.	$12.00



PRINTED CIRCUIT
ACCESSORIES
PAGES 2•849-2•851

MILITARY TYPES

MADE TO MEET MIL-C-39024/11A

BODY: MOLDED NYLON, Per MIL-P-17091. 10 Colors, specify color, as coded.

SPRING: Beryllium Copper, Per QQ-C-533.

FINISH: Gold Plate, per MIL-G-45204, Class I, Type 2. Nickel underplate, per QQ-N-290, Class I, Type 7, .0002" thick.

MOUNTING: Mounts in .052" dia. holes on .400" centers. Board thickness as specified below. Can be spaced side-by-side .160" on centers minimum.

MECHANICAL DATA: Thermal shock, vibration, humidity, insulation resistance, salt spray per MIL-STD-202B. All mechanical Tests per applicable section of MIL-C-39024. Insertion force 30 oz. Max., withdrawal force 3 oz. min., with .080" (.001") probe.

RATINGS: Operating voltage 1500 volts, 60 cps RMS, sea level. 350 volts, 60 cps RMS at 50,000 feet. 5 amps. AC max. current rating. Contact resistance 20 millivolt drop max. At specified current, at 25° C.

Std. Pkg. 100

"L" DIMENSION 0.130

For boards up to 1⁄16" thick, MIL-C-39024/11-01 thru -10

No.	NET Per C
325	$15.00

"L" DIMENSION 0.219

For Boards up to ⅛" thick, MIL-C-39024/11-21 thru -30

No.	NET Per C
321	$15.00

ECONOMY TYPES

"L" DIMENSION 0.130

No.	Spring Plating	NET Per C
306	Gold flash over .0002 Silver	$13.00
359	.0002 Silver	$12.00

"L" DIMENSION 0.219

328	Gold flash .0002 Silver	$13.00
402	.0002 Silver	$12.00

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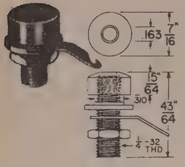
You'll find these SMITH products on the shelves of leading industrial Electronic Distributors, throughout the U.S.A. For your production runs, draw directly on our large plant inventories of standard components.

T'S SOUND PLANNING TO "**SPECIFY SMITH**" WHEN DESIGNING OR PURCHASING

SPECIFY SMITH INSULATED BANANA JACKS

STOCKED BY LEADING DISTRIBUTORS NATIONWIDE

INSULATED BANANA JACK



HEAD: MOLDED PHENOLIC plastic, Red, Black, Yellow, Green, Blue, White. SPECIFY COLOR

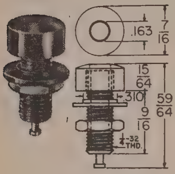
BODY: Brass, nickel plated.

RATING: 15 Amps AC for 10°C Temp. rise, continuous duty. 750 Volts 60 cycle AC continuous working voltage. CAPACITANCE 4.0 pf.

DESCR.: Supplied with hex nut, fibre washer, and brass tinned lug. Mounts in 5/16" hole in panels up to ⅜" thick. Accepts standard banana plugs. **Std. Pkg. 100**

No.	NET Per C
205	$20.00

INSULATED BANANA JACK With Turret Terminal



HEAD: MOLDED PHENOLIC plastic, Red, Black, Yellow, Green, Blue, White. SPECIFY COLOR

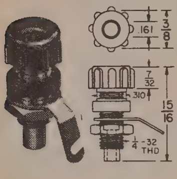
BODY: Brass, nickel plated.

RATING: 15 Amps AC for 10°C Temp. rise, continuous duty. 750 Volts 60 cycle AC continuous working voltage. CAPACITANCE 4.0 pf.

DESCR.: Supplied with hex nut & fibre washer. Mounts in 5/16" hole in panels up to 5/8" thick. Solder direct to turret terminal. Accepts standard banana plugs. **Std. Pkg. 100**

No.	NET Per C
256	$27.00

NYLON BANANA JACK



HEAD: MOLDED NYLON, per MIL-P-20693A. With molded nylon washer. Red, Black, Yellow, Green, Blue. SPECIFY COLOR

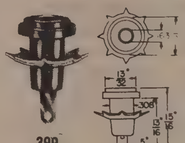
BODY: Brass, nickel plated.

RATING: 15 Amps AC for 10°C Temp. rise, continuous duty. 1 K Volts 60 cycle AC continuous working voltage. CAPACITANCE 4.0 pf.

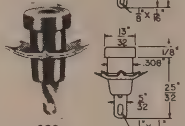
DESCR.: Extruded portion of head and washer provides excellent insulation from panel. Supplied with hex nut, brass tinned lug. Mounted in 5/16" hole in panels up to ¼" thick. Accepts standard banana plugs. **Std. Pkg. 100**

No.	NET Per C
221	$38.00

"SPEEDI-MOUNT" BANANA JACKS



399



398

BODY: MOLDED PHENOLIC plastic, Red, Black, Yellow, Green, Blue, White. SPECIFY COLOR

CONTACT: Brass, cadmium plated.

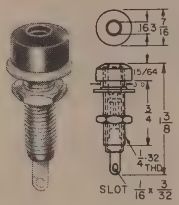
WASHER: Steel cadmium plated, internal and external tooth.

RATING: 12 Amps AC for 10°C Temp. rise, continuous duty. 3 K Volts 60 cycle AC continuous working voltage. CAPACITANCE 4.0 pf.

DESCR.: Unusual dished lockwasher permits fast assembly. Teeth embed into jack and panels, prevent pulling out and turning. Mounts in 5/16" hole in panels up to 3/16" thick. Accepts standard banana plug. **Std. Pkg. 100**

No.	Description	NET Per C
398	Small Head 13/32" Dia.	$10.00
399	Large Head ½" Dia.	$10.00

INSULATED JACK *Combination Type*



HEAD: MOLDED PHENOLIC plastic, Red, Black, Yellow, Green, Blue, White. SPECIFY COLOR

BODY: Brass, nickel plated.

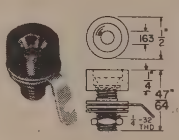
SPRING: Phosphor bronze.

CONTACT: 12 Amps AC for 10°C Temp. rise, continuous duty. 750 Volts 60 cycle AC continuous working voltage. CAPACITANCE 4.0 mmfd.

DESCR.: Supplied with hex nut & fibre washer. Accepts standard phone tip plugs or standard banana plugs. Mounts in 5/16" hole in panels up to ½" thick. **Std. Pkg. 100**

No.	NET Per C
206	$32.00

INSULATED BANANA JACK



HEAD: MOLDED PHENOLIC plastic, Red, Black, Yellow, Green, Blue, White. SPECIFY COLOR

BODY: Brass, nickel plated.

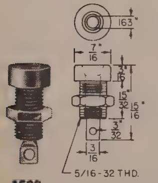
RATING: 15 Amps AC for 10°C Temp. rise, continuous duty. 750 Volts 60 cycle AC continuous working voltage. CAPACITANCE 4.0 pf.

DESCR.: Supplied with hex nut, fibre washer, lockwasher and brass tinned lug. Mounts in 5/16" hole in panels up to ⅜" thick. Jack body recessed for snug contact. Accepts standard banana plugs. **Std. Pkg. 100**

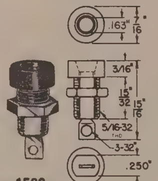
No.	NET Per C
219	$28.00

NYLON BANANA JACKS

PIERCED TERMINAL



1508



1509

BODY: MOLDED NYLON, per MIL-P-20693A.

COLORS: Available in White, Red, Black, Green, Blue, Orange, Yellow, Brown, Purple and Grey. Specify color as coded above.

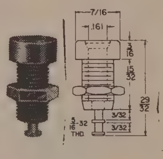
CONTACT: Brass, Cadmium plated.

RATING: 15 Amps AC for 10°C Temp. rise, continuous duty. 1 K Volts 60 cycle AC continuous working voltage. CAPACITANCE 5.0 pf.

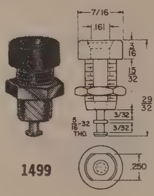
DESCR.: Mounts in 5/16" hole in panels up to 5/16" thick. Accepts standard banana plugs. Wide temperature and humidity range. **Std. Pkg. 100**

No.	Body	NET Per C
1508	Full-Round	$15.00
1509	"Double-D"	$15.00

TURRET TERMINAL



1498



1499

BODY: MOLDED NYLON, Per MIL-P-20693A.

COLORS: Available in 10 colors as coded above. Specify color by adding color code suffix to basic catalog number.

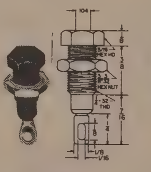
CONTACT: Brass, electro-tin plated.

RATING: 15 Amps. A.C. for 10° C. Temp. rise, continuous duty. 1 Kv., 60 cycle A.C. continuous Working Voltage. Capacitance 5.0 Pf.

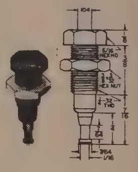
DESCR.: Mounts in 5/16" hole in panels up to 5/16" thick. Accepts standard banana plugs. One-piece turret terminal contact allows sealed panel entry hole. **Std. Pkg. 100**

No.	Body	NET Per C
1498	Full-Round	$18.00
1499	"Double-D"	$18.00

MINIATURE



1458



1459

BODY: MOLDED NYLON, per MIL-P-20693A.

COLORS: Avaliable in 10 colors as coded above. Specify color by adding color code suffix to basic catalog number.

CONTACT: Brass, gold washed.

RATING: 10 Amps. AC for 10° C. Temp. rise, continuous duty. 2 KV 60 cycle AC continuous working voltage. Capacitance 3.0 pf.

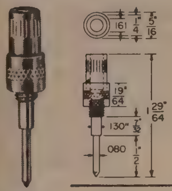
DESCR.: Mounts in ¼" hole in panels up to ¼" thick. Accepts subminiature banana plugs. One-piece contact allows sealed panel entry hole. Hex head for ease in mounting. Recessed contact provides for full seating of plug with no exposed metal. **Std. Pkg. 100**

No.	Terminal	NET Per C
1458	Pierced	$33.00
1459	Turret	23.00

IT'S SOUND PLANNING TO **"SPECIFY SMITH"** WHEN DESIGNING OR PURCHASING

PHONE TIP PLUGS & JACKS & BANANA JACKS

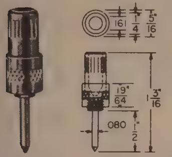
SPECIFY **SMITH**


.161
1/4
5/16
19/64
29/64
.130"
1/2
.080
1/2

SOLDERLESS TIP PLUG

BODY: Brass, nickel plated.
RATING: 12 Amps AC for 10°C Temp. rise, continuous duty.
DESCR.: Solderless; wire fits through body of tip then wraps around screw portion and is tightened with knurled collar. Force fit type. Fits standard phone tip jacks. **Std. Pkg. 100**

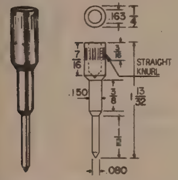
No.	Type	NET Per C
105	Senior	$21.00


.161
1/4
5/16
19/64
3/16
.080
1/2

SOLDERLESS TIP PLUG

BODY: Brass, nickel plated.
RATING: 12 Amps AC for 10°C Temp. rise, continuous duty.
DESCR.: Solderless; wire fits through body of tip then wraps around screw portion and is tightened with knurled collar. Force fit type. Fits standard phone tip jacks. **Std. Pkg. 100**

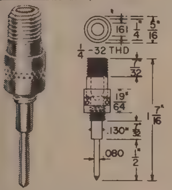
No.	Type	NET Per C
106	Junior	$21.00


.163
7/16
STRAIGHT KNURL
.150
3/8
13/32
1/2
.080

HEAVY DUTY TIP PLUG
Force-Fit

BODY: Brass, nickel plated.
RATING: 12 Amps AC for 10°C Temp. rise, continuous duty.
DESCR.: Extra large well for soldering. Rear of plug accepts standard banana plugs. Fits all standard phone tip jacks. **Std. Pkg. 100**

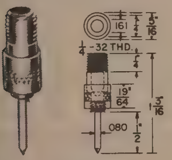
No.	Type	NET Per C
156	Force Fit	$21.00


.161
1/4
5/16
1/4-32 THD
3/32
19/64
7/16
.130"
1/2
.080
1/2

SOLDERLESS TIP PLUG
Threaded Sr.

BODY: Brass, nickel plated.
RATING: 12 Amps AC for 10°C Temp. rise, continuous duty.
DESCR.: Solderless; wire fits through body of tip, then wraps around screw portion and is tightened with knurled collar. Threaded for easy assembly in plastic handle. Fits standard phone tip jacks. **Std. Pkg. 100**

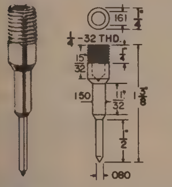
No.	Type	NET Per C
124	Senior	$21.00


.161
3/16
1/4-32 THD.
19/64
3/16
.080
1/2

SOLDERLESS TIP PLUG
Threaded Jr.

BODY: Brass, nickel plated.
RATING: 12 Amps AC for 10°C Temp. rise, continuous duty.
DESCR.: Solderless; wire fits through body of tip, then wraps around screw portion and is tightened with knurled collar. Threaded for easy assembly in plastic handle. Fits standard phone tip jacks. **Std. Pkg. 100**

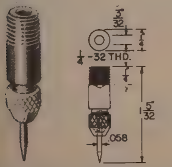
No.	Type	NET Per C
127	Junior	$21.00


.161
1/4-32 THD.
15/32
.150
11/32
1 3/8
1/2
.080

HEAVY DUTY TIP PLUG
Threaded

BODY: Brass, nickel plated.
RATING: 12 Amps AC for 10°C Temp. rise, continuous duty.
DESCR.: Extra large well for soldering. Rear of plug accepts standard banana plugs. Fits standard phone tip jacks. Threaded for easy assembly in plastic handle. **Std. Pkg. 100**

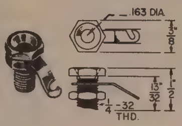
No.	Type	NET Per C
125	Threaded	$21.00


3/32
1/4-32 THD.
1 5/32
.058

NEEDLE TIP AND CHUCK

BODY: Brass, nickel plated.
NEEDLE: Steel, nickel plated.
RATING: 12 Amps AC for 10°C Temp. rise, continuous duty.
DESCR.: Removable chuck for easy replacement. Needle pierces plating or corrosion for positive reading. **Std. Pkg. 100**

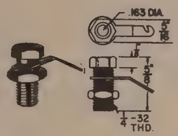
No.	NET Per C
128	$30.00


.163 DIA.
3/8
13/32
1/2
1/4-32 THD.

BANANA JACK

BODY: Hex brass nickel plated with recessed head.
RATING: 15 Amps AC for 10°C Temp. rise, continuous duty.
DESCR.: Supplied with hex nut and brass tinned lug. Mounts in ¼" hole; fits panels up to 5/16" thick. Accepts standard banana plugs. **Std. Pkg. 100**

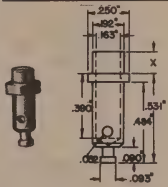
No.	NET Per C
101	$19.00


.163 DIA
5/16
1/4-32 THD.

BANANA JACK

BODY: Hex brass, nickel plated.
RATING: 15 Amps AC for 10°C Temp. rise, continuous duty.
DESCR.: Supplied with hex nut and brass tinned lug. Mounts in ¼" hole in panels up to ⅜" thick. Accepts standard banana plugs. **Std. Pkg. 100**

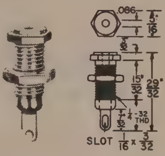
No.	NET Per C
109	$19.00


.250"
.192"
.163"
X
.380
.531"
.484
.062
.080
.093"

PANEL MOUNT BANANA JACK

BODY: BRASS, nickel plated.
RATING: 15 Amps AC for 10°C Temp. rise, continuous duty.
DESCR.: Accepts all standard banana plugs. These jacks are riveted directly to chassis or bakelite board **Std. Pkg. 100**

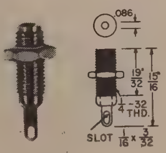
No.	"X" Dim.	Panel	NET Per C
2079	.105	1/16"	$15.00
2080	.135	3/32"	$15.00
2081	.165	1/8"	$15.00


.086
5/16
15/32
29/32
1/4-32 THD
SLOT 1/16 x 3/32

PHONE TIP JACK

BODY: Brass, nickel plated.
CONTACT Phosphor bronze.
RATING: 15 Amps AC for 10°C Temp. rise, continuous duty.
DESCR.: Positive contact with standard phone tip plugs. Supplied with hex nut. Mounts in ¼" hole in panels up to ⅜" thick. **Std. Pkg. 100**

No.	NET Per C
107	$28.00

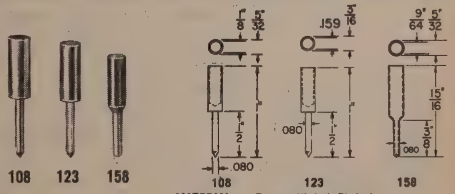

.086
19/32
15/16
1/4-32 THD.
SLOT 1/16 x 3/32

HEADLESS PHONE TIP JACK

BODY: Brass, nickel plated.
CONTACT: Phosphor bronze.
RATING: 15 Amps AC for 10°C Temp. rise, continuous duty.
DESCR.: Supplied with hex nut. Used with plastic molded instrument cases, where jack body is screwed into case. Accepts standard phone tip plugs. **Std. Pkg. 100**

No.	NET Per C
147	$17.00

SOLDER TYPE PHONE TIPS


108
123
158
1/8
5/32
.159
3/16
9/64
5/32
15/16
1/2
.080
1/2
.080
3/8
.080
108
123
158

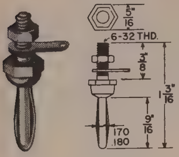
MATERIAL: Brass, Nickel Plated
RATING: 12 Amps AC for 10°C Temp. rise, continuous duty.
Std. Pkg. 100

No.	Type	NET Per M
108	Standard	$55.00
123	Large I.D.	$65.00
158	Drawn	$20.00

IT'S SOUND PLANNING TO **"SPECIFY SMITH"** WHEN DESIGNING OR PURCHASING

SPECIFY SMITH BANANA PLUGS

STOCKED BY
LEADING
DISTRIBUTORS
NATIONWIDE



BANANA PLUG

BODY: HEX BRASS, nickel plated.

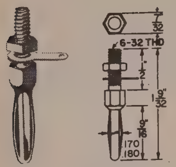
SPRING: Four-leaved phosphor bronze, nickel plated.

RATING: 15 Amps AC for 10°C Temp. rise, continuous duty.

DESCR.: Supplied with hex nut and phosphor bronze tinned lug. Threaded stud for panel mounting. Fits standard banana jacks.

Std. Pkg. 100

No.	NET Per C
102	$34.00



BANANA PLUG

BODY: HEX BRASS, nickel plated.

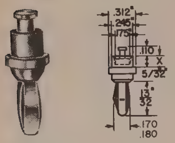
SPRING: Four-leaved phosphor bronze, nickel plated.

RATING: 15 Amps AC for 10°C Temp. rise, continuous duty.

DESCR.: Supplied with hex nut and phosphor bronze tinned lug. Threaded stud for panel mounting. Fits standard banana jacks.

Std. Pkg. 100

No.	NET Per C
103	$29.00



RIVET TYPE BANANA PLUG

Wrap Around Type

BODY: BRASS, nickel plated.

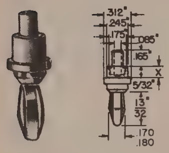
SPRING: Four leaved, beryllium copper, nickel plated.

RATING: 10 Amps AC for 10°C Temp. rise, continuous duty.

DESCR.: Rivets to panel or bakelite board. Wire wraps around stud and is then soldered.

Std. Pkg. 100

No.	"X" Dim.	Panel	NET Per C
2082	.105	1/16"	$33.00
2083	.135	3/32"	$33.00
2084	.165	1/8"	$33.00



Solder Well Type

BODY: BRASS, nickel plated.

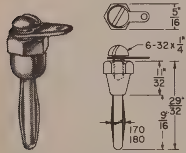
SPRING: Four-leaved beryllium copper, nickel plated.

RATING: 10 Amps AC for 10°C Temp. rise, continuous duty.

DESCR.: Rivets to panel or bakelite board. Wire solders to well in rear of plug.

Std. Pkg. 100

No.	"X" Dim.	Panel	NET Per C
2067	.105	1/16"	$33.00
2068	.135	3/32"	$33.00
2069	.165	1/8"	$33.00



BANANA PLUG

BODY: HEX BRASS, nickel plated.

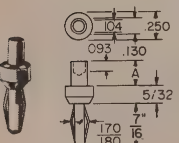
SPRING: Four-leaved phosphor bronze or beryllium copper, nickel plated.

RATING: 15 Amps AC for 10°C Temp. rise, continuous duty.

DESCR.: Supplied with screw & phosphor bronze tinned lug. Internal female permits use on all size panels. Fits standard banana jacks.

Std. Pkg. 100

No.	Spring Material	NET Per C
100	Phosphor Bronze	$33.00
190	Beryllium Copper	40.00



MIDGET BANANA PLUG

Rivet Type

BODY: Brass, silver plated.

SPRING: Four-leaved phosphor bronze, silver plated.

RATING: 10 Amps AC for 10°C Temp. Rise, continuous duty.

DESCR.: Rivet body can be flanged into countersunk hole in chassis for flush mount, or curled for thinner chassis plates.

St. Pkg. 100

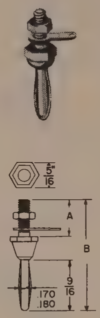
No.	Rivet Length "A"	NET Per C
121	7/32"	$22.00
143	3/16"	$22.00
139	1/8"	$22.00

MIL SPEC. TYPE

Same as above, but with Beryllium Copper spring, silver plated, made to meet Signal Corps Drawing SC-C-2231.

122	0.261	$25.00

No. 3875 Staking Tool for above plugs
NET Ea. $1.50



BANANA PLUG

BODY: HEX BRASS, nickel or silver plated.

SPRING: Phosphor bronze or beryllium copper. Nickel or silver plated.

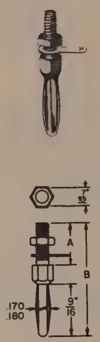
RATING: 15 Amps AC for 10°C Temp. rise, continuous duty.

DESCR.: Supplied with hex nut and tinned phosphor bronze lug. Threaded stud for panel mounting. Fits standard banana jacks.

Std. Pkg. 100

PHOS. BR. SPRING Nickel Plated Overall				BERYL. COP. SPRING Nickel Plated Overall	
No.	NET Per C	A	B	No.	NET Per C
431	$34.00	6-32x3/8"	1 3/16	443	$39.00
432	$37.00	6-32x1/2"	1 5/16	444	$42.00
433	$40.00	6-32x3/4"	1 9/16	445	$45.00
434	$34.00	8-32x3/8"	1 3/16	446	$39.00
435	$37.00	8-32x1/2"	1 5/16	447	$42.00
436	$40.00	8-32x3/4"	1 9/16	448	$45.00

PHOS. BR. SPRING Silver Plated Overall				BERYL. COP. SPRING Silver Plated Overall	
No.	NET Per C	A	B	No.	NET Per C
437	$37.00	6-32x3/8"	1 3/16	449	$42.00
438	$40.00	6-32x1/2"	1 5/16	450	$45.00
439	$43.00	6-32x3/4"	1 9/16	451	$48.00
440	$37.00	8-32x3/8"	1 3/16	452	$42.00
441	$40.00	8-32x1/2"	1 5/16	453	$45.00
442	$43.00	8-32x3/4"	1 9/16	454	$48.00



BANANA PLUG

BODY: HEX BRASS, nickel or silver plated.

SPRING: Phosphor bronze or beryllium copper. Nickel or silver plated.

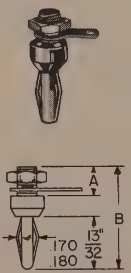
RATING: 15 Amps AC for 10°C Temp. rise, continuous duty.

DESCR.: Supplied with hex nut and tinned phosphor bronze lug. Threaded stud for panel mounting. Fits standard banana jacks.

Pkg. 100

PHOS. BR. SPRING Nickel Plated Overall				BERYL. COP. SPRING Nickel Plated Overall	
No.	NET Per C	A	B	No.	NET Per C
401	$28.00	6-32x3/8"	1 5/32	414	$31.00
403	$29.00	6-32x1/2"	1 9/32	415	$34.00
404	$33.00	6-32x3/4"	1 17/32	416	$39.00
405	$28.00	8-32x3/8"	1 5/32	417	$31.00
406	$29.00	8-32x1/2"	1 9/32	418	$34.00
407	$33.00	8-32x3/4"	1 17/32	419	$39.00

PHOS. BR. SPRING Silver Plated Overall				BERYL. COP. SPRING Silver Plated Overall	
No.	NET Per C	A	B	No.	NET Per C
408	$31.00	6-32x3/8"	1 5/32	420	$34.00
409	$32.00	6-32x1/2"	1 9/32	421	$37.00
410	$36.00	6-32x3/4"	1 17/32	422	$42.00
411	$31.00	8-32x3/8"	1 5/32	423	$34.00
412	$32.00	8-32x1/2"	1 9/32	424	$37.00
413	$36.00	8-32x3/4"	1 17/32	425	$42.00



MIDGET BANANA PLUG

BODY: BRASS, nickel or silver plated.

SPRING: Phosphor bronze or beryllium copper. Nickel or silver plated.

RATING: 10 Amps AC for 10°C Temp. rise, continuous duty.

DESCR.: Supplied with hex nut and tinned phosphor bronze lug. Threaded stud for panel mounting. Fits standard banana jacks.

Std. Pkg. 100

PHOS. BR. SPRING Nickel Plated Overall				BERYL. COP. SPRING Nickel Plated Overall	
No.	NET Per C	A	B	No.	NET Per C
460	$29.00	4-40x3/8"	15/16"	468	$33.00
461	$29.00	4-40x1/2"	1 1/16"	469	$33.00
462	$29.00	6-32x3/8"	15/16"	470	$33.00
463	$29.00	6-32x1/2"	1 1/16"	471	$33.00

PHOS. BR. SPRING Silver Plated Overall				BERYL. COP. SPRING Silver Plated Overall	
No.	NET Per C	A	B	No.	NET Per C
464	$32.00	4-40x3/8"	15/16"	472	$36.00
465	$32.00	4-40x1/2"	1 1/16"	473	$36.00
466	$32.00	6-32x3/8"	15/16"	474	$36.00
467	$32.00	6-32x1/2"	1 1/16"	475	$36.00

IT'S SOUND PLANNING TO **"SPECIFY SMITH"** WHEN DESIGNING OR PURCHASING

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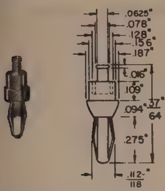
NATIONWIDE

MINIATURE BANANA PLUGS & JACKS

SPECIFY SMITH



MINIATURE BANANA PLUG

Rivet Type

BODY: BRASS, silver plated.

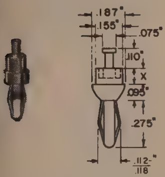
SPRING: Four leaved beryllium copper, silver plated.

RATING: 10 Amps AC for 10°C Temp. rise, continuous duty

DESCR.: One piece beryllium copper spring insures positive and lasting contact. **Std. Pkg. 100**

No.	NET Per C
191	$21.00

No. 3876 Staking Tool Kit Net Ea. $3.00



MINIATURE BANANA PLUG

Rivet Type

BODY: BRASS, silver plated.

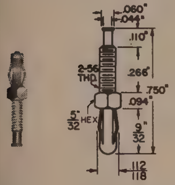
SPRING: Four leaved beryllium copper, silver plated.

RATING: 10 Amps AC for 10°C Temp. rise, continuous duty

DESCR.: One piece beryllium copper spring insures positive and lasting contact. **Std. Pkg. 100**

No.	"X" Dim.	Panel	NET Per C
2073	.105	1/16"	$21.00
2074	.135	3/32"	$21.00
2075	.165	1/8"	$21.00

No. 3876 Staking Tool Kit Net Ea. $3.00



MINIATURE BANANA PLUG

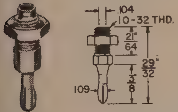
BODY: BRASS, silver plated.

SPRING: Four leaved beryllium copper, silver plated.

RATING: 10 Amps AC for 10°C Temp. rise, continuous duty

DESCR.: One piece beryllium copper spring insures positive and lasting contact. **Std. Pkg. 100**

No.	NET Per C
192	$30.00



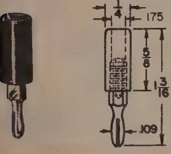
MINIATURE BANANA PLUG

BODY: BRASS, nickel plated.

RATING: 10 Amps AC for 10°C Temp. rise, continuous duty.

DESCR.: Cross-slotted, supplied with hex nut. Fits midget banana jacks. **Std. Pkg. 100**

No.	NET Per C
111	$17.00



INSULATED BANANA PLUG

Miniature

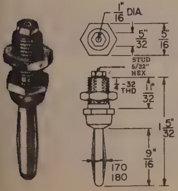
HANDLE: MACHINED BUTYRATE, per Fed. Spec. L-P344, Type I, class MH. Red, Black. SPECIFY COLOR

PLUG: Brass, nickel plated.

RATING: 10 Amps AC for 10°C Temp. rise, continuous duty

DESCR.: Cross-slotted for spring tension. Wire solders directly into plug. Fits standard midget banana jacks. **Std. Pkg. 100**

No.	NET Per C
197	$32.00



BANANA PLUG

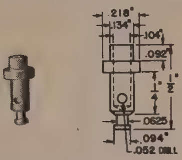
BODY: HEX BRASS, nickel plated.

SPRING: Phosphor bronze or beryllium copper, nickel plated.

RATING: 15 Amps AC for 10°C Temp. rise, continuous duty.

DESCR.: Supplied with hex nut. Wire can be soldered to brass stud or directly into plug itself. Stud also locks wire to plug for solderless connection. **Std. Pkg. 100**

No.	Spring Material	NET per C
145	Phosphor Bronze	$34.00
135	Beryllium Copper	$40.00



MINIATURE BANANA JACK

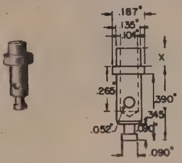
BODY: BRASS, silver plated.

RATING: 15 Amps AC for 10°C Temp. rise, continuous duty.

DESCR.: This jack is riveted directly to chassis or to printed circuit board for easy assembly. **Std. Pkg. 100**

No.	NET Per C
193	$15.00

No. 3860 Staking Tool Kit Net Ea. $3.00



MINIATURE BANANA JACK

Panel Mount

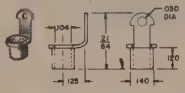
BODY: BRASS, silver plated.

RATING: 15 Amps AC for 10°C Temp. rise, continuous duty.

DESCR.: This jack is riveted directly to chassis or to printed circuit board for easy assembly. **Std. Pkg. 100**

No.	"X" Dim.	Panel	NET Per C
2076	.105	1/16"	$15.00
2077	.135	3/32"	$15.00
2078	.165	1/8"	$15.00

No. 3860 Staking Tool Kit Net Ea. $3.00



MINIATURE BANANA JACK

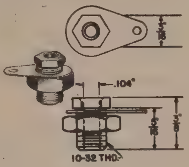
BODY: BRASS, silver plated.

RATING: 15 Amps AC for 10°C Temp. rise, continuous duty.

DESCR.: This jack is riveted directly to chassis or to printed circuit board for easy assembly. **Std. Pkg. 1000**

No.	NET Per M
194	$20.00

No. 3875 Staking Tool Net Ea. $1.50



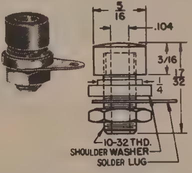
MINIATURE BANANA JACK

BODY: HEX BRASS, nickel plated.

RATING: 15 Amps AC for 10°C Temp. rise, continuous duty

DESCR.: Supplied with hex nut and tinned lug. Mounts in .196 (#10) hole in panels up to 1/8" thick. Accepts standard midget banana plugs. **Std. Pkg. 100**

No.	NET Per C
195	$20.00



INSULATED BANANA JACK

Sub Miniature

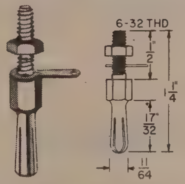
HEAD: MACHINED BUTYRATE, per Fed. Spec. L-P344, Type I, class MH. Red, Black. SPECIFY COLOR

BODY: Brass, nickel plated.

RATING: 15 Amps AC for 10°C Temp. rise, continuous duty. 750 Volts 60 cycle AC continuous working voltage. CAPACITANCE 6.0 pf.

DESCR.: Supplied with hex nut, fibre washer and tinned lug. Mounts in 1/4" hole in panels up to 1/8" thick. Accepts standard midget banana plugs. **Std. Pkg. 100**

No.	NET Per C
196	$40.00



BANANA PLUG

Split Type

BODY: HEX BRASS, nickel plated, cross-slotted.

RATING: 15 Amps AC for 10°C Temp. rise, continuous duty.

DESCR.: Fits all standard banana jacks. Supplied with hex nut and phosphor bronze lug. Threaded stud for panel mounting. Fits standard banana jacks. **Std. Pkg. 100**

No.	NET Per C
104	$22.00

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SPECIFY SMITH TELEPHONE PLUGS & JACKS

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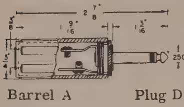
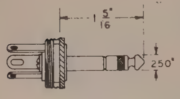
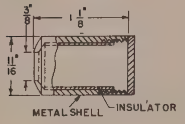


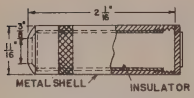
Barrel A Plug D



Plug E



Barrel B



Barrel C

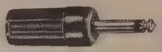
STANDARD PHONE PLUGS

BODY: Body, tip, and sleeve—Brass, nickel plated.

RATING: 5 Amps AC for 10°C Temp. rise, continuous duty. 750 Volts 60 cycle AC working voltage.

DESCR.: Fits standard phone jacks. Molded styrene separator insures maximum insulation between elements.

LUGS: 2 circuit plugs are screw terminals with ribbed clips and cord anchor. 3 circuit plugs are solder lugs. **Std. Pkg. 50**



Phenolic Barrel

BARREL: MOLDED PHENOLIC plastic, Red and Black. SPECIFY COLOR

Std. Pkg. 50

No.	Circuit	Terminals	Plug	Barrel	NET Per C
222	2	Screw	D	A	$ 75.00
227	3	Solder	E	A	102.00

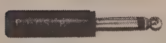
Shielded Barrel

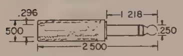
BARREL: BRASS, nickel plated with tubular insert.

Std. Pkg. 25

No.	Circuit	Terminals	Plug	Barrel	NET Per C
252	2	Screw	D	B	$ 99.00
272	2	Screw	D	C	102.00
228	3	Solder	E	B	147.00
238	3	Solder	E	C	150.00

PJ055 AND PJ068 PLUGS





BARREL: MOLDED plastic.

BODY: Body, tip, sleeve, machined brass.

TERM.: Brass, hot tinned.

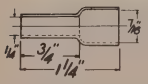
INSUL.: Ethyl cellulose type EM-1 per MIL-P3412.

RATING: Meets MIL Spec. JAN-P-642.

DESCR.: Designed especially for high quality communications equipment and to meet the exacting requirements of the armed services. Parts are assembled together in a mold, providing a finished plug with complete continuity of thermo plastic insulation between the tip rod and plug sleeve. **Std. Pkg. 25**

No.	Type	NET Per C
217	PJ055B	$245.00
247	PJ068B	355.00

TELEPHONE CORD SLEEVE



MATERIAL: Neoprene in accordance with Grade SC415AFF per MIL-R-3065. Black.

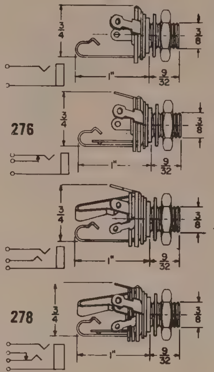
DESCR.: Used on Government cord assemblies for Strain Relief, Dust and Moisture Seal. **Std. Pkg. 100**

No.	NET Per C
748	$11.00

SPECIAL REQUIREMENTS?

Use our Engineering and Production Facilities to design and develop new products or modify existing components to meet your specific needs. "Specials are Standard with SMITH!"

TELEPHONE JACKS



BUSHING: BRASS, nickel plated.

INSUL.: Phenolic, type PBE-P per MIL-P-3115B.

SPRING: Nickel-Silver alloy, spring temper. New tapered design provides for ease of insertion while eliminating possibility of shorts.

SLEEVE TERM.: Brass, hot tinned.

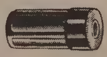
RATING: 10 Amps AC for 10°C Temp. rise, continuous duty. 1.2 K Volts 60 cycle AC continuous working voltage.

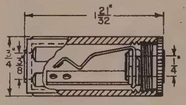
DESCR.: Notched insulating washers accurately locate all parts, and eliminate possibility of shorts and arc-over. Springs designed for firm, low-resistance electrical contact. Bushings 1/4" long, threaded 3/8"-32. Mounts in 3/8" hole in panels up to 5/32" thick. Overall diameter 7/8", requires 1" clearance behind panel. Supplied with 1/2" hex brass nut and 5/8" steel panel washer, all nickel plated. **Std. Pkg. 50**

No.	Circuit	NET Per C
275	Two Conductor Open	$42.00
276	Two Conductor Closed	50.00
277	Three Conductor Open	55.00
278	Three Conductor Closed	75.00

IN-LINE EXTENSION JACK

Phenolic Barrel





BARREL: MOLDED PHENOLIC plastic, Red and Black. SPECIFY COLOR

BODY: Brass, nickel plated.

RATING: 10 Amps AC for 10°C Temp. rise, continuous duty. 1 K Volts 60 cycle AC continuous working voltage.

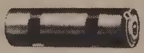
SPRING: Nickel, silver, special alloy, spring temper.

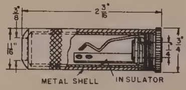
INSUL.: XXP PHENOLIC.

DESCR.: For microphone and Hi-Fi extension cords. Mates with standard phone plugs. **Std. Pkg. 25**

No.	Circuit	Terminals	NET Per C
274	2	Solder	$ 99.00
288	2	Screw	108.00

Shielded Barrel





BARREL: Brass, nickel plated, with tubular insulator.

BODY: Brass, nickel plated.

RATING: 10 Amps AC for 10°C Temp. rise, continuous duty. 1 K Volts 60 cycle AC continuous working voltage.

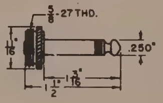
SPRING: Nickel, silver, special alloy, spring temper.

INSUL.: XXP PHENOLIC.

DESCR.: For microphone and Hi-Fi extension cords. Mates with standard phone plugs. **Std. Pkg. 25**

No.	Circuit	Terminals	NET Per C
273	2	Solder	$132.00
289	2	Screw	144.00

PHONE PLUG ADAPTER



BODY: Body, tip, sleeve—Brass, nickel plated.

INSUL XXXP PHENOLIC.

RATING: 5 Amps AC for 10°C Temp. rise, continuous duty. 750 Volts 60 cycle AC continuous working voltage.

DESCR.: Assembled to insure positive contact with input wire of mating microphone connector. Molded styrene separator insures maximum insulation between conductors. Mates with No. 116 microphone connector. Fits standard phone jacks. **Std. Pkg. 25**

No.	NET Per C
113	$47.00

USE OUR MOLDING AND SCREW MACHINE FACILITIES for variations and for special parts which we will be happy to manufacture TO YOUR SPECIFICATIONS!

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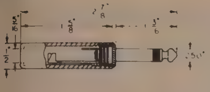
TELEPHONE PLUGS & JACKS SPECIFY SMITH



Barrel G Plug F

SLIM PHONE PLUGS

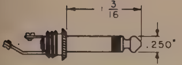
BODY: Body, tip, and sleeve -Brass, nickel plated.

RATING: 5 Amps AC for 10°C Temp. rise, continuous duty. 750 Volts 60 cycle AC continuous working voltage.

DESCR.: Fits standard phone jacks. Molded styrene separator insures maximum insulation between elements. **Std. Pkg. 50**

Phenolic Barrel

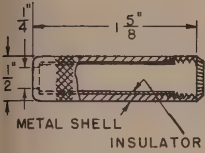
BARREL: MOLDED PHENOLIC plastic, Red and Black. SPECIFY COLOR



Plug H

No.	Circuit	Terminals	Plug	Barrel	NET Per C
225	2	Solder	F	G	$ 72.00
307	2	Screw	H	G	75.00

Shielded Barrel



Barrel J

BARREL: BRASS, nickel plated with tubular insert.

Std. Pkg. 25

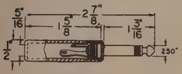
No.	Circuit	Terminals	Plug	Barrel	NET Per C
226	2	Solder	F	J	$102.00
316	2	Screw	H	J	105.00

ECONOMY TYPE

DESCR.: An inexpensive modified version of our popular #225 and 226 plugs shown above. Features two small solder lugs. **Std. Pkg. 50**

Phenolic Barrel

BARREL: MOLDED PHENOLIC plastic, Red and Black. SPECIFY COLOR **Std. Pkg. 50**



Plug O

No.	Circuit	Terminals	Plug	Barrel	NET Per C
320	2	Solder	O	G	$60.00

Shielded Barrel

Std. Pkg. 25

BARREL: BRASS, nickel plated with tubular insert. **Std. Pkg. 50**

No.	Circuit	Terminals	Plug	Barrel	NET Per C
330	2	Solder	O	J	$75.00

MINIATURE PHONE PLUG

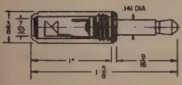
BARREL: MOLDED plastic. Black.

BODY: Body, tip, sleeve—Brass, nickel plated.

TERM.: Brass, hot tin dipped.

RATING: 5 Amps AC for 10°C Temp. rise, continuous duty. 350 Volts 60 cycle AC continuous working voltage.

DESCR.: Designed for use with small radios, tape recorders, etc. Solder terminals. **Std. Pkg. 50**



No.	Circuit	NET Per C
480	Two Conductor	$85.00

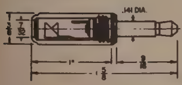
Shielded Barrel

BARREL: BRASS, nickel plated with tubular insulator.

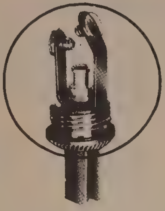
BODY: Body, tip, sleeve—Brass, nickel plated.

RATING: 5 Amps AC for 10°C Temp. rise, continuous duty. 350 Volts 60 cycle AC continuous working voltage.

DESCR.: Designed for use with small radios, tape recorders, etc. Solder terminals. **Std. Pkg. 25**



No.	Circuit	NET Per C
481	Two Conductor	$120.00



IMPROVED "TURRET-CENTER" STYLE

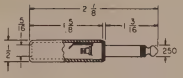
BODY: Body, Tip, Ring, and sleeve — Brass, nickel plated.

RATING: 5 Amps AC for 10°C Temp. rise, continuous duty. 1.5 KV 60 cycle AC continuous working voltage.

DESCR.: New, improved construction has coaxial "turret-terminal" tip lug and widely separated contacts for maximum voltage ratings. Styrene separator, Mylar sleeves, and Nylon bushings used for increased performance. Fits standard phone jacks. **Std. Pkg. 50**

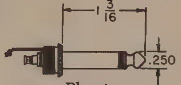
Phenolic Barrel

BARREL: MOLDED PHENOLIC plastic, Red and Black. SPECIFY COLOR

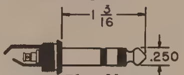


Barrel G Plug K

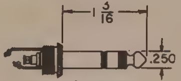
No.	Circuit	Terminals	Plug	Barrel	NET Per C
171	2	Solder	K	G	$ 77.00
172	2	Screw	L	G	80.00
308	3	Solder	M	G	117.00
309	3	Screw	N	G	120.00



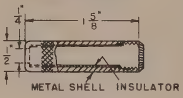
Plug L



Plug M



Plug N



Barrel J

Shielded Barrel

BARREL: BRASS, nickel plated with tubular insert.

Std. Pkg. 25

No.	Circuit	Terminals	Plug	Barrel	NET Per C
173	2	Solder	K	J	$107.00
174	2	Screw	L	J	110.00
311	3	Solder	M	J	135.00
312	3	Screw	N	J	138.00

MINIATURE TELEPHONE JACKS

BUSHING: BRASS, nickel plated.

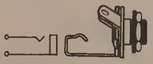
INSUL.: XXXP Phenolic, type PBE-P per MIL-P-3115A.

SPRING: Nickel silver alloy, spring temper.

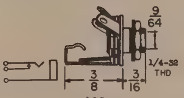
TERM.: Brass, hot tinned.

RATING: 5 Amps AC for 10°C Temp. rise, continuous duty. 500 Volts 60 cycle AC continuous working voltage.

DESCR.: Notched insulation washers interlock springs and lugs, eliminate possibility of shifting which result in electrical shorts. Springs firmly hold mating plug. Supplied with hex brass nut and steel mounting washer, all nickel plated. **Std. Pkg. 50**



482



483

No.	Circuit	NET Per C
482	Two Conductor, Open	$50.00
483	Two Conductor, Closed	55.00

MINIATURE EXTENSION JACK

Shielded

BARREL: Brass, nickel plated.

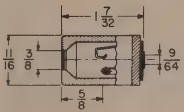
BODY: Brass, nickel plated.

SPRING: Nickel silver alloy, spring temper.

INSUL.: Phenolic.

RATING: 5 Amps AC for 10°C Temp. rise, continuous duty. 500 Volts 60 cycle AC continuous working voltage.

DESCR.: Mates with Miniature Phone Plugs. **Std. Pkg. 25**



No.	Circuit	Terminals	NET Per C
487	2	Solder	$135.00

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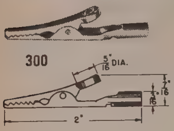
SPECIFY SMITH ALLIGATOR & BATTERY CLIPS



300

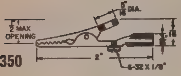
ALLIGATOR CLIPS

RATING: 5 Amps AC for 10°C Temp. rise, continuous duty.

DESCR.: ½" jaw opening. Jaws match accurately and grip securely, accepts standard banana plug in rear. **Std. Pkg. 100**

Solder Connection

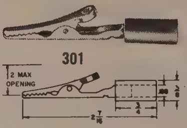
No.	Type	NET Per C
300	Steel, Cad. Pl	$ 7.10
380	Solid Copper	9.60
332	Brass N.P.	11.50



350

Screw Connection

No.	Type	NET Per C
350	Steel, Cad. Pl.	$ 8.10
360	Solid Copper	12.20
339	Brass N.P.	13.80



301

INSULATED ALLIGATOR CLIPS

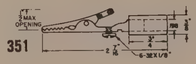
HANDLE: MOLDED BUTYRATE, per Fed. Spec. L-P349A, Type 3, Class MS. Red and Black. SPECIFY COLOR

RATING: 5 Amps AC for 10°C Temp. rise, continuous duty.

DESCR.: ½" jaw opening. Jaws match accurately and grip securely, accepts standard banana plug in rear. **Std. Pkg. 100**

Solder Connection

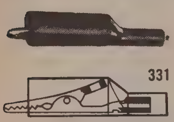
No.	Type	NET Per C
301	Steel, Cad. Pl.	$10.30
381	Solid Copper	12.00
354	Brass N.P.	13.80



351

Screw Connection

No.	Type	NET per C
351	Steel, Cad. Pl.	$10.80
361	Solid Copper	16.00
362	Brass N.P.	16.00



331

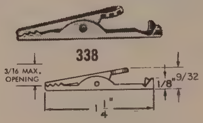
ALLIGATOR CLIP BOOTS

MATERIAL: MOLDED VINYL PLASTIC, Red, Black, Yellow, Green, Blue or White. SPECIFY COLOR

RATING: 1 K Volts 60 cycle AC continuous working voltage.

DESCR: Fully insulates clip while allowing maximum jaw opening. **Std. Pkg. 100**

No.	Type	For Clip Length	NET Per C
331	Standard	2"	$3.70
389	Midget	1¼"	2.90



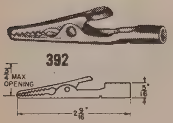
338

MINIATURE ALLIGATOR CLIP

RATING: 1 Amp AC for 10° C Temp. rise, continuous duty.

DESCR.: 3/16" jaw opening, jaws match accurately and grip securely. Unique SMITH spring construction. Solder connection and ears for crimping. **Std. Pkg. 100**

No.	Type	NET per C
338	Steel, Cad. Pl.	$5.50
367	Copper	6.80



392

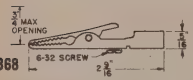
JUMBO ALLIGATOR CLIPS

RATING: STEEL: 10 Amps AC for 10°C Temp. rise, continuous duty. COPPER: 15 Amps AC for 10°C Temp. rise, continuous duty.

DESCR: ¾" jaw opening. Jaws match accurately. For heavy terminal use. **Std. Pkg. 100**

Solder Connection

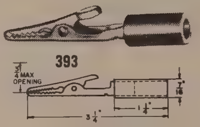
No.	Type	NET Per C
392	Steel, Cad. Pl.	$19.00
396	Solid Copper	22.70



368

Screw Connection

No.	Type	NET per C
368	Steel, Cad. Pl.	$22.70
356	Solid Copper	27.70



393

INSULATED JUMBO ALLIGATOR CLIPS

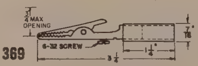
HANDLE: MACHINED BUTYRATE, per MIL-P-10408A, Type I, Class II. Red or Black. SPECIFY COLOR

RATING: STEEL: 10 Amps AC for 10°C Temp. rise, continuous duty. COPPER: 15 Amps AC for 10°C Temp. rise, continuous duty.

DESCR: ¾" jaw opening. Jaws match accurately. For heavy terminal use. **Std. Pkg. 25**

Solder Connection

No.	Type	NET per C
393	Steel, Cad. Pl.	$26.50
397	Solid Copper	31.60

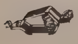


369

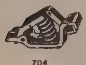
Screw Connection

No.	Type	NET per C
369	Steel, Cad. Pl.	$30.30
357	Solid Copper	35.60

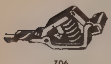
BATTERY CLIPS



701, 702, 703,



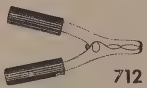
704



706

No.	Current Capacity	Spread Jaw	Length	Spring	Std. Pkg.	NET Per C
		STEEL, ELECTROPLATED				
365	5 Amp.	⅜"	1⅝"	7 lbs.	100	11.00
366	10 Amp.	9/16"	2"	10 lbs.	100	11.00
701	25 Amp.	1"	2½"	17 lbs.	10	20.00
702	50 Amp.	1½"	3⅞"	33 lbs.	5	30.00
704	100 Amp.	1⅜"	5"	40 lbs.	5	90.00
		SOLID COPPER				
703	50 Amp.	1"	2½"	17 lbs.	5	30.00
705	100 Amp.	1¼"	4¾"	33 lbs.	5	90.00
706	200 Amp.	1⅜"	5¾"	40 lbs.	5	170.00

SEE OUR STANDARD LINE OF ALLIGATOR CLIP TEST LEADS AND JUMPERS on pages 2•835 and 2•836. Contact us for your special requirements.

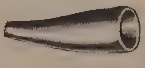


712

PLIER TYPE BATTERY CLIPS

Insulated Vinylite Handles, Red or Black. SPECIFY COLOR

No.	Amps.	Material	Overall Size	Std. Pkg.	NET Per C
712	35	Steel, Cop. Pl.	3¼"	5	$25.00
713	75	Steel, Cop. Pl.	4½"	5	35.00
714	100	Steel, Cop. Pl.	7½"	5	60.00
721	300	Solid Copper	7½"	5	180.00



BATTERY CLIP INSULATORS

Red or Black. SPECIFY COLOR

No.	Made to fit Smith Clip #	Material	Std. Pkg.	NET per C
331	365	Vinyl	100	3.70
710	704, 706	H.D. Rubber	10	75.00

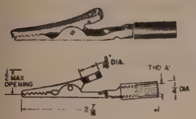
IT'S SOUND PLANNING TO **"SPECIFY SMITH"** WHEN DESIGNING OR PURCHASING

ALLIGATOR CLIPS & ADAPTERS

SPECIFY SMITH

ALLIGATOR CLIP ADAPTERS

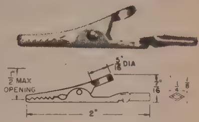
PHONE TIP TO ALLIGATOR CLIP



BUSHING: Brass, nickel plated.
CLIP: Steel cadmium plated.
RATING: 5 Amps AC for 10°C Temp. rise, continuous duty.
DESCR.: Adapts standard solderless tips to alligator clip. This novel quick-adapter is a must for all types of bench work.
Std. Pkg. 50

No.	Thd. "A"	NET Per C
310	10-32	$25.00
720	8-32	25.00

PHONE TIP TO ALLIGATOR CLIP

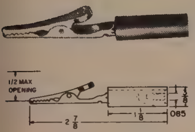


CLIP: Steel, cadmium plated.
RATING: 5 Amps AC for 10°C Temp. rise, Continuous duty.
DESCR.: ½″ jaw opening. Jaws match accurately and grip securely. Accepts standard phone tip in rear. Crimped for spring tension. **Std. pkg. 100**

No.	Type	NET Per C
333	Steel, Cad. Pl.	$10.30

INSULATED ALLIGATOR CLIP ADAPTERS

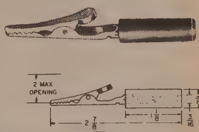
PHONE TIP TO ALLIGATOR CLIP



HANDLE: MOLDED BUTYRATE, per Fed. Spec. L-P349A, Type 3, Class MS. Red and Black.
SPECIFY COLOR
CLIP: Steel, cadmium plated or solid copper.
BODY: Brass.
CONTACT: Phosphor bronze.
RATING: 5 Amps AC for 10°C Temp. rise, continuous duty.
DESCR.: Jack in rear permits adapting standard phone tip plug to alligator clips.
Std. Pkg. 50

No.	Type	NET per C
304	Steel Clip	$40.00
334	Copper Clip	44.00

PHONE TIP OR BANANA PLUG TO ALLIGATOR CLIP

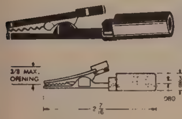


HANDLE: MOLDED BUTYRATE, per Fed. Spec. L-P349A, Type 3, Class MS. Red and Black.
SPECIFY COLOR
CLIP: Steel, cadmium plated or solid copper.
BODY: Brass.
CONTACT: Phosphor bronze.
RATING: 5 Amps AC for 10°C Temp. rise, continuous duty.
DESCR.: Combination jack in rear, permits the adapting standard phone tip plug or banana plug to alligator clip. **Std. Pkg. 50**

No.	Type	NET Per C
305	Steel Clip	$47.00
335	Copper Clip	51.00

ALL INSULATED ADAPTER

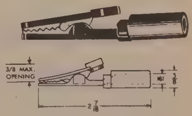
PHONE TIP TO ALLIGATOR CLIP



INSULA.: MOLDED BUTYRATE, per Fed. Spec. L-349A, Type 3, Class MS. Red or Black.
SPECIFY COLOR
CLIP: Steel, cadmium plated.
BODY: Brass.
CONTACT: Phosphor bronze.
RATING: 5 Amps AC for 10°C Temp. rise, continuous duty.
DESCR.: All metal parts fully insulated with molded plastic. Insures against shock or grounding. Jack in rear permits adapting standard phone tip plugs to alligator clips.
Std. Pkg. 50

No.	NET per C
336	$43.00

ALL INSULATED ALLIGATOR CLIP

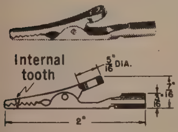


INSULA.: MOLDED BUTYRATE, per Fed. Spec. L-349A, Type 3, Class MS. Red or Black.
SPECIFY COLOR
CLIP: Steel cadmium plated.
RATING: 5 Amps AC for 10°C Temp. rise, continuous duty. 1 K Volts 60 cycle AC continuous working voltage.
DESCR.: All metal parts fully insulated with molded plastic. Insures against shock or grounding. Solder type connection.
Std. Pkg. 50

No.	NET Per C
337	$29.00

INSULATION PIERCING CLIPS

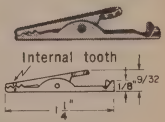
STANDARD



CLIP: Steel, cadmium plated.
RATING: 5 Amps AC for 10° C Temp. rise, continuous duty.
DESCR: 1/2″ jaw opening. Jaws match accurately and grip securely. Internal tooth for piercing wire insulation. Accepts standard banana plug in rear.
Std. Pkg. 100

No.	NET per C
347	$15.00

MINIATURE



CLIP: Steel, cadmium plated.
RATING: 1 Amp AC for 10° C Temp. rise, continuous duty.
DESCR: 3/16″ jaw opening. Jaws match accurately and grip securely. Internal tooth for piercing wire insulation. Solder connection and ears for crimping.
Std. pkg. 100

No.	NET per C
326	$10.00

You'll find these SMITH products on the shelves of leading industrial Electronic Distributors, throughout U.S.A. For your production runs, draw directly on our large plant inventories of standard components.

SPECIAL REQUIREMENTS?

Use our Engineering and Production Facilities to design and develop new products or modify existing components to meet your specific needs.

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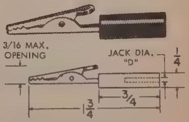
MINIATURE ALLIGATOR CLIP ADAPTERS



HANDLE: MOLDED BUTYRATE, Per Fed. Spec. L-P-349-A, Type 3, Class MS, Red or Black.
SPECIFY COLOR
CONTACT: Beryllium Copper (Tip Jack only).
RATING: 1 Amp for 10°C Temp. rise, cont. duty.
DESCR.: Jack in rear adapts miniature alligator clip to phone tip plug, miniature banana plug or standard banana plug. **Std. Pkg. 50**

No.	Type	Jack Dia. "D"	NET per
STEEL, CADMIUM PLATED			
1320	Tip Plug	.080″	$39.00
1321	Min. Banana Jack	.104″	39.00
1322	Std. Banana Jack	.161″	39.00
COPPER			
1323	Tip Plug	.080″	$44.00
1324	Min. Banana Jack	.104″	44.00
1325	Std. Banana Jack	.161″	44.00

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SPECIFY SMITH

TEST PRODS

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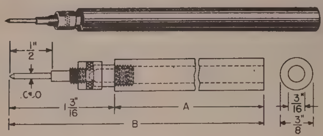


SOLDERLESS TEST PROD—*Threaded Type*

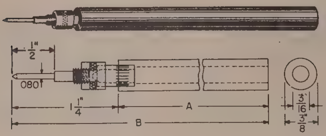
HANDLE: MOLDED BUTYRATE, per Fed. Spec. L-P349A, Type 3, Class MS. Red or Black. SPECIFY COLOR

PLUG: Brass, nickel plated.

RATING: 12 Amps AC for 10°C Temp. rise, continuous duty.

DESCR.: Solderless: Wire fits through handle and body of plug, then wraps around screw portion and is tightened with knurled collar. **Std. Pkg. 25**

No.	Handle (A)	Overall (B)	NET Per C
302	4"	5¼"	$33.00
303	5½"	6¾"	36.00



SOLDERLESS TEST PROD—*Force Fit Type*

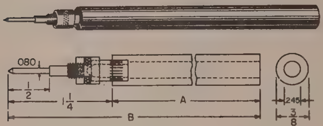
HANDLE: MOLDED BUTYRATE, per Fed. Spec. L-P349A, Type 3, Class MS. Red or Black. SPECIFY COLOR

PLUG: Brass, nickel plated.

RATING: 12 Amps AC for 10°C Temp. rise, continuous duty.

DESCR.: Solderless: Wire fits through handle and body of plug, then wraps around screw portion and is tightened with knurled collar. **Std. Pkg. 25**

No.	Handle (A)	Overall (B)	NET Per C
382	4"	5¼"	$33.00
383	5½"	6¾"	36.00



SOLDERLESS TEST PROD—*Force Fit Type*
Large Inside Diameter

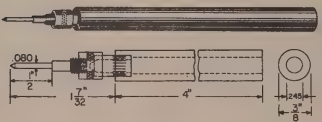
HANDLE: MOLDED BUTYRATE, per Fed. Spec. L-P349A, Type 3, Class MS. Red or Black. SPECIFY COLOR

PLUG: Brass, nickel plated.

RATING: 12 Amps AC for 10°C Temp. rise, continuous duty.

DESCR.: Solderless: Wire fits through handle and body of plug, then wraps around screw portion and is tightened with knurled collar. Extra large I.D. for heavy duty wire. **Std. Pkg. 25**

No.	Handle (A)	Overall (B)	NET Per C
352	4"	5¼"	$33.00
353	5½"	6¾"	36.00



SOLDERLESS FIBRE TEST PROD
Large Inside Diameter

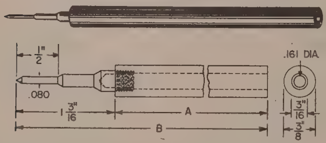
HANDLE: FIBRE, per MIL-F-1148A, Grade CH. Red or Black. SPECIFY COLOR

PLUG: Brass, nickel plated.

RATING: 12 Amps AC for 10°C Temp. rise, continuous duty.

DESCR.: Solderless: Wire fits through handle and body of plug, then wraps around screw portion and is tightened with knurled collar. Large I.D. permits use of heavy duty wire. **Std. Pkg. 25**

No.	NET Per C
323	$39.00



HEAVY DUTY TEST PROD—*Threaded Type*

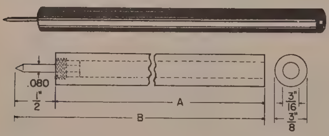
HANDLE: MOLDED BUTYRATE, per Fed. Spec. L-P349A, Type 3, Class MS. Red or Black. SPECIFY COLOR

PLUG: Brass, nickel plated.

RATING: 12 Amps AC for 10°C Temp. rise, continuous duty.

DESCR.: Large diameter well enables soldering of heavy duty wire directly into plug. Fits standard phone tip jacks. **Std. Pkg. 25**

No.	Handle (A)	Overall (B)	NET Per C
319	4"	5³⁄₁₆"	$33.00
329	5½"	6¹¹⁄₁₆"	36.00



SHORT TIP TEST PROD

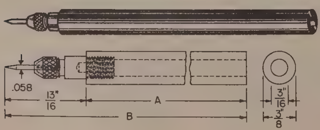
HANDLE: MOLDED BUTYRATE, per Fed. Spec. L-P349A, Type 3, Class MS. Red or Black. SPECIFY COLOR

PLUG: Brass, nickel plated.

RATING: 12 Amps AC for 10°C Temp. rise, continuous duty.

DESCR.: Inserts flush with insulated handle, no metal exposed; eliminates possibility of shock or grounding. Fits standard phone tip jacks. **Std. Pkg. 25**

No.	Handle (A)	Overall (B)	NET Per C
363	4"	4½"	$28.00
364	5½"	6"	31.00



PHONO NEEDLE TEST PROD

HANDLE: MOLDED BUTYRATE, per Fed. Spec. L-P349A, Type 3, Class MS. Red or Black. SPECIFY COLOR

PLUG: Brass, nickel plated.

RATING: 12 Amps AC for 10°C Temp. rise, continuous duty.

DESCR.: Removable chuck for easy replacement or broken needles. Needle pierces corrosion or plating for positive reading. **Std. Pkg. 25**

No.	Handle (A)	Overall (B)	NET Per C
317	4"	4¹³⁄₁₆"	$36.00
318	5½"	6⁵⁄₁₆"	42.00

IT'S SOUND PLANNING TO "**SPECIFY SMITH**" WHEN DESIGNING OR PURCHASING

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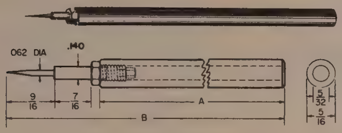
TEST PRODS

SPECIFY SMITH



SOLDERLESS PHONO NEEDLE TEST PROD

HANDLE: XXXP Phenolic lacquered, per MIL-P-79, Form TR. Red or Black. SPECIFY COLOR

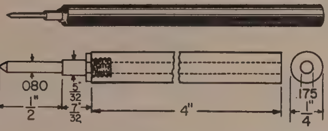
PLUG: Brass, nickel plated.

NEEDLE: Phono needle, steel.

RATING: 12 Amps AC for 10°C Temp. rise, continuous duty.

DESCR.: Wire can be soldered to brass stud or directly into plug itself. Stud also locks wire to pellet for solderless connections. **Std. Pkg. 25**

No.	Handle (A)	Overall (B)	NET Per C
314	4"	5 3/32"	$83.00
313	6"	7 3/32"	90.00



MINIATURE TEST PROD

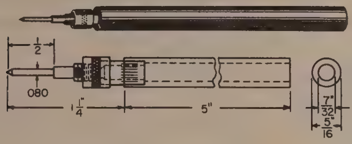
HANDLE: FIBRE, per MIL-F-1148A, Grade CH. Red or Black. SPECIFY COLOR

PLUG: Brass, nickel plated.

RATING: 12 Amps AC for 10°C Temp. rise, continuous duty.

DESCR.: Threaded for easy assembly ideally suited for checking all types sub-miniature equipment. **Std. Pkg. 25**

No.	NET Per C
322	$39.00



PENCIL TYPE SOLDERLESS TEST PROD

Force Fit Type

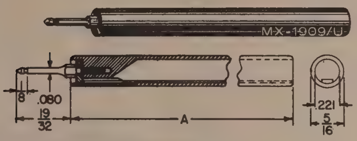
HANDLE: MACHINED BUTYRATE, per MIL-P-10408A, Type I, Class 2. Red or Black. SPECIFY COLOR

PLUG: Brass, nickel plated.

RATING: 12 Amps AC for 10°C Temp. rise, continuous duty.

DESCR.: Solderless: Wire fits through handle and body of plug, then wraps around screw portion and is tightened with knurled collar. **Std. Pkg. 25**

No.	NET Per C
384	$33.00



NYLON HANDLE PRODS & TIPS

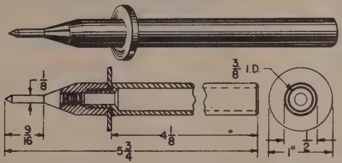
HANDLE: MOLDED NYLON, per MIL-P-20693A. Red or Black. SPECIFY COLOR

TIP: Brass, silver plated.

RATING: 10 Amps AC for 10°C Temp. rise, continuous duty.

DESCR.: Solderless. Made to meet Signal Corps Drawing SC-C-82761. **Std. Pkg. 25**

No.	Sig. Corps. Part No.	Size ("A")	Color	NET Per C
176	MX-1906/U	1"	Red	$40.00
177	MX-1907/U	1"	Black	40.00
178	MX-1909/U	4"	Red	50.00
179	MX-1910/U	4"	Black	50.00



TEST PROBE High Voltage Type

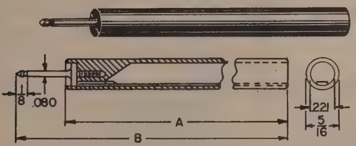
HANDLE: FIBRE, per MIL-F-1148A, Grade CH. Red or Black. SPECIFY COLOR

PROBE: Brass, nickel plated.

RATING: 12 Amps. AC for 10°C Temp. rise, continuous duty. 15 KV 60 cycle AC continuous working voltage.

DESCR.: Heavy insulated fibre probe with flash-over shield for high-voltage applications. Large internal I.D. accomodates shielded cable or R.F. networks. Heavy duty removable tip. **Std. Pkg. 10**

No.	NET per C
630	$125.00



MINIATURE TIP PLUG AND TEST PROD

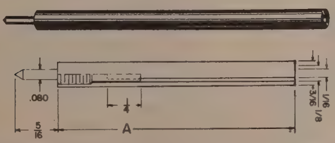
HANDLE: Molded Nylon, per MIL-P-20693A. Available in Red or Black. SPECIFY COLOR

TIP: Brass, Silver plated.

RATING: 10 Amps AC for 10°C Temp. rise, continuous duty.

DESCR.: Solderless assembly. Ideal for use with sub-miniature printed-circuit tip jacks. Sharp tip breaks flux or oxide coating on printed-circuit pattern for positive contact when used as prod. Grooved head or prod makes positive contact when laid across wires. Fits all standard .080" tip jacks.

No.	Std. Pkg.	Handle (A)	Length (B)	NET Per C
348	100	1 inch	1-5/16"	$40.00
349	25	4 inches	4-5/16"	50.00



MINIATURE TIP PLUG AND TEST PROD

HANDLE: MACHINED BUTYRATE, per Mil-P-10408A, Type I, Class II, Red or Black. SPECIFY COLOR.

PLUG: Brass, nickel plated.

RATING: 2 Amps AC for 10°C Temp. rise, continuous duty.

DESCR.: Ideally suited for checking sub-miniature equipment. Fits standard phone tip jacks.

No.	Std. Pkg.	Length (A)	NET Per C
244	100	¾"	$20.00
666	25	3"	33.00

IT'S SOUND PLANNING TO "**SPECIFY SMITH**" WHEN DESIGNING OR PURCHASING

SPECIFY SMITH TEST LEADS

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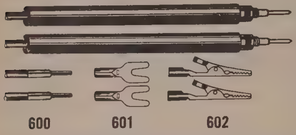
SOLDERLESS TIP TEST LEAD

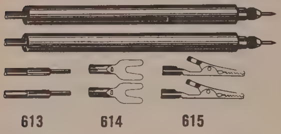


HANDLE: MOLDED BUTYRATE, per Fed. Spec. L-P349A, Type 3, Class MS. Red and Black.

TIP: Solderless: Brass, nickel plated.
Std. Pkg. 12

No.	Meter End	NET Per Pr.
600	Phone Tips	$1.25
601	Spade Lugs	1.25
602	Alligator Clips	1.30

PHONO NEEDLE TEST LEAD

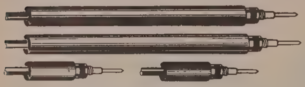


HANDLE: MOLDED BUTYRATE, per Fed. Spec. L-P349A, Type 3, Class MS. Red and Black.

BODY: Brass, nickel plated.
NEEDLE: Steel, nickel plated. **Std. Pkg. 12**

No.	Meter End	NET Per Pr.
613	Phone Tips	$1.25
614	Spade Lugs	1.25
615	Alligator Clips	1.30

ALL SOLDERLESS TEST LEAD

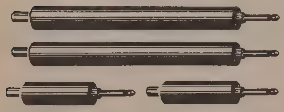


HANDLE: MOLDED BUTYRATE, per Fed. Spec. L-P349A, Type 3, Class MS. Red and Black.

PLUG: MOLDED THERMOSETTING plastic, Red and Black per MIL-M-14 CFG.
TIP: Solderless: Brass, nickel plated.
Std. Pkg. 12

No.	NET Per Pr.
603	$1.60

SOLDERLESS PHONE TIP TEST LEAD SLIM HANDLES

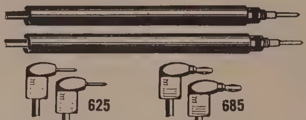


HANDLE: MOLDED NYLON, per MIL-P-20693A ¼″ O.D. RED and BLACK.
TIP: Brass, Silver Plated with front retention groove.
WIRE: #18 AWG, 65/36 to an O.D. of .140, rubber covered. 10,000 volts.
DESCR: Wire slips thru molded hole in handles and is held securely by washer under tip.
Std. Pkg. 12

No.	NET Per Pr.
684	$2.00

METER TEST LEADS

Solderless Prod

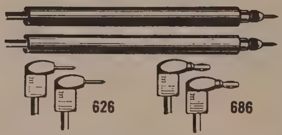


HANDLE: MOLDED BUTYRATE, per Fed. Spec. L-P349A, Type 3, Class MS. Red and Black.

TIP: Solderless: Brass, nickel plated.
ELBOW: MOLDED PHENOLIC plastic, Red and Black.
BODY: Brass, nickel plated.
SPRING: Four leaved, phosphor bronze, nickel plated. **Std. Pkg. 12**

No.	Type	NET Per Pr.
625	Phone Tip Meter Tip	$1.80
685	Banana Meter Tip	2.05

Needle Prod

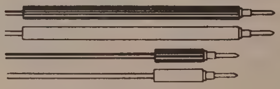


HANDLE: MOLDED BUTYRATE, per Fed. Spec. L-P349A, Type 3, Class MS. Red and Black.

NEEDLE: Steel, nickel plated.
ELBOW: MOLDED PHENOLIC PLASTIC, Red and Black.
BODY: Brass, nickel plated.
SPRING: Four leaved, phosphor bronze, nickel plated. **Std. Pkg. 12**

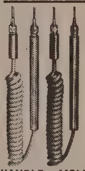
No.	Type	NET Per Pr.
626	Phone Tip Meter Tip	$1.80
686	Banana Meter Tip	2.05

SLIM HANDLE TEST LEAD



HANDLE: FIBRE, per MIL-F-1148A, Grade CH. Red, Black. ¼″ O.D.
PLUG: FIBRE, per MIL-F-1148A, Grade CH. Red, Black. ¼″ O.D.
TIPS: Brass, nickel plated. **Std. Pkg. 12**

No.	NET Per Pr.
678	$2.45

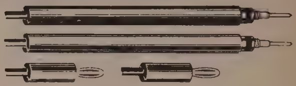


KOIL-KORD TEST LEAD ALL SOLDERLESS

HANDLE: MOLDED BUTYRATE, per Fed. Spec. L-P349A, Type 3, Class MS. Red and Black.
PLUG: MOLDED PHENOLIC plastic, Red and Black.
TIP: Solderless: Brass, nickel plated.
WIRE: #20 gauge, 41/36 strand, 4000 volt, nominal O.D. .165. Retracted length 12 inches, extended length 6-ft. **Std. Pkg. 6**

No.	NET Per Pr.
618	$3.65

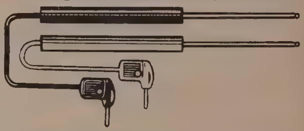
BANANA PLUG TEST LEAD



HANDLE: MOLDED BUTYRATE, per Fed. Spec. L-P349A, Type 3, Class MS. Red and Black.
PLUG: MOLDED PHENOLIC plastic, Red and Black.
TIP PLUG: Solderless: Brass, nickel plated.
BODY: Brass, nickel plated.
SPRING: Four leaved phosphor bronze, nickel plated. **Std. Pkg. 12**

No.	NET per Pr.
623	$1.80

SLIM JIM TEST LEAD

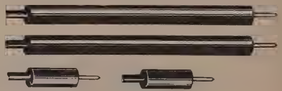


HANDLE: MOLDED BUTYRATE, per Fed. Spec. L-P349A, Type 3, Class MS. Red and Black.

PROBE: Steel, cadmium plated.
INSULATOR: Vinyl spaghetti tubing, Red and Black.
ELBOWS: MOLDED PHENOLIC plastic. Red and Black.
TIPS: Brass, nickel plated. **Std. Pkg. 12**

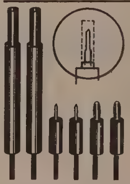
No.	NET per Pr.
698	$1.75

SHORT TIP TEST LEAD



HANDLE: MOLDED BUTYRATE, per Fed. Spec. L-P349A, Type 3, Class MS. Red and Black.
PLUG: MOLDED PHENOLIC plastic, Red and Black.
TIP: Brass, nickel plated. **Std. Pkg. 12**

No.	NET Per Pr.
624	1.35



RETRACTABLE SHIELDED TEST LEADS

HANDLE: MOLDED BUTYRATE, per Fed. Spec. L-P349A, Type 3, Class MS. Red and Black.
TIP: Prod tip brass, nickel plated. Meter end, see type.
DESCR.: Plugs insert flush to insulated handle. Prods have retractable cover leaving no metal exposed. Eliminates possibility of shock or grounding. Supplied with either phone tip or banana plug meter ends. Other variations on special order. **Std. Pkg. 6**

No.	Type	NET Per Pr.
616	Phone Tip End	$2.30
617	Banana Plug End	2.45

IT'S SOUND PLANNING TO **"SPECIFY SMITH"** WHEN DESIGNING OR PURCHASING

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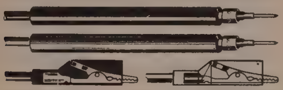
TEST LEADS

SPECIFY SMITH

ALLIGATOR CLIP TEST LEAD



HANDLES: MOLDED BUTYRATE, per Fed. Spec. L-P349A, Type 3, Class MS. Red and Black.
TIPS: Solderless: Brass, nickel plated.
CLIPS: Steel, cadmium plated.
BOOT: Vinyl Plastic Red and Black.

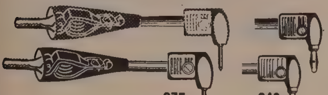
Std. Pkg. 12

No.	NET Per Pr.
672	$1.55

CROCODILE CLIP TEST LEAD

CLIPS: STEEL, Cadmium Plated.
BOOT: Vinyl Plastic, Red and Black.
HANDLE: MOLDED BUTYRATE, per Fed. Spec. L-P349A, Type 3, Class MS. Red and Black.
LUG: Brass, Nickel Plated. Std. Pkg. 12

No.	NET Per Pr.
671	$1.45

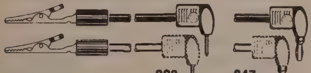


CLIPS: STEEL, Cadmium Plated.
BOOT: Vinyl Plastic, Red and Black.
ELBOWS: MOLDED PHENOLIC plastic, Red and Black.
TIPS: Brass, Nickel Plated.
SPRING: Four leaved, phosphor bronze, nickel plated.

Std. Pkg. 12

No.	Type	NET Per Pr.
675	Phone Tip Meter Tip	$1.50
648	Banana Meter Tip	1.60

ALLIGATOR CLIP TEST LEAD



CLIP HANDLES: MOLDED BUTYRATE, per Fed. Spec. L-P349A, Type 3, Class MS. Red and Black
CLIPS: Steel, Cadmium Plated.
ELBOWS: MOLDED PHENOLIC plastic, Red and Black.
TIPS: Brass, Nickel Plated.
SPRING: Four-leaved phosphor bronze, nickel plated.

Std. Pkg. 12

No.	NET Per Pr.
628	$1.50
647	1.60

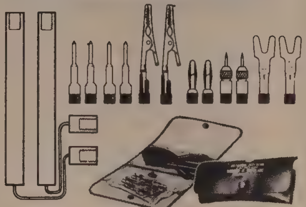
MINIATURE TEST LEAD

HANDLE: MACHINED BUTYRATE, 3/16" O.D., 3" long, per MIL-P-10408A, Type I, Class II, Red and Black.
PLUG: MACHINED BUTYRATE, 3/16" O.D., ¾" long, per MIL-P-10408A, Type I, Class II.
TIPS: Brass, nickel plated. Std. Pkg. 12

No.	NET per Pr.
660	$1.20

"UNIVERSAL" TEST LEAD

Completely Interchangeable

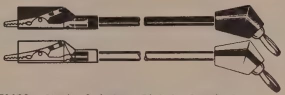


Fifty Leads In One! One lead can make any required test lead combination. All parts adapt into prod handle or tip handle. Complete as shown. With plastic kit.
WIRE: 5 KV rubber covered, 26 strands #34 copper, #20 AWG insulated to an O.D. of .125". Std. Pkg. 6

No.	Description	NET Ea.
699	Standard	$ 5.00
679	Miniature	5.00

ALLIGATOR CLIP TEST LEAD

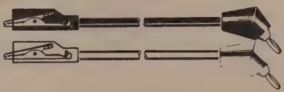
FOR STANDARD BANANA JACKS



CLIPS: Steel, Cadmium Plated, Standard.
BOOTS: Vinyl Plastic, Red and Black.
BODIES: Brass, Nickel Plated, and Aluminum.
SPRING: Four-leaved Beryllium copper, Nickel Plated.
WIRE: 10 KV PVC flexible wire, 65 strands #36 copper, #18 AWG, insulated to an O.D. of .140" Std. Pkg. 12

No.	NET Per Pr.
1332	$1.60

FOR MINIATURE BANANA JACKS

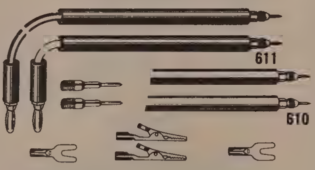


Same as above, except:

WIRE: 5 KV PVC Flexible Wire, 19 strands #36 copper, #24 AWG, insulated to an O.D. of .090" Std. Pkg. 12

No.	NET Per Pr.
1342	$1.60

TEST LEAD KIT

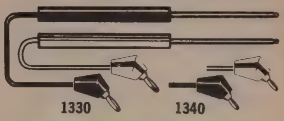


DESCR.: Each kit is supplied with one pair of test leads. One end test prods, other end ins. banana plugs.
FITTINGS: Two each: Phone tips, alligator clips, spade lugs. Std. Pkg. 6

No.	Type	NET Ea.
610	Solderless Prods	$2.50
611	Needle Tip Prods	2.50

SLIM JIM TEST LEAD

FOR STANDARD BANANA JACKS



HANDLE: MOLDED BUTYRATE, per Fed. Spec. L-P349A, Type 3, Class MS. Red and Black.
PROBE: Steel, Cadmium Plated.
INSULATOR: Vinyl Spaghetti Tubing, Red and Black.
BODIES: Brass nickel plated, and Aluminum.
SPRING: Four-leaved Beryllium copper, nickel plated.
WIRE: 10 KV PVC flexible wire, 65 strands #36 copper, #18 AWG, insulated to an O.D. of .140" Std. Pkg. 12

No.	NET Per Pr.
1330	$2.00

FOR MINIATURE BANANA JACKS

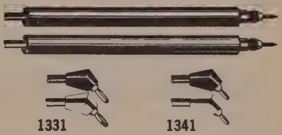
Same as above, except:

WIRE: 5 KV PVC Flexible Wire, 19 strands #36 copper, #24 AWG, insulated to an O.D. of .090" Std. Pkg. 12

No.	NET Per Pr.
1340	$2.00

PHONO NEEDLE TEST LEAD

FOR STANDARD BANANA JACKS



HANDLE: MOLDED BUTYRATE, per Fed. Spec. L-P349A, Type 3, Class MS Red and Black.
BODIES: Brass, Nickel Plated, and Aluminum.
NEEDLE: Steel, Nickel Plated.
SPRING: Four-leaved Beryllium copper, Nickel Plated.
WIRE: 10 KV PVC flexible wire, 65 strands #36 copper, #18 AWG, insulated to an O.D. of .140" Std. Pkg. 12

No.	NET Per Pr.
1331	$2.00

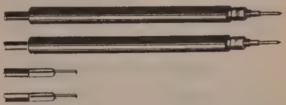
FOR MINIATURE BANANA JACKS

Same as above, except:

WIRE: 5 KV PVC Flexible Wire, 19 strands #36 copper, #24 AWG, insulated to an O.D. of .090" Std. Pkg. 12

No.	NET Per Pr.
1341	$2.00

SLIM HANDLE TEST LEAD



HANDLES: MACHINED BUTYRATE, per MIL-P-10408A, type 1, class 2. Red and Black 5/16" O.D.
TIPS: Prod: Brass, Nickel Plated. Meter End: Drawn Brass Nickel Plated.

Std. Pkg. 12

No.	NET Per Pr.
670	$1.25

IT'S SOUND PLANNING TO **"SPECIFY SMITH"** WHEN DESIGNING OR PURCHASING

SPECIFY SMITH TEST LEADS & JUMPERS

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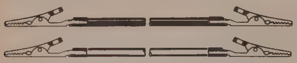
WIRE SPECIFICATIONS

#20 Wire, 26/34 strands, 5000 Volts, .125" O.D.
All Test Leads on this page are supplied with extra-flexible rubber-covered kinkless wire, 50 inches long, unless specified otherwise.

ALLIGATOR CLIP TEST LEAD



CLIPS: STEEL, cadmium plated.

Std. Pkg. 12

No.	Wire	NET Per Pr.
604	12 inches	$1.00
605	24 inches	1.05
606	36 inches	1.10
607	48 inches	1.15

ALLIGATOR CLIP TEST LEAD
With Boots

CLIPS: Steel, Cadmium Plated.
BOOTS: Vinyl plastic Red and Black.

Std. Pkg. 12

No.	Wire	NET Per Pr.
629	12 inches	$1.10
657	24 inches	1.15
658	36 inches	1.20
659	48 inches	1.25

MIDGET ALLIGATOR CLIP TEST LEAD

CLIPS: Steel, Cadmium Plated.
BOOTS: Vinyl plastic Red and Black.

Std. Pkg. 12

No.	Wire	NET Per Pr.
716	12 inches	$1.10
717	18 inches	1.15
718	24 inches	1.20
719	36 inches	1.25

ALLIGATOR CLIP TEST LEAD

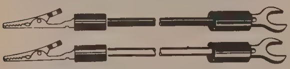
CLIP HANDLES: MOLDED BUTYRATE, per Fed. Spec. L-P349A, Type 3, Class MS. Red and Black.
PLUG HANDLES: MOLDED PHENOLIC PLASTIC, Red and Black.

CLIPS: Steel, Cadmium Plated.
TIPS: Solderless, Brass, Nickel Plated.

Std. Pkg. 12

No.	NET Per Pr.
627	$1.30

ALLIGATOR CLIP TEST LEAD



CLIP HANDLES: MOLDED BUTYRATE, per Fed. Spec. L-P349A, Type 3, Class MS. Red and Black.
CLIPS: Steel, Cadmium Plated.
LUGS: Brass, Nickel Plated.

Std. Pkg. 12

No.	NET Per Pr.
649	$1.30

STANDARD ALLIGATOR CLIP BOTH ENDS

CLIPS: STEEL, Cadmium plated (No. 300)
BOOTS: Vinyl plastic. Boot colors match wire.
RATING: 5 Amps AC for 10°C Temp. rise, continuous duty.
WIRE: 10 KV PVC flexible wire, 65 strands #36 copper, #18 AWG, insulated to an O.D. of .140". Available in Red, Black, Yellow, Green, Blue, and White. SPECIFY COLOR.

Std. Pkg. 10

No.	Length	Net Ea.
1596-12	12 inches	$ .63
1596-24	24 inches	.65
1596-36	36 inches	.67
1596-48	48 inches	.69
1596-60	60 inches	.71

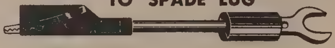
MINIATURE ALLIGATOR CLIP BOTH ENDS

CLIPS: STEEL, Cadimum plated (No. 338).
BOOTS: Vinyl plastic. Boot colors match wire.
RATING: 5 Amps AC for 10°C Temp. rise, continuous duty.
WIRE: General purpose, PVC insulated, 1/64" wall. #18 AWG, 16/30 stranded conductor. Available in Red, Black, Yellow, Green, Blue, and White. SPECIFY COLOR.

Std. Pkg. 10

No.	Length	Net Ea.
1597-12	12 inches	$ .63
1597-18	18 inches	.64
1597-24	24 inches	.65
1597-36	36 inches	.67
1597-48	48 inches	.69
1597-60	60 inches	.71

STANDARD ALLIGATOR CLIP TO SPADE LUG



HANDLES: MOLDED BUTYRATE, per Fed. Spec. L-P349A, Type 3, Class MS. Red or Black. SPECIFY COLOR
LUG: Brass, Nickel Plated. .050 thick.
CLIPS: STEEL, Cadmium plated
BOOTS: Vinyl plastic. Boot colors match wire.
RATING: 15 Amps AC for 10°C Temp. rise, continuous duty.
WIRE: 10 KV PVC flexible wire, 65 strands #36 copper, #18 AWG, insulated to an O.D. of .140".

Std. Pkg. 10

No.	Length	Net Ea.
1867-12	12 inches	$ .60
1867-24	24 inches	.68
1867-36	36 inches	.75
1867-48	48 inches	.82
1867-60	60 inches	.90

SPECIALS

are STANDARD with SMITH

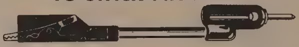
STANDARD ALLIGATOR CLIP TO STACK BANANA PLUG

HANDLES: MOLDED PHENOLIC plastic, Red, Black, Yellow, Green, Blue, White. SPECIFY COLOR
PLUG: Hex brass, nickel plated.
SPRING: Four-leaved phosphor bronze, nickel plated.
CLIPS: STEEL, Cadmium plated
BOOTS: Vinyl plastic. Boot colors match wire.
RATING: 15 Amps AC for 10°C Temp. rise, continuous duty.
WIRE: 10 KV PVC flexible wire, 65 strands #36 copper, #18 AWG, insulated to an O.D. of .140".

Std. Pkg. 10

No.	Length	Net Ea.
1866-12	12 inches	$ .99
1866-24	24 inches	1.02
1866-36	36 inches	1.05
1866-48	48 inches	1.07
1866-60	60 inches	1.10

STANDARD ALLIGATOR CLIP TO STACK PIN PLUG

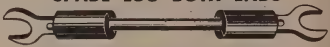


HANDLES: MOLDED PHENOLIC plastic, Red, Black, Yellow, Green, Blue, White. SPECIFY COLOR
PLUG: Brass, nickel plated.
CLIPS: STEEL, Cadmium plated
BOOTS: Vinyl plastic Boot colors match wire.
RATING: 12 Amps AC for 10°C Temp. rise, continuous duty.
WIRE: 10 KV PVC flexible wire, 65 strands #36 copper, #18 AWG insulated to an O.D. of .140".

Std. Pkg. 10

No.	Length	Net Ea.
1865-12	12 inches	$ .96
1865-24	24 inches	.98
1865-36	36 inches	1.00
1865-48	48 inches	1.02
1865-60	60 inches	1.04

SPADE LUG BOTH ENDS



HANDLES: MOLDED BUTYRATE, per Fed. Spec. L-P349A, Type 3, Class MS. Red or Black. SPECIFY COLOR
LUG: Brass, Nickel Plated. .050 thick.
RATING: 25 Amps AC for 10°C Temp. rise, continuous duty.
WIRE: 10 KV PVC flexible wire, 65 strands #36 copper, #18 AWG, insulated to an O.D. of .140".

Std. Pkg. 10

No.	Length	Net Ea.
1864-12	12 inches	$ .71
1864-24	24 inches	.78
1864-36	36 inches	.86
1864-48	48 inches	.93
1864-60	60 inches	1.00

FOR YOUR SPECIAL REQUIREMENTS

We are equipped to manufacture all types of Jumpers in various combinations using Alligator and Battery clips.

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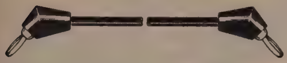
JUMPERS & RF PATCH CORDS SPECIFY SMITH

BANANA PLUG JUMPERS

STANDARD



HANDLE: MOLDED BUTYRATE, per Fed. Spec. L-P349A, Type 3, Class MS. Red, Black, Yellow, Green, Blue, White. SPECIFY COLOR

BODY: Brass Nickel Plated and Aluminum.

SPRING: Four-leaved Beryllium copper, nickel plated.

WIRE: 10 KV PVC flexible wire, 65 strands #36 copper, #18 AWG, insulated to an O.D. of .140" **Std. Pkg. 10**

No.	Length ("A")	NET Each
1334-8	8 inches	$ .82
1334-12	12 inches	.82
1334-24	24 inches	.88
1334-36	36 inches	.93

MINIATURE

HANDLE: MOLDED BUTYRATE, per Fed. Spec. L-P349A, Type 3, Class MS. Red, Black, Yellow, Green, Blue, White. SPECIFY COLOR

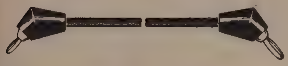
BODY: Brass Nickel Plated and Aluminum.

SPRING: Four-leaved Beryllium copper, nickel plated.

WIRE: 5 KV PVC Flexible Wire, 19 strands #36 copper, #24 AWG, insulated to an O.D. of .090" **Std. Pkg. 10**

No.	Length ("A")	NET Each
1344-8	8 inches	$ .82
1344-12	12 inches	.82
1344-24	24 inches	.88
1344-36	36 inches	.93

MINIATURE TO STANDARD



HANDLE: MOLDED BUTYRATE, per Fed. Spec. L-P349A, Type 3, Class MS. Red, Black, Yellow, Green, Blue, White. SPECIFY COLOR

BODIES: Brass Nickel Plated, and Aluminum

SPRING: Four-leaved Beryllium copper, nickel plated.

WIRE: 5 KV PVC Flexible Wire, 19 strands #36 copper, #24 AWG, insulated to an O.D. of .090" **Std. Pkg. 10**

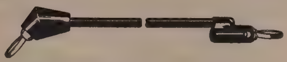
No.	Length ("A")	NET Each
1349-8	8 inches	$ .82
1349-12	12 inches	.82
1349-24	24 inches	.88
1349-36	36 inches	.93

MODERN FACILITIES

We invite you to utilize our modern manufacturing facilities and methods for your molding, screw-machine, stamping or sub-assemblies. We are equipped for both the long run and the short run. From raw material to finished part, SMITH detailed workmanship and production efficiency assure a quality product, speedily and economically made.

CROSS PATCH JUMPERS

STANDARD BANANA PLUGS



HANDLE: MOLDED BUTYRATE, per Fed. Spec. L-P349A, Type 3, Class MS. Red, Black, Yellow, Green, Blue, White. SPECIFY COLOR

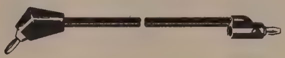
BODY: Brass Nickel Plated and Aluminum.

SPRING: Four-leaved Beryllium copper, nickel plated.

WIRE: 10 KV PVC flexible wire, 65 strands #36 copper, #18 AWG, insulated to an O.D. of .140" **Std. Pkg. 10**

No.	Length ("A")	NET Each
1335-8	8 inches	$1.21
1335-12	12 inches	1.21
1335-24	24 inches	1.27
1335-36	36 inches	1.32

MINIATURE BANANA PLUGS



HANDLE: MOLDED BUTYRATE, per Fed. Spec. L-P349A, Type 3, Class MS. Red, Black, Yellow, Green, Blue, White. SPECIFY COLOR

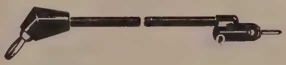
BODY: Brass Nickel Plated and Aluminum.

SPRING: Four-leaved Beryllium copper, nickel plated.

WIRE: 5 KV PVC Flexible Wire, 19 strands #36 copper, #24 AWG, insulated to an O.D of .090" **Std. Pkg. 10**

No.	Length ("A")	NET Each
1345-8	8 inches	$1.21
1345-12	12 inches	1.21
1345-24	24 inches	1.27
1345-36	36 inches	1.32

STANDARD BANANA PLUG TO PHONE TIP



HANDLE: MOLDED BUTYRATE, per Fed. Spec. L-P349A, Type 3, Class MS. Red, Black. Yellow, Green, Blue, White. SPECIFY COLOR

BODY: Brass Nickel Plated and Aluminum.

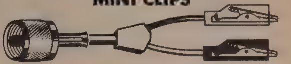
SPRING: Four-leaved Beryllium copper, nickel plated.

WIRE: 10 KV PVC flexible wire, 65 strands #36 copper, #18 AWG, insulated to an O.D. of .140" **Std. Pkg. 10**

No.	Length ("A")	NET Each
1336-8	8 inches	$1.21
1336-12	12 inches	1.21
1336-24	24 inches	1.27
1336-36	36 inches	1.32

You'll find these SMITH products on the shelves of leading industrial Electronic Distributors, throughout the U.S.A. For your production runs, draw directly on our large plant inventories of standard components.

UHF MALE TO INSULATED MINI CLIPS



CLIP: Steel, Cadmium plated, No. 338.

INSULATOR: Molded Vinyl plastic, No. 384.

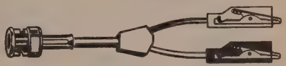
WIRE: RG-174/U coaxial cable.

DESCR.: For testing wave patterns, etc.

One end terminates with UHF male, other end with insulated mini clips, one red, one black. **Std. Pkg. 10**

No.	Length	Net Ea.
1790-12	12 inches	$5.35
1790-24	24 inches	5.45
1790-36	36 inches	5.55
1790-48	48 inches	5.65
1790-60	60 inches	5.75

BNC MALE TO INSULATED MINI CLIPS



CLIPS: Steel, Cadmium plated, No. 338.

INSULATOR: Molded Vinyl plastic, No. 389.

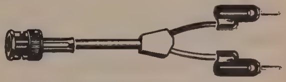
WIRE: RG-174/U coaxial cable.

DESCR.: For testing wave patterns, etc.

One end terminates with BNC male, other end with insulated mini clips, one red, one black. **Std. Pkg. 10**

No.	Length	Net Ea.
1791-12	12 inches	$5.35
1791-24	24 inches	5.45
1791-36	36 inches	5.55
1791-48	48 inches	5.65
1791-60	60 inches	5.75

BNC MALE TO STACK TIP PLUGS



WIRE: RG-58/U coaxial cable.

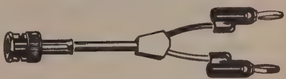
PLUGS: No. 1595, one Red, one Black.

DESCR.: For testing wave patterns, etc.

One end terminates with BNC male, other end with cross patch tip plugs, one red, one black. **Std. Pkg. 10**

No.	Length	Net Ea.
1792-12	12 inches	$5.50
1792-24	24 inches	5.75
1792-36	36 inches	6.00
1792-48	48 inches	6.25
1792-60	60 inches	6.50

BNC MALE TO STACK BANANA PLUGS



WIRE: RG-58/U coaxial cable

PLUGS: No. 1510, one red, one black

DESCR.: For testing wave patterns, etc.

One end terminates with BNC male, other end with cross patch standard banana plugs, one red, one black. **Std. Pkg. 10**

No.	Length	Net Ea.
1793-12	12 inches	$5.50
1793-24	24 inches	5.75
1793-36	36 inches	6.00
1793-48	48 inches	6.25
1793-60	60 inches	6.50

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RF PATCH CORDS

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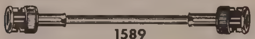
MOLDED
BUTTON

CABLE TYPES AVAILABLE

	WIRE
DESCRIPTION	RG58/U Coaxial cable.
INSULATION	Polyethylene
JACKET	Vinyl
NOM. CAP.	50 Ohm Impedance.

BNC MALE BOTH ENDS

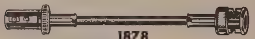


1589

WIRE: As specified above. **Std. Pkg. 10**

	Lgth.	NET Ea.
1589-12	12″	$5.35
1589-24	24″	5.45
1589-36	36″	5.55
1589-48	48″	5.65
1589-60	60″	5.75

BNC FEMALE TO BNC MALE



1878

Std. Pkg. 10

No.	Length	Net Ea.
1878-12	12 inches	$5.60
1878-24	24 inches	5.70
1878-36	36 inches	5.80
1878-48	48 inches	5.90
1878-60	60 inches	6.00

UHF MALE BOTH ENDS

1871

Std. Pkg. 10

No.	Length	Net Ea.
1871-12	12″	$5.35
1871-24	24″	5.45
1871-36	36″	5.55
1871 48	48″	5.65
1871-60	60″	5.75

BNC FEMALE TO TEST PROBE

HANDLE: Molded Butyrate, per Federal Spec. L-P349A, Type 3, Class MS. BLACK.

TIP: .080 Brass Nickel Plated.

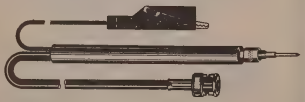
CONNECTOR: BNC Female.

DESCR.: Permits the use of coaxial cables terminated with a BNC Male for all circuit testing. Probe shielded within 1″ from tip.

Std. Pkg. 1

No.	NET Ea.
1797	$4.85

BNC MALE TO TEST PROBE



HANDLE: Molded Butyrate per Federal Spec. L-P349A, Type 3, Class MS, RED.

TIP: .080 Brass Nickel Plated.

CONNECTOR: BNC Male.

WIRE: RG-58/U, 48″ long.

CLIP: Miniature steel alligator clip, cadmium plated with black insulator.

DESCR.: Permits the use of probe testing with any equipment utilizing a BNC female termination. Probe shielded within 1″ from tip.

Std. Pkg. 1

No.	NET Ea.
1798	$5.85

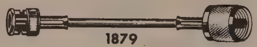
BNC FEMALE BOTH ENDS

1869

Std. Pkg. 10

No.	Length	Net Ea.
1869 12	12 inches	$6.10
1869-24	24 inches	6.20
1869-36	36 inches	6.30
1869-48	48 inches	6.40
1869-60	60 inches	6.50

BNC MALE TO UHF MALE



1879

Std. Pkg. 10

No.	Length	Net Ea.
1879-12	12 inches	$5.35
1879-24	24 inches	5.45
1879-36	36 inches	5.55
1879-48	48 inches	5.65
1879-60	60 inches	5.75

BNC MALE TO ALLIGATOR CLIPS

1587

CLIPS: Steel Cad. Plated (#300).

INSUL.: Molded Vinyl (#331).

WIRE: As specified above.

DESCR.: For testing wave patterns etc. One end terminates with BNC Male Plug, other end with insulated alligator clips, one red, one black. **Std. Pkg. 10**

No.	Lgth.	NET Ea.
1587-12	12″	$5.35
1587-24	24″	5.45
1587-36	36″	5.55
1587-48	48″	5.65
1587-60	60″	5.75

UHF MALE TO ALLIGATOR CLIPS

1586

CLIPS: Steel Cad. Plated (#300).

INSUL.: Molded Vinyl (#331).

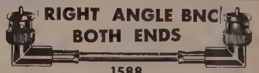
DESC.: For testing wave patterns, etc. One end terminates with UHF Male, other end with insulated alligator clips one red, one black.

WIRE: As specified above. **Std. Pkg. 10**

No.	Lgth.	NET Ea.
1586-12	12″	$5.35
1586-24	24″	5.45
1586-36	36″	5.55
1586-48	48″	5.65
1586-60	60″	5.75

SEE
R.F. CONNECTORS
AND ADAPTERS
ON PAGE 2•848

RIGHT ANGLE BNC BOTH ENDS



1588

WIRE: As specified above. **Std. Pkg. 10**

No.	Lgth.	NET Ea.
1588-12	12″	$10.00
1588-24	24″	10.10
1588 36	36″	10.20
1588-48	48″	10.30
1588-60	60″	10.40

BNC FEMALE TO UHF MALE

1880

Std. Pkg. 10

No.	Length	Net Ea.
1880-12	12 inches	$5.35
1880 24	24 inches	5.45
1880-36	36 inches	5.55
1880-48	48 inches	5.65
1880-60	60 inches	5.75

BNC MALE TO DOUBLE PLUG

1584

HANDLES: MOLDED BUTYRATE, per Fed. Spec. L-P349A, Type 3, Class MS. Black or Grey to match wire.

PLUG: Brass, nickel plated.

SPRING: Four-leaved beryllium copper, nickel plated.

DESCR.: Mates with standard dual binding post having ¾″ center. Polarity indicated by the word GROUND molded on side. One end terminates with double banana plug, other end with BNC Male Plug.

WIRE: As specified above. **Std. Pkg. 10**

No.	Lgth.	NET Ea.
1584-12	12″	$5.35
1584-24	24″	5.45
1584-36	36″	5.55
1584-48	48″	5.65
1584-60	60″	5.75

UHF MALE TO DOUBLE PLUG

1585

HANDLES: MOLDED BUTYRATE, per Fed. Spec. L-P349A, Type 3, Class MS. Black or Grey to match wire.

PLUG: Brass, nickel plated.

SPRING: Four-leaved beryllium copper, nickel plated.

DESCR.: Mates with standard dual binding post having ¾″ center. Polarity indicated by the word GROUND molded on side. One end terminates with double banana plug, other end with UHF Male Plug.

WIRE: As specified above. **Std. Pkg. 10**

No.	Lgth.	NET Ea.
1585-12	12″	$5.35
1585-24	24″	5.45
1585-36	36″	5.55
1585-48	48″	5.65
1585-60	60″	5.75

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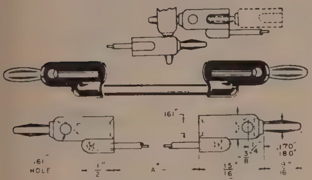
NATIONWIDE

PATCH CORDS

SPECIFY **SMITH**

CROSS PATCH BANANA PLUG CORD



HANDLE: MOLDED BUTYRATE, per Fed. Spec. L-P349A, Type 3, Class MS. Red, Black, Yellow, Green, Blue, White SPECIFY COLOR

BODY: Brass, nickel plated.

SPRING: Four-leaved beryllium copper, nickel plated.

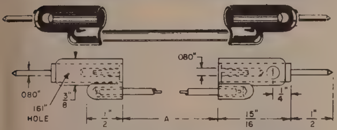
WIRE: 10 KV PVC flexible wire, 65 strands #36 copper, #18 AWG, insulated to an O.D. of .140″.

DESCR.: Interconnects unlimited number of multiple circuits. Positive, lasting contact for all banana plugs on top and side. **Std. Pkg. 10**

With Plug Spring 9/16″ Long

No.	Length ("A")	Net Ea.
1510-8	8 inches	$ 1.30
1510-12	12 inches	1.30
1510-24	24 inches	1.35
1510-36	36 inches	1.40

CROSS PATCH PIN TIP CORD



HANDLE: MOLDED BUTYRATE, per Fed. Spec. L-P349A, Type 3, Class MS. Red, Black, Yellow, Green, Blue, White SPECIFY COLOR

BODY: Brass, nickel plated.

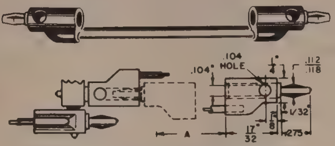
CONTACT: Beryllium copper.

WIRE: 10 KV PVC flexible wire, 65 strands #36 copper, insulated to an O.D. of .140″.

DESCR.: Interconnects an unlimited number of multiple circuits. .080″ tip plug and female jack in rear of body fits all standard phone tips and jacks. Side holes accept standard banana plugs. **Std. Pkg. 10**

No.	Length ("A")	NET Ea.
1595-8	8″	$ 1.40
1595-12	12″	1.40
1595-24	24″	1.45
1595-36	36″	1.50

MINIATURE BANANA PLUG CROSS PATCH CORD



HANDLE: MOLDED BUTYRATE,, per Fed. Spec. L-P349A, Type 3, Class MS. Red, Black, Yellow, Green, Blue, White, Orange, Brown, Purple and Grey.

BODY: Brass, nickel plated.

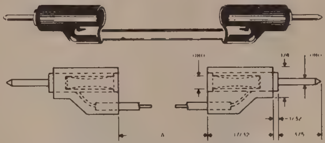
SPRING: Four-leaved beryllium copper, nickel plated.

WIRE: General purpose, PVC insulated, 1/64″ wall. #18 AWG, 41/34 stranded conductor. Voltage rating up to 1 KV RMS.

DESCR.: Interconnects unlimited number of multiple circuits. Positive, lasting contact for banana plugs on top and side. Special lengths on request. **Std. Pkg. 10**

No.	Length ("A")	NET Ea.
1590-6	6 inches	$ 1.30
1590-12	12 inches	1.30
1590-18	18 inches	1.35
1590-24	24 inches	1.40

PHONE TIP PATCH CORD



HANDLE: MOLDED BUTYRATE, per Fed. Spec. L-P39A, Type 3, Class MS. Available in 10 colors as coded above. SPECIFY COLOR

BODY: BRASS, NICKEL PLATED.

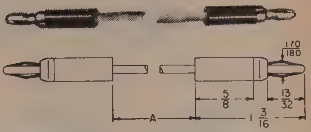
CONTACT: BERYLLIUM COPPER, GOLD FLASHED

WIRE: 5 KV PVC FLEXIBLE WIRE, 19 strands #36 copper, #24 awg, insulated to an O.D. of .090″.

DESCR: Short phone tip plug for fully insulated insertion in miniature jacks. Captive cage jack in rear for unlimited stack-up. Special lengths on request. **Std. Pkg. 10**

No.	Length ("A")	NET Ea.
1591-6	6 inches	$1.25
1591-12	12 inches	1.25
1591-18	18 inches	1.30
1591-24	24 inches	1.35

MOLDED BANANA PLUG PATCH CORD



HANDLE: MOLDED BUTYRATE, per Fed. Spec. L-P349A, Type 3, Class MS. Red, Yellow, Black, Green, assemblies. SPECIFY COLOR.

BODY: Brass, nickel plated.

SPRING: Four-leaved beryllium copper, nickel plated.

WIRE: 10 Kv PVC flexible wire, 65 strands #36 copper, insulated to an O.D. of .140″.

DESCR.: Interconnects banana jacks on closely spaced centers where space is at a premium. Fits standard banana jacks. **Std. Pkg. 10**

No.	Length ("A")	NET Ea.
1860-8	8 inches	$ .75
1860-12	12 inches	.75
1860-24	24 inches	.80
1860-36	36 inches	.85

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- Precision Turning
- Stamping
- Molding
- Assembly
- Quality Finishing

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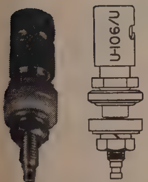
MIL-SPEC BINDING POST

MADE TO MEET MIL-P - 55149/8



HEAD & BODY: BRASS, SILVER PLATED

SPRING & CONTACT PLATE: STEEL

WASHERS: MOLDED NYLON

O-RINGS AND CAP: Silicon Rubber. Red or Black Cap, SPECIFY COLOR.

DESCR.: Style U-106/U binding post (Sig. Corp. Dwng. SC-C-16495). Meets requirements of Mil-P-55149/8, DTD 30 Sep 1963. Mounts in 5/16″ hole, in panels from 1/16″ to 1/18″ thick. "O" ring seals provide waterproof seal in panel. Push on cap opens slot in which wire is inserted. Releasing cap grips wire with heavy spring pressure on serrated steel plates for minimum contact resistance. Provided with either red or black silicon rubber insulating cap boot.

Std. Pkg. 5

No.	Type	NET EA.
1837-102 (Red)	PB08NA02	$5.00
1837-103 (Black)	PB08NA01	5.00

JUST ADDED AT PRESS TIME

"THE HOOKON"

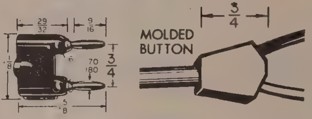
PROBE FOR HIGH DENSITY CIRCUITS. SEE PAGE 2•849

SEE OUR COMPLETE LINE OF TEFLON TERMINALS AND TEST JACKS STARTING ON PAGE 2•885

IT'S SOUND PLANNING TO **"SPECIFY SMITH"** WHEN DESIGNING OR PURCHASING

SPECIFY SMITH STANDARD DUAL BANANA PLUG PATCH CORDS (3/4" CENTERS)

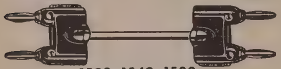
STOCKED BY LEADING DISTRIBUTORS NATIONWIDE



CABLE TYPES AVAILABLE

	WIRE "A"	WIRE "B"
DESCRIPTION	2-cond. tw. 18 ga. 65/36 str.	RG58/U Coaxial cable.
INSULATION	Vinyl	Polyethylene
JACKET	Vinyl	Vinyl
NOM. CAP.	30 pf./ft.	50 Ohm Impedance.

DOUBLE PLUG BOTH ENDS



1530, 1540, 1580

HANDLES: MOLDED BUTYRATE, per Fed. Spec. L-P349A, Type 3, Class MS. Black or Grey to match wire.

PLUG: Brass, nickel plated.

SPRING: Four-leaved beryllium copper, nickel plated.

WIRE: As specified above.

DESCR.: Mates with standard dual binding post having ¾" center. Polarity indicated by the word GROUND molded on side. Interconnects unlimited number of multiple circuits top and side. Each end terminates with molded double banana plug.

Std. Pkg. 10

No. Wire "A"	No. Wire "B"	Lgth.	NET Ea.
1530-12	1580-12	12"	$4.35
1530-24	1580-24	24"	4.45
1530-36	1580-36	36"	4.55
1530-48	1580-48	48"	4.65
1530-60	1580-60	60"	4.75

DOUBLE PLUG TO "CROSS-PATCH" PLUGS

1523, 1524, 1525

HANDLES: MOLDED BUTYRATE, per Fed. Spec. L-P349A, Type 3, Class MS. Black or Grey to match wire.

BODY: Brass, nickel plated.

SPRING: Four-leaved beryllium copper, nickel plated.

WIRE: As specified above.

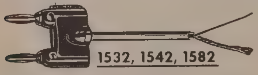
PLUG: Our No. 1510. Red and black.

DESCR.: Mates with standard dual binding post having ¾" centers. Polarity indicated by the word GROUND molded on side. Interconnects unlimited number of multiple circuits on top and side. One end terminates with double banana plug, other end with "Cross-Patch" banana plugs, color coded Red and Black

Std. Pkg. 10

No. Wire "A"	No. Wire "B"	Lgth.	NET Ea.
1523-12	1525-12	12"	$5.35
1523-24	1525-24	24"	5.45
1523-36	1525-36	36"	5.55
1523-48	1525-48	48"	5.65
1523-60	1525-60	60"	5.75

DOUBLE PLUG TO TINNED LEADS



1532, 1542, 1582

HANDLE: MOLDED BUTYRATE, per Fed. Spec. L-P349A, Type 3, Class MS.

PLUG: Brass, nickel plated.

SPRING: Four-leaved beryllium copper, nickel plated.

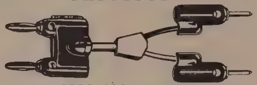
WIRE: As specified above.

DESCR.: Mates with standard dual binding post having ¾" center. Polarity indicated by the word GROUND molded on the side. One end terminates with double banana plug, other end stripped and tinned.

Std. Pkg. 10

No. Wire "A"	No. Wire "B"	Lgth.	NET Ea.
1532-12	1582-12	12"	$3.35
1532-24	1582-24	24"	3.45
1532-36	1582-36	36"	3.55
1532-48	1582-48	48"	3.65
1532-60	1582-60	60"	3.75

DOUBLE PLUG TO "CROSS-PATCH" PIN PLUGS



1592, 1593, 1594

HANDLE: MOLDED BUTYRATE, per Fed. Spec. L-P349A, Type 3, Class MS.

WIRE: As specified above.

PLUG: Our No. 1595. Red and black.

BODY: Brass, nickel plated.

SPRING: Four-leaved beryllium copper, nickel plated.

DESCR.: Mates with standard dual binding post having ¾" centers. Polarity indicated by the word GROUND molded on side. Interconnects unlimited number of multiple circuits on top and side. One end terminates with double banana plug, other end with "Cross-Patch" Pin plugs with standard .080" tip and jack in rear, banana jack in side, color coded Red and Black.

Std. Pkg. 10

No. Wire "A"	No. Wire "B"	Lgth.	NET Ea.
1592-12	1594-12	12"	$5.35
1592-24	1594-24	24"	5.45
1592-36	1594-36	36"	5.55
1592-48	1594-48	48"	5.65
1592-60	1594-60	60"	5.75

DOUBLE PLUG TO PHONE TIP

1533, 1543, 1583

HANDLE: MOLDED BUTYRATE, per Fed. Spec. L-P349A, Type 3, Class MS.

BODY: Brass, nickel plated.

SPRING: Four-leaved beryllium copper, nickel plated.

WIRE: As specified above.

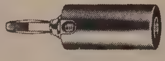
PLUG: Our No. 203. Red and black.

DESCR.: Mates with standard dual binding post having ¾" center. Polarity indicated by the word GROUND molded on side. One end terminates with double banana plug, other end with insulated tip plug, one red and one black.

Std. Pkg. 10

No. Wire "A"	No. Wire "B"	Lgth.	NET Ea.
1533-12	1583-12	12"	$ 4.70
1533-24	1583-24	24"	4.80
1533-36	1583-36	36"	4.90
1533-48	1583-48	48"	5.00
1533 60	1583-60	60"	5.10

STACK BANANA PLUG



BODY: MOLDED POLYSTYRENE, Red or Black. SPECIFY COLOR

PLUG: Brass, nickel plated.

SPRING: Four-leaved phosphor bronze, nickel plated.

SCREW: Steel, cadmium plated.

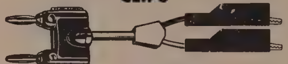
RATING: 15 Amps AC for 10°C Temp. rise, continuous duty.

DESCR.: Internal set screw for wire or phone tip connection. Can be stacked for multiple connections.

Std. Pkg. 50

No.	NET Per C.
324	$58.00

DOUBLE PLUG TO ALLIGATOR CLIPS



1531, 1541, 1581

HANDLES: MOLDED BUTYRATE, per Fed. Spec. L-P349A, Type 3, Class MS. Black or Grey to match wire.

PLUG: Brass, nickel plated.

SPRING: Four-leaved beryllium copper, nickel plated.

CLIP: Steel cadmium plated (No. 300)

INSUL.: Molded vinyl plastic (No. 331).

WIRE: As specified above.

DESCR.: Mates with standard dual binding post having ¾" center. Polarity indicated by the word GROUND molded on side. One end terminates with double banana plug, other end with insulated alligator clips, one red, one black.

Std. Pkg. 10

No. Wire "A"	No. Wire "B"	Lgth.	NET Ea.
1531-12	1581-12	12"	$5.35
1531-24	1581-24	24"	5.45
1531-36	1581-36	36"	5.55
1531-48	1581-48	48"	5.65
1531 60	1581-60	60"	5.75

STANDARD DUAL BANANA PLUG TO STANDARD BANANA PLUGS

1337

HANDLE: MOLDED BUTYRATE, per Fed. Spec. L-P349A, Type 3, Class MS. Black.

BODIES: Brass, Nickel Plated, and Aluminum

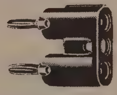
SPRING: Four-leaved Beryllium copper, nickel plated.

WIRE: RG58/U Coaxial Cable

Std. Pkg. 10

No.	Length	NET Ea.
1337-12	12 inches	$5.00
1337-24	24 inches	5.10
1337-36	36 inches	5.20
1337-48	48 inches	5.30
1337-60	60 inches	5.40

DUAL BANANA PLUG



BODY: MOLDED POLYSTYRENE, Red or Black. SPECIFY COLOR

PLUG: Brass, nickel plated.

SPRING: Four-leaved phosphor bronze, nickel plated.

SCREW: Steel, cadmium plated.

RATING: 15 Amps AC for 10°C Temp. rise, continuous duty. 5K Volts 60 cycle AC continuous working voltage. CAPACITANCE 1.0 pf. between conductors.

DESCR.: Mates with standard dual binding post ¾" centers. Polarity indicated on top and side. Wire held with internal set screw. Can be stacked for multiple connections.

Std. Pkg. 25

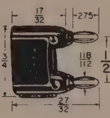
No.	NET Per C
210	$100.00

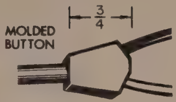
IT'S SOUND PLANNING TO "**SPECIFY SMITH**" WHEN DESIGNING OR PURCHASING

STOCKED BY
LEADING
DISTRIBUTORS
NATIONWIDE

MINIATURE DUAL BANANA PLUG PATCH CORDS (1/2" CENTERS)

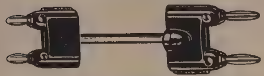
SPECIFY **SMITH**





All standard and miniature dual banana plug patch cords and instrument test adapters are molded to exacting specifications, in our plant. We welcome your inquiries for any variations to fit your special requirements.

MINIATURE DUAL BANANA PLUG TO STANDARD DUAL BANANA PLUG



HANDLES: Molded Butyrate, per Fed. Spec. L-P349A, Type 3, Class MS.

PLUG: Brass, Nickel plated.

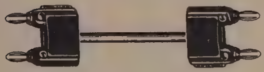
SPRING: Four-leaved Beryllium Copper, Nickel plate.

DESCR.: Mates with standard or miniature banana jacks or binding posts having ½" center or ¾" center. Polarity indicated by the word GROUND molded on side. Interconnects unlimited number of multiple circuits top and side. One end terminates in a miniature dual banana plug, ½" center, other end in a standard dual banana plug ¾" center.

WIRE: RC-174 Coaxial wire. **Std. Pkg. 10**

No.	Lgth.	NET Ea.
1729-12	12"	$ 4.35
1729-24	24"	4.45
1729-36	36"	4.55
1729-48	48"	4.65
1729-60	60"	4.75

MINIATURE DUAL BANANA PLUG BOTH ENDS



HANDLES: Molded BUTYRATE, per Fed. Spec. L-P349A Type 3, Class MS

PLUGS: Brass, Nickel plated.

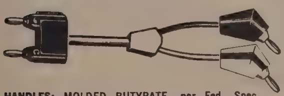
SPRING: Four-leaved Beryllium Copper, Nickel plated.

DESCR.: Mates with miniature dual binding posts or banana jacks having ½" centers. Polarity indicated by word GROUND molded on side. Interconnects unlimited number of multiple circuits on top and side. Each end terminated with molded double banana plug.

WIRE: RG-174/U Coaxial cable. **Std. Pkg. 10**

No.	Length	NET Ea.
1599-12	12"	$4.35
1599-24	24"	4.45
1599-36	36"	4.55
1599-48	48"	4.65
1599-60	60"	4.75

MINIATURE DUAL BANANA PLUG TO MINIATURE BANANA PLUGS



HANDLES: MOLDED BUTYRATE, per Fed. Spec. L-P349A, Type 3, Class MS. Black or Grey to match wire.

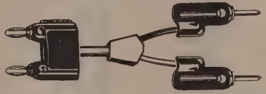
BODIES: Brass Nickel Plated, and Aluminum

SPRING: Four-leaved Beryllium copper, nickel plated.

WIRE: RG174/U Coaxial Cable **Std. Pkg. 10**

No.	Length	NET Ea.
1347-12	12 inches	$5.00
1347-24	24 inches	5.10
1347-36	36 inches	5.20
1347-48	48 inches	5.30
1347-60	60 inches	5.40

MINIATURE DUAL BANANA PLUG TO STANDARD CROSS PATCH PIN PLUGS



HANDLES: Molded BUTYRATE, per Fed Spec. L-P349A, Type 3, Class MS.

BODIES: Brass, Nickel plated.

SPRING: Four-leaved Beryllium Copper, Nickel plated.

WIRE: RG-174/U Coaxial cable.

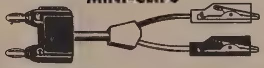
PLUGS: Our No. 1595, Red and Black.

DESCR.: Mates with miniature dual binding posts or banana jacks having ½" centers. Polarity indicated by word GROUND molded on side. Interconnects unlimited number of multiple circuits on top and side. One end terminates with double banana plug, other end with cross-patch pin plugs with standard .080" tip and jack in rear, banana jack in side, color coded Red and Black.

Std. Pkg. 10

No.	Length	NET Ea.
1535-12	12"	$5.35
1535-24	24"	5.45
1535-36	36"	5.55
1535-48	48"	5.65
1535-60	60"	5.75

MINIATURE DUAL BANANA PLUG TO INSULATED MINI-CLIPS



HANDLES: Molded BUTYRATE, per Fed. Spec. L-P348A, Class MS.

BODIES: Brass, Nickel plated.

SPRING: Four-leaved Beryllium Copper, Nickel plated.

CLIP: Steel cadmium plated (No. 338).

INSULATOR: Molded vinyl plastic (No. 389)

DESCR.: Mates with miniature dual binding posts or banana jacks having ½" centers. Polarity indicated by the word GROUND molded on side. One end terminates with double banana plug, other end with insulated miniature clips.

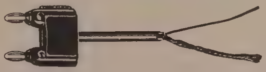
WIRE RG-174/U Coaxial cable. **Std. Pkg. 10**

No.	Length	NET Ea.
1739-12	12"	$5.35
1739-24	24"	5.45
1739-36	36"	5.55
1739-48	48"	5.65
1739-60	60"	5.75

"OFF-THE-SHELF"

SMITH Standard Products are stocked nationally on the shelves of every major Parts Distributor. That's ONE reason why Engineers and Purchasing Agents agree: "It's Sound Planning to SPECIFY SMITH!"

MINIATURE DUAL BANANA PLUG TO TINNED LEADS



HANDLE: Molded BUTYRATE, per Fed. Spec. L-P349A, Type 3, Class MS.

BODIES: Brass, Nickel plated.

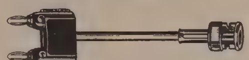
SPRING: Four-leaved Beryllium Copper, Nickel plated.

DESCR.: Mates with miniature dual binding posts or banana jacks having ½" centers. Polarity indicated by the word GROUND molded on side. One end terminates with double banana plug, other end stripped and tinned.

WIRE: RG-174/U Coaxial cable. **Std. Pkg. 10**

No.	Length	NET Ea.
1534-12	12"	$3.35
1534-24	24"	3.45
1534-36	36"	3.55
1534-48	48"	3.65
1534-60	60"	3.75

MINIATURE DUAL BANANA PLUG TO BNC MALE



HANDLES: Molded Butyrate, per Fed. Spec. L-P349A, Type 3, Class MS.

PLUG: Brass, Nickel plated.

SPRING: Four-leaved Beryllium Copper, Nickel plated.

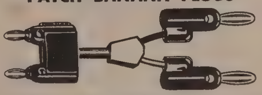
CONN.: BNC male.

DESCR.: Mates with miniature dual binding posts or banana jacks having ½" center. Polarity indicated by the word GROUND molded on side. One end terminates with the double banana plug, other end with BNC male conn.

WIRE: RG-174/U Coaxial cable. **Std. Pkg. 10**

No.	Length	NET Ea.
1748-12	12"	$5.35
1748-24	24"	5.45
1748-36	36"	5.55
1748-48	48"	5.65
1748-60	60"	5.75

MINIATURE DUAL BANANA PLUG TO MINIATURE CROSS PATCH BANANA PLUGS



HANDLES: Molded BUTYRATE, per Fed. Spec. L-P349A, Type 3, Class MS.

BODIES: Brass, Nickel Plated.

SPRING: Four-leaved Beryllium Copper, Nickel plated.

PLUGS: Our No. 1590, Red and Black.

DESCR.: Mates with miniature dual binding posts or banana jacks having ½" centers. Polarity indicated by word GROUND molded on side. Interconnects unlimited number of multiple circuits on top and side. One end terminates with double banana plug, other end with Cross-Patch banana plugs, color coded Red and Black.

WIRE: RG-174/U Coaxial cable. **Std. Pkg. 10**

No.	Length	NET Ea.
1738-12	12"	$5.35
1738-24	24"	5.45
1738-36	36"	5.55
1738-48	48"	5.65
1738-60	60"	5.75

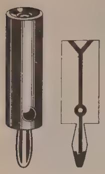
IT'S SOUND PLANNING TO **"SPECIFY SMITH"** WHEN DESIGNING OR PURCHASING

SPECIFY SMITH TEST LEAD ACCESSORIES

STOCKED BY LEADING DISTRIBUTORS NATIONWIDE

ADAPTER

Tip Plug to Banana Plug



HANDLE: MOLDED BUTYRATE, per Fed. Spec. L-P349A, Type 3, Class MS. Red and Black. SPECIFY COLOR

CONTACT: Beryllium Copper.

SPRING: Four-leaved phosphor bronze, nickel plated.

BODY: Brass, nickel plated.

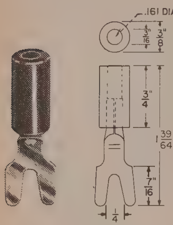
RATING: 15 Amps AC for 10°C Temp. rise, continuous duty.

DESCR.: Accepts standard phone tip plugs and adapts to standard banana plugs.

Std. Pkg. 50

No.	NET Per C
214	$55.00

INSULATED SPADE LUG



HANDLE: MOLDED BUTYRATE, per Fed. Spec. L-P349A, Type 3, Class MS. Red and Black. SPECIFY COLOR

LUG: Steel electro tinned, .020 thick.

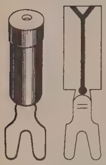
RATING: 15 Amp AC for 10°C Temp. rise, continuous duty.

DESCR.: Tapered slot ts studs from 1/4" dia. down to #6 dia. Fits all standard binding posts. Accepts standard banana plugs in rear. Solder bridge for wire connection up to No. 18 AWG.

No.	Description	Std. Pkg.	NET Per C
218	Insulated Spade Lug	100	$10.00
129	Lug Only	1000	2.80

ADAPTER

Tip Plug to Spade Lug



HANDLE: MOLDED BUTYRATE, per Fed. Spec. L-P349A, Type 3, Class MS. Red and Black. SPECIFY COLOR

CAP: MOLDED THERMOSETTING plastic, Red or Black per MIL-M-14CFG.

BODY: Brass.

CONTACT: Beryllium Copper, Gold Plated.

LUG: Steel electro tinned, .020 thick.

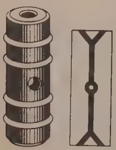
RATING: 15 Amps AC for 10°C Temp. rise, continuous duty.

DESCR.: Tapered slot fits studs from 1/4" dia. down to #6 Dia. Fits all standard binding posts. Accepts standard .080 phone tip plugs in rear.

Std. Pkg. 50

No.	Description	NET Per C
249	Adapter	$44.00

BANANA PLUG SPLICE



REAR: Standard or miniature banana jack.

FRONT: Standard or miniature banana jack. Banana jack hole for side stacking.

Std. Pkg. 50

No.	Description	NET Per C
245	Standard banana jack both ends	$28.00
5043	Miniature banana jack both ends	28.00
5034	Standard banana jack to min. banana jack	28.00

PHONE TIP PLUG SPLICE

HANDLE: MACHINED BUTYRATE, per MIL-P-10408A, Type I, Class II. Red. Black, Yellow, Green. SPECIFY COLOR

CAP: MOLDED PHENOLIC plastic, Red, Black, Yellow, Green.

BODY: Brass, nickel plated.

CONTACT: Phosphor bronze.

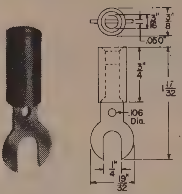
RATING: 15 Amps AC for 10°C Temp. rise, continuous duty.

DESCR.: Invaluable for quick splicing connections or for test lead extensions. Accepts standard phone tip plugs.

Std. Pkg. 50

No.	NET Per C
246	$33.00

INSULATED SPADE LUG



HANDLE: MOLDED BUTYRATE, per Fed. Spec. L-P349A, Type 3, Class MS. Red and Black. SPECIFY COLOR

LUG: Brass, .050 thick, nickel plated.

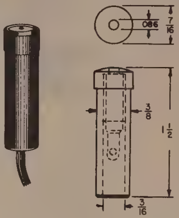
RATING: 30 Amps AC for 10°C Temp. rise, continuous duty.

DESCR.: 1/4" I.D. fits all standard Multi-purpose binding posts. Accepts up to #10 insulated wire, which solders in front hole.

Std. Pkg. 100

No.	NET Per C
400	$15.00

IN-LINE PHONE TIP JACK



HANDLE: MACHINED BUTYRATE, per MIL-P-10408A, Type I, Class II. Red, Black, Yellow, Green. SPECIFY COLOR

CAP: MOLDED PHENOLIC plastic, Red, Black, Yellow, Green.

BODY: Brass, nickel plated.

CONTACT: Phosphor bronze.

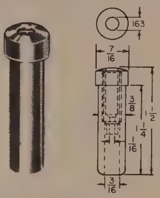
RATING: 15 Amps AC for 10°C Temp. rise, continuous duty.

DESCR.: Suitable for test lead extension where long leads are required. Accepts standard phone tip plug.

Std. Pkg. 50

No.	NET Per C
248	$23.00

IN-LINE BANANA JACK



HANDLE: MACHINED BUTYRATE, per MIL-P-10408A, Type I, Class II. Red, Black Yellow, Green. SPECIFY COLOR

CAP: MOLDED PHENOLIC plastic, Red, Black, Yellow, Green.

BODY: Brass, nickel plated.

RATING: 15 Amps AC for 10°C Temp. rise, continuous duty.

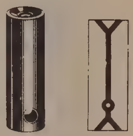
DESCR.: Suitable for test lead extension where long leads are required. Accepts standard banana plugs.

Std. Pkg. 50

No.	NET Per C
251	$23.00

COMBINATION SPLICE

Phone Tip to Banana Plug.



HANDLE: MOLDED BUTYRATE, per Fed. Spec. L-P349A, Type 3, Class MS. Red or Black Specify Color

BODY: Brass.

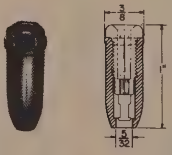
CONTACT: Beryllium copper, gold washed.

DESCR: Invaluable for quick splice of test leads. Accepts standard Banana plug one end, .080 phone tip other end.

Std. Pkg. 50

No.		NET Per C
496	Standard banana to tip jack	$33.00
5044	Miniature banana to tip jack	33.00

NYLON IN-LINE TIP JACK



HANDLE: MOLDED NYLON, per MIL-P-20693A. Specify color as coded above.

BODY: Molded Nylon, per MIL-P-20693A.

CONTACT: Phosphor Bronze, gold plated.

RATING: 15 Amps AC for 10°C Temp. rise, continuous duty, 5 KV 60 cycle AC continuous woring voltage.

DESCR.: Accepts all standard phone-tip plugs, with recessed contact for safe connection. Ideally suited for use in patch and extension cords. Can also be used for panel mounting where wrap-around terminal connection must be insulated at rear.

Std. Pkg. 50

No.	NET Per C
1513	$33.00

HAVE YOU SEEN OUR No.'s 699 AND 679 "UNIVERSAL TEST LEAD KITS" ON PAGE 2•835

IT'S SOUND PLANNING TO **"SPECIFY SMITH"** WHEN DESIGNING OR PURCHASING

STOCKED BY
LEADING
DISTRIBUTORS
NATIONWIDE

SINGLE INSTRUMENT TEST ADAPTERS

SPECIFY SMITH

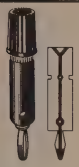
MATERIALS:
BODIES MACHINED: Butyrate, per MIL-P-10408A, Type 1, Class 2. Color Black or Red. Specify color by adding color code suffix to basic part No. as coded above.
CONDUCTORS: Brass, per QQ-B-626, Comp. 22, half hard.
SPRINGS: Four-leaved beryllium copper, heat-treated.
HEADS: Molded Nylon, Per MIL-P-20693A.
SCREWS: Steel, cadmium plated.

FINISHES:
CONDUCTORS: Nickel Plate, per QQ-N-290, Class I, Type VII.
SPRING: Nickel Plate, as above.
TERMINAL: Gold washed.

MECHANICAL:	Standard Adapters	Miniature Adapters
PHONE TIP:	.080 Dia. x ½″ long	.080 Dia. x ⅜″ long
BANANA PLUG:	.180/.170 Dia. x $^{9}\!/_{16}$″ long	.118/.112 Dia. x $^{9}\!/_{32}$″ long
PHONE JACKS:	.080 Dia	.080 Dia.
BANANA JACKS:	.161 Dia.	.104 Dia.
BODIES:	⅜″ Dia.	¼″ Dia.

RATINGS:
CURRENT: 15 Amps (Standard), 5 Amps (Miniature) AC for 10°C Temp. Rise, Continuous Duty, except where limited by co-axial connector.
VOLTAGE: 5 KV (Standard), 2 KV (Miniature) 60 cycle AC Continuous Working Voltage, except where limited by co-axial connector.
RESISTANCE: 1 Milliohm or less when seated in proper mating connectors.

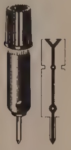
Colors: Red or Black, specify by adding Color Code Suffix



BINDING POST TO BANANA PLUG

REAR: Insulated 5-way binding post.
FRONT: Standard or Miniature Banana plug. Banana jack hole for side stacking.
Std. Pkg. 10

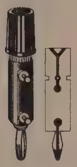
No.	Description	NET Per C
5025	Standard Adapter	$110.00
5035	Miniature Adapter	110.00



BINDING POST TO PHONE TIP

REAR: Insulated 5-way binding post.
FRONT: Standard .080 phone tip. Banana jack hole for side stacking. **Std. Pkg. 10**

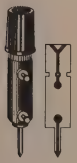
No.	Description	NET Per C
5026	Standard Adapter	$100.00
5036	Miniature Adapter	100.00



BINDING POST TO ISOLATED BANANA PLUG

REAR: Insulated 5-way binding post.
CENTER: Turret-terminal connections to isolated front and rear conductors allow insertion of component in series input circuit.
FRONT: Standard or miniature banana plug.
Std. Pkg. 10

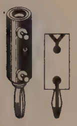
No.	Description	NET Per C
5027	Standard Adapter	$110.00
5037	Miniature Adapter	110.00



BINDING POST TO ISOLATED PHONE TIP

REAR: Insulated 5-way binding post.
CENTER: Turret-terminal connections to isolated front and rear conductors allow insertion of component in series input circuit.
FRONT: Standard .080 phone tip. **Std. Pkg. 10**

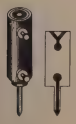
No.	Description	NET Per C
5028	Standard Adapter	$100.00
5038	Miniature Adapter	100.00



BANANA JACK TO ISOLATED BANANA PLUG

REAR: Standard or Miniature Banana Jack.
CENTER: Turret-terminal connections to isolated front and rear conductors allow insertion of component in series input circuit.
FRONT: Standard or miniature banana plug.
Std. Pkg. 10

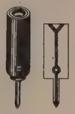
No.	Description	NET Per C
5029	Standard Adapter	$100.00
5039	Miniature Adapter	100.00



TIP JACK TO ISOLATED PHONE TIP

REAR: Standard .080 tip jack.
CENTER: Turret-terminal connections to isolated front and rear conductors allow insertion of component in series input circuit.
FRONT: Standard .080 phone tip. **Std. Pkg. 10**

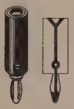
No.	Description	NET Per C
5030	Standard Adapter	$95.00
5040	Miniature Adapter	95.00



STACKING SOLDERLESS PHONE TIP

REAR: Standard or miniature banana jack for stacking.
SIDE: Wire-lead hole secures test lead with internal set-screw.
FRONT: Standard .080 phone tip. **Std. Pkg. 10**

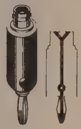
No.	Description	NET Per C
5031	Standard Adapter	$70.00
5041	Miniature Adapter	70.00



STACKING SOLDERLESS BANANA PLUG

REAR: Miniature Banana jack for stacking.
SIDE: Wire lead hole secures test lead with internal set-screw.
FRONT: Miniature banana plug.

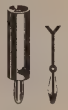
No.	Description	NET Per C
5042	Miniature Adapter	$65.00
5021	Standard Adapter	65.00



BNC SERIES JACK TO BANANA PLUG

REAR: BNC Series co-axial jack.
SIDE: Banana jack hole for side stacking.
FRONT: Standard banana plug. **Std. Pkg. 10**

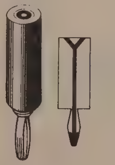
No.	Description	NET Per C
5032	Standard Adapter	$200.00



TIP JACK TO BANANA PLUG

REAR: Standard .080 phone tip jack.
FRONT: Standard or miniature banana plug. Banana jack hole for side stacking.
Std. Pkg. 50

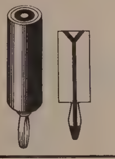
No.	Description	NET Per C
214	Standard Adapter	$50.00
5033	Miniature Adapter	50.00



MINIATURE BANANA JACK TO STANDARD BANANA PLUG ADAPTER

REAR: Miniature banana jack.
FRONT: Standard banana plug.
COLOR: Available in red or black. **Std. Pkg. 10**

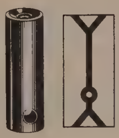
No.	Net per C
5075	$50.00



STANDARD BANANA JACK TO MINIATURE BANANA PLUG ADAPTER

REAR: Standard banana jack.
FRONT: Miniature banana plug.
COLOR: Available in red or black. **Std. Pkg. 10**

No.	Net per C
5076	$50.00



COMBINATION SPLICE

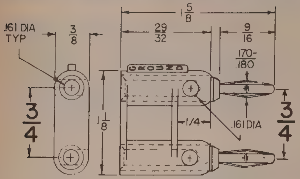
Phone Tip to Banana Plug

HANDLE: MOLDED BUTYRATE, per Fed. Spec. L-P349A, Type 3, Class MS. Red or Black Specify Color
BODY: Brass.
CONTACT: Beryllium copper, gold washed.
DESCR: Invaluable for quick splice of test leads. Accepts standard Banana plug one end, .080 phone tip other end.
Std. Pkg. 50

No.	Description	NET Per C
496	Standard banana to tip jack	$33.00
5044	Miniature banana to tip jack	33.00

IT'S SOUND PLANNING TO **"SPECIFY SMITH"** WHEN DESIGNING OR PURCHASING

SPECIFY SMITH STANDARD DUAL INSTRUMENT TEST ADAPTERS (3/4" CENTERS)



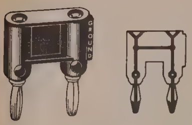
MATERIALS:
BODY: Molded Butyrate, per Fed. Spec. L-P349A, Type 3, Class MS. Color specified.
CONDUCTOR: Brass, per QQ-B-626, Comp. 22, ½ hard.
SPRING: Four-leaved beryllium copper, heat treated.
HEAD: Molded Nylon, per MIL-P-20693A.
SHIELD: Drawn Aluminum.
SCREWS: Steel, cadmium plated.

FINISHES:
SPRING: Nickel plate, as above.
CONDUCTOR: Nickel plate, per QQ-N-290, Class I, Type VII.
TERMINAL: Gold washed.
SHIELD: Black Anodized. **CONNECTOR:** TR-5 Non-Tarnish.

RATINGS:
CURRENT: 15 Amps AC for 10°C Temp. Rise, continuous duty, except where limited by co-axial connectors.
VOLTAGE: 5 KV, 60 cycle AC continuous working voltage, except where limited by co-axial connectors.
CAPACITY: 1.0 pf. nominal between ¾" spaced conductors.
RESISTANCE: 1 milliohm or less per conductor.

MOLDED-IN SHORTING TYPE

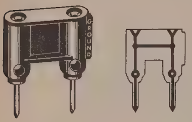
BANANA PLUG



REAR: Dual banana jacks on ¾" centers for stacking.
INTERNAL: Busbar shorted across line.
FRONT: Dual banana plugs on ¾" centers. Banana jack holes for side stacking.
COLORS: Available in Red and Black (Specify color) **Std. Pkg. 10**

No.	NET Ea.
1516	$ 1.00

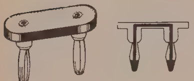
.080 PHONE TIP



REAR: Dual banana jacks on ¾" centers for stacking.
INTERNAL: Busbar shorted across line.
FRONT: Dual .080 phone tips on ¾" centers. Banana jack holes for side stacking.
COLORS: Available in Red and Black. (Specify color) **Std. Pkg. 10**

No.	NET Ea.
1692	$ 1.00

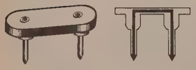
METAL SHORTING BAR TYPE



REAR: 3/32" thick brass busbar. 15 amps. continuous duty.
FRONT: Dual banana plugs on ¾" centers. Unit sits flush to panel. **Std. Pkg. 10**

No.	NET Ea.
1683	$ .75

METAL SHORTING BAR TYPE

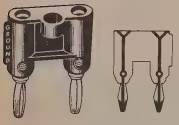


REAR: $\frac{3}{32}$" thick brass busbar ,15 Amps, continuous duty.
FRONT: Dual tip plugs on ¾" centers. Units sit flush to panel. **Std. Pkg. 10**

No.	NET Ea.
1796	$.66

CABLE MOUNTED

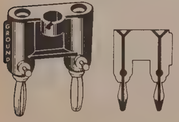
SET-SCREW TYPE



REAR: 7/32 Dia. cable guide. Dual banana jacks on ¾" centers.
FRONT: Dual banana plugs on ¾" centers. Set-screws secure leads to conductors.
COLORS: Available in Red and Black, (Specify color) **Std. Pkg. 10**

No.	NET Ea.
1675	$ .75

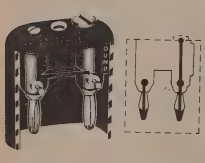
TURRET-TERMINAL TYPE



Same as above, except:
FRONT: Dual banana plugs on ¾" centers, Turret terminals for permanent solder connection of leads. **Std. Pkg. 10**

No.	NET Ea.
1676	$ .85

SHIELDED TYPE

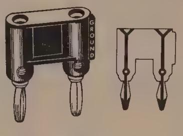


REAR: Mounting screw and locating boss. In-line cable entry with flush cable guide.
FRONT: Dual banana plugs ¾" centers. Turret terminals for permanent solder connection of leads.
SHIELD: Aluminum shield electrically connected to GND conductor fully enclosed plug and mating binding posts to reduce noise pickup. **Std. Pkg.**

No.	NET Ea.
1787	$2.25

COMPONENT MOUNTING

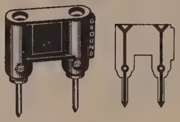
SET-SCREW BANANA



REAR: Dual banana jacks on ¾" centers for stacking.
FRONT: Dual banana plugs on ¾" centers. Set-screws secure component leads to conductors.
COLORS: Available in Red and Black as coded above. (Specify color) **Std. Pkg. 10**

No.	NET Ea
1677	$ .75

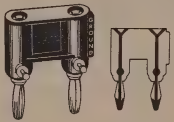
SET-SCREW PHONE-TIP



REAR: Dual banana jacks on ¾" centers for stacking.
FRONT: Dual .080" phone tips on ¾" centers. Set-screws secure component leads to conductors.
COLORS: Available in Red or Black only. (Specify color.) **Std. Pkg. 10**

No.	NET Ea.
1694	$ .75

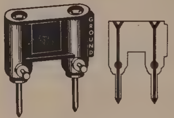
TURRET-BANANA



REAR: Dual banana jacks on ¾" centers for stacking.
FRONT: Dual banana plugs on ¾" centers. Turret terminals for permanent solder connection of component leads.
COLORS: Available in Red and Black as coded above. (Specify color) **Std. Pkg. 10**

No.	NET Ea.
1678	$ .85

TURRET-PHONE TIP

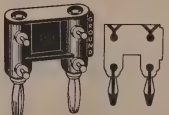


REAR: Dual phone tip jacks on ¾" centers for stacking.
FRONT: Dual .080" phone tips on ¾" centers. Turret terminals for permanent solder connections of component leads.
COLORS: Available in Red or Black only. (Specify color) **Std. Pkg. 10**

No.	NET Ea.
1693	$ .85

ISOLATION TYPE

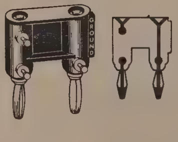
FOUR TERMINAL



REAR: Dual banana jacks on ¾" centers for stacking.
CENTER: Turret-terminal connections to isolated front and rear conductors in both GND and HOT circuits allow insertion of matching pad or other 4-terminal networks in input circuits of instruments.
FRONT: Dual banana plugs on ¾" centers.
COLORS: Available in Red and Black (Specify color) **Std. Pkg. 1**

No.	NET Ea.
1696	$3.25

THREE TERMINAL



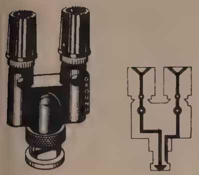
Same as above, except:
CENTER: Turret-terminal connections to isolated front and rear conductors in HOT circuit, and straight-thru connection of GND circuit, with terminal, allow insertion of "T" and "Pi" networks in input-output circuits in instruments. **Std. Pkg. 1**

No.	Net Ea.
1770	$2.50

IT'S SOUND PLANNING TO **"SPECIFY SMITH"** WHEN DESIGNING OR PURCHASING

STANDARD DUAL INSTRUMENT TEST ADAPTERS (3/4") CENTERS

SPECIFY **SMITH**



DUAL BINDING POST ADAPTERS

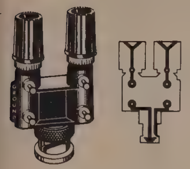
BINDING POSTS TO BNC MALE

Meets UG-144 I/U

REAR: Insulated dual 5-way binding posts, Red and Black heads on ¾" centers. Banana jack holes for side stacking.

FRONT: BNC series co-axial plug. **Std. Pkg. 1**

No.		NET Ea.
1688	Black body	$4.60



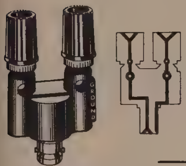
BINDING POSTS TO ISOLATED BNC MALE

REAR: Insulated dual 5-way binding posts, Red and Black heads on ¾" centers.

CENTER: Turret-terminal connections to isolated front and rear conductors in both GND and HOT circuits allow insertion of matching pad or other 4-terminal networks in input circuits.

FRONT: BNC series co-axial plug. **Std. Pkg. 1**

No.		NET Ea.
1698	Black body	$10.00

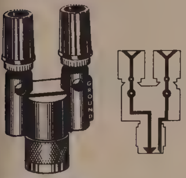


BINDING POSTS TO BNC FEMALE

REAR: Insulated dual 5-way binding posts, Red and Black heads on ¾" centers. Banana jack holes for side stacking.

FRONT: BNC series co-axial jack. **Std. Pkg. 1**

No.		NET Ea.
1689	Black body	$4.60

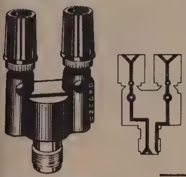


BINDING POSTS TO TNC MALE

REAR: Insulated dual 5-way binding posts, Red and Black heads on ¾" centers. Banana jack holes for side stacking.

FRONT: TNC series co-axial plug. **Std. Pkg. 1**

No.		NET Ea.
1776	Black body	$ 7.00

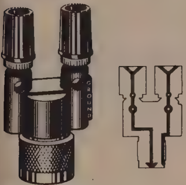


BINDING POSTS TO TNC FEMALE

REAR: Insulated dual 5-way binding posts, Red and Black heads on ¾" centers. Banana jack holes for side stacking.

FRONT: TNC series co-axial jack. **Std. Pkg. 1**

No.		NET Ea.
1777	Black body	$ 6.00

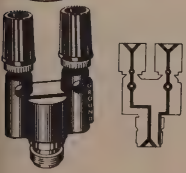


BINDING POSTS TO TYPE N MALE

REAR: Insulated dual 5-way binding posts, Red and Black heads on ¾" centers. Banana jack holes for side stacking.

FRONT: Type N co-axial plug. **Std. Pkg. 1**

No.		NET Ea.
1780	Black body	$ 7.00

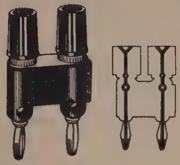


BINDING POSTS TO TYPE N FEMALE

REAR: Insulated dual 5-way binding posts, Red and Black heads on ¾" centers. Banana jack holes for side stacking.

FRONT: Type N co-axial jack. **Std. Pkg. 1**

No.		NET Ea.
1781	Black body	$ 6.00



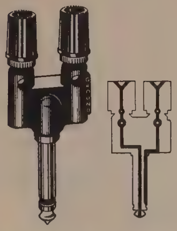
DUAL BINDING POST ADAPTERS

BINDING POSTS TO DUAL BANANA PLUGS

REAR: Insulated dual 5-way binding posts, Red and Black heads on ¾" centers. Banana jack holes for side stacking.

FRONT: Dual banana plugs on ¾" centers. **Std. Pkg. 1**

No.		NET Ea.
1682	Black body	$2.25

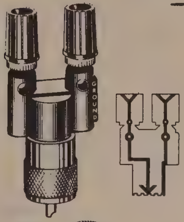


BINDING POSTS TO 2-CIRCUIT PHONE PLUG

REAR: Insulated dual 5-way binding posts, Red and Black heads on ¾" centers. Banana jack holes for side stacking.

FRONT: Standard ¼" 2-circuit phone plug.

No.	Std. Pkg. 1	NET Ea.
1684	Black body	$4.60

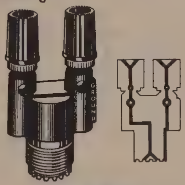


BINDING POSTS TO UHF MALE

REAR: Insulated dual 5-way binding posts, Red and Black heads on ¾" centers. Banana jack holes for side stacking.

FRONT: UHF series co-axial plug. **Std. Pkg. 1**

No.		NET Ea.
1695	Black body	$ 5.00

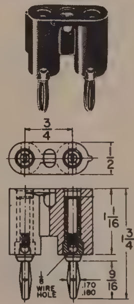


BINDING POSTS TO UHF FEMALE

REAR: Insulated dual 5-way binding posts, Red and Black heads on ¾" centers. Banana jack holes for side stacking.

FRONT: UHF series co-axial jack. **Std. Pkg. 1**

No.		NET Ea.
1691	Black body	$ 5.25



DUAL BANANA PLUG

BODY: MOLDED POLYSTYRENE, Red or Black. SPECIFY COLOR

PLUG: Brass, nickel plated.

SPRING: Four-leaved phosphor bronze, nickel plated.

SCREW: Steel, cadmium plated.

RATING: 15 Amps AC for 10°C Temp. rise, continuous duty. 5K Volts 60 cycle AC continuous working voltage. CAPACITANCE 1.0 mmfd. between conductors.

DESCR.: Mates with standard dual binding post ¾" centers. Polarity indicated on top and side. Wire held with internal set screw. Can be stacked for multiple connections. **Std. Pkg. 25**

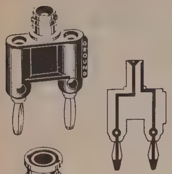
No.	NET Per C
210	$88.00

UTILIZE OUR IN-HOUSE INJECTION MOLDING FACILITIES for small or large quantities of insert molding on cables or components to your special requirements.

IT'S SOUND PLANNING TO **"SPECIFY SMITH"** WHEN DESIGNING OR PURCHASING

SPECIFY SMITH STANDARD DUAL INSTRUMENT TEST ADAPTERS (3/4" CENTERS)

COAXIAL CONNECTOR ADAPTERS

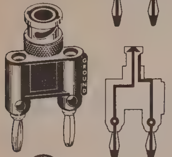


BNC FEMALE TO BANANA PLUGS

REAR: BNC series co-axial jack. Banana jack holes for side stacking.

FRONT: Dual banana plugs on ¾" centers. Banana jack holes for side stacking.

No.	Std. Pkg. 1	NET Ea.
1686	Black body	$2.60

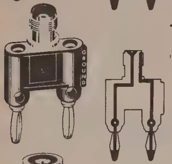


BNC MALE TO BANANA PLUGS

REAR: BNC series co-axial plug.

FRONT: Dual banana plugs on ¾" centers. Banana jack holes for side stacking.

No.	Std. Pkg. 1	NET Ea.
1687	Black body	$3.60

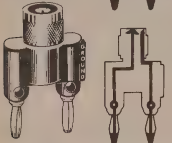


TNC FEMALE TO BANANA PLUGS

REAR: TNC series co-axial jack.

FRONT: Dual banana plugs on ¾" centers. Banana jack holes for side stacking.

No.	Std. Pkg. 1	NET Ea.
1774	Black body	$5.25

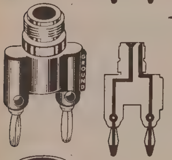


TNC MALE TO BANANA PLUGS

REAR: TNC series co-axial plug.

FRONT: Dual banana plugs on ¾" centers. Banana jack holes for side stacking.

No.	Std. Pkg. 1	NET Ea.
1775	Black body	$6.00

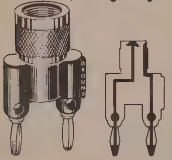


TYPE N FEMALE TO BANANA PLUGS

REAR: Type N co-axial jack.

FRONT: Dual banana plugs on ¾" centers. Banana jack holes for side stacking.

No.	Std. Pkg. 1	NET Ea.
1778	Black body	$5.25

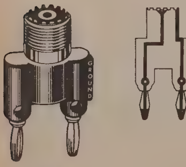


TYPE N MALE TO BANANA PLUGS

REAR: Type N co-axial plug.

FRONT: Dual banana plugs on ¾" centers. Banana jack holes for side stacking.

No.	Std. Pkg. 1	NET Ea.
1779	Black body	$6.00

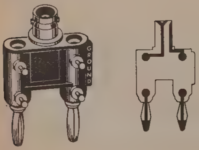


UHF FEMALE TO BANANA PLUGS

REAR: UHF series co-axial jack.

FRONT: Dual banana plugs on ¾" centers. Banana jack holes for side stacking.

No.	Std. Pkg. 1	NET Ea.
1690	Black body	$4.60



BNC FEMALE TO ISOLATED DUAL BANANA PLUGS

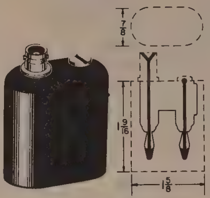
REAR: BNC series co-axial jack.

CENTER: Turret-terminal connections to isolated front and rear conductors in both GND and HOT circuits allow insertion of matching pad or other 4-terminal networks in input circuits.

FRONT: Dual banana plugs on ¾" centers.

No.	Std. Pkg. 1	NET Ea.
1697	Black body	$9.00

SHIELDED CO-AXIAL CONNECTOR ADAPTERS



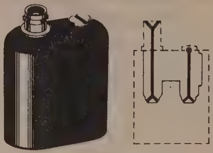
BNC FEMALE TO DUAL BANANA PLUGS

REAR: BNC series co-axial jack.

FRONT: Dual banana plugs on ¾" centers.

SHIELD: Aluminum shield electrically connected to GND conductor fully encloses plug and mating binding posts to reduce noise pickup.

No.	Std. Pkg. 1	NET Ea.
1783	Black body	$3.25



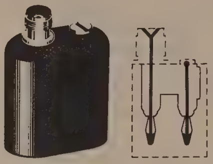
BNC FEMALE TO DUAL BANANA JACKS

REAR: BNC series co-axial jack.

FRONT: Dual banana plugs on ¾" centers.

SHIELD: Aluminum shield electrically connected to GND conductor fully encloses jacks and mating plug to reduce noise pickup.

No.	Std. Pkg. 1	NET Ea.
1784	Black body	$3.25



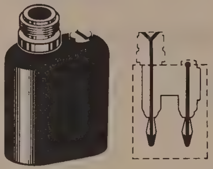
TNC FEMALE TO DUAL BANANA PLUGS

REAR: TNC series co-axial jack.

FRONT: Dual banana plugs on ¾" centers.

SHIELD: Aluminum shield electrically connected to GND conductor fully encloses plug and binding posts to reduce noise pickup.

No.	Std. Pkg. 1	NET Ea.
1785	Black body	$ 5.25



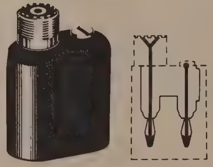
TYPE N FEMALE TO DUAL BANANA PLUGS

REAR: Type N co-axial jack.

FRONT: Dual banana plugs on ¾" centers.

SHIELD: Aluminum shield electrically connected to GND conductor fully encloses plug and binding posts to reduce noise pickup.

No.	Std. Pkg. 1	NET Ea.
1786	Black body	$ 5.25



UHF FEMALE TO DUAL BANANA PLUGS

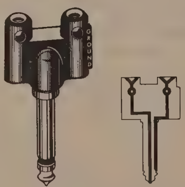
REAR: UHF series co-axial jack.

FRONT: Dual banana plugs on ¾" centers.

SHIELD: Aluminum shield electrically connected to GND conductor fully encloses plug and mating binding posts to reduce noise pickup.

No.	Std. Pkg. 1	Net Ea.
1788	Black body	$4.50

ADAPTERS

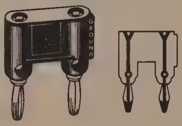


DUAL BANANA JACKS TO 2-CIRCUIT PHONE PLUG

REAR: Dual banana jacks on ¾" centers, rear and side, for stacking.

FRONT: Standard ¼" 2-circuit phone plug.

No.	Std. Pkg. 1	NET Ea.
1685	Black body	$2.60



DUAL PHONE-TIP TO DUAL BANANA PLUGS

REAR: Dual .080" phone tip jacks on ¾" centers.

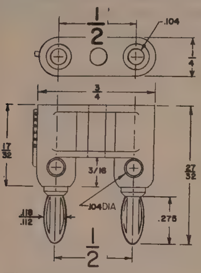
FRONT: Dual banana plugs on ¾" centers. Banana jack holes for side stacking.

No.	Std. Pkg. 10	NET Ea.
1679	Black body	$ .85

IT'S SOUND PLANNING TO **"SPECIFY SMITH"** WHEN DESIGNING OR PURCHASING

MINIATURE DUAL INSTRUMENT TEST ADAPTERS (1/2″) CENTERS

SPECIFY SMITH



SPECIFICATIONS

MATERIALS:

BODY: Molded Butyrate, per Fed. Spec. L-P349A, Type 3, Class MS. Color as specified.

CONDUCTOR: Brass, per QQ-B-626, Comp. 22, ½ hard.

SPRING: Four-leaved beryllium copper, heat treated.

HEAD: Molded Nylon, per MIL-P-20693A.

SCREWS: Steel, cadmium plated.

FINISHES:

CONDUCTOR: Nickel plate, per QQ-N-290, Class I, Type VII.

SPRING: Nickel plated.

TERMINAL: Gold washed.

CONNECTOR: TR-5 Non-tarnish Plate.

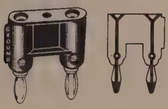
RATINGS:

CURRENT: 5 Amps AC for 10°C Temp. Rise, continuous duty, except where limited by co-axial connectors.

VOLTAGE: 2 KV, 60 cycle AC continuous working voltage, except where limited by co-axial connectors.

CAPACITY: 3.0 pf. nominal between ½″ spaced conductors.

RESISTANCE: 1 milliohm or less per conductor.



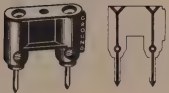
SET SCREW CONNECTION BANANA PLUGS

REAR: Dual banana jacks on ½″ centers for stacking.

FRONT: Dual banana plugs on ½″ centers. Set-screws secure leads to conductors.

COLORS: Available in Red or Black (Specify color.) **Std. Pkg. 10**

No.	NET Ea.
1749	$ .75



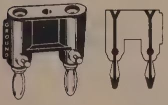
SET SCREW CONNECTION PHONE TIP

REAR: Dual banana jacks on ½″ centers for stacking.

FRONT: Dual .080″ phone tips on ½″ centers. Set-screws secure component leads to conductors.

COLORS: Available in Red or Black (Specify color.) **Std. Pkg. 10**

No.	NET Ea.
1754	$ .75



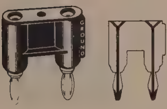
TURRET TERMINAL CONNECTION

REAR: Dual banana jacks on ½″ centers for stacking.

FRONT: Dual banana plugs on ½″ centers, Turret terminals for permanent solder connection of component leads.

COLORS: Available in Red or Black (Specify color.) **Std. Pkg. 10**

No.	NET Ea.
1750	$ .85



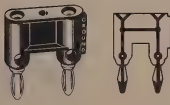
PHONE TIP ADAPTER

REAR: Dual .080″ phone tip jacks on ½″ centers for stacking.

FRONT: Dual banana plugs on ½″ centers.

COLORS: Available in Red or Black (Specify color.) **Std. Pkg. 10**

No.	NET Ea.
1751	$ .85



MOLDED-IN SHORTING TYPE BANANA PLUGS

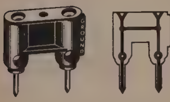
REAR: Dual banana jacks on ½″ centers for stacking.

INTERNAL: Busbar shorted across line.

FRONT: Dual banana plugs on ½″ centers. Banana jack holes for side stacking.

COLORS: Available in Red or Black (Specify color.) **Std. Pkg. 10**

No.	NET Ea.
1752	$ .75



MOLDED-IN SHORTING TYPE .080 PHONE TIP

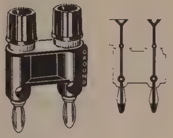
REAR: Dual banana jacks on ½″ centers for stacking.

INTERNAL: Busbar shorted across line.

FRONT: Dual .080 phone tips on ½″ centers. Banana jack holes for side stacking.

COLORS: Available in Red or Black (Specify color.) **Std. Pkg. 10**

No.	NET Ea.
1753	$ .75

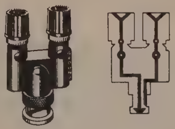


BINDING POSTS TO DUAL BANANA PLUGS

REAR: Insulated dual 5-way binding posts, Red and Black heads on ½″ centers. Banana jack holes for side stacking.

FRONT: Dual banana plugs on ½″ centers. **Std. Pkg. 1**

No.		NET Ea.
1755	Black only	$2.25

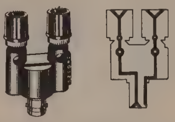


BINDING POSTS TO BNC MALE

REAR: Insulated dual 5-way binding posts, Red and Black heads on ½″ centers. Banana jack holes for side stacking.

FRONT: BNC series co-axial plug. **Std. Pkg. 1**

No.		NET Ea.
1756	Black only	$4.60

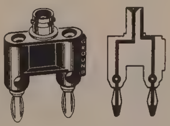


BINDING POSTS TO BNC FEMALE

REAR: Insulated dual 5-way binding posts, Red and Black heads on ½″ centers. Banana jack holes for side stacking.

FRONT: BNC series co-axial jack. **Std. Pkg. 1**

No.		NET Ea.
1757	Black only	$4.60

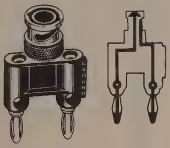


BNC FEMALE TO BANANA PLUGS

REAR: BNC series co-axial jack. Banana jack holes for stacking.

FRONT: Dual banana plugs on ½″ centers. Banana jack holes for side stacking.

No.	Std. Pkg. 1	NET Ea.
1758	Black only	$ 3.00



BNC MALE TO BANANA PLUGS

REAR: BNC series co-axial plug.

FRONT: Dual banana plugs on ½″ centers. Banana jack holes for side stacking.

No.	Std. Pkg. 1	NET Ea.
1759	Black only	$ 3.95

METAL SHORTING BAR TYPE

REAR: 3/32″ thick brass busbar, 15 Amps, continuous duty.

FRONT: Dual miniature banana plugs on ½″ centers. Unit sits flush to panel. **Std. Pkg. 10**

No.	Net per C
1795	$66.00

IT'S SOUND PLANNING TO **"SPECIFY SMITH"** WHEN DESIGNING OR PURCHASING

SPECIFY SMITH R.F. CONNECTORS & ADAPTERS

MALE CABLE CONNECTORS

Crimp Type

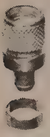


FIG.1

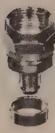


FIG.2

FIG.3

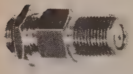
Designed to crimp onto cable, and use the center conductor of the cable for the male pin. For use with RG-59/U, RG-11/U and RG-6/U cable.
Std. Pkg. 25

No.	Style	Fig.	Descr.	NET Each
1652	C-52	1	RG-59/U Separate Ring	$.48
1816	F-59	2	RG-59/U Separate Ring	.30
1817	F-59A	3	RG-59/U Integral Ring	.35
1818	F-56	2	RG-6/U Separate Ring	.35
1819	F-11	2	RG-11/U Separate Ring	.60

FEMALE CHASSIS FITTINGS

Designed to accept above "C" and "F" series connectors. Supplied with nut and washer. Std. Pkg. 25

No.	Style	Descr.	NET Each
1660	C-61	Mounts in 5/16" hole	$.90
1820	F-61	Mounts in 3/8" hole	.50



CABLE COUPLINGS

Female splice fittings for joining two cables with above series "C" and "E" connectors. Can also be used as bulkhead thru fittings. Supplied with nut for bulkhead mount.
Std. Pkg. 25

No.	Style	Descr.	NET Each
1680	C-81	Mounts in 1/4" hole	$.90
1821	F-81	Mounts in 3/8" hole	.70

ACCESSORIES

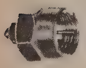


FIG.4

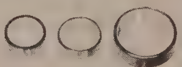


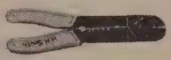
FIG.5

Fig. 4
"F" Series 75-ohm termination, 1/4 Watt 5%.
No. 1822 Std. Pkg. 25 NET Each $.75

Fig. 5

No.	Crimp Ring for:	Std. Pkg.	NET Per C
1823	RG-59/U Cable	100	$2.50
1824	RG-11/U Cable	100	4.50
1825	RG-6/U Cable	100	3.50

CRIMPING TOOL

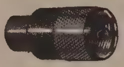


Combination crimp and stripping tool for above connectors.
Std. Pkg. 1
No. 1826 NET Each $3.60

SEE R.F. PATCH CORDS PAGES 2•837 AND 2•838.

COAXIAL CONNECTORS

R.F. Connectors for use with RG-6, 8, 11, 58 and 59/U coaxial cables.



STRAIGHT

Solder Type

Brass, Silver-plated shell. Std. Pkg 10

No.	Type	NET Ea.
1713	PL-259	$ .80

CHASSIS TYPE

Std. Pkg. 10

		NET Ea.
1715	SO-239	$ .80

JUNCTION

Std. Pkg. 10

For joining separate cable lengths.		NET Ea.
1716	PL-258	$1.22

CABLE REDUCING ADAPTER

Std. Pkg. 10

No.	Type	Wire	NET per C
1719	UG-175 U	58/U	$27.00
1711	UG-176 U	59/U	27.00

BNC FEMALE JACK

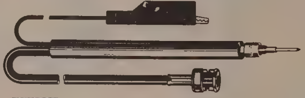
No.	Type	Descr.	NET Ea.
1768	UG-1094/U	Single Hole Jack	$1.00

BNC FEMALE TO TEST PROBE

HANDLE: Molded Butyrate, per Federal Spec. L-P349A, Type 3, Class MS. BLACK.
TIP: .080 Brass Nickel Plated.
CONNECTOR: BNC Female.
DESCR.: Permits the use of coaxial cables terminated with a BNC Male for all circuit testing. Probe shielded within 1" from tip.
Std. Pkg. 1

No.	NET Ea.
1797	$4.85

BNC MALE TO TEST PROBE

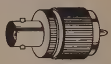


HANDLE: Molded Butyrate per Federal Spec. L-P349A, Type 3, Class MS, RED.
TIP: .080 Brass Nickel Plated.
CONNECTOR: BNC Male.
WIRE: RG-58/U, 48" long.
CLIP: Miniature steel alligator clip, cadmium plated with black insulator.
DESCR.: Permits the use of probe testing with any equipment utilizing a BNC female termination. Probe shielded within 1" from tip.
Std. Pkg. 1

No.	NET Ea.
1798	$5.85

ADAPTERS

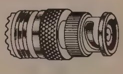
BNC FEMALE TO UHF MALE



FRONT: UHF plug.
REAR: BNC jack.
DESCR.: Permits the use of a BNC plug on equipment using a UHF jack. Std. Pkg. 1

No.	NET Ea.
1703	$2.50

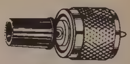
UHF FEMALE TO BNC MALE



FRONT: BNC plug.
REAR: UHF jack.
DESCR.: Permits the use of a UHF plug to equipment using a BNC jack. Std. Pkg. 1

No.	NET Ea.
1700	$4.00

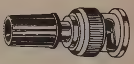
BINDING POST TO UHF MALE



FRONT: UHF male.
REAR: Insulated 5-way binding post.
DESCR.: Permits the adaptation of a 5-way insulated binding post to equipment using a UHF jack. Available in Red or Black.
Std. Pkg. 1

No.	NET Ea.
1706	$3.50

BINDING POST TO BNC MALE



FRONT: BNC male.
REAR: Insulated 5-way binding post.
DESCR.: Permits adaptation of a 5-way insulated binding post to equipment using a BNC jack. Available in Red or Black. Std. Pkg. 1

No.	NET Ea.
1705	$3.50

BNC MALE TO BNC MALE

FRONT: BNC plug.
REAR: BNC plug.
DESCR.: Permits interconnection between cable terminations with BNC jacks. Std. Pkg. 1

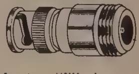
No.	NET Ea.
1704	$4.40

BNC FEMALE TO TYPE "N" MALE

FRONT: Type "N" plug.
REAR: BNC jack
DESCR.: Permits the use of a BNC plug on equipment using a Type "N" jack. Std. Pkg. 1

No.	NET Ea.
1701	$2.50

TYPE "N" FEMALE TO BNC MALE



FRONT: BNC plug.
REAR: Type "N" jack.
DESCR.: Permits the use of a type "N" plug on equipment using a BNC jack. Std. Pkg. 1

No.	NET Ea.
1702	$4.40

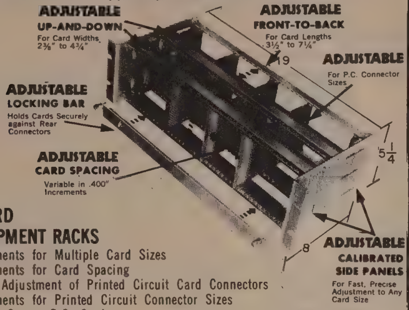
IT'S SOUND PLANNING TO "**SPECIFY SMITH**" WHEN DESIGNING OR PURCHASING

STOCKED BY
LEADING
DISTRIBUTORS
NATIONWIDE

P.C. CARD RACK & "HOOKON" SPECIFY SMITH

UNIVERSALLY ADJUSTABLE, STACKABLE PRINTED CIRCUIT CARD RACK

Complete and Economical Support System for Printed Circuit Card


ADJUSTABLE
UP-AND-DOWN
For Card Widths 2⅜" to 4¾"
ADJUSTABLE
FRONT-TO-BACK
For Card Lengths 3½" to 7¼"
19
ADJUSTABLE
For P.C. Connector Sizes
ADJUSTABLE
LOCKING BAR
Holds Cards Securely against Rear Connectors
5¼
ADJUSTABLE
CARD SPACING
Variable in .400" Increments
8
ADJUSTABLE
CALIBRATED
SIDE PANELS
For Fast, Precise Adjustment to Any Card Size

CARD RACK
CAT. NO. 3050
Suggested
Resale Each
$27.95

FITS STANDARD 19-INCH EQUIPMENT RACKS

- Simple Adjustments for Multiple Card Sizes
- Simple Adjustments for Card Spacing
- Front to Back Adjustment of Printed Circuit Card Connectors
- Simple Adjustments for Printed Circuit Connector Sizes
- Locking Bar to Secure P.C. Cards
- Complete with Board Guides

SPECIFICATIONS

CARD CAPACITY Up to 39 cards, depending on component height.

CARD SIZES 1/16" thick standard

With Locking Bar Feature:	Without Front Card Lock:
Maximum Card Width: 4³/4"	Maximum Card Length: 7¹/4"
Maximum Card Length: 6¹/2"	Minimum Card Length: 3¹/2"
Minimum Card Width: 2³/8"	
Minimum Card Length: 4³/8"	

CARD SPACING .400" Min. Centers. Adjustable in .400" increments.

CARD GUIDES Precision Molded Plastic. Four guides provided for each card to insure location accuracy. Guides nest together in staggered holes for minimum practical card spacing

ADJUSTABILITY All card guide and connector rails slide smoothly on Nylon bushings for ease in adjusting. Card rails adjust symmetrically to keep cards centered in rack. Connector rails adjust front-to-back to keep cards against locking rail. Adjust index marks permanently stamped on side plates for standard card sizes.

CONNECTOR SPACING Accomodates card-edge connectors with mounting centers from 0.936" minimum to 4.437" maximum.

CONSTRUCTION Heavy-gauge clear Anodized aluminum. Guide and alignment members are extrusions for maximum precision of fits.

DIMENSIONS Designed to fit standard 19" equipment racks, 5¹/4" panel space. Length 19"; Width 5¹/4"; Depth 8".

ASSEMBLY Supplied knocked-down. All hardware, card guides, and complete assembly instructions included.

SPECIAL FEATURES

LOCKING BAR Front locking bar holds cards securely against rear connectors. Held in place with captive screws for rapid card change. Card identification marking available on front of locking bar.

STACKING Can be stacked for wider panels in multiples of 5¹/4". Accessory brackets available for free-standing stacking.

SPECIALS Special color anodized finishes available on request. Non-standard sizes available on special order.

REPLACEMENT PARTS

Cat. No.	Description	NET Ea.	Cat. No.	Description	NET Ea.
3050-1	Guide Rail	$2.50	3050-10	Screw, 6-32 x 5/16, Type F Phillips	.01
3050-2	Guide Rail Bracket	.50	3050-11	Hex Nut, 4-40 x ¼	.01
3050-3	Connector Rail Bracket	1.25	3050-12	Lockwasher, Int. Tooth, #4	.01
3050-4	Connector Rail	1.00	3050-13	Nylon Guide Bushing	.02
3050-5	Side Plate	2.50	3050-14	Captive Screw	.15
3050-6	Locking Bar Bracket	.50	3050-16	Nylon Washer	.02
3050-7	Locking Bar	1.50	3050-17	Plastic Card Guide	.05
3050-8	Screw, 4-40 x ¼, Type F Phillips	.01	3050-18	Instructions	.50
3050-9	Screw, 4 40 x ⅜, Type F Phillips	.01			

P.C. CARD RACK BLANK END PLATES

Anodized aluminum blank-end plates for P.C. card racks. Designed for use with the standard No. 3050 hardware, to design custom rack sizes. Flanged and notched for RETMA mounting. Drill templates furnished with each pair of end plates to facilitate drilling within the P.C. card size limitations. Available in pairs.

Std. Pkge. 1 Pair

No.	Length	Height	Centers	Net Per Pair
3052	7.812	5.219	1.125	$4.80
3053	9.000	6.970	2.000	5.80
3054	11.000	8.718	2.875	7.00
3055	12.000	5.219	1.125	5.80
3056	12.000	10.470	3.750	9.00

P.C. CARD RACK STACKING PLATES

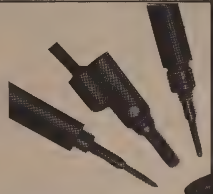
Designed to stack one or more No. 3050 card racks. Can also be used to create a double size card rack to accommodate larger size cards. Made of anodized aluminum, supplied with mounting hardware, available in pairs. Std. Pkge. 1 Pair

No.	Net Per Pair
3057	$3.50

"HOOKON"

PROBE FOR HIGH DENSITY AREAS.

Easy to use . . . Versatile . . . Reaches into the densest wiring areas, quickly

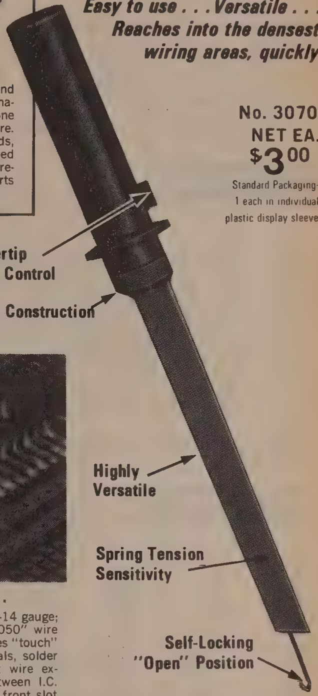


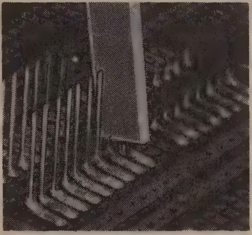
Universal Input Application

"The Hookon" accepts and adapts to existing terminations and banana plugs; phone tips, test prods and wire. When used with test prods, the overall length is increased to further reach into deeply restricted areas. All metal parts are completely enclosed.

No. 3070
NET EA.
$3.00

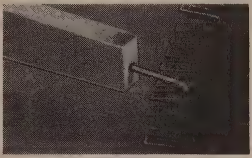
Standard Packaging 1 each in individual plastic display sleeve


Fingertip Slide Control
Rugged Lexan* Construction
Highly Versatile
Spring Tension Sensitivity
Self-Locking "Open" Position



Test Point Capability . . .

connects to bare wires — 26-14 gauge; .025" square; and .025" x 050" wire wrap terminations. It simplifies "touch" contact to P.C. pads, terminals, solder junctions, etc., with contact wire extended and locked. Fits between I.C. terminals on .100" centers; front slot accepts tails without extending contact.



Contact Sensitivity . . .

"The Hookon" offers positive tensioned contact to all terminations without danger of damage or marring. The contact is made of corrosion resistant steel, while the entire unit is precision molded of sturdy Lexan* for long term durability, heat resistance and high levels of insulation. The slide button is in white and the body mold in red.

Use Vertically or Laterally . . .

"The Hookon" reaches through the densest wire jungles and hooks onto leads, pins, square wire wraps† for safe, sure connections. The fingertip slide control includes a self-locking open position and a "no hands spring grip" upon trigger release.

Designed for Scopes, DVM's, VTVM's and Other Test Gear; for Use in Field, or Laboratory. Probes all types of Discrete Components, Computer System Logic and Matrix P.C. Boards; Integrated Circuitry and High Density Electronic Circuitry.

*Lexan is a GE Trademark
†Registered trade-mark of Gardner-Denver Co

IT'S SOUND PLANNING TO **"SPECIFY SMITH"** WHEN DESIGNING OR PURCHASING

SPECIFY SMITH P.C. PRE-PUNCH BOARDS

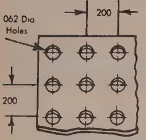
STOCKED BY
LEADING
DISTRIBUTORS
NATIONWIDE

SPECIFICATIONS

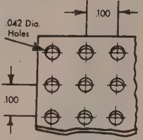
All boards are precision-punched and pre-cut to size with various spacings to accommodate and provide economical mounting of components in Electronic circuitry. They are ideal for production and prototype uses. They can be etched as required, drilled, punched or sawed. The following specifications apply:

XXXP—**Phenolic** unclad, Type PBE-P per MIL-P-3115, 250° F Max.
EXXXP — **Epoxy Paper,** Type PEE per MIL-P-22324, 250° F Max.
XXXPC — **Phenolic,** Copper Clad, Type PP per MIL-P-13949, 250° F Max.
G-10 — **Epoxy Glass,** unclad, Type GEE per MIL-P-18177, 300° F Max.
G-10 — **Epoxy Glass,** Copper Clad, Type GE per MIL-P-13949B, 300° Max.

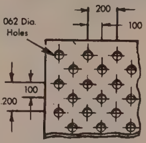
Many Others Available — Specials — Inquire



"F" PATTERN



"P" PATTERN



"G" PATTERN

"F" PATTERN

.062 Holes .200 Centers 1/16" Thickness Std. Pkg. 10

MATERIALS AVAILABLE

Size	No. of Holes	XXXP No.	XXXP NET Per C	G-10 No.	G-10 NET Per C	XXXP 1 Side Copper Clad No.	XXXP 1 Side Copper Clad NET Per C	G-10 1 Side Copper Clad No.	G-10 1 Side Copper Clad NET Per C
3x4	15x20	6001	28.00	6014	72.00	6027	39.00	6040	100.00
3x4.5	15x22	6002	35.00	6015	81.00	6028	45.00	6041	110.00
3x6	15x30	6003	45.00	6016	105.00	6029	60.00	6042	150.00
3x6.5	15x32	6004	48.00	6017	115.00	6030	62.00	6043	160.00
3.5x4	17x20	6005	33.00	6018	82.00	6031	45.00	6044	114.00
3.5x4.5	17x22	6006	36.50	6019	91.00	6032	50.00	6045	127.00
3.5x6	17x30	6007	50.50	6020	120.00	6033	67.00	6046	155.00
3.5x6.5	17x32	6008	55.50	6021	131.00	6034	73.00	6047	183.00
4x4.5	20x22	6009	45.00	6022	108.00	6035	60.00	6048	150.00
4x6	20x30	6010	56.00	6023	138.00	6036	75.00	6049	192.00
4x6.5	20x32	6011	60.00	6024	147.00	6037	81.00	6050	207.00
4.5x6	22x30	6012	61.50	6025	152.00	6038	83.00	6051	207.00
4.5x6.5	22x32	6013	66.00	6026	162.00	6039	88.00	6052	230.00

"P" PATTERN

.042 Holes .100 Centers 3/64" Thickness Std. Pkg. 10

MATERIALS AVAILABLE

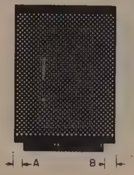
Size	No. of Holes	G-10 No.	G-10 NET Per C	G-10 1 Side Copper Clad No.	G-10 1 Side Copper Clad NET Per C
2.5x4	25x40	6092	66.00	6109	90.00
2.5x4.5	25x45	6093	74.00	6110	100.00
2.5x6	25x60	6094	99.00	6111	134.00
2.5x6.5	25x65	6095	105.00	6112	142.00
3x4	30x40	6096	77.00	6113	105.00
3x4.5	30x45	6097	85.00	6114	115.00
3x6	30x60	6098	110.00	6115	155.00
3x6.5	30x65	6099	122.00	6116	165.00
3.5x4	35x40	6100	88.00	6117	119.00
3.5x4.5	35x45	6101	96.00	6118	132.00
3.5x6	35x60	6102	127.00	6119	177.00
3.5x6.5	35x65	6103	135.00	6120	184.00
4x4.5	40x45	6104	114.00	6121	155.00
4x6	40x60	6105	144.00	6122	197.00
4x6.5	40x65	6106	152.00	6123	212.00
4.5x6	45x60	6107	157.00	6124	220.00
4.5x6.5	45x65	6108	168.00	6125	235.00

"G" PATTERN

.062 Holes .100 x .200 Alternate Centers 1/16" Thickness Std. Pkg. 10

MATERIALS AVAILABLE

Size	No. of Hole	XXXP No.	XXXP NET Per C	G-10 No.	G-10 NET Per C	G-10 1 Side Copper Clad No.	G-10 1 Side Copper Clad NET Per C
3x4	(15x20)2	6053	30.00	6066	72.00	6079	100.00
3x4.5	(15x22)2	6054	32.50	6067	81.00	6080	110.00
3x6	(15x30)2	6055	45.00	6068	105.00	6081	150.00
3x6.5	(15x32)2	6056	48.00	6069	115.00	6082	160.00
3.5x4	(17x20)2	6057	37.00	6070	80.00	6083	114.00
3.5x4.5	(17x22)2	6058	36.50	6071	91.00	6084	127.00
3.5x6	(17x30)2	6059	50.50	6072	120.00	6085	155.00
3.5x6.5	(17x32)2	6060	55.50	6073	131.00	6086	183.00
4x4.5	(20x22)2	6061	45.00	6074	108.00	6087	150.00
4x6	(20x30)2	6062	56.00	6075	138.00	6088	192.00
4x6.5	(20x32)2	6063	60.00	6076	147.00	6089	207.00
4.5x6	(22x30)2	6064	61.50	6077	152.00	6090	207.00
4.5x6.5	(22x32)2	6065	66.00	6078	162.00	6091	230.00



4.5" x 6.5" PLUG-IN CARDS WITH ETCHED FINGERS

.062 Holes. .100 x .200 Alternate Centers.
.156 Spacing. 1/16" Thickness. **Std. Pkg. 5**

Total Con-tacts	1 or 2 Sides	Fig. A	Fig. B	G-10 No.	G-10 NET Ea.	XXXP No.	XXXP NET Ea.
43	2	.408	.508	6126	6.40	6130	4.90
43	2	.458	.458	6127	5.80	6131	4.90
22	1	.408	.508	6128	4.90	6132	3.30
22	1	.458	.458	6129	4.90	6133	3.30

CONNECTOR INFORMATION:

With Plug-In Cards SMITH Nos.	Use SMITH Connector Commercial No.	Military No.
6126 and 6130	6227	6212
6127 and 6131	6227	6212
6128 and 6132	6220	6204
6129 and 6133	6220	6204

FIG. 1

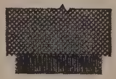


FIG. 2

PLUG-IN CARDS WITH ELCO "VARICON" CONTACTS

.062 Holes. .100 x .200 Alternate Centers.
1/16" Thickness. **Std. Pkg. 1**

No.	Fig.	No. of Con-tacts	Size	Material	NET Ea.
6134	1	16	4.5x6.5	Paper Epoxy	5.20
6135	1	16	4.5x6.5	Glass Epoxy	5.50
6136	1	12	3x4.5	Paper Epoxy	3.90
6137	1	12	3x4.5	Glass Epoxy	4.20
6138	1	14	3x4.5	Paper Epoxy	3.90
6139	1	14	3x4.5	Glass Epoxy	4.50
6140	2	35	4.5x6.5	Glass Epoxy	9.80
6141	2	35	4.5x6.5	Paper Epoxy	8.50

CONNECTOR INFORMATION:

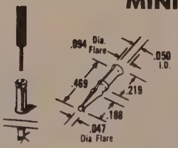
Plug-In Cards, SMITH Nos.	Use Elco Connector No.
6134 and 6135	5009-016-156-001
6136 and 6137	5009-012-156-001
6138 and 6139	5004-014-103-002
6140	7008-035-146-001
6141	7001-035-146-001

BLANK PANELS

1 and 2 Sides Copper.
1/16" Thickness. **Std. Pkg. 5**

Size	XXXP Copper 1 Side No.	XXXP Copper 1 Side NET Per C	XXXP Copper 2 Sides No.	XXXP Copper 2 Sides NET Per C	G-10 Copper 1 Side No.	G-10 Copper 1 Side NET Per C	G-10 Copper 2 Sides No.	G-10 Copper 2 Sides NET Per C
3x4.5	6142	38.00	6144	51.00	6146	88.00	6148	98.00
4.5x6.5	6143	70.00	6145	98.00	6147	170.00	6149	193.00

MINIATURE TUBULAR TERMINALS

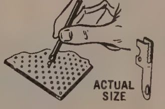


For .062-.067 Diam. Hole

For printed circuits. Suitable for mounting transistors, resistors, neons, etc. Tapered section retains wire leads. Positive locking in hole, no staking required. Firmly holds wires of .010 to .050 diam. **Material:** .006 thick brass, precision-formed and pre-tinned. **Std. Pkg.** 100
No. 6160 **NET Per C $2.00**

INSERTION TOOL, for hand insertion.
No. 6161 Std. Pkg. 6 NET Each $1.25

PUSH-IN TERMINALS For .062 Diam. Holes



Miniature type, excellent for point-to-point or feed-thru wiring. Serrated slot grips transistor or heavier leads. Multiple connections quickly and easily made. **Material:** .008 thick Beryllium Copper. **Finish:** Fused Tin Plate. **Std. Pkg.** 100
No. 6162 **NET Per C $2.20**

INSERTION TOOL, for hand insertion.
No. 6163 Std. Pkg. 6 **NET Each $1.35**

IT'S SOUND PLANNING TO **"SPECIFY SMITH"** WHEN DESIGNING OR PURCHASING

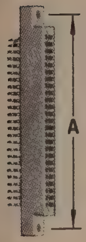
STOCKED BY
LEADING
DISTRIBUTORS
NATIONWIDE

P.C. CONNECTORS, ACCESS. SPECIFY SMITH

PRINTED CIRCUIT CONNECTORS

COMMERCIAL

INSULATOR: Glass filled blue Alkyd.
CONTACTS: Beryl Copper .00001 gold flash; pierced terminal.
ACCEPTS: 1/16″ Printed Circuit Cards.
MTG. HOLE: .125 Clearance.
DESCR.: Bifurcated bellows action assures positive electrical contact.



.156 SPACING

.125 Mtg. Hole Clearance.
Pierced Terminal Std. Pkg. 5

Smith No.	No. of Con-tacts	Single or Double	A Mtg. Centers	NET Ea.
6216	6	S	1.531	1.85
6217	10	S	2.156	1.95
6218	15	S	2.937	1.80
6219	18	S	3.406	2.70
6220	22	S	4.031	2.80
6221	28	S	5.046	4.75
6222	36	S	6.219	3.70
6223	12	D	1.531	1.90
6224	20	D	2.156	1.95
6225	30	D	2.937	1.85
6226	36	D	3.406	2.75
6227	44	D	4.031	2.80
6228	56	D	5.046	4.75
6229	72	D	6.219	3.80
6230	86	D	7.302	4.35

MILITARY - MIL-C-21097

INSULATOR: Diallyl Phthalate, Green, Type GDI-30 per MIL-P-19833.
CONTACTS: Beryl. Copper .000031 gold per MIL-G-45204, Type II over .0005 silver per QQ-5-365, pierced terminal.
ACCEPTS: 1/16″ Printed Circuit Cards.
MTG. HOLE: .125 Clearance.
DESCR.: Bifurcated bellows action assures positive electrical contact.

.156 SPACING

.125 Mtg. Hole Clearance.
Pierced Terminal Std. Pkg. 5

No. Smith	No. of Con-tacts	Single or Double	A Mtg. Centers	NET Ea.
6200	6	S	1.531	3.10
6201	10	S	2.156	3.30
6202	15	S	2.937	3.65
6203	18	S	3.406	4.15
6204	22	S	4.031	4.35
6205	28	S	5.046	4.75
6206	36	S	6.219	5.20
6207	43	S	7.302	8.00
6208	12	D	1.531	3.25
6209	20	D	2.156	3.35
6210	30	D	2.937	3.65
6211	36	D	3.406	4.15
6212	44	D	4.031	4.35
6213	56	D	5.046	4.75
6214	72	D	6.219	8.00
6215	86	D	7.302	8.50

.100 SPACING

.125 Mtg. Hole Clearance.
Pierced Terminal Std. Pkg. 1

Smith No.	No. of Con-tacts	Single or Double	A Mtg. Centers	NET Ea.
6231	40	D	2.625	7.55
6232	60	D	—	8.40
6233	70	D	4.125	9.40
6234	80	D	4.625	10.35
6235	100	D	—	11.10
6236	120	D	6.625	11.30

.050 SPACING

.125 Mtg. Hole Clearance.
Dip Solder Terminal Std. Pkg. 1

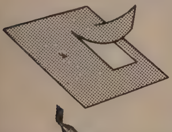
6237	40	D	1.500	11.50
6238	60	D	2.000	13.45
6239	80	D	2.500	14.00
6240	100	D	3.000	15.80
6241	110	D	3.250	16.25
6242	120	D	3.500	17.35

PRINTED CIRCUIT EDGE STRIPS

Convert any P.C. Board for plug-in applications. Can also be used where high reliability is required. Molded diallyl phthalate body with gold plated contacts. .125 Micro-inch. Available in single or double sided. For 1/16″ boards. Std. Pkg. 1

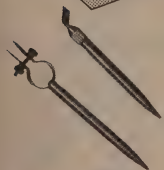
No.	Contacts	Single or Double	NET Each
6254	6	S	$ 4.40
6255	10	S	5.10
6256	15	S	6.10
6257	18	S	6.60
6258	22	S	7.15
6259	12	D	5.55
6260	20	D	6.80
6261	30	D	8.30
6262	36	D	9.35
6263	44	D	10.75

P. C. PROTOTYPE ETCHING EQUIPMENT



FOR SCREEN CUTTING

Photo layout film for hand-cutting mechanical negatives. A red film is laminated to a transparent backing sheet. When knife-cut, the red film laminate is peeled back to permit light to penetrate only through the cutaway area; the remainder is light-safe. Supplied in 8″ x 10″ sheets. Std. Pkg. 6
No. 6268 NET Each $1.00



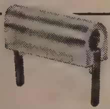
SWIVEL CUTTING KNIFE for cutting circles and curves. Also locks tight for cutting straight lines. Std. Pkg. 6
No. 6269 NET Each $1.00

EXTRA BLADES for above. Std. Pkg. 12
No. 6270 NET Each $.50

PARALLEL LINE-CUTTING KNIFE, for cutting parallel lines up to ½″ in width. Std. Pkg. 1
No. 6271 NET Each $3.50

FOR ETCHING

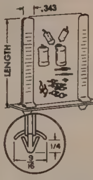
A low cost kit to enable the engineer to quickly etch copper-clad boards in minutes. The kit contains a unique felt-tip Resist Ink pen to apply the Resist-Ink as easily as writing. Also included is a 2-oz. bottle of Resist-Ink solvent and a 6-oz. bottle of ferric-chloride etchant solution. Std. Pkg. 1
No. 6272 NET Each $3.95



FOR PRINTED CIRCUIT JACKS SEE PAGE 2•823

NYLON P.C. CARD HANDLE

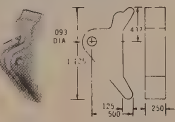
Designed for use as a permanent handle or puller for quick and easy card insertion and removal.
Std. Pkg. 100
No. 6298 NET Per C $40.00



PRINTED CIRCUIT BOARD GUIDES

Position P.C. Boards of any width. Made of Natural Nylon, snaps into place. Double channeled for stacking and available in three sizes. Accepts board thicknesses from .030″ to .075″; fits into panel hole .175″ x .310″. Std. Pkg. 100

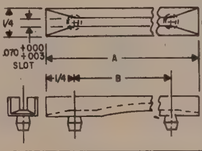
No.	Length	NET Per C
6249	1″	$17.00
6250	2″	18.50
6251	3″	20.00



NYLON P.C. CARD EJECTOR

Designed for easy and quick removal of circuit boards. Lever action prevents damage to card and components. For use with cards up to 1/16" thick, supplied with mounting pins. Std. Pkg. 100
No. 6297 NET Per C $35.00

RACK CARD GUIDES



Guides may be used horizontally or vertically for mounting circuit boards in rack chassis. Guides snap into .125″ dia. hole at both ends. Four lengths in natural nylon. Std. Pkg. 50

No.	A	B	NET Per C
6339	3″	2½″	$34.00
6340	4″	3½″	39.00
6341	6″	5½″	42.00
6342	8½″	8″	45.00

JUST ADDED AT PRESS TIME

"THE HOOKON"

PROBE FOR HIGH DENSITY CIRCUITS. SEE PAGE 2•849

IT'S SOUND PLANNING TO **"SPECIFY SMITH"** WHEN DESIGNING OR PURCHASING

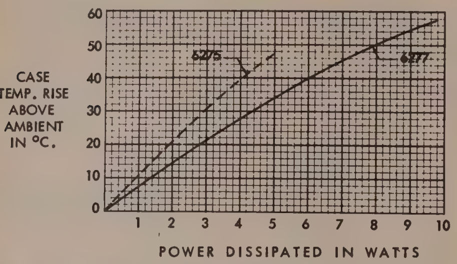
SPECIFY SMITH

HEAT SINKS

STOCKED BY
LEADING
DISTRIBUTORS
NATIONWIDE

LIGHTWEIGHT - ECONOMICAL - VERSATILE
HEAT SINKS FOR SEMI-CONDUCTOR CIRCUITRY

The θca figures represent natural convection situations in a sea level atmosphere. Actual performance in individual situations depends upon air flow, proximity of interfering objects, thermal conductive effects of the chassis, and heat radiated or convected from other components.



THERMOVANES

Manufactured of pre-painted aluminum .060" thick. Designed for thru-board mounting, except Fig. 4 provided with mounting lugs.

ALL HEAT SINKS ARE FURNISHED WITH PRE-PUNCHED TRANSISTOR HOLE PATTERNS

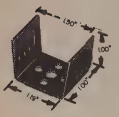


FIG. 1

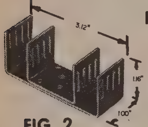


FIG. 2

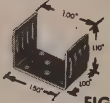


FIG. 3

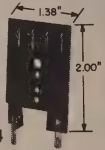


FIG. 4

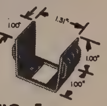


FIG. 5

SMITH NO.	FIG. NO.	CASE STYLE	THERMAL* RES. °C/W	WEIGHT IN GRAMS	STD. PKG.	RESALE Per C
6275	1	TO-3	9.5	9.8	100	30.00
6276	1	TO-66, MD-17	9.5	9.8	100	30.00
6277	2	TO-3	5.6	23.4	50	65.00
6278	5	I.C., -V21-675, Case 675	9.5	9.8	100	30.00
6279	2	TO-66, MD-17	5.6	23.4	50	65.00
6280	3	TO-36, Stud Mtd Types ¼" max.	10.0	10.8	100	30.00
6281	4	Flat Packs, Plastic or Tab	15.1	7.0	50	45.00

*Thermal Resistance measured in free air; lower when chassis-mounted.

THERMOFLAGS

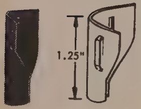


FIG. 6

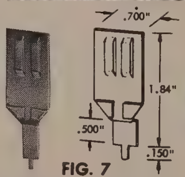


FIG. 7

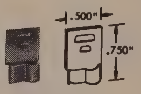
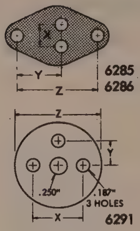


FIG. 8

Manufactured of silver-bearing copper, except Fig. 6 pre-painted aluminum .018" thick. Designed for self support, except Fig. 7 provided with mounting lug.

SMITH NO.	FIG. NO.	CASE STYLE	THERMAL* RES. °C/W	WEIGHT IN GRAMS	STD. PKG.	RESALE Per C
6282	6	TO-5, 0.325" Case Dia.	46	1.0	100	15.00
6283	7	152, Tab Mtd Flat Packs	40-43	1.6	100	29.00
6284	8	TO-92, TO-98, All "D" Shape Styles	72	1.0	100	14.00

*Thermal Resistance measured in free air.

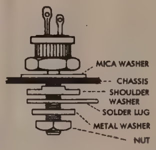


MICA INSULATING WAFERS

FOR TO-3, TO-66 AND TO-36 CASE STYLES

When installed between semi-conductor and chassis or heat dissipator, it yields a lower thermal resistance. **Std. Pkg. 100**

SMITH NO.	CASE STYLE	DIMENSIONS X	Y	Z	NET Per C
6285	TO-3	.430"	.665"	1.187"	$5.00
6286	TO-66	.200"	.580"	.960"	5.00
6291	TO-36	.690"	.345"	1.187"	5.00



STUD TRANSISTOR MOUNTING HARDWARE

A complete listing of required mounting hardware for stud type transistors from #10 to #¼ stud. Std. Pkg. 100

No.	Description	NET Per C
1153	#10 Mica Washer	$3.40
1154	#¼ Mica Washer	3.40
2666	#10 Nylon Shoulder Washer	2.50
2664	#¼ Nylon Shoulder Washer	2.40
1410-10	#10 Solder Lug	1.50
1468	#¼ Solder Lug	1.50
1152	#10 Metal Washer	.95
1147	#¼ Metal Washer	.90
1367	#10-32 Nut	.90
1368	#¼-20 Nut	1.45
1399	#¼-28 Nut	1.80

ENGINEERING TRANSISTOR MOUNT HARDWARE KIT

Contains all hardware necessary to mount and insulate stud mount transistors and TO-3, TO-66 types. Includes: 25 each of Smith Nos. 6285, 6286, 6291, 2666, 2664, 1410-10, 1468, 1152, 1147, 1367, 1368; 5 each of Smith Nos. 6287, 6294; 25 each of #10 mica washers, #¼ mica washers and ¼-28 nuts. Packaged in a clear plastic hinged box. Std. Pkg. 1

No. 1319 NET Each $12.00

6287

6294

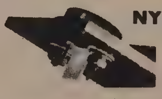
6295
6296

NYLON PROTECTIVE COVER

FOR TO-3 CASE STYLE

Insulates case from electrical shock and thermal contact. Webbed construction for free air flow. Std. Pkg. 100

No.	For Case Style	NET Per C
6287	TO-3	$30.00
6294	TO-66	30.00
6295	TO-5	4.50
6296	TO-18	4.50



6273
6274

NYLON POWER TRANSISTOR MOUNTS

One-piece Nylon transistor mount replaces six pieces of conventional insulation when mounting power transistors. Built-in barrier separates and insulates base and emitter pins from each other. Screw insulators require ³⁄₁₆" clearance holes, pin insulators .113 dia. clearance. Mounting centers are standard for types TO-3 and TO-66 power transistors. Std. Pkg. 100

No.	Transistor Type	NET Per C
6273	TO-3	$4.00
6274	TO-66	4.00

6292
6293

HIGH TEMPERATURE TRANSISTOR MOUNTS

Heavy Duty. Made of Celanese 917 J101 Polyester. Designed for excessive temperature and electrical requirements. Rated SE-O UL, 400° F Cont.

6292	TO-3	8.00
6293	TO-66	8.00

MORE THAN TEN THOUSAND ITEMS MANUFACTURED UNDER ONE ROOF

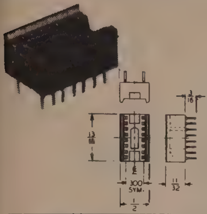
IT'S SOUND PLANNING TO **"SPECIFY SMITH"** WHEN DESIGNING OR PURCHASING

STOCKED BY
LEADING
DISTRIBUTORS
NATIONWIDE

I.C. TRANSISTOR SOCKETS

SPECIFY **SMITH**

INTEGRATED SOCKETS
DUAL IN-LINE

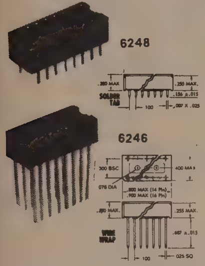


For 14 and 16 pin in-line Hybrid packages having .100" x .300" grid spacing. Accepts round or flat pins. Body of general purpose phenolic. Brass electro plated contacts.

Std. Pkg. 50

No.	Pins	NET Per C
6252	14	$66.00
6253	16	66.00

LOW PROFILE I.C. SOCKETS
WIRE WRAP and SOLDER TAB



Provided with removable cover for closed entry and contact replacement, polarity guide for assembly alignment. Made of glass filled Black Nylon, phosphor bronze (QQ 13-750 Comp A) contacts, 10-20 microinches gold over 30-100 microinches silver. Available in 14 and 16 pin, wire wrap and solder tab terminals. **Std. Pkg. 50**

No.	Pins	Contacts Lgth.	Contacts Thick.	Body	NET Per C
6245	14	.687"	.025" Sq.	Wire Wrp	$80.00
6246	16	.687"	.025" Sq.	Wire Wrp	85.00
6247	14	.156"	.025x.007"	Sldr Tab	70.00
6248	16	.156"	.025x.007"	Sldr Tab	75.00

10 PIN IC SOCKET

Contacts are Brass, Cadmium Plated. Sockets are Molded of General Purpose, or Mica Filled Phenolic. Other Materials Upon Application. Socket to Accept .017 Dia. Pins. Contacts may be Omitted to Accept Various Types of Integrated Circuit Patterns. **Std. Pkg. 50**

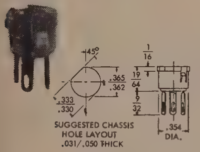
No.	NET per C
6267	$ 40.00

UNIVERSAL TRANSISTOR SOCKET

Contacts are Phosphor Bronze, Cadmium Plated. Sockets are Molded of General Purpose Phenolic, or Mica Filled Phenolic. Other materials available upon request. **Std. Pkg. 100**

No.	Net per C
No. 6299	$25.00

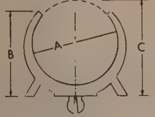
TRANSISTOR SOCKETS



Snap-in type transistor sockets for TO-5 and TO-18 cases. Phosphor bronze, cadmium plated contacts with a polysulfone body. Fits in "D" shape hole. **Std. Pkg. 100**

No.	Case	NET Per C
6264	TO-18	$15.00
6265	TO-5	15.00

COMPONENT CLIPS



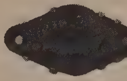
Clip Width 1/4" except #4081 3/16".

Made of black self-extinguishing Nylon. Mounts into chassis or P.C. board. For panel thickness 1/16", panel hole size 5/32"; except #4081: panel hole size 1/8". **Std. Pkg. 100**

No.	A	B	C	NET Per C
4081	7/32"	.265	.343	$5.70
4082	1/4"	.343	.375	6.40
4084	3/8"	.437	.500	7.40
4086	1/2"	.546	.625	9.00
4088	5/8"	.685	.750	10.50
4090	3/4"	.800	.875	12.00
4091	.800	.781	.925	13.00
4092	1.000	1.000	1.125	16.00

USE OUR VAST NATIONAL DISTRIBUTION NETWORK for Off-The-Shelf Deliveries of your smaller hardware requirements.

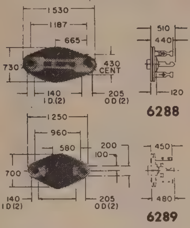
POWER TRANSISTOR SOCKET



Fully insulated power transistor socket, for use with diamond case, TO-3 style. Body of self-extinguishing phenolic, U.L. Listed. Phosphor bronze contacts, gold plated over silver. Mounting plate tapped for 6-32 screws. Integrally molded bosses on mounting holes eliminate need for separate washers. **Std. Pkg. 100**

No.	NET Per C.
6266	$30.00

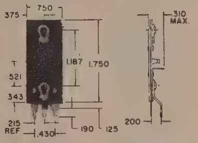
TRANSISTOR WAFER SOCKETS
FOR TO-3 AND TO-66 CASE STYLES



Molded nylon top with molded boss washer construction and self-threading mounting bracket for #6 screw. Contacts and mounting plate are of cadmium plated brass. Std. Pkg. 100

NO.	FOR CASE	NET Per C
6288	TO-3	$20.00
6289	TO-66	$20.00

P.C. VERTICAL MOUNT SOCKET
FOR TO-3 CASE STYLE



All connections are made through P.C. mounting tabs. Contacts and mounting plate of cadmium plated brass. Std. Pkg. 100

No. 6290 **NET Per C $30.00**

AMP* AC FAULT FINDER

ELECTRICAL CIRCUIT CONDITIONS

- Open Ground
- Open Hot
- Open Neutral
- Correct
- Hot/Ground — Reversed
- Hot/Neutral — Reversed

This revolutionary AC Fault Finder has indicator lights and a chart on both sides to describe the condition for each lighting arrangement. Plug in and illuminated signals indicate: reverse polarity, faulty wiring, missing grounds and/or correct wiring conditions.

FEATURES:

- Just plug in — simple & easy-to-use.
- No tools, meters, wires needed.
- Easy to read from any angle —labeled on both sides.
- Break resistant plastic.
- Designed for conventional 3 wire 120 Volt AC outlets
- Checks dual wire outlets with use of polarized adapter and ground wire.

No. 3030 Standard Pkg.—12 **$5.95** Net Each

*All international rights reserved by AMP Incorporated. Products covered by U.S. and foreign patents and/or patents pending.

IT'S SOUND PLANNING TO **"SPECIFY SMITH"** WHEN DESIGNING OR PURCHASING

SPECIFY SMITH EQUIPMENT HANDLES

STOCKED BY
LEADING
DISTRIBUTORS
NATIONWIDE

MATERIAL AND FINISH SPECIFICATIONS

MATERIALS:

Brass:	In accordance with Federal Spec. QQ-B-626, Composition 22, ½ Hard.
Aluminum:	In accordance with Federal Spec. QQ-A-365, Composition A. Type 3.
Steel:	Cold-Rolled, in accordance with QQ-S-633b, Grade FS-1010.

SEND US YOUR DRAWINGS FOR SPECIAL SIZE HANDLES

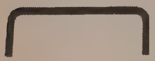
FINISHES:

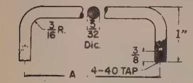
Nickel Plate:	Polished Nickel Plate, in accordance with Federal Spec. QQ-N-290, Class I, Type VI.
Black Oxide:	In accordance with MIL-F-495A.
Satin Etch:	Commercial finish.
Black Anodize:	In accordance with MIL-A-8625A.
Optical Black:	Color in accordance with Fed. Std. 595, type 37038. Paint complies with Fed. Spec. TT-E-527.

PANEL HANDLES

Brass Panel Handles, finished as shown, with internal thread. Individually packaged.
Std. Pkg. 10

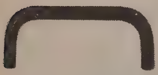
5/32" O.D.

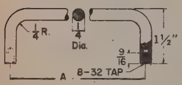




No.	(A)	Finish	NET Ea.
BRASS			
1632	1¼"	Nickel Plate	$1.25
1633	1¼"	Black Oxide	1.25
1636	2"	Nickel Plate	1.40
1637	2"	Black Oxide	1.40
1640	3"	Nickel Plate	1.45
1641	3"	Black Oxide	1.45
ALUMINUM			
1634	1¼"	Satin	$1.00
1635	1¼"	Blk. Anodize	1.15
1638	2"	Satin	1.20
1639	2"	Blk. Anodize	1.35
1642	3"	Satin	1.25
1643	3"	Blk. Anodize	1.40

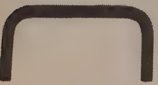
1/4" O.D.

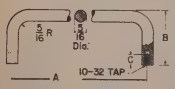




No.	(A)	Finish	NET Ea.
BRASS			
1616	2"	Nickel Plate	$1.50
1617	2"	Black Oxide	1.50
1620	3"	Nickel Plate	1.55
1621	3"	Black Oxide	1.55
1624	4"	Nickel Plate	1.60
1625	4"	Black Oxide	1.60
1628	6"	Nickel Plate	1.80
1629	6"	Black Oxide	1.80
ALUMINUM			
1618	2"	Satin	$ .80
1619	2"	Blk. Anodize	.85
1622	3"	Satin	.85
1623	3"	Blk. Anodize	.95
1626	4"	Satin	.90
1627	4"	Blk. Anodize	1.00
1630	6"	Satin	1.05
1631	6"	Blk. Anodize	1.20

5/16" O.D.



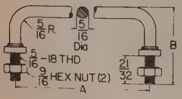


No.	(A)	(B)	(C)	NET Ea.
BRASS NICKEL PLATE				
2050	3"	1⁵⁄₁₆"	7/16"	$1.60
2057	3"	1½"	9/16"	1.75
2056	4¼"	1½"	9/16"	1.85
2051	4⁹⁄₁₆"	1½"	9/16"	2.00
2052	6⁷⁄₁₆"	1¾"	9/16"	2.50
BRASS BLACK OXIDE				
1601	3"	1⁵⁄₁₆"	7/16"	$1.60
1602	3"	1½"	9/16"	1.75
1604	4¼"	1½"	9/16"	1.85
1605	4⁹⁄₁₆"	1½"	9/16"	2.00
1606	6⁷⁄₁₆"	1¾"	9/16"	2.50

5/16" O.D.

PANEL HANDLES

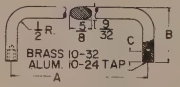
Brass Panel Handles, finished as shown with male threaded stud. Supplied complete with matching ferrules, and brass, nickel plated hex nuts. Individually packaged. Std. Pkg. 10



No.	(A)	(B)	NET Ea.
BRASS NICKEL PLATE			
1607	2"	2⅛"	$2.20
1609	3"	2⅛"	2.25
1611	4"	2⅛"	2.50
2053	4¼"	2⅛"	2.55
1614	6"	2¹¹⁄₁₆"	2.95
BRASS BLACK OXIDE			
1608	2"	2⅛"	$2.20
1610	3"	2⅛"	2.25
1612	4"	2⅛"	2.50
1613	4¼"	2⅛"	2.55
1615	6"	2¹¹⁄₁₆"	2.95

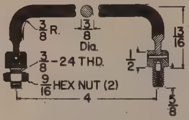
OVAL PANEL HANDLES

Individually packaged. Std. Pkg. 10



No.	Mtg. Ctrs. (A)	Height (B)	Tap Depth (C)	Finish	NET Ea.
BRASS					
1644	3"	1⁹⁄₃₂"	9/32"	Nickel Plate	$ 3.00
1645	3"	1⁹⁄₃₂"	9/32"	Black Oxide	3.00
1647	4⁹⁄₁₆"	1½"	½"	Nickel Plate	3.50
1648	4⁹⁄₁₆"	1½"	½"	Black Oxide	3.50
1651	6⁷⁄₁₆"	1¾"	½"	Nickel Plate	3.65
1653	6⁷⁄₁₆"	1¾"	½"	Black Oxide	3.65
1655	9"	1¾"	½"	Nickel Plate	4.15
1657	9"	1¾"	½"	Black Oxide	4.15
ALUMINUM					
1646	3"	1⁹⁄₃₂"	9/32"	Black Anodize	1.80
1649	4⁹⁄₁₆"	1½"	9/32"	Black Anodize	2.20
1654	6⁷⁄₁₆"	1¾"	9/32"	Black Anodize	2.95
1658	9"	1¾"	9/32"	Black Anodize	3.15

FOLDING HANDLES



Folding Brass panel handles, with spring-loaded detents which snap into upright or left-or-right folded position. Finished as shown. Supplied with brass, nickel plated hex nuts. Mounts in ⅜" panel holes. Individually packaged. Std. Pkg. 10

No.	Finish	NET Ea.
1662	Nickel Plate	$7.00
1663	Black Oxide	7.00

US PATENT NO 3,082,473

FERRULES

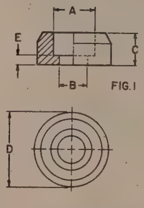


FIG. I

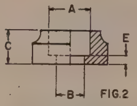
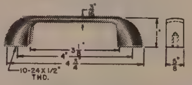


FIG. 2

Brass and Aluminum ferrules, finished as shown, to match handles listed above. Std. Pkg. 50

No.	Fig.	A	B	C	D	E	NET Per C
BRASS, NICKEL PLATED							
1664	1	5/32	.109	⅛	¼	3/64	$23.00
1668	1	¼	.203	3/16	⅜	1/16	29.00
2055	1	5/16	.219	¼	9/16	1/16	32.00
2054	2	5/16	.196	5/16	¾	3/32	42.00
BRASS, BLACK OXIDE							
1665	1	5/32	.109	⅛	¼	3/64	23.00
1669	1	¼	.203	3/16	⅜	1/16	29.00
1673	1	5/16	.219	¼	9/16	1/16	32.00
1672	2	5/16	.196	5/16	¾	3/32	42.00
ALUMINUM SATIN ETCH							
1666	1	5/32	.109	⅛	¼	3/64	23.00
1670	1	¼	.203	3/16	⅜	1/16	25.00
ALUMINUM, BLACK ANODIZED							
1667	1	5/32	.109	⅛	¼	3/64	23.00
1671	1	¼	.203	3/16	⅜	1/16	25.00

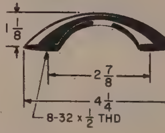
OVAL HANDLE



Die Cast Zamac Handle. Brush chrome plated. Std. Pkg. 10

No.	NET Per C
2065	$99.00

BAKELITE HANDLE



MATERIAL: Molded Phenolic, Red or Black.
RATING: 40 lbs maximum load.
DESCR.: Molded cabinet handle attaches with two 8-32 screws (not supplied) on 2⅞" mounting centers. Std. Pkg. 10

No.	Color	NET Per C
2281	Black	$22.00
2882	Red	22.00

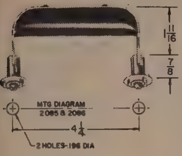
THESE HANDLES ARE STANDARD AND STOCKED IN DEPTH. We welcome your inquiry for special sizes, materials and plating.

IT'S SOUND PLANNING TO "**SPECIFY SMITH**" WHEN DESIGNING OR PURCHASING

EQUIPMENT HANDLES & ACCESS.

SPECIFY **SMITH**

MOLDED GRIP HANDLES



HANDLE: Molded high impact Styrene, fungus resistant.

HDWRE.: Steel, nickel plated.

RATING: 75 lbs maximum load.

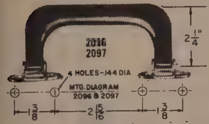
DESCR.: Rounded palm fitting design.

Std. Pkg. 10

Attaches with 10-32 machine screws supplied. Maximum panel thickness 1/4″.

No.	Color	NET Ea.
2085	Black	$2.20
2086	Grey	2.20

MOLDED GRIP HANDLES



HANDLE: Molded high impact Styrene.

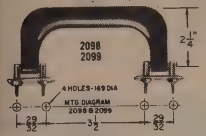
HDWRE.: Steel, nickel plated.

RATING: 60 lbs maximum load.

DESCR.: Designed for economy and rugged use. Folds flat to case. **Std. Pkg. 10**

Attaches with rivits or #6 screws (not supplied). Maximum panel thickness unlimited.

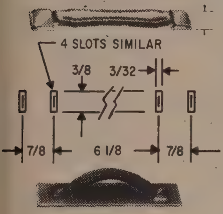
No.	Color	NET Ea.
2096	Black	$.70
2097	Grey	.70



Attaches with integral 8-32 studs and nuts supplied. Maximum panel thickness 3/8″.

2098	Black	$1.60

SPRING-GLIDE HANDLE



HANDLE: Black genuine leather, contoured stitched.

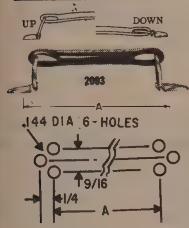
HDWRE.: Steel, chrome plate.

RATING: 120 lbs maximum load.

DESCR.: Strong spring-glide retract mechanism prevents handle rattle at vibration extremes, automatically lies flat against case when not in use. Attaches with fold tabs on cap against rear bearing washer plate. Spring and washer plate can be secured with optional screws. Maximum panel thickness 1/4″. **Std. Pkg. 10**

No.	Color	NET Ea.
2089	Black	$4.20

RETRACTO-LINK HANDLES



HANDLE: Black genuine leather, matching stitching.

HDWRE.: Steel, nickel plated.

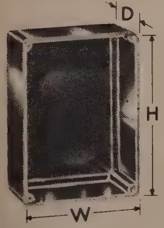
RATING: 60 lbs maximum load.

DESCR.: Sliding link retracts inside handle to lie flat to panel when not in use. Shipped with all hardware assembled except decorative cover cap. **Std. Pkg. 10**

Attaches with fold tabs against rear bearing washer plate, which can be secured with optional #6 screws (not supplied). Maximum panel thickness 1/2″.

2093	4½″	5¾″	$3.60
2094	5½″	6⅝″	3.60
2095	6¾″	7⅞″	3.60

INSTRUMENT CASES AND COVERS



Ideal for small instruments and test equipment. The right size and the right mounting for your requirements. Molded of high quality, glass finish, thermosetting plastic. Threaded brass insert for cover mounting. BLACK ONLY. **Std. Pkg. 5.**

No.	H	W	D	Insert	NET Ea.
2377	4″	2⅞″	1 9/16″	4-40	.72
2291	5″	4¼″	1¾″	6-32	1.25
2255	6¼″	3¾″	2″	6-32	1.00
2257	6 13/16″	5 9/32″	2 5/16″	4-40	2.00
2289	8½″	7 7/16″	3″	6-32	2.40

PHENOLIC COVERS

2378	For No. 2377	.20
2292	For No. 2291	.30
2256	For No. 2255	.75
2260	For No. 2257	1.30
2390	For No. 2289	2.30

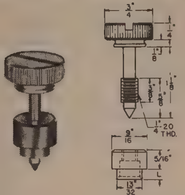
PANEL PLATE

Brushed and lacquered Aluminum

2379	For No. 2255	1.10

CAPTIVE SCREW & BUSHING

LARGE HEAD



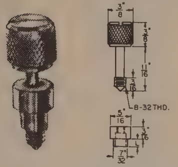
BODY: BRASS, nickel plated.

DESCR.: Supplied with panel bushing as shown. Used extensively for quick removal of panels from chassis. Non-removable from panel. **Std. Pkg. 25**

No.	Panel Bushing Length (L)	Panel Thickness	NET Per C
2365-A	5/32″	1/8	$125.00
2365-B	7/32″	3/16	125.00
2365-C	9/32″	1/4	125.00

CAPTIVE SCREW & BUSHING

SMALL HEAD

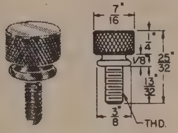


BODY: BRASS, nickel plated.

DESCR.: Supplied with panel bushing as shown. Used extensively for quick removal of panels from chassis. Non-removable from panel. **Std. Pkg. 25**

No.	Panel Bushing Length (L)	Panel Thickness	NET Per C
2375-A	5/32″	1/8	$55.00
2375-B	7/32″	3/16	55.00
2375-C	9/32″	1/4	55.00

THUMB SCREW

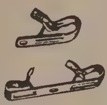


BODY: BRASS, nickel plated.

DESCR.: Used extensively for quick removal of panels from chassis. **Std. Pkg. 25**

No.	Thread	NET Per C
2366	6-32	$30.00
2367	8-32	30.00
2368	10-32	30.00

FAHNESTOCK CLIPS



Nickel plated, spring brass battery clips, in both single and double clip types, with single counting hole. Type 539 has additional solder lug hole for wire. **Std. Pkg. 100**

No.	Width	Length	Mtg. Hole	NET Per C
SINGLE CLIPS				
539	7/32″	11/16″	#4	$2.80
533	5/16″	25/32″	#6	2.80
534	3/8″	1″	#6	4.00
DOUBLE CLIPS				
535	5/16″	1 15/32″	#6	16.00
536	3/8″	2⅛″	#8	20.00

BATTERY CONNECTING STRIPS

1205 1217
1206 1218
1210

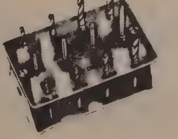
1219
1234

1296 1297

Std. Pkg. 50

No.	Term. Spacing	Fits Batteries No. Eveready	Burgess	RCA	NET per C
1205	1½″	455, 467, 457, 468	XX30, XX45, K45, V451	VS055, VS016, VS082, VS125	$35.00
1206	2½″	490	N60	VS090	35.00
1210	15/16″	437, 495, 477, 2356, 479	XX50, N60X, P45, C6X, P60	VS217, VS316 VS218, VS219	35.00
1217	1¼″	707	D5	VS315	$35.00
1218	1⅜″	274, 276	4D4, D6	VS306	35.00
1219	13/16″	243	2Z3	VS324	35.00
1234	½″	E126, 415, 216, 416, 246	H126, U30, 2U6, UX45, 2N6	VS328, VS086, VS323, VS318, VS305	27.00
CONNECTOR SNAPS					Std. Pkg. 100
1296	Female	226, 228	P6, PM8	VS300A, VS329	15.00
1297	Male	2709		VS326	15.00

DRILL & TAP KIT



Contains most popular size drills & taps for electronic bench duty. Includes 4-40, 6-32, 8-32, 10-32 taps with eight corresponding tap & body drills. **Std. Pkg. 1**

No.		NET Each
750	Kit	$20.00
749	Drill Stand Only	.75

IT'S SOUND PLANNING TO **"SPECIFY SMITH"** WHEN DESIGNING OR PURCHASING

SPECIFY SMITH SWAGE TURRET TERMINALS

STOCKED BY
LEADING
DISTRIBUTORS
NATIONWIDE

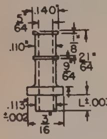
Terminals shown below are "stock" items, available for speedy delivery. All brass, silver-plated, precision made. See next page for Suggested Resale Prices. For quantities over 15,000 request special prices. Inquiries are invited, for special types and sizes to particular requirements.

L indicates **Shank Length** of Lug. T indicates **thickness** of mounting boards.

Standard Package 100

2000

HOLLOW LUG

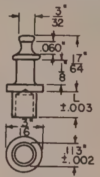

.140
5/64
.110"
1/8"
21"/64
9/64
L±.003
.113 ±.002
3"/16

No.	L	T
2000A	.075	1/32
2000B	.105	1/16
2000C	.135	3/32
2000D	.165	1/8
2000E	.195	5/32
2000F	.230	3/16

STAKING TOOL KIT
No. 3860

2001

SHORT TERMINAL LUG

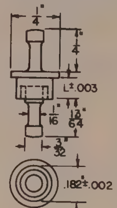

3"/32
.060"
17"/64
1/8
L ±.003
3"/16
.113" ±.002

No.	L	T
2001A	.075	1/32
2001B	.105	1/16
2001C	.135	3/32
2001B	.165	1/8

STAKING TOOL KIT
No. 3860

2002

DOUBLE END TERMINAL LUG

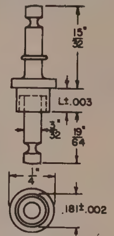

1"/4
1"/4
L±.003
1"/16
13"/64
3"/32
.182"±.002

No.	L	T
2002A	.105	1/16
2002B	.135	3/32
2002C	.165	1/8
2002D	.195	5/32
2002E	.230	3/16

STAKING TOOL KIT
No. 3861

2003

DOUBLE END LUG, LONG

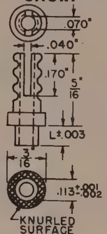

15"/32
L±.003
3"/32
19"/64
1"/4
.181±.002

No.	L	T
2003A	.105	1/16
2003B	.135	3/32
2003C	.165	1/8
2003D	.195	5/32
2003E	.230	3/16

STAKING TOOL KIT
No. 3862

2004

SLOTTED TERMINAL LUG SHORT

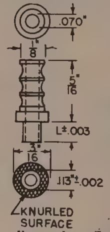

.070"
.040"
.170"
5"/16
L±.003
3"/16
.113 +.001 -.002
KNURLED SURFACE

No.	L	T
2004A	.075	1/32
2004B	.105	1/16
2004C	.135	3/32
2004D	.165	1/8

STAKING TOOL KIT
No. 3863

2005

HOLLOW KNURLED LUG

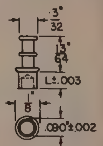

.070"
1"/8
5"/16
L±.003
3"/16
.113"±.002
KNURLED SURFACE

No.	L	T
2005A	.105	1/16
2005B	.135	3/32
2005C	.165	1/8

STAKING TOOL KIT
No. 3860

2006

SHORT TERMINAL LUG

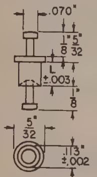

3"/32
13"/64
L±.003
1"/8
.090"±.002

No.	L	T
2006A	.075	1/32
2006B	.105	1/16
2006C	.135	3/32
2006D	.165	1/8

STAKING TOOL KIT
No. 3864

2007

SHORT DOUBLE END LUG

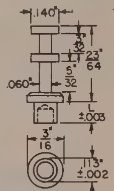

.070"
1"/8
5"/32
L ±.003
1/8
5"/32
.113" ±.002

No.	L	T
2007A	.075	1/32
2007B	.105	1/16
2007C	.135	3/32
2007D	.165	1/8

STAKING TOOL KIT
No. 3865

2008

TERMINAL LUG

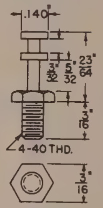

.140
3/32
23"/64
5"/32
.060"
L ±.003
3"/16
.113" ±.002

No.	L	T
2008A	.075	1/32
2008B	.105	1/16
2008C	.135	3/32
2008D	.165	1/8
2008E	.195	5/32
2008F	.230	3/16
2008G	.293	1/4

STAKING TOOL KIT
No. 3860

2009

TERMINAL LUG

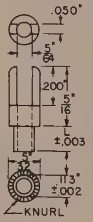

.140
3"/32
5"/32
23"/64
3"/16
4-40 THD.
3"/16

No. 2009

STAKING TOOL KIT
Not Required

2010

SPLIT TERMINAL LUG

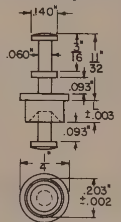

.050"
5"/64
.200
5"/16
L ±.003
5"/32
.113" ±.002
KNURL

No.	L	T
2010A	.075	1/32
2010B	.105	1/16
2010C	.135	3/32
2010D	.165	1/8

STAKING TOOL KIT
No. 3866

2011

DOUBLE END TERMINAL LUG

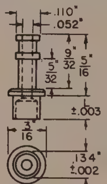

.140
3"/16
11"/32
.060
.093"
L ±.003
.093"
1"/4
.203" ±.002

No.	L	T
2011A	.105	1/16
2011B	.135	3/32
2011C	.165	1/8
2011D	.195	5/32
2011E	.230	3/16

STAKING TOOL KIT
Not Available

2012

TERMINAL LUG

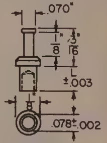

.110"
.052"
9"/32
5"/16
5"/32
L ±.003
3"/16
.134" ±.002

No.	L	T
2012A	.105	1/16
2012B	.135	3/32
2012C	.165	1/8

STAKING TOOL KIT
No. 3860

2013

TERMINAL LUG

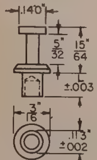

.070"
1"/8
3"/16
L ±.003
1"/8
.078"±.002

No.	L	T
2013A	.075	1/32
2013B	.105	1/16
2013C	.135	3/32
2013D	.165	1/8

STAKING TOOL KIT
No. 3864

2014

TERMINAL LUG

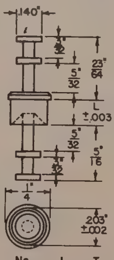

.140"
5"/32
15"/64
L ±.003
3"/16
.113" ±002

No.	L	T
2014A	.105	1/16
2014B	.135	3/32
2014C	.165	1/8
2014D	.195	5/32
2014E	.230	3/16

STAKING TOOL KIT
No. 3860

2015

TERMINAL LUG

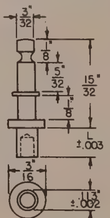

.140"
3/32
23"/64
5"/32
L ±.003
5"/32
5"/16
3/32
1"/4
.203" ±.002

No.	L	T
2015A	.135	3/32
2015B	.165	1/8
2015C	.195	5/32
2015D	.230	3/16

STAKING TOOL KIT
Not Available

2016

TERMINAL LUG

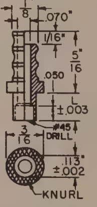

3"/32
1"/8
5"/32
15"/32
1"/8
L ±.003
3"/16
.113" ±.002

No.	L	T
2016A	.105	1/16
2016B	.135	3/32
2016C	.165	1/8

STAKING TOOL KIT
No. 3860

2017

HOLLOW KNURLED LUG

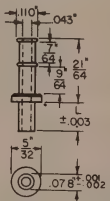

1"/8
.070"
1/16"
5"/16
.050
L ±.003
3"/16
#45 DRILL
.113" ±.002
KNURL

No.	L	T
2017A	.105	1/16
2017B	.135	3/32
2017C	.165	1/8
2017D	.195	5/32

STAKING TOOL KIT
No. 3860

2018

HOLLOW TERMINAL LUG

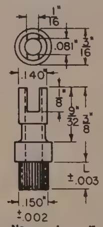

.110
.043"
7"/64
21"/64
9"/64
L ±.003
5"/32
.078" +.001 -.002

No.	L	T
2018A	.075	1/32
2018B	.105	1/16
2018C	.135	3/32
2018D	.165	1/8
2018E	.195	5/32
2018F	.230	3/16

STAKING TOOL KIT
No. 3863

2019

SPLIT TERMINAL LUG

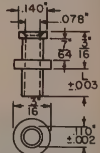

1"/16
.081"
3"/16
.140"
1"/8
9"/32
3"/8
L ±.003
.150"
±.002

No.	L	T
2019A	.075	1/32
2019B	.105	1/16
2019C	.135	3/32
2019D	.165	1/8
2019E	.195	5/32
2019F	.230	3/16

STAKING TOOL KIT
No. 3860

2020

TERMINAL LUG


.140"
.078"
7/64
3"/16
L ±.003
3"/16
.110" ±.002

No.	L	T
2020A	.075	1/32
2020B	.105	1/16
2020C	.135	3/32
2020D	.165	1/8

STAKING TOOL KIT
No. 3860

IT'S SOUND PLANNING TO "**SPECIFY SMITH**" WHEN DESIGNING OR PURCHASING

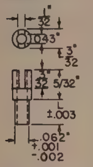
STOCKED BY
LEADING
DISTRIBUTORS
NATIONWIDE

SWAGE TURRET TERMINALS

SPECIFY **SMITH**

Terminals shown below are "stock" items, available for speedy delivery. All brass, silver-plated, precision made. See below for Suggested Resale Prices. For quantities over 15,000 request special prices. Inquiries are invited, for special types and sizes to particular requirements.
L indicates Shank Length of Lug. T indicates thickness of mounting boards. **Standard Package 100**

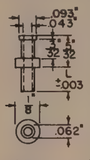
2021 MINIATURE SPADE LUG


1/32"
.043"
3/32
3/32"
5/32"
L
±.003
.062"
+.001
-.002

No.	L	T
2021A	.037	1/64
2021B	.053	1/32
2021C	.084	1/16
2021D	.115	3/32
2021E	.147	1/8

STAKING TOOL KIT No. 3867

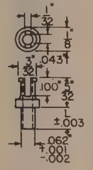
2022 MINIATURE HOLLOW LUG


.093"
.043"
3/32
5/32
L
±.003
1/8"
.062"

No.	L	T
2022A	.037	1/64
2022B	.053	1/32
2022C	.084	1/16
2022D	.115	3/32
2022E	.147	1/8

STAKING TOOL KIT No. 3864

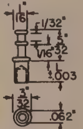
2023 MINIATURE HOLLOW SPLIT LUG


1/32"
1/8
3/32"
.043"
.100"
5/32"
L
±.003
.062"
+.001
-.002

No.	L	T
2023A	.037	1/64
2023B	.053	1/32
2023C	.084	1/16
2023D	.115	3/32
2023E	.147	1/8

STAKING TOOL KIT No. 3864

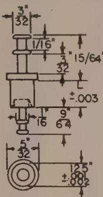
2024 MINIATURE DOUBLE TIE LUG


1/16"
1/32"
1/16
3/32
L
±.003
3/32"
.062"

No.	L	T
2024A	.037	1/64
2024B	.053	1/32
2024C	.084	1/16
2024D	.115	3/32
2024E	.147	1/8

STAKING TOOL KIT No. 3868

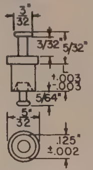
2025 MINIATURE THROUGH LUG


3/32"
1/16"
3/32
15/64"
L
±.003
1/16
9/64
5/32"
.125"
±.001
-.002

No.	L	T
2025A	.075	1/32
2025B	.105	1/16
2025C	.135	3/32
2025D	.165	1/8

STAKING TOOL KIT No. 3869

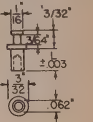
2026 MINIATURE THROUGH LUG


3/32"
3/32"
5/32"
L
+.003
-.003
5/64"
5/32"
.125"
±.002

No.	L	T
2026A	.075	1/32
2026B	.105	1/16
2026C	.135	3/32
2026D	.165	1/8

STAKING TOOL KIT No. 3869

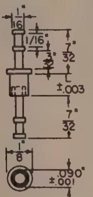
2027 MINIATURE LUG


1/16"
3/32"
3/64"
L
±.003
3/32"
.062"

No.	L	T
2027A	.037	1/64
2027B	.054	1/32
2027C	.084	1/16
2027D	.115	3/32
2027E	.147	1/8

STAKING TOOL KIT No. 3868

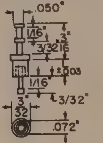
2028 FEED-THRU TERMINAL LUG


1/16"
1/16"
7/32"
3/32"
L
±.003
7/32"
1/8"
.090"
±.001

No.	L	T
2028A	.054	1/32
2028B	.084	1/16
2028C	.115	3/32
2028D	.147	1/8

STAKING TOOL KIT No. 3870

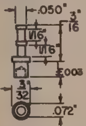
2029 TERMINAL LUG


.050"
1/16"
3/32
3/16"
L
±.003
1/16"
3/32"
3/32"
.072"

No.	L	T
2029A	.054	1/32
2029B	.084	1/16
2029C	.115	3/32
2029D	.147	1/8

STAKING TOOL KIT No. 3871

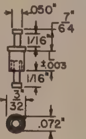
2030 TERMINAL LUG


.050"
3/16"
1/16
1/16
L
±.003
3/32"
.072"

No.	L	T
2030A	.054	1/32
2030B	.084	1/16
2030C	.115	3/32
2030D	.147	1/8

STAKING TOOL KIT No. 3868

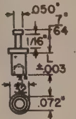
2031 FEED TERMINAL LUG


.050"
7/64"
1/16"
L
±.003
1/16"
3/32"
.072"

No.	L	T
2031A	.054	1/32
2031B	.084	1/16
2031C	.115	3/32
2031D	.147	1/8

STAKING TOOL KIT No. 3871

2032 TERMINAL LUG


.050"
7/64"
1/16"
L
±.003
3/32
.072"

No.	L	T
2032A	.054	1/32
2032B	.084	1/16
2032C	.115	3/32
2032D	.147	1/8

STAKING TOOL KIT No. 3868

SUGGESTED RESALE PRICES & QUANTITY DISCOUNT SCHEDULE

Cat. No.	NET Per C	Cat. No.	NET Per C
2000	$ 6.10	2021	$ 4.60
2001	6.00	2022	3.50
2002	14.60	2023	5.00
2003	14.90	2024	3.50
2004	8.70	2025	7.50
2005	6.80	2026	5.30
2006	3.60	2027	3.50
2007	5.00	2028	4.60
2008	6.00	2029	4.50
2009	9.10	2030	3.20
2010	9.20	2031	3.60
2011	10.00	2032	3.50
2012	6.60	2033	10.80
2013	3.20	2034	11.50
2014	4.50	2035	10.30
2015	13.50	2036	11.10
2016	6.60	2037	15.00
2017	8.00	2038	15.00
2018	6.70		
2019	9.00		
2020	4.80		

QUANTITY	DISCOUNT OFF NET
100 - 999	Net
1,000 - 4,999	15%
5,000 - 9,999	25%
10,000 - 24,999	35%
25,000 - 49,999	40%
50,000 - 99,999	50%
100,000 -	On Request

ALL STAKING TOOL KITS Each..................$3.00

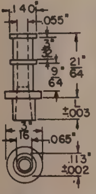
ACCESSORY TOOL HOLDERS

Anvil Bench Tool Holder, 1/4" anvils. Malleable iron base with bottom felt pad for bench use.
No. 3877 Net Ea. $4.20

Anvil tool holder for use with drill press, arbor, kick press, punch press or vise.
No. 3878 Net Ea. $1.50

WE INVITE YOUR INQUIRIES ON OTHER TYPES OF TURRET TERMINALS NOT SHOWN HERE

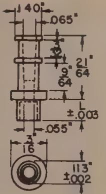
2033 RECEPTACLE LUG


.140"
.055"
3/32"
21/64"
9/64
L
±.003
3/16"
.065"
.113"
±.002

No.	L	T
2033A	.075	1/32
2033B	.105	1/16
2033C	.135	3/32
2033D	.165	1/8
2033E	.195	5/32
2033F	.230	3/16

STAKING TOOL KIT No. 3860

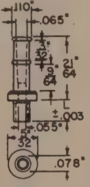
2034 RECEPTACLE LUG


.140"
.065"
3/32
21/64"
9/64
L
±.003
.055"
3/16"
.113"
±.002

No.	L	T
2034A	.075	1/32
2034B	.105	1/16
2034C	.135	3/32
2034D	.165	1/8
2034E	.195	5/32
2034F	.230	3/16

STAKING TOOL KIT No. 3860

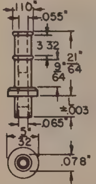
2035 RECEPTACLE LUG


.110"
.065"
3/32"
21/64"
9/64
L
±.003
.055"
5/32"
.078"

No.	L	T
2035A	.075	1/32
2035B	.105	1/16
2035C	.135	3/32
2035D	.165	1/8
2035E	.195	5/32
2035F	.230	3/16

STAKING TOOL KIT No. 3863

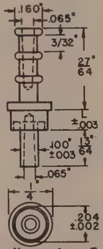
2036 RECEPTACLE LUG


.110"
.055"
3/32
21/64"
9/64
L
±.003
.065"
5/32"
.078"

No.	L	T
2036A	.075	1/32
2036B	.105	1/16
2036C	.135	3/32
2036D	.165	1/8
2036E	.195	5/32
2036F	.230	3/16

STAKING TOOL KIT No. 3863

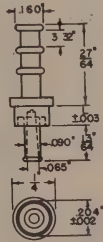
2037 TAPERED TERMINAL


.160"
.065"
3/32"
27/64"
L
±.003
.100"
±.003
13/64"
.065"
1/4"
.204
±.002

No.	L	T
2037A	.105	1/16
2037B	.135	3/32
2037C	.165	1/8

STAKING TOOL KIT Not Available

2038 TAPERED TERMINAL


.160"
3/32"
27/64"
L
±.003
.090"
13/64"
.065"
1/4
.204"
±.002

No.	L	T
2038A	.105	1/16
2038B	.135	3/32
2038C	.165	1/8

STAKING TOOL KIT Not Available

IT'S SOUND PLANNING TO "**SPECIFY SMITH**" WHEN DESIGNING OR PURCHASING

SPECIFY SMITH BRASS SPACERS ZINC PLATED

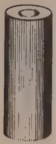
STOCKED BY
LEADING
DISTRIBUTORS
NATIONWIDE

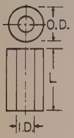
ROUND

1/4" O.D.

Std. Pkg. 100

Length "L"	CLEARANCE HOLE #4(.115) No.	#6(.140) No.	#8(.171) No.	NET Per C
.125	8700	8701	8702	$ 5.70
.187	8703	8704	8705	6.20
.250	2340	2100	2105	7.00
.312	8706	8707	8708	7.90
.375	2341	2101	2106	8.40
.437	8709	8710	8711	$ 9.20
.500	2342	2102	2107	9.40
.562	8712	8713	8714	10.70
.625	8715	8716	8717	11.20
.687	8718	8719	8720	14.00
.750	2343	2103	2108	$14.50
.812	8721	8722	8723	15.00
.875	8724	8725	8726	16.30
.937	8727	8728	8729	16.80
1.000	2344	2104	2109	18.60





3/8" O.D.

Length "L"	CLEARANCE HOLE #4(.115) No.	#6(.140) No.	#8(.171) No.	NET Per C
.125	8730	8731	8732	$10.20
.187	8733	8734	8735	11.90
.250	2345	2110	2115	12.50
.312	8736	8737	8738	13.40
.375	2346	2111	2116	15.90
.437	8739	8740	8741	$16.90
.500	2347	2112	2117	17.30
.562	8742	8743	8744	21.80
.625	8745	8746	8747	20.70
.687	8748	8749	8750	23.30
.750	2348	2113	2118	$20.60
.812	8751	8752	8753	24.10
.875	8754	8755	8756	27.40
.937	8757	8758	8759	28.20
1.000	2349	2114	2119	29.30

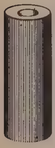
ROUND THREADED

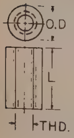
1/4" O.D.

Std. Pkg. 100

*On Threaded Spacers over 1" the tap is 3/8" from each end and not continuous through.

Length "L"	4-40 No.	6-32 No.	8-32 No.	NET Per C
.125	8760	8761	8762	$ 7.40
.187	8763	8764	8765	7.70
.250	2370	2120	2125	8.00
.312	8766	8767	8768	8.50
.375	2371	2121	2126	9.50
.437	8769	8770	8771	$10.10
.500	2372	2122	2127	12.40
.562	8772	8773	8774	13.20
.625	8775	8776	8777	13.70
.687	8778	8779	8780	17.80
.750	2373	2123	2128	$18.00
.812	8781	8782	8783	18.10
.875	8784	8785	8786	19.10
.937	8787	8788	8789	19.50
1.000	2374	2124	2129	21.00



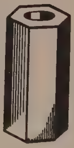


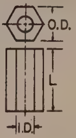
HEX

1/4" HEX

Std. Pkg. 100

Length "L"	CLEARANCE HOLE #4(.115) No.	#6(.140) No.	#8(.171) No.	NET Per C
.125	8790	8791	8792	$ 6.40
.187	8793	8794	8795	6.80
.250	2380	2300	2305	7.50
.312	8796	8797	8798	8.90
.375	2381	2301	2306	9.20
.437	8799	8800	8801	$ 9.50
.500	2382	2302	2307	9.80
.562	8802	8803	8804	10.80
.625	8805	8806	8807	11.40
.687	8808	8809	8810	14.20
.750	2383	2303	2308	$14.50
.812	8811	8812	8813	15.70
.875	8814	8815	8816	17.50
.937	8817	8818	8819	19.00
1.000	2384	2304	2309	20.00





3/8" HEX

Length "L"	CLEARANCE HOLE #4(.115) No.	#6(.140) No.	#8(.171) No.	NET Per C
.125	8850	8851	8852	$10.60
.187	8853	8854	8855	11.90
.250	2385	2310	2315	12.80
.312	8856	8857	8858	14.80
.375	2386	2311	2316	16.20
.437	8859	8860	8861	$19.80
.500	2387	2312	2317	20.50
.562	8862	8863	8864	21.50
.625	8865	8866	8867	23.70
.687	8868	8869	8870	24.10
.750	2388	2313	2318	$25.10
.812	8871	8872	8873	26.40
.875	8874	8875	8876	29.50
.937	8877	8878	8879	29.90
1.000	2389	2314	2319	32.60

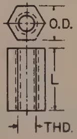
HEX THREADED

1/4" HEX

Std. Pkg. 100

*On Threaded Spacers over 1" the tap is 3/8" from each end and not continuous through.

Length "L"	4-40 No.	6-32 No.	8-32 No.	NET Per C
.125	8820	8821	8822	$ 7.50
.187	8823	8824	8825	8.00
.250	2330	2320	2325	8.70
.312	8826	8827	8828	9.40
.375	2331	2321	2326	10.60
.437	8829	8830	8831	$11.40
.500	2332	2322	2327	12.40
.562	8832	8833	8834	14.50
.625	8835	8836	8837	17.30
.687	8838	8839	8840	18.30
.750	2333	2323	2328	$19.30
.812	8841	8842	8843	20.00
.875	8844	8845	8846	20.30
.937	8847	8848	8849	21.30
1.000	2334	2324	2329	22.80



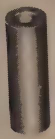
IT'S SOUND PLANNING TO **"SPECIFY SMITH"** WHEN DESIGNING OR PURCHASING

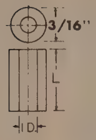
3/16" O.D. BRASS SPACERS ZINC PLATED

SPECIFY SMITH

ROUND

3/16" O.D.



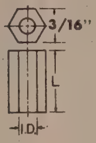


Std. Pkg. 100

DIM. "L"	CLEARANCE HOLE #2(.093) No.	CLEARANCE HOLE #4(.115) No.	NET Per C
.125	9000	9015	$ 5.70
.187	9001	9016	6.20
.250	9002	9017	7.00
.312	9003	9018	7.90
.375	9004	9019	8.40
.437	9005	9020	$ 9.00
.500	9006	9021	9.40
.562	9007	9022	10.70
.625	9008	9023	11.20
.687	9009	9024	14.00
.750	9010	9025	$14.50
.812	9011	9026	15.00
.875	9012	9027	16.30
.937	9013	9028	16.80
1.000	9014	9029	18.00

HEX

3/16" HEX

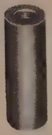


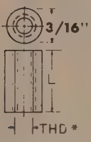
Std. Pkg. 100

DIM. "L"	CLEARANCE HOLE #2(.093) No.	CLEARANCE HOLE #4(.115) No.	NET Per C
.125	9100	9115	$ 6.40
.187	9101	9116	6.80
.250	9102	9117	7.50
.312	9103	9118	8.90
.375	9104	9119	9.20
.437	9105	9120	$ 9.50
.500	9106	9121	9.80
.562	9107	9122	10.80
.625	9108	9123	11.40
.6875	9109	9124	14.20
.750	9110	9125	$14.50
.812	9111	9126	15.70
.875	9112	9127	17.50
.937	9113	9128	19.00
1.000	9114	9129	20.00

ROUND THREADED

*On Threaded Spacers over 1/2", tap is 3/8" from each end and not continuous through.



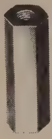


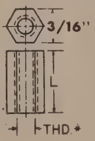
Std. Pkg. 100

DIM. "L"	THREADED 2-56 No.	THREADED 4-40 No.	NET Per C
.125	9030	9045	$ 7.40
.187	9031	9046	7.70
.250	9032	9047	8.00
.312	9033	9048	8.50
.375	9034	9049	9.50
.437	9035	9050	$10.10
.500	9036	9051	12.40
.562	9037	9052	13.20
.625	9038	9053	13.70
.687	9039	9054	17.80
.750	9040	9055	$18.00
.812	9041	9056	18.10
.875	9042	9057	19.10
.937	9043	9058	19.50
1.000	9044	9059	21.00

HEX THREADED

*On Threaded Spacers over 1/2", tap is 3/8" from each end and not continuous through.



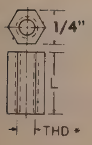


Std. Pkg. 100

DIM. "L"	THREADED 2-56 No.	THREADED 4-40 No.	NET Per C
.125	9130	9145	$ 7.50
.187	9131	9146	8.00
.250	9132	9147	8.70
.312	9133	9148	9.40
.375	9134	9149	10.60
.437	9135	9150	$11.40
.500	9136	9151	12.40
.562	9137	9152	14.50
.625	9138	9153	17.30
.687	9139	9154	18.30
.750	9140	9155	$19.30
.812	9141	9156	20.00
.875	9142	9157	20.30
.937	9143	9158	21.30
1.000	9144	9159	22.80

THREADED HEX STAINLESS STEEL SPACERS

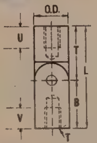
*On Threaded Spacers over 1/2", tap is 3/8" from each end and not continuous through.

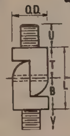


MINIMUM Std. Pkg. 100

DIM. "L"	4-40	6-32	NET Per C
.125	9060	9080	$29.00
.187	9061	9081	30.00
.250	9062	9082	31.00
.312	9063	9083	32.00
.375	9064	9084	33.00
.437	9065	9085	38.00
.500	9066	9086	43.00
.562	9067	9087	46.00
.625	9068	9088	49.00
.687	9069	9089	52.00
.750	9070	9090	54.00
.812	9071	9091	55.00
.875	9072	9092	56.00
.937	9073	9093	57.00
1.000	9074	9094	58.00

SWIVEL STANDOFFS





MATERIALS: BRASS
FINISH: TIN PLATED
DESCR.: FOR PRINTED CIRCUIT BOARDS

STD. PKG. 25

FEMALE INTERNAL THREAD

NO.	O.D.	THD.	TOP (T)	DEP. (U)	BOT (B)	DEP. (V)	LGTH (L)	NET PER C
3021	3/16	4-40	.375	.172	.375	.172	3/4"	$55.00
3022	3/16	4-40	.375	.172	.625	.250	1"	60.00
3023	1/4	6-32	.375	.172	.375	.172	3/4"	60.00
3024	1/4	6-32	.375	.172	.625	.250	1"	65.00
3025	1/4	8-32	.375	.172	.375	.172	3/4"	60.00
3026	1/4	8-32	.375	.172	.625	.250	1"	65.00

MALE INTERNAL THREAD

NO.	O.D.	THD	TOP (T)	DEP. (U)	BOT (B)	DEP. (V)	LGTH (L)	NET PER C
3027	3/16	4-40	.250	.250	.250	.250	1/2"	$55.00
3028	1/4	6-32	.250	.312	.250	.312	1/2"	60.00
3029	1/4	8-32	.250	.312	.250	.312	1/2"	60.00

NOTE: SPECIAL SIZES ON REQUEST.

IT'S SOUND PLANNING TO **"SPECIFY SMITH"** WHEN DESIGNING OR PURCHASING

SPECIFY SMITH

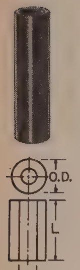
ALUMINUM SPACERS

STOCKED BY
LEADING
DISTRIBUTORS
NATIONWIDE

ALUMINUM SPACERS

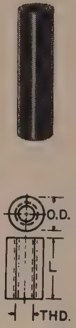
Irridite 14-2 per MIL-C-5541 Std. Pkg. 100

ROUND



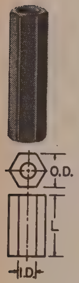
	1/4" O.D.				5/16" O.D.	
	– CLEARANCE HOLE –				CLEAR	
LENGTH "L"	#4(.115) No.	#6(.140) No.	#8(.171) No.	NET Per C	#10(.200) No.	NET Per C
.125	8480	8500	8520	$ 5.00	8540	$ 7.00
.187	9200	9207	9214	5.50	9221	7.50
.250	8481	8501	8521	6.00	8541	8.00
.312	9201	9208	9215	6.50	9222	8.50
.375	8482	8502	8522	7.00	8542	9.00
.437	9202	9209	9216	7.50	9223	9.50
.500	8483	8503	8523	8.00	8543	10.00
.562	9203	9210	9217	8.50	9224	10.50
.625	8484	8504	8524	9.00	8544	11.00
.687	9204	9211	9218	9.50	9225	11.50
.750	8485	8505	8525	10.00	8545	12.00
.812	9205	9212	9219	10.50	9226	12.50
.875	8486	8506	8526	11.00	8546	13.00
.937	9206	9213	9220	11.50	9227	13.50
1.000	8487	8507	8527	12.00	8547	14.00
1.250	8488	8508	8528	15.00	8548	15.00
1.500	8489	8509	8529	16.00	8549	27.00
1.750	8490	8510	8530	17.00	8550	28.00
2.000	8491	8511	8531	18.00	8551	29.00

ROUND THREADED



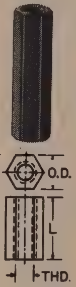
	1/4" O.D.				5/16" O.D.	
LENGTH "L"	4-40 No.	6-32 No.	8-32 No.	NET Per C	10-32 No.	NET Per C
.125	8320	8340	8360	$ 6.00	8380	$ 8.00
.187	9228	9235	9242	6.50	9249	8.50
.250	8321	8341	8361	7.00	8381	9.00
.312	9229	9236	9243	7.50	9250	9.50
.375	8322	8342	8362	8.00	8382	10.00
.437	9230	9237	9244	8.50	9251	10.50
.500	8323	8343	8363	9.00	8383	11.00
.562	9231	9238	9245	9.50	9252	11.50
.625	8324	8344	8364	10.00	8384	12.00
.687	9232	9239	9246	10.50	9253	12.50
.750	8325	8345	8365	11.00	8385	13.00
.812	9233	9240	9247	11.50	9254	13.50
.875	8326	8346	8366	12.00	8386	14.00
.937	9234	9241	9248	12.50	9255	14.50
1.000	8327	8347	8367	14.00	8387	15.00
1.250	8328	8348	8368	16.00	8388	16.00
1.500	8329	8349	8369	17.00	8389	18.00
1.750	8330	8350	8370	18.00	8390	20.00
2.00	8331	8351	8371	19.00	8391	22.00

HEX



	1/4" O.D.				5/16" O.D.	
	– CLEARANCE HOLE –				CLEAR	
LENGTH "L"	#4(.115) No.	#6(.140) No.	#8(.171) No.	NET Per C	#10(.200) No.	NET Per C
.125	8560	8580	8600	$ 6.00	8620	$ 9.00
.187	9256	9263	9270	6.50	9277	9.50
.250	8561	8581	8601	7.00	8621	10.00
.312	9257	9264	9271	7.50	9278	10.50
.375	8562	8582	8602	8.00	8622	11.00
.437	9258	9265	9272	8.50	9279	11.50
.500	8563	8583	8603	9.00	8623	12.00
.562	9259	9266	9273	9.50	9280	12.50
.625	8564	8584	8604	10.00	8624	13.00
.687	9260	9267	9274	10.50	9281	13.50
.750	8565	8585	8605	11.00	8625	14.00
.812	9261	9268	9275	11.50	9282	14.50
.875	8566	8586	8606	12.00	8626	15.00
.937	9262	9269	9276	12.50	9283	15.50
1.000	8567	8587	8607	13.00	8627	16.00

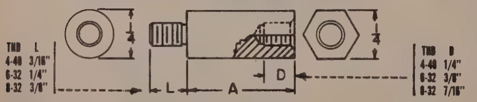
HEX THREADED



	1/4" O.D.				5/16" O.D.	
LENGTH "L"	4-40 No.	6-32 No.	8-32 No.	NET Per C	10-32 No.	NET Per C
.125	8400	8420	8440	$ 7.00	8460	$10.00
.187	9284	9291	9298	7.50	9305	10.50
.250	8401	8421	8441	8.00	8461	11.00
.312	9285	9292	9299	8.50	9306	11.50
.375	8402	8422	8442	9.00	8462	12.00
.437	9286	9293	9300	9.50	9307	12.50
.500	8403	8423	8443	10.00	8463	13.00
.562	9287	9294	9301	10.50	9308	13.50
.625	8404	8424	8444	11.00	8464	14.00
.687	9288	9295	9302	11.50	9309	14.50
.750	8405	8425	8445	12.00	8465	15.00
.812	9289	9296	9303	12.50	9310	15.50
.875	8406	8426	8446	13.00	8466	16.00
.937	9290	9297	9304	13.50	9311	16.50
1.000	8407	8427	8447	14.00	8467	17.00

MALE-FEMALE SPACERS

MALE-FEMALE THREADED SPACERS



THD	L
4-40	3/16"
6-32	1/4"
8-32	3/8"

THD	D
4-40	1/4"
6-32	3/8"
8-32	7/16"

BRASS zinc plated

Std. Pkg. 100

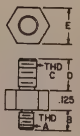
ROUND

4-40 THD. No.	6-32 THD. No.	8-32 THD. No.	"A" LGTH.	NET PER C
8200	8232	8264	.250	$22.80
8201	8233	8265	.375	23.20
8202	8234	8266	.500	23.70
8203	8235	8267	.625	24.20
8204	8236	8268	.750	24.70
8205	8237	8269	.875	25.20
8206	8238	8270	1.000	25.90
8207	8239	8271	1.125	26.40
8208	8240	8272	1.250	27.60
8209	8241	8273	1.375	29.30
8210	8242	8274	1.500	30.30
8211	8243	8275	1.625	31.00
8212	8244	8276	1.750	31.60
8213	8245	8277	2.000	32.40
8214	8246	8278	2.500	33.90
8215	8247	8279	3.000	36.80

HEX

4-40 THD. No.	6-32 THD. No.	8-32 THD. No.	"A" LGTH.	NET PER C
8216	8248	8280	.250	$22.80
8217	8249	8281	.375	23.20
8218	8250	8282	.500	23.70
8219	8251	8283	.625	24.20
8220	8252	8284	.750	24.70
8221	8253	8285	.875	25.20
8222	8254	8286	1.000	25.90
8223	8255	8287	1.125	26.40
8224	8256	8288	1.250	27.60
8225	8257	8289	1.375	29.30
8226	8258	8290	1.500	30.30
8227	8259	8291	1.625	31.00
8228	8260	8292	1.750	31.60
8229	8261	8293	2.000	32.40
8230	8262	8294	2.500	33.90
8231	8263	8295	3.000	36.80

MALE SPACER ADAPTERS



Dual-stud spacer adapters convert female threaded spacers to male-female or splice spacers together for added length. Brass, zinc plated hex body for wrench tightening. Adds 1/8" to length of spacer. Std. Pkg. 25

No.	THD. A	LGTH. B	THD. C	LGTH. D	HEX E	NET Per C
8300	4-40	3/16"	4-40	3/16"	1/4"	$21.30
8301	4-40	3/16"	6-32	1/4"	1/4"	23.60
8302	6-32	1/4"	6-32	1/4"	1/4"	24.50
8303	6-32	1/4"	8-32	3/8"	1/4"	25.00
8304	8-32	3/8"	8-32	3/8"	1/4"	26.00
8305	8-32	3/8"	10-32	3/8"	1/4"	27.00
8306	8-32	3/8"	10-32	3/8"	5/16"	29.10
8307	10-32	3/8"	10-32	3/8"	5/16"	30.60

SPACERS SHOWN ARE STANDARD AND STOCKED IN DEPTH. We welcome your inquiry for special sizes, materials and plating.

IT'S SOUND PLANNING TO **"SPECIFY SMITH"** WHEN DESIGNING OR PURCHASING

STOCKED BY
LEADING
DISTRIBUTORS
NATIONWIDE

INSULATED SPACERS

SPECIFY **SMITH**

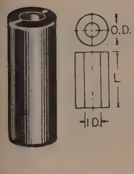
FIBRE SPACERS

MATERIAL: FIBRE, per MIL-F-1148A, Grade CH.

These fibre bushings are ideal for use in raising sub panels, chassis, condensers, transformers, etc

1/4" O.D.

Std. Pkg. 100



Length "L"	— CLEARANCE HOLE — #4(115) No.	#6(140) No.	#8(171) No.	NET Per C
.125	8880	8881	8882	$5.20
.187	8883	8884	8885	5.80
.250	2335	2130	2140	6.30
.312	8886	8887	8888	7.10
.375	2336	2131	2141	7.80
.437	8889	8890	8891	8.50
.500	2337	2132	2142	9.20
.562	8892	8893	8894	10.20
.625	8895	8896	8897	10.60
.687	8898	8899	8900	11.70
.750	2338	2133	2143	12.60
.812	8901	8902	8903	13.80
.875	8904	8905	8906	14.50
.937	8907	8908	8909	15.20
1.000	2339	2134	2144	15.50

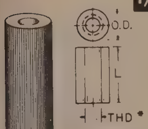
PHENOLIC THREADED SPACERS

MATERIAL:

PBE Grade MIL-P-79A, Natural Color

1/4" O.D.

Ideal for use in mounting chassis, components, etc. Good mechanical strength, resists abrasives and chemicals. Excellent dielectric and low moisture absorption. Std. Pkg. 100

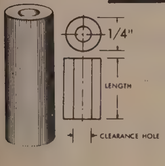


*On threaded spacers ¾" and longer, tap is ⅜" from each end, and not continuous through.

Length "L"	THD. 4-40 No.	THD. 6-32 No.	THD. 8-32 No.	NET Per C
.250	8660	8661	8662	$ 9.40
.312	8663	8664	8665	10.40
.375	8666	8667	8668	12.00
.437	8669	8670	8671	12.40
.500	8672	8673	8674	13.40
.562	8675	8676	8677	14.00
.625	8678	8679	8680	15.00
.687	8681	8682	8683	16.70
.750	8684	8685	8686	17.70
.812	8687	8688	8689	18.40
.875	8690	8691	8692	19.40
.937	8693	8694	8695	20.00
1.000	8696	8697	8698	21.00

1/4" O.D. ROUND PLASTIC SPACERS

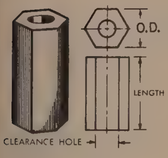
Polyvinyl Dichloride (PVDC) ¼" O.D. plastic spacers. Self-extinguishing and high temperature resistant. Available in gray. Std. Pkg. 100



Length	CLEARANCE HOLE #4(.115) No.	#6(.140) No.	#8(.171) No.	NET Per C
¼"	4154	4155	4156	$3.20
⅜"	4157	4158	4159	3.35
½"	4160	4161	4162	3.50
⅝"	4163	4164	4165	3.75
¾"	4166	4167	4168	4.20
1"	4169	4170	4177	4.35

HEX PLASTIC SPACERS

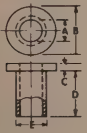
Polyvinyl Dichloride (PVDC) Hex Spacers. Self-extinguishing and high temperature resistant Designed for use with self-tapping screws of size indicated. Available in gray only. Std. Pkg. 100



Length	SELF-TAPPING SCREW HOLE SIZE #4(.092) O.D. 3/16" No.	#6(.110) O.D. 1/4" No.	#8(.141) O.D. 3/8" No.	NET Per C
⅜"	4178	—	—	$3.50
½"	4179	4180	—	4.00
⅝"	4181	4182	4183	4.20
¾"	4184	4185	4186	4.35
⅞"	4187	4188	4189	5.00
1"	4190	4191	4192	5.50

NYLON SPACER BUSHINGS

Natural Color. MIL-P-20693A. Std. Pkg. 100

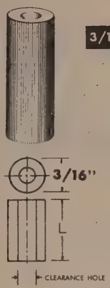


No.	I.D. (A)	B	C	D	E	NET Per C
2534	#4 (.115)	.235	³⁄₆₄	¼	.147	$2.30
2535	#6 (.140)	.290	³⁄₆₄	¼	.170	2.40
2536	#8 (.170)	.344	¹⁄₁₆	⅜	.205	2.50
2537	#10 (.200)	.399	¹⁄₁₆	⅜	.260	2.70
2538	¼" (.260)	.513	¹⁄₁₆	⅜	.312	3.00

NYLON SPACERS

3/16" O.D. Molded Nylon, Type 66, Mil Spec. 20693A

Std. Pkg. 100



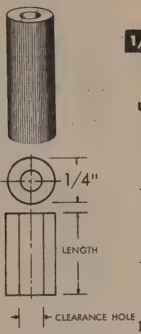
DIM "L"	#2 (.091) No.	#4 (.115) No.	NET PER C
.125	9160	9180	3.30
.187	9161	9181	3.80
.250	9162	9182	4.30
.312	9163	9183	4.90
.375	9164	9184	5.50
.437	9165	9185	6.00
.500	9166	9186	6.50
.562	9167	9187	7.00
.625	9168	9188	7.50
.687	9169	9189	8.00
.750	9170	9190	8.50
.812	9171	9191	8.80
.875	9172	9192	9.30
.937	9173	9193	9.70
1.000	9174	9194	10.00

NYLON SPACERS

1/4" O.D.

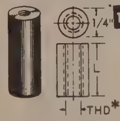
Non-conductive and molded of corrosive resistant Nylon. Useful for a wide variety of applications as well as for bushings, bearings, rollers and glides. Available in Natural finish, ¼" O.D. in various clearance hole diameters.

Std. Pkg. 100



Length	— CLEARANCE HOLE — #4(.115) No.	#6(.140) No.	#8(.171) No.	NET Per C
.125	4000	4001	4002	$ 3.30
.187	4003	4004	4005	3.80
.250	4006	4007	4008	4.30
.312	4009	4010	4011	4.90
.375	4012	4013	4014	5.50
.437	4015	4016	4017	6.00
.500	4018	4019	4020	6.50
.562	4021	4022	4023	7.00
.625	4024	4025	4026	7.50
.687	4027	4028	4029	8.00
.750	4030	4031	4032	8.50
.812	4033	4034	4035	8.80
.875	4036	4037	4038	9.30
.937	4039	4040	4041	9.70
1.000	4042	4043	4044	10.00

1/4" O.D. NYLON THREADED SPACERS

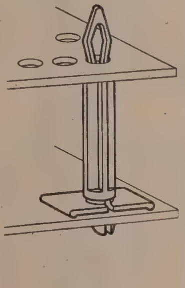


* On threaded spacers 3/4" and longer, tap is 3/8" from each end and not continuous through.

Molded Nylon, Type 66, Mil Spec 20693A, ¼" O.D. machine tapped. Std. Pkg. 100

LENGTH "L"	4/40 No.	6/32 No.	8/32 No.	NET per C
¼"	4050	4051	4052	$8.00
⅜	4053	4054	4055	9.50
½"	4056	4057	4058	11.00
¾"	4059	4060	4061	15.00
1"	4062	4063	4064	18.00

PRINTED CIRCUIT BOARD SUPPORTS



Made of Nylon and snaps into circuit board and chassis. Chassis hole .187 diameter, thickness from .034 to .080. P.C. board hole .156, ¹⁄₁₆ thick. Std. Pkg. 100

No.	Length	NET Per C
4093	³⁄₁₆"	$3.00
4094	¼"	3.10
4095	⅜"	3.30
4096	½"	3.50
4097	⅝"	3.75
4098	¾"	4.00
4099	⅞"	4.50

SELF-EXTINGUISHING PRINTED CIRCUIT BOARD SUPPORTS

Same as above except
Made of natural flame retardant Nylon.

No.	Length	NET Per C
4293	³⁄₁₆"	$4.20
4294	¼"	4.50
4295	⅜"	4.85
4296	½"	5.20
4297	⅝"	5.50
4298	¾"	6.00
4299	⅞"	6.75

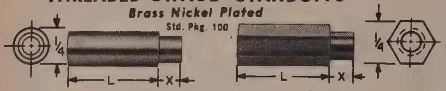
IT'S SOUND PLANNING TO "**SPECIFY SMITH**" WHEN DESIGNING OR PURCHASING

SPECIFY SMITH SWAGE & CERAMIC STANDOFFS

THREADED SWAGE STANDOFFS

Brass Nickel Plated

Std. Pkg. 100

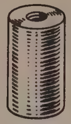


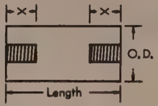
NOTE: FOR 1″ STANDOFFS, TAP IS ½″ FROM EACH END, AND NOT CONTINUOUS THRU. 8-32 TAPS ARE FULL LENGTH, BUT DO NOT CLEAR COUNTERBORE. C = Counter Bore S = Shoulder

PANEL	DIM.-"X"	DIM. "L"	ROUND	NET Per C	HEX	NET Per C
	2-56 THREAD		"S" DIA. — .138		"C" DIA. — .113	
3/64	.094	.125	4369	10.00	4269	10.40
		.187	4370	10.40	4270	10.70
		.250	4371	10.70	4271	11.00
	4-40 THREAD		"S" DIA. — .138		"C" DIA. — .113	
3/64	.094	.125	4354	10.00	4254	10.40
		.187	4358	10.40	4258	10.70
		.250	4362	10.40	4262	11.00
1/16	.105	.125	4355	10.00	4255	10.40
		.187	4359	10.40	4259	10.70
3/32	.135	.125	4356	10.00	4256	10.40
		.187	4360	10.40	4260	10.70
1/8	.165	.125	4357	10.00	4257	10.40
		.187	4361	10.40	4261	10.70
	4-40 THREAD		"S" DIA. — .187		"C" DIA. — .156	
1/16	.105	.250	4100	10.40	4200	11.00
		.375	4103	12.00	4203	12.70
		.500	4106	14.70	4206	15.40
		.625	4109	15.40	4209	16.00
		.750	4112	17.00	4212	17.70
		1.000	4115	22.00	4215	22.70
3/32	.135	.250	4101	10.40	4201	11.00
		.375	4104	12.00	4204	12.70
		.500	4107	14.70	4207	15.40
		.625	4110	15.40	4210	16.00
		.750	4113	17.00	4213	17.70
		1.000	4116	22.00	4216	22.70
1/8	.165	.250	4102	10.40	4202	11.00
		.375	4105	12.00	4205	12.70
		.500	4108	14.70	4208	15.40
		.625	4111	15.40	4211	16.00
		.750	4114	17.00	4214	17.70
		1.000	4117	22.00	4217	22.70
	6-32 THREAD		"S" DIA. — .138		"C" DIA. — .113	
1/16	.105	.125	4363	10.00	4263	10.40
		.187	4366	10.40	4266	10.70
3/32	.135	.125	4364	10.00	4264	10.40
		.187	4367	10.40	4267	10.70
1/8	.165	.125	4365	10.00	4265	10.40
		.187	4368	10.40	4268	10.70
	6-32 THREAD		"S" DIA. — .187		"C" DIA. — .156	
1/16	.105	.250	4118	10.40	4218	11.00
		.375	4121	12.00	4221	12.70
		.500	4124	14.70	4224	15.40
		.625	4127	15.40	4227	16.00
		.750	4130	17.00	4230	17.70
		1.000	4133	22.00	4233	22.70
3/32	.135	.250	4119	$10.40	4219	$11.00
		.375	4122	12.00	4222	12.70
		.500	4125	14.70	4225	15.40
		.625	4128	15.40	4228	16.00
		.750	4131	17.00	4231	17.70
		1.000	4134	22.00	4234	22.70
1/8	.165	.250	4120	$10.40	4220	$11.00
		.375	4123	12.00	4223	12.70
		.500	4126	14.70	4226	15.40
		.625	4129	15.40	4229	16.00
		.750	4132	17.00	4232	17.70
		1.000	4135	22.00	4235	22.70
	8-32 THREAD		"S" DIA. — .187		"C" DIA. — .156	
1/16	.105	.250	4136	10.40	4236	11.00
		.375	4139	12.00	4239	12.70
		.500	4142	14.70	4242	15.40
		.625	4145	15.40	4245	16.00
		.750	4148	17.00	4248	17.70
		1.000	4151	22.00	4251	22.70
3/32	.135	.250	4137	10.40	4237	11.00
		.375	4140	12.00	4240	12.70
		.500	4143	14.70	4243	15.40
		.625	4146	15.40	4246	16.00
		.750	4149	17.00	4249	17.70
		1.000	4152	22.00	4252	22.70
1/8	.165	.250	4138	10.40	4238	11.00
		.375	4141	12.00	4241	12.70
		.500	4144	14.70	4244	15.40
		.625	4147	15.40	4247	16.00
		.750	4150	17.00	4250	17.70
		1.000	4153	22.00	4253	22.70

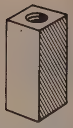
CERAMIC STANDOFFS

MIL SPEC. GRADE L-5 MIL 1-10





Std. Pkg. 100



ROUND

SQUARE

3/8″ Dia. 6/32 Thread

Std. Pkg. 50

No.	MIL Type	NET Per C	Length	X	No.	MIL Type	NET Per C
2600	NL523W01-004	24.00	.500	5/32	3600	NL523W10-004	85.00
2601	NL523W01-005	25.00	.625	3/16	3601	NL523W10-005	88.00
2602	NL523W01-006	26.00	.750	¼	3602	NL523W10-006	93.00
2603	NL523W01.008	28.00	1.000	⅜	3603	NL523W10-008	99.00
2604	NL523W01-010	29.00	1.250	⅜	3604	NL523W10-010	104.00
2605	NL523W01-012	32.00	1.500	⅜	3605	NL523W10-012	112.00
2606	NL523W01-016	35.00	2.000	⅜	3606	NL523W10-016	125.00

1/2″ Dia. 8/32 Thread

Std. Pkg. 25

No.	MIL Type	NET Per C	Length	X	No.	MIL Type	NET Per C
2607	NL523W02-005	26.00	.625	3/16	—	—	—
2608	NL523W02-006	27.00	.750	¼	3608	NL523W11-006	96.00
2609	NL523W02-008	29.00	1.000	¼	3609	NL523W11-008	104.00
2610	NL523W02-010	32.00	1.250	⅜	3610	NL523W11-010	112.00
2611	NL523W02-012	34.00	1.500	⅜	3611	NL523W11-012	120.00
2612	NL523W02-016	38.00	2.000	⅜	3612	NL523W11.016	136.00
2613	NL523W02-020	42.00	2.500	⅜	3613	NL523W11-020	152.00
2614	NL523W02-024	46.00	3.000	⅜			

3/4″ Dia. 10/32 Thread

Std. Pkg. 25

No.	MIL Type	NET Per C	Length	X	No.	MIL Type	NET Per C
2615	NL523W03-008	55.00	1.000	⅜	3615	NL523W12-008	147.00
2616	NL523W03-010	59.00	1.250	⅜	3616	NL523W12-010	155.00
2617	NL523W03-012	67.00	1.500	⅜	3617	NL523W12-012	163.00
2618	NL523W03-016	70.00	2.000	⅜	3618	NL523W12-016	182.00
2619	NL523W03-020	78.00	2.500	⅜	3619	NL523W12-020	200.00
2620	NL523W03-024	87.00	3.000	⅜	3620	NL523W12-024	219.00
2621	NL523W03-032	95.00	4.000	⅜	3621	NL523W12-032	246.00

1″ Dia. 1/4 x 20 Thread

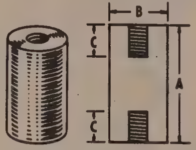
Std. Pkg. 25

No.	MIL Type	NET Per C	Length	X	No.	MIL Type	NET Per C
2622	NL523W04.010	78.00	1.250	7/16	—	—	—
2623	NL523W04-012	84.00	1.500	½	3623	NL523W13-012	190.00
2624	NL523W04-016	98.00	2.000	⅝	3624	NL523W13-016	216.00
2625	NL523W04-020	109.00	2.500	⅝	3625	NL523W13-020	243.00
2626	NL523W04-024	118.00	3.000	⅝	3626	NL523W13-024	270.00
2627	NL523W04-032	129.00	4.000	⅝	3627	NL523W13-032	326.00
2628	NL523W04-040	140.00	5.000	⅝	—	—	—
2629	NL523W04-048	151.00	6.000	⅝	—	—	—

CERAMIC STANDOFFS, COMMERCIAL

Grade L5 Ceramic with outside glazed.

Std. Pkg. 100

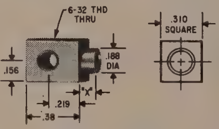


No.	A	B	C	Thd.	NET Per C
2640	¼″	¼″	THRU	6-32	21.00
2641	½″	¼″	5/32″	6-32	22.00
2642	⅜″	⅜″	5/32″	6-32	23.00
2643	½″	⅜″	3/16″	6-32	24.00
2644	½″	½″	9/64″	6-32	25.00
2645	¾″	½″	¼″	6-32	26.00
2646	1″	½″	⅜″	6-32	28.00
2647	1½″	½″	5/16″	6-32	32.00
2648	2½″	½″	½″	6-32	55.00
2649	2½″	¾″	¾″	¼-20	110.00
2650	4″	¾″	¾″	¼-20	128.00

CHASSIS FASTENERS

Designed to be swaged onto metal chassis for use as mounting surfaces for terminal boards, tie strips, etc. Brass, Cadmium Plated.

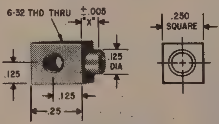
Std. Pkg. 100



2039 SERIES

2039 SERIES

No.	"X"	Board Thickness	NET Per C
2039B	.105	.062	$30.00
2039C	.135	.094	30.00
2039D	.165	.125	30.00



2040 SERIES

2040 SERIES

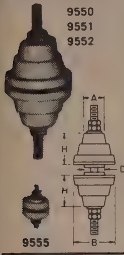
No.	"X"	Board Thickness	NET Per C
2040A	.075	.031	$30.00
2040B	.105	.062	30.00
2040C	.135	.094	30.00
2040D	.165	.125	30.00

SPACERS SHOWN ARE STANDARD AND STOCKED IN DEPTH.
We welcome your inquiry for special sizes, materials and plating.

IT'S SOUND PLANNING TO "**SPECIFY SMITH**" WHEN DESIGNING OR PURCHASING

STEATITE & PORCELAIN INSULATORS

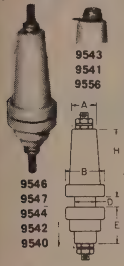
SPECIFY SMITH



STEATITE INSULATED THRU-PANEL BUSHINGS

Consists of a pair of identical steatite insulators along with cushion washers and hardware. The 9555 assembly has interlocking insulators which are self-centering in mounting hole and may be used on very thin panels.

No.	Std. Pkg.	H	B	D	A	Hdwre	Net Ea.
9555	50	1/4"	3/4"	15/32"	1/2"	6-32	.48
9550	25	1/2"	3/4"	15/32"	3/8"	6-32	.66
9551	10	13/16"	1 1/4"	27/32"	5/8"	10-32	1.05
9552	10	1 1/8"	1 3/4"	1 7/32"	7/8"	1/4"-20	1.50

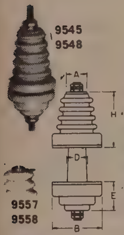


THRU-PANEL INSULATORS

Compression mounted by means of a stud throughout the entire length of the unit. Extrusion of insulator base extends thru mounting hole, increasing the breakdown rating. Units have flat mounting surfaces and are furnished with cushion washer. Types with jacks have terminal permitting connection above, as well as below, panel.

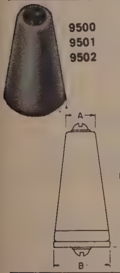
STEATITE

No.	Std. Pkg.	H	B	D	E	A	Hdwre	Net Ea.
9544	50	5/8"	5/8"	5/16"	5/16"	3/8"	6-32	.54
9542	25	7/8"	3/4"	13/32"	3/8"	1/2"	10-32	.84
9540	25	1 1/4"	15/16"	7/16"	1/2"	19/32"	10-32	1.00
9543	10	No. 9542 with Std. Ban. Jack						1.03
9541	10	No. 9540 with Std. Ban. Jack						1.19



PORCELAIN

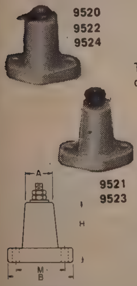
No.	Sta. Pkg.	H	B	D	E	A	Hdwre	Net Ea.
9545	25	1 3/8"	1 1/4"	1/2"	11/15"	5/8"	10-32	1.10
9548	10	2"	1 5/8"	11/16"	7/8"	3/4"	10-32	1.68
9546	10	2 3/4"	1 5/8"	11/16"	1"	15/16"	1/4"-20	2.15
9547	10	4 1/2"	2 1/8"	31/32"	1 1/2"	1 1/16"	1/4"-20	3.60
9557	10	No. 9545 with Std. Ban. Jack						1.30
9558	10	No. 9548 with Std. Ban. Jack						1.88
9556	10	No. 9546 with Giant Ban. Jk.						2.75



STEATITE CONE INSULATORS

Constructed of grade L-423 or better steatite, with threaded holes. Insulators are furnished complete with two nickel-plated machine screws, nickel-plated brass washers, and a cork cushion washer.

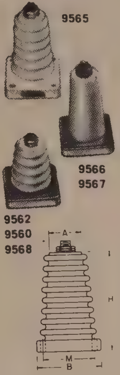
No.	Sta. Pkg.	H	B	A	Hdwre	Net Ea.
9500	50	21/32"	5/8"	7/16"	6-32	.40
9501	25	1 1/32"	3/4"	1/2"	8-32	.45
9502	25	1 7/16"	1"	1/2"	8-32	.84
9503	10	2 1/16"	1 1/8"	5/8"	10-32	1.40
9504	10	3 1/16"	1 1/2"	3/4"	10-32	4.00



STEATITE STAND-OFF INSULATORS

Two hole mounting permits substantial lateral loads. Hardware includes screw, flat washer, and two nuts.

No.	Sta. Pkg.	H	B	M	A	Hdwre	Net Ea.
9524	50	5/8"	1"	11/16"	1 3/8"	6-32	.27
9522	50	1"	1 5/32"	13/16"	15/32"	8-32	.42
9520	25	1 9/16"	1 3/4"	1 5/16"	3/4"	10-32	.60
9523	10	No. 9522 with Std. Ban. Jack					.62
9521	10	No. 9520 with Std. Ban. Jack					.80



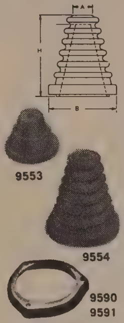
PORCELAIN STAND-OFF INSULATORS

Feature square mounting bases with fouf mounting holes. Porcelain is dense molded and glazed, except on mounting surfaces.

No.	Std. Pkg.	H	B	M	A	Hdwre	Net Ea.
9562	10	2 3/4"	1 7/8"	1 3/8"	7/8"	1/4"-20	1.70
9560	10	4 1/2"	2 1/2"	1 7/8"	1 3/16"	1/4"-20	2.10

This group is supplied with drawn and etched aluminum bases.

No.	Std. Pkg.	H	B	M	A	Hdwre	Net Ea.
9565	10	1 3/8"	1 7/8"	1 1/2"	5/8"	10-32	.72
9568	10	2"	1 3/4"	1 3/8"	23/32"	10-32	.90
9566	10	2 3/4"	1 3/4"	1 3/8"	1"	1/4"-20	1.38
9567	10	4 1/2"	2 1/4"	1 3/4"	1 1/16"	1/4"-20	2.10



PORCELAIN LEAD-IN BUSHINGS

Consisting of single porcelain insulators less all hardware and mounting flange except cushion washer.

No.	Sta. Pkg.	H	B	A	Net Ea.
9553	10	1 3/4"	2 1/2"	1 1/16"	.75
9554	10	4"	3 1/2"	1"	1.80

Stamped aluminum mounting flanges, for three mounting holes spaced 120 degrees apart.

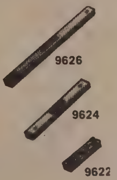
No.	Sta. Pkg.	For Bushing No.	Net Ea.
9590	10	9553	.75
9591	10	9554	1.80

9651
9652
9653
9604
9607
9612
9632

PORCELAIN ANTENNA STRAIN INSULATORS

The 9651, 9652, and 9653 have heavy 1 1/2" diameter wet process porcelain insulator with specially sealed end bells of non-corrosive aluminum alloy. Porcelain is glazed to prevent moisture absorption. Numbers 9607 and 9612 are wet process, 1" diameter glazed porcelain. Number 9604 is dry process, glazed 5/8" square. The 9632 is a compression type strain insulator for aircraft or guy wire applications — made of dry process glazed porcelain.

No.	Sta. Pkg.	Breaking Strength	Length Net	Length Overall	Net Ea.
9632	50	EGG	—	1 1/2"	.30
9604	25	400 lbs.	—	4"	.43
9607	25	800 lbs.	—	7"	2.20
9612	25	800 lbs.	—	12"	2.50
9651	1	5000 lbs.	8"	15 1/2"	20.00
9652	1	5000 lbs.	12"	19 1/2"	21.00
9653	1	5000 lbs.	20"	25 1/2"	ON REQUEST



PORCELAIN FEEDER INSULATORS

Conventional feeder spreaders for constructing high efficiency, open-wire antenna feeders and transmission lines. Insulators are made of high grade, low absorption porcelain silicone impregnated for moisture resistance. Insulators have 3/8" x 1/2" cross section. The 9622 has extra notches for 1 1/2" line spacing.

No.	Sta. Pkg.	Length	Net Ea.
9622	25	2"	.24
9624	25	4"	.48
9626	25	6"	.60

IT'S SOUND PLANNING TO **"SPECIFY SMITH"** WHEN DESIGNING OR PURCHASING

SPECIFY SMITH

KNOBS

STOCKED BY LEADING DISTRIBUTORS NATIONWIDE

INSTRUMENT KNOBS

Style A Plain

Style B With Pointer

Style C With Skirt

Molded black bakelite instrument knobs with molded in brass insert for ¼" shafts. **Style B** pointer knobs have white vinyl pointer. **Style C** skirt type have white indicator line. **Style D** same as style A except with protruding brass insert for mounting special dials and pointers.

Std. Pkg. 10

No.	Style	O.D.	Pointer Size	Height	NET Per C
2200	A	1⅛"		⅝"	$52.00
2201	A	1⅜"		11/16"	53.00
2202	A	1⅝"		¾"	59.00
2203	A	2⅜"		⅞"	80.00
2204	B	1⅛"	¾" pointer	11/16"	78.00
2205	B	1⅜"	1 1/16" pointer	¾"	79.00
2206	B	1⅝"	1 3/16" pointer	13/16"	84.00
2207	B	2⅜"	1 5/16" pointer	15/16"	108.00
2208	C	1⅛"	1½" Skirt	13/16"	106.00
2209	C	1⅜"	1¾" Skirt	⅞"	114.00
2210	C	1⅝"	2 1/16" Skirt	29/32"	123.00
2211	C	2⅜"	3" Skirt	1 1/32"	155.00

FLUTED INSTRUMENT KNOBS

2391

2891

Molded Black bakelite, supplied with white filled line on crown and skirt. Supplied with ¼" plain hole with set screw.

Std. Pkg. 10

No.	Skirt Dia.	Height	Net Per C
2391	¾"	½"	$38.00
2392	1⅛"	⅝"	43.00
2393	1¼"	¾"	48.00
2394	1½"	⅞"	52.00
2395	2.000"	15/16"	67.00

With ⅛" plain hole and set screw

No.	Skirt Dia.	Height	Net Per C
2396	¾"	½"	40.00

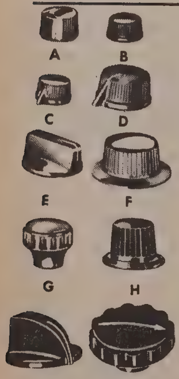
Same as above, except for spun Silver insert and lined skirt.

No.	Skirt Dia.	Height	Net Per C
2891	¾"	½"	57.00
2892	1⅛"	⅝"	73.00
2893	1¼"	¾"	61.00
2894	1½"	⅞"	78.00
2895	2.000"	15/16"	97.00

With ⅛" plain hole and set screw

No.	Skirt Dia.	Height	Net Per C
2896	¾"	½"	61.00

CONTROL KNOBS



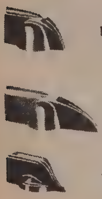
Molded bakelite control knobs. Supplied with ¼" molded hole; complete with set screw.

Std. Pkg. 50

No.	Style	O.D.	Height	Color	NET Per C
2240	A	¾"	19/32"	Black	$25.00
2242	B	11/16"	13/32"	Black	14.00
2244*	B	1"	½"	Black	20.00
2275†	B	11/16"	13/32"	Black	18.00
2246	C	11/16"	13/32"	Black	14.00
2273†	C	11/16"	13/32"	Black	18.00
2248*	D	1"	½"	Black	27.00
2250*	E	1⅛"	9/16"	Black	22.00
2252*	F	1½"	11/16"	Black	29.00
2258	G	⅞"	¾"	Black	25.00
2265	H	29/32"	19/32"	Black	26.00
2267	J	1 3/16"	⅝"	Black	21.00
2283	L	⅞"	½"	Black	37.00

†Supplied with Brass Insert. *Recessed for locknut.

POINTER KNOBS



A
Length 1¼"
Hgt. ⅝"

B
Length 2"
Hgt. ⅝"

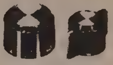
C
Length 1¼"
Hgt. 9/16"

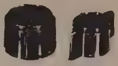
Molded bakelite pointer knobs, supplied with ¼" plain hole or brass inset. Complete with set screw.

Std. Pkg. 50

No.	Style	Type Hole	Color	NET per C
2220	A	¼" Plain	Black	$15.00
2223	A	¼" Brass Insert	Black	19.00
2226	B	¼" Plain	Black	28.00
2228	B	¼" Brass Insert	Black	41.00
2230	C	¼" Plain	Black	22.00

DESIGNER SERIES INSTRUMENT KNOBS


2885 2890


2879 2884

Molded Black bakelite with lined spun Silver insert. Supplied with plain ¼" hole and set screw.

Std. Pkg. 10

No.	Height	Diameter	Net Per C
2885	⅝"	¾"	$64.00
2886	11/16"	1.000"	62.00
2887	¾"	1⅜"	74.00
2888	13/16"	1¾"	81.00

Pointer type, white line on pointer.

No.	Height	Diameter	Net Per C
2890	⅝"	1¼"	82.00

With ⅛" plain hole and set screw

No.	Height	Diameter	Net Per C
2889	⅝"	½"	64.00

Same as above, lined crown, less the spun Silver insert.

No.	Height	Diameter	Net Per C
2879	⅝"	¾"	35.00
2880	11/16"	1.000"	38.00
2881	¾"	1⅜"	45.00
2882	13/16"	1¾"	48.00

With ⅛" plain hole and set screw

No.	Height	Diameter	Net Per C
2883	⅝"	½"	35.00

Pointer type, white line on pointer.

No.	Height	Diameter	Net Per C
2884	⅝"	1¼"	44.00

CONCENTRIC DESIGNER SERIES KNOBS

2898 2899

Molded Black outside knob with filled line ¼ hole, inner molded Black knob with lined spun Silver lined insert, ⅛ hole. **Std. Pkg. 10**

No.	Net Per C
2898	$110.00

Same as above except less the spun Silver insert, outside knob with lined side, top inner knob with lined crown.

No.	Net Per C
2899	82.00

CONCENTRIC FLUTED INSTRUMENT KNOB

2397 2897

Molded Black and Red bakelite dual concentric knob. Black outside knob with White filled line on skirt. Red inner knob with White filled line on skirt and crown. Supplied with set screws.

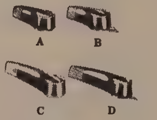
Std. Pkg. 10

No.	Net Per C
2397	$80.00

Same as above except with lined spun Silver insert on Red inner knob.

No.	Net Per C
2897	$102.00

LEVER KNOBS



Molded bakelite lever knobs with ¼" brass insert, complete with set screw. **Std. Pkg. 25**

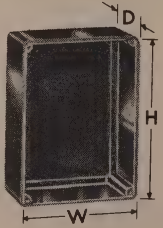
No.	Style	Length	Height	Color	NET per C
2232	A	1⅝"	19/32"	Black	$42.00
2234	B	1 15/16"	19/32"	Black	74.00
2236	C	2½"	⅝"	Black	41.00
2238	D	2 13/16"	⅝"	Black	73.00

PUSH BUTTON KNOBS

Std. Pkg. 50

No.	Style	O.D.	Height	Color	NET Per C
2277	A	½"	51/64"	Black	$ 10.70
2279	B	31/64"	9/16"	Black	4.50

INSTRUMENT CASES AND COVERS



Ideal for small instruments and test equipment. The right size and the right mounting for your requirements. Molded of high quality, glass finish, thermosetting plastic. Threaded brass insert for cover mounting. BLACK ONLY. **Std. Pkg. 5.**

No.	H	W	D	Insert	NET Ea.
2377	4"	2⅞"	1 9/16"	4-40	.72
2291	5"	4¼"	1¾"	6-32	1.25
2255	6¼"	3¾"	2"	6-32	1.00
2257	6 13/16"	5 9/32"	2 5/16"	4-40	2.00
2289	8½"	7 7/16"	3"	6-32	2.40

PHENOLIC COVERS

No.		NET Ea.
2378	For No. 2377	.20
2292	For No. 2291	.30
2256	For No. 2255	.75
2260	For No. 2257	1.30
2390	For No. 2289	2.30

PANEL PLATE

Brushed and lacquered Aluminum

No.		NET Ea.
2379	For No. 2255	1.10

IT'S SOUND PLANNING TO "**SPECIFY SMITH**" WHEN DESIGNING OR PURCHASING

SPECIFY SMITH PILOT LIGHT SOCKETS & INDICATOR LIGHTS

PILOT LIGHT SOCKETS

Sockets are available for Mini Screw, Mini Bayonet, Candelabra Screw, Candelabra Bayonet (Single and Double Contact), Sub-Mini Groove, Wedge and Printed Circuit in Mini Bayonet and Sub-Mini groove. Brackets are made of .025-032 corrosion resistant plated steel, shells of nickel plated brass and tinned brass solder lugs.

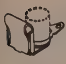


FIG.1

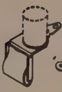


FIG.2

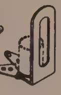


FIG.3

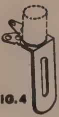


FIG.4

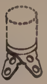


FIG.5

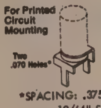


FIG.6

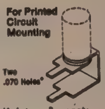


FIG.7

*SPACING: .375" Miniature Bayonet; 19/64" Subminiature Groove.

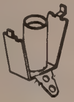


FIG.8

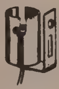


FIG.9

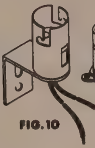


FIG.10

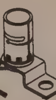


FIG.11

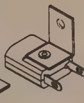


FIG.12

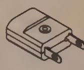


FIG.13

MINIATURE SCREW

No.	Fig. No.	Std. Pkg.	NET Per C
1922	1	100	$33.00
1923	2	100	33.00
1928	3	100	33.00
1929	4	100	33.00
1934	5	100	33.00

MINIATURE BAYONET

No.	Fig. No.	Std. Pkg.	NET Per C
1924	1	100	$33.00
1925	2	100	33.00
1930	3	100	33.00
1931	4	100	33.00
1935	5	100	33.00
1938	8	100	33.00
1900	6	25	65.00
1901	7	25	110.00

CANDELABRA SCREW

No.	Fig. No.	Std. Pkg.	NET Per C
1926	1	100	$33.00
1927	2	100	33.00
1932	3	100	33.00
1933	4	100	33.00
1936	5	100	33.00

CANDELABRA BAYONET — SINGLE CONTACT

No.	Fig. No.	Std. Pkg.	NET Per C
1902	9	25	$60.00
1903	10	25	60.00

CANDELABRA BAYONET — DOUBLE CONTACT

No.	Fig. No.	Std. Pkg.	NET Per C
1904	9	25	$75.00
1905	10	25	75.00

SUB-MINIATURE GROOVE

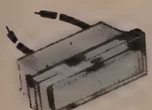
No.	Fig. No.	Std. Pkg.	NET Per C
1906	6	25	$120.00
1907	7	25	120.00
1908	11	25	75.00

WEDGE

No.	Fig. No.	Std. Pkg.	NET Per C
1909	13	25	$50.00
1910	12	25	50.00

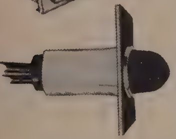
INDICATOR LIGHTS

Housings of White Nylon, lens of high impact plastic. Built-in resistors provide voltage ratings from 6.3V to 115V. Low voltage indicators use incandescent lamps, the 115V indicators use high brilliance Neon lamps. Lens colors available for incandescent indicators, Red, Green and Amber, for Neon indicators, Red, Clear and Amber. SPECIFY COLOR.



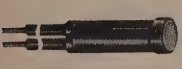
Self-mounting, snaps into a rectangular opening 1.28" x .391", panel thickness up to .090". Terminates with two 6" wire leads, 18 gauge, stripped ½". UL and CSA approved.
Std. Pkg. 10

No.	Voltage	NET Per C
1911	6.3 V	$190.00
1912	28 V	190.00
1913	115 V	140.00



Self-mounting, snaps into a ½" round hole and requires no mounting hardware. Terminates with two 6" wire leads, 18 gauge, stripped ½". UL and CSA approved.
Std. Pkg. 10

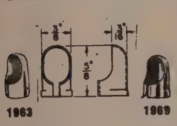
No.	Voltage	NET Per C
1914	6.3 V	$190.00
1915	28 V	190.00
1916	115 V	140.00



Designed to mount in a 5/16" round hole, retained by Speednut which is supplied. Terminates with two 6" wire leads, 18 gauge, stripped ½". UL and CSA approved.
Std. Pkg. 10

No.	Voltage	NET Per C
1917	6.3 V	$190.00
1918	28 V	190.00
1919	115 V	140.00

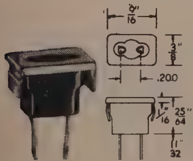
PILOT LIGHT SHIELD



Prevents glare when used in radio receiver meters, etc. Ribbed bottom holds shield securely in place on bulb.
Std. Pkg. 100

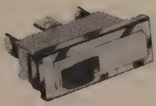
No	Type	NET Per C
1963	Brass Cad Plate	$5.50
1968	Plain Brass	5.00
1969	Flared Brass Cad. Plate	6.00

SNAP-IN BULB CONNECTOR



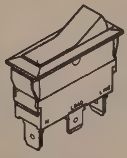
Designed for use with the new Twin Pin Baseless Miniature Lamps (G.E. #10-25 volts, #12-6.3 volts, or #15-7.0 volts). Easily assembled to any unit for indicating purposes. Withstands excessive temperatures. Snaps into a .500 x .296 rectangular hole in panels .032 to .062 thick. Bezel — brass, cad. plated; contacts — brass, silver plated.
Std. Pkg. 25

No. 1504 NET per C $25.00



Low cost switch and indicator combination. Self-mounting, snaps into a rectangular opening 1.281" x .395", panel thickness to .080". SPST switch rated at 6 Amps AC 125 V. Terminates with three quick disconnect .250" tabs. Available only for 115 V operation. UL and CSA approved.
Std. Pkg. 10

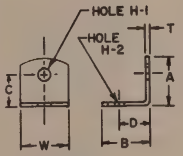
No.	Voltage	NET Per C
1920	115 V	$270.00



Self-mounting, snaps into a rectangular opening 1.281" x .395", panel thickness .032" — .125". SPST switch rated at 10 Amps AC 125 V. Illuminated rocker, lights in the "on" position. Terminates with two quick-disconnect .250" male tabs. Available for 115 V only. UL and CSA approved
Std. Pkg. 10

No.	Voltage	NET Per C
1921	115 V	$270.00

ANGLES



A - Length of leg C - Hole location H1 - Hole dia. T - Thickness
B - Length of leg D - Hole location H2 - Hole dia. W - Width

Std. Pkg. 100

STEEL, Cadmium Plated

No.	A	B	C	D	W	T	H1	H2	Net Per C
1444	7/16	7/16	17/64	¼	⅜	.032	8/16	#4	$.80
1445	½	½	11/32	23/64	5/16	.030	#6	#4	1.00
1446	49/64	27/64	39/64	15/64	5/16	.032	#6	#6	1.00
1447	19/64	½	61/64	23/64	5/16	.050	#8	#8	1.10
1476	11/16	11/16	½	½	⅝	.032	#6	#6	1.70

Note: No. 1476 has Hot Tin Dipped finish

BRASS, Nickel Plated

No.	A	B	C	D	W	T	H1	H2	Net Per C
1474	15/32	15/32	19/64	19/64	5/16	.025	#8	#	$2.50
1475	21/32	21/32	⅝	⅝	⅝	.030	#8	#	5.00

"OFF-THE-SHELF"

SMITH Standard Products are stocked nationally on the shelves of every major Parts Distributor. That's ONE reason why Engineers and Purchasing Agents agree: "It's Sound Planning to SPECIFY SMITH!"

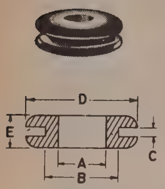
IT'S SOUND PLANNING TO **"SPECIFY SMITH"** WHEN DESIGNING OR PURCHASING

GROMMETS-BUMPERS-BUSHINGS-WASHERS

SPECIFY SMITH

RUBBER GROMMETS

Std. Pkg. 100



No.	A	B	C	D	E	NET Per C
2185	1/8	3/16	1/16	5/16	3/16	$2.40
2172	3/16	5/16	1/16	7/16	3/16	2.20
2170	1/4	3/8	1/16	5/8	1/4	2.50
2174	5/16	7/16	1/16	5/8	1/4	2.40
2175	3/8	1/2	1/16	21/32	1/4	2.50
2177	7/16	9/16	1/16	3/4	1/4	2.50
2186	1/2	3/4	1/16	1-1/16	5/16	5.30
2188	9/16	13/16	1/16	1-1/16	5/16	5.30
2187	5/8	7/8	1/16	1-1/8	5/16	5.40
2189	3/4	7/8	1/32	1	5/32	5.20

VINYL GROMMETS

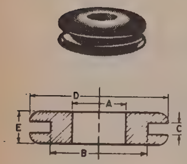
DESCR.: Exceptional aging qualities. High dielectric properties. Oil resistant. Durometer hardness 45 to 85.

No.	A	B	C	D	E	NET Per C
2145	1/8	1/4	1/16	11/32	3/16	$1.20
2146	3/16	5/16	1/16	7/16	7/32	1.35
2147	1/4	3/8	1/16	9/16	1/4	1.70
2148	3/8	1/2	1/16	5/8	1/4	1.75
2149	1/2	5/8	1/16	13/16	9/32	2.80

RUBBER GROMMETS

Formerly listed by Radio Essentials, Inc., and American Radio Hardware Inc., (Their catalog numbers as below, minus first digit).

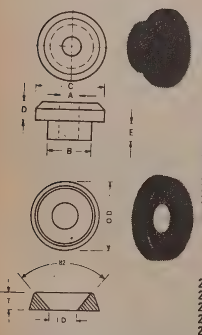
Std. Pkg. 100



No.	A	B	C	D	E	NET Per C
91114	1/8	1/4	1/16	11/32	3/16	$2.50
91118	3/16	5/16	1/16	7/16.	7/32	2.50
91103	3/16	15/32	1/8	9/16	3/8	3.30
91122	1/4	11/32	1/32	1/2	5/32	3.10
91119	1/4	13/32	1/16	9/16	1/4	2.70
91102	9/32	13/32	5/32	5/8	3/8	3.50
91123	9/32	1/2	1/4	11/16	7/16	5.50
91117	5/16	7/16	1/8	19/32	3/8	3.50
91116	5/16	1/2	1/8	3/4	3/8	5.00
91106	5/16	1/2	3/16	5/8	1/2	7.20
91120	19/64	7/16	1/16	5/8	1/4	3.10
91107	3/8	7/16	3/32	5/8	5/16	5.00
91121	3/8	1/2	1/16	21/32	1/4	3.00
91100	3/8	1/2	9/64	13/16	13/32	8.00
91111	3/8	11/16	9/64	7/8-1"	13/32	9.00
91109	3/8	7/8	1/4	1-1/16	3/8	15.00
91124	7/16	9/16	1/16	3/4	1/4	3.50
91112	49/64	1-3/32	1/16	1-5/8	5/16	15.00

MOLDED NYLON WASHERS

Non conductive and corrosion resistant, ideal for insulation, cushioning or spacing protection. Meets Military Specification MIL-P-20693, Type 1. Available in Natural. Std. Pkg. 100



SHOULDER

No.	A	B	C	D	E	NET Per C
2681	.122	.187	.281	.040	.040	$2.25
2682	.146	.218	.328	.040	.040	2.40
2683	.174	.250	.375	.060	.050	2.50
2684	.201	.281	.437	.050	.050	2.75
2685	.260	.375	.562	.060	.060	3.00
2686	.385	.500	.750	.060	.060	4.75

FINISHING

No.	O.D.	I.D.	Thickness	NET Per C
2687	.437	.143	.100	$5.00
2688	.515	.171	.115	5.25
2689	.580	.191	.152	5.50
2690	.609	.225	.160	6.00
2691	.683	.251	.183	6.50

USE OUR VAST NATIONAL DISTRIBUTION NETWORK for Off-The-Shelf Deliveries of your smaller hardware requirements.

FIG. 1

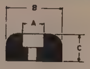


FIG. 2

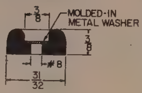


FIG 3

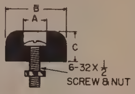
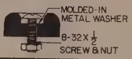


FIG. 4



RECESS RUBBER BUMPERS

Std. Pkg. 100

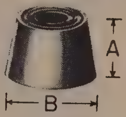
No.	Fig.	A	B	C	NET Per C
2192	1	1/4"	1/2"	1/4"	$1.80
2193	1	1/4"	5/8"	5/16"	3.00
2194	1	9/32"	3/4"	3/8"	3.50
2184	1	9/32"	5/8"	9/32"	3.50
	With molded-in metal washer				
2135	2	3/8"	31/32"	3/8"	5.00

With Screw and Nut

Supplied complete with 1/2" mounting screw and hex nut. For panels up to 1/4" thick. Specify longer screw for thicker panels. Std. Pkg. 100

No.	Fig.	A	B	C	Screw	NET Per C
2196	3	1/4"	1/2"	1/4"	6-32	$7.00
2197	3	1/4"	5/8"	5/16"	6-32	8.00
2198	3	9/32"	3/4"	3/8"	6-32	9.00
2199	3	1/4"	5/8"	9/32"	6-32	9.00
	With molded-in metal washer					
2195	4	3/8"	31/32"	3/8"	8-32	10.00

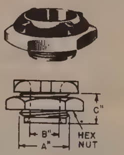
VINYL CABINET BUMPERS



All molded cabinet bumpers with brass insert to absorb screw load. Molded of ethylene vinyl, color black. Std. Pkg. 100

No.	Size Screw	A	B	NET Per C
2181	4	3/8"	9/16"	$5.50
2182	6	7/16"	3/4"	6.50
2183	8	5/8"	15/16"	9.00

BAKELITE BUSHINGS

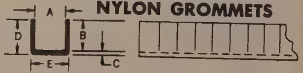


BODY: MOLDED Phenolic, black. U.L. approved. recommended for temperatures up to 300 degrees Fahrenheit.

NUT: Steel, cadmium plated. Std. Pkg. 50

No.	A	B	C	NET Per C
2136	13/32"	17/64"	1/4"	$4.70
2137	17/32"	5/16"	5/16"	6.50
2138	21/32"	29/64"	5/16"	8.00
2139	27/32"	9/16"	11/32"	20.00

EXTRUDED "CATERPILLAR" NYLON GROMMETS

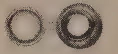


Shape your own grommets to fit any size or shape opening. Made of non-conductive Black Nylon, Type 6/6, fungus resistant to conform to Mil M 20693a, Type 1. Available in 25 ft. rolls for panel thickness .052 to .125 Std. Pkg. 1

No.	A	B	C	D	E	NET Ea.
2692	.052	.150	.040	.190	.125	$10.00
2693	.085	.155	.045	.200	.162	11.50
2694	.125	.175	.045	.220	.206	12.00

BLIND HOLE MOUNTING ACCESSORIES

Molded of polyethylene and requires no mounting hardware or special tools, just snaps into hole. Color Gray, temperature rating 100-205°F.



GROMMETS

Std. Pkg. 100

max. panel thickness .095

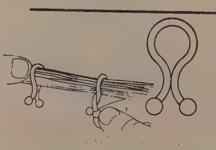
No.	Mtg. Hole	Cable Dia.	Net Per C
8974	1/4"	1/8"	$2.00
8975	3/8"	1/4"	2.25
8976	1/2"	3/8"	2.50
8977	5/8"	1/2"	3.50
8978	3/4"	5/8"	4.00

CABLE STRAPS

mounting hole 1/4", 5/16" wide for panel thickness 1/16"

No.	Max. Cable Dia.	NET Per C
8971	1/4"	$2.00
8972	7/16"	2.50
8973	5/8"	3.00

TWIST LOCK CABLE TIES



Time and cost saving white Nylon re-usable cable ties. Twists to lock wire into place, twists to unlock. Std. Pkg. 100

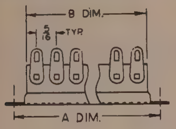
No.	For Wire Dia.	NET Per C	NET per M
8982	.200-.300	$2.10	$18.00
8983	.400-.500	2.40	20.00
8984	.700-.800	2.90	24.00

STOCKED BY
LEADING
DISTRIBUTORS
NATIONWIDE

TERMINAL STRIPS

SPECIFY **SMITH**

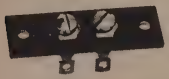
TERMINAL STRIP ASSEMBLY

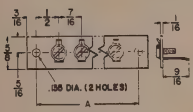


LUG: Steel, cadmium plated.
BASE: Steel, cadmium plated. Mounting holes for #6 screw.
STRIP: XP Phenolic **Std. Pkg. 100**

No.	Terminals	Dimensions "A"	Dimensions "B"	NET Per C
3002	2	1.000	5/8"	$10.50
3003	3	1.312	15/16"	13.00
3004	4	1.625	1¼"	15.50
3005	5	1.937	1 9/16"	17.00
3006	6	2.250	1⅞"	18.50
3007	7	2.562	2 3/16"	19.50
3008	8	2.875	2½"	22.00
3009	9	3.187	2 13/16"	24.00
3010	10	3.500	3⅛"	26.50
3011	11	3.812	3 7/16"	27.50
3012	12	4.125	3¾"	30.00
3013	13	4.437	4 1/16"	32.00

SCREW TYPE TERMINAL BOARD

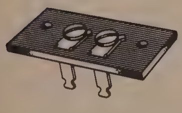


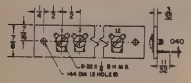


LUGS: BRASS, hot tinned. spaced 7/16" centers.
SCREW: Steel, cadmium plated 6-32 x ⅜".
STRIP: λP Phenolic ⅝" wide x .062 thick.

No.	Terminals	Mounting Center	Std. Pkg.	NET Per C
914	1	⅞"	50	$12.00
872	2	1 7/16"	50	13.00
873	3	1¾"	50	19.00
874	4	2 3/16"	50	23.00
875	5	2⅝"	25	28.00
876	6	3 1/16"	25	31.00
877	7	3½"	25	38.00
928	8	3 15/16"	25	42.00
929	9	4⅜"	25	46.00
930	10	4 13/16"	25	52.00
878	Shorting Link		-	2.50

HEAVY DUTY TERMINAL BOARD



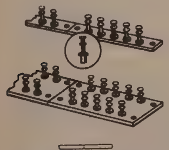


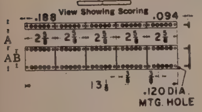
LUG: BRASS, cadmium plated .042 thick spaced ½" centers. Terminals numbered.
STRIP: XP Phenolic ⅞" wide x 3/32" thick, numbered.
SCREW: Brass, nickel plated 8-32 x 5/16".
Std. Pkg. 25

No.	Terminals	Mounting Center	NET Per C
902	2	1½"	$28.00
903	3	2"	35.00
904	4	2½"	42.00
905	5	3"	50.00
906	6	3½"	56.00
907	7	4"	63.00
908	8	4½"	72.00
909	9	5"	79.00
910	10	5½"	87.00
911	11	6"	94.00
912	12	6½"	102.00

SCORED TERMINAL BOARDS

SNAP-APART SEPARATION





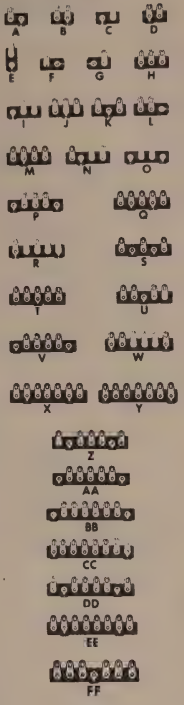
SMITH Scored Boards are fabricated in PBE material per MIL-P-3115C, Temp. 250° F. Max., Type XXXP. Terminals are securely staked and are made of Brass per QQ-626 comp. 22, half-hard with hot-tinned dip solder finish, per MIL-F-14072 Type 221. Smith type 2008. **Std. Pkg. 10**

Cat. No.	Dimensions A	Dimensions B	Terminals	Net Price Each
2810	½"	Single Row	25	$2.25
2811	1½"	1"	50	4.70
2812	2"	1½"	50	4.90
2813	2½"	2"	50	5.10
2814	3"	2½"	50	5.25

"T" TYPE TERMINAL STRIPS

LUGS: STEEL , cadmium plated, spaced ⅜" centers.
STRIP: XP Phenolic ⅜" wide x .062 thick.
MOUNT: .140 I.D. for No. 6 screw. **Std. Pkg. 100**

No.	Lugs	NET Per C	No.	Lugs	NET Per C
815	1	$ 4.10	818	4	$11.50
816	2	6.20	819	5	15.00
817	3	8.60			



TIE DOWN TERMINAL STRIP

STANDARD TYPE

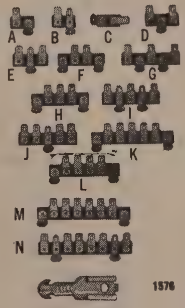
LUG: STEEL cadmium plated, spaced ⅜"
STRIP: XP Phenolic ⅜" wide x .062 thick.
MOUNT.: .140 I.D. for No. 6 screw.
Std. Pkg. 100

Ill.	No.	NET Per C	Ill.	No.	NET Per C
A	861	$ 2.40	Q	868	5.00
B	862	2.40	R	847	5.50
C	813	2.50	S	865	4.50
D	820	2.50	T	866	4.00
E	849	3.00	U	855	3.50
F	828	2.40	V	869	5.10
G	821	2.40	W	854	5.50
H	830	3.00	X	879	6.50
I	829	2.80	Y	859	6.00
J	864	3.00	Z	871	5.50
K	863	3.00	AA	860	6.00
L	846	3.50	BB	848	6.70
M	850	4.00	CC	900	6.50
N	857	4.00	DD	858	7.00
O	867	4.50	EE	870	7,20
P	853	4.50	FF	901	6.00

MINIATURE TYPE

LUG: STEEL cadmium plated, spaced ¼" centers.
STRIP: XP Phenolic 5/16" wide x .062 thick.
MOUNT.: .096 I.D. for No. 3 screw or 3/32 rivet.
Std. Pkg. 100

Ill.	No.	NET Per C	Ill	No.	NET Per C
A	1061	$ 2.40	Q	1068	5.80
B	1062	3.00	R	1071	5.80
C	1003	3.30	S	1065	5.20
D	1004	3.50	T	1066	6.50
E	1039	4.00	U	1084	7.00
F	1005	4.50	V	1069	6.20
G	1009	3.50	W	1076	9.00
H	1055	4.50	X	1158	9.50
I	1043	4.50	Y	1156	9.50
J	1064	3.60	Z	1157	9.50
K	1063	4.50	AA	1060	7.00
L	1059	4.50	BB	1078	7.50
M	1074	5.50	CC	1075	10.50
N	1072	5.50	DD	1096	10.20
O	1067	5.00	EE	1070	8.40
P	1073	5.20			



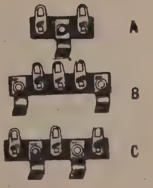
TERMINAL STRIPS

UNIVERSAL LUGS

LUG: Steel, cadmium plated, spaced ⅜"
STRIP: XP Phenolic ⅜" wide x .062 thick.
MOUNT: .140" I.D. for No. 6 screw.
DESCR.: QUICK CONNECT-DISCONNECT; TIE POINT SOLDER; WRAP and SOLDER.
Std. Pkg. 100

No.	Illust.	NET Per C	No.	Illust.	NET Per C
1085	A	$ 5.60	1092	H	$13.10
1086	B	6.30	1093	I	14.40
1087	C	5.60	1094	J	13.20
1088	D	8.10	1095	K	18.80
1089	E	8.80	1097	L	16.30
1090	F	10.60	1098	M	21.30
1091	G	13.10	1099	N	21.90

1576 Terminal Strip Connectors 8.00



BRACKET TERMINAL STRIPS

LUGS: STEEL cadmium plated, spaced ⅜" centers.
BRACKETS: Brass, cadmium plated.
STRIPS: XP Phenolic ⅜" wide x .062 thick.
MOUNT.: .140 I.D. for No. 6 screw.

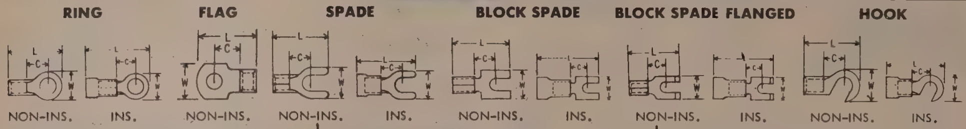
No.	Fig.	Lugs	NET Per C
1077	A	2	$ 5.60
1079	C	3	8.80
1080	B	3	9
1081	B	4	
1082	B	5	1
1083	B	6	14.00

IT'S SOUND PLANNING TO **"SPECIFY SMITH"** WHEN DESIGNING OR PURCHASING

SPECIFY SMITH SOLDERLESS TERMINALS

STOCKED BY LEADING DISTRIBUTORS NATIONWIDE

COLOR CODE: RED: 22-18 AWG; BLUE: 16-14 AWG; YELLOW: 12-10 AWG



WIRE SIZE 12—10 AWG

UL APPROVED .040 Electrolytic Copper Tin Plated

Smith Cat.No.	Material	Stud Size	Dimensions W	C	L	Net Per C
RING TERMINAL — NON-INSULATED						
4931	Butted Seam	8-10	3/8	9/32	47/64	$3.10
4932	Butted Seam	12¼	39/64	7/16	31/32	3.50
4933	Butted Seam	5/16-⅜	39/64	7/16	31/32	3.50
4934	Brazed	8-10	39/64	7/16	47/64	$5.30
4935	Brazed	12¼	39/64	7/16	31/32	6.10
4936	Brazed	5/16-⅜	39/64	7/16	31/32	6.10
RING TERMINAL — INSULATED						
4937	Vinyl	8-10	3/8	9/32	1-1/64	6.10
4938	Vinyl	12¼	39/64	7/16	1-9/32	6.60
4939	Vinyl	5/16-⅜	39/64	7/16	1-9/32	6.60
4940	Nylon	8-10	3/8	9/32	1-1/64	7.70
4941	Nylon	12¼	39/64	7/16	1-9/32	8.80
4942	Nylon	5/16-⅜	39/64	7/16	1-9/32	8.80
FLAG TERMINAL — NON-INSULATED						
4943	Butted Seam	8-10	3/8	9/32	11/16	3.50
SPADE TERMINAL — NON-INSULATED						
4944	Butted Seam	8	3/8	9/32	47/64	$3.10
4945	Butted Seam	10	3/8	9/32	47/64	3.10
4946	Brazed	8	3/8	9/32	47/64	5.30
4947	Brazed	10	3/8	9/32	47/64	5.30
SPADE TERMINAL — INSULATED						
4948	Vinyl	8	3/8	9/32	1-1/64	6.10
4949	Vinyl	10	3/8	9/32	1-1/64	6.10
4950	Nylon	8	3/8	9/32	1-1/64	8.30
4951	Nylon	10	3/8	9/32	1-1/64	8.30
BLOCK SPADES — NON-INSULATED						
4952	Butted Seam	8	5/16	9/32	47/64	$3.10
4953	Butted Seam	10	5/16	9/32	47/64	3.10
4954	Brazed	8	5/16	9/32	47/64	5.30
4955	Brazed	10	5/16	9/32	47/64	5.30
BLOCK SPADE - INSULATED						
4956	Nylon	8	5/16	9/32	1-1/64	6.10
4957	Vinyl	10	5/16	9/32	1-1/64	6.10
4958	Nylon	8	5/16	9/32	1-1/64	8.30
4959	Nylon	10	5/16	9/32	1-1/64	8.30
HOOK TERMINAL — NON-INSULATED						
4960	Butted Seam	8	3/8	9/32	47/64	$3.10
4961	Butted Seam	10	3/8	9/32	47/64	3.10
4962	Brazed	8	3/8	9/32	47/64	5.30
4963	Brazed	10	3/8	9/32	47/64	5.30
HOOK TERMINAL — INSULATED						
4964	Vinyl	8	3/8	9/32	1-1/64	6.10
4965	Vinyl	10	3/8	9/32	1-1/64	6.10
4966	Nylon	8	3/8	9/32	1-1/64	8.30
4967	Nylon	10	3/8	9/32	1-1/64	8.30

WIRE SIZE 26—24 AWG

UL APPROVED .020 Electrolytic Copper Tin Plated

Smith Cat.No.	Material	Stud Size	Dimensions W	C	L	Net Per C
MINIATURE RING TERMINAL - NON-INSULATED						
4968	Butted Seam	4	13/64	7/32	37/64	$6.60
4969	Butted Seam	6	13/64	7/32	37/64	6.60
4970	Butted Seam	8	1/4	9/32	21/32	6.60
4971	Butted Seam	10	1/4	9/32	21/32	6.60
MINIATURE RING TERMINAL — INSULATED						
4972	Nylon	4	13/64	7/32	39/64	7.70
4973	Nylon	6	13/64	7/32	39/64	7.70
4974	Nylon	8	1/4	9/32	11/16	7.70
4975	Nylon	10	1/4	9/32	11/16	7.70
MINIATURE SPADE TERMINAL - NON-INSULATED						
4976	Butted Seam	4	13/64	7/32	37/64	6.60
4977	Butted Seam	6	1/4	9/32	11/16	6.60
MINIATURE SPADE TERMINAL — INSULATED						
4978	Nylon	4	13/64	7/32	39/64	7.70
4979	Nylon	6	1/4	9/32	11716	7.70

WIRE SIZE 16—14 AWG

UL APPROVED .030 Electrolytic Copper Tin Plated

Smith Cat.No.	Material	Stud Size	Dimensions W	C	L	Net Per C
RING TERMINAL — NON-INSULATED						
4865	Butted Seam	4-6	1/4	7/32	19/32	$2.20
4866	Butted Seam	8	21/64	1/4	11/16	2.20
4867	Butted Seam	10	21/64	1/4	11/16	2.20
4868	Butted Seam	12¼	15/32	13/32	57/64	2.80
4869	Brazed	4-6	1/4	7/32	19/32	3.50
4870	Brazed	8	21/64	1/4	11/64	3.50
4871	Brazed	10	21/64	1/4	11/64	3.50
4872	Brazed	12¼	15/32	13/32	57/64	4.40
RING TERMINAL — INSULATED						
4873	Vinyl	4-6	1/4	7/32	25/32	4.40
4874	Vinyl	8	21/64	1/4	7/8	4.40
4875	Vinyl	10	21/64	1/4	7/8	4.40
4876	Vinyl	12¼	15/32	13/32	1-3/16	5.00
4877	Nylon	4-6	1/4	7/32	25/32	7.20
4878	Nylon	8	21/64	1/4	7/8	7.20
4879	Nylon	10	21/64	1/4	7/8	7.20
4880	Nylon	12¼	15/32	13/32	1-3/64	8.30
FLAG TERMINAL — NON-INSULATED						
4881	Butted Seam	8-10	3/8	11/32	11/16	$3.30
SPADE TERMINAL — NON-INSULATED						
4882	Butted Seam	4-6	21/64	1/4	11/16	$2.20
4883	Butted Seam	8	21/64	1/4	11/16	2.20
4884	Butted Seam	10	21/64	1/4	11/16	2.20
4885	Brazed	4-6	21/64	1/4	11/16	3.50
4886	Brazed	8	21/64	1/4	11/16	3.50
4887	Brazed	10	21/64	1/4	11/16	3.50
SPADE TERMINAL — INSULATED						
4888	Vinyl	4-6	21/64	1/4	7/8	4.40
4889	Vinyl	8	21/64	1/4	7/8	4.40
4890	Vinyl	10	21/64	1/4	7/8	4.40
4891	Nylon	4-6	21/64	1/4	7/8	7.20
4892	Nylon	8	21/64	1/4	7/8	7.20
4893	Nylon	10	21/64	1/4	7/8	7.20
BLOCK SPADES — NON-INSULATED						
4894	Butted Seam	4-6	19/64	1/4	21/32	$2.20
4895	Butted Seam	8	19/64	1/4	21/32	2.20
4896	Butted Seam	10	19/64	1/4	21/32	2.20
4897	Brazed	4-6	19/64	1/4	21/32	3.50
4898	Brazed	8	19/64	1/4	21/32	3.50
4899	Brazed	10	19/64	1/4	21/32	3.50
BLOCK SPADES — INSULATED						
4901	Vinyl	4-6	19/64	1/4	27/32	4.40
4902	Vinyl	8	19/64	1/4	27/32	4.40
4903	Vinyl	10	19/64	1/4	27/32	4.40
4904	Nylon	4-6	19/64	1/4	27/32	7.20
4905	Nylon	8	19/64	1/4	27/32	7.20
4906	Nylon	10				7.20
BLOCK SPADES FLANGED — NON-INSULATED						
4907	Butted Seam	4-6	19/64	1/4	21/32	$2.20
4908	Butted Seam	8	19/64	1/4	21/32	2.20
4909	Butted Seam	10	19/64	1/4	21/32	2.20
4910	Brazed	4-6	19/64	1/4	21/32	3.50
4911	Brazed	8	19/64	1/4	21/32	3.50
4912	Brazed	10	19/64	1/4	21/32	3.50
BLOCK SPADES FLANGED — INSULATED						
4913	Vinyl	4-6	19/64	1/4	27/32	4.40
4914	Vinyl	8	19/64	1/4	27/32	4.40
4915	Vinyl	10	19/64	1/4	27/32	4.40
4916	Nylon	4-6	19/64	1/4	27/32	7.20
4917	Nylon	8	19/64	1/4	27/32	7.20
4918	Nylon	10	19/64	1/4	27/32	7.20
HOOK TERMINAL — NON-INSULATED						
4919	Butted Seam	4-6	21/64	1/4	11/16	$2.20
4920	Butted Seam	8	21/64	1/4	11/16	2.20
4921	Butted Seam	10	21/64	1/4	11/16	2.20
4922	Brazed	4-6	21/64	1/4	11/16	3.50
4923	Brazed	8	21/64	1/4	11/16	3.50
4924	Brazed	10	21/64	1/4	11/16	3.50
HOOK TERMINAL — INSULATED						
4925	Vinyl	4-6	21/64	1/4	7/8	4.40
4926	Vinyl	8	21/64	1/4	7/8	4.40
4927	Vinyl	10	21/64	1/4	7/8	4.40
4928	Nylon	4-6	21/64	1/4	7/8	7.20
4929	Nylon	8	21/64	1/4	7/8	7.20
4930	Nylon	10	21/64	1/4	7/8	7.20

STANDARD PACKAGE: 100 OF A NUMBER

WIRE SIZE 22—18 AWG

UL APPROVED .020 Electrolytic Copper Tin Plated

Smith Cat.No.	Material	Stud Size	Dimensions W	C	L	Net Per C
RING TERMINAL — NON-INSULATED						
4801	Butted Seam	4-6	1/4	7/32	19/32	$2.20
4802	Butted Seam	8	21/64	1/4	11/16	2.20
4803	Butted Seam	10	21/64	1/4	11/16	2.20
4804	Brazed	4-6	1/4	7/32	19/32	3.50
4805	Brazed	8	21/64	1/4	11/16	3.50
4806	Brazed	10	21/64	1/4	11/16	3.50
RING TERMINAL — INSULATED						
4809	Vinyl	4-6	1/4	7/32	25/32	4.40
4810	Vinyl	8	21/64	1/4	7/8	4.40
4811	Vinyl	10	21/64	1/4	7/8	4.40
4812	Nylon	4-6	1/4	7/32	25/32	7.20
4813	Nylon	8	21/64	1/4	7/8	7.20
4814	Nylon	10	21/64	1/4	7/8	7.20
FLAG TERMINAL — NON-INSULATED						
4815	Butted Seam	8-10	3/8	11/32	21/32	3.50
SPADE TERMINAL — NON-INSULATED						
4816	Butted Seam	4-6	21/64	1/4	11/16	$2.20
4817	Butted Seam	8	21/64	1/4	11/16	2.20
4818	Butted Seam	10	21/64	1/4	11/16	2.20
4819	Brazed	4-6	21/64	1/4	11/16	3.50
4820	Brazed	8	21/64	1/4	11/16	3.50
4821	Brazed	10	21/64	1/4	11/16	3.50
SPADE TERMINAL — INSULATED						
4822	Vinyl	4-6	21/64	1/4	7/8	4.40
4823	Vinyl	8	21/64	1/4	7/8	4.40
4824	Vinyl	10	21/64	1/4	7/8	4.40
4825	Nylon	4-6	21/64	1/4	7/8	7.20
4826	Nylon	8	21/64	1/4	7/8	7.20
4827	Nylon	10	21/64	1/4	7/8	7.20
BLOCK SPADES — NON-INSULATED						
4829	Butted Seam	4-6	19/64	1/4	21/32	$2.20
4830	Butted Seam	8	19/64	1/4	21/32	2.20
4831	Butted Seam	10	19/64	1/4	21/32	2.20
4832	Brazed	4-6	19/64	1/4	21/32	3.50
4833	Brazed	8	19/64	1/4	21/32	3.50
4834	Brazed	10				3.50
BLOCK SPADES — INSULATED						
4835	Vinyl	4-6	19/64	1/4	27/32	4.40
4836	Vinyl	8	19/64	1/4	27/32	4.40
4837	Vinyl	10	19/64	1/4	27/32	4.40
4838	Nylon	4-6	19/64	1/4	27/32	7.20
4839	Nylon	8	19/64	1/4	27/32	7.20
4840	Nylon	10	19/64	1/4	27/32	7.20
BLOCK SPADES FLANGED — NON-INSULATED						
4841	Butted Seam	4-6	19/64	1/4	21/32	$2.20
4842	Butted Seam	8	19/64	1/4	21/32	2.20
4843	Butted Seam	10	19/64	1/4	21/32	2.20
4844	Brazed	4-6	19/64	1/4	21/32	3.50
4845	Brazed	8	19/64	1/4	21/32	3.50
4846	Brazed	10	19/64	1/4	21/32	3.50
BLOCK SPADES FLANGED — INSULATED						
4847	Vinyl	4-6	19/64	1/4	27/32	4.40
4848	Vinyl	8	19/64	1/4	27/32	4.40
4849	Vinyl	10	19/64	1/4	27/32	4.40
4850	Nylon	4-6	19/64	1/4	27/32	7.20
4851	Nylon	8	19/64	1/4	27/32	7.20
4852	Nylon	10	19/64	1/4	27/32	7.20
HOOK TERMINAL — NON-INSULATED						
4853	Butted Seam	4-6	21/64	1/4	11/16	$2.20
4854	Butted Seam	8	21/64	1/4	11/16	2.20
4855	Butted Seam	10	21/64	1/4	11/16	2.20
4856	Brazed	4-6	21/64	1/4	11/16	3.50
4857	Brazed	8	21/64	1/4	11/16	3.50
4858	Brazed	10	21/64	1/4	11/16	3.50
HOOK TERMINAL — INSULATED						
4859	Vinyl	4-6	21/64	1/4	7/8	4.40
4860	Vinyl	8	21/64	1/4	7/8	4.40
4861	Vinyl	10	21/64	1/4	7/8	4.40
4862	Nylon	4-6	21/64	1/4	7/8	7.20
4863	Nylon	8	21/64	1/4	7/8	7.20
4864	Nylon	10	21/64	1/4	7/8	7.20

SEE NEXT PAGE FOR SMITH SOLDERLESS TERMINAL BARREL STYLES

IT'S SOUND PLANNING TO **"SPECIFY SMITH"** WHEN DESIGNING OR PURCHASING

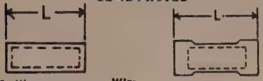
STOCKED BY
LEADING
DISTRIBUTORS
NATIONWIDE

SOLDERLESS TERMINALS

SPECIFY **SMITH**

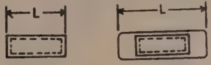
BUTT CONNECTORS

UL APPROVED



Smith Cat.No.	Material	Wire Size	Thick	L	Cost Per C
NON-INSULATED					
4986	Butted Seam	26-24	.016	5/8	$7.20
4987	Butted Seam	22-18	.030	9/16	2.20
4988	Butted Seam	16-14	.030	9/16	2.20
4989	Butted Seam	12-10	.040	9/16	3.30
INSULATED —					
4990	Nylon	26-24	.016	7/8	$10.50
4991	Vinyl	22-18	.030	15/16	5.50
4992	Vinyl	16-14	.030	15/16	5.50
4993	Vinyl	12-10	.040	15/16	6.60

PARALLEL CONNECTORS —



Smith Cat.No.	Material	Wire Size	Thick	L	Cost Per C
NON-INSULATED					
4994	Butted Seam	22-18	.030	5/16	$2.20
4995	Butted Seam	12-10	.030	5/16	2.20
4996	Butted Seam	12-10	.040	5/16	2.80
INSULATED					
4997	Vinyl	22-18	.030	11/16	$3.90
4998	Vinyl	16-14	.030	11/16	3.90
4999	Vinyl	12-10	.040	11/16	5.00

CONNECTORS

BUTT CONNECTORS — CLOSED END

Smith Cat.No.	Material	Wire Size	I.D.	O.D.	L	Cost Per C
5005	Nylon	22-14	1/4	13/32	45/64	$3.90
5006	Nylon	18-10	3/8	15/32	3/4	5.00

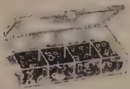
TOOLS

TOOL NO. 4980

Made of heavy gauge heat treated tool steel with insulated handles. Adjustable tension screw, cuts and crimps wire and all types of terminals 10-22 AWG, also 7 MM. Std. Pkg. 1

No.		NET Ea.
4980	Less Bolt Cutter	$5.50
5050	With Bolt Cutter	6.10

KITS



TERMINAL KIT, UNINSULATED

Terminal Kit, Uninsulated, contains 200 popular assorted types, 18 styles.

Cat. No. 4981	With Tool	NET	$11.00
Cat. No. 4984	Less Tool	NET	5.50

TERMINAL KIT, VINYL INSULATED

Terminal Kit, Vinyl Insulated Types, contains 180 popular types, 18 styles.

Cat. No. 4982	With Tool	NET	15.40
Cat. No. 4985	Less Tool	NET	9.90

TERMINAL KIT, NYLON INSULATED

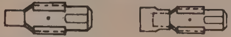
Terminal Kit, Nylon Insulated Types, contains 165 assorted types, 18 styles.

Cat. No. 4983	With Tool	NET	$18.70
Cat. No. 5000	Less Tool	NET	13.20

ALL KITS PACKED IN PLASTIC BOXES

*QUICK SLIDES — SELF MATING

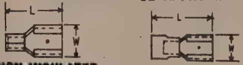
UL APPROVED



Smith Cat.No.	Material	Wire Size	W	Thick	L	Cost Per C
NON-INSULATED —						
5015	Butted Seam	18-14	.187-.205		31/64	$2.80
5016	Butted Seam	18-14	.250		41/64	2.80
INSULATED — PATENTED						
5017	Vinyl	18-14	.187-.205	—	25/32	5.00
5018	Vinyl	18-14	.250	—	25/32	5.00

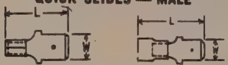
* U. S. PATENT

QUICK SLIDES — FEMALE — UL APPROVED



Smith Cat.No.	Material	Wire Size	W	Thick	L	Cost Per C
NON-INSULATED						
5007	Butted Seam	18-14	.187 .205	.016 .030	31/64	$2.20
5008	Butted Seam	18-14	.250		41/64	2.20
INSULATED						
5009	Vinyl	18-14	.187 .205	.016 .030	25/32	5.00
5010	Vinyl	18-14	.250	.032	55/64	5.00

QUICK SLIDES — MALE



Smith Cat.No.	Material	Wire Size	W	Thick	L	Cost Per C
NON-INSULATED						
5011	Butted Seam	18-14	.187	.016	1/2	$2.20
5012	Butted Seam	18-14	.250	.030 .032	23/32	2.20
INSULATED						
5013	Vinyl	18-14	.187	.016	25/32	5.00
5014	Vinyl	18-14	.250	.030 .032	59/64	5.00

QUICK SLIDE RECEPTACLE INSULATED

DOUBLE MALE INLINE CONNECTION

5019	Vinyl	.137	.250W	$8.30

MULTI-STACKING QUICK SLIDE SELF-MATING

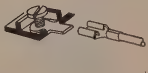
Smith Cat. No.	Material	Wire Size	W	Thick	Length	Cost Per C
NON-INSULATED						
5077	Butted Seam	22-18	.250	.030	5/8″	6.40
5078	Butted Seam	16-14	.250	.030	5/8″	6.40
INSULATED						
5079	Vinyl	22-18	.250	.030	7/8″	9.70
5080	Vinyl	16-14	.250	.030	7/8″	9.70

MULTI-STACKING QUICK SLIDE SELF-MATING

Smith Cat. No.	Material	Wire Size	W	Thick	Length	Cost Per C
5082	Open Barrel Solder	20-14	.250	.030	3/4″	6.40

QUICK SLIDE ADAPTER

Smith Cat. No.	Material	Wire Size	W	Thick	Length	Cost Per C
5081	—	—	.250	.030	3/4″	6.40



QUICK SLIDE MALE TABS

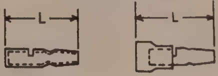
Smith Cat. No.	Material	Stud Size	W	Thick	Length	Cost Per C
5083	—	#6	.250	.030	13/16″	$2.80
5084	—	#8	.250	.030	13/16″	2.80

*CROSS-LOCK DISCONNECT — SELF-MATING

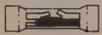
Smith Cat.No.	Material	Wire Size	W	Thick	Cost Per C
NON-INSULATED					
5001	Butted Seam	22-18	1/4	.080	$3.90
5002	Butted Seam	16-14	1/4	.080	3.90
INSULATED					
5003	Vinyl	22-18	1/4	.030	6.60
5004	Vinyl	16-14	1/4	.030	6.60

* U. S. PATENT

SNAP PLUGS —



Smith Cat.No.	Material	Snap Area	Wire Size	L	Thick	Net Per C
NON-INSULATED						
5020	Butted Seam	16-14	.157	3/16	.030	$2.20
5021	Butted Seam	16-14	.176	3/16	.030	2.20
INSULATED						
5022	Vinyl	16-14	.157	3/16	.030	4.40
5023	Vinyl	16-14	.176	3/16	.080	4.40

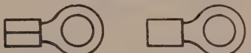


SNAP PLUG RECEPTACLE INSULATED

5024	Vinyl	used with .157 plug	6.60

SMITH BARREL STYLES

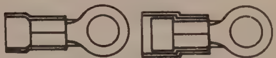
NON-INSULATED TERMINALS



BUTTED SEAM
- Eletrolytic pure copper, tin plated.
- Open end for visual inspection of wire contact.
- Tight grip, multiple barrel serrations for full wire contact.

BRAZED — Same as above except silver brazed barrel.

INSULATED TERMINALS



VINYL INSULATED
- Electrolytic pure copper, tin plated.
- Vinyl insulation,, butted seam.
- Flared for easy wire insertion.
- Color coded for proper wire selection.

NYLON INSULATED
- Electrolytic pure copper, tin plated.
- Flared for easy wire insertion.
- Nylon insulation.
- Butted seam with seamless brass sleeve attached.
- Color Coded.

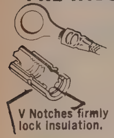
MODERN FACILITIES

We invite you to utilize our modern manufacturing facilities and methods for your molding, screw-machine, stamping or sub-assemblies. We are equipped for both the long run and the short run. From raw material to finished part, SMITH detailed workmanship and production efficiency assure a quality product, speedily and economically made.

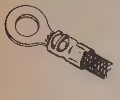
IT'S SOUND PLANNING TO **"SPECIFY SMITH"** WHEN DESIGNING OR PURCHASING

SPECIFY SMITH AMP SOLDERLESS TERMINALS

"PRE-INSULATED DIAMOND GRIP" (P.I.D.G.)

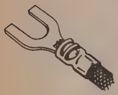

V Notches firmly lock insulation.
Copper sleeve insulation support.

These terminals exceed all military specifications in regard to Tensile Strength Corrosion Resistance, Vibration Resistance and Heat Cycling Tests. Color coded for wire size. **Std. Pkg. 100**



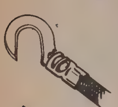
RING TONGUE

Wire Size	No.	AMP No.	Stud Size	Tongue Width	Overall Length	Stud Clear.	NET Per C
22 to 16	1550	320882	4	3/16	21/32	5/32	$13.00
	1551	31881	6	7/32	21/32	5/32	13.00
	1552	31886	8	9/32	25/32	1/4	13.00
	1553	31887	10	9/32	25/32	1/4	13.00
	1554	31894	1/4	15/32	1 1/16	27/64	15.00
14 to 16	1555	32441	4	1/4	11/16	11/64	$13.00
	1556	32442	6	1/4	11/16	11/64	13.00
	1557	31902	8	11/32	27/32	9/32	13.00
	1558	322238	10	5/16	25/32	1/4	13.00
	1559	31906	1/4	15/32	1/16	7/16	15.00



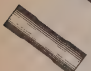
SPADE TONGUE

Wire Size	No.	AMP No.	Stud Size	Tongue Width	Overall Length	Stud Clear.	NET Per C
22-16	1565	34541	6	1/4	53/64	19/64	$13.00
	1566	32053	8	3/8	57/64	19/64	15.00
	1567	32054	10	3/8	57/64	19/64	13.00
14-16	1568	35559	6	19/64	47/64	13/64	$13.00
	1569	321233	8	19/64	47/64	13/64	13.00
	1570	32060	10	3/8	57/64	5/16	15.00



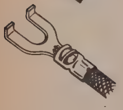
HOOK TONGUE

Wire Size	No.	AMP No.	Stud Size	Tongue Width	Overall Length	Stud Clear.	NET Per C
22-16	1571	34313	6	9/32	47/64	13/64	$13.00
	1572	32456	8	11/32	55/64	9/32	13.00
14-16	1573	320381	6	11/32	27/32	9/32	$13.00
	1574	320306	8	11/32	27/32	9/32	15.00
	1575	35481	10	11/32	27/32	9/32	13.00



BUTT CONNECTOR

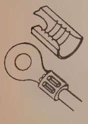
1548	320559	22-16	.125 I.D.	$50.00
1549	320562	16-14	.150 I.D.	50.00



FLANGED SPADE

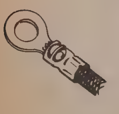
Wire Size	No.	AMP No.	Stud Size	Tongue Width	Overall Length	Stud Clear.	NET Per C
22-16	1560	32562	6	19/64	23/32	13/64	$13.00
	1561	32498	8	27/64	13/16	1/4	13.00
14-16	1562	320861	6	19/64	23/32	13/64	13.00
	1563	320862	8	19/64	23/32	13/64	16.00
	1564	320863	10	19/64	23/32	13/64	16.00

"SOLISTRAND" TERMINALS



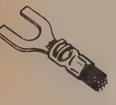
NON-INSULATED

The only terminal designed for use with solid, stranded or irregularly shaped wires, or combinations of wires. Corrosion resistant, high strength, electro-tinned; versatile — widely adaptable. **Std. Pkg. 100**



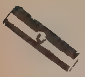
RING TONGUE

Wire Size	No.	AMP No.	Stud Size	Tongue Width	Overall Length	Stud Clear.	NET Per C
22 to 16	2850	32989	4	7/32	17/32	5/32	$ 6.00
	2851	34194	6	7/32	17/32	5/32	6.00
	2852	32990	8	9/32	11/16	15/64	7.00
	2853	33214	10	5/16	11/16	9/32	7.00
	2854	33215	1/4	15/32	15/16	27/64	10.00
	2855	33452	5/16	15/32	15/16	27/64	10.00
	2856	33453	3/8	17/32	1 1/16	17/32	10.00
16 to 14	2857	32991	4	1/4	9/16	11/64	$ 7.00
	2858	34197	6	1/4	9/16	11/64	7.00
	2859	32992	8	5/16	11/32	1/4	7.00
	2860	320093	10	5/16	11/32	1/4	7.00
	2861	33218	1/4	15/32	15/16	7/16	10.00
	2862	33454	5/16	15/32	15/16	7/16	10.00
	2863	33455	3/8	17/32	1 1/8	17/32	10.00



SPADE TONGUE

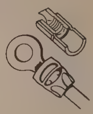
Wire Size	No.	AMP No.	Stud Size	Tongue Width	Overall Length	Stud Clear.	NET Per C
22 to 16	2864	32897	6	11/32	5/8	13/64	6.00
	2865	32898	8	11/32	5/8	13/64	6.00
	2866	32899	10	11/32	5/8	13/64	6.00
16 to 14	2867	32903	6	11/32	5/8	13/64	6.00
	2868	32904	8	11/32	5/8	13/64	6.00
	2869	32905	10	11/32	5/8	13/64	6.00



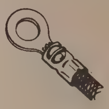
BUTT CONNECTOR

2870	31818	22-16	.140 I.D.	37/64	8.00
2871	31819	16-14	.170 I.D.	37/64	8.00

"PLASTI-GRIP" (P.G.)

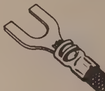


Insulated, strong, special plastic has high dielectric strength. Applied with single operation of press dies or hand tools. High tensile strength. High conductivity copper, electro-tinned. Color coded for wire size. **Std. Pkg. 100**



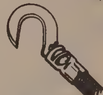
RING TONGUE

Wire Size	No.	AMP No.	Stud Size	Tongue Width	Overall Length	Stud Clear.	NET Per C
22 to 16	2750	34141	4	7/32	21/32	5/32	$10.50
	2751	34142	6	7/32	21/32	5/32	10.50
	2752	34145	8	9/32	25/32	1/4	10.50
	2753	34146	10	9/32	25/32	1/4	10.50
	2754	34150	1/4	15/32	1 1/16	27/64	12.00
	2755	34151	5/16	15/32	1 1/16	27/64	12.00
	2756	34152	3/8	17/32	1 13/64	17/32	12.00
16 to 14	2757	34157	4	1/4	11/16	5/32	10.50
	2758	34158	6	1/4	11/16	5/32	10.50
	2759	34160	8	11/32	27/32	17/64	10.50
	2760	34161	10	11/32	27/32	17/64	10.50
	2761	34162	1/4	15/32	1 1/16	27/64	12.00
	2762	34163	5/16	15/32	1 1/16	27/64	12.00
	2763	34164	3/8	17/32	1 13/64	33/64	12.00



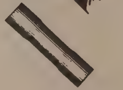
SPADE TONGUE

Wire Size	No.	AMP No.	Stud Size	Tongue Width	Overall Length	Stud Clear.	NET Per C
22 to 16	2764	34153	6	11/32	49/64	13/64	10.50
	2765	34155	8	3/8	57/64	19/64	10.50
	2766	34156	10	3/8	57/64	19/64	10.50
16 to 14	2767	34165	6	3/8	57/64	19/64	10.50
	2768	34166	8	3/8	57/64	19/64	10.50
	2769	34167	10	3/8	57/64	19/64	10.50



HOOK TONGUE

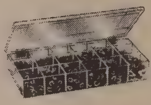
Wire Size	No.	AMP No.	Stud Size	Tongue Width	Overall Length	Stud Clear.	NET Per C
20-16	2770	34501	6	9/32	47/64	3/16	10.50
	2771	321699	8	11/32	55/64	9/32	10.50
16-14	2772	320263	8	11/32	55/64	17/64	14.00



BUTT CONNECTOR

2773	34070	22-16	.140 I.D.	1	12.00
2774	34071	16-14	.170 I.D.	1 1/64	12.00

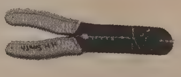
SOLDERLESS TERMINAL ASSORTMENTS



A basic assortment of the most commonly used Ring Tongue and Spade Terminals for wire sizes 22 thru 14. Packed in a re-usable clear plastic compartmented box. **Std. Pkg. 1**

No.	Approx. Quantity of Terminals	Style	NET
1526	200	"PLASTI-GRIP"	$25.00
1527	300	"PLASTI-GRIP"	35.00
1528	200	"SOLISTRAND"	16.00
1529	300	"SOLISTRAND"	22.00
1577	200	"P.I.D.G."	30.00
1578	300	"P.I.D.G."	45.00

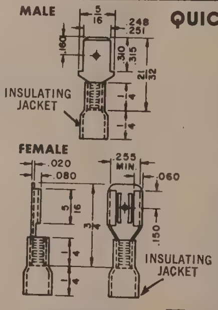
HAND CRIMPING TOOLS

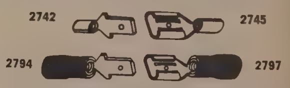


Made of heavy gauge heat treated tool steel with insulated handles. Adjustable tension screw, cuts and crimps wire and all types of terminals 10-22 AWG, also 7 MM. **Std. Pkg. 1**

No.		NET Ea.
4980	Less Bolt Cutter	$5.50
5050	With Bolt Cutter	6.10

QUICK DISCONNECT TERMINALS





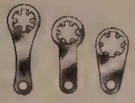
Terminals of pure electrolytic copper. Resists corrosion and insures shelf life. Beveled entry for easy wire threading and improved V-ridges for wire protection. Male tongue width .248/251, female entry .225 Min. **Std Pkg. 100**

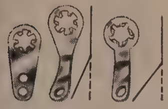
Male	Female	Wire-Size	NET Per C
Non-Insulated			
2742	2745	22-16	$ 2.10
2743	2746	16-14	2.10
2744	2747	12-10	2.10
Insulated			
2794	2797	22-16	4.50
2795	2798	16-14	4.50
2796	2799	12-10	4.50

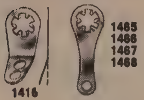
Std. Pkg. 1

No. 2748 Kit, 50 each, 12 types in plastic box — **NET Ea. $19.80**

SOLDER LUGS & POWER OUTLETS SPECIFY SMITH



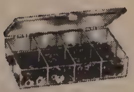




LOCKING TERMINAL LUGS

Brass Hot Tinned Std. Pkg. 1000

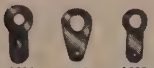
No.	Length	Thick	Hole	NET Per M
1410-4	7/8"	.018	#4	$15.00
1410-6	7/8"	.018	#6	15.00
1410-8	7/8"	.018	#8	15.00
1410-10	57/64"	.018	#10	15.00
1410-14	13/16"	.018	1/4"	15.00
1411-4	47/64"	.020	#4	15.00
1411-6	47/64"	.020	#4	15.00
1411-8	47/64"	.020	#8	15.00
1412-4	5/8"	.018	#4	15.00
1412-6	5/8"	.018	#6	15.00
1412-8	5/8"	.018	#8	15.00
1413-4	23/32"	.018	#4	15.00
1413-6	23/32"	.018	#6	15.00
1413-8	23/32"	.018	#8	15.00
1414-4	13/16"	.018	#4	15.00
1414-6	13/16"	.018	#6	15.00
1414-8	13/16"	.018	#8	15.00
1414-10	53/64"	.018	#10	15.00
1415-4	41/64"	.018	#4	15.00
1415-6	41/64"	.018	#6	15.00
1415-8	41/64"	.018	#8	15.00
1416-4	11/16"	.020	#4	15.00
1416-6	11/16"	.020	#6	15.00
1416-8	11/16"	.020	#8	15.00
1465	47/64"	.020	#4	15.00
1466	47/64"	.020	#6	15.00
1467	7/8"	.020	#8	15.00
1468	13/16"	.020	1/4"	15.00

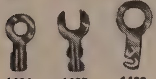


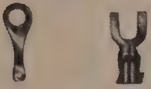
LOCKING TERMINAL LUG ASSORTMENT

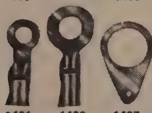
A complete assortment of the most widely used Locking Terminal Lug styles, with hole sizes from #4 thru #10. Packed in a re-usable clear plastic compartmented box. Std. Pkg. 1

No.	Approx. Quantity of Terminals	NET
1547	900	$20.00









SOLDER LUGS

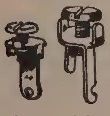
Hot Tinned Std. Pkg. 1000

No.	Material	Length	Thickness	Hole	NET Per M
1484	Ph. Br.	5/8"	.020"	# 6	$12.00
1485-4	Ph. Br.	17/32"	.012"	# 4	12.00
1485-6	Ph. Br.	17/32"	.012"	# 6	12.00
1485-8	Ph. Br.	17/32"	.012"	# 8	12.00
1485-10	Ph. Br.	17/32"	.012"	#10	12.00
1486-4	Ph. Br.	13/16"	.012"	# 4	12.00
1486-6	Ph. Br.	13/16"	.012"	# 6	12.00
1486-8	Ph. Br.	13/16"	.012"	# 8	12.00
1486-10	Ph. Br.	13/16"	.012"	#10	12.00
1488-4	Ph. Br.	9/16"	.012"	# 4	12.00
1488-6	Ph. Br.	9/16"	.012"	# 6	12.00
1488-8	Ph. Br.	9/16"	.012"	# 8	12.00
1490	Brass	3/4"	.020"	#10	15.00
1491	Copper	15/16"	.020"	#10	25.00
1493	Brass	1 1/8"	.027"	1/4"	30.00
1494-6	Brass	5/8"	.020"	# 6	13.00
1494-8	Brass	5/8"	.020"	# 8	13.00
1495	Brass	5/8"	.020"	# 8	15.00
1496	Brass	3/4"	.020"	1/4"	15.00
1497	Brass	7/8"	.017"	3/8"	18.00

SOLDER LUG ASSORTMENT

A complete assortment of the most widely used Solder Lug syles, with hole sizes from #4 thru #10. Packed in a re-usable clear plastic compartmented box. Std. Pkg. 1

No.	Approx. Quantity of Terminals	NET
1546	1400	$20.00



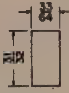
TERMINAL LUGS & SCREWS

Recommended for heavy duty terminal strips. Lugs are tapped with screw inserted. Brass hot tinned. Std. Pkg. 100

No.	Screw	NET Per C
1478	6-32	$6.00
1479	8-32	8.00

CONVENIENCE OUTLETS

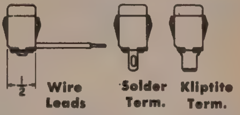
For small unit electrical appliances and Electronic devices.
UL Approved RADIOS — CLOCK RADIOS — CLOCKS —
T.V. SETS — LAMPS — TOASTERS, ETC.



Cutout Dimensions

1283-1284-1285 Flat Flange

PUSH-IN SNAP-LOCK BRACKET TYPE

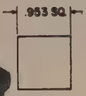


Carbon Steel spring clips lock unit securely in place when pushed into opening. UL Approved. SPECIFY COLOR

Rating: 15 Amps, 125 Volts AC or DC.
Leads: Plastic wire #14 gauge, 6" long.

Std. Pkg. 50

No.	Terminals	Color	Net Per C
1283-103	Wire Leads	Black	$30.00
1284-103	Solder	Black	38.00
1285-103	Kliptite	Black	38.00



Cutout Dimensions

THREE WIRE OUTLET

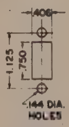
(With grounding lead)

Carbon Steel spring clips lock unit securely in place when pushed into opening. UL Approved. SPECIFY COLOR

Rating: 15 Amps, 125 Volts AC or DC.
Leads: Two #14 gauge 6" long plastic wire and one #16 gauge green ground lead 6" long.

Std. Pkg. 50

No.	Color	Net Per C
1280-103	Black	$43.00
1280-101	White	45.00



Cutout Dimensions

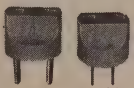
BRACKET TYPE

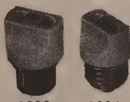
Top or Bottom Mount

Flat steel bracket mounts with two #6 screws or equivalent size eyelets. Black Only.
Rating: 15 Amps, 125 Volts AC or DC.
Leads: No. 1279 has two leads, plastic wire #16 gauge, 8" long. UL Approved.

Std. Pkg. 50

No.	Type	Terminals	Net Per C
1299	Top or Bottom Mount	Solder	$18.00





"UNIVERSAL" FOREIGN ADAPTER PLUGS

Permits operation of American, British or Continental electric shavers, radios, record players and other small appliances from any electrical outlet, anywhere in the world, supplying the required voltage. All plugs are rated at 15 Amps/117V; 7½ Amps/220 V. Std. Pkg. 25

No.	Male Plug	NET Per C
1991	Continental	$ 51.00
1992	American	60.00
1993	Bayonet	60.00
1994	Screw	60.00
1995	Kit of 4 Adapters, 1 each of above Std. Pkg. 6	240.00

Streamlined bakelite plug adapters. Adapts from American to Foreign type.
RATING: 125 VAC — 15 AMP
220 VAC — 7.5 AMP

Std. Pkg. 25

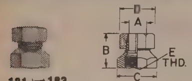
No.	Female End	Male End	NET per C
852	American	Continental	$50.00
856	American	British	55.00

THE SMITH ORGANIZATION has been a major supplier of electronic components to the industry for 25 years. Today, with its modern plant facilities and capabilities we are in a position to convert your ideas and needs, whether they be one or a million, and deliver what you want, when you want it!

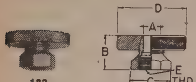
IT'S SOUND PLANNING TO **"SPECIFY SMITH"** WHEN DESIGNING OR PURCHASING

SPECIFY SMITH SHAFT ACCESSORIES

STOCKED BY
LEADING
DISTRIBUTORS
NATIONWIDE



181 — 183

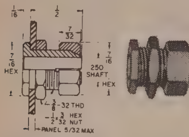


182

SHAFT LOCKS

DESCR.: Brass, nickel plated shaft locks, supplied with lock nut. Standard (No. 181, 182) for 1/4″ shafts; miniature (No. 183) for 1/8″ shafts. **Std. Pkg. 50**

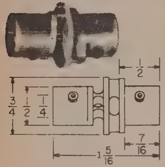
No.	A	B	C	D	E	NET Per C
181	.253	1/2	1/2	7/16	3/8-32	$50.00
182	.253	1/2	1/2	1″	3/8-32	95.00
183	.128	1/2	11/32	5/16	1/4-32	34.00



PANEL MOUNT SHAFT LOCKS

DESCR.: Brass, nickel plated combination panel bearings and shaft locks. Mounts thru panel in 3/8″ hole. For 1/4″ shafts. **Std. Pkg. 50**

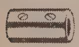
No.	Type	NET Per C
114	Single-hole mount	$55.00



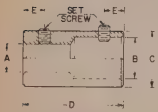
NYLON FLEXIBLE SHAFT COUPLING

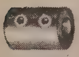
DESCR.: Molded nylon with molded-in brass bushings. Hi-temp nylon not influenced by moisture. Designed for long reach shaft coupling. Supplied with 2 Allen head set screws. **Std. Pkg. 25**

No.	NET Ea.
164	$ 1.65



120





180

SHAFT COUPLERS

DESCR.: Brass and insulated shaft couplers. Supplied with two 6-32 x 1/8″ slotted cup-point set screws, except as indicated. **Std. Pkg. 50**

BRASS, NICKEL PLATED COUPLERS

No.	A	B	C	D	E	NET Per C
120	1/4	1/4	7/16	3/4	3/16	$40.00
131	1/4	3/8	1/2	3/4	3/16	48.00
133	3/8	3/8	1/2	3/4	3/16	48.00

WITH FOUR SET SCREWS, SPACED 90°

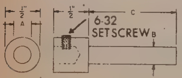
No.	A	B	C	D	E	NET Per C
138	1/4	1/4	7/16	3/4	3/16	$65.00

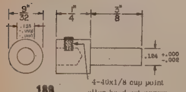
MINIATURE COUPLER, WITH 4-40 x 1/8″ ALLEN HEAD CUP-POINT SET SCREWS

No.	A	B	C	D	E	NET Per C
180	1/8	1/8	9/32	3/8	5/64	$40.00

INSULATED BLACK FIBRE, PER MIL-F-1148A, GRADE CH.

No.	A	B	C	D	E	NET Per C
140	1/4	1/4	7/16	3/4	3/16	$33.00





189
4-40x1/8 cup point
allen head set screw
for 3/64″ key

EXTENDERS

Brass and Insulated

Std. Pkg. 50

LONG SHAFT TYPE

No.	A B	C	Material	NET Per C
150	1/4″-1/4″	1 1/4″	Brass N..P.	$65.00
130	1/4″-1/4″	1 1/4″	Fibre	65.00
132	3/8″-1/4″	1 1/4″	Brass N. P.	75.00

SHORT SHAFT TYPE

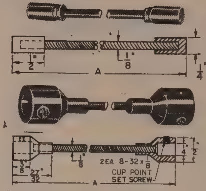
No.	A B	C	Material	NET Per C
160	1/4″-1/4″	5/8″	Brass N. P.	$50.00
161	1/4″-1/4″	5/8″	Fibre	50.00

MINIATURE EXTENDER

With Allen Head Set Screws

No.	A B	C	Material	NET Per C
189	1/8″-1/8″	3/8″	Brass N.P.	$50.00

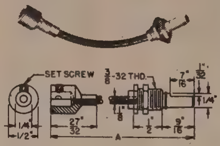
Our screw machine division has open time for small or large quantities of screw machine products fabricated to your exacting requirements.



FLEXIBLE SHAFTS

High quality phosphor bronze non-magnetic, non-rusting flexible shafts. Remote control when necessary to mount condensers and potentiometers away from panel at unusual angles. Turns at any angle up to 90°; free from back lash. **Std. Pkg. 25**

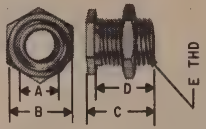
No.	Size "A"	Description	NET Per C
151	3″	with 1/4″ hub	$85.00
152	6″	with 1/4″ hub	120.00
153	3 5/8″	with 1/4″ coupler	200.00
154	6 5/8″	with 1/4″ coupler	215.00



BI-DIRECTIONAL FLEXIBLE SHAFT AND PANEL BEARING

Combination of 1/4″ Coupler at one end and Panel Bearing Assembly at other. High quality phosphor bronze non-magnetic, non-rusting flexible shaft, turns at any angle up to 90°. Free from backlash. **Std. Pkg. 25**

No.	Length "A"	NET Ea.
165	4 1/16″	$ 2.30
166	7 1/16″	2.40

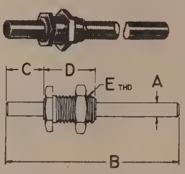


PANEL BEARINGS

Standard & Miniature

DESCR.: Brass, nickel plated panel bearings, supplied with hex nut. Standard (No. 119) for 1/4″ shafts; miniature (No. 184) for 1/8″ shafts. **Std. Pkg. 100**

No.	A	B	C	D	E	NET Per C
119	.253	7/16	1/2	7/16	3/8-32	$22.00
184	.128	11/32	7/16	3/8	1/4-32	22.00

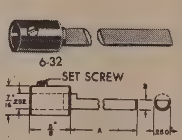


PANEL BEARING ASSEMBLIES

Standard & Miniature

DESCR.: Brass, nickel plated. for 1/4″ and 1/8″ shafts. **Std. Pkg. 50**

No.	A	B	C	D	E	NET Per C
148	.250	3″	1/2	1/2	3/8-32	$75.00
149	.250	6″	1/2	1/2	3/8-32	80.00
1448	.125	2″	11/32	7/16	1/4-32	75.00
1449	.125	4″	11/32	7/16	1/4-32	80.00

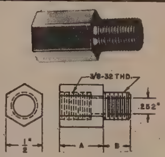


SHAFT EXTENDERS

For Volume Controls

Brass, Nickel Plated. **Std. Pkg.-25**

No.	A	B	NET Per C
	FULL ROUND		
2356	2″	.250″	$63.00
2357	3″	.250″	64.00
2358	4″	.250″	68.00
	WITH FLAT		
2359	2″	.219″	$69.00
2360	3″	.219″	75.00
2361	4″	.219″	93.00
2362	2″	.156″	69.00
2363	3″	.156″	75.00
2364	4″	.156″	93.00

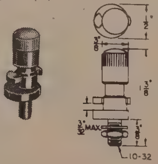


BUSHING EXTENDERS

For Volume Controls

Brass, Nickel Plated. **Std. Pkg. 25**

No.	A	NET Per C
2350	5/8″	$55.00
2351	5/8″	60.00
2352	5/8″	65.00
2353	11/16″	75.00
2354	11/16″	77.00
2355	3/4″	80.00



DIAL LOCK

HEAD: Captive: Brass, nickel plated.
BODY: Brass nickel plated.
DESCR.: Prevents detuning of the dial when locked by means of the captive knurled nut.
Supplied with hex nut & lockwasher. **Std. Pkg. 25**

No.	Net per C
198	$130.00

IT'S SOUND PLANNING TO **"SPECIFY SMITH"** WHEN DESIGNING OR PURCHASING

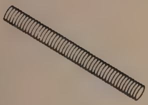
STOCKED BY
LEADING
DISTRIBUTORS
NATIONWIDE

MOUNTING ACCESSORIES

SPECIFY SMITH

BRASS THREADED RODS

Std. Pkg. 10



1-Ft. Length No.	NET Ea.	Threaded	2-Ft. Length No.	NET Ea.
1400-1	$ .90	6-32	1400-2	$1.80
1401-1	.90	8-32	1401-2	1.80
1402-1	.90	10-32	1402-2	1.80
1403-1	1.10	¼-20	1403-2	2.20

NYLON THREADED RODS

Std. Pkg. 10

1-Ft. Length No.	NET Ea.	Threaded	2-Ft. Length No.	NET Ea.
1420 1	$1.20	6-32	1420-2	$2.40
1421-1	1.30	8-32	1421-2	2.60
1422-1	1.50	10-32	1422-2	3.00
1423-1	1.80	¼-20	1423-2	3.60

PLAIN RODS

Brass, Acetate & Nylon

Std. Pkg. 10

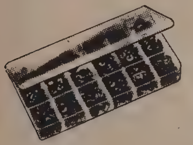
¼" DIA No.	Net Ea.	Type	Length	⅛" DIA No.	Net Ea.
1404	$ .70	Brass N.P.	6"	1431	$ .60
1405	1.40	Brass N.P.	12"	1432	1.20
1406	.15	Acetate	6"	1433	.15
1407	.30	Acetate	12"	1434	.30
1408	.35	Nylon	6"	1440	.35
1409	.70	Nylon	12"	1441	.70

SHAFT WRENCHES

Specially designed offset, double-end wrenches for most hex sizes encountered in electronic construction. Made of heavy gauge, cadmium plated steel, clearly marked with size. No. 999 is especially useful for Toggle Switch and Volume Control mounting nuts. Std. Pkg. 25

No.	For Nut Sizes	NET per C
998	5/16" - ⅜"	$30.00
999	½" - 9/16"	30.00
997	Set of 2 above	60.00

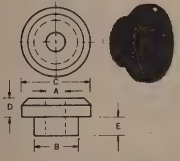
FIBRE WASHER KIT



Each kit contains about 1,000 Flat and Shoulder Washers, packed in an 18-compartment plastic box, in the following approximate quantities of SMITH standard washers:
100 each #2151, 2161, 2153, 2160: 75 each #2150, 2162; 60 each #2155, 2163; 50 each #2156, 2164, 2154, 2165; 35 each #2159, 2167; 25 each #2158, 2168; 10 each #2157, 2169.

No.		NET Each
2173	Kit of 1,000 Washers	$20.00

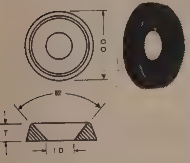
MOLDED NYLON WASHERS



Non conductive and corrosion resistant, ideal for insulation, cushioning or spacing protection. Meets Military Specification MIL-P-20693, Type 1. Available in Natural. Std. Pkg. 100

SHOULDER

No.	A	B	C	D	E	NET Per C
2681	.122	.187	.281	.040	.040	$2.25
2682	.146	.218	.328	.040	.040	2.40
2683	.174	.250	.375	.060	.050	2.50
2684	.201	.281	.437	.050	.050	2.75
2685	.260	.375	.562	.060	.060	3.00
2686	.385	.500	.750	.060	.060	4.75

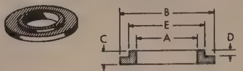


FINISHING

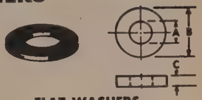
No.	O.D.	I.D.	Thickness	NET Per C
2687	.437	.143	.100	$5.00
2688	.515	.171	.115	5.25
2689	.580	.191	.152	5.50
2690	.609	.225	.160	6.00
2691	.683	.251	.183	6.50

MORE THAN TEN THOUSAND ITEMS MANUFACTURED UNDER ONE ROOF

FIBRE WASHERS



SHOULDER WASHERS



FLAT WASHERS

MATERIAL: Commercial vulcanized fibre, black, per MIL-F-1148A, grade CH.
TOLERANCES: "A" dim. (I.D.) — +.010 —.000. All other dimensions shown, ± 1/64". "E" dim. (shoulder dia.) — +.000 —.010.

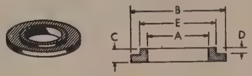
SHOULDER WASHERS

Cat. No.	Screw Clear.	A (I.D.)	B (O.D.)	C (Thk)	D (Shldr Hgt.)	E (Shldr Dia.)	NET Per C	NET Per M
2171	NO. 2	.093	.250	.055	.025	.154	$1.40	$11.00
2151	NO. 4	.115	.250	.062	.031	.187	1.40	11.00
2152	NO. 6	.141	.250	.093	.031	.187	1.40	11.00
2153	NO. 6	.141	.312	.093	.031	.187	1.50	12.00
2150	NO. 6	.141	.375	.093	.031	.240	1.50	12.00
2155	NO. 8	.167	.375	.093	.031	.246	1.50	12.00
2156	NO. 10	.194	.375	.093	.031	.308	1.60	13.00
2154	1/4"	.253	.500	.093	.031	.308	1.60	13.00
2159	17/64"	.265	.500	.093	.031	.365	2.10	17.00
2158	3/8"	.385	.625	.093	.031	.498	2.30	19.00
2157	3/8"	.378	.750	.093	.031	.498	2.70	22.00

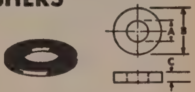
FLAT WASHERS

Cat. No.	Screw Clear.	A (I.D.)	B (O.D.)	C (Thk)	NET Per C	NET Per M
2191	NO. 2	.093	.250	1/32"	$ .80	$ 6.00
2161	NO. 4	.115	.250	1/16"	.90	7.00
2160	NO. 6	.141	.250	1/16"	.90	7.00
2162	NO. 6	.141	.375	1/16"	.90	7.00
2163	NO. 8	.169	.375	1/16"	1.00	8.00
2164	NO. 10	.196	.375	1/16"	1.00	8.00
2165	1/4"	.253	.500	1/16"	1.00	8.00
2166	1/4"	.253	.500	3/32"	1.80	14.00
2167	5/16"	.315	.500	1/16"	1.30	10.00
2168	3/8"	.385	.625	1/16"	1.30	10.00
2169	3/8"	.378	.750	1/16"	1.90	15.00

NYLON WASHERS



SHOULDER WASHERS



FLAT WASHERS

MATERIAL: Nylon (Zytel 101), natural, per MIL-P-20693A.
TOLERANCES: "A" dim. (I.D.) — +.010 —.000. All other dimensions shown, ± 1/64". "E" dim. (shoulder dia.) — +.000 —.010.

SHOULDER WASHERS

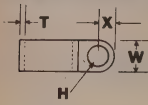
Cat. No.	Screw Clear.	A (I.D.)	B (O.D.	C (Thk)	D (Shldr Hgt)	E (Shldr Dia)	NET Per C	NET Per M
2651	NO. 2	.093	.250	.055	.025	.154	$ 2.20	$17.00
2661	NO. 4	.115	.250	.062	.031	.187	2.00	15.00
2662	NO. 6	.141	.250	.093	.031	.187	2.00	15.00
2663	NO. 6	.141	.312	.093	.031	.187	2.10	16.00
2660	NO. 6	.141	.375	.093	.031	.240	2.20	17.00
2665	NO. 8	.167	.375	.093	.031	.246	2.20	17.00
2666	NO. 10	.194	.375	.093	.031	.308	2.20	17.00
2664	1/4"	.253	.500	.093	.031	.308	3.30	25.00
2669	17/64"	.265	.500	.093	.031	.365	3.30	25.00
2668	3/8"	.385	.625	.093	.031	.498	3.30	25.00
2667	3/8"	.378	.750	.093	.031	.498	4.80	37.00

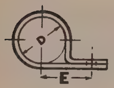
FLAT WASHERS

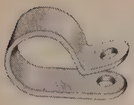
Cat. No.	Clear. Screw	A (I.D.)	B (O.D.)	C (Thk)	NET Per C	NET Per M
2652	NO. 2	.093	.250	1/32"	$ 1.00	$ 8.00
2671	NO. 4	.115	.250	1/16"	1.20	9.00
2514	NO. 4	.115	.281	3/64"	1.20	9.00
2670	NO. 6	.141	.250	1/16"	1.20	9.00
2515	NO. 6	.141	.312	3/64"	1.20	9.00
2672	NO. 6	.141	.375	1/16"	1.40	11.00
2673	NO. 8	.170	.375	1/16"	1.40	11.00
2516	NO. 8	.170	.375	1/16"	1.40	11.00
2674	NO. 10	.196	.375	1/16"	1.40	11.00
2517	NO. 10	.196	.437	1/16"	1.80	14.00
2675	1/4"	.253	.500	1/16"	2.10	16.00
2676	1/4"	.253	.500	3/32"	3.30	25.00
2518	1/4"	.253	.562	1/16"	2.20	17.00
2677	5/16"	.315	.500	1/16"	2.10	16.00
2678	3/8"	.385	.625	1/16"	2.50	19.00
2679	3/8"	.378	.750	1/16"	3.90	30.00

IT'S SOUND PLANNING TO "**SPECIFY SMITH**" WHEN DESIGNING OR PURCHASING

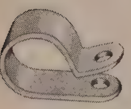
SPECIFY SMITH NYLON CABLE ACCESSORIES



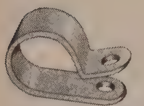




T=.060 X=7/32″
W=½″ H=13/64″



T=.060 X=7/32″
W=½″ H=13/64″



T=.050 X=7/32″
W=½″ H=13/64″

T=.050 X=7/32″
W=⅜″ H=13/64″

ALL-MOLDED CABLE CLAMPS

POLYPROPYLENE

Marked for easy identification. Conforms to applicable Mil. Specs. **Std. Pkg. 100**

No.	Hole (D)	E	NET Per C
8910	⅛	.360	$1.60
8911	3/16	.423	1.80
8912	¼	.457	1.90
8913	5/16	.498	2.00
8914	⅜	.529	2.10
8915	7/16	.560	2.20
8916	½	.592	2.30
8917	9/16	.623	2.40
8918	⅝	.654	2.50
8919	11/16	.752	2.60
8920	¾	.783	2.70
8921	⅞	.845	2.90
8922	1	.908	3.00

CELLULOSE

Made to meet MIL Std 242B (Ships), MS 3914 (Ord.) **Std. Pkg. 100**

No.	Hole (D)	E	NET Per C
8925	⅛	.360	$2.10
8926	3/16	.423	2.20
8927	¼	.457	2.30
8928	5/16	.498	2.40
8929	⅜	.529	2.50
8930	7/16	.560	2.60
8931	½	.592	2.70
8932	9/16	.623	2.90
8933	⅝	.654	3.00
8934	11/16	.752	3.30
8935	¾	.783	3.50
8936	⅞	.845	3.70
8937	1	.908	3.90

NYLON

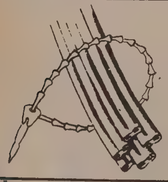
Marked for easy identification. Black. Made to meet these Military Specifications: Mil-Std-24E; MS-30914(ord.) Mil-C-21565(NAS); Mil-P-17091-B; Mil-P-20693. **Std. Pkg. 100**

No.	Hole (D)	E	NET Per C
8940	⅛	.360	$2.30
8941	3/16	.423	2.40
8942	¼	.457	2.50
8943	5/16	.495	2.60
8944	⅜	.529	2.70
8945	7/16	.560	2.80
8946	½	.592	2.90
8947	9/16	.623	3.00
8948	⅝	.654	3.20
8949	11/16	.752	3.30
8950	¾	.783	3.50
8951	⅞	.845	3.70
8952	1	.908	3.90
8955	⅛	.325	1.90
8956	3/16	.378	2.00
8957	¼	.409	2.10
8958	5/16	.441	2.20
8959	⅜	.471	2.30
8960	7/16	.519	2.40
8961	½	.550	2.50

BEADED WIRE TIES

WHITE NYLON

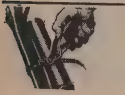
No. 8962 5″ Long **Std. Pkg. 100 NET Per C $2.30**



NYLON ADJUSTABLE CABLE TIE

Efficiently and economically replaces lacing cord, tape and other fasteners in wrap-around applications. Adjustable from ⅛″ to 1⅜″ diameter. Once applied it cannot slip. Made of Nylon.

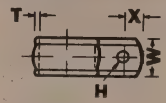
No.	
8963C	NET Per C $ 1.50
8963M	NET Per M $13.00

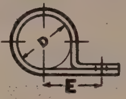


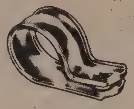
TIGHTENING TOOL

Used with strapping for fast assembly. **Std. Pkg. 1**

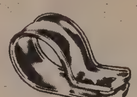
No. 804 **NET Ea.** $20.00







T .060 — W ½″
X 7/32″ — H .204



Hole (D)
⅛″ to ½″
T .040
W ⅜″
X 5/32″
H .167

Hole (D)
3/16″ to 1¼″
T .060
W ½″
X 13/64″
H .204

CABLE CLAMPS

BUTYRATE

Made to meet MIL Std 242B (Ships), MS 3914 (Ord.) Withstands temperatures from —60 to +175 degrees F.

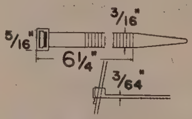
Std. Pkg. 100

No.	Hole (D)	E	NET Per C
831	⅛	.360	$ 2.34
832	3/16	.423	2.40
833	¼	.457	2.58
834	5/16	.498	2.85
835	⅜	.529	3.00
836	7/16	.560	3.30
837	½	.592	3.60
838	9/16	.623	4.20
839	⅝	.654	4.50
840	11/16	.752	4.80
841	¾	.783	5.10
842	⅞	.845	5.40
843	1	.908	5.70
844	1⅛	.970	6.00
845	1¼	1.062	6.30

NYLON

MIL P17091A, Amend 2. Withstands temperatures from −60 to +250 degrees F. Black.
Std. Pkg. 100

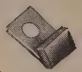
No.	Hole (D)	E	NET Per C
771	⅛	.310	$ 3.60
772	3/16	.373	3.90
773	¼	.407	4.20
774	5/16	.448	4.65
775	⅜	.479	4.80
776	7/16	.510	5.10
777	½	.542	5.40
778	9/16	.623	6.60
779	⅝	.654	7.20
780	11/16	.752	7.50
781	¾	.783	8.10
782	⅞	.845	8.70
783	1	.908	10.20
784	1⅛	1.002	12.00
785	1¼	1.062	13.80



NYLON LOCKING CLAMP

Wedge and ratchet design makes for positive holding and locking. Accommodates cables from ⅛″ to 1¾″. No knot tying, just slip clamp around cable, insert tongue and pull tight. **Std. Pkg. 100**

No. 800 **NET Per C** $9.00



NYLON MOUNTING TABS

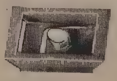
For use with No. 800 locking clamp when premounted assembly points are desired. Furnished with .203 mounting hole. **Std. Pkg. 100**

No. 801 **NET Per C** $3.00

NYLON PERFORATED STRAPPING

For bundling of wire, cable and tubing. Time saver for harnessing. Use No. 803 ratchet buckle for fast assembly. Supplied on 50′ rolls. **Std. Pkg. 1**

No. 802 **NET Per Roll** $18.00



NYLON RATCHET BUCKLE

For No. 802 strapping. Quick and easier assembly with this ingenious item. **Std. Pkg. 100**

No. 803 For ½″ Strapping **NET Per C** $12.00

USE OUR VAST NATIONAL DISTRIBUTION NETWORK for Off-The-Shelf Deliveries of your smaller hardware requirements.

TEFLON* SPAGHETTI TUBING

SPECIFY **SMITH**

STANDARD WALL

Meets and exceeds MIL-1-22129B, AMS-3655 or 3654, CS252-63. Ideal for slip-on insulation, and provides greater reliability and resistance to high temperatures. Shrink-back is virtually eliminated. Individually packed in dust. SPECIFY COLOR.

COLOR CODE CHART

-101	WHITE
-102	RED
-103	BLACK
-104	GREEN
-105	BLUE
-106	ORANGE
-107	YELLOW
-108	BROWN
-112	PURPLE
-113	GREY
-115	NATURAL

SPECIFY COLOR

If no color is specified, Natural Teflon (-115) will be supplied.)

STANDARD WALL

CAT. NO.	AWG WIRE SIZE	NOM I.D.	NOM. WALL THK.	STD. PKG. FT.	NET EA.
7701-24	24	.022	.012	100	$8.66
7701-22	22	.027	.012	100	9.57
7701-20	20	.034	.016	100	12.91
7701-19	19	.038	.016	100	14.04
7701-18	18	.042	.016	100	15.12
7701-17	17	.047	.016	100	16.46
7701-16	16	.053	.016	100	17.46
7701-15	15	.059	.016	100	18.36
7701-14	14	.066	.016	100	19.65
7701-13	13	.076	.016	100	21.81
7701-12	12	.085	.016	100	23.32
7701-11	11	.095	.016	100	25.92
7701-10	10	.106	.016	100	30.91
7701-09	9	.118	.020	100	46.32
7701-81	1/8″	.125	.020	100	52.80
7701-08	8	.133	.020	50	27.55
7701-07	7	.148	.020	50	28.20
7701-06	6	.166	.020	50	30.38
7701-05	5	.186	.020	50	33.24
7701-04	4	.208	.020	50	38.40
7701-03	3	.234	.020	50	41.16
7701-41	1/4″	.250	.020	50	44.40
7701.02	2	.263	.020	50	45.19
7701-01	1	.294	.020	50	50.40
7701-51	5/16″	.312	.020	50	57.60
7701-00	0	.330	.020	50	55.80

LIGHTWEIGHT

CAT. NO.	AWG WIRE SIZE	NOM I.D.	NOM. WALL THK.	STD. PKG. FT.	NET EA.
7703-28	28	.015	.006	100	$7.54
7703-26	26	.018	.006	100	6.00
7703-24	24	.022	.006	100	6.48
7703-22	22	.027	.006	100	7.44
7703-20	20	.034	.006	100	9.24
7703-19	19	.038	.006	100	9.72
7703-18	18	.042	.006	100	10.10
7703-17	17	.047	.006	100	11.52
7703-16	16	.053	.006	100	12.60
7703-15	15	.059	.006	100	12.96
7703-14	14	.066	.008	100	13.80
7703-13	13	.076	.008	100	15.60
7703-12	12	.085	.008	100	16.92
7703-11	11	.095	.008	100	18.36
7703-10	10	.106	.008	100	20.16
7703-09	9	.118	.008	50	14.83
7703-81	1/8″	.125	.008	50	15.60
7703-08	8	.133	.008	50	16.32
7703-07	7	.148	.008	50	20.64
7703-06	6	.166	.010	50	23.88
7703-05	5	.186	.010	50	26.04
7703-04	4	.208	.010	50	29.28
7703-03	3	.234	.010	50	31.68
7703-41	1/4″	.250	.010	50	33.60
7703-02	2	.263	.010	50	35.76
7703-01	1	.294	.010	50	40.08
7703-51	5/16″	.312	.012	50	43.20
7703-00	0	.330	.012	50	45.48

THINWALL

CAT. NO.	AWG WIRE SIZE	NOM I.D.	NOM. WALL THK.	STD. PKG. FT.	NET EA.
7702-30	30	.012	.009	100	$7.80
7702-28	28	.015	.009	100	6.84
7702-26	26	.018	.009	100	6.24
7702-24	24	.022	.010	100	6.84
7702-22	22	.027	.010	100	7.56
7702-20	20	.034	.012	100	9.36
7702-19	19	.038	.012	100	10.08
7702-18	18	042	.012	100	10.92
7702-17	17	.047	.012	100	11.88
7702-16	16	.053	.012	100	12.96
7702-15	15	.059	.012	100	13.20
7702-14	14	.066	.012	100	14.16
7702-13	13	.076	.012	100	15.96
7702-12	12	.085	.012	100	17.04
7702-11	11	.095	.012	100	18.96
7702-10	10	.106	.012	100	20.40
7702-09	9	.118	.015	100	28.68
7702-81	1/8″	.125	.015	100	29.28
7702-08	8	.133	.015	50	16.66
7702-07	7	.148	.015	50	20.40
7702-06	6	.166	.015	50	26.04
7702-05	5	.186	.015	50	29.16
7702-04	4	.208	.015	50	31.68
7702-03	3	.234	.015	50	34.20
7702-41	1/4″	.250	.015	50	36.00
7702-02	2	.263	.015	50	38.88
7702-01	1	.294	.015	50	39.60
7702-51	5/16″	.312	.015	50	46.80
7702-00	0	.330	.015	50	48.00

*Registered Trademark, E.I. DuPont DeNemours & Co.

NYLON LACING CORD

MIL-T-713-D, Type P, Classes 3,2 and 1. Supplied in 1-lb. tubes. Std. Pkg. 1

No.	Class	Test	Ydge.	NET Ea.
NATURAL				
734	1	70 lb.	600	$13.00
735	2	48 lb.	800	13.00
736	3	32 lb.	1140	13.00
BLACK				
791	1	70	600	$17.00
792	2	48	800	17.00
793	3	32	1140	17.00

NYLON LACING TAPE

BRAIDED — MGD FINISH

#18 size meets MIL-T-43435, size 3, finish B. Furnished in 500 yard spools.

No.	Size	Width	Thick.	Test	NET Each
NATURAL					
766	18	.090	.0125	50 lbs.	$15.00
767	21	.054	.008	20 lbs.	17.00
BLACK					
769	18	.090	.0125	50 lbs.	$16.00
770	21	.054	.008	20 lbs.	18.00

COMMERCIAL TYPE

Has all application of above but at a much lower cost. Supplied in 1-lb. tubes in natural color.

No.	Width	Yardage	NET Ea.
743	⅛″	620	$12.00

LINEN LACING CORD

MIL-T-713-D, Type N. Mildew-proofed. Supplied in 1-lb. tubes. Std. Pkg. 1

No.	Ply	Class	Ydge.	NET Ea.
NATURAL				
727	4	—	850	$12.00
730	6	3	600	12.00
739	8	2	470	12.00
733	9	—	400	12.00
742	12	1	300	12.00
BLACK				
794	4	—	850	$12.00
795	6	3	600	12.00
796	8	2	470	12.00
797	9	—	400	12.00
798	12	1	300	12.00

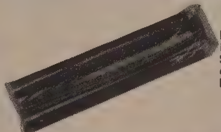
DACRON LACING CORD

Conforms to the physical requirements of MIL-T-713-D. Greater tensile strength with minimal stretch than nylon. Fungus, acid and abrasion resistance.

Supplied in 1 lb. tubes in natural color.

No.	Class	Test	Yardage	NET Ea.
722	1	78 lbs.	750	$11.60
724	3	37 lbs.	1500	12.70

SHRINK TUBING ASSORTMENT

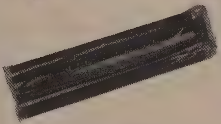


Laboratory or Work Shop assortment of Heat Shrink Polyolefin tubing, meets Mil Spec 123053/5. Contains 6 different colors of all sizes from 1/16″ thru ⅜″ in 12″ lengths, total of 36 feet.

Std. Pkge 5

No.	Suggested Resale/Ea.
7705	$10.80

P.V.C. TUBING ASSORTMENT

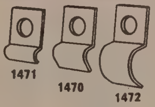


A 36 piece assortment of tubing consisting of 12″ lengths, sizes #24 thru #2, 3 lengths of each size, a total of 12 sizes in assorted colors. Made of Military Grade 105°PVC, conforms to Mil-I-631D.

Std. Pkg. 6

No.	NET Ea.
7706	$3.00

CABLE CLAMPS

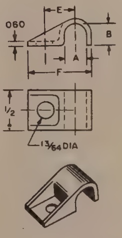


Steel Cadmium Plated with No. 8 Mtg. Hole.

Std. Pkg. 100

No	Length	Width	Cable	NET Per C
1471	⅝″	⅜″	⅛″	$.90
1470	¾″	⅜″	¼″	.95
1472	1″	⅜″	½″	1.00

NYLON "HALF" CABLE CLAMPS

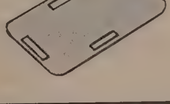


Made of solvent resistant Nylon, unaffected by most solvents, alkalies, dilute mineral acids and most organic acids. Available in Black and conforms to the following Military Specifications: MIL-P-17091A and Amendment 2, MIL-P-17091B/, MIL-M-20693A Type 1, MIL-STD-242A (Ships)/ MIL-STD-242B (Ships), MS-39014 (ORD)

Std. Pkg. 100

No.	Wire Size	A	B	E	F	NET Per C
8964	⅛	.115	.115	.307	.675	$5.50
8965	3/16	.172	.172	.336	.732	5.90
8966	¼	.234	.234	.366	.793	6.50
8967	5/16	.297	.297	.400	.859	6.70
8968	⅜	.359	.359	.430	.920	7.00
8969	7/16	.422	.422	.460	.980	7.25
8970	½	.484	.484	.492	1.044	8.00

NYLON WIRE MARKER PLATES



Made of Nylon, attaches to wire harness with any type of wire tie or lacing cord. Write in identification. Available in three sizes. Reusable.

Std. Pkg. 100

No.	Size	NET Per C
8979	3/4″x1½″	9.00
8980	3/4″x1¾″	9.50
8981	3/4″x2″	10.00

IT'S SOUND PLANNING TO **"SPECIFY SMITH"** WHEN DESIGNING OR PURCHASING

SPECIFY SMITH HARDWARE

STOCKED BY
LEADING
DISTRIBUTORS
NATIONWIDE

MACHINE SCREWS
ROUND HEAD
STEEL, CADMIUM PLATED

Size	No.	NET per C	No.	NET per M
2-56 x 1/4"	1173C	$1.29	1173M	$11.90
2-56 x 1/2"	1174C	1.39	1174M	12.90
2-56 x 3/4"	1175C	1.47	1175M	13.70
3-48 x 3/4"	1176C	1.54	1176M	14.40
4-36 x 1/4"	1177C	1.39	1177M	12.90
4-36 x 3/8"	1178C	1.43	1178M	13.30
4-36 x 1/2"	1183C	1.48	1183M	13.80
4-36 x 5/8"	1184C	1.56	1184M	14.60
4-36 x 3/4"	1185C	1.59	1185M	14.90
4-40 x 1/4"	1350C	1.39	1350M	12.90
4-40 x 3/8"	1351C	1.43	1351M	13.30
4-40 x 1/2"	1352C	1.48	1352M	13.80
4-40 x 5/8"	1353C	1.56	1353M	14.60
4-40 x 3/4"	1354C	1.59	1354M	14.90
6-32 x 1/4"	1000C	1.23	1000M	11.30
6-32 x 3/8"	1001C	1.27	1001M	11.70
6-32 x 1/2"	1002C	1.32	1002M	12.20
6-32 x 5/8"	1355C	1.40	1355M	13.00
6-32 x 3/4"	1356C	1.48	1356M	13.80
6-32 x 1"	1357C	1.64	1357M	15.40
6-32 x 2"	1358C	3.42	1358M	33.20
8-32 x 1/4"	1006C	1.55	1006M	14.50
8-32 x 3/8"	1007C	1.45	1007M	13.50
8-32 x 1/2"	1008C	1.55	1008M	14.50
8-32 x 5/8"	1010C	1.67	1010M	15.70
8-32 x 3/4"	1359C	1.80	1359M	17.00
10-32 x 1/4"	1271C	3.04	1271M	29.40
10-32 x 1/2"	1360C	1.84	1360M	17.40
10-32 x 3/4"	1361C	2.14	1361M	20.40
10-32 x 1"	1362C	2.47	1362M	23.70

BRASS, NICKEL PLATED

Size	No.	NET per C	No.	NET per M
4-36 x 1/4"	1044C	$2.72	1044M	$26.20
4-36 x 3/8"	1045C	2.79	1045M	26.90
4-36 x 1/2"	1046C	3.38	1046M	32.80
4-40 x 1/4"	1047C	2.72	1047M	26.20
4-40 x 3/8"	1048C	2.79	1048M	26.90
4-40 x 1/2"	1049C	3.38	1049M	32.80
6-32 x 1/4"	1050C	3.38	1050M	32.80
6-32 x 3/8"	1051C	3.61	1051M	35.10
6-32 x 1/2"	1052C	4.05	1052M	39.50
8-32 x 1/4"	1056C	4.98	1056M	48.80
8-32 x 3/8"	1057C	5.27	1057M	51.70
8-32 x 1/2"	1058C	5.96	1058M	58.60

BINDING HEAD
STEEL, CADMIUM PLATED

Size	No.	NET per C	No.	NET per M
2-56 x 1/4"	1369C	$1.29	1369M	$11.90
2-56 x 1/2"	1370C	1.39	1370M	12.90
2-56 x 5/8"	1371C	1.43	1371M	13.30
3-48 x 1/4"	1272C	1.21	1272M	11.10
4-40 x 1/4"	1372C	1.39	1372M	12.90
4-40 x 1/2"	1373C	1.48	1373M	13.80
4-40 x 3/4"	1374C	1.60	1374M	15.00
6-32 x 1/8"	1273C	1.09	1273M	9.90
6-32 x 3/16"	1375C	1.40	1375M	13.00
6-32 x 1/4"	1425C	1.23	1425M	11.30
6-32 x 3/8"	1426C	1.27	1426M	11.70
6-32 x 1/2"	1427C	1.32	1427M	12.20
6-32 x 5/8"	1376C	1.40	1376M	13.00
6-32 x 3/4"	1377C	1.48	1377M	13.80
8-32 x 1/4"	1428C	1.55	1428M	14.50
8-32 x 5/16"	1378C	1.50	1378M	14.00
8-32 x 3/8"	1429C	1.45	1429M	13.50
8-32 x 1/2"	1430C	1.55	1430M	14.50
8-32 x 3/4"	1379C	1.80	1379M	17.00
10-32 x 1/2"	1380C	1.84	1380M	17.40
10-32 x 3/4"	1381C	2.14	1381M	20.40

OVAL HEAD RACK SCREWS
STEEL, NICKEL PLATED

Size	No.	NET per C	No.	NET per M
6-32 x 3/4"	1382C	$1.55	1382M	$14.50
8-32 x 3/4"	1383C	1.96	1383M	18.60
10-32 x 1/2"	1111C	2.53	1111M	24.30
10-32 x 3/4"	1112C	2.44	1112M	23.40

COUNTER SUNK WASHERS
BRASS, NICKEL PLATED

Size	No.	NET per C	No.	NET per M
#6	1115C	$1.90	1115M	$18.00
#8	1116C	1.95	1116M	18.50
#10	1117C	2.00	1117M	19.00

HEXAGON NUTS
BRASS NICKEL PLATED

Thrd Size	WD. A.F.	Thk-ness	No.	Net Per C	No.	Net Per M
2-56	3/16	1/16	1326C	$1.04	1326M	$ 9.40
3-48	3/16	1/16	1327C	1.04	1327M	9.40
4-36	1/4	3/32	1188C	1.33	1188M	12.30
4-40	1/4	3/32	1168C	1.33	1168M	12.30
6-32	1/4	3/32	1189C	1.33	1189M	12.30
6-32	5/16	7/64	1190C	1.87	1190M	17.70
8-32	1/4	3/32	1328C	1.33	1328M	12.30
8-32	5/16	7/64	1192C	1.79	1192M	16.90
10-32	5/16	7/64	1193C	1.85	1193M	17.50

VOLUME CONTROL—SWITCH AND POTENTIOMETER NUTS
HEX BRASS NICKEL PLATED

Thrd Size	WD. A.F.	Thk-ness	No.	Net Per C	No.	Net Per M
1/4-20	7/16	3/16	1329C	$4.58	1329M	$44.80
1/4-28	3/8	3/32	1243C	2.36	1243M	$22.60
1/4-28	3/8	1/8	1244C	2.41	1244M	23.10
1/4-32	5/16	5/64	1245C	1.87	1245M	17.70
1/4-32	3/8	3/32	1187C	2.60	1187M	25.00
5/16-32	7/16	.101	1255C	3.71	1255M	36.10
3/8-32	1/2	3/32	1195C	2.33	1195M	22.30
*3/8-32	1/2	3/32	*1199C	3.26	1199M	31.60
3/8-32	9/16	3/32	1258C	3.05	1258M	29.50
15/32-32	9/16	5/64	1196C	2.42	1196M	23.20
15/32-32	9/16	3/32	1260C	2.65	1260M	25.50

**STEEL, CADMIUM PLATED

RING NUTS, BRASS NICKEL PLATED

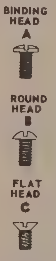
Thrd Size	Dia.	Thk-ness	No.	Net Per C	No.	Net Per M
3/8-32	1/2	3/32	1120C	$ 5.10	1120M	$ 50.00
15/32-32	5/8	1/16	1197C	3.10	1197M	30.00

DRESS NUT, BRASS NICKEL PLATED

15/32-32	5/8	3/32	1198C	10.10	1198M	100.00

HEXAGON NUTS
STEEL, CADMIUM PLATED

2-56	3/16	1/16	1363C	$1.47	1363M	$13.70
3-48	3/16	1/16	1364C	1.47	1364M	13.70
4-36	1/4	3/32	1398C	1.42	1398M	13.20
4-40	1/4	3/32	1365C	1.42	1365M	13.20
6-32	1/4	3/32	1179C	1.42	1179M	13.20
6-32	5/16	7/64	1180C	1.42	1180M	13.20
8-32	1/4	3/32	1366C	1.42	1366M	13.20
8-32	5/16	7/64	1181C	1.70	1181M	16.00
10-32	3/8	1/8	1367C	1.62	1367M	17.20
1/4-20	7/16	3/16	1368C	2.86	1368M	27.60
1/4-32	3/8	1/8	1186C	2.90	1186M	28.00

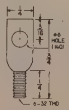


NYLON SCREWS
Natural Color, MIL-P-20693A **Std. Pkg. 100**

Size	A No.	B No.	C No.	
4-40 x ¼	2500	2520	2580	$4.50
4-40 x ⅜	2501	2521	2581	4.50
4-40 x ½	2502	2522	2582	4.50
6-32 x ¼	2503	2523	2583	4.50
6-32 x ⅜	2504	2524	2584	4.50
6-32 x ½	2505	2525	2585	4.50
6-32 x ⅝	2506	2526	2586	4.50
6-32 x ¾	2507	2527	2587	4.50
8-32 x ¼	2509	2529	2589	4.50
8-32 x ⅜	2510	2530	2590	4.50
8-32 x ½	2511	2531	2591	4.50
8-32 x ⅝	2512	2532	2592	4.50

NYLON HEX NUTS
Natural Color, MIL-P-20693A. **Std. Pkg. 100**

No.	Size	NET per C
2554	4-40 x 1/4"	$7.00
2555	6-32 x 5/16"	7.00
2556	8-32 x 11/32"	7.00
2557	10-32 x 3/8"	7.00



SPADE BOLTS
STEEL, CADMIUM PLATED

No.	NET Per C	No.	NET Per M
1500C	$3.73	1500M	$36.30

CAP NUTS
BRASS NICKEL PLATED

Thrd Size	Hex	Ht.	No.	Net Per C	No.	Net Per M
6-32	5/16	9/32	1300C	$2.15	1300M	$20.50
8-32	5/16	9/32	1301C	2.15	1301M	20.50
10-32	3/8	11/32	1302C	2.96	1302M	28.60
1/4-20	7/16	3/8	1303C	3.77	1303M	36.70
1/4-20	1/2	13/32	1304C	4.67	1304M	45.70
1/4-28	7/16	3/8	1305C	3.77	1305M	36.70
5/16-18	9/16	7/16	1306C	3.10	1306M	30.00
3/8-16	5/8	1/2	1307C	8.18	1307M	80.80
3/8-24	5/8	1/2	1308C	8.18	1308M	80.80

OPEN END CAP NUTS

8-32	5/16	1/4	1309C	1.73	1309M	16.30
1/4-20	7/16	21/64	1310C	3.21	1310M	31.10
1/4-20	1/2	3/8	1311C	4.47	1311M	43.70
5/16-18	9/16	3/8	1312C	5.66	1312M	55.60

KNURLED THUMB NUTS
BRASS NICKEL PLATED

Thrd Size	Dia.	Ht.	No.	Net Per C	No.	Net Per M
6-32	3/8	1/4	1313C	$2.58	1313M	24.80
8-32	7/16	5/16	1314C	3.21	1314M	31.10
10-24	1/2	21/64	1315C	3.83	1315M	37.30
10-32	1/2	21/64	1316C	3.83	1316M	37.30
1/4-20	5/8	3/8	1317C	6.03	1317M	59.30

BATTERY NUTS
BRASS NICKEL PLATED

Thrd Size	Dia.	Ht.	No.	Net Per C	No.	Net Per M
6-32	11/32	13/64	1248C	$1.87	1248M	$17.70
8-32	11/32	13/64	1249C	1.84	1249M	17.40

ROUND LOCK NUTS
BRASS NICKEL PLATED

Thrd Size	Dia.	Thk-ness	No.	Net Per C	No.	Net Per M
1/8P	9/16	3/32	1240C	$1.75	1240M	$16.50
1/8P	3/4	3/32	1241C	3.39	1241M	32.90

HEX LOCK NUT

1/8P	1/2	1/8	1242C	1.85	1242M	17.50

INTERNAL TOOTH LOCKWASHERS
STEEL - CADMIUM PLATED

I.D. (Clear)	O.D.	Thk-ness	No.	Net Per C	No.	Net Per M
#2	3/16	1/32	1118C	$ .91	1118M	$ 8.10
#3	7/32	1/32	1119C	.80	1119M	7.60
#4	1/4	1/32	1127C	.85	1127M	7.50
#6	9/32	1/32	1128C	.83	1128M	7.30
#8	11/32	3/64	1129C	.83	1129M	7.30
#10	3/8	3/64	1130C	.85	1130M	7.50
1/4"	15/32	1/16	1132C	1.38	1132M	12.80
3/8"	11/16	1/16	1131C	1.85	1131M	17.50
3/8"	1/2	3/64	1145C	1.98	1145M	18.80
15/32	19/32	1/32	1146C	2.10	1146M	20.00

EXTERNAL TOOTH LOCKWASHERS
STEEL - CADMIUM PLATED

#4	1/4	1/32	1139C	$ .85	1139M	$ 7.50
#6	5/16	1/32	1140C	.83	1140M	7.30
#8	3/8	1/32	1141C	.83	1141M	7.30
#10	13/32	3/64	1142C	.85	1142M	7.50
1/4"	1/2	1/16	1144C	1.38	1144M	12.80
3/8"	11/16	5/64	1143C	1.85	1143M	17.50

FLAT WASHERS
STEEL, NICKEL PLATED

I.D. (Clear)	O.D.	Thk-ness	No.	Net Per C	No.	Net Per M
#2	1/4	1/32	1138C	$.71	1138M	$7.00
#4	5/16	1/32	1149C	.71	1149M	7.00
#6	3/8	1/32	1150C	.71	1150M	7.00
#8	3/8	1/32	1151C	.71	1151M	7.00
#10	3/8	1/32	1152C	.71	1152M	7.00
1/4"	9/16	3/64	1147C	.71	1147M	7.00
3/8"	5/8	1/32	1148C	.71	1148M	7.00

IT'S SOUND PLANNING TO **"SPECIFY SMITH"** WHEN DESIGNING OR PURCHASING

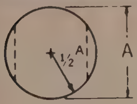
STOCKED BY
LEADING
DISTRIBUTORS
NATIONWIDE

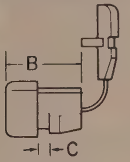
ACCESSORIES

SPECIFY SMITH

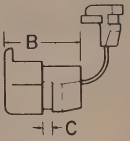
NYLON STRAIN RELIEFS

One-piece construction, absorbs pull and twist. Wire full anchored and insulated at chassis entrance. Available straight thru and right angle.
Std. Pkg. 100





STRAIGHT THRU



RIGHT ANGLE

A = Chassis Hole. B = Length. C = Max. Chassis Thickness

STRAIGHT THRU

No.	Wire Type	Approx. Wire Size	A	B	C	NET Per C
937	AWM	1/8 - 3/16	.375″	.410″	.060″	$ 4.00
938	SP-1, SPT-1	.12 x .22	.437″	.410″	.062″	4.00
939	SV, SVT, HPD	.250-.290	.500″	.438″	.100″	4.50
822	SPT-1, SPT-2, SP-2, HPN	.12 to .30	.500″	.406″	.062″	6.00
823	SJ, SJT, SJO	.365-.360	.625″	.580″	.062″	9.50

RIGHT ANGLE

No.	Wire Type	Approx. Wire Size	A	B	C	NET Per C
824	SPT-1, SPT-2, SP-2, HPN	.12 to .30	.500″	.687″	.100″	8.50
825	SV, SVT, HPD	.250-.290	.500″	.687″	.100″	8.50
826	S, ST	.360-.430	.750″	1.085″	.125″	19.00

No. 940 Setting Pliers $25.00 **NET Each**

FUSE MOUNTING BASES

Black bakelite, panel mount type. Will accommodate the 3 A G Auto type cartridge fuse.
Std. Pkg. 50

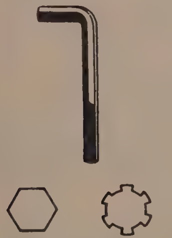
No.	Type	NET per C
530	Single	$22.00
531	Double	40.00

MOLDED "IN-LINE" FUSE HOLDER

For use in automobile radios, T.V., and other applications. Provides positive insulated connection. For use with 3 A G fuse, supplied with 18″ wire loop, less fuse.
Std. Pkg. 50

No.	NET Per C
1295	$40.00

HEX AND SPLINE KEYS



Made of special alloy steel, tempered to avoid brittleness and impose maximum resistance to torsional strain. Ends ground for easy insertion.
Std. Pkg. 100

HEX KEYS

No.	Screw	O.D.	NET Per C
340	No. 2	.034	$ 8.60
341	No. 3, 4	.050	8.60
342	No. 5, 6	.062	8.60
343	No. 8	.078	8.60
344	No. 10	.093	9.90
345	1/4″	.125	9.90
346	5/16″	.156	9.90

SPLINE KEYS

No.	Screw	O.D.	NET Per C
370	No. 4	.058	$ 8.60
371	No. 5	.068	8.60
372	No. 6	.075	8.60
373	No. 8	.093	8.60
374	No. 10	.109	9.90
375	1/4″	.143	9.90
376	5/16″	.182	9.90

HEX AND SPLINE KEY KITS

Attractive tearproof vinyl plastic kit with individual pockets for each of six keys in kit.
Std. Pkg. 10

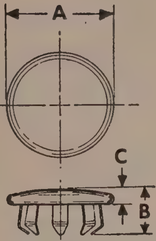
Kit of 6 hex keys for screws from No. 3 to 5/16″.
No. 355 **NET per C $66.00**

Kit of 6 spline keys for screws from No. 5 to 5/16″.
No. 385 **NET per C $66.00**

Combination Kit of 3 hex and 3 spline keys for No. 6-8-10 screws.
No. 390 **NET per C $66.00**

Kit of 7 hex keys for screws from No. 2 to 5/16″ and 4 spline keys Nos. 4, 6, 8, and 10.
No. 395 **NET per C $130.00**

METAL HOLE PLUGS

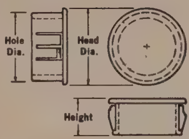


Metal plugs for covering punched or drilled holes. Firm grip spring action prongs in steel, nickel plated.
Std. Pkg. 100

No.	Hole Dia.	A	B	C	Prongs	NET per C
650	1/4″	13/32″	15/64″	1/16″	6	$2.75
651	5/16″	7/16″	1/4″	1/16″	6	2.75
652	3/8″	1/2″	15/64″	1/16″	6	2.75
653	1/2″	21/32″	9/32″	5/64″	8	3.00
654	5/8″	13/16″	19/64″	5/64″	8	4.00
655	3/4″	59/64″	19/64″	5/64″	12	4.00
608	7/8″	1 1/16″	19/64″	1/16″	12	4.50
612	1″	1 9/64″	21/64″	3/32″	12	8.00
656*	1″	1 5/32″	19/64″	5/64″	6	27.00
3084	1 1/8″	1 5/16″	11/32″	5/64″	12	10.00
3085	1 1/4″	1 7/16″	11/32″	3/32″	12	10.25
3086	1 3/8″	1 9/16″	13/32″	5/64″	12	10.50
3087	1 1/2″	1 41/64″	13/32″	3/32″	12	12.00

*Vent

NYLON HOLE PLUGS



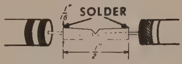
Nylon hole plug, Type 66, Mil Spec. 20693A. Maximum panel thickness .062″, (1/4 and 5/16); all others .125″. All flat heads, except 1 1/4″ dia. domed, head thickness 1/16″.
Std. Pkg. 100

No.	Hole Dia.	Head Dia.	Height	NET per C
3089	1/4″	5/16″	5/16″	$4.00
3090	5/16″	3/8″	5/16″	4.25
3091	3/8″	15/32″	13/32″	4.50
3092	1/2″	37/64″	13/32″	4.75
3093	5/8″	23/32″	13/32″	5.75
3094	3/4″	27/32″	13/32″	7.50
3095	1.000	1 1/8″	29/64″	10.00
3096	1 1/8″	1 7/32″	29/64″	10.75
3097	1 1/4″	1 3/8″	29/64″	13.00
3098	1 3/8″	1 15/32″	29/64″	15.00
3099	1 1/2″	1 39/64″	29/64″	16.50
3083*	1″	1 13/64″	29/64″	12.00

*Vent

"CLEAPS"

(Connectors for Joining Severed Wires)



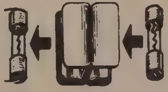
MATERIAL: Brass, cadmium plated.

WIRE SIZE: For wires, .010″ to .050″ (B&S Gauge 16 to 30).

DESCR.: Used to splice cut leads of condensers, resistors, etc., in process of trouble-shooting. Insert wire in each tapered end and solder **Std. Pkg. 1000**

No.	NET per M
1270	$10.00

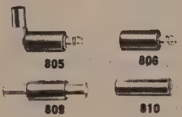
TV SNAP-ON FUSE HOLDER



Snap fuse clip over burned out fuse. Insert new fuse without soldering.
Std. Pkg. 50

No.	NET Per C
529	$40.00

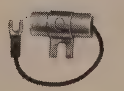
AUTO RADIO IGNITION SUPPRESSORS



Std. Pkg. 50

No.	Type	NET per C
805	Snap-On -Type Suppressor	$55.00
806	Univ. Type with Double Thr.	50.00
809	Distributor Plug-in Type	60.00
810	Double Screw Type	35.00

GENERATOR CONDENSER



Eliminates radio interference caused by auto electrical system. Fits all cars — Proven quality — Guaranteed long life.
Std. Pkg. 25

No.	Cap.	Type	NET per C
811	.5 Mfd.	General, Univ.	$40.00
812	.25 Mfd.	Universal	42.00

MOTOROLA PLUGS & JACKS

1200
1207
1204
1235

Std. Pkg. 100

No.	Type	NET per C
1200	Motorola Type Plug	$12.00
1207	Motorola Jack	65.00
1204	Lead-in Adapter	9.00
1235	Motorola Jack, without flange	10.00

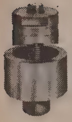
IT'S SOUND PLANNING TO **"SPECIFY SMITH"** WHEN DESIGNING OR PURCHASING

SPECIFY SMITH CHASSIS PUNCHES / WIRE & CABLE

GREENLEE

RADIO CHASSIS PUNCHES

A complete line of chassis hole punches for swiftly cutting clean, accurately located holes in chassis and panels. An assortment of round, square, "D", and Keyed holes can be punched by inserting in drilled pilot hole, and turning with wrench. Finished hole is smooth, accurately sized without burrs. Round punches are provided with center-line markings for enlarging holes larger than pilot hole. Individually packed.



ROUND

ROUND HOLE PUNCHES

Std. Pkg. 1

No.	Hole Size	NET Ea.	No.	Hole Size	NET Ea.
3801	½"	$3.85	3814	1¼"	$ 4.60
3802	9/16"	3.85	3815	1 5/16"	5.70
3803	⅝"	3.85	3816	1⅜"	5.70
3804	11/16"	3.90	3817	1½"	6.25
3805	¾"	3.90	3818	1⅝"	7.60
3806	13/16"	3.90	3819	1¾"	8.60
3807	⅞"	3.90	3820	1⅞"	10.65
3808	15/16"	4.40	3821	2"	11.25
3809	1"	4.40	3822	2⅛"	12.15
3810	1 1/16"	4.60	3823	2¼"	12.60
3811	1⅛"	4.60	3824	2½"	20.40
3812	1 5/32"	4.60	3825	2¾"	28.45
3813	1 3/16"	4.60	3826	3"	39.20

SQUARE

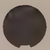
METER HOLE PUNCH

3836	2 25/32"	$20.35

SQUARE PUNCHES

3827	½"	$10.25	3830	⅞"	$13.00
3828	⅝"	10.25	3831	1"	13.45
3829	¾"	11.10			

"KEY"



"KEY" PUNCHES

3832	15/32"	$ 9.65	3834	1 11/64"	$11.45
3833	13/16"	10.40	3835	1 17/64"	13.45

"D" PUNCHES

3837	½"x15/32'	$ 8.35	3838	⅝"x19/32"	$ 8.85

STANDARD DRIVE SCREWS

No.	Use with Nos.	NET Ea.
3847	3804 to 3807	$ .40
3848	3808 to 3817	.45
3849	3818 to 3819	.75
3850	3820 to 3824	.85

"D"

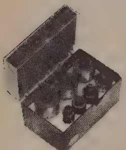
BALL BEARING DRIVE SCREWS

Reduces friction and effort when punching round holes 11/16" and larger. For use only with Round punches listed above.

No.	Use with Nos.	NET Ea.
3839	3804 to 3807	$1.75
3840	3809 to 3817	1.85
3841	3818 to 3819	4.30
3842	3820 to 3824 and 3836	4.50

RELAY SOCKET PUNCH

No.	Hole Size	NET Ea.
3845	1.018 x .861	$20.95
3846	1.250 x 1.375	31.90
3851	.990 x 1.140	23.20

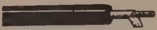


CHASSIS PUNCH SET

A set of 7 of the most often used chassis punch sizes for electronic construction. Packed in a plastic platform box to keep punches sharp and rust-free. Contains the following sizes: ½", ⅝", ¾", ⅞", 1", 1⅛", 1¼".

No.	Description	Net ea.
3844	Set of 7 Punches	$30.00

USE OUR VAST NATIONAL DISTRIBUTION NETWORK for Off-The-Shelf Deliveries of your smaller hardware requirements!



RUBBER COVERED TEST LEAD WIRE

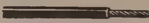
Single conductor exceptionally flexible rubber covered wire for test lead applications. Conductor is tinned, soft annealed copper wire, stranded as shown. Available in Red and Black, specify color. **Std. Pkg. 6**

No.	AWG	Strand	Volt.	O.D.	Spool	NET ea.
7500	20	41/36	5,000	.120"	100'	$ 9.00
7501	20	26/34	5,000	.125"	100'	9.20
7502	18	65/36	12,000	.150"	100'	17.00
7503	18	65/36	22,000	.245"	100'	20.40

PLASTIC COVERED TEST LEAD WIRE

Single conductor exceptionally flexible wire for modern test lead applications. Conductor is tinned, soft annealed copper wire, stranded as shown. Insulation is special flexible compound PVC, smooth finish, grease and oil resistant. Available in Red, Black, Yellow, Green, Blue, and White. Specify color. **Std. Pkg. 6**

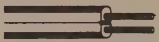
No.	AWG	Strand	Volt.	O.D.	Spool	NET ea.
7510	18	65/36	5,000	.140"	100'	$18.00



PLASTIC-COVERED HOOK UP WIRE

Single conductor flexible stranded wire, soft annealed copper, stranded as shown. Insulation is UL rated PVC, smooth finish, available in Red, Black, Yellow, Green, Blue, White, and Brown. Specify color. **Std. Pkg. 6**

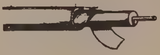
No.	AWG	Strand	Volt.	O.D.	Spool	NET ea.
7561	18	16/30	1,000	.109"	100'	$13.70
7562	16	26/30	1,000	.123"	100'	14.40
7563	14	41/30	1,000	.141"	100'	15.00



PORTABLE APPLIANCE CORD (Zip-Cord)

Two conductor, UL type SPT-1 Vinyl covered appliance cord. Available in White or Brown. Specify color. **Std. Pkg. 6**

No.	AWG	Strand	Volt.	O.D.	Spool	NET ea.
7564	18	41/34	300	.110"	100'	$13.70



SHIELDED AUDIO CABLE

Single conductor, stranded tinned copper wire, clear polyethylene insulation. Spiral or braided shield, as shown, tinned. Gray PVC jacket overall. *No. 7520 has 3/36 Phos. bronze wires for pull resistance. **Std. Pkg. 6**

No.	AWG	Strand	Shield	Cap. mm/ft	O.D.	Spool	NET ea.
7520	26	*7/36	Spiral #36		.140"	100'	$24.40
7521	22	19/34	Braid #34	25	.195"	100'	17.70

STEREO AUDIO CABLE

Two separate, shielded audio cables, molded side-by-side for stereo application. Color coded red stripe on one cable for channel identification. Each cable has stranded, tinned copper wire inner conductor color coded clear and red polyethylene insulation. Spiral shield, tinned. Gray PVC jacket overall. Can be separated in "zip-cord" fashion for termination. **Std. Pkg. 6**

No.	AWG	Strand	Shield	Cap. mm/ft	O.D.	Spool	NET ea.
7540	20	10/30	Spiral #36	35	.110"	100'	$31.70

CO-AXIAL CABLE

MIL-type coaxial cable, Stranded bare copper center conductor, polyethylene insulation. Copper braided shield, black PVC jacket overall. **Std. Pkg. 6**

No.	RG-type	AWG	Braid	Cap. mmf/ft	Spool	NET ea.
7530	RG-58C/U	#20 #21	Tinned	28.5	100'	$30.40
7531	RG-11/U	#18	Bare	20.5	50'	41.80

MULTIPLE CONDUCTOR CABLE

Two color-coded (Orange and Yellow) PVC insulated stranded wires. Jute filler, Gray PVC full-round .015 jacket. **Std. Pkg. 6**

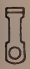
No.	AWG	Strand	Volt.	O.D.	Spool	NET ea.
7550	18	65/36	600	.210"	100'	$25.40

IT'S SOUND PLANNING TO **"SPECIFY SMITH"** WHEN DESIGNING OR PURCHASING

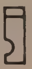
CONTINENTAL-WIRE SLIDE SWITCHES

SPECIFY SMITH

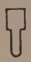
LUG A



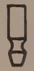
LUG B



LUG C



LUG D



MATERIALS: Housings—Steel, cad. plated; Insulators—Phenolic; Contacts—Silver Plated Brass; Knobs & Toppers—Black Phenolic (except =8655—Natural Nylon)

RATINGS: Ratings: Based on 125 Volts:
Rating A—3.0 amps AC, 0.5 amps DC
Rating B—6.0 amps AC, 0.5 amps DC
Rating C—0.5 amp AC-DC

FIG. 1

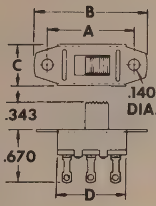


FIG. 2

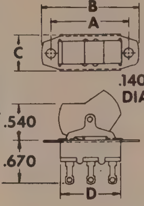


FIG. 3

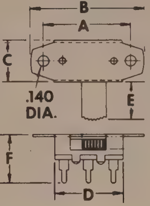


FIG. 4

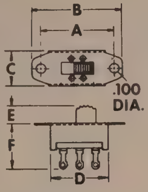
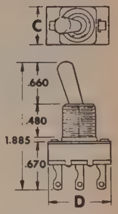


FIG. 5



SLIDE SWITCHES - STANDARD

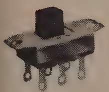


FIG. 1 – LUG A

DETENT

TYPE	A	B	C	D	RATING "A" NO.	RATING "A" NET per C	RATING "B" NO.	RATING "B" NET per C
SPST	1.12	1.40	0.54	0.88	515	$17.00	1105	$24.00
SPDT	1.12	1.40	0.54	0.88	516	18.00	1106	25.00
DPST	1.12	1.40	0.54	0.88	517	24.00	1107	32.00
DPDT	1.12	1.40	0.54	0.88	518	25.00	1108	33.00
DP3Pos	1.40	1.65	0.54	1.18	1054	35.00	8637	37.00
3PDT	1.12	1.40	0.71	0.88	1109	55.00	8638	65.00
3P3Pos	1.40	1.65	0.78	1.18	8635	65.00	8639	75.00
4PDT	1.12	1.40	1.00	0.88	1104	75.00	8640	80.00
4P3Pos	1.40	1.65	1.00	1.18	8636	90.00	8641	100.00

SPRING RETURN

TYPE	A	B	C	D	RATING "A" NO.	RATING "A" NET per C	RATING "B" NO.	RATING "B" NET per C
SPST	1.12	1.40	0.54	0.88	568	36.00	8643	33.00
SPDT	1.12	1.40	0.54	0.88	569	40.00	8644	35.00
DPDT	1.12	1.40	0.71	0.88	8642	45.00	8645	50.00

ROCKER

FIG. 2 – LUG A RATING "A"

TYPE	A	B	C	D	DETENT NO.	DETENT NET per C	SPRING RETURN NO.	SPRING RETURN NET per C
SPST	1.12	1.40	0.54	0.88	8646	$50.00	8651	60.00
SPDT	1.12	1.40	0.54	0.88	8647	55.00	8652	65.00
DPST	1.12	1.40	0.54	0.88	8648	60.00	--	--
DPDT	1.12	1.40	0.54	0.88	8649	62.00	--	--
3PDT	1.12	1.40	0.71	0.88	8650	90.00	--	--

SIDE ACTION

FIG. 3 – LUG A RATING "A"

TYPE	A	B	C	D	E	F	NO.	NET per C
SPDT	1.12	1.40	0.54	0.88	0.51	.610	8653	30.00
DPDT	1.12	1.40	0.54	0.88	0.51	.610	8654	35.00

PRINTED CIRCUIT

FIG. 1 – LUG C RATING "A"

TYPE	A	B	C	D	NO.	NET per C
SPDT	1.12	1.40	0.54	0.88	8613	20.00
DPDT	1.12	1.40	0.54	0.88	8614	30.00

PRINTED CIRCUIT - SIDE ACTION

FIG. 3 – LUG C RATING "C"

TYPE	A	B	C	D	E	F	NO.	NET per C
DPDT	1.125	1.406	0.54	0.88	0.515	.610	8615	30.00

SUBMINIATURE SLIDE SWITCHES

FIG. 4 – LUG A or B RATING "C"

DETENT

TYPE	LUG	A	B	C	D	E	F	NO.	NET per C
SPDT	B	0.56	0.76	0.31	0.38	0.19	0.261	8655	$45.00
SPDT	A	0.81	1.00	0.40	0.63	0.20	0.550	1226	27.00
DPDT	A	0.81	1.00	0.40	0.63	0.20	0.550	1227	35.00
SP3Pos	A	1.00	1.19	0.40	0.80	0.20	0.550	1238	40.00
DP3Pos	A	1.00	1.19	0.40	0.80	0.20	0.550	1239	45.00

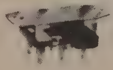
SPRING RETURN

TYPE	LUG	A	B	C	D	E	F	NO.	NET per C
SPDT	A	0.81	1.00	0.40	0.63	0.20	0.550	1236	40.00

PRINTED CIRCUIT

FIG. 4 – LUG C or D RATING "C"

TYPE	LUG	A	B	C	D	E	F	NO.	NET per C
SPST	C	0.812	1.00	0.400	0.628	0.208	0.550	8632	30.00
DPDT	C	0.812	1.00	0.400	0.628	0.208	0.550	8633	36.00
DPDT	D	0.562	0.762	0.312	0.380	0.187	0.371	8634	65.00



PRINTED CIRCUIT - SIDE ACTION

FIG. 3 – LUG C RATING "C"

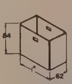
TYPE	A	B	C	D	E	F	NO.	NET per C
SPDT	0.812	1.00	0.400	0.628	0.456	0.504	8616	45.00
DPDT	0.812	1.00	0.400	0.628	0.456	0.504	8617	50.00
DP3Pos	1.000	1.19	0.400	0.800	0.456	0.504	8618	65.00

SLIDE TOGGLE SWITCHES

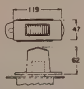
FIG. 5 – LUG A RATING "B"

NO.	TYPE	C	D	NET per C
1100	SPDT	0.544	0.88	$ 95.00
1101	DPDT	0.544	0.88	100.00
1102	3PDT	0.714	0.88	130.00
1103	4PDT	1.000	0.88	150.00

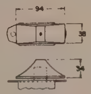
SLIDE SWITCH ACCESSORIES



519

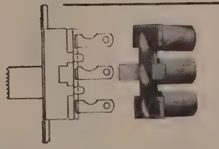


8656



8657

NO.	DESCRIPTION	NET PER C
519	NYLON SHIELD	$15.00
8656	BLACK SLIDE TOPPER FOR STANDARD SWITCH	12.00
8657	BLACK SLIDE TOPPER FOR MINIATURE SWITCH	12.00



PLASTIC WIRE INSULATOR

For SPST and SPDT standard slide switches. Insulates lug and wire. Eliminates need of shrink-tubing insulation.

No.	NET Per C
8699	$7.00

IT'S SOUND PLANNING TO **"SPECIFY SMITH"** WHEN DESIGNING OR PURCHASING

SPECIFY SMITH CUTLER-HAMMER SWITCHES

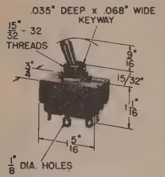

.035" DEEP x .068" WIDE KEYWAY
15/32 - 32 THREADS
9/16
3/4
15/32"
11/16
5/16
1/8 DIA. HOLES

FIG.A

TOGGLE SWITCHES
STANDARD DUTY

15 Amps. 125 Volts—10 Amps. 250 Volts

AC, UL Approved; 15/32" shank; slow-make and break; bakelite case. AC rated only for longer life and greater capacity. **Std. Pkg. 10**

BACK CONNECTED LUG TERMINALS

No.	C-H No.	Fig.	Type	NET Each
966	7501K13	A	SPST	$1.25
967	7505K4	A	SPDT	1.40
968	7561K4	A	DPST	1.90
969	7565K5	A	DPDT	2.25
970	7611K2	C	TPST	3.70
971	7615K2	C	TPDT	4.55

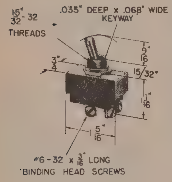

.035" DEEP x .068" WIDE KEYWAY
15/32 - 32 THREADS
9/16
3/4
15/32"
11/16
5/16
#6-32 x 3/16 LONG BINDING HEAD SCREWS

FIG.B

BACK CONNECTED SCREW TERMINALS

No.	C-H No.	Fig.	Type	NET Each
972	7500K14	B	SPST	$1.40
973	7504K4	B	SPDT	1.70
974	7560K5	B	DPST	2.25
975	7564K6	B	DPDT	2.70
976	7610K2	C	TPST	4.35
977	7614K2	C	TPDT	5.45

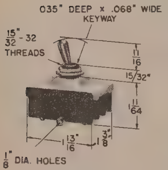

.035" DEEP x .068" WIDE KEYWAY
15/32 - 32 THREADS
11/16
15/32"
11/64
13/16
3/8
1/8 DIA. HOLES

FIG.C

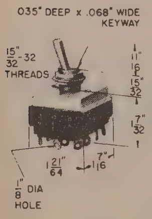
CENTER OFF STANDARD DUTY TOGGLE SWITCHES

BACK CONNECTED LUG TERMINALS

No.	C-H No.	Fig.	Type	NET Each
978	7503K13	A	SPDT	$1.40
979	7563K4	A	DPDT	2.25
980	7613K2	C	TPDT	4:50

BACK CONNECTED SCREW TERMINALS

No.	C-H No.	Fig.	Type	NET Each
981	7502K13	B	SPDT	$1.70
982	7562K4	B	DPDT	2.75
983	7612K2	C	TPDT	5.45


.035" DEEP x .068" WIDE KEYWAY
15/32 - 32 THREADS
11/16
15/32
1 7/32
1 21/64
7/16
1/8 DIA HOLE

FOUR POLE SWITCHES

AC-DC GOVERNMENT APPROVED PER MIL-S-6745. 15/32" shank. Rated 10 amps, 115 volt AC – 20 amps. 28 volts DC (Nominal rating per pole) SEALED LEVER. **Std. Pkg. 5**

SOLDER LUGS

No.	C-H No.	"MS" No.	Type	Circuit†	NET Each
944	7661K6	—	4PST	A-D-B	$ 7.25
945	7665K4	—	4PDT	A-D-A	8.70
3924	7673K4	—	4PDT	C-B-C	11.00
3925	7675K4	—	4PDT	A-D-C	11.00

SCREW TERMINALS (Per MIL-S-3950)

No.	C-H No.	"MS" No.	Type	Circuit†	NET Each
946	7660K12	MS25068- *	4PST	A-D-B	$ 7.55
947	7664K5	MS25068-23	4PDT	A-D-A	9.05
3926	7660K13	MS25068-24	4PST	A-B-D	7.55
3927	7666K6	MS25068- *	4PST	A-D-C	10.90
3928	7666K9	MS25068-28	4PST	D-B-C	10.90
3930	7670K6	MS25068-31	4PDT	A-B-C	11.75
3931	7672K5	MS25068-27	4PDT	C-B-C	11.75
3932	7674K5	MS25068-26	4PDT	A-D-C	11.75

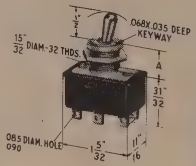
†Circuit Code: A=On B=Off C=Momentary On
D=None E=Momentary Off

SHAFT WRENCHES

Specially designed offset, double-end wrenches for most hex sizes encountered in electronic construction. Made of heavy gauge, cadmium plated steel, clearly marked with size. No. 999 is especially useful for Toggle Switch and Volume Control mounting nuts. **Std. Pkg. 25**

No.	For Nut Sizes	NET per C
998	5/16" - 3/8"	$30.00
999	1/2" - 9/16"	30.00
997	Set of 2 above	60.00

SMITH STOCKS SWITCHES


1/2
.068X.035 DEEP KEYWAY
15/32 DIAM-32 THDS.
A
31/32
.085 DIAM. HOLE .090
1 5/32
11/16

TOGGLE SWITCHES
LIGHT DUTY

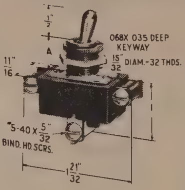
AC-DC, UL Approved; 15/32" shank; quick make — quick break; bakelite case. Unusually small size for electrical capacity. **Std. Pkg. 10**

BAT HANDLE 15/32" LONG

No.	C-H No.	Type	Current Rating 125 V.	250 V.	NET Each
950	8280K16	SPST		3 Amps.	$1.15
951	8381K8	SPST	6 Amps.	3 Amps.	1.35
952	8282K14	SPDT	3 Amps.	1 Amp.	1.50
953	8284K14	2 circ.	3 Amps.	1 Amp.	1.55
954	8360K7	DPST		3 Amps.	2.10
955	8370K7	DPST	6 Amps.	3 Amps.	2.30
956	8363K7	DPDT		3 Amps.	2.45
957	8373K7	DPDT	6 Amps.	3 Amps.	2.60

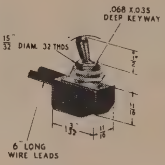
BAT HANDLE 11/16" LONG

No.	C-H No.	Type	Current Rating 125 V.	250 V.	NET Each
1160	8280K38	SPST		3 Amps.	$1.15
1164	8360K38	DPST		3 Amps.	2.10
1166	8363K38	DPDT		3 Amps.	2.45


1/2
.068X.035 DEEP KEYWAY
A
15/32 DIAM.-32 THDS.
11/16
5-40 x 5/32 BIND. HD. SCRS.
1 21/32

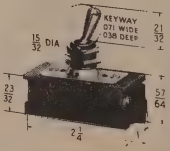
SIDE CONN. SCREW TERMINALS
SMALL BAT HANDLE 15/32" LONG

No.	C-H No.	Type	Current Rating 125 V.	250 V.	NET Each
958	8295K8	SPST		3 Amps.	$1.40
959	8396K8	SPST	6 Amps.	3 Amps.	1.60
960	8297K8	SPDT	3 Amps.	1 Amp.	2.05
961	8372K7	DPST	6 Amps.	3 Amps.	2.75
962	8365K7	DPDT		3 Amps.	3.35
963	8375K7	DPDT	6 Amps.	3 Amps.	3.35


.068 X.035 DEEP KEYWAY
15/32 DIAM. 32 THDS
1/2
11/16
1 3/32
11/16
6" LONG WIRE LEADS

WIRE LEADS—SIX INCHES LONG
SMALL BAT HANDLE 15/32" LONG

No.	C-H No.	Type	Current Rating 125 V.	250 V.	NET Each
964	8290K16	SPST		3 Amps.	$1.40
965	8391K8	SPST	6 Amps.	3 Amps.	1.60

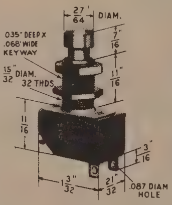

KEYWAY .071 WIDE .038 DEEP
15/32 DIA
21/32
23/32
57/64
2 1/4

TOGGLE SWITCHES
HEAVY DUTY

AC-DC, UL Approved; 15/32" shank; quick make — quick break; bakelite case. Screw Terminals. **Std. Pkg. 10**

No.	C-H No.	Type	Current Rating 125 V	250 V	NET Each
984*	7321K3	SPST	16 A	8 A	$2.00
985*	7320K3	DPST	16 A	8 A	2.35
986+	7361K5	SPST	15 A	10 A	4.25
987+	7360K8	DPST	15 A	10 A	4.05
988±	7402K4	DPST		20 A	5.50

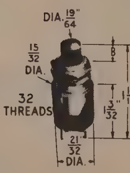
*1 Hp — 125/250V. +1½ Hp — 125/250V.
±1½ Hp — 125V, 2 Hp — 250V.


27/64 DIAM.
7/16
.035" DEEP X .068" WIDE KEYWAY
15/32 DIAM. 32 THDS.
11/16
11/16
3/16
1 3/32
21/32
.087 DIAM HOLE

PUSH BUTTON SWITCHES
Push to make—Push to break

AC-DC, UL Approved; 11/16" shank; bakelite case Pushing the button once closes the contacts. Pushing it again opens the contacts. Rated at 6 Amps. 125 Volts-3 Amps. 250 Volts. **Std. Pkg. 10**

No.	C-H No.	Type	Terminals	NET Each
989	7206K4	SPST	Lug	$1.75
990	7208K4	SPST	Screw	2.00
991	7207K4	SPST	Wire	2.00


DIA. 19/64
15/32 DIA.
32 THREADS
1 15/16
1 3/32
21/32 DIA.

PUSH BUTTON MOMENTARY SWITCHES

AC-DC, UL Approved, 15/32" shank; rated at ¾ Amp, 125 volts — ¼ Amp, 250 volts. **Std. Pkg. 10**

No.	C-H No.	Type		Terminals	NET Each
992	8411K11	SP	Norm. Op	Lug	$.80
993	8411K12	SP	Norm. Op	Screw	.95
994	8411K8	SP	Norm. Cl	Lug	.60
995	8411K7	SP	Norm. Cl	Screw	.75

IT'S SOUND PLANNING TO **"SPECIFY SMITH"** WHEN DESIGNING OR PURCHASING

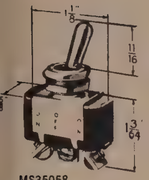
CUTLER-HAMMER SWITCHES

SPECIFY SMITH

"MS" SERIES

Made to Spec. MIL-S-3950B

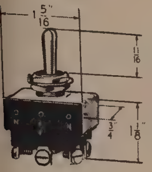
Supersedes all previous specifications. Made to meet MIL-S-3950B. Provided with sealed lever for protection against sand, dust and moisture.



MS35058

SINGLE POLE

No.	C-H No.	"MS" No.	Type	Circuit†	NET Each
3900	8800K16	MS35058-21	SPST	A-B-A	$3.10
3901	8801K22	MS35058-22	SPST	A-D-B	2.70
3902	8810K15	MS35058-23	SPST	A-D-A	3.10
3903	8801K23	MS35058-24	SPDT	A-B-D	2.70
3904	8813K18	MS35058-25	SPDT	A-E-D	4.40
3905	8804K13	MS35058-26	SPDT	A-D-C	3.40
3906	8812K14	MS35058-27	SPDT	C-B-C	3.40
3907	8811K18	MS35058-28	SPDT	D-B-C	3.00
3908	8813K17	MS35058-29	SPDT	A-D-E	3.00
3909	8811K17	MS35058-30	SPDT	B-D-C	3.00
3910	8809K16	MS35058-31	SPDT	A-B-C	3.40

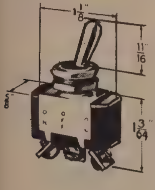


MS35059

DOUBLE POLE

No.	C-H No.	"MS" No.	Type	Circuit†	NET Each
3911	8820K16	MS35059-21	DPDT	A-B-A	$4.15
3912	8822K20	MS35059-22	DPST	A-D-B	3.70
3913	8824K14	MS35059-23	DPDT	A-D-A	4.15
3914	8822K21	MS35059-24	DPDT	A-B-D	3.80
3915	8828K12	MS35059-25	DPDT	A-E-D	5.40
3916	8830K13	MS35059-26	DPDT	A-D-C	5.15
3917	8834K5	MS35059-27	DPDT	C-B-C	5.15
3918	8826K14	MS35059-28	DPDT	D-B-C	4.90
3919	8828K13	MS35059-29	DPDT	A-D-E	5.40
3920	8826K15	MS35059-30	DPDT	B-D-C	4.90
3921	8832K6	MS35059-31	DPDT	A-B-C	5.40

†Circuit Code: A=On B=Off C=Momentary On D=None E=Momentary Off

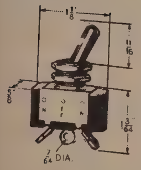


ST-40 SERIES

Nominal Rating Per Pole: 10 Amps. 115 V. AC.
20 Amps. 28 V. DC.

All ST-40 Series Switches are equipped with Sealed Lever. **Std. Pkg. 10**

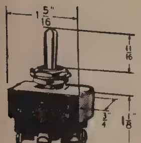
No.	C-H	JAN Type	Circuit	NET Each
1720	8801K13	ST40A SPST	On-Non-Off	$2.70
1721	8813K12	ST40B SPST	On-None-Mom-Off	3.00
1722	8811K12	ST4CC SPST	On-None-Mom-On	3.00
1723	8810K12	ST40D SPDT	On-None-On	3.10
1724	8800K13	ST40E SPDT	On-Off-On	3.10
1725	8804K12	ST40F SPDT	On-None-Mom-On	3.40
1726	8812K13	ST4CG SPDT	Mom-On-Off-Mom-On	3.40
1727	8809K13	ST40H SPDT	On-Off-Mom-On	3.40



ST-42 SERIES

Nominal Rating Per Pole: 10 Amps. 115 V. AC.
20 Amps. 28 V. DC.
Std. Pkg. 10

1730	8803K6	ST42A SPST	On-None-Off	$2.45
1732	8817K5	ST42C SPST	On-None-Mom-On	2.70
1733	8816K5	ST42D SPDT	On-None-On	3.10
1734	8802K6	ST42E SPDT	On-Off-On	2.70
1735	8805K5	ST42F SPDT	On-None-Mom-On	3.10
1736	8818K5	ST42G SPDT	Mom-On-Off-Mom-On	2.95
1737	8815K6	ST42H SPDT	On-Off-Mom-On	2.95

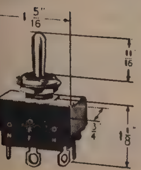


ST-50 SERIES

Nominal Rating Per Pole: 10 Amps. 115 V. AC.
20 Amps. 28 V. DC.
Std. Pkg. 10

1740	8822K8	ST50K DPST*	On-None-Off	$3.70
1742	8826K5	ST50M DPST	Off-None-Mom-On	4.75
1743	8824K8	ST50N DPDT*	On-None-On	4.15
1744	8820K10	ST50P DPDT*	On-Off-On	4.15
1745	8830K5	ST50R DPDT	On-None-Mom-On	5.15
1746	8834K4	ST50S DPDT*	Mom-On-Off-Mom-On	5.40
1747	8832K4	ST50T DPDT*	On-Off-Mom-On	5.15

*These switches are equipped with Sealed Lever.



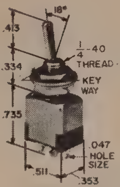
ST-52 SERIES

Nominal Rating Per Pole: 10 Amps. 115 V. AC.
20 Amps. 28 V. DC.
Std. Pkg. 10

1760	8823K5	ST52K DPST	On-None-Off	$3.45
1762	8827K5	ST52M DPST	Off-None-Mom-On	4.25
1763	8825K5	ST52N DPDT	On-None-On	3.45
1764	8821K5	ST52P DPDT	On-Off-On	3.55
1765	8831K5	ST52R DPDT	On-None-Mom-On	4.45
1766	8835K3	ST52S DPDT	Mom-On-Off-Mom-On	4.45
1767	8833K3	ST52T DPDT	On-Off-Mom-On	4.45

MINIATURE COMMERCIAL SWITCHES

Designed for miniature applications, small in size, lightweight and requires a minimum of rear panel clearance. All phenolic parts resistive to soldering temperature, humidity and arc tracking. Mounts in a ¼" clearance hole, solder terminal lugs with .047 dia. hole. Rated at 5 Amps 125V AC, 28V. DC except those with * 10 Amps 125V AC, 5 Amps 28V. DC. Optional color coded lever caps available to coordinate with equipment or to code circuit function. Supplied with mounting hardware, unassembled, less plastic lever cap. **Std. Pkg. 10**



No.	C-H No.	Circuit†	Type	NET Each
3100	SF1SBX191	A-B-A	SPDT	$ 2.35
3101	SF1SCY191*	A-D-A	SPDT	2.00
3102	SF1SFX191	A-B-C	SPDT	2.35
3103	SF1SGX191	A-D-C	SPDT	2.35
3104	SF1SHX191	C-B-C	SPDT	2.10
3105	SF2SBX191	A-B-A	DPDT	3.10
3106	SF2SCY191*	A-D-A	DPDT	2.55
3107	SF2SFX191	A-B-C	DPDT	3.10
3108	SF2SGX191	A-D-C	DPDT	3.10
3109	SF2SHX191	C-B-C	DPDT	3.10
3110	SF3SBX191	A-B-A	3PDT	4.70
3111	SF3SCY191*	A-D-A	3PDT	4.40
3112	SF3SFX191	A-B-C	3PDT	4.70
3113	SF3SGX191	A-D-C	3PDT	4.70
3114	SF3SHX191	C-B-C	3PDT	4.70
3115	SF4SBX191	A-B-A	4PDT	6.05
3116	SF4SCY191*	A-D-A	4PDT	5.00
3117	SF4SFX191	A-B-C	4PDT	6.05
3118	SF4SGX191	A-D-C	4PDT	6.05
3119	SF4SHX191	C-B-C	4PDT	6.05

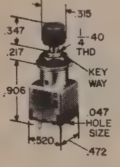
†A-ON, B-OFF, C-Momentary ON, D-None

ACCESSORY PLASTIC LEVER DECORATOR CAPS

Available in white, red, black, blue, yellow, green. SPECIFY COLOR. **Std. Pkg. 100**

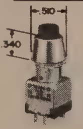
No.	C-H No.	NET Per C
3120	SW49AA	$15.00

MINIATURE PUSH BUTTON SWITCHES



Designed for single hole mounting, quick make and break action. Solder lug terminals with .047 dia. hole. Molded phenolic parts resistive to soldering temperature, humidity and arc tracking. Rated at 5 Amps 125V AC, 28V DC. Color coded screw-on plastic available for coordination with equipment or circuit function. A decorative metal Bezel is also available and acts as shroud for the switch. Supplied unassembled, with mounting hardware less decorative button. **Std. Pkg. 10**

No.	C-H No.	Circuit	Type	NET Each
3126	SA21SDX1	MOM.	SPDT	$2.36
3127	SA21SEX1	PUSH-ON-OFF	SPST	2.36
3128	SA22SDX1	MOM.	DPDT	3.24
3129	SA22SEX1	PUSH-ON-OFF	DPDT	3.24
3130	SA24SDX1	MOM.	4PDT	5.99
3131	SA24SEX1	PUSH-ON-OFF	4PDT	5.99



DECORATOR BEZEL AND SHROUD

Std. Pkg. 25

No.	C-H No.	NET per C
3138	SW2AA10	$40.00

SCREW ON DECORATIVE PLASTIC BUTTON

Available in white, red, black, blue, yellow, green. SPECIFY COLOR. **Std. Pkg. 100**

No.	C-H No.	NET per C
3132	SW53AA	$15.00

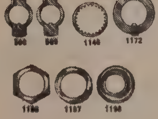
SHAFT WRENCHES

H H SMITH INC
BKLYN, N.Y.

Specially designed offset, double-end wrenches for most hex sizes encountered in electronic construction. Made of heavy gauge, cadmium plated steel, clearly marked with size. No. 999 is especially useful for Toggle Switch and Volume Control mounting nuts. **Std. Pkg. 25**

No.	For Nut Sizes	NET per C
998	$\frac{5}{16}$" - $\frac{3}{8}$"	$30.00
999	$\frac{1}{2}$" - $\frac{9}{16}$"	30.00
997	Set of 2 above	60.00

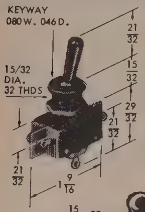
SWITCH ACCESSORIES

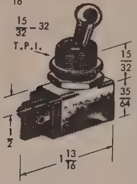


No.	Description	Std. Pkg.	NET per C
508	ON-OFF name plate	100	$ 7.00
509	HI-LO name plate	100	7.00
581	Snap-On Button (Red or Black)	50	35.00
1146	Narrow Rim Lockwasher	100	2.20
1170	Key — Remove off position	50	33.00
1171	Key — Remove both positions	50	33.00
1172	Locking Ring	100	3.20
1196	Hex Nut — Brass N.P.	100	2.40
1197	Ring Nut — Brass N.P.	100	3.10
1198	Dress Nut — Brass N.P.	100	10.10

IT'S SOUND PLANNING TO **"SPECIFY SMITH"** WHEN DESIGNING OR PURCHASING

SPECIFY SMITH ARROW, HART & HEGEMAN SWITCHES





CANOPY TYPE SWITCHES

Laminated type. 15/32-32 slotted sleeve, nickel finish. Supplied with hex nut and knurled nut. Solder terminals. SPST rated at 3 amps-250 volts AC-DC; all others rated at 1 amp-250 volts. 3 amps-125 volts AC-DC. **Std. Pkg. 10**

BAT LEVER POSITIVE ACTION

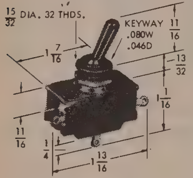
15/32" long shaft

No.	Circuit	NET Each
510	SPST	$1.55
511	SPDT	1.95
512	DPST	2.82
513	DPDT	3.23

BALL LEVER POSITIVE ACTION

15/32" long shaft

No.	Circuit	NET Each
500	SPST	$1.55
502	SPDT	1.95
504	DPST	2.82
506	DPDT	3.23



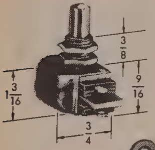
ST TYPE TOGGLE SWITCHES

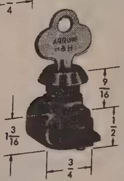
MEETS MIL-S-3950B

3 POSITION-CENTER OFF

Rated at 3 amps-250 volts, 6 amps-125 volts AC-DC

No.	Circuit	NET Each
566	SPDT	$3.00
567	DPDT	3.67





CANOPY TYPE ROTARY SWITCHES

Laminated type. 11/32-32 x 3/8" sleeve, nickel finish. Solder lugs. Supplied with hex nut and dress nut. SPST rated at 3 amps-250 volts AC-DC, all others rated at 1 amp-250 volts, 3 amps-125 volts AC-DC. Key removable in OFF position only on SPST and DPST—key removable in both positions on all others. **Std. Pkg. 10**

ROTARY TYPE

1⅛" Shaft

No.	Circuit	NET Each
570	SPST	$2.09
573	DPDT	4.39

KEY TYPE

No.	Circuit	NET Each
1034	SPST	$4.02
1035	SPDT	4.12
1037	DPST	5.10
1038	DPDT	5.12

MOMENTARY PUSH SWITCHES

Laminated type. 15/32-32 x 9/16" slotted sleeve, nickel finish. Supplied with hex nut and knurled nut. All switches accept snap on button. SPST rated at 3 amps-250 volts AC-DC. All others rated at 1 amp-250 volts, 3 amps-125 volts AC-DC. **SUPPLIED LESS BUTTON: ORDER BUTTON SEPARATELY,** (No. 581 listed on page 75.) **Std. Pkg. 10**

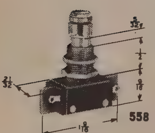
QUICK MAKE AND BREAK

Normally Closed (ON)

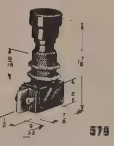
No.	Circuit	NET Each
552	SPST	$3.08
556	SPDT	3.48
557	2 Circ.	3.56
564	DPST	4.18
559	DPDT	4.32

Normally Open (OFF)

No.	Circuit	NET Each
555	SPST	$3.08
558	DPST	4.18



558



579

SLOW MAKE AND BREAK

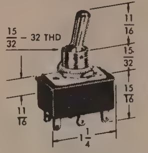
Rated at 1 amp-125 volts AC

Normally Closed (ON)

No.	Circuit	NET Each
582	SPST	$1.70
580	2 Circ.	2.16

Normally Open (OFF)

No.	Circuit	NET Each
579	SPST	$1.70



INTERMEDIATE SIZE TOGGLE SWITCHES

BAT LEVER

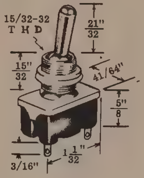
Molded phenolic base. 15/32-32 x 15/32" long slotted sleeve, nickel finish. Supplied with hex nut and knurled nut. Back connected silver plated solder contacts. SPDT rated at 1 amp-250 volts, 6 amps-125 volts AC-DC; all others rated at 3 amps-250 volts, 6 amps-125 volts AC-DC. **Std. Pkg. 10**

POSITIVE ACTION

No.	Circuit	NET Each
520	SPST	$1.55
521	SPDT	1.85
522	DPST	2.30
523	DPDT	2.62

MOMENTARY ACTION

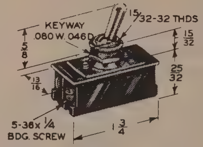
No.	Circuit	NET Each
524	SPST (OFF)	$2.45
537	DPST (OFF)	2.91
525	DPDT	3.86



MIDGET TOGGLE SWITCH

Bat lever. Molded phenolic base. 15/32-32 x 15/32" long. Slotted sleeve, nickel finish. Supplied with hex nut and knurled nut. Back connected silver plated solder contacts. Rated at 1 amp.-250 volts; 3 amps.-125 volts. **Std. Pkg. 10**

No.	Circuit	NET Each
920	SPST	$1.55
921	SPDT	1.85
923	DPST	2.30
924	DPDT	2.62



STANDARD DUTY SWITCHES

Molded phenolic base. 15/32"-32 x 7/16" long slotted sleeve, nickel finish, Screw terminals. Supplied with two hex nuts. **Std. Pkg. 10**

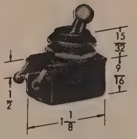
RATINGS:	SPST	SPDT	2-Circ.	DPST*
Amps @ 250 V ACDC	6	6	2	8
Amps @ 125 V ACDC	12	12	6	16

*also 1 H.P. 125/250 V ACDC.

QUICK MAKE AND BREAK TOGGLE

BAT LEVER

No.	Circuit	NET Each
597	SPST	$2.34
598	SPDT	2.34
596	DPST	2.34



MIDGET SIZE TOGGLE SWITCHES

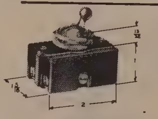
Molded phenolic base. 15/32-32 x 15/32" long slotted sleeve, nickel finish. Side connected silver plated solder contacts. Supplied with hex nut and knurled nut. SPST rated at 3 amps-250 volts; 6 amps-125 volts; all others rated at 1 amp-250 volts, 6 amps-125 volts. **Std. Pkg. 10**

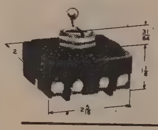
BALL LEVER

No.	Circuit	NET Each
590	SPST	$1.34
589	SPDT	1.65

BAT LEVER

No.	Circuit	NET Each
591	SPST	$1.34
592	SPDT	1.65





EXTRA HEAVY DUTY POWER SWITCHES

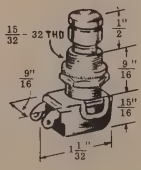
3 POSITION POSITIVE CENTER OFF

Slotted sleeve ¾-32, nickel finish. Screw terminals. Supplied with 2 hex nuts. Rated at 5 amps-250 volts, 10 amps-125 volts plus HP rating shown below. **Std. Pkg. 5**

Description

¾ HP 250 volts AC-DC
½ HP 115/230 volts AC, 3 phase
½ HP 115/230 volts AC, 2 phase

No.	Circuit	NET Each
574	DPDT	$ 7.10
575	TPDT	10.90
576	4PDT	14.50



MIDGET MOMENTARY PUSH

SLOW MAKE AND BREAK

Molded Phenolic Base· 15/32-32 x 9/16" slotted sleeve, Nickel Finish. Supplied with hex nut and knurled nut. Side connected silver plated solder contacts. Rated at 3 amps.-120 volts A.C. Supplied less button; order button separately. **Std. Pkg. 10**

No.	Contacts	Circuit	NET Ea.
925	Normally Closed (ON)	SPST	$1.28
926	Normally Closed (ON)	2 Circ.	1.36
927	Normally Open (OFF)	SPST	1.28

IT'S SOUND PLANNING TO **"SPECIFY SMITH"** WHEN DESIGNING OR PURCHASING

STOCKED BY
LEADING
DISTRIBUTORS
NATIONWIDE

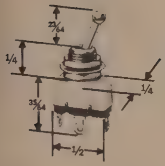
ARROW, HART & HEGEMAN & CUTLER-HAMMER SWITCHES SPECIFY SMITH

SUB-MINIATURE TOGGLE SWITCHES

Offers the greatest switching flexibility and is available in both positive and momentary action. Gold plated silver stationary contacts to insure continuity on low energy circuits and Rhodium plated silver movable contacts to withstand mechanical wear. Molded diallyl phthalate and aluminum housing. Available in Commercial and Military types

Rating.

5A. 125V. AC	*AC: 75% Power Factor
5A. 29V. DC	DC: An Inductors
Max. Inrush: 25A.	Mechanical Life:
Minimum rating: 40 milliamps at 1.5 volts	100,000 cycles

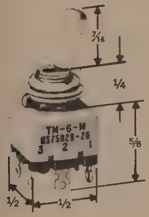


COMMERCIAL

Housing and mounting hardware gold anodized. Available only in stainless steel ball lever. Std. Pkg. 5

Smith No.	AH&H No.	Circuit*	Net Each
4740	TC-3	SPDT A-B-A	$5.50
4741	TE-3	SPDT C-B-A	5.80
4742	TG-3	SPDT C-B-C-	5.80
4743	TM-3	SPDT C-D-A	5.80
4744	TS-1	SPST B-D-A	5.00
4745	TS-2	DPST B-D-A	6.20
4746	TS-3	SPDT A-D-A	5.50
4747	TC-6	DPDT A-B-A	7.20
4748	TE-6	DPDT C-B-C	9.00
4749	TG-6	DPDT C-B-C-	9.00
4750	TM-6	DPDT C-D-A	9.00
4751	TS-6	DPDT A-D-A	7.20

*A-ON, B-OFF, C-Momentary ON, D-None

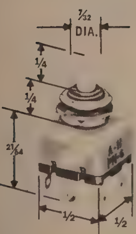


MILITARY

Meets Mil S-3950B, MS75028 and MS75029. Housing and hardware, clear anodized. Available only with aluminum bat lever. Std. Pkg. 5

Smith No.	AH&H No.	MS No.	Circuit*	Net Each
4760	TC-3-M	MS75028-21	SPDT A-B-A	$5.80
4761	TE-3-M	MS75028-31	SPDT C-B-A	6.20
4762	TG-3-M	MS75028-27	SPDT C-B-C	6.20
4763	TM-3-M	MS75028-26	SPDT C-D-A	6.20
4764	TS-1-M	MS75028-22	SPST B-D-A	6.20
4765	TS-2-M	MS75029-22	DPST B-D-A	6.60
4766	TS-3-M	MS75028-23	SPDT A-D-A	5.80
4767	TC-6-M	MS75029-21	DPDT A-B-A	7.50
4768	TE-6-M	MS75029-31	DPDT C-B-A	9.50
4769	TG-6-M	MS75029-27	DPDT C-B-C	9.50
4770	TM-6-M	MS75029-26	DPDT C-D-A	9.50
4771	TS-6-M	MS75029-23	DPDT A-D-A	7.50

*A-ON, B-OFF, C-Momentary ON, D-None.



SUB-MINIATURE MOMENTARY PUSH BUTTON SWITCHES

Smallest momentary switches available, combining maximum performance, dependability and durability with minimum weight and envelope. Gold plated leaf contacts, with molded diallyl phthalate body and anodized aluminum housing. Mounts with 1/4" diameter slotted sleeve, supplied with mounting hardware. Nylon push button caps are optional and are available in seven colors.

Rating: 2A. 29V.DV Resistive
1A. 115V.AC
Minimum Rating: 10 Micro-amps at 50 MV.
Weight: 2.5 Grams Single Pole
4.0 Grams Double Pole
Mechanical Life: Min. 1,000,000 Cycles.

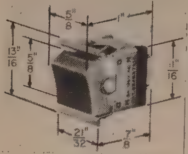
Smith No.	AH&H No.	Circuit	Net Each
4755	PM-3	SPDT NO/MC	$5.00
4756	PM-6	DPDT NO/MC	6.20
4757	PM-7	3PST 3P/NO	5.80
4758	PM 8	3PST 3P/NC	8.40
4754		Button Only, Available in Red, Black, Green, Yellow Blue, Brown, Natural	.19

Std. Pkg. 25

508
509
1146
1172
1196
1197
1198

SWITCH ACCESSORIES

No.	Description	Std. Pkg.	NET per C
508	ON-OFF name plate	100	$ 7.00
509	HI-LO name plate	100	7.00
581	Snap-On Button (Red or Black)	50	35.00
1146	Narrow Rim Lockwasher	100	2.20
1170	Key — Remove off position	50	33.00
1171	Key — Remove both positions	50	33.00
1172	Locking Ring	100	3.20
1196	Hex Nut — Brass N.P.	100	2.40
1197	Ring Nut — Brass N.P.	100	3.10
1198	Dress Nut — Brass N.P.	100	10.10



MINIATURE ILLUMINATED ROCKER SWITCHES

Designed to snap into a rectangular opening .729 x .662, panel thickness .040 to .125. Slow make and break, solder lug termination. Lamp circuit is independent with separate terminals for flexibility. Utilizes slide base bulb, readily replaceable from front panel, voltages from 6V to 220V. Rated at 5 Amps 125V AC, 28V DC. Translucent rocker available in colors, White, Red, Green, Amber, Grey, Black, Blue and Yellow — SPECIFY COLOR. Optional color-coded Nylon Bezel also available. Supplied less bulb and Bezel. Std. Pkg. 10

No.	C-H No.	Circuit†	NET Each
3139	SC2BX	A-B-A	$4.58
3140	SC2CX	A-D-A	4.58
3141	SC2GX	C-D-A	4.71

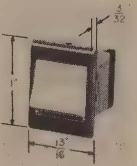
†A-ON, B-OFF, C-Momentary ON, D-None

REPLACEMENT BULBS

Available for 6, 12, 18, 24, 28 or *110/220 Volts. SPECIFY VOLTAGE. Std. Pkg. 25

No.	C-H No.	NET Each
3142	SW8F	$0.88

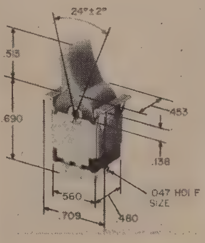
*Note: Neon lamp, use with 33K resistor for 110V, use 110K resistor for 220V.



DECORATOR PLASTIC BEZEL

Available in white, red, green, amber, gray, black, blue, yellow. SPECIFY COLOR. Std. Pkg. 100

No.	C-H No,	NET Per C
3148	SW2AA	$30.00



MINIATURE PADDLE SWITCHES

Designed to snap into a rectangular opening .610 x .490, panel thickness .040 to .125. Slow make and break operation, solder lug terminals. Rated at 5 Amps 125V AC, 28V. DC. Paddle available in White, Gray, Black and Red. SPECIFY COLOR. Supplied less Bezel. Std. Pkg. 10

No.	C-H No.	Circuit†	Type	NET Each
3156	SC3BX18	A-B-A	SPDT	$2.53
3157	SC3CX18	A-D-A	SPDT	2.31
3158	SC3FX18	A-B-C	SPDT	2.53
3159	SC3GX18	A-D-C	SPDT	2.53
3160	SC3HX18	C-B-C	SPDT	2.53
3161	SC4BX18	A-B-A	DPDT	3.21
3162	SC4CX18	A-D-A	DPDT	3.00
3163	SC4FX18	A-B-C	DPDT	3.21
3164	SC4GX18	A-D-C	DPDT	3.21
3165	SC4HX18	C-B-C	DPDT	3.21

†A-ON, B-OFF, C-Momentary ON, D-None

DECORATOR PLASTIC BEZELS

Available in white, red, gray, black. SPECIFY COLOR. Std. Pkg. 50

No.	C-H No.	NET Per C
3166	SW2AA	$20.00

H H SMITH, INC
BKLYN, N.Y.

SHAFT WRENCHES

Specially designed offset, double-end wrenches for most hex sizes encountered in electronic construction. Made of heavy gauge, cadmium plated steel, clearly marked with size. No. 999 is especially useful for Toggle Switch and Volume Control mounting nuts. Std. Pkg. 25

No.	For Nut Sizes	NET per C
998	5/16" - 3/8"	$30.00
999	1/2" - 9/16"	30.00
997	Set of 2 above	60.00

ALL SWITCHES ON PAGES 2•879 THRU 2•883 ARE STOCKED IN DEPTH AND ARE AVAILABLE THROUGH YOUR LOCAL INDUSTRIAL DISTRIBUTOR.

IT'S SOUND PLANNING TO **"SPECIFY SMITH"** WHEN DESIGNING OR PURCHASING

SPECIFY SMITH TEFLON* TERMINALS

*Du Pont's registered trademark

PLATING INFORMATION

FOR ALL SMITH TEFLON TERMINALS LISTED IN THIS DIRECTORY

-P1 and -P12 are STANDARD PLATING.

For Platings listed below, other than Standard, add $10.00 per M

Minimum Quantity 1000 Pieces.
For Platings other than listed below, please consult Factory.

Unless otherwise specified, these plating finishes will be supplied:

TEST JACKS & PROBES:	Plating -P1 (see below)
STANDOFFS & FEED-THRUS:	Plating -P12 (see below)

PLATING DASH NO.	TYPE OF PLATING	THICKNESS OF PLATE	APPLICABLE SPECIFICATIONS if any
—P1 (STANDARD)	Copper strike Gold flash	0.0005 0.000020	QQ-S-365, Type III MIL-G-45204, Type II
—P2	Copper strike Silver plate	0.0003/0.0005	QQ-S-365, Type III
—P3	Copper strike Solder plate	0.0005 Min.	(M-259) MIL-F-14072 (M222, Type I)
—P4	Copper strike Gold flash	0.000010/0.000020	MIL-G-45204, Type II
—P5	Copper strike Silver plate Gold plate	0.0003 0.000050	QQ-S-365, Type III MIL-G-45204, Type II
—P6	Copper strike Gold plate	0.000050/0.000070	MIL-G-45204, C1.1, Type II
—P7	Copper strike Gold plate	0.000200/0.000250	MIL-G-45204, C1.3, Type II
—P8	Copper strike Gold plate	0.000100/0.000150	MIL-G-45204, C1.2, Type II
—P9	Copper strike Nickel plate Gold plate	0.000050/0.000070 0.000030/0.000050	QQ-N-290, Class I MIL-G-45204, Type II
—P10	Copper strike Gold plate	0.00030 Min.	MIL-G-45204, Type II
—P11	Copper Tin plate	0.0002 0.0002/0.0004	MIL-T-10727, Type I
—P12 (STANDARD)	Copper Bright acid tin "Tintilate"	0.000050 0.0003	MIL-T-10727, Type I
—P13	Hot tin dip	Approx. 0.0002	MIL-T-10727, Type II
—P17	Copper strike Nickel plate	0.0003/0.0005	QQ-N-290, C1.1, Type VI (KC)
—P18	Silver Gold	0.0005 0.000030	QQ-S-365, Type III

QUANTITY DISCOUNTS

FOR ALL SMITH TEFLON TERMINALS LISTED IN THIS DIRECTORY

100 — 999	20% Off
1,000 — 4,999	35% Off
5,000 —14,999	45% Off
15,000 — & up	On request

COLOR CODE SUFFIX - Add to Catalog Number as required

— 101 WHITE* 104 GREEN 107 YELLOW 112 PURPLE
— 102 RED — 105 BLUE— 108 BROWN 113 GREY
— 103 BLACK— 106 ORANGE

* White is natural "Teflon" per MIL-P-19468 and will be supplied if no color is specified.

PROBES & PLUGS

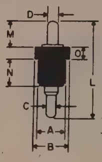


FIG. 80

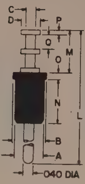


FIG. 81

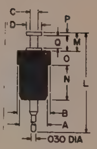


FIG. 82

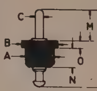


FIG. 83

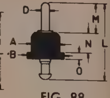


FIG. 88

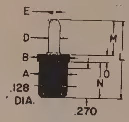


FIG. 84

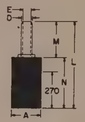


FIG. 85

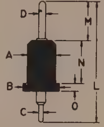


FIG.86

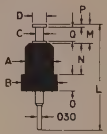


FIG. 89

FOR RAPID SELECTION: terminals are listed (within figure groups) in ascending order of the MOST PERTINENT DIMENSION:

C & D = PROBE DIAS.
M = LGTH. OF PIN
A = MIN. DIA.
B = MAJ. DIA.
N = LGTH. OF MIN. DIA.
O = LGTH. OF MAJ. DIA.
L = OVERALL LGTH.

FIG. No.	SMITH No.	A	B	C	D	E	L	M	N	O	P	Q	RESALE Per M
		PLATING: Standard (-P4 Gold flash) unless otherwise specified.											
80	73-1028	.185	.218	.030	.040	—	1.870	.120	.250	.046	—	—	$240.00
80	73-1018	.148	.172	.030	.050	—	1.937	.250	.165	.046	—	—	240.00
80	73-1003	.185	.218	.030	.050	—	1.937	.250	.140	.046	—	—	240.00
80	73-1001	.185	.218	.030	.050	—	.906	.250	.287	.046	—	—	240.00
80	73-1000	.185	.218	.030	.050	—	1.531	.250	.287	.046	—	—	240.00
80	73-1002	.185	.218	.030	.050	—	2.083	.250	.287	.046	—	—	240.00
80	73-3006	.218	.250	.040	.050	—	1.531	.312	.375	.157	—	—	240.00
80	73-3006	.218	.250	.040	.050	—	1.531	.312	.375	.157	—	—	240.00
80	73-1006	.185	.218	.050	.081	—	.739	.281	.287	.046	—	—	$190.00
81	73-1010	.185	.218	.060	.125	—	1.052	.281	.287	.046	.031	.093	230.00
82	73-1009	.185	.218	.050	.093	—	2.000	.125	.150	.230	.020	.085	$220.00
82	73-1008	.185	.218	.050	.093	—	1.000	.125	.287	.093	.020	.085	200.00
82	73-1007	.185	.218	.050	.093	—	2.005	.125	.287	.093	.020	.085	200.00
83	73-1182	.148	.172	.040	—	—	.415	.125	.100	.040	—	—	$180.00
83	73-1156	.148	.172	.040	—	—	.478	.188	.100	.040	—	—	180.00
83	73-1022	.171	.187	.040	—	—	.687	.272	.212	.040	—	—	$190.00
83	73-1011	.185	.218	.050	—	—	.562	.250	.135	.052	—	—	$190.00
83	73-1016	.185	.218	.050	—	—	.562	.250	.141	.046	—	—	190.00
83	73-1023	.185	.218	.050	—	—	.906	.250	.287	.046	—	—	220.00
83	73-1027	.185	.218	.062	—	—	.612	.250	.141	.046	—	—	$190.00
83	73-1017	.185	.218	.081	—	—	.562	.250	.141	.046	—	—	$190.00
83	73-1015	.185	.218	.081	—	—	.739	.281	.287	.046	—	—	190.00
83	73-1026	.185	.218	.090	—	—	.648	.190	.287	.046	—	—	$190.00
		PLATING: Standard (-P17) unless otherwise specified.											
84	73-3010	.218	.250	—	.080	.062	.695	.270	.325	.050	—	—	$210.00
85	73-3001	.218	—	—	.080	.062	.645	.270	.375	—	—	—	$210.00
85	73-3016	.218	—	—	.080	.062	.875	.500	.375	—	—	—	220.00
85	73-3012	.218	—	—	.090	.062	.645	.270	.375	—	—	—	$210.00
86	37-1028	.185	.218	.030	.040	—	1.870	.120	.250	.046	—	—	$200.00
86	37-1018	.148	.172	.030	.050	—	1.937	.250	.165	.046	—	—	200.00
86	37-1003	.185	.218	.030	.050	—	1.937	.250	.141	.046	—	—	200.00
86	37-1001	.185	.218	.030	.050	—	.906	.250	.287	.046	—	—	220.00
86	37-1000	.185	.218	.030	.050	—	1.531	.250	.287	.046	—	—	180.00
86	37-1002	.185	.218	.030	.050	—	2.083	.250	.287	.046	—	—	240.00
86	37-1006	.185	.218	.050	.081	—	.739	.281	.287	.046	—	—	200.00
88	37-1182	.148	.172	.040	—	—	.415	.125	.100	.040	—	—	$200.00
88	37-1156	.148	.172	.040	—	—	.478	.188	.100	.040	—	—	200.00
88	37-1022	.171	.187	.040	—	—	.687	.272	.212	.040	—	—	230.00
88	37-1011	.185	.218	.050	—	—	.562	.250	.135	.052	—	—	$180.00
88	37-1016	.185	.218	.050	—	—	.562	.250	.141	.046	—	—	180.00
88	37-1023	.185	.218	.050	—	—	.906	.250	.287	.046	—	—	200.00
88	37-1027	.185	.218	.062	—	—	.612	.250	.141	.046	—	—	$200.00
88	37-1017	.185	.218	.081	—	—	.562	.250	.141	.046	—	—	$210.00
88	37-1015	.185	.218	.081	—	—	.739	.281	.287	.046	—	—	200.00
88	37-1026	.185	.218	.090	—	—	.648	.190	.287	.046	—	—	$200.00
89	37-1009	.185	.218	.050	.093	—	2.000	.125	.150	.230	.020	.085	$220.00
89	37-1008	.185	.218	.050	.093	—	1.000	.125	.287	.093	.020	.085	220.00
89	37-1007	.185	.218	.050	.093	—	2.005	.125	.287	.093	.020	.085	220.00

COLORS: Supplied in White (-101) unless otherwise specified. Ten colors available.
See at right For COLOR CODE, PLATING SUFFIXES and QUANTITY DISCOUNTS

SPECIFY SMITH TEFLON* TERMINALS

TEST JACKS

*Du Pont's registered trademark

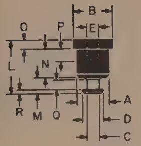


FIG. 68

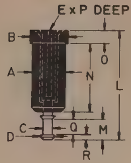


FIG. 69

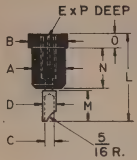


FIG. 70

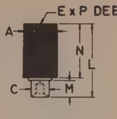


FIG. 71

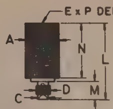


FIG. 72

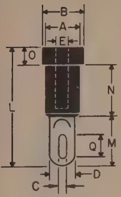


FIG. 76

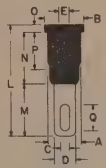


FIG. 77

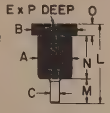


FIG. 97

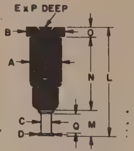


FIG. 98

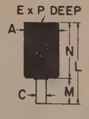


FIG. 96

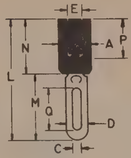


FIG. 78

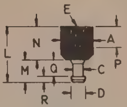


FIG. 79

FOR RAPID SELECTION:

terminals are listed (within figure groups) in ascending order of the MOST PERTINENT DIMENSION:

E = PROBE
P = PROBE DEPTH
A = MIN. DIA.
B = MAJ. DIA.
N = LGTH. OF MIN. DIA.
O = LGTH. OF MAJ. DIA.
M = LGTH. OF PIN
C = DIA. OF PIN
L = OVERALL LGTH.

PANEL BOARD MOUNT

FIG. No.	SMITH No.	A	B	C	D	E	L	M	N	O	P	Q	R	RESALE Per M
68	63-1033	.120	.150	.046	.080	.040	.203	.060	.113	.030	.078	.040	.010	$240.00
68	63-1032	.148	.172	.046	.080	.040	.203	.060	.097	.046	.078	.040	.010	240.00
68	63-1029	.140	.172	.046	.080	.040	.253	.060	.143	.050	.125	.040	.010	240.00
68	63-1077	.140	.172	.046	.060	.040	.345	.120	.179	.046	.140	.077	.023	240.00
68	63-1010	.148	.172	.040	.060	.040	.345	.120	.179	.046	.140	.077	.023	240.00
68	63-1061*	.148	.172	.040	.060	.040	.345	.120	.179	.046	.140	.077	.023	450.00
68	63-1072	.120	.142	.040	.060	.040	.410	.120	.244	.046	.205	.060	.030	240.00
68	63-1012	.120	.142	.040	.060	.040	.449	.120	.283	.046	.245	.060	.030	240.00
68	63-1079	.185	.218	.054	.074	.050	.437	.120	.271	.046	.195	.053	.037	$280.00
68	63-1004	.185	.218	.054	.074	.080	.437	.120	.271	.046	.195	.053	.037	$260.00
68	63-1060*	.185	.218	.054	.074	.080	.437	.120	.271	.046	.195	.053	.037	450.00
68	63-1075	.185	.218	.054	.074	.080	.504	.187	.271	.046	.195	.104	.037	280.00
68	63-1006	.204	.250	.054	.074	.080	.437	.120	.271	.046	.195	.053	.037	280.00
68	63-1057	.185	.218	.054	.074	.080	.367	.120	.301	.046	.225	.047	.035	240.00
68	63-1005	.185	.218	.054	.074	.080	.640	.187	.400	.050	.287	.104	.037	270.00
68	63-1080	.185	.218	.080	.125	.080	.455	.105	.300	.050	.315	.065	.020	180.00
68	63-1054	.185	.218	.054	.074	.090	.340	.120	.174	.046	.140	.077	.023	$250.00
68	63-1003	.185	.218	.054	.074	.090	.437	.120	.271	.046	.195	.053	.037	260.00
68	63-1007	.170	.218	.046	.078	.090	.375	.066	.269	.046	.250	.040	.010	280.00
68	63-1028	.200	.218	.054	.074	.093	.699	.187	.386	.125	.390	.116	.035	$300.00
68	63-1013	.200	.218	.054	.074	.093	.761	.187	.386	.187	.455	.116	.035	320.00
68	63-1081	.200	.375	.054	.074	.093	.834	.187	.417	.230	.518	.116	.035	180.00
68	63-1011	.218	.250	.066	.098	.104	.400	.060	.294	.046	.250	.037	.010	$300.00
69	63-1500	.148	.171	.040	.060	.040	.470	.100	.285	.065	.225	.070	.020	$260.00
69	63-1504	.148	.171	.040	.060	.062	.470	.100	.285	.065	.225	.070	.020	260.00
70	63-1083	.148	.171	.046	.061	.040	.359	.140	.154	.065	.125	—	—	$270.00
70	63-1093	.148	.188	.046	.061	.040	.359	.140	.154	.065	.125	—	—	270.00
70	63-1506	.148	.172	.046	.060	.040	.531	.147	.334	.050	.250	—	—	280.00
70	63-1505	.203	.245	.046	.060	.040	.531	.147	.334	.050	.250	—	—	300.00
70	63-1510	.185	.250	.080	.100	.080	.437	.156	.216	.065	.187	—	—	$320.00
76	63-1001	.185	.218	.050	.115	.040	.687	.354	.287	.046	.250	.156	—	$180.00
76	63-1016	.185	.218	.050	.115	.050	.624	.354	.224	.046	.200	.156	—	180.00
76	63-1037	.185	.218	.050	.115	.050	.687	.330	.146	.187	.200	.156	—	180.00
76	63-1014	.185	.218	.050	.115	.050	.687	.354	.281	.052	.250	.156	—	180.00
76	63-1000	.185	.218	.050	.115	.050	.687	.354	.287	.046	.250	.156	—	180.00
76	63-1017	.185	.218	.050	.115	.060	.718	.316	.356	.046	.315	.156	—	$180.00
76	63-1015	.185	.218	.050	.115	.080	.687	.330	.146	.187	.187	.156	—	180.00
76	63-1002	.185	.218	.050	.115	.080	.687	.354	.287	.046	.250	.156	—	180.00
76	63-1085	.185	.218	—	.110	.080	.710	.354	.287	.070	.275	.156	.050	180.00
77	63-1052	.185	.218	.050	.115	.050	.620	.287	.287	.046	.250	.156	—	$180.00
77	63-1063	.185	.218	.050	.115	.080	.704	.354	.304	.046	.280	.156	—	220.00
97	63-1095	.148	.18	.040	.—	.040	.359	.140	.154	.065	.135	—	—	$300.00
98	63-1151	.185	.218	.055	.070	.050	.890	.150	.275	.046	.350	.090	—	$420.00

*Closed Entry Type

VERTICAL - FLOATING

FIG. No.	SMITH No.	A	B	C	D	E	L	M	N	O	P	Q	R	RESALE Per M
71	63-3018	.187	—	.066	—	.080	.376	.085	.281	—	.200	—	—	$340.00
71	63-3019	.187	—	.066	—	.080	.376	.085	.281	—	.200	—	—	340.00
71	63-3020	.187	—	.062	—	.080	.381	.090	.281	—	.250	—	—	340.00
71	63-3008	.218	—	.112	—	.080	.381	.080	.281	—	.250	—	—	320.00
71	63-3007	.218	—	.112	—	.080	.441	.078	.343	—	.250	—	—	320.00
72	63-3017	.187	—	.048	.056	.080	.391	.100	.281	250	.250	—	—	$340.00
96	63-1073	.218	—	.050	—	.080	.585	.140	.430	—	.278	—	—	$280.00
78	63-1086	.185	—	—	.105	.050	.641	.354	.287	—	.204	—	—	$200.00
79	63-1034	.140	—	.046	.080	.025	.203	.060	.143	—	.075	.040	.010	$280.00
79	63-1009	.120	—	.046	.080	.040	.203	.060	.140	—	.075	.040	.010	300.00
79	63-1008	.140	—	.046	.080	.040	.203	.060	.140	—	.075	.040	.010	300.00
79	63-1039	.187	—	.046	.078	.090	1.000	.060	.940	—	.825	.040	.010	400.00
79	63-1038	.218	—	.046	.078	.090	1.000	.060	.940	—	.825	.040	.010	400.00

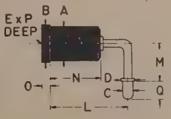


FIG. 73

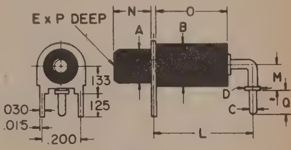


FIG. 74 & 75

RIGHT ANGLE - PRINTED CIRCUIT MOUNT

FIG. No.	SMITH No.	A	B	C	D	E	L	M	N	O	P	Q	R	RESALE Per M
73	63-1098	.218	250	.040	—	.040	.300	.437	.154	046	.190	.—	.—	$320.00
73	63-1099	.218	250	.040	—	.040	.500	.437	.154	046	.190	.—	.—	320.00
73	63-3000	.218	250	.050	.080	.080	.400	.250	.316	.046	.250	.125	.—	500.00
74	63-3003	.187	218	.050	.080	.080	.400	.140	.046	.300	.125	.250	.—	$500.00
74	63-3002	.187	218	.050	.080	.080	.500	.140	.046	.420	.125	.250	.—	500.00
74	63-3004	.187	218	.040	.080	.080	.520	.140	.046	.340	.130	.250	.—	500.00
74	63-3005	.187	.218	.035	.080	.080	.400	.140	.046	.300	.187	.250	—	500.00
75	63-3009	.187	218	.050	.080	.080	.500	.140	.230	.425	.125	.500	.—	$500.00

COLORS: Supplied in White (-101) unless otherwise specified.
Ten colors available.
PLATING: Standard (P-1) unless otherwise specified.

For COLOR CODE, PLATING SUFFIXES and QUANTITY DISCOUNT SCHEDULES see SMITH PAGE 2.884 in this directory

IT'S SOUND PLANNING TO **SPECIFY SMITH** WHEN DESIGNING OR PURCHASING

TEFLON* TERMINALS SPECIFY SMITH

*Du Pont's registered trademark

FEED-THRUS

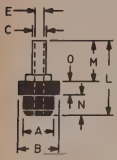


FIG. 48

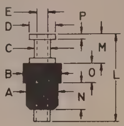


FIG. 49

FOR RAPID SELECTION:

terminals are listed (within figure groups) in ascending order of the MOST PERTINENT DIMENSION:

A = MIN. DIA.
N = LGTH. OF MIN. DIA.
M = LGTH. OF PIN
L = OVERALL LGTH.
B = MAJ. DIA.
O = LGTH. OF MAJ. DIA.
C = DIA. OF PIN

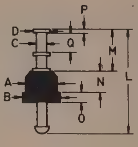


FIG. 42

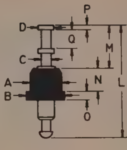


FIG. 43

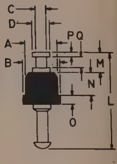


FIG. 44

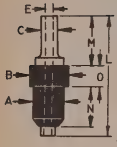


FIG. 50

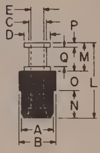


FIG. 52

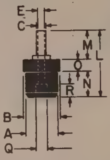


FIG. 54

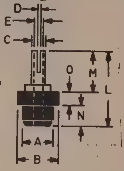


FIG. 51

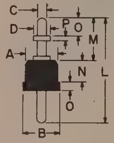


FIG. 46

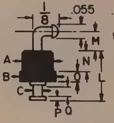


FIG. 47

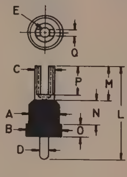


FIG. 64

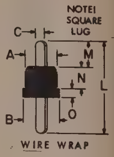


FIG. 101

SUB-MINIATURE TUBULAR

FIG. No.	SMITH No.	A	B	C	D	E	L	M	N	O	P	Q	R	RESALE Per M
48	82-1134	.093	.125	.040	—	.030	.215	.125	.050	.040	—	—	—	$150.00
48	82-1040	.093	.125	.040	—	.030	.225	.125	.060	.040	—	—	—	150.00
48	82-1135	.093	.125	.040	—	.030	.312	.207	.060	.040	—	—	—	150.00
48	82-1115	.093	.125	.040	—	.030	.317	.187	.090	.040	—	—	—	170.00
48	82-1116	.093	.125	.040	—	.030	.405	.275	.090	.040	—	—	—	150.00
48	82-1161	.093	.125	.043	—	.030	.252	.100	.110	.040	—	—	—	150.00
48	82-1037	.120	.130	.040	—	.030	.310	.207	.053	.050	—	—	—	$150.00
48	82-1036	.125	.150	.040	—	.030	.225	.125	.060	.040	—	—	—	$140.00
48	82-1151	.125	.150	.040	—	.030	.225	.126	.075	.025	—	—	—	140.00
48	82-1126	.125	.150	.040	—	.030	.247	.147	.075	.025	—	—	—	140.00
48	82-1124	.125	.150	.040	—	.030	.325	.125	.075	.125	—	—	—	140.00
48	82-1123	.148	.172	.040	—	.030	.245	.147	.053	.045	—	—	—	$150.00
48	82-1035	.148	.172	.040	—	.030	.250	.147	.053	.050	—	—	—	150.00
48	82-1034	.148	.172	.040	—	.030	.310	.207	.053	.050	—	—	—	150.00
48	82-1127	.148	.172	.080	—	.052	.193	.105	.063	.025	—	—	—	150.00
48	82-1090	.148	.172	.085	—	.063	.332	.207	.075	.050	—	—	—	150.00
48	82-1038	.148	.172	.040	—	.030	.296	.136	.100	.060	—	—	—	150.00
48	82-1017	.148	.172	.085	—	.063	.367	.207	.110	.050	—	—	—	150.00
48	82-1091	.148	.172	.085	—	.070	.367	.207	.110	.050	—	—	—	150.00
48	82-1089	.148	.172	.085	—	.063	.413	.207	.156	.050	—	—	—	150.00
48	82-1039	.171	.218	.040	—	.030	.367	.207	.110	.050	—	—	—	$160.00
48	82-1041	.171	.218	.085	—	.063	.367	.207	.110	.050	—	—	—	160.00
48	82-1024	.200	.240	.085	—	.063	.367	.207	.110	.050	—	—	—	$180.00
49	82-1055	.148	.172	.040	—	.030	.296	.136	.100	.060	—	—	—	$150.00
50	82-1146	.082	.093	.040	—	.030	.375	.172	.148	.040	—	—	—	$160.00
52	82-1119	.093	.125	.040	.080	.030	.215	.125	.050	.040	.020	.093	—	$150.00
52	82-1120	.125	.150	.060	.090	.030	.293	.133	.060	.040	.020	.093	—	$140.00
52	82-1122	.125	.150	.060	.090	.030	.200	.090	.060	.050	.020	.093	—	140.00
52	82-1049	.125	.150	.060	.090	.030	.273	.133	.080	.060	.020	.093	—	140.00
52	82-1103	.125	.150	.060	.090	.030	.273	.133	.100	.040	.020	.093	—	140.00
52	82-1118	.125	.150	.060	.090	.030	.293	.133	.110	.050	.020	.093	—	140.00
52	82-1093	.148	.172	.060	.093	.040	.238	.133	.065	.040	.020	.093	—	$160.00
52	82-1054	.148	.172	.060	.090	.030	.273	.133	.100	.040	.020	.093	—	160.00
52	82-1050	.148	.172	.060	.090	.030	.303	.133	.100	.040	.020	.093	—	160.00
52	82-1051	.148	.172	.060	.090	.030	.333	.133	.110	.050	.020	.093	—	160.00
52	82-1096	.148	.172	.060	.093	.030	.293	.133	.110	.050	.020	.093	—	160.00
52	82-1016	.148	.172	.082	.125	.063	.351	.133	.125	.093	.020	.093	—	160.00
52	82-1092	.148	.172	.060	.090	.030	.303	.133	.130	.040	.020	.093	—	160.00
52	82-1060	.148	.172	.060	.093	.042	.392	.162	.130	.100	.020	.130	—	160.00
52	82-1052	.171	.188	.082	.125	.062	.381	.133	.125	.093	.020	.093	—	$160.00
54	82-1046	.148	.172	.040	—	.030	.282	.147	.075	.060	—	.070	.042	$150.00
54	82-1085	.148	.172	.040	—	.030	.387	.207	.110	.050	—	.050	.050	150.00
54	82-1150	.148	.172	.072	—	.052	.606	.025	.220	.025	—	.062	.011	150.00
54	82-1088	.171	.218	.085	—	.063	.710	.500	.160	.040	—	.085	.050	$160.00
54	82-1047	.171	.218	.085	—	.063	.417	.207	.160	.050	—	.085	.050	160.00
54	82-1044	.200	.240	.040	—	.030	.367	.207	.110	.050	—	.050	.057	$160.00
54	82-1045	.218	.250	.060	—	.030	.287	.147	.100	.040	—	.050	.030	160.00
51	82-2015	.125	.150	.050	.030	.030	.160	.062	.073	.025	—	—	—	$230.00

REVERSED SUB-MINIATURE TURRET

FIG. No.	SMITH No.	A	B	C	D	E	L	M	N	O	P	Q	R	RESALE Per M
42	28-1516	.093	.125	.040	.080	—	.500	.210	.100	.040	.020	.100	—	$120.00
42	28-1551	.116	.172	.040	.080	—	.500	.210	.100	.040	.020	.100	—	$130.00
42	28-1521	.125	.150	.040	.080	—	.500	.210	.060	.040	.020	.100	—	$120.00
42	28-1518	.148	.172	.040	.080	—	.500	.210	.060	.040	.020	.100	—	$120.00
42	28-1536	.148	.172	.040	.080	—	.685	.395	.065	.040	.020	.070	—	120.00
42	28-1539	.148	.172	.040	.080	—	.438	.210	.083	.040	.020	.100	—	120.00
42	28-1509	.148	.172	.040	.080	—	.438	.210	.100	.040	.020	.100	—	120.00
42	28-1500	.148	.172	.040	.080	—	.500	.210	.100	.040	.020	.100	—	160.00
42	28-1537	.148	.172	.040	.080	—	.550	.245	.125	.040	.020	.100	—	130.00
42	28-1512	.148	.172	.040	.080	—	.609	.210	.125	.093	.020	.100	—	110.00
42	28-1527	.148	.172	.040	.080	—	.609	.210	.158	.060	.020	.100	—	130.00
42	28-1501	.148	.172	.040	.080	—	.500	.210	.165	.040	.020	.100	—	120.00
42	28-1550	.148	.172	.040	.080	—	.531	.210	.165	.040	.020	.100	—	120.00
42	28-1532	.148	.172	.040	.080	—	.609	.210	.165	.040	.020	.100	—	130.00
42	28-1538	.148	.172	.040	.080	—	.812	.210	.165	.040	.020	.100	—	150.00
42	28-1546	.152	.172	.047	.093	—	.437	.156	.088	.040	.020	.047	—	$140.00
42	28-1547	.152	.172	.047	.093	—	.437	.156	.100	.040	.020	.047	—	140.00
42	28-1514	.152	.172	.047	.093	—	.500	.156	.150	.040	.020	.047	—	130.00
42	28-1502	.179	.200	.040	.080	—	.500	.210	.100	.040	.020	.100	—	$130.00
42	28-1515	.185	.218	.040	.080	—	.438	.210	.100	.040	.020	.100	—	$140.00
42	28-1534	.185	.218	.040	.080	—	.609	.210	.125	.093	.020	.100	—	140.00
43	28-1504	.148	.172	.040	.080	—	.531	.210	.100	.040	.020	.100	—	$150.00
43	28-1523	.148	.172	.040	.080	—	.531	.210	.100	.040	.020	.100	—	150.00
43	28-1505	.148	.172	.040	.080	—	.531	.210	.125	.040	.020	.100	—	150.00
43	28-1520	.175	.218	.040	.080	—	.531	.210	.100	.040	.020	.100	—	$170.00
43	28-1506	.185	.218	.040	.080	—	.531	.210	.100	.040	.020	.100	—	$170.00
43	28-1507	.185	.218	.040	.080	—	.531	.210	.125	.040	.020	.100	—	170.00
44	28-1540	.093	.125	.040	.080	—	.350	.125	.100	.040	.020	.085	—	$120.00
44	28-1524	.125	.150	.040	.080	—	.350	.125	.060	.040	.020	.095	—	$120.00
44	28-1558	.148	.172	.040	.080	—	.380	.090	.100	.040	.020	.060	—	$130.00
44	28-1510	.148	.172	.040	.080	—	.443	.093	.100	.040	.020	.062	—	130.00
44	28-1513	.148	.172	.040	.080	—	.350	.125	.100	.040	.020	.094	—	120.00
44	28-1137	.148	.172	.040	.080	—	.450	.190	.100	.040	.020	.160	—	130.00
44	28-1581	.148	.172	.040	.080	—	.520	.190	.100	.040	.020	.160	—	140.00
44	28-1557	.148	.172	.040	.080	—	.640	.250	.125	.040	.020	.210	—	150.00
44	28-1549	.148	.172	.040	.093	—	.781	.078	.125	.040	.015	.062	—	120.00
44	28-1542	.148	.172	.040	.080	—	.493	.093	.170	.020	.020	.063	—	130.00
44	28-1511	.148	.172	.040	.080	—	.493	.093	.180	.040	.020	.062	—	130.00
44	28-1525	.172	.200	.048	.090	—	.500	.120	.125	.075	.020	.080	—	$150.00
44	28-1541	.172	.200	.080	.125	—	.500	.120	.125	.075	.020	.080	—	140.00
44	28-1143	.263	.312	.050	.093	—	.781	.078	.100	.040	.015	—	—	$180.00
46	28-1545	.148	.172	.040	.080	—	.500	.210	.100	.040	.020	.120	—	$160.00
47	28-1598	.148	.172	.040	.080	—	.240	.109	.100	.040	.020	.062	—	$180.00
64	28-2050	.148	.172	.125	.040	.062	.495	.190	.125	.060	.140	.042	—	$180.00
101	28-1140	.171	.187	.050	—	—	1.060	.500	.187	.100	—	—	—	160.00

COLORS: Supplied in White (-101) unless otherwise specified. Ten colors available. **PLATING:** Standard (P-12) unless otherwise specified.
For **COLOR CODE, PLATING SUFFIXES and QUANTITY DISCOUNT SCHEDULES** see **SMITH PAGE 2.884** in this directory

IT'S SOUND PLANNING TO **SPECIFY SMITH** WHEN DESIGNING OR PURCHASING

TEFLON* TERMINALS SPECIFY SMITH

*Du Pont's registered trademark

FEED-THRUS

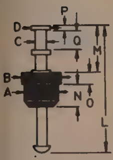


FIG. 37

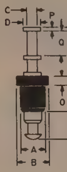


FIG. 38

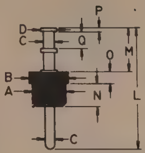


FIG. 39

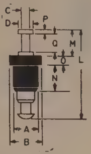


FIG. 40

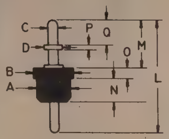


FIG. 41

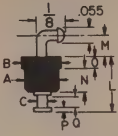


FIG. 45

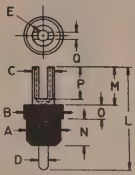


FIG. 87

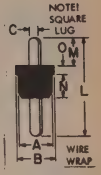


FIG. 100

FOR RAPID SELECTION: terminals are listed (within figure groups) in ascending order of the MOST PERTINENT DIMENSION:

A = MIN. DIA.
B = MAJ. DIA.
N = LGTH. OF MIN. DIA.
O = LGTH. OF MAJ. DIA.
M = LGTH. OF PIN
C = DIA. OF PIN
L = OVERALL LGTH.

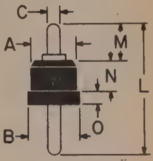


FIG. 36

SUB-MINIATURE TURRET

FIG. No.	SMITH No.	A	B	C	D	E	L	M	N	O	P	Q	R	RESALE Per M
37	82-1516	.093	.125	.040	.080	—	.500	.210	.100	.040	.020	.100	—	$120.00
37	82-1551	.116	.172	.040	.080	—	.500	.210	.100	.040	.020	.100	—	$130.00
37	82-1521	.125	.150	.040	.080	—	.500	.210	.060	.040	.020	.100	—	$120.00
37	82-1518	.148	.172	.040	.080	—	.500	.210	.060	.040	.020	.100	—	$120.00
37	82-1536	.148	.172	.040	.080	—	.685	.395	.065	.040	.020	.070	—	120.00
37	82-1539	.148	.172	.040	.080	—	.438	.210	.083	.040	.020	.100	—	120.00
37	82-1509	.148	.172	.040	.080	—	.438	.210	.100	.040	.020	.100	—	120.00
37	82-1500	.148	.172	.040	.080	—	.500	.210	.100	.040	.020	.100	—	120.00
37	82-1537	.148	.172	.040	.080	—	.550	.245	.125	.040	.020	.100	—	120.00
37	82-1512	.148	.172	.040	.080	—	.609	.210	.125	.093	.020	.100	—	130.00
37	82-1527	.148	.172	.040	.080	—	.609	.210	.158	.060	.020	.100	—	130.00
37	82-1501	.148	.172	.040	.080	—	.500	.210	.165	.040	.020	.100	—	120.00
37	82-1550	.148	.172	.040	.080	—	.531	.210	.165	.040	.020	.100	—	120.00
37	82-1532	.148	.172	.040	.080	—	.609	.210	.165	.040	.020	.100	—	130.00
37	82-1538	.148	.172	.040	.080	—	.812	.210	.165	.040	.020	.100	—	140.00
37	82-1546	.152	.172	.047	.093	—	.437	.156	.088	.040	.020	.047	—	$140.00
37	82-1547	.152	.172	.047	.093	—	.437	.156	.100	.040	.020	.047	—	140.00
37	82-1514	.152	.172	.047	.093	—	.500	.156	.150	.040	.020	.047	—	140.00
37	82-1502	.179	.200	.040	.080	—	.500	.210	.100	.040	.020	.100	—	$130.00
37	82-1515	.185	.218	.040	.080	—	.438	.210	.100	.040	.020	.100	—	$130.00
37	82-1534	.185	.218	.040	.080	—	.609	.210	.125	.093	.020	.100	—	140.00
38	82-1504	.148	.172	.040	.080	—	.531	.210	.100	.040	.020	.100	—	$150.00
38	82-1505	.148	.172	.040	.080	—	.531	.210	.125	.040	.020	.100	—	150.00
38	82-1520	.175	.218	.040	.080	—	.531	.210	.100	.040	.020	.100	—	$160.00
38	82-1506	.185	.218	.040	.080	—	.531	.210	.100	.040	.020	.100	—	$160.00
38	82-1507	.185	.218	.040	.080	—	.531	.210	.125	.040	.020	.100	—	160.00
39	82-1523	.148	.172	.040	.080	—	.531	.210	.100	.040	.020	.100	—	$120.00
40	82-1540	.093	.125	.040	.080	—	.350	.125	.100	.040	.020	.085	—	$120.00
40	82-1524	.125	.150	.040	.080	—	.350	.125	.060	.040	.020	.095	—	$120.00
40	82-1558	.148	.172	.040	.080	—	.380	.090	.100	.040	.020	.060	—	$120.00
40	82-1510	.148	.172	.040	.080	—	.443	.093	.100	.040	.020	.062	—	120.00
40	82-1513	.148	.172	.040	.080	—	.350	.125	.100	.040	.020	.094	—	120.00
40	82-1570	.148	.172	.040	.093	—	.385	.160	.100	.040	.020	.130	—	130.00
40	82-1137	.148	.172	.040	.080	—	.450	.190	.100	.040	.020	.160	—	120.00
40	82-1581	.148	.172	.040	.080	—	.520	.190	.100	.040	.020	.160	—	120.00
40	82-1557	.148	.172	.040	.080	—	.640	.250	.125	.040	.020	.210	—	130.00
40	82-1549	.148	.172	.040	.080	—	.500	.120	.130	.040	.020	.080	—	120.00
40	82-1542	.148	.172	.040	.080	—	.493	.093	.170	.020	.020	.063	—	130.00
40	82-1511	.148	.172	.040	.080	—	.493	.093	.180	.040	.020	.062	—	130.00
40	82-1525	.172	.200	.048	.090	—	.500	.120	.125	.075	.020	.080	—	$150.00
40	82-1541	.172	.200	.080	.125	—	.500	.120	.125	.075	.020	.080	—	140.00
40	82-1143	.263	.312	.050	.093	—	.781	.078	.100	.040	.015	—	—	$170.00
41	82-1545	.148	.172	.040	.080	—	.500	.210	.100	.040	.020	.120	—	$150.00
45	82-1598	.148	.172	.040	.080	—	.350	.097	.100	.040	.020	.062	—	$180.00
87	82-2050	.148	.172	.125	.040	.062	.495	.190	.125	.060	.140	.042	—	210.00
100	82-1140	.171	.187	.050	—	—	1.060	.500	.187	.100	—	—	—	160.00

REVERSED SUB-MINIATURE STRAIGHT PIN

FIG. No.	SMITH No.	A	B	C	D	E	L	M	N	O	P	Q	R	RESALE Per M
36	28-1023	.093	.125	.040	—	—	.375	.147	.075	.040	—	—	—	$120.00
36	28-1025	.093	.125	.040	—	—	.335	.125	.100	.040	—	—	—	120.00
36	28-1076	.093	.125	.040	—	—	.453	.156	.100	.040	—	—	—	140.00
36	28-1022	.093	.125	.040	—	—	.515	.210	.100	.040	—	—	—	140.00
36	28-1077	.093	.125	.040	—	—	.987	.687	.100	.040	—	—	—	150.00
36	28-1031	.125	.150	.040	—	—	.335	.125	.060	.040	—	—	—	120.00
36	28-1032	.125	.150	.040	—	—	.350	.187	.060	.040	—	—	—	120.00
36	28-1018	.125	.150	.040	—	—	.515	.210	.060	.040	—	—	—	$140.00
36	28-1002	.148	.172	.040	—	—	.515	.210	.050	.050	—	—	—	$140.00
36	28-1075	.148	.172	.040	—	—	.325	.075	.100	.040	—	—	—	130.00
36	28-1080	.148	.172	.040	—	—	.443	.093	.100	.040	—	—	—	130.00
36	28-1021	.148	.172	.040	—	—	.375	.125	.100	.040	—	—	—	130.00
36	28-1000	.148	.172	.040	—	—	.443	.210	.100	.040	—	—	—	120.00
36	28-1003	.148	.172	.040	—	—	.515	.210	.100	.040	—	—	—	140.00
36	28-1068	.148	.172	.040	—	—	.562	.210	.100	.040	—	—	—	140.00
36	28-1010	.148	.172	.040	—	—	.725	.210	.100	.040	—	—	—	150.00
36	28-1011	.148	.172	.040	—	—	1.000	.210	.100	.040	—	—	—	150.00
36	28-1084	.148	.172	.045	—	—	.585	.320	.100	.040	—	—	—	140.00
36	28-1033	.148	.172	.040	—	—	.890	.625	.100	.040	—	—	—	150.00
36	28-1069	.148	.172	.040	—	—	.431	.106	.110	.050	—	—	—	120.00
36	28-1001	.148	.172	.040	—	—	.410	.147	.110	.050	—	—	—	120.00
36	28-1004	.148	.172	.040	—	—	.535	.210	.110	.050	—	—	—	120.00
36	28-1007	.148	.172	.040	—	—	.535	.210	.120	.040	—	—	—	120.00
36	28-1028	.148	.172	.040	—	—	.407	.125	.132	.040	—	—	—	120.00
36	28-1086	.148	.172	.040	—	—	2.500	.175	.132	.040	—	—	—	130.00
36	28-1027	.148	.172	.040	—	—	.515	.210	.132	.040	—	—	—	120.00
36	28-1008	.148	.172	.040	—	—	.535	.210	.132	.040	—	—	—	130.00
36	28-1009	.148	.172	.040	—	—	.535	.210	.160	.040	—	—	—	130.00
36	28-1081	.148	.172	.040	—	—	.535	.210	.160	.040	—	—	—	131.00
36	28-1030	.148	.172	.040	—	—	.571	.210	.160	.040	—	—	—	130.00
36	28-1063	.148	.172	.040	—	—	.630	.210	.170	.040	—	—	—	150.00
36	28-1064	.148	.172	.040	—	—	.630	.210	.170	.040	—	—	—	150.00
36	28-1065	.148	.172	.040	—	—	.630	.210	.217	.040	—	—	—	150.00
36	28-1067	.148	.172	.040	—	—	.725	.210	.250	.040	—	—	—	150.00
36	28-1026	.157	.172	.040	—	—	.515	.210	.100	.040	—	—	—	$120.00
36	28-1073	.169	.218	.049	—	—	.250	.125	.100	.040	—	—	—	$210.00
36	28-1072	.169	.218	.049	—	—	.937	.125	.100	.040	—	—	—	210.00
36	28-1071	.169	.218	.049	—	—	1.875	.125	.100	.040	—	—	—	210.00
36	28-1013	.169	.219	.040	—	—	2.500	.460	.100	.040	—	—	—	230.00
36	28-1014	.169	.219	.040	—	—	2.500	.460	.100	.040	—	—	—	230.00
36	28-1082	.171	.218	.040	—	—	1.090	.680	.110	.050	—	—	—	$170.00
36	28-1012	.171	.218	.040	—	—	2.000	.680	.110	.050	—	—	—	230.00
36	28-1015	.172	.195	.040	—	—	.515	.210	.100	.040	—	—	—	$130.00
36	28-1070	.172	.195	.040	—	—	.560	.210	.100	.040	—	—	—	140.00
36	28-1005	.179	.200	.040	—	—	.515	.210	.100	.040	—	—	—	$120.00
36	28-1006	.218	.250	.040	—	—	.515	.210	.100	.040	—	—	—	$130.00

MODERN FACILITIES

We invite you to utilize our modern manufacturing facilities and methods for your molding, screw-machine, stamping or sub-assemblies. We are equipped for both the long run and the short run. From raw material to finished part, SMITH detailed workmanship and production efficiency assure a quality product, speedily and economically made.

COLORS: Supplied in White (-101) unless otherwise specified. Ten colors available. **PLATING:** Standard (P-12) unless otherwise specified.
For COLOR CODE, PLATING SUFFIXES and QUANTITY DISCOUNT SCHEDULES see SMITH PAGE 2.884 in this directory

IT'S SOUND PLANNING TO **SPECIFY SMITH** WHEN DESIGNING OR PURCHASING

SPECIFY SMITH TEFLON* TERMINALS

*Du Pont's registered trademark

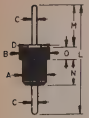


FIG. 28

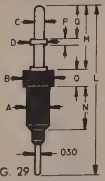


FIG. 29

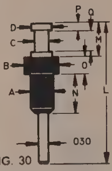


FIG. 30

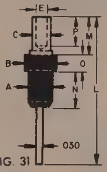


FIG. 31

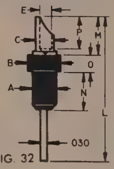


FIG. 32

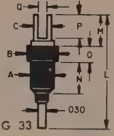


FIG. 33

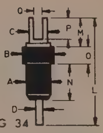


FIG. 34

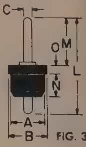


FIG. 35

FEED-THRU MICRO-MINIATURE

FIG.	SMITH	DIMENSIONS												RESALE
No.	No.	A	B	C	D	E	L	M	N	O	P	Q	R	Per M
28	81-1019	.058	.093	.018	.062	—	.450	.200	.060	.020	—	—	—	$290.00
28	81-1016	.075	.093	.030	.060	—	.550	.275	.100	.040	—	—	—	$290.00
29	81-1515	.075	.093	.032	.060	—	1.500	.210	.100	.040	.020	.100	—	$300.00
29	81-1514	.075	.093	.030	.060	—	1.500	.210	.125	.040	.020	.100	—	300.00
29	81-1513	.075	.093	.032	.060	—	1.500	.210	.125	.040	.020	.100	—	300.00
29	81-1516	.075	.093	.032	.060	—	1.700	.210	.125	.090	.020	.100	—	330.00
30	81-1506	.075	.093	.040	.060	—	.250	.090	.060	.030	.020	.050	—	$290.00
30	81-1505	.075	.093	.040	.060	—	.510	.100	.100	.040	.020	.060	—	290.00
31	81-1007	.075	.093	.060	—	.040	.588	.125	.100	.040	.080	—	—	360.00
32	81-1009	.075	.093	.060	—	.040	.588	.120	.100	.040	.080	—	—	$390.00
33	81-2002	.075	.093	.060	—	—	.471	.100	.090	.040	.080	.024	—	$290.00
33	81-2000	.075	.093	.060	—	—	.510	.100	.090	.040	.080	.024	—	290.00
33	81-2001	.075	.093	.060	—	—	.635	.225	.090	.040	.075	.024	—	290.00
34	81-2005	.075	.093	.060	—	—	.320	.100	.100	.040	.080	.024	—	$290.00
34	81-2003	.075	.093	.060	—	—	.510	.100	.100	.040	.080	.024	—	290.00
34	81-2004	.075	.093	.060	—	—	.525	.100	.100	.040	.080	.024	—	260.00
34	81-2016	.075	.093	.060	—	—	.320	.100	.125	.040	.080	.024	—	220.00
34	81-2017	.075	.093	.066	—	—	.320	.100	.125	.040	.080	.024	—	220.00

FEED-THRU SUB-MINIATURE STRAIGHT PIN

FIG.	SMITH	DIMENSIONS												RESALE
No.	No.	A	B	C	D	E	L	M	N	O	P	Q	R	Per M
35	82-1023	.093	.125	.040	—	—	.375	.147	.075	.040	—	—	—	$120.00
35	82-1025	.093	.125	.040	—	—	.337	.125	.100	.040	—	—	—	120.00
35	82-1076	.093	.125	.040	—	—	.453	.156	.100	.040	—	—	—	140.00
35	82-1022	.093	.125	.040	—	—	.515	.210	.100	.040	—	—	—	140.00
35	82-1077	.093	.125	.040	—	—	.987	.687	.100	.040	—	—	—	150.00
35	82-1031	.125	.150	.040	—	—	.335	.125	.060	.040	—	—	—	$120.00
35	82-1032	.125	.150	.040	—	—	.350	.187	.060	.040	—	—	—	120.00
35	82-1018	.125	.150	.040	—	—	.515	.210	.060	.040	—	—	—	140.00
35	82-1002	.148	.172	.040	—	—	.515	.210	.050	.050	—	—	—	$140.00
35	82-1075	.148	.172	.040	—	—	.325	.075	.100	.040	—	—	—	210.00
35	82-1080	.148	.172	.040	—	—	.443	.093	.100	.040	—	—	—	130.00
35	82-1021	.148	.172	.040	—	—	.375	.125	.100	.040	—	—	—	130.00
35	82-1000	.148	.172	.040	—	—	.443	.210	.100	.040	—	—	—	120.00
35	82-1003	.148	.172	.040	—	—	.515	.210	.100	.040	—	—	—	140.00
35	82-1068	.148	.172	.040	—	—	.562	.210	.100	.040	—	—	—	140.00
35	82-1010	.148	.172	.040	—	—	.725	.210	.100	.040	—	—	—	150.00
35	82-1011	.148	.172	.040	—	—	1.000	.210	.100	.040	—	—	—	150.00
35	82-1084	.148	.172	.045	—	—	.585	.320	.100	.040	—	—	—	140.00
35	82-1033	.148	.172	.040	—	—	.890	.625	.100	.040	—	—	—	150.00
35	82-1069	.148	.172	.040	—	—	.431	.106	.110	.050	—	—	—	130.00
35	82-1001	.148	.172	.040	—	—	.410	.147	.110	.050	—	—	—	120.00
35	82-1004	.148	.172	.040	—	—	.535	.210	.110	.050	—	—	—	120.00
35	82-1007	.148	.172	.040	—	—	.535	.210	.120	.040	—	—	—	120.00
35	82-1028	.148	.172	.040	—	—	.407	.125	.132	.040	—	—	—	120.00
35	82-1027	.148	.172	.040	—	—	.515	.210	.132	.040	—	—	—	120.00
35	82-1008	.148	.172	.040	—	—	.535	.210	.132	.040	—	—	—	130.00
35	82-1086	.148	.172	.040	—	—	2.500	.750	.132	.040	—	—	—	220.00
35	82-1009	.148	.172	.040	—	—	.535	.210	.160	.040	—	—	—	130.00
35	82-1081	.148	.172	.040	—	—	.535	.210	.160	.040	—	—	—	130.00
35	82-1030	.148	.172	.040	—	—	.571	.210	.160	.040	—	—	—	130.00
35	82-1063	.148	.172	.040	—	—	.630	.210	.170	.040	—	—	—	150.00
35	82-1064	.148	.172	.040	—	—	.630	.210	.170	.040	—	—	—	150.00
35	82-1065	.148	.172	.040	—	—	.630	.210	.217	.040	—	—	—	150.00
35	82-1067	.148	.172	.040	—	—	.725	.210	.250	.040	—	—	—	150.00
35	82-1026	.157	.172	.040	—	—	.515	.210	.100	.040	—	—	—	$120.00
35	82-1072	.169	.218	.049	—	—	.937	.125	.100	.040	—	—	—	$210.00
35	82-1071	.169	.218	.049	—	—	1.187	.125	.100	.040	—	—	—	210.00
35	82-1073	.169	.218	.049	—	—	1.250	.125	.100	.040	—	—	—	210.00
35	82-1013	.169	.219	.040	—	—	1.500	.460	.100	.040	—	—	—	230.00
35	82-1014	.169	.219	.049	—	—	1.500	.460	.100	.040	—	—	—	230.00
35	82-1082	.171	.218	.040	—	—	1.090	.680	.110	.050	—	—	—	$170.00
35	82-1012	.171	.218	.040	—	—	1.000	.680	.110	.050	—	—	—	230.00
35	82-1015	.172	.195	.040	—	—	.515	.210	.100	.040	—	—	—	$130.00
35	82-1070	.172	.195	.040	—	—	.560	.210	.100	.040	—	—	—	140.00
35	82-1005	.179	.200	.040	—	—	.515	.210	.100	.040	—	—	—	$120.00
35	82-1006	.218	.250	.040	—	—	.515	.210	.100	.040	—	—	—	130.00

FOR RAPID SELECTION:
Terminals are listed (within figure groups) in ascending order of the MOST PERTINENT DIMENSION:

A = MIN. DIA.
B = MAJ. DIA.
N = LGTH. OF MIN. DIA.
O = LGTH. OF MAJ. DIA.
M = LGTH. OF PIN
C = DIA. OF PIN
L = OVERALL LGTH.

METAL HEX STAND-OFFS

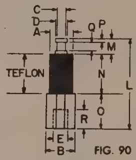


FIG. 90

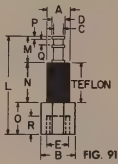


FIG. 91

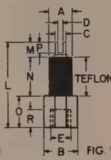


FIG. 92

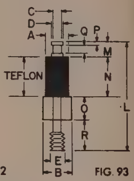


FIG. 93

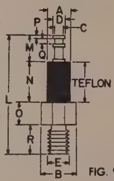


FIG. 94

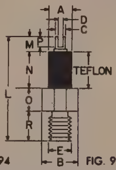


FIG. 95

FOR RAPID SELECTION:
Terminals are listed (within figure groups) in ascending order of the MOST PERTINENT DIMENSION:

R = LGTH. OF THD.
B = DIA. OF HEX
L = OVERALL LGTH.
O = LGTH. OF HEX
N = LGTH. OF TEFLON
A = DIA. OF TEFLON

SUB-MINIATURE TURRET - BIFURCATED

FIG.	SMITH	DIMENSIONS												RESALE
No.	No.	A	B	C	D	E	L	M	N	O	P	Q	R	Per M
90	52-1504	.125	.156	.045	.066	4-40	.484	.079	.303	.181	.018	.049	.100	$470.00
90	52-1503	.245	.250	.039	.140	4-40	.594	.180	.336	.258	.031	.120	.156	530.00
90	52-1510	.245	.250	.039	.140	4-40	1.172	.180	.914	.258	.031	.120	.156	620.00
90	52-1501	.245	.250	.069	.140	6-32	.594	.180	.336	.258	.031	.120	.156	$530.00
90	52-1511	.245	.250	.039	.140	6-32	1.172	.180	.914	.258	.031	.120	.156	620.00
91	52-1500	.125	.156	.045	.066	4-40	.547	.148	.366	.181	.018	.031	.100	$470.00
91	52-1505	.245	.250	.069	.140	4-40	.719	.310	.461	.258	.025	.100	.156	530.00
91	52-1507	.245	.250	.069	.140	4-40	1.297	.310	.750	.258	.025	.100	.156	620.00
91	52-1502	.245	.250	.069	.140	6-32	.719	.310	.461	.258	.025	.100	.156	$470.00
91	52-1508	.245	.250	.069	.140	6-32	1.297	.310	.750	.258	.025	.100	.156	620.00
92	52-2002	.125	.156	.066	.036	4-40	.484	.087	.303	.181	.067	—	.100	$470.00
92	52-2001	.245	.250	.140	.060	4-40	.594	.174	.236	.258	.101	—	.156	470.00
92	52-2003	.245	.250	.140	.060	4-40	1.172	.174	.914	.258	.101	—	.156	620.00
92	52-2000	.245	.250	.140	.060	6-32	.594	.174	.236	.258	.101	—	.156	$470.00
92	52-2004	.245	.250	.140	.060	6-32	1.172	.174	.914	.258	.101	—	.156	620.00
93	53-1504	.125	.156	.045	.066	4-40	.672	.079	.294	.128	.018	.049	.250	$500.00
93	53-1503	.245	.250	.069	.140	4-40	.766	.180	.336	.180	.031	.120	.250	530.00
93	53-1510	.245	.250	.069	.140	4-40	1.344	.180	.914	.180	.031	.120	.250	630.00
93	53-1509	.125	.156	.045	.066	6-32	.672	.079	.294	.128	.018	.049	.250	$500.00
93	53-1501	.245	.250	.069	.140	6-32	.766	.180	.336	.180	.031	.120	.250	530.00
93	53-1511	.245	.250	.069	.140	6-32	1.344	.180	.914	.180	.031	.120	.250	630.00
94	53-1500	.125	.156	.045	.066	4-40	.750	.148	.372	.128	.018	.031	.250	$500.00
94	53-1505	.245	.250	.069	.140	4-40	.890	.310	.460	.180	.025	.100	.250	530.00
94	53-1507	.245	.250	.069	.140	4-40	1.469	.310	.750	.180	.025	.100	.250	630.00
94	53-1506	.125	.156	.045	.066	6-32	.750	.148	.372	.128	.018	.031	.250	$500.00
94	53-1502	.245	.250	.069	.140	6-32	.890	.310	.460	.180	.025	.100	.250	530.00
94	53-1508	.245	.250	.069	.140	6-32	1.469	.310	.750	.180	.025	.100	.250	630.00
95	53-2002	.125	.156	.066	.036	4-40	.672	.087	.294	.128	.067	—	.250	$500.00
95	53-2001	.245	.250	.140	.060	4-40	.766	.174	.336	.180	.101	—	.250	530.00
95	53-2003	.245	.250	.140	.060	4-40	1.344	.174	.914	.180	.101	—	.250	630.00
95	53-2005	.125	.156	.066	.036	6-32	.672	.087	.294	.128	.067	—	.250	$500.00
95	53-2000	.245	.250	.140	.060	6-32	.766	.174	.336	.180	.101	—	.250	530.00
95	53-2004	.245	.250	.140	.060	6-32	1.344	.174	.914	.180	.101	—	.250	630.00

(HEX BASE: Cad. Plate, Chromate Conversion)

COLORS: Supplied in White (-101) unless otherwise specified. Ten colors available. **PLATING:** Standard (P-12) unless otherwise specified.
For **COLOR CODE, PLATING SUFFIXES and QUANTITY DISCOUNT SCHEDULES see SMITH PAGE 2.884 in this directory**

TEFLON* TERMINALS

SPECIFY SMITH

*Du Pont's registered trademark

FEED-THRUS

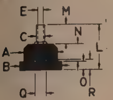


FIG. 55

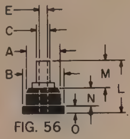


FIG. 56

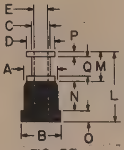


FIG. 57

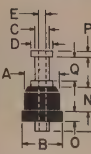


FIG. 58

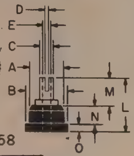


FIG. 53

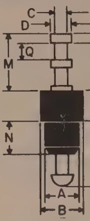


FIG. 59

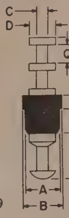


FIG. 60

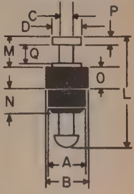


FIG. 61

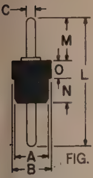


FIG. 62

FOR RAPID SELECTION: terminals are listed (within figure groups) in ascending order of the MOST PERTINENT DIMENSION:

A = MIN. DIA.
B = MAJ. DIA.
N = LGTH. OF MIN. DIA.
O = LGTH. OF MAJ. DIA.
M = LGTH. OF PIN
C = DIA. OF PIN
L = OVERALL LGTH.

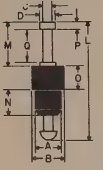


FIG. 63

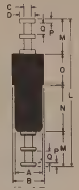


FIG. 65

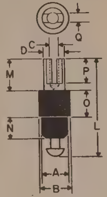


FIG. 66

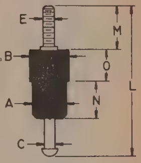


FIG.67

MINIATURE

FIG. No.	SMITH No.	A	B	C	D	E	L	M	N	O	P	Q	R	RESALE Per M
59	83-1509	.148	.172	.040	.093	—	.836	.250	.165	.187	.020	.095	—	$160.00
59	83-1510	.148	.172	.040	.093	—	.836	.250	.230	.125	.020	.095	—	160.00
59	83-1530	.148	.172	.040	.080	—	.812	.210	.287	.046	.020	.100	—	160.00
59	83-1544	.161	.187	.050	.093	—	.836	.250	.212	.187	.020	.093	—	$180.00
59	83-1524	.171	.187	.050	.093	—	.836	.250	.150	.250	.020	.093	—	$180.00
59	83-1511	.171	.187	.050	.093	—	.836	.250	.212	.187	.020	.095	—	180.00
59	83-1553	.171	.187	.050	.093	—	1.337	.281	.400	.375	.031	.093	—	240.00
59	83-1512	.204	.250	.040	.093	—	.836	.250	.212	.187	.020	.093	—	$200.00
59	83-1513	.230	.250	.040	.093	—	.836	.250	.212	.187	.020	.093	—	$200.00
59	83-1501	.234	.250	.040	.080	—	.500	.210	.100	.040	.020	.100	—	$150.00
59	83-1500	.264	.312	.040	.080	—	.531	.210	.100	.040	.020	.100	—	$150.00
60	83-1516	.171	.187	.062	.125	—	.828	.281	.200	.125	.031	.093	—	$150.00
60	83-1515	.185	.218	.062	.125	—	.828	.281	.210	.094	.031	.093	—	$180.00
60	83-1542	.185	.218	.062	.125	—	.828	.281	.212	.187	.031	.093	—	180.00
60	83-1570	.218	.250	.062	.125	—	.828	.281	.212	.050	.031	.093	—	$190.00
60	83-1571	.218	.250	.062	.125	—	.828	.281	.310	.050	.031	.093	—	190.00
61	83-1540	.171	.187	.050	.093	—	.740	.125	.125	.187	.020	.093	—	$160.00
61	83-1505	.171	.187	.050	.093	—	.740	.125	.150	.250	.031	.062	—	160.00
61	83-1502	.171	.187	.046	.093	—	.540	.133	.171	.063	.020	.093	—	120.00
61	83-1504	.171	.187	.050	.093	—	.740	.125	.212	.187	.031	.062	—	160.00
61	83-1521	.171	.187	.050	.125	—	1.115	.125	.212	.562	.031	.062	—	250.00
61	83-1506	.171	.187	.050	.093	—	.865	.125	.275	.250	.031	.062	—	240.00
61	83-1551	.171	.187	.050	.093	—	1.115	.125	.318	.365	.031	.062	—	240.00
61	83-1552	.171	.187	.050	.093	—	1.115	.125	.340	.375	.031	.062	—	240.00
61	83-1507	.171	.187	.050	.125	—	1.115	.125	.400	.375	.031	.062	—	230.00
61	83-1520	.171	.250	.050	.093	—	.740	.125	.212	.187	.031	.062	—	190.00
61	83-1522	.171	.250	.050	.125	—	1.365	.125	.525	.500	.031	.062	—	250.00
61	83-1523	.171	.250	.050	.125	—	1.965	.125	.825	.800	.031	.062	—	390.00
61	83-1503	.185	.215	.046	.093	—	.640	.133	.210	.093	.020	.093	—	$150.00
61	83-1519	.185	.215	.046	.093	—	.718	.133	.288	.093	.020	.093	—	160.00
61	83-1508	.217	.250	.050	.125	—	1.365	.125	.525	.500	.031	.062	—	$310.00
61	83-1514	.217	.250	.050	.125	—	1.965	.125	.825	.800	.031	.062	—	350.00
62	83-1002	.148	.172	.040	—	—	.619	.187	.105	.140	—	—	—	$160.00
62	83-1000	.165	.187	.040	—	—	.675	.200	.150	.125	—	—	—	$160.00
62	83-1001	.165	.187	.040	—	—	.710	.210	.150	.125	—	—	—	160.00
62	83-1003	.171	.187	.046	—	—	.540	.133	.171	.063	—	—	—	$160.00
62	83-1004	.171	.187	.063	—	—	.740	.125	.212	.187	—	—	—	160.00
62	83-1005	.171	.187	.050	—	—	.865	.125	.275	.250	—	—	—	160.00
63	83-1531	.171	.312	.125	.188	—	.506	.099	.171	.063	.020	.048	—	180.00
63	83-1532	.171	.312	.046	.093	—	.540	.133	.171	.063	.020	.093	—	180.00
65	83-1525	.218	.250	.062	.125	—	1.187	.281	.375	.250	.031	.093	—	$310.00
65	83-1526	.218	.250	.062	.125	—	1.687	.281	.625	.500	.031	.093	—	380.00
65	83-1527	.218	.250	.062	.125	—	2.287	.281	.925	.800	.031	.093	—	540.00
66	83-2050	.148	.172	.062	.125	—	.495	.190	.125	.060	.140	.042	—	$200.00
66	83-2031	.171	.187	.078	.148	—	.593	.203	.150	.100	.156	.046	—	$220.00
66	83-2001	.171	.187	.046	.148	—	.821	.203	.212	.187	.156	.030	—	220.00
66	83-2000	.171	.187	.078	.148	—	.821	.203	.212	.187	.156	.046	—	220.00
66	83-2003	.171	.187	.046	.148	—	.947	.203	.275	.250	.156	.030	—	220.00
66	83-2002	.171	.187	.078	.148	—	.947	.203	.275	.250	.156	.046	—	240.00
66	83-2005	.171	.187	.046	.148	—	1.197	.203	.400	.375	.156	.030	—	260.00
66	83-2004	.171	.187	.078	.148	—	1.197	.203	.400	.375	.156	.046	—	260.00
66	83-2007	.171	.187	.078	.148	—	1.197	.203	.525	.250	.156	.046	—	260.00
66	83-2006	.171	.187	.078	.148	—	1.197	.203	.550	.225	.156	.046	—	260.00
66	83-2034	.218	.250	.086	.156	—	.828	.281	.310	.050	.200	—	—	$240.00
67	83-2500	.171	.187	.050	—	4-36	.899	.281	.212	.187	—	—	—	$230.00
67	83-2502	.171	.187	.050	—	4-36	1.024	.281	.212	.250	—	—	—	240.00
67	83-2504	.171	.187	.050	—	4-36	1.274	.281	.212	.375	—	—	—	240.00
67	83-2501	.171	.187	.050	—	4-40	.899	.281	.212	.187	—	—	—	230.00
67	83-2503	.171	.187	.050	—	4-40	1.024	.281	.212	.250	—	—	—	240.00
67	83-2505	.171	.187	.050	—	4-40	1.274	.281	.212	.375	—	—	—	250.00

REVERSED SUB-MINIATURE TUBULAR

FIG. No.	SMITH No.	A	B	C	D	E	L	M	N	O	P	Q	R	RESALE Per M
55	28-1046	.148	.172	.040	—	.030	.282	.147	.075	.060	—	.070	.042	$150.00
55	28-1085	.148	.172	.040	—	.030	.387	.207	.110	.050	—	.050	.050	150.00
55	28-1150	.148	.172	.072	—	.052	.606	.025	.220	.025	—	.062	.011	150.00
55	28-1088	.171	.218	.085	—	.063	.710	.500	.160	.040	—	.085	.050	$160.00
55	28-1047	.171	.218	.085	—	.063	.417	.207	.160	.050	—	.085	.050	160.00
55	28-1044	.200	.240	.040	—	.030	.367	.207	.110	.050	—	.050	.057	$160.00
55	28-1045	.218	.250	.060	—	.030	.287	.147	.100	.040	—	.050	.030	$160.00
56	28-1134	.093	.125	.040	—	.030	.215	.125	.050	.040	—	—	—	$150.00
56	28-1040	.093	.125	.040	—	.030	.225	.125	.060	.040	—	—	—	150.00
56	28-1135	.093	.125	.040	—	.030	.312	.207	.060	.040	—	—	—	150.00
56	28-1115	.093	.125	.040	—	.030	.317	.187	.090	.040	—	—	—	150.00
56	28-1116	.093	.125	.040	—	.030	.405	.275	.090	.040	—	—	—	150.00
56	28-1161	.093	.125	.043	—	.030	.252	.100	.110	.040	—	—	—	150.00
56	28-1037	.120	.130	.040	—	.030	.310	.207	.053	.050	—	—	—	$150.00
56	28-1036	.125	.150	.040	—	.030	.225	.125	.060	.040	—	—	—	$140.00
56	28-1151	.125	.150	.040	—	.030	.225	.126	.075	.025	—	—	—	140.00
56	28-1126	.125	.150	.040	—	.030	.247	.147	.075	.025	—	—	—	140.00
56	28-1124	.125	.150	.040	—	.030	.325	.125	.075	.125	—	—	—	140.00
56	28-1123	.148	.172	.040	—	.030	.245	.147	.053	.045	—	—	—	$150.00
56	28-1035	.148	.172	.040	—	.030	.250	.147	.053	.050	—	—	—	150.00
56	28-1034	.148	.172	.040	—	.030	.310	.207	.053	.050	—	—	—	150.00
56	28-1127	.148	.172	.080	—	.052	.193	.105	.063	.025	—	—	—	150.00
56	28-1090	.148	.172	.085	—	.063	.332	.207	.075	.050	—	—	—	150.00
56	28-1038	.148	.172	.040	—	.030	.296	.136	.100	.060	—	—	—	150.00
56	28-1017	.148	.172	.085	—	.063	.367	.207	.110	.050	—	—	—	150.00
56	28-1091	.148	.172	.085	—	.070	.367	.207	.110	.050	—	—	—	150.00
56	28-1089	.148	.172	.085	—	.063	.413	.207	.156	.050	—	—	—	150.00
56	28-1039	.171	.218	.040	—	.030	.367	.207	.110	.050	—	—	—	$160.00
56	28-1041	.171	.218	.085	—	.063	.367	.207	.110	.050	—	—	—	160.00
56	28-1024	.200	.240	.085	—	.063	.367	.207	.110	.050	—	—	—	$180.00
57	28-1119	.093	.125	.040	.080	.030	.215	.125	.050	.040	.020	.093	—	$150.00
57	28-1120	.125	.150	.060	.090	.030	.293	.133	.060	.040	.020	.093	—	$140.00
57	28-1122	.125	.150	.060	.090	.030	.200	.090	.060	.050	.020	.093	—	140.00
57	28-1049	.125	.150	.060	.090	.030	.273	.133	.080	.060	.020	.093	—	140.00
57	28-1103	.125	.150	.060	.090	.030	.273	.133	.100	.040	.020	.093	—	140.00
57	28-1118	.125	.150	.060	.090	.030	.293	.133	.110	.050	.020	.093	—	140.00
57	28-1093	.148	.172	.060	.093	.040	.238	.133	.065	.040	.020	.093	—	$160.00
57	28-1054	.148	.172	.060	.090	.030	.273	.133	.100	.040	.020	.093	—	160.00
57	28-1096	.148	.172	.060	.093	.030	.293	.133	.110	.050	.020	.093	—	160.00
57	28-1016	.148	.172	.082	.125	.063	.351	.133	.125	.093	.020	.093	—	160.00
57	28-1092	.148	.172	.060	.090	.030	.303	.133	.130	.040	.020	.093	—	160.00
57	28-1060	.148	.172	.060	.093	.042	.392	.162	.130	.100	.020	.130	—	160.00
57	28-1052	.171	.188	.082	.125	.062	.381	.133	.125	.093	.020	.093	—	$160.00
57	28-1048	.263	.297	.060	.090	.030	.333	.133	.160	.040	.020	.093	—	$200.00
58	28-1050	.148	.172	.060	.090	.030	.303	.133	.100	.040	.020	.093	—	$170.00
58	28-1051	.148	.172	.060	.090	.030	.333	.133	.110	.050	.020	.093	—	171.00
53	28-2015	.125	.150	.050	.030	.030	.160	.062	.073	.025	—	—	—	$230.00

COLORS: Supplied in White (-101) unless otherwise specified.
Ten colors available.
PLATING: Standard (P-12) unless otherwise specified.

For COLOR CODE, PLATING SUFFIXES and QUANTITY DISCOUNT SCHEDULES see SMITH PAGE 2.884 in this directory

SPECIFY SMITH TEFLON* TERMINALS

*Du Pont's registered trademark

STAND-OFFS

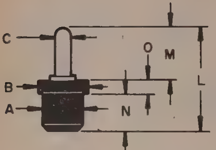


Fig. 1

FOR RAPID SELECTION: terminals are listed (within figure groups) in ascending order of the MOST PERTINENT DIMENSION:

A = MIN. DIA.
B = MAJ. DIA.
N = LGTH. OF MIN. DIA.
O = LGTH. OF MAJ. DIA.
M = LGTH. OF PIN
C = DIA. OF PIN
L = OVERALL LGTH.

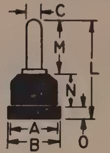


Fig. 2

SUB-MINIATURE STRAIGHT PIN

FIG.	SMITH	DIMENSIONS												RESALE
No.	No.	A	B	C	D	E	L	M	N	O	P	Q	R	Per M
1	92-1025	.093	.125	.040	—	—	.262	.147	.075	.050	—	—	—	$130.00
1	92-1055	.093	.125	.040	—	—	.299	.174	.085	.040	—	—	—	130.00
1	92-1053	.093	.125	.040	—	—	.213	.093	.089	.031	—	—	—	130.00
1	92-1066	.093	.125	.040	—	—	.250	.130	.089	.031	—	—	—	130.00
1	92-1034	.093	.125	.040	—	—	.350	.210	.100	.040	—	—	—	130.00
1	92-1089	.093	.125	.040	—	—	.572	.432	.100	.040	—	—	—	130.00
1	92-1095	.093	.125	.040	—	—	.587	.447	.100	.040	—	—	—	130.00
1	92-1089	.093	.125	.040	—	—	.672	.532	.100	.040	—	—	—	130.00
1	92-1090	.093	.125	.040	—	—	.737	.597	.100	.040	—	—	—	160.00
1	92-1094	.093	.125	.040	—	—	.755	.615	.100	.040	—	—	—	160.00
1	92-1091	.093	.125	.040	—	—	.770	.630	.100	.040	—	—	—	160.00
1	92-1098	.093	.125	.040	—	—	.797	.657	.100	.040	—	—	—	160.00
1	92-1086	.093	.125	.040	—	—	1.025	.885	.100	.040	—	—	—	200.00
1	92-1087	.093	.125	.040	—	—	1.125	.985	.100	.040	—	—	—	200.00
1	92-1003	.104	.125	.040	—	—	.250	.130	.098	.031	—	—	—	$130.00
1	92-1035	.104	.125	.040	—	—	.250	.130	.089	.031	—	—	—	130.00
1	92-1067	.106	.125	.040	—	—	.250	.130	.089	.031	—	—	—	$130.00
1	92-1070	.112	.172	.040	—	—	.350	.210	.120	.020	—	—	—	$120.00
1	92-1061	.112	.172	.040	—	—	.350	.210	.120	.020	—	—	—	120.00
1	92-1971	.125	.150	.040	—	—	.310	.210	.060	.040	—	—	—	$130.00
1	92-1022	.148	.172	.040	—	—	.247	.147	.050	.050	—	—	—	$130.00
1	92-1020	.148	.172	.040	—	—	.310	.210	.050	.050	—	—	—	130.00
1	92-1052	.148	.172	.040	—	—	.210	.120	.060	.030	—	—	—	130.00
1	92-1054	.148	.172	.040	—	—	.350	.210	.062	.076	—	—	—	130.00
1	92-1008	.148	.172	.040	—	—	.350	.210	.062	.078	—	—	—	130.00
1	92-1015	.148	.172	.040	—	—	.250	.150	.070	.030	—	—	—	130.00
1	92-1037	.148	.172	.040	—	—	.260	.145	.075	.040	—	—	—	130.00
1	92-1038	.148	.172	.040	—	—	.230	.105	.075	.050	—	—	—	130.00
1	92-1012	.148	.172	.040	—	—	.335	.210	.075	.050	—	—	—	130.00
1	92-1006	.148	.172	.040	—	—	.345	.210	.075	.060	—	—	—	130.00
1	92-1062	.148	.172	.040	—	—	.330	.210	.100	.020	—	—	—	130.00
1	92-1017	.148	.172	.040	—	—	.250	.110	.100	.040	—	—	—	130.00
1	92-1016	.148	.172	.040	—	—	.265	.125	.100	.040	—	—	—	130.00
1	92-1018	.148	.172	.040	—	—	.285	.145	.100	.040	—	—	—	130.00
1	92-1000	.148	.172	.040	—	—	.350	.210	.100	.040	—	—	—	130.00
1	92-1050	.148	.172	.040	—	—	.460	.320	.100	.040	—	—	—	130.00
1	92-1011	.148	.172	.040	—	—	.594	.450	.100	.040	—	—	—	130.00
1	92-1019	.148	.172	.040	—	—	.750	.610	.100	.040	—	—	—	130.00
1	92-1085	.148	.172	.040	—	—	.797	.657	.100	.040	—	—	—	130.00
1	92-1021	.148	.172	.040	—	—	.305	.145	.110	.050	—	—	—	130.00
1	92-1001	.148	.172	.040	—	—	.370	.210	.110	.050	—	—	—	130.00
1	92-1069	.148	.172	.040	—	—	.350	.210	.120	.020	—	—	—	130.00
1	92-1007	.148	.172	.040	—	—	.370	.210	.120	.040	—	—	—	130.00
1	92-1060	.148	.172	.040	—	—	.350	.210	.125	.015	—	—	—	130.00
1	92-1051	.148	.172	.040	—	—	.280	.125	.125	.040	—	—	—	130.00
1	92-1036	.148	.172	.040	—	—	.365	.193	.132	.040	—	—	—	130.00
1	92-1068	.148	.172	.040	—	—	.382	.210	.132	.040	—	—	—	130.00
1	92-1072	.148	.172	.040	—	—	.390	.218	.132	.040	—	—	—	130.00
1	92-1073	.148	.172	.040	—	—	.750	.578	.132	.040	—	—	—	130.00
1	92-1009	.148	.172	.040	—	—	.406	.210	.156	.040	—	—	—	130.00
1	92-1010	.148	.172	.040	—	—	.500	.210	.250	.040	—	—	—	130.00
1	92-1063	.148	.172	.040	—	—	.500	.210	.250	.040	—	—	—	130.00
1	92-1003	.171	.195	.040	—	—	.350	.210	.100	.040	—	—	—	$130.00
1	92-1004	.179	.200	.040	—	—	.350	.210	.100	.040	—	—	—	$130.00
1	92-1005	.218	.250	.040	—	—	.350	.210	.100	.040	—	—	—	$130.00

REVERSED SUB-MINIATURE STRAIGHT PIN

FIG.	SMITH	DIMENSIONS												RESALE
No.	No.	A	B	C	D	E	L	M	N	O	P	Q	R	Per M
2	29-1025	.093	.125	.040	—	—	.262	.147	.075	.050	—	—	—	$130.00
2	29-1055	.093	.125	.040	—	—	.299	.174	.085	.040	—	—	—	130.00
2	29-1053	.093	.125	.040	—	—	.213	.093	.089	.031	—	—	—	130.00
2	29-1066	.093	.125	.040	—	—	.250	.130	.089	.031	—	—	—	130.00
2	29-1034	.093	.125	.040	—	—	.350	.210	.100	.040	—	—	—	130.00
2	29-1089	.093	.125	.040	—	—	.572	.432	.100	.040	—	—	—	130.00
2	29-1095	.093	.125	.040	—	—	.587	.447	.100	.040	—	—	—	130.00
2	29-1088	.093	.125	.040	—	—	.672	.532	.100	.040	—	—	—	130.00
2	29-1090	.093	.125	.040	—	—	.737	.597	.100	.040	—	—	—	140.00
2	29-1094	.093	.125	.040	—	—	.755	.615	.100	.040	—	—	—	160.00
2	29-1091	.148	.172	.040	—	—	.795	.630	.100	.065	—	—	—	160.00
2	29-1098	.093	.125	.040	—	—	.797	.657	.100	.040	—	—	—	160.00
2	29-1086	.093	.125	.040	—	—	1.025	.885	.100	.040	—	—	—	200.00
2	29-1087	.093	.125	.040	—	—	1.125	.985	.100	.040	—	—	—	200.00
2	29-1003	.104	.125	.040	—	—	.250	.130	.089	.031	—	—	—	130.00
2	29-1035	.104	.125	.040	—	—	.250	.130	.089	.031	—	—	—	$130.00
2	29-1067	.106	.125	.040	—	—	.250	.130	.089	.031	—	—	—	120.00
2	29-1070	.112	.172	.040	—	—	.350	.210	.120	.020	—	—	—	$120.00
2	29-1061	.112	.172	.040	—	—	.350	.210	.125	.015	—	—	—	$120.00
2	29-1071	.125	.150	.040	—	—	.310	.210	.060	.040	—	—	—	130.00
2	29-1022	.148	.172	.040	—	—	.247	.147	.050	.050	—	—	—	130.00
2	29-1020	.148	.172	.040	—	—	.310	.210	.050	.050	—	—	—	130.00
2	29-1052	.148	.172	.040	—	—	.210	.120	.060	.030	—	—	—	130.00
2	29-1008	.148	.172	.040	—	—	.350	.210	.062	.078	—	—	—	130.00
2	29-1054	.148	.172	.040	—	—	.350	.210	.062	.078	—	—	—	130.00
2	29-1015	.148	.172	.040	—	—	.250	.150	.070	.030	—	—	—	130.00
2	29-1037	.148	.172	.040	—	—	.260	.145	.075	.040	—	—	—	130.00
2	29-1038	.148	.172	.040	—	—	.230	.105	.075	.050	—	—	—	130.00
2	29-1012	.148	.172	.040	—	—	.335	.210	.075	.050	—	—	—	130.00
2	29-1006	.148	.172	.040	—	—	.345	.210	.075	.060	—	—	—	130.00
2	29-1062	.148	.172	.040	—	—	.330	.210	.100	.020	—	—	—	130.00
2	29-1017	.148	.172	.040	—	—	.250	.110	.100	.040	—	—	—	130.00
2	29-1016	.148	.172	.040	—	—	.265	.125	.100	.040	—	—	—	130.00
2	29-1018	.148	.172	.040	—	—	.285	.145	.100	.040	—	—	—	130.00
2	29-1000	.148	.172	.040	—	—	.350	.210	.100	.040	—	—	—	130.00
2	29-1050	.148	.172	.040	—	—	.460	.320	.100	.040	—	—	—	130.00
2	29-1011	.148	.172	.040	—	—	.594	.450	.100	.040	—	—	—	130.00
2	29-1019	.148	.172	.040	—	—	.750	.610	.100	.040	—	—	—	140.00
2	29-1085	.148	.172	.040	—	—	.797	.657	.100	.040	—	—	—	130.00
2	29-1021	.148	.172	.040	—	—	.305	.145	.110	.050	—	—	—	130.00
2	29-1001	.148	.172	.040	—	—	.370	.210	.110	.050	—	—	—	130.00
2	29-1069	.148	.172	.040	—	—	.350	.210	.120	.020	—	—	—	130.00
2	29-1007	.148	.172	.040	—	—	.370	.210	.120	.040	—	—	—	130.00
2	29-1060	.148	.172	.040	—	—	.350	.210	.125	.015	—	—	—	130.00
2	29-1051	.148	.172	.040	—	—	.280	.125	.125	.040	—	—	—	130.00
2	29-1036	.148	.172	.040	—	—	.365	.193	.132	.040	—	—	—	130.00
2	29-1068	.148	.172	.040	—	—	.382	.210	.132	.040	—	—	—	130.00
2	29-1072	.148	.172	.040	—	—	.390	.218	.132	.040	—	—	—	130.00
2	29-1073	.148	.172	.040	—	—	.750	.578	.132	.040	—	—	—	140.00
2	29-1009	.148	.172	.040	—	—	.406	.210	.156	.040	—	—	—	130.00
2	29-1010	.148	.172	.040	—	—	.500	.210	.250	.040	—	—	—	130.00
2	29-1063	.148	.172	.040	—	—	.330	.210	.074	.046	—	—	—	130.00
2	19-1003	.171	.195	.040	—	—	.350	.210	.100	.040	—	—	—	$130.00
2	29-1004	.179	.200	.040	—	—	.350	.210	.100	.040	—	—	—	$130.00
2	29-1005	.218	.250	.040	—	—	.350	.210	.100	.040	—	—	—	$130.00

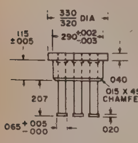
COLORS: Supplied in White (-101) unless otherwise specified. Ten colors available. **PLATING:** Standard (P-12) unless otherwise specified. For **COLOR CODE, PLATING SUFFIXES** and **QUANTITY DISCOUNT SCHEDULES** see **SMITH PAGE 2.884** in this directory

TEFLON* TRANSISTOR HOLDERS

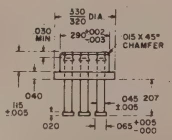
These holders provide insulated top and botton chassis mounting support of transistors. They have thru-holes and turreted solder terminals for wiring transistor leads and passive components, eliminating the need of a pad and providing total insulation and strain relief.

Holders shown represent the basic configurations available for JEDEC Packages TO-5 (.200" Dia. Pitch Circle) and TO-18 (.100" Dia. Pitch Circle.) Other styles and variations are constantly being added. Consult our ENGINEERING Dept for special requirements.

TYPE

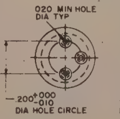


STANDARD

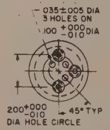


REVERSED

3-PIN

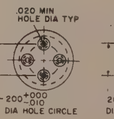


A
3 PINS

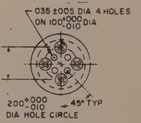


B
3 PINS
3 HOLES

4-PIN



C
4 PINS



D
4 PINS
4 HOLES

3-PIN

No.	Type	Fig.	NET Each
34-1000	Std.	A	$.18
43-1000	Rev.	A	.18
34-1003	Std.	B	.18
43-1003	Rev.	B	.18

4-PIN

No.	Type	Fig.	NET Each
34-1100	Std.	C	$.20
43-1100	Rev.	C	.20
34-1104	Std.	D	.20
43-1104	Rev.	D	.20

SUGGESTED RESALE

1 - 99	NET
100 - 249	10% Off
250 - 499	15% Off
500 - 999	25% Off
1000 and up	On Request

IT'S SOUND PLANNING TO **SPECIFY SMITH** WHEN DESIGNING OR PURCHASING

SPECIFY SMITH TEFLON* TERMINALS

*Du Pont's registered trademark

STAND-OFFS

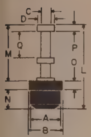


FIG. 3

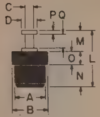


FIG. 4

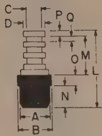


FIG. 5

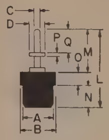


FIG. 6

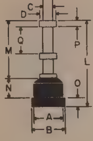


FIG. 9

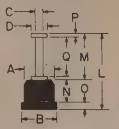


FIG. 10

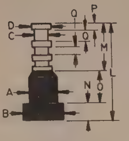


FIG. 11

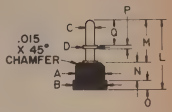


FIG. 12

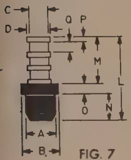


FIG. 7

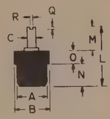


FIG. 8

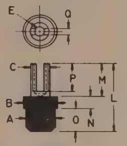


FIG. 16

FOR RAPID SELECTION:
terminals are listed (within figure groups) in ascending order of the MOST PERTINENT DIMENSION:

A = MIN. DIA.
B = MAJ. DIA.
N = LGTH. OF MIN. DIA.
O = LGTH. OF MAJ. DIA.
M = LGTH. OF PIN
C = DIA. OF PIN
L = OVERALL LGTH.

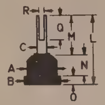


FIG. 13

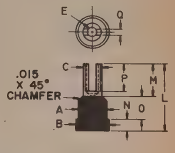


FIG. 14

SUB-MINIATURE
TURRET - SINGLE - MULTIPLE BIFURCATED

FIG. No.	SMITH No.	A	B	C	D	E	L	M	N	O	P	Q	R	RESALE Per M
3	92-1577	.093	.125	.040	.080	—	.280	.140	.100	.040	.030	.040	—	$130.00
3	92-1500	.093	.125	.030	.060	—	.310	.170	.100	.040	.020	.060	—	120.00
3	92-1528	.093	.125	.040	.080	—	.350	.210	.100	.040	.020	.100	—	130.00
3	92-1587	.093	.125	.040	.080	—	.390	.210	.140	.040	.020	.100	—	130.00
3	92-1540	.130	.172	.040	.093	—	.480	.250	.190	.040	.020	.093	—	$130.00
3	92-1519	.148	.172	.046	.090	—	.254	.154	.060	.040	.020	.046	—	$120.00
3	92-1511	.148	.172	.046	.093	—	.296	.156	.100	.040	.020	.046	—	120.00
3	92-1500	.148	.172	.040	.080	—	.350	.210	.100	.040	.020	.100	—	120.00
3	92-1578	.148	.172	.040	.080	—	.390	.250	.100	.040	.020	.093	—	120.00
3	92-1573	.148	.172	.040	.080	—	.400	.210	.100	.090	.020	.093	—	120.00
3	92-1586	.148	.172	.045	.093	—	.443	.250	.100	.093	.020	.085	—	120.00
3	92-1542	.148	.172	.040	.080	—	.359	.210	.109	.040	.020	.100	—	120.00
3	92-1570	.148	.172	.046	.093	—	.319	.154	.125	.040	.020	.046	—	120.00
3	92-1501	.148	.172	.040	.080	—	.375	.210	.125	.040	.020	.100	—	120.00
3	92-1505	.148	.172	.040	.080	—	.428	.210	.125	.093	.020	.100	—	120.00
3	92-1504	.148	.172	.046	.093	—	.334	.154	.140	.040	.020	.046	—	120.00
3	92-1566	.148	.172	.040	.080	—	.406	.210	.156	.040	.020	.100	—	120.00
3	92-1524	.148	.172	.040	.080	—	.461	.210	.158	.093	.020	.100	—	120.00
3	92-1506	.148	.172	.040	.093	—	.455	.250	.160	.040	.020	.093	—	120.00
3	92-1567	.148	.172	.040	.093	—	.470	.250	.180	.040	.020	.093	—	120.00
3	92-1507	.148	.172	.040	.093	—	.500	.210	.250	.040	.020	.100	—	120.00
3	92-1512	.148	.172	.040	.080	—	.540	.250	.250	.040	.020	.093	—	120.00
3	92-1534	.152	.172	.047	.093	—	.335	.207	.088	.040	.020	.093	—	$120.00
3	92-1532	.152	.172	.047	.093	—	.296	.156	.100	.040	.020	.047	—	120.00
3	92-1535	.152	.172	.047	.093	—	.347	.207	.100	.040	.020	.093	—	120.00
3	92-1531	.152	.172	.047	.093	—	.346	.156	.150	.040	.020	.047	—	120.00
3	92-1533	.152	.172	.047	.093	—	.361	.156	.165	.040	.020	.047	—	120.00
3	92-1513	.171	.187	.040	.080	—	.405	.210	.155	.040	.020	.100	—	$130.00
3	92-1502	.179	.200	.040	.080	—	.350	.210	.100	.040	.020	.100	—	$130.00
3	92-1508	.185	.218	.040	.080	—	.350	.210	.100	.040	.020	.100	—	$130.00
3	92-1523	.185	.218	.040	.080	—	.460	.300	.120	.040	.020	.140	—	130.00
3	92-1503	.185	.218	.040	.080	—	.375	.210	.125	.040	.020	.100	—	130.00
3	92-1526	.204	.250	.040	.080	—	.350	.210	.100	.040	.020	.100	—	$140.00
4	92-1579	.093	.125	.040	.080	—	.230	.090	.100	.040	.020	.060	—	$130.00
4	92-1527	.148	.172	.040	.080	—	.262	.125	.087	.050	.020	.085	—	$130.00
4	92-1525	.148	.172	.040	.080	—	.250	.110	.100	.040	.020	.080	—	130.00
4	92-1563	.148	.172	.046	.093	—	.296	.156	.100	.040	.020	.116	—	130.00
4	92-1562	.148	.172	.040	.080	—	.382	.227	.130	.025	.020	.187	—	130.00
4	92-1571	.148	.172	.045	.093	—	.468	.250	.168	.050	.020	.180	—	150.00
4	92-1521	.148	.172	.040	.080	—	.455	.227	.187	.040	.020	.187	—	130.00
4	92-1581	.150	.175	.045	.093	—	.468	.250	.168	.050	.020	.190	—	130.00
4	92-1520	.171	.200	.048	.090	—	.320	.120	.125	.075	.020	.080	—	$150.00
5	92-1517	.148	.172	.070	.109	—	.362	.232	.080	.050	.029	.031	—	$180.00
5	92-1514	.148	.172	.070	.109	—	.392	.232	.110	.050	.029	.031	—	180.00
6	92-1509	.148	.172	.040	.080	—	.328	.210	.075	.040	.020	.120	—	$130.00
6	92-1545	.148	.172	.040	.080	—	.350	.210	.100	.040	.020	.120	—	130.00
6	92-1546	.148	.172	.040	.080	—	.415	.210	.165	.040	.020	.120	—	130.00
7	92-1516	.093	.125	.068	.078	—	.255	.150	.075	.030	.015	.031	—	$160.00
7	92-1515	.093	.125	.068	.078	—	.344	.153	.140	.041	.015	.031	—	160.00
8	92-2008	.104	.125	.080	—	—	.350	.210	.100	.040	—	.180	.036	$180.00
8	92-2000	.148	.172	.040	—	—	.265	.125	.100	.040	—	.010	.010	$180.00
16	92-2010	.148	.172	.125	—	.062	.375	.190	.125	.060	.140	.030	—	$180.00

REVERSED SUB-MINIATURE
TURRET - SINGLE - MULTIPLE BIFURCATED

FIG. No.	SMITH No.	A	B	C	D	E	L	M	N	O	P	Q	R	RESALE Per M
9	29-1577	.093	.125	.040	.080	—	.280	.140	.100	.040	.020	.040	—	$130.00
9	19-1500	.093	.125	.030	.060	—	.310	.170	.100	.040	.020	.060	—	120.00
9	29-1528	.093	.125	.040	.080	—	.350	.210	.100	.040	.020	.100	—	130.00
9	29-1587	.093	.125	.040	.080	—	.390	.210	.140	.040	.020	.100	—	130.00
9	29-1540	.130	.172	.040	.093	—	.480	.250	.190	.040	.020	.093	—	$130.00
9	29-1519	.148	.172	.046	.093	—	.254	.154	.060	.040	.020	.046	—	$120.00
9	29-1511	.148	.172	.046	.093	—	.296	.156	.100	.040	.020	.046	—	120.00
9	29-1500	.148	.172	.040	.080	—	.350	.210	.100	.040	.020	.100	—	120.00
9	29-1578	.148	.172	.040	.080	—	.390	.250	.100	.040	.020	.093	—	120.00
9	29-1573	.148	.172	.040	.080	—	.400	.210	.100	.090	.020	.093	—	120.00
9	29-1586	.148	.172	.045	.093	—	.443	.250	.100	.093	.020	.085	—	120.00
9	29-1542	.148	.172	.040	.080	—	.359	.210	.109	.040	.020	.100	—	120.00
9	29-1570	.148	.172	.046	.093	—	.319	.154	.125	.040	.020	.046	—	120.00
9	29-1501	.148	.172	.040	.080	—	.375	.210	.125	.040	.020	.100	—	120.00
9	29-1505	.148	.172	.040	.080	—	.428	.210	.125	.093	.020	.100	—	120.00
9	29-1504	.148	.172	.046	.093	—	.334	.154	.140	.040	.020	.046	—	120.00
9	29-1566	.148	.172	.040	.080	—	.406	.210	.156	.040	.020	.100	—	120.00
9	29-1524	.148	.172	.040	.080	—	.461	.210	.158	.093	.020	.100	—	120.00
9	29-1506	.148	.172	.040	.093	—	.455	.250	.160	.040	.020	.093	—	120.00
9	29-1567	.148	.172	.040	.093	—	.470	.250	.180	.040	.020	.093	—	120.00
9	29-1507	.148	.172	.040	.093	—	.500	.210	.250	.040	.020	.100	—	120.00
9	29-1512	.148	.172	.040	.080	—	.540	.250	.250	.040	.020	.093	—	120.00
9	29-1534	.152	.172	.047	.093	—	.335	.207	.088	.040	.020	.093	—	$120.00
9	29-1532	.152	.172	.047	.093	—	.296	.156	.100	.040	.020	.047	—	120.00
9	29-1535	.152	.172	.047	.093	—	.347	.207	.100	.040	.020	.093	—	120.00
9	29-1531	.152	.172	.047	.093	—	.346	.156	.150	.040	.020	.047	—	120.00
9	29-1533	.152	.172	.047	.093	—	.361	.156	.165	.040	.020	.047	—	120.00
9	29-1513	.171	.187	.040	.080	—	.405	.210	.155	.040	.020	.100	—	$130.00
9	29-1502	.179	.200	.040	.080	—	.350	.210	.100	.040	.020	.100	—	$130.00
9	29-1508	.185	.218	.040	.080	—	.350	.210	.100	.040	.020	.100	—	$130.00
9	29-1523	.185	.218	.040	.080	—	.460	.300	.120	.040	.020	.140	—	130.00
9	29-1503	.185	.218	.040	.080	—	.375	.210	.125	.040	.020	.100	—	130.00
9	29-1526	.204	.250	.040	.080	—	.350	.210	.100	.040	.020	.100	—	$140.00
10	29-1579	.093	.125	.040	.080	—	.230	.090	.100	.040	.020	.060	—	$130.00
10	29-1527	.148	.172	.040	.080	—	.262	.125	.087	.050	.020	.085	—	$130.00
10	29-1525	.148	.172	.040	.080	—	.250	.110	.100	.040	.020	.080	—	130.00
10	29-1563	.148	.172	.046	.093	—	.296	.156	.100	.040	.020	.116	—	130.00
10	29-1562	.148	.172	.040	.080	—	.382	.227	.130	.025	.020	.187	—	130.00
10	29-1571	.148	.172	.045	.093	—	.468	.250	.168	.050	.020	.180	—	130.00
10	29-1521	.148	.172	.040	.080	—	.455	.227	.187	.040	.020	.187	—	130.00
10	29-1581	.150	.175	.045	.093	—	.468	.250	.168	.050	.020	.190	—	$130.00
10	29-1520	.171	.200	.048	.090	—	.320	.120	.125	.075	.020	.080	—	$150.00
11	29-1515	.093	.125	.068	.078	—	.344	.153	.140	.041	.015	.031	—	$160.00
11	29-1516	.093	.125	.068	.078	—	.255	.150	.075	.030	.015	.031	—	160.00
11	29-1514	.148	.172	.070	.109	—	.392	.232	.110	.050	.029	.031	—	$180.00
12	29-1509	.148	.172	.040	.080	—	.328	.210	.075	.040	.020	.120	—	130.00
12	29-1545	.148	.172	.040	.080	—	.350	.210	.100	.040	.020	.120	—	130.00
12	29-1546	.148	.172	.040	.080	—	.415	.210	.165	.040	.020	.120	—	$130.00
13	29-2008	.104	.125	.080	—	—	.350	.210	.100	.040	—	.180	.036	$200.00
13	29-2000	.148	.172	.040	—	—	.265	.125	.100	.040	—	.010	.010	200.00
13	29-2009	.148	.172	.040	—	—	.275	.125	.110	.040	—	.050	.010	$200.00
14	29-2010	.148	.172	.125	—	.062	.375	.190	.125	.060	.140	9030	—	$200.00

COLORS: Supplied in White (-101) unless otherwise specified. Ten colors available. **PLATING:** Standard (P-12) unless otherwise specified.
For **COLOR CODE, PLATING SUFFIXES and QUANTITY DISCOUNT SCHEDULES** see **SMITH PAGE 2.884** in this directory

SPECIFY SMITH TEFLON* TERMINALS

*Du Pont's registered trademark

STAND-OFFS

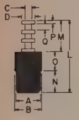


FIG. 17

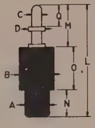


FIG. 18

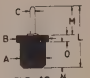


FIG. 19

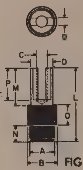


FIG. 20

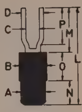


FIG. 21

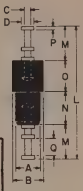


FIG. 24

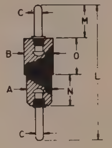


FIG. 25

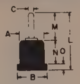


FIG. 22

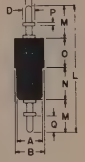


FIG. 26

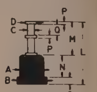


FIG. 23

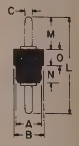


FIG 27

FOR RAPID SELECTION: terminals are listed (within figure groups) in ascending order of the MOST PERTINENT DIMENSION:

A = MIN. DIA.
B = MAJ. DIA.
N = LGTH. OF MIN. DIA.
O = LGTH. OF MAJ. DIA.
M = LGTH. OF PIN
C = DIA. OF PIN
L = OVERALL LGTH.

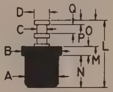


FIG. 15

MINIATURE TURRET

FIG.	SMITH	DIMENSIONS												RESALE
No.	No.	A	B	C	D	E	L	M	N	O	P	Q	R	Per M
15	93-1515	.104	.125	.046	.090	—	.346	.156	.087	.103	.020	.046	—	$140.00
15	93-1542	.104	.125	.046	.093	—	.346	.156	.087	.103	.020	.046	—	140.00
15	93-1549	.104	.125	.046	.093	—	.359	.156	.100	.103	.020	.046	—	140.00
15	93-1526	.127	.156	.046	.090	—	.531	.156	.156	.219	.020	.046	—	$170.00
15	93-1527	.135	.187	.040	.093	—	.647	.250	.150	.250	.020	.093	—	$140.00
15	93-1518	.148	.172	.040	.093	—	.482	.250	.110	.125	.020	.093	—	$140.00
15	93-1525	.148	.172	.040	.093	—	.598	.250	.165	.187	.020	.093	—	140.00
15	93-1535	.165	.187	.046	.093	—	.656	.156	.100	.400	.020	.046	—	$170.00
15	93-1563	.165	.187	.040	.093	—	.797	.250	.100	.400	.020	.093	—	170.00
15	93-1524	.165	.187	.046	.093	—	.468	.156	.125	.187	.020	.046	—	140.00
15	93-1500	.165	.187	.046	.093	—	.431	.156	.150	.125	.020	.046	—	140.00
15	93-1551	.165	.187	.040	.080	—	.485	.210	.150	.125	.020	.100	—	140.00
15	93-1502	.165	.187	.040	.093	—	.522	.250	.150	.125	.020	.093	—	140.00
15	93-1503	.165	.187	.046	.125	—	.556	.281	.150	.125	.031	.093	—	140.00
15	93-1519	.165	.187	.046	.125	—	.556	.281	.150	.125	.031	.093	—	140.00
15	93-1501	.165	.187	.046	.093	—	.493	.156	.150	.187	.020	.046	—	140.00
15	93-1504	.165	.187	.040	.093	—	.584	.250	.150	.187	.020	.093	—	140.00
15	93-1506	.165	.187	.046	.125	—	.616	.281	.150	.187	.031	.093	—	160.00
15	93-1505	.165	.187	.046	.093	—	.556	.156	.150	.250	.020	.046	—	140.00
15	93-1529	.165	.187	.040	.093	—	.647	.250	.150	.250	.020	.093	—	160.00
15	93-1530	.165	.187	.046	.125	—	.681	.281	.150	.250	.031	.093	—	160.00
15	93-1534	.165	.187	.046	.093	—	.706	.156	.150	.400	.020	.046	—	180.00
15	93-1533	.165	.187	.040	.093	—	.797	.250	.150	.400	.020	.093	—	180.00
15	93-1507	.165	.187	.046	.125	—	.831	.281	.150	.400	.031	.093	—	180.00
15	93-1528	.165	.187	.046	.125	—	.681	.281	.200	.200	.031	.093	—	160.00
15	93-1560	.165	.187	.046	.125	—	.831	.281	.200	.350	.031	.093	—	160.00
15	93-1561	.165	.187	.047	.125	—	.893	.343	.200	.350	.031	.125	—	180.00
15	93-1532	.165	.187	.046	.093	—	.706	.156	.300	.250	.020	.046	—	180.00
15	93-1579	.171	.187	.040	.093	—	.390	.250	.100	.040	.020	.093	—	$140.00
15	93-1574	.171	.187	.040	.093	—	.525	.250	.125	.150	.020	.093	—	140.00
15	93-1510	.171	.187	.046	.093	—	.431	.156	.150	.125	.020	.046	—	140.00
15	93-1552	.171	.187	.046	.080	—	.485	.210	.150	.125	.020	.100	—	140.00
15	93-1580	.171	.187	.040	.093	—	.525	.250	.150	.125	.020	.093	—	140.00
15	93-1520	.171	.187	.046	.125	—	.556	.281	.150	.125	.031	.093	—	140.00
15	93-1521	.171	.187	.062	.125	—	.556	.281	.150	.125	.031	.093	—	140.00
15	93-1511	.171	.187	.046	.093	—	.493	.156	.150	.187	.020	.046	—	140.00
15	93-1516	.171	.187	.040	.093	—	.584	.250	.150	.187	.020	.093	—	140.00
15	93-1583	.171	.187	.046	.125	—	.619	.281	.150	.187	.031	.093	—	150.00
15	93-1512	.171	.187	.046	.093	—	.556	.156	.150	.250	.020	.046	—	150.00
15	93-1547	.171	.187	.040	.080	—	.610	.210	.150	.250	.020	.100	—	150.00
15	93-1581	.171	.187	.040	.093	—	.650	.250	.150	.250	.020	.093	—	150.00
15	93-1531	.171	.187	.046	.125	—	.681	.281	.150	.250	.031	.093	—	160.00
15	93-1513	.171	.187	.046	.125	—	.831	.281	.150	.400	.031	.093	—	160.00
15	93-1582	.171	.187	.040	.093	—	.800	.250	.150	.400	.020	.093	—	160.00
15	93-1557	.171	.187	.046	.093	—	.593	.156	.187	.250	.020	.046	—	160.00
15	93-1543	.171	.187	.062	.125	—	.621	.281	.215	.125	.031	.093	—	160.00
15	93-1559	.171	.187	.046	.093	—	.706	.156	.300	.250	.020	.046	—	160.00
15	93-1562	.171	.187	.046	.125	—	.831	.281	.300	.250	.031	.093	—	170.00
15	93-1578	.171	.218	.040	.080	—	.350	.210	.100	.040	.020	.100	—	140.00
15	93-1522	.171	.218	.040	.080	—	.485	.210	.150	.125	.020	.100	—	140.00
15	93-1536	.171	.250	.046	.125	—	.968	.281	.187	.500	.031	.093	—	240.00
15	93-1514	.171	.250	.046	.125	—	1.268	.281	.187	.800	.031	.093	—	280.00
15	93-1553	.185	.218	.046	.125	—	.546	.281	.140	.125	.031	.093	—	$150.00
15	91-1003	.185	.218	.046	.093	—	.487	.154	.287	.046	.020	.046	—	130.00
15	91-1500	.185	.218	.046	.093	—	.583	.250	.287	.046	.020	.093	—	130.00
15	93-1558	.215	.250	.046	.125	—	.718	.281	.187	.250	.031	.093	—	$200.00
15	93-1538	.215	.250	.046	.093	—	.843	.156	.187	.500	.020	.046	—	220.00
15	93-1537	.215	.250	.040	.093	—	.934	.250	.187	.500	.020	.093	—	220.00
15	93-1508	.215	.250	.046	.125	—	.968	.281	.187	.500	.031	.093	—	190.00
15	93-1540	.215	.250	.046	.093	—	1.143	.156	.187	.800	.020	.046	—	220.00
15	93-1539	.215	.250	.040	.093	—	1.234	.250	.187	.800	.020	.093	—	240.00
15	93-1509	.215	.250	.046	.125	—	1.268	.281	.187	.800	.031	.093	—	240.00
15	93-1576	.215	.250	.046	.125	—	.641	.281	.310	.050	.031	.093	—	170.00
15	93-1564	.215	.250	.046	.125	—	.968	.281	.317	.370	.031	.093	—	180.00
15	93-1571	.312	.375	.125	.187	—	.812	.500	.250	.062	.032	.200	—	$300.00

MINIATURE SUB-MINIATURE

FIG.	SMITH	DIMENSIONS												RESALE
No.	No.	A	B	C	D	E	L	M	N	O	P	Q	R	Per M
17	93-1554	.171	.187	.046	.093	—	.555	.218	.150	.187	.020	.046	—	$200.00
18	93-1575	.171	.250	.046	.125	—	.993	.281	.187	.500	.031	.140	—	$250.00
19	39-1000	.165	.187	.040	—	—	.485	.210	.150	.125	—	—	—	$140.00
19	93-1004	.165	.187	.040	—	—	.547	.210	.150	.187	—	—	—	140.00
19	93-1006	.165	.187	.040	—	—	.718	.312	.218	.187	—	—	—	160.00
19	93-1007	.180	.200	.062	—	—	.600	.300	.175	.125	—	—	—	$160.00
19	93-1001	.185	.218	.040	—	—	.543	.210	.287	.046	—	—	—	$150.00
19	93-1002	.185	.218	.040	—	—	1.133	.800	.333	.046	.—	.—	—	170.00
20	93-2010	.165	.187	.078	.148	—	.603	.203	.150	.250	.156	.046	—	$230.00
20	93-2012	.171	.187	.078	.148	—	.703	.203	.100	.406	.156	.046	—	$240.00
20	93-2006	.171	.187	.046	.148	—	.478	.203	.150	.125	.156	.030	—	200.00
20	93-2007	.171	.187	.046	.148	—	.478	.203	.150	.125	.161	.030	—	200.00
20	93-2000	.171	.187	.078	.148	—	.478	.203	.150	.125	.156	.046	—	200.00
20	93-2008	.171	.187	.046	.148	—	.540	.203	.150	.187	.161	.030	—	200.00
20	93-2001	.171	.187	.078	.148	—	.540	.203	.150	.187	.156	.046	—	220.00
20	93-2009	.171	.187	.046	.148	—	.603	.203	.150	.250	.156	.030	—	220.00
20	93-2002	.171	.187	.078	.148	—	.603	.203	.150	.250	.156	.046	—	220.00
20	93-2011	.171	.187	.046	.148	—	.753	.203	.150	.400	.161	.030	—	230.00
20	93-2003	.171	.187	.078	.148	—	.753	.203	.150	.400	.156	.046	—	230.00
20	93-2017	.171	.187	.046	.148	—	.555	.203	.165	.187	.161	.030	—	230.00
20	93-2014	.171	.187	.078	.148	—	.890	.203	.187	.500	.156	.046	—	270.00
20	93-2018	.171	.187	.078	.148	—	.602	.203	.212	.187	.156	.046	—	230.00
20	93-2020	.171	.187	.078	.148	—	.620	.203	.230	.187	.156	.046	—	230.00
20	93-2016	.171	.250	.078	.148	—	1.190	.203	.187	.800	.156	.046	—	340.00
20	93-2013	.217	.250	.046	.148	—	.890	.203	.187	.500	.161	.030	—	$300.00
20	93-2004	.217	.250	.078	.148	—	.890	.203	.187	.500	.156	.046	—	300.00
20	93-2015	.217	.250	.046	.148	—	1.190	.203	.187	.800	.161	.030	—	340.00
20	93-2005	.217	.250	.078	.148	—	1.190	.203	.187	.800	.156	.046	—	340.00
20	93-2021	.218	.250	.086	.156	—	.641	.281	.310	.050	.200	.055	—	$220.00
21	93-2019	.171	.187	.090	.150	—	.633	.296	.150	.187	.234	—	—	$220.00
22	19-1003	.165	.187	.040	—	—	.485	.210	.150	.125	—	—	—	$140.00
22	93-1004	.165	.187	.040	—	—	.547	.210	.150	.187	—	—	—	140.00
22	93-1006	.165	.187	.040	—	—	.718	.312	.218	.187	—	—	—	160.00
22	93-1007	.180	.200	.062	—	—	.600	.300	.175	.125	—	—	—	$160.00
22	93-1001	.185	.218	.040	—	—	.543	.210	.287	.046	—	—	—	150.00
22	93-1002	.185	.218	.040	.—	—	1.133	.800	.333	.046	.—	.—	—	170.00
23	19-1003	.185	.218	.046	.093	—	.487	.154	.287	.046	.020	.046	—	$160.00
23	19-1500	.185	.218	.046	.093	—	.583	.250	.287	.046	.020	.093	—	150.00
24	93-3500	.169	.205	.040	.080	—	.640	.210	.170	.050	.020	.100	—	$210.00
24	93-3509	.148	.187	.040	.080	—	.819	.210	.212	.187	.020	.100	—	$230.00
24	93-3500	.171	.187	.040	.080	—	.819	.210	.212	.187	.020	.100	—	$210.00
24	93-3505	.187	.218	.040	.080	—	.819	.210	.212	.187	.020	.100	—	$230.00
24	93-3501	.218	.250	.046	.125	—	1.187	.281	.375	.250	.031	.093	—	$320.00
24	93-3502	.218	.250	.046	.125	—	1.687	.281	.625	.500	.031	.093	—	290.00
24	93-3503	.218	.250	.046	.125	—	1.287	.281	.925	.800	.031	.093	—	460.00
25	93-3512	.148	.172	.040	.—	—	.819	.210	.187	.212	—	—	—	$230.00
25	93-3511	.148	.187	.040	.—	—	.819	.210	.187	.212	—	—	—	230.00
25	93-3507	.171	.187	.040	.—	—	.572	.110	.140	.212	—	—	—	$230.00
25	93-3508	.171	.187	.040	.—	—	.696	.172	.140	.212	—	—	—	230.00
25	93-3513	.171	.187	.040	.—	—	.587	.125	.187	.150	—	—	—	230.00
25	93-3504	.171	.187	.040	.—	—	.819	.210	.187	.212	—	—	—	230.00
26	93-3510	.171	.187	.040	.080	—	.819	.210	.212	.187	.020	.120	—	$230.00
27	92-3003	.148	.172	.040	—	—	.515	.155	.160	.040	—	—	—	$220.00
27	92-3001	.148	.172	.040	—	—	.560	.180	.160	.040	—	—	—	220.00
27	92-3002	.148	.172	.040	—	—	.606	.155	.210	.080	—	—	—	170.00
27	92-3000	.169	.205	.040	—	—	.640	.210	.170	.020	—	—	—	220.00

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Use our Engineering and Production Facilities to design and develop new products or modify existing components to meet your specific needs. "Specials are Standard with SMITH!"

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TECHNICAL DATA

Teflon insulated terminals have proven to have outstanding inherent quality characteristics, electrically, mechanically, chemically, and thermally made possible through the use of virgin *Teflon* resins. These terminals are manufactured to strict quality control standards based on MIL-spec requirements.

MATERIAL SPECIFICATIONS

TEFLON*

MIL-P-19468

● MECHANICAL PROPERTIES

TENSILE STRENGTH - 1500 - 2500 PSI
ELONGATION - 75 - 150%
MODULUS OF ELASTICITY - 55,000 PSI

● CHEMICAL PROPERTIES

Teflon is resistant to acids and alkalis of all concentration, solvents, fungus and rot.

TEMPERATURE RANGE - -100° C to +250° C.
WATER ABSORPTION - .01%

LUGS

BRASS - All lugs on Stand-offs, Feed-thrus, Probes, Plugs, unless otherwise specified are manufactured from Brass/QQB-626, Composition 22, 1/2 hard.

BERYLLIUM COPPER - Test Jacks are manufactured from Beryllium Copper per MIL-C-530 or MIL-C-533 and heat treated prior to plating.

● TOLERANCES

"A" (minor dia.) +.000, -.002
"E" (probe dia.) ± .001
All other dimensions ±.005

● ELECTRICAL PROPERTIES

DIELECTRIC STRENGTH - 400 to 450 volts/Mil.
DIELECTRIC CONSTANT - 2.0 to 2.2 (60 cycles to 10^6 cycles.)

Capacitance and voltage measured with terminals installed in aluminum chassis .050 Thick. Insulator protrudes a minimum of .040 below panel.

IT'S SOUND PLANNING TO **"SPECIFY SMITH"** WHEN DESIGNING OR PURCHASING

SPECIFY **SMITH**

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LEADING
DISTRIBUTORS
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IT'S SOUND PLANNING TO **"SPECIFY SMITH"** WHEN DESIGNING OR PURCHASING

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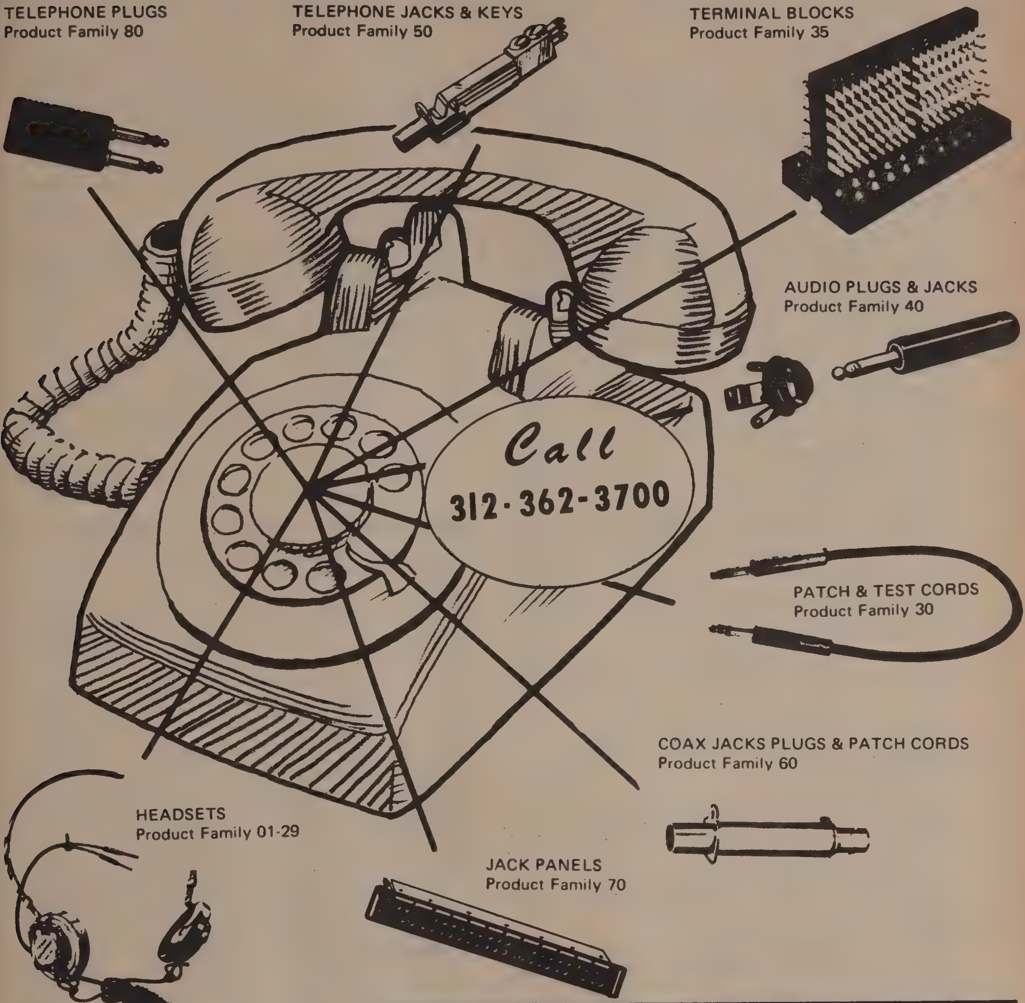

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Bulletins covering each product family represented by typical parts illustrated above are available upon your request. Also, for further engineering assistance, outline drawings of specific items can be supplied. In addition, our nationwide network of distributors of Trimm industrial electronic products are ready to assist you by supplying any of our standard cataloged items.

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TRW® CINCH CONNECTORS

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VIRGINIA

Arlington Electronic Wholesalers ▲□△
Arlington (703) 524-2412

Meridan Electronic Equip. Co.
Richmond (804) 353-6648

Peoples Radio & TV Supply Co.
Roanoke (703) 342-8933

Priest Electronics, Inc.
Norfolk (804) 855-0141

Virginia Radio Supply
Charlottesville (804) 296-4184

WASHINGTON

Advanced Electronic, Inc. ▲□△
Bellingham (206) 734-3400

Almac/Stroum Electronics
Seattle (206) 763-2300

Inland Electronics Supply ▲□△
Walla Walla (509) 529-2241

Interface Electronics Corp.
Seattle (206) 285-3500

Lay & Nord ▲□△
Yakima (509) 453-5596

Liberty Electronics
Seattle (206) 763-8200

Marshall Industries
Bellevue (206) 883-1084

Northwest Electronics, Inc.
Spokane (509) 535-7652

R. V. Weatherford Co.
Seattle (206) 243-6340

Western Electronics Co. ▲□△
Seattle (206) 284-0200

Wible Radio Supply Co. ▲□△
Tacoma (206) 474-9471

WEST VIRGINIA

Electronic Supply, Inc. ▲□
Huntington (304) 523-6443

WISCONSIN

Electronic Expeditors, Inc.
Milwaukee (414) 228-8100

Marsh Electronics
West Allis (414) 545-6500

Parts Mart Corp. ▲
Milwaukee (414) 276-4160

Satterfield Electronics
Madison (608) 257-4801

For Authorized IC Logic Board Distributors, Contact Your Local Sales Office.

Authorized distributor except for: ▲ D-Sub □ Edge △ Blue Ribbon

TRW/CINCH DISTRIBUTOR PRODUCTS, AN ELECTRONIC COMPONENTS DIV. OF TRW INC., 1501 MORSE AVE., ELK GROVE VILLAGE, ILL. 60007 (312) 439-8800

TRW® CINCH CONNECTORS

CINCH PRINTED CIRCUIT CONNECTORS

The connectors in this catalog are representative of TRW Cinch Connectors' broad capability in the design and production of printed circuit connectors. All of the units described are standard types which can be provided to the user on relatively short delivery cycles. Many of these connectors are available for immediate delivery through the nationwide network of Cinch Distributors.

Cinch specializes in the design and production of printed circuit connectors designed to fit specific customer applications. These connectors can be modifications of the devices described in this catalog or can be of a completely different design based on a detailed evaluation of your requirements. In addition to individual connectors, Cinch can supply complete modular assemblies mounted on aluminum plates. This can be done in virtually any configuration the customer may need.

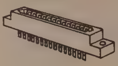
The ability of Cinch to provide high performance printed circuit connectors at surprisingly low prices is a result of special expertise in plating, plastic molding and connector assembly. Cinch has been a leader in the development of unique, proprietary selective plating techniques which permit deposition of gold or other precious metals **only** in the areas where they are required. The conventional barrel plating technique provides no control over the area of gold deposition. In order to obtain the necessary gold thickness at the contact area, the equivalent thickness must be plated over the entire contact area. Cinch can control the gold deposition to specific areas of the contact, thereby providing a device of high reliability that utilizes considerably less gold in the contact.

Cinch has special capabilities in plastic mold design and is recognized as a leader in molding equipment development. Manufacturers of molding equipment, of the type used in the connector industry, frequently come to Cinch for field evaluation and testing of their devices. Cinch engineers have made major contributions to the design of many plastic molding machines used today throughout the electronic industry. In addition, Cinch maintains its own mold design department known for its capability to develop molds that permit extremely high yields.

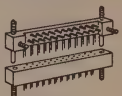
Our design engineering staff works closely with production engineering in the development of new connector designs. Techniques for automatic and semi-automatic assembly as well as special fixtures for hand assembly are planned in association with the product design. As a result, a high level of product uniformity and quality control as well as a low assembly cost is achieved.

BASIC TYPES

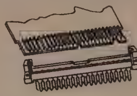
The most frequently used printed circuit connectors being manufactured today fall into three broad design categories: (1) the "edge" type in which the edge of the circuit board mates with a slotted connector; (2) a "two piece" type where one mating piece is permanently attached to the circuit board; and (3) a "hermaphroditic" connector which combines separately mounted contact banks and a card slot.



EDGE TYPE



TWO-PIECE

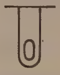


HERMAPHRODITIC TYPE

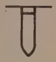
Cinch manufactures all three basic types; however, this catalog covers only the "edge" and "two-piece" types. Hermaphroditic connectors are described in the literature listed below.

CONTACT DESIGN & TERMINATIONS

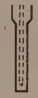
Most of the connectors in this catalog utilize a patented bifurcated bellows contact design which has two spring-loaded contact surfaces instead of one. This provides a more reliable contact where vibration or PC board irregularities may be encountered. There are four basic termination designs available. (1) Tabs or cups for conventional soldering; (2) Dip solder tails for automatic or wave soldering; (3) .025" and .045" square tails or .030" x .060" wrappost tails for automatic and semi-automatic Wirewrap** equipment; and (4) Crimp-on pins which snap into receptacles molded into the connector. Not all types are provided for each connector, but non-standard types and modifications can be designed on special order.



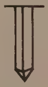
SOLDER TABS & CUPS



DIP SOLDER



WRAP POST



SQUARE TAIL

OTHER PRINTED CIRCUIT CONNECTORS

If the printed circuit connector to meet your requirements is not illustrated in this catalog, please call your nearest sales office listed on the back cover, or write or call TRW Cinch Connectors, 1501 Morse Ave., Elk Grove Village, Ill. 60007, (312) 439-8800.

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* Interchangeable with Elco's products sold under the trademark VARICON. Manufactured under license agreement with Elco Corp.
** Trade Mark Gardner Denver.

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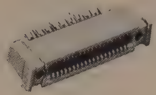
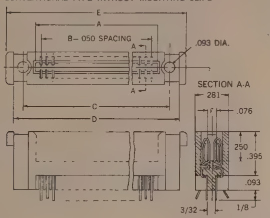
TRW® CINCH CONNECTORS

MINIATURE PC CONNECTORS

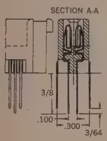
"TYKON" EDGE CONNECTORS/.050" SPACING - DOUBLE READOUT FOR 1/16" PRINTED CIRCUIT BOARDS



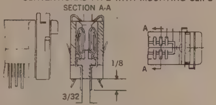
CONVENTIONAL TYPE WITHOUT MOUNTING CLIPS



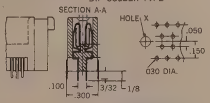
WRAP POST TAIL



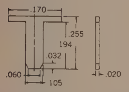
CONVENTIONAL TYPE WITH MOUNTING CLIPS

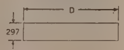


DIP SOLDER TYPE



POLARIZING KEY





RECOMMENDED CHASSIS OPENING 040 TO .062 THICK

FEATURES AND SPECIFICATIONS

SPECIAL FEATURES: High density (.050" centers) miniature edge connector with special ribbon-type contacts.

Potential applications include standard and thin film memory planes, diodes on insulating substrates and virtually any type of modular plug-in unit.

Available in wide range of sizes with variety of terminations and mounting styles.

SIZES: Available in 6, 10, 15, 20 and 25 contact position sizes with intermediate sizes available on special order.

TERMINATIONS: Available with conventional ribbon-type wiring tails; dip solder or wire wrap versions also available.

MOUNTING STYLES: Conventional wiring tail types available with special mounting clips for snap-in removable semi-flush panel mounting or without clips and using plain .093" dia. holes for standard mounting.

INSULATOR MATERIAL: Green glass-filled diallyl phthalate, type SDG-F per MIL-M-14.

CONTACT MATERIAL & PLATING: Beryllium copper with 30 micro-inches gold finish.

MOUNTING CLIP MATERIAL & PLATING: Carbon steel with cadmium plate plus yellow chromate finish.

POLARIZING KEY MATERIALS: Made of cellulose acetate and must be ordered separately.

PERFORMANCE SPECIFICATIONS: See page 18.

ORDERING INFORMATION

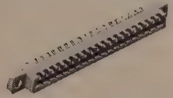
DESCRIPTION	PART NUMBERS* CONVENTIONAL TYPE WO/CLIPS**	CONVENTIONAL TYPE W/CLIPS	NO. OF POSITIONS	NO. OF CONTACTS
6-Position Connector	255-06-30-190	255-06-30-200	6	12
10-Position Connector	255-10-30-190	255-10-30-200	10	20
15-Position Connector	255-15-30-190	255-15-30-200	15	30
20-Position Connector	255-20-30-190	255-20-30-200	20	40
25-Position Connector	255-25-30-190	255-25-30-200	25	50
Polarizing Key	Part No. 456-99-99-190			

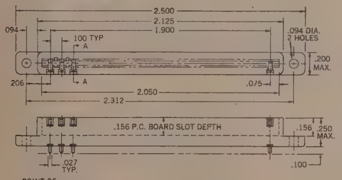
* To order DIP SOLDER or WIRE WRAP TYPES: Substitute "210" as final three figures of part number for dip solder types and "220" for wire wrap types (e.g. 255-06-30-210 or 255-06-30-220); both types available in all sizes shown above.
** These items available through Cinch Distributors.

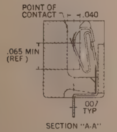
DIMENSIONAL DATA

SIZE (No. of Contact Positions)	DIMENSIONS "A"	"B"	"C"	"D"	"E"
6	.350	.250	.550	.725	.850
10	.550	.450	.750	.925	1.050
15	.800	.700	1.000	1.175	1.300
20	1.050	.950	1.250	1.425	1.550
25	1.300	1.200	1.500	1.675	1.800

"MINI-TYKE" EDGE CONNECTOR/.100" SPACING - SINGLE READOUT FOR 1/32" PRINTED CIRCUIT BOARDS

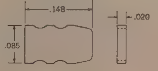






SECTION "A-A"

POLARIZING KEY



FEATURES AND SPECIFICATIONS

SPECIAL FEATURES: Extremely low profile connector for compact packaging — overall 1/4" height of connector less than half that of standard PC connectors.

Preloaded contact construction provides uniformity of gap and assures adequate contact pressure. Ideally suited for a wide range of miniature PC board plug-in applications including airborne equipment, test equipment and digital components.

SIZE: Available in 20 contact position size only.

TERMINATION: Dip solder tails for insertion and wave soldering in PC mother board.

MOUNTING STYLE: Plain .094" Dia. holes for standard mounting.

INSULATOR MATERIAL: Green glass-filled diallyl phthalate, type SDG-F per MIL-M-14.

CONTACT MATERIAL & PLATING: Beryllium copper with 50 micro-inches gold finish.

POLARIZING KEY MATERIAL: Made of nylon and must be ordered separately.

PERFORMANCE SPECIFICATIONS: See page 18 for environmental specifications. Consult factory for electrical data.

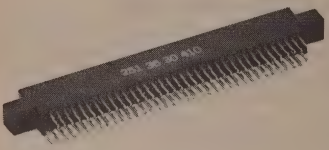
ORDERING INFORMATION

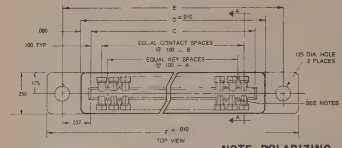
DESCRIPTION	PART NUMBER	NO. OF POSITIONS	NO. OF CONTACTS
Connector	259-20-30-233	20	20
Polarizing Key	457-01-25-008	—	—

TRW/CINCH CONNECTORS, AN ELECTRONIC COMPONENTS DIV. OF TRW INC. / 1501 MORSE AVE. / ELK GROVE VILLAGE, ILL. 60007

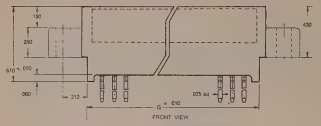
TRW® CINCH CONNECTORS

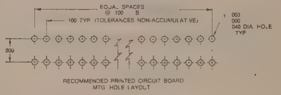
PC BOARD CONNECTORS WITH TERMINALS ON .100 CENTERS

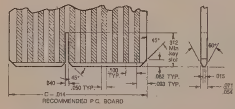

251-35-30-410

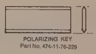

E
D ± .010
C
.080
.100 TYP
EQUAL CONTACT SPACES @ .100 — B
EQUAL KEY SPACES @ .100 — A
.125 DIA HOLE 2 PLACES
.175
.350
SEE NOTES
.237
F ± .010
TOP VIEW

NOTE: POLARIZING KEY SLOTS LOCATED SYMMETRICALLY BETWEEN CONTACT POSITIONS.

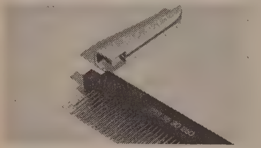

.180
.250
.610 ± .010
.060
.212
.025 sq
G ± .010
.430
FRONT VIEW


EQUAL SPACES @ .100 — B
.100 TYP (TOLERANCES NON-ACCUMULATIVE)
+ .003 .000 .040 DIA HOLE TYP
.200
RECOMMENDED PRINTED CIRCUIT BOARD MTG HOLE LAYOUT

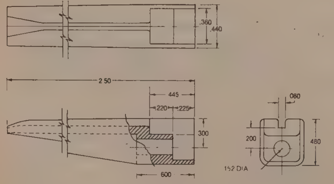

45°
.312 Min key slot
.100 TYP.
.040
.050 TYP.
.062 TYP.
.093 TYP.
C — .014
60°
.015
.071 .054
RECOMMENDED P.C. BOARD


POLARIZING KEY Part No. 474-11-76-229

CARD GUIDE POST NO. 474-11-90-259



Card Guides No. 474-11-90-259 can be ordered separately and can be assembled with any 251- or 253- connector with clearance mounting holes. Available through Cinch distributors; specify No. 50-GP-1.


.360
.440
2.50
.445
.220
.225
.300
.600
.060
.200
.480
.152 DIA

FEATURES AND SPECIFICATIONS

CURRENT RATING: 3 amperes.

RATED VOLTAGE (Sea Level): 600 VDC.

INSULATION RESISTANCE: 5000 megohms min.

CONTACT RESISTANCE: 16 milliohms max.

TERMINAL STYLES: Dip Solder, Wire Wrap or Solder Tab.

TOTAL INSERTION FORCE: A maximum of one lb. times the number of contact pairs when measured with a .070 in. thick steel blade in accordance with MIL-C-21097.

INDIVIDUAL SEPARATION FORCE: A minimum of one oz. per pair of contacts when measured with a .054 in. thick blade in accordance with MIL-C-21097.

INSULATOR MATERIAL: Diallyl phthalate, type SDG-F per MIL-M-14 Color Green.

POLARIZING KEY MATERIAL: Nylon.

CARD GUIDE MATERIAL: Polypropylene, Color Green.

CONTACT MATERIAL: Phosphor bronze QQ-B-750.

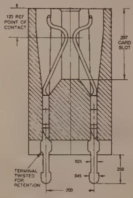
CONTACT PLATING MATERIAL: .00003 min. gold over .00005 min. nickel on contacting area .00001 gold on remainder of contact.

DIMENSIONAL DATA

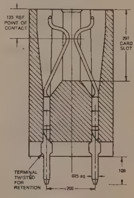
	PART NUMBER	NO. OF CONTACTS	DIMENSIONS						
			A	B	C	D	E	F	G
SOLDER TAB	*251-10-30-410	10/20	.800	.900	1.100	1.260	1.575	1.835	1.150
	†251-15-30-410	15/30	1.300	1.400	1.600	1.760	2.075	2.335	1.650
	*251-18-30-410	18/36	1.600	1.700	1.900	2.060	2.375	2.635	1.950
	*251-20-30-410	20/40	1.800	1.900	2.100	2.260	2.575	2.835	2.150
	†251-22-30-410	22/44	2.000	2.100	2.300	2.460	2.775	3.035	2.350
	*251-25-30-410	25/50	2.300	2.400	2.600	2.760	3.075	3.335	2.650
	*251-28-30-410	28/56	2.600	2.700	2.900	3.060	3.375	3.635	2.950
	*251-30-30-410	30/60	2.800	2.900	3.100	3.260	3.575	3.835	3.150
	*251-31-30-410	31/62	2.900	3.000	3.200	3.360	3.675	3.935	3.250
	*251-35-30-410	35/70	3.300	3.400	3.600	3.760	4.075	4.335	3.650
	†251-36-30-410	36/72	3.400	3.500	3.700	3.860	4.175	4.435	3.750
	†251-40-30-410	40/80	3.800	3.900	4.100	4.260	4.575	4.835	4.150
	†251-43-30-410	43/86	4.100	4.200	4.400	4.560	4.875	5.135	4.450
	*251-44-30-410	44/88	4.200	4.300	4.500	4.660	4.975	5.235	4.550
	*251-49-30-410	49/98	4.700	4.800	5.000	5.160	5.475	5.735	5.050
	†251-50-30-410	50/100	4.800	4.900	5.100	5.260	5.575	5.835	5.150
DIP SOLDER	*252-10-30-360	10/20	.800	.900	1.100	1.260	—	—	1.150
	†252-15-30-360	15/30	1.300	1.400	1.600	1.760	—	—	1.650
	*252-18-30-360	18/36	1.600	1.700	1.900	2.060	—	—	1.950
	*252-20-30-360	20/40	1.800	1.900	2.100	2.260	—	—	2.150
	†252-22-30-360	22/44	2.000	2.100	2.300	2.460	—	—	2.350
	*252-25-30-360	25/50	2.300	2.400	2.600	2.760	—	—	2.650
	*252-28-30-360	28/56	2.600	2.700	2.900	3.060	—	—	2.950
	*252-30-30-360	30/60	2.800	2.900	3.100	3.260	—	—	3.150
	*252-31-30-360	31/62	2.900	3.000	3.200	3.360	—	—	3.250
	*252-35-30-360	35/70	3.300	3.400	3.600	3.760	—	—	3.650
	†252-36-30-360	36/72	3.400	3.500	3.700	3.860	—	—	3.750
	†252-40-30-360	40/80	3.800	3.900	4.100	4.260	—	—	4.150
	†252-43-30-360	43/86	4.100	4.200	4.400	4.560	—	—	4.450
	*252-44-30-360	44/88	4.200	4.300	4.500	4.660	—	—	4.550
	*252-49-30-360	49/98	4.700	4.800	5.000	5.160	—	—	5.050
	†252-50-30-360	50/100	4.800	4.900	5.100	5.260	—	—	5.150
WIRE WRAP	*253-10-30-260	10/20	.800	.900	1.100	1.260	1.575	1.835	1.150
	†253-15-30-260	15/30	1.300	1.400	1.600	1.760	2.075	2.335	1.650
	*253-18-30-260	18/36	1.600	1.700	1.900	2.060	2.375	2.635	1.950
	*253-20-30-260	20/40	1.800	1.900	2.100	2.260	2.575	2.835	2.150
	†253-22-30-260	22/44	2.000	2.100	2.300	2.460	2.775	3.035	2.350
	*253-25-30-260	25/50	2.300	2.400	2.600	2.760	3.075	3.335	2.650
	*253-28-30-260	28/56	2.600	2.700	2.900	3.060	3.375	3.635	2.950
	*253-30-30-260	30/60	2.800	2.900	3.100	3.260	3.575	3.835	3.150
	*253-31-30-260	31/62	2.900	3.000	3.200	3.360	3.675	3.935	3.250
	*253-35-30-260	35/70	3.300	3.400	3.600	3.760	4.075	4.335	3.650
	†253-36-30-260	36/72	3.400	3.500	3.700	3.860	4.175	4.435	3.750
	†253-40-30-260	40/80	3.800	3.900	4.100	4.260	4.575	4.835	4.150
	†253-43-30-260	43/86	4.100	4.200	4.400	4.560	4.875	5.135	4.450
	*253-44-30-260	44/88	4.200	4.300	4.500	4.660	4.975	5.235	4.550
	*253-49-30-260	49/98	4.700	4.800	5.000	5.160	5.475	5.735	5.050
	†253-50-30-260	50/100	4.800	4.900	5.100	5.260	5.575	5.835	5.150

* To be made available at a later date. Contact factory.

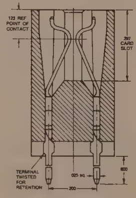
† Indicates items available through Cinch Distributors.


.123 REF POINT OF CONTACT
.297 CARD SLOT
TERMINAL TWISTED FOR RETENTION
.025
.045
.250
.200

SOLDER TAB


.123 REF POINT OF CONTACT
.291 CARD SLOT
TERMINAL TWISTED FOR RETENTION
.025 sq
.200
.100

DIP SOLDER

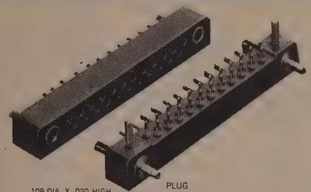

.123 REF POINT OF CONTACT
.297 CARD SLOT
TERMINAL TWISTED FOR RETENTION
.025 sq
.200
.600

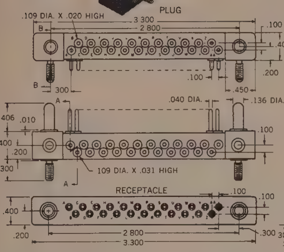
WIRE WRAP

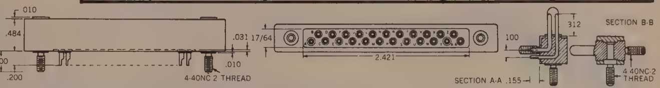
TRW® CINCH CONNECTORS

TWO-PIECE RIGHT ANGLE PC CONNECTORS

RIGHT ANGLE PC CONNECTOR/.100″ SPACING (STAGGERED) - TWO-PIECE PLUG & RECEPTACLE




PLUG
.109 DIA. X .020 HIGH
3.300
2.800
.100
.400
.200
.100
.300
.450
B
A
.040 DIA.
.136 DIA.
.406
.010
.400
.200
.300
.100
109 DIA. X .031 HIGH
RECEPTACLE
.100
.400
.200
2.800
3.300
.300


.010
.484
.300
.200
.031
17/64
.010
4-40NC 2 THREAD
2.421
100
.312
SECTION B-B
SECTION A-A
.155
4-40NC-2 THREAD

FEATURES AND SPECIFICATIONS

SPECIAL FEATURES: Two-piece right angle construction with contacts staggered on .100″ centers.

Primarily used in military type applications requiring considerable vibration resistance.

SIZES: Available in 23 contact size only for both plug and receptacle.

TERMINATION: Receptacle contacts have solder cups for 20 gauge wire.

MOUNTING STYLES: Plug is assembled direct to printed circuit board with right angle contact mounting studs; plug guide pins mate with bushings on receptacle.

INSULATOR MATERIAL: Both plug and receptacle are green glass-filled diallyl phthalate type SDG-F.

CONTACT MATERIALS & PLATING: Plug contacts are phosphor bronze with finish of gold flash over 200 micro-inches silver; receptacle contacts are beryllium copper with same finish.

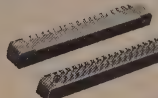
GUIDE PIN & BUSHING MATERIAL: Guide pins and bushings are stainless steel.

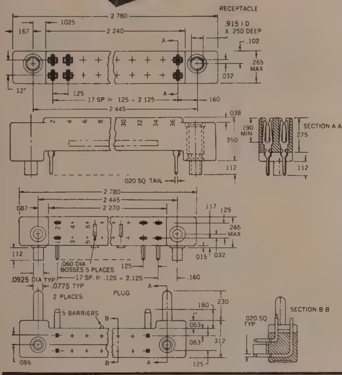
PERFORMANCE SPECIFICATIONS: See page 18.

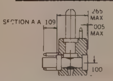
ORDERING INFORMATION

DESCRIPTION	PART NUMBER	NO. OF POSITIONS	NO. OF CONTACTS
Plug	213-23-42-194	23	23
Receptacle	212-23-42-901	23	23

RIGHT ANGLE PC CONNECTOR/.125″ SPACING - DOUBLE READOUT TWO-PIECE PLUG & RECEPTACLE




RECEPTACLE
2.780
1025
2.240
.167
.915 I.D. X .250 DEEP
.102
.265 MAX
.032
.12
.125
17 SP. @ .125 = 2.125
.160
2.445
.038
.190 MIN
.350
.112
SECTION A-A
.275
.112
.020 SQ TAIL
2.780
2.445
2.270
.087
.117
.125
.265 MAX
.112
.015
.032
.060 DIA BOSSES 5 PLACES
.125
17 SP. @ .125 = 2.125
.0925 DIA TYP
.0775 TYP
2 PLACES
.160
PLUG
.230
5 BARRIERS
.160
.063
.063
.312
.086
.125
.020 SQ TYP
SECTION B-B


SECTION A-A
.109
.265 MAX
.005 MAX
.100

FEATURES AND SPECIFICATIONS

SPECIAL FEATURES: Rugged military qualified connector for environmental and shock resistant applications.

Two-piece right angle construction with contacts on .125″ center grid.

SIZE: Available in 18-position size only for both plug and receptacle.

TERMINATION: Receptacle contacts have .020″ square tail for dip solder termination.

MOUNTING STYLE: Plug is assembled directly to PC board with right angle contacts and mounting rivets; plug guide pins mate wtih bushings on receptacle.

INSULATOR MATERIAL: Both plug and receptacle are green glass-filled diallyl phthalate, type SDG-F per MIL-M-14.

CONTACT MATERIALS & PLATING: Plug contacts are brass with a finish of 50 micro-inches gold over 200 micro-inches silver; receptacle contacts are beryllium copper with same finish as on plug.

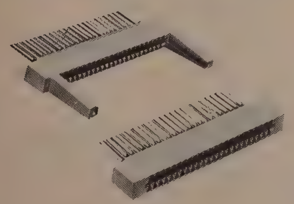
RIVET, GUIDE PIN & BUSHING MATERIAL & PLATING: Plug rivets, guide pins, and receptacle bushings are nickel-plated brass.

PERFORMANCE SPECIFICATIONS: See page 18.

ORDERING INFORMATION

DESCRIPTION	PART NUMBER	NO. OF POSITIONS	NO. OF CONTACTS
Plug	213-36-90-101	18	36
Receptacle	211-36-92-106	18	36

24-POSITION WIRE WRAP CONNECTORS/.125″ SPACING - DOUBLE READOUT FOR 1/16″ PRINTED CIRCUIT BOARDS



FEATURES AND SPECIFICATIONS

SPECIAL FEATURES: Special edge connector with or without card guides having .025″ square tails for hand or machine wire wrap.

Heat treated contacts take over 3 in. oz. torque.

Applications include fire control systems, environmental military ground equipment and shipboard sonar.

SIZE: Available in 24-position size with or without card guides.

TERMINATION: .025″ square tails on .125″ centers for wire wrap.

MOUNTING STYLE: Molded-in stainless steel bushings for #4-40 thread.

INSULATOR MATERIAL: Grey glass-filled diallyl phthalate, type SDG-F per MIL-M-14.

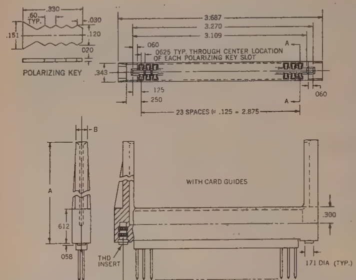
CONTACT MATERIAL & PLATING: Beryllium copper with 50 micro-inches gold finish over 25 micro-inches nickel.

POLARIZING KEY MATERIAL: Made of glass epoxy laminate and must be ordered separately.

TRW® CINCH CONNECTORS

WIRE WRAP PC CONNECTORS

24-POSITION WIRE WRAP CONNECTORS (CONT.)

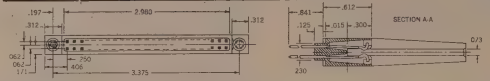

.330
.60 TYP.
.030
.151
.120
.020
POLARIZING KEY
3.687
3.270
3.109
.060
.0625 TYP. THROUGH CENTER LOCATION OF EACH POLARIZING KEY SLOT
A
.343
.125
.250
.060
23 SPACES @ .125 = 2.875
B
A
WITH CARD GUIDES
.300
.612
.058
THD INSERT
.171 DIA (TYP.)

ORDERING INFORMATION

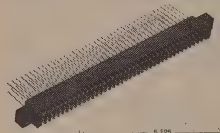
DESCRIPTION	PART NUMBER	NO. OF POSITIONS	NO. OF CONTACTS
Connector w/card guides	253-24-30-054	24	48
Connector w/short card guides	253-24-30-056	24	48
Connector wo/card guides	253-24-30-055	24	48
Polarizing Key	456-07-35-003	—	—

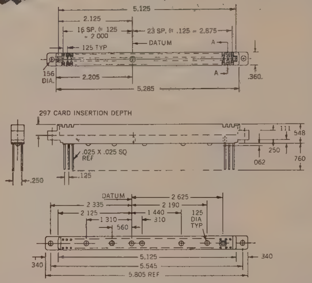
DIMENSIONAL DATA

PART NUMBER	A	B
253-24-30-054	1.812	.203
253-24-30-056	1.093	.287


.197
2.980
.312
.312
.062
.062
.171
.250
.406
3.375
.841
.612
.125
.015
.300
SECTION A-A
.230
0/3

40-POSITION WIRE WRAP CONNECTORS/.125″ SPACING - DOUBLE READOUT FOR 1/16″ PRINTED CIRCUIT BOARDS




5.125
2.125
16 SP. @ .125 = 2.000
23 SP. @ .125 = 2.875
DATUM
.125 TYP
A
.156 DIA.
2.205
A
.360
5.285
.297 CARD INSERTION DEPTH
.111
.548
.025 X .025 SQ REF
.250
.062
.760
.250
.125
DATUM
2.625
2.335
2.190
2.125
1.440
1.310
.310
.560
.125 DIA TYP
.340
5.125
5.545
5.805 REF
.340

FEATURES AND SPECIFICATIONS

SPECIAL FEATURES: Special edge connector with .025″ square tails for hand or machine wire wrap.

Ideally suited for variety of wire wrap interconnection applications on data processing, test and communications equipment.

SIZE: Available in 40-contact position size only.

TERMINATIONS: .025″ square tails on .125″ centers for wire wrapping.

MOUNTING STYLE: Plain holes for standard mounting.

INSULATOR MATERIAL: Green glass-filled diallyl phthalate, type SDG-F per MIL-M-14.

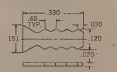
CONTACT MATERIAL & PLATING: Phosphor bronze with .100 micro-inches gold over 25 micro-inches nickel plate finish.

POLARIZING KEY MATERIAL: Made of glass epoxy laminate and must be ordered separately.

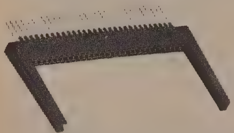
ORDERING INFORMATION

DESCRIPTION	PART NUMBER	NO. OF POSITIONS	NO. OF CONTACTS
Connector	253-40-30-003	40	80
Polarizing Key	456-07-35-003	—	—

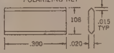
POLARIZING KEY

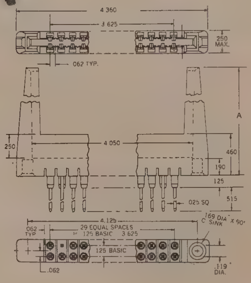

.330
.60 TYP.
.030
.151
.120
.020

30-POSITION WIRE WRAP CONNECTOR FOR PUNCHED PLATE APPLICATION/ .125″ SPACING - DOUBLE READOUT FOR 1/16″ PRINTED CIRCUIT BOARDS



POLARIZING KEY


.108
.015 TYP
.300
.020


4.360
3.625
.250 MAX.
.062 TYP.
A
.250
4.050
.460
.190
.125
.025 SQ
.515
4.125
29 EQUAL SPACES @ .125 BASIC 3.625
.169 DIA x 90° C SINK
.062 TYP
.125 BASIC
.119 DIA.
.062

FEATURES AND SPECIFICATIONS

SPECIAL FEATURES: Designed for extreme ruggedness — insulator is impervious to normal cleaning solvents.

Special oversize bosses on insulator permit press-fit retention to aluminum plate.

SIZE: Available in 30-position size only with card guides.

TERMINATION: .025″ wire wrap square tails on .125″ centers.

MOUNTING STYLE: Connector insulator has special oversize bosses to press-fit into .080″ thick plate with .072 ±.001 dia. holes. (Bosses can be omitted at positions where grounding is desired.)

INSULATOR MATERIAL: Black glass-filled nylon.

CONTACT MATERIAL & PLATING: Phosphor bronze contacts with finish of 30 micro-inches gold.

NOTE: Contacts can also be selectively gold plated creating substantial reduction in overall connector costs. Contact factory for further details on Cinch selective plating process.

POLARIZING KEY MATERIAL: Made of Nylon and must be ordered separately.

PERFORMANCE SPECIFICATIONS: See page 18.

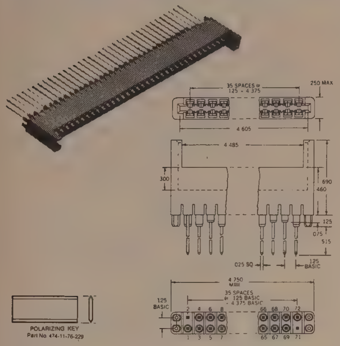
ORDERING INFORMATION

DESCRIPTION	PART NO.	NO. OF POSITIONS	NO. OF CONTACTS	DIMENSION "A"
Connector w/Card Guides	253-30-80-024	30	60	2.000″
Connector w/Card Guides	253-30-80-025	30	60	.720″
Connector wo/Card Guide	253-30-80-026	30	60	—
Polarizing Key	474-11-76-229	—	—	—

TRW® CINCH CONNECTORS

WIRE WRAP PC CONNECTORS FOR PUNCHED PLATE APPLICATION

36-POSITION WIRE WRAP CONNECTOR FOR PUNCHED PLATE APPLICATION/ .125″ SPACING - DOUBLE READOUT FOR 1/16″ PRINTED CIRCUIT BOARDS


35 SPACES @ .125 = 4.375
.250 MAX
4.605
4.485
.300
.690
.460
.125
.075
.515
.025 SQ
.125 BASIC
4.750 MAX
35 SPACES @ .125 BASIC = 4.375 BASIC
.125 BASIC
POLARIZING KEY
Part No. 474-11-76-229

FEATURES AND SPECIFICATIONS

SPECIAL FEATURES: Extremely rugged design — with or without card guides. Molded oversize bosses at each end provide interference fit into punched holes in plate.

SIZE: Available in 36-position size with or without card guides.

TERMINATION: .025″ wire wrap square tails on .125″ centers.

CONTACT MATERIAL & PLATING: Phosphor bronze contacts with 30 micro-inches gold finish.

MOUNTING STYLE: Connectors have special oversize bosses at end to press-fit into .080″ thick plate with .072″ ±.001 dia. holes.

INSULATOR MATERIAL: Black lexan.

NOTE: Contacts can also be selectively plated with significant reduction in gold requirements. Contact factory for further details.

POLARIZING KEY MATERIAL: Made of nylon and must be ordered separately.

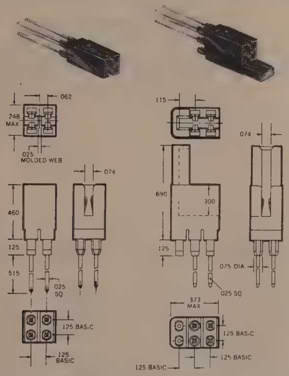
PERFORMANCE SPECIFICATIONS: See page 18.

ORDERING INFORMATION

DESCRIPTION	PART NUMBER	NO. OF POSITIONS	NO. OF CONTACTS
Connector w/card guides	253-36-90-005	36	72
Connector wo/card guides	253-36-90-006	36	72
Polarizing Key	474-11-76-229	—	—

WIRE WRAP PC CONNECTOR MODULES

.025″ SQUARE TAIL WIRE WRAP PC CONNECTOR MODULES/ .125″ SPACING - DOUBLE READOUT FOR 1/16″ PRINTED CIRCUIT BOARDS


.062
.248 MAX
.025 MOLDED WEB
.074
.460
.125
.515
.025 SQ
.125 BASIC
.125 BASIC
.115
.074
.690
.300
.125
.075 DIA
.025 SQ
.373 MAX
.125 BASIC
.125 BASIC
.125 BASIC

FEATURES AND SPECIFICATIONS

SPECIAL FEATURES: Special module with or without end guide having .025″ square tails for hand or machine wire wrap.

Oversize bosses on insulator permit press-fit retention to aluminum plate.

SIZE: Available in 2 position size only with or without end guide.

TERMINATION: .025″ square tails on .125″ centers for wire wrap.

MOUNTING STYLE: Modules have oversize bosses on contacts that press fit into .080″ thick plate with .073″ ±.001 dia. holes.

INSULATOR MATERIAL: Black lexan.

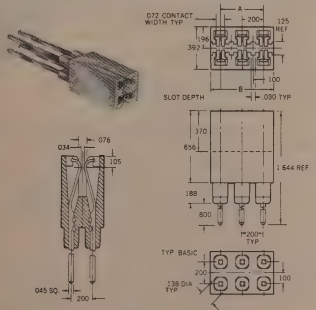
CONTACT MATERIALS & PLATING: All module contacts made of phosphor bronze with 50 micro-inches gold finish.

PERFORMANCE SPECIFICATIONS: Consult factory for specifications.

ORDERING INFORMATION

DESCRIPTION	PART NUMBER	NO. OF POSITIONS	NO. OF CONTACTS
Inner Section Module wo/ Polarizing Key	253-04-90-009	2	4
Inner Section Module w/Polarizing Key	253-04-90-010	2	4
End Section Module w/End Guide	253-04-90-011	2	4
End Section Module w/Grounding Boss	253-04-90-012	2	4

.045″ SQUARE TAIL WIRE WRAP PC CONNECTOR MODULES/ .200″ SPACING - DOUBLE READOUT FOR 1/16″ PRINTED CIRCUIT BOARDS


.072 CONTACT WIDTH TYP
A
.200
.125 REF
.196
.392
.100
B
SLOT DEPTH
.030 TYP
.370
.656
1.644 REF
.188
.800
.200 TYP
.034
.076
.105
TYP BASIC
.200
.138 DIA TYP
.100
.045 SQ.
.200

FEATURES AND SPECIFICATIONS

SPECIAL FEATURES: Cantilever contact construction insures maximum contact pressure with minimum insertion force. Solid .045″ square tail section provides necessary rigidity and stability for wire wrap application. Oversize bosses on insulator permit interference fit into aluminum plate.

SIZES: Available in 2 or 3 position sizes.

TERMINATION: .045″ square tail for automatic semi-automatic wire wrapping.

MOUNTING STYLE: Module contacts have bosses that press-fit into .125″ thick chassis with .137″ ±.001 dia. holes.

INSULATOR MATERIAL: Grey nylon for all modules.

CONTACT MATERIAL & PLATING: All module contacts made of phosphor bronze with 30 micro-inches gold over 30 - 150 micro-inches nickel.

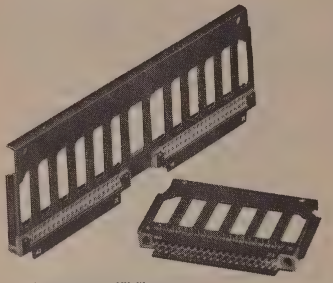
PERFORMANCE SPECIFICATIONS: Consult factory for specifications.

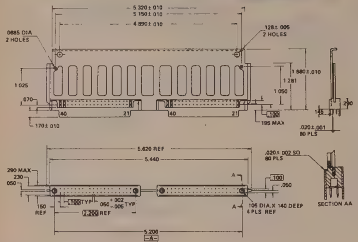
ORDERING INFORMATION

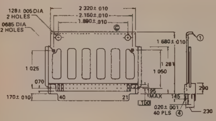
DESCRIPTION	PART NUMBER	NO. OF POSITIONS	NO. OF CONTACTS	DIM. A	DIM. B
2-Position Module	253-04-90-007	2	4	.200	.392
3-Position Module	253-06-90-008	3	6	.400	.592

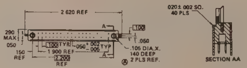
TRW® CINCH CONNECTORS

NAFI 40 & 80 CONTACT PC CONNECTOR & MODULES




5.320± 010
5 150± 010
4.890± 010
0685 DIA
2 HOLES
128± 005
2 HOLES
1 025
.070
40
21
40
21
170± 010
1 680± .010
1 281
1 050
.100
195 MAX
145
290
.020±.001
80 PLS
5.620 REF
5.440
290 MAX
230
050
150
REF
.100 TYP
050 + 002 - .005 TYP
2.200 REF
A
A
.100
.050
105 DIA.X 140 DEEP
4 PLS REF
5.200
-A-
.020± 002 SQ
80 PLS
SECTION AA


128± 005 DIA
2 HOLES
0685 DIA
2 HOLES
2 320± 010
2.150±.010
1.890±.010
1 680±.010
①
1 281
1 025
1 050
070
170± 010
40
21
195
MAX
145
290
.100
020± 001
40 PLS ④
230


2 620 REF
A
.100
290
MAX
050
.050
150
REF
.100 TYP
050 + 002 - 005 TYP
1 900 REF
2.200
REF
A
.105 DIA.X.
140 DEEP
Ⓐ 2 PLS REF.
020± 002 SQ.
40 PLS
SECTION AA

This miniature connector assembly can be quickly and easily disassembled and reassembled for wave solder installation of PC boards as well as for field servicing and retrofit.

These 40 and 80 pin connectors are designed to meet, or exceed, the requirements of NavOrd specification number WS-6116, and associated profile drawing number 2672600. Specifically, they comply with the design configurations delineated by NavOrd drawings 0102-655 and 0102-660, respectively.

These assemblies function as headers for the support of a printed circuit board measuring approximately 2 5/16″, or 5 5/16″ x 1 5/32″. They provide for the assembly of dual-in-line packages, the leads of which will extend through the cutouts in the metal frame portion, into the printed circuit board allowing for their interconnection by wave soldering. The metal frame acts as a heat sink to carry away the heat generated by the dual-in-line devices.

The connector contains 40 contacts, 2 rows of 20 each arranged in .100″ x .100″ centers, which are gold plated brass.

These assemblies may be mated to back panel assemblies with insulated or grounded mini-mod receptacles described on this page, or with any receptacle arrangement conforming to NavOrd specification WS6157.

ELECTRICAL SPECIFICATIONS

Current Rating: 3.0 amps.
Contact Resistance: 6.0 milliohms max.
Dielectric Strength: 1000V RMS, 1200V DC.
Insulation Resistance: 100,000 megohms min.

MATERIALS AND FINISHES

Contact Strip: Glass filled diallyl phthalate per MIL-M-14F, Type SDG.

Contact Pins: Brass alloy per QQ-B-613, 50 microinches gold minimum over nickel.
Frame: Black anodized aluminum per QQ-A-250.

MECHANICAL SPECIFICATIONS

Molded-in pins will withstand 20 oz. pull.
Guide ribs will withstand 10 in.-lbs. torque.
Extractor fin withstands 6 in.-lbs. torque.
Pin shield withstands 6 lbs. pull.

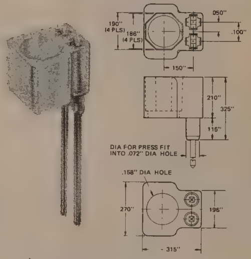
ORDERING INFORMATION

Cinch Part No.	NavOrd No.	Description
299 99 00 004	0102-655	Single Span
299 99 00 005	0102-660	Double Span

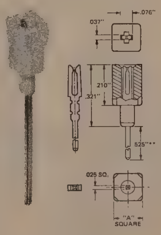
Consult the factory for other frame cutout configurations.

RECEPTACLE HARDWARE

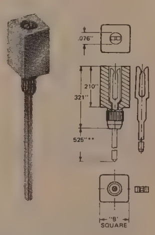
POLARIZING MODULE


050″
190″
(4 PLS)
186″
(4 PLS)
.100″
150″
210″
325″
115″
DIA FOR PRESS FIT
INTO .072″ DIA HOLE
.158″ DIA HOLE
270″
196″
315″

SIGNAL MODULE


.076″
037″
210″
.321″
525″**
025 SQ.
"A"
SQUARE

GROUND MODULE


.076″
210″
321″
525″**
"B"
SQUARE

Grid	Dim. "A"	Dim. "B"
.100″ x .100″	.095″	.095″
.125″ x .125″	.120″	.120″
.150″ x .150″	.145″	.145″

**Other tail lengths available upon request.

MINI-MOD MODULES

FEATURES

- Modular construction for wide latitude of configurations on .100″ x .100″, 125″ x .125″ and .150″ x .150″ grid.
- Meet stringent requirements for military airborne applications.
- Meet NAFI's standard packaging concept per WS-6157A.
- Nylon modules serve as both contact retention devices and as a dielectric.
- Available in colors for easy color coding and identification.
- Automatic assembly operations offer low overall costs.

PHYSICAL CHARACTERISTICS

Insulator Material: White nylon per MIL-M-20693A. Other colors available on request.

Ground Material: Aluminum per QQ-A-225.

Contact Material: Phosphor bronze per QQ-B-750. Comp. A or Beryllium copper per QQ-C-533.

Contact Plating: 30 microinches gold per MIL-G-45204B over copper flash. Other finishes available on request.

ELECTRICAL CHARACTERISTICS

Current Rating: 3 amps.

Withstanding Voltage: 1800V AC tested per EIA std. RS-364.

Operating Voltage: 600V AC — ⅓ withstanding voltage per EIA std. RS-364.

Contact Resistance: 8 milliohms max.

Insulation Resistance: 5000 megohms min.

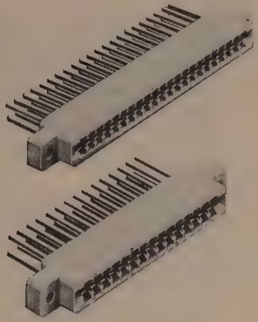
MECHANICAL DATA

Individual contact insertion and withdrawal with an .020 blade — 2-10 oz.
Individual contact retention — 8 lbs. min.

TRW® CINCH CONNECTORS

WIRE WRAP PC CONNECTORS

.045″ SQUARE TAIL WIRE WRAP CONNECTORS/.156″ SPACING - DOUBLE READOUT FOR 1/16″ PRINTED CIRCUIT BOARDS



FEATURES AND SPECIFICATIONS

SPECIAL FEATURES: Combines contact reliability of a flexing bifurcated contact with stability of a rigid .045″ square tail.

Tail section contains inner core of copper with outer cover of flexible contact material formed into .045″ square shape.

SIZES: Available in 15 and 22-position sizes.

TERMINATION: .045″ square tails for automatic and/or semi-automatic wire wrapping.

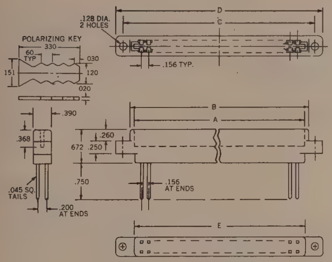
MOUNTING STYLE: Plain .128″ diameter holes for standard mounting.

INSULATOR MATERIAL: Green glass-filled diallyl phthalate, type SDG-F per MIL-M-14.

CONTACT MATERIAL & PLATING: Phosphor bronze contacts with 30 micro-inches gold finish.

POLARIZING KEY MATERIAL: Made of glass epoxy laminate and must be ordered separately.

PERFORMANCE SPECIFICATIONS: See page 18.


.128 DIA.
2 HOLES
D
C
.156 TYP.
POLARIZING KEY
330
60 TYP
030
151
120
020
.390
.368
672
.260
.250
.750
.045 SQ. TAILS
.200 AT ENDS
.156 AT ENDS
B
A
E

ORDERING INFORMATION

DESCRIPTION	PART NUMBER *	NO. OF POSITIONS	NO. OF CONTACTS
15-Position Connector	253-15-30-074	15	30
22-Position Connector	253-22-30-021	22	44
Polarizing Key	474-11-75-445	—	—

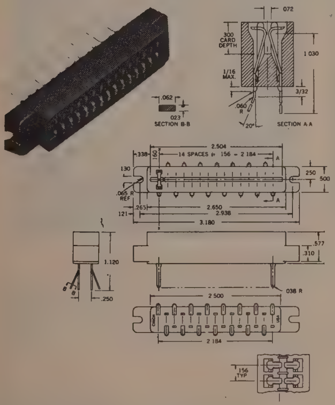
*Available through Cinch Distributors.

DIMENSIONAL DATA

SIZE (No. of Contact Positions)	DIMENSIONS				
	"A"	"B"	"C"	"D"	"E"
15	2.504	2.646	2.938	3.250	2.500
22	3.596	3.738	4.030	4.342	3.592

LOW COST PC CONNECTORS

LOW COST EDGE CONNECTOR WITH CANTILEVER CONTACTS/ .156″ SPACING - DOUBLE READOUT FOR 1/16″ PRINTED CIRCUIT BOARDS


072
300 CARD DEPTH
1 030
1/16 MAX.
3/32
.060 R
20°
SECTION A-A
.062
023
SECTION B-B
2.504
.338
160
14 SPACES @ 156 = 2 184
A
130
.065 R REF
250
500
.265
2.650
121
2.938
3.180
1.120
.250
.577
.310
038 R
2 500
2 184
156 TYP

FEATURES AND SPECIFICATIONS

SPECIAL FEATURES: Cantilever contact construction combines maximum contact pressure with minimum insertion force. Gap uniformity is achieved through pre-loading contacts against insulator stop. Selective gold plating permits concentration of gold at contact area only, at substantially reduced cost.

SIZE: Available in 15 positions, 30 contact size only.

TERMINATION: Special contact tails for slip-on clip or wire wrap application.

MOUNTING HOLE: Cutout area for standard mounting.

INSULATOR MATERIAL: High impact general purpose black phenolic.

CONTACT MATERIAL & PLATING: Phosphor bronze with selective plating of 100 micro-inches gold over 50 micro-inches of copper at contact area and tails tin-lead coated on 2 sides only.

PERFORMANCE SPECIFICATIONS: See page 18.

ORDERING INFORMATION

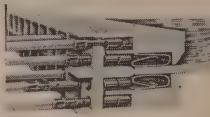
DESCRIPTION	PART NUMBER	NO. OF POSITIONS	NO. OF CONTACTS
Connector	253-15-90-240	15	30

TRW/CINCH CONNECTORS, AN ELECTRONIC COMPONENTS DIV. OF TRW INC. / 1501 MORSE AVE. / ELK GROVE VILLAGE, ILL. 60007

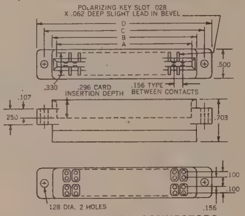
TRW® CINCH CONNECTORS

CRIMP TYPE PC CONNECTORS

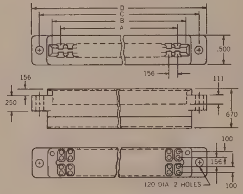
"TWIN-CON" EDGE CONNECTORS WITH CRIMP-ON SNAP-IN PINS/ .156" SPACING - DOUBLE READOUT FOR 1/16" PRINTED CIRCUIT BOARDS



8, 15 AND 22 POSITION CONNECTORS


POLARIZING KEY SLOT .028
X .062 DEEP SLIGHT LEAD IN BEVEL
D
C
B
A
.500
.330
.296 CARD INSERTION DEPTH
.156 TYPE BETWEEN CONTACTS
.107
250
.703
100
.100
128 DIA. 2 HOLES
.156

43 POSITION CONNECTORS



FEATURES AND SPECIFICATIONS

1. Crimp-on removable wire pins provide widest range of wiring flexibility.
2. Probe-proof closed entry back plates protect wire leads and receptacles.
3. Wire pins "snap" into contact receptacles, held securely by detent action.
4. Twin-barrel contact receptacles permit 2 wires per contact, 4 wires per position.
5. Bifurcated contacts provide twin contact surfaces, assure positive contact.

SIZES: Available in 8, 15, 22 and 43 position sizes.

TERMINATION: Twin-barrel contact receptacles with crimp-on snap-in wire pins.

MOUNTING STYLE: Plain .128" dia. holes for standard mounting.

INSULATOR MATERIAL: Green glass-filled diallyl phthalate, type GDI-30F per MIL-M-19833.

CONTACT AND PIN MATERIAL & PLATING: Contacts are made of beryllium copper and wire pins are brass, both with a finish of 30 micro-inches gold over 200 micro-inches silver.

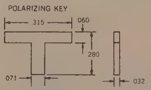
INSULATED JUMPER MATERIAL & PLATING: Jumpers are brass with red or black insulated area dipped and aired with plastisol coating; same finish as pins and contacts.

POLARIZING KEY MATERIAL: Made of nylon and must be ordered separately (Part No. 456-01-25-788). Pins and connectors indicated below can be supplied with 50 micro-inch gold finish to meet MIL-C-21097B.

PERFORMANCE SPECIFICATIONS: See page 18.

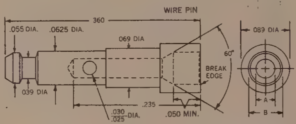
ORDERING INFORMATION

DESCRIPTION	PART NUMBER	NO. OF POSITIONS	NO. OF CONTACTS
8-Position Connector	254-08-70-118	8	16
15-Position Connector	254-15-70-113	15	30
22-Position Connector	254-22-70-115	22	44
43-Position Connector	254-43-70-114	43	86
Polarizing Key	456-01-25-788	—	—



DIMENSIONAL DATA

No. of Positions	DIMENSIONS "A"	"B"	"C"	"D"
8	1.412	1.572	1.844	2.094
15	2.504	2.668	2.938	3.188
22	3.596	3.760	4.030	4.280
43	6.552	6.802	7.302	7.600



Pin Part No.	Wire	"A" Dia. ±.002	"B" Dia. ±.002
462-94-11-130 (840)	No. 20	.046	.073
462-94-11-131 (840)	No. 22-24	.036	.063

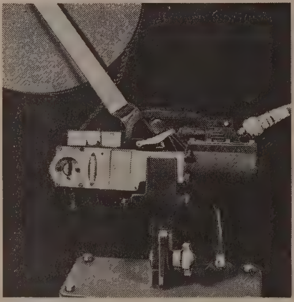
TOOLS AND MACHINES

HAND CRIMP TOOL

Part No. 599-11-11-108
Versatile, cycle-controlled Buchanan crimp tool. Positioners must be ordered separately. For #20 wire, order positioner No. 598-98-22-107. For #22-24 wire, order No. 598-98-22-108.

PIN INSERTION/REMOVAL TOOL

Part No. 599-11-11-102
Special metal hand tool with separate tips for inserting or removing wire pins from "Twin-Con" contact receptacles. Request Form ISM-51 for detailed operating instructions.



BENCH-MOUNTED SEMI-AUTOMATIC CRIMP MACHINE

Pneumatically operated, cycle-controlled tool with large capacity reel. Contacts fed to machine on strips. Order direct from Buchanan (their Catalog Nos. 11151 for machine base and 11566 for tool).

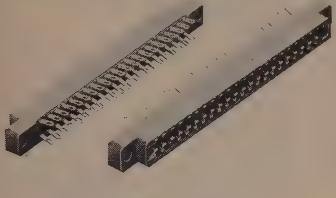
AUTOMATIC CRIMP MACHINE

Available only for extremely high production needs — contacts can be bulk fed into machine. Crimps over both wire and insulation at same time. Direct all inquiries to Factory.

TRW® CINCH CONNECTORS

STANDARD PC CONNECTORS

STANDARD EDGE CONNECTORS WITH SOLDER TAB CONTACTS/ .156″ SPACING - SINGLE OR DOUBLE READOUT FOR 1/16″ PRINTED CIRCUIT BOARDS



FEATURES AND SPECIFICATIONS

SPECIAL FEATURES: Patented bifurcated bellows contacts Pat. No. 3274532 provide added contact reliability especially in applications where vibration and board irregularities are involved.

SIZES: Both single and double readout versions are available in 6, 10, 12, 15, 18, 20, 22 and 25-contact position sizes.

TERMINATION: Bifurcated contacts with conventional .115″ x .050″ slot solder tabs.

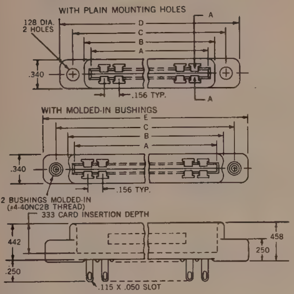
MOUNTING STYLES: Available with either .128″ diameter holes for standard mounting molded-in bushings or floating bushings. .142″ diameter plain holes also available on special order.

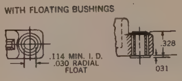
INSULATOR MATERIAL: Green glass-filled diallyl phthalate, type SDG-F per MIL-M-14.

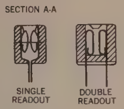
CONTACT MATERIALS & PLATING: Contacts are available in either phosphor bronze or beryllium copper. Standard finish is 30 micro-inches gold. Beryllium copper contacts can also be supplied with special finish of 50 micro-inches gold to meet MIL-C-21097B.

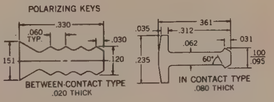
POLARIZING KEY MATERIALS: Two types of polarizing keys are available, and must be ordered separately as follows: Part No. 456-07-35-003 (for between-contact polarization) is made of glass epoxy; Part No. 474-11-54-200 (for in-contact polarization) is made of diallyl phthalate.

PERFORMANCE SPECIFICATIONS: See page 18.









SINGLE READOUT

NO. OF CONTACT POSI-TIONS	TYPE I PART NO. (Plain Mtg. Holes .128″ Dia.)	TYPE 1A PART NO. (Plain Mtg. Holes .142″ Dia.)	TYPE 2 PART NO. (Molded-In Bushings)	TYPE 3 PART NO. (Floating/ Bushings)	CONTACT MATERIAL	DIMENSIONS A	B	C	D	E	NO. OF CONTACT POSI-TIONS
6	250-06-30-170*	250-06-30-211	250-06-30-190	250-06-30-200	Phosphor Bronze	1.100	1.239	1.531	1.785	1.937	6
	250-06-30-171†	250-06-30-210	250-06-30-191†	250-06-30-201†	Beryllium Copper						
10	250-10-30-170*	250-10-30-211	250-10-30-190	250-10-30-200	Phosphor Bronze	1.724	1.864	2.156	2.410	2.562	10
	250-10-30-171†	250-10-30-210	250-10-30-191†	250-10-30-201†	Beryllium Copper						
12	250-12-30-170*	250-12-30-211	250-12-30-190	250-12-30-200	Phosphor Bronze	2.036	2.177	2.469	2.723	2.875	12
	250-12-30-171	250-12-30-210	250-12-30-191	250-12-30-201	Beryllium Copper						
15	250-15-30-170*	250-15-30-211	250-15-30-190	250-15-30-200	Phosphor Bronze	2.504	2.645	2.937	3.191	3.343	15
	250-15-30-171†	250-15-30-210	250-15-30-191†	250-15-30-201†	Beryllium Copper						
18	250-18-30-170*	250-18-30-211	250-18-30-190	250-18-30-200	Phosphor Bronze	2.972	3.114	3.406	3.660	3.812	18
	250-18-30-171†	250-18-30-210	250-18-30-191†	250-18-30-201†	Beryllium Copper						
20	250-20-30-170	250-20-30-211	250-20-30-190	250-20-30-200	Phosphor Bronze	3.286	3.427	3.719	3.973	4.125	20
	250-20-30-171	250-20-30-210	250-20-30-191	250-20-30-201	Beryllium Copper						
22	250-22-30-170*	250-22-30-211	250-22-30-190	250-22-30-200	Phosphor Bronze	3.596	3.739	4.031	4.285	4.437	22
	250-22-30-171†	250-22-30-210	250-22-30-191†	250-22-30-201†	Beryllium Copper						
25	250-25-30-170*	250-25-30-211	250-25-30-190	250-25-30-200	Phosphor Bronze	4.067	4.208	4.500	4.754	4.906	25
	250-25-30-171	250-25-30-210	250-25-30-191	250-25-30-201	Beryllium Copper						

DOUBLE READOUT

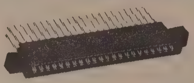
NO. OF CONTACT POSI-TIONS	TYPE I PART NO. (Plain Mtg. Holes .128″ Dia.)	TYPE 1A PART NO. (Plain Mtg. Holes .142″ Dia.)	TYPE 2 PART NO. (Molded-In Bushings)	TYPE 3 PART NO. (Floating/ Bushings)	CONTACT MATERIAL	DIMENSIONS A	B	C	D	E	NO. OF CONTACT POSI-TIONS
6	251-06-30-160*	251-06-30-260	251-06-30-210	251-06-30-220	Phosphor Bronze	1.100	1.239	1.531	1.785	1.937	6
	251-06-30-161†	251-06-30-261	251-06-30-211†	251-06-30-221†	Beryllium Copper						
10	251-10-30-160*	251-10-30-260	251-10-30-210	251-10-30-220	Phosphor Bronze	1.724	1.864	2.156	2.410	2.562	10
	251-10-30-161†	251-10-30-261	251-10-30-211†	251-10-30-221†	Beryllium Copper						
12	251-12-30-160*	251-12-30-260	251-12-30-210	251-12-30-220	Phosphor Bronze	2.036	2.177	2.469	2.723	2.875	12
	251-12-30-161	251-12-30-261	251-12-30-211	251-12-30-221	Beryllium Copper						
15	251-15-30-160*	251-15-30-260	251-15-30-210	251-15-30-220	Phosphor Bronze	2.504	2.645	2.937	3.191	3.343	15
	251-15-30-161†	251-15-30-261	251-15-30-211†	251-15-30-221†	Beryllium Copper						
18	251-18-30-160*	251-18-30-260	251-18-30-210	251-18-30-220	Phosphor Bronze	2.972	3.114	3.406	3.660	3.812	18
	251-18-30-161†	251-18-30-261	251-18-30-211†	251-18-30-221†	Beryllium Copper						
20	251-20-30-160	251-20-30-260	251-20-30-210	251-20-30-220	Phosphor Bronze	3.286	3.427	3.719	3.973	4.125	20
	251-20-30-161	251-20-30-261	251-20-30-211	251-20-30-221	Beryllium Copper						
22	251-22-30-160*	251-22-30-260	251-22-30-210	251-22-30-220	Phosphor Bronze	3.596	3.739	4.031	4.285	4.437	22
	251-22-30-161†	251-22-30-261	251-22-30-211†	251-22-30-221†	Beryllium Copper						
25	251-25-30-160*	251-25-30-260	251-25-30-210	251-25-30-220	Phosphor Bronze	4.067	4.208	4.500	4.754	4.906	25
	251-25-30-161	251-25-30-261	251-25-30-211	251-25-30-221	Beryllium Copper						

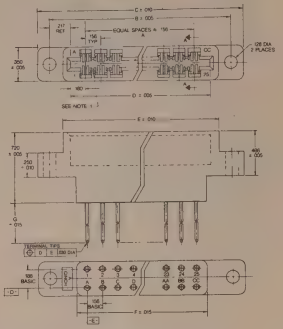
* These items available through Cinch distributors.
† Can be supplied to meet MIL-C-21097B.

TRW® CINCH CONNECTORS

PC BOARD CONNECTORS WITH TERMINALS ON .156 CENTERS

PRINTED CIRCUIT BOARD CONNECTORS/WITH WIRE WRAP .031 x .062 TERMINALS ON .156 CENTERS





FEATURES AND SPECIFICATIONS

CURRENT RATING: 3 amperes. Based upon all contacts carrying specified current and a temperature rise of 30°C above ambient.
RATED VOLTAGE (Sea Level): 900 V AC RMS 1200 V DC. (Based on ⅓ voltage breakdown)
TEST VOLTAGE (Sea Level): 2000 V AC RMS 2700 V DC. (Based on 75% voltage breakdown)
CONTACT RESISTANCE (Millivolt Drop @ 3 Amp): 16 millivolt max.
TOTAL INSERTION FORCE: 20 lbs. max. Performed in accordance with Paragraph 4.6.6.2 of MIL-C-21097 using .070 inch thick blade.
INDIVIDUAL CONTACT ENGAGING AND SEPARATION FORCE: 2-16 oz. Performed in accordance with Paragraph 4.6.6.1.1 of MIL-C-21097B using .062 inch thick blade.
INDIVIDUAL SEPARATION FORCE: 1 oz. min. Performed in accordance with Paragraph 4.6.6.1.2 of MIL-C-21097 using .054 inch thick blade.
DURABILITY: 100 cycles with steel blade .070 inch thick. Contact resistance and individual contact separation force requirements met after test.
INSULATOR MATERIALS: General purpose impact phenolic — color black.
POLARIZING KEY: Nylon
CONTACT: Phosphor bronze
CONTACT PLATING: .00003 min. gold over .00005 min. nickel in contacting area .00001 min. gold on remainder of contact.
GENERAL DESCRIPTION: 22 contact positions (44 contacts) double read-out .156 center to center spacing. For 1/16 (.054-.070) thick printed circuit card. Bifurcated — cantilever type contacts. Wire wrap termination .031 x .062. Between contact polarizing.

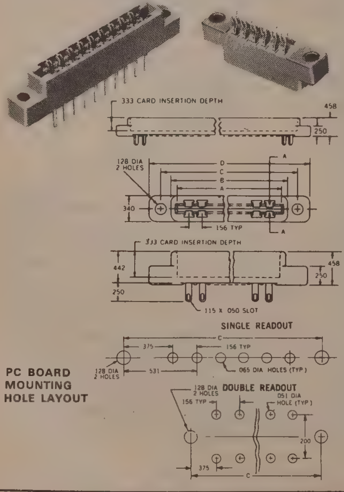
ORDERING INFORMATION

PART NUMBER	NO. OF CONTACTS	DIMENSIONS						
		A	B	C	D	E	F	G
253-10-00-253†	10/20	1.404	2.158	2.408	1.724	1.878	1.616	.550
253-10-00-254†	10/20	1.404	2.158	2.408	1.724	1.878	1.616	.755
253-10-00-255†	10/20	1.404	2.158	2.408	1.724	1.878	1.616	1.051
253-15-00-253†	15/30	2.184	2.938	3.188	2.504	2.658	2.396	.550
253-15-00-254†	15/30	2.184	2.938	3.188	2.504	2.658	2.396	.755
253-15-00-255†	15/30	2.184	2.938	3.188	2.504	2.658	2.396	1.051
253-18-00-253†	18/36	2.652	3.406	3.656	2.972	3.126	2.864	.550
253-18-00-254†	18/36	2.652	3.406	3.656	2.972	3.126	2.864	.755
253-18-00-255†	18/36	2.652	3.406	3.656	2.972	3.126	2.864	1.051
253-22-00-253†	22/44	3.276	4.030	4.280	3.596	3.750	3.488	.550
253-22-00-254†	22/44	3.276	4.030	4.280	3.596	3.750	3.488	.755
253-22-00-255†	22/44	3.276	4.030	4.280	3.596	3.750	3.488	1.051
253-25-00-253†	25/50	3.744	4.498	4.748	4.064	4.218	3.956	.550
253-25-00-254†	25/50	3.744	4.498	4.748	4.064	4.218	3.956	.755
253-25-00-255†	25/50	3.744	4.498	4.748	4.064	4.218	3.956	1.051
253-30-00-253†	30/60	4.524	5.278	5.528	4.844	4.988	4.736	.550
253-30-00-254†	30/60	4.524	5.278	5.528	4.844	4.998	4.736	.755
253-30-00-255†	30/60	4.524	5.278	5.528	4.844	4.998	4.736	1.051
474-11-76-229†	50 PK 3			Polarizing Key				

† Indicates items available through Cinch Distributors.

SPECIAL PURPOSE .156 CENTER PC BOARD EDGE CONNECTORS

PC BOARD EDGE CONNECTORS FOR INTERCONNECTING TWO OR MORE STANDARD 1/16" PRINTED CIRCUIT BOARDS



FEATURES AND SPECIFICATIONS

RATED VOLTAGE: AC RMS, adj. terminals 830 V (Sea Level) 300 V (3.4 Hg. 50,000 feet); 200 V (1.3 Hg. 70,000 feet).
CURRENT: 5.0 Amps.
CONTACT RESISTANCE: .005 Ohms at Rated Current.
INSULATION RESISTANCE: 5000 Megohms.
ENVIRONMENTAL: Per MIL-C-21097 and MIL-STD-202, latest versions.
SHOCK: 3 blows of 50G, Method 202B.
TEMPERATURE CYCLING: 5 continuous cycles per Method 107B, Test Condition B: Beryllium copper −65°C to 125°C; Phosphor bronze −65°C to 105°C.
SALT SPRAY: 48 hrs. per Method 101B, Condition B.
VIBRATION: Per Method 204A, Condition B.
HUMIDITY: Per Method 103B, Condition B.

ORDERING INFORMATION

NO. OF CONTACT POSITIONS	CARD EXTENDER	EXTENDED DIP SOLDER TERMINATIONS	
	DOUBLE READOUT PART NUMBER	SINGLE READOUT PART NUMBER	DOUBLE READOUT PART NUMBER
5	251-06-30-390	252-06-30-230	252-06-30-260
10	251-10-30-390	252-10-30-230	252-10-30-260
12	251-12-30-390	252-12-30-230	252-12-30-260
15	251-15-30-390	252-15-30-230	252-15-30-260
18	251-18-30-390	252-18-30-230	252-18-30-260
22	251-22-30-390	252-22-30-230	252-22-30-260
25	251-25-30-390	252-25-30-230	252-25-30-260

All connectors listed are available "off-the-shelf" from Cinch Distributors.

DIMENSIONAL DATA

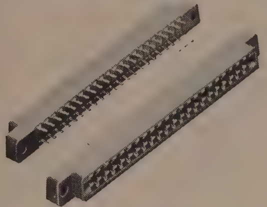
NO. OF CONTACT POSITIONS	A	B	C	D
6	1.100	1.239	1.531	1.785
10	1.724	1.864	2.156	2.410
12	2.036	2.177	2.469	2.723
15	2.504	2.645	2.937	3.191
18	2.972	3.114	3.406	3.660
22	3.596	3.739	4.031	4.285
25	4.067	4.208	4.500	4.754

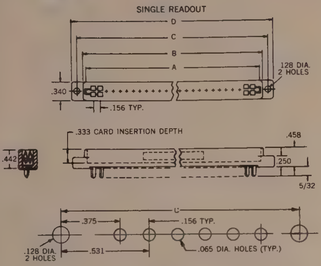
TRW/CINCH CONNECTORS, AN ELECTRONIC COMPONENTS DIV. OF TRW INC. / 1501 MORSE AVE. / ELK GROVE VILLAGE, ILL. 60007

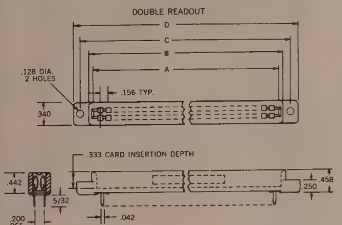
TRW® CINCH CONNECTORS

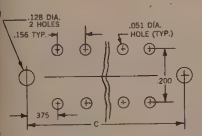
STANDARD DIP SOLDER PC CONNECTORS .156 CENTER SPACING

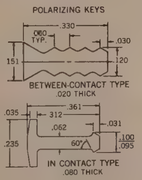
STANDARD EDGE CONNECTORS WITH DIP SOLDER CONTACTS/ .156″ SPACING - SINGLE OR DOUBLE READOUT FOR 1/16″ PRINTED CIRCUIT BOARDS




SINGLE READOUT
D
C
B
A
.128 DIA.
2 HOLES
.340
.156 TYP.
.333 CARD INSERTION DEPTH
.458
.442
.250
5/32
.375
C
.156 TYP.
.128 DIA.
2 HOLES
.531
.065 DIA. HOLES (TYP.)


DOUBLE READOUT
D
C
B
A
.128 DIA.
2 HOLES
.156 TYP.
.340
.333 CARD INSERTION DEPTH
.442
.458
.250
5/32
.200
REF.
.042


.128 DIA.
2 HOLES
.156 TYP.
.051 DIA.
HOLE (TYP.)
.200
.375
C


POLARIZING KEYS
.330
.060
TYP.
.030
.151
.120
BETWEEN-CONTACT TYPE
.020 THICK
.361
.035
.312
.062
.031
.235
60°
.100
.095
IN CONTACT TYPE
.080 THICK

FEATURES AND SPECIFICATIONS

SPECIAL FEATURES. Patented bifurcated bellows contacts Pat. No. 374532 provide added contact reliability especially in applications where vibration and board irregularities are involved.

SIZES: Both single and double readout versions are available in 6, 10, 12, 15, 18, 20, 22 and 25-contact position sizes.

TERMINATIONS: Bifurcated contacts with tails designed for dip soldering 5/32″ long. Other lengths available on special order.

MOUNTING STYLE: Plain .128″ diameter holes for standard mounting.

INSULATOR MATERIAL: Green glass-filled diallyl phthalate, type SDG-F per MIL-M-14.

CONTACT MATERIALS & PLATING: Contacts are available in either phosphor bronze or beryllium copper. Standard finish is 30 micro-inches gold. Connectors can also be supplied with a contact finish of 50 micro-inches gold to meet MIL-C-21097B.

POLARIZING KEY MATERIALS: Two types of polarizing keys are available, and must be ordered separately as follows: Part No. 456-07-35-003 (for between-contact polarization) is made of glass epoxy; Part No. 474-11-54-200 (for in-contact polarization) is made of diallyl phthalate.

PERFORMANCE SPECIFICATIONS: See page 18.

DIMENSIONAL DATA

SIZE (No. of Contact Positions)	DIMENSIONS "A"	"B"	"C"	"D"
6	1.100	1.239	1.531	1.785
10	1.724	1.864	2.156	2.410
12	2.036	2.177	2.469	2.723
15	2.504	2.645	2.937	3.191
18	2.972	3.114	3.406	3.660
20	3.286	3.427	3.719	3.973
22	3.596	3.739	4.031	4.285
25	4.067	4.208	4.500	4.754

SINGLE READOUT

NO. OF CONTACT POSITIONS	PART NO. (Plain Mounting Holes)	CONTACT MATERIAL	DIMENSIONS A	B	C	D	NO. OF CONTACT POSITIONS
6	252-06-30-240 252-06-30-241	Phosphor Bronze Beryllium Copper	1.100	1.239	1.531	1.785	6
10	252-10-30-240 252-10-30-241	Phosphor Bronze Beryllium Copper	1.724	1.864	2.156	2.410	10
12	252-12-30-240 252-12-30-241	Phosphor Bronze Beryllium Copper	2.036	2.177	2.469	2.723	12
15	252-15-30-240 252-15-30-241	Phosphor Bronze Beryllium Copper	2.504	2.645	2.937	3.191	15
18	252-18-30-240 252-18-30-241	Phosphor Bronze Beryllium Copper	2.972	3.114	3.406	3.660	18
20	252-20-30-240 252-20-30-241	Phosphor Bronze Beryllium Copper	3.286	3.427	3.719	3.973	20
22	252-22-30-240 252-22-30-241	Phosphor Bronze Beryllium Copper	3.596	3.739	4.031	4.285	22
25	252-25-30-240 252-25-30-241	Phosphor Bronze Beryllium Copper	4.067	4.208	4.500	4.754	25

DOUBLE READOUT

NO. OF CONTACT POSITIONS	PART NO. (Plain Mounting Holes)	CONTACT MATERIAL	DIMENSIONS A	B	C	D	NO. OF CONTACT POSITIONS
6	252-06-30-160* 252-06-30-161†	Phosphor Bronze Beryllium Copper	1.100	1.239	1.531	1.785	6
10	252-10-30-160 252-10-30-161†	Phosphor Bronze Beryllium Copper	1.724	1.864	2.156	2.410	10
12	252-12-30-160* 252-12-30-161	Phosphor Bronze Beryllium Copper	2.036	2.177	2.469	2.723	12
15	252-15-30-160* 252-15-30-161†	Phosphor Bronze Beryllium Copper	2.504	2.645	2.937	3.191	15
18	252-18-30-160* 252-18-30-161†	Phosphor Bronze Beryllium Copper	2.972	3.114	3.406	3.660	18
20	252-20-30-160 252-20-30-161	Phosphor Bronze Beryllium Copper	3.286	3.427	3.719	3.973	20
22	252-22-30-160* 252-22-30-161†	Phosphor Bronze Beryllium Copper	3.596	3.739	4.031	4.285	22
25	252-25-30-160 252-25-30-161	Phosphor Bronze Beryllium Copper	4.067	4.208	4.500	4.754	25

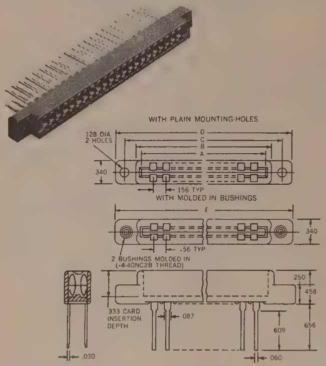
* These items available through Cinch distributors.

† Can be supplied to meet MIL-C-21097B.

TRW® CINCH CONNECTORS

STANDARD PC CONNECTORS .156 CENTER SPACING

STANDARD EDGE CONNECTORS WITH WIRE WRAP POST CONTACTS/ .156″ SPACING - DOUBLE READOUT FOR 1/16″ PRINTED CIRCUIT BOARDS


WITH PLAIN MOUNTING-HOLES
128 DIA
2 HOLES
D
C
B
A
340
156 TYP
WITH MOLDED IN BUSHINGS
E
340
.56 TYP
2 BUSHINGS MOLDED IN
(-4-40NC2B THREAD)
250
458
333 CARD
INSERTION
DEPTH
087
609
656
.030
060

FEATURES AND SPECIFICATIONS

SPECIAL FEATURES: Available in wide range of sizes and mounting styles.

SIZES: Available in 6, 10, 12, 15, 18, 20 and 25 contact position sizes.

TERMINATION: Special wrap post contacts with .060″ x .030″ tails designed for wire wrapping.

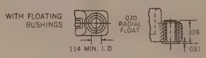
MOUNTING STYLES: Available with plain .128″ diameter holes for standard mounting, molded-in bushings or floating bushings.

INSULATOR MATERIAL: Green glass-filled diallyl phthalate, type SDG-F per MIL-M-14.

CONTACT MATERIALS & PLATING: Contacts are available in either phosphor bronze or beryllium copper with 30 micro-inches gold finish.

POLARIZING KEY MATERIALS: Two types of polarizing keys are available and must be ordered separately as follows: Part No. 456-07-35-003 key (for between-contact polarization) is made of glass epoxy. Part No. 474-11-54-200 key (for in-contact polarization) is made of diallyl phthalate (see page 13).

PERFORMANCE SPECIFICATIONS: See page 18.


WITH FLOATING
BUSHINGS
114 MIN. I. D
030
RADIAL
FLOAT
328
031

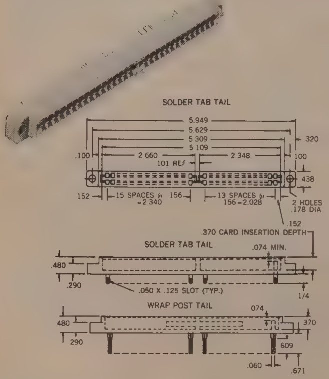
SPECIFICATIONS

NO. OF CONTACT POSITIONS	TYPE 1 PART NO. (Plain Mounting Holes)	TYPE 2 PART NO. (Molded-In Bushings)	TYPE 3 PART NO. (Floating Bushings)	CONTACT MATERIAL	DIMENSIONS A	B	C	D	E
6	253-06-30-140*	253-06-30-180	253-06-30-170	Phosphor Bronze	1.100	1.239	1.531	1.785	1.937
	253-06-30-141	253-06-30-181	253-06-30-171	Beryllium Copper					
10	253-10-30-140*	253-10-30-180	253-10-30-170	Phosphor Bronze	1.724	1.864	2.156	2.410	2.562
	253-10-30-141	253-10-30-181	253-10-30-171	Beryllium Copper					
12	253-12-30-140*	253-12-30-180	253-12-30-170	Phosphor Bronze	2.036	2.177	2.469	2.723	2.875
	253-12-30-141	253-12-30-181	253-12-30-171	Beryllium Copper					
15	253-15-30-140*	253-15-30-180	253-15-30-170	Phosphor Bronze	2.504	2.645	2.937	3.191	3.343
	253-15-30-141	253-15-30-181	253-15-30-171	Beryllium Copper					
18	253-18-30-140*	253-18-30-180	253-18-30-170	Phosphor Bronze	2.972	3.114	3.406	3.660	3.812
	253-18-30-141	253-18-30-181	253-18-30-171	Beryllium Copper					
20	253-20-30-140	253-20-30-180	253-20-30-170	Phosphor Bronze	3.286	3.427	3.719	3.973	4.125
	253-20-30-141	253-20-30-181	253-20-30-171	Beryllium Copper					
22	253-22-30-140*	253-22-30-180	253-22-30-170	Phosphor Bronze	3.596	3.739	4.031	4.285	4.437
	253-22-30-141	253-22-30-181	253-22-30-171	Beryllium Copper					
25	253-25-30-140	253-25-30-180	253-25-30-170	Phosphor Bronze	4.067	4.208	4.500	4.754	4.906
	253-25-30-141	253-25-30-181	253-25-30-171	Beryllium Copper					

* These items available through Cinch distributors.

SPECIAL DESIGN PC CONNECTORS .156 CENTER SPACING

SPECIAL EDGE CONNECTORS WITH CENTER BRIDGE DESIGN/ .156″ SPACING - DOUBLE READOUT FOR 1/16″ PRINTED CIRCUIT BOARDS


SOLDER TAB TAIL
5.949
5.629
5 309
5 109
.100
2 660
101 REF
2 348
320
100
438
152
15 SPACES @ 156 = 2 340
13 SPACES @ 156 = 2.028
2 HOLES
.178 DIA
.152
.370 CARD INSERTION DEPTH
SOLDER TAB TAIL
.074 MIN.
.480
.290
.050 X .125 SLOT (TYP.)
1/4
WRAP POST TAIL
074
480
370
290
609
.060
.671

FEATURES AND SPECIFICATIONS

SPECIAL FEATURES: Center bridge construction utilized in insulator to minimize warpage. Available with both solder tab and wrap post termination.

SIZE: Available in 30-position size only.

TERMINATIONS: Available with conventional solder tab tails or .060″ x .030″ wrap post contacts.

MOUNTING STYLE: Plain .178″ diameter holes for standard mounting.

INSULATOR MATERIAL: Green glass-filled diallyl phthalate, type SDG-F per MIL-M-14.

CONTACT MATERIALS & PLATING: Contacts are available in either phosphor bronze or beryllium copper with 30 micro-inches gold finish.

POLARIZING KEY MATERIALS: Available with "in-contact" polarization only; polarizing key is made of diallyl phthalate and must be ordered separately. (Part No. 474-11-54-200).

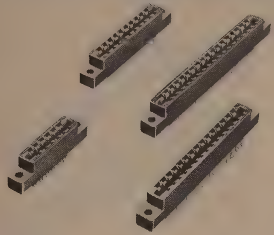
PERFORMANCE SPECIFICATIONS: See page 18.

ORDERING INFORMATION

DESCRIPTION	PART NO.	CONTACT MATERIAL	NO. OF POSITIONS	NO. OF CONTACTS
Connector w/Solder Tab Tails	251-30-30-232	Phosphor Bronze	30	60
	251-30-30-231	Beryllium Copper		
Connector w/Wrap Post Tails	253-30-30-212	Phosphor Bronze	30	60
	253-30-30-213	Beryllium Copper		

TRW® CINCH CONNECTORS

SERIES 90 ECONO-LINE LOW-COST P.C. EDGE CONNECTORS ON .156″ CENTERS FOR 1/16″ BOARDS — .333 DEEP CARD SLOT



Most of the performance features of TRW/Cinch Connectors standard printed circuit edge connectors are found in this low-cost version for commercial applications. Except for the reduced amount of gold-plating, the Series 90 Econo-Line connectors meet all the latest requirements of MIL-C-21097, Std. 202.

The Series 90 incorporates a newly developed high tensile brass, Alcoloy* 688, in its bifurcated bellow contacts. The contact area is selectively plated with 20 microinches of gold over 30 microinches of nickel that provides a non-migrating base. A green, glass-filled thermoplastic polyester replaces the more expensive diallyl phthalate used in the standard connector line.

Econo-Line connectors are supplied in 6, 10, 12, 15, 18, 22 and 25 positions, with either single or double readout in either conventional solder eyelet or dip solder tails.

*T.M. Olin Corporation.

PERFORMANCE DATA

MECHANICAL

Contact Insertion Force: 16 oz. max. per contact position.
Individual Separation Force: 1 oz. min. Performed in accordance with Para. 4.6.6.1.2 of MIL-C-21097 using .054-in. thick blade.
Durability: 100 cycles with steel blade .070-in. thick. Contact resistance and individual contact separation force requirements met after test.

ELECTRICAL

Voltage Rating (AC RMS, adjacent terminals): 830V (sea level): 300V (3.4″ Hg, 50,000 feet); 450V (1.3″ Hg, 70,000 feet).
Test Voltage (AC RMS, adjacent terminals): 1870V (sea level); 675V (3.4″ Hg, 50,000 feet); 450V (1.3″ Hg, 70,000 feet).
Current Rating: 5 amperes.
(Based upon all contacts carrying specified current and a temperature rise of 30°C. above ambient.)
Contact Resistance (at rated current): .005 ohms.
Insulation Resistance: 5000 Megohms.

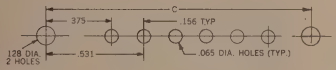
ENVIRONMENTAL SPECIFICATIONS

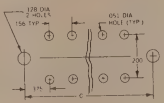
(Per MIL-C-21097 and MIL-STD-202, latest versions)
Shock: 3 blows at 50G, Method 202B.
Temperature Cycling: 5 continuous cycles per Method 107B.
Test Condition B: −65°C to +125°C.
Salt Spray: 48 hours per Method 101B, Condition B.
Vibration: Per Method 204A, Condition B for bifurcated contacts.
Humidity: Per Method 103B, Condition B.

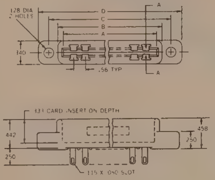
MATERIALS & FINISHES

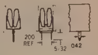
Contacts: Alcoloy 688 high tensile brass.
Plating: Contact surface selectively plated with 20 microinches gold over 30 microinches nickel overall; solder-coated terminals.
Insulator: 30% glass-filled green polyester, SEO-rated.

DIMENSIONS

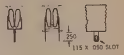








DIP SOLDER



SOLDER TAB

DIP SOLDER TERMINALS, .156 SPACING BETWEEN ROWS

Contact Positions	SINGLE READOUT Part No.	SINGLE READOUT Distributor Part No.	DOUBLE READOUT Part No.	DOUBLE READOUT Distributor Part No.
6	252-06-90-240	50-6EE-10	252-06-90-160	50-12EE-40
10	252-10-90-240	50-10EE-10	252-10-90-160	50-20EE-40
12	252-12-90-240	50-12EE-10	252-12-90-160	50-24EE-40
15	252-15-90-240	50-15EE-10	252-15-90-160	50-30EE-40
18	252-18-90-240	50-18EE-10	252-18-90-160	50-36EE-40
22	252-22-90-240	50-22EE-10	252-22-90-160	50-44EE-40
25	252-25-90-240	50-25EE-10	252-25-90-160	50-50EE-40

No. of Contact Pos.	DIMENSIONS A	B	C	D
6	1.100	1.239	1.531	1.785
10	1.724	1.864	2.156	2.410
12	2.036	2.177	2.469	2.723
15	2.504	2.645	2.937	3.191
18	2.972	3.114	3.406	3.660
22	3.596	3.739	4.031	4.285

CONVENTIONAL SOLDER TERMINALS, .156 SPACING BETWEEN ROWS

Contact Positions	SINGLE READOUT Part No.	SINGLE READOUT Distributor Part No.	DOUBLE READOUT Part No.	DOUBLE READOUT Distributor Part No.
6	250-06-90-170	50-6EE-20	251-06-90-160	50-12EE-30
10	250-10-90-170	50-10EE-20	251-10-90-160	50-20EE-30
12	250-12-90-170	50-12EE-20	251-12-90-160	50-24EE-30
15	250-15-90-170	50-15EE-20	251-15-90-160	50-30EE-30
18	250-18-90-170	50-18EE-20	251-18-90-160	50-36EE-30
22	250-22-90-170	50-22EE-20	251-22-90-160	50-44EE-30
25	250-25-90-170	50-25EE-20	251-25-90-160	50-50EE-30

DIP SOLDER TAILS, DOUBLE READOUT, .140 SPACING BETWEEN ROWS

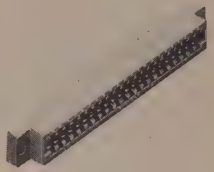
Contact Positions	Part No.	Distributor Part No.
6	252-06-90-210	50-12EE-140
10	252-10-90-210	50-20EE-140
12	252-12-90-210	50-24EE-140
15	252-15-90-210	50-30EE-140
18	252-18-90-210	50-36EE-140
22	252-22-90-210	50-44EE-140
25	252-25-90-210	50-50EE-140

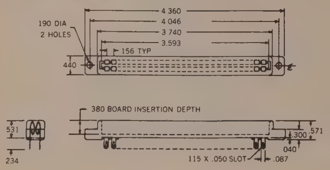
TRW/CINCH CONNECTORS, AN ELECTRONIC COMPONENTS DIV. OF TRW INC. / 1501 MORSE AVE. / ELK GROVE VILLAGE, ILL. 60007

TRW® CINCH CONNECTORS

SPECIAL BOARD SIZE PC CONNECTORS .156 CENTER SPACING

SPECIAL EDGE CONNECTORS/.156″ SPACING - DOUBLE READOUT FOR 3/32″ PRINTED CIRCUIT BOARDS





FEATURES AND SPECIFICATIONS

SPECIAL FEATURES: Accommodates 3/32″ thick printed circuit boards. Bifurcated contact construction provides added reliability.

SIZE: Available in 22-position size only.

TERMINATION: Conventional .234 solder tabs. Printed circuit tails 5/32″ long available on special order. Consult factory.

MOUNTING STYLE: Plain .190″ diameter holes for standard mounting.

INSULATOR MATERIAL: Green glass-filled diallyl phthalate, type SDG-F per MIL-M-14.

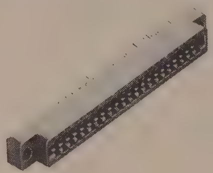
CONTACT MATERIALS & PLATING: Bifurcated contacts available in either phosphor bronze or beryllium copper with 30 micro-inches gold finish.

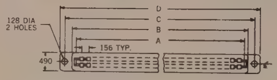
PERFORMANCE SPECIFICATIONS: See page 18.

ORDERING INFORMATION

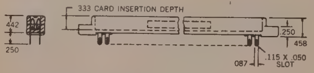
DESCRIPTION	PART NO.	CONTACT MATERIAL	NO. OF POSITIONS	NO. OF CONTACTS
Connectors	251-22-30-341 251-22-30-340	Phosphor Bronze Beryllium Copper	22	44

SPECIAL EDGE CONNECTORS/.156″ SPACING - DOUBLE READOUT FOR 1/8″ PRINTED CIRCUIT BOARDS

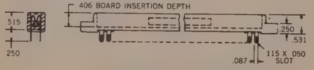




8, 12 AND 15 POSITION CONNECTORS
WITH .333″ BOARD INSERTION DEPTH



18 AND 22 POSITION CONNECTORS
WITH .406″ BOARD INSERTION DEPTH



No. of Contact Positions	DIMENSIONS			
	"A"	"B"	"C"	"D"
8	1.341	1.537	1.740	1.943
12	1.965	2.164	2.419	2.700
15	2.433	2.637	2.948	3.265
18	2.973	3.114	3.406	3.660
22	3.598	3.739	4.031	4.285

FEATURES AND SPECIFICATIONS

SPECIAL FEATURES: Accommodates 1/8″ thick printed circuit boards. Available in variety of sizes; all with patented bifurcated bellows contact construction. Pat. No. 3274532.

SIZES: Available in 8, 12, 15, 18 and 22-contact position sizes.

TERMINATION: Conventional 1/4″ solder tabs. Printed circuit tails 5/32″ long available on special order. Consult factory.

MOUNTING STYLE: Plain .128″ diameter holes for standard mounting.

INSULATOR MATERIAL: Green glass-filled diallyl phthalate, type SDG-F per MIL-M-14.

NOTE: Two different height insulators are used — the 8, 12 and 15-position connector insulators permit .333″ board insertion depth while the 18 and 22-position insulators permit .406″ depth.

CONTACT MATERIAL & PLATING: Bifurcated contacts available in either phosphor bronze or beryllium copper with 30 micro-inches gold finish.

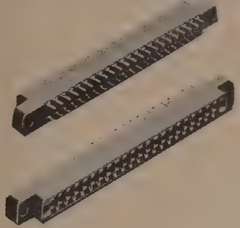
PERFORMANCE SPECIFICATIONS: See page 18.

ORDERING INFORMATION

DESCRIPTION	PART NO.	CONTACT MATERIAL	BOARD INSERTION DEPTH	NO. OF POSITIONS	NO. OF CONTACTS
8-Position Connectors	251-08-30-121 251-08-30-120	Phosphor Bronze Beryllium Copper	.333	8	16
12-Position Connectors	251-12-30-121 251-12-30-120	Phosphor Bronze Beryllium Copper	.333	12	24
15-Position Connectors	251-15-30-121 251-15-30-120	Phosphor Bronze Beryllium Copper	.333	15	30
18-Position Connectors	251-18-30-350 251-18-30-351	Phosphor Bronze Beryllium Copper	.406	18	36
22-Position Connectors	251-22-30-350 251-22-30-351	Phosphor Bronze Beryllium Copper	.406	22	44

TRW® CINCH CONNECTORS

DIP SOLDER TERMINAL PC CONNECTORS
0.140″ SPACING BETWEEN ROWS 0.156″ CONTACT CENTERS



- Patented bifurcated bellows contacts for added contact reliability.
- Ideal for applications involving vibration or board irregularities.
- 6, 10, 12, 15, 18, 22 and 25-contact sizes, double readout.
- Available with or without mounting ears.
- Accepts single or double $\frac{1}{16}$″ thick sided boards.
- 0.125″ long dip solder terminations.

MATERIALS

Insulator Material: Green glass-filled diallyl phthalate, type SDG-F per MIL-M-14.

Contact Material: Contacts are available in phosphor bronze. Standard finish is 30 microinches gold.

Polarizing Key Materials: Two types of polarizing keys are available, and must be ordered separately as follows: Part No. 456-07-35-003 (for between contact polarization) is made of glass epoxy; Part No. 474-11-54-200 (for in-contact polarization) is made of diallyl phthalate.

ENVIRONMENTAL SPECIFICATIONS

Shock: 3 blows of 50G per MIL-STD-202C, Method 202B.

Temperature Cycling: 5 continuous cycles (−65°C to +105°C) per MIL-STD-202C, Method 107B, Test Condition B.

Salt Spray: 48 hours per MIL-STD-202C, Method 101B, Condition B.

Vibration: Per MIL-STD-202C, Method 204A, Test Condition B.

Humidity: Per MIL-STD-202C, Method 103B, Condition B.

ELECTRICAL SPECIFICATIONS

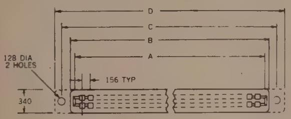
Test Voltage (AC RMS, adjacent terminals): 830V (sea level); 300V (3.4″ Hg, 50,000 feet); 200V (1.3″ Hg, 70,000 feet).

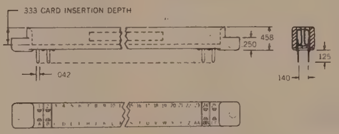
Current Rating: 5.0 amperes.

Contact Resistance at Rated Current: .005 ohms.

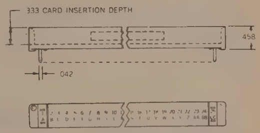
Insulation Resistance: 5000 megohms.

DIMENSIONS



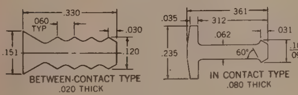


210 SERIES

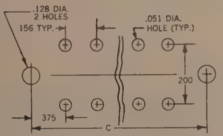


211 SERIES

POLARIZING KEYS



MOUNTING HOLE LAYOUT



WITH MOUNTING HOLES

Contact Positions	Contacts	Factory Part No.	Dimensions A	B	C	D
6	12	252-06-30-210*	1.100	1.239	1.531	1.785
10	20	252-10-30-210*	1.724	1.864	2.156	2.410
12	24	252-12-30-210*	2.036	2.177	2.469	2.723
15	30	252-15-30-210*	2.504	2.645	2.937	3.191
18	36	252-18-30-210*	2.972	3.114	3.406	3.660
22	44	252-22-30-210*	3.596	3.739	4.031	4.285
25	50	252-25-30-210*	4.067	4.208	4.500	4.754

WITHOUT MOUNTING HOLES

Contact Positions	Contacts	Factory Part No.	A	B	C	D
6	12	252-06-30-211*	1.100	1.239		
10	20	252-10-30-211*	1.724	1.864		
12	24	252-12-30-211*	2.036	2.177		
15	30	252-15-30-211*	2.504	2.645		
18	36	252-18-30-211*	2.972	3.114		
22	44	252-22-30-211*	3.596	3.739		
25	50	252-25-30-211*	4.067	4.208		

*These items available through Cinch distributors.

TRW® CINCH CONNECTORS

ENVIRONMENTAL SPECIFICATIONS

PAGE REF.	CONNECTOR DESCRIPTION	MIL-SPEC REF.	SHOCK	TEMP. CYCLING	SALT SPRAY	VIBRATION	HUMIDITY	NOTES
3	"Tykon" Connectors	2	1	2	1	1		1
3	"Mini-Tyke Connectors	1, 2	1	5	1	2		
5	Right Angle Connectors .100" Staggered Spacing	2-3	2	1	1	2		2, 3
5	Right Angle Connector .125" Spacing	1, 2	1	1	1	1	1	3
5-6	24-position wire wrap connectors .125" Spacing	1, 2	1	1	1	1	1	
6	40-position wire wrap connectors .125" Spacing	1, 2	1	1	1	1	1	
6	30-position wire wrap connectors for Punch Plate	1, 2	1	1	1			4
7	36-position wire wrap connectors for Punch Plate	1, 2	1	1	1			4
9	.045" Square Tail Wire Wrap connectors with .156" Spacing	1, 2	1	3	1	3	1	3
10	"Twin-Con" Edge connectors	1, 2	1	4	1	4	1	5
11-14, 16	Standard Edge Connector	1, 2	1	1	1	1	1	

MIL-Spec REFERENCES: 1. MIL-C-21097, latest version

2. MIL-STD-202, latest version

3. MIL-C-8384

SHOCK: 1. 3 blows of 50G per MIL-STD-202C, METHOD 202B.

2. 10 blows of 50G per MIL-STD-202C, METHOD 202B.

TEMPERATURE CYCLING: 1.5 Continuous cycles (−65°C to 125°C) per MIL-STD-202C, Method 107B, Test Condition B (−65°C to 105°C for phosphor bronze contacts, where applicable).

2. Per MIL-STD-202C, Method 102A, Condition D (except high temperature 105°C).

3. 5 continuous cycles (−55°C to 105°C) per MIL-STD-202C, Method 102A, Test Condition D.

4. 5 continuous cycles (−55°C to 125°C).

5. 5 continuous cycles (−55°C to 85°C) per MIL-STD-202C, Method 107B, Test Condition A.

SALT SPRAY: 1. 48 hours per MIL-STD-202C, Method 101B, Condition B.

VIBRATION: 1. Per MIL-STD-202C, Method 204A, Test Condition B for bifurcated contacts, Method 201A for non-bifurcated contacts.

2. Per MIL-STD-202C, Method 204A, Test Condition A.

3. Per MIL-STD-202C, Method 204A, Test Condition D.

4. 5-3000 CPS at 30G exceeding MIL-STD-202C, Method 204D.

HUMIDITY: 1. Per MIL-STD-202C, Method 103B, Condition B, unless otherwise stated in NOTES.

NOTES: 1. Insertion Force, 5-32 lbs., depending on number of contacts.

2. Insertion Force, 18 lbs., max.

3. Mechanical Durability, 500 cycles.

4. Vibration capability dependent on backplane aluminum plate design and mounting. Consult factory for specific application.

5. Insertion Force 16-40 lbs., depending on number of contacts.

ELECTRICAL SPECIFICATIONS

PAGE REF.	CONNECTOR DESCRIPTION	VOLTAGE RATINGS (AC RMS) (ADJACENT TERMINALS) SEA LEVEL	3.4 HG 50,000 FT.	1.3 HG 70,000 FT.	CURRENT RATING (AMPS)	CONTACT RESISTANCE AT RATED CURRENT	INSULATION RESISTANCE (MEG Ω)
3	"Tykon" Connectors	500	*	*	.5	.020 Avg.	5000
5	Right Angle Connectors .100" Spacing	2400	640	400	7.5	.004	100,000
5	Right Angle Connectors .125" Spacing	1800	675	450	5.0	.005	5000
5-6	24 and 40-position wire wrap connectors .125" Spacing	830	300	200	5.0	.005	1000
6-7	30 and 36-position wire wrap connectors for Punch Plate	1800	675	450	3.0	.016	5000
9	.045" Square tail wire wrap with .156" Spacing	830	300	200	5.0	.005	5000
10	"Twin con" Edge Connectors	500	—	—	5.0	.005	5000
11-14, 16	Standard Edge Connector	830	300	200	5.0	.005	5000

* Additional voltage ratings are: at sea level to ground, 1160 v rms, 1660 vdc; at 60,000 ft. to adjacent terminals, 165 v rms, 230 vdc; at 60,000 ft. to ground, 300 vrms, 400 vdc.

CONSULT FACTORY FOR ADDITIONAL INFORMATION

Dimensions in this book are nominal within accepted engineering standards. Consult factory for exact tolerances.

TRW/CINCH CONNECTORS, AN ELECTRONIC COMPONENTS DIV. OF TRW INC. / 1501 MORSE AVE. / ELK GROVE VILLAGE, ILL. 60007

TRW® CINCH CONNECTORS

CINCH D-SUBMINIATURE CONNECTORS†

All Cinch D-Subminiature Connectors undergo final assembly and inspection in the ultra-modern, temperature controlled Cinch "clean room." In this room, contacts, insulators and shells are stored and assembled under tight quality control inspection. Ultrasonic cleaning capabilities are also available on request.

GENERAL DESCRIPTION

The Cinch D-Subminiature Connectors described in this catalog are designed for applications where space and weight are prime considerations. These high contact density connectors are especially well-suited for aircraft, missile and ground support installations. Although designed essentially for rack-and-panel installations, D series connectors may be adapted for cable attachment by means of accessory junction shells with integral clamps.

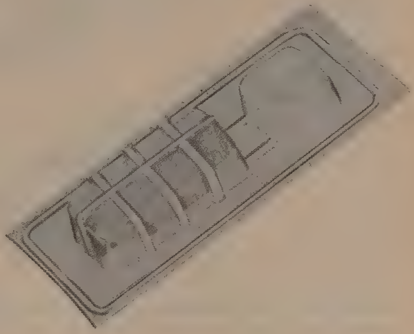
In addition to the original D series with solder pot contacts in a two piece insulator, Cinch now offers Golden D, Mark I Connectors with solder pot contacts in a monobloc insulator for improved moisture resistance; Royal D, Mark III connectors with crimp snap-in contacts in the Little Caesar assembly for high performance, high reliability applications, and the Burgun-D with insertable and removable stamped or machine contacts for commercial applications.

All D-Subminiature Connectors will inter-mate if insert arrangements correspond. Mark I and Mark III connectors are designed to meet or exceed the requirements of MIL-C-24308 Rev. A.

A wide range of insert arrangements is offered accommodating up to 50 contacts accepting standard AWG wire as indicated in the individual specifications. Combination layouts are available, with provisions for coaxial and/or high voltage contacts. Printed circuit and wire wrap terminations are also available. The versatility of the D series is further enhanced by the variety of insulating materials and finishes, as well as a complete line of accessories.

The D-Subminiature series is handled by leading electronic distributors throughout the country. Questions regarding modifications of these designs or any connector requirement should be addressed to your local Cinch representative and will receive his immediate attention.

CONNECTORS INDIVIDUALLY PACKED IN HEAT-SEALED CONTAINERS TO ASSURE EXTENDED SHELF-LIFE



To protect D-Subminiature Connectors from contamination and other corrosive elements in the air, Cinch individually packs each connector in heat-sealed polyvinylchloride containers (as shown). This assures every customer of an extended shelf life. A separate compartment is also provided in each container for the loose crimp-type contacts supplied with the Royal D Mark III Connectors. Connectors can also be packed in individual polyethylene bags if desired.

INDEX CONNECTORS

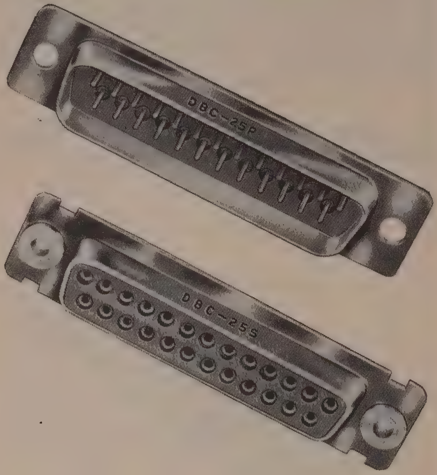
Type	Description	Common Name	Insulator Type	Contact Termination	Page
D*C	D connectors with crimp snap-in contacts in two-piece insulators, with integral retension system	Burgun D	Two-piece, Nylon	Crimp Snap-in Screw machine and stamped contacts	3-9
D*MA	D connectors with crimp snap-in contacts in monoblock insulators utilizing Little Caesar rear release contact assembly	Royal D, Mark III	Monobloc, diallyl phthalate	Crimp Snap-in	19-20
D*M	D connectors with monoblock insulators for more critical application requirements	Golden D, Mark I	Monobloc, diallyl phthalate	Solder Pot	14-18
		Golden D, Mark I Combination	Monobloc, diallyl phthalate	Solder Pot with coaxial and/or HV and/or power	
D*	Original D connector with two-piece insulators	Original D	Two-piece, Nylon	Solder Pot	12-13

ACCESSORIES 23-24
GENERAL RATINGS AND SPECIFICATIONS 11
HOW TO ORDER AND STANDARD DIMENSIONS 10
INSTALLATION INSTRUCTIONS 21-22
DURA-CON MICRO MINIATURE STRIP AND RECTANGULAR CONNECTORS ON .050 CENTERS 26-28

†Manufactured under license agreement with ITT Cannon Electric Inc.

TRW® CINCH CONNECTORS

BURGUN-D MARK IV CONNECTORS



The TRW/Cinch Burgun-D subminiature connector is designed for commercial applications where space, weight, and economy are important considerations.

It is especially suited to plug-in module, cable to panel and cable to cable installations, in computers and peripherals, test equipment, communications equipment and a wide range of other applications.

The Burgun-D (Mark IV) Series utilizes rear-release crimp snap-in contacts, that are readily inserted and removed by means of a simple, expendable insertion/extraction tool.

It offers these important features:

- Mates with existing original D and Mark I, Mark II and Mark III connectors.
- Operates at temperatures to 250°F (120°C).
- Size 20 contacts accommodate wire size #18 through #30 AWG stranded wire. (Screw machine only.)
- Closed-entry sockets automatically corrects misaligned pins.
- Rated at 5 amperes for #20 wire.
- Available in 9, 15, 25, 37, and 50 contact arrangements.
- Variety of contacts for hand and machine assembly and PC board insertion.

A COMPLETE LINE OF HARDWARE and accessories including junction shells, hoods, dust caps and lock assemblies is available and listed in TRW/Cinch Catalogs CD-12, and C-46.

FOR IMMEDIATE DELIVERY from stock, contact your TRW/Cinch D-subminiature industrial distributor.

CONDENSED DATA

STANDARD MATERIALS & FINISHES

Shell: Steel, yellow chromate over cadmium plate.

Insulator: Glass-filled burgundy nylon (per Fed. Spec. L-P-395B).

Contacts:

Machined — Copper alloy.

Stamped — Cadmium copper.

Contact Plating:

Selective Stamped — 30 microinches of gold (min.) over 50 microinches of nickel (min.) at contacting area, with gold flash overall.

Overall Stamped — 20 microinches of gold (min.) over 60 microinches of nickel (min.).

Machined — 30 microinches of gold over nickel.

Rivets and Washers: Stainless steel.
(float mounting)

MECHANICAL FEATURES

Coupling: Friction and lock accessories.

Polarization: Keystone-shaped shells.

Contact Type: Crimp snap-in.

ELECTRICAL DATA

Contact Termination: Crimp.

Wire Size:

Size 20 contacts — #20, #22, and #24 AWG stranded wire.

Size 20-18 contacts — one #18 or two #22 AWG stranded wires.

Current Rating: Size 20 contacts — 5 amps.

VOLTAGE RATING

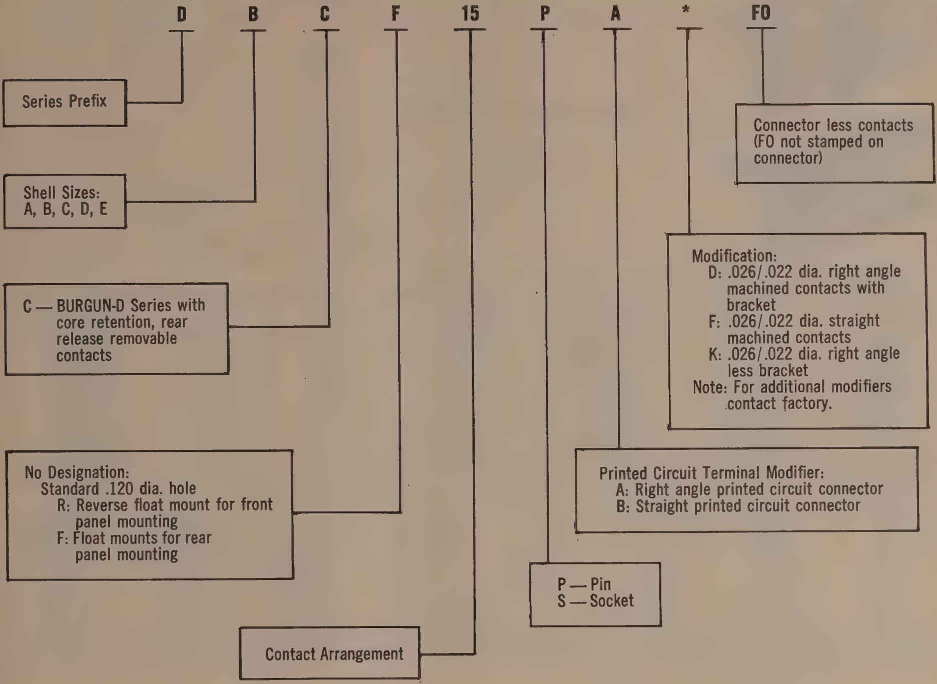
	Sea Level	20,000 ft.	70,000 ft.	120,000 ft.
Average Flashover:	1500V AC	1000V AC	500V AC	255V AC
Test:	1000V AC	650V AC	325V AC	175V AC

Voltage Drop: Size 20 contacts — 2.67 millivolts max. per amp when tested in accordance with MIL-STD-202, Method 307.

TRW/CINCH CONNECTORS, AN ELECTRONIC COMPONENTS DIV. OF TRW INC. / 1501 MORSE AVE. / ELK GROVE VILLAGE, ILL. 60007

TRW® CINCH CONNECTORS

HOW TO ORDER BURGUN-D CONNECTORS



D B C F 15 P A * FO

Series Prefix

Shell Sizes:
A, B, C, D, E

C — BURGUN-D Series with core retention, rear release removable contacts

No Designation:
Standard .120 dia. hole
R: Reverse float mount for front panel mounting
F: Float mounts for rear panel mounting

Contact Arrangement

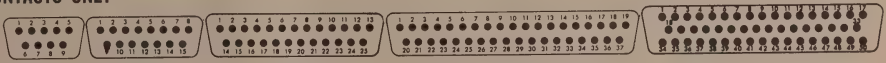
P — Pin
S — Socket

Printed Circuit Terminal Modifier:
A: Right angle printed circuit connector
B: Straight printed circuit connector

Modification:
D: .026/.022 dia. right angle machined contacts with bracket
F: .026/.022 dia. straight machined contacts
K: .026/.022 dia. right angle less bracket
Note: For additional modifiers contact factory.

Connector less contacts (FO not stamped on connector)

BASIC CONTACT ARRANGEMENTS
#20 CONTACTS ONLY



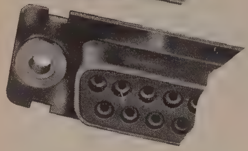
Shell Size	E	A	B	C	D
No. of Contacts	9	15	25	37	50
Contact Size	#20	#20	#20	#20	#20

PART NUMBERS

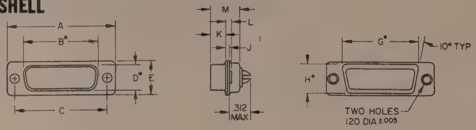
CONNECTORS WITH STD. .120 MOUNTING HOLE				CONNECTORS WITH FLOAT MOUNTS			
With Loose Machine Contacts		Less Contacts		With Loose Machine Contacts		Less Contacts	
Description Part No.	Factory Part No.	Description Part No.	Factory Part No.	Description Part No.	Factory Part No.	Description Part No.	Factory Part No.
DEC-9P	234-09-11-102	DEC-9PFO	234-09-11-100	DECF-9P	234-09-11-107	DECF-9PFO	234-09-11-106
DEC-9S	233-09-11-102	DEC-9SFO	233-09-11-100	DECF-9S	233-09-11-107	DECF-9SFO	233-09-11-106
DAC-15P	234-15-11-102	DAC-15PFO	234-15-11-100	DACF-15P	234-15-11-107	DACF-15PFO	234-15-11-106
DAC-15S	233-15-11-102	DAC-15SFO	233-15-11-100	DACF-15S	233-15-11-107	DACF-15SFO	233-15-11-106
DBC-25P	234-25-11-102	DBC-25PFO	234-25-11-100	DBCF-25P	234-25-11-107	DBCF-25PFO	234-25-11-106
DBC-25S	233-25-11-102	DBC-25SFO	233-25-11-100	DBCF-25S	233-25-11-107	DBCF-25SFO	233-25-11-106
DCC-37P	234-37-11-102	DCC-37PFO	234-37-11-100	DCCF-37P	234-37-11-107	DCCF-37PFO	234-37-11-106
DCC-37S	233-37-11-102	DCC-37SFO	233-37-11-100	DCCF-37S	233-37-11-107	DCCF-37SFO	233-37-11-106
DDC-50P	234-50-11-102	DDC-50PFO	234-50-11-100	DDCF-50P	234-50-11-107	DDCF-50PFO	234-50-11-106
DDC-50S	233-50-11-102	DDC-50SFO	233-50-11-100	DDCF-50S	233-50-11-107	DDCF-50SFO	233-50-11-106

TRW/CINCH CONNECTORS, AN ELECTRONIC COMPONENTS DIV. OF TRW INC. / 1501 MORSE AVE. / ELK GROVE VILLAGE, ILL. 60007

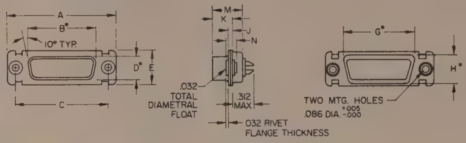
TRW® CINCH CONNECTORS



STANDARD SHELL



SHELL WITH FLOAT MOUNTS

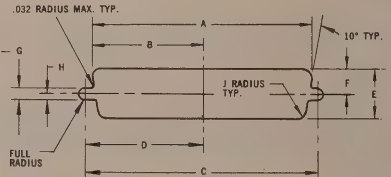


It is recommended that only one assembly, either pin or socket, be float mounted. For front panel mounting use reverse float mount.

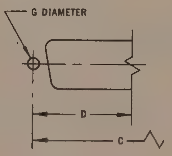
Description Part No.	A ±.015(0.38)	B* ±.010(0.25)	C ±.005(0.13)	D* ±.010(0.25)	E ±.015(0.38)	G* ±.010(0.25)
DEC-9P	1.213(30.81)	.697(17.70)	.984(24.99)	.360(9.14)	.494(12.55)	.759(19.28)
DEC-9S	1.213(30.81)	.640(16.26)	.984(24.99)	.308(7.82)	.494(12.55)	.759(19.28)
DAC-15P	1.541(39.14)	1.025(26.04)	1.312(33.32)	.360(9.14)	.494(12.55)	1.083(27.51)
DAC-15S	1.541(39.14)	.968(24.59)	1.312(33.32)	.308(7.82)	.494(12.55)	1.083(27.51)
DBC-25P	2.088(53.04)	1.583(40.21)	1.852(47.04)	.378(9.60)	.494(12.55)	1.625(41.27)
DBC-25S	2.088(53.04)	1.508(38.30)	1.852(47.04)	.308(7.82)	.494(12.55)	1.625(41.27)
DCC-37P	2.729(63.32)	2.231(56.67)	2.500(63.50)	.378(9.60)	.494(12.55)	2.272(57.71)
DCC-37S	2.729(63.32)	2.156(54.76)	2.500(63.50)	.308(7.82)	.494(12.55)	2.272(57.71)
DDC-50P	2.635(66.93)	2.127(54.03)	2.406(61.11)	.484(12.29)	.605(15.37)	2.178(55.32)
DDC-50S	2.635(66.93)	2.062(52.34)	2.406(61.11)	.420(10.67)	.605(15.37)	2.178(55.32)

Description Number	H* ±.010(0.25)	J ±.010(0.25)	K ±.010(0.25)	L ±.010(0.25)	M ±.010(0.25)	N ±.010(0.25)	X Max.
DEC-9P	.422(10.72)	.030(0.76)	.236(5.99)	.045(1.14)	.422(10.72)	.120(3.05)	.375(9.52)
DEC-9S	.422(10.72)	.030(0.76)	.243(6.17)	.045(1.14)	.429(10.92)	.120(3.05)	.375(9.52)
DAC-15P	.422(10.72)	.030(0.76)	.236(5.99)	.045(1.14)	.422(10.72)	.120(3.05)	.375(9.52)
DAC-15S	.422(10.72)	.030(0.76)	.243(6.17)	.045(1.14)	.429(10.92)	.120(3.05)	.375(9.52)
DBC-25P	.422(10.72)	.039(0.99)	.231(5.87)	.060(1.52)	.426(10.82)	.129(3.28)	.375(9.52)
DBC-25S	.422(10.72)	.030(0.76)	.243(6.17)	.045(1.14)	.429(10.92)	.120(3.05)	.375(9.52)
DCC-37P	.422(10.72)	.039(0.99)	.231(5.87)	.060(1.52)	.426(10.82)	.129(3.28)	.375(9.52)
DCC-37S	.422(10.72)	.030(0.76)	.243(6.17)	.045(1.14)	.429(10.92)	.120(3.05)	.375(9.52)
DDC-50P	.422(10.72)	.039(0.99)	.231(5.87)	.060(1.52)	.426(10.82)	.129(3.28)	.375(9.52)
DDC-50S	.534(13.56)	.030(0.76)	.243(6.17)	.045(1.14)	.429(10.92)	.120(3.05)	.375(9.52)

*Dimensions B, D, G, and H are measured as outside dimensions at the bottom of draw. For shell with float mounts, add letter F after C, e.g., DECF-9P. (Bracketed figures centimeters)



Standard Cutout



Optional Cutout
(For rear mounting)

Plug	Mounting Method	A ±.005(0.13)	B ±.005(0.13)	C ±.005(0.13)	D ±.005(0.13)	E ±.005(0.13)	F ±.005(0.13)	G ±.002(0.05)	H ±.002(0.05)	J ±.005(0.13)
DA,	Front Mtg.	1.202(30.53)	.601(15.26)	1.312(33.32)	.656(16.66)	.513(13.03)	.257(6.53)	.120(3.05)	.060(1.52)	.083(2.11)
DAC	Rear Mtg.	1.134(28.80)	.567(14.40)	1.312(33.32)	.656(16.66)	.449(11.40)	.225(5.72)	.120(3.05)	.060(1.52)	.132(3.35)
DAF,	Front Mtg.	1.234(31.34)	.617(15.67)	1.312(33.32)	.656(16.66)	.545(13.84)	.273(6.93)	.088(2.24)	.044(1.12)	.083(2.11)
DACF	Rear Mtg.	1.166(29.62)	.583(14.81)	1.312(33.32)	.656(16.66)	.481(12.22)	.241(6.12)	.088(2.24)	.044(1.12)	.132(3.35)
DB,	Front Mtg.	1.743(44.27)	.872(22.15)	1.852(38.61)	.926(23.52)	.513(13.03)	.257(6.53)	.120(3.05)	.060(1.52)	.083(2.11)
DBC	Rear Mtg.	1.674(42.52)	.837(21.26)	1.852(38.61)	.926(23.52)	.449(11.40)	.225(5.72)	.120(3.05)	.060(1.52)	.132(3.35)
DBF,	Front Mtg.	1.775(45.08)	.888(22.26)	1.852(38.61)	.926(23.52)	.545(13.84)	.273(6.93)	.088(2.24)	.044(1.12)	.083(2.11)
DBCF	Rear Mtg.	1.706(43.33)	.853(21.67)	1.852(38.61)	.926(23.52)	.481(12.22)	.241(6.12)	.088(2.24)	.044(1.12)	.132(3.35)
DC,	Front Mtg.	2.391(60.73)	1.196(30.38)	2.500(63.50)	1.250(38.10)	.513(13.03)	.257(6.53)	.120(3.05)	.060(1.52)	.083(2.11)
DCC	Rear Mtg.	2.326(59.08)	1.163(29.54)	2.500(63.50)	1.250(38.10)	.449(11.40)	.225(5.72)	.120(3.05)	.060(1.52)	.132(3.35)
DCF,	Front Mtg.	2.423(61.54)	1.212(30.78)	2.500(63.50)	1.250(38.10)	.545(13.84)	.273(6.93)	.088(2.24)	.044(1.12)	.083(2.11)
DCCF	Rear Mtg.	2.354(59.79)	1.177(29.90)	2.500(63.50)	1.250(38.10)	.481(12.22)	.241(6.12)	.088(2.24)	.044(1.12)	.132(3.35)
DD,	Front Mtg.	2.297(58.34)	1.149(29.18)	2.406(61.11)	1.203(30.56)	.623(15.82)	.312(7.92)	.120(3.05)	.060(1.52)	.083(2.11)
DDC	Rear Mtg.	2.218(56.34)	1.109(28.17)	2.406(61.11)	1.203(30.56)	.555(14.10)	.278(7.06)	.120(3.05)	.060(1.52)	.132(3.35)
DDF,	Front Mtg.	2.329(59.16)	1.165(29.59)	2.406(61.11)	1.203(30.56)	.655(16.64)	.328(8.33)	.088(2.24)	.044(1.12)	.083(2.11)
DDCF	Rear Mtg.	2.250(57.15)	1.125(28.57)	2.406(61.11)	1.203(30.56)	.587(14.91)	.294(7.47)	.088(2.24)	.044(1.12)	.132(3.35)
DE,	Front Mtg.	.874(22.20)	.437(11.10)	.984(24.99)	.492(12.50)	.513(13.03)	.257(6.53)	.120(3.05)	.060(1.52)	.083(2.11)
DEC	Rear Mtg.	.806(20.47)	.403(10.24)	.984(24.99)	.492(12.50)	.449(11.40)	.225(5.72)	.120(3.05)	.060(1.52)	.132(3.35)
DEF,	Front Mtg.	.906(23.01)	.453(11.51)	.984(24.99)	.492(12.50)	.545(13.84)	.273(6.93)	.088(2.24)	.044(1.12)	.083(2.11)
DECF	Rear Mtg.	.838(21.29)	.419(10.41)	.984(24.99)	.492(12.50)	.481(12.22)	.241(6.12)	.088(2.24)	.044(1.12)	.132(3.35)

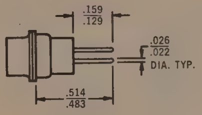
(Bracketed figures centimeters)

TRW/CINCH CONNECTORS, AN ELECTRONIC COMPONENTS DIV. OF TRW INC. / 1501 MORSE AVE. / ELK GROVE VILLAGE, ILL. 60007

TRW® CINCH CONNECTORS

PRINTED CIRCUIT CONNECTORS

STRAIGHT PRINTED CIRCUIT CONTACT CONNECTORS

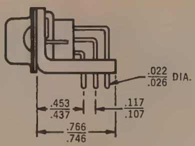


.159
.129
.026
.022
DIA. TYP.
.514
.483

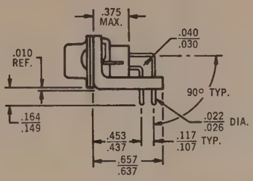
Supplied as complete assemblies with gold plated machined contacts.

Description Part No.	Part No.
DEC-9PBF	234-9-11-104
DEC-9SBF	233-9-11-104
DAC-15PBF	234-15-11-104
DAC-15SBF	233-15-11-104
DBC-25PBF	234-25-11-104
DBC-25SBF	233-25-11-104
DCC-37PBF	234-37-11-104
DCC-37SBF	233-37-11-104
DDC-50PBF	234-50-11-104
DDC-50SBF	233-50-11-104

RIGHT ANGLE CONNECTORS



.022
.026
DIA.
.453
.437
.117
.107
.766
.746



.375
MAX.
.040
.030
.010
REF.
90° TYP.
.022
.026
DIA.
.164
.149
.453
.437
.117
.107
TYP.
.657
.637

With Assembled Contacts

With Molded Bracket		Less Bracket	
Description Part No.	Factory Part No.	Description Part No.	Factory Part No.
DEC-9SAD	233-09-11-101	DEC-9SAK	233-09-11-105
DEC-9PAD	234-09-11-101	DEC-9PAK	234-09-11-105
DAC-15SAD	233-15-11-101	DAC-15SAK	233-15-11-105
DAC-15PAD	234-15-11-101	DAC-15PAK	234-15-11-105
DBC-25SAD	233-25-11-101	DBC-25SAK	233-25-11-105
DBC-25PAD	234-25-11-101	DBC-25PAK	234-25-11-105
DCC-37SAD	233-37-11-101	DCC-37SAK	233-37-11-105
DCC-37PAD	234-37-11-101	DCC-37PAK	234-37-11-105
DDC-50SAD	233-50-11-101	DDC-50SAK	233-50-11-105
DDC-50PAD	234-50-11-101	DDC-50PAK	234-50-11-105

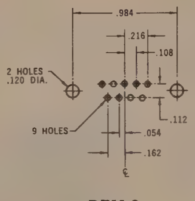
METRIC EQUIVALENTS FOR PC BOARD CONNECTOR LAYOUTS

Inches	MM's	Inches	MM's
.039	0.99	.435	11.09
.054	1.37	.489	12.42
.055	1.40	.544	13.82
.108	2.74	.598	15.19
.109	2.77	.652	16.56
.112	2.84	.707	17.96
.120	3.05	.761	19.33
.162	4.11	.815	20.70
.163	4.14	.870	22.10
.216	5.49	.924	23.47
.218	5.54	.978	24.84
.224	5.69	.984	24.99
.272	6.91	1.312	33.32
.324	8.23	1.852	47.04
.326	8.28	2.406	61.11
.381	9.68	2.500	63.50

LEAD HOLE SIZE

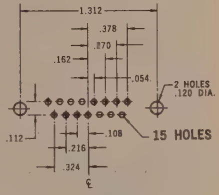
Terminal Dia.	Hole Dia.
.040	.055
.030	.045
.024	.039

BOARD LAYOUTS



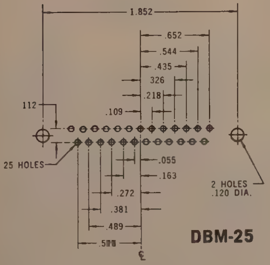
.984
.216
.108
2 HOLES
.120 DIA.
.112
9 HOLES
.054
.162
℄

DEM-9



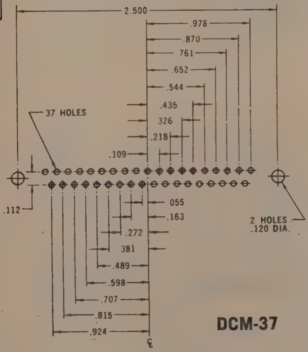
1.312
.378
.270
.162
.054
2 HOLES
.120 DIA.
15 HOLES
.112
.108
.216
.324
℄

DAM-15



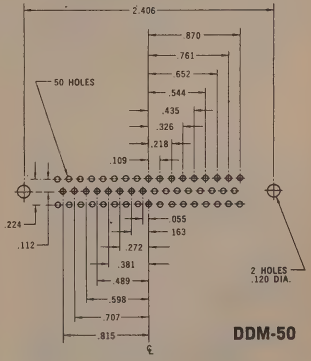
1.852
.652
.544
.435
326
.218
112
.109
25 HOLES
.055
.163
.272
.381
.489
2 HOLES
.120 DIA.
℄

DBM-25



2.500
.978
.870
761
.652
.544
.435
326
.218
.109
37 HOLES
.112
055
.163
.272
381
.489
.598
.707
.815
.924
2 HOLES
.120 DIA.
℄

DCM-37



2.406
.870
.761
.652
.544
.435
.326
.218
.109
50 HOLES
.224
.112
.055
163
.272
.381
.489
.598
.707
.815
2 HOLES
.120 DIA.
℄

DDM-50

TRW/CINCH CONNECTORS, AN ELECTRONIC COMPONENTS DIV. OF TRW INC. / 1501 MORSE AVE. / ELK GROVE VILLAGE, ILL. 60007

TRW® CINCH CONNECTORS

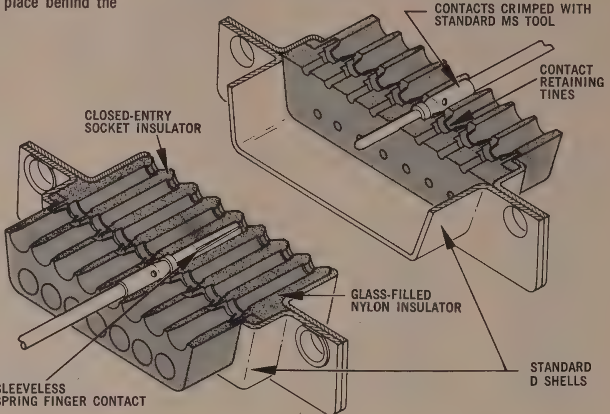
REAR RELEASE CONTACT RETENTION SYSTEM

The BURGUN-D connector features a rear insulator with integral, molded contact retaining tines. These plastic tines permit the insertion and extraction of contacts from the rear of the connector with a simple, expendable plastic insertion/extraction tool.

During contact insertion, the retaining tines expand as the contact passes thru. These rugged tines snap into place behind the contact shoulder when the contact is fully inserted. The tool is inserted to expand the tines, allowing easy extraction of the wired contact.

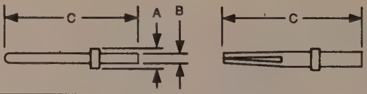
The retention system and the integral contact retaining tines guarantee functional reliability in many environments.

- Mates with existing D types.
- Operates in temperatures to +250°F.
- Crimp snap-in contacts.
- Highly reliable socket contacts.
- Insertion/extraction with expendable tool.
- Corrects misaligned contacts.


CONTACTS CRIMPED WITH STANDARD MS TOOL
CONTACT RETAINING TINES
CLOSED-ENTRY SOCKET INSULATOR
GLASS-FILLED NYLON INSULATOR
STANDARD D SHELLS
SLEEVELESS SPRING FINGER CONTACT

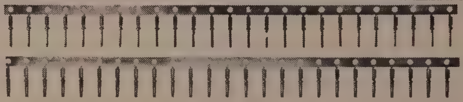
MACHINED CONTACTS

Machined contacts are supplied loose for use with hand crimp tools or in vibration hopper feeder crimp machines. A vibrator-feed, semi-automatic tool, 599-11-11-225 is available. These contacts are supplied in three wire cup sizes.

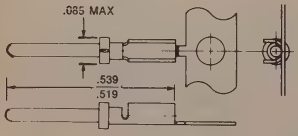


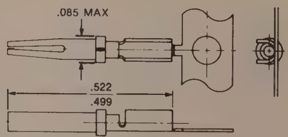
Description	Part No.	Cannon Reference	Wire Accommodation	A ±.002(.051)	B ±.002(.051)	C Max.
Pin 20	403-30-15-130-410	030-1952-000	#20, 22, 24	.067(1.70)	.042(1.07)	.537(13.64)
Pin 20-18	403-30-99-129-410	030-1954-000	#18 or 2-#22	.086(2.18)	.066(1.68)	.874(22.20)
Pin 20-26	403-30-99-126-410	030-1952-002	#26, 28, 30	.067(1.70)	.025(0.64)	.537(13.64)
Socket 20	414-30-14-227-410	030-1953-000	#20, 22, 24	.067(1.70)	.042(1.07)	.523(13.28)
Socket 20-18	414-30-99-236-410	030-1955-000	#18 or 2-#22	.086(2.18)	.062(1.68)	.852(21.64)
Socket 20-26	414-30-99-233-410	030-1953-002	#26, 28, 30	.067(1.70)	.025(0.64)	.523(13.28)

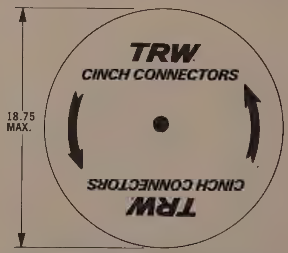
STAMPED CONTACTS



Stamped contacts are supplied loose for use with hand crimp tools, or on reels for use with the semiautomatic machines, selectively gold plated or with gold plate overall. These contacts will accommodate wire sizes #20 through #28 AWG by adjusting or changing the crimp die set. (For other wire sizes consult factory.)







LOOSE CONTACTS

Type	Plating	Part No.	Cannon Reference
Pin	Selective	402-30-11-135	030-1960-005
Pin	Overall	402-30-11-137	030-1960-001
Socket	Selective	412-30-14-355	030-1957-005
Socket	Overall	412-30-14-361	030-1957-001

RIGHT HAND FEED CONTACTS ON REELS

Type (RH)	Plating	Part No.	Cannon Reference
Pin	Selective	402-30-11-134	—
Pin	Overall	402-30-11-136	—
Socket	Selective	412-30-14-354	—
Socket	Overall	412-30-14-360	—

LEFT HAND FEED CONTACTS ON REELS

Type (LH)	Plating	Part No.	Cannon Reference
Pin	Selective	402-30-11-138	D110238-034
Pin	Overall	402-30-11-139	D110238-004
Socket	Selective	412-30-14-362	D110238-035
Socket	Overall	412-30-14-363	D110238-005

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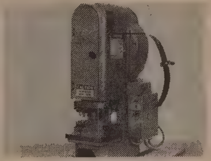
TRW® CINCH CONNECTORS

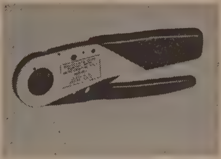
ASSEMBLY INSTRUCTIONS

CRIMP & ASSEMBLY TOOLS

599-11-11-189

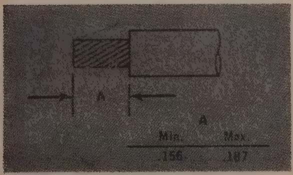

599-11-11-186

DAVO-320D


M22520/2-01

Contact	Wire Accom.	Hand Crimp Tool	Semi-Automatic Tool	Extraction	Insertion
20 (Machined)	24, 22, 20	M22520/1-01 with Locator TH185		599-11-11-176 (Colored Tip)	(White Tip)
		M22520/2-01 with Locator L22520-HDL	599-11-11-225 (Vibra-feed)		
		Davo 320D	CBT-460		
20-18 (Machined)	1 #18 or 2 #22	M22520/1-01 with Locator TH185	None	599-11-11-176 (Colored Tip)	(White Tip)
20-26 (Machined)	30, 28, 26	M22520/2-01 with Locator L22520/HDL	599-11-11-225 (Vibra-feed) CBT-460	599-11-11-176 (Colored Tip)	(White Tip)
20 (Stamped)	22, 20	599-11-11-189	ABT-500 599-11-11-186	599-11-11-176 (Colored Tip) NOTE: To extract a contact with a wire the wire will have to be clipped off the contact first.	(White Tip)
	28, 26, 24	599-11-11-189	ABT-500 599-11-11-186	599-11-11-176 (Colored Tip)	(White Tip)

ASSEMBLY



WIRE STRIPPING

1. Cut wires to length. Strip insulation per above illustration. Check for broken or frayed wires.

CONTACT CRIMPING

2. Insert contact and wire into proper crimp tool (and locator, if required). Crimp contact to wire. Inspect crimp.

CONTACT INSERTION

3. Center wired contact in groove of insertion tool, with tool tip butting contact shoulder. Insert contact into cavity until a positive stop is felt. Inspect insertion.

4. To be sure contact is locked securely, pull back lightly on wire. Repeat for balance of contacts, working row by row across the insulator.

CONTACT EXTRACTION

5. Place wire into extraction tool tip.

6. Insert tool tip into contact cavity and rotate slowly. When slot in tool aligns with contact crimp, push tool until tip bottoms against contact shoulder. Hold wire against tool with finger and remove tool and contact. Repeat for balance of contacts.

TRW® CINCH CONNECTORS

PANEL MOUNTING

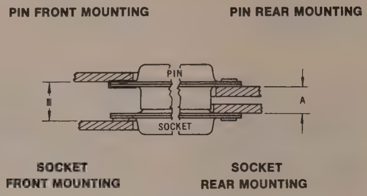

PIN FRONT MOUNTING
PIN REAR MOUNTING
PIN
SOCKET
B
A
SOCKET
FRONT MOUNTING
SOCKET
REAR MOUNTING

FIGURE 1A

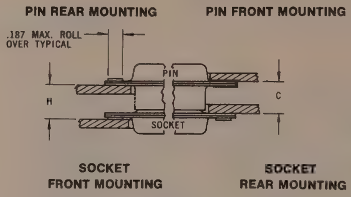

PIN REAR MOUNTING
PIN FRONT MOUNTING
.187 MAX. ROLL
OVER TYPICAL
PIN
SOCKET
H
C
SOCKET
FRONT MOUNTING
SOCKET
REAR MOUNTING

FIGURE 1B

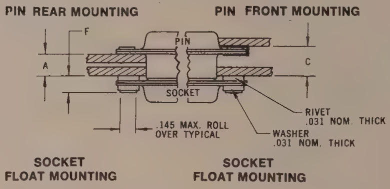

PIN REAR MOUNTING
PIN FRONT MOUNTING
F
A
C
PIN
SOCKET
RIVET
.031 NOM. THICK
.145 MAX. ROLL
OVER TYPICAL
WASHER
.031 NOM. THICK
SOCKET
FLOAT MOUNTING
SOCKET
FLOAT MOUNTING

FIGURE 2

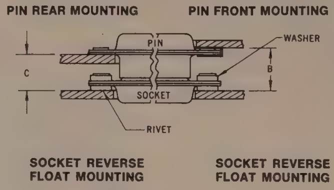

PIN REAR MOUNTING
PIN FRONT MOUNTING
WASHER
PIN
C
B
SOCKET
RIVET
SOCKET REVERSE
FLOAT MOUNTING
SOCKET REVERSE
FLOAT MOUNTING

FIGURE 3

Fig. No.	COMBINATION OF MATED CONNECTORS			A +.030(0.76) −.000	B +.030(0.76) −.000	C +.030(0.76) −.000	E		F ±.010(0.25)	H +.030(0.76) −.000
	Size	Pin*	Socket				Pin ±.010(0.25)	SKT. ±.010(0.25)		
1	A, E	Std.	Std.	.250(6.35)	.340(8.64)	.295(7.49)	.045(1.14)	.045(1.14)	—	.295(7.49)
1	B, C, D	Std.	Std.	.238(6.04)	.343(8.71)	.298(7.57)	.060(1.52)	.045(1.14)	—	.283(7.19)
2	A, E	Std.	Float Mount	.218(5.53)	—	.263(6.68)	.045(1.14)	—	.120(3.05)	—
2	B, C, D	Std.	Float Mount	.206(5.23)	—	.266(6.76)	.060(1.52)	—	.120(3.05)	—
2	A, E	Float Mount	Std.	.218(5.54)	—	.263(6.68)	—	.045(1.14)	.120(3.05)	—
2	B, C, D	Float Mount	Std.	.206(5.23)	—	.251(6.38)	—	.045(1.14)	.130(3.30)	—
3	A, E	Std.	Rev. Float Mount	—	.358(9.09)	.313(7.95)	.045(1.14)	—	.120(3.05)	—
3	B, C, D	Std.	Rev. Float Mount	—	.361(9.17)	.301(7.65)	.060(1.52)	—	.120(3.05)	—
3	A, E	Rev. Float Mount	Std.	—	.358(9.09)	.313(7.95)	—	.045(1.14)	.120(3.05)	—
3	B, C, D	Rev. Float Mount	Std.	—	.355(9.02)	.310(7.87)	—	.045(1.14)	.130(3.30)	—

*NOTE: Standard pin assemblies contain .015″ (0.38mm) thick front shells on E and A sizes; .024″ (0.61mm) thick front shells on B, C, and D sizes. (Bracketed figures centimeters)

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TRW® CINCH CONNECTORS

HOW TO ORDER — TYPES D*MA, D*M & D CONNECTORS

D B MA M R 15 P A * FO

Series Prefix

Shell Sizes
A, B, C, D, E

No designator — 2 pc. nylon Insulator — solder type Contacts — original "D" series

M: Monobloc insert — solder type contacts Mark I series

MA: Monobloc insert — crimp type contacts Mark III series

M: For connectors having .00005 gold plate over .0001 min. copper plate on contacts — omit for standard Mark I and Mark III only.

No designator — standard .120 diameter hole
E — 4-40 clinch nut for rear panel mounting
F — float mounts for rear panel mounting
R — reverse float mount for front panel mounting

Contact Arrangement, See page 11.

P — Pin
S — Socket

Printed circuit terminal modifier — applicable to the Mark I Series (monobloc, solder type).

A — Right-angle printed circuit connector with .040 diameter terminals; with bracket assembly and accommodates printed circuit boards up to 1/16 maximum thickness. (Plug only.)

B — Straight printed circuit connector with .040 diameter terminals; accommodates printed circuit boards up to 3/32 maximum thickness.

H — Straight printed circuit connector with .040 diameter terminals; accommodates printed circuit boards up to 1/8 maximum thickness.

L — Right-angle printed circuit connector with .030 diameter terminals with bracket assembly and accommodates printed circuit boards up to 3/32 maximum thickness. (Plug only.)

Printed Circuit Terminal Modifier — Applicable to the original "D" series.

V — Straight printed circuit connector with .040 diameter terminals; accommodates printed circuit boards up to 1/16 maximum thickness.

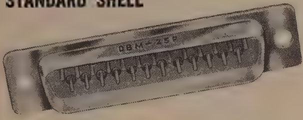
Modification — consult factory

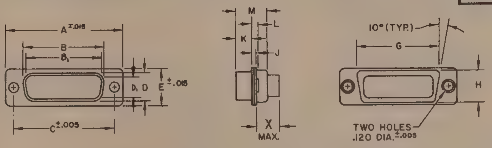
Connector less contacts (FO not stamped on connector)

STANDARD DIMENSIONS

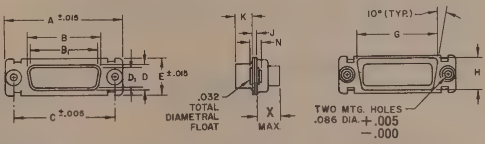
	Dim. X
Original "D"	.312
Mark I	.390
Mark III	.375

STANDARD SHELL





SHELL WITH FLOAT MOUNTS



Shell Size	Connector Type	A ±.015	B ±.005	B₁ ±.005	C ±.005	D ±.005	D₁ ±.005	E ±.015	G ±.010	H ±.010	J ±.010	K ±.005	L ±.010	M ±.010	N ±.010
E	9P	1.213		.666	.984		.329	.494	.759	.422	.030	.235	.045	.422	.120
	9S	1.213	.643		.984	.311		.494	.759	.422	.030	.243	.045	.429	.120
A	15P	1.541		.994	1.312		.329	.494	1.083	.422	.030	.235	.045	.422	.120
	15S	1.541	.971		1.312	.311		.494	1.083	.422	.030	.243	.045	.429	.120
B	25P	2.088		1.534	1.852		.329	.494	1.625	.422	.039	.230	.060	.426	.129
	25S	2.088	1.511		1.852	.311		.494	1.625	.422	.030	.243	.045	.429	.120
C	37P	2.729		2.182	2.500		.329	.494	2.272	.422	.039	.230	.060	.426	.129
	37S	2.729	2.159		2.500	.311		.494	2.272	.422	.030	.243	.045	.429	.120
D	50P	2.635		2.079	2.406		.436	.605	2.178	.534	.039	.230	.060	.426	.129
	50S	2.635	2.064		2.406	.423		.605	2.178	.534	.030	.243	.045	.429	.120

B and D dimensions are the outside dimensions (for socket side).
B₁ and D₁ dimensions are the inside dimensions (for pin side).

TRW® CINCH CONNECTORS

GENERAL RATINGS AND SPECIFICATIONS

VOLTAGE RATINGS

All voltage figures are AC (rms), 60 cps. measured at approximately 77°F., 50% RH.

Connectors with Basic Arrangements
AWG #20 wire contacts only

All voltages are measured from contact to contact, and contact to shell, in unmated condition.

Connector Type		Altitude (feet) Sea Level	20,000	50,000	70,000
D*MA	Average Flashover	1500	1000	500	500
	Test	1000	650	325	325
D*M D*	Average Flashover	1700	1000	650	500
	Test	1250	750	475	375

Connectors with Combination Arrangements
AWG #20 wire contacts with coaxial, high power, and/or high voltage contacts
All voltages are for plugs and receptacles in both mated and unmated conditions.

Altitude (feet)		Sea Level		20,000		Sea Level		20,000	
Type of Contact		90°	Straight	90°	Straight	90°	Straight	90°	Straight
Center Conductor to Coaxial Shell	Average Flashover	1200	1500	900	1000	600	700	400	500
	Test	800	1000	600	650	400	475	275	325
High Power Contact and/or Coaxial Shell to Plug Shell	Average Flashover	1500	1500	1000	1000	500	500	500	500
	Test	1000	1000	650	650	325	325	325	325
Coaxial Shell to Nearest Standard Solder Pot Contact	Average Flashover	•	1500	•	1500	•	900	•	650
	Test	•	1000	•	1000	•	600	•	425
HV Contact to Nearest #20 Contact or to Shell	Average Flashover	3800	3800	2300	2300	500	900	650	650
	Test	2800	2800	1700	1700	675	675	475	475

• Not applicable due to variable rotation.

CURRENT RATINGS

Cinch vs. Military.

The Cinch rating for #20 contacts is 5 amps, which means 5 amps for all contacts simultaneously. MIL-W-5088 rates #20 contacts at 7.5 amps maximum. The explanation is as follows:

MIL-W-5088B, Paragraph 3-9-2-1-2 specifies:

"Table I current ratings for cables in bundles are based upon 15 or more cables carrying no more than 20% of the total carrying capacity of the bundle."

Table I specifies a current rating of 7.5 amps maximum for single wires in bundles of 15 or more wires. NOTE: Wires and contacts are both considered to be in the category of conductors.

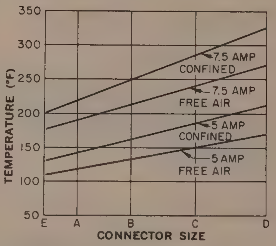
Explanation

If 15 wires (normally rated at 7.5 amps per wire maximum, or at a total bundle current of 112.5 amps) are not to carry more than 20% of the total 112.5 amps, the **average** current rating per wire is 20% of 112.5 amps (total bundle capacity) divided by 15 (number of wires).

Conclusion

The Military rating of #20 contacts or wires is 1.5 amps average (based on 15 wires per bundle or 15 contacts per connector) vs. a Cinch rating of 5 amps.

Average Maximum Temperature vs. Connector Size for various current ratings of mated pairs of D Subminiature Connectors.



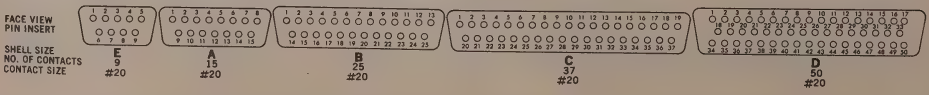
Notes:

1. Free air condition. Connectors not shielded from ambient condition in any manner.
2. Confined condition. Connectors placed in insulated box (1 x 2 x 3.5) during test, with no moving air.
3. Average maximum temperature stabilization: 1 hour or less in all cases.
4. All contacts in each mated pair tested were wired in series with specified current flowing.
5. Ambient conditions 77°F. 50% rh.

MATERIAL AND PLATING SPECIFICATIONS

Material	Application	Per Specification
Beryllium Copper	Coax. Recept. Outer Body	QQ-C-530
Brass	Contact	QQ-B-626a, Composition 22, HH
Brass	Shell	QQ-B-613a, Composition 2, soft temper
Diallyl phthalate, glass fibre filled, (short)	Insulator	MIL-M-14F. Type SDGF
Diallyl phthalate, glass fibre filled, (long)	Insulator	MIL-P-19833. Type GDI-30F
Leaded copper	Contact	Anaconda Alloy 1870 or equivalent
Nylon	Insulator	MIL-P-17091B
Phosphor bronze	Contact	ASTM B139. Alloy BE per QQ-B-750
Stainless steel	Float rivet	per QQ-S-764B
Stainless steel	Float washer	No. 304, per QQ-S-766c
Steel	Shell	QQ-S-636
Teflon	Coaxial Insulator	—
Plating	**Application**	**Per Specification**
Cadmium plate	Shell	QQ-P-416a. Type II, Class 2
Copper	Contact	MIL-C-14550, Class I
Gold plate	Contact	MIL-G-45204, Type II, Class I
Silver plate	Contact	QQ-S-365a
Tin plate	Shell and contact	MIL-T-10727A

BASIC CONTACT ARRANGEMENTS (Applicable to all Series)



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TRW® CINCH CONNECTORS

ORIGINAL D CONNECTORS

GENERAL INFORMATION

The Cinch Original D Plug utilizes a two-piece nylon insulator housed in a variety of five basic shell sizes: E, A, B, C, and D. These shell sizes contain 9, 15, 25, 37, and 50 #20 solder pot contacts respectively. Standard contact terminations accommodate up to #20 AWG stranded wire. Current rating is 5 amperes.*

The keystone shape of the shell assures proper polarization. Coupling is by means of friction; locking accessories are available. Also available are shells with float mounts. Connectors with #4-40 or #2-56 clinch nut mounts may be provided.

With standard nylon insulators, operating temperatures range from −65°F to +250°F (the limiting factor being the insulator material). When diallyl phthalate insulator is substituted, the operating temperature range is from −65°F to +275°F.

*Military rating of #20 contacts or wires is 1.5 amps average, and 7.5 amps maximum. See explanation on page 11.

MATERIALS AND FINISHES

Shells:	Steel, cadmium plated with yellow chromate supplementary coating.
Pin Contacts:	Brass, gold plated (.00003) over nickel plate (.000060 min.).
Socket Contacts:	Phosphor bronze, gold plated (.00003) over nickel plate (.000060 min.).
Insulators:	Nylon, two-piece.
Float Mounting Rivets and Washers:	Stainless steel.

For listing of applicable specifications see page 11.

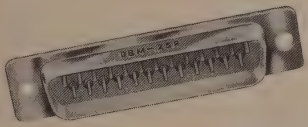
PERFORMANCE DATA

Voltage Rating:	See tabulation on page 11.
Insulation Resistance:	Greater than 5,000 megohms, determined in accordance with MIL-STD-202D, Method 302, Condition B.
Contact Resistance:	2.7 milliohms maximum @ 7.5 amps.
Individual Contact Separation Force:	1 to 8 ounces.
Moisture Resistance:	Exceeds test requirements of MIL-STD-202D, Method 106.†
Vibration:	Exceeds test requirements of MIL-STD-202D, Method 204, Condition B.†
Shock:	Exceeds test requirements of MIL-STD-202D, Method 213, Condition G.†
Corrosion Resistance:	Exceeds requirements of 48 hr. exposure to salt spray in accordance with MIL-STD-202D, Method 101C, Condition B.†

†As referenced in MIL-C-24308.

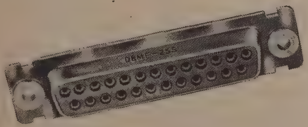
ORDERING INFORMATION

STANDARD MOUNT



Shell Size	Layout	Order No.*	Factory No.
E	9 Contact Plug Socket	DE-9P * DE-9S *	231-09-11-101 230-09-11-101
A	15 Contact Plug Socket	DA-15P * DA-15S *	231-15-11-101 230-15-11-101
B	25 Contact Plug Socket	DB-25P * DB-25S *	231-25-11-101 230-25-11-112
C	37 Contact Plug Socket	DC-37P * DC-37S *	231-37-11-101 230-37-11-101
D	50 Contact Plug Socket	DD-50P * DD-50S *	231-50-11-101 230-50-11-101

FLOAT MOUNT



Shell Size	Layout	Order No.*	Factory No.
E	9 Contact Plug Socket	DEF-9P * DEF-9S *	231-09-11-306 230-09-11-301
A	15 Contact Plug Socket	DAF-15P * DAF-15S *	231-15-11-301 230-15-11-301
B	25 Contact Plug Socket	DBF-25P * DBF-25S *	231-25-11-301 230-25-11-301
C	37 Contact Plug Socket	DCF-37P * DCF-37S *	231-37-11-301 230-37-11-301
D	50 Contact Plug Socket	DDF-50P * DDF-50S *	231-50-11-304 230-50-11-301

* These items available through Cinch distributors.

FOR DIMENSIONS SEE PAGE 10

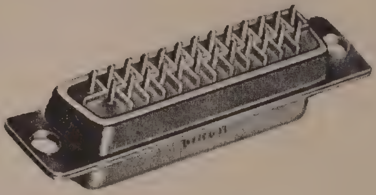
TRW/CINCH CONNECTORS, AN ELECTRONIC COMPONENTS DIV. OF TRW INC. / 1501 MORSE AVE. / ELK GROVE VILLAGE, ILL. 60007

TRW® CINCH CONNECTORS

ORIGINAL D CONNECTORS (Cont'd)

PRINTED CIRCUIT TERMINALS

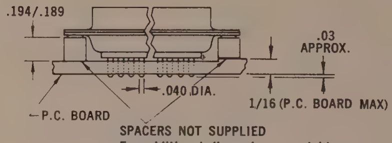
Straight terminals for printed circuit boards up to and including 1/16" maximum thickness. Terminals extend 3/32" beyond the rear of the insert. For greater board thicknesses consult factory.



ORDERING INFORMATION

Shell Size	Layout	Order No.*	Factory No.
E	9 Contact Plug Socket	DE-9PV * DE-9SV *	231-09-12-112 230-09-12-115
A	15 Contact Plug Socket	DA-15PV * DA-15SV *	231-15-12-121 230-15-12-131
B	25 Contact Plug Socket	DB-25PV * DB-25SV *	231-25-12-116 230-25-12-105
C	37 Contact Plug Socket	DC-37PV * DC-37SV *	231-37-12-115 230-37-12-114
D	50 Contact Plug Socket	DD-50PV * DD-50SV *	231-50-12-114 230-50-12-113

* These items available through Cinch distributors.



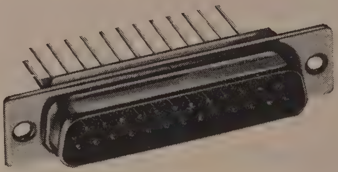
For additional dimensions see table on page 10.

WIRE WRAP TERMINALS

RACK AND PANEL CONNECTORS WITH 0.025" SQUARE WIRE WRAP* TAILS

Cinch D-Subminiature Connectors are designed for applications where space and weight considerations are prime considerations. These high contact density connectors are especially well-suited for aircraft, missile and ground support installations. They are designed to meet or exceed most of the requirements of MIL-C-24308.

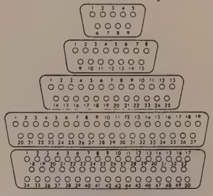
These wire-wrap versions are available in 9, 15, 25, 37 and 50 contact sizes in both plug and socket types. Two tail lengths are available: 3/8" long to accommodate two wires, and 37/64" long to accommodate three wires. Socket contacts and plug pins are copper alloy gold plated over silver. Insulators are two-piece nylon, and the outer shells are yellow chromate finished, cadmium-plated steel.



These D-Subminiature Connectors will intermate with any other D-Subminiature Connector of the same insert configuration. Mating connectors with standard termination may be adapted for cable attachment by means of accessory junction shells with integral clamps.

IMMEDIATE DELIVERY FROM CINCH DISTRIBUTORS can be provided on the 3/8" long termination types.

ORDERING INFORMATION

	Layout	Shell Size	3/8" TAIL LENGTH**		37/64" TAIL LENGTH	
			Order No.	Factory No.	Order No.	Factory No.
(#20 contacts only) 	9 Contact Plug Socket	E	DE-9P-F179 DE-9S-F179	231-09-13-133 230-09-13-132	DE-9P-F179C DE-9S-F179C	231-09-13-134 230-09-13-133
	15 Contact Plug Socket	A	DA-15P-F179 DA-15S-F179	231-15-13-152 230-15-13-142	DA-15P-F179C DA-15S-F179C	231-15-13-153 230-15-13-143
	25 Contact Plug Socket	B	DB-25P-F179 DB-25S-F179	231-25-13-157 230-25-13-149	DB-25P-F179C DB-25S-F179C	231-25-13-161 230-25-13-150
	37 Contact Plug Socket	C	DC-37P-F179 DC-37S-F179	231-37-13-141 230-37-13-131	DC-37P-F179C DC-37S-F179C	231-37-13-142 230-37-13-132
	50 Contact Plug Socket	D	DD-50P-F179 DD-50S-F179	231-50-13-136 230-50-13-124	DD-50P-F179C DD-50S-F179C	231-50-13-137 230-50-13-125

*Trademark Gardner-Denver Corp.
**All 3/8" Tail length D-Subminiature Connectors are available for immediate delivery from local Authorized Cinch Distributors.

FOR DIMENSIONS SEE PAGE 10

TRW® CINCH CONNECTORS

GOLDEN D MARK I CONNECTORS

GENERAL INFORMATION

Cinch D*M Connectors feature solder pot contacts in a monobloc insulator for improved temperature characteristics and increased moisture resistance. Two insulator types are available: (a) combination layouts with coaxial and/or high voltage contacts plus standard AWG wire contacts, and (b) layouts with standard AWG wire contacts only. The five amp* solder pot contacts accommodate wire sizes up to #20 AWG stranded wire. Socket contacts are of the closed entry type. Operating temperatures range from −65°F to +300°F.

Combination layouts are supplied with unfilled coaxial and/or HV contact cavities. Coaxial and HV contacts must be ordered separately, and may be used interchangeably in any of the layouts listed. HV contacts accommodate wire sizes up to #20. In both, coaxial and HV contacts, the center contacts have solder type termination. Braid, on coaxial contacts, may be soldered or crimped to the outer conductor. Both of the above contacts are snap-in, removable type.

Standard coaxial and HV plugs contain female center contacts; receptacles contain male center contacts. Special reversed versions are available. Pin connector assemblies accommodate coaxial and HV plugs only; socket assemblies accommodate receptacles. Connector assemblies and contact inserts are matched and color coded to ease assembly. Pins and plugs are coded red, sockets and receptacles are coded blue. No insertion tool is required. Coaxial and HV inserts may be removed with Cinch Tool CET-C6B.

Five basic shell sizes are available. Polarization is by means of the keystone cornered shell. Coupling is by friction; locking accessories are available. Shells with float mounts are also available.

Printed circuit plugs are listed on page 8 with other popular modifications. For additional modifications and special plugs, consult factory. Accessories such as junction shells are shown on pages 23 and 24.

*Military rating of #20 contacts or wires is 1.5 amps average, and 7.5 amps maximum. See explanation on page 11.

MATERIALS AND FINISHES

Shells: Steel, cadmium plated with yellow chromate supplementary coating.

Insulators: Diallyl phthalate, glass fibre filled, med. green color, monobloc construction.

#20 Contacts (Standard): Pins and sockets: brass, gold plated (.00003) over silver plate (.0001).

Coaxial Contacts (Standard):

- **Outer Contact —** Plug: Brass, gold plated (.00003) over silver plate (.0001). Receptacle: Beryllium copper, gold plated (.00003) over silver plate (.0001).
- **Center Female Contact —** Phosphor bronze, gold plated (.00003) over silver plate (.0001).
- **Center Male Contact —** Brass, gold plated (.00003) over silver plate (.0001).
- **Insulator —** Teflon.

High Voltage Contacts (Standard):

- **Socket Contact —** Phosphor bronze, gold plated (.00003) over silver plate (.0002).
- **Pin Contact —** Brass, gold plated (.00003) over silver plate (.0002).
- **Insulator —** Nylon (temperature range: −65°F to +250°F).

For listing of applicable specifications see page 11.

PERFORMANCE DATA

VOLTAGE RATING:

Insulation Resistance Ref. MIL-C-24308 — Greater than 5000 megohms in accordance with MIL-STD-202D, Method 302, Condition B

Contact Resistance Ref. MIL-C-24308 — (#20 contacts) 2.67 milliohms max. exceeds requirements of Para 3.53

Contact Engagement Force Ref. MIL-C-24308 — .7 to 12 oz. when tested with MS3197 test pin

Contact Separation Force Ref. MIL-C-24308 — .7 to 8 oz. when tested with MS3197 test pin

Moisture Resistance Ref. MIL-C-24308 — Exceeds test requirements of MIL-STD-202D, Method 106

Vibration Ref. MIL-C-24308 — Exceeds test requirements of MIL-STD-202D, Method 204, Condition B

Shock Ref. MIL-C-24308 — Exceeds test requirements of MIL-STD-202D, Method 213, Condition G

Corrosion Resistance Ref. MIL-C-24308 — Exceeds requirements of 48-hour exposure to salt spray in accordance with MIL-STD-202D, Method 101C, Condition B

High Potential Test Voltage Ref. MIL-C-24308 — MIL-STD-202D, Method 301

Temperature Cycling Ref. MIL-C-24308 — MIL-STD-202D, Method 102A, Condition D

See tabulation on page 11.

CROSS REFERENCE MIL-C-24308 MILITARY PART NO. VERSUS CINCH PART NO.

	Mark I Solder Contact Connectors	
	Military Part No.	Cinch Part No.
Sockets	M24308/1-1	230-09-09-129
	M24308/1-2	230-15-09-129
	M24308/1-3	230-25-09-129
	M24308/1-4	230-37-09-129
	M24308/1-5	230-50-09-129
Plugs	M24308/3-1	231-09-09-129
	M24308/3-2	231-15-09-129
	M24308/3-3	231-25-09-129
	M24308/3-4	231-37-09-129
	M24308/3-5	231-50-09-129

	Mark I Solder Contact Connectors With Float Mount	
	Military Part No.	Cinch Part No.
Sockets	M24308/1-12	230-09-09-322
	M24308/1-13	230-15-09-322
	M24308/1-14	230-25-09-322
	M24308/1-15	230-37-09-322
	M24308/1-16	230-50-09-322
Plugs	M24308/3-12	231-09-09-322
	M24308/3-13	231-15-09-322
	M24308/3-14	231-25-09-322
	M24308/3-15	231-37-09-322
	M24308/3-16	231-50-09-322

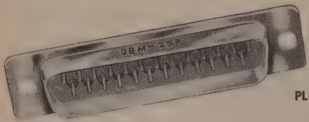
	Solder Contact Connectors (Non-Magnetic)	
	Military Part No.	Cinch Part No.
Sockets	M24308/5-1	230-09-09-513
	M24308/5-2	230-15-09-513
	M24308/5-3	230-25-09-513
	M24308/5-4	230-37-09-513
	M24308/5-5	230-50-09-513
Plugs	M24308/7-1	231-09-09-513
	M24308/7-2	231-15-09-513
	M24308/7-3	231-25-09-513
	M24308/7-4	231-37-09-513
	M24308/7-5	231-50-09-513

	Solder Contact Connectors (Non-Magnetic) With Float Mount	
	Military Part No.	Cinch Part No.
Sockets	M24308/5-12	230-09-09-210
	M24308/5-13	230-15-09-210
	M24308/5-14	230-25-09-210
	M24308/5-15	230-37-09-210
	M24308/5-16	230-50-09-210
Plugs	M24308/7-12	231-09-09-210
	M24308/7-13	231-15-09-210
	M24308/7-14	231-25-09-210
	M24308/7-15	231-37-09-210
	M24308/7-16	231-50-09-210

TRW® CINCH CONNECTORS

GOLDEN D MARK I CONNECTORS (Cont'd)

STANDARD MOUNT **FLOAT MOUNT**



PLUG WITH BASIC LAYOUT IN STANDARD SHELL

Shell Size	Layout	Standard Connectors Order No.*	Standard Connectors Factory No.	Commercial Equivalents of MIL-C-24308 Connectors Order No.	Commercial Equivalents of MIL-C-24308 Connectors Factory No.
E	9 Contact Plug Socket	DEM-9P* DEM-9S*	231-09-09-105 230-09-09-107	DEMM-9P DEMM-9S	231-09-09-120 230-09-09-120
A	15 Contact Plug Socket	DAM-15P* DAM-15S*	231-15-09-108 230-15-09-110	DAMM-15P DAMM-15S	231-15-09-127 230-15-09-123
B	25 Contact Plug Socket	DBM-25P* DBM-25S*	231-25-09-109 230-25-09-111	DBMM-25P DBMM-25S	231-25-09-124 230-25-09-1[illegible]
C	37 Contact Plug Socket	DCM-37P* DCM-37S*	231-37-09-109 230-37-09-109	DCMM-37P DCMM-37S	231-37-09-131 230-37-09-119
D	50 Contact Plug Socket	DDM-50P* DDM-50S*	231-50-09-109 230-50-09-111	DDMM-50P DDMM-50S	231-50-09-132 230-50-09-131

SOCKET WITH BASIC LAYOUT IN SHELL WITH FLOAT MOUNTS

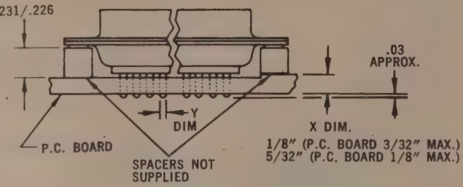
Shell Size	Layout	Standard Connectors Order No.*	Standard Connectors Factory No.	Commercial Equivalents of MIL-C-24308 Connectors Order No.	Commercial Equivalents of MIL-C-24308 Connectors Factory No.
E	9 Contact Plug Socket	DEMF-9P* DEMF-9S*	231-09-09-301 230-09-09-301	DEMMF-9P DEMMF-9S	231-09-09-305 230-09-09-314
A	15 Contact Plug Socket	DAMF-15P* DAMF-15S*	231-15-09-301 230-15-09-302	DAMMF-15P DAMMF-15S	231-15-09-304 230-15-09-312
B	25 Contact Plug Socket	DBMF-25P* DBMF-25S*	231-25-09-301 230-25-09-301	DBMMF-25P DBMMF-25S	231-25-09-308 230-25-09-312
C	37 Contact Plug Socket	DCMF-37P* DCMF-37S*	231-37-09-301 230-37-09-302	DCMMF-37P DCMMF-37S	231-37-09-307 230-37-09-314
D	50 Contact Plug Socket	DDMF-50P* DDMF-50S*	231-50-09-301 230-50-09-301	DDMMF-50P DDMMF-50S	231-50-09-308 230-50-09-313

PC CONNECTORS

STRAIGHT PC CONTACTS

These compact, high contact density connectors are designed for direct, above board mounting to printed circuit boards up to ⅛″ thick. They provide a highly reliable means for direct inline interconnection of printed circuitry with mother-board mounted sockets.

Shell Size	Layout	.040 Dia. ³⁄₃₂″ Board Order No.	.040 Dia. ³⁄₃₂″ Board Factory No.	.040 Dia. ⅛″ Board Order No.	.040 Dia. ⅛″ Board Factory No.
E	9 Contact Plug Socket	DEM-9PB DEM-9SB	231-09-09-117 230-09-09-127	DEM-9PH DEM-9SH	231-09-09-130 230-09-09-128
A	15 Contact Plug Socket	DAM-15PB DAM-15SB	231-15-09-124 230-15-09-118	DAM-15PH DAM-15SH	231-15-09-139 230-15-09-127
B	25 Contact Plug Socket	DBM-25PB DBM-25SB	231-25-09-127 230-25-09-122	DBM-25PH DBM-25SH	231-25-09-125 230-25-09-121
C	37 Contact Plug Socket	DCM-37PB DCM-37SB	231-37-09-118 230-37-09-114	DCM-37PH DCM-37SH	231-37-09-121 230-37-09-120
D	50 Contact Plug Socket	DDM-50PB DDM-50SB	231-50-09-133 230-50-09-119	DDM-50PH DDM-50SH	231-50-09-136 230-50-09-135

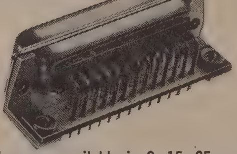


Dimensions subject to change

Part No. Printed Circuit Terminal Modifier	X	Y ±.003
B	³⁄₃₂	.040
H	⅛	.040

For additional dimensions see table on page 10.

RIGHT ANGLE PC CONTACTS



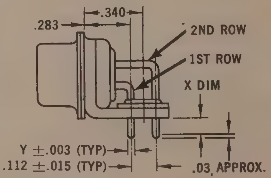
These right-angle plugs are available in 9, 15, 25, and 37 contact configurations. The standard units listed herein are supplied with 0.040″ or 0.030″ nominal diameter pins that extend 0.093″ below the 90° bracket. Other pin diameters and lengths may be obtained on special order.

Design and construction of these connectors meets or exceeds many of the requirements of MIL-C-24308.

These right-angle D-Subminiature connectors will mate with any other D-Subminiature connector of the same insert configuration. Mating connectors may be adapted for cable attachment by means of accessory junction shells.

Shell Size	Layout	.040 Dia. ¹⁄₁₆″ Board Order No.*	.040 Dia. ¹⁄₁₆″ Board Factory No.	.030 Dia. ³⁄₃₂″ Board Order No.	.030 Dia. ³⁄₃₂″ Board Factory No.
E	9 Contact Plug	DEM-9PA*	231-09-09-124	DEM-9PL	231-09-09-118
A	15 Contact Plug	DAM-15PA*	231-15-09-115	DAM-15PL	231-15-09-125
B	25 Contact Plug	DBM-25PA*	231-25-09-116	DBM-25PL	231-25-09-139
C	37 Contact Plug	DCM-37PA*	231-37-09-130	DCM-37PL	231-37-09-127

For additional dimensions see table on page 10.



Part No. Printed Circuit Terminal Modifier	X	Y ±.003 Typ.
A	¹⁄₁₆	.040
L	³⁄₃₂	.030

FOR DIMENSIONS SEE PAGE 10

* These items available through Cinch distributors.

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TRW® CINCH CONNECTORS

GOLDEN D MARK I CONNECTORS (Cont'd)

PLUG WITH
COMBINATION
LAYOUT IN
STANDARD SHELL

MARK 1 — COMBINATION PLUG & SOCKET LAYOUTS STANDARD SHELL — STANDARD FINISH ON CONTACTS

Shell Size	Order No.*	Factory No.
E	*DEM-5W1P	236-05-00-101
	*DEM-5W1S	235-05-00-101
A	*DAM-3W3P	236-03-00-101
	*DAM-3W3S	235-03-00-101
	*DAM-7W2P	236-07-00-101
	*DAM-7W2S	235-07-00-101
	*DAM-11WIP	236-11-00-102
	*DAM-11W1S	235-11-00-101
B	*DBM-9W4P	236-09-00-101
	*DBM-9W4S	235-09-00-101
	*DBM-13W3P	236-13-001-01
	*DBM-13W3S	235-13-00-101
	*DBM-17W2P	236-17-00-101
	*DBM-17W2S	235-17-00-101
	*DBM-21W1P	236-21-00-101
	*DBM-21W1S	235-21-00-101
C	DCM-8W8P	236-08-00-101
	DCM-8W8S	235-08-00-101
	*DCM-13W6P	236-13-00-102
	*DCM-13W6S	235-13-00-102
	DCM-17W5P	236-17-00-102
	DCM-17W5S	235-17-00-102
	DCM-21W4P	236-21-00-107
	DCM-21W4S	235-21-00-105
	DCM-25W3P	236-25-00-101
	DCM-25W3S	235-25-00-101
	DCM-27W2P	236-27-00-101
	DCM-27W2S	235-27-00-101
D	DDM-24W7P	236-24-00-101
	DDM-24W7S	235-24-00-101
	DDM-36W4P	236-36-00-101
	DDM-36W4S	235-36-00-101

MARK 1 — COMBINATION PLUG & SOCKET LAYOUTS STANDARD SHELL — MILITARY FINISH ON CONTACTS

Shell Size	Order No.	Factory No.
E	DEMM-5W1P	236-05-00-102
	DEMM-5W1S	235-05-00-105
A	DAMM-3W3P	236-03-00-102
	DAMM-3W3S	235-03-00-102
	DAMM-7W2P	236-07-00-104
	DAMM-7W2S	235-07-00-102
	DAMM-11W1P	236-11-00-106
	DAMM-11W1S	235-11-00-103
B	DBMM-9W4P	236-09-00-104
	DBMM-9W4S	235-09-00-106
	DBMM-13W3P	236-13-00-105
	DBMM-13W3S	235-13-00-103
	DBMM-17W2P	236-17-00-110
	DBMM-17W2S	235-17-00-107
	DBMM-21W1P	236-21-00-103
	DBMM-21W1S	235-21-00-103
C	DCMM-8W8P	236-08-00-103
	DCMM-8W8S	235-08-00-103
	DCMM-13W6P	236-13-00-108
	DCMM-13W6S	235-13-00-109
	DCMM-17W5P	236-17-00-116
	DCMM-17W5S	235-17-00-112
	DCMM-21W4P	236-21-00-102
	DCMM-21W4S	235-21-00-102
	DCMM-25W3P	236-25-00-106
	DCMM-25W3S	235-25-00-105
	DCMM-27W2P	236-27-00-102
	DCMM-27W2S	235-27-00-102
D	DDMM-24W7P	236-24-00-106
	DDMM-24W7S	235-24-00-107
	DDMM-36W4P	236-36-00-103
	DDMM-36W4S	235-36-00-102

SOCKET WITH
COMBINATION
LAYOUT IN
SHELL WITH FLOAT MOUNTS

MARK 1 — COMBINATION PLUG & SOCKET LAYOUTS SHELL WITH FLOAT MOUNTS — STANDARD FINISH ON CONTACTS

Shell Size	Order No.*	Factory No.
E	DEMF-5W1P	236-05-00-301
	DEMF-5W1S	235-05-00-301
A	DAMF-3W3P	236-03-00-301
	*DAMF-3W3S	235-03-00-301
	DAMF-7W2P	236-07-00-301
	DAMF-7W2S	235-07-00-301
	*DAMF-11W1P	236-11-00-301
	*DAMF-11W1S	235-11-00-301
B	*DBMF-9W4P	236-09-00-301
	*DBMF-9W4S	235-09-00-301
	DBMF-13W3P	236-13-00-301
	DBMF-13W3S	235-13-00-301
	*DBMF-17W2P	236-17-00-301
	*DBMF-17W2S	235-17-00-302
	DBMF-21W1P	236-21-00-301
	DBMF-21W1S	235-21-00-301
C	DCMF-8W8P	236-08-00-301
	DCMF-8W8S	235-08-00-301
	DCMF-13W6P	236-13-00-302
	DCMF-13W6S	235-13-00-302
	DCMF-17W5P	236-17-00-302
	DCMF-17W5S	235-17-00-307
	DCMF-21W4P	236-21-00-303
	DCMF-21W4S	235-21-00-305
	DCMF-25W3P	236-25-00-301
	DCMF-25W3S	235-25-00-301
	DCMF-27W2P	236-27-00-301
	DCMF-27W2S	235-27-00-301
D	DDMF-24W7P	236-24-00-301
	DDMF-24W7S	235-24-00-302
	DDMF-36W4P	236-36-00-301
	DDMF-36W4S	235-36-00-302

MARK 1 — COMBINATION PLUG & SOCKET LAYOUTS SHELL WITH FLOAT MOUNTS — MILITARY FINISH ON CONTACTS

Shell Size	Order No.	Factory No.
E	DEMMF-5W1P	236-05-00-302
	DEMMF-5W1S	235-05-00-304
A	DAMMF-3W3P	236-03-00-302
	DAMMF-3W3S	235-03-00-305
	DAMMF-7W2P	236-07-00-302
	DAMMF-7W2S	235-07-00-305
	DAMMF-11W1P	236-11-00-302
	DAMMF-11W1S	235-11-00-307
B	DBMMF-9W4P	236-09-00-302
	DBMMF-9W4S	235-09-00-306
	DBMMF-13W3P	236-13-00-303
	DBMMF-13W3S	235-13-00-307
	DBMMF-17W2P	236-17-00-303
	DBMMF-17W2S	235-17-00-314
	DBMMF-21W1P	236-21-00-302
	DBMMF-21W1S	235-21-00-304
C	DCMMF-8W8P	236-08-00-302
	DCMMF-8W8S	235-08-00-302
	DCMMF-13W6P	236-13-00-304
	DCMMF-13W6S	235-13-00-309
	DCMMF-17W5P	236-17-00-304
	DCMMF-17W5S	235-17-00-317
	DCMMF-21W4P	236-21-00-302
	DCMMF-21W4S	235-21-00-306
	DCMMF-25W3P	236-25-00-302
	DCMMF-25W3S	235-25-00-305
	DCMMF-27W2P	236-27-00-304
	DCMMF-27W2S	235-27-00-302
D	DDMMF-24W7P	236-24-00-302
	DDMMF-24W7S	235-24-00-304
	DDMMF-36W4P	236-36-00-302
	DDMMF-36W4S	235-36-00-304

FOR DIMENSIONS SEE PAGE 10

* These items available through Cinch distributors.

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TRW® CINCH CONNECTORS

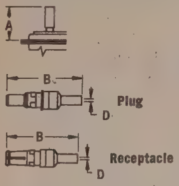
GOLDEN D MARK I CONNECTORS (Cont'd)

REMOVABLE COAXIAL, HIGH VOLTAGE, AND HIGH POWER CONTACTS

All coaxial and high voltage contacts have solder center contact. For coax, high voltage, and power contact material, see page 14.

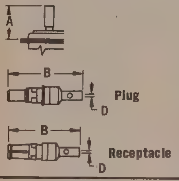
COAXIAL CONTACT TERMINATIONS For D*M coaxial crimp tools, consult factory.

STRAIGHT CRIMP BRAID CONTACTS



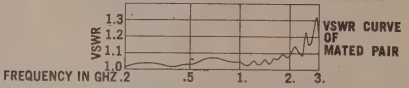
	Part Number				Dimensions			RG Cable No.	
	Standard Finish		Military Finish **		A	B	D		
	Order No.	Factory No.	Order No.	Factory No.	Max.	Ref.	±.005	Old	New
Plug	DM53740	167-0133-000	DM53740-17	167-0251-000	.739	.929	.040	196/U	178B/U
Plug	DM53740-1	167-0126-000	DM53740-15	167-0007-000	.739	.929	.067	187/U	179B/U
								188/U	316B/U
Plug	DM53740-3	167-0130-000	DM53740-16	167-0057-000	.847	1.037	.110	195/U	180B/U
Plug	DM53740-5	167-0088-000	DM53740-18	167-0252-000	.847	1.037	.125	58/U	58B/U
Receptacle	DM53742	167-0124-000	DM53742-18	167-0253-000	.739	.929	.040	196/U	178B/U
Receptacle	DM53742-1	167-0118-000	DM53742-16	167-0006-000	.739	.929	.067	187/U	179B/U
								188/U	316B/U
Receptacle	DM53742-3	167-0122-000	DM53742-17	167-0041-000	.847	1.037	.110	195/U	180B/U
Receptacle	DM53742-5	167-0086-000	DM53742-19	167-0254-000	.847	1.037	.125	58/U	58B/U

STRAIGHT SOLDER BRAID CONTACTS



	Part Number				Dimensions			RG Cable No.	
	Standard Finish		Military Finish **		A	B	D		
	Order No.	Factory No.	Order No.	Factory No.	Max.	Ref.	±.005	Old	New
Plug	DM53740-5008*	167-0189-000	DM53740-5015	167-0113-000	.739	.929	.040	196/U	178B/U
Plug	DM53740-5001*	167-0153-000	DM53740-5099	167-0010-000	.739	.929	.067	187/U	179B/U
								188/U	316B/U
Plug	DM53740-5002*	167-0132-000	DM53740-5104	167-0237-000	.847	1.037	.110	195/U	180B/U
Plug	DM53740-5005	167-0150-000	DM53740-5101	167-0207-000	.847	1.037	.125	58/U	58B/U
Receptacle	DM53742-5006	167-0190-000	DM53742-5092	167-0138-000	.739	.929	.040	196/U	178B/U
Receptacle	DM53742-5001*	167-0169-000	DM53742-5089	167-0012-000	.739	.929	.067	187/U	179B/U
								188/U	316B/U
Receptacle	DM53742-5002*	167-0168-000	DM53742-5091	167-0139-000	.847	1.037	.110	195/U	180B/U
Receptacle	DM53742-5004*	167-0172-000	DM53742-5086	167-0137-000	.847	1.037	.125	58/U	58B/U
Plug (Short)	DM53740-5000*	167-0129-000	DM53740-5100	167-0011-000	.670	.860	.040	196/U	178B/U
Receptacle (Short)	DM53742-5000*	167-0121-000	DM53742-5085	167-0023-000	.670	.860	.040	196/U	178B/U

50 OHM MATCHED IMPEDANCE COAX CONTACTS

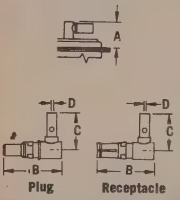


Description	Part No.
Straight Plug 50 Ohm	167-02-46-000
Straight Receptacle 50 Ohm	167-02-45-000

To be used with UT-85 coax cable

RIGHT ANGLE SOLDER BRAID CONTACTS

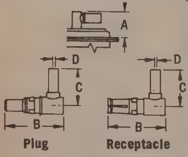
Cinch can also supply 50 ohm matched impedance coax contacts to be used with UT-85 coax cable.



	Part Number				Dimensions				RG Cable No.	
	Standard Finish		Military Finish **		A	B		D		
	Order No.	Factory No.	Order No.	Factory No.	Max.	Ref.	C	±.005	Old	New
Plug	DM53741-5000*	167-0187-000	DM53741-5059	167-0020-000	.530	.734	.492	.040	196/U	178B/U
Plug	DM53741-5001*	167-0128-000	DM53741-5062	167-0074-000	.530	.734	.492	.067	187/U	179B/U
									188/U	316B/U
Plug	DM53741-5003	167-0151-000	DM53741-5063	167-0159-000	.530	.734	.601	.110	195/U	130B/U
Plug	DM53741-5004	167-0173-000	DM53741-5060	167-0255-000	.530	.734	.601	.125	58/U	58B/U
Receptacle	DM53743-5000*	167-0119-000	DM53743-5073	167-0013-000	.530	.734	.492	.040	196/U	178B/U
Receptacle	DM53743-5001*	167-0120-000	DM53743-5076	167-0101-000	.530	.734	.492	.067	187/U	179B/U
									188/U	316B/U
Receptacle	DM53743-5003	167-0171-000	DM53743-5077	167-0158-000	.530	.734	.601	.110	195/U	180B/U
Receptacle	DM53743-5004	167-0170-000	DM53743-5074	167-0106-000	.530	.734	.601	.125	58/U	58B/U

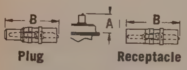
** MIL-C-24308 Finish: .00005 minimum gold plate over .0001 minimum copper plate.

RIGHT ANGLE CRIMP BRAID CONTACTS



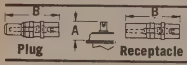
	Part Number				Dimensions				RG Cable No.	
	Standard Finish		Military Finish **		A	B		D		
	Order No.	Factory No.	Order No.	Factory No.	Max.	Ref.	C	±.005	Old	New
Plug	DM53741	167-0176-000	DM53741-12	167-0256-000	.530	.734	.492	.040	196/U	178B/U
Plug	DM53741-1	167-0152-000	DM53741-11	167-0162-000	.530	.734	.492	.067	187/U	179B/U
									188/U	316B/U
Plug	DM53741-3	167-0160-000	DM53741-10	167-0072-000	.530	.734	.601	.110	195/U	180B/U
Plug	DM53741-4	167-0149-000	DM53741-13	167-0257-000	.530	.734	.601	.125	58/U	58B/U
Receptacle	DM53743-2	167-0174-000	DM53743-18	167-0258-000	.530	.734	.492	.040	196/U	178B/U
Receptacle	DM53743-3	167-0166-000	DM53743-16	167-0161-000	.530	.734	.492	.067	187/U	179B/U
									188/U	316B/U
Receptacle	DM53743-5	167-0165-000	DM53743-17	167-0055-000	.530	.734	.601	.110	195/U	180B/U
Receptacle	DM53743-6	167-0164-000	DM53743-19	167-0259-000	.530	.734	.601	.125	58/U	58B/U

STRAIGHT HIGH VOLTAGE CONTACTS



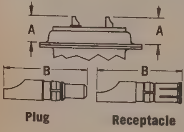
	Part Number				Dimensions		
	Standard Finish		Military Finish **		A	B	
	Order No.	Factory No.	Order No.	Factory No.	Max.	Ref.	Wire Size
Plug	DM51157	167-0002-000	DM51157-8	167-0263-000	.539	.734	#20
Receptacle	DM51155	167-0111-000	DM51155-7	167-0221-000	.539	.734	#20

RIGHT ANGLE HIGH VOLTAGE CONTACTS



Plug	DM51157-5000	167-0260-000	DM51157-5005	167-0261-000	.491	.697	#20
Receptacle	DM51155-5000	167-0089-000	DM51155-5004	167-0262-000	.491	.697	#20

HIGH POWER SOLDER TYPE CONTACTS



	Part Number				Dimensions			
	Standard Finish		Military Finish **		A	B	Cur. Rating	Wire Size
	Order No.	Factory No.	Order No.	Factory No.	Max.	Ref.	(amps)	Wire Size
Plug	DM53745-1	167-0144-000	DM53745-28	167-0219-000	.666	.866	40	#8
Plug	DM53745-7	167-0042-000	DM53745-27	167-0167-000	.666	.866	20	#21
Plug	DM53745-8	167-0115-000	DM53745-25	167-0187-000	.666	.866	10	#16
Receptacle	DM53744-1	167-0145-000	DM53744-21	167-0220-000	.666	.856	40	#8
Receptacle	DM53744-6	167-0043-000	DM53744-25	167-0215-000	.666	.856	20	#21
Receptacle	DM53744-7	167-0087-000	DM53744-24	167-0188-000	.666	.856	10	#16

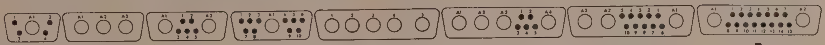
** MIL-C-24308 Finish: .00005 minimum gold plate over .0001 minimum copper plate.
* These items available through Cinch distributors.

TRW® CINCH CONNECTORS

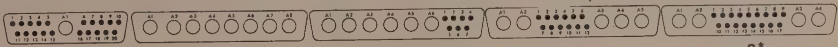
GOLDEN D MARK I CONNECTORS (Cont'd)

COMBINATION ARRANGEMENTS #20 CONTACTS WITH COAX, POWER AND/OR HIGH VOLTAGE CONTACTS

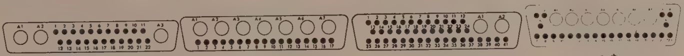
Coax and/or high voltage contacts must be ordered separately. See page 10 for ordering numbers.



Shell Size	E	A	A	A	B*	B	B	B
Arrangement	5W1	3W3	7W2	11W1	5W5	9W4	13W3	17W2
No. of Contacts	4	0	5	10	0	5	10	15
Contact Size	#20	—	#20	#20	—	#20	#20	#20
Coax or HV Cavities	1	3	2	1	5	4	3	2



Shell Size	B	C	C	C	C*
Arrangement	21W1	8W8	13W6	17W5	21WA4
No. of Contacts	20	0	7	12	17
Contact Size	#20	—	#20	#20	#20
Coax or HV Cavities	1	8	6	5	4



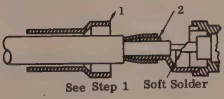
Shell Size	C	D	D	D*
Arrangement	25W3	24W7	43W2	30WS7
No. of Contacts	22	17	41	23
Contact Size	#20	#20	#20	#20
Coax or HV Cavities	3	7	2	7 shielded contacts

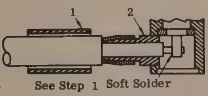
Consult factory for D*MA Series combination arrangements.

* These items not tooled.

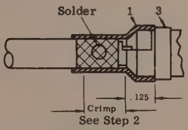
COAXIAL CABLE INSTALLATION INSTRUCTIONS

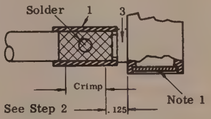
STRAIGHT COAXIAL **90° COAXIAL**





STEP 1. Slide outer ring (1) over cable jacket. Trim cable. Insert cable dielectric and center conductor into inside diameter of inner sleeve (2) solder center conductor to coaxial center contact.

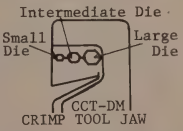




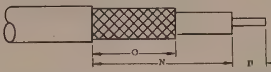
STEP 2. Slide outer ring (1) forward until flush with coaxial shell, (3) confining braid between outer ring and inner sleeve. For solder type coaxials, soft solder outer ring to assembly through cross-drilled solder hole. For crimp type coaxials, crimp with tool indicated being sure to crimp in area defined.

NOTES

1. Soft solder or stake access cap into shell after cable assembly on 90° type coaxials.
2. Crimp tool description — Cannon CCT-DM (to crimp outer sleeve only).
   - A. Use small die.
   - B. Use intermediate die.
   - C. Use large die.



3. Pin assemblies will accommodate high voltage and coaxial plugs only. Socket assemblies will accommodate high voltage and coaxial receptacles only.



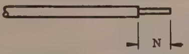
TRIM COAXIAL CABLE TO THESE DIMENSIONS
FOR INSTALLATION TO D*M COAXIAL CONTACTS

RECOMMENDED COAXIAL CABLE DIMENSIONS

Nomenclature	N	O	P	Tool No. Note 2
DM-53740	5/16	1/4	5/64	A
-1	5/16	1/4	5/64	B
-3	3/8	5/16	5/64	C
-5	3/8	5/16	5/64	C
DM-53741	3/8	15/64	1/16	A
-1	3/8	15/64	1/16	B
-3	27/64	5/16	3/32	C
-4	27/64	5/16	3/32	C
DM-53742	5/16	1/4	5/64	A
-1	5/16	1/4	5/64	B
-3	3/8	5/16	5/64	C
-5	3/8	5/16	5/64	C
DM-53743-2	3/8	15/64	1/16	A
-3	3/8	15/64	1/16	B
-5	27/64	5/16	3/32	C
-6	27/64	5/16	3/32	C
DM-53740-5000	5/16	1/4	5/64	None
-5001	5/16	1/4	5/64	None
-5002	3/8	5/16	5/64	None
-5005	3/8	5/16	5/64	None
-5008	5/16	1/4	5/64	None
DM-53741-5000	3/8	15/64	1/16	None
-5001	3/8	15/64	1/16	None
-5003	27/64	5/16	3/32	None
-5004	27/64	5/16	3/32	None
DM-53742-5000	5/16	1/4	5/64	None
-5001	5/16	1/4	5/64	None
-5002	3/8	5/16	5/64	None
-5004	3/8	5/16	5/64	None
-5006	5/16	1/4	5/64	None
DM-53743-5000	3/8	15/64	1/16	None
-5001	3/8	15/64	1/16	None
-5003	27/64	5/16	3/32	None
-5004	27/64	5/16	3/32	None

All tolerances ±.010 inch.

RECOMMENDED AWG WIRE DIMENSIONS



TRIM AWG WIRE TO THIS DIMENSION FOR INSTALLATION TO #20 CONTACTS

All tolerances ±.010 inch.

Nomenclature	N	Tool No. Note 2
DM-53744	.119	None
-5000	.119	None
DM-53745	.119	None
-5000	.119	None
Solder Type #20 Contact	.119	None

TRW/CINCH CONNECTORS, AN ELECTRONIC COMPONENTS DIV. OF TRW INC. / 1501 MORSE AVE. / ELK GROVE VILLAGE, ILL. 60007

TRW® CINCH CONNECTORS

ROYAL D MARK III CONNECTORS

GENERAL INFORMATION

The D*MA connector is a D-Subminiature Connector that utilizes the "Little Caesar" rear release contact assembly. This contact assembly allows rear insertion, release and extraction of crimp snap-in contacts. The simplified contact design with no undercuts offers greater bend resistance and a hard, closed entry socket insulator insures positive contact alignment. Crimp terminations accommodate #20, #22 and #24 AWG stranded wire and are rated for 5 amps.* ROYAL D-connectors are intermateable and interchangeable with all other D-Subminiature Connectors having compatible contact arrangement.

Polarization is by keystone shape of shell; coupling is by friction. Accessories are shown on pages 23 and 24. An extraction tool is supplied with ROYAL D-connectors. Extra contacts may be ordered for replacement purposes. See page 20 for ordering information.

MATERIALS, FINISHES AND TYPES

Shell:	Steel, cadmium plated with yellow chromate supplementary coating.
Insulator:	Diallyl phthalate, glass fibre filled, per MIL-P-19833, Type GDI-30F, royal purple color, monobloc construction.
Contacts:	Pin—leaded copper, gold plate over silver plate. Socket—copper alloy, gold plate over silver plate with stainless steel sleeves.
Current Rating:	(#20 Contacts) 5 amps.*
Contact Termination:	Crimp, accommodating #20, #22 or #24 AWG stranded wire. The 20-18 contacts accommodate one #18 or two #22 AWG stranded wires.
Contact Type:	Snap-in, removable, crimp, with rear release assembly. Contacts not interchangeable with other D Series.
Socket Type:	Closed entry.
Float Mounting	
Rivets & Washers:	Stainless steel.

For listing of applicable specifications, see page 11.

*Military rating of #20 contacts or wires is 1.5 amps average, and 7.5 amps maximum. See explanation on page 11.

PERFORMANCE DATA

VOLTAGE RATING:

Insulation Resistance Ref. MIL-C-24308	— Greater than 5000 megohms in accordance with MIL-STD-202D, Method 302, Condition B
Contact Resistance Exceeds Req'ts of MIL-C-24308	— (#20 contacts) 20 milliohms max. in accordance with Para 3.5.8
Contact Engagement Force Ref. MIL-C-24308	— .7 to 12 oz. when tested with MS3197 test pin
Contact Separation Force Ref. MIL-C-24308	— .7 to 8 oz. when tested with MS3197 test pin
Moisture Resistance Ref. MIL-C-24308	— Exceeds test requirements of MIL-STD-202D, Method 106
Vibration Ref. MIL-C-24308	— Meets test requirements of MIL-STD-202D, Method 204, Condition B
Shock Ref. MIL-C-24308	— Meets test requirements of MIL-STD-202D, Method 213, Condition G
Corrosion Resistance Ref. MIL-C-24308	— Exceeds requirements of 48-hour exposure to salt spray in accordance with MIL-STD-202D, Method 101A, Condition B
High Potential Test Voltage Ref. MIL-C-24308	— MIL-STD-202D, Method 301
Temperature Cycling Ref. MIL-C-24308	— MIL-STD-202D, Method 102A, Condition B

See tabulation on page 11.

Military Part No.	Cinch Part No.
*M24308/10-1 Socket	415-30-99-130
*M24308/11-1 Pin	403-30-99-106

Mark III Crimp Removable Contact Connectors

	Military Part No. With Contacts	Cinch Part No. Complete	Military Part No. Less Contacts	Cinch Part No. Less Contacts	Marked
Sockets	M24308/2-1 M24308/2-2 M24308/2-3 M24308/2-4 M24308/2-5	230-01-09-102 230-01-15-102 230-01-25-102 230-01-37-102 230-01-50-102	M24308/2-281 M24308/2-282 M24308/2-283 M24308/2-284 M24308/2-285	230-01-09-109 230-01-15-109 230-01-25-109 230-01-37-109 230-01-50-109	M24308/2-1 M24308/2-2 M24308/2-3 M24308/2-4 M24308/2-5
Plugs	M24308/4-1 M24308/4-2 M24308/4-3 M24308/4-4 M24308/4-5	231-01-09-102 231-01-15-102 231-01-25-102 231-01-37-102 231-01-50-102	M24308/4-259 M24308/4-260 M24308/4-261 M24308/4-262 M24308/4-263	231-01-09-109 231-01-15-109 231-01-25-109 231-01-37-109 231-01-50-109	M24308/4-1 M24308/4-2 M24308/4-3 M24308/4-4 M24308/4-5

Mark III Crimp Removable Contact Connectors With Float Mount

	Military Part No. With Contacts	Cinch Part No. Complete	Military Part No. Less Contacts	Cinch Part No. Less Contacts	Marked
Sockets	M24308/2-23 M24308/2-24 M24308/2-25 M24308/2-26 M24308/2-27	230-01-09-307 230-01-15-307 230-01-25-307 230-01-37-307 230-01-50-307	M24308/2-292 M24308/2-293 M24308/2-294 M24308/2-295 M24308/2-296	230-01-09-308 230-01-15-308 230-01-25-308 230-01-37-308 230-01-50-308	M24308/2-23 M24308/2-24 M24308/2-25 M24308/2-26 M24308/2-27
Plugs	M24308/4-302 M24308/4-303 M24308/4-304 M24308/4-305 M24308/4-306	231-01-09-307 231-01-15-307 231-01-25-307 231-01-37-307 231-01-50-307	M24308/4-324 M24308/4-325 M24308/4-326 M24308/4-327 M24308/4-328	231-01-09-308 231-01-15-308 231-01-25-308 231-01-37-308 231-01-50-308	M24308/4-302 M24308/4-303 M24308/4-304 M24308/4-305 M24308/4-306

Mark III Crimp Removable Contact Connectors (Non-Magnetic)

	Military Part No. With Contacts	Cinch Part No. Complete	Military Part No. Less Contacts	Cinch Part No. Less Contacts	Marked
Sockets	M24308/6-1 M24308/6-2 M24308/6-3 M24308/6-4 M24308/6-5	230-01-09-500 230-01-15-500 230-01-25-500 230-01-37-500 230-01-50-500	M24308/6-281 M24308/6-282 M24308/6-283 M24308/6-284 M24308/6-285	230-01-09-504 230-01-15-504 230-01-25-504 230-01-37-504 230-01-50-504	M24308/6-1 M24308/6-2 M24308/6-3 M24308/6-4 M24308/6-5
Plugs	M24308/8-1 M24308/8-2 M24308/8-3 M24308/8-4 M24308/8-5	231-01-09-500 231-01-15-500 231-01-25-500 231-01-37-500 231-01-50-500	M24308/8-259 M24308/8-260 M24308/8-261 M24308/8-262 M24308/8-263	231-01-09-504 231-01-15-504 231-01-25-504 231-01-37-504 231-01-50-504	M24308/8-1 M24308/8-2 M24308/8-3 M24308/8-4 M24308/8-5

Mark III Crimp Removable Contact Connectors (Non-Magnetic) With Float Mount

	Military Part No. With Contacts	Cinch Part No. Complete	Military Part No. Less Contacts	Cinch Part No. Less Contacts	Marked
Sockets	M24308/6-259 M24308/6-260 M24308/6-261 M24308/6-262 M24308/6-263	230-01-09-200 230-01-15-200 230-01-25-200 230-01-37-200 230-01-50-200	M24308/6-324 M24308/6-325 M24308/6-326 M24308/6-327 M24308/6-328	230-01-09-201 230-01-15-201 230-01-25-201 230-01-37-201 230-01-50-201	M24308/6-259 M24308/6-260 M24308/6-261 M24308/6-262 M24308/6-263
Plugs	M24308/8-302 M24308/8-303 M24308/8-304 M24308/8-305 M24308/8-306	231-01-09-200 231-01-15-200 231-01-25-200 231-01-37-200 231-01-50-200	M24308/8-324 M24308/8-325 M24308/8-326 M24308/8-327 M24308/8-328	231-01-09-201 231-01-15-201 231-01-25-201 231-01-37-201 231-01-50-201	M24308/8-302 M24308/8-303 M24308/8-304 M24308/8-305 M24308/8-306

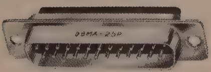
* These items available through Cinch distributors.

TRW® CINCH CONNECTORS

ROYAL D MARK III CONNECTORS (CONT'D)

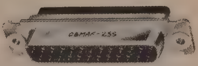
ORDERING INFORMATION

STANDARD SHELL



Shell Size	Layout	Order No.*	Factory No.	Order No.	Factory No.
E	9 Contact				
	Plug	DEMA-9P*	231-01-09-100	DEMAM-9P	231-01-09-103
	Socket	DEMA-9S*	230-01-09-100	DEMAM-9S	230-01-09-101
A	15 Contact				
	Plug	DAMA-15P*	231-01-15-100	DAMAM-15P	231-01-15-103
	Socket	DAMA-15S*	230-01-15-100	DAMAM-15S	230-01-15-101
B	25 Contact				
	Plug	DBMA-25P*	231-01-25-100	DBMAM-25P	231-01-25-108
	Socket	DBMA-25S*	230-01-25-100	DBMAM-25S	230-01-25-101
C	37 Contact				
	Plug	DCMA-37P*	231-01-37-100	DCMAM-37P	231-01-37-103
	Socket	DCMA-37S*	230-01-37-100	DCMAM-37S	230-01-37-101
D	50 Contact				
	Plug	DDMA-50P*	231-01-50-100	DDMAM-50P	231-01-50-103
	Socket	DDMA-50S*	230-01-50-100	DDMAM-50S	230-01-50-105

SHELL WITH FLOAT MOUNTS



Shell Size	Layout	Order No.*	Factory No.	Order No.	Factory No.
E	9 Contact				
	Plug	DEMAF-9P*	231-01-09-300	DEMAMF-9P	231-01-09-301**
	Socket	DEMAF-9S*	230-01-09-300	DEMAMF-9S	230-01-09-305
A	15 Contact				
	Plug	DAMAF-15P*	231-01-15-300	DAMAMF-15P	231-01-15-301**
	Socket	DAMAF-15S*	230-01-15-300	DAMAMF-15S	230-01-15-305
B	25 Contact				
	Plug	DBMAF-25P*	231-01-25-300	DBMAMF-25P	231-01-25-301**
	Socket	DBMAF-25S*	230-01-25-300	DBMAMF-25S	230-01-25-304
C	37 Contact				
	Plug	DCMAF-37P*	231-01-37-300	DCMAMF-37P	231-01-37-302
	Socket	DCMAF-37S*	230-01-37-300	DCMAMF-37S	230-01-37-305
D	50 Contact				
	Plug	DDMAF-50P*	231-01-50-300	DDMAMF-50P	231-01-50-302
	Socket	DDMAF-50S*	230-01-50-300	DDMAMF-50S	230-01-50-304

**A156 Parts.

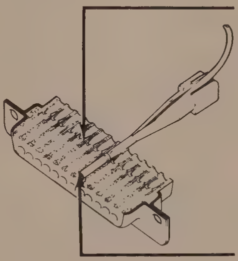
FOR DIMENSIONS SEE PAGE 10

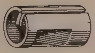
"LITTLE CAESAR" REAR RELEASE CONTACT ASSEMBLY

The "Little Caesar" rear release contact assembly permits contacts to be inserted by hand and to be released and extracted from the rear of the connector with a simple, expendable plastic tool.

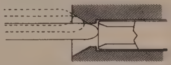
The contact is inserted from the rear of the connector thru a cylindrical clip in the insulator until the indented tines of the clip snap securely behind the contact shoulder. The contact is released as the plastic tool is inserted into the rear of the connector, expanding the tines beyond the contact shoulder and permitting contact extraction. The simplified contact design improves bend resistance through a single holding shoulder with no undercuts.

The "Little Caesar" contact assembly was selected by the National Aerospace Standards Committee for use in a major industry connector specification for vital programs demanding great operational reliability.

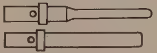




Contact retaining clip.

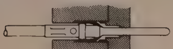


Hard dielectric, closed-entry socket inserts realigns bent or misaligned pin contacts.

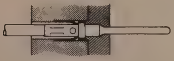


Simple stronger contact without undercuts for greater bend resistance.

CONTACT INSERTION

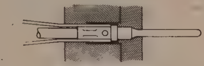


Contact partially inserted.



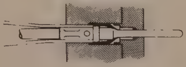
Tines snap behind contact shoulder when contact is fully inserted.

CONTACT EXTRACTION



Insert extraction tool to fully bottomed condition.

Tines expanded beyond contact shoulder.



Remove contact by pulling on wire.

Contact partially removed.

ORDERING INFORMATION FOR ADDITIONAL CONTACTS

All D*MA connectors are supplied with the proper number of crimp type contacts. Additional contacts may be ordered for replacement purposes as indicated.

Contact Size	Contact Part Numbers			
	Pin		Socket	
	Order No.	Factory No.	Order No.	Factory No.
20 Standard Finish	330-5291-000*	403-30-99-214	031-1007-000*	415-30-99-119
20-18 Standard Finish	330-5291-001	403-30-99-215	031-1007-001	415-30-99-118
20 Military Finish	M24308/11-1*	403-30-99-106	M24308/10-1*	415-30-99-130

* These items available through Cinch distributors.

TRW® CINCH CONNECTORS

INSTALLATION INSTRUCTIONS

RECOMMENDED PANEL MOUNTING CONFIGURATIONS

NOTES

1. A, B, and C minimum dimensions between panels represent a recommended limit to be approached in the design of the plug mounting means. The construction of this plug series permits normal operation when disengaged .030 above the minimum, indicated under any combination of mounting conditions.
2. On plugs with float hardware dimensions, apply as shown whether hardware is on socket (as illustrated) or pin side. Standard float mount plugs have sockets.
3. It is recommended that only one assembly, either pin or socket, be float mounted.
4. Float mount assemblies consist of .030 thick washers. Earlier versions (previous to September 1, 1961) contained .025 thick washers.
5. Standard pin assemblies contain .015 thick front shells on E and A sizes; .024 thick front shells on B, C and D sizes.
6. Standard plugs accommodate a number 4-screw. Float mounted plugs accommodate a #2 screw.

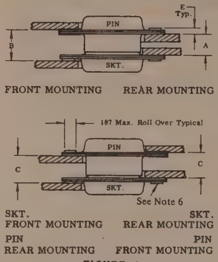

PIN
SKT.
E Typ.
A
B
C
FRONT MOUNTING
REAR MOUNTING
.187 Max. Roll Over Typical
See Note 6
SKT.
FRONT MOUNTING
SKT.
REAR MOUNTING
PIN
REAR MOUNTING
PIN
FRONT MOUNTING

FIGURE 1

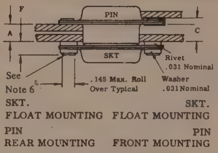

F
A
C
PIN
SKT.
Rivet
.031 Nominal
See Note 6
.145 Max. Roll Over Typical
Washer
.031 Nominal
SKT.
FLOAT MOUNTING
SKT.
FLOAT MOUNTING
PIN
REAR MOUNTING
PIN
FRONT MOUNTING

FIGURE 2

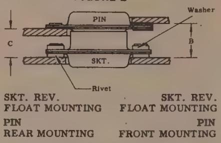
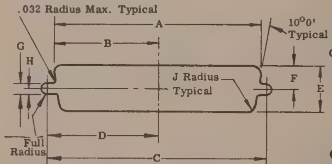

Washer
PIN
SKT.
C
B
Rivet
SKT. REV.
FLOAT MOUNTING
SKT. REV.
FLOAT MOUNTING
PIN
REAR MOUNTING
PIN
FRONT MOUNTING

FIGURE 3

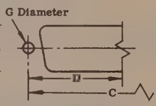
RECOMMENDED PANEL MOUNTING DIMENSIONS

Combination of Mated Plugs			Dimensions					
	Description		A	B	C	E		F
See Fig. No.	Pin	Socket	Min.	See Note 1 Min.	Min.	Pin ±.010	Skt. ±.010	±.010
1	.015 Front Shell	Std.	.250	.343	.298	.045	.045	—
1	.024 Front Shell	Std.	.238	.345	.298	.060	.045	—
2	.015 Front Shell	Float Mount	.221	—	.269	.045	—	.120
2	.024 Front Shell	Float Mount	.209	—	.269	.060	—	.120
2	.015 Front Shell Float Mount	Std.	.221	—	.268	—	.045	.120
2	.024 Front Shell Float Mount	Std.	.209	—	.256	—	.045	.130
3	.015 Front Shell	Rev. Float Mount	—	.360	.314	.045	—	.120
3	.024 Front Shell	Rev. Float Mount	—	.362	.302	.060	—	.120
3	.015 Front Shell Rev. Float Mount	Std.	—	.360	.314	—	.045	.120
3	.024 Front Shell Rev. Float Mount	Std.	—	.357	.302	—	.045	.130

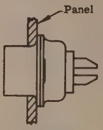
RECOMMENDED PANEL CUTOUT CONFIGURATIONS


.032 Radius Max. Typical
A
B
G
H
I
J Radius Typical
F
E
10°0' Typical
Full Radius
D
C

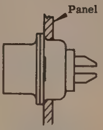
STANDARD CUTOUT


G Diameter
D
C

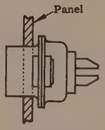
OPTIONAL CUTOUT
FOR
REAR MOUNTING



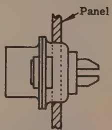
REAR
MOUNTING
STANDARD



FRONT
MOUNTING
STANDARD



REAR
MOUNTING
FLOAT



FRONT
MOUNTING
FLOAT

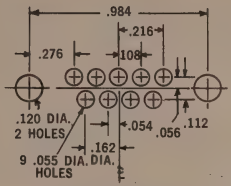
RECOMMENDED PANEL CUTOUT DIMENSIONS

Connectors	Mounting Method	A ±.005	B ±.005	C ±.005	D ±.005	E ±.005	F ±.005	G ±.002	H ±.002	J ±.005
DA, DAM	Front Mounting	1.202	.601	1.312	.656	.513	.257	.120	.060	.083
DAMA	Rear Mounting	1.134	.567	1.312	.656	.449	.225	.120	.060	.132
DAF, DAMF	Front Mounting	1.234	.617	1.312	.656	.545	.273	.088	.044	.083
DAMA	Rear Mounting	1.166	.583	1.312	.656	.481	.241	.088	.044	.132
DB, DBM	Front Mounting	1.743	.872	1.852	.926	.513	.257	.120	.060	.083
DBMA	Rear Mounting	1.674	.837	1.852	.926	.449	.225	.120	.060	.132
DBF, DBMF	Front Mounting	1.775	.888	1.852	.926	.545	.273	.088	.044	.083
DBMAF	Rear Mounting	1.706	.853	1.852	.926	.481	.241	.088	.044	.132
DC, DCM	Front Mounting	2.391	1.196	2.500	1.250	.513	.257	.120	.060	.083
DCMA	Rear Mounting	2.326	1.163	2.500	1.250	.449	.225	.120	.060	.132
DCF, DCMF	Front Mounting	2.423	1.212	2.500	1.250	.545	.273	.088	.044	.083
DCMAF	Rear Mounting	2.354	1.177	2.500	1.250	.481	.241	.088	.044	.132
DD, DDM	Front Mounting	2.297	1.149	2.406	1.203	.623	.312	.120	.060	.083
DDMA	Rear Mounting	2.218	1.109	2.406	1.203	.555	.278	.120	.060	.132
DDF, DDMF	Front Mounting	2.329	1.165	2.406	1.203	.655	.328	.088	.044	.083
DDMAF	Rear Mounting	2.250	1.125	2.406	1.203	.587	.294	.088	.044	.132
DE, DEM	Front Mounting	.874	.437	.984	.492	.513	.257	.120	.060	.083
DEMA	Rear Mounting	.806	.403	.984	.492	.449	.225	.120	.060	.132
DEF, DEMF	Front Mounting	.906	.453	.984	.492	.545	.273	.088	.044	.083
DEMAF	Rear Mounting	.838	.419	.984	.492	.481	.241	.088	.044	.132

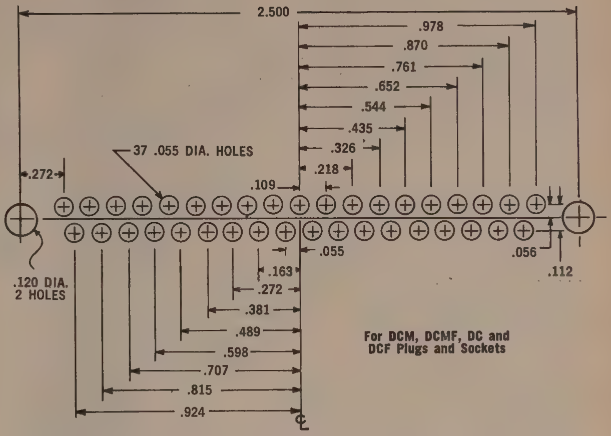
TRW® CINCH CONNECTORS

INSTALLATION INSTRUCTIONS (Cont'd)

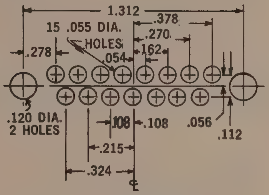
RECOMMENDED PRINTED CIRCUIT BOARD LAYOUTS


.984
.216
.276
.108
.120 DIA.
2 HOLES
.054
.056
.112
.162
9 .055 DIA. DIA.
HOLES
℄

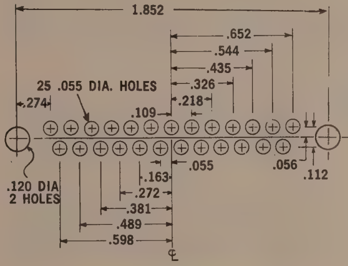
For DEM, DEMF, DE and DEF Plugs and Sockets


2.500
.978
.870
.761
.652
.544
.435
.326
37 .055 DIA. HOLES
.218
.272
.109
.055
.056
.112
.163
.272
.381
.489
.598
.707
.815
.924
.120 DIA.
2 HOLES
℄

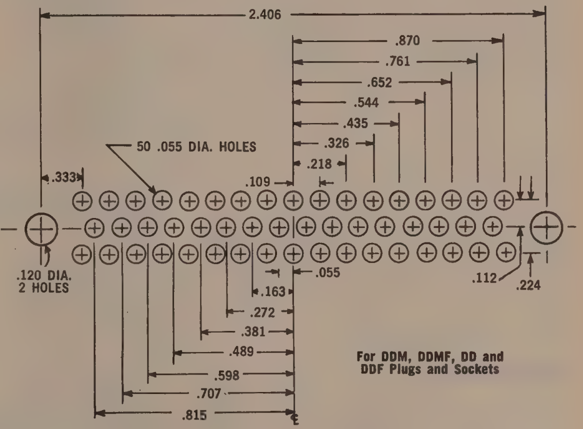
For DCM, DCMF, DC and DCF Plugs and Sockets


1.312
.378
15 .055 DIA.
.270
HOLES
.278
.054
.162
.120 DIA.
2 HOLES
.108
.108
.056
.112
.215
.324
℄

For DAM, DAMF, DA and DAF Plugs and Sockets

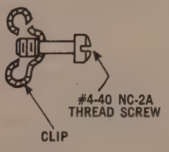

1.852
.652
.544
.435
25 .055 DIA. HOLES
.326
.274
.218
.109
.055
.056
.112
.163
.120 DIA
2 HOLES
.272
.381
.489
.598
℄

For DBM, DBMF, DB and DBF Plugs and Sockets

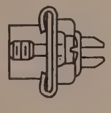

2.406
.870
.761
.652
.544
.435
50 .055 DIA. HOLES
.326
.218
.333
.109
.120 DIA.
2 HOLES
.055
.112
.224
.163
.272
.381
.489
.598
.707
.815
℄

For DDM, DDMF, DD and DDF Plugs and Sockets

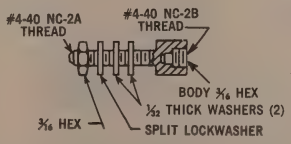
SCREW LOCK INSTALLATION INSTRUCTIONS


#4-40 NC-2A
THREAD SCREW
CLIP

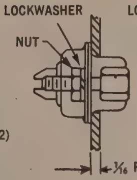
MALE



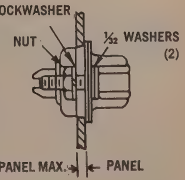
CABLE CONNECTOR


#4-40 NC-2A
THREAD
#4-40 NC-2B
THREAD
BODY 3/16 HEX
1/32 THICK WASHERS (2)
3/16 HEX
SPLIT LOCKWASHER

FEMALE


LOCKWASHER
NUT
1/16 PANEL MAX.

REAR MOUNTING

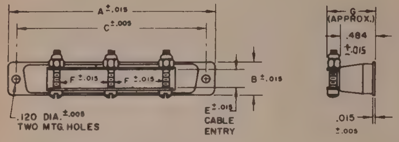

LOCKWASHER
NUT
1/32 WASHERS
(2)
PANEL

FRONT MOUNTING

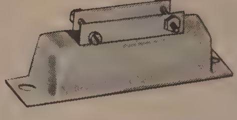
TRW® CINCH CONNECTORS

ACCESSORIES JUNCTION SHELLS

19678 STRAIGHT CLAMP


A ±.015
C ±.005
F ±.015
F ±.015
B ±.015
E ±.015 CABLE ENTRY
.120 DIA. ±.005 TWO MTG. HOLES
G (APPROX.)
.484 ±.015
.015 ±.005

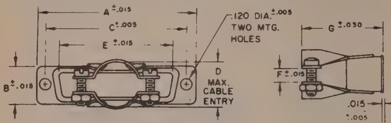
For use with D*, D*M and D*MA only



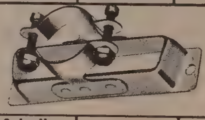
Material: Low carbon steel.
Finish: Cadmium plate, yellow chromate.
Corrosion Resistance: Passes 48 hour exposure to salt spray in accordance with MIL-STD-202D, Method 101C, Condition B.
All tolerances are ±.010 unless noted otherwise.

Order No.* by Shell Size	Factory No.	No. of Cable Locking Screws Required	A	B	C	E	F	G
DA-19678-1*	239-13-22-004	2	1.531	.500	1.312	.296	.312	.640
DB-19678-2*	239-13-22-003	2	2.078	.500	1.852	.296	.796	.640
DC-19678-3*	239-13-22-002	3	2.718	.500	2.500	.296	.687	.640
DD-19678-4*	239-13-22-001	3	2.625	.609	2.406	.390	.687	.703

ROUND CLAMP


A ±.015
C ±.005
E ±.015
.120 DIA. ±.005 TWO MTG. HOLES
D MAX. CABLE ENTRY
B ±.015
G ±.030
F ±.015
.015 ±.005

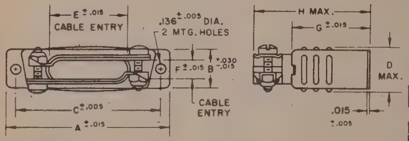
For use with D*, D*M and D*MA only

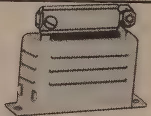


Material: Low carbon steel.
Finish: Cadmium plate, yellow chromate.
Corrosion Resistance: Passes 48 hour exposure to salt spray in accordance with MIL-STD-202D, Method 101C, Condition B.

Order No. by Shell Size	Factory No.	A	B	C	D	E	F	G
DA-20961	239-14-22-017	1.531	.500	1.312	.406	.984	.125	1.031
DB-20962	239-14-22-018	2.078	.500	1.852	.593	1.515	.187	1.062
DC-20963	239-14-22-019	2.718	.500	2.500	.718	2.171	.250	1.062
DD-20964	239-14-22-020	2.625	.609	2.406	.812	2.093	.312	1.062

DEEP, STRAIGHT CLAMP

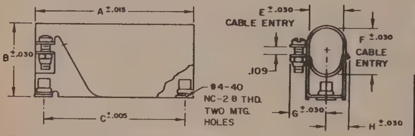

E ±.015 CABLE ENTRY
.136 ±.005 DIA. 2 MTG. HOLES
F ±.015
B +.030 -.015
CABLE ENTRY
C ±.005
A ±.015
H MAX.
G ±.015
D MAX.
.015 ±.005



Material: Low carbon steel.
Finish: Cadmium plate, yellow chromate.
Corrosion Resistance: Passes 48 hour exposure to salt spray in accordance with MIL-STD-202D, Method 101C, Condition B.

Order No.* by Shell Size	Factory No.	A	B	C	D	E	F	G	H
DE-24657*	239-14-23-030	1.203	.484	.984	.578	.375	.375	.750	1.219
DA-24658*	239-14-22-068	1.531	.484	1.312	.578	.713	.312	.750	1.250
DB-24659*	239-14-22-066	2.078	.484	1.852	.578	1.000	.312	1.000	1.531
DC-24660*	239-14-22-067	2.718	.484	2.500	.578	1.375	.312	1.000	1.531
DD-24661*	239-14-22-049	2.625	.593	2.406	.687	1.406	.406	1.125	1.656

19977 RIGHT ANGLE CLAMP

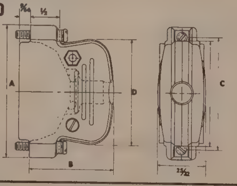

A ±.015
B ±.030
C ±.005
#4-40 NC-2 B THD. TWO MTG. HOLES
E ±.030 CABLE ENTRY
.109
F ±.030 CABLE ENTRY
G ±.030
H ±.030

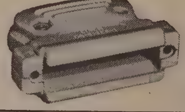
For use with D*, D*M and D*MA only

Material: Low carbon steel.
Finish: Cadmium plate, yellow chromate.
Corrosion Resistance: Passes 48 hour exposure to salt spray in accordance with MIL-STD-202D, Method 101C, Condition B.

Order No.* by Shell Size	Factory No.	A	B	C	E	F	G	H
DE-19977-5*	239-14-22-021	1.203	.718	.984	.437	.437	.468	.281
DA-19977-1*	239-14-22-013	1.531	.718	1.312	.437	.437	.468	.281
DB-19977-2*	239-14-22-014	2.078	.968	1.852	.437	.625	.468	.281
DC-19977-3*	239-14-22-015	2.718	1.187	2.500	.437	.812	.468	.281
DD-19977-4*	239-14-22-016	2.625	1.250	2.406	.562	.906	.531	.343

ALL MOLDED HOOD

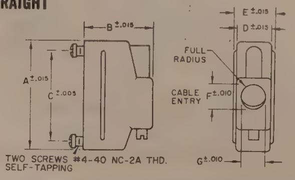

9/64
1/2
A
D
B
C
25/32



Material: Grey Melamine.
Finish: None.
Corrosion Resistance: Hardware passes 48 hour exposure to salt spray in accordance with MIL-STD-202D, Method 101C, Condition B.

Order No.* by Shell Size	Factory No.	A	B	C	D
DA-51225-1*	239-13-99-069	$1\frac{41}{64}$	$1\frac{19}{64}$	1.312	$1\frac{7}{32}$
DB-51226-1*	239-13-99-070	$2\frac{13}{64}$	$1\frac{13}{32}$	1.852	$1\frac{51}{64}$

PLASTIC STRAIGHT


B ±.015
A ±.015
C ±.005
TWO SCREWS #4-40 NC-2A THD. SELF-TAPPING
E ±.015
D ±.015
FULL RADIUS
CABLE ENTRY
F ±.010
G ±.010

Material: Nylon.
Finish: None.
Corrosion Resistance: Hardware passes 48 hour exposure to salt spray in accordance with MIL-STD-202D, Method 101C, Condition B.

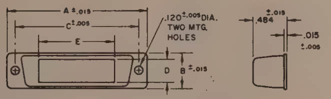
Order No.* by Shell Size	Factory No.	A	B	C	D	E	F	G
DE-51218-1*	239-13-99-101	1.218	1.000	.984	.500	.562	.281	.281
DA-51210-1*	239-13-99-124	1.546	1.000	1.312	.500	.562	.360	.360
DB-51212-1*	239-13-99-135	2.093	1.250	1.852	.500	.562	.493	.360

* These items available through Cinch distributors.

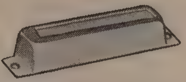
TRW® CINCH CONNECTORS

ACCESSORIES (Cont'd)

POTTING SHELLS

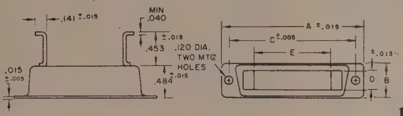

A ±.015
C ±.005
E
.120 ±.005 DIA.
TWO MTG. HOLES
D
B ±.015
±.015
.484
.015 ±.005

For use with D*, D*M and D*MA only

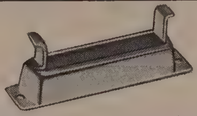


Material: Low carbon steel.
Finish: Cadmium plate, yellow chromate.
Corrosion Resistance: Passes 48 hour exposure to salt spray in accordance with MIL-STD-202D, Method 101C, Condition B.
All tolerances are ±.010 unless noted otherwise.

Order No. by Shell Size	Factory No.	A	B	C	D	E
DA-19678-10	239-14-22-009	1.531	.500	1.312	.300	.588
DB-19678-11	239-14-22-010	2.078	.500	1.852	.300	1.125
DC-19678-12	239-14-22-011	2.718	.500	2.500	.300	1.750
DD-19678-13	239-14-22-012	2.625	.609	2.406	.390	1.750


.141 ±.015
MIN .040
±.015
.453
.120 DIA. TWO MTG. HOLES
.484 ±.015
.015 ±.005
A ±.015
C ±.005
E
±.015
D
B

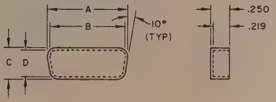
For use with D*, D*M and D*MA only



Material: Low carbon steel.
Finish: Cadmium plate, yellow chromate.
Corrosion Resistance: Passes 48 hour exposure to salt spray in accordance with MIL-STD-202D, Method 101C, Condition B.

Order No. by Shell Size	Factory No.	A	B	C	D	E
DA-19678-14	239-19-22-074	1.531	.500	1.312	.300	.588
DB-19678-15	239-19-22-075	2.078	.500	1.852	.300	1.125
DC-19678-16	239-19-22-076	2.718	.500	2.500	.300	1.750
DD-19678-17	239-19-22-077	2.625	.009	2.406	.390	1.750

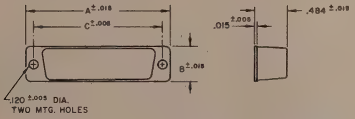
DUST CAPS


A
B
10° (TYP)
C
D
.250
.219

Material: Polypropylene (clear).
Finish: None.

Order No. by Shell Size	For Use with	Factory No.	A	B	C	D
DE-59-20	DE-9S	474-11-92-303	.694	.627	.362	.295
DE-60-20	DE-9P	474-11-92-304	.749	.682	.412	.345
DA-59-20	DA-15S	474-11-92-305	1.022	.955	.362	.295
DA-60-20	DA-15P	474-11-92-306	1.077	1.010	.412	.345
DB-59-20	DB-25S	474-11-92-301	1.562	1.495	.362	.295
DB-60-20	DB-25P	474-11-92-302	1.635	1.568	.430	.363
DC-59-20	DC-37S	474-11-92-307	2.210	2.143	.362	.295
DC-60-20	DC-37P	474-11-92-308	2.283	2.216	.430	.363
DD-59-20	DD-50S	474-11-92-309	2.116	2.049	.474	.407
DD-60-20	DD-50P	474-11-92-310	2.179	2.112	.536	.469

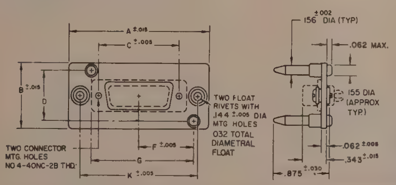
SWITCHING SHELLS


A ±.015
C ±.005
B ±.015
.120 ±.005 DIA.
TWO MTG. HOLES
.015 ±.005
.484 ±.015

Material: Low carbon steel.
Finish: Cadmium plate, yellow chromate.
Corrosion Resistance: Passes 48 hour exposure to salt spray in accordance with MIL-STD-202D, Method 101C, Condition B.

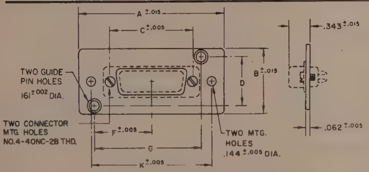
Order No. by Shell Size	Factory No.	A	B	C
DA-19678-6	239-14-22-005	1.531	.500	1.312
DB-19678-7	239-14-22-006	2.078	.500	1.852
DC-19678-8	239-14-22-007	2.718	.500	2.500
DD-19678-9	239-14-22-008	2.625	.609	2.406

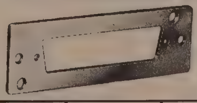
GUIDE PIN PLATES


A ±.015
C ±.005
B ±.015
D
F ±.005
G
K ±.005
TWO CONNECTOR MTG. HOLES NO 4-40NC-2B THD.
TWO FLOAT RIVETS WITH .144 ±.005 DIA MTG HOLES .032 TOTAL DIAMETRAL FLOAT
±.002 .156 DIA (TYP)
.062 MAX.
.155 DIA (APPROX TYP.)
.062 ±.005
.343 ±.015
.875 ±.030

Material: Plates and float hardware are cold rolled steel; guidepins are stainless steel.
Finish: Cadmium plate, yellow chromate.
Corrosion Resistance: Passes 48 hour exposure to salt spray in accordance with MIL-STD-202A, Method 101A, Condition B.

Order No. by Shell Size	Factory No.	A	B	C	D	F	G	K
DA-22213	442-36-22-703	2.281	1.000	1.312	.750	.898	1.663	1.906
DB-22255	442-36-22-701	2.820	1.000	1.852	.750	1.168	2.203	2.446
DC-22070	442-36-22-702	3.468	1.000	2.500	.750	1.492	2.851	3.094
DD-21962	442-36-22-706	3.375	1.125	2.406	.874	1.437	2.749	3.000


A ±.015
C ±.005
.343 ±.015
TWO GUIDE PIN HOLES .161 ±.002 DIA.
B ±.015
D
TWO CONNECTOR MTG. HOLES NO.4-40NC-2B THD.
F ±.005
G
K ±.005
TWO MTG. HOLES .144 ±.005 DIA.
.062 ±.005



Material: Cold rolled steel.
Finish: Cadmium plate, yellow chromate.
Corrosion Resistance: Passes 48 hour exposure to salt spray in accordance with MIL-STD-202A, Method 101A, Condition B.

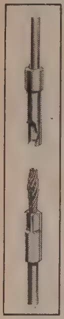
DA-22214	442-36-22-503	2.281	1.000	1.312	.750	.898	1.663	1.906
DB-22254	442-36-22-502	2.820	1.000	1.852	.750	1.168	2.203	2.446
DC-22071	442-36-22-501	3.468	1.000	2.500	.750	1.492	2.851	3.094
DD-21961	442-36-22-500	3.375	1.125	2.406	.874	1.437	2.749	3.000

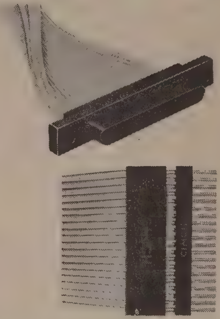
FOR ACCESSORIES OTHER THAN THOSE SHOWN, CONSULT FACTORY

TRW/CINCH CONNECTORS, AN ELECTRONIC COMPONENTS DIV. OF TRW INC. / 1501 MORSE AVE. / ELK GROVE VILLAGE, ILL. 60007

TRW® CINCH CONNECTORS

DURA-CON*SERIES MICROMINIATURE CONNECTORS ON .050" CENTERS



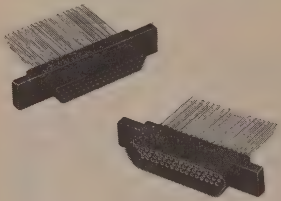


- High contact density with up to 266 contacts per square inch.
- Lightweight.
- Rugged, reliable contacts.
- Shock and vibration resistant.

The Cinch Dura-Con Series of Microminiature Strip and Rectangular connectors are ideally suited for space and weight reduction in miniaturized airborne electronics and for shorter signal paths in electronic data processing equipment. Both Cinch Dura-Con Series have rugged, high-performance contacts capable of providing shock and vibration proof continuity from dry circuit to three amperes current.

This is accomplished by making the pin the spring member. The Cinch Dura-Con is made from a precision miniature spring cable with a welded tip. The expanded cable provides seven spring members peripherally around the pin so that no matter what radial forces are applied, contact is maintained with the mating socket wall. Furthermore, this flexible spring pin can be bent many times without evidencing any metal fatigue. By protecting this pin in a recessed tolerance cavity, reliable mating is assured. Hence, despite its small size, the Cinch Dura-Con provides superior performance.

DURA-CON D RECTANGULAR MICROMINIATURE CONNECTORS



DURA-CON D RECTANGULAR CONNECTORS

This series of microminiature rectangular connectors is available in contact layouts with 9, 15, 21, 25, 37, and 51 positions. In addition to the ½" long #24 AWG solid copper leads and 18" long #26 AWG stranded Type E insulated wire terminations, this connector series can be supplied with custom terminations.

Contacts: 24 gage copper alloy, gold plated.
Insulator: Glass-filled polyester SE-0.

PERFORMANCE DATA

ELECTRICAL

Current Rating: 3 amperes.

Contact Resistance: Nominal 4 milliohms, maximum 8 milliohms

Dielectric Withstanding Voltage:
Sea Level: 900V RMS 60 Hz.
70,000 Ft.: 300V RMS 60 Hz.

Insulation Resistance: 5,000 megohms minimum.

MECHANICAL

Contact Engaging Force: 6 oz. per contact maximum.

Contact Separation Force: ½ oz. per contact minimum.

ENVIRONMENTAL

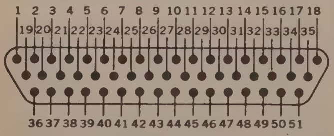
Temperature: −65°F to 300°F.

Vibration and Shock: No discontinuity detected (equipment sensitivity 6 nanoseconds) during 10 to 2,000 cps at .06" double amplitude or 50 g. 20 shocks 500 g.

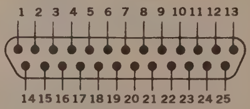
Durability: Contact resistance still within specification after 500 cycles mating and unmating.

Salt Spray: No damage — Contact resistance still within specification after mated sample exposed 48 hours per MIL-STD-202B, Method 101A, Condition B.

CONTACT ARRANGEMENTS (FACE VIEW OF PIN INSERT)


1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18
19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35
36 37 38 39 40 41 42 43 44 45 46 47 48 49 50 51

51 CONTACTS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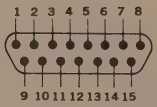
25 CONTACTS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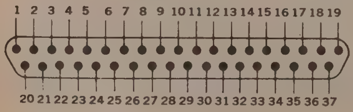
15 CONTACTS

37 CONTACTS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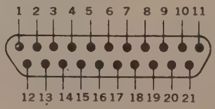
21 CONTACTS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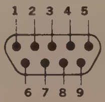
9 CONTACTS



*Trade Name TRW Inc.

TRW/CINCH CONNECTORS, AN ELECTRONIC COMPONENTS DIV. OF TRW INC. / 1501 MORSE AVE. / ELK GROVE VILLAGE, ILL. 60007

TRW® CINCH CONNECTORS

DURA-CON D RECTANGULAR MICROMINIATURE CONNECTORS

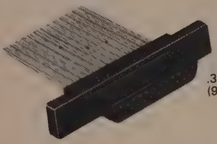
Termination: #24 AWG Solid Copper Leads, ½″ long

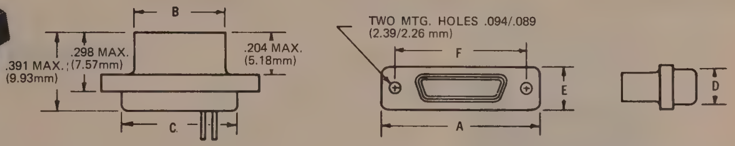
No. of Contacts	P — Pin S — Socket	Distributor Part No.	Factory Part No.
9	P	DCDA-9P4C4-00.5	280-51-09-001
	S	DCDA-9S4C4-00.5	280-52-09-001
15	P	DCDA-15P4C4-00.5	280-51-15-001
	S	DCDA-15S4C4-00.5	280-52-15-001
21	P	DCDA-21P4C4-00.5	280-51-21-001
	S	DCDA-21S4CA-00.5	280-52-21-001
25	P	DCDA-25P4C4-00.5	280-51-25-001
	S	DCDA-25S4C4-00.5	280-52-25-001
37	P	DCDA-37P4C4-00.5	280-51-37-001
	S	DCDA-37S4C4-00.5	280-52-37-001
51	P	DCDA-51P4C4-00.5	280-51-51-001
	S	DCDA-51S4C4-00.5	280-52-51-001

Termination: 18″ #26 AWG Stranded, Type E, Yellow Insulation

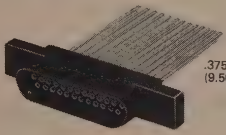
No. of Contacts	P — Pin S — Socket	Distributor Part No.	Factory Part No.
9	P	DCDA-9P6E2-18.0	280-53-09-001
	S	DCDA-9S6E2-18.0	280-54-09-001
15	P	DCDA-15P6E2-18.0	280-53-15-001
	S	DCDA-15S6E2-18.0	280-54-15-001
21	P	DCDA-21P6E2-18.0	280-53-21-001
	S	DCDA-21S6E2-18.0	280-54-21-001
25	P	DCDA-25P6E2-18.0	280-53-25-001
	S	DCDA-25S6E2-18.0	280-54-25-001
37	P	DCDA-37P6E2-18.0	280-53-37-001
	S	DCDA-37S6E2-18.0	280-54-37-001
51	P	DCDA-51P6E2-18.0	280-53-51-001
	S	DCDA-51S6E2-18.0	280-54-51-001

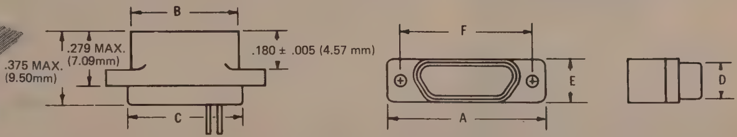
DIMENSIONS





PIN CONTACTS



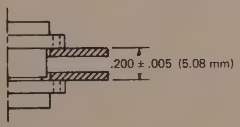


SOCKET CONTACTS

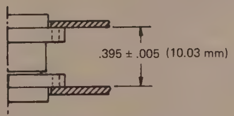
Part No.	A Max.	B Max.	C Max.	D Max.	E Max.	F Max.
DCDA-9P	.785(19.93)	.2905(7.38)	.403(10.23)	.170(4.32)	.215(5.46)	.565(14.35)
DCDA-9S	.785(19.93)	.3760(9.55)	.403(10.23)	.170(4.32)	.215(5.46)	.565(14.35)
DCDA-15P	.935(23.74)	.4405(11.21)	.553(14.04)	.170(4.32)	.215(5.46)	.715(18.16)
DCDA-15S	.935(23.74)	.5260(13.36)	.553(14.04)	.170(4.32)	.215(5.46)	.715(18.16)
DCDA-21P	1.085(27.38)	.5905(14.91)	.703(17.73)	.170(4.32)	.205(5.26)	.865(21.97)
DCDA-21S	1.085(27.38)	.5905(15.14)	.703(17.73)	.170(4.32)	.205(5.26)	.865(21.97)
DCDA-25P	1.185(30.09)	.6905(17.54)	.803(20.39)	.170(4.32)	.215(5.46)	.965(24.51)
DCDA-25S	1.185(30.09)	.7760(19.71)	.803(20.39)	.170(4.32)	.215(5.46)	.965(24.51)
DCDA-37P	1.485(37.71)	.9905(25.16)	1.103(28.01)	.170(4.32)	.215(5.46)	1.270(32.25)
DCDA-37S	1.485(37.71)	1.0760(27.33)	1.103(28.01)	.170(4.32)	.215(5.46)	1.270(32.25)
DCDA-51P	1.435(36.44)	.9405(23.89)	1.053(26.74)	.213(5.41)	.258(6.55)	1.215(30.86)
DCDA-51S	1.435(36.44)	1.0260(26.06)	1.053(26.74)	.213(5.41)	.258(6.55)	1.215(30.86)

NOTE: P — Pin, S — Socket. (Bracketed figures millimeters)

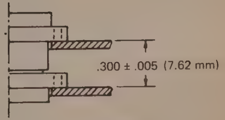
PANEL MOUNTING DIMENSIONS



Pin and socket rear mounted



Pin and socket front mounted



Pin front mounted
Socket rear mounted

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TRW® CINCH CONNECTORS

DURA-CON D RECTANGULAR MICROMINIATURE CONNECTORS (Cont'd)

PANEL CUTOUT DIMENSIONS

FIGURE 1 — FRONT MOUNTING

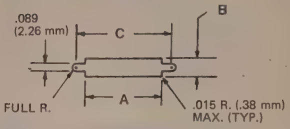
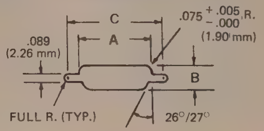


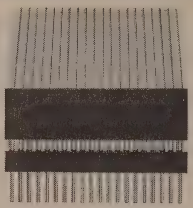
FIGURE 2 — REAR MOUNTING



Size	Fig.	A +.004(.102) −.000(.000)	B +.004(.102) −.000(.000)	C +.005(.127) −.000(.000)
DCDA-9	1	.408(10.36)	.172(4.37)	.570(14.49)
DCDA-9	2	.381(9.68)	.216(5.49)	.570(14.49)
DCDA-15	1	.558(14.17)	.172(4.37)	.720(18.29)
DCDA-15	2	.531(13.49)	.216(5.49)	.720(18.29)
DCDA-21	1	.706(17.93)	.172(4.37)	.870(22.10)
DCDA-21	2	.673(17.09)	.216(5.49)	.870(22.10)
DCDA-25	1	.808(20.52)	.172(4.37)	.970(24.64)
DCDA-25	2	.731(18.56)	.216(5.49)	.970(24.64)
DCDA-37	1	1.108(28.14)	.172(4.37)	1.270(32.26)
DCDA-37	2	1.081(27.46)	.216(5.49)	1.270(32.26)
DCDA-51	1	1.058(26.87)	.215(5.46)	1.220(30.99)
DCDA-51	2	1.031(26.19)	.259(6.58)	1.220(30.99)

(Bracketed figures millimeters)

MICROMINIATURE STRIP CONNECTORS



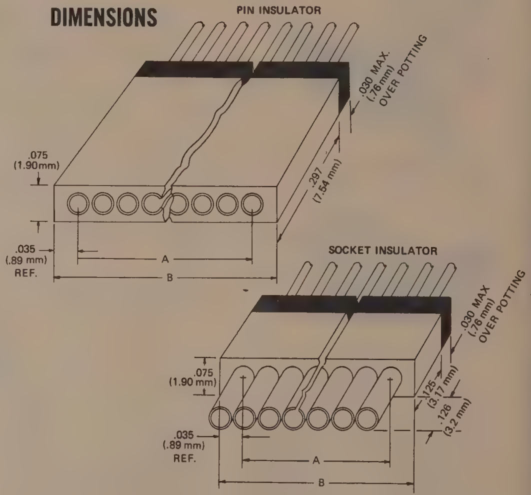
DURA-CON STRIP CONNECTORS

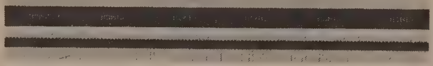
For maximum flexibility of application, Cinch Dura-Con contacts are available in strips on .050" centers. By cutting, adding, or stacking, a variety of contact arrangements can be achieved. These versatile connector strips are available with up to 120 contact positions on special order. Moreover, guide pins that engage prior to the contact in the mating cycle, can be provided to assist in mating and polarization.

Contacts: 24 gage copper alloy, gold plated.

Insulator: Glass-filled polyester SE-0.

DIMENSIONS





Part No.	A	B Max.
CSA1-5P/5S	.200(5.080)	.270(6.858)
CSA1-10P/10S	.450(11.420)	.520(13.198)
CSA1-15P/15S	.700(17.780)	.770(19.558)
CSA1-20P/20S	.950(24.130)	1.020(25.908)

(Bracketed figures millimeters)

DURA-CON STRIP CONNECTORS

Termination: #24 AWG Solid Copper Leads, ½" Long

No. of Contacts	P — Pin S — Socket	Distributor Part No.	Factory Part No.
5	P	CSA1-5P4C4-00.5	280-10-05-001
	S	CSA1-5S4C4-00.5	280-20-05-001
10	P	CSA1-10P4C4-00.5	280-10-10-001
	S	CSA1-10S4C4-00.5	280-20-10-001
15	P	CSA1-15P4C4-00.5	280-10-15-001
	S	CSA1-15S4C4-00.5	280-20-15-001
20	P	CSA1-20P4C4-00.5	280-10-20-001
	S	CSA1-20S4C4-00.5	280-20-20-001

NOTE: P — Pin, S — Socket.

Termination: 18" #26 AWG Stranded, Type E, Yellow Insulation

No. of Contacts	P — Pin S — Socket	Distributor Part No.	Factory Part No.
5	P	CSA1-5P6E2-18.0	280-30-05-001
	S	CSA1-5S6E2-18.0	280-40-05-001
10	P	CSA1-10P6E2-18.0	280-30-10-001
	S	CSA1-10S6E2-18.0	280-40-10-001
15	P	CSA1-15P6E2-18.0	280-30-15-001
	S	CSA1-15S6E2-18.0	280-40-15-001
20	P	CSA1-20P6E2-18.0	280-30-20-001
	S	CSA1-20S6E2-18.0	280-40-20-001

TRW® CINCH CONNECTORS

GENERAL FEATURES AND DESCRIPTION

CINCH SOLDERLESS RIBBON CONNECTORS

Now the popular Cinch Ribbon Connector is available with solderless terminations. This new Series of connectors is compatible in every way with 150,000,000 Cinch Ribbon Connectors now in use throughout the communications industry. The new Solderless Cinch Ribbon Connector Series can be assembled with automatic, semi-automatic or field assembly tools. They provide gas tight connections for both 24 and 26 gauge solid wire with speeds that far exceed conventional soldering techniques.

The newly designed Solderless Cinch Ribbon incorporates a built-in strain relief to prevent any inadvertant removal of wires. All existing Cinch Ribbon hardware is available on the new connectors.

BLUE RIBBON* CONNECTORS

Cinch's Blue Ribbon Connectors are ideal for a wide variety of applications. The smooth, easy insertion and extraction action and the self-wiping, self-cleaning features of both mating contact members give Blue Ribbon Connectors added reliability. The ribbon contact principal itself eliminates the possibility of bent contacts. Rack and panel plugs and receptacles are available with barrier-type polarization in four sizes: 8, 16, 24, and 32 contacts. Special 16-contact rack and panel plug and receptacle are also available with pin-type polarization.

CINCH RIBBON CONNECTORS

The extremely small Cinch Ribbon Connectors were designed to allow utilization of the unique "ribbon" contact features in miniaturization programs, particularly in airborne electronics and computer projects, for increased reliability. Available in as many as 50 contacts, it is possible to route a great many circuits through one or more small connectors at a great savings of space and weight. Mounting types include rack and panel, cable-to-chassis and cable-to-cable, each in 14, 24, 36, and 50-contact sizes. In addition, a special 50-contact "high barrier" plug and receptacle is also available for rack and panel or cable-to-cable mounting.

*Registered Trademark of Bunker-Ramo Corporation.

BLUE RIBBON CONNECTOR PERFORMANCE DATA

ELECTRICAL

Voltage Ratings:	
a) At Sea Level	800 Volts D.C.
b) At 70,000 Feet	300 Volts D.C.
Contact Current Rating:	5 Amperes
Contact Resistance:	.003 Ohms Max.
Insulation Resistance (As Received):	100,000 Megohms Min.

CINCH RIBBON & SOLDERLESS RIBBON CONNECTOR PERFORMANCE DATA

ELECTRICAL

Voltage Ratings:	Volts
a) At Sea Level	500 A.C. RMS 700 D.C.
b) At 70,000 Feet	125 A.C. RMS 200 D.C.
Contact Current Rating:	5 Amperes
Contact Resistance:	.003 Ohms Average
Insulation Resistance (As Received):	5000 Megohms Min.

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SOLDERLESS RIBBON CONNECTORS

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BLUE RIBBON CONNECTORS

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CINCH RIBBON CONNECTORS

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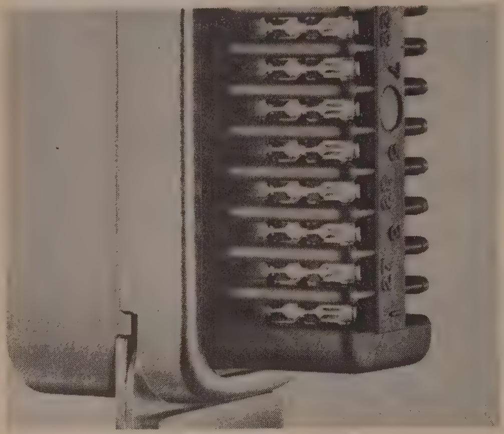
For Cable-to-Cable Mounting — Special "High Barrier" 8
Polyethylene Dust Covers 8
Performance Data .... Above

TRW® CINCH CONNECTORS

CINCH SOLDERLESS RIBBON CONNECTORS

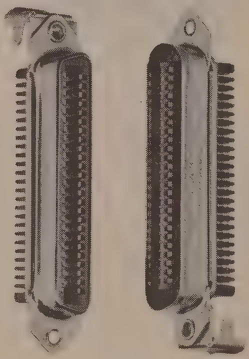


The Solderless Cinch Ribbon Connector has all the quality features of the solder type Cinch Ribbon Connectors, are intermateable and utilize all the same hardware.

The solderless Cinch Ribbon Series can be terminated with automatic, semi-automatic or field hand tools. Each contact provides four gas-tight connections for both 24 and 26 gauge solid wire. Termination speeds far exceed soldering techniques.

This newly designed connector incorporates a built-in strain relief in each contact to prevent any inadvertant removal of the wires; however, contacts can be reused without physical damage or electrical degradation.

CABLE-TO-CABLE PLUG & RECEPTACLE



Miniaturized rack and panel connectors utilizing "ribbon" contact feature. Smooth, easy insertion/extraction action plus the double-sided, self-cleaning, flexing action of both mating contact members provide added reliability. Shell-type polarization and float-mounted receptacle assure proper alignment. Insulator material is diallyl phthalate, Type MDG per MIL-M-14F. Plug and receptacle contacts are of cadmium bronze, ASTM-B-105, with a finish of .00002 gold per MIL-G-45204 Type II over copper flash. Shells are brass, ASTM-B-36 Alloy 6, with a finish of .0002 to .0004 zinc. No stripping of wires required for perfect connections, when terminated with Cinch Auto-Clinch, Clinch or Mini-Clinch tools.

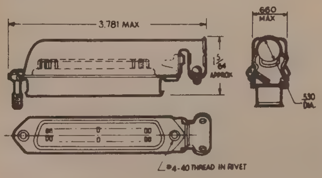
CONNECTORS WITH DEEP HOOD

No. of Contacts	PLUGS TRW/Cinch Part No.	RECEPTACLE TRW/Cinch Part No.
50	222-33-50-091	222-43-50-069

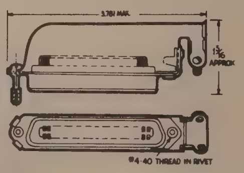
CONNECTORS WITH SHALLOW HOODS

No. of Contacts	PLUGS TRW/Cinch Part No.	RECEPTACLE TRW/Cinch Part No.
50	222-33-50-092	222-43-50-070

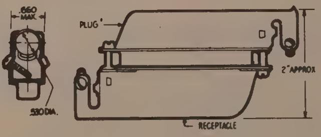
DIMENSIONAL DATA



PLUG



RECEPTACLE



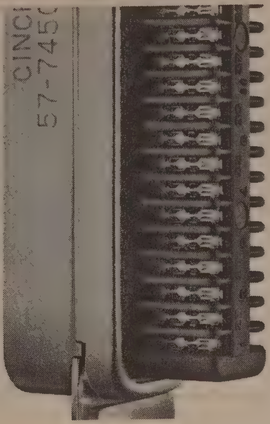
MATING PLUG & RECEPTACLE

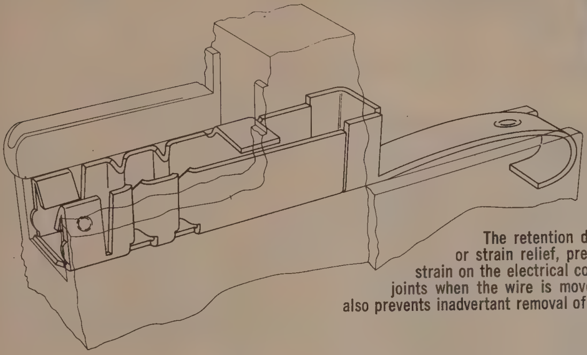
TRW® CINCH CONNECTORS

CINCH SOLDERLESS RIBBON CONNECTORS

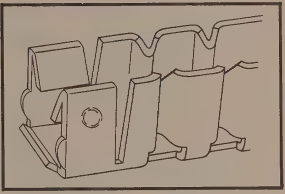
FEATURES

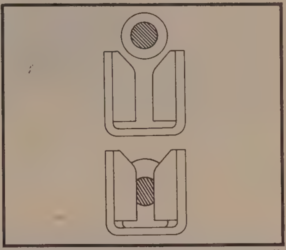
- Identical mating to standard solder type connector.
- Same contact material.
- Same mating and mounting dimensions.
- Will handle 24 and 26 gauge solid wire.
- Built-in wire restraint.
- 4 points of contact provide redundancy.
- Exactly same mounting and auxiliary hardware.
- Rapid field wiring.
- Totally interchangeable with existing Cinch Ribbon Connectors and hardware.



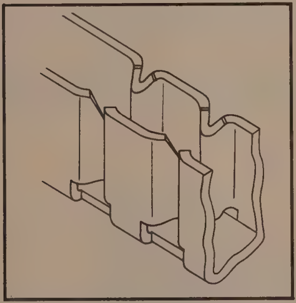


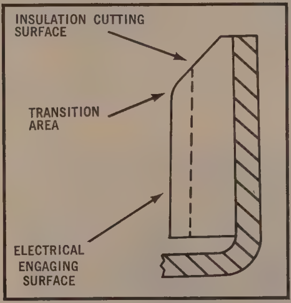
The retention device or strain relief, prevents strain on the electrical contact joints when the wire is moved. It also prevents inadvertant removal of wire.



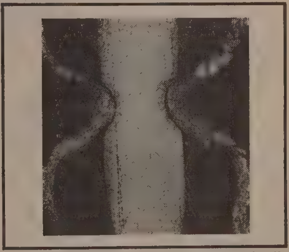


Insulation, both standard PVC and irradiated PVC is pierced sufficiently to facilitate electrical connection.





The shape of the wire terminating end of the contact is arranged with four indents. These indents are so constructed and shaped as to peel the insulation off the wire at these points. The step-by-step progression is as follows. As the wire enters, the insulation is peeled off by the ramp shape of the contact indents. This leads into a coined, relatively sharp area. As the wire, after the insulation is removed, progresses into the remaining contact pocket, the transition area permits the conductor to be deformed and held between each set of the two opposing indented sections. The result is four gas tight connections on each conductor.



Photomicrographic of 24 gauge longitudinal cross section of prime electrical contact area.

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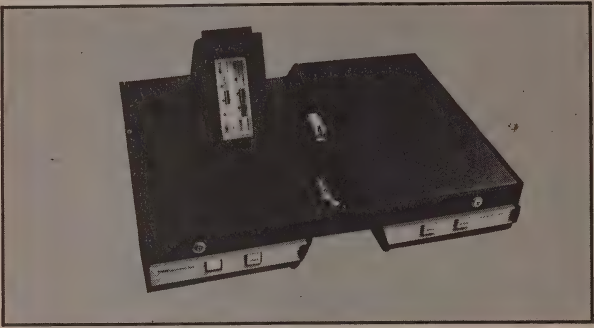
TRW® CINCH CONNECTORS

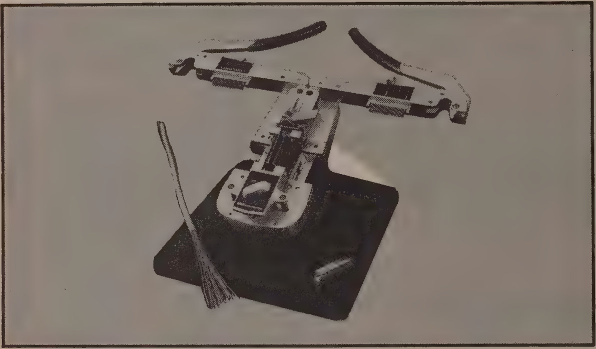
SYSTEMS FOR TERMINATING THE CINCH SOLDERLESS RIBBON CONNECTOR



AUTO-CLINCH

PART NO. 599-11-11-310

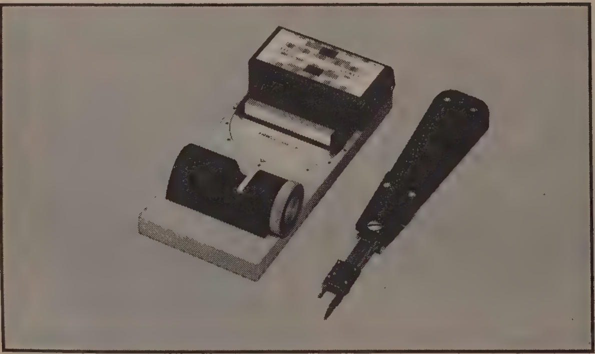
Auto-Clinch for rapid factory wiring. Completely terminates a 50-contact connector in less than 2 minutes. Has provision for omission of wires, inspection check during wiring, correction of errors and changing of wiring codes.



CLINCH

PART NO. 599-11-11-312

Clinch terminates a 50-contact connector in less than 4 minutes. Designed for field assembly and low production applications, it is readily portable and requires no set-up time.



MINI-CLINCH

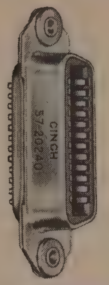
PART NO. 599-11-11-309

Mini-Clinch is a lightweight belt-mounted unit that enables a serviceman in the field to terminate a 50-contact connector in less than 5 minutes. It can be used with 90° or 180° connectors. Wires are automatically cut as they are inserted into the terminals.

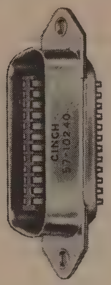
TRW® CINCH CONNECTORS

CINCH RIBBON CONNECTORS

RACK AND PANEL PLUGS & RECEPTACLES


CINCH
57-20240

57-20240 RECEPTACLE


CINCH
57-10240

57-10240 PLUG

Miniaturized rack and panel connectors utilizing "ribbon" contact feature. Smooth, easy insertion/extraction action plus the double-sided, self-cleaning, flexing action of both mating contact members provide added reliability. Shell-type polarization and float-mounted receptacle assure proper alignment. Insulator material is diallyl phthalate, type MDG per MIL-M-14F. Plug and receptacle contacts are of cadmium bronze, ASTM-B-105, with a finish of .00002 gold per MIL-G-45204 type II over copper flash. Shells are brass, ASTM-B-36 Alloy 6, with a finish of .0002 to .0004 zinc. Pretinning wires before soldering is recommended. 14, 24, 36 and 50-contact sizes are available.

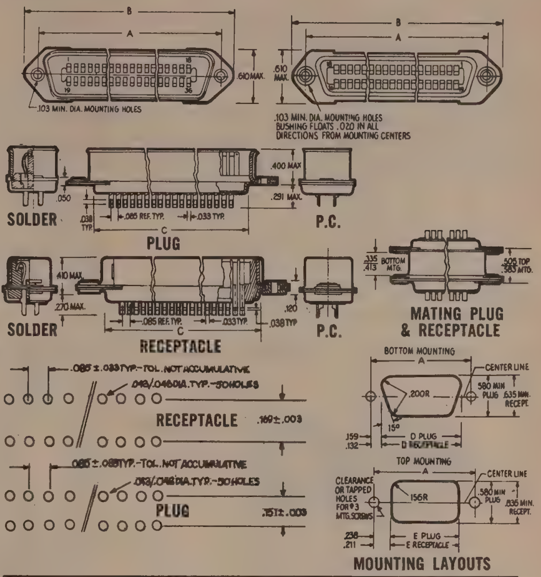
PART NUMBER ORDERING INFORMATION

No. of Contacts	SOLDER (CD) Plug Part No.*	SOLDER (CD) Receptacle Part No.*	P.C. (CD) Plug Part No.*	P.C. (CD) Receptacle Part No.*
14	57-10140	57-20140	57-10140-4	57-20140-8
24	57-10240	57-20240	57-10240-3	57-20240-8
36	57-10360	57-20360	57-10360-13	57-20360-9
50	57-10500	57-20500	57-10500-27	57-20500-31

*Part numbers shown in Listing have finish of **clear** chromate. If finish of **yellow** chromate is desired, add "-1" to appropriate part number(s) in listing to indicate same. (Examples: 57-10140-1 or 57-20140-1.)

(CD) Indicates items normally available through Cinch distributors.

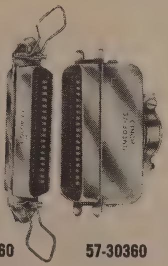
DIMENSIONAL DATA


B
A
.610 MAX.
.103 MIN. DIA. MOUNTING HOLES
.610 MAX.
.103 MIN. DIA. MOUNTING HOLES BUSHING FLOATS .020 IN ALL DIRECTIONS FROM MOUNTING CENTERS
.400 MAX
.291 MAX.
.050
.038 TYP.
.085 REF. TYP.
.033 TYP.
C
SOLDER
PLUG
P.C.
.410 MAX.
.270 MAX.
.120
.038 TYP
SOLDER
RECEPTACLE
P.C.
.335 .413 BOTTOM MTG.
.505 TOP .583 MTG.
MATING PLUG & RECEPTACLE
.085 ± .033 TYP.-TOL. NOT ACCUMULATIVE
.042/.046 DIA. TYP.-50 HOLES
RECEPTACLE
.169 ± .003
.085 ± .033 TYP.-TOL. NOT ACCUMULATIVE
.042/.046 DIA. TYP.-50 HOLES
PLUG
.151 ± .003
BOTTOM MOUNTING
CENTER LINE
.200R
.580 MIN PLUG
.635 MIN. RECEPT.
15°
.159
.132
D PLUG
D RECEPTACLE
TOP MOUNTING
CLEARANCE OR TAPPED HOLES FOR #3 MTG. SCREWS
.156R
.580 MIN PLUG
.635 MIN. RECEPT.
.238
.211
E PLUG
E RECEPTACLE
MOUNTING LAYOUTS

P.C.	SOLDER	DIMENSIONS‡ TYPE	A	B	C	D Min.	E Min.
57-10140-4	57-10140	Plug	1.417	1.750	.910	1.098	.940
57-20140-8	57-20140	Receptacle	1.417	1.750	.910	1.153	.995
57-10240-3	57-10240	Plug	1.842	2.175	1.335	1.523	1.365
57-20240-8	57-20240	Receptacle	1.842	2.175	1.335	1.578	1.420
57-10360-13	57-10360	Plug	2.352	2.685	1.845	2.033	1.875
57-20360-9	57-20360	Receptacle	2.352	2.685	1.845	2.088	1.930
57-10500-27	57-10500	Plug	2.947	3.270	2.440	2.628	2.472
57-20500-31	57-20500	Receptacle	2.947	3.270	2.440	2.683	2.525

‡NOTE: All dimensions are reference.

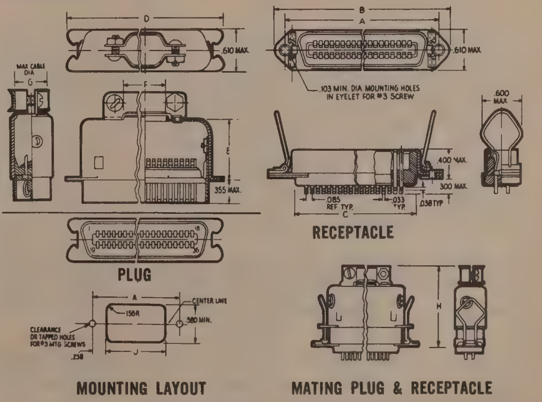
CABLE TO CHASSIS PLUGS & RECEPTACLES



57-40360 57-30360

Miniaturized connectors with same basic features as those shown on above except plug is equipped with hood and cable clamp while receptacle has sturdy spring-type latches which are guided and held by cutouts in plug hood flanges. Insulator body is molded of diallyl phthalate, type MDG per MIL-M-14F. Plug and

DIMENSIONAL DATA


D
.610 MAX.
MAX CABLE DIA
G
F
E
.355 MAX.
PLUG
B
A
.610 MAX
.103 MIN. DIA MOUNTING HOLES IN EYELET FOR #3 SCREW
.600 MAX
.400 MAX.
.300 MAX.
.085 REF TYP
.033 TYP
.038 TYP
C
RECEPTACLE
A
CENTER LINE
.156R
.580 MIN.
CLEARANCE OR TAPPED HOLES FOR #3 MTG SCREWS
.238
J
MOUNTING LAYOUT
H
MATING PLUG & RECEPTACLE

TRW® CINCH CONNECTORS

CINCH RIBBON CONNECTORS (Cont'd)

CABLE TO CHASSIS PLUGS & RECEPTACLES (Cont'd)

receptacle contacts are cadmium bronze, ASTM-B-105 with a finish of .00002 gold per MIL-G-45204 type II over copper flash. Shells are brass, ASTM-B-36 Alloy 6, with a finish of .0002 to .0004 zinc. Pretinning wires before soldering is recommended. 14, 24, 36 and 50-contact sizes are available.

PART NUMBER ORDERING INFORMATION

No. of Contacts	Plug Part No.* (with hood) Ⓒ	Receptacle Part No.* (with latches) Ⓒ
14	57-30140	57-40140
24	57-30240	57-40240
36	57-30360	57-40360
50	57-30500	57-40500

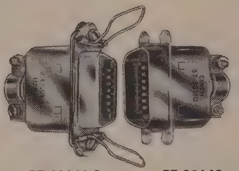
*Part numbers shown in listing have finish of **clear** chromate. If finish of **yellow** chromate is desired, add "-1" to appropriate part number(s) in listing to indicate same. (Example: 57-30140-1 or 57-40140-1.)

Ⓒ Indicates items normally available through Cinch distributors.

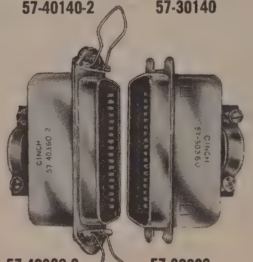
Dimensions‡	Type	A	B	C	D	E	F	G	H	J min.
57-30140	Plug	—	—	—	1.495	.843	.306	.422	1.668	—
57-40140	Receptacle	1.417	1.750	.910	—	—	—	—	—	.940
57-30240	Plug	—	—	—	1.920	.825	.473	.473	1.668	—
57-40240	Receptacle	1.842	2.175	1.335	—	—	—	—	—	1.365
57-30360	Plug	—	—	—	2.431	.905	.640	.473	1.730	—
57-40360	Receptacle	2.352	2.685	1.845	—	—	—	—	—	1.875
57-30500	Plug	—	—	—	3.025	.995	.766	.473	1.825	—
57-40500	Receptacle	2.947	3.270	2.440	—	—	—	—	—	2.472

‡NOTE: All dimensions are reference.

CABLE-TO-CABLE PLUGS & RECEPTACLES



57-40140-2 57-30140



57-40360-2 57-30360

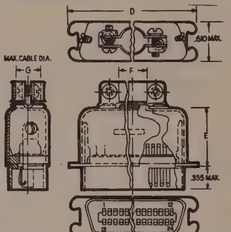
Same miniaturized connectors as shown on two previous pages except both plug and receptacle are equipped with hood and cable clamp for cable-to-cable application. Receptacle also has spring-type latches which are held by cutouts in plug hood flanges. Insulator material is diallyl phthalate, type MDG per MIL-M-14F. Plug and receptacle contacts are cadmium bronze, ASTM-B-105 with a finish of .00002 gold per MIL-G-45204 type II over copper flash. Shells are brass, ASTM-B-36 Alloy 6, with a finish of .0002 to .0004 zinc. Pretinning wires before soldering is recommended. 14, 24, 36 and 50-contact sizes are available.

PART NUMBER ORDERING INFORMATION

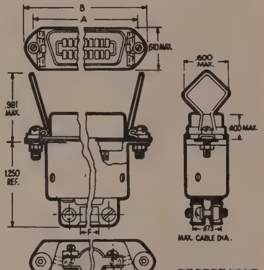
No. of Contacts	Plug Part No.* (with hood) Ⓒ	Receptacle Part No.* (with hood and latches)
14	57-30140	57-40140-2†
24	57-30240	57-40240-3†
36	57-30360	57-40360-2†
50	57-30500	57-40500-2†

Ⓒ Indicates items normally available through Cinch distributors.

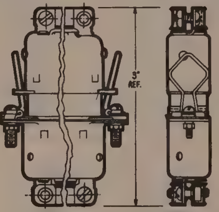
DIMENSIONAL DATA



PLUG



RECEPTACLE



MATING PLUG & RECEPTACLE

Dimensions‡	Type	A	B	D	E	F	G
57-30140	Plug	—	—	1.495	.843	.306	.422
57-40140-2	Receptacle	1.417	1.750	—	—	.306	.422
57-30240	Plug	—	—	1.920	.825	.473	.473
57-40240-3	Receptacle	1.842	2.175	—	—	.473	.473
57-30360	Plug	—	—	2.431	.905	.640	.473
57-40360-2	Receptacle	2.352	2.685	—	—	.640	.473
57-30500	Plug	—	—	3.025	.995	.766	.473
57-40500-2	Receptacle	2.947	3.270	—	—	.766	.473

*Part numbers shown in listing have **clear** chromate finish. If finish of **yellow** chromate is desired, add "-1" to appropriate plug part number(s) in listing. (Example: 57-30240-1) and "-6" to appropriate receptacle part number(s). (Example: 57-40240-6.)

NOTES:

†These cable-to-cable receptacles are available for large volume requirements only; consult factory for details.

‡All dimensions are reference.

TRW/CINCH CONNECTORS, AN ELECTRONIC COMPONENTS DIV. OF TRW INC. / 1501 MORSE AVE. / ELK GROVE VILLAGE, ILL. 60007

CINCH RIBBON CONNECTORS (Cont'd)

SPECIAL "HIGH-BARRIER" RACK AND PANEL PLUG & RECEPTACLE

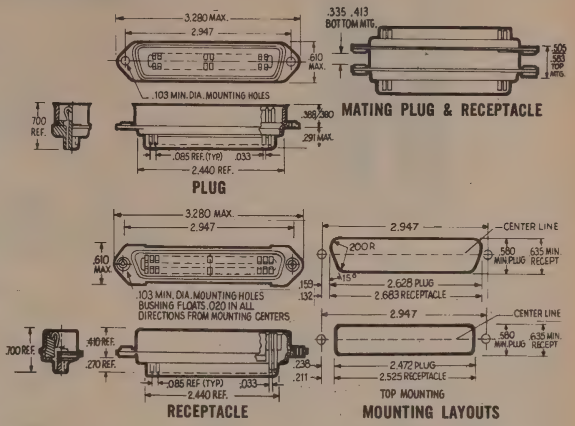
57-10500-6 57-20500-6

Available in 50-contact size only. Same as 50-contact rack and panel connector shown on page 5, except for a special "high barrier" (additional insulator material) interposed between opposite rows of contacts. Insulator body is molded of diallyl phthalate, type MDG per MIL-M-14F. Plug and receptacle contacts are of cadmium bronze, ASTM-B-105, with a finish of .00003 gold per MIL-G-45204 type II over gold flash per MIL-G-45204 type I over .00005 copper per MIL-C-14550. Shells are brass, ASTM-B-36 Alloy 6, with a finish of .0002 to .0004 zinc. Polyethylene dust covers also available as shown below.

PART NUMBER ORDERING INFORMATION

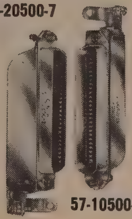
No. of Contacts	Plug Part No. ⒸD	Receptacle Part No. ⒸD
50	57-10500-6	57-20500-6

DIMENSIONAL DATA


3.280 MAX.
2.947
.335 .413
BOTTOM MTG.
.610 MAX.
.505 .583 TOP MTG.
.103 MIN. DIA. MOUNTING HOLES
.700 REF.
.388/.380
.291 MAX.
MATING PLUG & RECEPTACLE
.085 REF. (TYP)
.033
2.440 REF.
PLUG
3.280 MAX.
2.947
.610 MAX.
.103 MIN. DIA. MOUNTING HOLES
BUSHING FLOATS .020 IN ALL DIRECTIONS FROM MOUNTING CENTERS
.159
.132
2.947
CENTER LINE
.200 R
15°
.580 MIN. PLUG
.635 MIN. RECEPT
2.628 PLUG
2.683 RECEPTACLE
.700 REF.
.410 REF.
.270 REF.
.238
.211
.085 REF (TYP)
.033
2.440 REF.
RECEPTACLE
2.947
CENTER LINE
.580 MIN. PLUG
.635 MIN. RECEPT
2.472 PLUG
2.525 RECEPTACLE
TOP MOUNTING
MOUNTING LAYOUTS

SPECIAL "HIGH-BARRIER" CABLE-TO-CABLE PLUG & RECEPTACLE

57-20500-7



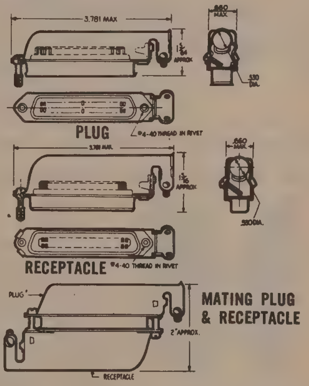
57-10500-7

Same as 50-contact rack and panel connector shown above except for special hood and hardware for cable-to-cable applications. Plug and receptacle have same special "high barrier" of insulator material interposed between opposite rows of contacts. Insulator body is molded of diallyl phthalate, type MDG per MIL-M-14F. Plug and receptacle contacts are of cadmium bronze, ASTM-B-105 with a finish of .00003 gold per MIL-G-45204 type II over gold flash per MIL-G-45204 type I over .00005 copper per MIL-C-14550. Shells are brass, ASTM-B-36 Alloy 6, with a finish of .0002 to .0004 zinc. Polyethylene dust covers are also available as described below.

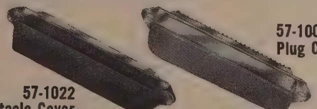
PART NUMBER ORDERING INFORMATION

No. of Contacts	Plug Part No. ⒸD	Receptacle Part No. ⒸD
50	57-10500-7	57-20500-7

DIMENSIONAL DATA


3.781 MAX.
.860 MAX.
1 1/8 APPROX.
.530 DIA.
PLUG
#4-40 THREAD IN RIVET
3.781 MAX.
.860 MAX.
1 1/8 APPROX.
.580 DIA.
RECEPTACLE
#4-40 THREAD IN RIVET
PLUG
2" APPROX.
RECEPTACLE
MATING PLUG & RECEPTACLE

POLYETHYLENE DUST COVERS



57-1008 Plug Cover

57-1022 Receptacle Cover

The 50-contact Cinch Ribbon connectors can be supplied with optional polyethylene dust covers. Two types of covers are available: one for the plugs and one for the receptacles. The plug cover is blue and fits inside the shell. The receptacle cover is red and fits outside the shell. The covers can be used only with these 50-contact size connectors.

PART NUMBER ORDERING INFORMATION

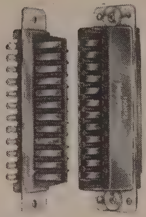
Plug Cover Part No.	Color and Type	Receptacle Cover Part No.	Color and Type
57-1008	Blue — Fits Inside Shell	57-1022	Red — Fits Outside Shell

ⒸD Indicates items normally available through Cinch distributors.

TRW® CINCH CONNECTORS

BLUE RIBBON CONNECTORS

RACK AND PANEL PLUGS & RECEPTACLES — BARRIER POLARIZATION TYPE



26-4100-24P 26-4200-24S

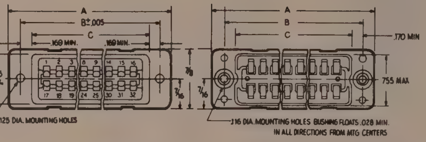
The interlocking design of these mating plug and receptacle bodies provides positive polarization equal to any other type. This barrier-type polarization makes visual alignment unnecessary since it is not dependent on contact arrangement. The float-mounted receptacle allows for possible misalignment with the mating plug. Insulator material is diallyl phthalate, type MDG per MIL-M-14F. Plug contacts are of copper, ASTM-B-152, type ETP, with a finish of .00002 gold per MIL-G-45204 type II over copper flash. Receptacle contacts are of phosphor bronze, ASTM-B-103, MIL-B-892, Grade A, with the same finish as on the plug contacts. The mounting plate, of corrosion resistant, passivated stainless steel, provides a sturdy mounting.

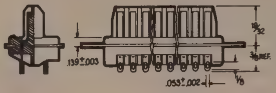
PART NUMBER ORDERING INFORMATION

No. of Contacts	Plug Part No. (CD)	Receptacle Part No. (CD)
8	26-4100-8P	26-4200-8S
16	26-4100-16P	26-4200-16S
24	26-4100-24P	26-4200-24S
32	26-4100-32P	26-4200-32S

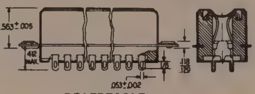
(CD) Indicates items normally available through Cinch distributors.

DIMENSIONAL DATA

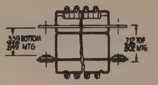

A
B±.005
C
.169 MIN.
.169 MIN.
.755 MAX.
7/8
7/16
.125 DIA. MOUNTING HOLES
.170 MIN
755 MAX
.116 DIA. MOUNTING HOLES BUSHING FLOATS .028 MIN. IN ALL DIRECTIONS FROM MTG CENTERS


.139±.003
13/32
3/8 REF.
.053±.002
1/8

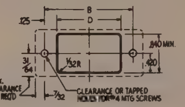
PLUG


.563±.005
.412 MAX.
.053±.002
.118
.125

RECEPTACLE


.359 BOTTOM
.349 MTG
.728 TOP
.808 MTG

MATING PLUG & RECEPTACLE

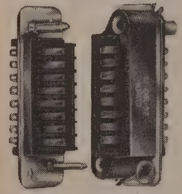

B
D
.125
.840 MIN.
.420
31/64
1/32 R
MAX. CLEARANCE REQ'D
7/32
CLEARANCE OR TAPPED HOLES FOR #4 MTG SCREWS

MOUNTING LAYOUT

DIMENSIONS*	A	B	C	D (Min.)
26-4100-8P or 26-4200-8S	$1\frac{23}{32}$	1.375	$1\frac{1}{32}$	1.120
26-4100-16P or 26-4200-16S	$2\frac{15}{32}$	2.125	$1\frac{25}{32}$	1.868
26-4100-24P or 26-4200-24S	$3\frac{7}{32}$	2.875	$2\frac{17}{32}$	2.620
26-4100-32P or 26-4200-32S	$3\frac{31}{32}$	3.625	$3\frac{9}{32}$	3.370

*Tolerances: Fractions ±1/64
Decimals ±.005

RACK AND PANEL PLUG & RECEPTACLE — PIN POLARIZATION TYPE



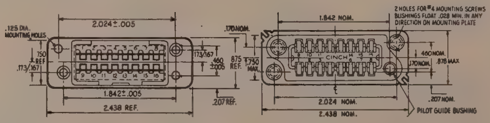
26-159-16 26-190-16

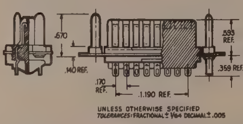
Combining pin-type polarization with unique spring contact construction, this plug and receptacle assure positive contact even under the most severe conditions of vibration. Receptacles are float-mounted to allow possible misalignment in mating with the plug. Insulator material is diallyl phthalate, type MDG per MIL-M-14F. Plug contacts are of copper, ASTM-B-152, type ETP, with a finish of .00002 gold per MIL-G-45204 type II over copper flash. Receptacle contacts are of phosphor bronze, ASTM-B-103, MIL-B-892, Grade A, with the same finish. Plug guide pins and receptacle guide pin bushings are aluminum. The mounting plate is corrosion resistant, passivated stainless steel. The only size available at the present time is 16-contact.

PART NUMBER ORDERING INFORMATION

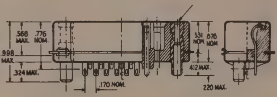
No. of Contacts	Plug Part No.	Receptacle Part No.
16	26-159-16	26-190-16

DIMENSIONAL DATA

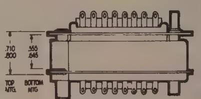

.125 DIA. MOUNTING HOLES
2.024±.005
.170 NOM.
1.842±.005
2.438 REF.
.207 REF.
1.842 NOM.
2 HOLES FOR #4 MOUNTING SCREWS BUSHINGS FLOAT .028 MIN. IN ANY DIRECTION ON MOUNTING PLATE
CINCH
.460 NOM.
.878 MAX
2.024 NOM.
2.438 NOM.
.207 NOM.
PILOT GUIDE BUSHING

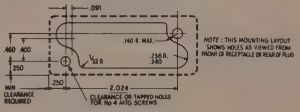

.670
.140 REF.
.170 REF.
1.190 REF.
.593 REF.
.359 REF.
UNLESS OTHERWISE SPECIFIED TOLERANCES: FRACTIONAL ± 1/64 DECIMAL ± .005

PLUG


.568 MAX.
.776 NOM.
.998 MAX.
.324 MAX.
.170 NOM.
.531 NOM.
.676 NOM.
.412 MAX.
.220 MAX.

RECEPTACLE


.710
.800
.555
.645
TOP MTG.
BOTTOM MTG.


.091
.140 R MAX.
.460
.400
.250
.250
1/32 R
.238 R.
.240
2.024
MIN CLEARANCE REQUIRED
CLEARANCE OR TAPPED HOLES FOR No 4 MTG SCREWS
NOTE: THIS MOUNTING LAYOUT SHOWS HOLES AS VIEWED FROM FRONT OF RECEPTACLE OR REAR OF PLUG

MATING PLUG & RECEPTACLE

MOUNTING LAYOUT

TRW/CINCH CONNECTORS, AN ELECTRONIC COMPONENTS DIV. OF TRW INC. / 1501 MORSE AVE. / ELK GROVE VILLAGE, ILL. 60007

TRW® CINCH CONNECTORS

GENERAL DESCRIPTION AND SPECIFICATIONS

The "Jones" Barrier Terminal Block is designed to offer increased insurance against failure of electrical/electronic circuitry. By interposing barriers between each adjacent terminal position, not only are much higher voltage ratings obtained, but an additional safeguard is created against frayed wire faults.

The various barrier block series shown in this catalog make it possible to select the combination of mechanical and electrical characteristics which best meet the exact requirements of the application. Over-sizing and under-rating are minimized, resulting in considerable cost savings. Also, the selection of optional terminals and fanning strips available permits the equipment designer to choose the method of termination most suitable for his environmental specifications and manufacturing requirements.

The standard barrier block insulator body is made of general purpose black phenolic. However, a large number of optional insulator materials are available upon request, including mica, diallyl phthalate, melamine and alkyd. Barrier block eyelets and binder head screws are made of brass nickel-plated. Optional terminals, such as the "W," "¾W" and "Y" are brass, hot solder finish. Fibre or XP phenolic marker strips are available on nearly all barrier blocks as indicated on each page. Fanning strips are all laminated XP black phenolic with cadmium-plated brass terminals.

Electrical ratings for all barrier block series are shown below. Otherwise, all the necessary ordering information for each series is shown complete on its own page. This includes specifications, dimensional data and a convenient part number listing. Refer to the index on this page to locate each individual series and its appropriate page number.

Many of the "Jones" barrier terminal blocks and accessories shown throughout this catalog are also available locally through **authorized Cinch Distributors** usually at a savings in delivery time and freight costs. For your convenience, those items normally carried in local stock by Cinch Distributors are indicated on each appropriate page of the catalog by the symbol Ⓒ.

ELECTRICAL RATINGS FOR BARRIER BLOCKS

Series	Max. Volts rms without Marker Strip	Max. Volts rms with Marker Strip	Max. Current in Amps	Max. Watts per Terminal
140	1,100	2,000	15	3,750
141	1,100	2,400	20	5,000
142	1,600	2,600	30	7,500
150	1,700	2,600	50	12,500
151	1,800	3,400	70	17,500
152	2,100	3,800	90	54,000
164	1,100	2,000	15	3,750
171	1,000	*	‡	‡
172	1,000	2,000	5	1,250
173	1,000	*	‡	‡
174	1,000	*	‡	‡
240	1,100	2,000	15	3,750
241	1,100	2,400	20	5,000
242	1,600	2,600	30	7,500
250	1,700	2,600	50	12,500
251	1,800	3,400	70	17,500
252	2,100	3,800	90	54,000
341	1,100	1,600	20	5,000
342	1,600	2,500	30	7,500
540†	2,300	2,300	15	3,750
541†	2,800	2,800	20	5,000
542†	4,000	4,000	30	7,500

*No marker strip available.

†Bottoms are closed; marker strip does not affect voltage rating.

‡The current rating of the 171, 173 and 174 Series is governed by the size of the wire being used. The ratings shown below would be typical when used with the following wire sizes:

Series	Wire	Rating
171	2 solid #18 wires	6 amps.
173	2 solid #16 wires	10 amps.
174	2 solid #16 wires	10 amps.

INDEX

BARRIER TERMINAL BLOCKS AND MARKER STRIPS

Special Features	Screw Size	Terminal Centers	Page
140 Series	#5-40	⅜″	3
140 Series (With Wrapost Terminals)	#5-40	⅜″	3
141 Series	#6-32	7/16″	4
141 Series (With Quick-Clamp Terminals)	#6-32	7/16″	4
142 Series	#8-32	9/16″	5
142 Series (With Quick-Clamp Terminals)	#8-32	9/16″	5
142 Series (With Special High Barriers)	#8-32	9/16″	6
150 Series	#10-32	11/16″	6
151 Series	#12-32	⅞″	6
152 Series	#¼-28	1⅛″	6
164 Series	#6-32	⅜″	7
171 Series (Single Row)	#2-56	¼″	7
172 Series (Double Row)	#2-56	¼″	7
173 Series (Sems Type B.H. Screws)	#4-40	⅜″	8
174 Series (Plain Type B.H. Screws)	#4-40	⅜″	8
240 Series (With Solder Terminals)	—	⅜″	8
241 Series (With Solder Terminals)	—	7/16″	8
242 Series (With Solder Terminals)	—	9/16″	8
250 Series (With Solder Terminals)	—	11/16″	8
251 Series (With Solder Terminals)	—	⅞″	8
252 Series (With Solder Terminals)	—	1⅛″	8
341 Series (With Solderless Tabs)	—	7/16″	9
342 Series (With Solderless Tabs)	—	9/16″	9
540 Series (Closed Back & Wider Barriers)	#5-40	⅜″	9
541 Series (Closed Back & Wider Barriers)	#6-32	7/16″	10
542 Series (Closed Back & Wider Barriers)	#8-32	9/16″	10

Fanning Strips for Connecting to Barrier Terminal Blocks 11
Optional Terminals, Jumpers & Cable Clamps 12
Marker Strip Imprinting Information 12
Dimensional Details 13, 14
Terminal Strips & Binding Posts 15, 16

FOR CROSS-REFERENCE BETWEEN NEW AND OLD PART NUMBERS

Request Cinch Form C-44A from your local Cinch Representative or write us direct. This form provides a convenient cross-reference between the new Cinch part numbers shown in this catalog and the old "Jones" part numbers used previously.

TRW® CINCH CONNECTORS

140 SERIES

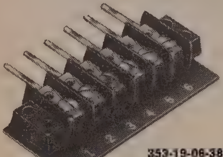
BARRIER TERMINAL BLOCKS AND MARKER STRIPS

353-11-06-001
Barrier Terminal Block with
363-11-06-011
Marker Strip (Imprinted)

Available in 1 to 25 terminal sizes with standard, "W," "¾W" and "Y" type terminals. Has 5-40 binder head screws. Accommodates up to #14 solid wire. Terminal centers are ⅜". Creepage distance from terminal to terminal and terminal to ground is ¼". Materials and finishes designated below. Electrical ratings are shown on the inside front cover.

Marker strips are available to mount beneath barrier block and afford additional insulation for metal mounting surface. "Single" marker strips that extend out on only one side are shown in listing below; "double" marker strips extending out on both sides are also available. Marker strips can be imprinted with terminal designations as described on page 12.

WITH WRAPOST TERMINALS



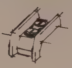
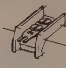
353-19-06-383
Barrier Terminal Block with
363-11-06-011
Marker Strip (Imprinted)

"Jones" Barrier Blocks with wrapost terminals on one side permit faster connections—four times faster than standard screw terminals. There are three terminal angles presently available—parallel to, at a 45° angle to, and perpendicular to the mounting surface. Choose the angle that best suits your application.

Available in 1 to 25-terminal sizes with each of the terminal angles. Has 5-40 binder head screw opposite terminal. Terminal centers are ⅜". Creepage distance is ¼". Materials and finishes designated below. Electrical ratings are shown on the inside front cover.

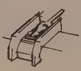
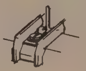
Standard 140 Series marker strips are available to mount beneath the barrier block and insulate against the metal mounting surface. "Single" or "double" marker strips are available. Marker strips can be imprinted with terminal designations as shown on page 12.

140 SERIES PART NUMBER ORDERING INFORMATION

NO. OF TERMINALS	 STANDARD TERMINAL (CD) 5-40 x $\frac{3}{16}$ B.H. Screws	 "W" TYPE TERMINAL 5-40 x ¼ B.H. Screws	 "¾W" TYPE TERMINAL (CD) 5-40 x ¼ B.H. Screws	MARKER STRIPS* FOR STANDARD, "W" and "¾W" TYPE TERMINALS (CD)	 "Y" TYPE TERMINAL (CD) 5-40 x ¼ B.H. Screws	MARKER STRIPS* FOR "Y" TYPE TERMINAL
1	353-11-01-001	353-16-01-001	353-17-01-001	363-11-01-010	353-18-01-001	363-12-01-010
2	†353-11-02-001	353-16-02-001	353-17-02-001	363-11-02-010	353-18-02-001	363-12-02-010
3	†353-11-03-001	353-16-03-001	353-17-03-001	363-11-03-010	353-18-03-001	363-12-03-010
4	†353-11-04-001	353-16-04-001	353-17-04-001	363-11-04-010	353-18-04-001	363-12-04-010
5	†353-11-05-001	353-16-05-001	353-17-05-001	363-11-05-010	353-18-05-001	363-12-05-010
6	†353-11-06-001	353-16-06-001	353-17-06-001	363-11-06-010	353-18-06-001	363-12-06-010
7	†353-11-07-001	353-16-07-001	353-17-07-001	363-11-07-010	353-18-07-001	363-12-07-010
8	†353-11-08-001	353-16-08-001	353-17-08-001	363-11-08-010	353-18-08-001	363-12-08-010
9	†353-11-09-001	353-16-09-001	353-17-09-001	363-11-09-010	353-18-09-001	363-12-09-010
10	†353-11-10-001	353-16-10-001	353-17-10-001	363-11-10-010	353-18-10-001	363-12-10-010
11	†353-11-11-001	353-16-11-001	353-17-11-001	363-11-11-010	353-18-11-001	363-12-11-010
12	†353-11-12-001	353-16-12-001	353-17-12-001	363-11-12-010	353-18-12-001	363-12-12-010
13	†353-11-13-001	353-16-13-001	353-17-13-001	363-11-13-010	353-18-13-001	363-12-13-010
14	†353-11-14-001	353-16-14-001	353-17-14-001	363-11-14-010	353-18-14-001	363-12-14-010
15	†353-11-15-001	353-16-15-001	353-17-15-001	363-11-15-010	353-18-15-001	363-12-15-010
16	†353-11-16-001	353-16-16-001	353-17-16-001	363-11-16-010	353-18-16-001	363-12-16-010
17	†353-11-17-001	353-16-17-001	353-17-17-001	363-11-17-010	353-18-17-001	363-12-17-010
18	†353-11-18-001	353-16-18-001	353-17-18-001	363-11-18-010	353-18-18-001	363-12-18-010
19	†353-11-19-001	353-16-19-001	353-17-19-001	363-11-19-010	353-18-19-001	363-12-19-010
20	†353-11-20-001	353-16-20-001	353-17-20-001	363-11-20-010	353-18-20-001	363-12-20-010
21	†353-11-21-001	353-16-21-001	353-17-21-001	363-11-21-010	353-18-21-001	363-12-21-010
22	†353-11-22-001	353-16-22-001	353-17-22-001	363-11-22-010	353-18-22-001	363-12-22-010
23	†353-11-23-001	353-16-23-001	353-17-23-001	363-11-23-010	353-18-23-001	363-12-23-010
24	†353-11-24-001	353-16-24-001	353-17-24-001	363-11-24-010	353-18-24-001	363-12-24-010
25	†353-11-25-001	353-16-25-001	353-17-25-001	363-11-25-010	353-18-25-001	363-12-25-010

†Available with SEMS Screws through Cinch Distributors. See Page 12.

140 SERIES (WRAPOST) PART NUMBER ORDERING INFORMATION

NO. OF TERMINALS	 PARALLEL (180°) STYLE 5-40 x $\frac{3}{16}$ B.H. Screws	 45° STYLE 5-40 x $\frac{3}{16}$ B.H. Screws	 PERPENDICULAR (90°) STYLE 5-40 x $\frac{3}{16}$ B.H. Screws	MARKER STRIPS* FOR ALL STYLES (CD)
1	353-19-01-383	353-19-01-385	353-19-01-386	363-11-01-010
2	353-19-02-383	353-19-02-385	353-19-02-386	363-11-02-010
3	353-19-03-383	353-19-03-385	353-19-03-386	363-11-03-010
4	353-19-04-383	353-19-04-385	353-19-04-386	363-11-04-010
5	353-19-05-383	353-19-05-385	353-19-05-386	363-11-05-010
6	353-19-06-383	353-19-06-385	353-19-06-386	363-11-06-010
7	353-19-07-383	353-19-07-385	353-19-07-386	363-11-07-010
8	353-19-08-383	353-19-08-385	353-19-08-386	363-11-08-010
9	353-19-09-383	353-19-09-385	353-19-09-386	363-11-09-010
10	353-19-10-383	353-19-10-385	353-19-10-386	363-11-10-010
11	353-19-11-383	353-19-11-385	353-19-11-386	363-11-11-010
12	353-19-12-383	353-19-12-385	353-19-12-386	363-11-12-010
13	353-19-13-383	353-19-13-385	353-19-13-386	363-11-13-010
14	353-19-14-383	353-19-14-385	353-19-14-386	363-11-14-010
15	353-19-15-383	353-19-15-385	353-19-15-386	363-11-15-010
16	353-19-16-383	353-19-16-385	353-19-16-386	363-11-16-010
17	353-19-17-383	353-19-17-385	353-19-17-386	363-11-17-010
18	353-19-18-383	353-19-18-385	353-19-18-386	363-11-18-010
19	353-19-19-383	353-19-19-385	353-19-19-386	363-11-19-010
20	353-19-20-383	353-19-20-385	353-19-20-386	363-11-20-010
21	353-19-21-383	353-19-21-385	353-19-21-386	363-11-21-010
22	353-19-22-383	353-19-22-385	353-19-22-386	363-11-22-010
23	353-19-23-383	353-19-23-385	353-19-23-386	363-11-23-010
24	353-19-24-383	353-19-24-385	353-19-24-386	363-11-24-010
25	353-19-25-383	353-19-25-385	353-19-25-386	363-11-25-010

INSULATOR MATERIAL: General Purpose Black Phenolic; Other Materials Available.
EYELET and SCREW MATERIAL and FINISH: Brass, Nickel-Plated. No Eyelet on Wrapost.
"W", "¾W" and "Y" TERMINAL MATERIAL and FINISH: Brass, Hot Solder Dipped. Wrapost Terminal Electro Tin Plate.
MARKER STRIP MATERIAL: $\frac{1}{32}$" Black Fibre; Also Available in $\frac{1}{32}$" XP Phenolic.

* Marker strip part numbers shown are "single sided" not imprinted type that extend out on only one side; equivalent "double" type strips extending out on both sides also available. To order change second field to 14. To order imprinted marker strips change fourth field from 010 to 011.

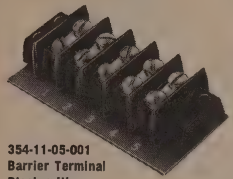
(CD) Indicates items normally available through Cinch Distributors.

TRW/CINCH CONNECTORS, AN ELECTRONIC COMPONENTS DIV. OF TRW INC. / 1501 MORSE AVE. / ELK GROVE VILLAGE, ILL. 60007

TRW® CINCH CONNECTORS

141 SERIES

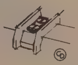
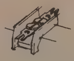
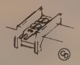
BARRIER TERMINAL BLOCKS AND MARKER STRIPS



354-11-05-001
Barrier Terminal
Block with
364-11-05-011
Marker Strip (Imprinted)

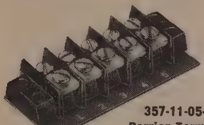
Available in 1 to 20-terminal sizes with standard, "W," "¾W" and "Y" type terminals. Has 6-32 binder head screws. Accommodates up to #12 solid wire. Terminal centers are 7⁄16". Creepage distance from terminal to terminal is ⅜" and terminal to ground is 5⁄16". Materials and finishes described below. Electrical ratings shown on inside front cover. Marker strips are available to mount beneath barrier block and provide insulation for metal mounting surface. "Single" or "double" marker strips are available. Marker strips can be imprinted with terminal designations as described on page 12.

141 SERIES PART NUMBER ORDERING INFORMATION

NO. OF TERMI-NALS	 (CD) STANDARD TERMINAL 6-32 x ¼ B.H. Screws	 "W" TYPE TERMINAL 6-32 x 5⁄16 B.H. Screws	 (CD) "¾W" TYPE TERMINAL 6-32 x 5⁄16 B.H. Screws	(CD) MARKER STRIPS* FOR STANDARD, "W" and "¾W" TERMINALS	(CD) "Y" TYPE TERMINAL 6-32 x 5⁄16 B.H. Screws	MARKER STRIPS* FOR "Y" TYPE TERMINAL
1	354-11-01-001	354-16-01-001	354-17-01-001	364-11-01-010	354-18-01-001	364-12-01-010
2	†354-11-02-001	354-16-02-001	354-17-02-001	364-11-02-010	354-18-02-001	364-12-02-010
3	†354-11-03-001	354-16-03-001	354-17-03-001	364-11-03-010	354-18-03-001	364-12-03-010
4	†354-11-04-001	354-16-04-001	354-17-04-001	364-11-04-010	354-18-04-001	364-12-04-010
5	†354-11-05-001	354-16-05-001	354-17-05-001	364-11-05-010	354-18-05-001	364-12-05-010
6	†354-11-06-001	354-16-06-001	354-17-06-001	364-11-06-010	354-18-06-001	364-12-06-010
7	†354-11-07-001	354-16-07-001	354-17-07-001	364-11-07-010	354-18-07-001	364-12-07-010
8	†354-11-08-001	354-16-08-001	354-17-08-001	364-11-08-010	354-18-08-001	364-12-08-010
9	†354-11-09-001	354-16-09-001	354-17-09-001	364-11-09-010	354-18-09-001	364-12-09-010
10	†354-11-10-001	354-16-10-001	354-17-10-001	364-11-10-010	354-18-10-001	364-12-10-010
11	†354-11-11-001	354-16-11-001	354-17-11-001	364-11-11-010	354-18-11-001	364-12-11-010
12	†354-11-12-001	354-16-12-001	354-17-12-001	364-11-12-010	354-18-12-001	364-12-12-010
13	†354-11-13-001	354-16-13-001	354-17-13-001	364-11-13-010	354-18-13-001	364-12-13-010
14	†354-11-14-001	354-16-14-001	354-17-14-001	364-11-14-010	354-18-14-001	364-12-14-010
15	†354-11-15-001	354-16-15-001	354-17-15-001	364-11-15-010	354-18-15-001	364-12-15-010
16	†354-11-16-001	354-16-16-001	354-17-16-001	364-11-16-010	354-18-16-001	364-12-16-010
17	†354-11-17-001	354-16-17-001	354-17-17-001	364-11-17-010	354-18-17-001	364-12-17-010
18	†354-11-18-001	354-16-18-001	354-17-18-001	364-11-18-010	354-18-18-001	364-12-18-010
19	†354-11-19-001	354-16-19-001	354-17-19-001	364-11-19-010	354-18-19-001	364-12-19-010
20	†354-11-20-001	354-16-20-001	354-17-20-001	364-11-20-010	354-18-20-001	364-12-20-010

†Available with SEMS Screws through Cinch Distributors. See Page 12.

WITH QUICK-CLAMP* TERMINALS



357-11-05-001
Barrier Terminal
Block with
364-11-05-011
Marker Strip (Imprinted)

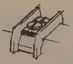
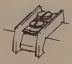
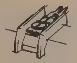
141 Series Barrier Blocks with Quick-Clamp Terminals permit efficient rapid assembly without costly wire terminals and without bending conductors around screws. Just insert the conductors and tighten screws to make positive contact.

Available in 1 to 20-terminal sizes for one side only, both sides, with "¾W" connection on one side and with "Y" connection through the panel. Uses 6-32 binder head screws. Terminal centers are 7⁄16". See page 12 for more complete description on the terminal itself and wire gauges accommodated. Materials and finishes described below. Electrical ratings are shown on the inside front cover.

141 Series marker strips are available to mount beneath the barrier block and provide insulation from the metal mounting surface. "Single" or "double" marker strips are available. Terminal designations can be imprinted on marker strips as shown on page 12.

* Patend Pending

141 SERIES (QUICK-CLAMP) PART NUMBER ORDERING INFORMATION

NO. OF TERMI-NALS	 STANDARD TERMINAL (One Side Only) 6-32 x 5⁄16 B.H. Screws	 STANDARD TERMINAL (Both Sides) 6-32 x 5⁄16 B.H. Screws	 "¾W" TYPE TERMINAL 6-32 x ⅜ B.H. Screws	(CD) MARKER STRIPS* FOR STANDARD "¾W" TYPE TERMINAL	"Y" TYPE TERMINAL 6-32 x ⅜ B.H. Screws	MARKER STRIPS* FOR "Y" TYPE TERMINAL
1	357-11-01-001	357-12-01-001	357-13-01-001	364-11-01-010	357-14-01-001	364-12-01-010
2	357-11-02-001	357-12-02-001	357-13-02-001	364-11-02-010	357-14-02-001	364-12-02-010
3	357-11-03-001	357-12-03-001	357-13-03-001	364-11-03-010	357-14-03-001	364-12-03-010
4	357-11-04-001	357-12-04-001	357-13-04-001	364-11-04-010	357-14-04-001	364-12-04-010
5	357-11-05-001	357-12-05-001	357-13-05-001	364-11-05-010	357-14-05-001	364-12-05-010
6	357-11-06-001	357-12-06-001	357-13-06-001	364-11-06-010	357-14-06-001	364-12-06-010
7	357-11-07-001	357-12-07-001	357-13-07-001	364-11-07-010	357-14-07-001	364-12-07-010
8	357-11-08-001	357-12-08-001	357-13-08-001	364-11-08-010	357-14-08-001	364-12-08-010
9	357-11-09-001	357-12-09-001	357-13-09-001	364-11-09-010	357-14-09-001	364-12-09-010
10	357-11-10-001	357-12-10-001	357-13-10-001	364-11-10-010	357-14-10-001	364-12-10-010
11	357-11-11-001	357-12-11-001	357-13-11-001	364-11-11-010	357-14-11-001	364-12-11-010
12	357-11-12-001	357-12-12-001	357-13-12-001	364-11-12-010	357-14-12-001	364-12-12-010
13	357-11-13-001	357-12-13-001	357-13-13-001	364-11-13-010	357-14-13-001	364-12-13-010
14	357-11-14-001	357-12-14-001	357-13-14-001	364-11-14-010	357-14-14-001	364-12-14-010
15	357-11-15-001	357-12-15-001	357-13-15-001	364-11-15-010	357-14-15-001	364-12-15-010
16	357-11-16-001	357-12-16-001	357-13-16-001	364-11-16-010	357-14-16-001	364-12-16-010
17	357-11-17-001	357-12-17-001	357-13-17-001	364-11-17-010	357-14-17-001	364-12-17-010
18	357-11-18-001	357-12-18-001	357-13-18-001	364-11-18-010	357-14-18-001	364-12-18-010
19	357-11-19-001	357-12-19-001	357-13-19-001	364-11-19-010	357-14-19-001	364-12-19-010
20	357-11-20-001	357-12-20-001	357-13-20-001	364-11-20-010	357-14-20-001	364-12-20-010

INSULATOR MATERIAL: General Purpose Black Phenolic; Other Materials Available.
EYELET and SCREW MATERIAL and FINISH: Brass, Nickel-Plated.
"W", "¾W" and "Y" TERMINAL MATERIAL and FINISH: Brass, Hot Solder Dipped.
QUICK-CLAMP TERMINAL MATERIAL and FINISH: Brass, Electro-Tinned.
MARKER STRIP MATERIAL: 1⁄32" Black Fibre; Also available in 1⁄32" XP Phenolic.

* Marker strip part numbers shown are "single sided" not imprinted type that extend out on only one side; equivalent "double" type strips extending out on both sides also available. To order change second field to 14. To order imprinted marker strips change fourth field from 010 to 011.

(CD) Indicates items normally available through Cinch Distributors.

TRW® CINCH CONNECTORS

142 SERIES

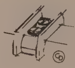
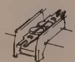
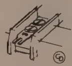
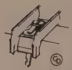
BARRIER TERMINAL BLOCKS AND MARKER STRIPS

355-11-04-001
Barrier Terminal
Block with
365-11-04-011
Marker Strip (Imprinted)

Available in 1 to 17-terminal sizes with standard, "W," "¾W" and "Y" type terminals. Has 8-32 binder head screws. Accommodates up to #10 solid wire. Terminal centers are 9⁄16". Creepage distance from terminal to terminal is 5⁄16" and terminal to ground is ⅜". Materials and finishes described below. Electrical ratings shown on inside front cover.

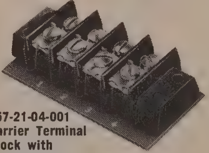
Marker strips are available to mount beneath barrier block and provide insulation for metal mounting surface. "Single" or "double" marker strips are available. Terminal designations can be imprinted on marker strips as described on page 12.

142 SERIES PART NUMBER ORDERING INFORMATION

NO. OF TERMINALS	 (CD) STANDARD TERMINAL 8-32 x 5⁄16 B.H. Screws	 "W" TYPE TERMINAL 8-32 x 5⁄16 B.H. Screws	 (CD) "¾W" TYPE TERMINAL 8-32 x 5⁄16 B.H. Screws	(CD) MARKER STRIPS* FOR STANDARD, "W" and "¾W" TYPE TERMINALS	 (CD) "Y" TYPE TERMINAL 8-32 x 5⁄16 B.H. Screws	MARKER STRIPS* FOR "Y" TYPE TERMINAL
1	355-11-01-001	355-16-01-001	355-17-01-001	365-11-01-010	355-18-01-001	365-12-01-010
2	†355-11-02-001	355-16-02-001	355-17-02-001	365-11-02-010	355-18-02-001	365-12-02-010
3	†355-11-03-001	355-16-03-001	355-17-03-001	365-11-03-010	355-18-03-001	365-12-03-010
4	†355-11-04-001	355-16-04-001	355-17-04-001	365-11-04-010	355-18-04-001	365-12-04-010
5	†355-11-05-001	355-16-05-001	355-17-05-001	365-11-05-010	355-18-05-001	365-12-05-010
6	†355-11-06-001	355-16-06-001	355-17-06-001	365-11-06-010	355-18-06-001	365-12-06-010
7	†355-11-07-001	355-16-07-001	355-17-07-001	365-11-07-010	355-18-07-001	365-12-07-010
8	†355-11-08-001	355-16-08-001	355-17-08-001	365-11-08-010	355-18-08-001	365-12-08-010
9	†355-11-09-001	355-16-09-001	355-17-09-001	365-11-09-010	355-18-09-001	365-12-09-010
10	†355-11-10-001	355-16-10-001	355-17-10-001	365-11-10-010	355-18-10-001	365-12-10-010
11	†355-11-11-001	355-16-11-001	355-17-11-001	365-11-11-010	355-18-11-001	365-12-11-010
12	†355-11-12-001	355-16-12-001	355-17-12-001	365-11-12-010	355-18-12-001	365-12-12-010
13	†355-11-13-001	355-16-13-001	355-17-13-001	365-11-13-010	355-18-13-001	365-12-13-010
14	†355-11-14-001	355-16-14-001	355-17-14-001	365-11-14-010	355-18-14-001	365-12-14-010
15	†355-11-15-001	355-16-15-001	355-17-15-001	365-11-15-010	355-18-15-001	365-12-15-010
16	†355-11-16-001	355-16-16-001	355-17-16-001	365-11-16-010	355-18-16-001	365-12-16-010
17	†355-11-17-001	355-16-17-001	355-17-17-001	365-11-17-010	355-18-17-001	365-12-17-010

†Available with SEMS Screws through Cinch Distributors. See Page 12.

WITH QUICK-CLAMP* TERMINALS



357-21-04-001
Barrier Terminal
Block with
365-11-04-011
Marker Strip (Imprinted)

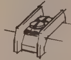
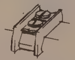
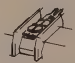
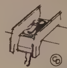
142 Series Barrier Blocks with Quick-Clamp Terminals permit fast, efficient assembly without costly wire terminals and without bending conductors around screws. Insert the conductors, tighten the screws and positive contact is made.

Available in 1 to 17-terminal sizes for one side only, both sides, with "¾W" connection on one side and with "Y" connection through the panel. 8-32 binder head screws are used. 9⁄16" terminal centers. Refer to page 12 for more complete description on the terminal itself and wire gauges accommodated. Materials and finishes described below. Electrical ratings are shown on the inside front cover.

142 Series marker strips are available to mount beneath the barrier block and afford insulation from the metal mounting surface. "Single" or "double" marker strips are available. Marker strips can be imprinted with terminal designations as shown on page 12.

*Patent Pending

142 SERIES (QUICK-CLAMP) PART NUMBER ORDERING INFORMATION

NO. OF TERMINALS	 STANDARD TERMINAL (One Side Only) 8-32 x ⅜ B.H. Screws	 STANDARD TERMINAL (Both Sides) 8-32 x ⅜ B.H. Screws	 "¾W" TYPE TERMINAL 8-32 x ⅜ B.H. Screws	(CD) MARKER STRIPS* FOR STANDARD, "W" and "¾W" TYPE TERMINALS	 (CD) "Y" TYPE TERMINAL 8-32 x ⅜ B.H. Screws	MARKER STRIPS* FOR "Y" TYPE TERMINAL
1	357-21-01-001	357-22-01-001	357-23-01-001	365-11-01-010	357-24-01-001	365-12-01-010
2	357-21-02-001	357-22-02-001	357-23-02-001	365-11-02-010	357-24-02-001	365-12-02-010
3	357-21-03-001	357-22-03-001	357-23-03-001	365-11-03-010	357-24-03-001	365-12-03-010
4	357-21-04-001	357-22-04-001	357-23-04-001	365-11-04-010	357-24-04-001	365-12-04-010
5	357-21-05-001	357-22-05-001	357-23-05-001	365-11-05-010	357-24-05-001	365-12-05-010
6	357-21-06-001	357-22-06-001	357-23-06-001	365-11-06-010	357-24-06-001	365-12-06-010
7	357-21-07-001	357-22-07-001	357-23-07-001	365-11-07-010	357-24-07-001	365-12-07-010
8	357-21-08-001	357-22-08-001	357-23-08-001	365-11-08-010	357-24-08-001	365-12-08-010
9	357-21-09-001	357-22-09-001	357-23-09-001	365-11-09-010	357-24-09-001	365-12-09-010
10	357-21-10-001	357-22-10-001	357-23-10-001	365-11-10-010	357-24-10-001	365-12-10-010
11	357-21-11-001	357-22-11-001	357-23-11-001	365-11-11-010	357-24-11-001	365-12-11-010
12	357-21-12-001	357-22-12-001	357-23-12-001	365-11-12-010	357-24-12-001	365-12-12-010
13	357-21-13-001	357-22-13-001	357-23-13-001	365-11-13-010	357-24-13-001	365-12-13-010
14	357-21-14-001	357-22-14-001	357-23-14-001	365-11-14-010	357-24-14-001	365-12-14-010
15	357-21-15-001	357-22-15-001	357-23-15-001	365-11-15-010	357-24-15-001	365-12-15-010
16	357-21-16-001	357-22-16-001	357-23-16-001	365-11-16-010	357-24-16-001	365-12-16-010
17	357-21-17-001	357-22-17-001	357-23-17-001	365-11-17-010	357-24-17-001	365-12-17-010

INSULATOR MATERIAL: General Purpose Black Phenolic; Other Materials Available.

EYELET and SCREW MATERIAL and FINISH: Brass, Nickel-Plated.

"W," "¾W" and "Y" TERMINAL MATERIAL and FINISH: Brass, Hot Solder Dipped.

QUICK-CLAMP TERMINAL MATERIAL and FINISH: Brass, Electro-Tinned.

MARKER STRIP MATERIAL: 1⁄32" Black Fibre; Also Available in 1⁄32" XP Phenolic.

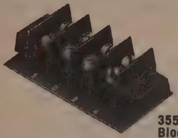
* Marker strip part numbers shown are "single sided" not imprinted type that extend out on only one side; equivalent "double" type strips extending out on both sides also available. To order change second field to 14. To order imprinted marker strips change fourth field from 010 to 011.

(CD) Indicates items normally available through Cinch Distributors.

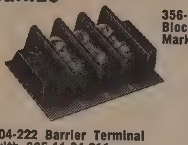
TRW/CINCH CONNECTORS, AN ELECTRONIC COMPONENTS DIV. OF TRW INC. / 1501 MORSE AVE. / ELK GROVE VILLAGE, ILL. 60007

TRW® CINCH CONNECTORS

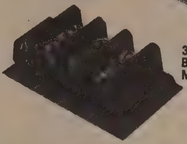
142/150/151/152 SERIES



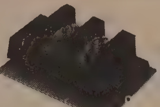
355-11-04-222 Barrier Terminal Block with 365-11-04-011 Marker Strip (Imprinted)



356-11-03-001 Barrier Terminal Block with 366-11-03-011 Marker Strip (Imprinted)



356-21-03-001 Barrier Terminal Block with 366-21-03-011 Marker Strip (Imprinted)



356-31-02-001 Barrier Terminal Block with 366-31-02-011 Marker Strip (Imprinted)

142 SERIES
SPECIAL HIGH BARRIER TERMINAL BLOCKS AND MARKER STRIPS

The 142 Series is also available, in 1 to 4-terminal sizes only, with special ¾″ high barriers to meet requirements for certain 220 volt specifications. Terminal centers still 5/16″. Creepage distance becomes ¾″. "Single" or "double" marker strips available for use with each size barrier block and can be imprinted with terminal designations as shown on page 12.

SPECIAL 142 SERIES PART NUMBER ORDERING INFORMATION

NO. OF TERMINALS	STD. TERM. ONLY (As Shown) 8-32 x 5/16 B.H. Screws	MARKER STRIPS* (CD)
1	355-11-01-223	365-11-01-010
2	355-11-02-224	365-11-02-010
3	355-11-03-225	365-11-03-010
4	355-11-04-222	365-11-04-010

150 SERIES
BARRIER TERMINAL BLOCKS AND MARKER STRIPS

Available in 1 to 10-terminal sizes with standard, "W," "¾W" and "Y" type terminals. Uses 10-32 binder screws. Accommodates up to #10 wire or 50 amp solder lug for #6 stranded wire. Terminal centers are 1 1/16″. Creepage distance from terminal to terminal is ⅝″; from terminal to ground is 7/16″. Materials and finishes described below. Electrical ratings are shown on the inside front cover.

Marker strips are available to mount beneath barrier block and provide insulation for metal mounting surface. "Single" or "double" marker strips are available. Terminal designations can be imprinted on marker strips as shown on page 12.

150 SERIES PART NUMBER ORDERING INFORMATION

NO. OF TERMINALS	STANDARD TERMINAL (CD) 10-32 x 5/16 B.H. Screws	"W" TYPE TERMINAL 10-32 x 5/16 B.H. Screws	"¾W" TYPE TERMINAL 10-32 x 5/16 B.H. Screws	MARKER STRIPS* FOR STANDARD "W" and "¾W" TYPE TERMINALS	"Y" TYPE TERMINAL (CD) 10-32 x 5/16 B.H. Screws	MARKER STRIPS* FOR "Y" TYPE TERMINAL
1	356-11-01-001	356-16-01-001	356-17-01-001	366-11-01-010	356-18-01-001	366-12-01-010
2	356-11-02-001	356-16-02-001	356-17-02-001	366-11-02-010	356-18-02-001	366-12-02-010
3	356-11-03-001	356-16-03-001	356-17-03-001	366-11-03-010	356-18-03-001	366-12-03-010
4	356-11-04-001	356-16-04-001	356-17-04-001	366-11-04-010	356-18-04-001	366-12-04-010
5	356-11-05-001	356-16-05-001	356-17-05-001	366-11-05-010	356-18-05-001	366-12-05-010
6	356-11-06-001	356-16-06-001	356-17-06-001	366-11-06-010	356-18-06-001	366-12-06-010
7	356-11-07-001	356-16-07-001	356-17-07-001	366-11-07-010	356-18-07-001	366-12-07-010
8	356-11-08-001	356-16-08-001	356-17-08-001	366-11-08-010	356-18-08-001	366-12-08-010
9	356-11-09-001	356-16-09-001	356-17-09-001	366-11-09-010	356-18-09-001	366-12-09-010
10	356-11-10-001	356-16-10-001	356-17-10-001	366-11-10-010	356-18-10-001	366-12-10-010

151 SERIES
BARRIER TERMINAL BLOCKS AND MARKER STRIPS

Available in 1 to 8-terminal sizes with standard, "W" and "¾W" type terminals. Has 12-32 binder head screws. Accommodates up to #8 wire or 70 amp solder lug for #4 stranded wire. Creepage distance is ¾″ from terminal to terminal and ½″ from terminal to ground. ⅞″ terminal centers. Materials and finishes described below. Electrical ratings are shown on the inside front cover.

Marker strips to mount beneath barrier block and provide insulation for metal mounting surface are available. "Single" or "double" marker strips are available. Marker strips can be imprinted with terminal designations as described on page 12.

151 SERIES PART NUMBER ORDERING INFORMATION

NO. OF TERMINALS	STANDARD TERMINAL (CD) 12-32 x ⅜ B.H. Screws	"W" TYPE TERMINAL 12-32 x ⅜ B.H. Screws	"¾W" TYPE TERMINAL 12-32 x ⅜ B.H. Screws	MARKER STRIPS* FOR ALL 151 SERIES TERMINALS
1	356-21-01-001	356-26-01-001	356-27-01-001	366-21-01-010
2	356-21-02-001	356-26-02-001	356-27-02-001	366-21-02-010
3	356-21-03-001	356-26-03-001	356-27-03-001	366-21-03-010
4	356-21-04-001	356-26-04-001	356-27-04-001	366-21-04-010
5	356-21-05-001	356-26-05-001	356-27-05-001	366-21-05-010
6	356-21-06-001	356-26-06-001	356-27-06-001	366-21-06-010
7	356-21-07-001	356-26-07-001	356-27-07-001	366-21-07-010
8	356-21-08-001	356-26-08-001	356-27-08-001	366-21-08-010

152 SERIES
BARRIER TERMINAL BLOCKS AND MARKER STRIPS

Available in 1 to 6-terminal sizes with standard, "W" and "¾W" type terminals. Uses ¼″-28 binder head screws. Accommodates up to #6 wire or 90 amp solder lug for #2 stranded wire. Creepage distance from terminal to terminal is 1″, from terminal to ground ⅝″. Terminal centers are 1⅛″. Materials and finishes described below. Electrical ratings are shown on the inside front cover.

Marker strips are available to mount beneath barrier block and afford insulation for metal mounting surface. "Single" or "double" marker strips are also available. Terminal designations can be imprinted on marker strips as described on page 12.

152 SERIES PART NUMBER ORDERING INFORMATION

NO. OF TERMINALS	STANDARD TERMINAL (CD) ¼″-28 x ½ B.H. Screws	"W" TYPE TERMINAL ¼″-28 x ½ B.H. Screws	"¾W" TYPE TERMINAL ¼″-28 x ½ B.H. Screws	MARKER STRIPS* FOR ALL 152 SERIES TERMINALS
1	356-31-01-001	356-36-01-001	356-37-01-001	366-31-01-010
2	356-31-02-001	356-36-02-001	356-37-02-001	366-31-02-010
3	356-31-03-001	356-36-03-001	356-37-03-001	366-31-03-010
4	356-31-04-001	356-36-04-001	356-37-04-001	366-31-04-010
5	356-31-05-001	356-36-05-001	356-37-05-001	366-31-05-010
6	356-31-06-001	356-36-06-001	356-37-06-001	366-31-06-010

INSULATOR MATERIAL: General Purpose Black Phenolic; Other Materials Available.

TERMINAL and SCREW MATERIAL and FINISH: Brass, Nickel-Plated.

"W," "¾W" and "Y" TERMINAL MATERIAL and FINISH: Brass, Hot Solder Dipped.

MARKER STRIP MATERIAL: 1/32″ Black Fibre; Also Available in 1/32″ XP Phenolic.

* Marker strip part numbers shown are "single sided" not imprinted type that extend out on only one side; equivalent "double" type strips extending out on both sides also available. To order change second field to 14.

To order imprinted marker strips change fourth field from 010 to 011.

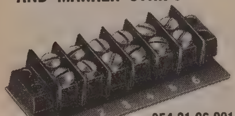
(CD) Indicates items normally available through Cinch Distributors.

TRW/CINCH CONNECTORS, AN ELECTRONIC COMPONENTS DIV. OF TRW INC. / 1501 MORSE AVE. / ELK GROVE VILLAGE, ILL. 60007

TRW® CINCH CONNECTORS

164 SERIES

BARRIER TERMINAL BLOCKS AND MARKER STRIPS



354-21-06-001 Barrier Terminal Block with 363-11-06-011 Marker Strip (Imprinted)

Similar to the 140 Series except equipped with 6-32 screws. Available in 1 to 21-terminal sizes with standard, "W," "¾W" and "Y" type terminals. Accommodates up to #14 solid wire. Terminal centers are ⅜". Creepage distance from terminal to terminal and terminal to ground is ¼". Materials and finishes described below. Electrical ratings shown on inside front cover.

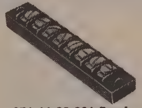
Marker strips are available to mount beneath barrier block and provide insulation for metal mounting surface. "Single" or "double" marker strips are available. Terminal designations can be imprinted on marker strips as described on page 12.

164 SERIES PART NUMBER ORDERING INFORMATION

NO. OF TERMINALS	Ⓒ STANDARD TERMINAL 6-32 x ¼ B.H. Screws	Ⓒ "W" TYPE TERMINAL 6-32 x ¼ B.H. Screws	Ⓒ "¾W" TYPE TERMINAL 6-32 x ¼ B.H. Screws	Ⓒ MARKER STRIPS* FOR STANDARD, "W" and "¾W" TYPE TERMINALS	Ⓒ "Y" TYPE TERMINAL 6-32 x ¼ B.H. Screws	MARKER STRIPS* FOR "Y" TYPE TERMINAL
1	354-21-01-001	354-26-01-001	354-27-01-001	363-11-01-010	354-28-01-001	363-12-01-010
2	354-21-02-001	354-26-02-001	354-27-02-001	363-11-02-010	354-28-02-001	363-12-02-010
3	354-21-03-001	354-26-03-001	354-27-03-001	363-11-03-010	354-28-03-001	363-12-03-010
4	354-21-04-001	354-26-04-001	354-27-04-001	363-11-04-010	354-28-04-001	363-12-04-010
5	354-21-05-001	354-26-05-001	354-27-05-001	363-11-05-010	354-28-05-001	363-12-05-010
6	354-21-06-001	354-26-06-001	354-27-06-001	363-11-06-010	354-28-06-001	363-12-06-010
7	354-21-07-001	354-26-07-001	354-27-07-001	363-11-07-010	354-28-07-001	363-12-07-010
8	354-21-08-001	354-26-08-001	354-27-08-001	363-11-08-010	354-28-08-001	363-12-08-010
9	354-21-09-001	354-26-09-001	354-27-09-001	363-11-09-010	354-28-09-001	363-12-09-010
10	354-21-10-001	354-26-10-001	354-27-10-001	363-11-10-010	354-28-10-001	363-12-10-010
11	354-21-11-001	354-26-11-001	354-27-11-001	363-11-11-010	354-28-11-001	363-12-11-010
12	354-21-12-001	354-26-12-001	354-27-12-001	363-11-12-010	354-28-12-001	363-12-12-010
13	354-21-13-001	354-26-13-001	354-27-13-001	363-11-13-010	354-28-13-001	363-12-13-010
14	354-21-14-001	354-26-14-001	354-27-14-001	363-11-14-010	354-28-14-001	363-12-14-010
15	354-21-15-001	354-26-15-001	354-27-15-001	363-11-15-010	354-28-15-001	363-12-15-010
16	354-21-16-001	354-26-16-001	354-27-16-001	363-11-16-010	354-28-16-001	363-12-16-010
17	354-21-17-001	354-26-17-001	354-27-17-001	363-11-17-010	354-28-17-001	363-12-17-010
18	354-21-18-001	354-26-18-001	354-27-18-001	363-11-18-010	354-28-18-001	363-12-18-010
19	354-21-19-001	354-26-19-001	354-27-19-001	363-11-19-010	354-28-19-001	363-12-19-010
20	354-21-20-001	354-26-20-001	354-27-20-001	363-11-20-010	354-28-20-001	363-12-20-010
21	354-21-21-001	354-26-21-001	354-27-21-001	363-11-21-010	354-28-21-001	363-12-21-010

171 SERIES

BARRIER TERMINAL BLOCKS



351-11-08-001 Barrier Terminal Block

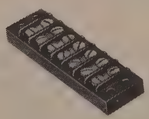
A miniature barrier terminal block with single screw terminals. Available in 1 to 8 terminal sizes with standard type terminal only. Has 2-56 x 3/16" binder head screws. Terminal centers are ¼". Insulator material is general purpose black phenolic. Eyelets and screws are brass with nickel-plated finish. Marker strips are not available for use with the 171 Series.

171 SERIES PART NUMBER ORDERING INFORMATION

NO. OF TERMINALS	PART NUMBER Ⓒ	NO. OF TERMINALS	PART NUMBER Ⓒ
1	351-11-01-001	5	351-11-05-001
2	351-11-02-001	6	351-11-06-001
3	351-11-03-001	7	351-11-07-001
4	351-11-04-001	8	351-11-08-001

172 SERIES

BARRIER TERMINAL BLOCKS



351-21-08-001 Barrier Terminal Block

Miniature barrier terminal block with double screw terminals. Available in 1 to 14-terminal sizes with standard, "W," "¾W" and "Y" type terminals. 2-56 binder head screws. ¼" terminal centers. Insulator molded of general purpose black phenolic. Eyelets and screws are nickel-plated brass. "W," "¾W" and "Y" terminals are made of brass, hot solder dipped. Marker strips are available; write for details.

172 SERIES PART NUMBER ORDERING INFORMATION

NO. OF TERMINALS	Ⓒ STANDARD TERMINAL 2-56 x 3/16 B.H. Screws	Ⓒ "W" TYPE TERMINAL 2-56 x ¼ B.H. Screws	Ⓒ "¾W" TYPE TERMINAL 2-56 x ¼ B.H. Screws	Ⓒ "Y" TYPE TERMINAL 2-56 x 3/16 B.H. Screws
1	351-21-01-001	351-26-01-001	351-27-01-001	351-28-01-001
2	351-21-02-001	351-26-02-001	351-27-02-001	351-28-02-001
3	351-21-03-001	351-26-03-001	351-27-03-001	351-28-03-001
4	351-21-04-001	351-26-04-001	351-27-04-001	351-28-04-001
5	351-21-05-001	351-26-05-001	351-27-05-001	351-28-05-001
6	351-21-06-001	351-26-06-001	351-27-06-001	351-28-06-001
7	351-21-07-001	351-26-07-001	351-27-07-001	351-28-07-001
8	351-21-08-001	351-26-08-001	351-27-08-001	351-28-08-001
9	351-21-09-001	351-26-09-001	351-27-09-001	351-28-09-001
10	351-21-10-001	351-26-10-001	351-27-10-001	351-28-10-001
11	351-21-11-001	351-26-11-001	351-27-11-001	351-28-11-001
12	351-21-12-001	351-26-12-001	351-27-12-001	351-28-12-001
13	351-21-13-001	351-26-13-001	351-27-13-001	351-28-13-001
14	351-21-14-001	351-26-14-001	351-27-14-001	351-28-14-001

INSULATOR MATERIAL: General Purpose Black Phenolic; Other Materials Available.
EYELET and SCREW MATERIAL and FINISH: Brass, Nickel-Plated.
"W," "¾W" and "Y" TERMINAL MATERIAL and FINISH: Brass, Hot Solder Dipped.
MARKER STRIP MATERIAL: 1/32" Black Fibre; Also available in 1/32" XP Phenolic.

* Marker strip part numbers shown are "single sided" not imprinted type that extend out on only one side; equivalent "double" type strips extending out on both sides also available. To order change second field to 14. To order imprinted marker strips change fourth field from 010 to 011.

Ⓒ Indicates items normally available through Cinch Distributors.

TRW® CINCH CONNECTORS

173/174 SERIES

BARRIER TERMINAL BLOCKS

352-11-08-001
Barrier Terminal Block

173 SERIES

Single-screw terminal barrier blocks available in 2 to 10-terminal sizes. Has 4-40 x 5⁄16″ Sems type binder head screws. Terminal centers are 3⁄8″. Insulator is general purpose black phenolic. Eyelets and screws are nickel-plated brass.

174 SERIES

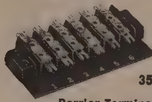
Same as 173 Series except the screws are 4-40 x 1⁄4″ plain binder head type. 2 to 10-terminal sizes. 3⁄8″ terminal centers. Same insulator material. Same eyelet and screw material and finish.

PART NUMBER ORDERING INFORMATION

NO. OF TERMI-NALS	173 SERIES 4-40 x 5⁄16 (CD) Sems Type B.H. Screws	174 SERIES 4-40 x 1⁄4 (CD) Plain Type B.H. Screws
1	352-15-01-001	352-11-01-001
2	352-15-02-001	352-11-02-001
3	352-15-03-001	352-11-03-001
4	352-15-04-001	352-11-04-001
5	352-15-05-001	352-11-05-001
6	352-15-06-001	352-11-06-001
7	352-15-07-001	352-11-07-001
8	352-15-08-001	352-11-08-001
9	352-15-09-001	352-11-09-001
10	352-15-10-001	352-11-10-001

240/241/242 SERIES

BARRIER TERMINAL BLOCKS AND MARKER STRIPS



359-14-06-001
240 Series
Barrier Terminal Block with
363-11-06-011 Marker Strip
(Imprinted)

Similar to the 140, 141 and 142 Series except that solder terminals are used instead of screw terminals. These solder terminals are designed to accommodate one or more wires, which can be brought through slot into hole, simplifying soldering. Terminal sizes available are: 1-25 for the 240 Series, 1-20 for the 241 and 1-17 for the 242. Terminal centers are shown in the dimensional drawings. Materials and finishes are described below. Electrical ratings are shown on the inside front cover. Marker strips that mount beneath barrier block and afford insulation from metal mounting surfaces are available in either "single" or "double" type. See page 12 for information on imprinting terminal designations in these marker strips.

PART NUMBER ORDERING INFORMATION

NO. OF TERMI-NALS	240 SERIES BARRIER BLOCKS With Solder Terminals	240 SERIES MARKER STRIPS* (CD)	241 SERIES BARRIER BLOCKS With Solder Terminals	241 SERIES MARKER STRIPS* (CD)	242 SERIES BARRIER BLOCKS (CD) With Solder Terminals	242 SERIES MARKER STRIPS*
1	359-14-01-001	363-11-01-010	359-24-01-001	364-11-01-010	359-34-01-001	365-11-01-010
2	359-14-02-001	363-11-02-010	359-24-02-001	364-11-02-010	359-34-02-001	365-11-02-010
3	359-14-03-001	363-11-03-010	359-24-03-001	364-11-03-010	359-34-03-001	365-11-03-010
4	359-14-04-001	363-11-04-010	359-24-04-001	364-11-04-010	359-34-04-001	365-11-04-010
5	359-14-05-001	363-11-05-010	359-24-05-001	364-11-05-010	359-34-05-001	365-11-05-010
6	359-14-06-001	363-11-06-010	359-24-06-001	364-11-06-010	359-34-06-001	365-11-06-010
7	359-14-07-001	363-11-07-010	359-24-07-001	364-11-07-010	359-34-07-001	365-11-07-010
8	359-14-08-001	363-11-08-010	359-24-08-001	364-11-08-010	359-34-08-001	365-11-08-010
9	359-14-09-001	363-11-09-010	359-24-09-001	364-11-09-010	359-34-09-001	365-11-09-010
10	359-14-10-001	363-11-10-010	359-24-10-001	364-11-10-010	359-34-10-001	365-11-10-010
11	359-14-11-001	363-11-11-010	359-24-11-001	364-11-11-010	359-34-11-001	365-11-11-010
12	359-14-12-001	363-11-12-010	359-24-12-001	364-11-12-010	359-34-12-001	365-11-12-010
13	359-14-13-001	363-11-13-010	359-24-13-001	364-11-13-010	359-34-13-001	365-11-13-010
14	359-14-14-001	363-11-14-010	359-24-14-001	364-11-14-010	359-34-14-001	365-11-14-010
15	359-14-15-001	363-11-15-010	359-24-15-001	364-11-15-010	359-34-15-001	365-11-15-010
16	359-14-16-001	363-11-16-010	359-24-16-001	364-11-16-010	359-34-16-001	365-11-16-010
17	359-14-17-001	363-11-17-010	359-24-17-001	364-11-17-010	359-34-17-001	365-11-17-010
18	359-14-18-001	363-11-18-010	359-24-18-001	364-11-18-010		
19	359-14-19-001	363-11-19-010	359-24-19-001	364-11-19-010		
20	359-14-20-001	363-11-20-010	359-24-20-001	364-11-20-010		
21	359-14-21-001	363-11-21-010				
22	359-14-22-001	363-11-22-010				
23	359-14-23-001	363-11-23-010				
24	359-14-24-001	363-11-24-010				
25	359-14-25-001	363-11-25-010				

250/251/252 SERIES

BARRIER TERMINAL BLOCKS AND MARKER STRIPS

359-44-03-001
250 Series
Barrier Terminal Block
with 366-11-03-011
Marker Strip (Imprinted)

Similar to the 150, 151 and 152 Series except for use of solder terminals instead of screw terminals. Solder terminals accommodate one or more wires that can be brought through slot into hole, simplifying solder operation. Terminal sizes available include: 1-10 for the 250 Series, 1-8 for the 251 and 1-6 for the 252. Refer to dimensional drawings for terminal centers. Materials and finishes are described below. Electrical ratings are shown on inside front cover. "Single" or "double" marker strips are available to mount beneath barrier block and provide insulation from metal mounting surface. Terminal designations can be imprinted on marker strips as described on page 12.

PART NUMBER ORDERING INFORMATION

NO. OF TERMI-NALS	250 SERIES BARRIER BLOCKS With Solder Terminals	250 SERIES MARKER STRIPS*	251 SERIES BARRIER BLOCKS With Solder Terminals	251 SERIES MARKER STRIPS*	252 SERIES BARRIER BLOCKS With Solder Terminals	252 SERIES MARKER STRIPS*
1	359-44-01-001	366-11-01-010	359-54-01-001	366-21-01-001	359-64-01-001	366-31-01-010
2	359-44-02-001	366-11-02-010	359-54-02-001	366-21-02-010	359-64-02-001	366-31-02-010
3	359-44-03-001	366-11-03-010	359-54-03-001	366-21-03-010	359-64-03-001	366-31-03-010
4	359-44-04-001	366-11-04-010	359-54-04-001	366-21-04-010	359-64-04-001	366-31-04-010
5	359-44-05-001	366-11-05-010	359-54-05-001	366-21-05-010	359-64-05-001	366-31-05-010
6	359-44-06-001	366-11-06-010	359-54-06-001	366-21-06-010	359-64-06-001	366-31-06-010
7	359-44-07-001	366-11-07-010	359-54-07-001	366-21-07-010		
8	359-44-08-001	366-11-08-010	359-54-08-001	366-21-08-010		
9	359-44-09-001	366-11-09-010				
10	359-44-10-001	366-11-10-010				

INSULATOR MATERIAL: General Purpose Black Phenolic; Other Materials Available.

TERMINAL MATERIAL and FINISH: Brass, Hot Solder Dipped.

MARKER STRIP MATERIAL: 1⁄32″ Black Fibre; Also Available in 1⁄32″ XP Phenolic.

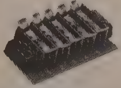
* Marker strip part numbers shown are "single sided" not imprinted type that extend out on only one side; equivalent "double" type strips extending out on both sides also available. To order change second field to 14. To order imprinted marker strips change fourth field from 010 to 011.

(CD) Indicates items normally available through Cinch Distributors.

TRW® CINCH CONNECTORS

341/342 SERIES

BARRIER TERMINAL BLOCKS AND MARKER STRIPS



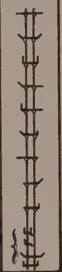
354-32-05-001 341 Series Barrier Terminal Block with 364-11-05-011 Marker Strip (Imprinted)

Similar to 141 and 142 Series except equipped with solderless-type terminals to accommodate either AMP tab receptacles or Ark-Les quick connects. (Contact manufacturer for exact part number.) Terminal sizes available are 1-20 for the 341 Series and 1-17 for the 342. A variety of terminal types are available for each series as shown. Refer to dimensional drawings for terminal centers. Materials and finishes are described below. Electrical ratings are shown on inside front cover.

"Single" or "double" type marker strips can be supplied to mount beneath barrier block and afford insulation from metal mounting surfaces. Terminal designations can be imprinted on marker strips as described on page 12.

9 different types of terminals can be supplied with any of the 341 or 342 Series barrier blocks. Identify these types by changing the **second field** of the part number to match the 341 or 342 series number opposite the desired terminal drawing below. For example, to order a 5-terminal 341 Series with both terminals at right angles (Type C), signify part no. 354-33-05-001. In addition, there are 4 more terminal types as shown which can be ordered in combination with the 9 regular terminal types. To order any of these 4 "combination" types, write direct to the factory for more further information, enclosing detailed drawings where possible.

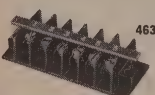
PART NUMBER ORDERING INFORMATION

Insert in 2nd Field 341 Series	Insert in 2nd Field 342 Series	Terminal Drawing	Terminal Type
31	21		A
32	22		B
33	23		C
34	24		D
35	25		E
36	26		F
37	27		G
38	28		H
39	29		J
Combination Types			

NO. OF TERMINALS	341 SERIES BARRIER BLOCKS† With Solderless Terminals	341 SERIES MARKER STRIPS* (CD)	342 SERIES BARRIER BLOCKS† With Solderless Terminals	342 SERIES MARKER STRIPS* (CD)
1	354-31-01-001	364-11-01-010	355-21-01-001	365-11-01-010
2	354-31-02-001	364-11-02-010	355-21-02-001	365-11-02-010
3	354-31-03-001	364-11-03-010	355-21-03-001	365-11-03-010
4	354-31-04-001	364-11-04-010	355-21-04-001	365-11-04-010
5	354-31-05-001	364-11-05-010	355-21-05-001	365-11-05-010
6	354-31-06-001	364-11-06-010	355-21-06-001	365-11-06-010
7	354-31-07-001	364-11-07-010	355-21-07-001	365-11-07-010
8	354-31-08-001	364-11-08-010	355-21-08-001	365-11-08-010
9	354-31-09-001	364-11-09-010	355-21-09-001	365-11-09-010
10	354-31-10-001	364-11-10-010	355-21-10-001	365-11-10-010
11	354-31-11-001	364-11-11-010	355-21-11-001	365-11-11-010
12	354-31-12-001	364-11-12-010	355-21-12-001	365-11-12-010
13	354-31-13-001	364-11-13-010	355-21-13-001	365-11-13-010
14	354-31-14-001	364-11-14-010	355-21-14-001	365-11-14-010
15	354-31-15-001	364-11-15-010	355-21-15-001	365-11-15-010
16	354-31-16-001	364-11-16-010	355-21-16-001	365-11-16-010
17	354-31-17-001	364-11-17-010	355-21-17-001	365-11-17-010
18	354-31-18-001	364-11-18-010		
19	354-31-19-001	364-11-19-010		
20	354-31-20-001	364-11-20-010		

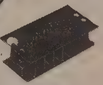
540 SERIES

BARRIER TERMINAL BLOCKS AND MARKER STRIPS



Drive Pin 463-10-22-015

353-21-06-001 Barrier Terminal Block with 363-21-06-071 Marker Strip (Imprinted)



353-21-06-001 Barrier Terminal Block with 363-31-06-020 "Cover"

Available in 1 to 31 terminal sizes with standard, "W," "¾W" and "Y" type terminals. Particularly recommended when electrical and mechanical performance requirements are especially critical. Same terminal centers (⅜") as 140 Series. Also uses same 5-40 binder head screws. Otherwise, has higher and wider barriers. Extra material between barriers at the base strengthens construction and maintains same ½" creepage distance between terminal to terminal and terminal to ground. Terminal designations can be imprinted on this base. Materials and finishes are described below. Electrical ratings are shown on inside front cover.

Bottoms are closed so that insulating strips are not required. However, knockouts are molded into the base so that "Y" terminals can be accommodated if desired. A top-mounted marker strip, ¼" wide is available and can be imprinted with ⅛" numbers or a "double" marker strip can be used as a "cover" with one end position slotted to facilitate swinging the cover clear for quick inspection. Character designations can be imprinted on one or both sides of the cover if desired as described on page 12.

540 SERIES PART NUMBER ORDERING INFORMATION

NO. OF TERMINALS	STANDARD TERMINAL (CD) 5-40 x ¼ B.H. Screws	"W" TYPE TERMINAL 5-40 x ¼ B.H. Screws	"¾W" TYPE TERMINAL 5-40 x ¼ B.H. Screws	"Y" TYPE TERMINAL 5-40 x ¼ B.H. Screws	540 SERIES TOP-MOUNTED MARKER STRIPS§ (CD)	540 SERIES COVERS‡¶ (DOUBLE MARKER STRIPS)
1	353-21-01-001	353-26-01-001	353-27-01-001	353-28-01-001	363-21-01-070	363-31-01-020
2	353-21-02-001	353-26-02-001	353-27-02-001	353-28-02-001	363-21-02-070	363-31-02-020
3	353-21-03-001	353-26-03-001	353-27-03-001	353-28-03-001	363-21-03-070	363-31-03-020
4	353-21-04-001	353-26-04-001	353-27-04-001	353-28-04-001	363-21-05-070	363-31-04-020
5	353-21-05-001	353-26-05-001	353-27-05-001	353-28-05-001	363-21-05-070	363-31-05-020
6	353-21-06-001	353-26-06-001	353-27-06-001	353-28-06-001	363-21-06-070	363-31-06-020
7	353-21-07-001	353-26-07-001	353-27-07-001	353-28-07-001	363-21-07-070	363-21-07-020
8	353-21-08-001	353-26-08-001	353-27-08-001	353-28-08-001	363-21-08-070	363-31-08-020
9	353-21-09-001	353-26-09-001	353-27-09-001	353-28-09-001	363-21-09-070	363-31-09-020
10	353-21-10-001	353-26-10-001	353-27-10-001	353-28-10-001	363-21-10-070	363-31-10-020
11	353-21-11-001	353-26-11-001	353-27-11-001	353-28-11-001	363-21-11-070	363-31-11-020
12	353-21-12-001	353-26-12-001	353-27-12-001	353-28-12-001	363-21-12-070	363-31-12-020
13	353-21-13-001	353-26-13-001	353-27-13-001	353-28-13-001	363-21-13-070	363-31-13-020
14	353-21-14-001	353-26-14-001	353-27-14-001	353-28-14-001	363-21-14-070	363-31-14-020
15	353-21-15-001	353-26-15-001	353-27-15-001	353-28-15-001	363-21-15-070	363-31-15-020
16	353-21-16-001	353-26-16-001	353-27-16-001	353-28-16-001	363-21-16-070	363-31-16-020
17	353-21-17-001	353-26-17-001	353-27-17-001	353-28-17-001	363-21-17-070	363-31-17-020
18	353-21-18-001	353-26-18-001	353-27-18-001	353-28-18-001	363-21-18-070	363-31-18-020
19	353-21-19-001	353-26-19-001	353-27-19-001	353-28-19-001	363-21-19-070	363-31-19-020
20	353-21-20-001	353-26-20-001	353-27-20-001	353-28-20-001	363-21-20-070	363-31-20-020
21	353-21-21-001	353-26-21-001	353-27-21-001	353-28-21-001	363-21-21-070	363-31-21-020
22	353-21-22-001	353-26-22-001	353-27-22-001	353-28-22-001	363-21-22-070	363-31-22-020
23	353-21-23-001	353-26-23-001	353-27-23-001	353-28-23-001	363-21-23-070	363-31-23-020
24	353-21-24-001	353-26-24-001	353-27-24-001	353-28-24-001	363-21-24-070	363-31-24-020
25	353-21-25-001	353-26-25-001	353-27-25-001	353-28-25-001	363-21-25-070	363-31-25-020
26	353-21-26-001	353-26-26-001	353-27-26-001	353-28-26-001	363-21-26-070	363-31-26-020
27	353-21-27-001	353-26-27-001	353-27-27-001	353-28-27-001	363-21-27-070	363-31-27-020
28	353-21-28-001	353-26-28-001	353-27-28-001	353-28-28-001	363-21-28-070	363-31-28-020
29	353-21-29-001	353-26-29-001	353-27-29-001	353-28-29-001	363-21-29-070	363-31-29-020
30	353-21-30-001	353-26-30-001	353-27-30-001	353-28-30-001	363-21-30-070	363-31-30-020
31	353-21-31-001	353-26-31-001	353-27-31-001	353-28-31-001	363-21-31-070	363-31-31-020

INSULATOR MATERIAL: General Purpose Black Phenolic; Other Materials Available.
TERMINAL and SCREW MATERIAL and FINISH: Brass, Nickel-Plated.
"W," "¾W" and "Y" TERMINAL MATERIAL and FINISH: Brass, Hot Solder Dipped.

* Marker strip part numbers shown are "single sided" not imprinted type that extend out on only one side; equivalent "double" type strips extending out on both sides also available. To order change second field to 14. To order imprinted marker strips change fourth field from 010 to 011.

† See information on "341 and 342 Series Terminals" on how to signify desired terminal type by changing second field part numbers above. "31" and "21" are given as examples.

341 and 342 SERIES TERMINAL MATERIAL and FINISH: Brass, Cadmium-Plated.
341 and 342 SERIES MARKER STRIP MATERIAL: 1/32" Black Fibre; Also Available in 1/32" XP Phenolic.

‡ 17/64" spacers should be used with the 540 Series cover available on special request.

§ TOP-MOUNTED MARKER STRIP MATERIAL: 1/16" XP Phenolic.

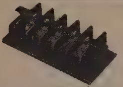
¶ COVER (DOUBLE MARKER STRIP) MATERIAL: 1/32" XP Phenolic.

(CD) Indicates items normally available through Cinch Distributors.

TRW® CINCH CONNECTORS

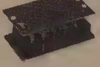
541 SERIES

BARRIER TERMINAL BLOCKS AND ACCESSORIES



Drive Pin
463-10-22-014

354-61-05-001 Barrier Terminal Block with 364-61-05-071 Marker Strip (Imprinted)



354-61-05-001 Barrier Terminal Block with 364-71-05-020 "Cover"

Available in 1 to 30 terminal sizes with standard, "W," "¾W" and "Y" type terminals. Ideal for higher voltage requirements. Same terminal centers (7/16″) as 141 Series. 6-32 binder head screws. Has higher and wider barriers with extra material between barriers at the base. Creepage distance is ⅝″ between terminal to terminal and terminal to ground. Terminal designations can be imprinted on base. Materials and finishes are described below. Electrical ratings are shown on inside front cover.

Insulating strips are not required because of closed bottoms on barrier block. However, "Y" terminals can still be accommodated if desired through use of knockouts molded into base. Top-mounted ¼″ wide marker strip is available and can be imprinted with ⅛″ numbers or a "double" marker strip can be used as a "cover" with one end position slotted to facilitate swinging clear. Cover can be imprinted with character designations on one or both sides as described on page 12.

541 SERIES PART NUMBER ORDERING INFORMATION

NO. OF TERMINALS	STANDARD TERMINAL 6-32 x ¼ (CD) B.H. Screws	"W" TYPE TERMINAL 6-32 x 5/16 B.H. Screws	"¾W" TYPE TERMINAL 6-32 x 5/16 B.H. Screws	"Y" TYPE TERMINAL 6-32 x 5/16 B.H. Screws	541 SERIES TOP-MOUNTED MARKER STRIPS (CD)	541 SERIES COVERS† (DOUBLE MARKER STRIPS)
1	354-61-01-001	354-66-01-001	354-67-01-001	354-68-01-001	364-61-01-070	364-71-01-020
2	354-61-02-001	354-66-02-001	354-67-02-001	354-68-02-001	364-61-02-070	364-71-02-020
3	354-61-03-001	354-66-03-001	354-67-03-001	354-68-03-001	364-61-03-070	364-71-03-020
4	354-61-04-001	354-66-04-001	354-67-04-001	354-68-04-001	364-61-04-070	364-71-04-020
5	354-61-05-001	354-66-05-001	354-67-05-001	354-68-05-001	364-61-05-070	364-71-05-020
6	354-61-06-001	354-66-06-001	354-67-06-001	354-68-06-001	364-61-06-070	364-71-06-020
7	354-61-07-001	354-66-07-001	354-67-07-001	354-68-07-001	364-61-07-070	364-71-07-020
8	354-61-08-001	354-66-08-001	354-67-08-001	354-68-08-001	364-61-08-070	364-71-08-020
9	354-61-09-001	354-66-09-001	354-67-09-001	354-68-09-001	364-61-09-070	364-71-09-020
10	354-61-10-001	354-66-10-001	354-67-10-001	354-68-10-001	364-61-10-070	364-71-10-020
11	354-61-11-001	354-66-11-001	354-67-11-001	354-68-11-001	364-61-11-070	364-71-11-020
12	354-61-12-001	354-66-12-001	354-67-12-001	354-68-12-001	364-61-12-070	364-71-12-020
13	354-61-13-001	354-66-13-001	354-67-13-001	354-68-13-001	364-61-13-070	364-71-13-020
14	354-61-14-001	354-66-14-001	354-67-14-001	354-68-14-001	364-61-14-070	364-71-14-020
15	354-61-15-001	354-66-15-001	354-67-15-001	354-68-15-001	364-61-15-070	364-71-15-020
16	354-61-16-001	354-66-16-001	354-67-16-001	354-68-16-001	364-61-16-070	364-71-16-020
17	354-61-17-001	354-66-17-001	354-67-17-001	354-68-17-001	364-61-17-070	364-71-17-020
18	354-61-18-001	354-66-18-001	354-67-18-001	354-68-18-001	364-61-18-070	364-71-18-020
19	354-61-19-001	354-66-19-001	354-67-19-001	354-68-19-001	364-61-19-070	364-71-19-020
20	354-61-20-001	354-66-20-001	354-67-20-001	354-68-20-001	364-61-20-070	364-71-20-020
21	354-61-21-001	354-66-21-001	354-67-21-001	354-68-21-001	364-61-21-070	364-71-21-020
22	354-61-22-001	354-66-22-001	354-67-22-001	354-68-22-001	364-61-22-070	364-71-22-020
23	354-61-23-001	354-66-23-001	354-67-23-001	354-68-23-001	364-61-23-070	364-71-23-020
24	354-61-24-001	354-66-24-001	354-67-24-001	354-68-24-001	364-61-24-070	364-71-24-020
25	354-61-25-001	354-66-25-001	354-67-25-001	354-68-25-001	364-61-25-070	364-71-25-020
26	354-61-26-001	354-66-26-001	354-67-26-001	354-68-26-001	364-61-26-070	364-71-26-020
27	354-61-27-001	354-66-27-001	354-67-27-001	354-68-27-001	364-61-27-070	364-71-27-020
28	354-61-28-001	354-66-28-001	354-67-28-001	354-68-28-001	364-61-28-070	364-71-28-020
29	354-61-29-001	354-66-29-001	354-67-29-001	354-68-29-001	364-61-29-070	364-71-29-020
30	354-61-30-001	354-66-30-001	354-67-30-001	354-68-30-001	364-61-30-070	364-71-30-020

542 SERIES

BARRIER TERMINAL BLOCKS AND ACCESSORIES

Drive Pin
463-10-22-014

355-31-04-001 Barrier Terminal Block with 365-31-04-071 Marker Strip (Imprinted)

355-31-04-001 Barrier Terminal Block with 365-41-04-020 "Cover"

Available in 1-26 terminal sizes with standard, "W," "¾W" and "Y" type terminals. Higher and wider barriers increase voltage ratings. Same 9/16″ terminal centers as 142 Series. Also uses 8-32 x 5/16″ binder head screws. Extra material between barriers at base adds strength and maintains same ¾″ creepage distance between terminal to terminal and terminal to ground. Terminal designations can be imprinted on base. Materials and finishes described below. Electrical ratings shown on inside front cover.

Bottoms are closed, eliminating need for insulating strips. Knockouts are molded into base to accommodate "Y" terminals if desired. Top mounted ¼″ wide marker strip is available and can be imprinted with ⅛″ numbers or a "double" marker strip can be used as a "cover" with one end position slotted to facilitate swinging clear for fast inspection. Character designations can be imprinted on one or both side of the cover if desired.

542 SERIES PART NUMBER ORDERING INFORMATION

NO. OF TERMINALS	STANDARD TERMINAL 8-32 x 5/16 (CD) B.H. Screws	"W" TYPE TERMINAL 8-32 x 5/16 B.H. Screws	"¾W" TYPE TERMINAL 8-32 x 5/16 B.H. Screws	"Y" TYPE TERMINAL 8-32 x 5/16 B.H. Screws	542 SERIES (CD) TOP-MOUNTED MARKER STRIPS	542 SERIES COVERS‡ (DOUBLE MARKER STRIPS)
1	355-31-01-001	355-36-01-001	355-37-01-001	355-38-01-001	365-31-01-070	365-41-01-020
2	355-31-02-001	355-36-02-001	355-37-02-001	355-38-02-001	365-31-02-070	365-41-02-020
3	355-31-03-001	355-36-03-001	355-37-03-001	355-38-03-001	365-31-03-070	365-41-03-020
4	355-31-04-001	355-36-04-001	355-37-04-001	355-38-04-001	365-31-04-070	365-41-04-020
5	355-31-05-001	355-36-05-001	355-37-05-001	355-38-05-001	365-31-05-070	365-41-05-020
6	355-31-06-001	355-36-06-001	355-37-06-001	355-38-06-001	365-31-06-070	365-41-06-020
7	355-31-07-001	355-36-07-001	355-37-07-001	355-38-07-001	365-31-07-070	365-41-07-020
8	355-31-08-001	355-36-08-001	355-37-08-001	355-38-08-001	365-31-08-070	365-41-08-020
9	355-31-09-001	355-36-09-001	355-37-09-001	355-38-09-001	365-31-09-070	365-41-09-020
10	355-31-10-001	355-36-10-001	355-37-10-001	355-38-10-001	365-31-10-070	365-41-10-020
11	355-31-11-001	355-36-11-001	355-37-11-001	355-38-11-001	365-31-11-070	365-41-11-020
12	355-31-12-001	355-36-12-001	355-37-12-001	355-38-12-001	365-31-12-070	365-41-12-020
13	355-31-13-001	355-36-13-001	355-37-13-001	355-38-13-001	365-31-13-070	365-41-13-020
14	355-31-14-001	355-36-14-001	355-37-14-001	355-38-14-001	365-31-14-070	365-41-14-020
15	355-31-15-001	355-36-15-001	355-37-15-001	355-38-15-001	365-31-15-070	365-41-15-020
16	355-31-16-001	355-36-16-001	355-37-16-001	355-38-16-001	365-31-16-070	365-41-16-020
17	355-31-17-001	355-36-17-001	355-37-17-001	355-38-17-001	365-31-17-070	365-41-17-020
18	355-31-18-001	355-36-18-001	355-37-18-001	355-38-18-001	365-31-18-070	365-41-18-020
19	355-31-19-001	355-36-19-001	355-37-19-001	355-38-19-001	365-31-19-070	365-41-19-020
20	355-31-20-001	355-36-20-001	355-37-20-001	355-38-20-001	365-31-20-070	365-41-20-020
21	355-31-21-001	355-36-21-001	355-37-21-001	355-38-21-001	365-31-21-070	365-41-21-020
22	355-31-22-001	355-36-22-001	355-37-22-001	355-38-22-001	365-31-22-070	365-41-22-020
23	355-31-23-001	355-36-23-001	355-37-23-001	355-38-23-001	365-31-23-070	365-41-23-020
24	355-31-24-001	355-36-24-001	355-37-24-001	355-38-24-001	365-31-24-070	365-41-24-020
25	355-31-25-001	355-36-25-001	355-37-25-001	355-38-25-001	365-31-25-070	365-41-25-020
26	355-31-26-001	355-36-26-001	355-37-26-001	355-38-26-001	365-31-26-070	365-41-26-020

INSULATOR MATERIAL: General Purpose Black Phenolic; Other Materials Available.
TERMINAL and SCREW MATERIAL and FINISH: Brass, Nickel-Plated.
"W," "¾W" and "Y" TERMINAL MATERIAL and FINISH: Brass, Hot Solder Dipped.
† 5/16″ spacers should be used with the 541 Series cover available on special request.
‡ ⅜″ spacers should be used with the 542 Series cover available on special request.
TOP-MOUNTED MARKER STRIP MATERIAL: 1/16″ XP Phenolic.
COVER (DOUBLE MARKER STRIP) MATERIAL: 1/32″ XP Phenolic.
(CD) Indicates items normally available through Cinch Distributors.

TRW/CINCH CONNECTORS, AN ELECTRONIC COMPONENTS DIV. OF TRW INC. / 1501 MORSE AVE. / ELK GROVE VILLAGE, ILL. 60007

TRW® CINCH CONNECTORS

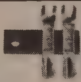
FANNING STRIPS

FOR CONNECTING TO BARRIER TERMINAL BLOCKS

161 Series Fanning Strip with Cable Clamp and 141 Series Barrier Terminal Block

Fanning strips serve as a convenient means for rapidly making and removing connections from barrier terminal blocks. They facilitate cable or harness wiring and minimize the possibility of subsequent wiring errors. Both straight and angle type fanning strips are available. Terminals are made of .032″ brass, cadmium-plated. The 3/32″ thick, ½″ wide XP black phenolic mounts are furnished with a hole, in either the right or left side, for securing the cable with lacing twine. For larger sizes, use of a cable clamp as shown on page 12 is recommended.

STRAIGHT TYPE FANNING STRIP PART NUMBER ORDERING INFORMATION

NO. OF TERMINALS	160 SERIES (CD) 327-11-02-001  Fits 140 Series Barrier Blocks ⅜″ Terminal Centers		160B SERIES 327-22-02-001 Fits 140 Series Barrier Blocks ⅜″ Terminal Centers		161 SERIES (CD) 327-31-02-001 Fits 141 Series Barrier Blocks 7/16″ Terminal Centers		162 SERIES (CD) 327-42-02-001 Fits 142 Series Barrier Blocks 9/16″ Terminal Centers	
	C.C. Hole on Left	C.C. Hole on Right	C.C. Hole on Left	C.C. Hole on Right	C.C. Hole on Left	C.C. Hole on Right	C.C. Hole on Left	C.C. Hole on Right
2	327-11-02-001	327-12-02-001	327-21-02-001	327-22-02-001	327-31-02-001	327-32-02-001	327-41-02-001	327-42-02-001
3	327-11-03-001	327-12-03-001	327-21-03-001	327-22-03-001	327-31-03-001	327-32-03-001	327-41-03-001	327-42-03-001
4	327-11-04-001	327-12-04-001	327-21-04-001	327-22-04-001	327-31-04-001	327-32-04-001	327-41-04-001	327-42-04-001
5	327-11-05-001	327-12-05-001	327-21-05-001	327-22-05-001	327-31-05-001	327-32-05-001	327-41-05-001	327-42-05-001
6	327-11-06-001	327-12-06-001	327-21-06-001	327-22-06-001	327-31-06-001	327-32-06-001	327-41-06-001	327-42-06-001
7	327-11-07-001	327-12-07-001	327-21-07-001	327-22-07-001	327-31-07-001	327-32-07-001	327-41-07-001	327-42-07-001
8	327-11-08-001	327-12-08-001	327-21-08-001	327-22-08-001	327-31-08-001	327-32-08-001	327-41-08-001	327-42-08-001
9	327-11-09-001	327-12-09-001	327-21-09-001	327-22-09-001	327-31-09-001	327-32-09-001	327-41-09-001	327-32-09-001
10	327-11-10-001	327-12-10-001	327-21-10-001	327-22-10-001	327-31-10-001	327-32-10-001	327-41-10-001	327-42-10-001
11	327-11-11-001	327-12-11-001	327-21-11-001	327-22-11-001	327-31-11-001	327-32-11-001	327-41-11-001	327-42-11-001
12	327-11-12-001	327-12-12-001	327-21-12-001	327-22-12-001	327-31-12-001	327-32-12-001	327-41-12-001	327-42-12-001
13	327-11-13-001	327-12-13-001	327-21-13-001	327-22-13-001	327-31-13-001	327-32-13-001	327-41-13-001	327-42-13-001
14	327-11-14-001	327-12-14-001	327-21-14-001	327-22-14-001	327-31-14-001	327-32-14-001	327-41-14-001	327-42-14-001
15	327-11-15-001	327-12-15-001	327-21-15-001	327-22-15-001	327-31-15-001	327-32-15-001	327-41-15-001	327-42-15-001
16	327-11-16-001	327-12-16-001	327-21-16-001	327-22-16-001	327-31-16-001	327-32-16-001	327-41-16-001	327-42-16-001
17	327-11-17-001	327-12-17-001	327-21-17-001	327-22-17-001	327-31-17-001	327-32-17-001	327-41-17-001	327-42-17-001
18	327-11-18-001	327-12-18-001	327-21-18-001	327-22-18-001	327-31-18-001	327-32-18-001		
19	327-11-19-001	327-12-19-001	327-21-19-001	327-22-19-001	327-31-19-001	327-32-19-001		
20	327-11-20-001	327-12-20-001	327-21-20-001	327-22-20-001	327-31-20-001	327-32-20-001		
21	327-11-21-001	327-12-21-001	327-21-21-001	327-22-21-001				

ANGLE TYPE FANNING STRIP PART NUMBER ORDERING INFORMATION

NO. OF TERMINALS	 160A SERIES 327-14-02-001 Fits 140 Series Barrier Blocks ⅜″ Terminal Centers		160BA SERIES 327-23-02-001 Fits 140 Series Barrier Blocks ⅜″ Terminal Centers		 161A SERIES 327-34-02-001 Fits 141 Series Barrier Blocks 7/16″ Terminal Centers		162A SERIES 327-43-02-001 Fits 142 Series Barrier Blocks 9/16″ Terminal Centers	
	C.C. Hole on Left	C.C. Hole on Right	C.C. Hole on Left	C.C. Hole on Right	C.C. Hole on Left	C.C. Hole on Right	C.C. Hole on Left	C.C. Hole on Right
2	327-13-02-001	327-14-02-001	327-23-02-001	327-24-02-001	327-33-02-001	327-34-02-001	327-43-02-001	327-44-02-001
3	327-13-03-001	327-14-03-001	327-23-03-001	327-24-03-001	327-33-03-001	327-34-03-001	327-43-03-001	327-44-03-001
4	327-13-04-001	327-14-04-001	327-23-04-001	327-24-04-001	327-33-04-001	327-34-04-001	327-43-04-001	327-44-04-001
5	327-13-05-001	327-14-05-001	327-23-05-001	327-24-05-001	327-33-05-001	327-34-05-001	327-43-05-001	327-44-05-001
6	327-13-06-001	327-14-06-001	327-23-06-001	327-24-06-001	327-33-06-001	327-34-06-001	327-43-06-001	327-44-06-001
7	327-13-07-001	327-14-07-001	327-23-07-001	327-24-07-001	327-33-07-001	327-34-07-001	327-43-07-001	327-44-07-001
8	327-13-08-001	327-14-08-001	327-23-08-001	327-24-08-001	327-33-08-001	327-34-08-001	327-43-08-001	327-44-08-001
9	327-13-09-001	327-14-09-001	327-23-09-001	327-24-09-001	327-33-09-001	327-34-09-001	327-43-09-001	327-44-09-001
10	327-13-10-001	327-14-10-001	327-23-10-001	327-24-10-001	327-33-10-001	327-34-10-001	327-43-10-001	327-44-10-001
11	327-13-11-001	327-14-11-001	327-23-11-001	327-24-11-001	327-33-11-001	327-34-11-001	327-43-11-001	327-44-11-001
12	327-13-12-001	327-14-12-001	327-23-12-001	327-24-12-001	327-33-12-001	327-34-12-001	327-43-12-001	327-44-12-001
13	327-13-13-001	327-14-13-001	327-23-13-001	327-24-13-001	327-33-13-001	327-34-13-001	327-43-13-001	327-44-13-001
14	327-13-14-001	327-14-14-001	327-23-14-001	327-24-14-001	327-33-14-001	327-34-14-001	327-43-14-001	327-44-14-001
15	327-13-15-001	327-14-15-001	327-23-15-001	327-24-15-001	327-33-15-001	327-34-15-001	327-43-15-001	327-44-15-001
16	327-13-16-001	327-14-16-001	327-23-16-001	327-24-16-001	327-33-16-001	327-34-16-001	327-43-16-001	327-44-16-001
17	327-13-17-001	327-14-17-001	327-23-17-001	327-24-17-001	327-33-17-001	327-34-17-001	327-43-17-001	327-44-17-001
18	327-13-18-001	327-14-18-001	327-23-18-001	327-24-18-001	327-33-18-001	327-34-18-001		
19	327-13-19-001	327-14-19-001	327-23-19-001	327-24-19-001	327-33-19-001	327-34-19-001		
20	327-13-20-001	327-14-20-001	327-23-20-001	327-24-20-001	327-33-20-001	327-34-20-001		
21	327-13-21-001	327-14-21-001	327-23-21-001	327-24-21-001				

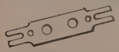
(CD) Indicates items normally available through Cinch Distributors.

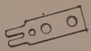
TRW/CINCH CONNECTORS, AN ELECTRONIC COMPONENTS DIV. OF TRW INC. / 1501 MORSE AVE. / ELK GROVE VILLAGE, ILL. 60007

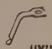
TRW® CINCH CONNECTORS

OPTIONAL TERMINALS, JUMPERS AND CABLE CLAMPS

SOLDER TERMINALS


"W"


"¾W"

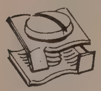

"Y"

"W," "¾W" and "Y" terminals are available optionally as separate terminals for use with 140, 141 and 142 Series barrier blocks as indicated below. Also specify hot solder dipped finish when ordering.

SOLDER TERMINALS PART NUMBER ORDERING INFORMATION

FOR:	"W" TYPE	"¾W" TYPE	"Y" TYPE
140 Series	495-11-11-017	495-11-11-019	495-12-11-016
141 Series	495-11-11-020	495-11-11-022	495-12-11-012
142 Series	495-11-11-023	495-11-11-025	495-12-11-011

QUICK-CLAMP* TERMINALS



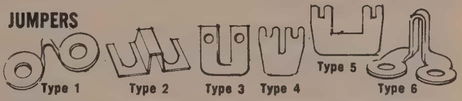
Simplifies engaging of wires to barrier blocks. Wire is inserted into flared opening and screw is tightened. Screws are nickel-plated brass, binder head type. Terminals are electro-tinned brass. Set includes two mating clamps and one screw. For use with 141 and 142 Series barrier blocks as shown below.

* Patent Pending

QUICK-CLAMP* TERMINALS PART NUMBER ORDERING INFORMATION

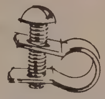
FOR:	PART NO.	WIRE GAUGES	SCREW SIZE
141 Series	422-14-11-143	14 thru 22	6-32 x 5⁄16"
142 Series	422-14-11-144	8 thru 16	8-32 x ⅜"

JUMPERS



Used for making permanent connections between adjacent barrier block terminals, except for type 5, which connects two alternate terminals bridging the intermediate terminal. Six types for use with 140, 141, 142, 540, 541 and 542 Series barrier blocks as shown. All jumpers are brass with nickel-plated satin finish.

CABLE CLAMPS



For use with "Jones" Fanning Strips shown on page 20. Recommended for securing the cable where at least several conductors are to be terminated with fanning strips. As indicated, six different inner diameter sizes are available. Clamps and 6-32 x ½" round head screws are brass, nickel-plated. For convenience cable clamps are supplied unassembled.

PART NUMBER ORDERING INFORMATION

JUMPERS			CABLE CLAMPS	
FOR:	PART NO.	TYPE	INNER DIA.	PART NO.
141 Series	422-13-11-026	1	¼"	422-04-11-109
142 Series	422-13-11-025	1	⅜"	422-04-11-110
140 Series	422-13-11-013	2	½"	422-04-11-111
141 Series	422-13-11-012	3	⅝"	422-04-11-112
142, 542 Series	422-13-11-028	4	¾"	422-04-11-113
142, 542 Series	422-13-11-027	5	⅞"	422-04-11-114
540 Series	422-13-11-029	6		
541 Series	422-13-11-030	6		
542 Series	422-13-11-031	6		

SEMS SCREW TERMINALS

The Sems screw termination, with integral lockwasher, permits rapid, permanent attachment of solid or stranded wire leads or spade lug terminations to the barrier terminal block. The lockwasher teeth cut into the termination material, assuring excellent electrical contact and the ability to withstand substantial strain and vibration.

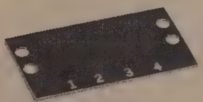
The Sems screws are nickel plated brass and the lockwasher is nickel plated phosphor bronze.

When ordering by ten digit manufacturing part number, change second digit from 11 to 12. (Example: 355-12-02-001)

When ordering by distributor part number, add letter (E). (Example: 2-140-E)

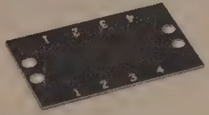
IMPRINTING INFORMATION ON MARKER STRIPS

"SINGLE" MARKER STRIPS



All "single" marker strips, extending out on only one side, as shown in this catalog, can be supplied at extra cost with terminal designations as desired, imprinted directly on the strips. Either 3⁄32" or ⅛" high letters, number, words or symbols can be imprinted in white. If no preference is given, the size best suited for the particular order will be used. Each imprinting order necessitates a set-up charge in addition to regular imprinting charges based on the number of characters and panels. Please make sure all imprinting instructions are clear and concise.

"DOUBLE" MARKER STRIPS



"Double" marker strips, extending out on both sides, can also have terminal designations imprinted at extra cost on one or two sides, if desired. Either 3⁄32" or ⅛" high letters, numbers, words or symbols can be imprinted in white and if no preference is given, the best suited size for the particular order will be used. When used as a "cover" for the 540, 541 or 542 Series, "double" marker strips can also be imprinted on either side, as specified. Regular imprinting and set-up charges apply. Please indicate whether the marker strip is being used as "double" or "cover."

SPECIAL TOP-MOUNTED MARKER STRIPS

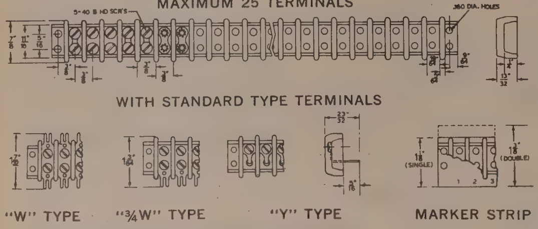
Special marker strips used on top of 540, 541 and 542 Series barrier blocks can be imprinted with terminal designations at extra cost. Either ⅛" letters, numbers, words or symbols can be imprinted in white. Each imprinting order requires both set-up and regular imprinting charges. Please make sure all necessary instructions are included.

TRW® CINCH CONNECTORS

MOUNTING DATA

140 SERIES DIMENSIONS

MAXIMUM 25 TERMINALS

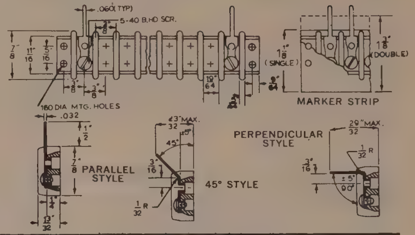

5-40 B HD SCR'S
.180 DIA. HOLES
7/8
11/16
5/16
3/8
3/8
7/64
13/32
1 7/32
1 5/64
23/32
1 1/8 (SINGLE)
1 5/8 (DOUBLE)
1
2
3

WITH STANDARD TYPE TERMINALS

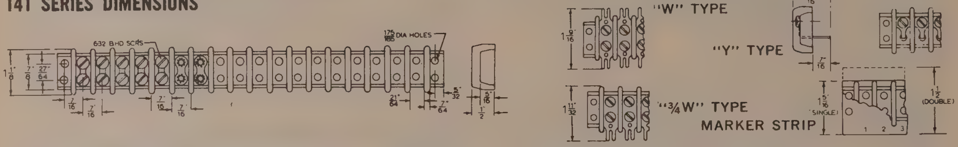
"W" TYPE "¾W" TYPE "Y" TYPE MARKER STRIP

140 SERIES (WRAPOST) TERMINALS

MAXIMUM 25 TERMINALS

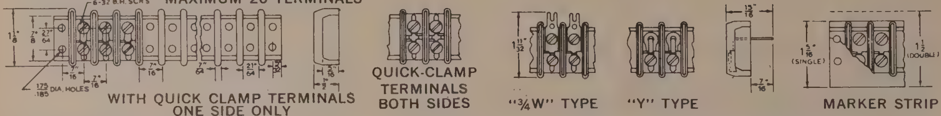

.060 (TYP)
5-40 B.HD SCR.
7/8
11/16
5/16
3/8
3/8
19/64
1 1/8 (SINGLE)
1 5/8 (DOUBLE)
MARKER STRIP
.180 DIA. MTG. HOLES
.032
1/2
7/8 PARALLEL STYLE
23/32 MAX.
45°
3/16
45° STYLE
1/32 R
29/32 MAX.
PERPENDICULAR STYLE
1/32 R
3/16
±5°
90°
13/32

141 SERIES DIMENSIONS


632 B HD SCR'S
.175/.185 DIA HOLES
1 1/8
7/8
27/64
7/16
7/16
7/16
7/16
21/64
5/32
7/64
5/16
1/2
"W" TYPE
1 9/16
15/16
"Y" TYPE
7/16
1 11/32
"¾W" TYPE
MARKER STRIP
1 5/16 (SINGLE)
1 1/2 (DOUBLE)
1
2
3

141 SERIES (QUICK-CLAMP) DIMENSIONS

MAXIMUM 20 TERMINALS


6-32 B.H. SCR'S
1 1/8
7/8
27/64
.175/.185 DIA. HOLES
7/16
7/16
7/16
7/64
21/64
5/32
5/16
1/2
1 11/32
13/16
7/16
1 5/16 (SINGLE)
1 1/2 (DOUBLE)

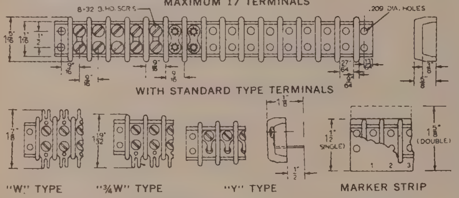
WITH QUICK CLAMP TERMINALS ONE SIDE ONLY

QUICK-CLAMP TERMINALS BOTH SIDES

"¾W" TYPE "Y" TYPE MARKER STRIP

142 SERIES DIMENSIONS

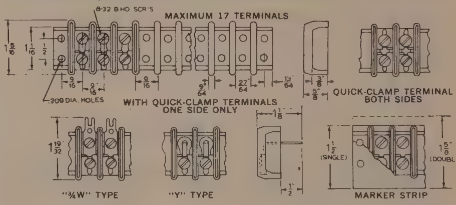
MAXIMUM 17 TERMINALS


8-32 B.HD. SCR'S
.209 DIA. HOLES
1 5/16
1 1/16
1/2
9/16
9/16
9/16
27/64
5/64
5/16
5/8
1 7/8
1 19/32
1 1/8
1 1/2 (SINGLE)
1 5/8 (DOUBLE)
1/2
1
2
3

WITH STANDARD TYPE TERMINALS

"W" TYPE "¾W" TYPE "Y" TYPE MARKER STRIP

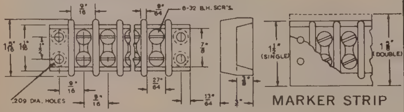
142 SERIES (QUICK-CLAMP) DIMENSIONS


8-32 B HD SCR'S
MAXIMUM 17 TERMINALS
1 5/16
1 1/16
1/2
.209 DIA. HOLES
9/16
9/16
9/16
9/64
27/64
5/64
5/16
5/8
QUICK-CLAMP TERMINAL BOTH SIDES
1 19/32
1 1/8
1 1/2 (SINGLE)
1 5/8 (DOUBLE)
1/2
"¾W" TYPE
"Y" TYPE
MARKER STRIP

WITH QUICK-CLAMP TERMINALS ONE SIDE ONLY

142 SERIES (SPECIAL) DIMENSIONS

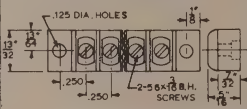
MAXIMUM 4 TERMINALS


9/16
9/16
8-32 B.H. SCR'S
1 5/16
1 1/16
1/2
7/8
27/64
.209 DIA. HOLES
9/16
9/16
13/64
5/8
1 1/2 (SINGLE)
1 5/8 (DOUBLE)

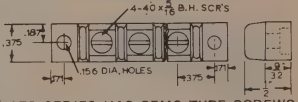
MARKER STRIP

171 SERIES DIMENSIONS

MAXIMUM 8 TERMINALS


.125 DIA. HOLES
1/8
13/32
1/4
.250
.250
2-56 x 3/16 B.H. SCREWS
3/32
5/16

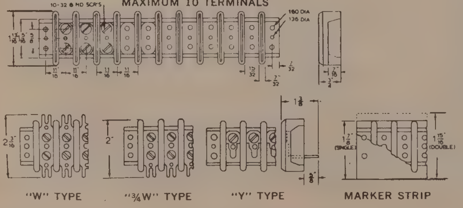
173/174 SERIES DIMENSIONS


4-40 x 5/16 B.H. SCR'S
.187
.375
.156 DIA. HOLES
.171
.375
.171
9/32
1/2

*173 SERIES HAS SEMS TYPE SCREWS
174 SERIES HAS PLAIN TYPE.

150 SERIES DIMENSIONS

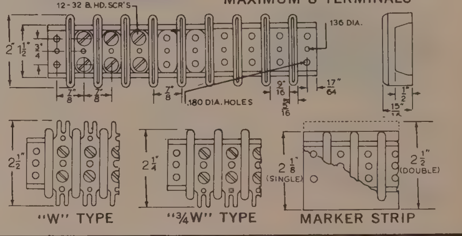
MAXIMUM 10 TERMINALS


10-32 B HD SCR'S
.180 DIA
.136 DIA
11/16
11/16
11/16
1/32
7/32
3/4
1 3/8
2 3/16
2
1 1/2 (SINGLE)
1 15/16 (DOUBLE)
3/8

"W" TYPE "¾W" TYPE "Y" TYPE MARKER STRIP

151 SERIES DIMENSIONS

MAXIMUM 8 TERMINALS

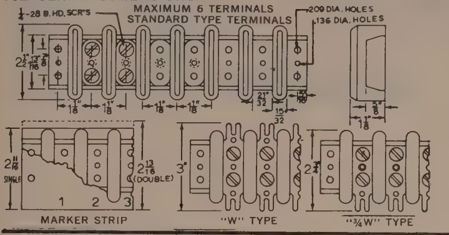

12-32 B.HD. SCR'S
.136 DIA.
2
1 1/2
3/4
7/8
7/8
7/8
.180 DIA. HOLES
9/16
3/16
17/64
1/2
15/16
2 1/2
2 1/4
2 1/8 (SINGLE)
2 1/2 (DOUBLE)

"W" TYPE "¾W" TYPE MARKER STRIP

TRW® CINCH CONNECTORS

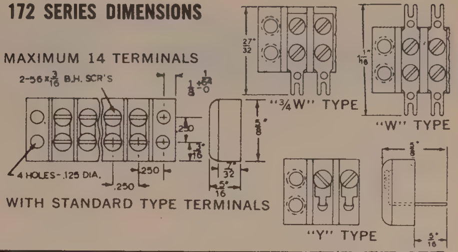
MOUNTING DATA

152 SERIES DIMENSIONS



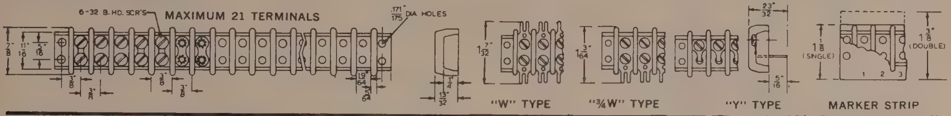
1/4-28 B. HD. SCR'S
MAXIMUM 6 TERMINALS
STANDARD TYPE TERMINALS
.209 DIA. HOLES
.136 DIA. HOLES
(DOUBLE)
SINGLE
MARKER STRIP
"W" TYPE
"3/4W" TYPE

172 SERIES DIMENSIONS



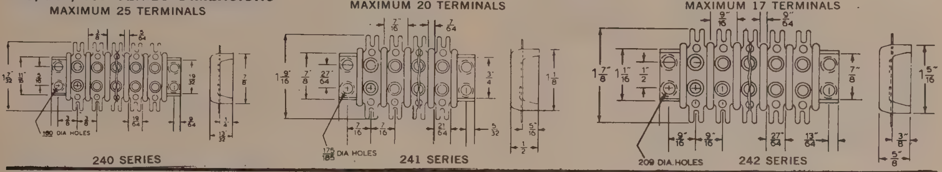
MAXIMUM 14 TERMINALS
2-56 x 3/16 B.H. SCR'S
4 HOLES-.125 DIA.
.250
WITH STANDARD TYPE TERMINALS
"3/4W" TYPE
"W" TYPE
"Y" TYPE

164 SERIES DIMENSIONS



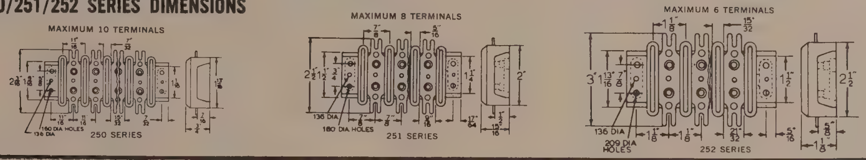
6-32 B. HD. SCR'S
MAXIMUM 21 TERMINALS
.171/.175 DIA HOLES
(SINGLE)
(DOUBLE)
"W" TYPE
"3/4W" TYPE
"Y" TYPE
MARKER STRIP

240/241/241 SERIES DIMENSIONS



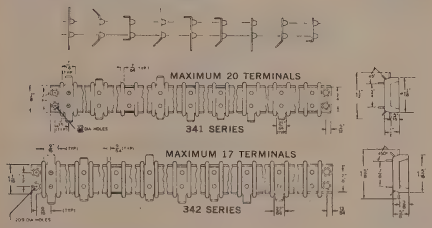
MAXIMUM 25 TERMINALS
.180 DIA HOLES
240 SERIES
MAXIMUM 20 TERMINALS
.175/.185 DIA HOLES
241 SERIES
MAXIMUM 17 TERMINALS
.209 DIA. HOLES
242 SERIES

250/251/252 SERIES DIMENSIONS



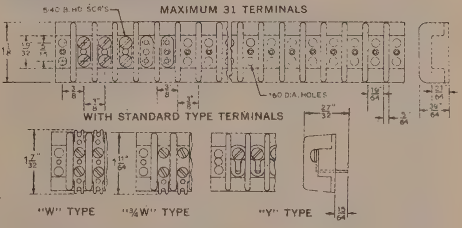
MAXIMUM 10 TERMINALS
.160 DIA HOLES
.136 DIA
250 SERIES
MAXIMUM 8 TERMINALS
.136 DIA
.180 DIA. HOLES
251 SERIES
MAXIMUM 6 TERMINALS
.136 DIA
.209 DIA HOLES
252 SERIES

341/342 SERIES DIMENSIONS



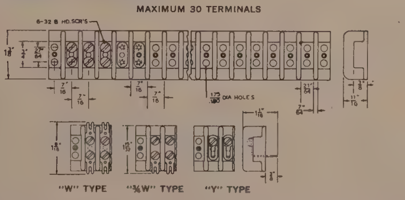
MAXIMUM 20 TERMINALS
DIA HOLES
341 SERIES
MAXIMUM 17 TERMINALS
.209 DIA HOLES
342 SERIES

540 SERIES DIMENSIONS



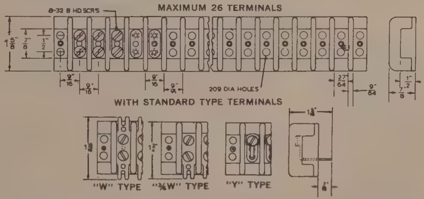
5-40 B. HD. SCR'S
MAXIMUM 31 TERMINALS
.160 DIA. HOLES
WITH STANDARD TYPE TERMINALS
"W" TYPE
"3/4W" TYPE
"Y" TYPE

541 SERIES DIMENSIONS



MAXIMUM 30 TERMINALS
6-32 B HD. SCR'S
.175/.180 DIA HOLES
"W" TYPE
"3/4W" TYPE
"Y" TYPE

542 SERIES DIMENSIONS



8-32 B HD SCRS
MAXIMUM 26 TERMINALS
.209 DIA HOLES
WITH STANDARD TYPE TERMINALS
"W" TYPE
"3/4W" TYPE
"Y" TYPE

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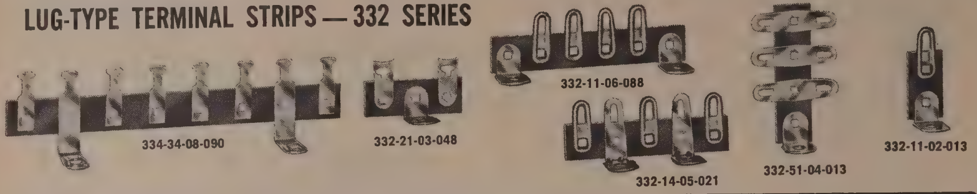
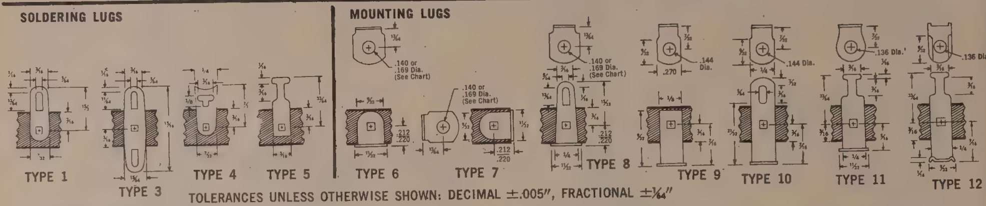
TRW® CINCH CONNECTORS

LUG-TYPE TERMINAL STRIPS — 332 SERIES





TOLERANCES UNLESS OTHERWISE SHOWN: DECIMAL ±.005″, FRACTIONAL ±¹⁄₆₄″

Two-lug to nine-lug strips made of ¹⁄₁₆″ thick by ⅜″ wide polyester UL approved 94V0 with cadmium plated steel lugs securely eyeletted in position. Brass lugs also available on request. ⅜″ or ½″ terminal centers. The chart above illustrates (with dimensions) the various soldering and mounting lug types available. These type numbers are shown in the part number listings below to designate the exact lug used in each position on the strip, in sequence from left to right.

TWO-LUG TERMINAL STRIP PART NUMBERS

Part No.	Lug Types Used In Positions: 1	2	Spacing Between Lugs	Terminal Strip Length	Mtg. Hole Dia.
332-11-02-001 (CD)	1	6	⅜″†	¾″	.140″
332-11-02-024 (CD)	6	1	⅜″†	¾″	.140″
332-14-02-001 (CD)	1	8	⅜″†	¾″	.140″
332-14-02-005 (CD)	8	1	⅜″†	¾″	.140″
332-11-02-013 (CD)	2	7	⅜″	¾″	.140″‡
332-51-02-003	3	7	⅜″	¾″	.140″

THREE-LUG TERMINAL STRIP PART NUMBERS

Part No.	Lug Types Used In Positions: 1	2	3	Spacing Between Lugs	Terminal Strip Length	Mtg. Hole Dia.
332-11-03-044 (CD)	6	1	1	⅜″	1⅛″	.140″
332-11-03-028 (CD)	1	6	1	⅜″†	1⅛″	.140″‡
332-11-03-051	1	1	6	⅜″	1⅛″	.140″
332-14-03-013 (CD)	8	1	1	⅜″	1⅛″	.140″
332-14-03-010 (CD)	1	8	1	⅜″†	1⅛″	.140″‡
332-14-03-017	1	1	8	⅜″	1⅛″	.140″
332-13-03-001*	1	9	1	⅜″	1⅛″	.144″
332-15-03-009*	1	10	1	⅜″	1⅛″	.144″
332-51-03-007*	3	3	7	⅜″	1⅛″	.140″
332-21-03-048*	4	6	4	⅜″	1⅛″	.140″
332-34-03-013*	5	11	5	⅜″	1⅛″	.136″
332-31-03-102*	5	6	5	⅜″	1⅛″	.140″

FOUR-LUG TERMINAL STRIP PART NUMBERS

Part No.	Lug Types Used In Positions: 1	2	3	4	Spacing Between Lugs	Terminal Strip Length	Mtg. Hole Dia.
332-11-04-082*	6	1	1	1	⅜″	1½″	.140″
332-11-04-068	1	6	1	1	⅜″	1½″	.140″
332-11-04-060	1	1	6	1	⅜″	1½″	.140″
332-11-04-074*	1	1	1	6	⅜″	1½″	.140″
332-14-04-037*	8	1	1	1	⅜″	1½″	.140″
332-14-04-022 (CD)	1	8	1	1	⅜″	1½″	.140″
332-14-04-061	1	1	8	1	⅜″	1½″	.140″
332-14-04-026*	1	1	1	8	⅜″	1½″	.140″
332-51-04-013*	3	3	3	7	⅜″	1½″	.140″
334-34-04-099*	5	12	5	5	½″	1⅞″	.133″

FIVE-LUG TERMINAL STRIP PART NUMBERS

Part No.	Lug Types Used In Positions: 1	2	3	4	5	Spacing Between Lugs	Terminal Strip Length	Mtg. Hole Dia.	Mtg. Centers
332-11-05-120*	1	6	1	1	1	⅜″†	1⅞″	.140″	—
332-11-05-092 (CD)	1	1	6	1	1	⅜″†	1⅞″	.140″‡	—
332-11-05-096*	1	1	1	6	1	⅜″	1⅞″	.140″	—
332-11-05-055 (CD)	1	6	1	6	1	⅜″	1⅞″	.140″	¾″
332-14-05-089*	1	8	1	1	1	⅜″†	1⅞″	.140″	—
332-14-05-034 (CD)	1	1	8	1	1	⅜″†	1⅞″	.140″‡	—
332-14-05-112*	1	1	1	8	1	⅜″	1⅞″	.140″	—
332-14-05-021 (CD)	1	8	1	8	1	⅜″	1⅞″	.140″	¾″
332-13-05-018*	1	1	9	1	1	⅜″	1⅞″	.144″	—
332-15-05-010*	1	1	10	1	1	⅜″	1⅞″	.144″	—
332-21-05-066*	4	4	6	4	4	⅜″	1⅞″	.140″	—
332-34-05-060*	5	5	11	5	5	⅜″	1⅞″	.136″	—
334-34-05-088*	5	5	12	5	5	½″	2⅜″	.133″	—

SIX-LUG TERMINAL STRIP PART NUMBERS

Part No.	Lug Types Used In Positions: 1	2	3	4	5	6	Spacing Between Lugs	Terminal Strip Length	Mtg. Hole Dia.	Mtg. Centers
332-11-06-088 (CD)	6	1	1	1	1	6	⅜″	2¼″	.140″	1⅞″
332-14-06-032 (CD)	8	1	1	1	1	8	⅜″	2¼″	.140″	1⅞″
334-34-06-091*	5	5	12	5	5	5	½″	2⅞″	.136″	—
332-34-06-294*	5	5	5	12	5	5	⅜″†	2¼″	.136″	—

SEVEN-LUG TERMINAL STRIP PART NUMBERS

Part No.	Lug Types Used In Positions: 1	2	3	4	5	6	7	Spacing Between Lugs	Terminal Strip Length	Mtg. Hole Dia.	Mtg. Centers
332-11-07-231*	1	1	1	6	1	1	1	⅜″	2⅝″	.140″	—
332-11-07-106 (CD)	6	1	1	1	1	1	6	⅜″	2⅝″	.140″	2¼″
332-11-07-108 (CD)	1	6	1	1	1	6	1	⅜″	2⅝″	.140″	1½″
332-14-07-039 (CD)	8	1	1	1	1	1	8	⅜″	2⅝″	.140″	2¼″
332-14-07-041 (CD)	1	8	1	1	1	8	1	⅜″	2⅝″	.140″	1½″
332-34-07-226*	5	5	5	12	5	5	5	⅜″†	2⅝″	.136″	—
334-34-07-098*	12	5	5	5	5	5	12	½″	3⅜″	.136″	3″

EIGHT LUG TERMINAL STRIP PART NUMBERS

Part No.	Lug Types Used In Positions: 1	2	3	4	5	6	7	8	Spacing Between Lugs	Terminal Strip Length	Mtg. Hole Dia.	Mtg. Centers
332-11-08-110 (CD)	1	6	1	1	1	1	6	1	⅜″	3″	.140″	1⅞″
332-11-08-111 (CD)	6	1	1	1	1	1	1	6	⅜″	3″	.140″	2⅝″
332-14-08-042 (CD)	1	8	1	1	1	1	8	1	⅜″	3″	.140″	1⅞″
332-14-08-045 (CD)	8	1	1	1	1	1	1	8	⅜″	3″	.140″	2⅝″
334-34-08-090*	5	12	5	5	5	5	12	5	½″	3⅞″	.136″	2½″

NINE-LUG TERMINAL PART NUMBERS

Part No.	Lug Types Used In Positions: 1	2	3	4	5	6	7	8	9	Spacing Between Lugs	Terminal Strip Length	Mtg. Hole Dia.	Mtg. Centers
332-34-09-297	12	5	5	5	5	5	5	12	5	⅜″	3⅜″	.136″	2⅝″

*Available for large volume requirements only; consult factory for details.

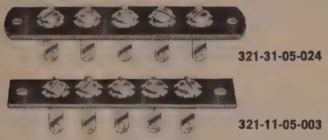
†Also available with ½″ spacing between lugs.

‡Also available with .169″ diameter mounting holes.

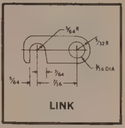
(CD) indicates items normally available through Cinch Distributors.

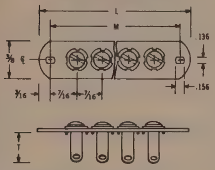
TRW® CINCH CONNECTORS

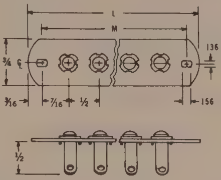
MINIATURE TERMINAL STRIPS — 321 SERIES



Screw type binding posts available with 7/16″, 15/32″, ½″, 21/32″, or ¾″ terminal centers in sizes as shown below. Insulation is polyester UL approved 94VO, 1/16″ thick for 1 to 6 terminal sizes, 3/32″ thick for all others. Screws are No. 6-32 x ⅜″ cadmium plated steel, binder head. Terminals are .032″ brass, cadmium plated. The link shown as Part No. 422-13-22-003 is .032″ cold rolled steel and can be swung to either right or left. Screw and terminal assembly can be ordered separately as shown.







7/16″ TERMINAL CENTERS

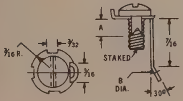
Part No. Ⓒᴅ	No. of Lugs	Dim. L	Dim. M	Dim. T
321-11-01-003	1	1¼″	.875″	½″
321-11-02-013	2	1 11/16″	1.3125″	½″
321-11-03-011	3	2⅛″	1.750″	½″
321-11-04-005	4	2 9/16″	2.1875″	½″
321-11-05-003	5	3″	2.625″	½″
321-11-06-001	6	3 7/16″	3.0625″	½″
321-11-07-001	7	3⅞″	3.500″	15/32″
321-11-08-001	8	4 5/16″	3.9375″	15/32″
321-11-09-001*	9	4¾″	4.375″	15/32″
321-11-10-001	10	5 3/16″	4.8125″	15/32″

½″ TERMINAL CENTERS

Part No.	No. of Lugs	Dim. L	Dim. M
321-31-02-052	2	1¾″	1.375″
321-31-03-033*	3	2¼″	1.875″
321-31-04-023*	4	2¾″	2.375″
321-31-05-024*	5	3¼″	2.875″

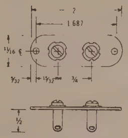
*Available for large volume requirements only; consult factory for details.
Ⓒᴅ Indicates items normally available through Cinch Distributors.

SCREW & TERMINAL ASSEMBLY

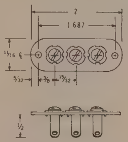


Part No. 494-26-03-045 (As Shown)
A = 5/32″, B = .089″
Part No. 494-26-03-035
(No 30° Bend in Tail)
A = ¼″, B = .093″

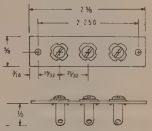
¾″ Terminal Centers
321-51-02-002



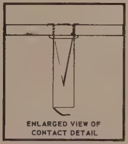
15/32″ Terminal Centers
321-51-03-004

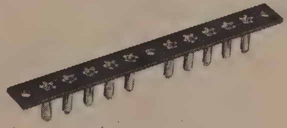


21/32″ Terminal Centers
321-51-03-003*



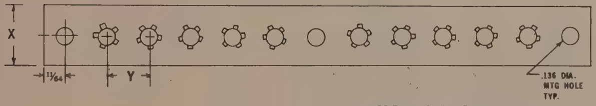
WIRE-GRIP TERMINAL STRIPS — 336 SERIES

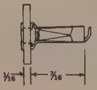




Cinch wire-grip* terminal strips provide the ideal quick, low cost termination for radio . . . TV . . . phonograph chassis assembly. Patented solder well construction holds wires securely to facilitate multiple-dipping or individual soldering. Strips available in lengths up to 26 positions including mounting holes. Insulator material ½″ wide by 1/16″ thick is available in laminated phenolic, Stradoclad 102, or UTS 1478, or GPO-2. Terminal material is brass, available in either cadmium or electroless-tin finish. .136″ diameter holes available in any position for use with eyelets or screws.

TYPICAL ASSEMBLY DIMENSIONS





When X is	Y is
½″	.343
⅜″	.300

HOW TO ORDER

SPECIFY

1. No. of Terminals.
2. List Terminals (T) and Mounting Holes (MH) by Position.
3. Choose insulator material . . .
   a. Laminated Phenolic (Stradoclad 102)
   b. Laminated Phenolic (UTS, 1478)
   c. (GPO-2)
4. Terminal Finish . . . Electroless Tin Plate.

*Manufactured under license agreement with Malco Manufacturing Company.

EXAMPLE: (as for typical assembly shown above)

1. 10 Terminals.
2. Pos. 1-MH, Pos. 2-T, Pos. 3-T
   Pos. 4-T, Pos. 5-T, Pos. 6-T
   Pos. 7-MH, Pos. 8-T, Pos. 9-T
   Pos. 10-T, Pos. 11-T, Pos. 12-T
   Pos. 13-MH
3. UTS 1478 Laminated Phenolic.
4. Plated Electro Tin.

TRW/CINCH CONNECTORS, AN ELECTRONIC COMPONENTS DIV. OF TRW INC. / 1501 MORSE AVE. / ELK GROVE VILLAGE, ILL. 60007

TRW® CINCH CONNECTORS

FLAME PROOF REQUIREMENTS For those who must consider the new requirements for flamability, all materials used in the parts listed in this catalog are considered self-extinguishing, and will, in general meet the UL requirements of Group II. Please consult factory for availability of parts meeting SE-1 or SE-0 as many are available on order.

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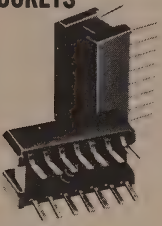
TRW® CINCH CONNECTORS

DIP SOCKETS

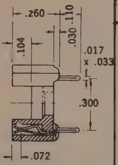


These dual-inline package sockets are designed for testing, prototype or production applications. They offer excellent resistance to corrosive atmospheres and to extremes of temperature and humidity. The unique bowed contact provides high contact forces, yet permits easy insertion and removal of the DIP.

The sockets will accept any standard 14, 16 or 24-lead DIP with round or flat centers. The socket leads are on the same centers as the DIP leads so the sockets can be used with PC boards designed for direct insertion of the DIP.

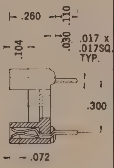
Cinch DIP sockets are available with diallyl phthalate, GP black phenolic or glass nylon insulation. Contacts on PC and solder tail versions are beryllium copper, and on wirewound versions are phosphor bronze. Contact plating is gold or electro-tin plate.

DIP SOCKET WITH .017 x .033 TAILS .110 LONG


.260
.110
.030
.104
.017
x .033
.300
.072

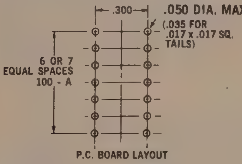
Part No.	Con-tacts	Insulator	Contacts
133-51-92-072	14	Diallyl Phthalate	Gold Plated
133-51-92-071	14	Diallyl Phthalate	Electro-Tin
133-51-02-073	14	GP Black Phenolic	Electro-Tin
133-51-02-074	14	GP Black Phenolic	Gold Plated
133-51-92-077	16	Diallyl Phthalate	Gold Plated
133-51-92-076	16	Diallyl Phthalate	Electro-Tin
133-51-02-078	16	GP Black Phenolic	Gold Plated
133-51-02-075	16	GP Black Phenolic	Electro-Tin
133-59-92-079	24	Diallyl Phthalate	Electro-Tin
133-59-92-080	24	Diallyl Phthalate	Gold Plated
133-59-02-081	24	GP Black Phenolic	Electro-Tin
133-59-02-082	24	GP Black Phenolic	Gold Plated

DIP SOCKETS WITH .017 x .017 SQ. TAILS .110 LONG


.260
.110
.030
.104
.017 x
.017SQ.
TYP.
.300
.072

Part No.	Con-tacts	Insulator	Contacts
‡133-59-92-060	14	Diallyl Phthalate	Gold Plated
133-59-92-066	14	Diallyl Phthalate	Electro-Tin
‡133-59-02-059	14	GP Black Phenolic	Electro-Tin
133-59-02-065	14	GP Black Phenolic	Gold Plated
‡133-59-92-061	16	Diallyl Phthalate	Gold Plated
133-59-92-067	16	Diallyl Phthalate	Electro-Tin
133-59-02-068	16	GP Black Phenolic	Gold Plated
‡133-59-02-062	16	GP Black Phenolic	Electro-Tin
133-59-92-070	24	Diallyl Phthalate	Electro-Tin
133-59-92-064	24	Diallyl Phthalate	Gold Plated
‡133-59-02-063	24	GP Black Phenolic	Electro-Tin
133-59-02-069	24	GP Black Phenolic	Gold Plated

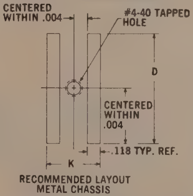
DIP SOCKET WITH .017 x .033 TAILS .170 LONG


.300
.050 DIA. MAX.
(.035 FOR
.017 x .017 SQ.
TAILS)
6 OR 7
EQUAL SPACES
100 - A

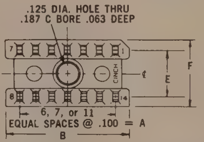
P.C. BOARD LAYOUT

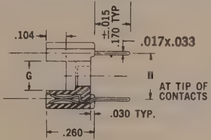
Part No.	Contacts	Insulator	Contacts
‡133-51-02-005	14	Diallyl Phthalate	Gold Plated
133-51-92-001	14	Diallyl Phthalate	Electro-Tin
‡133-51-02-003	14	GP Black Phenolic	Electro-Tin
133-51-02-004	14	GP Black Phenolic	Gold Plated
‡133-51-92-008	16	Diallyl Phthalate	Gold Plated
133-51-92-002	16	Diallyl Phthalate	Electro-Tin
133-51-02-007	16	GP Black Phenolic	Gold Plated
‡133-51-02-006	16	GP Black Phenolic	Electro-Tin
133-59-92-009	24	Diallyl Phthalate	Electro-Tin
‡133-59-92-010	24	Diallyl Phthalate	Gold Plated
‡133-59-02-011	24	GP Black Phenolic	Electro-Tin
133-59-02-012	24	GP Black Phelonic	Gold Plated

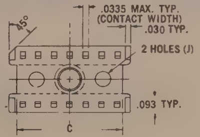
No. of Contacts	A	B	C	D	E	F	G	H ± .015	J	K
14	.600	.770	.690	.796	.300	.424	.187	.300	.093	.446
16	.700	.870	.790	.896	.300	.424	.187	.300	.093	.446
24	1.100	1.270	1.190	1.296	.600	.724	.488	.600	.125	.746


CENTERED
WITHIN .004
#4-40 TAPPED
HOLE
D
CENTERED
WITHIN
.004
.118 TYP. REF.
K

RECOMMENDED LAYOUT
METAL CHASSIS


.125 DIA. HOLE THRU
.187 C BORE .063 DEEP
7
1
8
14
CINCH
F
E
6, 7, or 11
EQUAL SPACES @ .100 = A
B

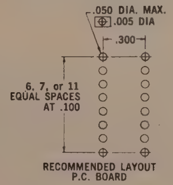

.104
.170 ± .015 TYP
.017x.033
G
H
AT TIP OF
CONTACTS
.030 TYP.
.260


45°
.0335 MAX. TYP.
(CONTACT WIDTH)
.030 TYP.
2 HOLES (J)
.093 TYP.
C

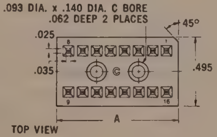
LOW PROFILE DIP SOCKETS WITH .025 x .025 W.W. TAILS .687 LONG

Part No.	Contacts	Insulator	Contacts
‡133-59-91-055	14	Black Glass Nylon	Electro-Tin
‡133-59-91-056	14	White Glass Nylon	Electro-Tin
‡133-59-91-051	14	Black Glass Nylon	Gold Plated
‡133-59-91-052	14	White Glass Nylon	Gold Plated
‡133-59-91-058	16	Black Glass Nylon	Electro-Tin
‡133-59-91-057	16	White Glass Nylon	Electro-Tin
‡133-59-91-054	16	Black Glass Nylon	Gold Plated
‡133-59-91-053	16	White Glass Nylon	Gold Plated

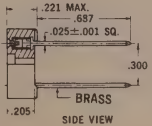
DIM.	14 Pin	16 Pin
A	.770	.870
B	.235	.285


.050 DIA. MAX.
.005 DIA
.300
6, 7, or 11
EQUAL SPACES
AT .100

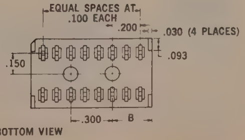
RECOMMENDED LAYOUT
P.C. BOARD


.093 DIA. x .140 DIA. C BORE
.062 DEEP 2 PLACES
45°
.025
.035
.495
9
16
A

TOP VIEW


.221 MAX.
.687
.025±.001 SQ.
.300
BRASS
.205

SIDE VIEW


EQUAL SPACES AT
.100 EACH
.200
.030 (4 PLACES)
.093
.150
.300
B

BOTTOM VIEW

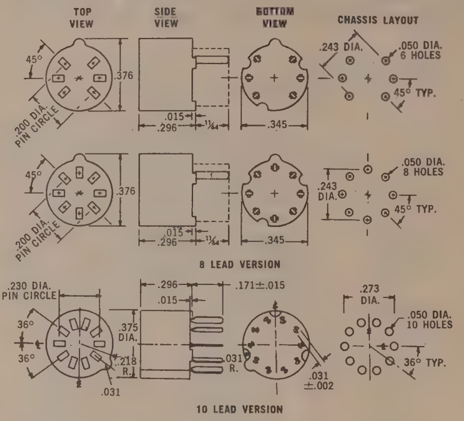
‡These items available through Cinch Distributors.

TRW® CINCH CONNECTORS

IC SOCKETS

TO-5 CASE SOCKETS

These Cinch miniature sockets are designed especially for integrated circuits mounted in 6, 8 or 10-lead TO-5 cases. They provide a convenient, dependable means of installing or removing IC's from the printed circuit board. Interconnections can be made without bending the leads, which substantially reduces the possibility of breaking leads or destroying the hermetic seal of the cases. Insulation material is diallyl phthalate Type SDG, contacts are beryllium copper with 30 micro-inches of gold over a copper flash.


TOP VIEW
SIDE VIEW
BOTTOM VIEW
CHASSIS LAYOUT
45°
.376
.200 DIA. PIN CIRCLE
.015
.296
1⁄64
.345
.243 DIA.
.050 DIA. 6 HOLES
45° TYP.
.050 DIA. 8 HOLES
.243 DIA.
8 LEAD VERSION
.230 DIA. PIN CIRCLE
36°
.375 DIA.
.218 R.
.031
.296
.015
.171±.015
.031 R.
.031 ±.002
.273 DIA.
.050 DIA. 10 HOLES
36° TYP.
10 LEAD VERSION

SPECIFICATIONS

ELECTRICAL

Current Rating: 1.0 ampere
Contact Resistance: 0.050 ohms, maximum
Withstanding Voltage Between Adjacent Contacts:

AC RMS	DC
1020	1560 (at sea level)
350	465 (at 50,000 ft.)

Insulation Resistance: 50,000 megohm, minimum

MECHANICAL

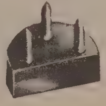
Shock: 50 g per MIL-STD-202
Temperature Range: −65°C to +125°C
Insertion Force: 16 lb. maximum
Withdrawal Force: 3 lb. minimum
Recommended Mtg. Method: Solder in PC Board

MATERIALS

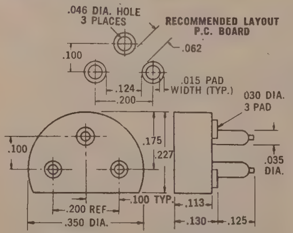
Insulator: Diallyl phthalate Type SDG per MIL-M-14
Contacts: Beryllium copper
Finish: Copper flash plus .00003 gold plate

Part No.	No. of Leads
‡133-96-92-060	6
‡133-98-92-061	8
‡133-99-92-054	10

LOW PROFILE 3-PIN P.C. SOCKETS FOR TO-5 CASES



These high quality Cinch-designed 3-pin sockets for TO-5 series transistors incorporate many unique features necessary for high circuit reliability . . . features not found in similar competitive units.


.046 DIA. HOLE 3 PLACES
RECOMMENDED LAYOUT P.C. BOARD
.062
.100
.015 PAD WIDTH (TYP.)
.124
.200
030 DIA. 3 PAD
.100
.175
.227
.035 DIA.
.200 REF
.350 DIA.
.100 TYP.
.113
.130
.125

SPECIFICATIONS

ELECTRICAL

Voltage Ratings:

AC RMS	DC
1500	2000 (at sea level)
500	700 (at 50,000 ft.)

Current Rating: 2.5 amperes
Contact Resistance: 0.005 ohms
Insulation Resistance: 100,000 megohms

MECHANICAL

Maximum Pin Diameter: .019 inch
Maximum Pin Depth: 0.200 ±0.010 inch
Maximum Insertion Force: 5 ounces measured with an 0.017″ diameter pin
Minimum Withdrawal Force: ¼ ounce measured with an 0.014″ diameter pin, after 3 sizing cycles with an 0.017″ diameter pin
Durability: ¼ ounce minimum withdrawal force after 100 cycles with an 0.017″ diameter pin

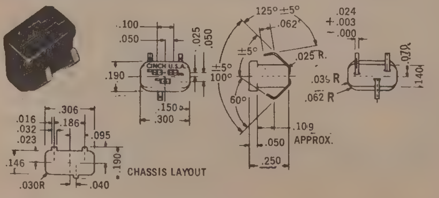
MATERIALS

Insulator: 20% glass filled natural nylon.
Contacts: Beryllium Copper, Tin Plate over Copper Base.
Insulator Colors:

Part No.	Color
‡133-23-92-041	Black
‡133-23-92-039	Natural
‡133-23-92-040	Green

TRANSISTOR SOCKETS

PRESS-IN AND SNAP-IN TRANSISTOR SOCKETS TYPE T-1


.100
.050
.025
.050
.190
CINCH U.S.A.
.150
.300
125°±5°
.062
±5°
100°
60°
.025 R.
.035 R
.062 R
.024 +.003 −.000
.070
.140
.109 APPROX.
.050
.250
.306
.186
.016
.032
.023
.095
.146
.190
.030R
.040
CHASSIS LAYOUT

A commercial transistor socket with contact arrangement for exact mating with TO-18 transistors. Presses into polarized chassis cutout in 1⁄16″ thick boards having bottom circuitry only. Insulator body is approved general purpose black phenolic (Type CFG per MIL-M-14) and contacts are beryllium copper with 30 micro-inches gold finish.

Part No.	No. of Contacts	Insulator Material	Contact Material
131-73-02-062	3	Black	Beryllium Copper

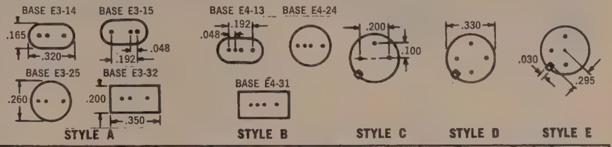
‡These items available through Cinch Distributors.

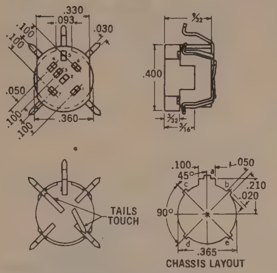
TRW® CINCH CONNECTORS

TRANSISTOR SOCKETS (CONT.)

UNIVERSAL TRANSISTOR SOCKETS TYPE T-7

For use with ten transistor bases and five base styles illustrated. Insulator bodies are all mica-filled low loss phenolic (MFE). Contacts are beryllium copper, gold-plated. For use with 1⁄16″ thick printed circuit board. Table lists the chassis cutout tabs required for the various base types.

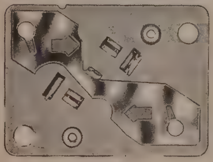

BASE E3-14
BASE E3-15
BASE E4-13
BASE E4-24
.165
.320
.048
.192
.192
.048
.200
.100
.330
.030
.295
BASE E3-25
BASE E3-32
BASE E4-31
.260
.200
.350
STYLE A
STYLE B
STYLE C
STYLE D
STYLE E


.330
.093
.030
.100
.100
.050
.100
.100
.360
.400
3⁄32
3⁄32
3⁄16
TAILS TOUCH
.100
45°
.050
.210
.020
90°
.365
a
b
c
d
e
CHASSIS LAYOUT

Part No.	Transistor Base Styles	Chassis Cutout Tabs Used	Contact Positions Used
‡133-27-12-011	All	a, b, c, d, e	All
‡133-24-12-012*	A & C	c, d, e	1, 3, 4, 7
133-25-12-013*	B & C	b, c, d, e	1, 2, 3, 4, 7
‡133-23-12-014*	C	c, d, e	1, 4, 7
‡133-25-12-015	D	a, b, c, d, e	1, 4, 5, 6, 7
‡133-23-12-016*	E	b, d, e	1, 6, 7
‡133-24-12-017	A & C	c, d, e	1, 3, 4, 7

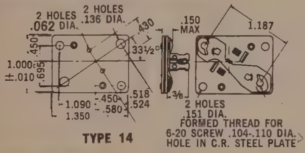
*In positions where contacts are not required, cavity for contacts is also omitted except in position 5.

POWER TRANSISTOR SOCKETS



TYPE 14

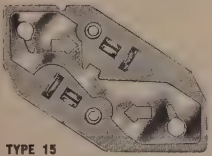
Type 14 and 15 power transistor sockets with laminated top and bottom plates are used under the most severe vibration conditions because of high initial withdrawal force. Transistor can be grounded to collector plate and at the same time be completely insulated from the chassis. Type 14 and 15 top and bottom plates are made of Valox 310. Collector plates are cadmium-plated steel and contacts are made of cadmium-plated brass. Type 16 power transistor socket with molded insulator body is designed for mobile communication receivers. Type 16 socket has an insulating body of general purpose black phenolic (also available in mica and diallyl) and contacts are phosphor bronze, cadmium plated.


2 HOLES .062 DIA.
2 HOLES .136 DIA.
.430
33½°
.150 MAX
1.187
.450
1.000 ±.010
.695
1.090
1.350
.450
.580
.518
.524
3⁄8
2 HOLES .151 DIA.
FORMED THREAD FOR 6-20 SCREW .104-.110 DIA. HOLE IN C.R. STEEL PLATE

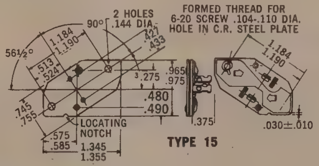
TYPE 14

Part No.	Type	Insulator Material	Contact Material	Contact Finish	Collector Plate Material & Finish
‡133-32-10-013	14	XP Natural*	Brass	Cadmium	Cadmium-Plated Steel
133-32-10-021	15	XP Natural*	Brass	Cadmium	Cadmium-Plated Steel
‡133-12-02-016	16	Black†	Phosphor Bronze	Cadmium	—

*Wax impregnated. †Also available in mica and diallyl.

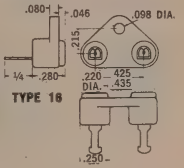


TYPE 15


2 HOLES .144 DIA.
FORMED THREAD FOR 6-20 SCREW .104-.110 DIA. HOLE IN C.R. STEEL PLATE
90°
56½°
1.184
1.190
.427
.433
.513
.524
.275
.965
.975
.480
.490
.745
.755
LOCATING NOTCH
.575
.585
1.345
1.355
.375
1.184
1.190
.030±.010

TYPE 15

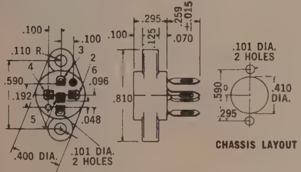
TYPE 16


.080
.046
.098 DIA.
.215
1⁄4
.280
.220 DIA.
.425
.435
.250

TYPE 16

GENERAL PURPOSE TRANSISTOR SOCKETS TYPE 13

Multi-purpose all-molded sockets designed to the triangular base layout (.2″ x .1″ JETEC-30 contact centers) as well as the 3-contact in-line layout (.048″ x .192″ contact centers). Insulator material is either general purpose black phenolic or mica-filled low loss phenolic (Type MFE per MIL-M-14). Contacts are made of phosphor bronze, cadmium plated. Sockets may be used with E3-14, E3-15, E3-25, E3-32, E3-43, E3-44 and E3-51 EIA base designations.


.100
.110 R.
.100
.100
.295
.125
.259 ±.015
.070
.590
.192
.096
.048
.810
.400 DIA.
.101 DIA. 2 HOLES
1
2
3
4
5
6
.101 DIA. 2 HOLES
.590
.295
.410 DIA.
CHASSIS LAYOUT

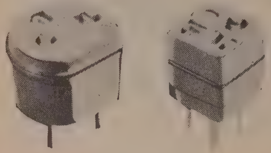
Part No.	Type	Insulator Material	Contact Material	Contact Finish	Contact Positions Used
‡133-14-01-011	13	Black	Phosphor Bronze	Cadmium	1, 2, 3, 5
133-14-11-014	13	Mica	Phosphor Bronze	Cadmium	1, 2, 3, 5
133-13-01-012	13	Black	Phosphor Bronze	Cadmium	1, 2, 3
133-13-11-025	13	Mica	Phosphor Bronze	Cadmium	1, 2, 3

‡These items available through Cinch Distributors.

TRW® CINCH CONNECTORS

MINIATURE SEMICONDUCTOR SOCKETS

TO-5 AND TO-18 CASE DEVICES

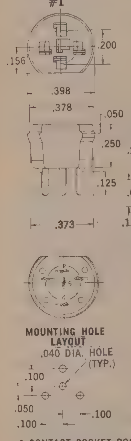


This group of semiconductor sockets, for printed circuit board insertion, covers the standard configurations in most common use today.

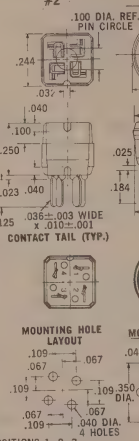
Their low profile (.250″) makes them especially applicable in high density applications. All units are made of MFE, mica-filled phenolic, and the six position TO-5 socket, is also available in FEP fluoro-carbon resin.

These Cinch sockets have low contact resistance, low capacitance and insulation resistance of over 1000 megohms. They are rated at 1.0 amperes and 750 volts A.C.

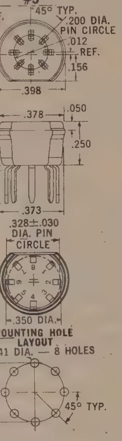
Drawing #1


.200
.156
.398
.378
.050
.250
.125
.373
MOUNTING HOLE LAYOUT
.040 DIA. HOLE (TYP.)
.100
.050
.100
.100

Drawing #2


.100 DIA. REF. PIN CIRCLE
.244
.032
.040
.100
.250
.023
.040
.125
.036±.003 WIDE x .010±.001
CONTACT TAIL (TYP.)
MOUNTING HOLE LAYOUT
.109
.067
.067
.109
.109
.067
.067
.109
.040 DIA. 4 HOLES

Drawing #3


45° TYP.
.200 DIA. PIN CIRCLE
.012 REF.
.156
.398
.378
.050
.250
.025
.184
.373
.328±.030 DIA. PIN CIRCLE
.350 DIA.
MOUNTING HOLE LAYOUT
.041 DIA. — 8 HOLES
.350 DIA.
45° TYP.

3 CONTACT SOCKET POSITIONS 1, 2, 3
4 CONTACT SOCKET POSITIONS 1, 2, 3, 5

SPECIFICATIONS

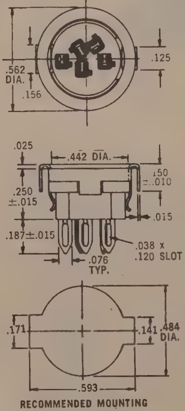
Maximum Voltage: 750 VAC
Maximum Current: 1.0 amperes
Max. Capacitance: 1.3 pf (1.0 pf for FEP)
Insulation Test: 1685 VAC
Insulation Resistance: 1000 megohm, minimum
Contact Resistance: 0.05 ohms

Socket Size	No. of Contacts	Terminal Mounting	Contact Material	Insulator Material**	Part No.	Contact Plating*	Dim. Drawing
TO-5	3	PC Board	Phos. Bronze	MFE	‡133-23-11-024	(1)	#1
TO-5	4	PC Board	Phos. Bronze	MFE	‡133-24-11-026	(1)	#1
TO-5	6	PC Board or Chassis	Ber. Copper	MFE	‡133-96-12-062	(2)	#3
TO-5	6	PC Board or Chassis	Ber. Copper	FEP	‡133-96-92-067	(2)	#3
TO-5	8	PC Board or Chassis	Ber. Copper	MFE	‡133-98-12-062	(2)	#3
TO-18	3	PC Board	Phos. Bronze	MFE	‡133-23-11-034	(2)	#2
TO-18	4	PC Board	Phos. Bronze	MFE	‡133-24-11-035	(2)	#2

*CONTACT PLATING: (1) Chromate over .0003″ cadmium
(2) .0003″ tin over .0001″ copper

**INSULATOR MATERIAL: MFE — Mica filled phenolic
FEP — Fluorocarbon resin

NUVISTOR TRIODE TUBE SOCKETS


.562 DIA.
.156
.125
.025
.442 DIA.
.150 ±.010
.250 ±.015
.015
.187±.015
.038 x .120 SLOT
.076 TYP.
.171
.141
.484 DIA.
.593
RECOMMENDED MOUNTING HOLE CUT-OUT

MECHANICAL CRIMP MOUNTING TYPE

This type socket is fastened to the chassis by two tabs, which are an integral part of the metal saddle retaining the insulator body. These tabs are rolled against the underneath side of the chassis. Insulator material is mica-filled low loss phenolic (Type MFE), glass-filled diallyl phthalate (Type SDG-F per MIL-M-14). Contacts are made of brass, phosphor bronze or beryllium copper with finishes as shown below. Saddles are made of cold rolled steel or brass, with finishes as shown below.

Part No.	Insulator Material*	Contact Material	Contact Finish	Saddle Material	Saddle Finish
‡133-65-10-001	Mica	Brass	.0001 Cadmium	C.R. Steel	Copper Flash plus .0001 Cadmium
133-65-11-011	Mica	Phosphor Bronze	.0001 Silver†	C.R. Steel	Copper Flash plus .0001 Cadmium
133-65-12-012	Mica	Beryllium Copper	.0001 Silver†	C.R. Steel	Copper Flash plus .0001 Cadmium
133-65-92-025	Diallyl	Beryllium Copper	.0005 Gold	C.R. Steel	Copper Flash plus .0001 Cadmium

*Also available in general purpose black phenolic.

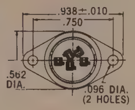
†Contact tails hot solder coated.

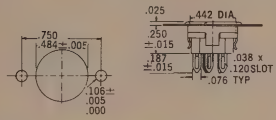
‡These items available through Cinch Distributors.

TRW® CINCH CONNECTORS

NUVISTOR TRIODE TUBE SOCKETS (CONT'D)

CONVENTIONAL MOUNTING TYPE


.938±.010
.750
.562 DIA.
.096 DIA. (2 HOLES)


.025
.442 DIA.
.250 ±.015
.187 ±.015
.038 x .120 SLOT
.076 TYP
.750
.484±.005
.106± .005 .000

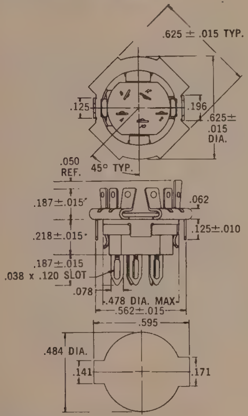
This tube socket is fastened to the chassis in the conventional manner, using screws, eyelets, rivets for self-tapping screws. Any #2 screw or 3/32" diameter rivet with a head diameter up to .190" may be used. Insulator material is mica-filled low loss phenolic (Type MFE). Contacts are made of cadmium-plated brass or silver-plated beryllium copper. Mounting saddle is either steel with copper flash plus cadmium plate finish or brass with cadmium plate plus yellow chromate finish.

Part No.	Insulator Material*	Contact Material	Contact Finish	Saddle Material	Saddle Finish
‡133-65-10-003	Mica	Brass	.0001 Cadmium	Steel	Copper Flash plus .0001 Cadmium

*Also available in general purpose black phenolic or glass-filled diallyl phthalate, Type SDG-F per MIL-M-14.

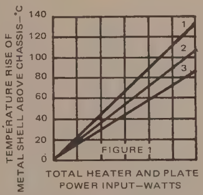
HEAT DISSIPATING TYPE

This socket with the fingered-style base, provides an excellent heat dissipator for VHF and industrial type Nuvistor tubes. As shown in the graph below, this socket is extremely effective in holding down the temperature rise of the tube metal shell relative to the chassis temperature. The socket adds 12 metal-shell-contact points to the heat paths provided by the base pins and indexing lugs which conduct tube-generated heat to the chassis. RF measurements through 1200 Mc made on the RCA-8058 double-ended Nuvistor triode in this socket show that the socket has the same effect as that obtained when the tube is soldered to the socket flange. Socket insulator material is mica-filled low loss phenolic (Type MFE). Contacts are made of brass, cadmium-plated. Saddle material is cold rolled steel, hot solder coated.


.625 ± .015 TYP.
.125
.196
.625± .015 DIA.
.050 REF.
45° TYP.
.187±.015
.062
.218±.015
.125±.010
.187±.015
.038 x .120 SLOT
.078
.478 DIA. MAX.
.562±.015
.595
.484 DIA.
.141
.171

COMPARISON OF COOLING EFFECTIVENESS OF VARIOUS TYPES OF NUVISTOR SOCKETS

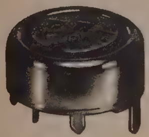
Temperature-rise curves for the RCA-7586 Nuvistor operating in (1) Cinch socket 133-65-10-009 mounted on printed-circuit board. (2) general-purpose socket crimp-mounted on aluminum chassis, and (3) Cinch socket 133-65-10-041 crimp-mounted on aluminum chassis.

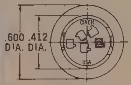


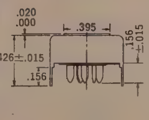
Part No.	Insulator Material*	Contact Material	Contact Finish	Saddle Material	Saddle Finish
‡133-65-10-041	Mica	Brass	.0001 Cadmium	C.R. Steel	Hot Solder Coated

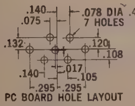
*Also available in general purpose black phenolic or glass-filled diallyl phthalate, Type SDG-F per MIL-M-14.

STAND-OFF P.C. TYPE




.600
.412 DIA.
DIA.
CINCH
USA


.020 .000
.395
.156 ±.015
.426±.015
.156


.140
.075
.078 DIA 7 HOLES
.132
.120
.108
.140
.017
.105
.295
.295
PC BOARD HOLE LAYOUT

This tube socket is a stand-off type for printed circuitry containing five contacts and two grounding terminals on the saddle. The tube socket is mounted to the printed circuit board by inserting the assembly into a pre-punched hole layout as shown. The socket is then soldered into the circuitry.

Part No.	Insulator Material*	Contact Material	Contact Finish	Saddle Material	Saddle Finish
‡133-65-10-009	Mica	Brass	.0001 Cadmium	C.R. Steel	Copper Flash plus .0001 Cadmium

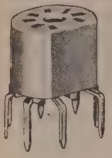
*Also available in general purpose black phenolic or glass-filled diallyl phthalate, Type SDG-F per MIL-M-14.

‡These items available through Cinch Distributors.

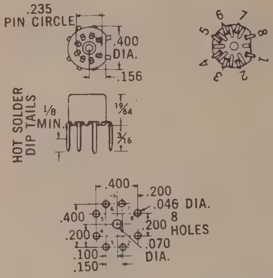
TRW® CINCH CONNECTORS

SUBMINIATURE TUBE SOCKETS

SUBMINIATURE MILITARY STAND-OFF SOCKETS TYPE S-1, S-3



TYPE S-1


.235
PIN CIRCLE
.400
DIA.
.156
6
7
8
1
2
3
4
5
HOT SOLDER
DIP TAILS
1/8
MIN.
19/64
3/16
.400
.200
.046 DIA.
8
HOLES
.400
.200
.200
.070
DIA.
.100
.150

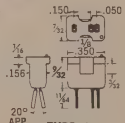
Two types of subminiature stand-off sockets designed and tooled under military contract to meet MIL specifications. They are designed to drop through clearance holes arranged on a .050″ x .050″ grid layout. Insulator bodies are available in either mica-filled low loss phenolic (MFE) or diallyl phthalate (Type SDG). Both types have beryllium copper contacts, silver-plated, with tips hot solder dipped.

The Type S-1 subminiature socket has an eight button base for vertical tube position and has no center shield.

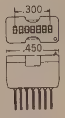
The Type S-3 socket is a seven-contact in-line subminiature right angle socket for horizontal tube position. A nickel-plated brass mounting bracket provides additional support when mounted to the printed circuit board.

Part No.	Type	No. of Contacts	Insulator Materials	Contact Material
131-78-12-024	S-1	8	Mica	Beryllium Copper
131-78-92-025	S-1	8	Diallyl Phthalate	Beryllium Copper

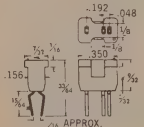
THREE, FIVE AND SEVEN CONTACT IN-LINE SOCKETS


.150
.050
7/32
1/8
.350
1/16
.156
9/32
3/32
11/64
20°
APP.

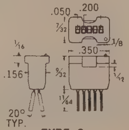
TYPE 1



TYPE 4


.192
.048
1/8
1/8
5/32
1/16
.350
.156
33/64
9/32
7/32
15/64
1/16 APPROX.

TYPE 2


.050
.200
7/32
1/8
1/16
.350
.156
9/32
1/32
11/64
20°
TYP.

TYPE 3

The first subminiature sockets ever produced. Type 1 and 2 three-contact sockets can be used with 3-prong transistors. Type 1, 3 and 4 sockets can be swaged or cemented into chassis or mounted with rings shown below. Type 2 is a stand-off style socket used primarily in printed circuitry but also suitable for conventional wiring. Insulating bodies are either general purpose black phenolic or mica-filled low loss phenolic (Type MFE per MIL-M-14). Contacts are of beryllium copper, either silver or cadmium plated as indicated.

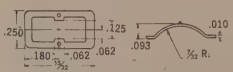
Part No.	Type	No. of Contacts	Insulator Material	Contact Material	Contact Finish
131-13-02-061	1	3	Black	Beryllium Copper	Silver
131-13-02-054	2	3	Black	Beryllium Copper	Cadmium
131-15-12-011	3	5	Mica†	Beryllium Copper	Silver
131-15-12-013	3	5	Mica	Beryllium Copper	Silver*
131-17-12-038	4	7	Mica†	Beryllium Copper	Silver
131-17-12-039	4	7	Mica	Beryllium Copper	Silver*

†Also available in black. *Contact tails hot solder coated.

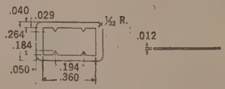
MOUNTING SPRING AND MOUNTING RINGS

No. 441-00-23-094 spring is designed for use with Type 1 and 2 three-contact sockets having a .093″ deep slot in the side of the insulator. Tempered spring steel material ensures positive retention of socket in chassis.

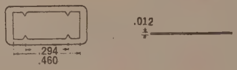
No. 441-00-11-082 ring is for use with Type 1, 2 and 3 sockets. No. 441-00-11-084 is for use with Type 4 and 5 sockets. Sharp teeth bite into side of insulator when ring is pressed on. Both rings are made of brass.


.250
.125
.180
.062
.062
13/32
.010
.093
1/32 R.

PART NO. 441-00-23-094


.040
.029
1/32 R.
.264
.184
.050
.194
.360
.012

PART NO. 441-00-11-082



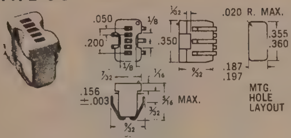
PART NO. 441-00-11-084

TRW/CINCH CONNECTORS, AN ELECTRONIC COMPONENTS DIV. OF TRW INC. / 1501 MORSE AVE. / ELK GROVE VILLAGE, ILL. 60007

TRW® CINCH CONNECTORS

SUBMINIATURE TUBE SOCKETS (CONT'D)

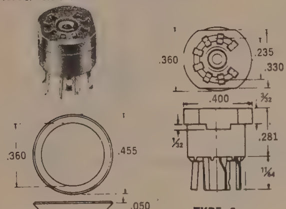
TYPE S-5



Type S-5 is a commercial 5-contact socket that presses into a non-polarized chassis cutout. For use on 1/16" thick boards. Insulator body is mica-filled low loss phenolic (MFE). Contacts are beryllium copper, silver-plated.

Part No.	No. of Contacts	Insulator Material	Contact Material
131-75-12-045	5	Mica	Beryllium Copper

RING MOUNT T-3 SOCKETS



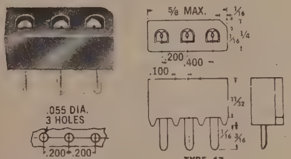
TYPE 6

These 8-contact sockets can be swaged or cemented into chassis or mounted with mounting ring No. 441-00-11-099. Insulator material is mica-filled low loss phenolic (Type MFE per MIL-M-14). Contacts have twisted tails and are made of beryllium copper with silver plated finish. Center shield is brass, cadmium plated. Mounting ring is .010 brass.

Part No.	Type	Insulator Material	Contact Finish	Contact Finish	Center Shield Material	Center Shield Finish
132-18-12-011	6	Mica	Beryllium Copper	Silver	Brass	Cadmium
132-18-12-017	6	Mica	Beryllium Copper	Silver*	Brass	Cadmium

*Contact tails and center shield hot solder coated.

DOUBLE DIODE SOCKET



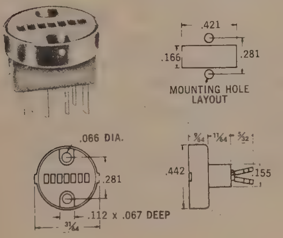
MOUNTING HOLE LAYOUT

TYPE 17

Special 3-contact socket used for mounting a diode in printed circuit applications. Used in horizontal phase detector. Insulator material is general purpose black phenolic. Contacts are made of brass with electro-tinned over copper flash finish.

Part No.	Type	Insulator Material	Contact Material	Contact Finish
203-91-03-029	17	Black	Brass	Electro-Tinned over Copper Flash

IN-LINE TYPE MILITARY SOCKETS

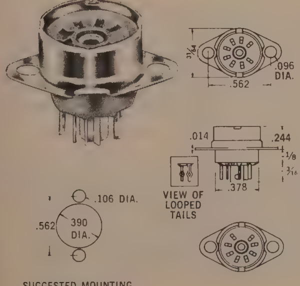


These in-line sockets are designed and tooled under military contact to meet MIL specifications. Available with or without nickel-plated brass mounting base. Either type can be mounted with No. 422-11-11-098 nickel-plated brass nut and No. 460-14-19-106 0-80 NF-2 stainless steel filister head type screws, which must be ordered separately. Insulator material is diallyl phthalate (Type SDG per MIL-M-14). Silver-plated beryllium copper contacts available with twisted tails as shown.

Part No.	Insulator Material	Contact Material	Contact Finish	Tail Type	Military Standard
131-27-92-011	Diallyl	Beryllium Copper	Silver*	Twisted	MS-35408-1
131-17-92-032	Diallyl	Beryllium Copper	Silver*	Twisted	—
131-17-92-034	Diallyl	Beryllium Copper	Silver	Looped	—

*Contact tails hot solder coated.

T-3 TYPE MILITARY SOCKETS



SUGGESTED MOUNTING HOLE LAYOUT

These sockets, utilizing the T-3 pin layout, are designed for military use in equipment subject to humidity or vibration conditions. Available with or without nickel-plated shield base type mounting saddle as shown. Insulator material is either diallyl phthalate (Type SDG per MIL-M-14) or mica-filled low loss phenolic (Type MFE per MIL-M-14). Contacts are beryllium copper, silver-plated. Sockets available with twisted or looped contact tails as indicated. Sockets also available with keyway rotated 90°. Center shields, when supplied, are brass, hot solder coated.

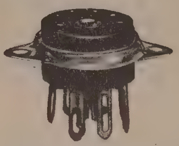
Part No.	Insulator Material	Contact Material	Contact Finish	Tail Type	Center Shield	Military Standard
132-28-92-022	Diallyl	Beryllium Copper	Silver*	Twisted	Yes	MS-35407-1
*132-28-12-023	Mica	Beryllium Copper	Silver*	Twisted	Yes	MS-35407-2
132-28-92-019	Diallyl	Beryllium Copper	Silver	Looped	No	—
132-28-92-023	Diallyl	Beryllium Copper	Silver	Looped	No	—
132-28-92-025	Diallyl	Beryllium Copper	Silver*	Twisted	Yes	—
132-28-12-026	Mica	Beryllium Copper	Silver*	Twisted	Yes	—

*Contact tails hot solder coated.

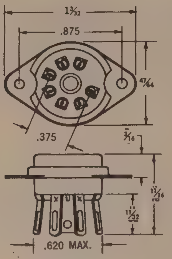
TRW® CINCH CONNECTORS

7-PIN MINIATURE TUBE SOCKETS

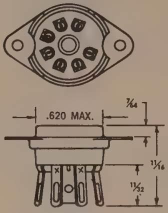
MOLDED MINIATURE SOCKETS WITH MOUNTING SADDLES



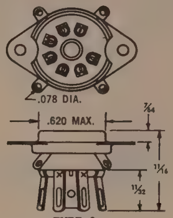
Securely holds all standard 7-pin miniature tubes. Available in top-mount, bottom-mount with ground lugs or bottom-mount with integral eyelets. Molded of high dielectric black phenolic, mica-filled low loss phenolic or ceramic material. Copper flash and electrolytic tin steel saddle with 7/8" mounting centers and .098 or .125 diameter mounting holes. Designed for mounting through chassis in 5/8" diameter hole. Center ground shield is brass. Positive grip contacts of spring temper brass alloy are cadmium-plated. Phosphor bronze and beryllium copper contacts are silver-plated. Standard contact length is 11/32", as shown in drawings; 3/16" and 1/4" contact lengths are also available on special order.



TYPE 1
Top Mount



TYPE 2
Bottom Mount

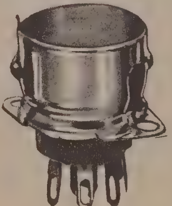


TYPE 3
Bottom Mount
With Ground Lugs

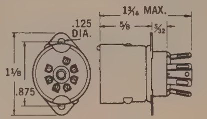
Part No.	Mtg. Hole Dia.	Part No.	Mtg. Hole Dia.	Type	Insulator Material	Contact Material	Center Shield O.D.
‡111-12-00-026	.098	111-12-00-037	.125	1	Black	Brass	3/16"
‡111-12-10-027	.098	111-12-10-038	.125	1	Mica	Brass	3/16"
111-12-20-035	.098	111-12-20-039	.125	1	Ceramic	Brass	3/16"
111-12-00-028	.098	111-12-00-034	.125	1	Black	Brass	—
111-12-10-029	.098	111-12-10-032	.125	1	Mica	Brass	—
111-12-20-036	.098	111-12-20-040	.125	1	Ceramic	Brass	—
‡111-11-00-011	.098	111-11-00-016	.125	2	Black	Brass	3/16"
‡111-11-10-012	.098	111-11-10-017	.125	2	Mica	Brass	3/16"
‡111-11-20-020	.098	111-11-20-024	.125	2	Ceramic	Brass	3/16"
111-11-00-013	.098	111-11-00-022	.125	2	Black	Brass	—
111-11-10-019	.098	111-11-10-023	.125	2	Mica	Brass	—
111-11-20-021	.098	111-11-20-025	.125	2	Ceramic	Brass	—
111-11-11-048	.098	111-11-11-041	.125	2	Mica	Phosphor Bronze	3/16"
—	—	111-11-12-014	.125	2	Mica	Beryllium Copper	3/16"
111-25-00-012	.098	—	—	3	Black*	Brass	3/16"

*Also available in Mica and Ceramic insulator materials.

MINIATURE SHIELD BASE SOCKETS



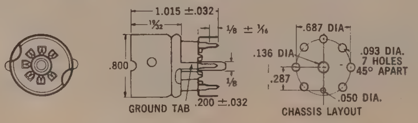
Shield base is attached to socket body for mounting through top of chassis. Molded from high dielectric black phenolic, mica-filled low loss phenolic or ceramic material. Cadmium-plated brass contacts and hot-solder-coated center shield. Cadmium-plated steel shield base with 7/8" mounting centers. Use J-slot type tube shields with these sockets.



Part No.	Mtg. Hole Dia.	Insulator Material	Contact Material	Center Shield O.D.
‡111-31-00-012	.125	Black	Brass	3/16"
‡111-31-10-011	.125	Mica	Brass	3/16"
‡111-31-20-102	.125	Ceramic	Brass	3/16"

MINIATURE SHIELD BASE STAND-OFF SOCKETS TYPE MSB-1

These miniature sockets have an attached bayonet type shield base. Bases have ground tab where specified in listings below. May also be obtained with heli-coil insert for use with No. 4-40 NC-2 screw. Sockets listed are for use in 1/16" thick printed circuit board, but others may also be obtained for use in 3/32" and 1/8" boards. Insulator bodies are mica-filled low loss phenolic (MFE). Contacts are phosphor bronze with copper flash and electrolytic tin. Center shield is copper flash and electrolytic tin brass and shield base and ground tab are nickel-plated brass.



Part No.	Insulator Material	Contact Material	Center Shield	Ground Tab
‡111-51-11-084	Mica	Phosphor Bronze	Yes	Yes
111-51-11-085	Mica	Phosphor Bronze	No	No
111-51-11-086	Mica	Phosphor Bronze	No	Yes

‡These items available through Cinch Distributors.

TRW® CINCH CONNECTORS

7-PIN MINIATURE TUBE SOCKETS (CONT'D)

MILITARY CONTRACT PC SOCKETS

TYPE MSB-2

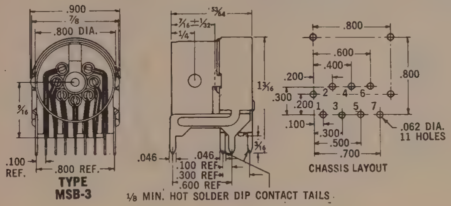
TYPE MSB-3

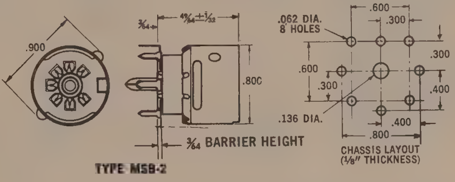
Two types of miniature shield base sockets designed for military use to meet rigid MIL specifications. Both types drop through clearance holes arranged on a .1" x .1" grid layout. The Type MSB-2 socket has a mica-filled low loss phenolic (MFE) insulator body. Contacts are phosphor bronze, silver-plated with hot solder dipped tails. Center shield is brass, hot solder dipped, and shield base is brass, nickel-plated. Hot solder dipped ground tab is an integral part of the base. The Type MSB-3 socket, for right angle tube position, also has a mica-filled low loss phenolic (MFE) insulator body. Contacts are made of beryllium copper, silver-plated with hot solder dipped tails. Shield base is brass, copper flash and electrolytic tin.

IMPORTANT

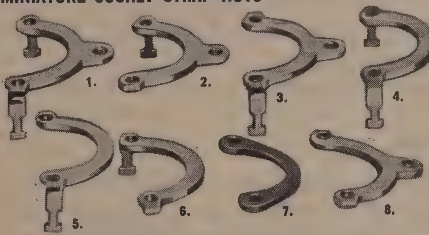
All of the sockets shown on this panel can **only** be purchased with a Government contract number. No exceptions can be made.

Part No.	Type	Insulator Material	Contact Material	Center Shield
111-54-11-101	MSB-2	Mica	Phosphor Bronze	Yes
111-54-12-149	MSB-3	Mica	Beryllium Copper	No

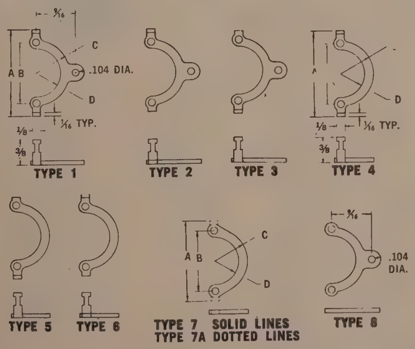

.900
7/8
.800 DIA.
9/16
.100 REF.
.800 REF.
TYPE MSB-3
53/64
7/16±1/32
1/4
1 3/16
3/16
.046
.046
.100 REF
.300 REF
.600 REF
1/8 MIN. HOT SOLDER DIP CONTACT TAILS
.800
.600
.400
.200
.300
.200
.100
1 2 3 4 5 6 7
.800
.300
.500
.700
.062 DIA. 11 HOLES
CHASSIS LAYOUT

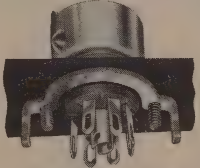

.900
3/64
49/64±1/32
.800
3/64 BARRIER HEIGHT
TYPE MSB-2
.062 DIA. 8 HOLES
.600
.300
.300
.600
.300
.400
.136 DIA.
.400
.800
CHASSIS LAYOUT (1/8" THICKNESS)

MINIATURE SOCKET STRAP NUTS



A Cinch development for ease and simplicity in mounting miniature sockets. One strap nut takes the place of two conventional type nuts. Generally used in assembling shield base sockets. 8 types are available, with hot tin dipped ground lugs attached for convenience in wiring. All are made of 1/16" brass. Three finishes are available with each type: .0005 cadmium-plated, .0005 cadmium-plated plus yellow chromate or .0003 electro-tin. Desired finish must be specified. Strap nuts with .104 diameter rivet hole can be used for mounting or for grounding to aluminum chassis. All mounting holes are tapped to accept No. 4-40 screws.


5/16
A
B
C
.104 DIA.
D
1/8
1/16 TYP.
3/8
TYPE 1
TYPE 2
TYPE 3
A
D
1/8
1/16 TYP.
3/8
TYPE 4
TYPE 5
TYPE 6
A B
C
D
TYPE 7 SOLID LINES
TYPE 7A DOTTED LINES
5/16
.104 DIA.
TYPE 8


TYPICAL STRAP NUT ASSEMBLY WITH SHIELD BASE SOCKET

Part. No.*	Type	Dim. A	Dim. B	Dim. C	Dim. D
422-05-11-113	1	1 1/4	.875	15/32	11/32
422-05-11-133	2	1 3/16	.875	15/32	11/32
422-05-11-143	3	1 3/16	.875	15/32	11/32
‡422-05-11-103	4	1 1/4	.875	15/32	11/32
422-05-11-083	5	1 3/16	.875	15/32	11/32
422-05-11-093	6	1 3/16	.875	15/32	11/32
422-05-11-153	7	—	.875	7/16	21/64
422-05-11-148	8	—	.875	15/32	11/32

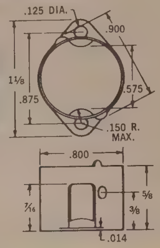
*Specify finish.

‡These items available through Cinch Distributors.

TRW® CINCH CONNECTORS

7-PIN MINIATURE TUBE SOCKETS (CONT'D)

J-SLOT TYPE SHIELD BASES

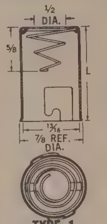


Durable shield bases of cadmium-plated steel or nickel-plated brass, designed for use with J-slot type miniature shields. ⅞" mounting centers.

Part No.*	Mtg. Hole Dia.	Material
‡441-43-22-018	.125	Steel
‡441-43-11-028	.125	Brass

*Specify finish.

J-SLOT TYPE TUBE SHIELDS



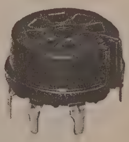
TYPE 1
Without Ventilating Windows

Durable tube shields with J-slot feature, designed to fit securely with Cinch miniature shield base type sockets or J-slot type shield bases. Available with or without ventilating windows. Three sizes of shields are available in either steel or brass. Each shield is complete with stainless steel pressure spring.

Part No.	Shield Material	Part No.	Shield Material	Type	Dim. L
‡150-11-13-011	Steel	150-11-10-018	Brass	1	1⅜"
‡150-11-23-012	Steel	150-11-20-019	Brass	1	1¾"
‡150-11-33-013	Steel	150-11-30-020	Brass	1	2¼"

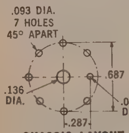
Available with either cadmium-plated or heat resistant flat black enamel finish.

MINIATURE STAND-OFF SOCKETS TYPE M-1

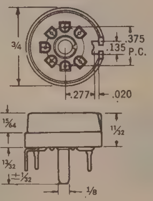


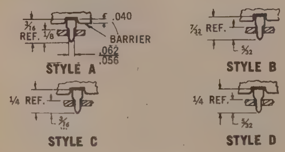
Miniature stand-off sockets that rest on the shoulder of the contact tail and provide an air gap for cooling, thus eliminating the possibility of a moisture trap. Sockets are designed with contacts for ¹⁄₁₆", ³⁄₃₂" and ⅛" thick printed circuit boards. These sockets are represented by Styles A, B and C respectively. Style D sockets are also for ¹⁄₁₆" thick boards, but they provide a greater air gap than the Style A socket.

The insulating body is available in either general purpose black phenolic or mica-filled low loss phenolic (MFE). Contacts are made of either brass or phosphor bronze and given a copper flash and electrolytic tin unless otherwise specified. Some of the phosphor bronze contacts are silver plated with tails hot solder dipped, as designated. Where provided, the center shield is brass with hot solder finish.



CHASSIS LAYOUT





CONTACT DETAILS

Part No.	Style	Insulator Material	O.D. Ctr. Shield	Contact Material
‡111-51-00-011	A	Black	—	Brass
111-51-00-012	A	Black	⅛	Brass
111-51-10-060	A	Mica	—	Brass
111-51-11-013	A	Mica	⅛	Brass
111-51-01-062	A	Black	—	Phos. Bronze
111-51-11-061	A	Mica	—	Phos. Bronze
111-51-11-059	A	Mica	⅛	Phos. Bronze*
111-51-11-014	B	Mica	—	Phos. Bronze*
111-51-00-066	C	Black	—	Brass
111-51-11-065	C	Mica	—	Phos. Bronze
111-51-11-063	C	Mica	—	Phos. Bronze*
111-51-00-113	D	Black	—	Brass
111-51-00-114	D	Black	⅛	Brass

*Silver plated with tails hot solder dipped.

‡These items available through Cinch Distributors.

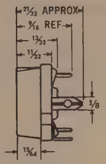
TRW® CINCH CONNECTORS

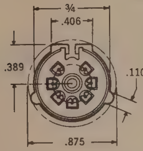
7-PIN MINIATURE TUBE SOCKETS (CONT'D)

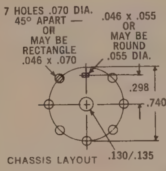
MINIATURE STAND-OFF SOCKET With Special Tabs and Center Shield

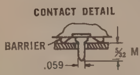
This socket is similar to those shown below except that special tabs have been added to prevent tube shield from contacting the printed circuit chassis. Center shield provides mechanical retention of the socket in the chassis. Insulating body is general purpose black phenolic. Contacts and center shield are brass with copper flash and electrolytic tin.

Part No.	Insulator Material	O.D. Ctr. Shield	Contact Material
‡111-51-00-105	Black	1/8	Brass

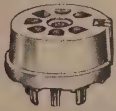

21/32 APPROX
9/16 REF
13/32
11/32
1/8
15/64


3/4
.406
.389
.110
.875


7 HOLES .070 DIA. 45° APART — OR MAY BE RECTANGLE .046 x .070
.046 x .055 OR MAY BE ROUND .055 DIA.
.298
.740
.130/.135
CHASSIS LAYOUT

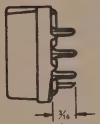

CONTACT DETAIL
BARRIER
5/32 MIN.
.059

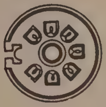
MINIATURE SOCKET With "V" Shaped Contact Tails

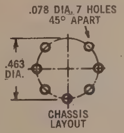


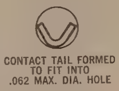
Miniature socket with small pin circle for contact tails. The "V" shape of the contact tail aids in dip soldering. Insulating body is mica-filled low loss phenolic (MFE). Contacts are beryllium copper with copper flash and electrolytic tin.

Part No.	Insulator Material	Contact Material
111-51-12-115	Mica	Beryllium Copper






.078 DIA. 7 HOLES 45° APART
.463 DIA.
CHASSIS LAYOUT

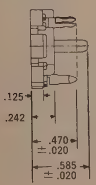

CONTACT TAIL FORMED TO FIT INTO .062 MAX. DIA. HOLE

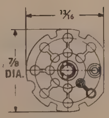
MINIATURE STAND-OFF SOCKETS With Snap-in Contact Tails

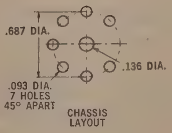
These miniature sockets have special contact tails that can be snapped into the chassis holes, providing mechanical retention prior to dip soldering in 1/16″ pc board. Outer circle of holes in the top of body permits sockets to be stacked vertically for automatic assembly.

Insulator bodies are available in either general purpose black phenolic, mica-filled low loss phenolic (MFE) or Alkyd 422 material. Contacts are brass with copper flash and hot tin dipped. Where provided, the center shield is brass, copper flash and electrolytic tin.

Part No.	Insulator Material	Contact Material	Center Shield
‡111-52-00-019	Black	Brass	No
‡111-52-10-020	Mica	Brass	No
111-52-90-021	Alkyd 422	Brass	No
‡111-52-00-022	Black	Brass	Yes
‡111-52-10-023	Mica	Brass	Yes


.125
.242
.470 ±.020
.585 ±.020




.687 DIA.
.136 DIA.
.093 DIA. 7 HOLES 45° APART
CHASSIS LAYOUT

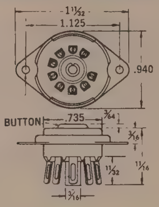
‡These items available through Cinch Distributors.

TRW® CINCH CONNECTORS

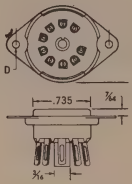
9-PIN NOVAL TUBE SOCKETS

MOLDED NOVAL SOCKETS WITH MOUNTING SADDLES

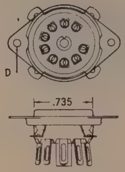
For all standard 9-pin noval tubes. Available in top-mount with or without button guide, bottom mount, bottom mount with ground lugs or bottom mount with integral eyelets. Molded of high dielectric black phenolic, mica-filled low loss phenolic or ceramic material (top mount only) with cadmium-plated brass contacts and hot-solder-coated center shield. Designed for mounting through chassis in 3/4″ diameter hole, copper flash and electrolytic tin steel saddle with 1⅛″ mounting centers and .098 or .125 diameter mounting holes.



TYPE 1
Top Mount Without Button
TYPE 1A
Top Mount With Button



TYPE 2
Bottom Mount

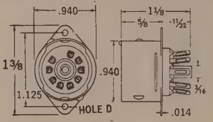


TYPE 3
Bottom Mount With Ground Lugs

Part No.	Mtg. Hole Dia. (D)	Part No.	Mtg. Hole Dia.	Type	Insulator Material	Contact Material	Center Shield O.D.
‡121-12-00-017	.098	121-12-00-023	.125	1	Black	Brass	3/16″
‡121-12-10-018	.098	121-12-10-022	.125	1	Mica	Brass	3/16″
121-14-20-094	.098	121-14-20-095	.125	1A	Ceramic	Brass	3/16″
‡121-11-00-016	.098	121-11-00-021	.125	2	Black	Brass	3/16″
121-11-00-029	.098	121-11-00-027	.125	2	Black	Brass	—
‡121-11-10-015	.098	121-11-10-020	.125	2	Mica	Brass	3/16″
121-11-10-019	.098	121-11-10-026	.125	2	Mica	Brass	—
121-25-00-013	.098	121-25-00-015	.125	3	Black	Brass	3/16″
121-25-10-014	.098	121-25-10-016	.125	3	Mica	Brass	3/16″

NOVAL SHIELD BASE SOCKETS

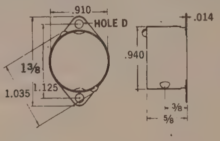
Molded from high dielectric black phenolic, mica-filled low loss phenolic or ceramic material. One piece cadmium-plated steel shield base and saddle on 1⅛″ centers. Cadmium-plated brass contacts and copper flash and elctrolytic tin center shield. Mounts through top of chassis in 3/4″ diameter hole. Use Cinch J-Slot type shields with these sockets.



Part No.	Mtg. Hole Dia. (D)	Part No.	Mtg. Hole Dia. (D)	Insulator Material	Contact Material
‡121-31-00-015	.098	121-31-00-014	.125	Black	Brass
‡121-31-10-012	.098	121-31-10-011	.125	Mica	Brass
‡121-31-20-018	.098	121-31-20-019	.125	Ceramic	Brass

J-SLOT SHIELD BASES

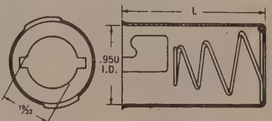
Durable cadmium-plated steel or nickel-plated brass shield bases designed for use with J-slot shields. 1⅛″ mounting centers. May be used with any 9-pin saddle type socket shown.



Part No.	Mtg. Hole Dia. (D)	Part No.	Mtg. Hole Dia. (D)	Material
441-41-22-213	.098	‡441-43-22-212	.125	Steel
441-41-11-216	.098	441-43-11-215	.125	Brass

J-SLOT TUBE SHIELDS

Made from durable cadmium-plated steel. Complete with tube pressure spring. J-slot feature designed to fit securely with Cinch noval shield base sockets and shield base.



Part No.	Dim. L	Material
‡151-11-13-011	1½″	Steel
‡151-11-23-012	1 15/16″	Steel
‡151-11-33-013	2⅜″	Steel

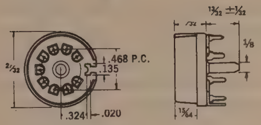
‡These items available through Cinch Distributors.

9-PIN NOVAL TUBE SOCKETS (CONT'D)

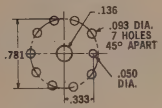
NOVAL STAND-OFF SOCKETS

Similar to miniature sockets shown on page 13 except noval size. Socket eliminates possibility of moisture trap by resting on shoulder of contact tail, thereby providing an air gap for cooling. Socket Styles A, B and C are designed with contacts for 1/16", 3/32" and 1/8" thick printed circuit boards, respectively.

Insulating bodies available in either general purpose black phenolic or mica-filled low loss phenolic (MFE). Contacts are either brass or phosphor bronze with copper flash and electrolytic tin, except that some of the phosphor bronze contacts are silver plated with tails hot solder dipped, as indicated. Center shield, where provided, is brass with copper flash and electrolytic tin.

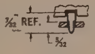


13/32 ±1/32
1/8
.468 P.C.
.135
.324
.020
15/64

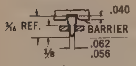


.136
.093 DIA.
7 HOLES
45° APART
.781
.050
DIA.
.333

CHASSIS LAYOUT

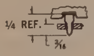


STYLE B



.040
1/16 REF.
BARRIER
.062
.056
1/8

STYLE A



STYLE C

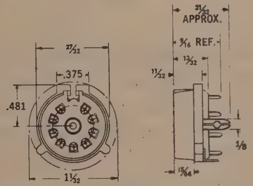
Part No.	Style	Insulator Material	Shield O.D. Shield	Contact Material
‡121-51-00-040	A	Black	—	Brass
121-51-00-041	A	Black	1/8	Brass
121-51-10-044	A	Mica	—	Brass
121-51-10-042	A	Mica	1/8	Brass
121-51-01-053	A	Black	—	Phos. Bronze
121-51-11-051	A	Mica	—	Phos. Bronze
121-51-11-050	A	Mica	1/8	Phos. Bronze*
121-51-00-046	B	Black	—	Brass
121-51-00-045	B	Black	1/8	Brass
121-51-10-047	B	Mica	1/8	Brass
121-51-11-049	B	Mica	—	Phos. Bronze*
121-51-11-055	C	Mica	—	Phos. Bronze
121-51-11-052	C	Mica	—	Phos. Bronze*

*Silver plated with tails hot solder dipped.

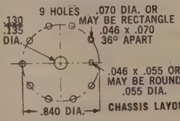
NOVAL STAND-OFF SOCKET With Special Tabs and Center Shield

Similar to miniature socket shown on page 12. Special tabs prevent tube shields from contacting printed circuit chassis. Mechanical retention of the socket in chassis is provided by special center shield. Insulating body is general purpose black phenolic. Center shield and contact material is brass with copper flash and electrolytic tin.

Part No.	Insulator Material	O.D. Ctr. Shield	Contact Material
‡121-51-00-011	Black	1/8	Brass

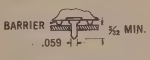


21/32 APPROX.
3/16 REF.
13/32
27/32
.375
11/32
.481
1/8
15/64
1 1/32



9 HOLES
.070 DIA. OR MAY BE RECTANGLE .046 x .070
36° APART
.130
.135
DIA.
.046 x .055 OR MAY BE ROUND .055 DIA.
.840 DIA.

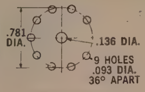
CHASSIS LAYOUT



BARRIER
3/32 MIN.
.059

CONTACT DETAIL

NOVAL STAND-OFF SOCKETS With Snap-in Contact Tails

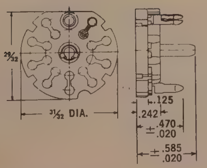


.781
DIA.
.136 DIA.
9 HOLES
.093 DIA.
36° APART

CHASSIS LAYOUT

Similar to miniature sockets shown on page 12, except for noval size. Same special snap-in contact tails. Outer circle holes in top of insulator facilitates vertical stacking for automatic assembly.

Insulator bodies available in general purpose black phenolic, mica-filled low loss phenolic or Alkyd 422 material. Contacts are brass copper flash and electrolytic tin finish. Where provided, center shield is brass, copper flash and electrolytic tin.



29/32
31/32 DIA.
.125
.242
.470 ±.020
.585 ±.020

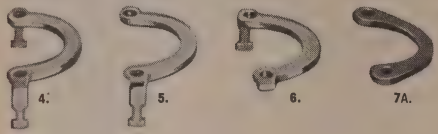
Part No.	Insulator Materials	Contact Material	Center Shield
‡121-52-00-106	Black	Brass	No
‡121-52-10-107	Mica	Brass	No
121-52-90-111	Alkyd 422	Brass	No
‡121-52-00-108	Black	Brass	Yes
‡121-52-10-109	Mica	Brass	Yes

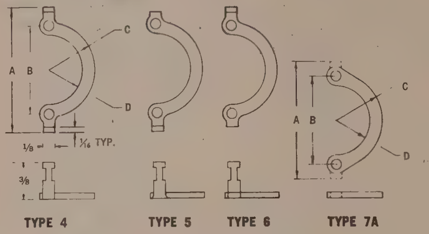
‡These items available through Cinch Distributors.

TRW® CINCH CONNECTORS

9-PIN NOVAL TUBE SOCKETS (CONT'D)

NOVAL SOCKET STRAP NUTS



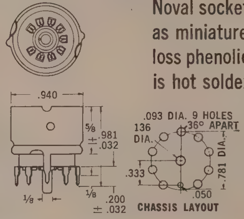

A
B
C
D
1/8
1/16 TYP.
3/8
TYPE 4
TYPE 5
TYPE 6
TYPE 7A

For ease and simplicity in mounting noval sockets. One strap nut takes the place of two conventional type nuts. Generally used in assembling shield base sockets. 4 types are available, some with hot tin dipped ground lugs attached for convenience in wiring. All are made of 1/16″ brass, except for Type 7A, which is 1/16″ cold rolled steel. Three finishes are available with each type: .0005 cadmium-plated, .0005 cadmium-plated plus yellow chromate or .0003 electro-tin. Desired finish must be specified. Strap nuts with .104 diameter rivet hole can be used for mounting or for grounding to aluminum chassis. All mounting holes are tapped to accept No. 4-40 screws.

Noval Part No.*	Type	Dim. A	Dim. B	Dim. C	Dim. D
‡422-05-11-169	4	1 9/16	1.125	17/32	13/32
422-05-11-179	5	1 15/32	1.125	17/32	13/32
422-05-11-189	6	1 15/32	1.125	17/32	13/32
422-05-11-159	7A	1 11/32	1.125	17/32	13/32

*Specify finish.

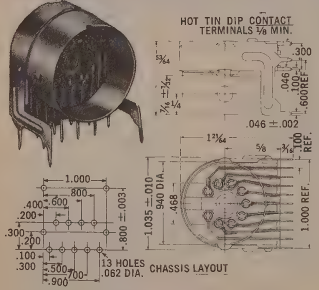
NOVAL SHIELD BASE STAND-OFF SOCKETS


.940
5/8
.981 ±.032
1/8
1/8
.200 ± .032
.093 DIA. 9 HOLES 36° APART
136 DIA.
.333
.781 DIA.
.050
CHASSIS LAYOUT

Noval sockets with bayonet type shield base attached. Same basic specifications as miniature shield base socket shown left. Insulator bodies are mica-filled low loss phenolic (MFE). Phosphor bronze contacts with hot solder finish. Center shield is hot solder dipped brass. Shield base and ground tab are brass, nickel-plated.

Part No.	Insulator Material	Contact Material	Center Shield	Ground Tab
‡121-51-11-077	Mica	Phosphor Bronze	Yes	Yes
121-51-11-078	Mica	Phosphor Bronze	No	No
121-51-11-079	Mica	Phosphor Bronze	No	Yes

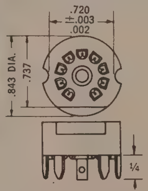
RIGHT ANGLE NOVAL SHIELD BASE STAND-OFF SOCKET


HOT TIN DIP CONTACT TERMINALS 1/8 MIN.
.300
53/64
.046
.100 REF.
.600 REF.
7/16 ±1/32
1/4
.046 ±.002
1 21/64
5/8
3/16
.100 REF.
1.000
.800
.400
.600
.200
.300
.200
.100
.300
.500
.700
.900
.800 ±.003
1.035 ±.010
.940 DIA.
.468
1.000 REF.
13 HOLES .062 DIA.
CHASSIS LAYOUT

Right angle noval socket with bayonet base as an integral part of the mounting bracket. Designed for military use and all material and workmanship meet rigid MIL specifications. Insulator body is mica-filled low loss phenolic (MFE). Contacts are made of beryllium copper, silver-plated with tails hot solder dipped, and are designed to drop through clearance holes arranged on a .1″ x .1″ grid layout. Shield base material is brass, hot solder dipped.

Part No.	Insulator Material	Contact Material
121-54-12-137	Mica	Beryllium Copper

NOVAL STAND-OFF WITH .25 P.C. TAILS/SOCKETS


.720 ±.003 .002
.843 DIA.
.737
1/4

Insulator available in black only. Contacts and center shields are brass with copper flash and electrolytic tin.

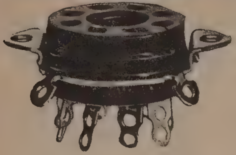
Part No.	Insulator Material	Contact Material
121-51-00-076	Black	Brass

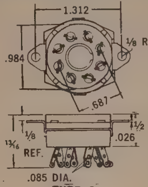
‡These items available through Cinch Distributors.

TRW® CINCH CONNECTORS

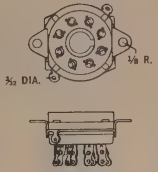
8-PIN OCTAL TUBE SOCKETS

MOLDED OCTAL SOCKETS With Mounting Saddle, 1$\frac{5}{16}$" Mounting Centers

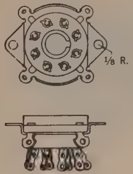




TYPE 1
Press-on Saddle Without Ground Lugs



TYPE 2
Press-on Saddle With 2 Ground Lugs



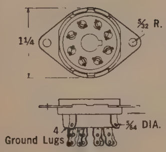
TYPE 3
Press-on Saddle With 4 Ground Lugs

Sub-panel mounting molded sockets for 1" chassis hole. Molded from high dielectric black phenolic or mica-filled low loss phenolic. Contacts are cadmium-plated brass or silver-plated phosphor bronze. Sturdy steel hot-solder-coated press-on type saddle, available with or without integral ground lugs. On saddles having two ground lugs, the lugs are adjacent to the No. 2 and 6 positions. On saddles having four ground lugs, they are adjacent to the No. 2, 4, 6 and 8 positions.

Part No.	Type	Mtg. Hole Dia.	Insulator Material	Contact Material
101-11-00-011	1	.140	Black	Brass
101-11-10-018	1	.140	Mica	Brass
101-11-11-013	1	.140	Mica	Phosphor Bronze
101-12-00-067	2	.140	Black	Brass
101-12-10-069	2	.140	Mica	Brass
101-12-11-068	2	.140	Mica	Phosphor Bronze
‡101-12-00-039	3	.136	Black	Brass
‡101-12-10-044	3	.136	Mica	Brass
101-12-11-051	3	.136	Mica	Phosphor Bronze
101-12-00-052	3	.156	Black	Brass
101-12-10-053	3	.156	Mica	Brass
101-12-11-054	3	.156	Mica	Phosphor Bronze

MOLDED OCTAL SOCKETS With Mounting Saddle, 1½ Mounting Centers

Sub-panel mounting molded octal sockets for 1⅛" chassis hole. Same specifications as 1$\frac{5}{16}$" type described above. Press-on type metal saddles are made with or without integral ground lugs.

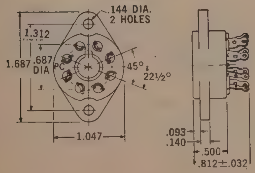


TYPE 5
Clinch-on Saddle With 4 Ground Lugs

Part No.	Type	Mtg. Hole Dia.	Insulator Material	Contact Material
‡101-24-00-065	5	.143	Black	Brass
‡101-24-10-067	5	.143	Mica	Brass
101-24-11-057	5	.143	Mica	Phosphor Bronze

ALL-MOLDED OCTAL SOCKETS

Cinch's all-molded octal socket offers a complete one-piece construction for higher voltage applications. The saddle and body are a single casting, molded of high dielectric black phenolic or mica-filled low loss phenolic. Contacts are of brass, cadmium-plated. Mounting hole centers are 1$\frac{5}{16}$". This socket can also be supplied with keyway rotated 90°.



Part No.	Mtg. Hole Dia.	Insulator Material	Contact Material
‡101-06-00-199	.144	Black	Brass
‡101-06-10-200	.144	Mica	Brass

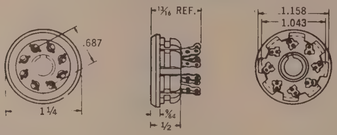
‡These items available through Cinch Distributors.

TRW® CINCH CONNECTORS

8-PIN OCTAL TUBE SOCKETS (CONT'D)

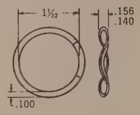
RING MOUNT MOLDED OCTAL SOCKETS

Used extensively on test equipment, public address amplifiers and on other apparatus where sockets are exposed. Mounts in 1¹¹⁄₆₄″ chassis hole. Molded keyways in side engage key in chassis hole, preventing socket from turning. Molded of high dielectric black phenolic or mica-filled low loss phenolic. Contacts are brass, cadmium-plated or phosphor bronze, silver-plated.



Part No.	Chassis Thickness	Insulator Material	Contact Material
101-03-00-033	¹⁄₁₆″	Black	Brass
101-03-10-059	¹⁄₁₆″	Mica	Brass

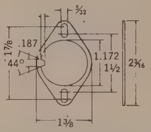
CRIMPED RETAINER RING



Formed of .020 spring steel, is used with ring mount sockets. Securely anchors sockets in place without requiring screws or rivets. Ring finishes available are cadmium-plated, nickel-plated and cadmium-plated plus yellow chromate. Specify finish.

‡(Part No. 441-00-23-072)

ADAPTOR PLATE

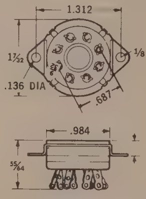


Is for use when the hole in chassis is too large to use crimped retainer ring alone. In such cases, this adaptor plate is anchored to the chassis and the ring clamps the appropriate ring-mount socket to the plate. Made of ¹⁄₁₆″ cold rolled steel with cadmium-plated or cadmium-plated plus yellow chromate finish. Specify finish.

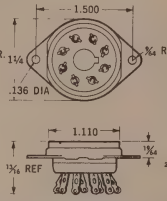
‡(Part No. 441-37-22-001)

SPECIAL COMMERCIAL MOLDED OCTAL SOCKETS WITH MOUNTING SADDLE

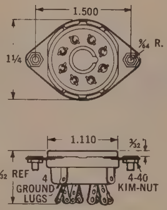
Several variations of molded saddle octal sockets are also available for special commercial needs. Type 3 in the table below refer to material variations of these types shown in the previous standard molded saddle sections. Types 7 and 9 are designed for top mounting in chassis. Type 8 is the equivalent of octal socket Type 5, with 1⁵⁄₁₆″ mounting centers instead of 1½″. Type 10 provides "Kim" nuts for simplification of assembly and to prevent screws from loosening due to vibration. Type 11 shows a socket with "Pem" nuts attached to simplify assembly by eliminating conventional type nuts.



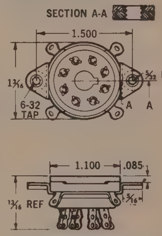
TYPE 7
1⁵⁄₁₆″ Mounting Centers
Press-on Saddle
Top Mount



TYPE 9
1½″ Mounting Centers
Clinch-on Saddle
Top Mount



TYPE 10
1½″ Mounting Centers
Clinch-on Saddle
With "Kim" Nuts



TYPE 11
1½″ Mounting Centers
Clinch-on Saddle
With "Pem" Nuts

Part No.	Type	Mtg. Hole Dia.	Insulator Material	Contact Material	Saddle Material	See Note
101-12-12-055	3*	.156	Mica	Beryllium Copper	Steel	1, 2, 3, 4
101-12-11-056	3*	.156	Mica	Phosphor Bronze	Steel	1, 2, 3, 4
101-11-90-101	7	.136	Brown	Brass	Steel	—
101-11-10-099	7	.136	Mica	Brass	Steel	—
101-23-10-146	9	.136	Mica	Brass	Steel	5
101-24-11-183	10	4-40 Tap	Mica	Phosphor Bronze	Steel	1, 3
101-24-12-223	11	6-32 Tap	Mica	Beryllium Copper	Brass	1, 2, 3, 4

NOTES

1. Contacts silver plated.
2. Contact tails tin dipped.
3. Saddle tin dipped.
4. Plated to withstand 50 hour salt spray test.
5. Insulator wax impregnated.

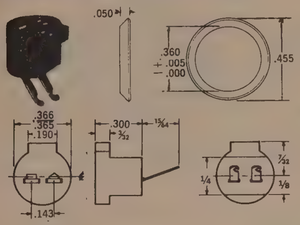
*See page 17 for dimensions.

‡These items available through Cinch Distributors.

TRW® CINCH CONNECTORS

SPECIAL PURPOSE TUBE SOCKETS

CETRON TUBE SOCKETS (2-PIN)

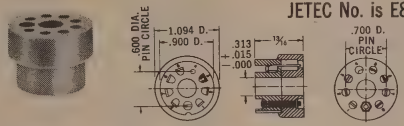


This socket is designed for use with Cetron Tubes CE701 and CE702 in such applications as electric eye doors and motion picture projectors. Molded from high dielectric black phenolic or mica-filled low loss phenolic. Contacts are of special alloy spring brass, cadmium-plated. May be mounted by press fit, gluing or by mounting ring 441-00-11-099. Mounting ring finishes available are cadmium-plated, nickel-plated or cadmium-plated plus yellow chromate. Specify finish.

Part No.	Insulator Material	Contact Material
‡149-12-00-001	Black	Brass
149-12-10-002	Mica	Brass

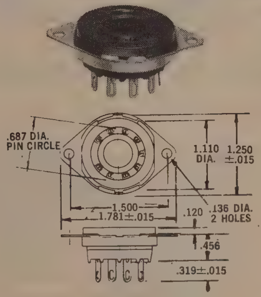
VIDICON TUBE SOCKET (7-PIN)

7-contact socket for RCA Vidicon Tube Nos. 6198 and 7038. Insulator material is mica-filled low loss phenolic. Contacts are of silver-plated phosphor bronze. JETEC No. is E8-11.



Part No.	Insulator Material	Contact Material
‡133-97-11-013	Mica	Phosphor Bronze

MOLDED NOVAR SOCKETS WITH MOUNTING SADDLE (9-PIN)

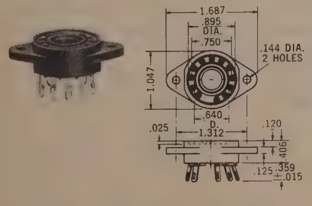


Sockets developed by Cinch for use with the Novar Tube. Since physical dimensions are the same as octal sockets, layouts and cutouts for octal sockets will accommodate Novar Sockets. Contact specifications provide max. fatigue strength and mating force with tube pins. Performance meets or surpasses EIA standards.

Novar sockets with mounting saddles are available bottom mount only. Molded from high dielectric black phenolic or mica-filled low loss phenolic. Cadmium-plated brass contacts. Cadmium-plated steel saddle. 1½″ mounting centers. Mounting holes are .136″ diameter.

Part No.	Insulator Material	Contact Material
‡149-19-00-033	Black	Brass
‡149-19-10-034	Mica	Brass

COMPACTRON TUBE SOCKETS (12-PIN)



Special all-molded multi-purpose 12-pin socket developed by Cinch for use with the Compactron Tube. Physical dimensions are the same as octal and novar sockets. Molded from high dielectric black phenolic or mica-filled low loss phenolic. Contacts are cadmium-plated brass. Mounting hole centers are 1 5/16″. Mounting holes are .144″ diameter.

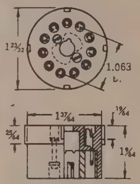
Part No.	Insulator Material	Contact Material
‡149-10-30-048	Black	Brass
‡149-10-10-049	Mica	Brass

‡These items available through Cinch Distributors.

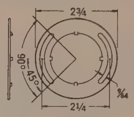
TRW® CINCH CONNECTORS

SPECIAL PURPOSE TUBE SOCKETS (CONT'D)

MAGNAL TUBE SOCKETS (11-PIN)



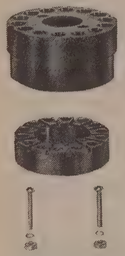
For use with 5BP1 and 2AP1 type cathode ray tubes. Molded from high dielectric black phenolic or mica-filled low loss phenolic. Full floating cadmium-plated phosphor bronze contacts ensure easy insertion of tube and provide excellent electrical connections. Navy type has silver-plated phosphor bronze contacts. Two-piece insulator consists of outer casting with required number of contacts assembled and inner casting assembled in position but not fastened. Supplied with two screws, two nuts and two lock washers for assembly. Also available with cadmium-plated or zinc-plated steel mounting ring 441-30-22-012. Specify mounting ring finish.

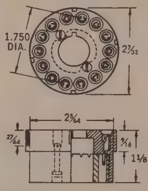


Part No.	Insulator Material	Contact Material	Navy Type No.
143-14-01-017	Black	Phosphor Bronze	—
143-14-11-016	Mica	Phosphor Bronze	—
‡143-13-11-011	Mica	Phosphor Bronze†	CMG49707

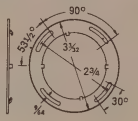
†Silver plated finish.

DIHEPTAL TUBE SOCKETS (14-PIN) STANDARD DIHEPTAL SOCKETS





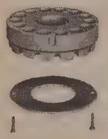
Possess same features as Cinch Magnal Sockets shown above. Molded of high dielectric black phenolic or mica-filled low loss phenolic with full-floating cadmium-plated phosphor bronze contacts. Silver-plated phosphor bronze contacts also available in mica material. Two-piece insulator construction. Supplied with two screws, two nuts and two lock washers unassembled. Available with cadmium-plated, nickel-plated or zinc-plated steel mounting ring 441-30-22-038. Specify mounting ring finish.

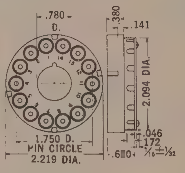


Part No.	Type	Insulator Material	Contact Material	Navy Type No.
‡143-42-01-014	Standard	Black	Phosphor Bronze	—
‡143-42-11-016	Standard	Mica	Phosphor Bronze	—
143-42-11-011	Standard	Mica	Phosphor Bronze†	CMG49920

†Silver plated finish.

THIN DIHEPTAL SOCKET (14-PIN)



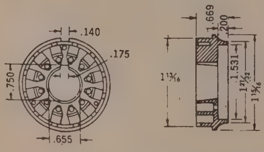


Thinner version of standard diheptal for tighter space requirements. Molded from mica-filled low loss phenolic with silver-plated beryllium copper contacts. Consists of one-piece socket base, back plate, contacts and two drive screws, all supplied unassembled.

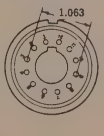
Part No.	Type	Insulator Material	Contact Material	Navy Type No.
143-44-12-028	Thin	Mica	Beryllium Copper†	—

†Silver plated finish.

DUODECAL TUBE SOCKETS (12-PIN)



For use with 10BP4, 2BP1, 5TP4 type tubes and RCA 6199 tube. Molded from high dielectric black phenolic with cadmium plated brass contacts or from mica-filled low loss phenolic with silver-plated beryllium copper contacts. Slightly larger in diameter than tube base and only slightly longer than tube pin, featuring wire strain relief as an integral part of the contact. Consists of socket base, back plate, contacts and three slotted-head self-tapping screws, all supplied unassembled for wiring to suit individual specifications.



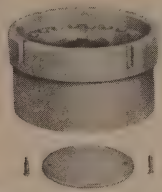
Part No.	Insulator Material	Contact Material	Navy Type No.
‡143-24-00-011	Black	Brass	—
‡143-24-12-013	Mica	Beryllium Copper	CMG492005

‡These items available through Cinch Distributors.

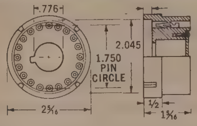
TRW® CINCH CONNECTORS

SPECIAL PURPOSE TUBE SOCKETS (CONT'D)

PHOTO-MULTIPLIER TUBE SOCKET (20-PIN)

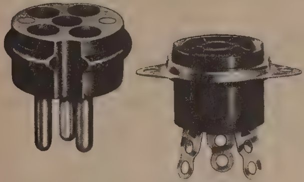


20-contact socket for RCA Photo-multiplier Tube Nos. 6810, C7187A, C7122 and 7265. Molded of MAI-60 Alkyd Glass Fibre. JETEC No. 20102. Contacts are of brass, cadmium-plated. Consists of socket base, contacts, back plate and two screws, all supplied unassembled.

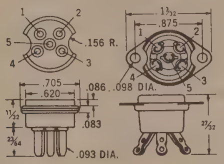

.776
2.045
1.750 PIN CIRCLE
2 5/16
1/2
1 5/16

Part No.	Insulator Material	Contact Material
‡143-94-90-016	Alkyd	Brass

3-5 PIN CONNECTOR PLUGS AND SOCKETS

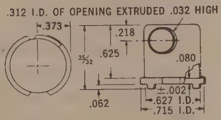


Designed to fit same chassis hole as standard 7-pin miniature sockets. Molded of high dielectric black phenolic. Plug pins are of nickel-plated brass with socket contacts of cadmium-plated brass. Cadmium-plated steel mounting saddle on socket.


1
2
3
4
5
.156 R.
.705
.620
.086
.098 DIA.
11/32
.083
23/64
.093 DIA.
1 13/32
.875
27/32

Plug Part No.	Socket Part No.	Pin or Contact Positions	Insulator Material	Pin or Contact Material
204-31-05-010	203-41-05-020	1, 2, 3, 4, 5	Black	Brass
204-31-04-012	203-41-04-021	1, 2, 3, 4	Black	Brass
204-31-04-017	203-41-04-023	1, 2, 3, 5	Black	Brass
204-31-03-013	203-41-03-026	2, 3, 4	Black	Brass

3-5 PIN CONNECTOR PLUG SHELL

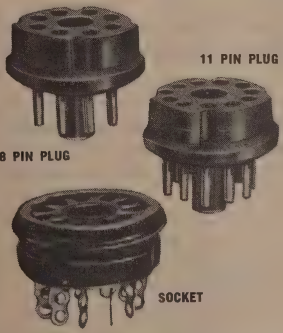

.312 I.D. OF OPENING EXTRUDED .032 HIGH
.373
.218
25/32
.625
.080
.062
±.002
.627 I.D.
.715 I.D.

One shell available, for 3-5 pin plug only. This shell, .016″ steel with gray enamel finish, has a 5/16″ diameter extruded hole in the side.

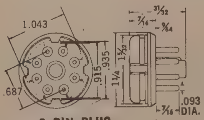
Part No. 209-13-13-171

MISCELLANEOUS SOCKETS AND PLUGS

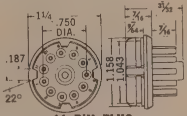
8-11 PIN CONNECTOR PLUGS AND SOCKETS


11 PIN PLUG
8 PIN PLUG
SOCKET

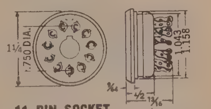
Ideal plugs and sockets for connector applications where power requirements are small and space is limited. Consists of 8-pin plug designed to fit any standard octal socket and mating 11-pin plug and socket. Molded of high dielectric black phenolic or mica-filled low loss phenolic. Plug pins are of nickel-plated brass with tapered ends for easy insertion. Socket contacts are cadmium-plated brass. Plugs are available with grooving for 1/16″ or 3/32″ chassis thicknesses or without grooving. Sockets are available with grooving for 1/16″ or 3/32″ or 1/8″ thicknesses. Both plugs and sockets mount on chassis with 441-00-23-072 retainer ring (as shown on page 11) and can be used with any of the shells shown below.


1.043
.687
.915
.935
1 1/4
1 5/32
31/32
7/16
5/64
7/16
.093 DIA.

8 PIN PLUG


1 1/4
.750 DIA.
.187
22°
1.158
1.043
7/16
5/64
7/16
3/32

11 PIN PLUG


1 1/4
.750 DIA.
1.043
1.158
5/64
1/2
13/16

11 PIN SOCKET

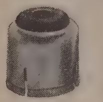
8-Pin Plug Part No.	11-Pin Plug Part No.	Chassis Thickness	Insulator Material	Plug Pin Material	11-Pin Socket Part No.	Chassis Thickness	Insulator Material	Socket Contact Material
‡204-51-08-002	‡204-51-11-001	1/16″	Black	Brass	‡203-52-11-012	1/16″	Black	Brass
204-52-08-005	204-52-11-033	1/16″	Mica	Brass	203-52-11-005	1/16	Mica	Brass
204-51-08-006	204-51-11-031	3/32″	Black	Brass	203-51-11-003	3/32″	Black	Brass
204-52-08-007	204-52-11-034	3/32″	Mica	Brass	203-52-11-006	3/32″	Mica	Brass
204-51-08-003	204-51-11-028	—	Black	Brass	203-51-11-004	1/8″	Black	Brass
204-52-08-004	204-52-11-029	—	Mica	Brass	203-52-11-007	1/8″	Mica	Brass

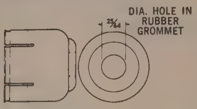
‡These items available through Cinch Distributors.

TRW® CINCH CONNECTORS

MISCELLANEOUS SOCKETS AND PLUGS

8-11 PIN CONNECTOR SHELLS

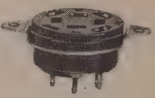




Shells are available to snap on to 8- and 11-pin connector plugs and sockets grooved for a 1/16″ chassis thickness. Shell has a 25/64″ diameter hole in a rubber grommet in the top. There is a screwdriver slot at the bottom of each shell to facilitate removal when necessary. All shells are made of cadmium-plated steel with an insulating liner. Part No. 209-23-23-205.

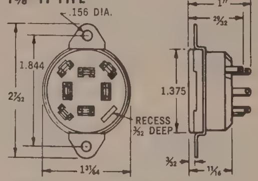
CAPACITOR SOCKETS

1″ FP TYPE

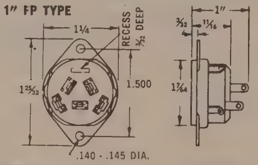


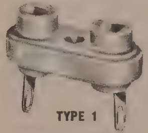
1⅜″ FP TYPE

1⅜″ FP TYPE



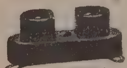
1″ FP TYPE



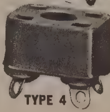


TYPE 1

TYPE 2



TYPE 3



TYPE 4

1″ FP TYPE CAPACITOR SOCKET

Molded of high dielectric black phenolic. Steel saddle, with 4 ground lugs, is hot-solder-coated. 1½″ mounting centers. Contacts are phosphor bronze, cadmium-plated. Has 3 recessed center contacts for extended prongs of capacitor and two outer contacts flush with surface for short prongs of capacitor.

1⅜″ FP TYPE CAPACITOR SOCKET

Molded of high dielectric black phenolic. Sturdy cadmium-plated steel saddle has 1 27/32″ mounting centers. Contacts are phosphor bronze, cadmium-plated. Has four recessed center contacts for extended prongs of capacitor and three outer contacts flush with surface for short prongs of capacitor.

Part No.	FP Type	No. of Contacts	Insulator Material†	Contact Material
‡203-41-05-001	1″	5	G.P. Black†	Phosphor Bronze
‡203-41-07-002	1⅜″	7	G.P. Black†	Phosphor Bronze

†Also available in mica material.

TYPE 1 — 2-PRONG .486″ CENTERS

Made of ceramic material. Silver-plated beryllium copper contacts with hot tinned tails, mounted on .486″ centers. ⅛″ mounting hole. Tails extend straight down. For all .050 pin crystals with HC-6/U holders.

TYPE 2 — 2-PRONG 31/64″ CENTERS

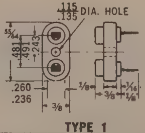
Molded of high dielectric black phenolic or mica-filled low loss phenolic. Silver-plated beryllium copper contacts. .120″ diameter recessed mounting hole. For use with crystals having .093 pins on .486″ centers.

TYPE 3 — 2-PRONG ½″ CENTERS

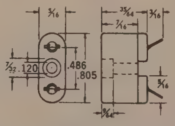
Molded of high dielectric black phenolic or mica-filled low loss phenolic. Silver-plated phosphor bronze contacts. No. 4-40 tap mounting hole. For crystals having .125 pins on .500 centers.

TYPE 4 — 4-PRONG

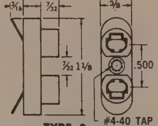
Molded of mica-filled low loss phenolic. Silver-plated beryllium copper contacts on 31/64″ centers. .150″ diameter mounting hole recessed 5/64″ from surface in 5/16″ diameter hole. Designed for use with two crystals having .093 pins on .486″ centers.



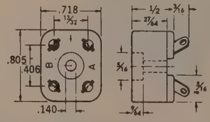
TYPE 1



TYPE 2



TYPE 3



TYPE 4

Part No.	Type	No. of Prongs	Centers	Insulator Material	Contact Material
‡203-73-02-015	1	2	.486″	Ceramic	Beryllium Copper
‡203-71-02-031	2	2	.486″	Black	Beryllium Copper
‡203-72-02-030	2	2	.486″	Mica	Beryllium Copper
203-72-02-021	3	2	.500″	Black	Phosphor Bronze
203-72-02-022	3	2	.500″	Mica	Phosphor Bronze
‡203-72-04-037	4	4	.486″	Mica	Beryllium Copper

‡These items available through Cinch Distributors.

TRW® CINCH CONNECTORS

LAMINATED CONNECTOR SOCKETS AND PLUGS

Part No.	Ref. Dwg.
202-31-02-068	1
202-31-02-002	1A
202-31-02-010	2
202-31-02-128	2A
202-41-02-074	3
202-41-02-075	3A
202-41-02-155	4
202-41-02-154	4A
201-31-02-001	5
201-41-02-288	6

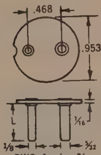
Part No.	Ref. Dwg.
201-41-02-106	7
202-31-03-070	8
202-31-03-003	8A
202-31-03-011	9
202-31-03-133	9A
202-41-03-152	10
202-41-03-153	10A
202-41-03-146	11
202-41-03-145	11A
201-31-03-002	12

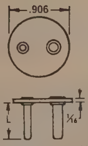
Part No.	Ref. Dwg.
201-41-03-024	13
201-41-03-278	14
202-31-04-179	15
202-31-04-005	15A
202-31-04-017	16
202-31-04-032	16A
202-41-04-108	17
202-41-04-109	17A
202-41-04-144	18
202-41-04-143	18A

Part No.	Ref. Dwg.
202-31-05-208	26
201-31-04-003	19
201-41-04-027	20
201-41-04-280	21
202-31-05-018	22
202-31-05-006	22A
202-41-05-141	23
202-41-05-139	23A
201-31-05-004	24
201-41-05-281	25

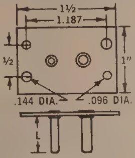
Part No.	Ref. Dwg.
202-31-05-212	26A
202-41-05-066	27
202-41-05-065	27A
201-31-05-062	28
201-41-05-074	29
202-31-06-066	30
202-31-06-007	30A
202-41-06-136	31
202-41-06-135	31A
201-31-06-005	32
201-41-06-243	33

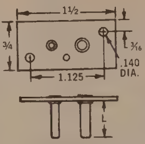
The following groups of Cinch sockets and plugs are made of NEMA grade XP laminated phenolic material with plug type pins of nickel plated brass and socket contacts of Cinch brass alloy, solder coated.

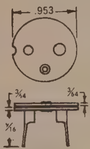

.468
.953
L
1/16
1/8
3/32
DWG. 1 L=3/8
DWG. 1A L=5/16

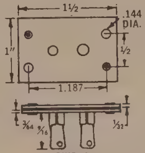


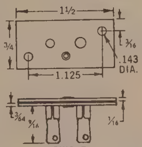
DWG. 2 L=3/8
DWG. 2A L=5/16

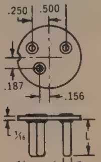

1½
1.187
½
1"
.144 DIA.
.096 DIA.
L
DWG. 3 L=3/8
DWG. 3A L=5/16

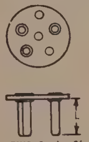

1½
¾
3/16
.140 DIA.
1.125
L
DWG. 4 L=3/8
DWG. 4A L=5/16


.953
3/64
3/64
5/16
DWG. 5

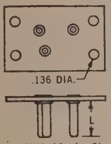

1½
.144 DIA.
1"
½
1.187
3/64
5/16
1/32
DWG. 6


1½
¾
3/16
.143 DIA.
1.125
3/64
5/16
1/16
DWG. 7

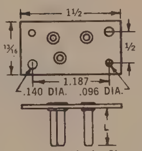

.250
.500
.187
.156
1/16
L
1/8
DWG. 8 L=3/8
DWG. 8A L=5/16

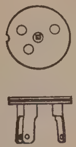


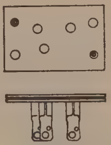
DWG. 9 L=3/8
DWG. 9A L=5/16

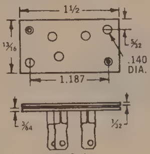


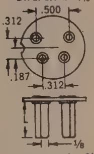
DWG. 10 L=3/8
DWG. 10A L=5/16

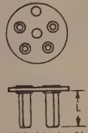

1½
13/16
½
1.187
.140 DIA.
.096 DIA.
L
DWG. 11 L=3/8
DWG. 11A L=5/16


DWG. 12

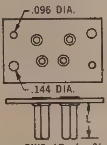

DWG. 13

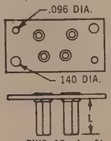

1½
13/16
3/32
.140 DIA.
1.187
3/64
1/32
DWG. 14

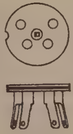

.500
.312
.187
.312
1/8
DWG. 15 L=3/8
DWG. 15A L=5/16

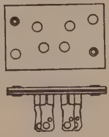


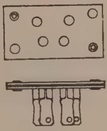
DWG. 16 L=3/8
DWG. 16A L=5/16


.096 DIA.
.144 DIA.
L
DWG. 17 L=3/8
DWG. 17A L=5/16

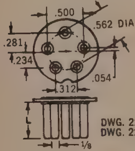

.096 DIA.
140 DIA.
L
DWG. 18 L=3/8
DWG. 18A L=5/16

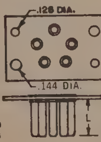

DWG. 19

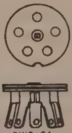

DWG. 20

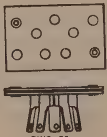

DWG. 21

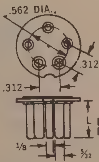
In the group below, the general dimensions of Part No. 202-41-05-141 group conform to those of Part No. 202-41-02-074 group in the top panel. Similarly, those of the 201-31-05-004 group and the 201-41-05-281 group correspond to the F-20 and 4068 groups respectively.

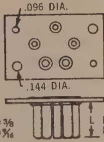

.500
.562 DIA.
.281
.234
.054
.312
L
1/8
DWG. 22 L=3/8
DWG. 22A L=5/16

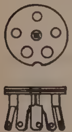

.128 DIA.
.144 DIA.
L
DWG. 23 L=3/8
DWG. 23A L=5/16

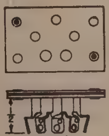

DWG. 24

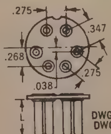

DWG. 25

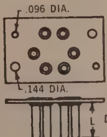

.562 DIA.
.312
.312
L
1/8
3/32
DWG. 26 L=3/8
DWG. 26A L=5/16

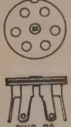

.096 DIA.
.144 DIA.
L
DWG. 27 L=3/8
DWG. 27A L=5/16

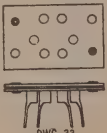

DWG. 28


DWG. 29


.275
.347
.268
.275
.038
L
1/8
DWG. 30 L=3/8
DWG. 30A L=5/16


.096 DIA.
.144 DIA.
L
DWG. 31 L=3/8
DWG. 31A =5/16


DWG. 32


DWG. 33

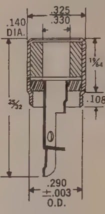
TRW® CINCH CONNECTORS

PHONO CONNECTORS AND SOCKETS

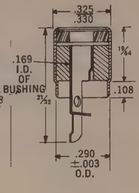
PHONO SOCKET

203-1901-027

203-1901-025



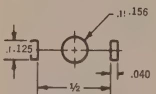
203-1901-025



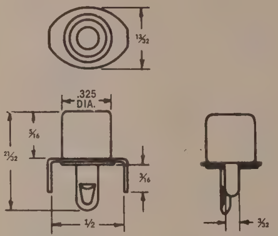
203-1901-027

Mates with either crimp or solder-type phono plug. Special internal bushing holds contact lengths. SHELL: Cold-rolled steel, cadmium-plated. CONTACT: Cadmium-plated brass. INSULATOR ASSEMBLY: Insulated washer with bushing.

PHONO CONNECTOR PC SOCKETS



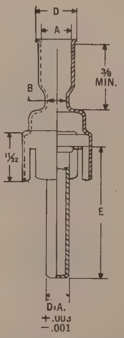
CHASSIS LAYOUT



Phono connector socket for printed circuit use. Can be used as a two-contact connector or for ground in phono applications. Insulator is general purpose black phenolic. Brass mounting bracket, brass contact and steel shell are cadmium-plated. Two styles available, one as shown and one with no wire hole in contact tail.

Part No.	Insulator Material	Contact Material	Wire Hole
203-11-01-016	Black	Brass	Yes
203-11-01-015	Black	Brass	No

PHONO PLUGS AND SOCKETS

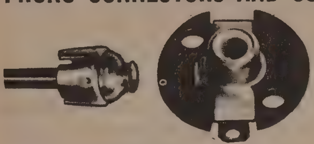


Cinch's low cost crimp-type phono plugs provide the ideal phono connector for your TV — stereo — hi-fi chassis needs. Sturdy, reliable construction assures electrical continuity. Automatic crimping capability helps cut assembly costs to barest minimum. Different types available for use with .090, .125 or .135 diameter wire. SHELL: Cold-rolled steel, cadmium-plated. PIN ASSEMBLY: Nickel-plated brass pin with insulated washer.

Part No.	DIMENSIONS IN INCHES			
	A +.010 −.005	B	D ± .010	E (Pin Length)
202-19-01-093	.125	.090	.188	31/64
202-19-01-092	.156	.125	.219	31/64
202-19-01-091	.175	.135	.233	31/64
202-19-01-111	.225	.180	.275	—

TRW® CINCH CONNECTORS

PHONO CONNECTORS AND SOCKETS (CONT'D)

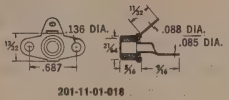


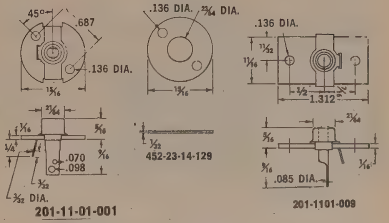
Some of the most popular single connectors for use with phono pick-up applications were developed and made by Cinch over a period of years.

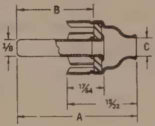
The shells of the male plugs are of the wiping action type, designed to ground on the housing of the mating part.

Part No. 452-23-14-129 insulator can be used with Part No. 201-11-01-001.

Part No. 201-11-01-018 is a small, compact unit especially designed for use in places where economy of space is essential.


.136 DIA.
13/32
.687
11/32
.088 DIA.
.085 DIA.
21/64
3/16
3/16
201-11-01-018

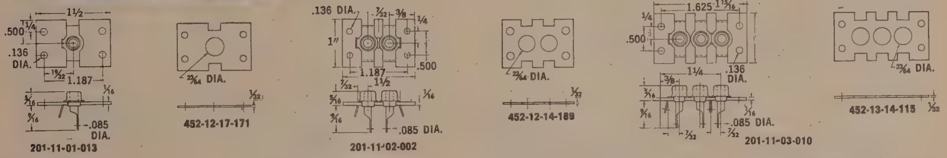

45°
.687
.136 DIA.
15/16
21/64
1/16
5/16
1/4
.070
.098
3/16
1/32
3/32 DIA.
201-11-01-001
.136 DIA.
25/64 DIA.
15/16
1/32
452-23-14-129
.136 DIA.
11/32
11/16
1/2
1.312
21/64
5/16
3/16
.085 DIA.
1/16
201-1101-009


B
1/8
C
17/64
15/32
A

Part No.	A	B	C
‡202-15-01-011	15/16	11/16	1/8
‡202-15-01-015	13/16	9/16	1/8
202-15-01-026	5/8	3/8	1/8
202-15-01-013	15/16	11/16	11/64
202-15-01-016	13/16	9/16	11/64
202-15-01-022	5/8	3/8	11/64

SINGLE, DOUBLE AND TRIPLE CONNECTORS AND INSULATORS

Insulators No. 452-12-17-171, 452-12-14-189 and 452-13-14-115 are made of 1/32" NEMA grade XP laminated phenolic material. Insulation in female connectors is ceramic. Mounting hole center distance of both single and double connectors is 1.187".


1½
.500
1/4
.136 DIA.
13/32
1.187
1/16
5/16
3/16
.085 DIA.
201-11-01-013
25/64 DIA.
1/32
452-12-17-171
.136 DIA.
5/32
3/8
1/4
1"
1.187
1½
.500
1/32
5/16
3/16
1/16
.085 DIA.
201-11-02-002
25/64 DIA.
1/32
452-12-14-189
1.625
1 15/16
1/4
.500
1¼
.136 DIA.
3/8
5/16
3/16
1/16
.085 DIA.
7/32
7/32
201-11-03-010
25/64 DIA.
452-13-14-115
1/32

COAXIAL PLUG AND SOCKET

MINIATURE, I.F. COAXIAL PLUG AND SOCKET

For Low Cost Shielded Contact in Non-critical VSWR Entertainment and Industrial Applications**

This revolutionary new miniature plug and socket is designed to replace standard phono plugs and sockets. Its features include:

- Approximately 1/3 smaller than standard phono plugs
- Higher reliability than standard phono plugs
- Less susceptibility to vibration
- Grounding before center contact
- Reduced wiring costs through automatic crimping of the plug

Only .200 inches in body diameter, this new Cinch connector will fit into many places where old style connectors are not suitable.

Greater reliability is obtained through the shrouded center pin design. The center pin, mounted in a Teflon insulator, cannot be shorted or bent by mishandling. To ensure correct mating, the conventional four fingered skirt, which is subject to bending, has been eliminated. High separation force due to long bearing surfaces assures that normal vibration of the lead will not separate the connector halves.

Shell grounding before center contact assures connection without bursts of hum in audio systems. It also protects components from overvoltages which can be generated when the center conductor connects first.

The shell and pin can be positioned to mount at varying heights off the chassis, by means of a special sleeve supplied with the connector. This provides a flexibility for mechanical design never before available.

**Not recommended for microwave devices.

‡These items available through Cinch Distributors.

SPECIFICATIONS

Dielectric Strength: 1,000 volts

Contact Current Rating: 1 ampere

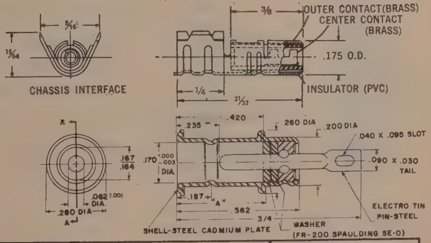
Contact Resistance: .03 ohms max.

Insulation Resistance:
10,000 megohms minimum.

Contact Retention:
After 3 insertions of plug into socket the withdrawal force shall not be less than 8 ounces.

Durability:
After 10 cycles of insertions and withdrawals, the connector contact resistance shall not exceed specs

Insulation:
Socket: Teflon
Plug: Polyvinyl chloride
Contacts: Pre-tinned brass
Shell and Sleeve:
Steel, copper flashed and cadmium plated


5/16
15/64
CHASSIS INTERFACE
3/8
OUTER CONTACT(BRASS)
CENTER CONTACT (BRASS)
.175 O.D.
1/4
21/32
INSULATOR (PVC)
.235
.420
.260 DIA
.200 DIA
.040 X .095 SLOT
.167
.164
.170
DIA.
.090 X .030 TAIL
.062
DIA.
.260 DIA
A
.187
"A"
.562
3/4
ELECTRO TIN PIN-STEEL
WASHER (FR-200 SPAULDING SE-O)
SHELL-STEEL CADMIUM PLATE

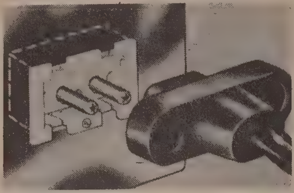
Part No.	Description	Mounting Sleeve Dimension "A"
202-19-01-117	Plug (Male)	—
203-19-01-042	Socket (Female)	.250
203-19-01-043	Socket (Female)	.437
203-19-01-044	Socket (Female)	No Shoulder

Standard parts are available with mounting sleeve dimensions as indicated in the chart.

TRW® CINCH CONNECTORS

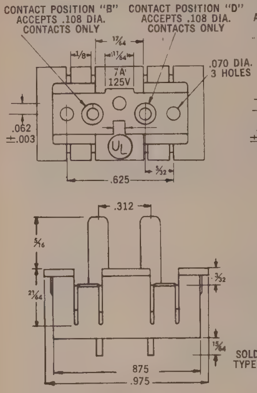
DISCONNECT PLUGS

125 VOLT A.C. CONNECTOR

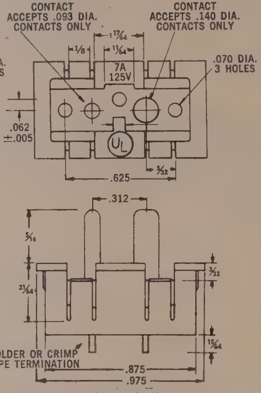


A low cost Cinch 125 volt AC connector provides the ideal disconnect plug for radio . . . TV . . . phonographs and appliance chassis needs. The snap-in locking feature eliminates the need for riveting or eyeleting. Sturdy construction insures continuous, dependable performance. Insulator material is Black Lexan. Solid brass pins are cadmium plated. These parts are UL and CSA approved.

TWO-CONTACT CONNECTOR

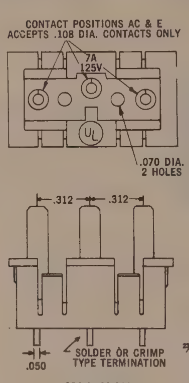

CONTACT POSITION "B" ACCEPTS .108 DIA. CONTACTS ONLY
CONTACT POSITION "D" ACCEPTS .108 DIA. CONTACTS ONLY
17/64
1/8
11/64
7A 125V
.070 DIA. 3 HOLES
.062 ±.003
UL
.625
3/32
.312
5/16
9/32
21/64
15/64
875
.975

204-49-02-042


CONTACT ACCEPTS .093 DIA. CONTACTS ONLY
CONTACT ACCEPTS .140 DIA. CONTACTS ONLY
17/64
1/8
11/64
7A 125V
.070 DIA. 3 HOLES
.062 ±.005
UL
.625
3/32
.312
5/16
9/32
21/64
15/64
SOLDER OR CRIMP TYPE TERMINATION
.875
.975

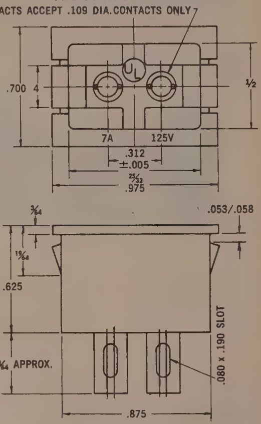
204-49-02-044

THREE-CONTACT CONNECTOR


CONTACT POSITIONS AC & E ACCEPTS .108 DIA. CONTACTS ONLY
7A 125V
UL
.070 DIA. 2 HOLES
.312
.312
.050
SOLDER OR CRIMP TYPE TERMINATION

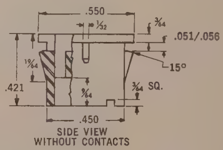
204-49-03-041

TWO-CONTACT CONNECTOR

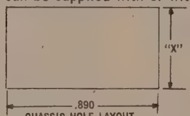

CONTACTS ACCEPT .109 DIA. CONTACTS ONLY
.700
4
1/2
UL
7A
125V
.312 ±.005
25/32
.975
3/64
.053/.058
13/64
.625
.080 x .190 SLOT
23/64 APPROX.
.875

204-49-02-043

Part Nos. 204-49-02-042/044 & 204-49-03-041 can be supplied with or without a polarizing key.


.550
1/32
3/64
.051/.056
15°
13/64
.421
3/64
3/64 SQ.
.450

SIDE VIEW WITHOUT CONTACTS

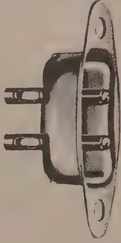


CHASSIS HOLE LAYOUT

For:	Dim. "X"
204-49-02-043	.615
204-49-03-041	.465
204-49-02-042	.465
204-49-02-044	.465

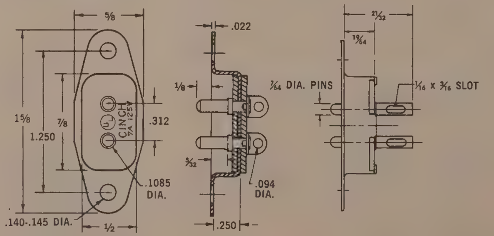
STANDARD DISCONNECT PLUG

202-41-02-179



202-41-02-180

Recessed Plug No. 202-41-02-179 is a sub-panel mounting type plug, UL approved, designed primarily for television applications. Part No. 203-41-02-013 is an UL approved receptacle for a standard 110 volt 2 blade appliance plug. When it is mounted on a device with a conducting surface, the face must project a minimum of 3/32″ and a maximum of 3/16″ from mounting surface. These parts are UL approved.


5/8
1 5/8
7/8
1.250
.312
CINCH 7A 125V
UL
.1085 DIA.
.140-.145 DIA.
1/2
.022
1/8
3/64 DIA. PINS
3/32
.094 DIA.
.250
21/32
13/64
1/16 x 3/16 SLOT

TRW® CINCH CONNECTORS

GENERAL DESCRIPTION

For more than a generation, "Jones" plugs and sockets have been a "by-word" of the electrical/electronic industry. Even today, the quality, reliability, convenience and basic excellence of the "Jones" design continues to meet the requirements of such exacting fields as communications and automatic vending equipment.

Within this catalog are listed each of the four basic lines of "Jones" plugs and sockets: 300, 400, 500, 2400 Series. The 300 Series, designed for light duty, has plug prongs $\frac{5}{32}$" wide by $\frac{3}{64}$" thick. The 400 Series, designed for medium work, has plug prongs $\frac{1}{4}$" wide by $\frac{1}{16}$" thick. The 500 Series, for heavy duty work, has plug prongs $\frac{5}{16}$" wide by $\frac{3}{32}$" thick. The 2400 Series, with the same characteristics as the 400 Series, carries a higher voltage rating.

In addition to the basic lines, also included are the 1400 Series and several other low-cost laminated plugs and sockets designed for simultaneous quick disconnect usage. Other units shown are special purpose plugs and sockets mounted in wall plates for terminating TV antennas or general industrial applications and a special line of audio connectors for high frequency connections.

For those individuals desiring a cross-reference between the "Jones" part numbers shown throughout this catalog and the new Cinch 10-digit factory part numbers, a separate form is available for this purpose. This free cross-reference guide, known as form C-1A, can be obtained by writing us direct or contacting your local Cinch representative.

Many of the "Jones" plugs and sockets shown throughout this catalog are also available locally through **authorized Cinch Distributors** usually at a savings in delivery time and freight costs. For your convenience those items normally carried in local stock by Cinch Distributors are indicated on each appropriate page of the catalog by the symbol. (CD)

ELECTRICAL RATINGS

	Rated Voltage* (V. RMS)	Current Capacity (Amps)	Max. Wattage on any Contact
300 SERIES	(Listed below)		
400 SERIES	1,100	15	3,750
2400 SERIES	1,700	10	2,500
500 SERIES	3,000	25	5,000
1400 SERIES	1,700	10	2,500

AUDIO CONNECTORS

	Rated Voltage* (V. RMS)	Current Capacity (Amps)	Max. Wattage on any Contact
101 SERIES	800	10	2,500
201 SERIES	1,300	10	2,500
202 SERIES	730	7.5	1,875

*Rated Voltage is ⅓ Voltage Breakdown.

300 SERIES

All connector ratings are based on a continuously mated condition. "Rated Voltage" is ⅓ of Voltage Breakdown.

Rated Voltage	730 Volts rms.
Contact Resistance	0.16 Ohms max.
Rated Current	(See at right)

Under most normal operating conditions where not all contacts are carrying susbtantially full rated current, maximum current per contact is rated at 10 amperes. The "Jones" 300 Series plugs and sockets are recognized under the Component Program of Underwriters' Laboratories, Inc. In accordance with UL Standard #498, the Underwriters' Laboratories ratings are derived from the condition whereby all contacts are carrying "rated" current simultaneously. The resultant ratings are as follows:

Rated Current

(2-12 contacts)	7.5 amperes
(15-33 contacts)	4.5 amperes

Rated Wattage

(2-12 contacts)	1875 watts
(15-33 contacts)	1125 watts

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FOR CROSS-REFERENCE BETWEEN "JONES" AND CINCH PART NUMBERS:

Request Cinch Form C-1A from your local Cinch Representative or write us direct. This form provides a convenient cross-reference between the "Jones" part numbers used in this catalog and the new Cinch 10-digit factory part numbers.

TRW® CINCH CONNECTORS

300 SERIES WITH STANDARD TERMINATION

The "Jones" 300 Series plugs and sockets, designed for light and medium duty applications, are small in size with good separation between contacts. This series is available in sizes from 2 to 33 contacts, arranged for either cap or panel mounting. All plugs and sockets are polarized so that plugs of one size cannot fit with sockets of another size. 24 to 33-contact plugs with standard termination also have a special polarizing pin to facilitate faster positioning of the mating plug and socket.

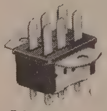
The insulating material is general purpose black phenolic. Phosphor bronze "knife-switch" type socket contacts engage both sides of flat brass plug contacts, providing double contact area. All contacts are cadmium-plated. Plug prongs are 5/32″ wide and 3/64″ thick. All solder lugs provided with size .093″ x .062″ wiring hole. Formed metal caps have black wrinkle finish with insulating liners. Other finishes and material available. Consult factory.

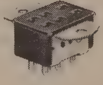
The 300 Series plugs and sockets feature MONOBLOCK (one-piece) construction. MONOBLOCK eliminates internal moisture traps. Furthermore, MONOBLOCK's new patented* snap-in socket contacts permit external prewiring, as well as removal and replacement of individual contacts if necessary. Contacts are "locked-in" to withstand wiring stress.

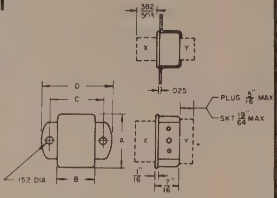
Note: All 2-contact plugs and sockets are round; all other sizes are rectangular.

*U.S. Pat. Nos. 2688123 & 2980881

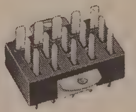
TYPE AB WITH ANGLE BRACKET

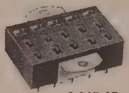

P-306-AB

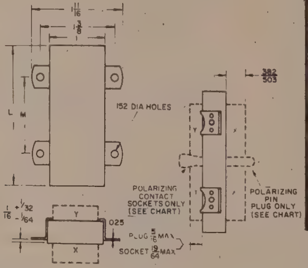

S-306-AB



No. of Contacts	Part No.* (CD)	Dimensions In Inches Tolerance: ±1/64″ or ±.005″ A	B	C	D
2	P-302-AB S-302-AB	21/32 Dia.	—	31/32	1 7/32
3	P-303-AB S-303-AB	1	7/16	3/4	1 1/16
4	P-304-AB S-304-AB	3/4	11/16	1	1 5/16
6	P-306-AB S-306-AB	1	11/16	1	1 5/16
8	P-308-AB S-308-AB	1 1/4	11/16	1	1 5/16
10	P-310-AB S-310-AB	1 9/16	11/16	1	1 5/16
12	P-312-AB S-312-AB	1 1/4	15/16	1 1/4	1 9/16


P-315-AB


S-315-AB



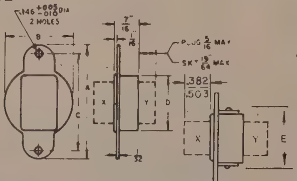
No. of Contacts	Part No.* (CD)	Dimensions Tol.: ±1/64″ or ±.005″ L	M	Polarizing Contact Pin	Polarizing In Cont. or Pin Position
15	P-315-AB S-315-AB	1 5/8	See Note	No	—
18	P-318-AB S-318-AB	1 15/16	1 1/4	No	—
21	P-321-AB S-321-AB	2 1/4	15/16	No	—
24	P-324-AB S-324-AB	2 9/16	1 1/4	Yes	14
27	P-327-AB S-327-AB	2 7/8	1 9/16	Yes	14
30	P-330-AB S-330-AB	3 3/16	1 7/8	Yes	14
33	P-333-AB S-333-AB	3 1/2	2 3/16	Yes	17

Note: P-315-AB and S-315-AB require only two mounting brackets, mounted at center on longer sides.
18-33 contact sizes require four mounting brackets.

TYPE FP WITH FLUSH PLATE

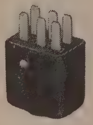
P-306-FP

S-306-FP

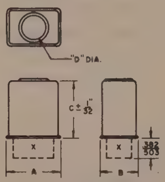


No. of Contacts	Part No.* (CD)	Tolerance: ±1/64″ or ±.005″ A	B	C	D	E (Max.)
2	P-302-FP S-302-FP	2 1/16	1 1/4	1 3/4	—	23/32
3	P-303-FP S-303-FP	2 1/16	1 1/4	1 3/4	15/16	1/2
4	P-304-FP S-304-FP	2 1/16	1 1/4	1 3/4	11/16	3/4
6	P-306-FP S-306-FP	2 1/16	1 1/4	1 3/4	15/16	3/4
8	P-308-FP S-308-FP	2 9/16	1 3/4	2 1/4	1 3/16	3/4
10	P-310-FP S-310-FP	2 9/16	1 3/4	2 1/4	1 1/2	3/4
12	P-312-FP S-312-FP	2 9/16	1 3/4	2 1/4	1 3/16	1

TYPE FHT WITH FLARED HOLE IN TOP


P-306-FHT

S-306-FHT



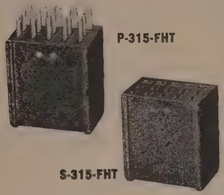
No. of Contacts	Part No.*	Tolerance: ±1/64″ or ±.005″ A	B	C	D
2	P-302-FHT S-302-FHT	21/32 Dia.	—	61/64	3/8
3	P-303-FHT S-303-FHT	1	7/16	61/64	5/16
4	P-304-FHT S-304-FHT	3/4	11/16	61/64	3/8
6	P-306-FHT S-306-FHT	1	11/16	1 5/64	7/16
8	P-308-FHT S-308-FHT	1 1/4	11/16	1 5/64	1/2
10	P-310-FHT S-310-FHT	1 9/16	11/16	1 13/64	1/2
12	P-312-FHT S-312-FHT	1 1/4	15/16	1 13/64	9/16

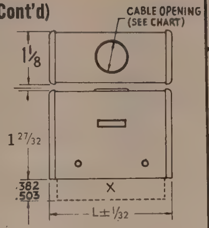
*P-Indicates Plug S-Indicates Socket.
X dimension is applicable to plugs only, with allowance made for pin float.
Y is the dimension for contact tail extension.
(CD) Indicates items normally available through Cinch Distributors.

TRW® CINCH CONNECTORS

300 SERIES WITH STANDARD TERMINATION (cont'd)

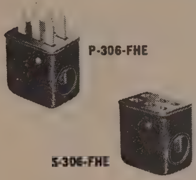
TYPE FHT WITH FLARED HOLE IN TOP (Cont'd)

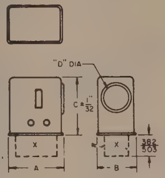

P-315-FHT
S-315-FHT


CABLE OPENING (SEE CHART)
1 1/8
1 27/32
.382
.503
X
L ± 1/32

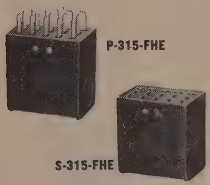
No. of Contacts	Part No.*	Dimensions In Inches L ±1/32	Cable Opening	Polarizing Contact Pin	Polarizing In Cont. or Pin Position
15	P-315-FHT S-315-FHT	1 11/16	9/16	No	—
18	P-318-FHT S-318-FHT	2	9/16	No	—
21	P-321-FHT S-321-FHT	2 5/16	5/8	No	—
24	P-324-FHT S-324-FHT	2 5/8	5/8	Yes	14
27	P-327-FHT S-327-FHT	2 15/16	5/8	Yes	14
30	P-330-FHT S-330-FHT	3 1/4	3/4	Yes	14
33	P-333-FHT S-333-FHT	3 9/16	3/4	Yes	17

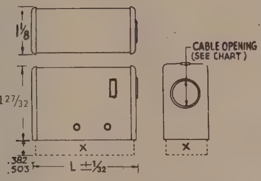
TYPE FHE WITH FLARED HOLE IN END


P-306-FHE
S-306-FHE


"D" DIA
C ± 1/32
X
A
B
.382
.503

No. of Contacts	Part No.*	Dimensions In Inches Tolerance: ±1/64" or ±.005" A	B	C	D
2	P-302-FHE S-302-FHE	21/32 Dia.	—	61/64	5/16
3	P-303-FHE S-303-FHE	1	7/16	61/64	1/4
4	P-304-FHE S-304-FHE	3/4	11/16	61/64	3/8
6	P-306-FHE S-306-FHE	1	11/16	1 5/64	7/16
8	P-308-FHE S-308-FHE	1 1/4	11/16	1 5/64	1/2
10	P-310-FHE S-310-FHE	1 9/16	11/16	1 13/64	1/2
12	P-312-FHE S-312-FHE	1 1/4	15/16	1 13/64	9/16

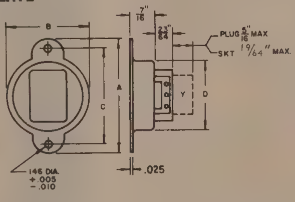

P-315-FHE
S-315-FHE


1 1/8
CABLE OPENING (SEE CHART)
1 27/32
X
.382
.503
L ± 1/32

No. of Contacts	Part No.*	Dimensions In Inches L ±1/32	Cable Opening	Polarizing Contact Pin	Polarizing In Cont. or Pin Position
15	P-315-FHE S-315-FHE	1 11/16	9/16	No	—
18	P-318-FHE S-318-FHE	2	9/16	No	—
21	P-321-FHE S-321-FHE	2 5/16	5/8	No	—
24	P-324-FHE S-324-FHE	2 5/8	5/8	Yes	14
27	P-327-FHE S-327-FHE	2 15/16	5/8	Yes	14
30	P-330-FHE S-330-FHE	3 1/4	3/4	Yes	14
33	P-333-FHE S-333-FHE	3 9/16	3/4	Yes	17

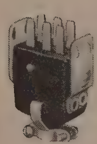
TYPE RP WITH RECESSED PLATE

P-306-RP
S-306-RP

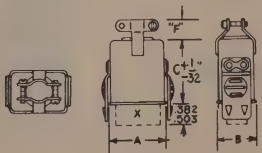

B
7/16
23/64
PLUG 5/16" MAX
SKT 19/64" MAX.
A
C
Y
D
.146 DIA. +.005 -.010
.025

No. of Contacts	Part No.* Ⓒᴅ	Dimensions In Inches Tolerance: ±1/64" or ±.005" A	B	C	D (Max.)
2	P-302-RP S-302-RP	2 1/16	1 1/2	1 3/4	1.350
3	P-303-RP S-303-RP	2 1/16	1 1/2	1 3/4	1.350
4	P-304-RP S-304-RP	2 1/16	1 1/2	1 3/4	1.350
6	P-306-RP S-306-RP	2 1/16	1 1/2	1 3/4	1.350
8	P-308-RP S-308-RP	2 9/16	2	2 1/4	1.850
10	P-310-RP S-310-RP	2 9/16	2	2 1/4	1.850
12	P-312-RP S-312-RP	2 9/16	2	2 1/4	1.850

TYPE CCT-L WITH CABLE CLAMP IN TOP OF CAP AND WITH LOCKS



P-306-CCT-L


"F"
C + 1/32"
X
.382
.503
A
B

No. of Contacts	Part No.* Ⓒᴅ	Dimensions In Inches Tolerance: ±1/64" or ±.005" A	B	C	F	Cable Opening
2	P-302-CCT-L	21/32 Dia.	—	61/64	25/64	3/8
3	P-303-CCT-L	1	7/16	61/64	25/64	5/16
4	P-304-CCT-L	3/4	11/16	61/64	27/64	3/8
6	P-306-CCT-L	1	11/16	1 5/64	27/64	7/16
8	P-308-CCT-L	1 1/4	11/16	1 5/64	27/64	1/2
10	P-310-CCT-L	1 9/16	11/16	1 13/64	27/64	1/2
12	P-312-CCT-L	1 1/4	15/16	1 13/64	27/64	9/16

*P-Indicates Plug S-Indicates Socket

X dimension is applicable to plugs only, with allowance made for pin float.

Y is the dimension for contact tail extension.

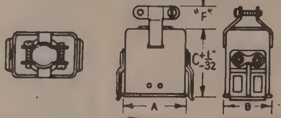
Ⓒᴅ Indicates items normally available through Cinch Distributors.

TRW® CINCH CONNECTORS

300 SERIES WITH STANDARD TERMINATION (cont'd)

TYPE CCT-K WITH CABLE CLAMP IN TOP OF CAP & WITH KEEPERS

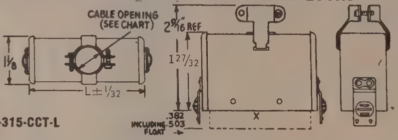
S-306-CCT-K



No. of Contacts	Part No.* (CD)	Dimensions In Inches Tolerance: ±1/64″ or ±.005″ A	B	C	F	Cable Opening
2	S-302-CCT-K	21/32 Dia.	—	61/64	25/64	⅜
3	S-303-CCT-K	1	7/16	61/64	25/64	5/16
4	S-304-CCT-K	¾	11/16	61/64	27/64	⅜
6	S-306-CCT-K	1	11/16	1 5/64	27/64	7/16
8	S-308-CCT-K	1¼	11/16	1 5/64	27/64	½
10	S-310-CCT-K	1 9/16	11/16	1 13/64	27/64	½
12	S-312-CCT-K	1¼	15/16	1 13/64	27/64	9/16

TYPE CCT-L WITH CABLE CLAMP IN TOP OF CAP & WITH LOCKS

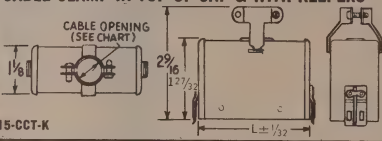
P-315-CCT-L



No. of Contacts	Part No.* (CD)	Dimensions In Inches L ±1/32	Cable Opening	Polarizing Contact Pin	Polarizing In Cont. Pin Pos.
15	P-315-CCT-L	1 11/16	9/16	No	—
18	P-318-CCT-L	2	9/16	No	—
21	P-321-CCT-L	2 5/16	⅝	No	—
24	P-324-CCT-L	2⅝	⅝	Yes	14
27	P-327-CCT-L‡	2 15/16	⅝	Yes	14
30	P-330-CCT-L‡	3¼	¾	Yes	14
33	P-333-CCT-L‡	3 9/16	¾	Yes	17

TYPE CCT-K WITH CABLE CLAMP IN TOP OF CAP & WITH KEEPERS

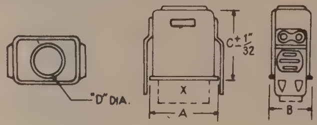
S-315-CCT-K



No. of Contacts	Part No.* (CD)	Dimensions In Inches L ±1/32	Cable Opening	Polarizing Contact Pin	Polarizing In Cont. Pin Pos.
15	S-315-CCT-K	1 11/16	9/16	No	—
18	S-318-CCT-K	2	9/16	No	—
21	S-321-CCT-K	2 5/16	⅝	No	—
24	S-324-CCT-K	2⅝	⅝	Yes	14
27	S-327-CCT-K‡	2 15/16	⅝	Yes	14
30	S-330-CCT-K‡	3¼	¾	Yes	14
33	S-333-CCT-K‡	3 9/16	¾	Yes	17

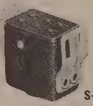
TYPE FHT-L WITH FLARED HOLE IN CAP AND WITH LOCKS

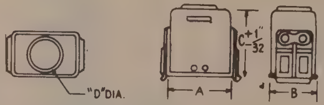
P-306-FHT-L



No. of Contacts	Part No.*	Dimensions In Inches Tolerance: ±1/64″ or .005″ A	B	C	D
2	P-302-FHT-L	21/32 Dia.	—	61/64	⅜
3	P-303-FHT-L	1	7/16	61/64	5/16
4	P-304-FHT-L	¾	11/16	61/64	⅜
6	P-306-FHT-L	1	11/16	1 5/64	7/16
8	P-308-FHT-L	1¼	11/16	1 5/64	½
10	P-310-FHT-L	1 9/16	11/16	1 13/64	½
12	P-312-FHT-L	1¼	15/16	1 13/64	9/16

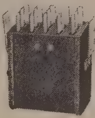
TYPE FHT-K WITH FLARED HOLE IN CAP AND WITH KEEPERS

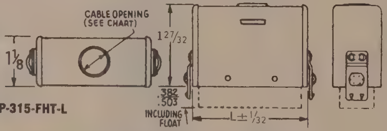

S-306-FHT-K



No. of Contacts	Part No.*	Dimensions In Inches Tolerance: ±1/64″ or .005″ A	B	C	D
2	S-302-FHT-K	21/32 Dia.	—	61/64	⅜
3	S-303-FHT-K	1	7/16	61/64	5/16
4	S-304-FHT-K	¾	11/16	61/64	⅜
6	S-306-FHT-K	1	11/16	1 5/64	7/16
8	S-308-FHT-K	1¼	11/16	1 5/64	½
10	S-310-FHT-K	1 9/16	11/16	1 13/64	½
12	S-312-FHT-K	1¼	15/16	1 13/64	9/16

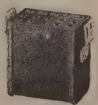
TYPE FHT-L WITH FLARED HOLE IN CAP AND WITH LOCKS

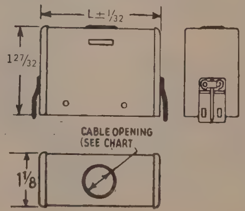

P-315-FHT-L



No. of Contacts	Part No.*	Dimensions In Inches L ±1/32	Cable Opening	Polarizing Contact Pin	Polarizing In Cont. Pin Pos.
15	P-315-FHT-L	1 11/16	9/16	No	—
18	P-318-FHT-L	2	9/16	No	—
21	P-321-FHT-L	2 5/16	⅝	No	—
24	P-324-FHT-L	2⅝	⅝	Yes	14
27	P-327-FHT-L‡	2 15/16	⅝	Yes	14
30	P-330-FHT-L‡	3¼	¾	Yes	14
33	P-333-FHT-L‡	3 9/16	¾	Yes	17

TYPE FHT-K WITH FLARED HOLE IN CAP AND WITH KEEPERS


S-315-FHT-K



No. of Contacts	Part No.*	Dimensions In Inches L ±1/32	Cable Opening	Polarizing Contact Pin	Polarizing In Cont. Pin Pos.
15	S-315-FHT-K	1 11/16	9/16	No	—
18	S-318-FHT-K	2	9/16	No	—
21	S-321-FHT-K	2 5/16	⅝	No	—
24	S-324-FHT-K	2⅝	⅝	Yes	14
27	S-327-FHT-K‡	2 15/16	⅝	Yes	14
30	S-330-FHT-K‡	3¼	¾	Yes	14
33	S-333-FHT-K‡	3 9/16	¾	Yes	17

*P-Indicates Plug S-Indicates Socket

‡Keepers and locks are centered on each side, not on each end as shown.

X dimension is applicable to plugs only, with allowance made for pin float.

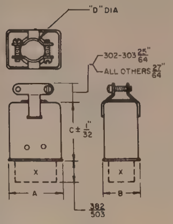
(CD) Indicates items normally available through Cinch Distributors.

TRW® CINCH CONNECTORS

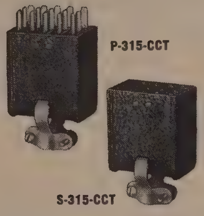
300 SERIES WITH STANDARD TERMINATION (cont'd)

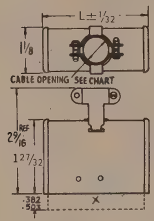
TYPE CCT WITH CABLE CLAMP IN TOP

P-306-CCT
S-306-CCT


"D" DIA
302-303 25/64"
ALL OTHERS 27/64"
C ± 1/32"
X
A
B
382
503

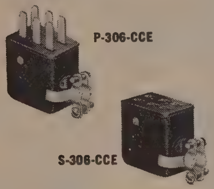
No. of Contacts	ⒸⒹ Part No.*	Dimensions In Inches Tolerance: ±1/64″ or ±.005″			
		A	B	C	D
2	P-302-CCT S-302-CCT	21/32 Dia.	—	61/64	3/8
3	P-303-CCT S-303-CCT	1	7/16	61/64	5/16
4	P-304-CCT S-304-CCT	3/4	11/16	61/64	3/8
6	P-306-CCT S-306-CCT	1	11/16	1 5/64	7/16
8	P-308-CCT S-308-CCT	1 1/4	11/16	1 5/64	1/2
10	P-310-CCT S-310-CCT	1 9/16	11/16	1 13/64	1/2
12	P-312-CCT S-312-CCT	1 1/4	15/16	1 13/64	9/16

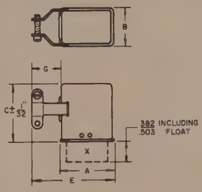

P-315-CCT
S-315-CCT


L ± 1/32
1 1/8
CABLE OPENING SEE CHART
REF
2 9/16
1 27/32
.382
.503
X

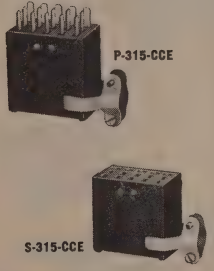
No. of Contacts	ⒸⒹ Part No.*	Dimensions In Inches		Polarizing Contact Pin	Polarizing In Cont. Pin Pos.
		L ±1/32	Cable Opening		
15	P-315-CCT S-315-CCT	1 11/16	9/16	No	—
18	P-318-CCT S-318-CCT	2	9/16	No	—
21	P-321-CCT S-321-CCT	2 5/16	5/8	No	—
24	P-324-CCT S-324-CCT	2 5/8	5/8	Yes	14
27	P-327-CCT S-327-CCT	2 15/16	5/8	Yes	14
30	P-330-CCT S-330-CCT	3 1/4	3/4	Yes	14
33	P-333-CCT S-333-CCT	3 9/16	3/4	Yes	17

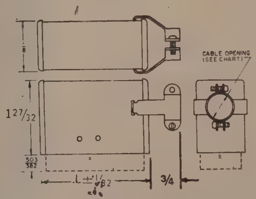
TYPE CCE WITH CABLE CLAMP IN END


P-306-CCE
S-306-CCE


B
G
C ± 1/32"
382 INCLUDING
.503 FLOAT
X
A
E

No. of Contacts	ⒸⒹ Part No.*	Dimensions In Inches ±1/64″ or ±.005″				Cable Opening
		A	B	C	G	
2	P-302-CCE S-302-CCE	21/32 Dia.	—	61/64	5/16	5/16
3	P-303-CCE S-303-CCE	1	7/16	61/64	25/64	1/4
4	P-304-CCE S-304-CCE	3/4	11/16	61/64	27/64	3/8
6	P-306-CCE S-306-CCE	1	11/16	1 5/64	27/64	7/16
8	P-308-CCE S-308-CCE	1 1/4	11/16	1 5/64	27/64	1/2
10	P-310-CCE S-310-CCE	1 9/16	11/16	1 13/64	27/64	1/2
12	P-312-CCE S-312-CCE	1 1/4	15/16	1 13/64	27/64	9/16


P-315-CCE
S-315-CCE


B
1 27/32
503
382
X
L ± 1/32
3/4
CABLE OPENING (SEE CHART)

No. of Contacts	ⒸⒹ Part No.*	Dimensions In Inches		Polarizing Contact Pin	Polarizing In Cont. Pin Pos.
		L ±1/32	Cable Opening		
15	P-315-CCE S-315-CCE	1 11/16	9/16	No	—
18	P-318-CCE S-318-CCE	2	9/16	No	—
21	P-321-CCE S-321-CCE	2 5/16	5/8	No	—
24	P-324-CCE S-324-CCE	2 5/8	5/8	Yes	14
27	P-327-CCE S-327-CCE	2 15/16	5/8	Yes	14
30	P-330-CCE S-330-CCE	3 1/4	3/4	Yes	14
33	P-333-CCE S-333-CCE	3 9/16	3/4	Yes	17

"See pg. 10 cable clamp for CCE caps."

*P-Indicates Plug S-Indicates Socket

X dimension is applicable to plugs only, with allowance made for pin float.

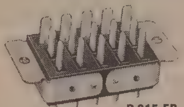
ⒸⒹ Indicates items normally available through Cinch Distributors.

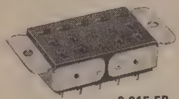
TRW/CINCH CONNECTORS, AN ELECTRONIC COMPONENTS DIV. OF TRW INC. / 1501 MORSE AVE. / ELK GROVE VILLAGE, ILL. 60007

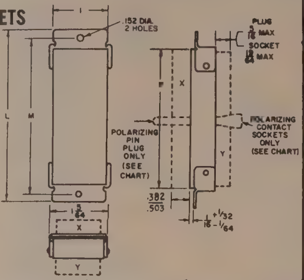
TRW® CINCH CONNECTORS

300 SERIES WITH STANDARD TERMINATION (cont'd)

TYPE EB WITH END BRACKETS


P-315-EB

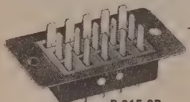

S-315-EB

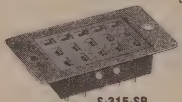


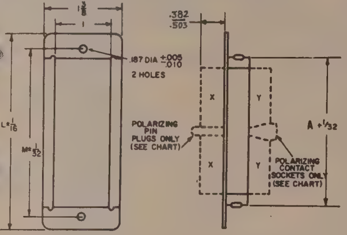
1
.152 DIA
2 HOLES
L
M
PLUG 5/16 MAX
SOCKET 19/64 MAX
P
X
Y
POLARIZING PIN PLUG ONLY (SEE CHART)
POLARIZING CONTACT SOCKETS ONLY (SEE CHART)
.382
.503
1 5/64
X
Y
1/16 +1/32 -1/64

No. of Contacts	Ⓒᴅ Part No.*	Dimensions In Inches L ±1/32	M ±1/32	P ±1/64	Polar. Contact Pins	Polar. In Cont. Pin Pos.
15	P-315-EB S-315-EB	2 5/16	2	1 5/8	No	—
18	P-318-EB S-318-EB	2 5/8	2 5/16	1 15/16	No	—
21	P-321-EB S-321-EB	2 15/16	2 5/8	2 1/4	No	—
24	P-324-EB S-324-EB	3 1/4	2 15/16	2 9/16	Yes	14
27	P-327-EB S-327-EB	3 9/16	3 1/4	2 7/8	Yes	14
30	P-330-EB S-330-EB	3 7/8	3 9/16	3 3/16	Yes	14
33	P-333-EB S-333-EB	4 3/16	3 7/8	3 1/2	Yes	17

TYPE SB WITH SHALLOW BRACKET FOR FLUSH MOUNTING


P-315-SB


S-315-SB



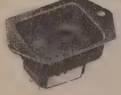
1 3/8
1
.382
.503
.187 DIA +.005 -.010
2 HOLES
L±1/16
M±1/32
X
Y
POLARIZING PIN PLUGS ONLY (SEE CHART)
A +1/32
POLARIZING CONTACT SOCKETS ONLY (SEE CHART)

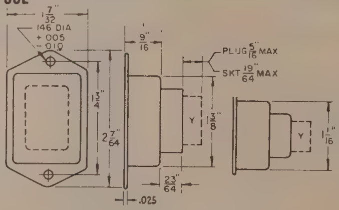
No. of Contacts	Ⓒᴅ Part No.*	Dimensions In Inches A ±1/32	M ±1/32	L ±1/16	Polar. Contact Pins	Polar. In Cont. Pin Pos.
15	P-315-SB S-315-SB	1 11/16	2 1/8	2 35/64	No	—
18	P-318-SB S-318-SB	2	2 7/16	2 55/64	No	—
21	P-321-SB S-321-SB	2 5/16	2 3/4	3 11/64	No	—
24	P-324-SB S-324-SB	2 5/8	3 1/16	3 31/64	Yes	14
27	P-327-SB S-327-SB	2 15/16	3 3/8	3 51/64	Yes	14
30	P-330-SB S-330-SB	3 1/4	3 11/16	4 7/64	Yes	14
33	P-333-SB S-333-SB	3 9/16	4	4 27/64	Yes	17

TYPE DB WITH DEEP BRACKET FOR RECESSED MOUNTING

CANNOT BE USED WITH CCE

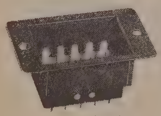
P-306-DB

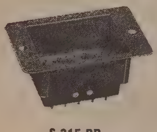

S-306-DB

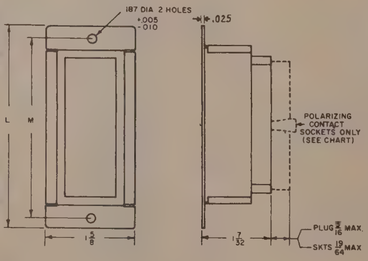


1 7/32"
.146 DIA +.005 -.010
9/16"
PLUG 5/16" MAX
SKT 19/64" MAX
1 3/4"
2 7/64"
Y
1 3/8"
Y
1 1/16"
23/64"
.025

No. of Contacts	Ⓒᴅ Part No.*	
2	P-302-DB S-302-DB	See Dimensions On Diagram
3	P-303-DB S-303-DB	
4	P-304-DB S-304-DB	
6	P-306-DB S-306-DB	
8	P-308-DB S-308-DB	
12	P-312-DB S-312-DB	


P-315-DB


S-315-DB



.187 DIA 2 HOLES +.005 -.010
.025
L
M
POLARIZING CONTACT SOCKETS ONLY (SEE CHART)
1 5/8
1 7/32
PLUG 5/16 MAX.
SKTS 19/64 MAX

No. of Contacts	Ⓒᴅ Part No.*	Dimensions In Inches L ±1/16	M ±1/32	Polarizing Contact Pins	Polarizing In Cont. Pin Pos.
15	P-315-DB S-315-DB	2 13/16	2 3/8	No	—
18	P-318-DB S-318-DB	3 1/8	2 11/16	No	—
21	P-321-DB S-321-DB	3 7/16	3	No	—
24	P-324-DB S-324-DB	3 3/4	3 5/16	Yes	14
27	P-327-DB S-327-DB	4 1/16	3 5/8	Yes	14
30	P-330-DB S-330-DB	4 3/8	3 15/16	Yes	14
33	P-333-DB S-333-DB	4 11/16	4 1/4	Yes	17

*P-Indicates Plug S-Indicates Socket

X dimension is applicable to plugs only, with allowance made for pin float.

Y is the dimension for contact tail extension.

Ⓒᴅ Indicates items normally available through Cinch Distributors.

TRW/CINCH CONNECTORS, AN ELECTRONIC COMPONENTS DIV. OF TRW INC. / 1501 MORSE AVE. / ELK GROVE VILLAGE, ILL. 60007

TRW® CINCH CONNECTORS

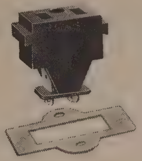
400 SERIES WITH STANDARD TERMINATION

The "400" Series plugs and sockets from the famous "Jones" line of quality components are rated for duty beyond the range of the 300 Series. Maximum rating is 1200 volts r.m.s. at 15 amperes.

400 Series plugs and sockets are available in sizes of 2, 4, 6, 8, 10 and 12 contacts, each size being polarized and suitable for either cap or panel mounting. "Knife-switch" type socket contacts are made of cadmium-plated phosphor bronze. These contacts engage both sides of the flat plug contacts, providing double the contact area.

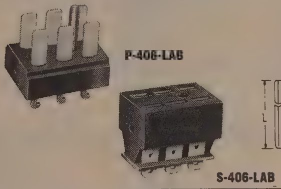
Plug prongs are made of cadmium-plated brass ¼″ wide by 1/16″ thick. Caps are finished in black wrinkle and equipped with insulating lining. Other finishes and material available. Consult factory.

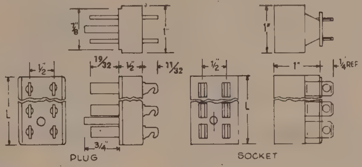
Should a connector be required which is rated for higher voltages, the "Jones" 2400 Series plugs and sockets are similar to the 400 Series except that the 2400 Series has a higher voltage rating.



Note: The 2-contact angle bracket (AB) type socket will not accept the standard angle bracket as shown in the S-406-AB illustration below. Instead, a special bracket is supplied for mounting to a panel or chassis. The illustration at the left shows the S-402-AB socket with the special bracket.

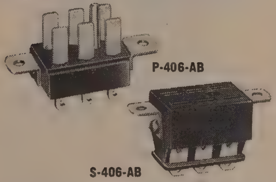
TYPE LAB LESS ANGLE BRACKETS

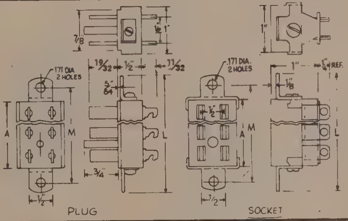

P-406-LAB
S-406-LAB


7/8
1″
1/2
19/32
1/2
11/32
L
3/4
PLUG
1″
1/4 REF
SOCKET

No. of Contacts	Part No.*	Dimensions In Inches ±1/64″ L
2	P-402-LAB S-402-LAB	9/16
4	P-404-LAB S-404-LAB	1
6	P-406-LAB S-406-LAB	1 7/16
8	P-408-LAB S-408-LAB	1 7/8
10	P-410-LAB S-410-LAB	2 5/16
12	P-412-LAB S-412-LAB	2 3/4

TYPE AB WITH ANGLE BRACKETS

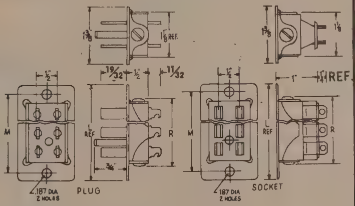

P-406-AB
S-406-AB


7/8
1″
.171 DIA 2 HOLES
19/32
1/2
11/32
5/64
A
M
L
3/4
1/2
PLUG
1″
1/4 REF.
SOCKET

No. of Contacts	Part No.*	Dimensions In Inches ±1/64″ A	M	L
2	P-402-AB S-402-AB	9/16	1 3/16	1 19/32
4	P-404-AB S-404-AB	1	1 5/8	2 1/32
6	P-406-AB S-406-AB	1 7/16	2 1/16	2 15/32
8	P-408-AB S-408-AB	1 7/8	2 1/2	2 29/32
10	P-410-AB S-410-AB	2 5/16	2 15/16	3 11/32
12	P-412-AB S-412-AB	2 3/4	3 3/8	3 25/32

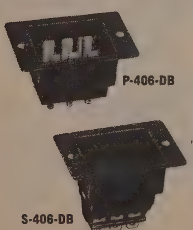
TYPE SB WITH SHALLOW BRACKET FOR FLUSH MOUNTING

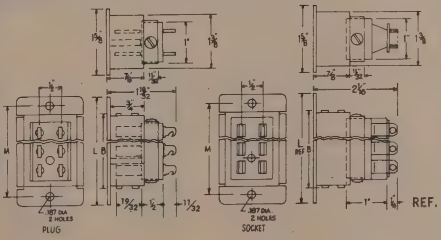
P-406-SB
S-406-SB


1 3/8
1/8 REF.
1 1/8
19/32
1/2
11/32
M
REF
R
3/4
.187 DIA 2 HOLES
PLUG
1″
1/4 REF.
SOCKET

No. of Contacts	Part No.*	Dimensions In Inches ±1/64″ L	M	R(Max.)
2	P-402-SB S-402-SB	1 1/2	1 1/16	49/64
4	P-404-SB S-404-SB	1 15/16	1 1/2	1 15/64
6	P-406-SB S-406-SB	2 3/8	1 15/16	1 43/64
8	P-408-SB S-408-SB	2 13/16	2 3/8	2 7/64
10	P-410-SB S-410-SB	3 1/4	2 13/16	2 35/64
12	P-412-SB S-412-SB	3 11/16	3 1/4	2 63/64

TYPE DB WITH DEEP BRACKET FOR RECESSED MOUNTING


P-406-DB
S-406-DB


1 3/8
1″
7/8
1 1/32
M
L
B
19/32
1/2
11/32
.187 DIA 2 HOLES
PLUG
2 1/8
REF
SOCKET
1″
1/4
REF.

No. of Contacts	Part No.*	Dimensions In Inches ±1/64″ B	L	M
2	P-402-DB S-402-DB	59/64	1 3/4	1 5/16
4	P-404-DB S-404-DB	1 23/64	2 3/16	1 3/4
6	P-406-DB S-406-DB	1 51/64	2 5/8	2 3/16
8	P-408-DB S-408-DB	2 15/64	3 1/16	2 5/8
10	P-410-DB S-410-DB	2 43/64	3 1/2	3 1/16
12	P-412-DB S-412-DB	3 7/64	3 15/16	3 1/2

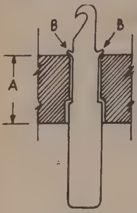
*P-Indicates Plug S-Indicates Socket

Ⓒᴅ Indicates items normally available through Cinch Distributors.

TRW/CINCH CONNECTORS, AN ELECTRONIC COMPONENTS DIV. OF TRW INC. / 1501 MORSE AVE. / ELK GROVE VILLAGE, ILL. 60007

TRW® CINCH CONNECTORS

400 SERIES WITH STANDARD TERMINATION (cont'd)

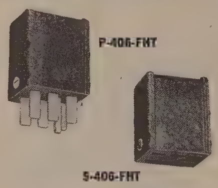


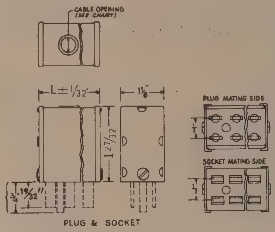
NOTE REGARDING LOOSE CONTACTS ON 400 SERIES PLUGS

This illustration shows the method of staking 400 Series plug contacts in the phenolic body. Manufacturing tolerances permit a slight variation in the "A" dimension during the molding process. Thus, in some instances the fit between the contact and the body at points "B" may not be perfectly snug. When this condition occurs, the contact appears to be "loose" in the connector body. However, the security of the contact is in no way jeopardized and the performance of the connector is not impaired.

It is recommended that personnel responsible for inspection and installation of the connectors be informed of this condition to avoid unnecessary delays and correspondence arising from a mistaken conclusion that the connectors are faulty. In case of doubt, however, it is advisable to check with the local Cinch representative or contact the factory before any action is taken.

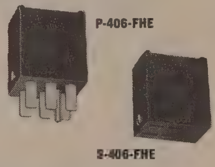
TYPE FHT WITH FLARED HOLE IN TOP

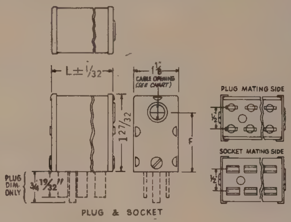

P-406-FHT
S-406-FHT


CABLE OPENING (SEE CHART)
L±1/32
1 1/8
1 27/32
PLUG MATING SIDE
SOCKET MATING SIDE
3/4
19/32"
1/2
PLUG & SOCKET

No. of Contacts	Part No.*	Dimensions In Inches L ±1/32″	Cable Opening ±1/64″
2	P-402-FHT S-402-FHT	5/8	5/16
4	P-404-FHT S-404-FHT	1 1/16	7/16
6	P-406-FHT S-406-FHT	1 1/2	7/16
8	P-408-FHT S-408-FHT	1 15/16	9/16
10	P-410-FHT S-410-FHT	2 3/8	9/16
12	P-412-FHT S-412-FHT	2 13/16	5/8

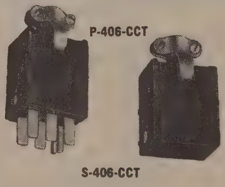
TYPE FHE WITH FLARED HOLE IN END

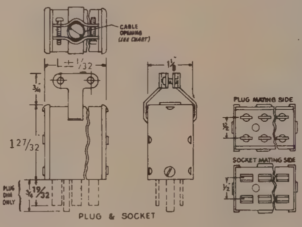

P-406-FHE
S-406-FHE


L±1/32
1 1/8
CABLE OPENING (SEE CHART)
1 27/32
F
PLUG MATING SIDE
SOCKET MATING SIDE
1/2
PLUG DIM. ONLY
3/4
19/32"
PLUG & SOCKET

No. of Contacts	Part No.*	Dimensions In Inches F	L ±1/32″	Cable Opening ±1/64″
2	P-402-FHE S-402-FHE	1 3/8	5/8	3/8
4	P-404-FHE S-404-FHE	1 3/8	1 1/16	7/16
6	P-406-FHE S-406-FHE	1 3/8	1 1/2	7/16
8	P-408-FHE S-408-FHE	1 11/32	1 15/16	9/16
10	P-410-FHE S-410-FHE	1 11/32	2 3/8	9/16
12	P-412-FHE S-412-FHE	1 5/16	2 13/16	5/8

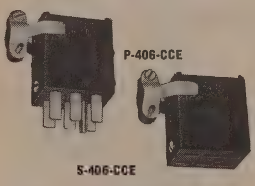
TYPE CCT WITH CABLE CLAMP IN TOP


P-406-CCT
S-406-CCT

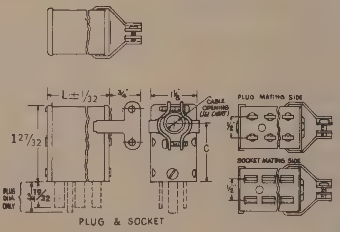

CABLE OPENING (SEE CHART)
L±1/32
3/4
1 1/8
1 27/32
PLUG MATING SIDE
SOCKET MATING SIDE
1/2
PLUG DIM. ONLY
3/4
19/32
PLUG & SOCKET

No. of Contacts	Part No.* Ⓒ	Dimensions In Inches L ±1/32″	Cable Opening ±1/64″
2	P-402-CCT S-402-CCT	5/8	5/16
4	P-404-CCT S-404-CCT	1 1/16	7/16
6	P-406-CCT S-406-CCT	1 1/2	7/16
8	P-408-CCT S-408-CCT	1 15/16	9/16
10	P-410-CCT S-410-CCT	2 3/8	9/16
12	P-412-CCT S-412-CCT	2 13/16	5/8

TYPE CCE WITH CABLE CLAMP IN END


P-406-CCE
S-406-CCE

"See p. 9 cable clamp for CCE Caps"


L±1/32
3/4
1 1/8
CABLE OPENING (SEE CHART)
1 27/32
C
PLUG MATING SIDE
SOCKET MATING SIDE
1/2
PLUG DIM. ONLY
3/4
19/32
PLUG & SOCKET

No. of Contacts	Part No.* Ⓒ	Dimensions In Inches L ±1/32″	C	Cable Opening ±1/64″
2	P-402-CCE S-402-CCE	5/8	1 3/8	3/8
4	P-404-CCE S-404-CCE	1 1/16	1 3/8	7/16
6	P-406-CCE S-406-CCE	1 1/2	1 3/8	7/16
8	P-408-CCE S-408-CCE	1 15/16	1 11/32	9/16
10	P-410-CCE S-410-CCE	2 3/8	1 11/32	9/16
12	P-412-CCE S-412-CCE	2 13/16	1 5/16	5/8

*P-Indicates Plug S-Indicates Socket

Ⓒ Indicates items normally available through Cinch Distributors.

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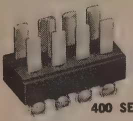
TRW® CINCH CONNECTORS

400 SERIES—WITH SCREW TERMINALS


400 SERIES PLUG

400 SERIES SOCKET

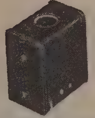
400 SERIES PLUGS AND SOCKETS WITH SCREW TERMINALS

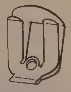
In addition to the solder-type terminals, the 400 Series is also available with screw terminals as listed below. The plug and socket bodies are of slightly different construction from those used with the standard solder-type. This is necessary in order to accommodate the screw terminals. However, the overall dimensions for installation purposes are compatible with the standard type. (To order see top pg. 11.)

No. of Contacts	Type LAB (Less Angle Brackets) Part No.*	Type AB (With Angle Brackets) Part No.*	Type SB (With Shallow Bracket) Part No.*	Type DB (With Deep Bracket) Part No.*	Type FHT (With Flared Hole in Top) Part No.*	Type FHE (With Flared Hole in End) Part No.*	Type CCT (With Cable Clamp in Top) Part No.*	Type CCE (With Cable Clamp in End) Part No.*
2	P-402-LAB-ST SS-402-LAB-ST	P-402-AB-ST SS-402-AB-ST	P-402-SB-ST SS-402-SB-ST	P-402-DB-ST SS-402-DB-ST	P-402-FHT-ST SS-402-FHT-ST	P-402-FHE-ST SS-402-FHE-ST	P-402-CCT-ST SS-402-CCT-ST	P-402-CCE-ST SS-402-CCE-ST
4	P-404-LAB-ST SS-404-LAB-ST	P-404-AB-ST SS-404-AB-ST	P-404-SB-ST SS-404-SB-ST	P-404-DB-ST SS-404-DB-ST	P-404-FHT-ST SS-404-FHT-ST	P-404-FHE-ST SS-404-FHE-ST	P-404-CCT-ST SS-404-CCT-ST	P-404-CCE-ST SS-404-CCE-ST
6	P-406-LAB-ST SS-406-LAB-ST	P-406-AB-ST SS-406-AB-ST	P-406-SB-ST SS-406-SB-ST	P-406-DB-ST SS-406-DB-ST	P-406-FHT-ST SS-406-FHT-ST	P-406-FHE-ST SS-406-FHE-ST	P-406-CCT-ST SS-406-CCT-ST	P-406-CCE-ST SS-406-CCE-ST
8	P-408-LAB-ST SS-408-LAB-ST	P-408-AB-ST SS-408-AB-ST	P-408-SB-ST SS-408-SB-ST	P-408-DB-ST SS-408-DB-ST	P-408-FHT-ST SS-408-FHT-ST	P-408-FHE-ST SS-408-FHE-ST	P-408-CCT-ST SS-408-CCT-ST	P-408-CCE-ST SS-408-CCE-ST
10	P-410-LAB-ST SS-410-LAB-ST	P-410-AB-ST SS-410-AB-ST	P-410-SB-ST SS-410-SB-ST	P-410-DB-ST SS-410-DB-ST	P-410-FHT-ST SS-410-FHT-ST	P-410-FHE-ST SS-410-FHE-ST	P-410-CCT-ST SS-410-CCT-ST	P-410-CCE-ST SS-410-CCE-ST
12	P-412-LAB-ST SS-412-LAB-ST	P-412-AB-ST SS-412-AB-ST	P-412-SB-ST SS-412-SB-ST	P-412-DB-ST SS-412-DB-ST	P-412-FHT-ST SS-412-FHT-ST	P-412-FHE-ST SS-412-FHE-ST	P-412-CCT-ST SS-412-CCT-ST	P-412-CCE-ST SS-412-CCE-ST

*P-Indicates Plug SS-Indicates Sockets

AUXILIARY LOCKING ARRANGEMENTS


Capped Connector Member Showing Extrusion for Engaged Auxiliary Lock


Auxiliary Lock 63A
Factory No.
422-12-14-012

Complete Auxiliary Locking Assembly

AUXILIARY LOCK 63A—FACTORY NO. 422-1214012

Where connectors are subject to shock or vibration, the Auxiliary Locking Arrangement (No. 63A) is recommended. It can be used with the 300 Series end bracket (EB), shallow bracket (SB) or deep bracket (DB) types. It consists of a set of spring locks secured by the mounted bolts which engage extrusions on the cap creating a secure, shakeproof mating condition.

The No. 63A locks must be ordered separately, one pair for each plug and socket. The part numbers for the plugs and sockets with the special extrusions on the caps are found in the table below. Note that there are two types of caps, one with extrusions placed for end bracket or shallow bracket mates (S-type) and the other for deep bracket mates (D-type).

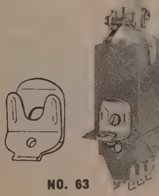
IMPORTANT: As indicated below, the caps with the S-type mates are the only ones which can be used with FHE and CCE plugs and sockets.

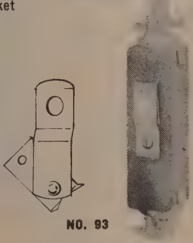
PLUGS AND SOCKETS WITH D-TYPE EXTRUSIONS
For Deep Bracket (DB) Mates

PLUGS AND SOCKETS WITH S-TYPE EXTRUSIONS
For Shallow Bracket (SB) and End Bracket (EB) Mates

No. of Contacts	Type FHT (With Flared Hole in Top) Part No.*	Type CCT (With Cable Clamp in Top) Part No.*	Type FHT (With Flared Hole in Top) Part No.*	Type CCT (With Cable Clamp in Top) Part No.*	Type CCE (With Cable Clamp in End) Part No.*
15	P-315-FHT-63A-DB S-315-FHT-63A-DB	P-315-CCT-63A-DB S-315-CCT-63A-DB	P-315-FHT-63A-SB S-315-FHT-63A-SB	P-315-CCT-63A-SB S-315-CCT-63A-SB	P-315-CCE-63A-SB S-315-CCE-63A-SB
18	P-318-FHT-63A-DB S-318-FHT-63A-DB	P-318-CCT-63A-DB S-318-CCT-63A-DB	P-318-FHT-63A-SB S-318-FHT-63A-SB	P-318-CCT-63A-SB S-318-CCT-63A-SB	P-318-CCE-63A-SB S-318-CCE-63A-SB
21	P-321-FHT-63A-DB S-321-FHT-63A-DB	P-321-CCT-63A-DB S-321-CCT-63A-DB	P-321-FHT-63A-SB S-321-FHT-63A-SB	P-321-CCT-63A-SB S-321-CCT-63A-SB	P-321-CCE-63A-SB S-321-CCE-63A-SB
24	P-324-FHT-63A-DB S-324-FHT-63A-DB	P-324-CCT-63A-DB S-324-CCT-63A-DB	P-324-FHT-63A-SB S-324-FHT-63A-SB	P-324-CCT-63A-SB S-324-CCT-63A-SB	P-324-CCE-63A-SB S-324-CCE-63A-SB
27	P-327-FHT-63A-DB S-327-FHT-63A-DB	P-327-CCT-63A-DB S-327-CCT-63A-DB	P-327-FHT-63A-SB S-327-FHT-63A-SB	P-327-CCT-63A-SB S-327-CCT-63A-SB	P-327-CCE-63A-SB S-327-CCE-63A-SB
30	P-330-FHT-63A-DB S-330-FHT-63A-DB	P-330-CCT-63A-DB S-330-CCT-63A-DB	P-330-FHT-63A-SB S-330-FHT-63A-SB	P-330-CCT-63A-SB S-330-CCT-63A-SB	P-330-CCE-63A-SB S-330-CCE-63A-SB
33	P-333-FHT-63A-DB S-333-FHT-63A-DB	P-333-CCT-63A-DB S-333-CCT-63A-DB	P-333-FHT-63A-SB S-333-FHT-63A-SB	P-333-CCT-63A-SB S-333-CCT-63A-SB	P-333-CCE-63A-SB S-333-CCE-63A-SB

*P-Indicates Plug S-Indicates Socket


NO. 63


NO. 93

AUXILIARY LOCK NO. 63—FACTORY NO. 422-12-14-011

Spring Lock For Use With 400 Series Panel-Mounted Plugs and Sockets: Can be used with Type AB or SB. Proper operation requires that the mounted plug or socket body be flush with the top of the panel. The standard binder head screws furnished for fastening the mating connector body to a cap must be replaced by filister head screws.

AUXILIARY LOCK NO. 93—FACTORY NO. 319-01-99-003

Extension-Cable Lock For Use With 400 Series: Can be used with any 400 Series unmounted (cap-type) plug or socket when both mating units are attached to cables. The lock is attached to the plug cap with the screw which holds the cap to the connector body. The binder head screws in the socket cap must be replaced with filister head screws and the opening in the lock snaps over the filister head screws, completing the lock.

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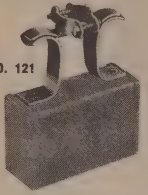
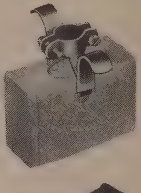
TRW® CINCH CONNECTORS



NO. 121



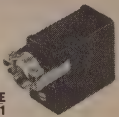
NO. 120

COMBINATION CABLE CLAMPS AND HANDLES

These units provide relief from strain on connector wiring and also facilitate connector separation in close quarters. Can be used for both plugs and sockets. Cap is not included.

No. 120 fits all Type CCT plugs and sockets of the 400 and 2400 Series and 15-33 contact plugs and sockets of the 300 Series.

No. 121 fits the following Type FHT plugs and sockets of the 300, 400 and 2400 Series: 300 Series — 24, 27, 30 and 33 contact; 400 Series — 10 and 12 contact; 2400 Series — 10 and 12 contact.

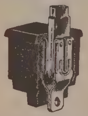


No. S-2408-CCE with #21851

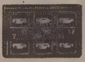
CABLE CLAMP FOR CCE CAPS — When Used with Deep Bracket

When ordering CCE caps for 315-333, 402-412, 2402-2412 Series plugs or sockets that are to be mated with DB plugs or sockets specify cable clamp No. 21851. (For example, P-2408-CCE with No. 2185.) There is no difference in price. Standard cable clamps normally furnished with all CCE will mate with SB plugs and sockets only.

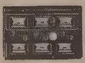
2400 SERIES WITH STANDARD TERMINATION



Cross-section of 2400 Series socket showing four-surfaced contact with plug prong.



Solder-connecting side of plug body showing recessed pockets with barriers around contacts. Plug contacts are also in recessed pockets on opposite side.



Solder-connecting side of socket body showing recessed pockets with barriers around contacts. Socket contacts are also in recessed pockets on opposite side.

The "Jones" 2400 Series plugs and sockets are designed for excellent electrical and mechanical performance. Ratings for the 2400 Series **voltage** (for which the 2400 Series carries a 50% higher rating). Note the electrical rating chart on the inside front cover.

An entirely new type of socket contact designed is utilized in the 2400 Series as shown in the above illustration. Four individual flexing surfaces make contact over practically their entire length. Note in the illustration how they exert maximum pressure at every point. Also note the unique method of anchoring terminals in the block — they cannot be moved up or down.

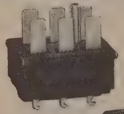
The contact-to-contact and contact-to-ground distance has been considerably increased by mounting the contacts into recessed pockets with a phenolic barrier surrounding and extending above. This method is used on both the top and bottom side of both plugs and sockets, greatly increasing the leakage path.

All units of the 2400 Series are interchangeable with corresponding units of the 400 Series. The same 2, 4, 6, 8, 10 and 12-contact plug and socket sizes are available, each size being polarized and suitable for either cap or panel mounting.

Plug and socket bodies are molded of general purpose black phenolic. Socket prongs are of heavy brass 1/4" x 1/16", cadmium-plated. The formed metal caps have a black wrinkle finish with insulating liners.

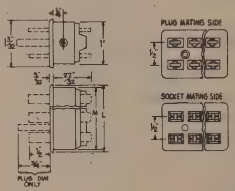
A shoulder extends around the mating side of the 2400 Series plug and socket presenting a finished appearance when mounted in bracket or cap. Because of this shoulder, when angle brackets are used, they must first be removed from the plug or socket. The unit is then inserted into the chassis with the brackets replaced underneath the panel.

TYPE LAB (LESS ANGLE BRACKETS)



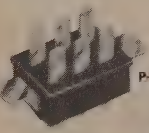
P-2406-LAB

S-2406-LAB

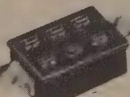


No. of Contacts	Part No.* Ⓒᴅ	Dim. In Inches ±1/64" L	M
2	P-2402-LAB S-2402-LAB	21/32	9/16
4	P-2404-LAB S-2404-LAB	1 3/32	1
6	P-2406-LAB S-2406-LAB	1 17/32	1 7/16
8	P-2408-LAB S-2408-LAB	1 31/32	1 7/8
10	P-2410-LAB S-2410-LAB	2 13/32	2 5/16
12	P-2412-LAB S-2412-LAB	2 27/32	2 3/4

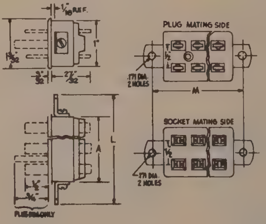
TYPE AB (WITH ANGLE BRACKETS)



P-2406-AB



S-2406-AB



No. of Contacts	Part No.*	Dim. In Inches ±1/64" L	M	A
2	P-2402-AB S-2402-AB	1 19/32	1 3/16	9/16
4	P-2404-AB S-2404-AB	2 1/32	1 5/8	1
6	P-2406-AB S-2406-AB	2 15/32	2 1/16	1 7/16
8	P-2408-AB S-2408-AB	2 29/32	2 1/2	1 7/8
10	P-2410-AB S-2410-AB	3 11/32	2 15/16	2 5/16
12	P-2412-AB S-2412-AB	3 25/32	3 3/8	2 3/4

*P-Indicates Plug S-Indicates Socket

Ⓒᴅ Indicates items normally available through Cinch Distributors.

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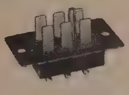
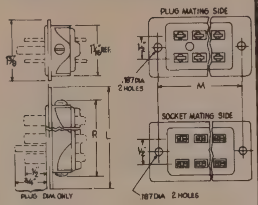
TRW® CINCH CONNECTORS

2400 SERIES WITH STANDARD TERMINATION (cont'd)

TYPE SB (WITH SHALLOW BRACKET FOR FLUSH MOUNTING)

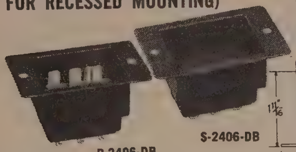

P-2406-SB

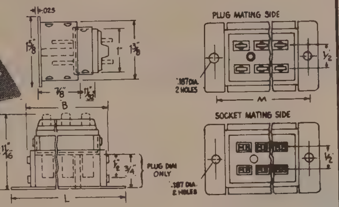
S-2406-SB


PLUG MATING SIDE
SOCKET MATING SIDE
.187 DIA 2 HOLES
M
R
L
½
PLUG DIM ONLY
.187 DIA 2 HOLES

No. of Contacts	Part No.* Ⓒ	Dim. In Inches R ±1/16"	L ±1/64	M ±1/64
2	P-2402-SB S-2402-SB	13/16	1 1/2	1 1/16
4	P-2404-SB S-2404-SB	1 1/4	1 15/16	1 1/2
6	P-2406-SB S-2406-SB	1 11/16	2 3/8	1 15/16
8	P-2408-SB S-2408-SB	2 1/8	2 13/16	2 3/8
10	P-2410-SB S-2410-SB	2 9/16	3 1/4	2 13/16
12	P-2412-SB S-2412-SB	3	3 11/16	3 1/4

TYPE DB (WITH DEEP BRACKET FOR RECESSED MOUNTING)

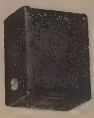

P-2406-DB
S-2406-DB

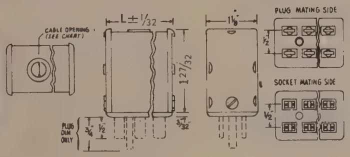

.025
PLUG MATING SIDE
SOCKET MATING SIDE
.187 DIA 2 HOLES
M
B
L
½
PLUG DIM ONLY
.187 DIA 2 HOLES

No. of Contacts	Part. No.* Ⓒ	Dim. In Inches B ±1/64"	L ±1/16"	M ±1/32"
2	P-2402-DB S-2402-DB	15/16	1 3/4	1 5/16
4	P-2404-DB S-2404-DB	1 3/8	2 3/16	1 3/4
6	P-2406-DB S-2406-DB	1 13/16	2 5/8	2 3/16
8	P-2408-DB S-2408-DB	2 1/4	3 1/16	2 5/8
10	P-2410-DB S-2410-DB	2 11/16	3 1/2	3 1/16
12	P-2412-DB S-2412-DB	3 1/8	3 15/16	3 1/2

TYPE FHT (WITH FLARED HOLE IN TOP)

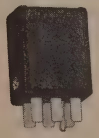
P-2406-FHT

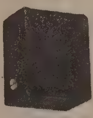

S-2406-FHT

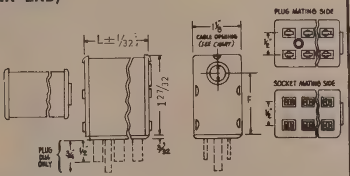

CABLE OPENING (SEE CHART)
L ± 1/32
1 27/32
PLUG DIM ONLY
PLUG MATING SIDE
SOCKET MATING SIDE

No. of Contacts	Part. No.*	Dim. In Inches Cable Opening	L ±1/32"
2	P-2402-FHT S-2402-FHT	5/16	5/8
4	P-2404-FHT S-2404-FHT	7/16	1 1/16
6	P-2406-FHT S-2406-FHT	7/16	1 1/2
8	P-2408-FHT S-2408-FHT	9/16	1 15/16
10	P-2410-FHT S-2410-FHT	9/16	2 3/8
12	P-2412-FHT S-2412-FHT	5/8	2 13/16

TYPE FHE (WITH FLARED HOLE IN END)


P-2406-FHE


S-2406-FHE

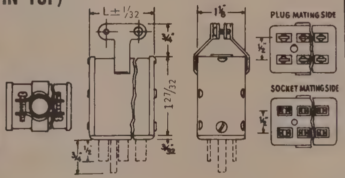

L ± 1/32
CABLE OPENING (SEE CHART)
1 27/32
F
PLUG DIM ONLY
PLUG MATING SIDE
SOCKET MATING SIDE

No. of Contacts		Dim. In Inches Cable Opening	L ±1/32"	F ±1/32"
2	P-2402-FHE S-2402-FHE	3/8	5/8	1 3/8
4	P-2404-FHE S-2404-FHE	7/16	1 1/16	1 3/8
6	P-2406-FHE S-2406-FHE	7/16	1 1/2	1 3/8
8	P-2408-FHE S-2408-FHE	9/16	1 15/16	1 11/32
10	P-2410-FHE S-2410-FHE	9/16	2 3/8	1 11/32
12	P-2412-FHE S-2412-FHE	5/8	2 13/16	1 5/16

TYPE CCT (WITH CABLE CLAMP IN TOP)

P-2406-CCT

S-2406-CCT


L ± 1/32
1 27/32
PLUG MATING SIDE
SOCKET MATING SIDE

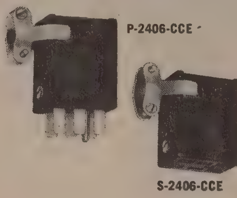
No. of Contacts	Part. No.* Ⓒ	Dim. In Inches L ±1/32"	Cable Opening
2	P-2402-CCT S-2402-CCT	5/8	5/16
4	P-2404-CCT S-2404-CCT	1 1/16	7/16
6	P-2406-CCT S-2406-CCT	1 1/2	7/16
8	P-2408-CCT S-2408-CCT	1 15/16	9/16
10	P-2410-CCT S-2410-CCT	2 3/8	9/16
12	P-2412-CCT S-2412-CCT	2 13/16	5/8

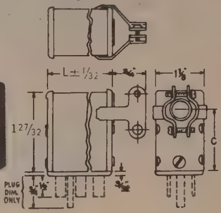
Ⓒ Indicates items normally available through Cinch Distributors.
*P-Indicates Plug S-Indicates Socket

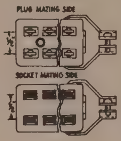
TRW® CINCH CONNECTORS

2400 SERIES WITH STANDARD TERMINATION (cont'd)

TYPE CCE (WITH CABLE CLAMP IN END)







No. of Contacts	Part. No.* (CD)	Dim. In Inches L ±1/32″	Dim. In Inches C ±1/32″	Dim. In Inches Cable Opening
2	P-2402-CCE S-2402-CCE	5/8	1 3/8	3/8
4	P-2404-CCE S-2404-CCE	1 1/16	1 3/8	7/16
6	P-2406-CCE S-2406-CCE	1 1/2	1 3/8	7/16
8	P-2408-CCE S-2408-CCE	1 15/16	1 11/32	9/16
10	P-2410-CCE S-2410-CCE	2 3/8	1 11/32	9/16
12	P-2412-CCE S-2412-CCE	2 13/16	1 5/16	5/8

(CD) Indicates items normally available througn Cinch Distributors.
*P-Indicates Plug S-Indicates Socket

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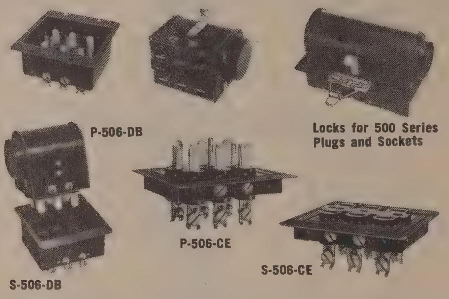
500 SERIES — WITH STANDARD SCREW TERMINALS / MOUNTING DATA



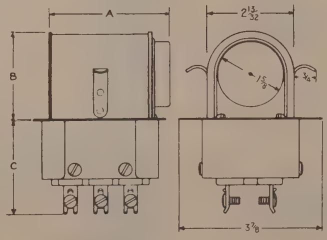
No. 500-L Lock fits any deep bracket and cap combination. It holds securely, but can be released instantly. The lock is fastened by the same screw or rivet that holds the deep bracket to the panel. Two locks are required. Cannot be used on shallow brackets.

The "Jones" 500 Series plugs and sockets are designed for use in extremely heavy-duty applications. Ratings are somewhat dependent on the parameters of the associated circuitry, but maximum voltage is nominally 3000 volts and maximum current is nominally 25 amperes per contact. Wattage per contact should not exceed 5000 watts.

500 Series plugs and sockets are available in sizes of 2, 4, 6, 8, 10 and 12 contacts, each size being polarized so as to prevent accidental mismating with any other size. The units have been designed to allow maximum accessibility under plug caps for making terminal connections and also subsequent inspection. Plug and socket blocks will accept all appropriately-sized caps and brackets interchangeably.

Male contacts are brass and female contacts are phosphor bronze, cadmium-plated. Metal parts of caps and brackets are steel and made rustproof by parkerizing. All caps are insulated with canvas bakelite. Plug prong cross section is 5/16″ by 3/32″.

IMPORTANT: When used with high voltages present, it is recommended that a deep bracket type (DB) be used as one plug or socket and that its mate has a cap. Shallow brackets (Type SB) are for use only in connecting to mates of the same type.



For Type DB connectors, dimension B is 2¼″ and Dimension C is 2⅝″ reference on the socket and 2 7/16″ reference on the plug. For Type SB connectors, dimension C is 1 9/16″, cap height is 2 57/64″.

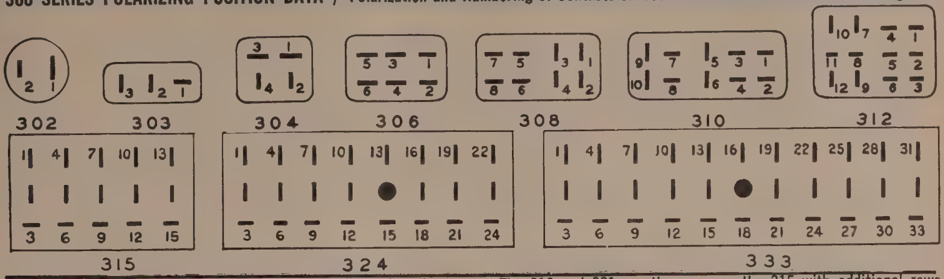
No. of Contacts	(CD) Type DB (With Deep Bracket for Recess Mounting) Type DB Part No.*	(CD) Type CE (With Cap) Type CE Part No.*	Type SB (With (CD) Shallow Bracket for Flush Mounting) Type SB Part No.*	Dimen. "A"
2	P-502-DB S-502-DB	P-502-CE S-502-CE	P-502-SB S-502-SB	1 11/16″
4	P-504-DB S-504-DB	P-504-CE S-504-CE	P-504-SB S-504-SB	2½″
6	P-506-DB S-506-DB	P-506-CE S-506-CE	P-506-SB S-506-SB	3 5/16″
8	P-508-DB S-508-DB	P-508-CE S-508-CE	P-508-SB S-508-SB	4⅛″
10	P-510-DB S-510-DB	P-510-CE S-510-CE	P-510-SB S-510-SB	4 15/16″
12	P-512-DB S-512-DB	P-512-CE S-512-CE	P-512-SB S-512-SB	5¾″

*P-Indicates Plug S-Indicates Socket
(CD) Indicates items normally available through Cinch Distributors.

TRW® CINCH CONNECTORS

MOUNTING DATA

300 SERIES POLARIZING POSITION DATA / Polarization and Numbering of Contacts on Socket Units When Viewed from Wiring Side

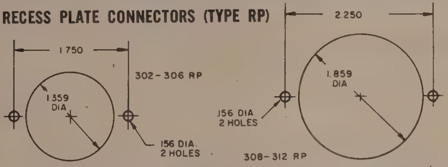

302
303
304
306
308
310
312
315
324
333

The drawings on this page show terminal markings viewed as marked at solder ends of socket contacts, plug marking opposite. These illustrations clearly show the polarization arrangement of each plug and socket. The contact numbers are molded in the casting.

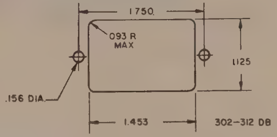
The 318 and 321 are the same as the 315 with additional rows of contacts. The 324, 327 and 330 plugs with standard termination have a round locating pin in position No. 14. This pin is in position No. 17 on the 333 plug. All of the 300 Series contacts start with No. 1.

MOUNTING DIMENSIONS FOR 300 SERIES 2-12 CONTACT

RECESS PLATE CONNECTORS (TYPE RP)

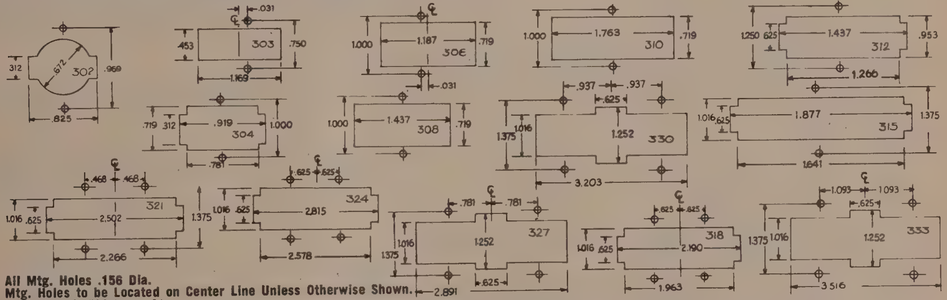

2.250
1.750
302-306 RP
1.359 DIA
1.859 DIA
156 DIA 2 HOLES
156 DIA. 2 HOLES
308-312 RP

DEEP BRACKET CONNECTORS (TYPE DB)


1.750
.093 R MAX
1.125
.156 DIA.
1.453
302-312 DB

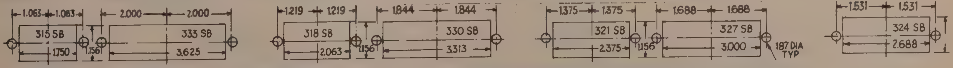
PANEL CUT-OUTS FOR 300 SERIES 2-33 CONTACT ANGLE BRACKET CONNECTORS

(TYPE AB) USED IN CONJUNCTION WITH 300 SERIES CAP WITH LOCK

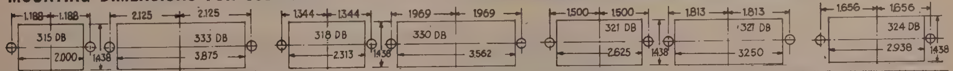

302
303
304
306
308
310
312
315
318
321
324
327
330
333

All Mtg. Holes .156 Dia.
Mtg. Holes to be Located on Center Line Unless Otherwise Shown.
Max. Chassis Thickness 1/16.

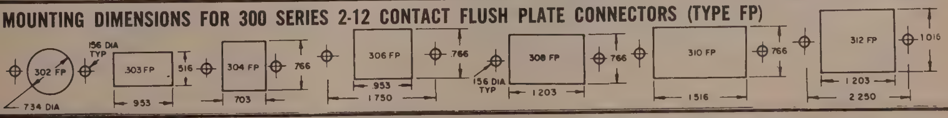
MOUNTING DIMENSIONS FOR 300 SERIES 15-33 CONTACT SHALLOW BRACKET CONNECTORS (TYPE SB)


315 SB
333 SB
318 SB
330 SB
321 SB
327 SB
324 SB
187 DIA TYP

MOUNTING DIMENSIONS FOR 300 SERIES 15-33 CONTACT DEEP BRACKET CONNECTORS (TYPE DB)


315 DB
333 DB
318 DB
330 DB
321 DB
321 DB
324 DB

MOUNTING DIMENSIONS FOR 300 SERIES 2-12 CONTACT FLUSH PLATE CONNECTORS (TYPE FP)

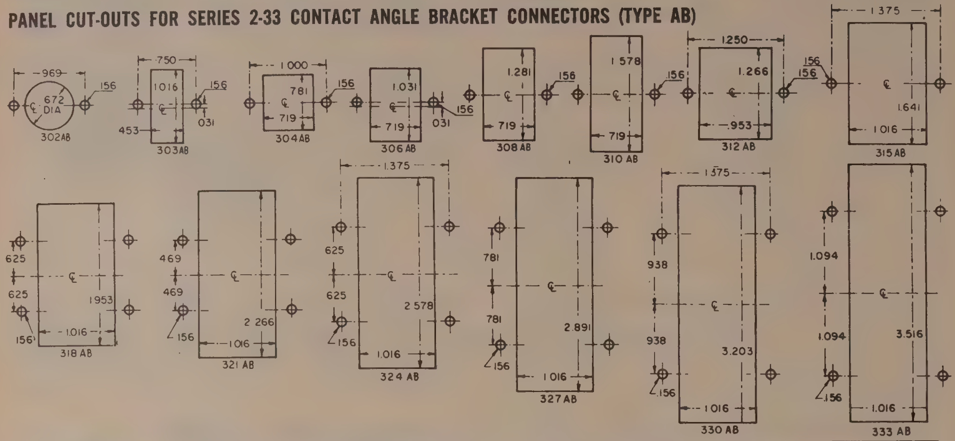

156 DIA TYP
302 FP
734 DIA
303 FP
304 FP
306 FP
308 FP
310 FP
312 FP
156 DIA TYP

TRW/CINCH CONNECTORS, AN ELECTRONIC COMPONENTS DIV. OF TRW INC. / 1501 MORSE AVE. / ELK GROVE VILLAGE, ILL. 60007

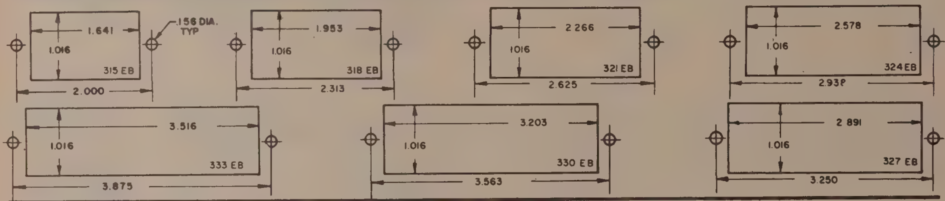
TRW® CINCH CONNECTORS

MOUNTING DATA

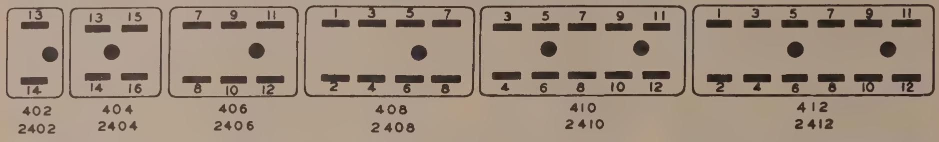
PANEL CUT-OUTS FOR SERIES 2-33 CONTACT ANGLE BRACKET CONNECTORS (TYPE AB)


302AB
.969
.672 DIA
.156
303AB
.750
1.016
.453
.031
304AB
1.000
.781
.719
306AB
1.031
.719
308AB
1.281
310AB
1.578
312AB
1.250
1.266
.953
315AB
1.375
1.641
1.016
318 AB
.625
1.953
321 AB
.469
2.266
324 AB
2.578
327 AB
.781
2.891
330 AB
.938
3.203
333 AB
1.094
3.516

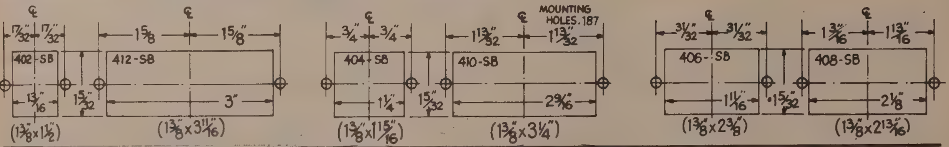
MOUNTING DIMENSIONS FOR 300 SERIES 15-33 CONTACT END BRACKET CONNECTORS (TYPE EB)


.156 DIA. TYP
315 EB
1.641
1.016
2.000
318 EB
1.953
2.313
321 EB
2.266
2.625
324 EB
2.578
2.938
333 EB
3.516
3.875
330 EB
3.203
3.563
327 EB
2.891
3.250

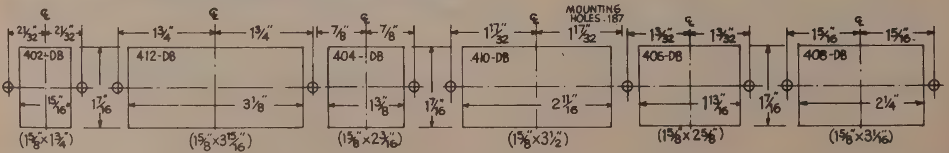
400 AND 2400 SERIES POLARIZATION DATA (VIEWED FROM WIRING SIDE OF SOCKET)


402 2402
404 2404
406 2406
408 2408
410 2410
412 2412

400 AND 2400 SB (SHALLOW BRACKET) MOUNTING DIMENSIONS


402-SB
(1 3/8 x 1 1/2)
412-SB
(1 3/8 x 3 11/16)
404-SB
(1 3/8 x 1 15/16)
410-SB
(1 3/8 x 3 1/4)
MOUNTING HOLES .187
406-SB
(1 3/8 x 2 3/8)
408-SB
(1 3/8 x 2 13/16)

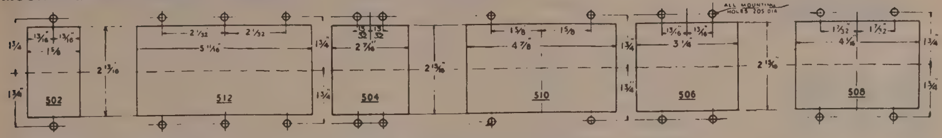
400 AND 2400 DB (DEEP BRACKET) MOUNTING DIMENSIONS


402-DB
(1 5/8 x 1 3/4)
412-DB
(1 5/8 x 3 15/16)
404-DB
(1 5/8 x 2 3/16)
410-DB
(1 5/8 x 3 1/2)
MOUNTING HOLES .187
406-DB
(1 5/8 x 2 5/8)
408-DB
(1 5/8 x 3 1/16)

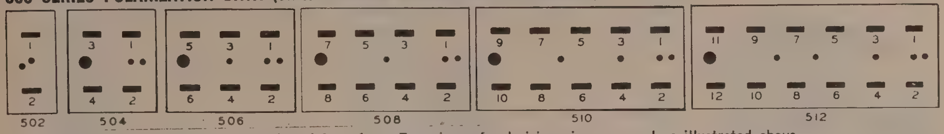
TRW® CINCH CONNECTORS

MOUNTING DATA

MOUNTING SPECIFICATIONS FOR DEEP OR SHALLOW BRACKETS



500 SERIES POLARIZATION DATA (VIEWED FROM WIRING SIDE OF SOCKET)



The contacts of the 500 Series are numbered from 1 up. Two sizes of polarizing pins are used as illustrated above.

PROPER WITHDRAWAL OF PLUG FROM SOCKET

As indicated in the descriptions of the 300, 400, 2400 and 500 Series plugs and sockets, the insulator bodies are made of general purpose black phenolic. This choice is based on the excellent electrical insulating properties of the material, rather than on its mechanical characteristics. Despite Cinch's achievement in designing as rugged a construction as other parameters will allow, some care is required in the mating and disconnecting of the plugs and sockets in order to avoid damage to the insulator bodies and contacts.

Figure 1 shows the correct method of inserting and withdrawing plugs from sockets — **only by direct pull straight out at right angles to the mounting surface.** Pulling alternately at one end of the connector and then the other as shown in Figure 2 is incorrect. Figure 3 shows the possible damage that may occur if one end of the plug is extracted before the other. When contacts are bent and insulator bodies cracked in this manner, the connector must be completely replaced in order to assure reliable operation.

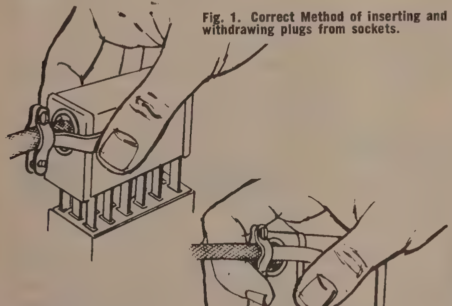


Fig. 1. Correct Method of inserting and withdrawing plugs from sockets.

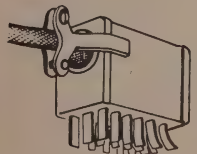


Fig. 2. Incorrect Method of inserting and withdrawing plugs from sockets.

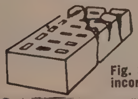


Fig. 3. Possible Damage caused by incorrect withdrawal of plug.

RECOMMENDATIONS ON SOLDERING TERMINAL WIRES

Although "Jones" plugs and sockets are designed to minimize the effects of wiring stress on the contacts, especially those with the new monoblock design, it is desirable to observe good wiring and soldering practices when attaching wires to the contacts. The wires should be of sufficient length and properly stripped so that they can be soldered to the terminals without placing undue stress on the contacts. Figure 4 shows a properly terminated wiring harness.

When soldering with leads that are too short or attempting to twist the wires into a compact assembly as illustrated in Figure 5, contacts may become distorted as shown in Figure 6. In extreme cases, socket contacts may be dislocated to the extent that insertion of the plug prong is impossible.

Good soldering technique is always a necessity to assure reliability. Despite plating of plug and socket contact tails to facilitate proper solder joints, oxidizing of unwrapped contacts and exposure to contaminated air may cause the contacts to become difficult to solder. The contacts may be easily cleaned with sandpaper or a small brush and then will be ready for proper soldering.

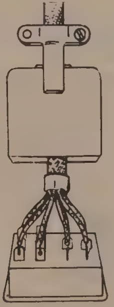


Fig. 4. Proper termination of wiring harness.

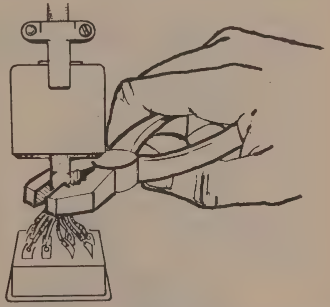


Fig. 5. Incorrect practice caused by allowing insufficient wire length and stripping.

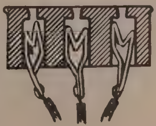
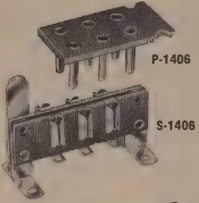
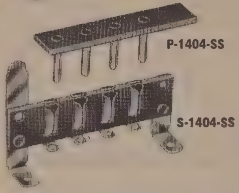


Fig. 6. Possible result of twisting improperly terminated wires.

TRW® CINCH CONNECTORS

1400 SERIES LAMINATED PLUGS AND SOCKETS





TWO-SIDE 1400 SERIES

Designed for use where a quick disconnect point is needed simultaneously for various circuits at low cost. Due to exposed metal parts, 1400 Series plugs and sockets are recommended for use when the complete unit is within a housing. All of the advantages of multiple-circuit connectors are offered including polarization to prevent incorrect connections.

Insulation is XP phenolic. Contacts are made of spring-tempered cadmium-plated brass. Socket mounting brackets are made of steel. In addition to the units indicated, others with more contacts are available on special order. However, with 20 or more contacts it is recommended that two or more plugs be used since a single long plug is not mechanically strong. However, the mating socket can feasibly be manufactured as a single assembly.

SINGLE-SIDE 1400 SERIES

The 1400 Series is also available with single-side plugs and sockets. Contacts are arranged in a single row, so that these units are actually half the size of the standard two-side plug or socket. Otherwise, all features are the same.

No. of Contacts	Plug Part No.	Socket Part No.	Socket Mounting Centers
2	P-1402	S-1402	15/16″
3	P-1403	S-1403	1⅜″
4	P-1404	S-1404	1⅜″
5	P-1405	S-1405	1 13/16″
6	P-1406	S-1406	1 13/16″
7	P-1407	S-1407	2¼″
8	P-1408	S-1408	2¼″
9	P-1409	S-1409	2 11/16″
10	P-1410	S-1410	2 11/16″
11	P-1411	S-1411	3⅛″
12	P-1412	S-1412	3⅛″
13	P-1413	S-1413	3 9/16″
14	P-1414	S-1414	3 9/16″
15	P-1415	S-1415	4″
16	P-1416	S-1416	4″

Mounting Hole Size — 9/64″

No. of Contacts	Plug Part No.	Socket Part No.
2	P-1402-SS	S-1402-SS
3	P-1403-SS	S-1403-SS
4	P-1404-SS	S-1404-SS
5	P-1405-SS	S-1405-SS
6	P-1406-SS	S-1406-SS
7	P-1407-SS	S-1407-SS
8	P-1408-SS	S-1408-SS
9	P-1409-SS	S-1409-SS
10	P-1410-SS	S-1410-SS
11	P-1411-SS	S-1411-SS
12	P-1412-SS	S-1412-SS

OTHER LAMINATED PLUGS AND SOCKETS

No. 53 Socket

No. 98 Plug • No. 53 Socket. Terminals mounted on ⅜″ centers. 3/32″ diameter plug prongs. Insulation is XP phenolic, ½″ wide, 3/32″ thick. Socket mounting holes ⅜″ from center of end terminals. Mounting hole size .144. Plug has no mounting holes.

No. 99 Plug • No. 42 Socket. Terminals mounted on ½″ centers. ⅛″ diameter plug prongs. Insulation: XP phenolic, ½″ wide, 3/32″ thick. Socket mounting holes ½″ from center of end terminals. Mounting hole size .144. No mounting holes on plug.

No. 100 Plug • No. 43 Socket. Terminals mounted on ⅝″ centers. 5/32″ diameter plug prongs. XP phenolic insulation, ⅝″ wide, 3/32″ thick. Socket mounting holes ⅝″ from center of end terminals. Mounting hole size .144. Plug does not have mounting holes.

No. of Contacts	No. 98 Plug Part No.	No. 53 Socket Part No.
2	2-98	2-53
3	3-98	3-53
4	4-98	4-53
5	5-98	5-53
6	6-98	6-53
7	7-98	7-53
8	8-98	8-53
9	9-98	9-53

No. of Contacts	No. 99 Plug Part No.	No. 42 Socket Part No.
2	2-99	2-42
3	3-99	3-42
4	4-99	4-42
5	5-99	5-42
6	6-99	6-42
7	7-99	7-42
8	8-99	8-42
9	9-99	9-42

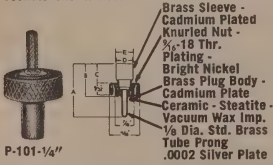
No. of Contacts	No. 100 Plug Part No.	No. 43 Socket Part No.
2	2-100	2-43
3	3-100	3-43
4	4-100	4-43
5	5-100	5-43
6	6-100	6-43
7	7-100	7-43
8	8-100	8-43
9	9-100	9-43

SPECIAL PURPOSE AUDIO CONNECTORS

These audio connectors have been designed for use in those applications where reliability under extreme environmental conditions is an absolute necessity. They have been designed to provide low-loss connections over a range of frequencies even beyond the audio spectrum.

SERIES 101 PLUGS

The "Jones" 101 Series audio connectors are designed to provide low-loss connections, even at high frequencies. The ¼″ and .290 have a one piece body and ferrule, which is cadmium-plated. All metal parts are brass. The plugs fit all of the No. 101 Series sockets shown below.


Brass Sleeve - Cadmium Plated
Knurled Nut - 9/16-18 Thr.
Plating - Bright Nickel
Brass Plug Body - Cadmium Plate
Ceramic - Steatite - Vacuum Wax Imp.
⅛ Dia. Std. Brass Tube Prong .0002 Silver Plate
A
B
C
D
E

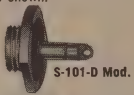
P-101-¼″

Part No. Ⓒ	Dimensions In Inches A	B	C	D	E
P-101-¼″	1¼	¾	7/16	¼	9/32
P-101-.290	1¼	¾	7/16	.290	.319

SERIES 101 SOCKETS

The No. 101 Series sockets are furnished in three types as shown below. Base is of brass, bright nickel finish. Brass contact is silver-plated. Insulation is of low-loss natural color XXX phenolic. The S-101-D is similar to the S-101 except that the phenolic is recessed in the base. S-101-D Mod. is the same as S-101-D except that two sides of the base are milled as shown.

S-101


S-101-D Mod.

Part No. ⒸD	Mounting Centers	Drill Size For Mounting Holes
S-101	11/16″	41
S-101-D	13/16″	30
S-101-D Mod.	13/16″	30

SERIES 202 PLUGS

The 202 Series plugs and sockets have two polarized contacts. Metal parts are of brass with bright nickel finish. Insulation is of molded phenolic. Phosphor bronze "knife-switch" type socket contacts engage both sides of flat brass plug contacts, doubling contact area. Formed fibre linings in caps. Knurled nut has ¾″-27 thread.

SERIES 202 PLUGS

P-202-CCT
S-202-B
S-202-CCT-THR

Socket Mounting Holes. No. 30 drill size on 1″ centers.

S-202-CCT-THR when used with the P-202-CCT makes an ideal microphone connector.

Part No ⒸD	Type	Part No ⒸD	Type
P-202-CCT (as shown above)	Plug with Cable Clamps	**S-202-B** (as shown above)	Socket with Mounting Base
S-202-CCT	Socket with Cable Clamps	**P-202-B**	Plug with Mounting Base
P-202-FHT	Plug without Cable Clamps	**S-202-CCT-THR** (as shown above)	Socket with Cable Clamps and threaded body. For attaching to a P-202-CCT
S-202-FHT	Socket without Cable Clamps		

*P-Indicates Plug S-Indicates Socket
ⒸD Indicates items normally available through Cinch Distributors.

TRW/CINCH CONNECTORS, AN ELECTRONIC COMPONENTS DIV. OF TRW INC. / 1501 MORSE AVE. / ELK GROVE VILLAGE, ILL. 60007

SPECIAL PURPOSE PLUGS AND SOCKETS MOUNTED ON WALL PLATES

The plugs and sockets shown on these pages are based on the designs of the 300, 400 and 2400 Series plugs and sockets described on pages 3-13 of this catalog. They are mounted on wall plates as illustrated below and are intended to mate with appropriate plugs and sockets of the same series.

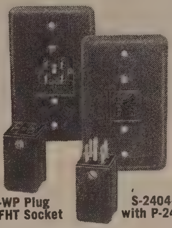
These plugs and sockets are normally used in general industrial applications where conventional chassis-mounted units are not practical. Those described below are used primarily for patching communications devices such as television antennas and rotators.

The wall plates shown below are made of heavy steel and are designed to fit a standard outlet box. They are finished in black wrinkle to match the mating plugs and sockets. When a 400 or 2400 Series plug is to be mounted on the wall plate, a deep bracket is used so that the plug prongs will be recessed, giving them necessary protection. However, if it should be desired that the plug contacts extend above the plate, delete the DB from the plug part number below and the angle bracket type of plate-mounted plug will be furnished.

S-315-WP Socket with P-315-FHT Plug

P-404-DB-WP Plug with S-404-FHT Socket

S-404-WP Socket with P-404-FHT Plug


P-2404-DB-WP Plug with S-2404-FHT Socket

S-2404-WP Socket with P-2404-FHT Plug

300 SERIES WITH ANGLE BRACKET SOCKET MOUNTED ON WALL PLATE No. of Contacts	Part No.
6	S-306-WP
8	S-308-WP
10	S-310-WP
12	S-312-WP
15	S-315-WP
18	S-318-WP
21	S-321-WP
24	S-324-WP
27	S-327-WP

400 SERIES				2400 SERIES			
WITH DEEP BRACKET PLUG MOUNTED ON WALL PLATE		WITH ANGLE BRACKET SOCKET MOUNTED ON WALL PLATE		WITH DEEP BRACKET PLUG MOUNTED ON WALL PLATE		WITH ANGLE BRACKET SOCKET MOUNTED ON WALL PLATE	
No. of Contacts	Part No.	No. of Contacts	Part No.	No. of Contacts	Part No.	No. of Contacts	Part No.
2	P-402-DB-WP	2	S-402-WP	2	P-2402-DB-WP	2	S-2402-WP
4	P-404-DB-WP	4	S-404-WP	4	P-2404-DB-WP	4	S-2404-WP
6	P-406-DB-WP	6	S-406-WP	6	P-2406-DB-WP	6	S-2406-WP
8	P-408-DB-WP	8	S-408-WP	8	P-2408-DB-WP	8	S-2408-WP

SPECIAL PURPOSE WALL PLATES FOR TERMINATING TV ANTENNAS

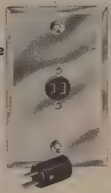
302 SERIES CHROME-PLATED WALL PLATES

The 302 Series wall plates are available as shown with various combinations of 2-contact, 4-contact and 8-contact sockets mounted in the heavy chrome-plated steel plates. The plates fit a standard outlet box and provide a convenient junction between the antenna lead-in and a TV or FM set, or even a low-power transmitter. Mounting screws are furnished.

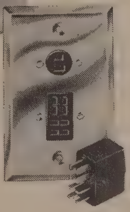
- Ⓒᴅ **S-302-WPC** provides a connection for antenna lead-in only.
- Ⓒᴅ **S-302-4-WPC** provides connections for antenna lead-in and up to a 4-contact rotor control system.
- Ⓒᴅ **S-302-8-WPC** is similar and will accommodate an 8-contact rotor contact system.
- Ⓒᴅ **S-302-2-8-WPC** (not shown) is similar to the S-302-8-WPC except that it has two 2-contact sockets instead of one.

The plugs shown in the illustrations are suggested mates for the rotor sockets.

Ⓒᴅ Indicates items normally available through Cinch Distributors.


S-302-WPC Wall Plate with P-302-FHT Plug

S-302-4-WPC Wall Plate with P-304-FHT Plug


S-302-8-WPC Wall Plate with P-308-FHT Plug

TRW® CINCH CONNECTORS

INTEGRATED CIRCUIT LOGIC BOARDS

Integrated circuit logic boards are designed to provide flexibility in breadboarding — by enabling the circuit designer to make rapid changes in either components or interconnect wiring at little or no expense — and in special purpose circuit layout for custom applications.

This flexibility is accomplished through the use of a specially designed, high reliability socket terminal that can accept directly the leads of standard dual-in-line IC packages and discrete components. These sockets are arrayed on one side of the epoxy glass boards to accommodate 14, 16, 24, 36, or 40-pin DIP packages, depending upon the series selected.

The reverse side of the board contains precision machined .025″ square terminals suitable for wire wrapping.* The boards themselves are designed for the layout of either mother, or daughter, board applications, and contain a ground plane on one side, and a power plane on the other, with discrete terminals connected to each plane.

A wide variety of board configurations and sizes are available to accommodate every need. To complement the line, various accessory hardware — such as input-output connectors, discrete component adaptors, and special purpose pins — are offered to provide the designer everything he needs to make the job of circuit layout easier.

FEATURES

- Wire wrapping pins available in two tail lengths: .370 and .510.
- Sockets accept rectangular DIP leads varying from as small as .009 x .016 to as large as .013 x .020.
- Sockets accept round pins ranging from .018 diameter to .023 diameter.
- Pins individually replaceable.
- Two board thicknesses: .062 and .125.
- Available with plated through holes.

MATERIALS

Wire Wrap Terminals: Brass per QQ-B-626.

Contacts: Beryllium copper per QQ-C-530.

PC Boards: FR-4 Epoxy Glass with 2 oz. copper.

Finishes:
- a. **Terminals:** .0002 tin plate per MIL-T-10727, or .00003 gold over .00005 nickel.
- b. **Contacts:** .00003 gold over .00005 nickel.
- c. **PC Boards:** Reflowed Solder and .00005 gold over .00005 nickel where applicable.

MECHANICAL & ELECTRICAL CHARACTERISTICS

Terminal to Board Retention: 8 lbs. minimum, (no movement of pin relative to board when 2.5 in.-oz. of torque applied).

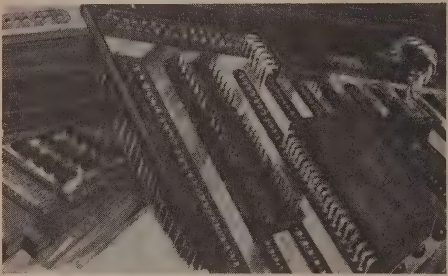
Maximum Insertion Force with Nominal Size Pin: 16 oz.

Minimum Withdrawal Force with Nominal Size Pin: 2 oz.

Current Rating: 5 amps.

Contact Resistance: 10 Milliohms maximum.

CUSTOM BOARDS



TRW/Cinch Connectors Division possesses extensive facilities to handle custom board requirements. Our complete manufacturing facilities, including drilling, etching, assembly, pin straightening, etc., enable us to provide customized IC logic boards made to individual customer specifications. Turn around time is minimized through flexible scheduling and total in-house manufacturing capability.

Although the standard logic boards described in this catalog are ⅛″ glass epoxy, 1/16″ thick boards are also available, as well as our line of standard 1/16″ PC board edge connectors.

To obtain a prompt proposal based on your specific requirements, submit a sketch and supporting details to New Products Manager, TRW/Cinch Connectors, An Electronic Components Division of TRW Inc., 1501 Morse Avenue, Elk Grove Village, Illinois 60007.

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Connectors, Edge (22 & 61 Position) 7
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  60-HC4, 60-HC6 (60 & 30 Patterns) 2
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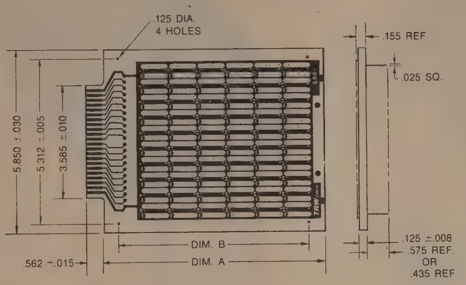
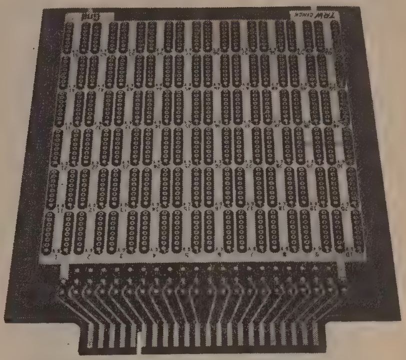
Socket/Terminals 9
Universal IC Logic Boards
  60-HUC (20 Rows of 50 Contacts) 6
  60-HUP (9 to 54 rows of 50 contacts) 4

TRW® CINCH CONNECTORS

HIGH DENSITY DIP PACKAGING PANELS

60-HC4 & 60-HC6 SERIES


.125 DIA.
4 HOLES
.155 REF
.025 SQ.
5.850 ±.030
5.312 ±.005
3.585 ±.010
DIM. B
DIM. A
.562 ±.015
.125 ±.008
.575 REF.
OR
.435 REF



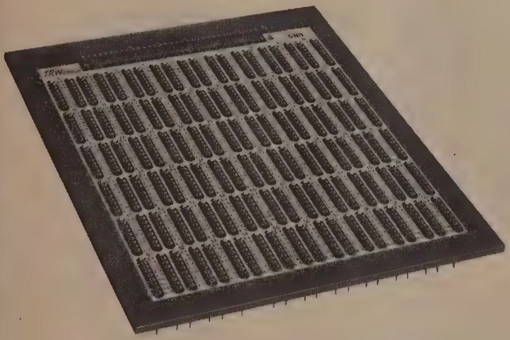
Edge connector take off accepts Cinch 22 position double readout edge connector. (See Page 2•1014)

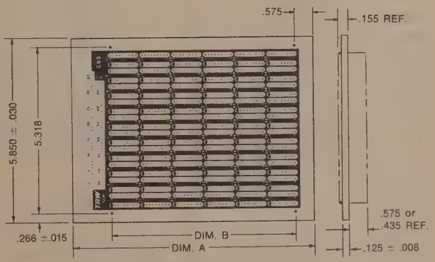
Contacts are gold plated all over and supplied for 3 level wrap.

Distributor Part No.	Factory Part No.	Pins Per Pattern	Gnd. and Power Pins	No. of Patterns For Board	A ±.030	B ±.005
60-HC4-60	299-08-00-018	14	V & G Dummies*	60	6.938	6.000
60-HC4-30	299-08-00-019	14	V & G Dummies*	30	4.238	3.300
60-HC6-60	299-08-00-020	16	V & G Dummies*	60	7.538	6.600
60-HC6-30	299-08-00-021	16	V & G Dummies*	30	4.538	3.600

*2 additional wire wrap pins for wire strapping to pins on different packages.

60-HP4 & 60-HP6 SERIES




.575
.155 REF.
GND
5.850 ± .030
5.318
.266 ±.015
DIM. B
DIM. A
.575 or
.435 REF.
.125 ± .008

Contacts are gold plated all over and supplied for 3 level wrap.

Distributor Part No.	Factory Part No.	Pins Per Pattern	Gnd. and Power Pins	No. of Patterns For Board	A ±.030	B ±.005
60-HP4-60	299-08-00-014	14	V & G Dummies*	60	7.000	5.200
60-HP4-30	299-08-00-015	14	V & G Dummies*	30	4.300	2.500
60-HP6-60	299-08-00-016	16	V & G Dummies*	60	7.600	5.800
60-HP6-30	299-08-00-017	16	V & G Dummies*	30	4.600	2.800

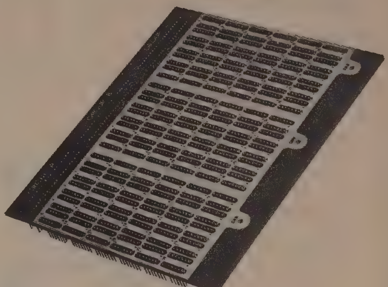
*2 additional wire wrap pins for wire strapping to pins on different packages.

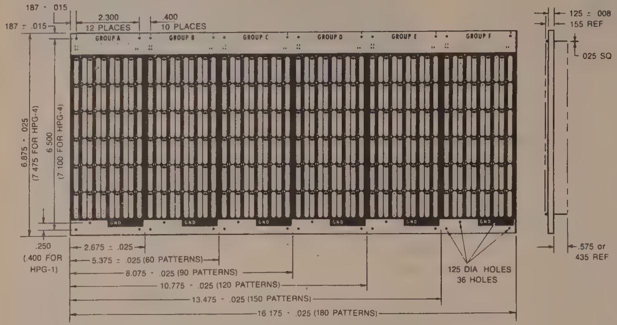
TRW® CINCH CONNECTORS

HIGH DENSITY DIP PACKAGING PANELS (Cont'd)

60-HPG SERIES

- Panels available in 30 pattern multiples from 30 to 180 patterns.
- Panels available in either 14- or 16-pin patterns for dual-in-line IC's.
- Ground and power planes are connected to contacts or dummy pins at each pattern.
- Contacts are gold plated all over and supplied for 3 level wrap.

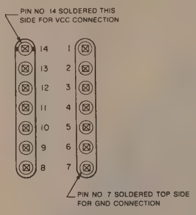



187 - 015
187 ± .015
2.300
12 PLACES
.400
10 PLACES
GROUP A
GROUP B
GROUP C
GROUP D
GROUP E
GROUP F
6.875 - 025
(7 475 FOR HPG-4)
6 500
(7 100 FOR HPG-4)
GND
.250
(.400 FOR HPG-1)
2.675 ± .025
5.375 ± .025 (60 PATTERNS)
8.075 - .025 (90 PATTERNS)
10.775 - .025 (120 PATTERNS)
13.475 - .025 (150 PATTERNS)
16 175 - .025 (180 PATTERNS)
125 DIA HOLES
36 HOLES
125 ± 008
155 REF
025 SQ
.575 or
435 REF

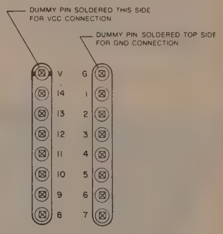
Finished panel widths for the specified number of patterns.

Distributor Part No.	Factory Part No.	No. of Patterns For Board	Pins Per Pattern	Gnd. and Power Pins
60-HPG1-30	299-08-00-022	30	14	7 + 14
60-HPG1-60	299-08-00-023	60		
60-HPG1-90	299-08-00-024	90		
60-HPG1-120	299-08-00-025	120		
60-HPG1-150	299-08-00-026	150		
60-HPG1-180	299-08-00-027	180		
60-HPG2-30	299-08-00-028	30	14	V & G Dummies*
60-HPG2-60	299-08-00-029	60		
60-HPG2-90	299-08-00-030	90		
60-HPG2-120	299-08-00-031	120		
60-HPG2-150	299-08-00-032	150		
60-HPG2-180	299-08-00-033	180		
60-HPG3-30	299-08-00-034	30	16	8 + 16
60-HPG3-60	299-08-00-035	60		
60-HPG3-90	299-08-00-036	90		
60-HPG3-120	299-08-00-037	120		
60-HPG3-150	299-08-00-038	150		
60-HPG3-180	299-08-00-039	180		
60-HPG4-30	299-08-00-040	30	16	V & G Dummies*
60-HPG4-60	299-08-00-041	60		
60-HPG4-90	299-08-00-042	90		
60-HPG4-120	299-08-00-043	120		
60-HPG4-150	299-08-00-044	150		
60-HPG4-180	299-08-00-045	180		

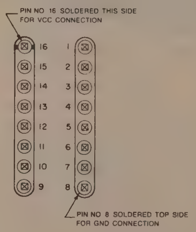
*2 additional wire wrap pins for wire strapping to pins on different packages.


PIN NO 14 SOLDERED THIS SIDE FOR VCC CONNECTION
14
13
12
11
10
9
8
1
2
3
4
5
6
7
PIN NO 7 SOLDERED TOP SIDE FOR GND CONNECTION

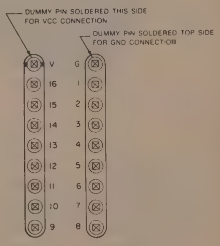
60-HPG1


DUMMY PIN SOLDERED THIS SIDE FOR VCC CONNECTION
DUMMY PIN SOLDERED TOP SIDE FOR GND CONNECTION
V
G
14
13
12
11
10
9
8
1
2
3
4
5
6
7

60-HPG2


PIN NO 16 SOLDERED THIS SIDE FOR VCC CONNECTION
16
15
14
13
12
11
10
9
1
2
3
4
5
6
7
8
PIN NO 8 SOLDERED TOP SIDE FOR GND CONNECTION

60-HPG3


DUMMY PIN SOLDERED THIS SIDE FOR VCC CONNECTION
DUMMY PIN SOLDERED TOP SIDE FOR GND CONNECTION
V
G
16
15
14
13
12
11
10
9
1
2
3
4
5
6
7
8

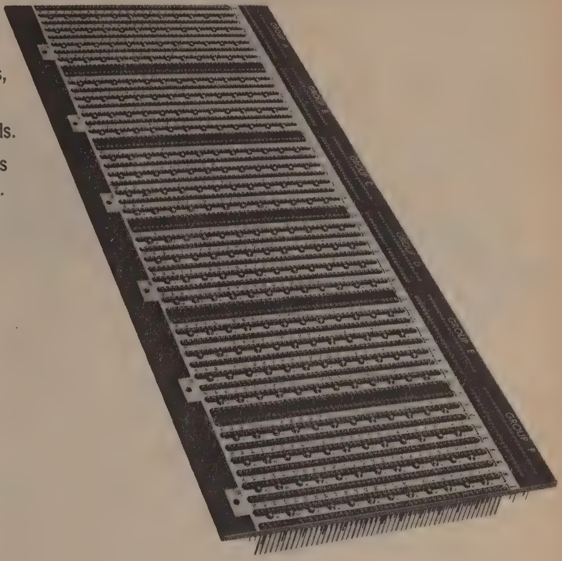
60-HPG4

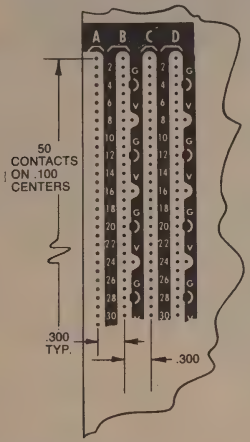
TRW® CINCH CONNECTORS

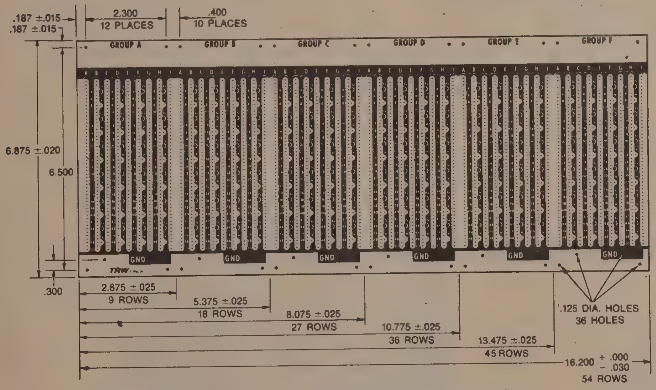
UNIVERSAL IC PACKAGING PANEL

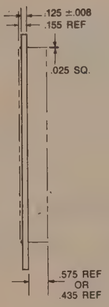
60-HUP SERIES

- Panels available in 9-row multiples from 9 to 54 rows, 50 contacts per row.
- Panels adaptable to DIP IC's containing 14 to 40 leads.
- Double-sided board contains power and ground planes connected to additional pins outside of contact rows.


GROUP A
GROUP B
GROUP C
GROUP D
GROUP E
GROUP F


A B C D
50 CONTACTS ON .100 CENTERS
.300 TYP.
.300
G
V


.187 ±.015
.187 ±.015
2.300 12 PLACES
.400 10 PLACES
GROUP A
GROUP B
GROUP C
GROUP D
GROUP E
GROUP F
GND
TRW
6.875 ±.020
6.500
.300
2.675 ±.025 9 ROWS
5.375 ±.025 18 ROWS
8.075 ±.025 27 ROWS
10.775 ±.025 36 ROWS
13.475 ±.025 45 ROWS
16.200 +.000 −.030 54 ROWS
.125 DIA. HOLES 36 HOLES


.125 ±.008
.155 REF
.025 SQ.
.575 REF OR .435 REF

Finished panel widths are for the specified number of contact rows.

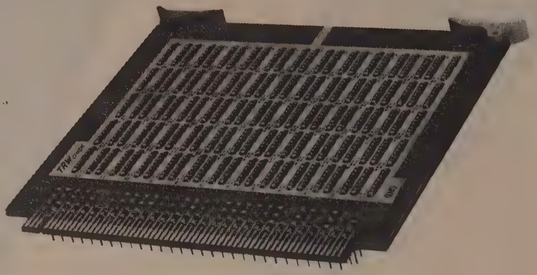
Distributor Part No.	Factory Part No.	No. of Rows	Panel Width ±.025
60-HUP-9	299-08-00-002	9	2.675
60-HUP-18	299-08-00-003	18	5.375
60-HUP-27	299-08-00-004	27	8.075
60-HUP-36	299-08-00-005	36	10.775
60-HUP-45	299-08-00-006	45	13.475
60-HUP-54	299-08-00-007	54	16.200 +.000 −.030

Additional wire wrap terminals are connected to ground and power planes outside of contact rows.

TRW/CINCH CONNECTORS, AN ELECTRONIC COMPONENTS DIV. OF TRW INC. / 1501 MORSE AVE. / ELK GROVE VILLAGE, ILL. 60007

TRW® CINCH CONNECTORS

HIGH DENSITY DIP PACKAGING PANEL WITH CONNECTOR TAKE-OFF

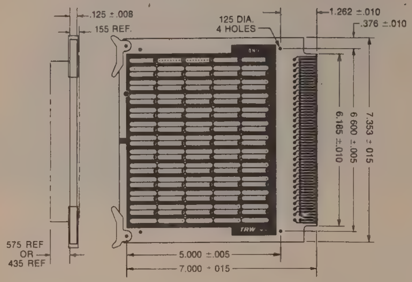


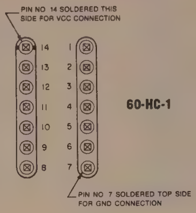
60-HC SERIES — 60 PATTERNS

Edge connector takeoff accepts Cinch 61 position, double readout edge connectors. (See Page **2•1014**)

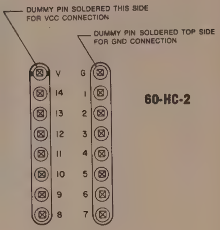
Ground and power planes connected to contacts or dummy pins at each pattern.

Contacts are gold plated all over and supplied for 3 level wrap.

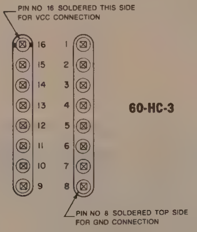

.125 ±.008
.155 REF.
125 DIA.
4 HOLES
1.262 ±.010
.376 ±.010
6.185 ±.010
6.600 ±.005
7.353 ±.015
575 REF
OR
435 REF
5.000 ±.005
7.000 ±.015
TRW


PIN NO 14 SOLDERED THIS SIDE FOR VCC CONNECTION
PIN NO 7 SOLDERED TOP SIDE FOR GND CONNECTION

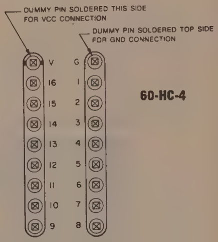
60-HC-1


DUMMY PIN SOLDERED THIS SIDE FOR VCC CONNECTION
DUMMY PIN SOLDERED TOP SIDE FOR GND CONNECTION
V
G

60-HC-2


PIN NO 16 SOLDERED THIS SIDE FOR VCC CONNECTION
PIN NO 8 SOLDERED TOP SIDE FOR GND CONNECTION

60-HC-3


DUMMY PIN SOLDERED THIS SIDE FOR VCC CONNECTION
DUMMY PIN SOLDERED TOP SIDE FOR GND CONNECTION
V
G

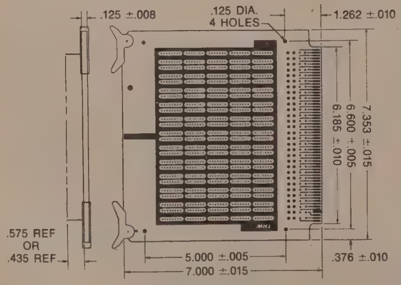
60-HC-4

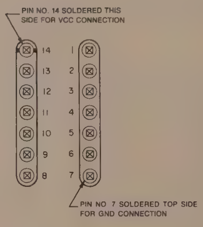
Distributor Part No.	Factory Part No.	Pins Per Pattern	Gnd. and Power Pins
60-HC-1	299-08-00-008	14	7 +14
60-HC-2	299-08-00-009	14	V & G Dummies*
60-HC-3	299-08-00-010	16	8 + 16
60-HC-4	299-08-00-011	16	V & G Dummies*

*2 additional wire wrap pins for wire strapping to pins on different packages.

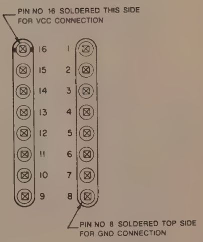
60-HMC-1 — 60 PATTERNS

COMBINATION 14 & 16 PIN PATTERNS — FACTORY PART NO. 299-08-00-013


.125 ±.008
.125 DIA.
4 HOLES
1.262 ±.010
6.185 ±.010
6.600 ±.005
7.353 ±.015
.575 REF
OR
.435 REF
5.000 ±.005
7.000 ±.015
.376 ±.010
MH1


PIN NO. 14 SOLDERED THIS SIDE FOR VCC CONNECTION
PIN NO 7 SOLDERED TOP SIDE FOR GND CONNECTION

**PATTERNS 1-48
(FIRST FOUR ROWS)**

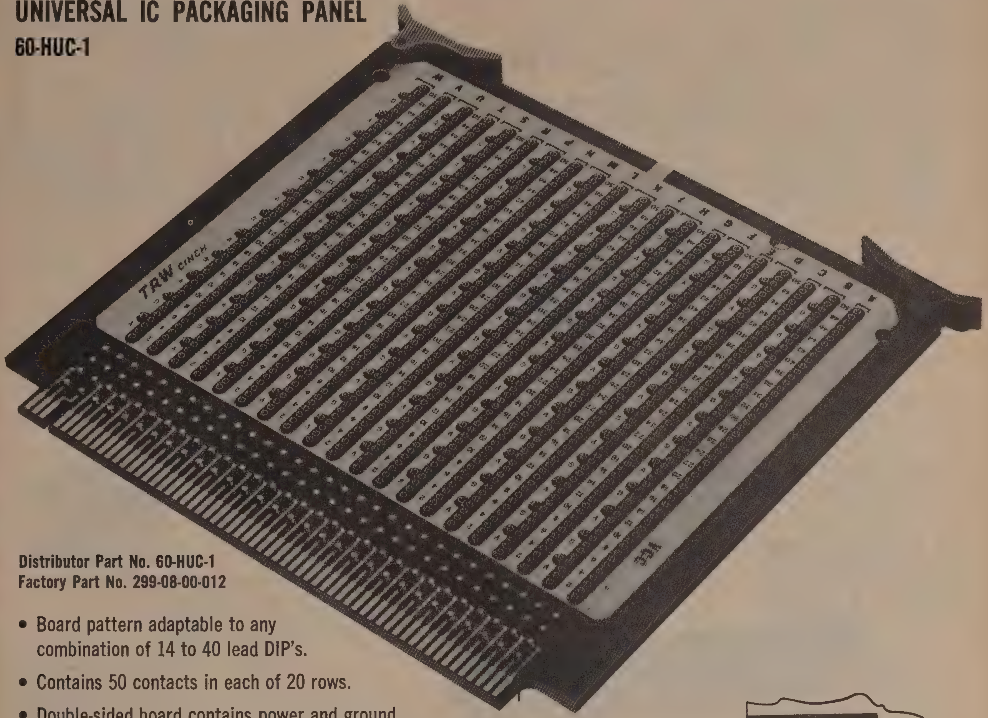

PIN NO 16 SOLDERED THIS SIDE FOR VCC CONNECTION
PIN NO 8 SOLDERED TOP SIDE FOR GND CONNECTION

**PATTERNS 49-60
(FIFTH ROW)**

TRW® CINCH CONNECTORS

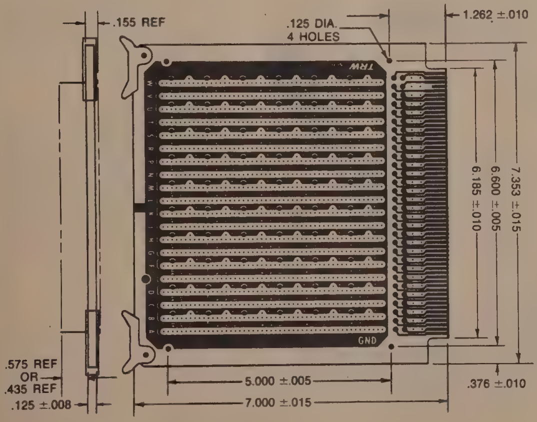
UNIVERSAL IC PACKAGING PANEL

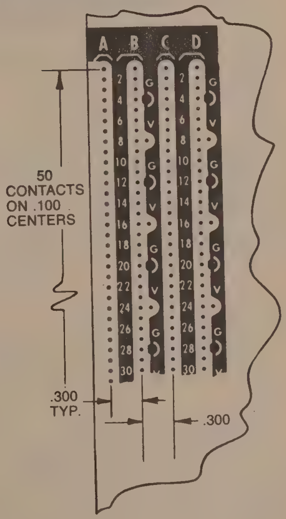
60-HUC-1


TRW CINCH
W
V
U
T
S
R
P
N
M
L
K
J
H
G
F
E
D
C
B
A
VCC

Distributor Part No. 60-HUC-1
Factory Part No. 299-08-00-012

- Board pattern adaptable to any combination of 14 to 40 lead DIP's.
- Contains 50 contacts in each of 20 rows.
- Double-sided board contains power and ground planes connected to additional pins outside of contact rows.
- Contacts are gold plated all over and supplied for 3 level wrap.


.155 REF
.125 DIA.
4 HOLES
1.262 ±.010
TRW
W V U T S R P N M L K J H G F E D C B A
GND
6.185 ±.010
6.600 ±.005
7.353 ±.015
.575 REF
OR
.435 REF
.125 ±.008
5.000 ±.005
7.000 ±.015
.376 ±.010


A
B
C
D
2
4
6
8
10
12
14
16
18
20
22
24
26
28
30
G
V
50
CONTACTS
ON .100
CENTERS
.300
TYP.
.300

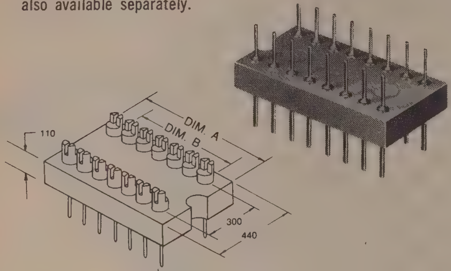
Additional wire wrap terminals are connected to ground and power planes outside of contact rows.

TRW/CINCH CONNECTORS, AN ELECTRONIC COMPONENTS DIV. OF TRW INC. / 1501 MORSE AVE. / ELK GROVE VILLAGE, ILL. 60007

TRW® CINCH CONNECTORS

ADAPTOR PLUGS

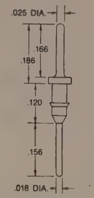
- Designed for interposing discrete components and as a base for modular construction and special plug assemblies.
- Terminals plug directly into 14- and 16-pin patterns on 60-HPG, 60-HP, 60-HC, and 60-HMC panels, or universal patterns on other panels.
- Round, solder pocket, and slotted pin styles available. Pins also available separately.


DIM. A
DIM. B
.110
.300
.440

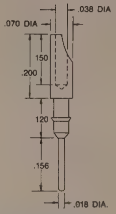
Materials: Base — Glass-filled nylon, ⅛″.
Pin — Brass, gold over nickel plated.

Distributor Part No.	Factory Part No.	No. of Pins	Dimensions A +.005 −.010	Dimensions B ±.005	Pin Style
AP-14-A	299-11-00-017	14	.740	.600	Round
AP-16-A	299-11-00-018	16	.840	.700	Round
AP-14-B	299-11-00-019	14	.740	.600	Solder Pocket
AP-16-B	299-11-00-020	16	.840	.700	Solder Pocket
AP-14-C	299-11-00-021	14	.740	.600	Slotted Pin
AP-16-C	299-11-00-022	16	.840	.700	Slotted Pin

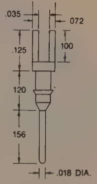
PIN STYLES


.025 DIA.
.166
.186
.120
.156
.018 DIA.

ROUND
Distributor Part No.
60-PA
Factory Part No.
462-14-11-038


.038 DIA
.070 DIA
.150
.200
.120
.156
.018 DIA.

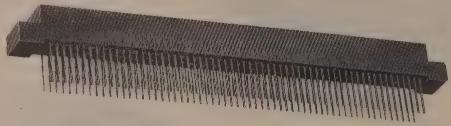
SOLDER POCKET
Distributor Part No.
60-PB
Factory Part No.
462-14-11-039

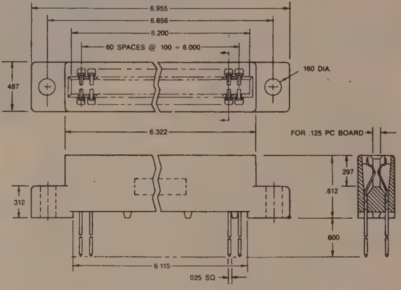

.035
.072
.100
.125
.120
.156
.018 DIA.

SLOTTED
Distributor Part No.
60-PC
Factory Part No.
462-14-11-040

61 POSITION EDGE CONNECTORS

Distributor Part No. 50-122W-60
Factory Part No. 253-61-00-001




6.955
6.656
6.200
60 SPACES @ .100 = 6.000
.160 DIA.
.487
6.322
FOR .125 PC BOARD
.297
.812
.312
.600
6.115
.025 SQ

Materials:

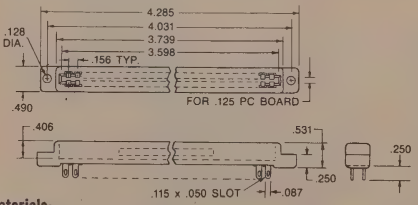
Contact — Phosphor Bronze per QQ-P-330 gold plated MIL-G-45204, over nickel plate.

Insulator — Glass Reinforced Polyester.

22 POSITION EDGE CONNECTORS

Distributor Part No. 50-44A-60
Factory Part No. 251-22-30-351

Designed for minimum printed circuit card wear, low insertion force, and bifurcated contacts that permit two flexing surfaces for positive contact.

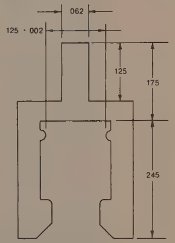

.128 DIA.
4.285
4.031
3.739
3.598
.156 TYP.
.490
FOR .125 PC BOARD
.406
.531
.250
.250
.115 x .050 SLOT
.087

Materials:

Insulation — Glass-filled diallyl phthalate, Type SDG-F per MIL-M-14.

Contacts — Phosphor bronze with minimum of 30 microinches thickness gold plate.

ADAPTOR


.062
.125 · .002
.125
.175
.245

Distributor Part No. A-60
Factory Part No. 474-11-77-430

Available for use with 60-HC, 60-HC4 and 60-HC6 Series Boards, as well as Board Nos. 60-HUC-1 and 60-HMC-1.

TRW/CINCH CONNECTORS, AN ELECTRONIC COMPONENTS DIV. OF TRW INC. / 1501 MORSE AVE. / ELK GROVE VILLAGE, ILL. 60007

TRW® CINCH CONNECTORS

PLUG ASSEMBLIES

Designed for input-output connections, interfacing, and testing terminals on the same plane as the IC patterns.

Available with top wire entry, terminated as a single or double ended assembly. Strain relief cover.

PLUG ASSEMBLIES (CRIMP CONTACT)

Distributor Part No.*	Factory Part No.**	No. of Pins	Pin Dia.	Wire Length***
PA-1412-T	299-11-00-001	14	.018	12″
PA-1424-T	299-11-00-003	14	.018	24″
PA-1436-T	299-11-00-005	14	.018	36″
PA-1612-T	299-11-00-007	16	.018	12″
PA-1624-T	299-11-00-009	16	.018	24″
PA-1636-T	299-11-00-011	16	.018	36″

ALL ABOVE TOP ENTRY

*For double-ended plug assemblies replace -T suffix with -DE. Example: PA-1412-DE

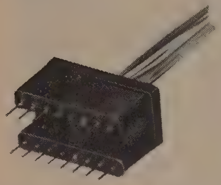
**For double-ended plug assemblies, add "1" to final digit: Example: 14 pins, 12″ — 299-11-00-002.

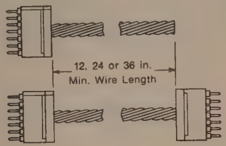
***Standard lengths are 12, 24, and 36″. Other lengths available, upon request.

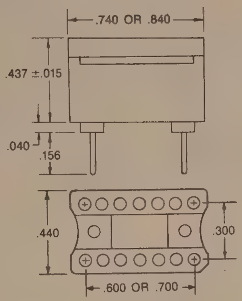
PLUG ONLY (UNASSEMBLED)

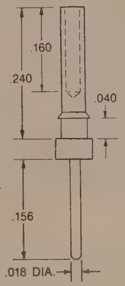
Distributor Part No.	Factory Part No.	Pin Termination	Pin Dia.
P-14-S	299-11-00-013	Solder Pocket	.018
P-14-C	299-11-00-015	Crimp*	.018
P-16-S	299-11-00-014	Solder Pocket	.018
P-16-C	299-11-00-016	Crimp*	.018

*Use Buchanan Tool No. 612118 and Locator No. 613427.









MATERIALS

Insulator: Glass-filled nylon.
Pins: Brass, gold over nickel plated.
Screws: Steel, nickel plated.
Wire: #26 AWG stranded copper, Type B per MIL-W-16878.

FEATURES

1. Wire in single ended plug is color coded per MIL-STD-681.
2. Wire in double ended plug is all black.

EXTRACTOR TOOL

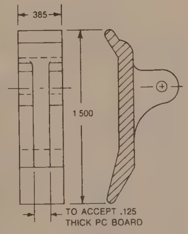
Distributor Part No. RT-60
Factory Part No. 599-11-11-184

Designed to speed handling of IC's and to minimize damage to leads. Permits easy removal of IC's from top of board, especially in high density packaging conditions.

Tool available separately.

EJECTOR KEYS

For use on plug-in type boards.
Material: Nylon

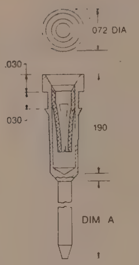


Distributor Part No.	Factory Part No.	Color	Board Thickness
EK-8W	474-11-77-428	White	⅛″
EK-8R	474-11-77-429	Red	⅛″

TRW® CINCH CONNECTORS

SOCKET/TERMINALS

Four standard pins and terminals are available to meet individual requirements. Modifications are simplified since no staking or special assembly tool is required. All pins and terminals are self-locking into insulated board by simply pressing into recommended mounting hole (.055 ±.001 dia.).



SOCKET/TERMINALS (AVAILABLE SEPARATELY)

Recommended Mtg. Hole: .055 ±.001 Dia. (Pressed into place without special tools.)

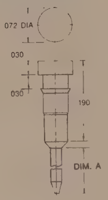
Distributor Part No.	Factory Part No.	Dimension "A"	Plating
60-S3	318-01-99-502	.510 (3 level)	Gold Contact and Sleeve
60-S3T	318-01-99-503	.510 (3 level)	Gold Contact, Tin Sleeve
60-S2	318-01-99-504	.370 (2 level)	Gold Contact and Sleeve
60-S2T	318-01-99-485	.370 (2 level)	Gold Contact, Tin Sleeve

DUMMY PIN (NO CONTACT)

Distributor Part No.	Factory Part No.	Dimension "A"
60-PD1	462-14-11-043	.510
60-PD2	462-14-11-035	.370

(Brass, Gold over Nickel Plated)

Recommended Mtg. Hole #54 drill (.055 dia. ref.) .062 min. board thickness.

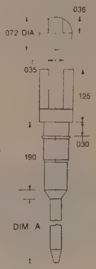


SLOTTED PIN

Distributor Part No.	Factory Part No.	Dimension "A"
60-PC1	462-14-11-041	.510
60-PC2	462-14-11-042	.370

(Brass, Gold over Nickel Plated)

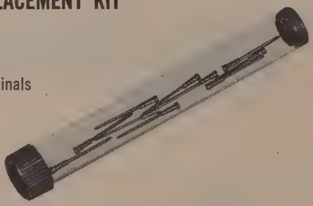
Recommended Mtg. Hole #54 drill (.055 dia. ref.) .062 min. board thickness.

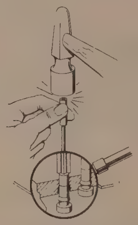


SOCKET/TERMINAL REPLACEMENT KIT

Distributor Part No. RK-60
Factory Part No. 318-01-99-505

Contains 20 60-S3 Socket/Terminals





To remove damaged Socket/Terminals, tap out from back side.

ALL IC LOGIC BOARDS LISTED ARE AVAILABLE FROM AUTHORIZED CINCH DISTRIBUTORS

TRW/CINCH AUTHORIZED IC LOGIC BOARD DISTRIBUTORS

ARIZONA
Marshall Industries
Phoenix (602) 968-6181
Sterling Electronics
Phoenix (602) 258-4531

CALIFORNIA
Marshall Industries
El Monte (213) 686-0141
Marshall Industries
Irvine (714) 556-6400
Marshall Industries
San Diego (714) 278-6350
Marshall Industries
Sunnyvale (408) 732-1100
Sterling Electronics
San Carlos (415) 592-2353
Sterling Electronics
San Diego (714) 565-2441
Sterling Electronics
Sun Valley (213) 767-5030

COLORADO
Marshall Industries
Arvada (303) 423-9670

CONNECTICUT
Marshall Industries
North Branford (203) 484-0488
Wilshire Electronics/Connecticut
Hamden (203) 281-1166

FLORIDA
Marshall Industries
Palm Beach Gardens (305) 622-8490

ILLINOIS
Marshall Industries
Des Plaines (312) 298-3700

INDIANA
Pioneer/Indiana
Indianapolis (317) 849-7300

LOUISIANA
Sterling Electronics
Metairie (504) 887-7610

MARYLAND
Pioneer/Washington
Rockville (301) 948-0710

MASSACHUSETTS
Marshall Industries
Newton Highland (617) 965-5115

MASSACHUSETTS (Cont'd)
Sterling Electronics
Watertown (617) 926-9720
Wilshire Electronics/New England
Burlington (617) 272-8200

MICHIGAN
Pioneer/Michigan
Livonia (313) 525-1800

NEW JERSEY
Resco
Pennsauken (609) 662-4000
Sterling Electronics
Perth Amboy (201) 442-8000
Wilshire Electronics/New Jersey
Clifton (201) 365-2600

NEW MEXICO
Sterling Electronics
Albuquerque (505) 345-6601

NEW YORK
Marshall Industries
Farmingdale, L.I. (516) 293-4141
Rampart Components, Inc.
Hauppauge (516) 273-1111

OHIO
Marshall Industries
Dayton (513) 898-1105
Pioneer/Cleveland
Cleveland (216) 587-3600
Pioneer/Dayton
Dayton (513) 236-9900

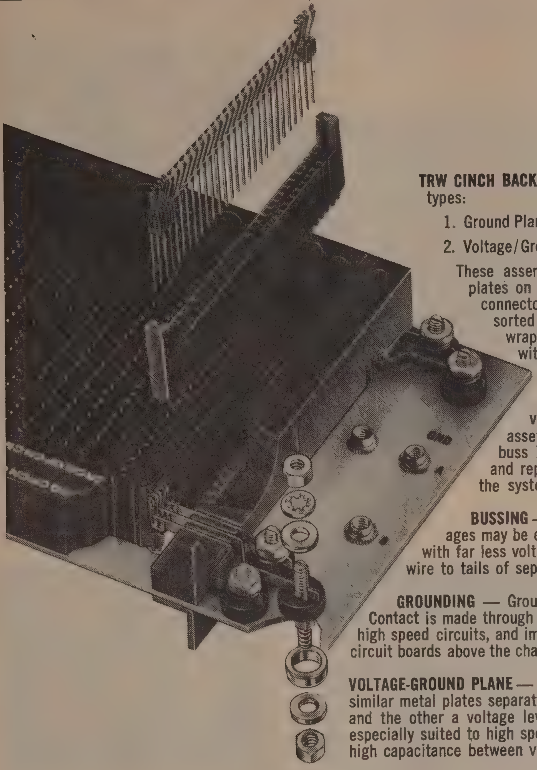
TEXAS
Marshall Industries
Dallas (214) 233-5200
Sterling Electronics
Dallas (214) 357-9131
Sterling Electronics
Houston (713) 627-9800

VIRGINIA
Sterling/Meridian Electronics
Richmond (804) 353-6648

WASHINGTON
Marshall Industries
Bellevue (206) 883-1084
Sterling Electronics
Seattle (206) 762-9100

TRW/CINCH CONNECTORS, AN ELECTRONIC COMPONENTS DIV. OF TRW INC. / 1501 MORSE AVE. / ELK GROVE VILLAGE, ILL. 60007

TRW® CINCH CONNECTORS



CREATIVE TECHNOLOGY IN BACK PLANE CONNECTOR SYSTEMS

TRW CINCH BACK PLANE CONNECTOR SYSTEMS are available in two general types:

1. Ground Plane Systems
2. Voltage/Ground Plane Systems

These assemblies consist, basically, of precision punched aluminum plates on which are mounted a series of printed circuit board edge connectors, solid copper buss bars, phenolic support bars, and assorted hardware. Contacts with square tails for automatic wire wrapping are assembled into rows of edge connector insulators with tails extending through the punched plate(s) for proper positioning.

VOLTAGE BUSS CONTACT — Specially designed Cinch voltage buss contacts are an integral part of each connector assembly. No soldering or welding is required in bussing. Both, buss bars and individual bussing contacts are easy to remove and replace. If necessary, without disturbing the remainder of the system.

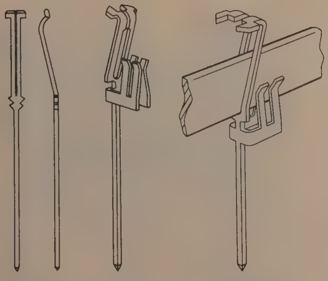
BUSSING — With connectors mounted side by side, all common voltages may be easily bussed together. Solid copper buss bars carry circuits with far less voltage variation than is possible by the technique of wrapping wire to tails of separate contacts.

GROUNDING — Grounding is made directly to the aluminum ground plate. Contact is made through the ground bushing. The short distance to ground enhances high speed circuits, and improves shielding between wiring below chassis and plug-in circuit boards above the chassis.

VOLTAGE-GROUND PLANE — Structurally, the voltage-ground plane is a sandwich of two similar metal plates separated by a layer of insulation. One plate serves as the ground, and the other a voltage level. This system provides superior circuit stability, and is especially suited to high speed signal applications. It also provides low impedance and high capacitance between voltage and ground planes.

PHYSICAL CHARACTERISTICS

TYPICAL CONTACTS

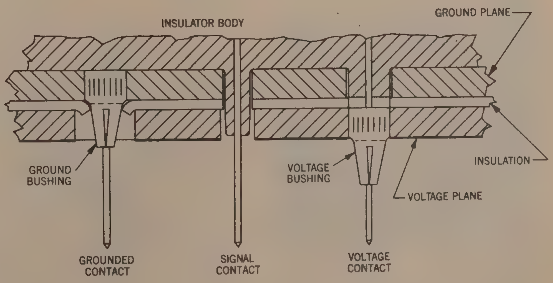


Signal Contact

Buss Contact*

Voltage Buss and Contact*

TYPICAL PLATE ASSEMBLY



*Patented Cinch Mfg. Co. a Div. of TRW Inc.

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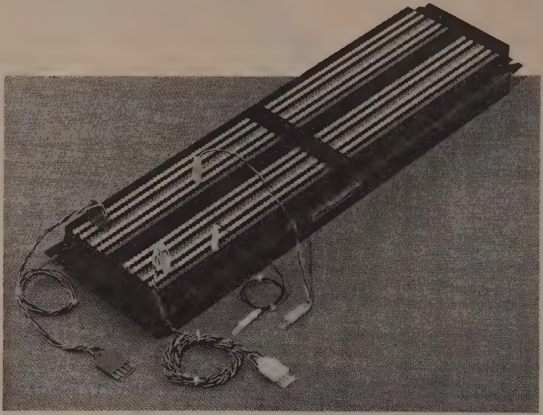
TRW® CINCH CONNECTORS

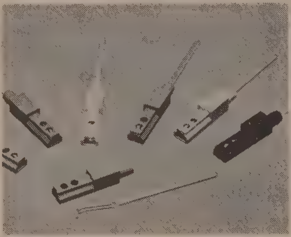
PATCHMASTER

CIRCUIT CONCENTRATION BAY SYSTEM

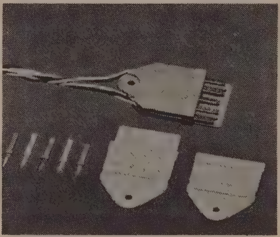
PATCHMASTER CCB—The heart of the new TRW Cinch Patchmaster system is a unique back panel and patch cord plugs. One side of the back panel is available for wire wrapping while the other side of the panel serves the same function as the solder side of the terminal block, but instead of soldering, interconnection is simply a matter of plugging in the patch cord.

The Cinch Patchmaster CCB Unit was originally designed to meet the stringent requirements of the telephone industry and to provide a product that offered the utmost in reliability with features that would make installation, service, usability and maintenance as simple and positive as possible. Patchmaster has a great many features that make it ideal for programming or interconnecting systems that require maximum flexibility.

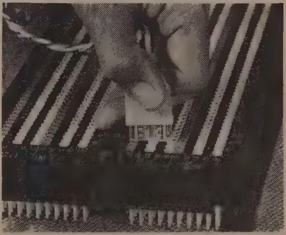




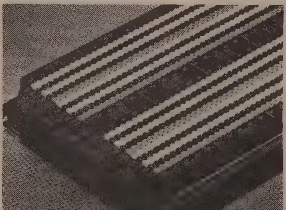
MODULES — The back panel consists of individual modules, press fitted into a 0.125-in. (3.18mm) thick anodized aluminum plate having formed sides. The module insulator material is a glass filled polyester in a variety of colors. The module contact is fabricated of phosphor bronze or copper nickel alloy and gold plated.



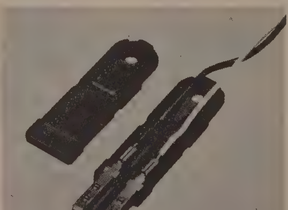
PATCH CORDS — The patch cord plugs consist of male pins assembled into a two piece insulator design with 24 or 26 gage wires either soldered or crimped to the pins. After the pins are assembled, the two insulator halves are ultrasonically bonded together. The plug insulator is polycarbonate and is available in a variety of colors. The plug pins are brass, gold plated.



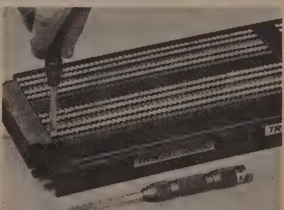
POLARIZATION — If the back panel and patch cord are designed without polarization, the patch cord plug could be assembled into the panel backwards, possibly causing serious circuit damages. The positive polarization of the Cinch Patchmaster plug assures correct insertion of the plug into the back panel.



RAISED MARKING — Those who install and service the CCB installation must be able to easily identify each circuit. In the Cinch Patchmaster system, all markings are on raised strips, putting circuit identification at the same level as the plug-in portion of the connector.



STRAIN RELIEF — Although a tool is provided to remove patch plugs from the back panel, on occasion it may become necessary to pull a plug out by the wires. If so, the plug has a built in strain relief that removes all strain from the interconnection of the wire to the pin.



REPAIRABILITY — The complete module can be replaced if a contact is damaged. Easily operated tools are available for convenient repair and replacement of modules.

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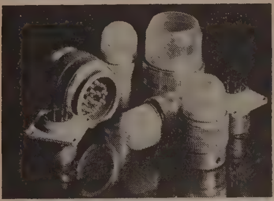
TRW® CINCH CONNECTORS

CINCH NULINE 904 SERIES COMMERCIAL INPUT/OUTPUT CONNECTORS



FEATURES

Meets or exceeds appropriate MIL-C-5015 requirements for:

- Moisture resistance (when potted).
- Insulation resistance.
- Environmental resistance.
- Temperature cycling.

Additional features of the 904 Series:

- Lightweight.
- Visual engagement ring.
- Positive locking.
- Hooded female contacts.
- Three pin coupling.
- Stainless steel pins and bayonet slots.

PERFORMANCE CHARACTERISTICS

Durability: Connectors do not show any damage detrimental to the operation of the connector after 100 mating-unmating cycles at a rate of 300 cycles per hour.

Corrosion Resistance: After salt-spray testing per MIL-STD-202, Method 101C, Test Condition B connectors show no exposure of base metal which will affect performance.

Dielectric Withstanding Voltage: Connectors show no evidence of breakdown or flash over between adjacent contacts and from contacts to outer shell when subjected to the conditions specified in table below. (Tests performed per Method 3001 of MIL-STD-1344.)

	Condition*	Test V RMS	Recommended Working Voltage DC	Recommended Working Voltage AC
Sea Level	Unsealed Sealed	1500 2000	700 700	500 500
70,000 Ft.	Unsealed Sealed	375 1500	175 700	125 500

*(Unsealed) Refers to connectors with no provisions made for sealing front or rear areas.
(Sealed) Refers to connectors that are potted or pressurized in mounting, having front and rear areas sealed.

Insulation Resistance: Minimum insulation resistance of 5000 megohms between adjacent contacts and from contacts to outer shell when tested in accordance with MIL-STD-202, Method 302, Test Condition B.

Vibration: There are no circuit descontinuities longer than one microsecond when subjected to vibration testing in accordance with MIL-STD-1344, Method 2005, Test Condition III.

Physical Shock: Connectors are not damaged when subjected to 1500 G's for 0.5 milliseconds in each of three mutually perpendicular planes per MIL-STD-202, Method 213A, Test Condition F.

Temperature Cycling: Mated connectors perform satisfactorily after being subjected to temperature cycling from −55°C to +85°C per MIL-STD-202, Method 102A, Test Condition D.

Humidity: Connectors remain completely functional after being subjected to humidity testing per MIL-STD-202, Method 103B, Test Condition A.

Contact Resistance: Contact resistance through each mated contact pair doesn't exceed the requirements specified in the following table when tested in accordance with MIL-STD-1344, Method 3004.

Contact Mating End Size	Wire Size	Test Current (Amp)	Millivolt Drop (Max.) Initial	Millivolt Drop (Max.) After Corrosion
#20	20 22 24	7.5 5.0 3.0	55 45 45	65 55 55
#16	16 18 20	13.0 10.0 7.5	50 45 45	60 55 55

MATERIALS & FINISHES

Contacts: Copper Base Alloy Gold Plated per MIL-G-45204, Type II, Grade C, Class 0 over Nickel Underplate.

Shells: Aluminum Alloy 6262 per QQ-A-225/10 Gray Anodized per MIL-A-8625.

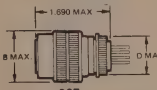
Inserts: Diallyl Phthalate per MIL-M-14F, Type MDG.

Face Seals: Neoprene Rubber per MIL-R-3065.

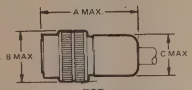
Bayonet Pins: Stainless Steel Type 303 Passivated.

Component Parts: Anodized Aluminum conforming to QQ-A-225 or Passivated Stainless Steel in accordance with QQ-S-764.

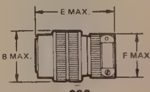
DIMENSIONS



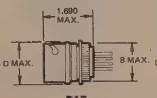
06E



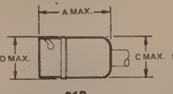
06P



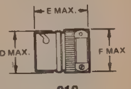
06C



01E



01P

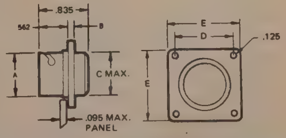


01C

Connector Size	A Inches	A Centimeters	B Inches	B Centimeters	C Inches	C Centimeters	D Inches	D Centimeters	E Inches	E Centimeters	F Inches	F Centimeters
12	1.687	4.284	.957	2.430	.795	2.019	.895	2.273	1.870	4.749	.817	2.075
14	1.687	4.284	1.082	2.748	.920	2.336	1.000	2.540	1.870	4.749	.967	2.456
18	1.687	4.284	1.375	3.492	1.170	2.971	1.250	3.175	1.870	4.749	1.185	3.009
20	1.734	4.404	1.500	3.810	1.223	3.106	1.375	3.492	1.970	5.003	1.312	3.332
22	1.734	4.404	1.625	4.127	1.352	3.434	1.468	3.728	1.970	5.003	1.440	3.657

MOUNTING DIMENSIONS (For Square Flange Connectors)

Connector Size	A Inches	A Centimeters	B Inches	B Centimeters	C Inches	C Centimeters	D Inches	D Centimeters	E Inches	E Centimeters
12	.662	1.681	.062	0.157	.690	1.752	.812	2.062	1.031	2.618
14	.781	1.983	.062	0.157	.812	2.062	.906	2.301	1.125	2.857
18	1.032	2.621	.093	0.236	1.062	2.697	1.062	2.697	1.312	3.332
20	1.156	2.936	.093	0.236	1.187	3.014	1.156	2.936	1.437	3.649
22	1.281	3.253	.093	0.236	1.281	3.253	1.250	3.175	1.562	3.967



TRW® CINCH CONNECTORS

904 SERIES (Cont'd)

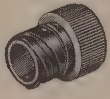
HOW TO ORDER

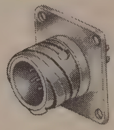
To get the 904 Series Connector you want, put together the part number as per the example in the following chart. The available combinations of shell styles and construction classes are shown below along with available inserts.

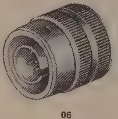
CN0904 06 E 12-7 P W

SERIES DESIGNATION
CN0904

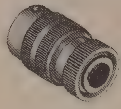
SHELL STYLE

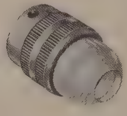

01
Cable Mounting Receptacle

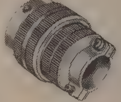

02
4-Hole Mount Panel Receptacle


06
Cable Plug-Straight

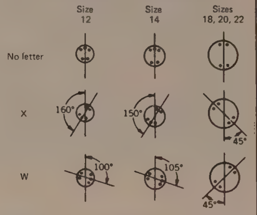
CONSTRUCTION


E
Environmentally sealed (Unitized grommet)


P
Environmentally sealed (Disposable Polyethylene Potting Form Furnished)


C
Mechanical Clamp (Sealed only when potted)

ALTERNATE INSERT POSITIONS

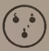


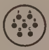
TYPE OF CONTACT

P-Pin
S-Socket

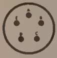
INSERTS AVAILABLE (Front face of pin insert shown)

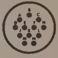
SIZE 12 INSERTS


12-60
3 #16 contacts

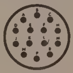

12-7
7 #20 contacts

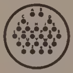
SIZE 14 INSERTS


14-63
5 #16 contacts

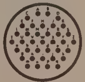

14-12
12 #20 contacts

SIZE 18 INSERTS

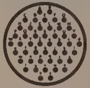

18-64
14 #16 contacts


18-24
24 #20 contacts

SIZE 20 INSERT

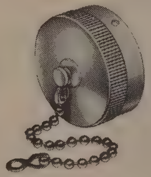

20-37
37 #20 contacts

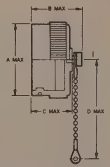
SIZE 22 INSERT


22-48
48 #20 contacts

CAP & CHAIN ASSEMBLIES

Cap and chain assemblies for 904 Series Receptacles are waterproof and include a sealing gasket. They provide protection against live circuits and contamination when receptacles are unmated.





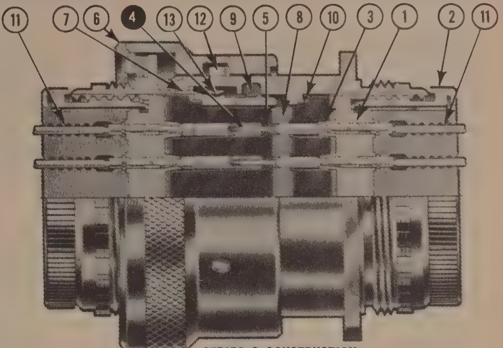
Connector Size	Part No.	A		B		C		D	
		Inches	Centimeters	Inches	Centimeters	Inches	Centimeters	Inches	Centimeters
12	CN0904-1200	.804	2.042	.774	1.965	.603	1.531	3.5	8.890
14	CN0904-1400	.938	2.382	.750	1.905	.594	1.508	3.5	8.890
18	CN0904-1800	1.172	2.976	.774	1.965	.603	1.531	3.5	8.890
20	CN0904-2000	1.296	3.291	.774	1.965	.603	1.531	4.0	10.160
22	CN0904-2200	1.421	3.609	.774	1.965	.603	1.531	4.0	10.160

TRW® CINCH CONNECTORS

CINCH-NULINE ASTRO/348® MIL-C-81511 HIGH DENSITY CONNECTORS

DESIGN FEATURES

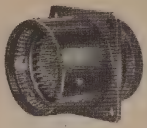
1. Molded One-Piece Contact Retention Disc.
2. Captivated Rear-Locking Nut (Metal to Metal Bottoming).
3. Individual Contact Risers.
4. Anti-Scoop Recessed Pin Contacts (in receptacle).
5. Closed Entry Socket Insert and Contacts.
6. Captivated Triple Bayonet Coupling System.
7. 5 Key Shell Polarization. (Series 2, Size 8 has 2 keys.)
8. Interfacial Mating Seal.
9. Dynamic "O" Ring Peripheral Shell Ring.
10. Monoblock Construction — Inserts Bonded to Shells.
11. Self-Sealing Rear Grommets.
12. Visual Mating Indicator.
13. Shell to Shell Grounding Fingers.



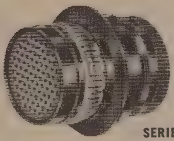
SERIES 2 CONSTRUCTION

Astro/348 has been designed to eliminate the costly space-wasters in removable contacts. Problem-causing metal retention clips for each contact are gone. Instead, a single one-piece molded dielectric retention system locks Poke-Home contacts in place. Designed as a high density subminiature, Astro/348 is the best high density miniature and standard connector ever made. It packs more contacts of every size into standard shells than any other design. MIL-C-81511* has established the standard connector family for the next decade.

The single-piece retention disc gives other excellent advantages in addition to density. Dielectric wall thicknesses in the subminiature #23-22 contact arrangements **are equal to standard miniatures.** With greater density, #20's, #16's and #12's provide dielectric separation comparable to standard miniature and power connectors.



SERIES 2



SERIES 1

GROUNDING FINGERS

Shell-to-shell grounding is established by beryllium spring fingers permanently fixed to the Series 2 receptacle shell and permanently fixed to the Series 1 plug shell. These spring fingers, spaced at a minimum of 6 per inch (except at key-ways in Series 2 construction), make contact at least .090″ before pin-socket electrical engagement occurs during mating and maintain contact at least .090″ after pin-socket disengagement during unmating.

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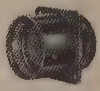
*MIL-C-81511 is a Military Specification for Connectors, Electric, Circular, High Density, Quick Disconnect, Environment Resistant.

**Astro/348 and Poke-Home are Trade Marks of the Bunker-Ramo Corp.

SHELL CONSTRUCTIONS SERIES 2

Plug
348-46EXX-XX

Single Hole Mtg. Receptacle
348-43EXX-XX



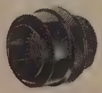
Square Flange Receptacle
348-40EXX-XX

Cable Receptacle
348-41EXX-XX

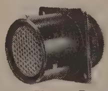
Hermetic Seal— Solder Flange Receptacle
348-25HXX-XXP

Hermetic Seal— Receptacle Single Hole Mtg.
348-23HXX-XXP

SHELL CONSTRUCTIONS SERIES 1

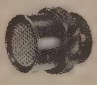


Plug 348-36EXX-XX



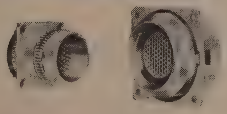
Square Flange Receptacle
348-30EXX-XX

Single Hole Mtg. Receptacle
348-33EXX-XX



Cable Receptacle
348-31EXX-XX

SHELL CONSTRUCTIONS SERIES 1



348 Series Type Rack and Panel Connector

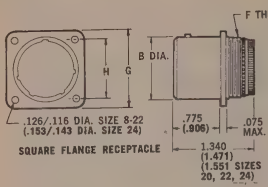
348 Series High Temperature Connector (200°C)

348 Series Fluid Resistant Connector (175°C)

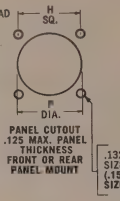
TRW® CINCH CONNECTORS

CINCH-NULINE ASTRO/348 HIGH DENSITY CONNECTORS (Cont'd)

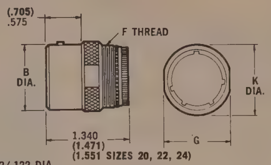
SHELL DIMENSIONS (inches) All Dimensions Are Shown As MAX.


F THREAD
B DIA.
H
G
.126/.116 DIA. SIZE 8-22
(.153/.143 DIA. SIZE 24)
.775
(.906)
.075
MAX.
1.340
(1.471)
(1.551 SIZES
20, 22, 24)

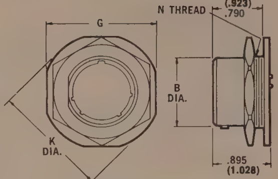
SQUARE FLANGE RECEPTACLE


H
SQ.
P
DIA.
.132/.122 DIA.
SIZE 8-22
(.159/.149 DIA.
SIZE 24)

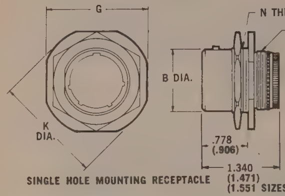
PANEL CUTOUT
.125 MAX. PANEL
THICKNESS
FRONT OR REAR
PANEL MOUNT


(.705)
.575
F THREAD
B
DIA.
K
DIA.
1.340
(1.471)
(1.551 SIZES 20, 22, 24)
G

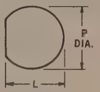
CABLE RECEPTACLE


N THREAD
(.923)
.790
G
B
DIA.
K
DIA.
.895
(1.028)

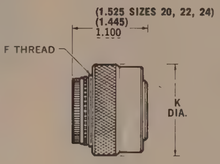
HERMETIC SEAL SINGLE HOLE
MOUNTING RECEPTACLE


G
N THREAD
F THREAD
B DIA.
K
DIA.
.778
(.906)
1.340
(1.471)
(1.551 SIZES 20, 22, 24)

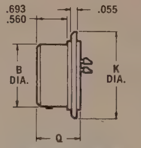
SINGLE HOLE MOUNTING RECEPTACLE



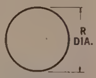
PANEL CUTOUT
.125 MAX. PANEL
THICKNESS


(1.525 SIZES 20, 22, 24)
(1.445)
1.100
F THREAD
K
DIA.

PLUG


.693
.560
.055
B
DIA.
K
DIA.
Q

HERMETIC SEAL SOLDER
FLANGE RECEPTACLE



PANEL CUTOUT
.125 MAX. PANEL
THICKNESS

Bold face in parentheses indicates Series 1-Long 100% No-Scoop Design.

DIMENSIONS

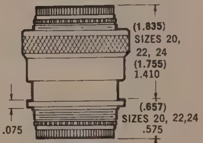
	SHELL SIZE						
	8-Standard Series 2	8-Long Series 1	10-Standard Series 2	10-Long Series 1	14-Standard Series 2	14-Long Series 1	16-Standard Series 2
B Dia. Max.	.553	.553	.678	.678	.928	.928	1.054
F Thread	½-28	½-28	⅝-28	⅝-28	⅞-28	⅞-28	1-28
G Max. Sq. Flange Recept.	.820	.820	.945	.945	1.133	1.133	1.258
G. Max. Cable Recept. Flats	.565	.565	.690	.690	.940	.940	1.066
G Max. Single Hole Mtg. Recept. & Her. Seal "D" Hole Recept.	.989	.989	1.114	1.114	1.401	1.401	1.526
H ±.005	.594	.594	.719	.719	.906	.906	.969
K Dia. Max. Cable Recept.	.780	.780	.900	.900	1.150	1.150	1.280
K Dia. Max. Single Hole Mtg. Recept. & Herm. Seal Single Hole	1.072	1.072	1.197	1.197	1.510	1.510	1.635
K Dia. Max. Plug	.850	.850	.975	.975	1.225	1.225	1.350
K Dia. Max. Herm. Seal Solder Flange Recept.	.945	.945	1.070	1.070	1.320	1.320	1.446
L ±.005	.605	.605	.730	.730	.980	.980	1.105
N Thread	⅝-20	⅝-20	¾-20	¾-20	1-20	1-20	1⅛-20
P Dia. ±.005	.635	.635	.760	.760	1.010	1.010	1.135
Q Max.	.710	.843	.710	.843	.710	.843	.710
R Dia. ±.005	.661	.661	.786	.786	1.036	1.036	1.162

	SHELL SIZE					
	16-Long Series 1	18-Standard Series 2	18-Long Series 1	20-Long Series 1	22-Long Series 1	24-Long Series 1
B Dia. Max.	1.054	1.178	1.178	1.303	1.428	1.553
F Thread	1-28	1⅛-28	1⅛-28	1¼-28	1⅜-28	1½-28
G Max. Sq. Flange Recept.	1.258	1.351	1.351	1.475	1.570	1.711
G. Max. Cable Recept. Flats	1.066	1.190	1.190	1.315	1.440	1.565
G Max. Single Hole Mtg. Recept. & Her. Seal "D" Hole Recept.	1.526	1.651	1.651	1.776	1.901	2.026
H ±.005	.969	1.062	1.062	1.156	1.250	1.375
K Dia. Max. Cable Recept.	1.280	1.400	1.400	1.525	1.650	1.775
K Dia. Max. Single Hole Mtg. Recept. & Herm. Seal Single Hole	1.635	1.745	1.745	1.870	1.995	2.120
K Dia. Max. Plug	1.350	1.475	1.475	1.624	1.749	1.874
K Dia. Max. Herm. Seal Solder Flange Recept.	1.446	1.570	1.570	1.816	1.941	2.066
L ±.005	1.105	1.230	1.230	1.355	1.480	1.605
N Thread	1⅛-20	1¼-20	1¼-20	1⅜-20	1½-20	1⅝-20
P Dia. ±.005	1.135	1.260	1.260	1.385	1.510	1.635
Q Max.	.843	.740	.873	.903	.903	.903
R Dia. ±.005	1.162	1.286	1.286	1.411	1.536	1.661

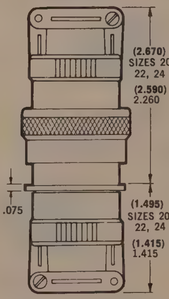
N.A. — Hermetics available only in Standard Sizes 8 through 18, Long Size 24.

Screened area indicates Series 1-Long 100% No-Scoop Design.

MATED CONNECTORS DIMENSIONS (inches)


(1.835)
SIZES 20,
22, 24
(1.755)
1.410
(.657)
SIZES 20, 22,24
.575
.075

MATED PLUG &
SQUARE FLANGE
RECEPTACLE


(2.670)
SIZES 20,
22, 24
(2.590)
2.260
.075
(1.495)
SIZES 20,
22, 24
(1.415)
1.415

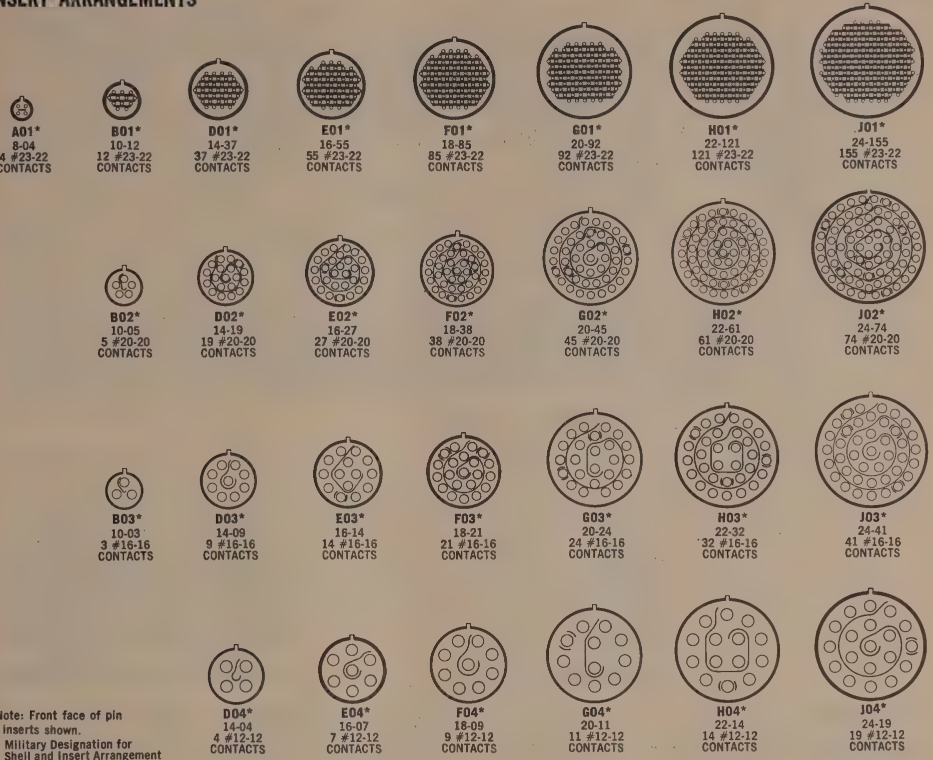
MATED PLUG & SQUARE
FLANGE RECEPTACLE
WITH CABLE SUPPORT

Bold face in parentheses indicates Series 1-Long 100% No-Scoop Design.

TRW® CINCH CONNECTORS

CINCH-NULINE ASTRO/348 HIGH DENSITY CONNECTORS (Cont'd)

INSERT ARRANGEMENTS



A01*
8-04
4 #23-22
CONTACTS

B01*
10-12
12 #23-22
CONTACTS

D01*
14-37
37 #23-22
CONTACTS

E01*
16-55
55 #23-22
CONTACTS

F01*
18-85
85 #23-22
CONTACTS

G01*
20-92
92 #23-22
CONTACTS

H01*
22-121
121 #23-22
CONTACTS

J01*
24-155
155 #23-22
CONTACTS

B02*
10-05
5 #20-20
CONTACTS

D02*
14-19
19 #20-20
CONTACTS

E02*
16-27
27 #20-20
CONTACTS

F02*
18-38
38 #20-20
CONTACTS

G02*
20-45
45 #20-20
CONTACTS

H02*
22-61
61 #20-20
CONTACTS

J02*
24-74
74 #20-20
CONTACTS

B03*
10-03
3 #16-16
CONTACTS

D03*
14-09
9 #16-16
CONTACTS

E03*
16-14
14 #16-16
CONTACTS

F03*
18-21
21 #16-16
CONTACTS

G03*
20-24
24 #16-16
CONTACTS

H03*
22-32
32 #16-16
CONTACTS

J03*
24-41
41 #16-16
CONTACTS

D04*
14-04
4 #12-12
CONTACTS

E04*
16-07
7 #12-12
CONTACTS

F04*
18-09
9 #12-12
CONTACTS

G04*
20-11
11 #12-12
CONTACTS

H04*
22-14
14 #12-12
CONTACTS

J04*
24-19
19 #12-12
CONTACTS

Note: Front face of pin inserts shown.
* Military Designation for Shell and Insert Arrangement

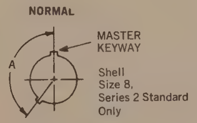
STANDARD — SERIES 2

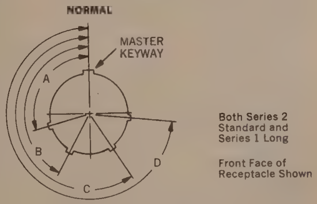
Key and Keyway Arrangement	Angular Location (All Dimensions In Degrees)								
	Shell Size 8	Shell Sizes 10, 14				Shell Sizes 16, 18			
	A	A	B	C	D	A	B	C	D
1	128	105	140	215	265	105	140	215	265
2	190	102	132	248	320	18	149	192	259
3	205	80	118	230	312	92	152	222	342
4	220	35	140	205	275	84	152	204	334
5	235	64	155	235	304	24	135	199	240
6	250	35	115	220	270	98	152	268	338

LONG — SERIES 1

Key and Keyway Arrangement	Angular Location (All Dimensions In Degrees)											
	Shell Size 8				Shell Sizes 10, 14				Shell Sizes 16, 18, 20, 22, 24			
	A	B	C	D	A	B	C	D	A	B	C	D
1	105	140	215	265	95	141	208	236	80	142	196	293
2	102	132	248	320	113	156	182	292	135	170	200	310
3	80	118	230	312	90	145	195	252	49	169	200	244
4	35	140	205	275	53	156	220	255	66	140	200	257
5	64	155	234	304	119	146	176	298	62	145	180	280
6	91	131	197	240	51	141	184	242	79	153	197	272

ALTERNATE SHELL POSITIONS

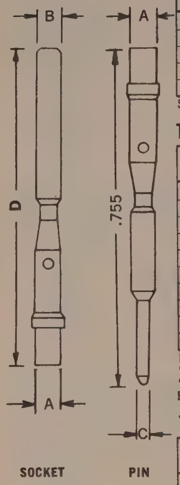



NORMAL
MASTER KEYWAY
A
B
C
D
Both Series 2 Standard and Series 1 Long
Front Face of Receptacle Shown

TRW® CINCH CONNECTORS

CINCH-NULINE ASTRO/348 HIGH DENSITY CONNECTORS (Cont'd)

CONTACTS



DIMENSIONS

Size	A. Max.		B Max.		C Max.		D Ref.		Current Rating
	Series 2	Series 1	Series 2	Series 1	Series 2	Series 1	Series 2	Series 1	
23-22	.050	.050	.051	.051	.028	.028	.718	1.048	5.0 Amps
23-28	.050	.050	.051	.051	.028	.028	.718	1.048	1.5 Amps
20-20	.078	.078	.078	.078	.041	.041	.718	1.048	7.5 Amps
16-16	.103	.103	.113	.113	.063	.063	.718	1.048	13.0 Amps
12-12	.158	.158	.161	.161	.095	.095	.718	1.048	23.0 Amps

Screened area indicates Series 1 (100% No-Scoop) Design.

TABLE OF POWER CONTACTS

Contact Size		Wire Size Accommodations	Cinch-Nuline Part No.		MS Part No.	
			Socket	Pin	Socket	Pin
23-22	Series 2	#22, #24, #26	348-100-2201S-02	348-100-2202P-02	MS90460A23-22	MS90461A23-22
23-28		#28, #30, #32	348-100-5047S-02	348-100-5047P-02	MS90460A23-28	MS90461A23-28
20-20		#20, #22, #24	348-100-2000S-02	348-100-2000P-02	MS90460A20-20	MS90461A20-20
16-16		#16, #18, #20	348-100-1600S-02	348-100-1600P-02	MS90460A16-16	MS90461A16-16
12-12		#12, #14	348-100-1200S-02	348-100-1200P-02	MS90460A12-12	MS90461A12-12
23-22	Series 1	#22, #24, #26	348-100-2203S-02	348-100-2202P-02	MS3343A23-22	MS90461A23-22
23-28		#28, #30, #32	348-100-5048S-02	348-100-5047P-02	MS3343A23-28	MS90461A23-28
20-20		#20, #22, #24	348-100-2003S-02	348-100-2000P-02	MS3343A20-20	MS90461A20-20
16-16		#16, #18, #20	348-100-1603S-02	348-100-1600P-02	MS3343A16-16	MS90461A16-16
12-12		#12, #14	348-100-1203S-02	348-100-1200P-02	MS3343A12-12	MS90461A12-12

FOR CONTACT FINISHES:
"A" 150°C. MS rating, use Cinch-Nuline P/N with .02 (see table).
"B" 200°C. MS rating, use Cinch-Nuline P/N with -03.
EXAMPLE: MS90460B23-22 is equivalent to 348-100-2201S-03.

Screened area indicates Series 1 (100% No-Scoop) Design.

TABLE OF THERMOCOUPLE CONTACTS

Contact Size		Material	Wire Size	Cinch-Nuline Part No.	
				Socket	Pin
20-20	Series 2	Leaded Copper	#20, #22, #24	348-100-5014S	348-100-5014P
	Series 1			348-100-5019S	348-100-5014P
	Series 2	Alumel		348-100-5015S	348-100-5015P
	Series 1			348-100-5020S	348-100-5015P
	Series 2	Chromel		348-100-5016S	348-100-5016P
	Series 1			348-100-5021S	348-100-5016P
	Series 2	Iron		348-100-5017S	348-100-5017P
	Series 1			348-100-5022S	348-100-5017P
	Series 2	Constantan		348-100-5018S	348-100-5018P
	Series 1			348-100-5023S	348-100-5018P

Screened area indicates Series 1 (100% No-Scoop) Design.

HOW TO ORDER

To get the specific Astro/348 Connector you want, put together the part number as per the following example:

348 - 3 0 E 18 - 85 P 1 (200)

Series Designation

Connector Type
150°C Oper. Temp.
3-Series 1 Connector
4-Series 2 Connector
200°C Oper. Temp.
5-Series 1 Connector
6-Series 2 Connector
High Fluid Resistance
7-Series 1 Connector
8-Series 2 Connector
175°C Oper. Temp.

0-Sq. Flange Recept.
1-Cable Receptacle
3-Single Hole Mtg. Recept.
5-Solder Flange Recept.
(Hermetic only)
6—Straight Plug

Class
E-Environmental
H-Hermetic
(Solder cap contacts)
P-Potting seal

Shell Size
08 10 14 16 18 20* 22* 24*
*Available only in Series 1-Long

Insert Arrangement
03 04 05 07 09 11
12 14 19 21 24 27
32 37 38 41 45 55
61 74 85 92
121 (01)* 155 (01)*

Contact Style
P-Pin
S-Socket

Alternate Shell Positions
1 Normal,
2, 3, 4, 5, 6
As per table on
Page 2•1023

Omit if no cable clamp is desired.
(200)—Connector with cable clamp.
(201)—Connector less contacts.
(207)—Connector with Fluorosilicone rubber seals and insert, Connector Types 3 & 4 only.

MIL-STD PART NO. FORMAT FOR REV. "C" CONNECTORS

Note: Under Rev. "C" of MIL-C-81511, the part numbering system has been revised to a 15 digit system to be in conformance with Defense Standardization Manual 4120-3-M.
The connector part number is put together as per the following example:

M81511 / 01 E F 01 P 1

Specification No.

Shell Style
Series 2 Connectors
/01 Sq. Flange Recept.
/02 Solder Flange Recept., Hermetic
/03 Single Hole Mtg. Recept.
/04 Single Hole Mtg. Recept., Hermetic
/05 Cable Receptacle
/06 Straight Plug
/28 Single Hole Mtg. Recept., Bulkhead Feed thru Contacts, Hermetic
/31 Square Flange Recept., Potting Seal
/32 Single Hole Mtg. Recept., Potting Seal
/33 Cable Recept., Potting Seal
/34 Straight Plug, Potting Seal
Series 1 Connectors
/21 Square Flange Recept.
/22 Solder Flange Recept., Hermetic
/23 Single Hole Mtg. Recept.
/24 Single Hole Mtg. Recept., Hermetic
/25 Cable Receptacle
/26 Straight Plug
/27 Single Hole Mtg. Recept., Bulkhead Feed thru Contacts, Hermetic
/35 Square Flange Recept., Potting Seal
/36 Single Hole Mtg. Recept., Potting Seal
/37 Cable Recept., Potting Seal
/38 Straight Plug, Potting Seal

Class
E-Grommet Seal Connectors (150°C Oper. Temp.)
F-Grommet Seal Connectors (175°C Oper. Temp.)
A-Grommet Seal Connectors (200°C Oper. Temp.)
H-Hermetic Seal Connectors (150°C Oper. Temp.)
G-Hermetic Seal Connectors (175°C Oper. Temp.)
B-Hermetic Seal Connectors (200°C Oper. Temp.)
P-Potting Seal Connectors (150°C Oper. Temp.)
T-Potting Seal Connectors (175°C Oper. Temp.)
C-Potting Seal Connectors (200°C Oper. Temp.)

Shell Size

8	10	14	16	18	20	22	24
A	B	D	E	F	G	H	J

Insert Arrangement
Code numbers coordinated with insert arrangements Page 2•1023.
Example:
F01 is 18-85 insert.

Contact
P-Pin, S-Socket,
C-Feed thru Cont.

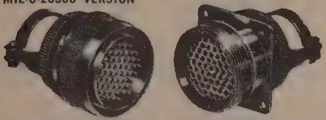
Alternate Shell Positions
1, 2, 3, 4, 5, 6
As per table on
Page 2•1023

TRW® CINCH CONNECTORS

CINCH-NULINE "OMEGA" SERIES — HIGH EFFICIENCY CIRCULAR CONNECTORS

MIL-C-26500 VERSION

HERMETICALLY SEALED RECEPTACLE


MIL-C-38300 VERSION OR "GOLDEN OMEGA"

MORE CONTACTS IN LESS SPACE

When it becomes necessary to provide connections for a large number of circuits in a limited amount of space, a CINCH-NULINE "Omega" Series High Environmental Circular Connector is your best choice. CINCH-NULINE offers a wide selection of these miniature connectors that meet and exceed the requirements of MIL-C-26500 and MIL-C-38300. They are available in a variety of constructions, including those which can be potted or are hermetically sealed. Most connectors feature MIL-C-26636 Crim-Lok contacts. Many others are available also with coaxial, shielded or thermocouple contacts.

SIGNIFICANT ADVANCE IN STATE-OF-THE-ART

On the ground or in space, wherever there is a requirement for superior environmental protection, high reliability and minimum weight and bulk, CINCH-NULINE "Omega" Series Connectors are the answer. To produce this series requires the satisfaction of many exacting requirements on reliability, logistics and present and anticipated environmental conditions. To meet these requirements, it was necessary to develop advanced design concepts, formulate materials for specific connector usage and work out new production techniques. The resulting connectors exceed the stringent requirements of MIL-C-26500 (USAF) and MIL-C-38300 (USAF) for performance and reliability.

THE "GOLDEN OMEGA" — CLOSED ENTRY & FRONT SERVICING

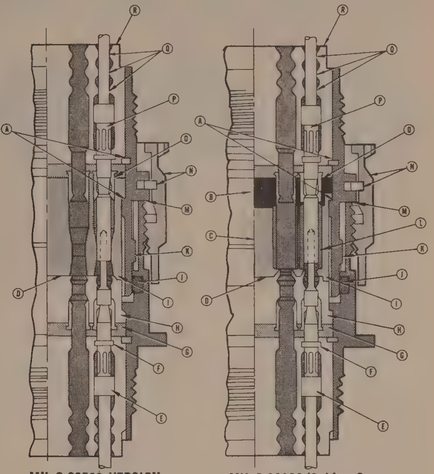
"Golden Omega" Connectors are identical to the other connectors in the "Omega" Series, except the socket inserts have a hard face of glass-filled epoxy. They are the first connectors to combine the positive reliability of closed entry with the speed and convenience of front servicing. In addition, the MIL-C-26636 contacts are tamper proof. Wrong-size contacts or oversize test prods cannot be inserted in the hard dielectric contact entry-ways on the socket inserts.

COMPLETE ENVIRONMENTAL SEALING

CINCH-NULINE "Omega" Series Connectors are fully sealed against extreme environmental conditions. Silicone rubber dielectric provides resilience and unsurpassed resistance to tear, compression set, fluids and high temperatures.

When the connectors are mated, insert faces compress to form a resilient dielectric seal around each individual contact. A continuous barrier on the periphery of the socket insert mates with a recess around the pin insert to form an additional compression seal. A dynamic "O" ring seal between mated shells constitutes still another barrier to dirt and moisture, and protects the integrity of the face seals. Together with monoblock construction, this puts void-free, continuous dielectric around each contact through the entire connector length.

Monoblock construction, with bonded interfaces between the dielectric components (insert, anti-deflection disc, and grommet) eliminates air voids and protects connectors from degrading moisture and altitude conditions. A pressurizing seal around each contact at the major O.D. prevents the passage of air or moisture through the contact hole, and triple sealing riser design at each wire hole in the grommet seals each individual wire.



MIL-C-26500 VERSION

MIL-C-38300/Golden Omega

A. Positive Location Captivated Insert (Mechanical Interlock)
B. Resilient Rear Insert (Only on MIL-C-38300 Version)
C. Closed Entry Hard Dielectric Front Insert (Only on MIL-C-38300 Version)
D. Insert Static Face Seal
E. Pin Contact, MIL-C-26636
F. Contact Pressurizing Seal
G. Anti-Deflection Disc
H. Resilient Pin Insert
I. Insert Rim Seal
J. Dynamic "O" Ring Shell Seal
K. Five Key Shell Polarization
L. Releasing Sleeve
M. Metal to Metal Shoulder
N. Bayonet or Threaded Coupling, Permanent Captivation
O. Contact Retention Clip
P. Socket Contact, MIL-C-26636
Q. Wire Sealing Risers
R. Grommet

WIDE VARIETY OF CONFIGURATIONS

Detailed information on configurations available, shell sizes, dimensions and data on how to order are given on the following pages.

GO/NO-GO RELIABILITY

When a "Golden Omega" connector is mated, you can be sure there is proper contact. The socket contacts are closely surrounded by hard dielectric with a chamfered entry to guide in the pins accurately. However, if the pins are bent, the hard dielectric presents a closed entry and prevents mating.

LIGHTWEIGHT & HIGH CONTACT DENSITY

Connector shells are impact-extruded aluminum forgings with a high strength-to-weight ratio. The insert arrangement is designed for the maximum number of contacts within the area available.

CRIM-LOK CONTACTS

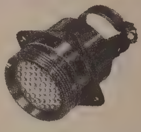
Crim-Lok contacts (front release, rear insertable) provide for easy servicing of connector circuits without disassembling the connector from its mounting, or disturbing adjacent contacts. MIL-C-26636 contacts are crimped quickly, consistently, and reliably with either hand or power tools. They have high electrical conductivity, present a smooth configuration, and completely protect electrical contact pressure-members from environmental and handling damage. The contacts come in sizes 20, 16, 12, and shielded coaxial, with rhodium-over-silver plating. (Other platings such as gold are available; write factory for details.)

TRW® CINCH CONNECTORS

CINCH-NULINE "OMEGA" SERIES — HIGH EFFICIENCY CIRCULAR CONNECTORS (Cont'd)

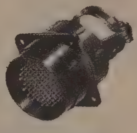
ALTERNATE SHELL POSITIONS

THREADED PLUG


THREADED SQUARE FLANGE RECEPTACLE

THREADED SINGLE HOLE MOUNTING RECEPTACLE

BAYONET PLUG


BAYONET SQUARE FLANGE RECEPTACLE

BAYONET SINGLE HOLE MOUNTING RECEPTACLE

FOR CONNECTORS SIZE 10

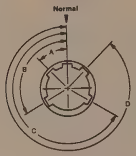
(All Dimensions In Degrees)

Position	A	B	C	D
Normal	105	140	215	265
6	102	132	248	320
7	80	118	230	312
8	35	140	205	275
9	64	155	234	304
10	25	115	220	270

FOR CONNECTORS SIZE 12, 14, 16, 18, 20, 22, 24

(All Dimensions In Degrees)

Position	A	B	C	D
Normal	105	140	215	265
6	18	149	192	259
7	92	152	222	342
8	84	152	204	334
9	24	135	199	240
10	98	152	268	338

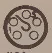


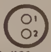
FRONT FACE OF RECEPTACLE SHOWN

Note: Alternate positions 6 thru 10 incorporate special shell polarizing key and keyways. All inserts remain in normal position.

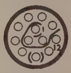
INSERTS AVAILABLE — (Showing front face of socket insert)

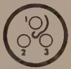
SHELL SIZE 10 — MS-24260


5 #20
5 CONTACTS*

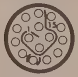

2 #20
2 CONTACTS**

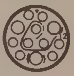
SHELL SIZE 12 — MS-24260

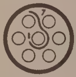

12 #20
12 CONTACTS*

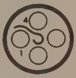

3 #16
3 CONTACTS*

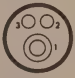
SHELL SIZE 14 — MS-24260


15 #20
15 CONTACTS*

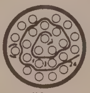

9 #20
3 #16
12 CONTACTS**

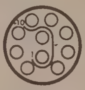

7 #16
7 CONTACTS*


4 #12
4 CONTACTS*

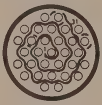

2 #16
1 #2
3 CONTACTS

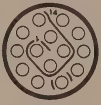
SHELL SIZE 16 — MS-24261

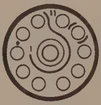

24 #20
24 CONTACTS*

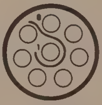

10 #16
10 CONTACTS**

SHELL SIZE 18 — MS-24262


31 #20
31 CONTACTS*


14 #16
14 CONTACTS*

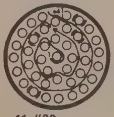

10 #16
1 #2
11 CONTACTS

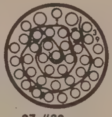

8 #12
8 CONTACTS

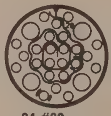
SPECIFICATIONS

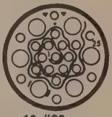
Contact Size	Rated Amps	for AWG Wire Size	Insulation Max.	O.D. Min.
20	7.5	24-22-20	.090	.040
16	20.	18-16	.130	.064
12	35.	14-12	.170	.106
#2 Shielded	7.5	Shielded Cable Size 20 per MIL-C-7078. Type II		

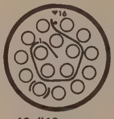
SHELL SIZE 20


41 #20
41 CONTACTS* **


37 #20
2 #16
39 CONTACTS**


24 #20
4 #12
28 CONTACTS**


19 #20
6 #12
25 CONTACTS**

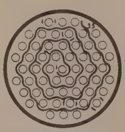

16 #16
16 CONTACTS**

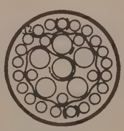
*Available with hard-dielectric face socket inserts for "Golden Omega" (MIL-C-38300) connectors.

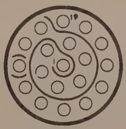
Pin inserts for MIL-C-38300 connectors have a resilient face and, except for marking, are identical to MIL-C-26500 pin inserts.

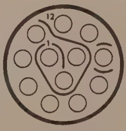
**Not included in MS24260 at time of printing.

SHELL SIZE 22 — MS-24263

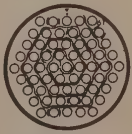

55 #20
55 CONTACTS*


26 #20
6 #12
32 CONTACTS**


19 #16
19 CONTACTS*


12 #12
12 CONTACTS

SHELL SIZE 24

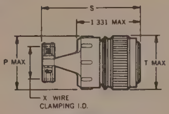

61 #20
61 CONTACTS* **

TRW® CINCH CONNECTORS

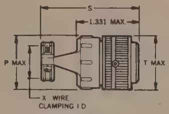
CINCH-NULINE "OMEGA" SERIES — HIGH EFFICIENCY CIRCULAR CONNECTORS (Cont'd)

DIMENSIONS

PLUGS


S
1.331 MAX
P MAX
T MAX
X WIRE CLAMPING I.D.

THREADED PLUG
48-06RXX-XXX
MS24266RXXT-XXX

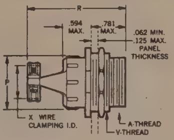

S
1.331 MAX
P MAX
T MAX
X WIRE CLAMPING I.D.

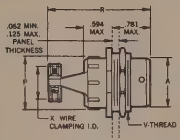
BAYONET PLUG
48-16RXX-XXX
MS24266RXXB-XXX

Shell Size	P Max. Thread & Bayonet	T Max. Thread	T Max. Bayonet	X ±.015	S
10	.914	.836	.906	.270	1.832
12	1.026	1.025	1.078	.400	1.832
14	1.090	1.125	1.141	.460	2.067
16	1.250	1.250	1.265	.610	2.067
18	1.358	1.375	1.375	.690	2.067
22	1.604	1.625	1.625	.940	2.067

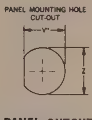
SINGLE HOLE MOUNTING RECEPTACLES

THREADED RECEPTACLE
48-03RXX-XXX
MS24265RXXT-XXX

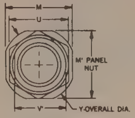

R
.594 MAX.
.781 MAX.
.062 MIN. .125 MAX. PANEL THICKNESS
P
X WIRE CLAMPING I.D.
A-THREAD
V-THREAD


R
.062 MIN. .125 MAX. PANEL THICKNESS
.594 MAX
.781 MAX.
P
A
X WIRE CLAMPING I.D.
V-THREAD

BAYONET RECEPTACLE
48-13RXX-XXX
MS24265RXXB-XXX


PANEL MOUNTING HOLE CUT-OUT
V''
Z

PANEL CUTOUT


M
U
M' PANEL NUT
V'
Y-OVERALL DIA.

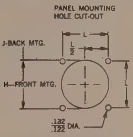
FLANGE AND NUT

BOTH THREADED & BAYONET RECEPTACLES

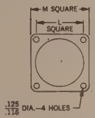
Shell Size	A Th'd	A +.000 −.003	M Max.	M' Max.	P Max.	U Max.	V Th'd	V' ±.003	V'' ±.005	X ±.015	Y Max.	Z ±.005	R Max.
10	11/16-24	.659	1.109	1.075	.914	.953	3/4-20	.718	.730	.270	1.192	.760	1.890
12	7/8-20	.829	1.296	1.292	1.026	1.140	15/16-20	.905	.917	.400	1.380	.947	1.890
14	15/16-20	.898	1.396	1.396	1.090	1.205	1-20	.968	.980	.460	1.505	1.010	2.125
16	1 1/16-18	1.025	1.521	1.521	1.250	1.329	1 1/8-20	1.093	1.105	.610	1.630	1.135	2.125
18	1 3/16-18	1.131	1.646	1.646	1.358	1.455	1 1/4-20	1.217	1.225	.690	1.740	1.260	2.125
22	1 7/16-18	1.381	1.959	1.959	1.604	1.705	1 1/2-20	1.467	1.475	.940	2.040	1.510	2.125

(DIMENSIONS (Inches))

SQUARE FLANGE RECEPTACLES

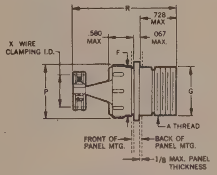

PANEL MOUNTING HOLE CUT-OUT
J-BACK MTG.
H—FRONT MTG.
L
.132/.122 DIA.

PANEL CUTOUT

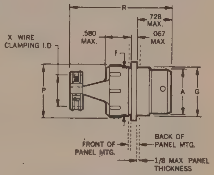

M SQUARE
L SQUARE
.125/.115 DIA.—4 HOLES

FLANGE

BOTH THREADED & BAYONET RECEPTACLES


R
.728 MAX
.580 MAX
.067 MAX.
X WIRE CLAMPING I.D.
F
P
G
A THREAD
FRONT OF PANEL MTG.
BACK OF PANEL MTG.
1/8 MAX. PANEL THICKNESS

THREADED RECEPTACLE
48-00RXX-XXX
MS24264RXXT-XXX

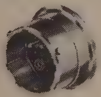

R
.728 MAX.
.580 MAX.
.067 MAX
X WIRE CLAMPING I.D
F
P
A
G
FRONT OF PANEL MTG.
BACK OF PANEL MTG.
1/8 MAX PANEL THICKNESS

BAYONET RECEPTACLE
48-10RXX-XXX
MS24264RXXB-XXX

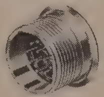
Shell Size	A Th'd	A +.000 −.003	F Max.	G Max.	H Min.	J Min.	L ±.005	M ±.005	P Max.	X ±.015	R Max.
10	11/16-24	.659	.562	.696	.572	.748	.719	.937	.914	.270	1.890
12	7/8-20	.829	.750	.875	.760	.913	.812	1.031	1.026	.400	1.890
14	15/16-20	.898	.812	.935	.822	.980	.906	1.125	1.090	.460	2.125
16	1 1/16-18	1.025	.938	1.062	.948	1.107	.969	1.250	1.250	.610	2.125
18	1 3/16-18	1.131	1.062	1.187	1.072	1.209	1.062	1.343	1.358	.690	2.125
22	1 7/16-18	1.381	1.312	1.437	1.322	1.452	1.250	1.562	1.604	.940	2.125

(DIMENSIONS (Inches))

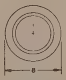
SOLDER FLANGE HERMETIC RECEPTACLES



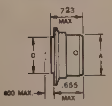
BAYONET



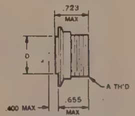
THREADED



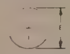
FLANGE
Both Threaded &
Bayonet Receptacles


.723 MAX
D
A
.400 MAX
.655 MAX

48-15HXX-XXP
MS27034HXX-XXP


.723 MAX
D
A TH'D
.400 MAX
.655 MAX

48-05HXX-XXP
MS27034HXXT-XXP



PANEL CUTOUT
Both Threaded &
Bayonet Receptacles

Shell Size	+.004 −.000	A Th'd	B Max.	D Max.	+.010 −.000 E
10	.659	11/16-24	.855	.557	.567
12	.829	7/8-20	1.050	.745	.755
14	.898	15/16-20	1.105	.807	.817
16	1.025	1 1/16-18	1.225	.933	.942
18	1.131	1 3/16-18	1.355	1.057	1.067
22	1.381	1 7/16-18	1.605	1.307	1.317

(DIMENSIONS (Inches))

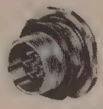
Write factory for information on Sizes 20 and 24.

TRW® CINCH CONNECTORS

CINCH-NULINE "OMEGA" SERIES — HIGH EFFICIENCY CIRCULAR CONNECTORS (Cont'd)

HERMETIC RECEPTACLES

SINGLE HOLE MOUNTING HERMETIC RECEPTACLES

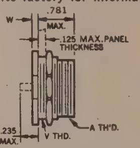


THREADED

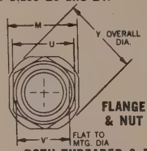
BAYONET

Shell Size	DIMENSIONS (Inches)									
	A +.004 −.000	A Th'd	Y Max.	M Max.	U Max.	V Th'd	V′ ±.003	V″ ±.005	W Max.	Z ±.005
10	.659	11/16-24	1.190	1.107	.953	¾-20	.718	.730	.135	.760
12	.829	⅞-20	1.380	1.294	1.140	15/16-20	.905	.917	.135	.947
14	.898	15/16-20	1.505	1.394	1.205	1-20	.968	.980	.135	1.010
16	1.025	1 1/16-18	1.630	1.519	1.329	1⅛-20	1.093	1.105	.135	1.135
18	1.131	1 3/16-18	1.740	1.644	1.455	1¼-20	1.217	1.225	.135	1.260
22	1.381	1 7/16-18	2.040	1.957	1.705	1½-20	1.467	1.475	.135	1.510

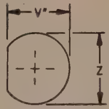
Write factory for information on Sizes 20 and 24.



48-03HX-XXX
MS24265HXXT-XXX

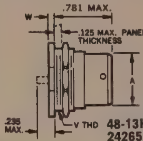


FLANGE & NUT



PANEL CUTOUT

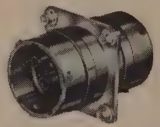
BOTH THREADED & BAYONET RECEPTACLES



48-13HXX-XXX
24265HXXB-XXX

48-7005 HERMETICALLY SEALED RECEPTACLE

- Hermetically sealed, feed-through connector.
- Has two #16 pin contacts, one shielded socket contact.
- Has bayonet coupling, mates with 48-16R14-3S or 48-16R14-2/1S.
- Offers all features of MIL-C-26500B(USAF) including continuous operation at 200°C; metal-to-metal bottoming of mated shells; interfacial insert seal, insert rim seal, and dynamic O ring between shells; visual full engagement indicators for mating; and five polarizing keys in alternate positions to prevent mismating.



HOW TO ORDER

To get the specific "Omega" Series Connector you want, put together the part number as per the following typical example. (Remember, of course, that only the inserts shown on Page 2•1026 are available.)

48 - 0 6 R 22 - 55 P 6 - (102)

Series Designation
48—

Coupling Type
0-Threaded
1-Bayonet

Shell Style
0-Square Flange Receptacle
3-Single Hole Mounting Receptacle¶
5-Solder Flange Mounting Receptacle¶
6-Straight Plug

Environmental Class
R-Meets MIL-C-26500(USAF)
C-Meets MIL-C-38300(USAF)*
H-Hermetically Sealed¶

Shell Size
10 12 14 16 18 20 22 24

See Table of available inserts on Page 2•1026

Number of Contacts
2 3 4 5 7 8 11 12
14 15 19 24 31 55 61

Contact Style
P-Pin, S-Socket

Alternate Shell Positions as per Table on Page 2•1026
(Omit for normal position)

Deviations
(100)—
Connector for Potting
(102)—
Connector Less Cable Support
(105)—
Connector Less Contacts
(106)—
Connector Less Contacts & Less Cable Support
(107)—
Shell Assembly — Less Insert Assembly
(108)—
Hermetic Receptacle with Solder Cup Contact
(113)—
Gold Iridite Finish on Shell & Grommet Nut & Less Cable Support
(114)—
Gold Iridite Finish on Shell & Grommet Nut & Less Cable Support & Contacts
(117)—
Hermetic with Solder Flowed on Mounting Flange Surface (48-15HXX-XX and 05HXX-XX)
(118)—
(108) & (117) Combined
(145)—
MIL-C-38300 Contact Style "P" Only

MIL. STANDARD PART NUMBERS

You can use MS as well as CINCH-NULINE part numbers in ordering "Omega" Series Connectors. The MS part numbers for MIL-C-26500 Connectors are worked out on the basis shown in the table below. Whether you order by the MS or the "Omega" Series Number, all qualified connectors are shipped with the MS marking.

The part numbers for MIL-C-38300 Connectors start off with the identification M38300/ and take the form M38300/XXXX-XX. To determine the specific M numbers, refer to military specifications MIL-C-38300.

MS24266 R 22 T 55 P 6 X

MS Shell Drawing
MS24264—
Sq. Flange Recept.
MS24265—
Single Hole Mtg. Receptacle¶
MS24266—
Straight Plug
MS27034—
Solder Flange Mtg. Receptacle
(Hermetic only)

Environmental Class
R-Meets MIL-C-26500 (USAF)
H-Hermetically Sealed¶

Shell Size
10 12 14 16 18 22

Coupling Type
T-Threaded, B-Bayonet

Cable Support
X-Less Cable Support
(Omit if cable support is desired)

Alternate Shell Positions as per Table on Page 2•1026
(Omit for normal position)

Contact Style
P-Pin, S-Socket

Number of Contacts
3 4 5 7 8 11 12 14 15 19 24 31 55

¶Hermetics are available in receptacle Shell Style "X3" (MS24265) and "X5" (MS27034).
*MIL-C-38300 Connectors are furnished without cable clamp. If a cable support is desired, it must be ordered separately.

TRW® CINCH CONNECTORS

CINCH-NULINE "OMEGA" SERIES

CRIM-LOK CONTACTS & SEALING PLUGS

MIL-C-26636 CONTACTS

When you order "Omega" Series Connectors with contacts, the contact package contains an extra 10% spares (or at least 3 extra contacts). The package also includes 15% as many sealing plugs as contacts (or at least 5 sealing plugs).
To order contacts and sealing plugs separately use the part numbers in the table at right. (The contacts, of course, are MIL-C-26636 contacts.) Contacts may also be ordered in reels for use with automatic crimping tools.

CONTACT DATA

Contact Size	Max. Current Rating	Wire Size	CINCH-NULINE Part No.		MS Part No.	
			Pin	Socket	Pin	Socket
No. 20	7.5 Amps	24-22-20 AWG	48-1595-02	48-100-2000S-02	MS24254-20P	MS24255-20S
No. 16	22 Amps	18-16 AWG	48-1825-02	48-100-1600S-02	MS24254-16P	MS24255-16S
No. 12	41 Amps	14-12 AWG	48-1827-02	48-1215-02	MS24254-12P	MS24255-12S
No. 1* (Shielded)	3 Amps	RG179/U, 179A/U, 187/U, 188/U, 161/U	48-1226-50	48-1227-50	—	—
No. 2** (Shielded)	7.5 Amps	RG195/U	48-2187-50	48-2188-50	—	—
No. 2** (Shielded)	7.5 Amps	—	48-2187-02	48-2188-02	MS27184	MS21785

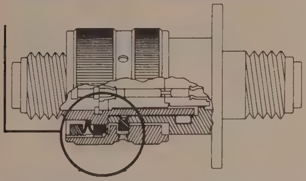
*Cables RG178/U, RG178A/U, and RG196/U can be accommodated with modification to shielded contacts.
**AWG 18, 20, and 22 shielded wire per MIL-C-7078 Type II or MIL-C-27500 (USAF) can be accommodated with modification to shielded contacts.
***MS numbers represent similar type contacts, pending qualification of CINCH-NULINE part numbers.

GROMMET SEALING PLUGS

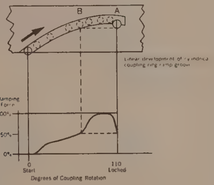
Color Code	Size	CINCH-NULINE Part No.	MS Part No.
Yellow	12	48-2221-12	MS27187-2
Blue	16	48-2221-16	MS27187-1

Color Code	Size	CINCH-NULINE Part No.	MS Part No.
Red	20	48-2221-20	MS27186-1
White	#2 Shielded	48-1458	MS25251-8

CINCH-NULINE MMB SERIES



The detent locking function is contained in this area and isolated from the mechanism which locks the connectors together.
Patent Numbers: 3,805,379, 3,750,087



CONTACTS

When you order connectors with contacts, the contact package contains enough contacts to complete the insert arrangement and have 2 spares left. The package also includes enough sealing plugs for at least 15% of the contacts in the insert, in any case a minimum of 3 sealing plugs. To provide proper sealing, insert unwired contacts and sealing plugs in all unused holes. (Use a #12 contact for a #1 shielded hole.) To order contacts and sealing plugs separately use the part numbers in the table at right. Contacts may also be ordered in reels for use with automatic crimping tools.

GROMMET SEALING PLUGS

Color Code	Size	TRW/Cinch Part No.	MS Part No.
Yellow	12 & #1 Shielded	C48-2221-12	MS27187-2
Blue	16	C48-2221-16	MS27187-1
Red	20	C48-2221-20	MS27186-1
White	#2 Shielded	C48-1458-01	—

- **The convenience of bayonet coupling.**
- **The rigidity of screw type coupling**

Severe vibration, such as that which occasionally occurs in airborne equipment, can cause a high rate of early failure in connectors. This is especially true of the bayonet type of coupling connectors. To overcome this problem, aircraft manufacturers put out a call for connector manufacturers to design a more vibration-proof model, within definite limits.

Realizing that a new type of connector could cost more per unit than the failure-prone type, the aircraft companies stipulated that the increased costs should be justified by reduced maintenance cost and lower air traffic revenue losses caused by excessive downtime. Also, to prevent a complete re-engineering of the present connection systems used in airplanes, the new design would have to:

1. Mate with the standard MIL-C-26500 and MIL-C-83723 bayonet receptacle presently used on the aircraft.
2. Use standard contacts.
3. Use standard crimping, insertion and removal tools.
4. Withstand vibration and shock equivalent to the capability of thread-coupled connectors locked up metal-to-metal.

To meet the challenging conditions imposed by the aircraft manufacturers, TRW/Cinch NuLine engineers decided to approach the development of a new design based on an analysis of the failure-modes of the present connector system.

Critical analysis of the connector needing improvement revealed that a vibration envelope induced forces on the connector that resulted in a wear producing relative motion between the plug and its mating receptacle.

Further analysis of the connector design disclosed that the "relative motion" was due to the unloading effect on the clamping force when the bayonet dropped into its detent in the coupling ring ramp.

Contact Size	Wire Size AWG	Max. Current Rating Amps	TRW/Cinch Part No.		MS Part No.		Crimping Tool	Bushing (Positioner)	Crimp Jaw Setting Dia. (Insp.)	Insertion Tool	Removal Tool
			Pin	Socket	Pin	Socket					Standard Connector
No. 20	24 22 20	3.0 5.0 7.5			MS24254-20P	MS24255-20S	294-126 294-186 294-243 294-293 294-358 294-506	Included 294-1266 Turret Hd. Turret Hd. 294-444 Automatic	.031-.041 .031-.041 .031-.041	294-88 (MS24256A20) 94 294-213	294-89 (MS524256R20)
No. 16	18 16	16 22			MS24254-16P	MS24255-16S	294-126 294-243 294-293 294-358 294-506	Included Turret Hd. Turret Hd. 294-901 Automatic	.041-.053 .041-.053	294-96 (MS24256A16)	294-97 (MS24256R16)
No. 12	14 12	32 41			MS24254-12P	MS24255-12S	294-86 294-126 294-243 294-293 294-358 294-506	294-903 Included Turret Hd. Turret Hd. 294-903 Automatic	.0625 .062-.072 .062-.072	294-72 (MS2425BA12)	294-73 (MS24256R12)
No. 1* (Shielded)	** **** *****	3 1 1	C48-1226-02 C48-1226-54 C48-1226-55	C48-1227-02 C48-1227-54 C48-1227-55			294-289	294-1631		294-72† (MS24256A12)	294-73† (S24256R12)
No. 2 (Shielded)	***	7.5	C48-2187-02	C48-2188-02			294-358	294-1015		294-128†	294-127†

*Replaces No. 12 power contact.
**Accommodates Cables RG174/U, RG179/U, RG179A/U, RG187/Y, RG188/U, and RG161/U as well as shielded wire. Can also accommodate Cable MIL-C-27500-22 K1N6 (Extruded) or 22 AWG per MIL-C-7078 Type II.
***Accommodates Cable MIL-C-27500-22 K1N6; 20 K1N6; 18 K1N6 (Extruded) or 22, 20, 18 AWG, per MIL-C-7078 Type II.
****For use with RG195/U, RG180/U, RG180A/U, and RG180B/U.
*****Accommodates Cables RG178/U, RG178A/U, RG178B/U, and RG196/U.
†These tools are applicable to all #1 or #2 shielded contacts, respectively, not just contacts listed here.

TRW® CINCH CONNECTORS

CINCH-NULINE MMB SERIES (Cont'd)

INSERTS

SHELL SIZE 8 — MS27561

2 #20 CONTACTS
INSERT 8-2

3 #20 CONTACTS
INSERT 8-3

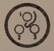
SHELL SIZE 10 — MS24260

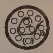
2 #20 CONTACTS
INSERT 10-2

2 #16 CONTACTS
INSERT 10-20

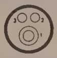
5 #20 CONTACTS
INSERT 10-5

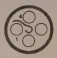
SHELL SIZE 12 — MS24260

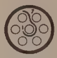

3 #16 CONTACTS
INSERT 12-3

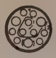

12 #20 CONTACTS
INSERT 12-12

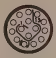
SHELL SIZE 14 — MS24260


2 #16 CONTACTS
1 #2 SHIELDED CONTACT
INSERT 14-3

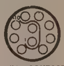

4 #12 CONTACTS
INSERT 14-4

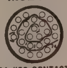

7 #16 CONTACTS
INSERT 14-7


9 #20 CONTACTS
3 #16 CONTACTS
INSERT 14-12

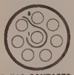

15 #20 CONTACTS
INSERT 14-15

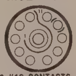
SHELL SIZE 16 — MS24261

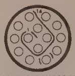

10 #16 CONTACTS
INSERT 16-10

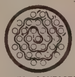

24 #20 CONTACTS
INSERT 16-24

SHELL SIZE 18 — MS24262

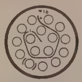

8 #12 CONTACTS
INSERT 18-8

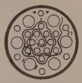

10 #16 CONTACTS
1 #2 SHIELDED CONTACT
INSERT 18-11

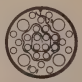

14 #16 CONTACTS
INSERT 18-14

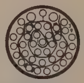

31 #20 CONTACTS
INSERT 18-31

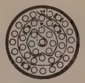
SHELL SIZE 20 — MS27561


16 #16 CONTACTS
INSERT 20-16

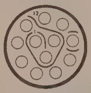

19 #20 CONTACTS
6 #12 CONTACTS
INSERT 20-25

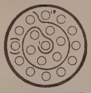

24 #20 CONTACTS
4 #12 CONTACTS
INSERT 20-28

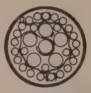

37 #20 CONTACTS
2 #16 CONTACTS
INSERT 20-39

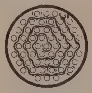

41 #20 CONTACTS
INSERT 20-41

SHELL SIZE 22 — MS24263

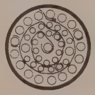

12 #12 CONTACTS
INSERT 22-12

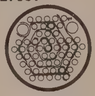

19 #16 CONTACTS
INSERT 22-19


26 #20 CONTACTS
6 #12 CONTACTS
INSERT 22-32


55 #20 CONTACTS
INSERT 22-55

SHELL SIZE 24 — MS27561


23 #20 CONTACTS
20 #16 CONTACTS
INSERT 24-43


2 #12 CONTACTS
55 #20 CONTACTS
INSERT 24-57

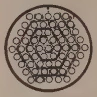

61 #20 CONTACTS
INSERT 24-61

TABLE I

Shell and Insert	Shell Size	Contacts	Drawing
08-02	8	2 #20	MS27561
08-03	8	3 #20	MS27561
10-02	10	2 #20	MS24260
10-05	10	5 #20	MS24260
10-20	10	2 #16	MS24260
12-03	12	3 #16	MS24260
12-12	12	12 #20	MS24260
14-03	14	2 #16	MS24260
		1 #2 Coax	
14-04	14	4 #12	MS24260
14-07	14	7 #16	MS24260
14-12	14	9 #20	MS24260
		3 #16	
14-15	14	15 #20	MS24260
16-10	16	10 #16	MS24261
16-24	16	24 #20	MS24261
18-08	18	8 #12	MS24262
18-11	18	10 #16	MS24262
		1 #2 Coax	
18-14	18	14 #16	MS24262
18-31	18	31 #20	MS24262
20-16	20	16 #16	MS27561
20-25	20	19 #20	MS27561
		6 #12	
20-28	20	24 #20	MS27561
		4 #12	
20-39	20	37 #20	MS27561
		2 #16	
20-41	20	41 #20	MS27561
22-12	22	12 #12	MS24263
22-19	22	19 #16	MS24263
22-32	22	26 #20	MS24263
		6 #12	
22-55	22	55 #20	MS24263
24-43	24	23 #20	MS27561
		20 #16	
24-57	24	55 #20	MS27561
		2 #12	
24-61	24	61 #20	MS27561

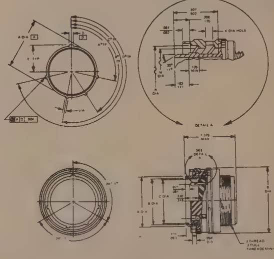


TABLE II

Shell Size	A +.000 −.005	B Min.	C Max.	D +.003	E +.000 −.003	J (3 Full Threads Min.)	K Min.	M +.005 −.000	R Min.	S Max.	V +.003
8	.424	.352	.312	.084	.234	7⁄16-28 UNEF-2A	.079	.539	.632	.766	.042
10	.526	.428	.388	.084	.285	9⁄16-24 UNEF-2A	.094	.662	.760	.906	.052
12	.696	.598	.558	.084	.370	3/4-20 UNEF-2A	.094	.832	.930	1.078	.052
14	.765	.667	.627	.084	.405	13⁄16-20 UNEF-2A	.094	.901	.999	1.141	.052
16	.892	.794	.754	.115	.468	15⁄16-20 UNEF-2A	.094	1.028	1.126	1.266	.052
18	.998	.900	.860	.115	.521	1 1⁄16-18 UNEF-2A	.094	1.134	1.232	1.375	.052
20	1.123	1.025	.985	.115	.583	1 3⁄16-18 UNEF-2A	.094	1.261	1.357	1.510	.052
22	1.248	1.150	1.110	.115	.646	1 5⁄16-18 UNEF-2A	.094	1.384	1.482	1.625	.052
24	1.373	1.275	1.235	.115	.708	1 7⁄16-18 UNEF-2A	.094	1.511	1.607	1.760	.052

TABLE III — ALTERNATE SHELL KEY POSITIONS

Shell	Position	A°	B°	C°	D°
8 and 10	Normal	105	140	215	265
	6	102	132	248	320
	7	80	118	230	312
	8	35	140	205	275
	9	64	155	234	304
10	10	25	115	220	270
12 14 16 18 20 22 24	Normal	105	140	215	265
	6	18	149	192	259
	7	92	152	222	342
	8	84	152	204	334
	9	24	135	199	240
	10	98	152	268	338

TABLE IV
TRW/CINCH NULINE PART NO. CODE (EXAMPLE)

C0909A 10 — 05 P 8 — XXX

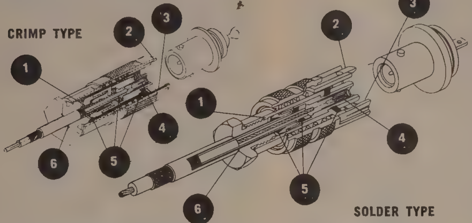
- Basic Part No.
- Shell Size (See Table I)
- Insert Arrangement (See Table I)
- P-Pin Insert, S-Socket Insert
- Alternate Shell Key Position (See Table III)
- Deviation
  - -102 Less Cable Support
  - -105 Less Contacts
  - -106 Less Contacts and Less Cable Support
  - -998 Nickel Plate per MIL-C-26074 Class 3 Grade A. .001 Min.

NOTES:
1. The C0909A-XX-XXXX-XXX complies with the requirements of TRW/Cinch Nuline PS-C0909 product specification.
2. The last three digits of the part number in Table IV are optional and denote deviations to the Standard Connector.

TRW® CINCH CONNECTORS

CINCH-NULINE NU-LOK 1200 SERIES CONNECTORS

HOW NU-LOK 1200 SERIES CRIMP & SOLDER TYPE ELECTRICAL CONNECTORS ELIMINATE THE WEAK LINKS



1 Solid, single-piece shell assures continuity of shielding circuit and eliminates intermittents. Crown contacts provide many independent points of contact.

2 Exclusive Nu-Lok bayonet locking mechanism assures positive locking of mating connectors.

3 Solid, one-piece, metal cable clamp distributes clamping stress uniformly over large area. Tightening back end nut causes beveled edge of cable clamp to cut through chevron seal, providing metal-to-metal locking of shielding to shell.

4 Closed entry socket contact prevents spreading and weakening tines due to insertion of oversize objects. Constructed of heat treated beryllium copper for ruggedness and gold plated to provide maximum electrical conductivity.

5 Maximum environmental protection provided by three moisture seals applied on non-distorted dielectrics. Nu-Lok exclusive locking mechanism assures rigid coupling of connectors and maintains front end gasket uniformly compressed at all times to exclude moisture.

6 Large radius eliminates sharp edge on back end nut, allowing maximum flexing of cable without rupturing insulation or conductors.

FAILURE-PROOF DESIGN & CONSTRUCTION

Cinch-Nuline 1200 Series Nu-Lok Connectors are miniature environment-resistant coaxial connectors designed to fully meet all requirements of Military Specification MIL-C-25516. They are available in either solder pot or crimp contact designs to accommodate conductor sizes 18 AWG or smaller, either coaxial or unshielded single conductor types. The crimp version also provides crimp termination for the cable braid.

All 1200 Series Cable Connectors are of environment-resistant construction. Bulkhead-mounted connectors are offered in conventional pressure sealed construction or true hermetic seal design with fused glass to metal seals. Hermetically sealed units are individually tested to ensure leakage of less than 1×10^{-5} cc/second of Helium at a pressure differential of one atmosphere. All units are designed for greatest ease of installation and maintenance with commonly available tools.

Center contacts of the 1200 Series Connectors are of "captive contact" design to provide electrical continuity that is completely independent of cable stability. Each center contact, both pin and socket types, is double-plated with gold over nickel. Socket contacts are chamfered to facilitate entrance of the mating contact and to minimize the possibility of contact damage during insertion or separation.

1200 Series Nu-Lok Connectors are highly corrosion-resistant. Both metallic and non-metallic connector components are resistant to hydrocarbon fuels and lubricants and sea water.

PERFORMANCE CHARACTERISTICS

ELECTRICAL

TEST	PERFORMANCE
1 Insulation Resistance (Ambient)	The insulation resistance between center contact and outer contact exceeds 5000 megohms. Between outer contact and shell, the resistance exceeds 1000 megohms.
2 Dielectric Withstanding Voltage (Sea Level)	Connectors will withstand 1500 V RMS without evidence of breakdown or leakage in excess of 0.3 ma, either mated or unmated.
3 Dielectric Withstanding Voltage (Altitude)	Mated connectors withstand 750V RMS without evidence of breakdown or leakage in excess of 0.3 ma. Unmated connectors withstand 125V RMS without breakdown or leakage in excess of 0.3 ma.
4 Contact Resistance	Center contacts in hermetic connectors do not exceed 0.4 mv at 10 ma. Other types do not exceed 0.2 mv. When tested at 7.5 amps the center contacts do not exceed 12.0 mv. Resistance for outer contacts is ¼ or less than above values.
5 Shield Clamp Resistance	The junction resistance for connectors assembled on typical 200°C cable is 10 milliohms max.
6 Impedance	Basic connector plugs and receptacles exhibit an impedance of 50 ±2 ohms.
7 Voltage Standing Wave Ratio	The VSWR of basic plugs and receptacles does not exceed 1.15:1 at frequencies up to 1 GHz.

PHYSICAL

TEST	PERFORMANCE
1 Contact Engaging & Separating Forces	The force required to engage and separate the steel test pin is within the minimum limit of 2 ozs. and the maximum limit of 12 oz.
2 Resistance to Test Probe Damage	Engagement and Separation forces for socket contact remains within the limits following the application of the weighted probe. In addition the socket will reject an oversize (0.044) pin.
3 Contact Retention	Axial displacement does not exceed 0.010" under a 10 lb. retention load.
4 Connector Endurance	There are no detrimental effects on physical or electrical performance as a result of endurance cycling.
5 Cable Retention Force	Connectors maintain electrical continuity under a 30 lb. retention load. There are no detrimental effects on physical or electrical performance as a result of the retention load. For connector assemblies using cable with a tensile strength of 33 lbs. or less, the retention load is 90% of the cable strength.

PHYSICAL (Cont'd)

TEST	PERFORMANCE
6 Side Load	Mated cabled and mounted jacks withstand a side load of 30 lbs. without detrimental effects to physical or electrical performance. Uncabled adaptors withstand 25 lbs.
7 Hermetic Seal	The leak rate of hermetic sealed connectors does not exceed 1×10^{-5} cc/second of helium.
8 Altitude Humidity (Leak Integrity)	Hermetic sealed connectors show no evidence of fluid leakage as a result of, or during 10 cycles of pressure cycling at room temperature and −54°C. The 5 lb. tensile load causes no leakage of fluid.
9 Shock	The connectors maintain electrical and leak integrity as well as remain fully operational following the test. Circuit continuity remains intact with no interruptions greater than 10 microsec.
10 Vibration	The connectors maintain electrical and seal integrity as well as remain fully operational following the test. Circuit continuity remains intact with no interruptions greater than 10 microsec.
11 Sulphide Immersion	Visual examinations indicate no detrimental effects to the plating on functional surfaces.

ENVIRONMENTAL

TEST	PERFORMANCE
1 Thermal Shock	The connectors maintain electrical and leak integrity as well as remain fully operational following the thermal shock.
2 High Temperature	The insulation resistance values remain above 1000 megohms for center contact to outer contact measurements. Outer insulators for triaxial connectors remain above 400 megohms. Contact resistance values remain below 23 millivolts at 7.5 amps and 0.8 millivolts at 10 milliamps.
3 Fluid Immersion	The connectors maintain electrical integrity and remain operational following the fluid immersion. There is no detrimental change in connector piece parts as a result of immersion in the specified fluids.
4 Altitude Humidity (Electrical Integrity)	The insulation resistance remains above 200 megohms through 10 altitude humidity cycles.
5 Ozone	The ozone exposure cause no detrimental effects to the connector.
6 Corrosion Resistance	Connectors and contacts maintain electrical integrity and remain operational following the salt spray exposure. No detrimental exposure of base metal is experienced.

TI's GOLDEN RULE: NO GOLD ADDERS.

A lot of manufacturers give you a little something extra when they sell you gold sockets.

It's called a gold adder. And it can cost you a lot of extra money.

Not so with TI.

TI has a policy of no gold adder. So when you order low profile solder tail sockets from us, the price we quote is the price you pay.

No matter what the cost of gold.

That's what you **don't** get from TI. Here's what you **do** get.

- 100 microinch wrought gold contact surfaces for maximum reliability, serviceability, and longevity.
- Universal mounting and packaging.
- Stand-off tabs on the base for solder flush.
- Redundant contact points for low contact resistance, high reliability, and repetitive insertion.
- An anti-wicking wafer for better wave soldering.
- And a price that even competes with many tin-plated sockets.

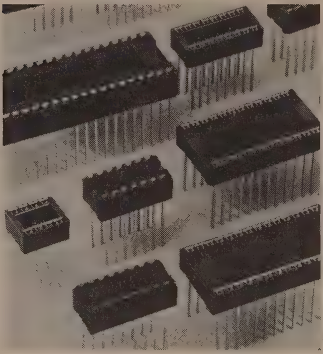
We have a whole family of gold, low profile DIP sockets to choose from—all the way from 8 pins to 40 pins.

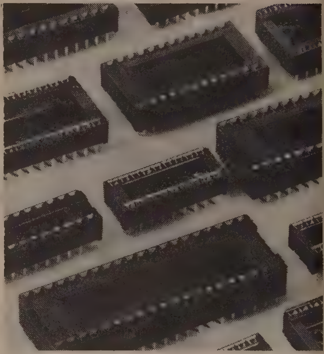
But if gold is a little rich for your needs, we offer an identical family of sockets with a tough 200-400 microinch plating of tin.

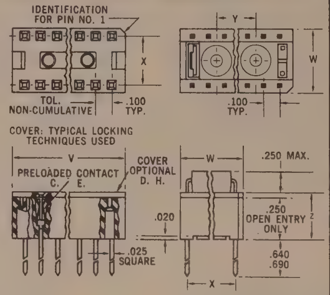
For literature, write Texas Instruments, Mail Station 10-5, Attleboro, Mass. 02703. For the name of your nearest distributor, or for information on our custom connectors, call Connector Systems Marketing,
(617) 222-2800,
Ext. 268 or 7216.

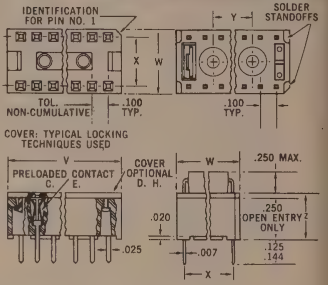
TEXAS INSTRUMENTS
INCORPORATED

STANDARD DIP SOCKETS






IDENTIFICATION FOR PIN NO. 1
X
TOL. NON-CUMULATIVE
.100 TYP.
Y
W
.100 TYP.
COVER: TYPICAL LOCKING TECHNIQUES USED
V
PRELOADED CONTACT C. E.
COVER OPTIONAL D. H.
W
.250 MAX.
.020
.250 OPEN ENTRY ONLY
Z
.025 SQUARE
.640
.690
X

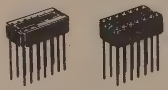

IDENTIFICATION FOR PIN NO. 1
X
W
TOL. NON-CUMULATIVE
.100 TYP.
Y
SOLDER STANDOFFS
.100 TYP.
COVER: TYPICAL LOCKING TECHNIQUES USED
V
PRELOADED CONTACT C. E.
COVER OPTIONAL D. H.
W
.250 MAX.
.020
.250 OPEN ENTRY ONLY
Z
.025
.007
.125
.144
X

	8 Pin	14 Pin	16 Pin	18 Pin	24 Pin	28 Pin	36 Pin	40 Pin
Dimen. V ±.010	.465	.765	.865	.965	1.280	1.480	1.880	2.080
Dimen. W (max.)	.400	.400	.400	.400	.700	.700	.700	.700
Dimen. X ±.005	.300	.300	.300	.300	.600	.600	.600	.600
Dimen. Y ±.010	NA	.300	.400	.400	.500	.500	.800	.800
Dimen. Z ±.005	.280	.280	.280	.280	.280	.280	.280	.280

WIRE WRAP

PART NUMBER

SCHEDULE



Contact Finish	Pins	Open Entry	Closed Entry
Series C-81	8	C81-08-54	C81-08-04
	14	C81-14-54	C81-14-04
200-400	16	C81-16-54	C81-16-04
microinch	18	C81-18-54	C81-18-04
min. tin per	24	C81-24-54	C81-24-04
MIL-T-10727	28	C81-28-54	C81-28-04
	36	—	C81-36-04
	40	—	C81-40-04
Series C-91	8	C91-08-50	C91-08-00
	14	C91-14-50	C91-14-00
50 microinch	16	C91-16-50	C91-16-00
min.	18	C91-18-50	C91-18-00
gold	24	C91-24-50	C91-24-00
inlay	28	C91-28-50	C91-28-00
	36	—	C91-36-00
	40	—	C91-40-00

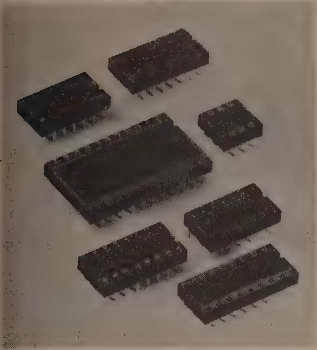
SOLDER TAIL

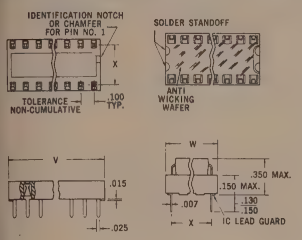
PART NUMBER

SCHEDULE

Contact Finish	Pins	Open Entry	Closed Entry
Series C-82	8	C82-08-54	C82-08-04
	14	C82-14-54	C82-14-04
200-400	16	C82-16-54	C82-16-04
microinch	18	C82-18-54	C82-18-04
min. tin per	24	C82-24-54	C82-24-04
MIL-T-10727	28	C82-28-54	C82-28-04
	36	—	C82-36-04
	40	—	C82-40-04
Series C-92	8	C92-08-50	C92-08-00
	14	C92-14-50	C92-14-00
100 microinch	16	C92-16-50	C92-16-00
min.	18	C92-18-50	C92-18-00
gold	24	C92-24-50	C92-24-00
inlay	28	C92-28-50	C92-28-00
	36	—	C92-36-00
	40	—	C92-40-00

LOW PROFILE DIP SOCKETS




IDENTIFICATION NOTCH OR CHAMFER FOR PIN NO. 1
X
TOLERANCE NON-CUMULATIVE
.100 TYP.
SOLDER STANDOFF
ANTI WICKING WAFER
V
.015
.025
W
.350 MAX.
.150 MAX.
.007
.130
.150
X
IC LEAD GUARD

Pin	Dimensions		
	X ± .005	V ± .015	W (max.)
8 Pin	.300	.400	.400
14 Pin	.300	.700	.400
16 Pin	.300	.800	.400
18 Pin	.300	.900	.400
22 Pin	.400	1.100	.500
24 Pin	.600	1.200	.700
28 Pin	.600	1.400	.700
40 Pin	.600	2.000	.700

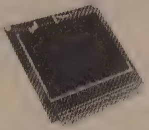
PART NUMBER SCHEDULE

BLACK BODY (with anti-wicking wafer)

Pins	Part Number
GOLD ALLOY	
8	C93-08-02
14	C93-14-02
16	C93-16-02
18	C93-18-02
22	C93-22-02
24	C93-24-02
28	C93-28-02
40	C93-40-02
TIN PLATE	
8	C83-08-02
14	C83-14-02
16	C83-16-02
18	C83-18-02
22	C83-22-02
24	C83-24-02
28	C83-28-02
40	C83-40-02

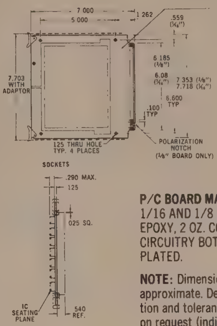
SOCKET CARDS

STANDARD SOCKET SERIES D02



- 14-16 pin socket pattern—60 position
- Standard ground and power pin commitment
- Mates with dual 60 position edge connector

LAYOUT FOR ALL CARDS

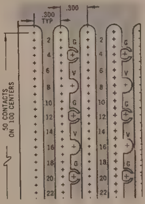

7 000
5 000
1 262
.559 (1/16")
7.703 WITH ADAPTOR
6 185 (1/8")
6.08 (1/16")
7 353 (1/8")
7.718 (1/16")
6.600 TYP
.100 TYP
125 THRU HOLE TYP. 4 PLACES
POLARIZATION NOTCH (1/8" BOARD ONLY)
SOCKETS
.290 MAX.
125
025 SQ.
IC SEATING PLANE
540 REF.

P/C BOARD MATERIAL
1/16 AND 1/8 THICK GLASS EPOXY, 2 OZ. COPPER CIRCUITRY BOTH SIDES. TIN PLATED.

NOTE: Dimensions shown are approximate. Detail information and tolerances available on request (indicate series and group number).

UNIVERSAL PATTERN LAYOUT

Double sided board with power and ground planes connected to additional wire wrap terminations outside of contact row


.300
.300 TYP
50 CONTACTS ON 100 CENTERS
2
4
6
8
10
12
14
16
18
20
22
G
V

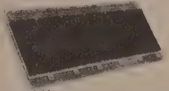
STANDARD SOCKET SERIES D02

CARD PART NO SCHEDULE (SOCKETS)

Group No.	Board Thickness	Cards with C-81 Sockets	Cards with C-91 Sockets
GROUP I **14 PIN** PIN 14—VCC PIN 7—GRD 	1/16"	D022-11-0	D022-13-0
	1/8"	D021-11-0	D021-13-0
GROUP II **14 PIN** PIN V—VCC PIN G—GRD 	1/16"	D022-31-0	D022-33-0
	1/8"	D021-31-0	D021-33-0
GROUP III **16 PIN** PIN 16—VCC PIN 8—GRD 	1/16"	D022-21-0	D022-23-0
	1/8"	D021-21-0	D021-23-0
GROUP IV **16 PIN** PIN V—VCC PIN G—GRD 	1/16"	D022-41-0	D022-43-0
	1/8"	D021-41-0	D021-43-0

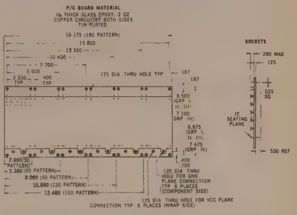
SOCKET PANELS

STANDARD SOCKET SERIES D4



- 180 position panel or multiples of 30 position with 14 or 16 position socket pattern
- Optional 52 pin or three 14 pin sockets in I/O area

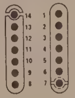
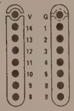
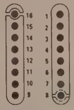
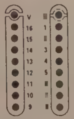
LAYOUT FOR STANDARD PANELS


P/C BOARD MATERIAL
1/8 THICK GLASS EPOXY, 2 OZ COPPER CIRCUITRY BOTH SIDES TIN PLATED
16 175 (180 PATTERN)
15 800
13 100
10 400
7 700
5 000
2 300 TYP
400 TYP
125 DIA THRU HOLE TYP
187
187
6 500 (GRP I, II, III)
7 100 (GRP IV)
6.875 (GRP I, II III)
7 475 (GRP IV)
.400
.250
2.880 (30 PATTERN)
5.360 (60 PATTERN)
8.080 (90 PATTERN)
10.880 (120 PATTERN)
13.480 (150 PATTERN)
125 DIA THRU HOLE FOR GND PLANE CONNECTION TYP 6 PLACES (COMPONENT SIDE)
125 DIA THRU HOLE FOR VCC PLANE CONNECTION TYP 6 PLACES (WRAP SIDE)
SOCKETS
290 MAX
125
025 SQ
IC SEATING PLANE
530 REF

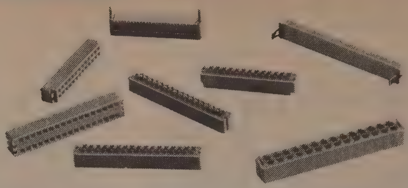
NOTE: Dimensions shown are approximate Detail information and tolerances available on request (indicate series and group number)

STANDARD SOCKET SERIES D4

PANEL PART NO. SCHEDULE

Group No.	I/O Option	Sockets per Panel	Panels with C-81 Sockets	Panels with C-91 Sockets
GROUP I **14 PIN** PIN 14—VCC PIN 7—GRD 	SOCKETS	30	D411-21-1	D411-23-1
		60	D411-21-2	D411-23-2
		90	D411-21-3	D411-23-3
		120	D411-21-4	D411-23-4
		150	D411-21-5	D411-23-5
		180	D411-21-6	D411-23-6
	FEED-THRU PINS	30	D411-41-1	D411-43-1
		60	D411-41-2	D411-43-2
		90	D411-41-3	D411-43-3
		120	D411-41-4	D411-43-4
		150	D411-41-5	D411-43-5
		180	D411-41-6	D411-43-6
GROUP II **14 PIN** PIN V—VCC PIN G—GRD 	SOCKETS	30	D434-21-1	D434-23-1
		60	D434-21-2	D434-23-2
		90	D434-21-3	D434-23-3
		120	D434-21-4	D434-23-4
		150	D434-21-5	D434-23-5
		180	D434-21-6	D434-23-6
	FEED-THRU PINS	30	D434-41-1	D434-43-1
		60	D434-41-2	D434-43-2
		90	D434-41-3	D434-43-3
		120	D434-41-4	D434-43-4
		150	D434-41-5	D434-43-5
		180	D434-41-6	D434-43-6
GROUP III **16 PIN** PIN 16—VCC PIN 8—GRD 	SOCKETS	30	D423-21-1	D423-23-1
		60	D423-21-2	D423-23-2
		90	D423-21-3	D423-23-3
		120	D423-21-4	D423-23-4
		150	D423-21-5	D423-23-5
		180	D423-21-6	D423-23-6
	FEED-THRU PINS	30	D423-41-1	D423-43-1
		60	D423-41-2	D423-43-2
		90	D423-41-3	D423-43-3
		120	D423-41-4	D423-43-4
		150	D423-41-5	D423-43-5
		180	D423-41-6	D423-43-6
GROUP IV **16 PIN** PIN V—VCC PIN G—GRD 	SOCKETS	30	D444-21-1	D444-23-1
		60	D444-21-2	D444-23-2
		90	D444-21-3	D444-23-3
		120	D444-21-4	D444-23-4
		150	D444-21-5	D444-23-5
		180	D444-21-6	D444-23-6
	FEED-THRU PINS	30	D444-41-1	D444-43-1
		60	D444-41-2	D444-43-2
		90	D444-41-3	D444-43-3
		120	D444-41-4	D444-43-4
		150	D444-41-5	D444-43-5
		180	D444-41-6	D444-43-6

Scotchflex® BRAND SOCKET CONNECTORS



INTRODUCTION

SCOTCHFLEX brand socket connectors are available in a variety of sizes and center spacings to fit standard, commercially available wrap panels and custom configurations. Socket connectors may be used in conjunction with SCOTCHFLEX headers, where quick disconnect/reconnect capability is required. Optional strain relief clips are available for all SCOTCHFLEX socket connectors, should design needs require them.

As you will note, all U.S. dimensions are followed with the respective corresponding metric dimensions, which are in parentheses.

TYPICAL PROPERTIES OF Scotchflex® BRAND SOCKET CONNECTORS

PHYSICAL PROPERTIES					
GRID SPACING	.100" x .100" (2.54 mm x 2.54 mm)	.100" x .200" (2.54 mm x 5.08 mm)	.100" x .300" (2.54 mm x 7.62 mm)	.125" x .250" (3.18 mm x 6.36 mm)	.150" x 150" (3.81 mm x 3.81 mm)
3M PART NUMBER(S)	3473-_____ 3421-_____ 3399-_____ 3414-_____ 3417-_____ 3425-_____	3471-0000 3471-0001	3407-0000 3327-0000	3450-0000 3450-0001	3441-0000
INSULATION MATERIAL	Glass Reinforced Polyester; U.L. Flame Retardant Rating 94V-O				
COLOR	GRAY		3407 – GRAY 3327 – RED	GRAY	
CONTACT MATERIAL	Beryllium Copper				
CONTACT PLATING	0.000030" (.762 μm) Gold Per Mil-G-45204 Type II over 0.000050" (1.27 μm) Nickel			0.000050" (1.27 μm) Gold Per Mil-G-45204 Type II over 0.000050" (1.27 μm) Nickel	0.000030" (.762 μm) Gold Per Mil-G-45204 Type II over 0.000050" (1.27 μm) Nickel
MARKING	Raised Figures; 3M and Part Identification Numbers, Contact Position Numbers, Orientation Triangle		Raised Figures; 3M and Part Identification Numbers, Contact Position Numbers	Raised Figures; 3M and Part Identification Numbers, Contact Position Numbers, Orientation Triangle	
WIRE ACCOMMODATION	26 Solid, 28 AWG Solid or Stranded, 30 AWG Solid			24 AWG Solid or Stranded 26 AWG Stranded	
CONTACT INSERTION FORCE	.5 lb. (2.2N) per Contact			.2 lb. (.9N) per Contact	.16 lb. (.71N) per Contact
CONTACT WITHDRAWAL FORCE	.5 lb. (2.2N) per Contact			.1 lb. (.4N) per Contact	.11 lb. (.49N) Contact
ELECTRICAL PROPERTIES					
CURRENT RATING	1 AMP				
INSULATION RESISTANCE	>5 x 10⁶ Ohms				
DIELECTRIC WITHSTANDING VOLTAGE	>500 Volts at Sea Level				
ENVIRONMENTAL PROPERTIES					
TEMPERATURE RATING	-67°F to +221°F (-55°C to +105°C)				

DIMENSIONS	
U.S.	Inches
Metric	(mm)

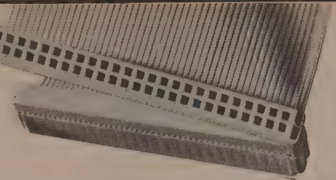
While the above data was correct at the time of publication, it is recommended that for specification purposes a current Spec Data Sheet on the particular connector be requested. These sheets contain full dimensional details and are available from the Scotchflex sales representative in your area.

Electronic Products Division 3M COMPANY

3M CENTER • SAINT PAUL, MINNESOTA 55101

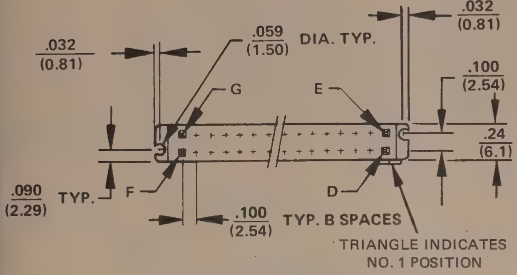
Scotchflex® BRAND SOCKET CONNECTORS

.100"(2.54mm) X .100"(2.54mm) GRID SPACING

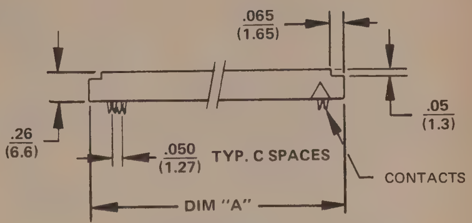


WITH FLAT CABLE COVER AND INDIVIDUAL WIRE COVER

CONNECTOR BODY


.032
(0.81)
.059
(1.50) DIA. TYP.
.032
(0.81)
G
E
.100
(2.54)
.24
(6.1)
.090
(2.29) TYP.
F
D
.100
(2.54) TYP. B SPACES
TRIANGLE INDICATES
NO. 1 POSITION

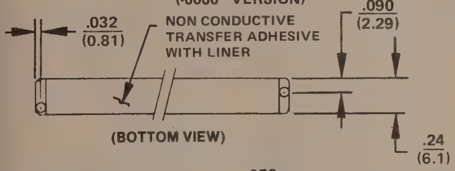
(BOTTOM VIEW)
(ALL VERSIONS)


.065
(1.65)
.05
(1.3)
.26
(6.6)
.050
(1.27) TYP. C SPACES
CONTACTS
DIM "A"

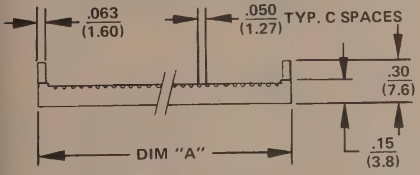
(SIDE VIEW)
(ALL VERSIONS)

CONNECTOR COVER

FLAT CABLE COVER
(-0000 VERSION)


.032
(0.81)
NON CONDUCTIVE
TRANSFER ADHESIVE
WITH LINER
.090
(2.29)
.24
(6.1)

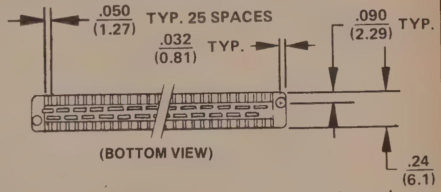
(BOTTOM VIEW)


.063
(1.60)
.050
(1.27) TYP. C SPACES
.30
(7.6)
.15
(3.8)
DIM "A"

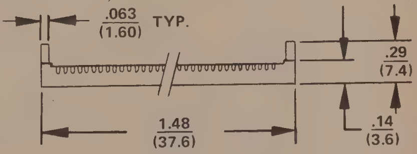
(SIDE VIEW)

DIMENSIONS	
U.S.	Inches
Metric	(mm)

*INDIVIDUAL WIRE COVER
(-1000 VERSION)


.050
(1.27) TYP. 25 SPACES
.032
(0.81) TYP.
.090
(2.29) TYP.
.24
(6.1)

(BOTTOM VIEW)


.063
(1.60) TYP.
.29
(7.4)
.14
(3.6)
1.48
(37.6)

(SIDE VIEW)

*3399-1000 ONLY

Scotchflex BRAND SOCKET CONNECTORS ON .100 x .100 (2.54 x 2.54) GRID SPACING

CONTACT QUANTITY	CONNECTOR PART NUMBER	DIMENSIONS			CONTACT NUMBER SEQUENCE			
		A	B	C	D	E	F	G
10	3473-0000	.68 (17.3)	4	9	1	2	9	10
20	3421-0000	1.18 (30.0)	9	19	1	2	19	20
26	3399-0000 3399-1000	1.48 (37.6)	12	25	1	14	13	26
34	3414-0000	1.88 (47.8)	16	33	1	18	17	34
40	3417-0000	2.18 (55.4)	19	39	1	2	39	40
50	3425-0000	2.68 (68.1)	24	49	1	2	49	50

When ordering SCOTCHFLEX brand socket connectors, be sure to order by using complete 8-digit part number (i.e., 3399-0000).

While the above data was correct at the time of publication, it is recommended that for specification purposes a current Spec Data Sheet on the particular connector be requested. These sheets contain full dimensional details and are available from the Scotchflex sales representative in your area.

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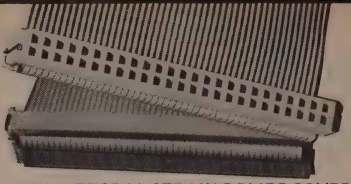
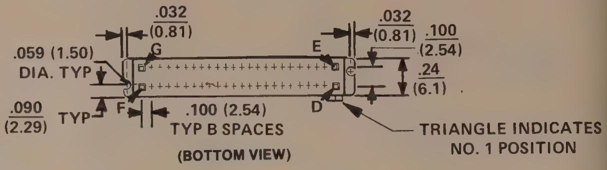
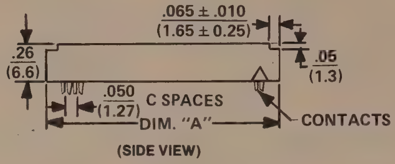
Scotchflex® BRAND SOCKET CONNECTORS .100"(2.54mm) X .100"(2.54mm) GRID SPACING



WITH INTEGRAL STRAIN RELIEF COVER

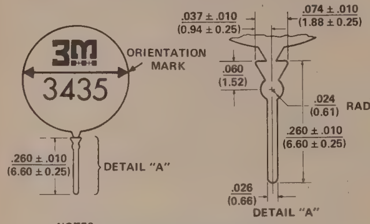
CONNECTOR BODY


.032
(0.81)
.032
(0.81)
.100
(2.54)
.059 (1.50)
DIA. TYP
G
E
.24
(6.1)
.090
(2.29)
TYP
F
.100 (2.54)
TYP B SPACES
D
TRIANGLE INDICATES
NO. 1 POSITION
(BOTTOM VIEW)


.065 ± .010
(1.65 ± 0.25)
.26
(6.6)
.05
(1.3)
.050
(1.27)
C SPACES
DIM. "A"
CONTACTS
(SIDE VIEW)

POLARIZING KEY FOR SCOTCHFLEX SOCKET CONNECTORS

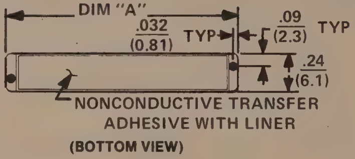
3M PART NO. 3435-0000
USED WITH 3M PART NOS: 3327, 3399, 3407, 3414
3417, 3421, 3424, 3425, 3471


.037 ± .010
(0.94 ± 0.25)
.074 ± .010
(1.88 ± 0.25)
3M
3435
ORIENTATION
MARK
.060
(1.52)
.024
(0.61)
RAD.
.260 ± .010
(6.60 ± 0.25)
.260 ± .010
(6.60 ± 0.25)
DETAIL "A"
.026
(0.66)
DETAIL "A"

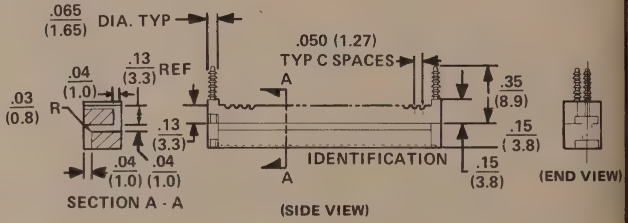
NOTES:

1 MATERIAL – POLYCARBONATE (.032 [0.81] THK.)
2 COLOR – GRAY
3 MARKING – RAISED FIGURES

STRAIN RELIEF CONNECTOR COVER


DIM "A"
.032
(0.81)
TYP
.09
(2.3)
TYP
.24
(6.1)
NONCONDUCTIVE TRANSFER
ADHESIVE WITH LINER
(BOTTOM VIEW)

DIMENSIONS	
U.S.	Inches
Metric	(mm)


.065
(1.65)
DIA. TYP
.050 (1.27)
TYP C SPACES
.13
(3.3)
REF
.04
(1.0)
.03
(0.8)
R
A
.35
(8.9)
.13
(3.3)
.15
(3.8)
IDENTIFICATION
.04
(1.0)
.04
(1.0)
A
.15
(3.8)
SECTION A - A
(SIDE VIEW)
(END VIEW)

Scotchflex® BRAND STRAIN RELIEF SOCKET CONNECTORS ON .100 x .100 (2.54 x 2.54) GRID SPACING

CONTACT QUANTITY	CONNECTOR PART NUMBER	DIMENSIONS			CONTACT NUMBER SEQUENCE			
		A	B	C	D	E	F	G
10	3473-3000	.68 (17.3)	4	9	1	2	9	10
20	3421-3000	1.18 (30.0)	9	19	1	2	19	20
26	3399-3000	1.48 (37.6)	12	25	1	14	13	26
34	3414-3000	1.88 (47.8)	16	33	1	18	17	34
40	3417-3000	2.18 (55.4)	19	39	1	2	39	40
50	3425-3000	2.68 (68.1)	24	49	1	2	49	50

When ordering SCOTCHFLEX brand socket connectors, be sure to order by using complete 8-digit part number (i.e., 3399-3000).

While the above data was correct at the time of publication, it is recommended that for specification purposes a current Spec Data Sheet on the particular connector be requested. These sheets contain full dimensional details and are available from the Scotchflex sales representative in your area.

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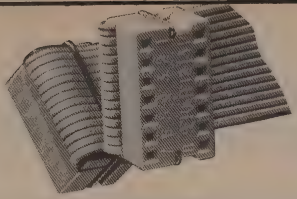
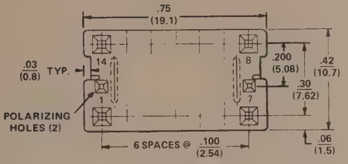
Scotchflex® BRAND SOCKET CONNECTORS .100″(2.54mm) X .300″(7.62mm) GRID SPACING

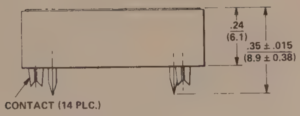


3M PART NO. 3407-0000

CONNECTOR BODY

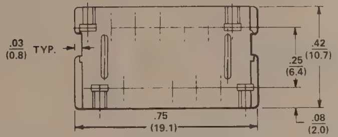

.75
(19.1)
.03
(0.8)
TYP.
14
8
1
7
.200
(5.08)
.42
(10.7)
.30
(7.62)
POLARIZING
HOLES (2)
6 SPACES @ .100
(2.54)
.06
(1.5)

(BOTTOM VIEW)

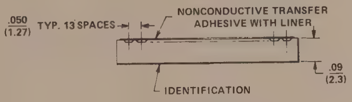

.24
(6.1)
.35 ± .015
(8.9 ± 0.38)
CONTACT (14 PLC.)

(SIDE VIEW)

CONNECTOR COVER


.03
(0.8)
TYP.
.42
(10.7)
.25
(6.4)
.75
(19.1)
.08
(2.0)

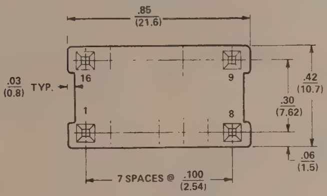
(BOTTOM VIEW)


.050
(1.27)
TYP. 13 SPACES
NONCONDUCTIVE TRANSFER
ADHESIVE WITH LINER
.09
(2.3)
IDENTIFICATION

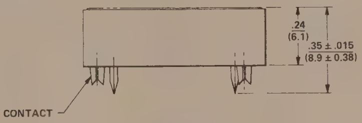
(SIDE VIEW)

3M PART NO. 3327-0000

CONNECTOR BODY

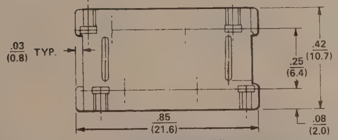

.85
(21.6)
.03
(0.8)
TYP.
16
9
1
8
.42
(10.7)
.30
(7.62)
.06
(1.5)
7 SPACES @ .100
(2.54)

(BOTTOM VIEW)

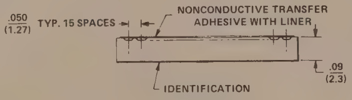

.24
(6.1)
.35 ± .015
(8.9 ± 0.38)
CONTACT

(SIDE VIEW)

CONNECTOR COVER

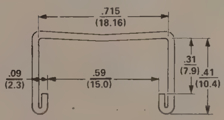

.03
(0.8)
TYP.
.42
(10.7)
.25
(6.4)
.85
(21.6)
.08
(2.0)

(BOTTOM VIEW)


.050
(1.27)
TYP. 15 SPACES
NONCONDUCTIVE TRANSFER
ADHESIVE WITH LINER
.09
(2.3)
IDENTIFICATION

(SIDE VIEW)

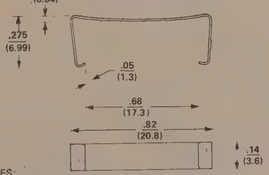
STRAIN RELIEF CLIP
3M PART NO. 3448-3
FOR 3407-0000


.715
(18.16)
.09
(2.3)
.59
(15.0)
.31
(7.9)
.41
(10.4)

NOTES:
MATERIAL – STEEL MUSIC WIRE, 13 GA. [.031 (.79) DIA.]
PLATING – NICKEL

DIMENSIONS	
U.S.	Inches
Metric	(mm)

STRAIN RELIEF CLIP 3M PART NO. 3448-8
FOR 3327-0000


.025
(0.64)
.275
(6.99)
.05
(1.3)
.68
(17.3)
.82
(20.8)
.14
(3.6)

NOTES:
1 – MATERIAL: STEEL 30 GA. [.010 (0.25) THK]
2 – FINISH: EPOXY COATING, .01 (.3) NOMINAL
3 – COLOR – RED

When ordering SCOTCHFLEX brand socket connectors, be sure to order by using complete 8-digit part number (i.e., 3407-0000).

While the above data was correct at the time of publication, it is recommended that for specification purposes a current Spec Data Sheet on the particular connector be requested. These sheets contain full dimensional details and are available from the Scotchflex sales representative in your area.

Electronic Products Division 3M COMPANY
3M CENTER • SAINT PAUL, MINNESOTA 55101

Scotchflex® BRAND HEADERS

REFERENCE CHART

CON-TACT QTY.	GRID SPACING	3M PART NUMBER						MATING SCOTCHFLEX SOCKET CONNECTOR
		SOLDER TAIL				WRAP TAIL		
		RIGHT ANGLE PIN		STRAIGHT PIN				
		FOR P.C. BOARD THICKNESS						
		.062 (1.57)	.094 -.125 (2.39-3.18)	.062 (1.57)	.094 -.125 (2.39-3.18)	RIGHT ANGLE PIN	STRAIGHT PIN	
10	.100 x .100 (2.54 x 2.54)	3491-1002	3491-1003	3491-2002*	3491-2003*	3491-3005*	3491-4005*	3473-0000, 3473-3000
20	.100 x .100 (2.54 x 2.54)	3428-1002 3492-1002*	3428-1003 3492-1003*	3428-2002 3492-2002*	3428-2003 3492-2003*	3428-3005 3492-3005*	3428-4005 3492-4005*	3421-0000, 3421-3000
24	.125 x .250 (3.18 x 6.36)	3466-1002*		3466-2002*				3450-0000, 3450-0001
26	.100 x .100 (2.54 x 2.54)	3429-1002 3493-1002*	3429-1003 3493-1003*	3429-2002 3493-2002*	3429-2003 3493-2003*	3429-3005 3493-3005*	3429-4005 3493-4005*	3399-0000, 3399-1000 3399-3000
28	.150 x .150 (3.81 x 3.81)	3467-1002*	3467-1003*	3467-2002*	3467-2003*			3441-0000
34	.100 x .100 (2.54 x 2.54)	3431-1002 3494-1002*	3431-1003 3494-1003*	3431-2002 3494-2002*	3431-2003 3494-2003*	3431-3005 3494-3005*	3431-4005 3494-4005*	3414-0000, 3414-3000
40	.100 x .100 (2.54 x 2.54)	3432-1002 3495-1002*	3432-1003 3495-1003*	3432-2002 3495-2002*	3432-2003 3495-2003*	3432-3005 3495-3005*	3432-4005 3495-4005*	3417-0000, 3417-3000
50	.100 x .100 (2.54 x 2.54)	3433-1002 3496-1002*	3433-1003 3496-1003*	3433-2002 3496-2002*	3433-2003 3496-2003*	3433-3005 3496-3005*	3433-4005 3496-4005*	3425-0000, 3425-3000

*Available Mid-1975.

Note: 3466-1001 and 3466-2001, 24 position solder tail headers are available when using .032"-.047" (0.81 mm-1.19 mm) printed circuit boards.

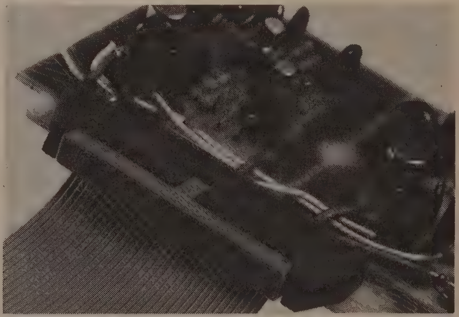
TYPICAL PROPERTIES	
PHYSICAL	
Body Material	Glass reinforced polyester; UL flammability rating 94V-O
Color	Gray
Contact Metal	Phosphor bronze
Contact Plating	0.000030" (.762 μm) min. Gold per Mil-G-45204 Type II over 0.000050" (1.27 μm) Nickel
Marking	Raised figures; 3M and part identification number and orientation triangle
ELECTRICAL	
Current Rating	1 AMP
Dielectric Withstand Voltage	>500 Volts at Sea Level
Insulation Resistance	>5 x 10^6 Ohms
ENVIRONMENTAL	
Temp Range	-67°F to +221°F (-55°C to +105°C)

DIMENSIONS	
U.S.	Inches
Metric	(mm)

Where additional header to board mounting is required, use the following screws with indicated header types.

P.C. Board Thickness	Right Angle Contact	Straight Contact
.032 - .062 (0.81 - 1.57)	2-56 x 3/8"	3M Part No. 3458 (4-40 x 1/4" Type F)
.063 - .125 (1.60 - 3.18)	2-56 x 1/2"	3M Part No. 3472 (4-40 x 5/16" Type F)

When ordering 3M Brand Headers, use complete 8 digit part - suffix number (i.e., 3428-1002).



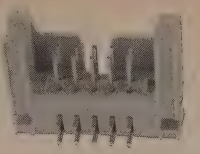
Contact your 3M Scotchflex sales representative, or the authorized 3M Scotchflex distributor in your area for pricing, availability, and design assistance.

Electronic Products Division 3M COMPANY

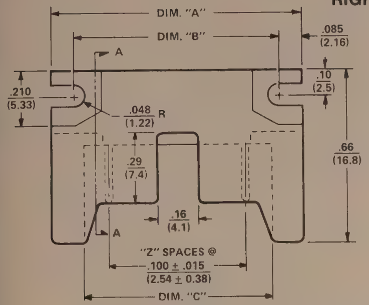
3M CENTER • SAINT PAUL, MINNESOTA 55101

Scotchflex® BRAND SOLDER TAIL HEADERS

.100″ (2.54mm) x .100″(2.54mm)

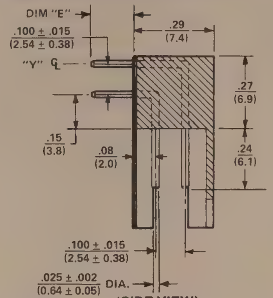


RIGHT ANGLE PIN CONFIGURATION*



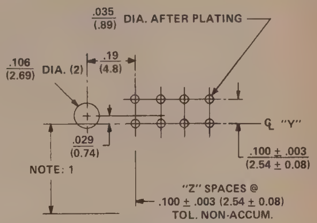
DIM. "A"
DIM. "B"
A
.085 (2.16)
.10 (2.5)
.210 (5.33)
.048 (1.22) R
.29 (7.4)
.66 (16.8)
.16 (4.1)
A
"Z" SPACES @ .100 ± .015 (2.54 ± 0.38)
DIM. "C"

(TOP VIEW)



DIM "E"
.100 ± .015 (2.54 ± 0.38)
"Y" ℄
.29 (7.4)
.27 (6.9)
.15 (3.8)
.08 (2.0)
.24 (6.1)
.100 ± .015 (2.54 ± 0.38)
.025 ± .002 (0.64 ± 0.05) DIA.

(SIDE VIEW)



.035 (.89) DIA. AFTER PLATING
.106 (2.69) DIA. (2)
.19 (4.8)
.029 (0.74)
℄ "Y"
NOTE: 1
.100 ± .003 (2.54 ± 0.08)
"Z" SPACES @ .100 ± .003 (2.54 ± 0.08) TOL. NON-ACCUM.

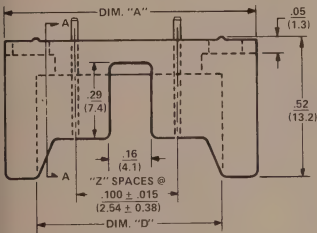
RECOMMENDED P.C. BOARD HOLE PATTERN

NOTE:
1. .41 (10.4) MAX. DIM. TO EDGE OF P.C.B. FOR DAISY CHAIN

When ordering 3M Brand Headers, use complete 8 digit part - suffix number (i.e., 3491-1002).

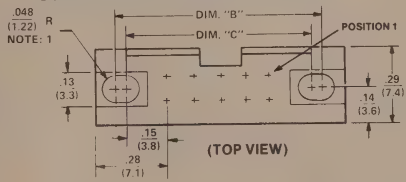
Contact Qty.	3M Part Number	Suffix Number for Board Thickness		DIM "A"	DIM "B"	DIM "C"	DIM "E" ±.010 (±0.25) for Suffix Number:		DIM "Z"
		.062 (1.57)	.094-.125 (2.39-3.18)				-1002	-1003	
10	3491-	-1002	-1003	.95 (24.1)	.78 (19.8)	.71 (18.0)	.092 (2.34)	.155 (3.94)	4
20	3492-			1.45 (36.8)	1.28 (32.5)	1.21 (30.7)			9
26	3493-			1.75 (44.5)	1.58 (40.1)	1.51 (38.4)			12
34	3494-			2.15 (54.6)	1.98 (50.3)	1.91 (48.5)			16
40	3495-			2.45 (62.2)	2.28 (57.9)	2.21 (56.1)			19
50	3496-			2.95 (74.9)	2.78 (70.6)	2.71 (68.8)			24

STRAIGHT PIN CONFIGURATION*



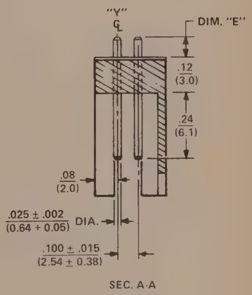
DIM. "A"
A
.05 (1.3)
.29 (7.4)
.52 (13.2)
.16 (4.1)
A
"Z" SPACES @ .100 ± .015 (2.54 ± 0.38)
DIM. "D"

(FRONT VIEW)

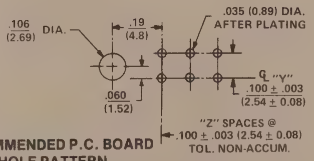


.048 (1.22) R
NOTE: 1
DIM. "B"
DIM. "C"
POSITION 1
.13 (3.3)
.29 (7.4)
.14 (3.6)
.15 (3.8)
.28 (7.1)

(TOP VIEW)



"Y" ℄
DIM. "E"
.12 (3.0)
.24 (6.1)
.08 (2.0)
.025 ± .002 (0.64 + 0.05) DIA.
.100 ± .015 (2.54 ± 0.38)
SEC. A-A



.106 (2.69) DIA.
.19 (4.8)
.035 (0.89) DIA. AFTER PLATING
℄ "Y"
.060 (1.52)
.100 ± .003 (2.54 ± 0.08)
"Z" SPACES @ .100 ± .003 (2.54 ± 0.08) TOL. NON-ACCUM.

DIMENSIONS	
U.S.	Inches
Metric	(mm)

NOTE:
1. ACCEPTS NO. 2-56 HEX HD OR NO. 1-72 RD HD SCREW

RECOMMENDED P.C. BOARD HOLE PATTERN

(SIDE VIEW)

When ordering 3M Brand Headers, use complete 8 digit part - suffix number (i.e., 3491-2002).

Contact Qty.	3M Part Number	Suffix Number for Board Thickness		DIM "A"	DIM "B"	DIM "C"	DIM "D"	DIM "E" ±.010 (±0.25) for Suffix Number:		DIM "Z"
		.062 (1.57)	.094-.125 (2.39-3.18)					-2002	-2003	
10	3491-	-2002	-2003	.95 (24.1)	.78 (19.8)	.70 (17.8)	.71 (18.0)	.092 (2.34)	.155 (3.94)	4
20	3492-			1.45 (36.8)	1.28 (32.5)	1.20 (30.5)	1.21 (30.7)			9
26	3493-			1.75 (44.5)	1.58 (40.1)	1.50 (38.1)	1.51 (38.4)			12
34	3494-			2.15 (54.6)	1.98 (50.3)	1.90 (48.3)	1.91 (48.5)			16
40	3495-			2.45 (62.2)	2.28 (57.9)	2.20 (55.9)	2.21 (56.1)			19
50	3496-			2.95 (74.9)	2.78 (70.6)	2.70 (68.6)	2.71 (68.8)			24

*Headers 3491- through 3496- will be available by Mid-1975. Contact your 3M Scotchflex sales representative or the Scotchflex distributor in your area for design assistance and availability.

Electronic Products Division 3M COMPANY

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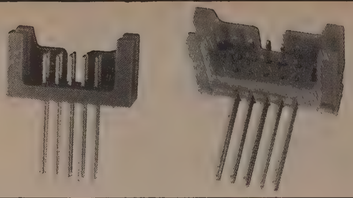
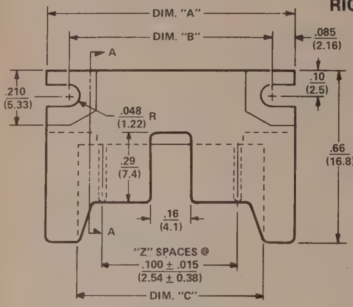
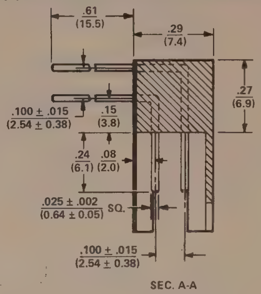
Scotchflex® BRAND WRAP TAIL HEADERS .100"(2.54mm) x .100"(2.54mm)



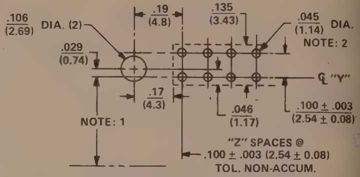
RIGHT ANGLE PIN CONFIGURATION*


DIM. "A"
DIM. "B"
A
.085 (2.16)
.10 (2.5)
.210 (5.33)
.048 (1.22) R
.29 (7.4)
.66 (16.8)
.16 (4.1)
A
"Z" SPACES @ .100 ± .015 (2.54 ± 0.38)
DIM. "C"

(TOP VIEW)


.61 (15.5)
.29 (7.4)
.27 (6.9)
.100 ± .015 (2.54 ± 0.38)
.15 (3.8)
.24 (6.1)
.08 (2.0)
.025 ± .002 (0.64 ± 0.05) SQ.
.100 ± .015 (2.54 ± 0.38)
SEC. A-A

(SIDE VIEW)


.106 (2.69) DIA. (2)
.19 (4.8)
.135 (3.43)
.045 (1.14) DIA. NOTE: 2
.029 (0.74)
℄ "Y"
.17 (4.3)
.046 (1.17)
.100 ± .003 (2.54 ± 0.08)
NOTE: 1
"Z" SPACES @ .100 ± .003 (2.54 ± 0.08) TOL. NON-ACCUM.

RECOMMENDED P.C. BOARD HOLE PATTERN

NOTE:
1. DIM. .41 (10.4) MAX. TO EDGE OF BOARD FOR DAISY CHAIN
2. ALTERNATE - SLOT (DOTTED LINES)

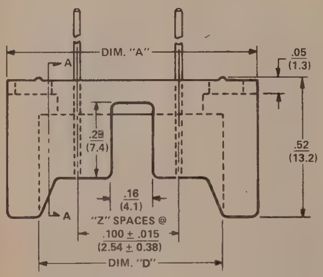
DIMENSIONS	
U.S.	Inches
Metric	(mm)

When ordering 3M Brand Headers, use complete 8 digit part - suffix number (i.e., 3491-4005).

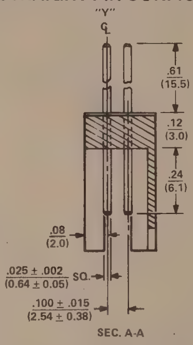
Contact Qty.	3M Part Number	DIM "A"	DIM "B"	DIM "C"	"Z"
10	3491-3005	.95 (24.1)	.78 (19.8)	.71 (18.0)	4
20	3492-3005	1.45 (36.8)	1.28 (32.5)	1.21 (30.7)	9
26	3493-3005	1.75 (44.5)	1.58 (40.1)	1.51 (38.4)	12
34	3494-3005	2.15 (54.6)	1.98 (50.3)	1.91 (48.5)	16
40	3495-3005	2.45 (62.2)	2.28 (57.9)	2.21 (56.1)	19
50	3496-3005	2.95 (74.9)	2.78 (70.6)	2.71 (68.8)	24

While the above data was correct at the time of publication, it is recommended that for specification purposes a current Spec Data Sheet on the particular connector be requested. These sheets contain full dimensional details and are available from the Scotchflex sales representative in your area.

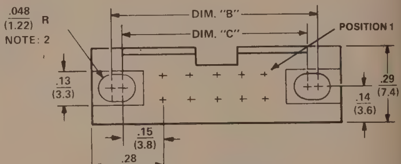
STRAIGHT PIN CONFIGURATION*


DIM. "A"
A
.05 (1.3)
.29 (7.4)
.52 (13.2)
.16 (4.1)
A
"Z" SPACES @ .100 ± .015 (2.54 ± 0.38)
DIM. "D"

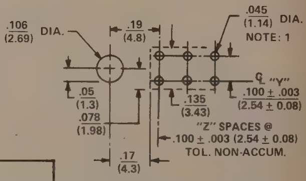
(FRONT VIEW)


"Y"
℄
.61 (15.5)
.12 (3.0)
.24 (6.1)
.08 (2.0)
.025 ± .002 (0.64 ± 0.05) SQ.
.100 ± .015 (2.54 ± 0.38)
SEC. A-A

(SIDE VIEW)


.048 (1.22) R NOTE: 2
DIM. "B"
DIM. "C"
POSITION 1
.13 (3.3)
.29 (7.4)
.14 (3.6)
.15 (3.8)
.28 (7.1)

(TOP VIEW)


.106 (2.69) DIA.
.19 (4.8)
.045 (1.14) DIA. NOTE: 1
℄ "Y"
.05 (1.3)
.078 (1.98)
.135 (3.43)
.100 ± .003 (2.54 ± 0.08)
"Z" SPACES @ .100 ± .003 (2.54 ± 0.08) TOL. NON-ACCUM.
.17 (4.3)

RECOMMENDED P.C. BOARD HOLE PATTERN

NOTE:
1. ALTERNATE - SLOT (DOTTED LINES)
2. ACCEPTS NO. 2-56 HEX HD SCREW OR NO. 1-72 RD HD SCREW

When ordering 3M Brand Headers, use complete 8 digit part - suffix number (i.e., 3491-3005).

Contact Qty.	3M Part Number	DIM "A"	DIM "B"	DIM "C"	DIM "D"	"Z"
10	3491-4005	.95 (24.1)	.78 (19.8)	.70 (17.8)	.71 (18.0)	4
20	3492-4005	1.45 (36.8)	1.28 (32.5)	1.20 (30.5)	1.21 (30.7)	9
26	3493-4005	1.75 (44.5)	1.58 (40.1)	1.50 (38.1)	1.51 (38.4)	12
34	3494-4005	2.15 (54.6)	1.98 (50.3)	1.90 (48.3)	1.91 (48.5)	16
40	3495-4005	2.45 (62.2)	2.28 (57.9)	2.20 (55.9)	2.21 (56.1)	19
50	3496-4005	2.95 (74.9)	2.78 (70.6)	2.70 (68.6)	2.71 (68.8)	24

*Headers 3491- through 3496- will be available by Mid-1975. Contact your 3M Scotchflex sales representative or the Scotchflex distributor in your area for design assistance and availability.

Electronic Products Division 3M COMPANY
3M CENTER • SAINT PAUL, MINNESOTA 55101

Scotchflex® BRAND P.C.B. CONNECTORS

INTRODUCTION

Flat cable may be terminated at the circuit card by hand or flow solderable SCOTCHFLEX connectors. The contacts which are positioned in the connector body are soldered to the board as a unit. The flat cable terminates in the connector to the "U" form end of the contacts. As with other SCOTCHFLEX connectors, no stripping or soldering of conductors is required. SCOTCHFLEX P.C.B. Connectors come in a variety of configurations to mate with SCOTCHFLEX flat cable.

TYPICAL PROPERTIES OF Scotchflex® BRAND P.C.B. CONNECTORS

PHYSICAL PROPERTIES			
3M PART NUMBER	3474-____T 3402-____T 3422-____T 3418-____T 3434-____T 3426-____T	3470-0000T	3378-____T 3468-0000T
INSULATION MATERIAL	GLASS FILLED POLYESTER; U.L. FLAME RETARDANT RATING 94V-O		
COLOR	GRAY		
CONTACT MATERIAL	BERYLLIUM COPPER		
CONTACT PLATING	TIN ALLOY		
MARKING	RAISED FIGURES, 3M PART & IDENTIFICATION NUMBER		
WIRE ACCOMMODATION	26 AWG SOLID, 28 AWG SOLID & STRANDED 30 AWG SOLID	24 AWG SOLID & STRANDED	24 AWG SOLID & STRANDED
CABLE ACCEPTANCE	.050" (1.27 mm) CONDUCTOR CENTERS	.0625" (1.59 mm) CONDUCTOR CENTERS	.075" (1.90 mm) CONDUCTOR CENTERS
ELECTRICAL PROPERTIES			
CURRENT RATING	1 AMP		
INSULATION RESISTANCE	> 5 X 10^6 OHMS		
DIELECTRIC WITHSTANDING VOLTAGE	>500 VOLTS AT SEA LEVEL		
ENVIRONMENTAL PROPERTIES			
TEMPERATURE RATING	-67°F TO +221°F (-55°C TO +105°C)		

REFERENCE CHART FOR P.C.B. CONNECTORS

NO. OF CONTACTS	3M PART NUMBER	FOR PC BOARD THICKNESS	FOR ASSEMBLY BEFORE SOLDERING USE LOCATOR PLATE PART NUMBER	FOR ASSEMBLY AFTER SOLDERING USE LOCATOR PLATE PART NUMBER	MATES WITH 3M FLAT CABLE
10	3474-0000T	.062 (1.57)	3443-15	3443-8	3350/10, 3365/10, 3306/10
	3474-0001T	.094 -.125 (2.39-3.18)			
20	3422-0000T	.062 (1.57)	3443-16	3443-8	3350/20, 3365/20, 3306/20, 3369/20, 3476/20
	3422-0001T	.094 -.125 (2.39-3.18)			
24	*3470-0000T	.062 (1.57)	3443-34	3443-8	3451/24
26	3434-0000T	.062 (1.57)	3443-15	3443-8	3350/26, 3365/26, 3306/26, 3469/26, 3476/26
	3434-0001T	.094 -.125 (2.39-3.18)			
28	*3468-0000T	.062 (1.57)	3443-33	3443-8	3405/28
34	3402-0000T	.062 (1.57)	3443-15	3443-8	3350/34, 3365/34, 3306/34, 3469/34, 3476/34
	3402-0001T	.094 -.125 (2.39-3.18)			
36	3378-0000T	.062 (1.57)	3443-19	3443-8	3405/36
	**3378-1000T	.062 (1.57)			Individual Insulated Wire
40	3418-0000T	.062 (1.57)	3443-16	3443-8	3350/40, 3365/40, 3306/40, 3380/40, 3469/40, 3476/40
	3418-0001T	.094 -.125 (2.39-3.18)			
50	3426-0000T	.062 (1.57)	3443-15	3443-8	3350/50, 3365/50, 3306/50, 3380/50, 3469/50, 3476/50
	3426-0001T	.094 -.125 (2.39-3.18)			

DIMENSIONS	
U S	Inches
Metric	(mm)

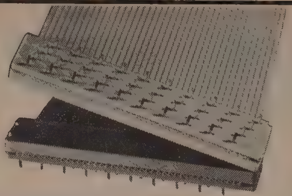
* Available Mid-1975

** 3378-1000 denotes individual wire cover.

NOTE: All connectors listed use the 3442-1 standard platen, except the 3378-____T connector, which utilizes the 3442-2 platen.

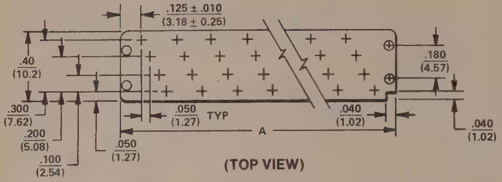
While the above data was correct at the time of publication, it is recommended that for specification purposes a current Spec Data Sheet on the particular connector be requested. These sheets contain full dimensional details and are available from the Scotchflex sales representative in your area.

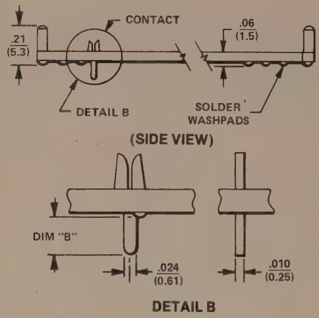
Scotchflex® BRAND P.C.B. CONNECTORS



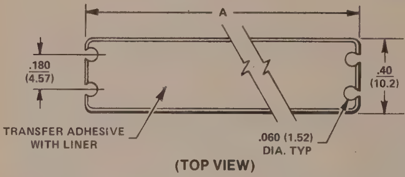
3M PART NOS. 3422-_____T & 3418-_____T

CONNECTOR BODY

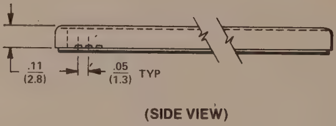

.125 ± .010
(3.18 ± 0.25)
.40
(10.2)
.180
(4.57)
.300
(7.62)
.200
(5.08)
.100
(2.54)
.050
(1.27)
.050
(1.27) TYP
.040
(1.02)
A
.040
(1.02)
(TOP VIEW)


CONTACT
.21
(5.3)
.06
(1.5)
DETAIL B
SOLDER
WASHPADS
(SIDE VIEW)
DIM "B"
.024
(0.61)
.010
(0.25)
DETAIL B

CONNECTOR COVER

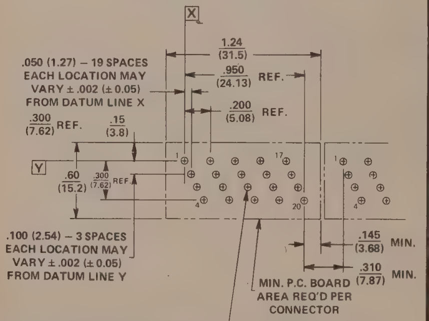

A
.180
(4.57)
.40
(10.2)
TRANSFER ADHESIVE
WITH LINER
.060 (1.52)
DIA. TYP
(TOP VIEW)

DIMENSIONS	
U.S.	Inches
Metric	(mm)


.11
(2.8)
.05
(1.3) TYP
(SIDE VIEW)

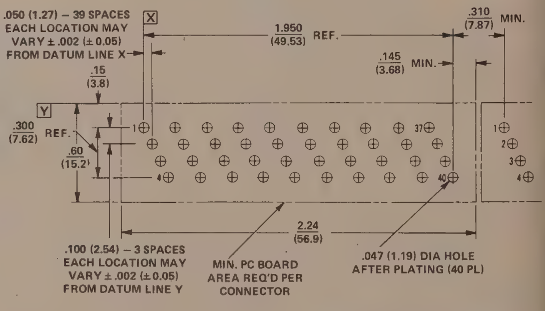
RECOMMENDED PCB HOLE PATTERNS

3M PART NO. 3422-_____T


X
.050 (1.27) – 19 SPACES
EACH LOCATION MAY
VARY ± .002 (± 0.05)
FROM DATUM LINE X
1.24
(31.5)
.950
(24.13) REF.
.200
(5.08) REF.
.300
(7.62) REF.
.15
(3.8)
Y
.60
(15.2)
.300
(7.62) REF.
1
17
4
20
1
4
.145
(3.68) MIN.
.310
(7.87) MIN.
.100 (2.54) – 3 SPACES
EACH LOCATION MAY
VARY ± .002 (± 0.05)
FROM DATUM LINE Y
MIN. P.C. BOARD
AREA REQ'D PER
CONNECTOR
.047 (1.19) DIA. HOLE
AFTER PLATING – 20 PLCS

NOTE: HOLE PATTERN IS SHOWN FOR THE MOUNTING SIDE OF THE P.C. BOARD

3M PART NO. 3418-_____T


.050 (1.27) – 39 SPACES
EACH LOCATION MAY
VARY ± .002 (± 0.05)
FROM DATUM LINE X
X
1.950
(49.53) REF.
.310
(7.87) MIN.
.145
(3.68) MIN.
.15
(3.8)
Y
.300
(7.62) REF.
.60
(15.2)
1
37
1
2
3
4
4
40
2.24
(56.9)
.100 (2.54) – 3 SPACES
EACH LOCATION MAY
VARY ± .002 (± 0.05)
FROM DATUM LINE Y
MIN. PC BOARD
AREA REQ'D PER
CONNECTOR
.047 (1.19) DIA HOLE
AFTER PLATING (40 PL)

NOTE: HOLE PATTERN IS SHOWN FOR THE MOUNTING SIDE OF THE P.C. BOARD

Scotchflex BRAND PCB CONNECTORS

CONTACT QUANTITY	CONNECTOR PART NUMBER	DIMENSIONS A	DIMENSIONS B
20	3422-0000T 3422-0001T	1.20 (30.5)	.100 ± .010 (2.54 ± .025) .156 ± .010 (3.96 ± .025)
40	3418-0000T 3418-0001T	2.20 (55.9)	.100 ± .010 (2.54 ± .025) .156 ± .010 (3.96 ± .025)

While the above data was correct at the time of publication, it is recommended that for specification purposes a current Spec Data Sheet on the particular connector be requested. These sheets contain full dimensional details and are available from the Scotchflex sales representative in your area.

Each Scotchflex connector is identified by an eight-digit part no. When ordering be sure to include the complete part number. (i.e., 3422-0000T).

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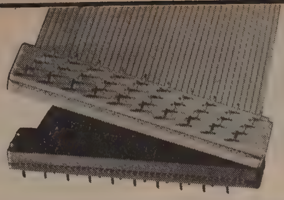
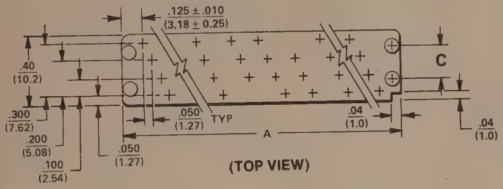
Scotchflex® BRAND P.C.B. CONNECTORS

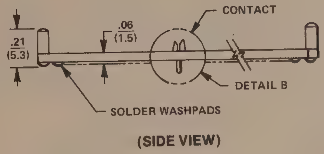


3M PART NOS. 3474-_____T, 3434-_____T, 3402-_____T, & 3426-_____T

CONNECTOR BODY

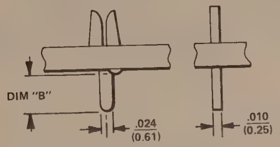

.125 ± .010
(3.18 ± 0.25)
.40
(10.2)
C
.300
(7.62)
.200
(5.08)
.100
(2.54)
.050
(1.27)
.050
(1.27)
TYP
A
.04
(1.0)
.04
(1.0)

(TOP VIEW)


.21
(5.3)
.06
(1.5)
CONTACT
DETAIL B
SOLDER WASHPADS

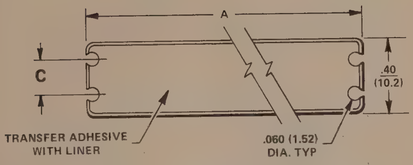
(SIDE VIEW)

DIMENSIONS	
U.S.	Inches
Metric	(mm)

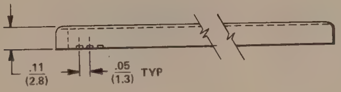

DIM "B"
.024
(0.61)
.010
(0.25)

DETAIL B

CONNECTOR COVER


A
C
.40
(10.2)
TRANSFER ADHESIVE
WITH LINER
.060 (1.52)
DIA. TYP

(TOP VIEW)


.11
(2.8)
.05
(1.3)
TYP

(SIDE VIEW)

Scotchflex® BRAND P.C.B. CONNECTORS

CONTACT QUANTITY	CONNECTOR PART NUMBER	DIMENSIONS A	DIMENSIONS B	DIMENSIONS C
10	3474-0000T	.70 (17.8)	.100 ± .010 (2.54 ± .025)	.200 (5.08)
	3474-0001T		.156 ± .010 (3.96 ± .025)	
26	3434-0000T	1.50 (38.1)	.100 ± .010 (2.54 ± .025)	.181 (4.60)
	3434-0001T		.156 ± .010 (3.96 ± .025)	
34	3402-0000T	1.90 (48.3)	.100 ± .010 (2.54 ± .025)	.181 (4.60)
	3402-0001T		.156 ± .010 (3.96 ± .025)	
50	3426-0000T	2.70 (68.6)	.100 ± .010 (2.54 ± .025)	.181 (4.60)
	3426-0001T		.156 ± .010 (3.96 ± .025)	

Each Scotchflex connector is identified by an eight-digit part no. When ordering be sure to include the complete part number. (i.e., 3474-0000T).

While the above data was correct at the time of publication, it is recommended that for specification purposes a current Spec Data Sheet on the specific connector be requested. These sheets contain full dimensional details and are available from the Scotchflex sales representative in your area.

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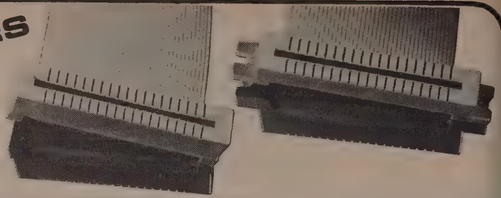
Scotchflex BRAND CARD-EDGE CONNECTORS



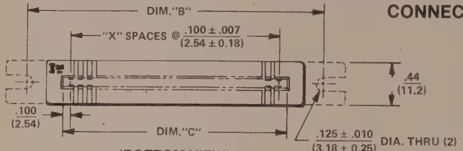
INTRODUCTION

Dual readout SCOTCHFLEX Card-Edge Connectors are available with or without mounting ears.

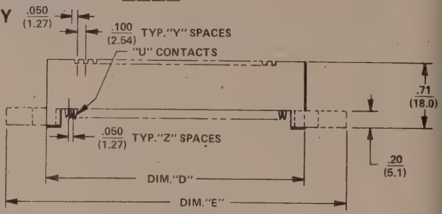
Both versions have bifurcated, gold-plated beryllium copper contacts insuring dependable electrical interface through repeated insertions and withdrawals. Insulation piercing "U" contacts are on .100" (2.54 mm) spacings, designed to accept SCOTCHFLEX round conductor cables on .050" (1.27 mm) centers. As with other SCOTCHFLEX connectors, 3M's card-edge connector line features labor cost savings, since up to 50 terminations can be made in a single step.

3M PART NOS. 3461-_____ THROUGH 3464-_____

CONNECTOR BODY

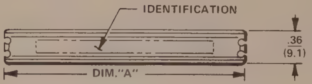

DIM."B"
"X" SPACES @ .100 ± .007 (2.54 ± 0.18)
.44 (11.2)
.100 (2.54)
DIM."C"
.125 ± .010 (3.18 ± 0.25) DIA. THRU (2)

(BOTTOM VIEW)

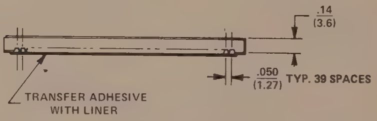

.050 (1.27)
.100 (2.54) TYP."Y" SPACES
"U" CONTACTS
.71 (18.0)
.050 (1.27) TYP."Z" SPACES
.20 (5.1)
DIM."D"
DIM."E"

(SIDE VIEW)

CONNECTOR COVER


IDENTIFICATION
.36 (9.1)
DIM."A"

(TOP VIEW)


.14 (3.6)
.050 (1.27) TYP. 39 SPACES
TRANSFER ADHESIVE WITH LINER

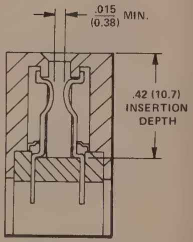
(SIDE VIEW)

TYPICAL PROPERTIES FOR ALL CARD-EDGE CONNECTORS

PHYSICAL	
Insulation Material	Glass filled thermoplastic
Contact Material	Beryllium Copper
Contact Plating	0.000050" (1.27 um) Min. Gold per MIL-G-45204 Type II over 0.000100" (2.54 um) Min. Nickel
Color	Gray
Contact Spacing	.100" (2.54 mm) accepts Scotchflex Cables on .050" (1.27 mm) Centers. Mates with P.C. Board Pads on .100" (2.54 mm) Centers.
ELECTRICAL	
Current Rating	1 AMP
Dielectric withstanding Voltage	>500 V.D.C. (Sea Level)
Insulation Resistance	>5 x 10^6 Ohms
ENVIRONMENTAL	
Temperature Range	-67°F to +221°F (-55°C to 105°C)

DIMENSIONS	
U.S.	Inches
Metric	(mm)

3M Suffix Number	Mounting Style
-0000	With mounting ears
-0001	Without mounting ears


.015 (0.38) MIN.
.42 (10.7) INSERTION DEPTH

NOTE: While the above data was correct at the time of this publication, it is recommended that for specification purposes a current Spec Data Sheet on the specific connector be requested from the 3M SCOTCHFLEX representative in your area.

When ordering 3M Brand Card-Edge Connectors, use complete 8 digit part - suffix number (i.e., 3461-0000).

Contact Qty.	3M Part Number	Dim "A"	Dim "B"	Dim "C"	Dim "D"	Dim "E"	"X"	"Y"	"Z"
20	3461-0000 3461-0001	1.24 (31.5)	1.80 (45.7)	1.104 (28.04)	1.50 (38.1)	2.00 (50.8)	9	8	19
26	3462-0000 3462-0001	1.54 (39.1)	2.10 (53.3)	1.404 (35.66)	1.80 (45.7)	2.30 (58.4)	12	11	25
34	3463-0000 3463-0001	1.94 (49.3)	2.50 (63.5)	1.804 (45.82)	2.20 (55.9)	2.70 (68.6)	16	15	33
40	3464-0000 3464-0001	2.24 (56.9)	2.80 (71.1)	2.104 (53.44)	2.50 (63.5)	3.00 (76.2)	19	18	39

Refer to page 35 for recommended P.C. Board configuration.

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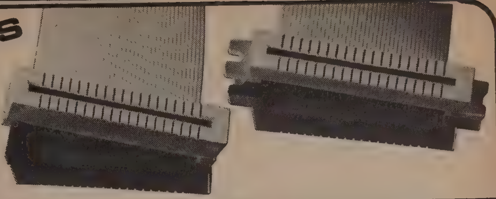
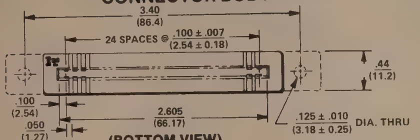
Scotchflex® BRAND CARD-EDGE CONNECTORS

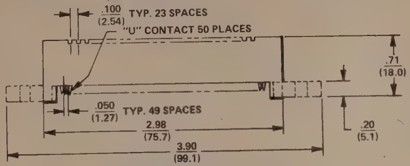


3M PART NUMBER 3415-____

CONNECTOR BODY

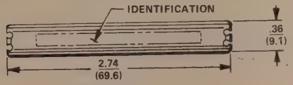

3.40
(86.4)
24 SPACES @ .100 ± .007 (2.54 ± 0.18)
.44
(11.2)
.100
(2.54)
.050
(1.27)
2.605
(66.17)
.125 ± .010 (3.18 ± 0.25) DIA. THRU

(BOTTOM VIEW)

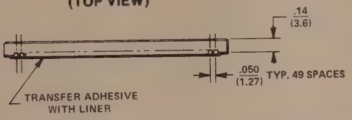

.100 (2.54) TYP. 23 SPACES
"U" CONTACT 50 PLACES
.71
(18.0)
.050 (1.27) TYP. 49 SPACES
2.98
(75.7)
.20
(5.1)
3.90
(99.1)

(SIDE VIEW)

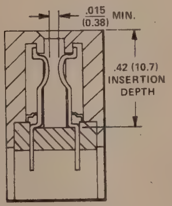
CONNECTOR COVER


IDENTIFICATION
.36
(9.1)
2.74
(69.6)

(TOP VIEW)


.14
(3.6)
.050 (1.27) TYP. 49 SPACES
TRANSFER ADHESIVE WITH LINER

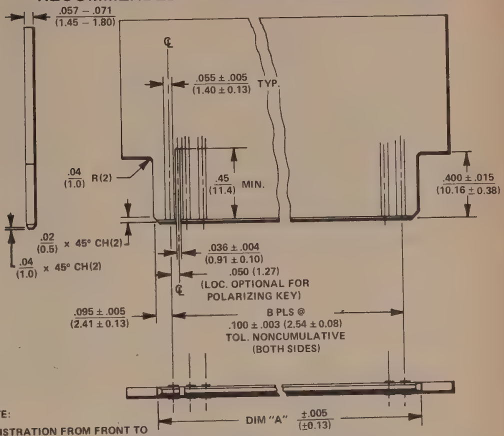
(SIDE VIEW)


.015 (0.38) MIN.
.42 (10.7) INSERTION DEPTH

3M Suffix Number	Mounting Style
-0000	With mounting ears
-0001	Without mounting ears

NOTE: When ordering 3M Brand Card-Edge connectors, use complete 8 digit part - suffix number (i.e., 3415-0000).

RECOMMENDED P.C. BOARD CONFIGURATION


.057 – .071
(1.45 – 1.80)
℄
.055 ± .005 (1.40 ± 0.13) TYP.
.04 (1.0) R(2)
.45 (11.4) MIN.
.400 ± .015 (10.16 ± 0.38)
.02 (0.5) × 45° CH(2)
.04 (1.0) × 45° CH(2)
.036 ± .004 (0.91 ± 0.10)
.050 (1.27) (LOC. OPTIONAL FOR POLARIZING KEY)
℄
.095 ± .005 (2.41 ± 0.13)
B PLS @ .100 ± .003 (2.54 ± 0.08) TOL. NONCUMULATIVE (BOTH SIDES)
DIM "A" ±.005 (±0.13)

NOTE:
REGISTRATION FROM FRONT TO BACK ±.005 (±0.13)

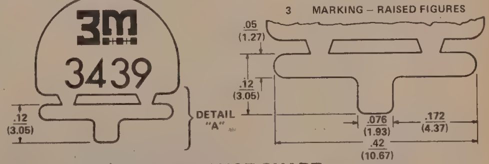
DIMENSIONS	
U.S.	Inches
Metric	(mm)

Contact Qty.	3M Part Number	Dim "A"	B
20	3461-____	1.095 (27.81)	9
26	3462-____	1.395 (35.43)	12
34	3463-____	1.795 (45.59)	16
40	3464-____	2.095 (53.21)	19
50	3415-____	2.595 (65.91)	24

3M PART NO. 3439-0000 POLARIZING KEY

USED WITH 3M PART NOS: 3415, 3461, 3462, 3463, 3464

NOTES:
1. MATERIAL – POLYCARBONATE (.027 [0.69] THK.)
2. COLOR – GRAY
3. MARKING – RAISED FIGURES


3M
3439
.12
(3.05)
DETAIL "A"
.05
(1.27)
.12
(3.05)
.076
(1.93)
.172
(4.37)
.42
(10.67)

DETAIL "A"

Scotchflex® BRAND CARD-EDGE CONNECTOR REFERENCE CHART

Contact Qty.	Grid Spacing	3M Part Number	Locator Plate Number	Platen Number	Mating Scotchflex Cable
20	.100" (2.54)	3461-0000 3461-0001	3443-11	3442-4	3350/20, 3365/20, 3306/20, 3469/20, 3476/20
26		3462-0000 3462-0001		3442-7	3350/26, 3365/26, 3306/26, 3469/26, 3476/26
34		3463-0000 3463-0001		3442-3	3350/34, 3365/34, 3306/34, 3469/34, 3476/34
40		3464-0000 3464-0001		3442-8	3350/40, 3365/40, 3306/40, 3380/40, 3469/40, 3476/40
50		3415-0000 3415-0001		3442-1	3350/50, 3365/50, 3306/50, 3380/50, 3469/50, 3476/50

NOTE: While the above data was correct at the time of publication, it is recommended that for specification purposes a current Spec Data Sheet on the specific connector be requested. These sheets contain full dimensional details and are available on request from the SCOTCHFLEX representative in your area.

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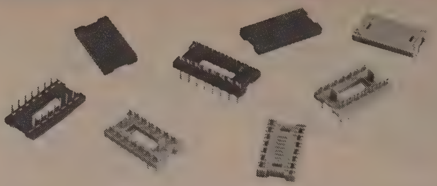
Scotchflex BRAND D.I.P. CONNECTORS



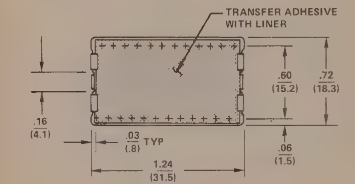
INTRODUCTION

Solderless connections with 14, 16 and 24 pin dual in-line plugs, which mate with standard I.C. sockets and high density D.I.P. panels, are now possible using Scotchflex Brand connectors. Offering interboard bussing capabilities, Scotchflex Brand D.I.P. connectors are designed to conserve space on the P.C. board. Fast, economical terminations using either flat cable or discrete wires make Scotchflex D.I.P. connectors an ideal choice.

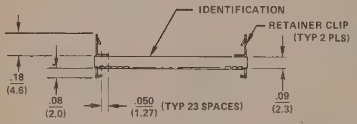
TYPICAL PROPERTIES OF Scotchflex BRAND D.I.P. CONNECTORS

PHYSICAL PROPERTIES			
GRID SPACING	.100″ X .300″ (2.54 mm X 7.62 mm)	.100″ X .300″ (2.54 mm X 7.62 mm)	.100″ X .600″ (2.54 mm X 15.24 mm)
3M PART NO	3406-____	3416-____	3460-____
INSULATION MATERIAL	GLASS REINFORCED POLYESTER; U.L. FLAMMABILITY RATING, 94V-O		
COLOR	GRAY	RED	GRAY
CONTACT MATERIAL	BERYLLIUM COPPER		
CONTACT PLATING	0.000030″ (.762 μm) MIN. GOLD PER MIL-G-45204 TYPE II OVER 0.000050″ (1.27 μm) NICKEL		
MARKING	RAISED FIGURES; 3M PART & IDENTIFICATION NUMBER, CONTACT POSITION NUMBER		
ELECTRICAL PROPERTIES			
CURRENT RATING	1 AMP		
INSULATION RESISTANCE	>5 X 10⁶ OHMS		
DIELECTRIC WITHSTANDING VOLTAGE	>500 VOLTS AT SEA LEVEL		
ENVIRONMENTAL PROPERTIES			
TEMPERATURE RATING	-67°F TO +221°F (-55°C TO +105°C)		

3M PART NO. 3460-
CONNECTOR COVER

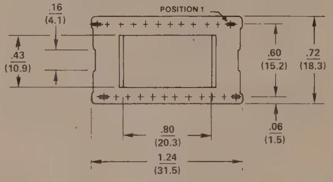


(BOTTOM VIEW)



(SIDE VIEW)

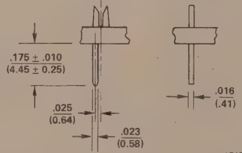
CONNECTOR BODY



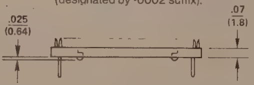
(TOP VIEW)

DIMENSIONS	
U S	Inches
Metric	(mm)

CONTACT DETAIL

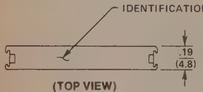


NOTE: .018 (.46) diameter round legs available on request (designated by -0002 suffix).

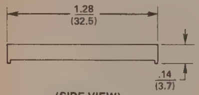


(SIDE VIEW)

STRAIN RELIEF CLIP FOR 3460-____CONNECTOR (SHIPPED WITH CONNECTOR)



(TOP VIEW)



(SIDE VIEW)

Scotchflex BRAND D.I.P. CONNECTOR REFERENCE CHART

Contact Qty.	Grid Spacing	3M Part No.	Connector Description	Strain Relief Clip Part No.	Platen Part No.	Locator Plate Part No.	Mates with 3M Flat Cable 3350	3365	3306	3469
14	.100 x .300 (2.54 x 7.62)	3406-0000	Rectangular leg with flat cable cover	3448-7	3442-1	3443-12	X	X	X	X
		3406-0002	Round leg with flat cable cover				X	X	X	X
		3406-1000	Rectangular leg with individual wire cover				28 AWG & 26 AWG Stranded & Solid Individual Insulated Wire			
16	.100 x .300 (2.54 x 7.62)	3416-0000	Rectangular leg with flat cable cover	3448-8	3442-1	3443-13.	X	X	X	X
		3416-0002	Round leg with flat cable cover				X	X	X	X
		3416-1000	Rectangular leg with individual wire cover				28 AWG & 26 AWG Stranded & Solid Individual Insulated Wire			
24	.100 x .600 (2.54 x 15.24)	3460-0000	Rectangular leg with flat cable cover	(Shipped with Connector)	3442-6	3443-10	X	X	X	
		3460-0002	Round leg with flat cable cover				X	X	X	

Each SCOTCHFLEX connector is identified by an eight digit part number When ordering, be sure to include the complete number. (i.e., 3460-0000). **NOTE:** While the above data was correct at the time of publication, it is recommended that for specification purposes a current Spec Data Sheet on the specific connector be requested. These sheets contain full dimensional details and are available on request from the SCOTCHFLEX representative in your area

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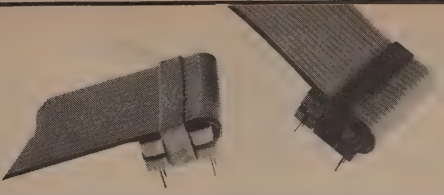
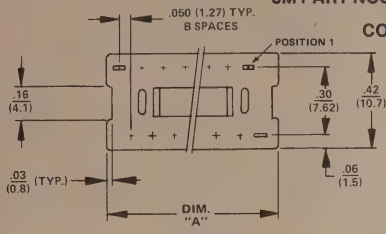
Scotchflex® BRAND D.I.P. CONNECTORS .100"(2.54mm) x .300"(7.62mm) GRID SPACING

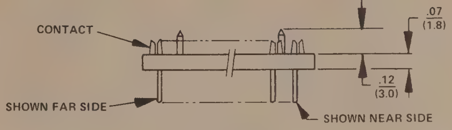


3M PART NOS. 3406-_____ & 3416-_____

CONNECTOR BODY


.050 (1.27) TYP.
B SPACES
POSITION 1
.16 (4.1)
.30 (7.62)
.42 (10.7)
.03 (0.8) (TYP.)
.06 (1.5)
DIM. "A"

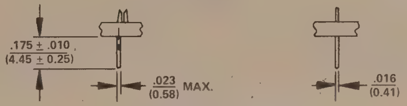
(TOP VIEW)


CONTACT
.07 (1.8)
.12 (3.0)
SHOWN FAR SIDE
SHOWN NEAR SIDE

(SIDE VIEW)

DIMENSION TABLE

Contact Quantity	3M Part Number	DIM "A"	DIM "B"
14	3406	.75 (19.1)	13
16	3416	.85 (21.6)	15


.175 ± .010
(4.45 ± 0.25)
.023 (0.58) MAX.
.016 (0.41)

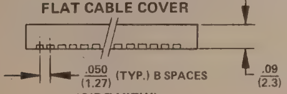
CONTACT DETAIL

NOTE: .018 (.46) diameter round contact legs available on request (designated by -0002 suffix).

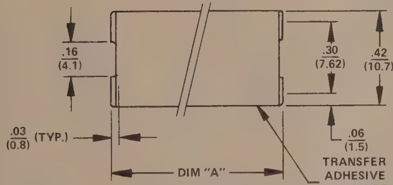
CONNECTOR COVER

3M PART NOS. 3406-0000 & 3416-0000

FLAT CABLE COVER


.050 (1.27) (TYP.) B SPACES
.09 (2.3)

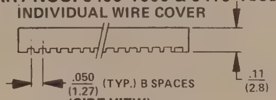
(SIDE VIEW)


.16 (4.1)
.30 (7.62)
.42 (10.7)
.03 (0.8) (TYP.)
.06 (1.5)
DIM "A"
TRANSFER ADHESIVE AND LINER

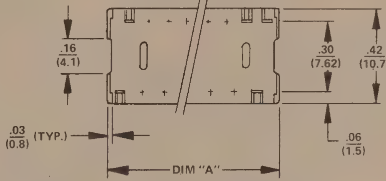
(BOTTOM VIEW)

3M PART NOS. 3406-1000 & 3416-1000

INDIVIDUAL WIRE COVER

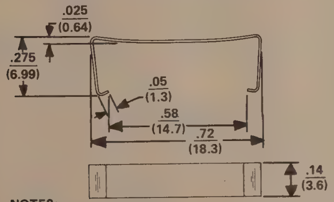

.050 (1.27) (TYP.) B SPACES
.11 (2.8)

(SIDE VIEW)


.16 (4.1)
.30 (7.62)
.42 (10.7)
.03 (0.8) (TYP.)
.06 (1.5)
DIM "A"

(BOTTOM VIEW)

3448-7 STRAIN RELIEF CLIP FOR USE WITH 3406-____

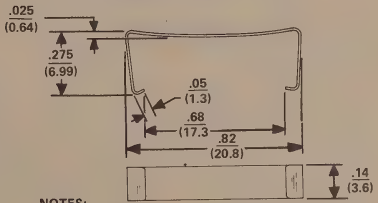

.025 (0.64)
.275 (6.99)
.05 (1.3)
.58 (14.7)
.72 (18.3)
.14 (3.6)

NOTES:

1 – MATERIAL: STEEL 30 GA. [.010 (2.54) THK.]
2 – FINISH: EPOXY COATING .01/(.3) NOMINAL
3 – COLOR: GRAY

DIMENSIONS	
U.S.	Inches
Metric	(mm)

3448-8 STRAIN RELIEF CLIP FOR USE WITH 3416-____


.025 (0.64)
.275 (6.99)
.05 (1.3)
.68 (17.3)
.82 (20.8)
.14 (3.6)

NOTES:

1 – MATERIAL: STEEL 30 GA. [.010/(0.25) THK]
2 – FINISH: EPOXY COATING, .01 (.3) NOMINAL
3 – COLOR – RED

Each SCOTCHFLEX connector is identified by an eight digit part number. When ordering, be sure to include the complete number.i.e., 3416-0000).
NOTE: While the above data was correct at the time of publication, it is recommended that for specification purposes a current Spec Data Sheet on the specific connector be requested. These sheets contain full dimensional details and are available on request from the SCOTCHFLEX representative in your area.

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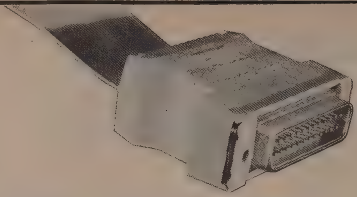
Scotchflex® BRAND DELTA CONNECTOR SYSTEM



INTRODUCTION

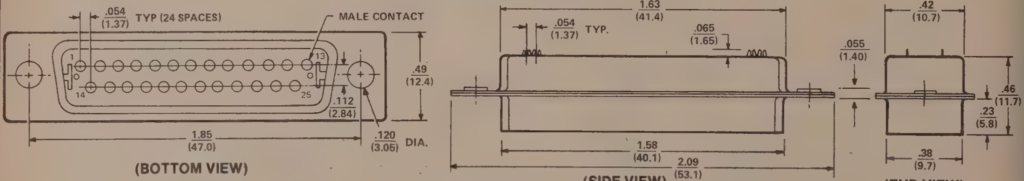
The revolutionary SCOTCHFLEX Delta Connector System is similar in configuration and compatible with other "D" subminiature connectors existing in the industry. It offers the first connector of its kind where it is not necessary to strip, solder, crimp and individually position discrete wires into the connector body. This connector offers simultaneous insulation stripping and terminating using the proven "U" contact principle of connecting a unique SCOTCHFLEX flat cable or individual insulated conductors to the connector. A SCOTCHFLEX brand cable, made especially for the SCOTCHFLEX Delta Connector System, with conductors alternating from .050" (1.27 mm) to .054" (1.37 mm) every 9.5" (24.13 cm) is specifically designed to provide instant interfacings of equipment based on two standard center spacings. Maximum versatility is achieved, for it is possible to connect a SCOTCHFLEX Delta Connector to other existing lines of SCOTCHFLEX connectors (i.e., Socket, P.C.B., D.I.P. and Card-Edge). Customer requirements for implementing the SCOTCHFLEX Delta Connector System are met through the complete line of accessory components.

TYPICAL PROPERTIES OF THE SCOTCHFLEX DELTA CONNECTOR 3M PART NOS. 3482-1000 & 3483-1000

No. of Contacts	3M Part No.	Description
25	3482-1000	pin version
25	3483-1000	socket version

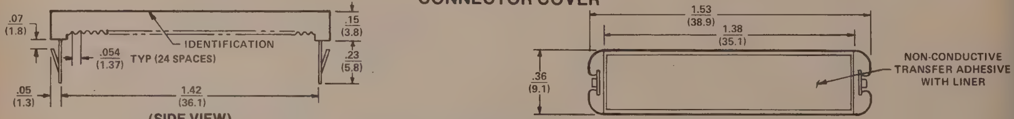
PHYSICAL
Contact housing—Glass reinforced polyester; U.L. Flammability rating 94V-O, encased in chromate plated steel shell
Color—Gray
Contact material—Beryllium copper
Contact plating—.000050" (1.27 μm) gold per MIL-G-45204 over .000050" (1.27 μm) electroless nickel
Marking—Raised figures; 3M and part identification numbers, contact position numbers
Wire accommodation—26 AWG solid
ELECTRICAL
Current rating—1 AMP
Insulation resistance—5 x 10^6 ohms minimum
Dielectric strength— >500 volts (sea level)
ENVIRONMENTAL
Temperature rating— -67°F to +221°F (-55°C to +105°C)

3M PART NO. 3482-1000 CONNECTOR BODY



(BOTTOM VIEW) (SIDE VIEW) (END VIEW)

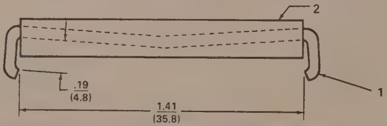
CONNECTOR COVER



(SIDE VIEW) (BOTTOM VIEW)

3M PART NO. 3448-6 STRAIN RELIEF CLIP

DIMENSIONS	
U.S.	Inches
Metric	(mm)



NOTES:

1 MATERIAL: STEEL MUSIC WIRE, 19 GA. [.043/(1.09) DIA.]
PLATING: NICKEL

2 MATERIAL: EXTRUDED POLYVINYL CHLORIDE
COLOR: GRAY

NOTE: Each SCOTCHFLEX connector is identified by an eight digit part number. When ordering, be sure to include the complete number. (i.e., 3482-1000).

NOTE: While the above data was correct at the time of publication, it is recommended that for specification purposes a current Spec Data Sheet on the specific connector be requested. These sheets contain full dimensional details and are available on request from the SCOTCHFLEX representative in your area.

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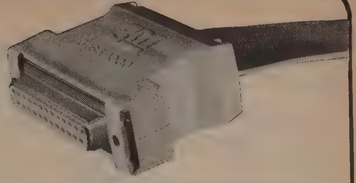
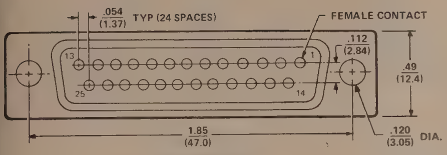
Scotchflex® BRAND DELTA CONNECTOR SYSTEM

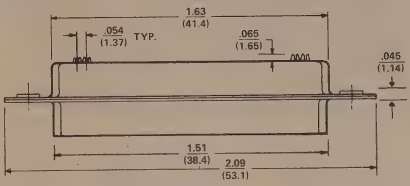


3M PART NO. 3483-1000

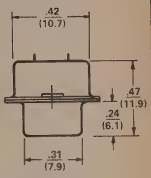
CONNECTOR BODY


.054 (1.37) TYP (24 SPACES)
FEMALE CONTACT
13
1
25
14
.112 (2.84)
.49 (12.4)
1.85 (47.0)
.120 (3.05) DIA.

(BOTTOM VIEW)

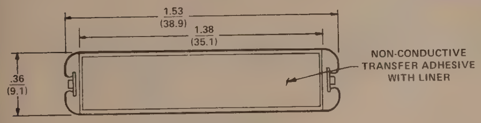

1.63 (41.4)
.054 (1.37) TYP.
.065 (1.65)
.045 (1.14)
1.51 (38.4)
2.09 (53.1)

(SIDE VIEW)

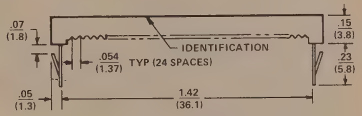

.42 (10.7)
.47 (11.9)
.24 (6.1)
.31 (7.9)

(END VIEW)

CONNECTOR COVER


1.53 (38.9)
1.38 (35.1)
.36 (9.1)
NON-CONDUCTIVE TRANSFER ADHESIVE WITH LINER

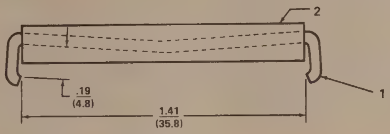
(BOTTOM VIEW)


.07 (1.8)
IDENTIFICATION
.054 (1.37) TYP (24 SPACES)
.15 (3.8)
.23 (5.8)
.05 (1.3)
1.42 (36.1)

(SIDE VIEW)

3M PART NUMBER 3448-6
STRAIN RELIEF CLIP

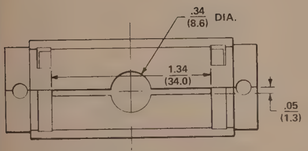
DIMENSIONS	
U.S.	Inches
Metric	(mm)


2
1
.19 (4.8)
1.41 (35.8)

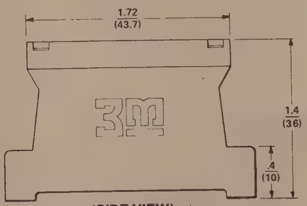
NOTES:

1. MATERIAL – STEEL MUSIC WIRE, 19 GA. [.043/(1.09) DIA.]
   PLATING – NICKEL
2. MATERIAL – EXTRUDED POLYVINYL CHLORIDE
   COLOR – GRAY

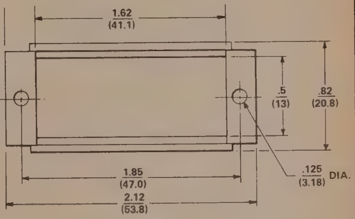
3M PART NUMBER 3485-1000
JUNCTION SHELL


.34 (8.6) DIA.
1.34 (34.0)
.05 (1.3)

(BOTTOM VIEW)


1.72 (43.7)
3M
1.4 (36)
.4 (10)

(SIDE VIEW)


1.62 (41.1)
.5 (13)
.82 (20.8)
.125 (3.18) DIA.
1.85 (47.0)
2.12 (53.8)

(TOP VIEW)

NOTES:

1. MATERIAL: POLYPROPYLENE (UL 94V-O)
2. COLOR: GRAY

NOTE: While the above data was correct at the time of publication, it is recommended that for specification purposes a current Spec Data Sheet on the specific connector be requested. These sheets contain full dimensional details and are available on request from the SCOTCHFLEX representative in your area.

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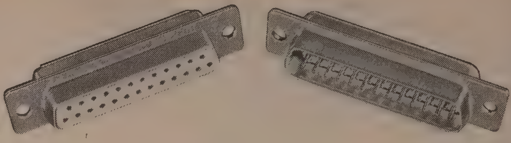
Scotchflex® BRAND DELTA CONNECTOR SYSTEM

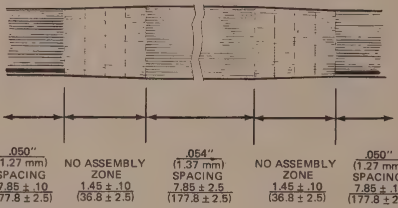


3M PART NO. 3349/25 ROUND CONDUCTOR FLAT CABLE

TYPICAL PROPERTIES OF Scotchflex® BRAND DELTA CONNECTORS

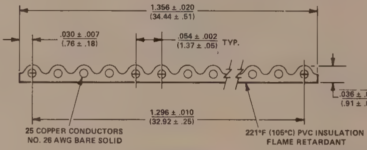
No of Conductors 25	3M Part No. 3349/25
PHYSICAL	
Insulator material—Polyvinyl chloride, U.L. style no. 2651, flammability rating of FR-1.	
Color—Gray	
Conductors—26 AWG solid	
Markings—Red line indicating .050 inch (1.27 mm) center to center conductor area. Raised lines running across cable indicating transition area from .050 inch (1.27 mm) to .054 inch (1.37 mm) center. Termination is made outside these lines.	
ELECTRICAL	
Ground Signal Ground (GSG) Configuration	
Impedance—94 ohms (nominal)	
Capacitance—14.6 pF/ft. (47.9 pF/m)	
Inductance—.16 μH/ft. (.52 μH/m)	
Propagation Delay—1.46 ns/ft. (4.79 ns/m)	
Insulation Resistance—10^{10} ohms/10 ft. (3 m)	
Voltage Rating—300 volts RMS	
Ground Signal (GS) Configuration	
Impedance—137 ohms (nominal)	
Capacitance—8.0 pF/ft. (26.2 pF/m)	
Inductance—.25 μH/ft. (.41 μH/m)	
Propagation Delay—1.42 ns/ft. (4.66 ns/m)	
Insulation Resistance— 10^{10} ohms/10 ft. (3 m)	
Voltage Rating—300 volts RMS	
ENVIRONMENTAL	
Temperature Rating— -4°F to +221°F (-20°C to +105°C)	

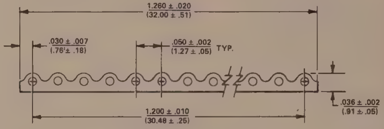
SCOTCHFLEX 3349/25 FLAT CABLE


.050" (1.27 mm) SPACING 7.85 ± .10 (177.8 ± 2.5)
NO ASSEMBLY ZONE 1.45 ± .10 (36.8 ± 2.5)
.054" (1.37 mm) SPACING 7.85 ± 2.5 (177.8 ± 2.5)
NO ASSEMBLY ZONE 1.45 ± .10 (36.8 ± 2.5)
.050" (1.27 mm) SPACING 7.85 ± .10 (177.8 ± 2.5)

NOTES:

1. **Pattern repeats itself every 18.62 ± .25 (473.0 ± 6.4)**
2. **Cable marking is red stripe down .050 (1.27) spacing, for a lineal length of 7.50 ± .25 (189.5 ± 6.4)**

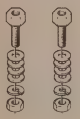

1.356 ± .020 (34.44 ± .51)
.030 ± .007 (.76 ± .18)
.054 ± .002 (1.37 ± .05) TYP.
.036 ± .002 (.91 ± .05)
1.296 ± .010 (32.92 ± .25)
25 COPPER CONDUCTORS NO. 26 AWG BARE SOLID
221°F (105°C) PVC INSULATION FLAME RETARDANT


1.260 ± .020 (32.00 ± .51)
.030 ± .007 (.76 ± .18)
.050 ± .002 (1.27 ± .05) TYP.
.036 ± .002 (.91 ± .05)
1.200 ± .010 (30.48 ± .25)

DIMENSIONS	
U.S.	Inches
Metric	(mm)

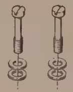
SYSTEM ACCESSORIES ASSEMBLY KITS

3M PART 3341-1
JACK SOCKET ASSEMBLY



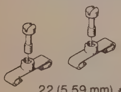
.44" (11.18 mm) long
#4-40 NC-2A Jack Socket—2 ea.
#4 Flat Washer—8 ea.
#4 Split Washer—2 ea.
3/16" (4.66 mm)
#4-40 NC-2B Hex Nut—2 ea.

3M PART NO. 3342-2
JACK SCREW ASSEMBLY (LONG)



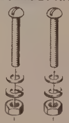
.57" (14.48 mm)
#4-40 NC-2A
Jack Screw—2 ea.
#4 Flat Washer—4 ea.

3M PART NO. 3342-1
JACK SCREW ASSEMBLY (SHORT)



.22 (5.59 mm) #4-40 NC-2A Jack Screw—2 ea.
Screw Retainer Clip—2 ea.

3M PART NO. 3343-1
ASSEMBLY KIT

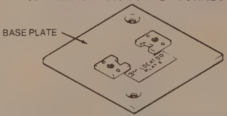


1.375" (3.49 cm) #4-40 NC-2A
Round Head Screw—2 ea.
#4 Flat Washer—2 ea.
#4 Split Lockwasher—2 ea.
3/16" (4.66 mm) NC-2B
Hex Nut—2 ea.

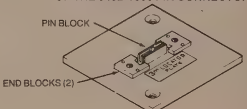
LOCATOR PLATES

FOR ASSEMBLY OF THE SCOTCHFLEX BRAND DELTA CONNECTORS, PART NOS. 3482-1000 AND 3483-1000

3M PART NO. 3443-30 FOR ASSEMBLY OF THE 3483-1000 SOCKET CONNECTOR


BASE PLATE
3M LOCATOR PLATE

3M PART NO. 3443-39 FOR ASSEMBLY OF THE 3482-1000 PIN CONNECTOR


PIN BLOCK
END BLOCKS (2)
3M LOCATOR PLATE

SCOTCHFLEX brand cable is identified by a six digit part - suffix number. When ordering, be sure to include the complete number.

NOTE: While the above data was correct at the time of publication, it is recommended that for specification purposes a current Spec Data Sheet on the specific cable be requested. These sheets contain full dimensional details and are available on request from the SCOTCHFLEX representative in your area.

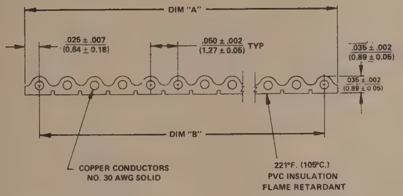
Electronic Products Division 3M COMPANY
3M CENTER • SAINT PAUL, MINNESOTA 55101

Scotchflex® BRAND FLAT CABLES

ROUND CONDUCTOR FLAT CABLE

The 3M Company supplies 6 standard round conductor flat cables. They come in wire sizes #30 AWG Solid, #28 AWG Stranded, #26 AWG Solid and #24 Stranded with up to 50 conductor widths. Depending on the particular cable, there are three center spacings to choose from — .050", .0625" and .075". Being zippable, breakouts can be made when more than one connector is required on an end. With this wide selection, 3M has the right cable to meet your needs.

3M PART NO. 3350/__ .050 (1.27) CENTER SPACING

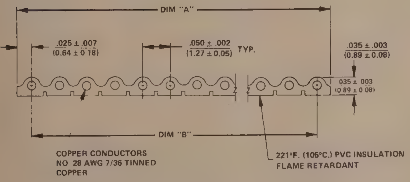

DIM "A"
.025 ± .007 (0.64 ± 0.18)
.050 ± .002 (1.27 ± 0.05) TYP
.035 ± .002 (0.89 ± 0.05)
.035 ± .002 (0.89 ± 0.05)
DIM "B"
COPPER CONDUCTORS NO. 30 AWG SOLID
221°F. (105°C.) PVC INSULATION FLAME RETARDANT

Number of Conductors	3M Part No	DIM "A"	DIM "B"
10	3350/10	.500 ± .010 (12 70 ± 0.25)	.450 ± .007 (11.43 ± 0.18)
14	3350/14	.700 ± .010 (17.78 ± 0.25)	.650 ± .007 (16.51 ± 0.18)
16	3350/16	.800 ± .015 (20.32 ± 0.38)	.750 ± .011 (19.05 ± 0.28)
20	3350/20	1.000 ± .015 (25.40 ± 0.38)	.950 ± .011 (24.13 ± 0.28)
24	3350/24	1.200 ± .015 (30 48 ± 0.38)	1.150 ± .011 (29.21 ± 0.28)
26	3350/26	1 300 ± .015 (33.02 ± 0.38)	1.250 ± .011 (31 75 ± 0.28)
34	3350/34	1.700 ± .020 (43.18 ± 0.51)	1.650 ± .011 (41 91 ± 0.28)
40	3350/40	2.000 ± .020 (50 80 + 0 51)	1.950 ± .015 (49.53 ± 0.38)
50	3350/50	2.500 ± .020 (63.50 ± 0.51)	2.450 ± .015 (62.23 ± 0.38)

NOTE:
1 RED MARKING ON ONE EDGE OF CABLE

U.L. STYLE NO. 2651

3M PART NO. 3365/ .050 (1.27) CENTER SPACING


DIM "A"
.025 ± .007 (0.64 ± 0.18)
.050 ± .002 (1.27 ± 0.05) TYP.
.035 ± .003 (0.89 ± 0.08)
.035 ± .003 (0.89 ± 0.08)
DIM "B"
COPPER CONDUCTORS NO 28 AWG 7/36 TINNED COPPER
221°F. (105°C.) PVC INSULATION FLAME RETARDANT

Number of Conductors	3M Part No.	DIM "A"	DIM "B"
10	3365/10	.500 ± .010 (12.70 ± 0.25)	.450 ± .007 (11.43 ± 0.18)
14	3365/14	700 ± .010 (17 78 ± 0.25)	.650 ± .007 (16.51 ± 0.18)
16	3365/16	.800 ± .015 (20.32 ± 0.38)	.750 ± .011 (19.05 ± 0.28)
20	3365/20	1.000 ± .015 (25.40 ± 0.38)	.950 ± .011 (24.13 ± 0.28)
24	3365/24	1.200 ± .015 (30.48 ± 0.38)	1.150 ± .011 (29.21 ± 0.28)
26	3365/26	1 300 ± .015 (33.02 ± 0.38)	1.250 ± .011 (31 75 ± 0.28)
34	3365/34	1 700 ± 020 (43 18 ± 0 38)	1.650 ± .011 (41 91 ± 0.28)
40	3365/40	2.000 ± .020 (50.80 ± 0.51)	1.950 ± .015 (49.53 ± 0.38)
50	3365/50	2.500 ± 0.20 (63.50 ± 0.51)	2.450 ± 015 (62.23 ± 0.38)

NOTE:
1 RED MARKING ON ONE EDGE OF CABLE

U.L. STYLE NO. 2651

When ordering SCOTCHFLEX Brand cable be sure to order by complete 6 digit part - suffix number (i.e., 3365/50).

FLAT CABLES WITH GROUND PLANE

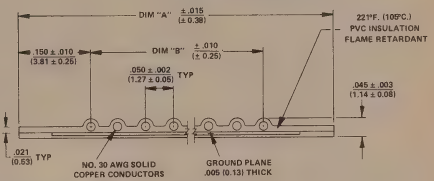
In applications where it is especially critical to control or lower cross-talk or inductive coupling, 3M Company offers a #30 AWG solid and #28 AWG stranded flat cable with a copper mesh ground plane embedded in the insulation parallel with the conductors. In addition, a #28 AWG stranded flat cable comes with a drain wire in contact with the ground plane. All these cables have a .050" wire center spacing and are designed to mate with SCOTCHFLEX connectors.

3M PART NO. 3380/ FLAT CABLE WITH GROUND PLANE .050 (1.27) CENTER SPACING

Number of Conductors	3M Part No.	DIM "A"	DIM "B"
40	3380/40	2.250 (57.15)	1.950 (49.53)
46	3380/46	2.550 (64.77)	2.250 (57.15)
50	3380/50	2.750 (69.85)	2.450 (62.23)

NOTE:
1 GREEN LINE ON INSULATION ABOVE ONE EDGE CONDUCTOR

U.L. STYLE NO. 2682

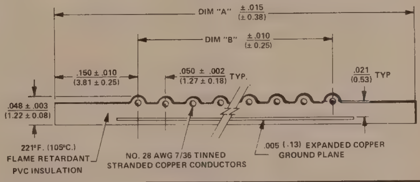

DIM "A" ± .015 (± 0.38)
221°F. (105°C.) PVC INSULATION FLAME RETARDANT
.150 ± .010 (3.81 ± 0.25)
DIM "B" ± .010 (± 0.25)
.050 ± .002 (1.27 ± 0.05) TYP
.045 ± .003 (1.14 ± 0.08)
.021 (0.53) TYP
NO. 30 AWG SOLID COPPER CONDUCTORS
GROUND PLANE .005 (0.13) THICK

3M PART NO. 3469/ FLAT CABLE WITH GROUND PLANE .050 (1.27) CENTER SPACING

Number of Conductors	3M Part No	DIM "A"	DIM "B"
14	3469/14	0.95 (24.13)	0.650 (16.51)
16	3469/16	1.050 (26.67)	0.750 (19.05)
20	3469/20	1.250 (31.75)	0.950 (24.13)
26	3469/26	1.550 (39.37)	1.250 (31.75)
34	3469/34	1.950 (49.53)	1.650 (41.91)
40	3469/40	2.250 (57.15)	1.950 (49.53)
50	3469/50	2.750 (69.85)	2.450 (62.23)

NOTE:
1 RED LINE ON INSULATION ABOVE ONE EDGE CONDUCTOR

U.L. STYLE NO. 2682


DIM "A" ± .015 (± 0.38)
DIM "B" ± .010 (± 0.25)
.150 ± .010 (3.81 ± 0.25)
.050 ± .002 (1.27 ± 0.18) TYP.
.021 (0.53) TYP
.048 ± .003 (1.22 ± 0.08)
221°F. (105°C.) FLAME RETARDANT PVC INSULATION
NO. 28 AWG 7/36 TINNED STRANDED COPPER CONDUCTORS
.005 (.13) EXPANDED COPPER GROUND PLANE

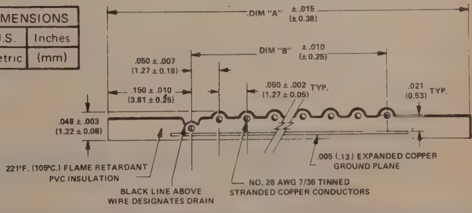
3M PART NO. 3476/ FLAT CABLE WITH GROUND PLANE AND DRAIN WIRE .050 (1.27) CENTER SPACING

Number of Conductors	3M Part No.	DIM "A"	DIM "B"
20	3476/20	1.250 (31.75)	0.950 (24.13)
26	3476/26	1.550 (39.37)	1.250 (31.75)
34	3476/34	1.950 (49.53)	1.650 (41.91)
40	3476/40	2.250 (57.15)	1.950 (49.53)
50	3476/50	2.750 (69.85)	2.450 (62.23)

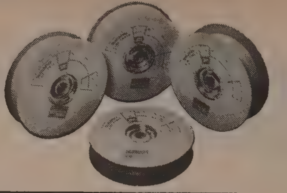
NOTE:
1 BLACK LINE ON INSULATION ABOVE DRAIN WIRE

U.L. STYLE NO. 2682

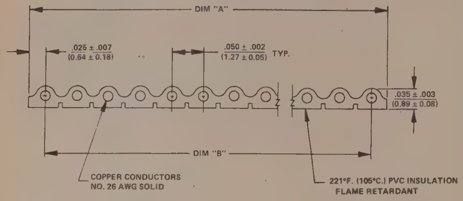
DIMENSIONS	
U.S.	Inches
Metric	(mm)


DIM "A" ± .015 (± 0.38)
DIM "B" ± .010 (± 0.25)
.050 ± .007 (1.27 ± 0.18)
.150 ± .010 (3.81 ± 0.25)
.050 ± .002 (1.27 ± 0.05) TYP.
.021 (0.53) TYP.
.048 ± .003 (1.22 ± 0.08)
.005 (.13) EXPANDED COPPER GROUND PLANE
221°F. (105°C.) FLAME RETARDANT PVC INSULATION
BLACK LINE ABOVE WIRE DESIGNATES DRAIN
NO. 28 AWG 7/36 TINNED STRANDED COPPER CONDUCTORS

Scotchflex® BRAND FLAT CABLES



3M PART NO. 3306/__ .050 (1.27) CENTER SPACING

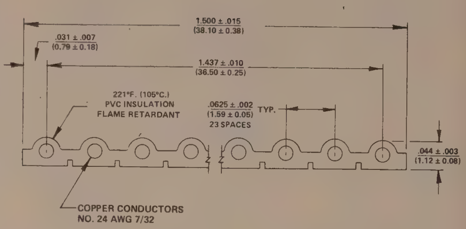

DIM "A"
.025 ± .007 (0.64 ± 0.18)
.050 ± .002 (1.27 ± 0.05) TYP.
.035 ± .003 (0.89 ± 0.08)
DIM "B"
COPPER CONDUCTORS NO. 26 AWG SOLID
221°F. (105°C.) PVC INSULATION FLAME RETARDANT

Number of Conductors	3M Part No.	DIM "A"	DIM "B"
10	3306/10	.500 ± .010 (12.70 ± 0.25)	.450 ± .007 (11.43 ± 0.18)
14	3306/14	.700 ± .010 (17.78 ± 0.25)	.650 ± .007 (16.51 ± 0.18)
16	3306/16	.800 ± .015 (20.32 ± 0.38)	.750 ± .011 (19.05 ± 0.28)
20	3306/20	1.000 ± .015 (25.40 ± 0.38)	.950 ± .011 (24.13 ± 0.28)
24	3306/24	1.200 ± .015 (30.48 ± 0.38)	1.150 ± .011 (29.21 ± 0.28)
26	3306/26	1.300 ± .015 (33.02 ± 0.38)	1.250 ± .011 (31.75 ± 0.28)
34	3306/34	1.700 ± .020 (43.18 ± 0.38)	1.650 ± .011 (41.91 ± 0.28)
40	3306/40	2.000 ± .020 (50.80 ± 0.51)	1.950 ± .015 (49.53 ± 0.38)
50	3306/50	2.500 ± 0.20 (63.50 ± 0.51)	2.450 ± .015 (62.23 ± 0.38)

NOTE:
1 RED MARKING ON ONE EDGE OF CABLE

U.L. STYLE NO. 2651

3M PART NO. 3451/24 .0625 (1.59) CENTER SPACING 24 CONDUCTORS

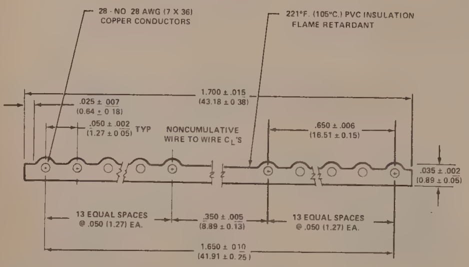

1.500 ± .015 (38.10 ± 0.38)
.031 ± .007 (0.79 ± 0.18)
1.437 ± .010 (36.50 ± 0.25)
221°F. (105°C.) PVC INSULATION FLAME RETARDANT
.0625 ± .002 (1.59 ± 0.05) 23 SPACES
TYP.
.044 ± .003 (1.12 ± 0.08)
COPPER CONDUCTORS NO. 24 AWG 7/32

NOTE:
1 RED MARKING ON ONE EDGE OF CABLE

U.L. STYLE 2651

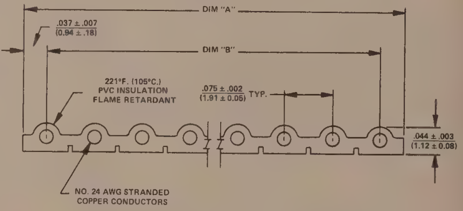
DIMENSIONS	
U.S.	Inches
Metric	(mm)

3M PART NO. 3401/28 .050 (1.27) CENTER SPACING 28 CONDUCTORS


28 - NO 28 AWG (7 X 36) COPPER CONDUCTORS
221°F. (105°C.) PVC INSULATION FLAME RETARDANT
1.700 ± .015 (43.18 ± 0.38)
.025 ± .007 (0.64 ± 0.18)
.050 ± .002 (1.27 ± 0.05) TYP
NONCUMULATIVE WIRE TO WIRE C_L'S
.650 ± .006 (16.51 ± 0.15)
.035 ± .002 (0.89 ± 0.05)
13 EQUAL SPACES @ .050 (1.27) EA.
.350 ± .005 (8.89 ± 0.13)
13 EQUAL SPACES @ .050 (1.27) EA.
1.650 ± .010 (41.91 ± 0.25)

U.L. STYLE NO. 2651

3M PART NO. 3405/__ .075 (1.91) CENTER SPACING


DIM "A"
.037 ± .007 (0.94 ± .18)
DIM "B"
221°F. (105°C.) PVC INSULATION FLAME RETARDANT
.075 ± .002 (1.91 ± 0.05) TYP.
.044 ± .003 (1.12 ± 0.08)
NO. 24 AWG STRANDED COPPER CONDUCTORS

Number of Conductors	3M Part No.	DIM "A"	DIM "B"
28	3405/28	2.100 ± .015 (53.34 ± 0.38)	2.025 + .011 (5.14 ± 0.28)
36	3405/36	2.700 ± .020 (68.58 ± 0.51)	2.625 ± .015 (66.68 ± 0.38)

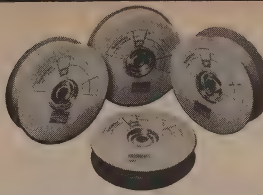
NOTE:
1 RED MARKING ON ONE EDGE OF CABLE

U.L. STYLE NO. 2651

When ordering SCOTCHFLEX Brand cable be sure to order by complete 6 digit part - suffix number (i.e., 3365/50).

Electronic Products Division 3M COMPANY
3M CENTER • SAINT PAUL, MINNESOTA 55101

Scotchflex® BRAND FLAT CABLES



TYPICAL PROPERTIES OF Scotchflex BRAND FLAT CABLES

3M Part Number	3350/__	3365/__	3401/28	3306/__	3451/24	3405/28 3405/36	3380/__	3469/__	3476/__
Insulation Material	Polyvinyl Chloride (PVC) U.L. Rated FR-1						Polyvinyl Chloride (PVC) U.L. Rated FR-1		
Color	Gray						Gray		
Edge Marking	Red		None	Red			Green	Red	Black
Center Spacing	.050" (1.27 mm)				.0625" (1.59 mm)	.075" (1.91 mm)	.050" (1.27 mm)		
Conductor	Solid Copper	Stranded Copper		Solid Copper	Stranded Copper		Solid Copper	Stranded Copper	
Conductor Size	30 AWG	28 AWG (7x36)		26 AWG	24 AWG (7x32)		30 AWG	28 AWG (7x36)	
Conductor Quantity	10 14 16 20 24 26 34 40 50	10 14 16 20 24 26 34 40 50	28	10 14 16 20 24 26 34 40 50	24	28 36	40 46 50	14 16 20 26 34 40 50	20 26 34 40 50
Impedance	125 ohms	105 ohms		95 ohms	85 ohms	100 ohms	75 ohms	65 ohms	
Capacitance	12 pF/ft. (39 pF/m)	15 pF/ft. (49 pF/m)		14 pF/ft. (46 pF/m)	16 pF/ft. (52 pF/m)	13 pF/ft. (43 pF/m)	24.0 pF/ft. (78.7 pF/m)	29.0 pF/ft. (95.1 pF/m)	
Inductance	0.23 µH/ft. (0.75 µH/m)	0.20 µH/ft. (0.66 µH/m)		0.16 µH/ft. (0.52 µH/m)	0.17 µH/ft. (0.56 µH/m)	0.17 µH/ft. (0.56 µH/m)	0.20 µH/ft (0.66 µH/m)	0.14 µH/ft. (0.46 µH/m)	
Propagation Delay	1.42 ns/ft. (4.66 ns/m)	1.40 ns/ft. (4.59 ns/m)		1.42 ns/ft. (4.66 ns/m)	1.29 ns/ft. (4.23 ns/m)	1.33 ns/ft. (4.36 ns/m)	1.68 ns/ft. (5.51 ns/m)	1.65 ns/ft. (5.41 ns/m)	
Insulation Resistance	$>10^{10}$ ohms/ 10 Ft. (3 m)						$>10^{9}$ ohms/ 10 Ft. (3 m)		
Voltage Rating	300 VRMS						300 VRMS		
Temperature Rating	-4°F to +221°F (-20°C to +105°C)						-4°F to +221°F (-20°C to +105°C)		
U.L. Style Number	2651						2682		

FLAT CABLE AND MATING CONNECTOR GUIDE

3M Part No.	Conductor Qty.	Socket	P.C.B.	Card-Edge	D.I.P.
3350/10	10	3473	3474	–	–
3350/14	14	3407	–	–	3406
3350/16	16	3327	–	–	3416
3350/20	20	3421	3422	3461	–
3350/24	24	–	–	–	3460
3350/26	26	3399	3434	3462	–
3350/34	34	3471, 3414	3402	3463	–
3350/40	40	3417	3418	3464	–
3350/50	50	3425	3426	3415	–
3365/10	10	3473	3474	–	–
3365/14	14	3407	–	–	3406
3365/16	16	3327	–	–	3416
3365/20	20	3421	3422	3461	–
3365/24	24	–	–	–	3460
3365/26	26	3399	3434	3462	–
3365/34	34	3471, 3414	3402	3463	–
3365/40	40	3417	3418	3464	–
3365/50	50	3425	3426	3415	–
3306/10	10	3473	3474	–	–
3306/14	14	3407	–	–	3406
3306/16	16	3327	–	–	3416
3306/20	20	3421	3422	3461	–
3306/24	24	–	–	–	3460
3306/26	26	3399	3434	3462	–
3306/34	34	3471, 3414	3402	3463	–
3306/40	40	3417	3418	3464	–
3306/50	50	3425	3426	3415	–
3401/28	28	3471-0001	–	–	–
3451/24	24	3450	3470	–	–
3405/28	28	3441	3468	–	–
3405/36	36	–	3378	–	–
3469/14	14	3407	–	–	3406
3469/16	16	3427	–	–	3416
3469/20	20	3421	3422	3461	–
3469/26	26	3399	3434	3462	–
3469/34	34	3471, 3414	3402	3463	–
3469/40	40	3417	3418	3464	–
3469/50	50	3425	3426	3415	–
3380/40	40	3417	3418	3464	–
3380/50	50	3425	3426	3415	–
3476/20	20	3421	3422	3461	–
3476/26	26	3399	3434	3462	–
3476/34	34	3471, 3414	3402	3463	–
3476/40	40	3417	3418	3464	–
3476/50	50	3425	3426	3415	–

TEST METHODS

Impedance, capacitance, and inductance are measured GROUND — SIGNAL —GROUND on round conductor flat cables.

Ground Plane cables are measured CONDUCTOR to GROUND PLANE.

CAPACITANCE & INDUCTANCE
Direct reading reactance meter to measure small reactances at a frequency between 125 KHz and 140 KHz. With cable in copper guard tube and a guard voltage applied to copper tube and two adjacent wires.

IMPEDANCE
TDR. Far end of cable open circuit. Sample length 10 feet (3 m).

PROPAGATION DELAY
TDR. Sample length 10 feet (3 m). Far end short circuit.

CROSSTALK — Minimum sample length 10'(3 m).6 ns rise time; 1 MHz repetition rate, 2 to 5 volts pulse amplitude, 10 ns pulse width, sample terminated in Z_0.

For test values on crosstalk, or full description of test methods, consult your local 3M SCOTCHFLEX representative or the SCOTCHFLEX distributor in your area.

Electronic Products Division 3M COMPANY
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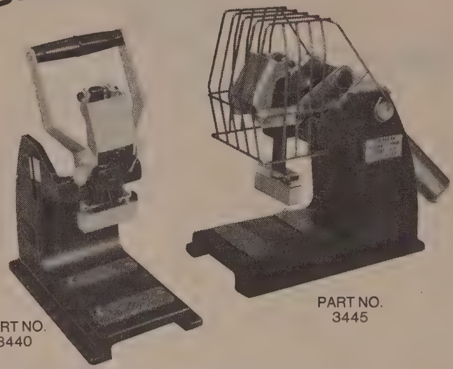
Scotchflex® BRAND ACCESSORIES



PART NO. 3440

PART NO. 3445

3M SUPPLIES EVERYTHING NEEDED TO IMPLEMENT THE Scotchflex BRAND SYSTEM

The SCOTCHFLEX assembly press is a parallel action device designed specifically for use with SCOTCHFLEX connectors. The proper amount of force is applied to connector components to pierce cable insulation and insure a tight interference fit between connector body and cover. Over center handle action reduces operator fatigue. Positive-stop design insures proper assembly pressure with each connection.

Both hand and pneumatically operated presses are available. These presses are die cast for strength and rigidity, and may be bench mounted, or easily moved from position to position. Special fixtures may also be used with the press to meet the requirements of unique SCOTCHFLEX applications.

With these assembly presses come an assortment of hex wrenches, a pressure platen, 3M Part No. 3442-1, and a shut height gauge block, 3M Part No. 3436-1, for making adjustment settings to insure proper termination of 3M cables and connectors.

SPECIFICATIONS

Part No.	3440	3445
Height	7½ ins. (19.05 cm)	10 ins. (25.4 cm)
Width	5¼ ins. (13.34 cm)	5¼ ins. (13.34 cm)
Depth	9½ ins. (24.13 cm)	9½ ins. (24.13 cm)
Weight	7 lbs. (30.8 N)	8 lbs. (35.2 N)
Line Pressure Required	65-125 lbs./sq. in.	

Model 3445 does not include air filtration, air pressure regulation, or actuation control equipment.

Connector locator plates are not included with press.

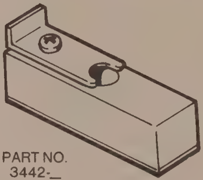
REPLACEMENT PARTS KIT

3M PART NO. 3455

2 small nylon bushings	2 10-32 machine screws
2 small nylon washers	2 10-32 nuts
2 large nylon bushings	2 ¼ x 20 nuts
2 large nylon washers	

DIMENSIONS	
U.S.	Inches
Metric	(mm)

PLATENS



PART NO. 3442-_

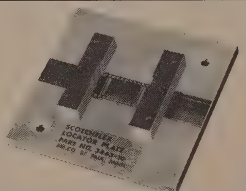
PLATEN GUIDE

3M Part No.	Description
3442-1	(Standard platen shipped with all assembly presses.) For assembly of all SCOTCHFLEX Connectors, except 3378, 3460, 3461, 3462, 3463, and 3464.
3442-2	For assembly of 3378 P.C.B. Connector.
3442-3	For assembly of 3463 Card-Edge Connector.
3442-4	For assembly of 3461 Card-Edge Connector.
3442-6	For assembly of 3460 D.I.P. Connector.
3442-7	For assembly of 3462 Card-Edge Connector.
3442-8	For assembly of 3464 Card-Edge Connector.

LOCATOR PLATE GUIDE

3M Part Number	For Assembly of:
	SOCKET CONNECTORS
3443-1	3399-0000, 3399-1000
3443-2	3407-0000, 3407-1000
3443-3	3414-0000
3443-4	3417-0000
3443-5	3421-0000
3443-6	3471-0000, 3471-0001
3443-7	3425-0000
3443-9	3473-3000, 3421-3000, 3399-3000, 3414-3000, 3417-3000, 3425-3000
3443-20	3441-0000
3443-21	3450-0000
3443-22	3450-0001
3443-23	3473-0000
3443-31	3327-0000
*3443-36	3473-0000, 3421-0000, 3399-0000, 3414-0000, 3417-0000, 3425-0000
	P.C.B. CONNECTORS
3443-8	For assembly after soldering of all versions of: 3474, 3422, 3434, 3402, 3378, 3418, 3426, 3468, and 3470.
3443-15	For assembly before soldering of all versions of: 3474, 3402, 3434, and 3426.
3443-16	For assembly before soldering of all versions of: 3418 and 3422.
3443-19	For assembly before soldering of all versions of: 3378.
*3443-33	For assembly before soldering of 3468.
*3443-34	For assembly before soldering of 3470.

LOCATOR PLATE



PART NO. 3443-__

An assortment of locator plates are available from 3M Company for making the proper connection of SCOTCHFLEX cables to connectors.

	D.I.P. CONNECTORS
3443-10	All versions of 3460.
3443-12	All versions of 3406.
3443-13	All versions of 3416.
	CARD-EDGE CONNECTORS
3443-11	All versions of: 3461, 3462, 3463, 3464, and 3415.
	DISCRETE COMPONENT CONNECTOR
3443-35	3447-0000

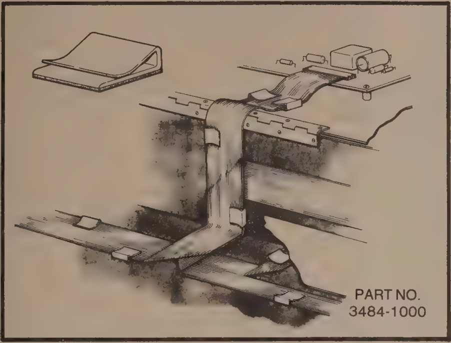
*Available Mid-1975

While the above data was correct at the time of publication, it is recommended that for specification purposes a current Spec Data Sheet on the particular connector be requested. These sheets contain full dimensional details and are available from the Scotchflex sales representative in your area.

Scotchflex® BRAND ACCESSORIES

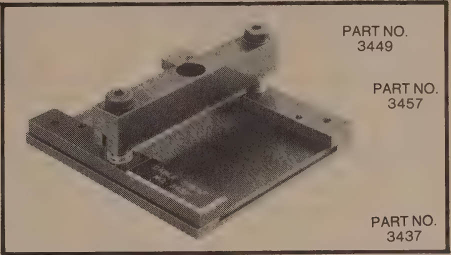
3M SUPPLIES EVERYTHING NEEDED TO IMPLEMENT THE Scotchflex BRAND SYSTEM

CABLE CLAMP



3M Company offers a cable clamp, part no. 3484-1000 to organize and simplify cable routing.

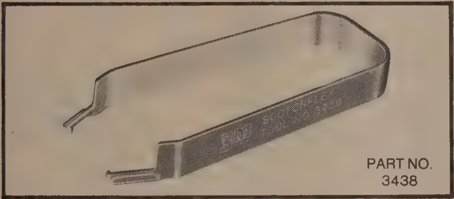
CABLE SHEAR



A precision cable shear, 3M Part No. 3437, is available for use with the assembly press, enabling the user to trim cable ends squarely and quickly.

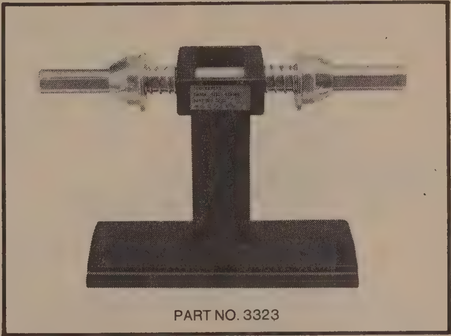
A replaceable cutting board, 3M Part No. 3457, and replacement cutting blades, 3M Part No. 3449, are available for order if needed.

EXTRACTOR TOOL



3M Company supplies a connector extractor tool, part no. 3438, for removing Scotchflex socket connectors from their mating posts.

CABLE REEL STAND



The No. 3323, cable reel stand, provides convenient storing and dispensing of Scotchflex brand cables.

HEADER MOUNTING SCREWS

Where additional header to board mounting is required, use the following screws with the indicated header types.

P.C. Board Thickness	Right Angle Contact	Straight Contact
.062″ (1.57 mm)	2-56 x 3/8″	3M Part No. 3458 (4-40 x 1/4″ Type F)
.063″ - .125″ (1.67 mm - 3.18 mm)	2-56 x 1/2″	3M Part No. 3472 (4-40 x 5/16″ Type F)

CABLE REEL STAND SPECIFICATIONS

HEIGHT	9″ (22.9 cm)
WIDTH	15″ (38.1 cm)
DEPTH	5″ (12.7 cm)
WEIGHT	10 lbs. 10 oz. (46.75N)
MATERIAL	Cast Aluminum
FINISH	Black Enamel
SHAFT	Steel, 1″ (2.54 cm) dia.
MAXIMUM CABLE WIDTH	3½″ (8.89 cm) per side of pedestal
MAXIMUM REEL DIAMETER	14″ (35.6 cm)
MOUNTING CENTERS	4.5″ (11.4 cm) x 10″ (25.4 cm)

Electronic Products Division 3M COMPANY

3M CENTER • SAINT PAUL, MINNESOTA 55101

VACO®

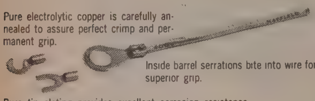
Solderless Connectors

UNCONDITIONALLY GUARANTEED

for quick, positive terminations or connections of wire . . . solid or stranded

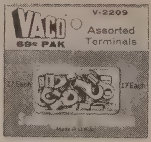
Vaco Terminals and Connectors are produced from the finest materials to give you unequalled accuracy at the lowest possible cost. Ample use of materials means that the current carrying capacity of the devices exceeds that of the wire size they are designed to accept. Uniform, positive connections are made every time with no special skill required.

Your choice of insulated or non-insulated styles.

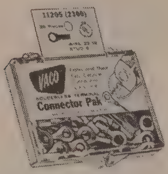

Pure electrolytic copper is carefully annealed to assure perfect crimp and permanent grip.
Inside barrel serrations bite into wire for superior grip.

Pure tin plating provides excellent corrosion resistance and electrical conductivity.

PACKAGED 4 CONVENIENT WAYS



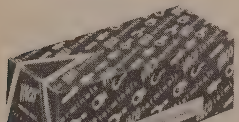
The Vaco "V" Pak is a self closing bubble pak card for the small quantity user. Available in 26 popular sizes and two assortment paks. Standard package 5.



The Vaco "D" Pak holds larger quantity in plastic box for on-the-job use. Standard package 5 per shelf carton.

VACO
Solderless Terminals
11205 (2300)

The Vaco "C Pak" features Mod-Pak packaging. Contains 100 Terminals in individual plastic bags to the box . . . 5 boxes (500 pieces) to master carton.

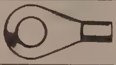


The Vaco "MB" Pak features Mod-Pak packaging for the largest user. Contains 10 Mod-Paks of 100 Terminals each to the carton.

10000 SERIES

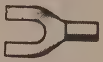
Non-Insulated, Single Grip

Ring Tongue



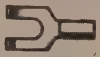
Stock No.	Wire Size	Stud Size	Hole Dia.	Length	Width
11204	22-18	4	7/64	19/32	15/64
11205	22-18	5-6	9/64	19/64	15/64
11206	22-18	5-6	9/64	21/32	19/64
11208	22-18	8	11/64	43/64	21/64
11210	22-18	10	13/64	43/64	21/64
11214	22-18	12-1/4	17/64	59/64	15/32
11238	22-18	3/8	25/64	1-1/16	17/32
11304	16-14	4	7/64	9/16	1/4
11305	16-14	5-6	9/64	9/16	1/4
11306	16-14	5-6	9/64	43/64	21/64
11308	16-14	8	11/64	23/32	21/64
11310	16-14	10	13/64	23/32	21/64
11314	16-14	12-1/4	17/64	59/64	15/32
11338	16-14	3/8	25/64	1-1/16	35/64
11406	12-10	5-6	9/64	23/32	25/64
11408	12-10	8	11/64	23/32	25/64
11410	12-10	10	13/64	23/32	25/64
11414	12-10	12-1/4	17/64	63/64	17/32
11438	12-10	3/8	25/64	1-3/32	39/64

Spade Tongue



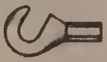
Stock No.	Wire Size	Stud Size	Hole Dia.	Length	Width
13204	22-18	4	7/64	17/32	19/64
13206	22-18	5-6	9/64	5/8	19/64
13208	22-18	8	11/64	23/32	13/32
13210	22-18	10	13/64	23/32	13/32
13306	16-14	4-6	9/64	5/8	19/64
13308	16-14	8	11/64	23/32	13/32
13310	16-14	10	13/64	23/32	13/32
13406	12-10	4-6	9/64	11/16	23/64
13408	12-10	8	11/64	11/16	23/64
13410	12-10	10	13/64	23/32	13/32

Spade Tongue With Flange



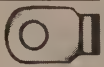
Stock No.	Wire Size	Stud Size	Hole Dia.	Length	Width
14206	22-18	4-6	9/64	11/16	19/64

Hook Tongue



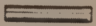
Stock No.	Wire Size	Stud Size	Hole Dia.	Length	Width
15408	12-10	8	11/64	43/64	23/64
15410	12-10	10	13/64	23/32	13/32
15206	22-18	4-6	9/64	43/64	23/64
15208	22-18	8	11/64	43/64	23/64
15210	22-18	10	13/64	43/64	23/64
15306	16-14	4-6	9/64	19/32	5/16
15308	16-14	8	11/64	21/32	23/64
15310	16-14	10	13/64	45/64	13/32

Flag Tongue



Stock No.	Wire Size	Stud Size	Hole Dia.	Length	Width
16210	22-18	8-10	13/64	41/64	3/8
16310	16-14	8-10	13/64	5/8	3/8
16410	12-10	8-10	13/64	3/4	3/8

Butt Connectors



Stock No.	Wire Size	Stud Size	Hole Dia.	Length	Width
17202	22-18	—	—	5/8	9/64
17302	16-14	—	—	5/8	5/32
17402	12-10	—	—	11/16	7/32

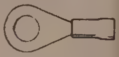
Parallel Connectors

Stock No.	Wire Size	Stud Size	Hole Dia.	Length	Width
17203	22-14	—	—	21/64	9/64
17405	18-10	—	—	21/64	7/32

60000 SERIES

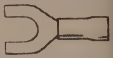
Bellmouth Insulated

Ring Tongue



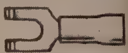
Stock No.	Wire Size	Stud Size	Hole Dia.	Length	Width
61204	22-18	4	7/64	51/64	15/64
61205	22-18	5-6	9/64	51/64	15/64
61206	22-18	5-6	9/64	55/64	19/64
61208	22-18	8	11/64	7/8	21/64
61210	22-18	10	13/64	7/8	21/64
61214	22-18	12-1/4	17/64	1-1/8	15/32
61238	22-18	3/8	25/64	1-17/64	17/32
61304	16-14	4	7/64	51/64	1/4
61305	16-14	5-6	9/64	51/64	1/4
61306	16-14	5-6	9/64	29/32	21/64
61308	16-14	8	11/64	61/64	21/64
61310	16-14	10	13/64	61/64	21/64
61314	16-14	12-1/4	17/64	1-5/32	15/32
61338	16-14	3/8	25/64	1-19/64	35/64
61406	12-10	4-6	9/64	1-1/32	25/64
61408	12-10	8	11/64	1-1/32	25/64
61410	12-10	10	13/64	1-1/32	25/64
61414	12-10	12-1/4	17/64	1-19/64	17/32
61438	12-10	3/8	25/64	1-13/32	39/64

Spade Tongue



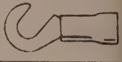
Stock No.	Wire Size	Stud Size	Hole Dia.	Length	Width
63204	22-18	4	7/64	47/64	19/64
63206	22-18	5-6	9/64	53/64	19/64
63208	22-18	8	11/64	59/64	13/32
63210	22-18	10	13/64	59/64	13/32
63306	16-14	4-6	9/64	55/64	19/64
63308	16-14	8	11/64	61/64	13/32
63310	16-14	10	13/64	61/64	13/32
63406	12-10	4-6	9/64	1	23/64
63408	12-10	8	11/64	1	23/64
63410	12-10	10	13/64	1-1/32	13/32

Spade Tongue With Flange



Stock No.	Wire Size	Stud Size	Hole Dia.	Length	Width
64206	22-18	4-6	9/64	57/64	19/64

Hook Tongue

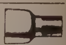


Stock No.	Wire Size	Stud Size	Hole Dia.	Length	Width
65206	22-18	4-6	9/64	7/8	23/64
65208	22-18	8	11/64	7/8	23/64
65210	22-18	10	13/64	7/8	23/64
65306	16-14	4-6	9/64	53/64	5/16
65308	16-14	8	11/64	57/64	23/64
65310	16-14	10	13/64	15/16	13/32

Butt Connectors

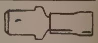
Stock No.	Wire Size	Stud Size	Hole Dia.	Length	Width
67202	22-18	—	—	1-1/16	—
67302	16-14	—	—	1-1/16	—
67402	12-10	—	—	1-1/16	—

Pigtail Connectors



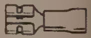
Stock No.	Wire Size	Stud Size	Hole Dia.	Length	Width
67203	22-14	—	—	3/4	21/64
67405	18-10	—	—	53/64	15/32

Quick Connects Male Tab



Stock No.	Wire Size	Stud Size	Hole Dia.	Length	Width
68202	22-18	—	—	29/32	5/16
68301	18-14	—	—	63/64	1/4
68401	12-10	—	—	29/32	5/16

Female Tab



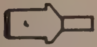
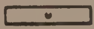
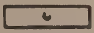
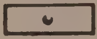
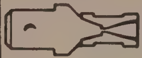
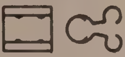
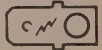
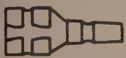
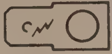
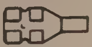
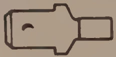
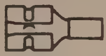
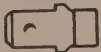
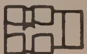
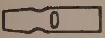
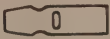
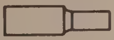
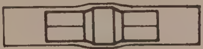
Stock No.	Wire Size	Stud Size	Hole Dia.	Length	Width
68203	22-18	—	—	1-1/4	9/32
68302	18-14	—	—	63/64	1/4
68403	12-10	—	—	1-1/4	9/32

VACO PRODUCTS COMPANY • 510 North Dearborn St. • Chicago, Ill. 60610 • Phone: (312) 467-0123

VACO®

Solderless Connector Kits & Crimping Tools

Illustrations Actual Size

Metal Tab  18201 Wire 22-18	**Butt Connector**  17202* Wire 22-18	**Butt Connector**  17302* Wire 16-14	**Butt Connector**  17402* Wire 12-10	**Adapter (Snap to Male)**  18001	**Adapter (Male to Female)**  18002	**Adapter (Screw to Tab)**  18006 Stud 4-6
Adapter (Snap to Female)  18007	**Adapter (Screw to Tab)**  18010 Stud 8-10	**Female Tab**  18204 Wire 22-18	**Male Tab**  18301* Wire 16-14	**Female Tab**  18302* Wire 16-14	**Angle Male Tab**  18303 Wire 16-14	**Angle Female Tab**  18304 Wire 16-14
Snap Terminal  19301 Wire 16-14	**Snap Terminal**  19303 Wire 16-14	**Snap Stop Lite Conn.**  19305	**Snap Connector**  19302	See facing page for complete selection of Vaco solderless terminals in 4 convenient package types.		

*Available in Insulated Style Also

TERMINAL KITS

No. 2195-63

No. 2195-63 Service Kit. Kit contains 10 different types of popular electrical, radio and TV single-grip terminals and No. 1963 crimping tool. Terminals included are: 11205, 11206, 11210, 11305, 11306, 11310, 14206, 13306, 13310, 15208.

No. 3185-63

No. 3185-63 Service Kit. Especially designed for the appliance, automotive and electrical equipment service man. Contains varied assortment of popular quick connect terminals and adapters plus No. 1963 crimping tool. Terminals included are: 18301, 18302, 18303, 18304, 18001, 18002, 18008, 18007, 19301, 19302.

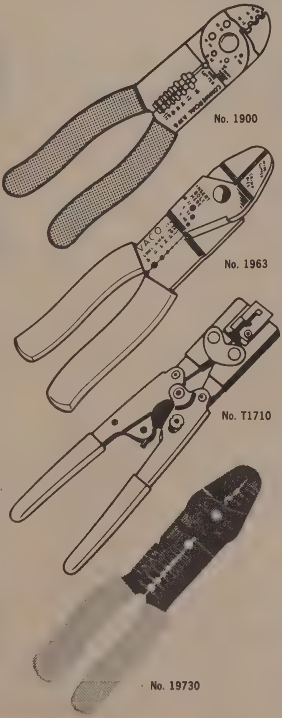
No. 6175-63

No. 6175-63 Service Kit. Kit contains 10 different types of popular insulated single-grip terminals for electrical, radio and TV plus No. 1963 crimping tool. Terminals included are: 51205, 51206, 51210, 51305, 53206, 53306, 53310, 51306, 51310, 54206.

No. 5000-63 Non-Insulated "Cash Register" Assortment. Heavy steel box contains 20 compartmented sections each with supply of 50 single-grip, non-insulated terminals (1000 in all). Complete with identification card in cover for easy selection of any terminal. Size: 13-1/4"x9-1/4"x2".

No. 4900-63 Insulated "Cash Register" Assortment. Same as No. 5000-63 except assortment contains 500 insulated, single-grip terminals in 20 different types and sizes. Plastic insulation is color-coded for size. Size: 13-1/4"x9-1/4"x2".

ATTACHING TOOLS



No. 1900 Tool. Features specially designed crimping dies for use on non-insulated type terminals . . . forms cold weld between wire and terminal barrel. Cuts wire, strips wire and crimps terminals 22 to 10 gauge AWG. Plastic comfort grip handles.

No. 1963 Tool. Patented, all prupose wiring tool cuts wire, strips wire, crimps insulated and non-insulated terminals and slices 6 sizes of bolts (4-40, 5-40, 6-32, 8-32, 10-32, and 10-24). Special features include end positioned wire cutter for reaching into hard-to-get-at places, and new bolt slicing principle that permits less hand pressure for slicing bolts with no burrs to file. Plastic comfort grip handles.

No. T1710 Tool. One tool . . . one die . . . crimps all styles of insulated and non-insulated terminals in wire range from 22-10 gauge AWG. Built-in ratchet with safety release assures uniform crimps every time, and compound lever action from narrow span handles puts "ease in the squeeze." Terminals are quickly positioned for double crimps by special terminal locator. Plastic comfort grip handles.

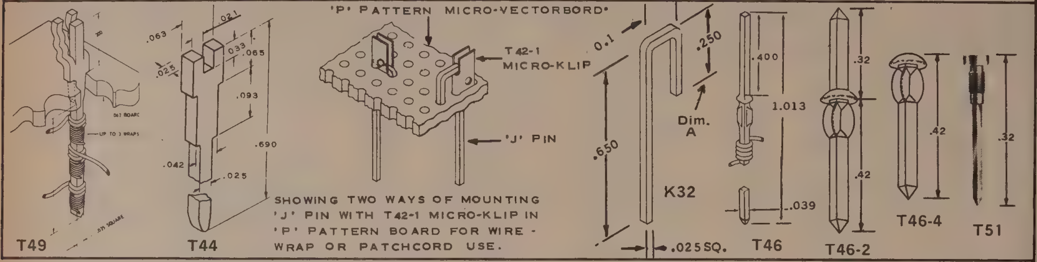
No. 19730 Wire Plier. Unique, highly versatile wiring tool will crimp 7mm ignition terminals and 6 and 8 gauge non-insulated terminals, as well as 10 to 22 AWG insulated and non-insulated terminals. Other features include a wire cutter, stripping dies and bolt cutting dies. Large, comfortable plastic cushion grip handles.

VACO PRODUCTS COMPANY • 510 North Dearborn St. • Chicago, Ill. 60610 • Phone: (312) 467-0123

Vector WIRE WRAPPABLE TERMINALS – TOOLS

WIRE WRAPPABLE TERMINALS AND PINS

Vector "wrap-post" terminals are stamped from high grade phosphor bronze (for hardness) and have sharp corners (maximum radius .003") for "gas-tight" connections when properly wrapped with Vector P160-4 Power Wrapper or other wrapping equipment. Like many other Vector terminals, wrap-post terminals may be installed with inexpensive hand tools. **As a result of their unique board holding design, when properly installed, terminals hold tightly to meet all production requirements.** Wrap-post terminals may be installed wherever required without high cost machines. They are ideal for building sub-assembly production boards for later incorporation in larger assemblies. Most models fit 0.042" dia. circuit board holes ("P" Pattern Micro-Vectorbord®) and those with knurled or "stepped" shank designs may be used in plated-through holes. Different tail lengths accommodate single to multi-level wraps.



SHOWING TWO WAYS OF MOUNTING 'J' PIN WITH T42-1 MICRO-KLIP IN 'P' PATTERN BOARD FOR WIRE-WRAP OR PATCHCORD USE.

T49 TRIFURCATED KLIP-WRAP

Unique three-fingered clip on upper end makes this a time-saving terminal for production or experimental uses. The spring clip holds leads from 0.018" to 0.025", 0.032" or 0.040" until soldered. Hand Insertion Tool P156 is adequate for installing a few at a time, but Spring Impact Tool P158 and D-8 Die Point are recommended for larger quantity installation due to the speed and ease of use.

T44 MINIWRAP

Low profile upper end has .021" wide by .055" deep slot for laying in small wires. Ideal for miniatured assemblies which are to be wire wrapped.

K32 "J" PIN

Lowest cost wrappable terminal. May be used alone in circuit board hole by inserting into two adjacent 0.028" to 0.042" dia. holes and bending shorter leg over for retention. Hooked end can also be embedded in encapsulated assemblies and wraps made on protruding tail. Illustration also shows terminal being used to provide wire wrappable extension tail to T42-1, a solderable Micro-Klip terminal.

T46 MINIWRAP - 0.028" SQ.

Sturdy double ended terminal fits 0.042" dia. holes. Has flanged midsection.

STAR SERIES T46-2,-3,-4 - 0.025" SQ.

This 0.025" sq. double ended terminal stands rigid in 0.042" holes without wobble due to four protrusions on the terminal corners in the terminal midsection. It is ideal for printed circuit applications because the seating flange creates a natural solder fillet bonding point.

T51 SERIES

Lowest profile rounded head is low enough to fit beneath installed DIP packages. Head diameter is .072" and may be used as a solder point for wave or "tack" soldering.

ORDERING INFORMATION

Supplied in Pkg. 100 or 1000

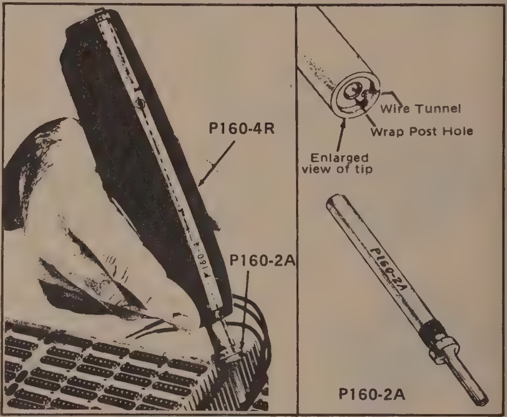
Part No./Plating Tin	Gold	Tail Lgth. Below 1/16" Bd.	Hand Insertion Tool	P158 Tool w/ Die Point:	Install in Hole Dia.
T49	T49A	.560	P156	D-8	.042
T49-1	T49A-1	.388	P156	D-8	.042
T44	T44-1	.500	A13	—	.042

Part No.	Dimension "A"	Insertion Tool	For Staking-- P158 Tool Plus:	Install in Hole Dia.
K32	.250"	Not Required	Not Applicable	.028" min.
K32-2	.170"		D-14 Die; A-14 Anvil	.028" min.
K32-3	.140"		D-14 Die; A-14 Anvil	.028" min.

Part No./Plating Tin	Gold	O/A Lgth.	Hgt. Above Board	Lgth. Below 1/16" Board
T46	T46-1	1.013	.400	.950
T46-2	T46-2A	.74	.32	.358
T46-3	T46-3A	1.02	.42	.538
T46-4	T46-4A	.42	.030	.358

For T46,-1: Order **P158 Tool w/ D7-1 Die Pt.** or **P133A Hand Tool**
For T46-2,-3: Order **P158 Tool w/ D7 Die Pt.** (for T46-4: **D10 Die Pt.**) or **P133B Hand Tool**

Part No.	Material	For Hole Dia.	O/A Lgth.	Hgt. Above Board	Lgth. Below 1/16" Board
T51	Phosphor Bronze	0.042"	.35	.03	.258



WIRE WRAPPING TOOLS

The Vector P160-2A Tool for wrapping wire is the ideal, low-cost manual tool for making solderless wrapped connections. The hardened bit insures long life. The effective radius of .070" permits working on terminals spaced 0.1" apart. The tool will wrap 0.025-0.028" sq. Wrap-Posts (standard Vector terminals), and its 0.56" minimum post hole depth permits multi-level wrap capability. Wire sizes range from 26 ga. through 30 ga., with 28 ga. (0.0129" dia.) preferred. Tool may be used for wrapping bare wire point to point, or for continuous strapping using bare wire fed through the back end of the tool.

P160-1A Dual-Way Unwrap Tool slips over terminal and is turned to unwrap wire which was wrapped either right or left. Use with P160-4L for powered unwrapping of wires wrapped clockwise, and with P160-4R for unwrapping wires wrapped counter-clockwise.

The convenience of a power tool is supplied by the P160-4R (Right Hand) Rechargable Electro-Tool. This lightweight unit (9 oz.) accepts the P160-2A Manual Wrapping Tool (see above) in its chuck. The sturdy, shock-resistent, high torque P160-4R is shaped in a straight configuration, convenient for working on horizontal as well as vertical panels. Just a touch of the switch on its side with the index finger provides 6 to 8 gas-tight wraps. May be used remotely without cord for many hours without recharging-- or may be used with cord to extend its working time.

P160-2A	Manual Wrapping Tool
P160-4R	Power Wrapper, 110V to 2.9 VDC recharging unit, wall hanger, 6' plug-in cord. Order P160-4L (for left hand).
P160-1A	Manual Unwrapping Tool
2323A-28-3	28 ga. bare tinned copper wrapping wire, 50' roll
2323A-28-4	28 ga. tinned copper wrapping wire, Kynar insulated, 50' roll
2323A-32-4	Belsol Solder-Through insulated wrapping wire, 32 ga., 50' "

VECTOR ELECTRONIC COMPANY, INC. 12460 Gladstone Avenue, Sylmar CA 91342 Phone (213) 365-9661 TWX 910-496-1539

Vector SOLDERABLE TERMINALS – TOOLS

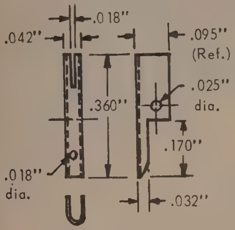
SOLDERABLE TERMINALS AND PINS

Stamped Push-In Terminals -- Hold WITHOUT Staking Faster to Install -- Inexpensive -- Hold Component Leads Until Soldered

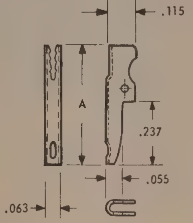
Vector Push-In Terminals for All the Most Popular Hole Sizes -- 0.042", 0.062", 0.093"

Suitable for PC Board Production, Prototyping and Experimenting

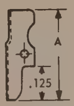
No Expensive Installation Machines Required -- Just Inexpensive Hand Tools



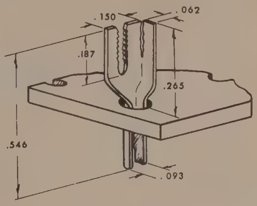
T42-1



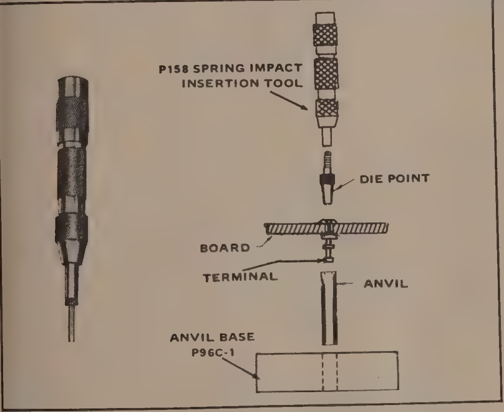
T28



T28-1



T9.4



SPRING IMPACT TOOL P158 AND ACCESSORIES

The P158 spring loaded installing tool delivers an adjustable striking force of 18 to 34 lbs. to a terminal anvil or installing die screwed into the end. It is ideal for production terminal and wrap-post installation because of the uniform striking pressure resulting in well-seated terminals. The tool may be adapted to any drill or arbor press accepting a ½" shank furnished on the P158-1 Adapter. Anvils and dies are available for use with nearly all Vector terminals and many screw machine terminals.

Part No.	Description
P158	Spring Impact Insertion Tool
P96C-2	Holder to adapt die point to arbor or drill press, or to adapt die point to anvil base
P96C-1	Anvil Base
P158-1	Holder to adapt P158 for arbor or drill press

ALIGNMENT BLOCK MB45-20-062

This alignment block is 5/8" high by 4½" long by 2¼" wide and has holes on 0.1" centers. The block is used to insure perpendicularity of wrap-post tails during their installation in circuit boards. Additionally, it provides support during installation of wrap-post or other high-insertion-force terminals.

T42-1 MINIATURIZED COMPACT PUSH-IN

Fits 0.042" dia. holes such as in "P" and "Q" Pattern Micro-Vectorbord® and can be mounted on 0.1 in. centers side-to-side. Tintillate plated. Main slot holds three to four 0.025" dia. 22 ga. wires, two 0.032" dia. 20 ga. wires, or five 0.016" dia. 26 ga. wires. Cross holes in upper part accommodates 0.025" wire (22 ga.). Small hole in bottom tab accepts 0.018" transistor size wires. Ideal for IC work because leads can be laid in slots or pass through terminal vertically. By addition of soldered K32 "J" pin series terminal, converts to wire wrappable type (see illustration, on Vector wrappable terminal page).

T28 SERIES

Compact push-in fits 0.062" dia. holes in printed circuit boards and Vectorbord® Patterns B,F,G and H. Deep springy main slot holds leads in serrated teeth until soldered; additional cross hole is useful for busing; and tab end is furnished with slot or hole as indicated. 20 ga. 0.032" dia. wires may be run down center of terminal. Staking is not required, but may be done by flattening the tab end with a pair of flats, or flaring the tab end and subsequently cutting across the "U" with a pair of diagonal pliers. Tintillate or silver plated. All models in phosphor bronze material.

Installation of T28:

P91 Insertion Tool has terminal holding hole and ¼" metal shaft for hand use or mounting in arbor or drill press. P91A has wooden handle on ¼" metal shaft with terminal holding hole in end. "Pusher" tool may be readily made by using ½w or 1 watt resistor with wire on one side cut to about 9/16" for guiding terminal down into hole and pushing in.

T9.4 AND T9.6 SERIES

Push-in type fits 0.093" dia. holes in printed circuit boards or Vectorbord® "A" and "AA" Patterns. Serrated teeth (on all except T9.4A type) holds leads 0.032" to 0.040" in slots until soldered. Sturdy construction holds larger components readily. Wires of up to 0.040" may be passed down through center slot. Staking is not required, but may be done by flaring the "U" shaped end with round nose pliers and subsequently cutting across the flare with diagonal cutting pliers. Supplied with tintillate plating for easy soldering. T9.6 type is beryllium copper and has more "spring" action in slots and shank.

Installation of T9.4 and T9.6 Types:

P122B Insertion Tool holds terminal in end and has wooden handle. Long nose pliers may also be used.

ORDERING INFORMATION

Supplied in Pkg. 100 or 1000

Part No.	Material	For Hole Dia.	O/A Lgth.	Hght.Above Board	Lgth.Below 1/16"Bd.
T42-1	Beryll. Copper brite tin plated	0.042"	.360"	.190"	.107"

Part No.	Plating	Tab End Style	For Hole Dia.	O/A Lgth.	Ht.Above Board	Lgth.Below 1/16"Bd.
T28	Tintillate	Hole	0.062"	.437"	.200"	.175"
T28S	Silver	Hole	0.062"	.437"	.200"	.175"
T28-1	Tin	No Hole	0.062"	.325"	.200"	.063"
T28S-1	Silver	No Hole	0.062"	.325"	.200"	.063"

Part No.	Material	Main Slot Style	For Hole Dia.	O/A Lgth.	Ht.Above Board	Lgth.Below 1/16"Bd.
T9.4	.016" Half Hard Brass	Serrated	0.093"	.562"	.203"	.296"
T9.4A		Smooth	0.093"	.562"	.203"	.296"
T9.6	.016" Beryllium Copper	Serrated	0.093"	.605"	.324"	.218"

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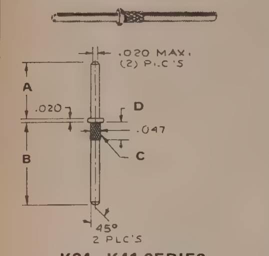
Vector D.I.P. SOCKETS — PINS — CONTACTS



K24 - K41 SERIES

KNURLED SHANK PINS

New diamond knurled shank phosphor bronze pins for 0.042" dia. circuit board holes seat firmly and are "rockless." Recommended for use in epoxy or polyester glass boards only. P158 Impact Tool with D7-2 Die Point is recommended, but Hand Insertion Tool P133A may be used.

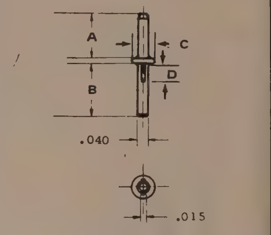
Supplied in Pkg. 50 or 1000

Part No.			Dimensions			
Tintill.	Nick/Gold	O/A Lgth.	A	B	C	D
K24C	K24A	.650	.255	.375	.075	.080
K41C	K41A	.753	.255	.478	.075	.080

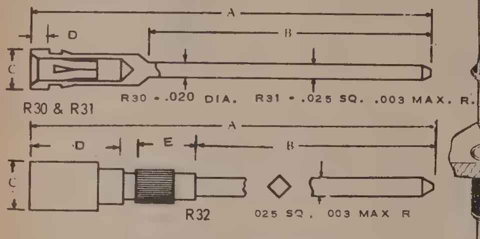
PHOSPHOR BRONZE PINS TO FIT 0.040" DIA. HOLES

Supplied in Pkg. 100 or 1000

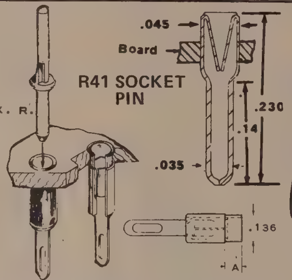
Part No.		O/A	Dimensions					P158 Tool
Tintill.	Nick/Gold	Lgth.	A	B	C	D	Hand Push-In Tool	+ Die Point:
K26C	K26A	3/8"	.160	.195	.080	.080	P133A	D7-2
K27C	K27A	3/8"	.160	.195	.050	.050	P131A	---
K30C	K30A	.550"	.225	.225	.305	.085	P133A	D7-2
K31C	K31A	3/8"	.160	.195	.075	.060	P133A	D7-2
K36C	K36A	.705"	.293	.400	.040	.050	P131A	---
K37C	K37A	.415"	.255	.140	.042	.050	P131A	---
K38C	K38A	.700"	.080	.600	.085	.062	P133A	D7-2



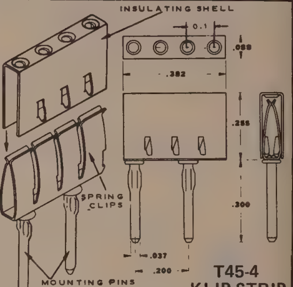
K31 SERIES



R30, R31, R32 SOCKET PINS



R23A, R24A CUP RECEPTACLES



T45-4 KLIP-STRIP

SOCKET CONTACTS FOR INTEGRATED CIRCUITS

SOCKET PINS

High quality beryllium copper gold plated four-fingered contacts are housed inside gold plated brass screw machine terminals with solderable or 0.025" sq. wire wrappable tails for installing wherever required in 1/16" thick circuit boards. Models R30 and R31 have lower profile than low profile DIP sockets and press fit into 0.055" dia. holes. Model R32 fits 0.042" dia. holes in "P" Pattern Micro-Vectorbord® or DIP Plugbords.

		Dimensions					
Part No.	Tail Type	A	B	C	D	E	Supplied in Pkg.:
R30	Solder	.250	.100	.072	.030	---	25, 100, or 1000
R31	WW	.703	.500	.072	.030	---	25, 100, or 1000
R32	WW	.745	.500	.072	.155	.075	25, 100, or 1000

P158 Impact Insert. Tool w/D10 Die Point inserts R30, R31; **w/D9 Die Point** inserts R32. **P158-1 Holder** adapts Tool to drill or arbor press.

SOCKET PINS FOR TRANSISTORS

Low cost gold plated beryllium copper socket pin accepts round wires, such as L.E.D.s and transistor leads, 0.014" to 0.017". Pins press-fit in 0.1" centers in 0.042" dia. holes in "P" Pattern Micro-Vectorbord®, DIP Plugbords, or drilled circuit boards. Extremely low profile (extends 0.015" above 1/16" thick circuit board) pins are 0.230" long and may be wave or hand soldered into circuits. R41 Socket Pin Pkg. 50, 1000

DIP SOCKETS

Vector DIP sockets have high quality beryllium copper or phosphor bronze gold plated contacts in glass filled nylon castings. Tapered lead entry on all models facilitates DIP insertion and castings are "keyed" for proper orientation. All models will fit "P" Pattern Micro-Vectorbord® or DIP Plugbords. Contact tails are 0.025" sq. for wrapping or solder tab type as indicated. Solder tab models have barrier to prevent solder wicking up inside contact.

	Wire Wrap Tail Type			Solder Tab Tail Type (Regular Hght.)			Solder Tab Tail Type (Low Prof.)	
	Pkg.5,25		Pkg.3,15	Pkg. 5,10		Pkg. 3,15	Pkg. 10 only	
	R714	R716	R724	R714-1	R716-1	R724-2	R714-1	R716-2
No. Contacts	14	16	24	14	16	24	14	16
Casting Lgth.	.762	.862	1.280	.762	.862	1.280	.700	.700
Casting Wdth.	.400	.400	.700	.400	.400	.700	.400	.400
Casting Hght.	.280	.280	.280	.280	.280	.280	.150	.150
Spacing Betw. Contact Rows	.300	.300	.50	.300	.300	.50	.30	.30
Tail Style	WW	WW	WW	Sold. Tab	Sold. Tab	Sold. Tab	Sold. Tab	Sold. Tab
Lgth.Below Casting	.684 max.	.684 max.	.690 max.	.145 max.	.145 max.	.150 max.	.150 max.	.150 max.

P150 DIP Extractor Tool and **P157 DIP Inserting Tool for 14- & 16-pin** units – prevent bent leads; **P157** guides DIPs into sockets. (Not illustr.)

KLIP-STRIPS

For leads 0.055" to 0.032" max. diameter. Handy low resistance solderless contacts are ideal for use as test points, or for plugging in devices such as operational amplifiers with random spaced leads or for DIP or transistor leads. Clips are furnished with or without press-in mounting pins for push-in or adhesive mounting on circuit boards. Only 0.095" wide by 0.382" long, Klip-Strips have 4 top entry holes into a multiple tandem clip. Klip-Strips have insulated brass shells and beryllium copper contacts with fused tin lead plating.

T45-4	Klip-Strip w/two .040"mtg.pins spaced 0.2"	Pkg. 16 or 100
T45A-4	Klip-Strip without mounting pins	Pkg. 16 or 100

CUP RECEPTACLES FOR 0.040" DIA. PINS

Vector Cup Receptacles accept 0.040" dia. Inbord Pins. High reliability press formed phosphor bronze contacts are positioned in brass shells with contact tabs emerging through a slot in one end. May be mounted anywhere on 1/16" or 3/32" panels in 0.140" dia. holes with staking tools listed below. Cup spacing should not be less than 0.2". A special staking anvil for the 0.2" spacing is listed giving greater clearance between the edges than the standard anvil. Staking and holding tools have ½" dia. shank for arbor or drill press use. P95 provides uniform "roll"; P95A provides oblong "roll" for 0.2" spacing.

SPECIFICATIONS.

Cup: Half hard brass, bright tin plate per MIL-T-10727.

Contacts: Phosphor bronze, nickel plate per QQ-N-45204, Type II.

			Staking Tools	
Part No.	Description	Dim.A	Circular Roll	Oblong Roll
R23A	Cup Receptacle for .062" thick board.	.095	P95	P95A
R24A	Cup Receptacle for .093" thick board.	.127	P95	P95A

P95B Cup Holder – Use for both stakers.

SLIP-ON CONTACTS FOR 0.025" SQ . POSTS

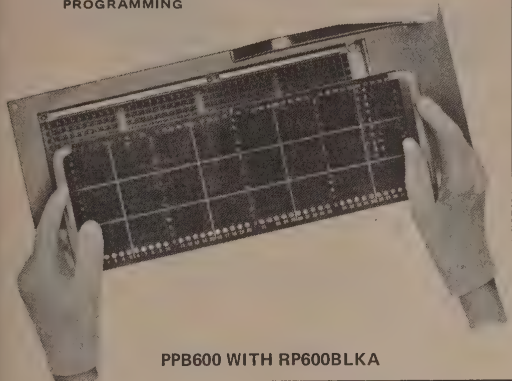
Use for solderless connection to 0.025" sq. posts on Vector Wrap-Post terminals or I.C. sockets. Loose contacts are tin plated and supplied without insulation. "Daisy chain" type are gold plated, insulated, and connected to No. 26 vinyl insulated wire 5" apart.

T120	Slip-on single contacts, solder type, tin plated.	Pkg. 50
T120-1	Slip-on contacts, "Daisy Chain" spaced 5", No.26 insul. wire, nickel & gold plate. Blue Insulation.	Reel 50 or Reel 250

VECTOR ELECTRONIC COMPANY, INC. 12460 Gladstone Avenue, Sylmar CA 91342 Phone (213) 365-9661 TWX 910-496-1539

Vector PATCHBOARD PROGRAMMING SYSTEMS

For: RELIABILITY — TEST AND CONTROL SYSTEMS
LONG LIFE, LOW NOISE CONNECTIONS
204, 300, 450, 600, 1200 CONTACT SYSTEMS
ANALOG AND DIGITAL COMPUTER PROGRAMMING



PPB600 WITH RP600BLKA

PREPROGRAMMING PATCHBOARDS

Functionally, Vector preprogramming patchboard systems work as a multi-contact switch which makes up to 1200 connections at the throw of a lever. These connections can be made in any combination due to the program panel. Contacts on the back of the receptacle frame are connected by soldering or wire wrapping to the functions being controlled or tested. Interconnection arrangements are set up on the removable program panel with patchcords which make contact with the receptacle frame contacts when the program panel is put into the frame and engaged by depressing the hand lever. Test programs may be pre-arranged in extra program panels, thus speeding up test running by eliminating costly reprogramming time between tests.

SPECIFICATIONS.

Receptacle Frame Contacts: Heat treated beryllium copper, nickel plus tin or gold plating, staked in epoxy laminate. Wire wrappable types (W) have wrap tails; solder contact models have 2 holes in tabs for wire attachment.
Frame: Welded steel with hardened steel cam engagement mechanism, grey painted finish.
Removable Program Panels: Black paper based phenolic or epoxy paper to special order.
Rack Adapter Plate: 19" wide with holes for rack mounting, 1/8" thk. steel, painted light grey, with cutout for receptacle frame.
Operational: Maximum operating voltage 1500 V.D.C. or 1000 V.A.C.
Leakage Resistance Between Adjacent Contacts: In excess of 5000 megohms.
Continuous Current Rating: Max. 5.0 amps, AC/DC.
Capacitance Between Any Two Contacts: 2.5 mmfd. max.
Total Resistance At Contact: Less than .01 ohms from nickel plated contact to nickel plated plug; less than .003 ohms from gold flashed contact to gold flashed plug.

	RECEPTACLE FRAME NO.			OVERALL DIMENSION			MATING PROGRAM PANELS†					Cover for Mating	
								w/Standard	Holes				
No. of Contacts	Tin-Plated Contacts	Gold-Plated Contacts	Gold-Plated WW Contacts	Wdth.	Hght.	Dpth.*	Blank for User Markg.	Alpha-Numeric Markings	No. Wide	No. Vert.	Rack Adapter Mounting Plate	Program Panel	Cover Hght. Above Panel
204	PPB204	PPB204G	PPB204AG	10-3/8"	6"	2-5/8"	RP204	RP204BLKA	17	12	AP19-70-300	PC300-1	2.5"
300	PPB300	PPB300G	PPB300AG	10-3/8"	6"	2-5/8"	RP300	RP300BLKA	20	15	AP19-70-300	PC300-1	2.5"
450	PPB450	PPB450G	PPB450AG	16"	6"	2-5/8"	RP450	RP450BLKA	30	15	AP19-70-600	PC600-1	2.5"
600	PPB600	PPB600G	PPB600AG	16"	6"	2-5/8"	RP600	RP600BLKA	40	15	AP19-70-600	PC600-1	2.5"
1200	PPB1200	PPB1200G	PPB1200AG	17"	10¾"	2-5/8"	RP1200	RP1200BLKA	40	30	AP19-123-1200	PC1200-1	2.5"

† Custom silk screened panels available to order. Write factory for layout sheets.

* Front Face Panel to tab contact ends at back. Handle in engaged position extends 2½" above panel; during disengagement when program panels being removed, lever end extends 4" above receptacle frame panel.

FIXED PANEL PATCHBOARDS

These low-cost, high reliability patch panels are ideal for test or control panels in all types of equipment where connection ease and flexibility is desirable. All models have heat treated "wrap-around" beryllium copper nickel plated gold flashed contacts mounted in aluminum framed phenolic panels on 0.265" centers. Tabs at rear of patchboard have two holes for soldered connections. Interconnection between the patch panel contacts is readily made with various types of patchcords having 0.090" dia. prongs which plug into contacts located behind holes in front insulating panels. For programming and wiring ease, front and back panels have standard printed alpha-numeric legend. Custom marked (or colored) panels are available to order. Unmarked bottom sides of front panels may be marked by user if removed from aluminum frame and reassembled after marking. The 10, 20, 50, and 100 contact units are of equal width so units may be "stacked" to achieve larger number of contacts. Sturdy, attractive anodized frames on all units provide finished appearance, and have brackets for panel mounting.
Custom units in special sizes, with or without brackets, are available to order. Contact factory.

No. of Contacts				Dimensions		No. of
Total	Wide	Vertical	Part No.	A	B	Brackets
10	10	1	PB110-2	2.985	.600	2
20	10	2	PB210-2	2.985	.865	2
50	10	5	PB510-2	2.985	1.660	4
50	10	5	PB510-4*	2.985	1.660	4
100	10	10	PB1010-2	2.985	2.985	4
100	10	10	PB1010-4*	2.985	2.985	4
200	20	10	PB1020-2	5.635	2.985	4
300	20	15	PB1520-2	5.635	4.310	4

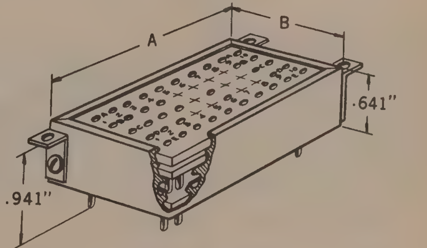
*Front Panel unprinted; all others have standard legend.

PATCHCORDS

Patchcords are No. 20 gage vinyl insulated stranded wire in color coded lengths with vinyl shrouded 0.091" dia. brass nickel plated plug tips. Special cord lengths may be made by user by ordering K2001-2 prongs and T7.39 eyelets to which he connects own wire and prong insulation.

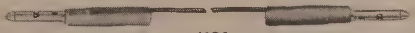
SPECIFICATIONS.

Maximum Current: 5 amps.
Contact Resistance: Less than .001 ohms.
Capacitance Between Adjacent Contacts: Less than 1.0 pf.
Resistance Between Adjacent Contacts: More than 10,000 megohms.
Maximum Operating Voltage: More than 1500 V.D.C. or 1000 V.A.C.



PB510-2 PATCH-BOARD

K16



K21

BALL DETENT TYPE PATCHCORDS

Overall Length	Wire Insul. Color	Single Conductor Plug Plating Nickel	Single Conductor Plug Plating Nkl.Gold Flash	3-Prong Common Plug Plating Nickel	3-Prong Common Plug Plating Nkl.Gold Flash
6"(min.)	Black	K3.06	KG3.06		
9"	Yellow	K3.09	KG3.09	K4.09	KG4.09
15"	Blue	K3.15	KG3.15	K4.15	KG4.15
24"	Green	K3.24	KG3.24	K4.24	KG4.24
Jumper	Gray	K3.02	KG3.02		

PIGGY-BACK TYPE PATCHCORDS

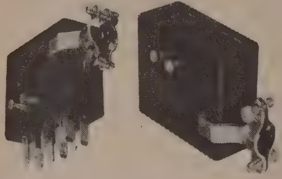
Overall Length	Wire Insul. Color	Single Plug & Prong Ea.End	Piggy-Back Recept. Ea. End	Piggy-Back, Sgl. Conductor, Prong & Recept. Both Ends Nickel	Piggy-Back, Sgl. Conductor, Prong & Recept. Both Ends Nick/Gold	Piggy-Back, Sgl.Cond. Prong 1 End, Prong & Recept. at Other Nickel	Piggy-Back, Sgl.Cond. Prong 1 End, Prong & Recept. at Other Nick/Gold
6"	Black	K2.06	K9.06	K16.06	KG16.06	K21.06	KG21.06
9"	Yellow	K2.09	K9.09	K16.09	KG16.09	K21.09	KG21.09
15"	Blue	K2.15	K9.15	K16.15	KG16.15	K21.15	KG21.15

VECTOR ELECTRONIC COMPANY, INC. 12460 Gladstone Avenue, Sylmar CA 91342 Phone (213) 365-9661 TWX 910-496-1539

BEAU® PLUG & SOCKET CONNECTORS

3300 SERIES

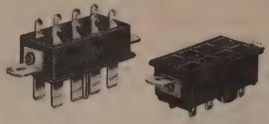
10 amps, 250 volts
2-33 contacts



UL
CSA

5400 SERIES

15 amps, 250 volts
4-16 contacts

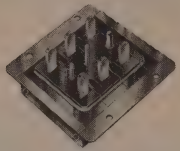


UL
CSA

Also, 4400 Series—for mounting from back of panel.

5500 SERIES

50 amps, 250 volts
2-16 contacts



Shallow-bracket mounting

SEVEN EXCLUSIVE INNOVATIONS

Standard Beau connectors offer special innovations not available from other manufacturers—like the seven described here—only from Beau. And Beau's prices offer you a big advantage.

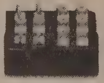
1. PRE-GROUNDING—see next page.

2. THERMOPLASTIC BACKSHELLS.

(Metal also.) Resilient thermoplastic backshells provide greater dielectric strength and greater safety. They're also non-rusting and acid resistant. UL; CSA.

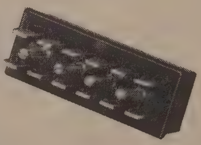
3. WAVE SOLDERABLE CONTACT TAILS.

Special tail design (S_6) allows for mounting directly to PC boards and flexible circuits—and gives you the economy of automatic wave soldering. 3300 series. UL; CSA.



4. 16 CONTACTS IN THE SPACE OF 12.

Our 15 amp connectors can have up to 16 contacts—4 more than other 15 amp makes. That's 33% more contacts in the same amount of space. UL; CSA.

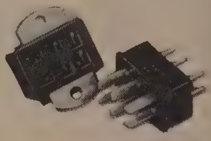


5. PANEL MOUNTED IN ONE-FOURTH THE TIME.

C-clip mounting of Beau connectors cuts panel mounting time by 3/4ths. No drilling. No screws. Just slide on C-clips and it's secure. 3300, 5400 Series. UL; CSA.

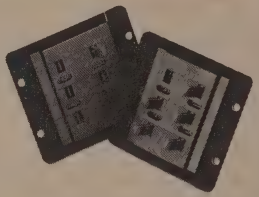
6. SELF-POLARIZING 6-CONTACT CONNECTOR.

With contacts set in opposing directions, even a heavy hand can't mismate our 6-contact 10 amp plugs and sockets. UL; CSA.



7. HERMAPHRODITIC SELF-POLARIZING.

With male and female contacts in both halves, or with conventional polarization. Can gang in building block fashion. 50 amp.



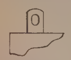
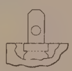
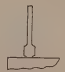
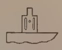
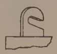
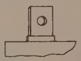
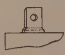
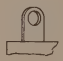
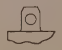
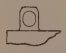
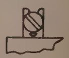
PANEL MOUNTING HARDWARE

AB = Angle Bracket
ABR = Angle Bracket Reversed
LAB = Less Angle Bracket
ABT = Angle Bracket Tapped
DB = Deep Bracket
EB = End Bracket
EBR = End Bracket Reversed
EBT = End Bracket Tapped
FP = Flat Plate
SB = Shallow Bracket
SCC = Snap "C" Clip
RP = Recessed Plate

CABLE MOUNTING HARDWARE

BBS = Blank Back Shell
CCE = Cable Clamp End
CCE-L = Cable Clamp End, Latch
CCE-K = Cable Clamp End, Keeper
CCT = Cable Clamp Top
CCT-L = Cable Clamp Top, Latch
CCT-K = Cable Clamp Top, Keeper
FHE = Flared Hole End
FHE-L = Flared Hole End, Latch
FHE-K = Flared Hole End, Keeper
FHT = Flared Hole Top
FHT-L = Flared Hole Top, Latch
FHT-K = Flared Hole Top, Keeper

CONTACT TAILS

3300 SERIES				5400 SERIES						5500
										
P or S Solder eye	**P_1 or S_1** Quick Connect .110 tab	**P_4** Wire-Wrap	**S_6** Printed Circuit	**P** Solder hook	**P_1** Quick Connect, .205 tab	**P_2** Quick Connect, .187 tab	**P_3** Solder eye	**S_1** Quick Connect/ Sold. eye	**S_3** Large Solder Eye	Binding head screw

Beau Products Division
Vernitron Electrical Components

P.O. Box 10, Laconia, N.H. 03246 Tel. (603) 524-5101 TWX 710-364-1843
See your local representative listed in EEM Yellow Pages
Also available in Canada, England and Europe

BEAU® PRE-GROUNDING CONNECTORS

3300 SERIES: 10 amps per contact
5400 SERIES: 15 amps per contact

PRE-GROUNDING FOR GREATER SAFETY

Beau gives you the greater safety of U.L. recognized pre-grounding plug and socket connectors. The extra long grounding contact engages before any other active contacts are mated. Available for chassis and cable mounting.

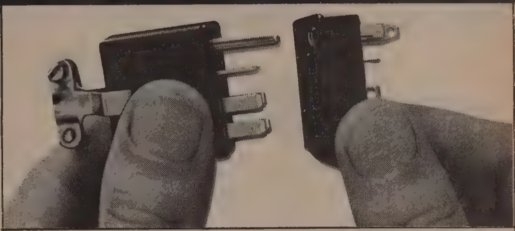
LOWEST INSTALLED COST

Only Beau offers the longer pre-grounding contact. Thus, you will never have to cut any contacts to a shorter length to achieve a safer connection. No more costly, time-consuming hand cutting operations.

CONTACT POSITION

In the 3300 Series, the grounding contact takes the place of a regular contact. Connector sizes 3324 through 3333 are already of the pre-grounding type, and there is no need to specify the grounding contact.

In the 5400 Series, the grounding contact is an additional contact position rather than taking the place of a standard contact.



SPECIFICATIONS

For other specifications and data, see previous page.

Rating: 3300 Series, 10 amps per contact at 250 v,
5400 Series, 15 amps per contact at 250 v

Grounding contact rating: 30 amps at rated voltages.

No. of contacts: 3300 Series, 3 to 33 (incl. grounding contact),
5400 Series, 5 to 13 (incl. grounding contact)

Grounding contact: Extra long, heavy-duty plated brass.

Grounding contact tail: 5400 Series, mounted on an elevated creep path barrier that puts required distance between ground and active contacts.

U.L. recognized.

CSA certified.

BEAU® HIGH-BARRIER RESILIENT TERMINAL STRIPS

72000 SERIES:

SINGLE ROW; 3/8" CENTERS
20 AMPS, 600 VOLTS
FEED THRU AND CLOSED BACK

BEND BARRIERS WITHOUT BREAKING

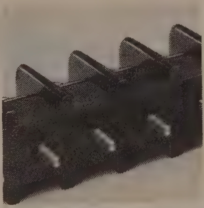
Beau's flexible barrier strips reduce breakage dramatically because they are made of highly resilient glass-filled thermoplastic materials. Impact strength is many times greater than phenolics. Production line and in-field damage (and time-consuming re-wiring) are virtually eliminated.

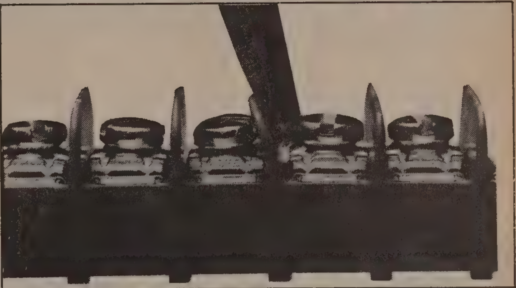
PROTECTS SOLDER JOINTS FROM DAMAGE

Exclusive from Beau—terminals are ultrasonically welded to the base. This eliminates solder joint damage from torqueing screws, or from strain in dressing down wire bundles. Also, pull-out strength is double the other makes.

CONTACT TAILS ENCLOSED

Cavities are eliminated around dip solder contact tails. This allows mounting directly on PC board without affecting circuit isolation. It eliminates entrapment of foreign matter, reduces solder wicking.





SPECIFICATIONS

Size: 5/8" w x 21/32" h

No. of terminals: 1 to 26

Terminal styles (bottom):

- Printed circuit
- Printed circuit/wire wrap combination (with long extended tail)
- Quick connect tab (insulated feed thru)
- Solder turret (insulated feed thru)
- Closed back

Terminal styles (screw side):

- #6-32 x 1/4" binding head screw
- Wire clamp plate, self rising
- Quick connect tab (1 to 6 terminations)
- Solder terminal, single or double

Beau Products Division
Vernitron Electrical Components

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BEAU® BARRIER TERMINAL STRIPS

SINGLE-ROW TYPES

Available in 15 and 20 amp models, both have high-impact glass-filled phenolic bases with excellent breakage resistance. They can be furnished with or without mounting ends. Nickel-plated brass screws. Cadmium or tin plated terminals. Imprinting available.

RATING, AMPS	SERIES NO.	BACK TYPES	NO. CIRCUITS	WIDTH	HEIGHT	TERMINAL SCREWS
15	12000	Open & Closed	1-31	35/64"	7/16"	5-40x3/16"
20	13000	Open & Closed	1-26	47/64"	35/64"	6-32x1/4"

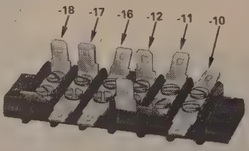
TERMINALS (bottom)

12000 SERIES
Closed back
PC
Turret

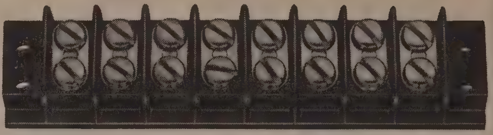
13000 SERIES
Screw
Closed back
Turret, insul.
PC, insul.
Taper pin/turret
PC
Turret

QUICK CONNECT TERMINALS

Beau Quick Connect terminals cut assembly time and costs; improve connections; eliminate cold solder joints. In 1- and 2-sided types for single- and double-row strips. Cadmium-plated brass.



DOUBLE-ROW TYPES



Available in 10, 15, 20 and 30 amp models, they can be molded in general-purpose phenolic, glass-filled phenolic, or highly resilient glass-filled thermoplastic materials. Nickel-plated brass terminals and screws. Marker/insulation strips and covers available for added safety (in vulcanized fiber or phenolic). Choice of printing styles.

RATING, AMPS	SERIES	BACK TYPE	NO. CURCUITS	WIDTH	HEIGHT	TERMINAL SCREWS
10	10,000	Open	1-20	5/8"	5/16"	2-56x3/16"
15	14,000	Open	1-30	7/8"	13/32"	5-40x1/4"
	15,000	Closed	1-31	7/8"	27/64"	5-40x1/4"
	16,000	Open	1-30	7/8"	13/32"	6-32x1/4"
	17,000	Closed	1-31	7/8"	27/64"	6-32x1/4"
20	18,000	Open	1-30	1-1/8"	1/2"	6-32x1/4"
	19,000	Closed	1-30	1-1/8"	35/64"	6-32x1/4"
30	21,000	Open	1-25	1-5/16"	5/8"	8-32x5/16"
	22,000	Closed	1-26	1-5/16"	21/32"	8-32x5/16"

TERMINALS

Single-sided solder
Two-sided solder
Feed-thru solder
PC
Wire-wrap
Quick connect
(details at left)

OTHER HARDWARE

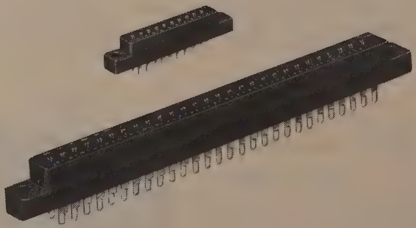
Straddle plate
Jumper plate, over-the-barrier type
Jumper plate, edge-on type

BEAU® PC EDGEBOARD CONNECTORS

FOR .062" BOARDS
SOLDER DIP AND SOLDER EYE
DUAL READ-OUT
SERIES 8500: 600 vac; .125" contact centers
SERIES 8600: 750 vac; .156" contact centers

Beau Edgeboard Connectors are designed for heavy usage in commercial applications where economy is an important factor. They're designed for low, stable contact resistance (up to 50% lower than others), mimimum wear of mating surfaces and excellent mechanical abuse withstanding qualities. Problems from vibration and board irregularities are minimized.

Unique bow design has improved spring characteristics, reduced fatigue. A modified ribbon contact has cantilever action and maximum wiping action.



Beau Products Division
Vernitron Electrical Components

P.O. Box 10, Laconia, N.H. 03246 Tel (603) 524-5101 TWX 710-364-1842
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Also available in Canada, England and Europe

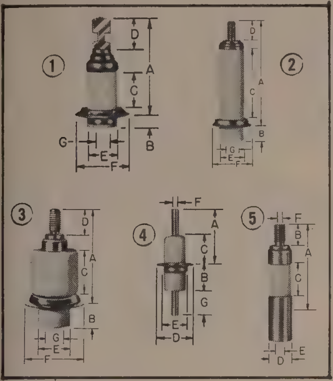
VICTOREEN METALIZED CERAMICS

ALITE TERMINALS • BUSHINGS • SEALS • SPECIAL ASSEMBLIES

ALITE CERAMIC-TO-METAL SEALS

The key to the performance of ALITE ceramic-to-metal seals, lies in careful attention to these three basic factors:

- Soundness of the Design
- Quality of the Ceramic
- Integrity of the Bond



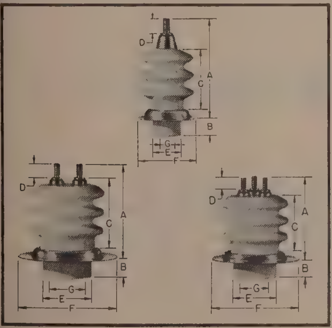
ALITE HIGH VOLTAGE TERMINAL BUSHINGS

- Reliable Electrical Characteristics
  - Excellent Dielectric Strength
  - High Surface Resistivity
- Vacuum-tight, Mass Spectrometer Tested
- Superior Mechanical Strength
- High Temperature Resistance
- Resistance to Thermal Shock

STANDARD PART NUMBERS for fluted terminals indicate certain physical features of each terminal. For example, Part No. 4-4-3B indicates the following:

4 — size designation
4 — number of flutes
3 — number of terminals
B — type of terminal cap

NOTE: Voltage ratings are average, measured at 40% RH at sea level. Voltages are 60 cycles RMS.



TUBULAR TYPE BUSHINGS

Fig.	Part No.	A	B	C	D	E	F	G
		(Dimensions In Inches)						
1	B-27-1	3/4	3/32	7/32	9/32	17/64	1/2	.105
	B-27-2	3/4	7/32	7/32	9/32	17/64	1/2	.105
	B-27-6	7/8	7/32	11/32	9/32	17/64	1/2	.105
2	B-38-1	27/32	1/32	3/16	3/8	3/8	11/16	3/16
	B-38-3	1 5/32	1/32	1/2	3/8	3/8	11/16	3/16
	B-38-6	1 9/32	1/32	5/8	3/8	3/8	11/16	3/16
	B-50-2	15/16	1/32	9/32	3/8	1/2	13/16	1/4
	B-50-5	1 9/64	3/32	31/64	3/8	1/2	13/16	1/4
	B-50-9	1 23/64	3/16	45/64	3/8	1/2	13/16	1/4
	B-50-10	1 17/32	1/32	7/8	3/8	1/2	13/16	1/4
	B-50-14	2 21/64	1/4	1 43/64	3/8	1/2	13/16	1/4
	B-50-15	2 47/64	1/4	2 5/64	3/8	1/2	13/16	1/4
	B-75-1	1 13/64	1/4	1	7/16	3/4	1 1/8	3/8
	B-75-5	2 13/16	1/4	2	7/16	3/4	1 1/8	3/8
	B-75-9	4 3/16	1	3 3/8	7/16	3/4	1 1/8	3/8
	B-100-1	2 7/32	9/32	1 3/32	5/8	1	1 1/2	1/2
	B-100-5	5 3/8	1	4 1/4	5/8	1	1 1/2	1/2

STANDARD TYPE BUSHINGS

	Part No.	A	B	C	D	E	F	G
		(Dimensions In Inches)						
3	A-50-1	27/32	3/32	1/4	3/8	17/64	1/2	1/8
	A-50-2	1 1/32	1/4	7/16	3/8	17/64	1/2	1/8
	A-50-3	1 9/32	3/8	11/16	3/8	17/64	1/2	1/8
	A-75-1	15/32	3/16	7/16	3/8	1/2	13/16	1/4
	A-75-2	1 13/32	5/16	11/16	3/8	1/2	13/16	1/4
	A-75-3	1 21/32	5/16	15/16	3/8	1/2	13/16	1/4
	A-100-1	1 9/32	3/16	7/16	1/2	3/4	1 1/8	1/2
	A-100-2	1 17/32	5/16	11/16	1/2	3/4	1 1/8	1/2
	A-100-3	1 25/32	5/16	15/16	1/2	3/4	1 1/8	1/2

FEED-THROUGH TERMINALS

	Part No.	A	B	C	D	E	F	G
		(Dimensions In Inches)						
4	D-187	3/8	1/8	3/16	5/16	3/16	.045	3/16
	D-250	9/16	1/4	5/16	3/8	1/4	.060	1/4
	D-312	3/4	1/4	7/16	7/16	5/16	.060	5/16

Metal Parts: Grade A Nickel.

CABLE END SEALS

	Part No.	A	B	C	D	E	F	Thread Size
		(Dimensions In Inches)						
5	C-250	1 1/8	13/32	5/16	.250	1/8	.082	8-32
	C-320	1 1/8	13/32	5/16	.320	5/32	.117	10-32
	C-375	1 3/8	13/32	1/2	.375	3/16	.117	10-32
	C-435	1 5/8	21/32	1/2	.435	7/32	.150	1/4-28
	C-450	1 5/8	21/32	1/2	.450	7/32	.150	1/4-28
	C-500	1 5/8	21/32	1/2	.500	1/4	.150	1/4-28
	C-625	1 5/8	21/32	1/2	.625	5/16	.150	1/4-28

Cap and Tube: Grade A Nickel.

HIGH VOLTAGE TERMINAL BUSHINGS — SINGLE TERMINAL

Series	Part No.	No. of Flutes	A	B	C	D	E	F	G	Flash Voltage KV	Weight Approx Net
			(Dimension In Inches)								
100	1-2-1C	2	2	1/4	7/8	7/16	3/4	1 3/8	1/2	12.0	2 oz.
100	1-3-1C	3	2 3/8	1/4	1 1/4	7/16	3/4	1 3/8	1/2	16.0	3 oz.
200	2-2-1C	2	2 3/8	1/2	1 1/4	7/16	7/8	1 3/4	5/8	17.0	4 oz.
200	2-3-1C	3	2 7/8	1/2	1 3/4	7/16	7/8	1 3/4	5/8	21.0	5 oz.
200	2-4-1C	4	3 3/8	1/2	2 1/4	7/16	7/8	1 3/4	5/8	25.0	6 oz.
200	2-5-1C	5	3 7/8	1/2	2 3/4	7/16	7/8	1 3/4	5/8	29.0	7 oz.
300	3-3-1D	3	3 1/16	1/2	1 3/4	5/8	1 3/8	2 3/4	1	24.0	7 oz.
300	3-4-1D	4	3 9/16	1/2	2 1/4	5/8	1 3/8	2 3/4	1	28.5	9 oz.
300	3-5-1D	5	4 1/16	1/2	2 3/4	5/8	1 3/8	2 3/4	1	33.0	11 oz.
400	4-3-1D	3	3 1/16	1/2	1 3/4	5/8	2	3 1/2	1 5/8	26.5	13 oz.
400	4-6-1D	6	4 9/16	1	3 1/4	5/8	2	3 1/2	1 5/8	39.0	1 lb. 6 oz.
400	4-8-1D	8	5 9/16	1 1/4	4 1/4	5/8	2	3 1/2	1 5/8	48.0	1 lb. 12 oz.

HIGH VOLTAGE TERMINAL BUSHINGS — TWO TERMINALS

300	3-2-2A	2	2 1/16	1/2	1 1/4	3/8	1 3/8	2 3/4	1	20.0	6 oz.
300	3-5-2A	5	3 9/16	1/2	2 3/4	3/8	1 3/8	2 3/4	1	33.0	11 oz.
400	4-6-2B	6	4 3/16	1	3 1/4	1/2	2	3 1/2	1 5/8	39.0	1 lb. 6 oz.
400	4-8-2B	8	5 3/16	1 1/4	4 1/4	1/2	2	3 1/2	1 5/8	48.0	1 lb. 12 oz.

HIGH VOLTAGE TERMINAL BUSHINGS — THREE TERMINALS

300	3-2-3A	2	2 1/16	1/2	1 1/4	3/8	1 3/8	2 3/4	1	20.0	6 oz.
300	3-5-3A	5	3 9/16	1/2	2 3/4	3/8	1 3/8	2 3/4	1	33.0	11 oz.
400	4-8-3B	8	5 3/16	1 1/4	4 1/4	1/2	2	3 1/2	1 5/8	48.0	1 lb. 12 oz.

FOR ADDITIONAL INFORMATION REQUEST BULLETIN 5593-2-71

SPECIALS QUOTED UPON REQUEST

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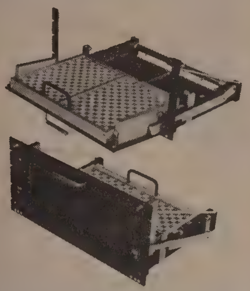
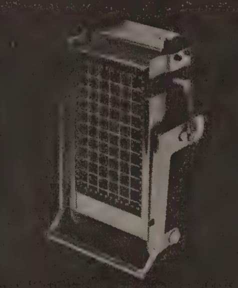
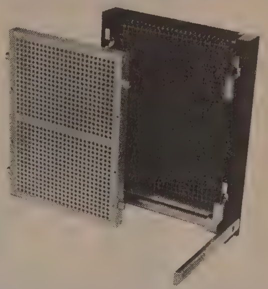
Patchboard Programming Systems and Accessories



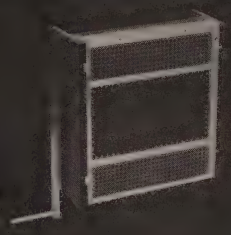
Drawer Type Systems—a roll cam designed for horizontal mounting to save up to 50% in panel areas. Also provides R.F. shielding. Five standard sizes range from 480 to 1870 contacts. All fit 19" wide racks.



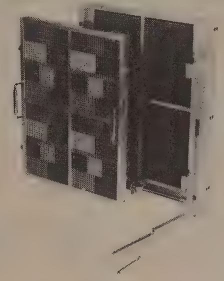
Lever Lock Systems—are most utilized by large computer manufacturers. A lever provides the necessary force to simultaneously mate up to 680 patchcord tips and paddle contacts. A smaller model offers 252.



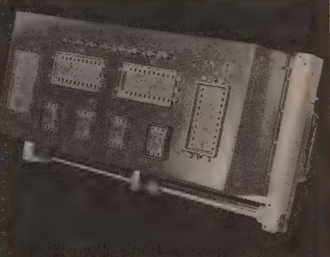
Shielded Systems—Each paddle contact is isolated with medal shielding. Crosstalk reduction is 92 db at 1000 cycles, 100 volts peak to peak. There are six models ranging from 360 to 4200 contacts.



True Thru-Shielded Systems—offer individual shielding, matched impedance, VSWR of 1.01 from 100 MHz to 500 MHz. These advanced programming systems can be manufactured to virtually any specifications.

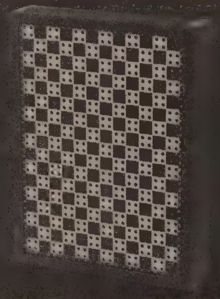


Roll Cam Systems—offer greatest capability and reliability, large number of contacts (24 sizes from 48 to 5120 contacts). Camming action engages full patchboard gently and accurately.



Pre-Wired Systems—can be standard panel boards wired to special quick connectors to eliminate hours of wiring and permit instantaneous re-circuiting. The 2560-contact roll cam system shown terminates in only 13 connectors.

Plating—Nickel or Gold
Board Material—Phenolic or Diallyl Phthalate
Contact Diameters—.093 and .053
Connections—Solder, wire wrap or Locktite
Finish—clear polish or black anodized
Silk Screen—Alpha/numeric grid or special designs
Patchcords—Manual or fixed; single tip to nine-prong tip; squids; splits; shunts.
All unconditionally guaranteed.
Tools—a variety of 27 tools for crimping, extraction, insertion, and paddle contact.
Send for complete 40-page catalog today.



Fixed Systems—26 standard models ranging from 30 contact points to 7,188 combine reliability and economy to meet a wide variety of programming needs primarily in industrial controls and communications.

We have salesmen in 42 U.S. Cities. Please refer to the proper section in this catalog for the one nearest you, or contact our factory in Waynesboro, Va.

◆

Besides our 75 standard models of programming systems, some of which are described on this page, VPC also produces a wide variety of custom products.

◆

We invite your inquiries and will appreciate your business.

VIRGINIA PANEL CORPORATION
1400 NEW HOPE ROAD

VPC

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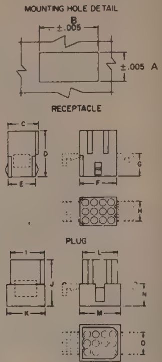
waldom / molex

NYLON CONNECTORS

STANDARD .093″ CONNECTORS (.198″ GRID PATTERN)

MINIATURE .062″ CONNECTORS (.145″ GRID PATTERN)



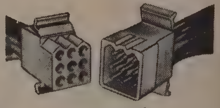
MINIATURE .062″ CONNECTORS DATA

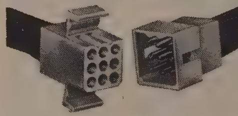
No. of Cir.	1		3		4		5		6		8		9		12		15		24		36	
	1625-1		1625-3		1625-4		1625-5		1625-6		1649-8		1625-9		1625-12		1625-15		1625-24		1772-36	
	R	P	R	P	R	P	R	P	R	P	R	P	R	P	R	P	R	P	R	P	R	P
A	N/A	N/A	.265	.318	N/A	N/A	.265	N/A	.552	N/A	.330	N/A	.552	.615	.563	.614	.563	.614	.715	.765	.707	.825
B	N/A	N/A	.650	.754	N/A	N/A	.940	N/A	.505	N/A	1.715	N/A	.650	.752	.795	.903	.934	1.042	1.079	1.182	1.677	1.795
C	.203 Dia.		.203		.203		.203		.484		.310		.531		.531		.531		.640		.859	
D	.781		.781		.781		.781		.781		.781		.781		.781		.781		.750		.781	
E	N/A		.203		.203		.203		.484		.220		.484		.484		.484		.500		.687	
F	N/A		.484		.625		.781		.343		1.500		.484		.625		.765		.920		1.515	
G	N/A		.390		.390		.390		.390		.390		.390		.390		.390		.375		.390	
H	N/A		.187		N/A		.187		.375		.312		.375		.375		.375		.500		.562	
I	.203 Dia.		.203		.203		.203		.484		.225		.531		.531		.531		.640		1.015	
J	.750		.750		.750		.750		.750		.750		.750		.750		.750		.750		.750	
K	.296 Dia.		.281		.296		.296		.578		.312		.578		.578		.593		.750		.812	
L	N/A		.484		.625		.781		.343		1.500		.484		.625		.781		.930		1.640	
M	N/A		.578		.734		.875		.453		1.593		.578		.718		.859		1.031		1.640	
N	N/A		.375		.375		N/A		.375		N/A		.375		.375		.375		.375		.375	
O	N/A		.187		N/A		N/A		N/A		N/A		.375		.375		.350		.500		.625	

STANDARD .093″ CONNECTORS DATA

No. of Cir.	1		2		3		4		5		6		9		12		15	
	1619		1545		1396		1490		1653		1261		1292		1360		1375	
	R	P	R	P	R	P	R	P	R	P	R	P	R	P	R	P	R	P
A	N/A	N/A	.705	.800	.840	.933	1.038	1.131	N/A	N/A	.718	.750	.828	.937	1.050	1.155	1.240	1.343
B	N/A	N/A	.312	.375	.312	.375	.312	.375	N/A	N/A	.600	.695	.725	.725	.655	.760	.655	.760
C	.234 Dia.		.250		.234		.236		.234		.632		.625		.640		.632	
D	1.000		1.000		1.031		1.000		1.000		1.031		1.031		1.031		1.031	
E	N/A		.250		.234		.236		.234		.632		.625		.640		.632	
F	N/A		.531		.671		.875		1.062		.437		.671		.870		1.067	
G	N/A		.437		.437		.437		.437		.437		.437		.437		.437	
H	N/A		.250		.234		.236		N/A		.562		.562		.562		.562	
I	.241 Dia.		.250		.234		.250		.250		.734		.634		.634		.632	
J	.968		.968		.968		.968		.968		.968		.968		.968		.968	
K	.358 Dia.		.352		.338		.338		.343		.640		.734		.734		.734	
L	N/A		.531		.671		.859		1.062		.531		.765		.975		1.169	
M	N/A		.640		.773		.968		1.171		.531		.765		.975		1.169	
N	N/A		.421		.421		.421		.421		.421		N/A		.421		.421	
O	N/A		.250		.234		.250		N/A		.562		.562		.562		.562	

Dimensions subject to nominal variation. N/A — Not Applicable.





ORDER DATA

HOUSINGS ARE SUPPLIED LESS TERMINALS — TO ORDER TERMINALS REFER TO PAGE ....

WALDOM/MOLEX MINIATURE NYLON CONNECTOR HOUSINGS .062″ PIN DIA. — 250 VOLTS PER CIRCUIT

PLUG OR RECEPTACLE				PLUG CONFIGURATION ONLY						RECEPTACLE CONFIGURATION ONLY						
				Mounting Ears			Per C							Per C		
No. of Cirs.	Amps Per Cir.	Std. Package	En. P/N New No. Shown ( )	With	Without	Per Pkg.	100-499	500-999	1000-2499	Eng. P/N New No. Shown ( )	With Holding Tabs	With Mtg. Ears and Holding Tabs	Per Pkg.	100-499	500-999	1000-2499
1	5	10	1625-1	—	P (03-06-2011)	1.00	6.90	4.75	3.70	1625-1	R (03-06-1011)	—	.85	5.95	4.10	3.15
3	5	10	1625-3	P (03-06-2031)	P1 (03-06-2032)	1.70	11.60	8.60	6.15	1625-3	R1 (03-06-1032)	R (03-06-1031)	1.95	13.00	9.65	7.05
4	5	10	1625-4	P (03-06-2041)	P1 (03-06-2042)	3.85	25.80	19.20	13.35	1625-4	R1 (03-06-1042)	R (03-06-1041)	3.80	25.50	18.90	13.10
5	5	5	1625-5	P (03-06-2054)	P1 (03-06-2055)	1.25	17.15	12.70	9.20	1625-5	—	R (03-06-1055)	1.65	22.15	16.15	11.80
6	5	5	1625-6	P (03-06-2062)	P1 (03-06-2061)	1.20	16.45	11.95	9.00	1625-6	—	R (03-06-1061)	1.40	19.15	13.50	10.40
8	5	5	1649-8	—	P (03-06-2081)	1.00	14.05	9.75	7.55	1649-8	—	R (03-06-1081)	1.25	17.25	12.00	9.30
9	5	5	1625-9	P (03-06-2091)	P1 (03-06-2092)	1.30	17.75	12.70	9.65	1625-9	R1 (03-06-1092)	R (03-06-1091)	1.50	20.30	14.40	11.05
12	5	5	1625-12	P (03-06-2121)	P1 (03-06-2122)	1.35	18.50	13.70	10.10	1625-12	R1 (03-06-1122)	R (03-06-1121)	1.55	21.20	15.45	11.60
15	5	5	1625-15	P (03-06-2151)	P1 (03-06-2152)	2.20	30.00	21.00	16.25	1625-15	R1 (03-06-1152)	R (03-06-1151)	2.55	34.25	23.85	18.50
24	4	5	1625-24	P (03-06-2241)	P1 (03-06-2242)	3.30	44.60	31.00	24.00	1625-24	R1 (03-06-1242)	R (03-06-1241)	3.45	46.80	32.50	25.20
36	4	5	1772-36	P (03-06-2361)	P1 (03-06-2362)	3.75	50.40	34.95	27.05	1772-36	—	R (03-06-1361) R1 (03-06-1362)†	3.90	52.65	36.50	28.20

WALDOM/MOLEX STANDARD NYLON CONNECTOR HOUSINGS .093″ PIN DIA. — 250 VOLTS PER CIRCUIT

1	12	10	1619P	—	P (03-09-2011)	1.00	6.75	4.65	3.60	1619R	R (03-09-1011)	—	.85	5.85	4.05	3.10
2	12	10	1545P	P (03-09-2021)	P1 (03-09-2022)	1.95	13.30	9.85	6.80	1545R	R1 (03-09-1022)	R (03-09-1021)	2.00	13.40	9.95	6.90
3	12	10	1396P	P (03-09-2031)	P1 (03-09-2032)	1.70	11.50	7.95	6.15	1396R	R1 (03-09-1032)	R (03-09-1031)	1.70	11.60	8.05	6.25
4	9	10	1490P	P (03-09-2041)	P1 (03-09-2042)	2.40	16.05	11.10	8.60	1490R	R1 (03-09-1042)	R (03-09-1041)	2.45	16.40	11.35	8.75
5	9	5	1653P	—	P (03-09-2052)	1.40	18.85	13.15	10.25	1653R	R (03-09-1052)	—	1.75	23.85	17.10	12.90
6	9	5	1261P	P (03-09-2061)	P1 (03-09-2062)	1.55	20.75	13.75	10.50	1261R	R2 (03-09-1063)	R (03-09-1061)	1.60	21.75	14.40	10.90
9	9	5	1292P	P (03-09-2091)	P1 (03-09-2092)	1.65	22.20	15.40	11.90	1292R	R3 (03-09-1094)	R (03-09-1091) R2 (03-09-1093)†	1.70	23.10	15.60	12.05
12	7.5	5	1360P	P1 (03-09-2122)	P (03-09-2121)	1.65	22.55	15.70	12.15	1360R	—	R (03-09-1121) R1 (03-09-1122)†	1.85	25.20	17.50	13.60
15	7.5	5	1375P	P2 (03-09-2152)	*P (03-09-2151)	2.60	34.50	24.10	18.60	1375R	—	R (03-09-1151)	2.95	39.40	27.30	21.05

* With Pull Tabs only. † Without Mounting Ears and Holding Tabs

STRAIN RELIEF (2 PCS. REQUIRED PER PLUG OR RECEPTACLE)

Eng. P/N	New P/N	Used With	"A" I.D.	Std. Pkg.	Per Pkg.	100-499 Per C	500-Up Per C
SD-1815	15-04-0201	15 Cir. .062″	.230″	10	3.50	28.40	21.15
SD-1864-415	15-04-0202	36 Cir. .062″	.500″	10	3.75	25.15	18.90

Maximum Panel Thickness For Mounting Ears:
.062″ Series...... .060″ (1.5mm)
.093″ Series...... .093″ (2.4mm)

Engineering Part Nos. are to be used as a Reference No. only. Order by proper 8 digit Part No. shown.

Manufactured by Molex Products Co. These items are made available from leading electronic distributors through Waldom Electronics Inc.

FOR LARGER QUANTITY PRICES, CONTACT WALDOM ELECTRONICS

molex

4633 WEST 53rd STREET / CHICAGO, ILLINOIS 60632 / (312) 585-1212

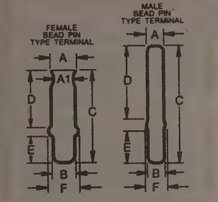
waldom / molex

CRIMP & P.C. TERMINALS

PRINTED CIRCUIT TAIL

CRIMP TYPE

CLASPCON



Part	Body Dia. A Outside	Body Dia. A-1 Inside	Staking Dia. B	Overall Length C	Contact Length D	Staking Length E	Bead Dia. F	Bead Terminal Part #
Female Bead-type terminal (mates with 1560 and 1854 Miniature .062 Male Terminal).	.093	.060	.083	.365	.210	.125	.110	M93-102
Male Bead-type terminal (mates with 1561 and 1855 Miniature .062 Female Terminal).	3 varieties	.062	.062	.435	.280	.125	.090	R62-3
		.062	.062	.555	.400	.125	.090	R62-4
		.062	.062	.455	.280	.145	.100	R62-5
Female Bead-type terminal (mates with 1190, 1380 & 1434 Standard .093 Male Terminal).	.118	.089	.093	.420	.234	.14	.150	M118-95A
Male Bead Pin-type terminal (mates with 1189, 1381 & 1433 Standard .093 Female Terminal).	2 varieties	.093	.093	.592	.437	.109	.125	R93-12
		.093	.093	.592	.437	.169	.125	R93-31

Eng. No.	New P/N	Type	Mating Dia.	Style	Wire Range	Per Pkg. †	1000-3999*	4000-11,999*	12,000-27,999 *	Prototype Hand Tool	Manual Prod. Tool
1189	02-09-1103	F	.093	Crimp	18-14	4.20	26.60	19.50	15.30	HT-1919	HTR-1031-C
1190	02-09-2103	M	.093	Crimp	18-14	4.20	26.60	19.50	15.30	HT-1919	HTR-1031-C
1381	02-09-1118	F	.093	Crimp	24-18	4.20	26.60	19.50	15.30	HT-1919	HTR-1031-C
1380	02-09-2118	M	.093	Crimp	24-18	4.20	26.60	19.50	15.30	HT-1919	HTR-1031-C
1433	02-09-1143	F	.093	Crimp	30-22	4.20	26.60	19.50	15.30	HT-1921	HTR-2262
1434	02-09-2143	M	.093	Crimp	30-22	4.20	26.60	19.50	15.30	HT-1921	HTR-2262

Eng. No.	New P/N	Type	Mating Dia.	Style	Wire Range	Per Pkg. †	1000-4999*	5000-9999*	10,000-24,999 *	Prototype Hand Tool	Manual Prod. Tool
1377	02-09-1133	F	.093	P. C. Tail	—	3.25	22.50	17.35	13.90	—	—
1376	02-09-2133	M	.093	P. C. Tail	—	3.25	22.50	17.35	13.90	—	—

Eng. No.	New P/N	Type	Mating Dia.	Style	Wire Range	Per Pkg. †	4000-7999*	8,000-27999*	—	Prototype Hand Tool	Manual Prod. Tool
1881-2	02-08-1102	F	.093	Crimp	28-16	4.60	26.40	21.10	—	HT-1919	HTR-1031-C

Eng. No.	New P/N	Type	Mating Dia.	Style	Wire Range	Per Pkg. †	1000-2999*	3000-5999*	6000-11,999*	12,000-24,999 *	Prototype Hand Tool	Manual Prod. Tool
1561	02-06-1103	F	.062	Crimp	22-18	4.65	40.25	31.80	19.20	13.20	HT-1921	HTR-2262
1560	02-06-2103	M	.062	Crimp	22-18	4.65	40.25	31.80	19.20	13.20	HT-1921	HTR-2262
1855	02-06-1132	F	.062	Crimp	30-22	4.65	40.25	31.80	19.20	13.20	HT-1921	HTR-2262
1854	02-06-2132	M	.062	Crimp	30-22	4.65	40.25	31.80	19.20	13.20	HT-1921	HTR-2262

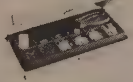
Eng. No.	New P/N	Type	Mating Dia.	Style	Wire Range	Per Pkg. †	4000-7999*	8,000-2499*	—	Prototype Hand Tool	Manual Prod. Tool
1929	02-05-1105	F	.062	Crimp	22-18	4.00	24.80	18.45	—	HT-1921	HTR-2262

Eng. No.	New P/N	Type	Mating Dia.	Style	Wire Range	Per Pkg. †	1000-4999*	5000-9999*	10,000 Up*	Prototype Hand Tool	Manual Prod. Tool
M-93-102	M-93-102	F	.093	Bead Chain	—	1.80	11.15	7.75	6.95	—	—
R-93-12	R-93-12	M	.093	Bead Chain	—	1.80	11.00	7.70	6.30	—	—
R-93-31	R-93-31	M	.093	Bead Chain	—	1.80	11.40	7.90	6.45	—	—
M-118-95A	M-118-95A	F	.093	Bead Chain	—	1.85	11.80	8.20	6.70	—	—
R-62-3	R-62-3	M	.062	Bead Chain	—	1.80	11.50	8.10	6.65	—	—
R-62-4	R-62-4	M	.062	Bead Chain	—	1.85	11.90	8.45	6.65	—	—
R-62-5	R-62-5	M	.062	Bead Chain	—	1.80	11.50	8.10	6.95	—	—

F — Female. M — Male. * Per M. † Standard pkg. — 100 pcs.

Engineering Part Nos. are to be used as a Reference No. only. Order by proper 8 digit Part No. shown.

DESIGNER KITS



The MINIATURE SERIES No. WM-72 (using .062" pin terminals) Designer Kit contains parts to assemble male and female connector housing from SINGLE-CIRCUIT to 36-CIRCUIT COMPLETE CONNECTORS. (Total of 56 Connectors.) Includes crimping tool and pin terminal ejector tool. WM-72 KIT EACH $34.95

A must for every creative designer, repairman and experimenter . . . as modern as today's circuitry. Eliminates need of searching for proper connectors or tools — everything is under one lid. This polarized Nylon Connector Designers Kit comes with all circuit capacities, complete with Male and Female housings, terminals, and crimp tool. Separated in individual compartments, each connector element is numbered and described, enabling you to re-order when running low.

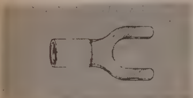
This light-weight, unbreakable kit closes with a snap-lock to avoid spills and mix-ups. Each kit contains a prototype hand crimping tool, specially balanced and weighted for ease of operation. Machined from hardened-steel, this tool provides excellent, uniform crimps every time. It also cuts and strips wire. Each kit also contains a special terminal ejector tool, and detailed crimping instructions permanently affixed and mar-proof.

WALDOM/MOLEX also produces a Designer Kit in the STANDARD SERIES No. WM-50 (using .093" pin terminals). Similarly, it has all the elements and tools necessary to make up standard connectors in all sizes. (Single circuit to 15 circuits in the standard series.) Total of 45 complete connectors. WM-50 KIT EACH $29.95

Manufactured by Molex Products Co. These items are made available from leading electronic distributors through Waldom Electronics Inc.

FOR LARGER QUANTITY PRICES, CONTACT WALDOM ELECTRONICS

SOLDERLESS TERMINALS AND CONNECTORS



S TYPE (1000 SERIES)

Basic non-insulated electro-tin plated copper terminal. One-piece construction for maximum strength and conductivity.

Vinyl Insulating Sleeve

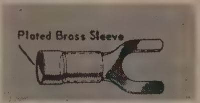
T TYPE (2000 SERIES)

All advanced features of S TYPE plus permanently attached rigid vinyl plastic insulating sleeve for increased vibration resistance. Temperature range from −40°F to 220°F continuous duty to 220°F intermittent duty.

Brazed Barrel

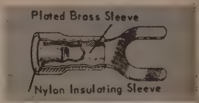
B TYPE (3000 SERIES)

Advantageous features of S TYPE plus the higher tensile strength afforded by BRAZED BARREL construction.



D TYPE (4000 SERIES)

Particularly suitable where high vibration is a factor. S TYPE construction plus seamless annealed electro-tin plated brass sleeve.



N TYPE (5000 SERIES)

All D TYPE features, tin plated brass sleeve plus permanently attached overlapping nylon insulating sleeve. Temperature range −40°F to 250°F continuous duty — to 350°F intermittent duty.

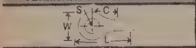
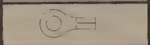
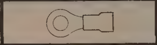
Insulated terminals color coded: 26-24 Yellow, 22-18 Red, 16-14 Blue, 12-10 Yellow UL & CSA LISTED

Material: Annealed electrolytic copper, electro-tin finish. Modern one-piece design for maximum strength and conductivity. With strength gusset, open end rapid inspection, beveled edge to facilitate wire insertion. Circumferential serrations for maximum contact area and grip. Full 1/4 inch barrel length, wide crimping area, easy location.

Wire ranges 26-24, .020 stock. 22-18, .032 stock. 16-14 .030 stock. 16-12, .050 stock. 12-10, .040 stock. No. 8, and No. 6, .050 stock. No. 4, .075 stock. Terminals in 22-18 and 16-14 wire range are available with 5/32" barrel by adding "S" to front of part desired.

RING TONGUE TERMINALS

(1/8" Barrel) 26-24 / AWG WIRE RANGE / BARREL I.D. — .035 x .020" THICK / INSULATION COLOR — YELLOW

BASIC TERMINAL DIMENSIONS			NON-INSULATED BUTTED SEAM		VINYL INSULATED		NON-INSULATED BRAZED SEAM		NON-INSULATED WITH INSULATION GRIP		NYLON INSULATED WITH INSULATION GRIP		
													
Stud Size S	Width W	Clearance C	Catalog Number	Length L	Catalog Number	Length L	Catalog Number	Length L	Catalog Number	Length L	Catalog Number	Length L	PRICE CODE
0	9/64	7/64	S-1925	5/16	———		———		D-4925	7/16	N-5925	15/32	A
1-2	9/64	7/64	S-1926	5/16	———		———		D-4926	7/16	N-5926	15/32	A
3-4	13/64	7/32	S-1929	29/64	———		———		D-4929	37/64	N-5929	39/64	A
5-6	13/64	7/32	S-1930	29/64	———		———		D-4930	37/64	N-5930	39/64	A
8	1/4	9/32	S-1932	17/32	———		———		D-4932	21/32	N-5932	11/16	A
10	1/4	9/32	S-1933	17/32	———		———		D-4933	21/32	N-5933	11/16	A
STANDARD BARREL (1/4" Barrel) 22-18 / AWG WIRE RANGE / BARREL I.D. — .075 x .030" THICK / INSULATION COLOR — RED													
1-2	1/4	7/32	S-1099	19/32	T-2099	25/32	B-3099	19/32	D-4099	47/64	N-5099	25/32	A
3-4	1/4 21/64	7/32 1/4	S-1047 S-1096	19/32 11/16	T-2047 T-2096	25/32 7/8	B-3047 B-3096	19/32 11/16	D-4047 D-4096	47/64 53/64	N-5047 N-5096	25/32 7/8	A A
5-6	1/4 1/4 21/64 5/16	7/32 9/32 1/4 9/32	S-1001 S-1700 S-1002 S-1103	19/32 11/16 11/16 47/64	T-2001 T-2700 T-2002 T-2103	25/32 57/64 7/8 59/64	B-3001 B-3700 B-3002 B-3103	19/32 11/16 11/16 47/64	D-4001 D-4700 D-4002 D-4103	47/64 27/32 53/64 7/8	N-5001 N-5700 N-5002 N-5103	25/32 57/64 7/8 59/64	A A A A
8	1/4 21/64 5/16	7/32 1/4 9/32	S-1097 S-1021 S-1701	19/32 11/16 47/64	T-2097 T-2021 T-2701	25/32 7/8 59/64	B-3097 B-3021 B-3701	19/32 11/16 47/64	D-4097 D-4021 D-4701	47/64 53/64 7/8	N-5097 N-5021 N-5701	25/32 7/8 59/64	A A A
10	21/64 5/16	1/4 9/32	S-1098 S-1003	11/16 47/64	T-2098 T-2003	7/8 59/64	B-3098 B-3003	11/16 47/64	D-4098 D-4003	53/64 7/8	N-5098 N-5003	7/8 59/64	A A
1/4	15/32 9/16	13/32 13/32	S-1004 S-1801	57/64 15/16	T-2004 T-2801	1 3/64 1 3/32	B-3004 B-3801	57/64 15/16	D-4004 D-4801	1 1 3/64	N-5004 N-5801	1 3/64 1 3/32	B B
5/16	15/32 9/16	13/32 13/32	S-1005 S-1802	57/64 15/16	T-2005 T-2802	1 3/64 1 3/32	B-3005 B-3802	57/64 15/16	D-4005 D-4802	1 1 3/64	N-5005 N-5802	1 3/64 1 3/32	B B
3/8	9/16	13/32	S-1143	15/16	T-2143	1 3/32	B-3143	15/16	D-4143	1 3/64	N-5143	1 3/32	B
STANDARD BARREL (1/4" Barrel) 16-14 / AWG WIRE RANGE / BARREL I.D. — .095 x .030" THICK / INSULATION COLOR — BLUE													
1-2	1/4	7/32	S-1102	19/32	T-2102	25/32	B-3102	19/32	D-4102	47/64	N-5102	25/32	A
3-4	1/4 21/64	7/32 1/4	S-1048 S-1823	19/32 11/16	T-2048 T-2823	25/32 7/8	B-3048 B-3823	19/32 11/16	D-4048 D-4823	47/64 53/64	N-5048 N-5823	25/32 7/8	A A
5-6	1/4 21/64 5/16	7/32 1/4 9/32	S-1006 S-1007 S-1092	19/32 11/16 47/64	T-2006 T-2007 T-2092	25/32 7/8 59/64	B-3006 B-3007 B-3092	19/32 11/16 47/64	D-4006 D-4007 D-4092	47/64 53/64 7/8	N-5006 N-5007 N-5092	25/32 7/8 59/64	A A A
8	1/4 21/64 5/16	7/32 1/4 9/32	S-1824 S-1024 S-1093	19/32 11/16 47/64	T-2824 T-2024 T-2093	25/32 7/8 59/64	B-3824 B-3024 B-3093	19/32 11/16 47/64	D-4824 D-4024 D-4093	47/64 53/64 7/8	N-5824 N-5024 N-5093	25/32 7/8 59/64	A A A
10	21/64 5/16	1/4 9/32	S-1008 S-1094	11/16 47/64	T-2008 T-2094	7/8 59/64	B-3008 B-3094	11/16 47/64	D-4008 D-4094	53/64 7/8	N-5008 N-5094	7/8 59/64	A A
1/4	15/32 9/16	13/32 13/32	S-1009 S-1826	57/64 15/16	T-2009 T-2826	1 3/64 1 3/32	B-3009 B-3826	57/64 15/16	D-4009 D-4826	1 1 3/64	N-5009 N-5826	1 3/64 1 3/32	B B
5/16	15/32 9/16	13/32 13/32	S-1041 S-1827	57/64 15/16	T-2041 T-2827	1 3/64 1 3/32	B-3041 B-3827	57/64 15/16	D-4041 D-4827	1 1 3/64	N-5041 N-5827	1 3/64 1 3/32	B B
3/8	9/16	13/32	S-1147	15/16	T-2147	1 3/32	B-3147	15/16	D-4147	1 3/64	N-5147	1 3/32	B
STANDARD BARREL (1/4" Barrel) 12-10 / AWG WIRE RANGE / BARREL I.D.—.138x.040" THICK / INSULATION COLOR—YELLOW													
3-4	1/4	9/32	S-1148	47/64	T-2148	1 1/64	B-3148	47/64	D-4148	31/32	N-5148	1 1/64	B
5-6	1/4 3/8	9/32 9/32	S-1149 S-1049	47/64 47/64	T-2149 T-2049	1 1/64 1 1/64	B-3149 B-3049	47/64 47/64	D-4149 D-4049	31/32 31/32	N-5149 N-5049	1 1/64 1 1/64	B B
8	1/4 3/8	9/32 9/32	S-1150 S-1050	47/64 47/64	T-2150 T-2050	1 1/64 1 1/64	B-3150 B-3050	47/64 47/64	D-4150 D-4050	31/32 31/32	N-5150 N-5050	1 1/64 1 1/64	B B
10	3/8	9/32	S-1011	47/64	T-2011	1 1/64	B-3011	47/64	D-4011	31/32	N-5011	1 1/64	B
1/4	17/32 39/64	7/16 7/16	S-1100 S-1012	61/64 31/32	T-2100 T-2012	1 13/64 1 9/32	B-3100 B-3012	61/64 31/32	D-4100 D-4012	1 3/16 1 15/64	N-5100 N-5012	1 15/64 1 9/32	C C
5/16	17/32 39/64	7/16 7/16	S-1101 S-1042	61/64 31/32	T-2101 T-2042	1 15/64 1 9/32	B-3101 B-3042	61/64 31/32	D-4101 D-4042	1 3/16 1 15/64	N-5101 N-5042	1 15/64 1 9/32	C C
3/8	17/32 39/64	7/16 7/16	S-1013 S-1153	61/64 31/32	T-2013 T-2153	1 15/64 1 9/32	B-3013 B-3153	61/64 31/32	D-4013 D-4153	1 3/16 1 15/64	N-5013 N-5153	1 15/64 1 9/32	C C
7/16	3/4	37/64	S-1154	1 13/64	T-2154	1 15/32	B-3154	1 13/64	D-4154	1 27/64	N-5154	1 15/32	N
1/2	3/4	37/64	S-1155	1 13/64	T-2155	1 15/32	B-3155	1 13/64	D-4155	1 27/64	N-5155	1 15/32	N

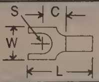
FOR LARGER QUANTITY PRICES, CONTACT WALDOM ELECTRONICS

"REFER TO PAGE 2•1074 FOR PRICES"

BLOCK SPADE—FLANGED BLOCK SPADE TERMINALS

STANDARD BARREL (1/4" BARREL)

22-18/AWG WIRE RANGE/BARREL I.D. — .075 x .030" THICK/
INSULATION COLOR — RED

BASIC TERMINAL DIMENSIONS			NON-INSULATED BUTTED SEAM		VINYL INSULATED		NON-INSULATED BRAZED SEAM		NON-INSULATED WITH INSULATION GRIP		NYLON INSULATED WITH INSULATION GRIP		
													
Stud Size S	Width W	Clearance C	Catalog Number	Length L	Catalog Number	Length L	Catalog Number	Length L	Catalog Number	Length L	Catalog Number	Length L	PRICE CODE
4-6	1/4 19/64	1/4 1/4	S-1118 S-1014	21/32 21/32	T-2118 T-2014	27/32 27/32	B-3118 B-3014	21/32 21/32	D-4118 D-4014	51/64 51/64	N-5118 N-5014	27/32 27/32	A A
8	19/64	1/4	S-1030	21/32	T-2030	27/32	B-3030	21/32	D-4030	51/64	N-5030	27/32	A
10	19/64	1/4	S-1032	21/32	T-2032	27/32	B-3032	21/32	D-4032	51/64	N-5032	27/32	A

STANDARD BARREL (1/4" BARREL)

16-14/AWG WIRE RANGE/BARREL I.D. — .095 x .030" THICK/
INSULATION COLOR — BLUE

4-6	1/4 19/64	1/4 1/4	S-1123 S-1015	21/32 21/32	T-2123 T-2015	27/32 27/32	B-3123 B-3015	21/32 21/32	D-4123 D-4015	51/64 51/64	N-5123 N-5015	27/32 27/32	A A
8	19/64	1/4	S-1033	21/32	T-2033	27/32	B-3033	21/32	D-4033	51/64	N-5033	27/32	A
10	19/64	1/4	S-1702	21/32	T-2702	27/32	B-3702	21/32	D-4702	51/64	N-5702	27/32	A

STANDARD BARREL (1/4" BARREL)

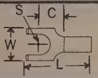
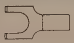
12-10/AWG WIRE RANGE/BARREL I.D. — .138 x .040" THICK/
INSULATION COLOR — YELLOW

4-6	5/16	9/32	S-1706	47/64	T-2706	1 1/64	B-3706	47/64	D-4706	31/32	N-5706	1 1/64	B
8	5/16	9/32	S-1707	47/64	T-2707	1 1/64	B-3707	47/64	D-4707	31/32	N-5707	1 1/64	B
10	5/16	9/32	S-1708	47/64	T-2708	1 1/64	B-3708	47/64	D-4708	31/32	N-5708	1 1/64	B

FLANGED BLOCK SPADE TERMINALS

STANDARD BARREL (1/4" BARREL)

22-18/AWG WIRE RANGE/BARREL I.D. — .075 x .030" THICK/
INSULATION COLOR — RED

BASIC TERMINAL DIMENSIONS			NON-INSULATED BUTTED SEAM		VINYL INSULATED		NON-INSULATED BRAZED SEAM		NON-INSULATED WITH INSULATION GRIP		NYLON INSULATED WITH INSULATION GRIP		
													
Stud Size S	Width W	Clearance C	Catalog Number	Length L	Catalog Number	Length L	Catalog Number	Length L	Catalog Number	Length L	Catalog Number	Length L	PRICE CODE
4-6	1/4 19/64	1/4 1/4	S-1717 S-1080	21/32 21/32	T-2717 T-2080	27/32 27/32	B-3717 B-3080	21/32 21/32	D-4717 D-4080	51/64 51/64	N-5717 N-5080	27/32 27/32	A A
8	19/64	1/4	S-1081	21/32	T-2081	27/32	B-3081	21/32	D-4081	51/64	N-5081	27/32	A
10	19/64	1/4	S-1082	21/32	T-2082	27/32	B-3082	21/32	D-4082	51/64	N-5082	27/32	A

STANDARD BARREL (1/4" BARREL)

16-14/AWG WIRE RANGE/BARREL I.D. — .095 x .030" THICK/
INSULATION COLOR — BLUE

4-6	1/4 19/64	1/4 1/4	S-1718 S-1083	21/32 21/32	T-2718 T-2083	27/32 27/32	B-3718 B-3083	21/32 21/32	D-4718 D-4083	51/64 51/64	N-5718 N-5083	27/32 27/32	A A
8	19/64	1/4	S-1084	21/32	T-2084	27/32	B-3084	21/32	D-4084	51/64	N-5084	27/32	A
10	19/64	1/4	S-1085	21/32	T-2085	27/32	B-3085	21/32	D-4085	51/64	N-5085	27/32	A

STANDARD BARREL (1/4" BARREL)

12-10/AWG WIRE RANGE/BARREL I.D. — .138 x .040" THICK/
INSULATION COLOR — YELLOW

4-6	5/16	9/32	S-1722	47/64	T-2722	1 1/64	B-3722	47/64	D-4722	31/32	N-5722	1 1/64	B
8	5/16	9/32	S-1723	47/64	T-2723	1 1/64	B-3723	47/64	D-4723	31/32	N-5723	1 1/64	B
10	5/16	9/32	S-1724	47/64	T-2724	1 1/64	B-3724	47/64	D-4724	31/32	N-5724	1 1/64	B

Short Barrel (5/32" Barrel) terminals available for all above terminals except 12-10 wire range. To order, add prefix letter "S" to complete part number shown above.

FOR LARGER QUANTITY PRICES, CONTACT WALDOM ELECTRONICS

"REFER TO PAGE 2•1074 FOR PRICES"

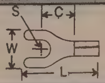
waldom

4633 WEST 53rd STREET / CHICAGO, ILLINOIS 60632 / (312) 585-1212

ROUND SPADE— ROUND FLANGED SPADE TERMINALS

26-24/AWG WIRE RANGE/BARREL I.D. — .035 x .020" THICK/
INSULATION COLOR — YELLOW

(¼" BARREL)

BASIC TERMINAL DIMENSIONS			NON-INSULATED BUTTED SEAM		VINYL INSULATED		NON-INSULATED BRAZED SEAM		NON-INSULATED WITH INSULATION GRIP		NYLON INSULATED WITH INSULATION GRIP		
													
Stud Size S	Width W	Clearance C	Catalog Number	Length L	Catalog Number	Length L	Catalog Number	Length L	Catalog Number	Length L	Catalog Number	Length L	PRICE CODE
0	9/64	7/64	S-1938	5/16	—		—		D-4938	7/16	N-5938	15/32	A
3-4	13/64	7/32	S-1934	29/64	—		—		D-4934	37/64	N-5934	39/64	A
5-6	1/4	9/32	S-1940	17/32	—		—		D-4940	21/32	N-5940	11/16	A

22-18/AWG WIRE RANGE/BARREL I.D. — .075 x .030" THICK/
INSULATION COLOR — RED

STANDARD BARREL (¼" BARREL)

Stud Size S	Width W	Clearance C	Catalog Number	Length L	Catalog Number	Length L	Catalog Number	Length L	Catalog Number	Length L	Catalog Number	Length L	PRICE CODE
4-6	21/64 23/64	1/4 9/32	S-1029 S-1501	11/16 23/32	T-2029 T-2501	7/8 15/16	B-3029 B-3501	11/16 23/32	D-4029 D-4501	53/64 57/64	N-5029 N-5501	7/8 15/16	A A
8	21/64 23/64	1/4 9/32	S-1031 S-1806	11/16 23/32	T-2031 T-2806	7/8 15/16	B-3031 B-3806	11/16 23/32	D-4031 D-4806	53/64 57/64	N-5031 N-5806	7/8 15/16	A A
10	21/64 23/64	1/4 9/32	S-1709 S-1505	11/16 23/32	T-2709 T-2505	7/8 15/16	B-3709 B-3505	11/16 23/32	D-4709 D-4505	53/64 57/64	N-5709 N-5505	7/8 15/16	A A

16-14/AWG WIRE RANGE/BARREL I.D. — .095 x .030" THICK/
INSULATION COLOR — BLUE

STANDARD BARREL (¼" BARREL)

Stud Size S	Width W	Clearance C	Catalog Number	Length L	Catalog Number	Length L	Catalog Number	Length L	Catalog Number	Length L	Catalog Number	Length L	PRICE CODE
4-6	21/64 23/64	1/4 9/32	S-1529 S-1051	11/16 23/32	T-2529 T-2051	7/8 15/16	B-3529 B-3051	11/16 23/32	D-4529 D-4051	53/64 57/64	N-5529 N-5051	7/8 15/16	A A
8	21/64 23/64	1/4 9/32	S-1831 S-1052	11/16 23/32	T-2831 T-2052	7/8 15/16	B-3831 B-3052	11/16 23/32	D-4831 D-4052	53/64 57/64	N-5831 N-5052	7/8 15/16	A A
10	21/64 23/64	1/4 9/32	S-1016 S-1533	11/16 23/32	T-2016 T-2533	7/8 15/16	B-3016 B-3533	11/16 23/32	D-4016 D-4533	53/64 57/64	N-5016 N-5533	7/8 15/16	A A

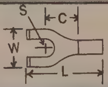
12-10/AWG WIRE RANGE/BARREL I.D. — .138 x .040" THICK/
INSULATION COLOR — YELLOW

STANDARD BARREL (¼" BARREL)

Stud Size S	Width W	Clearance C	Catalog Number	Length L	Catalog Number	Length L	Catalog Number	Length L	Catalog Number	Length L	Catalog Number	Length L	PRICE CODE
4-6	3/8	9/32	S-1053	47/64	T-2053	1 1/64	B-3053	47/64	D-4053	31/32	N-5053	1 1/64	B
8	3/8	9/32	S-1054	47/64	T-2054	1 1/64	B-3054	47/64	D-5054	31/32	N-5054	1 1/64	B
10	3/8	9/32	S-1017	47/64	T-2017	1 1/64	B-3017	47/64	D-4017	31/32	N-5017	1 1/64	B

22-18/AWG WIRE RANGE/BARREL I.D. — .075 x .030" THICK/
INSULATION COLOR — RED

ROUND FLANGED SPADE TERMINALS
STANDARD BARREL (¼" BARREL)

BASIC TERMINAL DIMENSIONS			NON-INSULATED BUTTED SEAM		VINYL INSULATED		NON-INSULATED BRAZED SEAM		NON-INSULATED WITH INSULATION GRIP		NYLON INSULATED WITH INSULATION GRIP		
													
Stud Size S	Width W	Clearance C	Catalog Number	Length L	Catalog Number	Length L	Catalog Number	Length L	Catalog Number	Length L	Catalog Number	Length L	PRICE CODE
4-6	21/64 23/64	1/4 9/32	S-1510 S-1809	11/16 23/32	T-2510 T-2809	7/8 15/16	B-3510 B-3809	11/16 23/32	D-4510 D-4809	53/64 57/64	N-5510 N-5809	7/8 15/16	A A
8	21/64 23/64	1/4 9/32	S-1811 S-1812	11/16 23/32	T-2811 T-2812	7/8 15/16	B-3811 B-3812	11/16 23/32	D-4811 D-4812	53/64 57/64	N-5811 N-5812	7/8 15/16	A A
10	21/64 23/64	1/4 9/32	S-1715 S-1582	11/16 23/32	T-2715 T-2582	7/8 15/16	B-3715 B-3582	11/16 23/32	D-4715 D-4582	53/64 57/64	N-5715 N-5582	7/8 15/16	A A

16-14/AWG WIRE RANGE/BARREL I.D. — .095 x .030" THICK/
INSULATION COLOR — BLUE

STANDARD BARREL (¼" BARREL)

Stud Size S	Width W	Clearance C	Catalog Number	Length L	Catalog Number	Length L	Catalog Number	Length L	Catalog Number	Length L	Catalog Number	Length L	PRICE CODE
4-6	21/64 23/64	1/4 9/32	S-1538 S-1834	11/16 23/32	T-2538 T-2834	7/8 15/16	B-3538 B-3834	11/16 23/32	D-4538 D-4834	53/64 57/64	N-5538 N-5834	7/8 15/16	A A
8	21/64 23/64	1/4 9/32	S-1836 S-1837	11/16 23/32	T-2836 T-2837	7/8 15/16	B-3836 B-3837	11/16 23/32	D-4836 D-4837	53/64 57/64	N-4836 N-5837	7/8 15/16	A A
10	21/64 23/64	1/4 9/32	S-1716 S-1585	11/16 23/32	T-2716 T-2585	7/8 15/16	B-3716 B-3585	11/16 23/32	D-4716 D-4585	53/64 57/64	N-5716 N-5585	7/8 15/16	A A

12-10/AWG WIRE RANGE/BARREL I.D. — .138 x .040" THICK/
INSULATION COLOR — YELLOW

STANDARD BARREL (¼" BARREL)

Stud Size S	Width W	Clearance C	Catalog Number	Length L	Catalog Number	Length L	Catalog Number	Length L	Catalog Number	Length L	Catalog Number	Length L	PRICE CODE
4-6	3/8	9/32	S-1086	47/64	T-2086	1 1/64	B-3086	47/64	D-4086	31/32	N-5086	1 1/64	B
8	3/8	9/32	S-1087	47/64	T-2087	1 1/64	B-3087	47/64	D-4087	31/32	N-5087	1 1/64	B
10	3/8	9/32	S-1088	47/64	T-2088	1 1/64	B-3088	47/64	D-4088	31/32	N-5088	1 1/64	B

Short Barrel (5/32" Barrel) terminals available for all above terminals except 12-10 wire range. To order, add prefix letter "S" to complete part number shown above.

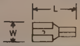
FOR LARGER QUANTITY PRICES, CONTACT WALDOM ELECTRONICS **"REFER TO PAGE 2•1074 FOR PRICES"**

4633 WEST 53rd STREET / CHICAGO, ILLINOIS 60632 / (312) 585-1212

waldom

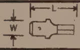
QUICK-DISCONNECT TERMINALS & BUTT-PARALLEL CONNECTORS

FEMALE PUSH-ON TYPE



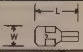
BASIC TERMINAL DIMENSIONS			NON-INSULATED BUTTED SEAM		VINYL INSULATED		NON-INSULATED WITH INSULATION GRIP		NYLON INSULATED WITH INSULATION GRIP		
Wire Range	Tab Width W	Tab Thickness T	Catalog Number	Length L	Catalog Number	Length L	Catalog Number	Length L	Catalog Number	Length L	PRICE CODE
26-20	.110-.125	.016	S-1725	31/64	—		D-4725	39/64	N-5725	41/64	D
	.110-.125	.030-.032	S-1726	31/64	—		D-4726	39/64	N-5726	41/64	D
22-18	.250	.030-.032	S-1727	41/64	—		—		—		D
18-14	.110-.125	.016	SS-1186	35/64	ST-2186	51/64	SD-4186	3/4	SN-5186	51/64	D
	.110-.125	.030-.032	SS-1728	35/64	ST-2728	51/64	SD-4728	3/4	SN-5728	51/64	D
	.187-.205	.016	SS-1187	31/64	ST-2187	25/32	SD-4187	47/64	SN-5187	25/32	D
	.250	.030-.032	SS-1090	41/64	ST-2090	55/64	SD-4090	13/16	SN-5090	55/64	AK
12-8	.250	.030-.032	S-1729	41/64	T-2729	61/64	D-4729	29/32	N-5729	61/64	F
	.375	.050	S-1730	59/64	T-2730	1 3/16	D-4730	1 1/64	N-5730	1 3/16	C

MALE PUSH-ON TYPE



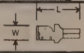
Wire Range	Tab Width W	Tab Thickness T	Catalog Number	Length L	Catalog Number	Length L	Catalog Number	Length L	Catalog Number	Length L	PRICE CODE
18-14	.187	.016	S-1190	1/2	T-2190	25/32	D-4190	47/64	N-5190	25/32	D
18-14	.250	.030-.032	S-1089	23/32	T-2089	59/64	D-4089	7/8	N-5089	59/64	D
16-12	.250	.030-.032	SS-1188	41/64	ST-2188	27/32	SD-4188	51/64	SN-5188	27/32	P
12-8	.250	.030-.032	S-1731	47/64	T-2731	1 1/32	D-4731	63/64	N-5731	1 1/32	P

MALE-FEMALE QUICK SLIDES — SELF-MATING



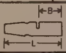
Wire Range	Tab Width W	Tab Thickness T	Catalog Number	Length L	Catalog Number	Length L	Catalog Number	Length L	Catalog Number	Length L	PRICE CODE
26-20	.110-.125		S-1732	31/64	—		D-4732	39/64	N-5732	41/64	D
18-14	.110-.125	SELF-MATING PARTS	S-1733	35/64	T-2733	51/64	D-4733	3/4	N-5733	51/64	D
	.187-.205		S-1734	31/64	T-2734	25/32	D-4734	47/64	N-5734	25/32	D
	.250		S-1735	41/64	T-2735	55/64	D-4735	13/16	N-5735	55/64	D
12-8	.250		S-1736	41/64	T-2736	61/64	D-4736	29/32	N-5736	61/64	P
	.375		S-1737	59/64	T-2737	1 3/16	D-4737	1 3/16	N-5737	1 3/16	R

SELF-MATING DISCONNECTING TERMINALS



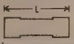
Wire Range	Tab Width W	Tab Thickness T	Catalog Number	Length L	Catalog Number	Length L	Catalog Number	Length L	Catalog Number	Length L	PRICE CODE
22-18	.250	.030	S-1738	47/64	T-2738	59/64	D-4738	7/8	N-5738	59/64	C
16-14	.250	.030	S-1739	47/64	T-2739	59/64	D-4739	7/8	N-5739	59/64	C

SNAP PLUGS



Wire Range	Tab Width W	Tab Thickness T	Catalog Number	Length L	Catalog Number	Length L	Catalog Number	Length L	Catalog Number	Length L	PRICE CODE
16-14	3/16	.157	S-1055	19/32	T-2055	27/32	D-4055	51/64	N-5055	27/32	A
16-14	3/16	.176	S-1056	19/32	T-2056	27/32	D-4056	51/64	N-5056	27/32	A
12-10	3/16	.157	S-1740	19/32	T-2740	61/64	D-4740	29/32	N-5740	61/64	B

BUTT CONNECTORS



			NON-NSULATED BUTTED SEAM		VINYL INSULATED		NON-INSULATED SEAMLESS		NYLON INSULATED WITH INSULATION GRIP		
Wire Range	Stock	Barrel I.D.	Catalog Number	Length L	Catalog Number	Length L	Catalog Number	Length L	Catalog Number	Length L	PRICE CODE
26-22	.020	.035	S-1950	3/8	—		—		N-5950	7/8	P
22-18	.030	.075	S-1019	5/16	T-2019	1	B-3019	5/8	N-5019	1	D
16-14	.030	.095	S-1020	5/16	T-2020	1	B-3020	21/32	N-5020	1	D
12-10	.040	.138	S-1046	5/16	T-2046	1 1/32	B-3046	13/16	N-5046	1 1/64	F
8	.050	.185	—		T-2263	1 13/32	B-3263	13/16	—		AC
5-6	.050	.255	—		T-2264	1 11/16	B-3264	1 1/64	—		AA
3-4	.075	.285	—		T-2265	2 1/8	B-3265	1 1/8	—		AA

PARALLEL CONNECTORS

Wire Range	Stock	Barrel I.D.	Catalog Number	Length L	Catalog Number	Length L	Catalog Number	Length L	Catalog Number	Length L	PRICE CODE
22-18	.020	.075	S-1105	5/16	T-2105	11/16	B-3105	5/16	N-5105	11/16	A
16-14	.030	.095	S-1063	5/16	T-2063	11/16	B-3063	5/16	N-5063	11/16	G
12-10	.040	.138	S-1064	5/16	T-2064	49/64	B-3064	5/16	N-5064	11/16	H
8	.050	.185	—		T-2260	15/16	B-3260	13/32	—		AB
4-6	.050	.255	—		T-2261	1 3/16	B-3261	29/64	—		AC

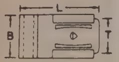
"REFER TO PAGE 2•1074 FOR PRICES"

FOR LARGER QUANTITY PRICES, CONTACT WALDOM ELECTRONICS

QUICK-DISCONNECT TERMINALS

FEMALE FLAGS

18-14 WIRE RANGE—KRIMPTITE*

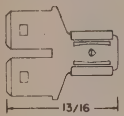


Part No.	Basic Dimensions Tab T	Barrel Length B	Length L	Pkg. of 100	Bulk 1000-4999, per M	5000 or more, per M
S-1189	.187x.020	15/64	29/64	3.75	26.55	20.90
S-1091-A	.250x.032	15/64	29/64	4.15	29.35	22.90

16-12 WIRE RANGE—KRIMPTITE*

S-1091-B	.250x.020	5/16	19/32	4.15	29.35	22.90

DOUBLE MALE TAB ADAPTER



For converting one .250 x .032 Male Tab to two Male Tabs. .032 Stock.

Part No.	Net Prices Pkg. of 100	Bulk 1000-4999, per M	5000 or more, Per M
A-1428	6.10	48.45	36.35

ECONOMICAL INSULATION-GRIP QUICK DISCONNECTS

MATERIAL: BRASS, ELECTRO-TIN PLATED

CP-801

CP-802

CP-803

Part No.	Wire Range	Description	Net Prices Pkg. of 100	Bulk 1000-4999, per M	5000 or more, per M
CP-801	20-16	1/4" Female	4.75	37.50	32.65
CP-802	16-12	1/4" Female	4.75	37.50	32.65
CP-803	20-16	1/4" Male	4.75	37.50	32.65

1/4" MALE TABS

MATERIAL: .031 BRASS, CADMIUM PLATED

S-1432T

S-1431T

Part No.	Height	Mtg. Hole	Net Prices Pkg. of 100	Bulk 1000-4999, per M	5000 or more per M
S-1431T	7/16	.156	2.20	17.35	16.95
S-1432T	29/64	.144	4.75	37.50	32.65

INSULATED TAB RECEPTACLE

For connecting two .250 Female Disconnects.

TR1427

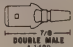
Part No.	Net Prices Pkg. of 100	1000-4999, per M	5000 or more, per M
TR-1427	11.65	83.75	65.25

PR-1426

Part No.	Net Prices Pkg. of 100	1000-4999, per M	5000 or more, per M
PR-1426	11.65	83.75	65.25

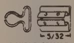
INSULATED SNAP PLUG RECEPTACLE. An insulated connector for use with S-1005, T-2055, T-2055X, D-4055 & N-5055. One snap plug is inserted in either end of the receptacle. Tubular Shell is high impact transparent Styrene.

SNAP PLUG TO TAB ADAPTERS



DOUBLE MALE
A-1429

For adapting .157 Plug Receptacle to .250 Female Disconnect. .032 Stock.



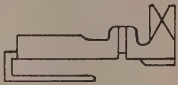
DOUBLE FEMALE
A-1430

For adapting .157 Plug to .250 x .032 Tab.

Part No.	Net Prices Pkg. of 100	1000-4999, per M	5000 or more, per M
A-1429	6.05	45.85	35.80
A-1430	8.60	61.50	57.10

PIGGY BACK TERMINAL

MATERIAL: BRASS (UNPLATED)

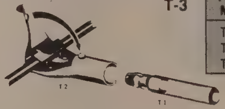


Part No.	Wire Range	Net Prices Pkg. of 100	Pkg. of 1000 1-4	5 or more
PB-1431	20-12	8.60	61.50	57.10

T—TAB TERMINAL

For attaching trailer lights to Towing Vehicle's Lighting System without cutting wires. The T-2 receptical consists of a brass insulation piercing terminal with a slipover, fold-over insulating sleeve. (Use ordinary plyers to crimp piercing portion of terminal to wire.)
The T-1 snap plug, with nylon insulating sleeve, allows easy, quick disconnecting of trailer wire. Wire range 16-14. Use CT-4050 crimping tool.

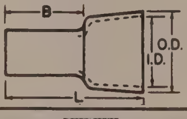
PART NO. (Male) T-1
PART NO. (Female) T-2
PART NO. (Complete Set) T-3



Part No.	Pkg. of 25	Net Prices Pkg. of 100	1000-4999 per M	5000 or more per M
T-3	7.10	22.95	182.45	153.05
T-2	3.90	12.50	100.05	83.60
T-1	3.25	10.50	82.40	69.45

NYLON INSULATED CLOSED END CONNECTORS

Connectors are annealed, tin-plated, seamless brass for 22-14 wire range, and annealed tin-plated copper for 16-10 wire range. Insulation is natural-color translucent DuPont Nylon. Underwriters' Laboratories approved. UL temperature rating of 105°C maximum. 600 Volts maximum in building wire and 1,000 Volts inside a sign or fixture.



Wire Range	Part Number	Outside Diameter O.D.	Overall Length L	Barrel Length B	Inside Diameter I.D.	Circular Mil Area	Pkg. of 100	Bulk 1000-4999, per M	5000 or more, per M
22-14	CE-2214	5/16	39/64	11/32	1/4	600- 5,180	5.40	39.80	31.15
16-10	CE-1610	7/16	23/32	3/8	3/8	2,400-13,000	7.85	57.90	45.25

S-1000 SERIES
NON-INSULATED BUTTED SEAM

PRICE CODE	PER PKG. A-25 B-20	100-999 Per C	1,000-4,999 Per M	5,000-9,999 Per M
A		$ 3.05	$21.55	$16.85
B		4.20	29.75	23.30
C		6.45	45.85	35.80
D		3.40	23.95	18.65
E		6.45	45.85	35.80
F		4.45	32.00	26.05
G		2.90	26.70	16.15
H		3.85	27.45	21.40
I	A-2.55	8.05	68.95	64.15
J	A-3.50	11.05	82.95	76.25
K	A-4.90	15.20	113.70	104.05
L		4.15	29.35	22.90
M		6.25	44.85	35.05
N		9.85	70.80	55.30
O		3.70	26.45	20.75
P		3.50	24.95	24.10
Q		3.75	26.55	20.90
R		4.75	37.50	32.65
S		6.10	48.45	36.35
T		2.20	17.35	16.95
U		10.65	84.85	75.80
AH		25.40	193.60	154.90
AI		8.60	61.50	57.10
AJ		36.30	290.40	232.30

T-2000 SERIES
VINYL INSULATED

PRICE CODE	PER PKG. A-25 B-20 C-50	100-999 Per C	1,000-4,999 Per M	5,000-9,999 Per M
A		$ 6.05	$44.70	$35.05
B		7.85	57.90	45.25
C		9.25	68.20	53.25
D		7.20	52.85	41.35
E	C- 5.95	11.65	83.75	65.25
F		9.80	72.20	56.40
G		5.40	39.80	31.15
H		7.25	53.20	41.55
I	A- 5.70	22.85	182.55	137.00
J	A- 7.30	29.20	233.15	217.05
K	A- 9.55	38.40	305.10	228.80
N	A- 3.05	11.65	83.75	65.25
P		7.20	52.85	41.35
R		8.25	65.65	49.30
S		9.95	79.30	59.50
U		13.50	107.65	80.80
W	A- 4.70	13.60	118.80	101.80
X	A- 5.25	16.80	146.25	125.45
Y	A- 7.75	22.60	197.85	169.60
Z	A- 6.70	19.40	169.85	145.70
AA	A- 8.55	24.90	217.70	186.65
AB	A- 3.35	10.60	92.55	79.30
AC	A- 4.90	15.60	148.00	128.60
AD	B-10.50	33.45	292.75	250.95
AE	A- 3.25	10.50	82.40	69.45
AF	A- 3.90	12.50	100.05	83.60
AG	A- 7.10	22.95	182.45	153.05

B-3000 SERIES
NON-INSULATED BRAZED BARREL

PRICE CODE	PER PKG. A-25 B-20	100-999 Per C	1,000-4,999 Per M	5,000-9,999 Per M
A		$ 4.90	$38.95	$29.20
B		6.80	54.45	40.85
C		9.30	74.35	55.75
D		5.55	44.10	33.05
F		9.55	76.05	57.10
N		12.45	98.85	74.20
R		8.45	67.55	50.65
S		10.25	81.55	61.15
U		13.85	110.65	83.05
W	A-2.65	9.30	81.75	77.45
X	A-3.50	12.45	108.70	106.40
Y	A-5.85	18.20	169.40	164.55
Z	A-4.95	14.40	125.90	123.40
AA	A-7.25	23.00	172.60	168.20
AB	A-1.55	5.45	52.80	50.80
AC	A-3.20	12.00	104.80	89.85
AD	B-6.75	27.05	235.30	223.85

D-4000 SERIES
NON-INSULATED WITH COPPER SLEEVE

PRICE CODE	PER PKG. A-25 B-20	100-999 Per C	1,000-4,999 Per M	5,000-9,999 Per M
A		$ 6.20	$49.90	$37.45
B		8.00	63.70	54.10
C		9.40	75.15	56.40
D		8.90	57.70	52.85
F		8.90	54.90	45.95
I	A-5.90	19.05	142.55	131.25
J	A-7.05	23.80	178.35	167.35
K	A-7.70	31.25	234.10	206.00
N		12.15	97.40	73.10
P		9.10	58.60	53.55
R		10.45	83.70	62.80
S		11.00	88.15	66.15
U		15.15	118.40	88.95

N5000 SERIES
NYLON INSULATED WITH COPPER SLEEVE

PRICE CODE	PER PKG. A-25 B-20	100-999 Per C	1,000-4,999 Per M	5,000-9,999 Per M
A		$ 9.40	$75.90	$57.00
B		11.70	93.60	70.30
C		13.20	103.75	77.85
D		9.40	75.90	57.00
F		10.90	87.90	73.00
I	A- 8.60	27.35	205.10	183.60
J	A-11.20	33.40	250.50	230.65
K	A-13.75	44.00	330.00	297.75
N		15.40	123 30	92.50
P		9.85	79.60	71.80
R		14.90	118.60	89.00
S		16.15	129.40	97.00
U		18.45	147 30	110.40
Y		15.90	139.25	112.05

FOR LARGER QUANTITY PRICES, CONTACT WALDOM ELECTRONICS

4633 WEST 53rd STREET / CHICAGO, ILLINOIS 60632 / (312) 585-1212

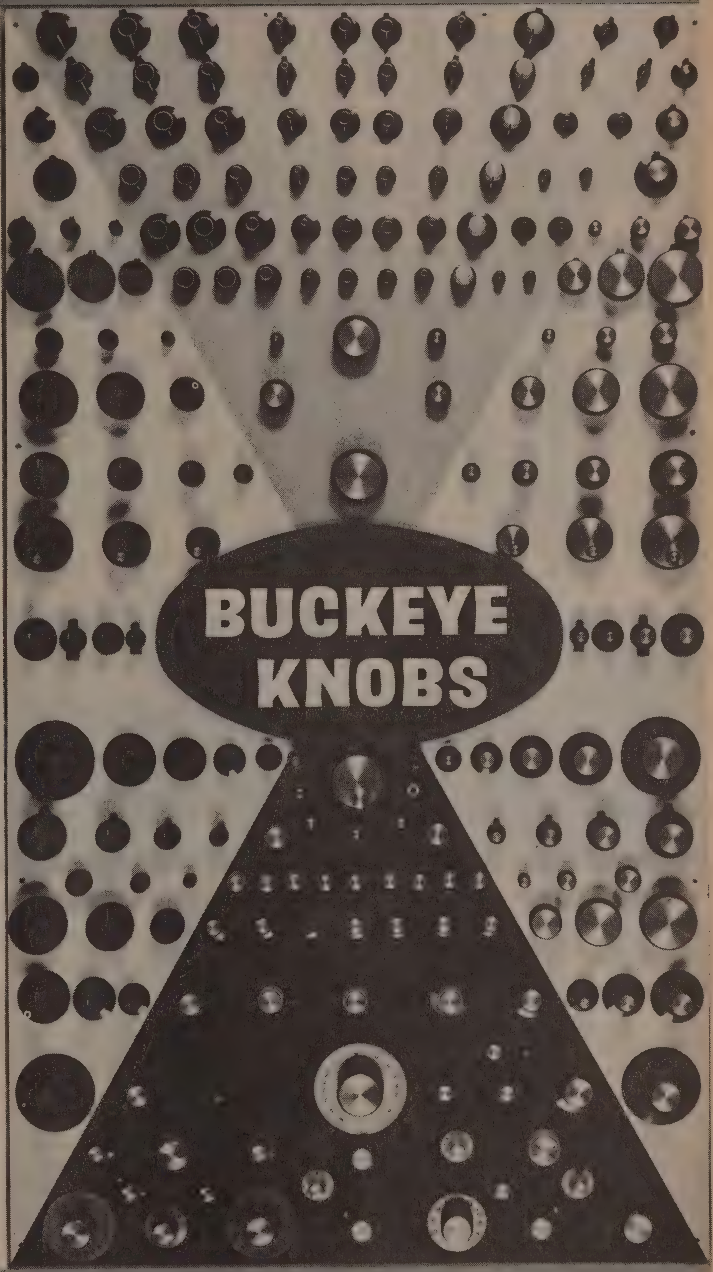
Buckeye KNOBS

IMPERIAL SERIES

DESIGNER SERIES

STANDARD SERIES

PRESTIGE SERIES



STANDARD AND CUSTOM MODIFICATIONS

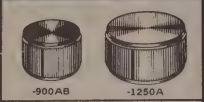
SILK SCREENING

HOT STAMPING

Buckeye Stamping also manufactures:
Cabinets, Cases, Bord-pak Racks, retractable self-locking Bails, and modular Card Guides shown on pages 1•46, 1•47 section 1400

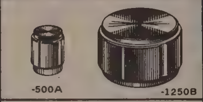
the **BUCKEYE** stamping co.
555 MARION ROAD / COLUMBUS, OHIO 43207 / TELEPHONE (614) 445-8433
"Quality Products Since 1902"

ALCOKNOB



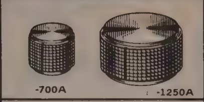
KN STRAIGHT KNURL WITH OR WITHOUT HAIRLINE INDICATOR

BASIC DIAMETER	Model - Shaft Size	Finish	Unit Price
1/2"	KN-500A-1/8	Natural	1.05
	KN-500A-1/4	Natural	1.05
	KN-500B-1/8	Black	1.05
	KN-500B-1/4	Black	1.05
	KN-500AB-1/8	Nat'l/Blk.	1.30
	KN-500AB-1/4	Nat'l/Blk.	1.30
	KN-500BA-1/8	Blk./Nat'l	1.30
	KN-500BA-1/4	Blk./Nat'l	1.30
3/4"	KN-700A-1/4	Natural	1.10
	KN-700B-1/4	Black	1.10
	KN-700AB-1/4	Nat'l/Blk.	1.40
	KN-700BA-1/4	Blk./Nat'l	1.40
15/16"	KN-900A-1/4	Natural	1.30
	KN-900B-1/4	Black	1.30
	KN-900AB-1/4	Nat'l/Blk.	1.60
	KN-900BA-1/4	Blk./Nat'l	1.60
1-1/4"	KN-1250A-1/4	Natural	1.85
	KN-1250B-1/4	Black	1.85
	KN-1250AB-1/4	Nat'l/Blk.	2.10
	KN-1250BA-1/4	Blk./Nat'l	2.10
	KN-1251A-1/4	Natural	1.80
	KN-1251B-1/4	Black	1.80



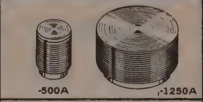
K FLUTED, WITH OR WITHOUT HAIRLINE AND SPINNER

BASIC DIAMETER	Model - Shaft Size	Finish	Unit Price
1/2"	K-500A-1/8	Natural	.90
	K-500A-1/4	Natural	.90
	K-500B-1/8	Black	.90
	K-500B-1/4	Black	.90
	K-500G-1/8	Gold	.90
	K-500G-1/4	Gold	.90
3/4"	K-700A-1/4	Natural	1.00
	K-700B-1/4	Black	1.00
	K-700G-1/4	Gold	1.00
15/16"	K-900A-1/4	Natural	1.15
	K-900B-1/4	Black	1.15
	K-900G-1/4	Gold	1.15
1-1/4"	K-1250A-1/4	Natural	1.60
	K-1250B-1/4	Black	1.60
	K-1250G-1/4	Gold	1.60
	K-1251A-1/4	Natural	1.55
	K-1251B-1/4	Black	1.55
	K-1251G-1/4	Gold	1.55
	K-1251AS-1/4	Natural	2.20
	K-1251BS-1/4	Black	2.20



KD DIAMOND KNURL WITH HAIRLINE INDICATOR

BASIC DIAMETER	Model - Shaft Size	Finish	Unit Price
1/2"	KD-500A-1/8	Natural	1.05
	KD-500A-1/4	Natural	1.05
	KD-500B-1/8	Black	1.05
	KD-500B-1/4	Black	1.05
	KD-500G-1/8	Gold	1.05
	KD-500G-1/4	Gold	1.05
3/4"	KD-700A-1/4	Natural	1.10
	KD-700B-1/4	Black	1.10
	KD-700G-1/4	Gold	1.10
15/16"	KD-900A-1/4	Natural	1.30
	KD-900B-1/4	Black	1.30
	KD-900G-1/4	Gold	1.30
1-1/4"	KD-1250A-1/4	Natural	1.75
	KD-1250B-1/4	Black	1.75
	KD-1250G-1/4	Gold	1.75



KG HORIZONTAL KNURL WITH HAIRLINE INDICATOR

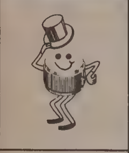
BASIC DIAMETER	Model - Shaft Size	Finish	Unit Price
1/2"	KG-500A-1/8	Natural	.90
	KG-500A-1/4	Natural	.90
	KG-500B-1/8	Black	.90
	KG-500B-1/4	Black	.90
3/4"	KG-700A-1/4	Natural	1.00
	KG-700B-1/4	Black	1.00
15/16"	KG-900A-1/4	Natural	1.15
	KG-900B-1/4	Black	1.15
1-1/4"	KG-1250A-1/4	Natural	1.50
	KG-1250B-1/4	Black	1.50

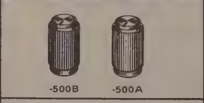
MACHINED ANODIZED

All ALCO aluminum knobs are precision machined from special alloys. Anodized in natural, black or gold, depending on model selected. Five basic diameters from 1/2" to 1 3/4". Choice of styles from a variety of plain, knurled, fluted or grooved designs.

All standard series offer a choice of sizes, and the most popular styles have matching concentric, skirted, and spinner options. 1/8" and 1/4" shaft hole diameters are indicated by type number suffix. Allen head cup point stainless steel set screws are standard.

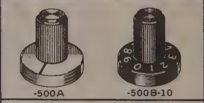
ALCO, YOUR PRIME KNOB SUPPLIER





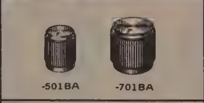
KB STRAIGHT KNURL WITH TOP LINE INDICATOR

BASIC DIAMETER	Model - Shaft Size	Finish	Unit Price
1/2"	KB-500A-1/8	Natural	1.15
	KB-500A-1/4	Natural	1.15
	KB-500B-1/8	Black	1.15
	KB-500B-1/4	Black	1.15
3/4"			



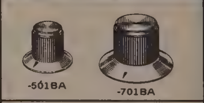
KBS STRAIGHT KNURL WITH TOP LINE INDICATOR OR NUMERALS AND SKIRT

BASIC DIAMETER	Model - Shaft Size	Finish	Unit Price
1/2"	KBS-500A-1/8	Natural	1.50
	KBS-500A-1/4	Natural	1.50
	KBS-500B-1/8	Black	1.50
	KBS-500B-1/4	Black	1.50
	KBS-500A-10-1/8	Natural	1.75
	KBS-500A-10-1/4	Natural	1.75
	KBS-500B-10-1/8	Black	1.75
	KBS-500B-10-1/4	Black	1.75
3/4"			



KN STRAIGHT KNURL WITH TOP ARROWHEAD INDICATOR

BASIC DIAMETER	Model - Shaft Size	Finish	Unit Price
1/2"	KN-501BA-1/8	Blk./Nat'l	1.30
	KN-501BA-1/4	Blk./Nat'l	1.30
3/4"	KN-701BA-1/8	Blk./Nat'l	1.35
	KN-701BA-1/4	Blk./Nat'l	1.35



KNS STRAIGHT KNURL WITH SKIRT AND TOP ARROWHEAD INDICATOR

BASIC DIAMETER	Model - Shaft Size	Finish	Unit Price
1/2"	KNS-501BA-1/8	Blk./Nat'l	1.55
	KNS-501BA-1/4	Blk./Nat'l	1.55
3/4"	KNS-701BA-1/8	Blk./Nat'l	1.70
	KNS-701BA-1/4	Blk./Nat'l	1.70

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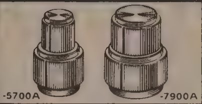
ALCOKNOB

KPN STRAIGHT KNURL WITH POINTER AND LINE INDICATOR

BASIC DIAMETER	Model - Shaft Size	Finish	Unit Price
1/2"	KPN-500A-1/8	Natural	2.60
	KPN-500A-1/4	Natural	2.60
	KPN-500B-1/8	Black	2.60
	KPN-500B-1/4	Black	2.60
	KPN-500AB-1/8	Nat'l/Blk.	2.95
	KPN-500AB-1/4	Nat'l/Blk.	2.95
	KPN-500BA-1/8	Blk./Nat'l	2.95
	KPN-500BA-1/4	Blk./Nat'l	2.95
3/4"	KPN-700A-1/4	Natural	2.75
	KPN-700B-1/4	Black	2.75
	KPN-700AB-1/4	Nat'l/Blk.	3.10
	KPN-700BA-1/4	Blk./Nat'l	3.10
15/16"	KPN-900A-1/4	Natural	3.45
	KPN-900B-1/4	Black	3.45
	KPN-900AB-1/4	Nat'l/Blk.	3.70
	KPN-900BA-1/4	Blk./Nat'l	3.70
1-1/4"			
1/2" 3/4"			
3/4" 15/16"			

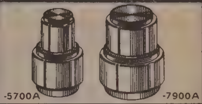
KHF SMOOTH BODY WITH TOP AND SIDE SAWCUT INDICATOR

BASIC DIAMETER	Model - Shaft Size	Finish	Unit Price
1/2"	KHF-500A-1/4	Natural	.85
	KHF-500G-1/4	Gold	.85
3/4"	KHF-700A-1/4	Natural	.95
	KHF-700G-1/4	Gold	.95
15/16"	KHF-900A-1/4	Natural	1.05
	KHF-900G-1/4	Gold	1.05
1-1/4"	KHF-1250A-1/4	Natural	1.45
	KHF-1250G-1/4	Gold	1.45
1/2" 3/4"			
3/4" 15/16"			



KN STRAIGHT KNURL CONCENTRIC WITH HAIRLINE INDICATORS

BASIC DIAMETER	Model - Shaft Size	Finish	Unit Price
1/2"			
3/4"			
15/16"			
1-1/4"			
1/2" 3/4"	KN-5700A	Natural	2.30
	KN-5700B	Black	2.30
3/4" 15/16"	KN-7900A	Natural	2.55
	KN-7900B	Black	2.55



K CONCENTRIC, FLUTED DESIGN WITH INDICATOR LINE

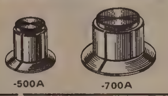
BASIC DIAMETER	Model - Shaft Size	Finish	Unit Price
1/2"			
3/4"			
15/16"			
1-1/4"			
1/2" 3/4"	K-5700A	Natural	2.05
	K-5700B	Black	2.05
3/4" 15/16"	K-7900A	Natural	2.40
	K-7900B	Black	2.40

ALUMINUM KNOBS

Special and modified versions of all Alco machined aluminum knobs are available on special order. The unsurpassed appearance and high quality of these knobs provide enhanced visual impact for any control panel and assure greater customer acceptance.

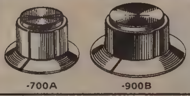
Normally, orders are filled promptly from our inventory or from our large group of stocking distributors throughout the U.S.A., Canada and Europe. Use complete model numbers when requesting quotations or ordering. For detailed information ask for catalog K 974.

CUSTOM DESIGN SERVICE PROVIDED



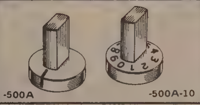
KS FLUTED DESIGN WITH ALUMINUM SKIRT AND INDICATOR LINE

BASIC DIAMETER	Model - Shaft Size	Finish	Unit Price
1/2"	KS-500A-1/8	Natural	1.25
	KS-500A-1/4	Natural	1.25
	KS-500B-1/8	Black	1.25
	KS-500B-1/4	Black	1.25
3/4"	KS-700A-1/4	Natural	1.50
	KS-700B-1/4	Black	1.50
15/16"	KS-900A-1/4	Natural	1.75
	KS-900B-1/4	Black	1.75



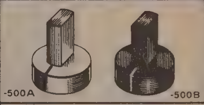
KSP FLUTED DESIGN WITH CLEAR ACRYLIC SKIRT AND INDICATOR LINE

BASIC DIAMETER	Model - Shaft Size	Finish	Unit Price
1/2"			
3/4"	KSP-700A-1/4	Natural	1.35
	KSP-700B-1/4	Black	1.35
15/16"	KSP-900A-1/4	Natural	1.55
	KSP-900B-1/4	Black	1.55



KC CONTROL KNOB WITH FLATTED BODY AND SKIRT

BASIC DIAMETER	Model - Shaft Size	Finish	Unit Price
1/2"	KC-500A-1/8	Natural	1.65
	KC-500B-1/8	Black	1.65
	KC-500A-10-1/8	Natural	1.90
	KC-500B-10-1/8	Black	1.90
3/4"			
15/16"			



KCVS "ADJUSTABLE STOP" CONTROL KNOB WITH SKIRT

BASIC DIAMETER	Model - Shaft Size	Finish	Unit Price
1/2"	KCVS-500A-1/8	Natural	2.05
	KCVS-500B-1/8	Black	2.05

KNOB DISCOUNT SCHEDULE

1-99	List
100-249	less 10%
250-499	less 15%
500-999	less 20%

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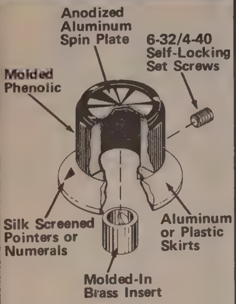
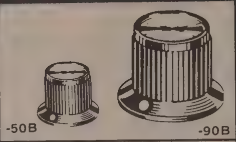

Anodized Aluminum Spin Plate
6-32/4-40 Self-Locking Set Screws
Molded Phenolic
Silk Screened Pointers or Numerals
Aluminum or Plastic Skirts
Molded-In Brass Insert

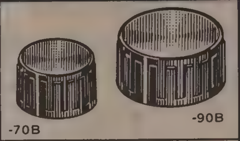
All Alco phenolic knobs have molded-in brass inserts, aluminum spin plates, and cup point Allen head set screws.



PK

STRAIGHT KNURL, PHENOLIC SKIRT & DOT INDICATOR

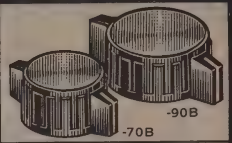
Model - Shaft Size	Max. Dia.	Unit Price
PK-50B-1/8	.748	.35
PK-50B-1/4	.748	.35
PK-70B-1/4	.984	.40
PK-90B-1/4	1.245	.45



PKG

RIBBED, BLACK OR RED WITH INDICATOR LINE

Model - Shaft Size	Max. Dia.	Unit Price
PKG-40B-1/8	.437	.55
PKG-40R-1/8	.437	.60
PKG-50B-1/8 - 1/4	.551	.60
PKG-50R-1/8 - 1/4	.551	.65
PKG-60B-1/8 - 1/4	.673	.60
PKG-60R-1/8 - 1/4	.673	.65
PKG-70B-1/8 - 1/4	.740	.65
PKG-70R-1/8 - 1/4	.740	.70
PKG-90B-1/8 - 1/4	.858	.70
PKG-90R-1/8 - 1/4	.858	.75
PKG-100B-1/4	1.055	.80
PKG-125B-1/4	1.248	1.05

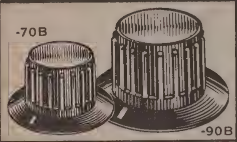


PKGP

RIBBED WITH BAR POINTERS AND INDICATOR LINE

Model - Shaft Size	Max. Dia.	Unit Price
PKGP-70B-1/4	.996	.75
PKGP-90B-1/4	1.295	.80
PKGP-100B-1/4	1.642	.90

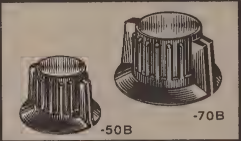
(Diameter is bar length.)



PKA

RIBBED, PHENOLIC SKIRT AND INDICATOR LINE

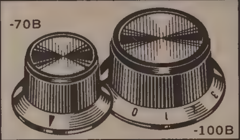
Model - Shaft Size	Max. Dia.	Unit Price
PKA-50B-1/8	.795	.55
PKA-50B-1/4	.795	.55
PKA-70B-1/4	.984	.65
PKA-90B-1/4	1.370	.80



PKAP

RIBBED, PHENOLIC SKIRT, POINTER & INDICATOR LINE

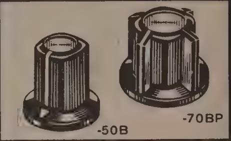
Model - Shaft Size	Max. Dia.	Unit Price
PKAP-50B-1/8	.795	.65
PKAP-50B-1/4	.795	.65
PKAP-70B-1/4	.980	.75
PKAP-90B-1/4	1.365	.90



PKD

STRAIGHT KNURL, ALUM. SKIRT/ARROW OR 0-10 NUMERALS

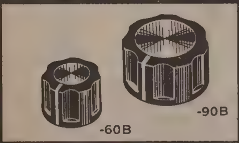
Model - Shaft Size	Max. Dia.	Unit Price
PKD-60B-1/8	.790	.50
PKD-60B-1/4	.790	.50
PKD-70B-1/4	1.030	.55
PKD-100B-1/4	1.290	.60
PKD-60B-10-1/8	.790	.55
PKD-60B-10-1/4	.790	.55
PKD-70B-10-1/4	1.030	.60
PKD-100B-10-1/4	1.290	.65



PKF

SMOOTH OR RIBBED QUADRATE WITH INDICATOR LINE

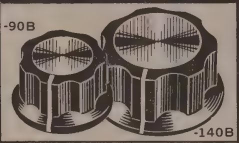
Model - Shaft Size	Max. Dia.	Unit Price
PKF-50B-1/8	.688	.55
PKF-50B-1/4	.688	.55
PKF-70B-1/4	.830	.60
PKF-70BP-1/4	.830	.70



PKE

FLUTED DESIGN WITH INDICATOR LINE

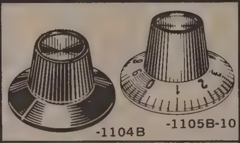
Model - Shaft Size	Max. Dia.	Unit Price
PKE-60B-1/8	.626	.60
PKE-60B-1/4	.626	.60
PKE-60R-1/8	.626	.65
PKE-90B-1/4	.890	.70



PKES

FLUTED DESIGN WITH SKIRT AND INDICATOR LINE

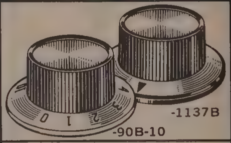
Model - Shaft Size	Max. Dia.	Unit Price
PKES-60B-1/8	.750	.60
PKES-60B-1/4	.750	.65
PKES-70B-1/4	.855	.65
PKES-90B-1/4	1.012	.70
PKES-120B-1/4	1.296	.85
PKES-140B-1/4	1.496	1.20
PKES-150B-1/4	1.768	1.35



PKS

STRAIGHT KNURL, ALUM./PHEN. SKIRT HAIRLINE/NUM.

Model - Shaft Size	Max. Dia.	Unit Price
PKS-1104B-1/4	1.120	.50
PKS-1103B-10-1/4	1.120	.55
PKS-1106B-1/4	1.160	.55
PKS-1105B-10-1/4	1.160	.60



PKS

STRAIGHT KNURL, ALUMINUM SKIRT ARROW OR NUM.

Model - Shaft Size	Max. Dia.	Unit Price
PKS-90B-1/4	1.425	.60
PKS-90B-10-1/4	1.425	.65
PKS-1137B-1/4	1.390	.65
PKS-1137B-10-1/4	1.390	.70

KNOB DISCOUNT SCHEDULE: 1-99, list; 100-249, less 10%; 250-499, less 15%; 500-999 less 20%. Higher quantity prices quoted upon request.

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A ballpoint pen will transfer these amazing words, letters, numbers or symbols to any clean surface! JUST RUB AND IT'S MARKED. Reproduction quality printing is clean and sharp with no background film or haze. Heat resistant adhesive is safe for diazo copies. Makes your prototypes look like production units. Coat panels with DATAKOAT for permanency.

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This popular set for professionals has well over 2000 titles plus letters and numbers. 24 sheets cover audio, aircraft, controls, communications, computers, microwaves and other specialties. Coat transferred titles with DATAKOAT for permanency.

9581 Black Titles (24 sh.)	$5.95	9611 White Letters (12 sh.)	$3.00
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terminal & chassis marking kit

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1 182 183 184 185 186 187 188 189
1 192 193 194 195 196 197 198 199

Mark chassis, terminals, circuit boards and components with this handy set. Includes all standard component ID letters and consecutive number sheets from 1 to 209. Contains 24 3″x5″ sheets.

966 Black set	$5.95	967 White set	$5.95

DATAMARK titles and alphabets

These economical sets offer DATAK quality in 12 specialized assortments of titles, symbols, alphabets and numerals. Each set of 6 sheets (3″x5″) covers one electronic specialty. Sets use the same typeface and size as "Titles for Electronic Equipment" so they make handy refills. Coat transferred titles with DATAKOAT for permanency.

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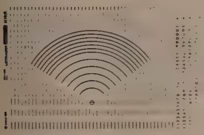
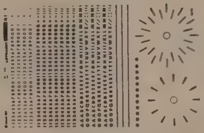
K60B Black (K60W — White) Experimenter, Home & Intercom	1.50
K61B Black (K61W — White) Test Equipment, Industry	1.50
K62 Marks & Switch Patterns (Black & White)	1.50
K63 ⅛″ Letters & Numbers (Black, White & Gold)	1.50
K64 ¼″ Letters & Numbers (Black, White & Gold)	1.50
K65 ½″ Letters & Numbers (Black, White & Gold)	1.50

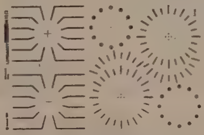
meter & dial marking kit



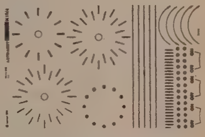
K19/1 BLK
K19/5 RED
K19/1* WHT



K19/2 BLK
K19/6 RED
K19/9 WHT



K19/3 BLK
K19/7 WHT
K19/12 RED



K19/4 BLK
K19/8, 10 WHT
K19/11 RED

Use directly on control panels and meter dial plates or as 1:1 master art. Tap switch marks are set for standard 15° and 30° detents but can be transferred at any angle for special situations. The complete set has meter arcs and graduations in black and red (white available as a refill)*. Other patterns, letters and numbers supplied in black, white and red. Protect finished panels with DATAKOAT SPRAY. Do not coat dialplates.

968 Meter & Dial Kit	$5.95
K19/# (color) Refill of 4 Identical Sheets	$4.58

DATAKOAT protective coating

High solids water-clear coating encapsulates transfers under a tough plastic film. Will not attack most plastics, lacquers or cured enamels.

04176 Brushcoat & Thinner Kit (1 oz. ea.)	$1.25
04177 Gloss Spray (16 fl. oz.)	3.25
04178 Matte Spray (16 fl. oz.)	3.25

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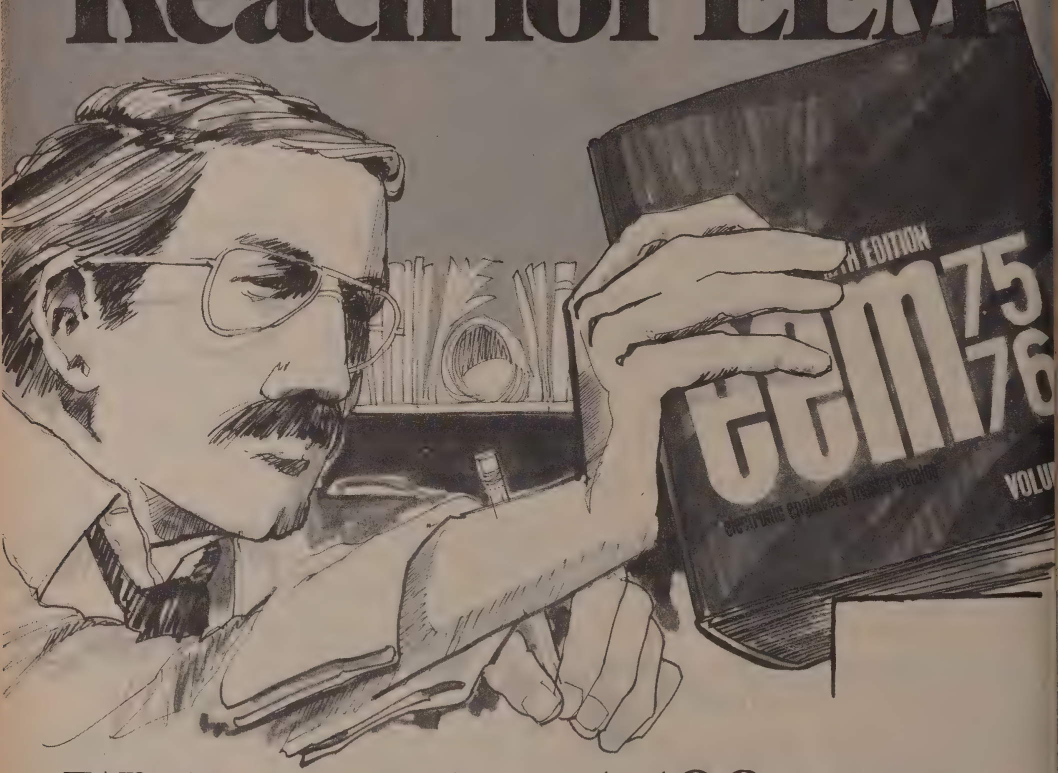
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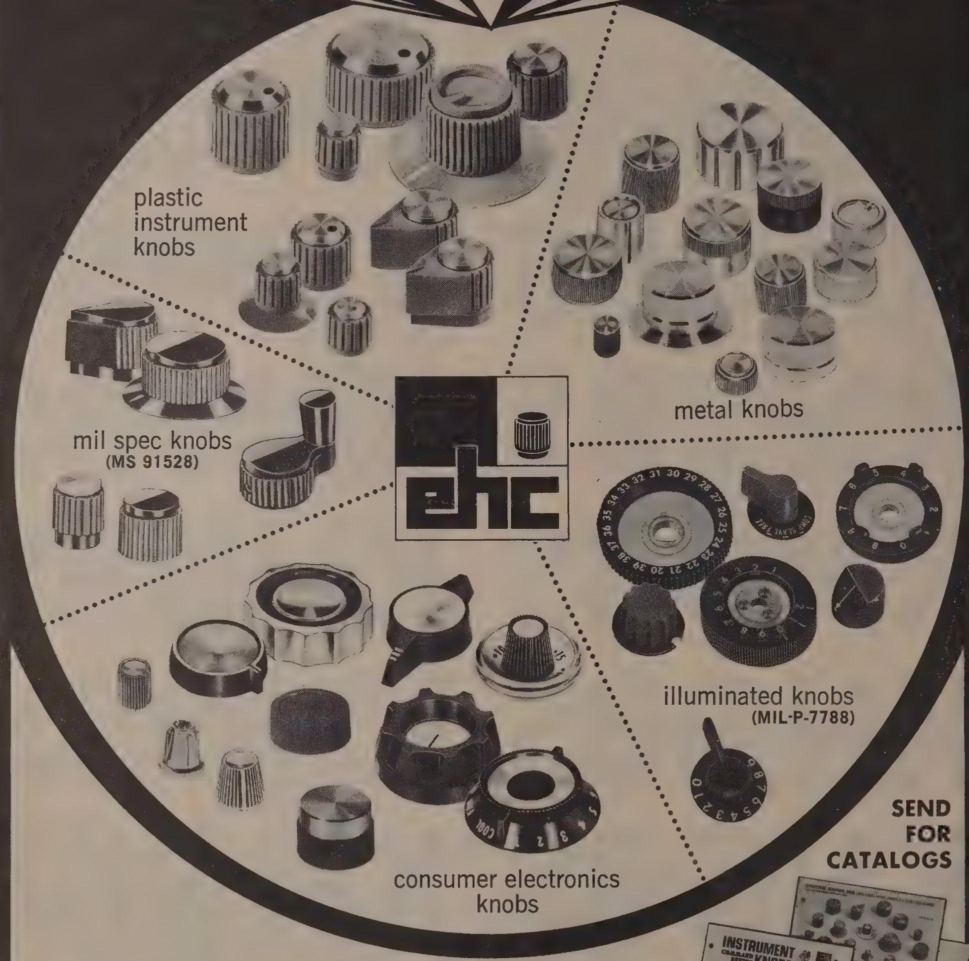
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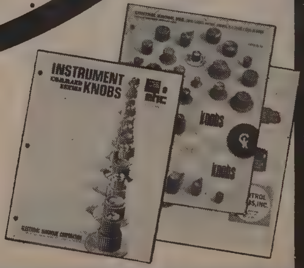
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INTERLOK

ONE OF THE **PURDY** GROUP OF COMPANIES

Knobs and Accessories

770 AIRPORT BLVD. • BURLINGAME, CA 94010
(415) 348-5625 • TWX 910-374-2353 • TELEX 34-9373

INTERLOK offers two basic knob styles; with or without wings, and with or without line markings. The diameters include 10-mm, 14.5-mm, 21-mm, 28-mm and 36-mm. You have a choice of three cap styles, nine different colors, nine standard variations in figure dials and the ability to order special dials. The standard collets will fit 1/8″ shafts on the 10-mm, 14.5-mm and 21-mm knobs, and 1/4″ shafts on the 14.5-mm, 21-mm, 28-mm and 36-mm knobs.

Versatility, design and engineering pace-setting standards are only the beginning of our knob story. Throw away those Allen wrenches, and don't scratch any more front panels. Our knobs mount easily and securely without damage to the knob or to your products.

A large selection of standard figure dials, plain and skirted pointers, stators, and other indicators add to the flexibility of the system and eliminate the need for obtaining any part from another source. Depending on the knob size, dial division ranges from 30° to 60°.

Because of the unique collet used on all INTERLOK knobs, the 10-mm and 14.5-mm, the 14.5-mm and 21-mm, and the 21-mm and 28-mm knobs can be combined to form concentric knobs.

INTERLOK also has binding posts available in two sizes, 10-mm and 14.5-mm, and six different colors including the new international standard for ground terminals, green with yellow stripes.

Contact INTERLOK for a complete catalog and begin putting together your own custom knobs.

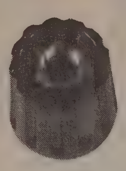


Fig. A

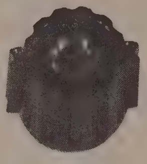


Fig. B

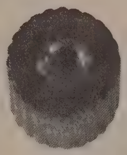
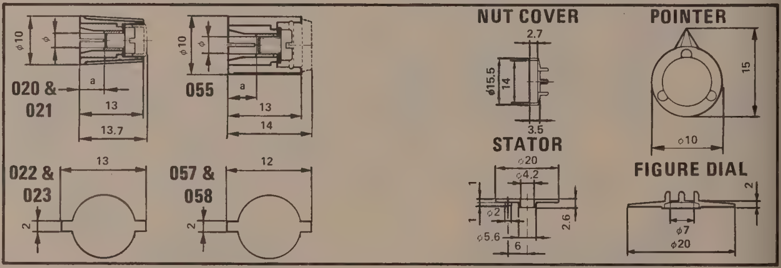


Fig. C

Fig. D

10 mm

Part Number	Fig.	Shaft Size	Color
020-2210	A	1/8″	Lt Gy
020-2220	A	1/8″	Blk
020-2230	A	1/8″	Red
021-2210	A	1/8″	Lt Gy w/line
021-2220	A	1/8″	Blk w/line
021-2230	A	1/8″	Red w/line
022-2210	B	1/8″	Lt Gy
022-2220	B	1/8″	Blk
022-2230	B	1/8″	Red
023-2210	B	1/8″	Lt Gy w/line
023-2220	B	1/8″	Blk w/line
023-2230	B	1/8″	Red w/line
055-2220	C	1/8″	Blk
055-2231	C	1/8″	Dk Red
057-2220	D	1/8″	Blk
057-2231	D	1/8″	Dk Red
058-2220	D	1/8″	Blk w/line
058-2231	D	1/8″	Dk Red w/line



Dimensions are in millimeters

CAPS
(USE ON
020-023 ONLY)

Part Number	Color
040-1010	Lt Gy
040-1020	Blk
040-1030	Red
040-1040	Blu
040-1050	Yel
040-1060	Grn

CAPS, FLAT
(USE ON
055-058 ONLY)

Part Number	Color
040-2110	Lt Gy
040-2113	Wht
040-2120	Blk
040-2131	Dk Red
040-2141	Blu Gy

CAPS, RIDGED
(USE ON 055-058 ONLY)

Part Number	Color
040-2210	Lt Gy
040-2213	Wht
040-2220	Blk
040-2231	Dk Red
040-2241	Blu Gy

POINTERS

Part Number	Color
041-2110	Lt Gy
041-2120	Blk
041-2130	Red
041-2131	Dk Red
041-2141	Blu Gy

STATORS

Part Number	Color
043-2110	Gy w/Blk line
043-2220	Blk w/Wht indicator

NUT COVERS

Part Number	Color
044-2010	Lt Gy
044-2013	Wht
044-2020	Blk
044-2030	Red
044-2031	Dk Red
044-2041	Blu Gy
044-2110	Lt Gy w/line
044-2113	Wht w/line
044-2120	Blk w/line
044-2130	Red w/line
044-2131	Dk Red w/line
044-2141	Blu Gy w/line

FIGURE DIALS

Part Number	Color	Marking	Size
042-2000	Clear	–	20 mm
042-2100	Clear	0 - 11	20 mm
042-2200	Clear	1 - 12	20 mm
042-2300	Clear	0 - 9	20 mm
042-2400	Clear	1 - 10	20 mm
042-2500	Clear	0 - 5	20 mm
042-2600	Clear	1 - 6	20 mm
042-2800	Clear	–	20 mm
042-2910	Lt Gy	Pointer	20 mm
042-2913	Wht	Pointer	20 mm
042-2920	Blk	Pointer	20 mm
042-2930	Red	Pointer	20 mm
042-2931	Dk Red	Pointer	20 mm
042-2941	Blu Gy	Pointer	20 mm

The Collet Knob

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14.5 mm

Part Number	Fig.	Shaft Size	Color
020-3210	A	1/8"	Lt Gy
020-3220	A	1/8"	Blk
020-3230	A	1/8"	Red
020-3510	A	1/4"	Lt Gy
020-3520	A	1/4"	Blk
020-3530	A	1/4"	Red
021-3210	A	1/8"	Lt Gy w/line
021-3220	A	1/8"	Blk w/line
021-3230	A	1/8"	Red w/line
021-3510	A	1/4"	Lt Gy w/line
021-3520	A	1/4"	Blk w/line
021-3530	A	1/4"	Red w/line
022-3210	B	1/8"	Lt Gy
022-3220	B	1/8"	Blk
022-3230	B	1/8"	Red
022-3510	B	1/4"	Lt Gy
022-3520	B	1/4"	Blk
022-3530	B	1/4"	Red
023-3210	B	1/8"	Lt Gy w/line
023-3220	B	1/8"	Blk w/line
023-3230	B	1/8"	Red w/line
023-3510	B	1/4"	Lt Gy w/line
023-3520	B	1/4"	Blk w/line
023-3530	B	1/4"	Red w/line
055-3220	C	1/8"	Blk
055-3231	C	1/8"	Dk Red
055-3520	C	1/4"	Blk
055-3531	C	1/4"	Dk Red
057-3220	D	1/8"	Blk
057-3231	D	1/8"	Dk Red
057-3520	D	1/4"	Blk
057-3531	D	1/4"	Dk Red
058-3220	D	1/8"	Blk w/line
058-3231	D	1/8"	Dk Red w/line
058-3520	D	1/4"	Blk w/line
058-3531	D	1/4"	Dk Red w/line

CAPS (USE ON 020-023 ONLY)

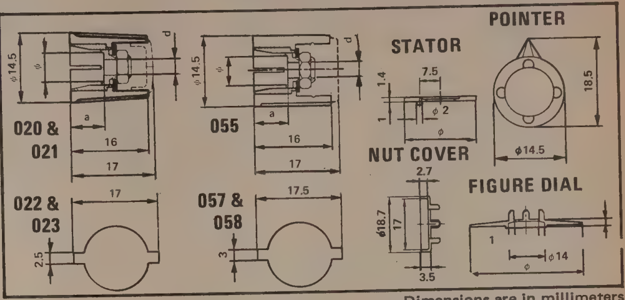
Part Number	Color
040-3010	Lt Gy
040-3020	Blk
040-3030	Red
040-3040	Blu
040-3050	Yel
040-3060	Grn

CAPS, FLAT (USE ON 055-058 ONLY)

Part Number	Color
040-3110	Lt Gy
040-3113	Wht
040-3120	Blk
040-3131	Dk Red
040-3141	Blu Gy

CAPS, RIDGED (USE ON 055-058 ONLY)

Part Number	Color
040-3210	Lt Gy
040-3213	Wht
040-3220	Blk
040-3231	Dk Red
040-3241	Blu Gy



Dimensions are in millimeters

POINTERS

Part Number	Color
041-3110	Lt Gy
041-3120	Blk
041-3130	Red
041-3131	Dk Red
041-3141	Blu Gy

STATORS

Part Number	Color
043-3110	Gy w/Blk line
043-3220	Blk w/Wht indicator

NUT COVERS

Part Number	Color
044-3010	Lt Gy
044-3013	Wht
044-3020	Blk
044-3030	Red
044-3031	Dk Red
044-3041	Blu Gy
044-3110	Lt Gy w/line
044-3113	Wht w/line
044-3120	Blk w/line
044-3130	Red w/line
044-3131	Dk Red w/line
044-3141	Blu Gy w/line
044-3210	Lt Gy w/line
044-3220	Blk w/line
044-3230	Red w/line

FIGURE DIALS

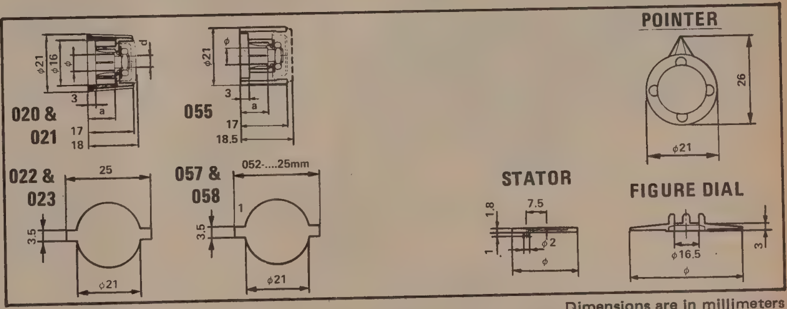
Part Number	Color	Marking	Size
042-3000	Clear	–	26 mm
042-3010	Clear	–	44 mm
042-3100	Clear	0 - 11	26 mm
042-3200	Clear	1 - 12	26 mm
042-3300	Clear	0 - 9	26 mm
042-3400	Clear	1 - 10	26 mm
042-3500	Clear	0 - 5	26 mm
042-3600	Clear	1 - 6	26 mm
042-3800	Clear	–	26 mm
042-3910	Lt Gy	Pointer	26 mm
042-3913	Wht	Pointer	26 mm
042-3920	Blk	Pointer	26 mm
042-3930	Red	Pointer	26 mm
042-3931	Dk Red	Pointer	26 mm
042-3941	Blu Gy	Pointer	26 mm

21 mm

Part Number	Fig.	Shaft Size	Color
020-4210	A	1/8"	Lt Gy
020-4220	A	1/8"	Blk
020-4230	A	1/8"	Red
020-4510	A	1/4"	Lt Gy
020-4520	A	1/4"	Blk
020-4530	A	1/4"	Red
021-4210	A	1/8"	Lt Gy w/line
021-4220	A	1/8"	Blk w/line
021-4230	A	1/8"	Red w/line
021-4510	A	1/4"	Lt Gy w/line
021-4520	A	1/4"	Blk w/line
021-4530	A	1/4"	Red w/line
022-4510	B	1/4"	Lt Gy
022-4520	B	1/4"	Blk
022-4530	B	1/4"	Red
023-4510	B	1/4"	Lt Gy w/line
023-4520	B	1/4"	Blk w/line
023-4530	B	1/4"	Red w/line
055-4220	C	1/8"	Blk
055-4231	C	1/8"	Dk Red
055-4520	C	1/4"	Blk
055-4531	C	1/4"	Dk Red
057-4520	D	1/4"	Blk
057-4531	D	1/4"	Dk Red
058-4520	D	1/4"	Blk w/line
058-4531	D	1/4"	Dk Red w/line

CAPS (USE ON 020-023 ONLY)

Part Number	Color
040-4010	Lt Gy
040-4020	Blk
040-4030	Red
040-4040	Blu
040-4050	Yel
040-4060	Grn



Dimensions are in millimeters

CAPS, FLAT (USE ON 055-058 ONLY)

Part Number	Color
040-4110	Lt Gy
040-4113	Wht
040-4120	Blk
040-4131	Dk Red
040-4141	Blu Gy

CAPS, RIDGED (USE ON 055-058 ONLY)

Part Number	Color
040-4210	Lt Gy
040-4213	Wht
040-4220	Blk
040-4231	Dk Red
040-4241	Blu Gy

POINTERS

Part Number	Color
041-4110	Lt Gy
041-4120	Blk
041-4130	Red
041-4131	Dk Red
041-4141	Blu Gy

STATORS

Part Number	Color
043-4110	Gy w/Blk line
043-4220	Blk w/Wht indicator

FIGURE DIALS

Part Number	Color	Marking	Size
042-4000	Clear	–	36 mm
042-4010	Clear	–	44 mm
042-4020	Clear	–	53 mm
042-4030	Clear	–	63 mm
042-4100	Clear	0 - 11	36 mm
042-4200	Clear	1 - 12	36 mm
042-4700	Clear	1 - 13	36 mm
042-4800	Clear	–	36 mm
042-4910	Lt Gy	Pointer	36 mm
042-4913	Wht	Pointer	36 mm
042-4920	Blk	Pointer	36 mm
042-4930	Red	Pointer	36 mm
042-4931	Dk Red	Pointer	36 mm
042-4941	Blu Gy	Pointer	36 mm

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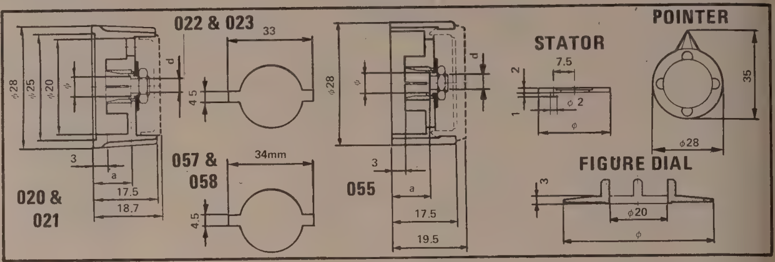
28 mm

Part Number	Fig.	Shaft Size	Color
020-5510	A	1/4"	Lt Gy
020-5520	A	1/4"	Blk
020-5530	A	1/4"	Red
021-5510	A	1/4"	Lt Gy w/line
021-5520	A	1/4"	Blk w/line
021-5530	A	1/4"	Red w/line
022-5510	B	1/4"	Lt Gy
022-5520	B	1/4"	Blk
022-5530	B	1/4"	Red
023-5510	B	1/4"	Lt Gy w/line
023-5520	B	1/4"	Blk w/line
023-5530	B	1/4"	Red w/line
055-5520	C	1/4"	Blk
055-5531	C	1/4"	Dk Red
057-5520	D	1/4"	Blk
057-5531	D	1/4"	Dk Red
058-5520	D	1/4"	Blk w/line
058-5531	D	1/4"	Dk Red w/line



Dimensions are in millimeters

CAPS (USE ON 020-023 ONLY)

Part Number	Color
040-5010	Lt Gy
040-5020	Blk
040-5030	Red
040-5040	Blu
040-5050	Yel
040-5060	Grn

CAPS, FLAT (USE ON 055-058 ONLY)

Part Number	Color
040-5110	Lt Gy
040-5113	Wht
040-5120	Blk
040-5131	Dk Red
040-5141	Blu Gy

CAPS, RIDGED (USE ON 055-058 ONLY)

Part Number	Color
040-5210	Lt Gy
040-5213	Wht
040-5220	Blk
040-5231	Dk Red
040-5241	Blu Gy

POINTERS

Part Number	Color
041-5110	Lt Gy
041-5120	Blk
041-5130	Red
041-5131	Dk Red
041-5141	Blu Gy

STATORS

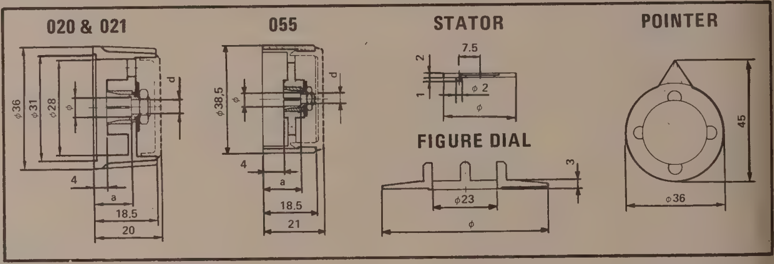
Part Number	Color
043-5110	Gy w/Blk line
043-5220	Blk w/Wht indicator

FIGURE DIALS

Part Number	Color	Marking	Size
042-5000	Clear	–	44 mm
042-5020	Clear	–	53 mm
042-5030	Clear	–	63 mm
042-5100	Clear	0 - 11	44 mm
042-5200	Clear	1 - 12	44 mm
042-5700	Clear	1 - 13	44 mm
042-5800	Clear	–	44 mm
042-5910	Lt Gy	Pointer	44 mm
042-5913	Wht	Pointer	44 mm
042-5920	Blk	Pointer	44 mm
042-5930	Red	Pointer	44 mm
042-5931	Dk Red	Pointer	44 mm
042-5941	Blu Gy	Pointer	44 mm

36 mm

Part Number	Fig.	Shaft Size	Color
020-6510	A	1/4"	Lt Gy
020-6520	A	1/4"	Blk
020-6530	A	1/4"	Red
021-6510	A	1/4"	Lt Gy w/line
021-6520	A	1/4"	Blk w/line
021-6530	A	1/4"	Red w/line
055-6520	B	1/4"	Blk
055-6531	B	1/4"	Dk Red



Dimensions are in millimeters

CAPS (USE ON 020,021 ONLY)

Part Number	Color
040-6010	Lt Gy
040-6020	Blk
040-6030	Red
040-6040	Blu
040-6050	Yel
040-6060	Grn

CAPS, FLAT (USE ON 055 ONLY)

Part Number	Color
040-6110	Lt Gy
040-6113	Wht
040-6120	Blk
040-6131	Dk Red
040-6141	Blu Gy

CAPS, RIDGED (USE ON 055 ONLY)

Part Number	Color
040-6110	Lt Gy
040-6113	Wht
040-6120	Blk
040-6131	Dk Red
040-6141	Blu Gy

POINTERS

Part Number	Color
041-6110	Lt Gy
041-6120	Blk
041-6130	Red
041-6131	Dk Red
041-6141	Blu Gy

STATORS

Part Number	Color
043-6110	Gy w/Blk line
043-6220	Blk w/Wht indicator

FIGURE DIALS

Part Number	Color	Marking	Size
042-6000	Clear	–	53 mm
042-6030	Clear	–	63 mm
042-6100	Clear	0 - 11	53 mm
042-6200	Clear	1 - 12	53 mm
042-6700	Clear	1 - 13	53 mm
042-6800	Clear	–	53 mm
042-6910	Lt Gy	Pointer	53 mm
042-6913	Wht	Pointer	53 mm
042-6920	Blk	Pointer	53 mm
042-6930	Red	Pointer	53 mm
042-6931	Dk Red	Pointer	53 mm
042-6941	Blu Gy	Pointer	53 mm

Knob Designer Kits

INTERLOK has a great idea for the packaging designer. We have a series of five designer kits that give you a complete idea of the many applications for each of our knob sizes. Each kit contains one of every item relating to that size knob.

Description	Part Number
10 mm Knob Designer Kit	070-1000
14,5 mm Knob Designer Kit	070-1450
21 mm Knob Designer Kit	070-2100
28 mm Knob Designer Kit	070-2800
36 mm Knob Designer Kit	070-3600

The Collet Knob

There is more catalog data available to you at your fingertips than ever before...when you

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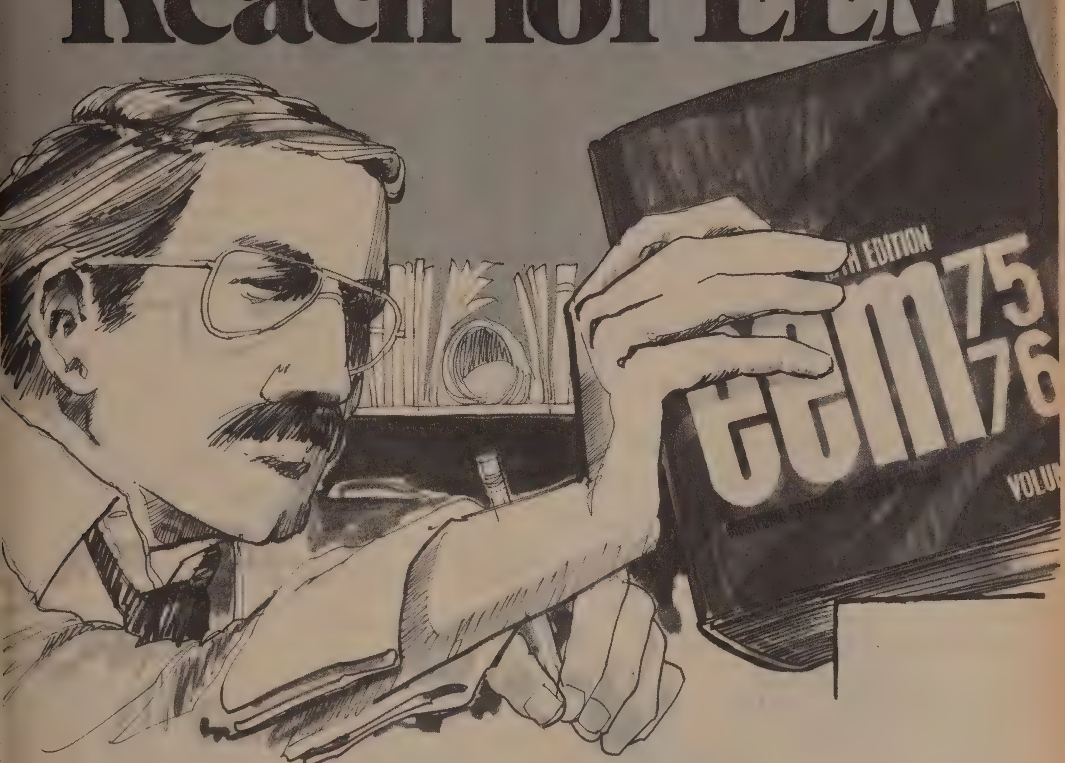

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RELIABILITY
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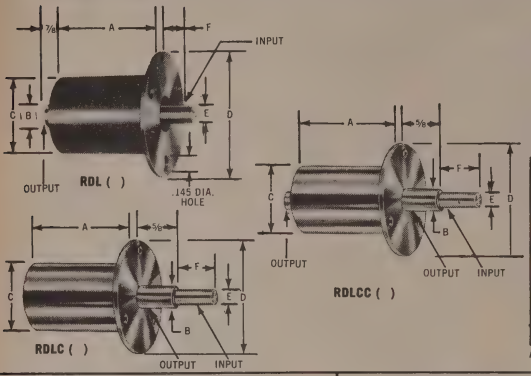
RATIO DRIVES FOR FINE INSTRUMENT AND MACHINE CONTROLS

BALL BEARING TYPES — Compact, Durable, Exceptionally Smooth Action

These unique ratio drives employ precision ball bearings. Used for rotary control of components in instruments, they provide unexcelled smooth motion. Ruggedly built, permanently sealed and lubricated, JAN Ratio Drives accommodate applications where miniaturization is essential.

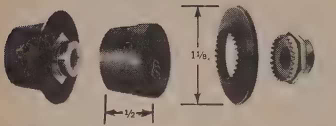
Input and output snafts of these units operate in the SAME DIRECTION. Type "RDL" provides "in-line" input-output shafts. Type "RDLC" is supplied with **concentric** shafts whereby the output envelopes the input shaft. An added feature of Type "RDLCC" is the output shaft in the rear.



Cat. No.	Ratio	A	B O.D.	B I.D.	C	D	Input Shaft E	F	Bolt-Mtg. Dia.
RDL-1	2.6:1	1	3/8	1/4	1 1/8	1 13/16	1/4	3/4	1 15/32
RDL-2	7.0:1	1 13/32	3/8	1/4	1 1/8	1 13/16	1/4	3/4	1 15/32
RDL-3	17.0:1	1 13/16	3/8	1/4	1 1/8	1 13/16	1/4	3/4	1 15/32
RDLC-1	2.6:1	1	3/8	1/4	1 1/8	1 13/16	1/4	1 1/2	1 15/32
RDLC-2	7.0:1	1 13/32	3/8	1/4	1 1/8	1 13/16	1/4	1 5/64	1 15/32
RDLC-3	17.0:1	1 13/16	3/8	1/4	1 1/8	1 13/16	1/4	23/32	1 15/32
RDLCC-1	2.6:1	1 13/32	3/8	1/4	1 1/8	1 13/16	1/4	1 5/64	1 15/32
RDLCC-3	17.0:1	2 43/64	3/8	1/4	1 3/16	1 55/64	1/4	11/16	1 15/32

All Ratios are ±10%.

KNOB RATIO DRIVE



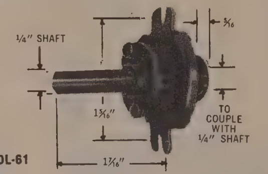
9 to 1 ratio (to dial skirt).
1:1 to potentiometer.

Cat. No. KRD-11 (Plain Gripping Surface)	**Cat. No. KRD-12** (Knurled Gripping Surface)

Exploded view shows engineered miniature gear system, to permit precise, fine tuning of controls. As shown, 9 to 1 ratio (to dial skirt). 1:1 to potentiometer. Other ratios designed to specifications.

Brass gears; black anodized aluminum knob and dial. Available with knurled or non-knurled outside knob. Available for 1/8" shafts. 1/4" on special order.

Now! Corrosion Resistant! IN-LINE RATIO DRIVE — 6.3:1



RDL-61

Variations Available to Customers Specifications

For smooth rotary control of components requiring Vernier adjustments. Suitable for use where panel space is at a premium. Durable, ruggedized ball bearing mechanism.

LIMIT STOP COMPONENTS

Designers can now consider the limit stop as a component to design with, such as potentiometers, capacitors, or other standard units. The simplicity of adjustment and the large number of available turns enables the stop range to be set with extreme precision. Conveniently located dual locking screws maintain settings under all conditions of shock and vibration.

LS-552
Washer

LS-554
Collar

Typical End Product

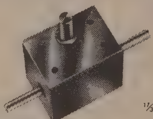
LS-556
Stop Plate

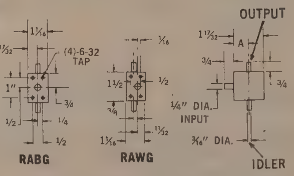
Available for 1/4" and 3/16" Shafts
Specify — (3) for 3/16"
— (4) for 1/4"

RIGHT ANGLE RATIO DRIVES — Versatile, Miniaturized, Right Angle Rotary Controls

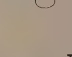
Featuring dual output stainless steel shafts at right angles to input, these engineered drives provide ideal type instrument control. Available with matched bevel worm gears covering a wide range of ratios.

JAN's Right Angle Drives are especially useful for handling spring or gravity-loaded components since the output shaft automatically locks in any desired position yet remains free for smooth adjustment by the input shaft. Assembled in dust-proof housings, the gears are permanently pinned in place on stainless-steel shafts mounted in oilite bearings and held under constant pressure.


RAWG ( )
RABG ( )



BEVEL GEAR RIGHT ANGLE DRIVES

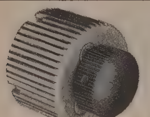


Cat. No.	Ratio	"A"
RABG-1	1:1	7/8
RABG-2	2:1	7/8
RABG-3	3:1	7/8

WORM GEAR RIGHT ANGLE DRIVES

Cat. No.	Ratio	"A"
RAWG-1	5.1	3/4
RAWG-2	10:1	3/4
RAWG-22	12:1	3/4
RAWG-3	20:1	3/4

MACROVERNIER CONTROL KNOBS

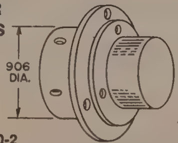

K-1320-1

Macroposition—
1" Dia. Knob; Ratio 1:1

Vernier Position—
5/8" Dia. Knob; Ratio 10:1

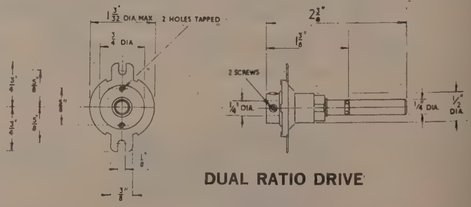
Vernier ratios from 6:1 up to 18:1 available on special order.

Torque capacity factory adjusted in increments up to 6 lb.-in.



K-1320-2

Flange mounts to front panel.
Provisions for Dial mounting.
Vernier ratios from 6:1 to 18:1 available on special order.

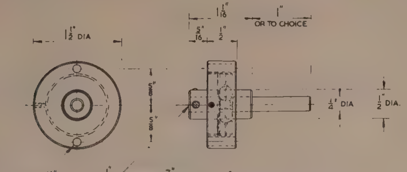


DUAL RATIO DRIVE

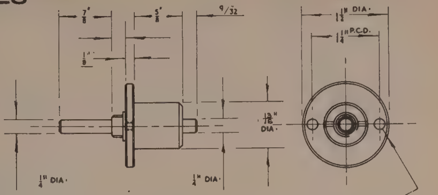
RDLC-D 366

Reverse Vernier Action with 36-1 ratio and Fast Drive of 6-1 ratio.

RATIO DRIVES

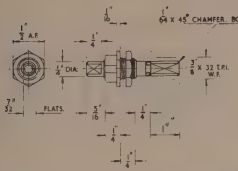

1 1/2" DIA
1 1/16"
5/16"
1/2"
1" OR TO CHOICE
5/8"
5/8"
1/4" DIA
1/2" DIA.
2 HOLES 1/8" DIA.
1/4" DIA BORE X 7/16" DEEP

RDLC-601 6-1 ratio.

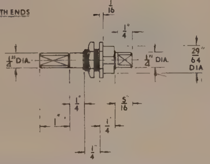

7/8"
5/8"
9/32
1/8"
1 1/2" DIA.
1 1/4" P.C.D.
13/16" DIA.
1/4" DIA.
1/4" DIA.
2 HOLES 1/8" DIA.

RDL-C 101 : 10-1 ratio.

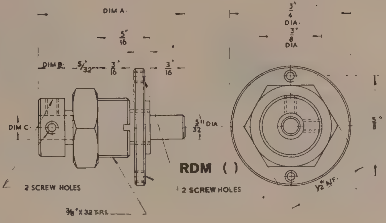
DIRECT DRIVE, REVERSE VERNIER
RDS - R 51


1/2" A.F.
1/16"
1/64 x 45° CHAMFER BOTH ENDS
1/4"
1/4" DIA.
3/8" x 32 T.P.I. W.F.
7/32"
FLATS
5/16"
1/4"
1"
1/4"

CONTINUOUS DRIVE
RDS 51

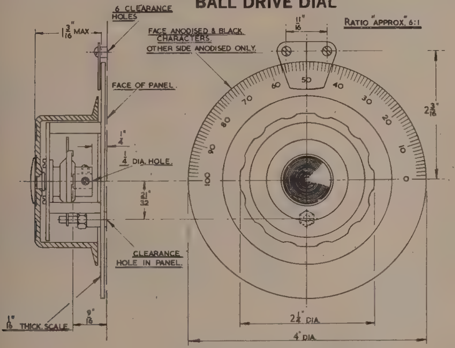

1/16
1/4"
1/4" DIA.
1/4" DIA.
29/64" DIA
1/4"
5/16
1"
1/4"
1"

*OTHER LENGTHS AVAILABLE

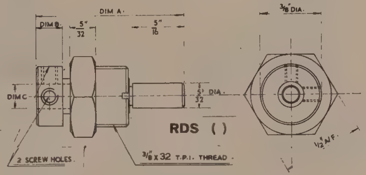

DIM A
3/4" DIA.
3/8" DIA
5/16
DIM B
5/32
3/16
3/16
DIM C
5/32" DIA
5/8"
2 SCREW HOLES
2 SCREW HOLES
3/8" x 32 T.P.I.
1/2" A/F.

RDM ( )

BALL DRIVE DIAL


6 CLEARANCE HOLES
1 3/16" MAX
FACE ANODISED & BLACK CHARACTERS.
OTHER SIDE ANODISED ONLY.
11/16"
RATIO APPROX. 6:1
FACE OF PANEL.
1/4"
1/4" DIA. HOLE.
21/32"
2 3/16"
CLEARANCE HOLE IN PANEL.
1/16" THICK SCALE
9/16"
2 1/4" DIA.
4" DIA.
0
10
20
30
40
50
60
70
80
90
100

DAD 600 6-1 ratio.


DIM A
3/8" DIA.
DIM B
5/32
5/16"
DIM C
5/32" DIA.
2 SCREW HOLES
3/8" x 32 T.P.I. THREAD
1/2" A/F.

RDS ( )

PART NO.	PART NO.	DIM A	DIM B	DIM C
RDS 101-1	RDM 101-1	29/32″	5/32″	5/32″
RDS 101-2	RDM 101-2	15/16″	13/64″	15/64″
RDS 101-3	RDM 101-3	15/16″	13/64″	1/4″

TURNS COUNTING DIALS WITH BRAKE

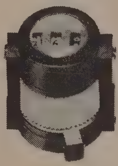
Turns-counting Dials for Accurate Multi Turn Settings.

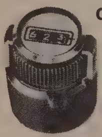
These devices are continuous and Bi-directional and can be used with Potentiometers or other Multi-Turn devices having 1; 10; 15; or 20 turns.

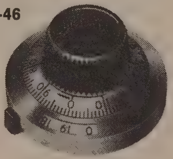
Other dials and knobs can be supplied to special requirements.

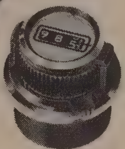
P/N	No. of Turns	Reading Accuracy	O.D.	Knob Height	Shaft Dia.
CT-19	10/15	.02	.827	.787/.906	⅛ or ¼
CT-25	10	.01	.875	.866	⅛ or ¼
CT-22	10	.01	*1.102	1.385	⅛ or ¼
CT-23	10	.002	1.070	1.240	⅛ or ¼
CT-26	10	.002	1.204	1.240	⅛ or ¼
BT-11	1	.01	.827	.866	⅛ or ¼
CT-22A	10	.01	*1.023	1.141	⅛ or ¼
CT-46	10/20	.01	1.791	.906/1.000	¼ only

NEW!

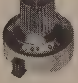

CT-22


CT-23

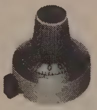

CT-46


CT-26

CT-25


BT-11

CT-22A


CT-19

JAN

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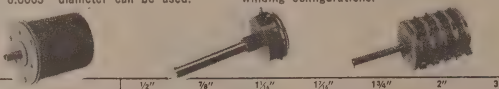
QUALITY
RELIABILITY
ECONOMY

POTENTIOMETERS / PRECISION WIRE WOUND

- LINEAR AND NON-LINEAR
- SINGLE AND MULTI-TURN
- PENDULUM OPERATED
- SECTORS AND GYRO PICKOFFS
- SWITCHES

Reliable, competitively priced wire-wound potentiometers for commercial, industrial and military electronic equipment manufacturers.

- **EXCELLENT LINEARITY:** 0.03% available in single turn 5″ diameter unit.
- **LONG LIFE:** Over two million revolutions with base metal windings.
- **WIDE TEMPERATURE RANGE:** Available for operation from −55°C to +125°C.
- **MAXIMUM STORAGE LIFE:** Platinum alloy winding also insures low noise level.
- **RELIABILITY:** Welded taps for better mechanical and electrical connections.
- **HIGH RESOLUTION:** Wire as fine as 0.0003″ diameter can be used.
- **CUSTOM DESIGNS:** Fast prototype delivery on special linear or non-linear units.
- **PRECISION CONSTRUCTION:** Anodized aluminum housings and polished steel shafts.
- **ACCURATE FUNCTIONS:** Welded taps to a single turn of wire eliminates shorted sections of winding at intermediate taps.
- **RUGGEDNESS:** Meets all applicable MIL Specs.
- **LOW NOISE** Maintained over long life and extreme environments by unique wiper designs compatible with winding configurations.

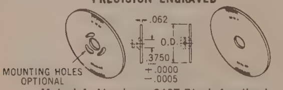


DIAMETER	½″	⅞″	1 1/16″	1 7/16″	1¾″	2″	3″
SERIES	05	09	11	15	18	20	30
ELECTRICAL							
Standard Resistance Range, Ohms	100 to 100K	100 to 100K	200 to 110K	200 to 120K	200 to 155K	200 to 180K	200 to 230K
Standard Resistance Tolerance %	5% 3%	5% 3%	5% 3%	5% 2%	5% 1%	5% 0.5%	5% 0.5%
Standard Linearity %	0.5	0.5	0.5	0.5	0.3	0.3	0.3
Best Linearity %	0.2	0.2	0.15	0.12	0.1	0.1	0.05
Power Rating, Watts at 40° ⁶	1.2	1.2	2.0	3.0	3.5	4.0	6.0
Noise Max. in Ohms	100	100	100	100	100	100	100
Temp. Coefficient of Wire PPM/°C	±20	±20	±20	±20	±20	±20	±20
Electrical Rotation (Nominal)	352°	354°	354°	354°	356°	356°	358°
MECHANICAL							
Mechanical Rotation	AS REQUIRED						
Weight, Oz., Single Section	0 5	0.6	0.8	1.7	2.5	3.5	6.0
Each Additional Section	0.2	0.3	0.5	1.0	1.3	1.5	1.8
Torque, Max. Starting, Oz., In., B.B., Single Section	0.1	0.1	0.3	0.4	0.7	0.8	1.1
Each Additional Section	0.1	0.1	0.2	0.4	0.5	0.6	0.6
Torque, Max. Running, Oz., In., Single Section	0.1	0.1	0.15	0.2	0.5	0.6	0.6
Each Additional Section	0.1	0.1	0.15	0.2	0.5	0.6	0.6
Taps, Maximum	4	9	12	17	20	24	27
Tap Tolerance	AS REQUIRED ±1 TURN OF WIRE						
Ganged Section, Maximum	3	6	6	8	8	9	9
Life Expectance, Shaft Revolutions	2 x 10⁶	2 x 10⁶	2 x 10⁶	2 x 10⁶	2 x 10⁶	2 x 10⁶	2 x 10⁶
Shaft Runout, Max. T.I.R., In.	.001	.001	.001	.001	.001	.001	.001
Shaft Radial Play Max. T.I.R., In.	.001	.001	.001	.001	.001	.001	.001

PRECISION DISC DIALS

Clockwise and Counter Clockwise

PRECISION ENGRAVED



Material: Aluminum 24ST Black Anodized

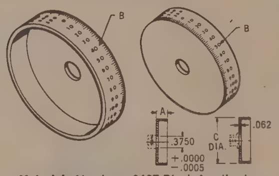
Cat. No.	Range	O.+.000 D.−.003	Steps in Degrees	Graduations
DA-01	—	1.500	—	BLANK
DA-02	0-360		2°	180
DA-03	0-100		3°-36′	100
DA-04	0-60		6°	60
DA-05	0-50		7°-12′	50
DA-06	0-25		14°-24′	25
DA-07	0-10		36°	10
DA-08	—	2.000	—	BLANK
DA-09	0-360		2°	180
DA-010	0-120		3°	120
DA-011	0-100		3°-36′	100
DA-012	0-72		5°	72
DA-013	0-60		6°	60
DA-014	0-50		7°-12′	50
DA-015	0-25		14°-24′	25
DA-016	0-10		36°	10
DA-017	—	3.000	—	BLANK
DA-018*	0-360		1°	360
DA-019*	0-360		2°	180
DA-020	0-200		1°-48′	200
DA-021	0-180		2°	180
DA-022	0-120		3°	120
DA-023*	0-100		3°-36′	100
DA-024	0-72		5°	72
DA-025	0-50		7°-12′	50
DA-026	0-10		36°	10
DA-027	—	4.000	—	BLANK
DA-028*	0-360		1°	360
DA-029*	0-360		2°	180
DA-030	0-200		1°-48′	200
DA-031	0-180		2°	180
DA-032	0-100		3°-36′	100
DA-033	0-50		7°-12′	50
DA-034	0-10		36°	10

*Available counter clockwise. To order, use prefix DC in place of DA.

PRECISION DRUM DIALS

Clockwise and Counter Clockwise

PRECISION ENGRAVED

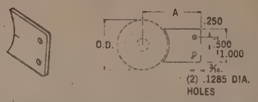


Material: Aluminum 24ST Black Anodized

Cat. No.	A	B	C	Range	Steps in Degrees
DB-1	⅜	—	.990	BLANK	—
DB-2		100		0-100	3°-36′
DB-3		180		0-360	2°
DB-4	⅜	—	1.490	BLANK	—
DB-5		60		0-60	6°
DB-6		100		0-100	3°-36′
DB-7		180		0-360	2°
DB-8	⅜	—	1.990	BLANK	—
DB-9		50		0-50	7°-12′
DB-10		25		0-25	14′-24°
DB-11		10		0-10	36°
DB-12		180		0-180	2°
DB-13		180		0-360	2°
DB-14	½	—	2.490	BLANK	—
DB-15		200		0-200	1°-48′
DB-16		180		0-180	2°
DB-17*		180		0-360	2°
DB-18*		360		0-360	1°
DB-19		100		0-100	3°-36′
DB-20	½	—	2.990	BLANK	—
DB-21		180		0-180	2°
DB-22		100		0-100	3°-36′
DB-23		10		0-10	36°
DB-24*		360		0-360	1°
DB-25*		180		0-360	2°

*Available counter clockwise. To order, use prefix DD in place of DB.

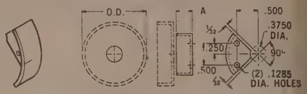
PRECISION DISC DIAL INDEX



Material: Aluminum 24ST Black Anodized
Note: Use with "DA" and "DC" Type Disc Dials

Cat. No.	A	O.D. of Dial
DG-1	1.760	1.500
DG-2	2.010	2.000
DG-3	2.510	3.000
DG-4	3.010	4.000

PRECISION DRUM DIAL INDEX

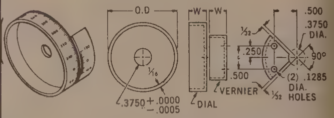


Material: Aluminum 24ST Black Anodized
Note: Use with "DB" and "DD" Type Drum Dials

Cat. No.	A	O.D. of Drum
DF-1	.375	1.490
DF-2	.375	1.990
DF-3	.500	2.490
DF-4	.500	2.999

VERNIER AND DRUM DIAL SETS

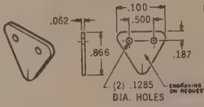
PRECISION ENGRAVED



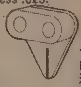
Material: Aluminum 24ST Black Anodized
Note: Special Sets Available on Request
For Additional Information See Technical Section

Cat. No.	O.+.005 D.−.005	W	Dial Graduations	Dial Range	Vernier Reading
DJ-1	1.490	.375	360° in 2° Steps	0°-360°	12′
DJ-2	1.990	.375			12′
DJ-3	2.490	.500	360° in 1° Steps		6′
DJ-4	2.990	.500			6′

PRECISION INDEX



No. 1341 POINTER, DIAL
⅜″W. x ⅜″H. x ⅛″D.
Pointer Section thickness .025.

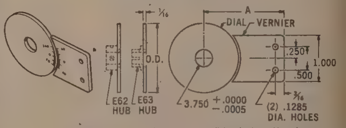


Two .078 Dia. Holes 3/16″ Apart.

Cat. No.	Material
DE-1	Clear Plexiglass
DE-2	Aluminum 24ST Black Anodized

VERNIER AND DISC DIAL SETS

PRECISION ENGRAVED



Material: Aluminum 24ST Black Anodized
Note: Special Sets Available on Request
For Additional Information See Technical Section

Cat. No.	O.+.000 D.−.005	A	Dial Graduations	Dial Range	Vernier Reading
DH-1	1.500	1.760	360° in 2° Steps	0°-360°	12′
DH-2	2.000	2.010			12′
DH-3	3.000	2.510	360° in 1° Steps		6′
DH-4	4.000	3.010			6′

We invite your inquiries for special dials and drums. Also available from stock — precision ground shafts.

JAN

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HI-VOLTAGE INSULATED COUPLINGS U.S. PATENT NO. 2,681,387

MEETS MILITARY SPECIFICATIONS — TEMPERATURE - HUMIDITY - SHOCK - VIBRATION - FUNGUS

HI-VOLTAGE INSULATED COUPLINGS

15 KV Breakdown — 10 inch pounds torque
Series No. AK-5079 and No. AK-5164

Engineered with stainless steel shaft and precision, screwdriver tip molded-integrally with Diallyl Phthalate Material in accordance with Military Specifications. Completely shock, vibration and fungus proof, they operate with ease over an ambient temperature range of −75°C to +175°C. Supplied complete with nickel plated mounting hardware.

Stainless steel screwdriver tip fits all standard slotted shafts (potentiometer, etc.) without need for further machining. Ideally suited to adjust high voltage controls thus protecting operating personnel against danger. They are also used to reduce ground capacitance on other types of sensitive instrument controls.

For Commercial Instrument Applications . . .
These couplings are available in general purpose Black Bakelite.
Cat. No. 6164-(X or B)-( ) For Standard Type
Cat. No. 6079-(X or B)-( ) with Locking Type Bushing.
Dimensions are identical with 5000 Series, in chart below.

STANDARD TYPE

Cat. No.	Dimensions in Inches			
	"A"	"B"	Shaft	"C"
AK-5164-X-1	3/8	3/16	Slotted	5/16
AK-5164-B-1	3/8	1/16	Slotted	5/16
AK-5164-X-2	3/8	3/16	Slotted	15/32
AK-5164-B-2	3/8	1/16	Slotted	15/32
AK-5164-X-3	3/8	3/16	No Slot	15/16
AK-5164-B-3	3/8	1/16	No Slot	15/16
AK-5164-X-4	3/8	3/16	No Slot	1 7/16
AK-5164-B-4	3/8	1/16	No Slot	1 7/16
AK-5164-X-5	3/8	3/16	Slotted	Minus 1/16
AK-5164-B-5	3/8	1/16	Slotted	Minus 1/16

WITH LOCKING TYPE BUSHING

Cat. No.	"A"	"B"	Shaft	"C"
AK-5079-X-1	9/16	3/16	Slotted	1/8
AK-5079-B-1	9/16	1/16	Slotted	1/8
AK-5079-X-2	9/16	3/16	Slotted	9/32
AK-5079-B-2	9/16	1/16	Slotted	9/32

Note: (3/16″) to be used with 1/8″ long shaft.
(1/16″) to be used with 1/4″ long shaft.

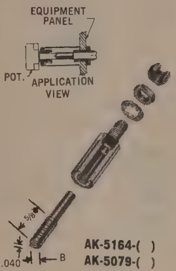
HI-VOLTAGE INSULATED COUPLINGS FOR 1/8″ SHAFTS

White Cycalac material. Voltage rating: 6000 VDC. Hubs — Brass, Nickel Plated; Shafts — St. Steel.
*Insert letter "S" or "N" followed by first two numbers of decimal equivalent, for fractional length of shaft beyond bushing.
"S" = with slot. "N" = no slot.

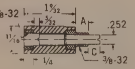
Typical Part Number: AK-2164-N31 =
5/16″ long shaft beyond bushing (standard), no slot. If length is 1″ use "X".

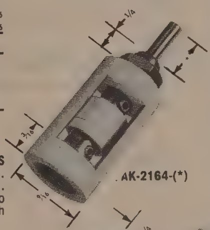
Typical Part Number: AK-2164-SX =
1″ long shaft beyond bushing, slotted.
If length exceeds 1″, use "X" and decimal equivalent for balance of number.

Typical Part Number: AK-2164-NX31 =
1 5/16″ long shaft beyond bushing, no slot.

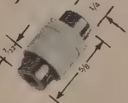


AK-5164-( )
AK-5079-( )





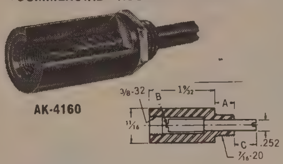
AK-2164-(*)



AP-1540

COMMERCIAL INSULATED COUPLINGS

30 KV Breakdown
10 inch pounds torque



AK-4160

STANDARD TYPE

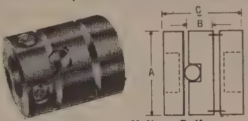
Cat. No.	Dimensions in Inches			
	"A"	"B"	Shaft	"C"
AK-4160-X-1	3/8	3/8	Slotted	1/8
AK-4160-B-1	3/8	3/16	Slotted	1/8
AK-4160-X-2	3/8	3/8	No Slot	1/2
AK-4160-B-2	3/8	3/16	No Slot	1/2

Series No. AK-4160
For TV and Industrial Applications

These handy couplings, capable of withstanding 30 KV, are made of high grade Bakelite throughout except for the stainless steel screwdriver tip molded within the drive shaft. Mounting hardware supplied.

AUTOLINEAR (INSULATED) SHAFT COUPLINGS

2.5-5 KV Breakdown Universal, Miniature, Self-aligning



Typical Part No.'s	Voltage Rating
AP-1530-34	AP-1530, 2500 V
AP-1538-22	AP-1538, 5000 V

Part No.	Dimensions in Inches			
	Dia. Hole	"A"	"B"	"C"
AP-1530-2	1/8	1/2	15/64	59/64±1/32
AP-1530-3	3/16	1/2	15/64	59/64±1/32
AP-1530-4	1/4	1/2	15/64	59/64±1/32
AP-1538-2	1/8	1/2	27/64	1 7/64±1/32
AP-1538-3	3/16	1/2	27/64	1 7/64±1/32
AP-1538-4	1/4	1/2	27/64	1 7/64±1/32

Cat. No. AP-1530 and AP-1538

A unique series of shaft couplers that accommodate either similar or dissimilar 1/8″, 3/16″ or 1/4″ shafts. Permits offset misalignment to 1/16″ and 5° angle. Operates free of backlash. Self-extinguishing low water absorption characteristic plastic insulator between precision cast aluminum hubs. Each hub has 2 set screws for firm attachment. Alodine finish.

1/4″ SHAFT COUPLING EXTENDER

Cat. No. AP-1010
Nickel plated brass with 2 set screws for firm attachment to shaft. 1/2″ O.D.; 1 3/4″ overall length.
Cat. No. AP-1321
Same as above, except extends 1/4″ shaft to 1/8″, overall length 2 1/2″.

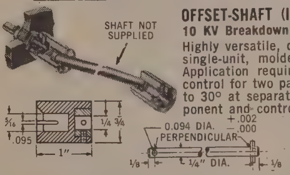
SHAFT COUPLING

Cat. No. AP-15150
A rugged, nickel plated brass coupling for joining two 1/4″ shafts. Supplied with 4 set screws for firm attachment to shafts.
Cat. No. AP-15151
Same as above, 2 set screws.

OFFSET-SHAFT (INSULATED) COUPLINGS

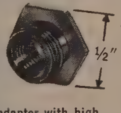
10 KV Breakdown / ±30° Offset Cat. No. AP-15299

Highly versatile, durable, insulated couplings made with single-unit, molded Nylon-to-metal insert construction. Application requires two couplings — permits smooth control for two parallel shafts offset from each other up to 30° at separations greater than 3″. Secured to component and control shafts by 2 set screws.



Note: Coupling is accomplished with a 1/4″ shaft of any length (not furnished). Coupling shaft keyed to coupler by steel drive pins supplied.

REDUCER INSERT BUSHING
Cat. No. AK771



Used as an adapter with high voltage insulated couplings to accommodate miniature (1/8″ shaft) potentiometers. External thread 3/8x32. Internal thread 1/4x32.

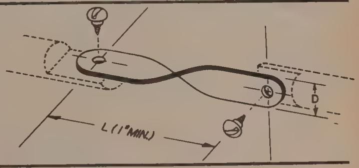
Cat. No. AP-1367

UNITWIST JAN UNIVERSAL

(shoulder screws supplied)

Specify:

1. Torque Requirement
2. Shaft Diameters (D) in increments of 1/16
3. Distance "L" in increments of 1/16″

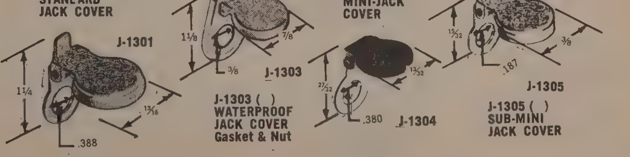


JACK COVERS (TRIMMER COVERS)

These sturdy Jack Covers fit jack or panel bushings and are used to keep out dust and moisture as well as to prevent inadvertent disturbance of control settings. Outer surfaces are finished in standard colors of baked enamel.

To Order Colors Specify:
(-1) Black Wrinkle; (-2) Smooth Gray; (-3) Smooth Olive; (-4) Smooth Black. Other colors on request.

Example: Jack cover, color black wrinkle, order as J-1301 (-1)



JAN

JAN HARDWARE

MANUFACTURING COMPANY INC.

47-27 36th STREET • LONG ISLAND CITY, NEW YORK 11101 • TEL: (212) 361-0800

QUALITY
RELIABILITY
ECONOMY

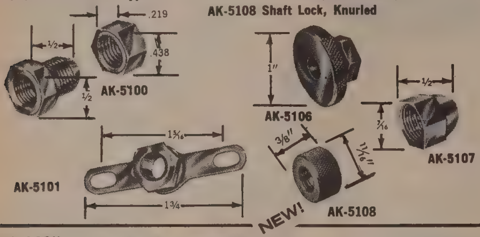
SHAFT LOCKS

Cat. No. AK-5100 thru No. AK-5107 — Split-Bushing, Collet Type Locks

Used to securely hold the shaft of volume controls, capacitors, switches, etc. in position. Body and lock nut are brass — nickel plated. Supplied with nickel plated internal tooth lock washers, upon request.

SPLIT BUSHING TYPE — For ¼″ Shafts

AK-5100 Standard Lock Nut
AK-5101 Panel Mount Type
AK-5106 Knurled Shaft Lock (1″ O.D. Knurl)
AK-5107 Lock Nut (Round Head)
AK-5108 Shaft Lock, Knurled



DIAL LOCK

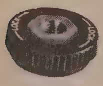
Cat. No. AP-1060

Supplied completely assembled. Securely locks dial in position. Nickel plated on brass. Knurled head. 1⅜″ overall length.

NYLON SHAFT LOCK **Cat. No. AK-1050**

One-piece, black nylon; fits standard ⅜″-32 thread of shaft bushing. Friction grip holds ¼″ shaft to prevent accidental or vibrational disturbance of control settings. Adjustment for semi-permanent locking, provided.

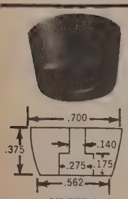
SHAFT KNOB LOCK



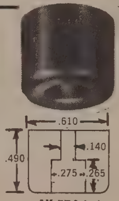
Cat. No.
AK-1057-2 (*) (⅛″ shaft)
AK-1057-4 (*) ¼″ shaft)
(Used with 71 Series Knob)
AK-1059-4 (*) (¼″ shaft)
(Used with 91 Series Knob)
*Specify "M" or "G" for matte or glossy finish.

Prevents movement of controls due to shock, vibration, or accidental manual contact. Available in matte or glossy finish, for commercial or military applications.

Typical Part Numbers: **AK-1057-2MA = For ⅛″ Shaft/matte finish/Black**
AK-1059-4GA = For ¼″ Shaft/glossy finish/Black



AK-575 ( )



AK-574 ( )

CHASSIS AND CABINET BUMPERS

Durable, low-friction polyethylene. Guards against scuffing. Supplied in either black or russet brown, with recessed hole for screw or bolt usage.

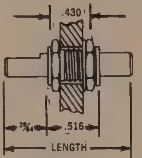
To Order Colors: Black, specify (4); Brown, specify (7). Other colors on request.

AK-574 also available in white nylon; thru hole .187 dia., C bore ⅜″. Specify No. AK-577-8

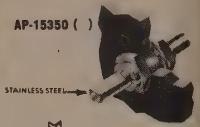
PANEL BEARING AND SHAFT ASSEMBLIES

Cat. No. AP-15350 Series

Used for rotary control of components. Passivated stainless steel shaft is ¼″ dia. with one end flattened for attaching to knob control by set screws. Supplied completely assembled with two retaining rings, jam nut with lock washer and nickel plated, brass panel bearing. Fits panels up to 3/16″ thick; mounts in 13/32″ dia. hole.

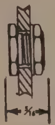


AP-15350

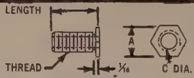


Cat. No.	Item	"L" Shaft Length
AP-15350	Panel Bearing	—
AP-15350-1	Panel Bearing &	1 15/16″
AP-15350-2	Shaft Assembly	3″
AP-15350-3		6″

Also available as Nylon Panel Bearing.



Cat. No. AK-5511 Panel Bearing Assembly
Shafts available on special order.



PANEL BUSHING

FOR ¼ AND ⅜ SHAFT

EXAMPLE (TO ORDER)
Pt. No. PB 61614-B=¼-28 Thd., ½ Lg. Panel Bushing-Brass w/.127 Hole.

Bushing supplied with Mtg. nut and int. tooth lockwasher.

Lgth.	A=⅜ ¼-28 Thread	A=½ ⅜-32 Thread
⅜	PB 60614	PB 80638
7/16	PB 60714	PB 80738
½	PB 60814	PB 80838
⅝	PB 61014	PB 81038
¾	PB 61214	PB 81238

Thread	"C" Dia.
¼-28	.127
⅜-32	.252

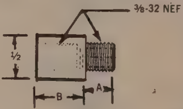
Can be made to order with special nylon bearings.

BUSHING EXTENDERS

Cat. No. AK-5075-1 thru AK-5075-11

Permit staggered mounting of components having ¼″ shafts, behind a panel. Useful in meeting problems of space economy. Supplied in nickel plated brass.

Note:
Extender AK-5075-9 is a locking (collet) type and is supplied by JAN with lock nut.



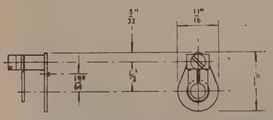
AK-5075 ( )

Dimensions in Inches

Cat. No.	"B"	"A"	Cat. No.	"B"	"A"
AK-5075-1	⅝	⅜	AK-5075-6	1⅝	¼
AK-5075-2	⅝	¼	AK-5075-7	1 7/16	3/16
AK-5075-3	⅝	3/16	AK-5075-8	1 1/16	¼
AK-5075-4	¾	¼	AK-5075-9	11/16	½
AK-5075-5	2¼	¼	AK-5075-10	1 21/64	7/16
			AK-5075-11	55/64	7/16

"SHAFT LOCK"

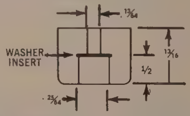
AK 5180



FITS OVER ⅜″ BUSHING FOR ¼″ SHAFT

NO. AK-576-4 HEAVY DUTY CHASSIS AND CABINET BUMPER

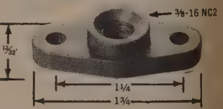
(WITH STEEL WASHER INSERT)



Molded neoprene. 1″ diameter, 13/16″ high. Configuration similar to AK-574 above. Color: Black. Other colors on request.

RETAINER NUT

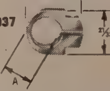
Cat. No. R-1030



Used in conjunction with captive screw and nut assemblies. Die casting. Can be painted. Other thread sizes available upon special order.

"NO-MAR" CLAMPS

No. 938



No. 937

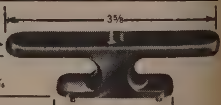
Set screw does not touch shaft. Ideal for knob and gear applications. Variety of sizes available.

A Dimensions in Inches

Cat. No.	-2	-3	-4	-5	-6	-7	-8
937	⅛	3/16	¼	5/16	⅜	13/32	7/16
938	⅛	3/16	¼	5/16	⅜	13/32	

HANDLE, CORD

Cat. No. H-692-1



Colors:
(-1) Grey
(-2) Black
Special colors on request.

This durable, die-cast aluminum handle is designed for use on small instrument panels. Single integral hole accepts No. 10 screw.

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ECONOMY

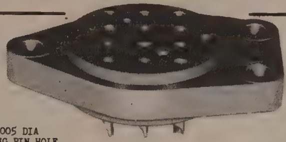
RELAY SOCKETS with Fixed or Removable Contacts!

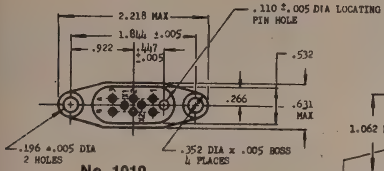
Jan's relay sockets are specifically designed for use with plug-in relays . . . in electronic circuit applications which demand quick and easy assembly and maintenance.

Available with dip-solder pin terminals for printed circuit assembly, or solder cup and turret terminals for direct wiring. For applications requiring removable contacts, solderless wire crimp terminations are available for #16, 20, 22, or 24 AWG wire sizes.

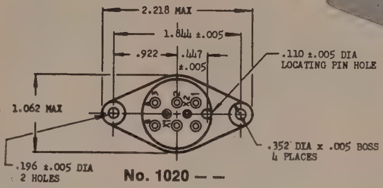
A variety of mounting styles are offered including . . . tapped inserts with studs for top chassis mounting; thru hole; or tapped inserts with removable standoffs and screws for mounting on either side of chassis or panel. Unexpected disconnect because of vibration is eliminated by fastening the relay to the socket. Polarization dots and/or index holes (optional) aid in plugging in relay correctly. Socket contact material is spring tempered phosphor bronze gold plate over silver plate. Body material is Diallyl Phthalate, fiberglass filled per MIL-M-19833.

1000 SERIES

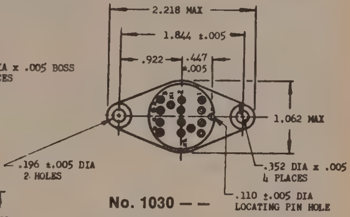



2.218 MAX
1.844 ±.005
.922
.447 ±.005
.110 ±.005 DIA LOCATING PIN HOLE
.532
.266
.631 MAX
.196 ±.005 DIA 2 HOLES
.352 DIA x .005 BOSS 4 PLACES

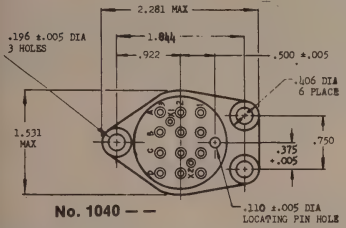
No. 1010 — —


2.218 MAX
1.844 ±.005
.922
.447 ±.005
.110 ±.005 DIA LOCATING PIN HOLE
1.062 MAX
.196 ±.005 DIA 2 HOLES
.352 DIA x .005 BOSS 4 PLACES

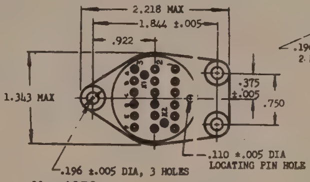
No. 1020 — —


2.218 MAX
1.844 ±.005
.922
.447 ±.005
1.062 MAX
.196 ±.005 DIA 2 HOLES
.352 DIA x .005 4 PLACES
.110 ±.005 DIA LOCATING PIN HOLE

No. 1030 — —


2.281 MAX
.196 ±.005 DIA 3 HOLES
1.844
.922
.500 ±.005
.406 DIA 6 PLACE
1.531 MAX
.750
.375 ±.005
.110 ±.005 DIA LOCATING PIN HOLE

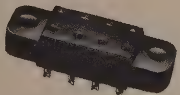
No. 1040 — —

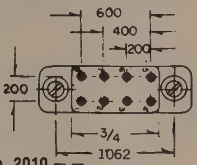

2.218 MAX
1.844 ±.005
.922
1.343 MAX
.375 ±.005
.750
.110 ±.005 DIA LOCATING PIN HOLE
.196 ±.005 DIA, 3 HOLES

No. 1050 — —

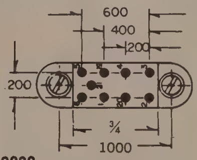
MS No.	JAN Part No.	MS No.	JAN Part No.
MS25322	No. 1010	MS25456	No. 1060
MS25324	No. 1020	MS25458	No. 1070
MS25326	No. 1030	MS25460	No. 1080
MS25328	No. 1040	MS25462	No. 1090
MS25330	No. 1050	MS25464	No. 1100

2000 SERIES

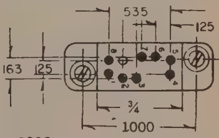



600
400
200
200
3/4
1062

No. 2010 — —

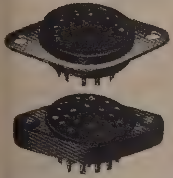

600
400
200
200
¾
1000

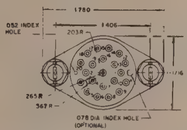
No. 2020 — —


535
125
163
125
¾
1000

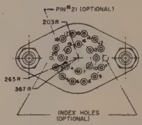
No. 2030 — —

3000 SERIES

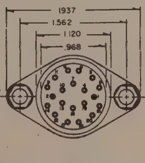



1780
052 INDEX HOLE
1406
203R
265R
367R
078 DIA INDEX HOLE (OPTIONAL)

No. 3010 — —


PIN #21 (OPTIONAL)
203R
265R
367R
INDEX HOLES (OPTIONAL)

No. 3020 — —


1937
1562
1120
968

No. 3030 — —

JAN Part No.			Relay Type
No. 3010	No. 3020	No. 3030	6PDT
No. 3011	No. 3021	No. 3031	6PDTL
No. 3012	No. 3022	No. 3032	4PDT
No. 3013	No. 3023	No. 3033	4PDTL
No. 3014	No. 3024	No. 3034	3PDT
No. 3015	No. 3025	No. 3035	3PDTL

Numbering System

3000 — —

1 = Solder Cup
2 = Eyelet
3 = Turret
4 = Dip Solder
5 = Taper

A = Closed Entry
B = Slotted

JOLTA SHOCK TEST MACHINES

For Reproducible Impact-Shock Test Pulses

Four Models Engineered to Reproduce the Entire Spectrum of All Significant Impact Shock Waves

Designed for laboratory and production testing of light to medium weight components as well as complete instrumentation. Produced to meet practically all requirements of common Mil. Spec. qualification tests. Each JOLTA is electronically calibrated to certify compliance with test specifications.

JOLTA Bench Model No. 1001 — Produced to meet JAN-S-44 and Mil-Std. 202 (202A). Standard model range 30-120G. Accessory plate springs available for test pulses to 500 G.

JOLTA Bench Model No. M-500 — Produced to meet Mil-T-12679A (Sig. C) and Mil-T-19500A. Standard model range — 200 to 1000 G at 1.0 millisecs. Alternate anvil and pad kits available to order.

JOLTA Floor Model Nos. F-3003-C1, C2, C3 — Designed for high impact shock testing for small and moderate-sized components. Precision-machined magnesium casting utilized for higher shock amplitudes. Typical tests with these units 50 to 5000 G at .2 to 11.0 millisecs. For high impact testing, accessory springs and twin anvil combinations yield impulses of 0.2 millisecs to 5000 G.

SPECIFICATIONS — JOLTA SHOCK TESTERS

Model No.	Carriage Volume	Test Weight	"G" Ranges
1001	4″x4″x5″	0-12 lbs.	25-500
M-500	3″ cube	0-2.0 lbs.	100-1000
F-3003-C-1	5″ cube	0-12 lbs.	50-1500
F-3003-C-2	5″ cube	0-4.0 lbs.	350-5000

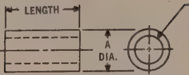
For Production Testing, Can Be Automated for Continuous Operation

FEATURES
- Economical
- Simple to Operate
- Rugged
- Uniformly Accurate

Note:
New design allows for quick changeovers of accessories.

STANDOFFS

SPACER-THRU HOLE



Clearance Hole	Code
.091 Dia. (No. 2 Screw)	1
.116 Dia. (No. 4 Screw)	2
.141 Dia. (No. 6 Screw)	3
.171 Dia. (No. 8 Screw)	4
.194 Dia. (No. 10 Screw)	5
.219 Dia. (No. 12 Screw)	6
.257 Dia. (No. 1/4 Screw	7

Length	A=1/8	A=3/16	A=1/4	Length	A=3/16	A=1/4
1/16	SP 021	SP 031		11/16	SP 0311	SP 0411
1/8	SP 022	SP 032	SP 042	3/4	SP 0312	SP 0412
3/16	SP 023	SP 033	SP 043	7/8	SP 0314	SP 0414
1/4	SP 024	SP 034	SP 044	15/16	SP 0315	SP 0415
5/16	SP 025	SP 035	SP 045	1	SP 0316	SP 0416
3/8	SP 026	SP 036	SP 046	1 1/8		SP 0418
7/16	SP 027	SP 037	SP 047	1 1/4		SP 0420
1/2	SP 028	SP 038	SP 048	1 3/8		SP 0422
9/16	SP 029	SP 039	SP 049	1 1/2		SP 0424
5/8		SP 0310	SP 0410			

EXAMPLE (TO ORDER) Pt. No. SP 035-2-B = 3/16 Dia. x 5/16 Lg. Spacer-Brass w/.116 Clearance Hole for #4 Screw.

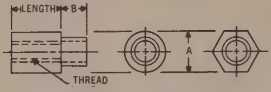
Length	A=5/16	A=3/8	A=1/2	Length	A=5/16	A=3/8	A=1/2
1/8	SP 025	SP 062	SP 082	7/8	SP 0514	SP 0614	SP 0814
3/16	SP 053	SP 063	SP 083	15/16	SP 0515	SP 0615	SP 0815
1/4	SP 054	SP 064	SP 084	1	SP 0516	SP 0616	SP 0816
5/16	SP 055	SP 065	SP 085	1 1/8	SP 0518	SP 0618	SP 0818
3/8	SP 056	SP 066	SP 086	1 1/4	SP 0520	SP 0620	SP 0820
7/16	SP 057	SP 067	SP 087	1 3/8	SP 0522	SP 0622	SP 0822
1/2	SP 058	SP 068	SP 088	1 1/2	SP 0524	SP 0624	SP 0824
9/16	SP 059	SP 069	SP 089	1 5/8		SP 0626	SP 0826
5/8	SP 0510	SP 0610	SP 0810	1 3/4		SP 0628	SP 0828
11/16	SP 0511	SP 0611	SP 0811	1 7/8		SP 0630	SP 0830
3/4	SP 0512	SP 0612	SP 0812	2		SP 0632	SP 0832

EXAMPLE (TO ORDER) Pt. No. SP 064-3-PH = 3/8 Dia. x 1/4 Lg. Spacer-Phenolic w/.141 Clearance Hole for #6 Screw.

MATERIALS B = Brass A = Aluminum SS = Stainless Steel PH = Phenolic

STANDOFF — RIVET

— HEX AND ROUND



Code	Board Thickness	Shank B
1	1/32	.075
2	1/16	.105
3	3/32	.135
4	1/8	.165
5	3/16	.230
6	1/4	.290

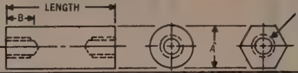
	A=1/8 Dia. 0-80 Thread		A=1/4 Dia. 2-56 Thread		A=5/16 Dia. 4-40 Thread		A=3/8 Dia. 6-32 Thread	
Length	Round	Hex	Round	Hex	Round	Hex	Round	Hex
1/8	RR 202	RH 202	RR 4022	RH 4022	RR 5024	RH 5024	RR 6026	RH 6026
3/16	RR 203	RH 203	RR 4032	RH 4032	RR 5034	RH 5034	RR 6036	RH 6036
1/4	RR 204	RH 204	RR 4042	RH 4042	RR 5044	RH 5044	RR 6046	RH 6046
5/16	RR 205	RH 205	RR 4052	RH 4052	RR 5054	RH 5054	RR 6056	RH 6056
3/8	RR 206	RH 206	RR 4062	RH 4062	RR 5064	RH 5064	RR 6066	RH 6066
7/16	RR 207	RH 207	RR 4072	RH 4072	RR 5074	RH 5074	RR 6076	RH 6076
1/2	RR 208	RH 208	RR 4082	RH 4082	RR 5084	RH 5084	RR 6086	RH 6086
9/16	RR 209	RH 209	RR 4092	RH 4092	RR 5094	RH 5094	RR 6096	RH 6096
5/8	RR 210	RH 210	RR 4102	RH 4102	RR 5104	RH 5104	RR 6106	RH 6106
11/16	RR 211	RH 211	RR 4112	RH 4112	RR 5114	RH 5114	RR 6116	RH 6116
3/4	RR 212	RH 212	RR 4122	RH 4122	RR 5124	RH 5124	RR 6126	RH 6126
7/8	RR 214	RH 214	RR 4142	RH 4142	RR 5144	RH 5144	RR 6146	RH 6146
1	RR 216	RH 216	RR 4162	RH 4162	RR 5164	RH 5164	RR 6166	RH 6166

EXAMPLE (TO ORDER) Pt. No. RR 4052-2-B = 1/4 Dia. x 5/16 Lg. Round, Rivet Standoff-Brass w/2-56 Thread Shank = .105 for 1/16 Board.

MATERIALS B = Brass A = Aluminum SS = Stainless Steel PH = Phenolic

STANDOFF — THREADED ENDS

— HEX & ROUND



Thread	Depth B
0-80	3/16
4-40	1/4
6-32	3/8
8-32	7/16

	A=1/8 Dia. 0-80 Thread		A=1/4 Dia. 4-40 Thread		A=1/4 Dia. 6-32 Thread		A=1/4 Dia. 8-32 Thread	
Length	Round	Hex	Round	Hex	Round	Hex	Round	Hex
1 1/16	DR 217	DH 217	DR 4174	DH 4174	DR 4176	DH 4176	DR 4178	DH 4178
1 1/8	DR 218	DH 218	DR 4184	DH 4184	DR 4186	DH 4186	DR 4188	DH 4188
1 3/16	DR 219	DH 219	DR 4194	DH 4194	DR 4196	DH 4196	DR 4198	DH 4198
1 1/4	DR 220	DH 220	DR 4204	DH 4204	DR 4206	DH 4206	DR 4208	DH 4208
1 5/16	DR 221	DH 221	DR 4214	DH 4214	DR 4216	DH 4216	DR 4218	DH 4218
1 3/8	DR 222	DH 222	DR 4224	DH 4224	DR 4226	DH 4226	DR 4228	DH 4228
1 7/16	DR 223	DH 223	DR 4234	DH 4234	DR 4236	DH 4236	DR 4238	DH 4238
1 1/2	DR 224	DH 224	DR 4244	DH 4244	DR 4246	DH 4246	DR 4248	DH 4248
2			DR 4324	DH 4324	DR 4326	DH 4326	DR 4328	DH 4328
2 1/8			DR 4344	DH 4344	DR 4346	DH 4346	DR 4348	DH 4348
2 3/4			DR 4444	DH 4444	DR 4446	DH 4446	DR 4448	DH 4448
3			DR 4484	DH 4484	DR 4486	DH 4486	DR 4488	DH 4488

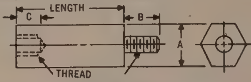
EXAMPLE (TO ORDER) Pt. No. DH 219-B = 1/8 Dia. x 1 3/16 Lg. Hex Standoff-Tapped Both Ends Brass w/o-80 x 3/16 Hole.

	A=5/16 Dia. 6-32 Thread		A=3/8 Dia. 6-32 Thread		A=3/8 Dia. 8-32 Thread		A=1/2 Dia. 8-32 Thread	
Lgth.	Round	Hex	Round	Hex	Round	Hex	Round	Hex
1 1/16	DR 5176	DH 5176	DR 6176	DH 6176	DR 6178	DH 6178	DR 8178	DH 8178
1 1/8	DR 5186	DH 5186	DR 6186	DH 6186	DR 6188	DH 6188	DR 8188	DH 8188
1 3/16	DR 5196	DH 5196	DR 6196	DH 6196	DR 6198	DH 6198	DR 8198	DH 8198
1 1/4	DR 5206	DH 5206	DR 6206	DH 6206	DR 6208	DH 6208	DR 8208	DH 8208
1 5/16	DR 5216	DH 5216	DR 6216	DH 6216	DR 6218	DH 6218	DR 8218	DH 8218
1 3/8	DR 5226	DH 5226	DR 6226	DH 6226	DR 6228	DH 6228	DR 8228	DH 8228
1 7/16	DR 5236	DH 5236	DR 6236	DH 6236	DR 6238	DH 6238	DR 8238	DH 8238
1 1/2	DR 5246	DH 5246	DR 6246	DH 6246	DR 6248	DH 6248	DR 8248	DH 8248
1 3/4	DR 5286	DH 5286	DR 6286	DH 6286	DR 6288	DH 6288	DR 8288	DH 8288
2	DR 5326	DH 5326	DR 6326	DH 6326	DR 6328	DH 6328	DR 8328	DH 8328
2 1/4	DR 5366	DH 5366	DR 6366	DH 5366	DR 6368	DH 6368	DR 8368	DH 8368
2 1/2	DR 5406	DH 5406	DR 6406	DH 6406	DR 6408	DH 6408	DR 8408	DH 8408
3	DR 5486	DH 5486	DR 6486	DH 6486	DR 6488	DH 6488	DR 8488	DH 8488
3 1/2	DR 5566	DH 5566	DR 6566	DH 6566	DR 6568	DH 6568	DR 8568	DH 8568
4	DR 5646	DH 5646	DR 6646	DH 6666	DR 6648	DH 6648	DR 8648	DH 8648

EXAMPLE (TO ORDER) Pt. No. DR 6186-A = 3/8 Dia. x 1 1/8 Lg. Round Standoff-Aluminum-Tapped Both Ends w/6-32 x 3/8 Thread.

MATERIALS B = Brass A = Aluminum SS = Stainless Steel PH = Phenolic

STANDOFF — MALE-FEMALE



Thread	B	C
4-40	3/16	1/4
6-32	1/4	3/8
8-32	3/8	7/16
10-32	3/8	1/2

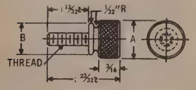
	A=1/4 AC. Flts.				A=3/8 AC. Flts.			
Lgth.	4-40	6-32	8-32	10-32	4-40	6-32	8-32	10-32
1/4	MF 4044	MF 4046	MF 4048	MF 40410	MF 6044	MF 6046	MF 6048	MF 60410
3/8	MF 4064	MF 4066	MF 4068	MF 40610	MF 6064	MF 6066	MF 6068	MF 60610
1/2	MF 4084	MF 4086	MF 4088	MF 40810	MF 6084	MF 6086	MF 6088	MF 60810
5/8	MF 4104	MF 4106	MF 4108	MF 41010	MF 6104	MF 6106	MF 6108	MF 61010
3/4	MF 4124	MF 4126	MF 4128	MF 41210	MF 6124	MF 6126	MF 6128	MF 61210
7/8	MF 4144	MF 4146	MF 4148	MF 41410	MF 6144	MF 6146	MF 6148	MF 61410
1	MF 4164	MF 4166	MF 4168	MF 41610	MF 6164	MF 6166	MF 6168	MF 61610
1 1/8	MF 4184	MF 4186	MF 4188	MF 41810	MF 6184	MF 6186	MF 6188	MF 61810
1 1/4	MF 4204	MF 4206	MF 4208	MF 42010	MF 6204	MF 6206	MF 6208	MF 62010
1 3/8	MF 4224	MF 4226	MF 4228	MF 42210	MF 6224	MF 6226	MF 6228	MF 62210
1 1/2	MF 4244	MF 4246	MF 4248	MF 42410	MF 6244	MF 6246	MF 6248	MF 62410
1 5/8	MF 4264	MF 4266	MF 4268	MF 42610	MF 6264	MF 6266	MF 6268	MF 62610
1 3/4	MF 4284	MF 4286	MF 4288	MF 42810	MF 6284	MF 6286	MF 6288	MF 62810
2	MF 4324	MF 4326	MF 4328	MF 43210	MF 6324	MF 6326	MF 6328	MF 63210
2 1/2	MF 4404	MF 4406	MF 4408	MF 44010	MF 6404	MF 6406	MF 6408	MF 64010
3	MF 4484	MF 4486	MF 4488	MF 44810	MF 6484	MF 6486	MF 6488	MF 64810

EXAMPLE (TO ORDER) Pt. No. MF 4146-B = 1/4 AC. Flts. Standoff-Brass 6-32 Male-Female Threads.

MATERIALS B =Brass A = Aluminum SS = Stainless Steel

SPECIAL SIZES AND MATERIALS MANUFACTURED TO ORDER

THUMB SCREW

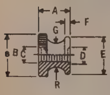


Thread	A Dia.	B Dia.	Pt. No.
6-32	3/8	5/16	TS 6056
	7/16	3/8	TS 7066
	1/2	7/16	TS 8076
	3/8	5/16	TS 6058
8-32	7/16	3/8	TS 7068
	1/2	7/16	TS 8078
10-32	3/8	5/16	TS 60510
	7/16	3/8	TS 70610
	1/2	7/16	TS 80710

EXAMPLE (TO ORDER)

Pt. No. TS 6058-9 = 8-32 x 13/32 Lg. Thread, Thumb Screw- Brass.

THUMB NUT KNURLED



Thread	A	B Dia.	C Dia.	D Dia.	E Dia.	F	G	R Rad.	Part No.
4-36	1/4	3/8	1/8	.147	5/16	3/64	7/32	3/64	KN 436
4-40	1/4	3/8	1/8	.147	5/16	3/64	7/32	3/64	KN 440
6-32	1/4	3/8	9/64	.169	5/16	3/64	7/32	3/64	KN 632
6-32	9/32	13/32	9/64	13/64	11/32	3/64	7/32	1/16	KN 6321
8-32	5/16	7/16	11/64	15/64	3/8	1/16	1/4	1/16	KN 832
10-24	21/64	1/2	13/64	17/64	7/16	1/16	9/32	.070	KN 124
10-32	21/64	1/2	13/64	17/64	7/16	1/16	9/32	.070	KN 132
12-24	11/32	9/16	7/32	19/64	1/2	1/16	21/64	.070	KN 224
1/4-20	3/8	5/8	17/64	21/64	9/16	1/16	23/64	5/64	KN 420

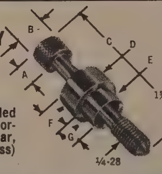
THREADED ROD

— 1/4-20 THREAD — 2″ EACH END

Lgth.		Lgth.		Lgth.		Lgth.		Lgth.		Lgth.	
4 1/2	TR 1445	7	TR 1470	9 1/2	TR 1495	12	TR 14120	14 1/2	TR 14145	17 1/2	TR 14175
5	TR 1450	7 1/2	TR 1475	10	TR 14100	12 1/2	TR 14125	15	TR 14150	18.	TR 14180
5 1/2	TR 1455	8	TR 1480	10 1/2	TR 14105	13	TR 14130	15 1/2	TR 14155	18 1/2	TR 14185
6	TR 1460	8 1/2	TR 1485	11	TR 14110	13 1/2	TR 14135	16	TR 14160	19	TR 14190
6 1/2	TR 1465	9	TR 1490	11 1/2	TR 14115	14	TR 14140	16 1/2	TR 14165	19 1/2	TR 14195
								17	TR 14170	20	TR 14200

MATERIALS B = Brass A = Aluminum SS = Stainless Steel

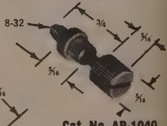
CAPTIVE SCREW
AND NUT ASSEMBLY



Cat. No. AP-711-(1)
Cat. No. AP-711-(2)

Consists of slotted, knurled thumb screws made of corrosion resistant steel bar, and nickel-plated (on brass) panel inserts.

	A	B	C	D	E	F	G
—1	1/4	3/8	1 5/16	9/16	13/32	5/16	3/8
—2	1/4	29/64	1 7/16	9/16	13/32	5/16	3/8



Cat. No. AP-1040
Screw, Captive
Cat. No. AP-1039
Insert, Captive

Cat. No. AP-1197
Screw, Captive
1/16″ slotted knurled head (7/16″ O.D.)
1 1/4″ overall length; 8-32 thread.

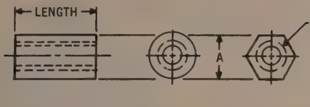
QUALITY
RELIABILITY
ECONOMY

JAN HARDWARE
MANUFACTURING COMPANY INC.
47-27 36th STREET • LONG ISLAND CITY, NEW YORK 11101 • TEL: (212) 361-0800

STANDOFFS (cont'd)

STANDOFF — THREADED

— HEX & ROUND



MATERIALS B = Brass A = Aluminum SS = Stainless Steel PH = Phenolic
SPECIAL SIZES AND MATERIALS/MANUFACTURED TO ORDER

Lgth.	A=⅛ Dia. 0-80 Thread Round	A=⅛ Dia. 0-80 Thread Hex	A=3/16 Dia. 2-56 Thread Round	A=3/16 Dia. 2-56 Thread Hex	A=3/16 Dia. 4-40 Thread Round	A=3/16 Dia. 4-40 Thread Hex
1/16	SR 201	SH 201	SR 3012	SH 3012	SR 3014	SH 3014
⅛	SR 202	SH 202	SR 3022	SH 3022	SR 3024	SH 3024
3/16	SR 203	SH 203	SR 3032	SH 3032	SR 3034	SH 3034
¼	SR 204	SH 204	SR 3042	SH 3042	SR 3044	SH 3044
5/16	SR 205	SH 205	SR 3052	SH 3052	SR 3054	SH 3054
⅜	SR 206	SH 206	SR 3062	SH 3062	SR 3064	SH 3064
7/16	SR 207	SH 207	SR 3072	SH 3072	SR 3074	SH 3074
½	SR 208	SH 208	SR 3082	SH 3082	SR 3084	SH 3084
9/16	SR 209	SH 209	SR 3092	SH 3092	SR 3094	SH 3094
⅝	SR 210	SH 210	SR 3102	SH 3102	SR 3104	SH 3104
¾	SR 212	SH 212	SR 3122	SH 3122	SR 3124	SH 3124
1			SR 3162	SH 3162	SR 3164	SH 3164

EXAMPLE (TO ORDER) Pt. No. SR 3032-A = 3/16 Dia. x 3/16 Lg. Round Standoff-Aluminum w/2-56 Threaded Hole.

Lgth.	A=¼ Dia. 4-40 Thread Round	4-40 Thread Hex	6-32 Thread Round	6-32 Thread Hex	8-32 Thread Round	8-32 Thread Hex	10-32 Thread Round	10-32 Thread Hex
⅛	SR 4024	SH 4024	SR 4026	SH 4026	SR 4028	SH 4028	SR 40210	SH 40210
3/16	SR 4034	SH 4034	SR 4036	SH 4036	SR 4038	SH 4038	SR 40310	SH 40310
¼	SR 4044	SH 4044	SR 4046	SH 4046	SR 4048	SH 4048	SR 40410	SH 40410
5/16	SR 4054	SH 4054	SR 4056	SH 4056	SR 4058	SH 4058	SR 40510	SH 40510
⅜	SR 4064	SH 4064	SR 4066	SH 4066	SR 4068	SH 4068	SR 40610	SH 40610
7/16	SR 4074	SH 4074	SR 4076	SH 4076	SR 4078	SH 4078	SR 40710	SH 40710
½	SR 4084	SH 4084	SR 4086	SH 4086	SR 4088	SH 4088	SR 40810	SH 40810
9/16	SR 4094	SH 4094	SR 4096	SH 4096	SR 4098	SH 4098	SR 40910	SH 40910
⅝	SR 4104	SH 4104	SR 4106	SH 4106	SR 4108	SH 4108	SR 41010	SH 41010
¾	SR 4124	SH 4124	SR 4126	SH 4126	SR 4128	SH 4128	SR 41210	SH 41210
⅞	SR 4144	SH 4144	SR 4146	SH 4146	SR 4148	SH 4148	SR 41410	SH 41410
1	SR 4164	SH 4164	SR 4166	SH 4166	SR 4168	SH 4168	SR 41610	SH 41610

EXAMPLE (TO ORDER) Pt. No. SH 4086-B = ¼ Dia. x ½ Lg. Hex Standoff-Brass w/6-32 Threaded Hole.

Lgth.	A=5/16 Dia. 4-40 Thread Round	4-40 Thread Hex	6-32 Thread Round	6-32 Thread Hex	8-32 Thread Round	8-32 Thread Hex	10-32 Thread Round	10-32 Thread Hex
⅛	SR 5024	SH 5024	SR 5026	SH 5026	SR 5028	SH 5028	SR 50210	SH 50210
3/16	SR 5034	SH 5034	SR 5036	SH 5036	SR 5038	SH 5038	SR 50310	SH 50310
¼	SR 5044	SH 5044	SR 5046	SH 5046	SR 5048	SH 5048	SR 50410	SH 50410
5/16	SR 5054	SH 5054	SR 5056	SH 5056	SR 5058	SH 5058	SR 50510	SH 50510
⅜	SR 5064	SH 5064	SR 5066	SH 5066	SR 5068	SH 5068	SR 50610	SH 50610
7/16	SR 5074	SH 5074	SR 5076	SH 5076	SR 5078	SH 5078	SR 50710	SH 50710
½	SR 5084	SH 5084	SR 5086	SH 5086	SR 5088	SH 5088	SR 50810	SH 50810
9/16	SR 5094	SH 5094	SR 5096	SH 5096	SR 5098	SH 5098	SR 50910	SH 50910
⅝	SR 5104	SH 5104	SR 5106	SH 5106	SR 5108	SH 5108	SR 51010	SH 51010
¾	SR 5124	SH 5124	SR 5126	SH 5126	SR 5128	SH 5128	SR 51210	SH 51210
⅞	SR 5144	SH 5144	SR 5146	SH 5146	SR 5148	SH 5148	SR 51410	SH 51410
1	SR 5164	SH 5164	SR 5166	SH 5166	SR 5168	SH 5168	SR 51610	SH 51610

EXAMPLE (TO ORDER) Pt. No. SR 5146-PH = 5/16 Dia. x ⅞ Lg. Round Standoff-Phenolic w/6-32 Threaded Hole.

Lgth.	⅜ Dia. 6-32 Thread Round	6-32 Thread Hex	8-32 Thread Round	8-32 Thread Hex	10-32 Thread Round	10-32 Thread Hex
⅛	SR 6026	SH 6026	SR 6028	SH 6028	SR 60210	SH 60210
3/16	SR 6036	SH 6036	SR 6038	SH 6038	SR 60310	SH 60310
¼	SR 6046	SH 6046	SR 6048	SH 6048	SR 60410	SH 60410
5/16	SR 6056	SH 6056	SR 6058	SH 6058	SR 60510	SH 60510
⅜	SR 6066	SH 6066	SR 6068	SH 6068	SR 60610	SH 60610
7/16	SR 6076	SH 6076	SR 6078	SH 6078	SR 60710	SH 60710
½	SR 6086	SH 6086	SR 6088	SH 6088	SR 60810	SH 60810
9/16	SR 6096	SH 6096	SR 6098	SH 6098	SR 60910	SH 60910
⅝	SR 6106	SH 6106	SR 6108	SH 6108	SR 61010	SH 61010
¾	SR 6126	SH 6126	SR 6128	SH 6128	SR 61210	SH 61210
⅞	SR 6146	SH 6146	SR 6148	SH 6148	SR 61410	SH 61410
1	SR 6166	SH 6166	SR 6168	SH 6168	SR 61610	SH 61610

EXAMPLE (TO ORDER) Pt. No. SH 6068-B = ⅜ Dia. x ⅜ Lg. Hex Standoff-Brass w/8-32 Threaded Hole.

Lgth.	A=½ Dia. 8-32 Thread Round	8-32 Thread Hex	10-32 Thread Round	10-32 Thread Hex	12-24 Thread Round	12-24 Thread Hex	¼-20 Thread Round	¼-20 Thread Hex
⅛	SR 8028	SH 8028	SR 80210	SH 80210	SR 80212	SH 80212	SR 80214	SH 80214
3/16	SR 8038	SH 8038	SR 80310	SH 80310	SR 80312	SH 80310	SR 80314	SH 80314
¼	SR 8048	SH 8048	SR 80410	SH 80410	SR 80412	SH 80412	SR 80414	SH 80414
5/16	SR 8058	SH 8058	SR 80510	SH 80510	SR 80512	SH 80512	SR 80514	SH 80514
⅜	SR 8068	SH 8068	SR 80610	SH 80610	SR 80612	SH 80612	SR 80614	SH 80614
7/16	SR 8078	SH 8078	SR 80710	SH 80710	SR 80712	SH 80712	SR 80714	SH 80714
½	SR 8088	SH 8088	SR 80810	SH 80810	SR 80812	SH 80812	SR 80814	SH 80814
9/16	SR 8098	SH 8098	SR 80910	SH 80910	SR 80912	SH 80912	SR 80914	SH 80914
⅝	SR 8108	SH 8108	SR 81010	SH 81010	SR 81012	SH 81012	SR 81014	SH 81014
¾	SR 8128	SH 8128	SR 81210	SH 81210	SR 81212	SH 81212	SR 81214	SH 81214
⅞	SR 8148	SH 8148	SR 81410	SH 81410	SR 81412	SH 81412	SR 81414	SH 81414
1	SR 8168	SH 8168	SR 81610	SH 81610	SR 81612	SH 81612	SR 81614	SH 81614

EXAMPLE (TO ORDER) Pt. No. SR 80910-A = ½ Dia. x 9/16 Lg. Round Standoff-Aluminum w/10-32 Threaded Hole.

EQUIPMENT HANDLES

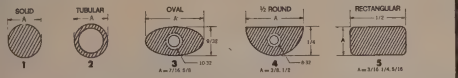
MATERIAL

A — ALUMINUM
B — BRASS
S — COLD ROLLED STEEL
SS — STAINLESS STEEL

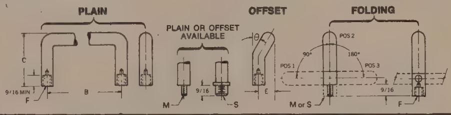
FINISH

A — BLACK ANODIZE
B — OPTICAL BLACK
C — CLEAR ANODIZE
E — SATIN ETCH
N — NICKEL PLATE
X — BLACK OXIDE
P — PASSIVATE
O — NO FINISH

SHAPE



TYPE



HOW TO SPECIFY

TYPE OF HANDLE

*TYPE	PREFIX	DESCRIPTION
PLAIN	NONE	——
OFFSET	ϕ, E	——
FOLDING	A	A = FREE 180°
	B	B = 2 POS., DETENT, 90°
	C	C = 3 PCS., DETENT, 90°

A DIA.	3/16	¼	5/16	⅜	7/16	½
M, F	4-40	8-32	10-32	10-32	10-32	10-32
S	10-32	¼-28	5/16-24	⅜-24	⅜-24	⅜-24

RECOMMENDED CARRYING LOAD (lbs.)
BASED ON HUMAN ENGINEERING FACTORS

A DIA.	¼	⅜	½	⅝	¾
JAN STD. (lbs.)	10-15	15-20	20-30	30-40	40-50
MIL STD. 1472 (lbs. max.)	15	—	20	—	40

NOTE: For special designs, identify differences from standard in ( ) after Part No.
Example: 3008 H0A 1 F 10 C09 B08 A (F = 6-32 x ¾" deep).

TYPE* (PREFIX)
H (HANDLE)
MATERIAL
SHAPE
THREAD M, F, or S
A DIA. OR WIDTH
B DIMENSION
C DIMENSION
FINISH

DIMENSION:

θ Specify in Degrees
A, E Specify in 1/16 increments
C, B Specify with Letter + Fraction in 1/16 increments

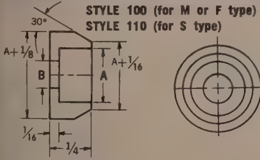
LETTER VALUE:

A thru Z = 1 thru 26. When Specifying dimension in 1/16 increments, use numerator of fraction for Part No. See Examples.

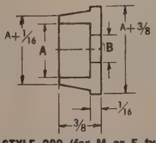
TYPICAL PART NUMBER

H 0B 1 M 04 D03 A02 X ..	Plain Handle Brass, Shape 1, Male Thd., A = ¼ O.D., B = 4 3/16, C = 1⅛, Black Oxide Finish.
3008 H 0A 1 F 10 C09 B08 A ..	30°, Offset, E = ½, Aluminum, Shape 1. Female Thd,. A = ⅝ O.D., B = 3 3/16, C = 2½, Blk. Anodized.
A H SS 2 S 08 D00 A08 P ...	Folding Handle, 180°, Free. Stainless Steel, Shape 2. A = ½ Dia., B = 4", C = 1½, Passivate, ⅜-24 thd.

FERRULES



STYLE 100 (for M or F type)
STYLE 110 (for S type)



STYLE 200 (for M or F type)
STYLE 210 (for S type)

DESIGNATION
MATERIAL
STYLE
A DIA.
B DIA.
FINISH

NOTES: "A" dimension is specified in 1/16 increments using numerator of fraction for part No.
"B" Dia. is clearance hole. For thd., see table.
For material and finish, see above.
See examples.

HF 0B 100 05 10 X	Ferrule Brass, Style 100, A = 5/16 Dia. B = clearance for 10-32, Black Oxide
HF 0A 200 08 10 A	Ferrule Aluminum, Style 200, A = ½ Dia. B = clearance for 10-32, Black Anodized.

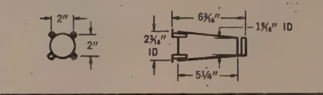
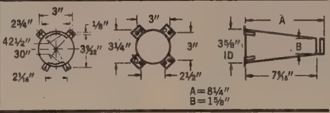
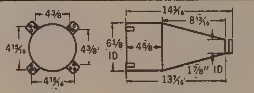
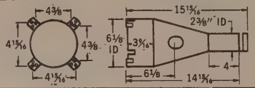
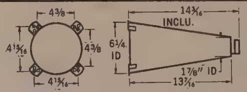
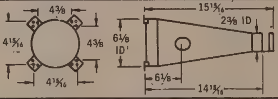
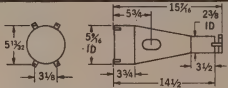
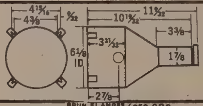
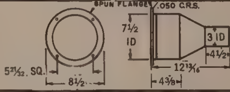
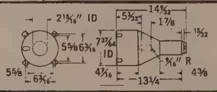
Thd. Size	4-40	6-32	8-32	10-32	¼-24	⅜-24
B	04	06	08	10	25	38

JAN

JAN HARDWARE
47-27 36th STREET • LONG ISLAND CITY, NEW YORK 11101 • TEL: (212) 361-0800

SHIELDS

JAN's Magnetic Shields are made of MU-Metal or equal and are hydrogen annealed by a special process to assure optimum orientation of the molecular structure of the alloy for best magnetic shielding. JAN's Magnetic Shields prevent distortion and intensify modulation of the electron beam due to stray magnetic fields. In addition, the use of these shields protect personnel against the dangers of accidental tube breakage. Mounting holes are tapped for No. 6-32 screws as shown. These shields are designed to fit JAN's standard bezels as listed below. See following page for specifications on JAN's Bezel Assemblies.

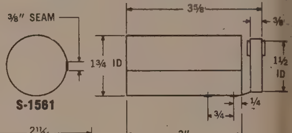
Shield Cat. No.	For Use With C.R.T. No.	Matching JAN Bezel	
S-2001 **S-2001-1**	902 2AP 2BP	CP-1110P2 CP-1120P2	 2" 2" 6 3/16" 1 9/16" ID 2 3/16" ID 5¼"
S-3001 adaptable for edge-lighting graticule using S-3010 with Bezel CP-1428*	3RP 3RPA	CP-1328-P1 CP-1427-1 CP-1429-1 CP-1328-P2 CP-1427-2 CP-1429-2 CP-3430-1 CP-3430-2	 3" 2¾" ⅛" 42½" 30" 3 3/32" 2 1/16" 3" 3¼" 3" 2½" A B 3⅝" ID 7 9/16" A=8¼" B=1⅝"
S-3003 **S-3003-1**	3KP 908A 3AP	CP-1328-P1 CP-1427-1 CP-1429-1	Same type as S-3001, except A=10⅛ B=2
S-3004 — 12 (less anode hole) — 22 (with anode hole) adaptable for edge-lighting graticule using S-3012 with Bezel CP-1428*	3BP 3JP 3ACP	Same as S-3003 Same as S-3005	Same type as S-3001, except A=8⅝ B=2⅜
S-3005 adaptable for edge-lighting graticule using S-3008 with Bezel CP-1428*	3WP	CP-1328-P2 CP-1427-2 CP-1429-2	Same type as S-3001, except A=10⅝ B=1⅞
S-5001	5UP	CP-1465 CP-13584-1 CP-13549-1 CP-13595-1 CP-19495-1 CP-446-11 CP-446-22	 4⅜ 4 15/16 4⅜ 4 15/16 14 3/16 8 13/16 6⅛ ID 4⅝ 1⅞" ID 13 7/16
S-5002 adaptable for Edge-lighting	5BP 5CP 5ABP 5ADP	Same as S-5001	 4⅜ 4 15/16 4⅜ 4 15/16 15 15/16 2⅜" ID 6⅛ ID 3 9/16 4 6⅛ 14 15/16
S-5003	5UP	CP-1465 CP-13584-1 CP-13549-1 CP-13595-1 CP-19495-1	 4⅜ 4 15/16 4⅜ 4 15/16 14 3/16 INCLU. 6¼ ID 1⅞" ID 13 7/16
S-5005 adaptable for edge-lighting	5AQP 5ABP 5ADP	CP-1465-2 CP-13549-2 CP-13584-2 CP-13595-2 CP-19495-2 CP-446-11 CP-446-22	 4⅜ 4 15/16 4⅜ 4 15/16 15 15/16 2⅜ ID 6⅛ ID 6⅛ 14 15/16
S-5017 adaptable for edge-lighting	5ABP 5ADP	CP-1465-2 CP-19636-2	 5 13/32 3⅛ 15 7/16 5¾ 2⅜ ID 5 9/16 ID 3¾ 3½ 14½
S-5027	5BTP	CP-19495-2	 4 15/16 4⅜ 9/32 11 9/32 10 19/32 3⅜ 3 31/32 6⅛ ID 1⅞ 2⅞
S-7001	7GP 7JP 7VP	CP-7330 CP-7445 CP-7331 CP-7550 CP-7420	 SPUN FLANGE .050 C.R.S. 7½ ID 3 ID 4½ 5 21/32. SQ. 8½ 12 13/16 4⅜
S-7006	7AEP	CP-7330 CP-7445 CP-7331 CP-7550 CP-7420	 2 15/16" ID 5⅝ 6 3/16 5⅝ 6 3/16 14 9/32 5 3/32 1⅞ 15/32 7 37/64 ID 9/16" R 4 7/16 13¼ 4⅜

All Shields are Fabricated with Overlapped and Spot Welded Construction.
*See mounting hole arrangement illustrated with S-3001 edge-lit dimension drawing.

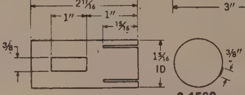
When ordering, be sure to specify CRT type number. Anode openings provided, where required. Shielding for EMC, RFI, and EMI now available, as bezels, shields, cushions, gaskets . . . in strip, sheet, formed, and molded.

MAGNETIC SHIELDS FOR PHOTO-MULTIPLIER AND SPECIAL PURPOSE TUBES

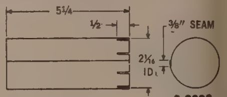
Shield	Tube	Shield	Tube	Shield	Tube
S-1091	ICP1	S-1562	IP21 IP22 IP28	S-2005	6372
S-1181	929 930 5581 5653 IP39 IP40	S-1563	1EP1	S-2007	7850
S-1500	6291	S-2002	6810 7264	S-2008	6217
S-1561	6199 7102	S-2003	6903	S-3015	1197 6363
S-1562	931 6323 6328	S-2004	5819 6292 6342 6571 6655	S-5013	1112
				S-5018	1198 6364
				S-7009	1238 1287


⅜" SEAM
1¾ ID
3⅝
⅜
1½ ID
¾
¼
3"

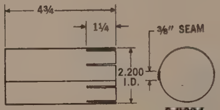
S-1561


2 11/16
1"
1"
15/16
⅜
1 5/16 ID
⅜" SEAM

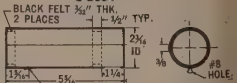
S-1562


5¼
½
⅜" SEAM
2 1/16 ID

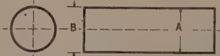
S-2002


4¾
1¼
⅜" SEAM
2.200 I.D.

S-2004


BLACK FELT 3/32" THK.
2 PLACES
½" TYP.
2 3/16 ID
1 5/16
5 5/16
1¼
RIVET
⅜
#8 HOLE

S-2007



Seamless Tubing **Available in These Dimensions**
Can be supplied cut to your length, with holes and/or cut-outs to your specifications.

A	B
1.010	1.050
.948	.998
.740	.783
.632	.663

We will design and manufacture SPECIAL Shields and Bezels, to customers specifications. Complete facilities for prototype work.

CRT Alignment Board contained within neck.
VIEWING AREA
11⅜" high x 14½" wide

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QUALITY
RELIABILITY
ECONOMY

BEZELS

JAN's Bezels enhance the appearance of the instruments on which they are used. These units are functionally designed to provide OPTIMUM UTILIZATION OF THE C.R.T. SCREEN, as well as safety against tube breakage and danger to operating personnel.

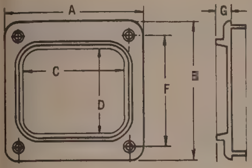
JAN Bezel Assemblies are supplied with a bezel, calibrated graticule, (where applicable) light filter and C.R.T. cushion. Bezels are finished in a smooth dull black non-reflecting surface. These units fit JAN Mu-Metal Shields.

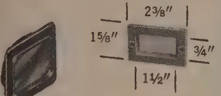
Edge-lit Bezels (E.L.B.A.)**
These Bezels are designed to provide edge lighting of the engraved scale-calibrated graticule by means of pilot lights.

Camera Mount Bezel
These units provide an integral cast mounting flange that fits all standard 3", 5" and 7" C.R.T. cameras.

Cat. No.	C.R.T. Face	Material	Type	Dimensions in Inches										
				Panel Opening	A Overall Width	B Overall Ht.	C Visible Area (Bezel) Width	D Visible Area (Bezel) Ht.	E Mtg. Holes Width	F Mtg. Holes Ht.	G- Thickness (Face Only)	H- Thickness (Incl. Flange)	Visible Area (Cushion) Ht.	Visible Area (Cushion) Width
BEZELS FOR 2" C.R.T.														
CP-1110-P-2	Flat	Plastic*	Standard	2 3/16	2 5/8	2 5/8	1 3/4	1 3/4	2	2	5/16	7/16	1 3/4	1 3/4
BEZELS FOR 3" C.R.T.														
CP-1220-P‡	Curved or Flat	Plastic*	Camera Mount	—	4 7/8	3 1/4	2 3/4	2 1/4	4	2 1/2	5/16	1 1/16	—	
CP-1328-P-1 CP-1328-P-2	Curved Flat	Plastic*	Standard	3 33/64	3 3/4	3 3/4	2 5/8	2 3/16	3	3	3/8	45/64	2 1/2	2 1/16
CP-1427-1 CP-1427-2	Curved Flat	Aluminum	Camera Mount	3 17/64	4	4	2 3/4 Dia.		3	3	9/16	27/32	2 25/32 Dia.	
CP-1428-1** CP-1428-2**	Curved Flat	Aluminum	Camera Mount E.L.B.A.**	3 17/64	4	4	2 3/4 Dia.		3	3	9/16	27/32	2 25/32 Dia.	
CP-1429-1 CP-1429-2	Curved Flat	Aluminum	Camera Mount	3 17/64	4	4	2 3/4 Dia.		3	3	9/16	27/32	2 25/32 Dia.	
CP-3430-1 CP-3430-2	Curved Flat	Steel	Standard	—	4 1/16 Dia.		3 3/8 Dia.		3 3/4	3 3/4	1 41/64	1 41/64	2 25/32 Dia.	
BEZELS FOR 4" C.R.T.														
CP-1533-P‡	—	Plastic*	Camera Mount	3 1/32	4 39/64	3 61/64	3	3	4	—	1 3/32	1 3/32	No Cushion	
BEZELS FOR 5" C.R.T.														
CP-13549-1 CP-13549-2	Curved Flat	Aluminum	Standard	6.0	6 1/4	6 1/4	4 7/8	3 3/4	4 15/16	4 15/16	17/32	1 3/32	4 1/4	3 3/16
CP-13584-1 CP-13584-2	Curved Flat	Aluminum	Camera Mount	6.0	6 1/4	6 1/4	4 7/8	3 3/4	4 15/16	4 15/16	1 5/32	1 23/32	4 1/4	3 3/16
CP-13595-1** CP-13595-2**	Curved Flat	Aluminum	Standard E.L.B.A.**	5 7/16	6 1/4	6 1/4	4 7/8	3 3/4	4 15/16	4 15/16	17/32	—	4 3/4 Dia.	
CP-1465 CP-1465-2	Curved or Flat Flat	Steel	Camera Mount	5 5/16 5 17/32	6 3/8 Dia.		5 35/64 Dia.		6	6	7/8	7/8	No Cushion 4 1/2 Dia.	
CP-19495-1** CP-19495-2**	Curved Flat	Aluminum	Camera Mount E.L.B.A.**	5 7/16	6 1/4	6 1/4	5 1/4 Dia.		4 15/16	4 15/16	1 5/32	—	4 3/4 Dia.	
CP-19636-2**	Flat	Aluminum	Camera Mount E.L.B.A.**	5 5/8	5 7/8	5 7/8	4 1/2 Dia.	3	4 7/8	4 7/8	1 1/4	—	4 1/2 Dia.	
CP-446-11 CP-446-22	Flat	Steel	Camera Mount	—	6 9/16 Dia.		5 9/16 Dia.		6 5/32 6 1/8	6 5/32 6 1/8	1	1 19/64 1 3/16	4 1/2 Dia.	
CP-545	Curved or Flat	Aluminum	Camera Mount	5	5 27/32	5 27/32	4 25/32 Dia.		5	5	25/32	—	—	
BEZELS FOR 7" C.R.T.														
CP-7330-1 CP-7331-2**	Curved Flat	Aluminum	Standard E.L.B.A.**	7 13/32	7 13/16	7 13/16	6 5/16 Dia.		6 3/16	6 3/16	3/4	3/4	6 3/8 Dia.	
CP-7375-1** CP-7375-2**	Curved Flat	Aluminum	E.L.B.A.**	7 13/32	8	8	4 1/2	4 1/2	6 3/16	6 3/16	1 17/32	2 29/32	1 1/2	4 1/2
CP-7420-1** CP-7420-2**	Curved or Flat	Aluminum	Camera Mount	7 13/32	7 13/16	7 13/16	6 15/16 Dia.		6 3/16	6 3/16	3/4	1 3/8	6 3/8 Dia.	
CP-7550	Curved or Flat	Aluminum	Camera Mount	4 25/32	7 3/8	6 1/4	4 3/4	4 3/4	6 1/4	5 1/8	1 3/16	1 3/16	No Cushion	
BEZEL FOR 10" C.R.T.														
CP-10860	Curved or Flat	Aluminum	Standard	11 1/32	12 1/4 Dia.		8 1/16	6 1/4	11 1/2 B.O.		11/16	13/16	No Cushion	

*All Plastic Bezels are furnished in shock resistant plastic, per MIL-P-3414. **Edge Lit Bezel Assemblies. ‡Rectangular C.R.T.



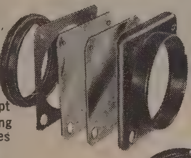


CP-1393

CP-1110P2
(with 4 mounting holes)
CP-1120P2
(same as above, but with 2 mounting holes, in diagonal corners)

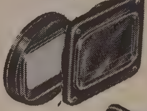
CP-1220-P

CP-1328-P-( )

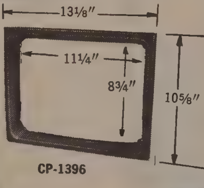


CP-1428-( )

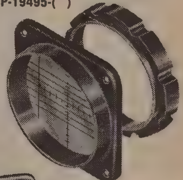
CP-1427 } Same as
CP-1429 } 1428, except for mounting holes



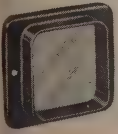
CP13549-( )



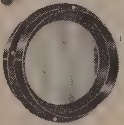
CP-1396



CP-19495-( )



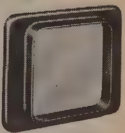
CP-1533-P



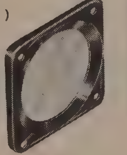
CP-1465

CP-13584-( )

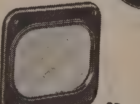
CP-7420



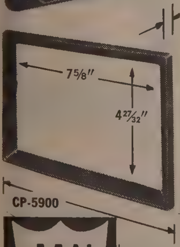
CP-7550



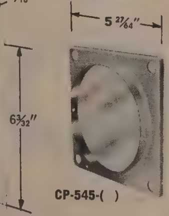
CP-7330



CP-13595-( )



CP-5900



CP-545-( )

DISTINCTIVE FEATURES

- Engineered for 2", 3", 4", 5", 7", 8", 10" C.R.T.
- Maximum display area
- Precision engraved, scale-calibrated graticules; standard or to customer's specifications
- Materials and finish to "Mil Spec"
- Heavy buna-S shock cushion
- Models for edge-lighting
- Phosphor-matched light filters
- Non-reflecting matte surfaces
- Rugged camera mounts
- Models for curved and flat-faced C.R.T.

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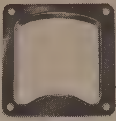
QUALITY
RELIABILITY
ECONOMY

ESCUTCHEON PLATES
FOR ELEGANT FRAMING OF PANEL OPENINGS

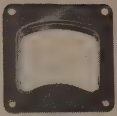
ET-120

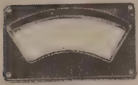
ET-150

ET-160


EM-310

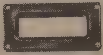
EM-320


EM-325

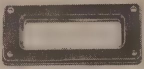

ET-125

ET-165

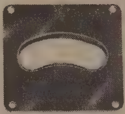
ET-140

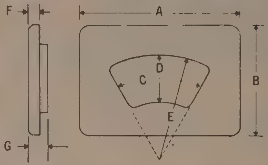

ET-155

ET-135


ET-130

ET-145


EM-315



SPECIFICATIONS — JAN ESCUTCHEONS

Escutcheon Cat. No.	A Overall Width	B Overall Height	C Window Width	D Window Height	E Effective Outer Dial Radius	Thickness F=Face Only	Thickness G=Incl. Flange	Panel Opening Width	Panel Opening Height	Mounting Holes Width	Mounting Holes Height	Type of Dial	Material
ET-128*	2 27/32	1 7/8	1 3/4	1	1 27/32	3/16	3/16	2 11/32	1 3/8	2 9/16 top 2 1/16 bottom	1 9/16	Circular	Injection Molded Tenite II, Black Matte Finish
ET-125*	3 7/8	2 15/16	2 7/8	1	3 1/4	3/16	5/16	3 1/2	1 1/2	3 1/2	1 15/16		
ET-135*	2 3/4	1 7/8	1 1/2	7/8	1 7/8	3/16	1/4	1 31/32	1 7/32	2 1/4	1 3/8		
ET-150*	3 7/8	2 5/16	2 7/8	3/4	3 1/8	3/16	5/16	3 9/32	1 7/32	3 1/2	1 15/16		
ET-165*	2 5/8	1 5/8	1 49/64	9/16	2 3/32	1/8	1/4	2 7/16	1 1/2	2 1/16	1 1/16		
ET-130*	4	1 13/16	2 3/4	13/16	—	3/16	1/4	2 13/32	1 11/32	3 1/2	1 5/16	Flexible Tape, Digital Counter, Cylinder or Drum	Injection Molded Tenite II, Black Matte Finish
ET-140*	2 1/2	1 1/2	1 1/4	5/8	—	1/8	5/16	1 17/32	1 1/32	2	1		
ET-145*	3 1/4	2 1/16	1 15/16	3/4	—	5/32	5/32	2 13/32	1 5/32	2 3/4	1 9/16		
ET-155*	2 1/2	1 3/16	1 11/16	1/2	—	5/32		2 1/32	2 9/32	2 1/4	15/16		
ET-160*	3 7/8	2 1/2	2 15/16	1 5/8	—	1/8	1/8	3	2 1/32	3 5/8	2 1/4		
EM-310	3	3	2 1/16	1 15/16	2 9/16	1/32	1/4	3 11/32	2 1/2	2 1/2	2 1/2	Helical	Soft Aluminum with Black Matte Enamel Finish
EM-315	3 1/4	3	2 1/4	5/8	2 1/16	1/32	1/8	2 15/32	1 5/64	2 3/4	2 5/8	Circular	
EM-320	3 1/4	2 3/4	2 1/4	5/8	2 1/16	1/32	1/8	2 29/64	1 3/64	2 3/4	2 1/4	Circular	
EM-325	3	3	2 1/16	1 1/2	2 5/16	1/32	1/4	2 11/32	1 61/64	2 1/2	2 1/2	Helical	

*To Order Specify: (1) frame only; (2) frame with clear window; (3) frame with clear window scribed with a center line.

JAN's molded, black, shock-resistant plastic escutcheons are available in an exceptionally wide variety of different types and sizes. They provide a pleasing window to frame dial plates mounted behind the panel.

Plastic escutcheons are available in the following ways: frame only; frame with clear windows; frame with clear window scribed with a center line.

For especially large working areas, stamped aluminum escutcheons, finished in dull black are available to meet the needs for space economy. Withstands temp. shock −65°C to +80°C. NON INFLAMMABLE.

VIEWING HOODS

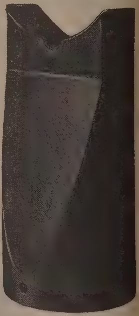
Cat. No. H-465
AND/OR ADAPTER
Can be used as viewing hood, on 2¾" dia. bezels. (#1427; 1428; 1429). Also serves as adapter to permit use of face-fitting neoprene rubber viewing hoods (see above). All aluminum. Has dull black enamel finish.

Cat. No. H-689-1
(5⅝" I.D.)
Black neoprene rubber, contour-molded, fits the shape of face. Keeps out ambient light when viewing scope.
Used with following Jan Bezels: 19636; 19495; 13584; 1465.
No. H-689-2 (4⅞" I.D.)
Used with JAN Bezel #545

Cat. No. H-1008
TO FIT RECTANGULAR BEZELS
Black, contour molded neoprene rubber. Keeps ambient light out, when viewing scope. Fits shape of face. Can be adapted for smaller I.D.'s.
Can be used with JAN Bezel CP-1328P. Can be adapted for #1533-P

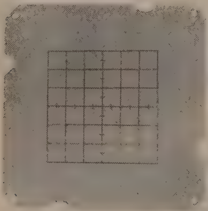
NEW!

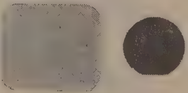
Cat. No. H-1063
Black, contour molded neoprene rubber. Keeps ambient light out, when viewing scope. Fits shape of face. Flanges provided for hand access to PPI settings.



Cat. No. H-1361
Black neoprene rubber, contour-molded, fits the shape of face. Keeps out ambient light when viewing scope.

GRATICULES — FILTERS — CUSHIONS —
Assorted Sizes and Shapes





New! Non-reflective filter material.
Matte 1 side. Grey or Blue.
Other colors on special order.

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QUALITY
RELIABILITY
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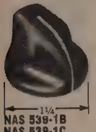
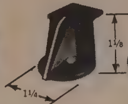
KNOBS

TRANSILLUMINATED POINTER KNOBS



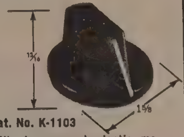
NAS 539-1B
NAS 539-1C
Similar knob also available with 1½″ dia.
Order No. 00278



USAF 61D 404 74
Cat. No. K-977

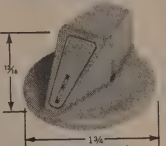
MS25165-1

MS91528



Cat. No. K-1103

Precision molded of JAN's transparent plastic material, to NAS specs, with dull finish. Transilluminated pointers permit easy reading under subdued lighting conditions. For use on instrument panels, switchboards electrical and electronic apparatus.



Cat. No. LM
USED ON LUNAR MODULES!

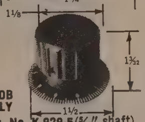
Precision aluminum casting. Adaptable for back lighting. With slip clutch features similar to K1375.

Cat. No. K-936-5

Black phenolic molded knob, with beveled aluminum skirt, black with white contrasting markings. Accurately centered brass insert, for 5/16″ shafts.

Cat. No. K-936-4
(¼″ shaft)

Variations on shaft sizes and markings available in production quantities.



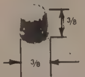
KNOB ONLY
Cat. No. K-929-5 (5/16″ shaft)
Same as above, less skirt.
Cat. No. K-929-4 (¼″ shaft)

MINIATURE KNOBS

PLASTIC

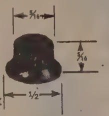
K-101295( )
-1 w/white dot
-2 plain
For ⅛″ flatted shaft.
Can also be supplied with ⅛″ round shafts.

K-101294( )
-1 11/16″ skirt dia.
-2 ¾″ skirt dia.



K-101297

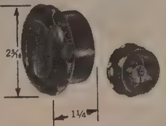
METAL



BK-1080
⅛″ flatted shaft

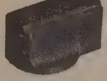
9/16
LOCK
11/32
½

AK-1326
For ¼″ shaft



TUNING KNOB
Cat. No. K-243

For 5/16″ shaft. Die cast aluminum. Made to Fed. Spec. QQ-A-591 and MIL-F-14072. Use no-mar clamp Cat. No. 937-8 for mounting (not supplied).



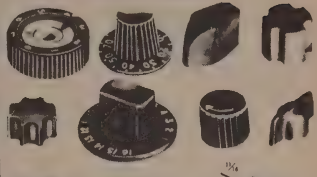
BAR KNOB
Cat. No. K-783

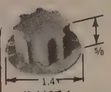
Phenolic molded knob, with metal insert. Set screw at back, for shaft attachment. Finished to specifications.

K1329

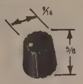
Knurled edge for easy turning. Twin set screws. 23/32″ high x ⅝″ dia. Available with & w/o marking.

STANDARD PLASTIC KNOBS

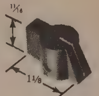




K-1105-1



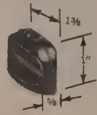
1575289PC-2



47B47299

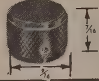
1007267-501

Knobs to satisfy almost any design or demand. Can be produced in any color or finish, either illuminated or non-illuminated. Knobs shown are only part of our stock. Let us quote on your specifications.
Knobs back lighted on special request, only. Special marking by engraving or screening, available to your specifications.



POINTER KNOB
Cat. No. K-706

Molded thermosetting phenolic. Type CFG per MIL-P-14. Designed for square shaft, providing positive action.



KNOB
Cat. No. K-897

Machined knurled edge for easy turning. Has set screw for firm attachment to ¼″ shafts. Height 7/16″ x 9/16″ dia.

NEW!

MOLDED PLASTIC KNOBS WITH METAL INSERTS

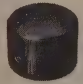
K1280 For 13/64″ shaft. Molded plastic with metal insert 5/16″ high x ⅞″ long x 11/16″ wide.

K1334 For ⅛″ shaft. Molded plastic with metal insert. Twin set screws. ⅝″ high x ¾″ dia. Notch: 3/32″ wide x 3/32″ deep.

K1345 For 3/16″ shaft. Twin set screws. ¾″ high x 7/16″ diameter.

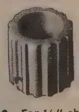
K1349 For 5/32″ shaft with .130 across flat. Twin set screws. 11/16″ high x ¾″ diameter.

K1354 For 5/16″ shaft with .281 across flat. Twin set screws. 45/64″ high x ¾″ diameter.



K1331 For 3/16″ shaft. Molded plastic with metal insert. Twin set screws. ¾″ high x 1 1/64″ dia.

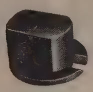
K1335 For 3/32″ D flatted shaft. Molded plastic. 11/32″ high x 21/32″ dia.



K1346 For ¼″ shaft with .222 across flat. Twin set screws. 11/16″ high x 11/16″ diameter.

K1350 For ⅛″ shaft with .107 across D flat. Twin set screws. ⅞″ high x ⅞″ diameter.

K1355 For 5/16″ shafts. Twin set screws. ⅝″ high. Base size 17/32 x 13/32″.



K1332 For 3/16″ shaft. Molded plastic with metal insert. Twin set screws. 21/32″ high x 1⅛″ dia. Notch: ⅛″ wide x 3/16″ deep.

K1343 For 9/32″ shaft with .250 across D flat. Twin set screws. 21/32″ high x ⅞″ diameter.

K1347 For 5/32″ shaft with .130 across flat. Twin set screws. ½″ high x ¾″ diameter.

K1351 For ⅛″ round with .096 across flat. Twin set screws. 9/16″ high x ⅝″ diameter.

K1368 For ¼″ D flatted shaft. Twin set screws. 11/16″ high x 11/16″ diameter.

K1333 For 3/16″ shaft. Molded plastic with metal insert. Twin set screws. ⅝″ high x ¾″ dia.

K1344 For 5/32″ shaft with .130 across flat. Twin set screws. ⅞″ high x ⅞″ diameter.

K1348 For 5/32″ round or 5/32″ D flatted shaft. Twin set screws. ½″ high x ¾″ diameter.

K1352 For ⅛″ shaft with .112 across flat. Twin set screws. 11/16″ high x ½″ diameter.

K1353 For 5/16 — 32 threaded shaft. 59/64″ high x ½″ diameter.

K1398/WD For ⅜″ shaft. Twin set screws. 1 1/16″ high x 2⅜″ diameter. Molded plastic with metal inserts.

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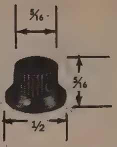
QUALITY
RELIABILITY
ECONOMY

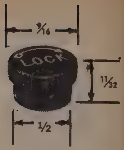
K1336
Aluminum locking knob.
15/32″ high, 1/2″ knurled O.D.
For 8-32 threaded shaft.

K1328
For 1/4″ shaft.
Precision cast aluminum.
11/16″ high X 11/16″ dia.
Twin set screws.

K1330 For 1/8″ shaft. Aluminum. Can be used for printed circuit boards. Gives both finger and screwdriver adjustment. 1/2″ high x 5/8″ diameter. One set screw.



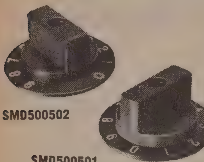
BK-1080
1/8″ flatted shaft.



AK-1326
For 1/4″ shaft.

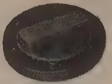
KNOBS TO MILITARY SPECIFICATIONS

One of the largest assortment of Military Knobs in the country



SMD500502

SMD500501



K1124 For 1/8″ shaft. 9/16″ high x 1 1/16″ diameter. One set screw. Aluminum die-cast.

No. K-1005
Available with or without skirt.

No. K-1020
11/16″ high x
9/16″ bas dia.

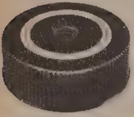
No. K-1021
11/16″ high
x 1″ base dia.

For 1/4″ shaft.
Other shaft diameters on request.

MACHINED KNOBS

K-1006-(2)
-(3)
3/4″ high x
3/8″ dia.

K-1007-(2)
-(4)
3/4″ high
x 3/4″ O.D.



SCB-41848
5/8″ High x 1 13/16″ Dia.

K1047 For 1/8″ shaft with .095 across flats. (Double D). 7/8″ high x 1 1/8″ diameter. Aluminum.

K1126 For 1/4″ Double D shaft. 15/32″ high x 23/32″ diameter. Mounts from top of knob. Aluminum die-cast.

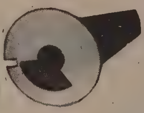
K1127 For 1/8″ shaft. 15/32″ high x 23/32″ diameter. Two set screws. Aluminum die-cast.

CAST ALUMINUM KNOBS

Available in black. Other colors on request. Specify shaft hole size required.

No. K-1022
Full Round Skirt
1/4″ hole x
1 1/32″ high
x 15/16″ base dia.

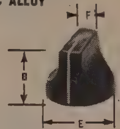
No. K-1023
Flat Back Round
Skirt 1/4″ hole x
1 1/32″ high x 15/16″
base dia.
(29/32″ to flat back)



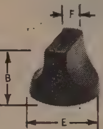
No. K-1024
With Cam Shape
Cut-out 1/4″ hole
x 1 1/32″ high
x 15/16″ base dia.

SIGNAL CORPS DIE CAST KNOBS

ZINC ALLOY



No. K-242-1
& K-242-2



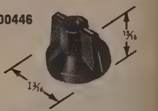
No. K-242-3

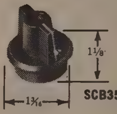
Cat. No.	B	E	F	Marking
K-242-1	3/4″	15/16″	5/16″	White
K-242-2	7/8″	1 1/8″	3/8″	White
K-242-3	3/4″	15/16″	5/16″	None

ALUMINUM

No. K-984
Dimensions as per 242-3
No markings.
Aluminum.
.257 tear drop shaft hole.

100446

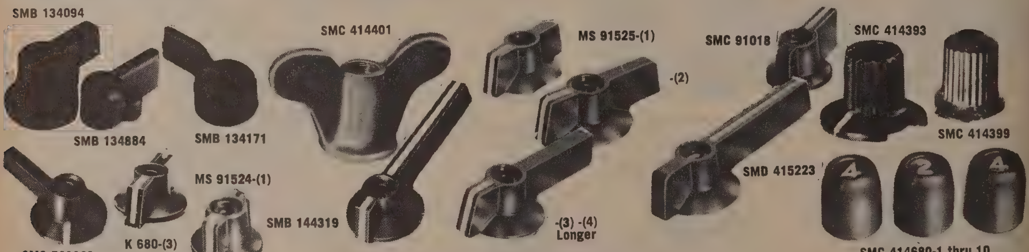




SCB35862-1

MS SIGNAL CORPS DIE-CAST ALUMINUM AND ZINC ALLOY CONTROL KNOBS

Manufactured in Accordance with Applicable Military Specifications



(Many sizes available. Lengths from 1 3/16″ to 2 9/16″)

PARTIAL LIST OF GOVERNMENT KNOBS MANUFACTURED BY JAN

SMC 100446
SCB 104717
SMC 108874
SMC 108875
SMC 108876
SMC 108951
SMC 108952
SMB 120139
SMD 131010
SMB 134093
SMB 134094
SMB 134171
SMB 134884
SMB 134957
SMB 143975
SMB 144318
SMB 144319
SMB 144358
SMB 144517
SMB 149064
SMB 16505
SCB 16532
SMB 16552
SMB 180200A2
SMB 180288A2
SMB 180465A1
SMB 182273
SMB 249242-3
MS 25165
SCD 2593-5
SMB 283419
SMB 314747
SMB 320816
SMC 328271
SMB 336784
SMC 344847
SMC 345389
SCB 35862
SCB 35863
SMB 393998
SCB 40771
SCB 40859
SCB 40860
SMB 414393
SMC 414399
SMC 414401
SMC 414680-1
thru -10
SMD 415160
SMC 415161
SMD 415223
BUORD 416956PT2
SCB 41848
SMB 422875
SMB 424034
SMC 447052
SMC 447226
SMC 447307
SMB 456374
SMC 500407
SMC 500501
SMC 502491
NAS 539 1B
NAS 539 1C
SMB 540595-2
SMB 541048
SMC 541119
SMB 541127
SMB 541150
SMB 552131-1
SMB 552258
SMC 558544-1
SMB 601249
SMC 60125
SMB 601422
SMC 60158
SCB 60744
USAF 61D40474
SCC 614661
SCB 63251
SMB 633276
SCC 65018
SCC 65018-1
SCB 65411
SCC 65673
SCB 65884
SCB 72585
SCB 72687
NAVORD 814528
SCB 82716
SMB 902574-1
SMC 91018
MS 91522
MS 91523
MS 91525-1
thru -4
MC 91528
SMC 97250

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QUALITY
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ECONOMY

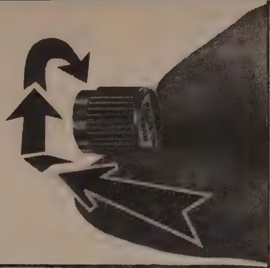
SAFETY KNOBS

"PRESS-TO-TURN" KNOBS

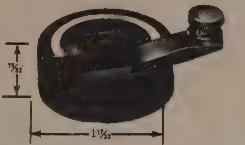
FOR LOW TORQUE APPLICATIONS

Knobs spin freely . . . and **Must Be Pressed-in** while making changes. Developed specifically to prevent inadvertent changing of settings. For basic dimensions, see our "Deluxe Instrument Knobs" (9, 12, 17 and 22 body dia. series). When ordering, be sure to substitute prefix "T" for 9 Series and "Q" for 17 Series, as per typical part numbers.

TIC4GA = .90 Dia./Press-to-Turn/Round/Dial/1/4"/Glossy/Black



Cat. No. MS-91522-1 CRANK KNOB Retractable Spinner



Aluminum Olive Drab. For 1/4" shaft. Other colors and shaft diameters on request. 2 5/8" minimum clearance required with handle in open position.

NEW!

Cat. No. K1622
Retractable Spinner CRANK KNOB
Modified version to replace MS91522. Incorporates brake mechanism to lock control in position.

SLIP-CLUTCH KNOB with Spinners

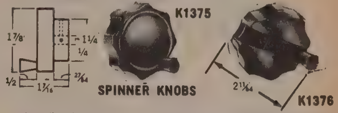
Cat. Nos. K-1375 & K-1376 (For 1/4" Shafts)

For driving devices such as variable capacitors, inductors, potentiometers, etc., the "slip-clutch"* automatically disengages and slips when the pre-determined torque has been exceeded. Knobs are fluted, and are equipped with either fixed or retractable spinner for fast turning. Backlash-free units safeguard delicate and costly instruments against careless or inadvertent cranking beyond their normal stops.

*Normally set for 3-6" lbs. Can be modified for other requirements.

Model No. K-1376 is identical with No. K-1375 but has the additional feature of a retractable spinner. Spring loading provides positive, toggle-type action to lock spinner in either open or closed position. Model No. K-1376 is designed for use where economy of space is essential.

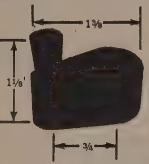
Cat. Nos. K-1275 & 1276 (For 1/4" shafts)
In appearance, these knobs are identical with No. K-1375 and No. K-1376 but without JAN's Slip-Clutch mechanism. Made with single-unit, molded Bakelite-to-metal-insert construction, with two set screws for firm attachment to shafts.



With Fixed or Retractable Spinners

Standard: Glossy finish. (Matte finish avail. on special order)

Cat. No. K-1125
SPINNER KNOB
For Limited Space Applications



For 1/4" shaft. Other shaft diameters on request.

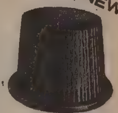
NEW!

Cat. No. K1358
MINIATURE SPINNER KNOB
Nylon. 13/32" High x 3/4" Wide. Spinner section diameter 3/8". Accepts 1/8" shaft or smaller.

NEW!

Cat. No. K-1356
RADIAL LOCK —
Single-turn indicator dial with Radial Lock

NEW!

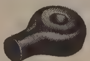


Cat. No. K1357
CLUTCH KNOBS
Straight knurl aluminum knob. Twin set screws. For 1/4" shaft. Other sizes available. 1 3/8" dia. skirt, tapers to 1" dia. at top. Height, 1" Std. Torque 1 to 3 in/lbs. Available from 1/2 in/oz. to 48 in./oz.

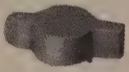
BAR-KNOB
Cat. No. K-1325
Precision cast aluminum for 1/4" shafts. Furnished with twin 8-32 set screws for shaft attachment. Provides a 1.0" integrally cast lever arm for heavy-load switching. Finished to specifications.

K1327 For 1/4" shaft. Twin set screws. 1" high x 11/16" body diameter. 1 3/8" overall width.

K1337 Shaft hole .260. Twin set screws. 1 1/8" long x 3/8" high x 1/2" body diameter.



K1342 Knob switch. For 1/4" D flatted shaft. 1 1/2" long x 7/16" high. 1" body dia., 7/16" bar dia.



51A30C82
Aluminum cast bar knob for high torque applications.

K1387 For 5/32" shaft hole. Twin set screws. 1/4" high x 23/32" diameter. Aluminum die-cast.

K1389 For 1/4" shaft. Twin set screws. 27/32" high x 15/16" diameter. Aluminum die-cast.

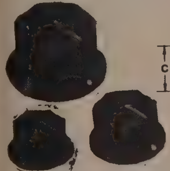
K1390 For 9/64" shaft. Two set screws. 11/16" high x 9/16" diameter. Aluminum die-cast.

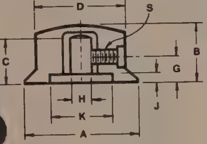
K1391 For 1/8" shaft. Twin set screws. 43/64" high x 5/8" diameter. Aluminum die-cast, with white-filled line.

K1392 For 3/16" shaft. Two set screws. 25/32" high x 11/16" diameter. (Bar is 13/16" long). Aluminum die-cast.

K1394 For 1/8" shaft. Two set screws. 7/8" high x 1/2" diameter. Aluminum die-cast.

INSTRUMENT KNOBS





DIMENSIONS

PART NO.					A	B	C	D	G	H	J	K	S
6	1	C	SPECIFY AS REQUIRED		3/4	7/16	3/8	5/8	7/32	1/4	1/16	9/16	6-32
8	1	C			1	19/32	1/2	13/16	9/32	1/4	3/32	11/16	8-32
10	1	C			1 1/4	21/32	1/2	1	9/32	1/4	3/32	11/16	8-32
13	1	C			1 1/2	3/4	9/16	1 1/4	11/32	1/4	5/32	31/32	8-32
16	1	C			2	7/8	21/32	1 5/8	13/32	1/4	3/32	13/16	8-32

Body Dia.
6=5/8"
8=13/16"
10=1"
13=1 1/4"
16=1 5/8"

Body Style
1=Round

Skirt
C=Skirt w/ Indicator Marker

Shaft Hole Dia.
2=1/8"
4=1/4"
(Standard— with metal insert.
"0" preceding number means without metal insert)

(Other shaft holes to order)

Finish
G=Glossy (Standard)
M=Matte

Color
A=Black
Other Colors on Special Order

TYPICAL PART NUMBERS

81C4GB= 13/16" Dia./Round/Skirt w/indicator marker/1/4" Shaft Hole Dia./Glossy/Red
101C4MA= 1" Dia./Round/Skirt w/indicator marker/1/4" Shaft Hole Dia./Matte/Black
101C04MA= 1" Dia./Round/Skirt w/indicator marker/1/4" Shaft Hole Dia. without metal insert/Matte/Black

Available with Metal Tops

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QUALITY
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ECONOMY

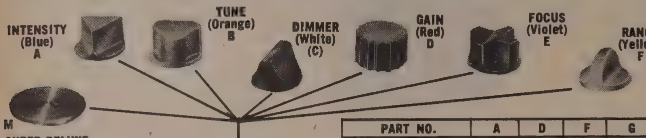
DELUXE INSTRUMENT KNOBS

MEETS PERFORMANCE OF MIL-STD-242D (SHIPS) & MS 91528D

Molded of polycarbonate, these knobs will withstand the extreme environmental conditions of MIL-E-16400. **QPL #3926 — T.R. #J101**

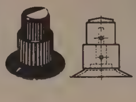
TACTILE SHAPE CONTROL CAPS

Expressly made for both visual and tactile function identification. Each Tactile Knob is produced in the standard recognizable color identified with its configuration. Available in other colors on special order. See column below for applicable tactile shape.

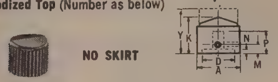


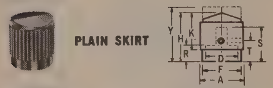
SUPER DELUXE Aluminum Anodized Top (Number as below)

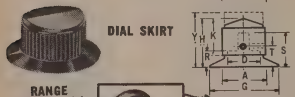
Dual Knobs for Concentric Controls
APPROVED FOR USE MIL-STD-242D & MS-91528C

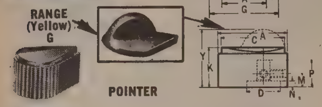


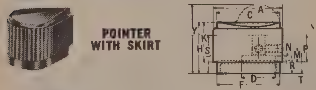
Molded of polycarbonate plastic, these "piggy-back" knobs are used with dual concentric potentiometers and in other similar applications. Meet performance of military specs above. See diagrams below for dimensions of each knob.

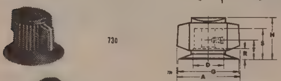


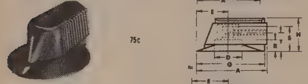


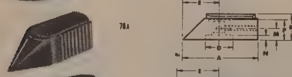


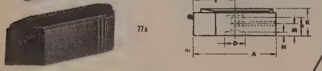












DIMENSIONS

PART NO.	A	D	F	G	H	K	M	N	P	R	S	T	Y
5 1 A	.505	.435				.509	.158	.026	.408				
7 1 A	.708	.486				.626	.187	.026	.406				.915
9 1 A	.911	.645				.798	.255	.114	.521				1.171
12 1 A	1.255	.974				.703	.260	.115	.458				1.220
17 1 A	1.755	1.465				.854	.255	.114	.521				
22 1 A	2.255	1.870				.885	.255	.114	.521				
5 1 B	.505	.435	.450		.660	.509				.181	.563	.324	
7 1 B	.708	.486	.670		.805	.626				.188	.568	.340	1.100
9 1 B	.911	.654	.826		1.027	.798				.323	.730	.484	1.399
12 1 B	1.255	.974	1.155		.870	.703				.262	.605	.427	1.399
17 1 B	1.755	1.465	1.666		1.088	.854				.338	.740	.489	
22 1 B	2.255	1.870	2.153		1.114	.885				.333	.740	.489	
5 1 C	.505	.435		.885	.660	.509				.181	.563	.324	
7 1 C	.708	.486		1.135	.805	.626				.183	.568	.340	1.100
9 1 C	.911	.645		1.510	1.027	.798				.323	.730	.484	1.399
12 1 C	1.255	.974		1.822	.870	.703				.262	.605	.427	1.399
17 1 C	1.755	1.465		2.453	1.088	.854				.333	.740	.489	
22 1 C	2.255	1.870		3.005	1.114	.885				.333	.740	.489	

SPECIFY AS REQUIRED

POINTER KNOBS

PART NO	A	D	E	F	H	K	M	N	P	R	S	T	Y
5 2 A	7.50	.406	.510			.505	.158	.026	.402				
7 2 A	1.038	.486	.690			.619	.187	.026	.406				.918
9 2 A	1.344	.645	.895			.796	.255	.114	.555				1.171
5 2 B	.750	.406	.510	.669	.655	.505			.402	.177	.563	.324	
7 2 B	1.038	.486	.690	.940	.791	.619			.406	.193	.573	.364	1.100
9 2 B	1.344	.645	.895	1.251	1.051	.796			.555	.328	.796	.479	1.400

SPECIFY AS REQUIRED

PART NO.	A	D	F	G	H	K	M	N	P	R	S	T
7 3 A	1.150	.486				.610	.187	.026	.406			
7 3 B	1.150	.486	.680		.782					.183	.568	.364
7 3 D	1.150	.486		1.135	.782					.183	.568	.364

SPECIFY AS REQUIRED

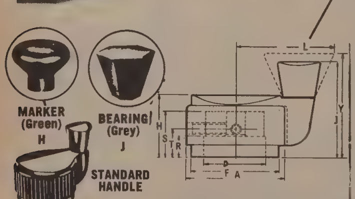
PART NO.	A	D	E	G	H	K	M	N	P	R	S	T
7 5 A	1.515	.515	.575			.645	.250	.110	.445			
7 5 C	1.720	.515	.780	1.520	.815					.266	.590	.435
7 6 A	1.855	.595	.900			.645	.250	.110	.445			
7 7 A	2.552	.562	1.290			.869	.348	.177	.739			

SPECIFY AS REQUIRED

CRANK KNOBS

PART NO.	A	D	F	H	J	L	R	S	T	Y
12 4 B	1.250	0.685	1.185	.850	1.350	1.275	.250	.605	.427	1.475
17 4 B	1.750	0.685	1.690	1.070	1.758	1.735	.320	.740	.489	1.940
22 4 B	2.250	0.685	2.185	1.095	1.782	1.970	.320	.740	.489	1.970

SPECIFY AS REQUIRED



1 — TOP
(Color of Tactile)
O = NO TOP — Shaft Hole Drilled Thru
A = (INTENSITY - Blue)
B = (TUNE - Orange)
C = (DIMMER - White)
D = (GAIN - Red)
E = (FOCUS - Violet)
F = (RANGE - Yellow)
M = ALUM ANODIZED TOP
H = (MARKER - Green)†
J = (BEARING - Grey)†

2 — BODY DIA.
5 = .51
7 = .71
9 = .90
I = .90 Press-to-Turn*
12 = 1.25
L = 1.25 Press-to-Turn*
17 = 1.75
Q = 1.75 Press-to-Turn*
22 = 2.25
V = 2.25 Press-to-Turn*

*For Press-to-Turn Knobs see "SAFETY & SPECIAL PURPOSE KNOBS" section.

3 — BODY STYLE
1 = ROUND
2 = POINTER
3 = BAR, ROUND
4 = SPINNER
5 = BAR, SHORT
6 = BAR, LONG
7 = BAR—HIGH TORQUE

4 — SKIRT
A = NONE
B = PLAIN
C = DIAL W/POINTER
D = DIAL W/O POINTER
H = Slot

5 — SHAFT HOLE DIA.
2 = .128
3 = .190
4 = .253
5 = .312
6 = .375
7 = .268
"D" FLAT SHAFT HOLES
B = .107 (1/8")
D = .222 (1/4")

6 — FINISH
M = MATTE
G = GLOSSY

7 — COLOR
A = BLACK
B = RED
C = GREY
D = GREEN
E = YELLOW
F = PURPLE
G = BLUE
H = WHITE
J = ORANGE

8 — MARKING
/WD = WHITE DOT
/FD = FLUORESCENT DOT
/PD = PHOSPHORESCENT DOT
/FA = FLUORESCENT ARROW
/PA = PHOSPHORESCENT ARROW
For no marking, leave blank

T = STANDARD TOP (prefix not required). Use letter 'T' only when color of standard shape top is different than body color. Precede T by color code from Column 7 (BT — would mean standard shape RED top).

TYPICAL PART NUMBERS

91C4GA = .90 Dia./Round/Dial/1/4"/Glossy/Black.
T1C4GA = .90 Dia/Press-to-Turn/Round/Dial/1/4"/Glossy/Black.
A71B4MA = Triangle Top Blue/.72/Round/Plain/1/4"/Matte/Black.
124B4MA = 1.25 dia./Crank (Spinner)/Plain/1/4"/Matte/Black.
BT71B4MA = Standard Top Red/.72/Round/Plain/1/4"/Matte/Black.
****071B4MA** = No Top, Shaft hole drilled thru/.72/Round/Plain/1/4"/Matte/Black.

** — Specify if .127, .190, .250 hole is required for dual mounting.

NOTE: *T — Preceded by color code (BT — would mean Standard RED top).

▲To order slip-clutch mechanism, prefix part no. with letter 'S' and add torque requirement in brackets. e.g. **S 124B4MA** (2 lbs.-in. ±0.5).

FOR SPECIAL KNOBS — GIVE FULL DESCRIPTION OR SKETCH WITH ORDER.

JAN
JAN HARDWARE | QUALITY RELIABILITY ECONOMY
MANUFACTURING COMPANY INC.
47-27 36th STREET • LONG ISLAND CITY, NEW YORK 11101 • TEL: (212) 361-0800

JAN HARDWARE MANUFACTURING COMPANY, INC.
47-27 36th STREET • LONG ISLAND CITY, NEW YORK 11101 • TEL: (212) 361-0800

JANSET® KNOBS

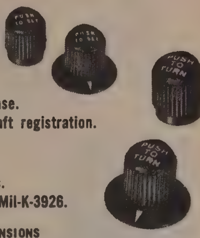
QUALITY
RELIABILITY
ECONOMY

"PUSH-TO-SET" OR "PUSH-TO-TURN"

JANSET® Knobs are precision engineered and are completely integral with its mechanism totally enclosed within the knob body configuration. They protect control settings against accidental change due to shock or vibration. Only when they are depressed can the setting be altered. The knob provides infinite resolution with zero backlash such that registration to indicators (illuminated arrow, dot, cutouts etc.) is maintained throughout a full excursion. To use for existing or new designs JANSET® KNOBS REQUIRE NO MODIFICATION TO PANEL DESIGN.

Available from ½" to 2¼" diameters with ring or dial skirts; with or without indicator markings. Fits all ¼" or ⅜" panel bushings and ⅛" thru ¼" shafts.

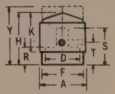
FOR TACTILE SHAPE CONTROL CAPS, SEE INFORMATION ON PRECEDING PAGE.



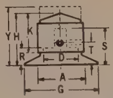
Distinctive Features

- **Knob locks automatically upon release.**
- **Infinite resolution with absolute shaft registration.**
- **Guards critical settings.**
- **Completely integral assembly.**
- **Installation same as standard knobs.**
- **Configuration meets MS-91528 and Mil-K-3926.**

PLAIN SKIRT



DIAL SKIRT



Marking
Cap

PUSH-TO-SET or PUSH-TO-TURN DIMENSIONS

SPECIFY AS REQUIRED

PART NO.	A	D	F	G	H	K	R	S	T	Y
5 1 B	.505	.435	.450		.660	.509	.181	.563	.375	
7 1 B	.708	.486	.670		.805	.626	.188	.587	.406	1.100
9 1 B	.911	.654	.826		1.027	.798	.323	.812	.603	1.399
12 1 B	1.255	.974	1.155		.870	.703	.262	.605	.603	1.399
17 1 B	1.755	1.465	1.666		1.088	.854	.338	.740	.603	
22 1 B	2.255	1.870	2.153		1.114	.885	.333	.740	.603	
5 1 C	.505	.435		.885	.660	.509	.181	.587	.400	
7 1 C	.708	.486		1.135	.805	.626	.183	.602	.431	1.100
9 1 C	.911	.645		1.510	1.027	.798	.323	.730	.603	1.399
12 1 C	1.255	.974		1.822	.870	.703	.262	.605	.603	1.399
17 1 C	1.755	1.465		2.453	1.088	.854	.333	.740	.603	
22 1 C	2.255	1.870		3.005	1.114	.885	.333	.740	.603	

SPECIFY AS REQUIRED

PREFIX
PS = PUSH-TO-SET
PT = PUSH-TO-TURN
PN = NO MARKING

Cap

INCREMENTAL KNOBS DIMENSIONS

SPECIFY AS REQUIRED

PART NO.	A	D	F	G	H	K	R	S	T	Y
EE 1 B	.505	.435	.450		.660	.509	.181	.563	.375	
GG 1 B	.708	.486	.670		.805	.626	.188	.587	.406	1.100
II 1 B	.911	.654	.826		1.027	.798	.323	.812	.603	1.399
LL 1 B	1.255	.974	1.155		.870	.703	.262	.605	.603	1.399
QQ 1 B	1.755	1.465	1.666		1.088	.854	.338	.740	.603	
VV 1 B	2.255	1.870	2.153		1.114	.885	.333	.740	.603	
EE 1 C	.505	.435		.885	.660	.509	.181	.587	.400	
GG 1 C	.708	.486		1.135	.805	.626	.183	.602	.431	1.100
II 1 C	.911	.645		1.510	1.027	.798	.323	.812	.603	1.399
LL 1 C	1.255	.974		1.822	.870	.703	.262	.605	.603	1.399
QQ 1 C	1.755	1.465		2.453	1.088	.854	.333	.740	.603	
VV 1 C	2.255	1.870		3.005	1.114	.885	.333	.740	.603	

SPECIFY AS REQUIRED

1 — CAP
(Color of Tactile)
0 = NO TOP —
Shaft Hole Drilled Thru
A = (INTENSITY - Blue)
B = (TUNE - Orange)
C = (DIMMER - White)
D = (GAIN - Red)
E = (FOCUS - Violet)
F = (RANGE - Yellow)
M = ALUM ANODIZED TOP

T = STANDARD TOP (prefix not required) Use letter 'T' only when color of standard shape top is different than body color. Precede T by color code from Column 7 (BT— would mean standard shape RED top).

2 — BODY DIA.
EE = .51
GG = .71
II = .90
LL = 1.25
QQ = 1.75
VV = 2.25

3 — BODY STYLE
1 = ROUND
2 = POINTER

4 — SKIRT
B = PLAIN
C = DIAL W/POINTER
D = DIAL W/O POINTER
H = Slot

5 — SHAFT HOLE DIA
2 = .128
3 = .190
4 = .253
5 = .312
6 = .375
7 = .268
"D" FLAT SHAFT HOLES
B = .107 (⅛")
D = .222 (¼")

6 — FINISH
M = MATTE
G = GLOSSY

7 — COLOR
A = BLACK
B = RED
C = GREY
D = GREEN
E = YELLOW
F = PURPLE
G = BLUE
H = WHITE
J = ORANGE

8 — MARKING
/WD = WHITE DOT
/FD = FLUORESCENT DOT
/PD = PHOSPHORESCENT DOT
/FA = FLUORESCENT ARROW
/PA = PHOSPHORESCENT ARROW
For no marking, leave blank

9 — NO. OF INCREMENTAL POSITIONS.
SPECIFY
1 THRU 32.

10 — INCREMENT ANGLES
E = Equal Angles
N = Unequal Angles*
*Supply table of angular increments in degrees and minutes. See Table.

11 — TOTAL ANGULAR ROTATION IN DEGREES AND MINUTES
SPECIFY 0° to 360°

TYPICAL PART NUMBERS

PS91C4GA =	Marking Push-To-Set/.90 Dia./Round/Dial/¼"/Glossy/Black.
PTBT71B4MA =	Marking Push-To-Turn/Standard Top Red/.72/Round/Plain/¼"/Matte/Black.
11B4MA/WD [17E 180°] =	Std. Top/.90 Dia./Round/Plain/.253 Dia. Shaft Hole/Matte/Black/White Dot/17 Incremental Positions/Equally Spaced, in 180° Rotation.
MLL1C4GB [5N 300°] =	Alum. Anodized Top/1.25 Dia./Round/Dial with Pointer/.253 Dia. Shaft Hole/Glossy/Red/5 Incremental Positions/ Unequally Spaced, in 300° Rotation (See Table).

FOR SPECIAL KNOBS — GIVE FULL DESCRIPTION OR SKETCH WITH ORDER.

*SAMPLE OF TYPICAL TABLE
(to be supplied)

Position	Increment Angle	Total Angle
1	0	0
2	5	5
3	4	9
4	25	34
5	266	300

INCREMENTAL KNOBS

Easily provide precise setting to pre-determined positions. Equipment can now be tuned repeatedly with finite exactness to as many as 32 or as few as a single specific position.

Lock positively at exact point required with zero backlash. Once positioned, no further tuning or other adjustment is needed. They guard against shock or vibration and provide a uniquely smooth action, yet permit easy setting to pre-determined, incremental positions by touch, sight or sound. Essentially, their purpose may be compared to a series of multi-position stops.

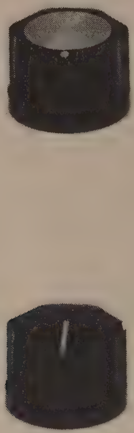
JANSET Incremental Knobs are totally integral and incorporate all functions within the knob body itself. Achieve major economies in space, weight and cost. Equally suited to existing or new designs since they require no modification to the panel. Installation is the same as any standard knob.

Available in a wide variety of styles, sizes and shapes, and are made to fit ⅛" to ¼" diameter shafts. Configuration meets MS-91528 and MIL-K-3926.

- **Knob locks automatically at exact point, with zero backlash.**

High Quality Thermoset Instrument Knobs

Snob Knob Series



Instrument Series

Skirted Series

Pointer Series

For information on our complete line of thermoset knobs, contact our representative in your area.

Adams McGregor, Inc.
Wallingford, Conn. (203) 269-5816
Lincoln, R.I. (401) 726-1300
Scituate, Mass. (617) 545-2213

Marsey Sales
Rochester, N.Y. (716) 442-9700

Carter-McCormic & Pierce
Pittsburgh, Pa. (412) 824-3760
Cleveland, Ohio (216) 333-5650
Dayton, Ohio (513) 278-5873
Worthington, Ohio (614) 888-4466
Farmington, Mich. (313) 477-7700

R. Klipp Associates
Libertyville, Ill. (312) 362-4676

KSW Associates
Kansas City, Mo. (816) 358-5240

Gordon Peck Co.
Garland, Tex. (214) 341-8311
Houston, Texas (713) 664-1435

Dale G. Weber Co.
Portland, Oregon (503) 234-7671

W. S. Harmon Co.
Los Angeles, Cal. (213) 937-1460

Frank Tylinski Co.
Great Neck, L.I., N.Y. (516) 466-9070

Skor, Inc.
St. Paul, Minn. (612) 645-6461

Lake Engineering Ltd.
Scarborough, Ont., Canada (416) 757-3253
Montreal, Quebec, Canada (514) 739-5795
Quebec, Canada (514) 747-2411

KURZ-KASCH
711 Hunter Ave.
Wilmington, Ohio 45177
(513) 382-0966

RAYTHEON CONTROL KNOBS

STANDARD SERIES

Raytheon Standard Series Control Knobs feature top quality and lend distinctive customer appeal to your products. All knobs have a common motif, resulting in uniform appearance regardless of function. Standard Series includes hundreds of knobs in many functional shapes, sizes and colors meeting MIL-K-3926 and MS91528. All are molded from high-impact polycarbonate with corrosion-resistant aluminum inserts for maximum strength.

DESIGNER SERIES

Give your product a fine, custom appearance with these Designer Series Knobs. Contrasting with the black bases, the aluminum caps, protected by baked-on epoxy coating, give a sunburst effect which is modern, aesthetically pleasing and implies quality. Knob bases are molded of high quality polycarbonate. Set screws, inserts same as for Standard Series. Colors or other modifications available on special order.

REGENCY SERIES

Regency Series Control Knobs offer the combination of fine quality and a custom appearance at a **modest cost**, with the choice of spun aluminum cupped caps (RS Series) or flat inlaid discs (RSF Series), protected by an epoxy coating. These knobs are particularly suited for use in industrial and instrumentation applications.

400 SERIES

To complement or contrast with the color and design of your products. The 400 Series Knobs are made of durable, high-impact acrylonitrite—butadiene—styrene (ABS) with a lusterless finish. All contain metal bushings and two set screws.

PANELRAMA SERIES

These knobs, molded of durable, high-impact acrylonitrite-butadiene-styrene (ABS), have a black matte finish capped with an epoxy-coated aluminum disk. All contain circular shaft metal inserts with two 6-32 UNC-3A set screws.

PUSH TO ENGAGE

PUSH TO TURN

Designed for applications in which control settings must be maintained under conditions of shock and vibration. The setting can not be changed accidentally, since the knob must be depressed before movement. Zero backlash allows the operator infinite resolution of setting, yet prevents control shaft from rotating when released. Design is identical to Raytheon's standard line of control knobs, allowing uniformity of panel design when used in conjunction with other types.

FOR SPECIFICATIONS SEE PAGE 2•1110

ORDERING INFORMATION

Catalog numbers published here are for stocked items. For other variations, contact factory. The derivation of the catalog numbers for each series is shown below. This does not imply that all combinations are available. Mirror finish is specified on most Standard and Designer Series Catalog numbers listed. Where matte (dull) finish is specified the suffix G is added. Note 400 and Panelrama Series have a matte finish.

Raytheon knobs are available through franchised distributor. See listing of representatives for location of your nearest distributor.

Sample knobs are available for your evaluation, write Raytheon Distributor—Products Operation, Fourth Ave., Burlington, Mass. 01803, Dept. RK.E.

STANDARD AND DESIGNER SERIES AND REGENCY SERIES

Series
DS—Designer
None—Standard
Regency Series
RS—Cupped Cap
RSF—Flat Inlaid Cap

Color
None—Black Knob
G—Gray Knob
R—Red Knob

Approx. Diameter
50 = ½"
70 = ¾"
90 = 1"
125 = 1¼"
175 = 1¾"
225 = 2¼"

Bar Knob
B—Bar knob
None—Other Styles

Type
1. Plain round
2. Skirted round
3. Dial Skirted Round
4. Unskirted Pointer
5. Skirted Pointer
6. Crank
7. Plain Bar Pointer
8. Dial Skirted Bar Pointer

Style
BL—Backlighted Skirt
CB—Concentric Base
LK—Knob Lock Pointer Knob
NP—No Pointer Mark
WD—White Dot
WL—White Line
Regency Styles
BD—Blackdot
BL—½ Black Line

Shaft Hole Size
1 = .127"
2 = .252"
3 = .190"
4 = .267"
5 = .377"

Finish
None—Mirror Finish
G—Matte Finish

400 AND PANELRAMA SERIES

Approx. Dia. and
Series Panelrama
PS6—5/8"
PS7—3/4"
PS12—1-1/4"
400 Series
407—3/4"
409—7/8"
412—1-1/4"

Style
D—Round/Dial Skirt
P—Pointer
PD—Pointer/Dial Skirt
R—Round

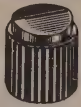
Shaft hole size
1—1/8"
2—1/4"

Note: Panelrama available only in K1R black with aluminum cap

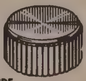
Color
K1—Black
K3—Beige
K7—Blue-Gray
K1R—See note

RAYTHEON CONTROL KNOBS/STANDARD AND DESIGNER SERIES

ROUND



Standard

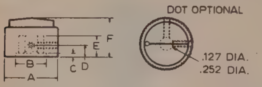


Designer

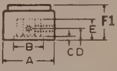
SELECTION GUIDE

Knob Dia. (Appx.)	Shaft Dia.	Knob Height (Appx.)	Dimension Dwg. Ref.	Stocked Catalog Numbers			
				Standard		Designer	
				Black Plain	White Dot	Black Plain	Black Dot
1/2"	1/8"	1/2"	Series 50	50-1-1	50-1WD-1	—	—
3/4"	1/8"	5/8"	Series 70	70-1-1	70-1WD-1	DS70-1-1	DS70-1BD-1
3/4"	3/16"	5/8"	Series 70	70-1-3	—	DS70-1-3	DS70-1BD-3
3/4"	1/4"	5/8"	Series 70	70-1-2	70-1WD-2	DS70-1-2	DS70-1BD-2
1"	1/8"	3/4"	Series 90	90-1-1G	90-1WD-1G	DS90-1-1	DS90-1BD-1G
1"	3/16"	3/4"	Series 90	90-1-3	—	DS90-1-3	DS90-1BD-3
1"	1/4"	3/4"	Series 90	90-1-2	90-1WD-2	DS90-1-2	DS90-1BD-2
1-1/4"	1/4"	5/8"	Series 125	125-1-2	125-1WD-2G	DS125-1-2	—
1-3/4"	1/4"	7/8"	Series 175	175-1-2	—	—	—
2-1/4"	1/4"	7/8"	Series 225	225-1-2	—	—	—

Standard

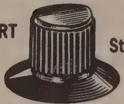


Designer

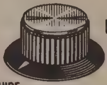


Series	A +.030 −.010	B min.	C min.	D max.	E min.	F ±.030	F1 ±.030
50	.500	.435	.026	.158	.405	.510	—
70	.700	.485	.026	.187	.405	.610	.590
90	.900	.640	.114	.260	.520	.790	.735
125	1.250	.750	.114	.260	.455	.700	.620
175	1.750	.750	.114	.260	.520	.850	—
225	2.250	.750	.114	.260	.520	.875	—

ROUND/ DIAL SKIRT



Standard

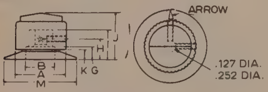


Designer

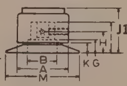
SELECTION GUIDE

Knob Dia. (Appx.)	Dial Skirt Dia. (Appx.)	Shaft Dia.	Knob Hght. (Appx.)	Dimension Dwg. Ref.	Stocked Catalog Numbers		
					Standard Pointer Arrow		Designer Pointer Arrow
					Black	Black Matte Back Lighted Arrow	Black
1/2"	1"	1/8"	5/8"	Series 50	50-3-1	50-3BL-1G	—
3/4"	1-1/8"	1/8"	3/4"	Series 70	70-3-1	—	DS70-3-1
3/4"	1-1/8"	1/4"	3/4"	Series 70	70-3-2	70-3BL-2G	DS70-3-2
1"	1-1/2"	1/8"	1"	Series 90	90-3-1G	—	—
1"	1-1/2"	1/4"	1"	Series 90	90-3-2	90-3BL-2G	DS90-3-2
1-1/4"	1-7/8"	1/4"	3/4"-7/8"	Series 125	125-3-2	125-3BL-2G	DS125-3-2
1-3/4"	2-1/2"	1/4"	1"	Series 175	175-3-2	175-3BL-2G	—
2-1/4"	3"	1/4"	1"	Series 225	225-3-2	—	—

Standard

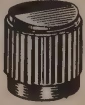


Designer

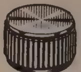


Series	A +.030 −.010	B min.	G min.	H max.	I min.	J ±.030	J1 ±.030	K max.*	M max.
50	.500	.435	.177	.325	.560	.655	—	.175	.900
70	.700	.485	.188	.369	.568	.782	.780	.187	1.150
90	.900	.640	.320	.484	.730	1.010	.980	.235	1.525
125	1.250	.750	.250	.427	.605	.850	.785	.175	1.837
175	1.750	.750	.320	.489	.740	1.070	—	.240	2.468
225	2.250	.750	.320	.489	.740	1.095	—	.240	3.020

ROUND/RING SKIRT



Standard

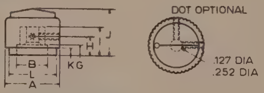


Designer

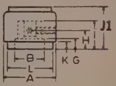
SELECTION GUIDE

Knob Dia. (Appx.)	Shaft Dia.	Knob Height (Appx.)	Dimension Dwg. Ref.	Stocked Catalog Numbers			
				Standard		Designer	
				Black Plain	White Dot	Black Plain	Black Dot
1/2"	1/8"	5/8"	Series 50	50-2-1	50-2WD-1	—	—
3/4"	1/8"	3/4"	Series 70	70-2-1	70-2WD-1	DS70-2-1	DS70-2BD-1
3/4"	1/4"	3/4"	Series 70	70-2-2	70-2WD-2	DS70-2-2	DS70-2BD-2
1"	1/8"	1"	Series 90	90-2-1G	—	—	—
1"	1/4"	1"	Series 90	90-2-2	90-2WD-2	DS90-2-2	DS90-2BD-2
1-1/4"	1/4"	3/4"-7/8"	Series 125	125-2-2	—	DS125-2-2	—
1-3/4"	1/4"	1"	Series 175	175-2-2	—	—	—
2-1/4"	1/4"	1"	Series 225	225-2-2	—	—	—

Standard



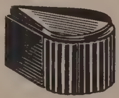
Designer



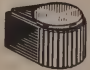
Series	A +.030 −.010	B min.	H max.	I min.	J ±.030	J1 ±.030	K max.	L max.
50	.500	.435	.325	.560	.655	—	.175	.460
70	.700	.485	.369	.568	.782	.780	.187	.680
90	.900	.640	.484	.730	1.010	.980	.235	.845
125	1.250	.750	.427	.605	.850	.785	.175	1.185
175	1.750	.750	.489	.740	1.070	—	.240	1.690
225	2.250	.750	.489	.740	1.095	—	.240	2.185

Note: Two set screws are provided.

POINTER



Standard

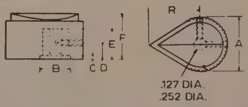


Designer

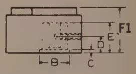
SELECTION GUIDE

Knob Dia. (Appx.)	Pointer Radius (Appx.)	Shaft Dia.	Knob Hght. (Appx.)	Dimension Dwg. Ref.	Stocked Catalog Numbers	
					Standard	Designer
					Black	Black
1/2"	1/2"	1/8"	1/2"	Series 50	50-4-1	—
3/4"	5/8"	1/8"	5/8"	Series 70	70-4-1	—
3/4"	5/8"	1/4"	5/8"	Series 70	70-4-2	DS70-4-2
1"	7/8"	1/8"	1"	Series 90	90-4-1G	—
1"	7/8"	1/4"	1"	Series 90	90-4-2	DS90-4-2

Standard



Designer



Series	A +.030 −.010	B min.	C min.	D max.	E min.	F ±.030	F1 ±.030	R +.025 −.005
50	.500	.435	.026	.158	.405	.510	—	.490
70	.700	.485	.026	.187	.405	.610	.590	.680
90	.900	.640	.114	.260	.520	.790	.735	.885

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RAYTHEON CONTROL KNOBS/STANDARD & DESIGNER SERIES

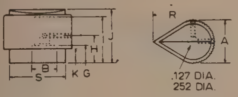
POINTER/RING SKIRT

Standard
Designer

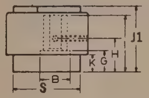
SELECTION GUIDE

Knob Dia. (Appx.)	Pointer Radius (Appx.)	Shaft Dia.	Knob Hght. (Appx.)	Dimension Dwg. Ref.	Stocked Catalog Numbers Standard Black	Stocked Catalog Numbers Designer Black
1/2"	1/2"	1/8"	1/2"	Series 50	50-5-1	—
3/4"	5/8"	1/8"	5/8"	Series 70	70-5-1	DS70-5-1
3/4"	5/8"	1/4"	5/8"	Series 70	70-5-2	—
1"	7/8"	1/8"	1"	Series 90	—	—
1"	7/8"	1/4"	1"	Series 90	90-5-2	DS90-5-2

Standard


R
A
J
H
I
B
S
K G
.127 DIA.
252 DIA.

Designer



Series	A +.030 −.010	B min.	G min.	H max.	I min.	J ±.030	J1 ±.030	K max.	R +.025 −.005	S max.
50	.500	.435	.177	.325	.560	.655	—	.175	.490	.690
70	.700	.485	.188	.369	.568	.782	.765	.187	.680	1.000
90	.900	.640	.320	.484	.730	1.010	.970	.235	.885	1.345

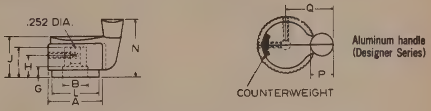
Note: Two set screws are provided.

CRANK

Standard
Designer

Knob Dia. (Appx.)	Crank Radius (Appx.)	Shaft Dia.	Crank Hght. (Appx.)	Dimension Dwg. Ref.	Stocked Catalog Numbers Standard Black	Stocked Catalog Numbers Designer Black
1-1/4"	1-1/8"	1/4"	1-3/8"	Series 125	125-6-2	DS125-6-2
1-3/4"	1-1/2"	1/4"	1-3/4"	Series 175	175-6-2	DS175-6-2G
2-1/4"	1-3/4"	1/4"	1-3/4"	Series 225	225-6-2	—

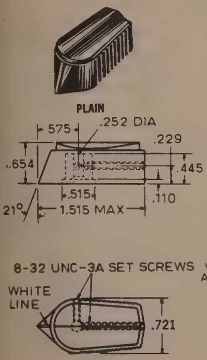
Standard and Designer

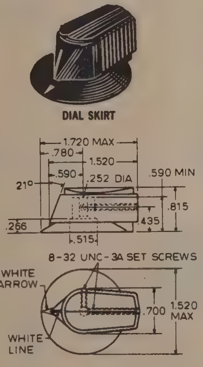

.252 DIA.
N
J
H
I
G
B
L
A
Q
P
COUNTERWEIGHT
Aluminum handle
(Designer Series)

Series	A +.030 −.010	B min.	H max.	I min.	J ±.030	L max.	N ±.050	P ±.025	Q max.
125	1.250	.750	.427	.605	.850	1.185	1.350	.580	1.133
175	1.750	.750	.489	.740	1.070	1.690	1.758	.780	1.527
225	2.250	.750	.489	.740	1.095	2.185	1.782	.780	1.777

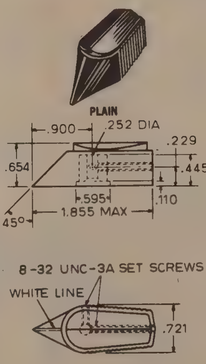
BAR POINTERS/STANDARD SERIES

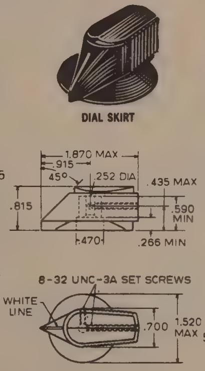
1-1/2" BAR—70 SERIES


PLAIN
.575
.252 DIA
.229
.654
.445
.515
.110
21°
1.515 MAX
8-32 UNC-3A SET SCREWS
WHITE LINE
.721

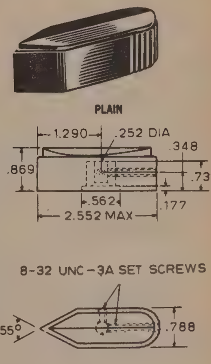

DIAL SKIRT
1.720 MAX
.780
1.520
.590
.252 DIA
21°
.590 MIN
.815
.435
.266
.515
8-32 UNC-3A SET SCREWS
WHITE ARROW
WHITE LINE
.700
1.520 MAX

1-7/8" BAR—90 SERIES


PLAIN
.900
.252 DIA
.229
.654
.445
.595
.110
45°
1.855 MAX
8-32 UNC-3A SET SCREWS
WHITE LINE
.721


DIAL SKIRT
1.870 MAX
.915
45°
.252 DIA
.435 MAX
.815
.590 MIN
.470
.266 MIN
8-32 UNC-3A SET SCREWS
WHITE LINE
.700
1.520 MAX

2-1/2" BAR—125 SERIES


PLAIN
1.290
.252 DIA
.348
.869
.739
.562
.177
2.552 MAX
8-32 UNC-3A SET SCREWS
55°
.788

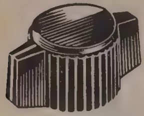
Bar Lgth. (Appx.)	Shaft Dia.	Bar Wdth. (Appx.)	Style	Stocked Catalog Numbers Plain Black	Stocked Catalog Numbers Plain With White Line Black	Stocked Catalog Numbers Plain With White Line *Gray	Stocked Catalog Numbers Dial Skirt With White Line Black	Stocked Catalog Numbers Dial Skirt With White Line Gray
1-1/2"	1/4"	3/4"	Series 70	—	70-7WL-2	G70-7WL-2G	70-8WL-2	G70-8WL-2
1-7/8"	1/4"	3/4"	Series 90	—	90-7WL-2	G90-7WL-2G	90-8WL-2	*G90-8WL-2G
2-1/2"	1/4"	3/4"	Series 125	125-7-2	—	—	—	—

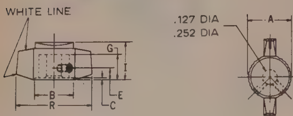
*Matte Finish

RAYTHEON CONTROL KNOBS/STANDARD & DESIGNER SERIES

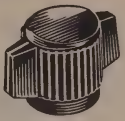
BAR KNOBS—STANDARD SERIES

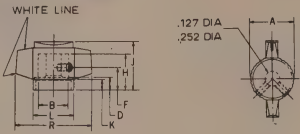
ROUND



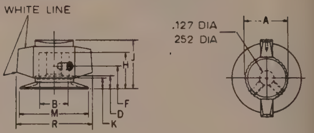

WHITE LINE
.127 DIA
.252 DIA
A
G
I
B
R
E
C

RING SKIRT




WHITE LINE
.127 DIA
.252 DIA
A
J
H
B
L
R
F
D
K

DIAL SKIRT


WHITE LINE
.127 DIA
252 DIA
A
J
H
B
M
R
F
D
K

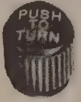
A +.030 −.010	.700	H min.	.568
B min.	.485	I ±.030	.610
C min.	.026	J ±.030	.782
D min.	.188	K max.	.187
E max.	.187	L max.	.680
F max.	.369	M max.	1.150
G min.	.405	R ±.025	1.150

SELECTION GUIDE

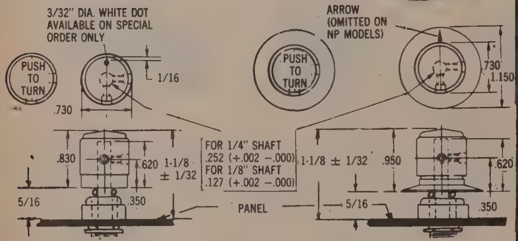
Knob Dia. (Appx.)	Bar Lgth. (Appx.)	Shaft Dia.	Knob Hght. (Appx.)	Stocked Catalog Numbers		
				Black with White Line		
				Round	Ring Skirt	Dial Skirt
3/4"	1-1/8"	1/8"	3/4"	—	—	70B-3-1
3/4"	1-1/8"	1/4"	3/4"	—	70B-2-2	70B-3-2
3/4"	1-1/8"	1/4"	5/8"	70B-1-2	—	—

PUSH TO ENGAGE DEVICES—STANDARD SERIES

ROUND—RING SKIRT



ROUND—DIAL SKIRT


3/32" DIA. WHITE DOT AVAILABLE ON SPECIAL ORDER ONLY
PUSH TO TURN
1/16
.730
ARROW (OMITTED ON NP MODELS)
PUSH TO TURN
.730
1.150
.830
.620
1-1/8 ± 1/32
FOR 1/4" SHAFT .252 (+.002 −.000)
FOR 1/8" SHAFT .127 (+.002 −.000)
1-1/8 ± 1/32
.950
.620
5/16
.350
PANEL
5/16
.350

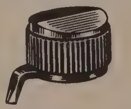
SELECTION GUIDE

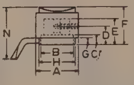
Push to Engage Devices			Stocked Catalog Numbers			
			Round-Ring Skirt		Round-Dial Skirt	
Knob Dia. (Appx.)	Shaft Dia.	Series No.	Gray*	Black*	Gray with Arrow*	Black with Arrow*
3/4"	1/8"	70	PTEG70-2-1	PTE70-2-1	—	PTE70-3-1
3/4"	1/4"	70	PTEG70-2-2	PTE70-2-2	PTEG70-3-2	PTE70-3-2

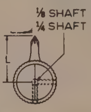
*Numbers shown are for mirror finish. Add suffix G for matte (dull) finish.

KNOB LOCKS—STANDARD SERIES

POINTER






⅛ SHAFT
¼ SHAFT
L

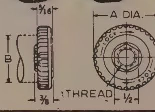
KNOB LOCK POINTER DIMENSIONS

Series	A +.030 −.010	B min.	C min.	D max.	E min.	F ±.030	G max.	H max.	L max.	N max.
70	.700	.560	.188	.369	.568	.782	.187	.680	.812	1.154
90	.905	.640	.320	.437	.680	.958	.235	.845	.968	1.310
125	1.250	1.000	.250	.442	.605	.862	.175	1.185	1.125	1.215

SELECTION GUIDE KNOB LOCK POINTER

Knob Dia. (Appx.)	Shaft Dia.	Dimension Dwg. Series	Stocked Catalog No.
			Knob Lock Pointer
			Black
3/4"	1/4"	70	50-1LK-2
1"	1/4"	90	90-1LK-2
1-1/4"	1/4"	125	125-1LK-2

KNOB LOCK


5/16
A DIA.
B
⅜
THREAD
½

KNOB LOCK DIMENSIONS

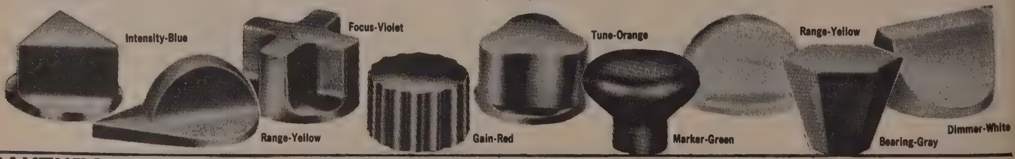
Series	A	B
70	1	.721
90	1-5/16	.928
125	1-5/8	1.269

SELECTION GUIDE KNOB LOCKS

Knob Dia. (Appx.)	Thread	Dimension Series No.	Stocked Catalog Numbers	
			Knob Locks	
			Black Standard	Splash Proof
3/4"	3/8-32	70	KL701	KL703
3/4"	1/4-32	70	KL702	—
1"	3/8-32	90	KL901	KL902
1-1/4"	3/8-32	125	KL1251	KL1252

TACTILE KNOBS

These tactile-shaped and colored tops may be combined with all knob styles except bar pointer.


Intensity-Blue
Focus-Violet
Tune-Orange
Range-Yellow
Range-Yellow
Gain-Red
Marker-Green
Bearing-Gray
Dimmer-White

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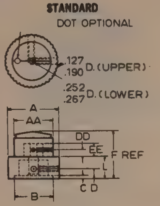
RAYTHEON CONTROL KNOBS/STANDARD & DESIGNER SERIES

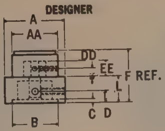
CONCENTRIC KNOBS

ROUND—ROUND

Standard

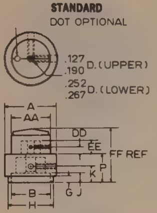

STANDARD
DOT OPTIONAL
.127
.190 D. (UPPER)
.252
.267 D. (LOWER)
A
AA
DD
EE
F REF
L
C D
B

Designer

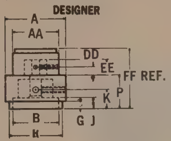

DESIGNER
A
AA
DD
EE
F REF.
L
C D
B

ROUND—RING SKIRT

Standard

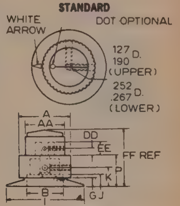

STANDARD
DOT OPTIONAL
.127
.190 D. (UPPER)
.252
.267 D. (LOWER)
A
AA
DD
EE
FF REF
P
K
G J
B
H

Designer

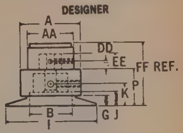

DESIGNER
A
AA
DD
EE
FF REF.
P
K
G J
B
H

ROUND—DIAL SKIRT

Standard

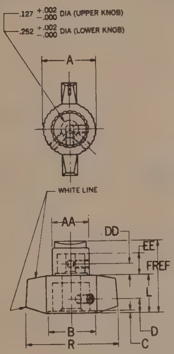

WHITE ARROW
STANDARD
DOT OPTIONAL
.127
.190 D. (UPPER)
.252
.267 D. (LOWER)
A
AA
DD
EE
FF REF
P
K
G J
B
I

Designer


DESIGNER
A
AA
DD
EE
FF REF.
P
K
G J
B
I

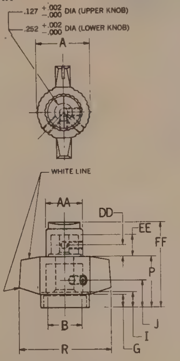
ROUND—ROUND BAR

Standard


.127 +.002 −.000 DIA (UPPER KNOB)
.252 +.002 −.000 DIA (LOWER KNOB)
A
WHITE LINE
AA
DD
EE
F REF
L
B
R
D
C

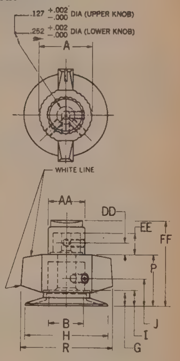
ROUND—RING SKIRT BAR

Standard


.127 +.002 −.000 DIA (UPPER KNOB)
.252 +.002 −.000 DIA (LOWER KNOB)
A
WHITE LINE
AA
DD
EE
FF
P
J
I
B
R
G

ROUND—DIAL SKIRT BAR

Standard


.127 +.002 −.000 DIA (UPPER KNOB)
.252 +.002 −.000 DIA (LOWER KNOB)
A
WHITE LINE
AA
DD
EE
FF
P
J
I
B
H
R
G

DIMENSIONS FOR ALL CONCENTRICS

Standard and Designer Series	A +.030 −.010	AA +.030 −.010	B min.	C min.	D max.	DD max.	EE min.	F ref.	FF ref.	G max.	H max.	I max.	J max.	K max.	L ±.015	P ±.025	R ±.025
50/70	.700	.500	.485	.026	.187	.158	.405	1.065	1.255	.187	.680	1.150	.188	.369	.510	.690	1.150
70/90	.900	.700	.640	.114	.260	.187	.405	1.310	1.550	.235	.845	1.525	.320	.484	.655	.885	—
90/125	1.250	.900	.750	.114	.260	.260	.520	1.365	1.545	.175	1.185	1.837	.250	.427	.530	.700	—

SELECTION GUIDE ROUND TYPES ONLY

Knob Dia's. Upper/Lower (Approx.)	Shaft Dia's. Upper/Lower	Knob Color Upper/Lower	Style Series	Stocked Catalog Numbers — Concentric Styles — Round—Round Upper/Lower	Round—Ring Skirt Upper/Lower	Round Dial Skirt Upper/Lower
STANDARD SERIES ROUND TYPES ONLY						
1/2"/3/4"	1/8"/1/4"	Black/Black	50/70	—	—	50-1-1/70-3CB-2
1/2"/3/4"	1/8"/1/4"	Black White Dot/Black	50/70	—	—	50-1WD-1/70-3CB-2
3/4"/1"	1/8"/1/4"	Black/Black	70/90	70-1-1/90-1CB-2	70-1-1/90-2CB-2	70-1-1/90-3CB-2
3/4"/1"	1/8"/1/4"	Black White Dot/Black	70/90	70-1WD-1/90-1CB-2	70-1WD-1/90-2CB-2	70-1WD-1/90-3CB-2
3/4"/1"	3/16"/.267	Black/Black	70/90	70-1-3/90-1CB-4	—	70-1-3/90-3CB-4
1"/1.25"	3/16"/1/4"	Black/Black	90/125	—	—	90-1-3/125-3CB-2
DESIGNER SERIES ROUND TYPES ONLY						
3/4"/1"	1/8"/1/4"	Alum./Black	70/90	DS70-1-1/90-1CB-2	DS70-1-1/90-2CB-2	DS70-1-1/90-3CB-2
3/4"/1"	1/8"/1/4"	Alum. Black Dot/Black	70/90	DS70-1BD-1/90-1CB-2	DS70-1BD-1/90-2CB-2	DS70-1BD-1/90-3CB-2
3/4"/1"	3/16"/.267	Alum./Black	70/90	DS70-1-3/90-1CB-4	—	DS70-1-3/90-3CB-4
3/4"/1"	3/16"/.267	Alum. Black Dot/Black	70/90	—	—	—
1"/1.25"	1/8"/1/4"	Alum. Black Dot/Black	90/125	—	—	DS90-1BD-1/125-3CB-2
1"/1.25"	3/16"/1/4"	Alum./Black	90/125	—	—	DS90-1-3/125-3CB-2
STANDARD SERIES BAR TYPES ONLY						
1/2"/3/4"	1/8"/1/4"	Black/Black White Line	50/70	50-1-1/70B-1CB-2	50-1-1/70B-2CB-2	50-1-1/70B-3CB-2

RAYTHEON CONTROL KNOBS/REGENCY SERIES

ROUND

RS

CUPPED

RSF

FLAT

ROUND/RING SKIRT

RS

CUPPED

RSF

FLAT

ROUND/DIAL SKIRT

RS

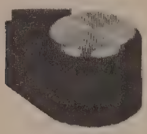
CUPPED

RSF

FLAT

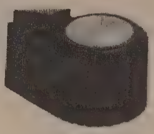
POINTER

RS



CUPPED

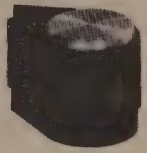
RSF



FLAT

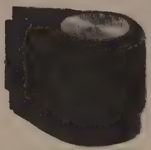
POINTER/RING SKIRT

RS



CUPPED

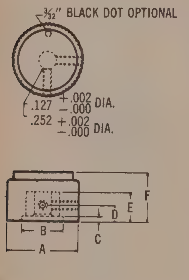
RSF



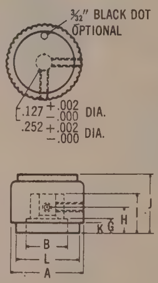
FLAT

DIMENSIONS REGENCY SERIES

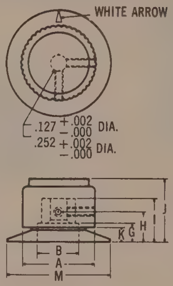
ROUND



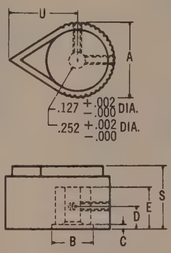
ROUND/RING SKIRT



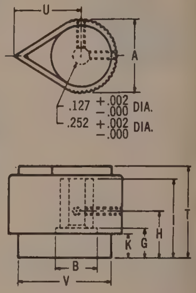
ROUND/DIAL SKIRT



POINTER



POINTER/RING SKIRT



SPECIFICATIONS FOR ALL SERIES

STANDARD SERIES

A. Material and performance per MIL-K-3926
B. Dimensions per MS91528
C. Colors per FED-STD-595. Black No. 37038 (matte); 17038 (mirror). Gray No. 36231 (matte); 16231 (Mirror).
D. Moisture Resistance: 10 days, method 106 of MIL-STD-202.
E. Salt Spray: 48 hours, method 101, Cond. B of MIL-STD-202.
F. Temperature: −65° to +125°C.
G. Torque: 15 pound inches with 4-40 set screws, maximum diameter ¾" 30 lb. inches with 8-32 set screw and larger diameters.
H. Set Screws: Corrosion treated steel with hex heads, cup points. Fluted socket and stainless steel types available.
J. Flammability: self extinguishing.

DESIGNER SERIES

Moisture Resistance: 10 days
Temperature: −65°C to +125°C
Torque: 15 pound inches with 4-40 set screws, maximum diameter ¾", 30 lb. inches with 8-32 set screw and larger diameters.
Set Screws: Corrosion treated steel with hex heads, cup points. Fluted socket and stainless steel types available.

REGENCY SERIES

Molded parts in accordance with MIL-K-3926.
Color per FED-STD-595.
Black number 37038 (MATTE), 10738 (MIRROR).
Flammability: self extinguishing.
Set screws: per FFS200, corrosion-treated steel with hex heads and cup points.

NOTES:

Standard Series

(a) Two set screws are provided
4-40 UNC-3A on all 50 & 70 series and all 1/8" shaft models
8-32 UNC-3A on all others
(b) Custom skirt or body marking available on special order.
(c) Some sizes available from stock in gray or red. Other colors on special order
(d) Reducing bushings available to reduce 1/4" shaft to 1/8" or 3/16" (RB-100=1/8") (RB-200=3/16")

Designer Series

(a) Two set screws are provided:
4-40 UNC-3A on all 70 series and 1/8" shaft models
8-32 UNC-3A on all others

400 and Panelrama Series

(a) Two set screws are provided:
4-40 UNC-3A on all 1/8" shaft models
6-32 UNC-3A on all others

Regency Series

(a) Two set screws are provided:
4-40 UNC-3A on all 1/8" shaft models
8-32 UNC-3A on 1/4" shaft models.

RAYTHEON COMPANY • DISTRIBUTOR PRODUCTS OPERATION
Fourth Avenue, Burlington, Massachusetts 01803 Tel.: (617) 272-6400 TWX: 710-332-7641

RAYTHEON

CONTROL KNOBS/REGENCY SERIES

DIMENSIONS

Series	A +.030 −.010	B min.	C min.	D max.	E min.	F ±.030	G min.	H max.	I min.	J ±.030	K max.	L max.	M ±.050	S ±.030	T ±.030	U +.025 −.005	V max.
RS/RSF50	.500	.300	.026	.158	.405	.470	.177	.325	.560	.625	.175	.460	.900	—	—	—	—
RS/RSF70	.700	.485	.026	.187	.405	.590	.188	.369	.568	.780	.187	.680	1.150	.590	.765	.680	1.000
RS/RSF90	.900	.640	.114	.260	.520	.735	.320	.484	.730	.980	.235	.845	1.525	.735	.970	.885	1.345
RS/RSF125	1.250	.750	.114	.260	.455	..620	.250	.427	.605	.785	.175	1.185	1.837	—	—	—	—

*RS70, RS90, RSF70 and RSF90 series knobs available with 0.127 hole for 1/8" shafts at slight additional cost.

Note: Two set screws are provided:
4-40 UNC-3A on all 50 & 70 Series and 1/8" shaft models
8-32 UNC-3A on all others

SELECTION GUIDE

STOCKED CATALOG NO.

Style	Finish		Knob Dia. (Inches Approx.)	*Shaft Dia. (Inches)	Knob Height (Inches Approx.)	Dial Skirt Dia. (Inches Approx.)	Pointer Radius (Inches Approx.)	Dimension Drawing Reference	Cupped RS Series			Flat RSF Series		
	Matte	Mirror							Plain	Black Dot	Black 1/2 Line	Plain	Black Dot	Black 1/2 Line
Round	—	X	1/2	1/8	1/2	—	—	50	—	—	—	RSF50-1-1	RSF50-1BD-1	RSF50-1BL-1
	X	—	1/2	1/8	1/2	—	—	50	—	—	—	RSF50-1-1G	RSF50-1BD-1G	RSF50-1BL-1G
	—	X	3/4	1/4	5/8	—	—	70	RS70-1-2	RS70-1BD-2	—	—	RSF70-1BD-2	RSF70-1BL-2
	X	—	3/4	1/4	5/8	—	—	70	RS70-1-2G	RS70-1BD-2G	—	—	RSF70-1BD-2G	RSF70-1BL-2G
	—	X	1	1/4	3/4	—	—	90	—	—	—	RSF90-1-2	RSF90-1BD-2	RSF90-1BL-2
	X	—	1	1/4	3/4	—	—	90	—	RS90-1BD-2G	—	RSF90-1-2G	RSF90-1BD-2G	RSF90-1BL-2G
	—	X	1-1/4	1/4	5/8	—	—	125	RS125-1-2	—	—	RSF-125-1-2	RSF125-1BD-2	—
	X	—	1-1/4	1/4	5/8	—	—	125	—	—	—	—	RSF125-1BD-2G	RSF125-1BL-2G
Round with Ring Skirt	—	X	1/2	1/8	5/8	—	—	50	—	RS50-2BD-1	—	RSF50-2-1	RSF50-2BD-1	RSF125-2BL-1
	X	—	1/2	1/8	5/8	—	—	50	RS50-2-1G	—	RS50-2BL-1G	—	RSF50-2BD-1G	RSF50-2BL-1G
	—	X	3/4	1/4	3/4	—	—	70	RS70-2-2	RS70-2BD-2	—	RSF70-2-2	RSF70-2BD-2	RSF70-2BL-2
	X	—	3/4	1/4	3/4	—	—	70	RS70-2-2G	RS70-2BD-2G	RS70-2BL-2G	RS70-2-2G	RSF70-2BD-2G	RSF70-2BL-2G
	—	X	1	1/4	1	—	—	90	RS90-2-2	—	—	RSF90-2-2	RSF90-2BD-2	RSF90-2BL-2
	X	—	1	1/4	1	—	—	90	—	—	—	RSF90-2-2G	RSF90-2BD-2G	RSF90-2BL-2G
	—	X	1-1/4	1/4	3/4	—	—	125	—	—	—	—	RSF125-2BD-2	—
	X	—	1-1/4	1/4	3/4	—	—	125	—	—	—	—	RSF125-2BD-2G	RSF125-2BL-2G
Round with Dial Skirt	—	X	1/2	1/8	5/8	1	—	50	RS50-3-1	—	—	RSF-50-3-1	—	—
	X	—	1/2	1/8	5/8	1	—	50	RS50-3-1G	—	—	RSF-50-3-1	—	—
	—	X	3/4	1/4	3/4	1-1/8	—	70	RS70-3-2	—	—	—	—	—
	X	—	3/4	1/4	3/4	1-1/8	—	70	RS70-3-2G	—	—	—	—	—
	—	X	1	1/4	1	1-1/2	—	90	RS90-3-2	—	—	RSF-90-3-2	—	—
	X	—	1	1/4	1	1-1/2	—	90	RS90-3-2G	—	—	RSF-90-3-2G	—	—
Pointer	—	X	3/4	1/4	1/2	—	5/8	70	RS70-4-2	—	—	RSF-70-4-2	—	—
	X	—	3/4	1/4	1/2	—	5/8	70	RS70-4-2G	—	—	RSF-70-4-2G	—	—
	—	X	1	1/4	3/4	—	7/8	90	—	—	—	RS—90-4-2	—	—
	X	—	1	1/4	3/4	—	7/8	90	RS90-4-2G	— —	—	RSF-90-4-2G	—	—
Pointer with Ring Skirt	—	X	3/4	1/4	3/4	—	5/8	70	RS70-5-2	—	—	RSF-70-5-2	—	—
	X	—	3/4	1/4	3/4	—	5/8	70	RS70-5-2G	—	—	RSF-70-5-2G	—	—
	—	X	1	1/4	1	—	7/8	90	RS90-5-2	—	—	RSF-90-5-2	—	—
	X	—	1	1/4	1	—	7/8	90	RS90-5-2G	—	—	RSF-90-5-2G	—	—

RAYTHEON CONTROL KNOBS/CONCENTRIC STYLES

ROUND—ROUND

CUPPED

FLAT

ROUND—RING SKIRT

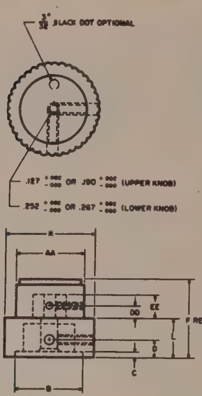
CUPPED

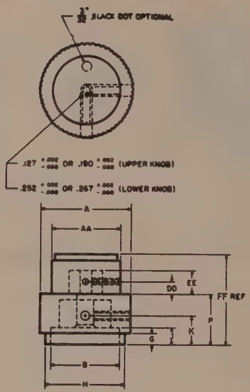
FLAT

ROUND—DIAL SKIRT

CUPPED

FLAT


3/32" BLACK DOT OPTIONAL
.127 +.002 −.000 OR .190 +.002 −.000 (UPPER KNOB)
.252 +.002 −.000 OR .267 +.002 −.000 (LOWER KNOB)
A
AA
EE
DD
F REF
L
D
C
B


3/32" BLACK DOT OPTIONAL
.127 +.002 −.000 OR .190 +.002 −.000 (UPPER KNOB)
.252 +.002 −.000 OR .267 +.002 −.000 (LOWER KNOB)
A
AA
EE
DD
FF REF
P
K
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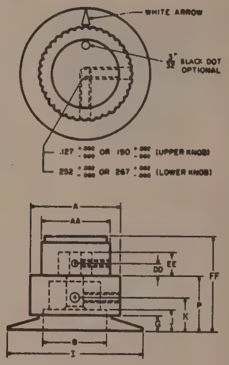
WHITE ARROW
3/32" BLACK DOT OPTIONAL
.127 +.002 −.000 OR .190 +.002 −.000 (UPPER KNOB)
.252 +.002 −.000 OR .267 +.002 −.000 (LOWER KNOB)
A
AA
EE
DD
FF
P
K
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I

EXPLANATION OF CATALOG DESIGNATIONS FOR CONCENTRIC KNOBS

Concentric knobs bear a dual designation, those at the left of the slash mark describe the upper round knob (1) the series, (2) the diameter, (3) the cap marking if any. The designations to the right of the slash mark describe for the lower concentric knob (1) the diameter, (2) the type, (3) the through shaft hole size and (4) the finish of both upper and lower knobs.

Note: Two set screws are provided:
4-40 UNC-3A on all 1/8" shaft models
8-32 UNC-3A on 1/4" shaft models

DIMENSIONS

Series	A +.030 −.010	AA +.030 −.010	B min.	C min.	D max.	DD max.	EE min.	F ref.	FF ref.	G max.	H max.	I min.	J max.	K max.	L ±.015	P ±.025
RS/RSF50/70	.700	.500	.485	.026	.187	.158	.405	.980	1.309	.187	.680	1.150	.188	.369	.510	.690
RS/RSF70/90	.900	.700	.640	.114	.260	.187	.405	1.310	1.550	.235	.845	1.525	.320	.484	.655	.885
RS/RSF90/125	1.250	.900	.750	.114	.260	.260	.520	1.365	1.545	.175	1.185	1.837	.250	.427	.530	.700

Style	Finish Upper and Lower		Knob Dia. (Inches Approx.)		Overall Height (Inches (Approx.)	Shaft Dia. (Inches)		Dial Skirt (Inches Approx.) Lower Only	Dimension Drawing Reference	STOCKED CATALOG NUMBERS					
										Cupped RS Series Upper Knob			Flat RSF Series Upper Knob		
	Matte	Mirror	Upper	Lower		Upper	Lower			Plain	Black Dot	Black 1/2 Line	Plain	Black Dot	Black 1/2 Line
Round Round	—	X	1/2	3/4	1	1/8	1/4	—	50/70	RS50/70-1-2	—	—	RSF50/70-1-2	—	—
	X	—	1/2	3/4	1	1/8	1/4	—	50/70	RS50/70-1-2G	RS50BD/70-1-2G	RS50BL/70-1-2G	RSF50/70-1-2G	RSF50BD/70-1-2G	RSF50BL/70-1-2G
	—	X	3/4	1	1-3/8	1/8	1/4	—	70/90	RS70/90-1-2	RS70BD/90-1-2	RS70BL/90-1-2	RSF70/90-1-2	RSF70BD/90-1-2	RSF70BL/90-1-2
	X	—	3/4	1	1-3/8	1/8	1—	—	70/90	RS70/90-1-2G	RS70BD/90-1-2G	RS70BL/90-1-2G	RSF70-90-1-2G	RSF70BD/90-1-2G	RSF70BL/90-1-2G
	—	X	1	1-1/4	1-3/8	1/8	1/4	—	90/125	RS90/125-1-2	RS90BD/125-1-2	RS90BL/125-1-2	RSF90/125-1-2	RSF90BD/125-1-2	RSF90BL/125-1-2
	X	—	1	1-1/4	1-3/8	1/8	1/4	—	90/125	RS90/125-1-2G	RS90BD/125-1-2G	RS90BL/125-1-2G	RSF90/125-1-2G	RSF90BD/125-1-2G	RSF90BL/125-1-2G
Round Ring Skirt	—	X	1/2	3/4	1-1/4	1/8	1/4	—	50/70	RS50/70-2-2	—	RS50BL/70-2-2	RSF50/70-2-2	RSF50BD/70-2-2	RSF50BL/70-2-2
	X	—	1/2	3/4	1-1/4	1/8	1/4	—	50/70	RS50/70-2-2G	RS50BD/70-2-2G	RS50BL/70-2-2G	RSF50/70-2-2G	RSF40BD/70-2-2G	RSF50BL/70-2-2G
	—	X	3/4	1	1-1/2	1/8	1/4	—	70/90	RS70/90-2-2	RS70BD/90-2-2	RS70BL/90-2-2	RSF70/90-2-2	RSF70BD/90-2-2	RSF70BL/90-2-2
	X	—	3/4	1	1-1/2	1/8	1/4	—	70/90	RS70/90-2-2G	RS70BD/90-2-2G	RS70BL/90-2-2G	RSF70/90-2-2G	RSF70BD/90-2-2G	RSF70BL/90-2-2G
	—	X	1	1-1/4	1-1/2	1/8	1/4	—	90/125	RS90/125-2-2	RS90BD/125-2-2	RS90BL/125-2-2	RSF90/125-2-2	RSF90BD/125-2-2	RSF90BL/125-2-2
	X	—	1	1-1/4	1-1/2	1/8	1/4	—	90/125	RS90/125-2-2G	RS90BD/125-2-2G	RS90BL/125-2-2G	RSF90/125-2-2G	RSF90BD/125-2-2G	RSF90BL/125-2-2G
Round Dial Skirt	—	X	1/2	3/4	1-3/8	1/8	1/4	1-1/8	50/70	—	—	—	RSF50/70-3-2	RSF50BD/70-3-3	RSF50BL/70-3-2
	X	—	1/2	3/4	1-3/8	1/8	1/4	1-1/8	50/70	RS50/70-3-2G	RS50BD/70-3-2G	RS50BL/70-3-2G	RSF50/70-3-2G	RSF50BD/70-3-2G	RSF50BL/70-3-2G
	—	X	3/4	1	1-1/2	1/8	1/4	1-1/2	70/90	RS70/90-3-2	RS70BD/90-3-2	RS70BL/90-3-2	RSF70/90-3-2	RSF70BD/90-3-2	RSF70BL/90-3-2
	X	—	3/4	1	1-1/2	1/8	1/4	1-1/2	70/90	RS70/90-3-2G	RS70BD/90-3-2G	RS70BL/90-3-2G	RSF70/90-3-2G	RSF70BD/90-3-2G	RSF70BL/90-3-2G
	—	X	1	1-1/4	1-1/2	1/8	1/4	1-7/8	90/125	RS90/125-3-2	RS90BD/125-3-2	RS90BL/125-3-2	RSF90/125-3-2	RSF90BD/125-3-2	RSF90BL/125-3-2
	X	—	1	1-1/4	1-1/2	1/8	1/4	1-7/8	90/125	RS90-125-3-2G	RS90BD/125-3-2G	RS90BL/125-3-2G	RSF90/125-3-2G	RSF90BD/125-3-2G	RSF90BL/125-3-2G

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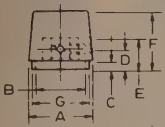
Fourth Avenue, Burlington, Massachusetts 01803 Tel.: (617) 272-6400 TWX: 710-332-7641

RAYTHEON CONTROL KNOBS/400 & PANELRAMA SERIES

ROUND

400 SERIES

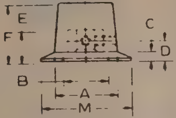
PANELRAMA



ROUND/DIAL SKIRT

400 SERIES

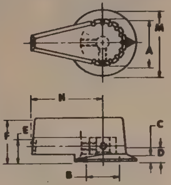
PANELRAMA



POINTER/DIAL SKIRT

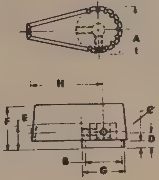
400 SERIES

PANELRAMA



POINTER

400 SERIES



DIMENSIONS 400 SERIES AND PANELRAMA

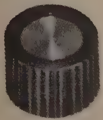
Series No.		A	B	C	D	E	F	G	H	J	K	M
400 Series	Panel Rama	+.025 −.005	min.	min.	max.	min.	±.030	max.	max.	max.	max.	max.
—	PS6	.625	.458	.120	.290	.625	.813	.558	.910	—	—	.925
407	PS7	.720	.520	.120	.290	.625	.813	.640	1.120	—	—	1.050
409	—	.875	.660	.120	.290	.625	.813	.800	1.375	1.540	.500	1.270
412	PS12	1.250	1.041	.120	.290	.625	.813	1.170	2.000	1.540	.500	1.710

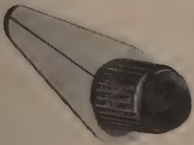
SELECTION GUIDE 400 SERIES AND PANELRAMA

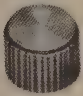
Knob Dia. Panel End (Appx.)	Shaft Size	Knob Hght. (Appx.)	Dial Skirt Dia. (Appx.)	Pointer Radius (Appx.)	Dimension Series Ref.	STOCKED CATALOG NUMBERS												
						Round				Round/Dial Skirt				Pointer/Dial Skirt			Pointer	
						400 Series			Panelrama	400 Series			Panelrama	400 Series		Panelrama	400 Series	
						Black	Beige	Blue Gray	Black	Black	Beige	Blue Gray	Black	Black	Beige	Black	Black	Beige
5/8"	1/4"	13/16"	1"	—	PS6	—	—	—	—	—	—	—	PS6D2K1R	—	—	—	—	—
3/4"	1/8"	13/16"	1"	—	407	407R1K1	—	—	—	407D1K1	—	—	—	—	—	—	—	—
3/4"	1/4"	13/16"	1-1/16"	1-1/8"	PS7/407	407R2K1	407R2K3	407R1K7	PS7R2K1R	407D2K1	407D2K3	407D2K7	PS7D2K1R	407PD2K1	407PD2K3	PS7PD2K1R	407P2K1	—
7/8"	1/4"	13/16"	1-1/4"	1-3/8"	409	409R2K1	409R2K3	—	—	409D2K1	409D2K3	—	—	409PD2K1	409PD2K3	—	409P2K1	—
1-1/4"	1/4"	13/16"	1-11/16"	2"	PS12/412	412R2K1	412R2K3	—	—	412D2K1	412D2K3	—	PS12DK1R	412PD2K1	—	—	412P2K1	412P2K3

CUSTOM CONTROL KNOBS

Increase the sales appeal of your equipment by coordinating its front panel design. Control Knobs don't have to be just functional "add-on" accessories; you can design your knobs to enhance the appearance of panels and instruments. Raytheon has the experience and technical know-how in metalizing, machine tooling, molding, engraving, hot stamping and photo screening. Our product specialist will assist you in your design efforts by selecting the exact color, size, shape and materials to fully satisfy your requirements.







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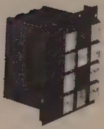
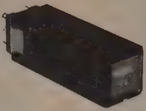
Product Selection Guide

STACOSWITCH
a STACO, INC. company

1139 BAKER STREET, COSTA MESA, CALIF. 92626
(714) 549-3041 TWX: 910/595-1507

PANEL COMPONENTS (EXCLUDING LIGHTING & DISPLAYS)



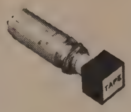
DISPLAY
STACOSWITCH


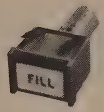
STACOSWITCH

MODEL
25
SQUARE

	SERIES 1M PUSHBUTTON SWITCH MATRIX SYSTEM	SERIES 1MR PUSHBUTTON SWITCH MATRIX SYSTEM	SERIES 40 PUSHBUTTON SWITCH INDICATOR	SERIES 40R PUSHBUTTON SWITCH INDICATOR	SERIES 2/S PUSHBUTTON SWITCH INDICATOR
PUSHBUTTON SHAPE					
Round	—	—	—	—	—
Square	X	—	X	—	X
Rectangular	—	X	—	X	—
MOUNTING					
Matrix	X	X	—	—	—
Clamping Bezel	—	—	X	X	X
Snap-in	—	—	—	—	—
Bushing	—	—	—	—	—
DISPLAY SCREEN					
Visible Message	X	X	X	X	X
Concealed Message	X	X	X	X	X
Full Display	X	X	X	X	X
Split Horz./Vertical	X	X	X	X	X
Split 3-way	X	X	X	X	X
Split 4-way	X	X	X	X	X
MECHANICAL ACTION					
Alternate	X	X	X	X	X
Momentary	X	X	X	X	X
Magnetic Held Momentary	X	—	X	—	—
Mechanical Latchdown	X	—	X	—	—
Indicator Light Only	X	X	X	X	X
CIRCUIT					
6PDT	—	—	—	—	—
4PDT	X	X	X	X	X
2PDT	X	X	X	X	X
SPDT	—	—	—	—	—
2 Circuit	—	—	—	—	—
Illuminated	X	X	X	X	X
Unlighted	—	—	—	—	—
ELECTRICAL					
Contact Load	28 VDC/115 VAC	28 VDC/115 VAC	28 VDC/115 VAC	28 VDC/115 VAC	28 VDC/115 VAC
Resistive	2 amps	2 amps	2 amps	2 amps	5 amps
Lamp	.75 amps	.75 amps	.75 amps	.75 amps	.75 amps
DIMENSIONS					
Depth Behind Panel Front	2.81/3.31	2.81/3.31	2.65-3.11	2.65	2.65
Mounting Centers	.775	.775 x 1.025	.805/.875	1.125 x .875	.875

MODEL
2R
RECTANGULAR



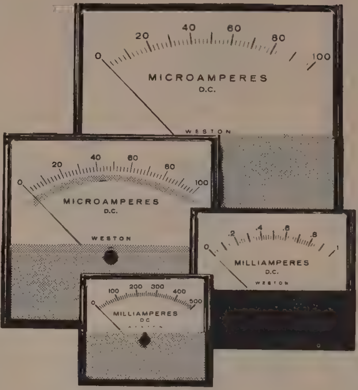


For more information on variable transformers and variable isolation transformers, see our pages in the Transformers section, pages 2•1808, 2•1809.

SERIES 2/R PUSHBUTTON SWITCH INDICATOR	SERIES C1 PUSHBUTTON SWITCH INDICATOR	SERIES C3 PUSHBUTTON SWITCH	SERIES C6 PUSHBUTTON SWITCH INDICATOR	SERIES C6P PUSHBUTTON SWITCH INDICATOR	SERIES 30 PUSHBUTTON SWITCH	SERIES 60/70 PUSHBUTTON SWITCH INDICATOR
—	—	X	X	X	X	X
—	X	—	X	X	—	X
X	—	—	X	X	—	X
—	—	—	—	—	—	—
X	—	—	—	—	—	—
—	X	—	—	X	—	—
—	—	X	X	—	X	X
X	X	—	X	X	—	X
X	—	—	—	—	—	—
X	X	—	X	X	—	X
X	—	—	—	—	—	—
X	—	—	—	—	—	—
X	—	—	—	—	—	—
X	X	X	X	X	X	X
X	X	X	X	X	X	X
—	—	—	—	—	—	—
—	—	—	—	—	—	—
X	X	—	X	X	—	X
—	—	—	—	—	X	X
X	—	—	—	—	—	—
X	X	X	X	X	X	X
—	X	X	X	X	X	X
—	—	X	X	—	X	X
X	X	—	X	X	—	X
—	—	X	—	—	X	—
28 VDC/115 VAC 5 amps .75 amps	28 VDC/115 VAC 2 amps 1 amp	28 VDC/115 VAC 3 amps 1 amp	28 VDC/115 VAC 3 amps 1 amp	28 VDC/115 VAC 3 amps 1 amp	28 VDC/115 VAC 3 amps 1 amp	28 VDC/115 VAC 3 amps 60 - 1 amp 70 - .75 amp
2.65	2.28	1.13	1.40	2.39	1.16/1.25	1.30/1.41
1.125 x .875	1.00	.625/.880	.635-1.125	.865-1.35	.880/1.00	.630/.990

WESTON®

2000 Series Panel Meters


0
20
40
60
80
100
MICROAMPERES
D.C.
WESTON
0
20
40
60
80
100
MICROAMPERES
D.C.
WESTON
0
.2
.4
.6
.8
1
MILLIAMPERES
D.C.
WESTON
0
100
200
300
400
500
MILLIAMPERES
D.C.

Specifications

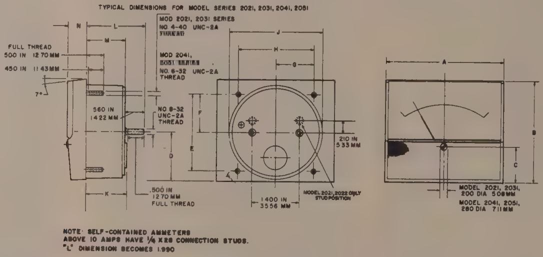
Size	Model	Function & Mechanism	Accuracy (% Full Scale)	Scale Length	Pointer	Type*** Scale
2½"	2021 2022	DC—CORMAG® AC RECT.—CORMAG®	2% 3%*	2.13" 2.13"	Knife-Edge Knife-Edge	Plain Plain
3½"	2031 2032	DC—CORMAG® AC RECT.—CORMAG®	2%** 3%*	2.7" 2.7"	Knife-Edge Knife-Edge	Plain Plain
4½"	2041 2042	DC—CORMAG® AC RECT.—CORMAG	2%** 3%*	3.7" 3.7"	Knife-Edge Knife-Edge	Plain Plain
5½"	2051 2052	DC—CORMAG® AC RECT.—CORMAG®	2%** 3%*	4.5" 4.5"	Knife-Edge Knife-Edge	Plain Plain

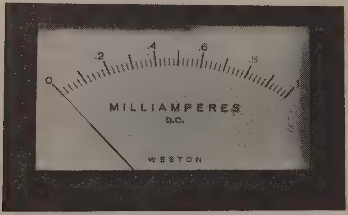
**On Sinewave. 25-20,000 Hz for current meters, 25-1500 Hz voltmeters.*
***Available with increased accuracy and tracking on special order.*
****Mirror scale available on special order.*
(Higher frequency available on special order.)

Dimensions

Model	A	B	C	D	E	F	G	H	J	K	L	M	N
2021 2022	2.810 71.37mm	2.400 in. 60.96 mm	.985 in. 25.02 mm	1.160 in. 29.46 mm	1.880 in. 47.75 mm	.940 in. 23.88 mm	.940 in. 23.88 mm	1.880 in. 47.75 mm	2.200 in. 55.88 mm	1.220 in. 30.99 mm	1.725 in. 43.82 mm	1.140 in. 28.96 mm	.560 in. 14.22 mm
2031 2032	3.500 in. 88.90 mm	2.980 in. 75.69 mm	1.060 in. 26.92 mm	1.440 in. 36.58 mm	2.250 in. 57.15 mm	1.125 in. 28.58 mm	1.125 in. 28.58 mm	2.250 in. 57.15 mm	2.750 in. 69.85 mm	1.200 in. 30.48 mm	1.725 in. 43.82 mm	1.140 in. 28.96 mm	.560 in. 14.22 mm
2041 2042	4.530 in. 115.06 mm	4.050 in. 102.87 mm	1.480 in. 37.59 mm	1.780 in. 45.21 mm	3.560 in. 90.42 mm	2.020 in. 51.31 mm	2.000 in. 50.80 mm	4.000 in. 101.60 mm	2.750 in. 69.85 mm	1.200 in. 30.48 mm	1.725 in. 43.82 mm	1.140 in. 28.96 mm	.600 in. 15.24 mm
2051 2052	5.630 in. 143.00 mm	4.490 in. 114.45 mm	1.460 in. 37.08 mm	1.590 in. 40.39 mm	3.000 in. 76.20 mm	2.150 in. 54.61 mm	2.625 in. 66.68 mm	5.250 in. 133.35 mm	2.750 in. 69.85 mm	1.200 in. 30.48 mm	1.725 in. 43.82 mm	1.140 in. 28.96 mm	.600 in. 15.24 mm

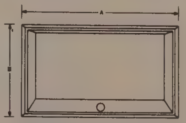
See diagram for dimensions


TYPICAL DIMENSIONS FOR MODEL SERIES 2021, 2031, 2041, 2051
MOD 2021, 2031 SERIES
NO. 4-40 UNC-2A
THREAD
MOD 2041,
2051 SERIES
NO. 6-32 UNC-2A
THREAD
N
L
M
FULL THREAD
.500 IN 12.70 MM
.450 IN 11.43 MM
7°
.560 IN
14.22 MM
NO. 8-32
UNC-2A
THREAD
F
E
D
K
.500 IN
12.70 MM
FULL THREAD
J
H
G
.210 IN
5.33 MM
1.400 IN
35.56 MM
MODEL 2021, 2022 ONLY
STUD POSITION
A
B
C
MODEL 2021, 2031,
.200 DIA 5.08 MM
MODEL 2041, 2051,
.280 DIA 7.11 MM
NOTE: SELF-CONTAINED AMMETERS
ABOVE 10 AMPS HAVE ¼ X 28 CONNECTION STUDS.
"L" DIMENSION BECOMES 1.990

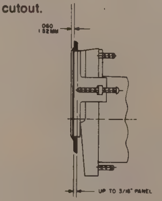

0
.2
.4
.6
.8
1
MILLIAMPERES
D.C.
WESTON

RECESS ***(Bezel mounting)***

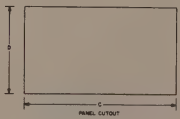
Only the scale is visible since meter is mounted behind the panel . . . half bezel fits into panel cutout.



Note: Half bezel mounting easily adaptable to external illumination.


.060
1.52 MM
UP TO 3/16" PANEL

Model	A	B	C	D	Catalog. No.
2021/22/24	3.120 in. 79.25 mm	1.720 in. 43.69 mm	3.000 in. 76.20 mm	1-19/32 (1.609) in. 40.87 mm	020090271495
2031/32/34	3.860 in. 98.04 mm	2.265 in. 57.54 mm	3-23/32 (3.718) in. 94.43 mm	2-5/32 (2.156) in. 54.74 mm	020090271922
2041/42/44	4.960 in. 125.98 mm	2.900 in. 73.66 mm	4-13/16 (4.812) in. 122.22 mm	2-3/4 (2.750) in. 69.85 mm	020090271923
2051/52	6.060 in. 153.92 mm	3.300 in. 83.82 mm	5-7/8 (5.875) in. 149.22 mm	3-5/32 (3.156) in. 80.16 mm	020090271924

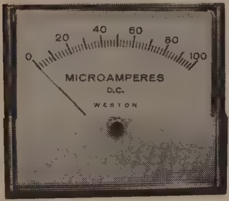

D
C
PANEL CUTOUT

WESTON INSTRUMENTS, INC. 614 FRELINGHUYSEN AVENUE, NEWARK, N. J. 07114

WESTON 2000 Series Panel Meters

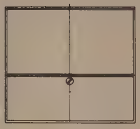
CONVENTIONAL

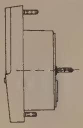
Use same dimensions, whether you choose a meter with taut band or pivot and jewel movement.

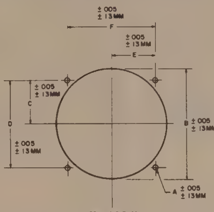


Model	A	B	C	D	E	F
2021	.125 in. 3.17 mm	2.200 in. 55.88 mm	.940 in. 23.88 mm	1.880 in. 47.75 mm	.940 in. 23.88 mm	1.880 in. 47.75 mm
2031	.125 in. 3.17 mm	2.820 in. 71.63 mm	1.125 in. 28.57 mm	2.250 in. 57.15 mm	1.125 in. 28.57 mm	2.250 in. 57.15 mm
2041	.166 in. 4.21 mm	2.820 in. 71.63 mm	2.020 in. 51.31 mm	3.562 in. 90.47 mm	2.000 in. 50.80 mm	4.000 in. 101.60 mm
2051	.166 in. 4.21 mm	2.820 in. 71.63 mm	2.150 in. 54.61 mm	3.000 in. 76.20 mm	2.625 in. 66.67 mm	5.250 in. 133.35 mm

0
20
40
60
80
100
MICROAMPERES
D.C.
WESTON







DRILLING PLAN

DC MICROAMMETERS

2½" MODEL 2021

Range	Scale Div.	Pivot & Jewel Resistance (Ohms)	Catalog No. † △	Taut Band Resistance (Ohms)	Catalog No. † △
50	50	2500	5841050*	950	5842050*
100	50	2300	5841100*	845	5842100*
200	40	850	5841200	275	5842200*
500	50	230	5841500	60	5842500*
50-0-50	40	2300	8888001	845	8888004*
100-0-100	40	850	8888002	275	8888005*
500-0-500	50	85	8888003	16.5	8888006

3½" MODEL 2031

Range	Scale Div.	Pivot & Jewel Resistance (Ohms)	Catalog No. † △	Taut Band Resistance (Ohms)	Catalog No. † △
50	50	2500	5841050*	950	5842050*
100	50	2300	5841100*	845	5842100*
200	40	850	5841200	275	5842200*
500	50	230	5841500	60	5842500
50-0-50	40	2300	8888001*	845	8888004*
100-0-100	40	850	8888002	275	8888005
500-0-500	50	85	8888003	16.5	8888006

4½" MODEL 2041

Range	Scale Div.	Pivot & Jewel Resistance (Ohms)	Catalog No. † △	Taut Band Resistance (Ohms)	Catalog No. † △
50	50	2500	5841050*	950	5842050*
100	50	2300	5841100*	845	5842100*
200	40	850	5841200*	275	5842200*
500	50	230	5841500	60	5842500*
50-0-50	40	2300	8888001*	845	8888004
100-0-100	40	850	8888002	275	8888005
500-0-500	50	85	8888003	16.5	8888006

5½" MODEL 2051

Range	Scale Div.	Pivot & Jewel Resistance (Ohms)	Catalog No. † △	Taut Band Resistance (Ohms)	Catalog No. † △
50	50	2500	5841050*	950	5842050
100	50	2300	5841100	845	5842100
200	40	850	5841200*	275	5842200
500	50	230	5841500	60	5842500
50-0-50	40	2300	8888001*	845	8888004
100-0-100	40	850	8888002	275	8888005
500-0-500	50	85	8888003	16.5	8888006

DC MILLIAMMETERS

2½" MODEL 2021

Range	Scale Div.	Pivot & Jewel Res. Ohms ±20%	Catalog No. † △	Taut Band Res. Ohms ±20%	Catalog No. † △
1	50	85	4841001*	16.5	4842001*
2	40	16	4841002	8.2	4842002
5	50	9	4841005	4.7	4842005
10	50	2.2	4841010*	2.2	4842010
20	40	1.6	4841020	2.0	4842020
50	50	2.0	4841050*	2.0	4842050
100	50	1.0	4841100*	1.0	4842100
200	40	0.5	4841200*	0.5	4842200
300	60	0.33	4841300*	0.33	4842300
500	50	0.2	4841500	0.2	4842500

3½" MODEL 2031

Range	Scale Div.	Pivot & Jewel Res. Ohms ±20%	Catalog No. † △	Taut Band Res. Ohms ±20%	Catalog No. † △
1	50	85	4841001*	16.5	4842001*
2	40	16	4841002	8.2	4842002
5	50	9	4841005	4.7	4842005
10	50	2.2	4841010*	2.2	4842010
20	40	1.6	4841020	2.0	4842020
50	50	2.0	4841050*	2.0	4842050
100	50	1.0	4841100*	1.0	4842100
200	40	0.5	4841200	0.5	4842200
300	60	0.33	4841300	0.33	4842300
500	50	0.2	4841500*	0.2	4842500

4½" MODEL 2041

Range	Scale Div.	Pivot & Jewel Res. Ohms ±20%	Catalog No. † △	Taut Band Res. Ohms ±20%	Catalog No. † △
1	50	85	4841001*	16.5	4842001*
2	40	16	4841002	8.2	4842002
5	50	9	4841005*	4.7	4842005
10	50	2.2	4841010	2.2	4842010
20	40	1.6	4841020	2.0	4842020
50	50	2.0	4841050*	2.0	4842050
100	50	1.0	4841100	1.0	4842100
200	40	0.5	4841200	0.5	4842200
300	60	0.33	4841300*	0.33	4842300
500	50	0.2	4841500	0.2	4842500

5½" MODEL 2051

Range	Scale Div.	Pivot & Jewel Res. Ohms ± 20%	Catalog No. † △	Taut Band Res. Ohms ± 20%	Catalog No. † △
1	50	85	4841001*	16.5	4842001*
2	40	16	4841002	8.2	4842002
5	50	9	4841005	4.7	4842005
10	50	2.2	4841010	2.2	4842010
20	40	1.6	4841020	2.0	4842020
50	50	2.0	4841050	2.0	4842050
100	50	1.0	4841100	1.0	4842100
200	40	0.5	4841200	0.5	4842200
300	60	0.33	4841300	0.33	4842300
500	50	0.2	4841500	0.2	4842500

* *Stock item.*
† *When ordering meters, model number must precede catalog number.*
△ *When ordering meter with optional black painted front change second digit of catalog number "8" to "7."*

WESTON INSTRUMENTS, INC. 614 FRELINGHUYSEN AVENUE, NEWARK, N. J. 07114

WESTON 2000 Series Panel Meters

DC AMMETERS

2½" MODEL 2021

Range	Scale Div.	Pivot & Jewel	Catalog No. †△	Taut Band	Catalog No. †△
1	50	Approx. 50MV Drop	2841001*	Approx. 50MV Drop	2842001
2	40		2841002		2842002
5	50		2841005*		2842005
10	50		2841010		2842010
20	40		2841020		2842020
25	50		2841025*		2842025
30	60		2841030		2842030
50	50		2841050*		2842050

3½" MODEL 2031

Range	Scale Div.	Pivot & Jewel	Catalog No. †△	Taut Band	Catalog No. †△
1	50	Approx. 50MV Drop	2841001*	Approx. 50MV Drop	2842001*
2	40		2841002		2842002
5	50		2841005*		2842005
10	50		2841010*		2842010
20	40		2841020		2842020
25	50		2841025		2842025
30	60		2841030		2842030
50	50		2841050*		2842050

4½" MODEL 2041

Range	Scale Div.	Pivot & Jewel	Catalog No. †△	Taut Band	Catalog No. †△
1	50	Approx. 50MV Drop	2841001*	Approx. 50MV Drop	2842001
2	40		2841002*		2842002
5	50		2841005*		2842005
10	50		2841010		2842010
20	40		2841020		2842020
25	50		2841025*		2842025
30	60		2841030		2842030
50	50		2841050*		2842050

5½" MODEL 2051

Range	Scale Div.	Pivot & Jewel	Catalog No. †△	Taut Band	Catalog No. †△
1	50	Approx. 50MV Drop	2841001*	Approx. 50MV Drop	2842001
2	40		2841002		2842002
5	50		2841005*		2842005
10	50		2841010*		2842010

DC VOLTMETERS

2½" MODEL 2021

Range	Scale Div.	OHMS PER VOLT			
		Pivot & Jewel	Catalog No. †△	Taut Band	Catalog No. †△
2	40	1000	1841002	1000	1842002
5	50		1841005*		1842005
10	50		1841010*		1842010
15	30		1841015		1842015
25	50		1841025		1842025
30	60		1841030		1842030
50	50		1841050*		1842050
100	50		1841100		1842100
150	30		1841150*		1842150
200	40		1841200*		1842200
300	60		1841300*		1842300
500	50		1841500		1842500

3½" MODEL 2031

Range	Scale Div.	OHMS PER VOLT			
		Pivot & Jewel	Catalog No. †△	Taut Band	Catalog No. †△
2	40	1000	1841002	1000	1842002
5	50		1841005		1842005
10	50		1841010*		1842010
15	75		1841015		1842015
25	50		1841025*		1842025
30	60		1841030		1842030
50	50		1841050*		1842050
100	50		1841100		1842100
150	75		1841150*		1842150
200	40		1841200		1842200
300	60		1841300*		1842300
500	50		1841500		1842500

4½" MODEL 2041

Range	Scale Div.	OHMS PER VOLT			
		Pivot & Jewel	Catalog No. †△	Taut Band	Catalog No. †△
2	40	1000	1841002	1000	1842002
5	50		1841005		1842005
10	50		1841010*		1842010
15	75		1841015		1842015
25	50		1841025		1842025
30	60		1841030		1842030
50	50		1841050*		1842050
100	50		1841100		1842100
150	75		1841150*		1842150
200	40		1841200		1842200
300	60		1841300*		1842300
500	50		1841500		1842500

5½" MODEL 2051

Range	Scale Div.	OHMS PER VOLT			
		Pivot & Jewel	Catalog No. †△	Taut Band	Catalog No. †△
2	40	1000	1841002	1000	1842002
5	50		1841005		1842005
10	50		1841010		1842010
15	75		1841015		1842015
30	60		1841030		1842030
50	50		1841050		1842050
100	50		1841100		1842100
150	75		1841150		1842150
200	40		1841200		1842200
300	60		1841300		1842300
500	50		1841500		1842500

AC VOLTMETERS, RECTIFIER TYPE

2½" MODEL 2022

Range	Scale Div.	OHMS PER VOLT			
		Pivot & Jewel	Catalog No. †△	Taut Band	Catalog No. †△
15	30	1000	1841015	1000	1842015
30	60		1841030		1842030
75	75		1841075		1842075
150	75		1841150		1842150
300	60		1841300		1842300

3½" MODEL 2032

Range	Scale Div.	OHMS PER VOLT			
		Pivot & Jewel	Catalog No. †△	Taut Band	Catalog No. †△
15	30	1000	1841015	1000	1842015
30	60		1841030		1842030
75	75		1841075		1842075
150	75		1841150*		1842150
300	60		1841300		1842300

4½" MODEL 2042

Range	Scale Div.	OHMS PER VOLT			
		Pivot & Jewel	Catalog No. †△	Taut Band	Catalog No. †△
15	30	1000	1841015	1000	1842015
30	60		1841030		1842030
75	75		1841075		1842075
150	75		1841150		1842150
300	60		1841300		1842300

5½" MODEL 2052

Range	Scale Div.	OHMS PER VOLT			
		Pivot & Jewel	Catalog No. †△	Taut Band	Catalog No. †△
15	75	1000	1841015	1000	1842015
30	60		1841030		1842030
75	75		1841075		1842075
150	75		1841150		1842150
300	60		1841300		1842300

** Stock item.*
† When ordering meters, model number must precede catalog number.
△ When ordering meter with optional black painted front change second digit of catalog number "8" to "7."

WESTON INSTRUMENTS, INC. 614 FRELINGHUYSEN AVENUE, NEWARK, N. J. 07114

WESTON 2000 Series Panel Meters

AC MICROAMMETERS, RECTIFIER TYPE

2½" MODEL 2022

Range	Scale Div.	Pivot & Jewel Resistance Ohms (Approx.)	Catalog No. †△	Taut Band Resistance Ohms (Approx.)	Catalog No. †△
100	50	5500	5841100	5500	5842100
200	40	2600	5841200	2400	5842200
500	50	1000	5841500	1000	5842500

3½" MODEL 2032

Range	Scale Div.	Pivot & Jewel Resistance Ohms (Approx.)	Catalog No. †△	Taut Band Resistance Ohms (Approx.)	Catalog No. †△
100	50	5500	5841100	5500	5842100
200	40	2600	5841200	2400	5842200
500	50	1000	5841500	1000	5842500

4½" MODEL 2042

Range	Scale Div.	Pivot & Jewel Resistance Ohms (Approx.)	Catalog No. †△	Taut Band Resistance Ohms (Approx.)	Catalog No. †△
100	50	5500	5841100	5500	5842100
200	40	2600	5841200	2400	5842200
500	50	1000	5841500	1000	5842500

5½" MODEL 2052

Range	Scale Div.	Pivot & Jewel Resistance Ohms (Approx.)	Catalog No. †△	Taut Band Resistance Ohms (Approx.)	Catalog No. †△
100	50	5500	5841100	5500	5842100
200	40	2600	5841200	2400	5842200
500	50	1000	5841500	1000	5842500

AC MILLIAMMETERS, RECTIFIER TYPE

2½" MODEL 2022

Range	Scale Div.	Pivot & Jewel Resistance Ohms (Approx.)	Catalog No. †△	Taut Band Resistance Ohms (Approx.)	Catalog No. †△
1	50	530	4841001	500	4842001
2	40	280	4841002	270	4842002
5	50	115	4841005	115	4842005

3½" MODEL 2032

Range	Scale Div.	Pivot & Jewel Resistance Ohms (Approx.)	Catalog No. †△	Taut Band Resistance Ohms (Approx.)	Catalog No. †△
1	50	530	4841001	500	4842001
2	40	280	4841002	270	4842002
5	50	115	4841005	115	4842005

4½" MODEL 2042

Range	Scale Div.	Pivot & Jewel Resistance Ohms (Approx.)	Catalog No. †△	Taut Band Resistance Ohms (Approx.)	Catalog No. †△
1	50	530	4841001	500	4842001
2	40	280	4841002	270	4842002
5	50	115	4841005	115	4842005

5½" MODEL 2052

Range	Scale Div.	Pivot & Jewel Resistance Ohms (Approx.)	Catalog No. †△	Taut Band Resistance Ohms (Approx.)	Catalog No. †△
1	50	530	4841001	500	4842001
2	40	280	4841002	270	4842002
5	50	115	4841005	115	4842005

** Stock item.*
† When ordering meters, model number must precede catalog number.
△ When ordering meter with optional black painted front change second digit of catalog number "8" to "7."

AC IRON VANE

AC VOLTMETERS Iron Vane (Pivot & Jewel Only) Frequency: 25-125 Hz△

Range	2½" MODEL 2024		3½" MODEL 2034		4½" MODEL 2044		CATALOG NO.
	Scale Div.	Nominal Resistance	Scale Div.	Nominal Resistance	Scale Div.	Nominal Resistance	
7.5	75	37.5	75	37.5	75	37.5	1841975
10	50	66 5	50	66.5	50	66.5	1841010***
15	75	150	75	150	75	150	1841015**
25	50	500	50	500	50	500	1841025
30	60	600	60	600	60	600	1841030
50	50	1665	50	1665	50	1665	1841050*
100	50	6700	50	6700	50	6700	1841100
150	75	15,000	75	15,000	75	15,000	1841150*
300	60	60 000	60	60,000	60	60,000	1841300*
500	50	100,000	50	100,000	50	100,000	1841500**

△ Can be adjusted for 400 (± 10%) Hz

NOTE: Power Consumption: 150 Volt Range at 115 Volts, 1 15 Watts, at 60 Hz, 1.15 Volt-Amperes

AC AMMETERS Iron Vane (Pivot & Jewel Only) Frequency: 25-500 Hz

Range	2½" MODEL 2024		3½" MODEL 2034		4½" MODEL 2044		CATALOG NO.
	Scale Div.	Nominal Resistance	Scale Div.	Nominal Resistance	Scale Div.	Nominal Resistance	
1	50	.25	50	.25	50	25	2841001*
2	40	.06	40	.062	40	.062	2841002
3	60	.025	60	.025	60	.025	2841003
5	50	016	50	.016	50	.016	2841005*
10	50	.0045	50	.0045	50	.0045	2841010*
15	75	.0015	75	.0025	75	.0025	2841015
20	40	.0011	40	.0011	40	.0011	2841020*
25	50	.0011	50	.0011	50	.0011	2841025**
30	60	.00056	60	.00056	60	.00056	2841030*
50	50	00027	50	00027	50	00027	2841050*

NOTE: Power Consumption: 5 Ampere Range at 5 Amperes, 0 45 Watts, 0.45 Watts: at 60 Hz, 0 45 Volt-Amperes

AC MILLIAMMETERS Iron Vane (Pivot & Jewel Only) Frequency: 25-500 Hz

*Denotes Stock Item
**Model 2044 In Stock Only
***Models 2034, 2044 In Stock Only

Range	2½" MODEL 2024		3½" MODEL 2034		4½" MODEL 2044		CATALOG NO.
	Scale Div.	Nominal Resistance	Scale Div.	Nominal Resistance	Scale Div.	Nominal Resistance	
10	20	2550	50	2550	50	2550	4841010
50	25	100	50	100	50	100	4841050*
100	20	25	50	25	50	25	4841100*
200	40	6 3	40	6 33	40	6 33	4841200
250	25	6 3	50	4 0	50	4 0	4841250
500	25	1 0	50	1 0	50	1 0	4841500*

2000 SERIES VU METERS

Model	Catalog No.	Scale Type
2022	3841001* 3841002	Type 30 A scale Type 30 B scale
2032	3841001* 3841002	Type 30 A scale Type 30 B scale

Weston VU Meters are available with Type A or Type B scales. The Type A scale stresses the level in VU units for monitoring wire lines. The Type B scale emphasizes percent use of transmitter output and is the standard for broadcast service. The VU meter is designed to read zero VU, or 100%, with 1.228 volts AC applied to the meter and a 3600 ohm series resistor. This represents 4dB above 1 MW in 600 ohms.

** Stock item.*
† When ordering meters, model number must precede catalog number.
△ When ordering meter with optional black painted front change second digit of catalog number "8" to "7."

External Illumination Kits Available

WESTON INSTRUMENTS, INC. 614 FRELINGHUYSEN AVENUE, NEWARK, N. J. 07114

WESTON® Digital Panel Meters

MODEL 1220 (BIPOLAR)

WESTON
MILLIVOLTS DC

Also available for AC operation as Model 1221

Features

- All digital logic circuitry contained on a single MOS LSI plug-in chip—added reliability
- LED plug-in readout—added reliability
- Instant accuracy—requires no warm-up time
- Requires only 4 sq. in. space
- Complete instrument uses approximately ¾ watt power—conservatively rated to operate in 60°C ambient—added reliability
- Fixed or remote programmed decimal points
- Range change easily accomplished—simplifying stocking requirements
- Input vs readout "slope" changes easily accomplished
- Ruggedized — engineered to meet Military shock and vibration specs. — exceeds requirements of ACA C39.1 specifications for analog panel meters
- Model 1220 weighs less than 4 oz.

SPECIFICATIONS

Full Scale Ranges **Volts:**	**Input impedance:**
0—100 millivolts	>100 megohms
0—1 volt	>100 megohms
0—10 volts	5 megohms
0—100 volts	5 megohms
0—1000 volts	5 megohms
Current:	**Input Impedance:**
0—10 microamps	10 K ohms
0—100 microamps	1 K ohms
0—1 milliamp	100 ohms
0—10 milliamps	10 ohms
0—100 milliamps	1 ohm
Accuracy:	±0.1% of reading ±1 digit @ 25°C ±10°C
Overrange:	100% (reads 1999) except on 1000V range (Stated accuracy applies to full overrange)
Readout:	3½ digits, 7 segment LED
Out-of-Range Indication:	Flashing "1" in most significant digit with blanking of the remaining digits
Operating Temperature Range:	0-60°C (32-140°F)
Temperature Coefficient	±0.01% F.S. ±1 digit (±0.005% reading/°C)
Common Mode Rejection:	Battery operation: >120 dB Line operation: 80 dB
Normal Mode Rejection:	30 dB at 60 Hz
Sampling Rates:	>3 per second
Response Time:	<1.5 seconds
Power Requirements:	**Model 1220:** +5.5 volts DC ±10% (.75 watts) **Model 1221:** 117 volts ±10% or 234 volts ±10% 50 to 400 Hz
Storage Temperature:	—40°C to 70°C
Weight:	Approximately 4 oz

NOTE: Input PC board connectors are not supplied with the DPM. They may be ordered as an accessory under part No. 9790-0273883.

MODEL 1230

WESTON
VOLTS D.C.
-1230

Available in 2½ Digit as Model 1232

Features

- Dual Slope Integration* A/D Converter
- Automatic bipolar operation
- Automatic zeroing
- Reliable TTL Logic and C-MOS analog gates
- 100% overrange (except 1 KV range)
- 2 nA maximum input bias current
- 7.5 conversions per second
- 0.55" Sperry displays
- 80 dB CMRR
- 25 dB NMRR (10 dB on 1 volt range)
- Signal and control terminals:
  - Hold • Print Command • Outrange
  - Polarity

SPECIFICATIONS

Full Scale Ranges: **Volts**	**Input Impedance**
0—100 millivolts	>100 megohms
0—1 volt	>1000 megohms
0—10 volts	5 megohms
0—100 volts	5 megohms
0—1000 volts	5 megohms
Current:	
0—10 microamps	10K
0—100 microamps	1K
0—1 milliamp	100 ohms
0—10 milliamps	10 ohms
0—100 milliamps	1 ohm
Accuracy:	1230: ±0.1% of reading ±1 digit 1232: ±0.5% of reading ±1 digit
Overrange:	100% except on 1000V range. Stated accuracy applies to full overrange
Readout:	7 Segment, Sperry Display
Out-of-Range Indication:	"1" in most significant digit with blanking of the remaining digits
Operating Temperature Range	0-50°C, (32-122°F)
Temperature coefficient:	±100 PPM/°C
Common Mode Rejection:	80 dB with 1000 ohm unbalance at 60 Hz
Storage Temperature:	—40°C to +70°C
Sampling Rate:	7.5 per second
Response Time:	<1.0 seconds
Power:	117 volts ±10%, 50 Hz to 60 Hz, 4.7 watts Can be changed to 230 volts ±10% in field.
Weight:	Approximately 13 oz.

Connector supplied as
an accessory under P/N 9790-0267253

MODEL 1295 (BI-POLAR)

Limited Bi-Polar version Model 1296;
2½ Digit version Model 1297

Features

- Dual slope integration for long term stability
- All digital logic on a single 24-pin LSI MOS chip.
- 100% overrange (except 1000V range)
- Non-Blinking Display
- Automatic bi-polar operation
- Excellent noise rejection characteristics
- Plug-in readouts
  7 segment LED's
- Can be mounted entirely from front of panel
- Takes only 7 sq. in. of panel space
- "Of reading" accuracy
- Physically interchangeable with Weston's present 1230 series

SPECIFICATIONS

Full Scale Ranges: **Volts**	**Input Impedance**
0—100 millivolts	>100 megohms
0—1 volt	>1000 megohms
0—10 volts	5 megohms
0—100 volts	5 megohms
0—1000 volts	5 megohms
Current:	
0—10 microamps	10K
0—100 microamps	1K
0—1 milliamp	100 ohms
0—10 milliamps	10 ohms
0—100 milliamps	1 ohm
Accuracy:	±0 1% of reading, ±1 digit
Overrange:	100% (reads 1999) except on 1000V range Stated accuracy applies to full overrange
Readout:	7 Segment LED's
Out-of-Range Indication:	Flashing "1" in most significant digit with blanking of the remaining digits
Operating Temperature Range:	0-60°C, (32-140° F)
Temperature coefficient:	±0.01% F S. (.1 digit) ±0.005% rdg/° C
Common Mode Rejection:	100 dB with 1000 ohm unbalance at 60 Hz
Normal Mode Rejection:	30 dB at 60 Hz
Sampling Rate:	>3 per second
Response Time:	<1 5 seconds
Power:	117 volts ±10%, 50 Hz to 400 Hz 3 watts Can be changed to 230 volts ±10% in field
Weight:	Approximately 13 oz

NOTE. Input P C. Board Connectors are not supplied with the DPM They may be ordered as an accessory - P/N 9790-0267432

Model 1234

Features

- Dual Slope Integration* A/D Converter
- Automatic bipolar operation
- Reliable TTL Logic
- 3 nA maximum input bias current
- 7.5 conversions per second
- 0.55" Sperry displays
- 80 dB CMRR
- 40 db NMRR
- Signal and control terminals:
  - Hold • Print Command • Outrange
  - Polarity

SPECIFICATIONS

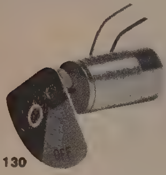
Accuracy:	
Short-term	±0.01% rdg. ±0.025% f.s (23°C, 30 min. warmup)
Long-term	±0.03% rdg. ±0.02% f.s
Linearity Error	<(0.01% rdg. + 0.015% f.s.)
Input Bias Current	3 nanoamperes
A.C. Rejection (NMRR)	40 dB minimum at 60 Hz (standard filter)
Common Mode Rejection	80 dB minimum, 60 Hz and 1000 ohm unbalance
Reading Rate	7.5 per second (15 sec or 30 sec optional)
Step Input Response	2 seconds max for full scale step
A/D Conversion Method	Dual Slope Integration*
Display Type	0.55" seven-segment gas plasma (±19999)
Operating Temperature	0° to 50°C
Storage Temperature	−40° to +70°C
Temp. Coefficient	<(50 ppm rdg. + 0 3 digit)/°C
Outrange Indication	Display blanked except MSD "1" and polarity
Control Outputs:	
Hold	Logic "0" retains most recent data
Convert (option)	1 μSec TTL pulse causes conversion within 10mSec
Status Outputs:	
Print Command	Logic "0" signifies valid output data
Polarity	Logic "1" signifies positive input signal
Overrange	Logic "1" signifies signal beyond 19999 counts
BCD Output (option)	1-2-4-8 parallel, TTL/DTL (2 u.l.)
Decimal Selection	External, by grounding appropriate terminal
Power Input	117 v. ± 10%, 50/60 Hz, 6 watts (available for 100, 220, or 240 volt line)
Size	Approx. 1.75" x 4.0" x 4.25" (see drawing)
Weight	Approx 2 pounds (0.9 kg)

WESTON INSTRUMENTS, INC. 614 FRELINGHUYSEN AVENUE, NEWARK, N. J. 07114

ELECTROMAGNETIC INDICATORS

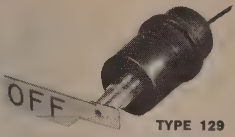
ALLARD INSTRUMENT DIV.
OF AFI

Designed for compact instrument and control panels, Allard miniature electromagnetic indicators provide positive visual signaling, are not subject to burnout, assure high readability in strong incident light. One-piece balanced rotor for dependable performance under shock and vibration. Models for momentary or latching operation, from DC or rectified AC. All models can be supplied to meet particular requirements for operating voltage, type of display and mounting, to commercial or MIL specifications.



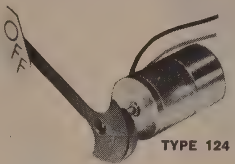
TYPE 130

Tiny indicator, totally enclosed structure. Rotation up to 60°. CW or CCW. For use with plug-on flags. Operates in any position. Case size: 7/16″ O.D. x 25/32″ L.



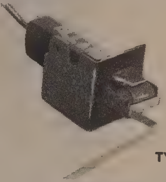
TYPE 129

Short, powerful semaphore indicator for CW or CCW rotation using demountable flag arms. Rotational anges to 60°. Works in any position. 7/16″ diam. x ¾″ long.



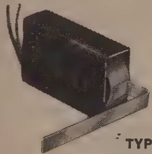
TYPE 124

Miniaturized semaphore indicator with rotation up to 60°. Available with CW or CCW rotation. For use with plug-on flags. Operates in any position. Case size: ⅜″ O.D. x .575″ long.



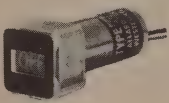
TYPE 219

Relatively inexpensive version of our highly successful instrument and panel mount indicator. Can display legends on the drum face or rotate a flag arm CW or CCW. 2 or 3 position momentary or 2 position latching operation. Indicator drum is .300″ wide x .300″ diam. Total length is 1⅝″.



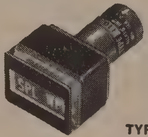
TYPE 109

2 or 3 position slim indicator for narrow locations. Can supply power to rotate a flag arm up to 60° or can display a legend directly on rotor face. CW or CCW for two position operation. .270″ x .562″ x 1″.



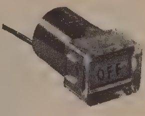
TYPE 108

Small indicator for 2- or 3-position momentary or 2-position latching (memory) indication. Prism-cut plastic lens in head can focus external light on indicator face. Colors or legends as required. 1⅛″ long, ⅜″ dia., 7/16″ square head.



TYPE 110

Extended face indicator, permits display of complete words- or multiple symbols. For 2- or 3-position momentary, or 2-position latching indication. Plastic capped for dust and moisture protection. Length 1¾″, head 1″ by ¾″.



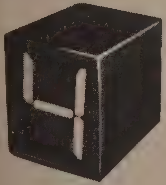
TYPE 120

Tiny broad faced indicator available with 2- or 3-position momentary or 2-position latching indication. Shows colors or legends. Head is 9/16″ wide by 7/16″ high. Body ½″ dia. Overall length 15/16″.

Types	130	129	124	219	109	108	110	120
D.C. VOLTAGES	To 28	To 40	To 40	To 40	To 40	To 90	To 50	To 40
OPERATING POWER (WATTS)	0.8	0.9	1.0	0.9	1.0	1.0	0.5	0.5
NO. OF CONNECTIONS	2	2	2	2, 3, 4	2, 3, 4	2, 3	2, 3, 4	2, 3
WEIGHT (GRAMS)	10	10.5	5	15	9.	10.6	35	9.5

ELECTROMECHANICAL READOUTS

All units illustrated are made under one or more of the following patents:
Re 24943/3,096,594
3,273,270/3,553,619



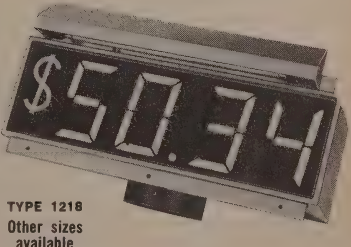
TYPE 202

A wide variety of other sizes available in single and multi-unit packages.

Compact digital indicating modules for instrument, data presentation and other display systems. Seven electromagnetic indicating segments can be operated in any desired combination by low power DC signals. Momentary or latching types. Windings available from 1 to 30 V, 1 15/16″ h. x 1 7/16″ w. x 2¼″ d. Digit size 1½″ h. x 1″ w. Other digit sizes up to 4″ and custom units, with as many lines as necessary, also available. Operating time less than 0.03 sec. Units also supplied with packaged encoders and decoders.

High Visibility!
Inherent Memory!

Complete readout display operating as remote repeater of cash register readings Contains readouts, encoding matrices, pulsing and cycling circuitry and its own power supply. Use of latching (memory) type readouts makes average power consumption negligible. Packaged for all-weather, outdoor use. Uses 4 Type 218 readouts, 4″ high.



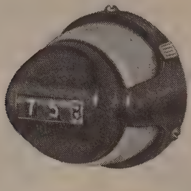
TYPE 1218
Other sizes available

For literature or quotations on electromagnetic instruments and controls, call or write -

ALLARD INSTRUMENT DIV. OF AFI
770 MAIN STREET, WESTBURY, L. I., N. Y. 11590 • (516) 334-8742

MICRODIAL® COUNTING DIALS

BUNKER RAMO AMPHENOL



1300 Series, Digital

Gives you fast, accurate indication of shaft position up to 1,000 turns. All models (3-digit 10-turn, 4-digit, 100-turn, and 5-digit 1,000-turn) mount directly on shaft to be controlled, eliminating backlash. Speed: up to 6,000 counts per minute.

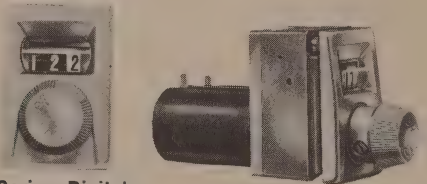
Large, contrasting numerals readable even from angular view because convex windows reduce glare, reflections. Rugged, dust-sealed construction includes Cycolac* counter wheels, Nylatron* GS gear assemblies, knurled aluminum control knobs. Brake optional. Special readouts are also optional. All models conform to military requirements.

*Reg. TM Borg-Warner Corp.

1330 Series, Digital

You get straight-on or angular readout with this illuminated turns-counting Microdial. One-piece lens/window magnifies numerals 1.5x. In exactly 10 turns, unit counts from 000 through 999. Fingertip brake locks settings in place.

This Microdial is sealed against dust yet its snap-on cap makes lamp replacement easy. Standard finishes for color coding: dark or light gray, red, white, and black; other colors and special read outs available on request.



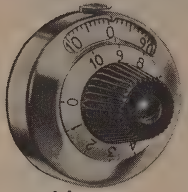
3100 Series, Digital

Remarkably accurate (1000:1 indexing accuracy) miniature 3100 Series dial almost makes a standard circular dial look gigantic by comparison. This Microdial measures only $1\frac{1}{8}$ x $1\frac{21}{32}$ inches and protrudes only $\frac{25}{32}''$ from a panel.

Digits (with illumination optional) are magnified by a convex lens in recessed window. Three-digit, ten-turn dial rotates continuously clockwise or counter clockwise with push-pull fingertip brake to lock settings. This 3100 miniature Microdial will mount on panels from $\frac{1}{16}''$ through $\frac{3}{16}''$ thick.

Standard color: natural brushed aluminum finish.

Amphenol's Dial-Pot assembly saves you time and money . . . eliminates costly mounting and phasing. If you now buy pots and dials separately, but for the same application, Amphenol can prephase and pre-assemble the 3100 dial to any potentiometer at no extra cost. You simply mount the assembly from rear of panel and wire into your circuit.



1320 Series, Concentric

The 1320 series is a $1\frac{3}{4}$ inch diameter 10 turn concentric scale dial with extra large numerals and a wide variety of color combinations including gloss and dull black, satin chrome, and bright chrome. Incorporating Amphenol's exclusive continuous inner dial movement, the 1320 is offered with or without brake. This dial is a rugged, long lasting, highly accurate unit which will meet your most demanding requirements.

DFD Series, Digital

- **250 PPM Reading Accuracy.**
- **High-Density Packaging — Up to 72 Per Sq. Foot!**

The DFD is a precision mechanism that provides a direct manual drive for a panel-mounted ten-turn potentiometer and an associated 3-digit readout that registers the drive-shaft rotation in turns, to three significant figures, a vernier wheel providing four graduations intermediate between adjacent digits on the least significant digit counter wheel permits interpolating to 250 parts per million, or less — fully compatible with the resolution and linearity of the average ten-turn precision potentiometer.

The entire assembly is less than one inch wide and less than two inches high, making it feasible to mount up to 72 controls per square foot of panel space, yet the digital display is comfortably readable at all times. It is not hidden by the operator's hand during adjustment and is equipped with a magnifying window that significantly enlarges the numerals and vernier scale for easy viewing from all positions.

Special Options

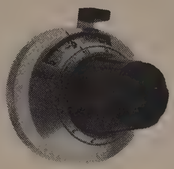
Amphenol, with the broadest and most versatile concentric scale and digital dial lines in the industry, offers you more than standard units. An example is the 1300 and 1330 series digitals which can be modified to give you such special features as index lines, internal illumination and special readouts. Contact your Amphenol area representative for full details on these and other optional features available to solve your design problems.

Microdial® — Trademark Reg. U.S. Patent Office.

MICRODIAL® COUNTING DIALS

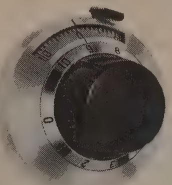
BUNKER RAMO AMPHENOL

Specify AMPHENOL Concentric and Digital Dials for precise potentiometer control



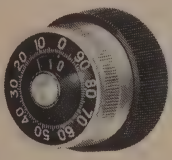
1370 Series, Concentric

Only ⅞″ diameter (1″ with finger brake), this 10-turn Microdial® projects 29/32″ from panel. Don't let the small size of this dial fool you. It has the same silent gear action of the conventional size Amphenol dials. It indicates angular position of potentiometers and multiturn devices of 10 turns and less with 1000:1 indexing accuracy. Inner dial counts turns, outer dial counts hundredths. Locks rigidly onto shaft to eliminate backlash. Epicyclical internal gearing assures readout accuracy. Finger-tip lever offers positive brake action without disturbing critical settings.



1350 Series, Concentric

The 1350, 1 13/16″ diameter, indicates angular position of potentiometers and multiturn devices of ten turns and less with 1000:1 indexing accuracy. Inner dial counts turns, outer dial counts off hundredths. Locks rigidly onto shaft to prevent backlash. Internal gearing is epicyclical type so you always know exact reading. Fingertip brake holds shaft position until reset.



3000 Series, Concentric

Only 1-inch diameter (1 5/32″ with finger brake), this 10-turn Microdial projects 15/16″ from your panel. Without brake, array of these units can be mounted on 1¼″ centers. And the digits are as large and as easy to read as some dials twice the size.

Clear plastic dial face is sealed and angled to prevent reflections. You can color-key dial functions by choosing from 5 standard brake knob colors and different combinations of numeral and background colors.

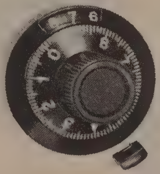
Don't let the small size of this Microdial fool you. It has the same silent gear action of the conventional size Amphenol Microdials.

1380 Series

FEATURES . . .

- **Precision digital dial designed for precision potentiometers up to ten turns — yet exceptionally low cost.**
- **Zinc die cast housing and rear cover for demanding applications.**
- **Indexing accuracy is 1 part in 1,000.**
- **Modern styling and small size.**
- **Easy mounting . . . A single set screw mounts dial to potentiometer shaft.**

Amphenol's new 1380 Series miniature digital dial is available in a black finish model 1381 or a fine black-grey hammer finish model 1385. The 1380 accepts a ¼″ shaft diameter and modification for a ⅛″ shaft diameter is available as a special option. Fingertip brake assures maintenance of critical dial settings. And the 1380 offers you ultra-modern styling to compliment any panel layout.



DFA Series, Concentric

- **1 Part in 1000 Reading Accuracy.**
- **Up to 99 Dials Per Square Foot of Panel Space!**
- **Satin Chrome on Black Finish.**

The DFA is an excellent answer to the need for a precision setting and indicating device for use with multi-turn potentiometers, particularly in control-console and computer applications, where the multiplicity of control elements is a significant factor in the total investment, and panel space is often at a premium.

The dial control knob couples directly to the potentiometer shaft, hence there is no backlash in the control of the actual resistance setting. A single numeral in the window above the knob indicates the number of completed turns of the shaft, and the graduated dial integral with the knob indicates in tenths and hundredths the percent of partial turn of the shaft enabling an accuracy in setting of one part per 1000.

Two standard models are available in this control series: The Model DFA-N with satin chrome finish and Model DFA-NB with white numbers on black finish. They feature constant torque that allows easy adjustment, yet maintain settings under conditions of extreme vibration. Both models include a flip-lock lever that applies 25 inch-ounces of torque against accidental displacement, in the locked position, yet allows high-speed rotation and setting when unlocked. The units are only 1.06 inches wide, with a body height of 1.25 inches (1.63 inches including lock lever) enabling grouping of miniature ten-turn potentiometers in control banks of up to 99 elements per square foot of panel space.

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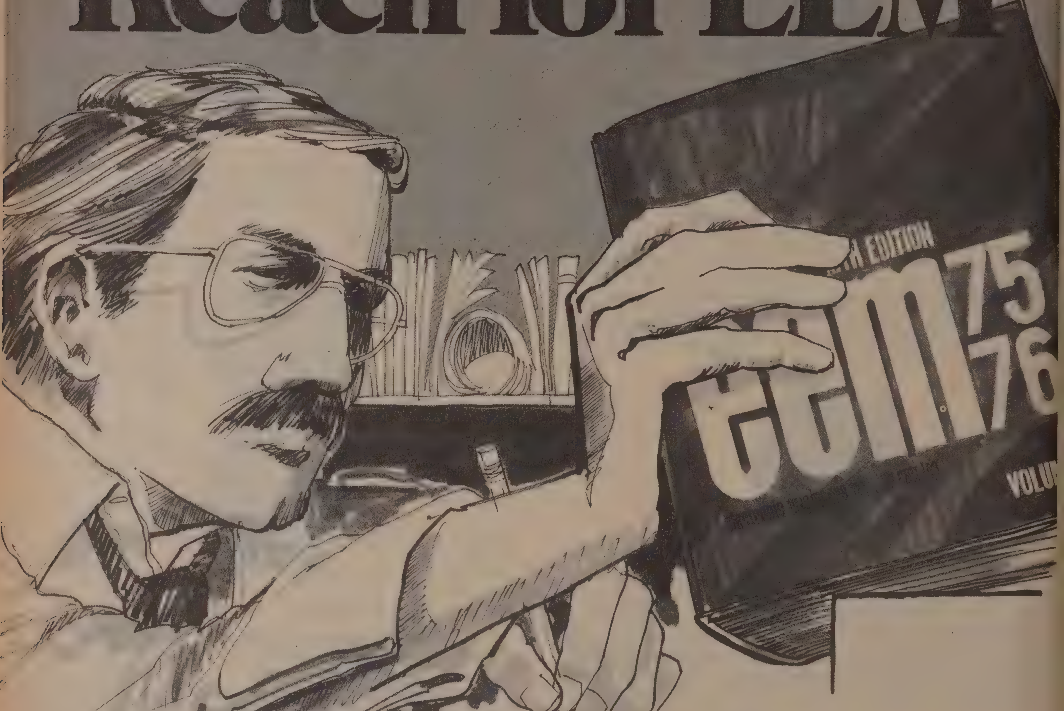

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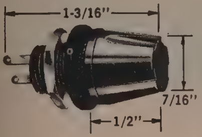
Lamp Holders for Replaceable Lamps   Polycarbonate Lens Red/Amber/Green/Blue/Clear

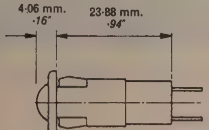
SL60/L111

Lens Colors: Trans/Red/Green/Amber/Blue/Clear
Replaceable Midget Screw
Base Lamp T1-3/4 can be supplied 6V, 12V, 24V
Mtg hole dia .375"
Solder Terminals



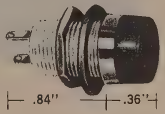
SL61/B

Lens Colors: Trans/Red/Green/Amber/Blue/Clear
Replaceable Midget Screw
Base Lamp T1-3/4 can be supplied 6V, 12V, 24V
Mtg hole dia .375"
Solder Terminals



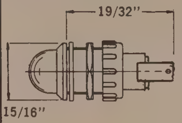
SL62

Lens Colors: Red/Green/Amber/Blue/Clear
Replaceable Midget Flange
Base Lamp T1-3/4 can be supplied 6V, 14V, 28V
Chrome bezel is "live" but insulated from panel
.50" dia mtg hole



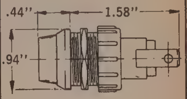
SL93/C

Chrome Bezel and Bushing
Can be supplied with replaceable T3-1/4 lamps, 6, 14, 28V
.750" dia mtg hole
.250" Tab Terminals
7/16" max panel acceptance
Colors: Transparent/Red/Green/Blue/Amber/Clear



SL392/C

All-Nylon, insulated; chrome bezel.
Can be supplied with replaceable T3-1/4 lamps, 6, 14, 28V
.375" dia mtg hole
.250 Tab Terminals
.250" max panel acceptance



Neon 125V and Low Voltage Versions

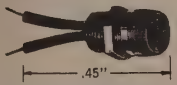
Add to Part Number Voltage required. Ex. SL267/B/125V, SL267/B/28V

Colors Red/Amber/Clear and Green on some types

Standard terminals are .250 tabs or 6-inch leads

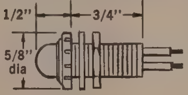
SL40 SL41 SL42

SL40 12/14V .04A .10K hours life
SL41/WL 125V Neon 10K hours life
SL42 LED Min Volt 1.6 Min Curr .02A

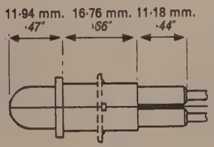


SL78

For 125V operation; built-in resistor;
Red/Amber/Green
All-insulated; nylon barrel;
8" leads; .375" dia mtg hole
21/32" max panel acceptance

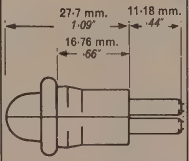


SL168/C



.375 dia Mtg. Hole

SL190



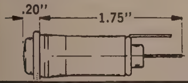
.53 dia Mtg. Hole

SL268/C

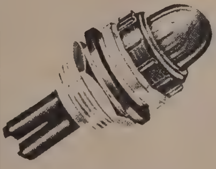
.375 dia Mtg. Hole
.97 Body

SL66N 125V Neon Red/Amb/Gr
SL67/C 6, 12 or 24V Replaceable Lamp Red/Amb/Blue/Gr
SL67/N/WL 125V Neon 8" wire leads; chrome bezel Red/Amb/Gr
All snap into .50" dia hole
Max panel thickness .045"
SL66N and SL67/C have .250" Tab Terminals
Wedge Bulbs:

BA7	6V	0.6W
BA7	12V	2.0W



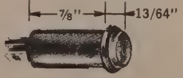
SL80



.50 dia Mtg. Hole
.59 Body

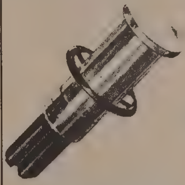
SL180/K

For 125V Operation; built in resistor
Supplied with push-on lock washer
Red/Amber
.250 tab terminals
Chrome bezel
Max panel acceptance ¾"



.50" dia Mtg. Hole

SL265



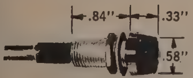
.375 dia Mtg. Hole
.97 Body

SL430

Snap-In Mtg.
1.11 x .452

SL77

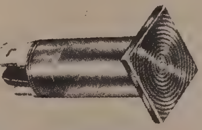
For 125V operation; built-in resistor
Red/Amber/Green
Nylon barrel; chrome bezel;
8" leads; .375" dia mtg hole
11/16" max panel acceptance



SL164/C

.375 dia Mtg. Hole
.77 Body

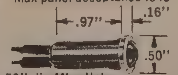
SL186



.50 dia Mtg. Hole
1.19 Body

SL267/B

For 125V operation; built in resistor
Snap-in fit;
.375 dia mtg. hole;
8" wire leads
Red/Amber/Green
Chrome bezel
Max panel acceptance .045"



.50" dia Mtg. Hole

COMPLETE
DETAILS
FORWARDED
ON
REQUEST

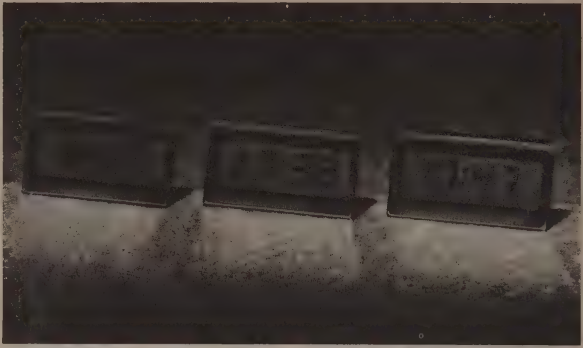
ALL ITEMS SUBJECT TO DESIGN CHANGE WITHOUT NOTICE

Beckman

LIQUID CRYSTAL DISPLAYS

Beckman Series 701, 702 and 703 Liquid Crystal Displays (LCD's) are field effect displays specifically designed for electronic digital watch module applications. Series 701 and 703 provide standardized mechanical configurations and electrical specifications for 12 hour (3-1/2 digit) applications and Series 702 provides a 24 hour display capability. Significant features include:

- 1.0 µW typical average power consumption.
- 3 volt and 6 volt standard models in all series.
- CMOS compatible drive characteristics.
- Transmissive designs for back lighting and reflective designs for ambient lighting in all series.
- Excellent readability in high ambient lighting conditions.
- High stability, moisture insensitive liquid crystal materials.



Series 701, 702 and 703

PERFORMANCE SPECIFICATIONS

Parameters Unless otherwise specified T_A = +25°C and test voltages are 32 Hz square wave, 3.0 ±0.1V_{rms} or 7.0 ±0.1V_{rms}		Series 701/702/703						
		R3 & T3			R6 & T6			
		Min.	Typ.	Max.	Min.	Typ.	Max.	Units
Operating Voltage		2.8	3.0	3.2	6.0	7.0	8.0	V_{rms}
DC drive component allowable				25			25	mV
Operating frequency range (Note 1)		25		100	25		100	Hz
Dynamic current (all segments ON)			300	600		250	450	nA
Capacitance (all segments ON)			325	650		225	400	pF
DC resistance (all segments ON)		100	300		100	400		MΩ
Visual threshold	10% ON	0.5			1.0			V_{rms}
	90% ON			2.7			5.7	V_{rms}
Response Time (Note 2)								
Segment ON	(T_A = +25°C)		250	500		250	500	ms
Segment OFF	(T_A = +25°C)		400	600		400	600	ms
Segment ON	(T_A = 0°C)		1500	2000		1500	2000	ms
Segment OFF	(T_A = 0°C)		2000	3000		2000	3000	ms
Colon	(½ sec. ON, ½ sec. OFF, T_A = +10°C)	visible "blink"			visible "blink"			
Contrast ratio		20:1			20:1			
Operating temperature range (Note 3)		0		+50	0		+50	°C
Storage temperature range (Note 3)		−20		+60	−20		+60	°C

Note 1: The limits shown avoid flicker below 25 Hz and increased power consumption above 100Hz.
Note 2: Time is measured from initial change of state of drive voltage to 90% change in visual state.
Note 3: Extended storage at high temperatures listed may cause polarizer degradation.

CUSTOM CAPABILITY

Variations of standard designs are readily available on a custom basis for any application where low power displays are required (hand held on portable test instruments, calculators, etc.), including:

- Special font styles
- Different background reflectors or polarizers
- Special configurations and sizes
- Other display thicknesses
- Other threshold voltage materials
- Different terminal assignments

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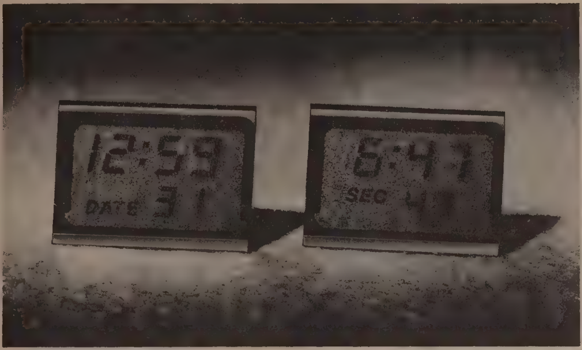
LIQUID CRYSTAL DISPLAYS



Series 705

Beckman Series 705 Liquid Crystal Displays (LCDs) are field effect displays specifically designed for electronic digital watch module applications. Series 705 LCDs provide a continuous 3-1/2 digit display of hours and minutes and also continuously display either seconds or the date as shown above. The word DATE or SEC and the appropriate corresponding digits are typically selected by a pushbutton which will alternately switch the display from one continuous presentation mode to the other. Features include:

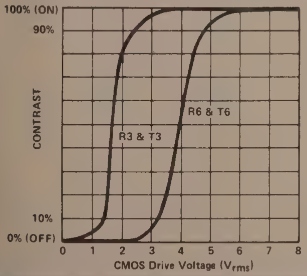
- 1.0 µW typical average power consumption.
- 3 volt and 6 volt standard models.
- CMOS compatible drive characteristics.
- Transmissive designs for back lighting and reflective designs for ambient lighting.
- Excellent readability in high ambient lighting conditions.
- High stability, moisture insensitive liquid crystal materials.

PERFORMANCE SPECIFICATIONS

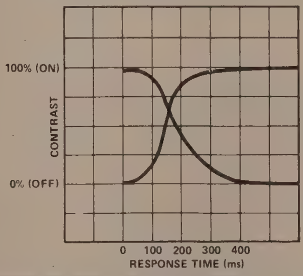
Parameters Unless otherwise specified T_A = +25°C and test voltages are 32 Hz square wave, 3.0 ±0.1 V_{rms} or 7.0 ± 0.1 V_{rms}	Series 705						
	R3 & T3			R6 & T6			
	Min.	Typ.	Max.	Min.	Typ.	Max.	Units
Operating Voltage	2.8	3.0	3.2	6.0	7.0	8.0	Vrms
DC drive component allowable			25			25	mV
Operating frequency range (Note 1)	25		100	25		100	Hz
Dynamic current (all segments ON)		325	700		300	600	nA
Capacitance (all segments ON)		400	800		300	600	pF
DC resistance (all segments ON)	100	300		100	300		MΩ
Visual threshold 10% ON	0.5			1.0			Vrms
Visual threshold 90% ON			2.7			5.7	Vrms
Response Time (Note 2)							
Segment ON (T_A = +25°C)		250	500		250	500	ms
Segment OFF (T_A = +25°C)		400	600		400	600	ms
Segment ON (T_A = 0°C)		1500	2000		1500	2000	ms
Segment OFF (T_A = 0°C)		2000	3000		2000	3000	ms
Colon (½ sec. ON, ½ sec. OFF, T_A = +10°C)	visible "blink"			visible "blink"			
Contrast ratio	20:1			20:1			
Operating temperature range (Note 3)	0		+50	0		+50	°C
Storage temperature range (Note 3)	–20		+60	–20		+60	°C

Note 1: The limits shown avoid flicker below 25 Hz and increased power consumption above 100Hz.
Note 2: Time is measured from initial change of state of drive voltage to 90% change in visual state.
Note 3: Extended storage at high temperatures listed may cause polarizer degradation.

TYPICAL CONTRAST CURVES @ 25°C



TYPICAL RESPONSE TIME @ 25°C



MODEL NUMBER EXPLANATION

Example: 701-R3 — 701 - R 3
Series designation — 701
R=Reflective type — R
T=Transmissive type — T
3 = 3 volt model — 3
6 = 6 volt model — 6

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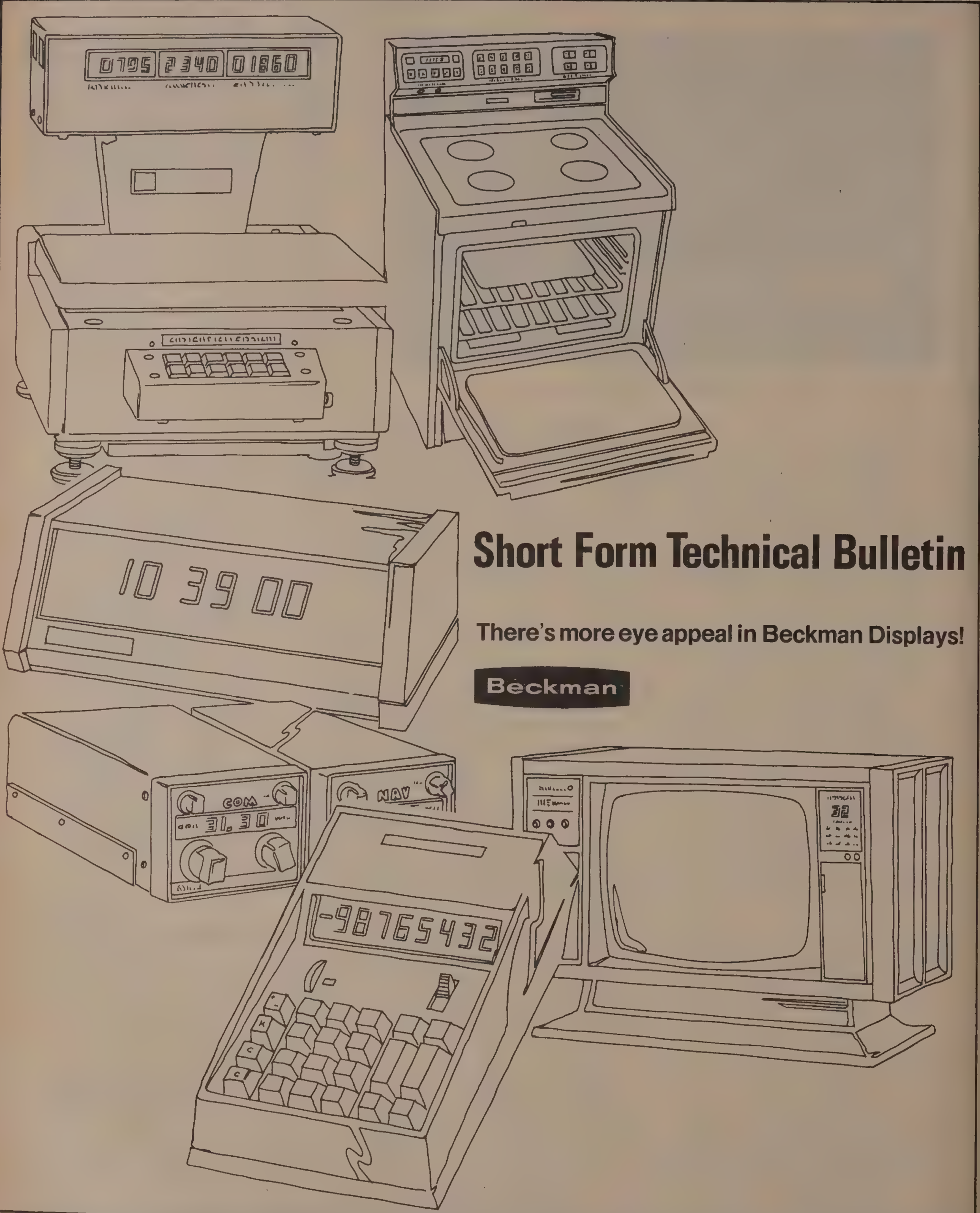
Displays and Accessories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Short Form Technical Bulletin

There's more eye appeal in Beckman Displays!

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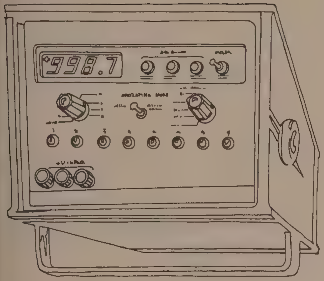
Display Features



Beckman continues to significantly advance display designs and application technology with the introduction of new and improved devices. Beckman has consolidated their position as a display manufacturer and is established as a leader in the field of planar gas-discharge display technology. Beckman's position in the marketplace is the result of providing devices which represent some of the most *readable* and *reliable* displays available today. Furthermore, their characteristics of low power consumption, low cost and versatility make them ideally suited for virtually any application.

Application and Use

Applications in which Beckman displays can be used are virtually unlimited. Any system or unit that requires a displayed information readout, will be enhanced by the use of Beckman displays. These devices are being used in a wide range of commercial and consumer products, as well as industrial and military applications. Manufacturers are finding that Beckman displays are a cost-effective means by which to improve sales, since they provide the end product with improved readability, reliability and overall appearance.

Readability

Beckman displays produce a brilliant, easily read orange neon glow. This color, which is well within the visual sensitivity spectrum of the human eye, makes the reading of a Beckman display a much less eye fatiguing action than other types or colors of displays presently available in today's marketplace. By comparison, the reading of red monochromatic colored displays can cause eye strain since this color is outside the optimum visual spectrum. Each display is illuminated against a stark black background, thus making it fully readable in any high ambient light condition, including direct sunlight. In addition, that flat planar design allows 130 degree viewing.

Power

Beckman displays use less power than most other display technologies available today. In contrast, a typical 0.27 inch light emitting diode (LED) display requires approximately 0.680 watts per digit, while a Beckman 0.33 inch display requires an average of only 0.200 watts per digit — less than half. Similar comparisons may be made with other gas discharge devices as well. This low power consumption is another good reason for specifying Beckman displays, especially when available power is limited or battery operation is required.

Versatility

Beckman displays are available in four convenient character heights — 0.33, 0.50, 0.55 and 1.0 inches. The small 0.33 inch characters are easily legible to 20 feet while the larger half-inch characters are legible to 40 feet and beyond. Beckman displays with the 0.33 and 0.55 character height are available in 1½-, 2-, 2½- and 3-digit envelopes that can be horizontally stacked in any configuration while maintaining uniform character spacing.

As a further endorsement of Beckman versatility, the 0.55 inch character displays are available in module form for the user who does not wish to design a complete display interface. The modules can be mounted in any digit combination and all module configurations are equipped with complete electronics.

Cost

Beckman displays are priced to make them attractive for any application from desk calculators and test instruments to process controls and consumer products. The prices of Beckman displays are a reality now and not a prediction for sometime in the future.

Reliability

All Beckman displays have a 10-year service life. Construction is rugged and compact to ensure total environmental and mechanical reliability in the most demanding application. Beckman's quality control procedures ensure that all shipments are fully tested and that each device meets all published specifications, thus eliminating the bulk of infant mortality in the working design.

Accessories

Beckman offers a full line of related accessories, providing the design engineer with convenience of application and ease of implementation. These accessories include monolithic TTL/DTL compatible decode/drivers, connectors, a 16-position multiplex board, voltage converters, and pin straighteners.

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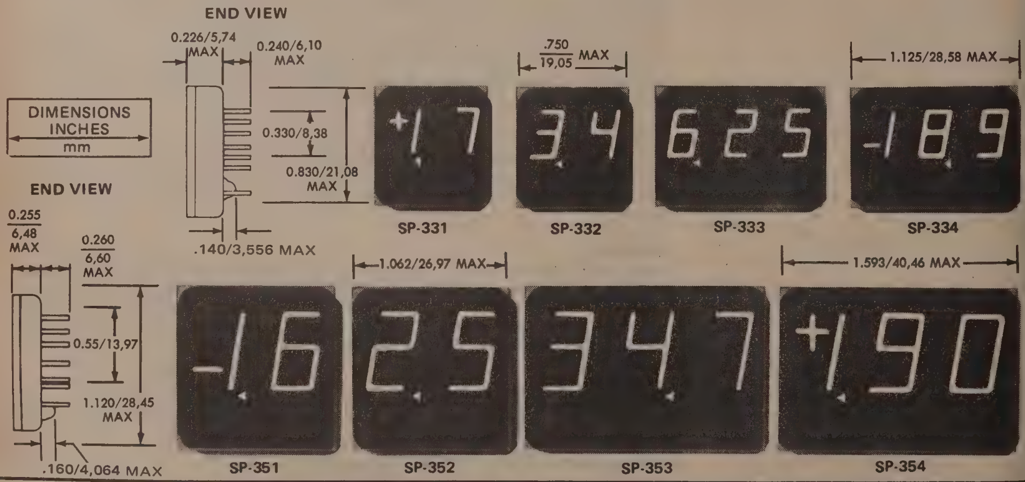
Beckman

SP-300 Series Displays

SPECIFICATIONS	SP-330 SERIES			SP-350 SERIES		
DC Characteristics	**Minimum**	**Typical**	**Maximum**	**Minimum**	**Typical**	**Maximum**
Display Supply Voltage(1)	160 Vdc	180 Vdc	Note 2	160 Vdc	180 Vdc	Note 2
Anode-to-Anode Differential Voltage(3)	—	—	14 Vdc	—	—	14 Vdc
Anode-to-Cathode Voltage Drop (Typical Current)	—	135 Vdc	—	—	135 Vdc	—
Cathode Current — Typical Segment (Seg. "b")(4)	70 μA	180 μA	250 μA	130 μA	330 μA	420 μA
Cathode Current — Decimal Point(4)	65 μA	135 μA	190 μA	65 μA	135 μA	190 μA
Cathode Current — Plus Sign	110 μA	290 μA	400 μA	260 μA	585 μA	820 μA
Cathode Current — Minus Sign	50 μA	135 μA	185 μA	120 μA	270 μA	380 μA
Cathode Current — Keep Alive	10 μA	50 μA	—	10 μA	50 μA	—
Power Dissipation per digit (With all segments lighted and assuming typical segment current)	—	175 mW	—	—	325 mW	—
Operating Temperature	0°C	—	70°C	0°C	—	70°C
Storage Temperature	—55°C	—	125°C	—55°C	—	125°C
Multiplex Characteristics	**Minimum**	**Typical**	**Maximum**	**Minimum**	**Typical**	**Maximum**
Anode On Time(5)	80 μsec	200 μsec	—	80 μsec	200 μsec	—
Interdigit Blanking Time(6) (10)	40 μsec	55 μsec	—	40 μsec	55 μsec	—
Refresh Period	—	—	Note 7	—	—	Note 7
*Display Supply Voltage(8)	160 Vdc	180 Vdc	Note 2	160 Vdc	180 Vdc	Note 2
Anode Voltage Swing(8)	30 Vdc	45 Vdc	90 Vdc	30 Vdc	45 Vdc	90 Vdc
Cathode Voltage Swing(8)	30 Vdc(9)	50 Vdc	120 Vdc	30 Vdc(9)	50 Vdc	120 Vdc
Cathode Bias Voltage ("On" Anode to "Off" Cathode Voltage)(8)	90 Vdc	115 Vdc	120 Vdc	90 Vdc	115 Vdc	120 Vdc

FEATURES	SP-330 SERIES	SP-350 SERIES
Character Height	0.330 inch/8,38 mm	0.550 inch/13,97 mm
Color	Orange (Neon Glow)	Orange (Neon Glow)
Brightness	210 foot lamberts at typical current	210 foot lamberts at typical current
Viewing Angle	130 degrees	130 degrees
Viewing Distance	20 feet/6,10 meters	40 feet/12,20 meters
Life Expectancy	>10 years	>10 years

The SP-330 and SP-350 Series Displays are designed for interfacing with MOS/LSI and are recommended for use in all dc or multiplexed applications, with or without suppressed (blanked) zeros. The displays can be quickly, easily read even in direct sunlight. Continuous, "no gap" characters make the displays most attractive to users. A keep-alive cathode provides an internal ion source that reduces reionization time to less than 30 microseconds, allows zero suppression, and improves the operation of the display in dark environments and at low temperatures. Units are horizontally stackable in any combination with uniform centerline spacing.



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SP-101 Display

DC CHARACTERISTICS

	MIN	TYP	MAX
Display Supply Voltage[1]	160 Vdc	180 Vdc	Note 2
Anode-to-Cathode Voltage Drop ('segment b = 700 μa)		135 Vdc	
Cathode Current — Per Segment[3,4]	350 μa	700 μa	1000 μa
Cathode Current — Decimal Point	100 μa	200 μa	300 μa
Cathode Current — Comma (decimal point included)	200 μa	400 μa	600 μa
Cathode Current — Each Colon Segment[5]	50 μa	100 μa	150 μa
Cathode Current — Keep-Alive	15 μa	75 μa	—
Power Dissipation (With All Segments Lighted @ 700 μa Typical)[4]		725 mW	
Operating Temperature	0°C		70°C
Storage Temperature	−55°C		125°C

MULTIPLEX CHARACTERISTICS

	MIN	TYP	MAX
Anode On Time[6,7]	80 μsec	400 μsec	—
Refresh Period			Note 6
Display Supply Voltage	160 Vdc	180 Vdc	Note 2
Anode Voltage Swing	30 Vdc	45 Vdc	90 Vdc
Cathode Voltage Swing	30 Vdc[8]	50 Vdc	120 Vdc
Cathode Bias Voltage ("ON" Anode to "OFF" Cathode Voltage)[9]	90 Vdc	110 Vdc	120 Vdc

NOTES

1. The minimum recommended supply voltage required to ionize the display is 160 volts DC. After the display has ionized, the voltage drop is approximately 135 volts. Typical cathode current of 700 μa is assumed.
2. Display supply voltage (including ripple) should not exceed 200 Vdc when display is used with DD-700 or DD-702 decoder/driver. Higher display supply voltages are acceptable when the drive device breakdown exceeds 80 volts DC.
3. All segment currents are ratioed to b segment.

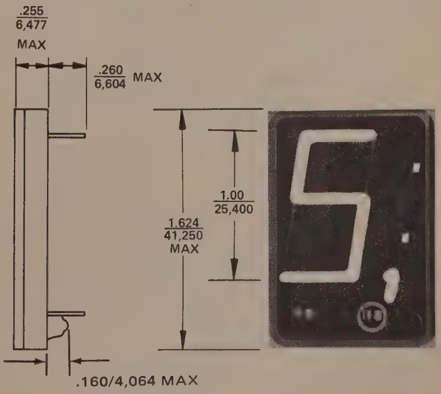
a, d, f, and g Current Ratio	1.00
c Current Ratio	1.25
e Current Ratio	1.20

4. The lowest current for even glow on the largest segment is 350 μa. Currents up to 1.5 times the typical current may be used, however, life expectancy may be reduced by operation at excessively higher currents. For multiplexed (time shared) operation segment currents may be increased to 2.8 mA with 0.25 or smaller duty cycle.
5. To ensure uniform operation of the two colon cathodes, it is recommended that each cathode have its own current limiting device (resistor or current sink). The current listed is the current required for each colon segment.
6. Keep-alive is recommended in all multiplexed applications. Three (3) milliseconds is maximum refresh period without keep-alive. Ten (10) milliseconds is typical with keep-alive.
7. No anode or cathode blanking is required for the display to perform properly, however, some blanking may be advantageous to eliminate time overlap of signals due to circuit characters.
8. Under specific conditions, Cathode Voltage Swings of as low as 30 volts are acceptable.
9. The combination of Cathode Bias Voltage and Cathode Voltage Swing must be within recommended display supply voltage.

The SP-101 is a planar, neon gas discharge display similar to the Beckman SP-300 series alphanumeric product family. It is intended to fill the need for display readability at distances greater than 40 feet/12 meters.

The SP-101 is recommended for either DC or multiplexed applications, with or without suppressed zeroes. The display can be quickly and easily read even in direct sunlight. Continuous, "no gap" characters make the display most attractive to users.

A keep-alive cathode provides an internal ion source that reduces reionization time to less than 30 micro-seconds. This enhances dynamic response and improves multiplex, low temperature and dark ambient performance. The units may be evenly or randomly spaced to build any display field desired.



Beckman

SP-100 Clock Displays

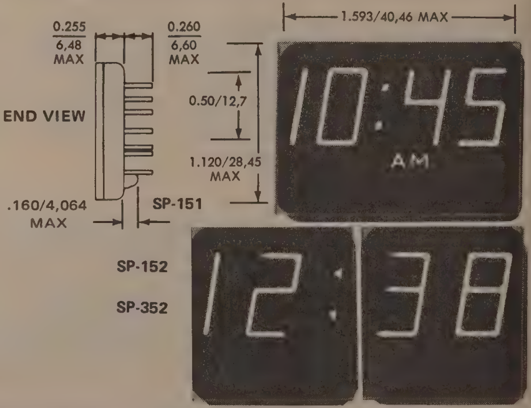
SPECIFICATIONS	SP-151			SP-152/SP-352		
DC Characteristics	**Minimum**	**Typical**	**Maximum**	**Minimum**	**Typical**	**Maximum**
Display Supply Voltage(1)	160 Vdc	180 Vdc	Note 2	160 Vdc	180 Vdc	Note 2
Anode-to-Anode Differential Voltage(3)	—	—	14 Vdc	—	—	14 Vdc
Anode-to-Cathode Voltage Drop (Typical Current)	—	135 Vdc	—	—	135 Vdc	—
Cathode Current — Typical Segment (Seg. "b")(4)	125 µA	300 µA	385 µA	130 µA	330 µA	420 µA
Cathode Current — Decimal Point(4)	65 µA	135 µA	190 µA	65 µA	135 µA	190 µA
Cathode Current — Colon (both colons tied together)(4)	90 µA	225 µA	315 µA	130 µA	270 µA	380 µA
Cathode Current — A(4)	100 µA	245 µA	340 µA	—	—	—
Cathode Current — P(4)	85 µA	205 µA	285 µA	—	—	—
Cathode Current — M(4)	140 µA	330 µA	460 µA	—	—	—
Cathode Current — Keep Alive	10 µA	50 µA	—	10 µA	50 µA	—
Power Dissipation — (One digit With All Segments Lighted, 330 µA typical)(4)	—	300 mW	—	—	325 mW	—
Operating Temperature	0°C	—	70°C	0°C	—	70°C
Storage Temperature	—55°C	—	125°C	—55°C	—	125°C
Multiplex Characteristics	**Minimum**	**Typical**	**Maximum**	**Minimum**	**Typical**	**Maximum**
Anode On Time (typical clock circuit)(5)	80 µsec	400 µsec	—	80 µsec	400 µsec	—
Interdigit Blanking Time ($I_{segment}$ = 825 µA @ 180 V)(6) (10)	50 µsec	100 µsec	—	40 µsec	80 µsec	—
Refresh Period	—	—	Note 7	—	—	Note 7
Display Supply Voltage	160 Vdc	180 Vdc	Note 2	160 Vdc	180 Vdc	Note 2
Anode Voltage Swing	30 Vdc	45 Vdc	90 Vdc	30 Vdc	45 Vdc	90 Vdc
Cathode Voltage Swing(8)	30 Vdc(9)	50 Vdc	120 Vdc	30 Vdc(9)	50 Vdc	120 Vdc
Cathode Bias Voltage ("On" Anode to "Off" Cathode Voltage)(8)	90 Vdc	115 Vdc	120 Vdc	90 Vdc	115 Vdc	120 Vdc

FEATURES	SP-151	SP-152
Character Height	0.50 inch/12,7 mm	0.55 inch/13,97 mm
Color	Orange (Neon Glow)	Orange (Neon Glow)
Brightness	200 foot lamberts at typical current	200 foot lamberts at typical current
Viewing Angle	130 degrees	130 degrees
Viewing Distance	40 feet/12,20 meters	40 feet/12,20 meters
Life Expectancy	>10 years	>10 years

NOTES: (Apply to both SP-100 & SP-300 Series)

1. The minimum recommended voltage required to ionize the display is 160 Volts dc. After ionization, the voltage drop across the display is approximately 135 Volts. Typical cathode current of 180 µA is assumed for the SP-330 Series, 300 µA for the SP-151 Series and 330 µA for the SP-350 Series.
2. Display supply voltage (including ripple) should not exceed 200 Vdc when display is used with DD-700 or DD-702 Decoder/Driver. Higher display supply voltages are acceptable when devices having a higher breakdown voltage are used. Current must be limited as specified.
3. Lighted cathodes on all digits with independent current limiting. For bussed cathodes (multiplexed operation), 90 Volts is permissible.
4. The lowest current for an even glow on segment b (reference segment) is 125 µA for the SP-151, 130 µA for the SP-152, 70 µA for the SP-330 Series, and 130 µA for the SP-350 Series. Currents up to 1.5 times the typical current may be used, however, life expectancy may be reduced by dc operation above the maximum current limit. For multiplexed operation, segment currents may be increased to 4 times typical dc rating, assuming a 0.25 or smaller duty cycle.
5. Anode On Time assumes typical keep-alive current and typical anode supply voltage.
6. Specified blanking time assumes 520 µA typical segment current for the SP-330 Series and 990 µA typical segment current for the SP-350 Series with 180 Vdc supply voltage. Blanking requirements are strongly dependent upon the mode of multiplex operation and upon the segment current used.
7. Three milliseconds is the maximum refresh period without keep-alive. Using keep-alive can extend the acceptable refresh period to 10 milliseconds.
8. The total display voltage (considering cathode bias and cathode swing) must be within the recommended display supply voltage.
9. Under specific conditions, Cathode Voltage Swings of as low as 30 Volts are acceptable.
10. The colons, AM and PM must have same blanking as any other cathode, and are only enabled during their respective digit times.

Beckman Clock Displays are designed for interfacing with MOS/LSI clock chips. They are recommended for use in all dc or multiplexed applications. The displays can be quickly, easily read even in direct sunlight. Continuous, "no gap" characters make the displays most attractive to users. A keep-alive cathode provides an internal ion source that reduces reionization time to less than 30 microseconds, allows zero suppression and improves operation of displays in dark environments and at low temperatures.



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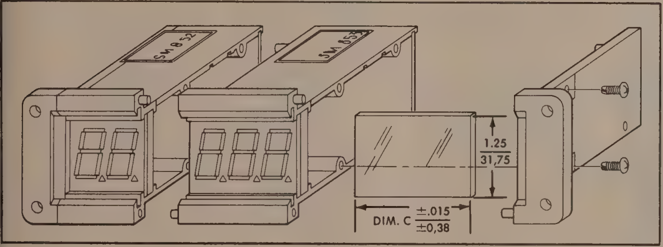
SM-800 Series Display Modules

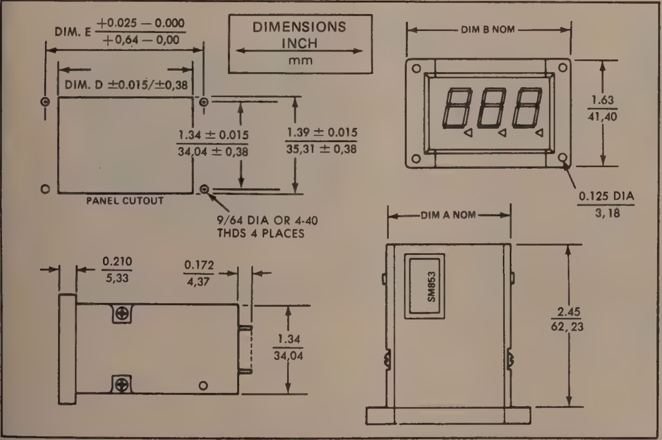
Type	Description		Electronics	Input
	Digit Positions	Digits		
SM-851	2	1-½	decoder, latch	BCD
SM-852	2	2	decoder, latch	BCD
SM-853	3	3	decoder, latch	BCD
SM-854	3	2-½	decoder, latch	BCD
SM-855	2	1-½	decoder, latch, counter	serial count
SM-856	2	2	decoder, latch, counter	serial count
SM-857	3	3	decoder, latch, counter	serial count
SM-858	3	2-½	decoder, latch, counter	serial count

MECHANICAL SPECIFICATIONS, INCH/MM

No. Digits	Body Width Dim A Nom	Bezel Width Dim B Nom	Filter Size 1.25/31,8x Dim C ± 0.015/,38	Panel Cutout Dim D	Hole Spacing Dim E +0.25/0,64 −0.000/0,00
2	1.30/33,0	1.98/50,3	1.51/38,4	1.42/36,1	1.68/42,7
3	1.83/46,5	2.51/63,8	2.04/51,8	1.94/49,3	2.21/56,1
4	2.40/61,0	3.08/78,2	2.62/66,5	2.52/64,0	2.78/70,6
5	2.93/74,4	3.61/91,7	3.15/80,0	3.05/77,5	3.31/84,1
6*	3.46/87,9	4.14/105,2	3.68/93,5	3.58/90,9	3.84/97,5
7	4.03/102,4	4.71/119,6	4.26/108,2	4.16/105,7	4.41/112,0
8**	4.56/115,8	5.24/133,1	4.79/121,7	4.69/119,1	4.94/125,5

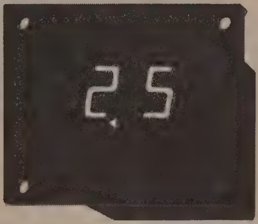
*Assumes two each three digit displays
**Assumes two each three digit displays and one each two digit displays


SM-852
SM-853
1.25
31,75
DIM. C ±.015 / ±0,38

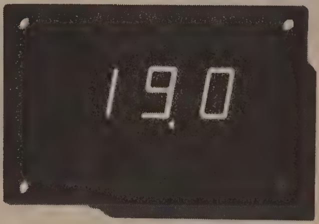

DIM. E +0.025 − 0.000 / +0,64 − 0,00
DIMENSIONS INCH / mm
DIM. D ±0.015/±0,38
1.34 ± 0.015 / 34,04 ± 0,38
1.39 ± 0.015 / 35,31 ± 0,38
PANEL CUTOUT
9/64 DIA OR 4-40 THDS 4 PLACES
DIM B NOM
1.63 / 41,40
0.125 DIA / 3,18
DIM A NOM
SM853
2.45 / 62,23
0.210 / 5,33
0.172 / 4,37
1.34 / 34,04

SM-851

SM-852



SM-853



The SM-800 Series modules provide the user with a modularly expandable display, complete electronics, and ready-to-mount convenience. The series is available in 1½-, 2-, 2½-, and 3-digit configurations that can be mounted individually or as multi-digit displays. These expanded displays are achieved by horizontally stacking two or more modules together. The maximum number of digits thus attainable is theoretically unlimited since each module contains its own drive and decode electronics. The SM-855, SM-856, SM-857 and SM-858 modules are supplied with counters in addition to the decoder/drivers and the latch provided in the SM-851, SM-852, SM-853 and SM-854.

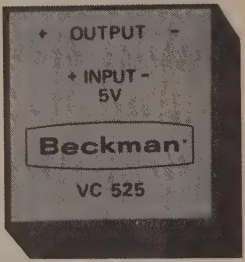
The physical design of the package allows for easy mounting of the module(s). The ease of assembly and expansion make Beckman's SM-800 Series an ideal unit for inclusion in low and medium volume display products. Character height is 0.55 inch/13,970mm for all modules.

Beckman INSTRUMENTS, INC. **INFORMATION DISPLAYS OPERATIONS** 350 North Hayden Rd. P. O. Box 3579
Scottsdale, Arizona 85257 Phone (602) 947-8371

Beckman

Display Accessories

Beckman offers a full line of related accessories, providing the design engineer with convenience of application and ease of implementation. These accessories include:



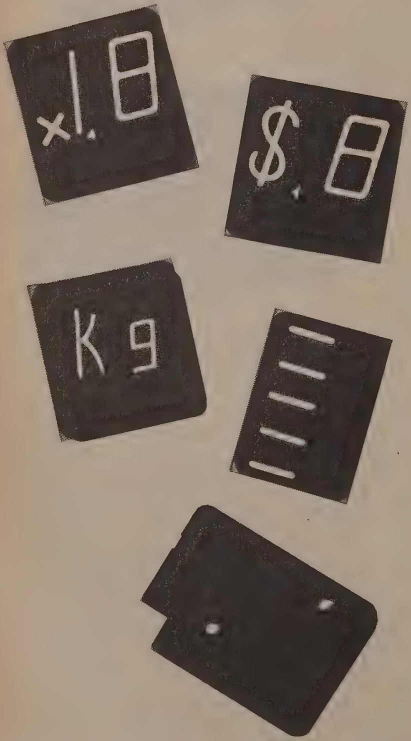
VC-525 VOLTAGE CONVERTERS

For the display user who prefers to buy rather than build a power supply, Beckman offers economically priced dc/dc voltage converters designed specifically to operate with the Beckman Displays. These reliable voltage converters are of compact modular construction that provides an adjustable output: 170 to 210 Volts dc. 180 Volts is recommended for most dc and multiplexed applications. Unit operates from 5 Volt dc TTL/DTL logic supply.

Significant product features include:

- Adjustable output from 170 to 210 Vdc.
- Operates from 5 Volt dc TTL/DTL logic supply (Vcc).
- Compact modular construction
- Rugged, reliable design

Electrical Characteristics	170-Volt Output	210-Volt Output
Input Voltage	5 Vdc (±5%)	5 Vdc (±5%)
Output Voltage Regulation	+25V-10V	±20V
Input Current (5 Vdc)	1.25A max	1.25A max
Load Current	0-15 mA	4-15 mA
Input/Output Isolation	600 Vdc	600 Vdc



SPECIAL CONFIGURATIONS

Beckman has the capability to design and produce displays for unique applications. Alpha readouts such as OHMS, VOLTS, AMPS, MPH, GPM and others can be combined with NUMERIC digits for special displays. You are invited to discuss your custom requirements with the local Beckman sales office.

CS-151 CONNECTORS

These Beckman connectors simplify the mounting of the SP-151. Units are attached with two mounting screws, or soldered directly to a circuit board.

CS-300 CONNECTORS

Designed for use with the SP-300 Series. Units help simplify assembly; they may be attached with screws or soldered directly to a circuit board.

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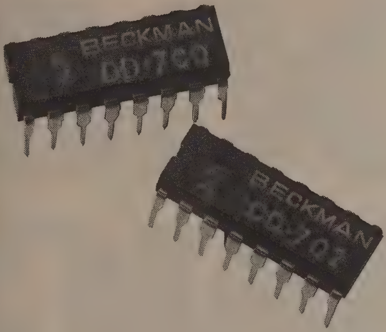
Scottsdale, Arizona 85257 Phone (602) 947-8371

Beckman

Display Products



DD-700 DECODER/DRIVER WITH CURRENT REGULATED OUTPUTS

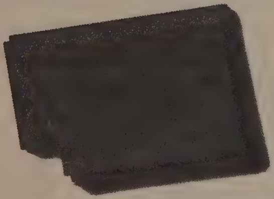
This monolithic integrated circuit accepts TTL/DTL 8-4-2-1 binary coded decimal (BCD) information to direct drive the seven-segment Beckman Display. A blanking input feature on the DD-700 provides unconditional blanking of all outputs while a ripple blanking feature allows suppression of unwanted leading and trailing zeros. The DD-700 has seven regulated, current programmable outputs capable of between 0.18 to 1.5 mA each. Regulation ensures constant brightness display operation under a changing supply voltage situation.

DD-702 BUFFER/DRIVER WITH CURRENT REGULATED OUTPUTS

This device interfaces MOS integrated circuits directly to Beckman SP-100 and SP-300 Series displays. Using the DD-702, calculator and clock chips with seven-segment outputs as well as all types of counter/latch/decoder circuits can be used to direct drive these neon gas discharge displays. The units have a current programmable output of 0.18 to 1.5 mA. Regulation ensures constant brightness display operation under a changing supply voltage situation.

The units feature:

- Output current programmable
- Direct drive for display segments
- BCD input for 7-segment output (DD-700)
- Six inputs decoded to seven outputs (DD-702)
- Output current ratioed for uniform brightness
- Ripple blanking for suppression of unwanted leading or trailing zeros (DD-700)
- Blanking input for unconditional blanking
- Saturated switch operation (external current limited)
- Current regulated outputs
- Hexidecimal decoding (DD-700)



PIN STRAIGHTENERS

Inexpensive pin straighteners are available for each display series. They are useful in realigning pins misaligned through handling, assuring ease of assembly.

SB-300 SUBASSEMBLIES

Beckman SP-300 Series Information Displays are available mounted on circuit boards. These circuit boards can be supplied in configurations of from 8 to 16 digits.

Subassemblies are available with either a lead frame or with the edge board connector. Both of these packages allow the user to mount the display conveniently to a panel cutout and connect them directly into the electronic circuitry by means of standard off-the-shelf connectors. The lead frame configuration can also be connected to the electronic circuitry by flow soldering.

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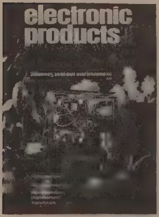

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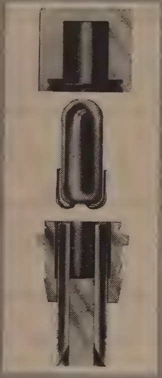
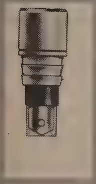
MINI-BRITE "simplicity" in subminiature indicator lights

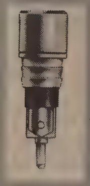
HOUSING GUIDES LAMP LEADS TO CONTACTS



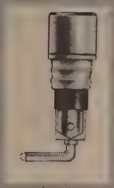
Housing is keyed so that wire leads of lamp will only be accepted by the electrical contacts.



MINI-BRITE
75001
Panel Mount



MINI-BRITE
75002
Panel/Printed
Circuit Mount



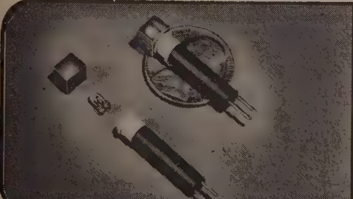
MINI-BRITE
75003
Printed Corcuit
Mount

MINI-BRITE subminiature indicators have been engineered and are manufactured with the idea of achieving the ultimate in simplicity, standardization, reliability and cost reduction . . . this has been accomplished by the design of a unique housing and contact arrangement centered on the use of standard, wire terminal lamps . . . which provides light intensity comparable to units five times their size.

Conforms to MS90308. U. S. Patent #3,559,153

- **FRONT RELAMPABLE**
  just remove the snap on cap
- **STANDARD LAMPS**
  any T-1 lamp, wire lead type
- **EASY INSTALLATION**
  press housing into hole
- **WIRING OPTIONS**
  combination solder/female terminal
- **MOUNTING OPTIONS**
  panel mounted, panel/printed circuit
- **HIGH DENSITY PACKAGING**
  mount on .250 centers.
- **CODED CAPS**
  available in a variety of colors

Write for Bulletin 1470



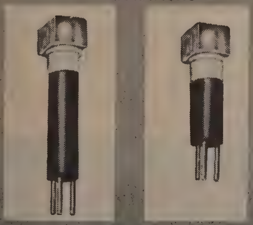
MINI-GLO Series 75004

MINI-GLO subminiature Neon indicator lights

This series of subminiature indicators provided neon bright intensity with the application of 115 VAC power. The complete indicator consists of a MINI-BRITE housing, a standard wire terminal neon lamp type USASI A1K, and a snap-on cap. The housing further incorporates an integral resistor for varying life expectancies. Except for the increased length of the housing, these indicators are compatible and have all of the features of the MINI-BRITE series.

Write for Bulletin No. 1470G

STANDARD OR SPECIAL CONFIGURATIONS



MINI-TRANS Series 75006 (NPN)
75007 (PNP)

MINI-TRANS subminiature Transistorized indicator lights

The MINI-TRANS series incorporates a silicon planar transistor, either NPN or PNP, which will turn on the indicator and provide an extremely bright indication from signal levels as low as 0.30 mA. In addition to standard circuits, specially designed physical and electrical configurations can be furnished to customer specifications. Units can be supplied with a built-in resistor of any standard value. This unique transistorized design capability is ideally suited when extremely low level signals are used for front panel indications, assuring long life and maximum brightness. A wide range of standard incandescent lamps are available to meet your requirements. Except for the increased length of the housing, these indicators are compatible and have all the features of the MINI-BRITE series.

Write for Bulletin No. 1470T

ANNUNCIATORS • LIGHT MATRICES • DISPLAY PANELS • EDGE-LIGHTED PANELS • SPECIAL INDICATORS • ALPHA/NUMERIC READOUTS.

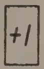
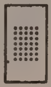
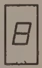
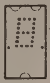
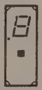
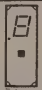
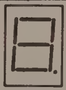
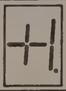
BLOC-LITE can offer specialized lighted products in a wide range of capabilities. Physical and electrical designed configurations based on customer specifications can be proposed and submitted at surprisingly low cost. Our staff will be happy to extend any engineering assistance needed to optimize your application. Please contact the factory direct, or our nearest field engineering representative.

SEE OUR CO-ORD MATRIX BOARDS • SECTION 5100

DIALIGHT LED

203 Harrison Place, Brooklyn, N.Y. 11237

Dialight offers you one-stop shopping in LED readout displays. Choose from readout with character height of .270", .300" or .625". Each display is available with or without decoder/driver or in assemblies ready for instant mounting.

Part No.	Display	Type	Character Height	Operating Temperature
745-0004		Overflow Display with Polarity and Decimal	0.270 in.	0 – 70° C
745-0005		5x7 Alphanumeric	0.300 in.	0 – 70° C
745-0006		Seven Segment	0.270 in.	0 – 70° C
745-0007		Hexadecimal (Latch Decoder/Driver)	0.270 in.	0 – 70° C
745-0008		Seven Segment (Latch Decoder/Driver)	0.270 in.	0 – 70° C
745-0009		Seven-Segment (Counter, Latch Decoder/Driver)	0.270 in.	0 – 70° C
730-0004 730-1004		Seven Segment	0.625 in.	0 – 70° C
730-0005 730-1005		Overflow Display with Polarity and Decimal	0.625 in.	0 – 70° C

* I_f peak is the peak current allowed for the stated Pulse width (Pw) and Duty Cycle.

745-0004

745-0005

745-0006

745-0007

READOUT DISPLAYS

DIALCO®

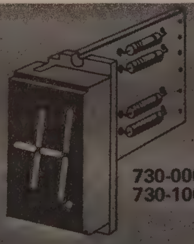
The table summarizes the salient points of all Dialight displays. Included is peak current information, at stated pulse widths and duty cycles, for multiplexing applications.

For detailed data, request Readout Product Selector Guide.

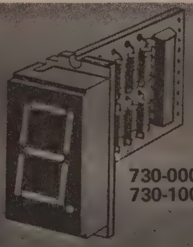
Segment	Decimal	I_F max	Multiplexing Data		
V_F @ I_F	V_F @ I_F		I_F peak	@ Pw	@Duty* Cycle
3.4V 20mA	1.65V 20mA	30mA	200mA	15msec	10%
1.65V 10mA	1.65V 10mA	20mA	100mA	.25msec	20%
3.4V 20mA	1.65V 20mA	30mA	200mA	15 msec	10%
→	→	→	→	N.A.	
→	→	→	→	N.A.	
→	→	→	→	N.A.	
2.2V 16mA	2.2V 16mA	25mA	200mA	10μ sec	10%
1.8V 27mA	1.8V 27mA	50mA	200mA	10μ sec	10%
2.2V 30mA	2.2V 15mA	25mA	200mA	10μ sec	10%
1.8V 25mA	1.8V 25mA	50mA	200mA	10μ sec	10%

745-0008

745-0009



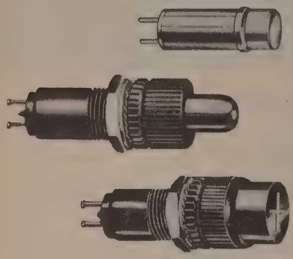
730-0004
730-1004



730-0005
730-1005

1,500,000 VISUAL INDICATORS

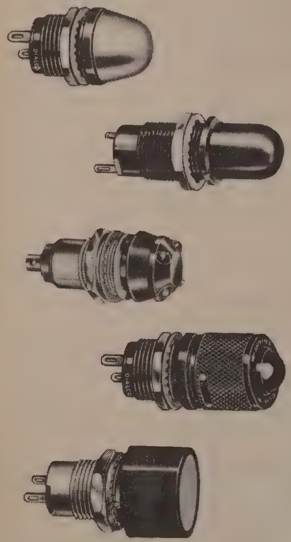
INDICATOR LIGHTS, ILLUMINATED SWITCHES, READOUT DISPLAYS



ULTRA-MINIATURE INDICATORS

Meet requirements of MIL-L-3661B. Incandescent, neon and LED. Mount in 3/8" clearance hole.

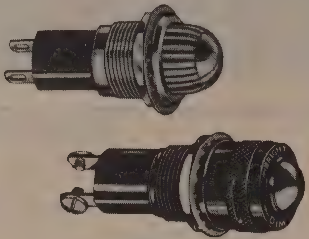
Ask for Catalog UM1200.



SUB-MINIATURE INDICATORS

Incandescent and neon. Mount in 13/32" to 17/32" clearance holes. Meet or exceed environmental requirements of MIL-L-6723 and MIL-L-3661B.

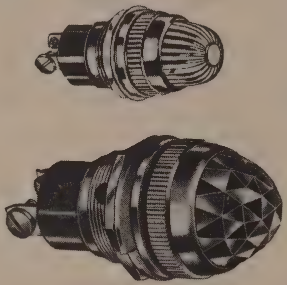
Ask for Catalogs L-157, L-158, L-178.



MINIATURE AND LARGE INDICATORS

Incandescent and neon. Miniature units mount in 9/16" or 11/16" clearance holes, large units in 1" or 1 3/16" hole. Wide choice of cap shapes and colors, also caps with mechanical dimming feature.

Ask for Catalog L-161.



OIL-TIGHT INDICATORS

Incandescent and neon. Mount in 11/16", 1" or 1 3/16" clearance holes. For heavy duty.

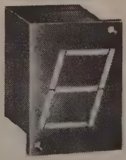
Ask for Catalog L-200.

DIALCO
DIAL
DIAL

LIGHTED SWITCHES AND MATCHING INDICATORS

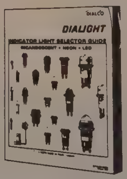
Low-profile snap-in switches and standard mounting switches. Momentary non-snap, snap or alternate switch actions. Ratings up to 5 A. Cap sizes include 1/2" 5/8" and 3/4" round or square; 3/4" x 1" rectangle.

Ask for Catalog L-210.



SINGLE-PLANE READOUTS

Incandescent and neon — 5 to 170 volts. 3/4" or 1" characters. Display 10 numbers and 10 letters. Compatible caption models.



Send for FREE Indicator Light Product Selector Guide Catalog SG730.

DIALIGHT
A NORTH AMERICAN PHILIPS COMPANY

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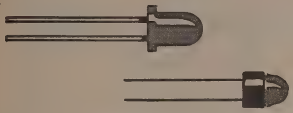


DIODE-LITE™ LIGHT SOURCES

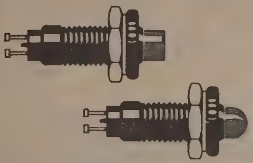
RED • GREEN • YELLOW

Diffusing particles in plastic encapsulant provide large, soft light source for panel light, status indicator and A/N display applications.

INDICATOR LIGHT CARTRIDGES

RED • GREEN • YELLOW

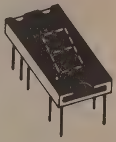
IC-compatible ultra-miniature cartridges with DIODE-LITE light source are interchangeable with incandescent types using DC power source.



INDICATOR LIGHT ASSEMBLIES

RED • GREEN • YELLOW

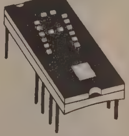
Cartridge with DIODE-LITE in housing with mounting hardware ready for installation. Interchangeable with DIALCO ultra-miniature incandescent types.



.270″ CHARACTER

PLUS-MINUS ONE, .270″ CHARACTER

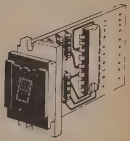
ALPHA-NUMERIC .300″ CHARACTER



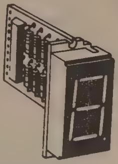
.270″ HEXADECIMAL

READOUT MODULES

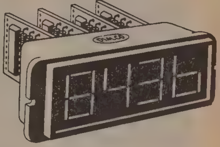
Character heights from .270″ to .625″. Dot, dot matrix and segmented formats for both numeric and full alpha-numeric displays. Wide angle (140°) viewing. IC compatible.



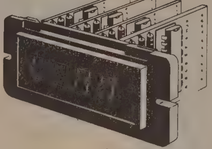
.270″ CHARACTER



.625″ CHARACTER



.625″ CHARACTER



.270″ or .300″ CHARACTERS

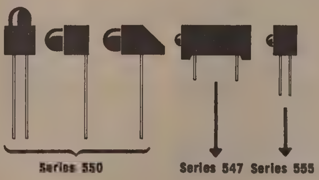
READOUT PACKAGES AND ASSEMBLIES

Single-digit packages in character heights from .270″ to .625″ include decoder/driver and resistors mounted on PC board. Bezel assemblies ready for panel mounting available with up to 10 display packages.

ASK FOR LED PRODUCT SELECTOR GUIDE

LED LOGIC-STATE FAULT INDICATORS

RED • GREEN • YELLOW



550 series indicators, with/without built-in series resistors. For use as electronic circuit fault finders, as indicators or in binary data displays.

547 series indicators, with built-in series resistor, permit dense packaging — 10 units to the inch. Pin spacing is compatible with DIP sockets.

555 series indicators have built-in series resistor, are IC compatible, and can be p-c board mounted 10 units to the inch.

DIALIGHT
A NORTH AMERICAN PHILIPS COMPANY

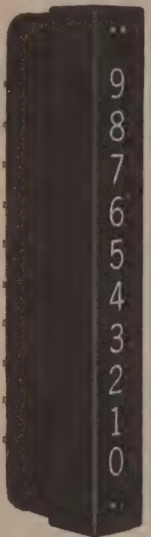
203 HARRISON PLACE, BROOKLYN, N.Y. 11237 • AREA CODE (212) 497-7600

d² display devices

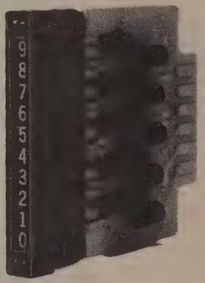
DIGISTRIP front relampable DIGITAL DISPLAYS

For a wide range of console and instrument display applications. Can be mounted horizontally or vertically, directly on p.c. boards, or ganged for high-density readout.

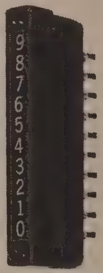
All Digistrip models are available with standard 0-9 legend, or with custom read-out information.



Digistrip II
3″ legend area.



Digistrip I with high-gain transistor drivers on integral printed circuit board.



Digistrip I
1½″ legend area.

MINIATURE T-1 INDICATOR LIGHTS

Designed to provide the brightest light in the least space. Available off-the-shelf, or designed to your application.

QUICK-LENS

Front-relampable miniature indicator light with built in light reflector for maximum brightness, even in high ambient light.

MINI-LENS

Front relampable, micro-miniature indicator light, featuring minimum panel spacing. Can be RFI shielded. Threaded body can mount directly to panel.

FLUSH-LENS

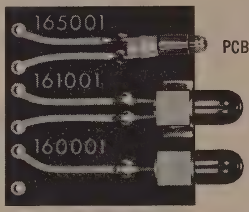
For panel mounting without protrusion. Available with RFI shield. Unit is relampable from rear of panel. No solder connections required.

TRANS-LENS

TDML

Each front relampable, with high-gain transistor driver on compact, integral p.c. board. Minimum depth behind panel. Both available in "bare board" configuration for customer to install own components. Trans-Lens is transistor-driven version of Quick-Lens; TDML is transistor-driven version of Mini-Lens.

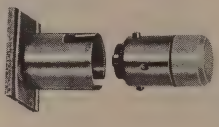
P.C. BOARD INDICATORS



PCB LIGHT

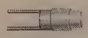
SINGLE-SIDED BOARDS
DOUBLE-SIDED BOARDS

TEST LENS

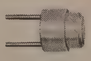


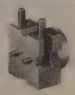
ADAPTER LENS AND SOCKET

Midget T-1¾ flanged base lamp adaptor used with T-3¼ printed circuit mounted socket. Furnished with or without integral color filter.



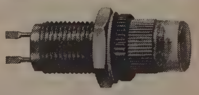
T-1 UNBASED





T-1¾ BI-PIN

Basic sockets for custom designed lamp holders or p.c. board mounting used as lighting chassis for back lighted display. Also available in side mounting.



TWIST-LENS

Quick-change lens, available in clear or colors. Waterproof and RFI shielded units available. Uses T-1¾ Bi-Pin base lamp for high brightness.

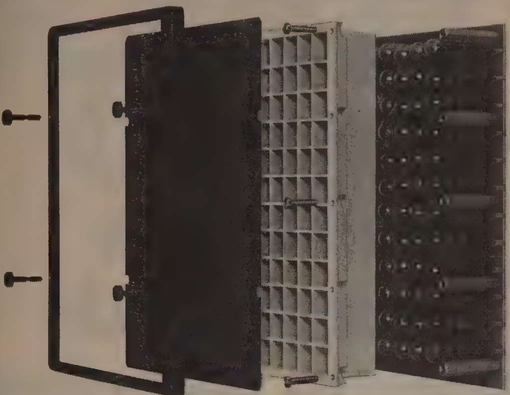
All illustrations are actual size

d² display devices, inc

mailing address: **p. o. box 667 encinitas, california 92024**
plant location: **second and E streets (714) 753-0113**

panels and laminates

d^2



BACK LIGHTED PANELS

Exploded view shows a typical backlighted panel application with printed circuit board lighting chassis containing lamps and sockets, light baffle (eggcrate) to divide message areas, and legend screen with front bezel. Application shown is relampable from front of panel. Rear relamping is also available.

CARD READER
STACKER JAM
NON PICK
PHOTODIODE ERROR
TRANSPORT JAM
TEST MODE
MISREGISTRATION CHECK
HOPPER EMPTY
STACKER FULL
0 1 2
3 4 5
6 7 8
9 10 11
LC

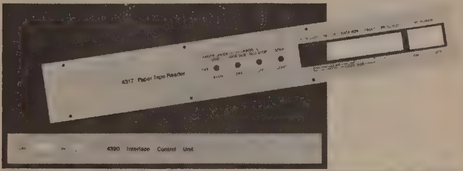
POLYESTER DEAD FRONT LAMINATES

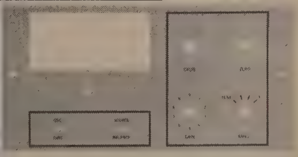
Used in conjunction with backlighted panels, or provided separately, are DF991 legend screen laminates. Except for permanently visible graphics that may be desired all nomenclature is invisible until backlighted. Standard background is black, but colored dead front laminates are also available. .010″ and double .010″ thickness are used.

NON-STANDARD CONTROL TRACK
NON-STANDARD OPERATION
TRANSPORT COVER OPEN
RECORD LOCK OUT
ON THE AIR
23.98

POLYCARBONATE AND ACRYLIC LAMINATES

Offered in dead front as noted above for polyester laminates. Thickness ranges from .020″ to .250″. Used for LED devices as well as incandescent lamps. All laminates are provided with or without pressure sensitive adhesive backing, depending upon application. All laminates feature color matching to FED STD 595, Pantone, or customer supplied color chips.


4317 Paper Tape Reader
4390 Interface Control Unit



NON-ILLUMINATED LAMINATES

Supplied on .010″ adhesive backed polyester film non-illuminated laminates are used to replace conventional painting and printing of metal panels. Screen printing of graphics is sub-surface to protect markings from being scratched off. Holes for switches, knobs, etc. are steel rule die cut. Background color is matched to customer requirements.

Write for detailed specification sheets

d^2 **display devices, inc**

mailing address: **p. o. box 667 encinitas, california 92024**
plant location: **second and E streets (714) 753-0113**

WHICH ONE?

A mini-guide to small-lamp selection*

Design Factors	Incandescent Lamps	
	Sub-Miniature	Miniature
Typical applications	Function indication (switches, indicators, etc.) illumination (front & back panel, edge lighting floodlight, backlight, etc.).	
Space requirements (bulb size.).	1/8″ to 1/4″ dia.	1/4″ — 9/16″ dia.
Current range	0.014 to 0.35 A	0.022 to 1.0 A
Voltage range	1.35 to 60 v	1.25 to 55 v
AC or DC operation	Both(2)	Both(2)
Light output range	0.003 to 0.65 mscp	0.04 to 8 mscp
Light source viewing angle	Full 180°	Full 180°
Light color	White, and all colors	White, and all colors
Infrared component	High	High
Environmental Temp. Range	−40 to 175°C	−40 to 175°C
Shock & Vibration resistance (5)	Depends on lamp application	Depends on lamp application
Life (5)	Up to 60,000 hr.	Up to 20,000 hr.
Approx. price range per lamp (in quantity to OEM mfg.)	10¢ to 53¢(6)	5¢ to 77¢(6)
Special features	High ambient light levels will not wash out lamp light source. Flexibility to fit many applications. Produces white light.	
Notes:	(1) Lamps up to 9/16-in. in diameter. (2) DC may affect lamp life. (3) Directional light source (4) Molded plastic lens limits high and low temperature use.	

For helpful service contact one of these offices. If your city isn't listed, look under General Electric Lamp Division in your phone book.

ALBANY, N. Y.	783-6188
ATLANTA, GA.	875-0921
BALTIMORE, MD.	242-5700
BOSTON, MASS.	332-6200
BUFFALO, N. Y.	874-5180
CHARLOTTE, N. C.	376-6585
CHICAGO, ILL.	332-4712
CINCINNATI, OHIO	745-5730
CLEVELAND, OHIO	
Commercial & Industrial	266-4256
Consumer Products	266-4264
DALLAS, TEXAS	358-5321
DENVER, COLO.	388-4611
DETROIT, MICH.	883-0200
HOUSTON, TEXAS	623-6250
HYATTSVILLE, MD.	864-6105
INDIANAPOLIS, IND.	547-5511
KANSAS CITY, MO.	471-0123
LOS ANGELES, CAL.	723-2541
MEMPHIS, TENN.	948-2646
MIAMI, FLA.	693-3811
MILWAUKEE, WIS.	462-3860
MINNEAPOLIS, MINN.	331-4050
NEWARK, N. J.	376-9000
NEW HAVEN, CONN.	932-2274
NEW ORLEANS, LA.	835-6421
NEW YORK, N. Y.	750-2180 750-3028
NEW YORK, N. Y.	896-6000
OAKLAND, CALIF.	569-3422
PHILADELPHIA, PA.	688-5900

There was a time when you could easily select the small lamp you needed from a limited number of incandescent types. But times change. Today, small-lamp selection requires a complex, precise sorting process through an almost endless array of styles, types, and sizes. The incandescents have broadened and subdivided into miniature and sub-miniature classes. And, to complicate things, there are neon-glow lamps in a range of colors, and light-emitting diodes have made the scene.

What used to be a relatively simple matter has become an all-important design consideration — which lamp is the right lamp? Right in terms of function? light output? available space? power requirements? life expectancy? color? environment? and **cost?**

How to be RIGHT

Being "right" in lamp selection first requires a systematic matching of design and function requirements to available types. This process will identify the most likely lamp candidates.

Second, being "right" requires a detailed analysis of the candidates along with a thorough evaluation of the various lamp design tradeoffs to zero in on the lamp for your specific application.

How to get help

Your local G-E sales specialist will be glad to assist you in all phases of the lamp selection process. But, to help you in the all-important first stage of systematically matching design and function requirements to available lamp types, we've prepared this "mini-guide" to small-lamp selection. For further help, contact one of the GE sales offices listed below. Or write General Electric, Miniature Lamp Products Department 3382E, Nela Park, Cleveland, Ohio 44112.

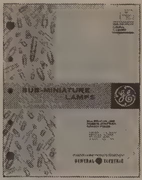
Neon-Glow Lamps	Light Emitting Diodes (visible)
Function indication (switches, indicators). Illumination (panel, edge lighting. Circuit component voltage regulation.	Function indication.
1/4" to 9/16" dia.	1/16" to 1/4" dia.
2.6 mA or less	5 to 25 mA
110 to 220 v	2.5 to 3.1 v
Both(2)	Both
0.003 to 0.018 mscp	0.004 cp(3)
Full 180°	Narrow(3)
Red, amber, green, blue	Red, amber, green
No	Low
−40 to 95°C	Note(4)
Excellent in most environments	Excellent in most environments
100,000 hr. with proper resistor selection	100,000 hr.
4-1/2¢ to 90¢	7¢ to 35¢
Variable light output with series resistor selection. Compatible with some semi-conductors. Low cost. Low power consumption. Excellent shock and vibration resistance.	Long life. Excellent shock and vibration resistance. Low operating voltage & power consumption.

(5) Service life depends on use and environment.

(6) Lamp price depends on base and filament configuration. Special purpose lamps, such as lens end, can cost up to $1.21.

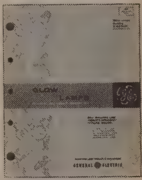
*Lamps up to 9/16" in diameter

You can find a GE miniature lamp for practically every need... in one of these 4 free catalogs.



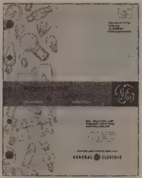
Sub Miniature Lamps: 24 pages. Data covers over 210 sub-miniature lamps. Diameters ¼" and smaller. Average rated voltage 1.3 to 60 Candlepower range from .006 to 15. Lamp life up to 60,000 hours.

Sub-Miniature Lamps (3-6252R1)



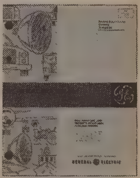
Glow Lamps: 8 pages. Data covers 83 Neon Glow Indicator and Circuit Component lamps. Diameters ranging from ¼" to 1¾". Wire terminal lengths ½", ⅝", ¾" and 15⁄16".

Glow Lamps (3-6254R)



Miniature Lamps: 40 pages. Data covers over 500 miniature lamps ranging up to 20,000 hours average rated life. With a design voltage range of from 1.2 to 55, and candlepower range from .02 to 250. Diameter range from 11⁄32" to 21⁄16".

Miniature Lamps (3-6253R1)



Sealed Beam Lamps: 16 pages. Data covers over 180 Sealed Beam lamps, ranging from 4½" to 8" in diameter with a design voltage range of from 4.0 to 115, and initial candlepower of from 150 to 600,000.

Sealed Beam Lamps (3-6251R1)

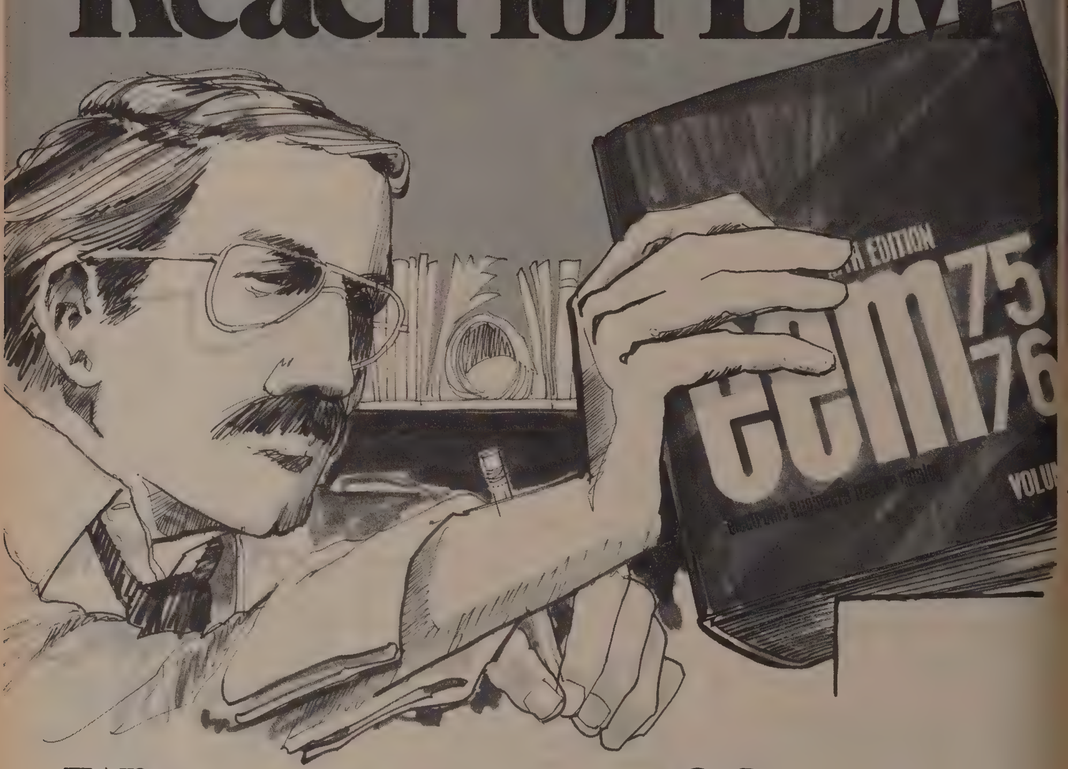
Get complete and up-to-date electrical and physical specifications from the four General Electric catalogs shown above. To order your new ones, contact one of the sales offices listed or write General Electric, Miniature Lamp Products Department, 3382E, Nela Park, Cleveland, Ohio 44112.

PITTSBURGH, PA.	471-9050
PORTLAND, ORE.	221-5120
RICHMOND, VA.	355-3289
SALT LAKE CITY, UTAH	487-2276
SEATTLE, WASH.	763-2870
ST. LOUIS, MO.	429-6930
TAMPA, FLA.	988-7351

GENERAL ELECTRIC

There is more catalog data available to you at your fingertips than ever before...when you

Reach for EEM


TH EDITION
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electronic engineers master catalog
VOLU

With more than 4,400 pages of product data from 700 manufacturers of electronic products in EEM.

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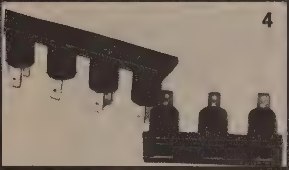
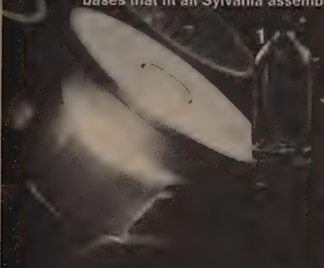
GTE SYLVANIA

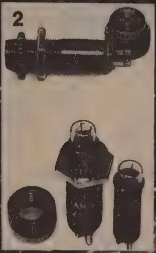
miniature lamps, sockets & lenses

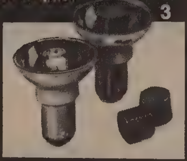
1. Meet stringent optical system requirements with all-glass, wedge-base halogen lamps featuring precisely located filaments, nearly constant light output over rated life. Other applications: detection systems, photocell activators, medical/dental instruments, aircraft instruments.
2. Reduce inventory with interchangeable cartridge lamps, sockets and lenses. For fast, easy field replacement, choose from a complete voltage range of 7 pilot and 15 indicator cartridge lamps, 10 transparent or translucent color lenses, and standard bi-pin bases that fit all Sylvania assemblies.
3. Fill special application needs with high-candlepower annunciator lamps. Ratings from 6 to 120V, with built-in aluminum reflectors to intensify candlepower, pyrex colored lens caps for unique lighting and signaling effects. Choice of bases: candelabra screws, miniature bayonets, PC-card compatible bi-pins.
4. Simplify multiple mounting with strip sockets that clip to panel, can be cut to any length. Up to 12 sockets on ½" or ¾" centers. Common or separate socket connections, choice of three optional snap-on color caps for the twin light.
5. Get total assembly backup without compromise for all pilot and indicator miniature lamps. Full hardware range includes pilot housing with five interchangeable screw-on lens types, round or rectangular single sockets, twin-light indicator assemblies, even three types of color caps.

For technical information and applications data compiled especially for the engineer, write or call for the 54-page Engineering Design Handbook and Catalog, No. 201.









SYLVANIA MINIATURE LIGHTING PRODUCTS INC.

West Main Street, Hillsboro, N. H. 03244 • (603) 464-5533
TWX 710-366-0387

GTE SYLVANIA

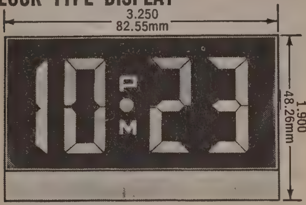
HAMLIN INC

628 LAKE STREET • LAKE MILLS, WISCONSIN 53551
PHONE: SALES 414/648-2361 • TWX 910-260-3740

LIQUID CRYSTAL DISPLAYS

Hamlin has "standard" LCD's to fill most digital readout requirements in watches, clocks, calculators, meters or instruments. Displays can be "custom" made to nearly any design. All feature very low power requirements, excellent contrast ratio and long life. Condensed descriptions and specifications are listed below. For further information on these, or if you have special requirements, please consult your local Hamlin representative or distributor.

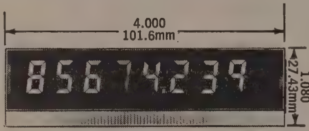
MODEL 3401 3½ DIGIT CLOCK TYPE DISPLAY



Dynamic Scattering, Reflective or Transmissive

Operating Voltage: 15-20 Vac, 15-120Hz. **Power Consumption:** 3.75 mW nominal (all segments energized with 15 volts). **Turn On (Rise) Time:** 150 milliseconds typical. **Turn Off (Decay) Time:** 100 milliseconds typical. **Contrast ratio:** 20:1 typical. **Character Height:** 1.12" (2.80 mm). **Terminal Width:** .050" (5.250mm). **Terminal Spacing:** .100" (2.50 mm) C to C. **Operating Temperature:** 5°C to 55°C. **Storage Temperature:** −20°C to 70°C. **Drawing No.:** D10-3401. **Base Price:** $24.00 reflective, $22.50 transmissive.

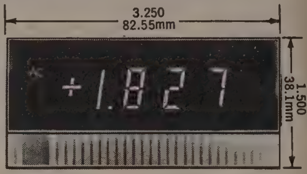
MODEL 3501 8 DIGIT CALCULATOR TYPE DISPLAY



Dynamic Scattering, Reflective or Transmissive

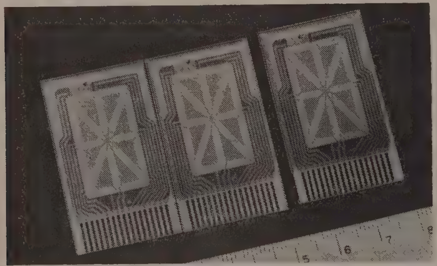
Operating Voltage: 15-20 Vac, 15-120 Hz. **Power Consumption:** 1.50 mW nominal (all segments energized with 15 volts). **Turn On (Rise) Time:** 150 milliseconds typical. **Turn Off (Decay) Time:** 100 milliseconds typical. **Contrast ratio:** 20:1 typical. **Character Height:** .470" (11.750 mm). **Terminal Width:** .025" (.625 mm). **Terminal Spacing:** .050" (1.250 mm). **Operating Temperature:** 5°C to 55°C. **Storage Temperature:** −20°C to 70°C. **Drawing No.:** D10-3501. **Base Price:** $22.50 reflective, $21.50 transmissive.

MODEL 3601 3½ DIGIT INSTRUMENT TYPE DISPLAY



Dynamic Scattering, Reflective or Transmissive

Operating Voltage: 15-20 Vac, 15-120 Hz. **Power Consumption:** 2.25 mW nominal (all segments energized with 15 volts). **Turn On (Rise) Time:** 150 milliseconds typical. **Turn Off (Decay) Time:** 100 milliseconds typical. **Contrast Ratio:** 20:1 typical. **Character Height:** .600" (15.0 mm). **Terminal Width:** .050". **Terminal Spacing:** .075" (1.875 mm) C to C. **Operating Temperature:** 5°C to 55°C. **Storage Temperature:** −20°C to 70°C. **Drawing No.:** D10-3601. **Base Price:** $21.50 reflective, $21.00 transmissive.



NEW! Alphanumeric Liquid Crystal Displays — 1" High

These 16 segment, dynamic scattering displays can be mounted side by side to form any legend. They are ideal for prototype work or where quantities desired might not meet factory minimum orders. Stocked at authorized distributors for immediate delivery.

Models — 3305-2 Reflective, silver — 3305-3 Transmissive, yellow segments, black background. **Operating Voltage:** 10-30 Vac, 16-150 Hz. **Power Consumption:** 2.25 mW. **Turn On (Rise) Time:** 150 milliseconds typical. **Turn Off (Decay) Time:** 50 milliseconds typical. **Contrast Rates:** Reflective 20:1; Transmissive 15:1. **Operating Temperature:** 5°C to 55°C. **Storage Temperature:** −20°C to 70°C. **Terminal Spacing:** .050" (1.25 mm) (centerline to centerline) **Terminal Width:** .025" (.625 mm). **Character Height:** 1.00" (25. mm). **Character Width:** 0.6" (15. mm). **Base Price:** $14.95 each.

MODEL 3302 3½ DIGIT WATCH TYPE (MEN'S) DISPLAY

Dynamic Scattering, Reflective Silver or Gold

Operating Voltage: 10-30 Vac, 16-150 Hz. **Power Consumption: 30 μW** maximum (all segments energized at 15 Volts). **Operating Temperature:** 5°C to 55°C. **Storage Temperature:** −20°C to 70°. **Turn On (Rise) Time:** 100 milliseconds typical. **Turn Off (Decay) Time:** 150 milliseconds typical. **Contrast Ratio:** 20:1. **Character Height:** .200" (5.0 mm). **Character Width:** .100" (2.50 mm). **Terminal Width:** .043" (1.075 mm). **Segment Width:** .020" (.500 mm). **Terminal Spacing:** .085" (2.125 mm) C to C. **Character Slope:** 5½°. **Base Price:** $25.00.

MODEL 3304 3½ DIGIT WATCH TYPE (MEN'S) DISPLAY

Field Effect

Operating Voltage: 5-20 Vac, 25-32 Hz. **Power Consumption:** 21 μW maximum (all segments energized with 7 volts). **Operating Temperature:** 0-50°C. **Storage Temperature:** −20°C to 55°C. **Turn On (Rise) Time:** 150 milliseconds typical. **Turn Off (Decay) Time:** 300 milliseconds typical. **Contrast Ratio:** 20:1. **Character Height:** .200" (5.0 mm). **Character Width:** .122" (3.050 mm). **Terminal Width:** .039" (.975 mm). **Terminal Spacing:** .070" (1.750 mm) C to C. **Character Slope** 5°. **Base Price:** $25.00.

HAMLIN INC

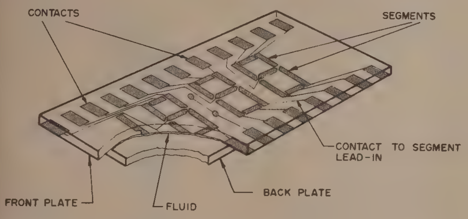
628 LAKE STREET • LAKE MILLS, WISCONSIN 53551
PHONE: SALES 414/648-2361 • TWX 910-260-3740

THE CASE FOR LIQUID CRYSTAL DISPLAYS

DYNAMIC SCATTERING OR FIELD EFFECT

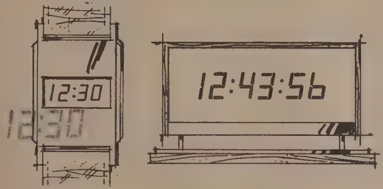
Liquid Crystal Displays; light emitting diodes; incandescent and fluorescent displays and "Nixie" tubes are becoming solidly established in circuit design as the trend to digital readout continues. The design engineer faces an unusually formidable task in determining the type of display most suitable and practical for his product. We make liquid crystal displays — dynamic scattering AND field effect.

The Display of the Future? Our displays are as sandwiches of two glass plates, spaced typically about .0005" apart with a nematic liquid crystal solution between them and hermetically sealed at the perimeters.



How They Work. When the liquid is not electrically excited, its long cigar-shaped molecules are parallel to one another in a position perpendicular to the plates. The liquid appears transparent. When an electric current is applied, ion activity of the molecules leads to turbulence causing the liquid to scatter incident light. Depending on the type of nematic liquid used, either a dynamic scattering or field effect display results.

Dynamic Scattering. We use a nematic liquid crystal solution in our dynamic scattering displays. This nematic liquid crystal is conductive, have negative dielectric anisotropy, and is oriented in either a homeotropic or homogeneous alignment. In either case the liquid is clear in the absence of an electric field. When an electric field is induced, the molecules scatter, giving the visual effect of a frosted piece of glass.



Field Effect. These displays also utilize a nematic liquid crystal but with a different molecular orientation. The molecules are arranged in a helical stack, like a spiral staircase. The liquid is also sandwiched between two polarizers which are at right angles with each other. When current is applied the molecules rotate 90° so that they become perpendicular to the front polarizer. Light that passes through them is not rotated and therefore is absorbed by the rear polarizer. The result is a dark image on a light background. The image also can be reversed — light on dark.

Producing an Image — digital or other — simply requires a conductive surface the shape of the desired image on the front glass plate. Current flowing from the conductive image through the liquid crystal to the common ground back plate causes the liquid to change from clear to a frosted appearance in the current-carrying areas.

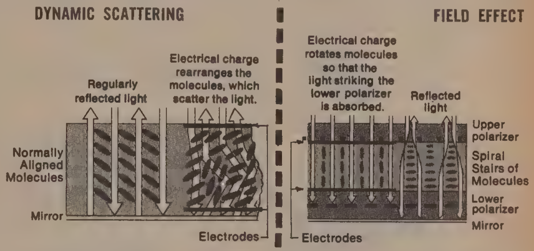
The images almost always are in the form of seven segments formed on the front glass with transparent oxide and each with its own electrical lead. Energizing the proper segments produces the desired numerals. Lead-ins connect the segments to external contacts on the sandwich (display).

Consider the Advantages. Liquid crystal displays have a number of distinct advantages. Simplicity is the reason for several of these. The elements are few and passive — very little can go wrong with an LCD and this means reliability and long life.

Simplicity means low cost too — lower than that of most similar displays. Packaging costs are low because LCD's can be driven directly by MOS and C/MOS circuits. Very narrow character widths are possible and still provide a good viewing angle — 60 degrees in many cases.

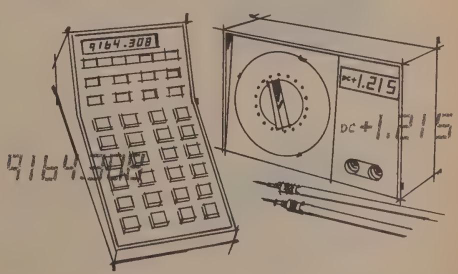
Low power consumption makes LCD's a logical choice where power limitations rule other displays out. They do not generate light as do other displays so use no power for that purpose. Watch type field effect LCD's use only 3 μW for example with all segments energized at 7 Volts.

LCD's offer the greatest flexibility of any display type. Several standard displays, dynamic scattering or field effect, are immediately available from Hamlin's stock. Special displays with virtually any type of image can be produced with surprisingly low preparation or "tooling" cost. Because of the LCD's simplicity, lead time on specials is only a matter of weeks.


DYNAMIC SCATTERING
FIELD EFFECT
Regularly reflected light
Electrical charge rearranges the molecules, which scatter the light.
Normally Aligned Molecules
Mirror
Electrodes
Electrical charge rotates molecules so that the light striking the lower polarizer is absorbed.
Reflected light
Upper polarizer
Spiral Stairs of Molecules
Lower polarizer
Mirror
Electrodes

A Few Limitations. LCD's have limitations too. Operating temperature range is one. Liquid crystals slow down and may even cease to function at temperatures below 0°C. Above 50-60°C, crystals go into solution and will not function properly. But extremes do not damage LCD's. Once the temperature returns to normal, operation is automatically resumed.

LCD's are somewhat difficult to read under low ambient light conditions. (Side or back lighting can remedy this.) Visibility under medium to high ambient light conditions is excellent.

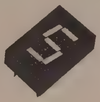
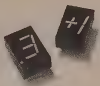
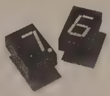
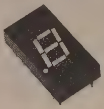
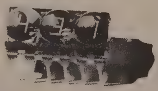


Conclusion. In the majority of display applications, MOS and C/MOS compatibility, reliability, flexibility and low power requirements are important considerations. No other display can match the liquid crystal display on these jobs. They could be the display of the future.

And that's the case for the LCD. For specifications, and application data, write Hamlin, Inc., Lake Mills, Wisconsin 53551, (414) 648-2361, for name of nearest representative.

Red, Yellow and Green Seven Segment LED Displays

HEWLETT PACKARD
COMPONENTS

Device		Description	Package	Application
	5082-7650	.43" High Efficiency Red, Common Anode, LHDP	14 Pin Epoxy, .3" DIP .75"H x .5"W x .25"D	General Purpose Market • Test Equipment • Digital Clocks • Clock Radios • TV Channel Indicators • Business Machines • Digital Instruments • Automobiles For further information ask for Application Note 941 on 7-Segment Displays or AN 964 on Contrast Enhancement
	5082-7660	.43" Yellow, Common Anode, LHDP		
	5082-7670	.43" Green, Common Anode, LHDP		
	5082-7750	.43" Red, Common Anode, LHDP	14 Pin Epoxy, .3" DIP .75"H x .5"W x .25"D	
	5082-7751	.43" Red, Common Anode, RHDP		
	5082-7752	.43" Red, Common Anode, Polarity & Overflow Indicator		
	5082-7760	.43" Red, Common Cathode, RHDP	14 Pin Epoxy, .3" DIP .75"H x .5"W x .25"D	
	5082-7730	.3" Red, Common Anode, LHDP	14 Pin Epoxy, .3" DIP .75"H x .4"W x .18"D	
	5082-7731	.3" Red, Common Anode, RHDP		
	5082-7732	.3" Red, Common Anode, Polarity & Overflow Indicator		
	5082-7740	.3" Red, Common Cathode, RHDP	10 Pin Epoxy, .3" DIP .75"H x .4"W x .18"D	
	5082-7402	.11" Red, 3 Digits Right,[1] Centered Decimal Point	12 Pin Epoxy, .3" DIP	Small Display Market • Portable/Battery Power Instruments • Portable Calculators For further information ask for Application Note 937 on Monolithic LED Displays
	5082-7403	.11" Red, 3 Digits Left,[1] Centered Decimal Point		
	5082-7404	.11" Red, 4 Digits, Centered Decimal Point		
	5082-7405	.11" Red, 5 Digits, Centered Decimal Point	14 Pin Epoxy, .3" DIP	
	5082-7412	.11" Red, 3 Digits Right,[1] RHDP	12 Pin Epoxy, .3" DIP	
	5082-7413	.11" Red, 3 Digits Left,[1] RHDP		
	5082-7414	.11" Red, 4 Digit, RHDP		
	5082-7415	.11" Red, 5 Digit, RHDP	14 Pin Epoxy, .3" DIP	
	5082-7432	.11" Red, 2 Digits Right,[2] RHDP	12 Pin Epoxy, .3" DIP	
	5082-7433	.11" Red, 3 Digits, RHDP		

NOTES: 1. Three Digit Displays are mounted in four-digit packages with digits placed to the left or right.
2. Two Digit Displays are mounted in three-digit packages with digits placed to the right.

HEWLETT PACKARD

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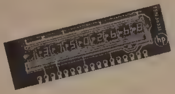
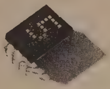
HEWLETT PACKARD
COMPONENTS

Red, Yellow and Green Seven Segment LED Displays (Continued)

Device		Description	Package	Application
	5082-7440	.105" Red, 8 Digits, Mounted on P.C. Board	17 Term. P.C. Bd., 2,000" W., Edge Card Connector	Small Display Market • Portable/Battery Power Instruments • Portable Calculators For further information ask for Application Note 937 on Monolithic LED Displays
	5082-7448	.105" Red, 8 Digits, Mounted on P.C. Board	17 Term. P.C. Bd., 2,375" W., Edge Card Connector	
	5082-7441	.105" Red, 9 Digits, Mounted on P.C. Board	17 Term. P.C. Bd., 2,000" W., Edge Card Connector	
	5082-7449	.105" Red, 9 Digits, Mounted on P.C. Board	17 Term. P.C. Bd., 2,375" W., Edge Card Connector	

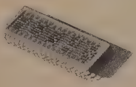
Commercial Integrated LED Displays

Device		Description	Package	Application
	5082-7300	.29" 4 x 7 Single Digit Numeric, RHDP, Built-In Decoder/Driver/Memory	8 Pin Epoxy, .6" DIP .55"H x .4"W x .11"D	General Purpose Market • Test Equipment • Business Machines • Medical • Computer Peripherals • Avionics For further information ask for Application Note 934 on LED Display Installation Techniques
	5082-7302	.29" 4 x 7 Single Digit Numeric, LHDP, Built-In Decoder/Driver/Memory		
	5082-7340	.29" 4 x 7 Single Digit Hexadecimal, Built-In Decoder/Driver/Memory		
	5082-7304	.29" Overrange Character Plus/Minus Sign	8 Pin Epoxy, .6" DIP .55"H x .4"W x .11"D	
	5082-7500	1.5" 5 x 7 Single Digit LHDP, Built-In Decoder/Driver	P.C. Board 10 Pin Edge Card Connector (.156" Centers)	General Purpose Market • Test Equipment • Medical Equipment • Industrial Controls

Hermetically Sealed Integrated LED Displays

Device		Description	Package	Application
	5082-7010	.27" 5 x 7 Single Digit Numeric, LHDP, Built-In Decoder/Driver	8 Pin Hermetic .100" Pin Centers	• Ground, Airborne, Shipboard Equipment • Fire Control Systems • Medical Instruments • Space Flight Systems
	5082-7011	.27" Plus/Minus Sign		
	5082-7001	.27" 5 x 7 Three Digit Numeric, LHDP, Built-In Decoder/Driver	24 Pin Hermetic .100" Pin Centers	

Alphanumeric LED Displays

Device		Description	Package	Application
	5082-7100	.29" 5x7 Three Digit Alphanumeric	22 Pin Hermetic .6" DIP	General Purpose Market • Business Machines • Calculators • Solid State CRT • High Reliability Applications For further information ask for Application Note 931 on Alphanumeric Displays
	5082-7101	.29" 5x7 Four Digit Alphanumeric	28 Pin Hermetic .6" DIP	
	5082-7102	.29" 5x7 Five Digit Alphanumeric	36 Pin Hermetic .6" DIP	

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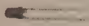
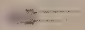
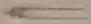
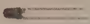
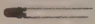
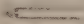
HEWLETT hp PACKARD
COMPONENTS

Red, Yellow and Green LED Lamps

Device		Description				Typical Luminous Intensity	Θ½ [1]	Typical Forward Voltage
Photo	Part No. 5082-	Color	Emitting Material	Lens	Package			
	4650	High Eff. Red (635nm)[2]	GaAsP on GaP	Red Diffused	T-1¾; Plastic; Long, General Purpose Leads[3]	2.0mcd @ 10mA	90°	2.2 Volts @ 10 mA
	4655					4.0mcd @ 10mA		
	4657			Red Non-Diffused		12.0mcd @ 10mA	35°	
	4658					24.0mcd @ 10mA		
	4684	High Eff. Red (635nm)[2]	GaAsP on GaP	Red Diffused	T-1; Plastic; Long Leads[4]	2.5mcd @ 10mA	80°	2.2 Volts @ 10mA
	4550	Yellow (583nm)[2]	GaAsP on GaP	Yellow Diffused	T-1¾; Plastic; Long, General Purpose Leads[3]	1.8mcd @ 10mA	90°	2.2 Volts @ 10mA
	4555					3.0mcd @ 10mA		
	4557			Yellow Non-Diffused		9.0mcd @ 10mA	35°	
	4558					16.0mcd @ 10mA		
	4584	Yellow (583nm)[2]	GaAsP on GaP	Yellow Diffused	T-1; Plastic; Long Leads[4]	2.5mcd @ 10mA	60°	2.2 Volts @ 10mA
	4950	Green (565nm)[2]	GaP	Green Diffused	T-1¾; Plastic; Long, General Purpose Leads[3]	1.8mcd @ 20mA	90°	2.4 Volts @ 20mA
	4955					3.0mcd @ 20mA		
	4957			Green Non-Diffused		9.0mcd @ 20mA	30°	
	4958					16.0mcd @ 20mA		
	4984	Green (565nm)[2]	GaP	Green Diffused	T-1; Plastic; Long Leads[4]	2.0mcd @ 20mA	70°	2.4 Volts @ 20mA
4403/4440	4403	Red (655nm) [2,5]	GaAsP on GaAs	Red Diffused	T-1¾; Plastic; Short Leads[3]	1.2mcd @ 20mA	75°	1.6 Volts @ 20mA
	4415				T-1¾; Plastic; Short, Bent Leads[4]			
4415/4444	4440				T-1¾; Plastic; Short Leads[3]	0.7mcd @ 20mA		
	4444				T-1¾; Plastic; Short, Bent Leads[4]			
	4480	Red (655nm) [2,5]	GaAsP on GaAs	Red Diffused	T-1; Plastic; Long Leads[4]	0.8mcd @ 20mA	120°	1.6 Volts @ 20 mA
	4483			Clear Diffused				
	4486			Clear Non-Diffused			80°	
4850/4855	4850	Red (655nm) [2,5]	GaAsP on GaAs	Red Diffused	T-1¾; Plastic; Long, Wire Wrappable Leads[3]	0.8mcd @ 20mA	95°	1.6 Volts @ 20 mA
	4855					1.4mcd @ 20mA		
4484/4494	4484				T-1; Plastic; Long Leads[4]	0.8mcd @ 20mA	120°	
	4494					1.4mcd @ 20mA		
	4487	Red (655nm) [2,5]	GaAsP on GaAs	Clear Non Diffused	T-1 (Low Dome); Plastic; Long Leads[4]	0.8mcd @ 20mA	120°	1.6 Volts @ 20mA
	4488					Guaranteed Minimum: 0.3mcd @ 20mA		

NOTES:
1. Total Angle Between Half Luminous Intensity Points.
2. Peak Wavelength.
3. Panel Mountable. Ask for Data Sheet 5082-4707.
4. PC Board Mountable.
5. Ask for AN 945 on Photometry of Red LED Lamps.

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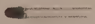
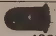
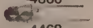
HEWLETT hp PACKARD
COMPONENTS

Red, Yellow and Green LED Lamps (Cont'd.)

Device		Description				Typical Luminous Intensity	Θ½ [1]	Typical Forward Voltage
Photo	Part No. 5082-	Color	Emitting Material	Lens	Package			
	4880	Red (655nm) [2,6]	GaAsP on GaAs	Red Diffused	T-1¾; Plastic; Long, Wire Wrappable Leads[3]	0.8mcd @ 20mA	58°	1.6 Volts @ 20mA
	4883			Clear Non-Diffused			50°	
	4886			Clear Diffused			65°	
	4881			Red Diffused		1.3mcd @ 20mA	58°	
	4884			Clear Non-Diffused			50°	
	4887			Clear Diffused			65°	
	4882			Red Diffused		1.8mcd @ 20mA	58°	
	4885			Clear Non-Diffused			50°	
	4888			Clear Diffused			65°	

Integrated LED Lamps

Device		Description				Typical Luminous Intensity	Θ½ [1]	Typical Forward Current
Photo	Part No. 5082-	Color	Integration	Lens	Package			
	4732	Red (655nm) [2,6]	Voltage Sensing IC integrated with GaAsP LED chip	Red Diffused	T-1; Plastic; Long Leads[4]	0.7mcd @2.75V	95°	13mA @2.75V
 -4860	4860	Red (655nm) [2,6]	Resistor chip integrated with GaAsP LED chip	Red Diffused	T-1¾; Plastic; Long Leads[3]	0.8mcd @ 5.0V	58°	16mA @5.0V
 -4468	4468			Clear Diffused	T-1; Plastic; Long Leads[4]		70°	

Hermetically Sealed LED Lamps

Device		Description			Minimum Luminous Intensity	Θ½ [1]	Typical Forward Voltage
Photo	Part No.	Color	Lens	Package			
	1N5765 JAN 1N5765[5] JAN TX 1N5765[5]	Red (655nm) [2,6]	Red Diffused	Hermetic/TO-46; Long Leads[4]	0.5mcd @ 20mA	70°	1.6 Volts @ 20mA
	5082-4420	Red (655nm) [2,6]	Red Diffused	Hermetic/TO-46; Long Leads[4]	0.5mcd @ 20mA	70°	1.6 Volts @ 20mA

NOTES:
1. Total Angle Between Half Luminous Intensity Points.
2. Peak Wavelength.
3. Panel Mountable. Ask for Data Sheet 5082-4707.
4. PC Board Mountable.
5. Military Approved and qualified for High Reliability Applications.
6. Ask for AN 945 on Photometry of Red LED Lamps.

HEWLETT hp PACKARD

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ILLUMINATED PRODUCTS INC. (formerly MARCO-OAK)

A Subsidiary of OAK Industries Inc.

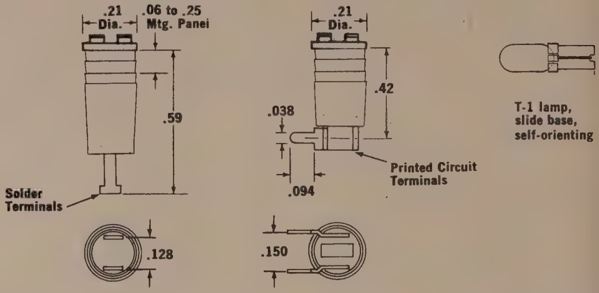
INDICATORS

The sub-miniature indicators shown here and other sizes and styles shown on the following page are examples of those most frequently used by panel designers. A complete catalog of IPI indicators and switches is available on request.

The QT series below owe their wide popularity to low cost, dependability, and the patented "slide base" lamp that is self-orienting when replaced. Caps are available in a variety of translucent or transparent colors and domed or flat top shapes. The LED and neon models feature a micro-grooved dome cap for optimum visibility.

sub-miniature "little QT"

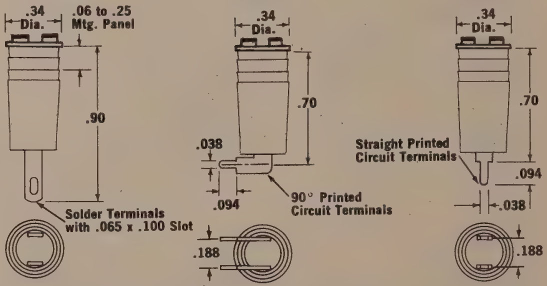
BASE ASSEMBLY 99-33080 **BASE ASSEMBLY 99-33081**


.21 Dia.
.06 to .25 Mtg. Panel
.59
Solder Terminals
.128
.21 Dia.
.42
.038
.094
Printed Circuit Terminals
.150
T-1 lamp, slide base, self-orienting

99-33080 SERIES
99-33081 SERIES

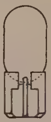
miniature "big QT"

BASE ASSEMBLY 14-33880 **BASE ASSEMBLY 14-33881** **BASE ASSEMBLY 14-33882**


.34 Dia.
.06 to .25 Mtg. Panel
.90
Solder Terminals with .065 x .100 Slot
.34 Dia.
.70
.038
.094
90° Printed Circuit Terminals
.188
.34 Dia.
.70
Straight Printed Circuit Terminals
.094
.038
.188

14-33880 SERIES
14-33881 SERIES
14-33882 SERIES

T-1¾ lamp, slide base, self-orienting

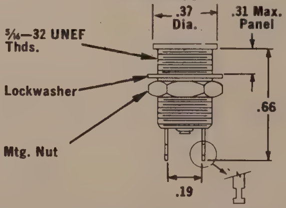


Neon version (22-35380 Series) uses standard T-2 neon lamp (series resistor not included). Used only with solder terminal base assembly.

L.E.D. version (QT/D300, 14-35380 Series) incorporated any L.E.D. conforming to outline, diam. is .235, height, .390. Solder terminal base only.

sub-miniature

BASE ASSEMBLY 99-33180


.37 Dia.
.31 Max. Panel
5⁄16—32 UNEF Thds.
Lockwasher
Mtg. Nut
.66
.19

The standard and watertight versions of this indicator are identical except for the addition of rubber washers to the base and lens caps for the latter.

99-33180 SERIES

sub-miniature, watertight

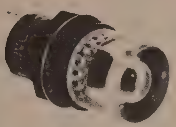
95-33180 SERIES

ILLUMINATED PRODUCTS INC. (formerly MARCO-OAK)

A Subsidiary of OAK Industries Inc.

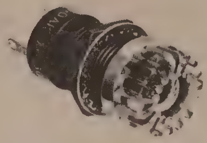
INDICATORS, typical

miniature



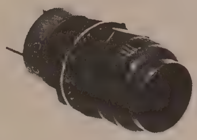
14-35180 SERIES

miniature



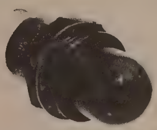
14-30380 SERIES

miniature



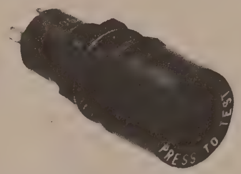
14-30080 SERIES

miniature



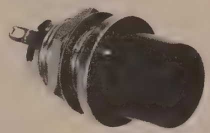
11-33480 SERIES (MS25256)

miniature, press-to-test



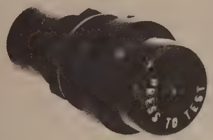
03-90980 SERIES

miniature, watertight and oiltight



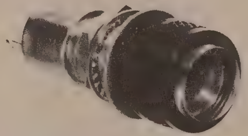
15-35183 SERIES

miniature, watertight, press-to-test



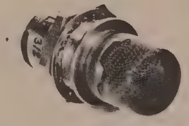
05-90881 SERIES

miniature, E. M. I. suppressed press-to-test



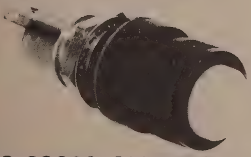
08-83281 SERIES

miniature, E. M. I. suppressed



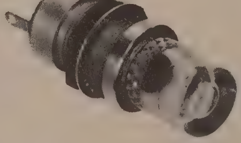
18-36880 SERIES

miniature, E. M. I. suppressed, watertight press-to-test



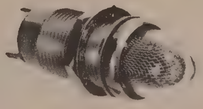
08-83283 SERIES

miniature, neon



33-30880 SERIES

miniature, neon, E.M.I. suppressed



38-36480 SERIES

ILLUMINATED PRODUCTS INC. (formerly MARCO-OAK)
A Subsidiary of OAK Industries Inc.
207 S. Helena St., P.O. Box 4011, Anaheim, CA 92803
Tel: (714) 535-6037 TWX 910-591-1185

For Switches, see ILLUMINATED PRODUCTS SWITCH SECTION, EEM Pages 1•2062-1•2065

ILLUMINATED PRODUCTS INC. (formerly LAMPS INC.)

A Subsidiary of OAK Industries Inc.

SUBMINIATURE AND MICROMINIATURE LAMPS

The incandescent lamps described in these 3 pages constitute only a small part of the broad line of high quality light sources available from Illuminated Products Inc. Those shown in bold face type are the more frequently specified types. A complete Lamp Catalog is available on request.

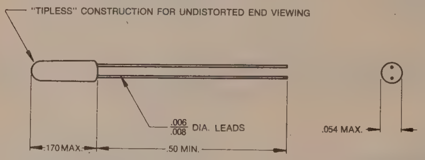
Contact factory for special lamp assemblies.

T-⅜ LAMP

Design		MSCP	Life	Part Numbers	
Volts	Amps (±10%)	(Note 1)	(hrs.)	IPI	Industry*
1.5	0.015	0.002	10,000	LA173	7090
1.5	0.051	0.020	1,000	LA155	—
3.0	0.029	0.030	5,000	LA156	7093

*Ref. American National Standards Institute

UNBASED

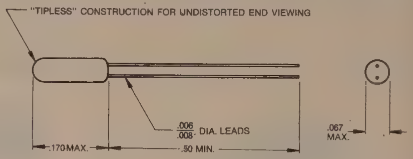

"TIPLESS" CONSTRUCTION FOR UNDISTORTED END VIEWING
.006/.008 DIA. LEADS
.054 MAX.
.170 MAX.
.50 MIN.

T-½ LAMP

Design		MSCP	Life	Part Numbers	
Volts	Amps (±10%)	(Note 1)	(hrs.)	IPI	Industry*
1.5	0.015	0.002	10,000	LA174	7094
1.5	0.051	0.020	5,000	LA175	—
2.5	0.045	0.050	1,000	LA186	—
3.0	0.029	0.030	5,000	LA176	7096
5.0	0.020	0.034	5,000	**LA157**	7097

*Ref. American National Standards Institute

UNBASED


"TIPLESS" CONSTRUCTION FOR UNDISTORTED END VIEWING
.006/.008 DIA. LEADS
.067 MAX.
.170 MAX.
.50 MIN.

T-¾ LAMP

Design		MSCP	Life	Part Numbers					
				Unbased		Flange		Bi-Pin	
Volts	Amps (±10%)	(Note 1)	(hrs.)	IPI	Industry*	IPI	Industry*	IPI	Industry*
1.5	0.010†	0.002	10,000	LA1	7100	LA282	3810	LA283	7810
1.5	0.015	0.003	5,000	LA3	—	LA285	—	LA286	—
1.5	0.060	0.015	50,000	LA201	—	LA289	—	LA290	—
2.0	0.040	0.020	10,000	LA739	—	LA733	—	LA734	—
5.0	0.020	0.020	50,000	**LA213**	—	LA292	—	**LA293**	—
5.0	0.020	0.034	10,000	**LA189**	2	LA262	7122	**LA455**	7112
5.0	0.024	0.043	1,000	LA224	—	LA296	—	LA297	—
5.0	0.025	0.030	5,000 Ø	LA803	—	LA819	—	LA804	—
5.0	0.060	0.030	100,000	**LA30****	6803	LA239	8587	LA299	7113
5.0	0.060	0.050	100,000	**LA9****	6833	LA240	8913	LA456	7114
5.0	0.075	0.090	25,000	**LA12****	7133	LA241	8828	LA303	7116
5.0	0.080	0.150	6,000	**LA34**	8666	LA305	8383	LA457	7117
5.0	0.115	0.150	40,000	**LA17****	7153	LA242	8270	LA405	7118
5.0	0.115	0.200	5,000	**LA18**	7102	LA310	7123	LA458	7119

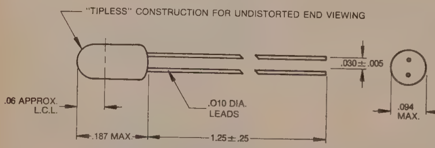
* *Ref. American National Standards Institute*

** *MS-90452 (AS)*

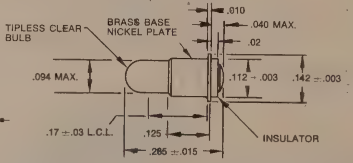
† *±0.0015 amp.*

Ø *Rated for D.C. operation*

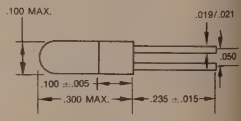
UNBASED


"TIPLESS" CONSTRUCTION FOR UNDISTORTED END VIEWING
.030±.005
.06 APPROX. L.C.L.
.010 DIA. LEADS
.094 MAX.
.187 MAX.
1.25±.25

FLANGE BASE


.010
.040 MAX.
.02
TIPLESS CLEAR BULB
BRASS BASE NICKEL PLATE
.094 MAX.
.112 ±.003
.142 ±.003
.17 ±.03 L.C.L.
.125
INSULATOR
.285 ±.015

BI-PIN BASE

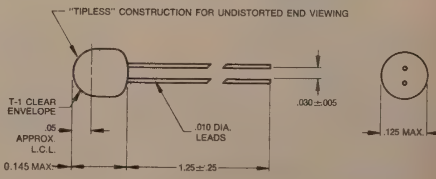

.100 MAX.
.019/.021
.050
.100 ±.005
.300 MAX.
.235 ±.015

T-1 LAMP — REDUCED LENGTH — 0.145″ MOL

Design		MSCP	Life	Part Numbers	
Volts	Amps (±10%)	(Note 1)	(hrs.)	IPI	Industry*
5.0	0.060	0.03	100,000	LA57**	6802
5.0	0.060	0.05	100,000	**LA58****	6832
5.0	0.060	0.15	6,500	LA697	6152
5.0	0.075	0.09	25,000	LA59**	7132
5.0	0.080	0.15	5,000	LA700	6212
5.0	0.115	0.15	40,000	**LA33****	7152
5.0	0.115	0.20	5,000	LA60	7212
5.0	0.125	0.25	5,000	LA701	8175

**Ref. American National Standards Institute* ***MS-90451*

UNBASED


"TIPLESS" CONSTRUCTION FOR UNDISTORTED END VIEWING
T-1 CLEAR ENVELOPE
.030±.005
.05 APPROX. L.C.L.
.010 DIA. LEADS
.125 MAX.
0.145 MAX.
1.25±.25

ILLUMINATED PRODUCTS INC. (formerly LAMPS INC.)

A Subsidiary of OAK Industries Inc.

T-1 INTEGRAL BI-PIN LAMP

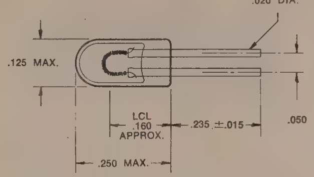
Design				IPI Part Numbers	
Volts	Amps (±10%)	MSCP (Note 1)	Life (hrs.)	Standard	Short
5.0	.020	.020	50,000	LA871	LA773
5.0	.020	.034	10,000	LA872	LA774
5.0	.060	.050	100,000	LA869	LA775
5.0	.115	.150	40,000	LA870	LA824

Features:

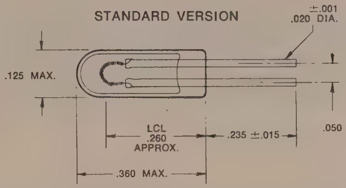
- Easy installation and removal
- Standard size fully interchangeable with conventional bi-pin lamp
- Short version unique for small-space applications
- Available with integral lens for increased light intensity from end of lamp (consult factory)

Tested in an integrating sphere traceable to National Bureau of Standards, after minimum burn-in period of 16 hours at 5V.

SHORT VERSION


±.001
.020 DIA.
.125 MAX.
LCL
.160
APPROX.
.235 ±.015
.050
.250 MAX.

STANDARD VERSION

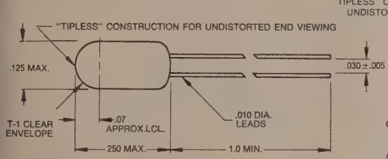

±.001
.020 DIA.
.125 MAX.
LCL
.260
APPROX.
.235 ±.015
.050
.360 MAX.

T-1 LAMP UNSUPPORTED (Also available in 1.5 through 3 volts.)

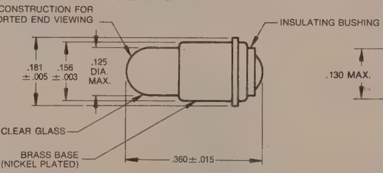
Design				Part Numbers					
				Unbased		Flange		Bi-Pin	
Volts	Amps (±10%)	MSCP (Note 1)	Life (hrs.)	IPI	Industry*	IPI	Industry*	IPI	Industry*
5.0	0.020	0.020	50,000	**LA472**	—	**LA473**	—	LA693	—
5.0	0.020	0.034	10,000	**LA210**	6022	LA263	8022	LA340	7022
5.0	0.025	0.030	5,000	LA821	—	LA822	—	LA823	—
5.0	0.060	0.030	100,000	**LA32****	680	**LA29*****	682	LA343	7680
5.0	0.060	0.050	100,000	**LA11****	683	**LA25*****	685	LA344	7683
5.0	0.060	0.150	6,500	LA246	—	LA247	—	LA346	—
5.0	0.075	0.090	25,000	**LA14****	713	**LA26*****	714	LA347	7714
5.0	0.115	0.150	40,000	**LA16****	715	**LA27*****	718	LA349	7715
5.0	0.115	0.200	5,000	**LA20**	7213	LA28	7237	LA356	7267
5.0	0.115	0.250	5,000	LA244	—	LA245	—	LA355	—

** Ref. American National Standards Institute* ***MS-24367* ****MS-24515*

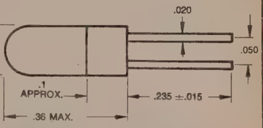
UNBASED


"TIPLESS" CONSTRUCTION FOR UNDISTORTED END VIEWING
.125 MAX.
.030±.005
T-1 CLEAR ENVELOPE
.07 APPROX.LCL.
.010 DIA. LEADS
250 MAX.
1.0 MIN.

FLANGE BASE


"TIPLESS" CONSTRUCTION FOR UNDISTORTED END VIEWING
INSULATING BUSHING
.181 ±.005
.156 ±.003
.125 DIA. MAX.
CLEAR GLASS
BRASS BASE (NICKEL PLATED)
.360±.015

BI-PIN BASE


.020
.130 MAX.
.050
.1 APPROX.
.235 ±.015
.36 MAX.

T-1 LAMP SUPPORTED

Design					Part Numbers					
					Unbased		Flange		Bi-Pin	
Volts	Amps (±10%)	MSCP (Note 1)	Life (hrs.)	Number of Supports	IPI	Industry*	IPI	Industry*	IPI	Industry*
3.0	0.008	0.001	10,000	1	LA80	7204	LA87	7228	LA330	—
5.0	0.030	0.030	16,000	1	**LA139**	7210	LA160	7234	LA341	7263
10.0	0.027	0.100	10,000	1	**LA74**	7218	LA85	7240	LA362	8095
12.0	0.030	0.100	25,000	1	**LA209**	—	LA243	—	LA382	—
12.0	0.060	0.150	16,000	1	**LA66**	7219	LA71	32	LA384	8097
14.0	0.040	0.150	16,000	1	LA248	—	LA256	—	LA388	—
14.0	0.065	0.150	16,000	1	LA367	8111	LA368	8112	LA369	8098
18.0	0.026	0.150	10,000	2	**LA75**	7220	LA86	7241	LA389	8099
28.0	0.024	0.150	16,000	2	**LA62**	6838	**LA64****	6839	LA393	7839
28.0	0.024	0.200	16,000	2	LA267	—	LA390	—	LA391	—

** Ref. American National Standards Institute* ***MS-3338* *Note 1: MSCP tolerances usually available are: ±50%, ±25% and ±15%.*

ILLUMINATED PRODUCTS INC. (formerly LAMPS INC.)

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T-1¾ LAMP

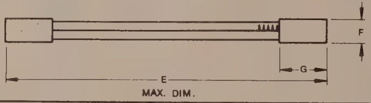
Design				Part Numbers							
				Unbased		Flange		Groove		Bi-Pin	
Volts	Amps (±10%)	MSCP (Note 1)	Life (hrs.)	IPI	Industry*	IPI	Industry*	IPI	Industry*	IPI	Industry*
2.5	0.200	0.220	500	LA715	1783	LA716**	368	LA717	8699	LA719	7968
3.0	0.015	0.002	20,000	LA582	2158	LA586	375	LA590	390	LA594	7375
6.0	0.040	0.040	10,000	**LA598**	1730	LA602	345	LA606	8705	LA610	7345
6.0	0.200	0.340 @ 5V	1,000	**LA421**	1784	**LA328****	328	LA422	337	**LA442**	7328
6.3	0.075	0.230	1,000	LA811	1739	LA812	377	LA813	8708	LA814	7377
6.3	0.200	0.400	50,000	**LA662**	2181	**LA666**	381	LA670	379	**LA674**	7381
10.0	0.014	0.006	50,000	**LA678**	1869	LA682	344	LA686	709	LA688	7344
12.0	0.040	0.100	10,000	LA815	2174	LA816	394	LA817	7354	LA818	7371
14.0	0.080	0.500	1,500	**LA703**	1705	**LA704****	330	LA705	336	LA706	7330
18.0	0.040	0.150	10,000	**LA707**	2102	**LA708**	370	LA709	346	LA710	7370
28.0	0.040	0.300	25,000	**LA711**	2187	**LA712*****	387	LA713	388	**LA714**	7387
28.0	0.040	0.340	7,000	**LA480**	1764	**LA327****	327	LA432	334	**LA447**	7327

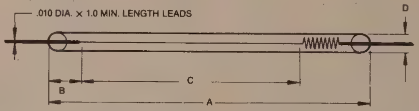
** Ref. American National Standards Institute **MS-25237 ***MS-18209*

LINE FILAMENT LAMP

Design		Filam. Temp. (°K)	Life (hrs.)	Dimensions							Part Numbers	
Volts	Amps (±10%)			A	B	C	Min. Hot Length	D	Max. E	F	G	IPI	Industry*
3.0	0.400	1910	25,000	2.00	20	1.45	1.00	.160	2.20	.190	.32	LA218	—
3.7	0.120	2380	1,000	1.30	12	.82	.62	.094	1.40	.125	.25	LA219	—
5.0	0.480	2100	20,000	2.25	20	1.75	1.50	.160	2.40	.190	.32	LA468	—
6.0	0.110	1980	25,000	2.00	12	1.60	1.40	.094	2.10	.125	.25	LA563	—
6.0	0.120	2160	5,000	1.70	12	1.25	1.00	.094	1.80	.125	.25	LA105	7104
12.0	0.140	1910	25,000	4.44	12	3.93	3.70	.094	4.56	.125	.25	LA288	—
14.0	0.500	2240	5,000	4.50	20	3.80	3.30	.160	4.70	.190	.32	LA211	—
18.0	0.120	1990	25,000	4.50	12	3.95	3.50	.094	4.60	.125	.25	LA97	7107
20.0	0.120	1990	25,000	5.00	12	4.45	4.00	.094	5.10	.125	.25	LA108	7106
30.0	0.335	2100	20,000	10.40	20	9.50	9.00	.160	10.60	.190	.32	LA40	—
36.0	0.120	1990	25,000	8.80	12	7.95	7.50	.094	8.90	.125	.25	LA98	7108
48.0	0.200	2130	5,000	12.90	15	11.95	11.50	.125	13.10	.160	.25	LA100	7224

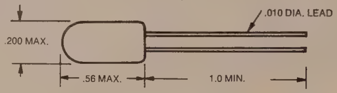
** Ref. American National Standards Institute*



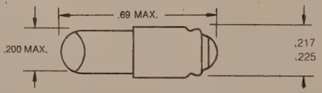


TL LAMPS

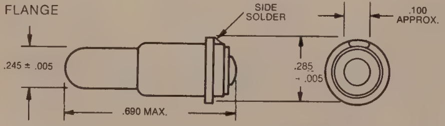
UNBASED



GROOVE



FLANGE

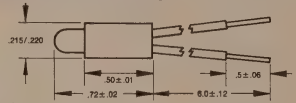


Design			Part Numbers					
			Unbased		Groove		Flange	
Volts	Amps (±10%)	Life (hrs.)	IPI	Ind.*	IPI	Ind.*	IPI	Ind.*
2.5	0.350	10,000	LA729	2140	LA253	253	LA732	252
2.5	0.350	10,000	LA731	2136	LA253-X	253-X	—	—
2.5	0.350	10,000	LA730	2124	LA253-1	261	—	—

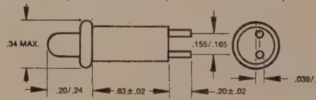
** Ref. American National Standards Institute*

TL LAMP ASSEMBLIES

1



2



Design		Life (hrs.)	Spot Intensity**	Part Numbers	Fig. No.
Volts	Amps (±10%)			IPI	
2	0.180	12,000	220	LA474***	1
2.5	0.200	1,000	500	LA474	1
2.5	0.350	10,000	800	LA476	1
2.5	0.350	10,000	1,000†	LA477	1
2.5	0.350	10,000	800	LA478	2
5	0.180	10,000	500	LA475***	1
6	0.200	1,000	1,000	LA475	1

***Foot-Candles ***Derated*
Note: Min. spot dia. is .12 measured at .6 in. from tip of lamp.
†0.06" Min. Dia. Spot

ILLUMINATED PRODUCTS INC. (formerly LAMPS INC.) A Subsidiary of OAK Industries Inc.
207 S. Helena St., P.O. Box 4011, Anaheim, CA 92803 • Tel: (714) 535-6037 • TWX 910-591-1185

NUMERIC READOUTS

"LINKS BETWEEN MAN AND MACHINE"

INFO-LITE CORPORATION

46-10 104th STREET • CORONA, N. Y. 11368

212 / 476-1287

See our Programming and Switching Products in Vol. 2, Section 5100.

– FEATURING –

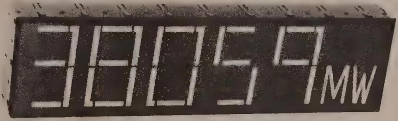
- Ready to mount into panel cutout
- Servicing from front without tools
- Supplied in attractive assemblies with bezel
- Includes anti-glare "Black-Out" panel & color filter
- Snap-in logic boards available with memory option
- All wear parts (lamps and logic) socket mounted
- Plus minus signs, colons, decimal, message modules optional

Series 68030

.7" Characters – Viewing to 20 Ft.

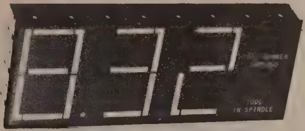
Series 68031

1.0" Characters – Viewing to 30 Ft.



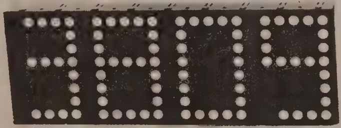
Series 68032

2.0" Characters – Viewing to 60 Ft.



Series 68033

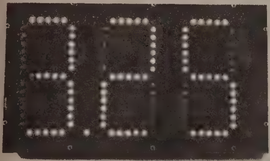
2.7" Characters – Viewing to 80 Ft.



FOR OUTDOOR VIEWING

Series OD68032/33

2.1"/2.9" Characters – Viewing to 60/80 Ft.



Series 68036 & OD68036

Indoor/Outdoor – Viewing to 150 Ft.

SPECIAL SYSTEMS

We have supplied various hardware designed to meet special customer needs, including keyboard entry displays, up/down counters, hi-threshold interfaces, pre-determining counters, display/control systems and special enclosures. Call us to discuss your requirements.

LIGHTED INDICATORS
STATUS DISPLAYS
BACK-LIGHTED/DEAD FRONT PANELS
ANNUNCIATORS

SERIES 68011, 68012, 68013 AND 68014

Any group of messages/symbols can be displayed in any combination of colors • Front panel graphics are back lighted using Std. MFB T 1¾" lamps • Basic message module sizes: 3/8" Sq, 3/8" x 3/4", 3/8" x 1-1/8", 3/8" x 1-1/2" or multiples of these • Units are supplied in an attractive package with bezel and "Black-Out" front panel, ready to snap into rectangular panel cutout • Common ground reduces installation time • Servicing can be done from the front • Lamp drivers and special logic available.

74000 SERIES BACKLIGHTED/DEAD FRONT PANEL ASSEMBLIES are available to meet a wide variety of medium to large size display applications. These are supplied to meet customer specifications.

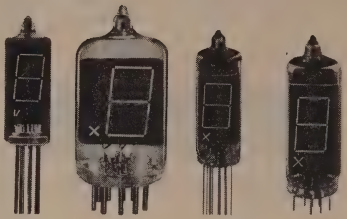
FRONT
REAR
CARRIER
OVERLOADED
SENDER IN USE
3
8
S
UM
2
3

The world's broadest line of

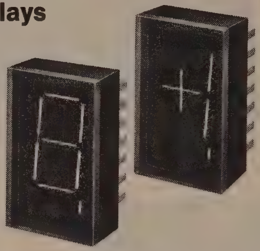
Industrial Electronic Engineers, Inc. • 7740 Lemona Avenue,

IEE - APOLLO — Incandescent Tube Digital Displays

- Choice of .4", .5", or .6" high, 7 segment digital characters (plus selected alphanumerics, ± 1, and decimal point options)
- Adjustable brightness: 1,500 through 85,000 F/L against black ceramic base for sharp contrast in high ambient lighting
- Variable, low power, AC/DC operation: 3.5 to 12.0V; 10 to 30 MA per segment
- Wide, single plane viewing angle (140°); unobstructed display
- Color filter option
- Rugged construction; 100,000 hour life expectancy
- Standard BCD logic, IC Driver/Decoder, commercial socket compatible



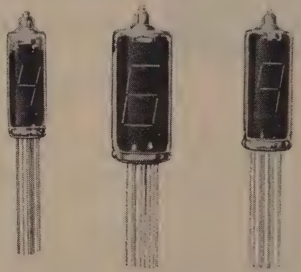
IEE - AURORA — Incandescent Flatpack Digital Displays



- Choice of .472" or .614" high, 7 segment characters
- 4,500 F/L of "morning dawn" brightness
- Low power - 15 MA per segment at 5 VDC
- Sharp contrast and excellent, 120° angular readability in high ambient lighting
- Convenient, slim profile; standard DIP package design
- 100,000 hours average life expectancy

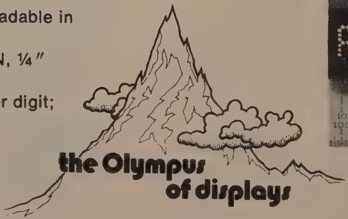
IEE - LUNA — Neon Tube Digital Displays

- Choice of 3/8", 1/2", or 5/8" high, 7 segment characters
- Sharp, high-contrast display with wide angle (120°) viewing
- Low power, cool operation - .5 MA at 190 VDC Max
- Bright, amber, single plane, stable and unobstructed characters
- Rugged, 100,000 hour life construction
- Minimal cost per digit
- Wide temperature range



IEE -HELIOS – High Intensity Fiberoptic Displays

- Specially designed for aircraft use; readable in direct sunlight @ 40,000′ altitude
- 7 segment numeric or 16 segment A/N, ¼" high characters
- Hi-density packaging: .1 in³ & .1 oz per digit; .2 in³ & .15 oz per A/N character
- Variable brightness for night vision
- 20mA per segment @ 5 VDC
- Meets MIL-E-5400, Class 2

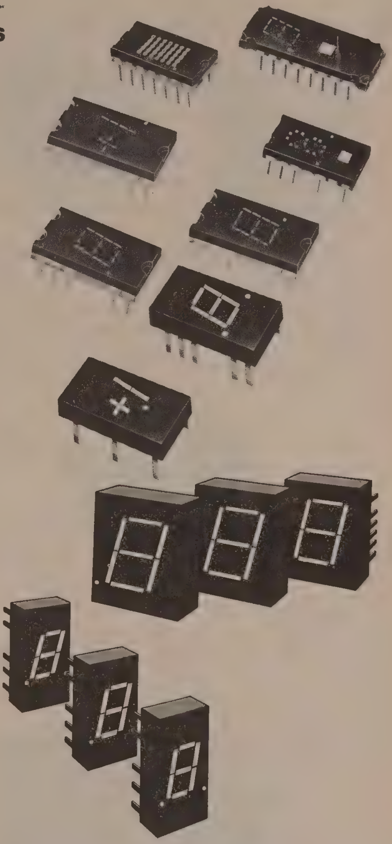


displays — digital readouts

Van Nuys, California 91405 • Telephone: (213) 787-0311 • TWX 910-495-1707

IEE - HERCULES — Light Emitting Diode Displays

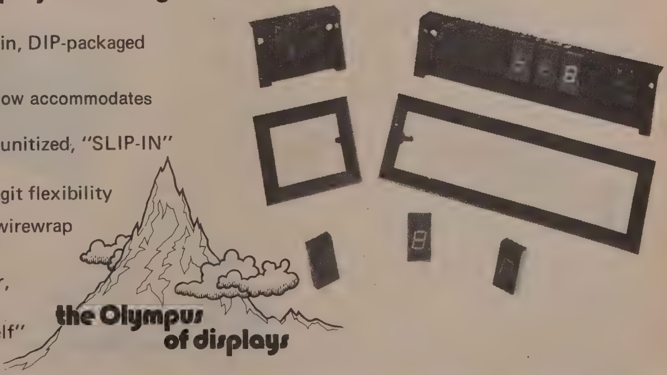
- Slim profile; single plane; standard 14/16 pin, .3″ C/C DIP-packaged (except Series 1714)
- Character format versatile; choice of red, yellow or green colors
- Self-contained LSI chip, logic options (BCD, hexadecimal, pulse count accumulation)
- Numeric, hexadecimal or alphanumeric formats available; seven segment or 5x7 dot matrix characters
- Bright, transparent-plastic encapsulated characters, easily readable over wide angles
- Durably designed for minimum power & low cost per digit
- Choice of .27″, .3″, .43″ or .6″ high characters
- Install as integral unit with IEE•ATLAS Display Mounting Hardware



HERCULES SERIES #	DESCRIPTION	CHARACTER HEIGHT	COLOR
1701	0-9, Left D. P.	.270″	Red
1702	0-9, Right D. P.	.270″	Red
1703	+,−,1, Right D. P.	.270″	Red
1704	5x7 Dot A/N; Left D. P.	.300″	Red
1705	0-9, w/ Counter, Latch, D/D/ IC; Left D. P.	.270″	Red
1706	0-9, w/Latch, D/D IC; Left D. P.	.270″	Red
1707	Hexadecimal; D/D IC; Left & Right D. P.	.270″	Red
1710	+,−,1, Left D. P.	.300″	Red
1711	0-9, Left & Right D. P.	.300″	Red
1712R	0-9, Left D. P.	.300″	Red
1712Y	0-9, Left D. P.	.300″	Yellow
1712G	0-9, Left D. P.	.300″	Green
1713R	0-9, Left D. P.	.430″	Red
1713Y	0-9, Left D. P.	.430″	Yellow
1713G	0-9, Left D. P.	.430″	Green
1714R	0-9, Left D. P.	.635″	Red
1714Y	0-9, Left D. P.	.635″	Yellow
1714G	0-9, Left D. P.	.635″	Green

IEE - ATLAS — Universal Display Mounting Hardware

- Accommodates all standard 14/16 pin, DIP-packaged LED and planar displays
- NEW, "WIDE-EYE" bezel with 1″ window accommodates character heights up to .500″
- Provides automatically self-aligning, unitized, "SLIP-IN" installation
- Offers optional two through eight digit flexibility
- Simplifies interconnection through wirewrap termination
- Facilitates wide-angle, optional color, polarized viewing
- Forever puts an end to "do-it-yourself" installation problems



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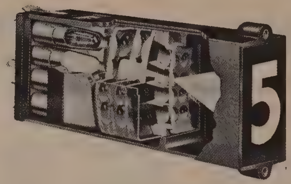
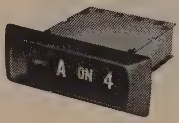
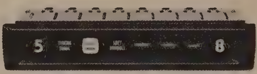
IEE - TITAN — Projection Readout Displays



- World's most extensively used message displays
- Completely versatile - displays any image, color, message, type style reproducible on film with variable brilliance
- Bright, easily, legible, single plane, 160° wide angle viewing
- Displays from 12 to 48 messages per module
- Easily combined into multi-module, integral assemblies for added information capacity
- 14 different models: message type font heights from .076" to 1.39"; individual character heights from 3/8" to 3-3/8"; MIL-R-39027 models available
- Ultra-reliable, non-mechanical, passive operation; easy unitized installation; long life, low power, subminiature incandescent lamps
- Integral Driver/Decoders optional



48
POSITION



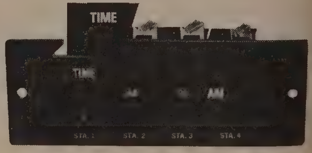
SERIES	10	80	120	160	220	340	345	360	400	405	865	880	1002	1100
NUMBER OF MESSAGES	12	12	12	12	12	11	11	12	12	12	24	12	48	12
CHARACTER HEIGHT	.94"	3.375"	.59"	1.56"	.59"	.375"	.375"	2"	.5"	.5"	.5"	.5"	.45"	.59"
VIEWING DISTANCE	20'	70'	12'	30'	12'	8'	8'	40'	10'	10'	10'	10'	8'	12'
CHARACTER BRIGHTNESS	75F/L	45F/L	100F/L	45F/L	100F/L	30F/L	30F/L	40F/L	30F/L	30F/L	30F/L	30F/L	12F/L	100F/L
MIL-R-39027					X				X					

IEE - IRIS — Transilluminated Status Indicators & Annunciators

- BIG, BOLD, BRIGHT display with easy-to-read, single plane viewing
- Choice of 1/2", 3/4", or 2" high, 7-bar digital or 9-bar hexadecimal characters
- Up to twelve discrete messages per module; five optional, standard screen colors
- Unlimited message versatility - any graphics or symbols reproducible on film
- Long life, low power, subminiature incandescent lamps
- Simple, plug-in installation
- Low cost per message with optimum versatility
- Integral Driver/ Decoders optional

IEE
2
3
4
GO
READY
INSTR PANEL CYCLE
NO GO
STAND BY
HIGH TEMP
NO. 3 FULL FLOW
STOP

the Olympus of displays

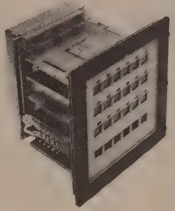


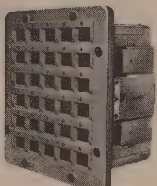
message displays & systems

Van Nuys, California 91405 • Telephone: (213) 787-0311 • TWX 910-495-1707

IEE - SYSTEMS

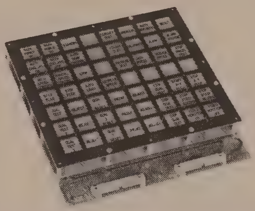
- Adaptable to all applications and environments
- Airborne, space, shipboard, subsurface, field and command center, military applications
- Process control, petrochemical, hydroelectric, paper, textile, aluminum, and manufacturing industrial usages
- Point-of-Sale, communications, telephonic switching accounting, computer, public health, educational, transportation, public services, governmental, medical & hotel facilities, and service industry commercial installations
- Multi-functional capabilities: information display; status indication; switching; automatic control; operator cueing and decision assistance; POS customer data





IEE - MIDAS — Illuminated Transparent Switches & Keyboard Arrays

- Environmentally sealed, transparent mylar membranes
- Extremely lightweight, "wafer-thin", profile - front & rear of panel
- Long life: 1,000,000 cycle life-rated
- No mechanical linkage, springs or buttons
- Quiet, positive, fingertip pressure (4-9 oz.), single pole/single throw, momentary contact switching
- Lowest cost per switch for high density switch requirements
- Optional matrix design (customized or standard), such as 1x8, 3x4, 2x3, 5x6, 7x8, 10x10, etc.
- Displays any graphic data reproducible on film; optional color

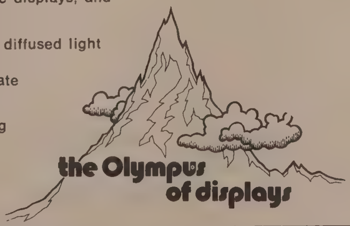


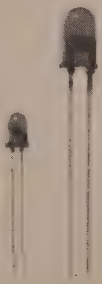
IEE - ARGUS — Dot Matrix Message Panel

- Choice of 4-line, 64-character or 8-line, 128 & 256-character soft copy panel displays
- 5x7 dot matrix; .3" character height; .9mm individual dot diameter
- Soft green characters for easy viewing
- USASCII/EBCDIC code compatible; complete repertoire of A/N's and symbols
- Flat plate display panel for overall slim profile
- Low operating voltage
- 100 us clock rate

IEE - HERCULES/ELECTRA — Solid State Indicators

- Ideally suited for visual indicators, large displays, and built-in diagnostics
- Choice of red, yellow, amber, or green, diffused light
- High brightness, with low cost, solid state reliability
- Socket, PC board or ⅛" panel mounting
- TTL/DTL circuit compatible
- Choice of T-1 or T-1¾ sizes





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IEE - ELECTRA — Subminiature Incandescent Lamps

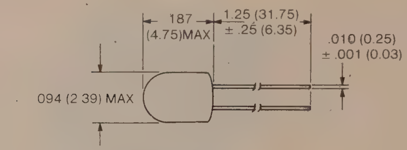
T-¾ LAMPS

LINE NO.	DESIGN VOLTS	DESIGN AMPS	MSCP (±25%)	LIFE HOURS	FILAMENT SHAPE	LAMP NUMBERS WIRE TERMINAL	LAMP NUMBERS BI-PIN BASE
1	1.5	.015	.01 NOM	5,000	C-2R	7101	7811
2	5.0	.020	.02	50,000	C-2R	DU51	DB51
3	5.0	.021	.034	10,000	C-2R	2	7112
4	5.0	.060	.03	100,000	C-2R	6803	7113
5	5.0	.060	.05	100,000	C-2R	6833	7114
6	5.0	.060	.15	3,000	C-2R	6153	7115
7	5.0	.075	.09	25,000	C-2R	7133	7116
8	5.0	.115	.15	40,000	C-2R	7153	7118
9	5.0	.115	.20	5,000	C-2R	7102	7119

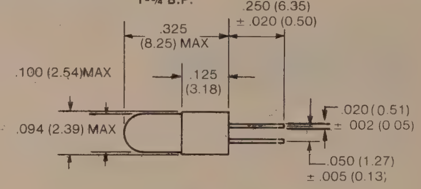
APPLICABLE MILITARY LAMP DRAWINGS
MS 90452AS 15°₀ (6803, 6833, 7133, 7153)

All dimensions are in inches and millimeters in ( ).

T-¾ W.T.


187 (4.75)MAX
1.25 (31.75) ± .25 (6.35)
.010 (0.25) ± .001 (0.03)
094 (2 39) MAX

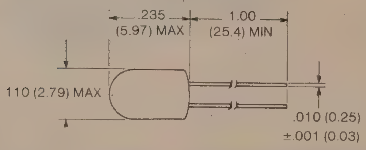
T-¾ B.P.


.250 (6.35) ± .020 (0.50)
.325 (8.25) MAX
.100 (2.54)MAX
.125 (3.18)
.020 (0.51) ± .002 (0.05)
.094 (2.39) MAX
.050 (1.27) ± .005 (0.13)

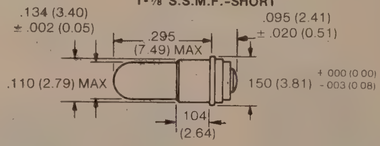
T-⅞ LAMPS

LINE NO.	DESIGN VOLTS	DESIGN AMPS	MSCP (±25%)	LIFE HOURS	FILAMENT SHAPE	LAMP NUMBERS WIRE TERMINAL SHORT	LAMP NUMBERS WIRE TERMINAL LONG	LAMP NUMBERS SPECIAL SUB-MIDGET FLANGE SHORT	LAMP NUMBERS SPECIAL SUB-MIDGET FLANGE LONG
10	5.0	.040	.12	1,000	C-2R	AU8	CU8	A8	C8
11	5.0	.060	.12	12,000	CC-6	AU12	CU12	A12	C12
12	5.0	.072	.12	40,000	C-2R	AU36	CU58	36	C58
13	5.0	.115	.15	40,000	C-2R	3	CU1	1	C1
14	12.0	.060	.14	16,000	C-2V	AU5	CU5	A5	C5
15	14.0	.040	.14	16,000	C-2V	AU3	CU3	A3	C3

T-⅞ W.T. SHORT

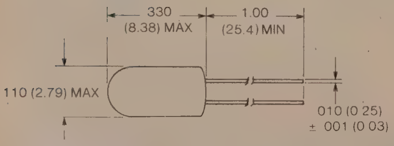

.235 (5.97) MAX
1.00 (25.4) MIN
110 (2.79) MAX
.010 (0.25) ±.001 (0.03)

T-⅞ S.S.M.F.-SHORT

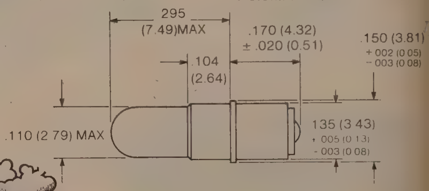

.134 (3.40) ± .002 (0.05)
.095 (2.41) ± .020 (0.51)
.295 (7.49) MAX
.110 (2.79) MAX
150 (3.81) + .000 (0.00) - .003 (0.08)
104 (2.64)

T-⅞ W.T. LONG

All dimensions are in inches and millimeters in ( ).


330 (8.38) MAX
1.00 (25.4) MIN
110 (2.79) MAX
010 (0 25) ± .001 (0 03)

T-⅞ S.S.M.F.-LONG


295 (7.49)MAX
.170 (4.32) ± .020 (0.51)
.150 (3.81) + .002 (0.05) - .003 (0.08)
.104 (2.64)
.110 (2 79) MAX
135 (3 43) + .005 (0.13) - .003 (0.08)

APPLICABLE MILITARY LAMP SPECIFICATION
MIL-L-6363

IEE manufactures lamps not listed above. Consult factory for your requirements

the Olympus of displays

(Specifications subject to change without notice)

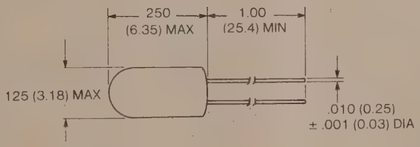
displays - Lamps & Indicators

Van Nuys, California 91405 • Telephone: (213) 787-0311 • TWX 910-495-1707

T-1 LAMPS

LINE NO.	DESIGN		MSCP (±25%)	LIFE HOURS	FILAMENT SHAPE	LAMP NUMBERS		
	VOLTS	AMPS				WIRE TERMINAL	SUB-MIDGET FLANGE	BI-PIN BASE
1	1.5	.015	.01 NOM	5,000	C-2R	7201	7226	7254
2	3.0	.012	.001 NOM	16,000	C-2R	2128	679	7259
3	3.0	.015	.02 NOM	5,000	C-2R	7205	7229	3229
4	3.0	.060	.03	100,000	C-2R	7207	7231	7260
5	3.0	.120	.15	16,000	C-2R	7208	7232	7261
6	5.0	.020	.02	50,000	C-2R	EU1	E1	EB1
7	5.0	.021	.034	10,000	C-2R	6022	8022	7022
8	5.0	.030	.03	75,000	C-2R	7210	7234	7263
9	5.0	.060	.03	100,000	C-2R	680	682	7680
10	5.0	.060	.05	100,000	C-2R	683	685	7683
11	5.0	.060	.15	5,000	C-2R	6150	6180	7265
12	5.0	.075	.09	25,000	C-2R	713	714	7714
13	5.0	.115	.15	40,000	C-2R	715	718	7715
14	5.0	.115	.20	5,000	C-2R	7213	7236	7267
15	10.0	.027	.10	10,000	C-2F	7218	7240	8095
16	12.0	.030	.10	25,000	C-2V	EU2	E2	EB2
17	12.0	.060	.15	16,000	C-2F	7219	32	8097
18	14.0	.040	.14	16,000	C-2V	23	22	EB3
19	14.0	.065	.15	16,000	C-2F	8111	8112	8098
20	18.0	.026	.15	16,000	C-2F	7220	7241	8099
21	24.0	.020	.08	15,000	CC-2F	EU4	E4	EB4
22	28.0	.024	.15	16,000	CC-2F	6838	6839	7839

T-1 W.T.

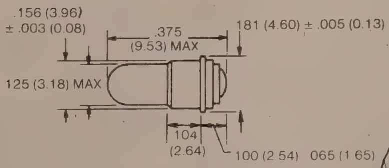

250 (6.35) MAX
1.00 (25.4) MIN
125 (3.18) MAX
.010 (0.25) ± .001 (0.03) DIA

APPLICABLE MILITARY LAMP SPECIFICATION
MIL-L-6363

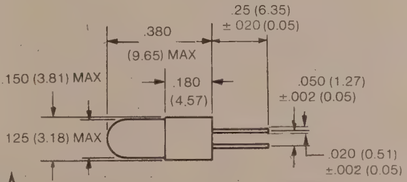
APPLICABLE MILITARY LAMP DRAWINGS
MS 3338AS 25% (6839)
MS 24367AS 15% and AS25% (680, 683, 713, 715)
MS 24515AS15% and AS25% (682, 685, 714, 718)

All dimensions are in inches and millimeters in ( ).

T-1 S.M.F.


.156 (3.96) ± .003 (0.08)
.375 (9.53) MAX
181 (4.60) ± .005 (0.13)
125 (3.18) MAX
104 (2.64)
100 (2 54)
065 (1 65)

T-1 B.P.


.25 (6.35) ± 020 (0.05)
.380 (9.65) MAX
.150 (3.81) MAX
.180 (4.57)
.050 (1.27) ±.002 (0.05)
125 (3.18) MAX
.020 (0.51) ±.002 (0.05)

IEE manufactures lamps not listed above. Consult factory for your requirements

the Olympus of displays

(Specifications subject to change without notice)

The world's broadest line of

Industrial Electronic Engineers, Inc. • 7740 Lemona Avenue,

T-1 LAMPS
(Short Envelope)

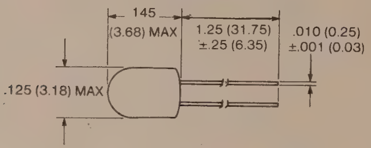
LINE NO.	DESIGN VOLTS	DESIGN AMPS	MSCP (±25%)	LIFE HOURS	FILAMENT SHAPE	LAMP NUMBERS WIRE TERMINAL SHORT	LAMP NUMBERS WIRE TERMINAL INTERMEDIATE
1	5.0	.060	.03	100,000	C-2R	6802	6801
2	5.0	.060	.05	100,000	C-2R	6832	6831
3	5.0	.060	.15	5,000	C-2R	6152	6151
4	5.0	.075	.09	25,000	C-2F	7132	7131
5	5.0	.115	.15	40,000	C-2R	7152	7151
6	5.0	.115	.20	5,000	C-2R	7212	3211

APPLICABLE MILITARY LAMP SPECIFICATION
MIL-L-6363

All dimensions are in inches and millimeters in ( ).

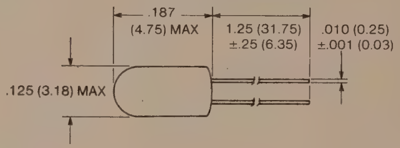
APPLICABLE MILITARY LAMP DRAWINGS
MS 90451AS15% (6802, 6832, 7132, 7152)

T-1 W.T. SHORT



145
(3.68) MAX
1.25 (31.75)
±.25 (6.35)
.010 (0.25)
±.001 (0.03)
.125 (3.18) MAX

T-1 W.T. INTERMEDIATE

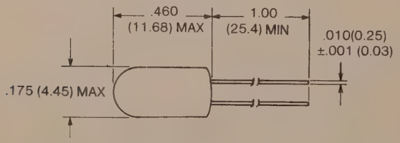


.187
(4.75) MAX
1.25 (31.75)
±.25 (6.35)
.010 (0.25)
±.001 (0.03)
.125 (3.18) MAX

T-1¼ LAMPS

LINE NO.	DESIGN VOLTS	DESIGN AMPS	MSCP (NOMINAL)	LIFE HOURS	FILAMENT SHAPE	LAMP NUMBERS WIRE TERMINAL	LAMP NUMBERS SPECIAL MIDGET FLANGE	LAMP NUMBERS BI-PIN BASE
7	5.0	.060	.03	100,000	C-2R	580	3582	7580
8	5.0	.060	.05	100,000	C-2R	583	3585	7583
9	5.0	.115	.15	40,000	C-2R	515	3518	7515
10	6.0	.040	.03	1,000	C-2V	8661	8660	7660
11	6.0	.060	.13	3,000	C-2R	2114	8541	7309
12	6.0	.200	.63	1,000	C-2R	634	8628	7628
13	6.3	.200	.55	5,000	C-2R	8610	8551	7310
14	14.0	.080	.30	25,000	C-2F	8605	F3	FB3
15	14.0	.080	.50	1,000	C-2F	8640	8646	7646
16	24.0	.040	.17	15,000	C-2F	FU1	F1	FB1
17	28.0	.040	.30	25,000	C-2F	FU2	F2	FB2
18	28.0	.040	.32	1,000	C-2F	8627	8632	7632

T-1¼ W.T.



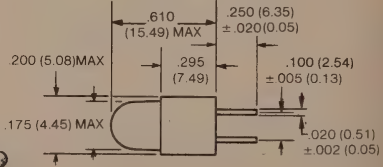
.460
(11.68) MAX
1.00
(25.4) MIN
.010(0.25)
±.001 (0.03)
.175 (4.45) MAX

APPLICABLE MILITARY LAMP SPECIFICATION
MIL-L6363

APPLICABLE MILITARY LAMP DRAWINGS
MS 28135AS25% (8627)

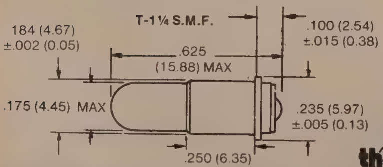
All dimensions are in inches and millimeters in ( ).

T1¼ B.P.

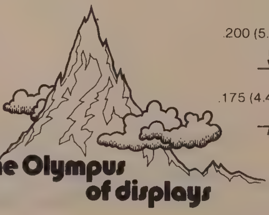


.610
(15.49) MAX
.250 (6.35)
±.020(0.05)
.200 (5.08)MAX
.295
(7.49)
.100 (2.54)
±.005 (0.13)
.175 (4.45) MAX
.020 (0.51)
±.002 (0.05)

T-1¼ S.M.F.



184 (4.67)
±.002 (0.05)
.625
(15.88) MAX
.100 (2.54)
±.015 (0.38)
.175 (4.45) MAX
.235 (5.97)
±.005 (0.13)
.250 (6.35)



the Olympus
of displays

IEE manufactures lamps not listed above. Consult factory for your requirements

(Specifications subject to change without notice)

displays - Lamps & Indicators

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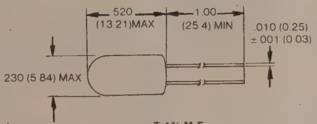
T-1¾ LAMPS

LINE NO.	DESIGN VOLTS	DESIGN AMPS	MSCP (NOMINAL)	LIFE HOURS	FILAMENT SHAPE	LAMP NUMBERS WIRE TERMINAL	LAMP NUMBERS MIDGET FLANGE	LAMP NUMBERS MIDGET GROOVE	LAMP NUMBERS MIDGET SCREW	LAMP NUMBERS BI-PIN BASE
1	1.35	.060	.01	500	C-2R	1728	331	698	8669	7931
2	2.5	.200	.22	500	C-2R	1783	368	8699	1769	7968
3	2.7	.060	.04	6,000	C-2R	1738	338	8704	8693	7838
4	3.0	.015	.003-.006	10,000	C-6	2158	375	390	7313	7375
5	5.0	.020	.02	50,000	C-2R	HU51	H51	HG51	HS51	HB51
6	5.0	.040	.03	25,000	C-2R	HU540	H540	HG540	HS540	HB540
7	5.0	.060	.03	100,000	C-2R	8805	7332	7346	7316	7360
8	5.0	.060	.05	100,000	C-2R	2200	7333	7347	7318	7361
9	5.0	.060	.15	5,000	C-2R	3151	3150	3152	3153	3149
10	5.0	.115	.15	40,000	C-2R	2203	7335	7348	7319	7362
11	6.0	.040	.03	10,000	C-2V	1730	345	8705	342	7945
12	6.0	.200	.60	3,000	C-2R	1784	328	337	1768	7328
13	6.3	.040	.03	50,000	C-2R	2180	380	7351	7320	7380
14	6.3	.075	.22	500	C-2R	1739	377	8708	1775	7377
15	6.3	.200	.42	50,000	C-2R	2181	381	379	378	7381
16	6.3	.200	.57	5,000	C-2R	2112	349	398	7323	7349
17	10.0	.014	.004	5,000	C-2F	1869	344	709	8691	7344
18	10.0	.040	.08	3,000	C-2V	2107	367	397	389	7367
19	12.0	.040	.12	10,000	C-2F	2174	394	7354	7326	7371
20	14.0	.080	.30	50,000	C-2V	2182	382	386	8362	7382
21	14.0	.080	.52	2,500	C-2V	1705	330	336	373	7330
22	14.0	.100	.50	10,000	C-2F	2162	8918	393	8162	7373
23	18.0	.040	.15	10,000	C-2F	2102	370	346	8536	7370
24	28.0	.040	.20	50,000	C-2F	2185	385	7355	8384	7374
25	28.0	.040	.30	25,000	C-2F	2187	387	388	399	7387
26	28.0	.040	.34	5,000	C-2F	1764	327	334	335	7327
27	28.0	.060	.34	25,000	C-2F	1764LSV	376	334LSV	335LSV	7876

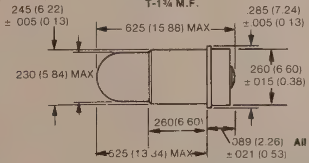
T-1¾ W.T.


.520 (13.21)MAX
1.00 (25.4) MIN
.010 (0.25) ± .001 (0.03)
.230 (5.84) MAX

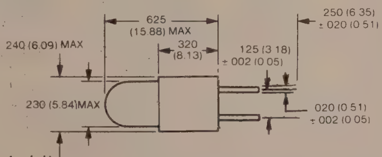
APPLICABLE MILITARY LAMP SPECIFICATION
MIL-L-6363

APPLICABLE MILITARY LAMP DRAWINGS
MS 15612 (335, 342, 1768, 1769)
MS 18209AS25% (387)
MS 25237AS (327, 328, 330, 338, 368)

T-1¾ M.F.

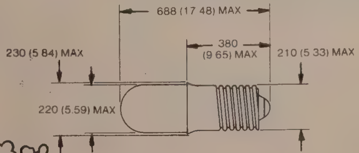

.245 (6.22) ± .005 (0.13)
.625 (15.88) MAX
.285 (7.24) ± .005 (0.13)
.230 (5.84) MAX
.260 (6.60) ± .015 (0.38)
.260 (6.60)
.089 (2.26) ± .021 (0.53)
.525 (13.34) MAX

T-1¾ B.P.

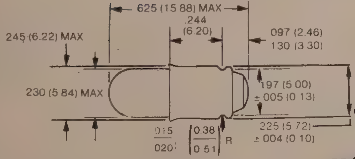

.625 (15.88) MAX
.320 (8.13)
.240 (6.09) MAX
.125 (3.18) ± .002 (0.05)
.250 (6.35) ± .020 (0.51)
.230 (5.84)MAX
.020 (0.51) ± .002 (0.05)

All dimensions are in inches and millimeters in ( ).

T-1¾ M.S.


.688 (17.48) MAX
.230 (5.84) MAX
.380 (9.65) MAX
.210 (5.33) MAX
.220 (5.59) MAX

T-1¾ M.G.


.625 (15.88) MAX
.244 (6.20)
.245 (6.22) MAX
.097 (2.46)
.130 (3.30)
.230 (5.84) MAX
.197 (5.00) ± .005 (0.13)
.015
.020
0.38
0.51
R
.225 (5.72) ± .004 (0.10)

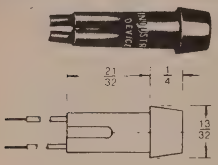
IEE manufactures lamps not listed above. Consult factory for your requirements

the Olympus of displays

(Specifications subject to change without notice)

IDI Pilot and Indicator Lights—

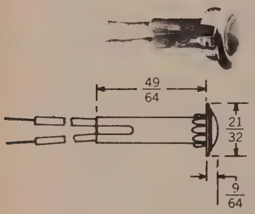
Glo-Dot



SERIES 2990D
One-piece lens-body 6, 12 and 28 volt incandescent pilot lights.

Lens Color	6V	12V	28V
Red	2990D1-6V	2990D1-12V	2990D1-28V
Amber	2990D3-6V	2990D3-12V	2990D3-28V
White	2990D4-6V	2990D4-12V	2990D4-28V
Green	2990D5-6V	2990D5-12V	2990D5-28V
Blue	2990D6-6V	2990D6-12V	2990D6-28V
Yellow	2990D7-6V	2990D7-12V	2990D7-28V

Mounting hole—5/16" diameter.



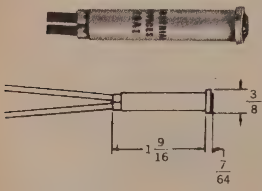
SERIES 2990P
One-piece lens-body 6, 12, and 28 volt incandescent pilot lights with plug bezel and low profile lens.

Lens Color	6V	12V	28V
Red	2990P1-6V	2990P1-12V	2990P1-28V
Amber	2990P3-6V	2990P3-12V	2990P3-28V
White	2990P4-6V	2990P4-12V	2990P4-28V
Green	2990P5-6V	2990P5-12V	2990P5-28V
Blue	2990P6-6V	2990P6-12V	2990P6-28V
Yellow	2990P7-6V	2990P7-12V	2990P7-28V

Mounting hole—½" diameter in 1/32 to 3/32" thick panels.

Current ratings for 2990D and 2990P series: 6V-.200A, 12V-.100A, 28V-.040A.

GLO-DOT MINIATURE NEON PILOT LIGHT WITH WIRE LEADS

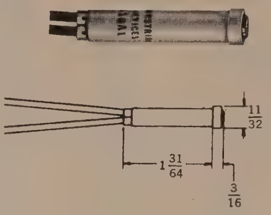


SERIES 2120A

Lens Color	120 VAC
Red	2120A1
Amber	2120A3
White	2120A4

Mounting hole—5/16" diameter

GLO-DOT MINIATURE NEON PILOT LIGHT WITH WIRE LEADS

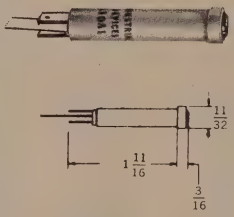


SERIES 2110A 2112A

Lens Color	120 VAC
Red	2110A1
Clear	2110A2
Amber	2110A3
White	2110A4
Green	2112A5

Mounting hole—5/16" diameter

GLO-DOT MINIATURE NEON PILOT LIGHT WITH .187 TERMINALS**

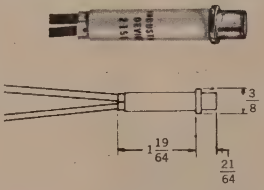


SERIES 2110QA 2112QA

Lens Color	120 VAC
Red	2110QA1
Clear	2110QA2
Amber	2110QA3
White	2110QA4
Green	2112QA5

Mounting hole: 5/16" diameter

GLO-DOT MINIATURE NEON PILOT LIGHT WITH WIRE LEADS

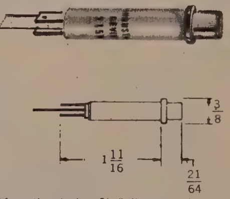


SERIES 2150A 2152A

Lens Color	120 VAC
Red	2150A1
Amber	2150A3
White	2150A4
Green	2152A5

Mounting Hole—5/16" diameter. Voltage—105-125 VAC.

GLO-DOT MINIATURE NEON PILOT LIGHT WITH .187 TERMINALS**



SERIES 2150QA 2152QA

Lens Color	120 VAC
Red	2150QA1
Amber	2150QA3
White	2150QA4
Green	2152QA5

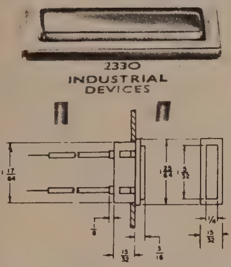
Mounting hole—5/16" diameter. Voltage—105-125 VAC.
**All terminal models tinned for soldering convenience.
Wire lead models have 4½" leads stripped ½"

INDUSTRIAL DEVICES, INC.

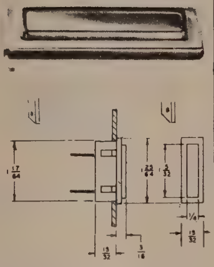
The Bright Spot for Your Product

Line-O-Lite

SERIES 2330D


2330
INDUSTRIAL
DEVICES
17/64
23/64
5/32
1/8
15/32
3/16
1/4
15/32

SERIES 2330QD


17/64
23/64
5/32
15/32
3/16
1/4
15/32

Will snap-fit into panels .055-070″ thick without speednut, and into other thicknesses with speednut. Mounting hole—1⁹⁄₃₂″ x ³⁹⁵⁄₄₀₀″. Voltage—105-125 VAC.

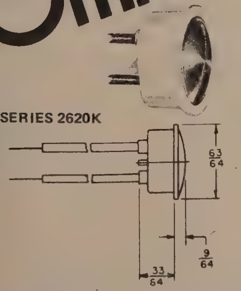
SERIES 2330D, 2330QD

Lens Color	NEON — 120 VAC	
	With wire leads	*With .250 terminals***
Red	2330D1	2330QD1
Amber	2330D3	2330QD3
White	2330D4	2330QD4
Green	2332D5	2332QD5

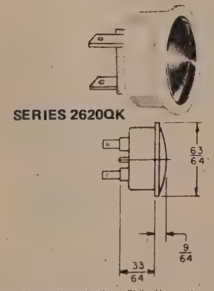
**All terminal models tinned for soldering convenience

Omni-Glow

SERIES 2620K


63/64
9/64
33/64

SERIES 2620QK


63/64
9/64
33/64

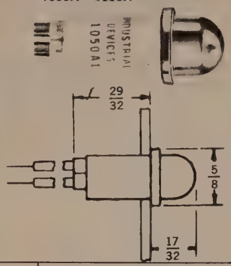
Versatile general purpose neon pilot lights. Mounting hole—⅞″ diameter. Voltage—105-125 VAC

SERIES 2620K, 2620QK

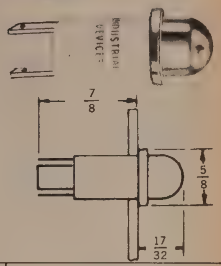
Lens Color	NEON — 120 VAC	
	With wire leads	*With .250 terminals***
Red	2620K1	2620QK1
Amber	2620K3	2620QK3
White	2620K4	2620QK4
Green	2622K5	2622QK5

**All terminal models tinned for soldering convenience.
Wire lead models have 4½″ leads stripped ½″

SERIES 1050A 1051A 1052A 1053A 1090A


INDUSTRIAL
DEVICES
1050A1
29/32
5/8
17/32

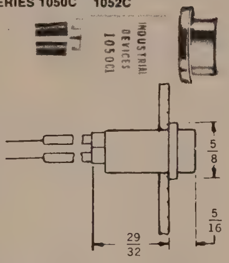
SERIES 1050QA 1051QA 1052QA 1053QA


INDUSTRIAL
DEVICES
7/8
5/8
17/32

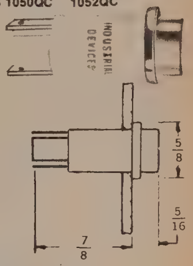
Lens Color	Incandescent			Neon			
	With wire leads					With .187 terminals**	
	6 Volt	**12 Volt**	**28 Volt**	**120 VAC**	**250 VAC**	**120VAC**	**250 VAC**
Red	1090A1-6V	1090A1-12V	1090A1-28V	1050A1	1051A1	1050QA1	1051QA1
Clear	—	—	—	1050A2	1051A2	1050QA2	—
Amber	1090A3-6V	1090A3-12V	1090A3-28V	1050A3	1051A3	1050QA3	1051QA3
White	1090A4-6V	1090A4-12V	1090A4-28V	1050A4	1051A4	1050QA4	1051QA4
Green	1090A5-6V	1090A5-12V	1090A5-28V	1052A5	1053A5	1052QA5	1053QA5
Blue	1090A6-6V	1090A6-12V	1090A6-28V	1052A6	—	—	—

*Mounting hole—½ inch diameter

SERIES 1050C 1052C


INDUSTRIAL
DEVICES
1050C1
5/8
5/16
29/32

SERIES 1050QC 1052QC

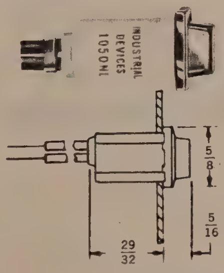

INDUSTRIAL
DEVICES
5/8
5/16
7/8

NEON

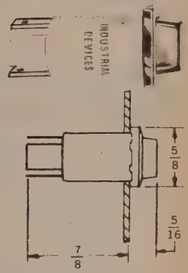
Lens Color	With wire leads **120 VAC**	With .187 terminals** **120VAC**
Red	1050C1	1050QC1
Amber	1050C3	1050QC3
White	1050C4	1050QC4
Green	1052C5	1052QC5

*Mounting hole—½ inch diameter

SERIES 1050N 1052N (Square Lens)


INDUSTRIAL
DEVICES
1050N1
5/8
5/16
29/32

SERIES 1050QN 1052QN (Square Lens)


INDUSTRIAL
DEVICES
5/8
5/16
7/8

NEON

Lens Color	With wire leads **120 VAC**	With .187 terminals** **120 VAC**
Red	1050N1	1050QN1
Amber	1050N3	1050QN3
White	1050N4	1050QN4
Green	1052N5	1052QN5

Versatile general purpose neon and incandescent pilot lights.
Mounting hole—½ inch diameter
**All terminal models tinned for soldering convenience.
Wire lead models have 4½″ leads stripped ½″

Edgewater, New Jersey 07020 Phone: (201) 224-4700

IDI Pilot and Indicator Lights

Red, Green or Amber Light Emitting Diodes

Light on your budget, heavy on performance

All models incorporate gallium phosphide light-emitting diodes—the brighter, more efficient LED

SOLID STATE GLO-DOT 2190U Series
HEMISPHERICAL LENS—RED, AMBER OR GREEN

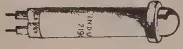
Approx. 100,000 hour life. Low voltage, low power drain—ideal for solid state and battery operations. Built-in current-limiting resistor and rectifier diode permit unit use in AC and DC applications, and protect against damage from incorrect polarity connection. Highly reliable, shock and vibration resistant. Requires 5/16" diameter hole for mounting (speednut supplied).

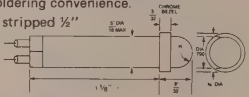
Lens Color	WITH WIRE LEADS 6 Volt	12 Volt	28 Volt
Red	2190U1-6V	2190U1-12V	2190U1-28V
Amber	2190U3-6V	2190U3-12V	2190U3-28V
Green	2190U5-6V	2190U5-12V	2190U5-28V

	With .187 tinned terminals**		
	6 Volt	12 Volt	28 Volt
Red	2190QU1-6V	2190QU1-12V	2190QU1-28V
Amber	2190QU3-6V	2190QU3-12V	2190QU3-28V
Green	2190QU5-6V	2190QU5-12V	2190QU5-28V

**All terminal models tinned for soldering convenience.

Wire lead models have 4½" leads stripped ½"

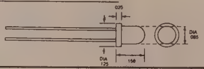




SOLID STATE SUBMINIATURE LED
4302 M SERIES—RED, GREEN OR AMBER

For circuit applications where space is limited. Wiring and installation instructions are funished with each unit.

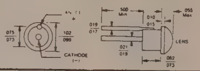
Lens Color	Stock Models Available	
Red	4302M1	**VOLTAGE RATING** From 3V up depending on resistor you use.
Amber	4302M3	
Green	4302M5	



SOLID STATE MICRO-MINIATURE LED
4301T SERIES—RED, GREEN OR AMBER

For circuit applications where space is limited. Wiring and installation instructions are furnished with each unit.

Lens Color	Stock Models Available	
Red	4301T1	**VOLTAGE RATING** From 3V up depending on resistor you use.
Amber	4301T3	
Green	4301T5	



SOLID STATE GLO-DOT 2190L SERIES
FLAT TOP LENS—RED, AMBER OR GREEN

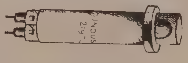
Approx. 100,000 hour life. Low voltage, low power drain—ideal for solid state and battery operations. Built-in current limiting resistor and rectifier diode permit unit use in AC and DC applications, and protect against possible damage from incorrect polarity connection. Highly reliable, shock and vibration resistant. Requires 5/16" diameter hole for mounting (speednut supplied).

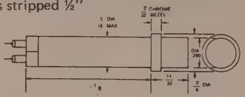
Lens Color	With wire leads 6 Volt	12 Volt	28 Volt
Red	2190L1-6V	2190L1-12V	2190L1-28V
Amber	2190L3-6V	2190L3-12V	2190L3-28V
Green	2190L5-6V	2190L5-12V	2190L5-28V

	With .187 tinned terminals**		
	6 Volt	12 Volt	28 Volt
Red	2190QL1-6V	2190QL1-12V	2190QL1-28V
Amber	2190QL3-6V	2190QL3-12V	2190QL3-28V
Green	2190QL5-6V	2190QL5-12V	2190QL5-28V

**All terminal models tinned for soldering convenience.

Wire lead models have 4½" leads stripped ½"

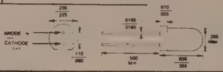




SOLID STATE 4300H HIGH DOME
LED SERIES—RED, GREEN OR AMBER

Each unit is packaged with one black panel mounting clip. Wiring and installation instructions are furnished with each unit. Mount in 17/64 diameter hole.

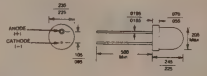
Lens Color	Stock Models Available	
Red	4300H1	**VOLTAGE RATING** From 3V up depending on resistor you use.
Amber	4300H3	
Green	4300H5	



SOLID STATE 4300S STANDARD DOME
LED SERIES—RED, GREEN OR AMBER

Each unit is packaged with one black panel mounting clip. Wiring and installation instructions are furnished with each unit. Mount in 17/64" diameter hole.

Lens Color	Stock Models Available	
Red	4300S1	**VOLTAGE RATING** From 3V up depending on resistor you use.
Amber	4300S3	
Green	4300S5	



Note: Resistance values are reccomended to limit current to approximately .015A for Red LEDs, and approximately .04A for Green and Amber LEDs.

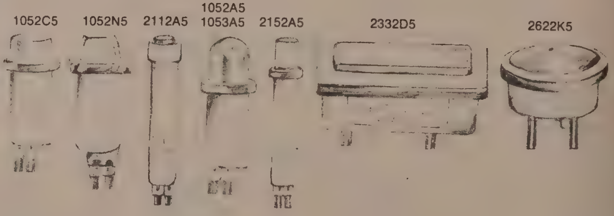
DIMENSION IN INCHES

New! Green Glow Pilot Lights

For the first time a green "neon" is available! The broad-spectrum bright green color gives you greater design flexibility, especially when emphasizing such functions as safe/unsafe and on/off. A special phosphor coating inside the bulb, which converts the emission from the internal ionized gas to green light, makes the green "neon" glow possible.

Lens Color	120 VAC With wire leads	With .187 terminals† and .250 terminals††
Green	1052A5	1052QA5†
Green	1052C5	1052QC5†
Green	1052N5	1052QN5†
Green	2112A5	2112QA5†
Green	2152A5	2152QA5†
Green	2332D5	2332QD5††
Green	2622K5	2622QK5††
	250 VAC	
Green	1053A5	1053QA5†

All terminal models tinned for soldering convenience.
W lead models have 4½" leads stripped ½"



INDUSTRIAL DEVICES, INC.

The Bright Spot for Your Product

Mini-Slide

• FULL RANGE OF COLORS • EASY TO INSTALL • SECURELY SEATED — WILL NOT VIBRATE LOOSE • ECONOMICAL — LONG-LIVED • EASY RELAMPING FROM FRONT OF PANEL • U.L. RECOGNIZED CSA APPROVED (120V MODELS)

Pilot Light Assemblies

MODEL 2800 SERIES
for use with "Pilot" Lamps

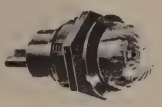
MINI-SLIDE Series 2800 pilot light assemblies are bright, highly visible, beautiful pilot lights styled with either solid black or stainless steel bezels.

The units feature round, light-diffusing, screw-in lenses. They come in a variety of colors and utilize "pilot" lamps in a full range of voltages from 6 to 120 volts. The lenses are molded polycarbonate, and the screw-in design permits easy relamping from the front of the panel. Mini-Slide Series 2800 is UL listed and CSA approved for 120 volt service.

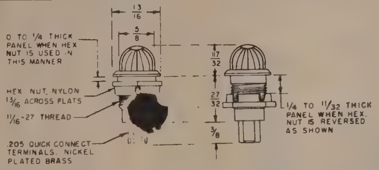
There are 2 sockets. Model 2800 (all plastic-black bezel) and Model 2801 (mirror-finish stainless steel bezel). Leads can be attached by soldering or with quick-connect receptacles for .205 x .020 tab.

MOUNTING

The heat-resistant phenolic socket is held to panel by means of a unique nylon torque-limiting nut (U.S. Patent 3352194). This nut eliminates any possibility of stripping threads or over-tightening, and is self-locking. Series 2800 Pilot Light Assemblies mount in an 11/16" diameter hole.



Socket #	Description
2800	All Plastic Black Bezel
2801	Mirror-finish Stainless Steel Bezel


13/16
5/8
0 TO 1/4 THICK PANEL WHEN HEX NUT IS USED IN THIS MANNER
HEX NUT, NYLON 13/16 ACROSS FLATS
11/16-27 THREAD
.205 QUICK CONNECT TERMINALS. NICKEL PLATED BRASS
117/32
27/32
3/8
1/4 TO 11/32 THICK PANEL WHEN HEX. NUT IS REVERSED AS SHOWN

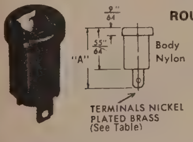
Lens Color	Red	Clear	Amber	White	Green	Blue	Yellow
Assembly lens code Lens Part Number (if ordered separately)	A1 2811	A2 2812	A3 2813	A4 2814	A5 2815	A6 2816	A7 2817

Ordering Information. The complete assembly model consists of the socket number plus lens code and lamp voltage and designation. (See table). For example Model 2801A1-120PSB indicates an assembly consisting of socket with stainless bezel, (2801), red lens (A1) and 120V lamp.

Individual Sockets

Available in round or rectangular styles to suit your design requirements. MINI-SLIDE mounts in ½" diameter holes—which may be punched with flats to prevent rotation. Model 3002 series socket can be turned to establish ½" or ¾" mounting centers.

Models 3001 and 3002 series sockets are molded from black nylon and accept "Indicator" lamps—Model 3061 socket is molded black phenolic and accepts the longer "Pilot" slide base lamps.



ROUND SOCKETS
MODEL 3001
3041 3044

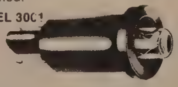
RECTANGULAR SOCKETS
MODEL 3002
3042 3045

Round Sockets Model No.	Rectangular Sockets Model No.	Terminal Size	Dim "A"
3001	3002	.205 x .020	1 9/64"
3041	3042	.187 x .020	1 9/64"
3044	3045	.060 Wide No Hole	63/64"

Mounting

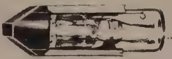
All MINI-SLIDE 3000 Series single sockets (3001, 3002, 3061) mount in either a ½" round hole or a standard "D" shaped hole. Push-on speednuts are automatically supplied with MINI-SLIDE sockets. Normally, #461 will be supplied with single sockets and ¾" center strips—#1264 supplied with ½" center strips. When single sockets are mounted on closer than ¾" centers, the #1264 speednut should be used and will be supplied if specified.

MODEL 3001

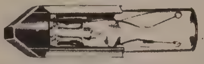


SHORT SLIDE BASE LAMPS

A complete line of rugged, long-life miniature incandescent slide base lamps is available, covering a wide range of voltages up to 120 volts and ratings up to three watts. Lamps are available in two lengths, the shorter "Indicator" lamps and the longer "Pilot" lamps.



"INDICATOR" LAMPS



"PILOT" LAMPS

Although relamping can be accomplished readily without special tools, where many lamps must be replaced a lamp-puller is helpful. The most effective such tool is simply a piece of soft vinyl sleeving of appropriate size. Order as stock No. 1937.

"INDICATOR" LAMPS

LAMP NUMBER	DESIGN VOLTS	DESIGN AMPS	MIN. LAB LIFE (HRS.)	WATTAGE at DESIGN VOLTS	AVERAGE END FOOT CANDLES
4ESB	4	.035-.045	5,000	.2	200
5ESB	5	035-.045	5,000	.2	225
6ESB	6	035-045	5,000	.2	250
10 ASB	10	009-.011	15,000	.1	*
10 CSB	10	015-.020	5,000	.2	100
10 ESB	10	.035-.045	10,000	.4	450
12 ESB	12	.035-.045	5,000	.4	650
16 CSB	16	015-.020	5,000	.3	150
16 ESB	16	035-.045	5,000	.6	900
18 ESB	18	.035-045	5,000	.7	1000
24 CSB	24	015-020	5,000	.4	200
24 ESB	24	.035-045	5,000	1.0	1100
28 ESB	28	035-045	5,000	1.1	1285
48 ESB	48	035-.045	5,000	1 9	2000

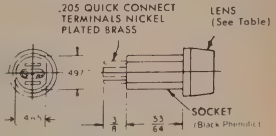
*Cherry Red Glow

"PILOT" LAMPS

LAMP NUMBER	DESIGN VOLTS	DESIGN AMPS	MIN. LAB LIFE (HRS.)	WATTAGE at DESIGN VOLTS	AVERAGE END FOOT CANDLES
6 PSB	6	140	5,000	8	800
12 PSB	12	.170	5,000	2.0	2400
24 PSB	24	073	5,000	1.7	2200
28 PSB	28	040	5,000	1.1	1900
48 PSB	48	053	5,000	2 5	1500
60 PSB	60	.050	5,000	3.0	2400
120 PSB	120	.025	5,000	3.0	1600

MODEL 3060 SERIES
For use with "Pilot" Lamps

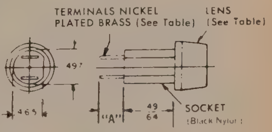
MINI-SLIDE Model 3060 assemblies accept slide base "Pilot" lamps. Socket molded of black phenolic is UL listed and CSA approved for 120 volt service and takes both round and square lenses. Lenses snap on or off for easy frontpanel relamping.



MODEL 3040 SERIES
For use with "Indicator" Lamps

MINI-SLIDE Model 3040 sockets are molded from black nylon. Designed to accept short slide base "Indicator" lamps. Otherwise identical to Model 3060.

Model No.	Terminal Size	Dim "A"
3040	.205 x .020	9/32"
3043	.187 x .020	9/32"
3046	.060 Wide No Hole	1/8"

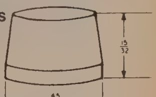


Pilot Light Lenses

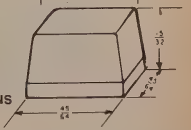
for 3060-3040 Series

MINI-SLIDE individual pilot light lenses are available in 3 shapes—round, square, and angle. Lenses are molded polycarbonate and either round or square lens will fit both 3040 and 3060 sockets. Angle lens will fit model 3060 with "Indicator" lamp only. Each lens is available in 7 bright colors (see table). Round and square lenses may be supplied hot-stamped with legends as desired. All lenses are keyed to socket for correct orientation.

ROUND LENS



	ROUND LENS		SQUARE LENS	
Lens Color	Lens Code	Lens Part No. (if ordered separately)	Lens Code	Lens Part No. (if ordered separately)
Red	C1	3111	D1	3121
Clear	C2	3112	D2	3122
Amber	C3	3113	D3	3123
White	C4	3114	D4	3124
Green	C5	3115	D5	3125
Blue	C6	3116	D6	3126
Yellow	C7	3117	D7	3127



SQUARE LENS

Ordering Information The complete assembly model consists of the socket number plus lens code (as derived from the lens table) and lamp voltage designation. For example: Model 3060D1-120PSB indicates an assembly consisting of socket, square red lens and 120v lamp. Model 3040C5-28ESB consists of a socket and a round green lens with 28ESB lamp.

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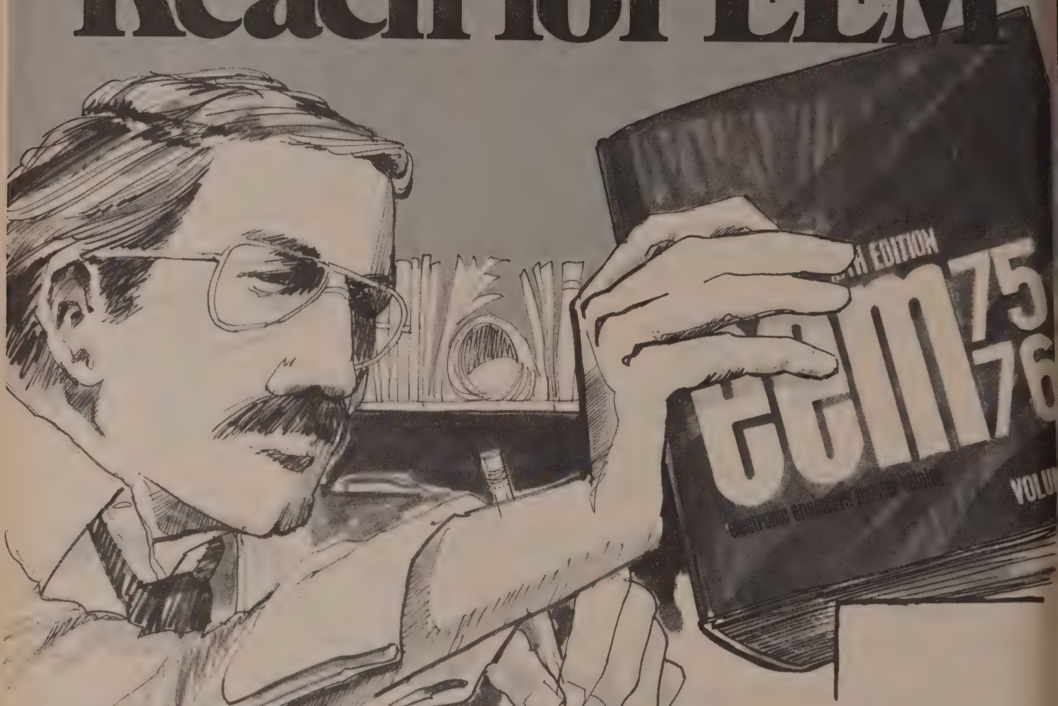
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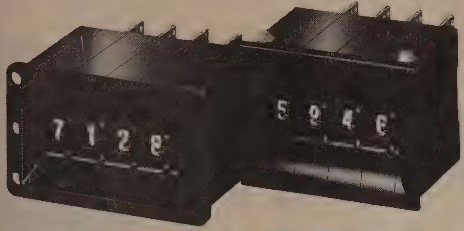


HARDWARE?

WHO NEEDS IT!

Not with Inter-Market's new "no hardware" Series SM subminiature thumbwheel switches. You put them together with built-in snap studs . . . which eliminates hardware, saves assembly time and simplifies bank changes . . . to reduce costs.

Even their size is frugal . . . a mere 8mm. wide with 5mm. high characters. Front or rear mounting models . . . 10, 11 and 16 position wheels . . . decimal or BCD boards . . . single or double pole.

Fully U.S. made . . . with plus features like removable stop pins, PCB pin terminations and plastic dust windows.

So go ahead . . . cut costs, fight inflation. Be a hero.

Request Bulletin TS-75

MINIATURE LAMPS

OUR HELPING HAND

If the prosaic nature of miniature lamps leaves you a little cold, maybe you'll warm up to our price and delivery.

Not being one of the "big" little lamp people—at least not yet—means Inter-Market has to do some attractive things on pricing and shipping to compete.

We aren't running this ad to ask to be your second source, but we'll accept this for openers. So if you're being kicked around by one of the "bigs," let's talk. You're important to us and we respond accordingly.

Complete lines of ImLec miniature and subminiature filament lamps, neon glow lamps, Green Glow lamps and accessories. Lamps only or packaged assemblies.

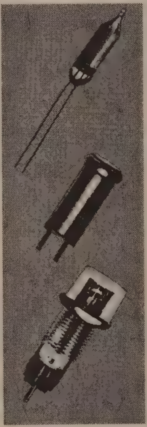
Request Bulletin ML-74

UNIQUE, NEW

green glow

LAMPS & INDICATOR LIGHTS

Give your product *a new look* without expensive retooling or redesign



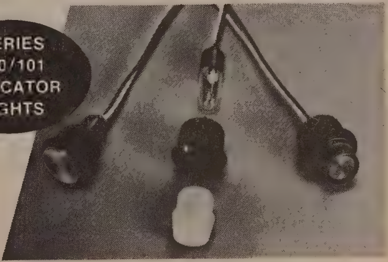
New high brightness lamps provide a pleasing, "easy on the eye" **green glow** . . . instead of conventional orange-red. Distinctive when used alone, greater contrast when used with ordinary neon glow lamps.

No expensive filtering, retooling or product modification required. Simply substitute for what you are now using. Inter-Market's green glow feature is available in lamps alone or in five models of packaged lamps, including both indicator lights and cartridges.

PHONE OR WRITE FOR FULL LINE BROCHURE

Request Bulletin GG-72

SERIES 100/101 INDICATOR LIGHTS



VERY PURPOSEFUL PARTS FOR MODULAR VERSATILITY

Somebody has finally seen the light on indicator lights. It's Inter-Market with their Series 100/101 comprised of three very purposeful parts.

A rubber bushing snaps into a ⅜" dia. cutout—and stays there without any nut or retainer clip. Then "marry" your light source and lens cap and "divorce" them later, if you change your mind as sometimes happens.

As your light source, choose a 6, 14 or 28 V. filament, neon, Green Glow or LED lamp assembly—now or later. Select blue, red, yellow, green, white or clear lenses in flush or top hat style. In addition to this modular design versatility, your production manager will appreciate the latitude in assembly and your customer the ease of lamp replacement.

Request Bulletin IL-75

IMLEC TM

PHONE OR WRITE FOR DETAILS

INTER-MARKET, INCORPORATED

1946 LEHIGH AVE. • GLENVIEW, ILLINOIS 60025 • (312) 729-5330 • TWX: 910-651-1997

litronix

- **Lamps**

  First with LED lamp incorporating IC current regulator.

- **Displays**

  First with super large 0.6 inch display.

- **Opto-Isolators**

  First with quad opto-isolator.

- **Calculator Circuits**

  First with low cost automatic shut-off calculator circuit.

- **Watch Circuits**

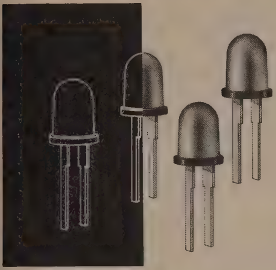
  First with low cost alphanumeric Day/Date electronic watch circuit.

**No wonder
we're No. 1!**

LAMPS

litronix

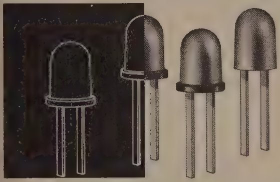
Panel Indicator Lamps



- High reliability
- TTL Compatible
- Low power consumption
- Economical molded plastic package
- Can be panel mounted
- Standard T-1¾ package

Part Number	Features	Typical Light Output @ 20 mA	
RL-2000	High brightness	3.5	
RL-4403	Wide angle	1.2	
RL-4415	Right angle leads	0.8	
RL-4850	Low cost	0.8	
RL-5054 -1	High on axis intensity	2	
RL-5054 -2	High on axis intensity	3	mcd
RL-5054 -5	High on axis intensity	0.4	
*RL-20	High on axis intensity	1.2	
*RL-21	High diffusion	0.8	
OL-30	Orange	1.2	
GL-4850	Green	1	

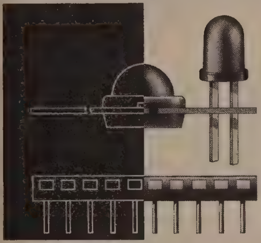
General Purpose Lamps



- TTL Compatible
- Economical molded plastic package
- Low power consumption
- High reliability
- Can be panel mounted
- Standard T-1 package

*RL-209	Wide angle	0.8	
RL-4484	Low cost	0.8	
*RL-T1	Flangeless	0.8	mcd
OL-31	Orange	0.8	
GL-4484	Green	1	

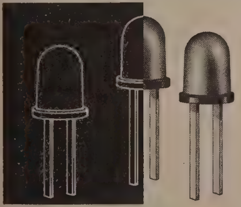
Status Indicator Lamps



- Axial leaded lamps
- Design for maximum strength at minimum linear spacing
- 8 Diode array for bar graphs

*RL-50	Water clear	0.8	
RL-54	Low cost	0.8	
RL-55	High intensity	3	
RL-55-5	Low cost	2	mcd
GL-56	Green	1	
*RL-2	Wide angle	1.5 @ 50 mA	
ARL-18	8-diode array	0.2	

Functional Lamps



- Constant intensity over wide voltage range
- Can be panel mounted
- Incorporates silicon current source IC
- Voltage indicator illuminates at preset voltage

RLC-200 (T-1¾)	20 mA Constant current	1.2 mcd @ 6v
RLC-201 (T-1¾)	10 mA Constant current	0.7 mcd @ 6v
RLC-210 (T-1)	10 mA Constant current	0.6 mcd @ 6v
RLC-400 (T-1)	Voltage indicator	2 mcd @ 3v
RLC-410 (T-1)	Voltage indicator	2 mcd @ 3.5v

Infrared Lamps

- Spectrally matched to silicon sensors
- High reliability
- Useful as optical source in Card Readers, Encoders, Photochoppers and high speed optoelectronic data links.

IRL-40	Header	1.5 mW @ 100 mA
IRL-60	Axial lead	550 μW @ 50 mA

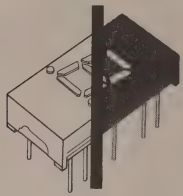
Mounting clips available all T-1¾

*Available in red diffused, red clear, white diffused and water clear.

DISPLAYS

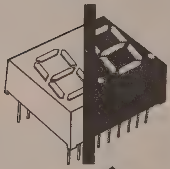
litronix

Single Digit Numeric Displays



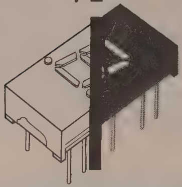
Soft light stroke, mitred corner, .3 inch high displays for use in portable or non-portable industrial instrumentation and consumer applications such as clocks and table top calculators.

707	7-segment display with left hand decimal
707R	7-segment display with right hand decimal
701	Overflow, polarity indicator
702	7-segment display with left hand decimal
704	Overflow, polarity indicator



Two-digit modules, soft light stroke, mitred corner, .5 inch high displays for use in DVM, and instrumentation requiring maximum readability in smallest package.

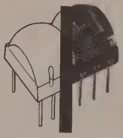
721	Overflow, polarity indicator
727	7-segment display with right hand decimal
722	Overflow, polarity indicator
728	7-segment display with right hand decimal



Largest LED digit available, soft light stroke, mitred corner, .6 inch high display for use in clocks and industrial systems.

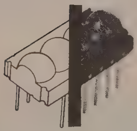
746	Overflow, polarity indicator
747	7-segment display with left hand decimal
749	Overflow, polarity indicator
750	7-segment display with left hand decimal

Magnified Numeric Displays



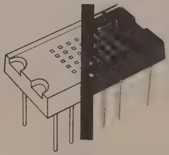
DL-44M	Dual, 7-segment with right hand decimal

Bubble magnified, .110-.190 inch high efficiency, multiple digit, monolithic display for application requiring maximum brightness at lowest currents, in a small package. Applications include stop watches, thermometers, and electronic scales.



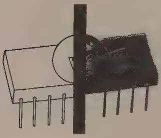
DL-34M	Quad, 7-segment with right hand decimal

Alpha-Numeric Displays



Hybrid, 5 x 7 matrix, .32 inch display for display of alphanumeric information in standard ASCII code.

DL-57	5 x 7 dot matrix with left hand decimal



Monolithic, bubble magnified, high efficiency, 16-segment starburst alphanumeric display.

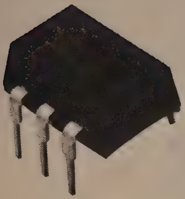
DL-16	16-segment with left hand decimal

Polarity	Character Height	Light Output	Forward Voltage (Typical)
Common Anode Common Cathode	0.30"	0.7mcd @10mA	1.7V $I_F=20mA$
Common Anode Common Cathode	0.50"	2.8mcd $I_F=20mA$	1.65V $I_F=20mA$
Common Anode Common Cathode	.630"	5.0 mcd $I_F=20mA$	3.4V $I_F=20mA$
Common Cathode	.19"	0.1mcd $I_F(AVG)=1.5mA$ Pulsed	1.7V $I_F=5mA$
Common Cathode	.110"	0.3mcd $I_F(AVG)=1.0mA$ Pulsed	1.7V
	.32"	0.6 mcd 300ft-L $I_F=10mA$	1.7V $I_F=10mA$
Common Cathode	.157"	0.8mcd segment $I_F=10mA$	1.7V $I_F=5mA$

OPTO-ISOLATORS

litronix

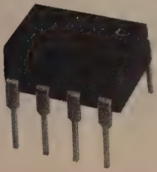
Single Channel



Complete selection of photo transistor and photo darlington isolators

	Current Transfer Ratio Min.	Typ.	Isolation Breakdown Voltage	BV$_{CEO}$ DET. (MAX.)	I$_{CEO}$ (Typ.)
IL-1	0.2	0.35	2500	30V	5nA
	no max.				
IL-5	0.5	0.70	2500		
IL-12	0.02	0.10	1000		
IL-15	0.06	0.14	1500		
	no max.				
IL-16	0.06	0.14	1500		
	max 0.3				
IL-74	.125	0.35	1500		
	Isolation Voltage	Collector Current			
ILCA2-30	2500V	125mA		30V	1nA
ILCA2-55	2500V	125mA		55V	1nA
ILA-30	1500V	100mA		30V	10nA
ILA-55	1500V	100mA		55V	10nA

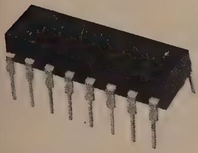
Dual Channel



2 totally independent isolators in a single package

	Current Transfer Ratio Min.	Typ.	Isolation Breakdown Voltage	BV$_{CEO}$ DET. (MAX)	I$_{CEO}$ (Typ)
ILCT-6	0.20	0.50	1500	30V	1nA
ILD-74	0.125	0.35			5nA

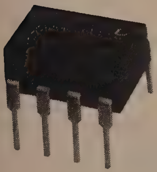
Quad Channel



4 low cost, totally independent general purpose isolators in a single package

ILQ-74	0.125	0.35	1500	30V	5nA

High Speed

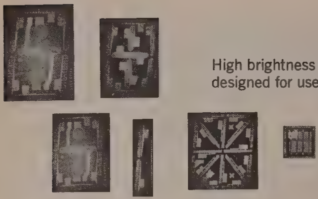


High speed three state output, built-in Schmitt trigger to avoid oscillation

			Propagation Delay	
			t$_{pd}$ (1)	t$_{pd}$ (0)
IL-100	1000	1500	65	65
IL-101	1000	1500	100	100

LED DISPLAY DIE

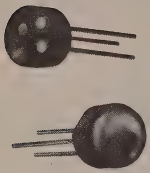
litronix



High brightness GaAsP monolithic LED displays designed for use in digital electronic watches.

	Character Height	Die Size	Description
RW-13	13 x 13 mils	15 x 15 mils	Decimal point
RW-26	40 mils	40 x 45 mils	7-segment + decimal point
RW-62	102 mils	78 x 107 mils	9-segment alphanumeric
RW-64	100 mils	95 x 105 mils	16-segment alphanumeric
RW-68	59 mils	48 x 64 mils	7-segment + decimal point
RW-74	102 mils	30 x 107 mils	2-segment
RW-50	71 mils	59 x 78 mils	7-segment
RW-72	71 mils	59 x 78 mils	9-segment alphanumeric

PHOTOTRANSISTORS



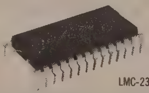
Low dark current, high responsivity phototransistors for use in electronic watches, card readers and high speed optoelectronic data links. Available packaged or in die form.

	I_{CEO} Collector Dark Current (Typ.)	Responsivity (Min.)		Photo Current (Min.)	
		Tungsten	GaAs	$V_{CE}=5V$ $H=5mW/cm^2$	
				Tungsten	GaAs
LPT-100	0.25nA $V_{CB}=10V$	0.6uA mW/cm² $V_{CB}=10V$	1.8uA mW/cm² $V_{CB}=10V$	0.2mA $V_{CE}=5V$	0.6mA
LPT-100A				1.0mA $V_{CE}=5V$	
LPT-100B				1.3mA $V_{CE}=5V$	
LPT-110				0.2mA $V_{CE}=5V$	
LPT-110A				0.6mA $V_{CE}=5V$	
LPT-100B				0.8mA $V_{CE}=5V$	
LPC-13 (Die)	10nA	0.6	1.8	0.2	0.6
LPC-30 (Die) Darlington	20nA	5	15	1.8	5

SILICON PRODUCTS

Calculators

LBC-1081


LMC-2302

LMC-2302 MOS/IC 8-digit full accumulating memory, full floating decimal point, automatic constant, percent and square root.

LMC-2304 MOS/IC 8-digit scratch pad memory, full floating decimal point, automatic constant, percent, square, square root and reciprocal.

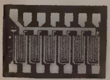
Both calculators have automatic shut-off.

LBC-1081 Bipolar IC including the digit decoder/drivers and necessary circuitry for the automatic shut-off feature of the 2300 series calculator MOS.

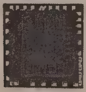
A full line of low cost 8 and 9-digit LED calculator displays is available.

LBC-1050 Bipolar IC is an 8-driver active low open collector array designed for use as the digit driver interface between MOS circuitry and LED displays.

Electronic Digital Watches


LBC-1060

LBC-1070


LMC-6120

LMC-6130

The LMC-6120 is a versatile multiplexed LED watch CMOS integrated circuit chip capable of displaying on demand seconds, minutes and hours.

The LMC-6130 is a versatile multiplexed LED watch CMOS integrated circuit chip capable of displaying on demand seconds, minutes, hours, day and date.

The LBC-1060 is a monolithic NPN transistor array designed for use as an LED/CMOS digit driver interface in electronic watch systems.

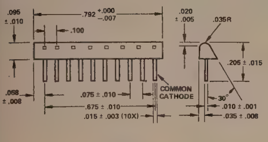
The LBC-1070 is a monolithic NPN transistor array designed for use as an LED/CMOS segment driver interface in electronic watch systems.

A full line of 4-digit LED electronic watch displays is available.

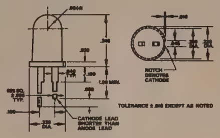
DIMENSIONS

litronix

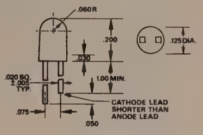
Lamps


.095 ±.010
.792 +.000 −.007
.100
.020 ±.005
.035R
.205 ± .015
.068 ±.008
.075 ± .010
.675 ± .010
.015 ± .003 (10X)
COMMON CATHODE
30°
.010 ± .001
.035 ± .008

ARL-18

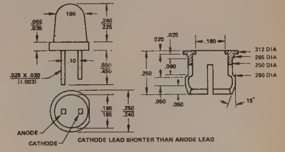

NOTCH DENOTES CATHODE
CATHODE LEAD SHORTER THAN ANODE LEAD
TOLERANCE ±.010 EXCEPT AS NOTED
1.00 MIN.

T1¾

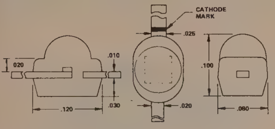

.060R
.200
.125 DIA.
.030
.020 SQ. ±.005 TYP.
1.00 MIN.
CATHODE LEAD SHORTER THAN ANODE LEAD
.075
.050

TOLERANCE ±.010 EXCEPT AS NOTED

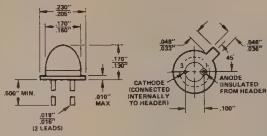
T1 (without flange)


.180
.240 .226
.055 .035
.10
.650 .450
.025 X .020 (±.003)
ANODE
CATHODE
.195 .185
.250 .240
CATHODE LEAD SHORTER THAN ANODE LEAD
.020
.025
.180
.090
.250
.312 DIA
.265 DIA
.250 DIA
.280 DIA
.050
.050
15°

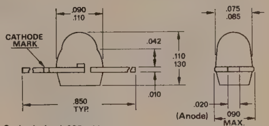
RL-2


CATHODE MARK
.025
.020
.010
.100
.120
.030
.020
.080

IRL-60


.230" .205"
.170" .160"
.170" .130"
.500" MIN.
.010" MAX
.019" .016" (2 LEADS)
.048" .033"
.048" .036"
45°
CATHODE (CONNECTED INTERNALLY TO HEADER)
ANODE (INSULATED FROM HEADER)
.100"

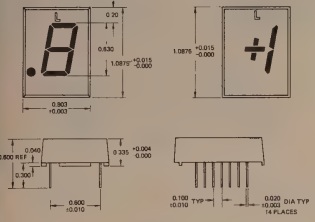
IRL-40


.090 .110
.075 .065
CATHODE MARK
.042
.110 .130
.010
.850 TYP.
.020
(Anode)
.090 MAX.

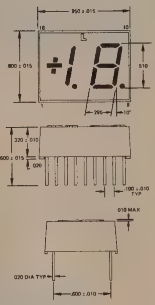
Cathode lead .025 wide

RL-55

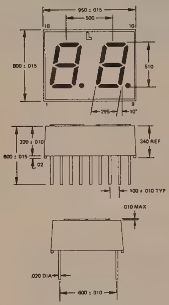
Displays


0.20
0.630
1.0875 +0.015 −0.000
0.903 ±0.003
0.040
0.600 REF
0.335 +0.004 −0.000
0.300
0.600 ±0.010
0.100 ±0.010 TYP
0.020 ±0.003 DIA TYP 14 PLACES

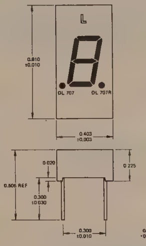
DL-747


.950 ±.015
.800 ±.015
.510
.295
10°
.320 ±.010
.600 ±.015
.020
.100 ±.010 TYP
.010 MAX
.020 DIA TYP
.600 ±.010

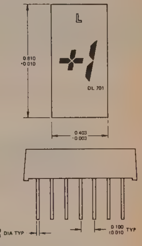
DL-721


.950 ±.015
.500
.800 ±.015
.510
.295
10°
.320 ±.010
.340 REF
.600 ±.015
.02
.100 ±.010 TYP
.010 MAX
.020 DIA
.600 ±.010

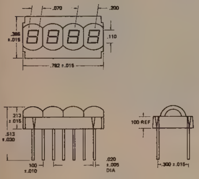
DL-727


0.810 ±0.010
DL 707
DL 707R
0.403 ±0.003
0.020
0.225
0.505 REF
0.300 ±0.030
0.300 ±0.010

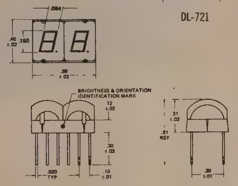
DL-707


0.810 ±0.010
DL 701
0.403 ±0.003
0.020 ±0.003 DIA TYP
0.100 ±0.010 TYP

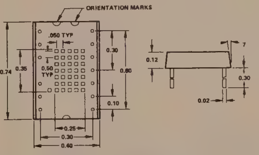
DL-701


.070
.200
.385 ±.015
.110
.782 ±.015
.213 ±.015
.513 ±.030
.100 ±.010
.020 ±.005 DIA
.100 REF
.300 ±.015

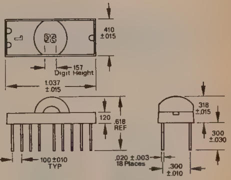
DL-34M


.094
.40 ±.02
.160
.59 ±.02
BRIGHTNESS & ORIENTATION IDENTIFICATION MARK
.12 ±.02
.31 ±.02
.61 REF
.30 ±.03
.020 TYP
.10 ±.01
.30 ±.01

DL-44M

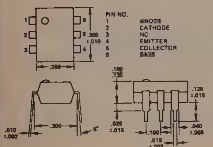

ORIENTATION MARKS
.050 TYP
0.30
0.74
0.35
0.50 TYP
0.80
0.10
0.25
0.30
0.40
0.12
7°
0.30
0.02

DL-57

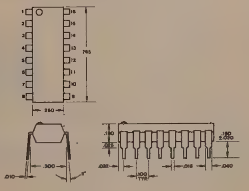

.410 ±.015
.157 Digit Height
1.037 ±.015
.120
.618 REF
.318 ±.015
.300 ±.030
.100 ±.010 TYP
.020 ±.003 18 Places
.300 ±.010

DL-16

Opto-Isolators

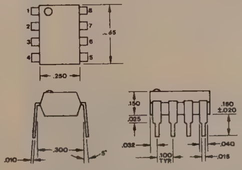

PIN NO.
1 ANODE
2 CATHODE
3 NC
4 EMITTER
5 COLLECTOR
6 BASE
.385 ±.010
.260
.180 .136
.125 ±.015
.010 ±.002
.300
5°
.025 ±.015
.100
.018 ±.003
.040 ±.008

Single Channel


.765
.250
.300
.010
.180 ±.030
.032
.100 TYP.
.018
.040

TOLERANCE ±.010 EXCEPT AS NOTED

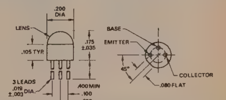
Quad Channel


.365
.250
.010
.300
5°
.150
.025
.032
.100 TYP.
.160 ±.020
.040
.018

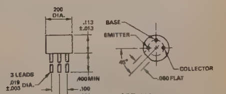
TOLERANCE ±.010 EXCEPT AS NOTED

Dual Channel and High Speed

Phototransistors


.200 DIA
LENS
.105 TYP
.175 ±.035
BASE
EMITTER
COLLECTOR
45°
.080 FLAT
3 LEADS .019 ±.003 DIA.
.400 MIN
.100
.050

LPT-100

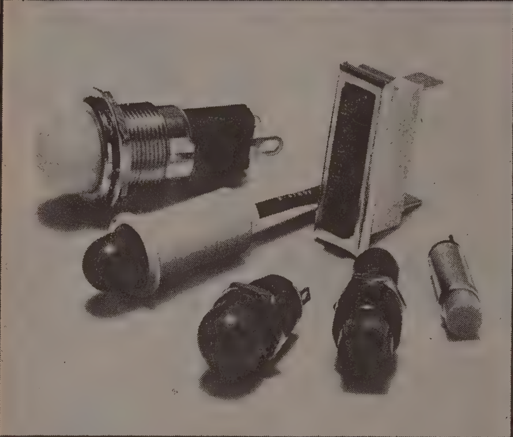

.200 DIA.
.113 ±.013
BASE
EMITTER
COLLECTOR
45°
.080 FLAT
3 LEADS .019 ±.003 DIA.
.400 MIN
.100
.050

LPT-110

LITRONIX, INC., 19000 HOMESTEAD ROAD/VALLCO PARK/CUPERTINO, CALIF. 95014/(408) 257-7910/TWX 910-338-0022

LITTELITES

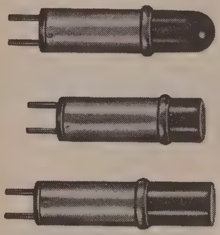
INDICATOR LIGHTS. . .



- **Broad line** . . . Littelites include Cartridge Lamps and Lampholders, Subminiature Lampholders, Miniature Lampholders, and Snap-Mount Plastic Lites . . . we offer a wider selection among these four product groups than any other single manufacturer.
- **UL/CSA** . . . All Littelites are UL Recognized or Listed and CSA Certified. New tools and molds assure you of the finest quality lights on the market today.
- **Fast** turn-around on large volume orders.
- **Off-the-shelf** availability from a nationwide network of Littelites distributors.
- **Special** requirements? Just give us a call (312) 824-1188.

CARTRIDGE LAMPS/LAMPHOLDERS

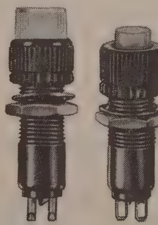
SEND FOR CATALOG LL-C574



UL RECOGNIZED
CSA CERTIFIED
MEET MIL-L-3661 REQUIREMENTS

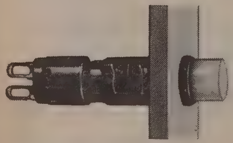
Cartridge Lamps

Incandescent, neon, or solid state. Solid state units supplied with green, red, yellow, or amber LEDs. All cartridge lamps offer a wide choice of lens styles and colors. Mate with cartridge lampholders shown below.



Cartridge Lampholders

Designed for rear mounting into 3/8" clearance hole. Turret pin, solder lug, or solder cup terminals. Available with flat for "D" hole mounting. Supplied separately or as complete assembly, which includes lens cap (smooth or fluted) or lens collar (.284" or .230" wide).

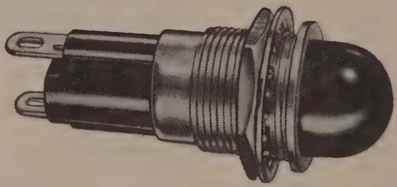


Clips and Sockets

Provides inexpensive means of mounting cartridge lamps directly to the panel. Solder lug or solder cup terminals. Clip secures cartridge lamp in 9/32" mounting hole.

MINIATURE LAMPHOLDERS

SEND FOR CATALOG LL-M574



- For front mounting into 11/16" clearance hole.
- Accommodate T3-1/4 or T2 bayonet based incandescent lamps and T3-1/4 bayonet based neon lamps.
- Screw or solder lug terminals
- Drip proof and "D" hole mounting available.
- Neon lampholders feature built-in resistor.
- Six basic lens styles available in wide choice of colors.
- **UL Listed, CSA Certified** (Solder Lug Terminals)
  UL Recognized, CSA Certified (Screw Type Terminals)

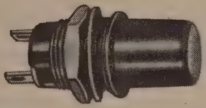
. . . FROM LITTELFUSE

LITTELFUSE

SUBMINIATURE LAMPHOLDERS

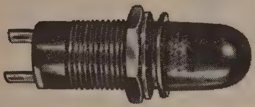
SEND FOR CATALOG LL-S574

Subminiature lampholders accommodate T1-3/4 incandescent or T2 neon midget flanged base lamps. All lampholders allow easy installation and replacement of the lamp and lens from the panel front. **UL Recognized. CSA Certified.**



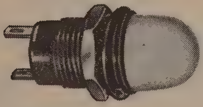
920 Series

For front mounting into 15/32" clearance hole. Accept a T1-3/4 incandescent midget flanged base lamp (1.35-28V). Choice of four different lens styles. Meet requirements of MIL-L-3661.



921 Series

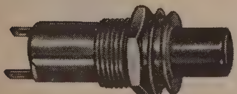
Front mounting into 15/32" clearance hole. Accommodate replaceable T2 neon midget flanged base lamps (C7A—105-125V AC-DC or C9A—110-125VAC). Built-in resistor limits lamp current. Meet requirements of MIL-L-3661.



922 Series

Three different mounting configurations: **922 Series**—front mount—15/32" clearance hole; **923 Series**—front mount—17/32" clearance hole; **924 Series**—front or rear mount—15/32" clearance hole.

Accept a T1-3/4 incandescent midget flanged base lamp (1.35-28V). Choice of four lens styles.



925, 926, 927 Series

Three different mounting configurations: **925 & 926 Series**—rear mount—3/8" hole; **927 Series**—front mount—15/32" hole.

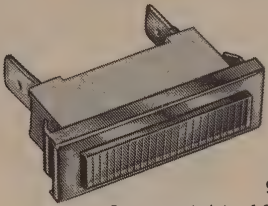
Accommodate either T1-3/4 incandescent or T2 neon midget flanged base lamps. Three different lens styles in smooth face or fresnel. Lampholders and lenses can be furnished with gaskets for drip proof applications.

SNAP-MOUNT PLASTIC LITES

SEND FOR CATALOG LL-P574

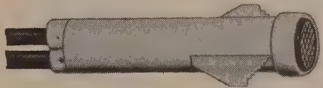
Designed to snap into mounting hole without the use of auxiliary hardware. The 970 and 980 Series feature a pair of flex arms which ensure positive retention and protection against shock and vibration. **UL Listed. CSA Certified:** All units with wire leads.

UL Recognized. CSA Certified: Units with Q.C. Terminals.



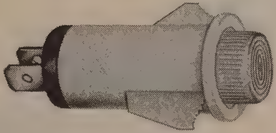
960 Series

Snap-mount into 1.281" x .395" mounting hole. Available with neon (125-250V) or incandescent (6-28V) lamps. Can be supplied with 6" wire leads, 1/4" or 3/16" Q.C. terminals. Choice of fluted or smooth face lens.



970 Series

Snap-mount into .312/.318" diameter hole. Available with neon (125-250V), incandescent (6-28V) or solid state (1.8-28V) lamps. Solid state units supplied with red, yellow, amber, or green LEDs. Terminations include 6" wire leads or .125" Q.C. terminals. Choice of eight lens styles.



980 Series

Snap-mount into .500/.510" diameter hole. Available with neon (125-250V) or incandescent (6-28V) lamps. 6" wire leads or .187" Q.C. terminals. Fresnel lenses in six different styles.

LITTELFUSE
SUBSIDIARY OF TRACOR

800 EAST N.W. HWY. • DES PLAINES, ILL. 60016
(312) 824-1188

LAMPHOLDERS

The special you want is probably a standard in the Leecraft line. The lampholders and mounting brackets shown are only part of the vast selection available.

No. 16-08

MIDGET SCREW

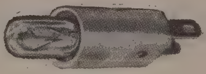
16-00 Series Solder Term.
16-200 Series Wire Leads

No. 25-35

MIDGET GROOVED

25-200 Series Wire Leads
25-00 Series Soldering Terminals

Used in instrumentation, meters, edp/automation, photoelectric controls. For use with lens end lamp Nos. 253, 253X, 261 and other styles.



No. 52-07

SUB-MINIATURE WEDGE BASE

For T1¾ Lamps
5200 Series
Also available with wire leads
(Series 52-200)

WEDGE BASE

No. 23-24

23-00 Series

23-00 Series—Molded housing, terminals

No. 23-223

23-200 Series

23-200 Series—Molded housing, wire leads

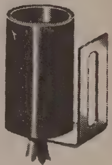
No. 24-07A

24-00 Series

24-00 Series—Wafer type, terminals

MINIATURE BAYONET

3-00 Series

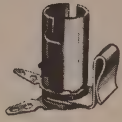


No. 3.05

2-00 Series

No. 2-15

7-00 Series



No. 7-01

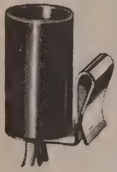
7-00 Series P.C. Mount

No. 7-35

No. 7-35XP11A

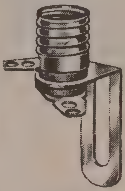
CANDELABRA SCREW

4-00 Series



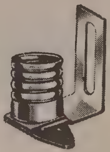
No. 4-45

6-00 Series



No. 6-06

18-00 Series



No. 18-79

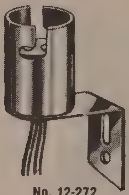
CANDELABRA BAYONET

Double Contact

57-00 Series

No. 57-45

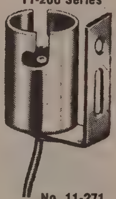
12-200 Series



No. 12-272

Single Contact

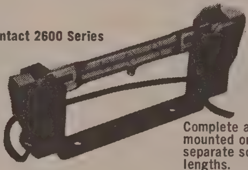
11-200 Series



No. 11-271

LAMPHOLDERS FOR SINGLE-ENDED & DOUBLE-ENDED QUARTZ LAMPS

Recessed
Single Contact 2600 Series



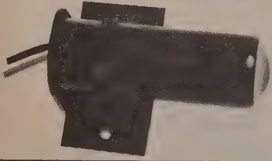
Complete assembly. Two holders mounted on common bracket, or separate sockets. Brackets in all lengths.

Double Contact 2200 Series

No. 22-225

Positions lamp more securely. Prevents shaking loose from vibration.

PHOTOELECTRIC CONTROLS



Full range of sizes for all applications including Counting, Conveyor Control, Inspection and Skew.

Series LRT and LRR

Responds to presence or absence of opaque or translucent materials from a fraction of an inch up to 25 feet. Special designs are available for specific requirements. Contact our applications engineers for details. Light sources may be incandescent or long life, narrow beam L-E-D's.

Series PT41 and PR 41

SSF FLASHER UNIT

SOLID STATE FLASHER PAK

Warning Lights, control for EXIT signs.

Series SSF

Flashing rate as specified Standard 6V-12V-24V, D.C. Standard wire termination. May be modified for specific applications.

LEECRAFT

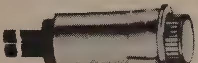
WRITE FOR PRODUCT LIGHTING GUIDE • PROTOTYPE SAMPLES AVAILABLE

MANUFACTURING CO., INC., 21-16 44th Road, Long Island City, N.Y. 11101, (212) 392-8800/TWX: 7105822897

INDICATOR LIGHTS AND LIGHTED SWITCHES

SNAPLITE INDICATOR LIGHTS

Long-life, high brightness lamps. Built-in resistors with neon lamps to suit circuit voltage. Snap fit in 1/2″ hole with no additional hardware. Wide variety of lens and housing colors. Tab or solder terminals or wire leads. Also available with chrome rings.



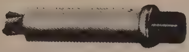
Flat Cylindrical Lens
32-2111 3/16″ high

Square Lens
32R-2911T 7/32″ high

4100 Series
(with neon
less resistor,
or incandescent)

3600 Series
(with built-in resistor
in 3 flange dimensions)
No. 36EN-2111

All Tineons may
be ordered with
aluminum bezel



45 Series
(Tab
Terminals)
No. 45RN-
2111T3

TINEON INDICATOR LIGHTS

Long-life, high brightness lamps. Press fit into 5/16″ hole. Plastic Lens and Nylon housing in colors (white, standard). Speednut furnished. Legends. Built-in resistor. Insulated leads. Neon types rated 110-250V. Also available with incandescent lamp.

3900 Series
(one piece lens and housing for
snap fit into .033/.078 panels)
No. 39-0381

RECTANGULAR INDICATOR LIGHTS

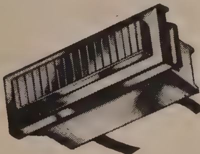
Long-life, high brightness, neon. Snap fit into panels securely without additional hardware. Choice of lens colors. Complete range of voltages. Series 3100 has chrome bezel and plastic lens.

Dual Bezel
No. 31ML2 **For 1 9/32″ x 13/16″ hole**

CLEAN
ADD SOAP

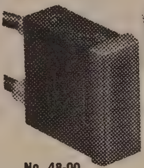
Barrier separates light into separate message areas. Individual or simultaneous operation.

Dual Message Lights
No. 31D
For 1 9/32″ x 13/32″ hole



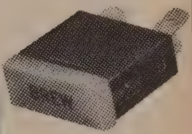
No. 31-2111

4800
Series



No. 48-00

48-T SERIES

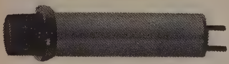


No. 48-3T

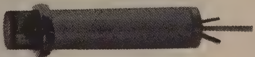
Snap Fit
for .325 x .860
mounting hole.
Panel Range .031 to .100

100,000 HOUR SOLID STATE L-E-D INDICATORS

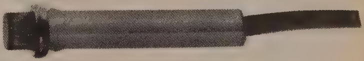
Gallium phosphide light emitting diodes. Red, green, yellow. White nylon housing. Plastic Hi-Hat or Flush lens. Low power consumption. 6V, 12V, 24V, DC or AC. Standard-chrome bezel.



Series L46R
.040 pins for PC and socket mounting.
Friction fit in 5/16″ hole (.312)

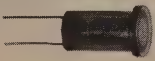


Series L45R
Friction fit mounting
in 5/16″ hole (.312)



Series L39UR
Wire leads. Snap fit for 5/16″ hole (.312)
Also available with tabs.

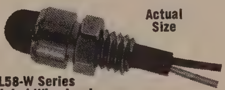
SUBMINIATURE L-E-D SERIES L28



For limited space. Mounts in 3/16″ hole. Clear Butyrate housing. Leads coded for polarity. Flush lens, red or green. 1/4″ dia. Front panel projection .040″. Rear panel projection 3/8″ max.

SOLID STATE L-E-D SERIES L58

Using high brightness L-E-D's, micro size. Unaffected by shock and vibration. Wide viewing angle. Red, green, yellow.



Actual
Size

L58-W Series
Insulated Wire Leads

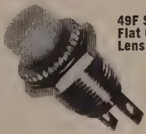
Actual
Size

L58-T Series
Bare Leads

Also available with square bezel

MIDGET SCREW INDICATORS

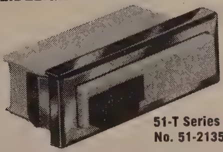
49D Series
Dome Lens



49F Series
Flat Cylindrical
Lens

Flat or dome shape lens of translucent plastic in yellow, red, amber, green and white. Incandescent lamp easily inserted into front panel. Fits 7/16″ dia. hole. 1/4″ (max.) panel thickness. 23/32″ (min.) centers. Alphanumeric hot stamping. 6-7V, 12-14V, 24-28V. Spring tempered phosphorous bronze center maintains positive contact with lamp.

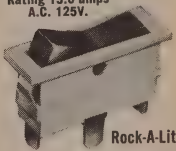
SLIDELIGHT™



51-T Series
No. 51-2135T

Pilot indicator light. Slide-switch. Ultra-compact. Snap fit in .395 x 1.281 hole. Choice of colors and lights. Wide voltage range. Message stamped. Leads or terminals. Rating: 125V, 6 amps.

Series 7100T
Rating 15.0 amps
A.C. 125V.



Rock-A-Lite

Ultra-compact. Snap Fit in 1.281″ x .395″. High-brightness, neon or incandescents. .250″ brass tab terminals. Size: 1 3/32″ x 1 5/16″ x 1 7/16″.

LEECRAFT

WRITE FOR INDICATOR LIGHT GUIDE LG 1-70 • PROTOTYPE SAMPLES AVAILABLE

MANUFACTURING CO., INC., 21-16 44th Road, Long Island City, N.Y. 11101, (212) 392-8800/TWX: 7105822897

X-Y PLASMA DISPLAY UNITS

Clear, stable, accurate and compact alphanumeric displays.
The units are consisted of dot matrix panels with drivers and some logic circuits.

●PXU0601

The unit provides a single row of 32 character positions. Each character is displayed on an NEC PX0606A-32, a 5 x 7 dot matrix plasma display panel. Positive logic 6-bit code employed for modified ASCII display.

PXU0601

Specifications

Character					Dot	
Dot Matrix	Digits	Height	Width	Separation	Size	Pitch
5 x 7	32 x 1-line	5.5mm	3.7mm	2 columns	0.5mm□	0.8mm

General Characteristics

Brightness	Viewing angle	Contrast ratio	Color	Scan rate	Operating temperature	Storage temperature
12fL	≧120°	≧30/1	Neon orange	≧60Hz	−10° ~ 50°C	−20° ~ 70°C

PXU0502A

●PXU0502A

The unit provides 256-character capability (32 digits x 8 lines). Each character is displayed on an NEC PX0705-32, a 5 x 7 dot matrix plasma display panel. Positive logic 6-bit code employed for modified ASCII display.

Specifications

Character					Dot	
Dot matrix	Digits	Height	Width	Separation	Size	Pitch
5 x 7	32 x 8-line	6.7mm	4.7mm	2 columns, 3 rows	0.7mm□	1.0mm

General Characteristics

Brightness	Viewing angle	Contrast ratio	Color	Scan rate	Memory access time	Operating temperature	Storage temperature
15fL	≧120°	≧30/1	Neon orange	≧60Hz	2.2μsec	−10° ~ 50°C	−20° ~ 70°C

NEC America, Inc.

Head Office
277 Park Ave., New York, N.Y. 10017
Tel: 212-758-1666
Cable Address: NIPPELECO NEW YORK
Telex Address: NECA UR 234936

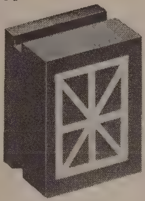
Los Angeles Office
4940 West 147th Street
Hawthorne, California 90045
Tel: 213-776-5923/4
Telex Address: NIPPON ELEC LA 673569

NEC
Nippon Electric Co., Ltd.

ALPHANUMERIC & NUMERIC DISPLAYS & LAMPS

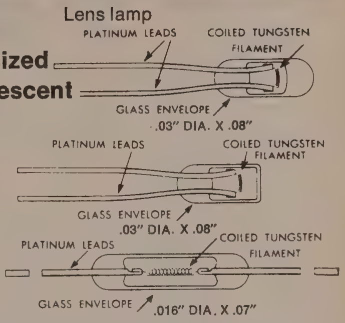
- Directly viewed incandescent
- IC Compatible
- Visable in high ambient light
- Custom designs
- Plus-minus, N.S.E.W., Colon, Decimal point all available
- Character heights: 3/16″ to 5/8″

"O" Series/16 segment alphanumeric:

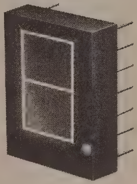


¼″ & 5/16″ character height, 3,4,5 Volt, 8 ma. to 17 ma., .465″H x .375″W x .312″D; AC, DC or multiplex operation.

Micro sized incandescent lamps:

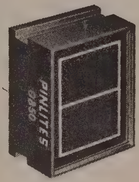

Lens lamp
PLATINUM LEADS
COILED TUNGSTEN FILAMENT
GLASS ENVELOPE
.03″ DIA. X .08″
Flat Top
PLATINUM LEADS
COILED TUNGSTEN FILAMENT
GLASS ENVELOPE
.03″ DIA. X .08″
Axial
PLATINUM LEADS
COILED TUNGSTEN FILAMENT
GLASS ENVELOPE
.016″ DIA. X .07″

600 & 800 Series DIP-LITE® digital displays



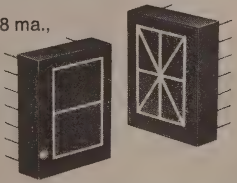
5/16″ (600) ½″ (800) char. ht., 3,4,5V, 8 ma.-18 ma., AC, DC or multiplex operation; DIP Pak mount, built-in decimal or colon (right or left), direct LED replacement

"O" Series digital readout:


PINLITES
9890

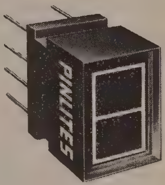
3/16″ - ½″ char. ht., 1.5V-5V, 8 ma.-18 ma., AC, DC or multiplex operation, I.C. decoder/driver compatible, plug-in construction.

1050 Series numeric and alphanumeric readouts:



⅝″ char. ht., 5V, 18 ma., plug-in — 14 pin (numeric) or 24 pin alphanumeric.

"Mini-Dip" numeric display:



5/16″ char. ht., 3,4,5V, 8-18 ma., AC, DC, or multiplex operation, PC board mounting, 8 pin DIP package.

SEND FOR COMPLETE INFORMATION

REFAC Electronics Corp.

1275 BLOOMFIELD AVENUE - FAIRFIELD, NEW JERSEY 07006
TELEPHONE 201/575-8820 — TWX 710-734-4348
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A REFAC Company
Manufacturer's of Pinlites Displays and Lamps

PRESENTING...
Industry's most complete line of T1 indicator lamps and LED's

Shelly sells more T1 indicators than anyone — Brite-Eye incandescents, Trans-Eyes with built in amplifier, LED's plus low cost, completely assembled indicators. For good reasons. Shelly offers more cap styles, more colors and more time saving features.

Just Snap Them Into Panel

Shelly indicators are the easiest to use, requiring no added hardware. Just insert the indicator into a 0.191″ (#11) hole and press into position. What a snap! Shelly Brite-Eye and Trans-Eye incandescents are also relampable from the front. Just remove the snap-on cap, remove the lamp, insert a new one and replace the cap. It takes just seconds.

Ideal for confined applications

Shelly's unique microminiature "Easy Lamp" housings are ideal for high density packaging applications. Incandescents and LED's mount on 0.225″ centers and weigh in at less than ½ gram. They combine high illumination with clean design. Just right for contemporary panel styling. Indicators have the same physical dimensions, which simplifies mixing or matching.

Wide Variety Of Colors, Cap Styles and Features

Brite-Eyes & Trans-Eyes come in 7 cap styles and colors. LED-Eyes are available with Ball End or Digi-Cap in red, green, yellow and orange. LED-EYE configurations include a current regulated LED for constant light intensity from 4.5V to 11V and a voltage sensing LED.

BRITE-EYES can be easily ordered using this chart

LAMP

Voltage	Amps	MSCP	Life	P/N
5	.020	.03	10,000	A03
5	.060	.05	100,000	A05
5	.060	.15	6,500	A02
5	.115	.15	40,000	A04
12	.030	.10	25,000	A06
18	.026	.15	10,000	A01
28	.024	.15	16,000	A07

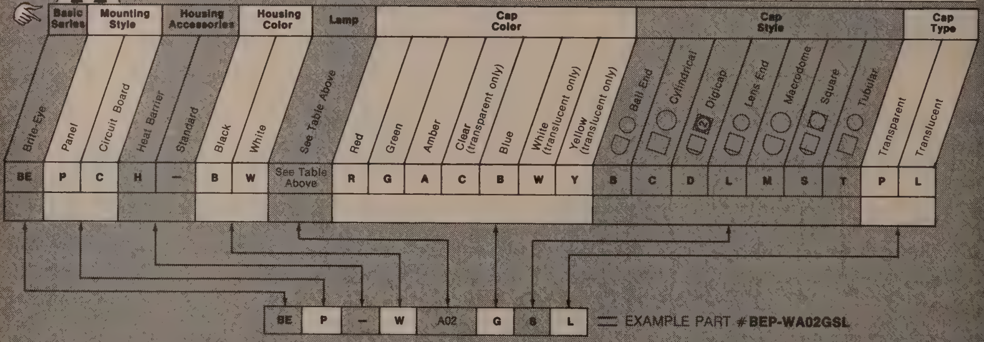
Other lamp voltages available on special order.

Completely Assembled Low Cost Indicators

Shelly Associates offers completely assembled, low cost indicator lamps in both Brite-Eye (LCI) and Trans-Eye (LCT) configurations. The indicators are available in 4 colors - red (R), green (G), yellow (Y) and white (W) - with a ball cap, a black base and a 5 volt, 60ma lamp. The LCT uses an NPN transistor. Three current limiting resistors - 1.7K, 2.2K and 3.9K are available.

Prices

Quantity	Brite-Eye LCI-R,G,Y,W	Trans-Eye LCT-R,G,Y,W
1-24	$ 0.78	$ 2.75
25-49	0.75	2.64
50-99	0.72	2.51
100-499	0.69	2.38
500-999	0.66	2.25
1000-4999	0.62	2.12
5000 up	0.59	1.99



Basic Series	Mounting Style		Housing Accessories		Housing Color		Lamp	Cap Color							Cap Style							Cap Type	
Brite-Eye	Panel	Circuit Board	Heat Barrier	Standard	Black	White	See Table Above	Red	Green	Amber	Clear (transparent only)	Blue	White (translucent only)	Yellow (translucent only)	Ball End	Cylindrical	Digicap	Lens End	Macrodome	Square	Tubular	Transparent	Translucent
BE	P	C	H	—	B	W	See Table Above	R	G	A	C	B	W	Y	B	C	D	L	M	S	T	P	L

BE | P | — | W | A02 | G | B | L = EXAMPLE PART #BEP-WA02GBL

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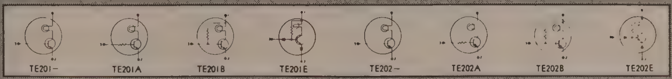
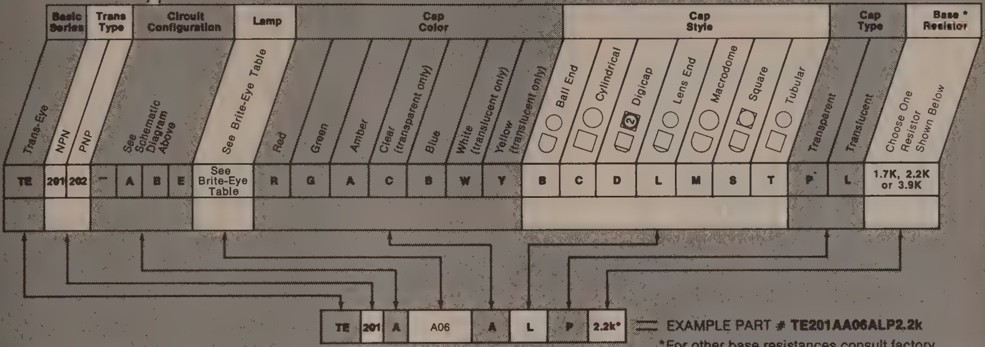
Mailing Address: P.O. Box 11427, Santa Ana, California 92711
TWX 910-595-1589

This chart's for ordering TRANS-EYES

TRANS-EYE — Base type/circuit configuration



TE201 & TE202 — Transistor driven lamp — requires ex. base limiting resistor.
TE201A & TE202A — Internal base current limiting resistor. Requires 1.6mA max. base drive. Any value resistor can be specified.
TE201B & TE202B — Internal pull-up resistor. Requires a −1.6mA sink. Use with open collector transistor.
TE201E — Compatible with most TTL, DTL and current sinking logic families.
TE202E — Compatible with positive inverted logic.



Basic Series	Trans Type		Circuit Configuration				Lamp	Cap Color							Cap Style							Cap Type		Base * Resistor
Trans-Eye	NPN	PNP	See Schematic Diagram Above				See Brite-Eye Table	Red	Green	Amber	Clear (transparent only)	Blue	White (translucent only)	Yellow (translucent only)	Ball End	Cylindrical	Digicap	Lens End	Macrodome	Square	Tubular	Transparent	Translucent	Choose One Resistor Shown Below
TE	201	202	–	A	B	E	See Brite-Eye Table	R	G	A	C	B	W	Y	B	C	D	L	M	S	T	P	L	1.7K, 2.2K or 3.9K

TE	201	A	A06	A	L	P	2.2k*

= EXAMPLE PART # **TE201AA06ALP2.2k**

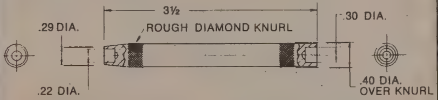
*For other base resistances consult factory

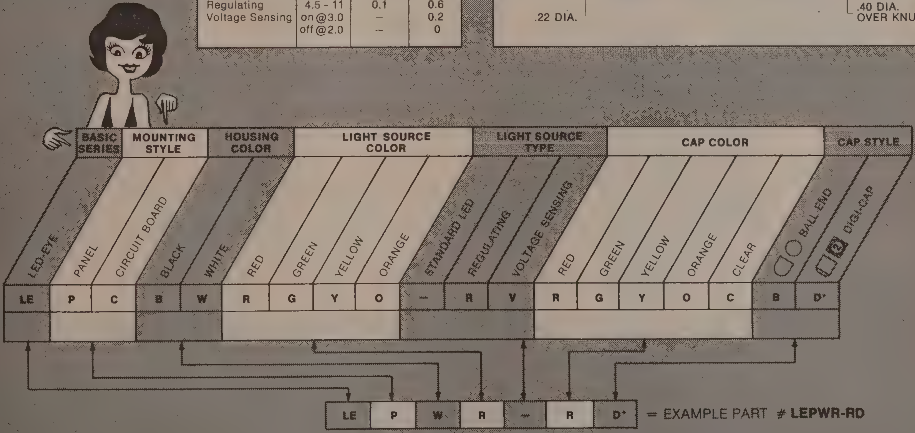
It's easy to order LED-EYES using this chart

LED Specifications			
Suggested Voltage & Current: Red: 2.4V @10 ma. Others: 2.4V @ 40 ma.	Vf (typ)	Luminous Intensity in MCD @ 10 ma.	
		Minimum	Typical
Red	2.0	0.5	1.5
Green	2.0	0.5	1.5
Yellow	2.0	0.5	1.5
Orange	2.0	0.5	1.5
Regulating	4.5 - 11	0.1	0.6
Voltage Sensing	on @3.0	–	0.2
	off @2.0	–	0

INSTALLATION TOOL

Although not required, this handy tool simplifies indicator installation in high density applications and makes cap removal much easier.



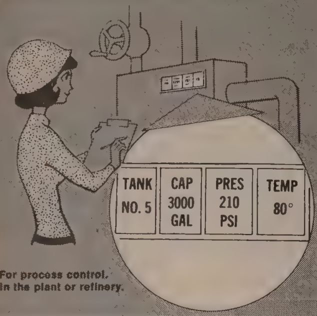


BASIC SERIES	MOUNTING STYLE		HOUSING COLOR		LIGHT SOURCE COLOR				LIGHT SOURCE TYPE			CAP COLOR					CAP STYLE	
LED-EYE	PANEL	CIRCUIT BOARD	BLACK	WHITE	RED	GREEN	YELLOW	ORANGE	STANDARD LED	REGULATING	VOLTAGE SENSING	RED	GREEN	YELLOW	ORANGE	CLEAR	BALL END	DIGI-CAP
LE	P	C	B	W	R	G	Y	O	–	R	V	R	G	Y	O	C	B	D*

LE	P	W	R	–	R	D*

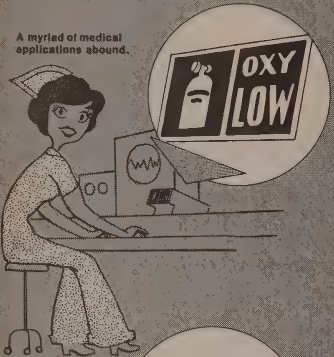
= EXAMPLE PART # **LEPWR-RD**

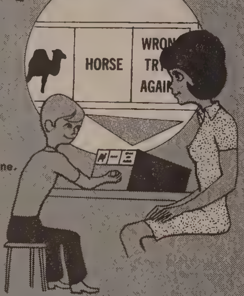
*Specify letters, numerals or symbols when ordering Digi-Caps.



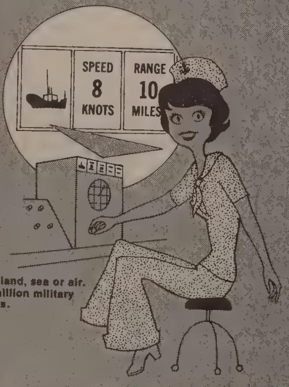
For process control.
In the plant or refinery.

A myriad of medical applications abound.





Education.
Such as the teaching machine.



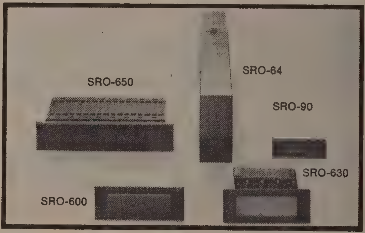
On land, sea or air.
A million military uses.

Shelly Multi-Message Modules and Displays

Some Important Advantages

- Industry's largest high-contrast image with single plane 160° viewing insures easy readability and increases operator efficiency.
- True random access provides fast selection of desired message.
- Complete messages are projected eliminating the possibility of erroneous readings.
- Rugged multi-module assemblies last longer and require less maintenance.
- Optional integral driver/decoder saves interface design time at customer level.
- Multi-message modules cost far less than other types of information displays.
- Commercial, industrial and military packaging. Choose the type that best fits your particular requirement.
- Small size minimizes panel space requirements.
- Wide selection of voltage and current combinations for the ultimate in flexibility.

The SRO-90 and 600 series of 12 message displays



SRO-90 Series — Industry's Smallest Multi-Message Module

The SRO-90 is industry's smallest multi-message display, providing a viewing area of 0.435″ by 0.34″. Up to 12 messages can be projected on the single plane screen. Lamp voltages are 5v and 28v and housing is modular. Either snap-on or screw-on bezels are available. A plug-in drive module with TTL logic, with or without memory, can convert an 8-4-2-1 binary input code into the visual decimal display.

SRO-92 is a dual unit which can display two messages simultaneously on a viewing screen that can be split either vertically or horizontally, offering a total of 24 different messages.

VALVE
2
STUCK
VALVE
3
OPEN

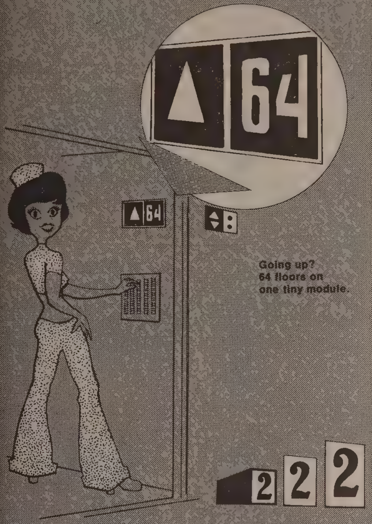
SRO-600 — For Commercial, Industrial & Military Applications

The SRO-600 is a 12 message module with a 0.7″ by 0.59″ display. The unit is modular with a screw-on bezel and offers switching capability. Lamp voltages are 5v to 28v. A plug-in drive module (TTL logic) with or without memory is available to convert an 8-4-2-1 binary input code into the visual decimal display.

SRO-630 is an economical, self-contained module. Display is 0.7″ by 0.59″ with a 12 message capacity. The unit can be provided with mounting brackets for panel mounting or can be provided in a projector component configuration for mounting directly to a PC board or to meet your own design requirement.

SRO 650 is a low cost commercial version of the SRO-600. Maximum viewing area is 0.62″ by 0.59″. Lightweight, with one piece construction, the SRO-650 is similar in performance to the SRO-600.

The SRO-64: up to 64 messages on a tiny, snap-in, snap-out "Slip-Chip"



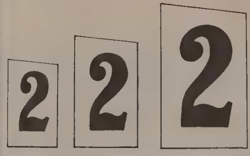
Going up?
64 floors on
one tiny module.

SRO-64

The Shelly SRO-64 is the first Multi-Message Display offering "Slip-Chip" readouts — 64 message "slip-chips" that snap in and out for easy field replacement.

The SRO-64 operates like a miniature slide projector, but uses only one multi-message slide and one projector lamp. Individual images can be created from anything photographable — black & white or in color. Random selection in response to a 6 bit* input code positions the desired image which is projected onto a high contrast screen. The image is retained without signal power and can be changed in only 70 milliseconds. Placement of the screen with relation to distance from the projector allows for image size areas from 0.7″ to 2″ high. Drivers and driver timers for low level and IC inputs are available.

*A subset of ASCII is standard. EBCDIC or virtually any 6-bit code optional.



A Quick-Look at Shelly's Line of Multi-Message Displays

Model Number	Number of Messages	Size of Display	Lamp Voltage	Housing	Driver Modules	Bezels	Switching Capability
SRO-64	up to 64	up to 2″	3.5V to 24V	Self-contained. Mounting cases for 2 to 20 readouts available.	Drivers & driver-timers for low level & IC inputs	Snap-on or screw-on types. RFI and drip-proof	No
SRO-90	12	0.435″ high 0.340″ high	5V-28V	Modular	Decode 8-4-2-1 BCD to visual decimal display	Snap-on or screw-on types. RFI and drip-proof	Yes
SRO-92	2 x 12 (dual unit)	0.435″ high 0.340″ high	5V-28V	Modular	Decode 8-4-2-1 BCD to visual decimal display	Snap-on or screw-on types. RFI and drip-proof	Yes
SRO-600	12	0.7″ high 0.59″ wide	5V-28V	Modular	Decode 8-4-2-1 BCD to visual decimal display	Screw-on type	Yes
SRO-630	12	0.7″ high 0.59″ wide	5V-28V	Self-contained	12 line input only	Screw-on type	No
SRO-650	12	0.62″ high 0.59″ wide	5V-28V	Modular	Decode 8-4-2-1 BCD to visual decimal display	Snap-on type	No

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Mailing Address: P.O. Box 11427, Santa Ana, California 92711
TWX 910-595-1589

THE SLOAN COMPANY

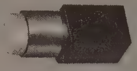
7704 SAN FERNANDO ROAD BOX 367

SERIES

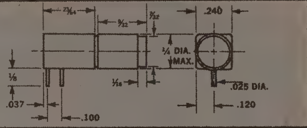
DRAWINGS

LENS STYLE

101



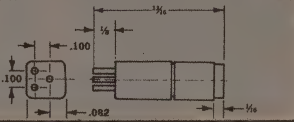
LENS BAYONET TYPE
LENS STYLES AVAIL. — DS, DSC, Q, QB



.240
¼ DIA.
MAX.
⅛
.037
⅛
.025 DIA.
.120
.100

111

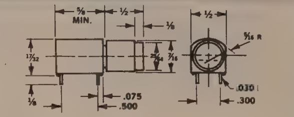
LENS BAYONET TYPE
SAME AS 101



⅛
.100
.100
.082

864

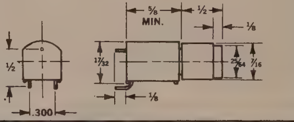
LENS
BAYONET TYPE
LENS STYLES AVAIL. — DS7, DSC7, Q7, QB7
THE SUFFIX (7) IS PERTINENT TO 864 OR 874 SERIES ONLY



⅝
MIN.
½
⅛
½
17/32
⅛
.075
.500
.030
.300

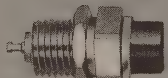
874

LENS
BAYONET TYPE
SAME AS 864



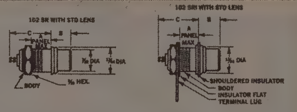
⅝
MIN.
½
⅛
½
17/32
⅛
.300

102



AVAILABLE IN ALL BODY STYLES

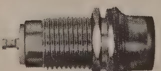
LENS STYLES AVAIL. — STD, DSC, QB, DS, Q



102 SR WITH STD LENS
102 SRI WITH STD LENS
C
B
A
PANEL
MAX
DIA
DIA
BODY
HEX
SHOULDERED INSULATOR
BODY
INSULATOR FLAT
TERMINAL LUG

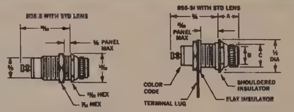
BODY	A	B	C
S	13/64	9/32	13/32
SI	5/32	5/16	3/8
SS	1/4	15/64	7/16
SSI	13/64	17/64	13/32
SK	17/64	15/64	15/32
SKI	7/32	1/4	7/16
SR	9/32	13/64	13/32
SRI	15/64	15/64	29/64

855



BODY STYLES AVAILABLE S OR SI

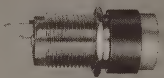
LENS STYLES AVAIL. — STD, DS, DSC, Q, QB, D, M, SE



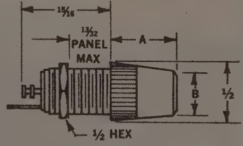
855-S WITH STD LENS
855-SI WITH STD LENS
⅛ PANEL
MAX
HEX
HEX
A
PANEL
MAX
B
C
½
DIA
COLOR
CODE
TERMINAL LUG
SHOULDERED
INSULATOR
FLAT INSULATOR

	A		B	C
LENS STLYE	S	SI		
STD	19/64	21/64	17/64	3/8
D	5/16	11/32	3/8	1/2
DS,DSC,Q,QB	21/64	23/64	3/8	7/16
M	21/32	11/16	3/8	1/2
SE	3/16	3/16		1/2

856



AVAILABLE IN BODY STYLE S ONLY
(2 TERMINAL BODY ONLY)
LENS STYLES AVAIL. — M, Q, DS, MB, QB, DSC



15/16
13/32
PANEL
MAX
A
B
½
½ HEX

LENS STYLE	A	B
M,MB	5/8	3/8
DS,DSC,Q,QB	3/8	15/32

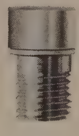
DS

Matte black anodized bezel prevents sidelight emission. Blends with dark colored panels; contrasts with light colored panels. BI-COLOR has the added feature, white when unlighted and colored lighted.

Q

Aluminum anodized bezel (matte silver appearing) allows 180° visibility, blends with light colored panels; contrasts with dark colored panels. BI-COLOR has the added feature, white when unlighted and colored when lighted.

DSC



Aluminum anodized bezel (matte silver appearing) prevents sidelight emission. Blends with light colored panels, contrasts with dark colored panels. BI-COLOR has the added feature, white when unlighted and colored when lighted.

STD

Flat, slightly projected lens gives 180° visibility.

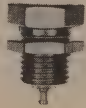
Lens differs on 855 — see drawing.

SE

Edgelight for plastic panels. Small diameter light gasket minimizes wasted panel space. Can be relamped with gloved hands.

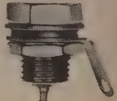
BODY TYPES

S



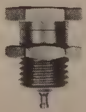
Presents bright metal Hex extending in front of the panel or in front of the shoulder washer on the SI model.

SI



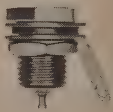
Presents bright metal Hex extending in front of the panel or in front of the shoulder washer.

SS



Presents 5/16" bright metal Hex extends very little in front of the panel or in front of the shoulder washer on the SSI model.

SSI

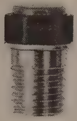


Presents 5/16" bright metal Hex extends very little in front of the panel or in front of the shoulder washer.

SUN VALLEY, CALIFORNIA 91353 PHONE: (213) 875-1123 TWX: 910-498-2250

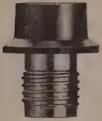
LENS STYLE

QB



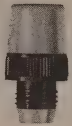
Matte black anodized bezel. Allows 180° visibility. Blends with dark colored panels; contrasts with light colored panels. BI-COLOR has the added feature, white when unlighted and colored when lighted.

D



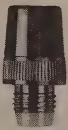
Skirted lens covers metal parts for neat panel appearance. Large lighted surface assures positive indication. BI-COLOR has the added feature, white when unlighted and colored when lighted.

MB



Offers the same features as Type M. Black metal trim. Both accommodate T-1¾ based lamp or T-2 based neon lamp (NE2J or AIH types).

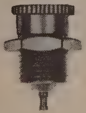
M



Large lens for maximum visibility from all angles. Engineered to offer the most uniform light distribution. Full 180° visibility.

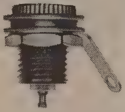
BODY TYPES

SK



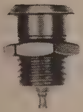
Presents small knurled flange in front of the panel or in front of the shoulder washer on the SKI model.

SKI



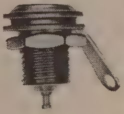
Presents small knurled flange in front of the panel or in front of the shoulder washer.

SR



Presents a small flange in front of the panel or in front of the shoulder washer on the SRI model.

SRI



Presents a small flange in front of the panel or in front of the shoulder washer.

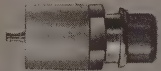
LENS COLOR	LAMP TYPE	HOW TO ORDER
TRANSPARENT RL — Red *BL — Blue *GL — Green AL — Amber CL — Clear TRANSLUCENT RLUC — Red WLUC — White BLUC — Blue GLUC — Green ALUC — Amber *Not recommended for use with neon lamps.	T-1 INCANDESCENT OR T-1 BASED LED	EXAMPLE: 101 RL Model No. Lens Color DSC T-1 Based Lamp Lens Style Lamp Type
TRANSPARENT RL — Red *BL — Blue *GL — Green AL — Amber CL — Clear TRANSLUCENT RLUC — Red WLUC — White BLUC — Blue GLUC — Green ALUC — Amber *Not recommended for use with neon lamps.	T-1¾ OR T-2 INCANDESCENT OR T-1¾ BASED LED	EXAMPLE: 864 RL Model No. Lens Color DSC T-1¾ Based Lamp Lens Style Lamp Type
GENERAL PURPOSE LENS MATERIAL (Translucent except M lens) R — Red W — White B — Blue G — Green A — Amber *C — Clear LEXAN LENS MATERIAL (Transparent) RL — Red BL — Blue GL — Green AL — Amber CL — Clear (Translucent) RLUC — Red WLUC — White BLUC — Blue GLUC — Green ALUC — Amber	T-1 INCANDESCENT OR T-1 BASED LED	EXAMPLE: 102SI AL Body Type Lens Color DSC T-1 BASED LAMP Lens Style Lamp Type
GENERAL PURPOSE (Translucent R — Red W — White B — Blue G — Green A — Amber LEXAN LENS MATERIAL (Transparent) RL — Red BL — Blue GL — Green AL — Amber CL — Clear (Translucent) RLUC — Red WLUC — White BLUC — Blue GLUC — Green ALUC — Amber	T-1¾ INCANDESCENT OR T-1¾ BASED LED	EXAMPLE: 855SI G 5 Body Type Lens Color Color Coding D BI-COLOR BASED LAMP Lens Style Lamp Type
M and MB LENS TRANSPARENT EXCEPT FOR WHITE R — Red W — White *B — Blue *G — Green A — Amber C — Clear ALL LENSES EXCEPT M AND MB TRANSPARENT RL — Red *BL — Blue *GL — Green AL — Amber CL — Clear TRANSLUCENT RLUC - Red WLUC White *BLUC - Blue *GLUC - Green ALUC -- Amber *Not recommended for use with neon lamps	T1¾ AND T2 INCANDESCENT OR T-1¾ BASED LED	EXAMPLE: 856 RLUC MODEL NO. LENS COLOR T-1¾ or T-2 BASED LAMP LAMP TYPE

THE SLOAN COMPANY

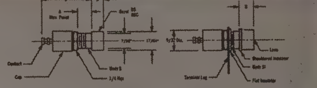
7704 SAN FERNANDO ROAD BOX 367

SERIES / DRAWINGS

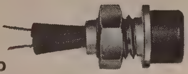
107



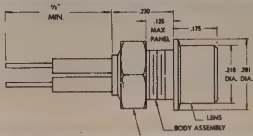
REAR RELAMPABLE
LENS STYLES AVAIL. — STD, DS, DSC, Q, QB
BODY STYLES — SI, S


C
B
A
Max Panel
Bezel DS DSC
7/32"
17/64"
5/32 Dia.
B
Contact
Cap
Body S
1/4 Hex
Terminal Lug
Lens
Shouldered Insulator
Body SI
Flat Insulator

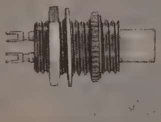
105



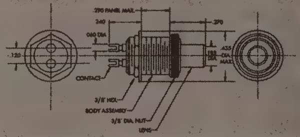
FIXED
LENS STYLES AVAILABLE —
STD DS DSC Q QB


½" MIN.
.230
.125 MAX PANEL
.175
.218 DIA.
.281 DIA.
LENS
BODY ASSEMBLY

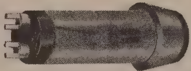
106



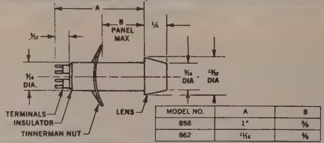
FIXED


.290 PANEL MAX.
.240
.270
.060 DIA
.120
.435 DIA MAX
CONTACT
3/8" HEX
BODY ASSEMBLY
3/8" DIA. NUT
LENS

858
862

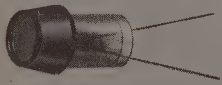


FIXED

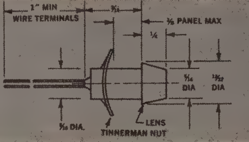

A
B PANEL MAX
¼
5/32
5/16 DIA.
9/16 DIA
13/32 DIA
TERMINALS
INSULATOR
TINNERMAN NUT
LENS

MODEL NO.	A	B
858	1"	5/8
862	11/16	3/8

859



FIXED


1" MIN WIRE TERMINALS
9/16
3/8 PANEL MAX
¼
9/16 DIA
13/32 DIA
5/16 DIA.
LENS
TINNERMAN NUT

LENS STYLE

DS

Matte black anodized bezel prevents sidelight emission. Blends with dark colored panels; contrasts with light colored panels. BI-COLOR has the added feature, white when unlighted and colored lighted.

Q

Aluminum anodized bezel (matte silver appearing) allows 180° visibility, blends with light colored panels; contrasts with dark colored panels. BI-COLOR has the added feature, white when unlighted and colored when lighted.

DSC

Aluminum anodized bezel (matte silver appearing) prevents sidelight emission. Blends with light colored panels, contrasts with dark colored panels. BI-COLOR has the added feature, white when unlighted and colored when lighted.

QB

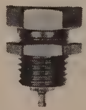
Matte black anodized bezel. Allows 180° visibility. Blends with dark colored panels; contrasts with light colored panels. BI-COLOR has the added feature, white when unlighted and colored when lighted.

STD

Flat, slightly projected lens gives 180° visibility.

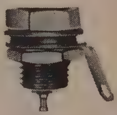
BODY STYLES

S



Presents bright metal Hex extending in front of the panel or in front of the shoulder washer on the SI model.

SI



Presents bright metal Hex extending in front of the panel or in front of the shoulder washer.

FIXED LED

WE RECOMMEND A TRANSPARENT LENSED LENS TO BE USED FOR APPLICATIONS REQUIRING A BASED LED. IF TRANSLUCENT LENS IS DESIRED WE RECOMMEND NO LENSING IN THE LENS.

SERIES

LENS COLOR

- Red Transparent, Red Translucent, White Translucent, Clear Transparent, Green Transparent, Amber Transparent
- Forward Voltage: 5.0± .3V for TTL Logic or Other Low Voltages as Needed
- Resistor Built-In for Voltage Needed (Over 2 Volts)
- Dome or Flat Lens
- Choice of Wire-Wrap* — Solder or Connector Terminals
- Soldering Conditions: 230°C for 5 Seconds Maximum

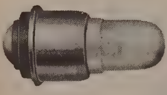
2L5
2G5
2A5

LENS STYLE

DOME

FLAT

T-1 BASED LED

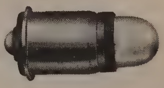


The versatile T-1 Based LED is available in Red diffused, Green diffused and Amber diffused.

It features: **For Red ONLY:**
(operating current of 12mA)
(absolute max. current 40mA)
(2.1V Typical to 3.0V max.)
For Green & Amber ONLY:
(operating current of 25mA)
(absolute max. current 40mA)
(2.4V Typical to 3.6V max.)

Light output is 2.0 millicandelas Typical for all colors at operating current.

T-1-3/4 BASED LED



The versatile T-1-3/4 Based LED is available in Red diffused, Green diffused and Amber diffused.

It features: **For Red ONLY**
(operating current of 10mA)
(absolute max. current 30mA)
(1.9V Typical to 2.4V max.)
For Green and Amber ONLY
(operating current of 10mA)
(absolute max. current 40mA)
(1.9V Typical to 2.4V max.)

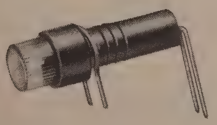
Light output is 1.5 millicandelas Typical for all colors at operating current.

Higher voltages are available with built-in resistor within the maximum current limit.

SUN VALLEY, CALIFORNIA 91353 PHONE: (213) 875-1123 TWX: 910-498-2250

LENS COLOR	LAMP TYPE	HOW TO ORDER
General Purpose Lens Materials (Translucent) R — Red W — White B — Blue G — Green A — Amber Lexan Lens Materials (Transparent) RL — Red BL — Blue GL — Green AL — Amber CL — Clear (Translucent) RLUC — Red WLUC — White BLUC — Blue GLUC — Green ALUC — Amber	T-1 BASED LAMP INCANDESCENT OR T-1 BASED LED	EXAMPLE 107 Body Type RLUC Lens Color DS Lens Style Based Lamp Lamp Type
General Purpose Lens Materials (Translucent) R — Red W — White B — Blue G — Green A — Amber Lexan Lens Materials (Transparent) RL — Red BL — Blue GL — Green AL — Amber CL — Clear (Translucent) RLUC — Red WLUC — White BLUC — Blue GLUC — Green ALUC — Amber	T-1 UNBASED LAMP MIL SPEC OR COMM.	105S - R - MIL. or COMM. Model No. Lens Color Mil. Spec. or Commercial Bulbs
R — Red **W** — White ***B** — Blue ***G** — Green **A** — Amber *Not recommended for use with neon lamps.	T-1 UNBASED LAMP MIL SPEC OR COMM.	106S - R - MIL. or COMM. Model No. Lens Color Mil. Spec. or Commercial Bulbs
R — Red **W** — White ***B** — Blue ***G** — Green **A** — Amber **C** — Clear *Not recommended for use with neon lamps.	T-1, T-1¾ OR T-2 UNBASED INCANDESCENT OR NEON LAMP	858 Model No. C Lens Color AIB Lamp Type 220K *Resistor
R — Red **W** — White ***B** — Blue ***G** — Green **A** — Amber **C** — Clear *Not recommended for use with neon lamps.	T-1, T-1¾ OR T-2 UNBASED INCANDESCENT OR NEON LAMP	859 Model No. C Lens Color AIB Lamp Type 220K *Resistor

LED RELAMPABLE INDICATOR LIGHTS



The P175 relampable LED indicator is virtually a modular lamp system for designers. The economical nylon-bodied unit features snap-in mounting in a quarter-inch hole on ⅜-inch centers, or PC board mounting—vertical or horizontal. Snap-on domed or flat lenses allow quick replacement of bright, Sloan furnished LED's, or those of any other manufacturer. The P175 is available in 2 to 28 volt units, and can be ordered with pull down resistor if needed.

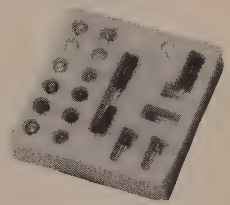
PART NUMBER SEQUENCE

Model No.		Body Style	LED Color	Lens Color	Lens Style	Voltage Current
P	175	D	R	RTP	F	5/15
P — Panel Mount P/C — Printed Circuit Mount**	Model #	D — D Hole R — Round Hole	R — Red G — Green A — Amber	RTP — Red Transparent RTL — Red Translucent GTP — Green Transparent ATP — Amber Transparent CTP — Clear Transparent WTL — White Translucent	F — Flat D — Domed	For unit with resistor see Graph. Fig. II Example: 5/15 *Omit callout for unit w/o resistor

*Unit w/o Resistor rated at:
Red — (Typical) — 2.15 volts at 10 mA.
Green/Amber — (Typical) — 2.6 volts at 40 mA.

**Printed circuit version available with D configuration body style only.

LED INDICATOR DESIGN KIT 175



The Sloan LED Indicator Design Kit 175 provides all of the component parts necessary to build an LED Indicator for either panel or printed circuit mounting. Varied snap-on lens styles and colors make this concept even more versatile.

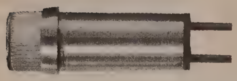
KIT CONTENTS

- 12 — Lenses
- 2 — Bodies for Panel Mount
- 1 — Body for PC Mount
- 3 — LED's; Rer, Green & Amber
- 1 — Mounting Clip
- 1 — Instruction Sheet

New Product Bulletin

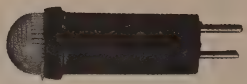
THE SLOAN CO.

Sloan Cartridge Indicators



SOLID STATE
CL SERIES

INCANDESCENT
CI SERIES



NEON
CN SERIES

Sloan Cartridge units are designed to provide low cost, front panel light indication with a variety of light sources and multi-optional mounting features.

Extremely rugged in construction, Sloan Cartridge units consist of an aluminum body incorporating Solid State, Incandescent or Neon light sources. Termination is by .040 diam. stainless steel pins.

Lens styles are flat or domed in transparent or transluscent material. All lenses incorporate Fresnal rings for maximum distribution of light output. A wide variety of lens colors make the Sloan Cartridge line even more versatile.

Series CL is designated for the Solid State version, Series CI for Incandescent and Series CN for Neon. All panel mount through .290 diameter holes and are non-relampable. Solid State and Neon versions can be supplied with or without built-in resistors.

BENEFITS:
- Easy replacement in the field without soldering.
- Interchangeability of light sources after installation with no effect on appearance.
- Interchangeable with most cartridge units on the market.
- Fast delivery from distributor or factory stock.

MATERIAL:

CASE — Aluminum clear anodized — Aluminum black anodized — HiDielectric internal insulation	LENS — Butyrate for Neon and LED — Lexan for Incandescent — All with Fresnal Rings	PINS — Stainless Steel .040 ±.002 Diam.

Electrical Specifications

LED

The following specifications pertain to Red, Green and Amber LED's.

W/RESISTOR: (Standard Values)

5 volt — 40mA Max.
6 volt — 35mA Max.
10 volt — 25mA Max.
14 volt — 20mA Max.
28 volt — 9mA Max.

Other voltage/current combinations available upon request.

W/O RESISTOR:

2.4 volt — 50 mA Max.
1.9 volt @ 10 mA (typical)

INCANDESCENT

	Voltage	Amps	MSCP	Life
1762/ 1764	28	.04	.34	1000 hrs.
1784	6	.20	.60	1000 hrs.
2182	14	.08	.30	50,000 hrs.
1869	10	.0126-.0154	.004	Indefinite
2101	18	.04	.15	10,000 hrs.
1730	6.0	.04	.04	1,000 hrs.
2180	6.3	.04	.03	50,000 hrs.
1739	6.3	.075	.23	1,000 hrs.
2107	10.0	.04	.08	3,000 hrs.

NEON

WITH RESISTOR

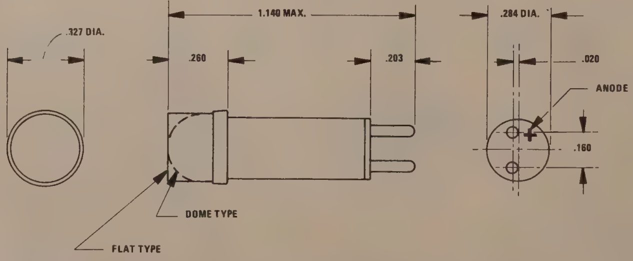
Lamp	Volts AC	Volts DC	Starting Voltage AC	Starting Voltage DC	Milli-Amps	Watts	Hours Life	Resistor
A1B	115	115	65	90	0.3	1/25	25,000	220K
*A1C	115	150	95	135	1.2	1/7	25,000	47K

WITHOUT RESISTOR

Lamp	Volts AC	Volts DC	Starting Voltage AC	Starting Voltage DC	Milli-Amps	Watts	Hours Life
A1B	115	115	65	90	0.3	1/25	25,000
*A1C	115	150	95	135	1.2	1/7	25,000

*High Brightness

Note 1: Resistors other than shown are available.
Note 2: Life figures are for AC. Life at DC is approximately 1/2 life at AC.



How to Order Information

LED CARTRIDGE ORDERING INFORMATION

EXAMPLE: CL-R-B-RTP-F-2.4/50

Series	LED Color	Body Type	Lens Color	Lens Style	Voltage/Current
CL	R-Red	B-Black	RTP — Red Transparent	F-Flat	5/40 Max.
	G-Green	S-Silver	GTP — Green Transparent	D-Domed	6/35 Max.
	A-Amber		ATP — Amber Transparent		10/25 Max.
			CTP — Clear Transparent		14/20 Max.
			WTL — White Transluscent		28/9 Max.
					Omit this callout for 2.4V — No Resistor

INCANDESCENT CARTRIDGE ORDERING INFORMATION

EXAMPLE: CI-B-RL-F-1762

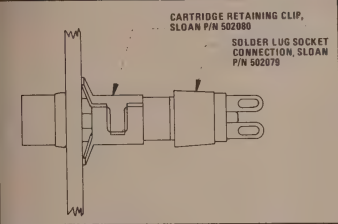
Series	Body Type	Lens Color	Lens Style	Lamp
CI	B-Black	RL — Red Transparent	F-Flat	1762
	S-Silver	BL — Blue Transparent	D-Domed	1764
		GL — Green Transparent		1784
		AL — Amber Transparent		2182
		CL — Clear Transparent		1869
		RLUC — Red Transluscent		2101
		BLUC — Blue Transluscent		1730
		GLUC — Green Transluscent		2180
		ALUC — Amber Transluscent		1739
		WLUC — White Transluscent		2107

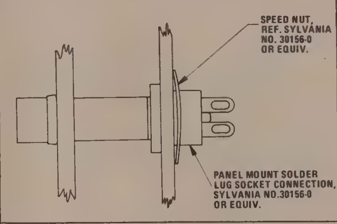
NEON CARTRIDGE ORDERING INFORMATION

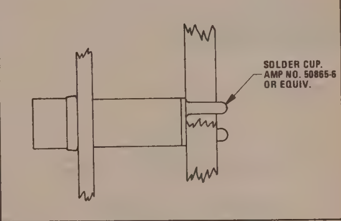
EXAMPLE: CN-B-RTL-F-A1B-22K

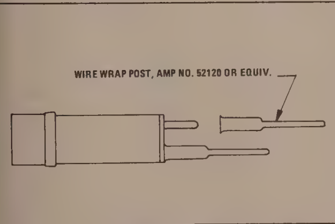
Series	Body Type	Lens Color	Lens Style	Lamp	Resistor
CN	B-Black	RTL — Red Transluscent	F-Flat	A1B	
	S-Silver	RTP — Red Transparent	D-Domed	A1B	220K
		ATL — Amber Transluscent		A1C	
		ATP — Amber Transparent		A1C	47K
		WTL — White Transluscent			
		CTP — Clear Transparent			

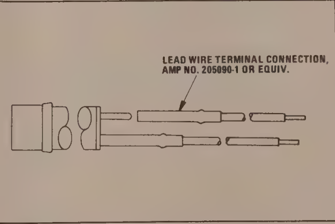
Mounting Options


CARTRIDGE RETAINING CLIP, SLOAN P/N 502080
SOLDER LUG SOCKET CONNECTION, SLOAN P/N 502079


SPEED NUT, REF. SYLVANIA NO. 30156-0 OR EQUIV.
PANEL MOUNT SOLDER LUG SOCKET CONNECTION, SYLVANIA NO.30156-0 OR EQUIV.


SOLDER CUP. AMP NO. 50865-6 OR EQUIV.


WIRE WRAP POST, AMP NO. 52120 OR EQUIV.


LEAD WIRE TERMINAL CONNECTION, AMP NO. 205090-1 OR EQUIV.

Mounting hardware shown can be provided as optional accessories — Sloan Part No. 502080 and Part No. 502079 can be purchased directly from Sloan.

Other additional mounting accessories can be purchased from the manufacturers referenced or their equivalents.

Approximate pricing for reference only:

Cartridge with Red LED — No Resistor	— 2000 pcs. $ .87 Each
Cartridge with Green or Amber LED — No Resistor	— 2000 pcs. $ .95 Each
Cartridge with Incandescent Bulb	— 2000 pcs. $ .90 Each
Cartridge with Neon — No Resistor	— 2000 pcs. $ .72 Each

THE SLOAN COMPANY, P.O. Box 367, 7704 San Fernando Rd., Sun Valley, CA 91352
Phone: (213) 875-1123 TWX: (910) 498-2250

P175 SERIES

HOW TO ORDER

EXAMPLE:
LENS ONLY

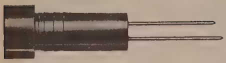
F — Flat

D — Dome

P175-RTPD

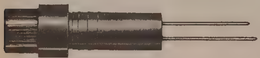
COLORS AVAILABLE	
RTP	Red Transparent
RTL	Red Translucent
GTP	Green Transparent
ATP	Amber Transparent
CTP	Clear Transparent
WTL	White Translucent

BODY ONLY



P175D BODY

BODY AND LENS ONLY

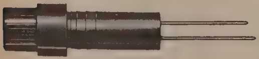


P175D-00-RTPD

BODY AND LED AND LENS ONLY

P175D-R-RTPD

BODY-LED-LENS-RESISTOR ASSEMBLY



P175D-R-RTPD-5/15

The P175 relampable LED indicator is virtually a modular lamp system for designers. The economical nylon-bodied unit features snap-in mounting in a quarter-inch hole on ⅜ inch centers, or PC board mounting — vertical or horizontal. Snap-on domed or flat lenses allow quick replacement of bright, Sloan furnished LED's, or those of **any other manufacturer**. The P175 is available in 2 to 28 volt units, and can be ordered with pull down resistor if needed.

At last . . . you can specify exactly and **only** what you need for an LED indicator.

PART NUMBER SEQUENCE

Model No.		Body Style	— LED Color	— Lens Color	Lens Style	— Voltage Current
P	**175**	**D**	**R**	**RTP**	**F**	**5/15**
P — Panel Mount P/C — Printed Circuit Mount**	Model #	D — D Hole R — Round Hole	R — Red G — Green A — Amber	RTP — Red Transparent RTL — Red Translucent GTP — Green Transparent ATP — Amber Transparent CTP — Clear Transparent WTL — White Translucent	F — Flat D — Domed	For unit with resistor see Graph. Fig. II Example: 5/15 *Omit callout for unit w/o resistor

*Unit w/o Resistor rated at:
Red — (Typical) — 2.15 volts at 10 mA.
Green/Amber — (Typical) — 2.6 volts at 40 mA.

**Printed circuit version available with D configuration body style only.

MATERIALS:

Terminal	Phosphor Bronze Spring Temper Gold Plate per Mil-6-45204, Type I, Class II
Body	Black Nylon per Mil-M-20693A, Type I
Lens	Cellulose Acetate Butyrate per LP-349C
P/C Mtg. Clip	Phosphor Bronze per QQ-B-750, Composition A, - Spring Temper Tin Plate per Mil-T-10727A, Type II.

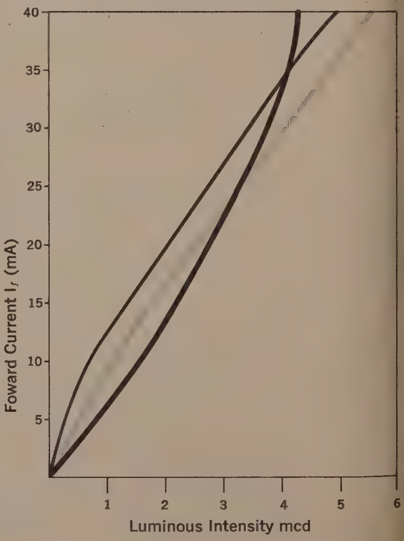
LED SPECIFICATIONS

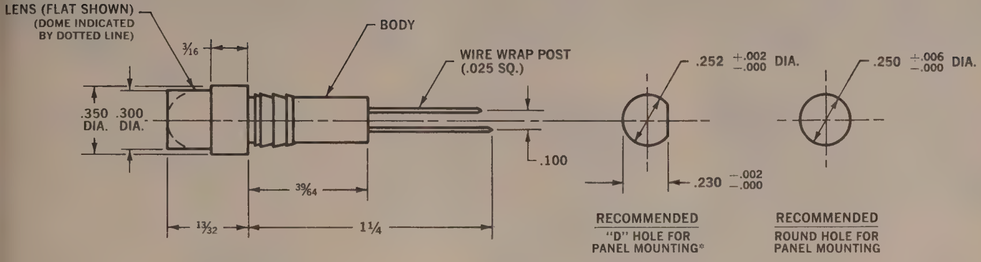
Red
2.15 Forward Voltage (Typical) at 10 mA.

Green/Amber
2.6 Forward Voltage (Typical) at 40 mA.

See chart for Special Voltage and current requirements which require built-in resistor.

LED Light Output




LENS (FLAT SHOWN)
(DOME INDICATED BY DOTTED LINE)
BODY
3/16
WIRE WRAP POST
(.025 SQ.)
.252 +.002 −.000 DIA.
.250 +.006 −.000 DIA.
.350 DIA.
.300 DIA.
.100
.230 −.002 −.000
39/64
13/32
1 1/4
RECOMMENDED
"D" HOLE FOR PANEL MOUNTING*
RECOMMENDED
ROUND HOLE FOR PANEL MOUNTING

*Note: We recommend "D" hole be punched from backside of panel.

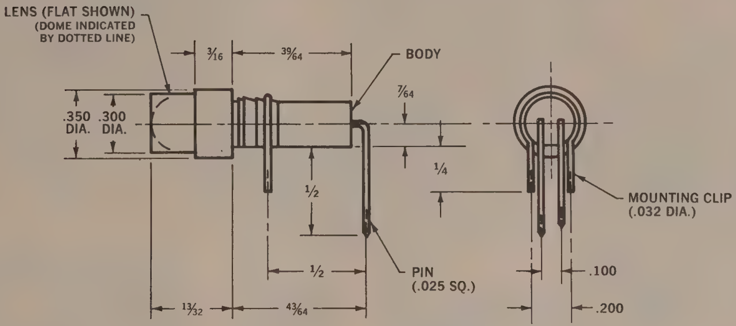

LENS (FLAT SHOWN)
(DOME INDICATED BY DOTTED LINE)
3/16
39/64
BODY
7/64
.350 DIA.
.300 DIA.
1/4
1/2
MOUNTING CLIP
(.032 DIA.)
1/2
PIN
(.025 SQ.)
.100
13/32
43/64
.200

Figure I

CURRENT/VOLTAGE AVAILABLE WITH BUILT-IN RESISTORS

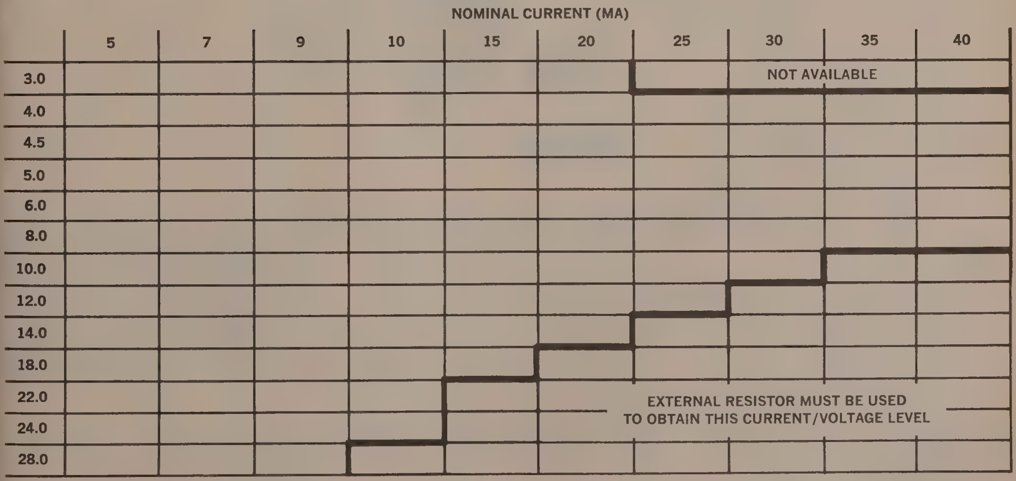
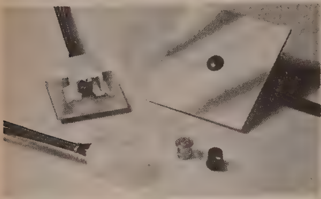


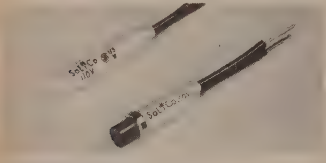
Figure II

SoLiCo PILOT AND INDICATOR LIGHTS

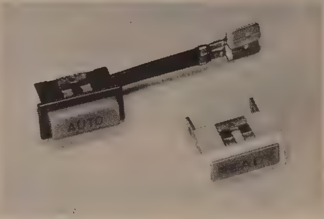


1K14 SERIES
Rear mounts in panel not more than .085" thick. Mounting hole .310" — .320"
LAMP: High brightness neon is standard with complete range of attached resistors available. Miniature incandescent in T-1¾ size available in range of 1.3 volt thru 28 volt.
COLORS: Lens colors are available in complete spectrum both in transparent and translucent material.
Recognized under the component program of U/L and CSA approved.

"L" SERIES
Molded from DuPont Zytel 101. Standard colors are black or white, custom colors available upon request.
Optional: When ordering metal bezel, stainless steel is standard. Consult factory for other finishes.
Recognized under the component program of U/L and CSA approved.



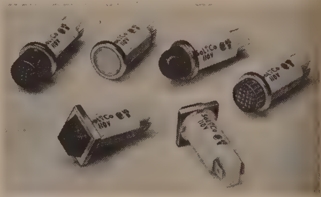
3L SERIES (with built-in resistor)
3S SERIES (resistor in lead)
These compact lights snapfit in a 5/16" hole. No additional hardware is necessary. Extended portion is .350 diameter by .110 inch high, while body length below shoulder is 1.420" long on 3L and .940" long on 3S.
Recognized under the component program of U/L and CSA approved. High brightness neon lamps with appropriate resistors to assure long life while achieving desired brightness. Complete range of incandescent lamps also available.
LENS: F4 and F5* lens is offered in a variety of colors and available in nylon or lexan. Decorative bezel with various finishes upon request. Chrome is standard.
BODY COLORS: White is standard although body can be molded in any color.
LEADS: Same as 5S.



"M" SERIES
These compact units snap securely without additional hardware into .940 by .440 inch opening. Material thickness .031" — .093".
LENS: M Series with "H" lens features a .855 by .315 inch lens face — .170" high offering excellent raised lighting characteristics with a choice of colors. (Imprinting available).
M Series with "F" lens affords a full .860 by .315 inch lighting face ideal for hot stamping legends, even two lines if desired.
BODY COLORS: white or black available.
LEADS: Black plastic 105°C leads 6" long ends stripped ½" and tinned are standard. Any desired length and colored leads can be readily supplied. In addition, these leads can be provided with a variety of terminations — ring, female flag, etc. M series can be supplied with .250" or .187" male spades.

"R" SERIES
These rectangular lights snap in securely (without additional hardware) into 1.312 or 1.280 by .375 inch opening. Material thickness range .030/.080 inch. 2R requires 1.280" by .812 inch mounting hole.
Recognized under the component program of U/L and CSA approved. High brightness neon lamps with appropriate built-in resistors to assure long life while achieving desired brightness. Complete range of incandescent lamps also available.
LENS: Ideal for vertical or horizontal hot stamp legends. These 1.150 by .250 inch lenses are offered in a variety of colors (nylon or lexan). Split lens variations also available (2R and 4R Series).
BEZEL: Decorative bezel in various finishes available (black, bright brass, etc.) Chrome plate is standard.
LEADS: Same as M SERIES.

5S AND 5L SERIES
These stylish round body lights with chrome plated bezel mount into ½" hole and are secured by snapfit feature. The overall body length below the bezel is .900" on the 5S and 1.120" on the 5L.
Recognized under the component program of U/L and CSA approved. High brightness neon lamps with appropriate resistors to assure long life while achieving desired brightness. Complete range of incandescent lamps also available.
LENS: A choice of lens styles and colors available. Nylon or Lexan material.
BEZEL: Decorative bezels in various finishes available (chrome plated is standard).
LEADS: Black plastic 105°C leads 6" long, ends stripped ½" and tinned are standard. Any desired length and color leads can readily be supplied. In addition, these leads can be provided with a variety of terminals, ring, female quick connect, male spade, etc.

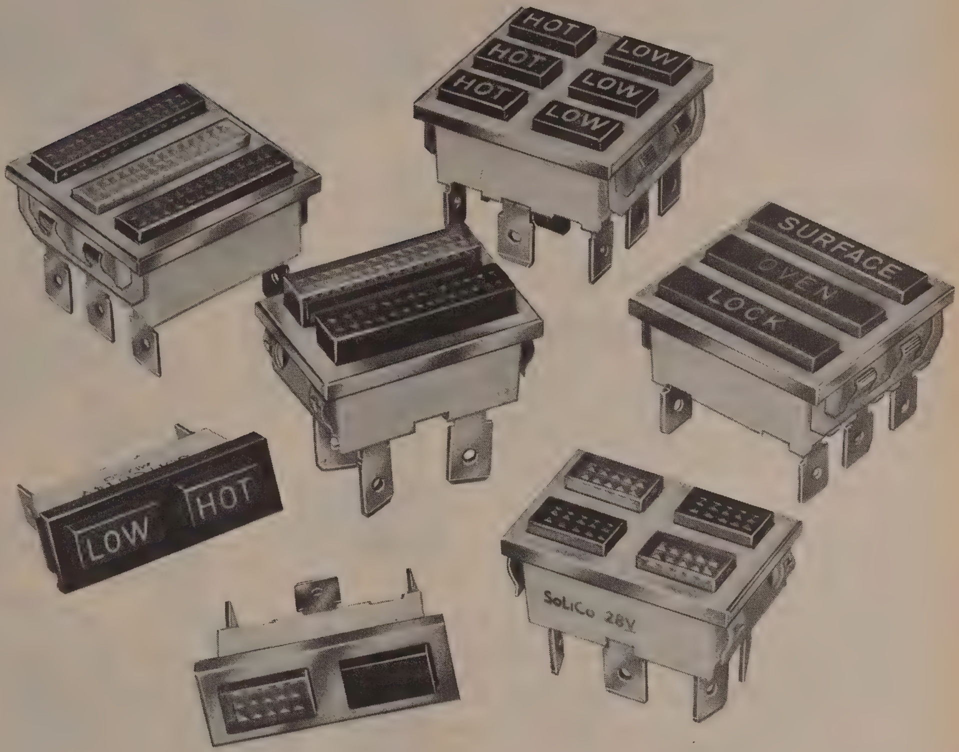


5T SERIES
HOUSING: Zytel 101, White is standard. However, Black, Red and other colors are available. Fits in ½" mounting hole (snap fit).
RATING: Same as 5S — 5L SERIES
LAMP: High brightness neon is standard with complete range of attached resistors available. Miniature incandescent in T-1¾ size available in range of 1.3 volt thru 28 volt.
LENS: Various styles with internal facets for maximum light refraction. Available in Lexan and Nylon.
COLORS: Lens colors are available in complete spectrum both in transparent and translucent material.
BEZEL: Optional, available in chrome or other finishes. Square or round depending on lens style.

S222 SERIES
These lights snap securely without additional hardware into a rectangular opening 1.200 by .640 inch. Material thickness .045 to .065 inch.
LENS: Choice of colors available (nylon and acrylic). Red, white, amber, clear.
LEADS: S222 Series provided with screw terminals, S222-A with wire leads. S222-B provided with .250 male spade terminals.

SORENSON LIGHTED CONTROLS, INC. 530 Oakwood Avenue, West Hartford, Ct. 06110

SoLiCo PILOT AND INDICATOR LIGHTS



multiple indication

SoLiCo now offers a complete range of multiple-function indicator lights. All models snap-mount securely without additional hardware into standard panel openings. Up to six separate lenses may be ordered in any combination of available lens colors; clear, red, amber, white, blue and green. Legend imprinting is available. Chrome plated bezels are standard with decorative black or brass bezels optional. 6″ black plastic leads are supplied. Solder lugs and male spades quick connect or female flag terminations may be specified.

SORENSON LIGHTED CONTROLS, INC.
530 Oakwood Avenue, West Hartford, Ct. 06110 Tel. 203/236-3267

Signalex electromagnetic displays

Inherent memory.
Large size.
Long lasting.
Legible in bright light.

Signalex signalling devices are the simple solutions to problem display requirements. Driven electromagnetically, they are virtually maintenance-free, last almost indefinitely. And the big, bold, light-reflecting characters (up to 6" high and larger) can be seen under most environmental conditions . . . even bright sunlight, or in the dark, when illuminated.

SIGNALEX READOUTS.

Type 400L, shown, is 5" x 3-1/4" x 1-13/16" with a character size of 4" H x 2-1/4" W. It can operate at up to 8 display cycles per second. Type 150L has a character size of 1-1/2" H x 9/10" W. Maximum operating speed is 15 cycles/second.

Specifications

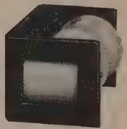
	TYPE 400L	TYPE 150L
Character Size	4" H x 2-1/4" W	1-1/2" H x 9/10" W
Panel Size	5" H x 3-1/4" W	1-13/16" H x 1-5/16" W
No. Segments	7	7
No. Coils	7	7
No. Connections	3/coil *(Plug-in PC Board available)*	3/coil *(Plug-in PC Board available)*
Mode of Operation	Bi-stable *(D.C. pulse activated)*	Bi-stable *(D.C. pulse activated)*
Pulse Length Required	50 ms — display or reset	30 ms — display or reset
Power Required during Pulse	0.93 watt/segment	0.33 watt/segment
Voltage available	6 or 12 VDC *(or to specs)*	6 or 12 VDC *(or to specs)*
Max. Operating Speed	8 cycles/sec.	15 cycles/sec.
Segment Colors	Per customer's specs *(matte white std)*	Per customer's specs *(matte white std)*

Type 400L

Type 150L

SIGNALEX STRIP INDICATOR.

Type A1-1 is a single window model. Strips may be ordered with as many windows as required. Each window has two alternating display faces. The signal, letter or number at each display position snaps into view with an electric pulse and remains until a pulse activates alternate circuit. Type AI-6, shown, is a six-window strip.


Type A1-1

Specifications

Window Size	3/8" H x 1/2" W
Window to Window Spacing	3/4"
No. Displays per Window	2
No. Connections	3/window
Mode of Operation	Bi-stable *(D.C. pulse activated)*
Pulse Length Required	30 ms either display
Power Required during Pulse	1.1 watts
Voltage Available	6 or 12 VDC *(or to specs)*
Display Colors	Per customer's specs *(black and white std)*

Note:

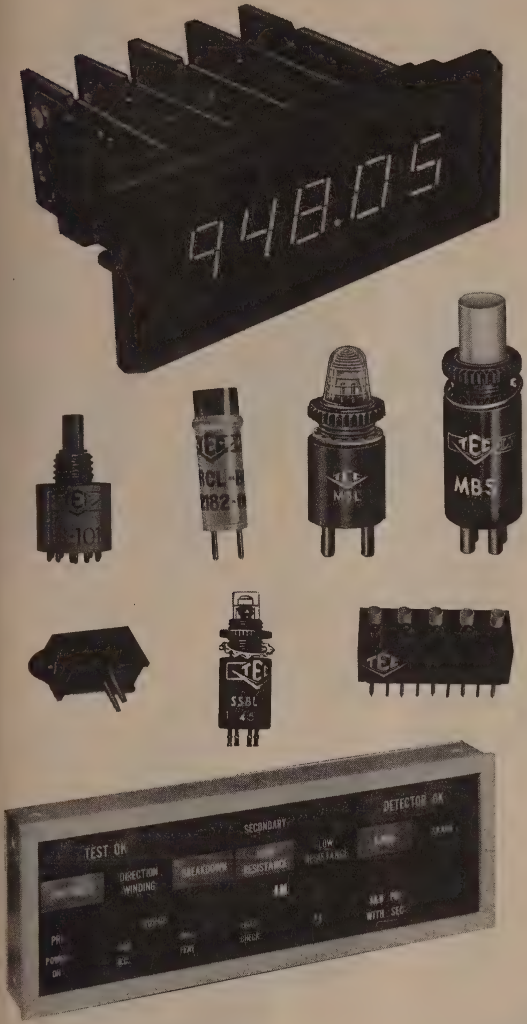
In addition to standard models, economical Signalex display devices can be designed to customers' specifications. For more information, write The Staver Company, Inc., Signalex Division, 41-51 N. Saxon Ave., Bay Shore, N.Y. 11706.

Type AI-6

The **Staver** Company, Inc.
41-51 N. Saxon Ave., Bay Shore, N.Y. 11706 (516) 666-8000

SIGNALEX

TEC-LITE™ YOUR SYMBOL FOR THE HIGHEST QUALITY INFORMATION DISPLAY/CONTROL DEVICES



READOUTS:

Full alphanumeric, low-cost hexadecimals, incandescents, and LED's in red, orange, yellow and green. Sizes from 0.27" to 1 foot. Solid state modules come ready to install and operate. Include decoder/driver and all circuitry needed to hook up to your system.

SWITCHES:

Rotary, PCB-mounted, bounce free, DIP models. Miniature and subminiature versions. Choose from a variety of switch options, lens colors and terminal types.

SWITCH/INDICATORS:

Conventional, subminiature, miniature, DIP and transistorized models. Available with various switch options, lens colors, and LED, incandescent or neon lamps.

INDICATORS:

LED, incandescent and neon. Miniature, subminiature, DIP, PCB-mounted and transistorized models. A size and style to meet most any requirement, with numerous lens colors, terminal types and mounting options.

DISPLAY SYSTEMS:

TEC's line of display systems, display modules, and annunciator systems, provide a low-cost approach to information display and control. TEC also manufactures a complete line of low-cost CRT terminals called DATA-SCREEN® terminals. See last page of TEC section for more details.

OVER 200 STANDARD INDICATING DEVICES! Add a wide variety of options—such as RFI/EMI shielding, numerous lens styles and voltage levels—and the number of catalogued items runs over 1,000,000! Also, over 50% of the products we sell are specials—devices made to our customers' specific designs. TEC has over 8,000 electrical and mechanical designs on file, so let us help you with your special requirements. And for a demonstration of TEC-LITE Indicating Devices in your own plant, just contact your nearest TEC-REP.

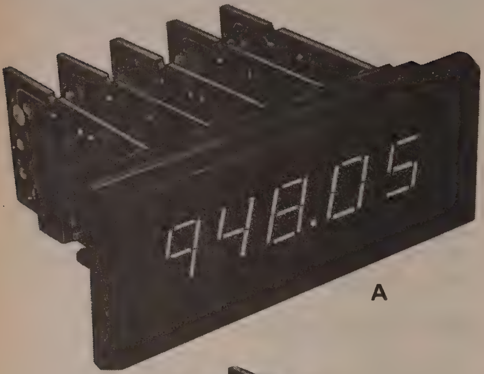
TEC offers you a complete man-machine interface line of highly reliable, economically priced devices for every information display and control need: computers and peripherals, industrial controls, communications, test equipment, aircraft and missiles, navigation, guidance/control systems and consumer products—TEC serves all, with over 17 years of proven performance. The following pages contain a sampling of TEC-LITE Indicating Devices. For detailed information on our complete product line, ask for 96-page catalog No. 2027.

TEC®

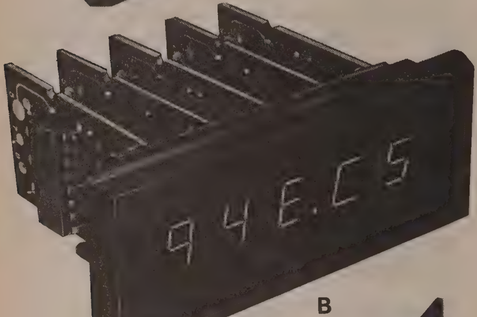
TEC, Incorporated 9800 N. ORACLE ROAD • TUCSON, AZ USA 85704 • (602) 297-1111 • TWX 910-952-1377

TEC-LITE™

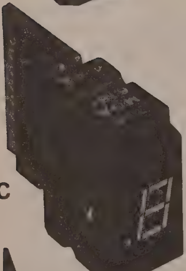
DIGITAL READOUTS



A



B



C

D

- **Bright, sharply defined characters are easily read over wide viewing angle from 10 feet to over 60 feet**
- **IC-compatible devices are controlled by DTL or TTL signal levels for high brightness with low power and current requirements**
- **All units have solid state circuitry for long life and dependability and accept BCD inputs**
- **Optional bezels provide handsome panel appearance, mount quickly and easily, and include red, neutral or amber polarizing filters**

Choose from a wide variety of standard configurations and display types, as well as custom-designed modules. All have supply voltage of 5 VDC ±5%. Some typical applications are calculators, digital clocks, counters, time/event indicators, test instrumentation, digital voltmeters and display terminals.

The SSR Series (A) is available with LED's (green, red and yellow in two models) in heights from 0.27" to 0.60" and incandescent displays in heights of 0.30" and 0.625". All models in this series have 7-segment decoder/driver and include nondriven decimal point, overflow module, memory option, lamp-test feature and provision for automatic blanking of leading and/or trailing edge zeros in a multidigit assembly.

Hexadecimal readout (B) has the same features as above, but with 0-9 and A-F character sequence, built-in memory, 0.27" or 0.30" high red LED display, and no lamp-test feature.

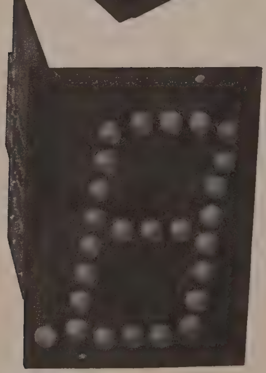
The MDA Series (C) consists of single-digit and hexadecimal LED displays in heights from 0.27" to 0.60". This series is available with decoder/driver, latch and counter, overflow module (D), and red, orange, green and yellow LED's in two models.

The R-100X Series (E) has the same features as the SSR Series above, but uses discrete LED's instead of a 7-segment display. Standard character heights are 1", 2" and 3", and we can build these modules up to 1 foot high.

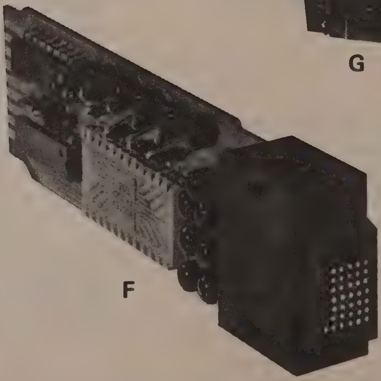
Full alphanumeric readouts (F and G) are equipped with ROM, drivers and clock and display 64 ASCII characters. Available in two models: 35-diode, single-plane red LED array 0.35" high (F) and 35-diode, discrete red, green or yellow LED array 1" high (G).

TEC also manufactures transistorized neon digital readouts and other incandescents; see catalog No. 2027 for details.

G



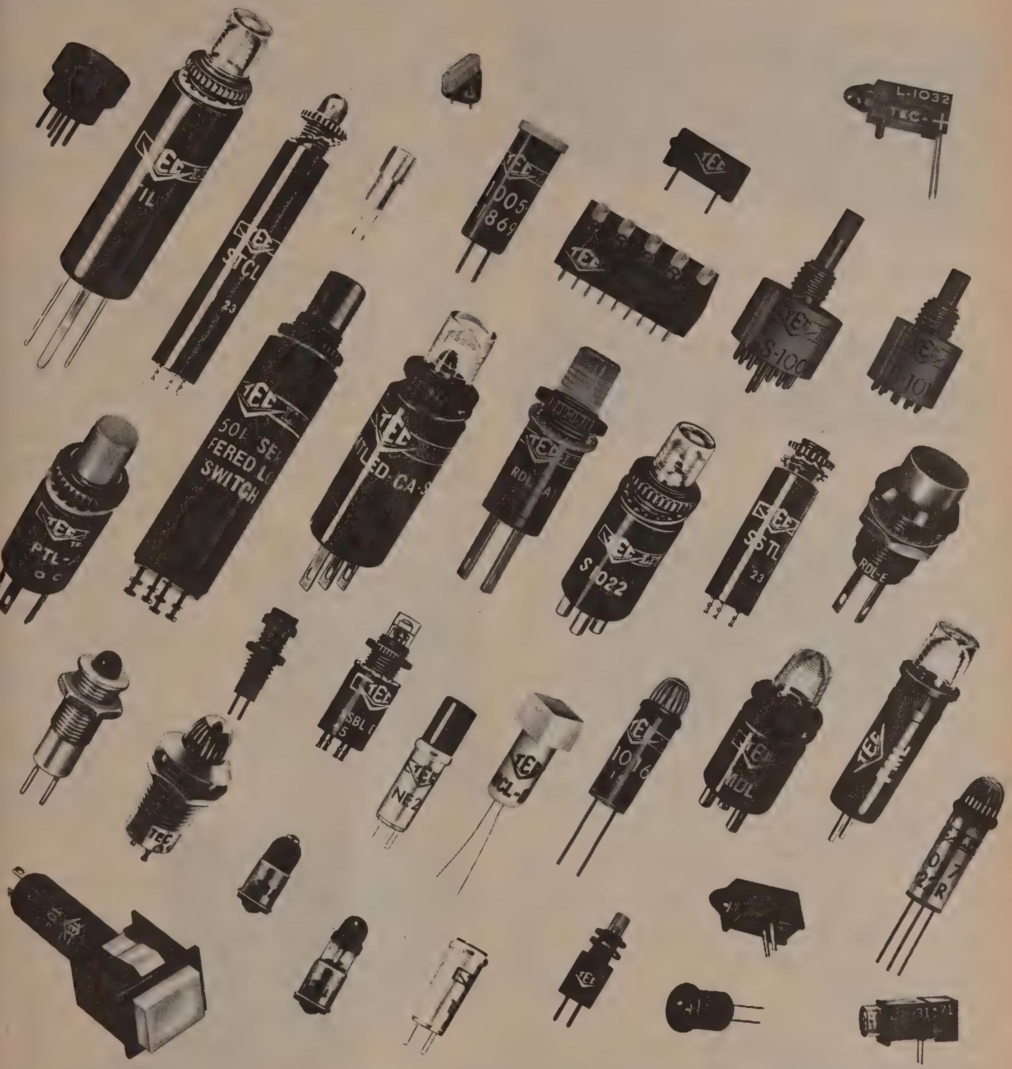
E



F

TEC, Incorporated 9800 N. ORACLE ROAD•TUCSON, AZ USA 85704•(602) 297-1111•TWX 910-952-1377

TEC-LITE™ SWITCHES AND INDICATORS



TEC–LITE switches and switch/indicators are available in a variety of switch options: momentary, alternate or snap-action SPST-NO-DB, SPST-NC-DB, SPDT-DB (NO & NC) and NO-DPST. Rotary switches can be factory set from 2 through 16 positions, depending on model. Terminal types available include turret lug, solder lug/taper tab, taper pin receptacle, wire-wrap and wire leads. Supply voltages range from 2 to 100 VDC, and many devices are available with replaceable lamps.

TEC–LITE indicators are available with the same terminal options and voltage ranges as shown at left, and many have replaceable lamps. All devices have either an anodized aluminum or rugged plastic body; irridite finish is available with many models for RFI/EMI shielding. Engraved legends and waterproof models are also available at slight extra cost. Units on this page are shown approximately actual size (except for rectangular switch/indicator, shown 50% actual size).

See the complete line of TEC–LITE switches and indicators in catalog No. 2027.

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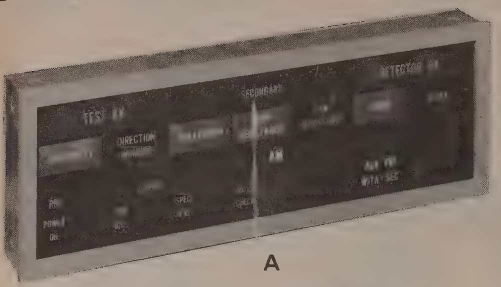
TEC-LITE™ DISPLAY SYSTEMS



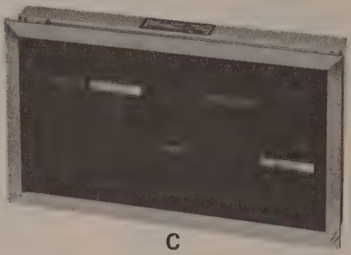
A

A. DATA·PANEL® DISPLAY SYSTEMS. These integrated display cost less per point than individual indicators and cut installation by 50% or more. Messages displayed in single viewing plane, and optimum use of IC's lowers cost and increases reliability. Permanently visible legends, symbols and grid lines can be provided. Unit functions as a total input/output system and is modular designed to grow with your needs. . .may be installed in consoles, racks or walls. Just a few applications are: data processing, communications, materials handling and dispatch. For complete information, ask for brochure No. 1024.

MEM 0
FAULT
NON PRINT

B

B. DATA–LINE™ DISPLAY MODULES. Combines switches, indicators and message displays in an in-line modular package that complements basic DATA·PANEL Display System design. . .an information display device for computers, industrial control, peripheral equipment, etc. Modular in-line design permits intermixing of message display, incandescent and neon functions. Displays may be arranged in any sequence on .7" centers in a frame available in lengths to 4 feet. Frame forms front bezel and provides panel mounting hardware; lamps are replaceable from front or rear of panel. Full details are contained in brochure No. 599.



C

C. DATA–MONITOR™ ANNUNCIATORS. Feature for feature, the best annunciator buy on the market–1/3 the cost and 1/9 the space of conventional models. Only 6-3/4" high by 11-3/4" wide. . .holds up to 10 cards and 100 legends. . .comes ready to install and operate. Five different systems are available–ranging from simple lighted indication of off-normal points to supervised model with audible and flashing alarms. Memory logic in four of these systems insures operator awareness of intermittent alarm. These four systems also have a built-in ringback capability. Brochure No. 1019 has complete details.

TEC–LITE™, DATA·PANEL®, DATA–LINE™, DATA–MONITOR™, DATA–SCREEN® and MINI–TEC™ TEC, Incorporated

DATA–SCREEN® TERMINALS

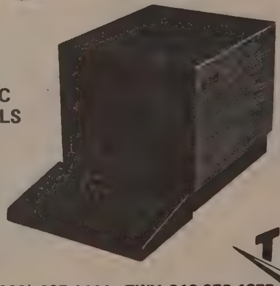
These versatile CRT terminals provide low-cost communications between man and computer–fast, efficient, operator-oriented terminals for data communications networks. Three basic interfaces–high speed parallel, block mode and conversational TTY–plus a full complement of application-proved features and options are provided in 14 different models.

Series 400 terminals were introduced in 1970, and several thousand units are now in service throughout the world. The 400 Series comprises 11 different models offering parallel, serial, polling and TTY compatible and replaceable interfaces.

MINI–TEC™ terminals incorporate design concepts that have resulted in a highly versatile, yet compact, low-cost model. Like the 400 Series, these terminals interface with most minicomputers and provide high-speed data communication capabilities.

A low-cost TTY replaceable terminal is also available. Brochure No. 3003 contains information on the complete line of DATA–SCREEN® terminals.

SERIES 400
TERMINALS



MINI–TEC
TERMINALS

TEC®

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TEKELEC, INC. TA

2623 Saddle Avenue, Oxnard, California 93030
Tel: (805) 485-5445 TWX: 910-336-1280

DIGITAL MULTIMETERS

There's a low-cost, high performance Tekelec Digital Multimeter to meet virtually every lab, bench and production application. Each model has exceptional accuracy, resolution and sensitivity. Exceptional stability and reliability are provided by Tekelec's exclusive Poly-Tek™ conversion system which uses special custom integrated IC's in both the analog and digital circuits.

An outstanding feature of all Tekelec digital multimeters is their big, bright "Field Effect" liquid crystal display that reduces eye fatigue and reading errors. A recently added sensational feature, available as a no-cost option on all Tekelec digital multimeters, is our new Transflective Liquid Crystal Display which can be easily read in bright sunlight or in complete darkness.

Ask your Tekelec representative or contact the factory direct for detailed brochures covering every model.

TA 357 MULTEX

AN ENTIRELY NEW CONCEPT IN LOW COST, HIGH PERFORMANCE DIGITAL MULTIMETERS

Tekelec presents the TA 357 MULTEX, an entirely new concept in low-cost digital multimeters. With its low, low cost and extreme versatility and an easily portable 9½" x 5¼" x 2½" package weighing only 1¾ pounds, the MULTEX will prove to be as valuable to you as a pocket calculator. The MULTEX is a rugged, portable digital multimeter, providing all the measuring power you'll ever need and assures you of laboratory accuracy no matter where you use it.

Accuracy of the MULTEX is outstanding. As an example, the basic accuracy on the two lowest DC voltage ranges is: ±.1% ±1 digit. And with extra-high sensitivity on every function — 100 microvolts on both the DC and AC voltage functions, the MULTEX will always meet your exacting measurement needs.

Protection against over-voltage is built into every function. All 8 DC and AC voltage ranges are protected against overvoltages up to 848 Volts peak to peak, and the current ranges are doubly protected by both current limiting circuits and fuses. And on all of the resistance ranges, the MULTEX will take a full 220 VAC without damage of any kind.

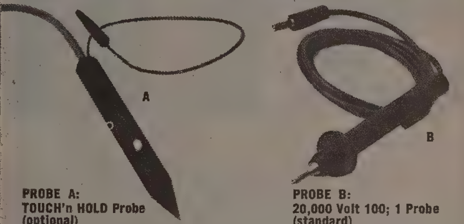
As an added standard feature, a unique test switch on the MULTEX causes the AC line voltage to be displayed without poking probes into the line socket.

TA 357 MULTEX $195

0023
MULTEX

- 7 Functions
- 27 Ranges
- Extra Long Life Field Effect Liquid Crystal Display with .4" High Numerals
- 10^{-12} MHO Sensitivity (10^{12} OHMS!)
- 10 pA Sensitivity
- AC Line Measurement Switch
- 20,000 Volts Measurement Capability, Safety Probe At No Extra Charge
- .05% F.S. +.1% R Basic Accuracy
- Automatic Decimal & Function Display

ACCESSORIES FOR TEKELEC MULTIMETERS

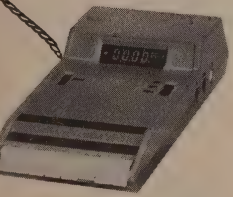


PROBE A:
TOUCH'n HOLD Probe
(optional)

PROBE B:
20,000 Volt 100; 1 Probe
(standard)

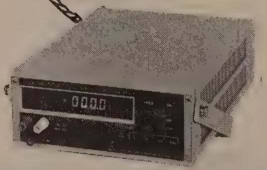
Now you can keep both eyes on your circuits with Tekelec's "TOUCH'n HOLD" probe. Just push the button of the probe and your Tekelec multimeter will take — and hold your reading for you.

TA 356 $289



- Nicad Battery Pack & Charger Standard
- 25 Ranges
- 5 Functions
- 3½ Digits
- Sensitivity: 100 µV AC & DC, .1 Ω, 100 nA
- .4" Extra Long Life Field Effect Liquid Crystal Display
- Illuminated Function Indicators
- LSI Circuits
- Pushbutton Operation

TA 355 $289



- 25 Ranges
- 5 Functions
- 3½ Digits
- Sensitivity: 100 µV AC & DC, .1 Ω, 100 nA
- Dual Reading Rate
- Pushbutton Operation
- Illuminated Function Indicators
- .4" Extra Long Life Field Effect Liquid Crystal Display

TA 365 $440

- 4½ Digits
- 25 Ranges
- 5 Functions
- Sensitivity: 10 µV AC & DC, .01 Ω, 10 nA
- Extra Long Life Field Effect Liquid Crystal Display:
  Pushbutton Operation
  Automatic Polarity & Decimal Placement
- Isolated BCD Output & Battery Operation Optional
- Dual Reading Rate
- LSI Circuits

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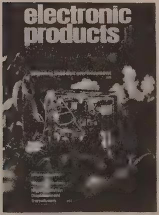

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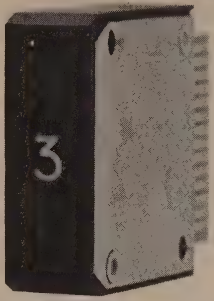
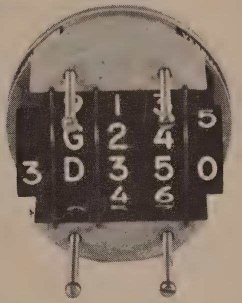
Problems with VISIBILITY?
Problems with LIFE?
Problems with POWER SHUTDOWN?

Call VERNITECH (516) 586-5100 for selection from the widest available range of RELIABLE electro-magnetic readouts



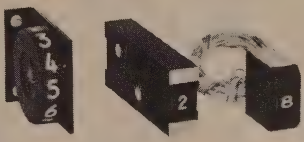
VERNIDEX STANDARD
½ x 1½ x 1½

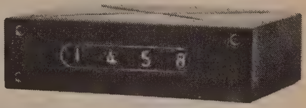


The tiny module that converts digital inputs to an electro-magnetic readout. In addition to standard models listed, Vernitech will manufacture to your specifications.

Part No.	Volts D.C.	No. of Char.	Size of Char.	Pulse Mode	No. of Leads or Term.
06VEA-0022	10	11	.156 x .156	1-1-1-1	12 L
06VBA-0048	10	10	.156 x .156	1-2-1-2	6 T
06VBD-1105 3 Position Flag	10	3	.187 x .187	Return to Flag with Power off	3 T
12VBB-1002	6	10	.281 x .250	Polarity Reversal	6 P/C
12VAC-0015	6	11	.250 x .156	1-1-1-1	12 P/C

Write or phone today for detailed bulletin and stock list.





VERNIDEX MINIATURE

Vernitech has fully qualified hermetically sealed units to military specs with regard to:

- Altitude
- Temperature
- Vibration
- Shock
- Salt Spray
- Sand/Dust
- Fungus
- Explosion
- Acceleration
- Radio Interference
- Life
- Fogging

ALL MODELS AVAILABLE WITH FULL LOGIC SELF-CONTAINED—ACCEPTS BCD INPUT

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VERNITRON CORP.

The VERNIBRATOR is an electro-mechanical vibrating device originally designed to eliminate stiction from instruments such as altimeters, etc. The Vernitech vibrator produces exceptionally High-G forces over 10,000 hours of failure and maintenance-free operation, while consistently attaining reliable low-voltage operation.

Consult the factory for either standard or custom-made designs.

Part No.	Input Voltage	Input Current	Peak G's	Size (Inches)	Weight
PX 10014	28 VDC	50 ma	.75 - 2.0	1.6 x .67 x .65	28 grams
PX 10018	13-15 VDC	25 ma max. @ 13V	.75 - 2.0	1.6 x .67 x .65	28 grams
PX 10021	21-28 VDC	25 ma @ 21V 30 ma @ 28V	.75 - 2.0	1.0 x .725 x .65	24 grams
PX 10036	14-28 VDC	30 ma max.	.25	.75 x .725 x .65	22 grams

AVAILABLE WITH AND WITHOUT MOUNTING PLATES

VERNITECH
DIVISION OF VERNITRON CORPORATION
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TUNG-SOL® SUBMINIATURE LAMPS

All base and bulb types for read-out and indicator applications

SPECIFICATIONS: T-1¾ LAMPS

ELECTRICAL CHARACTERISTICS					PHYSICAL CHARACTERISTICS					
Lamp No.	**Design Volts**	**Design Current**	**Nominal Light Output**	**Average Rated Life**	**Midget Base Style**	**Max. Bulb Diam.**	**MOL**	**Filament Type**	**LCL**	**Application**
331	1.35	.06	.02 CP	500	Flange	.230	.625	S-2	.375	Indicator(4)
440	1.5	.05	.012 CP	Indef.	Flange	.230	.625	C-2R	.375	Indicator
1769	2.5	.20	.20 CP	500	Screw	.230	.718	C-2R	.500	Indicator
1767	2.5	.20	.20 CP	500	Screw	.230	.625	C-2R	.500	Indicator(4)
*364	2.5	.40	.28 CP	5000	Flange	.230	.625	C-2R	.375	Indicator
4(1)	2.5	.40	800 ft.-cd(5)	Indef.	Groove	.240	.813	C-2R		Read-out
4S(1)	2.5	.40	1250 ft.-cd(6)	Indef.	Groove	.240	.813	C-2R		Read-out
1748(1)(2)	2.5	.40	800 ft.-cd(5)	Indef.	¾″ Leads	.240	.718	C-2R		Read-out
1748S(1)(2)	2.5	.40	1250 ft.-cd(6)	Indef.	¾″ Leads	.240	.718	C-2R		Read-out
*2169(2)	2.5	.35	.21 CP	10,000	⅝″ Leads	.230	.520	C-2R		Indicator
1738(2)	2.7	.06	.04 CP	6000	¾″ Leads	.230	.520	C-2R		Indicator
338	2.7	.06	.04 CP	6000	Flange	.230	.625	C-2R	.375	Indicator
342	6	.04	.03 CP	10,000	Screw	.230	.718	C-2V	.500	Indicator
345	6	.04	.03 CP	10,000	Flange	.230	.625	C-2V	.375	Indicator(4)
328	6	.20	.60 CP	1000	Flange	.230	.625	C-2R	.375	Indicator(4)
337	6	.20	.60 CP	1000	Groove	.230	.625	C-2R	.375	Indicator
1768	6	.20	.60 CP	1000	Screw	.230	.625	C-2R	.500	Indicator(4)
1730(2)	6	.04	.03 CP	10,000	1″ Leads	.230	.520	C-2V		Indicator
2134(2)	6	.04	.03 CP	10,000	1¾″ Leads	.230	.520	C-2V		Indicator
1784(2)	6	.20	.60 CP	1000	⅝″ Leads	.230	.520	C-2R		Indicator
*380	6.3	.040	.02 CP	50,000	Flange	.230	.625	C-2V	.375	Indicator
1739(2)	6.3	.075	.25 CP	1000	⅝″ Leads	.230	.520	C-2R		Indicator
1775	6.3	.075	.25 CP	1000	Screw	.230	.625	C-2R	.500	Indicator(4)
350	6.3	.15	.45 CP	3000	Flange	.230	.625	C-2R	.375	Indicator(4)
349	6.3	.20	.50 CP	5000	Flange	.230	.625	C-2R	.375	Indicator
*379	6.3	.20	.40 CP	20,000	Groove	.230	.625	C-2F	.375	Indicator
*381	6.3	.20	.40 CP	20,000	Flange	.230	.625	C-2F	.375	Indicator
2112(2)	6.3	.20	.50 CP	5000	⅝″ Leads	.230	.520	C-2R		Indicator
*2181(2)	6.3	.20	.40 CP	20,000	⅝″ Leads	.230	.520	C-2F		Indicator
344	10	.014	.002 CP	5000+	Flange	.230	.625	C-2F	.375	Indicator(4)
367	10	.04	.10 CP	Indef.	Flange	.230	.625	C-2V	.375	Indicator
374	10	.014	.006 CP	5000	Flange	.230	.625	C-2F	.375	Indicator
1869(2)	10	.014	.002 CP	5000+	⅝″ Leads	.230	.520	C-2F		Indicator
1917(2)	10	.014	.006 CP	5000	⅝″ Leads	.230	.520	C-2F		Indicator
2107(2)	10	.04	.10 CP	Indef.	⅝″ Leads	.230	.520	C-2V		Indicator
*2207	10	.04	.10 CP	20,000	Groove	.230	.625	C-2V	.375	Indicator
384	11	.025	.05 CP	2000	Flange	.230	.625	C-2F	.375	Indicator
1916(2)	12	.019	.012 CP	Indef.	⅝″ Leads	.230	.520	C-2V		Indicator
*336	14	.08	.50 CP	750	Groove	.230	.625	C-2F	.375	Indicator
*373	14	.08	.50 CP	750	Screw	.230	.718	C-2F	.500	Indicator
382	14	.08	.30 CP	50,000	Flange	.230	.625	C-2F	.375	Indicator
386	14	.08	.30 CP	50,000	Groove	.230	.625	C-2F	.375	Indicator
330	14	.08	.50 CP	750	Flange	.230	.625	C-2F	.375	Indicator(4)
1705(2)	14	.08	.50 CP	750	1″ Leads	.230	.520	C-2F		Indicator
2182(2)	14	.08	.30 CP	50,000	⅝″ Leads	.230	.520	C-2F		Indicator
346	18	.04	.25 CP	1000	Groove	.230	.625	C-2F	.375	Indicator
*370	18	.04	.25 CP	1000	Flange	.230	.625	C-2F	.375	Indicator
*457	22	.04	.30 CP	2000	Groove	.230	625	C-2F	.375	Indicator
327	28	.04	.34 CP	1000	Flange	.230	.625	C-2F	.375	Indicator(4)
327X	28	.046	.34 CP	2500	Flange	.230	.625	C-2F	.375	Indicator(4)
334	28	.04	.34 CP	1000	Groove	.230	.625	C-2F	.375	Indicator(4)
335	28	.04	.34 CP	1000	Screw	.230	.718	C-2F	.500	Indicator
340(3)	28	.04	.34 CP	1000	Flange	.230	.625	C-2F	.375	Indicator(4)
*369	28	.04	.34 CP	1000	Screw	.230	.593	C-2F	.500	Indicator
1762(2)	28	.04	.34 CP	1000	⅝″ Leads	.230	.520	C-2F		Indicator(4)
387	28	.04	.30 CP	25,000	Flange	.230	.625	C-2F	.375	Indicator
*388	28	.04	.30 CP	25,000	Groove	.230	.625	C-2F	.375	Indicator
2187(2)	28	.04	.30 CP	25,000	⅝″ Leads	.230	.520	C-2F		Indicator
1764(2)	28	.04	.34 CP	1000	1″ Leads	.230	.520	C-2F		Indicator
1860(2)	28	.04	.34 CP	1000	1″ Tinned Leads	.230	.520	C-2F		Indicator
1762X(2)	28	.046	.34 CP	2500	⅝″ Leads	.230	.520	C-2F		Indicator
37	14	.09	.5 CP	1500	Wedge	.240	.800	C-2F	.400	Indicator
73	14	.08	.3 CP	15,000	Wedge	.240	.800	C-2F	.400	Indicator
74	14	.10	.7 CP	500	Wedge	.240	.800	C-2F	.400	Indicator
85	28	.04	.3 CP	10,000	Wedge	.240	.800	C-2F	.400	Indicator
86	6.3	.20	.4 CP	20,000	Wedge	.240	.800	C-2F	.400	Indicator

These lamps are normally supplied in clear glass. Colored bulbs will be made on special order. Unless otherwise specified, all lamps have metal bases.

*Made to order only

SPECIFICATIONS: T-3/4 LAMPS

Lamp No.	Design Volts	Design Current	Nominal Light Output	Average Rated Life	Midget Base Style	Max. Bulb Diam.	MOL	Filament Type	LCL	Application
30	4.5 DC	.0215	.0175	5000.	1-3/16″ Tinned leads	.102	.230	C-2R		Digital

Reference Notes Indef.—Life over 5000 hours. (1) Lens end. (2) Wire leads. (3) High temperature solder. (4) Application in aircraft service. (5) Through 3/16″ min. dia. window at 3/8″ from lamp tip. (6) Through 1/8″ min. dia. window at 3/8″ from lamp tip.

Wire Lamp Types Not Shown—Type F. 2264—2129—2176—2183—2119—2201—2265 and 2002.

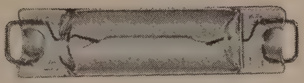
WAGNER ELECTRIC CORPORATION/Tung-Sol Division

630 W. Mt. Pleasant Avenue, Livingston, N.J. 07039 / TWX: 710-994-4865 Phone: (201) 992-1100; (212) 732-5426

Trademark "TUNG-SOL" Reg. U. S. Pat. Off. and Marcas Registradas

TUNG-SOL® MOLDED BASE LAMPS AND BASELESS CARTRIDGE LAMPS

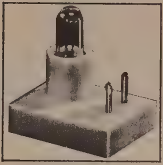
BASELESS CARTRIDGE LAMPS



ELECTRICAL CHARACTERISTICS

Lamp Type	Design Volts	Design Amps	Design C.P.	Life Hours
561	12.8	.97	12	1000 @ 12.8V
562	13.5	.74	6	2000 @ 14V
563	13.5	.52	4	1000 @ 14V
564	14.0	.44	2	2000† @ 14V
566	14.0	.36	1.0	2000† @ 14V
567	12.8	.78	9	1000 @ 12.8V

These lamps may be mounted on a variety of simplified terminals. AMP Inc., Harrisburg, Pa., makes several types.



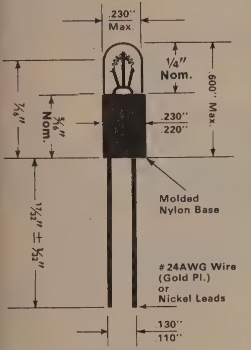
Plug-in module activates photo-electric sensor in high speed check sorter.

Molded base permits bending lead wires at acute angles.

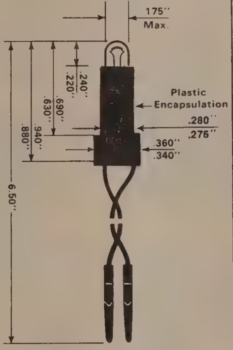
The molded base lamp provides important advantages that simplify production and contribute added reliability to the end product. The molded base is permanently bonded to the bulb. It replaces the previously cemented-on metal base. The former receptacle that had to be wired into the circuit is completely eliminated. The molded base lamp is self-mounting. In fact, the Tu-Pin lamp can be applied with automated equipment.

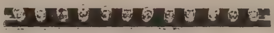
The molded base technique makes it possible to provide a wide variety of lamp packages—built-in key ways, plug-in types, unusual positioning of the leads and multi-purpose configurations.

Style G



Style H





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Strip-mounted, grain-size, 21-mil lamps snap into molded plastic holder to form a condition monitor for computer circuit boards. Lamp sockets are numbered to correspond to individual circuits. Space for test probe contacts is provided. Units can be operated in either normally "on" or "off" condition and can be wired to a door switch or test push button.

TUNG-SOL®

TUNG-SOL DIVISION

Wagner Electric Corporation

630 W. Mt. Pleasant Avenue, Livingston, N. J. 07039
TWX: 710-994-4865 Phone: (201) 992-1100; (212) 732-5426
Trademark "TUNG-SOL" Reg. U.S. Pat. Off. and Marcas Registradas

ELECTRICAL CHARACTERISTICS						PHYSICAL CHARACTERISTICS				
Lamp No.	Style	Design Volts	Design Current	Nominal Light Output	Average Rated Life	Midget Base Style	Max. Bulb Diam.	MOL	Filament Type	Indicator Base Color
2301	G	1.35	.06	.02	500	Tu-Pin Molded	.230	.600	S-2	White
2302	G	2.5	.20	.20	500	Tu-Pin Molded	.230	.600	C-2R	Brown
2303	G	2.7	.06	.04	500	Tu-Pin Molded	.230	.600	C-2R	Lt. Grn.
2304	G	3.0	.30	.34	1500	Tu-Pin Molded	.230	.600	C-2R	Black
2305	G	6.0	.04	.03	10,000	Tu-Pin Molded	.230	.600	C-2V	Aluminum
2306	G	6.0	.20	.60	1000	Tu-Pin Molded	.230	.600	C-2R	Orange
2307	G	6.3	.20	.50	5000	Tu-Pin Molded	.230	.600	C-2R	Dk. Blue
*2319	G	6.3	.20	.40	50.000	Tu-Pin Molded	.230	.600	C-2F	Lt. Brown
2308	G	10.0	.014	.006	5000	Tu-Pin Molded	.230	.600	C-2F	Pink
2309	G	10.0	.04	.10	5000	Tu-Pin Molded	.230	.600	C-2V	Lt. Blue
2310	G	14.0	.08	.50	750	Tu-Pin Molded	.230	.600	C-2F	Yellow
*2339	G	24.0	.05	.50	1000	Tu-Pin Molded	.230	.600	C-2F	Black
2311	G	18.0	.04	.25	1000	Tu-Pin Molded	.230	.600	C-2F	Dk. Grn.
*2318	G	24.0	.080	.50	20.000	Tu-Pin Molded	.230	.600	C-2F	Lt. Blue
2312	G	28.0	.04	.34	1000	Tu-Pin Molded	.230	.600	C-2F	Red
*2329	G	28.0	.046	.34	2500	Tu-Pin Molded	.230	.600	C-2F	Gray
2334	G	6.3	075	.25	1000	Tu-Pin Molded	.230	.600	C-2R	Red
EN1748†	H	2.5	.400	800 ft.-cd(5)	Indef.	Encapsulated	.175	.940	C-2R	Gray
EN1748S†	H	2.5	.400	1250 ft.-cd(6)	Indef.	Encapsulated	.175	.940	C-2R	Red

†Various lead lengths are available *Made to order only

WAGNER ELECTRIC CORPORATION/Tung-Sol Division

630 W. Mt. Pleasant Avenue, Livingston, N.J. 07039 / TWX: 710-994-4865 Phone: (201) 992-1100; (212) 732-5426

AD-MU AD-VANCE MAGNETICS SHIELDING

MAGNETIC SHIELD COSTS REDUCED

Ad-Vance Magnetics, Inc. already owns tooling for just about every type of magnetic shield used during the past 20 years. Such existing tooling could cut your shielding costs substantially. Or, our Magnetic Shielding Specialists will design and fabricate an AD-MU shield to your precise performance requirements.

AD-MU FOILS PROVIDE ECONOMICAL SHIELDING

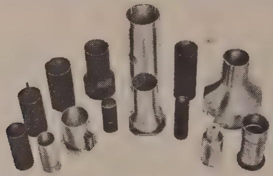
1. Cut and contour in minutes to exact desired shape.
2. Can eliminate costs of designing and manufacturing pre-fabricated shields in many instances.
3. Excellent for hard-to-get-at places.
4. Ideal for experimental applications to quickly determine exact amount of shielding required.
5. Useful in many production applications. Permit placing magnetically reacting components closer, compacting assemblies.

Heat treated; ready for instant use. Delivery from stock.

Widths: 4″, 15″.

Thicknesses: For AD-MU-78, .002″ (4″ width only), .004″, .006″, .010″. For AD-MU-00, .004″ only.

AD-MU-78 OR 80 HIGH PERMEABILITY SHIELDS FIT 312 TYPES OF PHOTOMULTIPLIER TUBES



For your special application or specific magnetic environment, our engineers can either modify a stock shield or custom design a shield to your exact requirement.

AD-MU SHEET STOCK — DELIVERY FROM STOCK

Order Low (AD-MU-00), Medium (AD-MU-48), and/or High (AD-MU-80) Permeability Stock as Required.

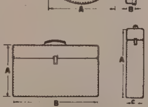
For the convenience of those preferring to design and manufacture magnetic shields in-house. Easy to work: bend, stamp, draw, finish, etc. on ordinary sheet metal working equipment. SHIELDS MUST BE HEAT TREATED before finishing by plating, MIL spec painting, etc.

Sheet dimensions: 30″ x 120″.

Thicknesses: .014″, .020″, .025″, .031″, .040″, .050″ and .062″.

STURDY AD-MU TAPE DATA PROTECTORS

1. Assure fidelity by keeping vital recorded data on magnetic tapes free from distortions caused by unforeseen external magnetic fields.
2. Minimize erasure accidents during safekeeping or transport.
3. Deter the covert saboteur or vandal.
4. Invaluable insurance against possible expensive or irreplaceable losses.



AD-MU CRT SHIELDS

Eliminate the reactive effects of external magnetic fields on the electron beam. Contact our Engineering Department for help in designing and manufacturing the best shield for your application.

Ad-Vance Magnetics, the Old Firm with the New Name, is the industry's largest, oldest and most experienced firm specializing in magnetic shielding. Our shielding is everywhere: off-planet in spacecraft and satellites, and planet-wide in exacting industrial, military, laboratory and consumer applications.

AD-MU CUSTOM FABRICATED SHIELDS FOR COMPONENTS AND SYSTEMS

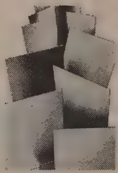
From the simplest component to the most complex system, Ad-Vance Magnetics can design and make the shields you need . . . for magnetic isolation test chambers, for low field research, magnetic shielding components required in systems (such as CRTs), transformers, motors, tachometers, reed relays and computers, dewars for cryogenic or geophysical research, video cameras, scan converters, etc.

COMPLETE FACILITIES IN 2 LARGE MODERN PLANTS

Up-to-date equipment for all types of metal forming, heliarc and spot welding, processing control of heat treating and finishing . . . complete in-house tool room . . . in-house quality control . . . experienced engineering and design services unequalled in the industry.

PHYSICAL CHARACTERISTICS OF AD-MU ALLOYS

(FORMING QUALITY — NOT ANNEALED)

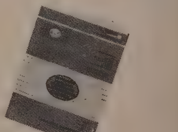


	AD-MU-80	AD-MU-78	AD-MU-48	AD-MU-00
density (grams/cm³)	8.74	8.21	8.20	7.80
coefficient of expansion per degree C (20°/100°)	12.30 x 10^{-6}	12.42 x 10^{-6}	9.38 x 10^{-6}	13.10 x 10^{-6}
tensile, strength (lbs/in² x 10³)	99.0	85.0	73.0	45.0
yield point (lbs/in² x 10³)	35.0	32.5	29.5	28.0
hardness (rockwell B)	65/80	65/75	65/75	20/40
modulus of elasticity (lbs/in² x 10⁶)	32.0	30.0	24.0	29.5
melting point degrees C	1450	1470	1425	1525
shear point (x 10³ psi)	—	42.75	—	35.00
elongation (% in 2″ section)	32	35	33	—

AD-MU ALLOYS PROTECT PERMANENTLY

- Will not saturate when properly used
- No excessive loss of permeability from shock
- Relatively stable permeability characteristics after final anneal, avoiding the expense and inconvenience of regularly repeated annealings
- Minimum retentivity for any alloy of a given permeability.

Ad-Vance engineers are magnetic shielding specialists. Contact our Engineering Department for help with your current magnetic shielding problems. Request Ad-Vance's complete 16-page catalog featuring advanced shielding techniques and components.



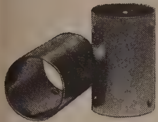
AD-VANCE MAGNETICS, INC., 226 E. SEVENTH ST. / ROCHESTER, IND. 46975 / (219) 223-3158 / TWX 810-290-0294

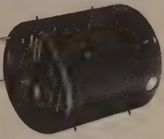
MAGNETIC SHIELDS—ANY SIZE OR SHAPE

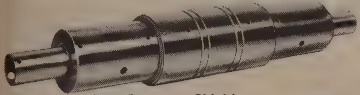
AD-MU AD-VANCE MAGNETICS SHIELDING

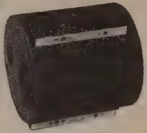
From Ad-Vance Magnetics, Inc., The Problem Solving Magnetic Shielding Specialists

Pictured are typical examples of magnetic shielding problems solved by Ad-Vance Magnetics. Tell us your problem. Be assured our Engineering Department will design the optimum magnetic shield to your exact requirement.


Small Transformer Shields

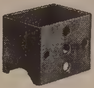

Storage Tube Shield


Scan Converter Shield

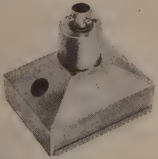

Radar Display Tube Shield

CRT Shield

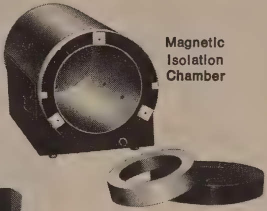
Motor Shields

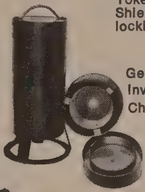

Small Transformer Shield

CRT Deflection Yoke & Neck Shield ("L" locking)


Specialized CRT Shield

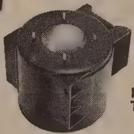
Hydroformed CRT Shield

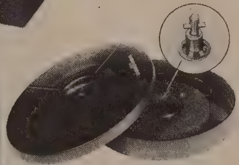

Magnetic Isolation Chamber

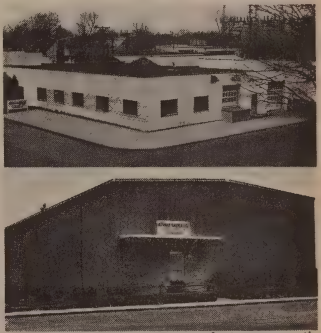

Geo-Magnetic Investigation Chamber

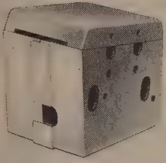
Movable Multi-Layer Controlled Magnetic Environment Chamber

Presidential Model Tape Data Protector

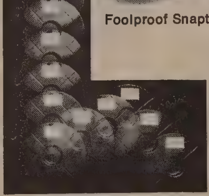

Hydroformed Storage Tube Shield


Foolproof Snaptwist Fastener Lock


Our 2 factories only manufacture magnetic shields. Complete in-house facilities.


Video Recorder Head Assembly Shield

Special 5-Layer PM Shield


Loaded Single Reel Tape Data Protector Drops 4 Feet to Concrete Surface Without Tape Damage

Typical DC Magnetic Properties For AD-MU Shielding Alloys

	MATERIAL	INITIAL PERMEABILITY at 40 gauss	PERMEABILITY at 100-200 gauss	MAXIMUM PERMEABILITY	SATURATION INDUCTION gauss	COERCIVE FORCE oersteds
High Permeability	AD-MU-80	35,000	45,000	350,000	8,200	0.015
	AD-MU-78	20,000	30,000	300,000	7,500	0.015
Med. Permeability	AD-MU-48	11,000	27,000	100,000	15,200	0.03
Low Permeability	AD-MU-00	300	500	3,000	22,000	1.0

Let our Problem-Solving Engineering Department help solve your shielding problem.

Our 3rd Decade of Magnetic Shielding Leadership

AD-VANCE MAGNETICS, INC., 226 SEVENTH STREET / ROCHESTER, IND. 46975 / (219) 223-3158 / TWX 810-290-0294

SPECIFY "ARNOLD" FOR YOUR **PERMANENT MAGNET**

Arnold permanent magnets are available in all types of Alnico material, in sizes ranging from large castings weighing over 80 pounds to very small sintered parts weighing less than one gram.

Alnico 5 can usually be depended upon to deliver the greatest energy product to the magnetic circuit per weight of magnet material. It is therefore generally the first choice for a magnetic material except where special physical considerations are paramount. Modified or premium grades are also available, such as Arkomax 800, a crystal-oriented material used where size and weight must be reduced without loss of energy.

Special assemblies such as rotors, traveling wave tube magnets, magnetron magnets, etc. may be supplied in an aluminum jacket to facilitate mounting and supply an added protection to the magnet.

Large magnet assemblies may be supplied for focusing mass spectrometer and other measuring applications where a high degree of stability and uniformity of field is required.

Many sizes and types of Alnico magnets are carried in stock for immediate delivery.

ALNICO 8 Available from Arnold in production quantities, Alnico 8 possesses the highest coercive force of all Alnico grades, as well as a high energy product and a relatively low temperature coefficient. It is especially suited for traveling wave tube periodic focusing applications. Gap flux densities greater than 1000 gausses are attainable in tubular-type straight field focusing magnets. Alnico 8 is also recommended for applications which involve strong demagnetizing fields, or where space considerations dictate the use of a short magnet.

ARNOX 5 Arnox 5 is a ceramic permanent magnet material composed of highly oriented barium ferrite. It has many times the energy product of Arnox 3 and is comparable in many applications to Alnico 5. Because of its high coercive force, its use is recommended in applications where a short magnetic length is desirable or where extremely high demagnetizing forces are encountered.

ARNOX 7 is a magnet material which was developed primarily for D.C. motors. It combines high energy with very high resistance to demagnetization over a wide range of temperatures.

ARNOX 8 is a premium quality ferrite magnet with the highest magnetic energy of all Arnox magnet grades. It is used where great magnetic efficiency and space-saving are desired. In addition to the higher flux density available from this magnetic material, it also provides a very high resistance to demagnetization.

SILECTRON C, E, O AND DISTRIBUTED GAP CORES Precision-rolled Silectron strip in 1, 2, 4 and 12 mil thicknesses. They are supplied in a wide variety of shapes, and in sizes from a fraction of an ounce to several hundred pounds. In addition to standard transformer applications, they may also be supplied for special applications such as saturable reactors, instrument transformers and pulse transformers.

Distributed Gap Cores reduce watt loss by 30%, exciting current by 70% and cost by 10% over conventional 12 mil C cores of the same size and weight. Made of the best commercial grades of .012″ grain-oriented silicon steel, cores are available in 36 basic sizes for power transformer and reactor applications.

Over 1,000 stock cores are listed in the Arnold Silectron catalog. A wide selection of preferred sizes are stocked for immediate shipment.

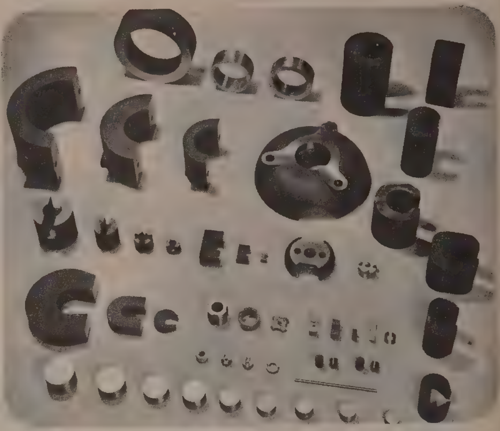
TAPE WOUND CORES OF HIGH PERMEABILITY MATERIALS Arnold tape wound cores are available made of Deltamax, 4-79 Mo-Permalloy, Supermalloy, Mumetal, 4750 Electrical Metal, Silectron, or the new rectangular-loop material, Supermendur. All except Supermendur cores are available in standard tape thicknesses of ½, 1, 2, 4 or 12-mils.

Toroidal cores are made in 30 standard sizes with protective nylon or aluminum cases. Special sizes produced to individual requirements. Wide selection of Deltamax, Square Permalloy and Supermalloy type 6T cores (aluminum cased, oil filled, heremetically sealed and epoxy coated) carried in stock for immediate shipment.

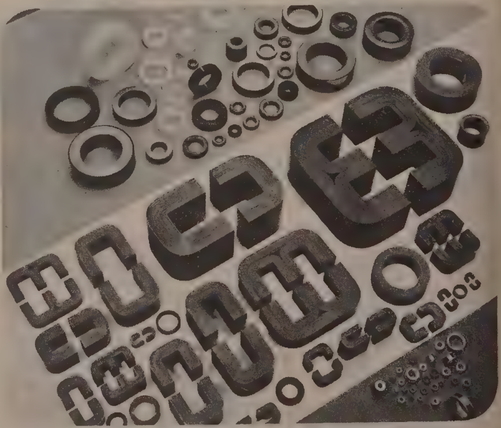
BOBBIN CORES Arnold bobbin cores are available in a wide range of sizes, tape thicknesses, widths and number of wraps to suit the ultimate use of the core in electronic computer assemblies. Magnetic materials usually employed are Deltamax and Square Permalloy in standard thicknesses of 1, ½, ¼ and ⅛ mil. Bobbins are supplied in ceramic or stainless steel.

MO-PERMALLOY POWDER CORES Available in a wide range of sizes, from .140″ OD to 5.218″ OD. They are given various types of enamel and varnish finishes, some of which permit winding with heavy Formex insulated wire without supplementary insulation over the core.

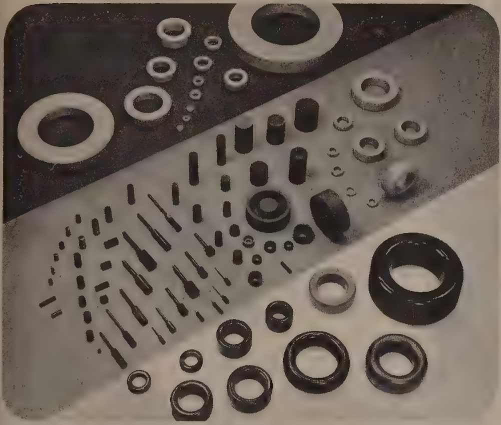
These powder cores are supplied in standard permeabilities of 14, 26, 60 and 125 Mu; high-permeability cores of 147, 160, 173, 205, 250, 300 and 350 Mu are also available in all sizes. They provide constant permeability over a wide range of flux density, and in many cases may be furnished stabilized to provide essentially constant permeability over a specific temperature range. Preferred sizes carried in warehouse stock for immediate shipment.


Typical group of Arnold permanent magnets, both cast and sintered types.

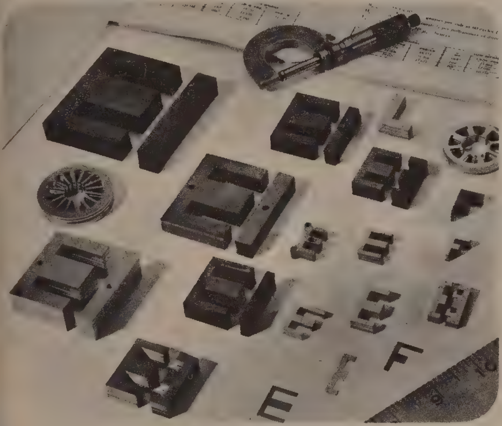
Typical group of permanent magnet assemblies.


Top to bottom: Tape wound cores, Silectron C, E and O cores, and bobbin cores.

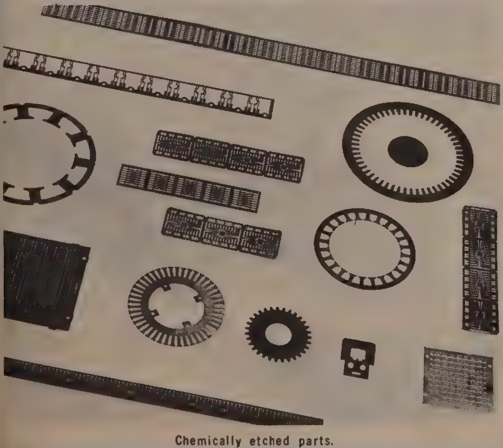
AND OTHER **MAGNETIC MATERIAL** REQUIREMENTS . . .



Powder cores.



Laminations of silicon and nickel-iron.



Chemically etched parts.

IRON POWDER CORES A wide selection of cores is available from simple cylinders to special cores of complicated design. The line includes all standard types of threaded cores, cup, sleeve, slug and cylindrical insert cores as well as a series of iron powder toroids conforming to the standard sizes adopted by the Metal Powder Industries.

SOFT FERRITE CORES Arnold Soft Ferrite cores are available in a wide range of shapes and permeabilities. Threaded cores, slugs, toroids, beads, E, & U-shapes and pot cores are produced in many sizes from standard tooling. Permeabilities range from 40 to 200 for nickel zinc ferrite and 400 to 3000 for manganese zinc ferrite. Higher permeability materials are currently under development.

MSS IRON POWDER CORES MSS powder cores have a very high electrical resistivity combined with a lower magnetostrictive noise than any other commercial iron powder even when cores are operated at saturation flux densities. They are moderately priced and are available in a wide range of sizes.

LAMINATIONS AND FORMED PARTS Arnold produces a wide selection of silicon-steel, nickel-iron and cobalt-iron laminations for motors and transformers. Thin-gauge laminations (1, 2 and 4-mil thicknesses) of high-permeability materials are specialties. A complete line of transformer cans and hardware is available, including Mil-T specification. Many sizes and types of magnetic shields are available or can be fabricated to your exact requirements from Mumetal and other shielding materials. Shielding materials are also available in bulk form, without annealing.

PHOTO-CHEMICAL FABRICATION This technique provides a wide variety of stress-free, burr-free parts. It also provides economical fabrication where expensive tooling is not justified. A wide range of materials is available for applications such as lead frames, recording head laminations, and other applications.

PRECISION FOIL AND STRIP PRODUCTS Thin and Ultra-thin metals and alloys are custom processed in one of the newest and most modern rolling facilities in the world. Materials such as Aluminum, Brass, Copper, Magnetic Alloys, Stainless Steels and others are produced to individual requirements of gage, width, hardness, flatness, grain size, edge and surface condition.

VICALLOY Vicalloy is a carbon-free permanent magnet alloy containing about 10% vanadium, 50% cobalt and the balance iron.

Vicalloy may be fabricated in the form of castings, hot rolled bars and forgings, or cold rolled strip, wire and tubing. After suitable heat treatment, the material is quite readily machinable. Vicalloy is available on special order in bar, strip and thin tape for recording purposes.

2V PERMENDUR A ferromagnetic alloy of cobalt, vanadium and iron that possesses high flux density saturation properties. Its magnetostrictive properties are useful in many transducer applications.

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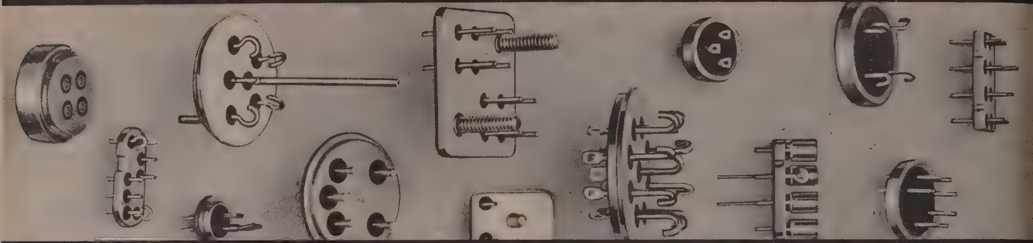
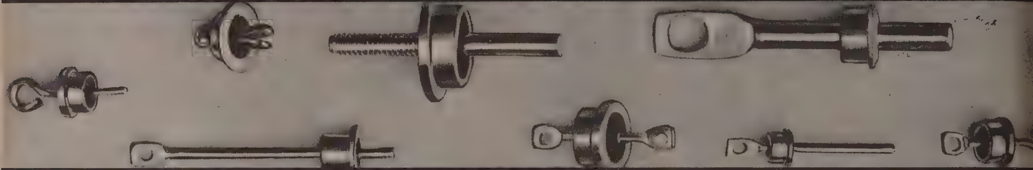
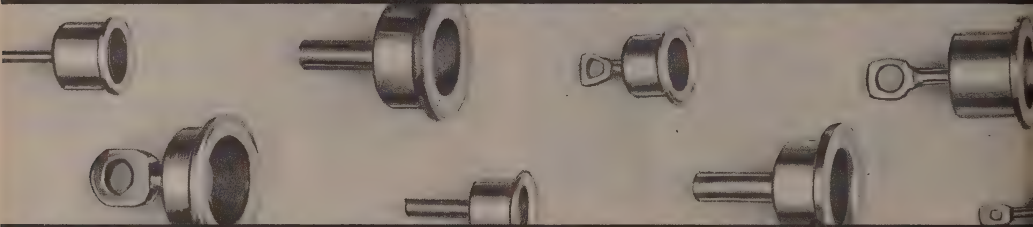


TERMINAL SEALS

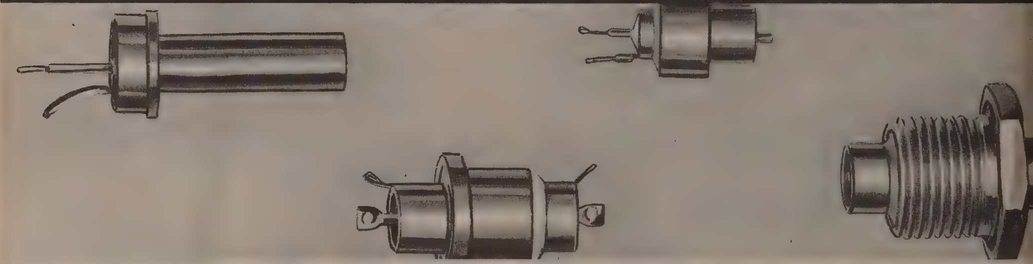


END SEALS and CAPACITOR SEALS

DIODE CASES



DOUBLE SEALS



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MAGNETIC PROPERTIES OF TYPICAL FAIR-RITE MATERIALS

Material	65	61	64	33	43	34	77	72	73	75
(μ_i) Initial Permeability	100	125	250	800	950	1200	1800	2000	2500	5000
(μ_M) Maximum Permeability	370	450	375	1380	3000	2500	4500 6000 @ 100°C	3500	4000	8000
(B_S) Saturation Flux Density @ 13 oersteds (gauss)	2150	2350	2200	2500	2750	3400	4600	3500	4000	3900
(T_C) Curie Temperature	300°C	300°C	210°C	150°C	130°C	120°C	200°C	150°C	160°C	160°C
(H_C) Coercive Force (oersteds)	2.35	1.60	1.40	0.30	0.30	0.25	0.22	0.18	0.16	0.18
Typical Applications	Microwave Attenuators, Wide Band Transformers	Antennas, Coilforms, Shielding Sleeves	Coil Forms, Shield Beads, Antennas	Coil Forms, Threaded Cores, Cup Cores	Shield Beads, High Frequency Transformers	Bobbins, Shield Beads	Inverters, Power & Pin Cushion Transformers	Inductors, Transformers	Shield Beads Wide Band Transformers	Wide Band Transformers, Inductors

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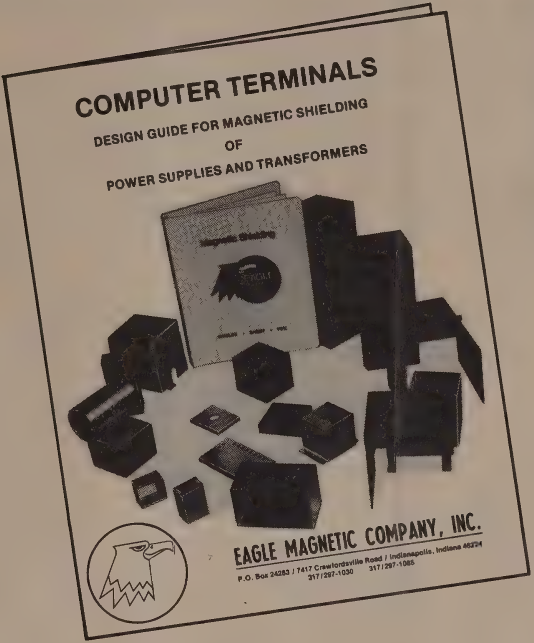

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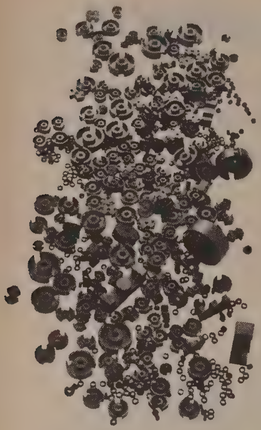
FERROXCUBE LINEAR-FERRITE MAGNETIC CORES



CHOOSE the exact shape, size, and performance combination you require in a magnetic core from among the thousand-odd in-stock, Ferroxcube Catalog-Standard ferrite designs. Then get the cores, in the quantity you need, direct from your local Ferroxcube Stocking Center. There are six of them, across the country — (see bottom of page). As the largest single source of ferrite products, and the largest volume supplier, we maintain a continuously available stock of cores that runs high up into the millions. What's more, we offer the broadest, most complete line in the industry:

. . . Six different ferrites . . . Six different shapes . . . Graduated sizes in every shape . . . Ungapped, fixed-gap, and adjustable-gap types . . . Operating ranges from power frequencies to >200MHz.

STANDARD FERRITES

Of the scores of ferrite compositions developed in our laboratories, six distinctive types are represented in our Catalog Standard cores. Each is precision-formulated; it's properties are deliberately determined, are tightly controllable, and consistently reproducible, from core to core, and lot to lot. Each is the core material of choice in a range of applications; at times it is the only means by which a set of design objectives may be met. The primary characteristics of these premium ferrites are listed below, in Table I. Their availability in standard core shapes are indicated in Table II, and their initial permeability curves, as influenced by frequency and temperature, are plotted in the adjacent graphs for comparison. Characteristics and availability of the standard cores are detailed on the following three pages.

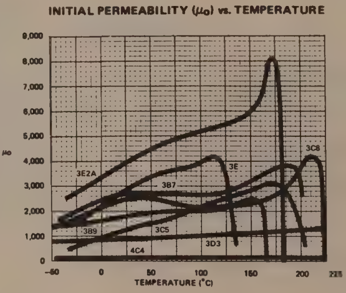
TABLE I. STANDARD-FERRITE CHARACTERISTICS

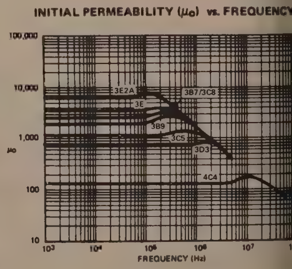
Parameters shown are typical values, based upon measurements of a 1″ toroid.

	3B7 FERRITE	3B9 FERRITE	3C8 FERRITE	3D3 FERRITE	3E2A FERRITE	4C4 FERRITE
(μ_o) Initial Permeability (±20%) at 25°C	2300	1800	2700	750	5000	125
(B_s) Saturation Flux Density at 25°C (Gauss) H = 2 Oersteds	3800	3200	25°C ⩾4400 100°C ⩾3300 (H = 3 Oersteds)	3800 (H = 5 Oersteds)	3600	3000
(TF) Temperature Factor (min.) (max.) (Temp. Range)	-0.6×10^{-6} $+0.6 \times 10^{-6}$ +20°C to +70°C	$+0.9 \times 10^{-6}$ $+1.9 \times 10^{-6}$ -30°C to +70°C		1×10^{-6} 3×10^{-6} 30°C to +70°C	$\pm 2 \times 10^{-6}$ +20°C to +70°C	$\pm 6 \times 10^{-6}$ 0 +5°C to +55°C
Recommended Frequency Range	Power frequencies to 300kHz	Power frequencies to 300kHz	Power frequencies to 300kHz	To 2.5MHz	Power frequencies to 300kHz	1MHz to 20MHz
Curie Temperature	⩾170°C	⩾145°C	⩾200°C	⩾150°C	⩾170°C	⩾300°C
Summary of Other Properties	Essentially zero T.C. Higher Q than 3B9, Higher permeability, permitting larger A_L values.	Linear, controlled T.C. over a wide temperature range, to compensate polystyrene capacitors.	High saturation. Low core loss material for power applications.	Linear, controlled T.C. over a wide temperature range, to compensate polystyrene capacitors.		Negative linear, controlled T.C. to compensate silver mica capacitors

TABLE II. FERRITE AVAILABILITY IN STANDARD CORES

FERRITE	POT CORES (see page 2)	SQUARE CORES (see page 3)	E CORES (see page 3)	U CORES (see page 3)	TOROIDS (see page 4)
3B7	X	X			X
3B9	X	X			
3C5				X	
3C8	X		X	X	X
3D3	X	X			X
3E	X				X
3E2A			X	X	X
4C4	X				X


INITIAL PERMEABILITY (μ_o) vs. TEMPERATURE


INITIAL PERMEABILITY (μ_o) vs. FREQUENC

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FERROXCUBE

FERRITE POT CORES FOR PRECISION DESIGN AND PREMIUM PERFORMANCE IN TRANSFORMERS AND INDUCTORS ALL ACROSS THE ELECTROMAGNETIC SPECTRUM

Ferroxcube Ferrite Pot Core designs represent one of the most significant advances in ferromagnetic technology in the past two decades. They offer an almost classic combination of closely controlled characteristics that enables the circuit designer to achieve near-ideal performance, and to accomplish objectives that are impracticable by any other technique.

Inductors and transformers wound on ferrite pot cores, operating in the range from power frequencies on up to tens of megahertz, are superior to conventional magnetic-core components in so many ways that they should automatically be considered first in undertaking any magnetic design — small-signal transformers, pulse and broadband transformers, power transformers from mid-audio to the RF region, filters, and tuned circuits of every description. Because of the tight control maintained in the core's properties, and in its dimensions, the designer can count on high Q, high stability, and minimum volume. He can work to tight tolerances in his winding specifications, with the assurance of achieving target performance, with little or no trimming or adjustment.

Pot core construction lends itself admirably to automated production procedures in winding, assembly, mounting, interwiring, and PC board insertion — a fact which appreciably enhances the fundamental design efficiency, and the economy inherent in mass-production core and hardware prices.

STANDARD POT CORES

Figure 1. ·Pot Core Halves

Ferroxcube pot cores are manufactured in half-core sections as illustrated in Figure 1, in **eleven** standard sizes (from .282" to 2.657" O.D.), in six different ferrites (3B7, 3B9, 3C8, 3D3, 4C4, and 3E). They are available in three core-gap forms, as shown in Figure 2 in cross-section. Ungapped core halfs (PL00's) are available in all materials. In the fixed-gap version, (PA's) the height of the center post in one core half is reduced by machining to selected dimensions, providing various air-gap lengths, with corresponding variations in effective permeability (μ_e) and in inductance index (A_L). Adjustable-gap versions (CA's) are identical to the fixed-gap cores, but are furnished with a pre-inserted threaded nut, and an inductance adjustor pin that provides a 10-turn adjustment range of approximately 13% in the effective permeability of the core. The availability of the various combinations are indicated by x's, in Table IV, and their essential dimensional and mechanical characteristics are shown in Table III.

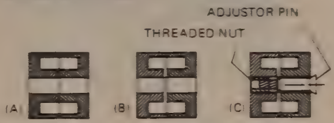

Figure 2. Internal Configurations of Ungapped (A), Fixed-Gap (B), and Adjustable-Gap (C) Pot Cores.

TABLE III. DIMENSIONAL AND MECHANICAL CHARACTERISTICS

POT CORE SERIES	O.D. (in.)	HGHT. (in.)	STANDARD BOBBIN WINDING AREA (in^2)	STANDARD BOBBIN MEAN LENGTH OF TURN (in.)
743	.282	.276	.0056	.47
906	.366	.212	.0053	.749
1107	.445	.264	.0083	.905
1408	.559	.334	.015	1.14
1811	.726	.428	.029	1.46
2213	.858	.538	.046	1.74
2616	1.024	.640	.063	2.08
3019	1.201	.754	.091	2.44
3622	1.418	.886	.116	2.92
4229	1.697	1.162	.217	3.39
6656	2.657	2.204	.620	5.118

Standard Delrin or Nylon bobbins are available for each of the 11 core sizes. For the more popular sizes, 2-section and 3-section bobbins are also obtainable, as well as printed circuit bobbins equipped with integral terminal pins. Standard hardware sets are available to provide surface mounting, PC board mounting, or panel mounting. (See page 4.)

NUMBERING SYSTEM FOR CORE IDENTIFICATION

All pot cores in the standardized sizes are identified by a part number that indicates many of the essential characteristics and the composition, of the core. The following is an example:

1811P	A100	3D3
Series (and size)	Inductance Index (Preadjustment)	Ferrite Material

1811P This Series number also indicates the core size in millimeters — in this case, 18 mm diameter, 11 mm assembled height.

A100 This indicates a preadjusted and/or adjustable pot core set, and the number following the letter "A" is the inductance Index (A_L) of the core set in millihenries per 1000 turns. (The preadjusted core set is termed a PA, and the adjustable set as a CA.) The A_L value of adjustable core sets is the value before insertion of the adjustor pin. (An adjustor pin always increases the effective inductance.) Cores with no A_L value indicated are ungapped and are termed P-LOO cores.

3D3 Designates the Ferrite material used in the core.

TABLE IV. MATERIAL AND GAP AVAILABILITY

POT CORE SERIES	FERRITE MATERIALS 3B7 PL00	3B7 PA	3B7 CA	3B9 PL00	3B9 PA	3B9 CA	3C8 PL00	3C8 PA	3C8 CA	3D3 PL00	3D3 PA	3D3 CA	4C4 PL00	4C4 PA	4C4 CA	3E PL00
905	x	x	x	x	x	x				x	x	x	x	x	x	
1107	x	x	x	x	x	x				x	x	x	x	x	x	
1408	x	x	x	x	x	x	x			x	x	x	x	x	x	
1811	x	x	x	x	x	x	x			x	x	x	x	x	x	
2213	x	x	x	x	x	x	x			x	x	x	x	x	x	
2616	x	x	x	x	x	x	x			x	x	x	x	x	x	
3019	x	x	x	x	x	x	x									
3622	x	x	x	x	x	x	x									
4229	x	x	x				x									
743				x												
6656																x

NOTES

(1) The nine Pot Core Series from 905 through 4229 are standardized sizes in accordance with the International E.I.C. specifications. Series 743, and 6656 are special (non-standardized) sizes but are standard items of manufacture with Ferroxcube Corporation.

(2) The designations PL00, PA, and CA designate ungapped, fixed gap, and adjustable-gap core, respectively (see numbering system).

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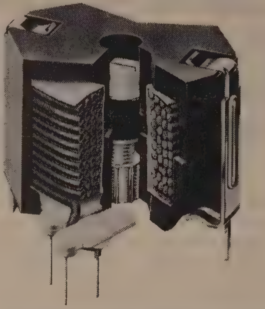
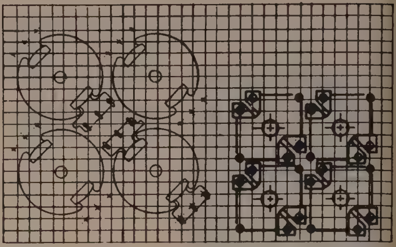
FERROXCUBE FERRITE SQUARE CORES

- *Almost 40% higher packing density than equivalent pot cores*
- *Three ferrite compositions to choose from*
- *Ungapped, fixed-gap, and adjustable-gap forms*

The RM6 square core system uses a specially designed printed circuit bobbin and is held together and mounted by two simple hardware clips. This unique core set allows for almost 40% higher packing density of core sets on a PC board, compared with conventional round pot cores. It is available in ungapped, fixed-gap and adjustable gap versions (see diagram on preceding page). Figure 3. compares the area occupied by the RM6 square core, and its pot core equivalent in performance (Series 1811).

A similar saving is achieved by the RM8 square core over the equivalent (Series 2213) pot core. Both models are available in 3B7, 3B9, and 3D3 ferrite, with a range of gap lengths available in each material. Single or dual-section bobbins, with 4 or 6 terminal pins are available for the RM6. 4, 8, or 12 pin single section bobbins are available for RM8 for direct PC board mounting.





Minimum Space Requirements for 18-mm Pot Core and RM6 Square Core.

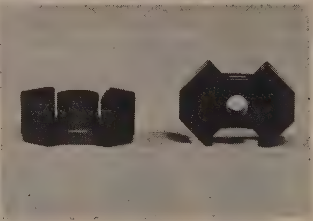
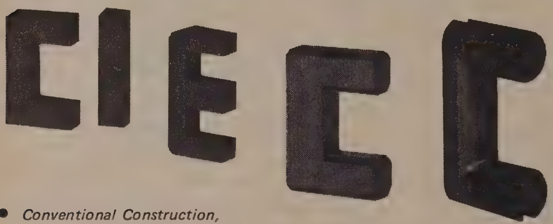


TABLE V. STANDARD SQUARE CORE CHARACTERISTICS

CORE SERIES	CORE MAT'L	OVERALL DIMENSIONS (in.)	STANDARD BOBBIN WINDING AREA (in²)	STANDARD BOBBIN MEAN LENGTH OF TURN (in.)
RM6	3B7 3B9 3D3	0.6″SQ., 0.488″ HIGH	.059	1.181
RM8	3B7 3B9 3D3	0.8″SQ., 0.646″ HIGH	.053	1.62

FERROXCUBE FERRITE E, U, AND I CORES

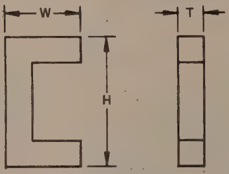
for Power, Audio, HF Inductor and Transformer Design



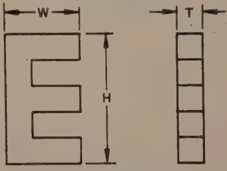
- *Conventional Construction, With Exceptional Performance*
- *E-E, E-I, U-U, and U-I Configurations*
- *Three Ferrite Compositions, Liberal Range of Sizes*

Ferroxcube Standard E, U, and I cores offer the convenience of employing conventional transformer and inductor winding techniques, the advantage of drastic reductions in eddy-current and hysteresis losses, as well as the uniquely precise control of magnetic, electrical, and dimensional properties afforded by ferrite materials.

The cores are all usable in E-E (or U-U) configuration. For certain models, a corresponding I core is available, offering an optional E-I (or U-I) configuration, as well. Standard bobbins, designed for installation on the center leg in E-E configurations, are obtainable.



U-CORE DIMENSIONS



E-CORE DIMENSIONS

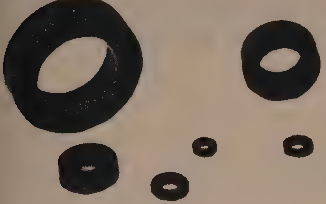
TABLE VI. SUMMARY OF E, U, I CORE CHARACTERISTICS

CORE PART NO.	CORE MAT'L	CONFIG.	INDUCTANCE INDEX A_L (mH/1000 turns)	DIMENSIONS (inches) Width (W)	Height (H)	Thickness (T)
1F4 (1B4)	3C5	U-U	⩾6300 (25°C) ⩾9000 (100°C)	2.99	3.66	1.18
		U-I	⩾8600 (25°C) ⩾12,300 (100°C)			
1F5 (1B5)	3C5	U-U	⩾5500 (25°C) ⩾7850 (100°C)	2.25	4.00	1.00
		U-I	⩾6900 (25°C) ⩾9850 (100°C)			
1F10	3C8	U-U	3800	1.06	2.625	.562
1F19	3C5	U-U	⩾2125 (25°C) ⩾3050 (100°C)	1.16	2.477	.545
1F30	3C8	U-U	2300	.875	1.32	.370
1F31	3C8	U-U	2700	.812	1.645	.470
376U250 (376B250)	3E2A	U-U	2320	.625	1.00	.250
		U-I	2500			
9F520	3C8	E-E	5700	.625	1.975	.520
206F440 (206B440)	3C8	E-E	5000	.415	1.117	.440
		E-I	6100			
	3E2A	E-E	7100			
		E-I	8650			
782E272 (782B272)	3C8	E-E	2500	.587	1.181	.272
		E-I	3400			
	3E2A	E-E	3280			
		E-I	4450			
783E608	3C8	E-E	5900	.823	1.653	.608
	3E2A	E-E	8000			
812E250	3C8	E-E	2340	.375	1.00	.250
	3E2A	E-E	3500			
813E187	3E2A	E-E	2300	.312	.750	.187
813E343	3E2A	E-E	4250	.312	.750	.343
814E250	3E2A	E-E	2600	.219	.500	.250

FERROXCUBE CORPORATION, SAUGERTIES, N.Y. 12477
914•246-2811

Distributed through North American Philips Electronic Components Corporation with warehouses in Boston, 617•899-7100; New York, 516•2300; Saugerties, 914•246-5861; Philadelphia, 215•836-1616; Chicago, 312•593-8220; San Diego, 714•453-5440

FERROXCUBE FERRITE TOROIDAL CORES
for Low-Level Pulse and Broadband Transformer Design



- *Highest Magnetic Efficiency of Any Core Configuration*
- *Thirteen Standard Sizes*
- *Six Standard Ferrite Compositions Available*
- *Uncoated, and Polymer-Coated Types*

The toroidal core offers the designer a magnetic efficiency higher than that of any other core configuration, due to its uniform cross-sectional area, and the absence of an air gap. The Ferroxcube Standard Toroid line is the largest in the industry, comprising thirteen sizes, and seven different ferrite compositions. The larger sizes are provided with an insulating lacquer coating; the smaller toroids (.135 to .375" O.D.) are available uncoated, or optionally with a poly-paraxylene type polymer coating that eliminates scraping of the wire during winding operations, with a consequent reduction of hi-pot breakdowns.

TABLE VII. TOROID CHARACTERISTICS

CORE PART NUMBER	CORE MAT'L TYPE	INDUCTANCE† INDEX A_L (mH/1000 turns) ±20%	INITIAL PERM. μ_o (REF.)	O.D.	I.D.	WIDTH	MAGENTIC PATH LENGTH ℓ_e (in.) (CM)	EFFECTIVE CORE AREA A_e (in.^{2}) (CM^2)
*135CT050	4C4 3D3 3B7 3E2A	20 110 375 660	125 675 2250 4000	.135	.070	.050	.3125 .790	.0016 .0108
*891CT050	4C4 3D3 3B7 3E2A	18 97 360 576	125 675 2500 4000	.155	.088	.050	.373 .945	.00167 .0108
*213CT050	4C4 3D3 3B7 3E2A	24 140 475 850	125 725 2500 4470	.190	.090	.050	.422 1.07	.00249 .0161
*1041CT060	4C4 3D3 3B7 3E2A	25 144 495 890	125 725 2500 4495	.230	.120	.060	.532 1.35	.0033 .0213
*266CT125	4C4 3D3 3B7 3E2A	55 330 1100 2135	125 750 2500 4830	.375	.187	.125	.852 2.16	.0118 .076
768T188	3D3 3E2A 3C8	415 2750 1475	750 5000 2700	.500	.281	.188	1.19 3.03	.0206 .133
846T250	3E2A 3C8	3055 1650	5000 2700	.870	.540	.250	2.18 5.52	.0418 .270
K300502	3E	1688	2700	1.142	.748	.295	2.95 7.50	.0578 .373
K300500	3E	2422	2700	1.417	.905	.394	3.63 9.20	.100 .647
K300501	3E	3639	2700	1.417	.905	.591	3.63 9.20	.147 .977
528T500	3C8	4700	2700	1.530	.770	.500	3.40 8.63	.187 1.21
400T750	3C8	4800	2700	2.040	1.270	.750	5.00 12.7	.281 1.81
144T500	3C8	4350	2700	2.90	1.53	.500	6.7 17.1	.342 2.21

*Core is available uncoated, or polymer coated (EXCEPT: Cores of 3E3 ferrite are available only as coated toroids.) Part number shown is for coated core. To specify uncoated core when ordering, omit letter C from part number.

**Polymer coating, when specified, increases O.D. and Width, and decreases I.D., by .001" ±.0003".

***Available only as coated toroid. All 3E3 toroids will meet the A_L value specifications over the temperature range from 10°C to 60°C.

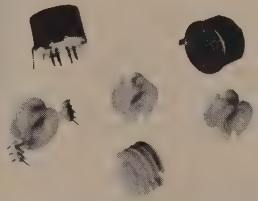
ACCESSORIES AND TECHNICAL LITERATURE

BOBBINS

Ferroxcube Standard Pot Cores may be wound and mounted in a variety of configurations, as shown at right. Standard Lexan, Delrin, or Nylon Bobbins are available for all models, some with 2 and 3 winding sections. PC bobbins, equipped with integral terminal pins for direct PC board mounting, are available for the more popular core sizes, as are hardware sets for mounting core assemblies on PC boards, panels, or chassis surfaces. Availability of these items in the various core Series are summarized in Table VIII below.

TABLE VIII. POT CORE BOBBINS AND HARDWARE

Pot Core Series	Standard Bobbins No. of Sections 1	2	3	PC Bobbin	Container Type Assembly For PC Mounting	Surface Tab Mount	Surface Rivet Mount
743	X						
905	X						
1107	X	X	X		X		
1408	X	X	X	X	X	X	
1811	X	X	X	X	X	X	X
2213	X	X	X	X	X	X	X
2616	X	X	X	X	X		X
3019	X	X	X		X		
3622	X	X	X		X		
4229	X	X			X		
6656	X						

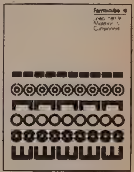


FERROXCUBE SHIELDING BEADS AND CHOKES

A convenient, simple, inexpensive means for obtaining effective RF decoupling, shielding, and parasitic suppression (without sacrificing DC or low-frequency power), for pennies per circuit. May be used in conjunction with small ceramic capacitors in damping circuits to provide additional rejection at the self-resonant frequency of the capacitor. Double-hole beads for twin-lead circuits, wideband 1½-turn or 2½-turn chokes, offer even better performance for a given space allotment. Five sizes, choice of four ferrite materials — ask for samples!

FERROXCUBE LINEAR FERRITE MASTER CATALOG

NEW



A 176-page catalog of the complete Ferroxcube line of Standard Linear-Ferrite Components, with complete magnetic, electrical and mechanical specifications, and performance data.

FERROXCUBE LINEAR FERRITE MAGNETIC DESIGN MANUAL

Your complete, definitive guide to fast, effective, precision design of magnetic components in the ferrite domain—transformers or inductors, power or low-level linear types. Step-by-step procedures, analyses, and examples.

POWER CORE APPLICATION NOTES

Power supply design factors, cores for switched mode power supply transformers, RFI suppression. Specifications and performance data.

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SERIES EC POWER E CORES

NEW FROM SAUGERTIES, N.Y.!

The Power E

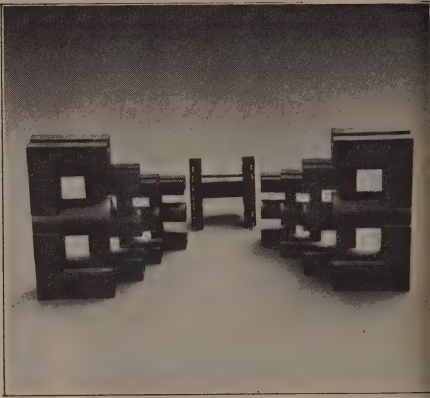
Ferroxcube's new line of EC-cores, designed specifically for switch-mode power supplies, inverters and converters, make transformer and filter design and fabrication easy. Representing a compromise between pot cores and the old-style square-legged U and I cores; they provide benefits not obtainable with either of these core configurations.

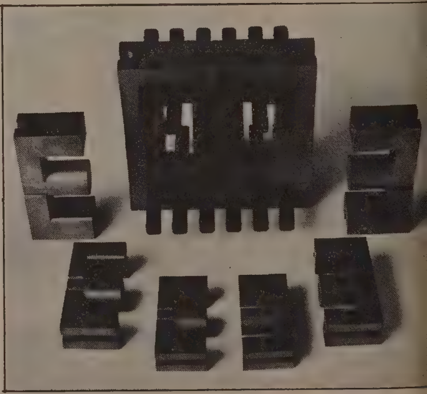
Ideally, any transformer operating at high flux densities and high frequencies should be completely screened to minimize external fields and radiation. Although this screening requirement is met by the pot core design, the slots place severe restrictions on the diameter of conductors that can be brought out. At the other extreme, the U and I core combination offers ease in winding and terminations but produces a high external field, particularly if an air gap is necessary.

These considerations have led to the adoption for the Series EC-cores of the round center-leg E-core design. This is virtually a pot core with the two sides removed and has the advantages of both the pot core and the U and I core, its external field being a compromise between the two. Because it has a circular cross-section for the center leg, the turn length is minimized, an important consideration in reducing copper losses. Further, the winding is more compact, since bowing is eliminated, reducing leakage inductance.

The new line of ferrite cores has been designed for use in switched-mode power supplies, inverters and converters. The core design has been optimized for operation in push-pull circuits, generally considered to be worst case, at frequencies up to 50 kHz. At present, the line comprises four sizes: Types EC-35, EC-42, EC-54 and EC-72 covering transformer throughput power to 1 Kw.

An added plus for the new core line is standardization and the resultant availability of associated accessories. A line of complementary bobbins is available for the EC-core series. In addition the cores are slotted to accept studding, thereby facilitating assembly and mounting and avoiding the need for special clips and attachments.





SERIES EC
POWER E CORES

This core type is:

- manufactured in the following material —3C8
- available with following optional accessories: single section standard bobbins for all sizes; printed circuit bobbin for EC-35.

Electrical parameters are expressed in the MKS System.

All terms and symbols used are defined in the Glossary at the rear of the Ferroxcube catalog.

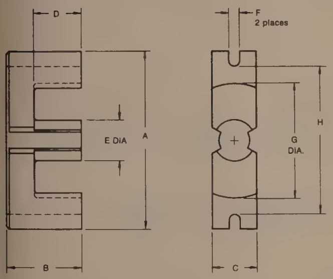
Characteristics of the ferrite material used are described in the Materials section at the front of the catalog.

ELECTRICAL CHARACTERISTICS

	EC-35	EC-42	EC-54	EC-72	UNITS
MIN. A_L at 3200 GAUSS & 100°C	1500	1875	2375	2700	mH/1000T
MAX. LOSSES 25 kHz 1600 GAUSS & 100°C	.85	1.35	2.35	5.0	watts

MECHANICAL CHARACTERISTICS AND DIMENSIONS

CORE DIMENSIONS



MECHANICAL CHARACTERISTICS

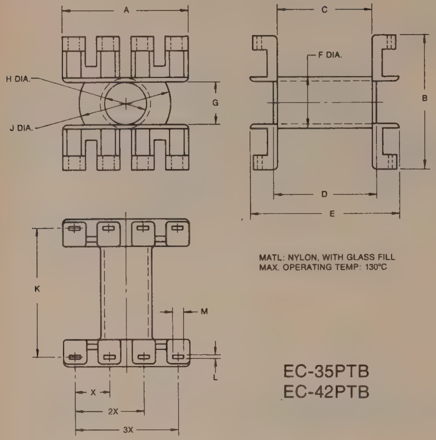
	EC-35	EC-42	EC-54	EC-72	UNITS
MAGNETIC PATH LENGTH l_e	77.4	89.3	105	144	mm
CORE CONSTANT $\sum \frac{l_e}{A_e}$	.92	.74	.58	.51	mm^{-1}
EFFECTIVE CORE AREA A_e	84.3	121	180	279	mm^2
EFFECTIVE CORE VOLUME V_e	6530	10,800	18,800	40,100	mm^3
WEIGHT	1.26 36	1.82 52	3.88 111	8.80 253	oz. grams

All Dimensions are in inches

Size Designation	A	B	C	D	E DIA.	F	G DIA.	H
EC-35	1.346	.681	.374	.482	.374	.108	.895	1.102
EC-42	1.598	.748	.457	.547	.457	.148	1.065	1.343
EC-54	2.055	.953	.528	.626	.528	.148	1.299	1.732
EC-72	2.756	1.359	.646	.895	.646	.187	1.752	2.347

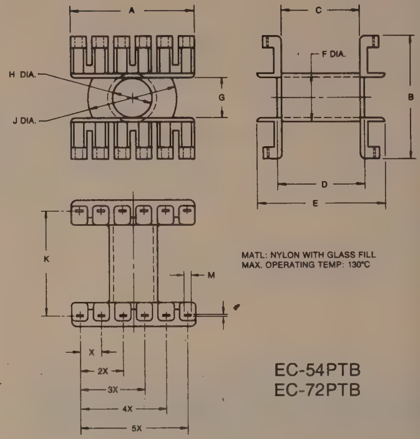
SERIES EC
POWER E CORES

STANDARD BOBBINS


A
C
F DIA.
H DIA.
J DIA.
G
B
D
E
K
M
L
X
2X
3X

MATL: NYLON, WITH GLASS FILL
MAX. OPERATING TEMP: 130°C

EC-35PTB
EC-42PTB


A
C
F DIA.
H DIA.
J DIA.
G
B
D
E
K
M
X
2X
3X
4X
5X

MATL: NYLON WITH GLASS FILL
MAX. OPERATING TEMP: 130°C

EC-54PTB
EC-72PTB

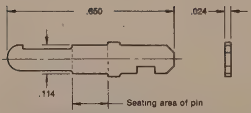
All Dimensions are in inches

TYPE	A	B	C	D	E	F	G	H	J	K	L	M	X	T*
EC-35PTB	1.125	1.284	.847	.925	1.340	.480	.394	.394	.853	1.200	.024	.102	.300	16
EC-42PTB	1.125	1.465	.965	1.052	1.512	.563	.476	.476	1.010	1.300	.024	.102	.300	16

* Number of terminals (991 930 00) that can be installed in bobbin.

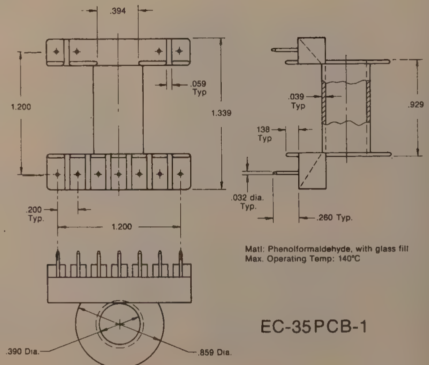
TYPE	A	B	C	D	E	F	G	H	J	K	L	M	X	T*
EC-54PTB	1.725	1.690	1.114	1.203	1.746	.638	.550	.550	1.238	1.500	.024	.102	.300	24
EC-72PTB	2.224	2.214	1.632	1.738	2.275	.768	.675	.675	1.676	2.000	.024	.102	.400	24

PRINTED CIRCUIT BOBBIN


.650
.024
.114
Seating area of pin

Terminal for bobbins' (PTB)
Matl: Brass hot tin dipped

991 930 00

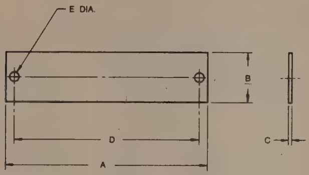

.394
.059 Typ
1.200
1.339
.039 Typ
.929
.138 Typ
.032 dia. Typ.
.260 Typ.
.200 Typ.
1.200
.390 Dia.
.859 Dia.

Matl: Phenolformaldehyde, with glass fill
Max. Operating Temp: 140°C

EC-35PCB-1

SERIES EC POWER E CORES

MOUNTING DATA



Recommended Screw Size

EC-35	#2	1⅝″
EC-42	#4	1¾″
EC-54	#6	2¼″
EC-72	#8	3″

MOUNTING PLATE DIMENSIONS (Mounting Plate is not supplied by Ferroxcube)

SIZE DESIGNATION	A	B	C	D	E DIA.
EC-35	1.411 ± .006	.375 ± .008	.032 ± .002	1.252 ± .004	.125 ± .004
EC-42	1.647 ± .006	.438 ± .008	.040 ± .002	1.481 ± .004	.144 ± .004
EC-54	2.111 ± .008	.500 ± .008	.040 ± .002	1.902 ± .004	.144 ± .004
EC-72	2.827 ± .008	.625 ± .008	.040 ± .002	2.571 ± .004	.171 ± .004

All Dimensions are in inches

For fast delivery of the ferrites you require, or assistance with their application, contact the nearest Ferroxcube Distributor listed below.

Northeast
N.A.P.E.C.C., 1393 Main Street,
Waltham, Mass. 02154
617•899-7103

Elna Ferrite Labs.
P.O. Box 395
Woodstock, New York 12498
914•246-5861

Kahgan Sales Corporation
556 Peninsula Blvd.
Hempstead, L.I., New York 11550
516•538-2300

Mid Atlantic
Eastern Components, Inc.
1407 Bethlehem Pike
Flourtown, Pa. 19031
215•836-1616-1619

Mid West
N.A.P.E.C.C.
175 Scott Street
Elk Grove Village, Ill. 60007
312•593-8220

West
N.A.P.E.C.C.
11568 Sorrento Valley Road
San Diego, Calif. 92121
714•453-5440

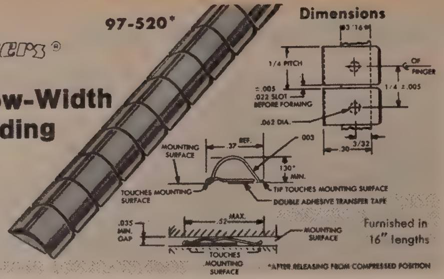
Canada
Philips Electron Devices, Ltd
116 Vanderhoof Avenue
Toronto, Ontario, Canada
416•425-5161

Specifications subject to change without notice.

FERROXCUBE CORPORATION, SAUGERTIES, N.Y. 12477 914•246-2811
A NORTH AMERICAN PHILIPS COMPANY

sticky fingers®

New Narrow-Width High Shielding Finger Contact Strips


97-520*
Dimensions
3/16
1/4 PITCH
OF FINGER
±.005
.022 SLOT BEFORE FORMING
1/4 ±.005
.062 DIA.
.003
MOUNTING SURFACE
.37 REF.
3/32
.30
130° MIN.
TOUCHES MOUNTING SURFACE
TIP TOUCHES MOUNTING SURFACE
DOUBLE ADHESIVE TRANSFER TAPE
.035 MIN. GAP
.52 MAX.
MOUNTING SURFACE
TOUCHES MOUNTING SURFACE
*AFTER RELEASING FROM COMPRESSED POSITION

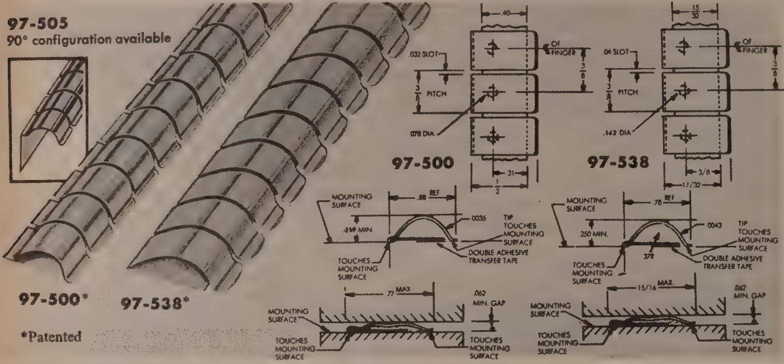
Furnished in 16" lengths

*Patented

A smaller size Sticky-Fingers beryllium copper contact strip, providing high RFI/EMI shielding effectiveness in less space.

Series 97-520* measures just 3/8" wide, and 1/2" at maximum deflection. Yet, it provides shielding effectiveness greater than 92 dB at 1 MHz magnetic and 92 dB at 10 GHz plane wave, and has a dynamic range of 0.10".

It is ideal as an all-purpose contact strip for metal cabinets and electronic enclosures where space is critical. Series 97-520 is especially recommended where variations exist in the space to be shielded and in applica-

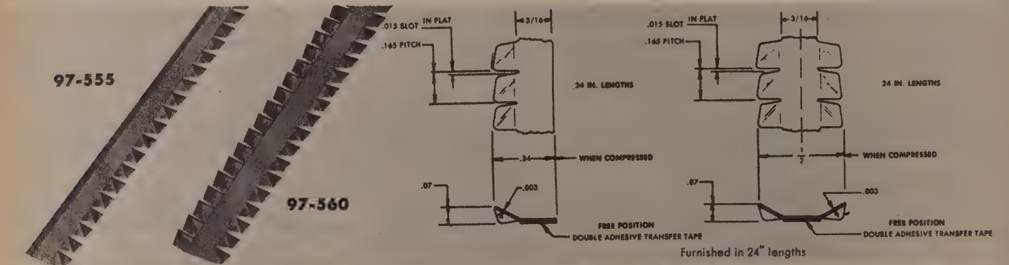

97-505
90° configuration available
97-500*
97-538*
.40
.032 SLOT
OF FINGER
3/8
3/8 PITCH
.078 DIA
97-500
.31
1/2
MOUNTING SURFACE
.58 REF
.0035
.219 MIN
TIP TOUCHES MOUNTING SURFACE
DOUBLE ADHESIVE TRANSFER TAPE
TOUCHES MOUNTING SURFACE
.77 MAX
.062 MIN. GAP
MOUNTING SURFACE
TOUCHES MOUNTING SURFACE
TOUCHES MOUNTING SURFACE
15/32
.04 SLOT
OF FINGER
3/8
3/8 PITCH
.142 DIA
97-538
3/8
17/32
MOUNTING SURFACE
.78 REF
.0043
.250 MIN.
37R
TIP TOUCHES MOUNTING SURFACE
DOUBLE ADHESIVE TRANSFER TAPE
TOUCHES MOUNTING SURFACE
15/16 MAX.
.062 MIN. GAP
MOUNTING SURFACE
TOUCHES MOUNTING SURFACE
TOUCHES MOUNTING SURFACE

*Patented

sticky fingers — a New Concept in Instant RFI/EMI Shielding

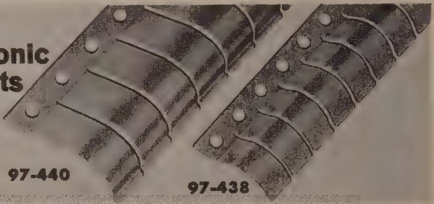
High-performance beryllium copper finger contact strips . . . each with its own self-adhesive backing . . . provide an extremely tight, instant bond. To install, simply peel off the protective paper backing . . . place strip into position . . . and press down firmly. Seals instantly to shield against RFI/EMI interference in all types of metal cabinets and electronic enclosures.

The adhesive strengthens as it cures with age. Moreover, the


97-555
97-560
.015 SLOT
IN FLAT
.165 PITCH
3/16
24 IN. LENGTHS
.34
WHEN COMPRESSED
.07
.003
FREE POSITION
DOUBLE ADHESIVE TRANSFER TAPE
.015 SLOT
IN FLAT
.165 PITCH
3/16
24 IN. LENGTHS
1/2
WHEN COMPRESSED
.07
.003
FREE POSITION
DOUBLE ADHESIVE TRANSFER TAPE

Furnished in 24" lengths

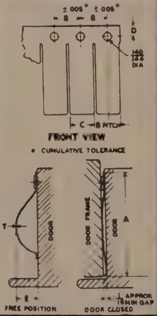
electronic gaskets


97-440
97-438

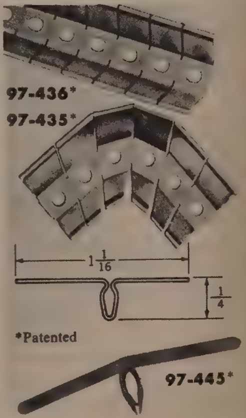
These standard beryllium copper contact strips offer ideal RFI/EMI shielding of doors and movable components in electronic screen rooms, trailers, computers and communication equipment.

They have been scientifically designed for wiping closures, but are also useable in compression. Moreover, these contact strips feature extremely good endurance life as well as a high dynamic range. In tests, attenuation up to 100 dB has been measured at 400 MHz and 10 GHz. Fastening of strip is usually accomplished using screws or rivets. Soldering is optional.

For pricing, please advise catalog number, total footage and surface finish required.


±.005* ±.005*
B B
D
C
B PITCH
FRONT VIEW
* CUMULATIVE TOLERANCE
T
DOOR
DOOR FRAME
DOOR
A
E
FREE POSITION
1/16 APPROX MIN GAP
DOOR CLOSED

CAT. NO.	A	B	C	D	E	T
97 - 438	1 9/32	3/8	.335	5/32	1/4	.005
97 - 440	1.90	1/2	.460	3/16	13/32	.007


97-436*
97-435*
1 1/16
1/4
97-445*

*Patented

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INSTRUMENT SPECIALTIES COMPANY, INC.
276 Bergen Boulevard, Little Falls, N.J. 07424
Phone: 201-256-3500 TWX: 710-988-5732

tions that require high shielding effectiveness despite frequent opening and closing of the cabinet.

Series 97-520 when tested per Military Standard MIL-STD-285 for electromagnetic shielding, showed superior performance under increased compression. It is supplied in standard 16" lengths, and in a variety of surface finishes.

*Patented

Typical Performance Capabilities*

*An independent testing laboratory has indicated the following performance:

Frequency	*Field*	*Shielding Effectiveness (Fully Deflected)* **97-520** at .045" Gap	**97-520** at .090" Gap
14 kHz	**Magnetic**	63dB	38dB
200 kHz		81	57
1 MHz		>92	>92
1 MHz	**Electric**	>126	>126
18 MHz		>120	>120
400 MHz	**Plane Wave**	,118	111
1 GHz		78	100
10 GHz		92	82

Approx. Pressure Required in Pounds/Linear Foot	97-520
Deflected to .090" height	26 lbs./ft.
.060" height	37 lbs./ft.

Standard finishes available

Add proper suffix to catalog number

-A	**-Bright (stock)**	**-G**	**-Gold**
-SnPb	**-Tin Lead**	**-S**	**-Silver**
-CdC	**-Cadmium Plate plus Chromate**		

Other finishes available on special order.

geometry of the strip design, continually compressed, further assists in strengthening the bond. Soldering or mechanical fastenings are completely eliminated. Shielding effectiveness of 97-500 has been proved greater than 46 dB at 14 kHz magnetic and 108 dB at 10 GHz plane wave.

STICKY FINGERS are unaffected in temperature ranges from —65 F. to 225 F. The adhesive meets salt spray, shock and humidity cycle tests, and complies with MIL-D-8634, MIL-N-25076 and MIL-P-19834A.

Furnished in approximately 24" lengths, cut to the center of nearest slot.

Typical Performance Capabilities

Frequency	*Field*	*Shielding Effectiveness* At 1/16" Gap **97-500**	At 1/8" Gap **97-500**
60 Hz	**Magnetic**	12dB	–
400 Hz		14	–
14 kHz		46	38dB
200 kHz		70	63
1 MHz		≥90	≥90
1 MHz	**Electric**	≥120dB	≥120dB
18 MHz		≥145	≥145
400 MHz	**Plane Wave**	117	109
1 GHz		104	100
10 GHz		≥108	100

Approx. Pressure Required in Pounds/Linear Foot

At 1/16" Gap: 36 lb/ft
At 1/8" Gap: 16 lb/ft

sticky fingers

Twist Series

Self-adhesive beryllium copper contact strips with scientific twist design offer narrower-than-ever electronic gaskets for general shielding applications where space is at a premium.

Series 97-555 single edge contact strip measures only ⅜" wide, yet shielding effectiveness is 71 dB at 14 kHz magnetic and 102 dB at 10 GHz plane wave. Ideal for all types of panels or electronic enclosures.

Series 97-560 strips for cabinets with panel-divider bars. Unique double edge design, ½" wide, permits panels to be easily removed and replaced without damage to the installed strip.

Typical Performance Capabilities

Frequency	**Field**	**Shielding Effectiveness (Fully Deflected)** **97-555**	**97-560**
14 kHz	**Magnetic**	**71dB**	**≥75dB**
200 kHz		**96**	**≥97**
1 MHz	**Electric**	**≥120**	**≥120**
18 MHz		**≥120**	**≥120**
400 MHz	**Plane Wave**	**≥115**	**≥115**
1 GHz		**≥106**	**≥106**
10 GHz		**102**	**≥126**

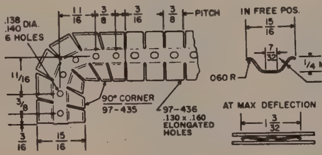
Approx. Pressure Required in Pounds/Linear Foot	**97-555**	**97-560**
Deflected to .030" height	**30 lbs./ft.**	**48 lbs./ft.**
.015" height	**67 lbs./ft.**	**72 lbs./ft.**

Balanced Finger Strips offer 90° corners and quick spring clip fastening.

When contact strips are required for rectangular openings or structural joints, they can be quickly and easily installed in field or factory.

Matching 90° corners provide a perfect fit and spring clips hold the strips firmly in place. (No special tools or soldering required.) Result: More simplified design and construction of cabinets and enclosures.

These strips feature a mechanically balanced design to provide high dynamic range, long endurance life and multiple lines of contact under relatively light pressure. Attenuation of more than 100 dB at 200 kHz, 400 MHz and 10 GHz has been measured for a single, rectangular enclosure using Series 97-436 gaskets.



Spring Clip Fastener

Designed for use with Series 97-436 and Series 97-435 finger strips. Permits full strip compression, yet is easily installed without special tools. Fastener also permits temporary lifting of gaskets for cleaning of contact surfaces.

Advise Catalog number, total footage, and surface finish for pricing.

cat. no.	**max. length***	**finish***
97-436-A	35 ft.	Bright
97-436-S	25 ft.	Silver Plated .0002" ± .0001
97-436-G	25 ft.	Gold Plated .000050" min.

prefabricated 90° corners	**cat. no.**	**finish***
(advise number of corners needed.)	97-435-A 97-435-S 97-435-G	Bright Silver Plated .0002" ± .0001 Gold Plated .000050" min.
spring clip fastener	**cat. no.**	**finish***
packaged in lots of 100, 200, 500, or 1000 (advise total quantity needed.)	97-445-A 97-445-S 97-445-G	Bright Silver Plated .0002" ± .0001 Gold Plated .000050" min.

*Specified lengths and other finishes to order

finger contact strips

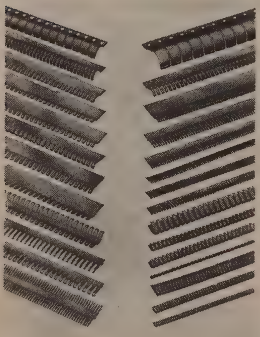
of MICRO-PROCESSED *beryllium copper, alloy 25*

for grounding and shielding in high-frequency equipment . . . for forming large-diameter contact rings

A wide variety of beryllium copper finger contact strips provides engineers and designers with flexibility in the solution of grounding and shielding problems. Various lengths, widths, contours and hole locations are possible for many of the standard catalog items shown here.

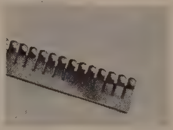
Engineering Design Kit Available

An Engineering Design Kit is available to permit the engineer the utmost latitude in his search for the exact strip configuration to effectively meet his needs. Each assortment contains at least 34 items listed on Pages 10 through 13. Includes data sheet on elastic performance of finger strips.



Order assortment by Number 97-272.

figure A



CONTIPS available

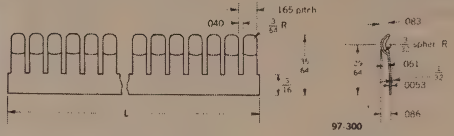
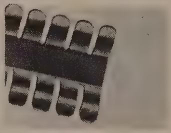

165 pitch
040
3/64 R
L
35/64
3/16
083
3/32 spher R
29/64
061
1/32
0053
086
97-300

figure B



CONTIPS available

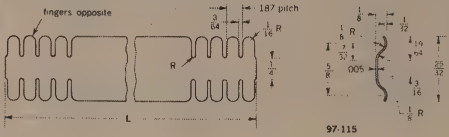
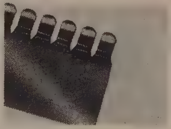

fingers opposite
187 pitch
3/64
1/16 R
R
1/4
L
1/8
1/32
R
5/8
005
19/64
25/32
3/16
1/8 R
97-115

figure C



CONTIPS available on 97-111, 97-112, 97-114 and 97-116 only

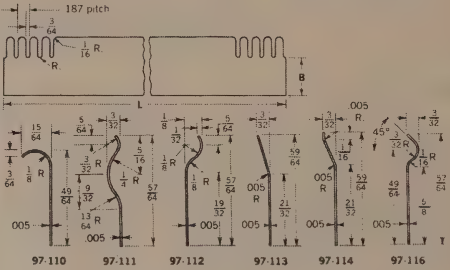
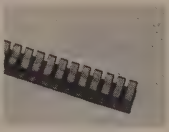

187 pitch
3/64
1/16 R.
R.
B
L
97-110
97-111
97-112
97-113
97-114
97-116

figure D



not available with CONTIPS

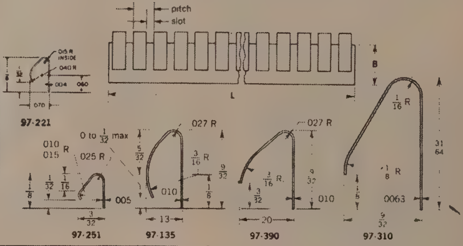
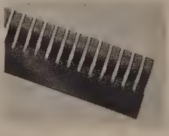
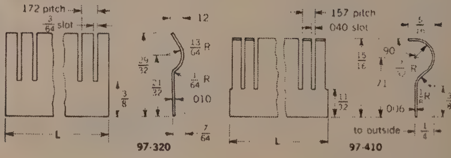

pitch
slot
B
L
97-221
97-251
97-135
97-390
97-310

figure E

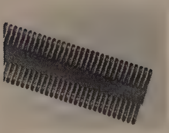


CONTIPS available


172 pitch
3/64 slot
L
12
13/64 R
1/64 R
010
7/64
3/8
97-320
157 pitch
040 slot
90
006
to outside
1/4
97-410

precision springs of beryllium copper

figure F



CONTIPS available

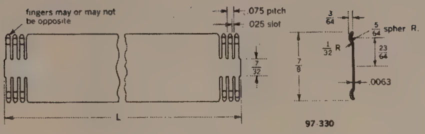
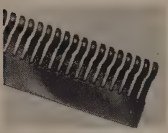

fingers may or may not be opposite
.075 pitch
.025 slot
7/32
L
3/64
5/64 spher. R.
1/32 R
23/64
7/8
.0063
97-330

figure G



CONTIPS available

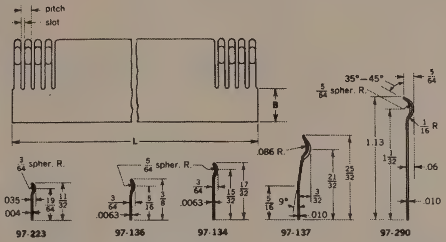
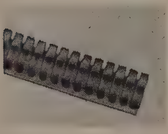

pitch
slot
B
L
3/64 spher. R.
.035
.004
19/64
11/32
97-223
5/64 spher. R.
3/64
.0063
5/16
3/8
97-136
3/64
.0063
15/32
17/32
97-134
.086 R.
5/16
9°
3/32
21/32
25/32
.010
97-137
35°–45°
5/64 spher. R.
5/64
1/16 R
1.13
1 1/32
.06
.010
97-290

figure H



CONTIPS available

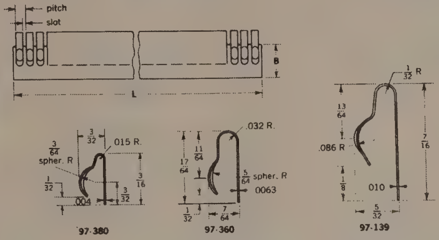
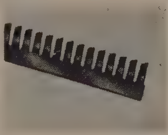

pitch
slot
B
L
3/32
.015 R.
3/64 spher. R
1/32
3/16
.004
3/32
97-380
.032 R.
11/64
17/64
5/64 spher. R
.0063
1/32
7/64
97-360
1/32 R
13/64
.086 R
7/16
1/8
.010
5/32
97-139

figure I



not available with CONTIPS

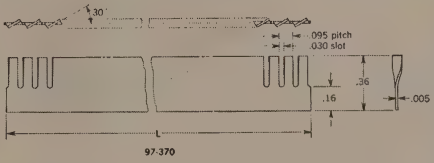
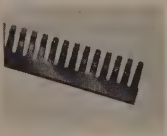
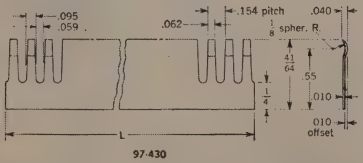

30°
.095 pitch
.030 slot
.36
.16
.005
L
97-370

figure J



CONTIPS available


.095
.059
.062
.154 pitch
.040
1/8 spher. R.
41/64
.55
1/4
.010
.010 offset
L
97-430

dimensions in inches

catalog number	fig-ure	pitch	slot	B	stock length L■	wt. per 1000 in., lb
97-110	C	.187	.047	5/8	16	1.3
97-111	C	.187	.047	5/8	16	1.3
97-112	C	.187	.047	5/8	16	1.3
97-113	C	.187	.047	5/8	16	1.3
97-114	C	.187	.047	5/8	16	1.3
97-115	B	.187	.047		16	1.1
97-116	C	.187	.047	41/64	16	1.3
97-134	G	.075	.025	7/32	16	.9
97-135	D	.134	.040	15/64	16	1.4
97-136	G	.075	.025	1/16	16	.6
97-137	G	.094	.031	5/16	16	2.0
97-139	H	.094	.031	5/16	16	2.0
97-221	D	.060	.020	3/32	12	.3
97-223	G	.060	.020	1/8	16	.35
97-251	D	.127	.050	3/32	12	.3
97-290	G	.075	.025	11/16	16	3.0
97-300	A	.165	.040	3/16	16	.8
97-310	D	.187	.062	3/8	16	1.4
97-320	E	.172	.047	3/8	16	2.4
97-330	F	.075	.025		16	1.3
97-360	H	.075	.025	7/32	16	.9
97-370	I	.095	.030	.16	16	.43
97-380	H	.060	.020	1/8	16	.35
97-390	D	.134	.040	15/64	16	1.4
97-410	E	.157	.040	11/32	16	1.8
97-430	J	.154	.059	1/4	16	1.4

■ **lengths:** Stock lengths supplied unless shorter lengths are specified . . . cut to nearest slot. Specified lengths may have partial fingers removed.

widths: Other widths and special contours available to order.

standard finishes

	add suffix to catalog number
as heat-treated user to apply finish	—H
bright finish for welding, soldering	—A
silver plated .0002 (±.0001) inch thick	—S
gold plated .000050 in. min.	—G

other finishes to specification

CONTIPS

localized deposits of silver or gold (see page 8)

	add suffix to catalog number
SILVER CONTIPS only	—K
SILVER CONTIPS plus silver plating	—KS
GOLD CONTIPS only	—GK
GOLD CONTIPS plus gold plating	—GKG

Write for Free Catalog Today!

INSTRUMENT SPECIALTIES COMPANY, INC.

276 Bergen Boulevard, Little Falls, N.J. 07424
Phone: 201-256-3500 TWX: 710-988-5732

The INTER-TECHNICAL Group, Inc.

UNITED STATES AGENCY OF THE TELCON METALS GROUP OF COMPANIES

P. O. BOX 23
IRVINGTON, N. Y. 10533
TEL: 914-591-8822
TWX: 710-564-0802

HIGH PERMEABILITY FOIL — SURFACE PREPARED FOR CHEMICAL ETCHING

TELCON METALS LTD. is one of the largest manufacturers of nickel-iron and cobalt alloys for magnetic applications. Their fully integrated facilities provide raw materials and fabricated components covering the whole range of commonly used soft magnetic materials.

HIGH PERMEABILITY TOROIDS— are available in all materials listed in the accompanying table in standard tape thickness.

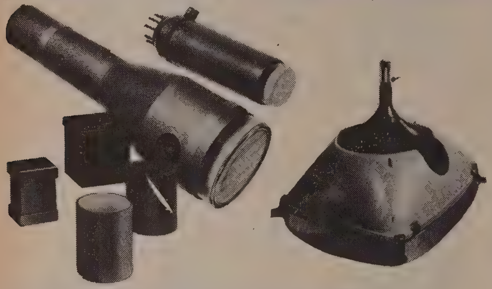
PHOTO-ETCH — high permeability alloys for recording and playback head laminations are available.

SEE OUR AD ON Page 1•2356

TELCON HIGH PERMABILITY SOFT MAGNETIC ALLOYS AND FABRICATED TOROIDS

80% NICKEL	50% NICKEL	OTHER ALLOYS	ULTRATHIN FOIL
Round TELCON 79 TELCON 60 TELCON 100 **Square** ORTHO TELCON 79	**Round** RADIOMETAL 50 SUPER RADIOMETAL HYRHO RADIOMETAL **Square** HCR ALLOY	SATMUMETAL PERMENDUR 49 PERMENDUR 24 SUPERMENDUR VICALLOY RADIOMETAL 36 Magnetic Compensating Alloy REMENDUR	As thin as 0.000125″ in a wide range of materials including many of those listed and others including Beryllium copper.

MAGNETIC SHIELDS UP TO 30″ DIAMETER FOR CATHODE RAY TUBES & TRANSFORMERS by Telcon Metals Ltd.



MELTING, ROLLING, FABRICATING, ANNEALING FROM START TO FINISH IN ONE FACILITY

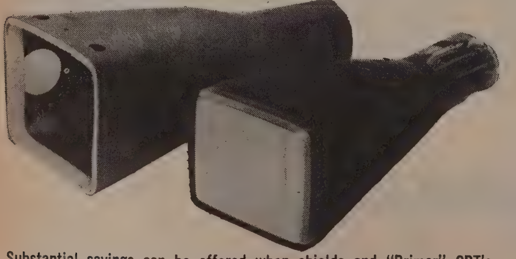
Telcon Metals, Ltd., has its own in-plant facilities to handle every phase of the magnetic shield manufacturing process from start to finish. This means 100% Telcon supervision all the way — from the melting and rolling of the raw material to the fabrication and annealing of the magnetic shield. Telcon's total production method is based on a century of experience in the manufacture of alloys. All these factors are your assurance that you get a sensibly priced, high quality product.

A NEW CONCEPT IN MAGNETIC SHIELD CONSTRUCTION

Specially developed for quantity production of high efficiency complex shields, new TELFORM construction utilizes precision drawn segments to drastically reduce welded seams. The result is extra close fitting shields with improved shielding characteristics. This new technique is applicable for CRT tubes up to approximately 20″ long. No premium charge even though dimensions, finish and appearance are far more uniform throughout batches than conventionally fabricated shields. Rapid delivery after initial tooling. Available in 80%, 50% and 36% nickel-iron alloys.

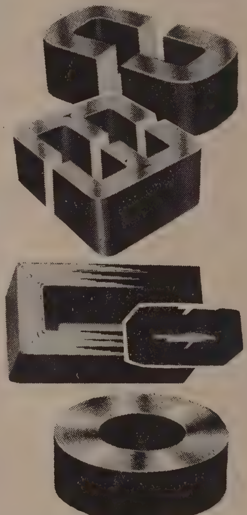
Extremely Competitive Prices on Custom Shields.
Send for Illustrated Catalog and Ask for a Quotation.

OTHER TELCON PRODUCTS
- Thermostatic Bimetals
- High Permeability Strip, Rod & Wire for Component Manufacturing
- Glass to Metal Seal Alloys



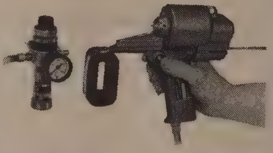
Substantial savings can be offered when shields and "Brimar" CRT's are purchased as assemblies. Also see CRT's described in EEM Page 1•2356

E, C AND TOROIDAL TAPE WOUND CORES BY TELMAG



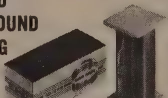
- Grain oriented Silicon Steel Cores.
- Made to EIA Spec. RS217 and trade specifications by our British assosiate TELCON MAGNETIC CORES LTD. . . . one of the largest manufacturers of grain oriented silicon steel components.
- Available in all American standard or special sizes to American core numbers. Popular types available from New York warehouse for immediate delivery.
- Sold at prices that help you solve your constantly rising cost level problem.
- Produced by one of the largest manufacturing facilities in the world.
- Now, also available, LL distributed gap cores for small transformers where temperature and/or gap VA may be problems. Can replace 4 to 6 mil cut cores, 6 mil laminations, and sometimes Ni-Fe laminations.
- Toroidal cores available in 2, 4, 6 and 12/13 mil tape thickness. Cores can be supplied impregnated or edge bonded for improved rigidity. Also available gapped or cut.

"C" CORE COMPRESSED AIR BANDING TOOL by TELMAG



Manufacturing rejects caused by variations in banding of "C" transformer cores can now be eliminated. The new "C" core Compressed Air Banding Tool provides consistent banding stresses in assembly-line operation. By making cores useful which were formerly rejected, the tool soon pays for itself.

TELSHIELD WRAP-AROUND SHIELDING FOIL



Shield components efficiently, simply, from unwanted signals with easy-to-use Telshield. Available in 0.001 in.-0.010 in. thickness tape, in widths of $\frac{3}{32}$ in-6 in. Special handy packs for laboratory and R & D use.

THERMOSTATIC BIMETALS BY TELCON METALS, LTD.

We offer a complete selection of Telcon thermostatic bimetals for various temperature ranges and environments. Their varied mechanical properties, hardnesses, thermal activities, and thermal and electrical conductivities make it easy for the user to select the right one for his particular requirements. Available in thicknesses from .004″ to .125″ and widths as small as $\frac{1}{16}$″ in coils and flat lengths.

Full Coverage

ITT Thermotech Surrounds You with Service And Quality

At ITT Thermotech you can expect complete company involvement with your custom molded plastic job from start to finish. Each department is staffed with individuals who, in total, account for many years of experience in precision plastic molding. These people cover your job completely through estimating, mold design, raw material selection and control, manufacturing, quality control, to on-time delivery.

In addition to its ability to mold high tolerance, intricate parts, ITT Thermotech is capable of offering an Engineering service. And, even though we don't literally serve your order on a silver platter, we place a high degree of emphasis on giving you the excellent service you expect from ITT Thermotech.

Call us for an estimate. And find out what we mean by "full coverage".

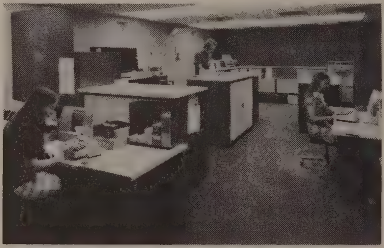
ITT THERMOTECH

1202 South Fifth St., Hopkins, Minnesota 55343, 612-938-7671 • 3200 Tyrone Blvd., St. Petersburg, Florida 33710, 813-347-2191

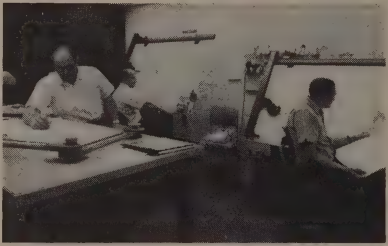
People make the big difference at ITT THERMOTECH

QUALITY CONTROL—Constant attention and adherence to strict quality control assures consistent part characteristics from run to re-run, press to press and within each lot.

MANUFACTURING—Over 200 injection, compression and transfer presses, from one ounce to 25 ounces and as large as 450 tons, offer a wide latitude for short and long runs.



COMPUTER FACILITIES—In-plant computer facilities are used for work order analysis, raw material control and production scheduling to insure fast, on time delivery of orders.



MOLD DESIGN—Skilled mold designers translate customer specifications into mold designs that meet customer's exact part cost, tolerances and quality requirements.

ITT THERMOTECH—The Full Service Molder—For a quarter of a century ITT Thermotech has served the nation's industrial and military markets with high quality custom and stock precision moldings. Employing close to 500 employees, Thermotech offers customers complete molding facilities for thermoplastic, thermoset and fluorocarbons plus secondary operations.

All tool room, manufacturing and inspection facilities have been approved by government agencies.

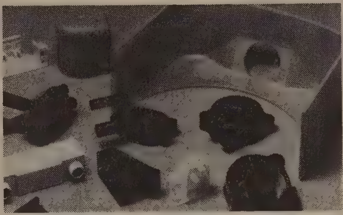
ITT Thermotech now encompasses these former subsidiaries and divisions:

- Booker Wallestad
- Thermotech Plastics
- Florida Division
- Wilcox Products
- Thermotech Coil Forms and Components

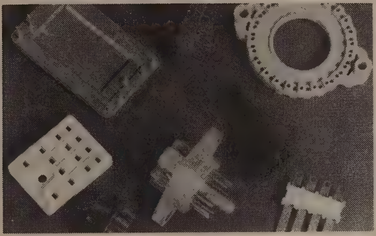
Other secondary services available:

- Silk Screening
- Hot Stamping
- Secondary Finishing
- Heat Sealing
- Sonic Welding
- Mold Maintenance

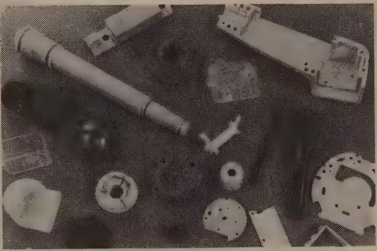
Precision makes the big difference at ITT THERMOTECH



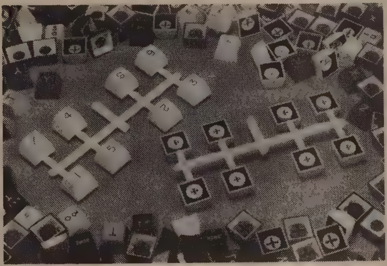
CASES AND HOUSING—Miniature or large cases and housings of thermoset, thermoplastic or fluorocarbons materials with a wide variety of characteristics and configurations are available in both short and long runs.



INSERTS—Highly automated equipment in both primary and secondary operations produce low-cost, precision parts with inserts for electrical/electronic components.

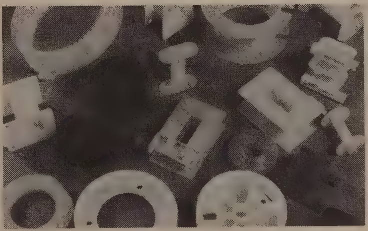


INTRICATE PARTS—Intricate configurations and shapes in a wide variety of plastics are commonplace challenges to design and production personnel.



TWO COLOR KEYTOPS—An extensive library of stock and custom designed legends are available to meet all but the most unusual of alphanumeric and conventional control keytop needs.

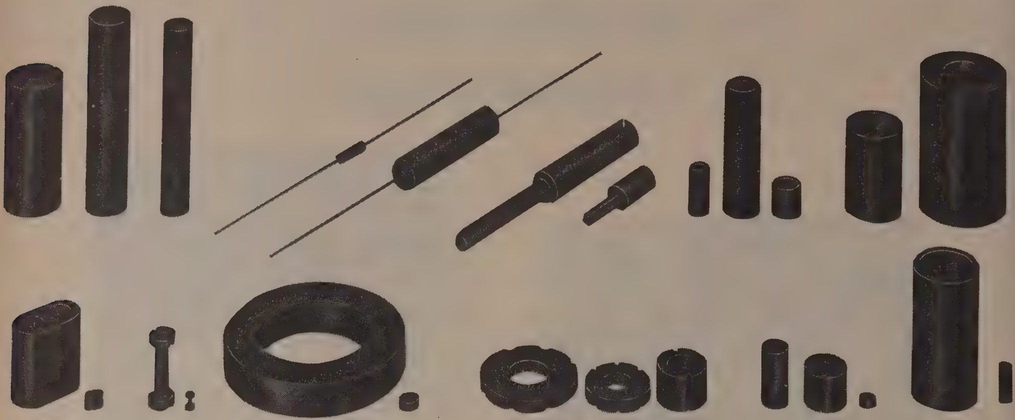
COILS AND BOBBINS—Years of experience bring superior technical know-how to the design and manufacture of simple or intricate shapes and sizes, thin or heavy walled coil forms and bobbins.



ITT THERMOTECH

1202 South Fifth Street / Hopkins, Minnesota 55343 / (612) 938-7671
Florida Division: 3200 Tyrone Blvd.,/St. Petersburg, Fla. 33710/(813) 347-2191

K KRYSTINEL FERRITE CORES



Krystinel Corporation manufactures a complete line of soft ferrite materials. These ferrites are custom made within technological limits to meet desired electrical and mechanical specifications.

Krystinel Corporation maintains a large inventory of ferrites in standard sizes and shapes as detailed in its catalog. In addition, Krystinel will tailor-make ferrites to your electrical and mechanical specifications. Copies of our catalog, as well as samples and information, may be obtained by contacting Krystinel Corporation.

SLUGS: .035 to .500″ diameter by .062 to 2″ long.

COIL FORMS: .055 to .260″ diameter x .187 to 1.250″ long.

INSERT TUNING CORES: .157 to .370″ diameter x .375 to 1.25″ long.

THREADED CORES: .129 to .303″ diameter x .187 to 1.500″. Threads: 6-32, 8-32, 10-32, ¼-28, 5/16-28. Metric: 4 x 0.5, 4.5 x 0.75, 6.3 x 1.0mm.

CUP CORES: .100 to .715″ diameter x .485 to 1.000″ long.

BALUN CORES: Various shapes: binocular, flat, chip, and round with 2 to 6 holes. All in many sizes.

BOBBINS: .060 to .375″ major diameter x .100 to .750″ long.

TOROIDS: .080 to 1.350″ diameter x .025 to .500″ height. (see next page)

WASHERS: .475 to .715″ diameter x .067 to .125″ long.

SHIELD BEADS: .050 to .500″ diameter x .062 to .500″ long. (see next page)

SLEEVES: .098 to .725″ OD x .150 to 1.125″ long.

KRYSTINEL

KRYSTINEL CORPORATION
FOX ISLAND ROAD / PORT CHESTER, NEW YORK 10573
(914) 937-5252 / TWX 710-569-1604

K KRYSTINEL FERRITE CORES

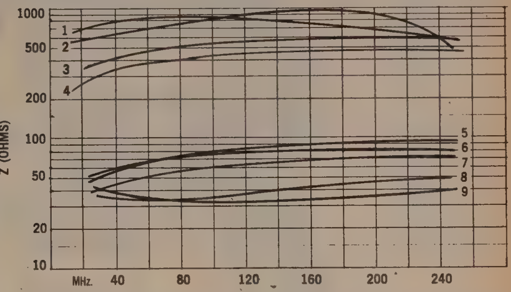
TOROIDAL CORE SELECTION CHART

A = CORE PART NUMBER, B = CORE MATERIAL TYPE, C = INDUCTANCE A_L (mH/1000 turns) ±20%, D = INITIAL PERM. μi (REF.), E = O.D., F = I.D., G = HEIGHT, H = MAGNETIC PATH LENGTH l. (cm), I = EFFECTIVE CORE AREA (cm^2).

A	B	C	D	E	F	G	H	I
L11-2V20-1F	K505	1.4	15	.100	.070	.050	.678	.0048
L10-2V20-1F	K502	4.0	40	.100	.070	.050	.678	.0048
L01-2V20-1F	K401-1	10.0	120	.100	.070	.050	.678	.0048
L31-2V20-1F	K810	62.0	700	.100	.070	.050	.678	.0048
L27-2V20-1F	K915	152.0	1500	.100	.070	.050	.678	.0048
L38-2V20-1F	K940	390.0	4400	.100	.070	.050	.678	.0048
L35-2V20-1F	K960	530.0	6000	.100	.070	.050	.678	.0048
L11-3Y20-1F	K505	2.7	15	.138	.070	.050	.829	.0109
L10-3Y20-1F	K502	7.5	40	.138	.070	.050	.829	.0109
L01-3Y20-1F	K401-1	19.0	120	.138	.070	.050	.829	.0109
L31-3Y20-1F	K810	116.0	700	.138	.070	.050	.829	.0109
L27-3Y20-1F	K915	280.0	1500	.138	.070	.050	.829	.0109
L31-3Y20-1F	K940	730.0	4400	.138	.070	.050	.829	.0109
L35-3Y20-1F	K960	990.0	6000	.138	.070	.050	.829	.0109
L11-4F2H-1F	K505	2.3	15	.155	.087	.050	.965	.0108
L10-4F2H-1F	K502	6.4	40	.155	.087	.050	.965	.0108
L01-4F2H-1F	K401-1	16.0	120	.155	.087	.050	.965	.0108
L31-4F2H-1F	K810	99.0	700	.155	.087	.050	.965	.0108
L27-4F2H-1F	K915	240.0	1500	.155	.087	.050	.965	.0108
L38-4F2H-1F	K940	620.0	4400	.155	.087	.050	.965	.0108
L35-4F2H-1F	K960	854.0	6000	.155	.087	.050	.965	.0108
L11-5F2K-1F	K505	2.9	15	.190	.090	.050	1.116	.0161
L10-5F2K-1F	K502	8.0	40	.190	.090	.050	1.116	.0161
L01-5F2K-1F	K401-1	21.0	120	.190	.090	.050	1.116	.0161
L31-5F2K-1F	K810	127.0	700	.190	.090	.050	1.116	.0161
L27-5F2K-1F	K915	272.0	1500	.190	.090	.050	1.116	.0161
L38-5F2K-1F	K940	798.0	4400	.190	.090	.050	1.116	.0161
L35-5F2K-1F	K960	1088.0	6000	.190	.090	.050	1.116	.0161
L11-6K3F-1Q	K505	3.0	15	.230	.120	.060	1.396	.0213
L10-6K3F-1Q	K502	8.6	40	.230	.120	.060	1.396	.0213
L01-6K3F-1Q	K401-1	22.0	120	.230	.120	.060	1.396	.0213
L31-6K3F-1Q	K810	134.0	700	.230	.120	.060	1.396	.0213
L27-6K3F-1Q	K915	287.0	1500	.230	.120	.060	1.396	.0213
L38-6K3F-1Q	K940	843.0	4400	.230	.120	.060	1.396	.0213
L35-6K3F-1Q	K960	1150.0	6000	.230	.120	.060	1.396	.0213
L11-AQ5C-3K	K505	6.8	15	.375	.187	.125	2.240	.076
L10-AQ5C-3K	K502	19.0	40	.375	.187	.125	2.240	.076
L01-AQ5C-3K	K401-1	46.0	120	.375	.187	.125	2.240	.076
L31-AQ5C-3K	K810	297.0	700	.375	.187	.125	2.240	.076
L27-AQ5C-3K	K915	595.0	1500	.375	.187	.125	2.240	.076
L38-AQ5C-3K	K940	1570.0	4400	.375	.187	.125	2.240	.076

SHIELD BEADS (Partial Listing)

Dimensions (Inches)				Material	K-430	K-405	K-810	K-480	K-925
				Prefix	E49	E03	E31	E41	E46
HT.	O.D.	I.D.	ADD PREFIX HERE	Base No.	A ($\eta h/N^2$) ± 20%				
.050	.138	.051		1F3Y-1G0	70	95	180	218	642
.128	.138	.051		3N3Y-1G0	181	244	460	561	1650
.128	.138	.062		3N3Y-1S0	137	185	350	425	1250
.125	.163	.062		3K4N-1S0	168	226	429	521	1530
.250	.163	.062		754N-1S0	337	453	858	1024	3060
.125	.190	.090		3K5F-2K0	130	175	331	400	1180
.250	.190	.090		755F-2K0	260	351	664	800	2370
.250	.200	.062		755Q-1S0	406	546	1034	1250	3690



1: WC41-B96R-25. 2: WC49-B96R-25. 3: WC41-B96R-15. 4: WC49-B96R-15. 5: E03-755Q-1S0, 1 turn. 6: E41-755Q-1S0, 1 turn. 7: E49-755Q-1S0, 1 turn. 8: E46-755Q-1S0, 1 turn. 9: E31-755Q-1S0, 1 turn.

WOUND CHOKE (6 HOLE BEAD)

Part Number	Dimensions			No. of Turns	No. of Windings	Impedance @ Freq.	
	L	O.D.	Lead			Min.Ω	MHz
WC41-B96R-15	.394	.236	1.562	1½	1	300	120
WC49-B96R-15	.394	.236	1.562	1½	1	400	240
WC41-B96R-25	.394	.236	1.562	2½	1	600	50
WC49-B96R-25	.394	.236	1.562	2½	1	700	180

KRYSTINEL FERRITE MAGNETIC CHARACTERISTICS

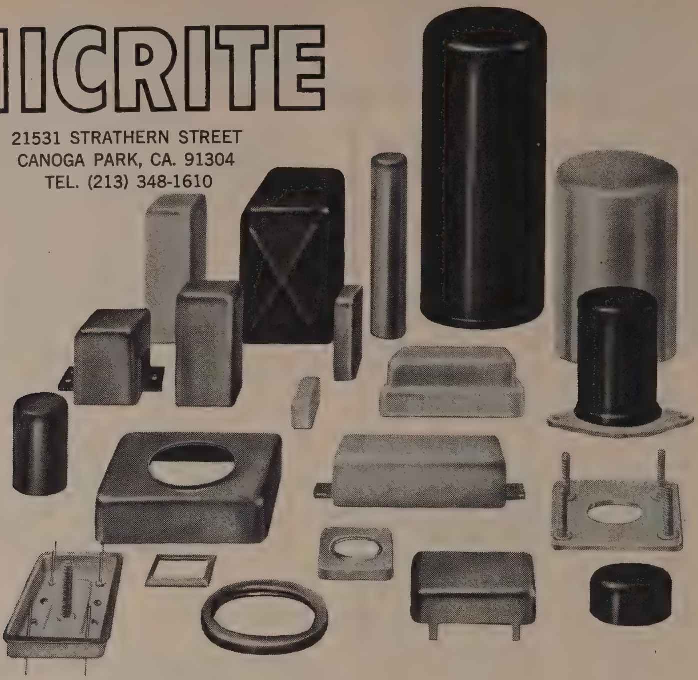
Characteristic	Unit	Symbol	K-505	K-502	K-401-1	K-430	K-405	K-204	K-810	K-480	K-820	K-915	K-925	K-940	K-960
			MATERIAL												
Initial Permeability		μi	15	40	120	275	370	375	700	850	1500	1500	2500	4400	6000
Maximum Permeability		μ Max.	40	100	300	1500	1200	700	1900	2500	2600	2500	4100	6300	7500
Coercive Force	Oersted	Hc	23	5.0	2.5	0.5	0.6	0.8	0.3	0.35	0.3	0.4	0.17	0.11	0.10
Saturation Flux Density	Gauss	Bsat	2200	2000	2800	2100	3100	2700	3200	2800	4200	4750	4500	4000	3900
(@ H Oersted)		(H)	(20)	(20)	(20)	(8)	(15)	(10)	(5)	(4)	(6)	(7)	(4)	(2.5)	(2)
Residual Flux Density	Gauss	Br	1350	700	1600	1200	2100	1100	1200	1400	1600	1750	950	920	750
Curie Temperature	°C	Tc	500	450	400	150	325	200	175	140	180	220	200	150	150
Volume Resistivity	Ohm-Cm	ρ	2x10^4	1x10^6	1x10^7	1x10^8	1x10^8	3x10^3	4x10^1	5x10^6	5x10^1	1x10^2	5x10^2	2x10^1	2x10^1
Temperature Change of Initial Permeability (0°C to 60°C)	%	$\frac{\triangle L\text{x}100}{L @ 25°C}$	±5	±5	±6	±12	±20	±8	±8	±10	±10	±10	±15	±15	±25
Loss Factor X10^{-6}		$\frac{\tan\delta}{\mu i}$	325	60	20	20	30	12.5	27.0	25.0	6.0	4.0	3.0	10.0	9.0
@ Frequency	MHz		100	10	1	.1	.1	.1	.1	.1	.1	.1	.1	.1	.1

KRYSTINEL

KRYSTINEL CORPORATION
FOX ISLAND ROAD / PORT CHESTER, NEW YORK 10573
(914) 937-5252 / TWX 710-569-1604

MICRITE

21531 STRATHERN STREET
CANOGA PARK, CA. 91304
TEL. (213) 348-1610



QUALITY IS OUR MOST IMPORTANT PRODUCT

DEEP DRAWN ENCLOSURES AND RELATED COMPONENTS

GENERAL INFORMATION

QUALITY CONTROL PROGRAM — In order to maintain our consistently high level of quality and precision workmanship, our quality control procedures have been designed to comply with the inspection standards of Military Specification MIL-Q-9858 or at your request, a more rigid sampling plan.

TOLERANCES — Standard tolerances are ±.010 unless otherwise specified.

PLATING/FINISHING — All plating processes with the exception of Hot Tin Dip are available.

HEAT TREATING — Standard heat treating at Micrite is Fast and Slow Cycle Hydrogen Annealing.

TOOLING CAPABILITIES — At Micrite a complete tool and die facility is at your disposal. Our standard line of enclosures is increasing every day. If you have a requirement not listed in our catalog, please feel free to contact us. If it can be made, we can make it for you.

MICRITE REPRESENTATIVES

BURKE SALES
911 Broadway
Kansas City, Missouri 64105
Tel. (816) 842-5511

CENTRAL STATES ASSOCIATES
306 Busse Highway
Parkridge, Illinois 60068
Tel. (312) 692-2101

DORTON ENTERPRISES
363 East Virginia Avenue
Phoenix, Arizona 85011
Tel. (602) 263-0414

JALCO ASSOCIATES
P.O. Box 97
Woburn, Massachusetts 01801
Tel. (617) 227-1515

KING & ASSOCIATES
2966 Scott Boulevard
Santa Clara, California 95050
Tel. (408) 240-1022

STANGENBERG & ASSOCIATES
9531 Slater Avenue No. 5
Fountain Valley, California 92208
Tel. (714) 968-5049

QUALITY IS OUR MOST IMPORTANT PRODUCT
DEEP DRAWN ENCLOSURES AND RELATED COMPONENTS

MC SERIES

MATERIAL THICKNESS CODE / **A** .018 ST .020 AL .020 BR .020 MU / **B** .024 ST .025 AL .025 BR .025 MU / **C** .029 ST .032 AL .032 BR .031 MU

MC Series	A Diam.	B Max. Depth	C Material Code	D Radius	Cover
MC-037	.375	1.500	A	1/32	IS
MC-056	.562	1.875	.012/A	1/16	IS
MC-062	.625	1.625	.012*	1/16	IS
MC-065	.656	3.250	.010/B	1/16	IS
MC-075	.750	2.750	.010/A	1/16	IS
MC-081	.812	1.500	A	1/16	IS
MC-084	.844	1.750	A	5/64	IS
MC-087	.875	1.875	A	1/16	IS
MC-093	.930	1.625	A	1/16	IS
MC-095	.950	1.625	A	1/16	IS
MC-097	.975	1.750	B	5/64	IS
MC-098	.985	1.625	B	5/64	IS
MC-100	1.000	1.625	A	5/64	IS
MC-100A	1.000	2.625	.012*	1/16	IS
MC-104	1.047	1.625	A	5/64	IS
MC-106	1.062	2.625	A	1/16	IS
MC-110	1.100	1.625	A	5/64	IS
MC-112	1.125	1.625	A	5/64	IS
MC-117	1.172	1.875	A	3/32	IS
MC-118	1.188	2.250	A	5/64	IS
MC-125	1.250	2.250	A	1/8	IS
MC-125A	1.250	3.000	C	3/32	IS
MC-130	1.297	1.750	A	3/32	IS
MC-131	1.312	3.000	A	1/16	IS

MC Series	A Diam.	B Max. Depth	C Material Code	D Radius	Cover
MC-132	1.320	2.000	A	3/32	IS
MC-137	1.375	2.000	A	3/32	IS
MC-140	1.406	1.500	.040*	3/32	IS
MC-143	1.438	2.500	B	3/32	IS
MC-145	1.453	1.875	A	3/32	IS
MC-146	1.469	2.500	B	3/32	IS
MC-150	1.500	2.500	B	3/32	IS
MC-156	1.562	2.500	A	5/64	IS
MC-160	1.600	2.750	B	3/32	IS
MC-162	1.625	2.750	B	3/32	IS
MC-168	1.687	2.500	C	1/8	IS
MC-170	1.700	2.500	B	1/8	IS
MC-171	1.715	1.295	.040*	3/32	IS
MC-175	1.750	2.750	B	3/32	IS
MC-182	1.820	3.250	B	3/32	IS
MC-200	2.000	3.500	B	3/32	IS
MC-206	2.062	3.500	B	3/32	IS
MC-211	2.109	2.125	B	3/32	IS
MC-212	2.125	3.000	A/B	1/8	IS
MC-215	2.155	2.062	B	1/8	IS
MC-220	2.203	2.125	B	1/16	IS
MC-237	2.375	2.750	B	1/8	IS
MC-295	2.950	3.125	C	5/32	IS

* Special Gauge

MR SERIES

MATERIAL THICKNESS CODE / **A** .018 ST .020 AL .020 BR .020 MU / **B** .024 ST .025 AL .025 BR .025 MU / **C** .029 ST .032 AL .032 BR .031 MU

MR Series	A Width	B Length	C Max. Depth	D Material Code	E Radius	Cover
MR-019-080	.19	.80	.750	.010*	.030	
MR-020-040	.203	.400	.520	.010*	.030	
MR-022-136	.218	1.359	.500	.013*	3/64	
MR-022-151	.218	1.515	.750	.010*	1/32	
MR-031-100	.312	1.000	.310	A	1/16	
MR-037-077	.375	.765	.379	.010*	.020	
MR-039-079	.390	.796	.400	.010*	1/32	
MR-040-080	.390	.790	.430	.010*	.030	
MR-045-082	.450	.820	1.250	A	3/32	IS
MR-047-073	.468	.734	.750	.010*	3/64	IS
MR-050-100	.500	1.000	1.375	A	3/64	IS
MR-050-100A	.500	1.000	1.000	A	1/32	IS
MR-050-103	.500	1.031	1.625	A	3/64	IS
MR-050-106	.500	1.062	1.300	A	3/64	IS
MR-051-101	.516	1.016	.880	A	3/64	IS
MR-051-157	.516	1.578	.477	.010*	1/16	IS
MR-053-157	.531	1.578	.500	.012*	1/16	IS
MR-055-125	.546	1.246	1.110	A	3/64	IS
MR-056-068	.562	.688	.250	A	5/64	IS
MR-059-098	.594	.984	1.125	A	3/16	IS
MR-059-100	.594	1.000	1.125	A	1/8	IS
MR-059-148	.593	1.484	.875	A	3/32	IS
MR-061-099	.614	.989	1.010	A	3/64	IS
MR-061-114	.614	1.146	1.350	A	3/64	IS
MR-062-308	.625	3.078	.500	A	3/32	IS
MR-068-126	.688	1.266	.500	A	3/32	IS
MR-071-150	.719	1.500	.475	A	3/64	IS
MR-074-131	.734	1.312	.160	C*	1/16	
MR-075-093	.750	.938	1.750	A	3/32	IS
MR-075-150	.750	1.500	.625	A	1/32	IS
MR-075-160	.750	1.594	1.375	B	1/16	IS
MR-075-218	.750	2.188	.780	A	3/32	IS
MR-075-269	.755	2.692	.580	A	3/64	IS
MR-076-089	.766	.891	.625	A	1/16	IS
MR-077-203	.766	2.031	.500	A	5/64	IS
MR-078-109	.781	1.094	2.125	A	3/32	IS
MR-078-156	.781	1.562	.656	A	5/64	IS
MR-079-175	.797	1.750	1.250	0.15*	5/64	IS
MR-080-237	.797	2.375	.560	A	3/32	IS
MR-082-093	.817	.927	1.110	A	3/64	IS
MR-084-103	.844	1.031	.600	C	1/8	IS
MR-085-100	.844	1.000	1.500	A	1/16	IS

MR Series	A Width	B Length	C Max. Depth	D Material Code	E Radius	Cover
MR-085-159	.844	1.594	1.500	B	5/64	IS
MR-086-149	.859	1.484	.750	A	3/32	IS
MR-087-106	.875	1.062	2.000	A	11/64	IS
MR-088-128	.875	1.281	1.625	A	7/64	IS
MR-088-280	.875	2.800	.875	A	7/64	IS
MR-094-112	.938	1.125	1.000	A/B	5/32	IS
MR-094-118	.938	1.188	2.000	B	5/32	IS
MR-094-143	.938	1.438	2.250	A	3/32	IS
MR-094-194	.938	1.938	1.375	B	5/64	IS
MR-095-132	.953	1.328	2.250	A	5/64	IS
MR-095-135	.953	1.359	2.250	B	7/64	IS
MR-097-106	.969	1.062	2.000	A	1/16	IS
MR-097-123	.969	1.234	2.812	B	9/64	IS
MR-098-107	.984	1.078	2.500	A	3/64	IS
MR-098-236	.984	2.359	.750	A	3/32	IS
MR-098-278	.984	2.781	.700	B	5/32	IS
MR-099-109	.984	1.094	1.625	A	3/32	IS
MR-099-123	.984	1.234	2.812	B	1/16	IS
MR-099-124	.984	1.234	.463	A	1/32	IS
MR-099-140	.984	1.406	1.000	A	1/32	IS
MR-099-164	.984	1.641	.600	A	1/32	IS
MR-100-150	1.000	1.500	.937	A	1/8	IS
MR-100-159	1.000	1.594	.475	A	1/16	IS
MR-100-161	1.000	1.609	2.625	B	1/8	IS
MR-100-205	1.000	2.050	.703	A	3/32	IS
MR-100-206	1.000	2.062	.705	A	3/32	IS
MR-100-238	1.000	2.375	.937	A	1/8	IS
MR-103-109	1.031	1.094	.413	A	1/8	IS
MR-103-118	1.031	1.188	.812	B	1/8	IS
MR-104-141	1.047	1.406	.745	C	1/8	IS
MR-105-137	1.047	1.375	2.250	B	1/8	IS
MR-105-147	1.047	1.469	1.000	A	3/64	IS
MR-105-177	1.047	1.775	1.250	A	1/16	IS
MR-105-305	1.052	3.052	.580	A	3/64	IS
MR-106-125	1.062	1.250	2.500	A	11/64	IS
MR-106-157	1.062	1.578	.500	.012*	1/16	
MR-109-143	1.094	1.438	2.250	A	7/64	IS
MR-110-123	1.109	1.234	.445	A	1/16	IS
MR-118-144	1.188	1.438	1.106	A	1/8	IS
MR-118-168	1.188	1.688	2.500	B	3/32	IS
MR-125-150	1.250	1.500	2.500	A	7/32	IS
MR-125-175	1.250	1.750	1.350	A	3/64	IS

* Special Gauge

MICRITE

21531 STRATHERN STREET / CANOGA PARK, CA. 91304 / TEL. (213) 348-1610

MR SERIES

MATERIAL THICKNESS CODE / A .018 ST .020 AL .020 BR .020 MU / B .024 ST .025 AL .025 BR .025 MU / C .029 ST .032 AL .032 BR .031 MU

MR Series	A Width	B Length	B Max. Depth	D Material Code	E Radius	Cover
MR-125-194	1.250	1.953	1.000	B	5/64	IS
MR-125-318	1.250	3.188	.575	A	1/16	IS
MR-126-237	1.266	2.375	.610	A	1/16	IS
MR-135-156	1.350	1.560	2.750	B	7/64	IS/OUT
MR-135-156A	1.350	1.560	2.000	B	½	IS/OUT
MR-139-150	1.391	1.500	2.000	A	⅛	IS
MR-143-167	1.438	1.672	1.250	A	1/16	IS
MR-143-175	1.438	1.750	3.000	A	9/32	IS
MR-148-211	1.438	2.109	.510	B	3/32	IS
MR-150-200	1.500	2.000	1.000	B	1/16	IS
MR-150-250	1.500	2.500	.940	.040	⅛	IS
MR-150-367	1.500	3.672	1.450	B	3/16	IS
MR-156-187	1.562	1.875	1.187	C	3/16	IS
MR-159-184	1.594	1.844	1.187	A	⅛	IS
MR-161-354	1.609	3.547	.680	B	5/64	IS
MR-162-175	1.625	1.750	1.125	A	⅛	IS
MR-162-201	1.625	2.016	2.875	A	.350	IS

MR Series	A Width	B Length	B Max. Depth	D Material Code	E Radius	Cover
MR-175-200	1.750	2.000	2.500	B	¼	IS/OUT
MR-175-375	1.750	3.750	2.500	B	⅛	IS
MR-178-586	1.781	5.859	3.700	C	⅛	IS
MR-179-787	1.797	7.875	1.093	C	1/16	IS
MR-184-200	1.844	2.000	2.875	A	⅛	IS
MR-187-690	1.875	6.906	1.250	C	3/16	IS
MR-187-699	1.875	6.984	1.250	C	¼	IS
MR-195-460	1.953	4.609	.520	.040	1/32	IS
MR-200-350	2.000	3.500	1.500	.050*	⅛	IS/OUT
MR-204-360	2.047	3.609	1.000	B	⅛	IS
MR-210-243	2.109	2.438	3.000	B	⅛	IS
MR-218-250	2.188	2.500	.812	C	3/32	IS
MR-250-397	2.500	3.969	1.125	B	⅛	IS
MR-253-413	2.531	4.125	1.000	B	⅛	IS
MR-258-418	2.578	4.188	1.000	B	⅛	IS
MR-312-338	3.125	3.375	1.000	B	⅛	IS
MR-393-462	3.938	4.625	.562	B	⅛	IS

*Special Gauge

MS SERIES

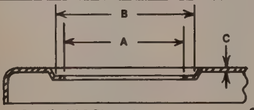
MATERIAL THICKNESS CODE / A .018 ST .020 AL .020 BR .020 MU / B .024 ST .025 AL .025 BR .025 MU / C .029 ST .032 AL .032 BR .031 MU

MS Series	A Square Dimen.	B Max. Depth	C Material Code	D Radius	Cover
MS-053	.531	1.000	A	1/32	IS
MS-073	.734	1.125	A	3/32	IS
MS-075	.750	1.125	A	3/64	IS
MS-079	.797	1.250	A	3/64	IS
MS-087	.875	2.125	A	3/32	IS
MS-095	.953	1.750	A	5/64	IS
MS-096	.968	1.750	A	3/32	IS
MS-100	1.000	2.125	A	3/32	IS
MS-100A	1.000	2.500	A	1/16	IS
MS-100B	1.000	1.250	A	3/64	IS
MS-103	1.031	.500	A	3/64	IS
MS-118	1.188	2.250	A	9/64	IS

MS Series	A Square Dimen.	B Max. Depth	C Material Code	D Radius	Cover
MS-121	1.219	1.500	A	13/32	IS
MS-125	1.216	1.350	A	3/64	IS
MS-126	1.266	.938	A	⅛	IS
MS-128	1.281	2.125	A	⅛	IS
MS-131	1.312	3.000	A	⅛	IS
MS-143	1.438	2.750	B	7/64	IS
MS-143A	1.438	2.000	A	9/64	IS
MS-150	1.500	2.750	B	⅛	IS
MS-160	1.600	2.438	B	⅛	IS
MS-175	1.750	3.000	B	⅛	IS
MS-200	2.000	1.125	B	⅛	IS
MS-301	3.016	.750	B	3/32	IS

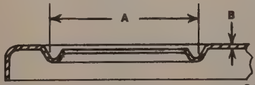
STANDARD MODIFICATIONS

TERMINAL KNOCKOUTS



Specify All 3 Dimensions

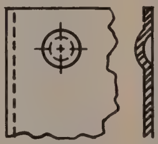
Style 1



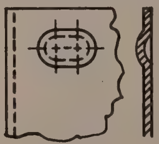
Specify A and B Dimensions

Style 2

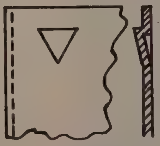
COVER STOPS



Style 1

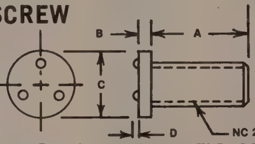


Style 2



Style 3

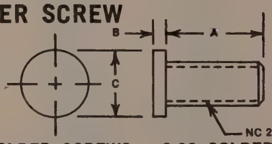
WELD SCREW



4-40 WELD SCREWS
A Dim. = .25, .31 & .38
B Dim. = .03
C Dim. = .22
D Dim. = .010

6-32 WELD SCREWS
A Dim. = .25, .31, .38 & .50
B Dim. = .03
C Dim. = .25
D Dim. = .010

SOLDER SCREW



4-40 SOLDER SCREWS
A Dim. = .25, .31 & .38
B Dim. = .030
C Dim. = .22

6-32 SOLDER SCREWS
A Dim. = .25, .31, .38 & .50
B Dim. = .03
C Dim. = .25

MICRITE

21531 STRATHERN STREET / CANOGA PARK, CA. 91304 / TEL. (213) 348-1610

HOW TO ORDER

ORDERING ENCLOSURES

In order to assure that you receive the correct part and to avoid delay in deliveries caused by misunderstanding, the steps outlined below should be followed when placing an order for Micrite parts:

1. Specify the correct Series Number for the part you want to order. The Series Number is the number in the first column on each catalog page describing Micrite Enclosure Series.
2. To the Series Number add the number representing Maximum Depth of the part. Maximum Depth is found in column 3 for MS and MC Series parts and in column 4 for MR Series parts.
   Note: All parts listed are of maximum depth. With your exact specification, Micrite will machine trim them to the desired depth.
3. Finally, at the end of the part number obtained thus far, specify the type of material from which the part is to be manufactured by adding a material code as follows:

   ST — Cold Rolled Steel
   AL — Aluminum
   BR — Brass
   MU — Mu-Metal

   The thickness at which a part may be made from each of these materials may be determined by consulting the Material Code chart at the top of each page.

Note: Most parts listed in this catalog also may be manufactured from Nickel Silver, Cupro Nickel, Copper and Stainless Steel. However, actual use is dependent upon the part requested. For additional information please contact Micrite directly or your nearest Micrite Representative.

4. When you have completed a Micrite Part Number, the number should appear as follows:

MC-075-1000 ST	Micrite Circular—.750" dia. x 1.000" depth of Cold Rolled Steel
MS-162-1750 BR	Micrite Square—1.625" sq. x 1.750" depth of Brass
MR-210-243-0875 AL	Micrite Rectangular—2.109" wide x 2.438" long x .875" depth of Aluminum

ORDERING MATING COVERS

To order a mating cover for use with any enclosure listed in this catalog use the following procedure:

1. Specify the Series Number of the corresponding part (from column 1 in the listing).
2. To the Series Number add the code **IS** (for Inside Cover) or **OS** (for Outside Cover) as required.

CUSTOM MODIFICATIONS & SERVICES

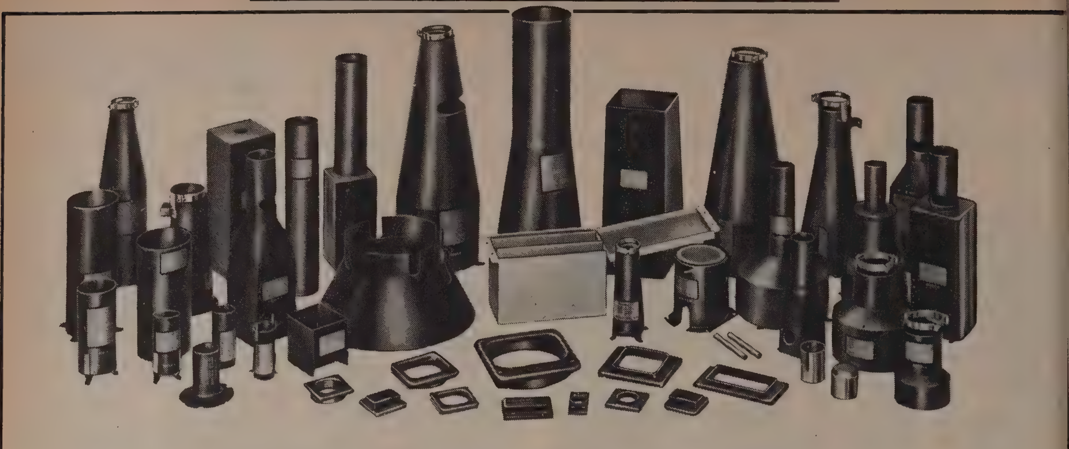
In addition to its line of standard configurations, Micrite also offers its customers the capability for providing certain custom services and modifications to standard parts. Among those services and modifications available are the following:

Holes . . . all forms of pierced holes, including potting, extruded, evacuation, keyhole, diamond, square, oval, rectangular and plain hole.

Sealing Discs
Engraved Stamping
Tabs
Flanges
Brackets
Soft Soldering
Spotwelding (resistant welding)

Silver Soldering
Brazing
Terminals
Inserts
Ground Pins
Nuts, etc.

For further information and/or engineering assistance relating to your specific modification requirements, please contact your nearest Micrite Representative or the Main Plant.



Standard Shields for FAIRCHILD/DUMONT, RCA, AMPEREX AND PHILIPS TUBES Available From Stock

MAGNETIC SHIELDS FOR MULTIPLIER PHOTOTUBES

The James Millen Manufacturing Company of Malden, Mass., with over 35 years of experience, presents magnetic shields designed to meet today's requirements covering storage tubes, multiplier tubes, and cathode ray tubes as well as many special applications requiring magnetic shielding. The shields that are listed below we try to keep in stock. More than 50% of our shield production is either modified or completely special. These shields are manufactured of high permeability material having a permeability of 80,000 or higher with a field of 40 gauss in the shield. We therefore can list a guaranteed field reduction on all of our shields.

TUBE TYPES				Millen Shield	Face Diameter Inside Inches	Neck Inside Diameter Inches	Length Inches	Tube Base Clamp	Side Opening Inches	Minimum D.C. Field Reduction in Gun Area	
RCA	Philips	Dumont	Other							2.5 Gauss	1.0 Gauss
	—	6467	—	80801-A	1 3/8	1 3/8	2 3/4	None	None	690	655
1P21 1P22 1P28	—	—	—	80801-B	1.5	1.5	3 5/8	None	1/2x1 1/8	330	312
931-A	—	—	—	80801-B	1.5	1.5	3 5/8	None	1/2x1 1/8	330	312
7360	—	—	—	80801-D-3	1 1/16	1 1/16	2 3/8	Bayonet	None	1030	950
—	52AVP	—	—	80801-F	1 1/8	1 1/8	4 7/8	None	None	1050	1010
6328	—	—	—	80801-G	1 7/16	1 7/16	2 11/16	None	3/8x1 1/8	250	200
6472	—	—	—	80801-H	1 5/16	1 5/16	2 1/4	None	3/8x1 1/8	275	220
7043	—	—	—	80801-J	1 13/32	1 13/32	2 3/4	None	5/8x1	275	220
7117	—	—	—	80801-K	1 1/2	1 1/2	2 11/16	None	1/2x1 1/8	200	175
7200	—	—	—	80801-L	1 7/16	1 7/16	5 1/8	None	1/2x1 1/8	960	910
7764	152AVP	7860	—	80801-M	3/4	3/4	2 1/8	None	None	1050	1000
7767 8644 8645	—	—	—	80801-N	.800	.800	3.25	None	None	1030	950
4460 4516	—	—	—	80801-P	.800	.800	3.00	None	None	1030	950
4515	—	—	—	80801-Q	1.26	1.26	5	None	None	750	700
2020 4463 5819	—	6292	—	80802-B	2 1/4	2 1/4	4	Spring Clips	None	715	680
6217 6342-A	—	—	—	80802-B	2 1/4	2 1/4	4	Spring Clips	None	715	680
6655-A 6914 or	—	—	—	80802-B	2 1/4	2 1/4	4	Spring Clips	None	715	680
6914A	—	—	—	80802-B	2 1/4	2 1/4	4	Spring Clips	None	715	680
4438 4439	150AVP or UP	—	—	80802-C	1 11/16	1 11/16	3 5/8	Spring Clips	None	850	810
4440 4517 6199	150CUP 50AVP	—	—	80802-C	1 11/16	1 11/16	3 5/8	Spring Clips	None	850	810
7102 7151	—	6291	—	80802-C	1 11/16	1 11/16	3 5/8	Spring Clips	None	850	810
6810-A 6903 7264	—	—	EMI 9558	80802-E	2 5/16	2 5/16	5 7/16	Spring Clips	None	850	810
7265 7850	—	—	CBS 7817	80802-E	2 5/16	2 5/16	5 7/16	Spring Clips	None	850	810
6372	—	—	—	80802-F	3 9/16	3 9/16	7 1/2	None	3x4 1/4	365	350
—	51UVP	—	—	80802-H	1 3/4	1 3/4	3 7/16	Spring Clips	None	850	810
—	51AVP	—	—	80802-H	1 3/4	1 3/4	3 7/16	Spring Clips	None	850	810
	—	—	Raytheon 1414	80802-86	2 1/4	2 1/4	10	None	1 1/4 Dia.	650	620
4523	53AVP & UVP	—	XP1010	80802-J	2 5/16	2 5/16	3 5/8	Spring Clips	None	650	620
—	153AVP	—	—	80802-J	2 5/16	2 5/16	3 5/8	Spring Clips	None	650	620
8053 4459 7746	55AVP	—	—	80802-K	2 5/16	2 5/16	4 9/16	Spring Clips	None	850	810
—	56AVP & UVP	—	—	80802-L	2 5/16	2 5/16	4 5/16	Spring Clips	None	850	810
4526 7038 7029	—	—	—	80802-M	1 5/8	1 5/8	2 1/4	None	None	850	810
7326 8575	—	—	—	80802-N	2 5/16	2 5/16	4 7/16	Spring Clips	None	850	810
4441 4441-A 4461	—	—	—	80802-P	1 11/16	1 11/16	2 5/8	Spring Clips	None	850	810
4464 4525 8054	—	1197 6363	EMI 9578 CBS	80803-J	3 19/32	2 1/2	4 7/8	2.25" Dia.	None	610	580
	—	—	XP1030 7818	80803-J	3 19/32	2 1/2	4 7/8	2.25" Dia.	None	510	580
6499	—	—	—	80803-L	3 7/16	3 7/16	12 1/4	Socket	Contact	700	665
—	58AVP	—	—	80805-210	5 3/8	5 3/8	8 3/4	None	None	1050	1010
6866	—	—		80805-N	5 1/2	3 1/4	14	None	2-1 1/4" Dia.	610	580
4465 8055 4525	—	6364	CBS 7819	80805-M	5 15/32	2 19/32	6 1/8	2.25" Dia.	None	550	510
8053 8054	—	—	—	80805-M	5 15/32	2 19/32	6 1/8	2.25" Dia.	None	550	520
7046	—	—	—	80805-P	6 1/2	3 1/2	9 3/4	None	Hole for Leads	550	520
7315 C73783	—	—	—	80805-R	5 1/2	2 3/8	11 3/16	2.25	4-1 Dia.	620	590
—	54AVP	—	—	80805-S	5 39/64	2 5/16	7 7/16	2.25	None	850	810
4522	—	—	—	80805-Y	6 1/8	6 1/8	11	None	1 1/2 Dia.	850	810

JAMES MILLEN MANUFACTURING COMPANY, INC.
Main Office and Factory
150 EXCHANGE ST., MALDEN, MASS. 02148. U.S.A.
TEL. (617) 324-4108

Experience in design and application
WE MAKE SHIELDS TO YOUR SPECIFICATIONS

MILLEN MAGNETIC SHIELDS FOR CATHODE RAY TUBES

TUBE TYPES	MILLEN SHIELD	FACE DIAMETER INSIDE INCHES	NECK INSIDE DIAMETER INCHES	LENGTH INCHES	TUBE BASE CLAMP	ANODE HOLE	CONTACT CUTOUT	MINIMUM D.C. FIELD REDUCTION IN GUN AREA		USE WITH MILLEN BEZEL #	SHIELD BEZEL ASSEMBLY	FIG. NO.
								2.5 Gauss	1.0 Gauss			
1CP-	80801-A	1.38	1.38	2.75	NONE	0	0	335	290	80071	80091-A	1
1DP-	80801-R	.89	.89	2.50	NONE	0	0	335	290	80071-R	80091-R	
1EP-	80801-C	1.34	1.48	3.25	NONE	0	0	415	340	80071-B	80091-C	2
2AP-	80802-D	2.19	1.56	5.25	1.37	0	0	425	400	80072	80092-D	3
2AP-	80042-A	2.19	1.56	5.25	1.37	0	0	110	100	80072	NONE	3
2BP-	80802-A	2.19	1.56	5.25	1.47	0	0	425	400	80072-B	80092-A	3
2BP-	80042	2.19	1.56	5.25	1.47	0	0	110	100	80072-B	NONE	3
3AP-	80803-B	3.45	2.00	9.44	1.64	0	0	500	450	80073	80093-B	4
3AP-	80053	3.45	2.00	9.44	1.64	0	0	100	90	80073	NONE	4
3ABP-	80803-K	3.45	3.45	8.75	NONE	2	0	405	375	80073-C	80093-K-1	5
3ACP-	80803-E	3.45	2.37	7.94	2.25	1	0	500	450	80073-C	80093-E-1	6
3ADP-	80803-H	3.45	2.50	8.44	1.50	1	1	425	400	80073-C	80093-H	7
3AHP-	80803-MB	3.06x1.62	1.69	8.00	NONE	0	0	425	400	80173-B	80093-MB	8
3AQP-	80803-D	3.45	1.75	7.62	1.50	0	0	425	400	80073	80093-D	4
3ASP-	80803-MA	3.06x1.62	1.69	7.50	NONE	1	0	550	500	80173-B	80093-MA	8
3AYP-	80803-M	3.06x1.62	1.69	7.50	NONE	0	0	550	500	80173-B	80093-M	8
3BP-	80803-C	3.45	2.37	7.94	2.25	0	0	425	400	80073-C	80093-C-1	6
3BP-	80043	3.45	2.37	7.94	2.25	0	0	100	90	80073	NONE	6
3BP-	80067	3.25	2.50	7.25	2.25	1	0	525	480	Shield & Bezel	NONE	9
3BCP-	80803-LA	3.44	3.44	14.50	NONE	2	0	550	500	80073-C	NONE	
3BDP-	80803-M	3.06x1.62	1.69	7.50	NONE	0	0	550	500	80173-B	80093-M-2	8
3BGP-	80803-MA	3.06x1.62	1.69	7.50	NONE	1	0	550	500	80173-B	80093-MA-2	8
3BFP-	80803-R	3.45	1.25	12.13	1.50	1	0	500	435	80073-C	80093-R-1	14
3DP	80067	3.25	2.50	7.25	2.25	1	0	525	480	Shield & Bezel	NONE	9
3DP-	80803-C	3.45	2.37	7.94	2.25	0	0	425	400	80073	80093-C	6
3FP	80803-E	3.45	2.37	7.94	2.25	1	0	500	450	80073	80093-E	6
3GP-	80803-A	3.45	2.00	9.44	1.69	0	0	500	450	80073	80093-A	4
3JP	80803-E	3.45	2.37	7.94	2.25	1	0	500	450	80073-C	80093-E-1	6
3KP-	80803-B	3.45	2.00	9.44	1.64	0	0	500	450	80073	80093-B	4
3MP-	80803-F	3.45	1.75	6.44	1.50	0	0	425	400	80073	80093-F	8
3RP-	80803-D	3.45	1.75	7.62	1.50	0	0	425	400	80073	80093-D	4
3SP-	80803-M	3.06x1.62	1.69	7.50	NONE	0	0	550	500	80173-B	NONE	8
3WP-	80803-G	3.45	1.75	9.44	1.50	0	0	550	500	80073-C	80093-G-1	4
3XP-	80803-M	3.06x1.62	1.69	7.50	NONE	0	0	550	500	80173-B	80093-M	8
3YP-	80803-MC	3.06x1.62	1.69	5.75	NONE	0	0	550	500	80173-B	80093-MC	8
S.C. 3042	80805-A	6.12	1.87	15.50	1.69	0	0	550	500	80075-M	80095-A-2	10
S.C. 3093	80805-K	6.12	2.50	15.75	2.25	0	1	425	400	80075-C	80095-K	7
S.C. 3377	80803-S	3.6x3.6	2.00	12.13	NONE	1	1	550	500	80174-A	NONE	11
S.C. 3511	80803-S	3.6x3.6	2.00	12.13	NONE	1	1	550	500	80174-A	NONE	11
S.C. 3561	80805-U	4.37x6.37	4.37	18.25	NONE	1	0	550	500	NONE	NONE	12
S.C. 4348	80803-MA	3.06x1.62	1.69	7.50	NONE	1	0	550	500	80173-B	NONE	8

Fig. 1

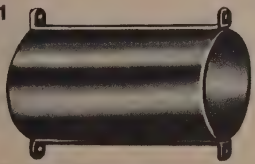


Fig. 2

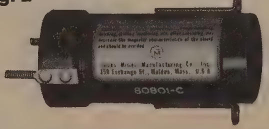


Fig. 3

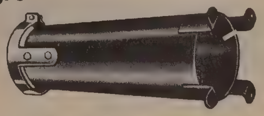


Fig. 4

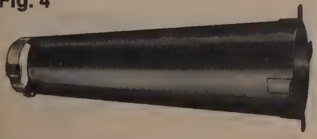


Fig. 5

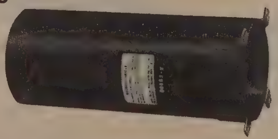
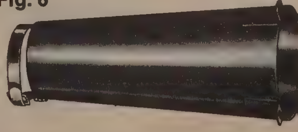


Fig. 6



MILLEN MAGNETIC SHIELDS FOR CATHODE RAY TUBES

TUBE TYPES	MILLEN SHIELD	FACE DIAMETER INSIDE INCHES	NECK INSIDE DIAMETER INCHES	LENGTH INCHES	TUBE BASE CLAMP	ANODE HOLE	CONTACT CUTOUT	MINIMUM D.C. FIELD REDUCTION IN GUN AREA		USE WITH MILLEN BEZEL #	SHIELD BEZEL ASSEMBLY	FIG. NO.
								2.5 Gauss	1.0 Gauss			
S.C. 4510	80085-G	5.44	1.75	10.75	1.50	1	0	600	540	80075-E	NONE	17
4KP-	80804-A	3.6x3.6	1.56	9.69	1.47	0	0	550	500	NONE	NONE	13
4MP-	80803-U	3.6x3.6	2.00	12.13	NONE	1	1	550	500	80174-A	80093-U	15
5ABP-	80035	6.25	2.38	14.88	2.25	1	0	100	90	80075-B or C	NONE	16
5ABP-	80085-H	5.44	2.38	14.94	2.25	1	0	600	540	80075-J or 80075-M	80095-H4 80095-H5	17
5ABP-	80805-H	6.12	2.50	15.00	2.25	1	0	600	540	80075-B or 80075-C	80095-H 80095-H2	16
5ABP-	80805-HZ	6.12	2.50	14.75	2.25	1	0	600	540	80075-B or 80075-C	80095-HZ 80095-HZ2	16
5ADP-	80035	6.25	2.38	14.88	2.25	1	0	100	90	80075-B or C	NONE	16
5ADP-	80085-H	5.44	2.38	14.94	2.25	1	0	600	540	80075-J or 80075-M	80095-H4 80095-H5	17
5ADP-	80805-H	6.12	2.50	15.00	2.25	1	0	600	540	80075-B or 80075-C	80095-H 80095-H2	16
5ADP-	80805-HZ	6.12	2.50	14.75	2.25	1	0	600	540	80075-B or 80075-C	80095-HZ 80095-HZ2	16
5AFP-	80805-D	5.50	4.50	16.00	NONE	2	2	500	460	80075-B or 80075-C	80095-D 80095-D2	18
5AGP-	80805-J	6.12	2.50	16.38	2.25	1	1	550	500	80075-B or 80075-C	80095-J 80095-J1	19
5AGP-	80805-JZ	6.12	2.50	15.50	2.25	1	1	550	500	80075-B or 80075-C	80095-JZ 80095-JZ1	19
5AHP-	80805-W	5.13	2.38	7.25	1.50	1	2	500	450	80075 or D	NONE	
5AMP-	80085-E	5.44	2.38	16.00	2.25	1	1	550	500	80075-J or 80075-M	80095-E 80095-E2	17
5AMP-	80805-K	6.12	2.50	15.75	2.25	0	1	550	500	80075-B or 80075-C	80095-K 80095-K2	7
5AMP-	80805-KZ	6.12	2.50	15.63	2.25	0	1	550	500	80075-B or 80075-C	80095-KZ 80095-KZ2	7
5AQP-	80035	6.25	2.38	14.88	2.25	1	0	100	90	80075-B or C	NONE	16
5AQP-	80085-H	5.44	2.38	14.94	2.25	1	0	600	540	80075-J or 80075-M	80095-H4 80095-H5	17
5AQP-	80805-H	6.12	2.50	15.00	2.25	1	0	600	540	80075-B or 80075-C	80095-H 80095-H2	16
5AQP-	80805-HZ	6.12	2.50	14.75	2.25	1	0	600	540	80075-B or 80075-C	80095-HZ 80095-HZ2	16
5ARP-	80805-X	5.50	5.50	13.25	NONE	0	0	350	330	80075-B or C	NONE	
5ATP-	80085-E	5.44	2.38	16.00	2.25	1	1	550	500	80075-J or 80075-M	80095-E 80095-E2	17
5ATP-	80805-K	6.12	2.50	15.75	2.25	0	1	550	500	80075-B or 80075-C	80095-K 80095-K2	7
5ATP-	80805-KZ	6.12	2.50	15.63	2.25	0	1	550	500	80075-B or 80075-C	80095-KZ 80095-KZ2	7
5AUP-	80805-Y	6.12	6.12	11.00	NONE	1	0	350	330	80075-B or C	NONE	5
5AWP-	80805-C	5.56	2.69	15.00	NONE	2	1	600	540	80075-B or 80075-C	80095-C 80095-C2	20

Fig. 7

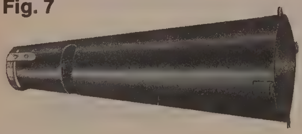


Fig. 8

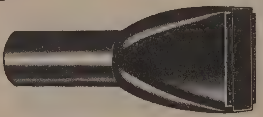


Fig. 9

Fig. 10

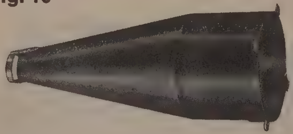


Fig. 11

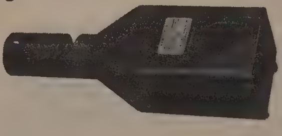
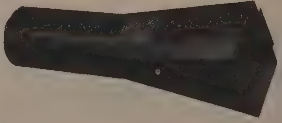


Fig. 12



MILLEN MAGNETIC SHIELDS FOR CATHODE RAY TUBES

TUBE TYPES	MILLEN SHIELD	FACE DIAMETER INSIDE INCHES	NECK INSIDE DIAMETER INCHES	LENGTH INCHES	TUBE BASE CLAMP	ANODE HOLE	CONTACT CUTOUT	MINIMUM D.C. FIELD REDUCTION IN GUN AREA		USE WITH MILLEN BEZEL #	SHIELD BEZEL ASSEMBLY	FIG. NO.
								2.5 Gauss	1.0 Gauss			
5AXP-	80805-Y	6.12	6.12	11.00	NONE	1	0	350	330	80075-B or C	NONE	5
5BP-	80805-AZ	6.12	1.87	14.78	1.69	0	0	550	500	80075 or 80075-D	80095-AZ 80095-AZ1	10
5BP-	80045-Z	6.12	1.87	14.78	1.69	0	0	100	90	80075	NONE	10
5BDP-	80805-C	5.56	2.69	15.00	NONE	2	1	600	540	80075-B or 80075-C	80095-C 80095-C2	20
5BFP-	80805-Y	6.12	6.12	11.00	NONE	1	0	350	330	80075-B or C	NONE	5
5BGP-	80085-A	5.44	2.38	16.00	2.25	1	1	600	540	80075-J or M	80095-A4	17
5BGP-	80805-V	6.12	2.50	16.38	2.25	1	1	600	540	80075-B or 80075-C	80095-V 80095-V2	19
5BHP-	80085-A	5.44	2.38	16.00	2.25	1	1	600	540	80075-B or C	80095-A4	17
5BHP-	80805-V	6.12	2.50	16.38	2.25	1	1	600	540	80075-B or C	80095-B5	19
5BNP-	80805-Y	6.12	6.12	11.00	NONE	1	0	350	330	80075 or A	NONE	5
5BTP-	80805-33	5.63	2.63	105.00	NONE	1	0	110	320	80075-B or C	NONE	
5BTP-	80805-33-B	5.63	2.63	10.50	NONE	1	0	550	500	80075-B or C	NONE	
5BTP-	80085-G	5.44	1.75	10.75	1.50	1	0	600	540	80075-J or M	80095-G4	17
5CP-	80055	6.12	2.50	15.50	2.25	1	0	100	90	80075-J or M	NONE	16
5CP-	80055-Z	6.12	2.50	15.16	2.25	1	0	100	90	80075	NONE	16
5CP-	80805-B	6.12	2.50	15.50	2.25	1	0	600	540	80075 or 80075-A	80095-B 80095-B2	16
5CP-	80805-BZ	6.12	2.50	14.66	2.25	1	0	600	540	80075 or 80075-A	80095-BZ 80095-BZ2	16
5CP-	80085-H	5.44	2.38	14.94	2.25	1	0	600	540	80075-J or 80075-M	80095-H4 80095-H5	17
5CAP-	80085-A	5.44	2.38	16.00	2.25	1	1	600	540	80075-J or M	80095-A4	17
5CBP-	80085-B	5.44	2.38	18.25	2.25	1	1	600	540	80075-J or M	80095-B5	17
5CEP-	80805-Y	6.12	6.12	11.00	NONE	1	0	350	330	80075-B or C	NONE	5
5CKP-	80805-Y	6.12	6.12	11.00	NONE	1	0	350	330	80075-B or C	NONE	5
5DEP-	80805-F	6.12	1.87	13.44	1.50	0	0	600	540	80075	NONE	10
5DEP-	80805-FZ	6.12	1.87	13.63	1.50	0	0	600	540	80075	NONE	10
5DWP-	80085-C	5.44	2.38	18.50	2.25	1	1	600	540	80075-J or 80075-M	80095-C4 80095-C5	17
5FP-	80805-Y	6.12	6.12	11.00	NONE	1	0	350	330	80075-B or C	NONE	5
5GP-	80045	6.12	1.87	15.50	1.69	0	0	100	90	80075	NONE	10
5GP-	80805-A	6.12	1.87	15.50	1.69	0	0	550	500	80075 or 80075-A	80095-A 80095-A2	10
5GP-	80805-AZ	6.12	1.87	14.78	1.69	0	0	550	500	80075 or 80075-A	80095-AZ 80095-AZ2	10
5HP-	80045	6.12	1.87	15.50	1.69	0	0	100	90	80075	NONE	10
5HP-	80045-Z	6.12	1.87	14.78	1.69	0	0	100	90	80075	NONE	10
5HP-	80805-A	6.12	1.87	15.50	1.69	0	0	550	500	80075 or 80075-A	80095-A 80095-A2	10
5HP-	80805-AZ	6.12	1.87	14.78	1.69	0	0	550	500	80075 or 80075-A	80095-AZ 80095-AZ2	10

Fig. 13

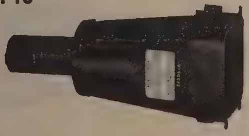


Fig. 14

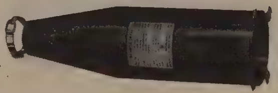


Fig. 15

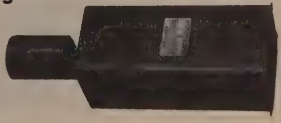


Fig. 16

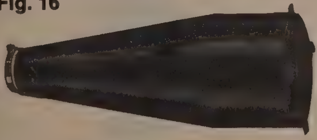


Fig. 17

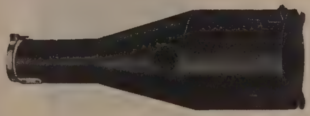
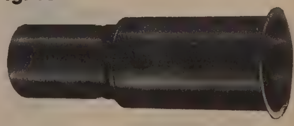


Fig. 18



MILLEN MAGNETIC SHIELDS FOR CATHODE RAY TUBES

TUBE TYPES	MILLEN SHIELD	FACE DIAMETER INSIDE INCHES	NECK INSIDE DIAMETER INCHES	LENGTH INCHES	TUBE BASE CLAMP	ANODE HOLE	CONTACT CUTOUT	MINIMUM D.C. FIELD REDUCTION IN GUN AREA 2.5 Gauss	1.0 Gauss	USE WITH MILLEN BEZEL #	SHIELD BEZEL ASSEMBLY	FIG. NO.
5JP-	80805-G	6.12	1.87	14.25	1.69	1	4	600	540	80075 or 80075-A	80095-G 80095-G2	21
5LP-	80805-E	6.12	1.87	14.56	1.62	1	0	600	540	80075 or 80075-A	80095-E 80095-E2	22
5M24X-	80805-Y	6.12	6.12	11.00	NONE	1	0	600	540	80075 or A	NONE	5
5MP-	80035	6.12	2.38	14.88	2.25	1	0	100	90	80075 or A	NONE	10
5MP-	80805-F	6.12	1.87	13.44	1.50	0	0	600	540	80075 or 80075-A	80095-F 80095-F1	10
5MP-	80805-FZ	6.12	1.87	13.12	1.50	0	0	600	540	80075 or 80075-A	80095-FZ 80095-FZ1	10
5NP-	80045	6.12	1.87	15.50	1.69	0	0	100	90	80075	NONE	10
5NP-	80045Z	6.12	1.87	14.78	1.69	0	0	100	90	80075	NONE	10
5NP-	80805-A	6.12	1.87	15.50	1.69	0	0	550	500	80075 or 80075-A	80095-A 80095-A2	10
5NP-	80805-AZ	6.12	1.87	14.78	1.69	0	0	550	500	80075 or 80075-A	80095-AZ 80095-AZ2	10
5RP-	80805-C	5.50	2.69	15.00	NONE	2	1	600	540	80075-B or 80075-C	80095-C 80095-C2	20
5SP-	80805-D	5.50	4.50	16.00	NONE	3	2	500	450	80075-B or 80075-C	80095-D 80095-D2	18
5UP-	80085-D	5.44	2.00	13.00	1.50	0	0	600	540	80075-J or 80075-M	80095-D4 80095-D5	17
5UP-	80805-F	6.12	1.87	13.44	1.50	0	0	600	540	80075 or 80075-A	80095-F 80095-F1	10
5UP-	80805-FZ	6.12	1.87	13.12	1.50	0	0	600	540	80075 or 80075-A	80095-FZ 80095-FZ1	10
5WP-	80805-Y	6.12	6.12	11.00	NONE	1	0	350	330	80075-B or C	NONE	5
5XP-	80805-C	5.50	2.69	15.00	NONE	2	1	600	540	80075-B or 80075-C	80095-C 80095-C2	20
5YP-	80805-J	6.12	2.50	16.38	2.25	1	1	550	500	80075-B or 80075-C	80095-J 80095-J-1	19
5YP-	80805-JZ	6.12	2.50	15.50	2.25	1	1	550	500	80075-B or 80075-C	80095-JZ 80095-JZ1	19
5ZP-	80805-Y	6.12	6.12	11.00	NONE	1	0	350	330	80075-C or B	NONE	
7ABP-	80807-C	7.50	4.12	12.00	NONE	1	0	600	540	80077-M	NONE	23
7ACP	80807-G	4.5x6.5	4.50	16.00	NONE	1	0	440	385	BEZEL	80177-D	23
7AEP-	80807-B	7.50	3.00	13.50	NONE	1	0	600	540	80077-M	NONE	23
7AQP & 7AUP	80807-D	7.5 DIA.	3.00	8.00	NONE	1	0	580	520	80077-M	NONE	23
7BP-	80807-C	7.50	4.12	12.00	NONE	1	0	600	540	80077-M	NONE	23
7E10P-	80807-A	7.50	3.00	12.81	NONE	0	0	600	540	80077-M	NONE	23
7GP-	80807-A	7.50	3.00	12.81	NONE	0	0	600	540	80077-M	NONE	23
7JP-	80807-A	7.50	3.00	12.81	NONE	0	0	600	540	80077-M	NONE	23
7MP-	80807-C	7.50	4.12	12.00	NONE	1	0	600	540	80077-M	NONE	23
7SP-	80807-C	7.50	4.12	12.00	NONE	1	0	600	540	80077-M	NONE	23
7TP-	80807-C	7.50	4.12	12.00	NONE	1	0	600	540	80077-M	NONE	23
7VP-	80807-A	7.50	3.00	12.81	NONE	0	0	600	540	80077-M	NONE	23
	80815-A	14.75	6.25	9.75	NONE	0	0	450	390	NONE	NONE	24

Fig. 19

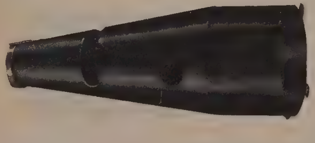


Fig. 20

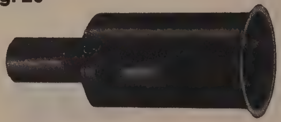


Fig. 21

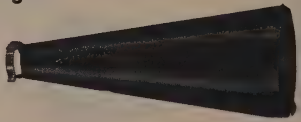


Fig. 22

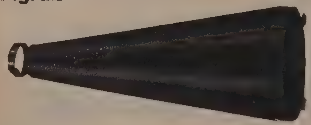


Fig. 23

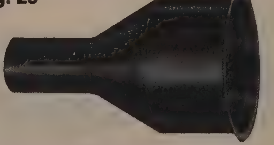
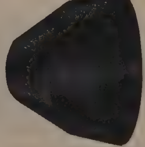
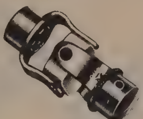


Fig. 24



MILLEN COUPLINGS

"*Designed for Application*"®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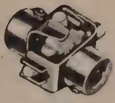
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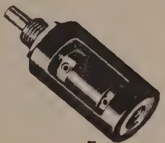
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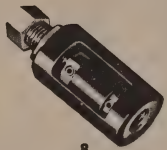
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Miniature and Standard Size

The No. 39000 series of standard size and No. M000 series of miniature Millen "Designed for Application" flexible coupling units include, in addition to improved versions of the conventional types, also such exclusive original designs as the No. 39006 "slide-action" coupling (in ceramic and phenolic insulation or non-insulated for high torque).

The No. 39016 incorporates features which have long been desired in a flexible coupling *NO* Back Lash — Higher Flexibility — High Breakdown Voltage — Smaller Diameter — etc. The couplings illustrated and tabulated here are standard production type units. Dimensioned drawings of each are contained in the Millen "Industrial Electronics Master Data Book".

The couplings described here are indicative of the types manufactured by the James Millen Mfg. Co., Inc. Many customers require special revisions of the standard designs or entirely special couplings. Hubs to fit 3/32", 1/8", 3/16", 1/4", and 3/8" shafts are available for most couplings where the design permits the use of special hubs. The James Millen Mfg. Co., Inc. often supplies special couplings to customer specifications and is pleased to quote on the design and manufacture of special couplings or revisions of standard couplings.

MINATURE COUPLINGS

Catalog Number	Body Material	Maximum O.D.-In.	Hub to Hub Shaft Size	Length Inches	Voltage Rating Peak Volts	Separable	Maximum Torque In.-Oz.	Misalignment Angular	Misalignment Parallel	FIG. NO.
M001	Ceramic	9/16	⅛ to ⅛	1 1/16	2500	No	75	45°	0	1
M001-C	Ceramic	9/16	⅛ to ⅛	¾	2500	No	75	18°	0	2
M003	Brass	9/32	⅛ to ⅛	⅜	Non-Insulated	No	Solid	0	0	3
M004	Brass	9/16	⅛ to ⅛	¾	Non-Insulated	No	75	18°	0	2
M005	Brass	9/16	⅛ to ⅛	1 1/16	Non-Insulated	No	75	45°	0	1
M005-B	Brass	9/16	⅛ to ⅛	1 1/16	Non-Insulated	No	96	45°	0	1
M006	Ceramic	11/16	⅛ to ⅛	15/16	2500	Yes	30	12°	1/16"	4
M008	Cycolac	11/32	⅛ to ⅛	39/64	6000	No	—	0	0	5
M017	Cycolac	15/16	⅛ to ⅛	17/32	4400	No	110	10°	0	6
M017-A	Cycolac	15/16	⅛ to 3/32	17/32	4400	No	—	10°	0	6
M017-B	Cycolac	15/16	⅛ to 3/16	17/32	4400	No	—	10°	0	6
M017-C	Phosphor Bronze	7/8	⅛ to ⅛	17/32	Non-Insulated	No	—	10°	0	
M017-D	Phosphor Bronze	7/8	⅛ to 3/32	17/32	Non-Insulated	No	—	10°	0	
M017-E	Phosphor Bronze	7/8	⅛ to 3/16	17/32	Non-Insulated	No	—	10°	0	
M023	Cycolac	9/16	⅛ to ⅛	1 9/32	6000	Yes	—	0	0	7
M024	Cycolac	9/16	⅛ to ⅛	1 17/32	6000	Yes	—	0	0	8

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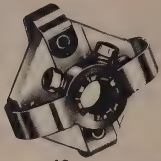
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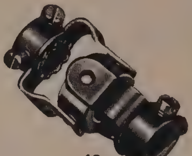
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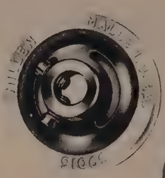
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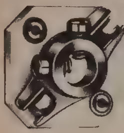
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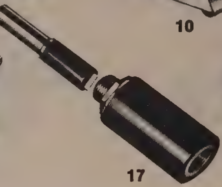
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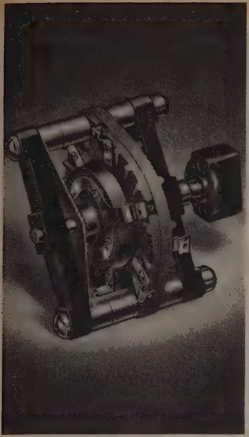
MILLEN
STANDARD COUPLINGS

Catalog Number	Body Material	Maximum O.D.-In.	Hub to Hub I.D.	Length Inches	Voltage Rating Peak Volts	Separable	Maximum Torque In.-Oz.	Misalignment Angular	Misalignment Parallel	FIG. NO.
39001	Ceramic	13/16	¼ to ¼	1 5/16	4000	No	110	45°	0	9
39001-C	Ceramic	13/16	¼ to ¼	15/16	4000	No	110	18°	0	12
39001-D	Ceramic	13/16	¼ to ⅛	1 5/16	4000	No	110	45°	0	9
39001-E	Ceramic	13/16	¼ to ⅜	1 5/16	4000	No	110	45°	0	9
39001-F	Ceramic	13/16	¼ to ⅛	15/16	4000	No		18°	0	12
39002	Ceramic	1¼	¼ to ¼	13/16	3000	No	48	18°	0	10
39002-A	Ceramic	1¼	¼ to ⅛	13/16	3000	No	48	18°	0	10
39002-B	Ceramic	1¼	¼ to 3/16	13/16	3000	No	48	18°	0	10
39003	Brass	¾	¼ to ¼	¾	Non-insulated	No	Solid	0	0	11
39003-K	Stainless	½	¼ to ¼	¾	Non-insulated	No	Solid	0	0	
39004	Brass	13/16	¼ to ¼	15/16	Non-insulated	No	110	18°	0	12
39004-B	Brass	13/16	¼ to ¼	15/16	Non-insulated	No	128	18°	0	12
39004-C	Brass	13/16	¼ to 3/16	15/16	Non-insulated	No	110	18°	0	12
39005	Brass	13/16	¼ to ¼	1 5/16	Non-insulated	No	110	45°	0	13
39005-B	Brass	13/16	¼ to ¼	1 5/16	Non-insulated	No	128	45°	0	13
39005-C	Brass	13/16	¼ to 3/16	1 5/16	Non-insulated	No	110	45°	0	13
39005-D	Brass	13/16	¼ to ⅛	1 5/16	Non-insulated	No	110	45°	0	13
39005-E	Brass	13/16	¼ to ⅜	1 5/16	Non-insulated	No	110	45°	0	13
39006	Ceramic	11/16	¼ to ¼	11/16 to ⅞	2000	Yes	140	13°	1/16	14
39006-A	Ceramic	11/16	¼ to ⅛	11/16 to ⅞	2000	Yes	140	13°	1/16	14
39006-B	Aluminum	11/16	¼ to ¼	11/16 to ⅞	Non-insulated	Yes	140	13°	1/16	14
39006-C	Ceramic	11/16	¼ to 3/16	11/16 to ⅞	2000	Yes	140	13°	1/16	14
39006-E	Ceramic	11/16	¼ to ⅜	11/16 to ⅞	2000	Yes	140	13°	1/16	14
39007	Phenolic	11/16	¼ to ¼	11/16 to ⅞	2000	Yes	140	13°	1/16	14
39008	Ceramic	1¼	¼ to ¼	1 ⅛	3500	No	48	15°	0	
39009	Ceramic	1⅝	¼ to ¼	1 ⅛	7000	No	190	3°	0	
39009-A	Ceramic	2	¼ to ¼	45/64	6200	No	250	0	0	
39011	Ceramic	13/16	¼ to ¼	4 ⅛	10000	No	110	90°	0	
39011-B	Ceramic	13/16	¼ to ¼	4 ⅛	10000	No	220	90°	0	
39012	Ceramic	1¼	¼ to ¼	11/16 to ⅞	2000	Yes	320	13°	1/16	
39013	Nylon	13/16	¼ to ¼	1 5/16	1700	No	96	45°	0	9
39013-B	Nylon	13/16	¼ to ¼	1 5/16	1700	No	128	45°	0	9
39013-C	Nylon	13/16	¼ to ¼	15/16	1700	No	96	18°	0	12
39013-D	Nylon	13/16	¼ to ¼	15/16	1700	No	190	18°	0	12
39016	Cycolac	13/16	¼ to ¼	9/16	4400	No	160	10°	0	16
39016-A	Cycolac	13/16	¼ to 3/16	9/16	4400	No	160	10°	0	16
39016-D	Phosphor Bronze	11/16	¼ to ¼	17/32	Non-insulated	No	130	10°	0	
39016-E	Cycolac	13/16	¼ to ⅛	9/16	4400	No	160	10°	0	16
39017	Cycolac	15/16	3/16 to 3/16	17/32	4400	No	80	8°	0	15
39017-A	Cycolac	15/16	3/16 to ⅛	17/32	4400	No	80	8°	0	15
39017-D	Phosphor Bronze	⅞	3/16 to 3/16	17/32	Non-insulated	No	80	8°	0	
39023	Phenolic	11/16	¼ to ¼	1 9/32	5500	No	224	0	0	17
39024	Phenolic	11/16	¼ to ¼	1 9/32	5500	No	224	0	0	18
39027	Aluminum	1¼	¼ to ¼	11/16 to ⅞	Non-insulated	Yes	320	13°	1/16	14
39031	Phenolic	15/16	¼ to ¼	2 ⅛		No	Solid	0	0	
39032-B	Ceramic	1⅝	¼ to ¼ shaft		9000	No	190	0	0	19



MILLEN NO. 10031 COUNTER DIAL

The **No. 10031 Dial** is a rugged turns counting dial. It has a 0-99 turn digital readout plus a vernier scale calibrated 0-100. The design includes a built-in dial lock. The output coupling is a hub for 1/4" diameter shaft. The crank handle drives any multi-turn device directly. This new small size dial is designed to drive vacuum variable capacitors, rotary tunable inductors, multi-turn potentiometers, permeability tuned inductors and other multi-turn devices. Height: 4⅛". Width: 2⅞". Depth: 1 31/32" behind panel. Bezel and gear case are black molded glass-filled Noryl. Ratio: 1:1. Scales: Black with white numerals.

51000 HIGH VOLTAGE R-F SWITCH

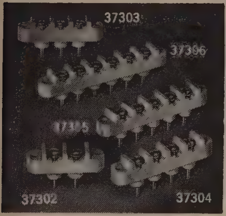
51001: Single Wafer. 1 pole, 2 to 6 positions. 13 KV. D.C. flashover. 20 Amperes.

51001D: Single Wafer. 2 poles, 2 or 3 positions. 9 KV. D.C. flashover. 20 Amperes.

51002: Double Wafer. 2 poles, 2 to 6 positions. 13 KV. D.C. flashover. 20 Amperes.

51002D: Double Wafer. 4 poles, 2 or 3 positions. 9 KV. D.C. flashover. 20 Amperes.

36002-B
36001-B
36004
36001
36002
36012
36021
360



37212
37202

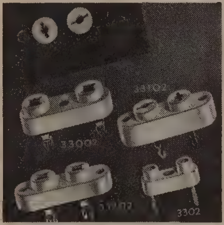
CERAMIC PLATE OR GRID CAPS—Soldering lugs and contact one-piece. Lug ears annealed and solder dipped to facilitate "mechanical plus soldered" connection of cable.
No. 36001—5/16"______ No. 36002—3/8"______ No. 36004—1/4"______

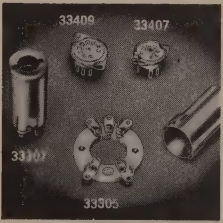
SAFETY TERMINAL—Combination high voltage terminal and thru-bushing. Tapered contact pin fits firmly into conical socket providing large area, low resistance connection. Pin is swivel mounted in cap to prevent twisting of lead wire.
No. 37001, Black or Red______ No. 37501, Low loss______

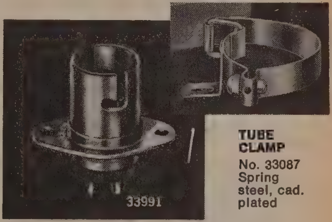
STEATITE TERMINAL STRIPS—Terminal and lug are one piece. Lugs are turret type and are free floating so as not to strain L522 ceramic on wide temperature variations. Easy to mount with series of round holes. 1400 volt and 3500 volt series.

POSTS, PLATES, AND PLUGS—The No. 37200 series, including both insulated and non-insulated binding posts with associated plates and plugs, provide various combinations to meet most requirements. The posts have captive heads and keyed mounting. The No. 37291 on No. 37223 are standard in black or red with other colors on special order. No. 37201, No. 37202, and No. 37204 are available in black, red, or low loss. The No. 37202 is also available in steatite.

No. Description	No. Description
37201—Single plates, pr.______	37204—Double dual plates, pr.______
37291—Single plates (tapered), pr.______	37212—Dual plug______
	37222—Non-insulated binding post
37202—Dual plates, pr.______	37223—Insulated binding post______







TUBE CLAMP
No. 33087
Spring steel, cad. plated

MILLEN TUBE SOCKETS DESIGNED FOR APPLICATION

Long Flashover path to chassis permits use with transmitting tubes, 866 rectifiers, etc. Long leakage path between contacts. Sockets may be mounted either with or without metal flange. Mounts in standard size chassis hole. All types have barrier between contacts and chassis. All but octal and crystal sockets also have barriers between individual contacts in addition.

Voltage regulator dual contact bayonet socket, 33991 black phenolic insulation and 33992 with low loss mica filled phenolic insulation.

No. Description	No. Description
33002—Crystal Socket ¾" x .125"______	33004—4 Pin Tube Socket
33102—Crystal Socket .487" x .095"______	33005—5 Pin Tube Socket
33202—Crystal Socket ½" x .125"______	
33302—Crystal Socket .487" x .050"______	33008—8 Pin Tube Socket
33407—Miniature Socket only, ceramic______	33991—Socket for 991______
33409—Noval Socket only, ceramic______	33992—Socket for 991______
33307—Miniature Socket, Shield, ceramic______	33207—829 Socket______
33309—Noval Socket, Shield, ceramic	33305—Acorn Socket______

JAMES MILLEN MANUFACTURING COMPANY, INC.
Main Office and Factory
150 EXCHANGE ST., MALDEN, MASS. 02148, U.S.A.
TEL. (617) 324-4108

MILLEN

DRIVES, SHAFT LOCKS AND BEARINGS

Stock Millen "Designed for Application" drives, shaft locks and bearings are illustrated and described on this page. Dimensioned drawings of each are contained in The Millen "Industrial Electronics Master Data Book". The parts described here are indicative of the types of drives, shaft locks and bearings manufactured by The James Millen Mfg. Co., Inc. Many customers require special revisions of the standard design or entirely special parts. The James Millen Mfg. Co., Inc. is pleased to quote on the design and manufacture of special parts.

Drives

RIGHT ANGLE DRIVES

No. A012 — Miniature right angle drive for ⅛″ shafts. Single hole mounting. One to one ratio. 15/32″ x ¾″ x ⅞″.

No. 10012 — Standard size right angle drive for ¼″ shafts. Provisions for many methods of mounting. 1:1

No. 10012-T — Thru-sleeve right angle drive. Stainless steel sleeve to take ¼″ diameter shaft. One to one.

WORM DRIVE UNITS

Cast aluminum frame may be panel or base mounted. Spring loaded split gears to minimize backlash. ¾″ x 2⅜″ x 3″.

No. 10000-A — 16:1 anti-backlash worm drive.

No. 10000-B — 48:1 anti-backlash worm drive.

No. 10000-C — 12:1 anti-backlash worm drive.

No. 10000-D — 36:1 anti-backlash worm drive.

GEAR DRIVE

No. 10000-12 — Spring loaded split gears to minimize backlash. 2 to 1 ratio spur gears. 1⅝″ x 1⅛″ x 1 3/16″.

FRICTION DRIVE

No. 10065 — Friction drive for .025″ to .032″ thick disc dials. Complete with 13/16″ diameter black phenolic knob.

Shaft Locks

No. A061 — Miniature shaft lock for ⅛″ diameter shaft. ¼—32 bushing. Nickel plated brass. Body 11/32″ hex.

No. A062 — Miniature shaft lock with knurled locking nut for thumb operation. For ⅛″ diameter shaft.

No. 10060 — Original standard size shaft lock for ¼″ diameter shaft. ⅜″-32 bushing with 7/16″ hex nut.

No. 10060-A — Shaft lock for ⅜″ diameter shaft. 9/16″-32 bushing with ⅝″ hex nut. Nickel plated brass.

No. 10061 — Standard size shaft lock for instant conversion of "plain" ¼″ diameter shaft to "locking type".

No. 10062 — Thumb screw shaft lock for ¼″ diameter shaft. ⅜″-32 bushing. Nickel plated brass.

No. 10062T — Standard shaft lock with molded phenolic thumb operated locking nut. ⅜″-32 bushing with 1″ nut.

No. 10063 — Lever operated shaft lock for ¼″ diameter shaft. ⅜″-32 bushing. Nickel plated brass.

No. 10064 — Shaft lock with dome locking nut. For ¼″ diameter shaft. ⅜″-32 bushing. Nickel plated brass.

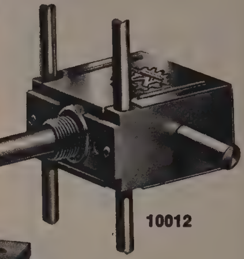
No. 10064-C — Dome locking nut for use on slotted ⅜″-32 bushings. Nickel plated brass. Also black oxide finish.

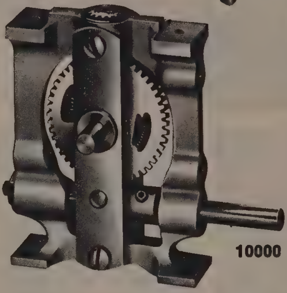
BEARINGS

No. A066 — Miniature shaft bearing for ⅛″ diameter shaft. Nickel plated brass. Fits 17/64″ diameter hole.

No. 10066 — Standard size shaft bearing for ¼″ diameter shaft. Nickel plated brass. Fits ½″ diameter hole.

A012


10012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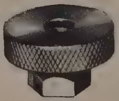
10065

A066
10066

A061
10061

A062

10060
10060-A

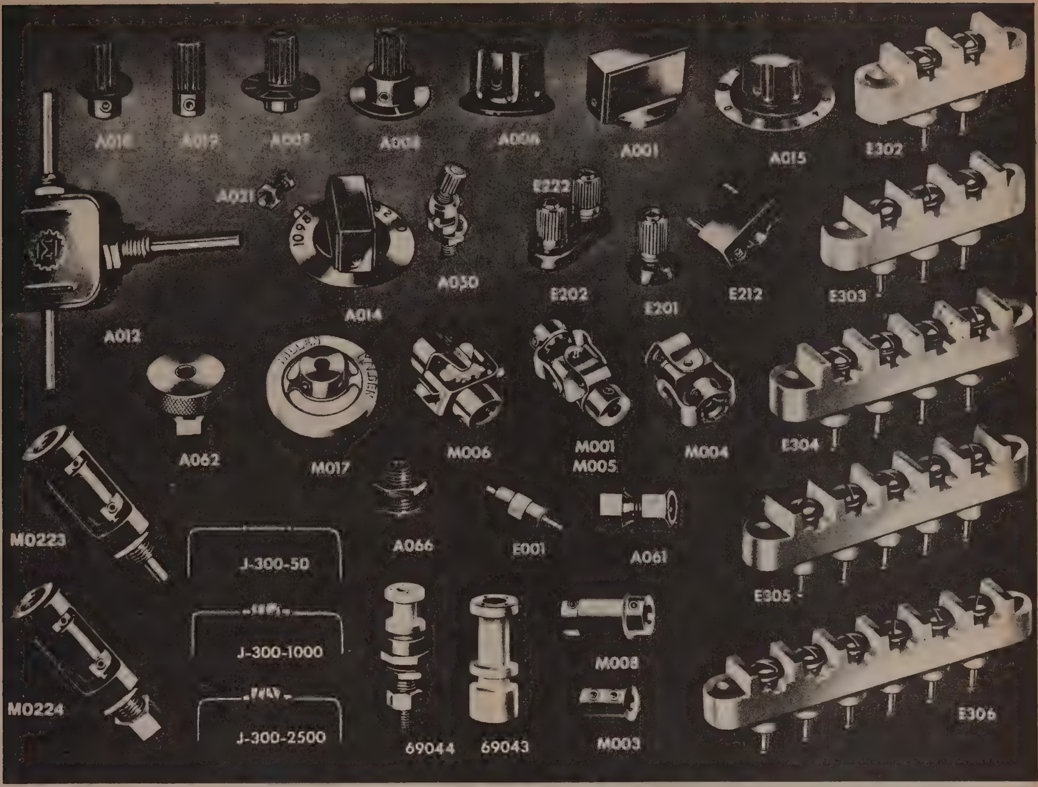

10062

10062-T

10063

10070

"Designed for Application"®



MILLEN *MINIATURIZED COMPONENTS*

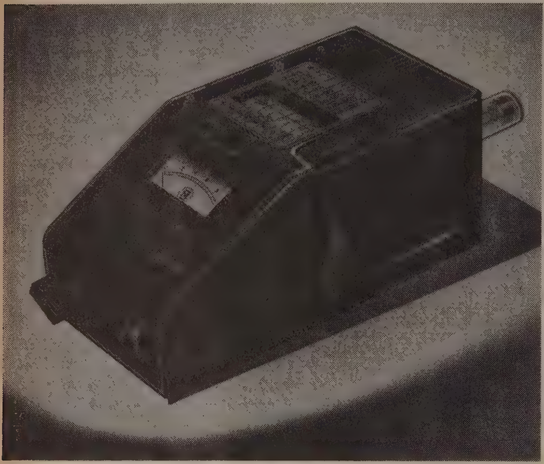
DESIGNED for APPLICATION miniaturized components developed for use in our own equipment such as the 90901 Oscilloscope, are available for separate sale. Many of these parts are similar, in most details except size, to their equivalents in our standard component parts group. In certain devices where complete miniaturization is not paramount, a combination of standard and miniature components may possibly be used to advantage. For convenience, we have also listed on this page the extremely small sized coil forms from our standard catalog.

Code	Description
A001	Bar knob for ⅛″ shaft. ½″ high by ¾″ long.
A006	Fluted black plastic knob with brass insert for ⅛″ shaft. ½″ high by ¾″ diameter.
A007	¼″ black plastic dial knob with brass insert for ⅛″ shaft. ⅝″ diameter dial. 9/16″ high.
A008	¼″ black plastic knob. Same as no. A007 except for style.
A012	Right angle drive for ⅛″ shafts. Single hole mounting.
A014	1″ bar dial for ⅛″ shaft. ½″ high. 180° or 280° dials for clockwise or counter-clockwise rotation.
A015	1″ fluted knob dial for ⅛″ shaft. ½″ high. Same dial plates as no. A014.
A017	1⅛″ diameter fluted black plastic knob for ⅛″ shaft.
A018	Knob, same as no. A007 except with 7/16″ diameter flange.
A019	Knob, same as no. A007, but without dial.
A021	Miniature metal index for miniature dials.
A050	Miniature dial lock.
A061	Shaft lock for ⅛″ diameter shaft. ¼″-32 bushing. Nickel plated brass.
A062	Shaft lock with knurled locking nut.
A066	Shaft bearing for ⅛″ diameter shafts. Nickel plated brass. Fits 17/64″ diameter hole.

Code	Description
E001	Steatite ceramic standoff or tie-point. Integral mounting eyelet. 0.205″ overall diameter.
E201	Black or red plastic binding post plates for No. E222.
E202	Black or red plastic plates for two binding posts spaced ½″.
E212	Black or red plastic plug for two binding posts spaced ½″.
E222	Metal binding post with jack top.
E302A to E306A	Steatite ceramic terminal strips. 5/16″ wide. Terminals spaced ⅜″ on centers. Screw type or solder type thru-terminals.
J300-3.3 to J300-2500	Complete line of miniature inductances 3.3 to 2500 microhenries. ⅜″ long. Diameter 0.115″ to 0.313″.
M001	Insulated universal joint style flexible coupling for ⅛″ dia. shafts.
M003	Solid coupling for ⅛″ dia. shafts. Nickel plated brass.
M004	Universal joint style flexible coupling for ⅛″ diameter shafts. Inverted hubs for short length. Not insulated.
M005	Universal joint style flexible coupling for ⅛″ diameter shafts. External hub. Not insulated.
M006	Universal joint style flexible coupling for ⅛″ diameter shafts. Spring finger. Steatite ceramic insulation.
M008	Plastic insulated coupling with nickel plated brass inserts for ⅛″ diameter shafts.
M017	Plastic insulated flexible coupling for ⅛″ diameter shafts. 17/32″ long by 15/16″ diameter. Bronze yoke.
M023	Insulated shaft extension for ¼″-32 bushing and ⅛″ shaft. For mounting sub-miniature potentiometer.
M024	Locking insulated shaft extension similar to no. M023.
69043	Steatite ceramic coil form. Adjustable core. Winding space ¼″ diameter by 13/32″ long. Mounting 4-40 hole.
69044	Steatite ceramic coil form. Adjustable core. Winding space 0.187″ dia. by 3/16″ long. No. 10-32 mounting.

"Designed for Performance"®

SOLID-STATE DIPPER



The Millen No. 90652 Solid-State Dipper is a dip oscillator with performance comparable to that of the best vacuum-tube grid dip meters available, but with the universal advantage of battery power which eliminates the power cord and provides a portability which is not restricted by the requirement for a-c power.

The No. 90652 Solid-State Dipper is supplied in a convenient polypropylene carrying case with a complete set of coils and a 9-volt alkaline battery to provide instant operation.

The operating features of the No. 90652 Solid-State Dipper include (1) a sensitive oscillator-dipper for checking resonant frequencies of non-energized resonant circuits, and (2) an absorption-type wavemeter with the oscillator circuit arranged to act as a Q-Multiplier Amplifier, providing both a sharp tuning response and great sensitivity. Frequency range: 1.7 to 300 MH/z.

Size of Dipper — 7¼"L x 3½"W x $3\frac{3}{16}$"H
Weight of Dipper — 2½ Pounds with battery
Size of Carrying Case With Dipper and Coils — 11⅜"L x 5⅛"W x 4"H
Shipping Weight — 7 Pounds

Tube GRID DIP METER

The Millen 90651-A Tube Grip Dip Meter is a calibrated stable RF oscillator unit with a transistorized electronic voltmeter to indicate the amplitude of the output. The frequency determining coil is plugged into the unit so that it may be used as a probe.

It features a transistor d.c. amplifier, and taut band meter.

The No. 90651-A is supplied complete in a convenient polypropylene carrying case which keeps the coil/probes with the Grid Dip Meter and protects both.

Five additional coils are available for extending the range to 165 KC.

The No. 90651-A has a transistor d.c. amplifier to increase sensitivity. It provides full scale meter reading at all frequencies from 1.7 to 300 mHz. It has a modern, taut band meter to eliminate any possibility of the meter ever becoming "sticky." These additions are made while still maintaining all of the features which have made the Millen No. 90651 Grip Dip Meter so thoroughly reliable it has become the standard of the industry. It uses the same stable oscillator without spurious dips, it has a transformer-type power supply, it has seven coils protected by form fitting molded covers, etc.

JAMES MILLEN MANUFACTURING COMPANY, INC.
Main Office and Factory
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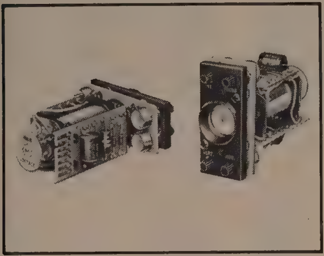
SCOPE MODULES TO BUILD INTO EQUIPMENT



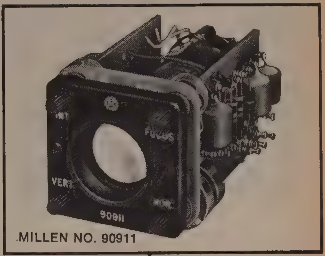
¾ Inch Round Tube/Flat Face

The Millen No. 90975 is an ultra-small, economical 'Scope with a flat face shielded 1DP1 C.R.T. that requires little power. Mounts on your panel and has a plug on rear for all input connections. Height: 2¾ inches overall. Depth: 3½ inches behind panel. Width: 1¼ inches overall. Weight: 5½ ounces, including tube. Uses Millen No. 90202 Module Plug-in High Voltage Power Supply. Sensitivity: Vert. 158, Hor. 184 v. per cm. defl.

MILLEN NO. 90901

One Inch Round Tube

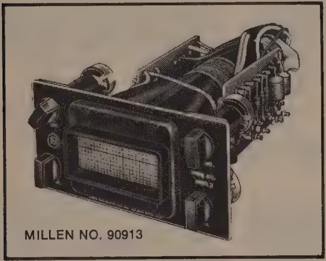
The Millen No. 90901 is the most economical of the module oscilloscopes. It uses a type 1CP31 one inch diameter cathode ray tube with fixed focus. Requires little power. Mounts on your panel. Height: 2¾ inches overall. Depth: 4⅝ inches behind panel. Width: 2⅞ inches overall. Weight: 10 ounces. Uses Millen No. 90202 Module Plug-in High Voltage Power Supply. Sensitivity: Vertical: 48, Horizontal: 71 v. p-p per cm. defl.



MILLEN NO. 90911

1¼ Inch Round Tube/Flat Face

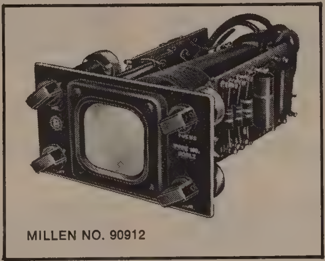
The Millen No. 90911 is a small module oscilloscope using the American-made type 1EP1 1¼ inch diameter cathode ray tube. The No. 90911 has balanced deflection, focus control and provisions for blanking or intensity modulation. Requires little power. Mounts on your panel. Height: 2⅝ inches overall. Depth: 4⅜ inches behind panel. Width: 3⅛ inches overall. Weight: 12 ounces. Uses No. 90202 Plug-in High Voltage Power Supply.



MILLEN NO. 90913

3 x 1½ Inch Rectangular Tube

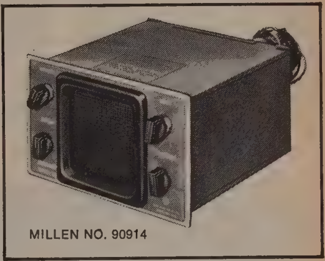
The Millen No. 90913 is a small module oscilloscope providing the larger rectangular display of a three inch tube, but requiring only the panel space used by a two inch tube. The No. 90913 has balanced deflection and has provisions for intensity modulation or blanking. Requires little power. Mounts on your panel. Height: 3 inches. Depth: 9½ inches behind panel. Width: 6 inches. Weight: 1½ pounds. Uses No. 90202 Power Supply.



MILLEN NO. 90912

Two Inch Round Tube

The Millen No. 90912 is a panel mounting module oscilloscope intended to be built into the customer's equipment. It is complete with bezel and panel, control of intensity, focus, vertical centering and horizontal centering. It requires only 3 x 5 inches of panel space but provides a 1¾ x 1⅝ inch display. Requires little power. Mounts on your panel. Height: 3 inches. Depth: 7¼ in. behind panel. Width: 5 in. Weight: 1¾ pounds.

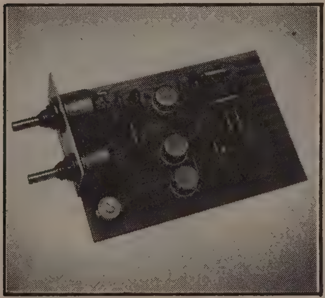


MILLEN NO. 90914

3½ Inch Square Tube

The Millen No. 90914 is a panel mounting module oscilloscope intended for monitoring applications. This oscilloscope indicator is complete with front panel, bezel and front panel controls consisting of Intensity, Focus, Vertical Centering and Horizontal Centering. The No. 90914 uses a 4KP-square face cathode ray tube. Requires little power. Mounts on your panel. Height: 3 13/16 in. Depth: 11¾ in. Width: 6⅝ in.

90928 Deflection Amplifier



MILLEN NO. 90928

Solid State   Direct Coupled

Frequency Response:
  DC to 500 kHz for 15 v. peak to peak output (—3 db). (Balanced).
  DC to 100 kHz for 250 v. peak to peak output (balanced).

Gain: Voltage: 650   Power: 55 db

Sensitivity: 23 millivolts input peak to peak produces 15 volts peak to peak swing.

Input Impedance: 100 kωcarbon potentiometer.

Output Impedance: 47 kωcollector load resistors.

Positioning: DC positioning control provided.
  At least ±150 volts plate-to-plate positioning voltage available.

Input: Single-ended.

Output: Push-pull balanced or single-ended (unbalanced).

Power Requirements:
  +300 volts unreg. 7 ma.
  + 15 volts reg. 12.5 ma.
  — 15 volts reg. 5 ma.

Dimensions:
  With control potentiometers mounted on bracket 2″w x 3 11/16″ lg. x 15/16″ deep.
  With potentiometers removed (for remote mounting) 2″ x 3″ x 5/8″.
  12 contacts, 0.156 centers, to fit circuit board receptacle (Such as Cinch 50-12A-20).

Weight: 1.7 oz.

MILLEN NO. 90202

Module Power Supplies

The Millen No. 90202 Plug-in High Voltage Module for use with the Millen Module Oscilloscopes supplies both high voltage and heater power. Input: 105-125 volts, 60 Hz. Output: 750 volts d.c. at 3 ma. to 1140 volts d.c. at 1 ma. and 6.3 volts a.c. at 0.6 ampere, Physical Data: 1⅞″ x 2⅛″ x 4⅝″. The Millan No. 90202-C is similar to No. 90202 except recommended for continuous duty and for 50 Hz. applications.

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Main Office and Factory
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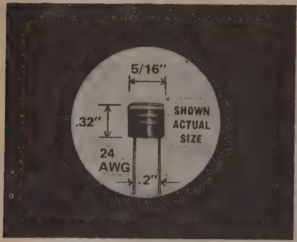
MINIATURE J302 SERIES ENCAPSULATED FOR PRINTED CIRCUITS

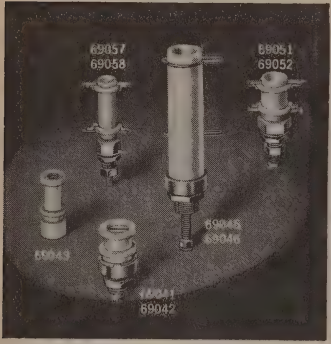

5/16"
.32"
SHOWN ACTUAL SIZE
24 AWG
.2"

Catalog Number	Inductance Microhenries	Min. Q	Self Resonant Freq.
J302-3.3	3.3 ± 10%	20	43 MHz
J302-3.9	3.9 ± 10%	20	39
J302-4.7	4.7 ± 10%	25	35
J302-5.6	5.6 ± 10%	25	32
J302-6.8	6.8 ± 10%	25	29.0
J302-8.2	8.2 ± 10%	25	26.0
J302-10	10 ± 10%	25	23.0
J302-12	12 ± 10%	25	21.0
J302-15	15 ± 10%	25	18.5
J302-18	18 ± 10%	25	16.5
J302-22	22 ± 5%	30	15
J302-24	24 ± 5%	30	14
J302-25	25 ± 5%	30	14
J302-27	27 ± 5%	30	13
J302-30	30 ± 5%	30	12
J302-33	33 ± 5%	30	12 MHz

Catalog Number	Inductance Microhenries	Min. Q	Self Resonant Freq.
J302-36	36 ± 5%	30	11 MHz
J302-39	39 ± 5%	30	11
J302-43	43 ± 5%	30	10
J302-47	47 ± 5%	30	9.7
J302-50	50 ± 5%	25	9.4
J302-56	56 ± 5%	30	8.8
J302-62	62 ± 5%	30	8.3
J302-68	68 ± 5%	30	7.9
J302-75	75 ± 5%	30	7.5
J302-82	82 ± 5%	30	7.2
J302-91	91 ± 5%	30	6.8
J302-100	100 ± 5%	35	6.5
J302-120	120 ± 5%	35	5.8
J302-130	130 ± 5%	40	5.5
J302-150	150 ± 5%	40	5.2
J302-180	180 ± 5%	45	4.7
J302-200	200 ± 5%	45	4.3
J302-220	220 ± 5%	50	4.1
J302-240	240 ± 5%	50	3.9
J302-250	250 ± 5%	50	3.8
J302-270	270 ± 5%	50	3.7
J302-300	300 ± 5%	55	3.5
J302-330	330 ± 5%	55	3.3
J302-360	360 ± 5%	55	3.1
J302-390	390 ± 5%	55	3.0
J302-430	430 ± 5%	60	2.8
J302-470	470 ± 5%	45	2.7
J302-500	500 ± 5%	60	2.6
J302-510	510 ± 5%	60	2.6
J302-560	560 ± 5%	60	2.4 MHz

Catalog Number	Inductance Microhenries	Min. Q	Self Resonant Freq.
J302-620	620 ± 5%	60	2.3 MHz
J302-680	680 ± 5%	60	2.2
J302-750	750 ± 5%	60	2.1
J302-820	820 ± 5%	60	2.0
J302-910	910 ± 5%	60	1.9
J302-1000	1000 ± 5%	60	1.8
J302-1200	1200 ± 5%	60	1.6
J302-1300	1300 ± 5%	60	1.5
J302-1500	1500 ± 5%	60	1.4
J302-1800	1800 ± 5%	55	1.3
J302-2000	2000 ± 5%	55	1.2
J302-2200	2200 ± 5%	55	1.1
J302-2400	2400 ± 5%	55	1.1
J302-2500	2500 ± 5%	55	1.1
J302-2700	2700 ± 5%	50	1.0 MHz
J302-3000	3000 ± 5%	50	960 KHz
J302-3300	3300 ± 5%	50	920
J302-3600	3600 ± 5%	50	880
J302-3900	3900 ± 5%	45	840
J302-4300	4300 ± 5%	45	800
J302-4700	4700 ± 5%	45	760
J302-5000	5000 ± 5%	40	740
J302-5100	5100 ± 5%	40	730
J302-5600	5600 ± 5%	40	700
J302-6200	6200 ± 5%	40	650
J302-6800	6800 ± 5%	40	620
J302-7500	7500 ± 5%	40	600
J302-8200	8200 ± 5%	40	560
J302-9100	9100 ± 5%	35	530
J302-10,000	10,000 ± 5%	35	500

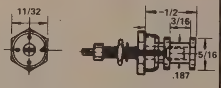
MILLEN 69000 SERIES PERMEABILITY TUNED CERAMIC FORMS


69057
69058
69051
69052
69045
69046
69043
69041
69042

SPECIAL CORE
MATERIALS AVAILABLE
ON ORDER
TEL. (617) 324–4108

3/16" DIA.

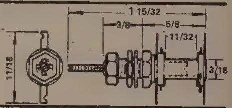
69044 –
Brass Core


11/32
1/2
3/16
5/16
.187

3/16" DIA.

69053 –
Brass Core

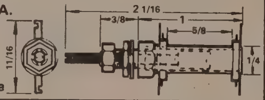
69054 –
Iron Core


1 15/32
3/8
5/8
11/32
11/16
3/16

1/4" DIA.

69057 –
Copper
Core

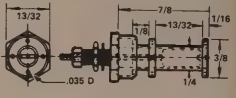
69058
Iron Core


2 1/16
3/8
1
5/8
11/16
1/4

1/4" DIA.

69047 –
Copper Core

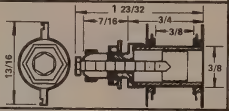
69048 –
Iron Core


13/32
7/8
1/8
13/32
1/16
3/8
.035 D
1/4

3/8" DIA.

69051 –
Copper Core

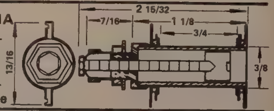
69052
Iron Core


1 23/32
7/16
3/4
3/8
13/16
3/8

3/8" DIA

69061 –
Copper
Core

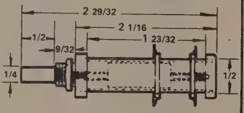
69062 –
Iron Core


2 15/32
7/16
1 1/8
3/4
13/16
3/8

1/2" DIA.

69100 –
Low Freq.

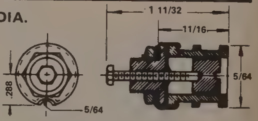
69100-H –
High Freq.


2 29/32
2 1/16
1/2
9/32
1 23/32
1/4
1/2

13/32" DIA.

69041 –
Copper
Core

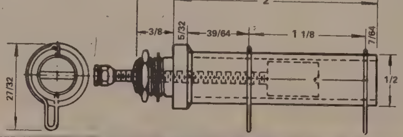
69042 –
Iron Core


1 11/32
11/16
.288
5/64
5/64

1/2" DIA.

69045 –
Copper Core

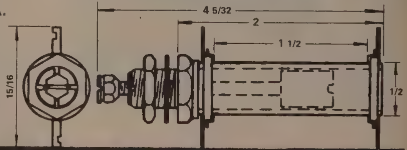
69046
Iron Core


2
3/8
5/32
39/64
1 1/8
7/64
27/32
1/2

1/2" DIA.

69055 –
Copper
Core

69056 –
Iron Core


4 5/32
2
1 1/2
15/16
1/2

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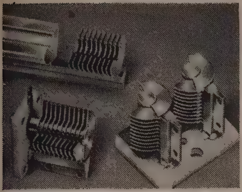
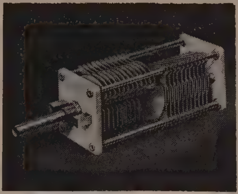
Main Office and Factory
150 EXCHANGE ST., MALDEN, MASS. 02148, U.S.A.
TEL. (617) 324-4108

MILLEN CAPACITORS—STANDARD AND "SPECIAL" ORDER TYPES

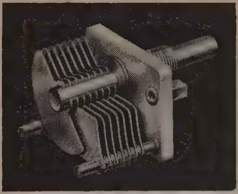


No. 25000 miniature, precision, high Q variable air dielectric capacitors with high reliability are machined from solid bars of extruded brass. Knob or screwdriver adjust from the front. Single hole mount, mount with two screws, or with tabs. 0.010" air gap. 350V. 21 plate **25035** is 4.0 to 35.8pf. 0.750" x 0.562" x 23/32"L.



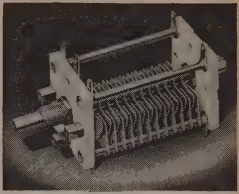
No. 28000 Straight line capacity or **No. 29000** straight line frequency. Double ceramic end plates 1 9/16" x 1 11/16". Double bearing. Single or double section. Balanced or inline rotor. Air gap 0.022"-850V. peak, 0.040"-1350V. peak, 0.066"-2250V. peak.

28227MKW 16-227pf. 1350V. 4 1/16"L.
29025KM 3.9-23.3pf. 850V. 1 9/16"L.



No. 22000 Ceramic end plate 1 1/16" x 1 7/16". Single bearing or double bearing. Air gap 0.020"-800V. peak or 0.060"-2000V. peak.

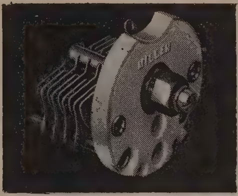
22006 2.8-7.5 pf. 800V. 1⅛"L.
22200MK 11-207pf. 800V. 2 9/16"L.
22910 4.1-12.5pf. 2000V. 1¼"L.
22950MK 8.5-57.0pf. 2000V. 3"L.



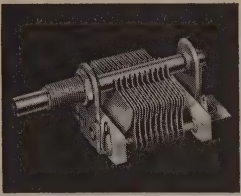
No. 23000 Ceramic end plate 1 7/16" x 1½". Single bearing or double bearing. Single or dual section. Balanced or inline rotor. Air gap: 0.020"-800V. peak or 0.060"-2000V. peak.

23907MKY 3.5-7pf. 2000V. 1 9/16"L.
23140MK 10-146.5pf. 800V. 2⅛"L.

No. 21000 series is a smaller version of the popular Millen 23000 series variable air capacitors. Single and dual sections are precision-built for smooth rotation. All plates (rotor and stator) are soldered to supporting members to insure permanent bonding and elimination of microphonics. Non-chatter brass bearings; brass plates are plated.

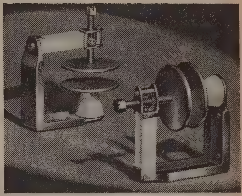


No. 17000 series is a single section tuning capacitor with a ceramic front plate. Soldered brass plates are cadmium plated, and uniformly spaced. Straight line capacity. Air gap 0.022" 850V. peak. Wide air gap capacitors may be supplied. Specify type number followed by the designation of W or Y. Gap: W—1350V. peak, Y—2250V. peak.



No. 19000 Ceramic insulators. Cross-section 1 9/16" x 1 11/16". Double bearing. Air gap 0.022"-850V. peak, 0.040"-1350 V. peak or 0.066"-2250V. peak. Single section. Tapped mounting brackets.

19335 14.7-339pf. 850V. 2⅜"L.
19950 11.6-60pf. 2250V. 2¼"L.

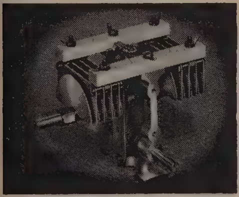


No. 15000 NEUTRALIZING CAPACITORS. Parallel discs or concentric cylinders.

15011 Disc. 3.5pf. at 0.4" gap to 18pf. at 0.04" gap.

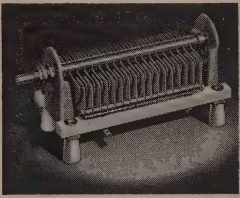
15005 Cylindrical Capacitor—3.5pf. to 16.2pf—4000V. peak.

15006 Cylindrical Capacitor—3.2pf. to 9.7pf—6000V. peak.



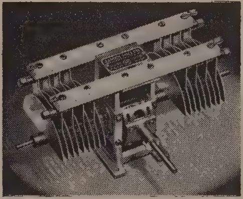
No. 11000 TRANSMITTING CAPACITORS. 16/1 or 48/1 ratio center gear drive. Ceramic insulation. Air gap 0.077"-3000V. peak or 0.176"—6000 V. peak. Aluminum plates 0.040" thick. Dual section.

11035 5.3-34pf. 3000V. 5 7/16"L.
11090 10-93pf 3000V. 7⅜"L.

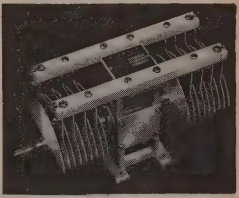


No. 12000 TRANSMITTING CAPACITORS. Rigid, heavy channeled aluminum end plates. Ceramic insulation. Single or dual section. Air gap 0.077"—3000V. peak or 0.176"—6000 V. peak. Aluminum plates 0.040" tick.

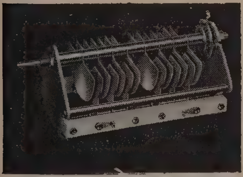
12935 9.7-28pf. 6000V. 4"L.
12515 16-150pf. 3000V. 5¼"L.



No. 04000 BALANCED TRANSMITTING CAPACITORS. 1/1 right angle center gear drive. Adjustable drive angle for sloping panel. Sturdy cast aluminum frame. Ceramic insulation. Air gap 0.077"—3000V. peak, 0.171" —6000V. peak or 0.265"—9000V. peak. Polished plates.



No. 14000 series transmitting capacitors have center-fed rotors for better high frequency current distribution, and ceramic insulation. "Designed for Application" terminals are in convenient places. End drive or right angle drive. Heavy gauge aluminum plates. Heavy cast aluminum mounting frame is employed. Rotor plate diameter is 3½".



No. 16000 TRANSMITTING CAPACITORS. Ceramic insulation. Air gap 0.077"—3000V. peak, 0.171"—6000V. peak or 0.265"—9000V. peak. Polished aluminum plates 0.050" thick. Single or dual section.

16550 13-52pf. 6000V. 3⅜"L.
16559 11-65pf. 9000V. 6¼"L.
16530 45-297pf. 6000V. 12½"L.
16512 40-128pf. 9000V. 11½"L.

Special Capacitors "Designed For Application"

At James Millen Mfg. Co., Inc. "special" capacitor designs and developments are the commonplace. Orders for unusual "special" capacitors are a specialty with us where we have the vast amount of standard parts and pieces of capacitor hardware to accomplish an infinite variety of specialized capacitors from the basic unit up to a completely new design. Whether it is a "special" capacitor to fit into a one inch cube or a capacitor a foot long, or custom units with low voltages required in solid state circuits to 9000 volt applications, James Millen Manufacturing Co., Inc. can design and produce it. Regardless of the size, voltage, or capacity, and whether it is an inline drive, right angle drive, gear box driven, or motor driven our facilities can manufacture a special capacitor to meet your specifications. Balanced low-torque constructions are also available to meet all the needs of the Armed Services and highly specialized research programs.

Since James Millen Manufacturing Co., Inc. manufactures and designs a wide range of shaft hardware (knobs, drives, couplings, locks, and gears) we can incorporate these into "special" capacitor designs to meet practically any equipment need, as well as its commercial or MIL specifications. The capacitor experience of James Millen Manufacturing Co., Inc. is based upon years of custom manufacturing for companies such as RCA, Foxboro Company and others. This experience plus the available tooling will give you an unusual advantage in obtaining "special" capacitors with speedy delivery, exacting quality and custom design at a sensible price.

JAMES MILLEN MANUFACTURING COMPANY, INC.
Main Office and Factory
150 EXCHANGE ST., MALDEN, MASS. 02148, U.S.A.
TEL. (617) 324-4108

SGL ELECTRONICS

MAGNETIC COMPONENTS

MAGNETIC LAMINATIONS

Available without tooling charge in a wide variety of EI, EE, F, DU, IU, L shapes in 6 and 14 mil. thickness, non-oriented and oriented, 80% and 50% nickel alloys. Also available in 4, 6, and selected 14 mil. grain oriented silicon steel alloys.

Special shapes are tooled in SGL's own Die Shop with either steel dies for economical short runs, or in carbide for maximum die life. Typical specialties are stamped rings, spacers, shields, in thickness down to 2 mil. with thickness tolerances as close as 50 micro-inches.

TAPE WOUND AND RING CORES

Promptly produced in gapless toroidal form — in sizes from less than ⅜″ O.D. and ⅛″ tape width, weighing from a gram to thousands of grams.

A wide selection of available alloys cover applications from tiny pulse and sensing transformers to massive cores for mag-amp controlled power supplies and inverters.

Aluminum cased cores, "EE" coated, have been used successfully in magnetic amplifiers at temperatures as high as 200°C. and have survived the shock of missile launching and in flight centrifugal and centripetal forces as high as 200 G.

SPECIFICATIONS

1. Custom annealing facilities in dry hydrogen and other atmospheres.
2. Custom stamping of flat metal parts on high speed presses.
3. High permeability foil material for magnetic shielding.
4. Permendur — For applications requiring higher saturation levels than either "O" or "S" alloys with other loop characteristics similar to "O" alloy.
5. Complete magnetic component testing, matching, grading facilities per IEEE Standard No. 106 and ASTM A346-64 (reapproved 1970).

"C" CORES

A wide range of 4 mil. "C" cores from the smallest requirements up to approximately 4½″ in overall length are available. SGL "C" cores are produced by new manufacturing techniques with special emphasis on maintaining precise dimensional and electrical uniformity, to assure easier assembly and lower power losses.

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SGL ELECTRONICS

A division of SGL INDUSTRIES, INC.

West Coast Warehouse
MAGNETIC MATERIALS
716 W. LaHabra Blvd.
LaHabra, Calif. 90631
TWX: 910-586-1642
(213) 694-2063

Factory, Engineering
Offices and
East Coast Warehouse
300 HARVARD AVE.
WESTVILLE, N.J. 08093
(609) 456-7300 TWX: 710-944-0758

REPRESENTATIVES THROUGHOUT U.S. & CAN.

SGL HOMALITE

TRANSPARENT PLASTIC MATERIALS

- **NON-GLARE CRT SCREENS**
- **LED FILTERS**
- **OPTICAL WEDGES**
- **INSTRUMENT WINDOWS**
- **FRONT PANEL DISPLAYS**

SGL Homalite manufactures high performance, optically clear and colored thermosetting plastic materials to customer specifications.

Four basic grades are available with or without the non-glare surface in assorted standard sheet sizes, or can be in-house fabricated to meet your exacting requirements.

These grades provide a combination of unique features not found in ordinary transparent plastic:

ABRASION RESISTANCE:

H-911 has the best abrasion resistance. When measured by the modified Tabor Method, H-911 exceeds Acrylic 30 to 40 times. Resistance to scratching by high-speed particles is especially good.

CHEMICAL RESISTANCE:

H-911 and H-100 are immune to the effects of virtually all solvents, including acetone and benzene, and to most chemicals other than highly oxidizing acids. H-911 and H-100 resist checking and crazing when exposed to nitric or HF fumes.

HEAT RESISTANCE:

H-101 meets UL requirements as a self-extinguishing material, and can operate in environments when the temperature is at 250°F. continuous.

RESISTANCE TO PITTING:

H-911, H-100 and H-101 have more resistance to pitting by small, hot particles than glass and most other plastics, and is many times more resistant to welding sparks and hot molten spatter.

ANTI-STATIC:

H-141, is permanently anti-static throughout the material. Slightly softer than acrylic.

Call or write us today. Our unique materials can add a new dimension to your requirements.

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PRODUCTS
SECTION

SGL HOMALITE

A division of SGL INDUSTRIES, INC.
11 BROOKSIDE DRIVE
WILMINGTON, DELAWARE 19804
(302) 652-3686

Netic & Co-Netic e.m.i. shield stock...

MAGNETIC SHIELD DIVISION

CO-NETIC NETIC

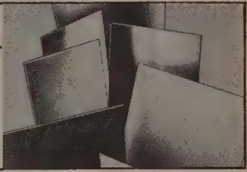
MAGNETIC SHIELD DIV. PERFECTION MICA CO.

Perfection Mica Company
740 Thomas Drive
Bensenville, Illinois 60106
(312) 766-7800 TWX (910) 256-4815

A complete stock of Netic (high saturation) and Co-Netic (high permeability) shielding alloys is available in both foil and sheet form. Our engineering department will gladly assist in the development of shield designs to meet your prototype or production-run needs.

sheet stock: (standard size — 30″ x 120″)

STD. THK. (Inch)	NETIC S3-6 ALLOY SHEET	CO-NETIC AA STRESS ANNEALED	CO-NETIC AA PERFECTION ANNEALED
.014 .020 .025 .031 .040 .050 .062	High saturation capability. Stock shipped same day as ordered. .040 NETIC not stocked.	High permeability characteristics. Stress annealed for ease of fabrication. Must be final annealed for maximum attenuation characteristics.	High permeability characteristics. Perfection annealed material has been fully hydrogen annealed for optimum magnetic properties. No further annealing after fabrication is necessary if severe forming is avoided.



foil stock: (standard rolls — 50 and 100 ft. lengths)

STD. THK. (Inch)	NETIC PERFECTION ANNEALED WIDTH (Inch)	CO-NETIC PERFECTION ANNEALED WIDTH (Inch)
.002	—	4
.004	4	4
.004	15	15
.006	—	4
.006	—	15
.010	—	4
.010	—	15

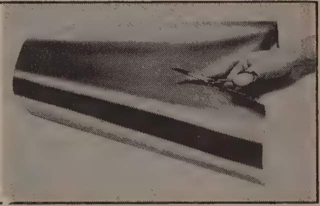
NOTES:

Standard foil shipped same day as ordered.

Adhesive backed foil shipped within 1 week of order.

Both Co-Netic AA and Netic foils can be slit to any desired width (including adhesive backed stock). Allow 1-2 weeks for delivery.

All foil is Perfection annealed for maximum attenuation characteristics.



physical & magnetic data:

	CO-NETIC AA PERFECTION ANNEALED	CO-NETIC AA STRESS ANNEALED	NETIC S3-6
Specific Gravity	8.5	8.5	7.86
Coefficient of expansion per °C x 10^{-6}	11.9	12.6	12.1
Tensile strength in PSI x 10^3	64	89.6	65
Yield strength PSI x 10^3	18	38	38
Hardness, Rockwell B	50±5	70±5	45±5
Modulus of Elasticity PSI x 10^6	25	30	29
Elongation in 2 inches, percent	27	35	30
Melting point (°F)	2680	2680	2760
Thermal conductivity (cal/sec/cm²/cm/°C) at 20°C	.138	.138	.118

	CO-NETIC AA PERFECTION ANNEALED	CO-NETIC AA STRESS ANNEALED	NETIC S3-6
Electrical Resistivity ohms/cir mil foot	337	337	60
Microhm centimeters	56	56	10
Thickness tolerance	±10%	±10%	±10%
Saturation Induction (Gauss)	7500	7500	22000
Initial Permeability	20000	15000	300
Permeability at 200 gauss	80000	60000	500
Maximum Permeability	450000	300000	3000
Induction at μmax.	3000	2800	8000
Coercive force, H_c, oersteds	.01-.03	.04-.06	1.0

photomultiplier tube shields...

Precision shields shipped from stock for 90% of photomultiplier tubes.

Photomultiplier tubes

MAGNETIC SHIELD DIVISION

Perfection Mica Company
740 Thomas Drive
Bensenville, Illinois 60106
(312) 766-7800 TWX (910) 256-4815

Co-Netic shields are not significantly affected by shock or vibration. They have minimal retentivity and do not require periodic re-annealing. When grounded, they effectively shield from electrostatic as well as magnetic fields over a wide range of intensity.

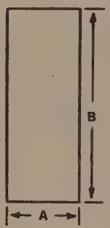
Shields can be custom engineered to your specifications and desired quantities.

Co-Netic shields improve the overall amplification characteristics of photomultiplier tubes by significantly reducing magnetic interference, especially in the low electron velocity region between the photocathode and first dynode.

SHIELDED DIMENSIONS

Part No.	Drawing	A	B	C	D	E	F	G	Notes
06P25	1	5/8	2½						
07P13V1	2	¾	1⅜		13/16	½	¼		a
10P25	1	1	2½						
10P40	1	1	4						
11P42X18	5	1⅛	4¼	1⅞	2 15/16	1 5/16	¼		d
12P31V1	2	1¼	3⅛		1 11/16	1⅛	5/8		a
12P35	1	1¼	3½						
12P45	1	1¼	4½						
13P23V1	2	1⅜	2⅜		1¼	1⅛	5/8		a
13P28V1	2	1⅜	2 13/16		1 9/16	1⅛	5/8		a
13P32V1	2	1⅜	3¼		1 15/16	1⅛	5/8		a
13P52V1	2	1⅜	5¼		3 15/16	1⅛	5/8		a
15P27	1	1½	2¾						
15P40	1	1½	4						
15P50	1	1½	5						
17P30	1	1¾	3						
17P33V1	2	1¾	3⅜		2 11/16	⅞	¾		a
17P45	1	1¾	4½						
17P53V1	4	1¾	5⅜		2¾	2⅝	¼	2 1/16	b
20P50	1	2	5						
21P45V1	3	2 3/16	4½		½	½	¼		c
21P55V1	3	2 3/16	5½		½	½	¼		c
22P40	1	2¼	4						
22P50	1	2¼	5						
22P60	1	2¼	6						
22P70	1	2¼	7						
23P55X32	6	2⅜	5 9/16		3⅜	11/16		1½	
23P61X37	6	2⅜	6⅛	3¾	¼	3¾		2⅛	
23P68X57	6	2⅜	6⅞	5¾	3	1⅞		2	
23P101X57	6	2⅜	10⅛	5¾	½	2¾		6⅞	
25P40	1	2½	4						
25P50	1	2½	5						
25P60	1	2½	6						
25P70	1	2½	7						
27P73V1	2	2¾	7⅜		3⅝	4⅜	3		a
30P67X57	6	3	6¾	5¾	3¼	1½		2	
32P80	1	3¼	8						
32P100X55	6	3¼	10	5½	3½	1		5½	
35P70	1	3½	7						

1



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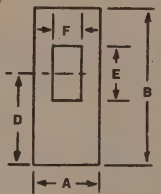

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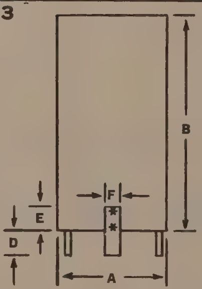

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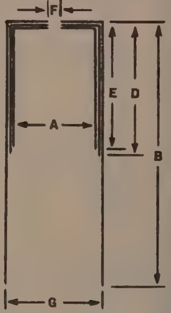


NOTES:

Unless otherwise noted:

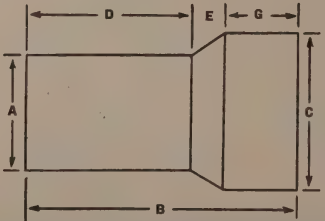
Dimensions — All ID

Material — .040″ Thick Co-Netic AA

Finish — Black baked enamel; texture outside, flat inside.

- **a** — Upper end closed.
- **b** — Dimensions D & E are measured from the outside of the outer shell. Dimension G is the maximum OD. Material — Three layers, separable; outer .049 Netic S3-6, two inner .031 Co-Netic AA Finish — Netic S3-6, black oxide; Co-Netic AA, none.
- **c** — Has three tabs, spaced 120° apart, to grip the metal collar of the PM tube.
- **d** — Material — .031″ Co-Netic AA.

6



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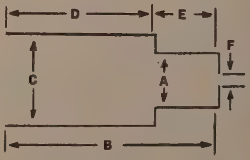

complete shielding accessories & mica

MAGNETIC SHIELD DIVISION

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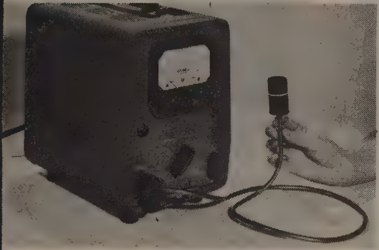
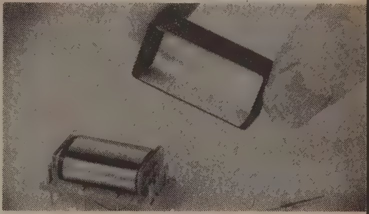


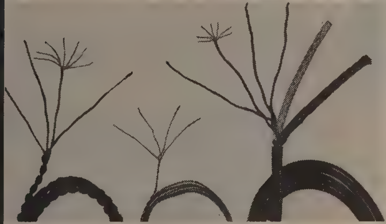
LAB KITS & PROBES

Perfection Mica's recently introduced e.m.i. shielding lab kit contains Netic and Co-Netic shielding material, double-side adhesive tape for shield construction and an LK-101 A.C. magnetic pick-up probe (output 20 millivolts/gauss @ 60Hz) . . . all for only $99.50. Higher sensitivity probes of 60 millivolts/gauss are available on individual order.

COMPONENT SHIELDS

Perfection Mica stocks many standard shield enclosures for relays, reed switches, transformers, CRT's, small motor assemblies, etc. High attenuation shields can also be quickly fabricated for special component or sub-assembly configurations. Call Perfection Mica for a fast estimate on any of your shielding needs.



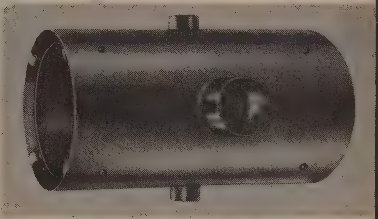


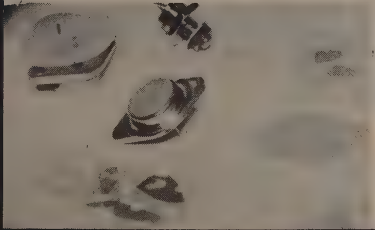
INTER-8 WEAVE CABLE

The special twisted configuration of individual wire leads within Inter-8 Weave Cable provides lower pick-up or radiation between interconnections. Typical performance improvement is −20 db for radiation and −12 db for pick-up. Plain or Co-Netic shielded cables are available in wire size 24 AWG in lengths up to 500 feet.

ZERO GAUSS CHAMBERS

Zero gauss chambers provide the ultimate in magnetic shielding. Perfection Mica's general-purpose zero gauss chamber (ZG-102), offers a significant reduction in both static and time varying fields normally found in laboratory and research environments. A Helmholtz coil system can be incorporated so that known fields can be generated for calibration purposes. Three concentrically spaced Co-Netic chambers with closed ends and two removable covers with openings for cable egress are provided.





MICA INSULATORS

All types of mica available. Supplied in clear, natural, and built-up sheet stock in thicknesses ranging from .001″ to .062″. Save tooling expense on many varieties of fabricated parts including semi-conductor insulators in .001″ to .003″ thickness with .002″ hole tolerances. Excellent heat dissipation and high dielectric strength improves breakdown protection and efficiency of semi-conductors.

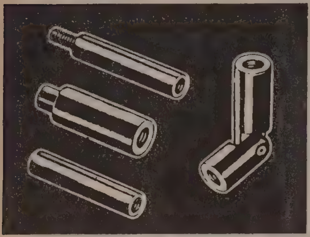
AEHCO

AMATOM ELECTRONIC HARDWARE

a Division of MITE Corporation · (203) 397-3311
446 Blake Street · New Haven · Conn. 06515 · Telex: 96-3419

Manufacturer of Standard Hardware for the Electric and Electronic Industries

Largest Stock of "OFF THE SHELF" Items Available Anywhere



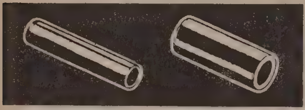
STANDOFFS

POST TYPE: Brass, Aluminum, Stainless Steel, Nylon, Phenolic, Tenite. 1/8 through 5/8 round, hex, square. Lengths: 1/8 through 10". Various thread sizes.

SWAGE TYPE: Brass, Aluminum, Stainless Steel. 1/8 through 3/8 round or hex. Lengths: 1/8 through 2". Various shank diameters and threads

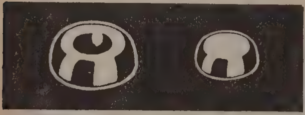
MALE–FEMALE: Brass, Aluminum, Stainless Steel, Nylon. 3/16 through 3/8 round or hex. Lengths: 1/4 through 6". Various thread sizes.

HINGED: Brass, Aluminum, Stainless Steel. 3/16 through 3/8 round. Lengths: 3/4 through 2". Internal threads, external threads, swage type. Available with legs of equal length from hinge point or with unequal leg lengths.



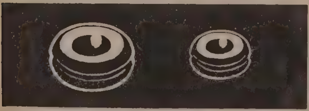
SPACERS

Brass, Aluminum, Stainless Steel, Nylon, Phenolic, Tenite. 1/8 through 1/2 OD; various ID. Lengths: up to 2" depending on diameters.



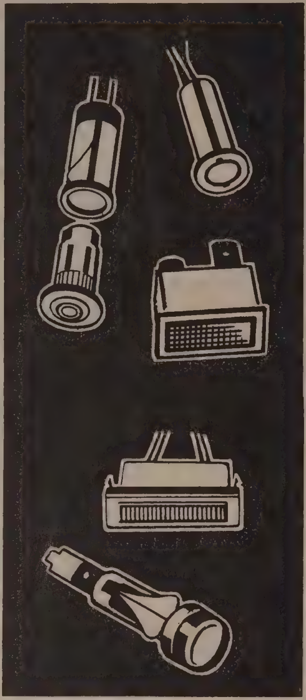
BUMPERS

Available types: machine screw, wood screw, knurled drive, recess and adhesive backed.



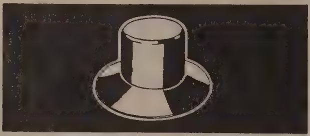
GROMMETS

Available in AN-MS and standard commercial line. 11/32 through 1-5/8 OD, 1/8 through 7/8 ID.



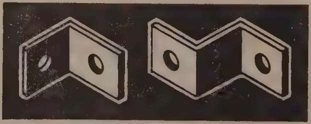
PANEL LIGHTS

Neon, fluorescent, incandescent from 6 to 380 volts. 10 colors in various shapes, sizes and terminations. Series available with interchangeable lamps.



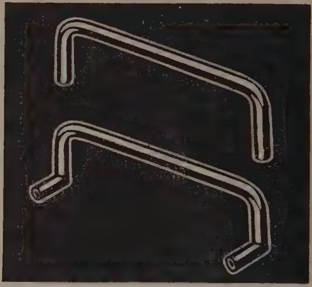
KNOBS

Machined aluminum—round, round skirted, pointer and push to turn. Variety of finishes.



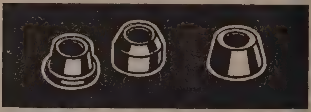
BRACKETS

"L" and "Z" brackets available with various combinations of holes—tapped or untapped.



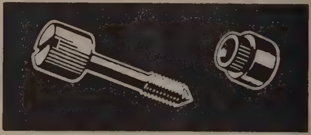
HANDLES

29 different styles available from standard round bow handles to 2 and 3 position folding handles. Rectangular, oval, extruded, tape insert, slanted, zinc die cast, circuit board, offset etc. External or internal threads. 1/8 through 3/8 round, 7/16 x 9/32 through 5/8 x 3/8 oval. Many combinations of heights and centers. Numerous finishes available.



FERRULES

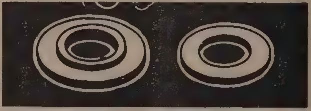
5 different styles available for 1/8 to 1/2 diameter handles in brass, aluminum and stainless steel.



CAPTIVE PANEL HARDWARE

SCREWS: Brass and Stainless Steel. 7 types available with head diameters 1/8 through 3/4. Lengths: 1/4 through 2". Threads: 4-40 through 5/16-18.

RETAINERS: Brass and Stainless Steel. 7 types available, diameters 1/4 through 7/8. Threads: 4-40 through 5/16-18.



INSULATING WASHERS

Fibre, Nylon, Phenolic, Teflon, Tenite etc.

Flat washers: .125 to 1.250 OD, .055-.563 ID, .016 to .135 thickness.

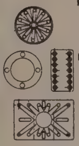
Shoulder washers: .140 to 1.500 OD, .046 to .765 ID, .019 to .187 overall thickness. Various shoulder thicknesses.

Full Line Catalog Available on Request

PACKAGING PROGRESS BY **Bivar**

circuit & packaging problem solvers.

PERMANENT COMPONENT SPACERS

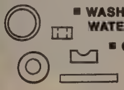


- PROTECT, INSULATE, SUPPORT COMPONENTS
- DURABLE NYLON PER MIL-M-20693
- HUNDREDS OF STANDARD STYLES
- LOW COST, IN-DEPTH STOCK

Reduce labor costs and repairs; ideal for transistors, capacitors, DIP packages.

WASH-AWAY COMPONENT SPACERS

DISS-O-PADS® provide accurate, uniform component spacing above PCB surface. Substantially reduces rejects and rework.



- WASH AWAY IN WARM OR HOT RUNNING WATER WITHOUT RESIDUE
- OVER 400 STANDARD STYLES
- IN-DEPTH STOCK; IMMEDIATE SHIPMENT

SNAP-IN CARD GUIDES

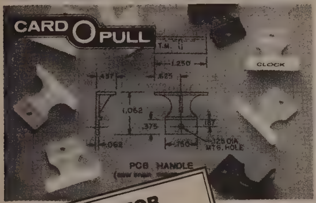
- 24 STANDARD LENGTHS FROM STOCK
- REINFORCED NYLON MOLDED
- SNAP-IN CONVENIENCE; MAXIMUM RETENTION

Snap-in convenience into card cages, sheet metal; unlimited spacing options to meet exacting needs.

PCB CARD EJECTORS

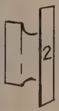
Safe, easy lever action for extraction and insertion of 1/16" and 3/32" PCB's.

- 6 STANDARD STYLES, 2 LOCKING VERSIONS
- MOLDED NYLON PER MIL-M-20693
- 12 COLORS, MARKING AVAILABLE
- STOCKED IN DEPTH



PCB CARD HANDLES

- LARGE, EASY PULL STYLE REQUIRES MINIMUM BOARD SPACE
- COLORS, MARKING AVAILABLE
- IN-DEPTH STOCK



PCB's can be easily removed or inserted and identified. Low cost, easy installation.

Hundreds of applications have provided a complete selection of standard BIVAR Component Spacers, Card Guides and PCB Card Ejectors to assist design, manufacturing and packaging engineers to improve efficiency and product appeal.

Reduced rework and rejections are assured with use of these Permanent or Temporary Spacers; and printed circuit boards are easily packaged and handled with BIVAR's Econ-O-Gide™ Snap-In Card Guides and CARD-O-PULL™ Ejectors and Handles. Although several standard models will answer most applications, special requirements are invited.

- **IMPROVE PRODUCT AND PACKAGING EFFICIENCY, APPEAL**
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- **REDUCED REWORK, REJECTIONS: FASTER ASSEMBLY**
- **LOW-COST AND IN-DEPTH STOCK FOR IMMEDIATE SHIPMENT: DISTRIBUTOR AVAILABILITY**

engineering/buyer's design and product catalogs free on request.

A complete, 24 page designer's catalog listing sizes, styles and pricing is available on request. Send for latest product/design bulletins and technical information on all BIVAR Packaging Products. Complete data will be sent immediately.

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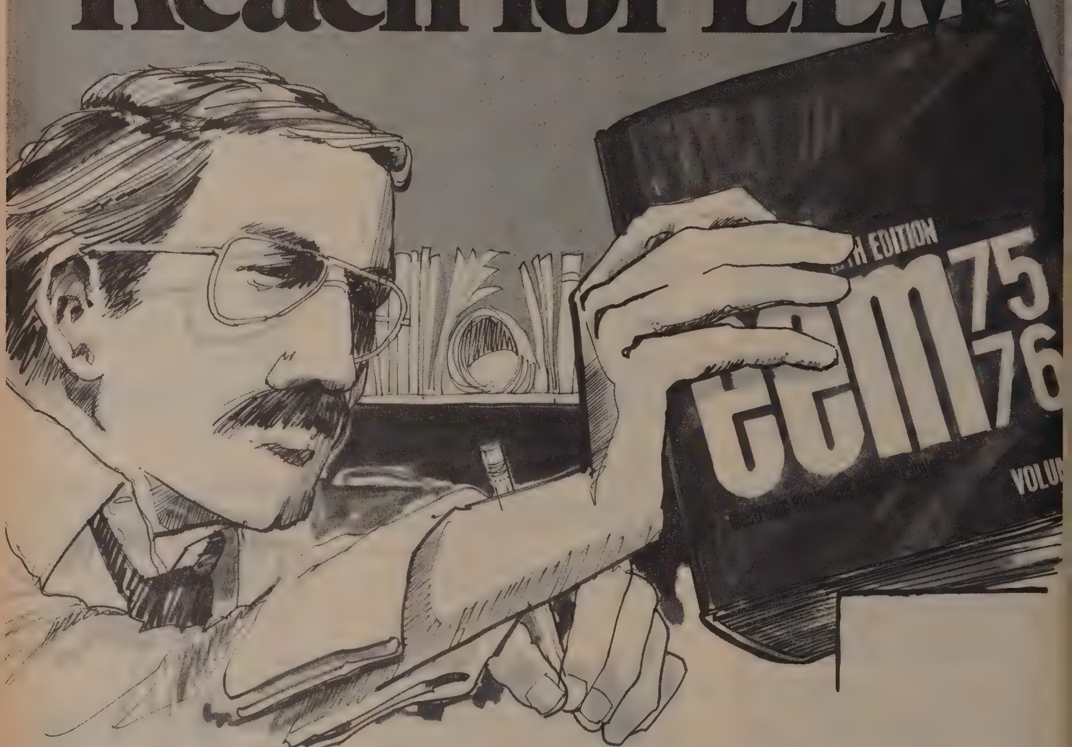
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Grayhill

TERMINATION HARDWARE SERIES 2, 22, 29

BINDING POSTS

RATING:

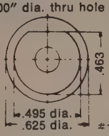
RATING AT 120 VDC: 15 amps continuously with a max temperature use of 20°C.

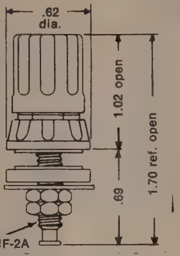
INSULATION RESISTANCE: Between stud and mounting panel — 200,000 megohms.

VOLTAGE BREAKDOWN: Between studs and mounting panel, 3000 VAC.

ACTUAL SIZE
Drawings and spec. for reference only

29-1 SCREW TYPE
SPECIFY RED OR BLACK


.100" dia. thru hole
.463
.495 dia.
.625 dia.

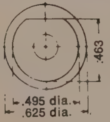

.62 dia.
1.02 open
1.70 ref. open
.69
#10-32UNF-2A

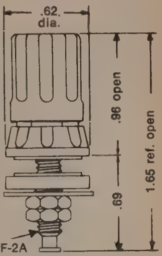
For ½" dia. mounting hole. For use in existing equipment or where wider spacing is desirable.

PRICE: Approx. $0.55 ea. 100 lots

ACTUAL SIZE
Drawings and spec. for reference only

29-33 SPRING LOADED
SPECIFY RED OR BLACK

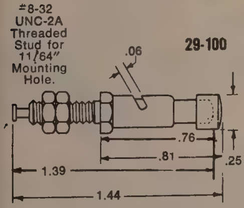

.463
.495 dia.
.625 dia.

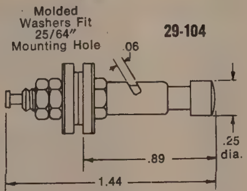

.62 dia.
.96 open
1.65 ref. open
.69
#10-32UNF-2A

For ½" mounting hole. Spring loaded head gives 24 oz. of contact force.

PRICE: Approx. $0.55 ea. 100 lots

PUSH POSTS


#8-32 UNC-2A Threaded Stud for 11/64" Mounting Hole.
29-100
.06
.76
.81
.25
1.39
1.44


Molded Washers Fit 25/64" Mounting Hole
29-104
.06
.25 dia.
.89
1.44

New plunger type binding post for positive connections. To operate, button is depressed, lead is placed in slot, and button is released. Spring pressure assures firm positive contact. Extends only ⅞" above mounting board.

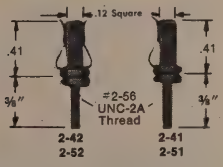
RATING AT 120 VDC: 20 amps continuously with a max. temperature use of 20°C.

ORDERING INFORMATION AND PRICES:

Part Number	Button or Cap Color	Approx. 100 pc. Lot Price
Push Posts Without Insulating Washers		
29-100R 29-100B	Red Button Cap Black Button Cap	$0.50 Ea. .50 Ea.
Push Posts With Insulating Washers		
29-104R 29-104B	Red Button Cap Black Button Cap	$0.70 Ea. .70 Ea.

TEST CLIPS

Designed for panel mounting on test equipment to allow rapid connections without manual opening and closing of jaws. Hex nut under clip allows for tension adjustment of individual clip.


.12 Square
.41
.41
⅜"
⅜"
#2-56 UNC-2A Thread
2-42
2-52
2-41
2-51

Approx. 2000 pc. Lot Price $0.40 Ea.

MINIATURE TEST CLIPS

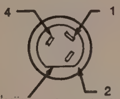
Pat. No. 3,116,101

For simplified, rapid testing of "pig-tail" components.

Part Number	Finish	Approx. 2000 pc. Lot Price
2-41	Nickel Plate	$0.40 Ea.
2-51	Gold	.60 Ea.
2-42	Nickel Plate	.45 Ea.
2-52	Gold	.60 Ea.

TRANSISTOR SOCKET

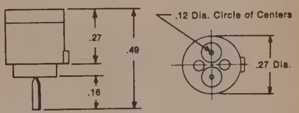
22-16-3



Hole and terminal at pos. 3 omitted

Part Number	Transistor Outlines	Dia. Pin Ctrs.	Max. Oper. Temp. (°F)	Loss Factor @ 1 Meg.	Mounting	Approx. 500 pc. Lot Price
22-16-3	TO-5, 9, 11, 16, 26, 29, 31 & 39	.200	265	.06	Tru-Arc Ring "D" Hole	$0.40 Ea.

BI-PIN LAMP SOCKET


.27
.49
.16
.12 Dia. Circle of Centers
.27 Dia.

22-3 accepts lamp size T-1¼ and T-1¾. Leads should be trimmed to .215" length for proper fit.

Part Number	Pin Diameter	Approx. 500 pc. Lot Price
22-3	.020	$0.50 Ea.

Terminals are silver plated, beryllium copper with gold plate.

✱ Available locally through your Grayhill distributor

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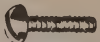
HARDWARE AND FASTENING DEVICES

PACKAGED HARDWARE

ROUND HEAD STEEL MACHINE SCREWS

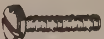
Nickel Plated



Screw Size	Pkg. of 100		Bag of 1000		
	Part No.	Per Pkg.	Part No.	1-4 Per Bag	5-9 Per Bag
2-56 x ⅛″	F-579-C	1.75	F-579-M	11.10	9.60
2-56 x ¼″	F-461-C	1.50	F-461-M	9.30	8.00
2-56 x ½″	F-462-C	1.70	F-462-M	10.70	9.25
2-56 x ¾″	F-463-C	1.75	F-463-M	11.30	9.70
3-48 x ¾″	F-464-C	2.00	F-464-M	13.40	11.55
4-36 x ¼″	F-465-C	1.85	F-465-M	12.10	10.45
4-36 x ⅜″	F-466-C	1.75	F-466-M	11.45	9.85
4-36 x ½″	F-467-C	1.85	F-467-M	12.05	10.40
4-36 x ⅝″	F-580-C	1.90	F-580-M	12.45	10.75
4-36 x ¾″	F-468-C	2.00	F-468-M	13.30	11.45
4-40 x ¼″	F-469-C	1.85	F-469-M	11.95	10.30
4-40 x ⅜″	F-581-C	1.65	F-581-M	10.45	9.00
4-40 x ½″	F-470-C	1.90	F-470-M	12.45	10.75
4-40 x ⅝″	F-582-C	1.80	F-582-M	11.60	10.00
4-40 x ¾″	F-471-C	1.95	F-471-M	12.80	11.00
6-32 x ¼″	F-472-C	1.60	F-472-M	9.80	8.45
6-32 x ⅜″	F-583-C	1.70	F-583-M	10.95	9.45
6-32 x ½″	F-473-C	1.60	F-473-M	10.15	8.70
6-32 x ⅝″	F-584-C	1.80	F-584-M	11.60	10.00
6-32 x 1″	F-475-C	2.10	F-475-M	14.10	12.15
6-32 x 1¼″	F-476-C	2.25	F-476-M	15.25	13.15
6-32 x 2″	F-477-C	3.70	F-477-M	27.55	23.75
8-32 x ¼″	F-478-C	1.80	F-478-M	11.45	9.85
8-32 x ⅜″	F-479-C	1.70	F-479-M	10.95	9.45
8-32 x ½″	F-480-C	1.85	F-480-M	11.95	10.30
8-32 x ⅝″	F-585-C	2.20	F-585-M	14.95	12.85
8-32 x ¾″	F-481-C	2.05	F-481-M	13.60	11.70
8-32 x 1″	F-482-C	2.30	F-482-M	15.95	13.75
8-32 x 1¼″	F-483-C	2.80	F-483-M	19.75	17.00
10-32 x ½″	F-484-C	2.05	F-484-M	13.50	11.65
10-32 x ⅝″	F-586-C	2.60	F-586-M	18.45	15.85
10-32 x ¾″	F-485-C	2.40	F-485-M	16.75	14.45
10-32 x 1″	F-486-C	2.95	F-486-M	21.10	18.15
10-32 x 1½″	F-487-C	3.45	F-487-M	25.25	21.75

BINDER HEAD STEEL MACHINE SCREWS

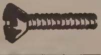
Nickel Plated



Screw Size	Pkg. of 100		Bag of 1000		
	Part No.	Per Pkg.	Part No.	1-4 Per Bag	5-9 Per Bag
2-56 x ⅛″	F-591-C	1.90	F-591-M	12.45	10.75
2-56 x ¼″	F-592-C	1.95	F-592-M	12.95	11.15
2-56 x ½″	F-953-C	2.10	F-593-M	14.10	12.15
2-56 x ⅝″	F-594-C	2.15	F-594-M	14.45	12.45
4-40 x ¼″	F-020-C	1.75	F-020-M	11.40	9.80
4-40 x ½″	F-021-C	2.05	F-021-M	13.50	11.65
4-40 x ¾″	F-022-C	2.15	F-022-M	14.70	12.65
6-32 x 3/16″	F-502-C	2.05	F-502-M	13.60	11.75
6-32 x ¼″	F-503-C	1.55	F-503-M	9.45	8.15
6-32 x ⅜″	F-504-C	1.65	F-504-M	10.45	9.00
6-32 x ½″	F-014-C	1.60	F-014-M	9.75	8.40
6-32 x ⅝″	F-621-C	1.80	F-621-M	11.45	9.85
6-32 x ¾″	F-015-C	1.90	F-015-M	12.40	10.65
8-32 x ¼″	F-023-C	1.75	F-023-M	11.25	9.70
8-32 x 5/16″	F-505-C	1.75	F-505-M	11.30	9.70
8-32 x ⅜″	F-024-C	1.70	F-024-M	10.60	9.15
8-32 x ½″	F-025-C	2.00	F-025-M	13.45	11.60
8-32 x ¾″	F-026-C	1.90	F-026-M	12.50	10.75
10-32 x ½″	F-577-C	2.45	F-577-M	16.95	14.60
10-32 x ¾″	F-578-C	2.90	F-578-M	20.80	17.90

FLAT HEAD STEEL MACHINE SCREWS

Nickel Plated



Screw Size	Pkg. of 100		Bag of 1000		
	Part No.	Per Pkg.	Part No.	1-4 Per Bag	5-9 Per Bag
4-40 x ¼″	F-622-C	1.80	F-622-M	11.60	10.00
4-40 x ⅜″	F-623-C	1.80	F-623-M	11.80	10.15
4-40 x ½″	F-624-C	1.90	F-624-M	12.30	10.60
6-32 x ¼″	F-625-C	1.60	F-625-M	9.95	8.60
6-32 x ⅜″	F-626-C	1.70	F-626-M	10.60	9.15
6-32 x ½″	F-627-C	1.80	F-627-M	11.60	10.00
6-32 x ¾″	F-628-C	1.85	F-628-M	12.10	10.45
8-32 x ⅜″	F-629-C	2.00	F-629-M	13.10	11.30
8-32 x ½″	F-630-C	2.10	F-630-M	13.95	12.00
8-32 x ¾″	F-631-C	2.25	F-631-M	15.45	13.30
10-32 x ½″	F-632-C	2.00	F-632-M	13.10	11.30

OVAL HEAD STEEL MACHINE SCREWS

Nickel Plated

Screw Size	Pkg. of 100		Bag of 1000		
	Part No.	Per Pkg.	Part No.	1-4 Per Bag	5-9 Per Bag
6-32 x ½″	F-506-C	1.80	F-506-M	11.80	10.15
6-32 x ¾″	F-507-C	1.90	F-507-M	12.45	10.75
8-32 x ¾″	F-508-C	2.15	F-508-M	14.60	12.60
10-32 x ½″	F-509-C	2.35	F-509-M	16.10	13.85
10-32 x ¾	F-510-C	2.05	F-510-M	13.55	11.65

HEX STEEL NUTS

Nickel Plated

Screw Size	Pkg. of 100		Bag of 1000		
	Part No.	Per Pkg.	Part No.	1-4 Per Bag	5-9 Per Bag
Thrd. Width Thk.					
2-56 x 3/16 x 1/16″	F-554-C	1.80	F-554-M	11.60	10.00
3-48 x 3/16 x 1/16″	F-555-C	1.90	F-555-M	12.45	10.75
4x36 x ¼ x 3/32″	F-556-C	2.00	F-556-M	13.30	11.45
4-40 x ¼ x 3/32″	F-557-C	2.10	F-557-M	14.10	12.15
6-32 x ¼ x 3/32″	F-559-C	2.20	F-559-M	14.95	12.85
6-32 x 5/16 x 7/64″	F-560-C	2.30	F-560-M	15.75	13.60
8-32 x ¼ x 3/32″	F-561-C	2.20	F-561-M	14.95	12.85
8-32 x 5/16 x 7/64″	F-562-C	2.30	F-562-M	15.75	13.60
10x32 x ⅜ x ⅛″	F-563-C	2.40	F-563-M	16.60	14.30
12-24 x 7/16 x 5/32″	F-619-C	3.40	F-619-M	25.05	21.60
¼-20 x 7/16 x 3/16″	F-564-C	3.70	F-564-M	27.50	23.70

VOLUME CONTROL & TOGGLE SWITCH MOUNTING NUTS

Nickel Plated

Screw Size	Pkg. of 100		Bag of 1000		
	Part No.	Per Pkg.	Part No.	1-4 Per Bag	5-9 Per Bag
(For Volume Control) ⅜-32 x ½ x 3/32″	F-565-C	5.60	F-565-M	43.15	37.20
(For Toggle Switch) 15/32-32 x 9/16 x 5/64″	F-566-C	3.70	F-566-M	27.40	23.60
.475-32x19/32x1/16″	F-567-C	5.20	F-567-M	39.85	34.30

HEX WASHER HEAD SHEET METAL SCREWS

(Type A) Steel-Indented
Slotted Head
Nickel Plated

Screw Size	Pkg. of 100		Bag of 1000		
	Part No.	Per Pkg.	Part No.	1-4 Per Bag	5-9 Per Bag
6 x ¼″	F-056-C	2.20	F-056-M	15.10	13.00
6 x ⅜″	F-057-C	2.10	F-057-M	14.05	12.10
6 x ½″	F-050-C	2.10	F-050-M	14.05	12.10
6 x 5/3″	F-058-C	2.25	F-058-M	15.35	13.25
6 x ¾″	F-054-C	2.30	F-054-M	15.60	13.45
8 x ¼″	F-051-C	2.30	F-051-M	15.75	13.60
8 x ⅜″	F-052-C	2.30	F-052-M	15.95	13.75
8 x ½″	F-053-C	2.45	F-053-M	17.10	14.75
8 x ⅝″	F-055-C	2.45	F-055-M	17.20	14.80
8 x ¾″	F-059-C	2.35	F-059-M	16.10	13.85

SLOTTED HEX HEAD SHEET METAL SCREWS

(Type A) — Nickel Plated

Screw Size	Pkg. of 100		Bag of 1000		
	Part No.	Per Pkg.	Part No.	1-4 Per Bag	5-9 Per Bag
4 x ⅜″	F-016-C	1.85	F-016-M	11.85	10.20
4 x ½″	F-523-C	1.90	F-523-M	12.40	10.65
6 x ¼″	F-524-C	1.95	F-524-M	12.80	11.00
6 x ⅜″	F-525-C	1.95	F-525-M	12.95	11.15
6 x ½	F-526-C	2.10	F-526-M	14.30	12.30
6 x ⅝″	F-595-C	2.20	F-595-M	14.75	12.75
6 x ¾″	F-527-C	2.30	F-527-M	15.95	13.75
8 x ¼″	F-528-C	1.90	F-528-M	12.30	10.60
8 x ⅜″	F-529-C	1.90	F-529-M	12.45	10.75
8 x ½″	F-530-C	2.05	F-530-M	13.80	11.85
8 x ⅝″	F-017-C	2.20	F-017-M	15.15	13.05
8 x 1″	F-531-C	2.60	F-531-M	18.25	15.75
10 x ⅜″	F-532-C	2.55	F-532-M	18.05	15.55
10 x ½″	F-533-C	2.50	F-533-M	17.35	14.95
10 x ¾″	F-534-C	2.85	F-534-M	20.40	17.60

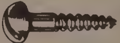
PAN HEAD SHEET METAL SCREWS

(Type A) — Nickel Plated

Screw Size	Pkg. of 100		Bag of 1000		
	Part No.	Per Pkg.	Part No.	1-4 Per Bag	5-9 Per Bag
4 x ½″	F-596-C	1.70	F-596-M	10.90	9.40
6 x ¼″	F-033-C	1.60	F-033-M	9.95	8.60
6 x ⅜″	F-597-C	1.70	F-597-M	10.70	9.25
6 x ½″	F-034-C	1.60	F-034-M	10.05	8.65
6 x ¾″	F-035-C	1.95	F-035-M	12.95	11.15
8 x ¼″	F-036-C	1.90	F-036-M	12.30	10.60
8 x ⅜″	F-598-C	1.90	F-598-M	12.45	10.75
8 x ½″	F-037-C	1.95	F-037-M	12.80	11.00
8 x 1″	F-038-C	2.50	F-038-M	17.45	15.00

ROUND HEAD STEEL WOOD SCREWS

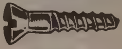
Nickel Plated



Screw Size	Pkg. of 100		Bag of 1000		
	Part No.	Per Pkg.	Part No.	1-4 Per Bag	5-9 Per Bag
4 x ½″	F-514-C	2.15	F-514-M	14.45	12.45
4 x ¾″	F-515-C	2.25	F-515-M	15.45	13.30
6 x ¾″	F-516-C	2.25	F-516-M	15.45	13.30
6 x 1″	F-517-C	2.60	F-517-M	18.45	15.90
8 x ¾″	F-518-C	2.35	F-518-M	16.25	14.00
8 x 1″	F-047-C	2.85	F-047-M	20.40	17.60
8 x 1¼″	F-519-C	2.90	F-519-M	20.90	18.00
10 x 1½″	F-520-C	3.70	F-520-M	27.40	23.60
12 x 1½″	F-521-C	4.90	F-521-M	37.20	32.05
14 x 1¾″	F-522-C	6.45	F-522-M	50.30	43.35

FLAT HEAD STEEL WOOD SCREWS

Nickel Plated



Screw Size	Pkg. of 100		Bag of 1000		
	Part No.	Per Pkg.	Part No.	1-4 Per Bag	5-9 Per Bag
8 x ½″	F-027-C	2.10	F-027-M	14.30	12.30
8 x 1″	F-048-C	2.90	F-048-M	20.75	17.90
8 x 1¼″	F-032-C	2.95	F-032-M	21.10	18.15
10 x 1½″	F-044-C	3.20	F-044-M	23.05	19.90

FLAT STEEL WASHERS

Nickel Plated

Screw Size	I.D. In.	O.D. In.	Thk. In.	Part No.	Per Pkg.	Part No.	1-4 Per Bag	5-9 Per Bag
2	.092	7/32	.018	MW-400-C	.75	MW-400-M	2.80	2.45
4	.125	9/32	.025	MW-401-C	.65	MW-401-M	2.15	1.85
6	.150	⅜	.032	MW-402-C	.75	MW-402-M	2.95	2.55
8	.170	⅜	.032	MW-403-C	.75	MW-403-M	2.80	2.45
10	.204	7/16	.032	MW-404-C	.75	MW-404-M	2.95	2.55
¼	.281	⅝	.050	MW-408-C	1.60	MW-408-M	9.80	8.45
⅜	.392	11/16	.050	MW-410-C	1.40	MW-410-M	8.15	7.00

FLAT BRASS WASHERS

Nickel Plated

Screw Size	I.D. In.	O.D. In.	Thk. In.	Part No.	Per Pkg.	Part No.	1-4 Per Bag	5-9 Per Bag
2	.092	7/32	.018	MW-400B-C	2.75	MW-400B-M	19.40	16.75
4	.125	9/32	.025	MW-401B-C	2.40	MW-401B-M	16.45	14.15
6	.150	⅜	.032	MW-402B-C	2.00	MW-402B-M	13.20	11.40
8	.170	⅜	.032	MW-403B-C	2.10	MW-403B-M	13.95	12.00
10	.204	7/16	.032	MW-404B-C	2.35	MW-404B-M	16.10	13.85

FLAT FIBER WASHERS

Screw Size	I.D. In.	O.D. In.	Thk. In.	Part No.	Per Pkg.	Part No.	1-4 Per Bag	5-9 Per Bag
4	.120	¼	1/32	FW-374-C	.90	FW-374-M	4.15	3.60
6	.145	¼	1/32	FW-375-C	.90	FW-375-M	4.15	3.60
8	3/16	⅜	1/32	FW-376-C	.90	FW-376-M	4.15	3.60
10	.192	⅜	1/32	FW-377-C	.90	FW-377-M	4.30	3.70
¼	.255	½	1/32	FW-378-C	1.10	FW-378-M	5.65	4.85
⅜	⅜	⅝	1/32	FW-379-C	1.20	FW-379-M	6.80	5.85
7/16	.440	¾	1/32	FW-380-C	2.05	FW-380-M	13.60	11.75

EXTRUDED FIBER WASHERS

Screw Size	I.D. In.	O.D. In.	Thk. In.	Part No.	Per Pkg.	Part No.	1-4 Per Bag	5-9 Per Bag
4	⅛	9/32	5/64	FW-384-C	2.35	FW-384-M	16.10	13.85
6	9/64	5/16	5/64	FW-385-C	2.20	FW-385-M	15.00	12.95
8	11/64	⅜	3/32	FW-386-C	2.35	FW-386-M	16.25	14.00
10	13/64	7/16	3/32	FW-387-C	2.50	FW-387-M	17.45	15.00
¼	.256	½	3/32	FW-388-C	2.75	FW-388-M	19.60	16.85
⅜	.375	⅝	3/32	FW-389-C	3.00	FW-389-M	21.75	18.75

STEEL CUP WASHERS

Nickel Plated

Screw Size	I.D. In.	O.D. In.	Thk. In.	Part No.	Per Pkg.	Part No.	1-4 Per Bag	5-9 Per Bag
6				CW-6-C	.85	CW-6-M	3.65	3.15
8				CW-8-C	1.00	CW-8-M	4.90	4.25
10				CW-10-C	1.10	CW-10-M	6.00	5.20

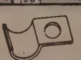
STEEL SPLIT LOCK WASHERS

Zinc Plated

Screw Size	I.D. In.	O.D. In.	Thk. In.	Part No.	Per Pkg.	Part No.	1-4 Per Bag	5-9 Per Bag
#4 Screw				MW-411-C	.85	MW-411-M	3.70	3.20
#6 Screw				MW-412-C	.75	MW-412-M	3.00	2.55
#8 Screw				MW-413-C	.80	MW-413-M	3.25	2.80
#10 Screw				MW-414-C	.80	MW-414-M	3.15	2.70
#¼ Screw				MW-415-C	.95	MW-415-M	4.60	3.95

METAL CABLE CLAMPS

Cadmium Plated



Mtl. In.	Ht. In.	W. In.	Wire Hold Area	Part No.	Per Pkg.	Part No.	1-4 Per Bag	5-9 Per Bag
.020B	7/16	¼	3/32	C-201-C	1.80	C-201-M	11.80	10.15
.032S	⅝	⅜	10/64	C-202-C	1.95	C-202-M	12.80	11.00
.032S	11/16	⅜	1/4	C-203-C	2.05	C-203-M	13.60	11.75
.032S	15/16	⅜	10/32	C-204-C	2.35	C-204-M	16.00	13.80

WRITE FOR QUOTATIONS ON LARGER QUANTITIES

HARDWARE AND FASTENING DEVICES

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PACKAGED HARDWARE

VINYL GROMMETS

- Exceptional Aging Qualities*
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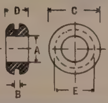


A	B	C	D	E	Pkg. of 100 Part No.	Pkg. of 100 Per Pkg.	Bag of 1000 Part No.	Bag of 1000 1-4 Per Bag	Bag of 1000 5-9 Per Bag
1/8	1/16	11/32	3/16	1/4	G-401-C	2.00	G-401-M	13.10	11.30
3/16	1/16	7/16	7/32	5/16	G-402-C	2.25	G-402-M	15.20	13.10
1/4	1/16	9/16	1/4	3/8	G-403-C	2.50	G-403-M	17.45	15.00
5/16	1/16	5/8	1/4	7/16	G-404-C	2.80	G-404-M	19.75	17.00
3/8	1/16	5/8	1/4	1/2	G-405-C	2.75	G-405-M	19.60	16.85
1/2	1/16	13/16	9/32	5/8	G-406-C*	4.80	G-406-M	33.05	28.45
5/8	1/16	1 1/8	9/32	7/8	G-407-C*	7.20	G-407-M	46.40	40.00

*(50)

These grommets were tested by Underwriters Laboratories in a circulating air oven at 212°F for seven days with no visible change.

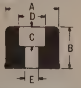
RUBBER GROMMETS

A	B	C	D	E	Pkg. of 100 Part No.	Pkg. of 100 Per Pkg.	Bag of 1000 Part No.	Bag of 1000 1-4 Per Bag	Bag of 1000 5-9 Per [illegible]
1/8	1/16	11/32	3/16	1/4	G-300-C	2.50	G-300-M	17.60	15.15
5/16	1/16	9/16	3/16	15/32	G-301-C	3.25	G-301-M	23.55	20.30
3/8	1/16	11/32	9/32	1/2	G-302-C	5.30	G-302-M	37.25	32.10
3/16	1/16	7/16	7/32	5/16	G-305-C	3.05	G-305-M	21.90	18.90
7/16	3/64	3/4	1/4	19/32	G-307-C*	5.60	G-307-M	40.00	34.45
11/32	1/16	5/8	5/16	15/32	G-309-C	3.30	G-309-M	24.25	20.90
5/8	1/16	1 1/8	5/16	7/8	G-311-C**	10.20	G-311-M	71.60	61.65

*(50) **(25)

RUBBER BUMPERS

Recess Screw Type



For mounting on all types of Electronic Equipment. Prevents vibration and protects surfaces under equipment from being marred.

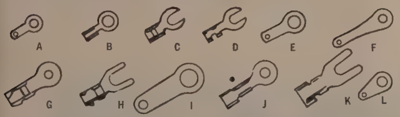
A	B	C	D	E	Pkg. of 100 Part No.	Pkg. of 100 Per Pkg.	Bag of 1000 Part No.	Bag of 1000 1-4 Per Bag	Bag of 1000 5-9 Per Bag
1/2	1/4	5/32	1/4	1/8	B-321-C	3.65	B-321-M	27.10	23.35
3/4	1/4	1/8	1/4	1/8	B-322-C*	8.10	B-322-M	53.95	46.50
5/8	3/8	7/32	1/4	1/8	B-323-C*	8.20	B-323-M	54.60	47.05
3/4	3/8	7/32	1/4	1/8	B-324-C*	8.50	B-324-M	57.25	49.35

*(25)

Button Type

A	B	C	D	E	Pkg. of 100 Part No.	Pkg. of 100 Per Pkg.	Bag of 1000 Part No.	Bag of 1000 1-4 Per Bag	Bag of 1000 5-9 Per Bag
3/8	3/8	17/64	3/16	.040	B-361-C	5.00	B-361-M	38.20	32.90
1/2	7/16	11/32	1/4	.040	B-362-C	4.70	B-362-M	35.85	30.90
5/8	9/16	15/32	5/16	.040	B-363-C	8.80	B-363-M	59.70	51.40

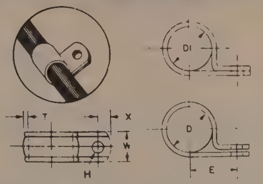
SOLDER TERMINAL AND SPADE LUGS



Supplied with hot-tin dipping in brass (B), or copper (C) as specified in Material (Mtl.) column.

Fig.	Mtl., Thickness	Hole Size	Length In.	Pkg. of 100 Part No.	Pkg. of 100 Per Pkg.	Bag of 1000 Part No.	Bag of 1000 1-4 Per Bag	Bag of 1000 5-9 Per Bag
A	.015C	#2	21/64	T-251-C	1.60	T-251-M	9.80	8.45
A	.020B	#6	1/2	T-151-C	1.60	T-151-M	10.10	8.70
A	.020B	#8	13/16	T-152-C	2.35	T-152-M	16.40	14.15
A	.020B	#10	13/16	T-153-C	2.40	T-153-M	16.45	14.20
B	.020C	#4	9/16	T-226-C	1.85	T-226-M	12.20	10.50
B	.032C	#6	1/2	T-156-C	1.90	T-156-M	12.65	10.90
B	.020B	#8	21/32	T-227-C	3.25	T-227-M	23.55	20.30
B	.020B	#10	21/32	T-228-C	3.00	T-228-M	21.75	18.75
C	.020B	#8	41/64	T-157-C	2.35	T-157-M	16.10	13.85
D	.020B	#6	21/32	T-158-C	2.20	T-158-M	14.80	12.75
D	.020B	#8	21/32	T-159-C	2.35	T-159-M	16.35	14.05
D	.020B	#10	47/64	T-225-C	2.80	T-225-M	19.90	17.15
E	.015B	#8	47/64	T-162-C	2.60	T-162-M	18.25	15.75
F	.025B	#6	1	T-163-C	2.40	T-163-M	16.55	14.25
F	.025B	#8	1	T-164-C	2.40	T-164-M	16.45	14.15
G	.020C	#6	15/16	T-166-C	4.55	T-166-M	34.35	29.65
G	.020C	#8	15/16	T-167-C	4.55	T-167-M	34.35	29.65
G	.020C	#10	15/16	T-168-C	4.55	T-168-M	34.45	29.60
H	.020B	3/16"	25/32	T-170-C	2.95	T-170-M	21.10	18.15
I	.020B	#10	1 5/32	T-173-C	Disc.	T-173-M	Discontinued	
J	.032B	#8	15/16	T-187-C	5.00	T-187-M	38.25	32.95
J	.032B	#10	15/16	T-188-C	5.45	T-188-M	42.05	36.25
K	.032B	#8	1	T-193-C	6.15	T-193-M	47.80	41.20
L	.020B	#6	9/16	T-154-C	1.70	T-154-M	10.90	9.40
L	.015C	#8	17/32	T-224-C	2.55	T-224-M	17.80	15.35

CABLE CLAMPS



NYLON CABLE CLAMPS

D	D₁	E	BLUE LINE Pkg. of 100 or as shown ( ) Part No.	BLUE LINE Per Pkg.	BULK PACK Pkg. of 1000 Part No.	BULK PACK 1-4 Per Bag	BULK PACK 5 or more Per Bag
1/8"	.125	.310	CCN-31-C	3.05	CCN-31-M	22.10	19.00
3/16"	.188	.373	CCN-32-C	3.20	CCN-32-M	23.30	20.10
1/4"	.250	.407	CCN-33-C	3.30	CCN-33-M	24.25	20.90
5/16"	.313	.448	CCN-34-C	3.80	CCN-34-M	24.75	21.30
3/8"	.375	.479	CCN-35-C (50)	3.85	CCN-35-M	25.30	21.80
7/16"	.438	.510	CCN-36-C (50)	3.95	CCN-36-M	26.15	22.50
1/2"	.500	.542	CCN-37-C (50)	4.00	CCN-37-M	26.75	23.00
9/16"	.563	.623	CCN-38-C (25)	4.85	CCN-38-M	27.15	23.40
5/8"	.625	.638	CCN-39-C (25)	5.00	CCN-39-M	28.15	24.25
11/16"	.688	.752	CCN-40-C (20)	6.85	CCN-40-M	40.25	34.70
3/4"	.750	.783	CCN-41-C (20)	6 90	CCN-41-M	40.50	34.90
7/8"	.875	.845	CCN-42-C (20)	7.25	CCN-42-M	43.60	37.55
1"	1.000	.908	CCN-43-C (15)	10.05	CCN-43-M	61.25	52.75

Width: Up to CCN-37, 3/8". All others are 1/2". 3/8" width have .167 mounting hole, 1/2" width have 13/64" mounting hole. 3/8" width are .040" thickness, 1/2" width are .060" thickness.

BUTYRATE CABLE CLAMPS

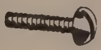
D	D₁	E	BLUE LINE Pkg. of 100 or as shown ( ) Part No.	BLUE LINE Per Pkg.	BULK PACK Pkg. of 1000 Part No.	BULK PACK 1-4 Per Bag	BULK PACK 5 or more Per Bag
1/8"	.115	.310	CCB-1-C	3.90	CCB-1-M	29.20	25.15
3/16"	.172	.373	CCB-2-C	3.95	CCB-2-M	29.40	25.30
1/4"	.234	.407	CCB-3-C	4.40	CCB-3-M	29.70	25.60
5/16"	.297	.448	CCB-4-C (50)	4.45	CCB-4-M	30.40	26.15
3/8"	.359	.479	CCB-5-C (50)	4.70	CCB-5-M	32.40	27.90
7/16"	.422	.510	CCB-6-C (40)	4.95	CCB-6-M	32.75	28.25
1/2"	.484	.542	CCB-7-C (40)	4.65	CCB-7-M	30.20	26.05
9/16"	.547	.623	CCB-8-C (30)	5.40	CCB-8-M	33.60	28.95
5/8"	.609	.654	CCB-9-C (25)	5.80	CCB-9-M	34.85	30.05
11/16"	.672	.752	CCB-10-C (20)	6.50	CCB-10-M	37.20	32.05
3/4"	.734	.783	CCB-11-C (20)	6.85	CCB-11-M	40.15	34.60
7/8"	.859	.845	CCB-12-C (20)	7.25	CCB-12-M	43.50	37.45
1"	.934	.908	CCB-13-C (15)	8.15	CCB-13-M	45.30	39.05
1 1/2"	1.102	.970	CCB-14-C (15)	9.00	CCB-14-M	52.60	45.35
1 1/4"	1.227	1.062	CCB-15-C (10)	11.15	CCB-15-M	59.25	51.05

Thickness: .060". Width: 1/2". Mounting hole: 13/64", 7/32" from end of clamp.

NYLON FLAT WASHERS

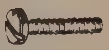
Part No.	I.D.	O.D.	Thickness	Net Prices Pkg. of 100	Net Prices Bulk 1000 or More Per M
NW-875	#4 (.120)	9/32	.050	1.20	6.45
NW-876	#6 (.150)	5/16	.050	1.25	7.15
NW-877	#8 (.170)	3/8	.060	1.80	11.65
NW-878	#10 (.195)	7/16	.060	1.85	12.20

NYLON SCREWS



Round Head

Description	Part No.	Net Prices Pkg. of 100	Net Prices Bulk 1000 or More, Per M
2-56 x 1/4"	FN-800	4.75	36.20
2-56 x 1/2"	FN-801	4.90	37.35
4-40 x 1/4"	FN-802	5.00	38.00
4-40 x 1/2"	FN-803	5.00	38.20
4-40 x 3/4"	FN-804	5.10	39.20
6-32 x 1/4"	FN-805	4.90	37.20
6-32 x 3/8"	FN-806	5.00	38.00
6-32 x 1/2"	FN-807	5.00	38.20
6-32 x 5/8"	FN-808	5.10	39.20
6-32 x 3/4"	FN-809	5.15	39.30
8-32 x 3/8"	FN-810	5.15	39.35
8-32 x 1/2"	FN-811	5.15	39.50
8-32 x 3/4"	FN-812	5.55	42.65
10-32 x 1/2"	FN-813	6.10	47.30
10-32 x 1"	FN-814	6.10	47.40



Binder Head

Description	Part No.	Net Prices Pkg. of 100	Net Prices Bulk 1000 or More, Per M
2-56 x 1/4"	FN-815	4.70	35.70
2-56 x 1/2"	FN-816	4.85	36.85
4-40 x 1/4"	FN-817	5.00	38.00
4-40 x 1/2"	FN-818	5.00	38.20
4-40 x 3/4"	FN-819	5.10	39.20
6-32 x 1/4"	FN-820	4.90	37.20
6-32 x 3/8"	FN-821	5.00	38.00
6-32 x 1/2"	FN-822	5.00	38.20
6-32 x 5/8"	FN-823	5.10	39.20
6-32 x 3/4"	FN-824	5.15	39.30
8-32 x 3/8"	FN-825	5.15	39.35
8-32 x 1/2"	FN-826	5.15	39.50
8-32 x 3/4"	FN-827	5.55	42.65
10-32 x 1/2"	FN-828	6.10	47.30
10-32 x 1"	FN-829	6.10	47.40

NYLON HEX NUTS

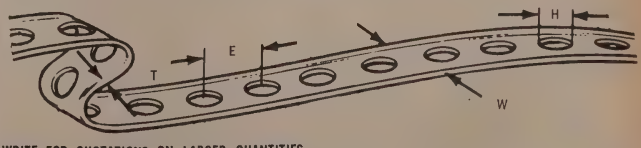
Description	Part No.	Net Prices Pkg. of 100	Net Prices Bulk 1000 or More, Per M
2-56	FN-853	5.30	40.50
4-40	FN-854	5.30	40.65
6-32	FN-855	5.30	40.85
8-32	FN-856	5.35	41.00
10-32	FN-857	5.90	45.65

PERFORATED NYLON STRAPPING

Part No.	W	T	H	E	Average Breaking Load in Pounds	Net Prices 25 ft. Roll	Net Prices 50 ft. Roll	Suggested Fastening and Mounting Methods
NS-932-25	9/32	.032	.095	3/16	23	20.65		SB-4 Stud Button, #2 Machine Screw or 3/32" Rivet
NS-932-50							37.95	
NS-38-25	3/8	.040	.167	3/16	51	16.15		#8 Machine Screw or SB-5 Stud Button
NS-38-50							29.60	
NS-12-25	1/2	.060	.203	25/64	107	16.25		#10 Machine Screw or SB-6 Stud Button
NS-12-50							29.35	

Part No.	H	A	B	C	D	L	Net Prices 100-999 Per C	Net Prices 1M-Over Per M
*SB-4	3/32	.093	.078	.105	.033	.206	4.60	34.85
†SB-5	11/32	.125	.137	.202	.165	.297	6.20	48.15
‡SB-6	15/32	.156	.153	.238	.200	.359	6.70	52.10

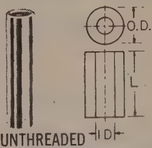
*SB-4 for use with Strapping NS-932 — 25 or 50
†SB-5 for use with Strapping NS-38 — 25 or 50
‡SB-6 for use with Strapping NS-12 — 25 or 50



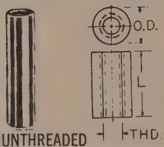
WRITE FOR QUOTATIONS ON LARGER QUANTITIES molex

4633 WEST 53rd STREET / CHICAGO, ILLINOIS 60632 / (312) 585-1212

waldom space-it's



ROUND UNTHREADED



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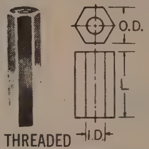
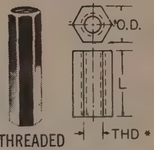


HEX THREADED



HEX THREADED

ROUND BRASS SPACERS CADMIUM PLATED - Std. Pkg. 100

Length "L"	¼" OD — UNTHREADED					¼" OD — THREADED				⅜" OD — UNTHREADED		
	Clearance Hole (ID)					Thread Size (ID)				Clearance Hole (ID)		
	#4 (.115) P/N	#6 (.140) P/N	#8 (.171) P/N	Per C	4-40 P/N	6-32 P/N	8-32 P/N	Per C	#4 (.115) P/N	#6 (.140) P/N	#8 (.171) P/N	Per C
.125	60001	60016	60031	5.60	60046	60061	60076	7.25	60091	60106	60121	10.00
.1875	60002	60017	60032	6.05	60047	60062	60077	7.50	60092	60107	60122	11.65
.250	60003	60018	60033	6.85	60048	60063	60078	7.80	60093	60108	60123	12.25
.3125	60004	60019	60034	7.75	60049	60064	60079	8.30	60094	60109	60124	13.10
.375	60005	60020	60035	8.25	60050	60065	60080	9.30	60095	60110	60125	15.55
.4375	60006	60021	60036	9.00	60051	60066	60081	9.75	60096	60111	60126	16.55
.500	60007	60022	60037	9.20	60052	60067	60082	12.10	60097	60112	60127	16.90
.5625	60008	60023	60038	10.50	60053	60068	60083	12.90	60098	60113	60128	21.35
.625	60009	60024	60039	11.00	60054	60069	60084	13.40	60099	60114	60129	20.30
.6875	60010	60025	60040	13.75	60055	60070	60085	17.40	60100	60115	60130	22.85
.750	60011	60026	60041	14.20	60056	60071	60086	17.65	60101	60116	60131	20.20
.8125	60012	60027	60042	14.70	60057	60072	60087	17.80	60102	60117	60132	23.60
.875	60013	60028	60043	16.00	60058	60073	60088	18.70	60103	60118	60133	26.80
.9375	60014	60029	60044	16.50	60059	60074	60089	19.25	60104	60119	60134	27.60
1.000	60015	60030	60045	18.25	60060	60075	60090	20.50	60105	60120	60135	28.70

HEX BRASS SPACERS CADMIUM PLATED - Std.Pkg.100

Length "L"	¼" HEX — UNTHREADED					¼" HEX THREADED				⅜" HEX — UNTHREADED		
	Clearance Hole (ID)					Thread Size (ID)				Clearance Hole (ID)		
	#4 (.115) P/N	#6 (.140) P/N	#8 (.171) P/N	Per C	4-40 P/N	6-32 P/N	8-32 P/N	Per C	#4 (.115) P/N	#6 (.140) P/N	#8 (.171) P/N	Per C
.125	60136	60151	60166	6.25	60181	60196	60211	7.35	60226	60241	60256	10.20
.1875	60137	60152	60167	6.65	60182	60197	60212	7.85	60227	60242	60257	11.65
.250	60138	60153	60168	7.35	60183	60198	60213	8.50	60228	60243	60258	12.65
.3125	60139	60154	60169	8.70	60184	60199	60214	9.20	60229	60244	60259	14.50
.375	60140	60155	60170	9.00	60185	60200	60215	10.35	60230	60245	60260	15.85
.4375	60141	60156	60171	9.30	60186	60201	60216	11.15	60231	60246	60261	19.40
.500	60142	60157	60172	9.60	60187	60202	60217	12.15	60232	60247	60262	20.00
.5625	60143	60158	60173	10.55	60188	60203	60218	14.20	60233	60248	60263	21.00
.625	60144	60159	60174	11.15	60189	60204	60219	17.00	60234	60249	60264	23.20
.6875	60145	60160	60175	13.90	60190	60205	60220	17.90	60235	60250	60265	23.60
.750	60146	60161	60176	14.20	60191	60206	60221	18.90	60236	60251	60266	24.60
.8125	60147	60162	60177	15.35	60192	60207	60222	19.60	60237	60252	60267	25.80
.875	60148	60163	60178	17.15	60193	60208	60223	19.90	60238	60253	60268	29.00
.9375	60149	60164	60179	18.60	60194	60209	60224	20.85	60239	60254	60269	29.40
1.000	60150	60165	60180	19.60	60195	60210	60225	22.50	60240	60255	60270	32.00

ROUND FIBRE SPACERS

ROUND NYLON SPACERS

ROUND PHENOLIC THREADED SPACERS

Length "L"	¼" OD — UNTHREADED				¼" OD — UNTHREADED				¼" OD — THREADED			
	Clearance Hole (ID)				Clearance Hole (ID)				Thread Size (ID)			
	#4 (.115) P/N	#6 (.140) P/N	#8 (.171) P/N	Per C	#4 (.115) P/N	#6 (.140) P/N	#8 (.171) P/N	Per C	4-40 P/N	6-32 P/N	8-32 P/N	Per C
.125	60271	60286	60301	5.10	60316	60331	60346	3.25	—	—	—	—
.1875	60272	60287	60302	5.65	60317	60332	60347	3.70	—	—	—	—
.250	60273	60288	60303	6.15	60318	60333	60348	4.20	60361	60374	60387	9.20
.3125	60274	60289	60304	6.95	60319	60334	60349	4.80	60362	60375	60388	10.20
.375	60275	60290	60305	7.65	60320	60335	60350	5.40	60363	60376	60389	11.65
.4375	60276	60291	60306	8.35	60321	60336	60351	5.85	60364	60377	60390	12.15
.500	60277	60292	60307	9.00	60322	60337	60352	6.35	60365	60378	60391	13.10
.5625	60278	60293	60308	10.00	60323	60338	60353	6.85	60366	60379	60392	13.70
.625	60279	60294	60309	10.40	60324	60339	60354	7.35	60367	60380	60393	14.70
.6875	60280	60295	60310	11.45	60325	60340	60355	7.85	60368	60381	60394	16.35
.750	60281	60296	60311	12.35	60326	60341	60356	8.20	60369	60382	60395	17.35
.8125	60282	60297	60312	13.50	60327	60342	60357	8.60	60370	60383	60396	18.00
.875	60283	60298	60313	14.20	60328	60343	60358	9.10	60371	60384	60397	19.00
.9375	60284	60299	60314	14.90	60329	60344	60359	9.50	60372	60385	60398	19.60
1.000	60285	60300	60315	15.20	60330	60345	60360	9.80	60373	60386	60399	20.60

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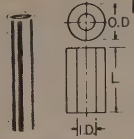
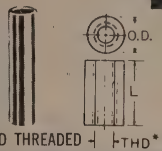
molex

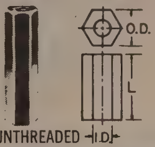
space-it's



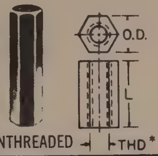
ROUND THREADED



ROUND THREADED



HEX UNTHREADED



HEX UNTHREADED

ROUND ALUMINUM SPACERS - Irridite 14-2 per MIL-C-5541 - Std. Pkg. 100

	¼″ OD — UNTHREADED				⁵⁄₁₆″ OD		¼″ OD — THREADED				⁵⁄₁₆″ OD	
	Clearance Hole (ID)				Clearance Hole (ID)		Thread Size (ID)				Thread Size (ID)	
Length "L"	#4 (.115) P/N	#6 (.140) P/N	#8 (.171) P/N	Per C	#10 (.200) P/N	Per C	4-40 P/N	6-32 P/N	8-32 P/N	Per C	10-32 P/N	Per C
.125	60400	60418	60436	4.90	60454	6.85	60472	60488	60504	5.90	60520	7.85
.250	60401	60419	60437	5.90	60455	7.85	60473	60489	60505	6.85	60521	8.80
.375	60402	60420	60438	6.85	60456	8.80	60474	60490	60506	7.85	60522	9.80
.500	60403	60421	60439	7.85	60457	9.80	60475	60491	60507	8.80	60523	10.80
.625	60404	60422	60440	8.80	60458	10.75	60476	60492	60508	9.80	60524	11.75
.750	60405	60423	60441	9.80	60459	11.75	60477	60493	60509	10.80	60525	12.75
.875	60406	60424	60442	10.75	60460	12.75	60478	60494	60510	11.75	60526	13.70
1.000	60407	60425	60443	11.75	60461	13.70	60479	60495	60511	13.70	60527	14.70
1.250	60408	60426	60444	12.75	60462	14.70	60480	60496	06512	15.65	60528	15.65
1.500	60409	60427	60445	23.50	60463	26.45	60481	60497	60513	17.65	60529	17.65
1.750	60410	60428	60446	24.50	60464	27.45	60482	60498	60514	19.60	60530	19.60
2.000	60411	60429	60447	25.50	60465	28.40	60483	60499	60515	21.55	60531	21.55
2.50	60412	60430	60448	26.45	60466	29.40	60484	60500	60516	23.50	60532	23.50
3.00	60413	60431	60449	27.45	60467	30.40	60485	60501	60517	25.50	60533	25.50
3.50	60414	60432	60450	31.35	60468	31.35	60486	60502	60518	27.45	60534	27.45
4.00	60415	60433	60451	36.25	60469	32.35	60487	60503	60519	35.30	60535	29.40
5.00	60416	60434	60452	37.25	60470	33.30	—	—	—	—	—	—
6.00	60417	60435	60453	47.00	60471	34.30	—	—	—	—	—	—

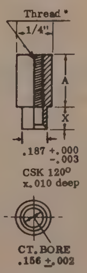
HEX ALUMINUM SPACERS - Irridite 14-2 per MIL-C-5541 - Std. Pkg. 100

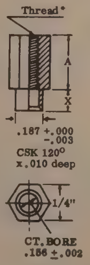
	¼″ HEX — UNTHREADED				⁵⁄₁₆″ HEX		¼″ HEX THREADED				⁵⁄₁₆″ HEX	
	Clearance Hole (ID)				Clearance Hole (ID)		Thread Size (ID)				Thread Size (ID)	
Length "L"	#4 (.115) P/N	#6 (.140) P/N	#8 (.171) P/N	Per C	#10 (.200) P/N	Per C	4-40 P/N	6-32 P/N	8-32 P/N	Per C	10-32 P/N	Per C
.125	60536	60548	60560	5.90	60572	8.80	60584	60600	60616	6.85	60632	9.80
.250	60537	60549	60561	6.85	60573	9.80	60585	60601	60617	7.85	60633	10.80
.375	60538	60550	60562	7.85	60574	10.80	60586	60602	60618	8.80	60634	11.75
.500	60539	60551	60563	8.80	60575	11.75	60587	60603	60619	9.80	60635	12.75
.625	60540	60552	60564	9.80	60576	12.75	60588	60604	60620	10.80	60636	13.70
.750	60541	60553	60565	10.80	60577	13.70	60589	60605	60621	11.75	60637	14.70
.875	60542	60554	60566	11.75	60578	14.70	60590	60606	60622	12.75	60638	15.70
1.000	60543	60555	60567	12.75	60579	15.70	60591	60607	60623	13.70	60639	16.65
1.250	60544	60556	60568	23.50	60580	26.45	60592	60608	60624	15.70	60640	18.60
1.500	60545	60557	60569	24.50	60581	27.45	60593	60609	60625	17.65	60641	20.60
1.750	60546	60558	60570	25.50	60582	82.40	60594	60610	60626	19.60	60642	22.55
2.000	60547	60559	60571	26.45	60583	29.40	60595	60611	60627	21.55	60643	24.50
2.50	—	—	—	—	—	—	60596	60612	60628	23.50	60644	26.45
3.00	—	—	—	—	—	—	60597	60613	60629	25.50	60645	28.40
3.50	—	—	—	—	—	—	60598	60614	60630	27.45	60646	30.40
4.00	—	—	—	—	—	—	60599	60615	60631	34.30	60647	32.35

THREADED SWAGE STANDOFFS - Brass Nickel Plated

ROUND

HEX





Length A	Length X	ROUND THREADED 4-40 P/N	ROUND THREADED 6-32 P/N	ROUND THREADED 8-32 P/N	Per C	HEX THREADED 4-40 P/N	HEX THREADED 6-32 P/N	HEX THREADED 8-32 P/N	Per C
¼	.105	60648	60666	60684	10.20	60702	60720	60738	10.80
¼	.135	60649	60667	60685	10.20	60703	60721	60739	10.80
¼	.165	60650	60668	60686	10.20	60704	60722	60740	10.80
⅜	.105	60651	60669	60687	11.75	60705	60723	60741	12.40
⅜	.135	60652	60670	60688	11.75	60706	60724	60742	12.40
⅜	.165	60653	60671	60689	11.75	60707	60725	60743	12.40
½	.105	60654	60672	60690	14.40	60708	60726	60744	15.10
½	.135	60655	60673	60691	14.30	60709	60727	60745	15.10
½	.165	60656	60674	60692	14.30	60710	60728	60746	15.10
⅝	.105	60657	60675	60693	15.10	60711	60729	60747	15.70
⅝	.135	60658	60676	60694	15.10	60712	60730	60748	15.70
⅝	.165	60659	60677	60695	15.10	60713	60731	60749	15.70
¾	.105	60660	60678	60696	16.65	60714	60732	60750	17.35
¾	.135	60661	60679	60697	16.65	60715	60733	60751	17.35
¾	.165	60662	60680	60698	16.65	60716	60734	60752	17.35
1″	.105	60663	60681	60699	21.60	60717	60735	60753	22.25
1″	.135	60664	60682	60700	21.60	60718	60736	60754	22.25
1″	.165	60665	60683	60701	21.60	60719	60737	60755	22.25

Waldom/Bivar
DISSOPADS™

- IMPROVE RELIABILITY
- REDUCE PRODUCTION COSTS
- NYLON PER MIL-M-20693

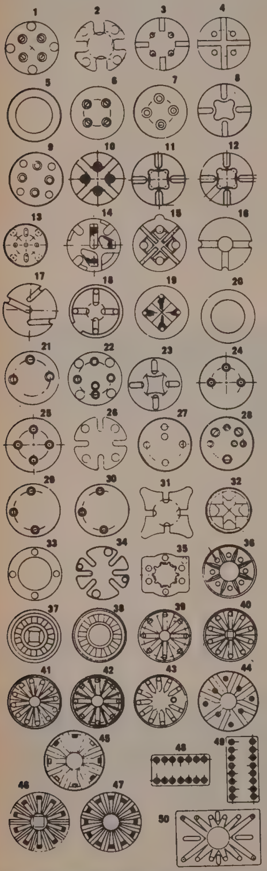
HARDWARE (NON-CURRENT CARRYING)

PERMANENT

PERM O PAD®

FOR . . . PROTECTING, LOCATING, FIXTURING, SPACING, MOUNTING & REINFORCING . . . TRANSISTORS, INTEGRATED CIRCUITS & OTHER PRINTED CIRCUIT COMPONENTS.

PERMANENT MOUNTING SPACERS give protective support, shock mounting, added insulation, greater heat dissipation, cleanliness and improve neatness. PERM-O-PADs are molded from Nylon per MIL-M-20693 and are available from stock in a multitude of configurations. There are many unique designs to choose from in these economical mounts.



Part No.	Fig.	O.D.	Thickness	Spacing of Leads		100-499 Per C	500-999 Per C	1000-4,999 Per M	5,000-9,999 Per M	10,000 up Per M
				Entry	Exit					
100-095	1	.200	.095	.100	.100	$4.35	$3.35	$23.75	$21.25	$17.00
101-096	2	.200	.096	.100	.100	4.35	3.35	23.75	21.25	17.00
102-125	3	.250	.125	.100	.100	4.35	3.35	23.75	21.25	17.00
111-125	4	.250	.125	.100	.100	4.35	3.35	23.75	21.25	17.00
103-080	5	.225	.080	.100	.100	4.35	3.35	23.75	21.25	17.00
104-060	6	.200	.060	.100	.100	4.35	3.35	23.75	21.25	17.00
105-021	7	.250	.021	.100	.100	4.35	3.35	23.75	21.25	17.00
106-045	8	.270	.045	.100	.100	4.35	3.35	23.75	21.25	17.00
107-180	9	.200	.180	.100	.100	4.35	3.35	23.75	21.25	17.00
108-021	10	.225	.021	.100	.100	4.35	3.35	23.75	21.25	17.00
109-045	11	.200	.045	.100	.100	4.35	3.35	23.75	21.25	17.00
110-030	12	.200	.030	.100	.100	4.35	3.35	23.75	21.25	17.00
112-040	13	.230	.040	.100	.100	4.35	3.35	23.75	21.25	17.00
200-170	14	.225	.170	.100	.200	$4.70	$3.65	$26.50	$22.50	$18.25
201-150	15	.310	.150	.100	.200	4.70	3.65	26.50	22.50	18.25
202-150	16	.250	.150	.100	.200	4.70	3.65	26.50	22.50	18.25
203-150	17	.250	.150	.100	.200	4.70	3.65	26.50	22.50	18.25
204-125	18	.270	.125	.100	.200	4.70	3.65	26.50	22.50	18.25
205-085	19	.225	.085	.100	.150	4.70	3.65	26.50	22.50	18.25
500-080	20	.365	.080	.200	.200	$4.70	$3.65	$26.50	$22.50	$18.25
501-075	21	.345	.075	.200	.200	4.70	3.65	26.50	22.50	18.25
502-120	22	.345	.120	.200	.200	4.70	3.65	26.50	22.50	18.25
503-075	23	.345	.075	.200	.200	4.70	3.65	26.50	22.50	18.25
504-038	24	.345	.038	.200	.200	4.70	3.65	26.50	22.50	18.25
511-038	25	.345	.038	.200	.200	4.70	3.65	26.50	22.50	18.25
505-120	26	.350	.120	.200	.200	4.70	3.65	26.50	22.50	18.25
506-038	27	.350	.038	.200	.200	4.70	3.65	26.50	22.50	18.25
507-100	28	.340	.100	.200	.200	4.70	3.65	26.50	22.50	18.25
508-075	29	.281	.075	.200	.200	4.70	3.65	26.50	22.50	18.25
510-110	30	.281	.110	.200	.200	4.70	3.65	26.50	22.50	18.25
509-060	31	.312	.060	.200	.200	4.70	3.65	26.50	22.50	18.25
512-115	32	.230	.115	.200	.200	4.70	3.65	26.50	22.50	18.25

Part No.	Fig.	No. of Leads	O.D.	Thickness	Spacing of Leads		100-499 Per C	500-999 Per C	1000-4,999 Per M	5,000-9,999 Per M	10,000 up Per M
					Entry	Exit					
600-080	33	—	.365	.080	.200/.230	.200/.230	$4.70	$3.65	$26.50	$22.50	$18.25
601-120	34	6	.350	.120	.200/.230	.200/.230	5.00	3.85	27.00	24.00	19.25
608-090	35	10	.390	.090	.200/.230	.200/.230	5.50	4.25	30.00	27.00	21.50
605-085	36	8	.370	.085	.200/.230	.200/.230	5.50	4.25	30.00	27.00	21.50
606-075	37	10	.370	.075	.200/.230	.200/.230	5.50	4.25	30.00	27.00	21.50
607-075	38	12	.370	.075	.200/.230	.200/.230	5.50	4.25	30.00	27.00	21.50
700-130	39	8	.500	.130	.200/.230	.400	$8.40	$6.70	$46.80	$41.75	$33.45
701-130	40	10	.500	.130	.200/.230	.400	8.40	6.70	46.80	41.75	33.45
702-130	41	12	.500	.130	.200/.230	.400	8.40	6.70	46.80	41.75	33.45
707-120	42	8	.450	.120	.200/.230	.400	8.40	6.70	46.80	41.75	33.45
708-275	43	12	.500	.275	.200/.230	.400	8.40	6.70	46.80	41.75	33.45
703-250	44	8	.500	.250	.200/.230	.400	9.05	7.25	50.75	45.30	36.25
704-250	45	8	.500	.250	.200/.230	.400	9.05	7.25	50.75	45.30	36.25
705-250	46	10	.500	.250	.200/.230	.400	9.05	7.25	50.75	45.30	36.25
706-250	47	12	.500	.250	.200/.230	.400	9.05	7.25	50.75	45.30	36.25
			Width								
814-060	48	14	.450	.060	.100	.100	$8.40	$6.70	$46.80	$41.75	$33.45
814-080	48	14	.450	.080	.100	.100	8.40	6.70	46.80	41.75	33.45
814-100	48	14	.450	.100	.100	.100	8.40	6.70	46.80	41.75	33.45
816-060	49	16	.450	.060	.100	.100	8.40	6.70	46.80	41.75	33.45
816-080	49	16	.450	.080	.100	.100	8.40	6.70	46.80	41.75	33.45
816-100	49	16	.450	.100	.100	.100	8.40	6.70	46.80	41.75	33.45
808-187	50	8	.385	.187	.200/.230	DIP	9.05	7.25	50.75	45.30	36.25
810-187	50	10	.385	.187	.200/.230	DIP	9.05	7.25	50.75	45.30	36.25
812-187	50	12	.385	.187	.200/.230	DIP	9.05	7.25	50.75	45.30	36.25

WASH-AWAY

DISS O PAD®

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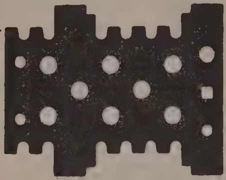
FOR EVERYTHING IN NATURAL & SYNTHETIC MICA

40 YEARS OF KNOW HOW.

Precision-punched parts and specialties made from natural and synthetic micas, plastics, and other insulating materials suggested for use as insulating components in the following partial list of products.

IndoMica Type MS



A new insulating product, which closely approximates the electrical, mechanical, chemical and thermal properties of Natural Mica.

IndoMica, Type MS, consists of natural high heat resistant mica platelets BONDED WITH BORON BASE SILICONE RESIN for high temperature applications. It is available in 10″ x 36″ sheets in thicknesses of 0.015″ to 0.060″ and in 20″ x 36″ sheets in thicknesses of 0.015″ to 0.032″ or precision punched to your specifications.

It offers: inorganic, odorless, smokeless insulation; high mechanical strength and durability; regular thickness and sheet sizes, easy to punch to specific requirements; high temperature resistance and stability; chemical inertness and resistance; excellent dielectric properties.

Recommended for use as a self-supporting carrier of heating coils in appliances and industrial apparatus, as mechanical and thermal washers and gaskets, as a substrate, or insulating board for mounting components and similar applications.

Outstanding properties include: Specific Gravity: 1.9. AIEE Thermal Classification: Class C. Maximum Continuous Use Temperature: 1200°F. Maximum Intermittent Use Temperature: 1400°F. Dielectric Strength per ASTM-D115: For .015″ Sheet 1012V/mil. Dielectric Strength per ASTM-D115. For .030″ Sheet 830V/mil. Surface Resistivity per ASTM-D257: 10^{15} megohm. Dielectric Constant per ASTM-D150: 2.95. Dissipation Factor per ASTM-D150: 0.33. Volume Resistivity per ASTM-D257: 10^{14} megohm-cm. Arc Resistance per ASTM-D495: 198 sec. Water Absorption, Weight Gain After 24 Hours Immersion: 0.91%. Coefficient of Linear Expansion: 9×10^{6} per °C. Tensile Strength: 30,000 psi. Compressive Strength: 36,000 psi. Flexural Modulus: 15×10^{6} psi.

IndoMica 21

Just as IndoMica Type MS, this new series 21 consists of natural high heat resistant mica platelets bonded with boron base silicone resin.

IndoMica series 21 is available in sheet sizes of approximately 22″ x 40″ in standard thicknesses of .004, .006, .008, .010, .012, .014 inches in the following three types:

IndoMica 21 - Soft
This material is similar to IndoMica Type MS but with a softer surface. It is not recommended for continuous applications above 500°F.

IndoMica 21 - Regular
This material has same properties as IndoMica Type MS and its only difference are thinner thicknesses of the sheets.

IndoMica 21 - Hard
Material similar to IndoMica Type MS but with a substantially harder surface, higher mechanical strength and lower water absorption.

In addition to the standard thicknesses indicated above, IndoMica series 21 may be manufactured to other thicknesses on special orders.

IndoMica GR

This new version of IndoMica consists of mica paper reinforced by fibre glass. The extreme flexibility and mechanical strength of IndoMica series GR makes it an excellent material for application as a wrap around coil subject to high temperatures. This Class C material is presently available in sheet sizes of approximately 22″ x 38″ in two standard types:

IndoMica GR - 1
is fibre glass reinforced on one side only and has a total thickness of approximately 0.005″.

IndoMica GR - 2
is fibre glass reinforced on both sides and has a total thickness of approximately 0.006″.

Natural Mica

Unsurpassed for its insulating properties for electrical and electronic applications, mica components manufactured by our Industrial Mica Division have been a standard for forty years.

Vacuum tube and capacitor manufacturers are just a few of the many customers who have taken advantage of coated natural mica spacers to reduce manufacturing shrinkage due to delamination. In addition, coating mica offers superior degassing properties and better dielectric parameters.

Industrial Mica offers an improved corrugated natural mica which enables the user to form thick mica sheets into curved patterns. This unique material overcomes the rigid properties that are inherent in natural mica and minimizes breakage during fabrication.

INDUSTRIAL MICA
A DIVISION OF COLUMBIA TECHNICAL CORPORATION
223 South Van Brunt St., Englewood, N. J. 07631 Telephone (201) 568-7200

HumiSeal® Protective coatings for electronics. See our General Chart of Properties in Section 1600 (Volume 2) of EEM.
HumiSeal Division, Columbia Technical Corporation. Woodside, N. Y. 11377 (212) 932-0800.

FOR EVERYTHING IN

NATURAL & SYNTHETIC MICA TRANSISTOR MOUNTINGS

40 YEARS OF KNOW HOW.

Precision-punched parts and specialties made from natural and synthetic micas, plastics, and other insulating materials suggested for use as insulating components in the following partial list of products.

Possessing exceptional thermal and electrical properties, which afford highly effective protection against electrical losses, free from pressure-induced distortion, achieve rapid heat dissipation and are extremely lightweight. Outstanding chemical inertness and an absence of degassing characteristics make them particularly well suited for varied vaccum and spacer applications.

Major specifications include:

Specific heat — 0.207
Volume resistivity — 10^{15} chm/cm^3
Dielectric strength — 3000 volts/mil
Dielectric constant — 6
Maximum operating temperature — 1400°F

Mica Pads and Spacers are available in both standard and custom produced items. When ordered from stock, units can be supplied at prices as low as $5.00 per thousand.

Quality control is the keynote of our production facilities. We employ the use of the latest inspection equipment which includes 14″ and 30″ optical comparators, templates, electric taper pin gauges, electronic thickness gauges, etc. Our punch presses were built to punch precision parts. Dies, whether the blanking type, compound or pressure for flawless edges, are the best in the world.

We fabricate tons of precoated Mica (magnesium oxide and aluminum oxide coating). We hand cut, machine and punch, not only Mica, but Inorganic Micamat and Isomica as well as other insulation materials such as mylar and teflon.

We offer you decades of experience with a history of quality which allows us to look ahead for additional advancement for the mineral — Mica.

INDUSTRIAL MICA A DIVISION OF COLUMBIA TECHNICAL CORPORATION
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HumiSeal Protective coatings for electronics. See our General Chart of Properties in Section 1600 (Volume 2) of EEM.
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HUMISEAL COATINGS

GENERAL CHART

Listed in this General Chart of Properties are ten of the most frequently used HumiSeal Protective Coatings and their principal properties. These have been tabulated in order to facilitate comparison of their characteristics and selection of the most suitable type for a specific application. In addition to these HumiSeal types we manufacture a variety of coatings for special purposes, including high temperature applications. Should none of the coatings listed in this chart fulfill your requirements, we suggest that you contact us for recommendations.

	PROPERTIES OF LIQUID HumiSeal										THERMAL PROPERTIES		
HumiSeal Type[1]	Specific Weight (lbs. per gallon)[2]	Solids Content (% by weight)[3]	Viscosity, with catalyst when applicable (centipoises)[4]	Flash Point (°F)[5]	Drying Time for Handling[6]	Recommended Curing Conditions	Time Required to Reach Optimum Properties	Pot Life, at Room Temperature	Shelf Life, at Room Temperature	Coverage per gallon (in sq. ft.) After One Dip	Continuous Use Temperature Range (°F)	Thermal Shock Test[7]	Solderability[8]
1B12	7.3	20	30	40	10 min.	24 hrs. at room temp. or 30 min. at 170°F	24 hrs.	1 year	1 year	550	−75°F to +280°F	Passes	Good
1B15	7.6	35	470	30	10 min.	24 hrs. at room temp. or 30 min. at 170°F	24 hrs.	1 year	1 year	450	−75°F to +270°F	Passes	Good
1B31	7.6	35	160	30	10 min.	24 hrs. at room temp. or 30 min. at 170°F	24 hrs.	6 mos.	6 mos.	450	−75°F to +270°F	Passes	Good
1A20	8.5	50	120	60	60 min.	24 hrs. at room temp.	1 week	6 mos.	6 mos.	375	−70°F to +250°F	Passes	Excellent
1A27	8.0	50	5000	100	15 min.	24 hrs. at room temp.	1 week	1 year	1 year	450	−90°F to +250°F	Passes	Excellent
1A33	7.7	44	160	30	15 min.	24 hrs. at room temp.	1 week	6 mos.	6 mos.	300	−90°F to +250°F	Passes	Excellent
2A72	7.8	36	<20	70	60 min.	24 hrs. at room temp. or 2 hrs at 170°F	1 week	4 hrs.	6 mos.	650	−70°F to +250°F	Passes	Excellent
2B13	7.5	42	50	40	30 min.	90 min. at 200°F	1 week	24 hrs.	1 year	480	−70°F to +270°F	Passes	Poor
2A51	9.2	100	6000	non flammable	2 hrs.	24 hrs. at room temp. or 2 hrs. at 200°F	1 week	6 hrs.	6 mos.	200	−70°F to +250°F	Passes	Poor
2A53	7.8	54	300	70	30 min.	2 hrs. at 200°F	1 week	24 hrs.	6 mos.	400	−70°F to +250°F	Passes	Poor

HumiSeal TYPES LISTED IN BOLD PRINT COMPLY WITH THE REQUIREMENTS OF MIL-I-46058C

All technical data in this bulletin are based on test results using the stated standards and are believed to be correct. However, since the end use of HumiSeal materials (and the manner of storing and handling them) is beyond our control, we make no warranty — expressed or implied — as to the fitness of use, results to be obtained from or effects of use with respect to these materials. Their use shall be solely by the judgment of and at the risk of the end-user notwithstanding any statement contained in this bulletin.

1. The first digit in the type number specifies whether the product is a one-, or a two-component system.
2. Fed-Std 141a, Method 4184.
3. Fed-Std 141a, Method 4044.
4. Fed.Std 141a, Method 4287.
5. Fed-Std 141a, Method 4291.
6. Fed-Std 141a, Method 4061.
7. Mil-I-46058C.
8. Visual evaluation for ease of soldering with an 85 watt iron through a 2 mil film.
9. Fluorescent dye may be added if required.
10. Fed-Std 141a, Method 2121.
11. Fed-Std 406, Method 7031, Procedure A.
12. Fed-Std 141a, Method 6303.
13. ASTM-D150-65T, at 1 MHz and 25°C.
14. Mil-I-46058C Insulation resistance during 10th cycle, at 65°C and 98% RH.

FOR ELECTRONICS

OF PROPERTIES

HumiSeal Protective Coatings are available in one-quart or one-gallon cans, five-gallon pails, or fifty-five gallon drums. HumiSeal types 1B15 and 1A27 are also available in 16-ounce aerosol containers. All HumiSeal types listed in this chart may be applied by dip, brush or spray. Literature on recommended techniques for the proper application of coatings and preparation of the substrate is available upon request.

PROPERTIES OF CURED HumiSeal COATING

PHYSICAL PROPERTIES							ELECTRICAL PROPERTIES					CHEMICAL PROPERTIES			
Color[9]	Specific Gravity	Average Build After One Dip (mils)[10]	Water Absorption (%)[11]	Flexibility[7]	Adhesion[12]	Mar Resistance[12]	Dielectric Constant[13]	Dissipation Factor[13]	Dielectric Strength (volts)[7]	Insulation Resistance (teraohms)[7]	Moisture Resistance (gigaohms)[14]	Main Constituent	Fungus Resistance[7]	Resistance to Solvents	HumiSeal Type[1]
Water Clear	1.05	0.5	.18	Very Good	Excellent	Very Good	2.8	.010	6000	250	30	Acrylic	Excellent	Very Good	1B12
Water Clear	1.05	2	.20	Fair	Excellent	Fair	2.3	.010	8000	350	40	Acrylic	Excellent	Fair	1B15
Water Clear	1.06	2	.20	Excellent	Excellent	Very Good	2.5	.010	7500	800	60	Acrylic	Excellent	Good	1B31
Light Straw	1.05	2	.30	Excellent	Very Good	Excellent	3.5	.028	8000	300	48	Polyurethane	Excellent	Excellent	1A20
Green Tinge	1.05	5	.31	Excellent	Excellent	Fair	3.6	.020	7500	200	12	Polyurethane	Fair	Good	1A27
Yellow Tinge	1.05	2	.31	Excellent	Excellent	Fair	3.6	.030	7500	200	16	Polyurethane	Excellent	Good	1A33
Yellow Tinge	1.09	0.5	.30	Excellent	Excellent	Good	3.6	.024	3500	300	56	Polyurethane	Excellent	Excellent	2A72
Yellow Tinge	1.06	2	.20	Excellent	Excellent	Excellent	3.0	.030	8000	300	33	Epoxy	Excellent	Excellent	2B13
Yellow Tinge	1.10	15	.31	Fair	Good	Good	3.0	.030	6000	400	6	Epoxy	Excellent	Good	2A51
Yellow Tinge	0.95	1	.30	Excellent	Excellent	Excellent	3.0	.030	8000	200	28	Epoxy	Excellent	Excellent	2A53

HUMISEAL DIVISION
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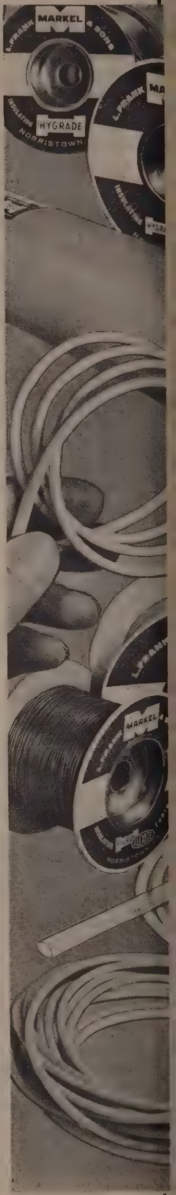
Insulating Tubings and Sleevings— High Temperature Wire and Cable



ELECTRICAL INSULATING SLEEVINGS

HYGRADE®

HYGRADE SR-398 Silicone Rubber Coated Fiberglass Sleeving is a Class H material made of closely-woven glass braid, coated with highly abrasion-resistant silicone rubber.

HYGRADE SV-862 Silicone Varnish Impregnated Fiberglass Sleeving is a flexible Class H insulation with unusual resistance to temperature extremes and weathering.

HYGRADE VF Flexible Fiberglass Sleeving is a tough, Class B insulation of plastic-covered fiberglass with excellent electrical resistance, flexibility, and heat stability. (UL FR-1)

HYGRADE Polytube 463 Class F Flexible Fiberglass Sleeving is an acrylic-coated material especially compatible with the wire enamels used in motors and transformers.

HYGRADE Thermoflex 1200 Class C Flexible Fiberglass Sleeving is made of 100% tightly braided fiberglass. For use at continuous temperatures as high as 1200°C. (UL FR-1)

HYGRADE Thermoflex 500 Class C Flexible Fiberglass Sleeving is made of tightly braided and pigmented fiberglass. For continuous operating temperatures to 500°C. (UL FR-1)

ELECTRICAL GRADE PLASTIC TUBINGS

FLEXITE®

FLEXITE TEFLON TFE Extruded Tubing offers unequaled quality, performance and scope in electrical insulation over the widest and most stable temperature range of any flexible insulation (below −70°C to +250°C). Its unique performance characteristics are superb electrical properties, unmatched chemical resistance, zero moisture absorption, non-corrosive to all metals, completely inert to fungi, and excellent anti-stick properties—having the lowest coefficient of friction of any solid material. With nearly infinite life under normal operating conditions, Teflon TFE is the ultimate space age insulating material.

FLEXITE TEFLON FEP Extruded Tubing is a fluorocarbon material that combines long-term reliability (matched only by TFE) with chemical inertness, flexibility, superb electrical characteristics and a useful continuous operating temperature range of −70°C to +200°C.

FLEXITE SR-200 Silicone Rubber Extruded Tubing is made of an extremely elastic compound, and is excellent for high voltage applications at Class H temperatures.

FLEXITE HT-105C Extruded Vinyl Tubing is UL recognized for continuous use at 105°C. It is a strong, very flexible tubing for many applications. (UL FR-1)

FLEXITE E Extruded Vinyl Tubing is an extremely flexible tubing designed primarily for low temperature applications (to −68°C), as in aeronautical instrumentation.

FLEXITE Shrinkdown HT105 is a flexible material made in expanded sizes to shrink 50% with 110°C heating; has outstanding electrical and mechanical properties. (UL FR-1)

FLEXITE Shrinkdown LM-145 is a very flexible modified polyolefin tubing that will shrink 50% with 120°C heating and conform closely to the object it covers. It is suitable for use at temperatures to 135°C; has excellent mechanical strength and abrasion resistance.

FLEXITE Shrinkdown PO-135 is a thermally-stable Class B (130°C) crosslinked material extruded from specially-formulated polymers. Supplied in expanded sizes, PO-135 may easily be assembled over components, connectors, cables, or other irregular shapes. When exposed to heat (150°C), it shrinks 50% in diameter, forming a tough, smooth insulating covering with excellent chemical, electrical and oil resistant properties.

FLEXITE Shrinkdown HM-140 is a heat shrinkable semi-rigid polyolefin tubing with exceptional mechanical strength and electrical properties. It has outstanding chemical resistance and may be operated continuously at temperatures from −55°C to +175°C. (UL FR-1)

FLEXITE Shrinkdown HA-150 is a heat shrinkable polyvinylidene fluoride tubing with an operating temperature range of −55°C to +175°C. It is a very tough material with high resistance to abrasion and cut through suitable for strain relief applications. (UL FR-1)

Ask for data sheets on these HYGRADE and FLEXITE products

Insulating Tubings and Sleevings— High Temperature Wire and Cable

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FLEXITE Shrinkdown TE-250 is a heat shrinkable Class H tubing with the unique properties of Teflon, plus the ability to shrink at 330°C to make a form-fitting cover over shapes.

FLEXITE SPIRAL-CUT CABLE WRAP is an expandable plastic wrap for harnessing, insulating, and the abrasion protection of wires, tubing lines, cables, or bundles in diameters up to four inches. Quick and easy to apply, the cable wrap provides openings through which leads can be broken out at any point, yet creates a firm, homogeneous harness assembly which can be channeled, bent or flexed without danger of cut through. Manufactured in five different materials to meet a wide variety of requirements over a temperature range from −100°C to +250°C.

FLEXTECH® FLUID AND MECHANICAL GRADE PLASTIC TUBINGS

FLEXTECH AR-400 Abrasion-Resistant Tubing is extruded from a Markel patented composition of reinforced Teflon and exhibits abrasion resistance many times greater than conventional Teflon tubings. It also offers good antistick properties, chemical inertness, high and low temperature stability, and meets the electrical requirements of MIL-I-22129C. Ideal for an extremely wide range of mechanical and viscous fluid transfer uses.

FLEXTECH AR-420 Abrasion-Resistant Tubing is extruded from a Markel-formulated reinforced Teflon. With chemical properties similar to AR-400, cut-through and abrasion resistance second only to AR-400, AR-420 also offers excellent flexibility and meets the requirements of MIL-I-22129C. Ideal for fluidic controls and transfer of fluids in difficult environments.

FLEXTECH TEFLON FEP is a fluorocarbon tubing suitable for continuous 200°C use in applications requiring the chemical inertness, durability, and other desirable properties of TFE but without the extreme high temperature requirements. It has nearly zero moisture absorbency, good antistick properties and semi-transparency ideal for fluid transfer.

FLEXTECH FN NYLON Tubings (FN-1000, standard wall and FN-2000, heavy wall) are extruded from polyamides specially compounded to provide flexibility, heat stability and ultraviolet resistance. They have low moisture absorption (1.5%), excellent mechanical strength, and are superior in corrosion resistance, flexibility and fatigue life. Both FN types are self-extinguishing and are available in non-toxic formulations for food and beverage and other uses at operating temperatures from −70°C to +70°C.

FLEXTECH HP NYLON Tubings (HP-1000, 1600 psi and HP-2500, 2800 psi Burst Strength) are extruded from a polyamide designed specifically for the conveyance of air, gases and liquids under high pressures. They are odorless, tasteless, non-corrosive, fungus-resistant and self-extinguishing. HP tubings have exceptional mechanical strength, are non-toxic, easy to clean and highly recommended for food processing or other heavy duty applications. Temperature ratings for HP-1000: −44°C to +93°C; for HP-2500: −85°C to +105°C.

FLEXTECH LP-80 POLYETHYLENE is a specially compounded tubing designed for the conveyance of air, gases and liquids under low pressure conditions. A strong flexible material with a useful working temperature range of −70°C to +80°C, it is odorless, tasteless, non-toxic, non-corrosive and fungus-resistant. Easily installed using standard fittings.

FLEXTECH U-585 POLYURETHANE is one of the most versatile of materials, combining long life with high working-pressure ratings, superb resistance to fuels and solvents, excellent flexibility, high resistance to abrasion, and low moisture absorption. U-585 preserves its rubber-like pliability and resistance to kinking over a temperature range of −70°C to +105°C, making it suitable for cryogenic use where clamped or pinched to control fluid flow.

FLEXTECH RETRACTABLE NYLON AIR HOSE is a seamless-extruded, abrasion-resistant, long life nylon hose that is helically coiled for spring-like action. It extends easily with minimum resistance and automatically retracts to its original coil configuration upon release. This self-storing feature keeps hose off the floor and out of the way, eliminating the need for expensive reel devices. It never becomes twisted or tangled, has long life, is lightweight and flexible, making it easy to use with any type of air-powered tool. Retractable air hose will not absorb oil and can be used to feed lubricant in air stream.

Ask for data sheets on these FLEXTECH products

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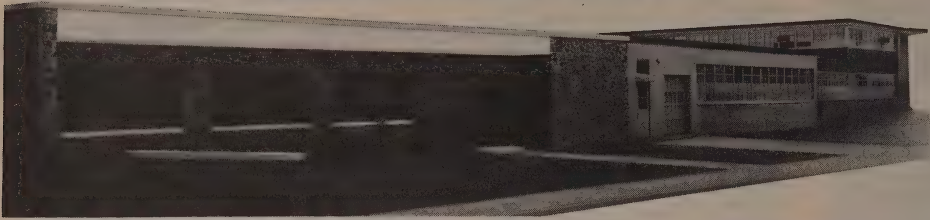
the complete line of electrical insulating sleeving and tubing



Whatever your problem, heat, cold, flexibility miniaturization, high insulating or dielectric strength—Varflex can supply the required reliability and delivery. Our rapidly expanding plant is fully equipped to supply sleeving for any combination of characteristics you may need. In addition to maintaining large stock for off-the-shelf delivery, Varflex has the productive capacity to provide prompt delivery (often 48 hours) on special orders. As insulation specialists, we are ready to work with you on unusual specifications or applications.

Here is a brief description of Varflex products

VARGLAS SILICONE RUBBER SLEEVING. The ultimate in flexibility, yet dielectric protection to 8000 volts. Class H-A-1 certified to meet Government Specification MIL-I-3190/6 (formerly MIL-I-18057A) Class H-B-1 (4000 volts) available, also. Continuous exposure from —70° to 400°F. does not affect coating or Fiberglas braid. Class H-C-1 (2500 volts), Class H-C-2 (1500 volts) and Class H-C-3 also available.

VARGLAS SILICONE RESIN SLEEVING. Class H-A-1 is recommended for applications requiring extremes of heat endurance and high dielectric strength (7000 volts). Class H-B-1 is identical except for dielectric guarantee (4000 volts). Good abrasion resistance. Class H-A-1 meets the requirements of MIL-I-3190/5. Four other standard grades available where 7000 volt test not important.

SILFLEX SLEEVING. A light coating of Silicone resin on Fiberglas braid. Extremely flexible within a temperature range from minus 85°F. to 500°F.

VARGLAS SILICONE LEAD WIRE. Made from solid or stranded wire covered with one or more walls of Fiberglas braid and impregnated with Silicone. Built to your specifications.

VARGLAS SILICONE TYING CORDS. Continuous filament Fiberglas cords impregnated with Silicone resin, 1/64″ to 1/8″ diameter. Specify Type 46 for dry cure, Type 48 for tacky cure.

VARGLAS S1600 SLEEVING. Newest development in Fiberglas yarn. Will retain "life" at temperatures up to 1600°F. (400 degrees higher than E glass).

VARGLAS POLYURETHANE CLASS F SLEEVING. Made with Polyurethane resins on Fiberglas braid. Offers better than Class B heat resistance (up to 155°C continuously). Available in F-A-1, F-B-1 and F-C-1 grades.

VARGLAS ACRYLIC CLASS F SLEEVING. Highly resistant to acids, organic solvents, oils and water and exhibits fair resistance to alkalies. It is compatible with polyester, acrylic, epoxy, phenolic and formvar wire enamels. Designed to perform for long periods in the 155°C range without loss of any electrical or physical properties. Available in five grades. Class F-A-1 (7000 volts) meets the requirements of MIL-I-3190/3.

VARFIL SLEEVING. Fiberglas braids impregnated with polyester resin. Four grades available in coils as well as 36″ lengths in most sizes. In a class by itself because of its toughness, flexibility, high temperature resistance and ability to withstand bending and twisting without dielectric loss. Compatible with varnish. Over 1000 hours at 125°C., with intermittent operation at 150°C.

VARFLO SLEEVING. Class B insulation. Good flexibility, solvent, oil and moisture resistance. The A grade passes 90° Navy bend test after 2000 hours at 300°F. with 3500 volt end point. Varflo has good shelf life and will not lose dielectric strength when subjected to severe twisting. Classes B-A-1, B-B-1 and B-C-1 are available. Flame and fungus resistant if specified. B-A-1 approved under MIL-I-3190/2 (formerly MIL-I-21557B).

VARGLAS VARNISHED SLEEVINGS. Flexible continuous coatings of flame resistant oleoresinous varnish built up over fine Fiberglas braids in several carefully controlled operations. Operate at temperatures up to 130°C continuously. Available in five grades.

VARGLAS LECTON SLEEVING. Specifically designed for hermetic motors. Non-contamination of Freon and other refrigerants in Class B motors. B-A-1, B-B-1, and B-C-1 grades.

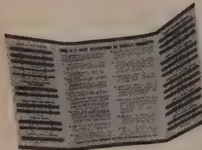
VARGLAS NON-FRAY SLEEVINGS. Type H: The normalizing treatment given the Fiberglas braid removes the organic impurities and tends to hold the individual filaments together. The lack of any bonding agent means it may be subjected to temperatures as high as 1200°F. Recommended for applications where dielectric requirements are not of prime importance. Resists fungus and is non-corrosive. Type HP: Similar to Type H, but dyed various colors for coding purposes. Ideal as secondary insulation where primary covering might disintegrate due to high temperature or continual flexing. Colors may fade at 300°F. Type HO: A very light treatment of resin added after the braid has been normalized — just enough to hold the sleeving round for accurate cutting. Will distend to cover soldered joints or terminals. Avaliable in eight colors. Colors fade at 300°F., but sleeving unaffected up to 1200°F. Best of the three from a non-fray standpoint.

VARGLAS LITEWALL SLEEVINGS. Wall thickness of Type A is .008″ and of Type B, .006″. These extremely flexible, finer braids are supplied untreated, heat treated and/or dyed. Produced in fractional sizes. Because of the construction, one size can be used to cover several different wire sizes. Specify Type HA or HB if heat treated braids preferred.

SYNTHOLVAR EXTRUDED TUBING. Made from vinyl polymers. High dielectric and tensile strength. Will not support combustion nor absorb moisture. Smooth surface, thin wall and flexibility all make for ease in assembling operations. Type SHH recognized by U/L for 105°C applications. Type LT will function at temperatures down to —50°C. Specify fungus resistant tubing where needed. Special formulations for high and low temperature environment. Made to meet applicable Government Specifications MIL-I-631 and MIL-I-7444.

RAYON SLEEVING. These sleevings are varnish impregnated. NEMA grades A-A-1, A-B-1, A-C-1, A-C-2 and A-C-3 readily available.

NYLON UNTREATED SLEEVING. This product has outstanding abrasion resistance and is the ultimate in flexibility. It is intended for use over insulated wire and cable, not as primary insulation.



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Varflex products meet or exceed applicable government specifications including: **MIL-I-18057A, MIL-I-3190C, MIL-I-7444B, MIL-I-631D, MIL-I-21557**

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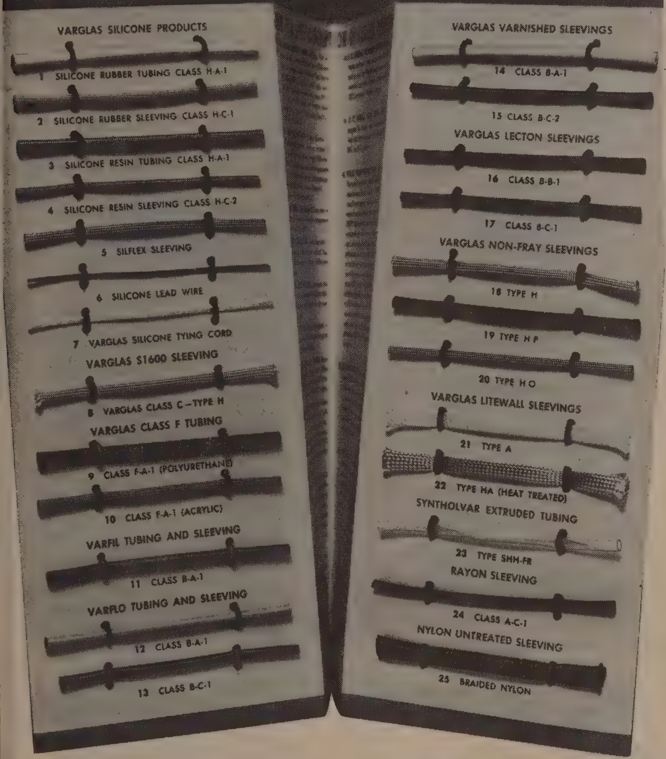
VARGLAS SILICONE PRODUCTS
1 SILICONE RUBBER TUBING CLASS H-A-1
2 SILICONE RUBBER SLEEVING CLASS H-C-1
3 SILICONE RESIN TUBING CLASS H-A-1
4 SILICONE RESIN SLEEVING CLASS H-C-2
5 SILFLEX SLEEVING
6 SILICONE LEAD WIRE
7 VARGLAS SILICONE TYING CORD
VARGLAS S1600 SLEEVING
8 VARGLAS CLASS C—TYPE H
VARGLAS CLASS F TUBING
9 CLASS F-A-1 (POLYURETHANE)
10 CLASS F-A-1 (ACRYLIC)
VARFIL TUBING AND SLEEVING
11 CLASS B-A-1
VARFLO TUBING AND SLEEVING
12 CLASS B-A-1
13 CLASS B-C-1
VARGLAS VARNISHED SLEEVINGS
14 CLASS B-A-1
15 CLASS B-C-2
VARGLAS LECTON SLEEVINGS
16 CLASS B-B-1
17 CLASS B-C-1
VARGLAS NON-FRAY SLEEVINGS
18 TYPE H
19 TYPE H P
20 TYPE H O
VARGLAS LITEWALL SLEEVINGS
21 TYPE A
22 TYPE HA (HEAT TREATED)
SYNTHOLVAR EXTRUDED TUBING
23 TYPE SHH-FR
RAYON SLEEVING
24 CLASS A-C-1
NYLON UNTREATED SLEEVING
25 BRAIDED NYLON

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RF Filters, Converters, Switches, Amplifiers, Multipliers, Signal Sources, Multicouplers

FIXED PAD ATTENUATORS & TERMINATIONS (DC—3 GHz)

FOR TYPES BNC, TNC C, N & OSM CONNECTORS

Integrated line of fixed pad attenuators, terminations and impedance-matching transformers provides means for rapid and accurate division of voltages over the frequency range of DC to 3 GHz, and for the matching of different impedances with minimum loss over a broad frequency band. The unit cost is within the practical price range of the large and small equipment user, as well as the research and experimental user.

General characteristics:

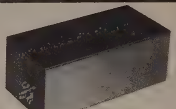
Frequency Range:	DC—3 GHz
VSWR:	1.25:1
Attenuation Accuracy:	±0.5 dB
Impedances (nominal):	50, 75, 90 ohms
Attenuation values:	1, 2, 3, 4, 6, 10, 12, 15, 20 dB (standard)

MULTICOUPLERS

Model HFM Series is designed to meet the needs of most systems.

General features:
- High isolation between outputs
- High dynamic range
- Low noise
- Modular construction
- Solid-state
- Octave bandwidth (if desired)

Model PM Series of passive multicouplers provides the ultimate performance in signal distribution.



BROADBAND MULTIPLIERS (5-18,000 MHz)

These units utilize solid state devices.

Using the frequency multiplier as the basic tool, lines of Signal Sources, Frequency Synthesizers and Multiplier Chains are now available.

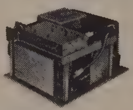
General characteristics:

Frequency Range:	5-18,000 MHz
Bandwidths:	up to 27%
Power Output:	up to 5 watts
Efficiency:	as high as 50%

SWITCHES (10-1000 MHz)

A series of computer compatible solid state switches using PIN diodes in a broadband stripline matching structure. Can be directly addressed without interfacing. Units available with equal path lengths to all outputs, providing good phase coherence with phase and amplitude tracking on all ports. Switch matrix configurations are also available.

General Characteristics:
- Frequency Band: 10-1000 MHz
- Switch Configuration: 1x2 to 1x30
- Isolation: 70 dB min. (higher available)
- Insertion Loss: 1.0 dB max.
- VSWR: 1.2:1
- Operation Time: 1.0 μsec.
- Primary Power: ±4.5V, 50ma per crosspoint
- Sizes: 2" to 16"L x 4"W x ½"H



CONVERTERS

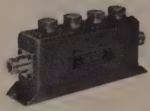
State of the art converters available for military or commercial application throughout the frequency range. All units are constructed to meet mil applications.

TELEMETRY CONVERTERS

These units permit the ready adapting of existing UHF telemetry receiving equipment for use in the 1435 to 1540 and 2200 to 2300 MHz telemetry band with high conversion gain.

General characteristics:

Long term stability:	better than ±.1 PPM over temperature range
Image rejection:	>than 50 dB
Noise figure:	better than 5 dB for 100 mc bandwidth (2.2 to 2.3 GHz)

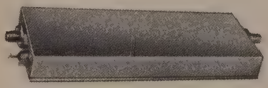


FILTERS (5-12,000 MHz)

Advanced network design techniques have developed filters operating in the frequency range up to 12,000 MHz. With electrical performance approximating theoretical expectations. In addition to Bandpass, Band Reject and Multiplex Filters, advanced network designs are available for antenna couplers, Diplexers, Interdigital Filters and many other types.

General characteristics:

Frequency Range:	5-12,000 MHz
Bandwidths:	up to several octaves
Insertion Loss:	as low as 0.25 dB
Power:	up to 3.5 kW (cw)
Band Reject Notches:	as narrow as ¼ % fo
Band Reject Attenuation:	as great as 75 dB



SOLID STATE RF AMPLIFIERS

(Power, low-noise, broadband, phase matched, linear and high dynamic range)

Constructed to meet mil and missile applications.

General characteristics:

Frequency Range:	up to 4 GHz
Bandwidths:	up to multiple octaves
Phase matching:	to within 1° over an octave
Noise figure:	as low as 1.5 dB
Gains:	up to 120 dB
Power output:	>than 20 watts

For complete details, write or call

Applied Research

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Port Washington, N.Y. 11050
(516) 883-5700

TUNABLE BAND REJECT FILTERS (5-2000 MHz)

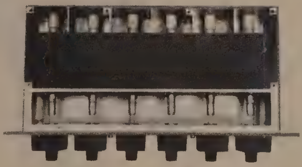
Tunable multicontrol band reject filters provide high rejection of more than one and up to eight unwanted signals, or, extreme rejection of one. Low insertion loss and sharp skirt selectivity in the band reject region. Eight knobs and counter readout allow continuous tuning.

General Characteristics:
- Center Frequency: 5-2000 MHz
- Out-of-Band Insertion Loss: 0.5 dB
- Notch Bandwidth: narrow as ¼ % fo
- Notch Depth: 20 dB/section
- VSWR (outside of notch region): 1.5:1
- Size: 24" x 2" x 8"
- Connectors: BNC

BAND REJECT FILTER (225 to 400 MHz)

Single knob control band reject filters reject unwanted signals, with extreme selectivity through L-band. Tune ranges of nearly an octave can be obtained. Units are tunable over the range 225 to 400 MHz. The bandwidth is >1 MHz at the 60 dB points. Total notch depth is 60 dB. Use of helical resonators provides for high rejection and low insertion loss in the passband of <1 dB. The phase linearity in the passband is achieved by utilizing quarterwave coaxial lines.

PERFORMANCE SPECIFICATIONS
Insertion Loss (out of notch region): 1 dB
Notch Range: 225 to 400 MHz
Typical Notch Specs: Frequency 225.2 MHz;
1 dB bandwidth 11.1 MHz;
Depth 68 dB
Impedance (I & O): 50 ohms
VSWR (I & O) (out of notch region): <1.3:1
Group Delay (out of notch region): <20 ns

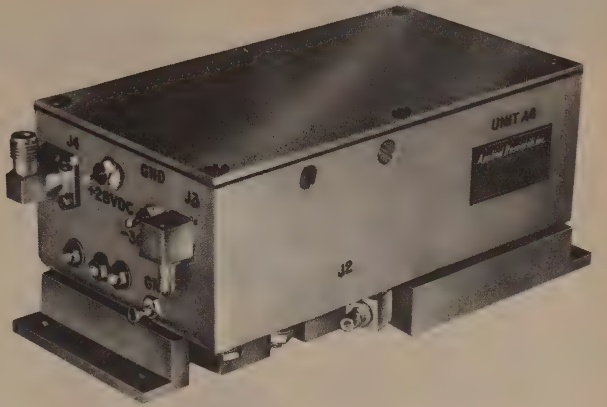


BAND REJECT FILTER (240 to 365 MHz)

Band reject filters operating from the HF range to K-band exhibit a wide bandpass frequency range without reentrances. Resonant elements are independently tuned or ganged to a single knob control. Operation is over frequency ranges greater than one octave, providing high rejection at one frequency or rejection by greater than 15 to 20 dB to as many as six separate and independent frequencies within the band.

Two or more notches can be aligned to adjacent frequencies to vary the depth and/or bandwidth of the band rejection curve. With all rejection notches tuned to a single frequency, the resultant response is such that an undesired signal approximately one percent away from a desired signal is attenuated by more than 70 to 80 dB while the desired signal is passed with only a 1 dB insertion loss.

PERFORMANCE SPECIFICATIONS
Insertion Loss (out of notch region):
<1 dB 100 to 1000 MHz
Bandpass: DC to 1000 MHz
Notch Frequency: 240 to 365 MHz
Typical Rejection below Passband: 240 MHz/23 dB; 325 MHz/19 dB; 365 MHz/17 dB
Impedance (I & O): 5 ohms
VSWR (I & O): < 1.35:1



Frequency Generation thru Multiplication & Phase-Lock techniques

VHF to Ku-Band (10 MHz to 1.5 GHz)

Applied Research offers many proven designs using both techniques. And we're capable of meeting your exact requirements, precisely.

Our Phase-lock loops, comprised of I.C. components, together with RF devices, yield outputs of up to 10 watts at microwave frequencies. And our multipliers are available as passive devices or in combination with amplifiers having multiplication factors of from 2 to 2000. In combination with varactor multiplier devices output in Ku-band can be obtained.

What's more, we can supply crystal oscillators or internal drivers to provide a self-contained source.

SOME PERFORMANCE SPECIFICATIONS

Phase-Lock Signal Source
Output: 494 MHz @ 10 watts
Stability: .005% from internal crystal oscillator

Phase-Lock Synthesizer
Input: 6 MHz & 200 MHz @ 10 dBm each
Output: 218, 224, 230, 236, 242, 248, 254, 260 MHz @ 10 dBm each
Spurious: 60 dBc min.

Ku-Band Multiplier
Input: 45.5 to 46.1 MHz @ 1 dBw; (other inputs available)
Output: 15.3 to 15.5 GHz @ 100 milliwatts
Spurious: 60 dBc min.

C-Band Multiplier
Input: 50.3 to 51.5 MHz @ 1 milliwatt; (other inputs available)
Output: 5030 to 5150 MHz @ 200 milliwatts
Spurious: 60 dBc min.

For complete details, write or call today.

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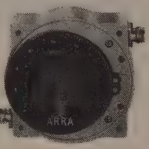
VARIABLE ATTENUATORS DC THRU 18000 MHz

Direct Reading

Low Ins. Loss • 1.5 Max. VSWR • 10 Watts Aver. Power

Freq. Range (GHz)	Atten. Range (dB)	Atten. vs. Freq. (±dB)	Form Type	Model No.
DC-0.3	50	2.0	0-760	7684-50*
DC-1.0	20	1.5	0-760	7684-20*
0.5-1.0	60	1.0	0-214	2952-60
0.5-1.0	100	1.5	0-214	2952-100
0.9-1.3	60	1.0	0-660	2-3952-60
0.9-1.3	100	1.5	0-660	2-3952-100
1.0-2.0	10	1.0	0-1014	3617-10F
1.0-2.0	60	1.0	0-660	3952-60X
1.0-2.0	100	1.5	0-660	3952-100X
1.4-2.4	80	1.25	0-660	3-4952-80
2.0-4.0	10	1.0	0-51	4674-10F
2.0-4.0	20	1.5	0-51	4674-20F
2.0-4.0	30	2.0	0-51	4674-30F
2.0-4.0	60	1.0	0-660	4952-60X
2.0-4.0	100	1.5	0-660	4952-100X
2.5-4.0	10	0.75	0-51	4674-10G
2.5-4.0	20	1.0	0-51	4674-20G
4.0-8.0	10	0.6	0-39	5684-10F
4.0-8.0	20	1.0	0-39	5684-20F
4.0-8.0**	60	1.0	0-660	5952-60X
4.0-8.0**	100	1.5	0-660	5952-100X
5.4-11.0	10	1.0	0-39-2	5-6684-10F
5.4-11.0	20	1.5	0-39-2	5-6684-20F
7.0-11.0	10	0.5	0-39-2	6684-10F
7.0-11.0	20	1.0	0-39-2	6684-20F
8.0-12.4	10	0.5	0-39-2	6684-10X
8.0-12.4	20	1.0	0-39-2	6684-20X
12.4-18.0	10	0.5	0-39-2	9684-10F
12.4-18.0	20	1.0	0-39-2	9684-20F
12.4-18.0	30	1.0	0-39-2	9684-30F

*See catalog for VSWR, Ins. Loss and Power.
**Only less than octave — consult factory.



Form 0-660: 5" Dia.
Form 0-214: 6" Dia.

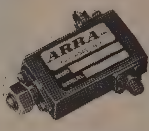
Form 0-39 & 0-39-2: 3" Dia.
Form 0-51: 5" Dia.

Miniature

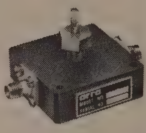
0.5 dB Max. Ins. Loss • 5 Watts Aver. 3 KW Peak • 2 Ounces

Freq. Range (GHz)	Atten. Range (dB)	Atten. vs. Freq. (±dB)	Max. VSWR	Form Type	Model No.
1.0-2.0	10		1.8	3651	3814-10
1.5-2.0	15		1.7	3651	3814-15
2.0-4.0	10		1.8	2191	4804-10
2.0-4.0	20		1.5	3651	4814-20
2.5-4.0	10		1.5	2191	4804-10X
3.0-4.0	10	1.5	1.5	3347	4603-10
4.0-8.0	10		1.5	2191	5804-10
4.0-8.0	20		1.5	2191	5804-20
4.0-8.0	30		1.5	3651	5814-30
4.0-8.0	10	1.5	1.5	3347	5603-10
6.0-11.0	10		1.5	2191	5-6804-10
6.0-11.0	20		1.5	2191	5-6804-20
6.0-11.0	30		1.5	2191	5-6804-30
6.0-11.0	40		1.5	3651	5-6814-40
8.0-18.0	10	1.5	1.5*	2191	9803-10
8.0-12.4	10		1.5*	2191	6804-10
8.0-12.4	20		1.5*	2191	6804-20
8.0-12.4	30		1.5*	2191	6804-30
8.0-12.4	40		1.5*	3651	6814-40
8.0-12.4	10	1.5	1.5	3347	6603-10
8.5-10.5	10	0.5	1.5	2191	6803-10A
8.5-10.5	20	0.5	1.5	2191	6803-20A
10.5-12.4	10	0.5	1.6	2191	6803-10B
10.5-12.4	20	0.5	1.6	2191	6803-20B
12.0-18.0	10		1.5	2191	9804-10X
12.0-18.0	20		1.5	2191	9804-20X
12.0-18.0	30		1.7	2191	9804-30X
12.0-18.0	40		1.7	2191	9804-40X
12.0-18.0	10	1.0	1.5	2191	9803-10A
12.0-18.0	15	1.0	1.7	2191	9803-15A

*1.7 VSWR above 11.0 GHz.



Form 2191: 1¾x1x½"
Form 3651: 2x1¼x½"



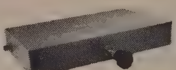
Form 3347: 1½x1½x½"

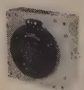
High Power

500W CW — 10KW PEAK

Low Ins. Loss • 1.5 Max. VSWR

Freq. Range (GHz)	Atten. Range (dB)	R. F. Power Watts (CW)	Model No.
0.5-1.0	10	500	2417-10
1.0-2.0	10	100	3617-10
1.0-2.0	20	500	3417-20
2.0-4.0	10	100	4617-10
2.0-4.0	20	500	4417-20
4.0-8.0	10	100	5417-10
4.0-8.0	20	500	5417-10
8.0-12.0	10	100	6417-10
8.0-12.0	20	500	6417-20
12.0-18.0	20	500	9417-20





Broadband Diode Devices

Attenuators & Modulators

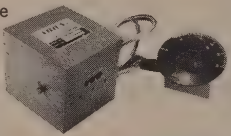
- Absorptive for all Values
- Each Model 200-18000 MHz
- Low Insertion Loss
- Integrated Linearized Driver (Attenuators)
- TTL Compatible Driver (Modulators)

Model 8752-30D

Configuration	Attenuation (dB)	Switching Time	Model No.
Cont. Variable	35	50 µsec	8752-35D
Cont. Variable	65	50 µsec	8752-65D
On/Off	30	20 nsec	8752-30M
On/Off	65	20 nsec	8752-65M

Direct Reading Remote Control

200-18000 MHz Frequency Range
Direct Reading Dial
SMA Female R.F. Connectors
Stop at Minimum and Maximum Loss Position
Counter-Clockwise Rotation Increases Loss



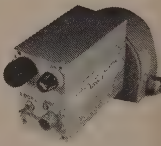
RF Section **Control Section**
Model 8752-60MDR

Model No.	Freq. Range (GHz)	Min. Atten. Rge. (dB)	Max. Ins. Loss (dB)	Max. VSWR 0 dB	Max. VSWR High Loss	Atten. vs Freq. (dB)
8752-30MDR	0.2-8.0	30	1.5	1.5	1.35	±1.0
	8.0-12.4	30	1.8	1.6	1.6	±1.0
	12.4-18.0	30	2.5	1.75	1.6	±1.0
8752-60MDR	0.2-8.0	60	2.5	1.5	1.5	±1.5
	8.0-12.4	60	3.0	2.0	1.6	±1.5
	12.4-18.0	60	5.0	2.3	1.8	±2.0

Motorized

Motor Head Characteristics

DC Voltage: 28V, 24V, 15V, 12V
AC Voltage: 115V, 60 Hz
Actuating Current: 200 ma max. (DC)
250 ma max. (AC)
Speed: 1½ RPM
Size: 3.5" x 2.0" x 2.75"



Attenuator Characteristics

Identical to the specific variable attenuator model selected.

General Description

ARRA offers a rugged line of motor driven a tenuators. Ideally suited for remote tuning applications. The ultimate in reliability and maintenance free operation.

The motors are integral gear head types. Units consist of an integrated motor gear head and single turn variable attenuator. All models feature fast stopping time and minimum backlash. Available with an optional follower potentiometer output; local override switch mounted directly to the motor head.

LOCAL
CONTROL

Outline drawings furnished on request.

15 Harold Court • Bay Shore, L.I., N.Y. 11706 • Phone: (516) 231-8400 • TWX: 510-227-6231

ARRA INC.
ANTENNA & RADOME RESEARCH ASSOCIATES

Coaxial • Waveguide • Solid State
# microwave
Components • Assemblies • Sub-Systems

Broadband Diode Switches

SPST & SPNT

- High Isolation
- Low Insertion Loss
- Integrated Drivers Available

SP4T

SPDT

Configuration	Freq. Range (MHz)	Switching Time (nsec)	Average Power (Watts)	Model Number	
				With Driver	Without Driver
SPST	100-18000	20	2	F8753-80D	F8753-80
SPST	200-18000	50	5	8753-80D	8753-80
SPST	500-18000	10	2	H8753-80D	H8753-80
SPDT	200-18000	500	2	2-8753D	2-8753
SP3T	200-18000	500	2	3-8753D	3-8753
SP4T	200-18000	500	2	4-8753D	4-8753
SP5T	200-18000	500	2	5-8753D	5-8753

Mechanical Phase Shifters

10 WATTS AVER. POWER • 5 KW PEAK

Freq. Range (GHz)	Min. Phase Adjustment	Max. Insertion Loss (dB)	Max. VSWR	Form Factor	Model No.
1.0-2.0	90°	1.0	2.0	3332	3418-90
2.0-4.0	90°	1.0	1.5	3332	4418-90
2.0-4.0	180°	2.0	1.75	3332	4418-180
4.0-8.0	90°	1.0	1.5	3332	5418-90
4.0-8.0	180°	2.0	2.0	3332	5418-180
7.0-11.0	90°	1.0	1.5	3333	6428-90
7.0-11.0	180°	2.0	2.0	3333	6428-180
8.0-12.4	90°	1.0	1.5	3333	6428-90X
8.0-12.4	180°	2.0	2.0	3333	6428-180X
9.0-11.0	45° at 9 GHz 90° at 10 GHz	1.0	1.5	3382	6428-45X

Miniature Couplers • 90° & 180° Hybrids

ARRA
DIRECTIONAL COUPLER

ARRA
90° HYBRID
IN

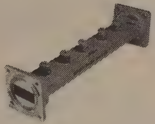
Freq. Range (GHz)	Model Number		
	90° Hybrid	180° Hybrid	Directional Coupler
0.5-1.0	2164-90	2164-180	2164-**
0.7-1.4			2-3164-**
0.925-1.225	2-3164-90	2-3164-180	
1.0-2.0	3164-90	3164-180	3164-**
2.0-4.2	4164-90	4164-180	4164-**
4.0-8.0	5164-90	5164-180	5164-**
7.0-11.0		6164-180	
7.0-12.4	6164-90		6164-**
8.0-12.4		6164-180	
8.0-16.0	6-9164-90		6-9164-**
12.0-18.0	9164-90		9164-**

**Value of coupling

Microwave Filters

STRIPLINE • WAVEGUIDE • COAX

BAND PASS FILTER
ARRA

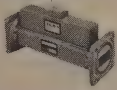


LOW PASS FILTER
ARRA

- 30-18,000 MHz (Narrow & Octave)
- High Power
- Miniature Size
- Band Pass
- Band Reject
- Low Pass
- 90 dB Rejection

WAVEGUIDE COMPONENTS & ASSEMBLIES

Broadband Diode Switches



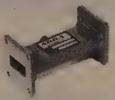
Operate over the complete waveguide frequency band.

Frequency Bands: 2.60-18.0 GHz.
Isolation: To 85 dB.
Switching Speed: 10 nsec.

Continuously Variable Attenuators

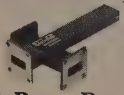
Frequency Bands: 3.95-18.0 GHz.
Attenuation Range: 25 dB min.
Max. VSWR: 1.15.
Insertion Loss: 0.5 dB max.

Fixed Attenuators



Frequency Bands: 2.6-18.0 GHz.
VSWR: 1.15.
Attenuation: 3, 6, 10, 20 dB (other values on request).
Attenuation Accuracy: ±0.2 dB at calibrated frequency.

Cross Guide Couplers



Frequency Bands: 2.60-18.0 GHz.
Coupling: 20, 30, 40 dB.
Directivity: 15 dB min.
Frequency Sensitivity: ±1.3 dB.

High Power Dummy Loads

Frequency Bands: 2.6-18.0 GHz.
Max. VSWR: 1.10 (typical 1.05).
Material: Aluminum.
Finish: High temperature black paint.

ARRA will fabricate your special waveguide assemblies in any material, finish, and in most waveguide sizes.

Items range from the simplest straight section and single bend to complex combinations of bends, miters, twists, [illegible]

Stringent quality control and electrical test facilities enable ARRA [illegible] guarantee your mechanical and electrical specifications.

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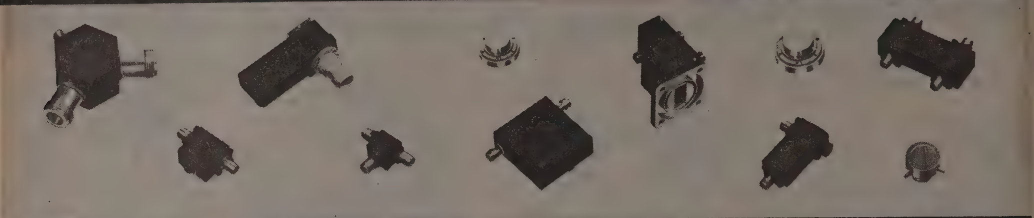
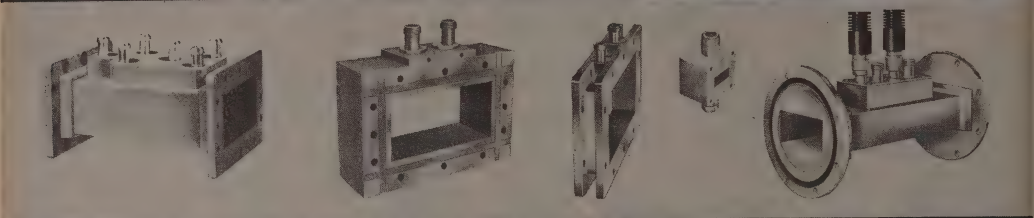
See YELLOW SECTION for Local Sales Offices and Key Personnel

MICROWAVE DEVICES

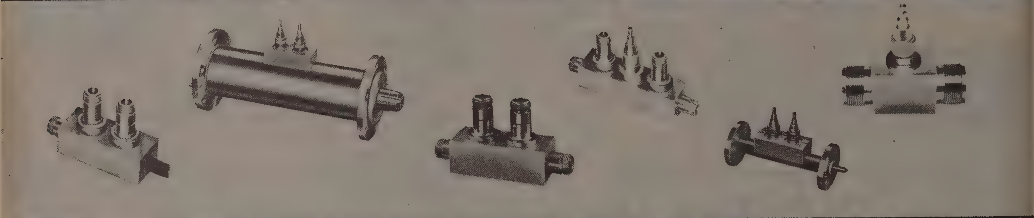
CIRCULATORS and ISOLATORS



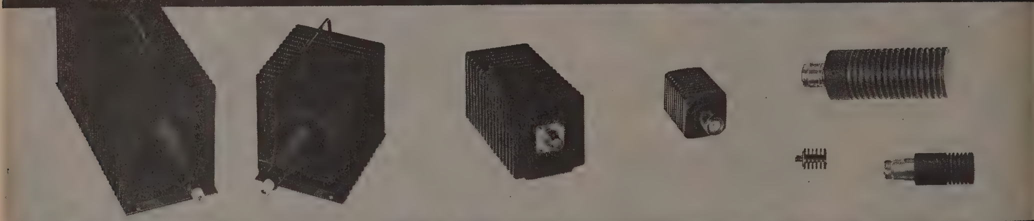
DIRECTIONAL COUPLERS—WAVEGUIDE



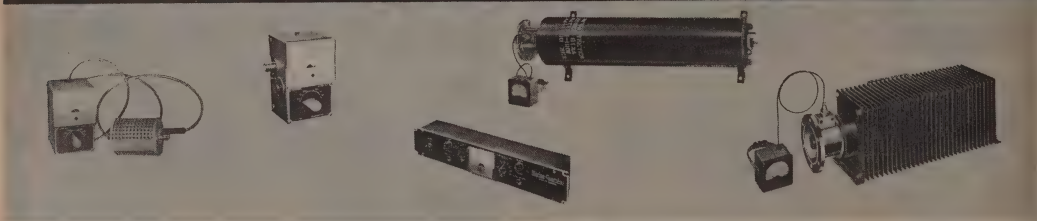
DIRECTIONAL COUPLERS—COAX



RESISTIVE TERMINATIONS



POWER METERS



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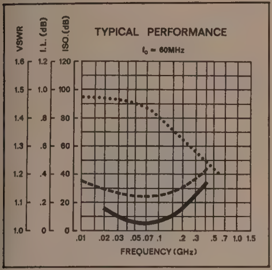
Bendix

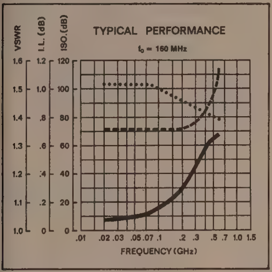
DAICO INDUSTRIES, INC.

MULTIPOLE DIODE SWITCHES

STANDARD



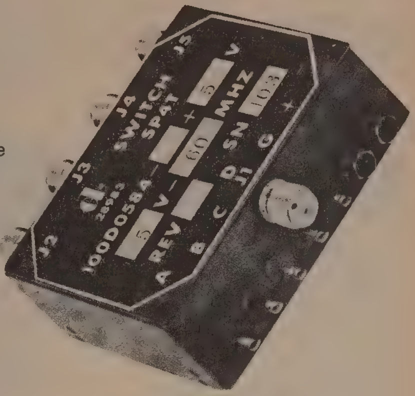
HIGH ISOLATION

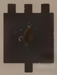


•••• ISOLATION ▬ VSWR ‒ ‒ ‒ INSERTION LOSS

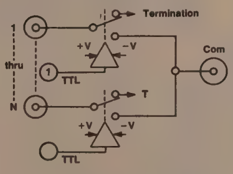
Daico Industries standard line of multiposition diode switches provides the lowest switching transients and insertion loss consistent with speed and RF power. All the units listed below are compatible with TTL logic. The self-contained driver utilizes complex function IC's to improve reliability and reduce size. These units are designed to operate in the most hostile of military, land, sea and airborne environments.

Special specification diode switches available from Daico include high-speed units for less than 25 nanosecond operation, RF units to 3 GHz, and high-power units to 1KW CW with up to 8KW peak load capabilities.



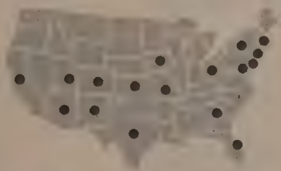
SOLID STATE +10 dbm, 5-800 MHz +30 dbm, 20-800 MHz SIZE MATRIX	 SPST	 SP2T	 SP3T	 SP4T	 SP5T	 SP6T	 TRANSFER
STANDARD ISOLATION +10 dbm ±5 Volt	100D0581 1x1½x.68	100D0582 1x1½x.68	100D0583 1½x1½x.68	100D0584 2x1½x.68	100D0585 2½x1½x.68	100D0586 3x1½x.68	100C0587 2x1½x.94
STANDARD ISOLATION +30 dbm ±12 Volt	100D0591 1x1½x.68	100D0592 1½x1½x.68	100D0593 2x1½x.68	100D0594 2½x1½x.68	100D0595 3x1½x.68	100D0596 3x1½x.68	100D0597 2x1½x.94
HIGH ISOLATION +10 dbm ±5 Volt	100D0801 1½x1½x.68	100D0802 2x1½x.68	100D0803 2½x1½x.68	100D0804 2½x1½x.68	100D0805 3½x1¾x.68	100D0806 3½x1¾x.68	100D0807
HIGH ISOLATION +30 dbm ±12 Volt	100D0821 1½x1½x.68	100D0822 2x1½x.68	100D0823 2½x1½x.68	100D0824 2½x1½x.68	100D0825 3½x1¾x.68	100D0826 3½x1¾x.68	100D0827
STANDARD ISOLATION +30 dbm ±12 Volt BNC, TNC, N or C	100D0901 1x1½x1¼	100D0902 1¾x1¾x1¼	100D0903 3x1¾x1¼	100D0904 4x1¾x1¼	100D0905 5x1¾x1¼	100D0906 5x1¾x1¼	100D0907 1¾x1¾x1¼

TYPICAL SWITCH SCHEMATIC MULTIPOLE



Unused Port Terminations
—1 50 ohms
—2 Open
—3 Short

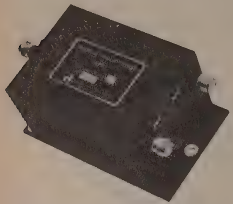
TTL control logic "1" introduced at terminal N will turn port ON. Where reverse logic is required ("ON" with 0 logic level) Part Number is suffixed with RL. Standard voltage of ±5 VDC is required for switches designed to handle +10 dbm. For ±30 dbm power levels a ±12 VDC is required. Other voltage levels can also be accommodated.



DAICO INDUSTRIES, INC.
2351 East Del Amo Blvd.
Compton, California 90220
Tel: (213) 631-1143
TWX 910-346-6741

RF SWITCH MATRICES • MODULATORS • PHASE SHIFTERS • ATTENUATORS

HIGH POWER DIODE SWITCHES

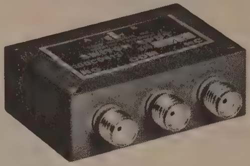


Daico Industries high-power diode switches have been successfully employed in numerous CW and pulse systems. CW power levels to 400 W are available in frequency ranges from 20-1100 MHz. Pulse power levels to 8 KW are available in frequency ranges of 50-1500 MHz.

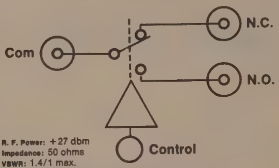
Representative designs (Can be adapted to other frequency ranges and power levels.)

P/N	Freq. MHZ	Power Watts CW	Power Peak	Isolation db min.	Insertion Loss db max.
100C0557	30-250	250	1 KW	75	0.2
100C0657	50-200	200	1 KW	45	0.3
100C0638	100-1400	10	300	50	0.5
100C0495	950-1225	10	3.5 KW	28	1.0

HIGH SPEED, LOW TRANSIENT DIODE SWITCHES

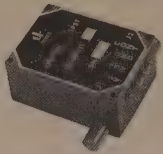


The SP2T High Speed Low Transient Diode Switch, Daico Industries Part Number 100D0812, is noted in the adjacent schematic. This unit has similar performance to the high speed modulator, 100D0811. The through channel is available for data immediately following the 30 nanosecond RF switching period. Other specifications:

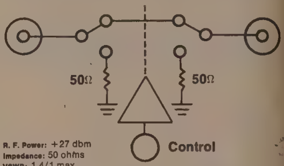


R. F. Power: +27 dbm
Impedance: 50 ohms
VSWR: 1.4/1 max.
Isolation: 40 db min. at 350 MHz, 60 db min. at 150 MHz
Insertion Loss: 3 db max.
Size: 1½ x 2 x 1 inches

HIGH SPEED, LOW TRANSIENT MODULATORS

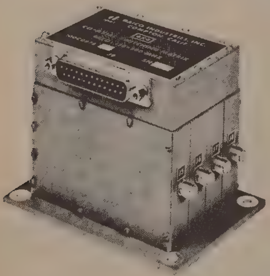


The Daico Industries Part Number 100D0811 is presented schematically with 50 ohm terminations for both ports when in the OFF condition. This unit is available in the frequency range from 60-400 MHz with 30% bandwidths. The TTL control and driver delay will consume approximately 20 nanoseconds with the RF switching and settling in less than 30 nanoseconds. The pass band transients do not exceed 10 MV peak. This SPST switch modulator is designed to preclude ringing thus allowing the full utilization of the data channel.



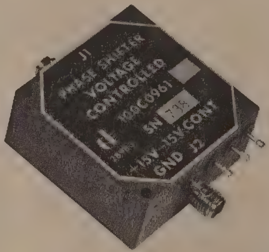
R. F. Power: +27 dbm
Impedance: 50 ohms
VSWR: 1.4/1 max.
Isolation: 40 db min. at 350 MHz, 60 db min. at 150 MHz
Insertion Loss: 3 db max.
Size: 1½ x 2 x 1 inches

RF SWITCH MATRICES



Daico Industries M x N RF matrices are available with both relay and solid state cross point connections through 12 x 12 positions. The unique design concept assures maximum isolation and minimum VSWR through 500 MHz. Higher frequency matrices are offered with fewer poles. The unit pictured above, P/N 100D0874, describes a 4 x 4 solid state unit covering the 150-500 MHz frequency band. Remote control panels are available with electronic interlocks and indicators as companion equipment.

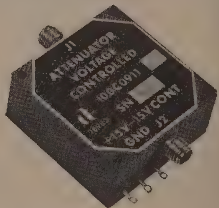
SOLID STATE VOLTAGE CONTROLLED PHASE SHIFTERS (ANALOG)



Daico Industries voltage controlled phase shifters are available in frequency ranges from 50-500 MHz. These units have a maximum RF power capability of +10 dbm with a 50 ohm impedance. Other specifications are listed below.

Frequency: Specify Center Frequency
Bandwidth: 20%
Insertion Loss: 3 db max.
Range: 360° continuous
Linearity: 10% max.
Scale Factor: 72°/volt
Power: ±15 volts
Slew Rate: 180°/millisec.
Size: 3 x 5 x 2
Connectors: SMA
Part Number: 100D0590

VOLTAGE CONTROLLED ATTENUATORS (ANALOG)



Daico Industries voltage controlled attenuators are analog devices offered in two octave band widths from 10-500 MHz. These solid state units have a maximum RF power of +10 dbm with a 50 ohm nominal impedance. The following specifications and part numbers apply. Information on other custom designs will be forwarded on request.

Power: ±15 Volts at 25 ma. nom./section
Control: 0 to +5 Volts
Slew Rate: 2 x Range/millisec.
Linearity: ±5% of range
Connector: SMA

Part Number	Range (db)	Scale Factor db/volt	VSWR	Size inches
100C0911	1-20	4	1.3/1	1½x1½x.68
100C0912	2-40	8	1.4/1	1½x1½x.68
100C0913	3-60	12	1.5/1	1½x2½x.68
100C0914	4-80	16	1.5/1	1½x3x.68
100C0919	1-20 (dual)	4	1.3/1	1½x2x.68

DAICO INDUSTRIES, INC.

PHASE SHIFTERS • PROGRAMMABLE/STEP ATTENUATORS

PHASE SHIFTERS

The IF series multi-bit phase shifters are also available with solid state or relay combining elements. The narrow band device uses various lengths of coaxial line to vary phase. The frequency of the solid state version covers 20-1000 MHz while those employing the relay combining elements are available in 20-500 MHz. Available with TTL compatibility. An LSB of 0.10 degrees can be readily provided.

	RELAY	SOLID STATE
Center Frequency Range	20-500 MHz	20-1000 MHz
R. F. Power	+30 dbm	+18 dbm
Impedance	50 ohms nom.	50 ohms nom.
VSWR	1.15/1 max.	1.2/1 max.
Insertion Loss	0.25 db/section	0.25 db/section
Control	Relay Coil Voltage	TTL
Power	(6, 12, 18 & 24 VDC)	±5VDC @ 30 ma/section
Phase Shift	MSB 180°, LSB 0.1°	MSB 180°, LSB 0.1°
Accuracy at Center Frequency	Standard ±0.2° ±1% of phase	Standard ±0.2° ±1% of phase

OPTIONS: Accuracy to ±0.1 degrees or ±0.3% of phase setting
Amplitude Stability: ±0.2 db

	RELAY			SOLID STATE	
Sections	P/N	Size	Sections	P/N	Size
4	100D0884	3x7x1.3	4	100D0894	3x7x1.3
5	100D0885	3x10x1.3	5	100D0895	3x10x1.3
6	100D0886	3x10x1.3	6	100D0896	3x10x1.3
7	100D0887	3x13x1.3	7	100D0897	3x13x1.3
8	100D0888	3x13x1.3	8	100D0898	3x13x1.3
9	100D0889	3x16x1.3	9	100D0899	3x16x1.3
10	100D0880	3x16x1.3	10	100D0890	3x16x1.3

PROGRAMMABLE STEP ATTENUATORS

IF series programmable attenuators are available with both solid state and relay combining elements. The solid state series are offered from 5-1000 MHz, while those employing the relay combining elements are offered from DC-500 MHz.

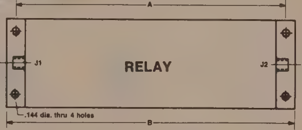
	RELAY	SOLID STATE
Frequency Range	DC-200 MHz 200-450 MHz 300-500 MHz	10-500 MHz
Bandwidth	—	2 octaves
R. F. Power	0.25 watts CW max.	+10 dbm
Impedance	50 ohms nom.	—
VSWR	1.25/1 max.	1.2/1 max.
Insertion Loss	0.25 db/section max.	0.2 db/section nom.
Control	—	TTL (low logic thru)
Accuracy	±0.1 db or ±2% of setting	±0.1 db ±2% standard
Switching Speed	—	1 microsec. typical
Power	6, 12 or 24 VDC	± Volt D.C. (others available on request)
Intercept Point	—	+40 dbm typical
Attenuation/Section	—	0.1 db to 32 db
Options	Accuracy to ±0.03 db or 0.5% of setting Phase Stability: 0-23 db ±2° 24-47 db ±3° 48-95 db ±4°	

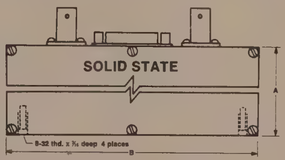
Connectors Available: SMA, BNC, TNC

Pads	P/N	A	B
1	100D0808-1	1½	1x⅞"
2	100D0810-2	2	1½x⅞"
3	100D0810-3	2	1½x⅞"
4	100D0809-4	3	1½x⅞"
5	100D0809-5	3	1½x⅞"
6	100C0469-6	5	1¾x⅞"
7	100C0469-7	5	1¾x⅞"
8	100C0469-8	6	1¾x⅞"

Connectors Available: SMA, BNC, TNC

Sections	P/N	A	B
1	100D0588-1	1¾	3x1.35
2	100D0588-2	1¾	3x1.35
3	100D0589-3	1¾	4x1.35
4	100D0589-4	1¾	4x1.35
5	100C0422	1¾	5x1.35
6	100D0576-6	3	5x1.35
7	100D0576-7	3	5x1.35
8	100D0576-8	3	5x1.35
9	100D0598-9	3	10x1.35
10	100D0598-10	3	10x1.35





HIGH SPEED PROGRAMMABLE PHASE SHIFTERS

High speed phase shifters in the ange of frequencies of 200 MHz - 1200 MHz feature 35 nanosecond ransition times with useful data within 50 nanoseconds of switching command. The phase shifter is compatible with computer controlled sampled data systems at rates up to 10MHz.

Typical of this type phase shifter is he 100D0693 which features 1.2 db nsertion loss, 1.25/1 VSWR, and accuracies of ±2 degrees over a 360 degree phase shift range. The phase shifter is controlled by TTL logic in 6 steps of 180°, 90°, 45°, 22.5°, 11.25°, and 5.6° at 435 MHz.

HIGH SPEED IF ATTENUATORS

Daico Industries high speed solid state programmable attenuators are available in frequency bands from 50-500 MHz with less than 35 nanoseconds switching speeds.

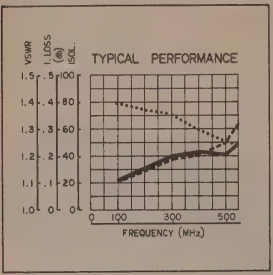
They are offered with MSB sections as high as 32 db and LSB sections as low as 0.2 db. Integral drivers are provided to operate from TTL or ECL levels.

Switching transients are less than 10 MV peak from 50 - 500 MHz. In-band transients are less than −50 dbm peak at 50 MHz and less than −80 db at 500 MHz.

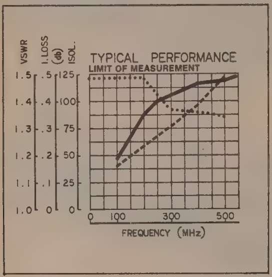
Attenuators in the band of 400 through 1200 MHz are available with similar specifications. Bandwidths of 25% around center frequencies in this range are provided at insertion losses on the order of 0.6 db/section, and VSWR of 1.5/1.

RF RELAYS, DC-500 MHz, 50 watts cw

STANDARD

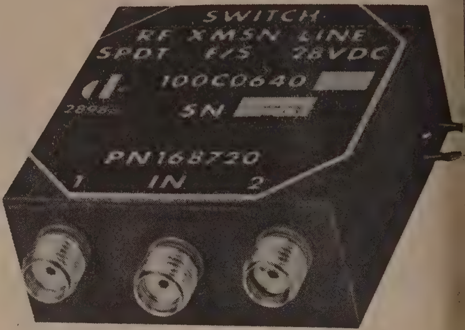


HIGH ISOLATION

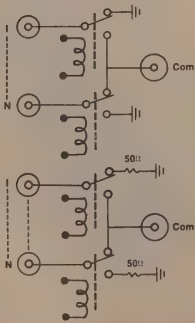


•••• ISOLATION ▬ VSWR --- INSERTION LOSS

Daico Industries RF relays employ hermetically sealed switching elements which provide extreme resistance to the severe environments encountered in military aircraft and communications systems, including 20 g's vibration to 3 KHz, 80 g's shock and altitude in excess of 100,000 ft. A continual test and evaluation program assures switch performance in excess of 20 million operations. These units are operable at extremely low current levels and may be ordered with 6-, 12- or 24-volt coils. Units also available to 1.5 GHz with 50 ohm termination, reference SP2T P/N 100C0878.



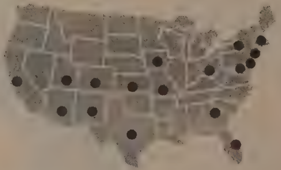
RF RELAYS DC-500 MHz 50 watts cw SIZE MATRIX	SPST	SP2T	SP3T	SP4T	SP5T	SP6T	TRANS.
STANDARD	100C0606 1x1½x.56	100C0073 1x1½x.56	100C0254 1½x1½x.62	100C0259 2x1½x.63	100C0604 2½x1½x.69	100C0605 3x1½x.69	100C0347 2x1½x.87
HIGH ISOLATION	100C0607 1x1½x.63	100C0109 1½x1½x.63	100C0630 1½x1¾x1.5	100C0104 1½x1¾x1.5			100C0608 1¼x1¼x1.3
50 OHM TERMINATION	100C0610 1x1½x.63	100C0611 1½x1½x.63	100C0612 2x1½x.63	100C0613 2½x1½x.63	100C0614 3x1½x.63	100C0615 3½x1¾x.63	
HIGH ISOLATION & 50 OHM TERMINATION	100C0609 1x1½x.75	100C0350 1½x1½x.75	100C0285 2x1½x.75	100C0485 2½x1½x.75			



Switching Speed: 5 millisec. max.
R. F. Power: 50W CW, 500 W Peak
Drive Current: 24 mills nom. at 24 VDC. Other coils available include 6, 12, 18 VDC.

Units can be provided with Fail Safe (no power) to a through path.

Can be operated directly from TTL with integrated circuit 75450 Dual Driver or equivalent.



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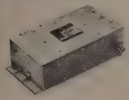
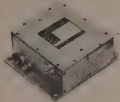
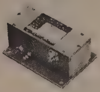
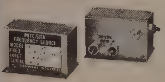
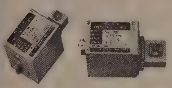
Compton, California 90220
Tel: (213) 631-1143
TWX 910-346-6741

MICROWAVE FREQUENCY SOURCES

500 MHz to 18 GHz

	Frequency range GHz	Tuning range	Stability	Power output (minimum)	Line Voltage	Tuning	Dimensions (inches) approx. L W H	Model	Price Range 1—3
CRYSTAL CONTROLLED SOURCES 	.5-1.0 1.01-2.0 2.01-4.0 4.01-6.0	Crystal Oscillators Fixed frequency	± .00075% over 0 to 50°C temperature range	5 mW	+ 28V dc	center freq. adjust.	3.8 x 3.4 x 2 3.8 x 3.4 x 2 3.8 x 3.4 x 2 3.8 x 3.4 x 2	EY-117-B EY-118-C EY-119-B EY-120-B	$ 745.00 745.00 890.00 1045.00
	6.01-7.0 7.01-8.0 8.01-9.0 9.01-10						4.5 x 3.4 x 2 4.5 x 3.4 x 2 6.0 x 3.4 x 2 6.0 x 3.4 x 2	EY-121-B EY-122-B EY-123-B EY-123-C	1290.00 1645.00 1890.00 1995.00
	.5-1.0 1.01-2.0 2.01-4.0 4.01-6.0	Crystal Oscillators Fixed frequency	± .00075% over 0 to 50°C temperature range	20 mW	+ 28V dc	center freq. adjust.	3.8 x 3.4 x 2 3.8 x 3.4 x 2 3.8 x 3.4 x 2 4.5 x 3.4 x 2	EY-103-1 EY-104-1A EY-105-2 EY-106-1	845.00 890.00 1290.00 1490.00
	6.01-7.0 7.01-8.0						6.0 x 3.4 x 2 6.0 x 3.4 x 2	EY-107-3 EY-108-1	1790.00 1990.00
	.5-10	Freq. std. Option	± .0001% (ovenized)	As above	+ 28V dc	As above	As above	EYHK-(above)	add 100.00
	.5-10	Freq. std. Option	± 2 x 10⁻⁸ (ovenized)	As above	+ 28V dc	As above	L (above) + 1.5"	EYH-(above)	add 550.00
	.5-10	± .1% VCXO Option	± .007% 0 to 50°C	As above	+ 28V dc	As above	L (above) + 3.0"	EN-(above)	add 400.00
HIGH "Q" TUNABLE OSCILLATORS 	.5-.8 .8-1.2 1.2-1.6	300 MHz 400 MHz 400 MHz	± .05% 0 to 50°C	10 mW	+ 24V dc	Mechanical (Screw driver adjust.)	7.0 x 1.3 x 1.3 5.0 x 1.3 x 1.3 3.0 x 1.0 x 1.4	EL-130 EL-131 EL-101	490.00 490.00 445.00
	1.6-2.1 2.1-2.6 2.6-3.2 2.1-3.6	500 MHz 500 MHz 600 MHz 1500 MHz					2.0 x 1.0 x 1.4	EL-102A EL-132 EL-103A EL-128	390.00 390.00 390.00 445.00
HIGH "Q" CAVITY STABILIZED OSCILLATORS 	6.4-8.1 8.2-12.3 12.4-18	Gunn Oscillator Fixed freq.	± .2% 0 to 50°C	10 mW	+ 15V dc	Center freq. adjust.	3.8 x 2.5 x 1.9 3.4 x 2.3 x 1.6 3.1 x 2.3 x 1.6	EL-154 EL-155 EL-156	690.00
	6.4-6.9 8.2-10 10-12 13-14	500 MHz 1800 MHz 2000 MHz 1000 MHz	± .2% 0 to 45°C	5 mW	+ 15V dc	Mechanical (Screw driver adjust.)	4.5 x 2.5 x 2.3	EL-126AF1 EL-126AF2 EL-126AF3 EL-126AF4	990.00
	6.4-14 Above ranges	Freq. ranges as above	± .05% (ovenized)	5 mW	+ 28V dc	Mechanical (Screw driver adjust.)	4.0 x 3.4 x 5.5	ELH-101A	1790.00
VOLTAGE TUNABLE OSCILLATORS	.58-1.0 .80-1.5	420 MHz 700 MHz	± .5% 10 to 45°C	20 mW	− 24V dc	Electrical 0 to + 65V	2.8 x 2.8 x 1.5	EP-149D EP-149E	890.00 990.00
	6.4-8.1 8.2-12.3 12.4-18.0	.6% tuning range	± .3% 0 to 50°C	10 mW	+ 15V dc	Electrical + 4 to + 30V	3.8 x 2.9 x 1.9 3.4 x 2.3 x 1.6 3.1 x 2.3 x 1.6	EP-168 EP-169 EP-170	1039.00
	4.6-8.0 8.01-10	500 MHz 700 MHz	± .05% (ovenized)	40 mW	+ 28V dc	Electrical + 9 to + 60V	4.0 x 2.5 x 3.5	EPH-171 EPH-172	1480.00

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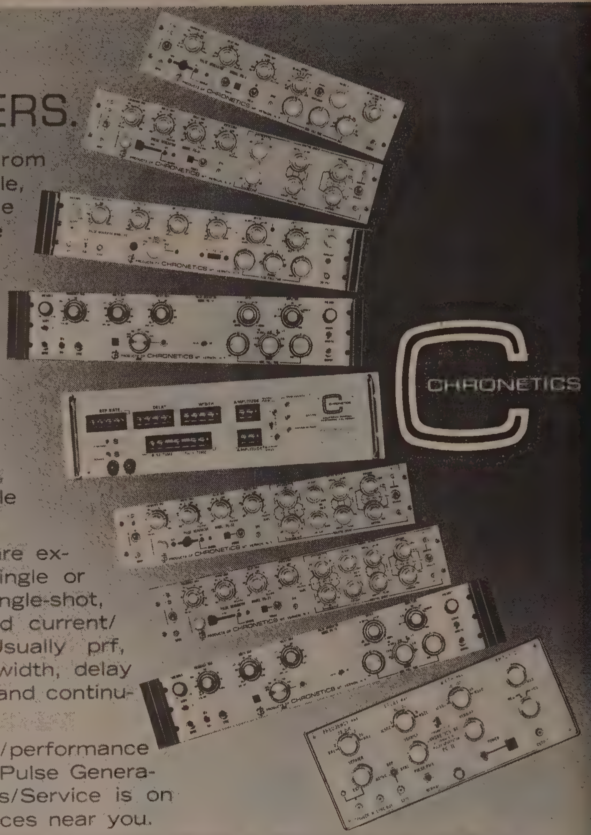
THE ***PLUS*** PULSERS.



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CHRONETICS Advanced Pulse Generators

MODEL	CLOCK PRF	AMPLITUDE^2	Z OUT	RISE/FALL TIME	PULSE DURATION	PULSE DELAY	DUTY CYCLE (MAX)	DC OFFSET
PG-10	0.1 Hz-50 MHz	5 mV-10V + or −	50 ohms or 1K, min.	< 5 ns	15 ns-1 sec	15 ns-1 sec	To 100%	± 2V ±40 mA
PG-11A	<10 Hz->50 MHz	0-15V + or −	8 ohms	<5 ns	15 ns-10 ms	20 ns-10 ms	85%	
PG-12	0.1 Hz-50 MHz	100 mV-10V + or −	50 ohms	<5 ns-1 sec^4	10 ns-1 sec	15 ns-1 sec	To 100%	±10V
PG-13B	1 Hz-25 MHz	100 mV-100V + or −	50 ohms or 1K, min.	<10 ns-50 ms^4	10 ns-500 ms^5	15 ns-500 ms	10% @ 2A 50% @ 1A 100% @ < 0.5A	±5V ±100 mA
PG-14	1 Hz-50 MHz	100 mV-20V + or −	50 ohms or 10K, min.	2 ns-50 ms^4	<5 ns-500 ms	10 ns-500 ms	To 100%	±5V ±100 mA
PG-16	1 Hz-100 MHz	100 mV-20V + or −	50 ohms or 10K, min.	2 ns-50 ms^4	<5 ns-500 ms^5	10 ns-500 ms	To 100%	±5V ±100 mA
PG-32A	0.1 Hz-10 MHz 20 MHz Max.^{1}	20 mV-20V^3 + and − 2 Channels	50 ohms or 500 ohms	5 ns-1 sec^4	< 30 ns-1 sec^5	50 ns-1 sec	To 100%	To 10V To 400 mA
1012P^6	10 Hz-9.99 MHz 20 MHz Max.^{1}	0-9.9V^2 + or −	50 ohms	5 ns-9.9 ms^4	40 ns-9.9 ms	25 ns-9.99 ms	85%	±9.9V

1 Effective PRF in double pulse mode
2 Max. Range into 50-ohm loads
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HOPE ELECTRONICS

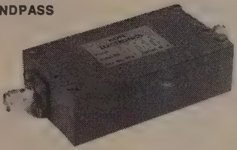
IN
20DB
20DB
20DB
10DB
6DB
3DB
2DB
1DB

ATTENUATORS

Model	Attenuation Range	Attenuation Steps	Frequency Range	Impedance	Price 1 - 24
AT-42-50	0 to 42 db	1, 2, 3, 6, 10, 20	DC to 300 MHZ	50Ω	$75.00
AT5-42-50	0 to 42 db	1, 2, 3, 6, 10, 20	DC to 500 MHZ	50Ω	$85.00
AT10-32-50	0 to 32 db	1, 2, 3, 6, 10, 10	DC to 1000 MHZ	50Ω	$90.00
AT5-3-50	0 to 3 db	.1, .2, .4, .5, .8, 1	DC to 500 MHZ	50Ω	$75.00
AT-82-50	0 to 82 db	1, 2, 3, 6, 10, 20, 20, 20	DC to 300 MHZ	50Ω	$89.00
AT5-82-50	0 to 82 db	1, 2, 3, 6, 10, 20, 20, 20	DC to 500 MHZ	50Ω	$99.00
AT-42-75	0 to 42 db	1, 2, 3, 6, 10, 20	DC to 300 MHZ	75Ω	$70.00
AT-3-75	0 to 3 db	.1, .2, .4, .5, .8, 1	DC to 300 MHZ	75Ω	$70.00
AT-82-75	0 to 82 db	1, 2, 3, 6, 10, 20, 20	DC to 300 MHZ	75Ω	$85.00
AT-42-600	0 to 42 db	1, 2, 3, 6, 10, 20	DC to 2 MHZ	600Ω	$70.00
AT-82-600	0 to 82 db	1, 2, 3, 6, 10, 20, 20, 20	DC to 2 MHZ	600Ω	$85.00
AT-3-600	0 to 3 db	.1, .2, .4, .5, .8, 1	DC to 2 MHZ	600Ω	$70.00

FILTERS

MODEL FLP — LOWPASS
MODEL FHP — HIGHPASS
MODEL FBP — BANDPASS



FROM $55.00

Cutoff Frequency Range .... 10 HZ — 300 MHZ
3 db Bandwidth Range . . . 5% to 10% Model FBP Only
VSWR .... Less than 1.5:1
Nominal Impedance .... 50Ω, 75Ω, 600Ω, or 10 K

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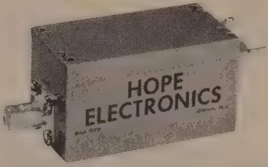
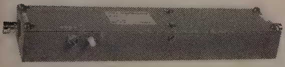
CRYSTAL OSCILLATORS

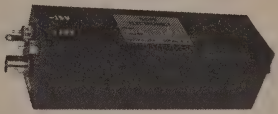


Model	Frequency Range	Power Output	Stability	From
EXO-10	70 KHZ to 300 MHZ	>10 mw	.005%	$ 85.00
XO-10V	1 HZ to 1 MHZ	10V into 1K	.005%	$ 99.00
XO-10	1 MHZ to 600 MHZ	>10 mw	.005%	$110.00
XO-100	1 MHZ to 400 MHZ	>100 mw	.005%	$195.00
ICXO-4	1 HZ to 1MHZ	4V into 50Ω	.005%	$ 50.00



AMPLIFIERS

WIDE BAND — I F — PULSE



Model	Bandwidth	Gain	Flatness	VSWR	Noise Figure	Output Level	Price 1 - 24
PA200-20	1 to 200 MHZ	20 db	±.5 db	<1.5:1	<8 db	.5V	$195.00
PA200-40	1 to 200 MHZ	40 db	±.5 db	<1.5:1	<8 db	.5V	$295.00
A300-30	100 KHZ to 300 MHZ	30 db	±.75 db	<1.5:1	<12 db	.5V	$275.00
A30-6-30E	27 to 33 MHZ	30 db		<1.3:1	<4 db	.1V	$145.00
A60-10-25E	55 to 65 MHZ	25 db		<1.3:1	<4 db	.1V	$145.00

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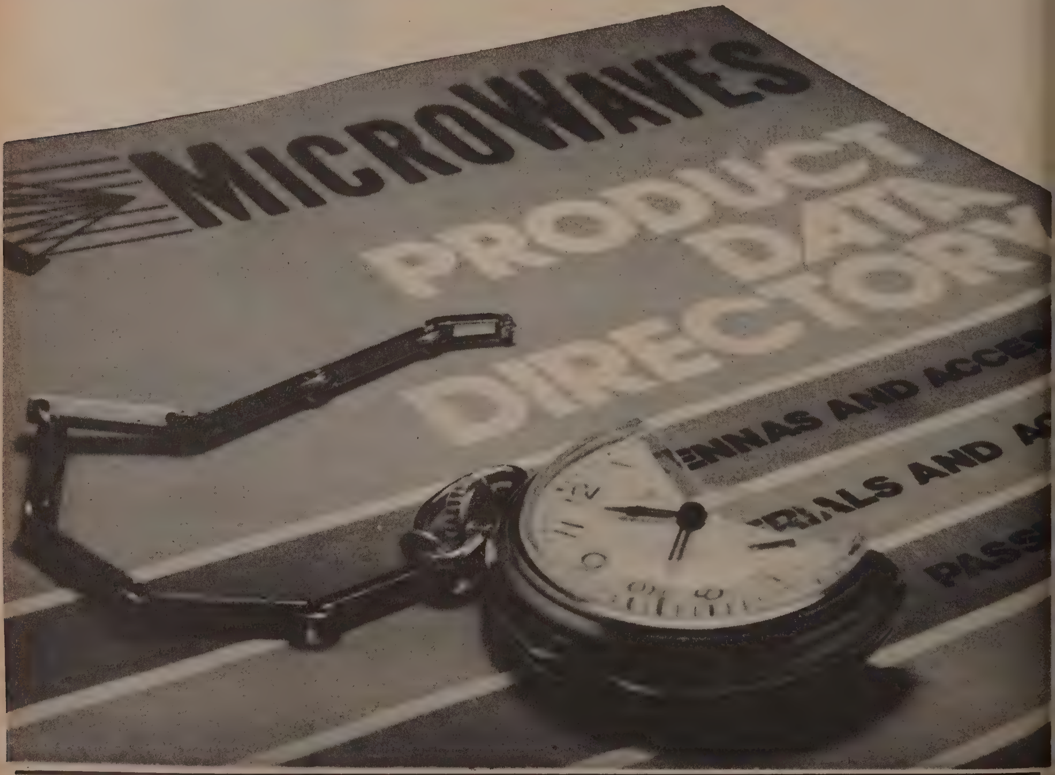

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The **NUMBER ONE**
Magazine for Microwave Engineers

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5. Scientist
6. Purchasing Agent, Buyer
7. Sales Manager, Marketing Manager
8. Professor
9. Other (specify) ____________

2. ☐ **Microwave job function** (insert letter)

A. Administrative management
B. Engineering management
C. Design engineering
D. Development engineering
E. Research
F. Production engineering
G. Applications engineering
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3. Plant ☐ Your own work ☐ **Primary microwave classification**
Insert letter in EACH BOX even if the same

Plant	Your own work	
A.	A.	Communications Systems
B.	B.	CATV and Broadcasting
C.	C.	Radar Systems
D.	D.	Telemetering and Data Systems
E.	E.	Electronic Countermeasures Systems
F.	F.	Navigation and Guidance Systems (incl. ATC, ILS)
G.	G.	Weapons Control Systems
H.	H.	Industrial Systems and Equipment
J.	J.	Laser Devices and Systems
K.	K.	Components, active, (solid-state devices, tube, etc.)
L.	L.	Components, passive, (attennuators, circulators, etc.)
M.	M.	Components, other, (antennae, cables, etc.)
N.	N.	Test and Measurement

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DIRECTIONAL COUPLERS ☐ FREQUENCY DOUBLERS

DOUBLE-BALANCED FET MIXERS ☐ LIMITERS

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There's an analogy between the popular Swiss Army knife and Mini-Circuits Laboratory's new double-balanced mixer kit (DBK-5). Both have been designed to serve their owner when the need arises . . . and both products should be on hand when the need arises.

MODEL	Frequency Range (MHz)	Conversion Loss (dB) Total Range	Isolation (dB)					
			Lower band edge to one decade higher		Mid range		Upper band edge to one octave lower	
			LO-RF	LO-IF	LO-RF	LO-IF	LO-RF	LO-IF
ZAD-1	LO-0.5-500 RF-0.5-500 IF-DC-500	6.5 typ. 8.5 max.	50 typ. 35 min.	45 typ. 30 min.	45 typ. 30 min.	40 typ. 25 min.	35 typ. 25 min.	30 typ. 20 min.
			Price $34.95 (1-3)					
ZAD-2	LO-1-1000 RF-1-1000 IF-0.5-500	6.5 typ. 8.5 max.	45 typ. 30 min.	45 typ. 30 min.	35 typ. 20 min.	35 typ. 20 min.	30 typ. 20 min.	30 typ. 20 min.
			Price $44.95 (1-3)					
ZAD-3	LO-0.025-200 RF-0.025-200 IF-DC-200	6.5 typ. 8.5 max.	60 typ. 50 min.	45 typ. 35 min.	45 typ. 35 min.	40 typ. 30 min.	35 typ. 25 min.	30 typ. 20 min.
			Price $36.95 (1-3)					

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DESIGNERS' SELECTION GUIDE

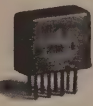
DOUBLE-BALANCED MIXERS

STANDARD LEVEL (+7dBmLO)

SRA SERIES
Low cost, miniature size. Frequency coverage from 500 Hz to 1250 MHz. Features 6 dB conversion loss, 40 dB isolation. Operates at −54°C to +100°C. The SRA-1 double balanced mixer is industry standard and number one volume leader. Small quantity prices at $9.95.

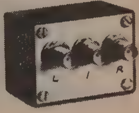
TAK SERIES
Low profile, miniature size, only 0.2 inches high. Frequency coverage 10 KHz to 1250 MHz. Features 6 dB conversion loss, 40 dB isolation. Operates −54°C to +100°C. Small quantity prices start at $19.95.

TSM SERIES
Frequency coverage from 100 KHz to 500 MHz. Low profile, micro-miniature size. Only 0.25 inches high, requires only 0.2 by 0.5 inches of PC board area. Smallest units available in industry. Features 6 dB conversion loss, 40 dB isolation, −54°C to +100°C operation. Small quantity prices start at $16.95.



SAM SERIES
Frequency coverage from 100 KHz to 1500 MHz. Micro-miniature size, requires only 0.2 by 0.5 inches of PC board area. Features 6 dB conversion loss, 40 dB isolation. Operates at −54°C to +100°C. Small quantity prices start at $15.95.

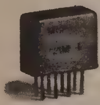
ZAD SERIES
Cast aluminum case. 2.25 inches long. BNC connectors standard, TNC on request. Frequency coverage from 500 Hz to 1250 MHz. Conversion loss 6 dB, isolation 40 dB. Operates at −54°C to +100°C. Small quantity prices start at $24.95.



ZLW SERIES
Cast aluminum case, miniature size 1.5 inches long. SMA (3mm) connectors standard. Frequency coverage from 500 Hz to 1500 MHz. Conversion loss 6 dB, isolation 40 dB. Operates at −54°C to +100°C. Small quantity prices start at $34.95.

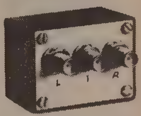
HIGH LEVEL (+17dBmLO)

SRA-H SERIES
Miniature size, provides frequency coverage from 50 KHz to 1000 MHz. Features 6 dB conversion loss, 40 dB isolation, temperature range −54°C to +100°C. Offers increased dynamic range, 1 dB compression point at +10 dBm RF input. Small quantity prices start from $15.95.



SAM-H SERIES
Micro-miniature size, requires same PC board area as a TO-5 transistor case. Premium high performance units. Frequency coverage from 100 KHz to 1000 MHz. Temperature range −54°C to +100°C, constructed for tough military requirements. Small quantity prices start from $19.95.

ZAD-H SERIES
Cast aluminum case, BNC, or TNC connectors. Double shielded for tough EMI requirements. Frequency coverage from 50 KHz to 1000 MHz. Features 6 dB conversion loss, 40 dB isolation. Offers increased dynamic range, 1 dB compression point at +10 dBm RF input. Small quantity prices start from $30.95.

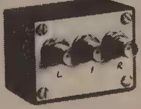


ZLW-H SERIES
Cast aluminum case, miniature size, 1.5 inches long. SMA (3mm) connectors standard. Frequency coverage from 50 KHz to 1000 MHz. Features 6 dB conversion loss, 40 dB isolation. Offers increased dynamic range, 1 dB compression point at +10 dBm RF input. Small quantity prices start at $40.95.

VERY HIGH LEVEL (+23dBmLO)

RAY SERIES
Miniature size, provides frequency coverage from 70 KHz to 1000 MHz. Features 6.5 dB conversion loss, 40 dB isolation, temperature range −54°C to +100°C. Offers extra increased dynamic range, 1 dB compression point at +15 dBm RF input. Small quantity prices start from $31.95 each.

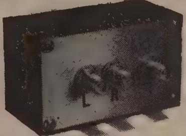
ZAY SERIES
Cast aluminum case, BNC connectors standard, TNC on request. Double shielded for tough EMI requirements. Frequency coverage from 70 KHz to 1000 MHz. Features 6.5 dB conversion loss, 40 dB isolation. Offers extra increased dynamic range, 1 dB compression point at +15 dBm RF input. Small quantity prices start from $41.95.



ZMY SERIES
Cast aluminum case, miniature size 1.5 inches long. SMA (3mm) connectors standard. Frequency coverage from 70 KHz to 1000 MHz. Conversion loss 6 dB, isolation 40 dB. Operates at −54°C to +100°C. Small quantity prices start at $51.95.

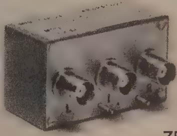
MICROWAVE MIXERS

MA SERIES — DOUBLE BALANCED
Cast aluminum case, SMA (3mm) connectors. Model MA-1 provides exceptionally broad frequency coverage 1 MHz to 2500 MHz. LO power +10 dBm, isolation greater than 40 dB, conversion loss 9.5 dB. Ruggedly constructed for tough military requirements. Single unit price only $99.95.



ZMA SERIES — BALANCED
Cast aluminum case, 2.25 inches long. SMA (3mm) connectors standard. Frequency coverage from 1.0 to 3.0 GHz. Conversion loss 7 dB, isolation 30 dB. Operates at −54°C to +100°C. Small quantity prices start at $49.95.

DOUBLE-BALANCED FET MIXERS



ZRC SERIES
Cast aluminum case, 2.25 inches long. BNC connectors standard, TNC on request. Frequency range 1.0-200 MHz. Ultra-low distortion. Two-tone, third order intercept point +30 dBm. Conversion gain 0 dB. DC power +15 V, 45 mA. From $79.95 in small quantities.

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DESIGNERS' SELECTION GUIDE

POWER SPLITTERS/COMBINERS

TWO-WAY 0°

PSC-2 SERIES

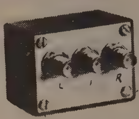
Miniature size, provides frequency coverage from 2 KHz to 400 MHz. Low insertion loss .5 dB. high isolation 40 dB, amplitude unbalance typically .05 dB, phase unbalance typically less than 1 degree. Temperature range is from −54°C to +100°C. Economically priced from $9.95 in small quantities.

MSC-2 SERIES

Micro-miniature size, requires same PC board area as a TO-5 transistor case. Model MSC-2-1 covers 0.1 to 450 MHz. Premium performance of low insertion loss .5 dB, high isolation 35 dB, amplitude unbalance less than .05 dB, phase unbalance less than 1 degree. Ruggedly constructed for military applications. Priced at $16.95 each in small quantities.

ZSC-2 SERIES

Cast aluminum case, BNC, or TNC connectors. Frequency coverage from 2 KHz to 400 MHz. Low insertion loss .5 dB, high isolation 40 dB, amplitude unbalance .05 dB, phase unbalance 1 degree. Temperature range −54°C to +100°C. Small quantity prices start from $24.95 each.



ZMSC-2 SERIES

Cast aluminum case, miniature size 1.5 inches long. SMA (3mm) connectors standard. Frequency coverage from 2 KHz to 400 MHz. Low insertion loss .5 dB, high isolation 40 dB, amplitude unbalance .05 dB, phase unbalance 1 degree. Temperature range −54°C to +100°C. Small quantity prices start from $34.95 each.

TWO-WAY 90°

PSCQ-2 SERIES

Miniature size. Frequency coverage from 25 MHz to 400 MHz. Low insertion loss .3 dB. Isolation 25 dB. Phase deviation from quadrature 1° typically. Temperature range −55°C to +100°C. From $19.95 in small quantities.

TWO-WAY OUT OF PHASE 180°

PSCJ-2 SERIES

Miniature size. Frequency coverage from 1 MHz to 200 MHz. Low insertion loss .5 dB, high isolation 40 dB, amplitude unbalance .05 dB, phase unbalance 1 degree. Temperature range −54°C to +100°C. Small quantity prices start from $19.95 each.

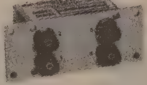
ZSCJ-2 SERIES

Cast aluminum case, BNC, or TNC connectors. Frequency coverage from 1 MHz to 200 MHz. Low insertion loss .5 dB, high isolation 40 dB, amplitude unbalance .05 dB, phase unbalance 1 degree. Temperature range −54°C to +100°C. Small quantity prices start from $34.95 each.

THREE-WAY 0°

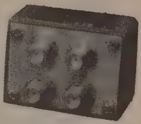
PSC-3 SERIES

Miniature size. Frequency coverage 10 KHz to 200 MHz. Low insertion loss .4 dB, high isolation 40 dB, amplitude unbalance .05 dB, phase unbalance 1 degree. Temperature range −55°C to +100°C. Small quantity prices start at $19.95.



ZSC-3 SERIES

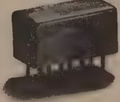
Cast aluminum case, 2.25 inches long. BNC connectors standard. TNC on request. Frequency coverage 10 KHz to 200 MHz. Low insertion loss .4 dB, high isolation 40 dB, amplitude unbalance .05 dB, phase unbalance 1 degree. Temperature range −55°C to +100°C. Small quantity prices start at $34.95.



ZMSC-3 SERIES

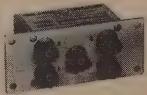
Cast aluminum case, miniature size 1.5 inches long. SMA (3mm) connectors standard. Frequency coverage 10 KHz to 200 MHz Low insertion loss 4 dB, high isolation 40 dB, amplitude unbalance .05 dB, phase unbalance 1 degree. Temperature range −55°C to +100°C. Small quantity prices start at $44.95.

FOUR-WAY 0°



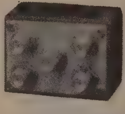
PSC-4 SERIES

Miniature size. Frequency coverage 100 KHz to 250 MHz. Low insertion loss .5 dB, high isolation 30 dB, amplitude unbalance .05 dB, phase unbalance 1 degree. Temperature range −55°C to +100°C. Small quantity prices begin at $23.95.



ZSC-4 SERIES

Cast aluminum case, 2.25 inches long. BNC connectors standard. TNC on request. Frequency coverage 2 KHz to 250 MHz. Low insertion loss .5 dB, high isolation 30 dB, amplitude unbalance .05 dB, phase unbalance 1 degree. Temperature range −55°C to +100°C. Small quantity prices begin at $38.95.



ZMSC-4 SERIES

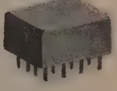
Cast aluminum case, miniature size 1.5 inches long. SMA (3mm) connectors standard. Frequency coverage 2 KHz to 250 MHz. Low insertion loss .5 dB, high isolation 30 dB, amplitude unbalance .05 dB, phase unbalance 1 degree. Temperature range −55°C to +100°C. Small quantity prices begin at $48.95.

SIX-WAY 0°

PSC-6 SERIES

Miniature size, .8 inches square. Frequency coverage from 1.0 to 175 MHz. Low insertion loss .7 dB. High isolation 30 dB. Amplitude unbalance .1 dB. Phase unbalance 3° typical. Temperature range −55°C to +100°C. From $59.95 in small quantities.

EIGHT-WAY 0°



PSC-8 SERIES

Miniature size, .8 inches square. Frequency coverage from 0.5 to 175 MHz. Low insertion loss .7 dB. High isolation 30 dB. Amplitude unbalance .1 dB. Phase unbalance 1° typical. Temperature range −55°C to +100°C. From $59.95 in small quantities.

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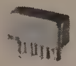
RF TRANSFORMERS

T SERIES

Micro-miniature, plastic case, wideband covering frequency range of .015 MHz to 800 MHz. Impedance levels from 12.5 ohms to 800 ohms. Low insertion loss less than 0.5 dB. Small quantity prices begin at only $2.95! Kit available.



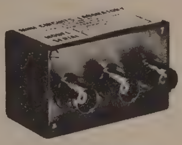
TMO SERIES

Micro-miniature, hermetically sealed metal case. Wideband, covering frequency range of .015 to 800 MHz. Impedance levels from 12.5 to 800 ohms. Low insertion loss less than 0.5 dB. Small quantity prices as low as $4.95. Kit available.

ELECTRONIC ATTENUATORS/SWITCHES

PAS SERIES

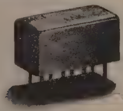
Miniature size. Broad frequency range 1-450 MHz. High on/off ratios, 50 dB. Low insertion loss, 1.5 dB. Ultra-low distortion, intercept point +45 dBm. Small quantity prices start from $27.95.



ZAS SERIES

Cast aluminum case, 2.25 inches long. BNC connectors standard. TNC on request. Broad frequency range 1-450 MHz. High on/off ratios, 50 dB. Low insertion loss, 1.5 dB. Ultra-low distortion, intercept point +45 dBm. Small quantity prices start at $42.95.

DIRECTIONAL COUPLERS



PDC SERIES

Miniature size. Broad frequency range 10 KHz to 1000 MHz. Wide selection of coupling. Low main line loss from 0.1 dB. High directivity to 35 dB. From $9.95 in small quantities.

ZDC SERIES

Cast aluminum case, 2.25 inches long. BNC connectors standard, TNC on request. Broad frequency range 10 KHz to 1000 MHz. Wide selection of coupling. Low main line loss from 0.1 dB. High directivity to 35 dB. From $26.95 in small quantities.

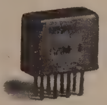
ZMDC SERIES

Cast aluminum case, miniature size 1.5 inches long. SMA (3mm) connectors standard. Broad frequency range 10 KHz to 1000 MHz. Wide selection of coupling. Low main line loss from 0.1 dB. High directivity to 35 dB. From $36.95 in small quantities.

FREQUENCY DOUBLERS

RK SERIES

Miniature size. Wide band .05 to 1000 MHz. Exceptionally good spurious rejection. Low conversion loss, 12 dB. Temperature range from −55°C to +100°C. From $14.95 in small quantities.

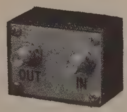


AK SERIES

Micro-miniature size, PC board area only 0.1 sq. inches. Wide band 1-1000 MHz. Exceptionally good spurious rejection. Low conversion loss 13.5 dB. Temperature range from −55°C to +100°C. From $19.95 in small quantities.

GK SERIES

Cast aluminum case, 2.25 inches long. BNC connectors standard, TNC on request. Wide band .05-1000 MHz. Exceptionally good spurious rejection. Low conversion loss 12 dB. Temperature range −55°C to +100°C. From $26.95 in small quantities.



MK SERIES

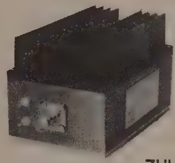
Miniature size, cast aluminum case, 1.5 inches long. SMA (3mm) connectors standard. Wide band .05-1000 MHz. Exceptionally good spurious rejection. Low conversion loss 12 dB. Temperature range −55°C to +100°C. From $34.95 in small quantities.

LIMITERS

PLS SERIES

Miniature size. Frequency coverage from .1 to 150 MHz. Input level +6 dBm to +20 dBM. Output level −1 dBm. Phase variation over range 2° typical. Temperature range −55°C to +100°C. From $14.95 in small quantities.

BROADBAND AMPLIFIERS



ZHL SERIES

High power linear amplifier. +38 dBm two-tone, third order intercept. Wide band, frequency range 2 to 500 MHz. Max. power output greater than 1 watt. Heat sink mounted on unit. Unit price $199.00.

World's largest supplier of double balanced mixers

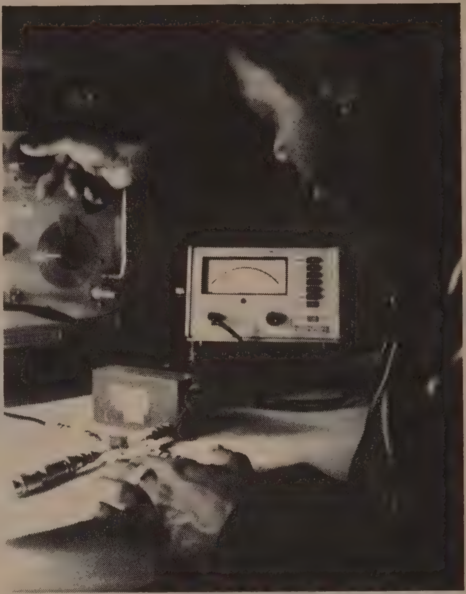
Mini Circuits Laboratory 837-843 Utica Avenue, Brooklyn, NY 11203 (212) 342-2500

Reliability Considerations

It is very important that the mixer should provide reliable service under adverse environmental conditions. The user should also expect satisfactory performance after years of operation. Since these two criteria are somewhat subjective the manufacturer should utilize procedures, techniques, and criterion which will enhance the reliability and quality of the finished product. After manufacturing tens of thousands of double balanced mixers Mini-Circuits Laboratory is confident that we are doing the "right thing".

At Mini-Circuits Laboratory reliability and quality control is one of the most important considerations in the manufacture of our products. Some of the procedures which are incorporated to ensure that every unit shipped has quality built in are as follows:

A. 100% testing of each diode.
B. 100% testing of each unit.
C. 100% inspection of every solder connection.
D. All transformers bonded to the header for protection against severe shock and vibration conditions.


No units are shipped without a thorough 100% test.

Matched diodes are carefully mounted to the header assembly for rugged protection against severe shock and vibration.

Every single solder connection is closely inspected to detect potential flaws.

E. All diodes bonded to the header for protection against severe shock and vibration conditions.

F. Diode power dissipation derated greater than 50%.

G. All Components rated for greater than +125°C operation.

H. All transformer leads double wrapped.

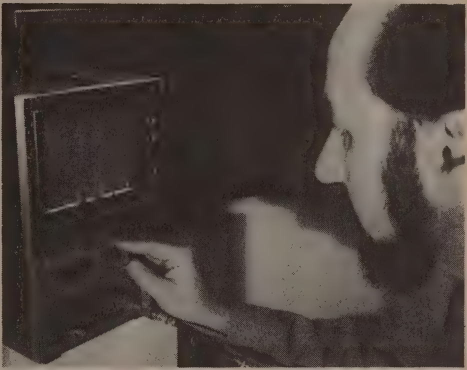
I. Heavy coated wire insulation for Hi-Pot/altitude requirements.

J. Completely encapsulated for protection against mechanical shock and vibration and temperature shock.

K. Permanent case marking of model number, cannot be removed by cleaning agents or ultrasonic baths.

L. Cupro-Nickel case for long lasting finish especially under salt atmosphere conditions.

As a consequence of these considerations Mini-Circuits Laboratory guarantees its products for one full year after shipment. In addition Mini-Circuits guarantees its units will meet the following environmental specifications.



Performance characteristics are checked to assure compliance with data-sheet specs.

Transformer leads are doubly wrapped to eliminate potential flaws.

Environmental Specifications

All MCL components are manufactured under exacting quality assurance and control standards. They will meet or exceed published specifications over the operating temperature range of —54° to +100°C, and after being subjected to any or all of the following physical or environmental tests of MIL STD 202D which are applicable.

Temperature Cycling: —65° to +125°C	102	C
Altitude: 656,000 feet	105	G
Humidity: 90% RH, 65°C	106	
Thermal Shock: —65°C to +125°C	107	B
Seal: less than 10^{-5} Atm. cc/sec.	112	A
Drop: Random, 45 min.	203	
Vibration: 2 to 2,000 cps, 20g, 12 hrs.	204	D
Solder Heat 260°C, 10 sec.	210	B
Solderability: 95% coverage	208	
Terminal Tensile Strength: 4½ lbs., 10 sec.	211	A
Terminal Fatigue: 2 lbs., 3 cycles	211	C
Mechanical Shock: 100g, 6ms	213	I
Solvent Resistance: Alcohol, Trichloroethane, Freon.	215	

Be prepared...
Kit includes Original Swiss Army knife at no extra cost
for emergency needs...and design improvements

100 KHz - 400 MHz

Power splitter Combiners Kit $79.95

SAVE $53.80 AND ALSO GET AN ORIGINAL SWISS ARMY KNIFE

Be prepared to . . .

- ***. . . meet emergency customer needs***
- ***. . . outfit breadboards and prototypes overnight***
- ***. . . customize designs without delay***
- ***. . . retrofit and update designs***
- ***. . . modify and substitute for better performance or price***
- ***. . . and to cut, skin, slice, sever, snip, saw, screw, scribe, shape, scrape, strip, pick, pry, punch, trim with the Swiss Army knife included in kit.***

There's an analogy between the popular Swiss Army knife and Mini-Circuits Laboratory's new Power Splitter/Combiner kit (PSK-1). Both have been designed to serve their owner when the need arises . . . and both products should be on hand when the need arises.

Power Splitter/Combiner Kit (PSK-1)
BE A PLANNER AND SAVE $53.80

Order now and receive Power Splitter/Combiners (2)PSC-2-1, (1) PSCJ-2-1, (1)PSC-3-1, (1)PSC-4-3 and one Swiss Army Knife for only $79.95. (A $133.75 Power Splitter value if purchased separately.)

	Model PSC 2-1	Model PSC 3-1	Model PSC 4-3	Model PSCJ 2-1
Frequency Range (MHz)	.1-400	1-200	.250-250	1-200
Nominal Phase Difference Between Output Ports	0°	0°	0°	180°
Isolation dB	Typ. Min.	Typ. Min.	Typ. Min.	Typ. Min.
Mid Range	25 20	40 30	40 30	40 30
Insertion Loss, dB	above 3 dB Typ. Max.	above 4.8 dB Typ. Max.	above 6 dB Typ. Max.	above 3 dB Typ. Max.
Mid Range	.4 .75	.4 .7	.5 .75	0.6 0.8
Phase Unbalance degrees	Typ. Max.	Typ. Max.	Typ. Max.	Typ. Max.
Mid Range	1 3	2 4	2 4	2.0 4.0
Amplitude Unbalance, dB	Typ. Max.	Typ. Max.	Typ. Max.	Typ. Max.
Mid Range	.05 .2	.05 .2	.1 .25	.05 .2
VSWR	1.2 typical	1.1 typical	1.1 typical	1.2 typical
Matched Power Rating	1 watt max.	1 watt max.	1 watt max.	1 watt max.
Internal Load Dissipation	⅛ watt	⅜ watt	⅜ watt	⅛ watt
Price (Quantity)	$19.95 (1-5)	$29.95 (1-5)	$33.95 (1-5)	$29.95 (1-4)

Impedance, All Ports 50 ohms

World's largest supplier of double balanced mixers

Mini-Circuits Laboratory

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Brooklyn, NY 11203 (212) 342-2500 Int'l Telex 620156

Foreign Sales Representatives: ☐ **AUSTRALIA** General Electronic Services, 99 Alexander Street, New South Wales, Australia 2065; ☐ **ENGLAND** Dale Electronics, Dale House, Whart Road, Frimley Green, Camberley Surrey; ☐ **FRANCE** S.C.I.E.-D.I.M.E.S., 31 Rue George - Sand, 91120 Palaiseau, France; ☐ **GERMANY, AUSTRIA, SWITZERLAND** Industrial Electronics GMBH, Kluberstrasse 14, 6000 Frankfurt/Main, Germany; ☐ **ISRAEL** Vectronics, Ltd., 69 Gordon Street, Tel-Aviv, Israel; ☐ **JAPAN** Densho Kaisha, Ltd., Eguchi Building, 8-1 1 Chome Hamamatsucho Minato-ku, Tokyo; ☐ **EASTERN CANADA** B. D. Hummel, 2224 Maynard Avenue, Utica, NY 13502 (315) 736-7821; **NETHERLANDS** Coimex, Veldweg 11, Hattem, Holland

US Distributors: ☐ **NORTHERN CALIFORNIA** Cain-White & Co., Foothill Office Center, 105 Fremont Avenue, Los Altos, CA 94022 (415) 948-6533; ☐ **SOUTHERN CALIFORNIA, ARIZONA** Crown Electronics, 11440 Collins Street, No. Hollywood CA 91601 (213) 877-3550

Be prepared...
Kit includes Original Swiss Army knife at no extra cost
for emergency needs...and design improvements

10 KHz – 1000 MHz
Directional Coupler Kit $79.95
SAVE $42.90 AND ALSO GET AN ORIGINAL SWISS ARMY KNIFE

Be prepared to . . .

- ***. . . meet emergency customer needs***
- ***. . . outfit breadboards and prototypes overnight***
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- ***. . . and to cut, skin, slice, sever, snip, saw, screw, scribe, shape, scrape, strip, pick, pry, punch, trim with the Swiss Army knife included in kit.***

There's an analogy between the popular Swiss Army knife and Mini-Circuits Laboratory's new Directional Coupler kit (DCK-1). Both have been designed to serve their owner when the need arises . . . and both products should be on hand when the need arises.

	Model ZDC 10-1		**Model ZDC 15-6**		**Model ZDC 10-2**		
Frequency Range, MHz	0.5-500		.01-35		250-1000		
Coupling, dB (Input To Coupled Port)	11.5±0.5		15 dB±0.5 dB		10±0.5		
Coupling Flatness, dB	±0.6		±0.5 dB		±0.5		
VSWR	1.2:1 Typ.		1.15:1 Typ.		1.5:1 Typ.		
Impedance	50 ohms		50 ohms		50 ohms		
Directivity, dB	Typ.	Min.	Typ.	Min.		Typ.	Min.
Lower Band Edge To One Decade Higher	32	25	38	30	(250-400 MHz)	40	30
Mid Range	32	25	35	25	(400-800 MHz)	30	20
Upper Band Edge To One Octave Lower	22	15	28	20	(800-1000 MHz)	20	15
Main Line Loss, dB (Includes Theoretical Power Split Loss)	Typ.	Max.	Typ.	Max.		Typ.	Max.
One Octave From Band Edge	.65	1.0	.2	.4	(250-600 MHz)	1.1	1.4
Total Range	.85	1.2	.3	.6	(600-1000 MHz)	1.6	1.9
Input Power							
Total Range (1)	3 Watts		4 Watts		5 Watts		
(1) Lower Band Edge To One Decade Higher	1.5 Watts		2 Watts		5 Watts		
Price (Quantity)	**$36.95 (1-3)**		**$44.95 (1-3)**		**$40.95 (1-3)**		

Directional Coupler Kit (DCK-1)
BE A PLANNER AND SAVE $42.90

Order now and receive three Directional Couplers (1) ZDC-10-1, (1) ZDC-15-6, (1) ZDC-10-2 and one Swiss Army Knife for only $79.95. (A $122.85 Directional Coupler value if purchased separately.)

World's largest supplier of double balanced mixers

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Be prepared...
Kit includes Original Swiss Army knife at no extra cost
for emergency needs...and design improvements

3 KHz – 750 MHz

Double-Balanced Mixer Kit $79.95

SAVE $ 41.75 AND ALSO GET AN ORIGINAL SWISS ARMY KNIFE

Be prepared to . . .

- *. . . meet emergency customer needs*
- *. . . outfit breadboards and prototypes overnight*
- *. . . customize designs without delay*
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- *. . . modify and substitute for better performance or price*
- *. . . and to cut, skin, slice, sever, snip, saw, screw, scribe, shape, scrape, strip, pick, pry, punch, trim with the Swiss Army knife included in kit.*

There's an analogy between the popular Swiss Army knife and Mini-Circuits Laboratory's new double-balanced mixer kit (DBK-4). Both have been designed to serve their owner when the need arises . . . and both products should be on hand when the need arises.

Double-balanced mixer kit (DBK-4)

BE A PLANNER AND SAVE $41.75.

Order now and receive six double-balanced mixers (2) SRA-1, (2) SRA-1W, (1) SRA-3, (1) SRA-6) and one Swiss Army knife for only $79.95. (A $121.70 mixer value if purchased separately.)

MODEL	Frequency Range (MHz)	Conversion Loss (dB) Total Range	Isolation (dB)					
			Lower band edge to one decade higher		Mid range		Upper band edge to one octave lower	
			LO-RF	LO-IF	LO-RF	LO-IF	LO-RF	LO-IF
SRA-1	LO-0.5-500 RF-0.5-500 IF-DC-500	6.5 typ. 8.5 max.	50 typ. 35 min.	45 typ. 30 min.	45 typ. 30 min.	40 typ. 25 min.	35 typ. 25 min.	30 typ. 20 min.
			Price $9.95—Quant. (1-49)					
SRA-1W	LO-1-750 RF-1-750 IF-DC-750	6.5 typ. 8.5 max.	50 typ. 45 min.	45 typ. 30 min	45 typ. 30 min.	40 typ. 25 min.	35 typ. 25 min.	30 typ. 20 min.
			Price $24.95-Quant. (1- 5)					
SRA-3	LO-0.025-200 RF-0.025-200 IF-DC-200	6.5 typ. 8.5 max.	60 typ. 50 min.	45 typ. 35 min.	45 typ. 35 min.	40 typ. 30 min.	35 typ. 25 min.	30 typ. 20 min.
			Price $21.95—Quant. (1-5)					
SRA-6	LO-0.003-100 RF-0.003-100 IF-DC-100	6.5 typ. 8.5 max.	60 typ. 50 min.	60 typ. 45 min.	45 typ. 30 min.	40 typ. 25 min.	35 typ. 25 min.	30 typ. 20 min
			Price $29.95—Quant. (1-5.)					

MCL

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Mini-Circuits Laboratory

INTRODUCTION TO SRA SERIES DOUBLE-BALANCED MIXERS

Standard Level

(+7 dBm LO)

SRA Series

SRA-1	.5- 500 MHz	$ 9.95 (1-49)
SRA-1-1	.1- 500 MHz	$11.95 (6-49)
SRA-1W	1- 750 MHz	$14.95 (6-49)
SRA-2	1-1000 MHz	$24.95 (1-24)
SRA-4	5-1250 MHz	$26.95 (1-24)
SRA-3	.025- 200 MHz	$12.95 (6-49)
SRA-6	.003- 100 MHz	$19.95 (5-24)
SRA-8	500 Hz- 10 MHz	$24.95 (5-24)

FAST DELIVERY
From stock, one week max.

For connector version see ZAD series

FEATURES

MINIATURE SIZE, .128 CU. INCHES

BROAD FREQUENCY RANGE
500Hz - 1250MHz

HIGH ISOLATION 40 dB

LOW CONVERSION LOSS 6dB

HERMETICALLY SEALED METAL CASE

PC BOARD MOUNTING

LOW COST FROM $9.95
IN SMALL QUANTITIES

APPLICATIONS

FREQUENCY MIXING

PULSE AND AMPLITUDE MODULATION

PHASE DETECTION

CURRENT CONTROLLED ATTENUATION

FAST SWITCHING

BI-PHASE MODULATION

DESCRIPTION

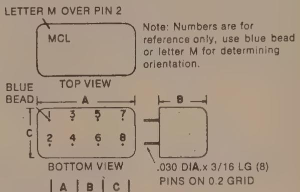
Having a volume of only .128 cu. inches, the SRA series covers a very broad frequency range from 500Hz to 1250MHz. Offered at the lowest prices available in the industry, these rugged units provide low conversion loss, 6 dB, high isolation 40 dB, and exceptional unit to unit matched performance.

Packaged within an RFI shielded metal enclosure and hermetically sealed header, these high performance units have their pins oriented on a 0.2 inch grid.

Ruggedness and durability are built into the SRA series. Only well matched hot-carrier diodes and ruggedly constructed transmission line transformers are used. Internally every component is bonded to the header and case with silicone rubber to provide super reliable protection against shock, vibration, and acceleration.

The model SRA-1 has become an industry standard throughout the world and is believed to be the number one volume leader. Used by all branches of the Department of Defense, NASA, FAA, and every major communications company, the SRA-1 has proven to be an industry work horse. Used in over 300 different military contracts, and over a period of years, enable sufficient history to establish the SRA-1 as one of the most reliable mixers obtainable, even when considering high priced models.

High reliability is associated with every SRA series mixer. Every production run is 100% tested and every unit must pass our rigid inspection and high quality standards. Naturally, our 1 year guarantee applies to these units.



Note: Numbers are for reference only, use blue bead or letter M for determining orientation.

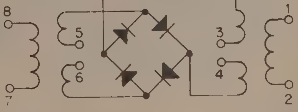
	A	B	C
INCHES	.8	.4	.4
CM	2	1	1

WEIGHT 5.2 grams .18 ounces

PIN CONNECTIONS

	SRA-1 SRA-1-1 SRA-1W* SRA-3	SRA-2 SRA-4	SRA-6 SRA-8
LO	8	8	8
RF	1	3,4	1
IF	3,4	1	3,4
Ground	2,5,6,7	2,5,6,7	2,5,6,7
Case Ground	2	*2,5,6,7	—

NOTE: PINS 3 AND 4 MUST BE CONNECTED TOGETHER



ABSOLUTE MAXIMUM RATINGS

Total Input Power	500 mW
Total Input, Current Peak	40 mA
Operating & Storage Temperature	−55° C to +100° C

Pin Temperature (10 seconds) 510° F

World's largest supplier of double balanced mixers
Mini Circuits Laboratory 837-843 Utica Avenue, Brooklyn, NY 11203 (212) 342-2500

Mini-Circuits Laboratory

DOUBLE-BALANCED MIXERS

Standard Level
(+7 dBm LO)

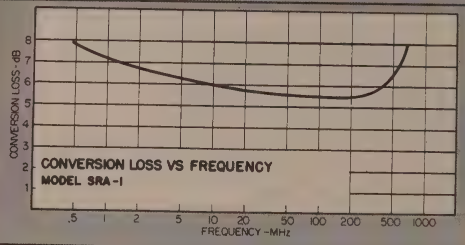
SRA Series

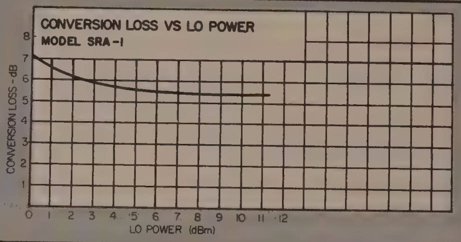
SRA-1 .5-500MHz $9.95 (1-49)

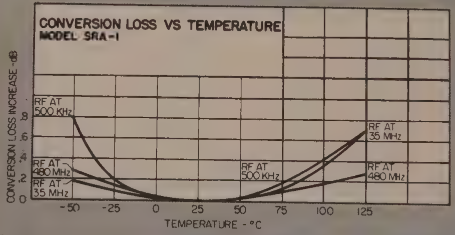
		MODEL SRA-1	
Frequency Range, MHz	LO	.5-500	
	RF	.5-500	
	IF	DC-500	
Conversion Loss, dB		Typical	Maximum
One Octave from Band Edge		5.5	7.5
Total Range		6.5	8.5
Signal, 1dB Compression Level	+1dBm		
Isolation, dB		Typical	Minimum
Lower Band Edge to One Decade Higher	LO-RF	50	35
	LO-IF	45	30
Mid Range	LO-RF	45	30
	LO-IF	40	25
Upper Band Edge to One Octave Lower	LO-RF	35	25
	LO-IF	30	20
Impedance, All Ports		50 ohms	
Phase Detection			
DC Offset		1mV typical	
DC Polarity		Negative	
Electronic Attenuation			
Minimum Attenuation (20mA)		3dB	

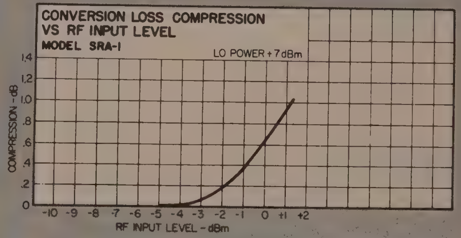
FAST DELIVERY
From stock, one week max.

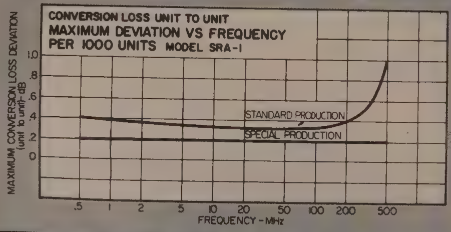
For connector version see ZAD series

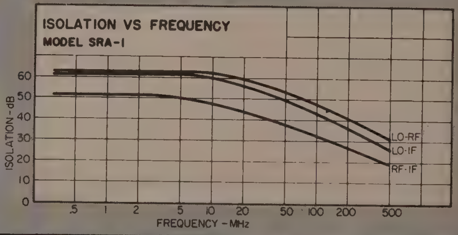

CONVERSION LOSS VS FREQUENCY
MODEL SRA-1


CONVERSION LOSS VS LO POWER
MODEL SRA-1


CONVERSION LOSS VS TEMPERATURE
MODEL SRA-1


CONVERSION LOSS COMPRESSION VS RF INPUT LEVEL
MODEL SRA-1


CONVERSION LOSS UNIT TO UNIT MAXIMUM DEVIATION VS FREQUENCY PER 1000 UNITS MODEL SRA-1


ISOLATION VS FREQUENCY
MODEL SRA-1

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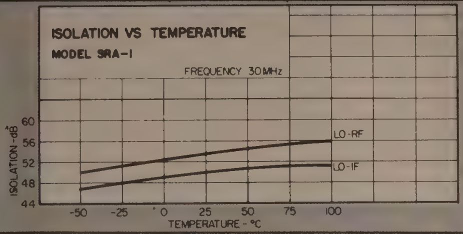
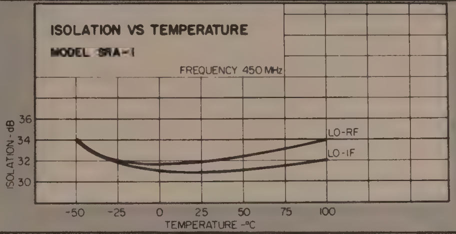
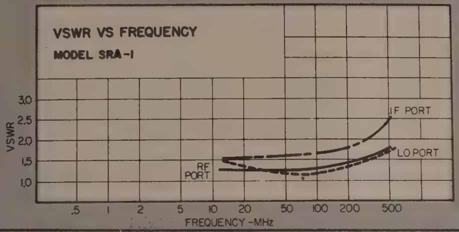
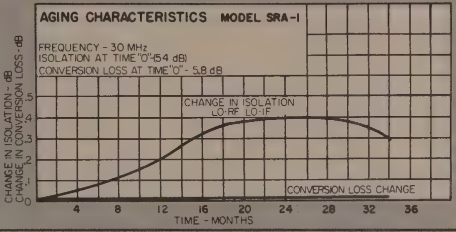
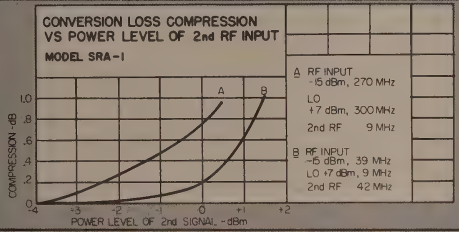
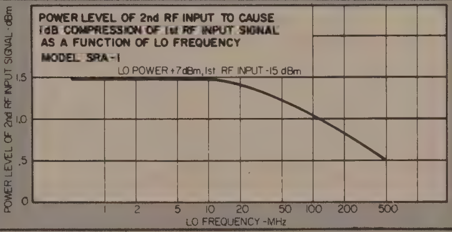

ISOLATION VS TEMPERATURE
MODEL SRA-1

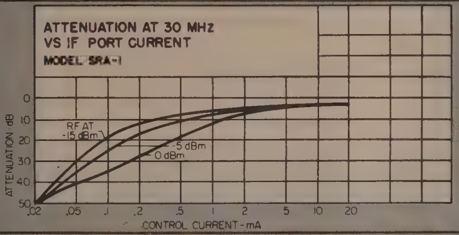

ISOLATION VS TEMPERATURE
MODEL SRA-1

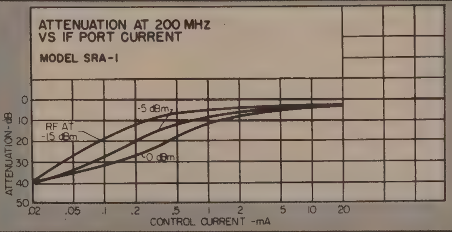

VSWR VS FREQUENCY
MODEL SRA-1

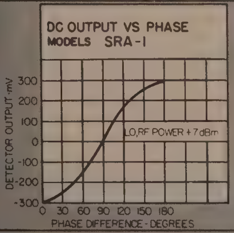

AGING CHARACTERISTICS MODEL SRA-1

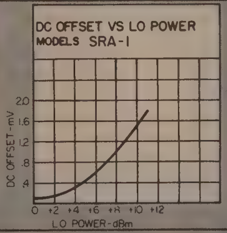

CONVERSION LOSS COMPRESSION VS POWER LEVEL OF 2nd RF INPUT
MODEL SRA-1

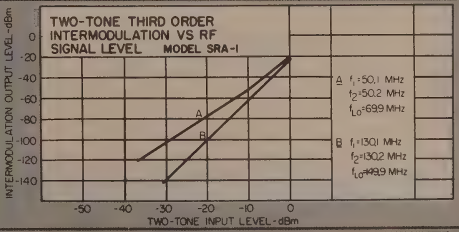

POWER LEVEL OF 2nd RF INPUT TO CAUSE 1dB COMPRESSION OF 1st RF INPUT SIGNAL AS A FUNCTION OF LO FREQUENCY
MODEL SRA-1

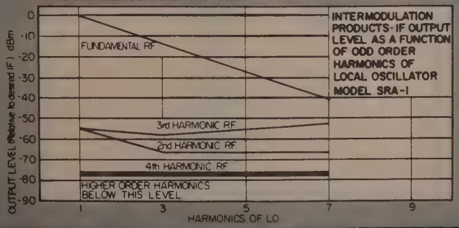

ATTENUATION AT 30 MHz VS IF PORT CURRENT
MODEL SRA-1

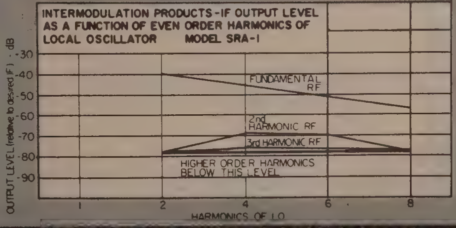

ATTENUATION AT 200 MHz VS IF PORT CURRENT
MODEL SRA-1


DC OUTPUT VS PHASE
MODELS SRA-1


DC OFFSET VS LO POWER
MODELS SRA-1


TWO-TONE THIRD ORDER INTERMODULATION VS RF SIGNAL LEVEL MODEL SRA-1


INTERMODULATION PRODUCTS - IF OUTPUT LEVEL AS A FUNCTION OF ODD ORDER HARMONICS OF LOCAL OSCILLATOR
MODEL SRA-1


INTERMODULATION PRODUCTS - IF OUTPUT LEVEL AS A FUNCTION OF EVEN ORDER HARMONICS OF LOCAL OSCILLATOR MODEL SRA-1

Mini-Circuits Laboratory MCL

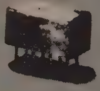
DOUBLE·BALANCED MIXERS

Standard Level
(+7 dBm LO)

SRA Series

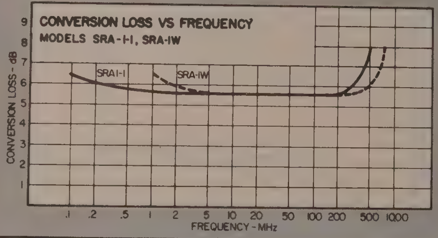
SRA-1-1	.1-500MHz	$11.95 (6-49)
SRA-1W	1-750MHz	$14.95 (6-49)

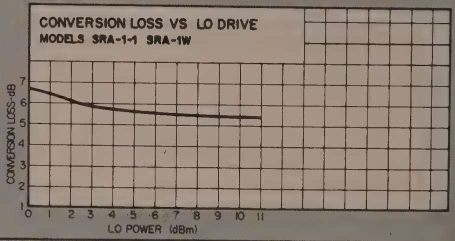
FAST DELIVERY
From stock, one week max.

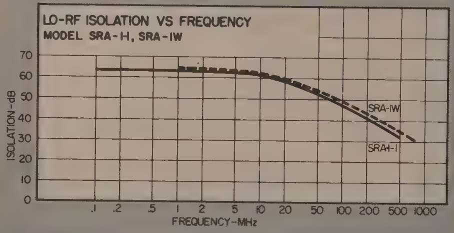


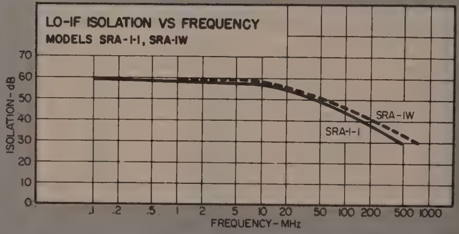
For connector version see ZAD series

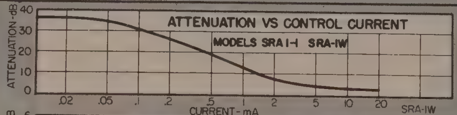
		MODEL SRA-1-1		MODEL SRA-1W	
Frequency Range, MHz	LO	.1-500		1-750	
	RF	.1-500		1-750	
	IF	DC-500		DC-750	
Conversion Loss, dB		Typical	Maximum	Typical	Maximum
One Octave From Band Edge		5.5	7.5	5.5	7.5
Total Range		6.5	8.5	6.5	8.5
Signal, 1dB Compression Level		+1dBm		+1dBm	
Isolation, dB		Typical	Minimum	Typical	Minimum
Lower Band Edge to One Decade Higher	LO-RF	50	45	50	45
	LO-IF	45	30	45	30
Mid Range	LO-RF	45	30	45	30
	LO-IF	40	25	40	25
Upper Band Edge to One Octave Lower	LO-RF	35	25	35	25
	LO-IF	30	20	30	20
Impedance, All Ports		50 ohms		50 ohms	
Phase Detection					
DC Offset		1mV typical		1mV typical	
DC Polarity		Negative		Negative	
Electronic Attenuation					
Minimum Attenuation (20mA)		2.5 dB		3.5dB	

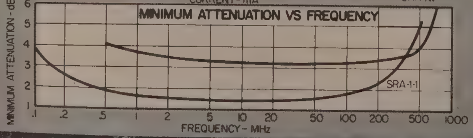


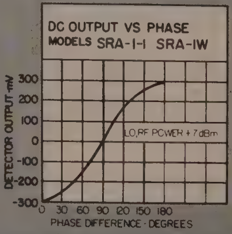


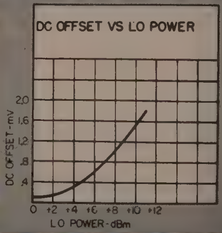












6/75

World's largest supplier of double balanced mixers

Mini Circuits Laboratory 837-843 Utica Avenue, Brooklyn, NY 11203 (212) 342-2500

MCL **Mini-Circuits Laboratory**

DOUBLE-BALANCED MIXERS

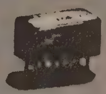
Standard Level
(+7 dBm LO)

SRA Series

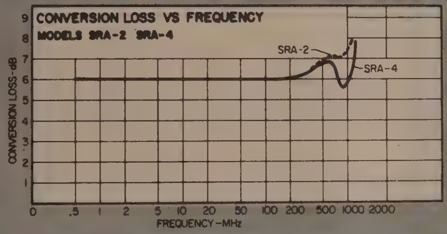
SRA-2 1-1000MHz $24.95 (1-24)
SRA-4 5-1250-MHz $26.95 (1-24)

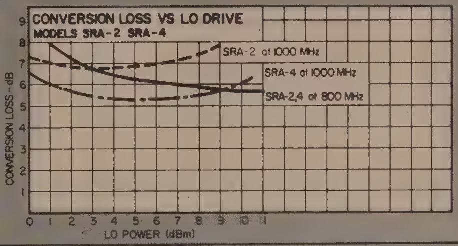
		MODEL SRA-2		MODEL SRA-4	
Frequency Range, MHz	LO	1-1000		5-1250	
	RF	1-1000		5-1250	
	IF	.5-500		.5-500	
Conversion Loss, dB		Typical	Maximum	Typical	Maximum
One Octave From Band Edge		5.5	7.5	5.5	7.5
Total Range		6.5	8.5	6.5	8.5
Signal, 1dB Compression Level		+1dBm		+1dBm	
Isolation, dB		Typical	Minimum	Typical	Minimum
Lower Band Edge to One Decade Higher	LO-RF	45	30	50	40
	LO-IF	45	30	50	40
Mid Range	LO-RF	35	20	40	20
	LO-IF	35	20	40	20
Upper Band Edge to One Octave Lower	LO-RF	30	20	30	20
	LO-IF	30	20	30	20
Impedance, All Ports		50 ohms		50 ohms	

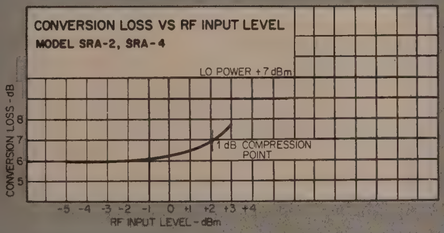
FAST DELIVERY
From stock, one week max.

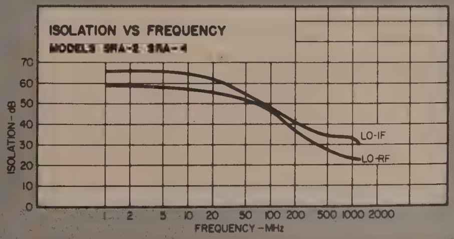


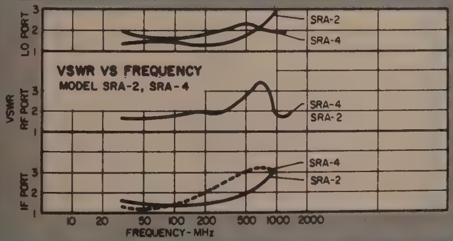
For connector version see ZAD series

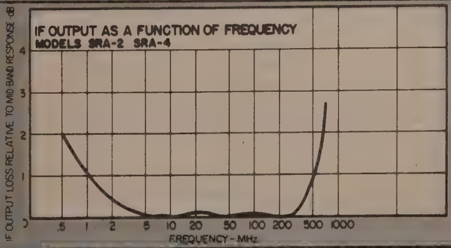

CONVERSION LOSS VS FREQUENCY
MODELS SRA-2 SRA-4


CONVERSION LOSS VS LO DRIVE
MODELS SRA-2 SRA-4


CONVERSION LOSS VS RF INPUT LEVEL
MODEL SRA-2, SRA-4


ISOLATION VS FREQUENCY
MODELS SRA-2 SRA-4


VSWR VS FREQUENCY
MODEL SRA-2, SRA-4


IF OUTPUT AS A FUNCTION OF FREQUENCY
MODELS SRA-2 SRA-4

World's largest supplier of double balanced mixers

Mini-Circuits Laboratory MCL

DOUBLE·BALANCED MIXERS

Standard Level

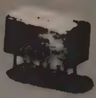
(+7 dBm LO)

		MODEL SRA-3		MODEL SRA-6		MODEL SRA-8	
Frequency Range, MHz	LO	.025-200		.003-100		.0005-10	
	RF	.025-200		.003-100		.0005-10	
	IF	DC-200		DC-100		DC-10	
Conversion Loss, dB		Typical	Maximum	Typical	Maximum	Typical	Maximum
One Octave From Band Edge		5.5	7.5	5.5	7.5	6.5	7.5
Total Range		6.5	8.5	6.5	8.5	7.0	8.5
Signal, 1dB Compression Level		+1dBm		+1dBm		+1dBm	
Isolation, dB		Typical	Minimum	Typical	Minimum	Typical	Minimum
Lower Band Edge to One Decade Higher	LO-RF	60	50	60	50	60	50
	LO-IF	45	35	60	45	60	50
Mid Range	LO-RF	45	35	45	30	50	40
	LO-IF	40	30	40	25	50	40
Upper Band Edge to One Octave Lower	LO-RF	35	25	35	25	45	35
	LO-IF	30	20	30	20	45	35
Impedance, All Ports		50 ohms		50 ohms		50 ohms	
Phase Detection							
DC Offset		1mV typical		1mV typical		1mV typical	
DC Polarity		Negative		Negative		Negative	
Electronic Attenuation							
Minimum Attenuation (20mA)		1.5dB		1.0dB		1.0dB	

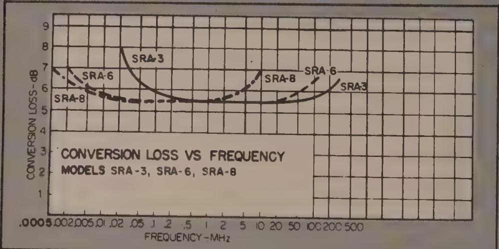
SRA Series

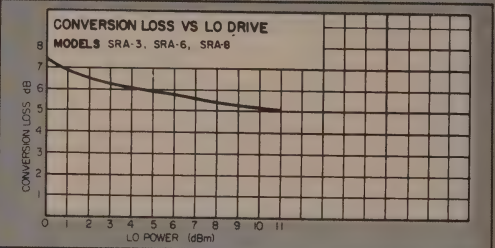
SRA-3	.025-200 MHz	$12.95	(6-49)
SRA-6	.003-100MHz	$19.95	(5-24)
SRA-8	.0005-10 MHz	$24.95	(5-24)

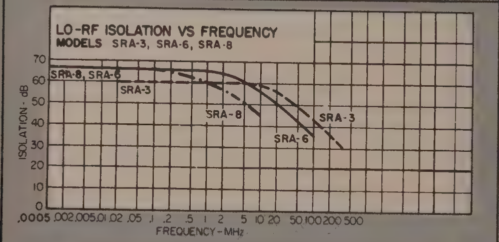
FAST DELIVERY
From stock, one week max.

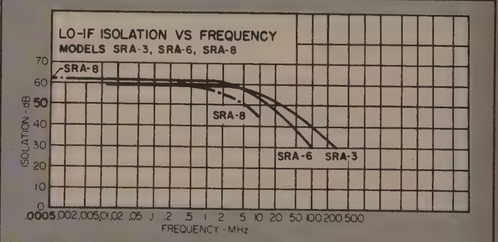


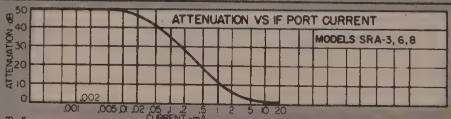
For connector version see ZAD series

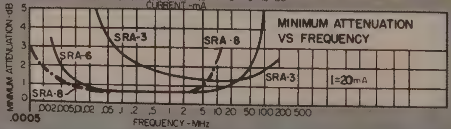


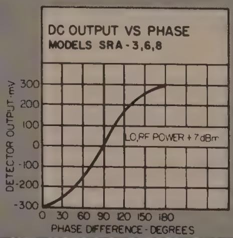


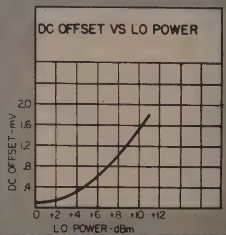












World's largest supplier of double balanced mixers

Mini Circuits Laboratory 837-843 Utica Avenue, Brooklyn, NY 11203 (212) 342-2500

Mini-Circuits Laboratory

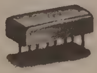
INTRODUCTION TO TAK SERIES
LOW-PROFILE DOUBLE-BALANCED MIXERS

Standard Level
(+7 dBm LO)

TAK Series

TAK-5	.01- 250 MHz	$19.95 (1-4)
TAK-6	.5- 600 MHz	$19.95 (1-4)
TAK-7	2-1000 MHz	$27.95 (1-4)
TAK-9	5-1250 MHz	$29.95 (1-4)

FAST DELIVERY
From stock; one week max.



FEATURES

- MINIATURE SIZE, .067 CU. INCHES
- LOW PROFILE, .21 INCH HEIGHT
- BROAD FREQUENCY RANGE 10KHz - 1250MHz
- HIGH ISOLATION 40 dB
- LOW CONVERSION LOSS 6 dB
- HERMETICALLY SEALED METAL CASE
- PC BOARD MOUNTING
- LOW COST FROM $24.95 IN SMALL QUANTITIES

APPLICATIONS

- FREQUENCY MIXING
- PULSE AND AMPLITUDE MODULATION
- PHASE DETECTION
- CURRENT CONTROLLED ATTENUATION
- FAST SWITCHING
- BI-PHASE MODULATION

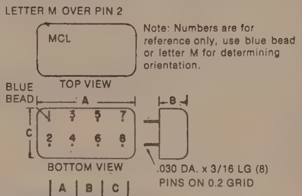
DESCRIPTION

Only 0.2 inches high, the low profile TAK series of double balanced mixers cover a very broad frequency range from 10KHz to 1250MHz. Exhibiting a flat conversion loss, these low profile units are designed to operate with a 50 ohm impedance at all ports. Conversion loss is typically 5.5 dB and isolation is typically greater than 40 dB.

Packaged within an RFI shielded metal enclosure and hermetically sealed header, this low profile unit is only .064 cubic inches. Facilitating your design and production efforts, the TAK series has its 8 pins located on a 0.2 inch grid.

Ruggedness and durability are built-in features. Internal components include well matched hot-carrier diodes and extra wideband transmission line transformers. Hermetically sealed, supported with a silicone rubber for vibration and shock requirements, the TAK series operates from −55° C to +100° C under high humidity conditions.

High reliability is characteristic of the TAK series. Each unit carries with it a one year guarantee by Mini-Circuits.



Note: Numbers are for reference only, use blue bead or letter M for determining orientation.

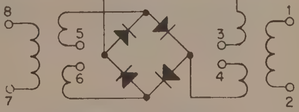
	A	B	C
INCHES	.8	.2	.4
CM	2	.5	1

WEIGHT 3.7 grams .13 ounces

PIN CONNECTIONS

	TAK-5 TAK-6	TAK-7 TAK-9
LO	8	8
RF	1	3,4
IF	3,4	1
Ground	2,5,6,7	2,5,6,7
Case Ground	2	2,5,6,7

NOTE: PINS 3 AND 4 MUST BE CONNECTED TOGETHER



ABSOLUTE MAXIMUM RATINGS

Total Input Power	50mW
Total Input, Current Peak	40mA
Operating & Storage Temperature	−55° C to +100° C

Pin Temperature (10 seconds) 510° F

MCL Mini-Circuits Laboratory

LOW·PROFILE DOUBLE·BALANCED MIXERS

		MODEL TAK-5		MODEL TAK-6	
Frequency Range, MHz	LO	.01-250		0.5-600	
	RF	.01-250		0.5-600	
	IF	DC-250		DC-600	
Conversion Loss, dB		Typical	Maximum	Typical	Maximum
One Octave From Band Edge		5.5	7.0	5.5	7.0
Total Range		6.5	8.5	6.5	8.5
Signal, 1dB Compression Level		+1dB		+1dB	
Isolation, dB		Typical	Minimum	Typical	Minimum
Lower Band Edge to One Decade Higher	LO-RF	60	50	60	50
	LO-IF	55	45	55	45
Mid Range	LO-RF	50	40	50	30
	LO-IF	45	35	45	30
Upper Band Edge to One Octave Lower	LO-RF	40	30	40	25
	LO-IF	35	25	30	20
Impedance, All Ports		50 ohms		50 ohms	
Phase Detection					
DC Offset		1mV typical		1mV typical	
DC Polarity		Negative		Negative	
Electronic Attenuation					
Minimum Attenuation (20mA)		1.5dB		3.5dB	

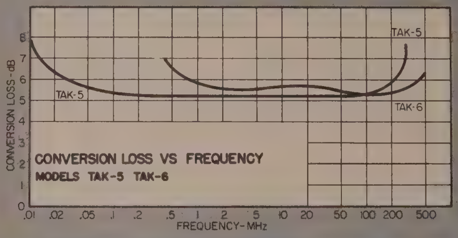
Standard Level

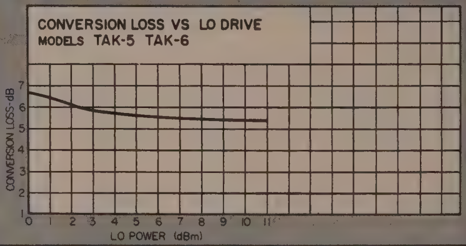
(+7 dBm LO)

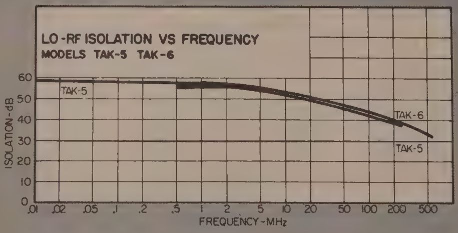
TAK Series

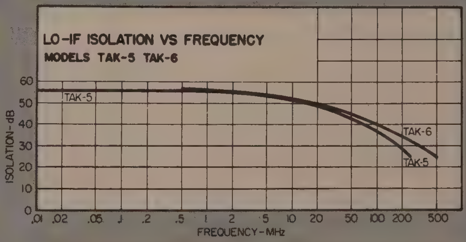
TAK-5	.01-250 MHz	$19.95 (1-4)
TAK-6	.5-600 MHz	$19.95 (1-4)

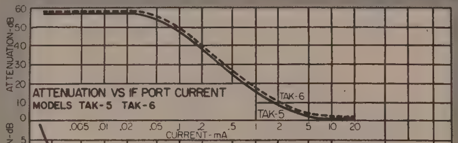
FAST DELIVERY
From stock, one week max.

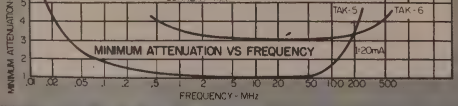

CONVERSION LOSS VS FREQUENCY
MODELS TAK-5 TAK-6

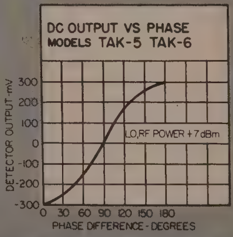

CONVERSION LOSS VS LO DRIVE
MODELS TAK-5 TAK-6

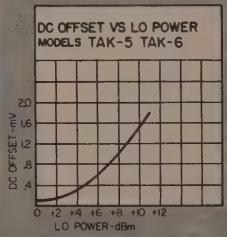

LO-RF ISOLATION VS FREQUENCY
MODELS TAK-5 TAK-6


LO-IF ISOLATION VS FREQUENCY
MODELS TAK-5 TAK-6


ATTENUATION VS IF PORT CURRENT
MODELS TAK-5 TAK-6


MINIMUM ATTENUATION VS FREQUENCY


DC OUTPUT VS PHASE
MODELS TAK-5 TAK-6


DC OFFSET VS LO POWER
MODELS TAK-5 TAK-6

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MCL Mini-Circuits Laboratory

LOW·PROFILE DOUBLE·BALANCED MIXERS

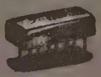
Standard Level
(+7 dBm LO)

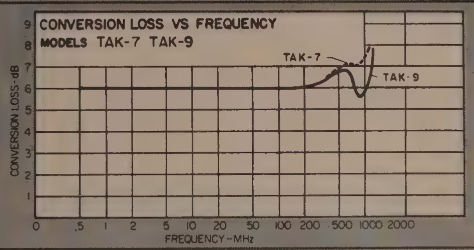
		MODEL TAK-7		MODEL TAK-9	
Frequency Range, MHz	LO	2-1000		5-1250	
	RF	2-1000		5-1250	
	IF	.5-500		.5-500	
Conversion Loss, dB		Typical	Maximum	Typical	Maximum
One Octave From Band Edge		5.5	7.5	5.5	7.5
Total Range		6.5	8.5	6.5	8.5
Signal, 1dB Compression Level		+1dBm		+1dBm	
Isolation, dB		Typical	Minimum	Typical	Minimum
Lower Band Edge to One Decade Higher	LO-RF	45	30	50	40
	LO-IF	45	30	50	40
Mid Range	LO-RF	35	20	40	20
	LO-IF	35	20	40	20
Upper Band Edge to One Octave Lower	LO-RF	30	20	30	20
	LO-IF	30	20	30	20
Impedance, All Ports		50 ohms		50 ohms	

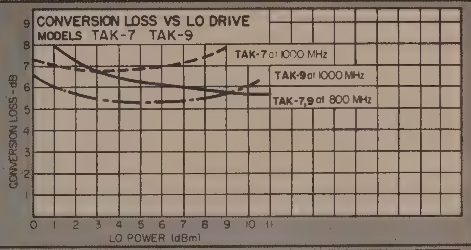
TAK Series

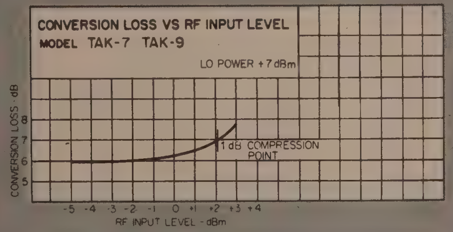
TAK-7	2-1000MHz	$27.95 (1-4)
TAK-9	5-1250MHz	$29.95 (1-4)

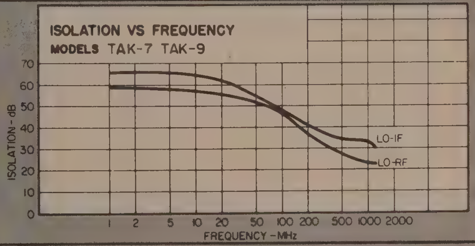
FAST DELIVERY
From stock, one week max.

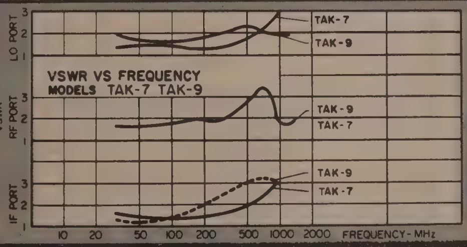


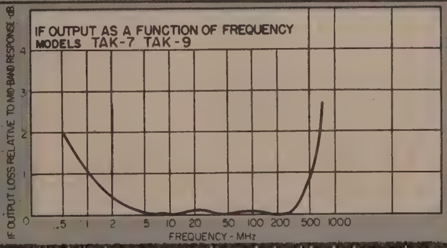

CONVERSION LOSS VS FREQUENCY
MODELS TAK-7 TAK-9


CONVERSION LOSS VS LO DRIVE
MODELS TAK-7 TAK-9


CONVERSION LOSS VS RF INPUT LEVEL
MODEL TAK-7 TAK-9


ISOLATION VS FREQUENCY
MODELS TAK-7 TAK-9


VSWR VS FREQUENCY
MODELS TAK-7 TAK-9


IF OUTPUT AS A FUNCTION OF FREQUENCY
MODELS TAK-7 TAK-9

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Mini-Circuits Laboratory

INTRODUCTION TO TSM SERIES
MINIATURE DOUBLE-BALANCED MIXERS

LOW-PROFILE

Standard Level
(+7 dBm LO)

TSM Series

TSM-1 1-500 MHz $16.95 (5-24)
TSM-3 0.1-400 MHz $18.95 (5-24)

FAST DELIVERY
From stock, one week max.

FEATURES

- MICRO-MINIATURE SIZE, .025 CU. INCHES
- LOW PROFILE, 0.25 INCH HEIGHT
- PC BOARD AREA ONLY 0.1 SQ. INCHES
- BROAD FREQUENCY RANGE 0.1 - 500MHz
- HIGH ISOLATION 40 dB
- LOW CONVERSION LOSS 5.5 dB
- HERMETICALLY SEALED METAL CASE
- PC BOARD MOUNTING
- LOW COST FROM $16.95 IN SMALL QUANTITIES

APPLICATIONS

- FREQUENCY MIXING
- PULSE AND AMPLITUDE MODULATION
- PHASE DETECTION
- CURRENT CONTROLLED ATTENUATION
- FAST SWITCHING
- BI-PHASE MODULATION

DESCRIPTION

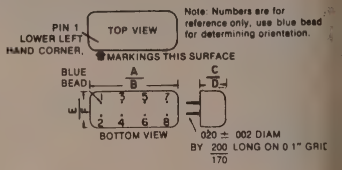
Representing a performance and price breakthrough in micro-miniature low profile double balanced mixers, the TSM series covers the frequency range 100KHz to 500MHz.

Although smaller than mixers presently available, the TSM series offers higher performance of extra wide bandwidth, low conversion loss, and high isolation. These tiny units offer isolation of greater than 55 dB and conversion loss of 5.5 dB! The TSM series performs with a 50 ohm impedance at all ports and has a operating and storage temperature range from −55° C to +100° C.

The TSM units require less PC area than a flat-pack or TO-5 can. For example, consider a 2×2 sq. in. PC board. You can mount 16 standard flat-packs (including room for lead bending), or 23 TO-5 cans (considering the space required for the tab), or 36 Mini-Circuits microminiature TSM's.

Packaged within an EMI shielded metal enclosure and hermetically sealed header (enclosure is 0.5 by 0.2 by 0.25 in.) the TSM series exhibits a typical noise figure of just 1/2 to 1dB greater than its conversion loss. Its pins are oriented on a 0.1 inch grid for printed circuit board mounting. Only well matched hot-carrier diodes and rugged transmission line transformers are used. Internally, silicone rubber is incorporated as an insulator against any wire shorts and to provide protection against shock, and vibration.

High reliability is characteristic of the TSM series. Each unit carries with it a one year warranty by MCL.


PIN 1
LOWER LEFT
HAND CORNER.
TOP VIEW
Note: Numbers are for reference only, use blue bead for determining orientation.
MARKINGS THIS SURFACE
BLUE
BEAD
A
B
C
D
E
F
1
3
5
7
2
4
6
8
BOTTOM VIEW
.020 ± .002 DIAM
BY .200/.170 LONG ON 0.1" GRI

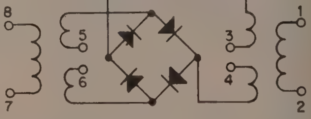
	A	B	C	D	E	F
INCHES	.500	.480	.255	.240	.230	.210
CM	1.27	1.22	.64	.60	.58	.53

WEIGHT 1.8 grams .07 ounces

PIN CONNECTIONS

	TSM-1 TSM-3
LO	8
RF	1
IF	3,4
Ground	2,5,6,7
Case ground	2

NOTE: PINS 3 AND 4 MUST BE CONNECTED TOGETHER



ABSOLUTE MAXIMUM RATINGS

Total Input Power	50mW
Total Input, Current Peak	40mA
Operating & Storage Temperature	−55° C to +100° C

Pin Temperature (10 seconds) 510° F

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MINIATURE DOUBLE·BALANCED MIXERS

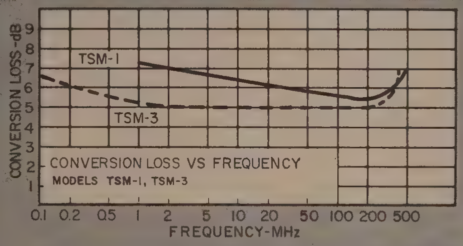
LOW·PROFILE

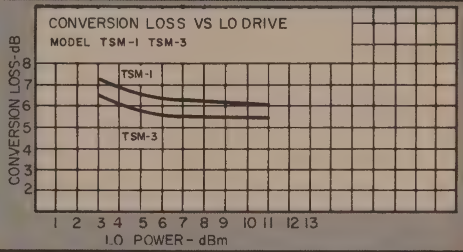
Standard Level
(+7 dBm LO)

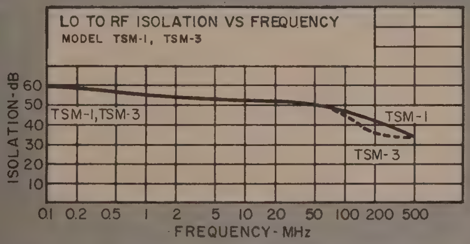
TSM Series
TSM-1 1-500 MHz $16.95 (5-24)
TSM-3 0.1-400 MHz $18.95 (5-24)

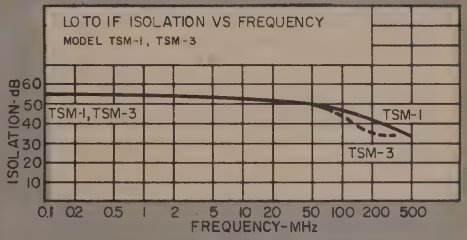
FAST DELIVERY
From stock, one week max.

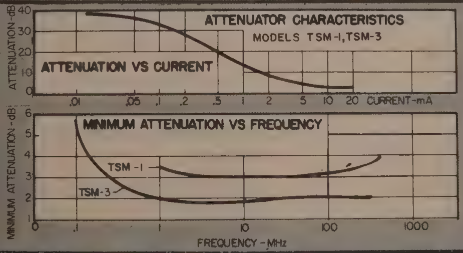
		MODEL TSM-1		MODEL TSM-3	
Frequency Range, MHz	LO	1-500		.1-400	
	RF	1-500		.1-400	
	IF	DC-500		DC-400	
Conversion Loss, dB		Typical	Maximum[1]	Typical	Maximum
One Octave From Band Edge		6.0	7.5	5.3	7.0
Total Range		6.5	8.5	6.5	8.0
Signal, 1dB Compression Level		+1dBm		+1dBm	
Isolation, dB		Typical	Minimum	Typical	Minimum
Lower Band Edge to One Decade Higher	LO-RF	60	45	60	50
	LO-IF	55	45	55	45
Mid Range	LO-RF	45	35	50	35
	LO-IF	40	30	45	30
Upper Band Edge to One Octave Lower	LO-RF	35	25	35	25
	LO-IF	35	25	35	25
Impedance, All Ports		50 ohms		50 ohms	
Phase Detection					
DC Offset		1mV typical		1mV typical	
DC Polarity		Negative		Negative	
Electronic Attenuation					
Minimum Attenuation (20mA)		3.5dB		2.5dB	

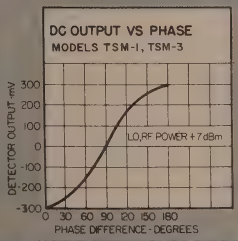


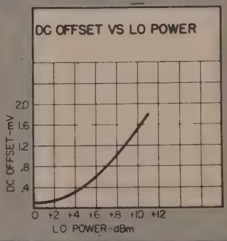












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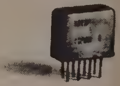
INTRODUCTION TO SAM SERIES
MINIATURE DOUBLE·BALANCED MIXERS

Standard Level
(+7 dBm LO)

SAM Series

SAM-1	1- 600 MHz	$15.95 (6-24)
SAM-2	1-1000 MHz	$29.95 (1-24)
SAM-3	1- 500 MHz	$17.95 (5-24)
SAM-4	5-1250 MHz	$39.95 (1-9)
SAM-5	5-1500 MHz	$49.95 (1-9)

FAST DELIVERY
From stock, one week max.



FEATURES

- MICRO-MINIATURE SIZE, .04 CU. INCHES
- PC BOARD AREA ONLY 0.1 SQ. INCHES
- BROAD FREQUENCY RANGE 0.1 - 1500MHz
- HIGH ISOLATION 40 dB
- LOW CONVERSION LOSS 5.5 dB
- HERMETICALLY SEALED METAL CASE
- PC BOARD MOUNTING
- LOW COST FROM $15.95 IN SMALL QUANTITIES

APPLICATIONS

- FREQUENCY MIXING
- PULSE AND AMPLITUDE MODULATION
- PHASE DETECTION
- CURRENT CONTROLLED ATTENUATION
- FAST SWITCHING
- BI-PHASE MODULATION

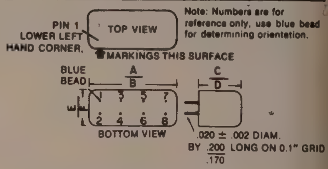
DESCRIPTION

Representing a performance and price breakthrough in micro-miniature double balanced mixers, the SAM series covers the frequency range 100KHz to 1500MHz. Although smaller than mixers presently available, the SAM series offers higher performance of extra wide bandwidth, low conversion loss, and high isolation. These tiny units offer isolation of greater than 55 dB and conversion loss of 5.5 dB. The SAM series performs with a 50 ohm impedance at all ports and has a operating and storage temperature range from −55° C to +100° C.

The SAM units require less PC area than a flat-pack or TO-5 can. For example, consider a 2×2 sq. in. PC board. You can mount 16 standard flat-packs (including room for lead bending), or 23 TO-5 cans (considering the space required for the tab), or 36 Mini-Circuits microminiature SAM's.

Packaged within an EMI shielded metal enclosure and hermetically sealed header (enclosure is 0.5 by 0.2 by 0.4 in.) the SAM series exhibits a typical noise figure of just 1/2 to 1dB greater than its conversion loss. Its pins are oriented on a 0.1 inch grid for printed circuit board mounting. Only well matched hot-carrier diodes and rugged transmission line transformers are used. Internally, silicone rubber is incorporated as an insulator against any wire shorts and to provide protection against shock, and vibration.

High reliability is characteristic of the SAM series. Each unit carries with it a one year warranty by MCL.



Note: Numbers are for reference only, use blue bead for determining orientation.

.020 ± .002 DIAM. BY .200/.170 LONG ON 0.1" GRID

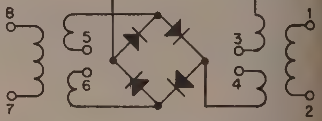
	A	B	C	D	E	F
INCHES	.500	.480	.405	.390	.230	.210
CM	1.27	1.22	1.03	.99	.58	.53

WEIGHT 1.9 grams .07 ounces

PIN CONNECTIONS

	SAM-1 * SAM-2 SAM-3	SAM-5 SAM-4
LO	8	8
RF	1	3,4
IF	3,4	1
Ground	2,5,6,7	2,5,6,7
Case ground	2	*2,5,6,7

NOTE: PINS 3 AND 4 MUST BE CONNECTED TOGETHER



ABSOLUTE MAXIMUM RATINGS

Total Input Power	50mW
Total Input, Current Peak	40mA
Operating & Storage Temperature	−55° C to +100° C

Pin Temperature - (10 seconds) - 510° F

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MINIATURE DOUBLE·BALANCED MIXERS

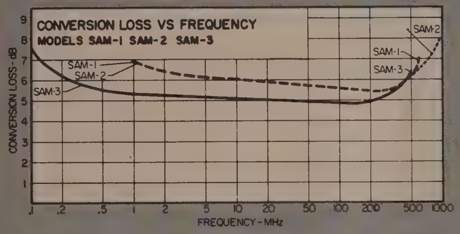
		MODEL SAM-1		MODEL-SAM-2		MODEL SAM-3	
Frequency Range, MHz	LO	1-600		1-1000		.1-500	
	RF	1-600		1-1000		.1-500	
	IF	DC-600		DC-1000		DC-500	
Conversion Loss, dB		Typical	Maximum	Typical	Maximum	Typical	Maximum
One Octave From Band Edge		5.5	7.0	6	7.5	5.5	7.0
Total Range		6.5	8.5	7.0	9.5	6.5	8.5
Signal, 1dB Compression Level		+1dBm		+1dBm		+1dBm	
Isolation, dB		Typical	Minimum	Typical	Minimum	Typical	Minimum
Lower Band Edge to One Decade Higher	LO-RF	55	45	55	45	60	50
	LO-IF	50	40	50	40	50	40
Mid Range	LO-RF	45	30	40	25	50	35
	LO-IF	40	25	40	25	45	30
Upper Band Edge to One Octave Lower	LO-RF	35	20	35	20	35	30
	LO-IF	30	20	30	20	30	20
Impedance, All Ports		50 ohms		50 ohms		50 ohms	
Phase Detection							
DC Offset		1mV typical		1mV typical		1mV typical	
DC Polarity		Negative		Negative		Negative	
Electronic Attenuation							
Minimum Attenuation (20mA)		3.5dB		3.5dB		2.5dB	

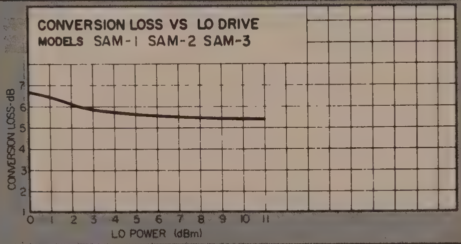
Standard Level
(+7 dBm LO)

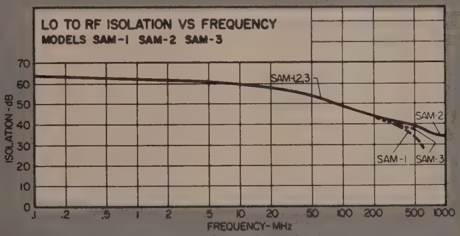
SAM Series

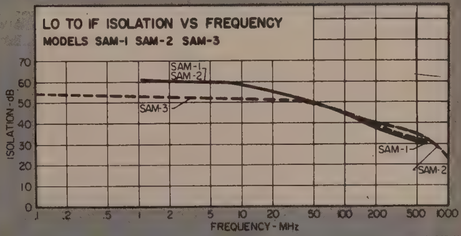
SAM-1	1-600MHz	$15.95	(6-24)
SAM-2	1-1000MHz	$29.95	(1-24)
SAM-3	.1-500MHz	$17.95	(5-24)

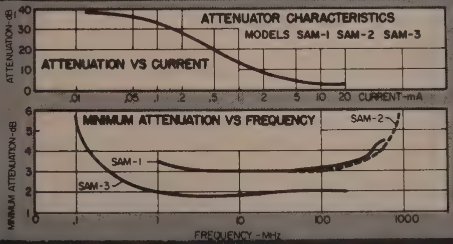
FAST DELIVERY
From stock, one week max.

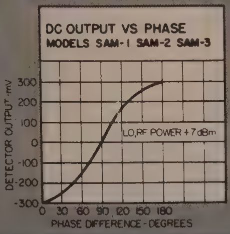

CONVERSION LOSS VS FREQUENCY
MODELS SAM-1 SAM-2 SAM-3

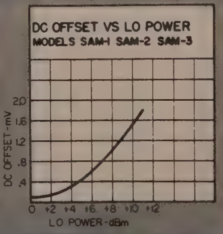

CONVERSION LOSS VS LO DRIVE
MODELS SAM-1 SAM-2 SAM-3


LO TO RF ISOLATION VS FREQUENCY
MODELS SAM-1 SAM-2 SAM-3


LO TO IF ISOLATION VS FREQUENCY
MODELS SAM-1 SAM-2 SAM-3


ATTENUATOR CHARACTERISTICS
MODELS SAM-1 SAM-2 SAM-3
ATTENUATION VS CURRENT
MINIMUM ATTENUATION VS FREQUENCY


DC OUTPUT VS PHASE
MODELS SAM-1 SAM-2 SAM-3


DC OFFSET VS LO POWER
MODELS SAM-1 SAM-2 SAM-3

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MINIATURE DOUBLE-BALANCED MIXERS

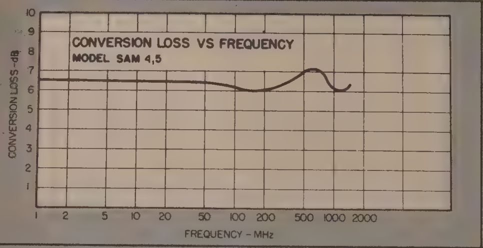
Standard Level
(+7 dBm LO)

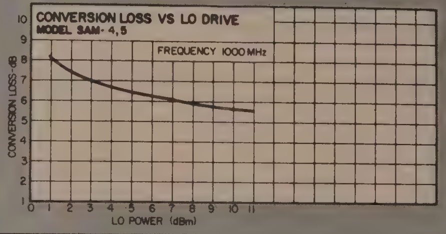
		MODEL SAM-4		MODEL SAM-5	
Frequency Range, MHz	LO	5-1250		5-1500	
	RF	5-1250		5-1500	
	IF	.5-1000		.5-1000	
Conversion Loss, dB		Typical	Maximum	Typical	Maximum
One Octave From Band Edge		6.5	8.5	6.5	8.5
Total Range		6.5	8.5	6.5	8.5
Signal, 1dB Compression Level		+1dBm		+1dBm	
Isolation, dB		Typical	Minimum	Typical	Minimum
Lower Band Edge to One Decade Higher	LO-RF	55	40	55	40
	LO-IF	50	40	50	40
Mid Range	LO-RF	35	25	35	25
	LO-IF	35	25	35	25
Upper Band Edge to One Octave Lower	LO-RF	30	20	30	20
	LO-IF	30	20	30	20
Impedance, All Ports		50 ohms		50 ohms	

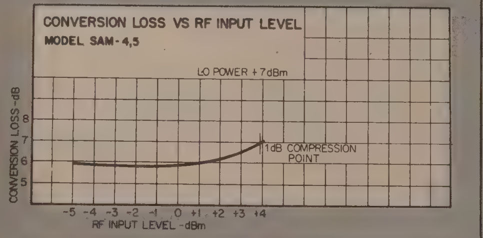
SAM Series

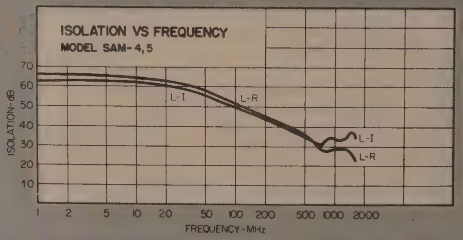
SAM-4	5-1250MHz	$39.95 (1-9)
SAM-5	5-1500MHz	$49.95 (1-9)

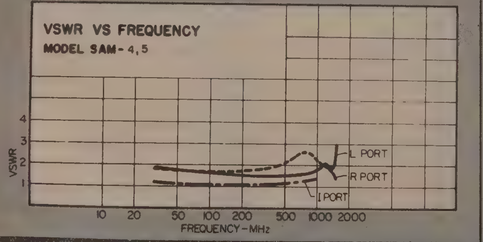
FAST DELIVERY
From stock, one week max.

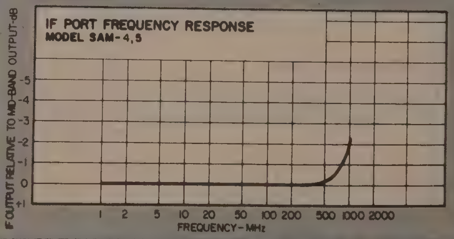












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INTRODUCTION TO ZAD SERIES DOUBLE-BALANCED MIXERS

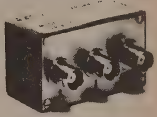
Standard Level

(+7 dBm LO)

ZAD Series

ZAD-1	.5- 500 MHz
ZAD-1-1	.1- 500 MHz
ZAD-1W	1- 750 MHz
ZAD-2	1-1000 MHz
ZAD-4	5-1250 MHz
ZAD-3	.025- 200 MHz
ZAD-6	.003- 100 MHz
ZAD-8	.0005- 10 MHz

FAST DELIVERY
From stock; one week max.



For pin version see SRA series

FEATURES

BROAD FREQUENCY RANGE, 500Hz - 1250MHz

HIGH ISOLATION 40 dB

LOW CONVERSION LOSS 6 dB

DIE-CAST ALUMINUM CASE

DOUBLE SHIELDED FOR RFI PROTECTION

LOW COST FROM $24.95 IN SMALL QUANTITIES

APPLICATIONS

FREQUENCY MIXING

PULSE AND AMPLITUDE MODULATION

PHASE DETECTION

CURRENT CONTROLLED ATTENUATION

FAST SWITCHING

BI-PHASE MODULATION

DESCRIPTION

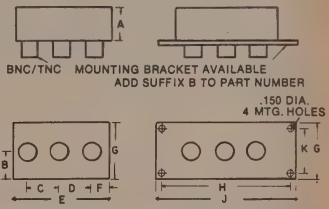
The ZAD series mixers are economically priced while covering the very broad frequency range from 500Hz to 1250MHz. They offer low conversion loss, 6 dB, high isolation 40 dB, and exceptional unit to unit matched performance.

Available with BNC, TNC, or SMA (3 mm) connectors the ZAD series is housed in a die cast aluminum case. These rugged units are double shielded to meet your tough RFI rquirements. The case is finished with a blue baked enamel per Federal Standard 595 #25109 over phosphoric etch per MIL-C-15328A.

Every unit is 100% tested and inspected under strict MCL quality control standards to ensure superior electrical performance and reliability.

Ruggedness and durability are built into the ZAD series. Only well matched hot-carrier diodes and ruggedly constructed transmission line transformers are used. Internally, every component is bonded with silicone rubber to provide protection against shock, vibration, and acceleration.

The exceptional low cost of the ZAD series is attributable to the breakthrough in production techniques achieved during the manufacture of the widely acclaimed Mini-Circuits SRA series of PC board mounting mixers. Utilizing this technology the ZAD series is offered at a remarkable price of 1/2 to 1/3 the cost of competitive units. The ZAD series provides performance, quality, and low cost.



	A	B	C	D	E	F	G	H	J	K
INCHES	1.15	.63	.750	.730	2.25	.385	1.40	2.95	3.25	1.10
CM	2.9	1.6	1.9	1.85	5.7	.977	3.55	7.49	8.25	2.8

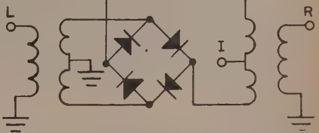
WEIGHT 74.0 grams 2.60 ounces

CONNECTORS

BNC	standard
TNC	on request
SMA (3mm)	on request, add $10 to unit cost.

MOUNTING BRACKET

On request, add $1.50 to unit cost.
See dimensions above.



ABSOLUTE MAXIMUM RATINGS

Total Input Power	50mW
Total Input, Current Peak	40mA
Operating & Storage Temperature	−55° C to +100° C

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Mini-Circuits Laboratory

DOUBLE·BALANCED MIXERS

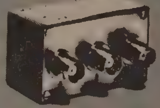
		MODEL ZAD-1	
Frequency Range, MHz	LO	.5-500	
	RF	.5-500	
	IF	DC-500	
Conversion Loss, dB		Typical	Maximum
One Octave From Band Edge		5.5	7.5
Total Range		6.5	8.5
Signal, 1dB Compression Level		+1dBm	
Isolation, dB		Typical	Minimum
Lower Band Edge to One Decade Higher	LO-RF	50	35
	LO-IF	45	30
Mid Range	LO-RF	45	30
	LO-IF	40	25
Upper Band Edge to One Octave Lower	LO-RF	35	25
	LO-IF	30	20
Impedance, All Ports		50 ohms	
Phase Detection			
DC Offset		1mV typical	
DC Polarity		Negative	
Electronic Attenuation			
Minimum Attenuation (20mA)		3dB	

Standard Level
(+7 dBm LO)

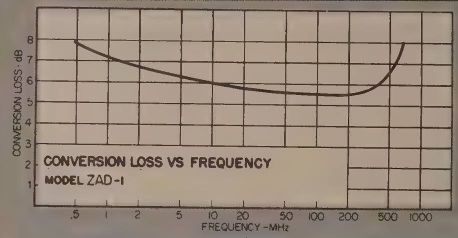
ZAD Series

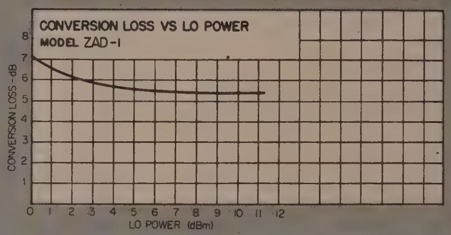
ZAD-1 .5-500MHz $24.95 (4-24)

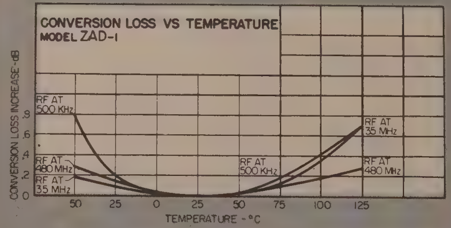
FAST DELIVERY
From stock, one week max.

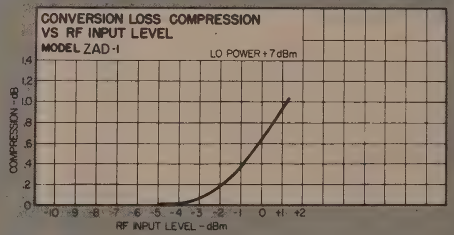


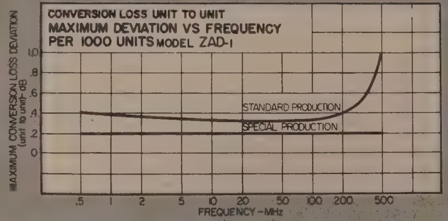
For pin version see SRA series

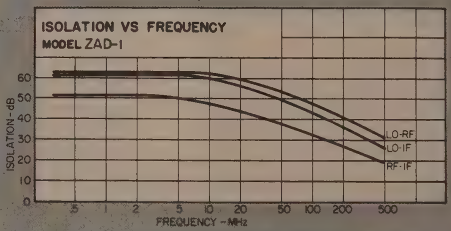

CONVERSION LOSS VS FREQUENCY
MODEL ZAD-1


CONVERSION LOSS VS LO POWER
MODEL ZAD-1


CONVERSION LOSS VS TEMPERATURE
MODEL ZAD-1


CONVERSION LOSS COMPRESSION
VS RF INPUT LEVEL
MODEL ZAD-1


CONVERSION LOSS UNIT TO UNIT
MAXIMUM DEVIATION VS FREQUENCY
PER 1000 UNITS MODEL ZAD-1


ISOLATION VS FREQUENCY
MODEL ZAD-1

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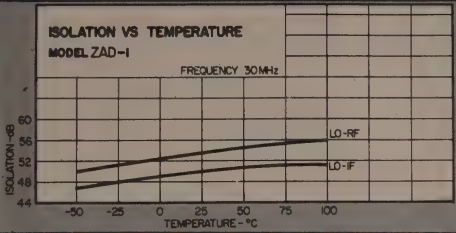
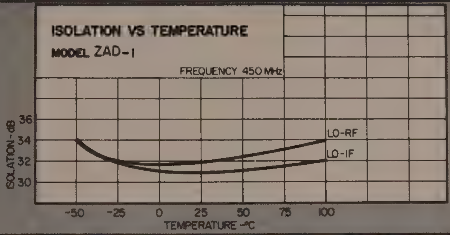
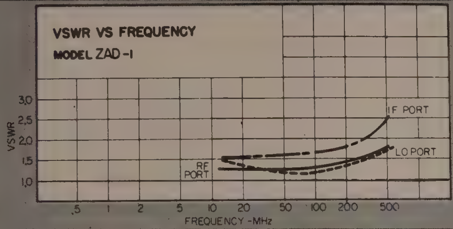
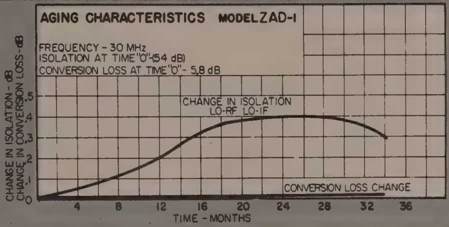
See YELLOW SECTION for Local Sales Offices and Key Personnel

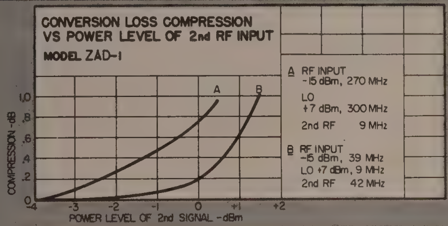
Mini-Circuits Laboratory

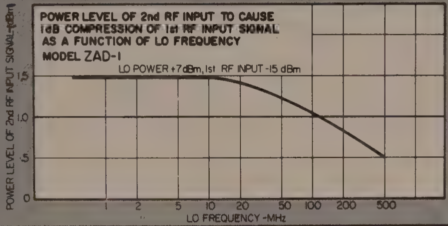

ISOLATION VS TEMPERATURE
MODEL ZAD-1

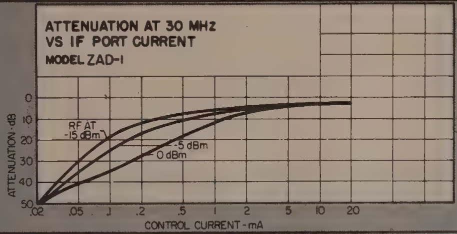

ISOLATION VS TEMPERATURE
MODEL ZAD-1

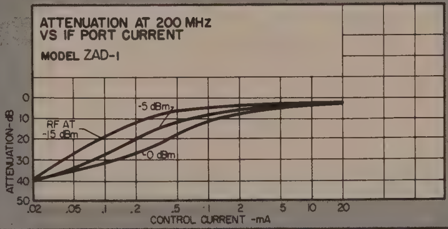

VSWR VS FREQUENCY
MODEL ZAD-1

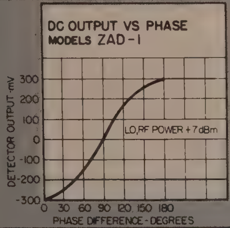

AGING CHARACTERISTICS MODEL ZAD-1

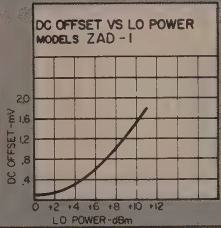

CONVERSION LOSS COMPRESSION VS POWER LEVEL OF 2nd RF INPUT
MODEL ZAD-1

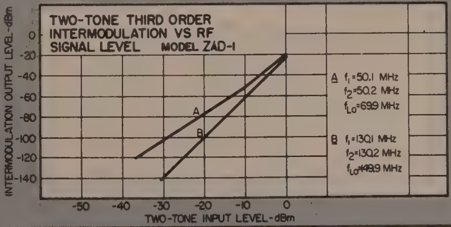

POWER LEVEL OF 2nd RF INPUT TO CAUSE 1dB COMPRESSION OF 1st RF INPUT SIGNAL AS A FUNCTION OF LO FREQUENCY
MODEL ZAD-1

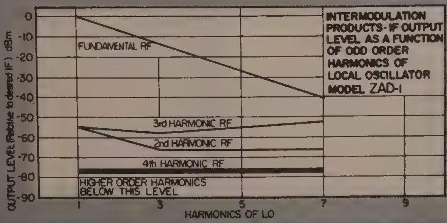

ATTENUATION AT 30 MHz VS IF PORT CURRENT
MODEL ZAD-1

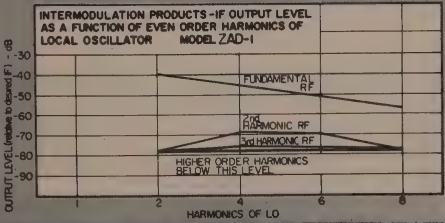

ATTENUATION AT 200 MHz VS IF PORT CURRENT
MODEL ZAD-1


DC OUTPUT VS PHASE
MODELS ZAD-1


DC OFFSET VS LO POWER
MODELS ZAD-1


TWO-TONE THIRD ORDER INTERMODULATION VS RF SIGNAL LEVEL MODEL ZAD-1


INTERMODULATION PRODUCTS - IF OUTPUT LEVEL AS A FUNCTION OF ODD ORDER HARMONICS OF LOCAL OSCILLATOR
MODEL ZAD-1


INTERMODULATION PRODUCTS - IF OUTPUT LEVEL AS A FUNCTION OF EVEN ORDER HARMONICS OF LOCAL OSCILLATOR MODEL ZAD-1

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DOUBLE·BALANCED MIXERS

		MODEL ZAD-1-1		MODEL ZAD-1W	
Frequency Range, MHz	LO	.1-500		1-750	
	RF	.1-500		1-750	
	IF	DC-500		DC-750	
Conversion Loss, dB		Typical	Maximum	Typical	Maximum
One Octave From Band Edge		5.5	7.5	5.5	7.5
Total Range		6.5	8.5	6.5	8.5
Signal, 1dB Compression Level		+1dBm		+1dBm	
Isolation, dB		Typical	Minimum	Typical	Minimum
Lower Band Edge to One Decade Higher	LO-RF	50	45	50	45
	LO-IF	45	30	45	30
Mid Range	LO-RF	45	30	45	30
	LO-IF	40	25	40	25
Upper Band Edge to One Octave Lower	LO-RF	35	25	35	25
	LO-IF	30	20	30	20
Impedance, All Ports		50 ohms		50 ohms	
Phase Detection					
DC Offset		1mV typical		1mV typical	
DC Polarity		Negative		Negative	
Electronic Attenuation					
Minimum Attenuation (20mA)		2.5dB		3.5dB	

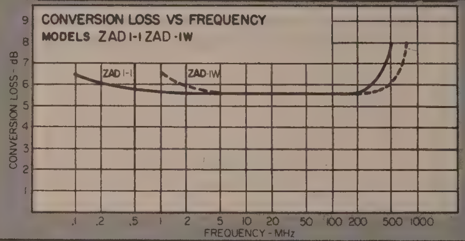
Standard Level
(+7 dBm LO)

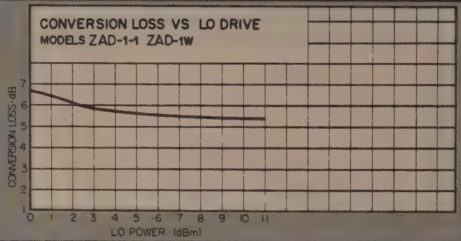
ZAD Series

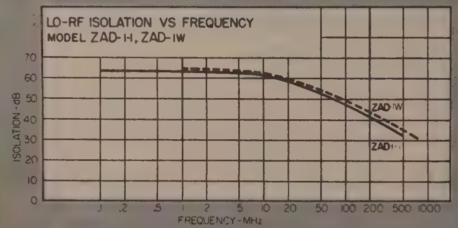
ZAD-1-1	.1-500MHz	$26.95	(4-24)
ZAD-1W	1-750MHz	$29.95	(4-24)

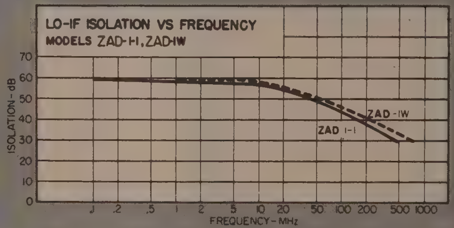
FAST DELIVERY
From stock, one week max.

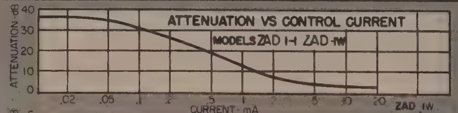
For pin version see SRA series

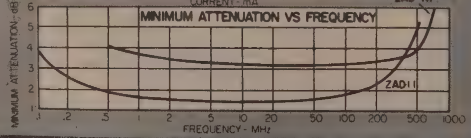


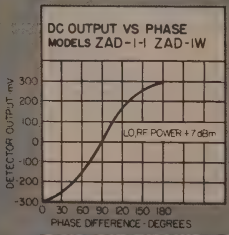


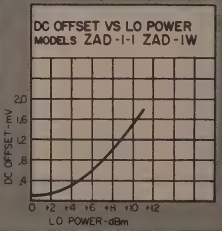












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DOUBLE·BALANCED MIXERS

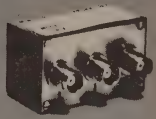
Standard Level
(+7 dBm LO)

ZAD Series

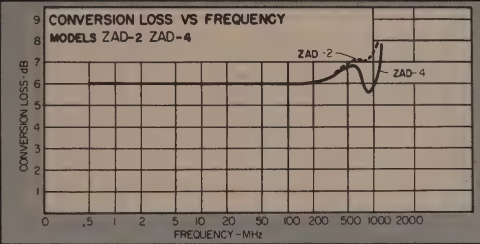
ZAD-2	1-1000MHz	$34.95	(4-24)
ZAD-4	5-1250MHz	$36.95	(4-24)

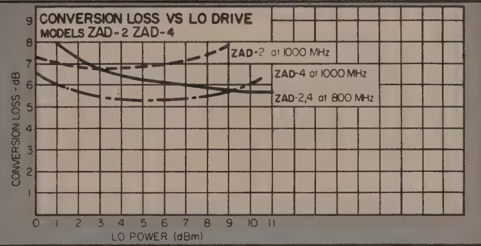
		MODEL ZAD-2		MODEL ZAD-4	
Frquency Range, MHz	LO	1-1000		5-1250	
	RF	1-1000		5-1250	
	IF	.5-500		.5-500	
Conversion Loss, dB		Typical	Maximum	Typical	Maximum
One Octave From Band Edge		5.5	7.5	5.5	7.5
Total Range		6.5	8.5	6.5	8.5
Signal, 1dB Compression Level		+1dBm		+1dBm	
Isolation, dB		Typical	Minimum	Typical	Minimum
Lower Band Edge to One Decade Higher	LO-RF	45	30	50	40
	LO-IF	45	30	50	40
Mid Range	LO-RF	35	20	40	20
	LO-IF	35	20	40	20
Upper Band Edge to One Decade Lower	LO-RF	30	20	30	20
	LO-IF	30	20	30	20
Impedance, All Ports		50 ohms		50 ohms	

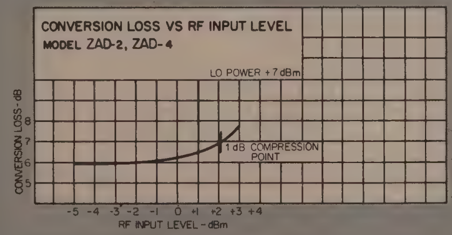
FAST DELIVERY
From stock, one week max.

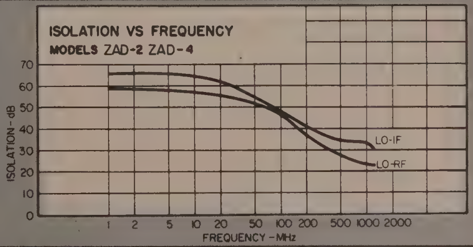


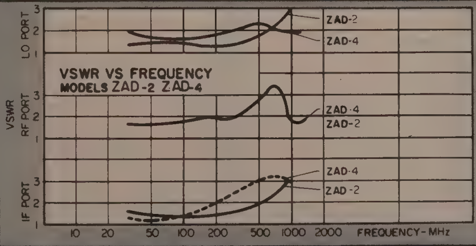
For pin version see SRA series

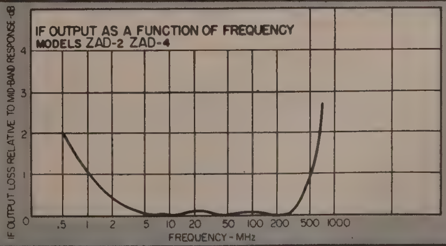












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DOUBLE·BALANCED MIXERS

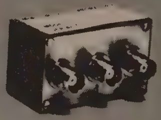
		MODEL ZAD-3		MODEL ZAD 6		MODEL ZAD-8	
Frequency Range, MHz	LO	.025-200		.003-100		.0005-10	
	RF	.025-200		.003-100		.0005-10	
	IF	DC-200		DC-100		DC-10	
Conversion Loss, dB		Typical	Maximum	Typical	Maximum	Typical	Maximum
One Octave From Band Edge		5.5	7.5	5.5	7.5	6.5	7.5
Total Range		6.5	8.5	6.5	8.5	7.0	8.5
Signal, 1dB Compression Level		+1dBm		+1dBm		+1dBm	
Isolation, dB		Typical	Minimum	Typical	Minimum	Typical	Minimum
Lower Band Edge to One Decade Higher	LO-RF	60	50	60	50	60	50
	LO-IF	45	35	60	45	60	50
Mid Range	LO-RF	45	35	45	30	50	40
	LO-IF	40	30	40	25	50	40
Upper Band Edge to One Octave Lower	LO-RF	35	25	35	25	45	35
	LO-IF	30	20	30	20	45	35
Impedance, All Ports		50 ohms		50 ohms		50 ohms	
Phase Detection							
DC Offset		1mV typical		1mV typical		1mV typical	
DC Polarity		Negative		Negative		Negative	
Electronic Attenuation							
Minimum Attenuation (20mA)		1.5dB		1.0dB		1.0dB	

Standard Level
(+7 dBm LO)

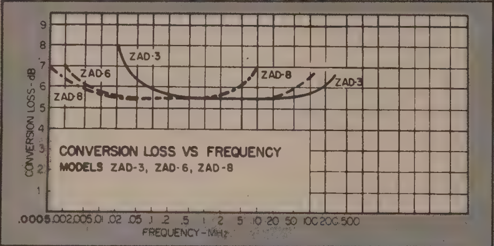
ZAD Series

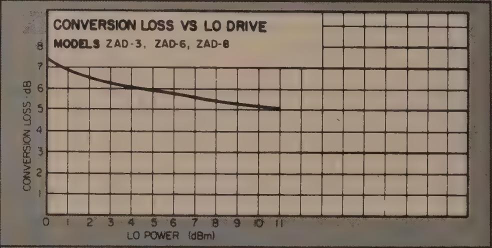
ZAD-3	.025-200MHz	$26.95	(4-24)
ZAD-6	.003-100MHz	$34.95	(4-24)
ZAD-8	.0005-10 MHz	$39.95	(4-24)

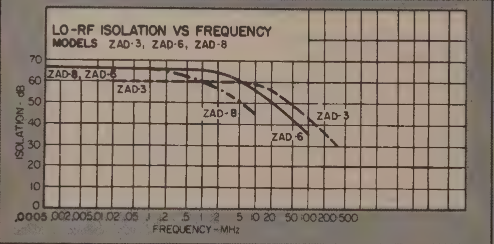
FAST DELIVERY
From stock, one week max.

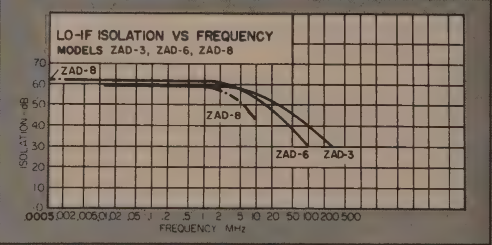


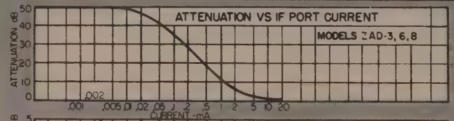
For pin version see SRA series

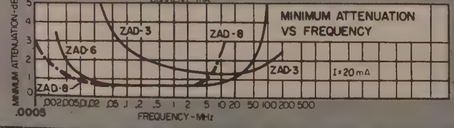


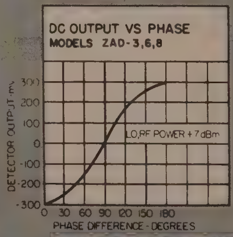


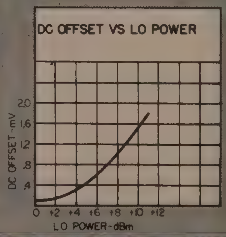












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INTRODUCTION TO ZLW SERIES

MINIATURE DOUBLE-BALANCED MIXERS

Standard Level

(+7 dBm LO)

ZLW Series

ZLW-1	.5- 500 MHz	$34.95 (4-24)
ZLW-1-1	.1- 500 MHz	$36.95 (4-24)
ZLW-1W	1- 750 MHz	$39.95 (4-24)
ZLW-2	1-1000 MHz	$39.95 (1-24)
ZLW-3	.025- 200 MHz	$36.95 (4-24)
ZLW-5	5-1500 MHz	$74.95 (1-9)
ZLW-6	.003- 100 MHz	$44.95 (4-24)
ZLW-8	.0005- 10 MHz	$49.95 (4-24)

FAST DELIVERY

From stock, one week max.

For pin version see SRA series

FEATURES

BROAD FREQUENCY RANGE, 500 Hz–1500 MHz

HIGH ISOLATION 40 dB

LOW CONVERSION LOSS 6 dB

DIE-CAST ALUMINUM CASE

DOUBLE SHIELDED FOR RFI PROTECTION

LOW COST FROM $34.95 IN SMALL QUANTITIES

APPLICATIONS

FREQUENCY MIXING

PULSE AND AMPLITUDE MODULATION

PHASE DETECTION

CURRENT CONTROLLED ATTENUATION

FAST SWITCHING

BI-PHASE MODULATION

DESCRIPTION

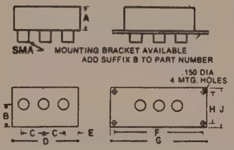
The ZLW series mixers are economically priced while covering the very broad frequency range from 500Hz to 1500MHz. They offer low conversion loss, 6 dB, high isolation 40 dB, and exceptional unit to unit matched performance.

Available with SMA (3 mm) connectors the ZLW series is housed in a die cast aluminum case. These rugged units are double shielded to meet your tough RFI rquirements. The case is finished with a blue baked enamel per Federal Standard 595 #25109 over phosphoric etch per MIL-C-15328A.

Every unit is 100% tested and inspected under strict MCL quality control standards to ensure superior electrical performance and reliability.

Ruggedness and durability are built into the ZLW series. Only well matched hot-carrier diodes and ruggedly constructed transmission line transformers are used. Internally, every component is bonded with silicone rubber to provide protection against shock, vibration, and acceleration.

The exceptional low cost of the ZLW series is attributable to the breakthrough in production techniques achieved during the manufacture of the widely acclaimed Mini-Circuits SRA series of PC board mounting mixers. Utilizing this technology the ZLW series is offered at a remarkable price of 1/2 to 1/3 the cost of competitive units. The ZLW series provides performance, quality, and low cost.



	A	B	C	D	E	F	G	H	J
INCHES	0.88	0.66	.438	1.50	.312	2.19	2.50	0.84	1.15
CM	2.2	1.7	1.1	3.8	.79	5.56	6.35	2.1	2.9

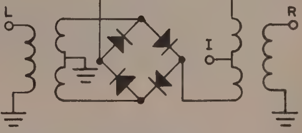
WEIGHT 34 grams 1.02 ounces

CONNECTORS

SMA (3mm) standard

MOUNTING BRACKET

On request, add $1.50 to unit cost.
See dimensions above.



ABSOLUTE MAXIMUM RATINGS

Total Input Power	50mW
Total Input, Current Peak	40mA
Operating & Storage Temperature	−55° C to +100° C

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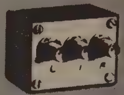
MINIATURE DOUBLE-BALANCED MIXERS

Standard Level
(+7 dBm LO)

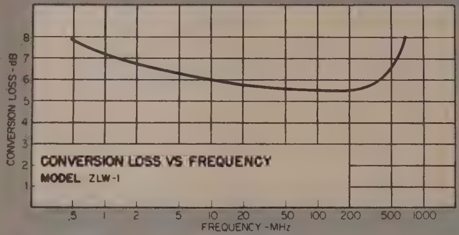
		MODEL ZLW-1	
Frequency Range, MHz	LO	.5-500	
	RF	.5-500	
	IF	DC-500	
Conversion Loss, dB		Typical	Maximum
One Octave from Band Edge		5.5	7.5
Total Range		6.5	8.0
Signal, 1dB Compression Level	+1dBm		
Isolation, dB		Typical	Minimum
Lower Band Edge to One Decade Higher	LO-RF	50	35
	LO-IF	45	30
Mid Range	LO-RF	45	30
	LO-IF	40	25
Upper Band Edge to One Octave Lower	LO-RF	35	25
	LO-IF	30	20
Impedance, All Ports		50 ohms	
Phase Detection			
DC Offset		1mV typical	
DC Polarity		Negative	
Electronic Attenuation			
Minimum Attenuation (20mA)		3dB	

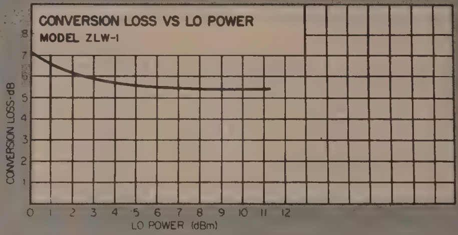
ZLW Series
ZLW-1 .5-500MHz $34.95(4-24)

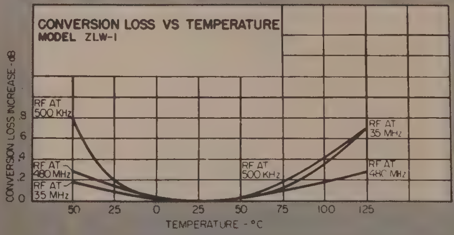
FAST DELIVERY
From stock, one week max.

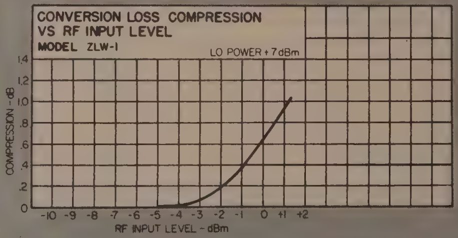


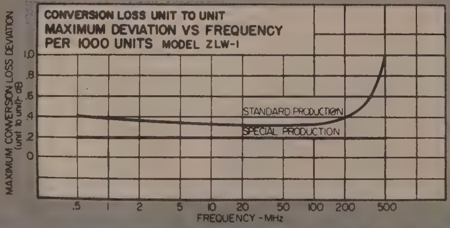
For pin version see SRA series

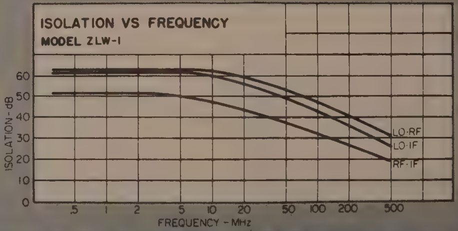












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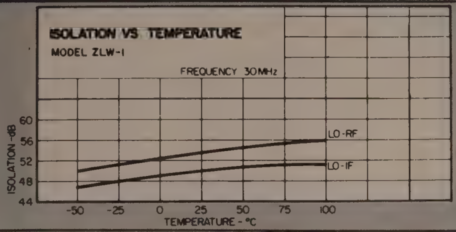
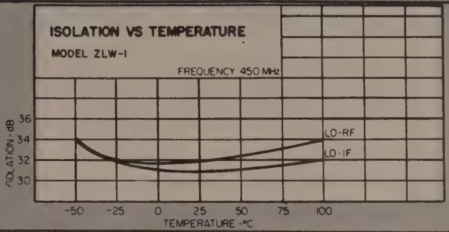
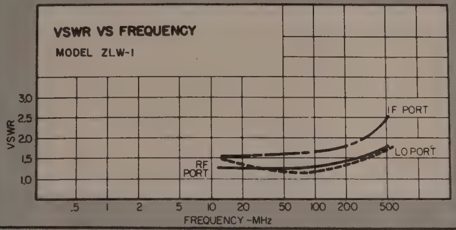
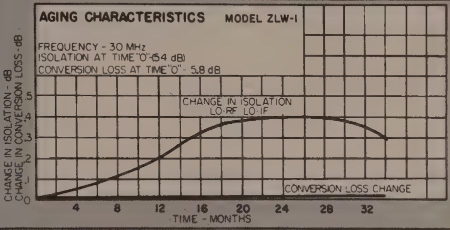
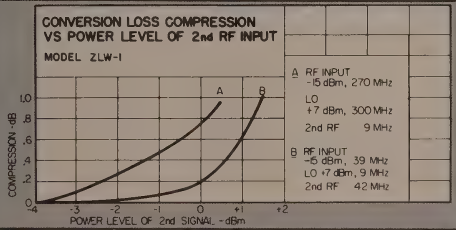
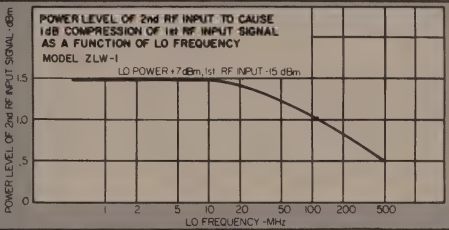

ISOLATION VS TEMPERATURE
MODEL ZLW-1

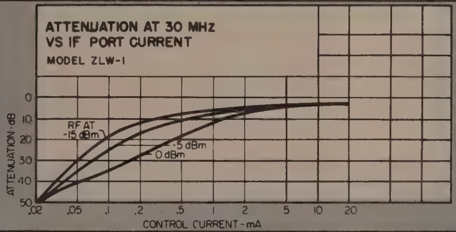

ISOLATION VS TEMPERATURE
MODEL ZLW-1

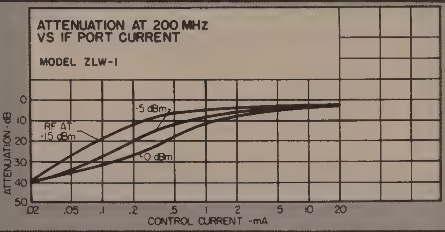

VSWR VS FREQUENCY
MODEL ZLW-1

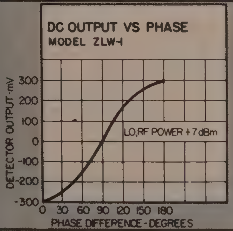

AGING CHARACTERISTICS MODEL ZLW-1
FREQUENCY - 30 MHz
ISOLATION AT TIME "0"-(54 dB)
CONVERSION LOSS AT TIME "0" - 5.8 dB

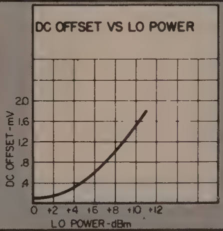

CONVERSION LOSS COMPRESSION VS POWER LEVEL OF 2nd RF INPUT
MODEL ZLW-1
A RF INPUT -15 dBm, 270 MHz
LO +7 dBm, 300 MHz
2nd RF 9 MHz
B RF INPUT -15 dBm, 39 MHz
LO +7 dBm, 9 MHz
2nd RF 42 MHz

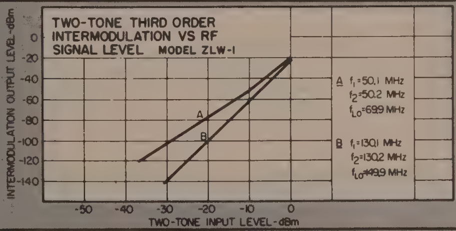

POWER LEVEL OF 2nd RF INPUT TO CAUSE 1dB COMPRESSION OF 1st RF INPUT SIGNAL AS A FUNCTION OF LO FREQUENCY
MODEL ZLW-1
LO POWER +7dBm, 1st RF INPUT -15 dBm

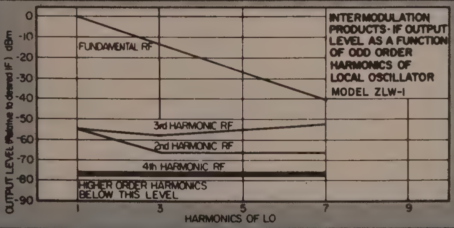

ATTENUATION AT 30 MHz VS IF PORT CURRENT
MODEL ZLW-1

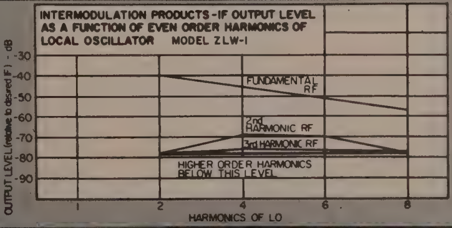

ATTENUATION AT 200 MHz VS IF PORT CURRENT
MODEL ZLW-1


DC OUTPUT VS PHASE
MODEL ZLW-1


DC OFFSET VS LO POWER


TWO-TONE THIRD ORDER INTERMODULATION VS RF SIGNAL LEVEL MODEL ZLW-1
A f_1=50.1 MHz
f_2=50.2 MHz
f_{LO}=69.9 MHz
B f_1=130.1 MHz
f_2=130.2 MHz
f_{LO}=149.9 MHz


INTERMODULATION PRODUCTS- IF OUTPUT LEVEL AS A FUNCTION OF ODD ORDER HARMONICS OF LOCAL OSCILLATOR
MODEL ZLW-1


INTERMODULATION PRODUCTS -IF OUTPUT LEVEL AS A FUNCTION OF EVEN ORDER HARMONICS OF LOCAL OSCILLATOR MODEL ZLW-1

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MINIATURE DOUBLE·BALANCED MIXERS

		MODEL ZLW I-I		MODEL ZLW-IW	
Frequency Range, MHz	LO	.1-500		1-750	
	RF	.1-500		1-750	
	IF	DC-500		DC-750	
Conversion Loss, dB		Typical	Maximum	Typical	Maximum
One Octave From Band Edge		5.5	7.5	5.5	7.5
Total Range		6.5	8.5	6.5	8.5
Signal, 1dB Compression Level		+1dBm		+1dBm	
Isolation, dB		Typical	Minimum	Typical	Minimum
Lower Band Edge to One Decade Higher	LO-RF	50	45	50	45
	LO-IF	45	30	45	30
Mid Range	LO-RF	45	30	45	30
	LO-IF	40	25	40	25
Upper Band Edge to One Octave Lower	LO-RF	35	25	35	25
	LO-IF	30	20	30	20
Impedance, All Ports		50 ohms		50 ohms	
Phase Detection					
DC Offset		1mV typical		1mV typical	
DC Polarity		Negative		Negative	
Electronic Attenuation					
Minimum Attenuation (20mA)		2dB		3.5dB	

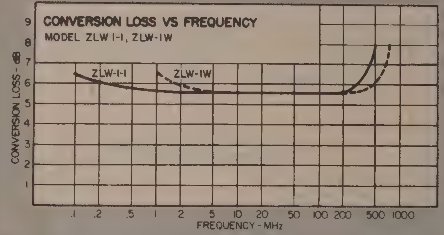
Standard Level
(+7 dBm LO)

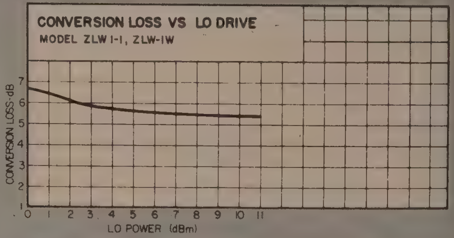
ZLW Series

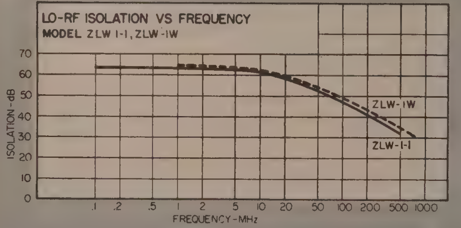
ZLW I-I	.1-500MHz	$36.95 (4-24)
ZLW-IW	1-750MHz	$39.95 (4-24)

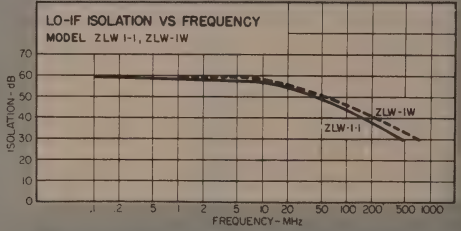
FAST DELIVERY
From stock, one week max.

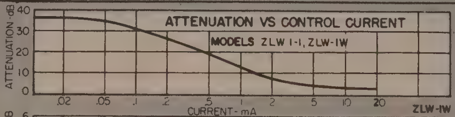
For pin version see SRA series

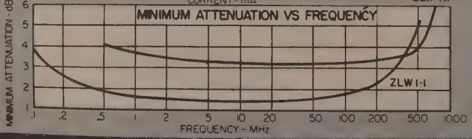


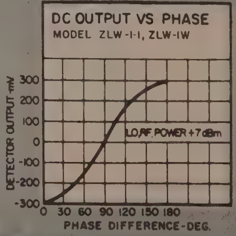


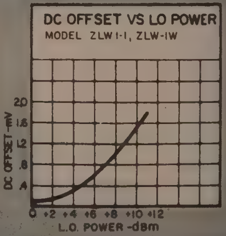












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MINIATURE DOUBLE-BALANCED MIXERS

		MODEL ZLW-3		MODEL ZLW-6		MODEL ZLW-8	
Frequency Range, MHz	LO	.025-200		.003-100		.0005-10	
	RF	.025-200		.003-100		.0005-10	
	IF	DC-200		DC-100		DC-10	
Conversion Loss, dB		Typical	Maximum	Typical	Maximum	Typical	Maximum
One Octave From Band Edge		5.5	7.5	5.5	7.5	6.5	7.5
Total Range		6.5	8.5	6.5	8.5	7.0	8.5
Signal, 1dB Compression Level		+1dBm		+1dBm		+1dBm	
Isolation, dB		Typical	Minimum	Typical	Minimum	Typical	Minimum
Lower Band Edge to One Decade Higher	LO-RF	60	50	60	50	60	50
	LO-IF	45	35	60	45	60	50
Mid Range	LO-RF	45	35	45	30	50	40
	LO-IF	40	30	40	25	50	40
Upper Band Edge to One Octave Lower	LO-RF	35	25	35	25	45	35
	LO-IF	30	20	30	20	45	35
Impedance, All Ports		50 ohms		50 ohms		50 ohms	
Phase Detection							
DC Offset		1mV typical		1mV typical		1mV typical	
DC Polarity		Negative		Negative		Negative	
Electronic Attenuation							
Minimum Attenuation (20mA)		1.5dB		1.0dB		1.0dB	

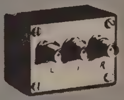
Standard Level

(+7 dBm LO)

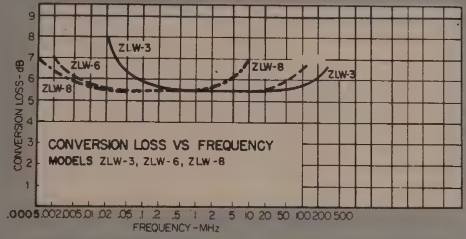
ZLW Series

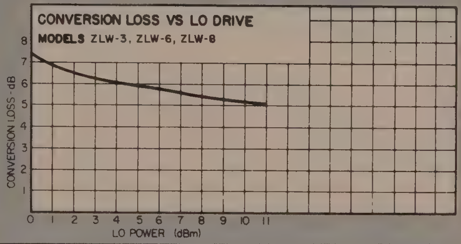
ZLW-3	.025-200 MHz	$36.95(4-24)
ZLW-6	.003-100MHz	$44.95(4-24)
ZLW-8	.0005-10 MHz	$49.95(4-24)

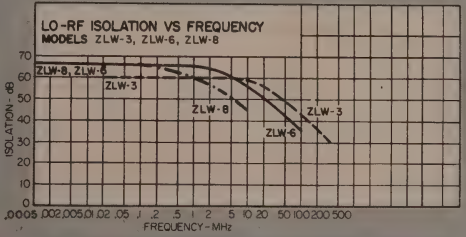
FAST DELIVERY
From stock, one week max

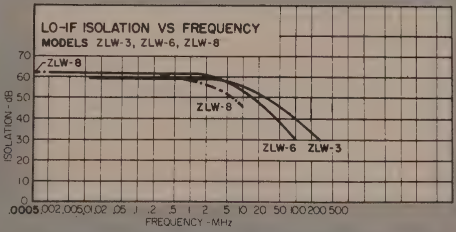


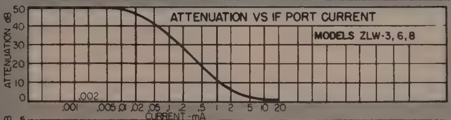
For pin version see SRA series

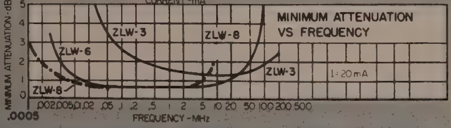

CONVERSION LOSS VS FREQUENCY
MODELS ZLW-3, ZLW-6, ZLW-8

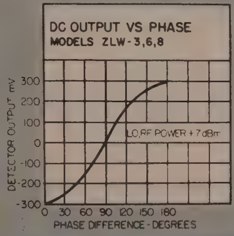

CONVERSION LOSS VS LO DRIVE
MODELS ZLW-3, ZLW-6, ZLW-8

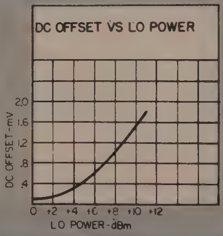

LO-RF ISOLATION VS FREQUENCY
MODELS ZLW-3, ZLW-6, ZLW-8


LO-IF ISOLATION VS FREQUENCY
MODELS ZLW-3, ZLW-6, ZLW-8


ATTENUATION VS IF PORT CURRENT
MODELS ZLW-3, 6, 8


MINIMUM ATTENUATION VS FREQUENCY


DC OUTPUT VS PHASE
MODELS ZLW-3,6,8


DC OFFSET VS LO POWER

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MINIATURE DOUBLE·BALANCED MIXERS

Standard Level
(+7 dBm LO)

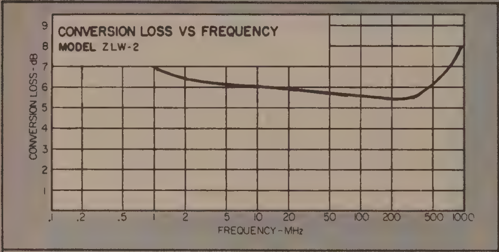
ZLW Series

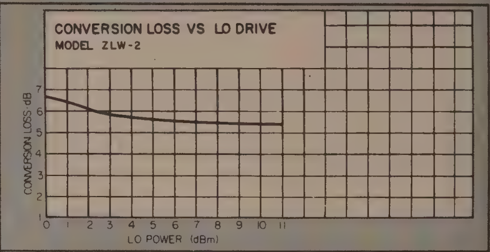
ZLW-2 1-1000MHz $39.95 (1-24)

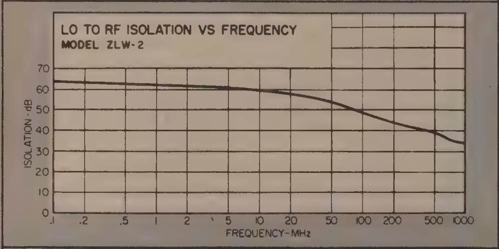
		MODEL-ZLW-2	
Frequency Range, MHz	LO	1-1000	
	RF	1-1000	
	IF	DC-1000	
Conversion Loss, dB		Typical	Maximum
One Octave From Band Edge		6	7.5
Total Range		7.0	9.5
Signal, 1dB Compression Level		+1dBm	
Isolation, dB		Typical	Minimum
Lower Band Edge to One Decade Higher	LO-RF	55	45
	LO-IF	50	40
Mid Range	LO-RF	40	25
	LO-IF	40	25
Upper Band Edge to One Octave Lower	LO-RF	35	20
	LO-IF	30	20
Impedance, All Ports		50 ohms	
Phase Detection			
DC Offset		1mV typical	
DC Polarity		Negative	
Electronic Attenuation			
Minimum Attenuation (20mA)		3.5dB	

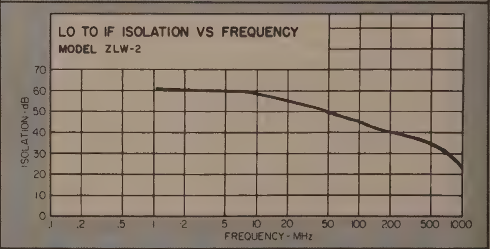
FAST DELIVERY
From stock, one week max

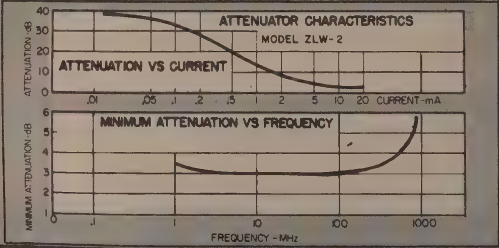
For pin version see SAM series

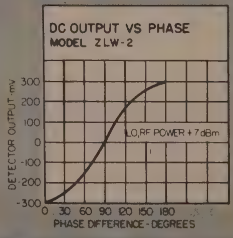


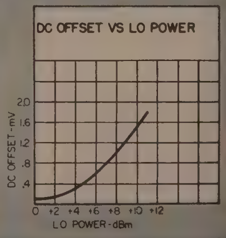












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Mini-Circuits Laboratory

MINIATURE DOUBLE·BALANCED MIXERS

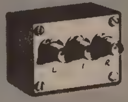
Standard Level
(+7 dBm LO)

		MODEL ZLW-5	
Frequency Range, MHz	LO	5-1500	
	RF	5-1500	
	IF	.5-1000	
Conversion Loss, dB		Typical	Maximum
One Octave From Band Edge		6.5	8.5
Total Range		6.5	8.5
Signal, 1dB Compression Level		+1dBm	
Isolation, dB		Typical	Minimum
Lower Band Edge to One Decade Higher	LO-RF	55	40
	LO-IF	50	40
Mid Range	LO-RF	35	25
	LO-IF	35	25
Upper Band Edge to One Octave Lower	LO-RF	30	20
	LO-IF	30	20
Impedance, All Ports		50 ohms	

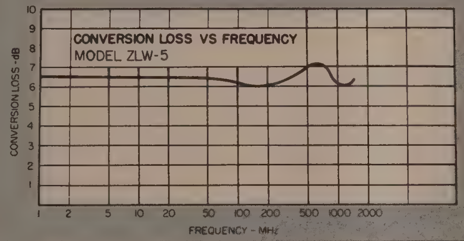
ZLW Series

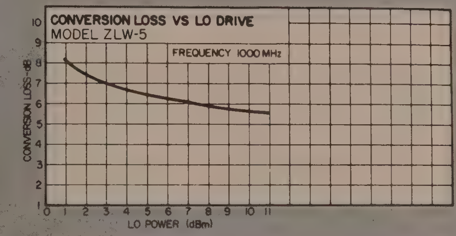
ZLW-5 5-1500MHz $74.95 (1-9)

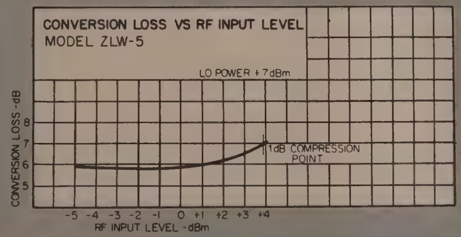
FAST DELIVERY
From stock, one week max.

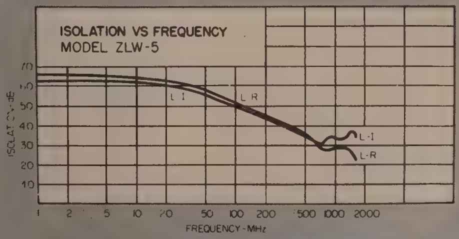


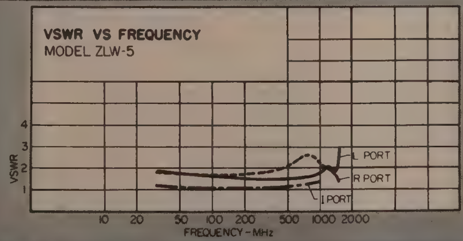
For pin version see SAM series

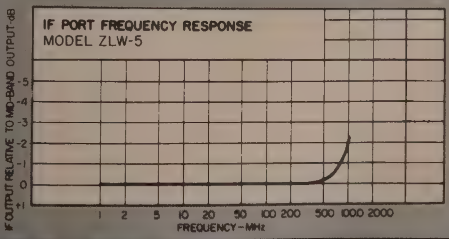












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Mini-Circuits Laboratory

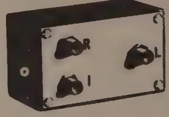
INTRODUCTION TO MA SERIES
DOUBLE-BALANCED MIXERS

Standard Level
(+10 dBm LO)

MA Series

MA-1 1-2500 MHz $99.95 (1-9)

FAST DELIVERY
From stock; one week max.



FEATURES

- ULTRA BROADBAND 1 - 2500MHz
- HIGH ISOLATION 40 dB
- LOW CONVERSION LOSS 9 dB
- UNIQUE RUGGED CONSTRUCTION FOR SEVERE MILITARY REQUIREMENTS
- SMA 3mm CONNECTORS
- LOW PRICED $99.95 (1-9 QUANTITY)

APPLICATIONS

- ECM
- TELEMETRY
- TEST INSTRUMENTATION
- WIDE RANGE SIGNAL SOURCES
- TEST RECEIVERS
- LABORATORY PROTOTYPE ASSEMBLY
- SWEEP GENERATORS

DESCRIPTION

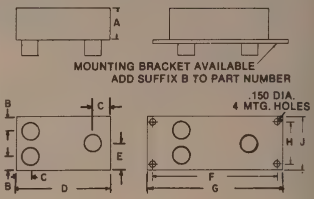
Representing a price/performance breakthrough in microwave double balanced mixers, a new 1 to 2500MHz mixer with 9.0dB. conversion loss and isolation of 40dB can now be purchased for as low as $99.95; even in small (1-9) quantities!

Housed in a die cast aluminum case, these rugged units are shielded to meet your tough EMI requirements. The case is finished with a blue baked enamel per Federal Standard 595# 25109 over phosphoric etch per MIL-C-15328A.

The MA-1 operates with a 50 ohm impedance at its ports and a local oscillator power level of +10dBm. Its operating and storage temperature range is from −55° to +100°C. Over the frequency range 1 to 30MHz the operating temperature is −20° to +100°C. Absolute ratings include total input power of 50mW, total peak input current of 40mA.

High reliability is characteristic of the MA-1. Each unit carries with it a one year warranty by MCL. Only well matched hot-carrier diodes and rugged coaxial transmission line transformers are used. Extra special care has been taken to enable these units to be used in environments of severe shock and vibration.

Every unit is 100% tested and inspected under strict MCL quality control standards to ensure superior electrical performance and reliability. The exceptionally low cost of the MA-1 is attributable to the breakthrough in production techniques achieved by MCL during the manufacture of its high performance low price double balanced mixers. Utilizing this technology the high performance MA-1 is offered at a remarkable price of ⅓ to ¼ of competitive units.

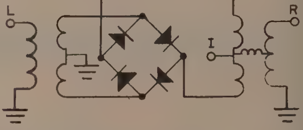


	A	B	C	D	E	F	G	H	J
INCHES	1.15	.360	.516	2.25	.690	2.95	3.25	1.10	1.40
CM	2.9	.9	1.3	5.7	1.75	7.49	8.25	2.8	3.55

WEIGHT 74.0 grams 2.60 ounces

CONNECTORS'
SMA (3mm) standard

MOUNTING BRACKET
On request, add $1.50 to unit cost.
See dimensions above.



ABSOLUTE MAXIMUM RATINGS

Total Input Power	50 mW
Total Input, Current Peak	40 mA
Operating & Storage Temperature	−55°C to +100°C

World's largest supplier of double balanced mixers
Mini Circuits Laboratory 837-843 Utica Avenue, Brooklyn, NY 11203 (212) 342-2500

Mini-Circuits Laboratory

DOUBLE-BALANCED MIXERS

Standard Level

(+10dBm LO)

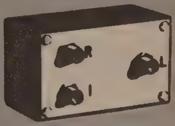
MA Series

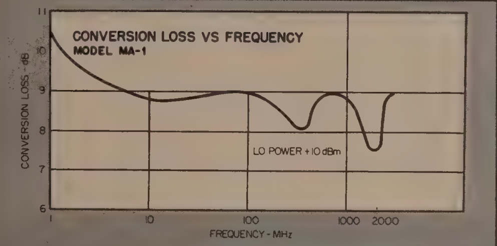
MA-1 1-2500MHz $99.95 (1-9)

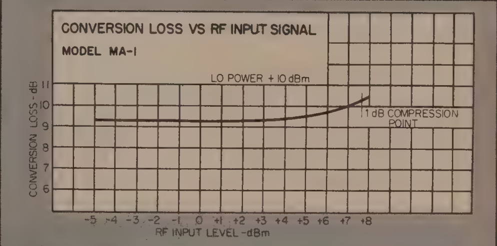
SPECIFICATIONS		MODEL MA-1	
Frequency Range, MHz	LO	1-2500	
	RF	1-2500	
	IF	1-1000	
Conversion Loss, dB		Typical	Maximum
1-5MHz		9.5	11.0
5-1000MHz		9.0	10.5
1000-2500MHz		8.0	11.0
LO Power	+10dBm		
Signal, 1dB Compression Level	+7dBm		
Isolation, dB		Typical	Minimum
Lower Band Edge to one Decade Higher	LO-RF	60	50
	LO-IF	55	45
Mid Range	LO-RF	40	30
	LO-IF	40	30
Upper Band Edge to One Octave Lower	LO-RF	35	25
	LO-IF	30	20

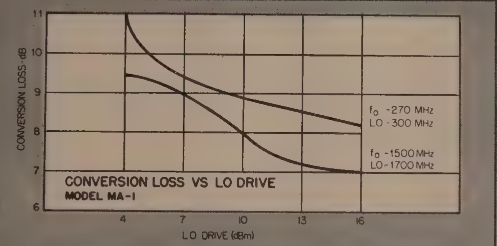
FAST DELIVERY

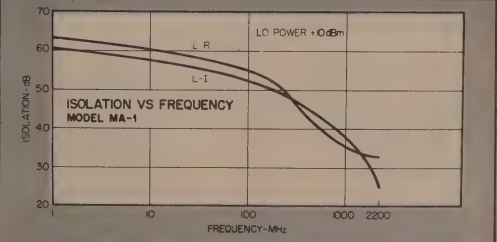
From stock, one week max.

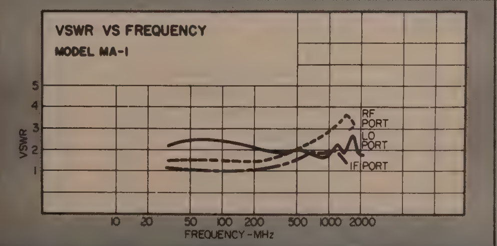


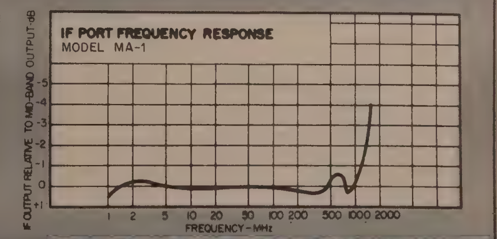












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MCL Mini-Circuits Laboratory

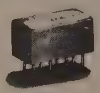
INTRODUCTION TO SRA·H SERIES DOUBLE·BALANCED MIXERS

High Level
(+17dBm LO)

SRA-H Series

SRA-1H	.5- 500 MHz	$15.95 (5-24)
SRA-2H	2-1000 MHz	$29.95 (5-24)
SRA-3H	.05- 200 MHz	$17.95 (5-24)
SRA-1WH	1- 750 MHz	$19.95 (5-24)

FAST DELIVERY
From stock, one week max.



For connector version see ZAD-H series

FEATURES

- MINIATURE SIZE, .128 CU. INCHES
- LINEAR OPERATION UP TO +10 dBm INPUT
- BROAD FREQUENCY RANGE 50KHz -1000 MHz
- HIGH ISOLATION 40 dB
- LOW CONVERSION LOSS 6 dB
- HERMETICALLY SEALED METAL CASE
- PC BOARD MOUNTING
- LOW COST FROM $15.95 IN SMALL QUANTITIES

APPLICATIONS

- FREQUENCY MIXING
- PULSE AND AMPLITUDE MODULATION
- PHASE DETECTION
- CURRENT CONTROLLED ATTENUATION
- FAST SWITCHING
- BI-PHASE MODULATION

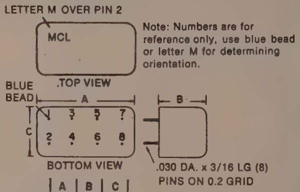
DESCRIPTION

Having only 0.1 cu. inches, the high level SRA-H series covers a broad frequency range from 50KHz to 1000MHz. Designed to solve severe intermodulation distortion problems, the SRA-H series offers linear operation up to +10 dBm signal input at only 1 dB of compression. Reducing all higher order signal harmonic IMD, the SRA-H series provides a conversion loss of typically 6 dB and isolation of greater than 40 dB.

Packaged within an RFI shielded metal enclosure and hermetically sealed header, this tiny unit has its 8 pins located on a 0.2 inch grid.

Ruggedness and durability are built-in features. Internal components include well matched hot-carrier diodes and very broad band, low distortion transformers. Supported with silicone rubber, the SRA-H series withstands high shock, vibration, and acceleration environments.

Priced at 1/2 to 1/3 the cost of competitive units the SRA-H series incorporates the high reliability associated with every Mini-Circuits mixer. Our standard 1 year guarantee applies to these units.



Note: Numbers are for reference only, use blue bead or letter M for determining orientation.

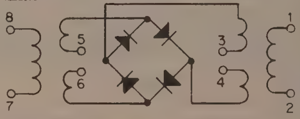
	A	B	C
INCHES	.8	.4	.4
CM	2	1	1

WEIGHT 5.2 grams .18 ounces

PIN CONNECTIONS

	SRA-1H SRA-3H	SRA-1WH SRA 2H
LO	8	8
RF	1	1
IF	3,4	3,4
Ground	2,5,6,7	2,5,6,7
Case Ground	2	2,5,6,7

NOTE: PINS 3 AND 4 MUST BE CONNECTED TOGETHER



ABSOLUTE MAXIMUM RATINGS

Total Input Power	500 mW
Total Input, Current Peak	40 mA
Operating & Storage Temperature	−55° C to +100° C

Pin Temperature (10 seconds) 510° F

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Mini-Circuits Laboratory MCL

MINIATURE DOUBLE-BALANCED MIXERS

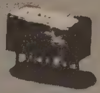
		SRA-1H		SRA-2H		SRA-1WH		SRA-3H	
Frequency Range, MHz	LO	.5-500		2-1000		1-750		.05-200	
	RF	.5-500		2-1000		1-750		.05-200	
	IF	DC-500		DC-1000		DC-750		DC-200	
Conversion Loss, dB		Typical	Max	Typical	Max	Typical	Max	Typical	Max
One Octave From Band Edge		5.5	7.5	6.0	7.5	5.5	7.5	5.5	7.0
Total Range		6.5	8.5	8.5	10.0	6.5	8.5	5.5	7.5
Signal, 1dB Compression Level		+10dBm		+10dBm		+10dBm		+10dBm	
Isolation, dB		Typical	Min	Typical	Min	Typical	Min	Typical	Min
Lower Band Edge to One Decade Higher	LO-RF	55	45	50	40	50	40	55	45
	LO-IF	45	35	45	35	45	35	45	35
Mid Range	LO-RF	45	30	35	25	45	25	45	30
	LO-IF	40	30	30	20	40	25	40	30
Upper Band Edge to One Octave Lower	LO-RF	35	25	35	25	35	25	35	25
	LO-IF	30	20	25	20	30	20	30	20
Impedance, All Ports		50 ohms		50 ohms		50 ohms		50 ohms	
Phase Detection									
DC Offset		1.5mV typical		1.5mV typical		1.5mV typical		1.5mV typical	
DC Polarity		Negative		Negative		Negative		Negative	
Electronic Attenuation									
Minimum Attenuation (20mA)		3.5dB		5.0dB		3.5dB		2dB	

High Level
(+17dBm LO)

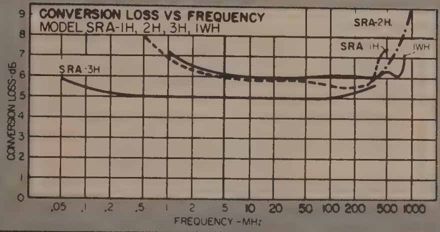
SRA-H Series

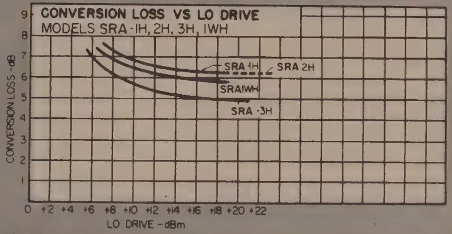
SRA-1H	.5-500MHz	$15.95	(5-24)
SRA-2H	2-1000MHz	$29.95	(5-24)
SRA-3H	.05-200MHz	$17.95	(5-24)
SRA-1WH	1-750MHz	$19.95	(5-24)

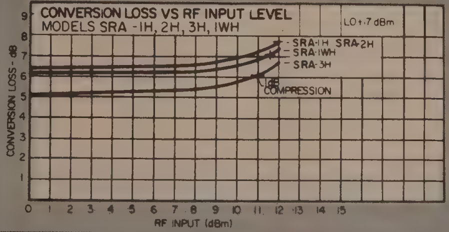
FAST DELIVERY
From stock, one week max.

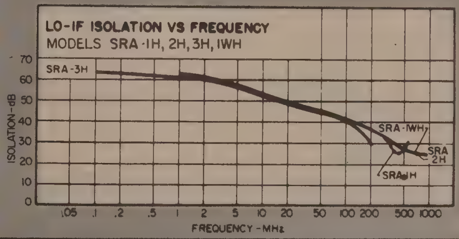


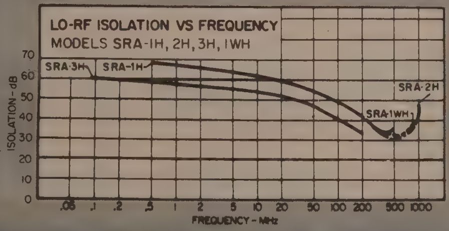
For connector version see ZAD-H series

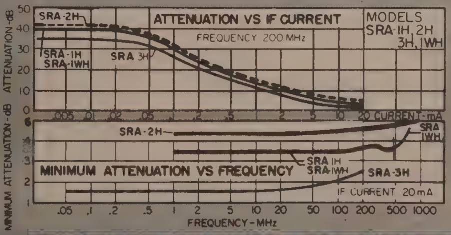












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MCL Mini-Circuits Laboratory

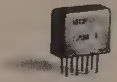
INTRODUCTION TO SAM·H SERIES
MINIATURE DOUBLE·BALANCED MIXERS

High Level
(+17dBm LO)

SAM·H Series

SAM-1H	1- 600 MHz	$19.95 (5-24)
SAM-2H	5-1000 MHz	$34.95 (1-24)
SAM-3H	.1- 500 MHz	$19.95 (5-24)

FAST DELIVERY
From stock, one week max.



FEATURES

MICRO-MINIATURE SIZE, .04 CU. INCHES

PC BOARD AREA ONLY 0.1 SQ. INCHES

BROAD FREQUENCY RANGE
0.1 - 1000MHz

HIGH ISOLATION 40 dB

LOW CONVERSION LOSS 6.0 dB

HERMETICALLY SEALED METAL CASE

PC BOARD MOUNTING

LOW COST FROM $19.95
IN SMALL QUANTITIES

APPLICATIONS

FREQUENCY MIXING

PULSE AND AMPLITUDE MODULATION

PHASE DETECTION

CURRENT CONTROLLED ATTENUATION

FAST SWITCHING

BI-PHASE MODULATION

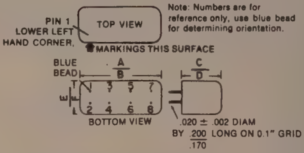
DESCRIPTION

Representing a performance and price breakthrough in micro-miniature double balanced mixers, the SAM-H series covers the frequency range 100KHz to 1000MHz. Although smaller than mixers presently available, the SAM-H series offers higher performance of extra wide bandwidth, low conversion loss, and high isolation. These tiny units offer isolation of greater than 55 dB and conversion loss of 6.0 dB. The SAM-H series performs with a 50 ohm impedance at all ports and has a operating and storage temperature range from −55° C to +100° C.

The SAM-H units require less PC area than a flat-pack or TO-5 can. For example, consider a 2×2 sq. in. PC board. You can mount 16 standard flat-packs (including room for lead bending), or 23 TO-5 cans (considering the space required for the tab), or 36 Mini-Circuits microminiature SAM's.

Packaged within an EMI shielded metal enclosure and hermetically sealed header (enclosure is 0.5 by 0.2 by 0.4 in.) the SAM-H series exhibits a typical noise figure of just 1/2 to 1dB greater than its conversion loss. Its pins are oriented on a 0.1 inch grid for printed circuit board mounting. Only well matched hot-carrier diodes and rugged transmission line transformers are used. Internally, silicone rubber is incorporated as an insulator against any wire shorts and to provide protection against shock, and vibration.

High reliability is characteristic of the SAM-H series. Each unit carries with it a one year warranty by MCL.



Note: Numbers are for reference only, use blue bead for determining orientation.

.020 ± .002 DIAM
BY .200/.170 LONG ON 0.1" GRID

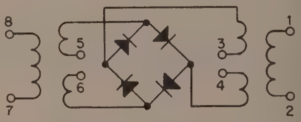
	A	B	C	D	E	F
INCHES	.500	.480	.405	.390	.230	.210
CM	1.27	1.22	1.03	.99	.58	.53

WEIGHT 1.9 grams .07 ounces

PIN CONNECTIONS

	SAM-1H SAM-3H	SAM-2H
LO	8	8
RF	1	1
IF	3,4	3,4
Ground	2,5,6,7	2,5,6,7
Case ground	2	2,5,6,7

NOTE: PINS 3 AND 4 MUST BE CONNECTED TOGETHER



ABSOLUTE MAXIMUM RATINGS

Total Input Power	100 mW
Total Input, Current Peak	40mA
Operating & Storage Temperature	−55° C to +100° C

Pin Temperature - (10 seconds) - 510° F

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Mini Circuits Laboratory 837-843 Utica Avenue, Brooklyn, NY 11203 (212) 342-2500

Mini-Circuits Laboratory

MINIATURE DOUBLE-BALANCED MIXERS

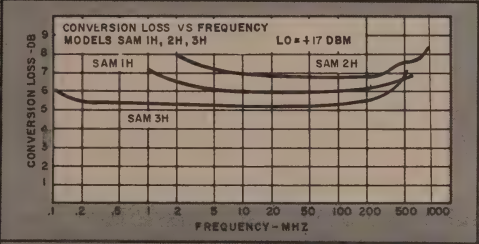
		MODEL SAM-1H		MODEL-SAM-2H		MODEL SAM-3H	
Frequency Range, MHz	LO	1-600		5-1000		.1-500	
	RF	1-600		5-1000		.1-500	
	IF	DC-600		DC-1000		DC-500	
Conversion Loss, dB		Typical	Maximum	Typical	Maximum	Typical	Maximum
One Octave From Band Edge		6.0	7.5	6.7	8.0	5.5	7.0
Total Range		6.5	8.5	7.5	9.5	6.5	8.0
Signal, 1dB Compression Level		+7dBm		+7dBm		+7dBm	
Isolation, dB		Typical	Minimum	Typical	Minimum	Typical	Maximum
Lower Band Edge to One Decade Higher	LO-RF	55	45	55	45	55	45
	LO-IF	50	40	50	40	50	40
Mid Range	LO-RF	40	25	40	25	40	25
	LO-IF	35	25	35	20	35	20
Upper Band Edge to One Octave Lower	LO-RF	35	20	35	20	30	20
	LO-IF	30	20	25	15	20	15
Impedance, All Ports		50 ohms		50 ohms		50 ohms	
Phase Detection							
DC Offset		2 mV typical		2 mV typical		2 mV typical	
DC Polarity		Negative		Negative		Negative	
Electronic Attenuation							
Minimum Attenuation (20mA)		3.5dB		5.0dB		2.5dB	

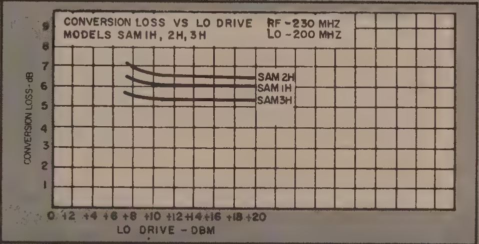
High Level
(+17dBm LO)

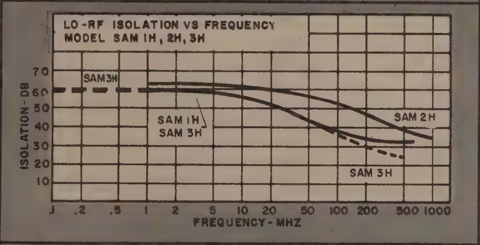
SAM-H Series

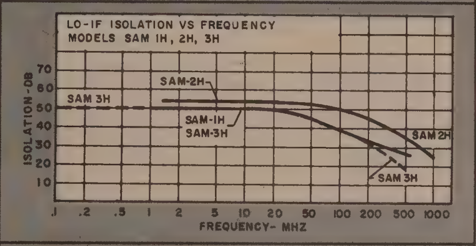
SAM-1H	1- 600 MHz	$19.95 (5-24)
SAM-2H	5-1000 MHz	$34.95 (1-24)
SAM-3H	.1- 500 MHz	$19.95 (5-24)

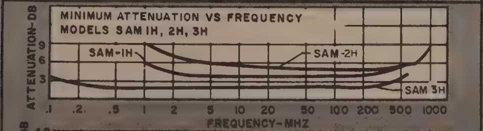
FAST DELIVERY
From stock, one week max.

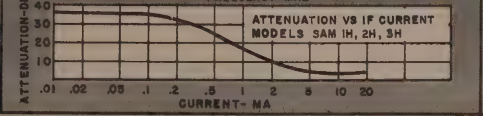


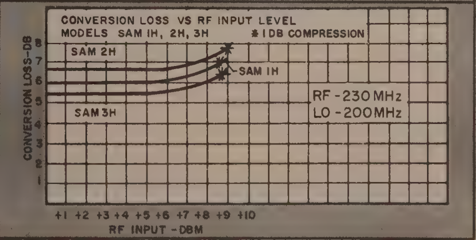












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Mini-Circuits Laboratory

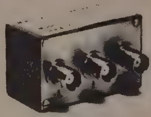
INTRODUCTION TO ZAD·H SERIES DOUBLE·BALANCED MIXERS

High Level
(+17dBm LO)

ZAD-H Series

ZAD-1H	.5- 500 MHz	$30.95 (4-24)
ZAD-2H	2-1000 MHz	$44.95 (4-24)
ZAD-3H	.05- 200 MHz	$32.95 (4-24)
ZAD-1WH	1- 750 MHz	$34.95 (4-24)

FAST DELIVERY
From stock, one week max.



For pin version see SRA-H series

FEATURES

- LINEAR OPERATION UP TO +10 dBm INPUT
- BROAD FREQUENCY RANGE 50KHz - 1000MHz
- HIGH ISOLATION 40 dB
- LOW CONVERSION LOSS 6 dB
- DIE-CAST ALUMINUM CASE
- DOUBLE SHIELDED FOR RFI PROTECTION
- LOW COST FROM $30.95 IN SMALL QUANTITIES

APPLICATIONS

- FREQUENCY MIXING
- PULSE AND AMPLITUDE MODULATION
- PHASE DETECTION
- CURRENT CONTROLLED ATTENUATION
- FAST SWITCHING
- BI-PHASE MODULATION

DESCRIPTION

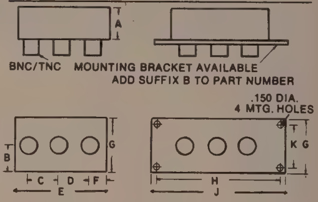
The ZAD-H series mixers cover a broad frequency range from 50KHz to 1000 MHz Solving severe intermodulation distortion problems, the ZAD-H series offers linear operation up to +10 dBm signal input at only 1 dB of compression. Reducing all higher order signal harmonic IMD, the ZAD-H series provides a conversion loss of typically 6 dB and isolation of greater than 40 dB.

Available with BNC, or TNC coaxial connectors, the ZAD-H series is housed in a die cast aluminum case. These rugged units are double shielded to meet your tough RFI requirements. The case is finished with a blue baked enamel per Federal Standard 595 #25109 over phosphoric etch per MIL-C-15328A.

Every unit is 100% tested and inspected under strict MCL quality control standards to ensure superior electrical performance and reliability.

Ruggedness and durability are built into the ZAD-H series. Only well matched hot-carrier diodes and ruggedly constructed low distortion transformers are used. Internally, every component is bonded with silicone rubber to provide protection against shock, vibration, and acceleration.

Priced at 1/2 to 1/3 the cost of competitive units the ZAD-H series incorporates the high reliability associated with every Mini-Circuits unit. The ZAD-H series offers performance, quality, and low cost so that you can expect value with every purchase.



	A	B	C	D	E	F	G	H	J	K
INCHES	1.15	.63	.750	.730	2.25	.385	1.40	2.95	3.25	1.10
CM	2.9	1.6	1.9	1.85	5.7	.977	3.55	7.49	8.25	2.8

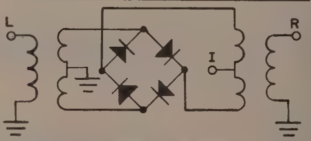
WEIGHT 74.0 grams 2.60 ounces

CONNECTORS

BNC	standard
TNC	on request

MOUNTING BRACKET

On request, add $1.50 to unit cost. See dimensions above.



ABSOLUTE MAXIMUM RATINGS

Total Input Power	500 mW
Total Input, Current Peak	40 mA
Operating & Storage Temperature	−55°C to +100°C

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MINIATURE DOUBLE·BALANCED MIXERS

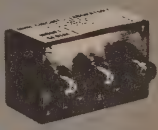
		ZAD-1H		ZAD-2H		ZAD-1WH		ZAD-3H	
Frequency Range, MHz	LO	.5-500		2-1000		1-750		.05-200	
	RF	.5-500		2-1000		1-750		.05-200	
	IF	DC-500		DC-1000		DC-750		DC-200	
Conversion Loss, dB		Typical	Max	Typical	Max	Typical	Max	Typical	Max
One Octave From Band Edge		5.5	7.5	6.0	7.5	5.5	7.5	5.5	7.0
Total Range		6.5	8.5	8.5	10.0	6.5	8.5	5.5	7.5
Signal, 1dB Compression Level		+10dBm		+10dBm		+10dBm		+10dBm	
Isolation, dB		Typical	Min	Typical	Min	Typical	Min	Typical	Min
Lower Band Edge to One Decade Higher	LO-RF	55	45	50	40	50	40	55	45
	LO-IF	45	35	45	35	45	35	45	35
Mid Range	LO-RF	45	30	35	25	45	25	45	30
	LO-IF	40	30	30	20	40	25	40	30
Upper Band Edge to One Octave Lower	LO-RF	35	25	35	25	35	25	35	25
	LO-IF	30	20	25	20	30	20	30	20
Impedance, All Ports		50 ohms		50 ohms		50 ohms		50 ohms	
Phase Detection DC Offset		1.5mV typical		1.5mV typical		1.5mV typical		1.5mV typica	
DC Polarity		Negative		Negative		Negative		Negative	
Electronic Attenuation Minimum Attenuation (20mA)		3.5dB		5.0dB		3.5dB		2dB	

High Level
(+17dBm LO)

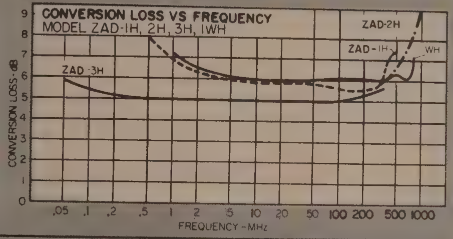
ZAD-H Series

ZAD-1H	.5- 500 MHz	$30.95 (4-24)
ZAD-2H	2-1000 MHz	$44.95 (4-24)
ZAD-3H	.05- 200 MHz	$32.95 (4-24)
ZAD-1WH	1- 750 MHz	$34.95 (4-24)

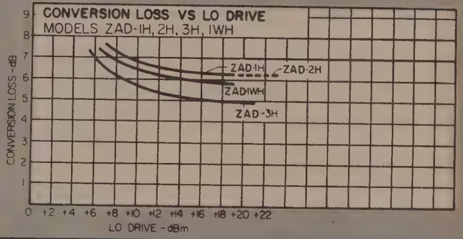
FAST DELIVERY
From stock, one week max.



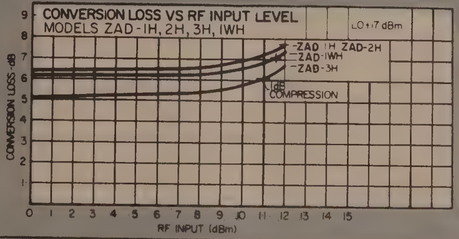
For pin version see SRA-H series



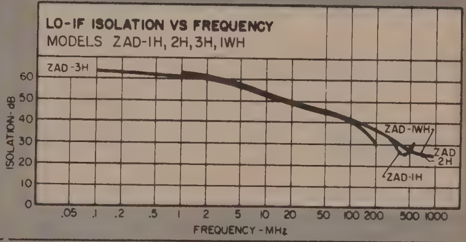
CONVERSION LOSS VS FREQUENCY
MODEL ZAD-1H, 2H, 3H, 1WH



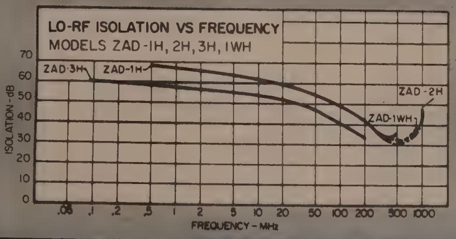
CONVERSION LOSS VS LO DRIVE
MODELS ZAD-1H, 2H, 3H, 1WH



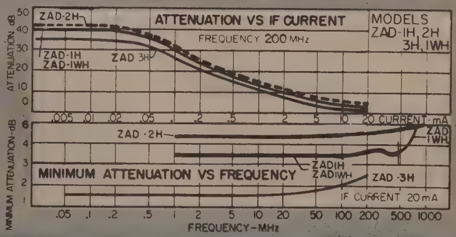
CONVERSION LOSS VS RF INPUT LEVEL
MODELS ZAD-1H, 2H, 3H, 1WH



LO-IF ISOLATION VS FREQUENCY
MODELS ZAD-1H, 2H, 3H, 1WH



LO-RF ISOLATION VS FREQUENCY
MODELS ZAD-1H, 2H, 3H, 1WH



ATTENUATION VS IF CURRENT
MODELS ZAD-1H, 2H 3H, 1WH

MINIMUM ATTENUATION VS FREQUENCY

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Mini-Circuits Laboratory

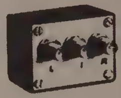
INTRODUCTION TO ZLW-H SERIES
MINIATURE DOUBLE-BALANCED MIXERS

High Level
(+17dBm LO)

ZLW-H Series

ZLW-1H	.5- 500 MHz	$40.95 (4-24)
ZLW-2H	2-1000 MHz	$54.95 (4-24)
ZLW-3H	.05- 200 MHz	$42.95 (4-24)
ZLW-1WH	1- 750 MHz	$44.95 (4-24)

FAST DELIVERY
From stock, one week max.



For pin version see SRA-H series

FEATURES

- LINEAR OPERATION UP TO +10 dBm INPUT
- BROAD FREQUENCY RANGE 50KHz - 1000MHz
- HIGH ISOLATION 40 dB
- LOW CONVERSION LOSS 6 dB
- DIE-CAST ALUMINUM CASE
- DOUBLE SHIELDED FOR RFI PROTECTION
- LOW COST FROM $40.95 IN SMALL QUANTITIES

APPLICATIONS

- FREQUENCY MIXING
- PULSE AND AMPLITUDE MODULATION
- PHASE DETECTION
- CURRENT CONTROLLED ATTENUATION
- FAST SWITCHING
- BI-PHASE MODULATION

DESCRIPTION

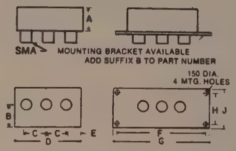
The ZLW-H series mixers cover a broad frequency range from 50KHz to 1000 MHz Solving severe intermodulation distortion problems, the ZLW-H series offers linear operation up to +10 dBm signal input at only 1 dB of compression. Reducing all higher order signal harmonic IMD, the ZLW-H series provides a conversion loss of typically 6 dB and isolation of greater than 40 dB.

Available with SMA (3mm) connectors, the ZLW-H series is housed in a die cast aluminum case. These rugged units are double shielded to meet your tough RFI requirements. The case is finished with a blue baked enamel per Federal Standard 595 #25109 over phosphoric etch per MIL-C-15328A.

Every unit is 100% tested and inspected under strict MCL quality control standards to ensure superior electrical performance and reliability.

Ruggedness and durability are built into the ZLW-H series. Only well matched hot-carrier diodes and ruggedly constructed low distortion transformers are used. Internally, every component is bonded with silicone rubber to provide protection against shock, vibration, and acceleration.

Priced at 1/2 to 1/3 the cost of competitive units the ZLW-H series incorporates the high reliability associated with every Mini-Circuits unit. The ZLW-H series offers performance, quality, and low cost so that you can expect value with every purchase.

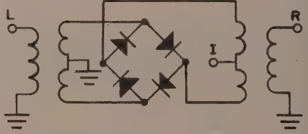


	A	B	C	D	E	F	G	H	J
INCHES	0.88	0.66	4 38	1.50	.312	2.19	2.50	0.84	1.15
CM	2.2	1.7	1.1	3.8	.79	5.56	6.35	2.1	2.9

WEIGHT 34.0 grams 1.02 ounces

CONNECTORS
SMA (3mm) standard

MOUNTING BRACKET
On request, add $1.50 to unit cost. See dimensions above.



ABSOLUTE MAXIMUM RATINGS

Total Input Power	500 mW
Total Input, Current Peak	40 mA
Operating & Storage Temperature	−55°C to +100°C

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MINIATURE DOUBLE·BALANCED MIXERS

		ZLW-1H		ZLW-2H		ZLW-1WH		ZLW-3H	
Frequency Range, MHz	LO	.5-500		2-1000		1-750		.05-200	
	RF	.5-500		2-1000		1-750		.05-200	
	IF	DC-500		DC-1000		DC-750		DC-200	
Conversion Loss, dB		Typical	Max	Typical	Max	Typical	Max	Typical	Max
One Octave From Band Edge		5.5	7.5	6.0	7.5	5.5	7.5	5.5	7.0
Total Range		6.5	8.5	8.5	10.0	6.5	8.5	5.5	7.5
Signal, 1dB Compression Level		+10dBm		+10dBm		+10dBm		+10dBm	
Isolation, dB		Typical	Min	Typical	Min	Typical	Min	Typical	Min
Lower Band Edge to One Decade Higher	LO-RF	55	45	50	40	50	40	55	45
	LO-IF	45	35	45	35	45	35	45	35
Mid Range	LO-RF	45	30	35	25	45	25	45	30
	LO-IF	40	30	30	20	40	25	40	30
Upper Band Edge to One Octave Lower	LO-RF	35	25	35	25	35	25	35	25
	LO-IF	30	20	25	20	30	20	30	20
Impedance, All Ports		50 ohms		50 ohms		50 ohms		50 ohms	
Phase Detection									
DC Offset		1.5mV typical		1.5mV typical		1.5mV typical		1.5mV typical	
DC Polarity		Negative		Negative		Negative		Negative	
Electronic Attenuation									
Minimum Attenuation (20mA)		3.5dB		5.0dB		3.5dB		2dB	

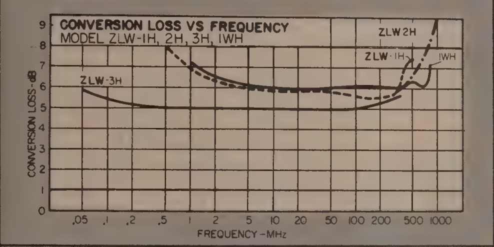
High Level
(+17dBm LO)

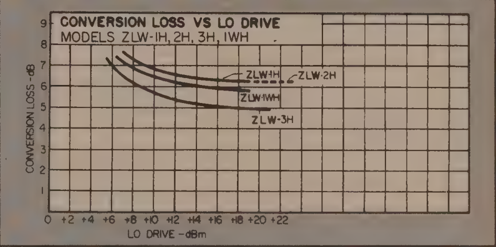
ZLW·H Series

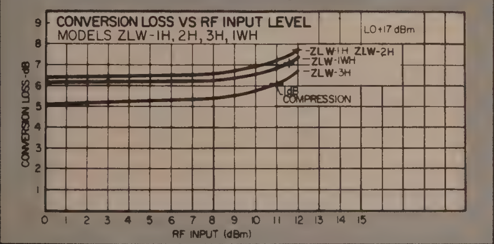
ZLW-1H	.5- 500 MHz	$40.95 (4-24)
ZLW-2H	2-1000 MHz	$54.95 (4-24)
ZLW-3H	.05- 200 MHz	$42.95 (4-24)
ZLW-1WH	1- 750 MHz	$44.95 (4-24)

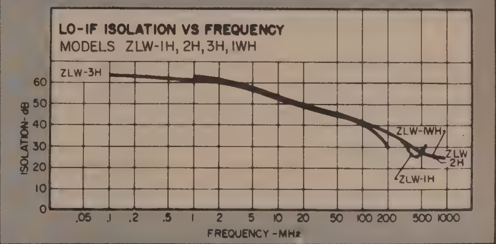
FAST DELIVERY
From stock, one week max.

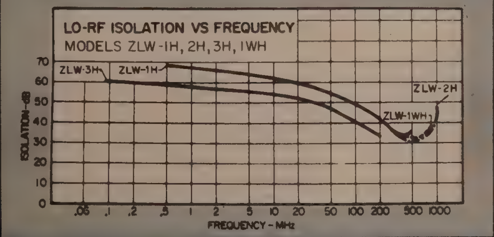
For pin version see SRA-H series

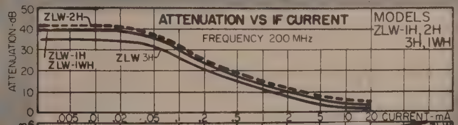


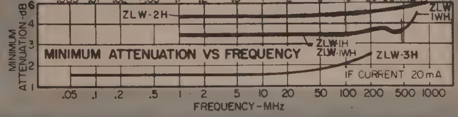












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INTRODUCTION TO RAY SERIES DOUBLE-BALANCED MIXERS

Very High Level
(+23 dBm LO)

RAY Series

RAY-1	5- 500 MHz	$31.95 (4-9)
RAY-2	10-1000 MHz	$51.95 (4-9)
RAY-3	.07- 200 MHz	$31.95 (4-9)

FAST DELIVERY
From stock, one week max.

For connector version see ZAY *series*

FEATURES

- MINIATURE SIZE, .128 CUBIC INCHES
- LINEAR OPERATION UP TO +15 dBm INPUT
- BROAD FREQUENCY RANGE 70KHz - 1000MHz
- HIGH ISOLATION 40 dB
- LOW CONVERSION LOSS 6 dB
- HERMETICALLY SEALED METAL CASE
- PC BOARD MOUNTING
- LOW COST FROM $31.95 IN SMALL QUANTITIES

APPLICATIONS

- FREQUENCY MIXING
- PULSE AND AMPLITUDE MODULATION
- PHASE DETECTION
- CURRENT CONTROLLED ATTENUATION
- FAST SWITCHING
- BI-PHASE MODULATION

DESCRIPTION

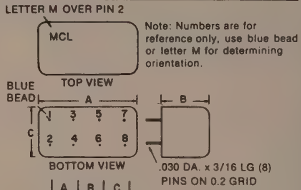
Housed in a volume of only 0.1 cu. inches and requiring a PC board area of only .32 sq. inches makes the RAY series the smallest packaged mixers for very high level operation. The RAY series covers a broad frequency range from 70 KHz to 1000 MHz.

Designed to solve very severe intermodulation distortion problems, the RAY series offers linear operation up to +15 dBm signal input at only 1 dB of compression. Reducing all higher order IMD, the RAY series provides a conversion loss of typically 6 dB and isolation of greater than 40 dB.

Packaged within an RFI shielded metal enclosure and hermetically sealed header, this tiny unit has its 8 pins located on a 0.2 inch grid.

Ruggedness and durability are built-in features. Internal components include well matched hot-carrier diodes and very broad band, low distortion transformers. Supported with silicone rubber, the RAY series withstands high shock, vibration, and acceleration environments.

Costing 1/3 to 1/4 the price of competitive units, the RAY series offers the high reliability associated with every Mini-Circuits mixer. Our standard 1 year guarantee applies to these units.


LETTER M OVER PIN 2
MCL
Note: Numbers are for reference only, use blue bead or letter M for determining orientation.
TOP VIEW
BLUE BEAD
A
B
C
1
3
5
7
2
4
6
8
BOTTOM VIEW
.030 DA. x 3/16 LG (8) PINS ON 0.2 GRID

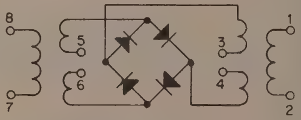
	A	B	C
INCHES	.8	.4	.4
CM	2	1	1

WEIGHT 5.2 grams .18 ounces

PIN CONNECTIONS

	RAY-1 RAY-3	RAY-2
LO	8	8
RF	1	1
IF	3,4	3,4
Ground	2,5,6,7	2,5,6,7
Case Ground	2	2,5,6,7

NOTE: PINS 3 AND 4 MUST BE CONNECTED TOGETHER



ABSOLUTE MAXIMUM RATINGS

Total Input Power	1 w
Total Input, Current Peak	40 mA
Operating & Storage Temperature	−55° C to +100° C

Pin Temperature (10 seconds) 510° F

Mini-Circuits Laboratory MCL

DOUBLE·BALANCED MIXERS

		MODEL RAY-1		MODEL RAY-2		MODEL RAY-3	
Frequency Range, MHz	LO	5-500		10-1000		0.07-200	
	RF	5-500		10-1000		0.07-200	
	IF	DC-500		DC-1000		DC-200	
Conversion Loss, dB		Typical	Maximum	Typical	Maximum	Typical	Maximum
One Octave From Band Edge		6.0	7.5	7.0	8.5	6.0	7.5
Total Range		7.5	8.5	8.5	10	6.5	8.0
Signal, 1dB Compression Level		+15dBm typical		+15dBm typical		+15dBm typical	
Isolation, dB		Typical	Minimum	Typical	Minimum	Typical	Minimum
Lower Band Edge to One Decade Higher	LO-RF	55	45	50	35	55	45
	LO-IF	55	45	50	35	55	45
Mid Range	LO-RF	40	30	40	30	40	30
	LO-IF	40	30	35	25	40	30
Upper Band Edge to One Octave Lower	LO-RF	30	25	35	25	30	25
	LO-IF	30	20	25	20	30	20
Impedance, All Ports		50 ohms		50 ohms		50 ohms	
Phase Detection							
DC Offset		2mV typical		2mV typical		2mV typical	
DC Polarity		Negative		Negative		Negative	
Electronic Attenuation							
Minimum Attenuation (20mA)		3.5dB		6 dB		2dB	

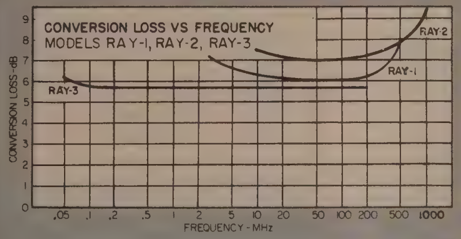
Very High Level
(+23 dBm LO)

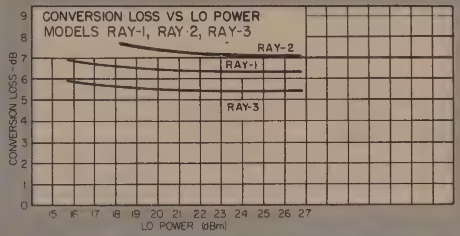
RAY Series

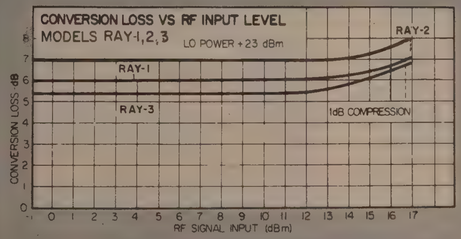
RAY-1	5- 500 MHz	$31.95 (4-9)
RAY-2	10-1000 MHz	$51.95 (4-9)
RAY-3	.07- 200 MHz	$31.95 (4-9)

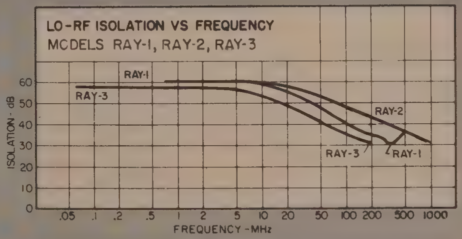
FAST DELIVERY
From stock, one week max.

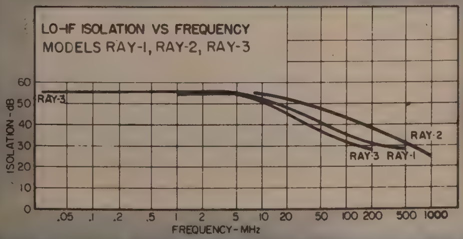
For connector version see ZAY series

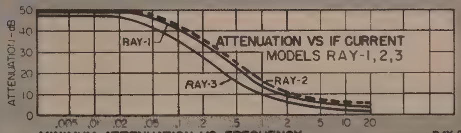


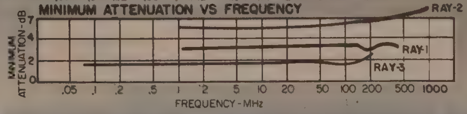












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Mini-Circuits Laboratory

INTRODUCTION TO ZAY ZMY SERIES DOUBLE·BALANCED MIXERS

Very High Level (+23 dBm LO)

FEATURES

LINEAR OPERATION UP TO +15 dBm INPUT

BROAD FREQUENCY RANGE 70KHz-1000 MHz

HIGH ISOLATION 40 dB

LOW CONVERSION LOSS 6 dB

DIE-CAST ALUMINUM CASE

DOUBLE SHIELDED FOR RFI PROTECTION

LOW COST FROM $41.95 IN SMALL QUANTITIES

APPLICATIONS

FREQUENCY MIXING

PULSE AND AMPLITUDE MODULATION

PHASE DETECTION

CURRENT CONTROLLED ATTENUATION

FAST SWITCHING

BI-PHASE MODULATION

DESCRIPTION

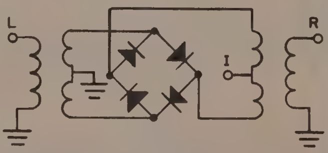
The ZAY/ZMY series of mixers cover a broad frequency range from 70 KHz to 1000MHz. Solving very severe intermodulation distortion problems, the ZAY/ZMY series offers linear operation up to + 15 dBb signal input at only 1 dB of compression. Reducing all higher order IMD, the ZAY/ZMY series provides a conversión loss of typically 6 dB and isolation of greater than 40 dB.

Available with BNC, TNC, or SMA (3mm) connectors, the ZAY/ZMY series is housed in a die cast aluminum case. These rugged units are double shielded to meet your tough RFI requirements. The case is finished with a blue baked enamel per Federal Standard 595 #25109 over phosphoric etch per MIL-C-15328A.

Every unit is 100% tested and inspected under strict MCL quality control standards to ensure superior electrical performance and reliability.

Ruggedness and durability are built into the ZAY/ZMY series. Only well matched hot-carrier diodes and ruggedly constructed low distortion transformers are used. Internally, every component is bonded with silicone rubber to provide protection against shock, vibration, and acceleration.

Priced at ⅓ to ¼ the cost of competitive units the ZAY/ZMY series incorporates the high reliability associated with every Mini-Circuits unit. The ZAY/ZMY series offers performance, quality, and low cost so that you can expect value with every purchase.



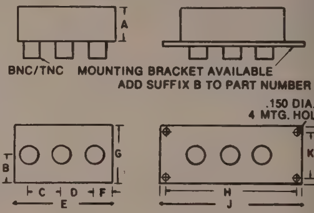
ABSOLUTE MAXIMUM RATINGS

Total Input Power	1w
Total Input, Current Peak	40 mA
Operating & Storage Temperature	−55° C to +100° C

ZAY Series (Standard Size)

ZAY-1	5- 500 MHz	$41.95 (4-9)
ZAY-2	10-1000 MHz	$61.95 (4-9)
ZAY-3	.07- 200 MHz	$41.95 (4-9)

For pin version see RAY series



	A	B	C	D	E	F	G	H	J	K
INCHES	1.15	.63	.750	.730	2.25	.385	1.40	2.95	3.25	1.10
CM	2.9	1.6	1.9	1.85	5.7	.977	3.55	7.49	8.25	2.8

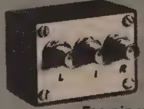
WEIGHT 74.0 grams 2.60 ounces

CONNECTORS

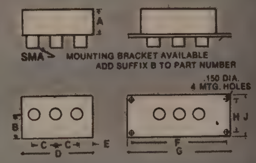
BNC	standard
TNC	on request

ZMY Series (Miniature Size)

ZMY-1	5-500MHz	$51.95(4-9)
ZMY-2	10-1000MHz	$71.95(4-9)
ZMY-3	.0 7-200MHz	$51.95(4-9)



For pin version see RAY series



	A	B	C	D	E	F	G	H	J
INCHES	0.88	0.66	.438	1.50	.312	2.19	2.50	0.84	1.15
CM	2.2	1.7	1.1	3.8	.79	5.56	6.35	2.1	2.9

WEIGHT 34.0 grams 1.02 ounces

CONNECTORS

SMA (3mm) standard

MOUNTING BRACKET

On request, add $1.50 to unit cost. See dimensions above.

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DOUBLE·BALANCED MIXERS

		MODEL ZAY-1/ZMY-1		MODEL ZAY-2/ZMY-2		MODEL ZAY-3/ZMY-3	
Frequency Range, MHz	LO	5-500		10-1000		0.07-200	
	RF	5-500		10-1000		0.07-200	
	IF	DC-500		DC-1000		DC-200	
Conversion Loss, dB		Typical	Maximum	Typical	Maximum	Typical	Maximum
One Octave From Band Edge		6.0	7.5	7.0	8.5	6.0	7.5
Total Range		7.5	8.5	8.5	10	6.5	8.0
Signal, 1dB Compression Level		+15dBm typical		+15dBm typical		+15dBm typical	
Isolation, dB		Typical	Minimum	Typical	Minimum	Typical	Minimum
Lower Band Edge to One Decade Higher	LO-RF	55	45	50	35	55	45
	LO-IF	55	45	50	35	55	45
Mid Range	LO-RF	40	30	40	30	40	30
	LO-IF	40	30	35	25	40	30
Upper Band Edge to One Octave Lower	LO-RF	30	25	35	25	30	25
	LO-IF	30	20	25	20	30	20
Impedance, All Ports		50 ohms		50 ohms		50 ohms	
Phase Detection							
DC Offset		2mV typical		2mV typical		2mV typical	
DC Polarity		Negative		Negative		Negative	
Electronic Attenuation							
Minimum Attenuation (20mA)		3.5dB		6dB		2dB	

Very High Level
(+23 dBm LO)

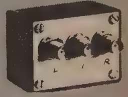
ZAY Series

ZAY-1	5- 500 MHz	$41.95 (4-9)
ZAY-2	10-1000 MHz	$61.95 (4-9)
ZAY-3	.07- 200 MHz	$41.95 (4-9)

For pin version see RAY series

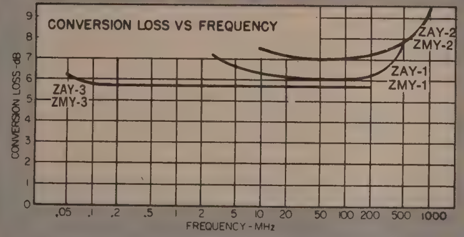
ZMY Series

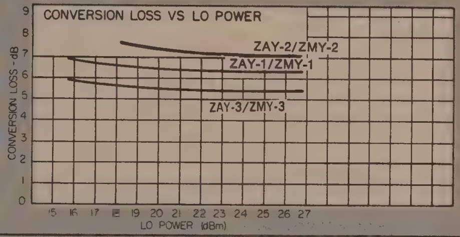
ZMY-1	5-500MHz	$51.95 (4-9)
ZMY-2	10-1000MHz	$71.95 (4-9)
ZMY-3	.07-200MHz	$51.95 (4-9)

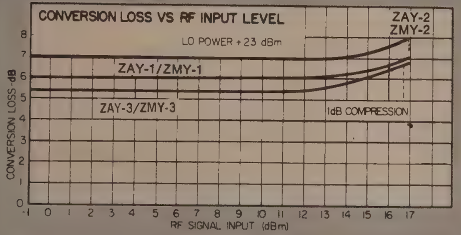


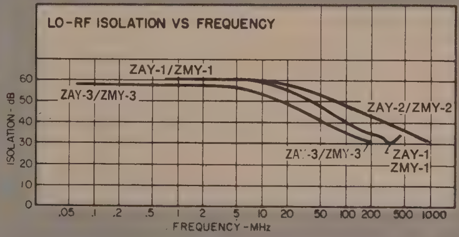
For pin version see RAY series

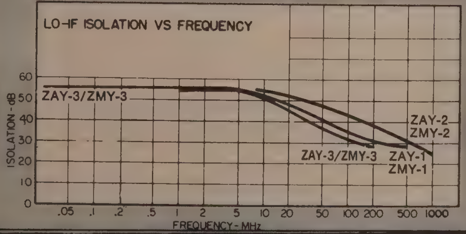
FAST DELIVERY
From stock, one week max.

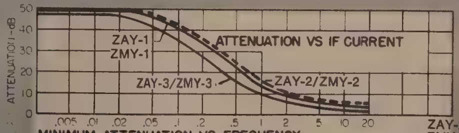


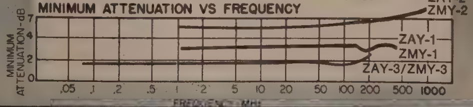












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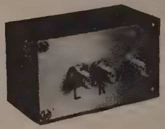
INTRODUCTION TO ZMA SERIES
MICROWAVE BALANCED MIXERS

Standard Level
(+7 dBm LO)

ZMA Series

ZMA-2	1.0-2.5 GHz	$ 49.95 (1-9)
ZMA-3	1.4-3.0 GHz	$ 54.95 (1-9)

FAST DELIVERY
From stock, one week max.



FEATURES

- BROADBAND 1.0 - 3.0 GHz
- HIGH ISOLATION 30 dB
- LOW CONVERSION LOSS 7 dB
- IF RESPONSE TO DC
- SMA 3mm CONNECTORS
- DELIVERY ONE WEEK
- LOW PRICED $49.95 (1-9 QUANTITY)

APPLICATIONS

- FREQUENCY MIXING
- PULSE AND AMPLITUDE MODULATION
- PHASE DETECTION
- CURRENT CONTROLLED ATTENUATION
- FAST SWITCHING

DESCRIPTION

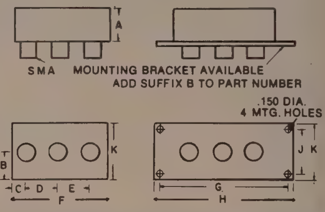
The ZMA series mixers are very economically priced while covering the broad frequency range from 1000 MHz to 3000 MHz They offer low conversion loss, 7 dB, and high LO-IF isolation 50 dB, over most of its frequency range.

Available with SMA (3 mm) connectors the ZMA series is housed in a die cast aluminum case. These rugged units are shielded to meet your tough RFI rquirements. The case is finished with a blue baked enamel per Federal Standard 595 #25109 over phosphoric etch per MIL-C-15328A.

Every unit is 100% tested and inspected under strict MCL quality control standards to ensure superior electrical performance and reliability.

Ruggedness and durability are built into the ZMA series. Only well matched hot-carrier diodes and ruggedly constructed transmission line transformers are used. Internally, every component is bonded with silicone rubber to provide protection against shock, vibration, and acceleration.

The exceptional low cost of the ZMA series is attributable to the breakthrough in production techniques achieved during the manufacture of the widely acclaimed Mini-Circuits SRA series of PC board mounting mixers. Utilizing this technology the ZMA series is offered at a remarkable price of 1/2 to 1/3 the cost of competitive units. The ZMA series provides performance, quality, and low cost.



	A	B	C	D	E	F	G	H	J	K
INCHES	1.15	.690	.688	.437	.562	2.25	2.95	3.25	1.10	1.40
CM	2.9	1.75	1.7	1.1	1.4	5.7	7.49	8.25	2.79	3.55

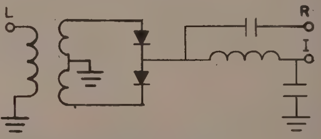
WEIGHT 74.0 grams 2.60 ounces

CONNECTORS

SMA (3mm) standard

MOUNTING BRACKET

On request, add $1.50 to unit cost. See dimensions above.



ABSOLUTE MAXIMUM RATINGS

Total Input Power	50mW
Total Input, Current Peak	40 mA
Operating & Storage Temperature	−55° C to +100° C

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MICROWAVE BALANCED MIXERS

		Model ZMA-2	
Frequency Range, GHz		LO	1-2.5
		RF	1-2.5
		IF	DC-0.15
Conversion Loss, dB		Typ.	Max.
1.4-2 GHz		7.0	8.5
1.0-2.5GHz		8.0	9.0
Isolation, dB		Typ.	Min.
1.0-1.5 GHz	LO-RF	25	20
	LO-IF	50	35
		Typ.	Min.
1.5-2.0 GHz	LO-RF	22	17
	LO-IF	40	30
		Typ.	Min.
2.0-2.5 GHz	LO-RF	20	15
	LO-IF	35	25
Signal 1 dB compression	+2 dBm typ.		
Total input power	50 mW		
Total input, current peak	40 mA		
Operating and Storage Temperature	−55°C to +100°C		

		Model ZMA-3	
Frequency Range, GHz		LO	1.4-3.0
		RF	1.4-3.0
		IF	DC-0.5
Conversion Loss, dB		Typ.	Max.
1.6-2.5 GHz		6.5	8.0
1.4-3.0 GHz		7.0	9.0
Isolation, dB		Typ.	Min.
1.4-2.0 GHz	LO-RF	25	20
	LO-IF	50	35
		Typ.	Min.
2.0-2.5 GHz	LO-RF	28	18
	LO-IF	50	30
		Typ.	Min.
2.5-3.0 GHz	LO-RF	23	15
	LO-IF	50	30
Signal 1 dB compression level	+3 dBm typ.		
Total input power	50 mW		
Total input, current peak	40 mA		
Operating and Storage Temperature	−55°C to +100°C		

Standard Level

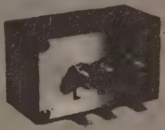
(+7 dBm LO)

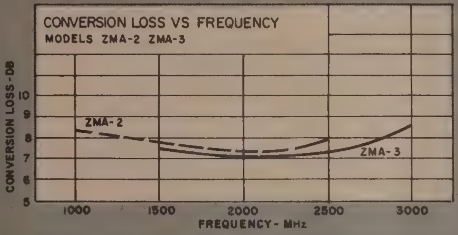
ZMA Series

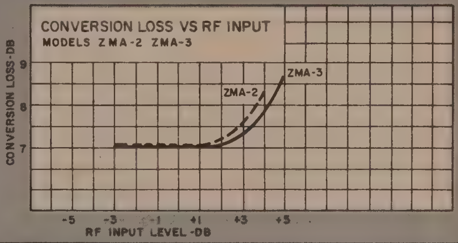
ZMA-2	1.0-2.5 GHz	$49.95 (1-9)
ZMA-3	1.4-3.0 GHz	$54.95 (1-9)

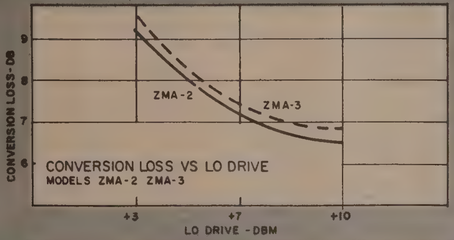
FAST DELIVERY

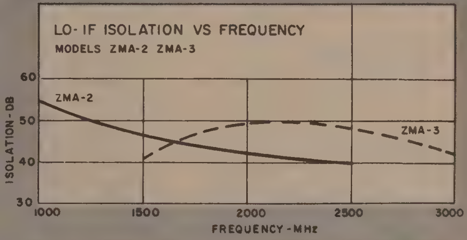
From stock, one week max.

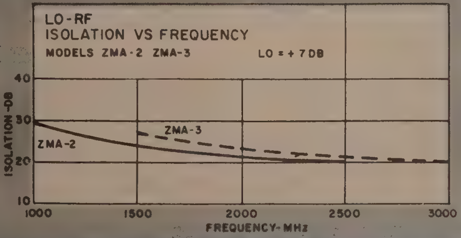


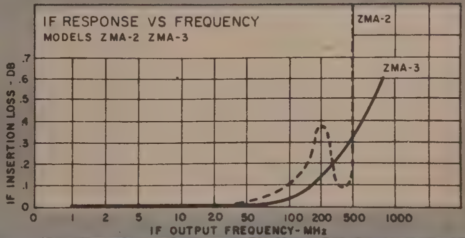












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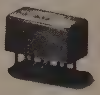
INTRODUCTION TO PDC SERIES DIRECTIONAL COUPLERS

PDC Series

PDC-10-1	0.5- 500 MHz	$11.95 (5-49)
PDC-10-2	250-1000 MHz	$24.95 (5-49)
PDC-15-6	0.01- 35 MHz	$19.95 (5-49)
PDC-20-3	0.2- 250 MHz	$11.95 (5-49)
PDC-20-1	25- 400 MHz	$19.95 (5-49)
PDC-10-1B	1- 400 MHz	$ 9.95 (6-49)
PDC-20-1B	0.5- 200 MHz	$14.95 (5-49)

FAST DELIVERY
From stock; one week max.



For connector version see ZDC series

FEATURES

- BROAD FREQUENCY RANGE, 10 KHz-1000 MHz
- WIDE SELECTION OF COUPLING
- LOW MAIN LINE LOSS FROM 0.1 dB
- HIGH DIRECTIVITY TO 35 dB
- HERMETICALLY SEALED METAL CASE
- PC BOARD MOUNTING
- LOW COST FROM $9.95 IN SMALL QUANTITIES

APPLICATIONS

- MEASURE INCIDENT AND REFLECTED POWER TO DETERMINE VSWR
- SIGNAL SAMPLING
- S PARAMETER MEASUREMENT
- SIGNAL INJECTION
- SIGNAL GENERATOR/OSCILLATOR LEVELING
- POWER FLOW MONITORING

DESCRIPTION

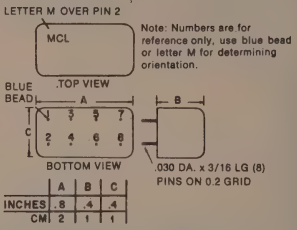
The PDC series directional couplers are economically priced while covering the frequency range from 10 kHz to 1000 MHz. They offer main-line loss as low as 0.1 dB and high directivity of up to 35 dB. A wide selection of coupling ratios are available and exceptional unit to unit matched performance is standard.

Having a volume of only 0.128 cu. inches, the PDC series is offered at the lowest prices available in the industry.

Packaged within an rfi shielded metal enclosure and hermetically-sealed header, these high performance units have their pins oriented on a 0.2 inch grid. Ruggedness and durability are built into the PDC series. Only well matched and ruggedly constructed transmission line transformers are used. Internally every component is bonded to the header and case with silicone rubber to provide super reliable protection against shock vibration and acceleration.

The PDC series uses the same construction technology as our SRA double-balanced mixer. This unit has become an industry standard throughout the world and is believed to be the number one volume leader. Used by all branches of the Department of Defense, NASA, FAA and every major communications company, the SRA has proven to be an industry work horse. Used in over 250 different military contracts, and over a period of years, enable sufficient history to establish SRA as one of the most reliable mixers obtainable, even when considering high priced models. The PDC series is expected to provide the same kind of results.

High reliability is associated with every PDC series directional coupler. Every production run is 100% tested and every unit must pass our rigid inspection and high quality standards. Naturally, our one year guarantee applies to these units.



Note: Numbers are for reference only, use blue bead or letter M for determining orientation.

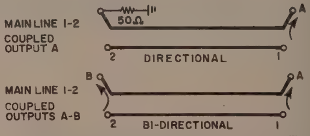
	A	B	C
INCHES	.8	.4	.4
CM	2	1	1

WEIGHT 5.2 grams .18 ounces

PIN CONNECTIONS

	PDC 10-1 10-2, 15-6 20-1, 20-3	PDC 10-1B 20-1B
MAIN LINE 2	4	4
MAIN LINE 1	1	1
COUPLE A	3	3
COUPLE B	—	6
GROUND	2,5,7,8	2,5,7,8

Model with Suffix B denotes external 50 ohm load required



ABSOLUTE MAXIMUM RATINGS

Operating & Storage Temperature −55° C to +100° C

Pin Temperature (10 seconds) 510° F

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Mini-Circuits Laboratory

DIRECTIONAL COUPLERS

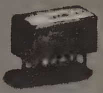
11.5 dB

	MODEL PDC 10-1	
Frequency Range, MHz	0.5-500	
Coupling, dB (Input To Coupled Port)	11.5±0.5	
Coupling Flatness, dB	±0.6	
VSWR	1.2:1 Typ.	
Impedance	50 ohms	
Directivity, dB	Typical	Minimum
Lower Band Edge To One Decade Higher	32	25
Mid Range	32	25
Upper Band Edge To One Octave Lower	22	15
Main Line Loss, dB (Includes Theoretical 0.32 dB Power Split Loss)	Typical	Maximum
One Octave From Band Edge	.65	1.0
Total Range	.85	1.2
Input Power		
Total Range (1)	3 Watts	
(1) Lower Band Edge To One Decade Higher	1.5 Watts	

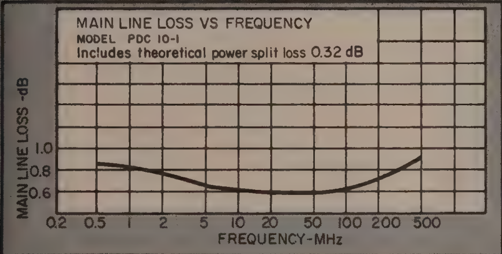
PDC 10·1 Series

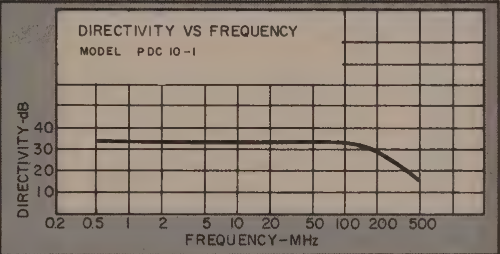
PDC 10-1	0.5-500 MHz	$11.95	(5-49)

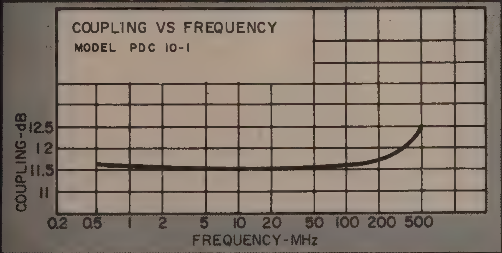
FAST DELIVERY
From stock, one week max

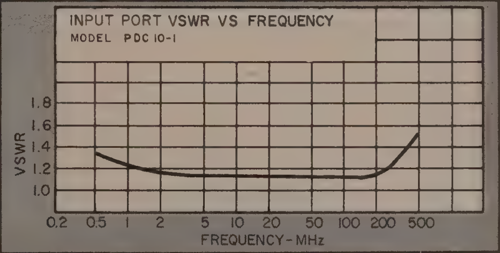


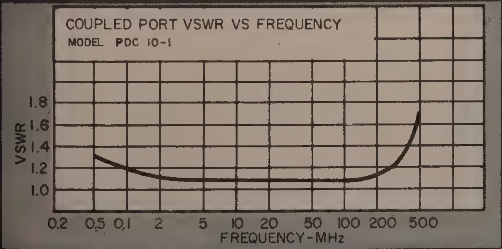
For connector version see ZDC10-1 series

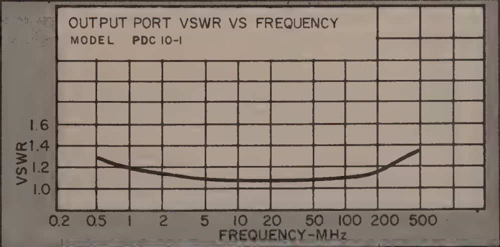

MAIN LINE LOSS VS FREQUENCY
MODEL PDC 10-1
Includes theoretical power split loss 0.32 dB


DIRECTIVITY VS FREQUENCY
MODEL PDC 10-1


COUPLING VS FREQUENCY
MODEL PDC 10-1


INPUT PORT VSWR VS FREQUENCY
MODEL PDC 10-1


COUPLED PORT VSWR VS FREQUENCY
MODEL PDC 10-1


OUTPUT PORT VSWR VS FREQUENCY
MODEL PDC 10-1

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DIRECTIONAL COUPLERS

10dB

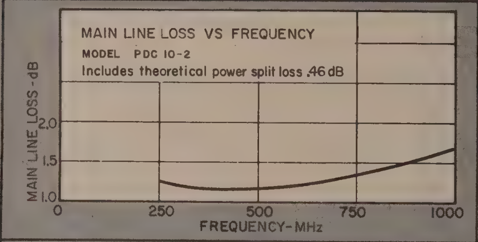
	MODEL PDC 10-2		
Frequency Range, MHz	250-1000		
Coupling, dB (Input To Coupled Port)	10±0.5		
Coupling Flatness, dB	±0.5		
VSWR	1.5:1 Typ.		
Impedance	50 ohms		
Directivity, dB	Typical	Minimum	
250-400 MHz	40	30	
400-800 MHz	30	20	
800-1000 MHz	20	15	
Main Line Loss, dB (Includes Theoretical .46 dB Power Split Loss)	Typical	Maximum	
250-600 MHz	1.1	1.4	
600-1000 MHz	1.6	1.9	
Input Power	5 Watts		

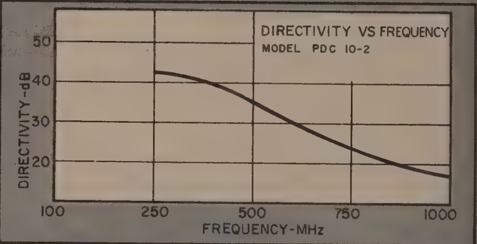
PDC 10·2 Series

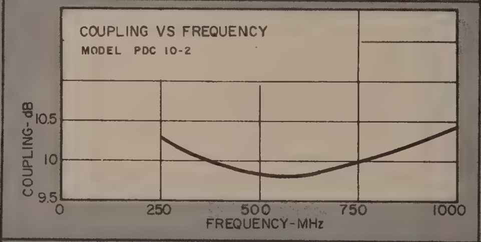
PDC 10-2	250-1000 MHz	$24.95	(5-49)

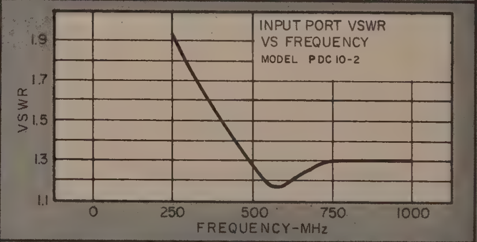
FAST DELIVERY
From stock, one week max

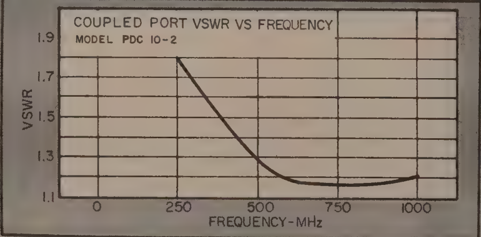
For connector version see ZDC10-1 series

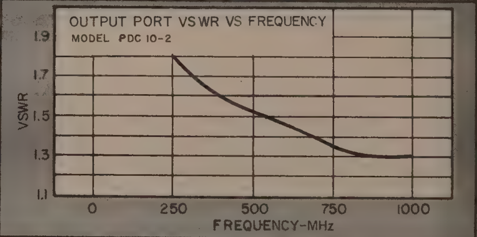












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DIRECTIONAL COUPLERS

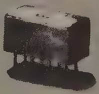
15 dB

PDC 15·6 Series

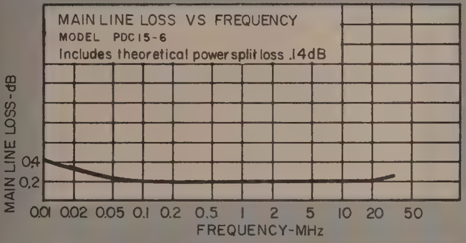
	MODEL PDC 15-6	
Frequency Range, MHz	.01-35	
Coupling, dB (Input To Coupled Port)	15 dB±0.5 dB	
Coupling Flatness, dB	±0.5 dB	
VSWR	1.15:1 Typ.	
Impedance	50 ohms	
Directivity, dB	Typical	Minimum
Lower Band Edge To One Decade Higher	38	30
Mid Range	35	25
Upper Band Edge To One Octave Lower	28	20
Main Line Loss, dB (Includes Theoretical .14 dB Power Split Loss)	Typical	Maximum
One Octave From Band Edge	.2	.4
Total Range	.3	.6
Input Power		
Total Range (1)	4 Watts	
(1) Lower Band Edge To One Decade Higher	2 Watts	

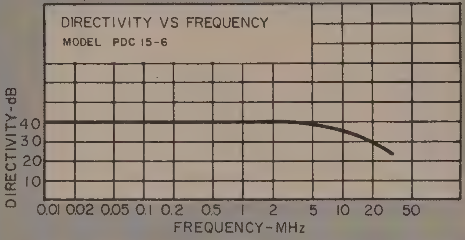
PDC 15-6	0.01-35 MHz	$19.95	(5-49)

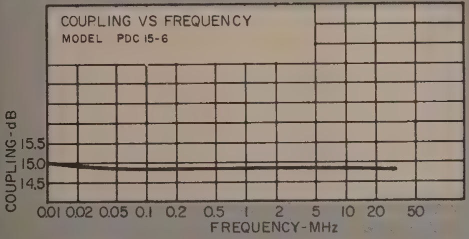
FAST DELIVERY
From stock, one week max

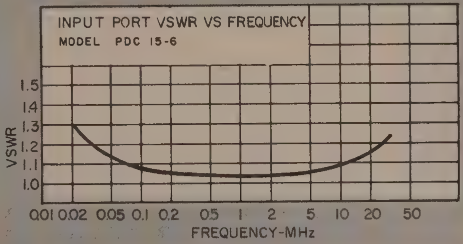


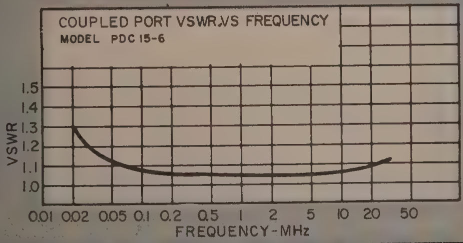
For connector version see ZDC15-6 series

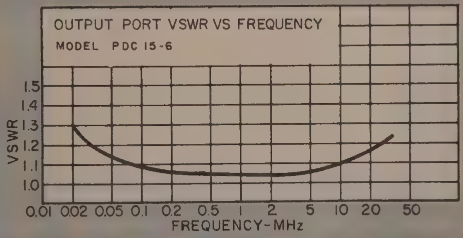












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DIRECTIONAL COUPLERS

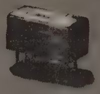
19.5 dB

	MODEL PDC 20-3	
Frequency Range, MHz	0.2-250	
Coupling, dB (Input To Coupled Port)	19.5±0.5	
Coupling Flatness, dB	±0.5	
VSWR	1.2:1 Typ.	
Impedance	50 ohms	
Directivity, dB	Typical	Minimum
Lower Band Edge To One Decade Higher	36	30
Mid Range	33	25
Upper Band Edge To One Octave Lower	25	20
Main Line Loss, dB (Includes Theoretical .04 dB Power Split)	Typical	Maximum
One Octave From Band Edge	0.25	0.5
Total Range	0.35	0.6
Input Power		
Total Range (1)	4 watts	
(1) Lower Band Edge To One Decade Higher	1.5 watts	

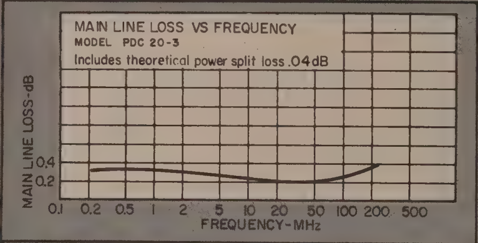
PDC 20·3 Series

PDC 20-3 0.2-250 MHz $11.95 (5-49)

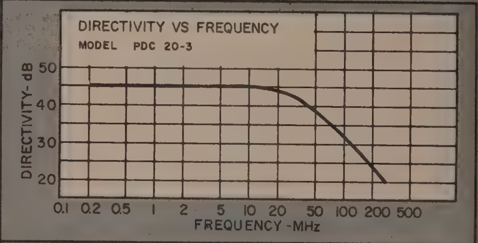
FAST DELIVERY
From stock, one week max



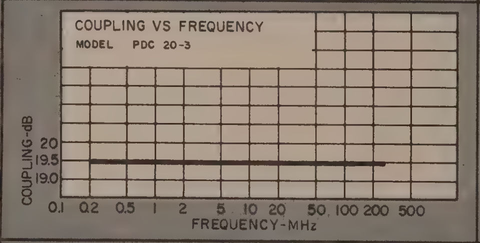
For connector version see ZDC20-3 series



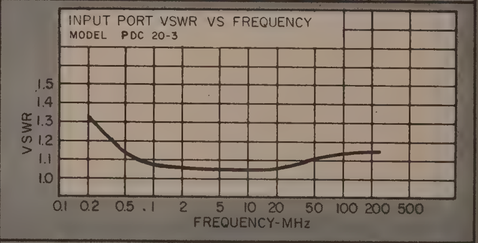
MAIN LINE LOSS VS FREQUENCY
MODEL PDC 20-3
Includes theoretical power split loss .04dB



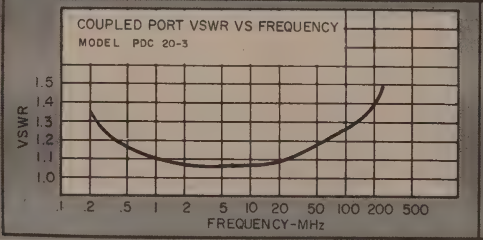
DIRECTIVITY VS FREQUENCY
MODEL PDC 20-3



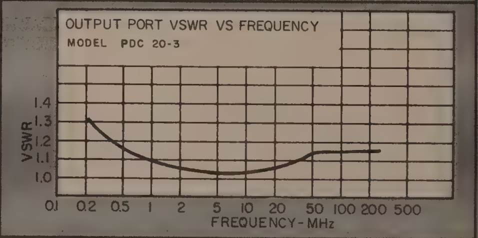
COUPLING VS FREQUENCY
MODEL PDC 20-3



INPUT PORT VSWR VS FREQUENCY
MODEL PDC 20-3



COUPLED PORT VSWR VS FREQUENCY
MODEL PDC 20-3



OUTPUT PORT VSWR VS FREQUENCY
MODEL PDC 20-3

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DIRECTIONAL COUPLERS

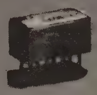
21 dB

	MODEL PDC 20-1	
Frequency Range, MHz	25-400	
Coupling, dB (Input To Coupled Port)	21±0.5	
Coupling Flatness, dB	±0.5	
VSWR	1.25:1 Typ.	
Impedance	50 ohms	
Directivity, dB	Typical	Minimum
25-150 MHz	25	20
150-300 MHz	35	25
300-400 MHz	25	20
Main Line Loss, dB (Includes Theoretical .04 db Power Split)	Typical	Maximum
25-50 MHz	0.2	0.5
50-300 MHz	0.1	0.2
300-400 MHz	0.15	0.3
Input Power		
Total Range (1)	5 watts	
(1) Lower Band Edge To One Octave Higher	3 watts	

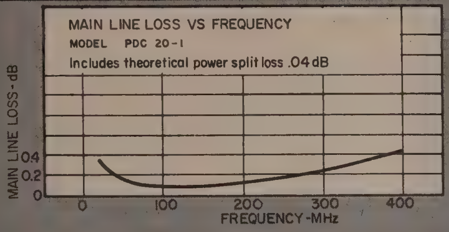
PDC 20·1 Series

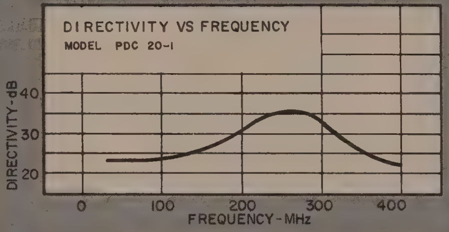
PDC 20-1	25-400 MHz	$19.95	(5-49)

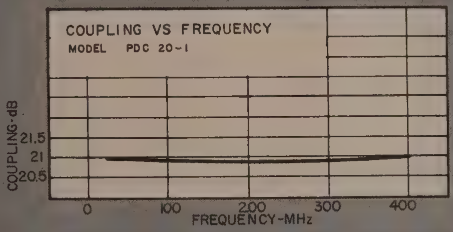
FAST DELIVERY
From stock, one week max.

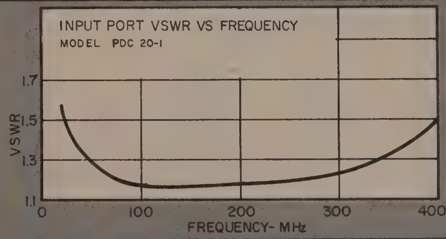


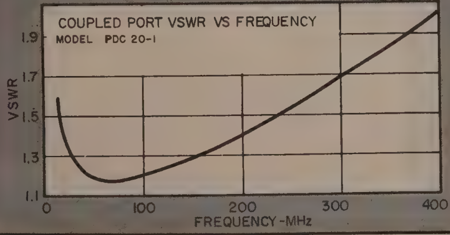
For connector version see ZDC 20-1 series

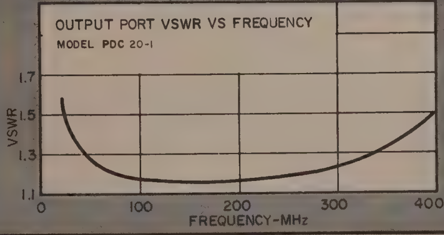












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BI-DIRECTIONAL COUPLERS

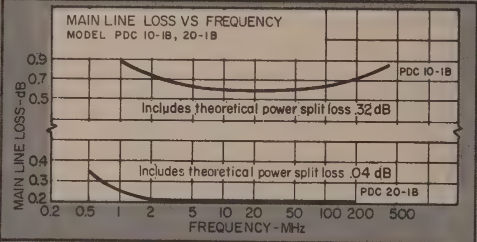
11.5 dB/19.2 dB

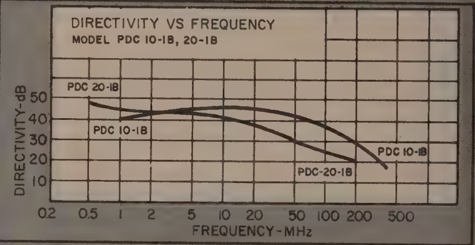
PDC 10·1B Series
PDC 20·1B Series

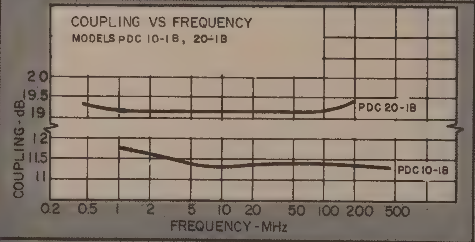
PDC 10-1B	1-400 MHz	$ 9.95	(6-49)
PDC 20-1B	0.5-200 MHz	$14.95	(5-49)

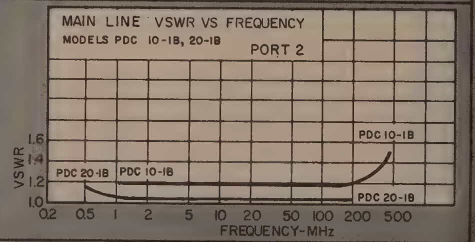
	MODEL PDC 10-1B		MODEL PDC 20-1B	
Frequency Range, MHz	1-400 MHz		0.5-200	
Coupling, dB (Input To Coupled Port)	11.5±0.5		19.2±0.5	
Coupling Flatness, dB	±0.5 dB		±0.5	
VSWR	1.2:1 Typ.		1.1:1 Typ.	
Impedance	50 ohms		50 ohms	
Directivity, dB	Typical	Minimum	Typical	Minimum
Lower Band Edge To One Decade Higher	42	30	40	30
Mid Range	35	24	35	20
Upper Band Edge To One Octave Lower	22	15	22	15
Main Line Loss, dB	(Includes Theoretical .32 dB Power Split Loss)		(Includes Theoretical .04 dB Power Split)	
	Typical	Maximum	Typical	Maximum
One Octave From Band Edge	0.7	0.9	0.3	0.5
Total Range	0.9	1.2	0.4	0.6
Input Power				
Total Range (1)	4 Watts		4 watts	
(1) Lower Band Edge To One Decade Higher	2 Watts			

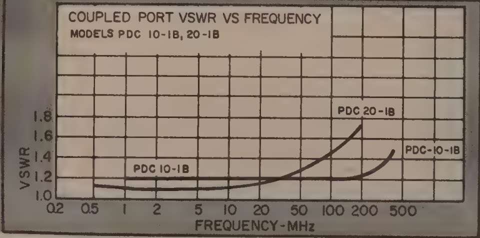
FAST DELIVERY
From stock, one week max

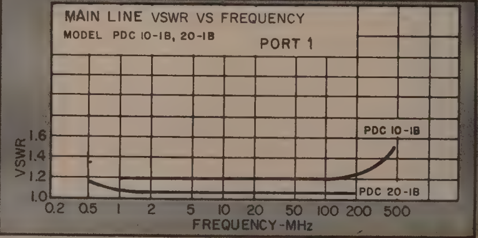












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INTRODUCTION TO ZDC ZMDC SERIES DIRECTIONAL COUPLERS

FEATURES

- BROAD FREQUENCY RANGE, 10 kHz - 1000 MHz
- WIDE SELECTION OF COUPLING
- LOW MAIN LINE LOSS FROM 0.1 dB
- HIGH DIRECTIVITY TO 35 dB
- DIE-CAST ALUMINUM CASE
- LOW COST FROM $26.95 IN SMALL QUANTITIES

APPLICATIONS

- MEASURE INCIDENT AND REFLECTED POWER TO DETERMINE VSWR
- SIGNAL SAMPLING
- S PARAMETER MEASUREMENT
- SIGNAL INJECTION
- SIGNAL GENERATOR/OSCILLATOR LEVELING
- POWER FLOW MONITORING

DESCRIPTION

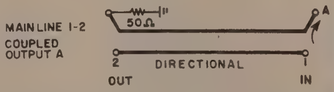
The ZDC/ZMDC series directional couplers are economically priced while covering the frequency range from 10 kHz to 1000 MHz. They offer main-line loss as low as 0.1 dB and high directivity of up to 35 dB. A wide selection of coupling ratios are available and exceptional unit to unit matched performance is standard.

Available with BNC, TNC, or SMA connectors, the ZDC/ZMDC series is housed in a die-cast aluminum case. The case is finished with a blue-baked enamel per Federal Standard 595 #25109 over phosphoric etch per MIL-C-15328A.

Every unit 100% tested and inspected under strict MCL quality-control standards to insure superior electrical performance and reliability.

Ruggedness and durability are built into the ZDC/ZMDC series. Only well matched and ruggedly constructed transmission line transformers are used. Internally, every component is bonded with silicone rubber to provide protection against shock, vibration and acceleration.

The exceptional low cost of the ZDC/ZMDC series is attributable to the breakthrough in production techniques achieved during the manufacture of the widely acclaimed Mini-Circuits SRA series of PC board mounting mixers. Utilizing this technology, the ZDC/ZMDC series is offered at a remarkable price of ⅓ to ⅕ the cost of competitive units. The ZDC/ZMDC series provides performance, quality and low cost.

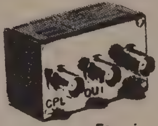


ABSOLUTE MAXIMUM RATINGS

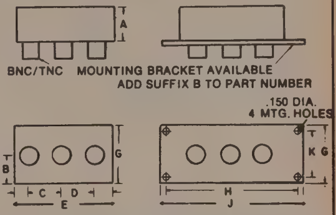
Operating & Storage Temperature	−55° C to +100° C

ZDC Series (Standard Size)

ZDC-10-1	0.5-500 MHz	(4-24)	$26.95
ZDC-10-2	250-1000 MHz	(4-24)	$34.95
ZDC-15-6	0.01-35 MHz	(4-24)	$34.95
ZDC-20-1	25-400 MHz	(4-24)	$34.95
ZDC-20-3	0.2-250 MHz	(4-24)	$26.95



For pin version see PDC series



MOUNTING BRACKET AVAILABLE
ADD SUFFIX B TO PART NUMBER

	A	B	C	D	E	F	G	H	J	K
INCHES	1.15	.63	.750	.730	2.25	.385	1.40	2.95	3.25	1.10
CM	2.9	1.6	1.9	1.85	5.7	.977	3.55	7.49	8.25	2.8

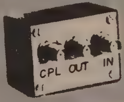
CONNECTORS

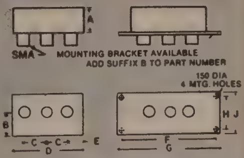
BNC	standard
TNC	on request

WEIGHT 74.0 grams 2.60 ounces

ZMDC Series (Miniature Size)

ZMDC-10-1	0.5-500 MHz	(4-24)	$36.95
ZMDC-10-2	250-1000 MHz	(4-24)	$44.95
ZMDC-15-6	0.01-35 MHz	(4-24)	$44.95
ZMDC-20-1	25-400 MHz	(4-24)	$44.95
ZMDC-20-3	0.2-250 MHz	(4-24)	$36.95





MOUNTING BRACKET AVAILABLE
ADD SUFFIX B TO PART NUMBER

	A	B	C	D	E	F	G	H	J
INCHES	0.88	0.66	4.38	1.50	.312	2.19	2.50	0.84	1.15
CM	2.2	1.7	1.1	3.8	7.9	5.56	6.35	2.1	2.9

WEIGHT 34.0 grams 1.02 ounces

CONNECTORS SMA (3mm) standard

MOUNTING BRACKET

On request, add $1.50 to unit cost. See dimensions above.

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DIRECTIONAL COUPLERS

	MODEL ZDC 10-1/ZMDC 10-1	
Frequency Range, MHz	0.5-500	
Coupling, dB (Input To Coupled Port)	11.5±0.5	
Coupling Flatness, dB	±0.6	
VSWR	1.2:1 Typ.	
Impedance	50 ohms	
Directivity, dB	Typical	Minimum
Lower Band Edge To One Decade Higher	32	25
Mid Range	32	25
Upper Band Edge To One Octave Lower	22	15
Main Line Loss, dB (Includes Theoretical 0.32 dB Power Split Loss)	Typical	Maximum
One Octave From Band Edge	.65	1.0
Total Range	.85	1.2
Input Power		
Total Range (1)	3 Watts	
(1) Lower Band Edge To One Decade Higher	1.5 Watts	

11.5 dB

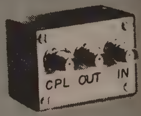
ZDC 10-1 Series

ZDC 10-1	0.5-500 MHz	$26.95	(4-24)

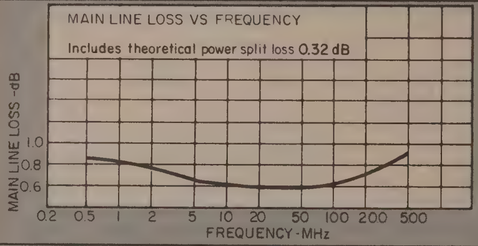
For pin version see PDC10-1 series

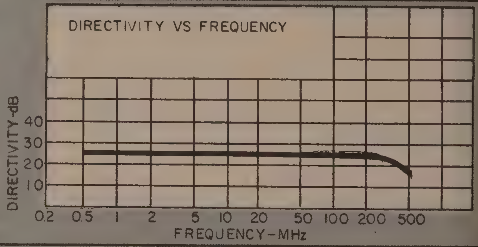
ZMDC 10-1 Series

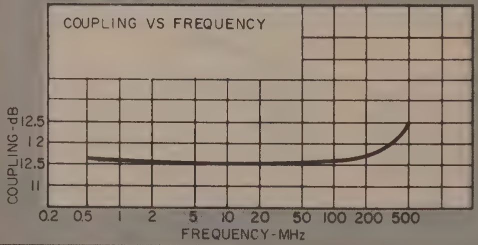
ZMDC 10-1	0.5-500 MHz	$36.95	(4-24)

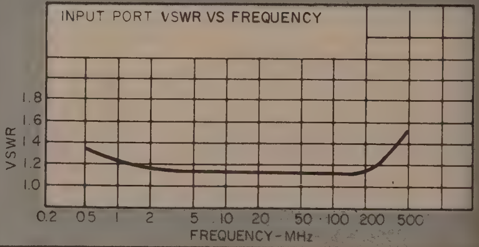


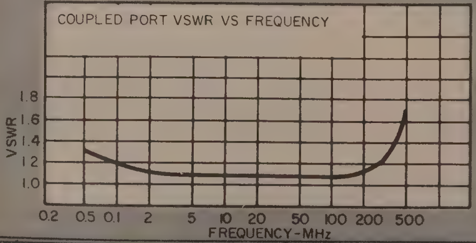
FAST DELIVERY
From stock, one week max

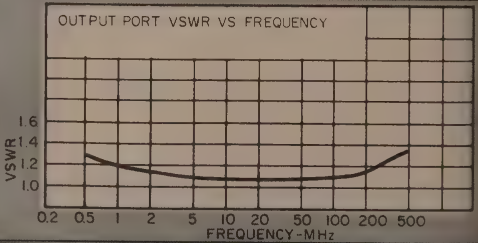












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Mini-Circuits Laboratory

DIRECTIONAL COUPLERS

	MODEL ZDC 10-2/ZMDC 10-2	
Frequency Range, MHz	250-1000	
Coupling, dB (Input To Coupled Port)	10±0.5	
Coupling Flatness, dB	±0.5	
VSWR	1.5:1 Typ.	
Impedance	50 ohms	
Directivity, dB	Typical	Minimum
250-400 MHz	40	30
400-800 MHz	30	20
800-1000 MHz	20	15
Main Line Loss, dB (Includes Theoretical .46dB Power Split Loss)	Typical	Maximum
250-600 MHz	1.1	1.4
600-1000 MHz	1.6	1.9
Input Power	5 Watts	

10 dB

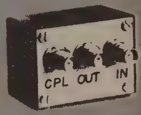
ZDC 10-2 Series

ZDC 10-2	250-1000 MHz	$34.95	(4-24)

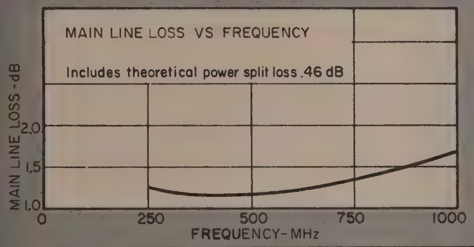
For pin version see PDC10-1 series

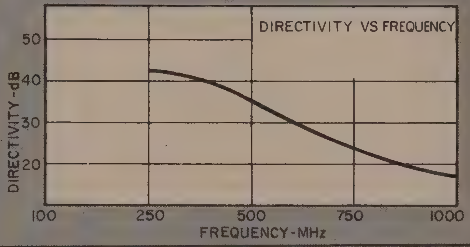
ZMDC 10-2 Series

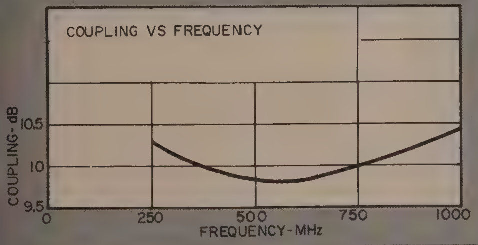
ZMDC 10-2	250-1000 MHz	$44.95	(4-24)

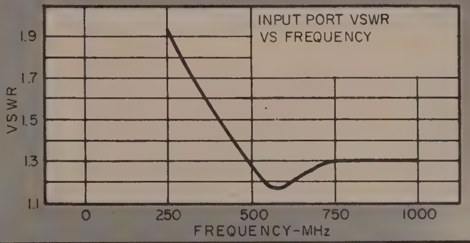


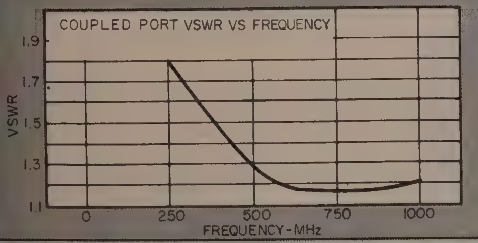
FAST DELIVERY
From stock, one week max

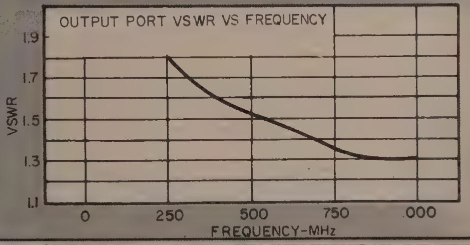












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DIRECTIONAL COUPLERS

	MODEL ZDC 15-6/ZMDC 15-6	
Frequency Range, MHz	.01-35	
Coupling, dB (Input To Coupled Port)	15 dB±0.5 dB	
Coupling Flatness, dB	±0.5 dB	
VSWR	1.15:1 Typ.	
Impedance	50 ohms	
Directivity, dB	Typical	Minimum
Lower Band Edge To One Decade Higher	38	30
Mid Range	35	25
Upper Band Edge To One Octave Lower	28	20
Main Line Loss, dB (Includes Theoretical .14 dB Power Split Loss)	Typical	Maximum
One Octave From Band Edge	.2	.4
Total Range	.3	.6
Input Power		
Total Range (1)	4 Watts	
(1) Lower Band Edge To One Decade Higher	2 Watts	

15 dB

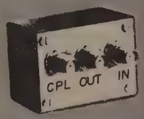
ZDC 15-6 Series

ZDC 15-6	0.01-35 MHz	$34.95	(4-24)

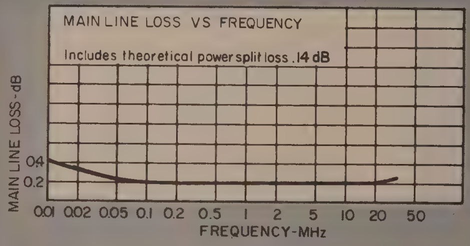
For pin version see PDC15-6series

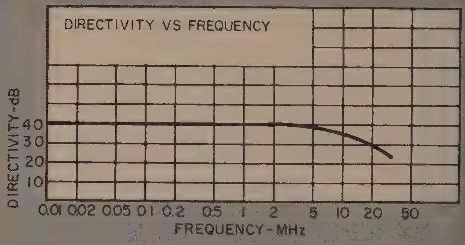
ZMDC 15-6 Series

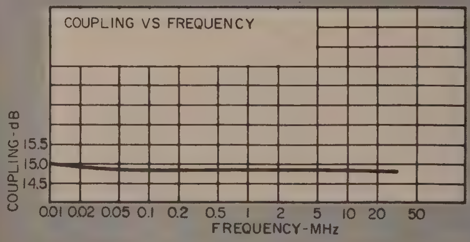
ZMDC 15-6	0.01-35 MHz	$44.95	(4-24)

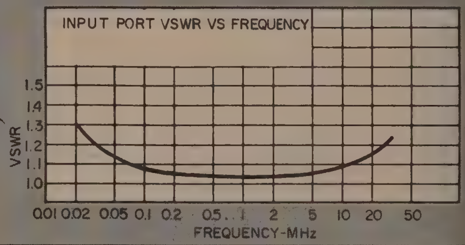


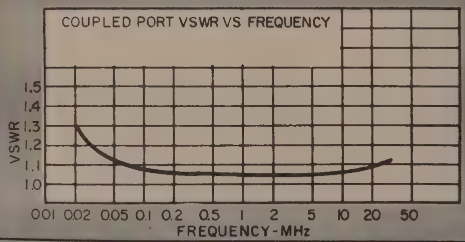
FAST DELIVERY
From stock, one week max

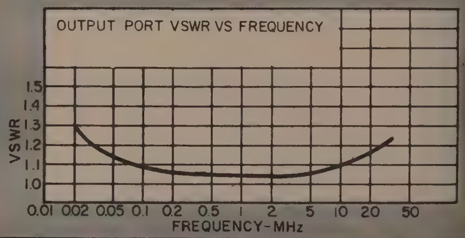












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Mini-Circuits Laboratory MCL

DIRECTIONAL COUPLERS

	MODEL ZDC 20-1/ZMDC 20-1	
Frequency Range, MHz	25-400	
Coupling, dB (Input To Coupled Port)	21±0.5	
Coupling Flatness, dB	±0.5	
VSWR	1.25:1 Typ.	
Impedance	50 ohms	
Directivity, dB	Typical	Minimum
25-150 MHz	25	20
150-300 MHz	35	25
300-400 MHz	25	20
Main Line Loss, dB (Includes Theoretical .04 db Power Split)	Typical	Maximum
25-50 MHz	0.2	0.5
50-300 MHz	0.1	0.2
300-400 MHz	0.15	0.3
Input Power		
Total Range (1)	5 watts	
(1) Lower Band Edge To One Octave Higher	3 watts	

21 dB

ZDC 20-1 Series

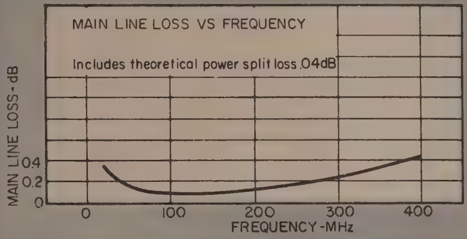
ZDC 20-1	25-400 MHz	$34.95	(4-24)

For pin version see PDC20-1 series

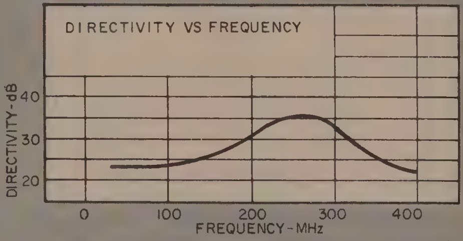
ZMDC 20-1 Series

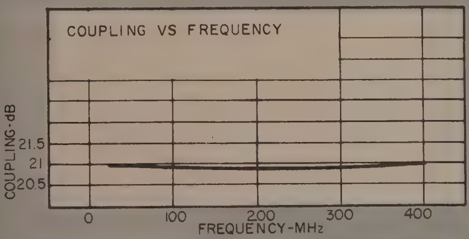
ZMDC 20-1	25-400 MHz	$44.95	(4-24)

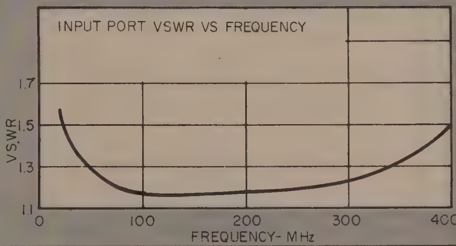
-FAST DELIVERY
From stock, one week max

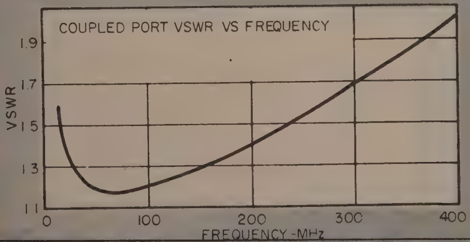

MAIN LINE LOSS VS FREQUENCY

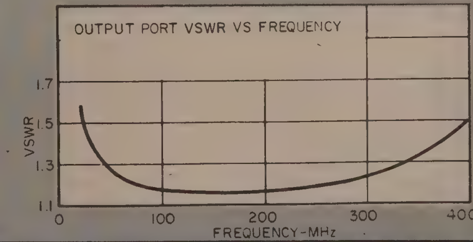
Includes theoretical power split loss .04dB


DIRECTIVITY VS FREQUENCY


COUPLING VS FREQUENCY


INPUT PORT VSWR VS FREQUENCY


COUPLED PORT VSWR VS FREQUENCY


OUTPUT PORT VSWR VS FREQUENCY

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DIRECTIONAL COUPLERS

	MODEL ZDC 20-3/ZMDC 20-3	
Frequency Range, MHz	0.2-250	
Coupling, dB (Input To Coupled Port)	19.5±0.5	
Coupling Flatness, dB	±0.5	
VSWR	1.2:1 Typ.	
Impedance	50 ohms	
Directivity, dB	Typical	Minimum
Lower Band Edge To One Decade Higher	36	30
Mid Range	33	25
Upper Band Edge To One Octave Lower	25	20
Main Line Loss, dB (Includes Theoretical .04 dB Power Split)	Typical	Maximum
One Octave From Band Edge	0.25	0.5
Total Range	0.35	0.6
Input Power		
Total Range (1)	4 watts	
(1) Lower Band Edge To One Decade Higher	1.5 watts	

19.5 dB

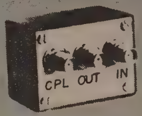
ZDC 20-3 Series

ZDC 20-3 0.2-250 MHz $26.95 (4-24)

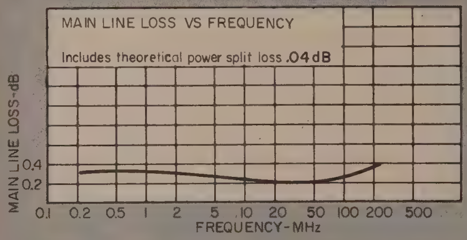
For pin version see PDC20-3 series

ZMDC 20-3 Series

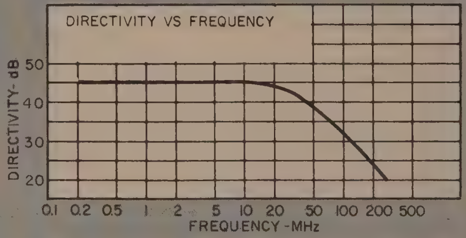
ZMDC 20-3 0.2-250 MHz $36.95 (4-24)

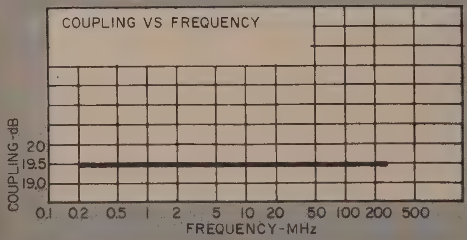


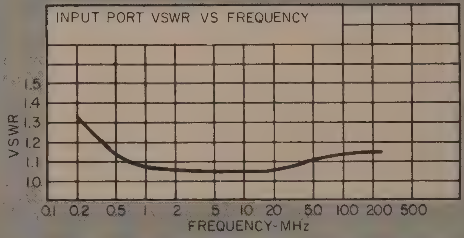
FAST DELIVERY
From stock, one week max

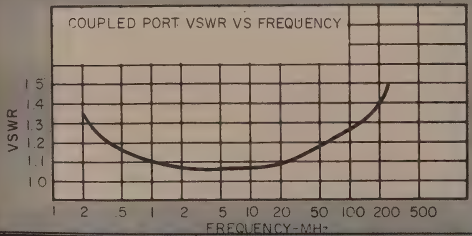

MAIN LINE LOSS VS FREQUENCY

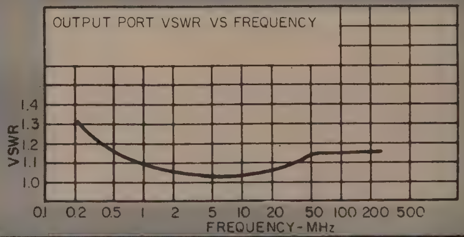
Includes theoretical power split loss .04 dB


DIRECTIVITY VS FREQUENCY


COUPLING VS FREQUENCY


INPUT PORT VSWR VS FREQUENCY


COUPLED PORT VSWR VS FREQUENCY


OUTPUT PORT VSWR VS FREQUENCY

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Mini-Circuits Laboratory MCL

INTRODUCTION TO PSC-2 SERIES POWER SPLITTER-COMBINERS

Two-Way
(In Phase 0°)

PSC-2 Series

PSC-2-1	100 KHz-400 MHz	$ 9.95 (6-49)
PSC-2-2	2 KHz- 60 MHz	$19.95 (6-49)
PSC-2-1-75	250 KHz-300 MHz	$11.95 (6-49)

FAST DELIVERY
From stock, one week max.

For connector version see ZSC-2 series

FEATURES

MINIATURE SIZE, .128 CU. INCHES

EXTRA WIDE BAND, 2KHz - 400MHz

EXCEPTIONALLY GOOD BALANCE

LOW INSERTION LOSS

HIGH ISOLATION

RFI SHIELDED

HERMETICALLY SEALED METAL CASE

LOW COST FROM $9.95
IN SMALL QUANTITIES

APPLICATIONS

ADD OR SUBTRACT SIGNALS VECTORIALLY

OBTAIN MULTI IN-PHASE OUTPUT SIGNALS PROPORTIONAL TO THE LEVEL OF A COMMON INPUT SIGNAL

SPLIT AN INPUT SIGNAL INTO MULTI-OUTPUTS

COMBINE SIGNALS FROM DIFFERENT SOURCES TO OBTAIN A SINGLE PORT OUTPUT

PROVIDE CAPABILITY TO OBTAIN RF LOGIC ARRANGEMENTS

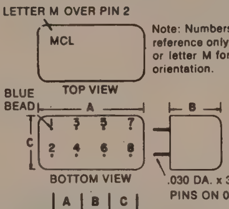
DESCRIPTION

The model PSC-2 2-way power splitter/combiner is a high performance broad band hybrid junction. Internally, terminations and transformers are provided to ensure a well matched 50 ohm impedance at all ports. Signals fed into the input S port are equally divided, in phase, to the two output (1 and 2) ports. Similarly, signals fed into ports 1 and 2 are vectorially summed at the output S port.

The PSC-2 features exceptionally good amplitude and phase balance between the signals at the 2 output ports. Typically, over most of the frequency range, the phase balance is within 1 degree and the amplitude balance is within .05 dB.

The PSC-2 is ruggedly constructed to provide reliable service under severe environmental conditions. Internally, every component is bonded to the header for added strength to protect against shock and vibration. This hermetically sealed unit performs well under high relative humidity conditions and over temperature extremes from −55°C to +100°C.

Every unit is 100% tested and inspected under strict MCL quality control standards to ensure superior electrical performance and reliability. The exceptionally low cost of the PSC-2 is attributable to the breakthrough in production techniques achieved by MCL during the manufacture of its high performance low price double balanced mixers. Utilizing this technology, the high performance PSC-2 is offered at a remarkable price of ½ to ⅓ of competitive units.

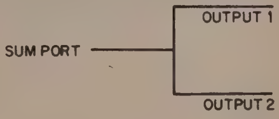


Note: Numbers are for reference only, use blue bead or letter M for determining orientation.

	A	B	C
INCHES	.8	.4	.4
CM	2	1	1

WEIGHT 5.2 grams .18 ounces

PIN CONNECTIONS	PSC-2-1 PSC-2-2
SUM PORT	1
OUTPUT 1	5
OUTPUT 2	6
GROUND	2,3,4,7,8



ABSOLUTE MAXIMUM RATINGS

Operating and Storage Temperature	−55° C to +100° C
Pin Temperature (10 seconds)	510° F

Mini-Circuits Laboratory

POWER SPLITTER-COMBINERS

Two-Way
(In Phase 0°)

PSC-2 Series

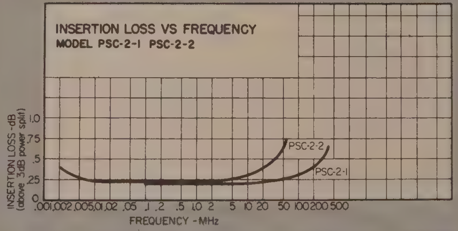
PSC-2-1	100KHz-400MHz	$9.95 (6-49)
PSC-2-2	2KHz-60MHz	$19.95 (6-49)

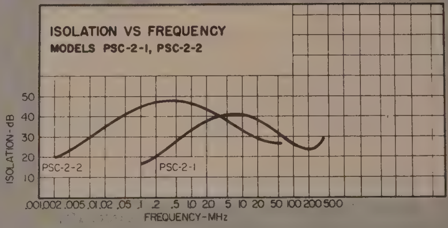
FAST DELIVERY
From stock, one week max.

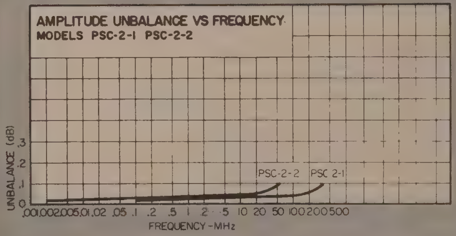
For connector version see ZSC-2series

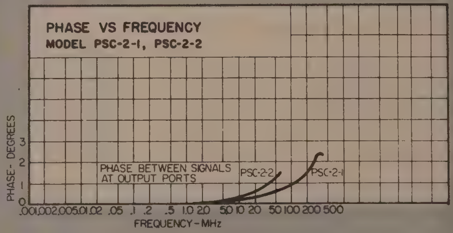
SPECIFICATIONS	MODEL PSC-2-1	
Frequency Range (MHz)	.1-400MHz	
Nominal Phase Difference Between Output Ports	0°	
Impedance, All Ports	50 ohms	
Isolation Between Output 1 and 2, dB	Typical	Minimum
2-40MHz	40	30
.4-400MHz	25	20
.1-.4MHz	20	15
Insertion Loss, dB (above 3dB split)	Typical	Maximum
.1-100MHz	.2	.5
100-200MHz	.4	.75
200-400MHz	.6	1.0
Phase Unbalance, degrees	Typical	Maximum
0.1-100MHz	.5	2
100-200MHz	1	3
200-400MHz	2	4
Amplitude Unbalance, dB	Typical	Maximum
.1-100MHz	.05	.15
100-200MHz	.05	.2
200-400MHz	.1	.3
VSWR	1.2 typical	
Matched Power Rating	1 watt maximum	
Internal Load Dissipation	⅛ watt	

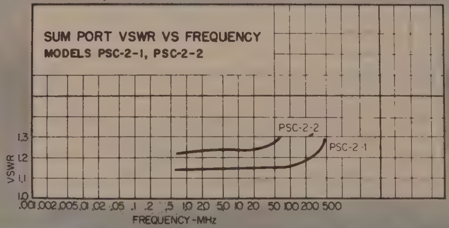
SPECIFICATIONS	MODEL PSC-2-2	
Frequency Range (MHz)	2KHz-60MHz	
Nominal Phase Difference Between Output Ports	0°	
Impedance, All Ports	50 ohms	
Isolation Between Output 1 & 2, dB	Typical	Minimum
15KHz-6MHz	40	30
2KHz-60MHz	27	20
Insertion Loss, dB (above 3dB split)	Typical	Maximum
10KHz-3MHz	.2	.4
2KHz-20MHz	.3	.6
20MHz-60MHz	.6	1.0
Phase Unbalance, degrees	Typical	Maximum
10KHz-3MHz	.5	2
2KHz-20MHz	1	3
20MHz-60MHz	2	4
Amplitude Unbalance, dB	Typical	Maximum
2KHz-20MHz	.05	.15
20MHz-60MHz	.1	.3
VSWR	1.2 typical	
Matched Power Rating	1 watt maximum	
Internal Load Dissipation	⅛ watt	

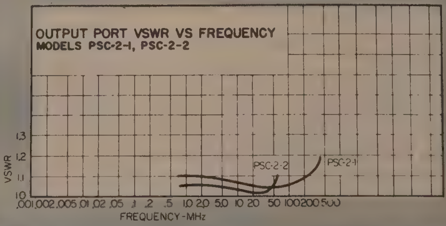

INSERTION LOSS VS FREQUENCY
MODEL PSC-2-1 PSC-2-2


ISOLATION VS FREQUENCY
MODELS PSC-2-1, PSC-2-2


AMPLITUDE UNBALANCE VS FREQUENCY
MODELS PSC-2-1 PSC-2-2


PHASE VS FREQUENCY
MODEL PSC-2-1, PSC-2-2


SUM PORT VSWR VS FREQUENCY
MODELS PSC-2-1, PSC-2-2


OUTPUT PORT VSWR VS FREQUENCY
MODELS PSC-2-1, PSC-2-2

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POWER SPLITTER-COMBINERS

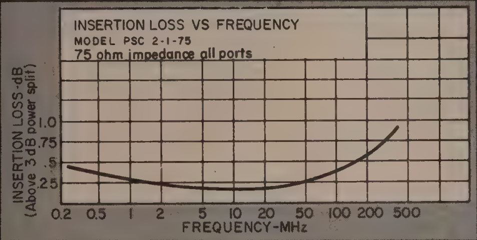
Two-Way
(In Phase 0°)

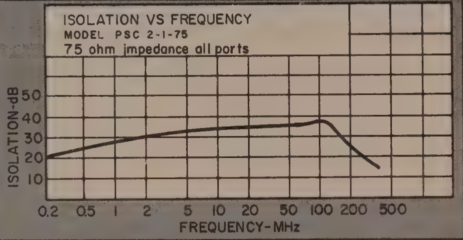
	MODEL PSC 2-1-75	
Frequency Range (MHz)	0.25-300 MHz	
Nominal Phase Difference Between Output Ports	0°	
Impedance, All Ports	75 ohms	
Isolation Between Output 1 and 2, dB	Typical	Minimum
10-50 MHz	40	30
2-150 MHz	25	20
0.25-300 MHz	20	15
Insertion Loss, dB (above 3dB split)	Typical	Maximum
1-50 MHz	.2	.5
0.25-100 MHz	.4	.75
100-300 MHz	.6	1.0
Phase Unbalance, degrees	Typical	Maximum
0.25-50 MHz	.5	2
50-150 MHz	1	3
150-300 MHz	2	5
Amplitude Unbalance, dB	Typical	Maximum
1-50 MHz	.05	.15
50-150 MHz	.05	.2
150-300 MHz	.1	.3
VSWR	1.2 typical	
Matched Power Rating	1 watt maximum	
Internal Load Dissipation	⅛ watt	

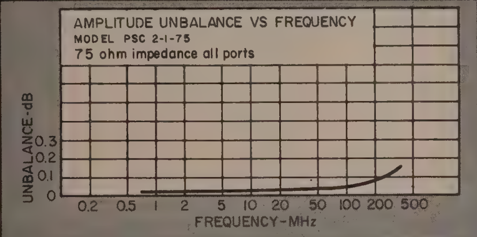
PSC·2 Series

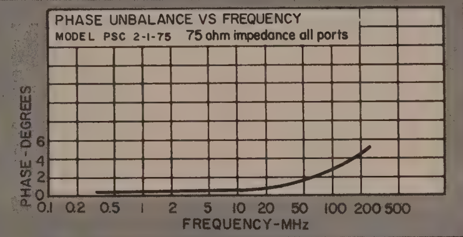
PSC-2-1-75 250 KHz-300 MHz $11.95 (6-49)

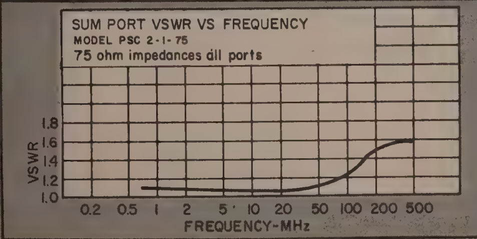
FAST DELIVERY
From stock, one week max.

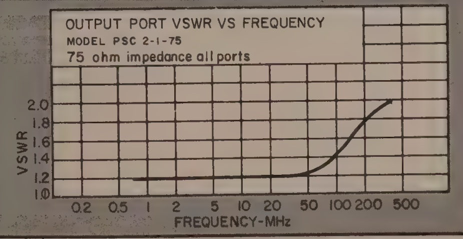

INSERTION LOSS VS FREQUENCY
MODEL PSC 2-1-75
75 ohm impedance all ports


ISOLATION VS FREQUENCY
MODEL PSC 2-1-75
75 ohm impedance all ports


AMPLITUDE UNBALANCE VS FREQUENCY
MODEL PSC 2-1-75
75 ohm impedance all ports


PHASE UNBALANCE VS FREQUENCY
MODEL PSC 2-1-75 75 ohm impedance all ports


SUM PORT VSWR VS FREQUENCY
MODEL PSC 2-1-75
75 ohm impedances all ports


OUTPUT PORT VSWR VS FREQUENCY
MODEL PSC 2-1-75
75 ohm impedance all ports

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Mini-Circuits Laboratory

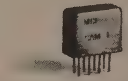
INTRODUCTION TO MSC-2 SERIES
POWER SPLITTER-COMBINERS

Micro-Miniature
Two-Way
(In Phase 0°)

MSC-2 Series

MSC-2-1 .1-450 MHz $16.95 (6-24)

FAST DELIVERY
From stock; one week max.



FEATURES

MICRO-MINIATURE SIZE, .04 CU. INCHES

PC BOARD AREA ONLY 0.1 SQ. INCHES

WIDE BAND, 100KHz - 450MHz

EXCEPTIONALLY GOOD BALANCE

LOW INSERTION LOSS

HIGH ISOLATION

RFI SHIELDED

HERMETICALLY SEALED METAL CASE.

LOW COST FROM $16.95
IN SMALL QUANTITIES

APPLICATIONS

ADD OR SUBTRACT SIGNALS VECTORIALLY

OBTAIN MULTI IN-PHASE OUTPUT SIGNALS PROPORTIONAL TO THE LEVEL OF A COMMON INPUT SIGNAL

SPLIT AN INPUT SIGNAL INTO MULTI-OUTPUTS

COMBINE SIGNALS FROM DIFFERENT SOURCES TO OBTAIN A SINGLE PORT OUTPUT

PROVIDE CAPABILITY TO OBTAIN RF LOGIC ARRANGEMENTS

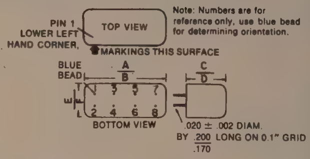
DESCRIPTION

The model MSC-2 2-way power splitter/combiner is a high performance broad band hybrid junction. Internally, terminations and transformers are provided to ensure a well matched 50 ohm impedance at all ports. Signals fed into the input S port are equally divided, in phase, to the two output (1 and 2) ports. Similarly, signals fed into ports 1 and 2 are vectorially summed at the output S port.

The MSC-2 features exceptionally good amplitude and phase balance between the signals at the 2 output ports. Typically, over most of the frequency range, the phase balance is within 1 degree and the amplitude balance is within .05 dB.

The MSC-2 is ruggedly constructed to provide reliable service under severe environmental conditions. Internally, every component is bonded to the header for added strength to protect against shock and vibration. This hermetically sealed unit performs well under high relative humidity conditions and over temperature extremes from −55°C to +100°C.

Every unit is 100% tested and inspected under strict MCL quality control standards to ensure superior electrical performance and reliability. The exceptionally low cost of the MSC-2 is attributable to the breakthrough in production techniques achieved by MCL during the manufacture of its high performance low price double balanced mixers. Utilizing this technology, the high performance MSC-2 is offered at a remarkable price of ½ to ⅓ of competitive units.

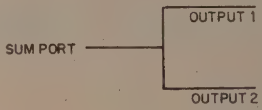


Note: Numbers are for reference only, use blue bead for determining orientation.

	A	B	C	D	E	F
INCHES	.500	.480	.405	.390	.230	.210
CM	1.27	1.22	1.03	.99	.58	.53

WEIGHT 1.9 grams .07 ounces

PIN CONNECTIONS	MSC-2-1
SUM PORT	1
OUTPUT 1	5
OUTPUT 2	6
GROUND	2,3,4,7,8



ABSOLUTE MAXIMUM RATINGS

Operating and Storage Temperature	−55° C to +100° C
Pin Temperature (10 seconds)	510° F

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Mini-Circuits Laboratory MCL

POWER SPLITTER-COMBINERS

Micro-Miniature Two-Way

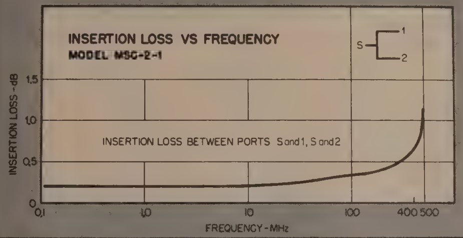
(In Phase 0°)

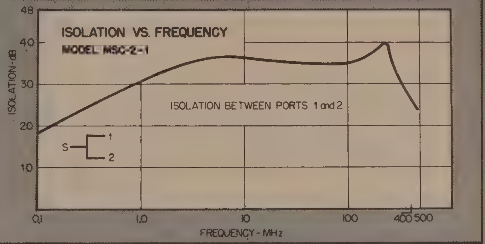
MSC-2 Series

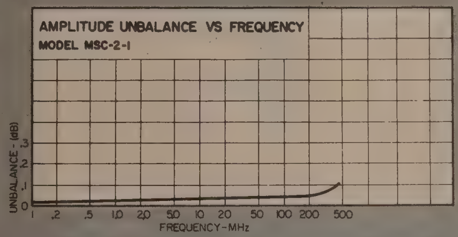
MSC-2-1 .1-450 MHz $16.95 (6-24)

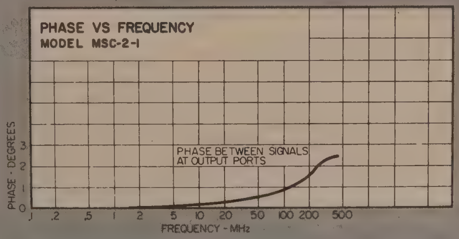
SPECIFICATIONS	**MODEL MSC-2-1**	
Frequency Range (MHz)	0.1-450MHz	
Nominal Phase Difference Between Output Ports	0°	
Impedance, All Ports	50 ohms	
Isolation, dB, Between Output 1 and 2	Typical	Minimum
2-250MHz	35	30
0.4-450MHz	30	20
0.1-0.4MHz	20	15
Insertion Loss, dB (above 3dB split)	Typical	Maximum
20-100MHz	.3	.5
100-250MHz	.4	.75
200-450MHz	.6	1.0
Phase Unbalance, degrees	Typical	Maximum
0.1-100MHz	.5	2
100-200MHz	1	3
200-400MHz	2	4
Amplitude Unbalance, dB	Typical	Maximum
.1-100MHz	.05	.15
100-200MHz	.05	.2
200-450MHz	.1	.3
VSWR	1.2 typical	
Matched Power Rating	1 watt maximum	
Internal Load Dissipation	⅛ watt	

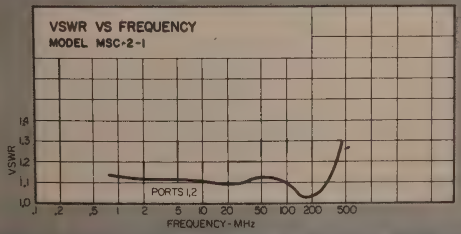
FAST DELIVERY
From stock, one week max.

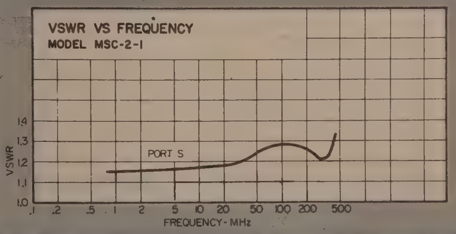












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INTRODUCTION TO ZSC·2 ZMSC·2 SERIES
POWER SPLITTER-COMBINERS

FEATURES

BROAD FREQUENCY RANGE
2 kHz - 400 MHz

EXCEPTIONALLY GOOD BALANCE

LOW INSERTION LOSS

HIGH ISOLATION

DIE-CAST ALUMINUM CASE

LOW COST FROM $24.95
IN SMALL QUANTITIES

APPLICATIONS

ADD OR SUBTRACT SIGNALS VECTORIALLY

OBTAIN MULTI IN-PHASE OUTPUT SIGNALS PROPORTIONAL TO THE LEVEL OF A COMMON INPUT SIGNAL

SPLIT AN INPUT SIGNAL INTO MULTI-OUTPUTS

COMBINE SIGNALS FROM DIFFERENT SOURCES TO OBTAIN A SINGLE PORT OUTPUT

PROVIDE CAPABILITY TO OBTAIN RF LOGIC ARRANGEMENTS

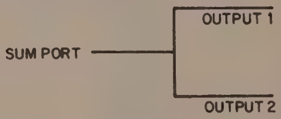
DESCRIPTION

The model ZSC-2/ZMSC-2 2-way power splitter/combiner is a high performance broad band hybrid junction. Internally, terminations and transformers are provided to ensure a well matched 50 ohm impedance at all ports. Signals fed into the input S port are equally divided, in phase, to the two output (1 and 2) ports. Similarly, signals fed into ports 1 and 2 are vectorially summed at the output S port.

The ZSC-2/ZMSC-2 features exceptionally good amplitude and phase balance between the signals at the 2 output ports. Typically, over most of the frequency range, the phase balance is within 1 degree and the amplitude balance is within .05 dB.

Housed in a die cast aluminum case, these rugged units are double shielded to meet your tough EMI requirements. The case is finished with a blue baked enamel per Federal Standard 595 #25109 over phosphoric etch per MIL-C-15328A.

Every unit is 100% tested and inspected under strict MCL quality control standards to ensure superior electrical performance and reliability. The exceptionally low cost of the ZSC-2/ZMSC-2 is attributable to the breakthrough in production techniques achieved by MCL during the manufacture of its high performance low price double balanced mixers. Utilizing this technology, the high performance ZSC-2/ZMSC-2 is offered at a remarkable price of ½ to ⅓ of competitive units.



ABSOLUTE MAXIMUM RATINGS

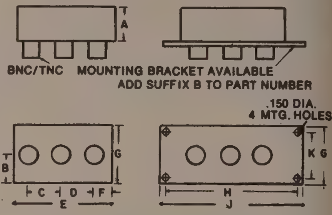
Operating and Storage Temperature −55° C to +100° C

Two-Way
(In Phase 0°)

ZSC-2 Series (Standard Size)

ZSC-2-1 100KHz-400MHz (4-24) $24.95
ZSC-2-2 2KHz-60MHz (4-24) $34.95

For pin version see PSC-2 series



	A	B	C	D	E	F	G	H	J	K
INCHES	1.15	.63	.750	.730	2.25	.385	1.40	2.95	3.25	1.10
CM	2.9	1.6	1.9	1.85	5.7	.977	3.55	7.49	8.25	2.8

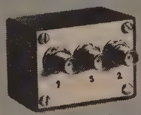
WEIGHT 74.0 grams 2.60 ounces

CONNECTORS

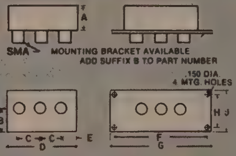
BNC	standard
TNC	on request

ZMSC-2 Series (Miniature Size)

ZMSC-2-1 100KHz-400MHz (4-24) $34.95
ZMSC-2-2 2KHz-60MHz (4-24) $44.95



For pin version see PSC-2 series



	A	B	C	D	E	F	G	H	J
INCHES	0.88	0.66	.438	1.50	.312	2.19	2.50	0.84	1.15
CM	2.2	1.7	1.1	3.8	.79	5.56	6.35	2.1	2.9

WEIGHT 34.0 grams 1.02 ounces
CONNECTORS SMA (3mm) standard

MOUNTING BRACKET

On request, add $1.50 to unit cost. See dimensions above.

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Mini-Circuits Laboratory

POWER SPLITTER-COMBINERS

Two-Way
(In Phase 0°)

SPECIFICATIONS	MODEL ZSC-2-1/ZMSC-2-1	
Frequency Range (MHz)	.1-400MHz	
Nominal Phase Difference Between Output Ports	0°	
Impedance, All Ports	50 ohms	
Isolation Between Output 1 and 2, dB	Typical	Minimum
2-40MHz	40	30
.4-400MHz	25	20
.1-.4MHz	20	15
Insertion Loss, dB (above 3dB split)	Typical	Maximum
.1-100MHz	.2	.5
100-200MHz	.4	.75
200-400MHz	.6	1.0
Phase Unbalance, degrees	Typical	Maximum
0.1-100MHz	.5	2
100-200MHz	1	3
200-400MHz	2	4
Amplitude Unbalance, dB	Typical	Maximum
.1-100MHz	.05	.15
100-200MHz	.05	.2
200-400MHz	.1	.3
VSWR	1.2 typical	
Matched Power Rating	1 watt maximum	
Internal Load Dissipation	¼ watt	

SPECIFICATIONS	MODEL ZSC-2-2/ZMSC-2-2	
Frequency Range (MHz)	2KHz-60MHz	
Nominal Phase Difference Between Output Ports	0°	
Impedance, All Ports	50 ohms	
Isolation Between Output 1 & 2, dB	Typical	Minimum
15KHz-6MHz	40	30
4KHz-60MHz	27	20
Insertion Loss, dB (above 3dB split)	Typical	Maximum
10KHz-3MHz	.2	.4
2KHz-20MHz	.3	.6
20MHz-60MHz	.6	1.0
Phase Unbalance, degrees	Typical	Maximum
10KHz-3MHz	.5	2
2KHz-20MHz	1	3
20MHz-60MHz	2	4
Amplitude Unbalance, dB	Typical	Maximum
2KHz-20MHz	.05	.15
20MHz-60MHz	.1	.3
VSWR	1.2 typical	
Matched Power Rating	1 watt maximum	
Internal Load Dissipation	¼ watt	

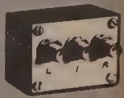
ZSC-2 Series

ZSC-2-1	100KHz-400MHz	$24.95	(4-24)
ZSC-2-2	2KHz-60MHz	$34.95	(4-24)

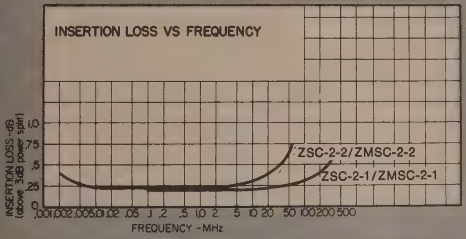
For pin version see PSC-2 series

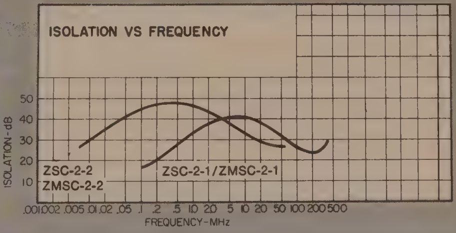
ZMSC-2 Series

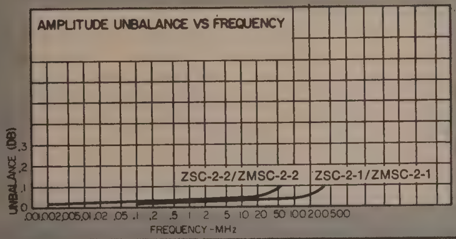
ZMSC-2-1	100KHz-400MHz	$34.95	(4-24)
ZMSC-2-2	2KHz-60MHz	$44.95	(4-24)

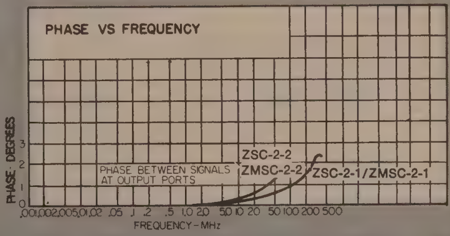


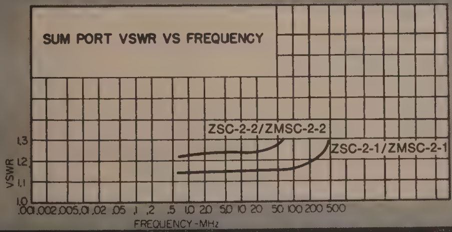
FAST DELIVERY
From stock, one week max.

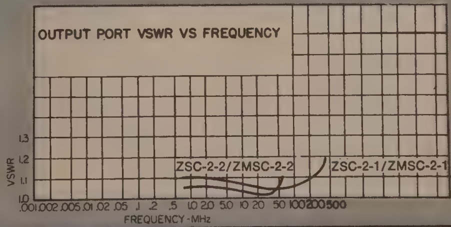












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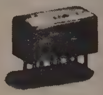
INTRODUCTION TO PSC J-2 SERIES
POWER SPLITTER-COMBINERS

Two-Way
(OUT OF PHASE 180°)

	PSC J-2	**Series**
PSCJ-2-I	I-200 MHz	$19.95 (5-49)

FAST DELIVERY
From stock, one week max.



For connector version see ZSCJ-2series

FEATURES

MINIATURE SIZE, .128 CU. INCHES

WIDE BAND, I-200 MHz

EXCEPTIONALLY GOOD BALANCE

LOW INSERTION LOSS

HIGH ISOLATION

RFI SHIELDED

HERMETICALLY SEALED METAL CASE

LOW COST FROM $19.95
IN SMALL QUANTITIES

APPLICATIONS

ADD OR SUBTRACT SIGNALS VECTORIALLY

OBTAIN MULTI 180° OUTPUT SIGNALS PROPORTIONAL TO THE LEVEL OF A COMMON INPUT SIGNAL

SPLIT AN INPUT SIGNAL INTO MULTI-OUTPUTS

COMBINE SIGNALS FROM DIFFERENT SOURCES TO OBTAIN A SINGLE PORT OUTPUT

PROVIDE CAPABILITY TO OBTAIN RF LOGIC ARRANGEMENTS

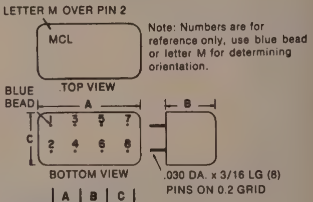
DESCRIPTION

The model PSCJ-2 2-way power splitter/combiner is a high performance broad band hybrid junction. Internally, terminations and transformers are provided to ensure a well matched 50 ohm impedance at all ports. Signals fed into the input S port are equally divided, 180° out of phase to the two output (1 and 2) ports. Similarly, signals fed into ports 1 and 2 are vectorially summed at the output S port.

The PSCJ-2 features exceptionally good amplitude and 180° phase between the signals at the 2 output ports. Typically, over most of the frequency range, the phase balance is within 1 degree and the amplitude balance is within .05 dB.

The PSCJ-2 is ruggedly constructed to provide reliable service under severe environmental conditions. Internally, every component is bonded to the header for added strength to protect against shock and vibration. This hermetically sealed unit performs well under high relative humidity conditions and over temperature extremes from −55°C to +100°C.

Every unit is 100% tested and inspected under strict MCL quality control standards to ensure superior electrical performance and reliability. The exceptionally low cost of the PSCJ-2 is attributable to the breakthrough in production techniques achieved by MCL during the manufacture of its high performance low price double balanced mixers. Utilizing this technology, the high performance PSCJ-2 is offered at a remarkable price of ⅓ to ⅙ of competitive units.

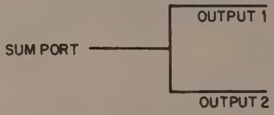


Note: Numbers are for reference only, use blue bead or letter M for determining orientation.

	A	B	C
INCHES	.8	.4	.4
CM	2	1	1

WEIGHT 5.2 grams .18 ounces

PIN CONNECTIONS	PSCJ-2-I
SUM PORT	1
OUTPUT 1	5
OUTPUT 2	6
GROUND	2,3,4,7,8



ABSOLUTE MAXIMUM RATINGS

Operating and Storage Temperature	−55° C to +100° C
Pin Temperature (10 seconds)	510° F

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Mini-Circuits Laboratory

POWER SPLITTER-COMBINERS

Two-Way

(OUT OF PHASE 180°)

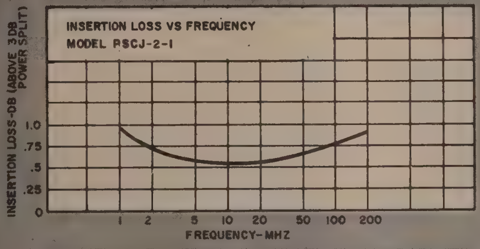
SPECIFICATIONS	MODEL PSCJ-2-1	
Frequency Range (MHz)	1-200MHz	
Nominal Phase Difference Between Output Ports	180°	
Impedance, All Ports	50 ohms	
Isolation Between Output 1 and 2, dB	Typical	Minimum
1-5MHz	35	25
5-50MHz	40	30
50-200 MHz	35	25
Insertion Loss, dB (above 3dB split)	Typical	Maximum
1-5MHz	0.75	1.0
5-50 MHz	0.6	0.8
50-200 MHz	0.75	1.0
Phase Deviation from 180°	Typical	Maximum
1-50 MHz	1.0	2.5
50-200 MHz	2.0	4.0
Amplitude Unbalance, dB	Typical	Maximum
1-100MHz	.05	.15
100-200MHz	.05	.2
VSWR	1.2 typical	
Matched Power Rating	1 watt maximum	
Internal Load Dissipation	⅛ watt	

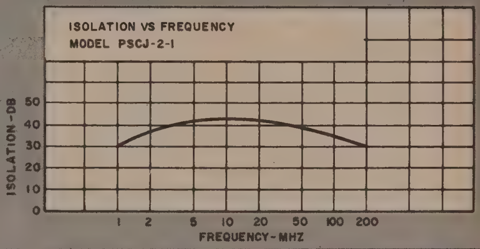
PSCJ-2 Series

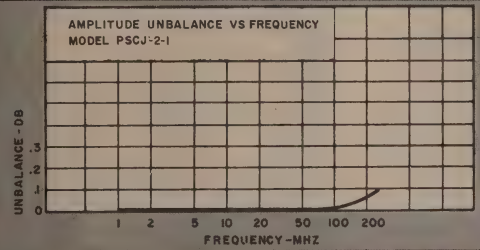
PSCJ-2-1	1-200MHz	$19.95	(5-49)

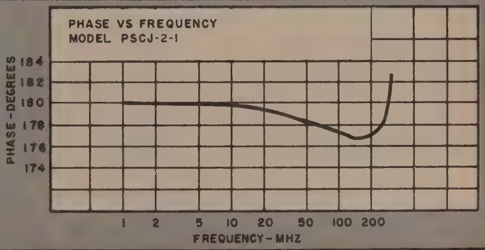
FAST DELIVERY
From stock, one week max.

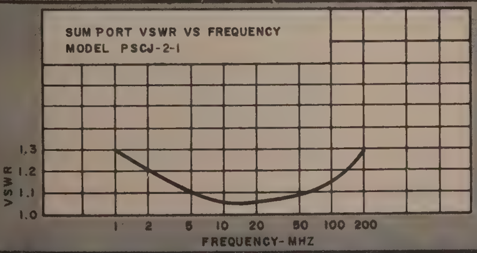
For connector version see ZSCJ-2 series

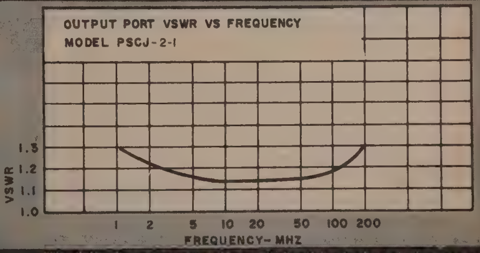












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Mini-Circuits Laboratory MCL

INTRODUCTION TO ZSCJ-2 ZMSCJ-2 SERIES
POWER SPLITTER-COMBINERS

FEATURES

BROAD FREQUENCY RANGE
1-200 MHz

EXCEPTIONALLY GOOD BALANCE

LOW INSERTION LOSS

HIGH ISOLATION

DIE-CAST ALUMINUM CASE

LOW COST FROM $34.95
IN SMALL QUANTITIES

APPLICATIONS

ADD OR SUBTRACT SIGNALS VECTORIALLY

OBTAIN MULTI 180° OUTPUT SIGNALS PROPORTIONAL TO THE LEVEL OF A COMMON INPUT SIGNAL

SPLIT AN INPUT SIGNAL INTO MULTI-OUTPUTS

COMBINE SIGNALS FROM DIFFERENT SOURCES TO OBTAIN A SINGLE PORT OUTPUT

PROVIDE CAPABILITY TO OBTAIN RF LOGIC ARRANGEMENTS

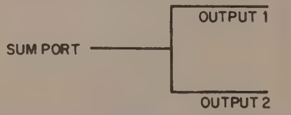
DESCRIPTION

The model ZSCJ-2/ZMSCJ-2 2-way power splitter/combiner is a high performance broad band hybrid junction. Internally, terminations and transformers are provided to ensure a well matched 50 ohm impedance at all ports. Signals fed into the input S port are equally divided, 180° out of phase to the two output (1 and 2) ports. Similarly, signals fed into ports 1 and 2 are vectorially summed at the output S port.

The ZSCJ-2/ZMSCJ-2 features exceptionally good amplitude and 180° phase between the signals at the 2 output ports. Typically, over most of the frequency range, the phase balance is within 1 degree and the amplitude balance is within .05 dB.

The ZSCJ-2/ZMSCJ-2 is ruggedly constructed to provide reliable service under severe environmental conditions. Internally, every component is bonded to the header for added strength to protect against shock and vibration. This hermetically sealed unit performs well under high relative humidity conditions and over temperature extremes from −55°C to +100°C.

Every unit is 100% tested and inspected under strict MCL quality control standards to ensure superior electrical performance and reliability. The exceptionally low cost of the ZSCJ-2/ZMSCJ-2 is attributable to the breakthrough in production techniques achieved by MCL during the manufacture of its high performance low price double balanced mixers. Utilizing this technology, the high performance ZSCJ-2/ZMSCJ-2 is offered at a remarkable price of ⅓ to ⅕ of competitive units.



ABSOLUTE MAXIMUM RATINGS

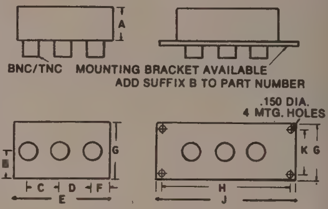
Operating and Storage Temperature −55° C to +100° C

Two-Way (Out of Phase 180°)

ZSCJ-2 Series
(Standard Size)

ZSCJ 2-1 1-200 MHz $34.95 (5-49)

For pin version see PSCJ-2 series



	A	B	C	D	E	F	G	H	J	K
INCHES	1.15	.63	.750	.730	2.25	.385	1.40	2.95	3.25	1.10
CM	2.9	1.6	1.9	1.85	5.7	.977	3.55	7.49	8.25	2.8

WEIGHT 74.0 grams 2.60 ounces

CONNECTORS

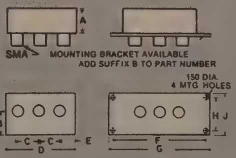
BNC standard
TNC on request
SMA (3mm) see miniature IC style

Two-Way Out of Phase 180°)
(Miniature Size)

Series ZMSCJ-2

ZMSCJ-2-1 1-200 MHz $44.95 (5-49)

For pin version see PSCJ-2 series



	A	B	C	D	E	F	G	H	J
INCHES	0.88	0.66	4 38	1.50	.312	2.19	2.50	0.84	1.15
CM	2.2	1.7	1.1	3.8	.79	5.56	6.35	2.1	2.9

WEIGHT 34 .0 grams 1.02 ounces

CONNECTORS

SMA (3mm) standard

MOUNTING BRACKET

On request, add $1.50 to unit cost. See dimensions above.

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POWER SPLITTER-COMBINERS

SPECIFICATIONS	MODEL ZSCJ-2-1/ZMSCJ-2-1	
Frequency Range (MHz)	1-200MHz	
Nominal Phase Difference Between Output Ports	180°	
Impedance, All Ports	50 ohms	
Isolation Between Output 1 and 2, dB	Typical	Minimum
1-5 MHz	35	25
5-50 MHz	40	30
50-200 MHz	35	25
Insertion Loss, dB (above 3dB split)	Typical	Maximum
1-5 MHz	0.75	1.0
5-50 MHz	0.6	0.8
50-200 MHz	0.75	1.0
Phase Deviation from 180°	Typical	Maximum
1-50 MHz	1.0	2.5
50-200 MHz	2.0	4.0
Amplitude Unbalance, dB	Typical	Maximum
.1-100MHz	.05	.15
100-200MHz	.05	.2
VSWR	1.2 typical	
Matched Power Rating	1 watt maximum	
Internal Load Dissipation	⅛ watt	

Two-Way

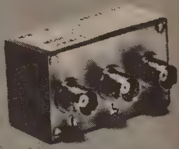
(Out of Phase 180°)

ZSCJ-2 Series

ZSCJ-2-1	1-200 MHz	$34.95 (5-49)

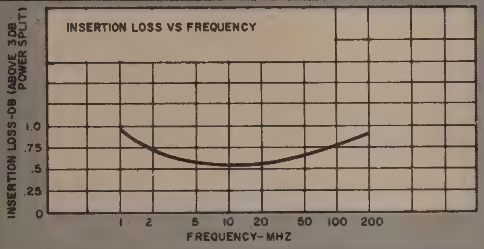
ZMSCJ-2 Series

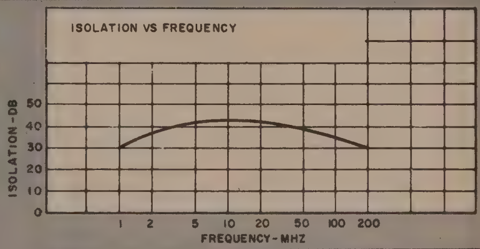
ZMSCJ-2-1	1-200 MHz	$44.95 (5-49)

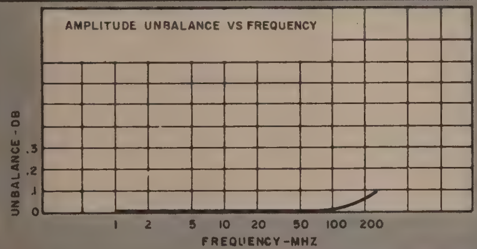


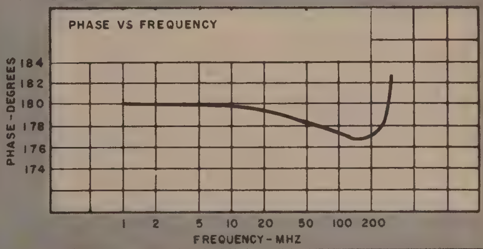
For pin version version see PSCJ-2 series

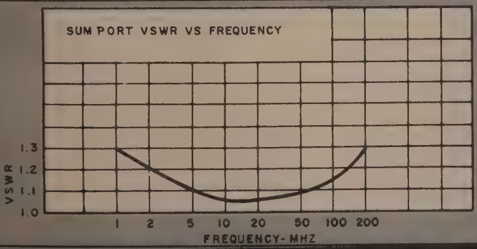
FAST DELIVERY
From stock, one week max.

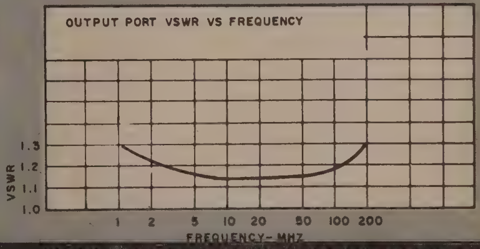

INSERTION LOSS VS FREQUENCY


ISOLATION VS FREQUENCY


AMPLITUDE UNBALANCE VS FREQUENCY


PHASE VS FREQUENCY


SUM PORT VSWR VS FREQUENCY


OUTPUT PORT VSWR VS FREQUENCY

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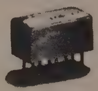
INTRODUCTION TO PSC-3 SERIES POWER SPLITTER-COMBINERS

Three-Way
(In Phase 0°)

PSC-3 Series

PSC-3-1	1-200 MHz	$19.95 (6-49)
PSC-3-2	.01- 30 MHz	$29.95 (6-49)

FAST DELIVERY
From stock, one week max.



For connector version see ZSC-3 series

FEATURES

- MINIATURE SIZE, .128 CU. INCHES
- WIDE BAND, 10KHz - 200MHz
- EXCEPTIONALLY GOOD BALANCE
- LOW INSERTION LOSS
- HIGH ISOLATION
- RFI SHIELDED
- HERMETICALLY SEALED METAL CASE
- LOW COST FROM $19.95 IN SMALL QUANTITIES

APPLICATIONS

- ADD OR SUBTRACT SIGNALS VECTORIALLY
- OBTAIN MULTI IN-PHASE OUTPUT SIGNALS PROPORTIONAL TO THE LEVEL OF A COMMON INPUT SIGNAL
- SPLIT AN INPUT SIGNAL INTO MULTI-OUTPUTS
- COMBINE SIGNALS FROM DIFFERENT SOURCES TO OBTAIN A SINGLE PORT OUTPUT
- PROVIDE CAPABILITY TO OBTAIN RF LOGIC ARRANGEMENTS

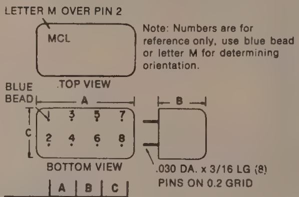
DESCRIPTION

The PSC-3 series 3-way power splitter/combiner is a high performance broad-band hybrid junction. Internally, terminations and transformers are provided to ensure a well matched 50 ohm impedance at all ports. Signals fed into the input S port are equally divided, in phase, to the three output (1, 2, and 3) ports. Similarly, signals fed into ports 1, 2 and 3 are vectorially summed at the output S port.

The PSC-3 series features exceptionally good amplitude and phase balance between the signals at the 3 output ports. Typically, over most of the frequency range, the phase balance is within 1 degree and the amplitude balance is within .0 5 dB.

The PSC-3 series is ruggedly constructed to provide reliable service under severe environmental conditions. Internally, every component is bonded to the header for added strength to protect against shock and vibration. This hermetically sealed unit performs well under high relative humidity conditions and over temperature extremes from −55° C to +100° C.

Every unit is 100% tested and inspected under strict MCL quality control standards to ensure superior electrical performance and reliability. The exceptionally low cost of the PSC-3 series is attributable to the breakthrough in production techniques achieved by MCL during the manufacture of its high performance low price double balanced mixer. Utilizing this technology, the high performance PSC-3 series is offered at a remarkable price of 1/2 to 1/3 the cost of competitive units.



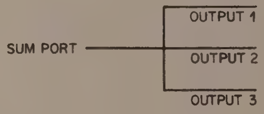
Note: Numbers are for reference only, use blue bead or letter M for determining orientation.

	A	B	C
INCHES	.8	.4	.4
CM	2	1	1

WEIGHT 5.2 grams .18 ounces

PIN CONNECTIONS

	PSC-3-1 PSC-3-2
SUM PORT	6
OUTPUT 1	1
OUTPUT 2	2
OUTPUT 3	5
GROUND	3,4,7,8



ABSOLUTE MAXIMUM RATINGS

Operating and Storage Temperature	−55° C to +100° C
Pin Temperature (10 seconds)	510° F

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POWER SPLITTER-COMBINERS

Three-Way
(In Phase 0°)

SPECIFICATIONS	MODEL PSC-3-1	
Frequency Range (MHz)	1-200	
Nominal Phase Difference Between Output Ports	0°	
Impedance, All Ports	50 ohms	
Isolation (dB) Between Outputs 1, 2, and 3	Typical	Minimum
1-50 MHz	45	35
50-200 MHz	40	30
Insertion Loss, dB (above 4.8dB split)	Typical	Maximum
3-30 MHz	.3	.5
1.5-100 MHz	.4	.7
1-200 MHz	.6	.85
Phase Unbalance, degrees	Typical	Maximum
1-100 MHz	1	2
100-200 MHz	2	4
Amplitude Unbalance, dB	Typical	Maximum
1-10 MHz	.05	.15
10-100 MHz	.05	.2
100-200 MHz	.1	.3
VSWR	1.1 typical	
Matched Power Rating	1 watt maximum	
Internal Load Dissipation	3/8 watt	

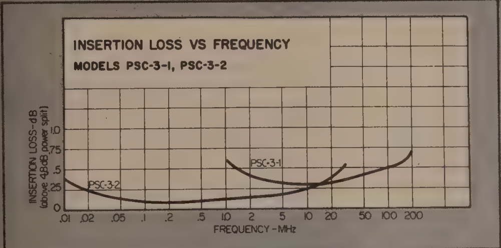
SPECIFICATIONS	MODEL PSC-3-2	
Frequency Range (MHz)	.01-30	
Nominal Phase Difference Between Output Ports	0°	
Impedance, All Ports	50 ohms	
Isolation (dB) Between Outputs 1, 2, and 3	Typical	Minimum
.01-5 MHz	45	35
5-30 MHz	40	30
Insertion Loss, dB (above 4.8dB split)	Typical	Maximum
.05-5 MHz	.15	.3
.01-15 MHz	.25	.45
15-30 MHz	.45	.75
Phase Unbalance, degrees	Typical	Maximum
.01-10 MHz	1	2
10-30 MHz	2	4
Amplitude Unbalance, dB	Typical	Maximum
1-100 MHz	.05	.2
1-200 MHz	.1	.3
VSWR	1.1 typical	
Matched Power Rating	1 watt maximum	
Internal Load Dissipation	3/8 watt	

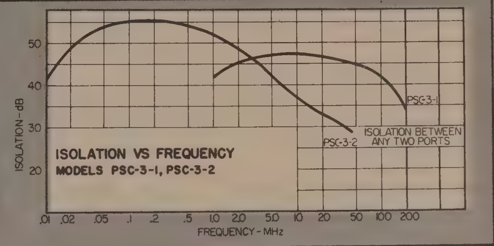
PSC-3 Series

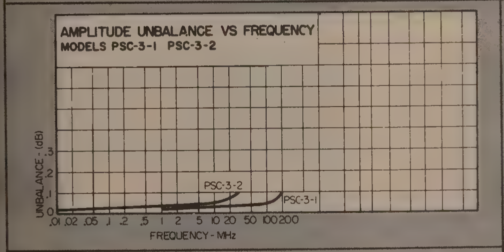
PSC-3-1	1-200 MHz	$19.95 (6-49)
PSC-3-2	.01- 30 MHz	$29.95 (6-49)

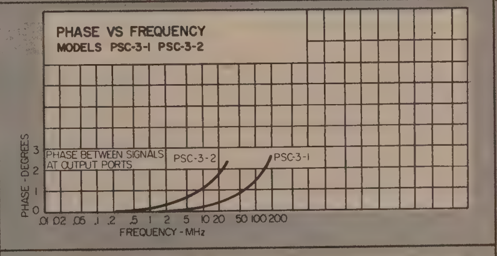
FAST DELIVERY
From stock, one week max.

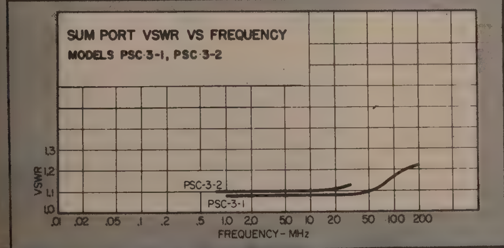
For connector version see ZSC-3 series

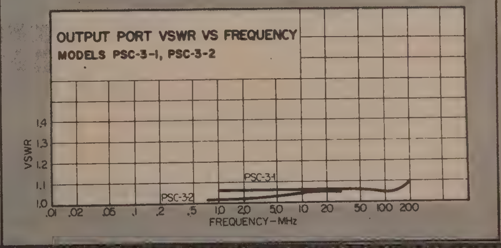

INSERTION LOSS VS FREQUENCY
MODELS PSC-3-1, PSC-3-2


ISOLATION VS FREQUENCY
MODELS PSC-3-1, PSC-3-2


AMPLITUDE UNBALANCE VS FREQUENCY
MODELS PSC-3-1 PSC-3-2


PHASE VS FREQUENCY
MODELS PSC-3-1 PSC-3-2


SUM PORT VSWR VS FREQUENCY
MODELS PSC-3-1, PSC-3-2


OUTPUT PORT VSWR VS FREQUENCY
MODELS PSC-3-1, PSC-3-2

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INTRODUCTION TO ZSC·3 ZMSC·3 SERIES POWER SPLITTER-COMBINERS

FEATURES

BROAD FREQUENCY RANGE
10 KHz - 200 MHz

EXCEPTIONALLY GOOD BALANCE

LOW INSERTION LOSS

HIGH ISOLATION

DIE-CAST ALUMINUM CASE

LOW COST FROM $34.95
IN SMALL QUANTITIES

APPLICATIONS

ADD OR SUBTRACT SIGNALS VECTORIALLY

OBTAIN MULTI IN-PHASE OUTPUT SIGNALS PROPORTIONAL TO THE LEVEL OF A COMMON INPUT SIGNAL

SPLIT AN INPUT SIGNAL INTO MULTI-OUTPUTS

COMBINE SIGNALS FROM DIFFERENT SOURCES TO OBTAIN A SINGLE PORT OUTPUT

PROVIDE CAPABILITY TO OBTAIN RF LOGIC ARRANGEMENTS

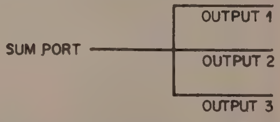
DESCRIPTION

The ZSC-3/ZMSC-3 series 3-way power splitter/combiner is a high performance broad band hybrid junction. internally, terminations and transformers are provided to ensure a well matched 50 ohm impedance at all ports. Signals fed into the input S port are equally divided, in phase, to the three output (1, 2, and 3) ports. Similarly signals fed into ports 1, 2, and 3 are vectorially summed at the output S port.

The ZSC-3/ZMSC-3 series features exceptionally good amplitude and phase balance between the signals at the 3 output ports. Typically over most of the frequency range, the phase balance is within 1 degree and the amplitude balance is within 0.5 dB.

Ruggedness and durability are built into the ZSC-3/ZMSC-3 series. Internally every component is bonded with silicone rubber to provide protection against shock, vibration, and acceleration. Available with BNC, TNC, or SMA (3mm) connectors, the ZSC-3/ZMSC-3 series is housed in a die cast aluminimum case. The case finish is a blue baked enamel per Federal Standard 595 #25109 over phosphoric etch per MIL-C-15328A.

Every unit is 100% tested and inspected under strict MCL quality control standards to ensure superior electrical performance and reliability. The exceptionally low cost of the ZSC-3/ZMSC-3 series is attributable to the breakthrough in production techniques achieved by MCL during the manufacture of its high performance low price double balanced mixers. Utilizing this technology, the high performance ZSC-3/ZMSC-3 series is offered at a remarkable price of ½ to ⅓ the cost of competitive units.



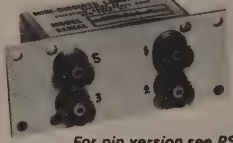
ABSOLUTE MAXIMUM RATINGS

Operating and Storage Temperature	−55° C to +100° C

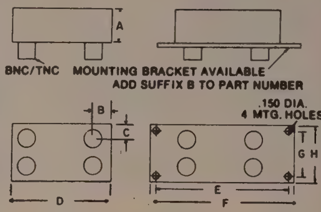
Three-Way
(In Phase 0°)

ZSC-3 Series (Standard Size)

ZSC-3-1	1-200 MHz	$34.95 (4-24)
ZSC-3-2	.01- 30 MHz	$44.95 (4-24)



For pin version see PSC-3 series



	A	B	C	D	E	F	G	H
INCHES	1.15	.781	.346	2.25	2.95	3.25	1.10	1.40
CM	2.9	1.98	.878	5.7	7.5	8.3	2.79	3.55

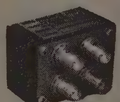
WEIGHT 81.0 grams 2.90 ounces

CONNECTORS

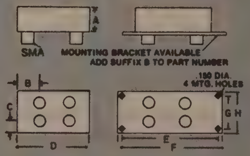
BNC	standard
TNC	on request
SMA (3mm)	see miniature style

ZMSC-3 Series (Miniature Size)

ZMSC3-1	1-200 MHz	$44.95 (4-24)
ZMSC3-2	.01- 30 MHz	$54.95 (4-24)



For pin version see PSC-3 series



	A	B	C	D	E	F	G	H
INCHES	0.88	0.5	.315	1.50	2.19	2.50	0.84	1.15
CM	2.2	1.3	.8	3.8	5.56	6.35	2.1	2.9

WEIGHT 40.5 grams 1.4 ounces

CONNECTORS SMA (3mm) standard

MOUNTING BRACKET

On request, add $1.50 to unit cost.
See dimensions above.

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POWER SPLITTER-COMBINERS

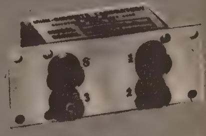
Three-Way
(In Phase 0°)

SPECIFICATIONS	MODEL ZSC-3-1/ZMSC-3-1	
Frequency Range (MHz)	1-200	
Nominal Phase Difference Between Output Ports	0°	
Impedance, All Ports	50 ohms	
Isolation (dB) Between Outputs 1, 2, and 3	Typical	Minimum
1-50 MHz	45	35
50-200 MHz	40	30
Insertion Loss, dB (above 4.8dB split)	Typical	Maximum
3-30 MHz	.3	.5
1.5-100 MHz	.4	.7
1-200 MHz	.6	.85
Phase Unbalance, degrees	Typical	Maximum
1-100 MHz	1	2
100-200 MHz	2	4
Amplitude Unbalance, dB	Typical	Maximum
1-10 MHz	.05	.15
10-100 MHz	.05	.2
100-200 MHz	.1	.3
VSWR	1.1 typical	
Matched Power Rating	1 watt maximum	
Internal Load Dissipation	3/8 watt	

SPECIFICATIONS	MODEL ZSC-3-2/ZMSC-3-2	
Frequency Range (MHz)	.01-30	
Nominal Phase Difference Between Output Ports	0°	
Impedance, All Ports	50 ohms	
Isolation (dB) Between Outputs 1, 2, and 3	Typical	Minimum
.01-5 MHz	45	35
5-30 MHz	40	30
Insertion Loss, dB (above 4.8dB split)	Typical	Maximum
.05-5 MHz	.15	.3
.01-15 MHz	.25	.45
15-30 MHz	.45	.75
Phase Unbalance, degrees	Typical	Maximum
.01-10 MHz	1	2
10-30 MHz	2	4
Amplitude Unbalance, dB	Typical	Maximum
1-100 MHz	.05	.2
1-200 MHz	.1	.3
VSWR	1.1 typical	
Matched Power Rating	1 watt maximum	
Internal Load Dissipation	3/8 watt	

ZSC-3 Series

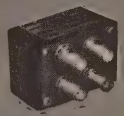
ZSC-3-1	1-200 MHz	$34.95	(4-24)
ZSC-3-2	.01-30 MHz	$44.95	(4-24)



For pin version see PSC-3 series

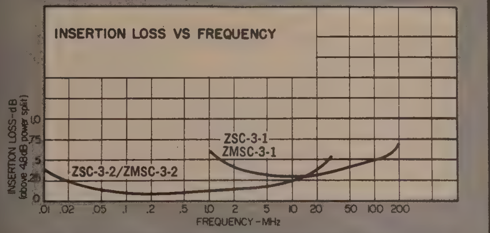
ZMSC-3 Series

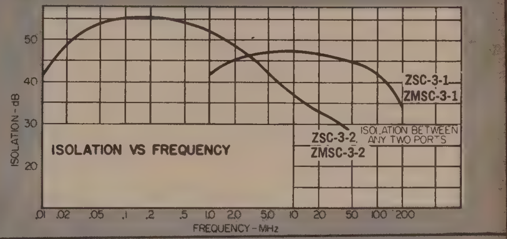
ZMSC3-1	1-200MHz	$44.95	(4-24)
ZMSC3-2	.01-30 MHz	$54.95	(4-24)

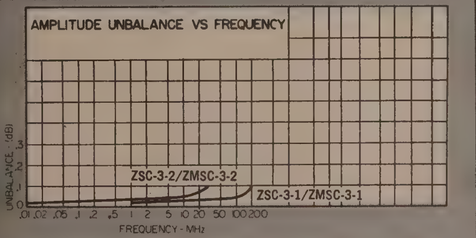


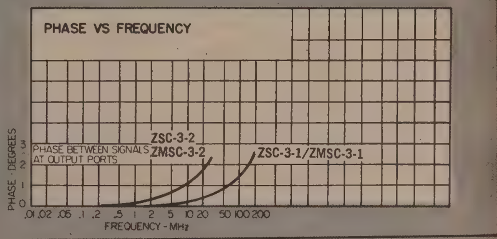
For pin version see PSC-3 series

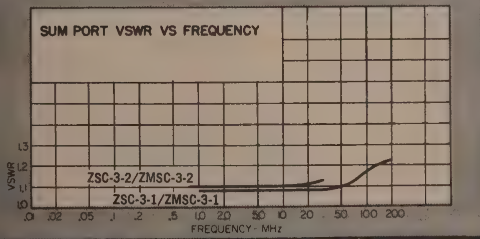
FAST DELIVERY
From stock, one week max

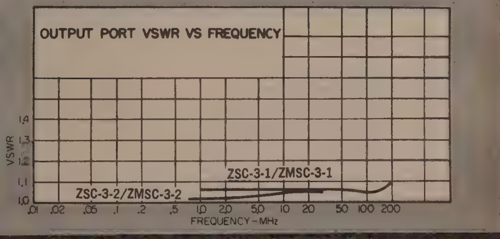












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Mini-Circuits Laboratory

INTRODUCTION TO PSC·4 SERIES
POWER SPLITTER-COMBINERS

Four-Way
(In Phase 0°)

PSC·4 Series

PSC-4-1	100 KHz-200 MHz	$26.95 (6-49)
PSC-4-3	250 KHz-250 MHz	$23.95 (6-49)

FAST DELIVERY
From stock, one week max.

For connector version see ZSC·4 series

FEATURES

- MINIATURE SIZE, .128 CU. INCHES
- WIDE BAND, 100KHz - 250MHz
- EXCEPTIONALLY GOOD BALANCE
- LOW INSERTION LOSS
- HIGH ISOLATION
- RFI SHIELDED
- HERMETICALLY SEALED METAL CASE
- LOW COST FROM $23.95 IN SMALL QUANTITIES

APPLICATIONS

- ADD OR SUBTRACT SIGNALS VECTORIALLY
- OBTAIN MULTI IN-PHASE OUTPUT SIGNALS PROPORTIONAL TO THE LEVEL OF A COMMON INPUT SIGNAL.
- SPLIT AN INPUT SIGNAL INTO MULTI-OUTPUTS
- COMBINE SIGNALS FROM DIFFERENT SOURCES TO OBTAIN A SINGLE PORT OUTPUT
- PROVIDE CAPABILITY TO OBTAIN RF LOGIC ARRANGEMENTS

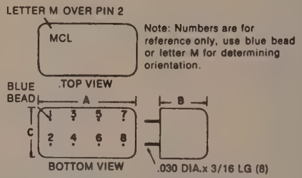
DESCRIPTION

The model PSC-4 4-way power divider/combiner is a high performance broad band hybrid junction. Internally, terminations and transformers are provided to ensure a well matched 50 ohm impedance at all ports. Signals fed into the input S port are equally divided, in power, to the four output (1, 2, 3, and 4) ports. Similarly, signals fed into ports 1, 2, 3 and 4 are vectorially summed at the output S port.

The PSC-4 features exceptionally good amplitude and phase balance between the signals at the 4 output ports. Typically, over most of the frequency range, the phase balance is within 1 degree and the amplitude balance is within .05 dB.

The PSC-4 is ruggedly constructed to provide reliable service under severe environmental conditions. Internally, every component is bonded to the header for added strength to protect against shock and vibration. This hermetically sealed unit performs well under high relative humidity conditions and over temperature extremes from −55° C to +100° C.

Every unit is 100% tested and inspected under strict MCL quality control standards to ensure superior electrical performance and reliability. The exceptionally low cost of the PSC-4 is attributable to the breakthrough in production techniques achieved by MCL during the manufacture of its high performance low price double balanced mixers. Utilizing this technology, the high performance PSC-4 is offered at a remarkable price of ½ to ⅓ of competitive units.

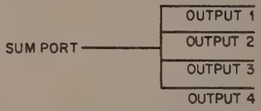


Note: Numbers are for reference only, use blue bead or letter M for determining orientation.

	A	B	C
INCHES	.8	.4	.4
CM	2	1	1

WEIGHT 5.2 grams .18 ounces

PIN CONNECTIONS	PSC 4-1 PSC 4-3
SUM PORT	4
OUTPUT 1	7
OUTPUT 2	8
OUTPUT 3	1
OUTPUT 4	2
GROUND	3,5,6



ABSOLUTE MAXIMUM RATINGS

Operating and Storage Temperature	−55° C to +100° C
Pin Temperature (10 seconds)	510° F

Mini-Circuits Laboratory MCL

POWER SPLITTER-COMBINERS

SPECIFICATIONS	MODEL PSC-4-1	
Frequency Range (MHz)	0.1-200	
Nominal Phase Difference Between Output Ports	0°	
Impedance, All ports	50 ohms	
Isolation, dB, Ports 1-3,4 2-3,4	Typical	Minimum
.1-10 MHz	35	20
10-100 MHz	40	30
100-200 MHz	40	30
Isolation, dB, Ports 1-2 3-4	Typical	Minimum
.1-10 MHz	33	25
10-100 MHz	30	20
100-200 MHz	27	20
Insertion Loss, dB, (above 6dB split)	Typical	Maximum
.1-10 MHz	.4	.6
10-100 MHz	.5	.75
100-200 MHz	.7	1.0
Insertion Loss, Unbalance, dB	Typical	Maximum
.1-100 MHz	.05	.15
100-200 MHz	.1	.25
VSWR	1.2 typical	
Matched Power Rating	1 watt maximum	
Internal Load Dissipation	⅜ watt	

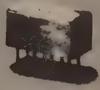
SPECIFICATIONS	MODEL PSC 4-3	
Frequency Range (MHz)	.250-250	
Nominal Phase Difference Between Output Ports	0°	
Impedance, All ports	50 ohms	
Isolation, dB, Ports 1-3,4 2-3,4	Typical	Minimum
.25-10 MHz	35	20
10-100 MHz	40	30
100-250 MHz	40	20
Isolation, dB, Ports 1-2 3-4	Typical	Minimum
.25-10 MHz	33	20
10-100 MHz	30	20
100-250 MHz	27	20
Insertion Loss, dB, (above 6dB split)	Typical	Maximum
.25-10 MHz	.4	.7
10-100 MHz	.5	.75
100-250 MHz	.7	1.2
Insertion Loss, Unbalance, dB	Typical	Maximum
.25-10 MHz	.05	.15
100-250 MHz	.1	.25
VSWR	1.1 typical	
Matched Power Rating	1 watt maximum	
Internal Load Dissipation	⅜ watt	

Four-Way
(In Phase 0°)

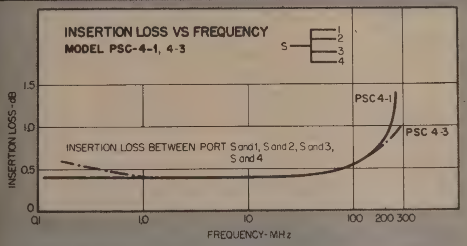
PSC-4 Series

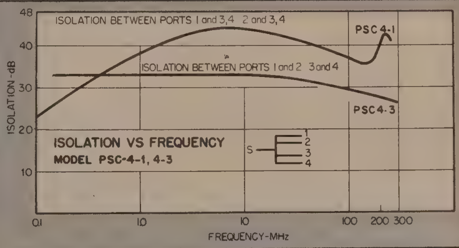
PSC-4-1	100 KHz-200 MHz	$26.95 (6-49)
PSC-4-3	250 KHz-250 MHz	$23.95 (6-49)

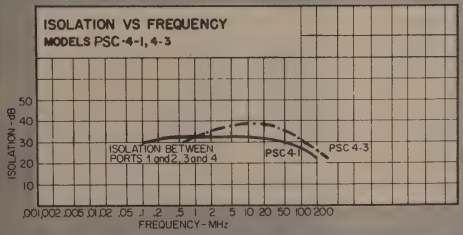
FAST DELIVERY
From stock, one week max

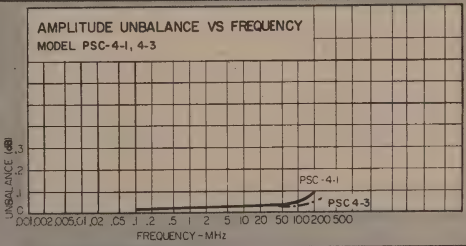


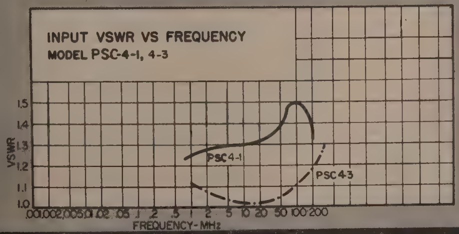
For connector version see ZSC-4 series

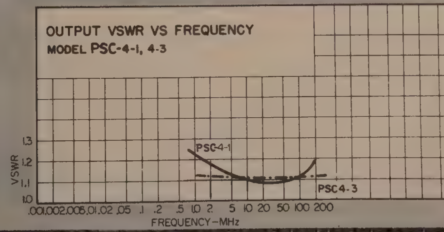

INSERTION LOSS VS FREQUENCY
MODEL PSC-4-1, 4-3


ISOLATION VS FREQUENCY
MODEL PSC-4-1, 4-3


ISOLATION VS FREQUENCY
MODELS PSC-4-1, 4-3


AMPLITUDE UNBALANCE VS FREQUENCY
MODEL PSC-4-1, 4-3


INPUT VSWR VS FREQUENCY
MODEL PSC-4-1, 4-3


OUTPUT VSWR VS FREQUENCY
MODEL PSC-4-1, 4-3

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INTRODUCTION TO ZSC·4 ZMSC·4 SERIES POWER SPLITTER-COMBINERS

Four-Way
(In Phase 0°)

FEATURES

BROAD FREQUENCY RANGE
2 KHz - 250 MHz

EXCEPTIONALLY GOOD BALANCE

LOW INSERTION LOSS

HIGH ISOLATION

DIE-CAST ALUMINUM CASE

LOW COST FROM $38.95
IN SMALL QUANTITIES

APPLICATIONS

ADD OR SUBTRACT SIGNALS VECTORIALLY

OBTAIN MULTI IN-PHASE OUTPUT SIGNALS PROPORTIONAL TO THE LEVEL OF A COMMON INPUT SIGNAL

SPLIT AN INPUT SIGNAL INTO MULTI-OUTPUTS

COMBINE SIGNALS FROM DIFFERENT SOURCES TO OBTAIN A SINGLE PORT OUTPUT

PROVIDE CAPABILITY TO OBTAIN RF LOGIC ARRANGEMENTS

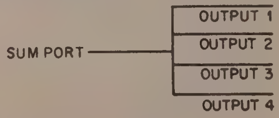
DESCRIPTION

The model ZSC-4/ZMSC-4 4-way power splitter/combiner is a high performance broad band hybrid junction. Internally, terminations and transformers are provided to ensure well matched 50 ohm impedance at all ports. Signals fed into the input S port are equally divided, in phase, to the four output (1, 2, 3 and 4) ports. Similarly, signals fed into ports 1, 2, 3 and 4 are vectorially summed at the S port.

The ZSC-4/ZMSC-4 features exceptionally good amplitude and phase balance between the signals at the 4 output ports. Typically, over most of the frequency range, the phase balance is within 1 degree and the amplitude balance is within .05 dB.

Housed in a die cast aluminum case, these rugged units are double shielded to meet your tough EMI requirements. The case is finished with a blue baked enamel per Federal Standard 595 #25109 over phosphoric etch per MIL-C-15328A.

Every unit is 100% tested and inspected under strict MCL quality control standards to ensure superior electrical performance and reliability. The exceptionally low cost of the ZSC-4/ZMSC-4 is attributable to the breakthrough in production techniques achieved by MCL during the manufacture of its high performance low price double balanced mixers. Utilizing this technology, the high performance ZSC-4/ZMSC-4 is offered at a remarkable price of ½ to ⅓ of competitive units.

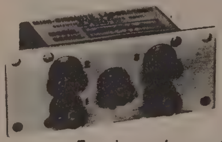


ABSOLUTE MAXIMUM RATINGS

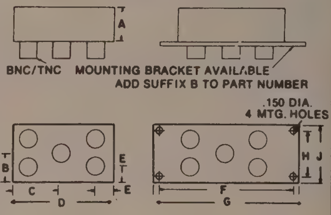
Operating and Storage
Temperature —55° C to +100° C

ZSC-4 Series (Standard Size)

ZSC-4-1	100KHz-200MHz	(4-24)	$41.95
ZSC-4-2	2KHz-20MHz	(4-24)	$64.95
ZSC-4-3	250KHz-250MHz	(4-24)	$38.95



For pin version see PSC-4 series



	A	B	C	D	E	F	G	H	J
INCHES	1.15	.70	1.125	2.25	.405	2.95	3.25	1.10	1.40
CM	2.9	1.8	2.85	5.7	1.03	7.49	8.25	2.79	3.55

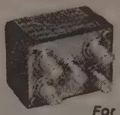
WEIGHT 85.0 grams 3.00 ounces

CONNECTORS

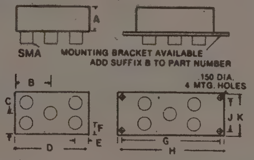
BNC	standard
TNC	on request

ZMSC-4 Series (Miniature Size)

ZMSC-4-1	100KHz-200MHz	(4-24)	$51.95
ZMSC-4-2	2KHz-20MHz	(4-24)	$74.95
ZMSC-4-3	250KHz-250MHz	(4-24)	$48.95



For pin version see PSC-4 series



	A	B	C	D	E	F	G	H	J	K
INCHES	0.88	0.75	.575	1.50	.313	.315	2.19	2.50	.84	1.15
CM	2.2	1.9	1.46	3.8	.795	.8	5.56	6.35	2.1	2.9

WEIGHT 40.5 grams 1.4 ounces

CONNECTORS SMA (3mm) standard

MOUNTING BRACKET

On request, add $1.50 to unit cost.
See dimensions above.

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POWER SPLITTER-COMBINERS

ZSC-4-1/ZMSC-4-1

Frequency Range	1-200MHz	
Nominal Phase Difference Between Output Ports	0°	
Impedance, All Ports	50 ohms	
Isolation, dB, Ports 1-3,4 2-3,4	**Typ**	**Min**
.1-10MHz	35	20
10-100MHz	40	30
100-200MHz	40	30
Isolation, dB, Ports 1-2 3-4	**Typ**	**Min**
.1-10MHz	33	25
10-100MHz	30	20
100-200MHz	27	20
Insertion Loss, (above 6dB split)	**Typ**	**Max**
.1-10MHz	.4	.6
10-100MHz	.5	.75
100-200MHz	.7	1.0
Insertion Loss, Unbalance, dB	**Typ**	**Max**
.1-100MHz	.05	.15
100-200MHz	.1	.25
VSWR	1.2 typical	
Matched Power Rating	1 Watt Max	
Internal Load Dissipation	⅜ Watt	

ZSC-4-2/ZMSC-4-2

Frequency Range	2KHz-20MHz	
Nominal Phase Difference Between Output Ports	0°	
Impedance, All Ports	50 ohms	
Isolation, dB Ports 1-3, 4 2-3, 4	**Typ**	**Min**
40KHz-4MHz	45	35
10KHz-20MHz	40	30
2KHz-10KHz	30	20
Isolation, dB Ports 1-2, 3-4	**Typ**	**Min**
2KHz-20MHz	33	25
Insertion Loss, dB (above 6dB split)	**Typ**	**Max**
5KHz-1.0MHz	.3	.5
2KHz-10MHz	.45	.75
10MHz-20MHz	.7	1.0
Insertion Loss, Unbalance dB	**Typ**	**Max**
2KHz-10MHz	.05	.15
10MHz-20MHz	.1	.25
VSWR	1.2 dB typical	
Matched Power Rating	1 watt maximum	
Internal Load Dissipation	⅜ Watt	

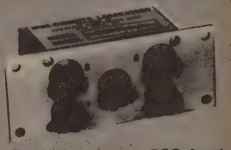
ZSC-4-3/ZMSC-4-3

Frequency Range	.250 - 250 MHz	
Nominal Phase Difference Between Output Ports	0°	
Impedance, All ports	50 ohms	
Isolation, dB, Ports 1-3,4 2-3,4	**Typ.**	**Min**
.25-10 MHz	35	20
10-100 MHz	40	30
100-250MHz	40	20
Isolation, dB, Ports 1-2 3-4	**Typ**	**Min**
.25-10 MHz	33	20
10-100 MHz	30	20
100-250 MHz	27	20
Insertion Loss, dB, (above 6dB split)	**Typ**	**Max**
.25-10 MHz	.4	.7
10-100 MHz	.5	.75
100-250MHz	.7	1.2
Insertion Loss, Unbalance, dB	**Typ**	**Max**
.25-10 MHz	.05	.15
100-250 MHz	.1	.25
VSWR	1.1 typical	
Matched Power Rating	1 watt max	
Internal Load Dissipation	⅜ watt	

Four-Way
(In Phase 0°)

ZSC-4 Series

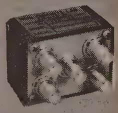
ZSC-4-1	100KHz-200MHz	(4-24)	$41.95
ZSC-4-2	2KHz-20MHz	(4-24)	$64.95
ZSC-4-3	250KHz-250MHz	(4-24)	$38.95



For pin version see PSC-4 series

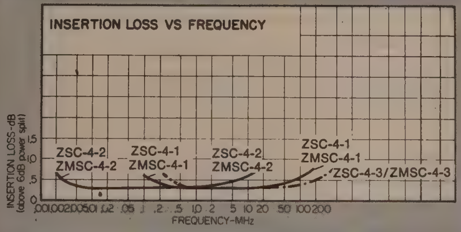
ZMSC-4 Series

ZMSC-4-1	100KHz-200MHz	(4-24)	$51.95
ZMSC-4-2	2KHz-20MHz	(4-24)	$74.95
ZMSC-4-3	250KHz-250MHz	(4-24)	$48.95

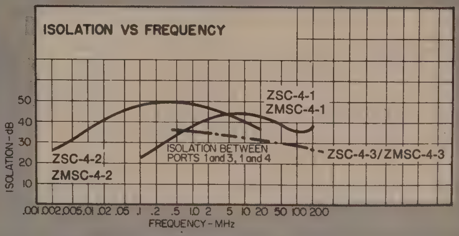


For pin version see PSC-4 series

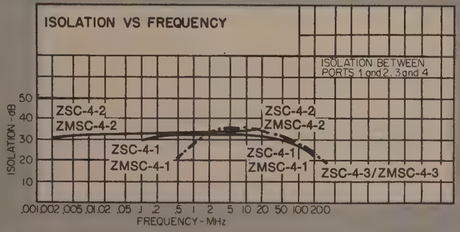
FAST DELIVERY
From stock, one week max.



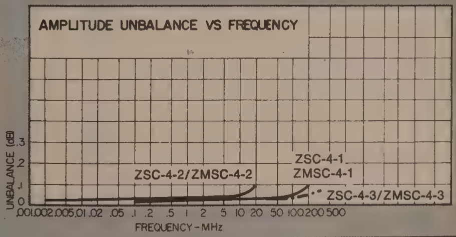
INSERTION LOSS VS FREQUENCY



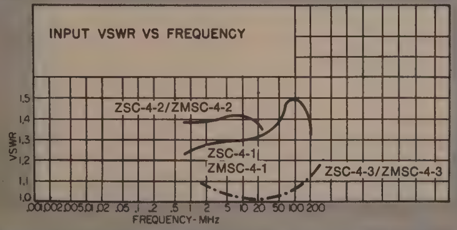
ISOLATION VS FREQUENCY



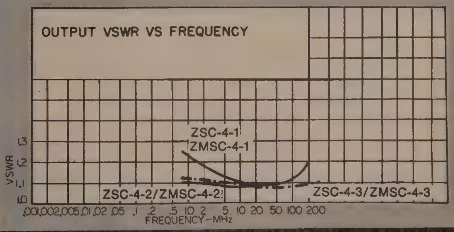
ISOLATION VS FREQUENCY



AMPLITUDE UNBALANCE VS FREQUENCY



INPUT VSWR VS FREQUENCY



OUTPUT VSWR VS FREQUENCY

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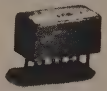
INTRODUCTION TO RK SERIES
FREQUENCY DOUBLERS

Broadband
(9 Octaves)

RK Series

RK-2 1-1000 MHz (5-24) $ 15.95
RK-3 .05-300 MHz (5-24) $ 14.95

FAST DELIVERY
From stock; one week max.



For connector version see GK series

FEATURES

MINIATURE SIZE, .128 CU. INCHES

WIDE BAND, 0.5 MHz -1000MHz

EXCEPTIONALLY GOOD SPURIOUS REJECTION

LOW CONVERSION LOSS, 12 dB

RFI SHIELDED

HERMETICALLY SEALED METAL CASE

LOW COST FROM $14.95 IN SMALL QUANTITIES

APPLICATIONS

WIDEBAND FREQUENCY MULTIPLIER CHAINS

LOW SPURIOUS FREQUENCY MULTIPLIER CHAINS

FM, PM MODULATION CHAINS

DOUBLE FREQUENCY RANGE OF SIGNAL GENERATORS

DESCRIPTION

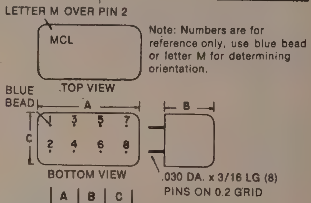
Having a volume of only .128 cu. inches, the RK series covers a very broad frequency range from 50KHz to 1000MHz. Offered at the lowest prices available in the industry, these rugged units provide low conversion loss, 12.5 dB, high spurious rejection 40 dB, and exceptional unit to unit matched performance.

The RK series offers a new degree of freedom in designing frequency multiplier chains. It's many octave band width, and excellent rejection of fundamental and third harmonics enable a significant reduction in filter requirements. In addition, it operates with 50 ohm impedances at its input and output ports and is not very sensitive to input power. It performs well from 0 dBm to +15 dBm input.

Packaged within an RFI shielded metal enclosure and hermetically sealed header, these high performance units have their pins oriented on a 0.2 inch grid.

Ruggedness and durability are built into the RK series. Only well matched hot-carrier diodes and ruggedly constructed transmission line transformers are used. Internally every component is bonded to the header and case with silicone rubber to provide super reliable protection against shock, vibration, and acceleration.

High reliability is associated with every RK unit. Every production run is 100% tested and every unit must pass our rigid inspection and high quality standards. Naturally, our 1 year guarantee applies to these units.



Note: Numbers are for reference only, use blue bead or letter M for determining orientation.

	A	B	C
INCHES	.8	.4	.4
CM	2	1	1

WEIGHT 5.2 grams .18 ounces

PIN CONNECTIONS	RK-2 RK-3
INPUT (Connect all pins together)	1, 3, 4
OUTPUT	8
GROUND	2,5,6,7

ABSOLUTE MAXIMUM RATINGS

Total Input Power	100 mW
Operating & Storage Temperature	−55° C to +100° C
Pin Temperature (10 seconds) 510° F	

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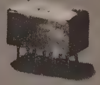
FREQUENCY DOUBLERS

Broadband
(9 Octaves)

RK Series

RK-2	1-1000 MHz	(5-24)	$15.95
RK-3	.05-300 MHz	(5-24)	$14.95

FAST DELIVERY
From stock, one week max



For connector version see G K series

MODEL RK-2

Frequency Range, MHz

Input	1 — 500
Output	2 — 1000

RF Input Power

Nominal	+7dBm
Full Range	+1dBm — +15dBm

Conversion Loss, dB	Typical	Maximum
1 — 100 MHz	13dB	15dB
100 — 300 MHz	13.5dB	15.5dB
300 — 500 MHz	14.0dB	16.5dB

Spurious Harmonic Ouput, dB
(Relative to F_2)

	F_1		F_3		F_4	
	Typ.	Max.	Typ.	Max.	Typ.	Max.
2 — 200 MHz	−40	−30	−50	−40	−16	−12
200 - 600 MHz	−25	−20	−40	−30	−16	−12
600 - 1000 MHz	−20	−15	−30	−25	−16	

Impedance, All Ports 50 ohms

MODEL RK-3

Frequency Range, MHz

Input	0.05 — 150
Output	0.1 — 300

RF Input Power

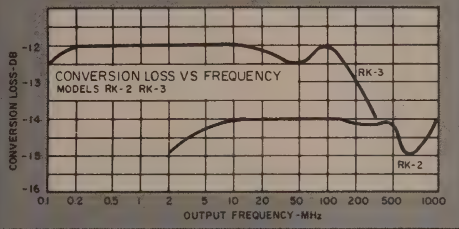
Nominal	+7dBm
Full Range	0dBm to +13dBm

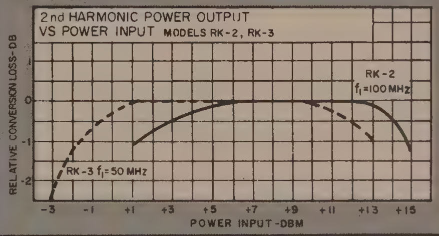
Conversion Loss, dB	Typical	Maximum
0.05 — 50 MHz	11dB	13dB
50 — 150 MHz	11.5dB	15dB

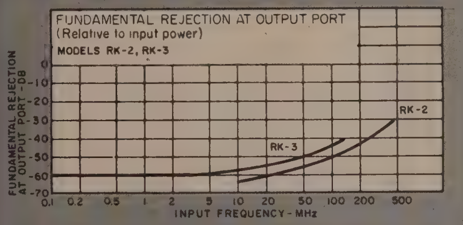
Spurious Harmonic Output, dB
(Relative to F_2)

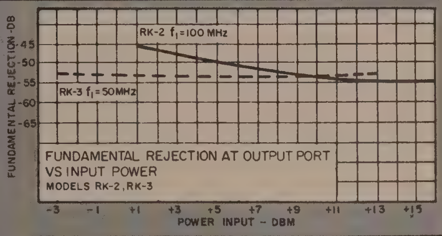
	F_1		F_3		F_4	
	Typ.	Max.	Typ.	Max.	Typ.	Max.
0.1 -100 MHz	−40	−30	−45	−30	−16	−12
100-300 MHz	−35	−20	−40	−20	−16	−12

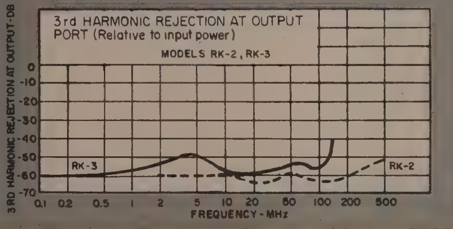
Impedance, All Ports 50 ohms

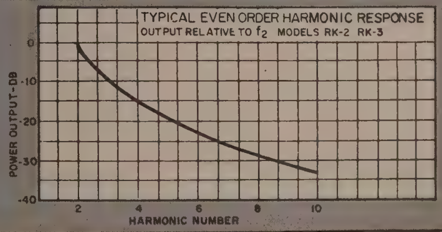












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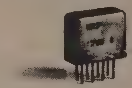
INTRODUCTION TO **AK** SERIES
MINIATURE FREQUENCY DOUBLERS

Broadband
(9 Octaves)

AK Series

AK-2 1-1000 MHz (5-24) $19.95

FAST DELIVERY
From stock; one week max.



For connector version see MK series

FEATURES

- MICRO-MINIATURE SIZE, .04 CU. INCHES
- PC BOARD AREA ONLY 0.1 SQ. INCHES
- WIDE BAND, 1-1000MHz
- EXCEPTIONALLY GOOD SPURIOUS REJECTION
- LOW CONVERSION LOSS 13.5 dB
- RFI SHIELDED
- HERMETICALLY SEALED METAL CASE
- PC BOARD MOUNTING
- LOW COST FROM $19.95 IN SMALL QUANTITIES

APPLICATIONS

- WIDEBAND FREQUENCY MULTIPLIER CHAINS
- LOW SPURIOUS FREQUENCY MULTIPLIER CHAINS
- FM, PM MODULATION CHAINS
- DOUBLE FREQUENCY RANGE OF SIGNAL GENERATORS

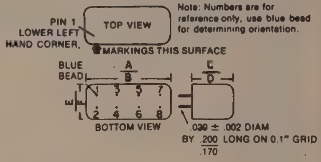
DESCRIPTION

Representing a performance and price breakthrough in micro-miniature frequency doublers the AK series covers the frequency range 1 to 1000MHz.
The AK series offers high performance of extra wide bandwidth, low conversion loss, and high spurious rejection. These tiny units offer fundamental rejection of greater than 25 dB and conversion loss of 12.5 dB! The AK series performs with a 50 ohm impedance at all ports and has a operating and storage temperature range from −55° C to +100° C.

The AK units require less PC area than a flat-pack or TO-5 can. For example, consider a 2×2 sq. in. PC board. You can mount 16 standard flat-packs (including room for lead bending), or 23 TO-5 cans (considering the space required for the tab), or 36 Mini-Circuits microminiature AK's

The AK units are packaged within an EMI shielded metal enclosure and hermetically sealed header (enclosure is 0.5 by 0.2 by 0.4 in.) Its pins are oriented on a 0.1 inch grid for printed circuit board mounting. Only well matched hot-carrier diodes and rugged transmission line transformers are used. Internally, silicone rubber is incorporated as an insulator against any wire shorts and to provide protection against shock, and vibration.

High reliability is characteristic of the AK series. Each unit carries with it a one year warranty by MCL.



Note: Numbers are for reference only, use blue bead for determining orientation.

	A	B	C	D	E	F
INCHES	.500	.480	.405	.390	.230	.210
CM	1.27	1.22	1.03	.99	.58	.53

WEIGHT 1.9 grams .07 ounces

PIN CONNECTIONS	AK-2
INPUT (Connect all pins together)	1, 3, 4
OUTPUT	8
GROUND	2,5,6,7

ABSOLUTE MAXIMUM RATINGS

Total Input Power	100 mW
Operating and Storage Temperature	−55° C to +100° C
Pin Temperature (10 seconds)	510° F

Mini-Circuits Laboratory

MINIATURE FREQUENCY DOUBLERS

Broadband

(9 Octaves)

AK Series

AK-2 1-1000 MHz (5-24) $19.95

MODEL AK-2

Frequency Range, MHz

Input	1 — 500
Output	2 — 1000

RF Input Power

Nominal	+7dBm
Full Range	+1dBm — +15dBm

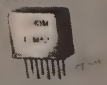
Conversion Loss, dB	Typical	Maximum
1 — 100 MHz	13dB	15dB
100 — 300 MHz	13.5dB	15.5dB
300 — 500 MHz	14.0dB	16.5dB

Spurious Harmonic Ouput, dB
(Relative to F_2)

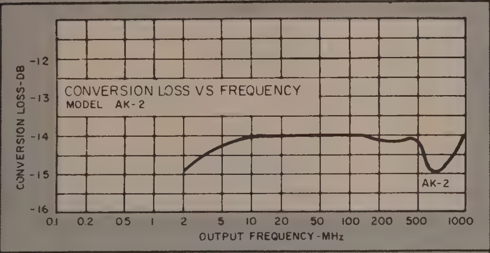
	F_1		F_3		F_4	
	Typ.	Max.	Typ.	Max.	Typ.	Max.
2 — 200 MHz	−40	−30	−50	−40	−16	−12
200 - 600 MHz	−25	−20	−40	−30	−16	−12
600 - 1000 MHz	−20	−15	−30	−25	−16	

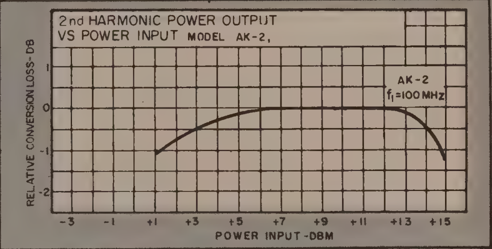
Impedance, All Ports 50 ohms

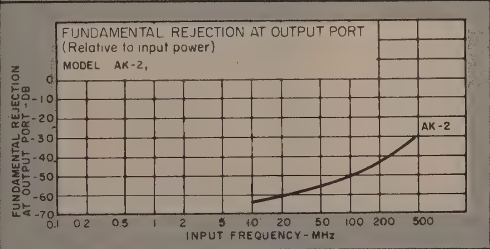
FAST DELIVERY
From stock, one week max

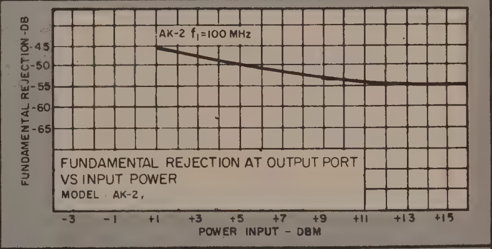


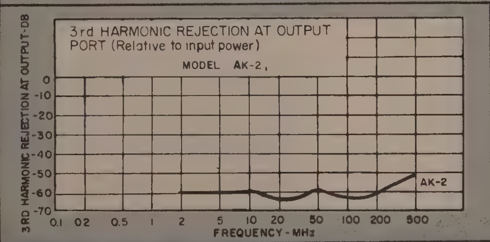
For connector version see MK series

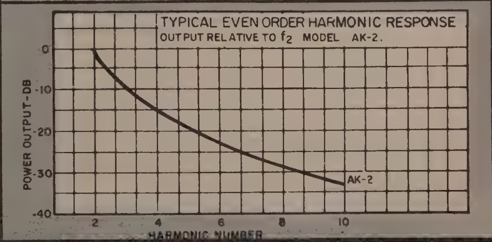

CONVERSION LOSS VS FREQUENCY
MODEL AK-2


2nd HARMONIC POWER OUTPUT VS POWER INPUT MODEL AK-2,


FUNDAMENTAL REJECTION AT OUTPUT PORT (Relative to input power)
MODEL AK-2,


FUNDAMENTAL REJECTION AT OUTPUT PORT VS INPUT POWER
MODEL AK-2,


3rd HARMONIC REJECTION AT OUTPUT PORT (Relative to input power)
MODEL AK-2,


TYPICAL EVEN ORDER HARMONIC RESPONSE
OUTPUT RELATIVE TO f_2 MODEL AK-2.

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INTRODUCTION TO GK MK SERIES FREQUENCY DOUBLERS

FEATURES

WIDE BAND, .05MHz - 1000MHz

EXCEPTIONALLY GOOD SPURIOUS REJECTION

LOW CONVERSION LOSS 12dB

DIE-CAST ALUMINUM CASE

DOUBLE SHIELDED FOR RFI PROTECTION

LOW COST FROM $34.95
IN SMALL QUANTITIES

APPLICATIONS

WIDEBAND FREQUENCY MULTIPLIER CHAINS

LOW SPURIOUS FREQUENCY MULTIPLIER CHAINS

FM, PM MODULATION CHAINS

DOUBLE FREQUENCY RANGE OF SIGNAL GENERATORS

DESCRIPTION

The GK/MK series frequency doublers are economically priced while covering the very broad frequency range from 50KHz to 1000MHz. They offer low conversion loss, 12.5dB, high spurious rejection 40 dB, and exceptional unit to unit matched performance.

Available with BNC, TNC, or SMA (3mm) connectors the GK/MK series is housed in a die cast aluminum case. These rugged units are double shielded to meet your tough RFI requirements. The case is finished with a blue baked enamel per Federal Standard 595 #25109 over phosphoric etch per MIL-C-15328A.

Every unit is 100% tested and inspected under strict MCL quality control standards to ensure superior electrical performance and reliability.

Ruggedness and durability are built into the GK/MK series. Only well matched hot-carrier diodes and ruggedly constructed transmission line transformers are used. Internally, every component is bonded with silicone rubber to provide protection against shock, vibration, and acceleration.

The GK/MK series offers a new degree of freedom in designing frequency multiplier chains. Its many octave band width, and excellent rejection of fundamental and third harmonics enable a significant reduction in filter requirements. In addition, it operates with 50 ohm impedances at its input and output ports and is not very sensitive to input power. It performs well from 0dBm to +15dBm input.

ABSOLUTE MAXIMUM RATINGS

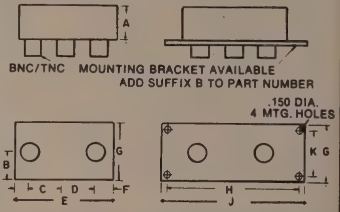
Total Input Power	100 mW
Operating and Storage Temperature	−55° C to +100° C

Broadband (9 Octaves)

GK Series (Standard Size)

GK-2	1-1000 MHz	$29.95 (1-4)
GK-3	.05-300 MHz	$27.95 (1-4)

For pin version see RK *series*



	A	B	C	D	E	F	G	H	J	K
INCHES	1.15	.63	.750	.730	2.25	.385	1.40	2.95	3.25	1.10
CM	2.9	1.6	1.9	1.85	5.7	.977	3.55	7.49	8.25	2.8

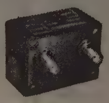
WEIGHT 74.0 grams 2.60 ounces

CONNECTORS

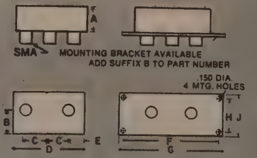
BNC	standard
TNC	on request

MK Series
(Miniature Size)

MK-2	1-1000 MHz	$39.95 (1-4)
MK-3	.05- 300 MHz	$34.95 (1-4)



For pin version see A K *series*



	A	B	C	D	E	F	G	H	J
INCHES	0.88	0.66	4.38	1.50	.312	2.19	2.50	0.84	1.15
CM	2.2	1.7	1.1	3.8	7.9	5.56	6.35	2.1	2.9

WEIGHT 34.0 grams 1.02 ounces

CONNECTORS SMA (3mm) standard

MOUNTING BRACKET

On request, add $1.50 to unit cost.
See dimensions above.

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MINIATURE FREQUENCY DOUBLERS

MODEL GK-2/MK-2

Frequency Range, MHz

Input	1 — 500
Output	2 — 1000

RF Input Power

Nominal	+7dBm
Full Range	+1dBm — +15dBm

Conversion Loss, dB	Typical	Maximum
1 — 100 MHz	13dB	15dB
100 — 300 MHz	13.5dB	15.5dB
300 — 500 MHz	14.0dB	16.5dB

Spurious Harmonic Ouput, dB
(Relative to F_2)

	F_1		F_3		F_4	
	Typ.	Max.	Typ.	Max.	Typ.	Max.
2 — 200 MHz	−40	−30	−50	−40	−16	−12
200 - 600 MHz	−25	−20	−40	−30	−16	−12
600 - 1000 MHz	−20	−15	−30	−25	−16	

Impedance, All Ports 50 ohms

MODEL GK-3/MK-3

Frequency Range, MHz

Input	0.05 — 150
Output	0.1 — 300

RF Input Power

Nominal	+7dBm
Full Range	0dBm to +13dBm

Conversion Loss, dB	Typical	Maximum
0.05 — 50 MHz	11dB	13dB
50 — 150 MHz	11.5dB	15dB

Spurious Harmonic Output, dB
(Relative to F_2)

	F_1		F_3		F_4	
	Typ.	Max.	Typ.	Max.	Typ.	Max.
0.1 - 100 MHz	−40	−30	−45	−30	−16	−12
100 - 300 MHz	−35	−20	−40	−20	−16	−12

Impedance, All Ports 50 ohms

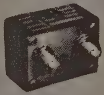
Broadband
(9 Octaves)

GK Series

GK-2	1-1000 MHz	$29.95 (1-4)
GK-3	.05-300 MHz	$27.95 (1-4)

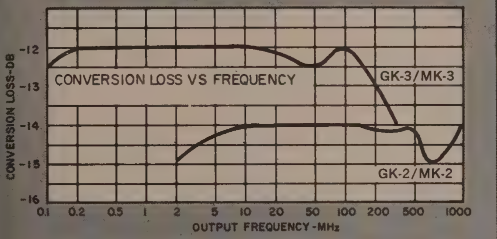
MK Series

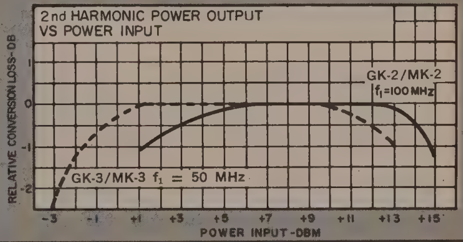
MK-2	1-1000 MHz	$39.95 (1-4)
MK-3	.05- 300 MHz	$34.95 (1-4)

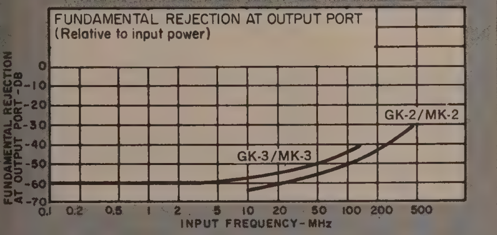


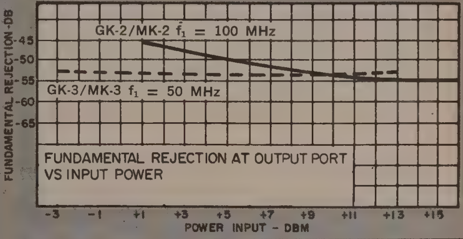
For pin version see RK/AK series

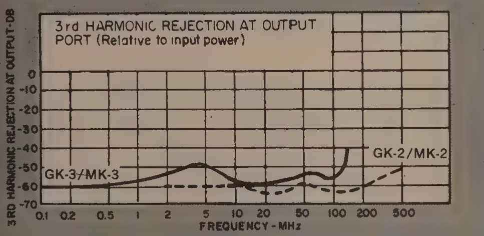
FAST DELIVERY
From stock, one week max

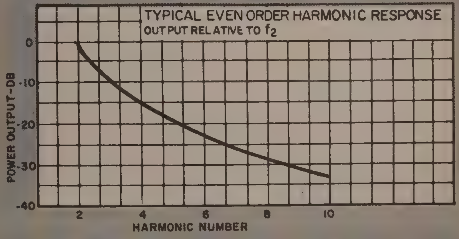












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INTRODUCTION TO PAS SERIES
ELECTRONIC ATTENUATOR/SWITCH

PAS Series

PAS-1	5-450 MHz	$27.95 (5-24)
PAS-3	1-200 MHz	$28.95 (5-24)

FAST DELIVERY
From stock, one week max.

For connector version see ZAS series

FEATURES

MINIATURE SIZE, .128 CU. INCHES

BROAD FREQUENCY RANGE
1 - 450 MHz

HIGH ON/OFF RATIOS, 50 dB

LOW INSERTION LOSS, 1.5 dB

ULTRA-LOW DISTORTION, INTERCEPT POINT +45 dBm

HERMETICALLY SEALED METAL CASE

PC BOARD MOUNTING

LOW COST FROM $27.95
IN SMALL QUANTITIES

APPLICATIONS

ELECTRONIC SWITCHING

CURRENT CONTROLLED ATTENUATION

BI-PHASE MODULATION

POWER LEVELING

DESCRIPTION

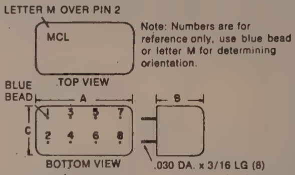
The PAS series of electronic attenuators enable attenuation control of AF signals with a maximum of only 20 mA of control current. Due to the specific properties of the PAS attenuators, for a single frequency input all harmonics even and odd order, are virtually eliminated at the output.
As a consequence, the PAS intercept point is greater than +45 dBm.

Having a volume of only .128 cu. inches, the PAS series covers a very broad frequency range from 1-450 MHz Offered at the lowest prices available in the industry, these rugged units provide low insertion loss, 1.5dB, high isolation 50 dB, and exceptional unit to unit matched performance.

Packaged within an RFI shielded metal enclosure and hermetically sealed header, these high performance units have their pins oriented on a 0.2 inch grid.

Ruggedness and durability are built into the PAS series. Only well matched diodes and ruggedly constructed transmission line transformers are used. Internally every component is bonded to the header and case with silicone rubber to provide super reliable protection against shock, vibration, and acceleration.

High reliability is associated with every PAS series attenuators. Every production run is 100% tested and every unit must pass our rigid inspection and high quality standards. Naturally, our 1 year guarantee applies to these units.



Note: Numbers are for reference only, use blue bead or letter M for determining orientation.

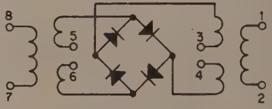
	A	B	C
INCHES	.8	.4	.4
CM	2	1	1

WEIGHT 5.2 grams .18 ounces

PIN CONNECTIONS

	PAS-1 PAS-3
Output	8
Input	1
Control	3,4
Ground	2,5,6,7
Case Ground	2

NOTE: PINS 3 AND 4 MUST BE CONNECTED TOGETHER



ABSOLUTE MAXIMUM RATINGS

Total Input Power	1 W
Total Input, Current Peak	40 mA
Operating & Storage Temperature	−55° C to +100° C

Pin Temperature (10 seconds) 510° F

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ELECTRONIC ATTENUATOR/SWITCH

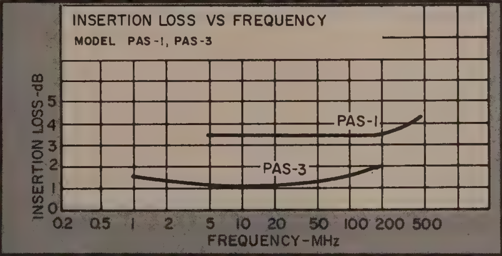
		MODEL PAS-1		MODEL PAS-3	
Frequency Range, MHz	OUTPUT	5-450		1-200	
	INPUT	5-450		1-200	
	CONTROL	DC-0.05		DC-0.05	
Insertion Loss, dB		Typical	Maximum	Typical	Maximum
One Octave From Band Edge		3.5	4.0	1.4	2.0
Total Range		3.5	4.7	1.6	2.5
Signal, 1dB Compression Level		Greater than 1 Watt			
Isolation, dB		Typical	Minimum	Typical	Minimum
Lower Band Edge to One Decade Higher	IN-OUT	65	50	65	50
	IN-CON.	35	25	35	25
Mid Range	IN-OUT	45	35	50	40
	IN-CON.	25	15	20	15
Upper Band Edge to One Octave Lower	IN-OUT	35	25	50	40
	IN-CON.	20	10	15	10
Impedance, All Ports		50 ohms		50 ohms	

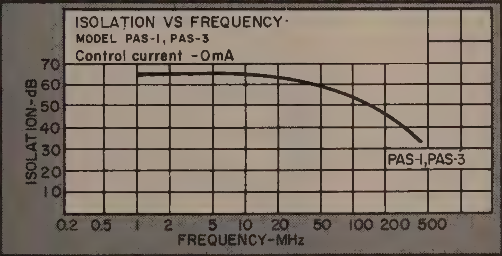
PAS Series

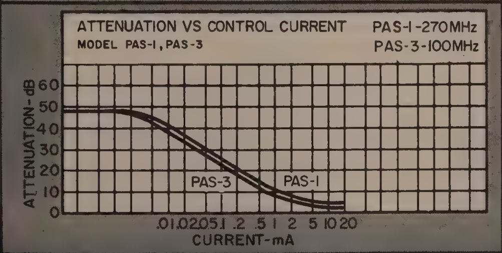
PAS-1	5-450 MHz	$27.95 (5-24)
PAS-3	1-200 MHz	$28.95 (5-24)

FAST DELIVERY
From stock, one week max.

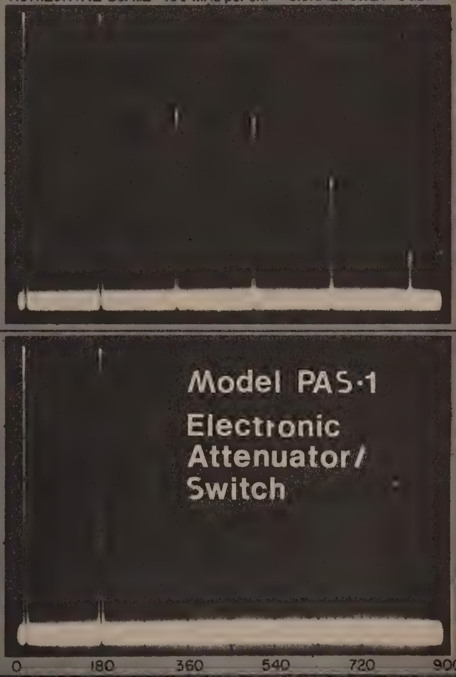
For connector version see ZAS series







TYPICAL HARMONIC SPECTRUM COMPARING ATTENUATORS-CONTROL CURRENT SET FOR 10dB ATTEN.
SIGNAL FREQUENCY- 180MHz VERTICAL SCALE-10 dB per cm
HORIZONTAL SCALE- 100 MHz per cm SIGNAL POWER- 0 dBm



World's largest supplier of double balanced mixers

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Mini-Circuits Laboratory

INTRODUCTION TO ZAS ZMAS SERIES
ELECTRONIC ATTENUATOR/SWITCH

FEATURES

BROAD FREQUENCY RANGE
1 - 450 MHz
1 - 1000 MHz

HIGH ON/OFF RATIOS, 50 dB

LOW INSERTION LOSS, 1.5 dB

ULTRA-LOW DISTORTION,
INTERCEPT POINT +45 dBm

DIE-CAST ALUMINUM CASE

DOUBLE SHIELDED FOR
RFI PROTECTION

LOW COST FROM $42.95
IN SMALL QUANTITIES

APPLICATIONS

ELECTRONIC SWITCHING

CURRENT CONTROLLED
ATTENUATION

BI-PHASE MODULATION

POWER LEVELING

DESCRIPTION

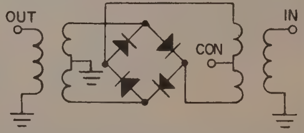
The ZAS/ZMAS series of electronic attenuators enable attenuation control of RF signals with a maximum of only 20 mA of control current. Due to the specific properties of the ZAS/ZMAS attenuators, for a single frequency input all harmonics even and odd order, are virtually eliminated at the output. As a consequence, the ZAS/ZMAS intercept point is greater than +45 dBm.

The ZAS/ZMAS series mixers are economically priced while covering the very broad frequency range from 1 - 450 MHz. They offer low insertion loss, 1.5 dB, high isolation 50 dB, and exceptional unit to unit matched performance.

Available with BNC, TNC, or SMA (3 mm) connectors the ZAS/ZMAS series is housed in a die cast aluminum case. These rugged units are double shielded to meet your tough RFI requirements. The case is finished with a blue baked enamel per Federal Standard 595 #25109 over phosphoric etch per MIL-C-15328A.

Every unit is 100% tested and inspected under strict MCL quality control standards to ensure superior electrical performance and reliability.

Ruggedness and durability are built into the ZAS/ZMAS series. Only well matched diodes and ruggedly constructed transmission line transformers are used. Internally, every component is bonded with silicone rubber to provide protection against shock, vibration and acceleration.



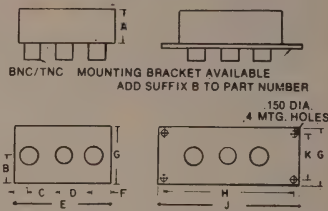
ABSOLUTE MAXIMUM RATINGS

Total Input Power	1 W
Total Input, Current Peak	40mA
Operating & Storage Temperature	−55° C to +100° C

ZAS Series (Standard Size)

ZAS-1	5-450 MHz	$42.95	(4-24)
ZAS-3	1-200 MHz	$43.95	(4-24)

For pin version see PAS series



	A	B	C	D	E	F	G	H	J	K
INCHES	1.15	.63	.750	.730	2.25	.385	1.40	2.95	3.25	1.10
CM	2.9	1.6	1.9	1.85	5.7	.977	3.55	7.49	8.25	2.8

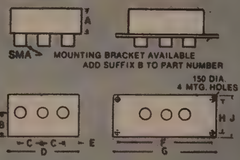
WEIGHT 74.0 grams 2.60 ounces

CONNECTORS

BNC	standard
TNC	on request

ZMAS Series (Miniature Size)

ZMAS-1	5-450 MHz	$52.95	(4-24)
ZMAS-3	1-200 MHz	$53.95	(4-24)



	A	B	C	D	E	F	G	H	J
INCHES	0.88	0.66	4.38	1.50	.312	2.19	2.50	0.84	1.15
CM	2.2	1.7	1.1	3.8	7.9	5.56	6.35	2.1	2.9

WEIGHT 5.2 grams .18 ounces

CONNECTORS SMA (3mm) standard

MOUNTING BRACKET

On request, add $1.50 to unit cost.
See dimensions above.

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Mini-Circuits Laboratory

ELECTRONIC ATTENUATOR/SWITCH

		MODEL ZAS-1/ZMAS-1		MODEL ZAS-3/ZMAS-3	
Frequency Range, MHz	OUTPUT	5-450		1-200	
	INPUT	5-450		1-200	
	CONTROL	DC-0.05		DC-0.05	
Insertion Loss, dB		Typical	Maximum	Typical	Maximum
One Octave From Band Edge		3.5	4.0	1.4	2.0
Total Range		3.5	4.7	1.6	2.5
Signal, 1dB Compression Level		Greater than 1 Watt			
Isolation, dB		Typical	Minimum	Typical	Minimum
Lower Band Edge to One Decade Higher	IN-OUT	65	50	65	50
	IN-CON.	35	25	35	25
Mid Range	IN-OUT	45	35	50	40
	IN-CON.	25	15	20	15
Upper Band Edge to One Octave Lower	IN-OUT	35	25	50	40
	IN-CON.	20	10	15	10
Impedance, All Ports		50 ohms		50 ohms	

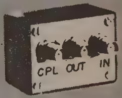
ZAS Series

ZAS-1	5-450 MHz	$42.95	(4-24)
ZAS-3	1-200 MHz	$43.95	(4-24)

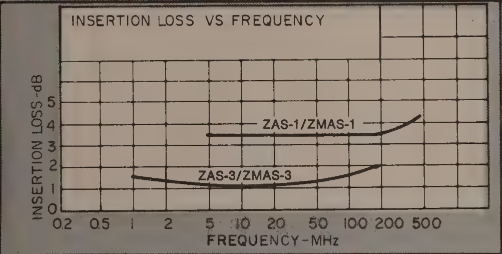
For pin version see PAS series

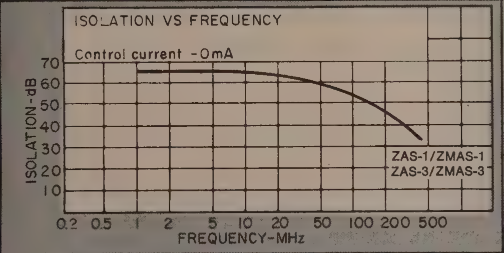
ZMAS Series

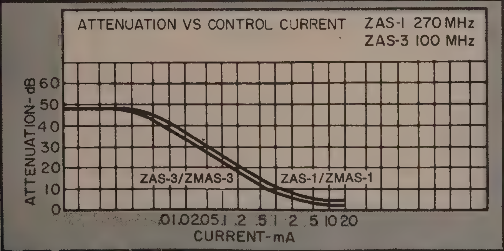
ZMAS-1	5-450 MHz	$52.95	(4-24)
ZMAS-3	1-200 MHz	$53.95	(4-24)



FAST DELIVERY
From stock, one week max.







TYPICAL HARMONIC SPECTRUM COMPARING ATTENUATORS-CONTROL CURRENT SET FOR 10dB ATTEN.
SIGNAL FREQUENCY- 180MHz VERTICAL SCALE-10 dB per cm
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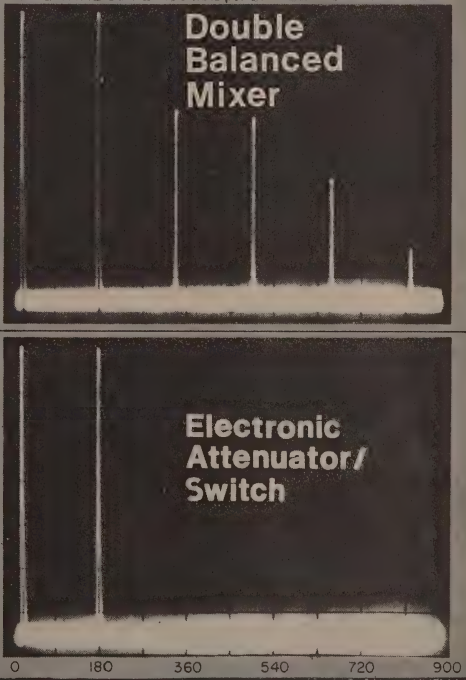

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Mini-Circuits Laboratory

RF TRANSFORMERS
PLASTIC CASE

DESCRIPTION

Mini-Circuits' T-series of micro-miniature wideband RF transformers cover the frequency range from .015 to 600 MHz. They operate with impedance levels from 12.5 ohms to 800 ohms, and provide very low insertion loss, typically less than 0.5dB.

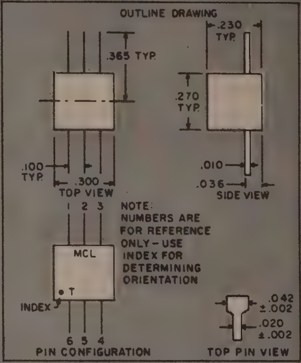
T SERIES

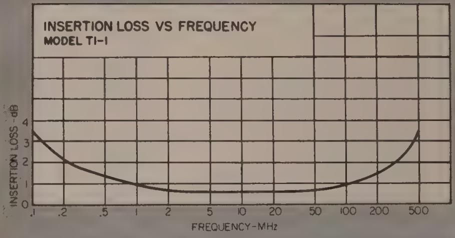
MODEL	T1-1	.15-400 MHz
MODEL	T2-1	.015-600 MHz
MODEL	T4-1	.2-350 MHz
MODEL	T9-1	.15-200 MHz
MODEL	T16-1	.3-120 MHz

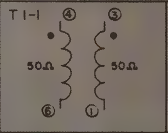
DESIGNERS KIT AVAILABLE

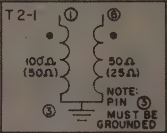
2 TRANSFORMERS OF EACH TYPE
T1-1, T2-1, T4-1, T9-1, T16-1 **$32.00**

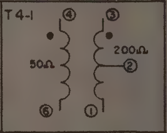
Model	T1-1	T2-1	T4-1	T9-1	T16-1
Impedance Ratio	1	2	4	9	16
Primary Impedance, ohms	50	50	50	50	50
Maximum Insertion Loss, dB					
1 dB	2-50 MHz	.05-200 MHz	2-100 MHz	2-40 MHz	5-20 MHz
2 dB	.35-200 MHz	.02-400 MHz	.35-300 MHz	.3-150 MHz	.7-80 MHz
3 dB	.15-400 MHz	.015-600 MHz	.2-350 MHz	.15-200 MHz	.3-120 MHz
Maximum Amplitude Unbalance, T4-1					
.1 dB			5-100MHz		
.5 dB			5-300MHz		
Maximum Phase Unbalance, T4-1					
1°			5-100MHz		
5°			5-300MHz		
MAXIMUM RATINGS FOR T-SERIES Operating and Storage Temperature −54°C to +100°C Pin Temperature (10 Sec) 500°F Input Power 1/4 watt					
WEIGHT .04 grams .01 ounces					
PRICE (10-49)	T1-1 $2.95	T2-1 $3.45	T4-1 $2.95	T9-1 $2.95	T16-1 $3.45
DELIVERY From Stock, One week maximum					

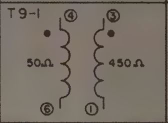

OUTLINE DRAWING
.230 TYP.
.365 TYP.
.270 TYP.
.100 TYP.
.300
TOP VIEW
.010
.036
SIDE VIEW
1 2 3
MCL
T
INDEX
6 5 4
PIN CONFIGURATION
NOTE: NUMBERS ARE FOR REFERENCE ONLY – USE INDEX FOR DETERMINING ORIENTATION
.042 ±.002
.020 ±.002
TOP PIN VIEW

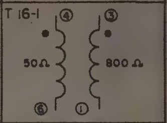


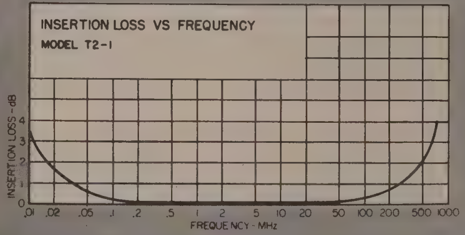

T1-1
④
③
50Ω
50Ω
⑥
①

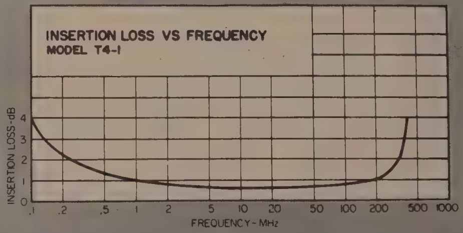

T2-1
①
⑥
100Ω
(50Ω)
50Ω
(25Ω)
NOTE: PIN ③ MUST BE GROUNDED
③

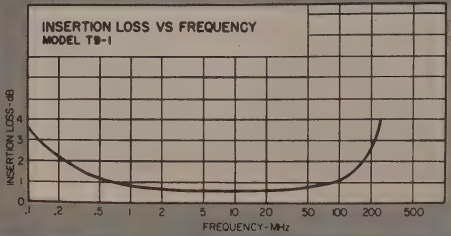

T4-1
④
③
50Ω
200Ω
②
⑥
①

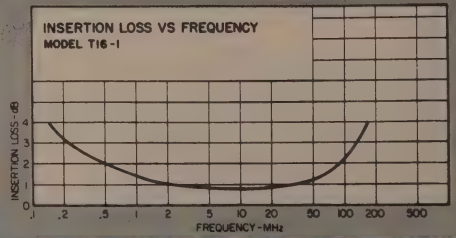

T9-1
④
③
50Ω
450Ω
⑥
①


T16-1
④
③
50Ω
800Ω
⑥
①









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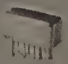
Mini-Circuits Laboratory

RF TRANSFORMERS

METAL CASE



Mini-Circuits' **TM** series of micro-miniature wideband RF transformers cover the frequency range from .015 to 600 MHz. They operate with impedance levels from 12.5 ohms to 800 ohms, and provide very low insertion loss, typically less than 0.5dB.
The TMO series is packaged in a hermetically sealed metal case and is especially useful when rugged environments are encountered.

TMO SERIES

MODEL	TMO 1-1	.15-400 MHz
MODEL	TMO 2-1	.015-600 MHz
MODEL	TMO 4-1	.2-350 MHz
MODEL	TMO 9-1	.15-200 MHz
MODEL	TMO16-1	.3-120 MHz

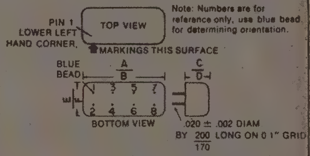
Model	TMO 1-1	TMO 2-1	TMO 4-1	TMO 9-1	TMO 16-1
Impedance Ratio	1	2	4	9	16
Primary Impedance, ohms	50	50	50	50	50
Maximum Insertion Loss, dB					
1 dB	2-50 MHz	.05-200 MHz	2-100 MHz	2-40 MHz	5-20 MHz
2 dB	.35-200 MHz	.02-400 MHz	.35-300 MHz	.3-150 MHz	.7-80 MHz
3 dB	.15-400 MHz	.015-600 MHz	.2-350 MHz	.15-200 MHz	.3-120 MHz
Maximum Amplitude Unbalance, .1 dB .5 dB	—	—	5-100MHz .5-300MHz	—	—
Maximum Phase Unbalance, 1° 5°	—	—	5-100MHz .5-300MHz	—	—
PRICE (10-49)	$4.95	$5.45	$4.95	$4.95	$5.45

MAXIMUM RATINGS FOR TMO-SERIES
Operating and Storage Temperature −54°C to +100°C
Pin Temperature (10 Sec) 500°F Input Power 1/4 watt

WEIGHT 1.8 grams .07 ounces

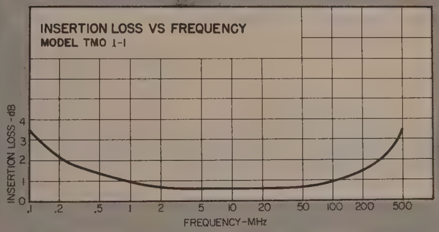
DELIVERY From Stock, One week maximum

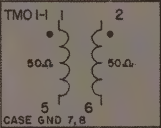
DESIGNERS KIT AVAILABLE
2 TRANSFORMERS OF EACH TYPE:
TMO 1-1, TMO 2-1, TMO 4-1
TMO 9-1, TMO 16-1 **$49.50**



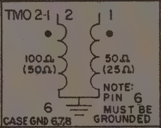
Note: Numbers are for reference only, use blue bead for determining orientation.

	A	B	C	D	E	F
INCHES	.500	.480	.255	.240	.230	.210
CM	1.27	1.22	.64	.60	.58	.53

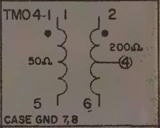

INSERTION LOSS VS FREQUENCY
MODEL TMO 1-1

TMO 1-1


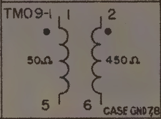
CASE GND 7, 8

TMO 2-1


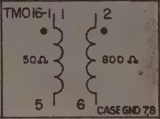
NOTE: PIN 6 MUST BE GROUNDED
CASE GND 6,7,8

TMO 4-1


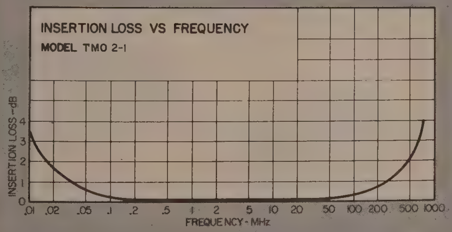
CASE GND 7, 8

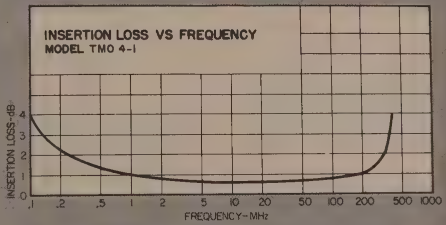
TMO 9-1


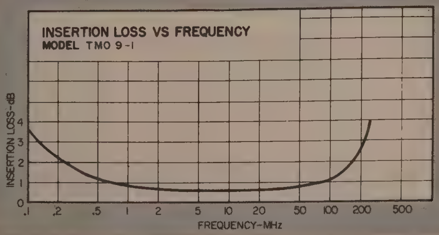
CASE GND 7,8

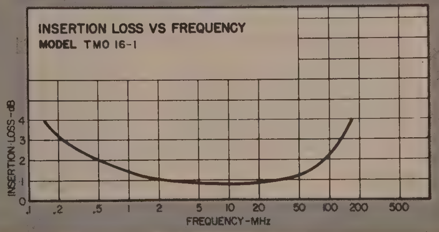
TMO 16-1


CASE GND 7,8


INSERTION LOSS VS FREQUENCY
MODEL TMO 2-1


INSERTION LOSS VS FREQUENCY
MODEL TMO 4-1


INSERTION LOSS VS FREQUENCY
MODEL TMO 9-1


INSERTION LOSS VS FREQUENCY
MODEL TMO 16-1

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WIDEBAND POWER DIVIDERS & HYBRID TRANSFORMERS

North Hills

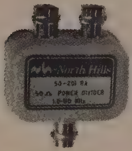
POWER DIVIDERS

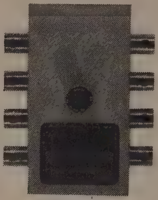
0.2 - 110 and 30 - 225 MHz
2, 4, and 8-way
50 and 75 ohms

Series 01 and 10 Power Dividers are designed for low power applications in the 0.2 to 110 and 30 to 225 MHz frequency ranges.

Hybrid Junction Techniques are employed to assure superior isolation and minimal insertion loss. VSWR is optimized at all ports.

50 and 75 ohm impedances are standard. Other impedances available on special order.



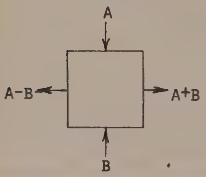


North Hills

	2-WAY				4-WAY				8-WAY			
Model	50-201RA	75-201RA	50-210RA	75-210RA	50-401RB	75-401RB	50-410RB	75-410RB	50-801SA	75-801SA	50-810SA	75-810SA
Impedance (Ω)	50	75	50	75	50	75	50	75	50	75	50	75
Frequency Range (MHz)	0.2 - 110		30 - 225		0.2 - 110		30 - 225		0.2 - 110		30 - 225	
Insertion Loss (dB)	0.25		1.0		0.5		1.0		1.0		1.5	
Isolation (dB min)	30		30		30		30		30		30	
Amplitude Balance (± dB)	0.5		0.5		0.5		0.5		1.0		0.5	
Phase Balance (± °)	0.5		2.0		1.0		2.0		0.5		2.0	
Input VSWR	1.1		1.25		1.1		1.25		1.1		1.25	
Input Power (watts)	5		3		5		3		5		3	
Case Style	RA		RA		RB		RB		SA		SA	
Weight (gm)	50		50		65		65		160		160	

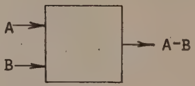
HYBRID TRANSFORMERS

SUM & DIFFERENCE (4-port)



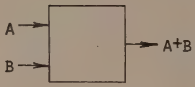
Port Impedance Type	50Ω 50-212RE	75Ω 75-212RE
Frequency Range	0.2 - 110 MHz	
Insertion Loss	1 dB max	
Isolation	30 dB min	
Amplitude Balance	±.3 dB	
Phase Balance	1° max	
VSWR	1.20 max	
Power	0.5 watt max	

DIFFERENCE DIVIDER (3-port)



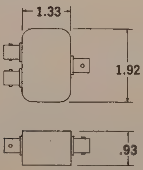
Port Impedance Type	50Ω 50-221RA	75Ω 75-221RA
Frequency Range	.2 - 110 MHz	
Insertion Loss	1 dB max	
Isolation	30 dB min	
Null	40 dB min	
VSWR	1.20 max	
Power	0.5 watt max	

SUMMING JUNCTION (3-port)

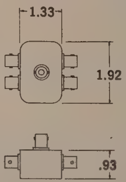


Port Impedance Type	50Ω 50-231RA	75Ω 75-231RA
Frequency Range	.2 - 110 MHz	
Insertion Loss	.5 dB max	
Isolation	30 dB min	
Amplitude Balance	±0.5 dB	
Phase Balance	±.5°	
VSWR	1.20 max	
Power	0.5 watt max	

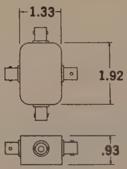
CASE STYLES



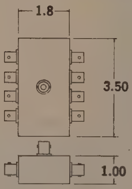
RA



RB



RE



SA

BNC Connectors are standard. Other connectors available on special order. Stud mounting standard.

Different case styles, including printed circuit types with solder terminals, available on special order.

SPECIAL UNITS

In addition to our standard lines, North Hills custom designs to specific requirements. Examples of these include:

- Active unity – or high-gain power splitters, adders and combiners.
- High power dividers.
- Power dividers for video applications with response down to 1 kHz.
- Non-standard impedances.

North Hills Electronics, INC.
GLEN COVE, N.Y. 11542 • 516-671-5700

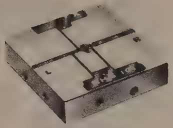
See Section 5600 for North Hills Wideband Transformers.

RHG

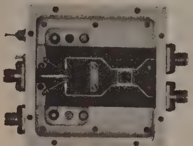
for newest designs & widest selections

MIC MIXERS & MIXER PREAMPS:

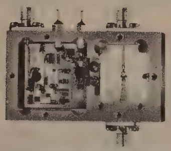
DOUBLE BALANCED • 1-18 GHz Coverage • IF's to 8 GHz • Starved LO operation • Noise Figures to 3.0 dB • Image Rejection • Drop-in mixers



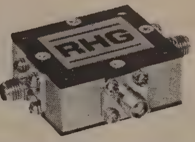
"Drop-In" Mixers
Supplied without housing
for Microstrip assemblies



"QUIET" (ultra low noise) Mixers
Noise figure to 3.0 dB
20 dB Image rejection
L thru X Band

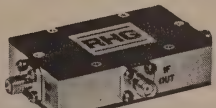


"Double Balanced" Mixer-Preamps
Over 150 standard
RF/IF combinations
L thru K band

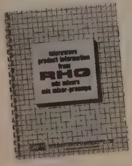


"QUAD-LINE" (extended IF) Mixers
2-18 GHz RF
0.5-8 GHz IF
+20 dBm intercept

Multi-Octave "Starved LO" Mixers
2-18 GHz RF
−10 dBm LO
Usable 1 to 26 GHz



"Double-balanced" Mixers
1-18 GHz coverage
Isolation 20 dB

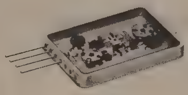


Comprehensive technical information, data sheets and application notes on MIC mixers and mixer preamps is contained in a special RHG catalog. Ask for a copy.

IF AMPLIFIERS:

LIN-LOG-LIMITING • Hybrid IC and discrete • Preamps from 10 MHz to 2 GHz • Linear amps with AGC and Video • Log amps to 1 GHz & octave BWs • Video amps —DC to 40 MHz • Constant phase limiters • Limiter-discriminators

Log IF Amplifiers — Discrete Component
10-200 MHz Center Frequency
3-100 MHz Bandwidths
60-90 dB dynamic range

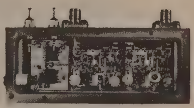


Hybrid IC IF Preamplifiers
10 to 300 MHz Center Frequency
2 to 300 MHz Bandwidths
Noise figure to 1.1 db

Linear IF Amplifiers — Discrete Component
10-160 MHz Center Frequency
2-40 MHz Bandwidths
IF & Video Outputs

Hybrid IC Limiting IF Amplifiers
10-160 MHz Center Frequency
±1 dB out for >70 dB in
low phase shift

Hybrid IC Log IF Amplifiers
10-1000 MHz Center Frequency
2-200 MHz Bandwidths
50-80 dB dynamic range



Hybrid IC Linear IF Amplifiers
10-160 MHz Center Frequency
2-40 MHz Bandwidths
IF & Video Outputs

Detailed product information on preamplifiers, log, linear and limiting amplifiers, limiter — discriminators is available in a special IF Amplifier Catalog. Call or write for a copy.

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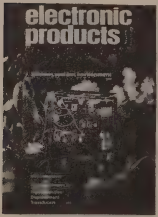

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COMPONENTS & SUBSYSTEMS

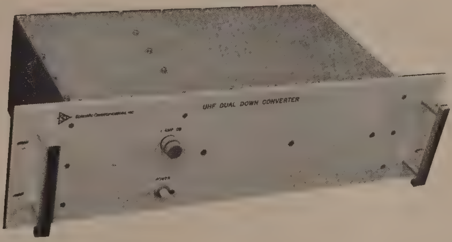
TRANSISTOR AMPLIFIERS

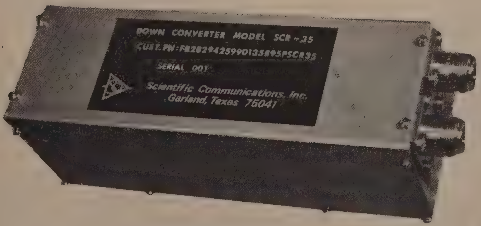
SCI components group produces several series of low-noise, cost effective solid state amplifiers from 0.5 MHz to 4 GHz. Available in a variety of mechanical packages, SCI transistor amplifiers are designed to deliver state-of-the-art performance with high reliability under adverse operating conditions.

CUSTOM AMPLIFIERS

SCI components group invites requests to modify standard series amplifiers or to design new amplifiers to meet special requirements. Our broad experience in all areas of amplifier design and fabrication enable SCI to perform these services with short turn around time at a modest increase in cost over our standard products.

DOWN CONVERTERS

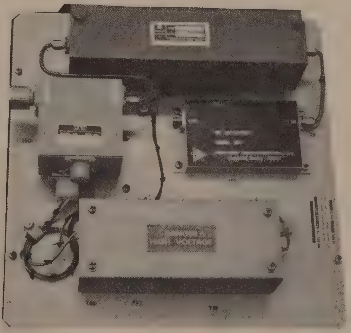

UHF DUAL DOWN CONVERTER


DOWN CONVERTER MODEL SCR-35
CUST. PN: FB2829425990135895PSCR35
SERIAL 001
Scientific Communications, Inc.
Garland, Texas 75041

OTHER COMPONENTS/SUBSYSTEMS

SCI also manufactures other products from PIN attenuators and log amplifiers thru downconverters and complete radar front ends.

RADAR FRONT ENDS



Scientific Communications, Inc.

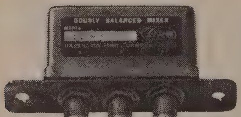
PARAMETRIC AMPLIFIERS•TRANSISTOR AMPLIFIERS•SURVEILLANCE RECEIVERS•MANAGEMENT CONTROL COMPUTERS

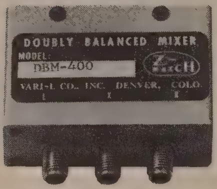
3425 KINGSLEY ROAD, GARLAND, TEXAS, 75041
(214) 271-3685 TWX 910-860-5172

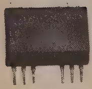
Z-MATCH

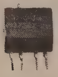
DOUBLY BALANCED MIXERS

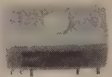
DOUBLY BALANCED MIXER
MODEL:
VARI-L CO., INC. DENVER, COLO.











THE DOUBLY BALANCED MIXERS

Low Noise Figure
Flat Conversion Efficiency
Low Intermodulation Products
Wide Bandwidth
High Isolation
Low Insertion Noise

Mixing two signals to produce a sum and a difference frequency requires a square-law device, and a diode has long been used for this purpose. Because it departs from true square-law behavior over much of its range, it produces products other than those desired, and it also feeds energy through from one port to another. The balanced mixer was developed to overcome these shortcomings, and its advantages are so numerous that it has become a standard component in most high-performance receivers. It is also valuable in the design of such high-reliability items as aircraft navigational equipment, microwave links, spectrum analyzers, etc. It would be out of the question to meet modern military equipment specifications, particularly as regards oscillator radiation from the antenna and intermodulation distortion, without the doubly balanced mixer. These advantages would also be desirable in equipment such as television receivers, CATV distribution circuits, and amateur communications receivers, but high cost has been a deterrent to using balanced mixers in such service. In recent months Vari-L Co., Inc. has been making strides toward a marked cost reduction in the device, and we invite inquiries from set designers who might like advance information.

NEW HIGH LEVEL DOUBLY BALANCED MIXERS

Recently balanced mixers have been developed containing networks which greatly improve their ability to handle, linearly, high RF signal levels. These designs have lower harmonic spurious outputs as well as improved odd order intermodulation production. Other characteristics parallel the low level types except that higher local oscillator drive levels are recommended.

APPLICATIONS:

MODULATOR

Because one port is coupled to DC, the doubly balanced mixer may be used as a pulse modulator with unlimited pulse duration. RF input is made to port L, modulation to port X, and the output from port R. Total current should not exceed 50 ma. The modulator has a 35 dB on/off ratio at f_{max} (greater at the lower frequencies) and a turn-on/turn-off time of less than one nanosecond. As an AM modulator, with the X port used for the modulation-signal input, the mixer has excellent carrier rejection at high frequencies. The carrier may be reinserted after the modulator, or will feed through the mixer in controlled amounts if a DC bias (suitably isolated from the modulation source) is introduced into the X port.

CURRENT-CONTROLLED ATTENUATOR

By the use of a DC bias as described above, the mixer can function as a current/voltage controlled attenuator. With zero current into the X port the attenuation of an RF signal of frequency up to the specified f_{max} will be at least 35 dB, reducing to approximately 3 dB when the bias current is increased to 10 ma. Response time is less than one nanosecond. The signal is introduced to the R port and the output taken from the L port.

PHASE DETECTOR

Because the X port is DC coupled, it is possible to extract a DC voltage as a function of the phase difference between two signals. Minimal 1/f noise is introduced, because of the inherent low-noise quality of the diodes, and their superior balance makes a DC adjustment of the phase detector unnecessary. The DC output is approximately 0 VDC when the L and R port signal phase relationship is $\phi = 90°$, and approximately ±.4 VDC for $\phi = 0$ or 180° phase conditions.

CONSTRUCTION

Z-match mixers are packaged in several case styles allowing the design engineer maximum layout flexibility. Most types are encapsulated to withstand severe environments and handling. High-rel screened diodes are employed throughout, as well as approved design tested materials. Write factory sales for appropriate bulletin.

Figures 8 and 9 are performance curves which are useful in selecting a mixer for a given application.

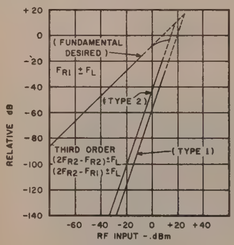


FIGURE 8
TYPICAL THIRD ORDER INTERMODULATION PERFORMANCE

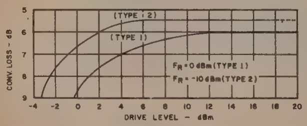


FIGURE 9
GENERAL PURPOSE DESIGN CURVE

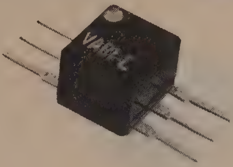
VARI-L CO., INC. • 3883 MONACO PARKWAY • DENVER, COLORADO 80207 • (303) 321-1511 • TWX 910-931-0590

DOUBLY BALANCED MIXERS (CONT.)

Z-MATCH

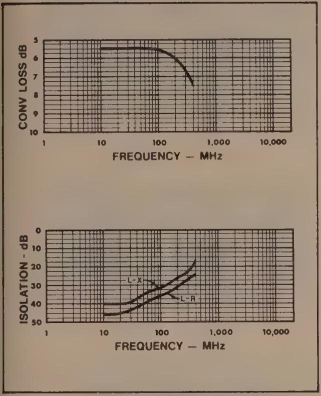
(1) OVERALL FREQ. RANGES (MHz)	(2) FREQ. BANDS (MHz)	(3) CON-VERSION LOSS SSBNF (dB, MAX.)	(4) ISOLATION (dB, MIN.)			PRICE
			LO-RF	LO-IF	RF-IF	
R&L: .4-400	.4-25	6.5	35	30	25	$18.00
X: DC-400	25-200	7	25	20	20	
X: DC-400	200-400	8.5	20	20	15	

DBM-140

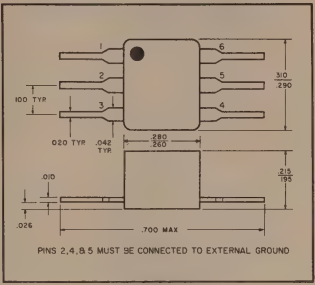


ULTRA MINIATURE DOUBLY BALANCED MIXER

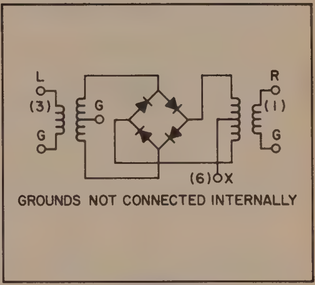
- .4-400 MHz
- ULTRA MINIATURE
- 6dB TYPICAL CONVERSION LOSS
- RUGGED-ENCAPSULATED
- CONVENIENT P.C. BOARD MOUNTING



TYPICAL PERFORMANCE


1
2
3
6
5
4
100 TYP
020 TYP
.042 TYP
310
.290
.280
.260
.010
.026
.215
195
.700 MAX
PINS 2,4,& 5 MUST BE CONNECTED TO EXTERNAL GROUND

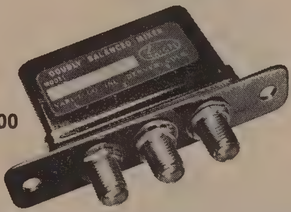
PACKAGE


L
(3)
G
G
R
(1)
G
(6)
X
GROUNDS NOT CONNECTED INTERNALLY

SCHEMATIC

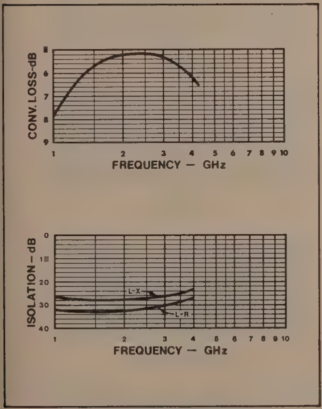
(1) OVERALL FREQ. RANGES (MHz)	(2) FREQ. BANDS (MHz)	(3) CON-VERSION LOSS SSBNF (dB, MAX.)	(4) ISOLATION (dB, MIN.)			PRICE
			LO-RF	LO-IF	RF-IF	
R&L: 1700-4200	2000-4000	6.5	25	25		$125.00
X: DC-1200	1700-4200	8.0	20	20		

DBM-500

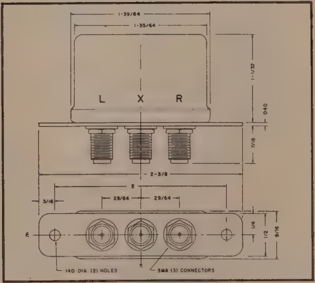

DOUBLY BALANCED MIXER

MICROWAVE DOUBLY BALANCED MIXER

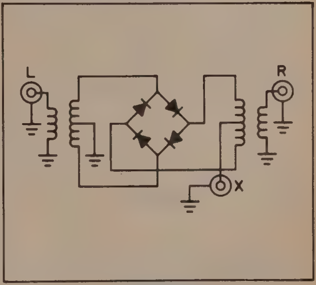
- 1.7-4.2 GHz
- 6dB TYPICAL CONVERSION LOSS
- SMA CONNECTOR PACKAGE



TYPICAL PERFORMANCE


1-39/64
1-35/64
L
X
R
1-1/32
040
7/16
2-3/8
2
3/16
29/64
29/64
1/4
1/2
9/16
.140 DIA (2) HOLES
SMA (3) CONNECTORS

PACKAGE



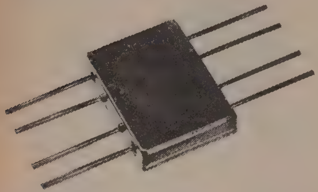
SCHEMATIC

Z-MATCH

DOUBLY BALANCED MIXERS (CONT.)

DBM-183

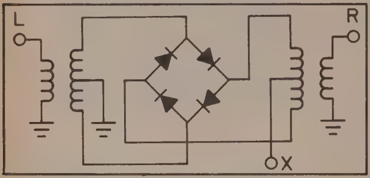
OVERALL FREQ. RANGES (MHz)	CON-VERSION LOSS SSBNF (dB, MAX.)	ISOLATION (dB, MIN.)			PRICE
		LO-RF	LO-IF	RF-IF	
R 20-2500 L 20-3500 X DC-2500	9.0	20	20	20	$165.00



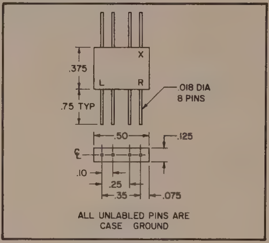
SUBMINIATURE FLATPACK DOUBLY BALANCED MIXER

- 20-3500 MHz
- .125″ HIGH
- 7 dB TYPICAL CONVERSION LOSS
- +17 dBm 3rd ORDER INTERCEPT POINT
- RUGGED-ENCAPSULATED

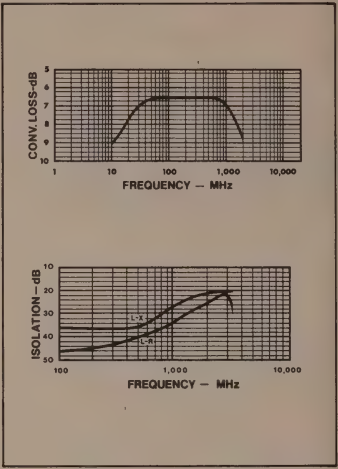
Conversion Loss: 9.0 dB Max. ($20 \leq f_R \leq 2100$ MHz)
Third Order Intercept Point: +17 dBm typical (+10 dBm LO, −10 dBm RF)
Port Impedance: 50 ohms Nom.
LO Power Range: +7 to +20 dBm (Specs. guaranteed with +10 dBm)
Total Power Input, Max: +26 dBm @ 25°C
Operating Temperature Range: −55 to +100°C



SCHEMATIC



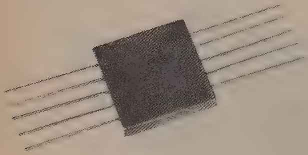
PACKAGE



TYPICAL PERFORMANCE

DBM-184

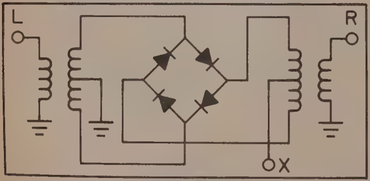
OVERALL FREQ. RANGES (MHz)	CON-VERSION LOSS SSBNF (dB, MAX.)	ISOLATION (dB, MIN.)			PRICE
		LO-RF	LO-IF	RF-IF	
R 5-2000 L 5-3000 X 2-2000	8.0	20	20	20	$165.00



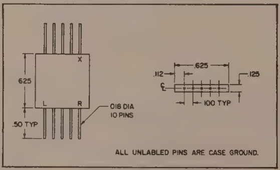
SUBMINIATURE FLATPACK DOUBLY BALANCED MIXER

- 2-3000 MHz
- .125″ HIGH
- 6.5 dB TYPICAL CONVERSION LOSS
- +20 dBm 3rd ORDER INTERCEPT POINT
- RUGGED-ENCAPSULATED

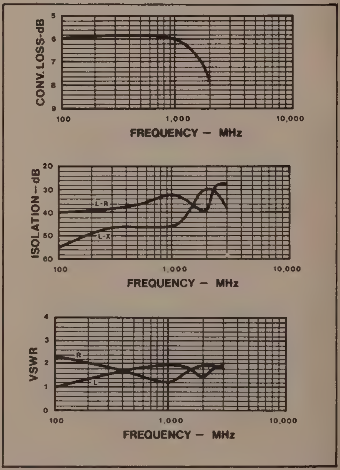
Conversion Loss:
7.0 dB Maximum, 20-1000MHz
8.0 dB Maximum, 5-2000 MHz
(R Port Frequencies)
Third Order Input Intercept Point: +20 dBm Minimum
Conditions: 1000 MHz RF Two Tone Level −5 dBm, LO Level +13 dBm, IF Frequency 5 MHz
LO Power: +10 dBm Minimum
+13 dBm Nominal
+20 dBm Maximum
Operating Temperature Range: −55°C to +85°C
Package:
⅝″square 10 lead flatpack
0.135″ Maximum height



SCHEMATIC



PACKAGE



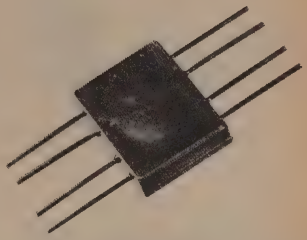
TYPICAL PERFORMANCE

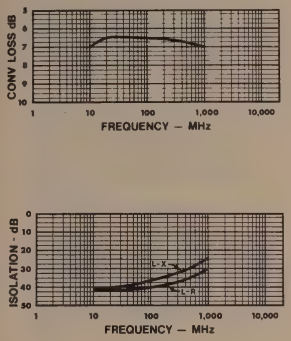
DOUBLY BALANCED MIXERS (CONT.)

Z-MATCH

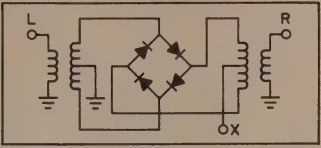
DBM-142

OVERALL FREQ. RANGES (MHz)	FREQ. BANDS	CONVERSION LOSS SSBNF (dB, MAX.)	ISOLATION (dB, MIN.)			PRICE
			LO-RF	LO-IF	RF-IF	
L-10-1000	10-200	7.5	30	25	25	$25.00
R-10-1000	200-500	7.5	30	25	20	
DC-1000	500-1000	8.0	25	20	15	





TYPICAL PERFORMANCE



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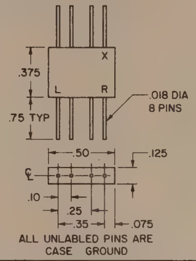
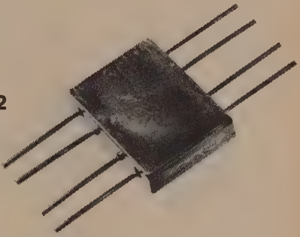

X
.375
L
R
.018 DIA
8 PINS
.75 TYP
.50
.125
℄
.10
.25
.35
.075
ALL UNLABLED PINS ARE
CASE GROUND

PACKAGE

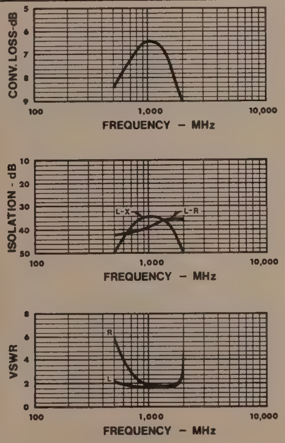
SUBMINIATURE FLATPACK DOUBLY BALANCED MIXER

- 10-1000 MHz
- .125″ HIGH
- 6.5 dB TYPICAL CONVERSION LOSS
- RUGGED-ENCAPSULATED

DBM-182



OVERALL FREQ. RANGES (MHz)	FREQ. BANDS (MHz)	CONVERSION LOSS SSBNF (dB, MAX.)	ISOLATION (dB, MIN.)			PRICE
			LO-RF	LO-IF	RF-IF	
R&L: 600-2000	600-2000	9.5	25	20	15	$50.00
X: DC-200	950-1300	7.0	25	20	15	



TYPICAL PERFORMANCE

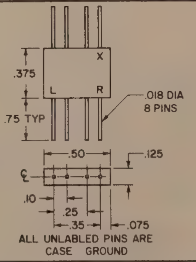
PORT IMPEDANCE: 50 OHMS — NOMINAL

MAXIMUM INPUT POWER: +20 dBm

OPERATING TEMPERATURE RANGE: −55° TO +100°C

PACKAGE: ½ x ⅜ x ⅛ FLATPACK

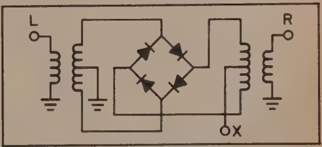
(1) TEST CONDITIONS:
LO POWER +7 dBm
RF POWER −10 dBm


X
.375
L
R
.018 DIA
8 PINS
.75 TYP
.50
.125
℄
.10
.25
.35
.075
ALL UNLABLED PINS ARE
CASE GROUND

PACKAGE

SUBMINIATURE FLATPACK DOUBLY BALANCED MIXER

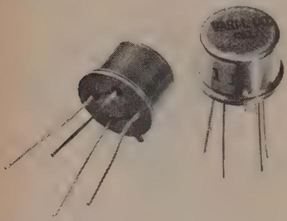
- SUBMINIATURE FLATPACK .125″ HIGH
- 600-2000 MHz
- 6.0 dB TYPICAL CONVERSION LOSS IN TACAN BAND
- LOW COST
- RUGGED-ENCAPSULATED



SCHEMATIC

Z-MATCH

DOUBLY BALANCED MIXERS (CONT.)

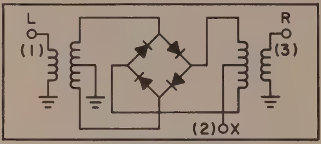


DBM-185

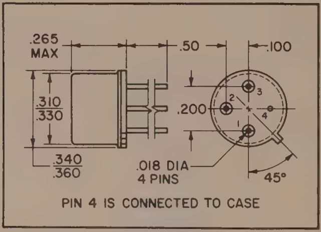
OVERALL FREQ. RANGES (MHz)	FREQ. BANDS (MHz)	CONVERSION LOSS SSBNF (dB, MAX.)	ISOLATION (dB, MIN.)			PRICE
			LO-RF	LO-IF	RF-IF	
R&L: 600-2000	600-1000	8.5	20	15	—	$65.00
X: DC-400	600-2000	9.5	15	15	—	

SUBMINIATURE TO-5 DOUBLY BALANCED MIXER

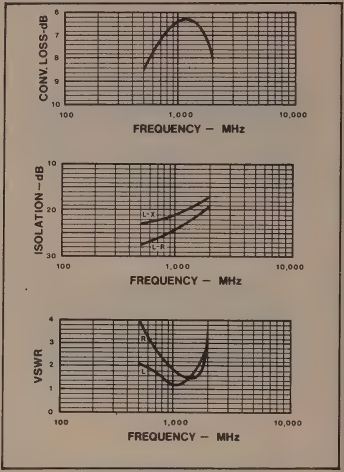
- 600-2000 MHz
- TYPICAL 7 dB CONVERSION LOSS
- CONVENIENT PC BOARD MOUNTING
- RUGGED-ENCAPSULATED



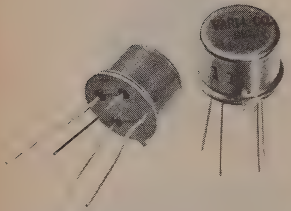
SCHEMATIC


.265 MAX
.50
.100
.310
.330
.200
.340
.360
.018 DIA
4 PINS
45°
1
2
3
4
PIN 4 IS CONNECTED TO CASE

PACKAGE



TYPICAL PERFORMANCE



DBM-141

OVERALL FREQ. RANGES (MHz)	FREQ. BANDS (MHz)	CONVERSION LOSS SSBNF (dB, MAX.)	ISOLATION (dB, MIN.)			PRICE
			LO-RF	LO-IF	RF-IF	
R .4-400	.4-100	6.5	35	25	20	$55.00
L .4-400	100-200	6.5	30	20	15	
X DC-400	200-400	7.0	20	15	15	

SUBMINIATURE TO-5 DOUBLY BALANCED MIXER

- .4-400 MHz
- 6 dB TYPICAL CONVERSION LOSS
- CONVENIENT PC BOARD MOUNTING
- RUGGED-ENCAPSULATED

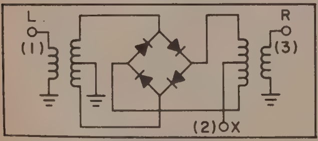
PORT IMPEDANCES: 50 OHMS — NOMINAL

TOTAL POWER INPUT (MAX.): 50 mW

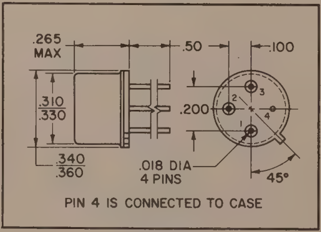
OPERATING TEMPERATURE: −55° TO +100°C

"X" PORT DC CURRENT (MAX.): 50 mA

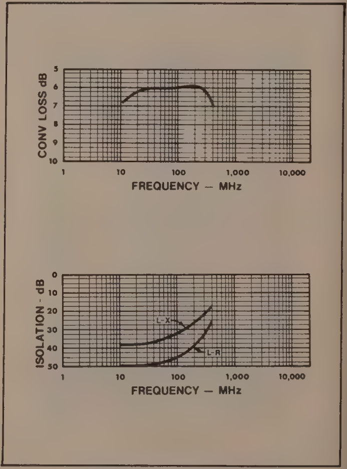
LO INPUT REQUIRED: +7 dBm NOMINAL



SCHEMATIC

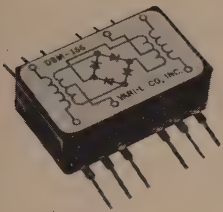

.265 MAX
.50
.100
.310
.330
.200
.340
.360
.018 DIA
4 PINS
45°
1
2
3
4
PIN 4 IS CONNECTED TO CASE

PACKAGE



TYPICAL PERFORMANCE

DOUBLY BALANCED MIXERS (CONT.)



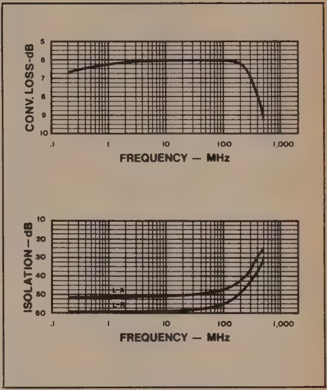
DBM-166

OVERALL FREQ. RANGES (MHz)	FREQ. BANDS (MHz)	CON-VERSION LOSS SSBNF (dB, MAX.)	ISOLATION (dB, MIN.)			PRICE
			LO-RF	LO-IF	RF-IF	
R .2-500	1-100	6.5	30	25	20	$15.00
L .2-500	100-300	7.5	25	20	20	
X DC-500	.2-500	9.5	25	15	10	

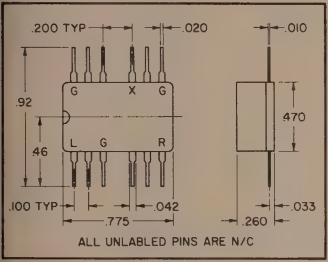
LOW COST WIDE BAND DOUBLY BALANCED MIXER

- .2-500 MHz
- LOW COST
- HIGH PERFORMANCE/ RELIABILITY
- REFLOW SOLDER OR PRINTED CIRCUIT INSTALLATION

Port Impedances: 50 Ω Nominal
Total Power Input: 50 mW Max.
Operating Temperature: −55 to +85°C
X Port Current: 50mA Max.
RF Level for 1dB Conversion compression: +2dBm (Lo = +7 dBm)
Unit prices: 1-24 ($15.00), 25-49 ($8.75), 50-99 ($8.00)

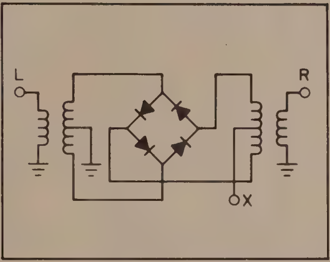


TYPICAL PERFORMANCE



ALL UNLABLED PINS ARE N/C

PACKAGE



SCHEMATIC

DOUBLY BALANCED MIXER SPECIFICATIONS

MODEL ( ) DENOTES TYPE*	OVERALL FREQUENCY RANGES (MHz)	FREQUENCY BANDS (MHz)	CONV. LOSS SSBNF (dB, Max.)	ISOLATION (dB, MIN.)			PACKAGE STYLE (See Page 2•1399)	Schematics Fig.	PRICE 1-9	SPECIAL NOTES
				LO-RF	LO-IF	RF-IF				
DBM-152 (2)	R&L: 002-15 X: DC-15	.002-1 1-15	5.5 5.5	50 50	40 40	25 20	EA	11B	$35.00	Fully Encapsulated High Rel. Plastic Type
DBM-162 (2)	R&L: 002-15 X: DC-15	.002-1 1-15	6.0 6.0	45 45	35 35	25 20	EA	11B	$35.00	Lower Spec. Equal of DBM-152
DBM-153 (2)	R&L: .01-50 X: DC-50	.01-1 1-35 35-50	8.5 5.0 5.5	40 40 40	35 35 30	25 25 20	EA	11B	$30.00	Fully Encapsulated High Rel. Plastic Type
DBM-163 (2)	R&L: .01-50 X: DC-50	.01-1 1-35 35-50	8.5 5.5 6.0	35 35 35	30 30 25	25 20 20	EA	11B	$25.00	Lower Spec. Equal of DBM-153
DBM-151 (2)	R&L: .05-200 X: DC-200	1-100 .05-200	6.5 7.5	40 35	35 30	25 20	EA	11B	$30.00	Fully Encapsulated High Rel. Plastic Type
DBM-161 (2)	R&L: .05-200 X: DC-200	1-100 .05-200	6.5 8.0	35 30	30 25	20 20	EA	11B	$25.00	Lower Spec. Equal of DBM-151
DBM-150 (2)	R&L: 5-500 X: DC-500	10-100 5-250 5-500	6.5 7.5 8.5	40 35 30	35 30 25	25 20 20	EA	11B	$30.00	Fully Encapsulated High Rel. Plastic Type
DBM-160 (2)	R&L: 5-500 X: DC-500	10-100 5-250 5-500	6.5 7.5 9.0	35 30 30	30 25 20	25 20 15	EA	11B	$25.00	Lower Spec. Equal of DBM-150

PORT IDENTIFICATION: L: LO PORT; R: RF PORT; X: IF PORT. All measurements made in a 50 ohm system with LO power of +7 dBm (5 mW). MAX. input power (total: 50 mW. Rated conv. loss and LO-RF figures maintained over a range from −55 to +100°C. Notes for models DBM-400 and DBM-400A: 1. Conversion loss figures apply to RF and/or LO frequencies in the ranges shown and an IF output frequency of 1.0 GHz (750 MHz for DBM-400A) or lower. The X port response extends to 1.5 GHz (1.0 GHz for DBM-400A) with approx. 1 dB increase in conversion loss. 2. (DBM-400 only) for UP conversion with IF frequencies above 1.5 GHz, interchange R and X ports. (R port is now IF output.) Apply the lower frequencies (below 1.5 GHz) to the X port.

* Type (1) High Level — Low Intermodulation Production
Type (2) Medium Level — Medium Intermodulation Production

DOUBLY BALANCED MIXERS (CONT.)

Z-MATCH

DOUBLY BALANCED MIXER SPECIFICATIONS (Continued)

MODEL ( ) DENOTES TYPE*	OVERALL FREQUENCY RANGES (MHz)	FREQUENCY BANDS (MHz)	CONV. LOSS SSBNF (db, Max.)	ISOLATION (dB, MIN.)			PACKAGE STYLE (See Outline)	Schematics Fig.	PRICE 1-9	SPECIAL NOTES
				LO-RF	LO-IF	RF-IF				
DBM-166	R: .2-500 L: .2-500 X: DC-500	1-100 100-300 .2-500	6.5 7.5 9.5	30 25 25	25 20 15	20 20 11	See Page 2•1397		$ 15.00	New Model, See Page 2•1397 for Details
DBM-140	R&L: .4-400 X: DC-400	.4-25 25-200 200-400	6.5 7.0 8.5	35 25 20	30 20 20	25 20 15	See Page 2•1393		$ 18.00	New Model, See Page 2•1393 for Details
DBM-141	R: .4-400 L: .4-400 X: DC-400	.4-100 100-200 200-400	6.5 6.5 7.0	35 30 20	25 20 15	20 15 15	See Page 2•1396		$ 55.00	New Model, See Page 2•1396 for Details
DBM-142	L: 10-1000 R: 10-1000 DC-1000	10-200 200-500 500-1000	7.5 7.5 8.0	30 30 25	25 30 20	25 20 15	See Page 2•1395		$ 25.00	New Model, See Page 2•1395 for Details
DBM-170 (2)	R&L: .2-700 X: DC-700	1-100 1-250 .5-500 .2-700	6.5 7.0 7.5 8.0	50 40 35 30	35 30 25 25	30 25 20 20	SPA "H" .200	11C	$ 60.00	High Isolation Very Wide Band Shielded
DBM-171 (2)	R&L: .2-600 X: DC-600	1-100 1-250 .5-500 .2-600	6.5 7.0 7.5 8.0	45 35 30 30	35 30 25 25	20 25 20 20	SPA .200	11C	$ 45.00	Best General Purpose Shielded PC Type
DBM-172 (2)	R&L: .2-500 X: DC-500	1-100 1-250 .5-400 .2-500	6.5 7.0 7.5 8.5	40 35 30 30	35 30 25 25	30 25 20 20	SPA .200	11C	$ 40.00	Lower Spec. Equal of DBM-171
DBM-175 (2)	R&L: .2-600 X: DC-600	1-100 1-250 .5-500 .2-600	6.5 7.0 7.5 8.0	45 35 30 30	35 30 25 25	30 25 20 20	SPA .250	11C	$ 70.00	Very High Rel., Encapsulated NASA Approved
DBM-182	R&L: 600-2000 X: DC-200	600-2000 950-1300	9.5 7.0	25 25	20 20	15 15	See Page 2•1395		$ 50.00	New Model, See Page 2•1395 for Details
DBM-183	R: 20-2500MHz L: 20-3500MHz X: DC-2500MHz		9.0	20	20	20	See Page 2•1394		$165.00	New Model, See Page 2•1394 for Details
DBM-184	R: 5-2000MHz L: 5-3000MHz X: 2-2000MHz		8.0	20	20	20	See Page 2•1394		$165.00	New Model, See Page 2•1394 for Details
DBM-185	R&L: 600-2000 X: DC-400	600-1000 600-2000	8.5 9.5	20 15	15 15		See Page 2•1396		$ 65.00	New Model, See Page 2•1396 for Details
DBM-100B (2)	R&L: .2-600 X: DC-600	.5-100 .5-250 .2-500 .2-600	6.5 7.0 8.0 8.5	45 40 30 30	35 30 25 25	25 20 20 20	CA	11A	$ 45.00	Low VSWR, Highest Performance Mixer of its Type
DBM-100E (1)	R&L: .5-500 X: DC-500	.5-30 30-100 100-500	7.0 7.5 9.0	60 55 35	45 40 30	30 25 25	CA	11A	$ 85.00	Very High Level, Low Intermodulation Type
DBM-110 (2)	R&L: 5-600 X: DC-600	10-100 10-250 10-500 5-600	7.0 7.5 8.0 8.5	40 30 30 30	35 30 25 25	25 20 20 20	CA	11A	$ 38.00	High Performance Low Cost
DBM-111 (2)	R&L: .05-200 X: DC-200	1-100 .05-200	6.5 7.5	40 35	35 30	25 20	CA	11A	$ 38.00	Low Frequency Companion to the DBM-110
DBM-200 (2)	R&L: 5-1000 X: DC-500	10-100 10-250 250-500 5-1000	6.5 7.0 8.0 9.5	40 35 35 30	40 35 30 25	30 25 25 20	CA	11A	$ 65.00	High Level, Low VSWR Ultrahigh Performance up to 1GHz
DBM-300B (2)	R&L: 300-1500 X: DC-500	300-1000 1000-1500	8.0 7.0	35 30	30 25	25 10	CC	11A	$125.00	High Performance, Optimumized for Tacan
DBM-300A (2)	R&L: 300-2000 X: DC-750	300-1000 1000-2000	8.0 9.5	35 30	30 20	25 10	CC	11A	$175.00	High Performance Optimumized for L-Band
DBM-400 (2)	R&L: 10-3000 X: 10-1500	30-500 50-1800 10-2800 2800-3000 See Note 1	7.0 8.5 9.0 9.5	40 35 30 25	40 30 20 20	20 20 20 20	CB	11A	$275.00	Best High Level Full Spectrum Miniature Mixer Available
DBM-400A (2)	R: 100-3000 L: 10-3000 X: DC-1000						CB	11A	$295.00	DC Coupled Equal of the DBM-400
DBM-500	R&L: 1700-4200 X: DC-1200	2000-4000 1700-4200	6.5 8.0	25 20	25 20		See Page 2•1393		$125.00	New Model, See Page 2•1393 for Details

GENERAL SPECIFICATIONS

TYPE	MAXIMUM TOTAL INPUT POWER	"X" PORT DC CURRENT (MAX.)	RF LEVEL FOR 1dB CONVERSION COMPRESSION	NOMINAL LEVEL - LO
(1)	200 mW	100 mA	+8 dBm	+17 dBm
(2)	50 mW	50 mA	+2 dBm	+ 7 dBm

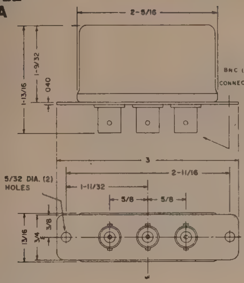
TYPES NOT RECOMMENDED FOR NEW DESIGNS

OLD MODEL #	NEAREST EQUIVALENT
DBM-154	DBM-140
DBM-155	DBM-140
DBM-157	DBM-183 DBM-184
DBM-159	DBM-183 DBM-184
DBM-174	DBM-172

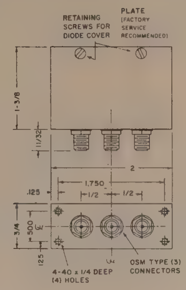
OLD MODEL #	NEAREST EQUIVALENT
DBM-181	DBM-182 DBM-183 DBM-184
DBM-600	DBM-400 DBM-500
DBM-156	DBM-142
DBM-158	DBM-182

Z-MATCH DOUBLY BALANCED MIXERS (CONT.)

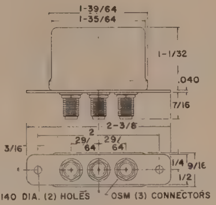
STYLE CA


2-5/16
1-13/16
1-9/32
.040
BNC (3) CONNECTOR
3
2-11/16
5/32 DIA. (2) HOLES
1-11/32
5/8
5/8
13/16
3/4
3/8

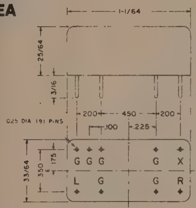
STYLE CB


RETAINING SCREWS FOR DIODE COVER
PLATE (FACTORY SERVICE RECOMMENDED)
1-3/8
11/32
2
1.750
1/2
1/2
.125
3/4
.500
.125
4-40 x 1/4 DEEP (4) HOLES
OSM TYPE (3) CONNECTORS

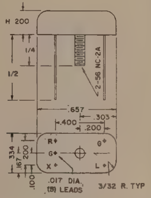
STYLE CC


1-39/64
1-35/64
1-1/32
.040
7/16
2-3/8
2
29/64
29/64
3/16
1/4
9/16
1/2
.140 DIA. (2) HOLES
OSM (3) CONNECTORS

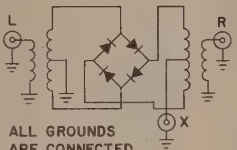
STYLE EA


1-1/64
25/64
3/16
.025 DIA (9) PINS
.200
.450
.200
.100
.225
33/64
.350
.175
G G G
G X
L G
G R

STYLE SPA

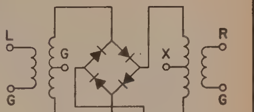

.200
1/4
1/2
2-56 NC-2A
.657
.303
.400
.200
.334
.200
.167
.100
R
G
X
G
L
.017 DIA. (5) LEADS
3/32 R. TYP

11A



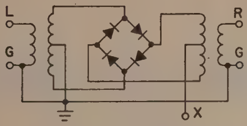
ALL GROUNDS ARE CONNECTED TO CASE

11B



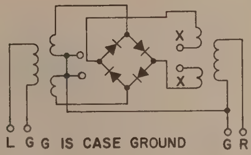
G TERMINALS ARE INTERNALLY INTERCONNECTED ON SOME TYPES

11C



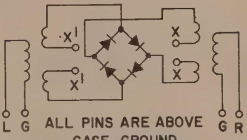
G IS CASE GROUND:
G PINS + MOUNTING STUD

11D



G IS CASE GROUND

11E



ALL PINS ARE ABOVE CASE GROUND

PACKAGES & SCHEMATICS

HARMONICS OF f_R	$7f_R$	100 (100)	80 (90)	100 (100)	80 (90)	100 (95)	80 (100)	100 (100)	80 (80)	100 (95)
	$6f_R$	100 (100)	100 (90)	100 (95)	100 (90)	100 (95)	100 (95)	100 (100)	100 (90)	90 (100)
	$5f_R$	95 (80)	75 (80)	90 (85)	70 (70)	90 (90)	65 (65)	85 (90)	65 (65)	80 (80)
	$4f_R$	95 (85)	80 (80)	95 (95)	85 (85)	95 (95)	80 (85)	100 (100)	80 (85)	90 (90)
	$3f_R$	65 (65)	60 (60)	65 (65)	60 (55)	65 (70)	55 (50)	65 (75)	55 (45)	65 (70)
	$2f_R$	70 (70)	65 (65)	75 (80)	65 (65)	80 (80)	65 (60)	80 (75)	65 (65)	85 (70)
	f_R	25 (25)	0 (0)	40 (35)	10 (10)	50 (40)	15 (40)	60 (45)	20 (30)	60 (50)
	0		40 (25)	40 (35)	45 (25)	60 (50)	35 (35)	65 (55)	50 (40)	75 (55)
HARMONICS OF f_L		0	f_L	$2f_L$	$3f_L$	$4f_L$	$5f_L$	$6f_L$	$7f_L$	$8f_L$

FIGURE 12
TYPICAL MID-BAND HARMONIC INTERMODULATION PRODUCT ATTENUATION

Figures to the left are for Type 1 mixers, and figures to the right (in parentheses) are for Type 2. Values shown in the table are obtained with clean, filtered input signals to the mixer. Suppression values given indicate the product amplitude in dB below the $f_L \pm F_R$ output level, using an f_R level for Type 1 mixers of 0 dBm and for Type 2 mixers of −10 dBm. The LO drive level is as shown in Figure 9, Page 2•1392. This table should be treated as design guide only; values given are normally within 10% of actual performance for models listed for service below 1 GHz and within 20% for models designed to operate above 1 GHz.

DOUBLY BALANCED MIXERS (CONT.)

Z-MATCH

ALTERNATE MIXER STYLES

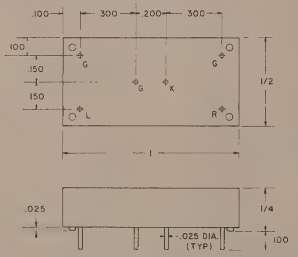
The mixers shown in the table below were designed at customer request to replace existing packages. This list of exact replacements gives specifications for units which are completely tooled in our shop and are available on a 2-3 week basis on special order. All are Type 2 units.

ALTERNATE PACKAGED MIXER SPECIFICATIONS

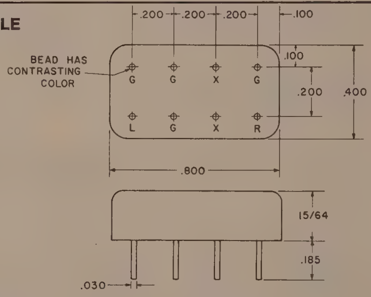
MODEL	OVERALL FREQUENCY RANGES (MHz)	FREQUENCY BANDS (MHz)	CONV. LOSS SSBNF (dB, MAX.)	ISOLATION (dB, MIN.)			PACKAGE STYLE (See Outline)	SCHEMATIC DIAGRAM	PRICE 1 - 9
				LO-RF	LO-IF	RF-IF			
DBM-151A	R&L: .05-200 X: DC-200	1-100 .05-200	6.5 7.5	40 35	35 30	25 20	ED	11B	$25.00
DBM-151B	R&L: .05-200 X: DC-200	.05-30 30-200	6.5 8.0	45 35	35 25	30 20	SPB	11E	$35.00
DBM-150A	R&L: 5-500 X: DC-500	10-100 5-250 5-500	6.5 7.5 8.5	40 35 30	35 30 25	25 20 20	ED	11B	*
DBM-150B	R&L: 5-500 X: DC-500	10-100 100-200 5-500	7.0 8.0 9.0	45 35 30	40 25 25	20 20 20	SPB	11D	*
DBM-172A	R&L: .2-500 X: DC-500	1-100 1-250 .5-400 .2-500	6.5 7.0 7.5 8.5	40 35 30 30	35 30 25 25	30 25 20 20	SPC	11C	*
DBM-172B	R&L: .2-500 X: DC-500	1-100 1-250 .5-400 .2-500	6.5 7.0 7.5 8.5	40 35 30 30	35 30 25 25	30 25 20 20	SPD	11C	*

*Contact Factory for Current Prices.

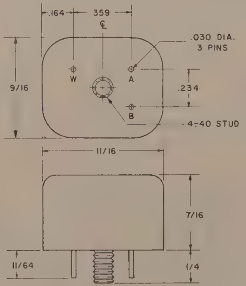
STYLE ED


.100
300
.200
300
100
.150
150
G
G
G
X
L
R
1/2
1
.025
1/4
.025 DIA. (TYP)
100

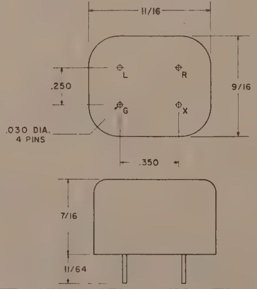
STYLE SPB


.200
.200
.200
.100
BEAD HAS CONTRASTING COLOR
G
G
X
G
L
G
X
R
.100
.200
.400
.800
15/64
.185
.030

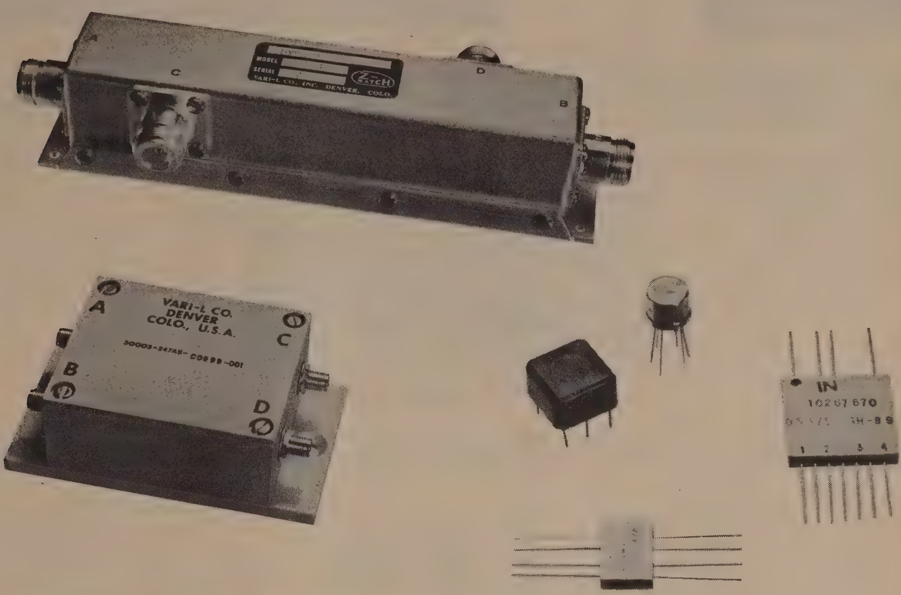
STYLE SPC


.164
359
℄
.030 DIA. 3 PINS
W
A
B
9/16
.234
4-40 STUD
11/16
7/16
11/64
1/4

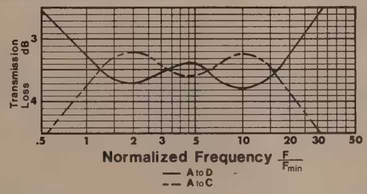
STYLE SPD


11/16
L
R
G
X
.250
9/16
.030 DIA. 4 PINS
.350
7/16
11/64

WIDE BAND HYBRID POWER COMBINERS/DIVIDERS


A
C
D
B
MODEL
SERIAL
VARI-L CO. INC. DENVER, COLO.
Z-MATCH
VARI-L CO.
DENVER
COLO., U.S.A.
30003-247AB- C0999-001
A
B
C
D
IN
10207 670
QH-89
1 2 3 4

ULTRAWIDEBAND 90° HYBRIDS



QH-90

- **20:1 FREQUENCY RANGE**
- **EXCELLENT PHASE AND AMPLITUDE BALANCE**
- **SMA CONNECTOR PACKAGE**

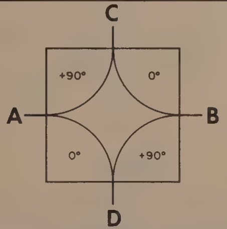

C
A
B
D
+90°
0°
0°
+90°

Figure A

QH series devices are four port quadrature hybrids capable of supplying equal amplitude, isolated quadrature outputs (90°) of an input signal.

A signal applied to any port couples equally (3dB) to the two adjacent ports. The opposite port remains isolated.

Conversely, the QH series hybrid can be used to obtain the vector sum of the quadrature components of two signals.

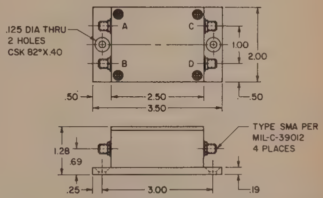

.125 DIA THRU
2 HOLES
CSK 82°X.40
A
C
B
D
1.00
2.00
.50
2.50
3.50
.50
TYPE SMA PER MIL-C-39012 4 PLACES
1.28
.69
.25
3.00
.19

Figure B

UNIT	FREQUENCY RANGE	MINIMUM ISOLATION dB	MAXIMUM INSERTION LOSS (dB)	DEVIATION FROM QUADRATURE	AMPLITUDE BALANCE (dB)	VSWR	PACKAGE	SCHEMATIC	PRICE
QH-1	10-200KHz	20	1.0	±3°	1.5 dB	1.5	FIG. B	FIG. A	$295.00
QH-2	.1-2.0MHz	20	1.0	±3°	1.5 dB	1.5	FIG. B	FIG. A	$275.00
QH-3	2-40MHz	20	1.0	±3°	1.2 dB	1.5	FIG. B	FIG. A	$275.00

VARI-L CO., INC. • 3883 MONACO PARKWAY • DENVER, COLORADO 80207 • (303) 321-1511 • TWX 910-931-0590

Z-MATCH

WIDE BAND HYBRID POWER COMBINERS/DIVIDERS (CONT.)

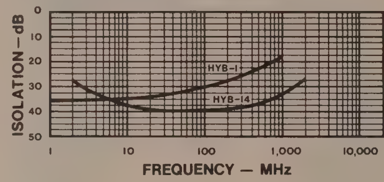
180° HYBRIDS

In all 180° hybrid designs ports A and B are mutually isolated and ports C and D are mutually isolated.

As a power combiner, two signals fed into port C and D yield their vector sum at port B and their vector difference at port A.

A signal fed into port B divides into two equal amplitude, equal phase, isolated output signals at port C and D. A signal fed into port A divides into equal amplitude, 180° out of phase, isolated signals at port C and D.

Vari-L hybrid models include both impedance transforming and non-impedance transforming designs. In the impedance transforming designs ports A and B are 50 ohm impedance and port C and D are 100 ohm impedance. (See Figure A.) In non-impedance transforming designs all four ports are 50 ohm impedance.



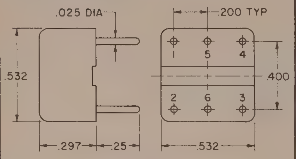
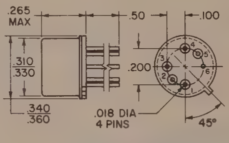
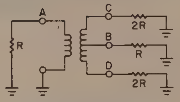

.025 DIA
.200 TYP
.532
.400
1
5
4
2
6
3
.297
.25
.532

Figure A


.265
MAX
.50
.100
.310
.330
.200
.340
.360
.018 DIA
4 PINS
45°
1
2
3
4
5
6

PIN 6-CASE GROUND PIN 3-N/C

Figure B


A
C
2R
B
R
R
D
2R

PIN IDENTIFICATION					
PORT	A	B	C	D	GND
FIG. A	1	6	2	3	4,5
FIG. B	1	4	2	5	6

Figure C

IMPEDANCE TRANSFORMING HYBRIDS

MODEL	FREQUENCY RANGE MHz	MINIMUM ISOLATION (dB) PORTS A to B	*MAXIMUM INSERTION LOSS (dB)	*PHASE BALANCE	*AMPLITUDE BALANCE (dB)	PACKAGE	SCHEMATIC	PRICE
HYB-1	1-500	20	1.0	2°	0.5	FIG. A	FIG. C	$24.50
HYB-2	.500-300	20	1.0	2°	0.5	FIG. A	FIG. C	$20.80
HYB-3	.250-200	20	1.0	2°	0.5	FIG. A	FIG. C	$20.80
HYB-7	.020-100	20	1.0	2°	0.5	FIG. A	FIG. C	$22.50
HYB-11	.250-200	20	1.0	2°	0.5	FIG. B	FIG. C	$20.80

*HYBRID MODE — INPUT AT PORT B

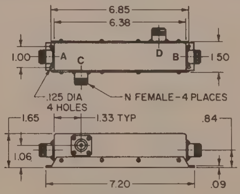
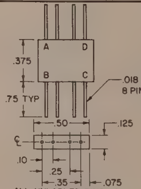

6.85
6.38
1.00
A
C
D
B
1.50
.125 DIA
4 HOLES
N FEMALE-4 PLACES
1.65
1.33 TYP
.84
1.06
7.20
.09

Figure D


A
D
B
C
.375
.75 TYP
.018 DIA
8 PINS
.50
.125
℄
.10
.25
.35
.075

ALL UNLABLED PINS ARE CASE GROUND

Figure E

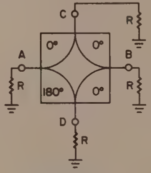

C
R
A
0°
0°
B
R
180°
0°
R
D
R

Figure F

NON-IMPEDANCE TRANSFORMING HYBRIDS

MODEL	FREQUENCY RANGE MHz	MINIMUM ISOLATION (dB)	MAXIMUM INSERTION LOSS	PHASE BALANCE	AMPLITUDE BALANCE (dB)	VSWR	SCHEMATIC	PACKAGE	PRICE
HYB-14	2-2000 25-500 500-1000	25 35 30	2.5 0.8 1.3	5.0° 1.5° 2.5°	0.85 0.25 0.25	2.5 1.5 1.5	FIG. F	FIG. D	$350.00
HYB-16	1-200 5-50	25 30	1.0 1.0	3° 2°	0.5 0.3	1.5 1.3	FIG. F	FIG. E	$37.00

WIDE BAND HYBRID POWER COMBINERS/DIVIDERS (CONT.)

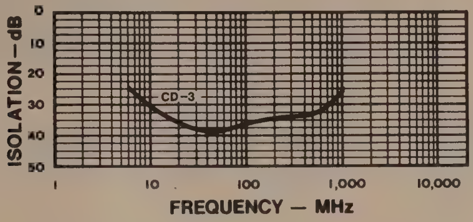
IN-PHASE HYBRIDS

A two-way in-phase hybrid power combiner/divider is a 180° hybrid power combiner/divider with the difference port (A) internally terminated.

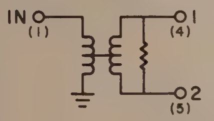
As a two-way power divider, a signal fed into the input port yields two in-phase output signals 3dB down from the input power.

As a two-way power combiner, signals applied to the output ports yield a vector sum at the input port.

Multi-way binary power combiners/dividers are realized by cascading combinations of the basic two-way device. The power division ratio of the multi-way combiner/divider is 1/n.



TYPICAL ISOLATION CD-3



(X) DENOTES TO PKG. PIN NUMBERS

Figure A

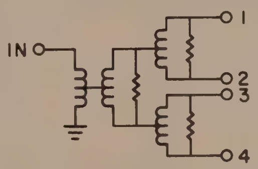
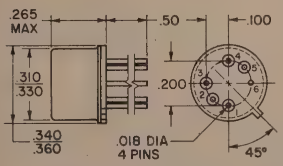
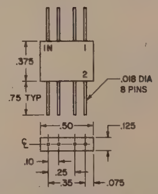


Figure B


.265
MAX
.50
.100
.310
.330
.200
.340
.360
.018 DIA
4 PINS
45°
1
2
3
4
5
6

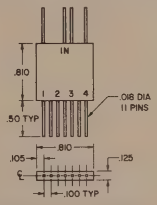
PINS 2,3,& 6 ARE CASE GROUND

Figure C


IN
1
2
.375
.75 TYP
.018 DIA
8 PINS
.50
.125
.10
.25
.35
.075

ALL UNLABLED PINS ARE CASE GROUND

Figure D

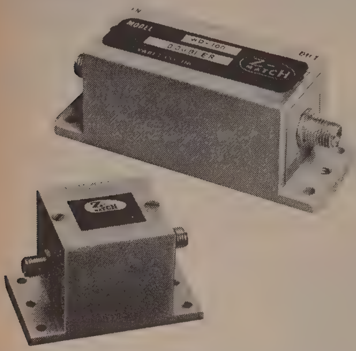

IN
1 2 3 4
.810
.50 TYP
.018 DIA
11 PINS
.810
.105
.125
.100 TYP

ALL UNLABLED PINS ARE CASE GROUND

Figure E

MODEL	FREQUENCY RANGE MHz	MINIMUM ISOLATION (dB)	MAXIMUM INSERTION LOSS (dB)	AMPLITUDE BALANCE (dB)	PHASE BALANCE	VSWR	SCHEMATIC	PACKAGE	PRICE
CD-1	1-100	30	0.5	0.1	1.0°	1.3	FIG. A	FIG. C	$24.50
CD-2	1-200	30	0.5	0.1	7.0°	1.4	FIG. A	FIG. D	$34.00
CD-3	25-500 10-25	30 25	0.5 0.5	0.1 0.1	1.0° 1.0°	1.3 1.5	FIG. A FIG. A	FIG. D FIG. D	$34.00 $34.00
CD-4	1-200 2-200	25 30	1.0 0.5	0.4 0.2	3° 2.0°	1.4 1.3	FIG. B FIG. B	FIG. E FIG. E	$80.00 $80.00

WIDE BAND FREQUENCY DOUBLERS


MODEL
WD-100
DOUBLER
VARI-L CO. INC.
Z-MATCH
OUT
Z-MATCH

Models WD-100, 101 and 102 were developed as components of laboratory equipment to double the frequency of high-level sweep generators, thus extending their range of usefulness. Since the output of the doubler is of relatively high level, the signal obtained is comparable to that of an expensive BWO unit, and a set-up can be made with existing equipment and appreciable savings are effected. The units, being quite small and compact, are often used as part of the local oscillator source for receivers, so they are recommended both as components of larger equipment and as laboratory test devices. The doublers are housed in extruded aluminum cases and are fitted with 3.6 mm. input and output connectors and have 50 ohm input and output impedances. The circuit employs a custom-designed Z-Match input transformer and carefully matched Schottky barrier diodes. The output circuit (Model WD-100 only) is isolated for DC by a special chip capacitor. The circuit elements and supporting structure are encapsulated in high-temperature polyurethane foam. Full electrical specifications are listed in the table below. Operating temperature range is −55 to +100°C. Contact factory sales for appropriate bulletin.

DOUBLER SPECIFICATIONS

MODEL	FREQUENCY RANGE INPUT/OUTPUT	IMPEDANCE INPUT/OUTPUT	INPUT POWER NORMAL OPERATION	CONVERSION LOSS	FUNDAMENTAL +3rd HARM. SUPPRESSION	OUTPUT LEVEL VARIATION OVER THE BAND	SCHEM. FIG.	PRICE 1 - 9
WD-101	.5-500 MHz 1-1000 MHz	50 ohms 50	+5 to +20 dBm	13 dB max.	40 dB min.	±1.5 dB	15A	$ 90.00
WD-100	.3-2 GHz .6-4 GHz	50 ohms 50	+5 to +20 dBm	13.5 dB max.	35 dB min.	±1.5 dB	15A	$225.00
WD-102A	0.02 to 4.5 GHz 0.04 to 9.0 GHz	50 ohms 50	+10 to +20 dBm	14 dB max.	30 dB min.	±1.5 dB	15B	$350.00

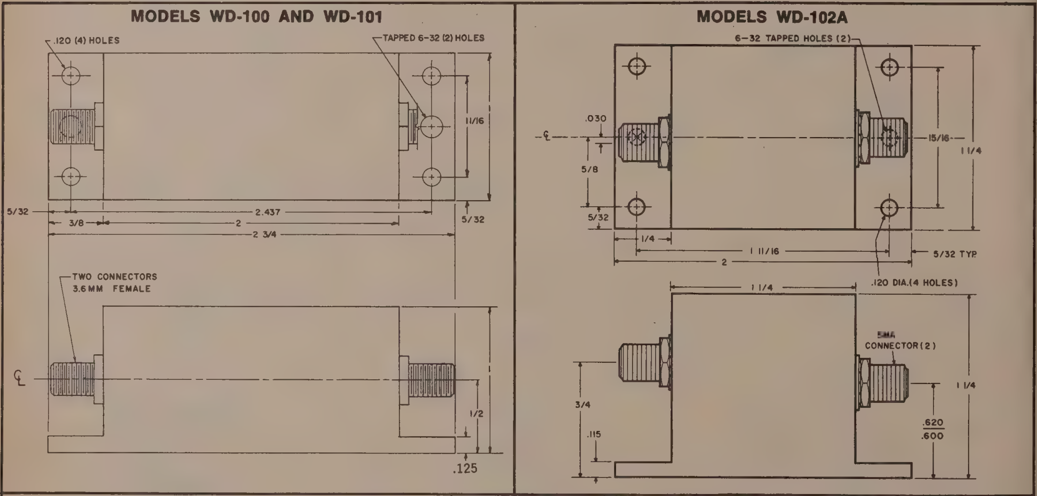

MODELS WD-100 AND WD-101
.120 (4) HOLES
TAPPED 6-32 (2) HOLES
11/16
5/32
3/8
2.437
2
2 3/4
5/32
TWO CONNECTORS
3.6 MM FEMALE
℄
1/2
.125
MODELS WD-102A
6-32 TAPPED HOLES (2)
.030
℄
5/8
5/32
15/16
1 1/4
1/4
1 11/16
2
5/32 TYP.
.120 DIA.(4 HOLES)
1 1/4
SMA
CONNECTOR (2)
3/4
.115
1 1/4
.620
.600

FIGURE 14 DOUBLER OUTLINE DRAWINGS

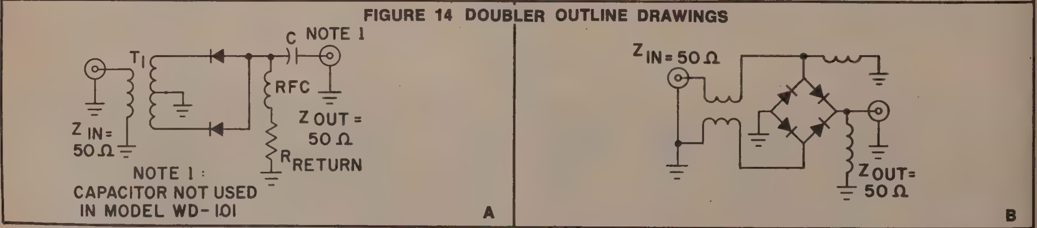

T1
C NOTE 1
RFC
Z IN = 50 Ω
Z OUT = 50 Ω
R RETURN
NOTE 1 :
CAPACITOR NOT USED
IN MODEL WD- 101
A
Z IN = 50 Ω
Z OUT = 50 Ω
B

FIGURE 15 DOUBLER SCHEMATICS

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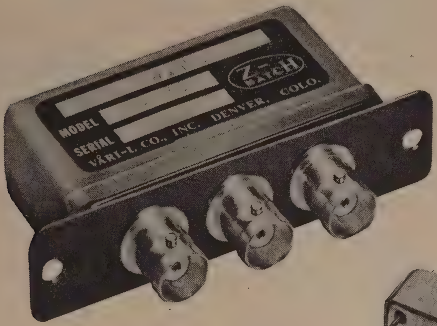
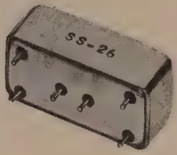
R.F. SWITCHES

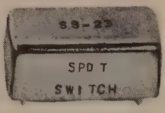
Z-MATCH

HIGH ISOLATION R.F. SWITCHES


MODEL
SERIAL
Z-MATCH
VARI-L CO., INC. DENVER, COLO.

- LESS THAN TWO NANO SECONDS SWITCHING SPEED
- HIGH LEVEL SIGNAL HANDLING
- LARGE ON TO OFF POWER RATIOS




SS-23
SPD T
SWITCH

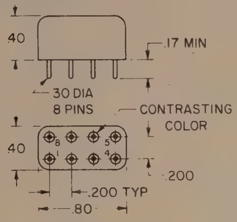

.40
.17 MIN
.030 DIA
8 PINS
CONTRASTING
COLOR
.40
8
5
1
4
.200
.200 TYP
.80

Figure A

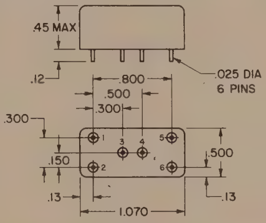

.45 MAX
.12
.025 DIA
6 PINS
.800
.500
.300
.300
1
3
4
5
2
6
.150
.500
.13
.13
1.070

Figure B

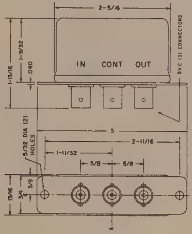
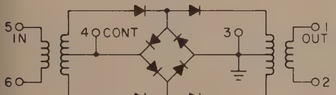
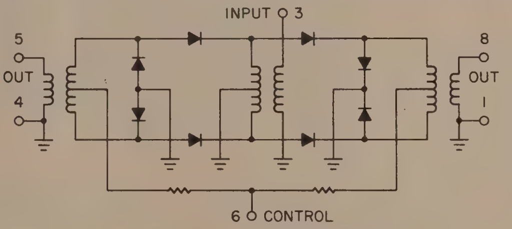

2-5/16
1-13/16
1-9/32
.040
IN
CONT
OUT
BNC (3) CONNECTORS
5/32 DIA (2) HOLES
3
2-11/16
1-11/32
5/8
5/8
13/16
3/4
3/8

Figure C


5
IN
6
4
CONT
3
1
OUT
2

PIN 3 IS CASE GROUND FIG. B.
2, 3, 8, 6 ARE CASE GROUND FIG. A.

Figure D


INPUT 3
5
OUT
4
8
OUT
1
6 CONTROL

CURRENT	STATE
+I AT 6	3 TO 5
-I AT 6	3 TO 8

Figure E

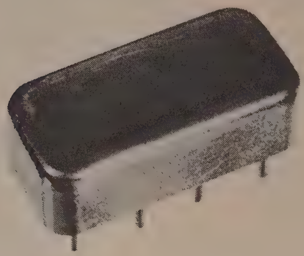
MODEL	TYPE	FREQ. RANGE MHz	ON-OFF RATIO db MIN.	INSERTION LOSS dB MAX.	RF POWER HANDLING	ON-OFF CURRENT TYPICAL	SWITCHING SIGNAL ISOLATION TYPICAL (1)	PACKAGE	PRICE 1 - 9
SS-23	SPST	5-50 50-200 .5-500	80 50 30	2.5 2.5 4.5	+10 dBm	±20 MA	30 dB (2)	Fig. B	$ 60.00
SS-26	SPDT	1-20 200-100 100-400	50 40 30	2 2 3	+10 dBm	±40 MA	25 dB	Fig. A	$110.00
SS-30	SPST	.5-100 100-500	80 60	5 6.5	+10 dBm	±20 MA	30 dB (2)	Fig. C	$135.00
SS-50	SPST	1-30 30-100 100-200	63 53 47	2 2 2.5	+ 6 dBm	±20 MA	35 dB	Fig. B	$120.00

(1) Fundamental feedthrough component at the output when a sine wave producing ±20 mA is used to switch the unit.
(2) Typically low repetition rate switching will produce very little feedthrough. For example, switching noise power at the output is —100 dBm maximum per 100 MHz of bandwidth when driven with a 3 KHz square wave, $T_r = T_f = .5\ \mu sec$ producing ±20 mA control current.

VARI-L CO., INC. • 3883 MONACO PARKWAY • DENVER, COLORADO 80207 • (303) 321-1511 • TWX 910-931-0590

PIN DIODE VARIABLE ATTENUATOR

Z-MATCH



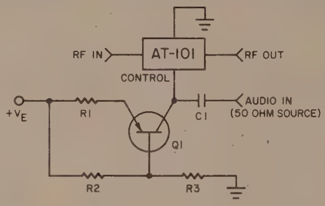
Model AT-101

DESIGNED FOR AM MODULATOR APPLICATION, BROADBAND PERFORMANCE, ULTRA LINEAR, LOW DISTORTION PERFORMANCE

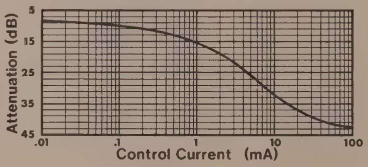
- 2-500 MHz RF PORT BANDWIDTH
- DC-250 MHz MODULATION PORT BANDWIDTH
- +35 dBm 3rd ORDER INTERCEPT POINT INDEPENDENT OF ATTENUATION SETTING
- CONSTANT PERCENTAGE AM MODULATION POSSIBLE OVER −55°C TO 85°C WITH SIMPLE COMPENSATION CIRCUIT

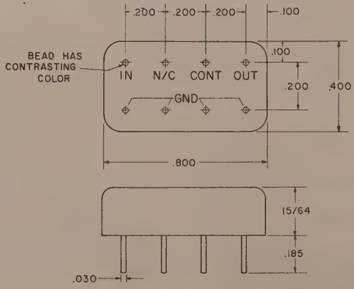
1dB Bandwidth RF Ports: 2-400 MHz
3dB Bandwidth Modulation Port: DC-100KHz
Maximum Attenuation, 0 Bias: 8.5 dB (100 MHz)
Minimum Attenuation, 25 mA Bias: 30 db (100 MHz)
Modulation Distortion:
  10% Maximum Distortion at 60% AM Modulation
  2% Maximum Distortion at 30% AM Modulation
3rd Order IM Ratio 100 MHz +3 dBm tones:
  70 dB, Minimum
  75 dB, Typical
Maximum DC Input Current: 100 mA
Maximum RF Input Power: +10 dBm

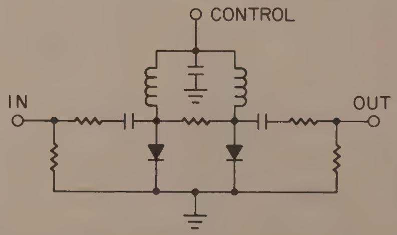
SUGGESTED TEMPERATURE COMPENSATED MODULATOR CIRCUIT


RF IN
AT-101
RF OUT
CONTROL
AUDIO IN
(50 OHM SOURCE)
$+V_E$
R1
C1
Q1
R2
R3

C1 – DC BLOCK
R1 – 294 OHM, 1%, LOW TCR, METAL FILM
R2 & R3 – SELECT FOR PROPER MODULATION BIAS CURRENT. RESISTORS SHOULD HAVE LOW TCR.
Q1 – 2N3906 OR EQUIVALENT.
V_E – +5 TO +30 VOLTS, (TEMPERATURE STABLE)




.200
.200
.200
.100
.100
BEAD HAS CONTRASTING COLOR
IN
N/C
CONT
OUT
GND
.200
.400
.800
15/64
.185
.030

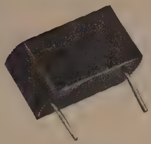

CONTROL
IN
OUT

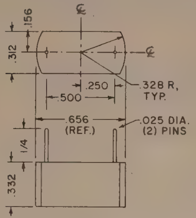
VARI-L CO., INC. • 3883 MONACO PARKWAY • DENVER, COLORADO 80207 • (303) 321-1511 • TWX 910-931-0590

Z-MATCH

CHOKES & PHASE DETECTORS

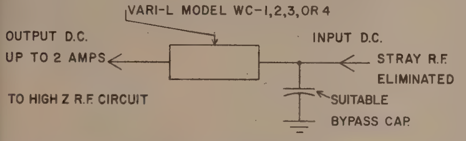
WIDEBAND R.F. CHOKES



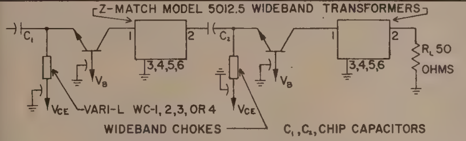

.156
.312
.250
.500
.328 R, TYP.
.656 (REF.)
.025 DIA. (2) PINS
1/4
.332

OUTLINE DRAWING

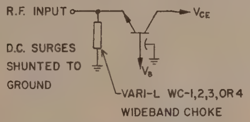
- **LOW LOSS & VIRTUALLY NON-RESONANT**
- **CONSTANT IMPEDANCE OVER A WIDE RANGE OF FREQUENCIES**
- **DC RESISTANCE OF LESS THAN .1 OHMS**
- **WILL HANDLE UP TO TWO AMPS OF CURRENT**
- **1-9 PRICE: $10.50 EACH ALL MODELS (WC-1, WC-2, WC-3, WC-4)**


VARI-L MODEL WC-1,2,3,OR 4
OUTPUT D.C. UP TO 2 AMPS
TO HIGH Z R.F. CIRCUIT
INPUT D.C.
STRAY R.F. ELIMINATED
SUITABLE BYPASS CAP.

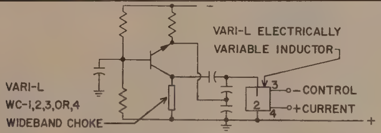
R.F. DECOUPLING


Z-MATCH MODEL 5012.5 WIDEBAND TRANSFORMERS
C1
C2
1
2
3,4,5,6
VB
VCE
RL 50 OHMS
VARI-L WC-1, 2, 3, OR 4 WIDEBAND CHOKES
C1, C2, CHIP CAPACITORS

D.C. ISOLATION IN SINGLE-ENDED POWER RF AMPLIFIER STAGES


R.F. INPUT
VCE
D.C. SURGES SHUNTED TO GROUND
VB
VARI-L WC-1,2,3,OR 4 WIDEBAND CHOKE

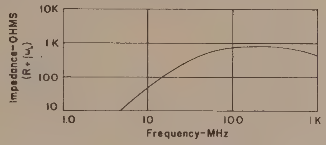
D.C. BURN-OUT PROTECTION IN INPUT STAGES


VARI-L ELECTRICALLY VARIABLE INDUCTOR
VARI-L WC-1,2,3,OR 4 WIDEBAND CHOKE
3
2
4
CONTROL
+CURRENT
+

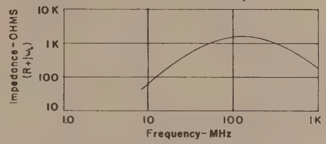
SHUNT FEED IN WIDE RANGE VARIABLE FREQUENCY RF OSCILLATORS

TYPICAL APPLICATIONS

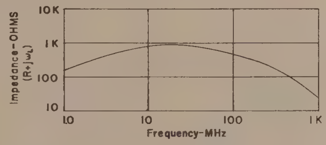
TYPE WC-1



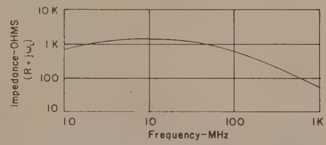
TYPE WC-2



TYPE WC-3

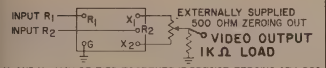


TYPE WC-4



IMPEDANCE CHARACTERISTICS

HIGH LEVEL PHASE DETECTORS

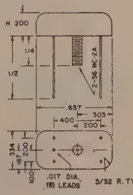

INPUT R1
INPUT R2
R1
X1
R2
G
X2
EXTERNALLY SUPPLIED 500 OHM ZEROING OUT
VIDEO OUTPUT
1K Ω LOAD

X1 AND X2 MAY BE TIED TOGETHER IF PRECISE ZEROING AT ± 90° IS NOT REQUIRED

INSTALLATION DIAGRAM

- **HIGH SENSITIVITY**
- **ADJUSTABLE DC BALANCE**
- **LINEAR OUTPUT CHARACTERISTIC**
- **PD-100, SPA PACKAGE PD-101, BNC CONNECTORS**

OUTLINE PD-100


.200
1/4
1/2
2-56 NC-2A
.657
.303
.400
.200
.334
.167
.200
.100
.017 DIA., (8) LEADS
3/32 R. TYP

MODEL	INPUT FREQUENCY RANGE	VIDEO BW OUTPUT PORT	φ SENSITIVITY @ +10 dBm INPUTS	TYPICAL OPERATION RF INPUTS +10 dBm		PRICE 1 - 9
				RELATIVE φ	DC OUT	
PD-100 and PD-101	R_1, DC-500 MHz R_2, .5-500 MHz	DC-1.5 MHz	10 MV/Degree	φ = 0° φ = 90° φ = 180°	+1 Volt 0 Volts −1 Volt	$70.00

VARI-L CO., INC. • 3883 MONACO PARKWAY • DENVER, COLORADO 80207 • (303) 321-1511 • TWX 910-931-0590

AIRCO® Electronics

Bradford, Pa. (814) 362-5536

Carbon Film Resistors

SPECIFICATIONS	Carbon Film Resistors			METAL OXIDE
Type Designation	CF ⅛	CF ¼	CF ½	MO-1
Power Rating @ 70°C	0.125 watts	0.25 watts	0.5 watts	1.0 watts
Max. Continuous Working Voltage	250V	250V	350V	350V
Operating Temperature Range	−25°C to +125°C	−55°C to +155°C	−55°C to +155°C	−55°C to +235°C
Derating to 0 at	+125°C	+155°C	+155°C	+235°C
Resistance Range @ ±5%	2.2Ω — 220KΩ	2.2Ω — 2.2MΩ	2.2Ω — 5.1MΩ	10Ω — 100KΩ
±2%	NA	10Ω — 1MΩ	10Ω — 1MΩ	NA
Mechanical	in./mm	in./mm	in./mm	in./mm
Body Length — Max.	0.177/4.50	0.275/6.98	0.375/9.53	0.488/12.50
Body Diameter — Max.	0.071/1.80	0.100/2.54	0.125/3.17	0.177/4.50
Lead Diameter — Nom.	0.020/0.50	0.024/0.61	0.024/0.61	0.032/0.80
Lead Length — Min.	1.060/27.00	1.125/28.57	1.125/28.57	1.496/38.0
Voltage Coefficient — Max.	−100ppm/V	−100ppm/V	−50ppm/V	100ppm/V
Insulation Resistance — Min.				
Dry	10,000MΩ	10,000MΩ	10,000MΩ	10,000MΩ
Wet	1,000MΩ	1,000MΩ	1,000MΩ	1,000MΩ
Dielectric Withstanding Voltage — Min.				
Atmospheric	500V rms	500V rms	700V rms	1000V rms
Barometric	350V rms	350V rms	450V rms	500V rms
Current Noise — Max.	dB//µV/V	dB//µV/V	dB//µV/V	dB//µV/V
Nominal Resistance (Ohms)				
≤1K	−20/0.100	−20/0.100	−20dB/0.100	−15db/0.3
1.1K — 10KΩ	−20/0.100	−15/0.180	−15dB/0.180	−15db/0.3
11KΩ — 100KΩ	−8/0.400	−12/0.225	−10dB/0.260	−15db/0.3
≥101KΩ	−2/0.800	−10/0.260	−6dB/0.500	−15db/0.3
PERFORMANCE CHARACTERISTICS	CF ⅛ Max. ΔR From 25°C	CF ¼ Max. ΔR From 25°C	CF ½ Max ΔR From 25°C	MO-1 Max. ΔR From 25°C
Temperature Coefficient of Resistance	@−25°C @+125°C	@−55°C @+105°C	@−55°C @+105°C	@ −55°C
Nominal Resistance (ohms)	ppm/°C ppm/°C	ppm/°C ppm/°C	ppm/°C ppm/°C	
≤1K	−350 −350	−350 −300	−350 −300	±200 ±200
1.1K — 10K	−350 −350	−350 −350	−350 −350	±200 ±200
11K — 100K	−400 −400	−450 −450	−450 −450	±200 ±200
110K — 1.0MΩ	−700 −700	−1000 −1000	−700 −700	NA NA
≥1.1MΩ	NA NA	−1300 −1300	−1300 −1300	NA NA
Thermal Shock	±(1.0% +0.05Ω)	±(0.5% +0.05Ω)	±(0.5% +0.05Ω)	±(1.0% +0.05Ω)
Short Time Overload	±(0.5% +0.05Ω)	±(0.3% +0.05Ω)	±(0.5% +0.05Ω)	±(0.5% +0.05Ω)
Dielectric Strength	±(0.5% +0.05Ω)	±(0.5% +0.05Ω)	±(0.5% +0.05Ω)	±(0.5% +0.05Ω)
Moisture Resistance ≤1.0MΩ	±2.0%	±2.0%	±2.5%	±1.5%
≥1.0MΩ	NA	±3.0%	NA	NA
Terminal Strength	±(0.5% +0.05Ω)	±(0.5% +0.05Ω)	±(0.5% +0.05Ω)	±(0.5% +0.05Ω)
Load Life ≤100KΩ	±2%	±2%	±2%	±5%
≥100KΩ	±3%	±3%	±3%	NA
Resistance to Solder Heat	±(1.0% +0.05Ω)	±(0.5% +0.05Ω)	±(0.5% +0.05Ω)	±(0.5% +0.05Ω)
Shock and High Frequency Oper.	±(0.3% +0.05Ω)	±(0.3% +0.05Ω)	±(0.3% +0.05Ω)	±(0.5% +0.05Ω)
Low Temperature Operation	±(0.5% +0.05Ω)	±(0.5% +0.05Ω)	±(0.5% +0.05Ω)	±(0.5% +0.05Ω)
Frequency Characteristics	% Rdc Min.	% Rdc Min.	% Rdc Min.	
Nominal Resistance (ohms)	@44MHz @200MHz	@44MHz @200MHz	@44MHz @200MHz	
≤100K	80% 60%	80% 60%	80% 60%	
≥101K	50%	50%	50%	

For additional resistor information write or contact Airco Electronics, P.O. Box 547, Bradford, Pa. 16701. Phone (814) 362-5536, TWX 510-695-5921.

AIRCO® Electronics

Bradford, Pa. (814) 362-5536

RELIABLE FIXED COMPOSITION RESISTORS

Airco Electronics offers a complete line of ¼, ½, 1 and 2 watt fixed composition resistors that meet or exceed all requirements of Military Specification MIL-R-11 and EIA Standard RS-172. Resistors to Established Reliability Specification MIL-R-39008 available in styles RCR 07, RCR 20 and RCR 32. Hi-Rel resistors for Military Space applications available. Integration of the resistor core and insulating shell during molding provides tight reliable resistor lead anchorage. 100% pure tin lead coating maintains superior soldering characteristics even after extended storage. An industrial grade ½ w. resistor available in standard resistance values and tolerances. Our composition resistors are available for all applications.

Military Specification MIL-R-39008	Airco Type SRR
Military Specification MIL-R-11	Airco Type SR
Industrial Applications	Airco Type SC

Airco Type	Mil Type	Power Rating Watts	Resistance Range	Dimensions (Inches) Body (Max.) Dia.	Body (Max.) Length	Leads (Nom.) Dia.	Leads (Nom.) Length
SR ¼	RC 07	¼	10 ohm to 1.0 megohm[1]	.090	.250	.025	1.405
SRR ¼	RCR 07[2]	¼	10 ohm to 1.0 megohm	.090	.250	.025	1.405
SR ½	RC 20	½	2.7 ohm to 22 megohm	.138	.375	.032	1.405
SRR ½	RCR 20[2]	½	10 ohm to 22 megohm	.138	.375	.032	1.405
SR 1	RC 32	1	2.7 ohm to 22 megohm	.225	.562	.040	1.430
SRR 1	RCR 32[3]	1	4.7 ohm to 5.6 megohm	.225	.562	.040	1.430
SR 2	RC 42	2	10 ohm to 22 megohm	.312	.688	.045	1.430

[1] Available to 5.6 megohms for non-military use. [2] S failure level. [3] R failure level.

NEW METAL FILM RESISTORS

Airco Type	Rated Power @ 70°C	Max. Cont. Working Voltage	Max. Overload Voltage	R.T.C. CHAR. K	R.T.C. CHAR. L	Resistance Range CHAR. K	Resistance Range CHAR. L	Tolerance
MF-55	0.250W	250V	500V	±100ppm/°C	±200ppm/°C	10Ω to 100KΩ	.47Ω to 240KΩ	D 0.5% F 1.0% G 2.0%
MF-60	0.500W	350V	700V			10Ω to 301KΩ	.47Ω to 510KΩ	

METAL OXIDE RESISTORS

Airco Type	Wattage @ 70°C	Max. Cont. Working Voltage	Max. Overload Voltage	Max. Pulse Voltage	R.T.C.	Resistance Range E-24 (5%)
MO-1	1	350	600	750	±200ppm/°C	10Ω-100KΩ
MO-2	2	500	600	750	±200ppm/°C	10Ω-100KΩ
MO-3	3	500	800	1500	±200ppm/°C	10Ω-150KΩ

**For additional information write or contact Airco Electronics, P.O. Box 547, Bradford, Pa. 16701.
Phone (814) 362-5536, TWX 510-695-5921.**

THIN FILM

- Custom Designed Precision Resistor Networks
  - Packaged Networks
  - Leadless Chip Networks
  - Beam Lead Networks
  - Matched Sets
- Low TCR Precision Resistors — Miniature Radial Lead Style
- Miniature Precision Thin Film Chip Resistors
- Beam Lead Thin Film Chip Resistors

THICK FILM

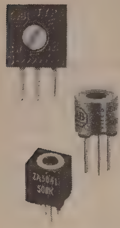
- High Stability Ultra Low Ohm Chip Resistors
- General Purpose Chip Resistors
- Miniature High Megohm Chip Resistors
- Unique High Voltage Divider Networks

RESISTIVE DEVICES

For additional resistive device information write or contact:

AIRCO ELECTRONICS
Special Components Operations
47th and Packard Road
Niagara Falls, N.Y. 14302
Phone: (716) 285-6971
TWX: 710-524-1653

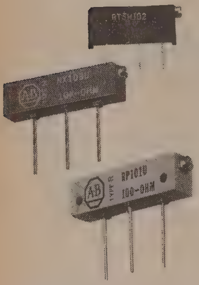
Allen-Bradley Trimming Potentiometers



TYPE E:
Cermet, single turn, 0.5W at 70°C, 10 ohms to 2 megs, ±10%, pin terminals, linear taper.

TYPE S:
Cermet, single turn, 0.5W at 85°C, 50 ohms to 1 meg, ±10%, pin terminals, linear taper.

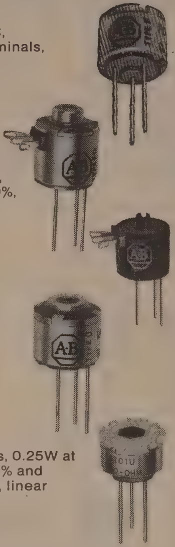
TYPE Z:
Cermet, single turn, 0.5W at 70°C, 50 ohms to 1 meg, ±10% and ±20%, pin terminals, linear taper.



TYPE RT:
Cermet, 20 turns, 0.75W at 70°C, 10 ohms to 2.0 megs, ±10%, pin terminals, linear taper, .250″ or .340″ high types.

TYPE N:
Hot-molded composition, 25 turns, 0.33W at 50°C, 100 ohms to 2.5 megs, ±10% and ±20%, pin terminals, linear taper.

TYPE R:
Hot-molded composition, 25 turns, 0.25W at 70°C, 100 ohms to 2.5 megs, ±10% and ±20%, pin or solder lug terminals, linear taper.



TYPE F:
Hot-molded composition, single turn, 0.25W at 70°C, 100 ohms to 5 megs, ±10% and ±20%, pin or solder lug terminals, 5 standard tapers.

TYPE FD:
Dual version of Type F; front section: solder lug only, rear: pin or lug. Well suited for Bridged-T or L-pad attenuator applications.

TYPE BT:
An all plastic version of the Type FD for excellent performance at high frequencies. Two types available for top or side adjustments. Also well suited for Bridged-T or L-pad attenuator applications.

TYPE O:
Hot-molded composition, single turn, 0.4W at 70°C, 100 ohms to 5 megs, ±10% and ±20%, pin or solder lug terminals, 5 standard tapers.

TYPE Y:
Hot-molded composition, single turn, 0.25W at 50°C, 100 ohms to 5 megs, ±10% and ±20%, pin terminals, 5 standard tapers.

SPECIFICATIONS

Type	Publication Number	Resistance Element and Adjustment Turns	Resistance Range and Tolerance	Power Rating	Voltage Rating (RMS or DC)	Operating Temperature Range	Terminal Types	Case Dimensions in inches, (millimeters)	Enclosure
E	5219	Cermet Single Turn	10 Ohms to 2 Megohms ±10%	0.5 Watt @ 70°C	300V	−55°C to +125°C	Pin	0.385 *(9,78)* Square by 0.197 *(5,00)* Thick	Immersion Sealed
S	5208		50 Ohms to 1 Megohm ±10%	0.5 Watt @ 85°C		−65°C to +150°C		0.375 *(9,52)* Diameter by 0.375 *(9,52)*	
Z	5211		50 Ohms to 1 Megohm ±10%, ±20%	0.5 Watt @ 70°C		−55°C to +125°C		0.250 *(6,35)* cube	
RT	5237	Cermet 20 Turn	10 Ohms to 2 Megohms ±10%	0.75 Watt @ 70°C		−65°C to +125°C		L 0.750 *(19,05)* H 0.250 *(6,35)* or H 0.340 *(8,64)* W 0.190 *(4,83)*	
N	5206	Composition 25 Turn	100 Ohms to 2.5 Megohms ±10%, ±20%	0.33 Watt @ 50°C		−55°C to +100°C		L 1.250 *(31,75)* H 0.359 *(9,13)* W 0.250 *(6,35)*	
R	5205			0.25 Watt @ 70°C		−55°C to +125°C	Pin or Solder Lug		
F	5234	Composition Single Turn	100 Ohms to 5 Megohms ±10%, ±20%	0.25 Watt @ 70°C	350V	−55°C to +120°C	Pin or Solder Lug	0.500 *(12,70)* Diameter by 0.531 *(13,49)*	
FD	5231						Front: Lug Rear: Lug or Pin	0.500 *(12,70)* Diameter by 0.688 *(17,46)*	
BT	5236			Contact Factory			Side Adjust: Front: 3 Lugs Rear: 3 Pins Top Adjust: Front: 2 Pins Rear: 2 Pins	0.500 *(12,70)* Diameter by 0.535 *(13,59)*	Dust and Splash Resistant
O	5235			0.4 Watt @ 70°C	350V	−55°C to +150°C	Pin or Solder Lug	0.500 *(12,70)* Diameter by 0.531 *(13,49)*	Immersion Sealed
Y	5209			0.25 Watt @ 50°C		−55°C to +100°C	Pin	0.500 *(12,70)* Diameter by 0.359 *(9,13)*	Dust and Splash Resistant

Allen-Bradley Variable Resistors

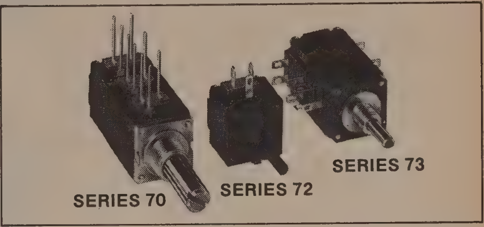
INSTANT PROTOTYPES

MOD POT Instant Prototypes (MPIP) puts a wide range of MOD POT components at your fingertips. MPIP available from your A-B distributor. Then get your production quantities of MOD POT fast from A-B distributors, assembled to exacting factory standards.

SERIES 70 MOD POT®: Unique modular design offers virtually unlimited configurations: single, double, triple or quadruple. Options include: PC or solder lug terminals, variety of switches, vernier drive, concentric shafts, composition or cermet resistance elements. 50 ohms to 10 megs, ±10% and ±20% (composition); 100 ohms to 1 meg, ±10% (cermet). 1.0W at 70°C (composition); 2.0W at 70°C (cermet).

SERIES 72 MOD POT®: Similar to Series 70 except the case, bushing and shaft are non-metallic for electrical isolation. Available in single or dual combinations only. Power rating is 0.5W at 70°C.

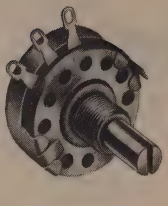
SERIES 73 MOD POT®: Another version of Series 70 for applications that require single or dual section controls.

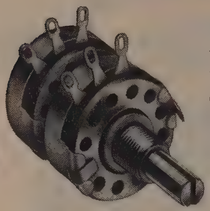


SPECIFICATIONS

Type	Publication Number	Resistance Element	Resistance Range and Tolerance	Power Rating	Voltage Rating (RMS or DC)	Operating Temperature Range	Number of Sections Available	Case Dimensions in inches, (millimeters)	Enclosure
70	5217	Cermet	100 Ohms to 1 Megohm ±10%	2.0 Watts @ 70°C	350V	−55°C to +150°C	1, 2, 3 or 4	0.594 *(15,08)* Deep by 0.625 *(15,88)* Square (Single Section)	Dust and Splash Resistant
		Composition	50 Ohms to 10 Megohms ±10%, ±20%	1.0 Watt @ 70°C		−55°C to +120°C			
72	5224	Composition	50 Ohms to 10 Megohms ±10%, ±20%	0.5 Watt @ 70°C		−55°C to +100°C	1 or 2		
73	5225	Cermet	100 Ohms to 1 Megohm ±10%	Contact Factory		Contact Factory			
		Composition	50 Ohms to 10 Megohms ±10%, ±20%						
J(RV4)	5200		50 Ohms to 5 Megohms ±10%, ±20%	2.25 Watts @ 70°C	500V	−55°C to +120°C	1, 2 or 3	0.625 *(15,88)* Deep by 1.156 *(29,36)* Diameter (Single Section)	
EJ	5230			2.25 Watts @ 70°C			1 or 2		
K	5222			3.0 Watts @ 70°C		−55°C to +150°C	1, 2 or 3		
G(RV6)	5201		100 Ohms to 5 Megohms ±10%, ±20%	0.5 Watt @ 70°C	350V	−55°C to +120°C	1	0.469 *(11,91)* Deep by 0.500 *(12,70)* Diameter (Without Switch)	Immersion Sealed
GD	5213						2		
L	5233			0.8 Watt @ 70°C		−55°C to +150°C	1		
W	5212			0.5 Watt @ 70°C		−55°C to +120°C			
WR	5220			0.5 Watt @ 70°C					Dust / Splash Resistant
CQ	5214	Cermet	100 Ohms to 5 Megohms ±10%	0.5 Watt @ 125°C		−65°C to +175°C			Immersion Sealed
SP	5216		50 Ohms to 1 Megohm ±10% (5% available)	1.0 Watt @ 70°C	300V	−65°C to +150°C		0.438 *(11,11)* Deep by 0.375 *(9,52)* Diameter	

TYPE J (RV4):
Standard of the industry for for quality. Hot-molded composition, 50 ohm to 5 megs, ±10% and ±20% (special values to 1000 megs available), 2.25W at 70°C, single, dual, triple sections available, variety of switch types for single or dual sections.

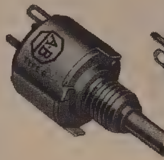


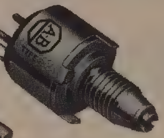


TYPE EJ:
Extra long life version of the Type J with rotational life exceeding one million rotations, single or dual configurations.

TYPE K:
A 3 0W (at 70°C) version of the popular Type J. −55°C to +150°C.

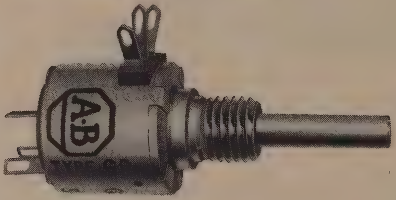
TYPE G (RV6):
Hot-molded composition, 100 ohms to 5 megs, ±10% and ±20%, 0.5W at 70°C, single section available with or without SPST switch.



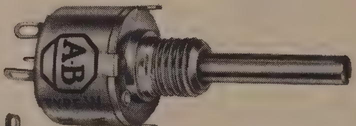


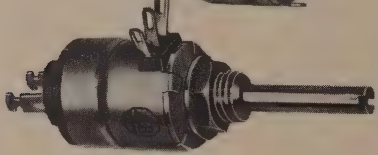
TYPE L:
Hot-molded composition, 100 ohms to 5 megs, ±10% and ±20%, 0.8W at 70°C, single section.

TYPE GD:
Dual section version of Type G. The smallest dual available.



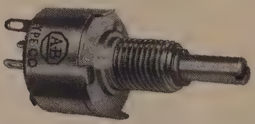
TYPE W:
Hot-molded composition, 100 ohms to 5 megs, ±10% and ±20%, 0.5W at 70°C, single section.

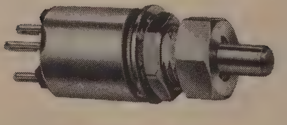




TYPE WR:
Radial-lead version of Type W. Available with switch with contacts that close at start of clockwise rotation (TYPE WRS) or with switch with contacts that close at start of counter-clockwise rotation (TYPE WRH).

TYPE CQ:
Cermet, 100 ohms to 5 megs, ±10%, 0.5W at 125°C, single section.





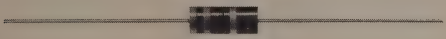
TYPE SP:
Cermet, 50 ohms to 1 meg, ±10%, 1.0W at 70°C, single section. Only ⅜″ diameter.

Standard options for all types include a variety of shafts, bushings, shaft endings, shaft lengths, and hardware.

Types FD, GD, J and the multi-section MOD POT with composition tracks are well suited for attenuator applications.

Allen-Bradley Hot-Molded Fixed Resistors

HB—RCR42



GB—RCR32

EB—RCR20

CB—RCR07

BB—RCR05

Allen-Bradley hot-molded composition resistors are high-quality units intended for general purpose use in the electronics industry.

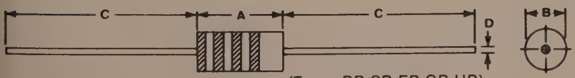
Allen-Bradley Style RCR resistors not only meet all requirements of MIL-R-39008 but also exceed the S level (best level) of Established Reliability of 0.001% failure rate per 1000 hours. And only Allen-Bradley resistors are available in S level reliability in all five wattage sizes over the entire resistance range. The S reliability level is indicated by a yellow 5th color band on the resistor body.

Metal-clad hot-molded resistors (Types GM and HM) are fitted with metal clamps which surround the major portion of the resistor. The metal clamps provide rigid mounting and efficient heat transfer from the resistors to the metal chassis or panels on which they are mounted.

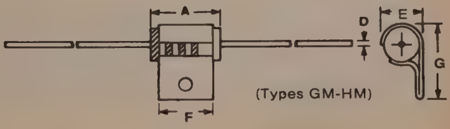
For more information request Publication EC21.

SPECIFICATIONS

Type	Power at 70°C	Resistance Range	Tolerance	Voltage Rating (RMS)	Maximum Ambient Temperature	Dimensions in Inches (millimeters)						
						A	B	C	D	E	F	G
BB	⅛ watt	2.7 Ohms to 100 Megohms	±5, 10, 20%	150V	+130°C	0.145 (3,68)	0.062 (1,59)	1.000 (25,40)	0.015 (0,38)			
RCR05		2.7 Ohms to 22 Megohms	±5, 10%									
CB	¼ watt	2.7 Ohms to 100 Megohms	±5, 10, 20%	250V	+150°C	0.250 (6,35)	0.090 (2,29)	1.500 (38,10)	0.025 (0,64)			
RCR07		2.7 Ohms to 22 Megohms	±5, 10%									
EB	½ watt	1.0 Ohms to 100 Megohms	±5, 10, 20%	350V		0.375 (9,52)	0.140 (3,56)	1.500 (38,10)	0.033 (0,84)			
RCR20		2.7 Ohms to 22 Megohms	±5, 10%									
GB	1 watt	2.7 Ohms to 100 Megohms	±5, 10, 20%	500V		0.562 (14,29)	0.225 (5,72)	1.500 (38,10)	0.041 (1,04)			
RCR32		2.7 Ohms to 22 Megohms	±5, 10%									
HB	2 watts	10 Ohms to 100 Megohms	±5, 10, 20%	750V		0.688 (17,46)	0.312 (7,94)	1.500 (38,10)	0.045 (1,14)			
RCR42		10 Ohms to 22 Megohms	±5, 10%	500V								
GM	3 watts	2.7 Ohms to 22 Megohms	±5% ±10%	500V		0.562 (14,29)	0.225 (5,72)	1.500 (38,10)	0.041 (1,04)	0.305 (7,75)	0.438 (11,11)	0.656 (16,67)
HM	4 watts	10 Ohms to 22 Megohms		750V		0.688 (17,46)	0.312 (7,94)	1.500 (38,10)	0.045 (1,14)	0.391 (9,92)	0.562 (14,29)	0.766 (19,45)



(Types BB-CB-EB-GB-HB)



(Types GM-HM)

Allen-Bradley Cermet Film Fixed Resistors

This one resistor can shrink your inventory costs

Capless design provides a reliable termination that does away with problems associated with end cap construction.

Leads are designed for both soldering and welding to give you freedom of choice about attachment, and long term storage capability.

Cores are high purity alumina with outstanding physical and thermal properties to reduce the incidence of fractures.

Coating is specially formulated to maintain outstanding insulation properties throughout environmental exposures.

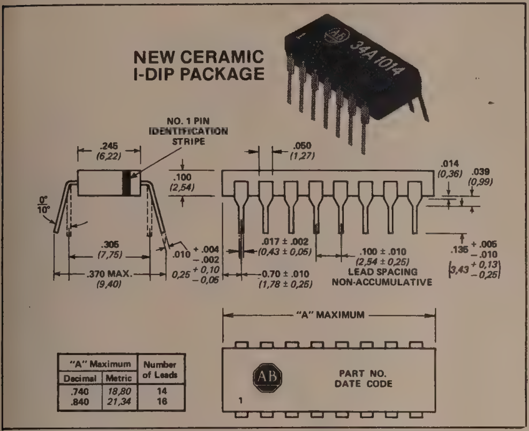
Markings are clear, crisp and precise; dual resistance marking for easy identification, and durable to withstand production handling.

For more information request Publication EC33.

Resistance range	10 Ohms to 10 Megohms
Power rating	⅛ watt @ 125°C ¼ watt @ 70°C ½ watt @ 70°C (250V Max.)
TCR	100 PPM
Tolerance	1%
Availability	Off the shelf
Approved	RN55D
Size	.250 L. x .090 D.

ALLEN-BRADLEY—THE LEADER IN TOTAL NETWORK CAPABILITY

CERMET DIP RESISTOR NETWORKS

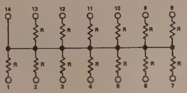

NEW CERAMIC
I-DIP PACKAGE
34A 101A
NO. 1 PIN IDENTIFICATION STRIPE
.245 (6,22)
.100 (2,54)
.050 (1,27)
.014 (0,36)
.039 (0,99)
0° 10°
.305 (7,75)
.370 MAX. (9,40)
.010 + .004 − .002
0,25 + 0,10 − 0,05
.017 ± .002 (0,43 ± 0,05)
-0.70 ± .010 (1,78 ± 0,25)
.100 ± .010 (2,54 ± 0,25) LEAD SPACING NON-ACCUMULATIVE
.135 + .005 − .010 (3,43 + 0,13 − 0,25)
"A" MAXIMUM
PART NO.
DATE CODE
1

"A" Maximum		Number of Leads
Decimal	Metric	
.740	18,80	14
.840	21,34	16

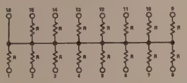
STANDARD • PULL-UP • PULL-DOWN • TERMINATION • NETWORKS

APPLICATIONS:

- Pull-up array for unused TTL gates
- Parallel high speed circuitry
- Wired OR configurations
- Pull-down applications
- TTL-MOS interfacing
- Digital pulse squaring



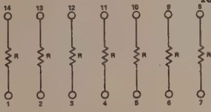
314A
13 Resistors...
14 Pin DIP



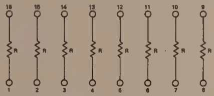
316A
15 Resistors...
16 Pin DIP

APPLICATIONS:

- Transmission line termination
- Power gate pull-up
- Current limiting
- Logic level translation



314B
7 Resistors...
14 Pin DIP



316B
8 Resistors...
16 Pin DIP

STANDARD RESISTANCE VALUES—SERIES 314A, 314B, 316A, 316B

		R (OHMS)				
22	75	270	910	3300	10K	47K
24	82	300	1000	3600	11K	68K
27	91	330	1100	3900	12K	100K
30	100	360	1200	4300	13K	
33	110	390	1300	4700	15K	
36	120	430	1500	5100	16K	
39	130	470	1600	5600	18K	
43	150	510	1800	6000	20K	
47	160	560	2000	6200	22K	
51	180	620	2200	6800	24K	
56	200	680	2400	7500	27K	
62	220	750	2700	8200	30K	
68	240	820	3000	9100	33K	

PRICES

Quantity	314A	316A	314B	316B
1—24	$1.20	$1.25	$1.15	$1.20
25—99	$1.10	$1.13	$1.07	$1.10

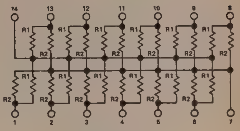
Prices and specifications subject to change without notice.

HOW TO ORDER

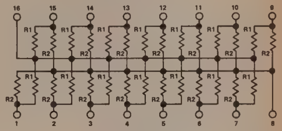
Example: Require Series 314A with resistance value=1000Ω. Order part #314A102.

STANDARD • PARALLEL • TERMINATION • NETWORKS

APPLICATIONS:
Series 314E and 316E networks are used in digital IC logic circuits and are especially suited for ECL and TTL applications. For ECL applications the network's circuit configuration serves a dual purpose. The R2 resistors are pull-down resistors and are normally tied to the most negative supply voltage. The R1 resistors, in parallel with the R2 resistors, provide the characteristic impedance for proper transmission line matching. In TTL logic the networks are used in pulse squaring applications.



SERIES 314E



SERIES 316E

PRICES

Quantity	314E	316E
1—24	$2.15	$2.30
25—99	$2.00	$2.14

Prices and specifications subject to change without notice.

HOW TO ORDER

Example: Require series 316E with characteristic impedance=50Ω. Order part #316E810131.

STANDARD RESISTANCE VALUES—SERIES 314E AND 316E

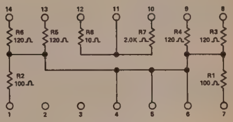
R1/R2	(Characteristic Z_0 Impedance)
81/130	50
120/200	75
90/660	80
130/210	80
160/260	100
220/330	132
330/680	222
180/390	123

STANDARD • SENSE AMP • INTERFACE • NETWORKS

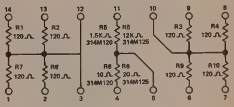
APPLICATIONS:

- Designed for use with 7520 series core memory sense amplifiers.
- Series 314M110 combines a threshold setting divider with balanced sense line termination and far end termination of two sense lines.
- Series 314M120 and 314M125 combine threshold setting dividers with four sense line termination. Following resistor values provide different threshold setting:

Resistor	314M120	314M125
R5	1.5KΩ	12KΩ
R6	10Ω	20Ω


R6 120Ω
R5 120Ω
R8 10Ω
R7 2.0K Ω
R4 120Ω
R3 120Ω
R2 100Ω
R1 100Ω

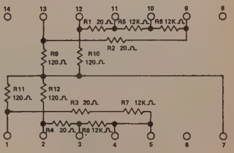
314M110


R1 120Ω
R2 120Ω
R5 1.5KΩ 314M120
R5 12KΩ 314M125
R3 120Ω
R4 120Ω
R7 120Ω
R8 120Ω
R6 10Ω 314M120
R6 20Ω 314M125
R9 120Ω
R10 120Ω

314M120 or 314M125

APPLICATIONS:

- Series 314M130 designed for use with μA711 dual voltage comparator in core memory sense amplifier applications.
- Combines four threshold dividers with balanced termination of two lines.

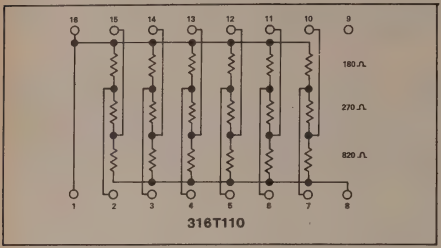

R1 20Ω
R5 12KΩ
R6 12KΩ
R2 20Ω
R9 120Ω
R10 120Ω
R11 120Ω
R12 120Ω
R3 20Ω
R7 12KΩ
R4 20Ω
R8 12KΩ

314M130

STANDARD TTL TO ECL TRANSLATOR NETWORK

APPLICATIONS:

- Series 316T110 provides TTL to ECL translation.
- Contains six TTL to ECL translators.

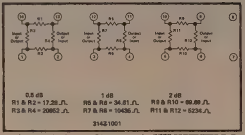

16
15
14
13
12
11
10
9
180 Ω
270 Ω
820 Ω
1
2
3
4
5
6
7
8

316T110

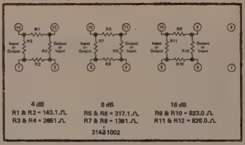
STANDARD "O" PAD (BALANCED π) ATTENUATORS

APPLICATIONS:

These networks are used primarily in the communications industry where a fixed voltage attenuation is required with impedance matching. Voltage attenuation in steps of 0.5 dB from 0.5 dB to 31.5 dB can be obtained from the Series 314Z networks by the use of one "O" pad, or by placing two or more in series. For example, 20 dB is obtained by placing the 4 dB and 16 dB sections in series.


R1
R2
R3
R4
R5
R6
R7
R8
R9
R10
R11
R12
Input or Output
Output or Input
0.5 dB
R1 & R2 = 17.28 Ω
R3 & R4 = 20852 Ω
1 dB
R5 & R6 = 34.81 Ω
R7 & R8 = 10436 Ω
2 dB
R9 & R10 = 69.69 Ω
R11 & R12 = 5234 Ω

314Z1001


R1
R2
R3
R4
R5
R6
R7
R8
R9
R10
R11
R12
Input or Output
Output or Input
4 dB
R1 & R2 = 143.1 Ω
R3 & R4 = 2651 Ω
8 dB
R5 & R6 = 317.1 Ω
R7 & R8 = 1381 Ω
16 dB
R9 & R10 = 923.0 Ω
R11 & R12 = 826.0 Ω

314Z1002

SPECIFICATIONS:

Characteristic Impedance	600 ohm
Attenuation Tolerance (dB)	±1
Attenuation Change Due to Temperature	±1% Additional
Resistor Tolerance	±1
Temperature Coefficient of Resistance	±200 ppm/°C
Power Dissipation Rating at 40°C	150 mw per Attenuator
Frequency Response	Flat to 1 MHz
Operating Temperature	0°C to +70°C

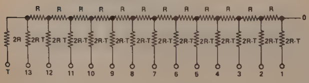
STANDARD NETWORK SPECIFICATIONS

Standard Network	Resistor Tolerance	Temperature Coefficient of Resistance (ppm/°C)	Power Dissipation Rating (Up to 70°C Ambient)	Operating Temperature Range	Resistance Ratios
314A	±2%	±100	125 mw/resistor 1.6 watt/package	−55°C to +125°C	———————
314B			250 mw/resistor 1.6 watt/package		
316A			125 mw/resistor 1.8 watt/package		
316B			250 mw/resistor 1.8 watt/package		
314E	±2%	±100	125 mw/resistor 1.6 watt/package	−55°C to +125°C	———————
316E			125 mw/resistor 1.8 watt/package		
314M110	±2% ±5% (R8 only)	±200	500 mw/resistor (R1 & R2) 100 mw/resistor (R3 through R8)	0°C to +70°C	R3/R4 ±1.5% R5/R6 ±1.5% R7/R8 ±2%
314M120	±2% ±5% (R6 only)	±100	100 mw/resistor	0°C to +70°C	R1/R2 R3/R4 R5/R6 R7/R8 R9/R10 ±1.5%
314M125					
314M130	±2%	±200	100 mw/resistor	0°C to +70°C	———————
316T110	±2%	±200	125 mw/resistor	0°C to +70°C	———————

PRECISION THIN FILM RESISTOR NETWORKS, LADDERS AND ARRAYS

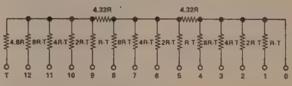
R/2R BINARY CODE LADDER NETWORKS

Ladder networks with fewer bits using the basic schematic of the FN132 are FN114, FN123, FN125, FN131, and FN160.

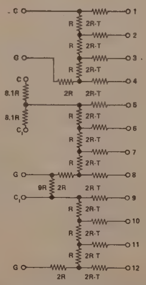

R
2R
2R-T
T
13
12
11
10
9
8
7
6
5
4
3
2
1
0

FN132

1-2-4-8 BCD CODE LADDER NETWORKS


4.32R
4.32R
4.8R
8R-T
4R-T
2R-T
R-T
T
12
11
10
9
8
7
6
5
4
3
2
1
0

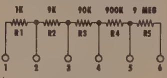
FN130


C
G
R
2R-T
2R
8.1R
8R
1
2
3
4
5
6
7
8
9
10
11
12

FN128 & FN129

VOLTAGE DIVIDER NETWORK

(Decade Attenuator)

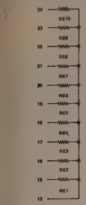

1K
9K
90K
900K
9 MEG
R1
R2
R3
R4
R5
1
2
3
4
5
6

FN207

APPLICATIONS:

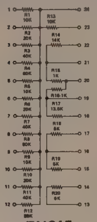
- All ladders—A/D and D/A conversion
- FN207—Input attenuation and range selection in digital instrumentation; particularly in digital voltmeters and multimeters.

CURRENT SUMMING NETWORKS

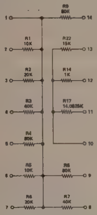


FN111 & FN112

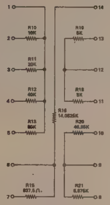
PRECISION RESISTOR ARRAYS



FN215



FN226



FN227

APPLICATIONS:

- A/D and D/A conversion.
- FN111*—10 bit binary operation.
- FN112*—3 place BCD operation (0 to 399).
- FN215—12 bit conversion—designed for use with Fairchild µA9650 IC.
- FN226**
- FN227**

*Both designed for use with Fairchild µA722 IC.

**Both designed for use with Intersil ICL 8018, 8019, 8020 IC's. FN226 gives 8 bit conversion. FN226 plus FN227 gives 12 bit conversion.

R/2R BINARY CODE LADDER NETWORKS

Part Number	FN114 (1)	FN123 (1)	FN125 (2)	FN131	FN132	FN160
Number of Bits	12	10	10	10	13	10
Ladder Resistance Value (R)	R=200K $T_{1-2}=500\Omega$ $T_{3-12}=550\Omega$	R=50K $T_{1-2}=500\Omega$ $T_{3-10}=550\Omega$	R=50K $T_{1-2}=200\Omega$ $T_{3-10}=550\Omega$	R=10K T=0	R=5K T=0	R=5K T=0
Ladder Resistance Tolerance	±10%	±10%	±10%	±10%	±10%	±10%
Network Full Scale Accuracy	±½ LSB	±½ LSB	±½ LSB	±½ LSB	±½ LSB	±½ LSB
Operating Temperature Range	−55°C to +125°C	−55°C to +125°C	−55°C to +125°C	−55°C to +125°C	−55°C to +125°C	−55°C to +125°C
Storage Temperature Range	−65°C to +175°C	−65°C to +175°C	−65°C to +175°C	−65°C to +175°C	−65°C to +175°C	−65°C to +175°C
Operating Voltage Range	±100V Maximum	±70V Maximum	±70V Maximum	±30V Maximum	±20V Maximum	±20V Maximum

(1) May be used with Fairchild 3750/3751 IC.
(2) May be used with Fairchild 3750 IC.

1-2-4-8 BCD CODE LADDER NETWORKS

Part Number	FN128 (1)	FN129 (1)	FN130
Number of Bits	12	12	12
Ladder Resistance Value (R)	R=50K $T_{1-2}=500\Omega$ $T_{3-12}=500\Omega$	R=100K $T_{1-2}=500\Omega$ $T_{3-12}=550\Omega$	R=10K T=0
Ladder Resistance Tolerance	±10%	±10%	±10%
Network Full Scale Accuracy	±½ LSB	±½ LSB	±½ LSB
Operating Temperature Range	−55°C to +125°C	−55°C to +125°C	−55°C to +125°C
Storage Temperature Range	−65°C to +175°C	−65°C to +175°C	−65°C to +175°C
Operating Voltage Range	±100V Maximum	±140V Maximum	±20V Maximum

(1) May be used with Fairchild 3750/3751 IC.

VOLTAGE DIVIDER NETWORK FN207

Resistance Tolerance on Total Resistance (R_T) at +25°C:
$R_T=R_1+R_2+R_3+R_4+R_5=10$ Megohms ±0.05%.

Ratio Tolerance at +25°C and from 0 to 1000 volts:

$$\frac{R_1+R_2+R_3+R_4}{R_T}=\frac{1\text{ Megohm}}{10\text{ Megohms}}=0.1\ \pm0.03\%$$

$$\frac{R_1+R_2+R_3}{R_T}=\frac{100\text{ K ohms}}{10\text{ Megohms}}=0.01\ \pm0.03\%$$

$$\frac{R_1+R_2}{R_T}=\frac{10\text{ K ohms}}{10\text{ Megohms}}=0.001\ \pm0.03\%$$

$$\frac{R_1}{R_T}=\frac{1\text{ K ohm}}{10\text{ Megohms}}=0.0001\ \pm0.03\%$$

Temperature Coefficient of Resistance . . . . ±25 ppm/°C
TCR Tracking . . . . ±5 ppm/°C
Operating Voltage (between pins 1 & 6) . . . . 1000 volts max.
Operating Temperature . . . . 0°C to +70°C
Storage Temperature . . . . −65°C to +175°C

CURRENT SUMMING NETWORKS

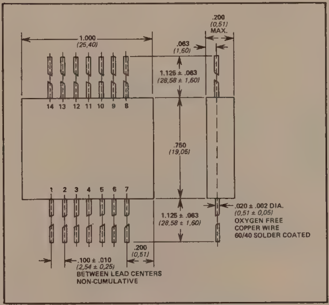
Part Number		FN111				FN112			
Terminal Number	Resistor Number (Rej)	Nominal Resistance (K ohm)	Nominal Ratio (Rej/Rei)	Max. Ratio Tolerance % At 25°C	Max. Ratio Temp. Coeff. (PPM/°C)	Nominal Resistance (K ohm)	Nominal Ratio (Rej/Rei)	Max. Ratio Tolerance % At 25°C	Max. Ratio Temp. Coeff. (PPM/°C)
15	RE1	2 547	1.000	±10% Absolute	±5.0	2.547	1.000	±10% Absolute	±20
16	RE2	5.094	2 000	±0 02	±5.0	5.094	2 000	±0 02	±5 0
17	RE3	10 245	4 022	±0.05	±10	6 379	2 5045	±0 02	±5.0
18	RE4	20.60	8.088	±0.10	±20	12 83	5 036	±0 05	±10
19	RE5	41.43	16.265	±0.20	±20	25.80	10.13	±0 10	±20
20	RE6	81.93	32.17	±0.20	±50	51.03	20 03	±0.20	±50
21	RE7	163.4	64.16	±0.50	±100	63.36	24.88	±0 50	±100
22	RE8	325.7	127.9	±1.0	±200	126 3	49.57	±1.0	±200
23	RE9	644.9	253.2	±2.0	±500	250 1	98.17	±1.0	±200
24	RE10	1275 0	500 8	±2.0	±500	495.0	194 3	±2 0	±500

PRECISION RESISTOR ARRAYS

Part Number	FN215	FN226	FN227
Tolerance— Resistance matching or ratio	R2/R1 = ±0.005% R3/R1 = ±0.01% R4/R1 = ±0.02% R5/R1 = ±1.0% R6/R5 = ±0.05% R7/R5 = ±0.1% R8/R5 = ±0.02% R9/R1 = ±1.0% R10/R9 = ±0.5% R11/R9 = ±1.0% R12/R9 = ±2 0% R13/R1 = ±0.2%	R2/R1 = ±0.0122% R3/R1 = ±0.0244% R4/R1 = ±0.0488% R5/R1 = ±0.096% R6/R1 = ±0.195% R7/R1 = ±0.391% R8/R1 = ±0.781% R9/R1 = ±0.1% R17/R14 = ±0 1% R22/R14 = ±0 5%	R11/R10 = ±1.0% R12/R10 = ±1.0% R13/R10 = ±1.0% R16/R15 = ±1.0% R19/R18 = ±0.1% R21/R20 = ±0.1%
Tolerance—Absolute	R14&R17 = ±0.5% R15&R16 = ±1.0% R18&R19 = ±0.1% R20 = ±1.0%	R1 = ±0.1% R14 = ±1.0%	R10 = ±0.5% R15 = ±1.0% R18 = ±0.5% R20 = ±0.5%
Temperature coefficient of resistance	±25 PPM/°C	±25 PPM/°C	±25 PPM/°C
Temperature coefficient of resistance tracking	±5 PPM/°C	±5 PPM/°C	±5 PPM/°C
Power rating each resistor up to +125°C	50MW	50MW	50MW
Operating temperature range	−55°C to +125°C	0°C to +70°C	0°C to +70°C
Storage temperature range	−65°C to +175°C	−65°C to +175°C	−65°C to +175°C

PACKAGE

Modified flat pack (Diallýl phthalate epoxy material).
(Dip, chip, and conformal coated package styles also available upon request.)



CUSTOM RESISTOR NETWORKS

For more information on custom resistor network capabilities ask for these publications:

Cermet resistor networks—A-B Publication 5850

Thin film resistor networks—A-B Publication 5800

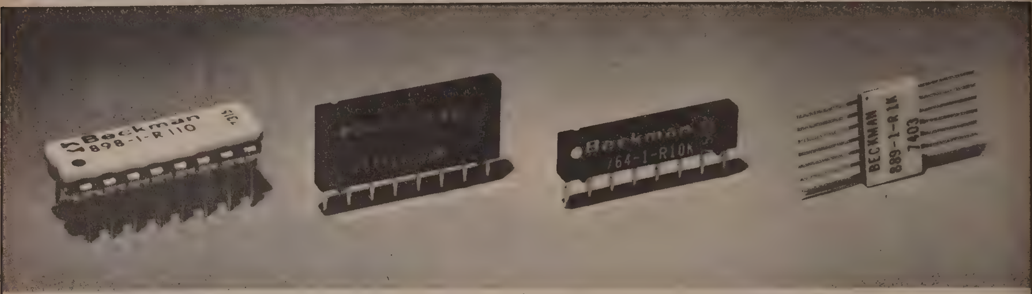
In addition to the standard cermet and precision thin film resistor networks listed on these pages, custom networks can be designed to meet a specific need.

ALLEN-BRADLEY
Electronics Division
Milwaukee, Wisconsin 53204

Beckman

Save time, space and money with . . .

THICK FILM RESISTOR NETWORKS



Beckman RESNET™ Dual-In-Line and Single-In-Line Resistor Networks consist of various thick film resistor configurations packaged in standard 14- and 16-pin DIPs and 8-pin SIPs that offer:

- Significant reduction of "on the board" costs.
- Space savings over individual resistors.
- Total compatibility with automatic insertion equipment.

Specifications (DIP or SIP)

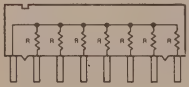
Resistance Tolerance (+25°C) . . . . 22Ω to 99Ω ± 2Ω
100Ω to 100K ± 2% max.

Power Rating (+25 C still air):

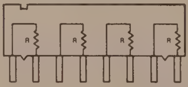
Model	Resistor Rating	Package Rating
764-1	0.175W	1.5W
764-3	0.2W	1.5W
784-1	0.3W	2.0W
784-3	0.5W	2.0W
898-1, 899-1	0.150W	1.5W
898-3, 899-3	0.250W	1.5W
898-5	0.250W	2.2W
899-5	0.250W	2.0W

Operating Temperature Range . . . . −55°C to +125°C

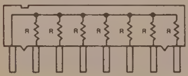
7 RESISTORS
8-pin SIP . . . 784-1-R



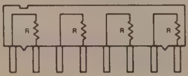
4 RESISTORS
8-pin SIP . . . 784-3-R



7 RESISTORS
8-pin Low Profile SIP
764-1-R



4 RESISTORS
8-pin Low Profile SIP
764-3-R



Stock Resistance Values Available (in Ohms)
784-1-R (R) 784-3-R (R)
764-1-R (R) 764-3-R (R)

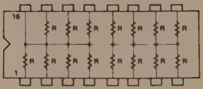
100 150 330 680 1.5K 3.3K 6.8K 15K
120 220 470 1K 2.2K 4.7K 10K 22K

PRICES — SIP RESISTOR NETWORKS

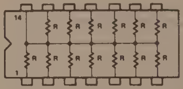
Quantity	784-1	784-3	764-1	764-3
1-99	$ .65	$ .60	$ .65	$ .60

STANDARD RESNET™ DIPS

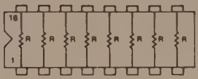
15 RESISTORS
16-Pin DIP . . . 898-1-R



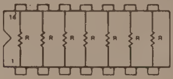
13 RESISTORS
14-Pin DIP . . . 899-1-R



8 RESISTORS
16-Pin DIP . . . 898-3-R



7 RESISTORS
14-Pin DIP . . . 899-3-R



Stock Resistance Values Available
898-1-R_______
898-3-R_______

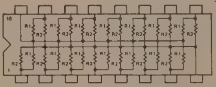
62†	110	330	1.0K	2.2K	6.0K	15.0K	47.0K
68	150	470	1.5K	3.3K	6.8K	22.0K	68.0K
100	220	680	2.0K††	4.7K	10.0K	33.0K	100.0K

†62Ω is not standard in 898-1.
††2.0K is not standard in 898-3.

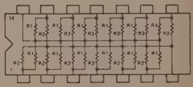
899-1-R_______
899-3-R_______

22	39	68	120	220	390	680	1.2K	2.2K	3.9K	6.2K	11K	20K
24	43	75	130	240	430	750	1.3K	2.4K	4.3K	6.8K	12K	22K
27	47	82	150	270	470	820	1.5K	2.7K	4.7K	7.5K	13K	33K
30	51	91	160	300	510	910	1.6K	3.0K	5.1K	8.2K	15K	47K
33	56	100	180	330	560	1.0K	1.8K	3.3K	5.6K	9.1K	16K	68K
36	62	110	200	360	620	1.1K	2.0K	3.6K	6.0K	10K	18K	100K

28 RESISTORS
16-Pin DIP . . . 898-5-R 220/330*



24 RESISTORS
14-Pin DIP . . . 899-5-R 220/330*
14-Pin DIP . . . 899-5-R 220/270*



*Stock Resistance Values (Ω's). Other resistance values available as factory order.

PRICES — DIP RESISTOR NETWORKS

Quantity	898-1	899-1	898-3	899-3	898-5	899-5
1-99	$1.25	$1.20	$1.20	$1.15	$2.30	$2.15

Prices and specifications subject to change without notice.

How to Order: List DIP or SIP model number, add dash and resistance value. Example: 1500 ohm, 14-pin network with 13 resistors (Series 899-1), order 899-1-R1.5K.

Beckman INSTRUMENTS, INC. **HELIPOT DIVISION** 2500 Harbor Boulevard, Fullerton, California 92634
(714) 871-4848 • TWX No. 910-592-1260

Beckman

THICK FILM RESISTOR NETWORKS

STANDARD ECL TERMINATORS

Beckman ECL Terminators are specifically designed for, and compatible with, the following Emitter Coupled Logic families:

- Motorola MECL 10,000 Series
- Signetics 10,000 Series ECL
- Fairchild 9500 Series ECL
- Texas Instruments Series SN10000 ECL
- National Semiconductor 10,000 Series ECL

Each terminator network utilizes thick film resistor materials with layouts specifically designed for low inductive characteristics and the high speed requirements of ECL systems. Where possible, the terminator networks include .01 μF decoupling capacitors. Each capacitor occupies the entire top surface of the ceramic substrate and consists of 2 metal plates and a single layer dielectric selected specifically for high capacitance at high frequency.

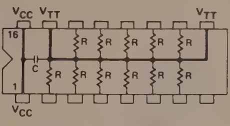

VCC
VTT
VTT
16
1
C
R
VCC

FIGURE 1 SERIES 898-41
–2.0 VOLT TERMINATORS

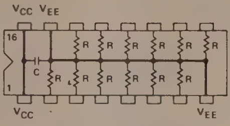

VCC
VEE
16
1
C
R
VCC
VEE

FIGURE 2 SERIES 898-42
–5.2 VOLT TERMINATORS

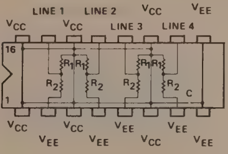

LINE 1
LINE 2
VCC
VEE
VCC
VCC
LINE 3
LINE 4
16
1
R1
R2
C
VCC
VCC
VEE
VEE
VEE
VEE
VCC
VEE

FIGURE 3 SERIES 898-43
THEVENIN EQUIVALENT
TERMINATORS

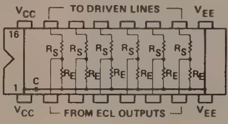

VCC
TO DRIVEN LINES
VEE
16
1
RS
RE
C
VCC
FROM ECL OUTPUTS
VEE

FIGURE 4 SERIES 898-44
SERIES LINE TERMINATOR

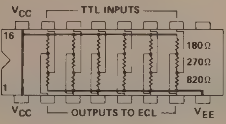

VCC
TTL INPUTS
16
1
180Ω
270Ω
820Ω
VCC
OUTPUTS TO ECL
VEE

FIGURE 5 SERIES 898-45
TTL TO ECL TRANSLATOR

ECL Performance Specifications

Resistance Tolerance (+25°C)	R > 100Ω: ± 2% max. R < 100Ω: ± 2Ω max.
Resistance Temperature Coefficient	0 ± 100 ppm/°C
Capacitance Tolerance	0.01μf + 40%, – 20%
Capacitance Dissipation Factor	2% max.
Capacitor Voltage Rating	25 volts max.
Operating Temperature Range	–30°C to +85°C
Storage Temperature Range	–55°C to +125°C

PRICES—ECL NETWORKS

Quantity	898-41	898-42	898-43	898-44	898-45
1-99	$2.50	$2.50	$2.95	$3.25	$2.25

Custom Networks: Special resistance values, resistor combinations and resistor/capacitor arrangements are available for specific customer applications. If an "off the shelf" Helipot DIP resistor package doesn't meet your needs, a custom network will!

STANDARD DIP INTERFACE NETWORKS

MODELS 899-17 and 899-18 RESNET™ DIP networks are designed for use with 7520 Series core memory sense amplifiers. The 899-17 terminates two sense lines, and the 899-18 terminates four sense lines in Series 7520 dual sense amplifiers.

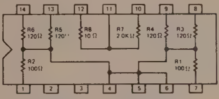

14
13
12
11
10
9
8
R6 120Ω
R5 120Ω
R8 10Ω
R7 2.0KΩ
R4 120Ω
R3 120Ω
R2 100Ω
R1 100Ω
1
2
3
4
5
6
7

FIGURE 6 MODEL 899-17
SENSE LINE TERMINATOR
FOR 7520 SERIES SENSE AMP

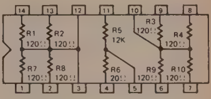

14
13
12
11
10
9
8
R1 120Ω
R2 120Ω
R5 12K
R3 120Ω
R4 120Ω
R7 120Ω
R8 120Ω
R6 20Ω
R9 120Ω
R10 120Ω
1
2
3
4
5
6
7

FIGURE 7 MODEL 899-18
SENSE LINE TERMINATOR
FOR 7520 SERIES SENSE AMP

MODEL 899-19 RESNET™ DIP provides the passive attenuator network required for sense amp applications using the μA711 dual comparator.

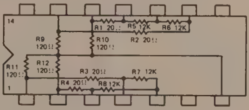

14
1
R1 20Ω
R5 12K
R6 12K
R9 120Ω
R10 120Ω
R2 20Ω
R12 120Ω
R11 120Ω
R3 20Ω
R7 12K
R4 20Ω
R8 12K

FIGURE 8 SENSE LINE TERMINATOR FOR μA711

MODEL 899-40 RESNET™ DIP network provides the optimum termination resistance and threshold level for interfacing the Intel 1103 series with the Intel 3208A. It provides six 600 ohm resistors (R_3) for terminating six interconnecting bit lines. In addition, this network provides a voltage divider (R_1 and R_2) to supply the 150 mV Threshold level required for the 3208A. The Beckman Series 899-40 uses standard 5V TTL power for the threshold setting network.

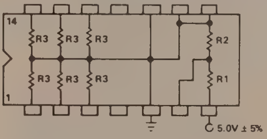

14
1
R3
R2
R1
5.0V ± 5%

FIGURE 9 MEMORY SENSE AMP INTERFACE

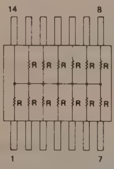
PRICES — INTERFACE NETWORKS

Quantity	899-17	899–18	899–19	899–40
1-99	$1.90	$1.75	$2.50	$1.45

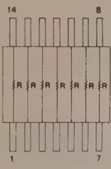
FLATPACK RESISTOR NETWORKS

Beckman Series 889-1 and 889-3 are 14-lead resistor flatpacks. Series 889-1 contains thirteen equal resistors with a common termination at lead 14, and Series 889-3 contains seven equal isolated resistors. The package style is compatible with standard flatpack IC dimensions, and is designed for applications requiring low package profile and ribbon lead terminations to the circuit board.

13 RESISTORS
14-Lead Flatpack . . . 889-1-R *



7 RESISTORS
14-Lead Flatpack . . . 889-3-R *



*Stock Resistance Values Available
889-1-R______
889-3-R______
1K 2K 3.3K 4.7K 10K

PRICES—FLATPACK RESISTOR NETWORKS

Quantity	1-9	10-49	50-99
	$7.50	$7.15	$6.75

Prices and specifications subject to change without notice.

Beckman INSTRUMENTS, INC.
HELIPOT DIVISION 2500 Harbor Boulevard, Fullerton, California 92634
(714) 871-4848 • TWX No. 910-592-1260

BOURNS INC

TRIMPOT PRODUCTS DIVISION

THICK-FILM NETWORKS

Bourns Resistor Networks are a product of many years of experience in the high volume production thick-film products. Bourns designs have been thoroughly tested to meet uncompromising standards as to product life and environmental performance. A proprietary thick-film resistor ink system imparts outstanding stability and temperature coefficient characteristics over the entire range of standard resistance values.

PERFORMANCE CHARACTERISTICS

Resistance Range: 33 Ω to 470K Ω Standard

10 Ω to 1 Meg Ω Special

Resistance Tolerance: ±2% Standard, to ±.5% Special

Power Ratings (@25°C)

MODELS	4114R-001	4114R-002	4116R-001	4116R-002	4406/08/10 R-001	4406/08/10 R-002
Total Pkg.	2.0W	2.0W	2.25W	2.25W	1.5/2./2.5W	1.5/2./2.5W
Single Resistor	0.25W	.125W	0.25W	0.125W	0.3W	0.5W

4114/16R 003	4116C-008	4410R-003	4116C-004	4116C-005	4116C-006	4116C-007	4114R-009
2./2.25W	1.0W	2.0W	1.5W	1.5W	1.5W	2.25W	1.5W
.125W	.125W	0.25W	.125W	.125W	.125W	0.25W	.125W

Capacitor Tolerance: ±20%

Capacitor Dissipation Factor: 3% Max.

Capacitor Voltage Rating: 25V Max.

Short Time Overload (2.5 x Rated Voltage, 5 sec): ±0.25% Max. △R

Resistance Temperature Coefficient (−55°C to ±125°C):

250 PPM/°C STD, ±100 PPM/°C Special

MECHANICAL CHARACTERISTICS

Body Material: DIP Package — Molded Epoxy

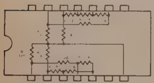
SIP Package — Epoxy Coated

Lead Material: Tin Plated Copper Alloy

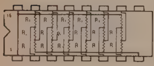
PHYSICAL CHARACTERISTICS

Meets or exceeds MIL-R-83401A, and MIL-STD-202E

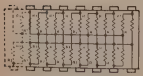
Call Bourns when you have applications which require nonstandard or unequal resistor values, special schematics, capacitors, or special performance specifications. We maintain a special facility for quick turn-around requirements on prototype units.



MODEL 4114C-009
14 PIN DUAL-IN-LINE PACKAGE
711 DUAL COMPARATOR TERMINATOR

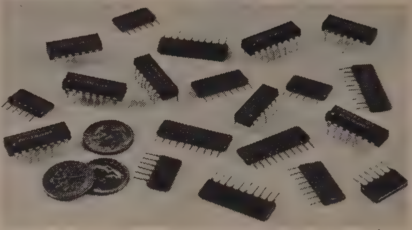


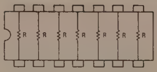
MODEL 4116R-008
16 PIN DUAL-IN-LINE PACKAGE
TTL TO ECL TRANSLATOR



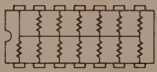
MODEL 4114/4116R-003
14/16 PIN DUAL-IN-LINE PACKAGE
LINE TERMINATOR

For quantity pricing, contact your Bourns representative or distributor . . . or contact the factory direct.

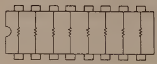




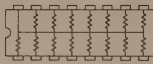
MODEL 4114R-001
14 PIN DUAL-IN-LINE PACKAGE
7 ISOLATED RESISTORS



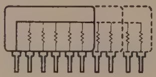
MODEL 4114R-002
14 PIN DUAL-IN-LINE PACKAGE
13 RESISTORS, PIN 14 COMMON



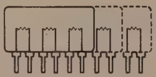
MODEL 4116R-001
16 PIN DUAL-IN-LINE PACKAGE
8 ISOLATED RESISTORS



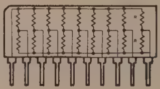
MODEL 4116R-002
16 PIN DUAL-IN-LINE PACKAGE
15 RESISTORS, PIN 16 COMMON



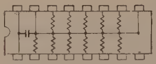
MODELS 4406/4408/4410R-001
6, 8, 10 PIN SINGLE-IN-LINE PACKAGE
5, 7 OR 9 RESISTORS, PIN 1 COMMON



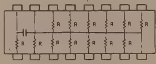
MODELS 4406/4408/4410R-002
6, 8 OR 10 PIN SINGLE-IN-LINE PACKAGE
3, 4 OR 5 ISOLATED RESISTORS



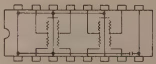
MODEL 4410R-003
10 PIN SINGLE-IN-LINE PACKAGE
16 RESISTOR LINE TERMINATOR



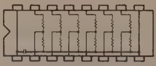
MODEL 4116C-004
16 PIN DUAL-IN-LINE PACKAGE
−2.0 VOLT ECL TERMINATOR



MODEL 4116C-005
16 PIN DUAL-IN-LINE PACKAGE
−5.2V ECL PULL DOWN RESISTORS



MODEL 4116C-006
16 PIN DUAL-IN-LINE PACKAGE
ECL THEVENIN EQUIVALENT TERMINATOR



MODEL 4116C-007
16 PIN DUAL-IN-LINE PACKAGE
SERIES LINE TERMINATOR

CTS *MICROELECTRONICS, INC.*

SUBSIDIARY OF CTS CORPORATION, ELKHART, INDIANA

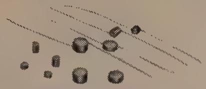
TOTAL CAPABILITY IN HYBRID CIRCUITRY

RESISTORS

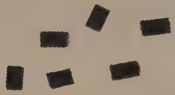
- Over 15 years production experience in cermet circuitry
- Prototype and production facilities offer fast turn around per your requirements

RESISTOR NETWORKS
RESISTOR CAPACITOR NETWORKS
RESISTOR TRIMMER NETWORKS

SOLID CERMET PELLET AND CHIP RESISTORS

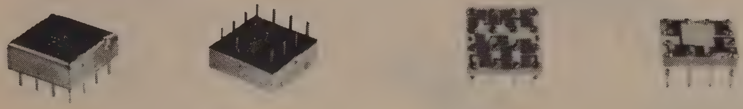


CERADOT RESISTOR



150 SERIES

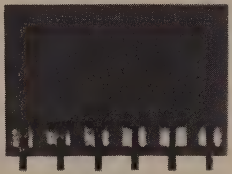
STANDARD RESISTOR NETWORKS



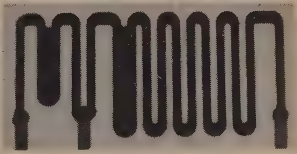
780 SERIES

CUSTOM RESISTOR NETWORKS

RESISTOR CONDUCTOR

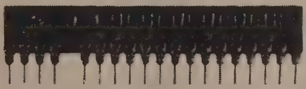


HIGH POWER MODULE



HIGH VOLTAGE MODULES

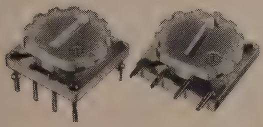
RESISTOR CAPACITOR NETWORKS



DIP COATING

780 SERIES

RESISTOR/TRIMMER COMBINATIONS



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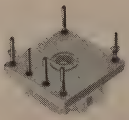

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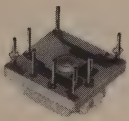

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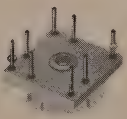


384

For active hybrid circuits, see page 1•888 in EEM

For Resistor/network applications, contact your CTS Representative (listed under CTS in the yellow pages) or contact: CTS MICROELECTRONICS, INC., P. O. Box 1278, Dept. E, Lafayette, Indiana 47902, or call and ask for Charles Sparks at (317) 463-2565 • TWX 810-342-1882

CTS OF BERNE, INC.

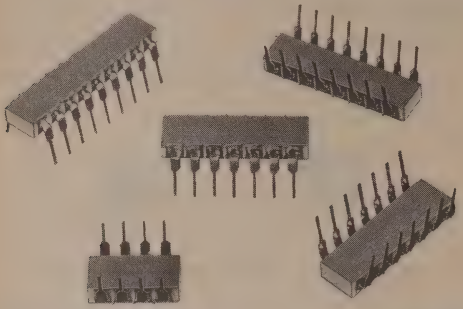
SUBSIDIARY OF CTS CORPORATION, ELKHART, INDIANA

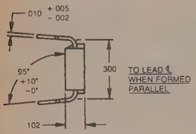
WORLD LEADER IN CERMET RESISTOR TECHNOLOGY

DUAL-IN-LINE CERMET RESISTOR NETWORKS

CERMET RESISTOR NETWORKS (Available with capacitor chips and/or active devices)*

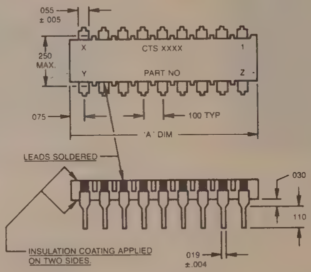
CTS Series 760 Dual-In-Line cermet resistor networks are available in 8, 14, 16, and 18 lead styles. CTS now offers you a choice of four popular space-saver packages. All are designed to simplify automatic insertion along with IC's and other DIP products for reduced costs. Easy to hand mount, too. Available without cover coat, so you can trim for circuit balance in your own plant. Choose from standard circuits available off-the-shelf for immediate delivery or custom designed to your specifications.





NO OF PINS	'A' DIM	PIN DESIGNATION		
		X	Y	Z
8	450	4	5	8
14	750	7	8	14
16	850	8	9	16
18	950	9	10	18

GEN. TOL. ±.010



Environmental Performance Characteristics

Test	Allowable Resistance Change CTS Max△ R	CTS Avg. △ R
Load Life: 1,000 hrs., 0.1 watt per resistor at 70°C	±0.50%	±0.20%
Moisture Resistance: 0.1 rated wattage at 70°C, 90-98% humidity, 1,000 hrs.	±0.50%	±0.20%
Insulation Resistance: Measured wet after moisture resistance test, 200 VDC	Greater than 1000 megohms	
Low Temperature Exposure: −63°C, 4 hrs.	±0.25%	±0.10%
Thermal Shock: 5 cycles, −63°C to +125°C, no load	±0.25%	±0.10%
Short Time Overload: 2.5 times rated voltage, 5 sec.	±0.25%	±0.05%
Terminal Strength: 5 lb. tensile & compression, 30 sec.	±0.25%	±0.03%
Effect of Soldering: 63/37 solder, 246°C, 2 sec.	±0.25%	±0.05%

FEATURES:

- Low height profile
- .100″ lead spacing
- High overload capabilities
- 8, 14, 16 & 18 pin constructions
- Compatible with automatic insertion equipment
- 2 watt power capabilities
- Reduced insertion time
- Available with capacitors and/or active devices*

ELECTRICAL AND MECHANICAL SPECIFICATIONS:

Description: 8, 14, 16, and 18 pin dual-in-line modules on .100″ lead centers.

Standard Resistance Range: 22Ω through 1 MegΩ.

Special Resistance Range: Below 22Ω and above 1 MegΩ.

Resistance Matching (2 like resistors):

50Ω to 30KΩ — 0.5%
30KΩ to 250KΩ — 1%
250KΩ to 3 MegΩ — 2.5%

Ratio Matching:

50Ω to 30KΩ — ±1%
30KΩ to 250KΩ — ±2%
250KΩ to 3 MegΩ — ±5%

Wattage Rating @ 70°C per module: 8 pin - .75 watt; 14 pin - 1.5 watts; 16 pin - 1.75 watts; 18 pin - 2.0 watts.

Standard Temperature Coefficient: ±300 ppm/°C.

Special Temperature Coefficient: to ±100 ppm/°C.

Temperature Coefficient Tracking: Available to 50 ppm/°C.

Standard Resistance Tolerance: ±5%.

Special Resistance Tolerance: ±1% or ½Ω (whichever is greater).

Substrate Material: Alumina.

Resistor Material: Cermet - thick film.

Insulation Coating: Organic - epoxy phenolic.

Lead Material: Solder coated copper.

Solder: 63/37 Tin/Lead. 246°C (475°F) for 9 sec. Max. reflow operation.

Lead Strength: 5# pull.

* Active devices added by CTS Microelectronics, Inc., Lafayette, Indiana.

ORDERING INFORMATION: Place orders using the following address: CTS OF BERNE, INC., 406E Parr Road, Berne, Indiana 46711 • Call and ask for John Henry at (219) 589-3111 • TWX 810-323-1580

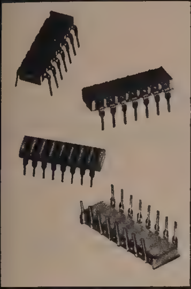
CTS OF BERNE, INC.

SUBSIDIARY OF CTS CORPORATION, ELKHART, INDIANA

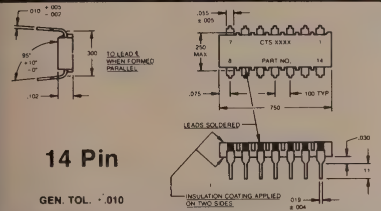
WORLD LEADER IN CERMET RESISTOR TECHNOLOGY

DIP RESISTOR NETWORKS

760 SERIES 14/16 LEAD DUAL-IN-LINE CERMET RESISTOR NETWORKS



CTS Series	Description	Element Type	Resistance Range & Tol.	Power Rating (Watts)	Standard TC	TC Tracking	Prices 1-99	Prices 100-499	Prices 500-999
760-3	14 Pin Module on .100" x .300" DIP Centers	Cermet	22Ω-220KΩ*±2%	1.5 @ 70°C per module	±300 ppm/°C	50 ppm/°C	$1.25	$ .99	$ .74
760-1							1.45	1.12	.91
760-5							2.50	2.00	1.75
760-19							2.20	1.78	1.55
761-3	16 Pin Module on .100" x .300" DIP Centers	Cermet	68Ω-470KΩ*±2%	1.75 @ 70°C per module	±300 ppm/°C	50 ppm/°C	$1.31	$1.04	$ .81
761-1							1.52	1.18	1.02
761-5							2.60	2.10	1.85
761-45							2.40	1.90	1.50

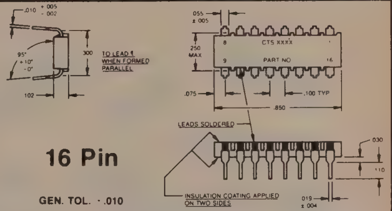


14 Pin

GEN. TOL. ±.010

FEATURES:

- Low cost automatic insertion and handling
- High overload capabilities
- Low height profile
- Package compatibility, with monolithic packages
- .100" lead spacing



16 Pin

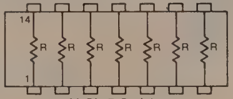
GEN. TOL. ±.010

STANDARD "OFF THE SHELF" PART NUMBERS

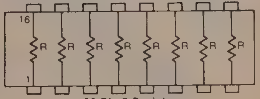
Resistance Value, Tolerance	14 Pin 7 Resistor	14 Pin 13 Resistor
22Ω ±2%	760-3-R22Ω	—
39Ω ±2%	760-3-R39Ω	—
68Ω ±2%	760-3-R68Ω	760-1-R68Ω
75Ω ±2%	—	760-1-R75Ω
100Ω ±2%	760-3-R100Ω	760-1-R100Ω
110Ω ±2%	760-3-R110Ω	—
150Ω ±2%	760-3-R150Ω	760-1-R150Ω
220Ω ±2%	760-3-R220Ω	760-1-R220Ω
330Ω ±2%	760-3-R330Ω	760-1-R330Ω
390Ω ±2%	—	760-1-R390Ω
470Ω ±2%	760-3-R470Ω	760-1-R470Ω
500Ω ±2%	760-3-R500Ω	760-1-R500Ω
680Ω ±2%	760-3-R680Ω	760-1-R680Ω
1KΩ ±2%	760-3-R1KΩ	760-1-R1KΩ
1.5KΩ ±2%	760-3-R1.5KΩ	760-1-R1.5KΩ
1.8KΩ ±2%	760-3-R1.8KΩ	—
2KΩ ±2%	—	760-1-R2KΩ
2.2KΩ ±2%	760-3-R2.2KΩ	760-1-R2.2KΩ
2.4KΩ ±2%	—	760-1-R2.4KΩ
3KΩ ±2%	—	760-1-R3KΩ
3.3KΩ ±2%	760-3-R3.3KΩ	760-1-R3.3KΩ
4.7KΩ ±2%	760-3-R4.7KΩ	760-1-R4.7KΩ
5KΩ ±2%	—	760-1-R5KΩ
5.6KΩ ±2%	—	760-1-R5.6KΩ
6KΩ ±2%	760-3-R6KΩ	760-1-R6KΩ
6.8KΩ ±2%	760-3-R6.8KΩ	760-1-R6.8KΩ
7.5KΩ ±2%	—	760-1-R7.5KΩ
9.1KΩ ±2%	—	760-1-R9.1KΩ
10KΩ ±2%	760-3-R10KΩ	760-1-R10KΩ
12KΩ ±2%	—	760-1-R12KΩ
15KΩ ±2%	760-3-R15KΩ	760-1-R15KΩ
22KΩ ±2%	760-3-R22KΩ	760-1-R22KΩ
33KΩ ±2%	760-3-R33KΩ	760-1-R33KΩ
47KΩ ±2%	760-3-R47KΩ	760-1-R47KΩ
68KΩ ±2%	760 3-R68KΩ	760-1-R68KΩ
75KΩ ±2%	760-3-R75KΩ	—
100KΩ ±2%	760-3-R100KΩ	760-1-R100KΩ
150KΩ ±2%	760-3-R150KΩ	760-1-R150KΩ
180KΩ ±2%	—	760-1-R180KΩ
220KΩ ±2%	760-3-R220KΩ	760-1-R220KΩ

Resistance Value, Tolerance	16 Pin 8 Resistor	16 Pin 15 Resistor
68Ω ±2%	761-3-R68Ω	761-1-R68Ω
87.5Ω ±2%	761-3-R87.5Ω	—
100Ω ±2%	761-3-R100Ω	761-1-R100Ω
110Ω ±2%	761-3-R110Ω	—
150Ω ±2%	761-3-R150Ω	761-1-R150Ω
220Ω ±2%	761-3-R220Ω	761-1-R220Ω
330Ω ±2%	761-3-R330Ω	761-1-R330Ω
470Ω ±2%	761-3-R470Ω	761-1-R470Ω
500Ω ±2%		761-1-R500Ω
680Ω ±2%	761-3-R680Ω	761-1-R680Ω
1KΩ ±2%	761-3-R1KΩ	761-1-R1KΩ
1.5KΩ ±2%	761-3-R1.5KΩ	761-1-R1.5KΩ
2KΩ ±2%	761-3-R2KΩ	761-1-R2KΩ
2.2KΩ ±2%	761-3-R2.2KΩ	761-1-R2.2KΩ
3.3KΩ ±2%	761-3-R3.3KΩ	761-1-R3.3KΩ
4.7KΩ ±2%	761-3-R4.7KΩ	761-1-R4.7KΩ
5.6KΩ ±2%	—	761-1-R5.6KΩ
6KΩ ±2%	—	761-1-R6KΩ
6.8KΩ ±2%	761-3-R6.8KΩ	761-1-R6.8KΩ
10KΩ ±2%	761-3-R10KΩ	761-1-R10KΩ
15KΩ ±2%	761-3-R15KΩ	761-1-R15KΩ
22KΩ ±2%	761-3-R22KΩ	761-1-R22KΩ
33KΩ ±2%	761-3-R33KΩ	761-1-R33KΩ
47KΩ ±2%	761-3-R47KΩ	761-1-R47KΩ
50KΩ ±2%	761-3-R50KΩ	761-1-R50KΩ
68KΩ ±2%	761-3-R68KΩ	761-1-R68KΩ
100KΩ ±2%	761-3-R100KΩ	761-1-R100KΩ
150KΩ ±2%	761-3-R150KΩ	761-1-R150KΩ
220KΩ ±2%	761-3-R220KΩ	761-1-R220KΩ
470KΩ ±2%	761-3-R470KΩ	—

*NOTE: Additional resistance values are constantly being added. Please contact your local CTS Industrial Distributor to check availability of values not shown above.

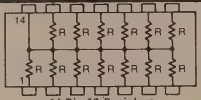


14 Pin-7 Resistors
Part Number 760-3-R+value

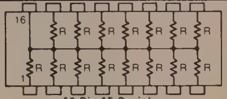


16 Pin-8 Resistors
Part Number 761-3-R+value

APPLICATIONS: "Wired OR" pull-up; Power driver pull-up; Power gate pull-up; Line termination; Long-line impedance balancing; LED current limiting; ECL output pull-down resistors; TTL input pull-down.

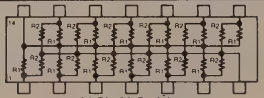


14 Pin-13 Resistors
Part Number 760-1-R+value

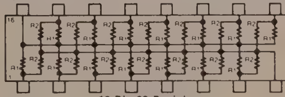


16 Pin-15 Resistors
Part Number 761-1-R+value

APPLICATIONS: MOS/ROM pull-up/pull-down; Open collector pull-up; "Wired OR" pull-up; Power driver pull-up; High speed parallel pull-up; TTL unused gate pull-up; TTL input pull-down; Digital pulse squaring.



14 Pin-24 Resistors
Part Number 760-5-R+values



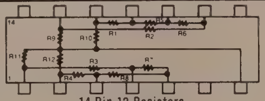
16 Pin-28 Resistors
Part Number 761-5-R+values

Resistance Values R1/R2	Part Numbers	
220Ω/270Ω	760-5-R220/270	761-5-R220/270
220Ω/330Ω	760-5-R220/330	761-5-R220/330
1.5K/3.3K	760-5-R1.5/3.3K	761-5-R1.5K/3.3K

Other combinations available upon request

Pulse Squaring TTL Terminators

CTS 760-5 networks consist of two resistor pairs of the above value combinations. The resistors are connected together in series with a common line for power and a common line for ground. The junction of each pair is brought out to a separate terminal.

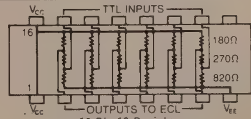


14 Pin-12 Resistors
Part Number 760-19

Interface Network

CTS 760-19 resistor network provides compatible interfacing with the μA711 dual differential voltage comparator for core memory sense amplifier applications.

Resistance Values:
R1 — R4 = 20Ω ±0.5Ω
R5 — R8 = 12KΩ ±2%
R9 — R12 = 120Ω ±2%



16 Pin-18 Resistors
Part Number 761-45

TTL to ECL Translator

CTS Series 761-45 network consists of 18 resistors internally divided into six identical three resistor sections for direct translation from TTL to ECL language.

ORDERING INFORMATION: Place orders using the following address: CTS OF BERNE, INC., 406E Parr Road, Berne, Indiana 46711 • Call and ask for John Henry at (219) 589-3111 • TWX 810-323-1580

CTS OF BERNE, INC.

SUBSIDIARY OF CTS CORPORATION, ELKHART, INDIANA

WORLD LEADER IN CERMET RESISTOR TECHNOLOGY

SINGLE-IN-LINE CERMET RESISTOR NETWORKS

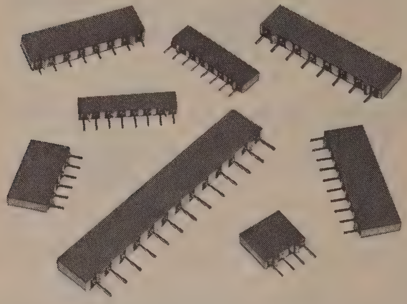
CERMET RESISTOR NETWORKS (Available with capacitor chips and/or active devices)*

CTS . . . Leader in the field of **Low Profile** space-saving Cermet Resistor Modules. Readily recognizable because of the familiar CTS Blue.

As is well illustrated, these modules have been specifically designed to save space.

So if you want to reduce the size of your design or add more complex circuitry without increasing size, CTS rates top consideration.

Most appealing is the fact that "The Little Blue Brick" is an extensive "Off The Shelf" item with CTS.



750 Series

FEATURES:

- Compact edge mount modules
- Ultra high stability and reliability
- Automatic insertion capabilities
- Reduced insertion time
- Fewer items to inventory
- Space savings over individual resistors
- Available with capacitors and/or active devices*
- Available with .100″, .125″ and .150″ lead centers

ELECTRICAL AND MECHANICAL SPECIFICATIONS:

Description: Cermet thick film single-in-line resistor networks.

Standard Resistance Range: 33Ω through 1 MegΩ.

Special Resistance Range: Below 33Ω and above 1 MegΩ.

Resistance Matching (2 like resistors):
50Ω to 30KΩ — 0.5%
30KΩ to 250KΩ — 1%
250KΩ to 3 MegΩ —2.5%

Ratio Matching:
50Ω to 30KΩ — ±1%
30KΩ to 250KΩ — ±2%
250KΩ to 3 MegΩ —±5%

Standard Temperature Coefficient: ±250 ppm/°C.

Special Temperature Coefficient: ±100 ppm/°C.

Temperature Coefficient Tracking: Available to 50 ppm/°C.

Standard Resistance Tolerance: ±5%.

Special Resistance Tolerance: to ±0.5% or ½Ω (whichever is greater).

Substrate Material: Alumina.

Resistor Material: Cermet - thick film.

Insulation Coating: Organic - epoxy phenolic.

Lead Material: Solder coated copper.

Solder: 63/37 Tin/Lead. 277°C (530°F) for 8 sec. Max. Reflow operation.

Lead Strength: 5# pull.

Wattage Rating @ 70°C (see chart below).

Lead Centers	Ht. of Module (Max.)	Number of Pins										
		2	4	5	6	7	8	9	10	11	12	13
.100	(.187)	.25	—	—	—	.7	.8	—	—	—	—	—
.100	(.250)	—	—	—	.9	—	1.1	—	1.5	—	—	—
.100	(.350)	—	.7	—	1.0	—	1.3	—	2.0	2.3	—	—
.125	(.187)	—	—	.6	—	—	1.0	—	—	—	—	—
.125	(.350)	.5	1.0	—	1.5	—	2.0	—	2.5	—	3.0	—
.150	(.340)	—	1.3	1.7	2.0	2.3	2.6	3.0	3.3	3.6	4.0	4.3

* Active devices added by CTS Microelectronics, Inc., Lafayette, Indiana.

Environmental Performance Characteristics

For units less than .340″ high, refer to page 8 for performance characteristics. Test	Allowable Resistance Change CTS Max△ R	 CTS Avg. △ R
Load Life: 1,000 hrs., 0.1 watt per resistor at 70°C	±0.40%	±0.20%
Moisture Resistance: 0.1 rated wattage at 70°C, 90-98% humidity, 1,000 hrs.	±0.50%	±0.20%
Insulation Resistance: Measured wet after moisture resistance test, 200 VDC	Greater than 1000 megohms	
Low Temperature Exposure: −63°C, 4 hrs.	±0.10%	±0.04%
Thermal Shock: 5 cycles, −63°C to +125°C, no load	±0.10%	±0.03%
Short Time Overload: 2.5 times rated voltage, 5 sec.	±0.25%	±0.05%
Terminal Strength: 5 lb. tensile & compression, 30 sec.	±0.10%	±0.03%
Effect of Soldering: 63/37 solder, 246°C, 2 sec.	±0.10%	±0.05%

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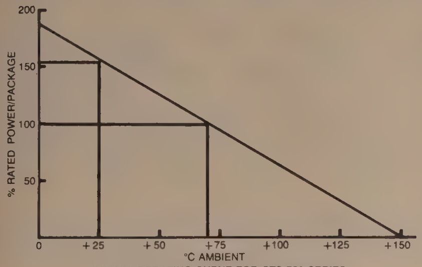
CTS OF BERNE, INC.

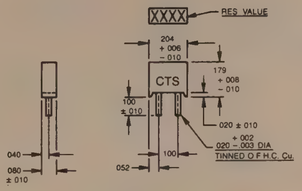
SUBSIDIARY OF CTS CORPORATION, ELKHART, INDIANA

WORLD LEADER IN CERMET RESISTOR TECHNOLOGY

SINGLE-IN-LINE CERMET RESISTOR NETWORKS

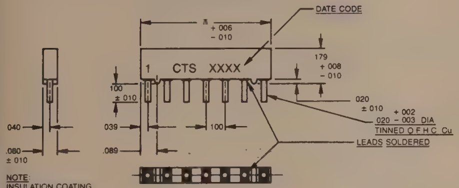


TYPICAL DERATING CURVE FOR CTS 750 SERIES


XXXX
RES VALUE
204
+ 006
− 010
CTS
179
+ 008
− 010
100
± 010
020 ± 010
+ 002
020 − 003 DIA
TINNED O F H.C. Cu.
100
040
080
± 010
052

GEN. TOL. ±.005

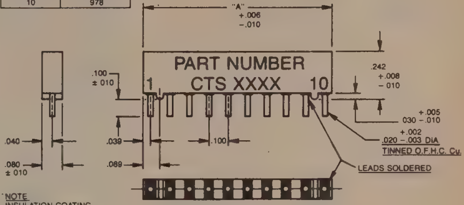
NO OF PINS	A DIMENSION
7	678
8	778


DATE CODE
A
+ 006
− 010
179
+ 008
− 010
1 CTS XXXX
100
± 010
020
± 010
+ 002
020 − 003 DIA
TINNED O F H C Cu
LEADS SOLDERED
040
039
100
080
± 010
089

NOTE:
INSULATION COATING
APPLIED ON THE
TWO FACES ONLY

GEN. TOL. ±.005

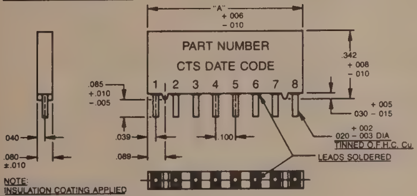
NO OF PINS	"A" DIMENSION
6	578
8	778
10	978


"A"
+.006
−.010
PART NUMBER
CTS XXXX
1
10
.100
± 010
.242
+.008
−.010
+.005
030 −.010
+.002
.020 −.003 DIA
TINNED O.F.H.C. Cu.
LEADS SOLDERED
.040
.039
.100
.080
± 010
.089

NOTE
INSULATION COATING
APPLIED ON THE
TWO FACES ONLY.

GEN. TOL. ±.005

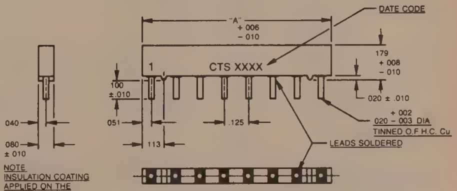
NO OF PINS	A DIMENSION
4	378
6	578
8	778
10	978
11	1 078


"A"
+ 006
− 010
PART NUMBER
CTS DATE CODE
1 2 3 4 5 6 7 8
342
+ 008
− 010
.085
+.010
−.005
+ 005
030 − 015
+ 002
020 − 003 DIA
TINNED O.F.H.C. Cu
LEADS SOLDERED
040
039
100
.080
±.010
089

NOTE:
INSULATION COATING APPLIED
ON THE TWO FACES ONLY.

GEN. TOL. ±.005

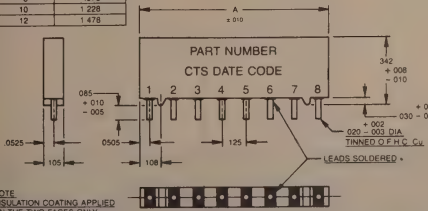
NO OF PINS	"A" DIMENSION
5	603
8	978


DATE CODE
"A"
+ 006
− 010
1 CTS XXXX
179
+ 008
− 010
100
±.010
020 ± .010
+ 002
020 − 003 DIA
TINNED O.F.H.C. Cu
LEADS SOLDERED
040
051
.125
080
± 010
113

NOTE
INSULATION COATING
APPLIED ON THE
TWO FACES ONLY

GEN. TOL. ±.005

NO OF PINS	"A" DIMENSION
2	.228
4	478
6	728
8	.978
10	1 228
12	1 478

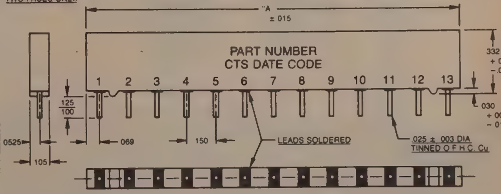

A
± 010
PART NUMBER
CTS DATE CODE
1 2 3 4 5 6 7 8
342
+ 008
− 010
085
+ 010
− 005
+ 005
030 − 015
+ 002
020 − 003 DIA
TINNED O F H C Cu
LEADS SOLDERED
.0525
0505
125
105
108

NOTE
INSULATION COATING APPLIED
ON THE TWO FACES ONLY

GEN. TOL. ±.005

NO OF PINS	"A" DIMENSION	NO OF PINS	A DIMENSION
4	588	9	1 338
5	738	10	1 488
6	888	11	1 638
7	1 038	12	1 788
8	1 188	13	1 938

NOTE
INSULATION COATING
APPLIED ON THE
TWO FACES ONLY


"A
± 015
PART NUMBER
CTS DATE CODE
1 2 3 4 5 6 7 8 9 10 11 12 13
332
+ 008
− 010
125
100
030
+ 005
− 015
.025 ± .003 DIA
TINNED O F H C Cu
LEADS SOLDERED
0525
069
150
105

GEN. TOL: ±.005

ORDERING INFORMATION: Place orders using the following address: CTS OF BERNE, INC., 406E Parr Road, Berne, Indiana 46711 • Call and ask for John Henry at (219) 589-3111 • TWX 810-323-1580

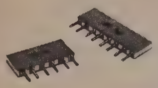
CTS OF BERNE, INC.

SUBSIDIARY OF CTS CORPORATION, ELKHART, INDIANA

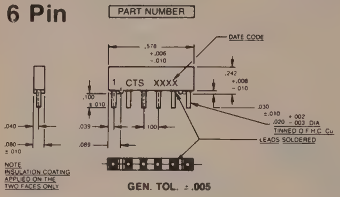
WORLD LEADER IN CERMET RESISTOR TECHNOLOGY

SIP RESISTOR

750 SERIES SINGLE-IN-LINE CERMET RESISTOR NETWORKS

	CTS Series	Description	Element Type	Resistance Range & Tol.	Power Rating (Watts)	Standard TC	TC Tracking	Prices		
								1-99	100-499	500-999
	750-63	6 and 8 Pin Single In-Line Module on .100″ Lead Centers	Cermet	33Ω-470KΩ* ±2%	6 Pin-.9 watt 8 Pin-1.1 watt @ 70°C per module	±250 ppm/°C	50 ppm/°C	$.80	$.62	$.38
	750-61							.85	.65	.40
	750-83							.90	.68	.41
	750-81							.95	.75	.45

6 Pin

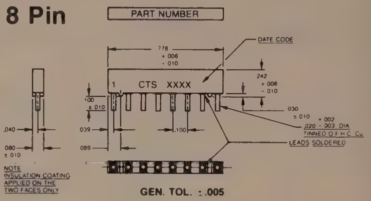

PART NUMBER
DATE CODE
.578
+.006
-.010
.242
+.008
-.010
1 CTS XXXX
.100
±.010
.030
±.010
.020 +.002 -.003 DIA
TINNED O F H C Cu
LEADS SOLDERED
.040
.080
±.010
.039
.100
.089
NOTE
INSULATION COATING
APPLIED ON THE
TWO FACES ONLY

GEN. TOL. ±.005

FEATURES:

- **Low-Profile construction**
- **.100″ lead spacing**
- **High reliability**
- **Alumina substrate**
- **Low cost automatic insertion and handling**

8 Pin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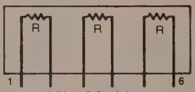
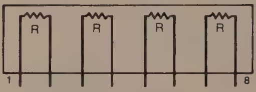
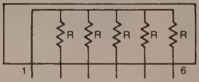


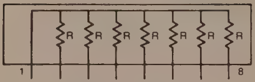
6 Pin—3 Resistors
Part Number 750-63-R+Value



8 Pin—4 Resistors
Part Number 750-83-R+Value



6 Pin—5 Resistors
Part Number 750-61-R+Value



8 Pin—7 Resistors
Part Number 750-81-R+Value

STANDARD "OFF THE SHELF" PART NUMBERS

Resistance Value, Tolerance	6 Pin, 3 Resistor	6 Pin, 5 Resistor	8 Pin, 4 Resistor	8 Pin, 7 Resistor
33Ω ±2%	750-63-R33Ω	750-61-R33Ω	750-83-R33Ω	750-81-R33Ω
68Ω ±2%	750-63-R68Ω	—	750-83-R68Ω	—
100Ω ±2%	750-63-R100Ω	750-61-R100Ω	750-83-R100Ω	750-81-R100Ω
150Ω ±2%	750-63-R150Ω	750-61-R150Ω	750-83-R150Ω	750-81-R150Ω
180Ω ±2%	—	—	—	750-81-R180Ω
220Ω ±2%	750-63-R220Ω	750-61-R220Ω	750-83-R220Ω	750-81-R220Ω
330Ω ±2%	750-63-R330Ω	750-61-R330Ω	750-83-R330Ω	750-81-R330Ω
470Ω ±2%	750-63-R470Ω	750-61-R470Ω	750-83-R470Ω	750-81-R470Ω
500Ω ±2%	—	750-61-R500Ω	—	750-81-R500Ω
680Ω ±2%	750-63-R680Ω	750-61-R680Ω	750-83-R680Ω	750-81-R680Ω
1KΩ ±2%	750-63-R1KΩ	750-61-R1KΩ	750-83-R1KΩ	750-81-R1KΩ
1.5KΩ ±2%	750-63-R1.5KΩ	750-61-R1.5KΩ	750-83-R1.5KΩ	750-81-R1.5KΩ
2KΩ ±2%	750-63-R2KΩ	750-61-R2KΩ	750-83-R2KΩ	750-81-R2KΩ
2.2KΩ ±2%	750-63-R2.2KΩ	750-61-R2.2KΩ	750-83-R2.2KΩ	750-81-R2.2KΩ
3.3KΩ ±2%	750-63-R3.3KΩ	750-61-R3.3KΩ	750-83-R3.3KΩ	750-81-R3.3KΩ
4.7KΩ ±2%	750-63-R4.7KΩ	750-61-R4.7KΩ	750-83-R4.7KΩ	750-81-R4.7KΩ
6.8KΩ ±2%	750-63-R6.8KΩ	750-61-R6.8KΩ	750-83-R6.8KΩ	750-81-R6.8KΩ
10KΩ ±2%	750-63-R10KΩ	750-61-R10KΩ	750-83-R10KΩ	750-81-R10KΩ
15KΩ ±2%	750-63-R15KΩ	750-61-R15KΩ	750-83-R15KΩ	750-81-R15KΩ
22KΩ ±2%	750-63-R22KΩ	750-61-R22KΩ	750-83-R22KΩ	750-81-R22KΩ
33KΩ ±2%	750-63-R33KΩ	750-61-R33KΩ	750-83-R33KΩ	750-81-R33KΩ
47KΩ ±2%	750-63-R47KΩ	750-61-R47KΩ	750-83-R47KΩ	750-81-R47KΩ
68KΩ ±2%	750-63-R68KΩ	750-61-R68KΩ	750-83-R68KΩ	750-81-R68KΩ
100KΩ ±2%	750-63-R100KΩ	750-61-R100KΩ	750-83-R100KΩ	750-81-R100KΩ
150KΩ ±2%	750-63-R150KΩ	750-61-R150KΩ	750-83-R150KΩ	750-81-R150KΩ
220KΩ ±2%	750-63-R220KΩ	750-61-R220KΩ	750-83-R220KΩ	750-81-R220KΩ
470KΩ ±2%	750-63-R470KΩ	750-61-R470KΩ	750-83-R470KΩ	750-81-R470KΩ

*NOTE: Additional resistance values are constantly being added. Please contact your local CTS Industrial Distributor to check availability of values not shown above.

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CRCA SERIES "200" WIRE WOUND RESISTORS

Quality Products Since 1953

24/48 HRS. SPECIAL HANDLING SERVICE

RESISTANCE RANGE (Ω): .01 to 10M
  Accuracy (25°C): 1% to 25 ppm/°C
  Stability: 30 ppm or better
  Matching: To 5 ppm

TEMPERATURE COEFFICIENT:
  Standard: 5 ppm/°C
  To Order: 1-6000 ppm/°C
  Matching: To ½ ppm/°C

EXTERNAL TEMPERATURE: −55°C thru 125°C

IMPREGNATION: Epoxy seal

TYPICAL OEM PRICES IN $

10Ω-10KΩ — 1/10W-1W — CAW TERMINALS

	1%	.1%	.05%	.01%	.0025%
1 each	$2.50	$3.10	$3.50	$6.00	$12.00
10-25	1.30	1.80	2.00	3.30	5.50
100-249	.95	1.25	1.40	2.40	3.90
1000-2499	.80	.95	1.00	1.70	3.10

Over 10K add $.30/100K

TABLE 1

WATTS vs. DIMENSIONS

Watts (125°C)	Body Style*	Size (Inches) Dia. (D)	Size (Inches) Length (L)
5	219-20	.875	4 15/16
3	220	.875	2 13/16
2	219	.875	2 3/16
1¼	218	.687	1 5/16
1	221	.875	11/16
	217	.520	1 1/32
¾	216	.687	23/32
½	215	.532	9/16
	294	.375	1
⅜	293	.375	¾
¼	276	.260	¾
	287	.312	17/32
⅙	275	.260	17/32
	263	.187	21/32
1/10	261	.187	17/32
1/15	251	.135	9/16

TABLE 2

TERMINAL STYLES

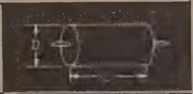
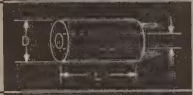
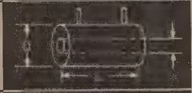
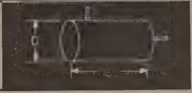
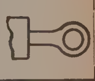
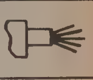
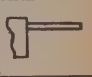
CA — Center Axial	
O — Printed Circuit	
R — Radial	
RA — Radial Axial	

TABLE 3

TERMINAL TYPES

"L" —	Lugs (tinned copper .016" thick x 3/32" wide x ⅝" long, measured from resistor axis).	
"T" —	Flexible Leads (#20 x 2" long, insulated, stranded, tinned copper wire).	
"W" —	Solid Leads (#22 or #20 x 1.5" long, tinned copper wire).	

MODEL DESIGNATION

Table #1	Table #2	Table #3
BODY STYLE	TERMINAL STYLE	TERMINAL TYPE

EXAMPLE: 215 CAW designates ½ watt resistor provided with center-axial wire lead terminals.

For further information on "200" Resistors, request Engineering Bulletin #C-72 or call Alyce Powers.

OTHER RESISTOR PRODUCTS

MINIATURE POWER RESISTORS
Axial lead, silicone coated
.01-250 K Range
.4%-.05% Tolerance
20 ppm/°C max. Temperature Coefficient

TRIMMER RESISTORS
(.01% resolution)

CURRENT SHUNTS RESISTOR NETWORKS
4 Terminal Resistors

EPOXY-CAST POTTING CUPS, CASES, HEADERS & BOBBINS

New manufacturing process for 1 — 10M quantity at competitive prices.
Any wanted Case or Header size — 24 hours delivery — No tool charges.

CUSTOMER DESIGN OPTIONS

DIMENSIONS: Any size specified by you
  a. Rectangular Cups: Width, length and height, ⅛" to 20"
  b. Round Cups: OD and height, ⅛" to 6"

MATERIAL: G10 Epoxy or XP Phenolic

WALL THICKNESS: .015", .020", .031", .046", .062", .093", .125"

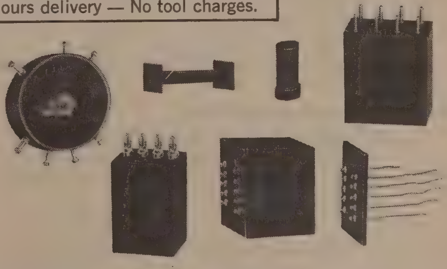
DIMENSIONAL TOLERANCE: ±.015", ±.010", ±.005"

FINISH: Regular or fine (seams are concealed)

COLOR: Black or natural

SECONDARY OPERATIONS: Holes, slots, terminals, inserts

DELIVERY: 3 weeks regular. 24 hours—1 week—at premium



For further information on Cases, request Engineering Bulletin #E-97 or call Alyce Powers.

CONSOLIDATED RESISTANCE COMPANY OF AMERICA, INC.

CONSOLIDATED RESISTANCE BUILDING

222 LAKE AVENUE • YONKERS, NEW YORK 10701 • TELEPHONE (914) YOnkers 3-5900

CADDOCK
HIGH PERFORMANCE FILM RESISTORS

High Performance Power Film Resistors

Micronox* Resistance Films Provide Higher Power Ratings and Higher Operating Temperatures

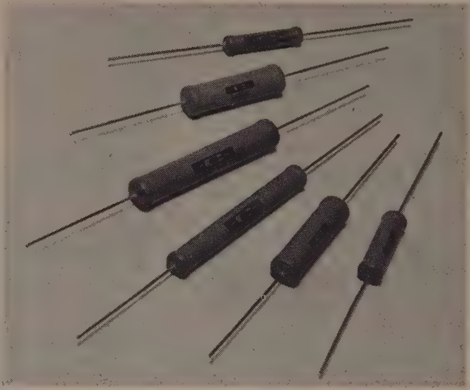
In the 12 years since Caddock Electronics first introduced Micronox* resistance films, the resistors produced with this advanced material have been providing electronic engineers with this long-sought combination of high performance advantages:

- **Higher power ratings.**
- **Higher operating temperatures.**
- **Improved temperature characteristics.**
- **Exceptional stability.**

The unique structure of Micronox* resistance films makes them relatively insensitive to high ambient temperatures and thermal shock. By firing these complex oxide films onto solid ceramic substrates, Caddock resistors achieve the higher stability that permits higher power densities and higher internal operating temperatures.

As a result, many types of Caddock resistors are rated for continuous operation at +275°C!

And Micronox* resistance films also provide a greatly extended resistance range that increases 'critical' resistance values up to 10 times higher than other types of power resistors.



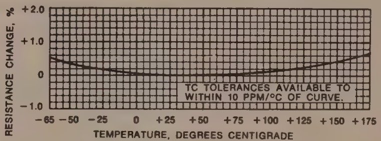
This higher performance has provided a means for immediately up-grading the specifications of many existing electronic circuits and systems, and has been instrumental in reducing the size, complexity and cost of newly developed electronic equipment.

Improved Temperature Characteristics, too

The curved temperature coefficient of Micronox* resistance films provides two important advantages:

First, because the shape of the curve is carefully controlled, the 'flat' section — that portion of the curve on each side of the point where the temperature coefficient is 'zero' — can be selected to provide minimum temperature effects over a wide range of temperature.

Second, because Micronox* resistance films are very stable, the "TC" of sets of resistors can be carefully matched for accurate temperature 'tracking.' On special order, this ratio 'tracking' can be held as close at 2 PPM/°C!

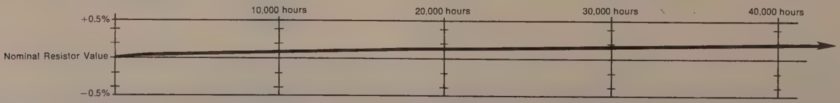


These temperature characteristics are a great advantage in all types of divider and reference circuits where precise resistance ratios are the primary source of equipment accuracy. Many precision instruments and scientific measurement systems now make use of matched sets of Caddock resistors to improve their overall performance specifications.

Outstanding Long-Term Stability

Annual load-life stability tests conducted on various types of Caddock resistors have demonstrated typical stability within 0.1% per 1000 hours and extended life stability of 0.01% per 1000 hours.

And in an extended load-life stability test that has now been running continuously for over 5 years — past the 50,000 hour mark — Caddock Type MP Power Film Resistors have achieved extended life stability better than 0.02% per 1000 hours!



This exceptional stability in combination with the other performance advantages of these advanced resistors is the reason why Caddock High Performance Film Resistors are the first choice in today's most demanding applications.

High Performance Power Film Resistors

CADDOCK
HIGH PERFORMANCE FILM RESISTORS

Non-Inductive Performance

When the lowest levels of inductance are required, Caddock High Performance Film Resistors can be specified with our Exclusive Non-Inductive Design. This special serpentine pattern provides for neighboring lines to carry currents in opposite directions, thereby achieving maximum cancellation of flux fields over the entire length of the resistor.

The result is a truly non-inductive resistor that is about as inductive as a straight piece of wire the length of the resistor or in the basic Micronox* resistance film, settling times and minimum distortion in all types of high frequency circuits.

And because this unique, patented design can be included without any changes in either the shape or size of the resistor or in the basic Micronox* resistance film, there's no derating of any performance advantages when you specify Caddock's Exclusive Non-Inductive Design!

In high power applications, for example, the Type MS Power Film Resistor with non-inductive performance can increase both the maximum resistance range and the maximum voltage ratings up to 10 times! Similar improvements available in other types of Caddock resistors can reduce both the size and the number of resistors required to meet circuit requirements and still maintain the superior stability and reliability that are an integral part of every Caddock High Performance Film Resistor.

N
Exclusive
Non-Inductive
Design
U.S. PATENT NO. 3,858,147
OTHER PATENTS PENDING

*Micronox is a registered trademark of Caddock Electronics, Inc.

Index to Caddock High Performance Film Resistors in EEM:

Here is an index to the many types of High Performance Film Resistors now available from Caddock Electronics:

Type MS and MR — Precision Power Film Resistors .... see pages 2•1430 & 2•1431
Type ML and MM — Precision Film Resistors .... see page 2•1432
Type MK — Non-Inductive Film Resistor in a Rectangular Case .... see page 2•1433
Type MG and MH — Precision High-Voltage Resistors .... see pages 2•1434 & 2•1435
Including Model MH 7-11 Shielded Resistor
Type MV — Low-R Power Film Resistors .... see page 2•1436
Type MP — Chassis Mounted Power Film Resistors .... see page 2•1437
Type MC — Precision Chip Resistors .... see pages 2•1438 & 2•1439
Custom Resistive Networks .... see page 2•1440
Precision Resistor Networks in SIP and DIP Packages .... see page 2•1441
Multi-Megohm Resistors .... see page 2•1442

Caddock also provides complete test results on the Annual Reliability and Qualification Tests that are conducted to verify performance to applicable government specifications. These reports are described in more detail on page 2•1443 and are available on request.

For complete information and technical assistance in the selection of any type of Caddock High Performance Film Resistors, please write or call to our main office in Riverside, California. We can often provide resistors for evaluation in 10 days or less, and production quantities of any model and type of resistors are always delivered on schedule.

CADDOCK
ELECTRONICS, INCORPORATED
3127 CHICAGO AVENUE, RIVERSIDE, CALIFORNIA 92507 PHONE: (714) 683-5361 • TWX: 910-332-6108

CADDOCK
HIGH PERFORMANCE FILM RESISTORS

Type MS & MR Power Film Resistors

Here are the power film resistors that overcome the design limitations of wire-wound resistors! Caddock Power Film Resistors provide power ratings to 12.5 watts at 6000 volts in a single axial lead resistor. By extending both the resistance range and maximum voltage ratings, Type MS Power Film Resistors simplify circuit design and reduce equipment complexity and cost.

All These Features in One Resistor

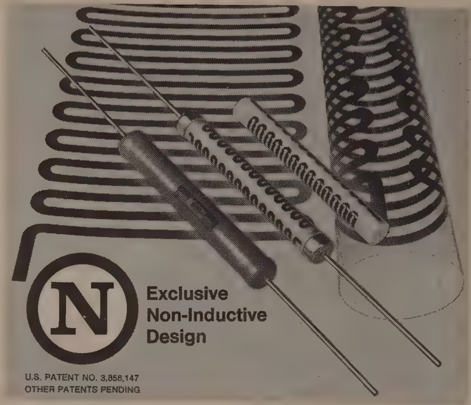
- Full power and voltage ratings, without derating —
  - — for non-inductive performance
  - — for high resistance values that extend the critical resistance value up to 10 times.
- Higher voltage ratings without the limitations of minimum wire size and spacing.
- Excellent long-term stability. Tests demonstrate typical stability of 0.05% per 1000 hours over extended life.

MICRONOX Resistance Films

Type MS performance begins with Micronox resistance films, the basic element in every Caddock resistor. Produced exclusively by Caddock Electronics, these proven complex oxide films have been used reliably for 12 years in Caddock's precision power resistor products.

Micronox resistance films are fired directly onto a ceramic core, in air, at 1400°F. These resistance films have demonstrated outstanding stability when exposed to a high ambient temperature, thermal shock and high power densities.

This totally new approach to precision power resistors opens new design possibilities because of the wider resistance range, precise temperature characteristics, and higher temperature and power handling capability.



U.S. PATENT NO. 3,858,147
OTHER PATENTS PENDING

There's no derating of performance when you specify Caddock's Exclusive Non-Inductive Design.

When non-inductive performance is specified, we produce these power film resistors with a serpentine resistive pattern that provides for neighboring lines to carry currents in opposite directions, thereby achieving maximum cancellation of flux fields over the entire length of the resistor.

The result is a truly non-inductive resistor that is about as inductive as a straight piece of wire the length of the resistor body. This efficient design means faster settling times and minimum distortion in all types of high frequency circuits.

Type MS Power Film Resistors are produced under carefully controlled manufacturing and test procedures.

Manufacturing Control

Type MS Resistors are produced under strict manufacturing controls with processes which include power conditioning, overvoltage conditioning and maximum temperature conditioning.

Quality Control

Type MS Resistors receive quality surveillance which reaches from incoming raw materials to your packaged resistors in the shipping area. And our QC system has been approved for conformance to the requirements of NASA NPC200-3 and MIL-I-45208 in many recent surveys.

Reliability Verification

Type MS Resistors are included in the Caddock Reliability Testing Program. Conformance to specification parameters including Extended Life, Shock, Vibration and Humidity are verified on a periodic basis. Data from MS resistors can be compared by similarity to other Caddock resistor types, since Type ML, MM, MS, MP, MG, MH and MK represent an identical combination of materials — aluminum oxide substrate, Micronox resistance film and silicone insulating coating.

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*Micronox is a registered trademark of Caddock Electronics, Inc.

Type MS & MR Power Film Resistors

CADDOCK
HIGH PERFORMANCE FILM RESISTORS

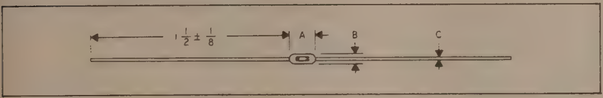
Type MS High Performance Power Film Resistors have a proven performance history in industrial, computer, military and space applications. This unique line now includes higher power ratings — up to 15 watts — and resistance values to 30 Megohms.

These exceptional resistors also provide outstanding extended life stability. In annual reliability tests where 2000 hour load-life stability data has been established, Type MS Power Film Resistors have demonstrated typical stability well within 0.1% per 1000 hours and extended life stability of 0.05% per 1000 hours.

Temperature coefficients are also low, with the standard TC of 50 PPM/°C available in all models of the Type MS Power Film Resistor. They can also be supplied on special order in matched resistor sets that provide ratio tracking with varying temperature to within 2 PPM/°C.

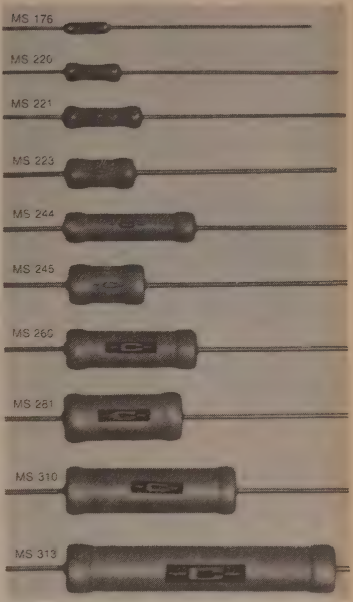
All of the Type MS Power Film Resistors are constructed with Micronox* resistance films bonded to a high strength solid ceramic core. Nickel alloy end caps and gold plated dumet axial leads complete the assembly. Encapsulation is provided by a silicone conformal coating.

Non-inductive construction is available in most models. Specify by adding "N" suffix to Model Number.



Model No.	Wattage	Max. Voltage	Oper. Temp. (Max.)	Dielect. Str'gth	TC ppm/°C†	Resistance		Dimensions			Encapsulation	Leadwire
						Min.	Max.	A	B	C		
MR 129	.25	200	275°C	500	150	10Ω	500 K	.188 ±.020	.070 ±.015	.020 ±.002	Silicone Conformal	Nickel
MR 154	.40	300	275°C	750	150	10Ω	1 Meg	.250 ±.020	.094 ±.015	.025 ±.002	Silicone Conformal	Nickel
MR 178	.60	500	275°C	750	150	20Ω	3 Meg	.313 ±.020	.094 ±.015	.025 ±.002	Silicone Conformal	Nickel
MS 126	.25	200	275°C	500	50	10Ω	1 Meg	.188 ±.020	.070 ±.015	.020 ±.002	Silicone Conformal	Gold Plated Dumet
MS 150	.5	—	275°C	500	50	10Ω	2 K	.188 ±.020	.070 ±.015	.020 ±.002	Silicone Conformal	Gold Plated Dumet
MS 151	.5	300	275°C	750	50	10Ω	2 Meg	.250 ±.020	.094 ±.015	.025 ±.002	Silicone Conformal	Gold Plated Dumet
MS 175	.75	—	275°C	750	50	10Ω	2 K	.250 ±.020	.094 ±.015	.025 ±.002	Silicone Conformal	Gold Plated Dumet
MS 176	.75	500	275°C	750	50	20Ω	5 Meg	.313 ±.020	.094 ±.015	.025 ±.002	Silicone Conformal	Gold Plated Dumet
MS 210	1.0	—	275°C	750	50	20Ω	3 K	.313 ±.020	.094 ±.015	.025 ±.002	Silicone Conformal	Gold Plated Dumet
MS 220	2.0	1000	275°C	800	50	20Ω	10 Meg	.400 ±.060	.140 ±.030	.025 ±.002	Silicone Conformal	Gold Plated Dumet
MS 221	3.0	1000	275°C	800	50	30Ω	10 Meg	.575 ±.050	.165 ±.030	.030 ±.002	Silicone Conformal	Gold Plated Dumet
MS 223	3.0	800	275°C	1000	50	10Ω	4 Meg	.480 ±.060	.230 ±.030	.040 ±.002	Silicone Conformal	Gold Plated Dumet
MS 244	4.0	2000	275°C	1000	50	30Ω	15 Meg	.950 ±.060	.230 ±.030	.040 ±.002	Silicone Conformal	Gold Plated Dumet
MS 245	4.0	800	275°C	1000	50	10Ω	6 Meg	.570 ±.060	.300 ±.030	.040 ±.002	Silicone Conformal	Gold Plated Dumet
MS 260	6.0	2000	275°C	1000	50	20Ω	15 Meg	.970 ±.060	.300 ±.030	.040 ±.002	Silicone Conformal	Gold Plated Dumet
MS 281	8.0	2000	275°C	1000	50	10Ω	8 Meg	.910 ±.060	.350 ±.040	.040 ±.002	Silicone Conformal	Gold Plated Dumet
MS 310	10.0	4500	275°C	1000	50	30Ω	20 Meg	1.25 ±.070	.350 ±.040	.040 ±.002	Silicone Conformal	Gold Plated Dumet
MS 313	12.5	6000	275°C	1000	50	50Ω	30 Meg	2.00 ±.080	.350 ±.040	.040 ±.002	Silicone Conformal	Gold Plated Dumet
MS 315	15.0	—	275°C	1000	50	50Ω	1 Meg	2.00 ±.080	.350 ±.040	.040 ±.002	Silicone Conformal	Gold Plated Dumet

†Temperature Coefficient: Referenced to 25°C, ΔR taken at −15°C and +105°C



SPECIFICATIONS

Resistance Tolerance: ±1% (tolerances to .1% on special order).

Insulation Resistance: 100 megohms, minimum.

Overload: 5 times rated power for 5 seconds, R shift .5% max., or .5 ohms max., whichever is greater.

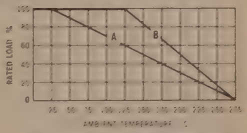
Overvoltage: 1.5 times max. voltage for 5 seconds, R shift .5% max., or .5 ohms max., whichever is greater.

Thermal Shock: MIL-STD-202, method 107, cond. C, R shift .5% max., or .5 ohms max., whichever is greater.

Moisture Resistance: MIL-STD-202, method 106, R shift .5% max., or .5 ohms max., whichever is greater.

Loadlife: 1000 hours at rated power. R shift .5% max., or .5 ohms max., whichever is greater.

DERATING CURVE



A—all MS models except MS126, MS151, MS176
B—all MR models, and MS126, MS151, MS176

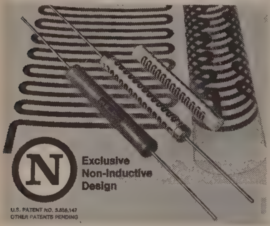
CADDOCK
ELECTRONICS, INCORPORATED
3127 CHICAGO AVENUE, RIVERSIDE, CALIFORNIA 92507 PHONE: (714) 683-5361 • TWX: 910-332-6108

CADDOCK
HIGH PERFORMANCE FILM RESISTORS

Type ML & MM Precision Film Resistors

Type ML and MM resistors have a proven performance history in industrial, computer, military and space applications. With power ratings up to 3 watts and resistance values to 15 megohms, these outstanding resistors are ideal for applications requiring tolerances as close as 0.1% and extended life stability of 0.1% per 1000 hours.

The Type MM Precision Film Resistors provide a maximum operating temperature range of +275°C and both the Type ML and the Type MM have temperature coefficients of only 50 PPM/°C over the range from −15°C to +105°C.



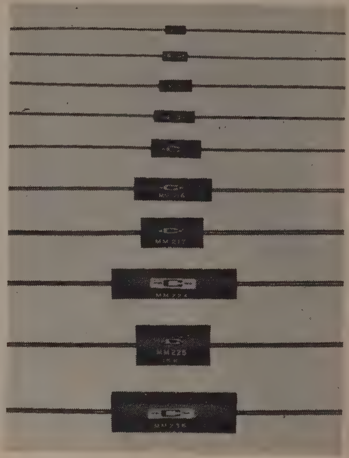
Construction includes Micronox* resistance films fired onto a high strength solid ceramic core. End cap construction and a molded case completes the resistor assembly and provides increased resistance to abrasion and solvents.

Caddock's Exclusive Non-Inductive Performance can also be specified for any of these resistors by adding the "N" suffix to the model number.

Model No.	Watt-age	Max. Voltage	Oper. Temp. (Max.)	Dielect. Str'gth	TC ppm/°C†	Resistance		Dimensions				Encap-sulation	Leadwire
						Min.	Max.	A	B	C	D		
ML 103	.06	—	175°C	300	50	10Ω	250 K	.110 ±.005	.045 ±.005	.016 ±.001	1.00 ±.12	Transfer Molded Type	Gold Plated Dumet
ML 104	.08	200	175°C	400	50	50Ω	300 K	.160 ±.010	.065 ±.010	.016 ±.002	1.50 ±.12	Transfer Molded Type	Gold Plated Dumet
ML 114	.15	200	175°C	500	50	50Ω	500 K	.188 ±.020	.070 ±.015	.020 ±.002	1.50 ±.12	Transfer Molded Type	Gold Plated Dumet
ML 124	.25	300	175°C	750	50	50Ω	600 K	.250 ±.020	.094 ±.006	.025 ±.002	1.50 ±.12	Transfer Molded Type	Gold Plated Dumet
ML 131	.4	500	175°C	750	50	50Ω	1 Meg	.313 ±.020	.094 ±.006	.025 ±.002	1.50 ±.12	Transfer Molded Type	Gold Plated Dumet
ML 181	.6	600	175°C	750	50	50Ω	5 Meg	.400 ±.020	.150 ±.010	.025 ±.002	1.50 ±.12	Transfer Molded Type	Gold Plated Dumet
ML 212	1.0	1000	175°C	1000	50	30Ω	10 Meg	.625 ±.030	.190 ±.020	.030 ±.002	1.50 ±.12	Transfer Molded Type	Gold Plated Dumet
ML 213	1.0	800	175°C	1500	50	10Ω	4 Meg	.500 ±.030	.250 ±.020	.040 ±.002	1.50 ±.12	Transfer Molded Type	Gold Plated Dumet
ML 218	1.25	2000	175°C	1500	50	30Ω	15 Meg	1.00 ±.030	.250 ±.020	.040 ±.002	1.50 ±.12	Transfer Molded Type	Gold Plated Dumet
ML 219	1.25	800	175°C	2000	50	10Ω	6 Meg	.600 ±.030	.330 ±.020	.040 ±.002	1.50 ±.12	Transfer Molded Type	Gold Plated Dumet
ML 226	2.0	2000	175°C	2000	50	20Ω	15 Meg	1.00 ±.030	.330 ±.020	.040 ±.002	1.50 ±.12	Transfer Molded Type	Gold Plated Dumet
MM 112	.12	200	275°C	400	50	10Ω	500 K	.160 ±.010	.065 ±.010	.016 ±.002	1.50 ±.12	Black Molded Type	Gold Plated Dumet
MM 125	.25	200	275°C	500	50	10Ω	1 Meg	.188 ±.020	.070 ±.015	.020 ±.002	1.50 ±.12	Black Molded Type	Gold Plated Dumet
MM 152	.4	300	275°C	750	50	10Ω	2 Meg	.250 ±.020	.094 ±.006	.025 ±.002	1.50 ±.12	Black Molded Type	Gold Plated Dumet
MM 177	.6	500	275°C	750	50	20Ω	5 Meg	.313 ±.020	.094 ±.006	.025 ±.002	1.50 ±.12	Black Molded Type	Gold Plated Dumet
MM 215	1.0	800	275°C	1000	50	10Ω	10 Meg	.400 ±.020	.150 ±.010	.025 ±.002	1.50 ±.12	Black Molded Type	Gold Plated Dumet
MM 216	1.5	1000	275°C	1000	50	30Ω	10 Meg	.625 ±.030	.190 ±.020	.030 ±.002	1.50 ±.12	Black Molded Type	Gold Plated Dumet
MM 217	1.5	800	275°C	1500	50	10Ω	4 Meg	.500 ±.030	.250 ±.020	.040 ±.002	1.50 ±.12	Black Molded Type	Gold Plated Dumet
MM 224	2.0	2000	275°C	1500	50	30Ω	15 Meg	1.00 ±.030	.250 ±.020	.040 ±.002	1.50 ±.12	Black Molded Type	Gold Plated Dumet
MM 225	2.0	800	275°C	2000	50	10Ω	6 Meg	.600 ±.030	.330 ±.020	.040 ±.002	1.50 ±.12	Black Molded Type	Gold Plated Dumet
MM 236	3.0	2000	275°C	2000	50	20Ω	15 Meg	1.00 ±.030	.330 ±.020	.040 ±.002	1.50 ±.12	Black Molded Type	Gold Plated Dumet

†Temperature Coefficient: Referenced to 25°C, ΔR taken at −15°C and +105°C

*Micronox is a registered trademark of Caddock Electronics, Inc.



SPECIFICATIONS

Resistance Tolerance: ±1% (tolerances to .1% on special order).

Insulation Resistance: 100 megohms, minimum.

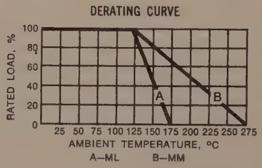
Overload: 5 times rated power for 5 seconds, R shift .5% max., or .5 ohms max., whichever is greater.

Overvoltage: 1.5 times max. voltage for .5 seconds, R shift .5% max., or .5 ohms max., whichever is greater.

Thermal Shock: MIL-STD-202, method 107, cond. B, R shift .2% max., or .5 ohms max., whichever is greater.

Moisture Resistance: MIL-STD-202, method 106, R shift .5% max., or .5 ohms max., whichever is greater.

Loadlife: 1000 hours at rated power, R shift .5% max., or .5 ohms, whichever is greater.



CADDOCK
ELECTRONICS, INCORPORATED
3127 CHICAGO AVENUE, RIVERSIDE, CALIFORNIA 92507 PHONE: (714) 683-5361 • TWX: 910-332-6108

Low Cost Non-Inductive Precision Film Resistor in Rectangular Case

CADDOCK
HIGH PERFORMANCE FILM RESISTORS

NEW! EXTENDED RESISTANCE RANGE!
Now available in values up to 100 Megohms!

Developed as a low cost precision resistor for high density packaging in large volume printed circuit applications, Type MK Precision Film Resistors are now available in values as high as 100 Megohms!

Constructed with Caddock Micronox* resistance films fired onto a solid ceramic substrate, the Type MK Precision Film Resistors combine all of these outstanding advantages:

• Power Rating	.75 watts at 125°C.
• Resistance Tolerance	±1% standard, to ±0.1% on special order.
• Operating Temperature	−55°C to +175°C.
• Temperature Coefficient	50 PPM/°C to 10 Megohms, 80 PPM/°C to 100 Megohms, referenced to 25°C with the △R taken at −15°C and +105°C.
• Extended Life Stability	Better than 0.05% per 1000 hours.

plus Caddock's Non-Inductive Performance for greater pulse fidelity and wider bandwidths in high frequency circuits!

The case of the Type MK resistors is a standard CK06 rectangular package that is only 0.3 inches square and 0.1 inches thick! The radial leads have a standard spacing of .2 inches and the resistor can be handled by automated assembly equipment.

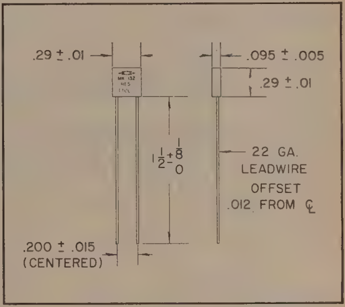
Because the temperature coefficients of all values of Type MK Precision Film Resistors can be matched for 'tracking' within 40 PPM/°C, these resistors are finding wide application in compact instrumentation and scientific equipment where resistor precision and stability is vital to the ultimate accuracy of the measurement system.

The construction includes a transfer molded case that meets all requirements of extreme environmental specifications.

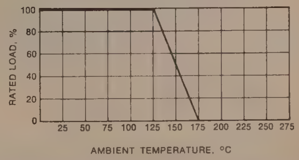
*Micronox is a registered trademark of Caddock Electronics, Inc.

SPECIFICATIONS

Resistance Range: 10 ohms to 100 meg
Tolerance: ±1% (Tolerances to ±.1% on special order)
Wattage: .75 Watt @ 125°C (Derated to 0 @ 175°C)
Max. Working Voltage: 400 Volts
Operating Temperature: −55°C to 175°C
Temperature Coefficient: 50 PPM/°C to 10 Megohms, 80 PPM/°C to 100 Megohms, referenced to 25°C with the ΔR taken at −15°C and +105°C.
Encapsulation: Transfer Molded
Leadwire Material: Tinned copper
1000 Hour Load Life: R Shift .4% Max. or .2Ω
Moisture Resistance: R Shift .5% Max. or .2Ω
Low. Temp. Operation: R Shift .05% Max. or .2Ω
Temperature Cycling: R Shift .2% Max. or .2Ω
Short Time Overload: R Shift .15% Max. or .2Ω
Low Temp. Storage 4 Hour @ −40°C: R Shift .05% Max. or .2Ω
Soldering: R Shift .03% Max. or .2Ω
Insulation Resistance: >10^{12} ohms
Shock: R Shift .05% Max. or .2Ω
Vibration: R Shift .05% Max. or .2Ω
Lead Pull 5 lbs.: R Shift .04% Max. or .2Ω
Marking: Caddock Logo, Model Number, Resistance Value, Tolerance


.29 ± .01
.095 ± .005
.29 ± .01
$1\frac{1}{2}{}^{+\frac{1}{8}}_{-0}$
22 GA. LEADWIRE OFFSET .012 FROM ℄
.200 ± .015 (CENTERED)

DERATING CURVE



CADDOCK
ELECTRONICS, INCORPORATED
3127 CHICAGO AVENUE, RIVERSIDE, CALIFORNIA 92507 PHONE: (714) 683-5361 • TWX: 910-332-6108

CADDOCK
HIGH PERFORMANCE FILM RESISTORS

Type MG & MH Precision High-Voltage Resistors

Type MG and MH resistors have been proven in years of use in critical applications such as airborne computer, manned space flight, geophysical instruments, medical electronics, etc., where long term reliability in extreme environment is of utmost importance. This line now includes a wide range of sizes with extended resistance range to lower values and higher values.

Matched resistor sets are available to your ratio requirements, with ratio TC as close as 2 ppm/°C. These divider sets are widely used in such applications as the control voltage feedback for precision high voltage supplies.

Special High-Voltage and High-Voltage Pulse Applications

All power ratings and maximum working voltage ratings are for continuous duty. Ratings are based on pre-stress voltage levels applied as part of the manufacturing process and provide for stable resistor performance, even with momentary overloads applied. These resistors, with non-inductive construction, can be factory-conditioned to withstand up to 60% higher maximum working voltage, provided power ratings are not exceeded. (For this higher rating specify -15, example: MG750N-15. Overload and overvoltage ratings do not apply to -15 resistors).

Originally, MG and MH resistors were available only in megohm values, however, in lower resistance values they have found wide use in pulse and current limiting applications where high voltage levels are involved. Pulse levels of several times rated working voltage have been applied as factory pre-stress for special applications. Caddock has facilities to prove many pulse application parameters, and we invite you to submit your specific design problem. Non-inductive construction is especially valuable in pulse applications to minimize problems of localized resistor degradation due to reflected wave and other unusual phenomena associated with instantaneous current situations.

N
Exclusive
Non-Inductive
Design
PATENTS PENDING

Non-Inductive construction available in most models. Specify with N suffix on Model No.

SPECIFICATIONS

Resistance Tolerance: ±1% (tolerances to .1% on special order).

Insulation Resistance: 100 megohms, minimum.

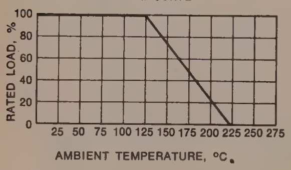
Overvoltage: 1.5 times working voltage for 5 seconds, R shift .8% max.

Thermal Shock: MIL-STD-202, method 107, cond. C, R shift .5% max.

Moisture Resistance: MIL-STD-202, method 106, R shift .8% max.

Loadlife: 1000 hours at rated power, R shift .8% max.

DERATING CURVE



Model No.	Wattage	Max. Continuous Oper. Volt	Oper. Temp. (Max.)	Dielect. Str'gth	TC ppm/°C†	Resistance		Dimensions			Encapsulation
						Min.	Max.	A	B	C	
MG650	.5	600	225°C	750	80	200Ω	5 Meg	.313 ±.020	.094 ±.015	.025 ±.002	Silicone Conformal
MG660	.6	1,000	225°C	750	80	400Ω	10 Meg	.500 ±.030	.094 ±.015	.025 ±.002	Silicone Conformal
MG680	.8	2,000	225°C	750	80	600Ω	20 Meg	.750 ±.030	.094 ±.015	.025 ±.002	Silicone Conformal
MG710	1.0	4,000	225°C	750	80	800Ω	50 Meg	1.000 ±.040	.094 ±.015	.025 ±.002	Silicone Conformal
MG714	1.0	1,000	225°C	750	80	200Ω	20 Meg	.562 ±.060	.150 ±.030	.032 ±.002	Silicone Conformal
MG715	1.0	2,000	225°C	750	80	400Ω	50 Meg	.750 ±.060	.140 ±.030	.025 ±.002	Silicone Conformal
MG716	1.5	4,000	225°C	750	80	600Ω	75 Meg	1.000 ±.060	.140 ±.030	.025 ±.002	Silicone Conformal
MG720	2.0	6,000	225°C	750	80	1K	150 Meg	1.500 ±.080	.140 ±.030	.025 ±.002	Silicone Conformal
MG721	2.0	4,000	225°C	750	80	200Ω	100 Meg	1.000 ±.050	.240 ±.030	.040 ±.002	Silicone Conformal
MG725	2.5	10,000	225°C	750	80	1.5K	200 Meg	2.000 ±.080	.140 ±.030	.025 ±.002	Silicone Conformal
MG730	3.0	6,000	225°C	1000	80	500Ω	250 Meg	1.500 ±.080	.240 ±.030	.040 ±.002	Silicone Conformal
MG735	3.6	10,000	225°C	1000	80	750Ω	300 Meg	2.000 ±.080	.240 ±.030	.040 ±.002	Silicone Conformal
MG745	5.0	15,000	225°C	1000	80	1K	500 Meg	3.000 ±.100	.240 ±.030	.040 ±.002	Silicone Conformal
MG750	5.0	10,000	225°C	1000	80	400Ω	500 Meg	2.125 ±.060	.315 ±.030	.040 ±.002	Silicone Conformal
MG780	7.5	15,000	225°C	1000	80	600Ω	750 Meg	3.125 ±.060	.315 ±.030	.040 ±.002	Silicone Conformal
MG785	8.0	20,000	225°C	1000	80	800Ω	1000 Meg	4.000 ±.120	.315 ±.030	.040 ±.002	Silicone Conformal
MG810	10.0	25,000	225°C	1000	80	1K	1250 Meg	5.000 ±.120	.315 ±.030	.040 ±.002	Silicone Conformal
MG812	12.5	30,000	225°C	1000	80	1.2K	1500 Meg	6.000 ±.120	.315 ±.030	.040 ±.002	Silicone Conformal
MG815	15.0	30,000	225°C	1000	80	1K	2000 Meg	6.000 ±.120	.350 ±.040	.040 ±.002	Silicone Conformal
MH651	.5	600	225°C	750	80	200Ω	5 Meg	.313 ±.020	.094 ±.006	.025 ±.002	Black Molded
MH661	.6	1,000	225°C	2000	80	400Ω	10 Meg	.500 ±.030	.114 ±.010	.025 ±.002	Black Molded
MH681	.8	2,000	225°C	2000	80	600Ω	20 Meg	.750 ±.030	.114 ±.010	.025 ±.002	Black Molded
MH682	.8	800	225°C	1000	80	200Ω	20 Meg	.400 ±.020	.150 ±.010	.025 ±.002	Black Molded
MH713	1.0	4,000	225°C	2000	80	800Ω	50 Meg	1.000 ±.030	.114 ±.010	.025 ±.002	Black Molded
		Type MH with special shielding, designed to eliminate degradation due to corona.									
MH711	1.0	2,000	225°C	2000	80	800Ω	50 Meg	1.200 ±.040	.220 ±.015	.025 ±.002	Black Molded

†Temperature Coefficient: Referenced to 25°C, ΔR taken at −15°C and +105°C

CADDOCK
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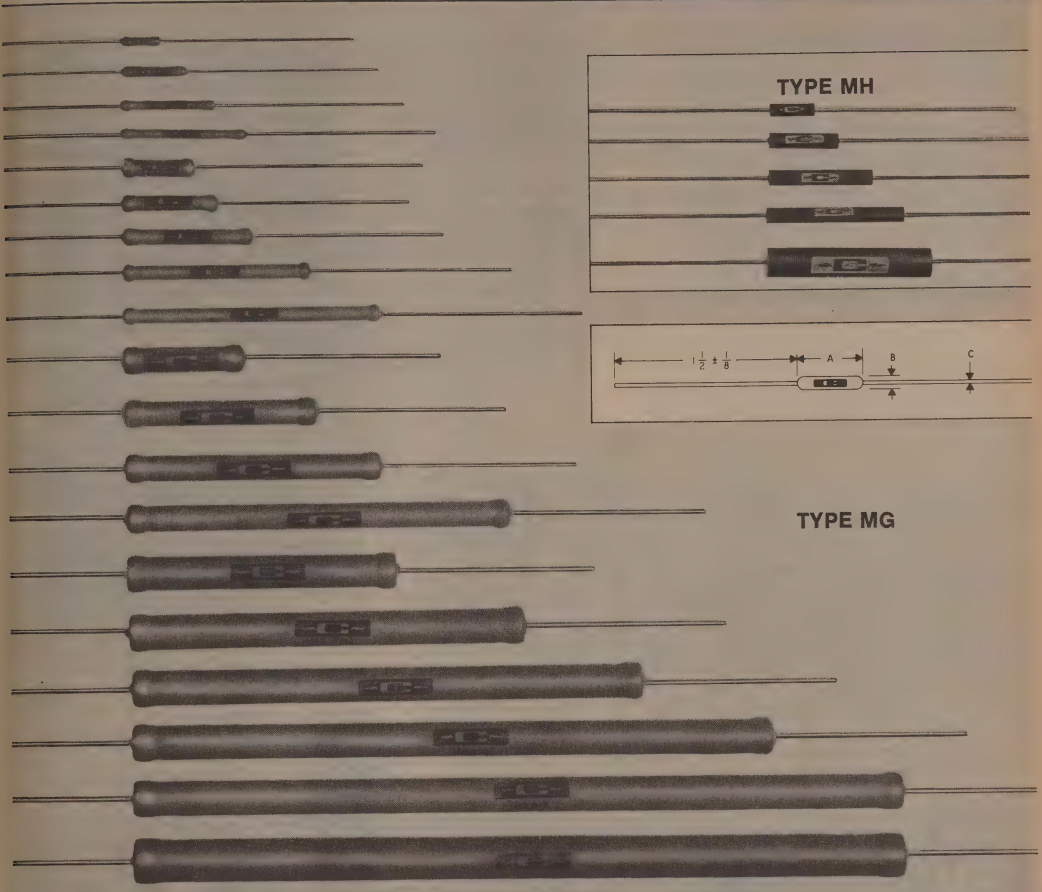
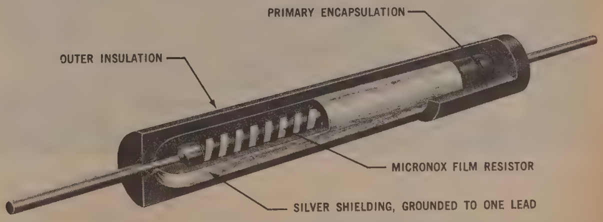
Type MG & MH Precision High-Voltage Resistors

CADDOCK
HIGH PERFORMANCE FILM RESISTORS


TYPE MH
1 1/2 ± 1/8
A
B
C
TYPE MG

Exclusive Shielded Resistor

MODEL MH711, designed for extremely high voltage applications, in very high resistance strings. Unit remains exceptionally stable since shielding prevents film degradation from corona developed in high voltage fields.


PRIMARY ENCAPSULATION
OUTER INSULATION
MICRONOX FILM RESISTOR
SILVER SHIELDING, GROUNDED TO ONE LEAD

CADDOCK
ELECTRONICS, INCORPORATED
3127 CHICAGO AVENUE, RIVERSIDE, CALIFORNIA 92507 PHONE: (714) 683-5361 • TWX: 910-332-6108

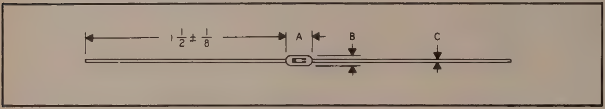
CADDOCK
HIGH PERFORMANCE FILM RESISTORS

Type MV
Low-R Power Film Resistors

Type MV resistors extend the advantages of Caddock Micronox* resistance films to values as low as 0.5 ohms in a unique non-inductive design. The multiple-path resistance pattern distributes the currents evenly throughout the resistor and reduces the inductance to an absolute minimum.

The exceptional stability of Caddock Micronox* resistors — produced by firing these complex oxide films onto solid ceramic substrates — provides power ratings as high as 10 watts in a compact axial lead configuration that features excellent overload ratings.

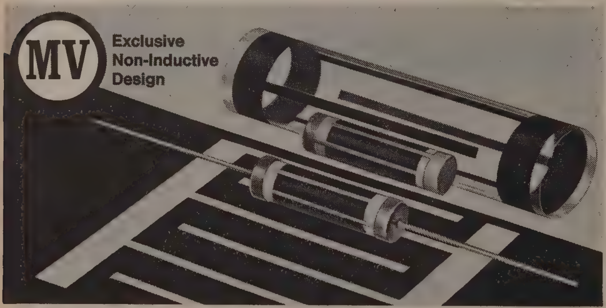
Type MV resistors are ideal for use in high frequency circuits where close resistance tolerances and excellent long-term stability are required.

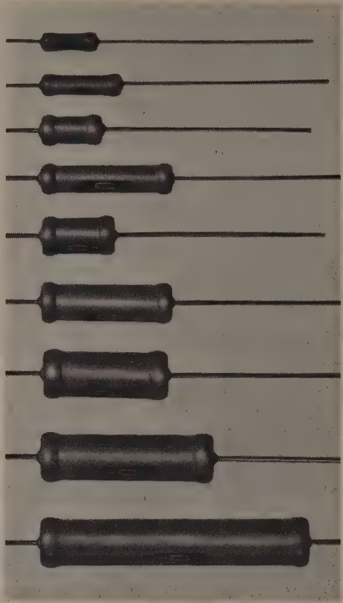


*Micronox is a registered trademark of Caddock Electronics, Inc.

Model No.	Watt-age	Oper. Temp. (Max.)	Dielect. Str'gth	TC ppm/°C†	Resistance		Dimensions			Encap-sulation	Leadwire
					Min.	Max.	A	B	C		
MV217	1.5	275°C	800	100	5Ω	100Ω	.400 ±.060	.140 ±.030	.025 ±.002	Silicone Conformal	Gold Plated Dumet
MV227	2.0	275°C	800	100	5Ω	100Ω	.575 ±.050	.165 ±.030	.030 ±.002	Silicone Conformal	Gold Plated Dumet
MV228	2.0	275°C	1000	100	3Ω	100Ω	.480 ±.060	.230 ±.030	.040 ±.002	Silicone Conformal	Gold Plated Dumet
MV233	3.0	275°C	1000	100	2Ω	100Ω	.950 ±.060	.230 ±.030	.040 ±.002	Silicone Conformal	Gold Plated Dumet
MV234	3.0	275°C	1000	100	3Ω	100Ω	.570 ±.060	.300 ±.030	.040 ±.002	Silicone Conformal	Gold Plated Dumet
MV251	4.0	275°C	1000	100	1Ω	100Ω	.970 ±.060	.300 ±.030	.040 ±.002	Silicone Conformal	Gold Plated Dumet
MV261	6.0	275°C	1000	100	1Ω	100Ω	.910 ±.060	.350 ±.030	.040 ±.002	Silicone Conformal	Gold Plated Dumet
MV280	8.0	275°C	1000	100	1Ω	100Ω	1.25 ±.070	.350 ±.040	.040 ±.002	Silicone Conformal	Gold Plated Dumet
MV311	10.0	275°C	1000	100	.5Ω	100Ω	2.00 ±.080	.350 ±.040	.040 ±.002	Silicone Conformal	Gold Plated Dumet

†Temperature Coefficient: Referenced to 25°C, ΔR taken at −15°C and +105°C





SPECIFICATIONS

Resistance Tolerance: ±1%.

Insulation Resistance: 100 megohms, minimum.

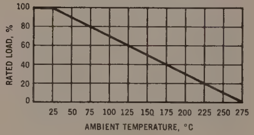
Overload: 5 times rated power for 5 seconds, R shift 1% max.

Thermal Shock: MIL-STD-202, method 107, cond. C, R shift 1% max.

Moisture Resistance: MIL-STD-202, method 106, R shift 1% max.

Loadlife: 1000 hours at rated power, R shift 1% max.

DERATING CURVE



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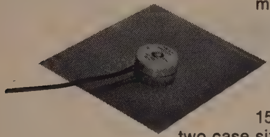
Type MP Chassis Mounted Power Film Resistors

CADDOCK
HIGH PERFORMANCE FILM RESISTORS

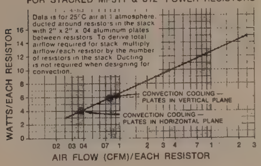
Type MP Chassis Mounted Power Film Resistors are made with Micronox* resistance films fired onto a ceramic substrate which is thermally bonded to an anodized aluminum base. By mounting this assembly directly to a metal surface for improved heat transfer, these unique resistors provide increased packaging densities in many types of electronic equipment.

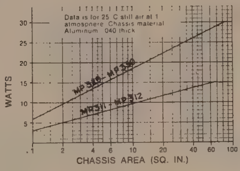


15 and 30 watt ratings are available in two case sizes that permit through-bolt attachment to the chassis or other heat conducting surface. The molded silicone case encapsulates the resistor assembly to meet the requirements of the most stringent environmental specifications.

The outstanding stability of the Type MP Power Film Resistors has been demonstrated in a 4½ year, 40,000 hour program of continuous load-life testing. Extended life stability during these full-power tests has been better than 0.01% per 1000 hours!

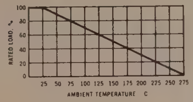
POWER RATING
FOR STACKED MP311 & 312 POWER RESISTORS

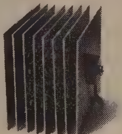




These charts of power ratings versus ambient temperature and chassis area show the high power levels that can be achieved with forced air cooling and with convection cooling in either vertical or horizontal orientation.

DERATING CURVE





Stacked Type MP resistor assemblies—constructed by bolting and resistors between aluminum heat dissipating plates—provide a simple means of further improving packaging densities.

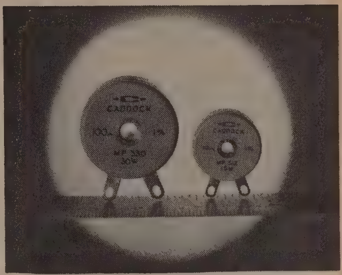
Model No.	Power Rating†	Max. Voltage	Diel. Str.	High Temp. TC‡	Resistance Range		Dimensions				Terminals
					Min.	Max.	A	B	C	D	
MP311	15 Watts	300	600	50	50Ω	200 K	.600	.188	—	.092	12" Min Teflon Leads 26AWG 7x34
MP312	15 Watts	300	600	50	10Ω	200 K	.600	.188	.185	.092	Gold Plated Solder Lugs
MP329	30 Watts	450	1000	50	50Ω	200 K	.850	.250	—	.142	12" Min Teflon Leads 22AWG 7x30
MP330	30 Watts	450	1000	50	10Ω	200 K	.850	.250	.250	.142	Gold Plated Solder Lugs

†Power rating based on chassis mounting — MP311 and MP312 on 6"x4"x2"x.040 aluminum chassis MP329 and MP330 on 5x7x2x.040 aluminum chassis.

‡TC — 50ppm Referenced to 25°C, △R taken at +150°C and +275°C. (Low temp. TC will be nominally −85ppm/°C at −55°C. See typical R-T curve.)

U.S. Patent No's 3,636,493 and 3,649,944 Other patents pending.

*Micronox is a registered trademark of Caddock Electronics, Inc.



SPECIFICATIONS

Resistance Tolerance: ±1% standard (Other tolerances on special order.)

Insulation Resistance: 10,000 Megohms, dry. Method — Mil-R-18546D, para. 4.6.8.

Solderability: Per Mil-R-18546D, para. 3.7, para. 4.6.4.

Terminal Strength: Per Mil-Std-202, Method 211, Cond. A (Pull Test), 5 lbs., and Cond. B (Bend Test). Max. △R, .2% or .2Ω, whichever is greater.

Thermal Shock: Per Mil-R-18546D, para. 4.6.9, max. △R, .5% or .2Ω, whichever is greater.

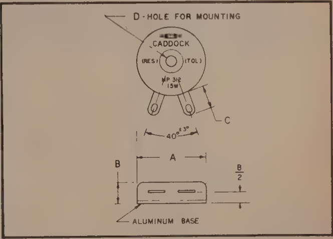
Momentary Overload: 2 times rated power or 1.5 times max. allowable working voltage, whichever gives the lower power, for 5 seconds. Max. △R, .5% or .2Ω, whichever is greater.

Moisture Resistance: Mil-Std-202, Method 106B, less steps 7a and 7b, max. △R, .5% or .2Ω, whichever is greater.

Life: Per Mil-R-18546D, para. 4.6.12, 1,000 hrs., Max. △R, 1% or .2Ω, whichever is greater.

Shock, Medium Impact: 50G, per Mil-Std-202, Method 205, Cond. C.

Vibration, High Frequency: Per Mil-Std-202, Method 204, Cond. B, Max. △R .2% or .2Ω, whichever is greater, through shock and vibration sequence.



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CADDOCK
HIGH PERFORMANCE FILM RESISTORS

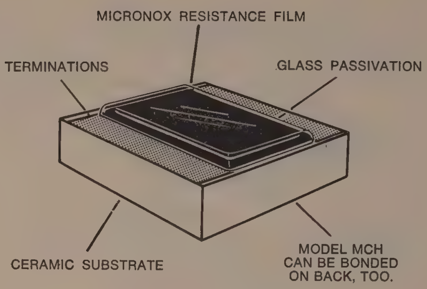
Type MC Precision Chip Resistors and High Resistance Precision Chip Resistors

Caddock introduces the Type MC Precision Chip Resistors — a new and complete line of precision chip resistors that meet the most stringent requirements of all types of hybrid circuits.

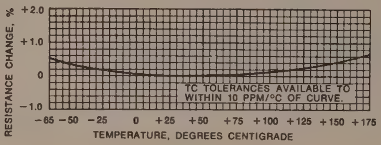
The latest advance in Caddock's 12 years of experience in the development and production of high performance film resistors, the Type MC Precision Chip Resistors utilize Micronox* complex oxide resistance films to provide all of these advantages:

- **Extended Resistance Range.**
  1 Megohm resistance values are now available in even the smallest of these chips, and the Model MCV Multi-Megohm Chip Resistors include resistance values up to 500 Megohms!
- **Precision Resistance Tolerances.**
  The standard resistance tolerance for all models and values is ±1%!
- **Higher Operating Temperatures.**
  +175°C maximum operating temperature is the standard specification for every model and all Type MC resistors can be operated without derating at +125°C!
- **Lower Temperature Coefficients.**
  TCs of 50 PPM/°C and 80 PPM/°C are standard over a 120°C operating temperature range.
- **Matched Temperature Coefficients.**
  TC tracking between any two chip resistors of any type, model and resistance value will stay within 40 PPM/°C over the temperature range from −15°C to +105°C.
- **Exceptional Stability.**
  The high stability of Caddock Micronox* resistance films keeps resistance shifts to a minimum under all thermal and environmental conditions.

There are four basic models to choose from, including chips for wire-bonding, solder reflow and a solderable design with wrap-around tinned terminals.



The typical TC curve shown in this graph illustrates the dish-shaped temperature characteristic of Micronox* resistance films. While the shape of this curve will vary slightly with the resistivity of the film, these resistance films provide a nearly 'zero' TC over a limited temperature range — a feature that can be the source of additional improvements in the stability of many electronic circuits.



For information on price and delivery of both production and evaluation quantities of any of the Type MC Precision Chip Resistors, contact the high performance film resistor specialists at Caddock.

Type MC Precision Chip Resistors are produced under carefully controlled manufacturing and test procedures.

Manufacturing Control.
Type MC Precision Chip Resistors, like all other Caddock High Performance Film Resistors, are produced under strict manufacturing controls with processes which include power conditioning, overvoltage conditioning and maximum temperature conditioning.

Quality Control.
Type MC Resistors receive quality surveillance which reaches from incoming raw materials to your packaged resistors in the shipping area. And our QC system has been approved for conformance to the requirements of NASA NPC200-3 and MIL-I-45208.

*Micronox is a registered trademark of Caddock Electronics, Inc.

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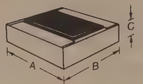
Type MC Precision Chip Resistors and High Resistance Precision Chip Resistors

CADDOCK
HIGH PERFORMANCE FILM RESISTORS

Type MCG and MCH for Wire-Bonding.

- Standard and High Resistance Ranges
- 175°C Maximum Operating Temperatures
- Power Ratings to .25 Watt

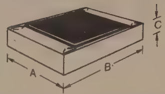


To order this type of chip with an electrically isolated gold backing for die-bonding, specify any of these Model Numbers as Type MCH.

	Model No.	Power Rating	Max. Voltage	Oper. Temp. (Max.)	TC ppm/°C†	Dimensions			Resistance Range	
						A ±.005	B ±.005	C ±.003	Min.	Max.
Standard Resistance Range	MCG 110	.1 W	50	175°C	50	.050	.050	.012	50Ω	40 K
	MCG 120	.2 W	100	175°C	50	.050	.100	.012	100Ω	50 K
	MCG 125	.25 W	150	175°C	50	.075	.150	.012	100Ω	100 K
High Resistance Range	MCG 210	.1 W	50	175°C	80	.050	.050	.012	40 K	1 Meg.
	MCG 220	.2 W	100	175°C	80	.050	.075	.012	50 K	2 Meg.
	MCG 225	.25 W	150	175°C	80	.075	.150	.012	100 K	5 Meg.

Type MCS for Solder Reflow.

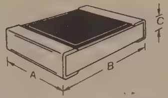
- Standard and High Resistance Ranges
- 175°C Maximum Operating Temperatures
- Power Ratings to .6 Watt
- Working Voltages to 400 Volts



	Model No.	Power Rating	Max. Voltage	Oper. Temp. (Max.)	TC ppm/°C†	Dimensions			Resistance Range	
						A ±.005	B ±.005	C♦ ±.003	Min.	Max.
Standard Resistance Range	MCS 325	.25 W	200	175°C	50	.075	.150	.012	100Ω	100 K
	MCS 330	.3 W	250	175°C	50	.100	.200	.012	100Ω	200 K
	MCS 340	.4 W	250	175°C	50	.150	.200	.027	75Ω	300 K
	MCS 350	.6 W	400	175°C	50	.200	.250	.027	75Ω	500 K
High Resistance Range	MCS 425	.25 W	200	175°C	80	.075	.150	.012	100 K	5 Meg.
	MCS 430	.3 W	250	175°C	80	.100	.200	.012	200 K	20 Meg.
	MCS 440	.4 W	250	175°C	80	.150	.200	.027	30 K	50 Meg.
	MCS 460	.6 W	400	175°C	80	.200	.250	.027	500 K	100 Meg.

Type MCW — Solderable with Wrap-Around Tinned Terminals

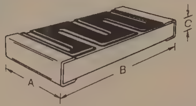
- Standard and High Resistance Ranges
- 175°C Maximum Operating Temperatures
- Power Ratings to .25 Watt



	Model No.	Power Rating	Max. Voltage	Oper. Temp. (Max.)	TC ppm/°C†	Dimensions			Resistance Range	
						A ±.005	B ±.005	C♦ ±.003	Min.	Max.
Standard Resistance Range	MCW 530	.3 W	250	175°C	50	.100	.200	.012	100Ω	200 K
	MCW 540	.4 W	250	175°C	50	.150	.200	.027	75Ω	300 K
	MCW 560	.6 W	400	175°C	50	.200	.250	.027	75Ω	500 K
High Resistance Range	MCW 630	.3 W	250	175°C	80	.100	.200	.012	200 K	20 Meg.
	MCW 640	.4 W	250	175°C	80	.150	.200	.027	30 K	50 Meg.
	MCW 660	.6 W	400	175°C	80	.200	.250	.027	500 K	100 Meg.

Type MCV — Multi-Megohm Chip Resistors

- Resistance Values from 1 Megohm to 500 Megohms!
- Maximum Working Voltages to 2000 Volts!
- Maximum Power Ratings to 1 Watt.
- 175° Maximum Operating Temperature
- Solderable with wrap-around tinned terminations.



	Model No.	Power Rating	Max. Voltage	Oper. Temp. (Max.)	TC ppm/°C†	Dimensions			Resistance Range	
						A ±.010	B ±.010	C♦ ±.005	Min.	Max.
Extended Resistance Range	MCV 770	.75 W	600	175°C	80	.25	.50	.027	1 Meg.	200 Meg.
	MCV 780	.8 W	1000	175°C	80	.25	.75	.027	1 Meg.	250 Meg.
	MCV 790	1.0 W	2000	175°C	80	.25	1.00	.027	1 Meg.	500 Meg.

SPECIFICATIONS

All Type MC Precision Chip Resistors

Resistance Tolerance: ±1% standard. Tolerances to ±0.1% on special order. (Tolerances less than ±1% will have organic passivation.)

Operating Temperature: −55°C to maximum specified temperature.

TC Tracking: 40 PPM/°C maximum between any resistor model and any resistance value. (Ref. 25°C, ΔR taken over range from −15°C and +105°C)

Short Time Overload: 5 times rated power or 1.5 times maximum allowable working voltage, whichever gives the lower power, for 5 seconds. Maximum ΔR .5%.

High Temperature Exposure: R Shift .5% max.*

Resistance to Bonding or Solder Exposure: R Shift .25% max.*

Moisture Resistance: R Shift .5% max.*

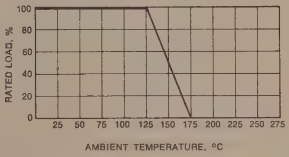
1000 Hour Load Life: R Shift .5% max. when mounted on a heat sink which maintains surface temperature within maximum range.

†Temperature Coefficient: Referenced to 25°C, ΔR taken at −15°C and +105°C.

♦ Dimension does not include thickness of solder deposit.

* Test parameters per applicable portions of Mil-R-55342

DERATING CURVE



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CADDOCK
HIGH PERFORMANCE FILM RESISTORS

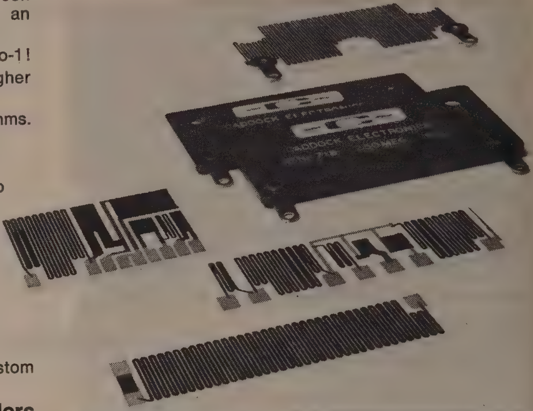
Custom Resistive Devices

For the ultimate in resistor network performance, Caddock produces many types of custom resistive networks with an unsurpassed combination of advantages:

- **High Resistance Ratios**—from 1-to-1 up to 1,000,000-to-1!
- **High Transient Handling Capability**—up to 100 times higher than the rated power level!
- **Extended Resistance Range**—from 1 ohm to 5000 Megohms.
- **Tight Resistance Tolerances**—to 0.05%.
- **Tight Ratio Tolerances**—to 0.025%.
- **Close Ratio Tracking**—to 5 PPM/°C from −15°C to +105°C.
- **Exceptional Resistor Stability**—as close as 0.01% per 1000 hours in extended life.

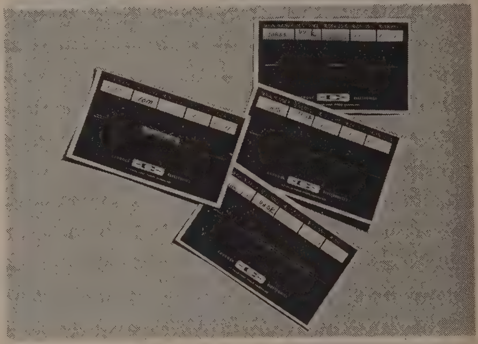
This combination of advantages in one resistor network often provides a practical—**and immediate**—means for improving the performance and specifications of electronic circuitry and equipment without any changes in the design!

Here are examples of the many high performance custom resistive networks available from Caddock Electronics:



Multimeter and Oscilloscope Input Signal Dividers

Precision voltage dividers with ratios as high as 1,000,000-to-1 are often required for range switching at the input of laboratory instruments. For these applications, Caddock produces single-chip networks with resistance ratios accurate to 0.025% and with the temperature coefficients matched to within 5 PPM/°C over the normal operating temperature range.



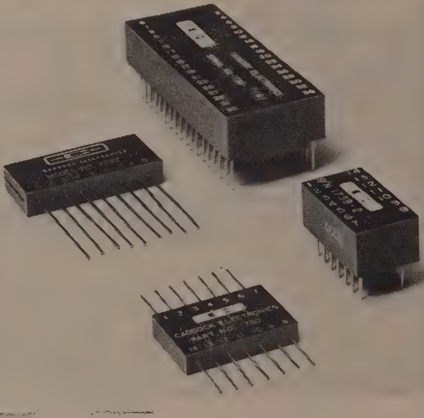
R-C Networks

A wide range of capacitance values can be combined with our precision resistors on a single chip. These high stability capacitors may be isolated from the other components on the chip or combined in R-C functions to meet your requirements.

Matched Resistor Sets

Sets of matched resistors with ratios held as close as 0.05% over the range of ratios from 1:1 to 1:100,000 provide solutions to the toughest accuracy problems in voltage dividers, reference networks, feedback networks, current summing networks, and high voltage divider networks. Virtually all of the various types of Caddock Film Resistors can be matched in discrete resistor sets for both tight ratio tolerances and TC tracking—some as tight as 2 PPM/°C over specific temperature ranges—making it practical to select **and intermix** the particular type of resistors needed to meet other important performance requirements.

These matched sets and networks can also be assembled in molded packages or DIP configurations, and in special shapes to meet your design requirements.



DAC Ladder Networks

Networks with resolution up to 12 binary bits can be produced, and the superior long-term stability of Micronox™ resistance films keeps accuracy higher for longer, more error-free operation of advanced digital systems.

Precision High Voltage Divider Networks

Special packages are available for discrete resistor sets, and flat ceramic substrates provide low profile configurations with integral mounting holes.

TC 'tracking' as close as 2 PPM/°C can be provided, and special encapsulation techniques meet rugged environmental limits.

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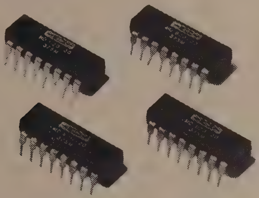
Precision Resistor Networks in DIP and SIP Packages

CADDOCK
HIGH PERFORMANCE FILM RESISTORS

The exceptionally high performance of Caddock Micronox* resistance films is now available in many standard DIP and SIP resistor packages that provide a unique combination of advantages:

- Tight Tolerances.
- Tight Resistance Ratios.
- Lower Temperature Coefficients.
- Matched TC Ratios.
- Extended Resistance Range.
- Excellent Transient Handling Capability.
- Outstanding Load-Life Stability.

These advantages make Caddock DIP and SIP Precision Resistor Networks the ideal choice for many high accuracy analog and digital circuits, including —

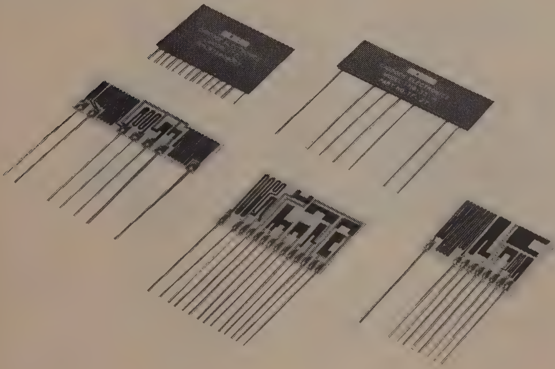


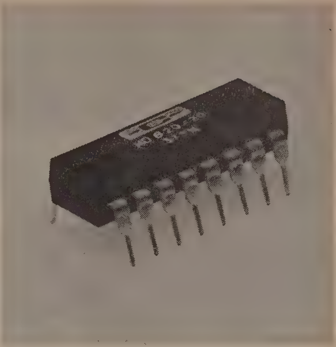
- Precision voltage dividers for multi-range instruments.
- Precision resistor ratios for accurate amplifier gain control.
- Feedback networks for precision power supplies.
- Custom ladder networks for precision D/A and A/D conversion circuits.

The DIP packages are available in all of the standard 14, 16 and 18 pin configurations. SIP packages are available in a wide variety of shapes and sizes to fit the requirements of each application, with standard or custom lead spacings and lengths.

For complete information on the high performance precision resistor network for your application, please call or write directly to the applications engineers at Caddock Electronics.

*Micronox is a registered trademark of Caddock Electronics, Inc.





14, 16 and 18 Pin DIP Packages and Standard and Custom SIP Packages

Resistance Range: 10 ohms to 10 Megohms in standard DIP packages. 1 ohm to 50 Megohms in SIP packages.

Number of Resistors per Package: Up to 36 resistors, depending upon interconnections.

Tolerance: ±0.5% and ±1.0% (Tolerances to ±0.1% on special order.)

Absolute Temperature Coefficient: ±50 PPM/°C for values up to 1 Megohm.§ ±80 PPM/°C for values above 1 Megohm.§

Ratio Tolerance: ±0.1%, ±0.25% or ±0.5%, as specified.

Ratio Temperature Coefficient: 40 PPM/°C.§ Special TCs to 5 PPM/°C.§

Power Rating: Up to 1 watt per resistor. Up to 2 watts per package.

Overload: 2.5 times rated voltage for 5 seconds. R shift .25% max.

Voltage Coefficient: To 0.1 PPM/volt when required.

Voltage Rating: 150 volts per resistor or 150 volts between adjacent pins.

Mechanical Configurations: DIP packages are molded of flame-proof high temperature materials and conform to mechanical outline requirements of Mil-R-83401B.

SIP packages include molded or conformal encapsulation and provide lead spacings of .100″, .125″, .150″ and .172″ as specified.

SIP package height is typically .300″ or .500″.

§ Temperature Coefficient: Referenced to 25°C, ΔR taken at −15°C and +105°C.

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CADDOCK
HIGH PERFORMANCE FILM RESISTORS

Multi-Megohm Film Resistors

Model 1718

This Multi-Megohm Resistor is designed to provide non-inductive high resistance values with precise resistance-temperature characteristics. These are especially useful in high resistance voltage dividers where fast response is important. On special order, resistor sets can be provided with voltage ratio accuracy to ±.01% and temperature tracking within 2ppm/°C.

Construction is high strength alumina substrate with fired-on Micronox resistance film and coated with material specially selected to prevent parallel leakage throughout temperature range. Units are compatible with most RTV potting.

Exclusive modular stack-up package

SPECIFICATIONS

Resistance Range: 1 meg-333 meg

Power Rating: 3 Watts @ 25°C

Max. Working Voltage: 12000 Volts

Resistance Tolerance: ±1% (Tolerances 0.2% on special order)

Terminal Material: Gold Plated Copper

Encapsulation: Conformal Coating

Insulation Resistance: 100,000 Megs, Min. when mounted

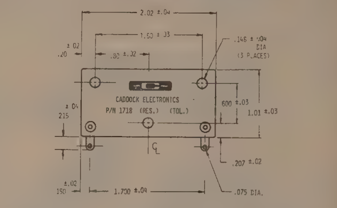
Temperature Coefficient: ±80 PPM/°C Referenced to 25°C, △R taken at −15°C and +105°C

Thermal Shock: Mil-Std 202, Method 107 R shift .5% Max.

Loadlife: 1000 hours at rated power R shift .8% Max.

Mounting: Three 6-32 Nylon Screws with Standoff Spacers, .050 Thick, Supplied with unit

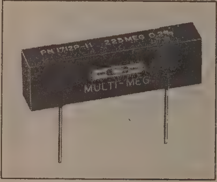
Operating Temperature: −55°C to +125°C



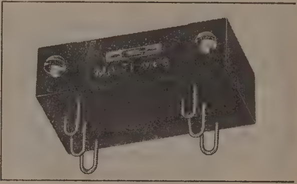
Substrate .054± .01 Thick. .09± .01 Thick Including Lug.

Model 1712

Caddock Multi-Meg Resistors utilize the exclusive Micronox resistance films, developed by Caddock, in a new and unique stack-up package. Extremely high resistance values, with excellent T.C. characteristics, can be specified to fit in an unusually small space by stacking as many units as required. Resistance density as high as 2000 megohms per cubic inch. Absolute T.C. is less than 80 PPM/°C between —15°C and +105°C. T.C. matching between modules to within 10 ppm/°C can be provided on special order. Modules may be combined in groups as voltage dividers, and also stacked with a trimmer for extremely fine adjustment of voltage ratio.

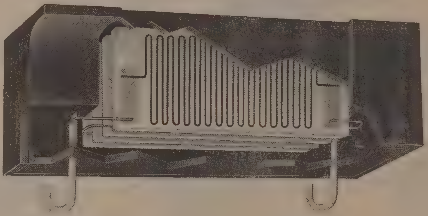


from 10 meg to 200 meg, 80 PPM T. C.* packaged in miniature stack-up case



Build resistance values as high as required with exclusive modular stacking design

Resistor construction: ceramic resistance wafers potted in cushioning material, packaged in a rugged molded case.



SPECIFICATIONS

***Temperature coefficient:** 80 PPM/°C, ref. 25°C, △ R @ −15°C and +105°C.

Resistance Range (per module): 10 meg. to 200 meg.

Standard resistance tolerance: ±1%.

Maximum working voltage: 1000 volts.

Dielectric strength: 1000 volts.

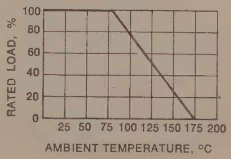
Moisture resistance: MIL-STD-202, method 106, R shift 0.8% max.

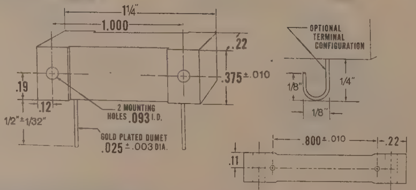
Load Life: 1000 hours at rated power, R shift 0.8% max.

Model 1712S — with solder lug Terminals.

Model 1712P — with pin Terminals.

DERATING CURVE




1¼"
1.000
.22
.375±.010
.19
.12
1/2"±1/32"
2 MOUNTING HOLES .093 I.D.
GOLD PLATED DUMET .025±.003 DIA.
OPTIONAL TERMINAL CONFIGURATION
1/4"
1/8"
1/8"
.800±.010
.22
.11

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ELECTRONICS, INCORPORATED
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"The CADDOCK Reports" Engineering, Test and Design Data

CADDOCK
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Caddock Electronics maintains a continuous program of reliability and performance testing on all of the many types of resistors presently being produced. In addition to the tests for stability and temperature characteristics that are part of our normal manufacturing procedures, we also perform semi-annual reliability tests to confirm compliance to the most stringent military and industry performance requirements.

The results of these tests, plus other extended life data developed over literally years of continuous testing that verifies performance characteristics, are now available to design engineers in a series of "Caddock Reports." You may request your personal copy of any of these test results by writing or calling to our main offices in Riverside, California.

Reliability Test Reports

These tests are conducted semi-annually to confirm the detailed performance of various types of Caddock High Performance Film Resistors when subjected to the requirements of applicable "Mil" specifications.

The report includes detailed graphs that show the actual performance-stability of five basic types of Caddock resistors. Individual test results for 15 different groups of resistors are shown for each of six tests: Temperature Cycling, Overload, 2000 Hour Load-Life, Moisture Resistance, Low Temperature and Shock and Vibration.

Extended Load-Life Stability Test Report

This report shows the exceptional stability that Caddock resistors deliver under full power conditions. The tests were initiated in May of 1969 on Caddock Type MP Power Film Resistors and are still being conducted at this time.

The test report includes a graph of resistor stability as measured over a period of 40,000 hours — **a continuous test period of over 4½ years** — that demonstrates extended-life stability better than 0.01% per 1000 hours! And there have been no failures of any kind during this continuous test program!

This test will be continued indefinitely as a means of verifying the outstanding stability and reliability of Caddock High Performance Film Resistors and the test summary regularly up-dated to show the latest data.

The Caddock General Catalog

Complete specifications and descriptions of all of the many types of Caddock High Performance Film Resistors are included in this catalog. And as new resistor types are introduced by Caddock, additional catalog data is made available.

Detailed information on the performance and availability of all Caddock resistors is available on request.

The outstanding stability and reliability of CADDOCK Power Film Resistors can give your equipment greater accuracy and longer life!
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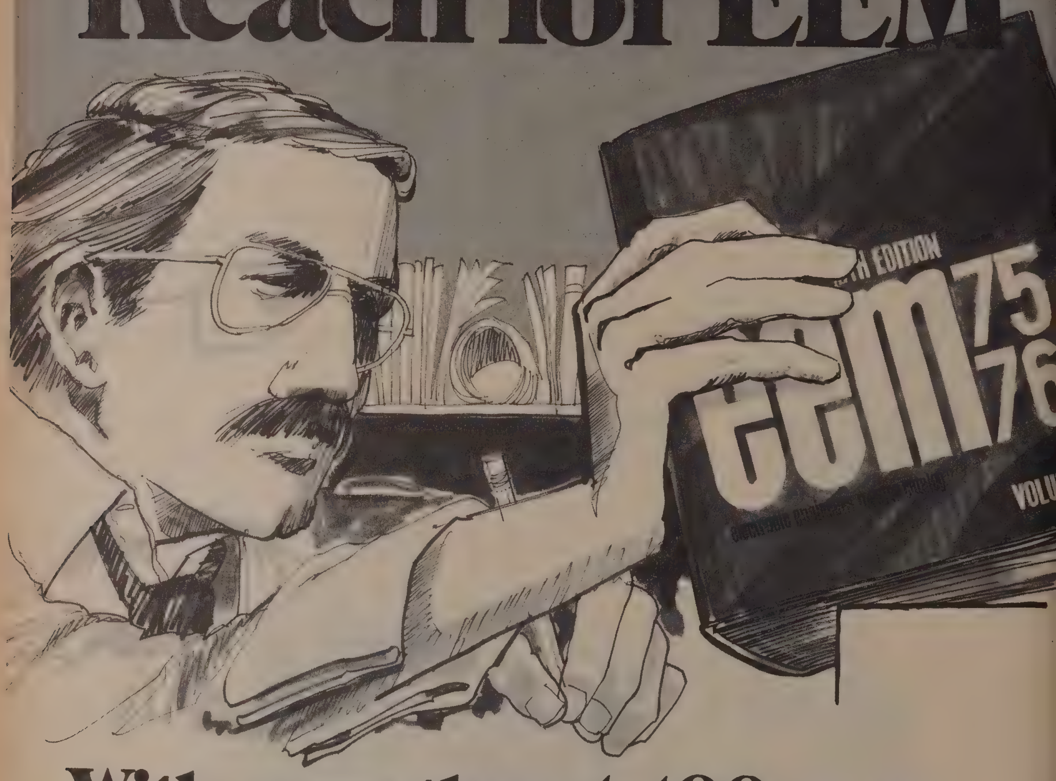

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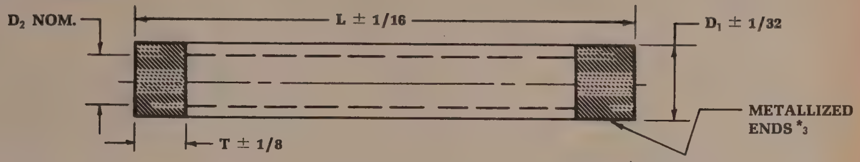
CARBORUNDUM NON-INDUCTIVE POWER RESISTORS

GLOBAR®
Non-Inductive Resistor



Specifications

	Type AS	Type SP
Tolerances	Standard 10%, 5% and 20% available	Same
Load-life	Max 5% after 1,000 hrs. at rated load	Same
Short time overload (10 times rated. Power 5 seconds on–90 seconds off.)	2% change	Same
Temperature coefficent	−50°C to +230°C ± .075%/°C max	−55°C to +350°C ± .075%/°C max
Voltage coefficient	Max 1%/kilovolt per inch effective length	Same
Max operating temperature	230°C	350°C
Density	2.5 grams/CM³	2.2 grams/CM³
Specific heat	.15-.30 cal/gram/°C	.15-.30 cal/gram/°C
De-rating	Linearly to 0° watts @ 230°C	Linearly to 0° watts @ 350°C
Moisture resistance:	Max 2.5% change tested per Mil Std 202B, Method 103	Same

The information, recommendations and opinions set forth herein are offered solely for your consideration, inquiry and verification and are not, in part or total, to be construed as constituting a warranty or representation for which we assume legal responsibility. Nothing contained herein is to be interpreted as authorization to practice a patented invention without a license.

Ceramic Carbon Composition Type AS

Type No.	Rated Power Watts @ 40° C	Allowable Injection Energy Joules *1	Max Peak Voltage (KV) *2 Standard	Special	L	Dimensions (inches) D₁	D₂	T	Resistance Range (ohms) *4 Min	Max
885	15	2,500	4.0	8.0	2½	¾	½	½	7.5	1,000
886	30	5,000	10.0	20.0	5	¾	½	⅝	20.0	2,500
887	50	15,000	15.0	30.0	6	1	¾	½	15.0	2,500
888	75	20 000	22.5	45.0	8	1	¾	⅞	20.0	3,000
889	100	35,000	37.5	75.0	12	1	¾	⅞	30.0	5,000
890	150	50,000	60.0	120	18	1	¾	⅞	50.0	7,500

Ceramic Silicon Composition Type SP

884	22.5	200	1.5		2	½	7/32	¼	1.0	150
885	45	250	1.5		2½	¾	½	½	1.0	100
886	90	500	4.0		5	¾	½	⅝	1.0	250
887	150	1,600	5.0		6	1	¾	½	1.0	250
888	190	2,100	6.0		8	1	¾	⅞	1.0	330
889	275	3,200	10.0		12	1	¾	⅞	1.0	700
890	375	4,200	16.0		18	1	¾	⅞	1.0	1,000
891	750	15,000	16.0		18	2	1½	1	1.0	350
892	1,000	17,500	22.0		24	2	1½	1	1.0	500

*1. Allowable energy per one shot pulse. For continuous duty, pulse repetition rate and duration must be considered.

*2. Peak voltages. Up to 100% increase can be obtained by special dielectric coatings and/or anti-corona terminations.

*3. Nickel metallization standard for AS types. Aluminum metallization standard for SP types. Other metallization available upon request; example: copper, solder-tinned copper or silver.

*4. Refer values other than shown to the plant for special quotation.

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CARBORUNDUM® VARISTORS

Standard varistors described below have a 10% tolerance on voltage. Also available: leadless discs and rods, voltages specified at intermediate values or at other currents, and voltage tolerances of ±15% and ±20%. Available at extra cost: voltage tolerances of ±5% and ±7%, color coding, and special coatings.

Standard disc varistors have a black flame-retardant PVC coating. Also available: Glyptal coating and kinked leads for printed circuit board insertion.

Standard rod varistors have a blue epoxy coating. Available at extra cost: formed leads for printed circuit board insertion.

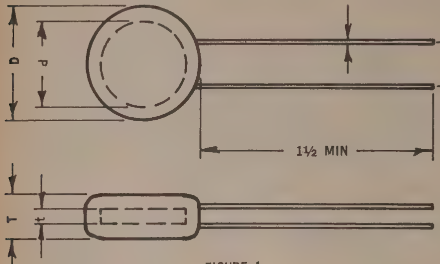


FIGURE 1

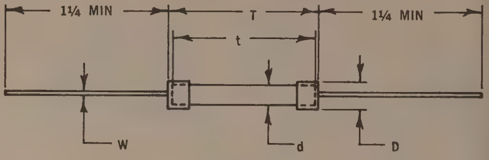
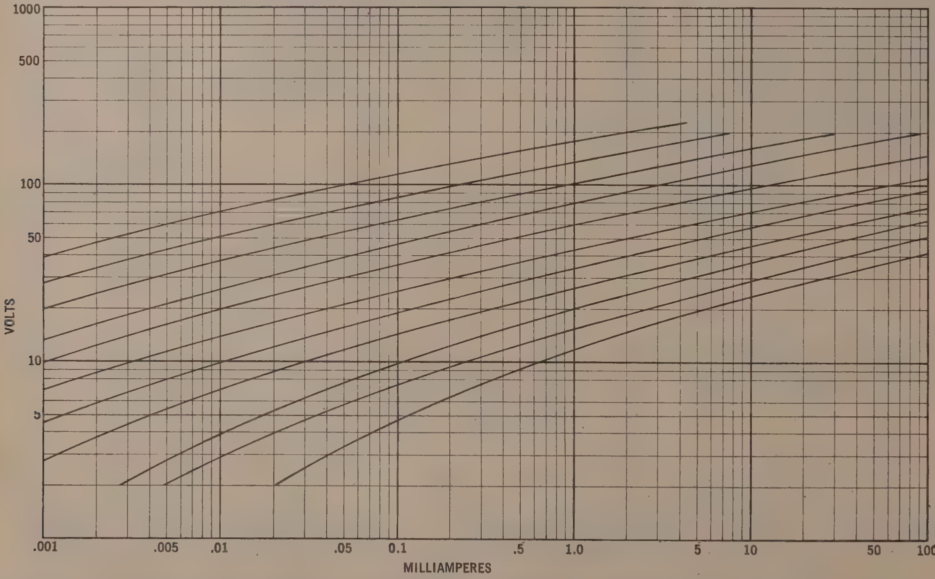


FIGURE 2

	Carborundum Style Number	d ±.030	t ±.030	D max.	T max.	w nom.	s nom.	Peak Voltage	Power Watts	"Curve Factors" Voltage	"Curve Factors" Current
DISC STYLES (figure 1)	551BNR2-	0.250	0.062	0.400	0.350	0.020	0.125	100	0.250	0.5	0.25
	432BNR2-	0.500	0.062	0.650	0.350	0.032	0.250	100	0.500	0.5	1.0
	379BNR2-	0.500	0.125	0.650	0.400	0.032	0.250	200	0.500	1.0	1.0
	328BNR2-	0.750	0.062	0.900	0.350	0.032	0.375	100	0.750	0.5	2.2
	925BNR2-	0.750	0.100	0.900	0.380	0.032	0.375	150	0.750	0.8	2.2
	613BNR2-	0.750	0.125	0.900	0.400	0.032	0.375	200	0.750	1.0	2.2
	923BNR2-	1.000	0.100	1.150	0.380	0.040	0.375	150	1.500	0.8	4.0
	463BNR2-	1.000	0.125	1.150	0.400	0.040	0.375	200	1.500	1.0	4.0
	927BNR2-	1.250	0.100	1.400	0.380	0.040	0.375	150	2.250	0.8	6.2
ROD STYLES (figure 2)	231BNR4-	0.156	0.625	0.250	0.812	0.032	—	800	0.750	5.0	0.1
	233BNR4-	0.250	0.625	0.375	0.812	0.032	—	800	1.000	5.0	0.25
	234BNR4-	0.250	1.000	0.375	1.188	0.032	—	1500	1.500	8.0	0.25



These curves are plotted for a family of variously rated 379BNR2- varistors. The characteristics of other varistor styles are of similar shape, and they can be approximated by using the "curve factors" shown in the above chart. To do this, multiply the voltages on the ordinate by the voltage curve factor for the style chosen, and multiply the currents on the abscissa by the current curve factor. For a type 233BNR4- varistor, for example, the 10.0 volt, 4.0 milliampere point on the chart would be read as 50.0 volts, 1.0 milliamperes.

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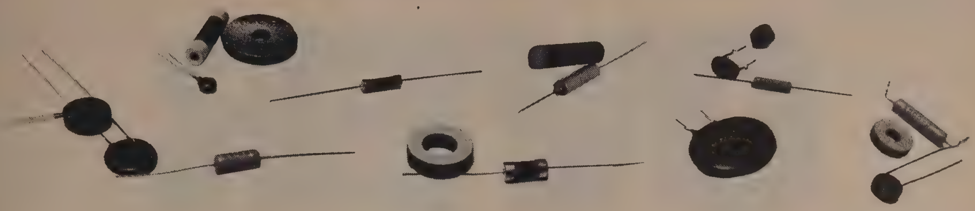
CARBORUNDUM® VARISTORS



Carborundum silicon carbide varistors are voltage-dependent resistors which are offered in a wide variety of configurations, including discs, rods, and washers. In addition to the sizes shown on these pages, rods are available up to 18 inches in length, washers are available up to 3½ inches in diameter. Typical uses include limitation of peak discharges, spike suppression, stabilization of voltages, and generation of nonlinear functions.

Varistors are specified by the voltage measured across them, suitably toleranced, at some constant current. The slope of the voltage-current characteristic is most often given by the maximum voltage ratio for two specified currents.

In general the characteristic for a varistor may be approximated by the equation:

$$i = Ke^n$$

where i and e are instantaneous current and voltage respectively, K is a proportionality constant, and n is an exponent applicable in the range in which the varistor is used: most often it is between 3 and 5.

The silicon carbide varistor is a "forgiving" component. When hit by a voltage surge, the energy is absorbed throughout its body, not at a junction. A voltage surge beyond the design level causes substantial increase in current and energy absorption, but not a catastrophic failure.

SMALL DISC VARISTORS

Carborundum Part Number	Volts ±10% @ 1.0 ma.	Volts @ 1.0 ma. ÷ Volts @ 0.1 ma. (maximum)
432BNR2-406*	6.8	2.70
432BNR2-407	8.2	2.60
432BNR2-408*	10.0	2.50
432BNR2-409	12.0	2.35
432BNR2-410	15.0	2.20
432BNR2-411	18.0	2.10
432BNR2-412	22.0	2.00
432BNR2-413	27.0	1.90
432BNR2-414	33.0	1.84
432BNR2-416	47.0	1.80
432BNR2-418	68.0	1.76
432BNR2-420	100.0	1.72
379BNR2-410*	15.0	2.50
379BNR2-412*	22.0	2.40
379BNR2-414*	33.0	2.30
379BNR2-415	39.0	2.20
379BNR2-416*	47.0	2.10
379BNR2-417	56.0	2.00
379BNR2-418*	68.0	1.95
379BNR2-419	82.0	1.90
379BNR2-420*	100.0	1.84
379BNR2-421	120.0	1.78
379BNR2-422*	150.0	1.74
379BNR2-423	180.0	1.70
328BNR2-400	2.2	3.60
328BNR2-401	2.7	3.40
328BNR2-402*	3.3	3.20
328BNR2-403	3.9	3.00
328BNR2-404*	4.7	2.80
328BNR2-405	5.6	2.60
328BNR2-406	6.8	2.50
328BNR2-407	8.2	2.40
328BNR2-408	10.0	2.30
328BNR2-409	12.0	2.20
328BNR2-410	15.0	2.10
328BNR2-411	18.0	2.00
328BNR2-412	22.0	1.95
328BNR2-413	27.0	1.90
328BNR2-414	33.0	1.85
328BNR2-416	47.0	1.76

Varistors marked with an asterisk (*) are carried by Carborundum distributors.

LARGE DISC VARISTORS

Carborundum Part Number	Volts ±10% @ 5.0 ma.	Volts @ 5.0 ma. ÷ Volts @ 0.5 ma. (maximum)
463BNR2-410	15.0	2.40
463BNR2-412	22.0	2.20
463BNR2-414	33.0	2.10
463BNR2-415	39.0	2.02
463BNR2-416	47.0	1.98
463BNR2-417	56.0	1.94
463BNR2-418*	68.0	1.90
463BNR2-419	82.0	1.86
463BNR2-420*	100.0	1.82
463BNR2-421	120.0	1.78
463BNR2-422*	150.0	1.74
463BNR2-423	180.0	1.70
927BNR2-408*	10.0	2.90
927BNR2-409	12.0	2.80
927BNR2-410*	15.0	2.70
927BNR2-411	18.0	2.60
927BNR2-412*	22.0	2.50
927BNR2-413	27.0	2.40
927BNR2-414*	33.0	2.30
927BNR2-416*	47.0	2.20

ROD VARISTORS

Carborundum Part Number	Volts ±10% @ 1.0 ma.	Volts @ 1.0 ma. ÷ Volts @ 0.1 ma. (maximum)
233BNR4-417	56.0	2.50
233BNR4-418*	68.0	2.40
233BNR4-419	82.0	2.30
233BNR4-420*	100.0	2.20
233BNR4-421	120.0	2.10
233BNR4-422*	150.0	2.00
233BNR4-423	180.0	1.90
233BNR4-424*	220.0	1.82
233BNR4-425	270.0	1.78
233BNR4-426*	330.0	1.76
233BNR4-428	470.0	1.74
233BNR4-430	680.0	1.70
234BNR4-426	330.0	2.00
234BNR4-427	390.0	1.90
234BNR4-428*	470.0	1.80
234BNR4-429	560.0	1.77
234BNR4-430*	680.0	1.74
234BNR4-431	820.0	1.70
234BNR4-432*	1000.0	1.68

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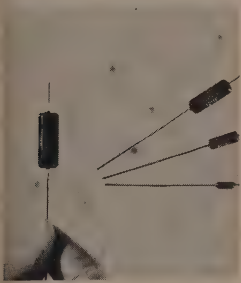
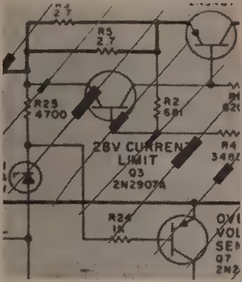
Resistors





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See Section 1500, Page 2-105 for Corning Glass, Ceramic, and Tantalum Capacitors.

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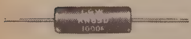
CORNING
ELECTRONICS

CORNING GLASS WORKS
Corning, New York 14830

Metal Film Resistors

	Military Type	Corning Type	Military (Commercial) Wattage Rating 70°C	125°C	Voltage Rating	Resistance Range	Standard Tol. (±)	Temperature Coefficient	Dimensions—Inches (Millimeters) Body Length	Body Diameter	Lead Diameter
MIL-R-10509 PRECISION 	RN55E	[NE55]	(¼)	1/10 (⅛)	200	49.9Ω-1 Meg	.1, .25, .5, 1%	± 25PPM/°C	.245 ±.020 (6.1 ±.51)	.088 ±.010 (2.24 ±.25)	.025 (.63)
	RN60E	[NE60]	(½)	⅛ (¼)	250	49.9Ω-1 Meg	.1, .25, .5, 1%	± 25PPM/°C	.375 $^{+.025}_{-.055}$ (9.5 $^{+.63}_{-1.4}$)	.135 ±.020 (3.4 ±.51)	.025 (.63)
	RN65E	[NE65]	(1)	¼ (½)	300	49.9Ω-1 Meg	.1, .25, .5, 1%	± 25PPM/°C	.575 $^{+.030}_{-.040}$ (14.6 $^{+.76}_{-1.3}$)	.185 $^{+.015}_{-.025}$ (4.70 $^{+.38}_{-.63}$)	.025 (.63)
MIL-R-10509 PRECISION 	RN55C	[NC55]	(¼)	1/10 (⅛)	200	49.9Ω-1 Meg	.1, .25, .5, 1%	± 50PPM/°C	.245 ±.020 (6.1 ±.51)	.088 ±.010 (2.24 ±.25)	.025 (.63)
	RN60C	[NC60]	(½)	⅛ (¼)	250	49.9Ω-1 Meg	.1, .25, .5, 1%	± 50PPM/°C	.375 $^{+.025}_{-.055}$ (9.5 $^{+.63}_{-1.4}$)	.135 ±.020 (3.4 ±.51)	.025 (.63)
	RN65C	[NC65]	(1)	¼ (½)	300	49.9Ω-1 Meg	.1, .25, .5, 1%	± 50PPM/°C	.575 $^{+.030}_{-.040}$ (14.6 $^{+.76}_{-1.3}$)	.185 $^{+.015}_{-.025}$ (4.70 $^{+.38}_{-.63}$)	.025 (.63)
MIL-R-10509 PRECISION	RN50C	[NC3]	1/10	1/20	200	49.9Ω-100K	1%	±50 ppm/°C	.145 ±.015 (3.68 ±.38	.062 ±.004 (1.57 ±.10)	016 (.41)
	RN55C	[NC4]	⅛	1/10	200	49.9Ω-150K 10Ω-301K	½% 1%	±50 ppm/°C	.225 ±.020 (5.71 ±.51)	.090 ±.008 (2.29 ±.20)	.025 (.63)
	RN60C	[NC5]	¼	⅛	250	49.9Ω-499K 49.9Ω-1 Meg	½% 1%	±50 ppm/°C	.355 ±.020 (9.02 ±.51)	.148 $^{+.000}_{-.023}$ (3.76 $^{+.000}_{-.58}$)	.025 (.63)
	RN65C	[NC6]	½	¼	300	49.9Ω-1 Meg 49.9Ω-1 Meg	½% 1%	±50PPM/°C	.554 ±.021 (14.07 ±.53)	.190 $^{+.010}_{-.015}$ (4.83 $^{+.25}_{-.38}$)	.025 (.63)
	RN70C	[NC7]	¾	½	350	51.1Ω-1 Meg	½%, 1%	±50 ppm/°C	.719 ±.031 (18.26 ±.79)	.248 ±.015 (6.30 ±.38)	.032 (.81)
MIL-R-10509 PRECISION	RN55D	[NA55]	⅛ (¼)	1/10 (⅛)	200	49.9Ω-150K 10Ω-301K	½% 1%	±100PPM/°C	.225 ±.020 (5.71 ±.51)	.090 ±.008 (2.29 ±.20)	.025 (.63)
	RN60D	[NA60]	¼ (½)	⅛ (¼)	300	49.9Ω-499K 10Ω-1 Meg	½% 1%	±100PPM/°C	.355 ±.020 (9.02 ±.51)	.148 $^{+.000}_{-.023}$ (3.76 $^{+.000}_{-.58}$)	.025 (.63)
	RN65D	[NA65]	½	¼	350	49.9Ω-1 Meg 10Ω-2 Meg	½% 1%	±100PPM/°C	.554 ±.021 (14.07 ±.53)	.190 $^{+.010}_{-.015}$ (4.83 $^{+.25}_{-.38}$)	.025 (.63)
	RN70D	[NA70]	¾	½	500	51.1Ω-1 Meg	½%, 1%	±100PPM/°C	.719 ±.031 (18.26 ±.79)	.248 ±.015 (6.30 ±.38)	.032 (.81)
ESTABLISHED RELIABILITY MIL-R-55182 PRECISION	RNC55H/K	(HH4/ HK4)		1/10	200	49.9Ω-100K	1%	±50/ PPM/°C ±100PPM/°C	.225 ±.020 (5.71 ±.51)	.090 ±.008 (2.29 ±.20)	.025 (.63)
	RNC60H/K	(HH5/ HK5)		⅛	250	49.9Ω-499K	½% 1%	±50/ PPM/°C ±100PPM/°C	.355 ±.020 (9.02 ±.51)	.148 $^{+.000}_{-.023}$ (3.76 $^{+.58}_{-.81}$)	.025 (.63)
ESTABLISHED RELIABILITY MIL-R-39017 SEMI-PRECISION	RLR05C	[HC3]	⅛	-	200	10Ω-150K	2, 5%	±100PPM/°C	.145 ±.015 (3.68 ±.38)	.062 ±.004 (1.57 ±.10)	.016 (.41)
	RLR07C	[HC4]	¼	-	250	10Ω-300K	2, 5%	±100PPM/°C	.225 ±.020 (5.71 ±.51)	.090 ±.008 (2.29 ±.20)	.025 (.63)
	RLR20C	[HC5]	½	-	350	10Ω-1 Meg	2, 5%	±100PPM/°C	.355 ±.020 (9.02 ±.51)	.148 $^{+.000}_{-.023}$ (3.76 $^{+.000}_{-.58}$)	.032 (.81)
	RLR32C	[HC6]	1	-	500	10Ω-1 Meg	2, 5%	±100PPM/°C	.554 $^{+.026}_{-.021}$ (14.07 $^{+.66}_{-.53}$)	.190 $^{+.010}_{-.015}$ (4.83 $^{+.25}_{-.38}$)	.040 (1.02)

CORNING
ELECTRONICS
CORNING GLASS WORKS
Corning, New York 14830

METAL FILM RESISTORS

MIL-R-22684 SEMI-PRECISION

Military Type	Corning Type	Military (Commercial) Wattage Rating 70°C	125°C	Voltage Rating	Resistance Range	Standard Tol. (±)	Temperature Coefficient	Dimensions—Inches (Millimeters) Body Length	Body Diameter	Lead Diameter
-	[C3]	(⅛)	(1/10)	200	10Ω-150K	1, 2, 5%	±100PPM/°C	145 ±.015 (3.68 ±.38)	.062 ±.004 (1.57 ±.10)	.016* (.41)
RL07S	[C4]	¼	(⅛)	250	10Ω-301K	1, 2, 5%	±100PPM/°C	.225 ±.020 (5.71 ±.51)	.090 ±.008 (2.29 ±.20)	.025 (.63)
RL20S	[C5]	½	(¼)	350	10Ω-1 Meg	1, 2, 5%	±100PPM/°C	.355 ±.020 (9.02 ±.51)	$.148^{+.000}_{-.023}$ $(3.76^{+.000}_{-.58})$	.032 (.81)
RL32S	[C6]	1	(½)	500	10Ω-2 Meg	1, 2, 5%	±100PPM/°C	.554 ±.021 (14.07 ±.53)	$.190^{+.010}_{-.015}$ $(4.83^{+.25}_{-.38})$	.040 (1.02)

GENERAL PURPOSE

Military Type	Corning Type	Military (Commercial) Wattage Rating 70°C	125°C	Voltage Rating	Resistance Range	Standard Tol. (±)	Temperature Coefficient	Dimensions—Inches (Millimeters) Body Length	Body Diameter	Lead Diameter
-	[C05]	(⅛)	-	200	10Ω-150K	2, 5, 10%	±200PPM/°C	.145 ±.015 (.3.68 ±.38)	.062 ±.004 (1.57 ±.10)	.016 (.41)
RL07S	[C07]	¼		250	10Ω-301K	2, 5, 10%	±200PPM/°C	.225 ±.020 (5.71 ±.51)	.090 ±.008 (2.29 ±.20)	.025 (.63)
RL20S	[CS20]	½		350	10Ω-470K	2, 5, 10%	±200PPM/°C	.355 ±.020 (9.02 ±.51)	$.148^{+.000}_{-.023}$ $(3.76^{+.000}_{-.58})$	.032 (.81)
RL32S	[FP32]	1	-	500	10Ω-1 Meg	2, 5, 10%	±200PPM/°C	.560 ±.030 (14.27 ±.79)	$.190^{+.010}_{-.015}$ $(4.83^{+.25}_{-.38})$	.040 (1.02)
RL42S	[FP42]	2	-	500	10Ω-1.5 Meg	2, 5, 10%	±200PPM/ΩC	.687 ±.031 (17.45 ±.79)	.315 ±.010 (8.00 ±.25)	.045** (1.14)

* .020 Also available ** .032 Also available

COMMERCIAL FLAMEPROOF

Corning Type	Wattage Rating 25°C	40°C	70°C	Voltage Rating	Resistance Range	Standard Tol. (±)	Temperature Coefficient	Dimensions—Inches (Millimeters) Body Length	Body Diameter	Lead Diameter
FP55			¼W	250	10Ω-301K	1, 2, 5, 10%	±100PPM/°C	.380 Max* (9.65 Max)	.088 ±.008 (2.24 ±.20)	.025 (.63)
FP60			½W	350	10Ω-1 Meg	1%	±100PPM/°C	.360 ±.020 (9.14 ±.51)	.148" Max (3.76 Max)	.025 (.63)
FP1/2			½W	350	10Ω-1 Meg	1, 2, 5, 10%	±150PPM/°C	.360 ±.020 (9.14 ±.51)	$.138^{+.012}_{-.023}$ $(3.51^{+.30}_{-.58})$	.032 (.81)
FP1			1W	500	10Ω-1 Meg	1, 2, 5, 10%	±150PPM/°C	.560 ±.031 (14.22 ±.79)	$.190^{+.010}_{-.015}$ $(4.83^{+.025}_{-.38})$	.032** (.81)
FP2	3½	3	2	500	9Ω-1.5 Meg	1, 2, 5, 10%	±200PPM/°C	.687 ±.031 (17.45 ±.79)	.315 ±.010 (8.00 ±.25)	.032*** (.81)
FP3	4	4	3	500	9Ω-125K	1, 2, 5, 10%	±200PPM/°C	.900 ±.055 (22.86 ±1.40)	.315 ±.010 (8.00 ±.25)	.032 (.81)
FP4	5½	5	4	500	16Ω-125K	1, 2, 5, 10%	±200PPM/°C	1.530 ±.035 (38.86 ±.89)	.315 ±.010 (8.00 ±.25)	.032 (.81)
FP5	6½	6	5	600	19Ω-125K	1, 2, 5, 10%	±200PPM/°C	1.710 ±.035 (43.43 ±.89)	.315 ±.010 (8.00 ±.25)	.032 (.81)
FP7	7½	-	7	700	24Ω-125K	1, 2, 5, 10%	±200PPM/°C	2.040 ±.035 (51.82 ±.89)	.315 ±.010 (8.00 ±.25)	.032 (.81)
FP10	-	10	-	700	24Ω-125K	1, 2, 5, 10%	±200PPM/°C	2.040 ±.035 (51.82 ±.89)	.315 ±.010 (8.00 ±.25)	.032 (.81)

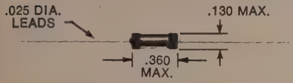
POWER FLAMEPROOF

Corning Type	Wattage Rating 25°C	40°C	70°C	Voltage Rating	Resistance Range	Standard Tol. (±)	Temperature Coefficient	Dimensions—Inches (Millimeters) Body Length	Body Diameter	Lead Diameter
FP67	5	-	-	500	5Ω-19K	1, 2, 5, 10%	±200 PPM/°C	.900 ±.055 (22.86 ±1.40)	.315 ±.010 (8.00 ±.25)	.032 (.81)
FP69	3	-	-	350	2.6Ω-1 Meg	1, 2, 5, 10%	±200PPM/°C	.516 ±.021 (13.11 ±.53)	.225 ±.012 (5.71 ±.30)	.032 (.81)

* Clean Lead to Clean Lead **Available .040" lead *** Available .045° lead

Special Products

TSR—Temperature Sensitive Resistor



A two terminal component that increases resistance linearly with temperature, the TSR is ideal for sensing, compensation, and control applications where temperature is the independent variable. In addition to its linearity and fast thermal response time, the TSR is ideally suited for high volume usage because of its low cost and specified part-to-part interchangeability.

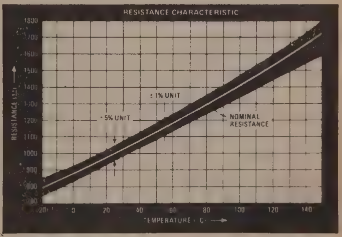
Specific applications for the TSR include:

- Temperature input for system control applications
- Temperature compensation for circuits or components subjected to wide ambient changes
- Electronic temperature indication
- Fluid level detection (using devices self-heating characteristics)
- Rate of rise detection

Construction—Nickel film on glass substrate, polymide-coated for environmental protection.

PERFORMANCE CHARACTERISTICS

Operating Temperature Range −55°C to +250°C
Resistance 1000Ω @ 25°C
Resistance Tolerance
±1% or ±5% @ 25°C
Temperature Coefficient of Resistance
+5900 ppm/°C



Part-to-Part Resistance Interchangeability

Note: Interchangeabilities are specified from −20° C to +150°C. However, the trends shown on the above graphs can typically be extrapolated over the full operating temperature range of −55°C to +250° C.

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Oak Park 48237
Tel: 313-548-0250

RS Electronics
12775 Lyndon Street
Detroit 48227
Tel: 313-491-1000

Stotts-Friedman
2035 Eastern, S.E.
Grand Rapids 49507
Tel: 616-241-6731

Wedemeyer Electronic Supply
2280 S. Industrial Highway
Ann Arbor 48107
Tel: 313-665-8611

MINNESOTA

Stark Electronics
112 3rd Avenue, N.
Minneapolis 55401
Tel: 612-332-1325

Gopher Electronics Company
2520 West Larpenteur
St. Paul 55113
Tel: 612-645-0241

MISSOURI

Burstein-Applebee Company
3199 Mercier Street
Kansas City 64106
Tele: 816-531-5614

Lectronix, Inc.
306 McDonough Street
St. Charles 63301 (Rear)
Tel: 314-946-6424

Radiolab, Inc.
3814 Main
Kansas City 64111
Tel: 816-561-9935

NEW JERSEY

Allen & Hurley
23 S. Warren Street
Trenton 08608
Tel: 609-393-3300

Garden State Industrial Electronics, Inc.
407 Hope Avenue
Roselle 07203
Tel: 201-241-9000

Wilshire Electronics
312 Clifton Avenue
Clifton 07015
Tel: 201-365-2600

Federated Purchaser
155 U.S. Route 22
Springfield 07081
Tel: 201-376-8900

Newark Electronics Center
303 Monroe Avenue
Kenilworth 07033
Tel: 201-272-8410

Terminal Electronics
1463 Pinewood Street
Rahway Industrial Center
Rahway 07065
Tel: 201-381-5700

NEW MEXICO

Kierulff Electronics Co.
2524 Baylor Drive, S.E.
Albuquerque 87116
Tel: 505-247-1058

Sterling Electronics, Inc.
3530 Pan American
Freeway, N.E.
Albuquerque 87107
Tel: 505-345-6601

NEW YORK

Arrow Electronics, Inc.
900 Broad Hollow Road
Route 110, Farmingdale,
Long Island 11735
Tel: 516-694-6800

Fairmont Electronics
35 South Service Road
Plainview 11803
Tel: 516-694-8200

Hallmark Electronics
215 Oser Avenue
Hauppauge 11787
Tel: 516-273-0030

Harrison Radio Corp.
20 Smith Street,
E. Farmingdale,
Long Island 11735
Tel: 516-293-7990

Higgins & Sheer
123 Dutchess Turnpike
Poughkeepsie 12603
Tel: 914-471-3510

Midway Industrial Electronics, Inc.
24 Maple Avenue
Rockville Centre 11571
Tel: 516-764-2400
TWX: 510-225-3661

Radio Equipment Corp.
196 Vulcan Street
Buffalo 14207
Tel: 716-874-2690

Rome Electronics
216 Erie Blvd., East
Rome 13440
Tel: 315-337-5400

Simcona Electronics Corp.
275 Mt. Read Blvd.
Rochester 14611
Tel: 716-328-3230

Stack Industrial Electronics
45 Washington Avenue
Binghamton 13902
Tel: 607-723-6326

Summit Dist., Inc.
916 Main
Buffalo 14202
Tel: 716-884-3450

Valley Industrial Electronics, Inc.
Commercial Drive
Yorkville 13495
Tel: 315-736-3393

Wilshire Electronics
617 Main Street
Johnson City 13790
Tel: 607-797-1236

NORTH CAROLINA

Brownell-Electro
5141 Bellhaven Blvd.
Charlotte 28214
Tel: 704-394-4341

Kirkman Electronics, Inc.
901 West Second St.
Winston-Salem 27102
Tel: 919-724-0541

OHIO

Hughes-Peters, Inc.
4865 Duck Creek Road
Cincinnati 45227
Tel: 513-351-2000

Hughes-Peters, Inc.
481 East 11th Avenue
Columbus 43211
Tel: 614-294-5351

Lima Radio
150 W. Grand Avenue
Lima 45802
Tel: 419-228-1220

NASCO, Inc.
3203 Plainfield Road
Dayton 45432
Tel: 513-253-8843

Pioneer/Dayton
1900 Troy Street
Dayton 45404
Tel: 513-236-9900

Pioneer Standard Electronics
4800 E. 131st Street
Cleveland 44105
Tel: 216-587-3600

W. M. Pattison Supply Co.
4550 Willow Parkway
Cleveland 44125
Tel: 216-441-3000

Plaintronics Co.
P.O. Box 2265
3100 Plainfield Rd.
Kettering 45429
Tel: 513-253-9176

Winteradio Electronics Supply Corp.
1468 West 25th Street
Cleveland 44113
Tel: 216-621-9383

OKLAHOMA

Oil Capitol Electronics
708 S. Sheridan, Box GG
Tulsa 74115
Tel: 918-836-2541

Radio, Inc.
1000 South Main
Tulsa 74119
Tel: 918-587-9123

OREGON

Almac-Stroum Electronics
P.O. Box 25444
Portland 97201
Tel: 503-292-3534
TWX: 910-464-6105

PENNSYLVANIA

Cameradio Company
2801 Liberty Avenue
Pittsburgh 15222
Tel: 412-288-2600

Herbach & Rademan, Inc.
401 E. Erie Avenue
Philadelphia 19134
Tel: 215-426-1700

RPC Electronics
620 Alpha Drive
Pittsburgh 15238
Tel: 412-782-3770

RHODE ISLAND

William Dandreta & Co.
28 Wolcott Street
Providence 02908
Tel: 401-861-2800

TENNESSEE

Electra Distributing Co.
1914 West End Avenue
Nashville 37203
Tel: 615-329-3971

TEXAS

Lenert Company
P.O. Box 2184
1420 Hutchins
Houston 77001
Tel: 713-225-1465

Sterling Electronics
P.O. Box 1229
Houston 77001
Tel: 713-623-6600

McNichols, Inc.
3012 East Yandell Drive
El Paso 79903
Tel: 915-566-2936

Sterling Electronics, Inc.
P.O. Box 20129
2875 Merrell Road
Dallas 75220
Tel: 214-357-9131

Textronics Company
1108 E. Lancaster
Fort Worth 76102
Tel: 817-335-8111
TWX: 910-893-4099

VIRGINIA

I.T.R.
1425 Blue Jay Lane
Richmond 23229
Tel: 804-288-7198
804-285-3931

WASHINGTON

Hamilton/Avnet Corporation
13407 Northrup Way
Bellevue 98005
Tel: 206-624-5930

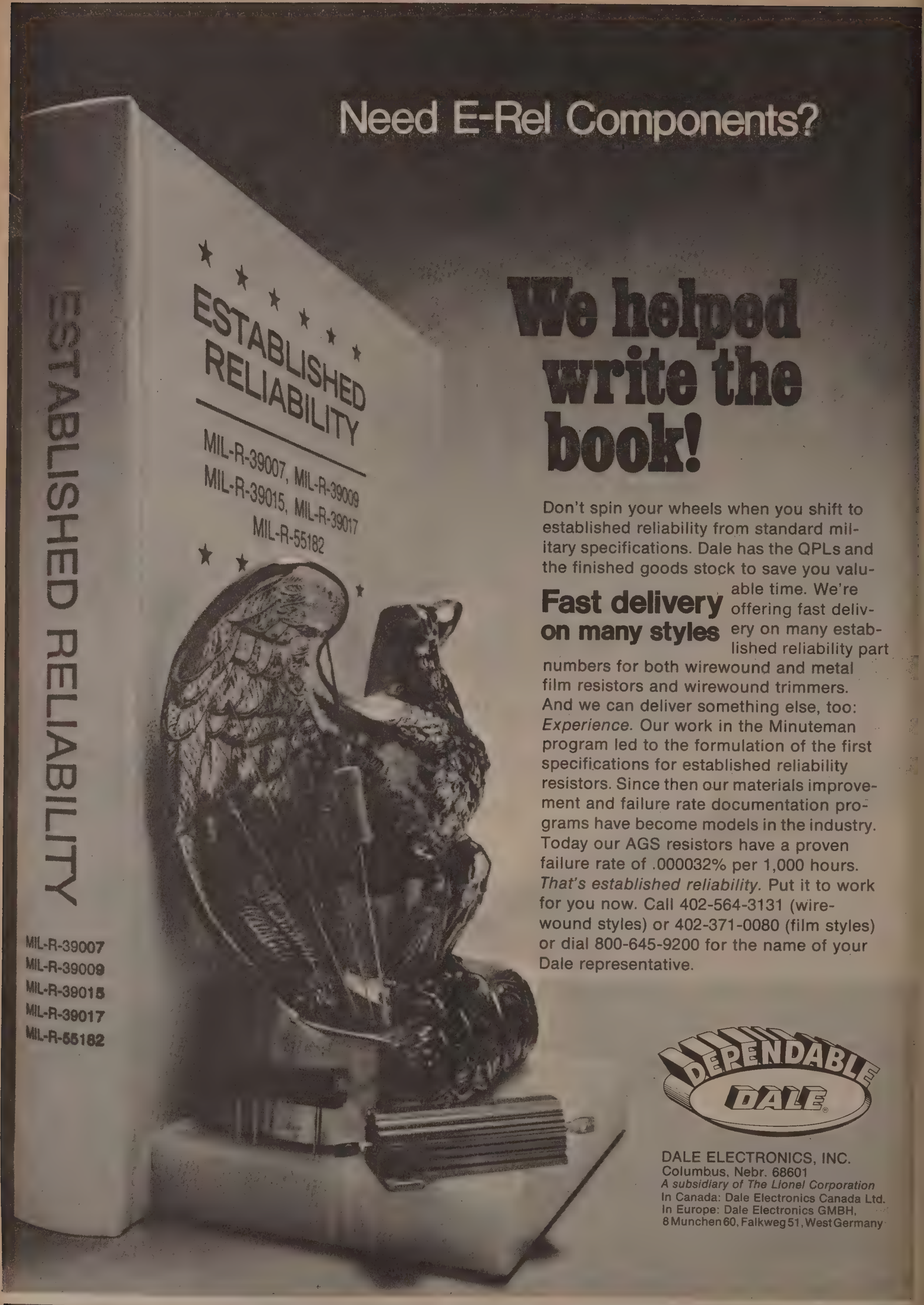
Radar Electric Co., Inc.
168 Western Avenue, West
Seattle 98119
Tel: 206-282-2511

Almac-Stroum Electronics
5811 Sixth Avenue, S.
Seattle 98108
Tel: 206-763-2300
TWX: 910-444-2067

WEST VIRGINIA

McJunkin Corporation
P.O. Box 513
Charleston 25322
Tel: 304-348-5211

For additional information, phone 402—564-3131 or write Dept. 860, Dale Electronics, Inc., Box 609, Columbus, Nebr. 68601.


ESTABLISHED RELIABILITY
MIL-R-39007, MIL-R-39009
MIL-R-39015, MIL-R-39017
MIL-R-55182
ESTABLISHED RELIABILITY
MIL-R-39007
MIL-R-39009
MIL-R-39015
MIL-R-39017
MIL-R-55182

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We helped write the book!

Don't spin your wheels when you shift to established reliability from standard military specifications. Dale has the QPLs and the finished goods stock to save you valuable time.

Fast delivery on many styles

We're offering fast delivery on many established reliability part numbers for both wirewound and metal film resistors and wirewound trimmers. And we can deliver something else, too: *Experience.* Our work in the Minuteman program led to the formulation of the first specifications for established reliability resistors. Since then our materials improvement and failure rate documentation programs have become models in the industry. Today our AGS resistors have a proven failure rate of .000032% per 1,000 hours. *That's established reliability.* Put it to work for you now. Call 402-564-3131 (wirewound styles) or 402-371-0080 (film styles) or dial 800-645-9200 for the name of your Dale representative.

DEPENDABLE DALE®

DALE ELECTRONICS, INC.
Columbus, Nebr. 68601
A subsidiary of The Lionel Corporation
In Canada: Dale Electronics Canada Ltd.
In Europe: Dale Electronics GMBH,
8 Munchen 60, Falkweg 51, West Germany

DALE®

WIREWOUND RESISTORS

APPLICABLE MIL. ENVIRONMENTAL SPECIFICATIONS

■ MIL-R-26

TYPES RS, G, RLS & GL

TEST	MIL-R-26E REQUIREMENT	DALE MAXIMUM RS, G, RLS & GL*
Load Life	± (.5%+.05Ω) ΔR	± (.5%+.05Ω) ΔR
Moisture Resistance	± (.2%+.05Ω) ΔR	± (.2%+.05Ω) ΔR
Temp. Coefficient	30-90 PPM/°C Max.	*See tables
Thermal Shock	± (.2%+.05Ω) ΔR	± (.2%+.05Ω) ΔR
Short Time Overload	± (.2%+.05Ω) ΔR	± (.2%+.05Ω) ΔR
Dielectric	± (.1%+.05Ω) ΔR	± (.1%+.05Ω) ΔR
Low Temp. Storage	± (.2%+.05Ω) ΔR	± (.2%+.05Ω) ΔR
High Temp. Exposure	± (.5%+.05Ω) ΔR	± (.5%+.05Ω) ΔR
Shock	± (.1%+.05Ω) ΔR	± (.1%+.05Ω) ΔR
Vibration	± (.1%+.05Ω) ΔR	± (.1%+.05Ω) ΔR
Terminal Strength	± (.1%+.05Ω) ΔR	± (.1%+.05Ω) ΔR

All ΔR figures shown are maximum, based on units with an initial tolerance of 1% and maximum operating temperature of 275°C.

*GL & RLS physical configurations are not covered in MIL-R-26. Environmental specifications will be same as for RS & G styles.

TYPES CW, HL, NHL, HLM, HLA, HLT & HLW

TEST	MIL-R-26E REQUIREMENT	DALE TYPICAL* HL Tubular & Flat	DALE TYPICAL CW
Load Life	± (3%+.05Ω) ΔR	± (2%+.05Ω) ΔR	± (0.5%+.05Ω) ΔR
Moisture Resistance	± (2%+.05Ω) ΔR	± (0.5%+.05Ω) ΔR	± (0.5%+.05Ω) ΔR
Temp. Coefficient	260-400 PPM/°C	±50 PPM/°C except on low values	±50 PPM/°C except on low values
Thermal Shock	± (2%+.05Ω) ΔR	± (0.5%+.05Ω) ΔR	± (0.2%+.05Ω) ΔR
Short Time Overload	± (2%+.05Ω) ΔR	± (0.5%+.05Ω) ΔR	± (0.2%+.05Ω) ΔR
Dielectric	± (0.1%+.05Ω)	± (0.1%+.05Ω) ΔR	± (0.1%+.05Ω) ΔR
Low Temp. Storage	± (2%+.05Ω) ΔR	± (0.2%+.05Ω) ΔR	± (0.2%+.05Ω) ΔR
High Temp. Exposure	± (2%+.05Ω) ΔR	± (1%+.05Ω) ΔR	± (1%+.05Ω) ΔR
Shock	± (0.2%+.05Ω) ΔR	N/A	± (0.1%+.05Ω) ΔR
Vibration	± (0.2%+.05Ω) ΔR	N/A	± (0.1%+.05Ω) ΔR
Terminal Strength	± (1%+.05Ω) ΔR	± (0.1%+.05Ω) ΔR	± (0.1%+.05Ω) Δ R

ΔR figures shown are based on units with an initial tolerance of 5% and maximum operating temperature of 350°C.

*NHL, HLM, HLA and HLW physical configurations are not covered in MIL-R-26. However, environmental specifications will be same as for HL tubular and HL flat styles.

■ MIL-R-18546

TYPES RH, HG & PH

TEST	MIL-R-18546	DALE TYPICAL RH, HG & PH*
Load Life	±(1%+.05Ω)ΔR	±(.5%+.05Ω)ΔR
Moisture Resistance	±(1%+.05Ω)ΔR	±(.5%+.05Ω)ΔR
Resistance Temperature Characteristic	±50 PPM to 2000Ω ±30 PPM over 2000Ω	See tables
Thermal Shock	±(.5%+.05Ω)ΔR	±(.25%+.05Ω)ΔR
Momentary Overload	±(.5%+.05Ω)ΔR	±(.25%+.05Ω)ΔR
Dielectric	±(.2%+.05Ω)ΔR	±(.1%+.05Ω)ΔR
High Temp. Storage	±(.5%+.05Ω)ΔR	±(.25%+.05Ω)ΔR
Shock	±(.2%+.05Ω)ΔR	±(.1%+.05Ω)ΔR
Vibration	±(.2%+.05Ω)ΔR	±(.1%+.05Ω)ΔR
Terminal Strength	±(.2%+.05Ω)ΔR	±(.1%+.05Ω)ΔR

All ΔR figures shown are based on units with an initial tolerance of 1% and maximum operating temperatures of 275° C.

*PH physical configuration is not covered in MIL-R-18546. However, environmental specifications will be same as for RH & HG styles.

■ MIL-R-93

TYPES WWA, MWA & WWP

TEST	MIL-R-93 REQUIREMENT	DALE MAXIMUM	DALE TYPICAL
Moisture	±(.1%+.05Ω)	±(.05%+.05Ω)ΔR	±.02%ΔR
T.C. (10 ohms and over)	± 20 ppm/°C	±20 ppm/°C	±15 ppm/°C
Short Time Overload	±(.1%+.05Ω)	±(.05%+.05Ω)ΔR	±.01% ΔR
Dielectric	±(.05%+.05Ω)	±(.02%+.05Ω)ΔR	±.00%ΔR
Low Temp. Storage	±(.2%+.05Ω)	±(.05%+.05Ω)ΔR	±.02%ΔR
High Temp. Exposure	±(.5%+.05Ω)	±(.10%+.05Ω)ΔR	±.04%ΔR
Low Temp. Operation	±(.25%+.05 Ω)	±(.05%+.05Ω)ΔR	±.02% ΔR
Temperature Cycling	±(.2%+.05Ω)	±(.15%+.05 Ω) ΔR	±.07% ΔR
Terminal Strength	±(.05%+.05Ω)	±(.01%+.05Ω)ΔR	±.00%ΔR
Salt Water	±(.25+.05Ω)	±(.15%+.05Ω) ΔR	±.03%ΔR
Life	±(.5%+.05Ω)	±(.25%+.05Ω)ΔR	±.09%ΔR
Shock	±(.1%+.05Ω)	±(.02%+.05Ω)ΔR	±.00%ΔR
Vibration	±(.1%+.05Ω)	±(.03%+.05Ω)ΔR	±.01%ΔR

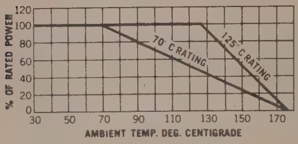
All ΔR figures shown are based on units with an initial tolerance of 1% and maximum operating temperature of 145°C.

DEPENDABLE DALE® RESISTORS

METAL FILM PRECISION RESISTORS, ESTABLISHED RELIABILITY

TYPE EMF

Failure Rate: Consult factory for current verified failure rate.



DERATING
Dale EMF resistors have an operating temperature range of −65° C to +175° C. They must be derated according to the curve above.

DALE TYPE	MIL. TYPE*	70° C RATING	125° C RATING	MAX. WT. (Grams)	MAX. WORKING VOLTAGE	RESISTANCE RANGE (OHMS) By T.C.**		
						T-1 (K)	T-2 (H)	T-9 (J)
EMF 50	RNR50	1/10 w	1/20 w	.11	200	49.9 to 100K	49.9 to 100K	49.9 to 100K
EMF 55	RNR55	1/8 w	1/10 w	.35	200	30.1 to 301K	49.9 to 200K	49.9 to 200K
EMF 60	RNR60	1/4 w	1/8 w	.45	250	24.9 to 1 Meg.	49.9 to 499K	49.9 to 499K
EMF 65	RNR65	1/2 w	1/4 w	.84	300	24.9 to 2 Meg.	49.9 to 1 Meg.	49.9 to 1 Meg.
EMF 70	RNR70	3/4 w	1/2 w	1.6	350	24.9 to 2.49 Meg.	24.9 to 1 Meg.	24.9 to 1 Meg.
EMF 75	–	–	1 w	4.4	500	24.9 to 4.07 Meg.	49.9 to 2.61 Meg.	49.9 to 2.61 Meg.

Standard Resistance Tolerances: .1% (B), .25%, .5% (D) and 1% (F).
*Available in corresponding RNC & RNN styles.
**Extended resistances above and below this range available as Non-MIL parts.

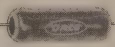
DIMENSIONS
See section on MF resistors. Dimensions on Types RNR50 thru RNR70 will conform to Types RN-50 thru RN-70.
Note: EMF 75 conforms to RN-75.

POWER RATING
Dale EMF power ratings are based on the following two conditions:

1. 0.5% maximum ΔR in 2000 hours load life.
2. 175° C maximum operating temperature.

WIREWOUND PRECISION RESISTORS, ESTABLISHED RELIABILITY

TYPE ARS*



Failure rate .000014% per 1000 hours at 50% rated power, 25°C ambient (60% confidence level). Failure defined as ΔR>0.5%.

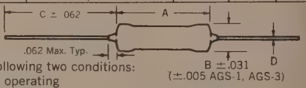
TYPE AGS*

Miniature version of ARS Series with BeO core for optimum thermal conductivity, operational stability and increased reliability. Significantly smaller size. Failure rate .000044% per 1000 hours at 50% rated power, 25°C ambient (60% confidence level). Failure defined as ΔR>0.5%.

*Available with solderable and weldable leads. AGS-1, AGS-3 have molded construction. Non-inductive styles available.

DALE TYPE	MIL-R-39007 TYPE	POWER RATING (watts)	MIN. RES. (ohms)	MAX. RES. (ohms)	MAX. WORKING VOLTAGE	MAX. WEIGHT (grams)	DIM. A	DIM. B	DIM. C	DIM. D
ARS-2	RWR-71	2	0.1	16.2K	180	1.6	.812±.062	.187	1.5	.032
ARS-5	RWR-74	5	0.1	12K	250	4.75	.875±.062	.312	2.0	.040
ARS-10	RWR-78	10	0.1	40K	650	12.00	1.780±.062	.375	2.0	.040
AGS-1	RWR-81	1	0.1	1.0K	25	.35	.276±.005	.100	1.5	.020
AGS-2	RWR-82	1.5	0.1	1.3K	32	.30	.312±.016	.078	1.5	.020
AGS-3	RWR-80	2.25	0.1	3.16K	52	.375	.426±.005	.120	1.5	.020
AGS-5	RWR-89	4	0.1	4.12K	112	1.25	.560±.062	.187	1.5	.032
AGS-10	RWR-84	7	0.1	12.4K	275	4.25	.875±.062	.312	2.0	.040

Tolerance: All established reliability resistors have a standard resistance tolerance of 1%.

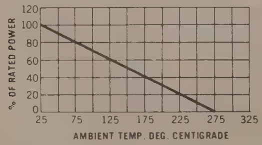


POWER RATING
Dale ARS and AGS power ratings are based on the following two conditions:

1. 0.5% maximum ΔR in 2000 hours load life.
2. 275°C maximum operating temperature.

TYPE ARH

Advanced design housed power wirewounds made on the same line and under the same high reliability standards as the ARS and AGS. Failure rate of .01% at 100% rated power.



DERATING
ARS, AGS, ARH
At high ambient temperatures, the derating curve above applies.

DALE TYPE	MIL-R-39009 TYPE	POWER RATING (watts)		RESISTANCE RANGES (ohms)		MAX. WORKING VOLTAGE	MAX. WT. GRAMS
		MTD.	FREE AIR	MIN.	MAX.		
ARH-5	RER-60	5	3	.1	4.12K	220	3
ARH-10	RER-65	10	6	.1	5.62K	340	8
ARH-25	RER-70	20	8	.1	12.1K	650	15
ARH-50	RER-75	30	10	1.0	39.2K	1400	32

Tolerance: All established reliability resistors have a standard resistance tolerance of 1%. Non-inductive versions also available.

DIMENSIONS: See section on RH resistors. Types ARH-5 thru 50 will correspond with RH-5 thru 50.

POWER RATING
Dale ARH resistor ratings are based on the following requirements:

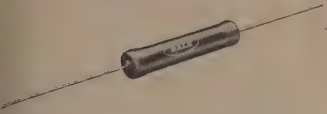
1. 275° maximum internal hotspot temperature
2. 1% maximum ΔR in 2000 hour load life
3. Proper heat sink
   4x6x2x.040 aluminum chassis = ARH-5 and ARH-10
   5x7x2x.040 aluminum chassis = ARH-25 and ARH-50

For additional information on Dale Resistors, write or call:
Box 609, Columbus, Nebraska 68601 • 402-564-3131 • **Wirewound Resistors**
Box 74, Norfolk, Nebraska 68701 • 402-371-0080 • **Film Resistors & Networks**

DEPENDABLE DALE® RESISTORS

WIREWOUND PRECISION RESISTORS, ESTABLISHED RELIABILITY

(M FAILURE RATE)



- **TYPE ESS** (Solderable Leads)
- **TYPE ESN*** (Solderable Leads, Non-Inductive)
- **TYPE ESW** (Weldable Leads)
- **TYPE EGS** (Solderable Leads)
- **TYPE EGN*** (Solderable Leads, Non-Inductive)
- **TYPE EGW** (Weldable Leads)

These styles meet the requirements of MIL-R-39007 Failure Rate Level M (1%/1000 hours). See ARS and AGS for lower failure rates.

POWER RATING

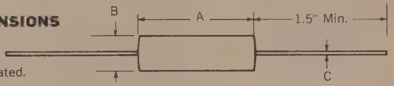
Power ratings are based on a maximum ΔR of .5% ±.05Ω when operated for 2,000 hours at rated power and at an ambient of +25°C.

DALE TYPE	MIL-R-39007 TYPE	POWER RATING (Watts)	RESISTANCE RANGE (Ohms)		MAX. WEIGHT (Grams)	DIMENSIONS		
			.1%	.5% & 1%		A	B	C
EGS-1*	RWR-81S	1	.499-1000	.1-1000	.21	.250	.078	.020
EGW-1*	RWR-81W	1	.499-1000	.1-1000	.21	.250	.078	.020
EGN-1*	RWR-81N	1	10-499	10-499	.21	.250	.078	.020
EGS-2*	RWR-82S	1.5	.499-1300	.1-1300	.23	.312	.078	.020
EGW-2*	RWR-82W	1.5	.499-1300	.1-1300	.23	.312	.078	.020
EGS-3*	RWR-80S	2	.499-2670	.1-2670	.34	.422	.110	.020
EGW-3*	RWR-80W	2	.499-2670	.1-2670	.34	.422	.110	.020
EGN-3*	RWR-80N	2	10-1330	10-1330	.34	.422	.110	.020
ESS-2B	RWR-89S	3	.499-4120	.1-4120	.70	.560	.187	.032
ESW-2B	RWR-89W	3	.499-4120	.1-4120	.70	.560	.187	.032
ESN-2B	RWR-89N	3	10-2050	10-2050	.70	.560	.187	.032
ESS-5	RWR-74S	5	.499-12,100	.1-12,100	4.2	.875	.312	.040
ESW-5	RWR-74W	5	.499-12,100	.1-12,100	4.2	.875	.312	.040
ESN-5	RWR-74N	5	10-6040	10-6040	4.2	.875	.312	.040
EGS-10	RWR-84S	7	.499-12,400	.1-12,400	3.6	.875	.312	.040
EGN-10	RWR-84N	7	10-6190	10-6190	3.6	.875	.312	.040
EGW-10	RWR-84W	7	.499-12,400	.1-12,400	3.6	.875	.312	.040
ESS-10	RWR-78S	10	.499-39,200	.1-39,200	9.0	1.780	.375	.040
ESW-10	RWR-78W	10	.499-39,200	.1-39,200	9.0	1.780	.375	.040
ESN-10	RWR-78N	10	10-19,600	10-19,600	9.0	1.780	.375	.040

Tolerance:
All established reliability resistors have a standard resistance tolerance of 1%.

*Molded models. Others conformal coated.

DIMENSIONS



- **TYPE ERH** (Inductive Winding)
- **TYPE ENH** (Non-inductive Winding)

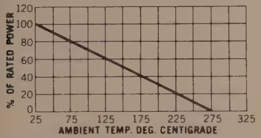
Meet the requirements of MIL-R-39009 Failure Rate Level M (1%/1000 hours). See ARH for lower failure rates.

POWER RATING

Dale ERH and ENH resistor ratings are based on the following requirements:

1. 275° C maximum internal hotspot temperature
2. 1% maximum ΔR in 2000 hour load life
3. Proper heat sink

4x6x2x.040 aluminum chassis = ERH-5 & ERH-10
5x7x2x.040 aluminum chassis = ERH-25 & ERH-50



DERATING

ESS, ESW, EGS, EGW, ERH, ENH
At high ambient temperatures, the derating curve above applies.

DALE TYPE	MIL-R-39009 TYPE	POWER RATING (Watts)		RESISTANCE RANGE (Ohms) 1%	MAX. WORKING VOLTAGE	MAX. WEIGHT (Grams)	STANDARD TEMPERATURE COEFFICIENT VALUE RANGES (Ohms)		
		DALE*	MIL				±50PPM	±30PPM	±20PPM
ENH-5	RER-40	7.5 (5)	5	1 to 1.65K	110	3.3	1 to 9.9	10 to 25	26 to 1.65K
ENH-10	RER-45	12.5 (10)	10	1 to 2.8K	190	8.8	1 to 9.9	10 to 40	41 to 2.8K
ENH-25	RER-50	25	20	1 to 6.04K	390	16.5	1 to 9.9	10 to 85	86 to 6.04K
ENH-50	RER-55	50	30	1 to 19.6K	890	35.0	1 to 9.9	10 to 235	236 to 19.6K
ERH-5	RER-60	7.5 (5)	5	0.10 to 3.32K	160	3	1 to 9.9	10 to 49	50 to 3.32K
ERH-10	RER-65	12.5 (10)	10	0.10 to 5.62K	265	6	1 to 9.9	10 to 79	80 to 5.62K
ERH-25	RER-70	25	20	0.10 to 12.1K	550	13	1 to 9.9	10 to 169	170 to 12.1K
ERH-50	RER-75	50	30	0.10 to 39.2K	1250	28	1 to 9.9	10 to 469	470 to 39.2K

Tolerance: All established reliability resistors have a standard resistance tolerance of 1%.

Figures in parentheses indicate wattage printed on these resistors. They can be rated at 7.5 and 12.5 watts respectively, but will be printed with these higher ratings only upon request.

DIMENSIONS

See section on RH resistors. Types ENH and ERH-5 thru 50 will correspond with RH-5 thru 50.

DOCUMENTATION

Qualification, acceptance and failure-rate maintenance test data is retained by Dale and is available upon request. Lot traceability and identification data is maintained by Dale for 5 years.

RELIABILITY PROGRAMS

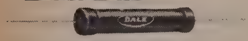
The established reliability series are the result of an extensive reliability program at Dale Electronics which includes basic design and materials improvement, special production and test facilities, and trained, reliability-oriented personnel. A separate program group has been set up to provide customer service on established reliability programs, and the facilities and know-how of the Dale established reliability organization can be directed toward the development of reliability programs for specific user requirements. Inquiries may be directed to your local Dale representative or to the factory.

DEPENDABLE DALE® RESISTORS

WIREWOUND PRECISION RESISTORS, SILICONE COATED OR MOLDED

(Available with Weldable Leads)

■ TYPE RS

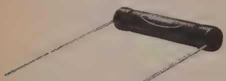


Meets applicable requirements of MIL-R-26E, MIL-R-26C and MIL-R-23379. Non-inductive (NS) styles available.

■ TYPE LVR

Combines extremely low resistance values with high power and low T.C. Molded body, axial leads.

■ TYPE RLS



Radial leads for printed circuit board mounting. Meets applicable requirements of MIL-R-26E. Non-inductive (NLS) styles available.

DALE TYPE	MIL-R-26 TYPE*	DALE RATING		RESISTANCE RANGE (Ohms)				MAX.** WORKING VOLTAGE		MAX. WT. GRAMS
		U .05% thru 5%	V 3% & 5%	.05%	.1%	.25%	.5%, 1%, 3%, 5%	U	V	
** RS-1/8	–	.25 W	–	–	–	–	1-950	8.5	–	.15
RS-1/4	–	.4W	–	1-950	.499-950	.499-3.4K	.1-3.4K	20	–	.21
RS-1/2	–	.75 W	–	1-1.3K	.499-1.3K	.499-4.9K	.1-4.9K	29	–	.23
RS-1A	RW-70	1.0 W	–	1-2.7K	.499-2.7K	.499-10.4K	.1-10.4K	52	–	.34
RS-1B	–	1.1 W	–	1-4.0K	.499-4K	.499-15K	.1-15K	62	–	.40
RS-2	–	4.0 W	5.5 W	.499-12.7K	.499-12.7K	.1-47.1K	.1-47.1K	210	250	2.1
RS-2A	–	3.25 W	4.75 W	.499-11.4K	.499-11.4K	.1-42.1K	.1-42.1K	185	220	.90
RS-2B	RW-79	3.0 W	3.75 W	.499-6.5K	.499-6.5K	.1-24.5K	.1-24.5K	140	157	.70
RS-2C	–	2.5 W	3.25 W	.499-8.6K	.499-8.6K	.1-32.3K	.1-32.3K	138	157	1.6
RS-2C-23	RW-69	2.5 W	3.25 W	.499-8.6K	.499-8.6K	.1-32.3K	.1-32.3K	138	157	1.6
RS-5	–	5.0 W	6.5 W	.499-25.7K	.499-25.7K	.1-95.2K	.1-95.2K	360	410	4.2
RS-5-69	RW-74	5.0 W	6.5 W	.499-24.5K	.499-24.5K	.1-91.0K	.1-91.0K	350	400	4.2
RS-5-70	RW-67	5.0 W	6.5 W	.499-25.7K	.499-25.7K	.1-95.2K	.1-95.2K	360	410	4.2
RS-7	–	7.0 W	9.0 W	.499-41.4K	.499-41.4K	.1-154K	.1-154K	504	576	4.7
RS-10	–	10 W	13 W	.499-73.4K	.499-73.4K	.1-273K	.1-273K	858	978	9.0
RS-10-38	RW-78	10 W	13 W	.499-71.5K	.499-71.5K	.1-265K	.1-265K	846	966	9.0
RS-10-39	RW-68	10 W	13 W	.499-73.4K	.499-73.4K	.1-273K	.1-273K	858	978	9.0

**Max. working voltage determined at .0008 dia. wire resistance values.

Standard Temperature Coefficients: ±90 ppm, below 1Ω; ±50 ppm, 1Ω-9.9Ω; ±20 ppm, 10Ω and beyond.

*MIL-R-26C, MIL-R-23379 TYPES

DALE TYPE	MIL-R-26C (G & V)	MIL-R-23379
RS-1A	–	RWP-18
RS-2C	RW-69	–
RS-2C-23	–	RWP-20
RS-5	RW-67	RWP-21
RS-10	RW-68	RWP-23

TYPE LVR STANDARD ELECTRICAL SPECIFICATIONS

DALE TYPE	POWER RATING	RESISTANCE RANGE (Ohms) 1%, 3%, 5%, 10%	TEMPERATURE COEFFICIENT ALL MODELS
LVR-2	2 W	.008 to .332	± 150 PPM/°C from +25°C to −55°C
LVR-5	5 W	.010 to .659	± 60 PPM/°C from +25°C to +125°C
LVR-10	10 W	.010 to .800	± 30 PPM/°C from +125°C to +275°C

POWER RATINGS RS, RLS, G SERIES

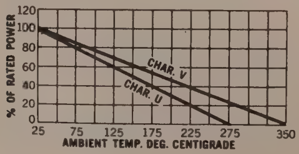
These Series have two power ratings, depending on operating temperature and stability requirements.

CHARACTERISTIC U: 1. 275°C maximum hotspot temperature
2. .5% maximum ΔR in 2000 hour load life

CHARACTERISTIC V: 1. 350°C maximum hotspot temperature
2. 3% maximum ΔR in 2000 hour load life

DERATING RS, RLS, G, LVR

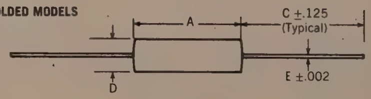
RS, RLS and G coated resistors have an operating temperature range of −55°C to +350°C. Dale RS and LVR molded resistors have an operating temperature range of −55°C to +275°C. They must be derated at high ambient temperatures according to the curves below.



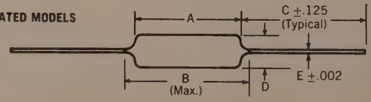
DIMENSIONS (Consult factory for RLS Types)

	TYPE	DIM. A	DIM. B	DIM. C	DIM. D	DIM. E
MOLDED MODELS	RS-⅛	.155±.015	–	1.500	.065±.015	.016
	RS-¼	.250±.015	–	1.500	.078±.015	.020
	RS-½	.312±.015	–	1.500	.078±.015	.020
	RS-1A	.422±.015	–	1.500	.110±.015	.020
	RS-1B	.575±.015	–	1.500	.110±.015	.020
	LVR-2	.675±.010	–	2.00	.250±.010	.040
	LVR-5	.927±.010	–	2.00	.343±.010	.040
	LVR-10	1.828±.010	–	2.00	.392±.010	.040
COATED MODELS	RS-2	.625±.062	.765	2.000	.250±.032	.040
	RS-2A	.812±.062	.890	1.500	.188±.032	.032
	RS-2B	.560±.062	.622	1.500	.187±.031	.032
	RS-2C	.500±.062	.593	1.500	.218±.032	.040
	RS-2C-23	.500±.062	.593	1.500	.218±.032	.032
	RS-5	.875±.062	1.000	2.000	.312±.032	.040
	RS-5-69	.875±.062	.937	2.000	.312±.031	.040
	RS-5-70	.875±.062	1.000	1.500	.312±.031	.032
	RS-7	1.218±.062	1.281	2.000	.312±.032	.040
	RS-10	1.780±.062	1.875	2.000	.375±.032	.040
	RS-10-38	1.780±.062	1.842	2.000	.375±.031	.040
	RS-10-39	1.780±.062	1.875	1.500	.375±.031	.032

MOLDED MODELS



COATED MODELS



DEPENDABLE DALE® RESISTORS

WIREWOUND PRECISION RESISTORS, SILICONE COATED *(Available with Weldable Leads)*

■ TYPE G

Beryllium oxide core for decreased size, increased stability. Meets applicable specifications of MIL-R-26 and MIL-R-23379. Non-inductive styles available.

■ TYPE GL

Radial leads for printed circuit board mounting. Meets applicable requirements of MIL-R-26E.

DALE TYPE	MIL-R-26 TYPE*	DALE RATING		RESISTANCE RANGE (Ohms)				MAX.** WORKING VOLTAGE		MAX. WT. GRAMS
		U .05% thru 5%	V 3% & 5%	.05%	.1%	.25%	.5%, 1%, 3%, 5%	U	V	
G-1	RW-81	1.0 W	–	1-950	.499-950	.499-3.4K	.1-3.4K	33	–	.20
G-2	–	1.5 W	–	1-1.3K	.499-1.3K	.499-4.9K	.1-4.9K	42	–	.21
G-3	RW-80	2.25 W	–	1-2.7K	.499-2.7K	.499-10.4K	.1-10.4K	80	–	.34
G-5	–	4.0 W	5 W	.499-6.5K	.488-6.5K	.1-24.5K	.1-24.5K	162	184	.80
G-5A	–	4.5 W	6.5 W	.499-11.4K	.499-11.4K	.1-42.1K	.1-42.1K	214	257	.95
G-5C	–	5 W	7 W	.499-8.6K	.499-8.6K	.1-32.3K	.1-32.3K	194	230	1.2
G-6	–	6 W	8 W	.499-12.7K	.499-12.7K	.1-47.1K	.1-47.1K	258	298	2.0
G-10	–	7 W	10 W	.499-25.7K	.499-25.7K	.1-95.2K	.1-95.2K	425	508	3.6
G-12	–	10 W	12 W	.499-41.4K	.499-41.4K	.1-154K	.1-154K	607	665	4.2
G-15	–	15 W	18 W	.499-73.4K	.499-73.4K	.1-273K	.1-273K	1050	1150	7.6

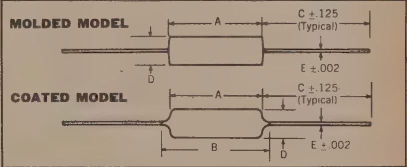
**Maximum Working Voltage determined at .0008 dia. wire resistance values.

*MIL-R-26C, MIL-R-23379 TYPES

	MIL-R-26C	MIL-R-23379
G-1	–	RWP-17
G-3	–	RWP-19
G-5C	RW-69	–
G-5C-2	–	RWP-20
G-10	RW-67	RWP-21
G-15	RW-68	RWP-23

DIMENSIONS

	TYPE	DIM. A	DIM. B	DIM. C	DIM. D	DIM. E
MOLDED MODELS	G-1	.250±.015	—	1.500	.078±.015	.020
	G-2	.312±.015	—	1.500	.078±.015	.020
	G-3	.422±.015	—	1.500	.110±.015	.020
COATED MODELS	G-5	.562±.062	.640	1.500	.188±.032	.032
	G-5A	.812±.062	.890	1.500	.188±.032	.032
	G-5C	.500±.062	.593	1.500	.218±.032	.040
	G-6	.625±.062	.765	2.000	.250±.032	.040
	G-10	.875±.062	1.000	2.000	.312±.032	.040
	G-12	1.218±.062	1.281	2.000	.312±.032	.040
	G-15	1.780±.062	1.875	2.000	.375±.032	.040



POWER RATING
Power ratings of Dale G resistors are 1.4 to 4 times higher than those of conventional wirewound resistors of equivalent size.

Stability When Dale G resistors are operated at the same ratings (Char. U) as conventional Dale RS resistors of equivalent size, the shift in resistance is 50% or less than that of the RS.

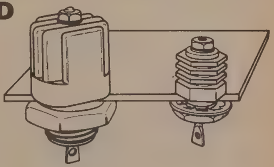
For additional power and derating information, see section on RS resistors.

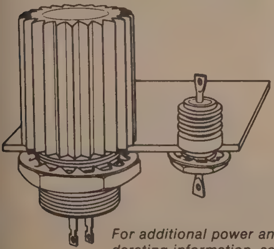
WIREWOUND POWER RESISTORS, HEAT SINK ENCASED

■ TYPE PH

TWO TERMINAL CONFIGURATIONS (PH-10-1, PH-25, PH-50 and PH-100).
Thru chassis mounting—two connections required on one or both sides of panel. Meet electrical and environmental requirements of MIL-R-18546.

SINGLE TERMINATION, CHASSIS GROUND (PH-10-5 and PH-25-8).
Speeds assembly time as only one connection is required. Often utilized as a drive line resistor in a high speed core memory system using a series termination technique. Non-inductive windings have low reactance properties giving exceptionally fast cycle time.





For additional power and derating information, see section on RH resistors

DALE TYPE	DALE RATING (WATTS)	RESISTANCE RANGES (OHMS)		MAX. WORKING VOLTAGE	MAX.* WT. (GRAMS)	STANDARD TEMPERATURE COEFFICIENT VALUE RANGES (OHMS)†		
		.05%, .1%, .25%	.5%, 1%, 3%			±50 PPM	±30 PPM	±20 PPM
PH-10A	10	1 to 12.7K	.1 to 47.1K	240	6	1 to 9.9	10 to 79	80 to 47.1K
PH-10-1	10	1 to 12.7K	.1 to 47.1K	240	6	1 to 9.9	10 to 79	80 to 47.1K
PH-10-5	10	.5 to 6.3K	.1 to 23.5K	170	6	1 to 9.9	10 to 79	80 to 23.5K
PH-25	25	.5 to 25.7K	.1 to 95.2K	425	22	1 to 9.9	10 to 169	170 to 95.2K
PH-25-8	25	.25 to 12.8K	.1 to 47.7K	300	22	1 to 9.9	10 to 169	170 to 47.7K
PH-50	50	3 to 52K	.1 to 75K	1500	80	1 to 99	100 to 999	1K to 75K
PH-100	100	5 to 35K	.1 to 50K	1700	186	1 to 99	100 to 999	1K to 50K

*A weight increase of 10% should be allowed for non-inductive types. †Consult factory for values below 1Ω and for special T.C. requirements.

DEPENDABLE DALE® RESISTORS

WIREWOUND POWER RESISTORS, HEAT SINK ENCASED

Patented design. Mount to the chassis. Provide high power and precision tolerance in a variety of sizes, mounting and terminal configurations. RH and HG types exceed MIL-R-18546. Non-inductive NH styles available.

■ TYPE RH

5 through 250 watts. Bonus power dissipation ability within MIL-R-18546 size.

■ TYPE HG

Beryllium oxide core for optimum heat dissipation. Doubles Mil. Spec. power at no increase in size. Exceptional stability at mil. levels.

DALE TYPE	MIL-R-18546 TYPE	POWER RATING* (WATTS)		RESISTANCE RANGES (OHMS)		MAX. WORKING VOLTAGE	MAX.† WT. GRAMS	STANDARD TEMPERATURE COEFFICIENT VALUE RANGES (OHMS)††		
		DALE**	MIL	.05%, .1%, .25%	.5%, 1%, 3%			±50 PPM	±30 PPM	±20 PPM
RH-5	RE-60	7.5 (5)	5	1 to 6.5K	.1 to 24.5K	160	3	1 to 9.9	10 to 49	50 to 24.5K
RH-10	RE-65	12.5 (10)	10	1 to 12.7K	.008 to 47.1K	265	6	1 to 9.9	10 to 79	80 to 47.1K
RH-25	RE-70	25	20	.5 to 25.7K	.01 to 95.2K	550	13	1 to 9.9	10 to 169	170 to 95.2K
RH-50	RE-75	50	30	.5 to 73.4K	.01 to 273K	1250	28	1 to 9.9	10 to 469	470 to 273K
RH-100	RE-77	100	75	.3 to 50K	.1 to 50K	1900	400	1 to 99	100 to 949	950 to 50K
RH-250	RE-80	250	120	.3 to 75K	.1 to 75K	2300	800	1 to 99	100 to 999	1K to 75K
HG-5	RE-60	15	5	1 to 6.5K	.1 to 24.5K	220	3	1 to 9.9	10 to 49	50 to 24.5K
HG-10	RE-65	20	10	1 to 12.7K	.1 to 47.1K	340	6	1 to 9.9	10 to 79	80 to 47.1K
HG-25	RE-70	35	20	.5 to 25.7K	.1 to 95.2K	650	13	1 to 9.9	10 to 169	170 to 95.2K
HG-50	RE-75	50	30	.5 to 73.4K	.1 to 273K	1400	28	1 to 9.9	10 to 469	470 to 273K

*Rating is based on chassis mounting area and stability.

**NOTE: Figures in parentheses on RH-5 and RH-10 indicate wattage printed on these resistors. New construction allows them to be rated at 7.5 and 12.5 watts—but they will be printed with these higher ratings only upon customer request.

†A weight increase of 10% should be allowed for non-inductive styles.

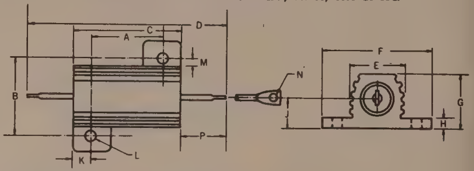
††Consult factory for values below 1 ohm and for special T.C. requirements.

POWER RATING RH, HG, PH TYPES

Dale housed resistor ratings are based on the following requirements:

1. 275°C maximum internal hotspot temperature
2. 1% maximum ΔR in 1000 hour load life for RH-5, 10, 25, 50; PH-10, 25, 50. 3% maximum ΔR in 1000 hour load life for RH-100, 250; PH-100.
3. Proper heat sink.
   4x6x2x.040 aluminum chassis = RH-5, 10; HG-5, 10; PH-10
   5x7x2x.040 aluminum chassis = RH-25; HG-25, 50; PH-25
   12x12x.059 aluminum panel = RH-50
   12x12x.125 aluminum panel = RH-100, 250; PH-50, 100

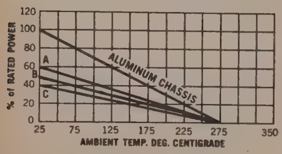
5 THRU 50 WATT MODELS, ARH, RH & HG



DERATING

Dale housed resistors have an operating temperature range of −55°C to +275°C. Derating is required for reduced chassis mounting area and for high ambient temperatures. The following curves apply to operation of unmounted resistors:

A = RH-5, 10
B = RH-25; PH-10, 25
C = RH-50, 100, 250; PH-50, 100; HG-5, 10, 25, 50

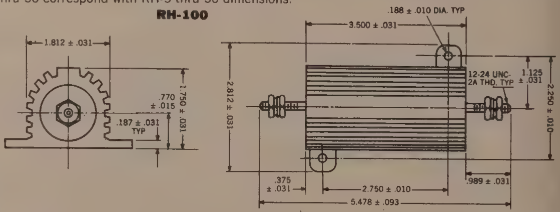


DIMENSIONS—5 thru 50 WATT MODELS—ARH, ERH, RH & HG

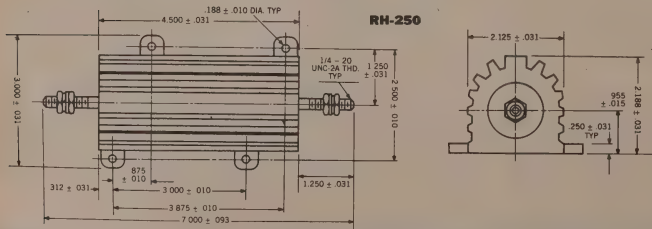
TYPE*	A	B	C	D	E	F	G	H	J	K	L	M	N	P
RH-5, HG-5	.444 ± .005	.490 ± .005	.600 ± .031	1.125 ± .062	.334 ± .015	.646 ± .015	.320 ± .015	.065 ± .010	.133 ± .010	.078 ± .010	.093 ± .005	.078 ± .015	.050 ± .005	.262 ± .062
RH-10, HG-10	.562 ± .005	.625 ± .005	.750 ± .031	1.375 ± .062	.420 ± .015	.800 ± .015	.390 ± .015	.075 ± .010	.165 ± .010	.093 ± .010	.093 ± .005	.102 ± .015	.086 ± .005	.312 ± .062
RH-25, HG-25	.719 ± .005	.781 ± .005	1.062 ± .031	1.938 ± .062	.550 ± .015	1.080 ± .015	.546 ± .015	.088 ± .010	.231 ± .010	.172 ± .010	.125 ± .005	.115 ± .015	.086 ± .005	.438 ± .062
RH-50, HG-50	1.563 ± .005	.844 ± .005	1.968 ± .031	2.781 ± .062	.630 ± .015	1.140 ± .015	.610 ± .015	.088 ± .010	.260 ± .010	.196 ± .010	.125 ± .005	.107 ± .015	.086 ± .005	.406 ± .062

*Types ARH, ERH, ENH 5 thru 50 correspond with RH-5 thru 50 dimensions.

RH-100



RH-250



For additional information, write or phone:
DALE ELECTRONICS, INC.
Box 609, Columbus, Nebr. 68601 (402-564-3131)

DEPENDABLE DALE® RESISTORS

WIREWOUND PRECISION RESISTORS, BOBBIN TYPE *(Available with Weldable Leads)*

Non-inductive precision resistors. Epoxy molded for high dielectric strength and complete environmental protection. Meet applicable requirements of MIL-R-93D.

■ TYPE WWA

Patented design insures high stability. Special tolerances and matching available.

■ TYPE MWA

Subminiature size retains Dale's unique bobbin-type design and high protection molding coating.

DALE TYPE	MIL-R-93 TYPE	POWER RATING (WATTS)	MINIMUM RESISTANCE RANGE (OHMS)*					MAXIMUM RESISTANCE (OHMS) ALL TOLERANCES	MAXIMUM WORKING VOLTAGE	MAXIMUM WEIGHT (GRAMS)
			.05%	.1%	.25%	.5%	1%			
MWA-8	–	.1	50	10	5	2	1	100K	27	.21
MWA-10	–	.125	50	10	5	2	1	160K	37	.23
WWA-13	–	.125	50	10	5	2	1	311K	50	.35
WWA-22	–	.15	130	20	5	.2	.1	600K	100	.9
WWA-23	RB-56	.15	105	12	5	.2	.1	650K	150	1.0
WWA-24	RB-55	.20	40	12	6	.2	.1	900K	200	1.2
WWA-26	RB-54	.25	20	10	5	.2	.1	1.72 Meg.	300	1.5
WWA-36	RB-53	.33	15	4	1	.2	.1	4 Meg.	300	3.1
WWA-38	RB-52	.50	10	3	1	.2	.1	5.4 Meg	600	3.8
WWA-44	†	.5	15	4	1	.2	.1	5.75 Meg.	500	3.4
WWA-45	†	.5	10	3	1	.2	.1	7.5 Meg.	550	5.4
WWA-48	–	.75	10	3	1	.2	.1	11.5 Meg.	850	6.5
WWA-412	--	.875	10	3	1	.2	.1	17.5 Meg.	1050	8.4
WWA-416	–	1	10	3	1	.2	.1	23 Meg.	1400	15.5

*Consult factory for tolerances below .05%.

†Although there is no direct mil. model of the same physical size, the Dale type will meet the electrical and environmental requirements of MIL-R-93.

SPECIAL MODIFICATIONS

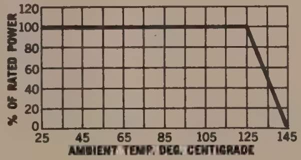
- ■ Special tolerances are available to as low as .005%.
- ■ Resistors can be matched to a tolerance of .001%.
- ■ Special T.C.'s are available to ±2 ppm/° C over a limited temperature range.
- ■ T.C.'s can be matched to an accuracy of 1 ppm/° C.

POWER RATING

MWA, WWA and WWP power ratings correspond to MIL-R-93 ratings and are based on .5% maximum ΔR in 1500 hours load life. For commercial applications, power ratings may be doubled.

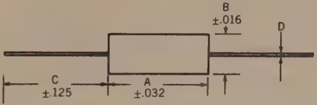
DERATING

Dale MWA, WWA and WWP resistors have an operating temperature range of −55° C to +145° C. Derating is required for temperatures above 125° C. The curve at right applies.



DIMENSIONS

TYPE	DIM. A	DIM. B	DIM. C	DIM. D
MWA-8	.250	.078	1.500	.020
MWA-10	.312	.078	1.500	.020
WWA-13	.375	.125	2.000	.020
WWA-22	.250	.250	2.000	.032
WWA-23	.375	.250	2.000	.032
WWA-24	.500	.250	2.000	.032
WWA-26	.750	.250	2.000	.032
WWA-36	.750	.375	2.000	.032
WWA-38	1.000	.375	2.000	.032
WWA-44	.500	.500	2.00	.032
WWA-45	.625	.500	2.00	.032
WWA-48	1.00	.500	2.00	.032
WWA-412	1.500	.500	2.00	.032
WWA-416	2.00	.500	2.00	.032

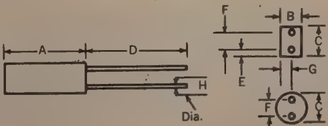


■ TYPE WWP

Rectangular or round printed circuit construction. High resistance per unit volume. Meets applicable requirements of MIL-R-93.

DALE TYPE	MIL-R-93D TYPE	POWER RATING (WATTS)	MINIMUM RESISTANCE RANGE (OHMS)						MAXIMUM RESISTANCE (OHMS) ALL TOLERANCES	MAXIMUM WORKING VOLTAGE	MAXIMUM WEIGHT (GRAMS)
			.02%	.05%	.1%	.25%	.5%	1%			
WWP-18	–	⅛ W	1.5K	600	150	50	25	10	1 Megohm	150 V	1.0
WWP-14	–	¼ W	1K	400	150	50	25	10	1.5 Megohms	300 V	1.5
WWP-225	RB-71	⅛ W	–	105	50	25	1.0	.1	515K	150 V	1.0

For additional Power Rating and Derating Information, see section on MWA and WWA styles.



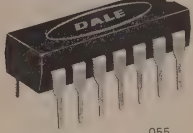
DIMENSIONS

TYPE	A (±.020)	B (±.020)	C (±.020)	D (Min.)	E (±.010)	F (±.010)	G (±.010)	H
WWP-18	.300	.125	.250	1	.062	.125	.062	.032
WWP-14	.600	.125	.250	1	.062	.125	.062	.032
WWP-225	.312	—	.250	1	.025	.200	—	.025

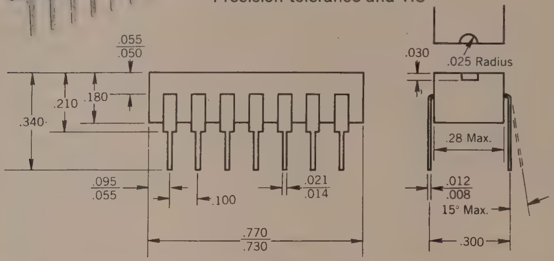
DEPENDABLE DALE® RESISTORS

WIREWOUND DUAL-IN-LINE PACKAGE

■ TYPE WDP



- Designed for automatic insertion
- Up to 7 resistors in a 14-pin package
- Optimum heat dissipation in small package
- High temperature stability
- Precision tolerance and T.C



SPECIFICATIONS

Electrical

Power Rating: 3.5 watts (up to .5 watts/resistor)

Resistance Range: 1Ω to 800Ω per resistor

Tolerance: ±0.1% to ±5.0%

Temperature Coefficient: ±20 PPM/° C (7Ω to 800Ω)
±50 PPM/° C (1Ω to 6.9Ω)

Tolerance Match: .05%

Temperature Coefficient Match: To 5 PPM/° C, depending on resistance values

Operating Temperature: −65° C to +275° C

Dielectric Strength: 500 VAC

Insulation Resistance: 1000 Megohms minimum dry, 100 Megohms minimum after moisture test.

Material

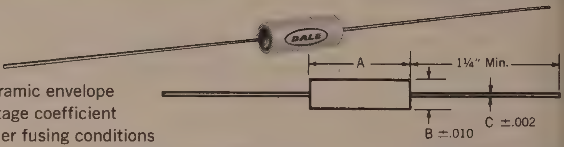
Package: Silicone molded

Leads: KOVAR

CUSTOM FUSE RESISTORS

■ TYPE CFR

- Performs function of resistor and series fuse
- Completely welded construction hermetically sealed in ceramic envelope
- Low temperature coefficient with negligible noise and voltage coefficient
- Predictable fusing times with no flaming or distortion under fusing conditions
- Commercial type fuse resistors also available



SPECIFICATIONS

Electrical

Tolerance: 3%, 5% and 10% standard. 1% available for some applications

Dielectric Strength: 750 VAC 1/4 watt thru 1 watt; 1000 VAC all others

Insulation Resistance: 10,000 Megohms minimum dry

Temperature Coefficient: ±90 PPM/°C below 1 ohm; ±50 PPM/°C 1 ohm thru 9.9 ohms; ±30 PPM/°C 10 ohms and up

Operating Temperature: −55°C to +275°C

Fusing Times: 1 millisecond to 1 second depending upon other parameters

Minimum Fusing Current: Approximately 4 times the continuous operating current obtainable on some designs. Larger ratios produce better designs.

Mechanical

Terminal Strength: 5 lb. pull test = 1/4 watt thru 1 watt; 10 lb. pull test = all others

Solderability: Continuous satisfactory coverage when tested in accordance with MIL-R-26E

NOMINAL CONTINUOUS POWER RATING*	VALUE RANGE	DIMENSIONS		
		"A" Length	"B" Dia.	"C" Lead Dia.
1/4 W	0.1Ω to 1.2KΩ	.437 ± .020	.155	.020
1/2 W	0.1Ω to 1.6KΩ	.437 ± .020	.155	.020
3/4 W	0.2Ω to 2.5KΩ	.437 ± .020	.155	.020
1-1/2 W	0.3Ω to 5.3KΩ	.640 ± .031	.243	.032
2-1/2 W	0.45Ω to 7.4KΩ	.750 ± .031	.250	.032

*Actual power rating will depend on fusing, stability, value and other design requirements

ORDERING INFORMATION *Please include the following information:*

1. Operating wattage or current, ambient temperature and required resistance stability, (% ΔR/1000 hours).
2. Fusing wattage or current and maximum "blow" time. Also minimum "blow" time, if applicable.
3. Nominal resistance and maximum allowable resistance tolerance, (5% to 10% preferred).
4. Maximum allowable physical size.
5. Voltage to be interrupted.
6. Frequency of power source, wave form, and a brief description of your application.

NON-STANDARD RESISTORS TO YOUR SPECIFICATION

Dale is the industry's acknowledged leader in designing and supplying non-standard resistors. From the thousands of designs in our engineering files, we can select proven methods of solving your specific requirements...faster and at a lower cost. Our capabilities include:

- ■ Extended resistance ranges
- ■ Low reactance
- ■ Very high or very low T.C.
- ■ Special tolerances
- ■ Low noise
- ■ Match of T.C., tolerance, resistance ratio
- ■ Special packaging

For assistance in obtaining non-standard resistors, call:

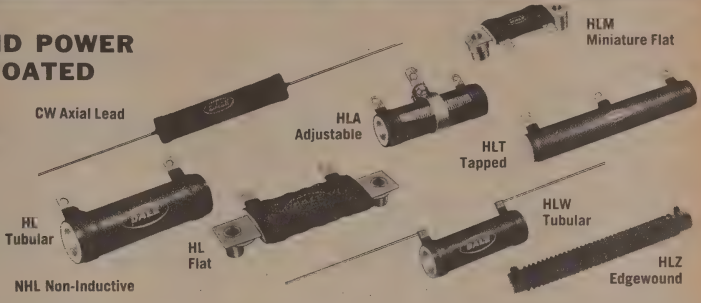
402—564-3131 • Columbus, Nebraska • DALE WIREWOUND RESISTORS
402—371-0080 • Norfolk, Nebraska • DALE METAL FILM RESISTORS

DEPENDABLE DALE® RESISTORS

INDUSTRIAL WIREWOUND POWER RESISTORS, SILICONE COATED

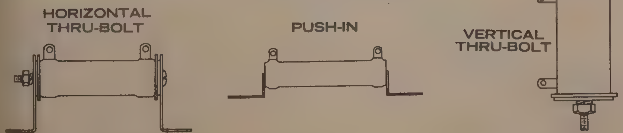
Dale's silicone-coated industrial wirewound resistors assure maintenance of tolerance and T.C. without compromise in mechanical and chemical protection.

This complete line, except for CW types, also available with vitreous enamel coating. Contact factory for details.
Canadian Customers Contact
DALE ELECTRONICS CANADA LTD.
18 Howden Road • Scarborough, Ontario
Phone: 416-759-5631

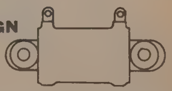


TYPE	APPLICATION	APPLICABLE MIL SPEC AND TYPES	WATTAGE RATING	RESISTANCE RANGE	CORE SIZES	TERMINALS	MOUNTINGS	TOLERANCE
CW Axial Lead	Axial leads. For applications requiring high performance at low cost	MIL-R-26 RW-67, 68, 69	2.5-13 watts	.1 ohm to 100K ohms	Body Dia. .188 to .375″ Body Length .500 to 1.781″ Leads 1.5 to 2″	Leads	Terminals	±5% (10% below 1 ohm)
HL Tubular	General purpose wirewound resistors with a broad power range.	MIL-R-26 RW-29, 30, 31, 32, 33, 35, 36, 37, 38, 47	5-225 watts	.1 ohm to 1.3 Megohms	O.D. 1/4 to 1-1/8″ Length 1-10½″	Lugs	Push-in bracket or thru-bolt	±5% (10% below 1 ohm)
NHL Non-Inductive	High frequency circuits and applications requiring low inductive effect and minimum distributed capacity	None	5-225 watts	1 ohm to 90K ohms	O.D. 1/4 to 1-1/8″ Length 1-10½″	Lugs or Leads	Push-in bracket or thru-bolt	±5%
HL Flat	For limited space requiring high power-to-size ratio. Vertical or horizontal stacking.	MIL-R-26 RW-20 thru RW-24	30-95 watts	.1 ohm to 150K ohms	Length 1¼ to 6″	Lugs	Thru mount with spacers	±5% (10% below 1 ohm)
HLM Miniature Flat	For limited space, high power-to-size requirements particularly in high vibration areas.	None	10-20 watts	.1 ohm to 51K ohms	Length 3/4 to 2-1/16″	Lugs	Thru mount with spacers	±5% (10% below 1 ohm)
HLA Adjustable	For resistance or voltage adjustment	MIL-R-19365C RX-29, 32, 33, 35, 36 37, 38, 47	12-225 watts	1 ohm to 100K ohms	O.D. 5/16 to 1-1/8″ Length 1½ to 10½″	Lugs	Push-in bracket or thru-bolt	±5%
HLT Tapped	For voltage divider networks	MIL-R-26 RW-22, 23, 24, 33, 35, 36, 37, 38, 47	11-225 watts	.1 ohm to 1.1 Megohms	O.D. 5/16 to 1-1/8″ Length 1½ to 10½″	Lugs	Push-in bracket or thru-bolt	±10% each section (±10% total)
HLW Tubular	General application where terminal wires are required for direct electrical connection	None	3-20 watts	.1 ohm to 80K ohms	O.D. 13/64 to 7/16″ Length 7/16″ to 2″	Lugs with terminal wires	Terminals, thru-bolt or push-in bracket	±5% (10% below 1ohm)
HLZ Edge-wound	For heavy duty requirements where space is at a premium. High thermal capacity.	None	35-375 watts	.05 ohm to 32 ohms	O.D. 9/16 to 1-1/8″ Length 2 to 10-1/2″	Lugs	Push-in bracket or thru-bolt	±10%

MOUNTING BRACKETS for TUBULAR STYLES



EXCLUSIVE BRACKET DESIGN FOR MINIATURE FLAT STYLE



Mounting strap fits snugly through core and is bound tightly against unit by two eccentric spacers. Eliminates expensive cements and improves heat transfer and power handling capabilities.

DEPENDABLE DALE® RESISTORS

TYPE CP

- Fireproof inorganic construction
- Special inorganic potting compound provides high thermal conductivity.
- Superior moisture resistance

Construction:
Resistance wire is high quality, premium grade wound onto a woven fiberglass core. Terminals are tinned copper crimped to the wound core with a special brass alloy.

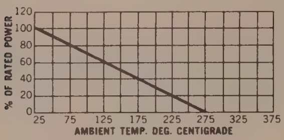
Tolerance: ±10% standard. ±5% also available.
Operating Temperature: −55° C to +275° C.
Terminal Strength: 5 lbs.

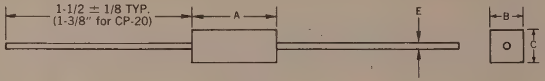
DIMENSIONAL AND POWER SPECIFICATIONS

DALE TYPE	WATTAGE RATING	EIA STANDARD RS-344 TYPE	RESISTANCE	MAX. WORKING VOLTAGE	DIMENSIONS A±1/32	B±1/32	C±1/32	D±.001
CP-2	2	CRU2A	.1 to 2.4K	65	11/16	1/4	1/4	.032
CP-3	3	CRU3	.1 to 7.5K	150	7/8	5/16	5/16	.036
CP-5	5	CRU5	.1 to 8.5K	200	7/8	3/8	11/32	.036
CP-7	7	CRU7	.12 to 18K	350	1-25/64	3/8	11/32	.036
CP-10	10	CRU10	.18 to 30K	540	1-7/8	3/8	11/32	.036
CP-15	15	—	.18 to 30K	670	1-7/8	1/2	1/2	.036
CP-20	20	—	.28 to 40K	890	2-1/2	1/2	1/2	.036

NOTE: Above models, except CP-15 and CP-20, available with standoffs on resistor body. To specify, add -3 to part number.

DERATING





Ordering Information:

When ordering, please specify Dale type, wattage, resistance value and tolerance.

Example: A 2-watt CP resistor with resistance at 1000 ohms and tolerance of ±10% is designated as shown.

CP	2	1K	±10%
1	2	3	4

1. Resistor type
2. Wattage
3. Resistance
4. Tolerance

TYPES CA and CR

TYPE CA

TYPE CR

Construction:
Dale CA and CR Series have a high quality, premium resistance wire wound on woven fiberglass core impregnated with a special grade silicone. Available with special smokeproof coating.

Resistance Range: .1 ohm minimum to 7K, dependent on resistor core length.

Tolerance: ±10% standard, ±5% also available.

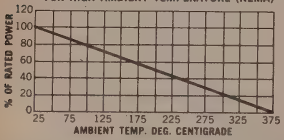
Leads: Standard minimum lead length is 1½". Standard lead material is tinned copper. Axial lead pull strength on CA Series is 5 lbs.

DIMENSIONAL AND POWER SPECIFICATIONS

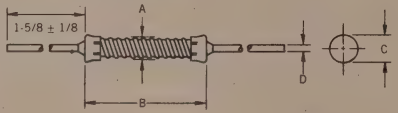
DALE TYPE	DIM. A	DIM. B. MIN.	MAX.	DIM. C (Max.)	DIM. D	DIM. E (±1/32)	DIM. F (±1/32)	WATTAGE RATING PER INCH
CA-4000	.110	.6	2.0"	.175	.032	NA	NA	4
CA-5000	.150	.6	2.0"	.225	.036	NA	NA	5
CR-4000	.110	.6	2.0"	.175	.032	B + 3/32	B + 7/32	4
CR-5000	.150	.6	2.0"	.225	.036	B + 3/32	B + 7/32	5

DERATING

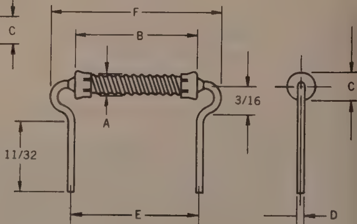
FOR HIGH AMBIENT TEMPERATURE (NEMA)



CA SERIES



CR SERIES



CR	4	150	350Ω	±10%
1	2	3	4	5

Ordering Information:

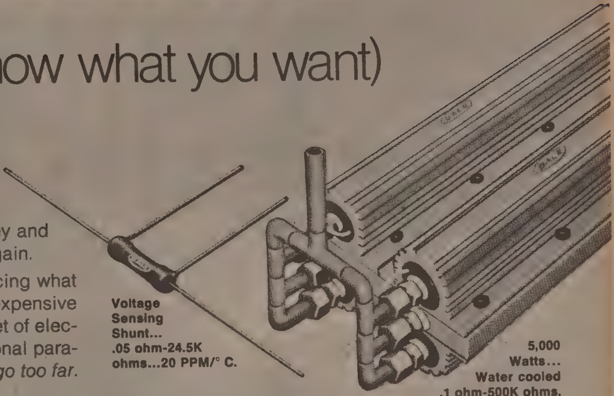
When ordering, please specify resistor body length, watts/inch, resistance and tolerance.

Example: A 1½" unit, 4 watts per inch; 350 ohms, ±10% radial lead unit is designated as shown.

1. Resistor type
2. Core diameter designation
3. Overall resistor body length
4. Resistance
5. Tolerance

How to cut the cost of special resistors

(even if you don't know what you want)



Voltage Sensing Shunt... .05 ohm-24.5K ohms...20 PPM/° C.

5,000 Watts... Water cooled .1 ohm-500K ohms, 0.5%-5% tol.

Project costs don't have to escalate when you find you can't use a standard resistor. There are positive ways you can save money and time—and even come out ahead in the bargain.

You can start cutting project costs by reducing what we call "visualization loss". This is the expensive extra time required to figure out an exact set of electrical, physical, environmental and dimensional parameters for the special part you need. *Don't go too far.* Especially don't wait until you're completely bogged down before you ask Dale for help. In electrical terms, we've long since figured out practical ways to deliver resistance as low as .001 ohm... tolerance as low as .01%...TC as low as ±5 ppm and power just as high and as stable as you want it to be. And we can put your non-standard electrical parameters in unique packages that are one part sophistication and one part midwestern ingenuity. Every day we're showing companies how they can bend, squeeze, mill, tap, bury and interconnect resistors for special purposes. We even put in plumbing, when required.

Your non-standard resistor may only need a different kind of lead or it may look like a Rube Goldberg nightmare. Either way, you'll find Dale is unique among resistor suppliers in the ability to help you quickly visualize what you need...and to deliver a prototype with a minimum of design lag. We've already designed and built nearly 5,000 special resistors—so it's quite possible we've already blueprinted the design you need.

Call us. You'll be glad to find someone is working to make the basics better.

Space-saving P.C. board module containing 3 non-inductive resistors. (Far left)

◄ Network with 16 quick couple connections containing 12 resistors from .025 ohm 50 watts to .1 ohm 10 watts.

High Pulse Wattage ► railway safety resistor. Special housing for underground use.

Send for our free **Functional Guide to Non-Standard Resistors.**

A Functional Guide to Non-Standard Resistors
DALE

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In Canada: Dale Electronics Canada Ltd.
In Europe: Dale Electronics GMBH,
8 Munchen 60, Falkweg 51, West Germany

DEPENDABLE DALE

DALE®

METAL and CARBON FILM RESISTORS

APPLICABLE MIL. ENVIRONMENTAL SPECIFICATIONS MIL-R-10509

TYPES MF, MFF & CMF

These environmental performance figures are typical for MFF conformally coated resistors. However, this style is dimensionally smaller than the RN types per MIL-R-10509.

REQUIREMENT	CHAR. B		CHAR. D		CHAR. C		CHAR. E	
Mil. Temp. Coefficient	± 500 PPM		+200 –500 PPM		±50 PPM		±25 PPM	
Applicable Dale T.C. Code	T-00 (200 PPM)		T-1 (100 PPM) T-0 (150 PPM)		T-2 (50 PPM)		T-9 (25 PPM)	
POWER RATING	at 70°C		at 70°C		at 125°C		at 125°C	
ENVIRONMENTAL TEST	MIL. MAX.	DALE TYP.	MIL. MAX.	DALE TYP.	MIL. MAX.	DALE TYP.	MIL. MAX.	DALE TYP.
Temperature Cycling	±0.5%ΔR	±0.10%	±0.5%ΔR	±0.10%	±0.25%ΔR	±0.10%	±0.25%ΔR	±0.10%
Low Temp. Operation	±0.5%ΔR	±0.05%	±0.5%ΔR	±0.05%	±0.25%ΔR	±0.05%	±0.25%ΔR	±0.05%
Short Time Overload	±0.5%ΔR	±0.02%	±0.5%ΔR	±0.02%	±0.25%ΔR	±0.02%	±0.25%ΔR	±0.02%
Dielectric Withstanding Voltage	±0.5%ΔR	±0.01%	±0.5%ΔR	±0.01%	±0.25%ΔR	±0.01%	±0.25%ΔR	±0.01%
Effect of Soldering	±0.5%ΔR	±0.02%	±0.5%ΔR	±0.02%	±0.1% ΔR	±0.02%	±0.1% ΔR	±0.02%
Moisture Resistance	±1.5%ΔR	±0.05%	±1.5%ΔR	±0.05%	±0.5% ΔR	±0.05%	±0.5% ΔR	±0.05%
Load Life	±1.0%ΔR	±0.05%	±1.0%ΔR	±0.05%	±0.5% ΔR	±0.15%	±0.5% ΔR	±0.15%
Shock	±0.5%ΔR	±0.01%	±0.5%ΔR	±0.01%	±0.25%ΔR	±0.01%	±0.25%ΔR	±0.01%
Vibration	±0.5%ΔR	±0.01%	±0.5%ΔR	±0.01%	±0.25%ΔR	±0.01%	±0.25%ΔR	±0.01%

All ΔR figures shown are based on units with an initial tolerance of 1%.

TYPES MC & DC

TYPE D This physical configuration is not covered in MIL-R-10509.

REQUIREMENT	CHAR. B		CHAR. D		CHAR. D		CHAR. C		CHAR. E	
Power Rating Temp.	70° C		70° C							
Temperature Coefficient	±500 PPM/° C		+200 –500 PPM/° C							
ENVIRONMENTAL TESTS	MIL. MAX	DALE TYP.	MIL. MAX.	DALE TYP.	MIL. MAX	DALE TYP.	MIL. MAX.	DALE TYP.	MIL. MAX.	DALE TYP.
Temperature Cycling	± 0.5% ΔR	± 0.25% ΔR	± 0.5% ΔR	± 0.25% ΔR	± 0.5% ΔR	± 0.10%	± 0.25% ΔR	± 0.1%	± 0.25% ΔR	± 0.10%
Low Temp. Operation	± 0.5% ΔR	± 0.05% ΔR	± 0.5% ΔR	± 0.05% ΔR	± 0.5% ΔR	± 0.05%	± 0.25% ΔR	± 0.05%	± 0.25% ΔR	± 0.05%
Short Time Overload	± 0.5% ΔR	± 0.05% ΔR	± 0.5% ΔR	± 0.05% ΔR	± 0.5% ΔR	± 0.10%	± 0.25% ΔR	± 0.10%	± 0.25% ΔR	± 0.10%
Dielectric Withstanding Voltage	± 0.5% ΔR	± 0.01% ΔR	± 0.5% ΔR	± 0.01% ΔR	± 0.5% ΔR	± 0.01%	± 0.25% ΔR	± 0.01%	± 0.25% ΔR	± 0.01%
Effect of Soldering	± 0.5% ΔR	± 0.01% ΔR	± 0.5% ΔR	± 0.01% ΔR	± 0.5% ΔR	± 0.05%	± 0.1% ΔR	± 0.05%	± 0.1% ΔR	± 0.05%
Moisture Resistance	± 1.5% ΔR	± 0.25% ΔR	± 1.5% ΔR	± 0.25% ΔR	± 1.5% ΔR	± 0.25%	± 0.5% ΔR	± 0.25%	± 0.5% ΔR	± 0.25%
Load Life	± 1.0% ΔR	± 0.10% ΔR	± 1.0% ΔR	± 0.20% ΔR	± 1.0% ΔR	± 0.5%	± 0.5% ΔR	± 0.5%	± 0.5% ΔR	± 0.5%
Shock	± 0.5% ΔR	± 0.10% ΔR	± 0.5% ΔR	± 0.10% ΔR	± 0.5% ΔR	± 0.01%	± 0.25% ΔR	± 0.01%	± 0.25% ΔR	± 0.01%
Vibration	± 0.5% ΔR	± 0.10% ΔR	± 0.5% ΔR	± 0.10% ΔR	± 0.5% ΔR	± 0.01%	± 0.25% ΔR	± 0.01%	± 0.25% ΔR	± 0.01%

DALE®

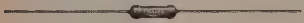
DEPOSITED CARBON RESISTORS *(Available with Weldable Leads)*

Made of pure crystalline carbon film bonded to selected ceramic cores. Excellent high frequency characteristics. Types MC and DC meet functional requirements of MIL-R-10509F.

■ TYPE MC Epoxy Molded

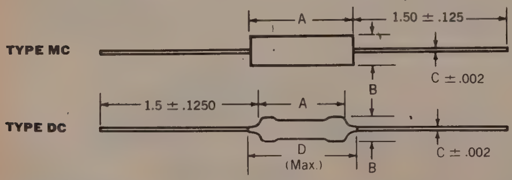
■ TYPE DC

Epoxy Conformal Coated



DALE TYPE	MIL. TYPE		POWER RATING (WATTS)		MINIMUM RESISTANCE (OHMS)	MAXIMUM 1% RESISTANCE (OHMS)	MAXIMUM 2% RESISTANCE (OHMS)	MAX. WT. (GRAMS)		MAXIMUM WORKING VOLTAGE
	MC	DC	B	D*				MC	DC	
MC-1/10, DC-1/10	RN-55	–	1/10	1/8	2	400K	400K	.35	.20	200
MC-1/8, DC-1/8	RN-60	–	1/8	1/4	1	3 Megohms	5 Megohms	.45	.30	300
MC-1/4, DC-1/4	RN-65	RN-10	1/4	1/2	2	5 Megohms	6 Megohms	.85	.35	350
MCS-1/2, DCS-1/2	RN-70	RN-20	1/2	3/4	1	10 Megohms	15 Megohms	1.50	.80	500
MC-1, DC-1	RN-75	RN-25	1	–	1	15 Megohms	30 Megohms	4.50	2.8	500
MC-2, DC-2	RN-80	RN-30	2	–	2	100 Megohms	125 Megohms	8.25	5.5	750

*Applies to MC only. **Tolerance:** .5%, 1%, 2%.
Temperature Coefficient: –200 PPM to –500 PPM, depending on value within normal resistance range.



DIMENSIONS

DALE TYPE	A	B	C	D
MC-1/10	.260±.010	.095±.005	.025 Dia.	–
MC-1/8	.406±.015	.135±.010	.025 Dia.	–
MC-1/4	.593±.015	.203±.015	.025 Dia.	–
MCS-1/2	.730±.020	.250±.015	.032 Dia.	–
MC-1	1.093±.020	.375±.015	.032 Dia.	–
MC-2	2.188±.020	.375±.015	.032 Dia.	–
DC-1/10	.249±.031	.090±.015	.025 Dia.	.381
DC-1/8	.343±.031	.098±.015	.025 Dia.	.453
DC-1/4	.468±.031	.125±.031	.025 Dia.	.578
DCS-1/2	.562±.062	.187±.031	.032 Dia.	.734
DC-1	.937±.062	.296±.031	.032 Dia.	1.187
DC-2	2.062±.062	.296±.031	.032 Dia.	2.312

POWER RATING
Dale MC and DC power ratings are based on 1% maximum ΔR in 1000 hours load life at 70° C.

DERATING
Dale MC and DC resistors have an operating temperature range of –55° C to +165° C. They must be derated at high ambient temperatures from 100% power at 70° C to 0% power at +165° C.

DEPENDABLE DALE® RESISTORS

PRECISION METAL FILM RESISTORS *(Available with Weldable Leads)*

Vacuum-deposited metal film resistors. Good R.F. characteristics. Low noise level. Wide choice of tolerances, T.C.'s and resistance.

TYPE M:
Standard values to 100 Meg. Special order to 300 Meg. See following page.

■ TYPE MF, LMF, HMF

Epoxy molded. Meets MIL-R-10509.

■ TYPE MFF, CMF, LFF, HFF

Epoxy conformal coated.
Type CMF meets MIL-R-10509 and MIL-R-22684.

■ TYPE D

Molded in aluminum housing to utilize heat sink effect of chassis. Resistance ranges from 24.9Ω to 2.6 Meg., with power ratings of 4, 8 and 12 watts.

DALE TYPE	MIL-R-10509 TYPE	125° C RATING (Char. C & E)	70° C RATING (Char. D)	MIL-R-22684		MAX. WT. (Grams)	MAX. WORKING VOLTAGE	DIMENSIONS (See Drawing on opposite page)			
				Type	Rating			A	B	C	D
MF50, HMF50	RN-50	1/20 w	–	–	–	.11	200	.150 ± .020	.065 ± .015	.016 Dia.	–
MF-1/10, LMF-1/10, HMF-1/10	RN-55	1/10 w	1/8 w	–	–	.35	200	.260 ± .010	.095 ± .005	.025 Dia.	–
MF-1/8, LMF-1/8, HMF-1/8	RN-60	1/8 w	1/4 w	–	–	.45	300	.406 ± .015	.135 ± .010	.025 Dia.	–
MF-1/4, LMF-1/4, HMF-1/4	RN-65	1/4 w	1/2 w	–	–	.84	350	.593 ± .015	.203 ± .015	.025 Dia.	–
MFS-1/2, LMF-1/2, HMF-1/2	RN-70	1/2 w	3/4 w	–	–	1.6	500	.730 ± .020	.250 ± .015	.032 Dia.	–
MF-1, HMF-1	RN-75	–	1 w*	–	–	4.4	500	1.093 ± .020	.375 ± .015	.032 Dia.	–
MF-2	RN-80	–	2 w*	–	–	7.9	750	2.188 ± .020	.375 ± .015	.032 Dia.	–
CMF-1/10, CMF-55, CMF-07	RN-55	1/10 w	1/8 w	RL-07	1/4 w	.25	200	.249 ± .031	.090 ± .008	.025 Dia.	.381
CMF-1/8, CMF-60, CMF-20	RN-60	1/8 w	1/4 w	RL-20	1/2 w	.50	300	.385 ± .031	.145 ± .015	.025 Dia.	.484
CMF-1/4, CMF-65	RN-65	1/4 w	1/2 w	–	1 w	.80	500	.562 ± .031	.190 ± .015	.025 Dia.	.750
MFF-1/8, LFF-1/8, HFF-1/8	–	1/8 w	–	–	–	.40	300	.343 ± .031	.098 ± .015	.025 Dia.	.453
MFF-1/4, LFF-1/4, HFF-1/4	–	1/4 w	–	–	–	.65	350	.468 ± .031	.125 ± .015	.025 Dia.	.578
MFF-1/2, LFF-1/2, HFF-1/2	–	1/2 w	–	–	–	.95	500	.562 ± .031	.187 ± .031	.032 Dia.	.734
MFF-1, LFF-1, HFF-1	–	–	1 w*	–	–	2.7	500	.937 ± .062	.296 ± .031	.032 Dia.	1.187
MFF-2, LFF-2, HFF-2	–	–	2 w*	–	–	4.7	750	2.062 ± .062	.296 ± .031	.032 Dia.	2.312

*Characteristic B

Tolerance MIL-R-10509 ±1%, ±.5%, ±0.25%, ±0.10% standard, MIL-R-22684 ±2%, ±5%. LMF and HMF ±1% standard. Special tolerances and matching on request.

STANDARD T.C. RESISTANCE RANGE (OHMS)*

TYPE	T-0 150 PPM	T-1 100 PPM	T-2 50 PPM	T-9 25 PPM
MF50	24.9-100K	49.9-100K	100-100K	100-100K
HMF50	100K-700K	100K-700K	100K-500K	100K-200K
LMF-1/10	1-9.9	5-30	10-30	15-30
MF-1/10, CMF-1/10, CMF-55	10-499K	30.1-499K	30.1-301K	30.1-301K
HMF-1/10, HFF-1/10	500K-5M	500K-5M	301K-2M	301K-500K
LMF-1/8, LFF-1/8	1-9.9	5-24	10-30	15-30
MF-1/8, MFF-1/8	10-1M	24.9-1M	30.1-499K	30.1-499K
CMF-1/8, CMF-60	10-1M	24.9-1M	30.1-499K	30.1-499K
HMF-1/8, HFF-1/8	1M-10M	1M-10M	499K-3M	499K-1M
LMF-1/4, LFF-1/4	1-9.9	5-24	10-30	15-30
MF-1/4, MFF-1/4	10-2M	24.9-2M	30.1-1M	30.1-1M
CMF-1/4, CMF-65	10-2M	24.9-2M	30.1-1M	30.1-1M
HMF-1/4, HFF-1/4	2M-20M	2M-20M	1M-10M	1M-2M
LMF-1/2, LFF-1/2	1-9.9	5-24	10-24	15-24
MFS-1/2, MFF-1/2	10-2.49M	24.9-2.49M	24.9-1M	24.9-1M
HMF-1/2, HFF-1/2	2.49M-30M	2.49M-30M	1M-20M	1M-3M
MF-1, MFF-1	10-5.11M	24.9-4.02M	49.9-2.61M	49.9-2.61M
HMF-1, HFF-1	5.11M-30M	4.02M-30M	2.61M-20M	2.61M-5M
MF-2, MFF-2	30.1-10M	100-8M	100-6M	200-5.11M

NOTE: T-00 standard for CMF-07 (51Ω to 150K) and CMF-20 (4.3Ω to 470K).

*On Mil types, T-0 and T-1 = Char. D, T-2 = Char. C and T-9 = Char. E. T-0 and T-1 are available in tolerance of ±.25% and greater only. 11 standard T.C.'s available in −55° C to +175° C range.

LOW T.C. RESISTANCE VALUE RANGES*

TYPE	L-1 (20 PPM)	L-2 (15 PPM)	L-3 (10 PPM)
CMF-1/10 MFF-1/8 MF-1/8	30.1Ω to 300KΩ	49.9Ω to 200KΩ	100Ω to 100KΩ
CMF-1/8 MFF-1/4 MF-1/4	30.1Ω to 499KΩ	49.9Ω to 300KΩ	100Ω to 200KΩ
MFF-1/2 MFS-1/2	30.1Ω to 750KΩ	49.9Ω to 500KΩ	100Ω to 400KΩ

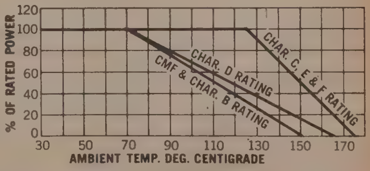
*Over temperature range from 0 to +80° C

POWER RATING

Dale metal film resistors have power ratings depending on operating temperatures of 70° C and 125° C as indicated above. All are based on a maximum ΔR of .5% in 1000 hour load life.

DERATING

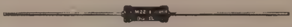
Dale metal film resistors have an operating temperature range beginning at −65° C. They must be derated according to the curves at right.



DEPENDABLE DALE® RESISTORS

PRECISION METAL FILM TO 100 MEG.

1% and 0.5% Tolerance



M22
M14 1%
100 M

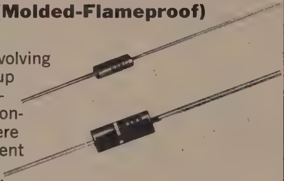
Unique combination of precision performance, high reliability, low temperature coefficient and high resistance values at economical prices. High values up to 300 Meg. available on special order.

TYPE NO.	WATTAGE RATING 70°C	125°C	MAX. Cont. VOLTAGE	SURF. TEMP. RISE °C	DIMENSIONS LENGTH	DIAMETER	LEADS	T.C. IN PPM	RESISTANCE RANGE
M20D*	.25	.125	250	30	.375″ ± .025″	.145″ ± .010″	.032″ ± .002″	100	10Ω to 500K
M22D	0.5	0.25	350	35	.575″ ± .015″	.205″ ± .010″	.032″ ± .002″	100	10Ω to 2.5 Meg.
M22H								150	High Value 2.51 Meg. to 10 Meg.
M13D	1.0	–	500	50	.840″ ± .025″	.285″ ± .010″	.032″ ± .002″	100	10Ω to 10 Meg.
M13H								150	High Value 10.1 Meg. to 30 Meg.
M14D	2.0	–	1600	60	2.000″ ± .060″	.285″ ± .010″	.032″ ± .002″	100	10Ω to 20 Meg.
M14H								150	High Value 20.1 Meg. to 100 Meg.

*Flameproof molded construction.

MINIATURE OXIDES TO MIL-R-22684B (Molded-Flameproof)

Metal oxide resistors are superior for requirements involving load life with extremely high reliability and stability—up to 100,000 hours or more. They have conclusively outperformed other resistor types under environmental conditions of varying humidities and temperatures or where prolonged operation in a high dissipation and/or ambient temperature is necessary. Their ability to withstand extreme overloads make them ideal for pulse applications where extremely high peak voltages are involved.

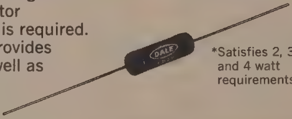


TYPE	RATING WATTS	MIL TYPE	RATED VOLTAGE	DIELECTRIC STRENGTH	RESISTANCE RANGE TOL.	MIN.	MAX.	DIMENSIONS LENGTH	DIAMETER	LEADS
F07	1/4	RL-07	250	1000 V	2%, 5%	10Ω	150K	.250″ ± .031″	.090″ ± .008″	.025″
F20	1/2	RL-20	350	1000 V	1%, 2%, 5%	10Ω	470K	.375″ ± .025″	.145″ ± .010″	.032″

TEST CHARACTERISTICS	MAXIMUM CHANGES PER MIL-R-22684	PERFORMANCE DATA—TYPICAL CHANGE F STYLE RESISTORS
Resistance/Temperature Characteristic	200 PPM	200 PPM
Dielectric Withstanding Voltage	±0.5%	±0.1%
Low Temp. Operation	±0.5%	±0.25%
Temperature Cycling	±1%	±0.5%
Moisture Resistance	±1.5%	±0.5%
Short Time Overload	±0.5%	±0.25%
Load Life	±2%	±1%
Terminal Strength	±0.5%	±0.1%
Soldering	±0.5%	±0.25%
Shock	±0.5%	±0.1%
Vibration	±0.5%	±0.1%

POWER OXIDES—2 to 10 WATTS (Flameproof) ±5% and 10% Tolerance

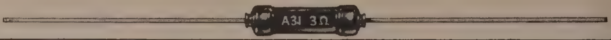
Medium power components specifically designed for applications where a highly reliable resistor (even under abnormal stress conditions) is required. A specially developed coating material provides high flame-retardant characteristics as well as excellent thermal conductivity.



*Satisfies 2, 3 and 4 watt requirements.

DALE TYPE	RATING WATTS 70° C	MAXIMUM LENGTH	DIA.	RESISTANCE RANGE* MIN.	MAX.
FP-32	4*	.906	.328	47Ω	39K
FP-33	6	1.312	.328	30Ω	56K
FP-34	8	1.718	.328	40Ω	68K
FP-35	10	2.093	.328	50Ω	91K

ULTRA LOW VALUES—0.27Ω TO 10Ω



Ultra low value resistors produced by an exclusive process in which passive conductive metal film is diffused in a new arrangement of materials upon the surface of a special ceramic substrate.

TYPE	TOLERANCE	LENGTH	DIAMETER	LEADS	WATTS	RESISTANCE RANGE
A20	1%, 2%, 5%	.400″ ± .010″	.145″ ± .005″	.032″ ± .002″	1/2	0.27Ω-10Ω
A31	2%, 5%, 10%	.687″ ± .031″	.203″ ± .015″	.032″ ± .002″	2	0.27Ω-27Ω

HIGH FREQUENCY LOAD RESISTORS (Tubes)

Carbon film resistors with inherent stability and excellent high frequency characteristics for applications involving high power, high accuracy RF measurements. Ideally suited as non-reactive radio frequency terminations for many applications.

Specifications show only a few standard types available. We invite your inquiries regarding special applications.

TYPE	LENGTH	O. D.	TERMINAL	I. D.	WATTAGE IN FREE AIR (25°C)
I-273	18″ ± 1/16″	1.750″ ± .010″	3/4″	1.250″ ± .010″	120
I-270	12″ ± 1/16″	.875″ ± .010″	3/4″	.625″ ± .010″	40
I-272	5″ ± 1/32″	.562″ ± .006″	1/2″	.375″ ± .010″	10
I-240	Max. 2.000″ Min. 1.937″	.252″ .240″	1/4″	Solid Rod	2
I-281	12″ ± 1/16″	1.125″ ± .010″	1/2″	.875″ ± .020″	55

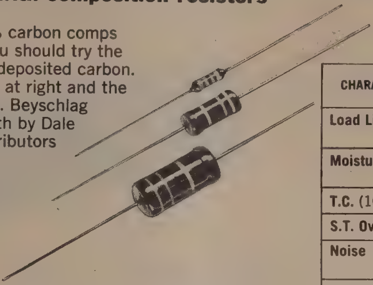
ATTENUATOR PADS Write for Bulletin AP13 covering our extensive line of pads.

For complete information, write or phone: **DALE ELECTRONICS, INC.,** Box 74, Norfolk, Nebraska 68701, Phone: 402-371-0080

DEPENDABLE DALE® RESISTORS

BEYSCHLAG SUPERIOR QUALITY 5% DEPOSITED CARBON RESISTORS
priced competitively with composition resistors

If you are using the best 5% carbon comps made in North America...you should try the world's best semi-precision deposited carbon. Check the comparison chart at right and the general specifications below. Beyschlag resistors are stocked in depth by Dale and handled by leading distributors from coast to coast.



CHARACTERISTIC	CARBON COMP per MIL-R-11 limits	BEYSCHLAG
Load Life	Avge. Allowable ±6.0% Max. Allowable ±10.0%	Less than 1.0%
Moisture Resistance	Avge. Allowable ±10.0% Max. Allowable ±15.0%	Less than 1.5%
T.C. (10Ω to 1 Meg.)	600 to ±1800 PPM*	−250 to −500 PPM
S.T. Overload	±2.5%	Less than 0.5%
Noise	Not applicable in Mil. specifications	0.3 microvolt/v**
Resistance to Soldering Heat	±3.0%	Less than 0.2%

*Depending on value and temperature. **Depending upon type and value.

GENERAL SPECIFICATIONS

Load Life ΔR/R 1000 hours: Less than 2.0%. Continuous operation @ 40°C results in maximum 1.0% change

Shelf Life ΔR/R: < 0.5% after 12 months

Moisture Resistance ΔR/R: < 1.0%

Solderability ΔR/R: < 0.5% ±0.1Ω

Voltage Coefficient: < 5 PPM per Volt

Short Time Overload ΔR/R: < 1.0%

Shock ΔR/R: < 0.5% ± 0.1Ω

Insulation Resistance: < 10^{10} Ω

H.F. Vibration ΔR/R: < 0.5% ± 0.1Ω

Terminal Strength ΔR/R: < 0.2% ± 0.1Ω

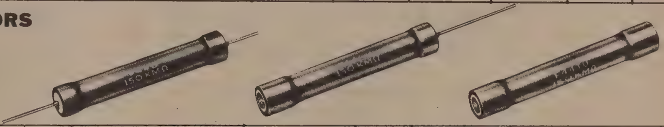
Low Temp. Operation ΔR/R: < 0.2% ± 0.1Ω

TYPE	WATTS @ 70°C	MAX. BODY LENGTH (Inches)	DIA. (Inches)	LEAD DIA. (Inches)	MAX. WORKING VOLTAGE	DIEL. VOLTAGE DC	RESISTANCE RANGE		
							TOL.	MIN.	MAX.
SBA	1/8	0.160	0.063	0.016	150	300V	±5% ±2%	10Ω 10Ω	220K 220K
SBB	1/4	0.250	0.098	0.024	250	500V	±5% ±2%	1Ω 1Ω	5.1M 5.1M
SBC	1/2	0.350	0.114	0.028	350	700V	±5% ±2%	1Ω 1Ω	5.1M 5.1M
SBE	3/4	0.470	0.157	0.032	500	1000V	±5% ±2%	1Ω 1Ω	10M 5.1M
SBF	1	0.554	0.236	0.032	630	1000V	±5% ±2%	1Ω 1Ω	22M 5.1M
SBH	2	0.810	0.354	0.032	750	1000V	±5% ±2%	10Ω 10Ω	22M 5.1M

HIGH VOLTAGE OXIDE RESISTORS

High Voltage oxide resistors with stability and reliability in high voltage and pulse applications far exceeding that obtained from components previously available. Continuous voltage stress up to 8,000 volts per inch can be applied. In addition, voltage pulses up to 3-1/2 times the magnitude of the continuous rating may be applied without deterioration of the element.

Industrial grade high voltage styles also available. Ask for TO Types F53D, F535D and F54D.

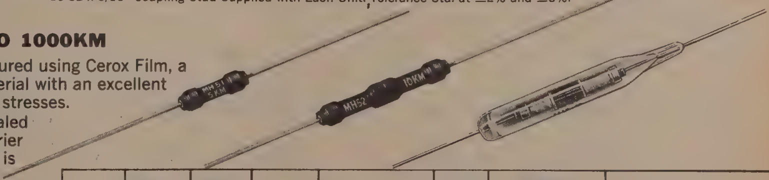


TYPE	WATTS @ 40°C	TERMINATION	DIMENSIONS		WORKING VOLTAGE	PULSE VOLTAGE	TEMP. RISE	RESISTANCE RANGE		
			L	D				TOL.	MIN.	MAX.
F43D	1/2	Standard Wire Leads	1.094″	0.312″	4KV.	15KV	26°C	±2%	2M	3,000M
F43KU	1/2	Comb. Lead/Threaded Cap	1.188″	0.312″	4KV	15KV	26°C	±5%	2M	100,000M
*F43TU	1/2	Threaded Cap, Both Ends	1.280″	0.312″	4KV	15KV	26°C	±10%		
F44D	1	Standard Wire Leads	2.000″	0.312″	14KV	50KV	36°C	±2%	2M	10,000M
F44KU	1	Comb. Lead/Threaded Cap	2.094″	0.312″	14KV	50KV	36°C	±5%	2M	150,000M
*F44TU	1	Threaded Cap, Both Ends	2.187″	0.312″	14KV	50KV	36°C	±10%		

*10-32 x 5/16″ Coupling Stud Supplied with Each Unit. Tolerance Std. at ±2% and ±5%.

ULTRA HIGH VALUES–TO 1000KM

High Value resistors are manufactured using Cerox Film, a highly stable thick resistance material with an excellent voltage coefficient at high voltage stresses. **Type M51 resistors** are vacuum sealed in a glass envelope to which a barrier coating of special silicone lacquer is applied to minimize the effects of surface moisture or contamination. **Types MH51 and MH52** are encapsulated in a sleeve of irradiated polyolefin heat shrunk for intimate contact with the capped body.



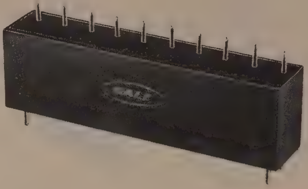
TYPE	WATTS @ 40°C	MAX. VOLT	LENGTH	DIAMETER	LEAD DIA.	RESISTANCE RANGE	TOLERANCE
MH51	1/4	1500	.50″	.140″ ± .010″	.028″	30M- 5KM	5%, 10%, 20%
MH52	1/2	3000	.88″	.140″ ± .020″	.028″	60M-10KM	1%, 2%, 5%, 10%, 20%
M51	1/2	500	1.88″	.216″ ± .006″	.020″	10M-1000KM	1%, 2%, 5%, 10%, 20%

DEPENDABLE DALE® ATTENUATORS

TYPE 62-00
MULTIPLE ATTENUATORS

FEATURES

- Units contain 2, 3, 4 or 5 attenuator pads.
- Suitable for direct insertion into printed circuit boards.
- Balanced square pads and unbalanced pads are available.



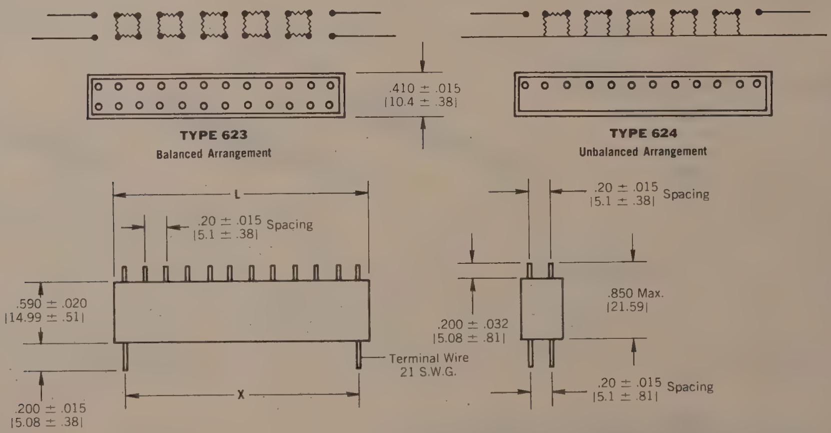
CIRCUIT DESIGN: The individual pads for the input and output form a wiring field on the upper surface. By the use of appropriate wire links, any combination of the pads may be brought into circuit. The choice of a Binary Series of pads enables a range of attenuation from the value of the lowest pad to the sum of all pads, in steps of the lowest value to be selected. For example: a unit containing 1/2, 1, 2 and 4 dB provides 0 to 7½ dB in 1/2 dB steps.

CHARACTERISTIC IMPEDANCE: 75Ω and 600Ω are standard. Other values to special order.

NUMBER OF PADS: 2, 3, 4 or 5

RANGE OF INSERTION LOSS: Standard values of 0.25, 0.5, 1, 2, 4, 6, 8 and 16 dB per pad from the range of 0.1 to 40 dB.

Dimensions in Inches
[Dimensions in Millimeters]


.410 ± .015
[10.4 ± .38]
TYPE 623
Balanced Arrangement
TYPE 624
Unbalanced Arrangement
L
.20 ± .015
[5.1 ± .38]
Spacing
.590 ± .020
[14.99 ± .51]
.200 ± .015
[5.08 ± .38]
Terminal Wire
21 S.W.G.
X
.20 ± .015
[5.1 ± .38]
Spacing
.850 Max.
[21.59]
.200 ± .032
[5.08 ± .81]
.20 ± .015
[5.1 ± .81]
Spacing

ORDERING INFORMATION

See table for type designation identifying the number of pads and configuration required. Specify characteristic impedance and values of individual pads in the order required, e.g., 6245 600Ω 1+2+4+8 + 16 dB.

TYPE NO.		NO. OF PADS	INCHES [mm] X	INCHES [mm] L
Balanced	Unbalanced			
6232	6242	2	1.0 ± 0.015 [25.4 ± 0.38]	1.2 max. [30.5]
6233	6243	3	1.4 ± 0.015 [35.6 ± 0.38]	1.6 max. [40.6]
6234	6244	4	1.8 ± 0.015 [45.7 ± 0.38]	2.0 max. [50.8]
6235	6245	5	2.2 ± 0.015 [55.9 ± 0.38]	2.4 max. [61.0]

DEPENDABLE DALE® ATTENUATORS

GENERAL INFORMATION

STANDARD IMPEDANCE VALUES: 75Ω, 140Ω and 600Ω. For special requirements, pads can be designed to provide any value of characteristic impedance in a very wide range.

IMPEDANCE ACCURACY: The impedance match is such that when the output terminals are closed by a resistor of the nominal impedance, the return loss against the nominal impedance is greater than 35 dB.

RANGE OF ATTENUATION: Pads can be supplied with any value of insertion loss between 0.1 dB and 40 dB (or between 0.01 neper and 4 nepers).

CONFIGURATION: Available in π, T, balanced π or square and balanced T or H. Units are also available giving change of impedance at minimum insertion loss both for balanced and unbalanced lines.

TERMINAL ARRANGEMENTS: Standard styles are shown in the drawings. These provide for the alternatives of solder lugs, wire leads for conventional wiring and leads for printed wiring.

FREQUENCY RANGE: Frequency range depends on the deviation that can be permitted from the nominal attenuation. This deviation will vary with different values of impedance and insertion loss. For example, 8 dB unbalanced pads of 75 Ω characteristic impedance may be used at any frequency up to 12 Mc and the insertion loss will not deviate by more than 0:2 dB from the value measured at DC. Information on the performance of any pads at high frequencies can be supplied on request.

RATING: Individual elements employed by these networks are rated at 250 milliwatts unless otherwise stated.

TEMPERATURE RANGE: −40°C to +85°C

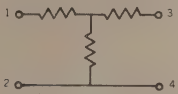
BALANCE: In all types of balanced pads, a measurement of resistance made between one input terminal and either output terminal will not differ by more than 3% from a measurement made between the other two terminals.

STABILITY: Under normal ambient conditions, the value of attenuation will not change by more than 0.05 dB. The change after prolonged exposure to humid conditions will not exceed 0.1 dB.

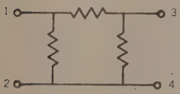
STANDARD TOLERANCE OF INSERTION LOSS: The tolerance of the insertion loss is dependent on the nominal value of insertion loss in accordance with the following table.

Nominal Value of Insertion Loss (dB)	Permissable Departure from Nominal Loss (dB)
Less than 0.25	±0.03
0.25 or more but less than 0.5	±0.05
0.5 or more but less than 2.0	±0.1
2.0 or more but less than 15	±0.2
15 or more	±0.25

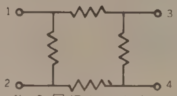
CONFIGURATIONS AND TERMINAL DIAGRAMS



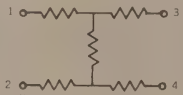
No. 1 T



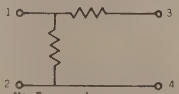
No. 2 π



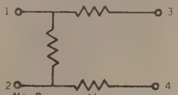
No. 3 □ (Balanced π)



No. 4 H (Balanced T)



No. 5 L
(Change of impedance. Unbalanced)



No. 6 U
(Change of impedance. Balanced)

Standard housings and terminal arrangements are shown here. Configuration of pads, characteristic impedance and insertion loss can be made to customer requirements. The range includes both single and multiple section pads.

When attenuator pads are made from discrete components, film resistors of appropriate stability are used. They are taken from the Dale film resistor production line before terminal wires are fitted. Interconnections in the various attenuators are then made directly from the end caps of the resistors to the terminal tags. Intermediate connections are kept to a minimum and the possibility of dry joints is eliminated.

Pads are encapsulated in resin or encased in a plastic molding which protects them from damage and insures that, under the most severe environmental conditions, there is no change in the electrical properties.

Resistance values are selected to give the correct matching impedance for the pad and to provide an insertion loss well inside the tolerance limits. Attenuators cannot be manufactured to the necessary degree of accuracy by using resistors of preferred values from E.I.A. Series, and it is essential to employ resistors made to the design calculated value and the appropriate close tolerance.

The reactance of discrete film resistors is low and this insures that the attenuation of the pad is constant over a wide range of frequencies. In some configurations and attenuation values, the insertion loss is constant from DC up to 10 MHz. Relative positioning of resistors is carefully maintained so that characteristic behavior at various frequencies is consistent between different units.

Attenuators are housed in plastic cases made to close dimensional tolerances. The marking is well cured, providing an indelible identification. Insulation between the elements and the surface of the case is maintained at a value in excess of 10^9 ohms at 500 volts DC. Cases are available in different colors and may be used to identify the impedance or other characteristic of the assembly.

Standard terminals include solder lugs and wire leads for conventional wiring or for direct insertion into printed circuit boards. Other terminal arrangements can be provided to suit particular applications.

DALE ELECTRONICS, INC.
Box 74, Norfolk, Nebraska 68701 • Phone 402—371-0080
A subsidiary of The Lionel Corporation

In Canada: Dale Electronics Canada Ltd. • In Europe: Dale Electronics GmbH. 8 Munchen 60. Falkweg 51. West Germany

Resistance functions ...packaged to go!

Thirty watts and 10 KVDC from a discrete thin film network? Sure! It's all in a day's work for Dale. We're specialists in tailoring the advantages of thin (metal or carbon) discrete film resistors to meet your unique and urgent needs. Dale discrete thin film network capabilities range from simple voltage dividers to complex binary D/A ladders with accuracy to 1/2 LSB.

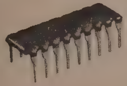
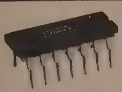
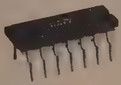
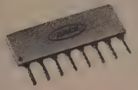
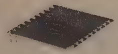
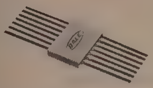
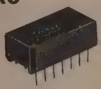
Packaging can vary from coated or molded, single or dual in-line to custom shapes and enclosures for unusual space and/or heat dissipation requirements. Resistor pairs or sets matched for ratio, T.C. tracking and/or tolerance can also be packaged to go. When what you need isn't in the catalog, call Dale. We cater to special needs. For immediate help with special film resistors, call **402-371-0080**

DEPENDABLE DALE®

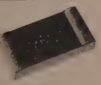
DALE ELECTRONICS, INC.
P. O. Box 74, Norfolk, Nebraska 68701
In Canada: Dale Electronics Canada Ltd.
In Europe: Dale Electronics GmbH,
8 Munchen 60, Falkweg 51, West Germany
A subsidiary of The Lionel Corporation

DEPENDABLE DALE® NETWORKS

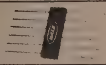
THICK FILM and DISCRETE NETWORKS

TYPE	BASIC DESCRIPTION	NO. OF PINS	CONDENSED SPECIFICATIONS
CDP 	DIP style with flame retardant coating. Also available in double width style.	14, 16, 18 (up to 24 in double width)	**Power Rating:** 1/8 watt maximum/resistor; maximum/package = 1-1/4 watts **Resistance Range:** 10Ω to 1 Meg. **Tolerance:** ±2%, 5%, 10% **T.C.:** ±250 PPM/° C
CDM 	DIP style with flat ceramic top. Epoxy coating. Suitable for automatic insertion. Designed to meet MIL-R-83401.	14, 16, 18	**Power Rating:** .10 watt maximum/resistor; maximum/package = 1-1/4 watts **Resistance Range:** 10Ω to 1.0 Meg. **Tolerance:** ±1%, 2%, 5%, 10% **T.C.:** ±300 PPM/° C
LDP 	DIP style with flat ceramic top. Epoxy coating. Suitable for automatic insertion. ***Complete specifications on following pages.***	14, 16, 18	**Power Rating:** .10 watt maximum/resistor; maximum/package = 1-1/4 watts **Resistance Range:** 10Ω to 1.0 Meg. **Tolerance:** ±1%, 2%, 5%, 10% **T.C.:** ±250 PPM/°C
SDM	DIP style with sandwich-type construction. Designed to meet MIL-R-83401. ***Complete specifications on following pages.***	14, 16, 18	**Power Rating:** 1/10 watt maximum/resistor; maximum/package = 1-1/4 watts **Resistance Range:** 10Ω to 1 Meg., depending on tolerance **Tolerance:** ±1%, 2%, 5%, 10% **T.C.:** ±300 PPM/° C
SDP	DIP style with sandwich-type construction. ***Complete specifications on following pages.***	14, 16, 18	**Power Rating:** 1/10 watt maximum/resistor; maximum/package = 1-1/4 watts **Resistance Range:** 10Ω to 1 Meg., depending on tolerance **Tolerance:** ±1%, 2%, 5%, 10% **T.C.:** ±250 PPM/°C
CSP 	Single in-line package with flame retardant epoxy coating. Built-in standoffs. Lead spacings .100" and .125". ***Complete specifications on following pages.***	4, 6, 8, 10	**Power Rating:** 1/8 watt maximum/resistor; maximum/package = 1-1/4 watts **Resistance Range:** 10Ω to 1 Meg., depending on tolerance **Tolerance:** ±1%, 2%, 5%, 10%, 20% **T.C.:** ±250 PPM/° C
TKR-36 	Binary ladder network designed for precision digital to analog conversion. Double-width DIP style package with flame retardant epoxy coating.	20	**Resistance Value:** 1K, 5K, 10K, 20K **Accuracy:** ±1/2, 1, 2 LSB **Tolerance:** ±5% typical
DFP 	Compact, thick film flat pack. Ceramic enclosure. Two internal configurations.	14, 16	**Power Rating:** .2 watt or .1 watt/resistor, depending on configuration; maximum/package = .65 watt **Resistance Range:** 20Ω to 1 Meg., depending on tolerance **Tolerance:** ±2%, 5%, 10%, 20% **T.C.:** ±250 PPM/° C
SPR-ARO 	DIP style with up to 11 discrete resistive elements. For use where tight tolerance and low temperature coefficient are required. Meets functional requirements of MIL-R-10509 and MIL-R-55182.	14, 16	**Power Rating:** .1 watt maximum/resistor; maximum/package = 1 watt **Resistance Range:** 10Ω to 400KΩ **Tolerance:** ±.05% to 5% **T.C.:** 10 PPM/° C to 200 PPM/° C

CHIP RESISTORS

RC 	Thick film chip resistor with choice of sizes to allow wide design flexibility in hybrid circuitry. ***Complete specifications on following pages.***	None	**Power Rating:** 75, 100, 150 and 300 mw **Resistance Range:** 100Ω to 500KΩ **Tolerance:** ±1%, 2%, 5%, 10%, 20% **T.C.:** ±250 PPM/°C

SPECIALTY NETWORKS

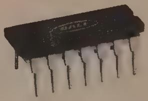
	Discrete precision wirewound and film resistors packaged to your requirements and providing broad flexibility in meeting electrical and physical requirements. ***Complete specifications on following pages.***

DEPENDABLE DALE® NETWORKS

TYPE LDP (Sandwich) THICK FILM PACKAGE

FEATURES

- Compact resistor circuits
- Suitable for automatic insertion
- Eliminates handling individual resistors



SPECIFICATIONS

ELECTRICAL

Resistance Range: 10Ω to 1 Megohm

Temperature Coefficient: ±250PPM/°C over a temperature range of −55°C to +150°C. (+25°C reference.)

Operating Voltage: 75 VDC typical (2 volts max. per .001″ of resistor length).

Power Rating: At 70°C, 1/8 watt maximum/resistor. Total package rating: LDP-14, 1 watt; LDP-16, 1-1/8 watt; LDP-18, 1-1/4 watt.

Ratio Matching: 0.5% available on special request.

T. C. Tracking: 50PPM/°C available on special request...in resistors of similar geometry and value.

Voltage Coefficient: As low as ±15PPM/V, depending on resistor geometry and value.

Noise: Depends on resistor geometry and value.

Operating Temp. Range: −55°C to +150°C.

MATERIAL

Element: Fused, thick film compositions

Substrate: High purity 95% minimum alumina

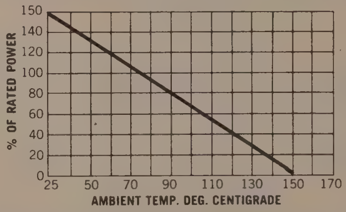
Terminals: Tin-plated Alloy 42 or equivalent

Coating Material: Epoxy between ceramic sandwich

DERATING

Dale thick film dual in-line sandwich packages have an operating temperature range of −55°C to +150°C. They should be derated at high ambient temperatures according to the curve at right.

Note: Power rating based on still air hotspot mounted on 1/16″ P.C. board at 70°C ambient. See derating curve between 25°C and 70°C.



ENVIRONMENTAL PERFORMANCE SPECIFICATIONS
MIL-R-83401

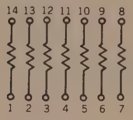
ENVIRONMENTAL TEST	DALE TYPICAL
Temperature Cycling	.10%ΔR
Low Temp. Operation	.10%ΔR
Short Time Overload	.05%ΔR
Resistance to Soldering Heat	.10%ΔR
Moisture Resistance	.20%ΔR
Load Life (1,000 hours)	.10%ΔR
Shock, Medium Impact	.05%ΔR
Vibration	.05%ΔR

DEPENDABLE DALE® NETWORKS

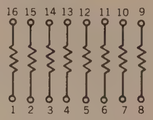
TYPICAL SCHEMATICS

SCHEMATICS: All resistors/package are the same value. Consult factory for different circuitry and/or mixed values.

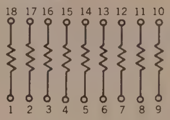
LDP-14-01


14 13 12 11 10 9 8
1 2 3 4 5 6 7

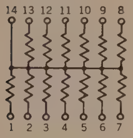
LDP-16-01


16 15 14 13 12 11 10 9
1 2 3 4 5 6 7 8

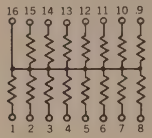
LDP-18-01


18 17 16 15 14 13 12 11 10
1 2 3 4 5 6 7 8 9

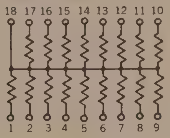
LDP-14-02


14 13 12 11 10 9 8
1 2 3 4 5 6 7

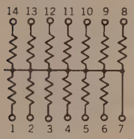
LDP-16-02


16 15 14 13 12 11 10 9
1 2 3 4 5 6 7 8

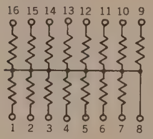
LDP-18-02


18 17 16 15 14 13 12 11 10
1 2 3 4 5 6 7 8 9

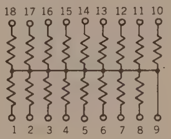
LDP-14-03


14 13 12 11 10 9 8
1 2 3 4 5 6 7

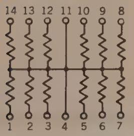
LDP-16-03


16 15 14 13 12 11 10 9
1 2 3 4 5 6 7 8

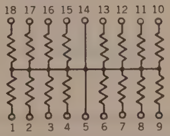
LDP-18-03


18 17 16 15 14 13 12 11 10
1 2 3 4 5 6 7 8 9

LDP-14-04

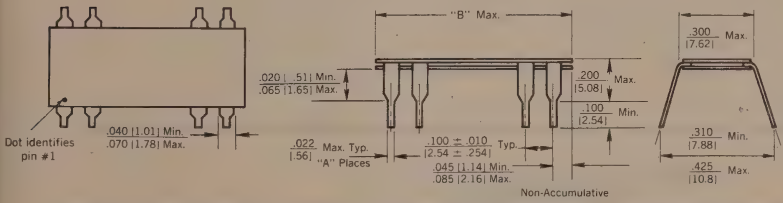

14 13 12 11 10 9 8
1 2 3 4 5 6 7

LDP-18-04


18 17 16 15 14 13 12 11 10
1 2 3 4 5 6 7 8 9

DIMENSIONAL AND TERMINAL CONFIGURATIONS

Dimensions in Inches
[Dimensions in Millimeters]


Dot identifies pin #1
.040 [1.01] Min.
.070 [1.78] Max.
.020 [.51] Min.
.065 [1.65] Max.
"B" Max.
.022 [.56] Max. Typ.
"A" Places
.100 ± .010 [2.54 ± .254] Typ.
.045 [1.14] Min.
.085 [2.16] Max.
Non-Accumulative
.200 [5.08] Max.
.100 [2.54] Min.
.300 [7.62] Max.
.310 [7.88] Min.
.425 [10.8] Max.

SERIES	A	B
LDP-14	14	.760 [19.3]
LDP-16	16	.860 [21.85]
LDP-18	18	.960 [24.4]

ORDERING INFORMATION

LDP	14	01	182	G
1. SERIES	2. NO. OF PINS	3. CONFIGURATION	4. RESISTANCE VALUE	5. TOLERANCE

1. **Series**
2. **Number of Pins**
3. **Configurations** (see schematics)
4. **Resistance Value**—the first two digits are significant figures; the last digit specifies the number of zeros to follow. NOTE: For "F" tolerance, the first three digits are significant figures and the last digit specifies the number of zeros to follow.
5. **Tolerance:** **F** = ±1%, **G** = ±2%, **J** = ±5%, **K** = ±10%, **M** = ±20%

EXAMPLE:

LDP14-01-182G = a thick film resistor with 14 pins with a resistance value of 1800 ohms, tolerance of 2% and the resistor configuration identified as –01 in the drawing above.

DEPENDABLE DALE® NETWORKS

TYPE SDM (Sandwich) THICK FILM PACKAGE
MIL-R-83401

FEATURES

- Compact resistor circuits
- Dual in-lines
- Eliminates handling individual resistors
- 100% conditioning per Group A of MIL-R-83401

SPECIFICATIONS

ELECTRICAL

Resistance Range: 10Ω to 1 Megohm

Temperature Coefficient: ±300 PPM/°C over a temperature range of −55°C to +125°C. (+25°C reference.)

Operating Voltage: 75 VDC typical (2 volts max. per .001" of resistor length).

Power Rating: At 70°C, 1/10 watt maximum/resistor. Total package rating: SDM-14, 1 watt; SDM-16, 1-1/8 watt; SDM-18, 1-1/4 watt.

Tolerance: ±1%, ±2%, ±5%.

Voltage Coefficient: As low as ±15 PPM/V, depending on resistor geometry and value

Noise: Depends on resistor geometry and value.

Operating Temp. Range: −55°C to +125°C

MATERIAL

Element: Fused, thick film compositions

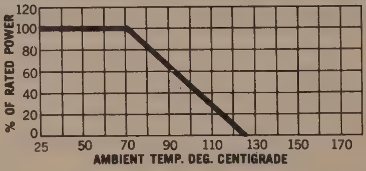
Substrate: High purity 95% minimum alumina

Terminals: Tin-plated Alloy 42 or equivalent

Coating Material: None

DERATING

Dale thick film dual in-line sandwich packages have an operating temperature range of −55°C to +125°C. They should be derated at high ambient temperatures according to the curve at right.



ENVIRONMENTAL PERFORMANCE SPECIFICATIONS
MIL-R-83401

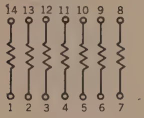
ENVIRONMENTAL TEST	DALE TYPICAL
Temperature Cycle	.10%ΔR
Low Temp. Operation	.05%ΔR
Short Time Overload	.05%ΔR
Resistance to Soldering Heat	.15%ΔR
Moisture Resistance	.20%ΔR
Load Life (1,000 hours)	.10%ΔR
Shock, Medium Impact	.05%ΔR
Vibration	.02%ΔR
High Temp. Exposure	.05%ΔR
Low Temp. Storage	.10%ΔR

DEPENDABLE DALE® NETWORKS

TYPICAL SCHEMATICS

SCHEMATICS: All resistors/package are the same value. Consult factory for different circuitry and/or mixed values.

SDM-14-01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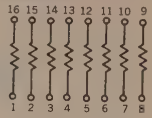
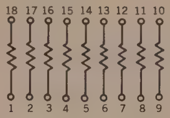
1 2 3 4 5 6 7

SDM-16-01


16 15 14 13 12 11 10 9
1 2 3 4 5 6 7 8

SDM-18-01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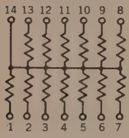
1 2 3 4 5 6 7 8 9

SDM-14-02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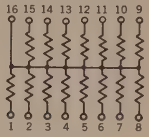
1 2 3 4 5 6 7

SDM-16-02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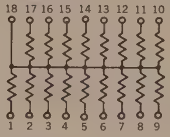
1 2 3 4 5 6 7 8

SDM-18-02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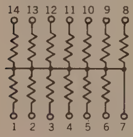
1 2 3 4 5 6 7 8 9

SDM-14-03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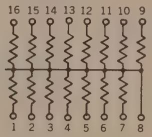
1 2 3 4 5 6 7

SDM-16-03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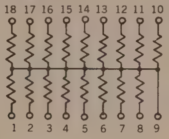
SDM-18-03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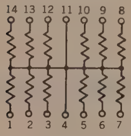
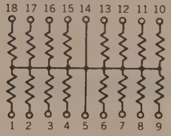
1 2 3 4 5 6 7 8 9

SDM-14-04

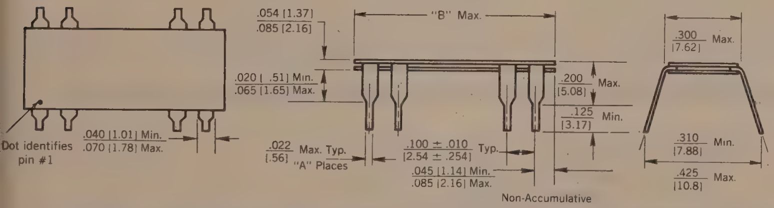

14 13 12 11 10 9 8
1 2 3 4 5 6 7

SDM-18-04


18 17 16 15 14 13 12 11 10
1 2 3 4 5 6 7 8 9

DIMENSIONAL AND TERMINAL CONFIGURATIONS

Dimensions in Inches
[Dimensions in Millimeters]


.054 [1.37]
.085 [2.16]
"B" Max.
.020 [.51] Min.
.065 [1.65] Max.
.200 [5.08] Max.
.125 [3.17] Min.
.300 [7.62] Max.
.310 [7.88] Min.
.425 [10.8] Max.
Dot identifies pin #1
.040 [1.01] Min.
.070 [1.78] Max.
.022 [.56] Max. Typ. "A" Places
.100 ± .010 [2.54 ± .254] Typ.
.045 [1.14] Min.
.085 [2.16] Max.
Non-Accumulative

SERIES	A	B
SDM-14	14	.760 [19.3]
SDM-16	16	.860 [21.85]
SDM-18	18	.960 [24.4]

ORDERING INFORMATION

SDM	14	01	182	G
1. SERIES	2. NO. OF PINS	3. CONFIGURATION	4. RESISTANCE VALUE	5. TOLERANCE

1. **Series**
2. **Number of Pins**
3. **Configurations** (see schematics.)
4. **Resistance Value**—the first two digits are significant figures; the last digit specifies the number of zeros to follow. NOTE: for "F" tolerance, the first three digits are significant figures and the last digit specifies the number of zeros to follow.
5. **Tolerance:** F = ±1%, G = ±2%, J = ±5%, K = ±10%, M = ±20%

EXAMPLE:
SDM14-182G-01 = a thick film resistor with 14 pins with a resistance value of 1800 ohms, tolerance of 2% and the resistor configuration identified as –01 in the drawing above.

DEPENDABLE DALE® NETWORKS

TYPE SDP (Sandwich) THICK FILM PACKAGE

FEATURES

- Compact resistor circuits
- Dual in-lines
- Eliminates handling individual resistors

SPECIFICATIONS

ELECTRICAL

Resistance Range: 10Ω to 1 Meg.

Temperature Coefficient: ±250 PPM/°C over a temperature range of −55°C to +150°C (+25°C reference.)

Operating Voltage: 75 VDC typical (2 volts max. per .001″ of resistor length).

Power Rating: At 70°C, 1/8 watt maximum/resistor. Total package rating: SDP-14, 1-1/8 watt; SDP-16, 1-1/4 watt; SDP-18, 1-1/2 watt.

Ratio Matching: 0.5% available on special request.

T. C. Tracking: 50 PPM/°C available on special request... in resistors of similar geometry and value.

Voltage Coefficient: As low as ±15 PPM/V, depending on resistor geometry and value.

Noise: Depends on resistor geometry and value.

Operating Temp. Range: −55°C to +150°C

MATERIAL

Element: Fused, thick film compositions

Substrate: High purity 95% minimum alumina

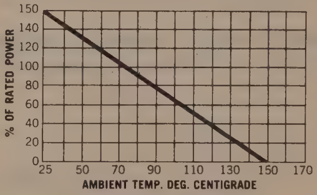
Terminals: Tin-plated Alloy 42 or equivalent

Coating Material: None

DERATING

Dale thick film dual in-line sandwich packages have an operating temperature range of −55°C to +150°C. They should be derated at high ambient temperatures according to the curve at right.

Note: Power rating based on still air hotspot mounted on 1/16″ P.C. board at 70°C ambient. See derating curve between 25°C and 70°C.



ENVIRONMENTAL PERFORMANCE SPECIFICATIONS
MIL-R-83401

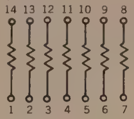
ENVIRONMENTAL TEST	DALE TYPICAL
Temperature Cycle	.10%ΔR
Low Temp. Operation	.05%ΔR
Short Time Overload	.05%ΔR
Resistance to Soldering Heat	.15%ΔR
Moisture Resistance	.20%ΔR
Load Life (1,000 hours)	.10%ΔR
Shock, Medium Impact	.05%ΔR
Vibration	.02%ΔR
High Temperature Exposure	.05%ΔR
Low Temperature Storage	.10%ΔR

DEPENDABLE DALE® NETWORKS

TYPICAL SCHEMATICS

SCHEMATICS: All resistors/package are the same value.
Consult factory for different circuitry and/or mixed values.

SDP-14-01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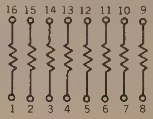
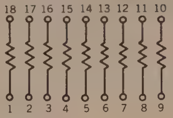
1 2 3 4 5 6 7

SDP-16-01


16 15 14 13 12 11 10 9
1 2 3 4 5 6 7 8

SDP-18-01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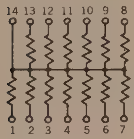
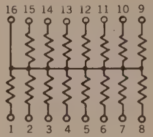
1 2 3 4 5 6 7 8 9

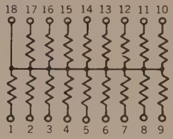
SDP-14-02


14 13 12 11 10 9 8
1 2 3 4 5 6 7

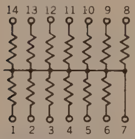
SDP-16-02


16 15 14 13 12 11 10 9
1 2 3 4 5 6 7 8

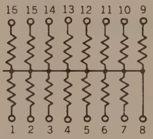
SDP-18-02


18 17 16 15 14 13 12 11 10
1 2 3 4 5 6 7 8 9

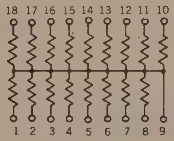
SDP-14-03


14 13 12 11 10 9 8
1 2 3 4 5 6 7

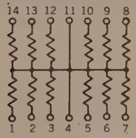
SDP-16-03


15 15 14 13 12 11 10 9
1 2 3 4 5 6 7 8

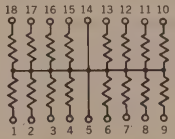
SDP-18-03


18 17 16 15 14 13 12 11 10
1 2 3 4 5 6 7 8 9

SDP-14-04

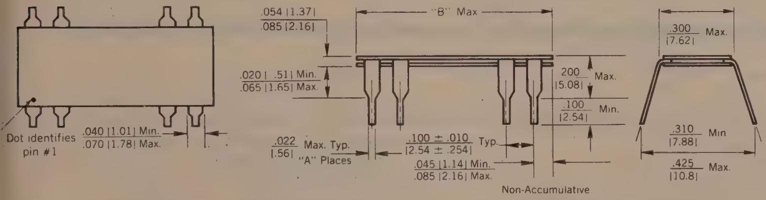

14 13 12 11 10 9 8
1 2 3 4 5 6 7

SDP-18-04


18 17 16 15 14 13 12 11 10
1 2 3 4 5 6 7 8 9

DIMENSIONAL AND TERMINAL CONFIGURATIONS

Dimensions in Inches
[Dimensions in Millimeters]


.054 [1.37]
.085 [2.16]
"B" Max
.300 [7.62] Max.
.020 [.51] Min.
.065 [1.65] Max.
.200 [5.08] Max.
.100 [2.54] Min.
.310 [7.88] Min
.425 [10.8] Max.
Dot identifies pin #1
.040 [1.01] Min.
.070 [1.78] Max.
.022 [.56] Max. Typ.
"A" Places
.100 ± .010 [2.54 ± .254] Typ.
.045 [1.14] Min.
.085 [2.16] Max.
Non-Accumulative

SERIES	A	B
SDP-14	14	.760 [19.3]
SDP-16	16	.860 [21.85]
SDP-18	18	.960 [24.4]

ORDERING INFORMATION

SDP	14	01	182	G
1. SERIES	2. NO. OF PINS	3. CONFIGURATION	4. RESISTANCE VALUE	5. TOLERANCE

1. **Series**
2. **Number of Pins**
3. **Configurations** (see schematics)
4. **Resistance Value**—the first two digits are significant figures; the last digit specifies the number of zeros to follow. NOTE: For "F" tolerance, the first three digits are significant figures and the last digit specifies the number of zeros to follow.
5. **Tolerance: F** = ±1%, **G** = ±2%, **J** = ±5%, **K** = ±10%, **M** = ±20%

EXAMPLE:
SDP14-182G-01 = a thick film resistor with 14 pins with a resistance value of 1800 ohms, tolerance of 2% and the resistor configuration identified as –01 in the drawing above.

DEPENDABLE DALE® NETWORKS

TYPE CSP (Coated) THICK FILM PACKAGE

FEATURES

- Flame retardant coating
- Compact resistor circuits
- Eliminates handling individual resistors
- Simplifies circuit wiring
- Single in-line package

SPECIFICATIONS

ELECTRICAL

Resistance Range: 10Ω to 1.0 Meg.

Temperature Coefficient: ±250 PPM/°C over a temperature range of −55°C to +150°C. (+25°C reference.)

Operating Voltage: 75 VDC typical (2 volts max. per .001″ of resistor length).

Power Rating: At 70°C, ⅛ watt maximum/resistor. See dimensional table for power rating by package.

Ratio Match: 0.5% available on special request.

T.C. Tracking: 50 PPM/°C available on special request.

Voltage Coefficient: As low as ±15 PPM/V, depending on resistor geometry and value.

Noise: Depends on resistor geometry and value

Operating Temp. Range: −55°C to +150°C

MATERIAL

Element: Fused, thick film compositions

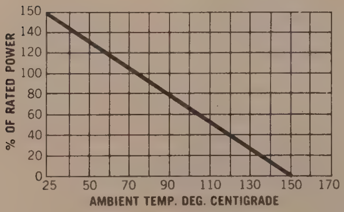
Substrate: High purity 95% minimum alumina

Terminals: Tin-plated alloy 42 or equivalent

Coating Material: Specially Dale-formulated epoxy

DERATING

Dale thick film single in-line resistor networks have an operating temperature range of −55°C to +150°C. They should be derated at high ambient temperatures according to the following curve:

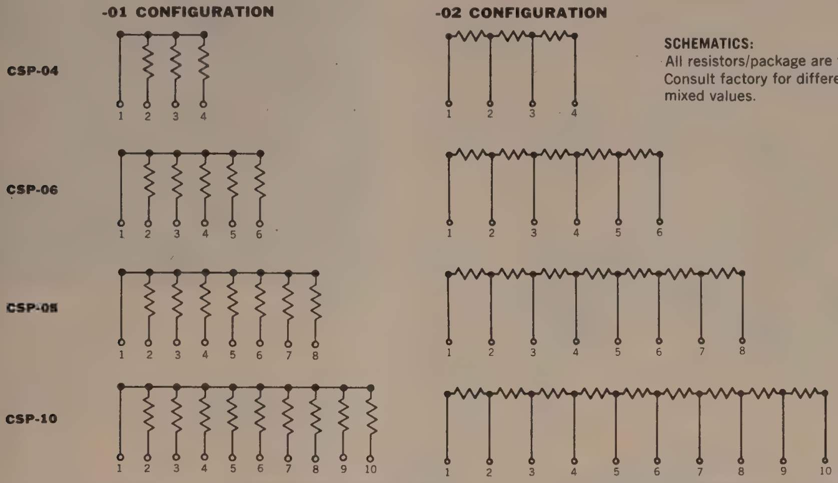


ENVIRONMENTAL PERFORMANCE SPECIFICATIONS
MIL-R-83401

ENVIRONMENTAL TEST	DALE TYPICAL
Temperature Cycling	±.10% ΔR
Low Temp. Operation	±.10% ΔR
Short Time Overload	±.06% ΔR
Resistance to Soldering Heat	±.10% ΔR
Insulation Resistance	10K Meg. min.
Moisture Resistance	±.25% ΔR
Load Life (1,000 hours)	±1% ΔR
Shock, Medium Impact	±.10% ΔR
Vibration	±.10% ΔR

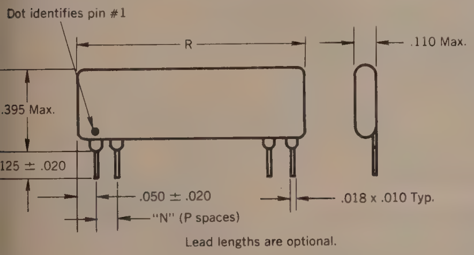
DEPENDABLE DALE® NETWORKS

TYPICAL SCHEMATICS



SCHEMATICS:
All resistors/package are the same value. Consult factory for different circuitry and/or mixed values.

DIMENSIONAL AND TERMINAL CONFIGURATIONS



Lead lengths are optional.

Note: Power rating based on still air hotspot mounted on 1/16" P.C. board at 70°C ambient. See derating curve between 25°C and 70°C.

MODEL	DIMENSIONS N	P	R	TERMINALS	POWER RATING (Watts)
CSP 04 E	.100 ± .010	3	.450 Max.	4	½
CSP 06 E	.100 ± .010	5	.650 Max.	6	¾
CSP 08 E	.100 ± .010	7	.850 Max.	8	1
CSP 10 E	.100 ± .010	9	1.050 Max.	10	1¼
CSP 04 F	.125 ± .010	3	.525 Max.	4	½
CSP 06 F	.125 ± .010	5	.775 Max.	6	¾
CSP 08 F	.125 ± .010	7	1.025 Max.	8	1
CSP 10 F	.125 ± .010	9	1.275 Max.	10	1¼

ORDERING INFORMATION

CSP	04	E	01	100	G
1. SERIES	2. NUMBER OF TERMINALS	3. LEAD SPACE CODE	4. CONFIGURATION	5. RESISTANCE VALUE	6. TOLERANCE

1. **Series**
2. **Number of terminals**
3. **Lead Spacing Code:** **E** = .100" centers, **F** = .125" centers
4. **Configurations** (see schematics)
5. **Resistance Value**—The first two digits are significant figures; the last digit specifies the number of zeros to follow.
   Note: For "F" tolerance, the first three digits are significant figures and the last digit specifies the number of zeros to follow.
6. **Tolerance:** **F** = ±1%, **G** = ±2%, **J** = ±5%, **K** = ±10%, **M** = ±20%

EXAMPLE:
CSP 04 E-01-100 G = a single in-line thick film resistor network with 4 terminals on .100" centers, -01 configuration, resistance of 10 ohms and tolerance of ±2%.

DEPENDABLE DALE® MICROCIRCUITS

THICK FILM MICROCIRCUITS

FEATURES

- Custom design allows you to specify design tolerance, packaging, environmental requirements.
- Engineering assistance for production design.
- Specialists in design of networks for high power dissipation.
- Standard dual in-line packaging or modular packaging with screened silicone coating and choice of lead types.
- Wide choice of pre-conditioning options.

CIRCUIT MATERIALS AVAILABLE

Substrates: Alumina

Terminations: Wire Leads, Ribbon Leads or Solder Pads

Conductors and Land Areas: Platinum Gold, Palladium Gold, Gold, Silver, Palladium Silver

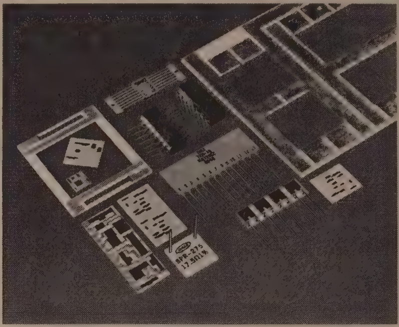
Crossovers: As required

Packaging: Dual in-line, single in-line, custom

Coating: Screened Silicone, epoxy, custom

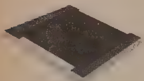
PRECONDITIONING OPTIONS

- Power Aging
- Temperature Cycling
- Temperature & Power
- Temperature Aging
- Short Time Overload
- Thermal Shock
- X-Ray



To obtain prototypes for your circuit...
contact your Dale representative or phone or write Dale at the address below. Dale's Microcircuit Department is geared to assist you with every phase of design—providing the shortest possible leadtime between concept and production ready component.

THICK FILM CHIP RESISTOR



Resistance Range: 100Ω to 500K. 10Ω to 5 Meg. by special order

Tolerance: ±20%, ±10%, ±5%, ±2%, ±1%

Temp. Coefficient: ±200 PPM (−55° C to +150° C) +25° C Reference

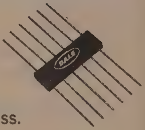
Operating Voltage: 50 to 125 VDC depending on size.

PHYSICAL	SIZE CODE	POWER RATING
.050 x .050	550	75mw
.050 x .075	575	100mw
.050 x .100	5100	150mw
.050 x .150	5150	300mw

WIREWOUND and FILM PACKAGED NETWORKS

FEATURES

- Choice of linear wirewound, bobbin wirewound, metal film, carbon film or cermet elements
- Less components to stock or handle
- Reduced inspection time
- Ease of assembly
- Matched resistors cannot be mixed or lost
- Complete environmental protection
- Dale networks meet or exceed requirements of MIL-R-26, MIL-R-93 or MIL-R-10509, depending on type of element used
- Packaged to meet your requirements



LADDER NETWORKS

- **Output Accuracy:** ±.05% full scale accuracy or ± 1/2 least significant bit, whichever is less.
- **Output Variation with Temp.:** ± .1% full scale accuracy or ± 1 least significant bit, whichever is less.
- **Operating Temp. Range** (For Accuracies Specified Above): −55° C to +70° C (Film Type) −55° C to +125° C (Wirewound Type).
- **Input Resistance** (All inputs connected): 1KΩ to 500KΩ
- **Output Resistance** (All inputs grounded): 250Ω to 125KΩ
- **Insulation Resistance:** 100 Megohms minimum.
- **Terminals:** Solderable or weldable wire leads.
- **Packaging:** Epoxy or Silicone resin potting. Transfer molded, Can be encapsulated. Other types of special packaging available to meet your requirements.

GENERAL RESISTOR ELECTRICAL CAPABILITIES

	WIREWOUND	FILM (Carbon & Metal)
Power Rating	.1 to 10 W	.02 to .5 W
Resistance Range	1 ohm to 1.5 Meg.	5 ohms to 5 Meg.
Tolerance	.02% to 1%	.1% to 1%
Tolerance Match	.005%	.05%
Temp. Coefficient	5 PPM/°C from 0° C to +75° C	25 PPM/° C
Temp. Coefficient Match	2 PPM/° C from 0° C to +75° C	7 PPM/° C
Resistance Stability	.005%/yr.	.03%/yr.
Operating Temp.	−65° C to +145° C	−55° C to +175° C

BINARY DIGITAL-TO-ANALOG LADDER NETWORKS

Resistor Parameters for meeting 4 and 8 bit dimensional requirements

	WIREWOUND	FILM
Power Rating	1/8 watt from −55° C to +125° C, derated linearly to 0 at +145° C	1/2 watt from −55° C to +70° C, derated linearly to 0 at +145° C.
Temp. Coefficient	0 ±20 PPM/° C from −55° C to +125° C. Lower T.C.'s available upon request	400 PPM/° C max. T. C.'s available down to 25 PPM/° C
Heat Rise	20° C max. at rated power	60° C max. at rated power

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COMPANY HISTORY

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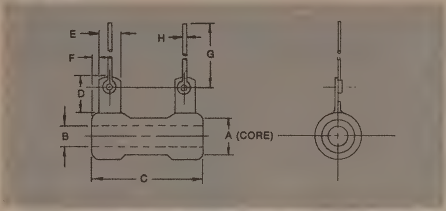
WIREWOUND RESISTORS

FIXED W/LEADS: TYPE FRL — 5-8, 10-12, 20 WATTS

Mtg. Bracket Mtg. Centers Wt. (Lbs.)	FR5-8 1441-003-001 1 11/32″ .012	FR10-12 1441-003-001 2 5/32″ .019	FR20 1441-004-001 2 17/32″ .033
Ohms	Max. Amps	Max. Amps	Max. Amps
0.5		4.90	6.32
1	2.29	3.46	4.47
1.5	2.30	2.82	
2	2.00	2.45	3.16
3	1.63	2.00	2.58
4	1.41	1.73	2.24
5	1.26	1.54	2.00
7.5	1.00	1.26	
10	.89	1.09	1.41
12	.81	1.00	
15	.73	.89	
20	.63	.77	
25	.56	.69	.89
30	.51	.63	
35	.47	.58	
40	.44	.54	
50	.40	.49	.63
75	.32	.40	.52
100	.28	.34	.45
125	25	.31	
150	.23	.28	.36
200	.20	.24	.32
225	.18	.23	
250	.17	.22	.28
300	.16	.20	.26
350	.15	.18	.24
400	.14	.17	.22
450	.13	.16	
500	.12	.15	.20
600	.11	.14	
700	.11	.13	.17
750	.10	.12	.16
800	.10	.12	.15
900	.094	.11	.15
1000	.089	.11	.14
1100	.085	.10	
1200	.081	.10	.13
1250	.080	.097	.12
1500	.073	.089	.12
1750	.067	.082	.11
2000	.063	.077	.10
2250	.059	.073	.094
2500	.056	.069	.089
3000	.046	.063	.081
3500	.043	.058	.075
4000	.040	.054	.070
4500	.038	.051	.066
5000	.036	.049	.063
6000	.033	.044	.057
7000	.030	.041	.053
7500	.029	.036	.051
8000	.029	.035	.050
9000	.027	.033	.047
10000	.026	.032	.043
12500	.023	.028	.032
15000	.021	.026	.029
20000	.018	.022	.026
25000	.015	.020	.023
30000			
50000		.014	.016
75000			.013
100000			.011



	A	B	C	D	E	F	G	H
FRL5-8W	5/16	.200	1	7/16	3/16	3/32	1¾	.036
FRL10-12W	5/16	.200	1¾	7/16	3/16	3/32	1¾	.036
FRL20W	7/16	¼	2	7/16	3/16	3/32	1¾	.036

FEATURES:

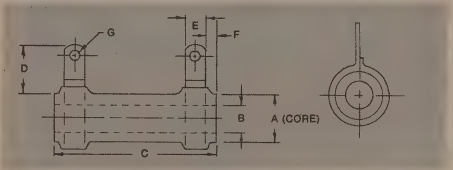
- Tubular construction provides excellent heat dissipation.
- Welded terminals and termination guarantees positive electrical connections.
- Balanced thermal expansion between core, wire and high temperature vitreous enamel assures reliable performance.
- Long term stability results from firing at temperatures exceeding 1000°F.
- Tinned terminals provide reliable solder or mechanical connections.
- Uniform winding and coating provides uniform heat dissipation and excellent appearance.
- Available in Non-inductive winding.
- Supplied with 1½″ solder leads.
- Other hardware available for mounting. See Hardware Section.

SPECIFICATIONS:

- Resistance tolerance ±5% . . . closer tolerance available.
- Temperature coefficient ±100 PPM . . . Lower TC available.
- When dual wattages are shown . . .
  - Lower wattages have a maximum "hotspot" of 275°C.
  - Higher wattages have a maximum "hotspot" of 350°C.
- Available resistance range 0.5 ohm to 100,000 ohm.
- Meets or exceeds applicable specifications of MIL-R-26.
- Dimensional Tolerances ±1/32″.

FIXED W/TABS: TYPE FR — 5-8, 10-12, 20, 25, 50, 100, 160-175, 200-225 WATTS

Mounting Brackets Mounting Centers Wt. (Lbs.)	FR25 1441-005-001 2¾″ .051	FR50 1441-005-001 4¾″ .082	FR100 1441-006-001 7⅜″ .2	FR160-175 1441-007-001 9⅜″ .445	FR200-225 1441-007-001 11⅜″ .74
Ohms	Max. Amps	Max. Amps	Max. Amps	Max. Amps	Max. Amps
1	5	7.07	10	13.2	15
2	3.54	5	7.07		10.60
3	2.88	4.07			
4	2.50	3.53			
5	2.24	3.16	4.47	5.92	6.72
10	1.58	2.23	3.16	4.18	4.74
15	1.29			3.24	
25	1	1.41	2	2.64	3
50	.71	1	1.41	1.87	2.12
75	.58	.82	1.15		1.73
100	.50	.71	1	1.32	1.50
150	.41	.58	.82	1.08	
200	.35	.50			
250	.32	.45	.63	.84	.95
500	.22	.32	.45	.59	.67
750	.18	.26	.37		
1000	.16	.22	.32	.42	.47
1500	.13	.18		.34	
2000	.12	.16	.22	.30	.34
2500	.10	.14			
3000	.091				
3500	.084				
4000	.079				
5000	.070	.10	.14	.19	.21
6000	.064				
7500	.057	.081			.17
10000	.050	.071	.10	.13	.15
15000	.036	.057		.11	
20000	.031	.050	.071	.094	.11
25000	.028	.045	.063	.083	
50000	.019	.026	.045	.059	.067
75000		.021	.032	.048	
80000	.012				
100000	.0094	.018	.028	.042	.047



	A	B	C	D	E	F	G
FR5-8	5/16	.200	1	7/16	3/16	3/32	.104
FR10-12	5/16	.200	1¾	7/16	3/16	3/32	.104
FR20	7/16	¼	2	7/16	3/16	3/32	.104
FR25	9/16	5/16	2	9/16	¼	3/32	.104
FR50	9/16	5/16	4	9/16	¼	3/32	.144
FR100	¾	½	6½	9/16	¼	3/32	.144
FR160-175	1⅛	¾	8½	⅝	5/16	3/32	.177
FR200-225	1⅛	¾	10½	⅝	5/16	3/32	.177

FEATURES:

- Tubular construction provides excellent heat dissipation.
- Welded terminals and termination guarantees positive electrical connections.
- Balanced thermal expansion between core, wire and high temperature vitreous enamel assures reliable performance.
- Long term stability results from firing at temperatures exceeding 1000°F.
- Tinned terminals provide reliable solder or mechanical connections.
- Uniform winding and coating provides uniform heat dissipation and excellent appearance.
- Available in Non-inductive winding.
- Quick disconnect terminal available as optional feature.
- Standard units supplied with push-in mounting brackets.
- Other hardware available for mounting. See Hardware Section.

SPECIFICATIONS:

- Resistance tolerance ±5% . . . closer tolerance available.
- Temperature coefficient ±100 PPM . . . Lower TC available.
- When dual wattages are shown . . .
  - Lower wattages have a maximum "hotspot" of 275°C.
  - Higher wattages have a maximum "hotspot" of 350°C.
- Available resistance range 0.5 ohm to 100,000 ohm.
- Meets or exceeds applicable specifications of MIL-R-26.
- Dimensional Tolerances ±1/32″ . . . except ±1/16″ on length of FR100W, FR160-175W and FR200-225W.

WIREWOUND RESISTORS

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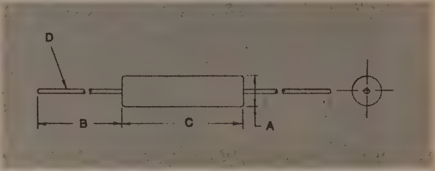
MOLDED SILICONE: TYPE ML — 1, 2, 3 WATTS/OHM VALES 1-10,000

Wt. (Lbs.) Ohms	ML1 .0009 Max. Amps	ML2 .0018 Max. Amps	ML3 .003 Max. Amps	Wt. (Lbs.) Ohms	ML1 .0009 Max. Amps	ML2 .0018 Max. Amps	ML3 .003 Max. Amps
1	1.24	1.5	1.8	220	.083	.10	.12
1.5	1.12	1.22	1.47	250	.077	.094	.11
2	1	1.05	1.27	270	.075	.091	.109
2.5	.87	.97	1.12	300	.071	.086	.10
3	.71	.86	1.04	350	.065	.080	.096
4	.61	.73	.90	400	.061	.075	.090
5	.55	.67	.81	450	.058	.071	.084
6	.49	.60	.73	470	.056	.069	.083
7.5	.45	.55		500	.055	.067	.081
8	.42	.52	.64	600	.050	.061	.073
10	.39	.47	.56	700	.046	.056	
12	.35	.43	.52	750	.045	.055	.065
15	.32	.39	.47	800	.043	.053	.064
20	.27	.33	.42	900	.041	.050	
25	.25	.30	.36	1000	.039	.047	.056
30	.22	.27	.30	1200	.035	.043	.052
35	.207	.25	.29	1500	.032	.039	.047
40	.193	.24	.28	2000	.027	.033	.040
50	.173	.21	.25	2500	.025	.030	.036
60	.156	.19	.23	3000		.027	.033
75	.141	.17	.21	3500		.024	.030
80	.135	.16	.20	4000			.028
90	.128	.16	.19	5000			.025
100	.123	.15	.18	6000			.023
125	.111	.14	.16	7500			.021
150	.1	.12	.15	8000			.020
175	.097	.12	.14	9000			.019
200	.087	.10	.13	10000			.018



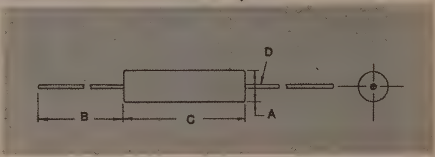
	A	B	C	D
ML1	.125	1½	.437	.020
ML2	.205	1½	.560	.032
ML3	.242	1½	.525	.032

FEATURES:
- Uniform molded size facilitates handling with automatic insertion equipment.
- Welded termination and lead/end cap assembly assure maximum reliability.
- Uniformly tinned leads assure reliable electrical and mechanical connections.
- Low temperature coefficient.
- 1% resistance tolerance standard.
- Available with Non-inductive winding.

SPECIFICATIONS:
- Resistance tolerance ±1% . . . Closer tolerance available.
- Temperature coefficient ±50 PPM . . . Lower TC available.
- Available resistance range 1-10,000 Ohm.
- Dielectric withstanding voltage 1000 V.
- Dimensional tolerances ±1/32″.

W/AXIAL LEADS: TYPE VL — 3, 5, 10 WATTS/OHM VALUES 1-50,000

Wt. (Lbs.) Ohms	VL3 .002 Max. Amps	VL5 .006 Max. Amps	VL10 .014 Max. Amps	Wt. (Lbs.) Ohms	VL3 .002 Max. Amps	VL5 .006 Max. Amps	VL10 .014 Max. Amps
1	1.80	2.24	3.32	600	.073	.091	
1.5	1.47	1.83	2.71	700	.068	.084	
2	1.27	1.58	2.34	750	.065	.082	.12
3	1.04	1.29	1.92	800	.064	.079	
4	.90	1.11	1.66	820		.078	
5	.81	1.00	1.48	900	.060	.074	
7.5	.65	.82	1.21	1000	.056	.071	.11
10	.56	.71	1.05	1100	.054		
12		.65		1200	.052	.065	
15	.47	.58	.86	1500	.047	.058	.086
20	.40	.50	.74	1800		.053	
25	.36	.45	.66	2000	.040	.050	.074
30	.30	.41	.61	2200	.039	.048	
35	.30	.38	.56	2500	.036	.045	.066
40	.28	.35	.51	3000	.033	.041	.061
47	.26	.33		3300	.031	.039	
50	.25	.32	.47	4000	.028	.035	.052
75	.21	.26	.38	4700	.026		
100	.18	.22	.33	5000	.025	.032	.047
125			.29	6000	.023	.029	.043
150	.15	.18	.27	7000	.021	.027	
200	.13	.16	.23	7500	.021	.026	.038
220	.12	.15	.22	8000		.025	
250	.11	.14	.21	8200	.020		
270	.109	.14		9000	.019	.024	
300	.100	.13	.19	10000	.018	.022	.033
330	.099	.12		12000		.020	
350		.12		15000		.018	.027
390	.091			20000		.016	
400	.090	.11	.16	25000		.014	.021
450	.084	.11	.16	35000			.018
500	.081	.10	.15	50000			.015



	A	B	C	D
VL3	7/32	1½	17/32	.032
VL5	5/16	1½	1 1/16	.036
VL10	3/8	1½	1 13/16	.036

FEATURES:
- Lowest cost Wirewound Resistor with vitreous enamel coating.
- Popular small sizes for circuit board, point-to-point, or terminal board applications.
- Welded terminations and lead/end cap assembly assure maximum reliability.
- Balanced thermal expansion between core, wire and high temperature vitreous enamel assures reliable performance.
- Long term stability results from firing vitreous enamel at temperatures exceeding 1000°F.
- Uniformly tinned leads assure reliable electrical and mechanical connections.
- Uniform winding and coating assure uniform heat dissipation and excellent appearance.
- Low temperature coefficient.
- Available with Non-inductive winding.

SPECIFICATIONS:
- Resistance tolerance ±5% . . . Closer tolerance available.
- Temperature coefficient ±150 PPM . . . Lower TC available.
- Available Resistance Range of 1 to 50,000 Ohm.
- Supplementary insulation is recommended when potential to ground is greater than 500 V.
- Dimensional tolerances ±1/32″.

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Molded Silicone: Type ML — 1, 2, 3 Watts/Ohm Values 7-10,000
Molded Silicone: Type ML — 1, 2, 3 Watts/Ohm Values 1-10,000

WIREWOUND RESISTORS

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Telephone (219) 356-4300
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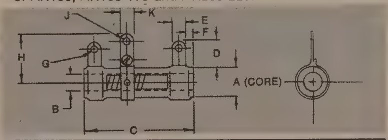
WIREWOUND RESISTORS

ADJUSTABLE: TYPE AR — 10-12, 25, 50, 75, 100, 160-175, 200-225 WATTS

Mounting Bracket Wt. (Lbs.)	AR10 1441-003-001 .02	AR25 1441-005-001 .05	AR50 1441-005-001 .09	AR75 1441-005-001 .15	AR100 1441-006-001 .20	AR160-175 1441-007-001 .50	AR200-225 1441-007-001 .62
Ohms	Max. Amps	Max. Amps	Max. Amps	Max. Amps	Max. Amps	Max. Amps	Max. Amps
1	3.46	5.0	7.07	8.66	10	13.2	15
2	2.45	3.54	5.00				
3	2.00	2.88					
5	1.54	2.24	3.16	3.87	4.47	5.92	6.72
7.5	1.26	1.82					
10	1.09	1.58	2.23	2.74	3.16	4.18	4.74
15	.89	1.29		2.24			
20	.77	1.12					
25	.69	1.00	1.41	1.73	2.00	2.64	3.00
50	.49	.71	1.00	1.22	1.41	1.87	2.12
75	.40	.58	.82	.86	1.00	1.32	1.50
100	.34	.50	.71				
150	.28	.41	.58				
200	.24	.35	.50	.61			
250	.22	.32	.45	.55	.63	.84	.95
300	.20	.29	.41				
400	.17	.25	.35				
500	.15	.22	.32	.39	.45	.59	.67
750	.13	.18	.26				
1000	.11	.16	.22	.27	.32	.42	.47
1500	.089	.13	.18				
2000	.077	.12	.16	.19			
2500	.069	.10	.14		.20	.26	.30
3000	.603	.01	.13				
3500	.058						
4000		.079					
5000	.049	.070	.10	.12	.14	.19	.21
7500	.040	.057	.081	.10			
10000	.035	.050	.071	.086	.10	.13	.15
12000		.042					
15000		.036	.057	.070			
20000		.031					
25000		.028	.045	.054	.063	.083	.095
50000			.026	.033	.045	.059	.067
75000					.032	.048	.055
100000					.028	.042	.047

FEATURES:
- Tubular construction provides excellent heat dissipation.
- Welded terminals and termination guarantees positive electrical connections.
- Balanced thermal expansion between core, wire and high temperature vitreous enamel assures reliable performance.
- Long term stability results from firing at temperatures exceeding 1000°F.
- Tinned terminals provide reliable solder or mechanical connections.
- Uniform winding and coating provide uniform heat dissipation and excellent appearance.
- Quick disconnect terminals available as optional features.
- Standard units supplied with push-in mounting brackets.
- Other hardware available for mounting. See Hardware Section.

SPECIFICATIONS:
- Resistance tolerance ±10% . . . Closer tolerance available.
- Temperature coefficient ±100 PPM . . . Lower TC available.
- When dual wattages are shown . . .
  Lower wattages have a maximum "hotspot" of 275°C.
  Higher wattages have a maximum "hotspot" of 350°C.
- Available resistance range 1.0 to 100,000 Ohms.
- Meets or exceeds applicable specifications of MIL-R-19365.
- Dimensional tolerances ±1/32" . . . except ±1/16" on length of AR100, AR160-175 and AR200-225.



	A	B	C	D	E	F	G	H	J	K
AR10-12	5/16	.200	1 3/4	7/16	3/16	3/32	.104	29/32	1/8	3/16
AR25	9/16	5/16	2	9/16	1/4	3/32	.144	1 3/64	.173	3/16
AR50	9/16	5/16	4	9/16	1/4	3/32	.144	1 3/64	.173	3/16
AR75	9/16	5/16	6	9/16	1/4	3/32	.144	1 3/64	.173	3/16
AR100	3/4	1/2	6 1/2	9/16	1/4	3/32	.144	1 1/4	.141	3/16
AR160-175	1 1/8	3/4	8 1/2	5/8	5/16	3/32	.177	1 29/64	.170	3/16
AR200-225	1 1/8	3/4	10 1/2	5/8	5/16	3/32	.177	1 29/64	.170	3/16

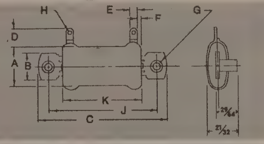
OVAL/MINIATURE OVAL: TYPE ZR (Oval) 30, 40, 55 W./TYPE MZ (Min. Oval) 10, 20 W.

FEATURES:
- Miniaturized oval for maximum power dissipation with lowest profile.
- Welded terminals and termination guarantee positive electrical connections.
- Balanced thermal expansion between core, wire and high temperature vitreous enamel assures reliable performance.
- Long term stability results from firing at temperatures exceeding 1000°F.
- Tinned terminals provide reliable solder or mechanical connections.
- Uniform winding and coating provides uniform heat dissipation and excellent appearance.
- Available with Non-inductive winding.
- Standard hardware allows stacking of units.
- Quick disconnect terminals available as optional features.

Wt. (Lbs.)	ZR30 0.37	ZR40 .052	ZR55 .095	Wt. (Lbs.)	MZ10 .007	MZ20 .015
Ohms	Max. Amps	Max. Amps	Max. Amps	Ohms	Max. Amps	Max. Amps
1	5.47	6.32	7.42	1	3.16	4.47
2			5.24			
3	3.17					
5	2.46	2.83	3.32	5	1.41	2.00
10	1.73	2.00	2.34	10	1.00	1.41
15	1.42					
25	1.10	1.26	1.48	25	0.63	0.89
50	0.77	0.89	1.05	50	0.45	0.63
75	0.63	0.73	0.86	75	0.37	0.52
100	0.55	0.63	0.74	100	0.32	0.45
150	0.45	0.52	0.61	150	0.26	0.36
250	0.35	0.40	0.47	250	0.20	0.28
500	0.25	0.28	0.33	500	0.14	0.20
				750	0.12	
				800		0.16
1000	0.17	0.20	0.23	1000	0.10	0.14
1500	0.14	0.16	0.19	1500	0.081	0.12
2000	0.12					
2500	0.11	0.13	0.15	2500	0.063	0.089
3000	0.10	0.12	0.14	3000	0.057	0.081
5000	0.076	0.089	0.10	5000	0.045	0.063
7500	0.057	0.073	0.086	7500		0.052
10000	0.049	0.063	0.074	10000		0.045
15000		0.045	0.061	15000		0.036
25000			0 .047	25000		0.028

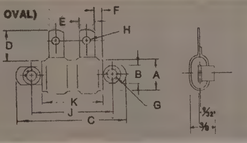
SPECIFICATIONS:
- Resistance tolerance ±5% . . . Closer tolerance available.
- Temperature coefficient ±100 PPM . . . Lower TC available.
- Available resistance range 1 Ohm to 25,000 Ohm.
- Meets or exceeds applicable specifications of MIL-R-26.
- Dimensional Tolerances ±1/32".

TYPE ZR (OVAL)



	A	B	C	D	E	F	G	H	J	K
ZR30	1	11/16	2 1/2	7/16	3/16	3/32	.196	.104	2	1 1/4
ZR40	1	11/16	3 1/4	7/16	3/16	3/32	.196	.104	2 3/4	2
ZR55	1	11/16	4 3/4	7/16	3/16	3/32	.196	.104	4 1/4	3 1/2

TYPE MZ (MINIATURE OVAL)



	A	B	C	D	E	F	G	H	J	K
MZ10	3/8	1/4	1 15/16	7/32	1/8	1/16	.128	.062	1	3/4
MZ20	3/8	1/4	2 5/8	7/32	1/8	1/16	.128	.062	2 15/16	2

WIRETWOUND RESISTORS

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Memcor Division
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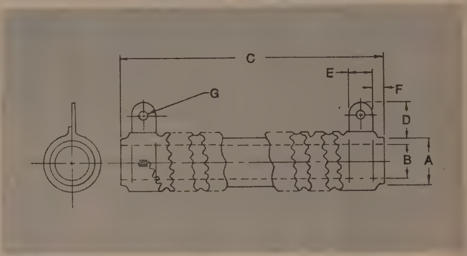
EDGEWOOD — TYPE TRU-RIB — 40 TO 1500 WATT

A	B	C	D	E	F	G	Wattage
9⁄16	5⁄16	2	11⁄16	5⁄16	1⁄8	.187	RR-0040
9⁄16	5⁄16	4	3⁄4	1⁄2	1⁄4	.196	RR-0090
3⁄4	1⁄2	3½	3⁄4	1⁄2	1⁄4	.196	RR-0100
9⁄16	5⁄16	5	3⁄4	1⁄2	1⁄4	.196	RR-0105
3⁄4	1⁄2	4	3⁄4	1⁄2	1⁄4	.196	RR-0105
1	5⁄8	4	3⁄4	1⁄2	1⁄4	.196	RR-0125
3⁄4	1⁄2	5	3⁄4	1⁄2	1⁄4	.196	RR-0135
1	5⁄8	5	3⁄4	1⁄2	1⁄4	.196	RR-0150
3⁄4	1⁄2	6	3⁄4	1⁄2	1⁄4	.196	RR-0160
3⁄4	1⁄2	6½	3⁄4	1⁄2	1⁄4	.196	RR-0180
1⅛	3⁄4	5	3⁄4	1⁄2	1⁄4	.196	RR-0185
1	5⁄8	6	3⁄4	1⁄2	1⁄4	.196	RR-0190
1	5⁄8	7	3⁄4	1⁄2	1⁄4	.196	RR-0215
1⅛	3⁄4	6	3⁄4	1⁄2	1⁄4	.196	RR-0220
1½	1⅛	5	3⁄4	1⁄2	1⁄4	.196	RR-0270
1⅛	3⁄4	8½	3⁄4	1⁄2	1⁄4	.196	RR-0300
1	5⁄8	10	3⁄4	1⁄2	1⁄4	.196	RR-0315
1⅛	3⁄4	10½	3⁄4	1⁄2	1⁄4	.196	RR-0375
2½	1¾	6	3⁄4	1⁄2	1⁄4	.196	RR-0375
1⅝	1⅛	8½	3⁄4	1⁄2	1⁄4	.196	RR-0400
1⅛	3⁄4	11¼	3⁄4	1⁄2	1⁄4	.196	RR-0420
1⅝	1⅛	10½	3⁄4	1⁄2	1⁄4	.196	RR-0500
1⅝	1⅛	11¾	3⁄4	1⁄2	1⁄4	.196	RR-0550
2½	1¾	12	3⁄4	1⁄2	1⁄4	.196	RR-0750
2½	1¾	15	3⁄4	1⁄2	1⁄4	.196	RR-1000
2½	1¾	20	3⁄4	1⁄2	1⁄4	.196	RR-1500



FEATURES:

- Heavy duty unit designed for application demanding maximum power dissipation in minimum space.
- Heavy ceramic tubular core provides heat sink for short term overloads.
- Available from 40 to 1500 watts.
- Available with tap or adjustable lug.
- A variety of mounting hardware available. See Hardware section.
- Welded terminals and termination guarantee positive electrical connections.
- Tinned terminals provide reliable solder or mechanical connections.

SPECIFICATIONS:

- Resistance Tolerance ±10%.
- Temperature coefficient ±100 ppm.
- Maximum Hotspot equal 415°C.
- Available resistance range .01Ω to 198Ω.
- Meets or exceeds applicable specifications of MIL-R-26.
- Dimensional tolerances ±1⁄32″ . . . except ±1⁄16″ on length of 6″ and above.

MILITARY — MADE TO MIL-R-26

Type		Rated Wattage V Characteristic	Min. Ohms	Max. Ohms
FERRULE	RW10	203	.20	180,000
	RW11	168	.10	160,000
	RW12	125	.10	110,000
	RW13	72	.10	51,000
	RW14	58	.10	43,000
	RW15	29	.10	15,000
	RW16	20	.10	8,200
OVAL	RW20	21	.10	8,200
	RW21	31	.10	16,000
	RW22	53	.10	36,000
	RW23	68	.10	51,000
	RW24	91	.10	75,000
TUBULAR	RW29	11	.10	5,600
	RW30	11	.10	2,700
	RW31	14	.10	6,800
	RW32	17	.10	10,000
	RW33	26	.10	18,000
	RW35	55	.10	43,000
	RW36	78	.10	56,000
	RW37	113	.10	91,000
	RW38	159	.10	150,000
	RW47	210	.10	180,000
AXIAL	RW55	7	.10	5,100
	RW56	14	.10	9,100
	RW57	6.5	.10	3,600
	RW58	11	.10	8,200
	RW59	3	.10	910
	RW67	6.5	.10	3,600
	RW68	11	.10	8,200
	RW69	3	.10	910

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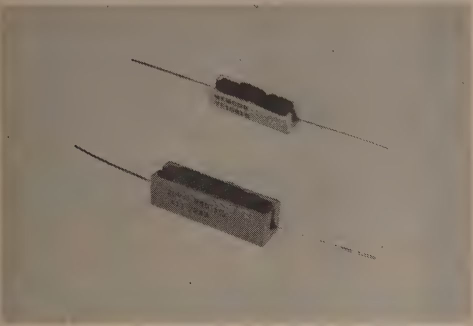
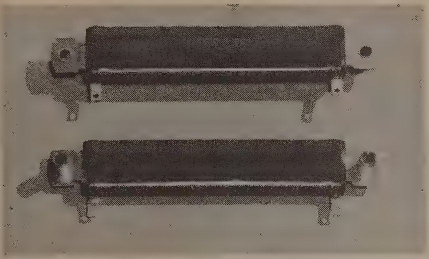
WIREWOUND RESISTORS



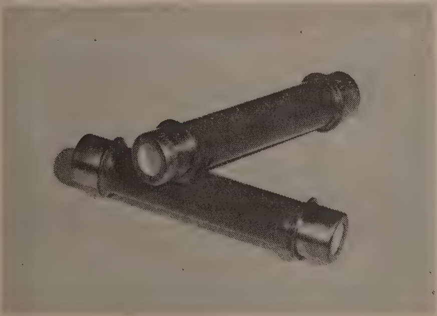
TYPE HC/HIGH CURRENT

.05-5.1 OHMS AVAILABLE RESISTANCE RANGE
300-2700 WATTS AVAILABLE WATTAGE



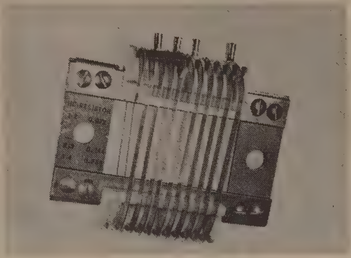
TYPE ML/MOLDED SILICONE

0.1-50,000 OHMS AVAILABLE RESISTANCE RANGE
5-11 WATTS AVAILABLE WATTAGE



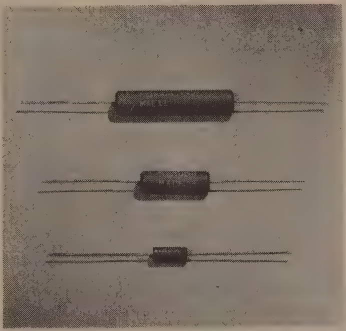
TYPE VF/VITREOUS-FIXED

AVAILABLE RESISTANCE RANGE .01-0.5 OHMS
AVAILABLE WATTAGE 3-25 WATTS



TYPE ZR/OVALS

AVAILABLE RESISTANCE RANGE 0.1-50,000 OHMS
AVAILABLE WATTAGE 65 & 75 WATTS



TYPE HD/FERRULE

AVAILABLE RESISTANCE RANGE 1-100,000 OHMS
AVAILABLE WATTAGE 25-200 WATTS

WIREWOUND RESISTORS

Type VF/Vitreous-Fixed
Type HC/High Current
Type ZR/Ovals
Type ML/Molded Silicone
Type HD/Ferrule

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RESISTOR HARDWARE

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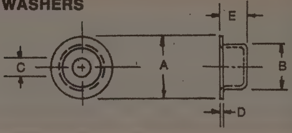
WASHERS — CENTERING/MICA

MICA WASHERS

Part No. 1321-010-	I.D.	O.D.	Thickness
003	.187	.750	.025
005	.250	.625	.031
007	.312	.750	.025
012	.500	1.000	.031
013	.562	1.125	.031
014	.750	1.375	.031
019	1.125	1.875	.031
020	1.812	3.000	.045

CENTERING WASHERS



Part No. 1431-026-	A	B	C	D	E	Recommended for Resistors with I.D. of
001	.437	.295	.175	.025	.130	⁵⁄₁₆
004	.500	.230	.165	.024	.093	¼
010	.750	.484	.196	.025	.078	½
011	.750	.563	.190	.031	.188	⅝
015	1.125	.719	.265	.032	.187	¾
017	1.375	1.063	.265	.031	.187	1⅛
019	2.375	1.688	.265	.026	.187	1¾

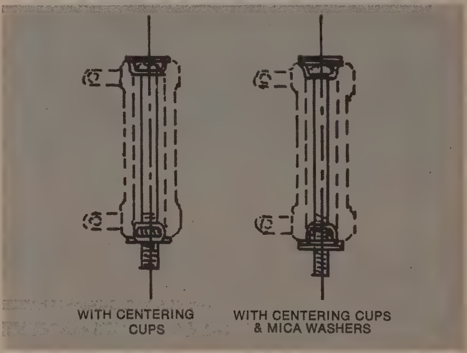
VERTICAL THRU-BOLT MOUNTING

Without Mica Washer Order 1245-004-XXX			With Mica Washer Order 1245-005-XXX		
Resistor Type		XXX	Resistor Type		XXX
FR-AR-5		-001	FR-AR-5		-001
FR-AR-10		-002	FR-AR-10		-002
FR-20		-003	FR-20		-003
FR-AR-25		-004	FR-AR-25		-004
FR-AR-50		-005	FR-AR-50		-005
FR-AR-75		-007	FR-AR-75		-007
FR-AR-100		-012	FR-AR-100		-012
FR-AR-160		-021	FR-AR-160		-020
FR-AR-200		-022	FR-AR-200		-021
RR-40	2″ LG.	-004	RR-40	2″ LG.	-004
RR-90	4	-005	RR-90	4	-005
RR-105	5	-006	RR-105	5	-006
RR-135	6	-007	RR-135	6	-007
RR-100	3½	-008	RR-100	3½	-008
RR-105	4	-009	RR-105	4	-009
RR-135	5	-010	RR-135	5	-010
RR-160	6	-011	RR-160	6	-011
RR-180	6½	-012	RR-180	6½	-012
RR-125	4	-013	RR-125	4	-013
RR-150	5	-014	RR-150	5	-014
RR-190	6	-015	RR-190	6	-015
RR-215	7	-016	RR-215	7	-016
RR-315	10	-018	RR-315	10	-017
RR-185	5	-019	RR-185	5	-018
RR-200	6	-020	RR-200	6	-019
RR-300	8½	-021	RR-300	8½	-020
RR-375	10½	-022	RR-375	10½	-021
RR-420	11¼	-023	RR-420	11¼	-022
RR-270	5	-024	RR-270	5	-023
RR-400	8½	-025	RR-400	8½	-024
RR-500	10½	-026	RR-500	10½	-025
RR-5	11¾	-027	RR-5	11¾	-026
RR-375	6	-028	RR-375	6	-027
RR-750	12	-029	RR-750	12	-028
RR-1000	15	-030	RR-1000	15	-029
RR-1500	20	-031	RR-1500	20	-030

Two styles of vertical Mounting Hardware are available for all Tubular Resistors. Mica Washers are available where it is desirable to electrically isolate the mounting bolt.

This method of mounting saves horizontal mounting space and in addition provides a "heat sink" for the resistor.

Length of bolts provided are for ¼″ panel mounting — extra length bolts can be supplied per customer request.

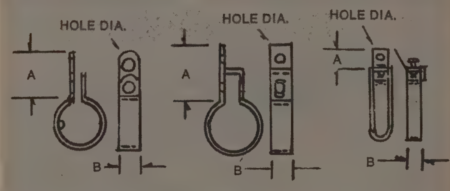


WITH CENTERING CUPS

WITH CENTERING CUPS & MICA WASHERS

ADJUSTABLE LUGS

Part No.	Core Dia.	A	B	C	D	E	Hole Dia.	Silver Cont.	Gauge
1401-075-001	⁵⁄₁₆	¹⁷⁄₃₂	³⁄₁₆	X			⅛	X	.020
1401-022-001	⁷⁄₁₆	¹⁷⁄₃₂	¼	X			.138	X	.035
1401-076-001	⁹⁄₁₆	²³⁄₃₂	¼	X			.173	X	.035
1401-035-002	⅝	⅝	¼	X			.173		.035
1401-077-001	¾	²⁷⁄₃₂	¼	X			.173	X	.035
1401-078-001	1⅛	¹³⁄₁₆	⁵⁄₁₆	X			⁵⁄₃₂	X	.035
1401-917-001	⁵⁄₁₆ x 1	⅜	¼			X	.171		.025
1401-026-001	2½	1¹⁄₁₆	½	X			.190		.031
1401-030-001	⁹⁄₁₆	1	⅜		X		.190		.082
1401-030-002	¾	1	⅜		X		.190		.082
1401-030-003	1	1	⅜		X		.190		.082
1401-030-004	1⅛	1	⅜		X		.190		.082
1401-030-007	2½	1	⅜		X		.190		.082
1401-030-005	1½	1	⅜		X		.190		.082
1401-030-006	1⅝	1	⅜		X		.190		.082



ROUND C

EDGEWOUND D

OVAL E

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RESISTOR HARDWARE

CERAMIC BUSHINGS

Fig.	Part No.	A	B	C	D	E	F	G	Core I.D.
1	1431-021-005	¼	.469	11⁄16	.313	.170			½
2	1431-022-001	1¼	.610	¾	.313	.200	⅝	.187	⅝
1	1431-021-004	1⅛	.734	11⁄16	.250	.312			¾
1	1431-021-003	¾	.484	¾	.250	.250			½
2	1431-022-002	1	.500	¾	.406	.172	½	.187	9⁄16
2	1431-021-007	1	.609	¾	.375	.172	½	.187	⅝
2	1431-021-008	¾	.485	¾	.375	.312	½	.187	½
2	1431-021-006	¾	.485	¾	.375	.172	½	.187	½
1	1431-021-002	1⅛	.734	11⁄16	.187	.312			¾
1	1431-021-001	¾	.437	⅜	.187	.187			½

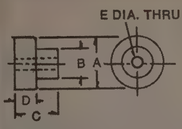


FIG. 1

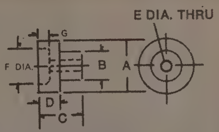


FIG. 2

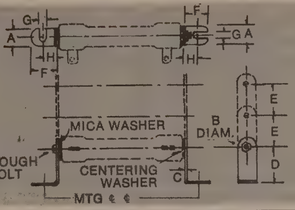
HORIZONTAL THRU-BOLT MOUNTING

	Mtg. CL-CL	Core I.D.	A	B	C	D	E	F	G	H
FR-AR-25	3	3⁄16	¾	.187	.047	25⁄32	15⁄16	⅞	.250	7⁄16
FR-AR-50	5	5⁄16	¾	.187	.047	25⁄32	15⁄16	⅞	.250	7⁄16
FR-AR-75	7	5⁄16	¾	.187	.047	25⁄32	15⁄16	⅞	.250	7⁄16
FR-AR-100	7	½	¾	.187	.047	25⁄32	1⅛	⅞	.250	7⁄16
FR-AR-160	10¼	¾	1⅛	.215	.062	1	1¾	17⁄16	.312	13⁄16
FR-AR-200	12¼	¾	1⅛	.215	.062	1	1¾	17⁄16	.312	13⁄16
RR-40	3	5⁄16	¾	.187	.047	25⁄32	15⁄16	⅞	.250	7⁄16
RR-90	5	5⁄16	¾	.187	.047	25⁄32	15⁄16	⅞	.250	7⁄16
RR-105	6	5⁄16	¾	.187	.047	25⁄32	15⁄16	⅞	.250	7⁄16
RR-135	7	5⁄16	¾	.187	.047	25⁄32	15⁄16	⅞	.250	7⁄16
RR-100	4½	½	¾	.187	.047	25⁄32	1⅛	⅞	.250	7⁄16
RR-105	5	½	¾	.187	.047	25⁄32	1⅛	⅞	.250	7⁄16
RR-135	6	½	¾	.187	.047	25⁄32	1⅛	⅞	.250	7⁄16
RR-160	7	½	¾	.187	.047	25⁄32	1⅛	⅞	.250	7⁄16
RR-180	7½	½	¾	.187	.047	25⁄32	1⅛	⅞	.250	7⁄16
RR-125	5¾	⅝	1⅛	.215	.062	1	1¾	17⁄16	.312	13⁄16
RR-150	6¾	⅝	1⅛	.215	.062	1	1¾	17⁄16	.312	13⁄16
RR-190	7¾	⅝	1⅛	.215	.062	1	1¾	17⁄16	.312	13⁄16
RR-215	8¾	⅝	1⅛	.215	.062	1	1¾	17⁄16	.312	13⁄16
RR-315	11¾	⅝	1⅛	.215	.062	1	1¾	17⁄16	.312	13⁄16
RR-185	6¾	¾	1⅛	.215	.062	1	1¾	17⁄16	.312	13⁄16
RR-220	7¾	¾	1⅛	.215	.062	1	1¾	17⁄16	.312	13⁄16
RR-300	10¼	¾	1⅛	.215	.062	1	1¾	17⁄16	.312	13⁄16
RR-375	12¼	¾	1⅛	.215	.062	1	1¾	17⁄16	.312	13⁄16
RR-420	13	¾	1⅛	.215	.062	1	1¾	17⁄16	.312	13⁄16
RR-500	12¼	1⅛	1⅛	.218	.062	1		17⁄16	.312	13⁄16
RR-550	13½	1⅛	1⅛	.218	.062	1		17⁄16	.312	13⁄16
RR-750	14⅛	1¾	2½	.193	.062	2¾		2¼	.375	1.0
RR-150	22⅛	1¾	2½	.193	.062	2¾		2¼	.375	1.0

Horizontal Thru-bolt Hardware is available for customer installation or factory assembly.

Resistors may be stacked 2 and 3 high — using this hardware.

Order as 1245-002-XXX
(for example FR-AR-25 SINGLE — order as 1245-002-001)



	Single	Double	Triple
FR-AR-25	-001	-002	-003
FR-AR-50	-004	-005	-006
FR-AR-75	-010	-011	-012
FR-AR-100	-022	-023	-024
FR-AR-160	-049	-050	-051
FR-AR-200	-052	-053	-054
RR-40	-001	-002	-003
RR-90	-004	-005	-006
RR-105	-007	-008	-009
RR-135	-010	-011	-012
RR-100	-013	-014	-015
RR-105	-016	-017	-018
RR-135	-019	-020	-021
RR-160	-022	-023	-024
RR-180	-025	-026	-027
RR-125	-028	-029	-030
RR-150	-031	-032	-033
RR-190	-034	-035	-036
RR-215	-037	-038	-039
RR-315	-040	-041	-042
RR-185	-043	-044	-045
RR-220	-046	-047	-048
RR-300	-049	-050	-051
RR-375	-052	-053	-054
RR-420	-055	-056	-057
RR-500	-064		
RR-550	-067		
RR-750	-073		
RR-1500	-079		

HOW TO ORDER MEMCOR RESISTORS

1. Give Memcor type and wattage
   i.e. VL3 = Vitreous axial lead 3 watt
2. Give ohmic value and resistance tolerance required
3. Specify if any mounting hardware is required
4. Specify if any other special features are required
   i.e. Non-inductive winding for resistors

If there are special requirements, a two or three digit alpha call out will appear after the ohmic value; these digits will be assigned by the factory.

RESISTANCE VALUE CODE

X XXX

NUMBER OF DECIMALS TO MOVE TO THE RIGHT

BASIC RESISTANCE VALUE

EXAMPLE:
3100 = 100Ω
2100 = 10Ω
1100 = 1Ω
0100 = 0.1Ω

EXAMPLE MEMCOR PART NUMBER

RESISTOR = XXXXXX XXXX XX

VL 0003 3100 AY

TYPE RESISTOR
VL = Vitreous Axial Lead

WATTAGE
003 = 3 Watts

RESISTANCE
3100 = 100Ω

SPECIAL FEATURE
AY = Special Temp. Coef.

RESISTOR HARDWARE

Ceramic Bushings
Horizontal Thru-Bolt Mounting
How to Order Memcor Resistors

E-SYSTEMS INC.
Memcor Division
MANUFACTURERS OF
MEMCOR
ELECTRONIC COMPONENTS

Charles T. Gamble Industries

New Jersey & Fairview Avenue • Riverside, New Jersey 08075 • 609-461-1900

CTG PRECISION WIRE WOUND RESISTORS & NETWORKS

Charles T. Gamble Industries has engineered and designed non inductive precision wire wound resistors to meet and exceed the requirements of MIL-R-93. These resistors are completely sealed against the effects of high humidity and salt water immersion cycling. The material used in the manufacture of our resistors has a very high dielectric strength. The bobbin material used in winding the resistors is one and the same as the encapsulating material. All resistors use resistance wire with very low thermal E.M.F. to the copper leads. Where thermal effects can be disregarded, welded construction with nickel alloy leads may be specified.

- Temperature Coefficient: Standard is ±10PPM/°C. T.C.'s as low as ±2PPM and as high as 6000PPM/°C can be supplied
- Tolerance available: from ±1.0% to ±0.001%

NETWORKS: RC NETWORKS, LADDER NETWORKS, VOLTAGE DIVIDERS, BINARY NETWORKS

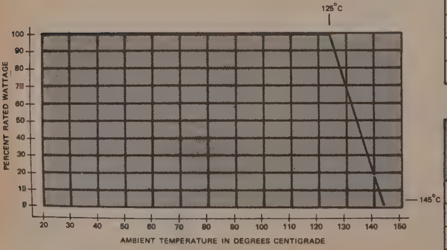
Standard Axial Lead Precision Resistors have been designed and engineered to offer high reliability and stability throughout a wide range of environmental factors.

Subminiature Axial Lead Precision Resistors have been designed for applications where space is a prime factor

Printed Circuit Resistors are designed for printed circuit board application, where space is a factor.

Radial Lug Resistors are supplied with a thru hole for mounting to the chassis by means of a #6 thru bolt.

Power Rating —
Maximum wattage ratings at 25°C through 125°C derated to 145°C at zero voltage



STANDARD AXIAL LEAD PRECISION RESISTORS

Type	Military Specs. New	Military Specs. Old	Commercial Wattage Rating	Max. Resist. Based on .0007 E Alloy	Military Wattage Rating	Max. Volts	Size Length	Size Dia.
0808AL			.125W	300K		200V	1/4″	1/4″
1108AL	RB56		.125W	350K	.125W	250V	11/32″	1/4″
1208AL			.200W	350K	.250W	225V	3/8″	1/4″
1212AL			.250W	1 meg.		225V	3/8″	3/8″
1608AL	RB55	AFRT 10	.250W	400K	.15 W	184V	1/2″	1/4″
1612AL			.400W	.500 meg.		300V	1/2″	3/8″
1616AL			.500W	1.3 meg.		300V	1/2″	1/2″
2008AL			.500W	.425 meg.		300V	5/8″	1/4″
2012AL			.750W	.600 meg.		600V	5/8″	3/8″
2016AL			.750W	2 meg.		600V	5/8″	1/2″
2408AL	RB54	AFRT 11	.333W	1 meg.	.250W	300V	3/4″	1/4″
2412AL	RB53	AFRT 12	.500W	1.2 meg.	.333W	300V	3/4″	3/8″
3208AL			.500W	1.1 meg.		300V	1″	1/4″
3212AL	RB52	AFRT 13	1.000W	2 meg.	.400W	600V	1″	3/8″
3216AL	RB57	AFRT 14	1.000W	3 meg.	.750W	600V	1″	1/2″
4816AL	RB58	AFRT 15	2.000W	6 meg.	1.000W	900V	1 1/2″	1/2″
6416AL	RB59	AFRT 16	2.500W	10 meg.	1.250W	1200V	2″	1/2″

SUB-MINIATURE AXIAL LEAD PRECISION RESISTORS

Type	Commercial Wattage Rating	Maximum Resistance based on .0007 E Alloy	Maximum Voltage	Size Length	Size Dia.
250109AL	.120W	25K	50 Volts	1/4″	7/64″
375093AL	.1W	20K	55 Volts	3/8″	3/32″
375109AL	.120W	30K	55 Volts	3/8″	7/64″
375125AL	.125W	50K	72 Volts	3/8″	1/8″
375187AL	.1W	40K	65 Volts	3/8″	3/16″
500156AL	.1W	70K	85 Volts	1/2″	5/32″
625156AL	.15W	100K	125 Volts	5/8″	5/32″

PRINTED CIRCUIT PRECISION RESISTORS

Type	Military Specs.	Commercial Wattage	Military Wattage	Max. Volts	Max. Resist. Based on .0007	Sizes Length	Sizes Dia.	Lead Spacing	Lead Length
0808PC		.125W		90V	70K	1/4″	1/4″	.100	1″
1008PC	RB71	.250W	.125W	240V	250K	5/16″	1/4″	.200	1″
1208PC		.200W		200V	200K	3/8″	1/4″	.100	1″
1608PC		.250W		184V	400K	1/2″	1/4″	.100	1″
1612PC	RB70	.500W	.250W	150V	.301 meg.	1/2″	3/8″	.200	1″
2408PC		.333W		300V	1 meg.	3/4″	1/4″	.100	1″
3208PC		.500W		750V	1.1 meg.	1″	1/4″	.100	1″
3212PC		1.000W		1350V	1.75 meg.	1″	3/8″	.250	1″
3216PC		1.250W		1700V	2.50 meg.	1″	1/2″	.250	1″

RADIAL LUG PRECISION RESISTORS

Type	Military Specs. New	Military Specs. Old	Commercial Wattage	Military Wattage Rating	Maximum Voltage	Max. Resist. Based on .0007	Size Length	Size Dia.
1616RLU	RB08	AFRT 17	.500W	1/4W	300V	885K	1/2″	1/2″
2020RLU	RB16	AFRT 18	.666W	1/3W	300V	1 meg.	5/8″	5/8″
3220RLU	RB17	AFRT 19	1.000W	1/2W	600V	2.5 meg.	1″	5/8″
4024RLU	RB18		1.500W	3/4W	600V	6.5 meg.	1 1/4″	3/4″
6828RLU	RB19		2.000W	1W	900V	12 meg.	2 1/8″	7/8″

Charles T. Gamble Industries

New Jersey & Fairview Avenue • Riverside, New Jersey 08075 • 609-461-1900

CTG AXIAL LEAD POWER WIRE WOUND SILICONE COATED RESISTORS

GENERAL SPECIFICATIONS

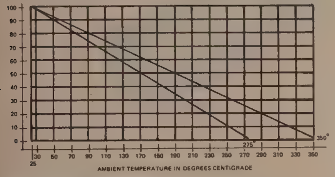
- Designed to meet the requirements of MIL-R-26
- Standard temperature coefficient ±20PPM additional TC's available from 5PPM/°C to 5500/°C
- Tolerance: ±1.0% standard. Available to ±.01%
- Wattage: ½ watt to 20 watts
- Coating — High temperature silicone, withstands moisture, salt water immersion, and cleaning solutions
- Leads: Tinned copperweld standard, other alloys available

Power Ratings:

Ratings are based on a 25°C ambient and either a 275°C (max.) or 350°C (max.) hotspot temperature

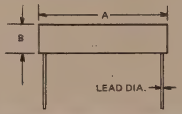
Characteristic U: Will result in .5% max. △R in 2000 hour load life

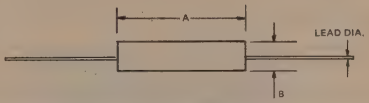
Characteristic V: Will result in a 3% max. △R in 2000 hour load life



Non-Inductive Winding:

- For non-inductivxe winding add prefix N
- Divide maximum resistance values by two
- Multiply maximum working voltage by .707





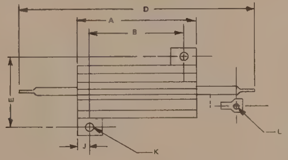
CTG Type	MIL-R-26 Type	CTG Power Rating 275°C	CTG Power Rating 350°C	Nominal Dimensions Length "A"	Nominal Dimensions Diameter "B"	Maximum Resistance	Max. Cont. Working Voltage	Lead Diam.
CG ½A	—	.4	.52	.250 ±.031	.085 ±.020	3.0K	25V	.020
CG 1	—	.75	1	.312 ±.032	.085 ±.020	5.0K	35V	.020
CG 2	RW 70	1	1.5	.406 ±.031	.094 ±.031	8.0K	50V	.020
CG 3	—	1.0	1.1	.531 ±.063	.094 ±.031	9.0K	50V	.020
CG 4	—	2.5	3	.812 ±.063	.188 ±.031	20K	135V	.032
CG 5	RW 69	2.5	3	.500 ±.063	.188 ±.063	20K	130V	.032
CG 6	RW 79	3	—	.560 ±.062	.187 ±.031	20K	135V	.032
CG 7	—	4	5	.625 ±.062	.250 ±.062	35K	175V	.040
CG 8	RW 74	5	—	.875 ±.062	.312 ±.031	70K	300V	.040
CG 9	—	7	8	1.218 ±.062	.312 ±.031	100K	450V	.040
CG 10A	RW 68	10	11	1.875 $^{+.063}_{-.125}$	.344 ±.094	200K	720V	.032
CG 10	RW 78	10	—	1.78 ±.062	.375 ±.031	200K	720V	.040
CG 11	RW 56	10	14	2.00 ±.094	.469 ±.094	210K	800V	.032
CG 12	—	1.5	1.7	.406 ±.031	.156 ±.063	12K	70V	.020
CG 13	RW 67	5	6.5	1.00 ±.094	.313 ±.063	70K	300V	.032
CG 14	—	1.5	1.7	.375 ±.031	.188 ±.063	12K	40V	.020
CG 15	RW 55	5	7	1.375 ±.094	.469 ±.094	120K	500V	.032
CG 33	—	15	20	2.875 ±.094	.500 ±.094	275K	1000V	.040

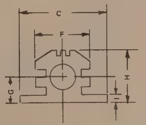
Specify Axial or Radial Lead when ordering!

CTG ANODIZED ALUMINUM HOUSED HEAT SINK POWER RESISTORS / 5 WATT TO 250 WATT

FEATURES

- Meets MIL-R-39009 or MIL-R-18546
- Tolerances 5% to .01%
- Standard temperature coefficient 1Ω thru 20Ω ±50PPM/°C above 21Ω ±20PPM/°C. Lower T.C.'s available
- All welded construction
- Screw mounts on chassis





SPECIFICATIONS

Type	Style	Wattage Comm.	Wattage MIL	Maximum* Resistance	Maximum Voltage
HS 5	RE 60	5	5	5K	160
HS 10	RE 65	10	10	10K	265
HS 25	RE 70	25	20	25K	550
HS 50	RE 75	50	30	60K	1250
HS 100	RE 77	100	75	126K	1990
HS 250	RE 80	250	120	196K	2300

* Based on .007 Ev. Wire

NON INDUCTIVE WOUND: HSN SERIES

Exhibits the same physical and electrical characteristics as the HS Series. Ayrton-Perry winding techniques are utilized to minimize inductance.

Type	A ±0.31	B ±.005	C ±.015	D ±.062	E ±.005	F ±.015	G ±.010	H ±.015	I ±.010	J ±.010	K ±.005	L ±.005
HS 5	.600	.444	.646	1.125	.490	.334	.133	.320	.065	.078	.093	.050
HS 10	.750	.562	.800	1.375	.625	.420	.165	.390	.075	.093	.093	.086
HS 25	1.062	.719	1.080	1.938	.781	.550	.231	.546	.088	.172	.125	.086
HS 50	1.968	1.563	1.140	2.781	.844	.630	.260	.610	.088	.196	.125	.086
HS 100	3.500	2.750	2.812	5.478	2.250	1.812	.770	1.750	.187	.375	.188	—
HS 250	4.500	3.875	3.000	7.000	2.500	—	1.000	2.187	.250	.312	.188	—

HSN NON INDUCTIVE STYLES
The above types are available in non inductive winding

Consult the factory for your specific needs

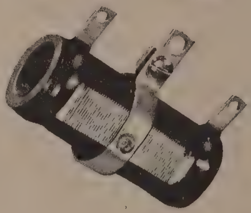
Charles T. Gamble Industries

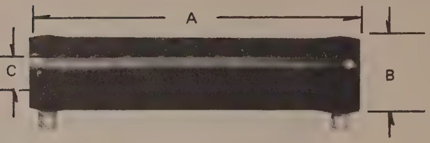
New Jersey & Fairview Avenue • Riverside, New Jersey 08075 • 609-461-1900

CTG RADIAL LUG TYPE VITREOUS POWER WIREWOUND RESISTORS

GENERAL SPECIFICATIONS

- Designed to meet the requirements of MIL-R-26E
- Wound using NiCr or CuNi Resistance Wire Alloys
- Positive center of winding pitch and tension eliminates hot spots
- Military grade of ceramic tube coated with "CTG" high temperature Vitreous Enamel Coating
- Wattage ratings from 5 to 250 watts
- Standard tolerance ±5%





Type	Military Spec.	Dimensions			Maximum Resistance	Comm. Watt	MIL Watt	
		A	B	C			G	V
321006	RW30	1	5/16	3/16	10.0K	5	8	11
561006	RW29	1¾	5/16	3/16	50.0K	10	8	11
481410	RW31	1½	7/16	5/16	45.0K	10	10	14
641410	RW32	2	7/16	5/16	76.0K	15	12	17
642015	—	2	⅝	29/64	100.0K	25	—	—
641812	—	2	9/16	⅜	100.0K	20	—	—
1282416	RW35	4	¾	½	338.0K	50	38	55
1281812	—	4	9/16	⅜	263.0K	50	—	—
1282418	—	4½	¾	35/64	390.0K	50	—	—
1283624	RW36	4	1⅛	¾	500.0K	70	54	78
2082416	—	6½	¾	½	600.0K	100	—	—
2083624	—	6½	1⅛	¾	890.0K	100	—	—
2563624	RW38	8	1⅛	¾	160K	160	110	159
2723624	—	8½	1⅛	¾	200K	160	—	—
3363624	RW47	10½	1⅛	¾	200K	200	145	210
3843624	RW39	12	1⅛	¾	250K	250	166	240

NOTE: Add F or A to end of type number to specify fixed or adjustable type.

Charles T. Gamble Industries

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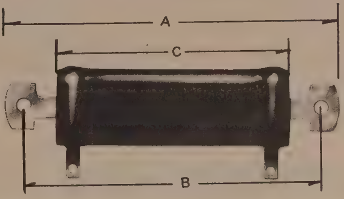
CTG OVAL WIREWOUND POWER RESISTORS

GENERAL SPECIFICATIONS

- Designed to meet the requirements of MIL-R-26E
- Through-bracket mounting and oval ceramic construction permit an even distribution of heat
- Design is suitable for multiple stacking
- Wattage ratings from 10 to 75 watts
- Standard tolerance ±5%



Type	Military Spec.	Dimensions A	Dimensions B	Dimensions C	Maximum Resistance	Comm. Watt	MIL Watts G	MIL Watts V
4224 OV	—	1¼	¾	1	10K	10	—	—
5032 OV	—	1½	1	1¼	15K	15	—	—
8464 OV	—	2¹¹⁄₁₆	2	2⁵⁄₁₆	55K	20	—	—
8040 OV	RW20	2½	2	1¼	10K	30	15	21
10464 OV	RW21	3¼	2¾	2	20K	40	22	31
112152 OV	RW22	4¾	4¼	3½	40K	55	37	53
192152 OV	RW23	6	5½	4¾	50K	65	47	68
216192 OV	RW24	7¼	6¾	6	75K	75	63	91

CTG POWER FLEX LOW RESISTANCE HIGH POWER RESISTORS

GENERAL SPECIFICATIONS

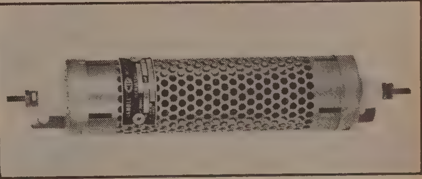
- High watt density — high surface area
- Hot spot temperatures to 415°C
- Tapped and adjustable also available
- High temperature vitreous enamel
- Rugged tinned screw type terminals
- All welded construction
- Standard tolerance 10%
- TCR — 20 PPM to 180 PPM

CTG Type	Full Watt Rating	Length	Core	Fixed or Tapped: Min. Poss. Ohms	Fixed or Tapped: Maximum Single Step	Fixed or Tapped: Ohms with Max. No. Steps	Tapped: Max. No. of Steps	Adjustable: Min. Poss. Ohms	Adjustable: Max. Poss. Ohms
PF 75	75	3½	¾	0.04	6.0	6.0	1	0.2	6.0
PF 110	110	4½	¾	0.04	9.0	7.0	2	0.3	9.0
PF 125	125	5	¾	0.05	10.0	9.0	2	0.4	10.0
PF 160	160	6½	¾	0.06	15.0	11.0	3	0.5	15.0
PF 155	155	4¼	1⅛	0.05	12.0	10.0	2	0.4	12.0
PF 225	225	6⅛	1⅛	0.08	18.0	13.0	3	0.7	18.0
PF 240	240	6½	1⅛	0.09	22.0	17.0	3	0.8	22.0
PF 300	300	8½	1⅛	0.11	33.0	23.0	5	1.0	33.0
PF 375	375	10½	1⅛	0.15	40.0	30.0	5	1.4	40.0
PF 420	420	11¾	1⅛	0.18	50.0	40.0	5	1.5	50.0

CTG CAGE MOUNTED RESISTORS

GENERAL SPECIFICATIONS

- Ventilating metal cage mounting for wall or panel locations where mechanical protection is required
- Terminals are brought out through insulating bushings
- Available in Single thru Four Cage Assemblies
- Wattage — 65 watts per resistor unit (enclosed rating)
- Tolerance ±5% standard



Metal cage mounted units are available as fixed units and can be assembled in series or parallel. Consult the factory with your specifications.

Resistor Products—Chip Resistors

Thin-Film Center-Tapped Chips; Standard Resistance Values; 5Ω To 510KΩ; On 30 MIL Square Chips

Features

- Precision
- Excellent Stability
- Low TCR
- Excellent Ratio Tracking
- Withstands High Temperature Assembly
- Nickel-Chromium or Tantalum Nitride
- Passivated
- High Reliability

Hybrid Systems' Thin Film Resistor Chips are specifically designed for use in hybrid circuits. A product innovator, Hybrid Systems, maintains an active R & D effort in support of its high-volume production programs for commercial and MIL-STD requirements.

Compatible With Active Chips, these resistor chips maintain their high performance resistor characteristics through all conventional integrated-circuit manufacturing processes.

Etched Silicon Backing allows easy, reliable die bonding using eutectic, epoxy, or other conventional techniques.

Large Area Aluminum Bonding Pads provide efficient operator location and proven reliable wire bonds.

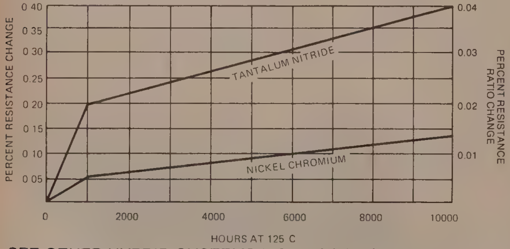
Glass Passivation offers added mechanical protection through assembly and chemical processes.

Excellent Characteristics; Inherent uniformity of individual resistors fabricated by vacuum deposition and photolithography processes results in resistor ratio tracking to 1PPM/°C typically. Individual resistors can be laser-trimmed to within ±.01%.

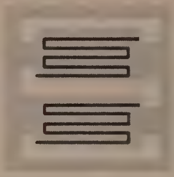
Nickel-Chromium or Tantalum Nitride versions of the thin- film resistor chips are available.

Reliability & Quality Assurance. Life test data proves quality and reliability over thousands of hours. Resistor chips and networks are inspected to the visual criteria specified in MIL-STD 883 Class B as our standard process with Class "A" inspection available upon request. Hybrid Systems' well staffed Quality Assurance and Reliability Department maintains the rigid standards necessary to assure reproductibility from month to month, and year to year. Hybrid Systems' Microelectronics manufacturing facility meets the Quality Assurance requirements of MIL-Q-9858A. Products are processed to meet the stringent requirements of MIL-M38510 and MIL-STD-883 specifications.

STABILITY CURVE (TYPICAL)



SEE OTHER HYBRID SYSTEMS LISTINGS IN SECTIONS 2000 AND 3130.



Center-Tapped Chips. Nickel-chromium thin-film resistor center tapped chips, with resistance values from 5Ω to 510KΩ, are supplied in 30 mil. squares. Standard tolerances are 1%, 5% and 10%; custom to 0.01%. Custom ratios up to 10:1 available for most resistor values in this series.

Resistor Networks. Resistor conformity, temperature tracking and stability are all better than with individual resistor chips—typically 1PPM/°C with long-term ratio stability of less than 0.01% after continuous operation at 125°C. A typical network contains approximately 10 resistors trimmed to 0.1% accuracy on a 0.080" x 0.080" x 0.008" silicon chip.

D/A Converter Resistor Network. Standard nickel-chromium or tantalum nitride designs for ladder, scaling, and adapter networks are available in chip and wafer form. Accuracies to 14 bits and TCR-tracking to 1 PPM/°C exemplify network performance as designed for D/A and A/D converters. The networks are laser, trimmed to their precise tolerances.

Specifications

CHARACTERISTIC	NICKEL-CHROMIUM	TANTALUM NITRIDE	UNITS
Resistivity Range	50 to 500	100 to 300	Ω/□
Resistance Range	5Ω to 10 Meg.	15 to 800K	Ω
Resistance Density	1000M	≈29M	Ω/sq. in.
TC of Resistance	0 to +50	−50 to −200	PPM/°C
Tracking	±1	±1	PPM/°C
Power Dissipation	300	25	W/sq. in.
Stability-Abs.	<0.1 (125°C)	<0.1 (85°C)	%
Ratio Stability	<0.01 (125°C)	<0.01% (85°C)	%
Temperature Range	−55 to +175	−55 to +85	°C
Noise[1]	<0.1	<0.1	µV/V
Resistance Tolerance[2]	±5	±5	%
Resistance Matching[3]	±.002	±0.01	%
Bonding Pad Size	4x4	5x5	mils
Method of Deposition	Evaporation	Sputtering	
Substrate Material	Silicon Glass Alumina	Silicon	
Conductor	Aluminum	Aluminum	

Notes
1. Measured in accordance with MIL-STD-202, Method 308.
2. Tolerances to 0.1% with laser trimming.
3. Tolerances to 0.002% with laser trimming.

Hybrid Systems CORPORATION Burlington, Massachusetts 01803

(617) 272-1522
TWX 710-332-7584

Resistor Products—Packaged Networks

Thin-Film Precision Networks—10Ω To 10MΩ
Standard Dual-In-Line And Flatpack Configurations

Features

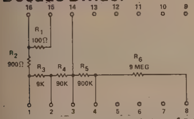
- Precision Tolerances
- High Stability
- Low TCR
- Low Noise
- Low Capacitance
- MIL-STD Screening

Hybrid Systems specializes in the application of thin-film technology and IC packaging to resistor network functions. For requirements of 2% or better absolute tolerance and/or ratios from 2% to 0.002%, Hybrid Systems offers a cost effective, timely solution. IC wafer fabrication technology and automatic laser trimming, combined with standard IC assembly techniques, provide versatile volume production capability.

Custom Networks

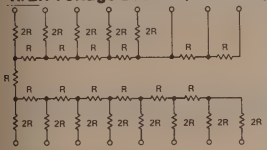
Hybrid Systems offers a wide range of fast turnaround resistor networks built to your exact specifications. Available in both chip and packaged form, these custom networks can typically be processed from specification to finished product in 6 to 8 weeks. MIL-STD-883 screening available.
A staff of resistor specialists is available to consult and advise on optimal configurations.
Some typical networks that you may evaluate are:

Decade Divider



- 100Ω to 9MΩ Resistance
- 0.01% Ratio Accuracy
- 5 PPM/°C max. Ratio Tracking
- High Voltage Operation (>1000 V)
- TO-116 (DIL) or 1/4" x 3/8" Flatpack

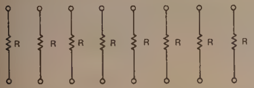
R/2R Voltage Ladder (25K/50K)



0.005% Ratio Accuracy Standard

- 0.002% Ratio Accuracy Available on Request
- 0.004% Ratio Accuracy over 1000 hrs @ 125°C.
- 100 ns Settling to 0.1%
- TO-116 (DIL) or 1/4" x 3/8" Flatpack

8 Resistor Network



- 1% Absolute Accuracy; R = 10K
- 1.0%, 0.1%, 0.01% Ratio Accuracy Available
- 1 PPM/°C Ratio Tracking
- 250 mWper Resistor (1W Total)
- 10:1 Ratio Variation per Resistor Available on Special Request
- TO-116 (DIL) or 1/4" x 3/8" Flatpack

Computer Laser Trimming

A fully automated laser trimming facility assures both consistency and uniformity for all high accuracy resistor products. This is the most modern trimming capability available anywhere.

Packages

Standard packaging configurations are listed below. Other packaging configurations are available, upon request.

TO	Flat Pack	Dual-In-Line
TO-5	14 Pin	14 Pin
TO-18	16 Pin	16 Pin
	24 Pin	24 Pin

Ceramic/Metal Packages

Designed for commercial and MIL-STD programs.

Low-cost plastic packaged equivalents maintain high accuracy and stability.

MIL-Type Manufacturing, Screening and Inspection Procedures

Procedure	Method
Screen	883-Method 5004 1, Class B
Internal Visual (Pre-Cap)	2010
Stabilization Bake	1008 Cond. C
Temperature Cycling	1010 Cond. B
Constant Acceleration	2001 Cond. D
Seal	1014
Burn-in-Test	1015
Final Electrical Tests	Per unit Electrical specifications
External-Visual	2009

Specifications

CHARACTERISTIC	MIN.	TYP.	MAX.	UNITS
Resistance Range	5	—	10 Meg	Ω
Accuracy—Abs.	—	0.1	—	%
(ΔR)—Ratio	—	0.01	0.002	%
Stability—Abs.	—	—	0.1%/1000 hrs./125°C	%
(ΔR)—Ratio	—	—	0.01%/1000 hrs./125°C	%
TC—Abs.	10	25	50	PPM/°C
—Ratio	0.5	2	5	PPM/°C
Power Dissipation	—	100	300	W/sq. in.
Noise	—	—	0.1	μV/V
Capacitance	—	<1	10	pF

SEE OTHER HYBRID SYSTEMS LISTINGS IN SECTIONS 2000 AND 3130.

Hybrid Systems CORPORATION
Burlington, Massachusetts 01803
(617) 272-1522
TWX 710-332-7584

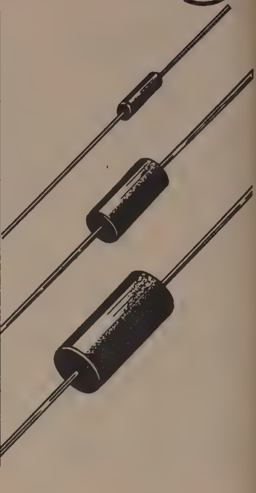
KRL electronics, inc.

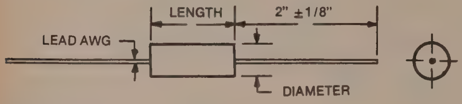
28 Bridge Street • Manchester, New Hampshire 03101
Tel. (603) 668-3210 • TWX (710) 220-1662

KRL Precision Wire Wound . . . Axial Lead Resistors

500 SERIES

KRL STYLE	MIL-R-93	MIL-R-39005	DIMENSIONS			POWER in WATTS		MAXIMUM VOLTAGE	MAXIMUM RESISTANCE
			LENGTH ±.015	DIAMETER ±.015	LEAD AWG	MIL 125°C	COMM 125°C		
532			.200	.100	24	.025	.050	100	100K
†533			.260	.100	24	.030	.060	100	150K
†534			.300	.100	22	.040	.080	100	150K
†535			.250	.125	22	.050	.100	150	300K
536			.312	.125	22	.065	.125	200	400K
537			.375	.125	22	.075	.150	200	500K
†538			.375	.187	22	.125	.250	300	600K
†540		RBR-74	.500	.187	22	.150	.300	300	1Meg
550		RBR-75	.295	.250	22	.125	.250	200	900K
555	RB-56	RBR-56	.375	.250	20	.150	.300	300	1Meg
†560	RB-55	RBR-55	.500	.250	20	.175	.350	400	2Meg
†565	RB-54	RBR-54	.750	.250	20	.350	.700	500	3.5Meg
570	RB-53	RBR-53	.750	.375	20	.375	.750	600	4Meg
575	RB-52	RBR-52	1.00	.375	20	.750	1.50	750	5Meg
578			.500	.500	20	.330	.660	400	2Meg
580	RB-57	RBR-57	1.00	.500	20	.850	1.75	850	10Meg
585	RB-58		1.50	.500	20	1.00	2.00	1.5KV	15Meg





THE KRL POLICY

KRL Electronics is a leader in precision wire wound resistors. Our approach to the production process, which includes design and material improvements, modern facilities, dedicated and trained personnel, have established our reputation for HIGH QUALITY and RELIABILITY in the Electronics Industry. That means years of experience in manufacturing goes into every one of our products. Our customers know what they're going to get, right from the beginning. KRL is committed to a program of "ZERO DEFECTS" and is seeking better ways to improve its Quality Products. At KRL, we test 100% of our product 3 to 5 times, during the manufacturing process. This eliminates any possible failures. KRL holds a "ZERO DEFECT" record, with no returns in over 4 years.

**"KRL QUALITY IS REMEMBERED . . .
LONG AFTER THE PRICE IS FORGOTTEN"**

STANDARD SPECIFICATIONS:

RESISTANCE RANGE— 1Ω to 15MegΩ's

TOLERANCES— Standard from 1%, 0.5%, 0.25%, 0.1%, .05%, .02%, and .01%. Accuracies to .0025% are available . . . Consult factory.

TEMPERATURE COEFFICIENT— (TCR)

0 ±10PPM/°C — 100Ω and over
0 ±15PPM/°C — 10Ω to 100Ω
0 ±25PPM/°C — 1Ω to 10Ω
0 ±90PPM/°C — Less than 1Ω

Closer T.C.'s available to ±1PPM/°C

TEMPERATURE RANGE— Operating from —55°C to +145°C

T.C. TRACKING— Available to ±1PPM/°C.

RATIO MATCHING— Resistors are available with tolerance and temperature coefficient matching and tracking over a wide temperature range. Resistor sets are packaged in individual envelopes and printed with all matching information . . . Consult Factory.

ENVIRONMENTAL REQUIREMENTS— All KRL precision wire wound resistors are manufactured to meet or exeeed the applicable requirements of MIL-R-93 and MIL-R-39005.

MARKING— All resistors are printed with Trade Name, Style, Value, Tolerance and EIA Date Code, when room permits. All markings will meet or exceed MIL-STD-130.

LEAD MATERIAL— Standard lead material is tinned 180 Alloy
Also available in other types . . .

POWER RATING— Available from .05 watts to 2.0 watts. Use column marked COMM, which lists the commercial power rating in watts for all resistors .1% and up. For tighter tolerance resistors, all power ratings shown are maximum watts, refer to the Wattage vs. Tolerance Derating Curve at right.

STABILITY:

Precision Resistors— 0.001% for the first year, 0.0025% over a three year period.
Power Resistors— 0.003% for the first year, 0.005% over a three year period.

MARKING:

All KRL resistors are printed with indelible ink and are completely resistant to all cleaning solvents used for general purpose cleaning of P.C. Boards and assemblies. All markings will meet or exceed MIL-STD-130.

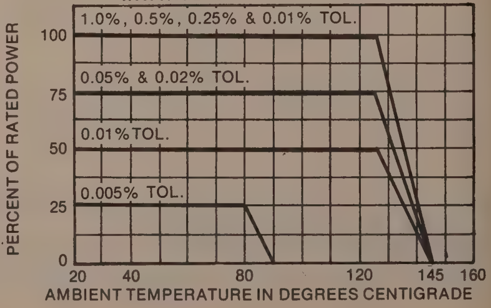
FREQUENCY CHARACTERISTICS:

Resistors above 10KΩ will appear capacitive and have 1 to 5pfds shunt capacitance, depending on value. Below 10KΩ resistors will appear inductive and can typically be controlled to less than 20 micro-henries and for specific applications be controlled down to 1 micro-henry . . . The above applies to Precision Resistors only.

RISE-TIME:

Available to less than 5 nano-seconds, as measured from 10% to 90% of the leading edge of a square wave pulse at 100KHZ applied across the resistor. These type resistors are called "HIGH SPEED" resistors, or Fast Switching Resistors.

WATTAGE vs. TOLERANCE DERATING



KRL electronics, inc.
28 Bridge Street • Manchester, New Hampshire 03101
Tel. (603) 668-3210 • TWX (710) 220-1662

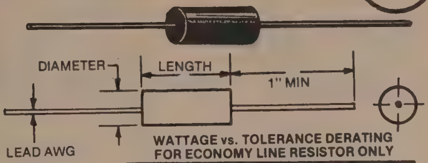
KRL Economy Line Resistors

EC SERIES

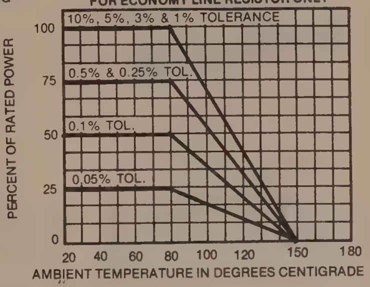
KRL STYLE	DIMENSIONS LENGTH ±.062	DIAMETER ±.032	LEAD AWG‡	POWER in WATTS COMM	MAXIMUM VOLTAGE	MAXIMUM RESISTANCE
EC-10	.390	.100	24	.50	150	100K
EC-12	.530	.100	24	.50	150	120K
†EC-20	.390	.140	20	1.0	200	100K
†EC-22	.530	.140	20	1.2	200	120K
†EC-30	.390	.187	20	1.5	250	100K
†EC-32	.530	.187	20	1.7	250	150K
†EC-34	.560	.187	20	1.8	250	150K
EC-36	.812	.187	20	2.0	300	240K
†EC-40	.500	.250	20	2.0	300	200K
EC-42	.625	.250	20	2.5	300	220K
EC-45	.812	.250	20	2.7	350	250K
EC-50	.875	.312	18	2.8	350	300K
EC-55	1.00	.312	18	3.0	350	500K

†Indicates Most Popular Types

‡Lead diameter may vary by one gauge, depending on requirement.



WATTAGE vs. TOLERANCE DERATING FOR ECONOMY LINE RESISTOR ONLY



KRL introduces the first true Economy Line Wire Wound Resistors . These resistors are ideally suited to D.C. Circuits and some A.C. applications. KRL EC SERIES are becoming especially popular in Industrial and Consumer applications, where low cost is of prime importance, and all the benefits of wire wounds, as low T.C. and high stability are required. An additional benefit, not offered by other manufacturers is the High Power Handling capability along with higher resistance ranges available from the KRL Economy Line Series.

STANDARD SPECIFICATIONS:

RESISTANCE RANGE— 0.01Ω to 500K Ω

TOLERANCES— Standard from 10%, 5%, 3%, 1%. Accuries to 0.05% are available, consult factory.

POWER RATING— .5 WATTS to 3.0 WATTS (See derating curves above)

OPERATING TEMPERATURE RANGE— from —55°C to +150°C.

KRL WIRE WOUND POWER RESISTORS:

P SERIES

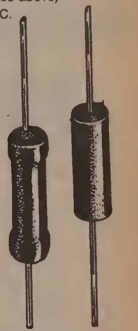
KRL STYLE	MIL-R-26	MIL-R-39007	WATTAGE RATING U	V	MAX. WORKING VOLTAGE(2) U	V	MAXIMUM RESISTANCE IN OHMS(3)	DIMENSIONS LENGTH ±.062	DIAMETER ±.032	LEAD AWG(1)
P-½A			.5	1.0	18	20	3.4K	.250	.094	24
P-½			.75	1.2	30	35	4.5K	.280	.094	24
P-1A	RW-70		1.0	1.5	50	55	10K	.406	.094	24
P-1B			1.1	1.6	62	67	12K	.530	.094	24
P-1C			1.0	1.5	28	33	5K	.330	.094	24
†P-2			1.5	2.0	72	79	10K	.385	.187	20
†P-2A	RW-79		3.0	3.75	135	148	22K	.560	.187	20
P-2B		RWR-71	3.25	4.75	185	220	42K	.812	.187	20
†P-2C			3.0	3.5	138	157	32K	.500	.250	20
†P-2D	RW-69		2.5	3.0	135	148	20K	.500	.187	20
†P-3			4.0	5.5	210	250	45K	.625	.250	20
†P-5	RW-74	RWR-74	5.0	6.0	325	375	90K	.875 ± .094	.312 ± .062	18
P-6	RW-67		6.0	6.5	360	400	95K	1.000 ± .094	.312 ± .062	18
P-7			7.0	8.0	360	400	100K	1.200 ± .094	.312 ± .062	18
P-7A	RW-55		7.5	9.0	510	580	150K	1.375 ± .094	.375 ± .062	18
†P-10			10.0	13.0	800	930	250K	1.815 ± .094	.375 ± .062	18
P-10A	RW-78	RWR-78	10.0	12.0	800	930	240K	1.780 ± .094	.375 ± .062	18
†P-10B	RW-68		10.5	14.0	800	930	275K	1.875 ± .094	.375 ± .062	18

†Indicates Most Popular Types.

(1) Lead diameter may vary by one gauge depending on requirement.

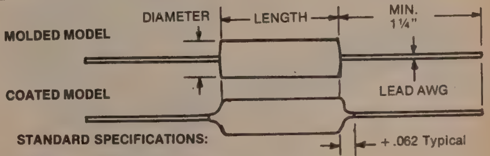
(2) Maximum working voltage determined at .0008" wire size.

(3) Non-Inductive types (NP), divide maximum resistance values by two, and multiply working voltage by .707.

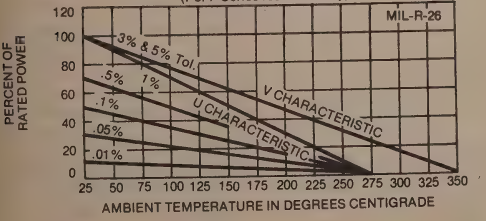


CHARACTERISTIC V: Coated resistors are available in 3% and 5% tolerance only.

CHARACTERISTIC U: Coated or Molded resistors are available in any tolerance.



WATTAGE vs. TOLERANCE DERATING
(For P Series resistors only)



STANDARD SPECIFICATIONS:

RESISTANCE RANGE— From 0.01Ω to 275KΩ

TOLERANCES— Standard from 10%, 5%, 3%, 1% (See tolerance order code on page 1). Accuracies available to ±.01%, consult factory.

TEMPERATURE COEFFICIENT— (TCR)

0 ±10PPM/°C — 100Ω and over
0 ±15PPM/°C — 10Ω to 100Ω
0 ±25PPM/°C — 1Ω to 10Ω
0 ±90PPM/°C — Less than 1Ω

Closer T.C.'s available . . .

All KRL power resistors are Hot Molded or Coated with a Silicone resin, selected to provide superior heat, thermal shock, and moisture resistance. The thermal life of our power resistor silicone coating is outstanding and directly competes with vitreous enamel and ceramic cement type resistors.

MRC MILWAUKEE
RESISTOR CORPORATION
700 WEST VIRGINIA STREET, MILWAUKEE, WI. 53204
Telephone: (414) 271-9900

WIREWOUND POWER RESISTORS

8 TO 2000* WATTS....VITREOUS ENAMEL, SILICONE OR CEMENT COATED

*STANDARD RESISTORS: 8 THRU 225 WATTS:.........
Vitreous Enamel 8,12,20,25,50,100,175 and 200 WATT are stocked in many values - both fixed and adjustable- *except 8 & 20 watt adjustable. WRITE FOR STOCK LIST !*

CUSTOM RESISTORS

36 additional wattage ratings are available with different core diameters and lengths. Non-inductive, tapped, live bracket, porcelain bushings, printed circuit board, strip and fuse resistors are manufactured to your specifications.

MILWAUKEE will satisfy your resistor requirements with custom values, tolerances, T.C., shapes, sizes and coatings with its engineering leadership.

TERMINALS

All 8, 12 and 20 watt fixed resistors are standard with 1½" tinned leads. They are available with conventional lug terminals.

12 watt adjustable and the 25 through 225 watt fixed and adjustable resistors have lug type terminals.

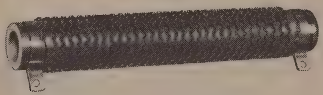
Available are single and double quick connect and many other special terminals to suit your requirements.

MOUNTING

Spring clips, vertical thru bolts and horizontal L brackets are available on all 8 through 225 watts. For ferrule mountings, special spring clips, mica washers, terminal hardware and other accessories, consult the factory.

WRITE FOR CATALOG DESCRIBING VARIOUS MOUNTING OPTIONS!

RIBWOUND RESISTORS 40 -2000 WATT



MILWAUKEE RIBWOUND RESISTORS are unique in the eveness of the crimping, allowing us to wind considerably higher ohmic values in any given wattage....If you have a particular application....*Contact our factory !*

APPLICATIONS

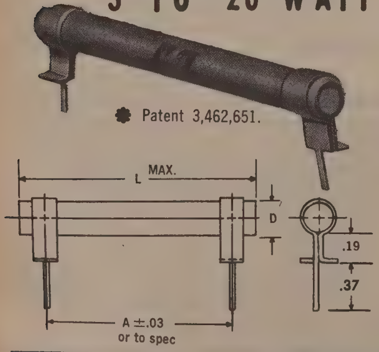
Particularly useful where high energy is to be dissipated in the lower ohmic ranges. Due to its ability to operate at higher temperatures and dissipate greater heat, the ribwound resistor is almost one-half the physical size of the equivalently rated round-wire style resistor. Ribwound wattage ratings are based on a temperature rise of 375°C. They may be mounted with spring clips (thru 1 ⅛" dia.); thrubolt mounting hardware, individual or multiple-stacked bracket assemblies or live bracket mountings.

MILWAUKEE's variety of coatings is particularly convenient for the manufacture of resistors for use in many special atmospheres...........
LET US KNOW OF ANY SPECIAL PROBLEMS !

BASIC CONSTRUCTION

Crimped ribbon resistance wire is edge-wound and then locked to the ceramic core with vitreous enamel. Resistance wire is spot-welded to the terminal connectors. Ribwound resistors can be furnished in fixed, adjustable, or tapped styles. Cement coating can be furnished. Several 300 watt units are stocked in both fixed and adjustable styles. Listed are the more popular 300 watt ohmic values. All other wattage ratings and styles are made to order.

3 TO 20 WATT PRINTED CIRCUIT BOARD RESISTORS



✽ Patent 3,462,651.

Watts	L	A	D	Max. Ohms
3	15⁄16	0.6	13⁄64	14K
5	1¼	0.9	13⁄64	25K
7	1⅝	1.3	13⁄64	40K
10	2	1.7	13⁄64	60K
15	2	1.7	5⁄16	90K
20	2½	2.2	5⁄16	110K

↑ FIXED ADJUSTABLE ↓

Watts	L	A	D	Max. Ohms
15	2	1.7	5⁄16	2K*
20	2½	2.2	5⁄16	3K*

* For higher ohms, consult factory

FEATURES

- Built-in standoff keeps board cool.
- Mounting feet prevent rocking.
- Power ratings 3 to 20 watts.
- Complete OHM range.
- One-piece, welded terminals
- Rectangular leads .020 x .040 in.
- Silicon base coating. Vitreous enamel coating available.
- Standard tolerance ±5%.
- 20 PPM upon request.

MRC MILWAUKEE RESISTOR CORPORATION

700 WEST VIRGINIA STREET, MILWAUKEE, WI. 53204
Telephone: (414) 271-9900

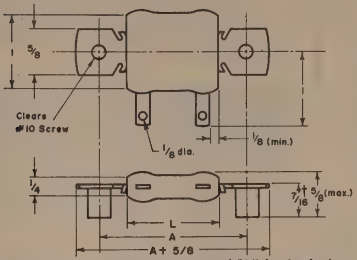
OVALS

OVAL RESISTORS are for use where space saving is desired and where the use of the 'Heat Sink' function of the metal chassis, rack or panel may be employed. Resistance tolerance of ±5% is standard except on low resistance and multi-tapped units. COATINGS of vitreous enamel or silicone base are offered.

OVALS are available in regular or miniature sizes an original development of MILWAUKEE Resistor.

Additional miniature oval core sizes are available increasing the possibility of taps and isolated sections. Other intermediate size are also available. Only regular ovals are available as adjustable.

REGULAR

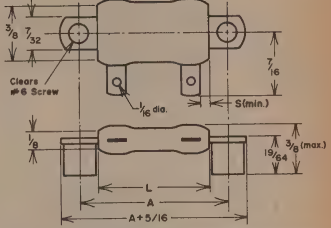


† 7/16" is standard.

Watts*	Ohms	Dimensions	
		A	L
30	.10 to 10K	2"	1¼"
40	.13 to 25K	2¾"	2"
55	.18 to 30K	4¼"	3½"
70	.22 to 55K	5½"	4¾"
95	.25 to 75K	6¾"	6"

*Rating is based on mounting on steel pad 10"x10"x.040".

MINIATURE

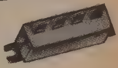


Watts*	Ohms	Dimensions		
		A	L	S
10	.1 to 5K	1"	¾"	1/16"
15	.15 to 25K	1¼"	1"	1/16"
20	.2 to 50K	2 5/16"	2"	1/16"

* Rating based on mounting on steel panel 10"x10"x.040".

METAL CASE *

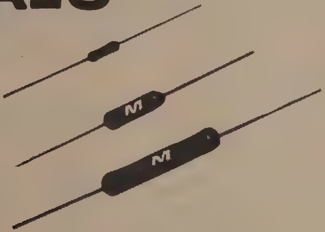
*Patent 3,581,266



High Heat Sink-flush mounting dissapates heat
20 to 100 Watts - higher on Specials
Quick Connect or Screw Terminals
Save: Space - Cost - Assembly Cost

WRITE FOR ADDITIONAL INFORMATION !

AXIALS



APPLICATIONS

- Electronic Circuitry
- Printed Circuits
- Radio, Television and Sound Reproduction
- Miniature Controls

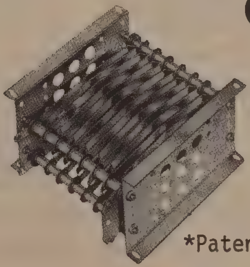
CONSTRUCTION

- Wire Wound on Ceramic Core
- All Welded
- Vitreous or Silicone Base Coating

FEATURES

- Rugged yet small.
- Highly stable.
- Matched expansion in core caps and coating for temperature stability.
- Standard 5% tolerance over 1 ohm, available in closer tolerances on request.
- Wattage ratings based on 325°C rise at 25°C ambient.
- Standard Stock — 3, 6.5 and 11 watt sizes.
- Leads Hot Tin Dipped.
  Available in a variety of sizes from 1 watt through 11 watts on request.

GRIDS *



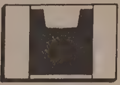
Stud or Deck Mounted, MILWAUKEE's patented pre-formed grid shape assures maximum heat dissapation & cooling.

*Patent 3,212,045

Pre-formed grid elements assure unidirectional stress motion. Custom design and construction features are most economical utilizing the exclusive MILWAUKEE patented grid system.

PRECISION *thick film* CHIP RESISTORS

why chip resistors?



why MINI-SYSTEMS?

In hybrid construction many have found it cheaper, quicker and easier to use MINI-SYSTEMS' chip resistors for prototypes, short production runs, "odd" high or low values, unique match and/or track specs, "tweak" or trim functions and cross-overs. Size reduction and repairs are easily accomplished with MSI Chip Resistors.

MINI-SYSTEMS has a wide selection of standard chip resistors tailored to fit assorted end uses. They are made from the very finest commercially-available, thick film materials; NO proprietary concoctions or "witches' brews" are used at M S I.

MINI-SYSTEMS has devoted over 6 years to developing and refining the materials and manufacturing processes used in high volume production of over 30 standard types of chip resistors.

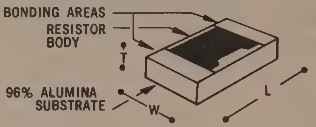
MINI-SYSTEMS' quality program assures the customer of the highest possible reliability. Quality control procedures are derived from the requirements of MIL-Q-9858A, and MIL-I-45208A. Inspection records are maintained from the raw material to final processing and testing stage. Total traceability is maintained. Quality assurance inspection points are built into each manufacturing procedure to assure uniformity and conformance to applicable specifications. All resistors manufactured by MINI-SYSTEMS are designed to retain the electrical and mechanical characteristics under conditions set forth in MIL-R-55342

MINI-SYSTEMS' well-known reputation for prompt deliveries is the product of an in-depth inventory and efficient processing of all customers' orders; most orders are on their way within 5 days after we receive them.

CHIP RESISTOR SELECTION CHART

	Length (L) ±.005"	Width (W) ±.005"	Thickness (T) Typ. /Max	Pdis Rating @ 25°C in Free Air	Type	
FLIP-R® "Flip Chip" Resistors	.050"	.050"	.013"/.016"	1/8 W	MSR-4	(1)
	.100"	.025"	.013"/.016"	1/10W	MSR-5	
	.075"	.050"	.027"/.029"	1/5 W	MSR-13	
	.100"	.050"	.027"/.029"	1/4 W	MSR-9	
	.100"	.100"	.027"/.029"	1/2 W	MSR-7	
	.125"	.244"	.027"/.029"	2 W	MSR-14	
	.244"	.125"	.027"/.029"	2 W	MSR-17	
	1.000"	.100"	.027"/.029"	4 W	⁴MSR-11	
	.050"	.040"	.013"/.016"	50mW	MSR-19	
	.150"	.050"	.027"/.029"	300mW	MSR-24	
	.393"	.192"	.027"/.029"	2 W	MSR-32	
	.496"	.100"	.027"/.029"	2 W	MSR-22	
	.494"	.243"	.027"/.029"	4 W	MSR-30	
	.661"	.326"	.027"/.029"	8 W	MSR-28	
	.661"	.494"	.027"/.029"	12 W	MSR-26	
Wire Bond Resistor Types	.035"	.035"	.011"/.013"	35mW	MSR-10	(2)
	.050"	.050"	.011"/.013"	1/8 W	MSR-1	
	.050"	.050"	.011"/.013"	1/8 W	MSR-2	
	.100"	.025"	.011"/.013"	1/10W	MSR-3	
	.075"	.050"	.027"/.029"	1/5 W	MSR-12	
	.100"	.050"	.027"/.029"	1/4 W	MSR-8	
	.100"	.100"	.027"/.029"	1/2 W	MSR-6	
	.125"	.244"	.027"/.029"	2 W	MSR-15	
	.244"	.125"	.027"/.029"	2 W	MSR-16	
	.050"	.040"	.011"/.013"	50mW	MSR-18	
	.150"	.050"	.027"/.029"	300mV	MSR-23	
	.393"	.192"	.027"/.029"	2 W	MSR-31	
	.494"	.243"	.027"/.029"	4 W	MSR-29	
	.661"	.326"	.027"/.029"	8 W	MSR-27	
	.661"	.494"	.027"/.029"	12 W	MSR-25	
*	.060"	.055"	.015"/.025"	1/8 W	WA-4	(3)
	.110"	.105"	.027"/.035"	1/2 W	WA-7	
	.110"	.055"	.027"/.035"	1/4 W	WA-9	
	.085"	.055"	.027"/.035"	1/5 W	WA-13	

GLASS OVERLAY ON ALL RESISTIVE ELEMENTS



NOTES:

(1) "Flip-Chip" resistors have solder-tinned (SN-62) end-metallization over high-adhesion palladium-silver.

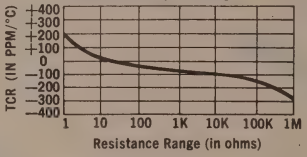
(2) Wire bond resistors have 0.0005" gold end-metallization optimized for wire bonding.

(3) Type WA-resistors have wraparound end-metallization for reflow solder or conductive epoxy attachment.

(4) MSR-11 is a high-voltage power resistor available on special order to customer's specification.

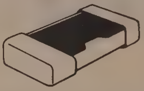
TEMPERATURE COEFFICIENT OF RESISTANCE

Actual TCR varies ±150 PPM/°C from typical, depending on geometry, materials and processing.



* *wraparound metallization*

TYPES WA-4/7/9/13 are unique design, HI-REL chip resistors having a glass-passivated resistor body "sandwiched" between double-screened electrodes. End metallization is double-dipped, high-adhesive platinum-gold plus solder tinning with "SN-62."



STANDARD OHMIC RANGE
ALL GEOMETRIES
1 ohm to 20 megohms

½ ohm to 1000 megohms
ON SPECIAL ORDER

New Products

PRECISION THIN-FILM CHIP RESISTORS

MINI-SYSTEMS' "Nichrome on Ceramic" Thin Film Chip Resistors offer several improvements and unique advantages:

- Extra large gold/nickel bonding pads — ideal for all bonding methods — provide "tie-point" convenience.
- Diamond wheel dicing for precise sizes and geometries.
- Values to 10 Megohms
- Low noise.
- Rapid deliveries.
- Low TCR.

Call, wire or write =M=S=I= for complete information or for your special requirements on =M=S=I= THIN FILM RESISTORS.

MSI

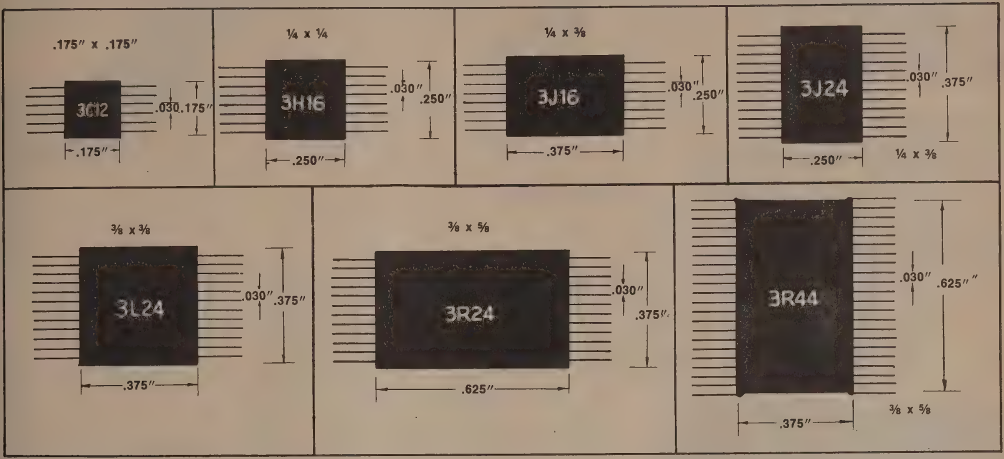
MINI-SYSTEMS, INC.

20 DAVID ROAD, NORTH ATTLEBORO, MASS. 02761
TELEPHONE: (617) 695-0206 • TWX NO. 710-348-0564

MINI-SYSTEMS, INC.

NEW FLAT-PAKS with 0.030″ LEAD SPACING

Also DEEP VERSIONS for HYBRID ASSEMBLIES



OFFERS ADVANTAGES IN —

- SPACE
- WEIGHT
- CONVENIENCE (Provides necessary depth)
- SHOCK & VIBRATION (Shorter wire bonds)
- HIGHER FREQ. (Shorter signal paths)
- ECONOMY (Less gold consumption)

Leads	Width	Length	Usable Depth	Minimum Glass Free Area	Part No.
12	.175″	.175″	.032″	.070″ x .090″	3C12M
16	.250″	.250″	.040″	.150″ x .180″	3H16M
16	.250″	.250″	.080″	.130″ x .170″	3H16M-1
16	.375″	.250″	.040″	.250″ x .160″	3J16M
16	.375″	.250″	.080″	.240″ x .150″	3J16M-1
24	.250″	.375″	.040″	.130″ x .290″	3J24M
24	.250″	.375″	.080″	.120″ x .280″	3J24M-1
24	.375″	.375″	.040″	.255″ x .290″	3L24M
24	.375″	.375″	.080″	.240″ x .280″	3L24M-1
24	.625″	.375″	.090″	.480″ x .280″	3R24M-1
44	.375″	.625″	.090″	.240″ x .530″	3R44M-1

- **Mating lids and preforms available.**
- **Mating ceramic substrates with or without metalization also available.**

Today's I.C.'s and Hybrid Microcircuits need packages more appropriate for the devices and/or end application. MINI-SYSTEMS proudly presents to the electronics industry a carefully conceived and engineered assortment of completely new hermetic Flat-Paks. These designs will give new possibilities, complement, and in some cases replace, existing Flat-Paks.

MINI-SYSTEMS Packages now and in the future will cater to new I.C. devices and hybrid microcircuit requirements. MINI-SYSTEMS pays consistent attention to quality, customer service and deliveries.

For more information, phone or wire MSI for complete Flat-Pak Catalog, design data and pricing.

MINI-SYSTEMS, INC.

20 David Road, North Attleboro, Mass. 02761
Tel. (617) 695-0206
TWX NO. 710-348-0564

Nytronics Components Group Inc.
ORANGE STREET, DARLINGTON, S. C. 29532
(803) 393-5421 • TWX 810-665-2182

SAGE/NYTRONICS RESISTORS

INDUSTRY'S FINEST RESISTORS

ALL STYLES AVAILABLE WITH SOLDERABLE (S) OR WELDABLE (W) TERMINALS

MIL-R-39007
ESTABLISHED RELIABILITY
FAILURE RATES M, P, AND R .01%/1000 HRS.
RESISTANCE TOLERANCE ±1%
TEMPERATURE COEFFICIENT:
±20 PPM/°C MAX. 10Ω AND HIGHER
±50 PPM/°C MAX. 1Ω TO 10Ω
±90 PPM/°C MAX. .1Ω TO 1Ω

TYPE DESIGNATIONS

MIL STYLE	DETAIL SPEC. NO.	SAGE STYLE	MIL WATTS @ 25°C	AVAILABLE RESISTANCE RANGE
RWR80S RWR80W	/8C /8C	1009SM 1007SM	2	.10Ω to 2.67K
RWR81S RWR81W	/9C /9C	259SM 257SM	1	.10Ω to 1.0K
RWR89S RWR89W	/11B /11B	1249SM 1247SM	3	.10Ω to 4.12K
RWR84S RWR84W	/10B /10B	1509SM 1507SM	7	.10Ω to 12.4K
RWR71S RWR71W	/5C /5C	1259SP 1257SP	2	.10Ω to 16.2K
RWR74S RWR74W	/6B /6B	1509SP 1507SP	5	.10Ω to 12.1K
RWR78S RWR78W	/7C /7C	1709SP 1707SP	10	.10Ω to 39.2K

EXAMPLE PART DESIGNATION:

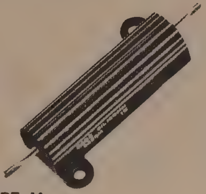
RWR-74	S	49R9	F	R
BODY STYLE	TERMINALS S—SOLDERABLE W—WELDABLE	NOMINAL RES., Ω. THREE SIGNIFICANT DIGITS PLUS FOURTH INDICATING NUMBER OF ZEROES. BELOW 100Ω, R-DECIMAL AND FOLLOWING DIGITS ARE SIGNIFICANT.	TOLERANCE ±1%	LIFE FAILURE RATE

Nytronics Components Group Inc.

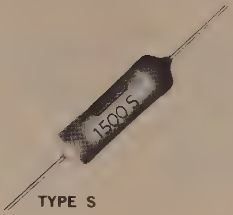
SAGE ELECTRONICS CORPORATION

ORANGE STREET, DARLINGTON, S. C. 29532 (803) 393-5421 • TWX 810-665-2182

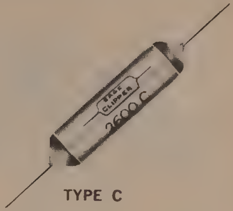
SAGE/NYTRONICS RESISTORS



TYPE M



TYPE S



TYPE C

TYPC C CLIPPER METAL SHEATHED RESISTORS

Similar in all respects to Type S, fully insulated plus addition of metal sleeve for heat sink mounting in spring clip holders.
Full heat sink rating.

TYPE S, NS SILICONE COATED POWER RESISTORS

Meet or exceed MIL-R-26E requirements.
N designates non-inductive.

STYLE	Rating Watts		STYLE	Char. U Rating Watts	Nominal Size Length	Nominal Size Dia.	Lead Dia	Maximum Standard Range, Ω Regular Winding	Maximum Standard Range, Ω Non-Inductive	
	Full heat sink rating		100S	1	.400	.094	.020	8400	3000	MINIATURE SERIES
			200S	2	.400	.125	.020	11000	3900	
			300S	3	.400	.187	.020	15000	5300	
			250S	.5	.250	.078	.020	3800	1350	
			500S	.8	.312	.078	.020	5000	1750	
			750S	1	.531	.094	.020	12000	4200	
			1000S	1	.406	.094	.020	8400	3000	
			1100S	2	.500	.125	.032	15000	5500	
2200C	6	→	1200S	3	.500	.187	.032	20000	7000	REGULAR S SERIES
			1240S	3	.562	.187	.032	24000	8400	
2250C	6	→	1250S	3	.812	.187	.032	40000	14000	
			1300S	3	.625	.250	.040	30000	10500	
			1500S	5	.875	.312	.040	71000	25000	
2550C	11	→	1550S	5	1.000	.312	.040	88000	31000	
2600C	14	→	1600S	7	1.219	.312	.040	114000	40000	
			1700S	10	1.781	.375	.040	230000	80000	
			1900S	10	1.375	.431	.040	210000	73000	
			1950S	11	2.000	.431	.040	314000	110000	

Min. Res. Tol. Available is ±1% on the NS Styles.

SAGE SILICOHM® fixed wirewound units are not ordinary power resistors. They provide remarkable miniaturization vs required wattage performance. Sage has pioneered the area of power handling capacity combined with precision and stability features ordinarily associated with Mil-R-93 resistors.

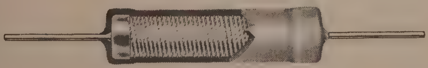
TYPE SB & NSB HIGH WATTAGE COMMERCIAL BERYLLIA CORE RESISTORS

STANDARD SOLDERABLE LEADS	RATED WATTS G	RATED WATTS V	Approx Grams WEIGHT
250SB	1	1.5	.18
500SB	1.5	2	.28
1000SB	2.25	2.75	.32
1200SB	3.5	4.5	1.0
1240SB	4	5	1.1
1250SB	4.5	6	1.2
1300SB	6	8	1.8
1500SB	7	9	3.6
1600SB	9	12	4.2
1700SB	14	18	7.3

TYPE S CONSTRUCTION

Showing ceramic core, spaced single layer winding, welded to stainless steel cap, and multiple layer coating.

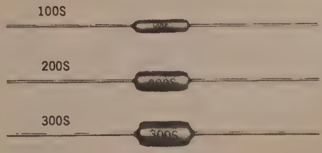
Copperweld leads 60/40 Hot Solder Dip. Lead Length 2″ ±1/16 *
is supplied on all sizes unless otherwise
specified on purchase order.



*Except 250S and 500S Styles, which are 1½″ minimum.

MINIATURE TYPE S "CORDWOOD" SERIES

1, 2, 3 watt .4 inch body length



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SAGE/NYTRONICS RESISTORS

TYPE S RESISTOR ITEM DESCRIPTION

Sage Part Number identification consists of a combination of numerals and letters according to the following guide. This is the nomenclature ordinarily marked on resistors and it fully serves the purpose of purchased item description except for limited cases of special testing. Note that grouping of characters is not constant, but varies to fit descriptive need of a given part.

STYLE DESIGNATION

1500 **S / NS** **B** **2740** **1**

If applicable

Nominal Value, Ohms (decimal symbol, as required, is used in both nominal value and tolerance)

±% tolerance

Core Material and Process Classification:
Blank entry indicates regular steatite core, commercial processing
A = alumina core, commercial processing
B = beryllia core, commercial processing
P = alumina core, High Rel processing
M = beryllia core, High Rel processing

S = Silicohm®, single layer wound; **NS** = Silicohm®, non-inductively wound

Body type, size, lead details per catalog chart

PRICING: On request from factory or any regional office. Item price is based on style designation, ohmic value, tolerance and quantity, plus any special testing if applicable.

QUALITY ASSURANCE: Sage continuously maintains systems and procedures for quality-reliability administration in conformance with:

MILITARY — MIL-Q-9858, MIL-I-45208A and MIL-STD-790
Our Federal Supply Code No. is 00213
Our Federal Supply Product Class is 5905

GOVERNMENT SOURCE INSPECTION: GSI orders are serviced on a regular basis by the Defense Contract Administration Services.

Nytronics Components Group Inc.
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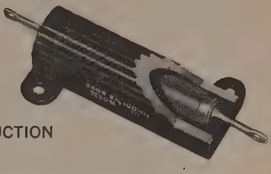
ORANGE STREET, DARLINGTON, S. C. 29532 (803) 393-5421 • TWX 810-665-2182

SAGE/NYTRONICS RESISTORS

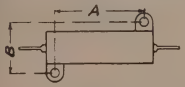
INDUSTRY'S FINEST RESISTORS . . . Commercial, Military, High Reliability

TYPE M
METAL CLAD
CHASSIS MOUNT
RESISTORS


TYPE M CONSTRUCTION

Aluminum housed resistors for heat sink mounting. Meet or exceed requirements of MIL-R-18546D. Dielectric strength to 2500 volts rms.

All dimensions are inches nominal. Complete specifications available on request.



STYLE	Rating Watts	A	B	Max. Resistance Ω	
				Regular Winding	Non-Induct.
3105M	8	.444	.490	24,000	8,400
3010M	14	.562	.625	30,000	10,500
3225M	25	.719	.781	71,000	25,000
3550M	50	1.562	.844	230,000	80,000

M suffix designates regular single layer wind.
NM suffix designates non-inductive wind.

TYPE MB HIGH WATTAGE
BERYLLIUM OXIDE CORES

STYLE	RATED WATTS 25°C ambient	
	chassis mounted	free air
3105 MB NMB	15	6
3010 MB NMB	20	8
3225 MB NMB	35	14
3550 MB NMB	50	20

MB suffix designates regular single layer wind, NMB non-inductive wind.

MIL-R-26E TYPE DESIGNATIONS

EXAMPLE: RW69 V 471

RW69	V	471
Body Style	Characteristic, V only (350°C max.)	Nominal resistance, Ω. Two significant digits plus third indicating number of zeros. Below 10ΩR = decimal and last digit is significant.

TOLERANCE: ±5% for values 1Ω and up; ±10% below 1Ω.
TC: ±260 ppm/°C 20Ω and up; 400 ppm/°C below 20Ω.

MIL STYLE	SAGE STYLE	MIL WATTS	DEFINED OHMIC RANGE	
			(Single layer wound .00175 min. wire dia.	.001 Min. Wire Dia.
RW55V	1900S	7	.1—5100	
RW56V	1950S	14	.1—9100	
RW67V	1550S	6.5	.1—3600	.1—8200
RW68V	1700S	11	.1—8200	.1—20K
RW69V	1200S	3	.1—910	.1—2K

EXAMPLE: RW70 U 49R9 F

RW70	U	49R9	F
Body Style	Characteristic, U only (275°C max.)	Nominal resistance, Ω. Three significant digits plus fourth indicating number of zeros. Below 100ΩR = decimal and following digits are significant.	Tolerance ±% B = .1% D = .5% F = 1.0%

TC: ±30 ppm/°C 10Ω and above
±50 ppm/°C 1Ω to 10Ω
±90 ppm/°C below 1Ω

MIL STYLE	SAGE STYLE	MIL WATTS	VOLTAGE Max.	DEFINED OHMIC RANGE		
				Min.	Max. for .001" wire (Navy)	Max. for .0008" wire (all other)
RW70U	1000S	1	——	.1	1210	3160
RW74U	1500S	5	300	.1	12100	38300
RW78U	1700S	10	720	.1	40200	90900
RW79U	1240S	3	135	.1	3570	10500
RW80U	1000SB	2	——	.1	1240	3160
RW81U	250SB	1	25	.1	649	——

MIL-R-18546D TYPE DESIGNATIONS

Example: RE65 G 1001

RE65	G	1001
Style	Characteristic, 275°C Max. G for regular inductive winding N for non-inductive winding	Nominal resistance, Ω. ±1% only. Three significant digits plus fourth indicating number of zeros. Below 100Ω R = decimal and following digits are significant.

T.C. ±30 ppm/°C 2000Ω and above
±50 ppm/°C under 2000Ω

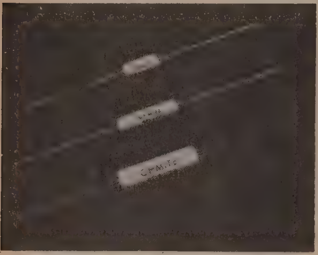
MIL STYLE	SAGE STYLE	MIL WATTS	DEFINED OHMIC RANGE	
			Min.	Max. (.001 wire)
RE60G	3105M	5	.1	3320
RE60N	3105NM	5	1.0	1650
RE65G	3010M	10	.1	5620
RE65N	3010NM	10	1.0	2800
RE70G	3225M	20	.1	12100
RE70N	3225NM	20	1.0	6040
RE75G	3550M	30	.1	39200
RE75N	3550NM	30	1.0	19600

CONSIDER THESE RESISTOR FEATURES:

- Wattage Rating, ½ to 50 watts
- T.C. 20 ppm/°C or 10 ppm/°C
- 1000 volt rms body insulation
- Characteristic U or V wattage rating: to 275°C or 350°C
- Power load life stability <.5%/1000 hours
- Weldable leads when specified
- Non-inductive winding when specified

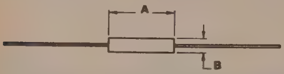
OHMITE® series 99

MOLDED VITREOUS ENAMEL AXIAL LEAD WIREWOUND RESISTORS



SERIES 99

Watt	Type	Resist. Range Min.-Max.	Body Dimensions Max. L. A ("/mm)	Body Dimensions Max. Dia. B ("/mm)	Leads (1.5"/ 38.1 mm) Ga.	Heat Sink Clip No.
1.5	995-1A	.1-6.65K	.437/11.1	.140/3.6	24	5900
2.25	995-2A	.1-6.49K	.390/9.9	.219/5.6	20	5902
3.25	995-3A	.1-22.1K	.562/14.3	.234/5.9	20	5904
5	995-5B	.1-53.6K	.953/24.2	.234/5.9	20	5906
6.5	995-5A	.1-80.6K	.937/23.8	.343/8.7	20	5905
9	995-7A	.1-118K	1.233/31.3	.343/8.7	20	5907
11	995-10A	.1-187K	1.796/45.6	.343/8.7	20	5908



- **Unique Molded Construction Provides Consistent Shape and Size**
- **Exceeds MIL-R-26 Moisture Requirements**
- **Endures Heat Up to 1500°F**
- **All Welded Construction**
- **Ideal for Machine Insertion and High Density Circuits**

Series 99 molded vitreous wirewound resistors are high performance components designed for precision instrumentation, medical equipment and other applications demanding high reliability and stable operation. MIL-R-26 approved units are available for Military Application.

An extremely wide range of resistance values can be specified (5% tolerance standard), up to 11 watts with 1 KV dielectric breakdown rating (500 V for 1 W types). Low temperature coefficient values of approx. 0 ±30 ppm/°C are typical. Precision molded bodies make them an excellent choice for machine insertion production line techniques. Durable molded bodies withstand harsh solvents.

MECHANICAL

Terminal Strength: Meets MIL-R-26 requirements.

Dimensions: See table at left.

ELECTRICAL

Tolerance: ±5% std.; ±1% to ±10% available.

Temperature Coefficient: 0 ±30 ppm/°C (+25°C to +350°C) for most values. T.C. for low values depends on resistance.

Dielectric Withstanding Voltage: 1 KV (500 V for 1 W types).

Overload, Short Time: 10X rated wattage for 5 sec. (5 W size and larger); 5X rated wattage (under 5 W).

Wattage: Up to 11 watts; see table. Ratings may be increased by using metal mounting clips. See Ohmite Catalog No. 100.

Inductance: Varies with number of turns and wire size. Std. units have single layer winding. Non-inductive (Aryton-Perry) windings available.

MATERIALS

Core: Steatite ceramic, resistant to thermal shock and wide variations in temperature.

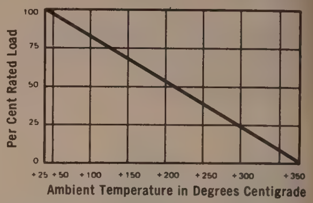
Resistance Element: High grade resistance alloy wire, single layer winding. Leads and resistance element welded to metal end caps.

Coating: High performance molded vitreous enamel.

Leads: Solder coated.

DERATING

Wattage rating is based on 25°C **Free Air Rating.** For higher ambient temperatures, use derating chart.



Popular values are available from Ohmite stock or from your local authorized Ohmite stocking distributor. Refer to Ohmite Catalog No. 300.

ORDERING DATA

For other than stock values specify style, resistance and tolerance.

For example: 995-1A, 500 ohms, 2% tolerance specifies a 1 watt, 500 ohm molded vitreous enamel resistor with a resistance tolerance of 2%.

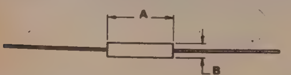
For special mechanical or electrical requirements, your inquiry will be given prompt attention.

OHMITE® series 22

CONFORMAL VITREOUS ENAMEL AXIAL LEAD WIREWOUND RESISTORS

SERIES 22

Watt	Type	Resist. Range Min.-Max.	Body Dimensions Max. L. A ("/mm)	Body Dimensions Max. Dia. B ("/mm)	Leads (1.5"/ 38.1 mm) Ga.
1	221	.1-2.5K	.406/10.3	.156/4	22
2	222	.1-3.9K	.406/10.3	.219/5.6	20
3	223	.1-10K	.562/14.3	.250/6.4	20
5	225	.1-30K	1.000/25.4	.250/6.4	20
6	226	.1-35K	1.031/26.2	.343/8.7	20
7	227	.1-40K	1.250/31.8	.343/8.7	20
11	220P	.5-60K	1.938/49.2	.343/8.7	20



- **Rugged Vitreous Enamel Coating Withstands Severe Humidity and Temperature Cycling**
- **Economical**
- **All Welded Construction**
- **Ideal for Machine Insertion**

Advanced conformal vitreous enamel coating protects resistors, even in environments of high heat. These rugged, economical wirewound resistors are recommended for industrial applications where quality construction and reliable operation are prime specifying parameters. 5% tolerance is standard for all wattage sizes. Dielectric breakdown is 1 KV. (500 V for 1 W size). Typical T.C. of 0 ±30 ppm/°C for 10Ω values and above.

MECHANICAL

Terminal Strength: Meets MIL-R-26 requirements.

Dimensions: See table at left.

ELECTRICAL

Tolerance: ±5% std.; ±1% to ±10% available.

Temperature Coefficient: 0 ±30 ppm/°C typical for 10Ω and above.

Dielectric Withstanding Voltage: 1 KV (500 V for 1 W types).

Overload, Short Time: 10X rated wattage for 5 sec. (5 W size and larger); 5X rated wattage for 5 sec. (under 5 W).

Wattage: Up to 11 watts; see table.

Inductance: Varies with number of turns and wire size. Std. units have single layer winding. Non-inductive (Aryton-Perry) windings available.

MATERIALS

Core: Ceramic, resistant to thermal shock and wide variations in temperature.

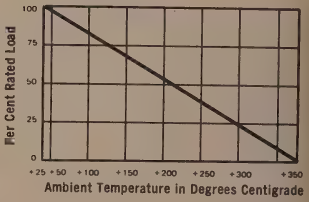
Resistance Element: High grade resistance alloy wire, single layer winding. Leads and resistance element welded to metal end caps.

Coating: High performance conformal vitreous enamel.

Leads: Solder coated.

DERATING

Wattage rating is based on 25°C **Free Air Rating.** For higher ambient temperatures, use derating chart.



ORDERING DATA

To specify resistors, see below:

Typical No.

22 1 S R5000 J

OHMITE SERIES NO.
Identifies basic resistor construction.

WATTAGE
1=1 W
2=2 W
3=3 W
5=5 W
6=6 W
7=7 W
0=10 W or more

MISCELLANEOUS SPECIFICATIONS
S=Standard winding.
N=Non-inductive winding.
P=Standard winding with actual wattage rating more than indicated.
T=Non-inductive winding with actual wattage rating more than indicated.

RESISTANCE VALUE
Value is identified by 4 digits and 1 letter. Resistance is expressed in ohms with the letter "R" signifying a decimal point. "R" is used in all resistance values lower than 1000Ω. Letter "K" indicates multiples of 1000Ω.

Examples:
R5000=.5Ω
1R000=1Ω
250R0=250Ω
1K000=1000Ω
25K00=25,000Ω
25K50=25,500Ω

TOLERANCE
F= ±1%
G= ±2%
H= ±3%
J= ±5% std.
K= ±10%

For special mechanical or electrical requirements, your inquiry will be given prompt attention.

OHMITE MFG. CO., a North AMERICAN PHILIPS company / 3601 W. Howard St., Skokie, Illinois 60076 / (312) 675-2600 / TWX 910-223-0805 / TELEX 72-4433

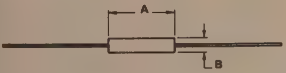
OHMITE® series 57 ceron®

FLAMEPROOF CONFORMAL CERAMIC AXIAL LEAD WIREWOUND RESISTORS

SERIES 57 CERON®

Watt	Type	Resist. Range Min.-Max.	Body Dimensions Max. L. A ("/mm)	 Max. Dia. B ("/mm)	Leads (1.5"/ 38.1 mm) Ga.
1	571	1.0-3K	.406/10.3	.156/4	22
2	572	1.0-4K	.406/10.3	.219/5.6	20
3	573	1.0-12K	.562/14.3	.234/5.9	20
5	575	1.0-30K	1.000/25.4	.234/5.9	20
7	577	1.0-50K	1.094/27.8	.343/8.7	20
10	570	1.0-60K	1.813/46.1	.343/8.7	20

®CERON is a registered trade name of Ohmite Mfg. Co.



- Flameproof — WILL NOT IGNITE from any Overload or Exposure to Open Flame
- Ideal for Applications Where High Overloads Could Result in Flaming or Body Deterioration
- Exceeds All Environmental Requirements of MIL-R-26E
- Resists Shock, Vibration, Salt Spray; Immune to Fungus Growth
- All Welded Construction
- Ideal for Machine Insertion

A unique coating on a rugged power wirewound resistor for a spectrum of applications where nonflammability is absolutely essential. Designed for use in data processing equipment, communications equipment, electrically controlled apparatus, medical and home entertainment equipment . . . and similar demanding applications.

MECHANICAL

Terminal Strength: Meets MIL-R-26E requirements.
Dimensions: See table at left.

ELECTRICAL

Tolerance: ±5% std.; ±1%, ±3%, ±10% available.

Temperature Coefficient: 0 ±30 ppm/°C max. Lower T.C. available on special order.

Dielectric Withstanding Voltage: 500 V (250 V for 1 and 2 W sizes). 1 KV available.

Overload, Short Time: 5X rated wattage for 3 seconds.

Wattage: Up to 10 watts; see table.

Inductance: Varies with number of turns and wire size. Std. units have single layer winding. Non-inductive (Aryton-Perry) windings available.

MATERIALS

Core: Ceramic, resistant to thermal shock and wide variations in temperature.

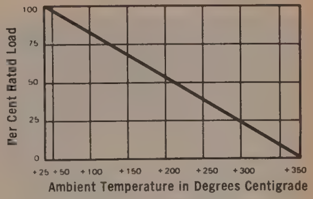
Resistance Element: High grade resistance alloy wire, single layer winding. Leads and resistance element welded to metal end caps.

Coating: FLAMEPROOF CERON® conformal ceramic.

Leads: Solder coated.

DERATING

Wattage rating is based on 25°C **Free Air Rating.** For higher ambient temperatures, use derating chart.



ORDERING DATA

To specify resistors, see below:

Typical No.

57 1 S R5000 J

OHMITE SERIES NO. Identifies basic resistor construction.

WATTAGE
1=1 W
2=2 W
3=3 W
5=5 W
6=6 W
7=7 W
0=10 W

MISCELLANEOUS SPECIFICATIONS
S=Standard winding.
N=Non-inductive winding.

RESISTANCE VALUE
Value is identified by 4 digits and 1 letter. Resistance is expressed in ohms with the letter "R" signifying a decimal point. "R" is used in all resistance values lower than 1000Ω. Letter "K" indicates multiples of 1000Ω.

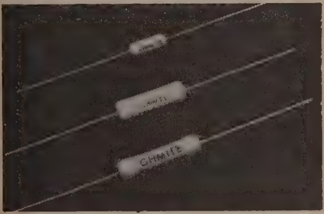
Examples:
R5000=.5Ω
1R000=1Ω
250R0=250Ω
1K000=1000Ω
25K00=25,000Ω
25K50=25,500Ω

TOLERANCE
F= ±1%
G= ±2%
H= ±3%
J= ±5% std
K= ±10%

For special mechanical or electrical requirements, your inquiry will be given prompt attention.

OHMITE® series 44 ohmicone®

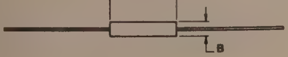
CONFORMAL SILICONE CERAMIC AXIAL LEAD WIREWOUND RESISTORS



SERIES 44 OHMICONE®

Watt	Type	Resist. Range Min.-Max.	Body Dimensions Max. L. A ("/mm)	 Max. Dia. B ("/mm)	Leads (1.5"/ 38.1 mm) Ga.
1	441	.5-4K	.437/9.4	.125/3.2	22
2	442	.1-4K	.406/10.3	.219/5.6	20
3	443	.1-15K	.563/14.3	.250/6.4	20
5	445	.1-60K	.937/23.8	.343/8.7	18
7	447	.1-80K	1.250/31.8	.343/8.7	18
10	440	.1-150K	1.843/46.8	.406/10.3	18

®OHMICONE is a registered trade name of Ohmite Mfg.



- Economically Priced with Low T.C.
- Ohmicone® Silicone-Ceramic Coated — Withstands High Temperatures
- Standard Tolerance — 5%
- All Welded Construction
- Ideal for Machine Insertion

Series 44 Ohmicone® conformal silicone ceramic power resistors are designed for a wide range of commercial, industrial, and communications equipment. Primary specifying features are excellent economy and low T.C.

MECHANICAL

Terminal Strength: Meets MIL-R-26 requirements.

Dimensions: See table at left.

ELECTRICAL

Tolerance: ±5% std.; ±0.05% to ±10% available.

Temperature Coefficient: >1Ω — 0 ±90 ppm/°C; 1 to 10Ω — 0 ±50 ppm/°C; 10Ω and greater — 0 ±20 ppm/°C.

Dielectric Withstanding Voltage: 500 V (250 V for 1 W size). 1 KV available.

Overload, Short Time: 10X rated wattage for 5 sec. (5 W and larger); 5X rated wattage for 5 sec. (3 W and smaller).

Wattage: Up to 10 watts; see table.

Inductance: Varies with number of turns and wire size. Std. units have single layer winding. Non-inductive (Aryton-Perry) windings available.

MATERIALS

Core: Ceramic, resistant to thermal shock and wide variations in temperature.

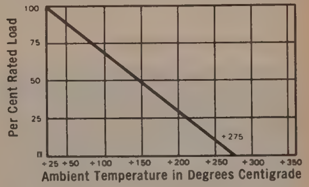
Resistance Element: High grade resistance alloy wire, single layer winding. Leads and resistance element welded to metal end caps.

Coating: High performance conformal silicone ceramic.

Leads: Solder coated.

DERATING

Wattage rating is based on 25°C **Free Air Rating.** For higher ambient temperatures, use derating chart.



ORDERING DATA

To specify resistors, see below:

Typical No.

44 1 S R5000 J

OHMITE SERIES NO. Identifies basic resistor construction.

WATTAGE
1=1 W
2=2 W
3=3 W
5=5 W
6=6 W
7=7 W
0=10 W

MISCELLANEOUS SPECIFICATIONS
S=Standard winding.
N=Non-inductive winding.

Examples:
R5000=.5Ω
1R000=1Ω
250R0=250Ω
1K000=1000Ω
25K00=25,000Ω
25K50=25,500Ω

RESISTANCE VALUE
Value is identified by 4 digits and 1 letter. Resistance is expressed in ohms with the letter "R" signifying a decimal point. "R" is used in all resistance values lower than 1000Ω. Letter "K" indicates multiples of 1000Ω.

TOLERANCE
A = ±.05%
B = ±.1%
W = ±.125%
C = ±.25%
D = ±.5%
F = ±1%
G = ±2%
H = ±3%
J= ±5% std.
K= ±10%
Not available for non-inductive types.

For special mechanical or electrical requirements, your inquiry will be given prompt attention.

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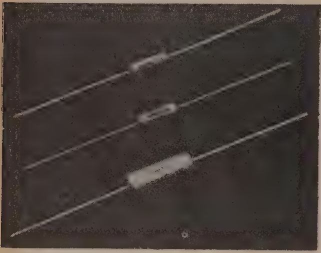
OHMITE® series 56 beryllia-core acrasil®

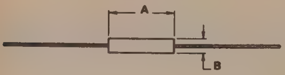
CONFORMAL SILICONE AXIAL LEAD WIREWOUND RESISTORS



SERIES 56 BERYLLIA-CORE ACRASIL®

Watt	Type	Resist. Range Min.-Max.	Body Dimensions Max. L. A ("/mm)	Body Dimensions Max. Dia. B ("/mm)	Leads (1.5"/ 38.1 mm) Ga.
1	561	.5-3K	.281/7.1	.098/2.5	24
2	562	.5-10K	.437/11.1	.124/3.1	24
5	565	.1-25K	.624/15.8	.218/5.5	20
6	566	.1-45K	.687/17.4	.281/7.1	18
7	567	1.0-75K	.937/23.8	.343/8.7	18
10	560	1.0-125K	1.280/32.5	.343/8.7	18
15	560P	1.5-250K	1.843/46.8	.406/10.3	18

®ACRASIL is a registered trade name of Ohmite Mfg. Co.



- **Beryllium Oxide Core Provides Optimum Heat Dissipation**
- **Precision Tolerance — 1% Standard**
- **Small Size**
- **Exceeds MIL-R-26 Requirements for Mil Applications**
- **All Welded Construction**
- **Ideal for Machine Insertion**
- **High Reliability**

High thermal conductivity beryllia cores permit greater heat dissipation in smallest practical package. In addition, silicone coating provides excellent moisture resistance (exceeds MIL-R-26E), high dielectric strength, and protection against effects of shock, vibration, fungus and salt spray. External markings are resistant to most commonly used commercial solvents.

Series 56 Beryllia-Core ACRASIL resistors are recommended for printed circuit board assemblies, terminal-to-terminal, and point-to-point connections in all types of military and industrial equipment calling for a compact, high heat dissipating, precision power resistor.

Series 56 resistors can be supplied reel-taped for machine insertion, if desired. Type 561 (1 W) is ideal for use in cordwood modules, also.

MECHANICAL

Terminal Strength: Meets MIL-R-26 requirements.
Dimensions: See table at left.

ELECTRICAL

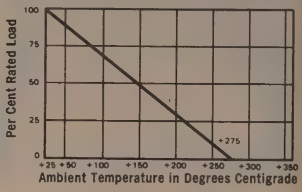
Tolerance: ±1% std.; ±.05% to ±5% available.
Temperature Coefficient: >0.1Ω to 1Ω — 0 ±90 ppm/°C — 1Ω and greater — 0 ±20 ppm/°C (Type 561).
Dielectric Withstanding Voltage: 1 KV (500 V — sizes under 5 W).
Overload, Short Time: 10X rated wattage for 5 sec. (5 W and larger); 5X rated wattage for 3 sec. (under 5 W).
Wattage: Up to 15 W in 7 types: 1, 2, 5, 6, 7, 10 and 15 watts.
Inductance: Varies with number of turns and wire size. Std. units have single layer winding. Non-inductive (Aryton-Perry) windings available.

MATERIALS

Core: Beryllia ceramic (high heat conduction).
Resistance Element: High grade resistance alloy wire, single layer winding. Leads and resistance elements welded to metal end caps.
Coating: ACRASIL® conformal silicone resin.
Leads: Solder coated.

DERATING

Wattage rating is based on 25°C **Free Air Rating.** For higher ambient temperatures, use derating chart.



ORDERING DATA

To specify resistors, see below:

Typical No.

56 1 S R5000 J

OHMITE SERIES NO. Identifies basic resistor construction.

WATTAGE
1=1 W
2=2 W
3=3 W
4=4 W
5=5 W
6=6 W
7=7 W
0=10 W or more

MISCELLANEOUS SPECIFICATIONS
S=Standard winding.
N=Non-inductive winding.
P=Standard winding with actual wattage rating more than indicated.
T=Non-inductive winding with actual wattage rating more than indicated.

RESISTANCE VALUE
Value is identified by 4 digits and 1 letter. Resistance is expressed in ohms with the letter "R" signifying a decimal point. "R" is used in all resistance values lower than 1000Ω. Letter "K" indicates multiples of 1000Ω.

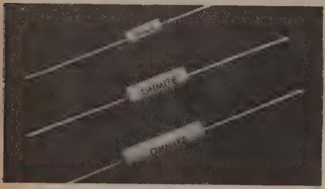
Examples:
R5000= 5Ω
1R000—1Ω
250R0=250Ω
1K000=1000Ω
25K00—25,000Ω
25K50=25,500Ω

TOLERANCE
A= ±.05%
B= ±.1%
W= ±.125%
C= ±.25%
D= ±.5%
F= ±1% std
G= ±2%
H= ±3%
J= ±5%
Not available for non-inductive types.

For special mechanical or electrical requirements, your inquiry will be given prompt attention.

OHMITE® series 88 riteohm

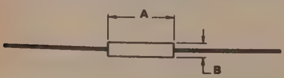
MOLDED SILICONE CERAMIC AXIAL LEAD WIREWOUND RESISTORS



SERIES 88 RITEOHM®

Watt	Type	Resist. Range Min.-Max.	Body Dimensions Max. L. A ("/mm)	Body Dimensions Max. Dia. B ("/mm)	Leads (1.5"/ 38.1 mm) Ga.	Heat Sink Clip No.
1	884-1A	.1-10K	.437/11.1	.125/3.2	24	5900
2	884-2	.1-10K	.395/10	.208/5.3	20	5902
3	884-3	.1-34K	.562/14.3	.250/6.4	20	5904
5	884-5	.1-124K	.937/23.8	.343/8.7	18	5905
7	884-7	.1-178K	1.238/31.4	.343/8.7	18	5907
10	884-10	.1-301K	1.843/46.8	.363/9.2	18	5909

®RITEOHM is a registered trade name of Ohmite Mfg. Co.



- **Molded Construction — Designed for High Stability, Precision Power Applications**
- **Low Temperature Coefficient**
- **1% Tolerance Standard**
- **All Molded Construction for Uniform Sizes**
- **Excellent Breakdown Voltage Rating**
- **All Welded Construction**
- **Ideal for Machine Insertion**

Series 88 precision power resistors provide high stability, load life ΔR of 0.5% with low T.C. and are recommended for high performance and reliability. All molded construction provides uniformity of sizes and even heat dissipation. Tolerance is 1% standard for 1, 2, 3, 5, 7 and 10 watt types. Clip mounting is possible for up to 100% increase in wattage. Typical T.C. is 0 ±20 ppm/°C.

MECHANICAL

Terminal Strength: Meets MIL-R-26 requirements.
Dimensions: See table at left.

ELECTRICAL

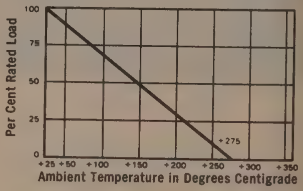
Tolerance: ±1% std.; ±.05% to ±10% available.
Temperature Coefficient: 0 ±20 ppm/°C for 10Ω and above.
Dielectric Withstanding Voltage: 1 KV (500 V for 1 W types).
Overload, Short Time: 10X rated wattage for 5 sec. (5 W size and larger); 5X rated wattage (under 5 W).
Wattage: Up to 10 watts; see table. Rating may be increased by using metal mounting clips. See Ohmite Catalog No. 100.
Inductance: Varies with number of turns and wire size. Std. units have single layer winding. Non-inductive (Aryton-Perry) windings available.

MATERIALS

Core: Ceramic, resistant to thermal shock and wide variations in temperature.
Resistance Element: High grade resistance alloy wire, single layer winding. Leads and resistance element welded to metal end caps.
Coating: Molded OHMICONE® — tough, resilient, moisture-resistant, high dielectric silicone ceramic.
Leads: Solder coated.

DERATING

Wattage rating is based on 25°C **Free Air Rating.** For higher ambient temperatures, use derating chart.



ORDERING DATA

For other than stock values specify style, resistance and tolerance.

For example: 884-1A, 500 ohms, 1% tolerance specifies a 1 watt, 500 ohm molded silicone ceramic resistor with a resistance tolerance of 1%.

Popular values are available from Ohmite stock or from your local authorized Ohmite stock distributor. Refer to Ohmite Catalog No. 300.

For special mechanical or electrical requirements, your inquiry will be given prompt attention.

OHMITE MFG. CO., a North AMERICAN PHILIPS company / 3601 W. Howard St., Skokie, Illinois 60076 / (312) 675-2600 / TWX 910-223-0805 / TELEX 72-4433

OHMITE® series 89 metal-mite™ resistors

FEATURES

- Molded construction
- Screw type mounting on housing
- Chassis design utilizes heat-sink effect
- Conventional power ratings produce high stability
- Housing surface allows for easy identification
- 5 through 50 watt models with standard or non-inductive winding

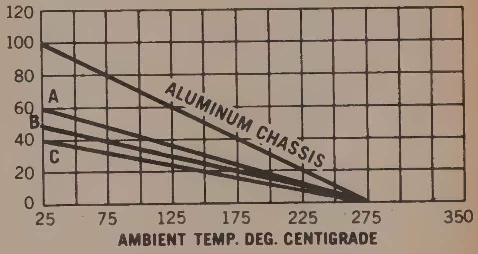
OHMITE Type	MIL-R-18546 Type	Power Rating* Watts		Resistance Ranges (Ohms) 1% Tolerance	Standard Temperature Coefficient Value Ranges (Ohms)		
		OHMITE**	MIL		±90 ppm	±50 ppm	±20 ppm
8905S	RE60G	7.5(5)	5	.1-24.9K	.1-.99	1-9.99	10-24.9K
8910S	RE65G	12.5(10)	10	.1-49.9K	.1-.99	1-9.99	10-49.9K
8925S	RE70G	25	20	.1-100K	.1-.99	1-9.99	10-100K
8950S	RE75G	50	30	.1-301K	.1-.99	1-9.99	10-301K

*Rating is based on chassis mounting area and stability proper heat sink.
4 x 6 x 2 x .040 aluminum chassis for 5 and 10 watt units
5 x 7 x 2 x .040 aluminum chassis for 25 watt units
12 x 12 x .059 aluminum panel for 50 watt units
**Types 8905 and 8910 will be stamped with wattages shown in parentheses but will be stamped with higher ratings upon customer request.

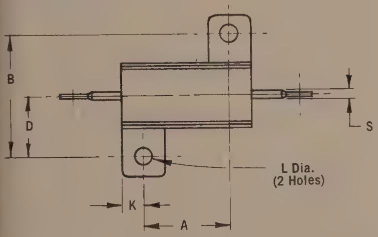
DERATING

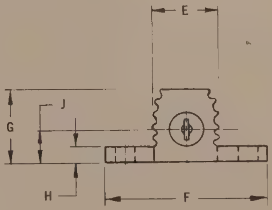
Series 89 resistors have an operating temperature range of −55°C to 275°C. Derating is required for reduced chassis mounting area and high ambient temperatures. The following curves apply to operation of unmounted resistors:

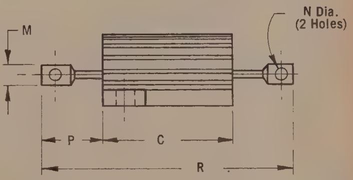
A = 5 and 10 watt units
B = 25 watt units
C = 50 watt units



DIMENSIONS







OHMITE MIL	Watts† Watts	A ±.005	B ±.005	C ±.031	D ±.0025	E ±.015	F ±.015	G ±.015	H ±.010	J ±.015	K ±.010	L ±.005	M Min.	N ±.005	P ±.062	R ±.062	S Min. AWG
8950 RE75	50 30	1.563	.844	1.968	.422	.630	1.140	.610	.088	.260	.196	.125	.140	.086	.438	2.781	12
8925 RE70	25 20	.719	.781	1.062	.391	.550	1.080	.546	.088	.231	.172	.125	.140	.086	.438	1.938	12
8910 RE65	12.5(10) 10	.562	.625	.750	.312	.420	.800	.390	.075	.165 .183	.093	.093	.140	.086	.312	1.375	12
8905 RE60	7.5(5) 5	.444	.490	.600	.245	.334	.646	.320	.065	.133 .156	.078	.093	.085	.050	.266	1.125	16

†Types 8905 and 8910 stamped with wattage shown in parenthesis.

OHMITE® type 200 *brown devil*® fixed resistors

SERIES 200

BROWN DEVIL® (Type 200) resistors, are vitreous enameled, wirewound units long famous for ruggedness and durability in small power resistors. With the emphasis towards miniaturization and the current industry trend towards higher operating temperatures, Ohmite has been able to increase the ratings on two Brown Devil sizes. The 5 watt size is now rated **8 watts** and the 10 watt size is now rated **12 watts**. The 20 watt unit retains the same rating. The higher ratings may be confidently applied to any 5 or 10 watt unit now in the possession of users or distributors. At this time also, to meet the demand for lower wattage units, Ohmite introduces two, new, small stock sizes — 3 and 5¼ watts.

Standard resistance tolerance is ±5% for values 1 ohm or higher; ±10% for values below 1 ohm. Tinned leads 1½" long: 3 and 5¼ watt, 20 AWG; 8, 12 and 20 watt, 18 AWG.

DIMENSIONS & WEIGHTS

Rating	3W	5¼W	8W	12W	20W
Core Dimen.	7/16x.21D	5/8x1/4D	1x5/16D	1¾x5/16D	2x7/16D
Weight (lbs.)	.003	.005	.01	.015	.03

Ohms	3 WATT		5¼ WATT		8 WATT		12 WATT		20 WATT	
	Cat. No.[1]	Amps.	Cat. No.[1]	Amps.	Cat. No.[1]	Amps.	Cat. No.[1]	Amps.	Cat. No.[1]	Amps.
0.5							**1700A**	4.90	**1800A**	6.32
1.0	**2712**	1.73	**2822**	2.29	**1500**	2.83	**1701**	3.46	**1802A**	4.47
1.1	(2713)	1.65	(2823)	2.19						
1.2	(2714)	1.58	(2824)	2.09						
1.3	(2715)	1.52	(2825)	2.01						
1.5	(2716)	1.41	2826	1.87	**1500B**	2.30	1704	2.82		
1.6	(2717)	1.37	(2827)	1.81						
1.8	2718	1.29	(2828)	1.71						
2.0	2719	1.22	**2829**	1.62	**1501**	2.00	**1705**	2.45	**1802B**	3.16
2.2	(2720)	1.17	(2830)	1.54						
2.4	(2721)	1.12	2831	1.48						
2.7	2722	1.05	2832	1.39						
3.0	2723	1.00	2833	1.32	1502	1.63	**1706**	2.00	**1802C**	2.58
3.3	2724	.95	2834	1.24						
3.6	2725	.91	2835	1.21						
3.9	(2726)	.88	2836	1.16						
4.0					**1503**	1.41	**1707**	1.73	1802D	2.24
4.3	2727	.83	2837	1.10						
4.7	(2728)	.80	2838	1.06						
5.0					**1504**	1.26	**1708**	1.54	**1803**	2.00
5.1	2729	.77	**2839**	1.01						
5.6	(2730)	.73	2840	.97						
6.2	2731	.69	2841	.92						
6.8	(2732)	.66	(2842)	.88						
7.5	2733	.63	2843	.84	**1505**	1.00	**1709**	1.26		
8.2	2734	.60	2844	.80						
9.1	(2735)	.57	(2845)	.76						
10	2736	.55	**2846**	.72	**1506**	.89	**1710**	1.09	**1804**	1.41
11	(2737)	.52	(2847)	.69						
12	(2738)	.50	2848	.66	1507	.81	1711	1.00		
13	(2739)	.48	(2849)	.64						
15	2740	.45	**2850**	.59	**1508**	.73	**1712**	.89		
16	(2741)	.43	2851	.57						
18	2742	.42	(2852)	.54						
20	2743	.39	2853	.51	**1509**	.63	**1713**	.77		
22	2744	.37	2854	.49						
24	2745	.35	2855	.47						
25					**1510**	.56	**1714**	.69	**1805**	.89
27	(2746)	.33	2856	.44						
30	2747	.32	**2857**	.42	1511	.51	**1715**	.63		
33	(2748)	.30	2858	.40						
35					**1512**	.47	1716	.58		
36	(2749)	.29	2859	.38						
39	2750	.28	2860	.37						
40					**1513**	.44	**1717**	.54		
43	(2751)	.26	2861	.35						
47	2752	.25	2862	.33						
50					**1514**	.40	**1718**	.49	**1806**	.63
51	2753	.24	2863	.32						
56	2754	.23	2864	.31						
62	2755	.22	2865	.29						
68	2756	.21	2866	.28						
75	2757	.20	2867	.27	**1515**	.32	**1719**	.40	**1807**	.52
82	(2758)	.19	2868	.25						
91	(2759)	.18	2869	.24						
100	2760	.17	**2870**	.23	**1516**	.28	**1720**	.34	**1808**	.45
110	(2761)	.16	2871	.22						
120	2762	.16	2872	.21						
125					**1517**	.25	**1721**	.31		
130	(2763)	.15	(2873)	.20						
150	2764	.14	**2874**	.19	**1518**	.23	**1722**	.28	**1809**	.36
160	(2765)	.14	2875	.18						
180	2766	.13	**2876**	.17						
200	**2767**	.12	**2877**	.16	**1519**	.20	**1723**	.24	**1810**	.32
220	2768	.12	2878	.16						
225					1520	.18	1724	.23		
240	**2769**	.11	2879	.15						
250					**1521**	.17	**1725**	.22	**1811**	.28
270	2770	.11	2880	.14						
300	2771	.10	**2881**	.13	**1522**	.16	**1726**	.20	**1812**	.26
330	2772	.095	**2882**	.12						
350					1523	.15	1727	.18	1813	.24
360	2773	.091	2883	.12						
390	(2774)	.088	2884	.12						
400					**1524**	.14	1728	.17	1814	.22
430	(2775)	.083	2885	.11						
450					1525	.13	1729	.16		
470	2776	.080	2886	.11						

Ohms	3 WATT		5¼ WATT		8 WATT		12 WATT		20 WATT	
	Cat. No.[1]	Amps.	Cat. No.[1]	Amps.	Cat. No.[1]	Amps.	Cat. No.[1]	Amps.	Cat. No.[1]	Amps.
500					**1526**	.12	**1730**	.15	**1815**	.20
510	2777	.077	**2887**	.10						
560	2778	.073	2888	.097						
600					**1527**	.11	**1731**	.14		
620	(2779)	.070	2889	.092						
650									**1816**	.18
680	2780	.067	2890	.088						
700					1528	.11	1732	.13	1817	.17
750	2781	.063	2891	.084	1529	.10	**1733**	.12	**1818**	.16
800					1530	.10	1734	.12	1819	.15
820	2782	.060	2892	.080						
900					1531	.094	**1735**	.11	1820A	.15
910	**2783**	.057	2893	.076						
1000	2784	.055	**2894**	.072	**1532**	.089	**1736**	.11	**1821**	.14
1100	(2785)	.052	2895	.069	1533	.085	(1737)	.10		
1200	2786	.050	2896	.066	1534	.081	**1738**	.10	**1822**	.13
1250					1535	.080	1739	.097	1823	.12
1300	(2787)	.048	2897	.063						
1500	2788	.045	**2898**	.059	**1536**	.073	**1740**	.089	**1824**	.12
1600	(2789)	.043	(2899)	.057						
1750					1537	.067	1741	.082	1825	.11
1800	(2790)	.042	2900	.050						
2000	2791	.039	2901	.047	**1538**	.063	**1742**	.077	**1827**	.10
2200	2792	.037	2902	.045						
2250					**1539**	.059	**1743**	.073	1828	.094
2400	(2793)	.035	2903	.043						
2500					**1540**	.056	**1744**	.069	**1830**	.089
2700	2794	.033	2904	.041						
2750									1831	.085
3000	2795	.032	**2905**	.039	**1541**	.046	**1745**	.063	**1832**	.081
3300	2796	.030	2906	.037						
3500					1542	.043	**1746**	.058	1833	.075
3600	(2797)	.029	2907	.035						
3900	2798	.028	2908	.034						
4000					**1543**	.040	**1747**	.054	**1834**	.070
4300	(2799)	.026	(2909)	.032						
4500					1544	.038	**1748**	.051	1835	.066
4700	2800	.025	2910	.031						
5000					**1545**	.036	**1749**	.049	**1836**	.063
5100	(2801)	.024	**2911**	.030						
5600	(2802)	.023	2912	.028						
6000					**1546**	.033	**1750**	.044	**1837**	.057
6200	(2803)	.022	2913	.027						
6800	(2804)	.021	2914	.026						
7000					**1547**	.030	1751	.041	1838	.053
7500	(2805)	.020	2915	.025	1548	.029	**1752**	.036	1839	.051
8000					1549	.029	**1753**	.035	1840	.050
8200	2806	.019	2916	.023						
8500							(1754)	.034		
9000					1550	.027	1754A	.033	(1840A)	.047
9100	(2807)	.018	(2917)	.022						
10K	**2808**	.016	**2918**	.021	**1551**	.026	**1755**	.032	**1841**	.043
11K			(2919)	.020			(1756)	.030		
12K			2920	.019			1757	.029		
12.5K					1552	.023	1758	.028	1842	.032
13K			2921	.019						
13.5K							1759	.027		
15K			2922	.017	**1553**	.021	**1761**	.026	1843	.029
16K			2923	.017			1762	.025		
17.5K					1554	.019	1763	.024		
18K			2924	.016			1764	.024		
20K			**2925**	.014	1555	.018	**1765**	.022	1844	.026
22.5K					1556	.017	1766	.021		
25K					1557	.015	**1767**	.020	1845	.023
30K							**1768**	.018	1846	.021
35K							**1769**	.017	1847	.019
40K							**1770**	.016	1848	.018
45K							1771	.015	(1849)	.017
50K							**1772**	.014	1850	.016
55K									(1851)	.015
60K									1852	.015
65K									1853	.014
70K									(1854)	.014
75K									(1855)	.013
80K									(1856)	.013
85K									(1857)	.012
90K									(1858)	.012
95K									(1859)	.012
100K									**1860**	.011

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[1] **Popular items appear in BOLD print and are usually in stock at authorized Ohmite stocking distributors. Items in** LIGHT FACE **print are available from stocking distributors but are not normally stocked in depth. Parentheses indicate non-stock standard items subject to a minimum handling charge per item.**

OHMITE MFG. CO., a North AMERICAN PHILIPS company / 3601 W. Howard St., Skokie, Illinois 60076 / (312) 675-2600 / TWX 910-223-0805 / TELEX 72-4433

OHMITE® type 270 vitreous enameled fixed resistors

SERIES 270

These lug type resistors are wire-wound on high quality ceramic cores, protected and insulated by Ohmite vitreous enamel — the time-proved standard covering that is the best conductor of heat for a material which must also be a good electrical insulator.

Resistance tolerance is ±5% for values 1 ohm or higher; ±10% below 1 ohm.

Wattage ratings are for use in free air. When resistors are mounted in closed spaces or where the circulation of air is restricted, they should not be used at more than one-half rating. Currents and voltages for reduced ratings can be obtained by multiplying full rating by the following factors: 75% load = .86, 66% = .81, 50% = .71, 33% = .57, 25% = .50.

Mounting brackets are automatically supplied in individual unit packs; supplied only when specified in bulk pack orders. See page ??, "Mounting Brackets for Tubular Resistors" to specify other brackets.

12 WATT Free air rating to 5600 Ohms Core: 1¾"x5⁄16" Mtg. Ctr: 23⁄16"—Av. Wt. .02 lb. Std. Mtg. Brkt.: Cat. No. 5		
Ohms Resist.	Catalog No.[1]	Max. Amps.
.51	**3723**	4.86
1.0	**3730**	3.46
1.5	3734	2.83
2.2	3738	2.34
3.3	3742	1.91
4.7	3746	1.60
6.8	3750	1.33
10	**3754**	1.10
12	3756	1.00
15	3758	.89
18	3760	.82
22	3762	.74
27	3764	.67
33	3766	.60
39	3768	.55
47	3770	.53
56	3772	.46
68	3774	.42
82	3776	.38
100	**3778**	.35
120	3780	.32
150	3782	.28
180	3784	.26
220	3786	.23
270	3788	.21
330	3790	.19
390	3792	.18
470	3794	.16
560	3796	.15
680	3798	.13
820	3880	.12
1,000	3802	.11
1,200	3804	.10
1,500	**3806**	.089
1,800	3808	.082
2,200	3810	.074
2,700	3812	.067
3,300	3814	.060
3,900	3816	.055
4,700	**3818**	.051
5,600	3820	.046
6,800	3822	.038
8,200	3824	.035
10,000	**3826**	.032
12,000	3828	.029
15,000	**3830**	.026
18,000	(3832)	.024
22,000	3834	.021
27,000	3836	.019
33,000	(3838)	.017
39,000	(3840)	.016
47,000	(3842)	.015
51,000	3843	.014

	25 WATT Free air rating to 12,000 Ohms Core: 2"x9⁄16" Mtg. Ctr: 2¾"— Av. Wt. .05 lb. Std. Mtg. Brkt.: No. 9		50 WATT Free air rating to 25,000 Ohms Core: 4"x9⁄16" Mtg. Ctr: 4¾"— Av. Wt. .09 lb. Std. Mtg. Brkt.: No. 9		100 WATT Free air rating to 60,000 Ohms Core: 6½"x¾" Mtg. Ctr: 7⅜"— Av. Wt. .20 lb. Std. Mtg. Brkt.: No. 12		175 WATT Free air rating for All Values Core: 8½"x1⅛" Mtg. Ctr: 9⅜"— Av. Wt. .50 lb. Std. Mtg. Brkt.: No. 18		225 WATT Free air rating for All Values Core: 10½"x1⅛" Mtg. Ctr: 11⅜"— Av. Wt. .62 lb. Std. Mtg. Brkt.: No. 18	
Ohms Resist.	Catalog No.[1]	Max. Amps.	Catalog No.[1]	Max. Amps.	Catalog No.[1]	Max. Amps.	Catalog No.[1]	Max. Amps.	Catalog No.[1]	Max. Amps.
1	**0200J**	5.00	**0400J**	7.07	**0600C**	10.00	**0700C**	13.2	**0900C**	15.00
2	**0200K**	3.54	**0400K**	5.00	**0600D**	7.07	0700D	9.35	**0900D**	10.60
3	**0200L**	2.88	**0400L**	4.07	**0600E**	5.77	0700E	7.63	**0900E**	8.67
4	0200N	2.50	0400N	3.53	**0600F**	5.00	(0700F)	6.6	0900F	7.50
5	**0200A**	2.24	**0400A**	3.16	**0600A**	4.47	**0700A**	5.92	**0900A**	6.72
10	**0200B**	1.58	**0400B**	2.23	**0600B**	3.16	0700B	4.18	**0900B**	4.74
15	**0200R**	1.29								
25	**0200C**	1.00	**0400C**	1.41	**0601**	2.00	**0701**	2.64	**0901**	3.00
50	**0200D**	.71	**0400D**	1.00	**0602**	1.41	**0702**	1.87	**0902**	2.12
75	**0200E**	.58	**0400E**	.82	**0603**	1.15	0703	1.52	**0903**	1.73
100	**0200F**	.50	**0400F**	.71	**0604**	1.00	**0704**	1.32	**0904**	1.50
125					0604B	.90	0704B	1.18		
150	**0200G**	.41	0400G	.58	**0605**	.82	0705	1.08	**0905**	1.25
200	**0200H**	.35	**0400H**	.50						
250	**0201**	.32	**0401**	.45	**0606**	.63	**0706**	.84	**0906**	.95
500	**0202**	.22	**0402**	.32	**0607**	.45	0707	.59	**0907**	.67
750	**0203**	.18	0403	.26	0608	.37	0708	.48	0908	.55
800	**0204**	.17	0404	.25						
1,000	**0205**	.16	**0405**	.22	**0609**	.32	0709	.42	**0909**	.47
1,500	**0206**	.13	0406	.18	0610	.26	(0710)	.34	0910	.39
2,000	**0207**	.12	0407	.16	0611	.22	0711	.30	**0911**	.34
2,500	0208	.10	0408	.14	**0612**	.20	(0712)	.26	0912	.30
3,000	**0209**	.091	0409	.13	0613	.18	(0713)	.24	0913	.27
3,500	0210	.084								
4,000	0211	.079	0410	.11						
5,000	**0212**	.070	**0411**	.10	0614	.14	0714	.19	**0914**	.21
6,000	0213	.064								
7,500	0214	.057	0412	.081	0615	.12	(0175)	.15	0915	.17
8,000			0413	.079						
10,000	**0215**	.050	**0414**	.071	0616	.10	0716	.13	**0916**	.15
12,000	0216	.045	0415	.064						
15,000	**0217**	.036	0416	.057	0617	.081	(0717)	.11	0917	.13
20,000	0218	.031	0417	.050	0618	.071	0718	.094	0918	.11
25,000	**0219**	.028	0418	.045	0619	.063	0719	.083	0919	.095
30,000	0220	.026			0620	.058	(0720)	.076	0920	.087
35,000	(0221)	.024	0419	.032						
40,000	0222	.022			0621	.050	0721	.066	0921	.075
50,000	0224	.019	0420	.026	**0622**	.045	(0722)	.059	**0922**	.067
60,000	0225	.016			0623	.041	(0723)	.054	0923	.061
70,000	0226	.013								
75,000			0421	.021	0624	.032	(0724)	.048	0924	.055
80,000	0227	.012								
100,000	**0229**	.0094	0422	.018	**0625**	.028	0725	.042	**0925**	.047
125,000			0423	.017						
150,000			0424	.015						
175,000			(0425)	.014						
200,000			0426	.012						
250,000			0428	.010						

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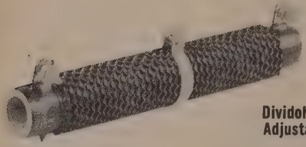
OHMITE MFG. CO., a North AMERICAN PHILIPS company / 3601 W. Howard St., Skokie, Illinois 60076 / (312) 675-2600 / TWX 910-223-0805 / TELEX 72-4433

OHMITE® corrib® HIGH CURRENT LOW OHMS resistors



SERIES 280 & 230

**Dividohm®
Adjustable**

High current, low resistance, heavy duty units used in motor starting, dynamic braking, etc. "Corrib" type units employ a corrugated ribbon of resistance alloy. This is space-wound edge-wise around a ceramic tube. Vitreous enamel is fused around the alloy ribbon to lock the turns securely in place. Heavy lug terminals. Resistance tolerance is ±10%.

Available in fixed or Dividohm® adjustable types. Dividohm® type is similar to fixed and includes one adjustable lug. Rating of Fixed or Dividohm® stock units—300 watts—reduce unit load for stack-mounted resistors; core size (bare) 8½" long x1⅛" diameter. Other sizes made to order.

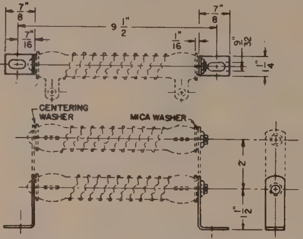
Ohms	Amps.	Fixed¹ Catalog No.	Dividohm*¹ Catalog No.
.10	54.7	**2501**	**2601**
.12	50.0	**2502**	(2602)
.16	43.3	2503	2603
.20	38.7	2504	2604
.25	34.6	**2505**	**2605**
.31	31.1	**2506**	**2606**
.40	27.4	2507	2607
.50	24.5	**2508**	**2608**
.63	21.8	2509	2609
.80	19.3	2510	2610
1.0	17.3	**2511**	**2611**
1.2	15.8	**2512**	(2612)
1.6	13.7	2513	2613
2.0	12.2	**2514**	**2614**
2.5	10.9	2515	2615
3.1	9.8	**2516**	2616
4.0	8.6	2517	**2617**
5.0	7.7	**2518**	**2618**
6.3	6.9	**2519**	**2619**
8.0	6.1	**2520**	2620
10.0	5.5	**2521**	2621
12.0	5.0	**2522**	**2622**
16.0	4.3	**2523**	**2623**
20.0	3.8	**2524**	**2624**

*Adjustable Lug Stk. No. 1974 supplied with Dividohm.

THRU-BOLT MOUNTING BRACKETS FOR CORRIBS

Includes 2 brackets; bolt; centering, mica, and lock washers; nuts. Diagram below.

No. of Resistors	Catalog No.
1	6126P8½
2	6127P8½
3	6128P8½
4	6129P8½



EXTRA ADJUSTABLE LUGS FOR CORRIBS

For Dividohm	Lug Catalog No.
2601-2606 2610; 2619	1974-B
2607-2609 2611-2618 2620-2624	1974-A

powr-rib® HIGH CURRENT LOW OHMS resistors

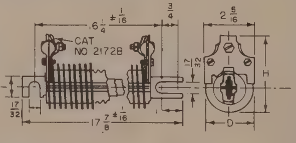
Even higher power handling capability—approximately 700 to 1000 watts—is available in stock, "Powr-Rib" resistors. These are UNCOATED types and are wound either edgewise with ribbon ("Edgewound" type) or with round wire (Round-Wire type).

The core of these units consists of ceramic segments on a metal bar which is slotted on both ends for rapid installation. Standard resistance tolerance is ±10%. Terminals clamp onto the resistor wire and may be moved in from the ends for intermediate resistance values. Extra terminals available for use as taps. See diagrams for terminals. Terminal Stk. No. 2172G (not shown) has screw connections.

Edgewound Ribbon Type

STYLE 080-5 EDGEWOUND POWR-RIBS

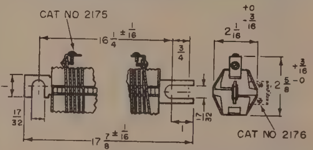
Ohms*	H ±⅛	D +⅛ —0
.10-.22	3⁵⁄₁₆	2⅛
.25-1.00	3⅛	1⅞
1.30-1.60	2⁹⁄₁₆	1⅞
2.2, 2.8, 4.5, 5.4	2½	1¾
3.5, 6.8, 8.5	2⁷⁄₁₆	1⅝



Avg. Weight .18Ω or less, 4 lbs.; .22Ω and up, 2 lbs.

Catalog No.¹	Ohms	Max. Amps.	Catalog No.¹	Ohms	Max. Amps.
2301	.10	100	2318	.67	41
2302	.12	91	**2311**	.75	39
2303A	.14	89	**2312**	1.00	33
2304A	.16	78	**2319**	1.30	29
2305A	.18	75	**2313**	1.60	26
2306A	.22	68	**2331A**	2.20	18.4
2306	.25	63	**2332A**	2.80	16.3
2308A	.30	57	**2333A**	3.50	14.6
2308	.33	54	**2334A**	4.50	12.7
2309A	.37	50	**2335A**	5.40	11.8
2310	.50	47	2336A	6.80	10.3
2317	.60	43	**2337A**	8.50	9.4

STYLE 082-5 ROUND-WIRE POWR-RIBS



Avg. Weight 3¼ lbs.

Catalog No.¹	Ohms	Max. Amps.
2338	11.0	8.3
2339	13.0	7.6
2340	17.0	6.6
2341	-20.0	5.9
2342	25.0	5.1

EXTRA TERMINALS

For Round Wire Powr-Rib

Descrip	Catalog No.
In-Line Mtg.	2175
90° Mtg.	2176

For Edgewound Powr-Rib

Descrip	Catalog No.
30 Amps & more	2172B
29 Amps & less	2172G

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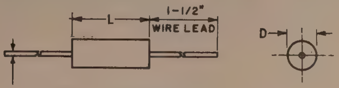
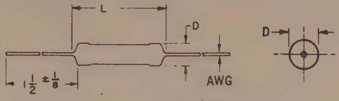
[1] Popular items appear in BOLD print and are usually in stock at authorized Ohmite stocking distributors. Items in LIGHT FACE print are available from stocking distributors but are not normally stocked in depth. Parentheses indicate non-stock standard items subject to a minimum handling charge per item.

OHMITE® wirewound resistors / axial lead and pc series



Series 88 & 99



Series 22, 44, 56 & 57

OHMITE WIRE WOUND AXIAL LEAD RESISTORS

All of Ohmite's axial lead resistors feature a high quality resistance wire, single layer wound on a cylindrical ceramic core, and welded to metallic end caps. The leads are solder coated, weldable wire 1½" long. Specific mechanical and electrical parameters are listed in appropriate descriptions and tables for the individual Series below.

AXIAL LEAD WIREWOUND RESISTOR SPECIFYING GUIDE

WATTS	VITREOUS ENAMEL					WATTS						WATTS	FLAMEPROOF CERAMIC				
	Molded						Conformal						Conformal				
	SERIES 99 5% Tolerance (1%-10% Available) T.C. ±30 ppm/°C Typical						SERIES 22 5% Tolerance (1%-10% Available) T.C. ±30 ppm/°C Typical						SERIES 57 CERON® 5% Tolerance (1%-10% Available) T.C. ±30 ppm/°C Typical				
			Maximum						Maximum						Maximum		
	Type	Res. Range	Length ("/mm)	Dia. ("/mm)	Leads 1.5"/38.1 mm Ga.		Type	Res. Range	Length ("/mm)	Dia. ("/mm)	Leads 1.5"/38.1 mm Ga.		Type	Res. Range	Length ("/mm)	Dia. ("/mm)	Leads 1.5"/38.1 Ga. mm
1.5	995-1A	.1-6.65K	.437/11.1	.140/3.6	24	1	221	.1-2.5K	.406/10.3	.156/4	22	1	571	1.0-3K	.406/10.3	.156/4	22
2.25	995-2A	.1-6.49K	.390/9.9	.219/5.6	20	2	222	.1-3.9K	.406/10.3	.219/5.6	20	2	572	1.0-4K	.406/10.3	.219/5.6	20
3.25	995-3A	.1-22.1K	.562/14.3	.234/5.9	20	3	223	.1-10K	.562/14.3	.250/6.4	20	3	573	1.0-12K	.562/14.3	.234/5.9	20
5	995-5B	.1-53.6K	.953/24.2	.234/5.9	20	5	225	.1-30K	1.000/25.4	.250/6.4	20	5	575	1.0-30K	1.000/25.4	.234/5.9	20
6.5	995-5A	.1-80.6K	.937/23.8	.343/8.7	20	6	226	.1-35K	1.031/26.2	.343/8.7	20	6					
9	995-7A	.1-118K	1.233/31.3	.343/8.7	20	7	227	.1-40K	1.250/31.8	.343/8.7	20	7	577	1.0-50K	1.094/27.8	.343/8.7	20
11	995-10A	.1-187K	1.796/45.6	.343/8.7	20	10						10	570	1.0-60K	1.813/46.1	.343/8.7	20
						11	220P	.5-60K	1.938/49.2	.343/8.7		11					
						15						15					

WATTS	SILICONE CERAMIC					WATTS						WATTS					
	Conformal						Conformal						Molded				
	SERIES 44 OHMICONE® 5% Tolerance (0.05%-10% Available) T.C. ±20 ppm/°C Typical						SERIES 56 BERYLLIA-CORE ACRASIL® 1% Tolerance (.05%-5% Available) T.C. ±20 ppm/°C Typical						SERIES 88 RITEOHM® 1% Tolerance (.05%-10% Available) T.C. ±20 ppm/°C Typical				
			Maximum						Maximum						Maximum		
	Type	Res. Range	Length ("/mm)	Dia. ("/mm)	Leads 1.5"/38.1 mm Ga.		Type	Res. Range	Length ("/mm)	Dia. ("/mm)	Leads 1.5"/38.1 mm Ga.		Type	Res. Range	Length ("/mm)	Dia. ("/mm)	Leads 1.5"/38.1 mm Ga.
1	441	.5-4K	.437/9.4	.125/3.2	22	1	561	.5-3K	.281/7.1	.098/2.5	24	1	884-1A	.1-10K	.437/11.1	.125/3.2	24
2	442	.1-4K	.406/10.3	.219/5.6	20	2	562	.5-10K	.437/11.1	.124/3.1	24	2	884-2	.1-10K	.395/10	.208/5.3	20
3	443	.1-15K	.563/14.3	.250/6.4	20	3						3	884-3	.1-34K	.562/14.3	.250/6.4	20
5	445	.1-60K	.937/23.8	.343/8.7	18	5	565	.1-25K	.624/15.8	.218/5.5	20	5	884-5	.1-124K	.937/23.8	.343/8.7	18
6						6	566	.1-35K	.687/17.4	.281/7.1	18	6					
7	447	.1-80K	1.250/31.8	.343/8.7	18	7	567	1.0-75K	.937/23.8	.343/8.7	18	7	884-7	.1-178K	1.238/31.4	.343/8.7	18
10	440	.1-150K	1.843/46.8	.406/10.3	18	10	560	1.0-125K	1.280/32.5	.343/8.7	18	10	884-10	.1-301K	1.843/46.8	.363/9.2	18
11						11						11					
15						15	560P	1.5-250K	1.843/46.8	.406/10.3	18	15					

HOW TO ORDER

MOLDED — For Series 88 and 99, specify style, resistance and tolerance.
CONFORMAL — Specify these Product Numbers:

56 1 S R5000 J

OHM E SERIES NUMBER
This identifies the basic resistor construction.

WATTAGE
1 = 1W 5 = 5W
2 = 2W 6 = 6W
3 = 3W 7 = 7W
4 = 4W 0 = 10W or more

MISCELLANEOUS SPECIFICATIONS
S = Standard winding
N = Non-inductive winding
P = Standard winding with actual wattage rating more than indicated
T = Non-inductive winding with actual wattage rating more than indicated

RESISTANCE VALUE

TOLERANCE
A = ±.05%
B = ±.1%
W = ±.125%
C = ±.25%
D = ±.5%
} Not available for non-inductive types
F = ±1%
G = ±2%
H = ±3%
J = ±5%

Resistance value is identified by four digits and one letter.
Resistance is expressed in ohms with the letter "R" signifying a decimal point. "R" is used in all resistance values lower than 1000 ohms. The letter "K" indicates multiples of 1000 ohms.

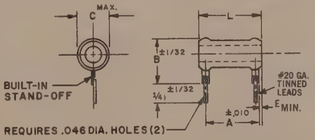
This chart provides all basic data needed to specify the right axial lead wirewound resistor for your circuit application. Refer to application guide to select the proper resistor based on your key specifying parameters.

VITREOUS ENAMEL		FLAMEPROOF CERAMIC
Series 99 Hi-Heat Dissipation Molded Construction MIL-R-26	**Series 99 & 22** Severe Humidity Protection Resistant to All Solvents Industrial Applications	**Series 57** Flameproof Severe Environments Immune to Fungus Growth High Overland Design
	SILICONE CERAMIC	
Series 88 Molded Construction **Series 56** MIL-R-39007	**Series 44, 88 & 56** Low TC Close Tolerance High Heat Dissipation Industrial Applications	**Series 88 & 56** High Stability Small Size/ High Heat Dissipation

Ohmite can supply resistors for applications requiring high reliability performance characteristics per MIL-R-39007.

- Meets MIL-R-26 Where Applicable
- Popular Values of Series 88, 99 and 44 Available from Stock
- Lead Taping Available
- Higher and Lower Resistance Values other Than Those Listed Above are Available. Consult Factory.

RADIAL LEAD RESISTORS FOR P.C. BOARDS



Resistance Element: Resistance wire single layer wound on a tubular ceramic core and welded to lug bands.

Terminals: Radial, wire leads welded to lugs on centers to fit standard 0.1 inch matrix boards. Built-in standoff.

Coating: Vitreous enamel or Ohmicone (silicone-ceramic).

Marking: Ohmite code and resistance value (ohms) on top opposite leads.

Tolerances: Vitreous (Type 270) ±5%, 1 ohm and higher — ±10%, below 1 ohm. For closer tolerances, specify Type 474 (Ohmicone).

Temperature Coefficient: Less than 260 PPM/°C — Lower temperature coefficient available in Type 474 (Ohmicone).

Rated Watts @ 25°C	Dimensions				
	A ±.010	B ±1/32	C Max.	E Min.	L ±1/64
3	.300	.429	9/32	1/32	7/16
5¼	.500	.469	5/16	1/32	5/8

OMI

PRECISION POWER WIRE WOUND RESISTORS AND HEAT SINK RESISTORS

Accuracy, quality, inventiveness, economy and ship-date guarantee are keystones in the dozen years Omtronics Manufacturing, Inc. has supplied the manufacturing community. If you see what you require in the following pages, you can count on its availability when we say, either from our Stock Resistor shelves or manufactured for your needs. If you need something special in heat sinks or experimental resistors, let us put our engineers to work for you. Our facilities are as close as your phone.

OMTRONICS MANUFACTURING, INC. • 2406 LEAVENWORTH STREET, OMAHA, NEBRASKA 68105 • (402) 348-9500

OMI CROSS REFERENCE CHART

This is a cross reference between OMI resistors and those of other manufacturers. Exact inter-changeability is not implied as some minor differences may exist. See applicable catalog bulletins for detailed information. The Mil-type designation is shown as a reference only and is not meant to imply qualification approval.

OMI	MIL TYPE	DALE	SAGE	CAL-R	TEPRO	IRC	PRC
T-½A		RS¼	250S	SA01			
T-½		RS½	500S	SA04	TS½S	AS½	05A
T-1A	RW-70	RS1A	1000S	SA15	TS1A	AS1	15A
T-1B		RS1B	750S	SA17	TS1B		20A
T-1C			100S	SA05			
T-2A	RW-79	RS2B	1240S	SA31	TS2B	AS2B	1A
T-2B		RS2A	1250S	SA32	TS2A	AS2A	25A
T-2C	RW-69	RS2C	1230S	SA30	TS2C	AS2	2A
T-3		RS2	1300S	SA35	T52W T53W	AS3	3A
T-5	RW-74	RS5	1500S	SA50	TS5W	AS5	5A
T-6	RW-67		1550S	SA55	TS5C	AS5	7A
T-7		RS7	1600S	SA70	TS7W	AS7	
T-7A	RW-55		1900S	SA95	TS5M	AS40	
T-10	RW-68	RS10	1700S	SA100	TS10W	AS10	10A
T-15							
T-10A	RW-56		1950S	SA125	TS10C	ASC15	
F-1	RW-81	G1	250SB				
F-2		G2	500SB				
F-3	RW-80	G3	100SB				
F-5		G5	1240SB				
F-5A		G5A	1250SB				
F-5C		G5C	1230SB				
F-6		G6	1300SB				
F-10		G10	1500SB				
F-12		G12	1600SB				
F-15		G15	1700SB				
HT-5	RE-60	RH5	3105M	MC80	TM5W		
HT-10	RE-65	RH10	3010M	MC100	TM10W		10CH
HT-25	RE-70	RH25	3225M	MC250	TM25W		25CH
HT-50	RE-75	RH50	3550M	MC500	TM50W		50CH
HT-75							
HT-100	RE-77	RH100					
HT-250							
HF-5		HG5	3105MB				
HF-10		HG10	3010MB				
HF-25		HG25	3225MB				
HF-50		HG50	3550MB				

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OMI	DALE	IRC
CA-2	CP-2	PW-2
CA-3	CP-3	PW-3
CA-5	CP-5	PW-5
CA-7	CP-7	PW-7
CA-10	CP-10	PW-10
BW-2A	CW-2B	
BW-2C	CW-2C	
BW-3	CW-2	
BW-5	CW-5	
BW-7	CW-7	
BW-10	CW-10	

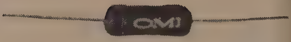
NO COMPARABLE
RESISTORS STYLES
FROM SAGE, CAL-R,
TEPRO, OR PRC.

TOTAL RANGE

OMI
FIXED RESISTORS

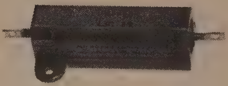
T

17 Basic sizes of silicone coated precision resistors from ½ to 10 watts, .05 to 275K ohms.



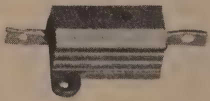
HT

Anodized, aluminum housed precision wire wound resistors for chassis mount. Four sizes, 5-50 watts, .1 to 250K ohms.



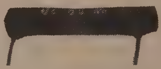
HF

Identical models to HT Series but offering increased power ratings through use of beryllium oxide cores.



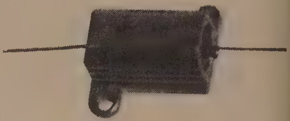
TR

Identical to T Series models in ratings and specifications but are furnished with radial leads. Also available in NR Series, non-inductively wound.



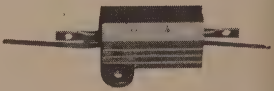
HN

A similar series to HT Series with electrical and physical equivalents but with non-inductive windings.



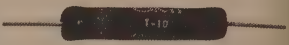
HFN

Identical to the HF Series above but non-inductively wound.



N

All series of OMI resistors are available in the non-inductive winding form. N or FM converts your order from T and F.



FN

Conversion letters for non-inductive windings of the F Series.

F

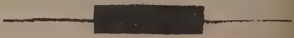
10 basic sizes at ratings from 1-15 watts offer greatly increased power ratings over conventional sizes, 0.1 to 250K ohms.

BW

High performance at low cost resistors, specially applicable to industrial uses. 6 sizes, complete welded construction.

CA

5 sizes of resistors wound on fibre glass cord, potted in ceramic case. High thermal conductivity and moisture resistant.

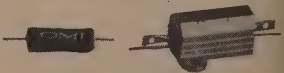


SPECIAL DESIGN

OMI offers engineering facilities to prepare and test for you heat sinks and special designs to meet particular needs.

STOCK RESISTORS

A whole host of stock resistors from .020 to 200K ohms in our standard series to supply normal instant supply.



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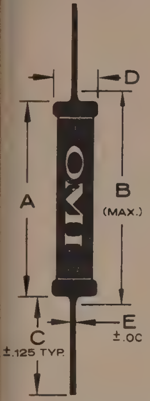
T SERIES

OMI

PRECISION POWER RESISTORS AXIAL LEADS

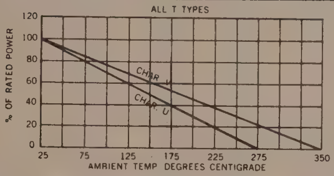
Highly reliable, silicone coated, precision resistors manufactured to meet MIL-R-26 specifications. There are 17 basic sizes with power ratings from ½ to 10 watts and resistance ranges from .05 ohms to 275K ohms. Resistance tolerances from .05% to 5% (1%, standard). Temperature coefficient of resistance 2PPM up (20PPM, standard).



OMI TYPE	MIL TYPE	OMI WATTAGE RATING		RESISTANCE RANGE		MAX. WORKING VOLTAGE*		Max. Weight Grams	PHYSICAL DIMENSIONS				
		U 275° C	V 350° C	Min.	Max.	U	V		A	B	C	D	E
T-½A	—	.4	—	.5	3.4K	18	—	.21	.210 ±.015	.265	1.500	.078 ±.015	.020
T-½	—	.75	—	.5	7.5K	31	—	.30	.330 ±.015	.390	1.500	.078 ±.015	.020
T-1A-20	RW-70 U	1.0	—	.1	10K	50	55	.36	.406 ±.031	.437	1.500	.093 ±.031	.020
T-1A	—	1.0	1.25	.1	10K	50	55	.36	.406 ±.031	.437	1.500	.093 ±.031	.020
T-1B	—	1.1	1.30	.1	12K	62	67	.40	.530 ±.015	.590	1.500	.093 ±.031	.020
T-1C	—	1.0	—	.1	5K	28	33	.33	.265 ±.015	.335	1.500	.093 ±.031	.020
T-2	—	1.5	—	.1	10K	72	79	.95	.343 ±.015	.410	1.500	.187 ±.031	.032
T-2A	—	3.0	3.75	.1	22K	135	148	.70	.560 ±.062	.622	1.500	.187 ±.031	.032
T-2A-20	RW-79 U	3.0	—	.1	22K	135	148	.70	.560 ±.062	.622	1.500	.187 ±.031	.032
T-2B	—	3.0	—	.1	40K	170	200	.92	.812 ±.062	.890	1.500	.188 ±.031	.032
T-2C	—	2.5	3.00	.05	32K	138	157	1.5	.500 ±.062	.593	2.000	.218 ±.032	.040
T-2C-20	RW-69 V	2.5	3.00	.05	32K	138	157	1.5	.500 ±.062	.593	2.000	.218 ±.032	.040
T-3	—	4.0	5.50	.05	40K	210	250	2.3	625 ±.062	.765	2.000	.250 ±.032	.040
T-5	—	5.0	6.00	.05	90K	300	365	4.3	.875 ±.062	.937	2.000	.312 ±.031	.040
T-5-20	RW-74 U	5.0	—	.05	90K	300	365	4.3	.875 ±.062	.937	2.000	.312 ±.031	.040
T-6	—	6.0	6.50	.05	95K	330	376	4.8	1.000 ±.094	1.094	2.000	.312 ±.031	.040
T-6-20	RW-67 V	6.0	6.5	.05	95K	330	376	4.8	1.000 ±.094	1.094	2.000	.312 ±.031	.040
T-7	—	7.0	8.00	.05	100K	350	390	5.2	1.185 ±.062	1.247	2.000	.312 ±.031	.040
T-7A	—	7.0	9.00	.05	150K	504	576	7.0	1.375 ±.094	1.469	2.000	.469 ±.094	.040
T-7A-20	RW-55 V	7.0	9.00	.05	150K	504	576	7.0	1.375 ±.094	1.469	2.000	.469 ±.094	.040
T-10	—	10.0	11.00	.05	250K	788	898	9.0	1.780 ±.062	1.842	2.000	.375 ±.031	.040
T-10-20	RW-78 U	10.0	—	.05	250K	788	898	9.0	1.780 ±.062	1.842	2.000	.375 ±.031	.040
T-10B-20	RW-68 V	10.0	11.00	.05	250K	788	898	9.0	1.875 $^{+.063}_{-.125}$	1.875	2.000	.344 ±.094	.040
T-10A	—	10.5	14.00	.05	275K	799	911	10.0	1.925 ±.062	2.094	2.000	.375 ±.062	.040
T-10A-20	RW-56 V	10.5	14.00	.05	275K	799	911	10.0	2.000 ±.094	2.094	2.000	.469 ±.094	.040
T-15	—	15	18	.1	275K	1000	1000	11.5	2.125 ±.094	2.200	2.000	.469 ±.094	.040

* Max. working voltage determined at .0008 wire.

SPECIAL FEATURES • Close tolerances (to .01% available). • Extremely high stability. • Low TC of resistance (to 2PPM). • Welded construction terminal to terminal. • Wide temperature range: from −65° to 275° C. • A specially formulated silicone coating makes OMI T-series resistors impervious to moisture, salt spray, abrasion and expanded temperatures.



DERATING

Applicable to both F and T Series

Both OMI, T and F Series resistors have an operating temperature range of −55°C to 275°C (characteristic U) or to 350°C (characteristic V). Derating is required for high ambient temperatures in accordance with the curve shown at left.

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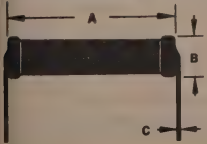
TR SERIES

OMI

PRECISION POWER RESISTORS RADIAL LEADS



SPECIFICATIONS

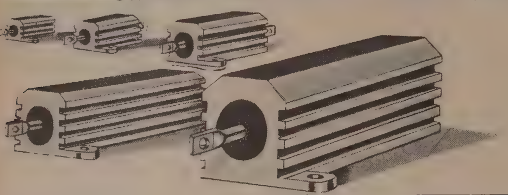
TR electrical, mechanical, material, power rating and derating specifications are identical to models of equivalent wattage and size in the OMI T Series. Also available, non-inductively wound, and identified as the "NR" Series.

Type	Dim. A	Dim. B	Dim. C
TR-1A	.406 ±.031	.093 ±.031	.020
TR-1B	.531 ±.031	.093 ±.031	.020
TR-2A	.562 ±.062	.187 ±.031	.020
TR-2C	.500 ±.062	.218 ±.031	.032
TR-2B	.812 ±.062	.187 ±.031	.020
TR-3	.625 ±.062	.250 ±.031	.032
TR-5	.875 ±.062	.312 ±.031	.032
TR-7	1.218 ±.062	.312 ±.031	.032
TR-10	1.780 ±.062	.375 ±.031	.032

HT HF

OMI

ALUMINUM HOUSED RESISTORS STANDARD & EXTENDED POWER RATINGS



HT Models are anodized, aluminum-housed, precision wire-wound resistors, designed to chassis mount for maximum heat dissipation. They are manufactured to meet or exceed MIL-R-18546 specifications. Four sizes: 5 to 50 watts (mounted), resistance ranges from .1 ohm to 250K, depending on size. Tolerances —1% standard — .05% to 5% available. Temperature coefficient from 2PPM up. (20PPM, standard.)

HF Models are identical in dimensions, resistance ranges, tolerance and temperature coefficients with those of the HT Series, but offer a great increase in their power ratings as similar size through the use of beryllium oxide cores for increased heat dissipation. These are manufactured to exceed MIL-R-18546 power ratings.

STANDARD ELECTRICAL SPECIFICATIONS

OMI Type		MIL Type	Power Rating (Watts)*			Resistance Range		Max. Working Voltage		Max. Weight Grams
			HF (OMI)	HT	MIL	MIN.	MAX.	HF	HT	
HF-5	HT-5	RE-60	15	5	5	.1	22K	220	160	3
HF-10	HT-10	RE-65	20	10	10	.1	47K	340	265	7
HF-25	HT-25	RE-70	35	25	20	.1	90K	650	550	14
HF-50	HT-50	RE-75	50	50	30	.1	250K	1400	1250	29
	HT-75			75		.1	75K		1500	120

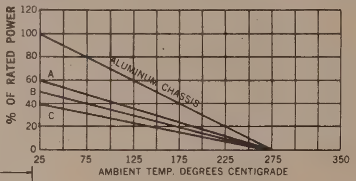
*Rating is based on chassis mounting area and stability.

Chassis Dimensions:

HT-5, HF-5, HT-10 and HF-10 — 6x4x2x .04", Aluminum Chassis.

HT-25, HF-25, HT-50 and HF-50—7x5x 2x.04". Aluminum Chassis.

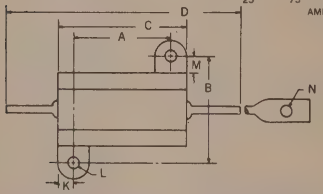
HT-75 — 12"x12"x.062, Aluminum Panel.

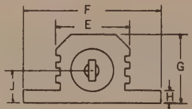


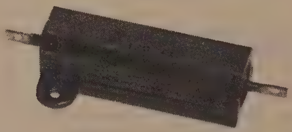
DERATING

OMI, HT and HF resistors have an operating temperature range of —55°C to +275°C. Derating is required for reduced chassis mounting area and for high ambient temperatures. The graph curves shown apply to operation of unmounted resistors. Free air rating.

A = HT5, HT-10
B = HT-25
C = HT-50, all HF Series and HT-75







DIMENSIONAL SPECIFICATIONS — HOUSED TYPE

TYPE		A	B	C	D	E	F	G	H	J	K	L	M	N
HF-5	HT-5	.444 ±.005	.490 ±.005	.600 ±.031	1.125 ±.062	.334 ±.015	.646 ±.015	.320 ±.015	.065 ±.010	.140 ±.010	.078 ±.010	.093 ±.005	.078 ±.015	.050 ±.005
HF-10	HT-10	.562 ±.005	.625 ±.005	.750 ±.031	1.375 ±.062	.430 ±.015	.800 ±.015	.400 ±.015	.075 ±.010	.190 ±.010	.093 ±.010	.093 ±.005	.102 ±.015	.086 ±.005
HF-25	HT-25	.719 ±.005	.781 ±.005	1.062 ±.031	1.938 ±.062	.530 ±.015	1.080 ±.015	.560 ±.015	.085 ±.010	.260 ±.010	.172 ±.010	.125 ±.005	.115 ±.015	.086 ±.005
HF-50	HT-50	1.563 ±.005	.844 ±.005	1.968 ±.031	2.781 ±.062	.615 ±.015	1.140 ±.015	.615 ±.015	.085 ±.010	.300 ±.010	.196 ±.010	.125 ±.005	.107 ±.015	.086 ±.005
	HT-75	2.125 ±.010	1.500 ±.010	2.500 ±.031	3.750 ±.093	1.125 ±.031	1.875 ±.031	1.125 ±.031	.125 ±.015	.625 ±.015	.187 ±.015	.172 ±.005	.187 ±.015	.095 ±.005

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HN HFN

OMI

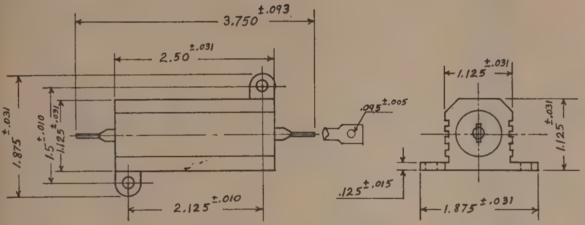
ALUMINUM HOUSED RESISTORS NON-INDUCTIVELY WOUND

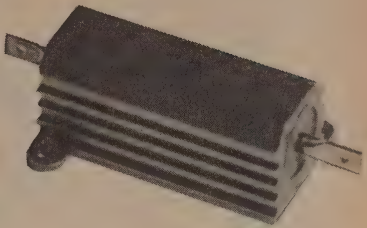
HN and HFN Models with equivalent electrical and physical specifications to the HT and HF Series are also available with non-inductive windings. To order HT, non-inductively wound, specify "HN." To order HF, non-inductively wound, specify "HFN" instead of the basic HT and HF models. **NOTE:** The following conditions apply to non-inductive types as compared to HT or HF:

1. **Maximum resistance values must be divided by 2.**
2. **Maximum working voltage must be multiplied by .707.**
3. **Maximum weights may slightly exceed those shown above.**

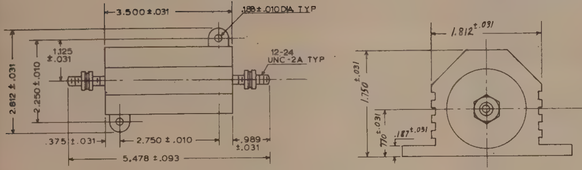
HT OMI
ALUMINUM HOUSED RESISTORS

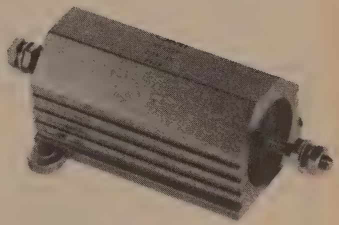
HT-75 (75 WATTS)

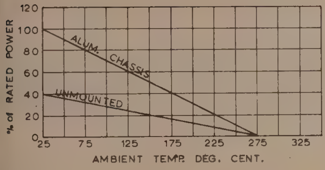

3.750 ±.093
2.50 ±.031
1.875 ±.031
1.5 ±.010
1.125 ±.031
.095 ±.005
2.125 ±.010
1.125 ±.031
1.125 ±.031
.125 ±.015
1.875 ±.031



HT-100 (100 WATTS)


3.500 ±.031
.188 ±.010 DIA TYP
1.125 ±.031
12-24 UNC-2A TYP
2.812 ±.031
2.250 ±.010
.375 ±.031
2.750 ±.010
.989 ±.031
5.478 ±.093
1.812 ±.031
1.750 ±.031
.770 ±.031
.187 ±.031

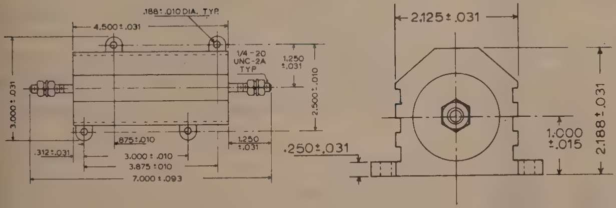


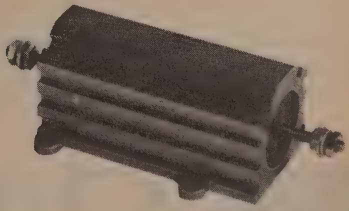


STANDARD ELECTRICAL SPECIFICATIONS							
OMI Type	MIL Type	Power Rating (Watts)*		Resistance Range		Max. Working Voltage	Max. Weight Grams
		(OMI) HT	MIL**	Min.	Max.	HT	
HT-75		75		.1	75K	1500	120
HT-100	RE-77	100	75	.1	50K	1900	400
HT-250	RE-80	250	120	.1	75K	2500	800

Chassis Dimensions: 12″ x 12″ x .125 Aluminum Panel

HT-250 (250 WATTS)


.188 ±.010 DIA. TYP.
4.500 ±.031
1/4-20 UNC-2A TYP
1.250 ±.031
3.000 ±.031
2.500 ±.010
.875 ±.010
1.250 ±.031
.312 ±.031
3.000 ±.010
3.875 ±.010
7.000 ±.093
2.125 ±.031
.250 ±.031
1.000 ±.015
2.188 ±.031



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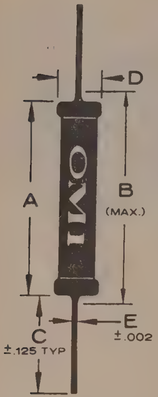
F SERIES

OMI

SILICONE COATED RESISTORS
AXIAL LEADS; BERYLIUM OXIDE CORE

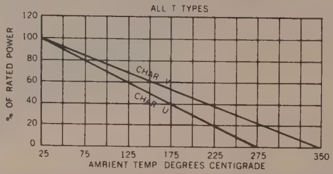
The OMI F Series resistors—at ratings from 1 to 15 watts—offer greatly increased power ratings over conventional resistors of equivalent size. All resistors in the F Series are manufactured in accordance with MIL. Specs. and are available in ten basic physical sizes with resistance ranges from 0.1 ohm to 250K ohms. Resistance tolerances from 0.05% to 5% (1%, standard) and temperature coefficient of resistance from 2PPM up (20PPM, standard).



OMI TYPE	MIL TYPE	OMI WATTAGE RATING		RESISTANCE RANGE		MAX. WORKING VOLTAGE*		Max. Weight Grams	PHYSICAL DIMENSIONS				
		U	V	Min.	Max.	Min.	Max.		A	B	C	D	E
F-1	RW-81U	1.0 W	1.5 W	1 to	3.4K	29	35	.21	.250 ±.031	.265	1.500	.078 ±.015	.020
F-2	—	1.5 W	2.0 W	1 to	7.5K	42	48	.21	.312 ±.015	.327	1.500	.078 ±.015	.020
F-3	RW-80U	2.25W	2.75W	.1 to	10K	74	81	.36	.406 ±.031	.437	1.500	.093 ±.032	.020
F-5	—	4.0 W	5 W	.1 to	22K	153	170	.80	.562 ±.062	.640	1.500	.188 ±.032	.032
F-5A	—	4.5 W	6.5 W	.1 to	40K	214	257	.96	.812 ±.062	.890	1.500	.188 ±.032	.032
F-5C	—	5 W	7 W	.1 to	32K	194	230	1.5	.500 ±.062	.593	2.000	.218 ±.032	.040
F-6	—	6 W	8 W	.1 to	40K	258	298	2.3	.625 ±.062	.765	2.000	.250 ±.032	.040
F-10	—	7 W	10 W	.1 to	90K	390	467	4.3	.875 ±.062	1.000	2.000	.312 ±.032	.040
F-12	—	10 W	12 W	.1 to	100K	607	665	5.2	1.218 ±.062	1.281	2.000	.312 ±.032	.040
F-15	—	15 W	18 W	.1 to	250K	979	1072	9.0	1.780 ±.062	1.875	2.000	.375 ±.032	.040

* Maximum working voltage determined at .0008 dia. wire.

SPECIAL FEATURES All features of the conventional precision power resistors, plus the beryllium oxide core for optimum heat dissipation, allow reduction of physical size of resistor while maintaining equivalent power ratings of conventional types.



DERATING
Applicable to both F and T Series

Both OMI, T and F Series resistors have an operating temperature range of −55°C to 275°C (characteristic U) or to 350°C (characteristic V). Derating is required for high ambient temperatures in accordance with the curve shown at left.

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N
FN

OMI

NON-INDUCTIVE TYPE RESISTORS
AXIAL OR RADIAL LEAD AVAILABLE

OMI Models of equivalent physical and electrical specifications are available with non-inductive windings. They are identified by the letter "N"; to order non-inductively wound T Series, specify "N"; to order non-inductively wound F Series, specify "FN."

NOTE: The following conditions apply to specifications applicable to the non-inductively wound types, as compared to the basic T or F types.

1. **Maximum resistance must be divided by 2.**
2. **Maximum working voltage must be multiplied by .707.**
3. **Maximum weights may slightly exceed those shown for the basic T or F types.**

FR SERIES

OMI

MINIATURE POWER RESISTORS
WITH RADIAL LEADS

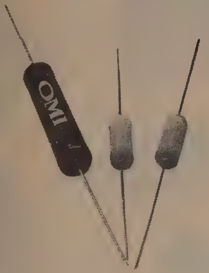
As in the OMI, TR Series, models of equivalent electrical, mechanical, power rating and derating specifications are available in FR3, FR5, FR5A, FR5C, FR6, FR10, FR12, and FR15 dimensions. These models are also available non-inductively wound and identified as the FNR Series.

BW SERIES

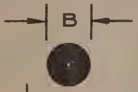
OMI

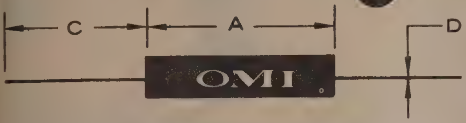
COMMERCIAL RESISTORS

AXIAL LEAD POWER WIREWOUND RESISTORS



The OMI BW Series of resistors are especially adaptable to industrial applications that require a high performance at low cost. They feature a complete welded construction with a high power to size ratio and long term stability for resistance and T.C.





OMI TYPE	BW-2A	BW-2C	BW-3	BW-5	BW-7	BW-10
Power Rating						
275°C	3.0	2.5	4.0	5.0	7.0	10.0
300°C	3.75	3.00	5.50	6.00	8.00	11.00
Resistance Range Available	.1 to 7K	.1 to 10K	.1 to 15K	.1 to 25K	.1 to 50K	.1 to 100K
Max. Weight (Grams)	.7	1.6	2.4	4.4	5.2	9.3
Dimensions in Inches						
A ± .062	.560	.500	.625	.875	1.185	1.780
B ± .032	.187	.218	.250	.312	.312	.375
C ± .125	1.500	2.000	2.000	2.000	2.000	2.000
D ± .001	.032	.040	.040	.040	.040	.040

Tolerance: Standard ±5% 1 ohm and over, 10% below 1 ohm.
T.C. of Resistance ±50 PPM/°C
Lead Material: Tinned Copperweld Standard

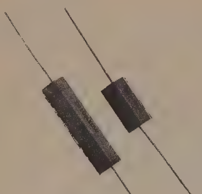
Ordering Information: When ordering, specify OMI Type, Resistance Value and Resistance Tolerance.

CA SERIES

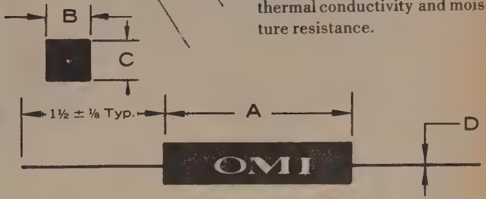
OMI

INDUSTRIAL RESISTORS

AXIAL LEAD POWER WIREWOUND RESISTORS



OMI CA-type resistors are wound on a high quality, fiberglass cord, and axial leads are securely fastened to resistor elements. These resistors are then potted into a ceramic case with a high temperature inorganic fireproof compound. This construction offers high thermal conductivity and moisture resistance.



OMI Type	CA-2	CA-3	CA-5	CA-7	CA-10
Wattage Rating at 25°C	2	3	5	7	10
Resistance Range Available	.2 to 2K	.2 to 7K	.2 to 8K	.5 to 15K	.5 to 25K
Dimensions In Inches					
A ± 1/32	11/16	7/8	7/8	1 25/64	1 7/8
B ± 1/32	1/4	5/16	3/8	3/8	3/8
C ± 1/32	1/4	5/16	11/32	11/32	11/32
D ± .001	.032	.036	.036	.036	.036

Tolerance: ±10% Standard; ±5% available above 10 ohms
Operating Temperature: −55°C to 275°C
Temperature Coefficient of Resistance:
Below 1 ohm 0 ± 400 PPM
Above 1 ohm 0 ± 200 PPM
Terminal Strength: 5 lbs. minimum

Ordering Information:
When ordering, specify OMI Type, Resistance Value and Resistance Tolerance.

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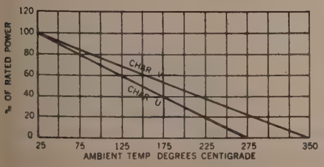
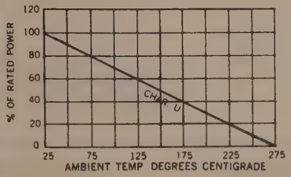


DERATING

These resistors have an operating temperature range of −55° C to 275° C (characteristic U) or to 350° C (characteristic V). Derating is required for high ambient temperatures in accordance with the curve shown at left.



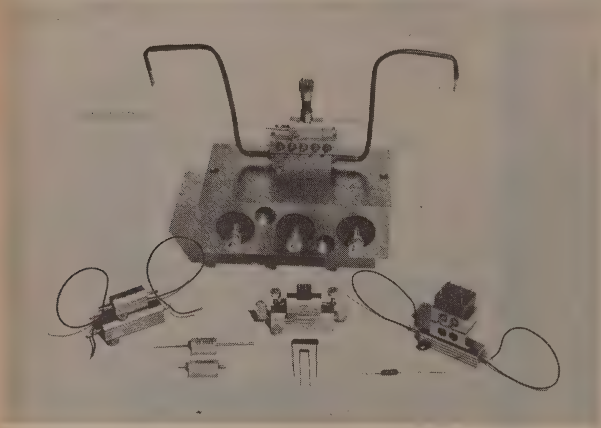
DERATING

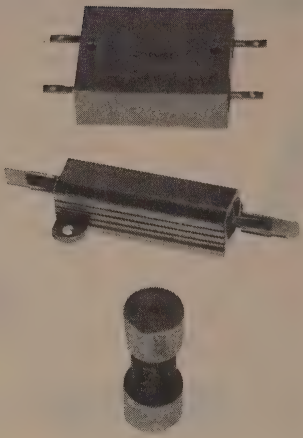
These resistors have an operating temperature range of −55° C to 275° C Derating is required for high ambient temperatures in accordance with the curve shown at left.

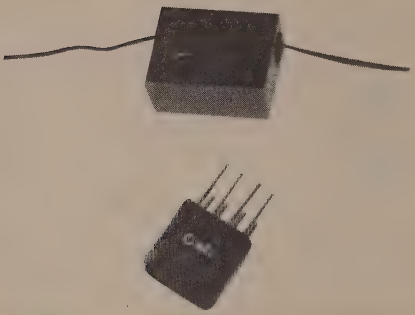
SPECIAL DESIGN

OMI

HEAT SINK RESISTORS







OMI cannot show examples of our capabilities in the field of creative heat sink development, because those are limited only by your need and our imagination. We *have* shown a few examples of special design work manufactured for specific client requirements. Our tooling and engineering experience, coupled with our production facilities allows us to invite discussion about your own peculiar requirements.

Give us your parameters and let us go to work. High power capabilities? 4-Wire low value resistors? Special combination of characteristics? High temperature or high pressure demands?

You state the form, the size, the physical forces at work and we'll apply our advanced state of the art to your product.

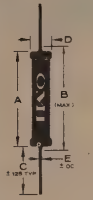
OMTRONICS MANUFACTURING, INC. • 2406 LEAVENWORTH STREET, OMAHA, NEBRASKA 68105 • (402) 348-9500

STOCK RESISTORS

OMI

"OFF-THE-SHELF" RESISTORS

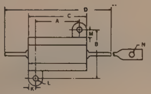
T

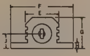


OMI TYPE	PHYSICAL DIMENSIONS — T SERIES A	B	C	D	E
T-½	.330±.015	.390	1.500	.078±.015	.020
T-1A	.406±.031	.437	1.500	.093±.031	.020
T-2A	.560±.062	.622	1.500	.187±.031	.032
T-2C	.500±.062	.593	2.000	.218±.032	.040
T-5	.875±.062	.937	2.000	.312±.031	.040
T-10	1.780±.062	1.842	2.000	.375±.031	.040

Our Stock Resistor program is designed to supply your needs within basic ranges in the most rapid manner possible. When ordering, please indicate fastest shipping method to your point of use. If the resistor specifications you need are not listed here, we invite your inquiry. We may be able to meet your deadline and your requirements outside of our Stock line.

HT





DIMENSIONAL SPECIFICATIONS — HOUSED TYPE

Type	A	B	C	D	E	F	G	H	J	K	L	M	N
HT-5	.444 ±.005	.490 ±.005	.600 ±.031	1.125 ±.062	.334 ±.015	.646 ±.015	.320 ±.015	.065 ±.010	.140 ±.010	.078 ±.010	.093 ±.005	.078 ±.015	.050 ±.005
HT-10	.562 ±.005	.625 ±.005	.750 ±.031	1.375 ±.062	.430 ±.015	.800 ±.015	.400 ±.015	.075 ±.010	.190 ±.010	.093 ±.010	.093 ±.005	.102 ±.015	.086 ±.005
HT-25	.719 ±.005	.781 ±.005	1.062 ±.031	1.938 ±.062	.530 ±.015	1.080 ±.015	.560 ±.015	.085 ±.010	.260 ±.010	.172 ±.010	.125 ±.005	.115 ±.015	.086 ±.005
HT-50	1.563 ±.005	.844 ±.005	1.968 ±.031	2.781 ±.062	.615 ±.015	1.140 ±.015	.615 ±.015	.085 ±.010	.300 ±.010	.196 ±.010	.125 ±.005	.107 ±.015	.086 ±.005

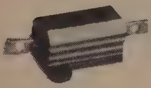
SERIES HT POWER RESISTORS

STANDARD STOCK RESISTANCE VALUES (IN OHMS)

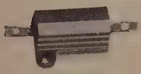
.020	.35	1.1	6.0	30	95	360	750	3600	27.5K
.025	.36	1.2	6.2	33	100	370	800	4000	30K
.033	.39	1.3	6.5	35	110	375	820	4200	33K
.040	.40	1.5	6.8	36	120	390	850	4500	35K
.047	.43	1.6	7.0	39	125	400	900	4700	40K
.068	.45	1.8	7.5	40	130	411	910	5000	47K
.03	.47	2.0	8.0	43	150	425	950	6000	50K
.04	.50	2.2	8.2	45	160	430	1000	6200	56K
.05	.51	2.4	8.5	47	175	450	1200	6800	60K
.08	.55	2.5	9.0	50	180	470	1250	7000	62K
.10	.56	2.7	9.1	51	190	480	1300	7500	75K
.11	.60	3.0	9.5	55	200	500	1400	8000	100K
.12	.62	3.3	10	56	220	510	1500	8200	200K
.13	.65	3.5	11	60	225	540	1600	9000	
.15	.68	3.6	12	62	240	550	1750	10K	
.16	.70	3.9	13	65	250	560	1800	12K	
.18	.75	4.0	15	68	260	580	2000	12.5K	
.20	.80	4.3	16	70	270	590	2200	13K	
.22	.82	4.5	18	75	280	600	2400	14K	
.24	.85	4.7	20	80	300	620	2500	15K	
.25	.90	5.0	22	82	320	650	2700	18K	
.27	.91	5.1	24	85	330	680	3000	20K	
.30	.95	5.5	25	90	340	700	3300	22.5K	
.33	1.0	5.6	27	91	350	710	3500	25K	

SERIES T POWER RESISTORS

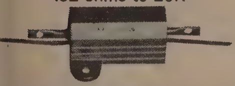
HT-5
5 Watt
.1 ohms to 10K



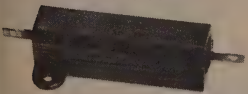
HT-10
10 Watt
.05 ohms to 12K



HT-25
25 Watt
.02 ohms to 20K



HT-50
50 Watt
.02 ohms to 50K

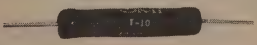


T-½
½ Watt
1 ohm to 5K

T-1A
1 Watt
.5 ohms to 8K

T-2A
2 Watt
.1 ohms to 20K

T-10
10 Watt
.02 ohms to 200K



T-5
5 Watt
.02 ohms to 60K

T-2C
3 Watt
.1 ohms to 25K

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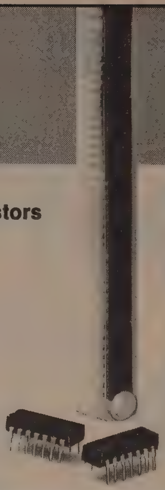
14 PIN

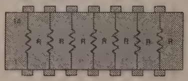
- 7 Resistors — 14 pin
- 13 Resistors — 14 pin
- Packaging is compatible with automatic insertion equipment
- Reduces space and reduces costs



PD 14———A 14 Pin-7 Resistors

Applications

- Power Gate Pull-up
- Line Terminations
- LED Current Limiting
- ECL Output Pull-down
- Impedance Balancing

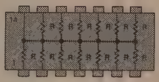


Schematic A

PD 14———B 14 Pin-13 Resistors

Applications

- TTL Input Pull-down
- Open Collector Pull-up
- MOS/Rom Pull-up/Pull-down
- Power Driver Pull-up
- "Wired OR" Pull-up

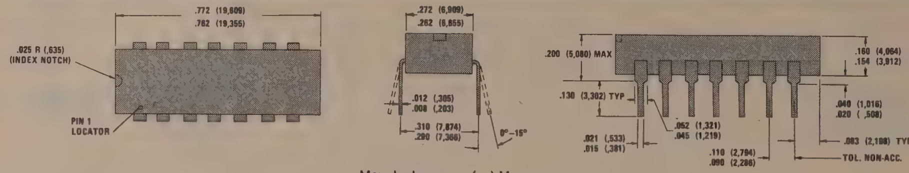


Schematic B

PD 16 — A and PD 16 — B Standard Resistance Values

22	47	100	220	470	1.0K	2.2K	4.7K	9.1K	20K
24	51	110	240	510	1.1K	2.4K	5.1K	10K	22K
27	56	120	270	560	1.2K	2.7K	5.6K	11K	33K
30	62	130	300	620	1.3K	3.0K	6.0K	12K	47K
33	68	150	330	680	1.5K	3.3K	6.2K	13K	68K
36	75	160	360	750	1.6K	3.6K	6.8K	15K	100K
39	82	180	390	820	1.8K	3.9K	7.5K	16K	
43	91	200	430	910	2.0K	4.3K	8.2K	18K	

Standard Tolerance ±2% (<100Ω ±.5Ω)


.772 (19,609)
.762 (19,355)
.025 R (,635) (INDEX NOTCH)
PIN 1 LOCATOR
.272 (6,909)
.262 (6,655)
.012 (,305)
.008 (,203)
.310 (7,874)
.290 (7,366)
0°–15°
.200 (5,080) MAX
.130 (3,302) TYP
.160 (4,064)
.154 (3,912)
.040 (1,016)
.020 (,508)
.052 (1,321)
.045 (1,219)
.021 (,533)
.015 (,381)
.110 (2,794)
.090 (2,286)
.083 (2,108) TYP
TOL. NON-ACC.

Max. Inches ( ) Max. mm
Min. Inches ( ) Min. mm

PRODUCT SPECIFICATIONS

Resistance Range .... 10 ohms to 1 meg ohm

Tolerance .... Letter designation for ordering
  Standard 2% .... G
  Special 5% .... J
  Special 1% .... F
  Special .5% .... D

Max. number of resistors per Dip available 24

Power Rating .... 1.5W Total per DIP at 70°C
  Max. power per resistor .125W for standard circuits

Temperature Coefficient Track .... Typical 50 PPM/°C
  Special 25 PPM/°C

Temperature Coefficient
of resistance .... Letter designation for ordering
  Standard — 0 ± 300PPM/°C .... M
  Special — 0 ± 200PPM/°C L
  Special — 0 ± 100PPM/°C .... K

Tolerance Ratio Match .... As low as .5%

Voltage Ratings .... 100 V max. per resistor,
  2000 V max. per DIP package for special circuits

Operating Temperature Range ...... −55°C to +125°C

Encapsulation .... epoxy transfer molded

ORDERING INFORMATION

Basic Model Number	Number of Pins	Temp. Coeff.	Resistance Value	Tolerance	Schematic
PD	14	M	220Ω	G	A

Setting New Standards in Reliability

PYROFILM

60 S. Jefferson Road • Whippany, N. J. 07981
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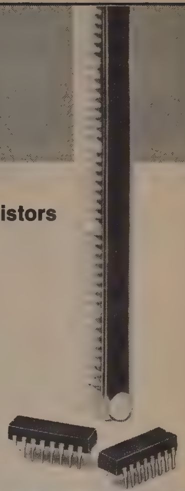
16 PIN

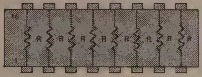
- 8 Resistor — 16 Pin
- 15 Resistor — 16 Pin
- Packaging is compatible with automatic insertion equipment
- Reduces space and reduces costs



PD 16———A 16 Pin-8 Resistors

Applications

- Power Gate Pull-up
- Line Terminations
- LED Current Limiting
- ECL Output Pull-down
- Impedance Balancing

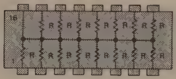


Schematic A

PD 16———B 16 Pin-15 Resistors

Applications

- TTL Input Pull-down
- Open Collector Pull-up
- MOS/Rom Pull-up/Pull-down
- Power Driver Pull-up
- "Wired OR" Pull-up

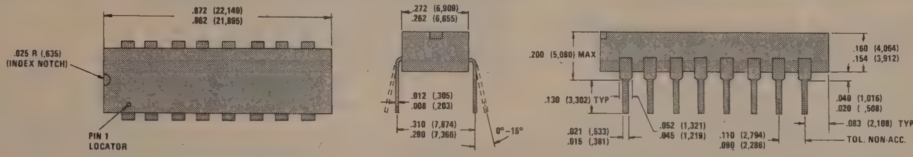


Schematic B

PD 14—A and PD 14—B Standard Resistance Values

62	220	1.5K	6.0K	33.0K
68	330	2.0K	6.8K	47.0K
100	470	2.2K	10.0K	68.0K
110	680	3.3K	15.0K	100.0K
150	1.0K	4.7K	22.0K	

Standard Tolerance ±2% (<100Ω ±.5Ω)


.872 (22,149)
.862 (21,895)
.025 R (,635)
(INDEX NOTCH)
PIN 1
LOCATOR
.272 (6,909)
.262 (6,655)
.012 (,305)
.008 (,203)
.310 (7,874)
.290 (7,366)
0°–15°
.200 (5,080) MAX
.130 (3,302) TYP
.021 (,533)
.015 (,381)
.052 (1,321)
.045 (1,219)
.110 (2,794)
.090 (2,286)
.160 (4,064)
.154 (3,912)
.040 (1,016)
.020 (,508)
.083 (2,108) TYP
TOL. NON-ACC.

Max. Inches / Min. Inches ( ) Max. mm / ( ) Min. mm

PRODUCT SPECIFICATIONS

Resistance Range .... 10 ohms to 1 meg ohm

Tolerance .... Letter designation for ordering
Standard 2% .... G
Special 5% .... J
Special 1% .... F
Special .5% .... D

Max. number of resistors per Dip available 28

Power Rating .... 1.75W Total per DIP at 70°C
Max. power per resistor .125W for standard circuits

Temperature Coefficient Track .... Typical 50 PPM/°C
Special 25 PPM/°C

Temperature Coefficient
of resistance .... Letter designation for ordering
Standard — 0 ± 300PPM/°C .... M
Special — 0 ± 200PPM/°C L
Special — 0 ± 100PPM/°C .... K

Tolerance Ratio Match .... As low as .5%

Voltage Ratings .... 100 V max. per resistor,
2000 V max. per DIP package for special circuits

Operating Temperature Range ...... −55°C to +125°C

Encapsulation .... epoxy transfer molded

ORDERING INFORMATION

Basic Model Number	Number of Pins	Temp. Coeff.	Resist-ance Value	Tolerance	Schematic
PD	16	M	220Ω	G	A

Setting New Standards in Reliability

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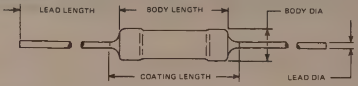
- Metal Film Resistors
- Thick & Thin Film Chips
- Microwave Rods, Discs, T-Pads
- Flange Terminations
- Microwave Stud Mounted Resistors
- Microwave Pill Shape Terminations
- Custom Networks - Thick & Thin Film Resistors

METAL FILM RESISTORS CONFORMAL COATED



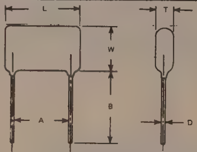
PHYSICAL AND ELECTRICAL CHARACTERISTICS

PYRO-FILM	MIL-R-55182	RATING Watts		RESISTANCE RANGE		MAX. VOLTAGE**	BODY DIMENSIONS Inches		LEAD DIMENSIONS Inches			MAXIMUM COATING LENGTH Inches	
		MIL	Com.	Min.	Max.		Diameter	Length	Dia.	Length	AWG	Standard	Special
PME45	–	–	1/20	25Ω	200K	200	.047 ± .010	0.125 ± .020	.010	1	#30	.160	–
PME50	RNC50*†	1/20	1/8	10Ω	1M	200	.060 + .015 −.010	.150 ± .020	.016	1	#26	.200	.172
PME55	RNC55*†	1/10	1/8	10Ω	4M	250	.095 ± .015	.250 ± .031	.025	1½	#22	.360	.281
PME60	RNC60*†	1/8	1/4	49Ω	10M	300	.105 ± .015	.390 ± .031	.025	1½	#22	.475	.406
PME62	–	–	1/4	500Ω	20M	1,500	.105 ± .015	0.510 ± .031	.025	1½	#22	.600	.530
PME64	–	–	1/4	500Ω	30M	2,500	.105 ± .015	0.970 ± .031	.025	1½	#22	1.070	.985
PME65	RNC65*†	1/4	1/2	49Ω	20M	400	.156 ± .015	.580 ± .031	.025	1½	#22	.650	.600
PME70	RNC70*†	1/2	1	24Ω	40M	700	.230 ± .015	.730 ± .031	.032	1½	#20	.830	.730
PME75	RN75*	1	2	49Ω	50M	1,000	.365 ± .015	1.050 ± .031	.032	1½	#20	1.165	1.081
PME80	RN80	2	2	100Ω	70M	5,000	.365 ± .015	2.175 ± .031	.032	1½	#20	2.290	2.206

*Qualified to MIL-R-10509F †Qualified to MIL-R-55182 RNC, RNN, & RNR

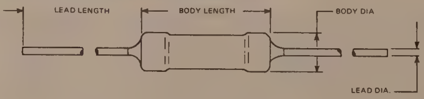
**Consult factory for extended voltage ratings.

FLATSO™ THICK FILM RESISTORS



PYROFILM TYPE	MAX. WATTAGE	MAX. VOLTAGE	RESISTANCE RANGE (Ohms)	BODY DIMENSIONS			LEAD DIMENSIONS		
				MAX. L	MAX. W	MAX. T	D±.002	A±.031	B±.125
FL 1/4	1/4	350	50Ω - 10M	.300	.300	.100	.020	.200	1.5
FL 1/2	1/2	750	1K - 25M	.525	.300	.125	.025	.400	1.5
FL 1	1	5,000	100K - 120M	1.125	.375	.160	.032	.900	1.5
FL 2	2	10,000	250K - 250M	2.125	.375	.175	.032	1.900	1.5

THICK FILM HIGH VOLTAGE



PYROFILM TYPE	WATTS MAX	VOLTAGE MAX	RESISTANCE RANGE*	BODY DIMENSIONS - INCHES		LEAD DIAM INCHES
				LENGTH	DIAMETER	
PVC55	1/8	250	10K - 50M	.250 ± .031	.105 ± .015	.025
PVC60	1/4	500	10K - 100M	.375 ± .031	.125 ± .020	.025
PVC62	1/4	500	10K - 200M	.510 ± .031	.125 ± .020	.025
PVC64	1/4	1000	10K - 500M	.970 ± .031	.125 ± .020	.025
PVC70	1	3.5KV	10K - 500M	.750 ± .050	.300 ± .020	.032
PVC100	1.5	5KV	10K - 1000M	1.040 ± .050	.300 ± .020	.032
PVC175	3	10KV	20K - 1000M	1.800 ± .050	.300 ± .020	.032
PVC200	3	10KV	20K - 1000M	2.050 ± .050	.300 ± .020	.032
PVC300	3.75	12.5KV	35K - 1000M	3.050 ± .050	.300 ± .020	.032
PVC400	5.25	17.5KV	50K - 1000M	3.980 ± .020	.300 ± .020	.032

**EXTENDED VALUES ARE AVAILABLE CONSULT FACTORY*

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AMF
RCL Electronics

General Sales Office:
700 So. 21st Street
Irvington, N. J. 07111

established reliability wire-wound resistors

PRECISION RESISTORS/PER MIL R-39005

RCL TYPE #	MIL-R-39005 TYPE	DIMENSIONS DIAM. ±.015	DIMENSIONS LENGTH +.020 −.032	MIL WATT	MAX. VOLTS	MAX. MIL RES.	MILLIMETERS DIAM. ±0.4	MILLIMETERS LENGTH +0.5 −0.8
7009-ER	RBR 56	.250	.344	0.125	150	220K	6.3	8.7
7010-ER	RBR 55	.250	.500	0.15	200	332K	6.3	12.7
7020-ER	RBR 54	.250	.750	0.250	300	562K	6.3	19.05
7030-ER	RBR 53	.375	.750	0.33	400	1.1 Meg.	9.5	19.05
7040-ER	RBR 52	.375	1.000	0.50	600	1.210 Meg.	9.5	25.4

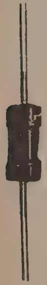
Lead Length: 1½″ min. (38.1mm min.). Lead Diameter: #20 AWG .032″ (0.8mm).

4060-ER	RBR 71	.250 ±.031	.312 ±.031	0.125	150	150K	6.3 ±0.8	8.0 ±0.8

Standard temp. coefficient ±20 PPM/°C.

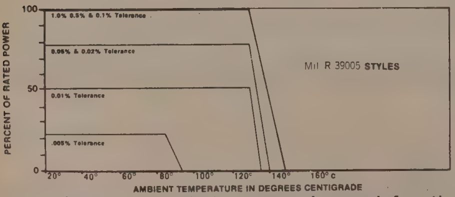
Resistance Tolerances Available: .01%, .02%, .05%, .10%, 1.0%
If solderable leads are required use suffix L.
If weldable leads are required use suffix U.

POWER RESISTORS/PER MIL R-39007

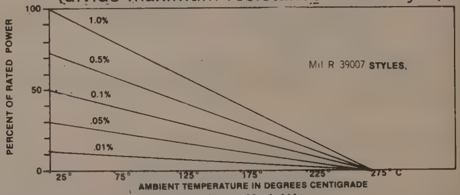


RCL TYPE #	MIL-R-39007 TYPE	DIMENSIONS DIAM. ±.031	DIMENSIONS LENGTH ±.062	WATTAGE RATING	MAX. RESIST.	LEAD DIAM. AWG	MILLIMETERS DIAM. ±0.8	MILLIMETERS LENGTH ±1.6
T-2B-71-ER	RWR 71	.188	.812	2.0	16.2K	#20	4.8	20.0
T-5-74-ER	RWR 74	.312	.875	5.0	12.1K	#18	8.0	22.2
B-1-ER	RWR 81	.085 ±.020	.250 ±.032	1.0	1K	#24	2.2 ±0.12	2.4 ±0.8
B-3-ER	RWR 80	.094	.406 ±.032	2.0	2.67K	#24	2.4	11.5 ±0.8
B-5-ER	RWR 89	.187	.560	3.0	4.12K	#20	4.8	14.2

If solderable leads are required use Suffix S
If weldable leads are required use suffix W
Resistance Tolerances Available: .1%, .5%, 1.0%



Lead length: 1½″ minimum.
Standard coefficient ± 20 PPM/°C
Non Inductive Winding: Add Suffix N.
(divide maximum resistance values by 2)



A completely controlled process is used for the manufacture of established reliability units. Every unit is documented and traceable with quality control data. A 100 hour burn-in at rated wattage is performed. Failure rates test results are available.

AMF

General Sales Office:
700 So. 21st Street
Irvington, N. J. 07111

RCL Electronics

SERIES T

silicone coated axial power wire-wound resistors

General Specifications Available:

☐ **Standard Temperature Coefficient:**
Standard T.C.:
±20 PPM/°C. 500Ω up ±30 PPM/°C 10Ω to 499Ω
±50 PPM/°C 1Ω to 9.9Ω ±90 PPM/°C below 1Ω
Lower ohmic values require higher T.C.'s, consult factory for information on specific applications.
Consult factory for lower temperature coefficient requirements.

☐ **Tolerance:** ±1.0% is standard. Closer tolerances available.

☐ **Wattage Range:** ½ watts to 14 watts.

☐ **Standard Resistance Values:** From 0.1 ohms to maximum values as stated in table. For values below 0.1 ohms consult factory.

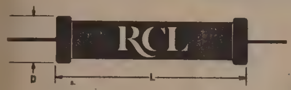
☐ **Coating:** RCL's proprietary silicone coating withstands moisture, salt water immersion, and cleansing solutions. It will withstand continuous operation up to 400°C.

☐ **Leads:** Tinned copperweld is standard.

☐ **Dielectric Strength:** 500 VAC for T-½A through T-1C, 1000 VAC for all others.

☐ **Insulation Resistance:** 5000 Megohms minimum at 100 volts D.C.

☐ **Wide Temperature Range:** From −65°C to +275°C (Characteristic U) or +350° (Characteristic V).



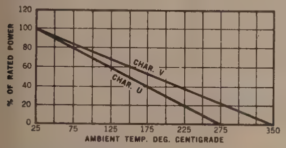
POWER RATINGS:

The RCL "T" Series has two power ratings, depending on operating temperature and stability requirements:

CHARACTERISTIC U: 275°C maximum hot-spot temperature.

CHARACTERISTIC V: 350°C maximum hot-spot temperature.

DERATING:
RCL Series "T" resistors have an operating temperature range of −65°C to +275°C (Characteristic U), or to +350°C (Characteristic V).



Ultra-fast delivery for prototypes and initial production needs.

RCL TYPE	MIL-R 26 E TYPE	WATTAGE RATING		DIMENSIONS		MAX. RESISTANCE		LEAD DIAM.
		U	V	DIA. ±.031*	LEN. ±.062*	RCL MAX.	MIL-R 26 E MAX.	
T-½A		.4		.078	.220	2.5K		#24
T-½		.75		.078	.330	7.5K		#24
T-1A		1.0	1.25	.093	.406	10K		#24
T-1A-70	RW-70	1.0		.094	.406 ±.031	10K	3.16K	#24
T-1B		1.1	1.30	.093	.530	12K		#24
T-1C		1.0		.093	.280	5K		#24
T-2		1.5		.156	.343	10K		#20
T-2A		3.0	3.75	.187	.500	22K		#20
T-2A-69	RW-69		3.00	.188 ±.063	.500 ±.063	22K	2.K	#20
T-2B		3.0	3.75	.188	.812	40K		#20
T-2B-79	RW-79	3.0		.187	.560	22K	10.5K	#20
T-2C		3.0	3.25	.250	.500	40K		#18
T-3		4.0	5.5	.250	.625	45K		#18
T-5		5.0	6.5	.312	.875	91K		#18
T-5-74	RW-74	5.0		.312	.875	91K	38.3K	#18
T-6		6.0	7.5	.312	1.000	95K		#18
T-6-67	RW-67		6.5	.313 ±.063	1.000 ±.094	95K	8.2K	#20
T-7		7.0	9.00	.312	1.185	100K		#18
T-7A		7.0	9.00	.375	1.375	150K		#18
T-7A-55	RW-55		7.00	.469 ±.094	1.375 ±.094	150K	5.1K	#20
T-10		10.0	13.00	.375	1.812	250K		#18
T-10-78	RW-78	10.0		.375	1.780	260K	90.9K	#18
T-10-68	RW-68		11.00	.344 ±.094	1.875 $^{+.063}_{-.125}$	265K	20K	#20
T-10A		10.5	14.00	.375	1.925	275K		#18
T-10-A-56	RW-56		14.00	.469 ±.094	2.000 ±.094	275K	9.1K	#20

Lead Length: 1¼" (32mm) minimum

* Tolerance applies to all types unless otherwise indicated.

BERYLLIUM OXIDE CORE WIRE-WOUND RESISTORS

For maximum heat dissipation . . . in smaller sizes. (All specifications same as above . . . Series T.)

RCL Type	MIL-R-26E	Rated Wattage		Dimensions: Diameter Inches	Diameter mm	Length Inches	Length mm	Lead Diameter		Max. Resistance	
		U	V	±.032	±.08 mm	±.062	±1.6 mm	AWG	mm	MIL	RCL
B-1	RW-81	1	—	.085 ±.020	2.2 ±0.5	.250 ±.032	6.4 ±0.8	#24	0.5	1K	3.4K
B-2	—	1.5	2	.078	2	.312	7.9	#24	0.5	—	7.5K
B-3	RW-80	2	—	.094	2.4	.406 ±.032	10.3 ±0.8	#24	0.5	3.16K	10.0K
B-5	—	4	5	.188	4.8	.562	14.3	#20	0.8	—	25K
B-5A	—	4.5	6.5	.188	4.8	.812	20.6	#20	0.8	—	42K
B-5C	—	5	7	.218	5.5	.500	12.7	#18	1	—	32K
B-6	—	6	8	.250	6.4	.625	15.9	#18	1	—	50K
B-10	—	7	10	.312	7.9	.875	22.2	#18	1	—	95K
B-12	—	10	12	.312	7.9	1.218	31	#18	1	—	154K
B-15	—	15	18	.375	9.5	1.780	45.2	#18	1	—	273K

Lead length 1¼" (32mm) Minimum.

NON-INDUCTIVE WINDING AVAILABLE FOR SERIES "T" OR "B"

☐ For non-inductive winding add prefix "N".
1. Divide maximum resistance values by two.
2. Multiply maximum working voltage by .707.
3. Where possible, specify maximum inductance or capacitance allowable at a specific frequency.

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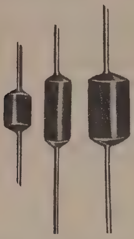
RCL Electronics

low-cost wire-wound resistors for commercial/industrial applications



RCL Commercial line — low cost, precision wire wound resistors for test equipment, instruments, industrial controls, communications equipment. All the benefits of wire wounds — low T.C., high stability, close tolerance.

- Price competitive with comparable metal film resistors
- Standard T.C. = ±10 PPM/°C
- Special T.C.'s available on request
- High temperature epoxy coating provides moisture protection
- Lead Length: 1½″(38.1mm) minimum
- Wattage rating at 60°C ambient; derated to zero at 105°C
- Low noise
- Molded-in leads for structural strength
- Tolerance Available: ±1.%, 0.5%
- Non-inductive winding available on special order

Style Number	Wattage* Rating	Min. Res.	Max. Res.	Bobbin Diameter ±.031	Bobbin Length ±.0625	Lead Diam. AWG
E-10	.1	0.1 ohm	6K	.1875	.375	#22
E-20	.25	0.1 ohm	13K	.1875	.5	#22
E-30	.5	0.1 ohm	25K	.25	.75	#20

subminiature wire-wound resistors

These extremely small, encapsulated resistors meet and exceed the specifications of MIL-R-93. Special RCL techniques also allow the production of custom sizes at minimal cost to the customer.

Tolerances available: from ±1.0% to ±0.001%.

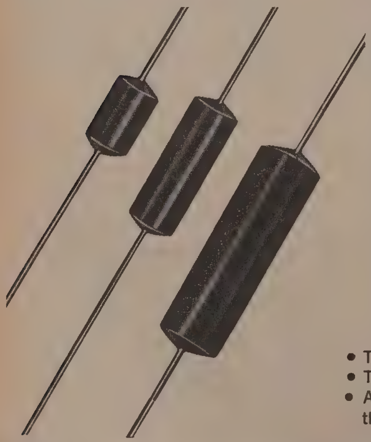
Temperature coefficient: Standard is ±10 PPM/°C.

Temperature coefficients available as low as ±2 PPM/°C.

RCL Type	Dia. Inches (±.016)	Length Inches (±.032)	Max. Watts	Max. Volts	Max. Res. .001 Wire (25.4μ)	Max. Res. .0005 Wire (12.7μ)	Non-inductive	Lead Diam. (Length 1½″ Min.)
7001	.100	.200	0.05	75	10K	—	No	#26AWG
7002	.110	.220	0.1	100	10K	100K	No	#24AWG
7003	.100	.260	0.05	100	10K	150K	No	#24AWG
7004	.100	.300	0.05	100	10K	250K	Yes	#24AWG
7005	.125	.250	0.1	100	10K	300K	Yes	#22AWG
7006	.125	.312	0.1	100	16K	350K	Yes	#22AWG
7007	.1875	.375	0.125	200	60K	700K	Yes	#22AWG
7008	.250	.250	0.150	100	100K	1 Meg.	Yes	#22AWG
7009	.250	.343	0.25	200	127K	1.4 Meg.	Yes	#20AWG
7010	.250	.500	0.33	400	226K	3 Meg.	Yes	#20AWG

Maximum wattage rating is at 25° C through 125° C

wire-wound encapsulated resistors



Lead Length: 1½″ Min. #20 AWG **Non-Inductive Winding**

Type	MIL-R-93 Type	Dia. In. (±.015)	Lgth In. ±.031	Maximum Watts	MIL Wattage	Maximum Volts	Max. Res. .001 Wire
7009	RB-56	.25	.343	0.25	0.125	200	127K
7010	RB-55	.25	.5	0.33	0.15	400	226K
7020	RB-54	.25	.75	0.50	0.25	400	511K
7030	RB-53	.375	.75	0.60	0.33	400	750K
7040	RB-52	.375	1.0	1.00	0.50	800	1.5 Meg.
7044	—	.5	.5	0.50	—	400	1 Meg.
7045	—	.5	.625	0.60	—	400	1 Meg.
7045A	—	.437	.625	0.60	—	400	650K
7050	RB-57	.5	1.0	1.25	0.75	800	2 Meg.
7050A	—	.437	1.0	1.25	—	800	1.5 Meg.
7060	RB-58	.5	1.5	1.50	1.0	900	3 Meg.
7070	RB-59	.5	2	2.00	1.25	1,200	5 Meg.

Maximum wattage rating is from −55° C to +125° C.

MILITARY SPECIFICATIONS

- These standard sizes meet the physical dimensions of MIL-R-93.
- Test data and approval information available.
- All RCL types meet or exceed the electrical and environmental characteristics of this specification.

INDUSTRY'S BEST DELIVERY

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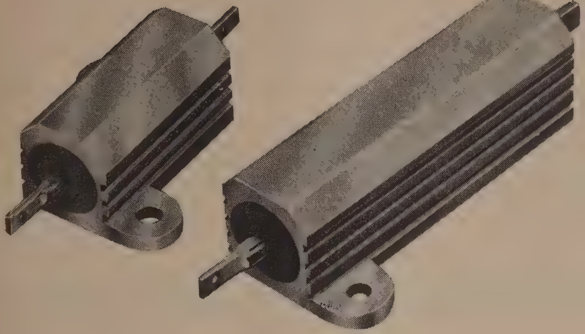
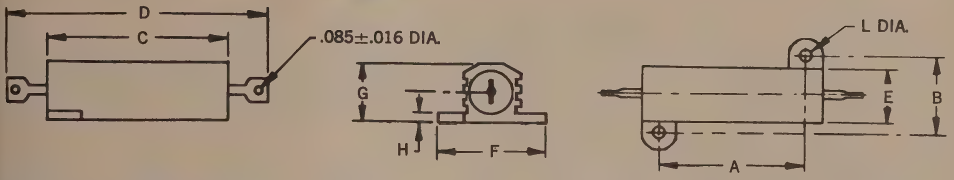
RCL Electronics

General Sales Office:
700 So. 21st Street
Irvington, N. J. 07111

aluminum housed wire-wound power resistors





TYPE	A	B	C	D	E	F	G	H	L	MIL-Type
Tol.	±.005	±.005	±.032	±.062	±.015	±.015	±.015	±.010	±.005	—
AL-5	.445	.490	.600	1.125	.335	.645	.321	.065	.094	RE-60
AL-10	.562	.625	.750	1.375	.420	.795	.400	.074	.094	RE-65
AL-25	.720	.780	1.060	1.940	.530	1.075	.560	.087	.125	RE-70
AL-50	1.562	.845	1.970	2.780	.615	1.135	.615	.087	.125	RE-75

FEATURES

- Tolerance: ±1% standard. Available to ±.05%.
- Standard TC:
  ±20 PPM/°C. 500Ω up
  ±30 PPM/°C. 10Ω to 499Ω
  ±50 PPM/°C. 1Ω to 9.9Ω
  ±90 PPM/°C. below 1Ω
- All popular types, 5 watts through 50 watts
- Molded and welded construction
- Screw mounts on chassis
- Exceptionally high stability at all conventional power ratings
- Utilizes heat-sink effect of chassis
- Clearly marked on top surface of housing for ease of identification after mounting
- Exceeds MIL-R-18546
- Complete protection against environment

NON INDUCTIVE STYLES: (Series "AL" and "ALB") The same physical and electrical specifications are available with non-inductive winding. They are identified by adding the letter N after the AL identification.

RCL TYPE	MIL-R-18546 TYPE	POWER RATING* (WATTS) RCL	MIL	RESISTANCE RANGES (OHMS)	MAX. WORKING VOLTAGE	MAX. WT. GRAMS
AL-5	RE-60G	7.5	5	.01 to 24.5K	160	3
AL-10	RE-65G	12.5	10	.01 to 47.1K	265	6
AL-25	RE-70G	25	20	.01 to 95.2K	550	14
AL-50	RE-75G	50	30	.01 to 273K	1250	29

* Rating based on chassis mounting.

BERYLLIUM OXIDE CORES FOR GREATER HEAT DISSIPATION

RCL TYPE	MIL-R-18546 TYPE	POWER RATING* (WATTS) RCL	MIL	RESISTANCE RANGES (OHMS)	MAX. WORKING VOLTAGE	MAX. WT. GRAMS
ALB-5	RE-60	15	5	.01 to 24.5K	220	3
ALB-10	RE-65	20	10	.01 to 47.1K	340	6
ALB-25	RE-70	35	20	.01 to 95.2K	650	14
ALB-50	RE-75	50	30	.01 to 273K	1400	29

* Rating based on chassis mounting.

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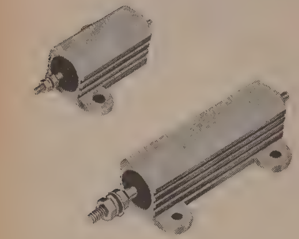
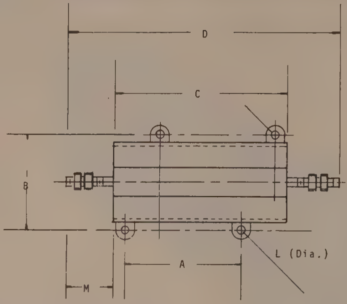
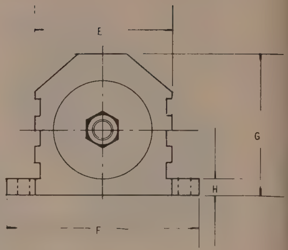
aluminum housed







ENGINEERING NOTES:

△ AL-250 has 4 mounting positions

△ Threads: AL-100: 12-24 UNC-2A typ.
AL-250: ¼-20 UNC-2A typ.

Dimensions (Decimals)

TYPE	A	B	C	D	E	F	G	H	L	M	MIL TYPE
Tol.	±.010	±.010	±.031	±.093	±.031	±.031	±.031	±.031	±.010	±.031	—
AL-100	2.750	2.250	3.500	5.478	1.812	2.812	1.750	.187	.188 (TYP)	.989	RE77
AL-250	3.000	2.500	4.500	7.000	2.125	3.000	2.188	.250	.188 (TYP)	1.250	RE80

RCL TYPE	MIL-R-18546D TYPE	POWER RATING* (WATTS)		RESISTANCE RANGES (OHMS)	MAX. WORKING VOLTAGE	MAX. WT. GRAMS
		RCL	MIL			
AL-100	RE-77G	100	75	.1 to 50K	1900	400
AL-250	RE-80G	250	120	.1 to 75K	2500	800

* Rate based on chassis mounting. See information on Power Rating below.

FEATURES

- Molded and welded construction
- Screw mounts on chassis
- Exceptionally high stability
- Utilizes heat-sink effect of chassis
- Clearly marked on top surface of housing for ease of identification after mounting
- Exceeds MIL-R-18546
- Complete protection against environment

MATERIAL

Core: Steatite, or Alumina Ceramic

Resistance Wire: Nichrome wire (800Ω/CMF) is standard; other alloys used when required.

End Caps: Stainless steel.

Sealant: Molded construction.

Housing: Anodized Aluminum.

Terminals: Tinned copperweld.

Flame Retardant Construction: Available on special order.

POWER RATING

Both AL-100 and AL-250 Series ratings based on the following requirements:

A. 275°C maximum internal hotspot temperature.

B. 1% maximum △R in 1000 hour load life.

C. Proper heat sink: 12"x12"x.125 Aluminum Panel.

D. Derating:

1. Operating temperature range of −55°C to +275°C.
2. Derating is required for reduced chassis mounting area and for high ambient temperatures.

APPLICABLE MIL-SPECIFICATIONS

MIL-R-18546: Meets or exceeds military specifications covering aluminum housed, chassis-mounted resistors.

ELECTRICAL SPECIFICATIONS

Tolerance: ±1.0% is standard. Available to ±.05%. Closer tolerances may necessitate lowering maximum resistance. Consult RCL for specifics.

Standard T.C.: ±20 PPM/°C. 500Ω up
±30 PPM/°C. 10Ω to 499Ω
±50 PPM/°C 1Ω to 9.9Ω
±90 PPM/°C. below 1Ω

Lower ohmic values require higher T.C.'s. Consult factory for information on specific applications.

Dielectric Strength: 5500 VAC on AL-100 and AL-250.

Insulation Resistance: 10,000 megohms min. dry.

NON INDUCTIVE STYLES

The same physical and electrical specifications are available with non-inductive winding. They are identified by adding the letter N after the AL identification.

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General Sales Office:
700 So. 21st Street
Irvington, N. J. 07111

RCL Electronics

special temperature coefficient wire wound resistors

- Applications include transistor circuits, zener diode temperature compensation, temperature measuring devices.
- Available in a range of temperature coefficients from −50 ppm/°C. to +6,000 ppm/°C.
- Values range from 10 ohms to 5 megohms.
- All available with axial or printed circuit leads.
- Available in all physical sizes.
- All meet applicable paragraphs of Mil-R-93D

Special Temperature Coefficients available (see table below)

COLD RANGE	HEAT RANGE	R FACTOR
−55°C to +25°C	+25°C to +105°C	Multiply Max. R by
−50 ±20	**−50 ±20**	1.00
−30 ±10	**−30 ±10**	1.00
±3	**±3**	1.00
±5	**±5**	1.00
±10	**±10**	1.00
±20	**±20**	1.00
+95 ±20	**+85 ±20**	.80
+110 ±10	**+100 ±10**	.80
+120 ±10	**+110 ±10**	.75
+150 ±30	**+150 ±30**	.85
+180 ±20	**+180 ±20**	.80
+280 ±30	**+280 ±30**	.25
+380 ±40	**+400 ±40**	.70
+700 ±200	**+650 ±200**	.60
+850 ±80	**+850 ±80**	.60
+1100 ±100	**+1050 ±100**	.50
+1250 ±100	**+1150 ±100**	.50
+1500 ±200	**+1450 ±200**	.55
+2600 ±200	**+2550 ±200**	.50
+3400 ±300	**+3600 ±300**	.36
+4000 ±400	**+4500 ±400**	.10
+5000 ±300	**+6000 ±300**	.05

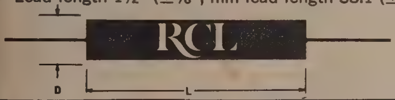
Above T.C.'s refer to .001 (25.4μ) minimum wire diameter. Some alloys available in sizes as low as .0007 (18μ).

RCL high positive TC resistors

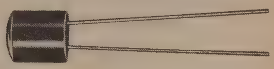
RCL Type #	Competitive 'SENSISTOR' Type #	Diam. ±.015	Length ±.015	RCL Resistance Range	'SENSISTOR' Resistance Range	Lead Diam. AWG.
8000	TM ⅛	.140	.406	1 Ohm to 10K	10 Ohms to 6K	#22
8001	TM ¼	.200	.585	1 Ohm to 20K	10 Ohms to 10K	#22

RCL has developed its own proprietary special alloy resistance wire which gives the unusually high positive TC of silicon, together with the basic advantages of resistance wire which are:

- Provides temperature compensation.
- Much greater stability for digital and linear integrated circuits.
- Closer resistance tolerances.
- Broader range of resistance values.
- Operating temperature range from −55°C to +150°C.
- Derated to zero watts at 150°C.
- Lead length 1½" (±⅛"; mm lead length 38.1 (±3.2mm).



RCL wire-wound printed circuit resistors



△ All welded construction.

△ All resistor wire terminations are made at the top of the resistor rather than at the bottom.

This does the following:

a. protects the joints from damage when submerged in a solder bath.

b. by placing these joints as far away as possible from the solder bath, the body acts as a heat sink and thus these terminations are given additional protection.

c. this design generally applies to values of 2K and above.

△ Custom designs on special order.

△ Different lead spacing can be furnished on request.

△ Non-inductive winding available.

RCL Type	MIL-R-93D Type	Dia. (±.025)	Length (±.032)	Max. Res. Using .001 (25.4μ)	Max. Res. Using .0006 (15.2μ)	Wattage	Standard Lead Spacing (±.010	Lead Diam. (AWG)
4060	RB-71	.25	.312	100K	500K	.250	.200	#22
4061	—	.25	.375	160K	800K	.250	.200	#22
4062	—	.25	.437	160K	800K	.250	.200	#22
4063	—	.375	.375	185K	1 Meg.	.333	.200	#20
4064	—	.375	.437	250K	1.3 Meg.	.333	.200	#20
4065	RB-70	.375	.5	301K	1.5 Meg.	.333	.200	#20
4066	—	.437	.375	450K	2 Meg.	.400	.300	#20
4067	—	.437	.437	600K	3 Meg.	.400	.300	#20
4068	—	.437	.5	700K	3.5 Meg.	.400	.300	#20

Lead length 1¼" Minimum. Tinned, weldable leads.

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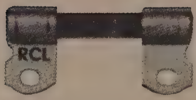
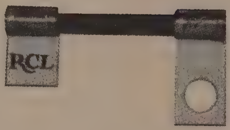
low cost commercial wire-wound resistors



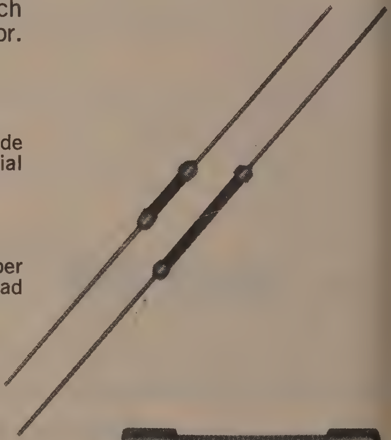


SERIES OWR

RCL Series OWR Resistors are available in a wide range of configurations to meet low-cost, high volume applications in the automotive and appliance fields. A range of terminal styles is available and others can be made to user specifications at a nominal cost. Power ratings are 4.5 watts per inch between mounting centers on the standard OWR, and 6 watts per inch between mounting centers on the hi-wattage OWR Resistor. Shown are some of the Terminal Configurations available.

CONSTRUCTION

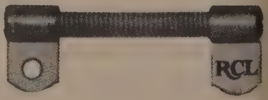
This RCL Series has a high quality, premium resistance wire wound on woven fiberglass cores impregnated with a special grade silicone. Available with special smokeproof coating.



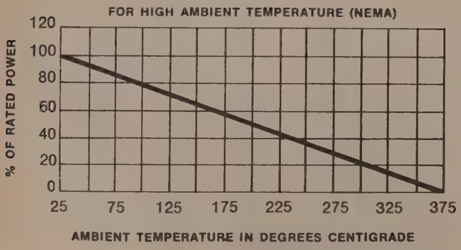
ORDERING INFORMATION

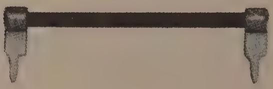
When ordering, please specify resistor body length, watts/inch, resistance and tolerance.

Example: A 1½″ unit, 4 watts per inch; 350Ω, ±10% radial lead unit is designated:
OWR-4-350Ω±10%



DERATING





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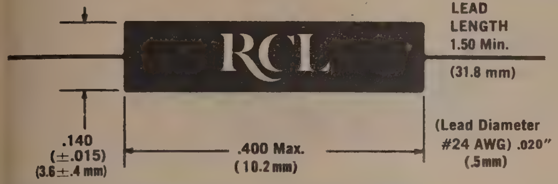
precision wire-wound fuse resistors

NOW . . . a dual-purpose device that performs the functions of acting both as a precision wirewound resistor and a fuse. Precisely controlled characteristics . . . stable, accurate resistance . . . allows precise control of fusing point and time lag.



GENERAL SPECIFICATIONS ON 500 SERIES

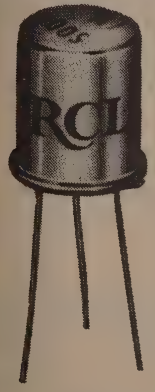
RESISTANCE RANGE: 0.2Ω - 200Ω
RESISTANCE TOLERANCE: 10% STD, 5% AND 2% AVAILABLE
BLOW CHARACTERISTICS: PER TABLE — 2 POINT DEFINITION
STEADY-STATE CONDITIONS: PER TABLE—CURRENT AND POWER RATINGS
OPERATING TEMPERATURE: —55°C TO +150°C
TEMPERATURE COEFFICIENT: ±50 PPM/°C MAX

CONSTRUCTION FEATURES

- SINGLE FUSING ELEMENT — ALL WELDED CONNECTIONS
- CERAMIC SHELL — AIR ENCAPSULATION
- MEETS OR EXCEEDS MIL-R-26 ENVIRONMENTAL CONDITIONS-SPECIFICATIONS
- INTRINSICALLY SAFE — CERAMIC BOBBIN — SINGLE LAYER WOUND

RCL designs and manufactures standard (F500 series) and special fuse-resistors to customer requirements. The fuse resistor acts both as a precision wirewound resistor and as a fusing element with precisely controlled characteristics.

- Affords protection for semiconductor devices
- Reduces the number of discrete components required
- Eliminates fire hazard and circuit board damage due to overheated components
- Eliminates unnecessary blowing due to transient conditions

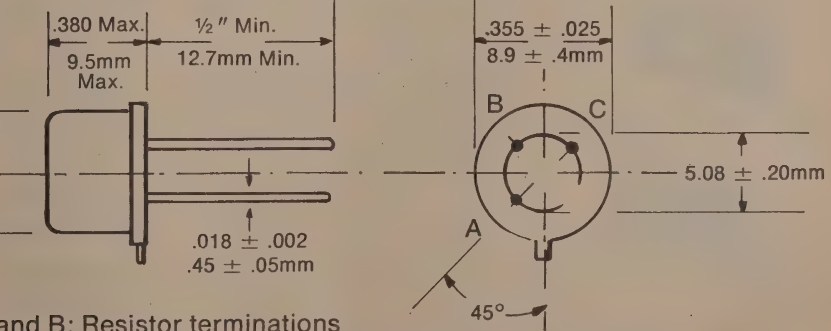


TYPE-T-05R

This new resistor is sealed in a T-05 "Transistor Case" providing hermetically sealed electrostatic and electromagnetic screening. The lead outs are through glass to metal seals.

SPECIFICATIONS

RESISTANCE RANGE: 1Ω to 1 meg. ohm.
STANDARD TOLERANCE: ±1% Available to ±.01%. Consult factory for details.
TEMPERATURE COEFFICIENT: ±10ppm/°C Standard. For special T.C.'s consult factory.
RATING: 150 milliwatts for temperature rise of 20°C. Maximum volts: 250 V.
CLIMATIC: Sealed for operation from −65°C to +125°C.



A and B: Resistor terminations
C: Envelope — electrostatic and electromagnetic shielding

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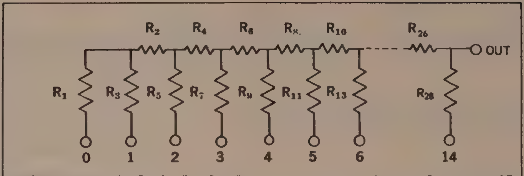
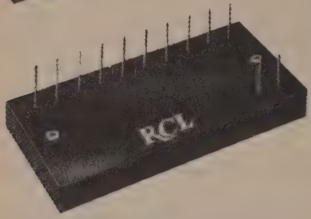
ladder and summing networks

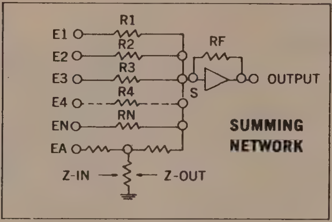


Resistors: $R_1, R_3, R_5, R_7, R_9, R_{11}, R_{13}, R_{15}, R_{17}, R_{19}, R_{21}, R_{23}, R_{25}, R_{27}, R_{28}$; each = 2R

Resistors: $R_2, R_4, R_6, R_8, R_{10}, R_{12}, R_{14}, R_{16}, R_{18}, R_{20}, R_{22}, R_{24}, R_{26}$; each = R

RCL makes available ladder networks in both standard and miniaturized versions





- Maximum total error less than ½ of the smallest word input combinations
- Modular construction
- Interchangeable sub-assemblies

General Specifications Available:

- Ambient operating temperature range . . . −55°C to +125°C
- Error . . . Under .50 of the least significant bit for every input combination
- Resistance Values: 500Ω to 100K
- Output accuracy to ±.01% and ±2 PPM/°C
- Up to 14 bits available
- Wire Wound precision resistors of matched characteristics result in high stability

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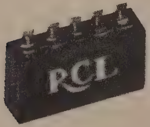
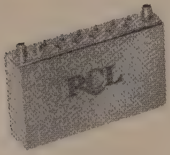
precision resistance networks





RCL designs, develops and produces packaged resistance networks to individual customer requirements.
A high degree of sophisticated packaging plus miniaturization techniques are available from RCL's network engineering specialists. Typical custom designed networks are shown here.

General Specifications Available:

- Absolute resistor tolerances to ±.002%
- Ratio tolerances to ±.001%
- Temperature coefficient match and tracking between resistors within ±1 PPM/°C from −0°C to +85°C
- Long term stability of .001% the first year and .002% over a three year period
- Low reactance and rise times as low as .02 microseconds
- AC resistance match at frequency determined by user
- In AC converter networks, capacitance can be matched to 0.01 MMFD with a shielded network.

If you have a network problem, send us your complete specifications for a prompt and detailed proposal.

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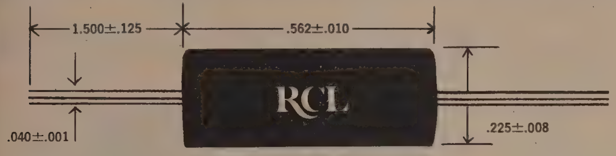
low cost 2 watt molded wire-wound resistors



TYPE BWR

A general purpose, extremely economical wire wound resistor. Type BWR covers three different wattage requirements in one size resistor.

BWR resistors offer wire wound stability, negligible noise and no catastrophic failures for 2, 1 and ½ watt applications. Significant cost savings may be obtained over Fixed Composition Resistors in the categories of 1 watt 5% tolerance, 2 watt 5% and 10% tolerances.

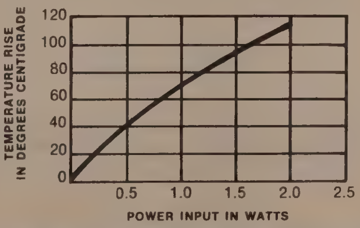
PERFORMANCE CHARACTERISTICS

REQUIREMENT	TYPICAL BWR R LESS THAN	MAXIMUM BWR △R
Temperature Coefficient 0.1Ω - 0.16Ω	+0.08%/°C	+0.1%/°C
0.10Ω - 0.62Ω	+0.06%/°C	+0.08%/°C
0.68Ω - 2400Ω	±0.02%/°C	±0.04%/°C
Low Temperature Operation	±1.5%	±3%
Temperature Cycling (−55°C to +125°C)	±1.5%	±5%
Moisture Resistance	±3%	±5%
Short Time Overload (8 Watts)	±1.5%	±4%
Load Life	±5%	±10%
Terminal Strength	±1%	±2%
Resistance to Soldering Heat	±2%	±4%
Shock	±0.5%	±2%
High Frequency Vibration	±1%	±2%

"Typical △R less than" is defined as the maximum △R to be expected in 95% of the population of a distribution.

NOTES:

1. Because of inaccuracies common in measuring low resistance values, an allowance of 0.01Ω should be added to the %△R limits.
2. Test conditions are as specified in MIL-R-11 and MIL-STD-202 except where shown in parenthesis.
3. For indication of approximate inductance values, consult factory.



SURFACE TEMPERATURE RISE AT HOT SPOT VS. LOAD

SPECIFICATIONS

MIL-R-11 Style Equivalent for Physical Size Only: RC32

Resistance, Standard: 0.10Ω thru 2400Ω.

Resistance Tolerances, Standard: ±5%, ±10%.

Power Rating: 2 watts @ 70°C
1 watt @ 115°C
½ watt @ 137°C; derating to 0 @ 160°C

Maximum Continuous Working Voltage: $\sqrt{PR}$

Minimum Insulation Resistance — Dry: 10,000 Megohms

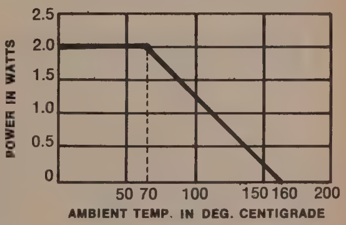
Minimum Insulation Resistance — Wet: 100 Megohms

Minimum Dielectric Withstanding Voltage: Atmospheric Pressure 1000 Volts R.M.S.; Reduced Pressure 625 Volts R.M.S.

Hot Spot Temperature Rise at 2 Watts: 115°C

Current Noise: Negligible

DERATING CURVE
TEMPERATURE — POWER



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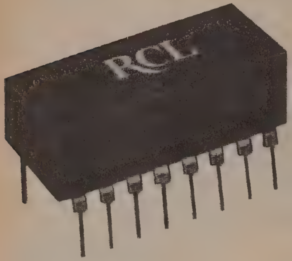
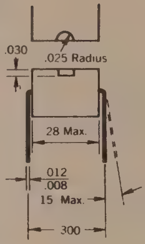
wire-wound networks (dual-in line package)



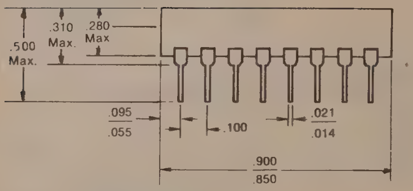


TYPE DPW 16

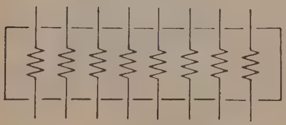
- Designed for automatic insertion
- Up to 8 resistors in a 16-pin package
- Optimum heat dissipation in small package
- High temperature stability
- Precision tolerance and T.C.

ELECTRICAL SPECIFICATIONS

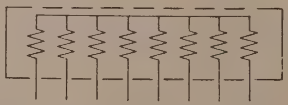
Power Rating: 4 watts (up to .5 watts/resistor)
Resistance Range: .5Ω to 1.000Ω per resistor
Temperature Coefficient Match: 10 PPM/°C Standard
Available to 2.5 PPM/°C
Tolerance: 1% Standard Available to .05%
Temperature Coefficient: 10Ω to 1000Ω ±20 PPM/°C
.5Ω to 9.9Ω ±50 PPM/°C
Tolerance Match: .05%
Dielectric Strength: 500 VAC
Insulation Resistance: 1000 Megohms minimum.
100 Megohms minimum after moisture test



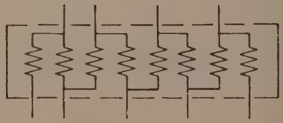
TYPICAL SCHEMATICS



DPW 16



DPW 16A



DPW 16B

Also available in 14 pin standard DIP configuration (Up to 7 resistors). Specify DPW 14, DPW 14A, DPW 14B.

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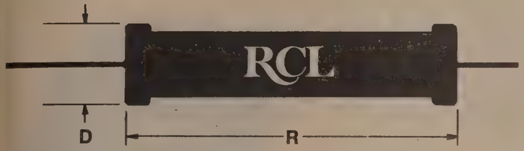
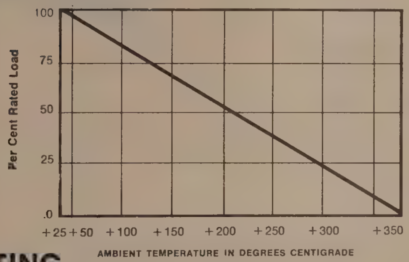
"black jack" vitreous enamel axial lead wire-wound resistors





DERATING

Wattage ratings are based on 25°C Free Air Rating. For higher ambient temperatures, use derating chart.

- Extremely rugged vitreous construction for military and aerospace circuit applications.
- Meets or exceeds MIL-R-26 specifications.
- Special RCL rugged conformal coating protects against extreme humidity and temperature cycling.
- All-welded construction.
- Ideal for machine insertion.

Standard tolerance ±5% in wattage ratings of 1, 2, 3, 5, 6, 7, and 11 watts. Dielectric breakdown voltage is 1 KV (500 V for 1 W types), T.C. 0 ±30 PPM/°C (typ.).

MECHANICAL

☐ **Terminal Strength:** Meets or exceeds MIL-R-26.

ELECTRICAL

☐ **Tolerance:** ±5% std.; ±1% to ±10% available.
☐ **Temperature Coefficient:** 0 ±30ppm/°C typical for 10Ω or greater.
☐ **Dielectric Withstanding Voltage:** 1 KV (500 V for 1 W types). Overload, Short Time: 10X rated wattage for 5 sec. (5 W size & larger); 5X rated wattage for 5 sec. (under 5 W).
☐ **Wattage:** See Table.
☐ **Inductance:** Varies with no. of turns and wire size. Std. units have single layer winding. Non-inductive (Aryton-Perry) windings available.

MATERIALS

☐ **Core:** Ceramic, resistant to thermal shock and wide variations in temperature.
☐ **Resistance Element:** High grade resistance alloy wire, single layer winding. Leads and resistance element welded to metal end caps.
☐ **Coating:** Consistent, uniform, high performance black vitreous enamel.
☐ **Leads:** Solder coated.

SERIES V

RCL STYLE	WATTAGE RATING	MAX. RESISTANCE	DIMENSIONS IN INCHES		LEAD DIAM.* AWG (1¼" Min. Lead Length)	DIMENSIONS IN MM.		LEAD (38.1MM)
			MAX. LENGTH (R)	MAX. DIAM. (D)		MAX. LENGTH (R)	MAX. DIAM. (D)	
V1	1	2.5K	.406	.156	#22	10.3	4	0.65
V2	2	3.9K	.406	.219	#20	10.3	5.6	0.8
V3	3	10K	.562	.250	#20	14.3	6.4	0.8
V5	5	30K	1.000	.250	#20	25.4	6.4	0.8
V6	6	35K	1.031	.343	#20	26.2	8.7	0.8
V7	7	40K	1.250	.343	#20	31.8	8.7	0.8
V11	11	60K	1.938	.343	#20	49.2	8.7	0.8

SERIES VT

RCL STYLE	WATTAGE RATING	MIL-R-26 SIZE EQUIVALENT (REF. ONLY)	MAX. RESISTANCE	MAX. DIMENSIONS IN INCHES		LEAD DIAM.* AWG (1¼" Min. Lead Length)	MAX. DIMENSIONS IN MM.		LEAD DIAM. (MM)
				DIAM.	LENGTH		DIAM.	LENGTH	
VT1A	1.5	RW70	8K	.125	.500	#24	3.17	12.7	0.5
VT2	2.0	—	8K	.187	.425	#20	4.8	10.8	0.8
VT2A	2.5	RW69	18K	.218	.600	#20	5.5	15.2	0.8
VT2B-79	3.0	RW79	20K	.218	.650	#20	5.5	16.6	0.8
VT2C	3.5	—	30K	.281	.600	#18	7.14	15.2	1.0
VT3	4.0	—	35K	.281	.750	#18	7.14	19.04	1.0
VT5	5.0	RW74	75K	.344	1.000	#18	8.7	25.4	1.0
VT6	7.0	RW67	80K	.344	1.150	#18	8.7	29	1.0
VT7	9.0	—	90K	.344	1.300	#18	8.7	32	1.0
VT10	12.0	RW78	125K	.406	2.000	#18	10.3	50.8	1.0

* Other Sizes Available

For Other Sizes and Wattage Ratings Consult Factory

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special products

RCL engineers have designed and produced thousands of unique products to meet special customer applications. Shown are a few typical examples. RCL has an application engineering group directed toward solving and producing unusual products to fit custom requirements. Our capabilities include extended resistance ranges, extremely low reactance, low thermal EMF and special configuration.

computer resistors

High-density power resistors specifically designed to meet demanding space requirements. Ideal for memory termination. Isolates line drive impulses and terminates lines. RCL engineers can meet all design requirements by adapting nearly any type of configuration. Particularly suited to very low resistance requirements for interface with integrated circuitry.

POWER RATING: 23 WATTS WHEN MOUNTED ON HEAT SINK MAINTAINED AT 75°C.

Resistance Range: From .01Ω to 100Ω.

Tolerances: 5% standard. Closer tolerances available. Consult factory.

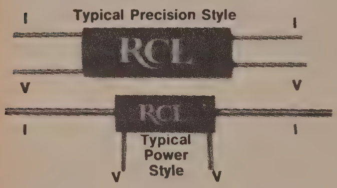
Dimensions: .5 x .5 x .062. (Millimeters: 12.7 x 12.7 x 1.6)

T.C.: ±100 PPM/°C. Closer tolerances available on request.

Terminals: Wire leads.

Max. Temp.: (on open side) 125°C.

4-terminal resistors

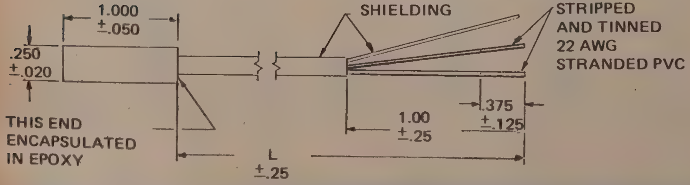


RCL manufactures 4-Terminal Resistor assemblies in both precision and power styles. They are used in current sensing circuits primarily with low resistance values to minimize the effects of lead resistance and lead temperature coefficient. This unique construction is essential for tight tolerance low value resistors where lead material characteristics are critical.

To order, specify "4-Terminal Construction" with any RCL Resistor Series 7000 (Precision Styles) or Series "T" (Power Styles).

Consult factory for application details or special packaging configurations.

molded temperature compensators


1.000
±.050
.250
±.020
SHIELDING
STRIPPED AND TINNED 22 AWG STRANDED PVC
THIS END ENCAPSULATED IN EPOXY
1.00
±.25
.375
±.125
L
±.25

RCL offers a standard line of epoxy encapsulated sensing resistors for temperature compensating applications. The standard resistance tolerance ±5% with tighter tolerances available on special order. Cable lengths from 2.0″ to 48.0″ are available, with 6.0″ standard. Operating temperature range is −55°C to +125°C. Repeatability of tempco within a given lot is ±100PPM.

RCL STYLE	RESISTANCE RANGE	PPM/°C AVERAGE TEMPCO 0°C - 100°C
TC35	10Ω - 50KΩ	3500±350
TC45	10Ω - 10KΩ	4500±450
TC55	10Ω - 5KΩ	5500±550

PRECISION WIREWOUND RESISTORS

Shallco

SHALLCO, INC. HWY. 301 SOUTH P.O. BOX 1089
SMITHFIELD, N.C. 27577 TEL. (919) 934-3135 TWX 510-939-1455

AXIAL LEAD SUBMINIATURE SERIES

SHALLCO Style	Dimensions			Wattage (Commercial)	Minimum Tolerance	Maximum Resistance	Maximum Voltage
	D	L	AWG				
SM04	.090	.150	26	.04	.1%	40K	50
SM05	.125	.150	24	.05	.1%	80K	50
SM-1	.080	.210	26	.04	.1%	60K	50
SM-2	.100	.210	24	.06	.1%	100K	50
SM-3	.125	.260	24	.08	.05%	250K	100
SM-4	.125	.375	24	.10	.05%	600K	100
SM-5	.187	.250	22	.125	.01%	500K	100
SM-6	.187	.295	22	.13	.01%	600K	100
SM-12	.187	.450	22	.20	.01%	900K	150
SM-15	.187	.375	22	.15	.01%	700K	100
SM-26	.160	.500	22	.10	.05%	500K	150
SM-30	.140	.490	24	.10	.05%	400K	100

AXIAL LEAD STANDARD SERIES

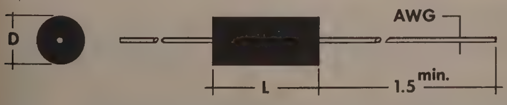
SHALLCO Style	Dimensions			Wattage		Minimum Tolerance	Maximum Resistance	Maximum Voltage
	D	L	AWG	COM	MIL			
100	.250	.343	20	.20	—	.01%	1.8M	300
101	.250	.500	20	.33	.15	↑	2M	400
102	.250	.750	20	.50	.25		3M	400
103	.375	.885	20	.60	—		5M	400
104	.500	.500	20	.60	—		5M	400
106	.500	1.00	20	1.25	.75	ABOVE 100 OHMS	10M	800
107	.500	1.50	20	1.5	1.0		12M	900
108	.500	2.00	20	2.0	1.25		15M	1000
112	.250	1.00	22	.75	—		3M	800
120	.375	.500	20	.50	—		5M	300
121	.375	.750	20	.60	.33	↓	5M	400
129	.375	1.00	20	1.00	.50	.01%	6.5M	800

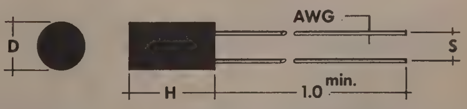
PRINTED CIRCUIT SERIES

SHALLCO Style	Dimensions				Wattage (Commercial)	Minimum Tolerance	Maximum Resistance	Maximum Voltage
	D	H	S	AWG				
100PC	.250	.375	.150	22	.25	.01%	500K	100
101PC	.250	.500	.150	22	.25	.01%	750K	150
104PC	.500	.500	.300	20	.50	.01%	2M	400
105PC	.500	.625	.300	20	.60	.01%	3M	400
120PC	.375	.500	.200	20	.50	.01%	1.1M	300
129PC	.375	1.00	.200	20	.60	.01%	2M	400
130PC	.250	.312	.150	22	.25	.05%	450K	150
131PC	.250	.312	.200	22	.25	.05%	450K	150
161PC	.250	.437	.150	22	.20	.01%	700K	150
164PC	.250	.500	.200	22	.25	.01%	750K	150

FAST RISETIME SERIES (AXIAL)

SHALLCO Style	Dimensions			Wattage (Commercial)	Minimum Tolerance	Maximum Resistance	Maximum Voltage
	D	L	AWG				
FSM-3	.125	.260	24	.05	.01%	175K	100
FSM-5	.185	.250	22	.12	↑	200K	100
FSM-6	.185	.295	22	.13		200K	100
FSM-15	.185	.375	22	.15		700K	100
F101	.250	.500	22	.25	ABOVE 100 OHMS	1M	150
F102	.250	.750	22	.30		1.5M	300
F103	.375	.885	20	.50		2M	400
F104	.500	.500	20	.50		3M	400
F106	.500	.625	20	1.0	↓	4M	400
F108	.500	2.00	20	2.0	.01%	10M	1000





REQUEST CATALOG 300 FOR COMPLETE LISTING OF RESISTANCE PRODUCTS

Versatile OHMIC CAPABILITY:

resistors, inc.

CUSTOM DESIGNING,
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5226 West 26th Street, Chicago, Illinois 60650
Area Code: 312 OLympic 2-7555

Demonstrated Consistently Over Three Decades Of Buyer Preference In Wirewound Resistors

AXIAL LEAD

No.	Watts	Resistance Min. Max.	Dimensions O.D. x Lgth.
3 AX	3	0.1- 10,000	¼ max. x 9/16
5 AX	5	0.1- 30,000	11/32 max. x 1 1/16
10 AX	10	0.1- 50,000	13/32 max. x 1 5/16

MIL-R-26 AXIAL LEAD

No.	Watts	Resistance Min. Max.	Dimensions O.D. x Lgth.
RW67V	6.5	0.10- 3,600	11/32 x 1 1/16
RW68V	11	0.10- 8,200	13/32 x 1 5/16
RW69V	3	0.10- 910	¼ x 9/16

Silicone-base coated, moisture-resistant.
TC = O ± 20 ppm/°C, 10 ohms and above.
Commercial equivalents available.

FIXED LUG

No.	Wattage	Resistance Min.-Max.	Max. Dimensions O.D. x Lgth.
1 M	5	0.1- 11,000	5/16 x 1
1¾ M	10	0.1- 50,000	5/16 x 1¾
2 E	20	0.25-100,000	7/16 x 2
2 B	25	0.25-100,000	9/16 x 2
4 B	50	0.5-175,000	9/16 x 4
6½ C	100	1.0-300,000	¾ x 6½
8½ R	160	1.0-300,000	1⅛ x 8½
10½ R	200	1.0-400,000	1⅛ x 10½

MIL-R-26 FIXED LUG

No.	Wattage	Resistance Min.-Max.	Max. Dimensions O.D. x Lgth.
RW29V	11	0.10- 5,600	7/16 x 1¾
RW30V	11	0.10- 2,700	9/16 x 1
RW31V	14	0.10- 6,800	9/16 x 1½
RW32V	17	0.10-10,000	9/16 x 2
RW33V	26	0.10-18,000	9/16 x 3
RW35V	55	0.10-43,000	29/32 x 4

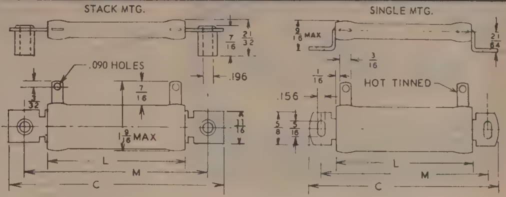
ADJUSTABLE

No.	Wattage	Resistance Min.-Max.	Max. Dimensions O.D. x Lgth.
1¾ MA	10	1.0- 10,000	5/16 x 1¾
2 BA	25	1.0- 25,000	9/16 x 2
4 BA	50	1.0-100,000	9/16 x 4
6 BA	75	1.0-100,000	9/16 x 6
6½ CA	100	1.0-100,000	¾ x 6½
8½ RA	160	1.0-100,000	1⅛ x 8½
10½ RA	200	1.0-100,000	1⅛ x 10½

MIL-R-19365 ADJUSTABLE

No.	Wattage	Resistance Min.-Max.	Max. Dimensions O.D. x Lgth.
RX29V	11	1- 470	7/16 x 1¾
RX32V	17	1- 910	9/16 x 2
RX33V	26	1-1,500	9/16 x 3
RX35V	55	1-3,600	29/32 x 4

FLAT OVAL



Watts* Free Air	Core—L	Min. Ohms	Max. Ohms	Mounting	C	M
30	1¼	0.1	10K	Single Stack	2⅛ 2½	1¾ 2
40	2	0.2	30K	Single Stack	2⅞ 3¼	2½ 2¾
55	3½	0.3	60K	Single Stack	4⅜ 4¾	4 4¼
65	4¾	0.4	85K	Single Stack	5⅝ 6	5¼ 5½
75	6	0.5	100K	Single Stack	6⅞ 7¼	6½ 6¾

MINIATURE, FLAT OVAL

Construction similar to above large size resistors.

WATTS* Free Air	Min. Ohms	Max. Ohms
10	1.0	15 K
15	1.0	25 K
20	1.0	50 K

Write for Bulletin RMF 5.0/1068

*Ratings of large and miniature, flat oval resistors based on mounting on steel panel 10″ x 10″ x .040″. When mounted on non-metallic surface, reduce wattage approximately 15%.

RIBBON-WOUND RESISTORS

Watts	Core Size D	Core Size L	Ohms Min. Res.	Ohms Max. Res.	Watts	Core Size D	Core Size L	Ohms Min. Res.	Ohms Max. Res.
400	1⅛	11¼	0.24	18.00	135	¾	5	0.06	4.25
375	1⅛	10½	0.22	16.50	105	¾	4	0.04	3.00
300	1⅛	8½	0.17	13.00	100	¾	3½	0.03	2.40
240	1⅛	6½	0.11	8.20	135	9/16	6	0.06	5.50
185	1⅛	5	0.09	6.40	105	9/16	5	0.05	3.65
180	¾	6½	0.08	6.00	90	9/16	4	0.04	2.75

Available with adjustable tap bands or with tapped windings.

NON-INDUCTIVE RESISTORS: for high frequency power circuits. Available in all fixed-lug types, 10 watts and larger. Standard tolerances: ±10%.

RESISTANCE TOLERANCES: Standard: ±5%, 1.0 ohm and over. Special: down to ±1%.

Write For Complete Catalog

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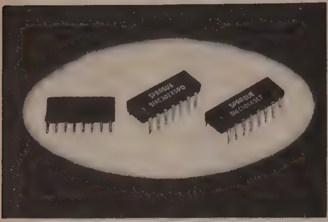
SPRAGUE RESISTORS

METANET® PRECISION RESISTOR NETWORKS

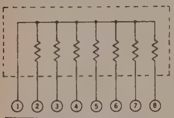


216C **914C** **916C**

- Designed for use in signal and data processing applications where repetitive resistance values and patterns are required.
- Cut package count, reduce equipment size, minimize costs.
- Up to 28 metal-film resistors on single ceramic base.
- High packaging density – Fewer components to stock, handle, inspect, install.
- Standard resistance tolerance, ±2%.†
- Typical temp. coefficient, with 250 ppm/°C. Tracking between resistors, ±50 ppm/°C.
- Type 216C has single in-line configuration for vertical installation on high-density boards. Continuous total power dissipation is 1.5W at +25 C. Derating is linear to +150 C.
- Types 914C and 916C have dual in-line packages compatible with ICs. Continuous power dissipation at 25 C is 3W and 3.5W, respectively. Derating is linear to +150 C.
- Cat. No. Series ending in PE and SR available to 500KΩ on special order.
- For data on Type 216C, see Bulletin 7041. For data on 941C/916C, see Bulletin 7042.

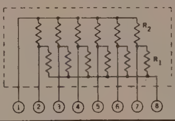
TYPE 216C SINGLE IN-LINE PACKAGE

INDIVIDUAL TERMINATING, PULL-UP/PULL-DOWN, INTERFACE NETWORKS



R(Ω)	Cat. No.*	R(Ω)	Cat. No.*
50	216CH500X2LT	1000	216CH102X2PD
100	216CH101X2LT	2000	216CH202X2PD
200	216CH201X2PD	3000	216CH302X2PD
500	216CH501X2PD	4000	216CH402X2PD
		5000	216CH502X2PD

DUAL TERMINATING NETWORKS



$R_1(\Omega)$	$R_2(\Omega)$	Cat. No.*
50	200	216CH400X2TR
90	660	216CH800X2TR
220	330	216CH131X2TR
330	390	216CH181X2TR
330	470	216CH191X2TR
390	500	216CH221X2TR

*This is current Cat. No. and is identical to original Cat. No. except for letter H immediately after Type No.

TYPE 914C, 916C DUAL IN-LINE PACKAGE

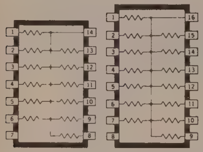


FIG. 1

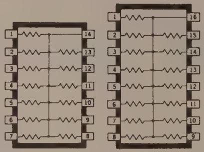


FIG. 2

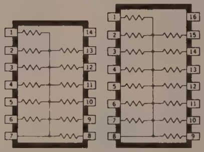


FIG. 3

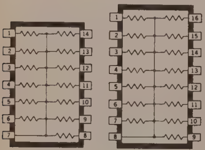


FIG. 4

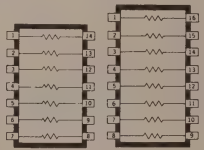


FIG. 5

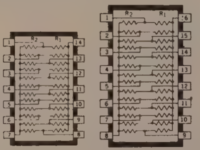


FIG. 6

PULL-UP/PULL-DOWN AND INTERFACE NETWORKS

Fig.	R(Ω)	Catalog Number 14-pin	Catalog Number 16-pin
1	200	914C201X2PD	916C201X2PD
1	500	914C501X2PD	916C501X2PD
1	1000	914C102X2PD	916C102X2PD
1	2000	914C202X2PD	916C202X2PD
1	3000	914C302X2PD	916C302X2PD
1	4000	914C402X2PD	916C402X2PD
1	5000	914C502X2PD	916C502X2PD
2	68	914C680X2PE	916C680X2PE
2	100	914C101X2PE	916C101X2PE
2	150	914C151X2PE	916C151X2PE
2	200	914C201X2PE	916C201X2PE
2	220	914C221X2PE	916C221X2PE
2	330	914C331X2PE	916C331X2PE
2	470	914C471X2PE	916C471X2PE
2	500	914C501X2PE	916C501X2PE
2	680	914C681X2PE	916C681X2PE
1	1000	914C102X2PE	916C102X2PE
2	1500	914C152X2PE	916C152X2PE
2	2000	914C202X2PE	916C202X2PE
2	2200	914C222X2PE	916C222X2PE
2	3300	914C332X2PE	916C332X2PE
2	4700	914C472X2PE	916C472X2PE
2	5600	914C562X2PE	916C562X2PE
2	6000	914C602X2PE	916C602X2PE
2	6800	914C682X2PE	916C682X2PE
2	10000	914C103X2PE	916C103X2PE
2	15000	914C153X2PE	916C153X2PE
2	22000	914C223X2PE	916C223X2PE
2	33000	914C333X2PE	916C333X2PE
2	47000	914C473X2PE	916C473X2PE
2	68000	914C683X2PE	916C683X2PE
2	100000	914C104X2PE	916C104X2PE

INDIVIDUAL TERMINATING NETWORKS

Fig.	R(Ω)	Catalog Number 14-pin	Catalog Number 16-pin
3	50	914C500X2LT	916C500X2LT
3	100	914C101X2LT	916C101X2LT
3	200	914C201X2LT	916C201X2LT
3	500	914C501X2LT	916C501X2LT
4	50	914C500X2LU	916C500X2LU
4	68	914C680X2LU	916C680X2LU
4	100	914C101X2LU	916C101X2LU
4	200	914C201X2LU	916C201X2LU
4	220	914C221X2LU	916C221X2LU
4	330	914C331X2LU	916C331X2LU
4	470	914C471X2LU	916C471X2LU
4	500	914C501X2LU	916C501X2LU

MULTIPLE ISOLATED RESISTORS

Fig.	R(Ω)	Catalog Number 14-pin	Catalog Number 16-pin
5	50	914C500X2SR	916C5002XSR
5	62	914C620X2SR	916C620X2SR
5	68	914C680X2SR	916C680X2SR
5	100	914C101X2SR	916C101X2SR
5	150	914C151X2SR	916C151X2SR
5	200	914C201X2SR	916C201X2SR
5	220	914C221X2SR	916C221X2SR
5	330	914C331X2SR	916C331X2SR
5	470	914C471X2SR	916C471X2SR
5	500	914C501X2SR	916C501X2SR
5	680	914C681X2SR	916C681X2SR
5	1000	914C102X2SR	916C102X2SR
5	1500	914C152X2SR	916C152X2SR
5	2000	914C202X2SR	916C202X2SR
5	2200	914C222X2SR	916C222X2SR
5	3300	914C332X2SR	916C332X2SR
5	4700	914C472X2SR	914C472X2SR
5	6800	914C682X2SR	916C682X2SR
5	10000	914C103X2SR	916C103X2SR
5	15000	914C153X2SR	916C153X2SR
5	22000	914C223X2SR	916C223X2SR
5	33000	914C333X2SR	916C333X2SR
5	47000	914C473X2SR	916C473X2SR
5	68000	914C683X2SR	916C683X2SR
5	100000	914C104X2SR	916C104X2SR

DUAL TERMINATING NETWORKS

Fig.	R_1 (Ω)	R_2 (Ω)	Catalog Number 14-pin	Catalog Number 16-pin
6	50	200	914C400X2TR	916C400X2TR
6	90	660	914C800X2TR	916C800X2TR
6	220	330	914C131X2TR	916C131X2TR
6	243	390	914C151X2TRA	916C151X2TRA
6	250	375	914C151X2TR	916C151X5TR
6	330	470	914C191X2TR	916C191X2TR
6	330	390	914C181X2TR	916C181X2TR
6	330	680	914C221X2TRA	916C221X2TRA
6	390	500	914C221X2TR	916C221X2TR

†All standard resistor networks shown with ±2% resistance tolerance. For ±5% tolerance (available at lower cost), change "2" to "5" after "X" in catalog number.

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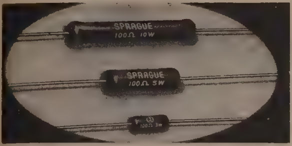
IND-EEM-61-EFAI

SPRAGUE RESISTORS

BLUE JACKET® VITREOUS-ENAMEL WIREWOUND RESISTORS



- Matched Coefficient of Expansion Allows Uniform Expansion of Vitreous Enamel Coating, Ceramic Base, and End Caps, Eliminating Crazing, Cracks, and Protects From Fumes and Humidity
- Standard Resistance Tolerance: ±5%
- Improved Minified Resistors Designed for Thorough Reliability and Stability Under Extreme Operating Conditions
- Windings and Leads Welded to End-Caps for Superior Mechanical Strength
- Fractional-Ohm Values Down to 0.10 Available on Special Order

	CATALOG NUMBER					
Ohms	239E 1 WATT 1/8" x 3/8"	240E 2 WATTS 3/16" x 3/8"	242E 3 WATTS 13/64" x 17/32"	243E 5 WATTS 13/64" x 15/16"	244E* 7 WATTS 5/16" x 1"	247E 10 WATTS 5/16" x 1 3/4"
1	239E1R05	240E1R05	242E1R05	243E1R05*	244E1R05	247E1R05
1.2	239E1R25	—	—	—	—	—
1.5	239E1R55	240E1R55*	242E1R55	243E1R55	244E1R55*	247E1R55
1.8	239E1R85	—	—	—	—	—
2	239E2R05	240E2R05	242E2R05	243E2R05	244E2R05*	247E2R05
2.2	239E2R25	—	—	—	—	—
2.7	239E2R27	—	—	—	—	—
3	239E3R05	240E3R05	242E3R05	243E3R05	244E3R05*	247E3R05
3.3	239E3R35	—	—	—	—	—
3.9	239E3R95	—	—	—	—	—
4	239E4R05	240E4R05	242E4R05	243E4R05	244E4R05*	247E4R05
4.7	239E4R75	—	—	—	—	—
5	239E5R05	240E5R05	242E5R05	243E5R05	244E5R05*	247E5R05
5.6	239E5R65	—	—	—	—	—
6.8	239E6R85	—	—	—	—	—
7.5	239E7R55	240E7R55	242E7R55	243E7R55	244E7R55*	247E7R55
8.2	239E8R25*	—	—	—	—	—
10	239E1005	240E1005	242E1005	243E1005	244E1005*	247E1005
12	239E1205	240E1205	242E1205	243E1205	244E1205*	247E1205
15	239E1505	240E1505	242E1505	243E1505	244E1505*	247E1505
18	239E1805	240E1805*	242E1805	—	—	—
20	239E2005	240E2005	242E2005	243E2005	244E2005*	247E2005
22	239E2205	240E2205	242E2205	—	—	—
25	239E2505*	240E2505	242E2505	243E2505	244E2505*	247E2505
27	239E2705*	240E2705	242E2705	—	—	—
30	239E3005	240E3005	242E3005	243E3005	244E3005*	247E3005
33	239E3305	240E3305*	242E3305	—	—	—
35	—	—	—	243E3505	244E3505*	247E3505
39	239E3905*	240E3905	242E3905	—	—	—
40	239E4005*	240E4005*	242E4005	243E4005	244E4005*	247E4005
47	239E4705*	240E4705	242E4705	—	—	—
50	239E5005	240E5005*	242E5005	243E5005	244E5005*	247E5005
56	239E5605	240E5605*	242E5605	—	—	—
68	239E6805	240E6805	242E6805	—	—	—
75	239E7505	240E7505*	242E7505	243E7505	244E7505*	247E7505
82	239E8205	240E8205*	242E8205	—	—	—
100	239E1015	240E1015	242E1015	243E1015	244E1015*	247E1015
120	239E1215	240E1215	242E1215	244E1215	244E1215*	247E1215
150	239E1515	240E1515	242E1515	243E1515	244E1515*	247E1515
180	239E1815	240E1815	242E1815	—	—	—
200	239E2015	240E2015	242E2015	243E2015	244E2015*	247E2015
220	239E2215	240E2215	242E2215	243E2215	244E2215*	247E2215
250	239E2515	240E2515	242E2515	243E2515	244E2515*	247E2515
270	239E2715	240E2715	242E2715	—	—	—
300	239E3015	240E3015	242E3015	243E3015	244E3015*	247E3015
330	239E3315	240E3315	242E3315	—	—	—
350	—	—	—	243E3515	244E3515*	247E3515
390	239E3915	240E3915*	242E3915	—	—	—
400	239E4015*	240E4015*	242E4015	243E4015	244E4015*	247E4015
450	—	—	—	243E4515	—	—
470	239E4715	240E4715	242E4715	—	—	—
500	239E5015	240E5015	242E5015	243E5015	244E5015*	247E5015
560	239E5615	240E5615*	242E5615	—	—	—
600	239E6015	240E6015*	242E6015	243E6015	244E6015*	247E6015
680	239E6815*	240E6815*	242E6815	—	—	—
700	239E7015	240E7015	242E7015	243E7015	244E7015*	247E7015
750	—	—	—	243E7515	244E7515*	247E7515
800	239E8015	240E8015*	242E8015	243E8015	244E8015*	247E8015
820	239E8215	240E8215	242E8215	—	—	—
900	239E9015*	240E9015*	242E9015	243E9015	244E9015*	247E9015
1000	239E1025	240E1025	242E1025	243E1025	244E1025*	247E1025
1100	—	—	—	243E1125	244E1125*	247E1125
1200	239E1225	240E1225	242E1225	243E1225	244E1225*	247E1225
1400	239E1425*	240E1425*	242E1425*	243E1425	244E1425*	247E1425
1500	239E1525	240E1525	242E1525	243E1525	244E1525*	247E1525
1800	239E1825*	240E1825*	242E1825	243E1825	244E1825*	247E1825
2000	239E2025	240E2025	242E2025	243E2025	244E2025*	247E2025
2200	239E2225	240E2225	242E2225	243E2225	244E2225*	247E2225
2500	239E2525	240E2525*	242E2525	243E2525	244E2525*	247E2525
2700	—	240E2725*	242E2725	—	—	—
3000	—	240E3025*	242E3025	243E3025	244E3025*	247E3025
3300	—	240E3325*	242E3325	—	244E3325*	247E3325
3500	—	240E3525*	—	243E3525	244E3525*	247E3525
3900	—	240E3925*	242E3925	—	244E3925*	247E3925*
4000	—	—	242E4025	243E4025	244E4025*	247E4025
4200	—	—	—	—	244E4225*	—
4500	—	—	—	243E4525	244E4525*	247E4525
4700	—	—	242E4725	—	—	—
5000	—	—	242E5025	243E5025	244E5025*	247E5025
5600	—	—	242E5625	—	—	—
6000	—	—	242E6025	243E6025	244E6025*	247E6025
6800	—	—	242E6825	—	—	—
7000	—	—	—	243E7025	244E7025*	247E7025
7500	—	—	242E7525	243E7525	244E7525*	247E7525
8000	—	—	242E8025	243E8025	244E8025*	247E8025
8200	—	—	242E8225	—	—	—
9000	—	—	242E9025	243E9025	244E9025*	247E9025*
10000	—	—	242E1035	243E1035	244E1035*	247E1035
11000	—	—	—	—	244E1135*	247E1135*
12000	—	—	—	243E1235	244E1235*	247E1235
14000	—	—	—	243E1435	244E1435*	247E1435*
15000	—	—	—	243E1535	244E1535*	247E1535
16000	—	—	—	—	244E1635*	247E1635*
17000	—	—	—	—	244E1735*	—
18000	—	—	—	243E1835	244E1835*	247E1835
20000	—	—	—	243E2035	244E2035*	247E2035
22000	—	—	—	243E2235	244E2235*	247E2235
25000	—	—	—	243E2535	244E2535*	247E2535
30000	—	—	—	243E3035	244E3035*	247E3035
35000	—	—	—	—	244E3535*	247E3535*
40000	—	—	—	—	244E4035*	247E4035
45000	—	—	—	—	—	247E4535*
50000	—	—	—	—	—	247E5035
55000	—	—	—	—	—	247E5535*

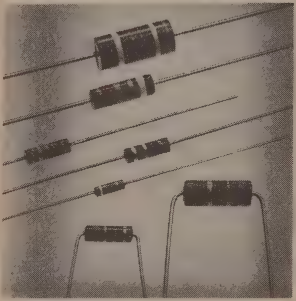
*Available until present stocks are exhausted.

EEM-58-EIAF

TRW® IRC RESISTORS

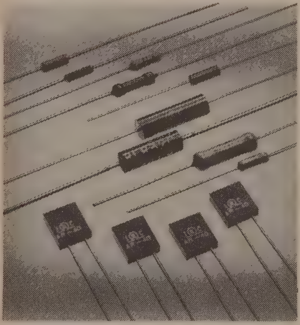
You get exactly the resistor you need for your application.

No compromises. No "favorites." Just quality.



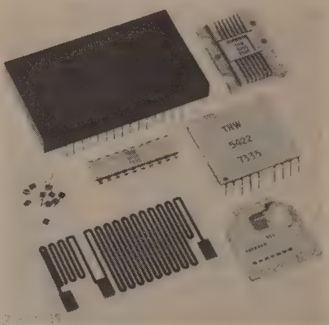
Carbon comp.

Billions used in consumer, industrial, military applications. TRW/IRC carbon comp. capability ranges from standard commercial types through established reliability RCR's, to ultra-high range (10^{11} ohms). Where you're using carbon comp.'s in automated assembly, TRW/IRC packaging options can help cut the cost of interfacing with your machines. Card packs, lead tape reels, cut and formed leads…we'll be glad to explore the potential economies with you.



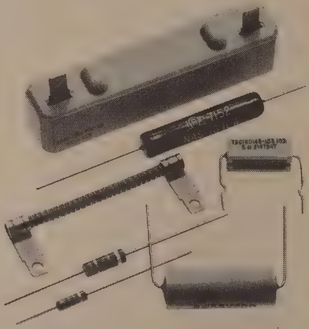
Metal Film

TRW/IRC has brought the state of the art in thin-film to a performance level equaling high-stability wirewounds. Capabilities include resistors with tolerances to ± 0.01% and ± 3 PPM T.C. …high-rel units… precision subminiatures…and, of course the popular RN's. You can also look at alloy films offering high-temperature and high-voltage capability at low cost.



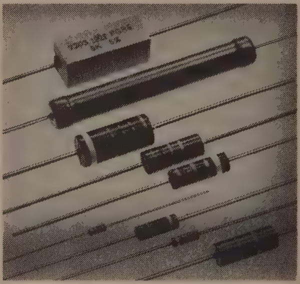
Resistive Networks

Advanced resistor technology here. These IC compatible, precision tantalum-film circuits provide inherent low noise, excellent stability, and hermetic performance without hermetic cost. Tolerances from 5% to 0.05% available in custom designs.
TRW/IRC also offers the industry's most complete line of discrete fixed resistors.



Wirewound

The line starts with molded wirewound resistors—"space-savers" that bridge the cost-performance gap between composition resistors and precision wirewounds.
It proceeds to standard, non-insulated types for appliance/automotive use…to precision subminiatures offering high power density… to low cost fusible, flameproof units for consumer and industrial applications… to tubular and flat power wirewounds with ratings to 250 W.



Metal Glaze™

This is TRW/IRC's thick-film technology—for all types of low power resistor applications. Metal Glaze is widely accepted for its built-in power handling reliability, resistance range, and cost effectiveness. Numerous standard and special designs—precision, semi-precision, flameproof, high-rel, high-voltage.

All types…all technologies…
one source

To wrap it up, TRW/IRC offers you the most complete line of fixed resistors in the business, with many of the popular types available from one source—your local TRW/IRC distributor. Having a direct pipeline to each of our plants, he can give you fast delivery.

Contact your local TRW *sales office* for application assistance, custom designs, and special engineering help when you need it. TRW/IRC Resistors, an Electronic Components Division of TRW, Inc. Plants at Boone, N.C., Burlington, Iowa, and Philadelphia, Pa. Write TRW/IRC Resistors, 401 N. Broad St., Philadelphia, Pa. 19108. Or call (215) 923-8230.

TRW/IRC RESISTORS, AN ELECTRONIC COMPONENTS DIVISION OF TRW INC., 401 N. BROAD ST., PHILADELPHIA, PA. 19108 (215) 922-8900

TRW® IRC RESISTORS

TRW/IRC RESISTORS

On the shelf... When you want them. Where you want them.

The TRW/IRC resistors listed in the table below are those usually carried in stock by our distributors. They're the resistors you're most likely to need, or at least, need in a hurry. When you do, chances are your nearby TRW/IRC distributor can fill your order from his shelves. Other parts and styles are available as well, although not always from stock. Ask your distributor, he'll be happy to discuss your special local stock needs with you.

GENERAL PURPOSE RESISTOR

Carbon Composition MIL-R-39008

- RCR07—¼ w
- RCR20—½ w
- RCR32—1 w

Molded Wirewound

- BWH—2w
- BW-20—1 w

RN GENERAL PURPOSE SEMI PRECISION AND PRECISION METAL GLAZE™ RESISTORS

MIL-R-22684 Type RL

- RL07—RG07
- RL20—RG20
- RL32—RG32
- RL42—RG42

MIL-R-10509 Type RN

- RN55D—T0-55
- RN60D—T0-60
- RN65D—T0-65
- RN55C—T2-55
- RN60C—T2-60
- RN65C—T2-65

MIL-R-39017 Type RLR

- RLR07—RGR07
- RLR20—RGR20
- RLR32—RGR32
- RLR42—RGR42

MIL-R-11 Style Equivalents

- RC05—RG-⅛
- RC07—RG-¼

M & C SERIES HIGH STABILITY METAL FILM RESISTORS

MIL-R-10509 Style

- CCA-T0 (RN60D)
- CCA-T2 (RN60C)
- CCB-T0 (RN65D)
- CCB-T2 (RN65C)
- CEA-T0 (RN55D)
- CEA-T2 (RN55C)
- CEC-T0
- CEC-T2
- MMC-T0 (RN50D)
- MMC-T2 (RN50C)

Established Reliability— Metal Film Resistors MIL-R-55182

- RNC/RNR50K
- RNC/RNR50H
- RNC/RNR55K
- RNC/RNR55H
- RNC/RNR60K
- RNC/RNR60H
- RNC/RNR65K
- RNC/RNR65H

DISTRIBUTOR OPERATION, TRW/IRC RESISTORS, AN ELECTRONIC COMPONENTS DIVISION OF TRW, INC.,
401 N. BROAD ST., PHILA., PA. 19108 (215) 923-8230

TRW® IRC RESISTORS

GENERAL PURPOSE MOLDED CARBON COMPOSITION RESISTORS (RC & RCR)

Performance advantages include **strong** lead assemblies. TRW's ribbed shoulder leads are **deeply** imbedded in the molding, defy twisting or pull-out.

TRW leads feature a uniform surface—thanks to an exclusive alloy electroplating process (no hot dipping). You'll find no lumps or voids to degrade solderability.

Moisture protection is another TRW feature. With the element thermally bonded to glass body and embedded in TRW's Selectrez™ mold jacket, you get a more than 50% boost in moisture protection.

TRW carbon comp.'s also offer outstanding high-temperature characteristics. This results from the resistance element's being bonded to the glass substrate at 500°C, plus the internal heat-sinking action of the talon lead construction.

Altogether, these features—plus superior high-frequency characteristics (see facing page)—mean a top quality resistor with outstanding reliability.

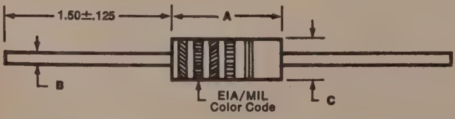
TRW TYPE	GBT-¼	GBT-½	GBT-1
MIL-R-11 Style	RC07	RC20	RC32
MIL-R-39008 Style	RCR07	RCR20	RCR32
MIL-R-39008 Failure Rate Level	S	S	S
Resistance, Standard	2.7 ohms thru 22 Megohms	2.7 ohms thru 22 Megohms	2.7 ohms thru 22 Megohms
Resistance, Special (Non Mil)		24 Megohms thru 100 Gigaohms	—
Tolerances, Standard	±5%, ±10%, ±20%	±5%, ±10%, ±20%	±5%, ±10%, ±20%
Power Rating	¼-watt @ 70°C	½-watt @ 70°C	1-watt @ 70°C
Maximum Continuous Working Voltage	250 Volts	350 Volts	500 Volts
Minimum Insulation Resistance—Dry	10,000 Megohms	10,000 Megohms	10,000 Megohms
Wet	100 Megohms	100 Megohms	100 Megohms
Minimum Dielectric Withstanding Voltage Atmospheric	500 Volts, R.M.S.	700 Volts, R.M.S.	1000 Volts, R.M.S.
Reduced	325 Volts, R.M.S.	450 Volts, R.M.S.	625 Volts, R.M.S.
Shunt Capacitance (Avg.)	0.15 pF	0.175 pF	0.25 pF
Load Life-Typical ΔR Less Than*	±4%	±6%	±6%
Resistance-Temperature Characteristic	Typical ΔR Less Than* From 25°C Reference		

Nominal Resistance (Ohms)	GBT¼		GBT-½		GBT-1	
	@ −55°C	@ +105°C	@ −55°C	@ +105°C	@ −55°C	@ +105°C
1K and Under	±2%	±2%	±4.5%	±2.5%	±5%	±4%
1.1K to 10K	+8%	±3%	+7%	−2.5%	+8%	−4%
11K to 100K	+9%	−4%	+9%	−3.5%	+9%	−4%
110K to 1Meg	+10%	−5%	+10%	−3.5%	+11%	−4%
1.1Meg to 10Meg	+11%	−5%	+11%	−3.5%	+11%	−4%
11Meg to 22Meg	+11%	−5%	+11%	−3.5%	+11%	−4%

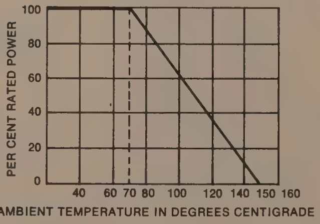
*"Typical ΔR Less than" is defined as the maximum ΔR to be expected in 95% of the population of Δ distribution.

DIMENSIONS

	A	B	C
GBT-¼	.250±.015	.025±.001	.090±.008
GBT-½	.390±.010	.031±.001	.140±.008
GBT-1	.562±.010	.040±.001	.225±.008



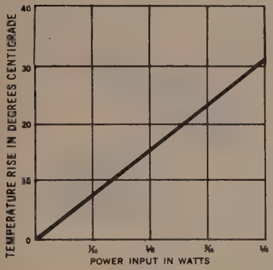
DERATING CURVE TEMPERATURE—POWER



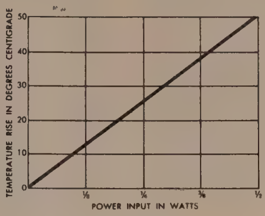
TRW/IRC RESISTORS, AN ELECTRONIC COMPONENTS DIVISION OF TRW INC., 401 N. BROAD ST., PHILADELPHIA, PA. 19108 (215) 922-8900

TRW® IRC RESISTORS

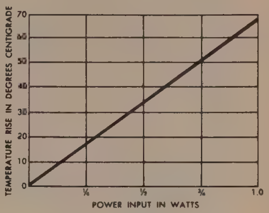
SURFACE TEMPERATURE RISE AT HOT SPOT VS. LOAD



GBT¼



GBT½



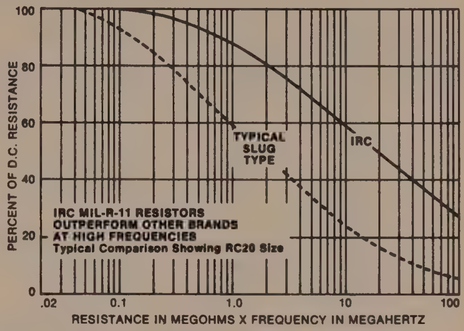
GBT1

Superior high frequency characteristics

The best high frequency characteristics in a fixed composition resistor are achieved when the ratio of cross-sectional area to resistor length is minimized. TRW/IRC's element has the smallest cross section and fewest carbon binder contacts of any carbon composition resistors.

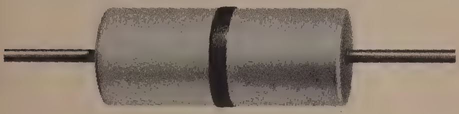
The low mass resistance element assures low shunt capacitance and superior performance at high frequencies. In high frequency equipment, this results in better pulse shaping with less broadening and truncation and faster response.

TRW/IRC resistors significantly outperform other brands, as shown on the chart.



IRC MIL-R-11 RESISTORS OUTPERFORM OTHER BRANDS AT HIGH FREQUENCIES
Typical Comparison Showing RC20 Size

ZEROHM Molded Jumper Wires



Molded jumper wires or crossovers, as they are sometimes called, are basically interconnection devices between points on a P.C. Board.

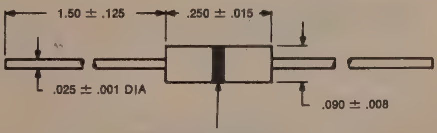
Generally they are used for the following reasons:

- —Inability to connect two points on a P.C. Board due to other circuit paths which must be crossed over.
- —An after-the-fact design change that requires new point connections.
- —Circuit tuning by changing point connections.

TRW's molded jumper wires offer a quick simple solution to these problems. They are especially suited for automatic machine insertion on lead tape or available in all packaging styles including pre-cut and formed for manual insertion.

SPECIFICATIONS

Maximum resistance	0.01 Ω
Lead material	30/70 tin/lead solder-coated copper wire.
Body material	Electrical grade, high performance, molding compound
Min. Insulation resistance—Dry	10,000 meg Ω
Wet	100 meg Ω
Min. Dielectric withstanding voltage	
Atmospheric	500V RMS
Reduced	325V RMS
Insulation flammability	Resistor insulation is self extinguishing within 10 seconds after externally applied flame is removed.



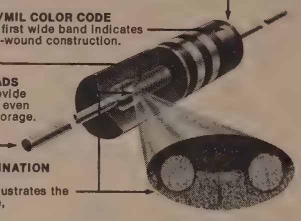
Single black color band denotes zero resistance.

TRW® IRC RESISTORS

GENERAL PURPOSE WIREWOUND MOLDED RESISTORS

Type BW-20 (1 Watt) and BWH (2 Watt)

The TRW/IRC Type BWH bridges the cost-performance gap between composition resistors and premium wirewounds. Its 2 watt rating in 1-watt size lets you replace 2 watt units and save space, or use it in 1 watt space with the advantages of a two-times safety factor and wirewound stability. BW-20s come in six types of packaging to cut assembly costs. They fit ½ watt inserting machines, and can be ordered with a wide variety of cut-and-formed lead configurations.



ALLOY RESISTANCE WIRE
Continuously wound on a fiberglass core for greater uniformity and extremely low inductances.

HEAVY MOLD JACKET
Exclusive phenolic plastic jacket provides superior strength and moisture protection.

EIA/MIL COLOR CODE
The first wide band indicates wire-wound construction.

ELECTROPLATED LEADS
Tin/lead coated to provide excellent solderability even after extended shelf storage.

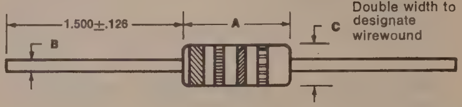
HOT CLAMP TERMINATION
Actual unretouched photomicrograph illustrates the positive termination, inherent stability.

Patent No. 3,319,210

GENERAL PURPOSE WIREWOUND MOLDED RESISTORS

TRW TYPE	BW-20	BWH
EIA RS-344 Style	CRU1	CRU2
MIL-R-11 Style Size Equivalent	RC20	RC32
Resistance, Standard	0.24 Ohms thru 750 Ohms*	0.10 Ohms thru 2400 Ohms*
Tolerance, Standard Special	±5%, ±10% ±2%	±5%, ±10%
Power Rating	1-watt 50°C ½-watt 100°C ¼-watt 125°C, derating to 0 @ 160°C	2-watts @ 70°C 1-watt @ 115°C ½-watt @ 137°C, derating to 0 @ 160°C
Max. Continuous Working Voltage	√ PR	√ PR
Min. Insulation Resistance—Dry	10,000 Megohms	10,000 Megohms
Min. Insulation Resistance—Wet	100 Megohms	100 Megohms
Min. Dielectric Withstanding Voltage Atmospheric Pressure Reduced Pressure	 700 Volts, R.M.S. 450 Volts, R.M.S.	 1000 Volts, R.M.S. 625 Volts, R.M.S.
Hot Spot Temp. Rise at 1-Watt	100°C	115°C
Current Noise	Negligible	Negligible
Marking	Standard EIA/MIL Color Code (double width first band)	Standard EIA/MIL Color Code (double width first band)

*See page 7 for decade values

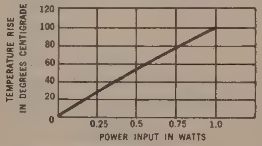


Double width to designate wirewound

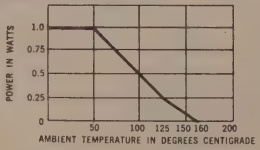
	A	B	C
BW-20	.390 ± .010	.032 ± .001	.140 ± .008
BWH	.562 ± .010	.040 ± .001	.225 ± .008

Typical BW-20 Δ R Less Than** **Load Life (50°C) ±3%**

SURFACE TEMPERATURE RISE AT HOT SPOT VS. LOAD



DERATING CURVE TEMPERATURE—POWER

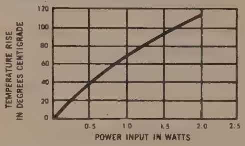


Temperature Coefficient†
0.24 Ohms-0.62 Ohms
0.68 Ohms-750 Ohms

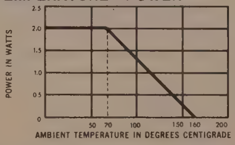
±0.025%/°C
±0.010%/°C
respectively

Typical BWH Δ R Less Than** **Load Life ±5%**

SURFACE TEMPERATURE RISE AT HOT SPOT VS. LOAD



DERATING CURVE TEMPERATURE—POWER



Temperature Coefficient†
0.1 Ohms-0.16 Ohms
0.18 Ohms-0.62 Ohms
0.68 Ohms-2400 Ohms

±0.08%/°C
±0.06%/°C
±0.02%/°C
respectively

**Typical ΔR Less Than is defined as the maximum ΔR to be expected in 95% of the population of a distribution. †Special TC available

TRW® IRC RESISTORS

BWF FLAMEPROOF FUSIBLE WIREWOUND RESISTOR

The BWF is an economical fusible/flameproof resistor designed to handle ½, 1 and 2 watt applications where dependable circuit and equipment protection is essential.

The BWF has predictable overload *Fusing* Characteristics and is *Flameproof* under fault conditions up to 1000X rated power. (1000V maximum).

Rated at 2 watts and physically a 1 watt size, the BWF provides space savings and is suited for lead forming or automatic insertion equipment on reels of 2000 units. Other packaging styles are available.

TRW-BT348 FLAMEPROOF RESISTOR SPECIFICATION HIGHLIGHTS

1. INSTANTANEOUS OVERLOAD

   Overloads from 0 to 15 minutes duration. From 4X to 1000X rated power, (or 1000V, whichever is smaller)
   —No flaming of resistor
   —A paper tissue (Kimwipe #900-S) shall not ignite when resting across or beneath the unit.

2. DYNAMIC OVERLOAD

   Wattage increased at 100% increments of rated power every 2 seconds, (after a 1 minute warmup at rated power).
   —Same as 1 above.

3. CURRENT LIMITING

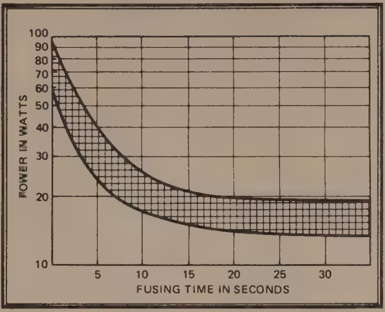
   Overload applied as in 1. Up to 1000X rated power (or 1000V).
   —Current shall limit to less than 1% of the ohms law value.

4. INSULATION FLAMMABILITY

   Resistor insulation is self extinguishing after externally applied flame is removed.
   —Extinguishes within 10 seconds.
   —Smoking is considered acceptable.

● Equiv. to E.I.A. RS-344	CRU2
● Size Equiv. to MIL-R-11	RC32
● Power Rating @ 70°C	2 Watts
● Resistance Range Minimum	0.10Ω
Maximum	100Ω
● Purchase Tolerance	5%, 10%
● Maximum Continuous Voltage	√PR
● Loadlife: 2 watts @ 70°C	Max. ΔR±10%
● Min. Dielectric Strength	
Atmospheric Pressure	1000V RMS
Reduced Pressure	625V RMS
● Min. Insulation Resistance	
Dry	10K MegΩ
Wet	100K MegΩ

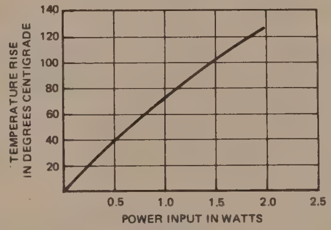
Typical Fusing Characteristics



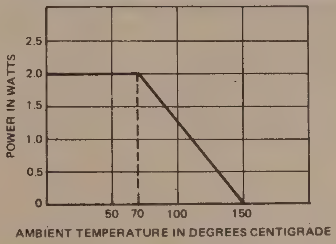
TYPICAL TEMPERATURE COEFFICIENT or ΔR Less Than

0.1Ω — 0.16Ω	+800 PPM/°C	or	+0.08%/°C
0.18Ω — 0.68Ω	+600 PPM/°C	or	+0.06%/°C
0.75Ω — 100Ω	±200 PPM/°C	or	±0.02%/°C

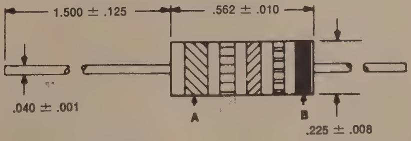
SURFACE TEMPERATURE RISE AT HOT SPOT VS. LOAD



TEMPERATURE CURVE RECOMMENDED POWER DERATING



MARKING AND DIMENSIONS



EIA/MIL COLOR CODE

A = First significant figure is a double width band to designate wirewound

B = Flameproof designator—Blue marking

TRW® IRC RESISTORS

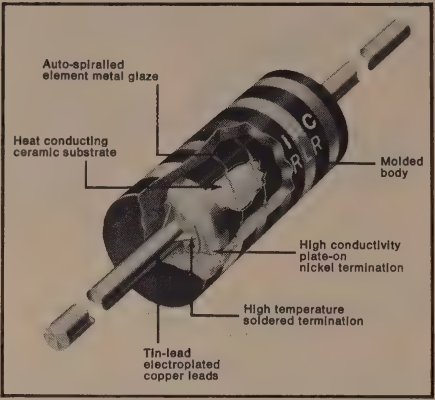
RG GENERAL PURPOSE SEMI PRECISION AND PRECISION METAL GLAZE™ RESISTORS

Cost effective IRC molded thick film Metal Glaze resistors are designed to provide a combination of ruggedness and performance unmatched anywhere for the price.

The secret is in the proprietary glaze systems, the unique design, and automated production techniques.

Metal Glaze resistors by the billions are in use worldwide, in all types of applications from missile guidance computers to truck anti skid systems, from telephone receivers to process control instrumentation.

Metal Glaze resistors meet or far exceed such MIL specifications as MIL-R-22684(RL), 10509(RN), 39017(RLR), 55182(RNR). Power Load △R's are often less than ±1%, even after 10,000 hours—equivalent to years of equipment life. And these units remain within tolerances even after extended periods of shelf or equipment storage.

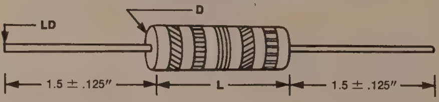

Auto-spiralled element metal glaze
Heat conducting ceramic substrate
IRC
Molded body
High conductivity plate-on nickel termination
High temperature soldered termination
Tin-lead electroplated copper leads

PRODUCT FEATURES

- **Metal Glaze™ Thick Film Element**—Fused to core at 2000°F—extremely rugged and reliable system—up to 100 times thickness of oxide or evaporated films.
- **Solid Ceramic Substrate**—Provides optimum thermal conductivity—permits maximum power density, lowest T.C. △R's, overload protection, and freedom from mechanical breakage.
- **End-Plated and Soldered Terminals**—Prevents movement, provides excellent electrical and thermal contact. Withstands 20 lb. pull for 5 seconds.
- **Uniform Molded Body**—Best mechanical strength for automated lead forming and insertion equipment.
- **Stability**—Above built-in features provide design tolerances of as low as ±1.5% (depending on purchase tolerance, style, and T.C. selection—see design tolerance discussion, page 6).

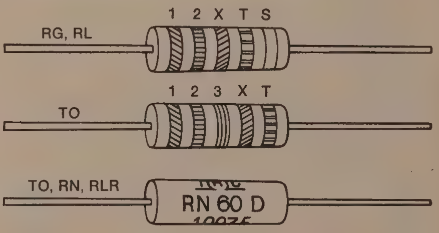
DIMENSIONS—See Table

Body Configuration—Molded


D
LD
1.5 ± .125″
L
1.5 ± .125″

IDENTIFICATION

Metal Glaze resistors can be provided with color bands or alpha-numeric printing.
See Table next page for marking by style.


1 2 X T S
RG, RL
1 2 3 X T
TO
TO, RN, RLR
IRC
RN 60 D
1007F

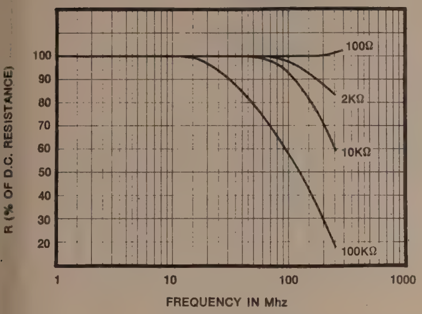
1, 2, 3 = Significant Figures
X = Multiplier
T = Tolerance
S = White Solderable Band (RL)

Black	= 0	Green	= 5	Brown	= ±1% Tol.
Brown	= 1	Blue	= 6	Red	= ±2% Tol.
Red	= 2	Violet	= 7	Gold	= ±5% Tol.
Orange	= 3	Gray	= 8	Silver	= ±10% Tol.
Yellow	= 4	White	= 9		

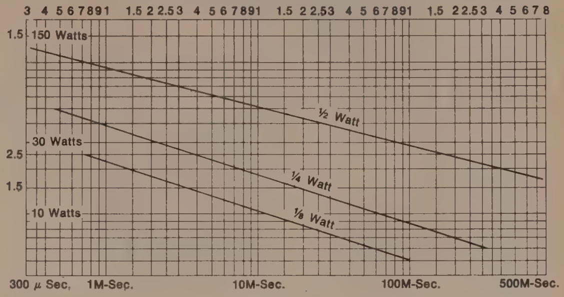
TRW® IRC RESISTORS

HIGH FREQUENCY CHARACTERISTICS

RG ¼W SIZE

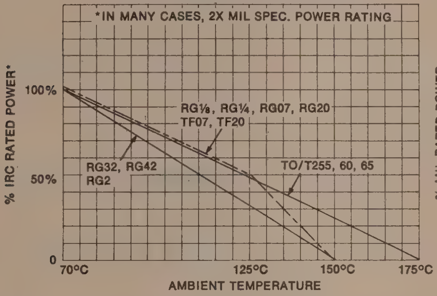


RG PULSE OR SURGE POWER RATING:
MAXIMUM APPLIED POWER/PULSE ON TIME

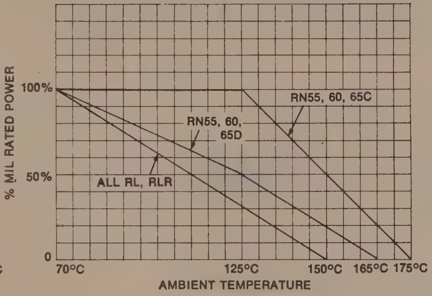


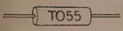
SPECIFICATIONS

COMMERCIAL POWER DERATING—METAL GLAZE
(SEE SPECIFICATION TABLE BELOW)



MIL SPECIFICATION POWER DERATING
(SEE SPECIFICATION TABLE BELOW)



CLASSIFICATION/ CONFIGURATION	IRC TYPE	MIL STYLE	MIL RANGE (Ω)	IRC RANGE (Ω)	TOL. ±%	T.C. (±ppm/°C)	POWER RATING[4]		VOLTAGE RATING (v)	DIMENSIONS		
							IRC	MIL		L (in.)	D (in.)	LD (in.)
GENERAL PURPOSE AND SEMI-PRECISION	RG⅛	RC05[1]	—	10 – 100K	5	250	¼W @ 70°C	⅛W @ 70°C	200	.150 ± .01	.066 ± .008	.016 ± .002[5]
	RG¼	RC07[1]	—	6.2 – 680K	5	250	½W @ 70°C	¼W @ 70°C	250	.250 ± .015	.090 ± .008	.025 ± .001
	RG07	RL07	51 – 150K	10 – 510K	2, 5	200	½W @ 70°C	¼W @ 70°C	250	.250 ± .015	.090 ± .008	.025 ± .001
	RG20	RL20	4.3 – 470K	4.3 – 1M	2, 5	200	1W @ 70°C	½W @ 70°C	350	.390 ± .010	.140 ± .008	.032 ± .002
	RG32	RL32	10 – 1M	10 – 1M	2, 5	200	1W @ 70°C	1W @ 70°C	500	.562 ± .031	.190 ± .008	.040 ± .002
	RG42	RL42	10 – 1.5M	10 – 1.5M	2, 5	200	2W @ 70°C	2W @ 70°C	500	.688 ± .040	.318 ± .018	.045 ± .002
Color Banded	RG2	RC42[1]	—	10 – 1.5M	5	250	2W @ 70°C	2W @ 70°C	500	.688 ± .040	.318 ± .018	.045 ± .002
 LOW RESISTANCE	TF07	RL07[1]	—	1 – 10	1, 2, 5	100	½W @ 70°C	¼W @ 70°C	250	.250 ± .015	.090 ± .008	.025 ± .001
Banded or Stamped	TF20	RL20[1]	—	1 – 10	1, 2, 5	100	¾W @ 70°C	½W @ 70°C	350	.390 ± .010	.140 ± .008	.032 ± .002
	T055	RN55D	10 – 301K	10 – 499K	1[3]	100[3]	½W @ 70°C	⅛W @ 70°C 1/10W @ 125°C	200	.250 ± .015	.090 ± .008	.025 ± .001
PRECISION	T255	RN55C	49.9 – 100K	10 – 301K	1[3]	50[3]	¼W @ 70°C	1/10W @ 125°C	200	.250 ± .015	.090 ± .008	.025 ± .001
	T060	RN60D	10 – 1M	10 – 1M	1[3]	100[3]	¾W @ 70°C	¼W @ 70°C ⅛W @ 125°C	250	.390 ± .010	.140 ± .008	.025 ± .001
	T260	RN60C	49.9 – 499K	10 – 499K	1[3]	50[3]	⅜W @ 70°C	⅛W @ 125°C	250	.390 ± .010	.140 ± .008	.025 ± .001
	T065	RN65D	10 – 1M	10 – 1M	1[3]	100[3]	¾W @ 70°C	½W @ 70°C ¼W @ 70°C	300	.562 ± .031	.190 ± .008	.025 ± .001
Banded or Stamped	T265	RN65C	49.9 – 348K	10 – 499K	1[3]	50[3]	½W @ 70°C	¼W @ 125°C	300	.562 ± .031	.190 ± .008	.025 ± .001
	RGR07	RLR07/R[2]	10 – 470K	10 – 470K	2, 5	200	¼W @ 70°C	¼W @ 70°C	250	.250 ± .015	.090 ± .008	.025 ± .001
	RGR20	RLR20/R[2]	4.3 – 1M	4.3 – 1M	2, 5	200	½W @ 70°C	½W @ 70°C	350	.390 ± .010	.140 ± .008	.032 ± .002
	RGR32	RLR32/P[2]	10 – 1M	10 – 1M	2, 5	200	1W @ 70°C	1W @ 70°C	500	.562 ± .031	.190 ± .008	.040 ± .002
ESTABLISHED RELIABILITY	RGR42	RLR42/M[2]	10 – 1.5M	10 – 1.5M	2, 5	200	2W @ 70°C	2W @ 70°C	500	.688 ± .040	.318 ± .018	.045 ± .002

[1] Not QPL listed [2] Failure rate symbol [3] See pp. 9–10 for close tolerance & TC [4] See power derating curves above [5] 1.00 ± .125 lead length

TRW/IRC RESISTORS, AN ELECTRONIC COMPONENTS DIVISION OF TRW INC., P.O. BOX 393, BOONE, N.C. 28607 (704) 264-8861

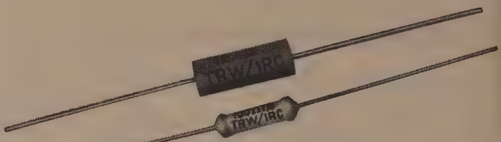
TRW® IRC RESISTORS

M&C SERIES HIGH STABILITY METAL FILM RESISTORS

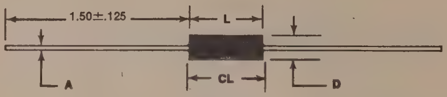
Evolved from the industry's original metal film process. These resistors are manufactured to the tightest controls for best performance with respect to low noise, high stability, and the ultimate in TCs and tolerances for precision applications. Standard tolerances and TCs are available to ± 0.1% and ±25 PPM°C respectively. Resistance values are to 100 megohms.

These evaporated metal film resistors will exceed all MIL-R-specification requirements, including the highest reliability level of MIL-R-55182. Voltage coefficient when measured between 1/10 and full rated voltage is typically less than 0.5 PPM/Volt for all values and essentially zero for low and medium values. Typical △ R for long term life is less than .04%.

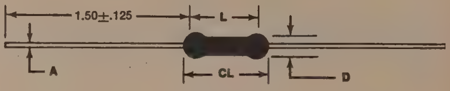
The design concept of these resistors offer high strength characteristics for potting applications and automatic insertion.



MIL-R-55182 Char.	IRC T.C. Code	Temperature Coefficient	Temperature Span
K	T0	0±100PPM/°C	−55°C to +165°C
H	T2	0±50PPM/°C	−55°C to +175°C
J	T9	0±25PPM/°C	−55°C to +175°C
	T3	0 to +100PPM/°C	−55°C to +165°C
	T4	0 to −100PPM/°C	−55°C to +165°C
	T5	0±25PPM/°C	+25°C to +145°C
	T6	0 to +50PPM/°C	−55°C to +165°C
	T7	0 to −50PPM/°C	−55°C to +165°C
	T8	0±25PPM/°C	+25°C to +165°C
		0±35PPM/°C	−55°C to +25°C
	TR	0 to +100PPM/°C 0 to −250PPM/°C	−55°C to +165°C
	TE	0 to +100PPM/°C 0 to −500PPM/°C	−55°C to +165°C



Molded
Style M



Conformally Coated
Style C

PERFORMANCE AND DIMENSIONS

IRC TYPE	MIL TYPE	RNR MIL CHAR	IRC T.C. CODE	MIL RESISTANCE RANGE (Ohms)	IRC RESISTANCE RANGE (Ohms)	MIL POWER RATING (Watts) 70°C	125°C	MIL VOLTAGE RATING (Volts)	DIMENSION IN INCHES Body Length (L)	Body Diameter (D)	Max. Clean Lead Length (CL)	Lead Gage (A)	BODY STYLE
MMC	RNR50 RN50+	K H, J	T0 T2, T9	10-100K 49.9-100K	10-3.2 MEG 49.9-1.1 MEG	⅛	1/20	200	.150±.020	.065±.010	.200	‡26** .016	C
CEA	RN55+	— —	T0 T2, T9	— —	10-6.5 MEG 30.1-2.3 MEG	⅛	1/10	200	.250±.031	.090±.010	.325	‡22 .0253	C
CCM	RNR55 RN55+	K H, J	T0 T2, T9	20-200K 49.9-200K	20-6.3 MEG 30.1-2.2 MEG	⅛	1/10	200	.250±.031	.088±.010	.325	‡22 .0253	C
MCM	—	— —	T0 T2, T9	— —	20-301K 30.1-301K	⅛	1/10	200	.250±.031	.093±.005	.310	‡22 .0253	M
CCA	RNR60 RN60+	K H, J	T0 T2, T9	24.9-499K 49.9-499K	10-13 MEG 49.9-4.5 MEG	¼	⅛	250	.400±.031	.140±.020	.540	‡22 .0253	C
MEA	RN60+	— —	T0 T2, T9	— —	10-6.5 MEG 30.1-2.3 MEG	¼	⅛	250	.406±.015	.130±.010	.545	‡22 .0253	M
MEB	RN65+	— —	T0 T2, T9	— —	10-13 MEG 49.9-4.5 MEG	½	¼	300	.594±.015	.203±.015	.733	‡22 .0253	M
CCB	RNR65 RN65+	K H, J	T0 T2, T9	24.9-1 Meg 49.9-1 Meg	10-24 MEG 49.9-8.4 MEG	½	¼	300	.594±.031	.180±.020	.734	‡22 .0253	C
MEC	RN70+	— —	T0 T2, T9	— —	10-24 MEG 24.9-8.4 MEG	¾	½	350	.719±.020	.261±.020	.863	‡20 .032	M
CEC	—	— —	T0 T2, T9	— —	10-24 MEG 49.9-8.4 MEG	1	½	350	.594±.031	.180±.020	.734	‡20 .032	C
MEF	RN75+	— —	T0 T2, T9	— —	49.9-55.5 MEG 49.9-19.5 MEG	1	1	500	1.105±.020	.395±.020	1.253	‡20 .032	M
MEH	RN80+	— —	T0 T2, T9	— —	100-148 MEG 100-52 MEG	2		750	2.254±.020	.395±.020	2.378	#20. 032	M

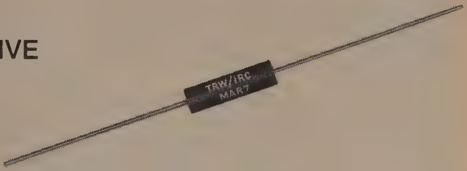
*Gold plated Dumet leads. 100" ± .062" **Lead length, 1.00" ± .062"

TRW® IRC RESISTORS

MAR ULTRA PRECISION, NON-INDUCTIVE METAL FILM RESISTORS

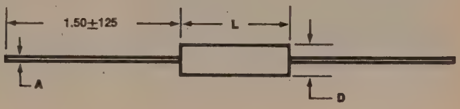
"Where speed and precision count"
MAR ultra-precision resistors have all of the advantages of evaporated metal film resistors and in addition, precision tolerances to .01% and temperature coefficients to 5 PPM/°C are standard. The inherent low inductance and low capacitance of this design make it ideally suited to high-speed applications requiring a high degree of stability. The rugged epoxy encapsulation provides excellent environmental protection.

Tailored TCs from —100 PPM/°C to +150 PPM/°C are available with TC tolerances to ± 5 PPM/°C.



TYPICAL PERFORMANCE

Load Life 1000 hrs. @ 85°C	.01% ΔR
Temperature Cycle	.002% ΔR
Humidity	.02% ΔR
Noise Index	−40 db
Voltage Coefficient	.02ppm/volt
1 year shelf life	±15 ppm



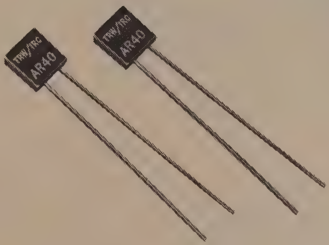
PERFORMANCE AND DIMENSIONS

IRC TYPE	RESISTANCE RANGE* (Ohms)	TEMPERATURE COEFFICIENTS −20°C to +85°C (±ppm/°C)	TOLERANCES (±%)	POWER RATING** @ 85°C (Watts)	VOLTAGE RATINGS (Volts)	DIMENSIONS IN INCHES Body Length (L Max.)	Body Diameter (D Max.)	Lead Gage (A)
MAR3	20 — 100K	T10 = 15 T13 = 10 T16 = 5	1.00, 0.50, 0.25, 0.10, 0.05, 0.02, 0.01	1/20	200	.191	.082	#26 .016†
MAR5	20 — 250K			1/10	250	.281	.102	#22 .025
MAR6	20 — 500K			1/8	300	.425	.155	#22 .025
MAR7	20 — 1 Meg			1/4	500	.650	.195	#22 .025

*Wider ranges available, contact factory.
**Higher power ratings available. Contact factory.
†Thread length 1.00 ± .062.

AR40 ULTRA-PRECISION METAL FILM RESISTORS

The AR40 ultra-precision metal film resistor is designed to satisfy those critical design requirements where virtually zero temperature coefficient, stability and absolute accuracy are needed. Temperature coefficients of ± 5 PPM/°C and ± 2 PPM/°C are standard. Standard tolerances are available to .01%. The radial lead design and small case size require a minimum of printed circuit board space. Proven end cap termination assures essentially no degradation during normal circuit board insertion practices.



PERFORMANCE AND DIMENSIONS

TCR CLASS.	STANDARD TEMP. COEFF. (°C)	RESISTANCE RANGE* (Ohms)	STANDARD TOLERANCE (±%)	WATTAGE 85°C	DIMENSIONS IN INCHES	
T-18	2 ppm 0 to 60°C 5 ppm −55 to 125°C	20 to 100K	.01, .02, .05, .10, .25, .50, 1.00	.3 watts	Height	.320 ± .020
					Length	.295 ± .010
					Width	.100 ± .010
T-16	5ppm 0 to 60°C 10 ppm −55 to 125°C				Lead spacing	.150 ± .010
					Lead gage #22	.0253**

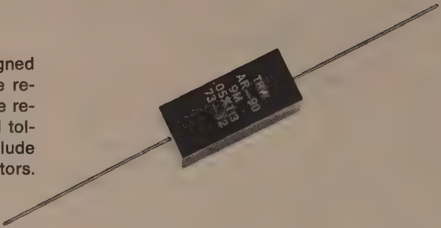
*Wider ranges available, contact factory.
**Lead Length 1.00 minimum

TRW/IRC RESISTORS, AN ELECTRONIC COMPONENTS DIVISION OF TRW INC., P.O. BOX 887, BURLINGTON, IOWA 52601 (319) 754-8491

TRW® IRC RESISTORS

AR 90 ULTRA-PRECISION HIGH RANGE RESISTORS

The AR90 ultra precision metal film resistor is designed to satisfy those critical design requirements where resistance values between 1 meg Ω and 10 meg Ω are required. Temperature coefficients to 5 PPM/°C and tolerances to .05% are standard. Applications include ultra precision voltage dividers and input attenuators.



PERFORMANCE AND DIMENSIONS

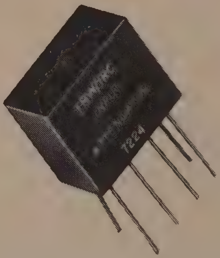
IRC TYPE	RESISTANCE RANGE* (ohms)	TEMPERATURE COEFFICIENTS −20°C to +85°C (± PPM/°C)	TOLERANCES	POWER RATING	VOLTAGE RATING	BODY DIMENSIONS (IN.)			
						LENGTH	DEPTH	HEIGHT	LEAD
AR90	1M — 10M	T10 = 5 T13 = 10 T16 = 15	1.0, 0.5, 0.25, 0.1, 0.05	.5W	1000	1.0	0.4	0.4	#22

*Wider ranges available. Contact factory.

AR ULTRA-PRECISION RESISTOR NETWORKS

AR Resistor Networks provide the best performance and packaging density for a circuit requiring multiple, interdependent precision resistors. The rugged epoxy encapsulation provides maximum environmental protection. AR networks are designed to specific circuit requirements using one of the standard sizes available or special sizes where required.

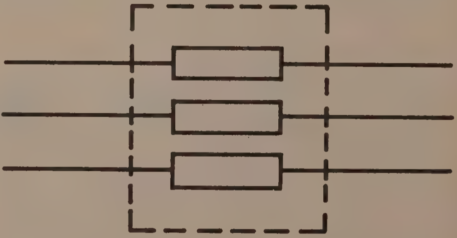
Features include:
- Lower Effective Cost
- High Density Packaging
- Ratio Matching to 0.005%
- Resistors thermally tied together
- Deliveries comparable to discretes
- All-welded construction
- TC Matching to ±1 PPM/°C



AR MATCHED RESISTOR SETS

AR Matched Resistor Sets provide ultra-precision resistor performance at the lowest possible cost. Tolerance matching to 0.005% and TC matching to 1 PPM/°C can be specified.

Any TRW/IRC metal film resistors may be obtained as matched sets. The AR series, MAR and AR40 styles are recommended for the most precise tolerance and TC matching requirements.



TRW® IRC RESISTORS

TaNFilm™ PRECISION FILM RESISTOR NETWORKS

TRW/IRC TaNFilm precision subminiature resistor networks are made of sputtered tantalum nitride, using proprietary equipment and processes.

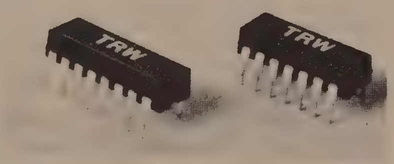
TaNFilm is inherently resistant to electrolytic attack, since each resistor is passivated with an anodized surface layer. The processes used in manufacture allow routine tolerances of 0.1% and make tolerances of 0.05% economically feasible. The continuous sputtering process makes TaNFilm very uniform, so resistors track over the full temperature range to a few parts per million. Many hours of test data allow accurate performance prediction. A variety of networks are available, and others can be fabricated to your packaging requirements. Standard configurations are the DIP sandwich pack shown on page 16, and TO-88 type flat packs.

TYPICAL TaNFilm Design CRITERIA[1]

Resistance Value	50Ω to 100,000Ω	Drift	$\leq$0.25% per year
Tolerance	±0.05% to ±1.0%	Noise	$\leq$−25dB
TCR	−100±25 ppm/°C	Voltage Coefficient	$\leq$5 ppm/V
TCR Tracking	to 5 ppm/°C	Series Inductance	$\leq$5 nH
Settling Time	to 20nSec.	Shunt Capacitance	$\leq$0.1 pF

[1] These are not absolute units. Contact factory for your specific requirements.

RESISTOR NETWORKS DUAL IN-LINE PACKAGE



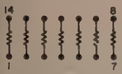
TRW/IRC TaNFilm* resistor networks utilize a Tantalum Nitride resistor film deposited on a high alumina ceramic substrate. Units are molded in standard TO-116 DIP form-factor with 14 and 16 pin terminations.

Styles

9989 = 7 resistors of equal value, 14 pin DIP
9999 = 8 resistors of equal value, 16 pin DIP
9987 = 13 resistors of equal value, 14 pin DIP
9998 = 15 resistors of equal value, 16 pin DIP

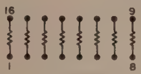
Resistance Values

Types 9987 and 9998	Types 9989 and 9999
50Ω to 50KΩ	50Ω to 100KΩ



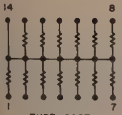
TYPE 9989

7 Resistors
14 Pin DIP



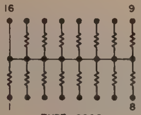
TYPE 9999

8 Resistors
16 Pin DIP



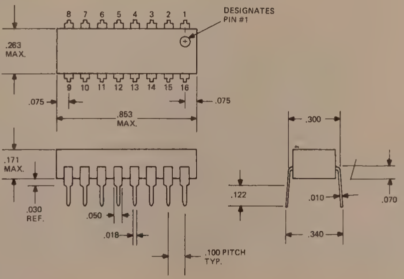
TYPE 9987

13 Resistors
14 Pin DIP

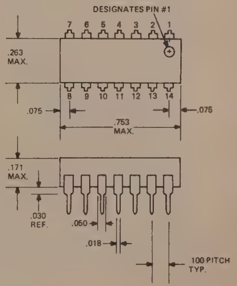


TYPE 9998

15 Resistors
16 PIN DIP


8 7 6 5 4 3 2 1
DESIGNATES PIN #1
.263 MAX.
9 10 11 12 13 14 15 16
.075
.075
.853 MAX.
.171 MAX.
.030 REF.
.050
.018
.100 PITCH TYP.
.300
.122
.010
.070
.340

16 PIN DIP


DESIGNATES PIN #1
7 6 5 4 3 2 1
.263 MAX.
8 9 10 11 12 13 14
.075
.075
.753 MAX.
.171 MAX.
.030 REF.
.050
.018
100 PITCH TYP.

14 PIN DIP

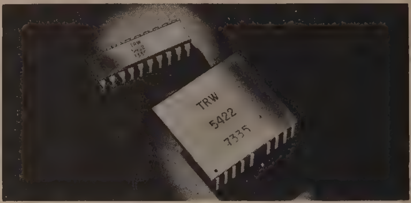
*Trademark of TRW INC. for its Tantalum Nitride Film.

TRW/IRC RESISTORS, AN ELECTRONIC COMPONENTS DIVISION OF TRW INC., 401 N. BROAD ST., PHILADELPHIA, PA. 19108 (215) 922-8900

TRW® IRC RESISTORS

TaNFilm© R-2R LADDERS

- 12 BIT RESOLUTION
- FULL MIL PERFORMANCE
- TWO PACKAGE STYLES
- FOUR RESISTANCE VALUES
- 12 BIT OR 10 BIT ACCURACY



DESIGN

These 12 Bit R-2R Ladders feature the inherent passivation, low noise and premium performance of TaNFilm. They provide ±½ LSB accuracy over the full mil temperature range (−55 to +125°C) and retain this accuracy after long operating life in extreme environments. Unlike competitive devices this military grade performance demands no price premium. TaNFilm networks provide hermetic performance without the cost and disadvantages of hermetic sealing, because the tantalum nitride film is anodically passivated.

Resistors are sputtered tantalum nitride on 99.5% Alumina ceramic and are anodically passivated. Interconnections are 99.9% pure gold and the gold plated leads are welded to the interconnection film. Complete absence of silver and solder provides absolute insurance against silver and tin migration. The 5430 series features standard dual in-line packaging with rugged, gold plated, copper alloy, shouldered leads for ease of insertion. The 5420 series has two rows of leads .900" apart and is pin compatible with Beckman 811 series networks. The 5200 series are identical with the 5400 except for accuracy.

CIRCUIT AND APPLICATION

The circuit and pinout diagram is shown on the right. The characteristic "R" value may be 5K, 10K, 20K or 25K. Other values may be provided on special order. Standard switch compensation of 5 ohms is built into the four most significant bits. This also may be changed on special order. Three extra application resistors are provided for bipolar operation, Op Amp feedback or output attenuation. Switch or offset compensation may be provided in these resistors if required.

SPECIFICATIONS:

Ladder Resistance Values (R)	5K, 10K, 20K, 25K
Ladder Resistance Tolerance	±1%
Maximum Input Voltage	20V
Settling Time (to 0.1% of final value)	100n sec.
External Switch Compensation (Note 1)	5Ω
Temperature Range	−55° to 125°C
Ladder Voltage Accuracy	P/N 5200 is ±488 ppm; 5400 is ±122 ppm
Application Resistor Voltage Ratio	P/N 5200 is ±488 ppm; 5400 is ±122 ppm
Lead Material	Gold Plated Copper Alloy

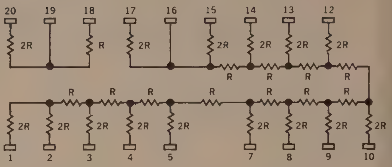
STABILITY

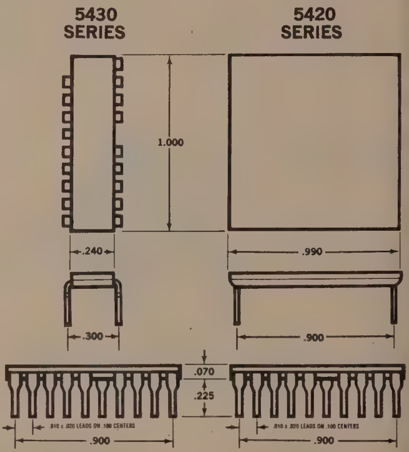
TaNFilm 12 Bit Ladders Exhibit specified Maximum Voltage Ratio Error after the following tests:

Operating Life	1000 Hrs. Full Load 100°C
Short Time Overload	10 Seconds 2.5 x Rated Voltage
Thermal Shock	10 Cycles −65°C to +150°C
Temperature Cycling	10 Cycles −65°C to +150°C
Moisture Cycle - Load/Polar	10 Days 90/98% R.H. Full Load (202-106)
Soldering Heat	10 Seconds @ 260°C
Shock	3000 g's for 0.2 Milliseconds
Vibration	20 g's
Terminal Strength	Per Mil 202-211B

NOTE 1 — CONSULT FACTORY FOR OTHER SWITCH COMPENSATION

CIRCUIT DIAGRAM





MARKING

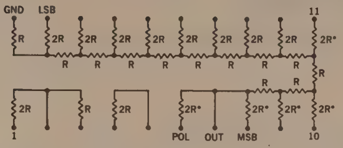
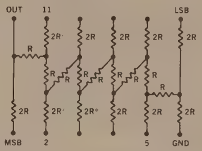
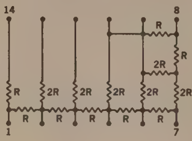
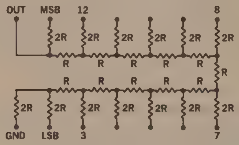
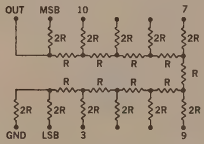
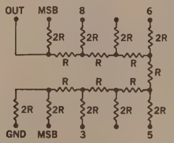
TRW 5XXX ← Mfg. and Part #
5K – 5R ← Resistance & Switch R
7332 ← Date Code

ORDERING INFORMATION

Style	Resistance	5K	10K	20K	25K
5420 Series	Part #	5421	5422	5423	5424
5430 Series	Part #	5431	5432	5433	5434
5220 Series	Part #	5221	5222	5223	5224
5230 Series	Part #	5231	5232	5233	5234

TRW/IRC RESISTORS, AN ELECTRONIC COMPONENTS DIVISION OF TRW INC., 401 N. BROAD ST., PHILADELPHIA, PA. 19108 (215) 922-8900

TANFILM© R-2R LADDERS

PART & DESCRIPTION	CIRCUIT	PACKAGE
5512 12 BIT R=10K 5516 12 BIT R=2K Accuracy ½ LSB *–15Ω SWITCH RESISTANCE	 GND LSB 11 R 2R 2R* 1 POL OUT MSB 10	20 PIN D.I.P.
5445 10 BIT 1/8 LSB (12 BIT ACCURACY) 5245 10 BIT ½ LSB (10 BIT ACCURACY) 5045 10 BIT 2 LSB (8 BIT ACCURACY) R=50K *–150Ω SWITCH RESISTANCE	 OUT 11 LSB R 2R 2R* MSB 2 5 GND	12 PIN D.I.P.
1045 8 BIT CURRENT SUMMING LADDER R=500Ω RATIO ACCURACY .25% BALANCED		14 PIN D.I.P.
12 BXXE* 12 BIT R=5K, 25K, 50K ACCURACY ½ LSB SWITCH COMPENSATION AVAILABLE	 OUT MSB 12 8 2R R GND LSB 3 7	14 PIN FLAT PACK .370" x .250"
10 BXXE* 10 BIT R=5K, 25K, 50K ACCURACY ½ LSB SWITCH COMPENSATION AVAILABLE	 OUT MSB 10 7 2R R GND LSB 3 9	12 PIN FLAT PACK .320" x .250"
8 BXXE* 8 BIT R=5K, 25K, 50K ACCURACY ½ LSB	 OUT MSB 8 6 2R R GND MSB 3 5	10 PIN FLAT PACK .270" x .250"

*XX INDICATES R VALUE — 05=5K, 25=25K, 50=50K
NOTE: D.I.P. LEADS ON .100 CENTERS, FLAT PACK RIBBON LEADS ON .050" CENTERS

TRW/IRC RESISTORS, AN ELECTRONIC COMPONENTS DIVISION OF TRW INC., 401 N. BROAD ST., PHILADELPHIA, PA. 19108 (215) 922-8900

TRW® IRC RESISTORS

TaNFilm© 10 BIT BCD ARRAY

- FULL MIL PERFORMANCE
- TWO PACKAGE STYLES
- COMPATIBLE WITH FAIRCHILD μ A722

DESIGN

These BCD Arrays feature the inherent passivation, low noise and premium performance of TaNFilm. They exhibit the specified accuracy over the full Mil temperature range (–55 to +125°C) and retain this accuracy after long operating life in extreme environments. Unlike competitive devices this military grade performance demands no price premium. TaNFilm networks provide hermetic performance without the cost and disadvantages of hermetic sealing, because the tantalum nitride film is anodically passivated.

Resistors are sputtered tantalum nitride on 99.5% Alumina ceramic and are anodically passivated. Interconnections are 99.9% pure gold and the gold plated leads are welded to the interconnection film. Complete absence of silver and solder provides absolute insurance against silver and tin migration. Part No. 1107 features standard dual in-line packaging with rugged, gold plated, copper alloy, shouldered leads for ease of insertion. Part No. 1105 has two rows of leads .900" apart and is compatible with Beckman Model 863 networks.

CIRCUIT AND APPLICATION

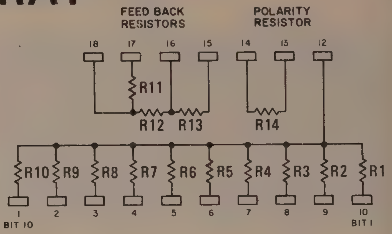
The circuit and pinout diagram is shown on the right. The resistance values are as specified in the Fairchild μ A 722 Data Sheet and the layout is compatible with the Fairchild layout. In addition to the 10 basic current controlling resistors, four application resistors are provided for bipolar operation, feedback or output scaling.

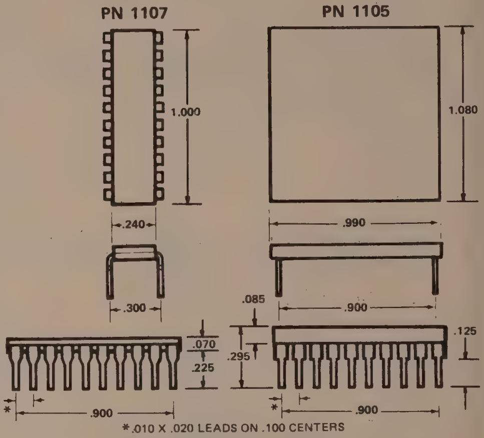
Resistor	Value K ohms	Ratio to R1	Max. Ratio Error
R1	2.547	–	–
R2	5.094	2.000	0.05%
R3	6.379	2.5045	0.05%
R4	12.83	5.036	0.1%
R5	25.80	10.13	0.25%
R6	51.03	20.03	0.5%
R7	63.36	24.88	1.0%
R8	126.3	49.57	2.0%
R9	250.1	98.17	2.0%
R10	495.0	194.3	5.0%
R11	1.5	Note 1	Note 2
R12	3.0	Note 1	Note 2
R13	3.0	Note 1	Note 2
R14	4.0	Note 1	Note 2

Note 1: Absolute tolerance ±1.0%

Note 2: TRC Ratio to R1 20 PPM/°C

CIRCUIT DIAGRAM





MARKING

TRW 1105 (or 1107) ← Mfg. and Part #
7442 ← Date Code

SPECIFICATIONS:

Operating Temperature	–55°C to 100°C
Storage Temperature	–65°C to 150°C

Temperature Coefficient of Resistance - -75 to -125 PPM/°C
Maximum Input Voltage - 20V
Maximum Dissipation/Resistor - 50 mW

STABILITY

TaNFilm BCD Arrays will meet the specified maximum ratio errors after the following tests:

Operating Life - 1000 Hours Full Load 100°C
Short Time Overload 10 Sec. 2.5 X rated voltage
Thermal Shock - 50 cycles –65°C to 150°C
Temperature Cycle - 50 cycles –65°C to 150°C
Moisture Cycle-Load/Polar - 10 cycles Mil 202-106
Soldering Heat - 10 seconds @ 260°C
Shock - 3000 gs for 0.2 milliseconds
Vibration - 20 gs
Terminal Strength - Per Mil 202-2118

TRW/IRC RESISTORS, AN ELECTRONIC COMPONENTS DIVISION OF TRW INC., 401 N. BROAD ST., PHILADELPHIA, PA. 19108 (215) 922-8900

TRW® IRC RESISTORS

MV GENERAL PURPOSE HIGH VOLTAGE RESISTORS

MV resistors are designed for high voltage requirements where high resistance and power are needed. TRW/IRC's exclusive composition film type resistance coating is applied in helical form on a ceramic tube to provide a conducting tube of long effective length.

MV resistors are particularly suited for voltmeter multipliers, bleeders, electrostatic filters, X-ray equipment, probes, voltage dividers, TV high voltage circuits, and similar applications.

TRW/IRC
MVX-1172

WITH LUG TERMINALS, COLLOIDAL SILVER TERMINALS OR AXIAL LEADS

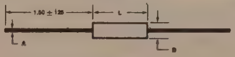
IRC TYPE	TERMINAL TYPE	POWER RATING (Watts)	PEAK VOLTAGE RATING* (KV)	MINIMUM AVAILABLE RESISTANCE		MAXIMUM AVAILABLE RESIST-ANCE (Megs)	DIMENSIONS IN INCHES			Widths of Silver Bands #15 Term.
				±10% or ±20% Tolerance	±5% Tolerance		Resistor Body Length	Resistor Body Diameter	Ceramic Inside Diameter	
MVC-1	‡**	1	3.5	10K	100K	1,000	1.00±.03	.31±.03	Thd. #6-32	N/A
MVC-2	‡**	2	7.5	25K	100K	1,000	1.75±.03	.31±.03	Thd. #6-32	N/A
MVC-3	‡**	3	15.0	100K	100K	1,000	3.00±.03	.31±.03	Thd. #6-32	N/A
MVC-5	‡**	5	30.0	100K	200K	1,000	5.50±.06	.31±.03	Thd. #6-32	N/A
MVX-½	Axial Leads	½	1.5	100K	100K	250	.69±.03	.25±.03	N/A	N/A
MVX-1	Axial Leads	1	3.5	100K	100K	1,000	1.00±.03	.25±.03	N/A	N/A
MVX-1½	Axial Leads	1.5	7.5	100K	100K	1,000	1.57±.03	.25±.03	N/A	N/A
MVX-2	Axial Leads	2	10.0	100K	100K	1,000	2.00±.03	.25±.03	N/A	N/A
MVX-3	Axial Leads	3	15.0	100K	100K	1,000	3.00±.06	.25±.03	N/A	N/A
MVH-2	‡	4	15.0	100K	150K	1,000	2.50±.06	.56±.03	Thd. #6-32	N/A
MVH-4	‡	6	25.0	100K	400K	1,000	4.00±.06	.56±.03	Thd. #6-32	N/A
MVF	12	2	5.0	25K	100K	1,000	1.75±.03	.31±.03	.19±.03	.38±.03
MVP	12, 15, 16, 17	10	15.0	100K	400K	1,000	4.50±.06	.75±.03	.50±.03	.56±.06
MVA	15, 16, 17	20	25.0	200K	1.0meg	1,000	3.50±.06	1.12±.03	.75±.03	.56±.06
MVO	15, 16, 17	30	50.0	400K	2.0meg	1,000	10.5±.06	1.12±.03	.75±.03	.56±.06
MVQ	15, 17	50	50.0	500K	3.5meg	1,000	10.5±.12	2.00±.05	1.56±.03	.88±.06
MVR	15, 17	90	100.0	1meg	7.0meg	1,000	18.5±.12	2.00±.05	1.56±.03	.88±.06

‡Solder lug or screw mounted
*Rated continuous working voltage determined by $E = \sqrt{PR}$
E should not exceed value listed in column above
**Also available with axial leads

E = Max. continuous votage
P = Power in watts
R = Resistance in ohms

TRW/IRC RESISTORS, AN ELECTRONIC COMPONENTS DIVISION OF TRW INC., P.O. BOX 393, BOONE, N.C. 28607 (704) 264-8861

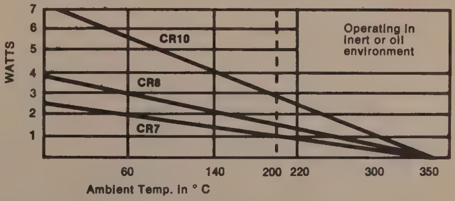
CR SEMI-PRECISION CARBON ALLOY RESISTORS HIGH TEMPERATURE/HIGH VOLTAGE



CR resistors are economically priced, high-voltage/high-temperature resistors developed for ballast and bleeder applications. This resistor series was originally designed to operate in inert, vacuum, or oil environments. Construction is completely inorganic with no outgassing, and these uncoated carbon alloy resistors will withstand an open flame of 1600°F.

CR resistors are currently being manufactured in three sizes. Other sizes and protective coatings are available upon request.

DERATING CURVE



PERFORMANCE AND DIMENSIONS

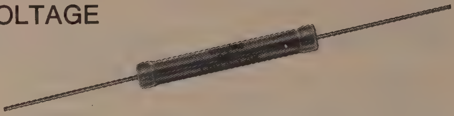
IRC TYPE	RESISTANCE RANGE (Ohms)	TOLERANCE (±%)	OPERATING TEMPERATURE (°C)	POWER RATING @ 200°C* (Watts)	VOLTAGE RATING* (Volts)	DIMENSIONS IN INCHES		
						Body Length (L Max.)	Body Diameter (D Max.)	Lead Gage (A)
CR6	1Ω—5 Meg	2-5	—65 to ±350	.5	1,000	.342	.095	#22 .025
CR7	500—25 Meg	5	—65 to +350	1	8,000	.580	.157	#20 .032
CR8	1K—50 Meg	5	—65 to +350	1.5	12,500	.938	.157	#20 .032
CR9	2K—100 Meg	5	—65 to ±350	2	12,500	.938	.300	#20 .032
CR10	2K—200 Meg	5	—65 to +350	3	15,000	2.125	.328	#20 .032

*Voltage and wattage dependent on resistance, operating temperature and environment (i.e. Oil, Air, Vacuum, Inert, etc.)

TRW/IRC RESISTORS, AN ÉLECTRONIC COMPONENTS DIVISION OF TRW INC., P.O. BOX 887, BURLINGTON, IOWA 52601 (319) 754-8491

TRW® IRC RESISTORS

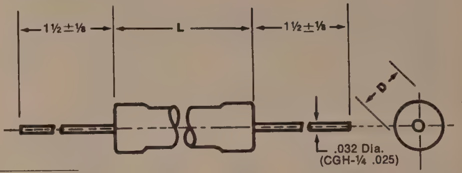
CGH PRECISION HIGH RANGE, HIGH VOLTAGE METAL GLAZE RESISTORS



The CGH resistor uses the superior qualities of precision thick film, fired at high temperatures on an extremely stable ceramic substrate. This results in a resistor capable of operating in high ambient temperatures and with excellent high voltage load stability.

CGH resistors are particularly suited for precision high voltage and high impedance applications, such as voltage multipliers, X-ray equipment, and high voltage power supplies where precision tolerances and TCs are required.

DIMENSIONS



SPECIFICATIONS

TRW TYPE	Power Rating @ 110°C (Watts)	VOLTAGE RATING (Volts)	RESISTANCE RANGE (Ohms)	T.C.*
CGH-¼	¼	1,500	301K-20 Meg ohms	T0,T2
CGH-½	½	3,000	500K-40 Meg ohms	T0,T2
CGH-1	1	3,500	1 Meg-100 Meg ohms	T0,T2
CGH-2	2	7,500	1 Meg-200 Meg ohms	T0,T2
CGH-3	3	15,000	1 Meg-300 Meg ohms	T0,T2
CGH-5	5	20,000	1 Meg-500 Meg ohms	T0,T2

TRW TYPE	Dimensions in Inches	
	Body Length (L)	Body Diameter (D)
CGH-¼	0.250 ± .031	0.088 ± .010
CGH-½	0.375 ± .031	0.138 ± .016
CGH-1	0.690 ± .062	0.297 ± .031
CGH-2	1.060 ± .062	0.297 ± .031
CGH-3	2.062 ± .062	0.297 ± .031
CGH-5	3.062 ± .062	0.297 ± .031

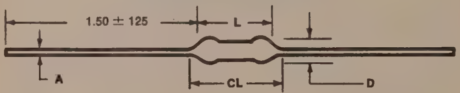
*T0 = ±100 PPM, T2 = ±50 PPM. ±200 PPM also available.

TRW/IRC RESISTORS, AN ELECTRONIC COMPONENTS DIVISION OF TRW INC., P.O. BOX 393, BOONE, N.C. 28607 (704) 264-8861

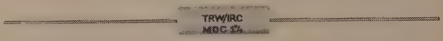
DC AND MD DEPOSITED CARBON FILM RESISTORS

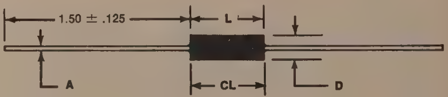
CONFORMALLY COATED (C)
PAINT COATED (P)

TRW/IRC
DCC1%



MOLDED (M)





IRC TYPE	MIL TYPE	MIL CHAR.	MIL RESISTANCE RANGE (Ohms)	STD. RESISTANCE RANGE* (Ohms)	POWER RATING (Watts)		VOLTAGE RATING (Volts)	Body Length (L)	DIMENSIONS IN INCHES		Lead Gage (A)	BODY STYLE
					40° C	70° C			Body Diameter (D)	Max. Clean Lead Length (CL)		
DCC	RN20	X	10 – 2 Meg	10 – 25 Meg	½	½	350	.594 ± .031	.180 ± .020	.750	#20 .032	C
DCF	RN25	X	10 – 2.49 Meg	10 – 50 Meg	1		500	.938 ± .062	.297 ± .031	1.250	#20 .032	P
DCH	RN30	X	30.1 – 10 Meg	15 – 100 Meg	2		750	2.062 ± .062	.297 ± .031	2.375	#20 .032	P
MDA	RN60	D	10 – 1 Meg	10 – 5 Meg		¼	300	.406 ± .015	.130 ± .010	.545	#22 .0253	M
MDB	RN65	D	10 – 2 Meg	10 – 5 Meg		½	350	.594 ± .015	.203 ± .015	.733	#22 .0253	M
MDC	RN70	D	10 – 2.49 Meg	10 – 25 Meg		1	500	.719 ± .020	.261 ± .020	.863	#20 .032	M
MDF	RN75	B	10 – 5.11 Meg	10 – 50 Meg		1	500	1.105 ± .020	.395 ± .020	1.253	#20 .032	M
MDH	RN80	B	30.1 – 10 Meg	15 – 100 Meg		2	750	2.234 ± .020	.395 ± .020	2.378	#20 .032	M

*These high resistance values, being above the highest MIL-R-10509 top values, have higher temperature coefficients, but otherwise are designed to meet the requirements of the specification. These high resistance values must be measured carefully under controlled conditions of humidity and temperature, to reduce possible variations due to test conditions and temperature coefficients. Due to higher temperature coefficient, value above approximately two times MIL maximum will be supplied with a standard tolerance of ±2.0%.

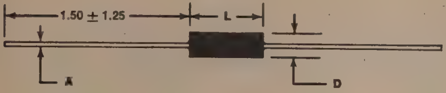
TRW/IRC RESISTORS, AN ELECTRONIC COMPONENTS DIVISION OF TRW INC., P.O. BOX 887, BURLINGTON, IOWA 52601 (319) 754-8491

TRW® IRC RESISTORS

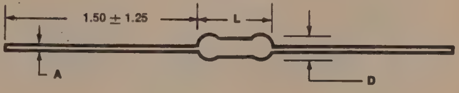
BR HIGH POWER DENSITY PRECISION THIN FILM RESISTORS

The BR series precision metal film power resistors offer an excellent power-to-size ratio, high frequency response, and exceptionally stable performance. They have power ratings 50% to 100% greater for a given size than formerly was available in metal films. This increased capability is obtained with no performance degradation.

Molded (M)



Conformally Coated (C)



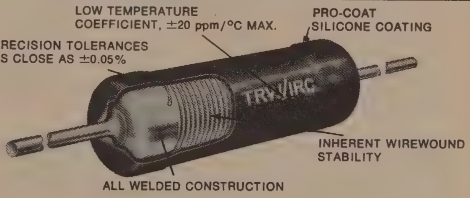
SPECIFICATIONS

IRC TYPE	RESISTANCE RANGE (Ohms)	TEMPERATURE COEFFICIENT (±ppm/°C)	TOLERANCE (±%)	POWER RATING @ 25°C* (Watts) See Note 4	VOLTAGE RATING (Volts)	DIMENSIONS IN INCHES		
						Body Length (L Max.)	Body Diameter (D Max.)	Lead Gage (A)
BR-3C	10-25K	25, 50, 100	1, 0.5, 0.25, 0.1	1	200	.152±.020	.065±.010	#26 .016
BR-4C	20-100K			1½	300	.250±.031	.088±.010	#22 .0253
BR-4M	20-100K			1½	300	.250±.031	.093±.005	#22 .0253
BR-5M	10-500K			2	300	.406±.015	.130±.010	#22 .0253
BR-7C	10-1Meg			3	525	.594±.031	.180±.020	#20 .032
BR-7M	10-1Meg			3	525	.719±.020	.261±.020	#20 .032
BR-9C	10-5Meg			5	750	.960±.031	.310±.020	#20 .032
BR-9M	10-5Meg			5	750	1.105±.020	.395±.020	#20 .032

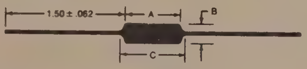
NOTES: 1. Derated power rating by 50% for ±0.1% tolerance. 2. BR-3C lead length 1.00±.062. 3. Molded units (M) are flame proof. 4. Power rating and derating is dependent on mounting conditions. Consult factory for mounting information.

TRW/IRC RESISTORS, AN ELECTRONIC COMPONENTS DIVISION OF TRW INC., P.O. BOX 887, BURLINGTON, IOWA 52601 (319) 754-8491

AS MINIATURE PRECISION POWER WIREWOUND RESISTORS


LOW TEMPERATURE COEFFICIENT, ±20 ppm/°C MAX.
PRO-COAT SILICONE COATING
PRECISION TOLERANCES AS CLOSE AS ±0.05%
TRW/IRC
INHERENT WIREWOUND STABILITY
ALL WELDED CONSTRUCTION

Type AS resistors expand circuit design limits significantly by carrying full power even at 125°C ambient. These resistors meet MIL Characteristic V (MIL-R-26) with an allowable 350°C hot spot. They also feature TRW's Pro-Coat silicone coating, offering high heat capability in a tough, smooth, solvent-resistant coating with high dielectric strength. Available in standard or non-inductive windings.



SPECIFICATIONS

IRC TYPE	STYLES MIL-R-26	IRC POWER RATING 350°C Max. HOT SPOT (Watts)		COMMERCIAL RANGE (Ohms)		VOLTAGE RATING (Volts)	NON-INDUCTIVE RANGE (Ohms)		DIMENSIONS IN INCHES			
		125°C	25°C	Min.	Max.		Min.	Max.	DIM. A ±.032	DIM. B ±.032	DIM. C MAX.	LEAD DIA.
AS-¼		0.25	0.5	1.0	3.4K	70	*	*	.250	.062	.312	.020
AS-½		0.5	1	0.5	6K	100	*	*	.312	.062	.375	.020
AS-1	RW70U	1	2	0.1	7.5K	130	0.1	3.8K	.375	.093	.450	.020
AS-2	RW69V RW79U	2	3	0.1	20K	140	0.5	10K	.500	.218	.625	.032
AS-2A		2.5	4	0.1	42.1K	300	0.5	21K	.812	.187	.937	.032
AS-2B		3	4	0.1	24K	185	0.5	12K	.562	.187	.687	.032
AS-3		3	5	0.1	30K	200	0.5	15K	.687	.250	.812	.040
AS-5	RW74U RW67V	5	7	0.1	60K	400	0.8	30K	.875	.312	1.000	.040
AS-7		7	9	0.1	90K	600	1.0	45K	1.250	.312	1.375	.040
AS-10	RW88V RW78U	10	14	0.1	175K	1000	3.0	50K	1.812	.375	1.937	.040
ASC-10	RW55V	7	10	0.1	90K	600	1.0	45K	1.375	.468	1.468	.040
ASC-15	RW56V	10	15	0.1	175K	1000	3.0	50K	2.000	.468	2.093	.040

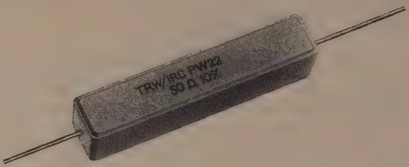
*Inductance on AS-¼ and AS-½ is less than 1μH at 1 MHz. Tolerance available, ±5, 3, 1, and > 0.1%

TRW/IRC RESISTORS, AN ELECTRONIC COMPONENTS DIVISION OF TRW INC., P.O. BOX 393, BOONE, N.C. 28607 (704) 264-8861

TRW® IRC RESISTORS

PW GENERAL PURPOSE FIREPROOF POWER RESISTORS

Type PW resistors are available in eight ratings: 2, 3, 5, 7, 10, 15, 22 to 50 watts. All resistors are inorganically constructed and will not support combustion. Available in standard, fusible, and positive T.C. variations.



SPECIFICATIONS

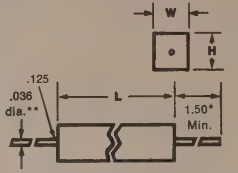
IRC TYPE	POWER RATING (Watts)	RESISTANCE		STANDARD TEMPERATURE COEFFICIENT (−55°C to +275°C)		SPECIAL TEMPERATURE COEFFICIENTS			
		Min.* (Ohms)	Max. (Ohms)	0.06%/°C (Ohms)	0.03%/°C (Ohms)	+0.55%/°C (Ohms)	+0.45%/°C (Ohms)	+0.26%/°C (Ohms)	+0.13%/°C (Ohms)
PW2	2	0.18	2.4K	0.18 to 0.62	0.68 to 2.4K	0.1 to 30	0.24 to 130	0.82 to 120	1.0 to 10
PW3	3	0.1	7.5K	0.1 to 0.27	0.3 to 7.5K	0.1 to 56	01. to 270	0.20 to 270	0.24 to 20
PW5	5	0.1	8.5K	0.1 to 0.36	0.39 to 8.5K	0.1 to 68	0.1 to 300	0.24 to 300	0.27 to 22
PW7	7	0.1	18K	0.1 to 0.56	0.62 to 18K	0.1 to 150	0.15 to 680	0.51 to 670	0.62 to 51
PW10	10	0.18	30K	0.18 to 0.91	1.0 to 30K	0.1 to 240	0.24 to 1100	0.82 to 1100	1.0 to 82
PW15	15	0.18	30K	0.18 to 0.91	1.0 to 30K	0.1 to 240	0.24 to 1100	0.82 to 1100	1.0 to 82
PW22	22	0.27	12K	0.27 to 1.3	1.3 to 12K	0.15 to 360	0.36 to 1800	1.25 to 1800	1.5 to 120

*Consult IRC for lower ranges

Tolerance: ±5% and ±10% (standard) tolerances on Standard Temperature Coefficient Resistors. Ranges below 1 ohm available in ±10% tolerance only.

Dimensions in Inches ±.03			
Type	**L**	**W**	**H**
PW2	.69	.25	.25
PW3	.88	.31	.31
PW5	.88	.38	.35
PW7	1.39	.38	.35
PW10	1.88	.38	.35
PW15	1.88	.50	.50
PW22	2.50	.50	.50

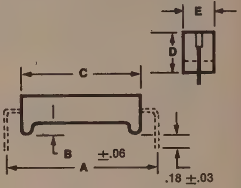
Note: Type PW-50 chassis mounted unit also available. Contact factory.



*1.44 min. on PW2 **.032 dia. on PW2
Add .125 for clean lead length

Recommended Mtg. Dimensions					
Type	**A**	**B**	**C**	**D**	**E**
PW-3A	1.25	.06	.88	.38	.31
PW-5A	1.25	.06	.88	.41	.38
PW-7A	1.75	.12	1.39	.47	.38
PW-10A	2.25	.12	1.88	.47	.38
PW-15A	2.25	.12	1.88	.63	.50

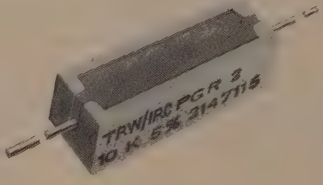
Standard parts are supplied with straight axial leads. Consult factory for available configurations for printed circuit mounting.



PGR METAL GLAZE GENERAL PURPOSE FLAMEPROOF RESISTORS

PGR resistors are inorganically filled, ceramic insulated resistors for use wherever economical flameproof resistors are required, particularly in resistance values 1K and above.

The two main flameproof characteristics are that the resistors open cleanly under overloads and/or will not support combustion.



DIMENSIONS ± .03″ PGR **DIMENSIONS ± .03″ PGR-A**

TYPE	L	W	H	Lead Dia.	Lead Length	TYPE	L	W	H	Lead Dia.	Lead Length
PGR-1	.59	.25	.25	.032	1⅜″±⅛	PGR-1A	.59	.25	.31	.032	1⅜″±⅛
PGR-2	.69	.25	.25	.032	1½″min.	PGR-2A	.69	.25	.31	.032	1½″min.
PGR-3	.88	.31	.31	.032	1½″min.	PGR-3A	.88	.31	.38	.032	1½″min.

TYPE PGR SPECIFICATIONS **TYPE PW STYLE EQUIVALENT**

TYPE	Rated Power @ 70°C Ambient	Resistance Range	Tolerance	Temperature Coefficient	Maximum Voltage Rating	TYPE	Resistance Range	Tolerance
PGR-1	1 WATT	10Ω-100KΩ	±5, 10%	±.02%	600V	—	—	—
PGR-2	2 WATTS	1K-100KΩ	±5, 10%	±.02%	600V	PW-2	0.18 to 2.4KΩ	±5, ±10%
PGR-3	3 WATTS	1K-100KΩ	±5, 10%	±.02%	600V	PW-3	0.1 to 7.5KΩ	±5, ±10%

Closer tolerances available on request. Dielectric strength—1000 V D.C.

±10% Only Below 1Ω.

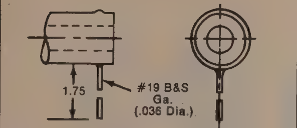
TRW/IRC RESISTORS, AN ELECTRONIC COMPONENTS DIVISION OF TRW INC., P.O. BOX 393, BOONE, N.C. 28607 (704) 264-8861

POWER WIREWOUND RESISTORS

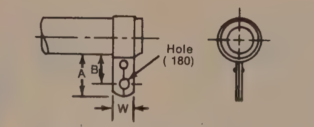
TRW/IRC Power Wirewound Resistors are designed to meet or exceed the requirements of MIL-R-26E and are available in a wide range of tubular, flat, ferrule and adjustable styles.

TRW/IRC
120W

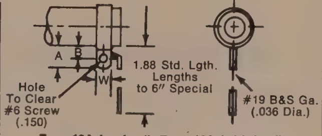
Tubular power wirewound resistors are standard tubular construction with lugs or leads for use in general applications. They are used in DC and low frequency AC circuits where appreciable power must be dissipated.



Type 1



Type 4A


A
B
W
Hole To Clear #6 Screw (.150)
1.88 Std. Lgth. Lengths to 6" Special
#19 B&S Ga. (.036 Dia.)

Type 12A (no lead) Type 13A (with lead)

PERFORMANCE AND SPECIFICATIONS

IRC WATTAGE	IRC TYPE	MIL Equiv.	CORE DIMENSION Length in Inches	O.D. in Inches	I.D. in Inches	TERMINALS Std.	Special	RESISTANCE RANGE (Ohms)	
4	⅞A		.88	.31	.19	12A	1*, 13A	0.10	10K
5	1A		1.00	.31	.19	13A	1**, 12A	0.10	15K
12	1¾A	RW29	1.75	.31	.19	13A†	1, 12A	0.10	50K
12	1C	RW30	1.00	.44	.27	12A	1, 13A	0.10	20K
15	1½C	RW31	1.50	.44	.27	12A	1, 13A	0.10	50K
20	2C	RW32	2.00	.44	.27	13A†	1, 12A	0.10	80K
25	2D		2.00	.56	.38	12A	1,4A, 13A	0.10	100K
26	3C	RW33	3.00	.44	.27	12A	1, 13A	0.10	150K
30	2½D		2.50	.56	.38	12A	1,4A, 13A	0.10	150K
35	3D		3.00	.56	.38	12A	1,4A, 13A	0.10	200K
45	3E		3.00	.75	.50	12A	4A, 13A	0.15	250K
50	3½E		3.50	.75	.50	12A	4A, 13A	0.20	300K
50	4D		4.00	.56	.38	12A	1,4A, 13A	0.20	300K
60	4E	RW35	4.00	.75	.50	12A	4A, 13A	0.20	350K
60	5D		5.00	.56	.38	12A	1,4A, 13A	0.25	400K
65	4½E		4.50	.75	.50	12A	4A, 13A	0.25	400K
75	5E		5.00	.75	.50	12A	4A, 13A	0.27	450K
80	4H	RW36	4.00	1.12	.75	4A	—	0.30	525K
100	6½E		6.50	.75	.50	12A	4A, 13A	0.36	600K
120	6H	RW37	6.00	1.12	.75	4A	—	0.47	850K
130	6½H		6.50	1.12	.75	4A	—	0.56	900K
160	8H	RW38	8.00	1.12	.75	4A	—	0.68	1.15 Meg.
175	8½H		8.50	1.12	.75	4A	—	0.75	1.25 Meg.
225	10½H	RW47	10.50	1.12	.75	4A	—	0.91	1.5 Meg.
250	12H		12.00	1.12	.75	4A	—	1.00	1.75 Meg.

NOTE: Non-inductive, tapped, and adjustable resistors also are available.

*6 Watts **8 Watts †12A std. on adjustable type

TRW/IRC
TYPE FRW
27Ω
30W

Flat power wirewound resistors offer a higher power-to-space ratio than tubular configurations. They are offered in self-stacking and snap-in assembly mounting brackets, and quick disconnect male terminals are available. NOTE: Stack-mounted resistors must be derated to limit the hotspot of the hottest unit to 350°C. For more efficient ventilation, resistors should be mounted with their flat sides (short axis) on a vertical axis.

PERFORMANCE AND SPECIFICATIONS

IRC WATTAGE	IRC TYPE	POWER RATING MIL Equiv.	V Watts	DIMENSIONS IN INCHES Mounting Centers	Core Length	RESISTANCE RANGE (ohms)	
30	FRW-20	RW20	21	2.00	1.25	0.1	15K
40	FRW-21	RW21	31	2.75	2.00	0.1	35K
55	FRW-22	RW22	53	4.25	3.50	0.20	75K
70	FRW-23	RW23	68	5.50	4.75	0.25	110K
95	FRW-24	RW-24	91	6.75	6.00	0.35	140K

TRW® IRC RESISTORS

AW COMMERCIAL WIREWOUND RESISTORS

Type AW resistors are available in a wide range of configurations to meet low-cost, high volume applications in the automotive and appliance fields. A range of terminal styles is available, and others can be made to user specifications at a nominal cost. Power ratings are 4.5 watts per inch between mounting centers on the standard AW, and 6 watts per inch between mounting centers on the Hi-Wattage AW resistor.

CONCENTRIC DISCS and STRIPS

Concentric discs and strips are available in power ratings of up to 1 watt per square inch. These resistors are carbon composition film screen on various flat substrates. Available 20Ω-100KΩ/sq. Standard tolerances are ± 20%.

Disc resistors are die stamped from resistance strips. Inner and outer rings of colloidal silver are applied to provide contact with coaxial line fixtures. Special configurations and tolerances to ± 10% are available. Applications are variable speed controls in automotive and appliance products, antenna rotor controls wherever a low cost special configuration pot element is required in quantity.

TRW/IRC RESISTORS, AN ELECTRONIC COMPONENTS DIVISION OF TRW INC., P.O. BOX 393, BOONE, N.C. 28607 (704) 264-8861

TRW/IRC APPLICATION/DESIGN CAPABILITY

It is impossible to describe in this catalog all the product variations available from TRW/IRC Resistors. Selected TC's, special tolerances, fixed rise times . . . the unique configurations variations are limited only by our mutual ability to work together.

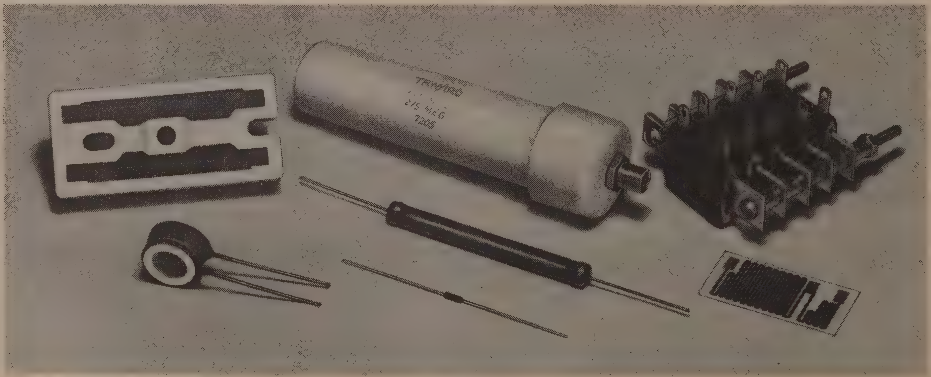
Beyond this, TRW also offers an application/design capability second to none in the industry—and ready to meet virtually any resistive need you might have.

This technology embraces both thin and thick metal film, networks, wirewounds, high-voltage and ultra-precision resistors. In thin-film, for example, it includes tolerance and TC matching down to .01% and 5 PPM/°C respectively. In thick-film, it includes design capabilities in subminiature, tubular substrates — for relays, LED's, and connector applications. In wirewound resistors and assemblies, it includes specialized TC's, fusible units, and custom configurations.

Too, TRW technology also takes in high-precision tantalum-nitride networks. Because of the high circuit density possible with tantalum units, this technology offers opportunities for extreme miniaturization.

* * *

The foregoing scarcely touches the highlights of TRW/IRC's application/design capability. But most important, whatever your performance, configuration or environmental problem, we urge that you let us work with you at the **design** stage. It's at this point, we believe, that we can offer the greatest help in application and cost effectiveness.



TRW/IRC RESISTORS, AN ELECTRONIC COMPONENTS DIVISION OF TRW INC., 401 N. BROAD ST., PHILADELPHIA, PA. 19108 (215) 922-8900

TRW® IRC RESISTORS

MIL SPEC DEFINITIONS, TERMINOLOGY

MIL—R—11 (RC) RC07GF153K

RC07	**GF**	**153**	**K**
Style/Power (See Tables 1 and 2)	"G" = 70°C Max. ambient temperature for full load operation. "F" = Temperature Coefficient which varies (with resistance) from ±625 ppm/°C to ±3100 ppm/°C.	Resistance First 2 digits significant, 3rd digit "number of zeros." 153 = 15,000Ω	Tolerance (See Table 4) K = ± 10%

MIL—R—22684 (RL) RL07S153J

RL07	**S**	**153**	**J**
Style/Power (See Tables 1 and 2)	Terminal (Lead) "S" = Solderable	Resistance First 2 digits significant, 3rd digit, "number of zeros." 153 = 15,000Ω	Tolerance (See Table 4) J = ±5%

MIL—R—10509 (RN) RN60D1003F

RN60	**D**	**1003**	**F**
Style/Power (See Tables 1 and 2)	Characteristic (See Table 3) D = ±100 ppm/°C	Resistance First 3 digits significant, 4th digit "number of zeros." 1003 = 100,000Ω	Tolerance (See Table 4) F = ±1%

MIL—R—26 (RW)—Numbering System Complex (See MIL spec) RW55U49R9F

RW55	**U**	**49R9**	**F**
Style/Power Size/ Construction	Max. "Hot Spot," derating temperature, insulation resistance and moisture resistance. "U" or "V" characteristic.	Resistance 3 or 4 digits depending on the TC, tolerance, etc. "U" char. has 4 "V" char. has 3	Tolerance (See Table 4) Only applicable to "U" char.

MIL—R—39008 (RCR) RCR07G153JS

RCR07	**G**	**153**	**J**	**S**
Style/Power (See Tables 1 and 2)	Characteristic "G" indicates a max. ambient temperature of 70°C for full load operation, and a TC which varies (with resistance) from ±625 ppm/°C to ±1900 ppm/°C.	Resistance First 2 digits significant, 3rd digit, "number of zeros." 153 = 15,000Ω	Tolerance (See Table 4) J = ±5%	Failure Rate (See Table 5) S = .001%/ 1000 hours

MIL—R—39017 (RLR) RLR07C153GR

RLR07	**C**	**153**	**G**	**R**
Style/Power (See Tables 1 and 2)	Terminal (Lead) "C" = Solderable/Weldable	Resistance First 2 digits significant, 3rd digit, "number of zeros." 153 = 15,000Ω	Tolerance (See Table 4) G = ±2%	Failure Rate (See Table 5) R = ±0.1%/ 1000 hours

MIL—R—55182 (RNR) RNR60H1003FS

RNR60	**H**	**1003**	**F**	**S**
Style, Terminal and Power (See Tables 1 and 2) RNR = Solderable Leads RNC = Solderable/Weldable Leads RNN = Nickel Leads	Characteristic (See Table 3) H = ±50 ppm/°C	Resistance First 3 digits significant, 4th digit "no. of zeros." 1003 = 100,000Ω	Tolerance (See Table 4) F = ±1%	Failure Rate (See Table 5) S = .001%/ 1000 hours

NOTE: The Established Reliability specifications (i.e., MIL-R-39008, MIL-R-39017, and MIL-R-55182) supersede MIL-R-11, MIL-R-22684, and MIL-R-10509 respectively, for all *new* design. Resistors qualified to the three Established Reliability specifications may be substituted, without limitation, wherever the older MIL devices are specified.

TABLE 1—Resistor Style

RC	Fixed Composition Resistor (MIL-R-11)
RCR	Fixed Composition Resistor, Established Reliability (MIL-R-39008)
RL	Fixed Film Resistor (MIL-R-22684)
RLR	Fixed Film Resistor, Established Reliability (MIL-R-39017)
RN	Fixed Resistor, High Stability (MIL-R-10509)
RNR	Fixed Film Resistor, Established Reliability (MIL-R-55182)
RW	Fixed Wirewound Resistor, Power Type (MIL-R-26)

TABLE 2—
Size/Power @ 70° unless otherwise stated)

05—⅛ watt 07—¼ watt 20—½ watt 32—1 watt 42—2 watt	MIL-R-11 (RC) MIL-R-39008 (RCR) MIL-R-22684 (RL) MIL-R-39017 (RLR)
50—1/20 watt (@ 125°C) 55—⅛ watt 60—¼ watt 65—½ watt 70—¾ watt 75—1 watt (@ 125°C) 80—2 watt (@ 125°C)	MIL-R-10509 (RN) MIL-R-55182 (RNR)

TABLE 3—Characteristic

B = ±500 ppm/°C C = ± 50 ppm/°C (T2) D = ±200, 500 ppm/°C (T0) E = ± 25 ppm/°C (T9) F = ± 50 ppm/°C	MIL-R-10509 (RN)
H = ± 50 ppm/°C (T2) J = ± 25 ppm/°C (T9) K = ±100 ppm/°C (T0)	MIL-R-55182 (RNR)

NOTE: RL and RLR resistors are ±200 ppm/°C. There is no temperature coefficient designation in the RL numbering system.

TABLE 4—
Tolerance

K = ±10%
J = ±5%
G = ±2%
F = ±1%
D = ±0.5%
C = ±0.25%
B = ±0.10%

TABLE 5—
Failure Rate
1000 Hours
(60%
Confidence)

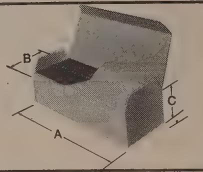
M = 1.0%
P = 0.1%
R = .01%
S = .001%

TRW® IRC RESISTORS

PACKAGING STYLES

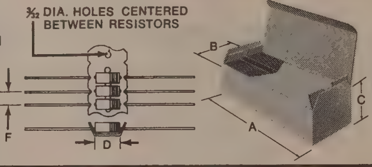
Consult factory for standard package available for the resistor of your choice.

Oriented Bulk: Preferred by manufacturers with their own feeding or taping arrangements. Resistors are axially oriented.



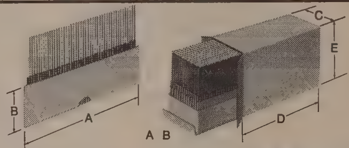
Type	Wattage	Standard Quantity Per Box	A	B	C
GBT-¼	¼	2500	10⁷⁄₁₆″	3¹¹⁄₁₆″	1⁵⁄₁₆″
GBT-½	½	2000	10⁷⁄₁₆″	4⅛″	2⁵⁄₁₆″
GBT-½V	½	2000	10⁷⁄₁₆″	4⅛″	2⁵⁄₁₆″
GBT-1	1	1000	10⁹⁄₁₆″	4¼″	2¹¹⁄₁₆″
BW-20	1	2000	10⁷⁄₁₆″	4⅛″	2⁵⁄₁₆″
BWH	2	1000	10⁹⁄₁₆″	4¼″	2¹¹⁄₁₆″

Grip Strip® A TRW exclusive. Resistors are held without adhesive in strips for ease of handling and counting.



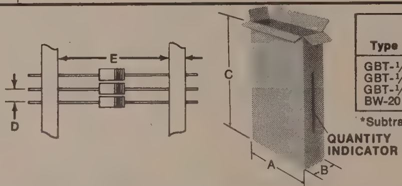
Type	Wattage	Standard Per Box	Quantity Per Strip	A	B		D	F
GBT-½	½	1000	50	10⁷⁄₁₆″	4⅛″	2⁵⁄₁₆″	.182″	⁷⁄₁₆″
GBT-½V	½	1000	50	10⁷⁄₁₆″	4⅛″	2⁵⁄₁₆″	.182″	⁷⁄₁₆″
GBT-1	1	1000	40	12″	4⁵⁄₁₆″	4″	.260″	⁹⁄₁₆″
BW-20	1	1000	50	10⁷⁄₁₆″	4⅛″	2⁵⁄₁₆″	.182″	⁷⁄₁₆″
BWH	2	1000	40	12″	4⁵⁄₁₆″	4″	.260″	⁹⁄₁₆″

Corrugated Card Pack: Resistors are inserted into the flutes of corrugated cards.



Type	Wattage	Standard Quantity Per Box	Quantity Per Strip	A	B	C	D	E
GBT-¼	¼	1000	50	6⅜″	1½″	2¹³⁄₁₆″	6⅞″	3½″
GBT-½	½	1000	50	8⅛″	1½″	3¹¹⁄₁₆″	8⅝″	3⅝″
BW-20	1	1000	50	8½″	1½″	3¹¹⁄₁₆″	8⅝″	3⅝″

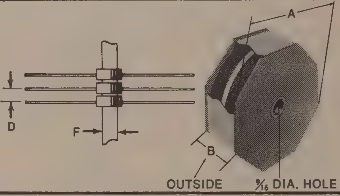
Ammo-Pak®: 10,000 resistor package is a continous lead tape belt. Each lead of the resistor is held between two sets of pressure sensitive tape.



Type	Wattage	Standard Quantity Per Box	A*	B*	C**	D ±.015″	E ±¹⁄₁₆″	F
GBT-¼	½	10,000	10³⁄₁₆″	3¾″	9¾″	.200″	2¹⁄₁₆″	¼″
GBT-½V	½	10,000	12½″	4″	19″	.200″	2¹⁄₁₆″	¼″
GBT-½	½	10,000	12½″	4″	19″	.200″	2¹⁄₁₆″	¼′
BW-20	1	10,000	12½″	4″	19″	.200″	2¹⁄₁₆″	¼″

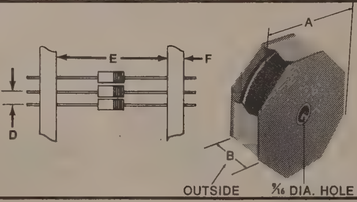
*Subtract ¼″ (**subtract ½″) for inside carton dimensions.

Body Tape Reel: Each resistor body is held by a pressure sensitve tape.



Type	Wattage	Standard Quantity Per Reel	A (Across Corners) Max.	B Max.	D	F
GBT-¼	¼	2500	6½″	3⅝″	.105″	³⁄₁₆″
GBT-¼	¼	5000	9¾″	3⅝″	.105″	³⁄₁₆″
GBT-½	½	2500	9¾″	3¹³⁄₁₆″	.158″	¼″
GBT-½	½	5000	13½″	3¹³⁄₁₆″	.158″	¼″
GBT-½V	½	2500	9¾″	3¹³⁄₁₆″	.158″	¼″
GBT-½V	½	5000	13½″	3¹³⁄₁₆″	.158″	¼″
GBT1	1	2000	13½″	3¹³⁄₁₆″	.260″	⅜″
BW-20	1	2500	9¾″	3¹³⁄₁₆″	.158″	¼″
BW-20	1	5000	13½″	3¹³⁄₁₆″	.158″	¼″
BWH	2	2000	13½″	3¹³⁄₁₆″	.260″	⅜″

Lead Tape Reel: Each resistor lead is held between two sets of pressure sensitive tape.



Type	Wattage	Standard Quantity Per Reel	A (Across Corners) Max.	B Max.	D ±.015″	E ±¹⁄₁₆″	F
GBT-¼	¼	2500	10⅞″	3¹³⁄₁₆″	.200″	2¹⁄₁₆″	¼″
GBT-¼	¼	5000	13½″	3¹³⁄₁₆″	.200″	2¹⁄₁₆″	¼″
GBT-½	½	2500	10⅞″	3¹³⁄₁₆″	.200″	2¹⁄₁₆″	¼″
GBT-½V	½	2500	10⅞″	3¹³⁄₁₆″	.200″	2¹⁄₁₆″	¼″
GBT-½	½	5000	13½″	3¹³⁄₁₆″	.200″	2¹⁄₁₆″	¼″
GBT-1	1	2000	13½″	3¹³⁄₁₆″	.375″	2⅞″	¼″
BW-20	1	2500	10⅞″	3¹³⁄₁₆″	.200″	2¹⁄₁₆″	¼″
BW-20	1	5000	13½″	3¹³⁄₁₆″	.200″	2¹⁄₁₆″	¼″
BWH	2	2000	13½″	3¹³⁄₁₆″	.375″	2⅞″	¼″

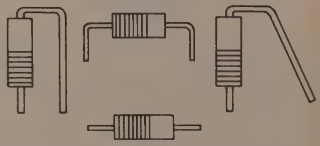
*Other spacing available.

Cut and formed leads

TRW/IRC offers the widest selection of pre-cut and formed units in the industry.

Purchasing of pre-cut units offers the user very significant savings in labor and assembly, as well as savings in valuable plant space, since units take only half the space of other packaging styles.

Drawings shown are for carbon composition types. These packaging styles are available for many wirewound and film resistors with some dimensional variations. Consult your sales representative or the factory for specifications, availability and costs.



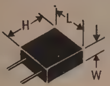
CUT AND FORMED LEADS AVAILABLE
CONTACT FACTORY FOR DIMENSIONS

VISHAY RESISTIVE SYSTEMS GROUP

OF VISHAY INTERTECHNOLOGY, INC.

63 LINCOLN HIGHWAY, MALVERN, PA. 19355 • PHONE: (215) 644-1300
• TWX: 510-668-8944

ULTRA-PRECISE RESISTORS WITH TCR TO ±1ppm/°C (0°C to 60°C)



S102 Series
Stability: 25ppm/yr.
Tolerance: To ±0.005%

VISHAY
HP202

Hermetic Seal
HP202 Series
(Radial Leads)
Stability: 5ppm/yr.
Tolerance: To ±0.001%

Hermetic Seal
HA Series
(Axial Leads)
Stability: 5ppm/yr.
Tolerance: To ±0.001%

STYLE		S102	S104	S105	S106C	Hermetic Seal HA Series (Axial Leads)	Hermetic Seal HP Series (Radial Leads)
Dimensions (inches)	H	.320	.520	.520	.520	3/8 dia. x 5/8 Lg. to 1/2 dia. x 1½ Lg.	.430
	L	.295	.565	.810	1.190		.435
	W	.100	.150	.150	.245		.185
Value Range (ohms) and Wattage rating at 125°C		30 to 100K 0.3W	60 to 200K 0.5W	90 to 300K 0.75W	120 to 600K 1.00W	30 at 0.3W to 1 meg. at 1.25W	30 to 100K 0.3W at 25°C (HP202)
Lead Spacing (inches) Leads are #22 AWG Tinned Copper		.150	.400	.650	.900	(Axial)	.150

VALUE ENGINEERED RESISTORS WITH TCR TO ±10ppm/°C (0°C to 60°C)

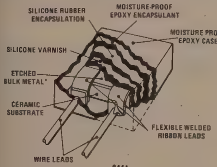
M Series
(Axial Leads)

Stability: 30ppm/yr.
Tolerance. To ±0.02%

V Series
(Radial Leads)

STYLE		V53-1	V53-5	V53-6	V53-7	M53	M55
Dimensions (inches)	H	3/8	1/2	1/2	1/2	3/8″ dia. x 3/4″ Long	1/4″ dia. x 1/2″ Long
V Series (Leads) are #22 AWG tinned copper)	W	3/8	5/8	7/8	1⅛		
M Series (Leads) are #20 AWG tinned copper	D	.200	.225	.225	.225		
Value Range (ohms) and Wattage rating (at ambient of 60°C without heat sink)		5 to 75K 0.3W	60 to 150K 0.5W	90 to 225K 0.75W	120 to 300K 1.0W	30 to 75K 0.5W	30 to 50K 0.25W
Lead Spacing (inches)		.150	.400	.650	.900	(Axial)	(Axial)

ESTABLISHED RELIABILITY RESISTORS PER MIL-R-55182/9


SILICONE RUBBER ENCAPSULATION
MOISTURE-PROOF EPOXY ENCAPSULANT
MOISTURE PROOF EPOXY CASE
SILICONE VARNISH
ETCHED BULK METAL
CERAMIC SUBSTRATE
FLEXIBLE WELDED RIBBON LEADS
WIRE LEADS

S444

	RNC90Y Limits	S444 Capabilities
Tolerance	To: 0.01%	To: 0.005%
TCR	5ppm/°C (−55 to +125°C)	1ppm/°C (0°C to +60°C)
Life at 10,000 hours	△R 5000ppm	△R 200ppm
Tracking	Not specified	To: 1/2ppm/°C
Shelf Stability	Not specified	50ppm after 10 yrs.
Noise	Not specified	Non measureable
Voltage Coefficient	0.0005% per volt	Negligible

- Small size: 0.100″ x 0.300″ board space
- Non inductive: 0.08 microhenry max.
- High temperature exposure: 175°C max.
- Power rating: 0.3W at 125°C

"BUILD PRECISION RESISTORS IN HOUSE"

Vishay's **In Plant Station** package provides the technology, equipment, and techniques to produce high precision resistors in your own laboratory.

- Tolerances: To ±0.005%
- TCR of 1ppm/°C (0°C to 60°C)

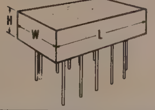
APPLICATIONS:

Breadboarding	Prototypes
Set and forget trimmer	Production

RESISTOR NETWORKS — VOLTAGE DIVIDERS — ATTENUATORS — BCD DECADE MODULES

STANDARD NETWORKS

BINARY and R-2R



Model No.	No. Bits	L (inches)
Series 500	4 or 5	0.700
	6, 7, or 8	1.080
H =0.5″	9 or 10	1.300
	11	1.500
W=0.750″	12 or 13	1.660
	14 or 15	1.900
Series 375	4	0.730
	5 or 6	1.080
H =0.375″	7 or 8	1.380
	9 or 10	1.680
W=1.230″	11 or 12	1.980
	13 or 14	2.280
	15	2.590

RESOLUTION TO **16** BITS

FULL SCALE ACCURACY TO **0.001%**

RISE TIME
LESS THAN **10** NANOSECONDS

SETTLING TIME
LESS THAN **50** NANOSECONDS

TEMPCO
LESS THAN **1** PPM/°C
FOR ALL VALUES (0°C TO 60°C)

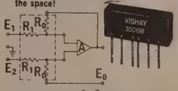
TRACKING TO **1/2** PPM/°C

STABILITY **25** PPM OVER 3 YRS.

BCD TO 4 DIGITS

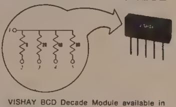
UNITIZED RESISTOR CIRCUITS SAVE *ALL* THESE OPERATIONS:

- Multi-component receiving inspection
- Sorting for TCR or ratio match
- Pre-packaging or binning
- Multi-insertions. With only ONE INSERTION you can assemble up to 4 resistors on a PC board, and in ⅛ the space!

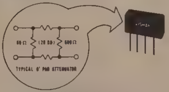


Typical op-amp feedback resistors showing how one VISHAY pre-packaged 4 resistor assembly can be used to replace precision wirewounds.

VISHAY pre-packaged 2 resistor voltage divider. Other configurations available with up to 4 discreet resistors



VISHAY BCD Decade Module available in any coding system: 1-2-2-4, 1-2-4-8, etc., up to 100K per resistor



ATTENUATOR MODULES

Virtually noiseless with no cross coupling Available in "L", "U", "Pi", "O", "T", Balanced "U", and bridged "T" configurations, with stability of 25ppm/yr., T.C.R. of ±1ppm/°C, and 10 nanoseconds rise time.

HIGH ACCURACY RATIO MATCH

- Each Resistor: 100Ω to 75K
- Absolute Tol. each R: To .005%,
- Absolute TCR each R: ±5ppm/°C (−55°C to +125°C)
- Tol. Match: To .005%
- TCR Match: Within 3ppm/°C (−55°C to +125°C)

MOX-750
MOX-1125
MOX-400
1906

VICTOREEN MINI-MOX RESISTORS

*"A" SERIES FOR SUPERIOR RELIABILITY

- **VOLTAGE RATING TO 5 kV**
- **POWER RATING TO 1 WATT**
- **±100 ppm TCR**
- **FULL LOAD STABILITY ±2% FOR 1000 HOURS AT 70°C**
- **RESISTANCE VALUES TO 10,000 MEGOHMS**

For design of high-voltage, highly-stable miniaturized electronic networks and equipment, the new MINI-MOX resistors have all the ingredients you need for ultra-critical applications. For instance, MINI-MOX resistors are a fraction the size of conventional types . . . 100 ppm TCR or less to 600 megohm; stability better than ±2% for 1000 hours at full load. In addition, typical quantech noise at 20 megohms is less than 1.5 microvolt/volt. All these characteristics combine to provide extremely-rugged and highly-stable resistor configurations that are virtually immune to environmental extremes. MINI-MOX resistors — where power and voltage to size ratios are critical.

RESISTANCE RANGE

See Table I.

VOLTAGE COEFFICIENT

Voltage coefficient depends on a number of resistor parameters, the most influential of which is resistor value. In general, the higher the resistance value, the higher the voltage coefficient. Victoreen tries to maintain a maximum voltage coefficient of 5 ppm/volt over the complete voltage range of the resistor.

STABILITY

Full load drift (rated wattage at 70°C) is less than 2% in 1000 hours. Shelf life or dry circuit drift is less than 0.1% per year.

TEMPERATURE COEFFICIENT

In accordance with Table II, the temperature range for calculating temperature coefficients is −55°C to +125°C.

VOLTAGE RANGE

Below critical resistance values, the voltage is limited by the wattage rating of the resistor. Application of the power formula $E^2 = WR$ will indicate the permissible maximum voltage. (Refer to Table I for additional data.)

WATTAGE RATING

Wattage ratings calculated on the basis of 70°C ambient temperature. MOX Series A resistors are derated to zero watts at 180°C.

RESISTOR CONSTRUCTION

Metal oxide glaze on a solid alumina core. A gold termination is used which accommodates a close fitting pressed on welded cap and lead assembly. Leads are tinned dumet. Other type leads including tinned copper and gold plated can be supplied. Resistors are marked with Type, Resistance Value and Tolerance. Customer marking available as an option.

COATING

Epoxy Resin

- Resists most industrial solvents.
- Excellent moisture resistance.
- High dielectric and low outgassing.
- Maximum hot spot temperature of 180°C.

***A high power MINI-MOX Resistor is available but its use is recommended only where the additional power dissipation is clearly indicated. Consult the factory for details.**

VICTOREEN

VICTOREEN INSTRUMENT DIV.
10101 WOODLAND AVENUE • CLEVELAND, OHIO 44104

SG SHELLER-GLOBE CORPORATION

SPECIFICATIONS

The following test specifications of Mil. Std. 202 are applicable to these resistors.

1. **MOISTURE RESISTANCE:**
   Method 103B, △R .25% max. Test condition B.
2. **TEMPERATURE CYCLING:**
   Method 102A test condition C, △R .2%.
3. **DIELECTRIC WITHSTANDING:**
   Method 301, 750 volts, △R .25%.
4. **INSULATION RESISTANCE:**
   Method 302 test condition A or B, 10,000 megs dry.
5. **SHOCK:** Method 205D test condition C, △R .25%.
6. **VIBRATION:** Method 204B test condition D, △R .2%.
7. **RESISTANCE TO SOLVENTS:** Method 215.
8. **TERMINAL STRENGTH:**
   Method 211A test conditions A and D, △R .25%.

There are no Mil specs specifically written to cover Mox type film resistors. However, the following are useful as reference documents:

Mil-R-10509F Mil-R-22684B Mil-R-39017A Mil-R-55182D

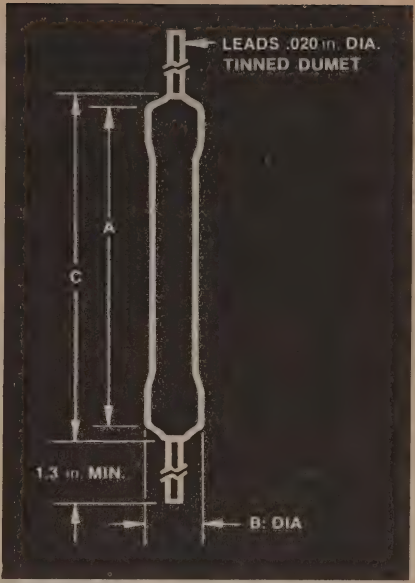


Table I — Resistor Specifications

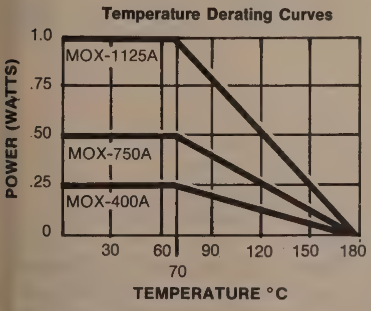
Model	Resistance Range	Power Rating @ 70°C	[1]Max. Oper. Volts	[2]Available Tolerance	Critical Resistance	Max. Surface Temperature	Max. Dimensions (Inches) A	B	C
MOX-400A	100K- 2500 Megs	.25W	1000V	1, 2, 5 & 10%	4 Megs	180°C	.540	.165	.600
MOX-750A	100K- 5000 Megs	.5W	2000V	1, 2, 5 & 10%	8 Megs	180°C	.860	.165	.920
MOX-1125A	100K-10,000 Megs	1W	5000V	1, 2, 5 & 10%	25 Megs	180°C	1.250	.165	1.310

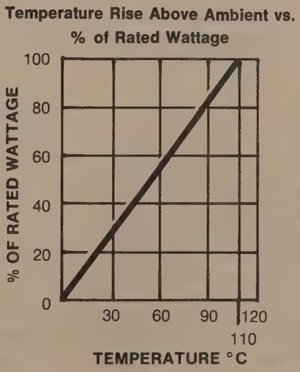
[1] Applicable above critical resistance.

[2] MOX- 400A: Below 1000 megohms, 1%, 2% & 5%; 1000 megohms and above, 2%, 5% & 10%.
MOX- 750A: Below 2000 megohms, 1%, 2% & 5%; 2000 megohms and above, 2%, 5% & 10%.
MOX-1125A: Below 3000 megohms, 1%, 2% & 5%; 3000 megohms and above, 2%, 5% & 10%.

Table II — Temperature Coefficient

Standard Temperature Coefficient	MOX-400A	MOX-750A	MOX-1125A
±100 ppm	100 K ohms to 200 Megs	100 K ohms to 400 Megs	100 K ohms to 600 Megs
±250 ppm	200 Megs to 1000 Megs	400 Megs to 2000 Megs	600 Megs to 3000 Megs
±600 ppm	1000 Megs to 2500 Megs	2000 Megs to 5000 Megs	3000 Megs to 10,000 Megs


Temperature Derating Curves


Temperature Rise Above Ambient vs. % of Rated Wattage

These resistors are capable of dissipating higher wattages than rated if ambient temperatures are lower than 70°C or if forced air or oil cooling is employed. This additional capability can be determined in accordance with the temperature rise and the derating curves.

SG SHELLER-GLOBE CORPORATION

VICTOREEN INSTRUMENT DIV.
10101 WOODLAND AVENUE • CLEVELAND, OHIO 44104

VICTOREEN

VICTOREEN MAXI-MOX RESISTORS

*"A" SERIES FOR SUPERIOR RELIABILITY

SUPERIOR RELIABILITY

- WIDE RESISTANCE RANGE — 10 K OHMS TO 5000 MEGOHMS
- FULL LOAD STABILITY BETTER THAN ±1% FOR 2000 HOURS AT 70°C
- EXCELLENT HIGH VOLTAGE, HIGH TEMPERATURE AND HIGH FREQUENCY OPERATION
- FULL PROTECTION AGAINST ROUGH HANDLING AND ENVIRONMENTAL EXTREMES
- TOLERANCE TO 1%
- POWER RATINGS TO 7.5 WATTS

MAXI-MOX resistors are available in a range of resistance values, voltage and power ratings which will handle most high voltage applications. From 7.5 kV to 37.5 kV, their high voltage parameters are unexcelled.

VOLTAGE RANGE

Below critical resistance values, the voltage is limited by the wattage rating of the resistor. Application of the power formula $E^2 = WR$, will indicate the permissible maximum voltage. (Refer to Table I for additional data.)

STABILITY

Full load drift (rated wattage at 70°C) is less than 1% in 2000 hours. Shelf or dry circuit drift is less than .1% per year.

RESISTOR CONSTRUCTION

Metal oxide glaze fired on an alumina core at temperatures in excess of 800°C. A gold termination is fired on over the glaze which accommodates a close fitting, pressed on welded cap and lead assembly. Standard lead material is tinned copper, other material including tinned dumet and gold plating can be supplied. An alternate end cap containing a 6-32 threaded hole can also be supplied, in this case the ends of the caps are not coated with protective material. Resistors are marked with Type, Resistance Value and Tolerance. Customer marking available as an option.

VOLTAGE COEFFICIENT

Voltage coefficient depends on a number of resistor parameters, the most influential of which is resistor value. In general, the higher the resistance value, the higher the voltage coefficient. Victoreen tries to maintain a maximum voltage coefficient of 5 ppm/volt over the complete voltage range of the resistor.

WATTAGE RATING

Wattage ratings calculated on the basis of 70°C ambient temperature. MOX Series A resistors are derated to zero watts at 180°C.

TEMPERATURE COEFFICIENT

In accordance with Table II, the temperature range for calculating temperature coefficients is −55°C to +125°C.

COATING

Epoxy Resin

- Resists most industrial solvents.
- Excellent moisture resistance.
- High dielectric and low outgassing.
- Maximum hot spot temperature of 180°C.

***A high power MAXI-MOX Resistor is available but its use is recommended only where the additional power dissipation is clearly indicated. Consult the factory for details.**

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SPECIFICATIONS

The following test specifications of Mil. Std. 202 are applicable to these resistors.

1. **MOISTURE RESISTANCE:** Method 103B, △R .25% max. Test condition B.
2. **TEMPERATURE CYCLING:** Method 102A test condition C, △R .2%.
3. **DIELECTRIC WITHSTANDING:** Method 301, 750 volts, △R .25%.
4. **INSULATION RESISTANCE:** Method 302 test condition A or B, 10,000 megs dry.
5. **SHOCK:** Method 205D test condition C, △R .25%.
6. **VIBRATION:** Method 204B test condition D, △R .2%.
7. **RESISTANCE TO SOLVENTS:** Method 215.
8. **TERMINAL STRENGTH:** Method 211A test conditions A and D, △R .25%.

There are no Mil specs specifically written to cover Mox type film resistors. However, the following are useful as reference documents:

Mil-R-10509F Mil-R-22684B Mil-R-39017A Mil-R-55182D

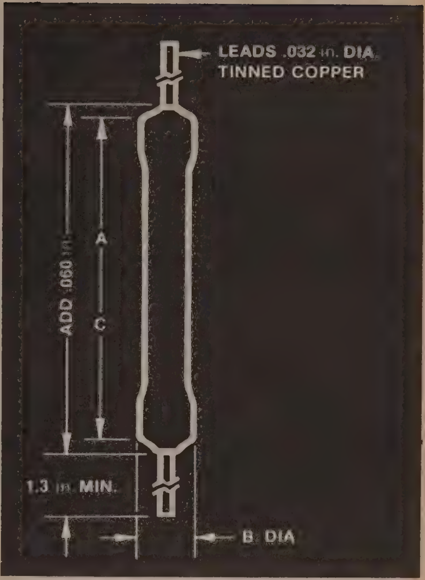


Table I — Resistor Specifications

Model	Resistance Range	Power Rating @ 70°C	¹Max. Oper. Volts	²Available Tolerance	Critical Resistance	Max. Surface Temperature	Max. Dimensions (Inches) A	B	C
MOX-1A	10K-1000 Megs	1.5W	7500V	1, 2 & 5%	37.5 Megs	180°C	1.140	.345	1.340
MOX-2A	20K-2000 Megs	3.0W	15,000V	1, 2 & 5%	75 Megs	180°C	2.140	.345	2.340
MOX-3A	30K-3000 Megs	4.5W	22,500V	1, 2 & 5%	112.5 Megs	180°C	3.140	.345	3.340
MOX-4A	40K-4000 Megs	6.0W	30,000V	1, 2 & 5%	150 Megs	180°C	4.140	.345	4.340
MOX-5A	50K-5000 Megs	7.5W	37,500V	1, 2 & 5%	187.5 Megs	180°C	5.140	.345	5.340

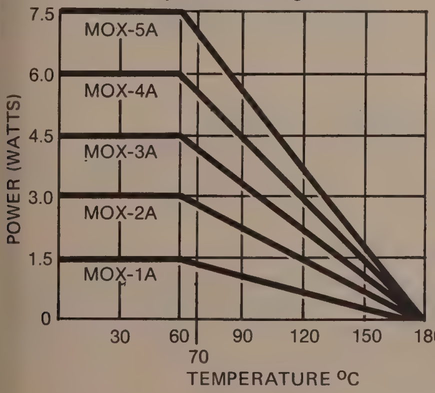
[1] Applicable above critical resistance.

[2] Length of the resistor when fitted with ferrule end caps with No. 6-32 tapped hole.

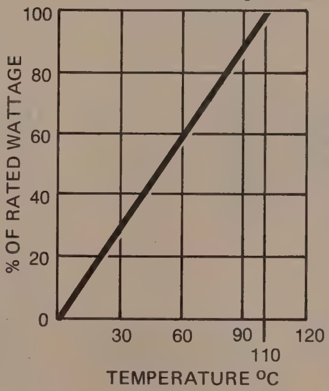
Table II — Temperature Coefficient

Standard Temperature Coefficient	MOX-1A	MOX-2A	MOX-3A	MOX-4A	MOX-5A
±100 ppm	10K-150 Megs	20K-300 Megs	30K-450 Megs	40K-600 Megs	50K-750 Megs
±300 ppm	150-1000 Megs	300-2000 Megs	450-3000 Megs	600-4000 Megs	750-5000 Megs

Temperature Derating Curves



Temperature Rise Above Ambient vs. % of Rated Wattage



These resistors are capable of dissipating higher wattages than rated if ambient temperatures are lower than 70°C or if forced air or oil cooling is employed. This additional capability can be determined in accordance with the temperature rise and the derating curves.

VICTOREEN

SLIM-MOX RESISTORS

- WIDE RESISTANCE RANGE — 1 TO 5000 MEGOHMS
- POWER RATING — 2 WATTS
- VOLTAGE RATING — 10 kV
- FULL LOAD STABILITY — TYPICALLY BETTER THAN ±0.5% FOR 1000 HOURS AT 70°C
- EXCELLENT HIGH VOLTAGE, HIGH TEMPERATURE AND HIGH FREQUENCY OPERATION

Victoreen Metal Oxide Glaze Resistors are the culmination of years of experience in the manufacture of resistors for many special applications requiring precision and reliability. The MOX resistive element is composed of highly stable metal oxides in a special glass matrix fired on high alumina substrates at temperatures in excess of 800°C. The end product is a highly stable resistor that gives improved parameters in all important areas including stability, temperature coefficients, voltage coefficients and power handling capability.

For design of high voltage, highly stable miniaturized electronic networks and equipment, the new SLIM-MOX resistors have all the ingredients you need for ultra-critical applications. For instance, SLIM-MOX resistors are a fraction the size of conventional types; 250 ppm TCR or less to 5000 megohms, stability better than ±1.5% for 1000 hours at full load, low voltage coefficient less than 5 ppm/volt. All these characteristics combine to provide extremely rugged and highly stable resistor configurations that are virtually immune to environmental extremes.

RESISTANCE RANGE

See Table I.

VOLTAGE COEFFICIENT

Voltage coefficient depends on a number of resistor parameters, the most influential of which is resistor value. In general, the higher the resistance value the higher the voltage coefficient. Victoreen tries to maintain a maximum voltage coefficient of 5 ppm/volt over the complete voltage range of the resistor.

STABILITY

Full load drift (rated wattage at 70°C) is typically 0.5% and conservatively stated as less than ±1.5% in 1000 hours. Shelf life or dry circuit drift is less than 0.1% per year.

VOLTAGE RANGE

In accordance with Table I, except below critical resistance values, the voltage is limited by the wattage rating of the resistor. Application of the power formula $E^2 = WR$, will indicate the permissible maximum voltage.

TEMPERATURE COEFFICIENT

In accordance with Table II. The temperature range for calculating temperature coefficients is −55°C to +125°C.

WATTAGE RATING

Wattage ratings are calculated on the basis of 70°C ambient temperature and derated to zero watts at 150°C. See temperature rise and derating curves. See Table I for ratings.

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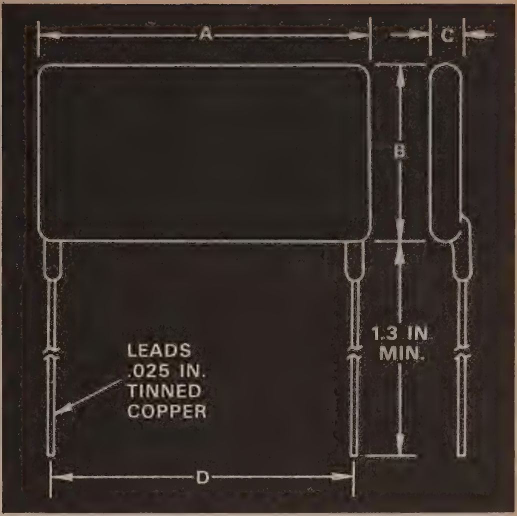


RESISTOR CONSTRUCTION

Metal oxide glaze on a solid alumina substrate. Leads are tinned copper.

COATING

Excellent environmental protection is afforded. SLIM-MOX resistors, through the use of a conformal epoxy coating, are moisture resistant and resist most industrial solvents. This coating has excellent high temperature properties allowing a maximum hot spot temperature of 150°C. It is compatible with most commonly used potting compounds, offers high dielectric and low outgassing properties.

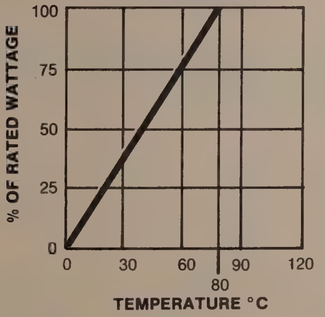
SPECIFICATIONS

Table I — Resistor Specifications

Model	Resistance Range	Critical Resistance	Power Rating @ 70°C	Maximum* Operating Volts	Available Tolerance	Maximum Surface Temp.	Dimensions (Inches)			
							A	B	C	D
SLIM-MOX 204	1M-5000M	50M	2W	10,000V	15%	150°C	1.03 ±.050	.54 ±.050	.095 ±.050	.835 ±.025

*Applicable above critical resistance.

Temperature Rise Above Ambient vs. % of Rated Wattage



Temperature Derating Curve

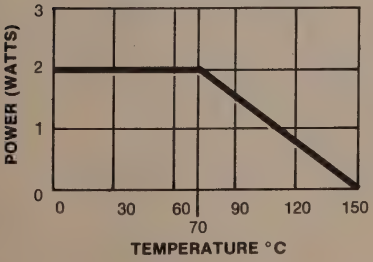


Table II — Temperature Coefficient

Standard Temperature Coefficient	SLIM-MOX 204
±250 ppm	1M to 5000M

The following resistance values are available from stock as "standard" values. Other values can be supplied where quantities warrant special set-up.

Table III — Resistance Values

Standard Resistance Values (Megohms)			
1	10	100	1000
2	20	200	2000
5	50	500	5000

These resistors are capable of dissipating higher wattages than rated if ambient temperatures are lower than 70°C or if forced air or oil cooling is employed. This additional capability can be determined in accordance with the temperature rise and the derating curves.

VICTOREEN INSTRUMENT DIV.
SHELLER-GLOBE CORPORATION **10101 WOODLAND AVENUE • CLEVELAND, OHIO 44104**

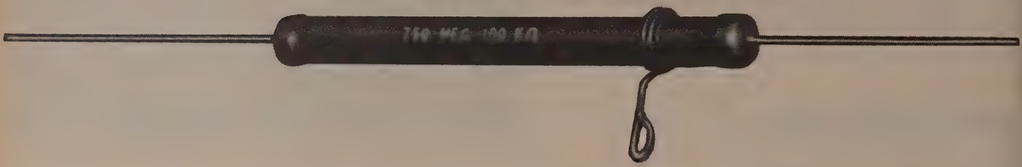
VICTOREEN

HIGH VOLTAGE DIVIDERS

VICTOREEN DIVIDER-MOX RESISTORS

RD SERIES HIGH VOLTAGE DIVIDERS

- INPUT VOLTAGES TO 30 kV
- RATIOS OF 10,000 TO 1
- OUTPUT VOLTAGE STABILITY OF ±0.1%
- TEMPERATURE RANGE, −55°C TO +125°C



Victoreen DIVIDER-MOX represents an advanced concept in the area of high voltage resistive divider networks. Through the use of a unique manufacturing process, Victoreen is able to produce a divider network utilizing the basic information available to the design engineer. The effects of T-C matching, V-C, self generated heat and other hard to define and control variables are minimized. The following basic information will enable us to supply a divider tailored to your application.

A) Total resistance value of the divider
B) Input Voltage
C) Output voltage and tolerance
D) Output voltage stability over operating temperature extremes (expressed in percent allowable change)

The limits of each of the above parameters are listed below.

RESISTANCE RANGE

See Table I. In order to enhance output voltage stability the total resistance of the divider should be as high as possible in order to minimize self-heating.

VOLTAGE RANGE

Below critical resistance values, the voltage is limited by the wattage rating of the resistor. Application of the power formula $E^2=WR$ will indicate the permissible maximum voltage. (Refer to Table I for additional data.)

WATTAGE RATING

Wattage ratings are calculated on the basis of 70°C ambient temperature. DIVIDER-MOX resistors are derated to zero watts at 180°C.

INPUT/OUTPUT VOLTAGE RATIOS

As indicated in Table I, any ratio between the maximum and minimum specified is available, except for those maximum ratios that exceed our manufacturing limitations.

INPUT VOLTAGE

Maximum in accordance with Table I. Minimum consistent with Input/output voltage ratios.

OUTPUT VOLTAGE

Determined only by input voltage limitations and Input/Output voltage ratios. The best available tolerance is 1%.

OUTPUT VOLTAGE STABILITY

This is the parameter which really defines the precision of a divider and is expressed in terms of percent allowable change over the operating temperature range. Stability is dependent on a number of factors including power dissipation and operating temperature range. While Victoreen DIVIDER-MOX resistors are capable of operating over the full range of characteristics indicated, if power dissipation is limited to 10% of the maximum values indicated, (not an unreasonable figure since most dividers are high resistance devices) stabilities of .1% are obtainable. Operation at higher wattage levels will effect initial (turn-on) stability and additional time must be allowed for the divider to reach temperature equilibrium.

OPERATING TEMPERATURE RANGE

The normal maximum operating temperature extremes used to calculate output voltage stability are −55°C to +125°C. Generally speaking, narrower extremes means better stability, wider extremes, of course, sacrifice stability.

DIVIDER CONSTRUCTION

A single high alumina core is utilized with a metal oxide resistive element. The end terminations are gold and accommodate close fitting, pressed on welded cap and lead assembles. The third terminal is mechanically fastened to a gold termination and the whole assembly is epoxy coated with the same high quality material used on other MOX resistors. Threaded end caps available on MAXI-MOX are available on DIVIDER-MOX as well. Resistors are marked with Type, Resistance Value and Tolerance. Customer marking available as an option.

COATING EPOXY RESIN

- Resists most industrial solvents
- Excellent moisture resistance
- High dielectric and low outgassing
- Maximum hot spot temperature of 180°C

VICTOREEN

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SG SHELLER-GLOBE CORPORATION

VICTOREEN DIVIDER-MOX RESISTORS

SELECTING THE PROPER VICTOREEN DIVIDER

1. Select the proper divider based on input voltage limitations
2. Determine that the input/output voltage ratio falls within the specified limits.
3. Choose the highest possible divider resistance value commensurate with circuit parameters, the wattage limitations of the divider, and within the specified resistance range.
4. Divide the resistance value selected by the input-output voltage ratio to obtain the tap resistance value. If this is greater than the minimum tap resistance for the divider selected, the divider can be fabricated. If the tap resistance value is less than the minimum, the divider resistance value must be increased or other parameters adjusted.

Example:

1. MOX-2RD; 7.5kV.
   Input voltage cannot exceed 7.5 kV (maximum operating volts).
2. Output Required; 7.5V.

   $$\frac{7.500\text{V}}{7.5\text{V}} = \text{I/O ratio } 1000{:}1.$$

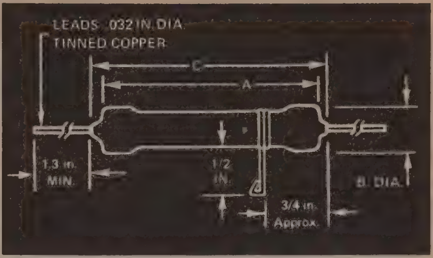
   (Ratio limits from 500-5000 maximum permissible).
3. Total Divider resistance selected. Resistance selected 100MΩ (resistance range 5 Megs to 500 Megs).

   Wattage Limitation; 1.5W.

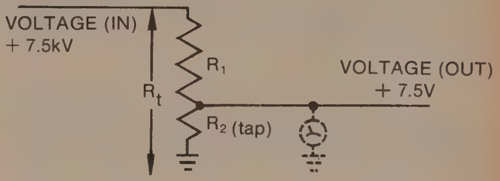
   High Stability Wattage; .15W or less.

   $$W = \frac{E^2}{R} = \frac{(7.5 \text{ x } 10^3)^2 \text{ volts}}{1 \text{ x } 10^8 \text{ ohms}} = 56.25 \text{ x } 10^{-2} = .5625$$

   Wattage does not fall within high stability power rating. However, it does not exceed maximum power rating of 1.5 watts.



4. To select the proper tap resistance, the following formula applies. (Figure 1).



$$R2 = \frac{V(\text{Out})}{V(\text{In})} \text{ x } R_t = \frac{7.5\text{V}}{7500\text{V}} \text{ x } 100 \text{ Megs}$$

$$= \frac{1}{1000} \text{ x } 100 \text{ Megs } R2 = {}^*100\text{k}\Omega$$

*This value must be greater than stated minimum tap resistances of:

MOX-2RD — 10kΩ MOX-4RD — 20kΩ
MOX-3RD — 15kΩ MOX-5RD — 25kΩ

5. Measurement.
   When testing MOX-RD Dividers with low impedance meters please note:

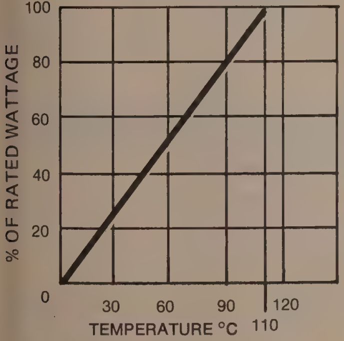
   $$V\text{ (Out)} = V(\text{In}) \text{ x } \frac{R2 \text{ (parallel with R meter)}}{R1 + R2 \text{ (parallel with R meter)}}$$

Table I — Resistor Specifications

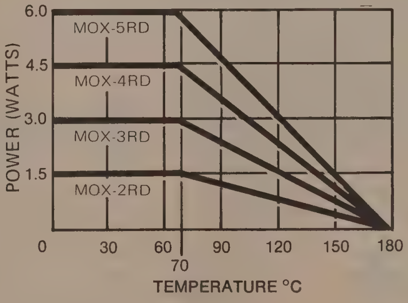
Model	[1]Resistance Range	[2]Power Rating @ 70°C	High Stability Power Rating[3]	[4]Max. Oper. Volts	Input/Output Voltage Ratio		Critical Resistance	Minimum Tap Resistance	Maximum Dimensions Inches		
					Min.	Max.			A	B	C
MOX-2RD	5 - 500 Megs	1.5W	0.15W	7.5 kV	500	5,000	37.5 Megs	10K ohms	2.140	.345	2.20
MOX-3RD	4.5-1000 Megs	3.0W	0.30W	15 kV	300	10,000	75 Megs	15K ohms	3.140	.345	3.20
MOX-4RD	6 -1500 Megs	4.5W	0.45W	22.5 kV	300	10,000	112.5 Megs	20K ohms	4.140	.345	4.20
MOX-5RD	7.5-2000 Megs	6.0W	0.60W	30 kV	300	10,000	150 Megs	25K ohms	5.140	.345	5.20

[1] Minimum total divider resistance dependent on maximum input/output voltage ratio.
[2] Derated to 0 watts @ 180°C.
[3] Recommended maximum power dissipation for highest stability.
[4] Applicable above critical resistance.

Temperature Rise Above Ambient vs. % of Rated Wattage



Temperature Derating Curve



These resistors are capable of dissipating higher wattages than rated if ambient temperatures are lower than 70°C or if forced air or oil cooling is employed. This additional capability can be determined in accordance with the temperature rise and the derating curves.

SG SHELLER-GLOBE CORPORATION

VICTOREEN INSTRUMENT DIV.
10101 WOODLAND AVENUE • CLEVELAND, OHIO 44104

VICTOREEN

VICTOREEN • HIGH RESISTANCE • CARBON COATED

PRECISION GLASS ENCAPSULATED RESISTORS

Type RX-1 Hi-Meg Resistors

VICTOREEN HI-MEG RESISTORS

Were originally designed for use in electrometer circuits where a high order of performance is required. HI-MEG resistors achieve a high degree of accuracy and stability, and operate at this high level for a long period of time. The HI-MEGS are manufactured in accordance with MIL-R-14293A, characteristic T, and therefore are measured at 20 volts ±1 volt. Reference to the average voltage coefficient curve below will indicate that deviations from the marked resistance value may be encountered when used at higher voltages. By special order, Victoreen can supply resistors with resistance measurements at specified voltages.

ELEMENT

The resistor element is a carbon coated glass rod, the ends of which are banded with silver to obtain the best electrical contact. Wire leads extend from the ends of the element.

NOISE

The noise level is negligible for most uses.

GLASS SEAL

HI-MEGS are vacuum sealed in a glass envelope which is treated with a special silicone varnish which keeps the resistor relatively free from the effects of moisture. Care should be exercised however, to avoid contamination in handling, such as fingerprints, which might result in reduced effective resistance.

POWER RATING

The power rating for any HI-MEG resistor is equal to one divided by the resistance in megohms.

RESISTANCE

HI-MEG resistors are available in values from 10^7 to 10^{14} ohms.

TOLERANCE

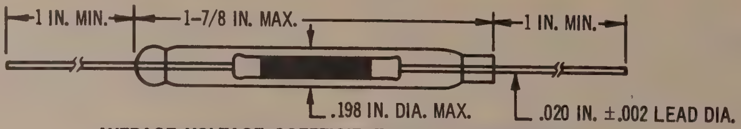
HI-MEG resistors can be supplied in the following tolerances; 1% below 10^{12} ohms, 2% and 5% below 10^{13} ohms, and 10% over the entire range. Refer to the price list for standard tolerance availability.

MAXIMUM WORKING VOLTAGE

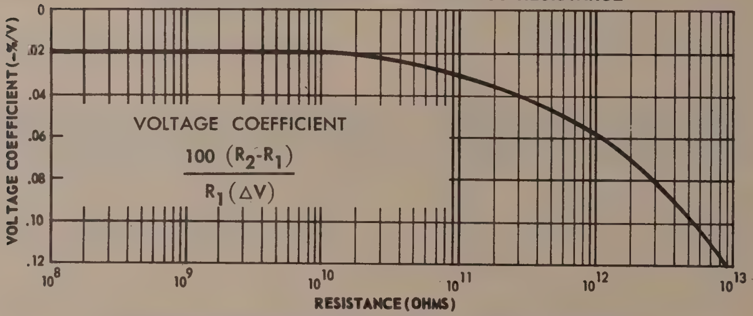
1000 volts.

MAXIMUM OPERATING AMBIENT TEMPERATURE

100°C.

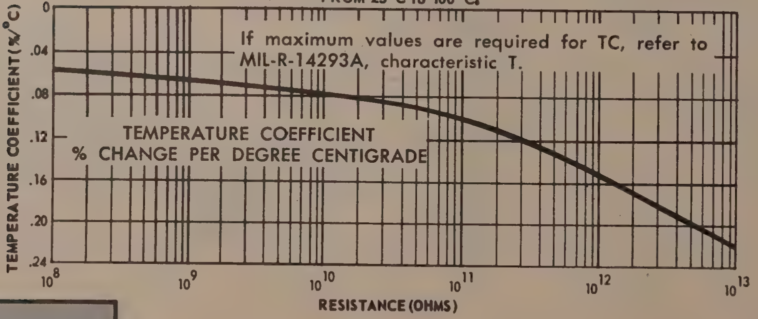


AVERAGE VOLTAGE COEFFICIENT VERSUS RESISTANCE



AVERAGE TEMPERATURE COEFFICIENT VERSUS RESISTANCE

FROM 25°C to 100°C.



If maximum values are required for TC, refer to MIL-R-14293A, characteristic T.

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VICTOREEN RESISTORS

CARBON FILM • GLASS ENCAPSULATED • CONFORMAL COATED

GLASS ENCAPSULATED • HIGH VOLTAGE • HIGH WATTAGE

Types RX-2, RX-3, RX-3HV, RX-4, RX-5 and RX-8

RESISTANCE ELEMENT: Ceramic rod, selected for high quality of composition and surface texture, has pure crystaline carbon deposited on its surface through pyrolysis of hydrocarbon vapor. No filler or binder is used with the carbon.

TERMINALS: Contact terminals are silver plated brass caps securely gripping the ends of the element which are also silvered to obtain the best electrical conductivity.

GLASS SEALS: All resistors are glass-sealed. The deposited carbon resistors are encased in glass envelopes from which the air has been exhausted and a dry, inert gas substituted.

MARKING: All resistors are plainly marked with the type designation, the resistance value and the tolerance.

TOLERANCE: Resistors are made to specified values within the limits shown in the data table. Limited quantities of resistors of any value can be furnished from stock for immediate delivery.

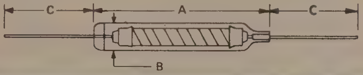
TEMPERATURE COEFFICIENT: ±500 ppm maximum over temperature range −55° to +125°C. TCR is effected by resistance value and resistor type.

VOLTAGE COEFFICIENT: The coefficient is −.0002 for all types and values of resistors listed in the table below.

POWER RATING: The power rating of these resistors should be determined from the "TEMPERATURE DE-RATING CURVES" and/or the "POWER VERSUS RESISTANCE VALUE" curves for the particular application.

CRITICAL RESISTANCE: Resistor performance may be adversely affected by (1) overheating due to overwattage or (2) the application of excessive voltage. Since $W = E^2/R$, the term "critical resistance" applies to that value of resistance at which both maximum voltage and maximum wattage may be applied. Below this value, the voltage must be limited to that voltage which will produce the maximum rated wattage; above this value, the wattage must be restricted to that wattage which will be produced by the application of maximum rated voltage.

HIGH VOLTAGE SHIELDING: The RX-3HV is designed to meet the difficult requirements encountered when the resistor operates at more than 10 kv above ground. Examples of this would be a resistor used as a series filter in a high voltage power supply or as bleeder strings across such supplies.



Type	Watts Max.	Resistance Min.	Resistance Critical	Resistance Max.	Max. Working Voltage	Tolerance %	Max. Temp. °C	Dimensions (Inches) A Max.	B Max.	C Min.	Lead Diam.
RX-2	1	500K	9 Meg	50 Meg	3000	1, 2, 5	125	2	.413	1½	.022 ±.005
RX-3	3	1 Meg	33 Meg	200 Meg	10,000	1, 2, 5	125	3¹⁄₁₆	.413	1½	.022 ±.005
RX-3HV	2	1K	50 Meg	200 Meg	10,000	1, 2, 5	125	3¹⁄₁₆	.413	1½	.022 ±.005
RX-4	5	200 Ohm	128K	1 Meg	800	1, 2, 5	200	2	.413	1½	.022 ±.005
RX-5	10	200 Ohm	400K	2 Meg	2000	1, 2, 5	200	3¹⁄₁₆	.413	1½	.022 ±.005
RX-8	2	100 Ohm	281K	10 Meg	750	1, 2, 5*	200	1½	.240	1⅜	.020 ±.002

*1% tolerance available only below 1 meg.

CONFORMAL COATED (VARNISH) • HIGH FREQUENCY • HIGH VOLTAGE • HIGH POWER

HIGH VOLTAGE • HIGH WATTAGE • HIGH FREQUENCY

HF SERIES HIGH FREQUENCY RESISTORS

The elements of Type HF resistors are applied as a solid coating resulting in a low inductance.

RADIAL LUG TYPE — STYLE 1

Type	Watts Max.	Resistance Min.	Resistance Critical	Resistance Max.	Volts Max.	Dimensions (Inches) A	B	Lead Dia. (AWG)
HFA	1	20 Ohms	140K	25 Meg	375	1	⁵⁄₁₆	—
HFB	2	35 Ohms	281K	50 Meg	750	1¾	⁵⁄₁₆	—
HFC	3	65 Ohms	650K	100 Meg	1400	3	⁵⁄₁₆	—
HFD	5	120 Ohms	1.35 Meg	100 Meg	2600	5½	⁵⁄₁₆	—
HFE	4	30 Ohms	300 K	50 Meg	1100	2½	⁹⁄₁₆	—
HFF	6	50 Ohms	600K	75 Meg	1900	4	⁹⁄₁₆	—
HFG	10	80 Ohms	960K	100 Meg	3100	6½	⁹⁄₁₆	—

RADIAL BAND TYPE — STYLE 3

HFX	12	20 Ohms	130K	25 Meg	1250	4½	¾	—
HFH	20	35 Ohms	380K	50 Meg	2750	6½	1⅛	—
HFJ	30	60 Ohms	750K	100 Meg	4750	10½	1⅛	—
HFK	50	65 Ohms	900K	100 Meg	6750	14½	1½	—
HFL	30	25 Ohms	300K	100 Meg	3000	6½	2	—
HFM	90	60 Ohms	800K	100 Meg	8500	18½	2	—

AXIAL LEAD TYPE — STYLE 2

HFAW	1	20 Ohms	140K	25 Meg	375	1⅛	⁵⁄₁₆	20
HFBW	2	35 Ohms	275K	35 Meg	750	2	⁵⁄₁₆	20
HFCW	3	65 Ohms	650K	65 Meg	1400	3³⁄₁₆	⁵⁄₁₆	20
HFDW	5	120 Ohms	1.35 Meg	100 Meg	2600	5¹¹⁄₁₆	⁵⁄₁₆	20

Wire lead and cap assembly will increase diameter approximately ¹⁄₁₆ inch.

HV SERIES HIGH VOLTAGE RESISTORS

RADIAL LUG TYPE — STYLE 1

Type	Watts Max.	Resistance (Megohms) Min.	Resistance (Megohms) Critical	Resistance (Megohms) Max.	Volts Max.	Dimensions (Inches) A	B	Lead Dia. (AWG)
HVA	1	.01	12	7,000	3500	1	⁵⁄₁₆	—
HVB	2	.025	28	20,000	7500	1¾	⁵⁄₁₆	—
HVC	3	.1	75	25,000	15,000	3	⁵⁄₁₆	—
HVD	5	.2	180	25,000	30,000	5½	⁵⁄₁₆	—
HVE	4	.2	56	25,000	15,000	2½	⁹⁄₁₆	—
HVF	6	.4	104	25,000	25,000	4	⁹⁄₁₆	—
HVG	10	.7	160	25,000	40,000	6½	⁹⁄₁₆	—

AXIAL LEAD TYPE — STYLE 2

HVAW	1	.01	12	7,000	3500	1⅛	⁵⁄₁₆	20
HVBW	2	.025	28	20,000	7500	1⅞	⁵⁄₁₆	20
HVCW	3	.1	75	25,000	15,000	3⅛	⁵⁄₁₆	20
HVDW	5	.2	180	25,000	30,000	5⅝	⁵⁄₁₆	20

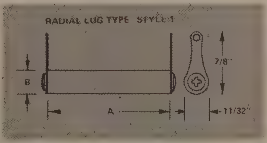
Wire lead and cap assembly will increase diameter approximately ¹⁄₁₆ inch.

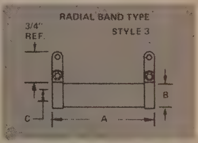
HP SERIES HIGH POWER RESISTORS

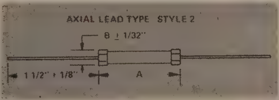
RADIAL BAND TYPE — STYLE 3

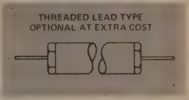
Type	Watts Max.	Resistance (Megohms) Min.	Resistance (Megohms) Critical	Resistance (Megohms) Max.	Volts Max.	Dimensions (Inches) A	B	C
HPX	12	0.5	19	50,000	15,000	4½	¾	½
HPA	22	1.0	56	100,000	35kV	6½	1⅛	¾
HPB	35	2.0	120	100,000	65kV	10½	1⅛	¾
HPC	55	4.0	147	100,000	90kV	14½	1½	1⅛
HPD	35	2.5	45	100,000	40kV	6½	2	1⁹⁄₁₆
HPE	100	7.5	155	100,000	125kV	18½	2	1⁹⁄₁₆

AVAILABLE TYPE STYLES









High Ohmic High Voltage Resistors — Resistances up to 25,000 megohms. (HV Series)

High Power Resistors — Resistances up to 100,000 megohms. (HP Series)

High Frequency Resistors — Resistances up to 100 megohms. (HF Series)

Victoreen Instrument Division

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Avenue,
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VICTOREEN

SG SHELLER-GLOBE CORPORATION

WAGNER HIGH RELIABILITY METAL FILM RESISTORS

HERMETIC SEAL AND NON HERMETIC SEAL PRECISION METAL FILM RESISTORS APPROVED PER MIL-R-55182

LEAKAGE RATE LESS THAN 1 x 10^{-9} CC/SEC

• Inductance	Approximately 0.007 Microhenry
• Capacitance	Below 1.0 Picofarad
• Noise	Below −20 db (0.1 Microvolt/Volt)
• Temperature Coefficient	50, 25, 10 ppm/°C
• Tolerance	1, 0.5, 0.25, 0.1
• Matched Sets for Tolerance and TC	

CHARACTERISTICS DEFINITION

C — 0 ± 50 ppm/°C Hermetic Seal
E — 0 ± 25 ppm/°C Hermetic Seal
H — 0 ± 50 ppm/°C Non Hermetic Seal
J — 0 ± 25 ppm/°C Non Hermetic Seal
K — 0 ± 100 ppm/°C Non Hermetic Seal

TERMINAL TYPE DEFINITION

RNC — Solderable and weldable leads
RNR — Solderable leads
RNN — Weldable leads

WAGNER HERMETIC SEALED PRECISION METAL FILM RESISTOR

WATTAGE 125°C	TYPE	T.C. PPM/°C	RESISTANCE RANGE	SIZE IN INCHES			
				Body Length	Body Diameter	Lead Length	Lead Diameter
1/10 WATT	HS47-2B HS47-2A HS47-2U	0 ± 50 0 ± 25 0 ± 10	24.9 OHMS to 200K	1/4 ±1/32	1/8 ±1/32	1 1/2 ±1/8	.025 ±.002
1/8 WATT	HS48-2B HS48-2A HS48-2U	0 ± 50 0 ± 25 0 ± 10	24.9 OHMS to 499K	3/8 ±1/16	1/8 ±1/32	1 1/2 ±1/8	.025 ±.002
1/4 WATT	HS55-2B HS55-2A HS55-2U	0 ± 50 0 ± 25 0 ± 10	24.9 OHMS to 1.5 MEG.	5/8 ±1/16	3/16 ±1/16	1 1/2 ±1/8	.025 ±.002
1/2 WATT	HS52-2B HS52-2A HS52-2U	0 ± 50 0 ± 25 0 ± 10	24.9 OHMS to 2 MEG.	3/4 ±1/16	1/4 ±3/32	1 1/2 ±1/8	.032 ±.002
1 WATT	HS50-2B HS50-2A HS50-2U	0 ± 50 0 ± 25 0 ± 10	24.9 OHMS to 3.5 MEG.	1 1/16 ±1/16	3/8 ±3/32	1 1/2 ±1/8	.032 ±.002
2 WATT	HS49-2B HS49-2A HS49-2U	0 ± 50 0 ± 25 0 ± 10	24.9 OHMS to 6 MEG.	2 3/16 +3/32 −1/16	3/8 +1/16 −1/32	1 1/2 ±1/8	.032 ±.002

CONFORMAL COATED (NON FLAMMABLE EPOXY)

MILITARY TYPE	STYLE CHAR.	WAGNER STYLE	TC ppm/°C	RESISTANCE RANGE	BODY LENGTH	BODY DIAMETER	LEAD LENGTH	LEAD DIAMETER
RNC55 RNR55 RNN55 (1/10 Watt)	C H E J K	HS47-2B HR47-2B HS47-2A HR47-2A HR47-2K	50 50 25 25 100	24.9 OHMS to 200K 24.9 OHMS to 200K 24.9 OHMS to 200K 24.9 OHMS to 200K 24.9 OHMS to 200K	.250 ±.031	.109 ±.031	1 1/2 ±1/8	.025 ±.002
RNC60 RNC60 RNN60 (1/8 Watt)	C H E J K	HS48-2B HR48-2B HS48-2A HR48-2A HR48-2K	50 50 25 25 100	24.9 OHMS to 500K 24.9 OHMS to 500K 24.9 OHMS to 500K 24.9 OHMS to 500K 24.9 OHMS to 500K	.375 ±.062	.125 +.040 −.031	1 1/2 ±1/8	.025 ±.002
RNC65 RNR65 RNN65 (1/4 Watt)	C H E J K	HS55-2B HR55-2B HS55-2A HR55-2A HR55-2K	50 50 25 25 100	24.9 OHMS to 1 MEG. 24.9 OHMS to 1 MEG. 24.9 OHMS to 1 MEG. 24.9 OHMS to 1 MEG. 24.9 OHMS to 1 MEG.	.625 +.031 −.094	.188 +.062 −.031	1 1/2 ±1/8	.025 ±.002
RNC70 RNR70 RNN70 (1/2 Watt)	C H E J K	HS52-2B HR52-2B HS52-2A HR52-2A HS52-2K	50 50 25 25 100	24.9 OHMS to 1 MEG. 24.9 OHMS to 1 MEG. 24.9 OHMS to 1 MEG. 24.9 OHMS to 1 MEG. 24.9 OHMS to 1.5 MEG.	.750 +.125 −.062	.250 +.078 −.031	1 1/2 ±1/8	.032 ±.002
RNC75 RNR75 (1 Watt)	E J	HS50-2A HR50-2A	25 25	24.9 OHMS to 2 MEG. 24.9 OHMS to 2 MEG.	1.062 ±.062	.375 +.062 −.031	1 1/2 ±1/8	.032 ±.002

TYPICAL MILITARY DESIGNATION

HERMETIC SEAL

RNC55	C	49R9	F	R
Style and Terminal Type	Characteristic 50 ppm	Resistance Value	Tolerance	Failure Rate

NON HERMETIC SEAL

RNC55	H	49R9	F	R
Style and Terminal Type	Characteristic 50 ppm	Resistance Value	Tolerance	Failure Rate

WAGNER ELECTRIC CORPORATION/Tung-Sol Division

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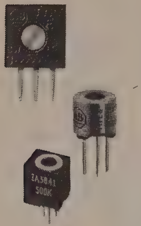
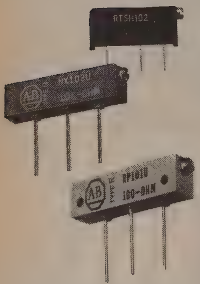
Allen-Bradley Trimming Potentiometers



TYPE E:
Cermet, single turn, 0.5W at 70°C, 10 ohms to 2 megs, ±10%, pin terminals, linear taper.

TYPE S:
Cermet, single turn, 0.5W at 85°C, 50 ohms to 1 meg, ±10%, pin terminals, linear taper.

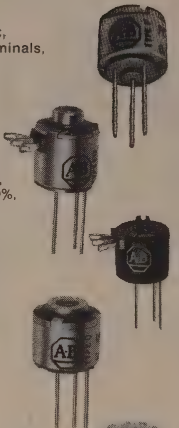
TYPE Z:
Cermet, single turn, 0.5W at 70°C, 50 ohms to 1 meg, ±10% and ±20%, pin terminals, linear taper.



TYPE RT:
Cermet, 20 turns, 0.75W at 70°C, 10 ohms to 2.0 megs, ±10%, pin terminals, linear taper, .250″ or .340″ high types.

TYPE N:
Hot-molded composition, 25 turns, 0.33W at 50°C, 100 ohms to 2.5 megs, ±10% and ±20%, pin terminals, linear taper.

TYPE R:
Hot-molded composition, 25 turns, 0.25W at 70°C, 100 ohms to 2.5 megs, ±10% and ±20%, pin or solder lug terminals, linear taper.



TYPE F:
Hot-molded composition, single turn, 0.25W at 70°C, 100 ohms to 5 megs, ±10% and ±20%, pin or solder lug terminals, 5 standard tapers.

TYPE FD:
Dual version of Type F; front section: solder lug only, rear: pin or lug. Well suited for Bridged-T or L-pad attenuator applications.

TYPE BT:
An all plastic version of the Type FD for excellent performance at high frequencies. Two types available for top or side adjustments. Also well suited for Bridged-T or L-pad attenuator applications.

TYPE O:
Hot-molded composition, single turn, 0.4W at 70°C, 100 ohms to 5 megs, ±10% and ±20%, pin or solder lug terminals, 5 standard tapers.

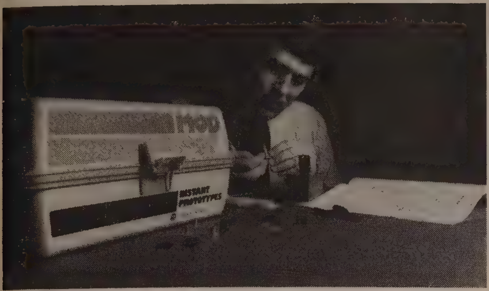
TYPE Y:
Hot-molded composition, single turn, 0.25W at 50°C, 100 ohms to 5 megs, ±10% and ±20%, pin terminals, 5 standard tapers.

SPECIFICATIONS

Type	Publication Number	Resistance Element and Adjustment Turns	Resistance Range and Tolerance	Power Rating	Voltage Rating (RMS or DC)	Operating Temperature Range	Terminal Types	Case Dimensions in inches, (millimeters)	Enclosure
E	5219	Cermet Single Turn	10 Ohms to 2 Megohms ±10%	0.5 Watt @ 70°C	300V	−55°C to +125°C	Pin	0.385 (9,78) Square by 0.197 (5,00) Thick	Immersion Sealed
S	5208		50 Ohms to 1 Megohm ±10%	0.5 Watt @ 85°C		−65°C to +150°C		0.375 (9,52) Diameter by 0.375 (9,52)	
Z	5211		50 Ohms to 1 Megohm ±10%, ±20%	0.5 Watt @ 70°C		−55°C to +125°C		0.250 (6,35) cube	
RT	5237	Cermet 20 Turn	10 Ohms to 2 Megohms ±10%	0.75 Watt @ 70°C		−65°C to +125°C		L 0.750 (19,05) H 0.250 (6,35) or H 0.340 (8,64) W 0.190 (4,83)	
N	5206	Composition 25 Turn	100 Ohms to 2.5 Megohms ±10%, ±20%	0.33 Watt @ 50°C		−55°C to +100°C		L 1.250 (31,75) H 0.359 (9,13) W 0.250 (6,35)	
R	5205			0.25 Watt @ 70°C		−55°C to +125°C	Pin or Solder Lug		
F	5234	Composition Single Turn	100 Ohms to 5 Megohms ±10%, ±20%	0.25 Watt @ 70°C	350V	−55°C to +120°C	Pin or Solder Lug	0.500 (12,70) Diameter by 0.531 (13,49)	
FD	5231						Front: Lug Rear: Lug or Pin	0.500 (12,70) Diameter by 0.688 (17,46)	
BT	5236			Contact Factory			Side Adjust: Front: 3 Lugs Rear: 3 Pins Top Adjust: Front: 2 Pins Rear: 2 Pins	0.500 (12,70) Diameter by 0.535 (13,59)	Dust and Splash Resistant
O	5235			0.4 Watt @ 70°C	350V	−55°C to +150°C	Pin or Solder Lug	0.500 (12,70) Diameter by 0.531 (13,49)	Immersion Sealed
Y	5209			0.25 Watt @ 50°C		−55°C to +100°C	Pin	0.500 (12,70) Diameter by 0.359 (9,13)	Dust and Splash Resistant

See YELLOW SECTION for Local Sales Offices and Key Personnel

Allen-Bradley Variable Resistors

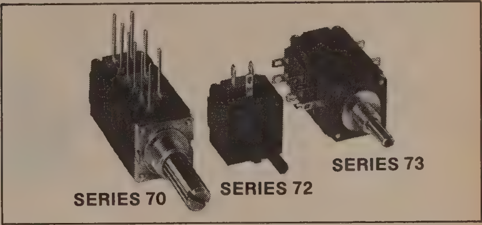


MOD POT Instant Prototypes (MPIP) puts a wide range of MOD POT components at your fingertips. MPIP available from your A-B distributor. Then get your production quantities of MOD POT fast from A-B distributors, assembled to exacting factory standards.

SERIES 70 MOD POT®: Unique modular design offers virtually unlimited configurations: single, double, triple or quadruple. Options include: PC or solder lug terminals, variety of switches, vernier drive, concentric shafts, composition or cermet resistance elements. 50 ohms to 10 megs, ±10% and ±20% (composition); 100 ohms to 1 meg, ±10% (cermet). 1.0W at 70°C (composition); 2.0W at 70°C (cermet).

SERIES 72 MOD POT®: Similar to Series 70 except the case, bushing and shaft are non-metallic for electrical isolation. Available in single or dual combinations only. Power rating is 0.5W at 70°C.

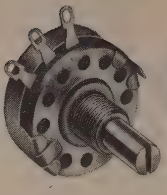
SERIES 73 MOD POT®: Another version of Series 70 for applications that require single or dual section controls.

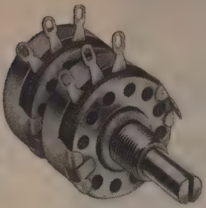


SPECIFICATIONS

Type	Publication Number	Resistance Element	Resistance Range and Tolerance	Power Rating	Voltage Rating (RMS or DC)	Operating Temperature Range	Number of Sections Available	Case Dimensions in inches, (millimeters)	Enclosure
70	5217	Cermet	100 Ohms to 1 Megohm ±10%	2.0 Watts @ 70°C	350V	−55°C to +150°C	1, 2, 3 or 4	0.594 *(15,08)* Deep by 0.625 *(15,88)* Square (Single Section)	Dust and Splash Resistant
		Composition	50 Ohms to 10 Megohms ±10%, ±20%	1.0 Watt @ 70°C		−55°C to +120°C			
72	5224	Composition	50 Ohms to 10 Megohms ±10%, ±20%	0.5 Watt @ 70°C		−55°C to +100°C	1 or 2		
73	5225	Cermet	100 Ohms to 1 Megohm ±10%	Contact Factory		Contact Factory			
		Composition	50 Ohms to 10 Megohms ±10%, ±20%						
J(RV4)	5200		50 Ohms to 5 Megohms ±10%, ±20%	2.25 Watts @ 70°C	500V	−55°C to +120°C	1, 2 or 3	0.625 *(15,88)* Deep by 1.156 *(29,36)* Diameter (Single Section)	
EJ	5230			2.25 Watts @ 70°C			1 or 2		
K	5222			3.0 Watts @ 70°C		−55°C to +150°C	1, 2 or 3		
G(RV6)	5201		100 Ohms to 5 Megohms ±10%, ±20%	0.5 Watt @ 70°C	350V	−55°C to +120°C	1	0.469 *(11,91)* Deep by 0.500 *(12,70)* Diameter (Without Switch)	Immersion Sealed
GD	5213						2		
L	5233			0.8 Watt @ 70°C		−55°C to +150°C	1		
W	5212			0.5 Watt @ 70°C		−55°C to +120°C			
WR	5220			0.5 Watt @ 70°C					Dust / Splash Resistant
CQ	5214	Cermet	100 Ohms to 5 Megohms ±10%	0.5 Watt @ 125°C		−65°C to +175°C			Immersion Sealed
SP	5216		50 Ohms to 1 Megohm ±10% (5% available)	1.0 Watt @ 70°C	300V	−65°C to +150°C		0.438 *(11,11)* Deep by 0.375 *(9,52)* Diameter	

TYPE J (RV4):
Standard of the industry for for quality. Hot-molded composition, 50 ohm to 5 megs, ±10% and ±20% (special values to 1000 megs available), 2.25W at 70°C, single, dual, triple sections available, variety of switch types for single or dual sections.

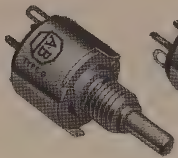


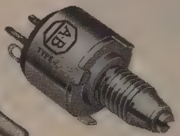


TYPE EJ:
Extra long life version of the Type J with rotational life exceeding one million rotations, single or dual configurations.

TYPE K:
A 3.0W (at 70°C) version of the popular Type J. −55°C to +150°C.

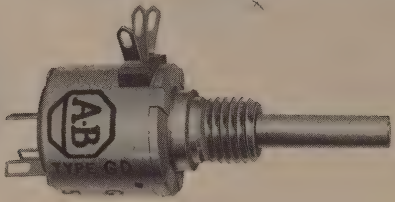
TYPE G (RV6):
Hot-molded composition, 100 ohms to 5 megs, ±10% and ±20%, 0.5W at 70°C, single section available with or without SPST switch.



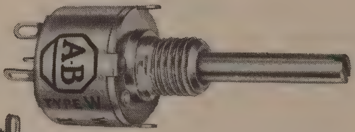


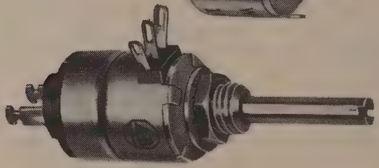
TYPE L:
Hot-molded composition, 100 ohms to 5 megs, ±10% and ±20%, 0.8W at 70°C, single section.

TYPE GD:
Dual section version of Type G. The smallest dual available.



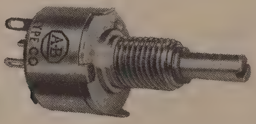
TYPE W:
Hot-molded composition, 100 ohms to 5 megs, ±10% and ±20%, 0.5W at 70°C, single section.

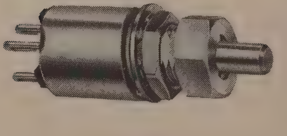




TYPE WR:
Radial-lead version of Type W. Available with switch with contacts that close at start of clockwise rotation (TYPE WRS) or with switch with contacts that close at start of counter-clockwise rotation (TYPE WRH).

TYPE CQ:
Cermet, 100 ohms to 5 megs, ±10%, 0.5W at 125°C, single section.



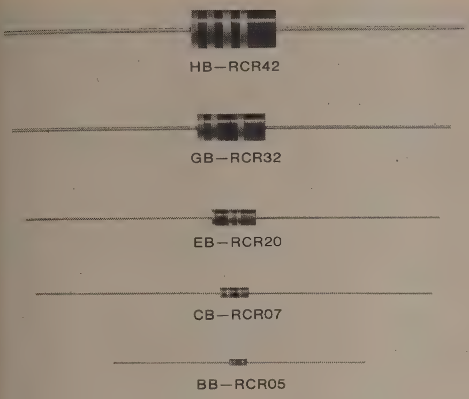


TYPE SP:
Cermet, 50 ohms to 1 meg, ±10%, 1.0W at 70°C, single section. Only ⅜″ diameter.

Standard options for all types include a variety of shafts, bushings, shaft endings, shaft lengths, and hardware.

Types FD, GD, J and the multi-section MOD POT with composition tracks are well suited for attenuator applications.

Allen-Bradley Hot-Molded Fixed Resistors



Allen-Bradley hot-molded composition resistors are high-quality units intended for general purpose use in the electronics industry.

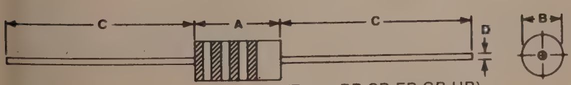
Allen-Bradley Style RCR resistors not only meet all requirements of MIL-R-39008 but also exceed the S level (best level) of Established Reliability of 0.001% failure rate per 1000 hours. And only Allen-Bradley resistors are available in S level reliability in all five wattage sizes over the entire resistance range. The S reliability level is indicated by a yellow 5th color band on the resistor body.

Metal-clad hot-molded resistors (Types GM and HM) are fitted with metal clamps which surround the major portion of the resistor. The metal clamps provide rigid mounting and efficient heat transfer from the resistors to the metal chassis or panels on which they are mounted.

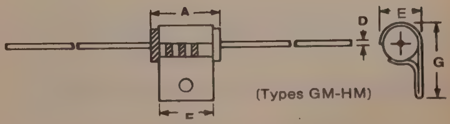
For more information request Publication EC21.

SPECIFICATIONS

Type	Power at 70°C	Resistance Range	Tolerance	Voltage Rating (RMS)	Maximum Ambient Temperature	Dimensions in Inches (millimeters)						
						A	B	C	D	E	F	G
BB	⅛ watt	2.7 Ohms to 100 Megohms	±5, 10, 20%	150V	+130°C	0.145 (3,68)	0.062 (1,59)	1.000 (25,40)	0.015 (0,38)			
RCR05		2.7 Ohms to 22 Megohms	±5, 10%									
CB	¼ watt	2.7 Ohms to 100 Megohms	±5, 10, 20%	250V	+150°C	0.250 (6,35)	0.090 (2,29)	1.500 (38,10)	0.025 (0,64)			
RCR07		2.7 Ohms to 22 Megohms	±5, 10%									
EB	½ watt	1.0 Ohms to 100 Megohms	±5, 10, 20%	350V		0.375 (9,52)	0.140 (3,56)	1.500 (38,10)	0.033 (0,84)			
RCR20		2.7 Ohms to 22 Megohms	±5, 10%									
GB	1 watt	2.7 Ohms to 100 Megohms	±5, 10, 20%	500V		0.562 (14,29)	0.225 (5,72)	1.500 (38,10)	0.041 (1,04)			
RCR32		2.7 Ohms to 22 Megohms	±5, 10%									
HB	2 watts	10 Ohms to 100 Megohms	±5, 10, 20%	750V		0.688 (17,46)	0.312 (7,94)	1.500 (38,10)	0.045 (1,14)			
RCR42		10 Ohms to 22 Megohms	±5, 10%	500V								
GM	3 watts	2.7 Ohms to 22 Megohms	±5% ±10%	500V		0.562 (14,29)	0.225 (5,72)	1.500 (38,10)	0.041 (1,04)	0.305 (7,75)	0.438 (11,11)	0.656 (16,67)
HM	4 watts	10 Ohms to 22 Megohms		750V		0.688 (17,46)	0.312 (7,94)	1.500 (38,10)	0.045 (1,14)	0.391 (9,92)	0.562 (14,29)	0.766 (19,45)



(Types BB-CB-EB-GB-HB)



(Types GM-HM)

Allen-Bradley Cermet Film Fixed Resistors

This one resistor can shrink your inventory costs

Capless design provides a reliable termination that does away with problems associated with end cap construction.

Leads are designed for both soldering and welding to give you freedom of choice about attachment, and long term storage capability.

Cores are high purity alumina with outstanding physical and thermal properties to reduce the incidence of fractures.

Coating is specially formulated to maintain outstanding insulation properties throughout environmental exposures.

Markings are clear, crisp and precise; dual resistance marking for easy identification, and durable to withstand production handling.

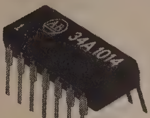
For more information request Publication EC33.

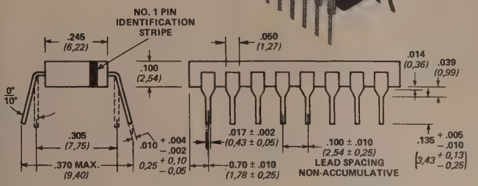
Resistance range	10 Ohms to 10 Megohms
Power rating	⅛ watt @ 125°C ¼ watt @ 70°C ½ watt @ 70°C (250V Max.)
TCR	100 PPM
Tolerance	1%
Availability	Off the shelf
Approved	RN55D
Size	.250 L. x .090 D.

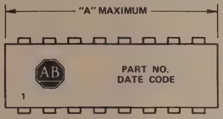
ALLEN-BRADLEY—THE LEADER IN TOTAL NETWORK CAPABILITY

CERMET DIP RESISTOR NETWORKS

NEW CERAMIC I-DIP PACKAGE




NO. 1 PIN
IDENTIFICATION
STRIPE
.245
(6,22)
.100
(2,54)
.050
(1,27)
.014
(0,36)
.039
(0,99)
0°
10°
.305
(7,75)
.370 MAX.
(9,40)
.010 + .004 − .002
0,25 + 0,10 − 0,05
.017 ± .002
(0,43 ± 0,05)
0.70 ± .010
(1,78 ± 0,25)
.100 ± .010
(2,54 ± 0,25)
LEAD SPACING
NON-ACCUMULATIVE
.135 + .005 − .010
(3,43 + 0,13 − 0,25)

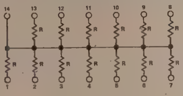

"A" MAXIMUM
PART NO.
DATE CODE
1

"A" Maximum		Number of Leads
Decimal	Metric	
.740	18,80	14
.840	21,34	16

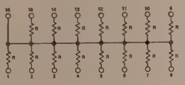
STANDARD • PULL-UP • PULL-DOWN • TERMINATION • NETWORKS

APPLICATIONS:

- Pull-up array for unused TTL gates
- Parallel high speed circuitry
- Wired OR configurations
- Pull-down applications
- TTL-MOS interfacing
- Digital pulse squaring


14
13
12
11
10
9
8
R
1
2
3
4
5
6
7

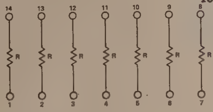
314A
13 Resistors . . .
14 Pin DIP


16
15
14
13
12
11
10
9
R
1
2
3
4
5
6
7
8

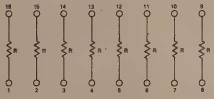
316A
15 Resistors . . .
16 Pin DIP

APPLICATIONS:

- Transmission line termination
- Power gate pull-up
- Current limiting
- Logic level translation


14
13
12
11
10
9
8
R
1
2
3
4
5
6
7

314B
7 Resistors . . .
14 Pin DIP


16
15
14
13
12
11
10
9
R
1
2
3
4
5
6
7
8

316B
8 Resistors . . .
16 Pin DIP

STANDARD RESISTANCE VALUES—SERIES 314A, 314B, 316A, 316B

		R (OHMS)				
22	75	270	910	3300	10K	47K
24	82	300	1000	3600	11K	68K
27	91	330	1100	3900	12K	100K
30	100	360	1200	4300	13K	
33	110	390	1300	4700	15K	
36	120	430	1500	5100	16K	
39	130	470	1600	5600	18K	
43	150	510	1800	6000	20K	
47	160	560	2000	6200	22K	
51	180	620	2200	6800	24K	
56	200	680	2400	7500	27K	
62	220	750	2700	8200	30K	
68	240	820	3000	9100	33K	

PRICES

Quantity	314A	316A	314B	316B
1—24	$1.20	$1.25	$1.15	$1.20
25—99	$1.10	$1.13	$1.07	$1.10

Prices and specifications subject to change without notice.

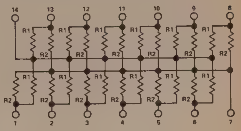
HOW TO ORDER

Example: Require Series 314A with resistance value=1000Ω.
Order part #314A102.

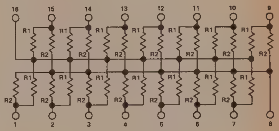
STANDARD • PARALLEL • TERMINATION • NETWORKS

APPLICATIONS:

Series 314E and 316E networks are used in digital IC logic circuits and are especially suited for ECL and TTL applications. For ECL applications the network's circuit configuration serves a dual purpose. The R2 resistors are pull-down resistors and are normally tied to the most negative supply voltage. The R1 resistors, in parallel with the R2 resistors, provide the characteristic impedance for proper transmission line matching. In TTL logic the networks are used in pulse squaring applications.


14
13
12
11
10
9
8
R1
R2
1
2
3
4
5
6
7

SERIES 314E


16
15
14
13
12
11
10
9
R1
R2
1
2
3
4
5
6
7
8

SERIES 316E

PRICES

Quantity	314E	316E
1—24	$2.15	$2.30
25—99	$2.00	$2.14

Prices and specifications subject to change without notice.

HOW TO ORDER

Example: Require series 316E with characteristic impedance=50Ω. Order part #316E810131.

STANDARD RESISTANCE VALUES—SERIES 314E AND 316E

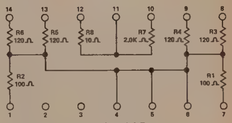
R1/R2	(Characteristic Z_0 Impedance)
81/130	50
120/200	75
90/660	80
130/210	80
160/260	100
220/330	132
330/680	222
180/390	123

STANDARD • SENSE AMP • INTERFACE • NETWORKS

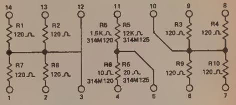
APPLICATIONS:

- Designed for use with 7520 series core memory sense amplifiers.
- Series 314M110 combines a threshold setting divider with balanced sense line termination and far end termination of two sense lines.
- Series 314M120 and 314M125 combine threshold setting dividers with four sense line termination. Following resistor values provide different threshold setting:

Resistor	314M120	314M125
R5	1.5KΩ	12KΩ
R6	10Ω	20Ω


14
13
12
11
10
9
8
R6 120Ω
R5 120Ω
R8 10Ω
R7 2.0KΩ
R4 120Ω
R3 120Ω
R2 100Ω
R1 100Ω
1
2
3
4
5
6
7

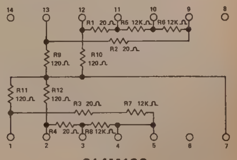
314M110


14
13
12
11
10
9
8
R1 120Ω
R2 120Ω
R5 1.5KΩ 314M120
R5 12KΩ 314M125
R3 120Ω
R4 120Ω
R7 120Ω
R8 120Ω
R6 10Ω 314M120
R6 20Ω 314M125
R9 120Ω
R10 120Ω
1
2
3
4
5
6
7

314M120 or 314M125

APPLICATIONS:

- Series 314M130 designed for use with μA711 dual voltage comparator in core memory sense amplifier applications.
- Combines four threshold dividers with balanced termination of two lines.

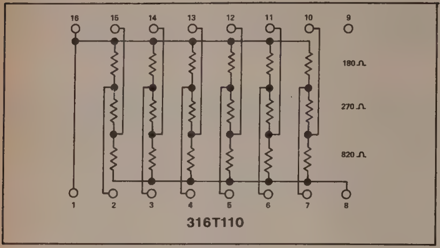

14
13
12
11
10
9
8
R1 20Ω
R5 12KΩ
R8 12KΩ
R2 20Ω
R9 120Ω
R10 120Ω
R11 120Ω
R12 120Ω
R3 20Ω
R7 12KΩ
R4 20Ω
R6 12KΩ
1
2
3
4
5
6
7

314M130

STANDARD TTL TO ECL TRANSLATOR NETWORK

APPLICATIONS:

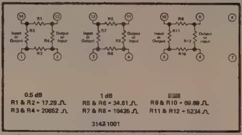
- Series 316T110 provides TTL to ECL translation.
- Contains six TTL to ECL translators.


16
15
14
13
12
11
10
9
180 Ω
270 Ω
820 Ω
1
2
3
4
5
6
7
8

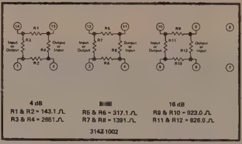
316T110

STANDARD "O" PAD (BALANCED π) ATTENUATORS

APPLICATIONS:
These networks are used primarily in the communications industry where a fixed voltage attenuation is required with impedance matching. Voltage attenuation in steps of 0.5 dB from 0.5 dB to 31.5 dB can be obtained from the Series 314Z networks by the use of one "O" pad, or by placing two or more in series. For example, 20 dB is obtained by placing the 4 dB and 16 dB sections in series.


14
13
12
11
10
9
8
7
1
2
3
4
5
6
R1
R2
R3
R4
R5
R6
R7
R8
R9
R10
R11
R12
Input or Output
Output or Input
0.5 dB
R1 & R2 = 17.28 Ω
R3 & R4 = 20852 Ω
1 dB
R5 & R6 = 34.61 Ω
R7 & R8 = 10436 Ω
[redacted]
R9 & R10 = 69.69 Ω
R11 & R12 = 5234 Ω

314Z1001


14
13
12
11
10
9
8
7
1
2
3
4
5
6
R1
R2
R3
R4
R5
R6
R7
R8
R9
R10
R11
R12
Input or Output
Output or Input
4 dB
R1 & R2 = 143.1 Ω
R3 & R4 = 2651 Ω
[redacted]
R5 & R6 = 317.1 Ω
R7 & R8 = 1391 Ω
16 dB
R9 & R10 = 923.0 Ω
R11 & R12 = 826.0 Ω

314Z1002

SPECIFICATIONS:

Characteristic Impedance . . . . 600 ohms
Attenuation Tolerance (dB) . . . . ±1%
Attenuation Change Due to Temperature . . . . . ±1% Additional
Resistor Tolerance . . . . ±1%
Temperature Coefficient of Resistance . . . . . ±200 ppm/°C
Power Dissipation Rating at 40°C . . . . . 150 mw per Attenuator
Frequency Response . . . . Flat to 1 MHz
Operating Temperature . . . . 0°C to +70°C

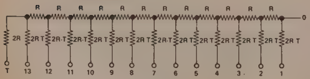
STANDARD NETWORK SPECIFICATIONS

Standard Network	Resistor Tolerance	Temperature Coefficient of Resistance (ppm/°C)	Power Dissipation Rating (Up to 70°C Ambient)	Operating Temperature Range	Resistance Ratios
314A	±2%	±100	125 mw/resistor 1.6 watt/package	−55°C to +125°C	——————
314B			250 mw/resistor 1.6 watt/package		
316A			125 mw/resistor 1.8 watt/package		
316B			250 mw/resistor 1.8 watt/package		
314E	±2%	±100	125 mw/resistor 1.6 watt/package	−55°C to +125°C	———————
316E			125 mw/resistor 1.8 watt/package		
314M110	±2% ±5% (R8 only)	±200	500 mw/resistor (R1 & R2) 100 mw/resistor (R3 through R8)	0°C to +70°C	R3/R4 ±1.5% R5/R6 ±1.5% R7/R8 ±2%
314M120	±2% ±5% (R6 only)	±100	100 mw/resistor	0°C to +70°C	R1/R2 R3/R4 R5/R6 R7/R8 R9/R10 } ±1.5%
314M125					
314M130	±2%	±200	100 mw/resistor	0°C to +70°C	———————
316T110	±2%	±200	125 mw/resistor	0°C to +70°C	——————

PRECISION THIN FILM RESISTOR NETWORKS, LADDERS AND ARRAYS

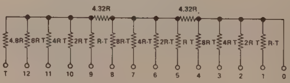
R/2R BINARY CODE LADDER NETWORKS

Ladder networks with fewer bits using the basic schematic of the FN132 are FN114, FN123, FN125, FN131, and FN160.

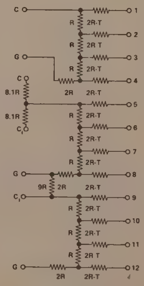

R
2R
2R T
2R-T
0
T
13
12
11
10
9
8
7
6
5
4
3
2
1

FN132

1-2-4-8 BCD CODE LADDER NETWORKS


4.32R
4.32R
4.8R
8R T
4R T
2R T
R-T
8R-T
4R-T
2R-T
R T
T
12
11
10
9
8
7
6
5
4
3
2
1
0

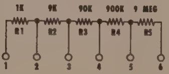
FN130


C
G
C
C1
G
C1
G
R
2R-T
2R T
2R
8.1R
8.1R
9R
1
2
3
4
5
6
7
8
9
10
11
12

FN128 & FN129

VOLTAGE DIVIDER NETWORK

(Decade Attenuator)

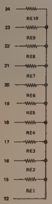

1K
9K
90K
900K
9 MEG
R1
R2
R3
R4
R5
1
2
3
4
5
6

FN207

APPLICATIONS:

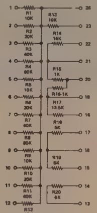
- All ladders—A/D and D/A conversion
- FN207—Input attenuation and range selection in digital instrumentation; particularly in digital voltmeters and multimeters.

CURRENT SUMMING NETWORKS

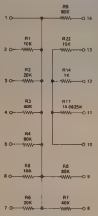

24
RE10
23
RE9
22
RE8
21
RE7
20
RE6
19
RE5
18
RE4
17
RE3
16
RE2
15
RE1
13

FN111 & FN112

PRECISION RESISTOR ARRAYS


R1 10K
R2 20K
R3 40K
R4 80K
R5 10K
R6 20K
R7 40K
R8 80K
R9 10K
R10 20K
R11 40K
R12 80K
R13 10K
R14 14K
R15 1K
R16 1K
R17 13.5K
R18 5K
R19 5K
R20 6K

FN215


R9 80K
R1 10K
R22 15K
R2 20K
R14 1K
R3 40K
R17 14.0625K
R4 80K
R5 10K
R8 80K
R6 20K
R7 40K

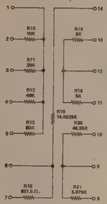
FN226

APPLICATIONS:

- A/D and D/A conversion.
- FN111*—10 bit binary operation.
- FN112*—3 place BCD operation (0 to 399).
- FN215—12 bit conversion—designed for use with Fairchild μA9650 IC.
- FN226**
- FN227**

*Both designed for use with Fairchild μA722 IC.

**Both designed for use with Intersil ICL 8018, 8019, 8020 IC's. FN226 gives 8 bit conversion. FN226 plus FN227 gives 12 bit conversion.


R10 10K
R11 20K
R12 40K
R13 80K
R19 5K
R18 5K
R16 14.0625K
R21 5.875K

FN227

R/2R BINARY CODE LADDER NETWORKS

Part Number	FN114 (1)	FN123 (1)	FN125 (2)	FN131	FN132	FN160
Number of Bits	12	10	10	10	13	10
Ladder Resistance Value (R)	R=200K T_{1-2}=500Ω T_{3-12}=550Ω	R=50K T_{1-2}=500Ω T_{3-10}=550Ω	R=50K T_{1-2}=200Ω T_{3-10}=550Ω	R=10K T=0	R=5K T=0	R=5K T=0
Ladder Resistance Tolerance	±10%	±10%	±10%	±10%	±10%	±10%
Network Full Scale Accuracy	±½ LSB	±½ LSB	±½ LSB	±½ LSB	±½ LSB	±½ LSB
Operating Temperature Range	−55°C to +125°C	−55°C to +125°C	−55°C to +125°C	−55°C to +125°C	−55°C to +125°C	·55°C to +125°C
Storage Temperature Range	−65°C to +175°C	−65°C to +175°C	−65°C to +175°C	−65°C to +175°C	−65°C to +175°C	−65°C to +175°C
Operating Voltage Range	±100V Maximum	±70V Maximum	±70V Maximum	±30V Maximum	±20V Maximum	±20V Maximum

(1) May be used with Fairchild 3750/3751 IC.
(2) May be used with Fairchild 3750 IC.

1-2-4-8 BCD CODE LADDER NETWORKS

Part Number	FN128 (1)	FN129 (1)	FN130
Number of Bits	12	12	12
Ladder Resistance Value (R)	R=50K T_{1-2}=500Ω T_{3-12}=500Ω	R=100K T_{1-2}=500Ω T_{3-12}=550Ω	R=10K T=0
Ladder Resistance Tolerance	±10%	±10%	±10%
Network Full Scale Accuracy	±½ LSB	±½ LSB	±½ LSB
Operating Temperature Range	−55°C to +125°C	−55°C to +125°C	−55°C to +125°C
Storage Temperature Range	−65°C to +175°C	−65°C to +175°C	−65°C to +175°C
Operating Voltage Range	±100V Maximum	±140V Maximum	±20V Maximum

(1) May be used with Fairchild 3750/3751 IC.

VOLTAGE DIVIDER NETWORK FN207

Resistance Tolerance on Total Resistance (R_T) at +25°C:
$R_T = R_1 + R_2 + R_3 + R_4 + R_5$ = 10 Megohms ±0.05%.

Ratio Tolerance at +25°C and from 0 to 1000 volts:

$$\frac{R_1 + R_2 + R_3 + R_4}{R_T} = \frac{1 \text{ Megohm}}{10 \text{ Megohms}} = 0.1 \pm 0.03\%$$

$$\frac{R_1 + R_2 + R_3}{R_T} = \frac{100 \text{ K ohms}}{10 \text{ Megohms}} = 0.01 \pm 0.03\%$$

$$\frac{R_1 + R_2}{R_T} = \frac{10 \text{ K ohms}}{10 \text{ Megohms}} = 0.001 \pm 0.03\%$$

$$\frac{R_1}{R_T} = \frac{1 \text{ K ohm}}{10 \text{ Megohms}} = 0.0001 \pm 0.03\%$$

Temperature Coefficient of Resistance . . . . ±25 ppm/°C
TCR Tracking . . . . ±5 ppm/°C
Operating Voltage (between pins 1 & 6) . . . . 1000 volts max.
Operating Temperature . . . . 0°C to +70°C
Storage Temperature . . . . −65°C to +175°C

CURRENT SUMMING NETWORKS

Part Number		FN111				FN112			
Terminal Number	Resistor Number (Rej)	Nominal Resistance (K ohm)	Nominal Ratio (Rej/Rei)	Max. Ratio Tolerance % At 25°C	Max Ratio Temp Coeff (PPM/°C)	Nominal Resistance (K ohm)	Nominal Ratio (Rej/Rei)	Max. Ratio Tolerance % At 25°C	Max Ratio Temp Coeff (PPM/°C)
15	RE1	2.547	1 000	±10% Absolute	±5 0	2.547	1.000	±10% Absolute	±20
16	RE2	5 094	2 000	±0 02	±5 0	5 094	2 000	±0.02	±5 0
17	RE3	10 245	4 022	±0 05	±10	6.379	2 5045	±0 02	±5 0
18	RE4	20 60	8 088	±0 10	±20	12 83	5.036	±0 05	±10
19	RE5	41 43	16 265	±0.20	±20	25.80	10 13	±0 10	±20
20	RE6	81 93	32 17	±0.20	±50	51.03	20.03	±0.20	±50
21	RE7	163 4	64 16	±0 50	±100	63.36	24 88	±0 50	±100
22	RE8	325.7	127 9	±1 0	±200	126.3	49.57	±1 0	±200
23	RE9	644 9	253 2	±2.0	±500	250.1	98.17	±1.0	±200
24	RE10	1275.0	500 8	±2 0	±500	495.0	194.3	±2.0	±500

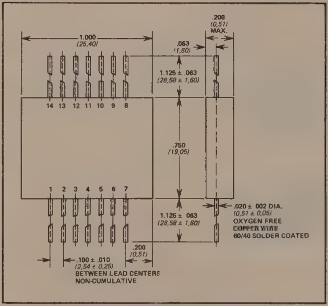
PRECISION RESISTOR ARRAYS

Part Number	FN215	FN226	FN227
Tolerance— Resistance matching or ratio	R2/R1 = ±0.005% R3/R1 = ±0.01% R4/R1 = ±0.02% R5/R1 = ±1.0% R6/R5 = ±0.05% R7/R5 = ±0.1% R8/R5 = ±0.02% R9/R1 = ±1.0% R10/R9 = ±0.5% R11/R9 = ±1.0% R12/R9 = ±2.0% R13/R1 = ±0.2%	R2/R1 = ±0.0122% R3/R1 = ±0.0244% R4/R1 = ±0.0488% R5/R1 = ±0.096% R6/R1 = ±0.195% R7/R1 = ±0.391% R8/R1 = ±0.781% R9/R1 = ±0.1% R17/R14 = ±0.1% R22/R14 = ±0.5%	R11/R10 = ±1.0% R12/R10 = ±1.0% R13/R10 = ±1.0% R16/R15 = ±1.0% R19/R18 = ±0.1% R21/R20 = ±0.1%
Tolerance—Absolute	R14&R17 = ±0.5% R15&R16 = ±1.0% R18&R19 = ±0.1% R20 = ±1.0%	R1 = ±0.1% R14 = ±1.0%	R10 = ±0.5% R15 = ±1.0% R18 = ±0.5% R20 = ±0.5%
Temperature coefficient of resistance	±25 PPM/°C	±25 PPM/°C	±25 PPM/°C
Temperature coefficient of resistance tracking	±5 PPM/°C	±5 PPM/°C	±5 PPM/°C
Power rating each resistor up to +125°C	50MW	50MW	50MW
Operating temperature range	−55°C to +125°C	0°C to +70°C	0°C to +70°C
Storage temperature range	−65°C to +175°C	−65°C to +175°C	−65°C to +175°C

PACKAGE

Modified flat pack (Diallyl phthalate epoxy material).

(Dip, chip, and conformal coated package styles also available upon request.)


1.000
(25,40)
.063
(1,60)
.200
(0,51)
MAX.
1.125 ± .063
(28,58 ± 1,60)
14 13 12 11 10 9 8
.750
(19,05)
1 2 3 4 5 6 7
1.125 ± .063
(28,58 ± 1,60)
.020 ± .002 DIA.
(0,51 ± 0,05)
OXYGEN FREE
COPPER WIRE
60/40 SOLDER COATED
.200
(0,51)
.100 ± .010
(2,54 ± 0,25)
BETWEEN LEAD CENTERS
NON-CUMULATIVE

CUSTOM RESISTOR NETWORKS

For more information on custom resistor network capabilities ask for these publications:

Cermet resistor networks—
A-B Publication 5850

Thin film resistor networks—
A-B Publication 5800

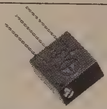
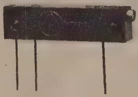
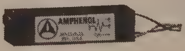
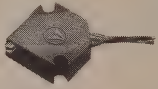
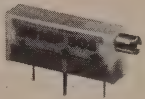
In addition to the standard cermet and precision thin film resistor networks listed on these pages, custom networks can be designed to meet a specific need.

A-B QUALITY

ALLEN-BRADLEY
Electronics Division
Milwaukee, Wisconsin 53204

MICROPOT® WIREWOUND TRIMMING POTENTIOMETERS

BUNKER RAMO AMPHENOL

Description		Amphenol Model No.	Adjustment Turns	Terminals[2]	Resistance Range in Ohms[3]	Resistance Tolerance	Temperature Range	Temperature Coefficient Potentiometer (PPM/°C)	Maximum Power Rating in Watts
1¼″ Rectangular		992[1] 994[1]*	22	L,S,P	10 to 20K	10 to 75 ±10% 100 ohms to 20K ±5%	−55°C to +125°C	70 ppm	1 @ 40°C
Microminiature ⅜″ Square		2300*	26	P,W,X	10 to 20K	±5%	−55°C to +150°C	50 ppm	¾ @ 85°C
High Temperature 1¼″ Rectangular		2750[1]*	22	P	10 to 20K	±5%	−55°C to +150°C	50 ppm	¾ @ 85°C
High Temperature 1¼″ Rectangular		2850[1]*	22	L,S,P	10 to 20K	±5%	−55°C to +150°C	50 ppm	¾ @ 85°C
Subminiature ½″ Square		2900[1]*	25	P,L,W,X,Y	10 to 20K	±5%	−55°C to +150°C	50 ppm	¾ @ 85°C
Microminiature ¾″ Rectangular Solvent-Resistant Vista-Trim		3810*	15	P, K	10 to 20K	±10%	−55°C to +125°C	100 ppm	1 @ 40°C

[1] Panel mounting bracket available.

[2] Terminations:
L — Color coded wire leads
S — Solder lugs
P — Printed circuit pins
W — Printed circuit pins (edge mount, top adjust leadscrew)
X — Printed circuit pins (edge mount, side adjust leadscrew)

[2] Terminations: Y — Printed circuit pins — staggered (edge mount, top adjust leadscrew)
K — Printed circuit pins with 0.200″ spacing

[3] See Catalog T-2 for standard resistance values.

* Humidity Proof

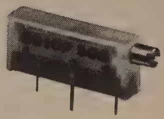
MICROPOT® WIREWOUND TRIMMING POTENTIOMETERS

BUNKER RAMO AMPHENOL

SIZE IN INCHES			Application
H	W	L	
0.32	0.28	1.25	Industrial Commercial
0.198 0.415 0.415	0.375 0.193 0.200	0.375P 0.375W 0.375X	MIL-R-27208 RT24
0.32	0.19	1.25	MIL-R-27208 RT12
0.32	0.28	1.25	Military Industrial MIL-R-27208 RT-11
0.220 0.187 0.500 0.575 0.500	0.500 0.500 0.195 0.190 0.195	0.500P 0.500L 0.500W 0.500Y 0.500X	MIL-R-27208 RT22
0.31	0.16	0.75	Commercial

® MICROPOT — Trademark registered U.S. Patent Office
Humidity-proof trimmers pass MIL-R-27208A moisture resistance test.

Vista-Trim Trimmers Allow Visual Settings of Approximate Desired Values . . .



Standard Resistances Available

Ohms	Wirewound 3810	Cermet 3805/3815	Film-Met™ 3811
10	X	—	X
20	X	X	X
50	X	X	X
100	X	X	X
200	X	X	X
500	X	X	X
1,000	X	X	X
2,000	X	X	X
5,000	X	X	X
10,000	X	X	X
20,000	X	X	X
50,000	—	X	X
100,000	—	X	—
250,000	—	X	—
500.000	—	X	—
1,000,000	—	X	—

Speed Production and Reduce Labor Costs —

Once you've set one Vista-Trim trimmer to a given value, the same (approximate) value can be set on others by visual measurement.

Saves Valuable Time —

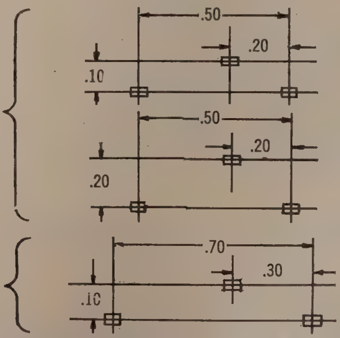
Both the element and contact carrier are visible through the semi-transparent top. Approximate final settings can be made with or without an ohmmeter. Example: For 50 ohms, set the contact at half the length of its travel along a 100 ohm element.

Reduce Field Service Time —

The repair of installed equipment is speeded up because the same advantages apply as for new equipment. The technician can visually adjust all units to approximate final settings. This saves time, aids him considerably by allowing quick easy final adjustments to balance the circuits.

Optional 0.100″ or 0.200″ Pin Spacing on ¾″ Commercial Trimmers

Amphenol has expanded its entire line of ¾″ rectangular cermet, Film-Met™ and wirewound trimmers to include 0.200″ pin spacing. You can now specify 0.100″ or 0.200″ pin spacing as standard on the following models. To order, indicate the appropriate terminal designation -P, K or Y- in Amphenol's part numbering system for the spacing desired, e.g. 3810**P**-101 or 6034**K**-101.



Models Available	Termination Designation	Pin Spacing
3805 3815 6034 3811 3810	P	0.100″
	K	0.200″
6034	Y	0.100″

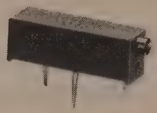
TRIMMING POTENTIOMETER

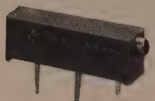
BUNKER RAMO AMPHENOL

6034 Series — Cermet

FEATURES:

- Low-cost, commercial cermet trimmer offers infinite resolution . . . wide resistance range.
- TC of 100 ppm/°C is standard.
- Multi-finger contact reduces CRV to a minimum and enhances rotational life.
- Commercial ¾″ rectangular style with solvent-resistant nylon case and popular PC pin spacing.
- Sealed construction . . . ideal for use in automated board cleaning processes.
- Commercial.
- Temperature to 125°C.
- Sealed construction
- ¾″ rectangular.
- Cermet.


6034K


6034P

6034Y

How to Order

When requesting a quotation or placing an order for Standard Micropot® Trimmers refer to part number listed under STANDARD RESISTANCE SPECIFICATIONS.

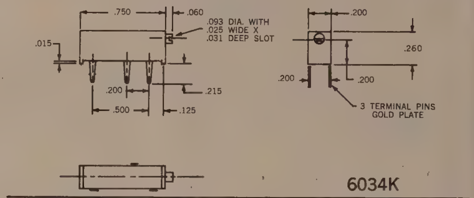
Special Options

Special resistances, performance tolerances and markings are available upon request. Refer to SPECIAL OPTIONS Catalog Sheet.

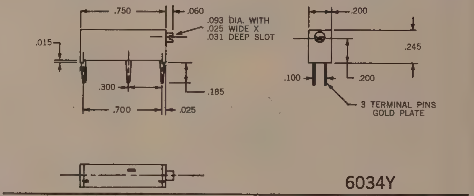
Standard Resistance Specifications:

Resistance (Ohms) Resistance Tol. ±10%	Resolution	Max. Volts at 85°C Amps.	Amphenol Part Number †		
			P Terminal	K Terminal	Y Terminal
10	Infinite	2.2	6034P-100	6034K-100	6034Y-100
20	Infinite	3.1	6034P-200	6034K-200	6034Y-200
50	Infinite	5.0	6030P-500	6034K-500	6034Y-500
100	Infinite	7.0	6034P-101	6034K-101	6034Y-101
200	Infinite	10.1	6034P-201	6034K-201	6034Y-201
500	Infinite	15.8	6034P-501	6034K-501	6034Y-501
1,000	Infinite	22.3	6034P-102	6034K-102	6034Y-102
2,000	Infinite	31.6	6034P-202	6034K-202	6034Y-202
5,000	Infinite	50.0	6034P-502	6034K-502	6034Y-502
10,000	Infinite	70.7	6034P-103	6034K-103	6034Y-103
20,000	Infinite	100.0	6034P-203	6034K-203	6034Y-203
50,000	Infinite	158.0	6034P-503	6034K-503	6034Y-503
100,000	Infinite	223.0	6034P-104	6034K-104	6034Y-104
200,000	Infinite	300.0	6034P-204	6034K-204	6034Y-204
500,000	Infinite	300.0	6034P-504	6034K-504	6034Y-504
1,000,000	Infinite	300.0	6034P-105	6034K-105	6034Y-105

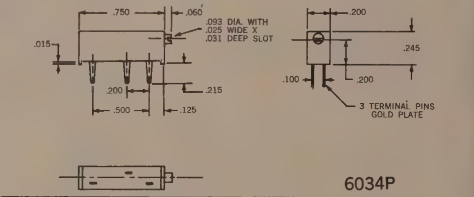
† Last three digits of the part number represent the resistance in Standard Code.



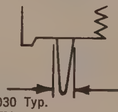
6034K

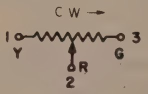


6034Y



6034P





TOLERANCES

.00 ±.010

.000 ±.005

Fractions ±1/64

Electrical Characteristics:

Resistance Values: 10 to 1 megohm (See Standard Resistance Specifications).

Resistance Tolerance: ±10%.

Resolution: Infinite.

End Resistance: 1% or 20 ohms whichever is greater.

Contact Resistance Variation: 3% of total resistance or 20 ohms, whichever greater.

Continuity: Continuous and unidirectional; maintained for full mechanical range.

Usable Potentiometer Range: 100%.

Insulation Resistance: 1,000 megohm minimum.

Electrical Output: Linear with shaft adjustment.

Mechanical Characteristics:

Number of Shaft Adjustment Turns: 15 turns.

Mechanical Stops: Contact idles with no electrical discontinuity.

Shaft Torque: 8.0 oz. in. maximum.

Rotational Life: 200 cycles min. with no discontinuity.

Terminal Type: Printed circuit pins.

Weight: Approximately 1.3 grams.

Volume: .0399 cu. in.

Markings: Standard manufacturer marking: Mfrs. name and nomenclature, resistance, date code. (Special marking optional.)

Environmental Characteristics:

Operating Temperature Range: −55°C to +125°C (−67°F to +257°F).

Power Rating: ½ watt at 85°C derated to zero at 125°C.

Temperature Coefficient Potentiometer: 100 ppm/°C.

Vibration: Per MIL-STD-202B, Method 204A — Condition D.

Shock: Per MIL-STD-202B, Method 213—Condition I.

Humidity: Per MIL-STD-202, Method 103.

Immersion: Sealed construction.

Dielectric Strength: 900 volts RMS at room temperature.

Load Life: 1,000 hours ½ watt at 85°C.

TRIMMING POTENTIOMETER

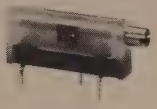
BUNKER RAMO AMPHENOL

3810 Series — Wirewound

FEATURES:

- A low-cost, quality trimmer for general purpose application.
- Permanently seals out dust and humidity.
- Full length mandrel provides optimum resolution.
- Corrosion-proof, gold-plated circuit pins are silver-brazed to resistance element for rugged long-life.
- Commercial.
- Temperature to 125°C.
- Sealed construction.
- ¾″ rectangular.
- Wirewound.

3810P



3810K

VISTA-TRIM Allows Visual Settings of Approximate Desired Values . . .

SAVES VALUABLE TIME

Both the element and contact carrier are visible through the semi-transparent top. Approximate final settings can be made with or without an ohmmeter. Example: For 50 ohms, set the contact at half the length of its travel along a 100 ohm element.

How to Order

When requesting a quotation or placing an order for Standard Micropot® Trimmers refer to part number listed under STANDARD RESISTANCE SPECIFICATIONS.

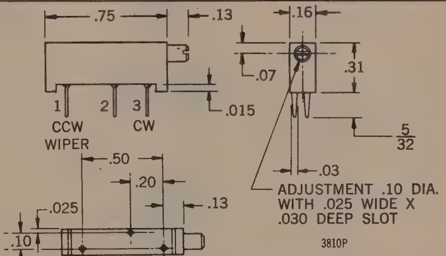
Special Options

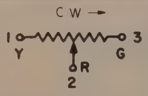
Special resistances, performance tolerances and markings are available upon request.

Standard Resistance Specifications:

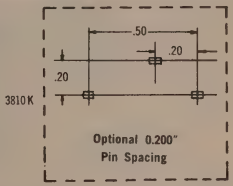
Resistance (Ohms) Resistance Tol. ±10%	Resolution		Max. Volts at 40°C Amb.	Amphenol Part Number †	
	No. of Turns	%		P Terminal	K Terminal
10	56	1.78	3.16	3810P-100	3810K-100
20	74	1.35	4.47	3810P-200	3810K-200
50	101	.98	7.07	3810P-500	3810K-500
100	105	.95	10.0	3810P-101	3810K-101
200	135	.72	14.2	3810P-201	3810K-201
500	157	.64	22.0	3810P-501	3810K-501
1,000	191	.525	32.0	3810P-102	3810K-102
2,000	211	.474	44.0	3810P-202	3810K-202
5,000	314	.32	70.0	3810P-502	3810K-502
10,000	403	.24	100.0	3810P-103	3810K-103
20,000	455	.22	142.0	3810P-203	3810K-203

† Last three digits of the part number represent the resistance in Standard Code.





TOLERANCES
.00 ±.010
.000 ±.005
Fractions ±1/64



Electrical Characteristics:

Resistance Values: 10 to 20,000 ohms (see Standard Resistance Specifications).

Resistance Tolerance: ±10%.

Resolution: .22% to 1.78% (see Standard Resistance Specifications).

End Resistance: 1% or 1 ohm, whichever greatest.

Noise During Adjustment: 100 ohms ENR maximum.

Continuity: Continuous and Unidirectional; maintained for full mechanical range.

Usable Potentiometer Range: 100%.

Insulation Resistance: 1,000 megohm minimum.

Electrical Output: Linear with shaft adjustment.

Mechanical Characteristics:

Number of Shaft Adjustment Turns: 20 turns.

Mechanical Stops: Contact idles with no electrical discontinuity.

Shaft Torque: 8.0 oz. in. max.

Rotational Life: 200 cycles min. with no discontinuity.

Terminal Type: P & K = Printed circuit pins.

Weight: Approximately 1.2 grams.

Volume: .0372 cu. in.

Markings: Standard manufacturer marking: Mfrs. name and nomenclature, resistance, date code. (Special marking optional)

Environmental Characteristics:

Operating Temperature Range: −65°C to +125°C (−85°F to +257°F).

Power Rating: 1 watt at 40°C derated to zero at 125°C.

Temperature Coefficient Resistance Wire: 20 ppm maximum.

Temperature Coefficient of Potentiometer: 100 ppm/°C max. 50 ppm/°C nom.

Vibration: Per MIL-R-27208.

Shock: Per MIL-R-27208.

Humidity: Per MIL-STD-202, Method 103.

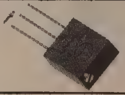
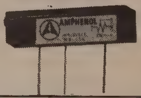
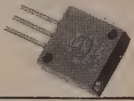
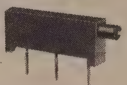
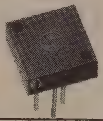
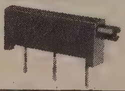
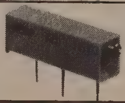
Immerson: Sealed construction.

Dielectric Strength: 1,000 volts RMS.

Load Life: 1,000 hours, 1 watt at 40°C.

MICROPOT® INFINITE RESOLUTION TRIMMING POTENTIOMETERS

BUNKER RAMO AMPHENOL

	Description	Amphenol Model No.	Adjustment Turns	Terminals[2]	Resistance Range in Ohms[3]	Resistance Tolerance	Temperature Range	Temperature Coefficient Potentiometer (PPM/°C)
FILM-MET™ ‡	Microminiature 3/8″ Square 	2301*	26	P,W,X	10 to 10K	±10% (±5% avail.)	−55° to +150°C	50 ppm
	High-Temperature 1¼″ Rectangular 	2851[1]*	22	L,S,P	20 to 20K	±10% (±5% avail.)	−55° to +150°C	50 ppm
	Subminiature ½″ Square 	2901[1]*	25	P,L,W,Y,X	10 to 20K	±10% (±5% avail.)	−55° to +150°C	50 ppm
	Microminiature ¾″ Rectangular Solvent-Resistant Vista-Trim 	3811*	15	P, K	10 to 20K	±10% (±5% avail.)	−55° to +125°C	50 ppm
CERMET	Microminiature 3/8″ Square	2305*	26	P,W,X	10 to 1 Meg.	±10% (±5% avail.)	−55° to +150°C	±150 ppm (±100 ppm avail.▲)
	High Temperature 1¼″ Rectangular	2855[1]*	22	P,L,S	20 to 1 Meg.	±10% (±5% avail.)	−55° to +150°C	±150 ppm (±100 ppm avail.▲)
	Subminiature ½″ Square 	2905[1]*	25	P,L,W,Y,X	20 to 10 Meg.	±10% (±5% avail.)	−55° to +150°C	±150 ppm (±100 ppm avail.▲)
	Microminiature ¾″ Rectangular Solvent-Resistant Vista-Trim 	3805 3815*	15	P, K	20 to 1 Meg.	±10% (±5% avail.)	−55° to +125°C	±150 ppm (±100 ppm avail.▲)
	Microminiature ¾″ Rectangular 	6034*	15	P,K,Y	10 to 1 Meg.	±10% (±5% avail.)	−55°C to +125°C	±100 ppm

Panel mounting bracket available.

[2] Terminations:
L — Color coded wire leads
S — Solder lugs
P — Printed circuit pins
W — Printed circuit pins (edge mount, top adjust leadscrew)
X — Printed circuit pins (edge mount, side adjust leadscrew)

[2] Terminations: Y — Printed circuit pins — staggered (edge mount, top adjust leadscrew)
K — Printed circuit pins with 0.200″ spacing

[3] See Catalog T-2 for standard resistance values.

* Humidity Proof

MICROPOT® INFINITE RESOLUTION TRIMMING POTENTIOMETERS

BUNKER RAMO AMPHENOL

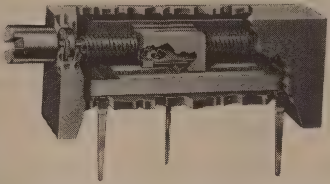
Maximum Power Rating in Watts	SIZE IN INCHES			Application
	H	W	L	
½ @ 85°C	0.198 0.415 0.415	0.375 0.193 0.200	0.375P 0.375W 0.375X	Military Industrial
¾ @ 85°C	0.32	0.28	1.25	Military Industrial
¾ @ 85°C	0.220 0.187 0.500 0.575 0.500	0.500 0.500 0.195 0.190 0.195	0.500P 0.500L 0.500W 0.500Y 0.500X	Military Industrial
¾ @ 40°C	0.31	0.16	0.75	Commercial
½ @ 85°C	0.198 0.415 0.415	0.375 0.193 0.200	0.375P 0.375W 0.375X	MIL-R-22097 RJ24
¾ @ 85°C	0.32	0.28	1.25	MIL-R-22097 RJ11
½ @ 85°C	0.220 0.187 0.500 0.575 0.500	0.500 0.500 0.195 0.190 0.195	0.500P 0.500L 0.500W 0.500Y 0.500X	MIL-R-22097 RJ22
¾ @ 40°C	0.31	0.16	0.75	Commercial
½ @ 85°C	0.20	0.16	0.75	Commercial

®MICROPOT — Trademark registered U.S. Patent Office

Humidity-proof trimmers pass MIL-R-27208A moisture resistance test.

▲ 1K and up

Film-Met™ by Amphenol*



It's the first major improvement in infinite resolution trimmers since cermets. Film-Met is an exclusive Amphenol resistance element completely different from wirewound and cermet types.

100% METAL ELEMENT — Amphenol's exclusive Film-Met element uses the same vacuum deposition process as precision metal-film fixed resistors. Continuous monitoring techniques during deposition assure maintenance of established performance levels and continuing high quality.

ENDS COMPROMISE—This new trimmer won't always replace wirewounds and cermets. Their characteristics fit many design parameters perfectly. But not all!

TEMPERATURE COEFFICIENT — Film-Met has a low TCR of ±50 ppm/°C maximum as standard. Perfect for applications requiring extremely low TCR.

NOISE—For applications requiring critical low noise levels, Film-Met must be your choice. This is especially true in applications where other components feature low thermal noise. Film-Met is now available for that critical job.

SETABILITY—Film-Met contact setability is improved over cermet because of lower contact resistance variation, and vastly improved over the resolution inherent in wirewound trimmers which have limited setability due to the turns of the resistance wire. The lower CRV of Film-Met results from the smooth metallic element surface which provides a low resistance interface with the precious metal contact.

OTHER FEATURES — Your choice for high frequency and pulse applications should also be Film-Met because of its excellent performance characteristics in these areas. Investigate Film-Met performance features for solutions to your circuit problems.

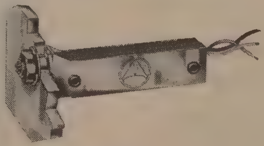
*U.S. Patent No. 3,354,134; also foreign patents.

SPECIAL OPTIONS

The following trimmer panel mounts are available for the designated Amphenol trimmers. If the panel mount is desired to be pre-assembled to an Amphenol trimmer at the factory, the Amphenol trimmer part number should be specified with the suffix "M". e.g.: 2750P-502M denotes a 2750 trimmer with printed circuit pins, 5000 ohms resistance, and mounted to the applicable panel mount shown below. If the panel mount is desired as a separate item, simply specify the panel mount part number shown below.

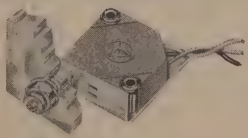
2799 PANEL MOUNT

For 2750 Trimmers



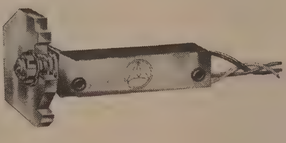
2949 PANEL MOUNT

For 2900, 2901 and 2905 Trimmers



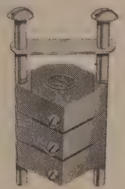
999 PANEL MOUNT

For 992, 994, 2850, 2851 and 2855 Trimmers



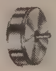
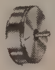
29-63816 STACK STRAP

For 2900, 2901 and 2905 Trimmers



PRECISION LINEAR WIREWOUND & CONDUCTIVE-PLASTIC POTENTIOMETERS

BUNKER RAMO **AMPHENOL**

	Size in Inches				Amphenol Model No.	Standard Resistance Range, ohms[4]	Standard Resistance Tolerance	Standard Linearity Tolerance	Temperature Range	Power Rating, watts		Type of Mounting	Max. No. of Sections	Applications
	Dia.	Length	Shaft							Single gang	Added cup			
SINGLE-TURN WIREWOUND	⅞	.685	⅛		751	1K to 50K	±5%	±0.5%	−65°C to +150°C	2	1	Servo bushing	5	Military Industrial
	1¹⁄₁₆	.665	⅛		752	200 to 100K	±5%	±0.5%	−65°C to +150°C	2	1	Servo bushing	5	Military Industrial
	1⁷⁄₁₆	.867	¼		749	600 to 250K	±5%	±0.5%	−65°C to +150°C	4	2	Servo bushing	5	Military Industrial
	1¾	.827	¼		757	1K to 300K	±5%	±0.35%	−65°C to +150°C	6	3	Servo bushing	8	Military Industrial
	2.0	.827	¼		754	800 to 350K	±5%	±0.25%	−65°C to +150°C	8	4	Servo bushing	8	Military Industrial
	3.0	.986	¼		743	1K to 340K	±5%	±0.25%	−65°C to +150°C	6	5	Servo bushing	8	Military Industrial
SINGLE-TURN CONDUCTIVE PLASTIC	⅞	.666	⅛		751P	250 to 100K	±10%	±0.5%	−55°C to +150°C	1.3	1.3	Servo bushing	5	Military Industrial
	1¹⁄₁₆	.635	⅛		752P	250 to 150K	±10%	±0.5%	−55°C to +150°C	1.5	1.5	Servo bushing	5	Military Industrial
	1⁷⁄₁₆	.867	¼		749P	250 to 175K	±10%	±0.4%	−55°C to +150°C	1.8	1.8	Servo bushing	5	Military Industrial
	1¾	.827	¼		757P	500 to 200K	±10%	±0.35%	−55°C to +150°C	2.0	2.0	Servo bushing	8	Military Industrial
	2.0	.934	¼		754P	500 to 250K	±10%	±0.3%	−55°C to +150°C	2.2	2.2	Servo bushing	8	Military Industrial
	3.0	1.179	¼		743P	500 to 300K	±10%	±0.25%	−55°C to +150°C	2.5	2.5	Servo bushing	8	Military Industrial

NOTE:

The wirewound and conductive-plastic precision potentiometers described above are also available in a wide range of non-linear functions. Amphenol specializes in customizing potentiometers to fulfill your specific needs. Combinations of potentiometers, torque motors, switches and detent assemblies are but a few of the products that have been engineered and used successfully in military and industrial markets. We welcome your inquiries.

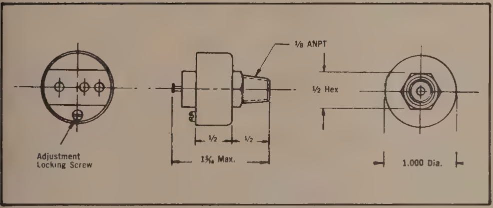
ADJUSTABLE PRESSURE SWITCHES

BUNKER RAMO AMPHENOL

MINIATURE ADJUSTABLE SNAP ACTION PRESSURE SWITCHES

- Miniature size reduces total system weight.
- Field adjustable lowering both installation and maintenance costs.
- Compatible with most pressure medias.
- Reduced size and weight decreases total system package.

SPECIFICATION PERFORMANCE DATA Model GAGE



GENERAL	MODEL KG-1	MODEL KG-2	MODEL KG-3	MODEL KG-4	MODEL KG-5
Pressure Range	2-15 psig	5-30 psig	8-50 psig	10-100 psig	20-200 psig
Proof Pressure	18 psig	35 psig	55 psig	110 psig	215 psig
Burst Pressure	35 psig	70 psig	120 psig	240 psig	450 psig
Dead Band Max. Oper. Diff.	1.0 psi	2.0 psi	3.0 psi	5.0 psi	10.0 psi
Accuracy	±½ psi	±1½ psi	±2 psi	±3.5 psi	±7½ psi
Operating Point	Set at mid-range unless otherwise specified				

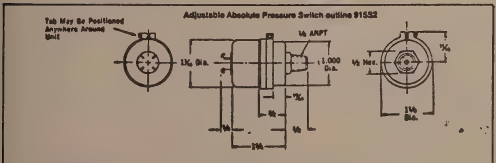
ELECTRICAL
Switch: Snap action S.P.D.T. (3 terminals).
Electrical Rating: 5 amps. at 125 V. 60 cycle inductive or resistive. 4 amps. at 30 V. d-c, resistive. 2.5 amps. at 30 V. d-c, inductive.

ENVIRONMENTAL
Temperature Limits: −65°F to +250°F.
Vibration Limits: 15g, 0-500 Hz (minimum). 10g, 0-2000 available.
Applicable MIL. Spec.: MIL-E-5272C.

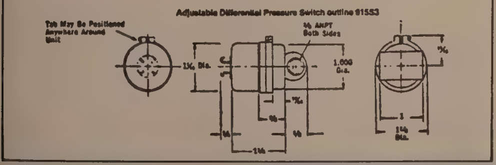
PHYSICAL
Pressure Connection: ⅛″ ANPT Male.
Electrical Connections: Made to switch.
Mounting: On pressure fitting.
Weight: 1⅛ oz.
Media: Any pressure media compatible with Ni-Span-C.

SPECIFICATION PERFORMANCE DATA DIFFERENTIAL — ABSOLUTE — Model

Adjustable Absolute Pressure Switch outline 91552



Adjustable Differential Pressure Switch outline 91553



GENERAL	Model KD1 Model KA1	Model KD2 Model KA2	Model KD3 Model KA3	Model KD4 Model KA4
Range	0-20 psi	0-40 psi	0-75 psi	0-100 psi
Proof Pressure at Max. Setting	25 psi	48 psi	90 psi	120 psi
Operating Pressure	5-20 psi	7-40 psi	20-75 psi	25-100 psi
Dead Band Maximum	2¼ psi	3½ psi	9 psi	9¼ psi
Operating Point	Set at mid-range unless otherwise specified			

ELECTRICAL
Switch: Snap action S.P.D.T. (3 terminals).
Electrical Ratings: 5 amps. at 125 V. 60 cycle inductive or resistive. 4 amps. at 30 V d-c, resistive. 2.5 amps. at 30 V. d-c, inductive.

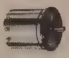
ENVIRONMENTAL
Temperature Limits: −65°F to +250°F.
Vibration Limits: 15g, 0-500 Hz (minimum). 10g, 0-2000 available MIL-E-5272C.

MILITARY
Applicable Military Spec. Calibration Shift Per 100°F:
Model KA1 & Model KD1 — 0.64 psi
Model KA2 & Model KD2 — 0.74 psi
Model KA3 & Model KD3 — 1.1 psi
Model KA4 & Model KD4 — 1.15 psi

PHYSICAL
Pressure Connection: Absolute — ⅛″ ANPT, Male
Differential — ⅛″ ANPT, both sides. Female.
Electrical Connections: Hermetic sealed header.
Mounting: On pressure fitting.
Weight: Absolute — 1⅝ oz.
Differential: 2⅛ oz.
Media: Any pressure media compatible with Ni-Span-C.

MICROPOT® PRECISION POTENTIOMETERS

BUNKER RAMO AMPHENOL

	Size in Inches				Amphenol Model No.	Standard Resistance Range, ohms[4]	Standard Resistance Tolerance	Standard Linearity Tolerance	Temperature Range	Max. Power Rating, watts	Type of Mounting	Max. No. of Sections	Applications
	Dia.	Length	Shaft										
3-TURN	1¾	1 31/64	¼		205-3T[1]	10 to 50K	10Ω ±10% 50-50K ±3%	±0.5%	−55°C to +105°C	3 @ 40°C	Bushing	1	Military Industrial
10-TURN	⅞	1.182	¼		4100	100 to 100K	100-100K ±5%	±0.25%	−55°C to +125°C	2 @ 40°C	Bushing	1	Industrial Commercial
	⅞	.750	¼		4200	100 to 100K	100-100K ±5%	±0.25%	−55°C to +125°C	2 Watts @ 70°C 0 Watts @ 125°C	Bushing	1	Industrial Commercial
	⅞	1.455	¼		2150	25 to 100K	25-50Ω ±5% 100-100K ±3%	±0.25%	−55°C to +105°C	3 @ 40°C	Bushing	2	Industrial Commercial
	⅞	1.573 Serv. 1.448 Bush.	⅛		2100	25 to 120K	100-100K ±3% 25-50Ω ±5% 120K ±5%	±0.25%	−55°C to +125°C	5 @ 40°C	Bushing Servo	3	Military Industrial
	1 13/16	2⅛	¼		2200	25 to 300K	25-50Ω ±5% 100-100K ±3% >100K ±5%	100Ω to 100K ±0.25%	−55°C to +105°C	5 @ 40°C	Bushing	3	Industrial Commercial
	1¾	2⅛	¼		205[3]	1.15 to 300K	<50Ω ±10% >50Ω ±3%	±0.1%	−55°C to +105°C	5 @ 40°C	Bushing	1	Military Industrial
	2	2 1/16 Serv. 2¼ Bush.	¼		900[2]	1 to 100K	<25Ω ±10% <50Ω ±5% >100Ω ±3%	±0.1%	−55°C to +125°C	5 @ 40°C	Bushing Servo	3	Military Industrial

[1] Zero base linearity standard
[2] Absolute linearity standard
[3] Different mounting configuration than model 2200
[4] See Catalog PD-2 for standard resistance values.
®MICROPOT — Trademark Reg. U.S. Patent Office

MINIATURE PRECISION POTENTIOMETER

BUNKER RAMO AMPHENOL

ScotPot™ 4200 SERIES

FEATURES

- Miniature Precision Potentiometer
- 10 Turn, wire wound
- ⅞″ dia. x ¾″ short.
- Low cost!
- Improved performance. Dissipates 2 watts @ 70°C for 1,000 hours.
- Over 1,000,000 revolution life.
- Gold-plated terminations.
- Glass filled nylon case with molded element grooves assures a perfect helix, high linear accuracy.
- Precious metal spring-loaded wiper prevents corrosion and noise.

STANDARD RESISTANCE SPECIFICATIONS

Standard Resistance	Resistance Tolerance	Linearity Tolerance (Ind.)	Resolution Number of Turns of Wire	Resolution %	Max. Volts Across Element (70°C)	Max. Amps Through Element (70°C)	Temperature Coefficient Resistance Wire	Temperature Coefficient Potentiometer	Amphenol Part Number Bushing One End
100	±5	±.25	1818	.055	14	.140	±20	±70	4201B-101
200	±5	±.25	2702	.037	20	.100	±20	±70	4201B-201
500	±5	±.25	3703	.027	31	.063	±20	±70	4201B-501
1,000	±5	±.25	4166	.024	44	.044	±20	±70	4201B-102
2,000	±5	±.25	5555	.018	62.5	.032	±20	±70	4201B-202
5,000	±5	±.25	6250	.016	100	.020	±20	±70	4201B-502
10,000	±5	±.25	5882	.017	140	.014	±20	±70	4201B-103
20,000	±5	±.25	6666	.015	200	.010	±20	±70	4201B-203
50,000	±5	±.25	7692	.009	310	.0063	±20	±70	4201B-503
100,000	±5	±.25	12500	.008	450	.0045	±20	±70	4201B-104

HOW TO ORDER

When placing an order for Standard Scot Pot™ Potentiometers, refer to part number listed under STANDARD RESISTANCE SPECIFICATIONS.

SPECIAL OPTIONS

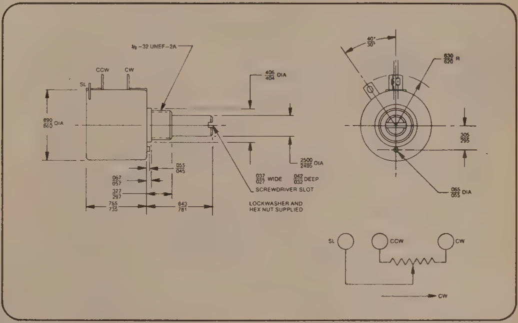
Many models are offered with special resistances, linearities, tolerances, mountings, markings, taps and shafts upon request. Refer to SPECIAL OPTIONS section.

ELECTRICAL CHARACTERISTICS

Resistance Range: 100 ohms to 100K ohms.
Standard Resistance Tolerance: ±5%.
Linearity Type: Independent.
Standard Linearity Tolerance: ±0.25%.
Power Dissipation: 2 Watts at 70°C.
Electrical Rotation: 3600° +10° −0°.
Absolute Minimum Resistance: 0.1% or 1 Ω whichever is greater.
Standard End Resistance: 0.25% or .1 Ω whichever is greater.
Standard Resolution Range (see standard resistance specification): 0.008% to 0.005%
Insulation Resistance: 1000 megohms minimum.
Noise: 100 ohms ENR maximum.

MECHANICAL CHARACTERISTICS

Mounting Type: Bushing.
Physical Dimensions: ⅞″ dia. x ¾″ long.
Bearing Type: Sleeve.
Weight: 1 oz. maximum.
Coil Length: 21.8″.
Mechanical Rotation: 3600° +10° −0°.
Stop Strength: 50 in. oz.
Torque: Start — 1.0 oz. in. Run — 1.0 oz. in.
Materials: Housing: Nylon; End Caps: Nylon; Shaft: Stainless Steel; Terminals: Gold Plated; Nut: Brass Nickel Plated; Washer: Steel Cadmium Plated.
Terminal Type: Solder lug.
Rotational Life: 1,000,000 Revolutions.
Backlash: None
Terminal Marking and Location: See Outline Dimensions.
Shaft: Length — 13/16″.
Diameter — .2500/.2495.
Max. End Play — .010
Radial Play — .003 T.I.R.
Runout — .005 T.I.R.
Mounting Diameter: Pilot Diameter Runout — .004 T.I.R.
Standard Marking: Manufacturers name and nomenclature, resistance value and tolerance, linearity type and tolerance, schematic, and date code.



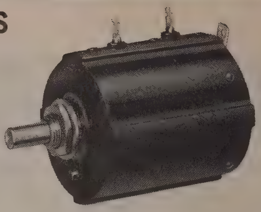
ENVIRONMENTAL CHARACTERISTICS

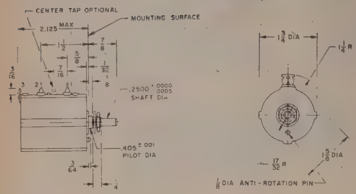
Operating Temperature Range: −55°C to +125°C.
Power Rating: 2 watts @ 70°C to Zero @ 125°C.
Temperature Cycling: 5 cycles −55°C to +125°C, 30 minutes @ each temperature per cycle.
High Temperature Exposure: 125°C for 100 Hours.
Low Temperature Exposure: −55°C for 24 hours.
Vibration: 10/500 Hz, .06 DA for ½ hour in each of three (3) planes.
Acceleration: 30 G's for one (1) minute in each of three (3) planes.
Shock: 18 shocks in three (3) planes of 30g's.
Humidity Cycling: 95% relative humidity for 12 hours under cycling conditions of −20°C to +75°C, six (6) hours at each temperature for a total of six (6) cycles.
Load Life: 2 Watts at 70°C for 1,000 Hours.
Dielectric Strength: At atmospheric pressure, 1,000 VRMS for one (1) minute.

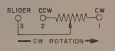
PRECISION POTENTIOMETERS

BUNKER RAMO AMPHENOL

205 SERIES







Fraction Tol. are ±1/64 unless noted. Decimal Tol. as noted.

Furnished with
3/8-32 Hex Nut
3/8 Lockwasher

FEATURES

- Resistance element and terminal lugs permanently molded into case.
- Zero-based linearity eliminates phasing to electrical zero.
- Extra-long resistance element gives up to 64% better resolution.
- Double-threaded leadscrew provides, low-torque, smooth rotation and ultra-accurate repeatable setting without hysteresis.
- Anti-backlash drive mechanism has single point contact of wiper-element.
- Dual bearings on rotor assembly provide accurate and permanent positioning.
- 1% zero-based linearity.
- Military-industrial.
- Ten turns.
- Wirewound.
- 3/4″ diameter.

ELECTRICAL CHARACTERISTICS

Standard Resistance Range: 1.15 to 300K ohms.
Standard Resistance Tolerance: Less than 50 ohms ±10% 50 to 100K ohms ±3%; Over 100K ohms ±5%.
Linearity Types Available: Zero-based and Independent 25 ohms through 300K ohms: Independent only 1.15 ohms and 2.9 ohms.
Standard Linearity: Zero-based 25 ohms through 300K ohms, Independent below 25 ohms.
Standard Linearity Tolerance: ±0.1%.
Power Dissipation: 5 watts at 40°C.
Electrical Rotation: 3600° +14.4° −0°.
Standard End Resistance: CW: 0.5% max. CCW: 0.1% max. End Resistance shall be .1 ohm max. for slide wire units.
Standard Resolution (see Standard Resistance Specifications): Inf. to .0037%.
Additional Taps: Center Tap only.
Tap Tolerance: ±2°.
Insulation Resistance: 1,000 megohm minimum.
Noise: 100 ohms ENR maximum.

MECHANICAL CHARACTERISTICS

Mounting Type Available: Bushing.
Physical Dimensions (see Outline Dimensions): 1¾″ dia. x 2⅛″.
Bearing Type: Sleeve.
Weight: 5 oz. max.
Coil Length: 43.5″.
Mechanical Rotation: 3600° +15° −0°.
Stop Strength: 15 in/ lbs.
Moment of Inertia: 58 gm. cm².
Torque: 3 oz. in. starting; 1.5 oz. in. running.
Materials: Housing — Phenolic
End Caps — Phenolic
Shaft — Stainless steel.
Mounting Hardware — Nut; brass, nickel plated — Washer; steel cadmium plated.
Bearing — Anodized Aluminum.
Terminals — Brass, Cadmium Plated.

Terminal Type: Solder Lug (Center tap; turret type).
Rotational Life: 1,000,000 revolutions.
Backlash: None.
Terminal Marking and Location: See Outline Dimensions:
Shaft: Standard Length — 7/8″.
Standard Diameter — .2500 +.0000 −.0005
Max. End Play — .014″.
Mounting Diameter (Pilot): See Outline Dimensions.
Standard Marking: Manufacturers' name and nomenclature, resistance value and tolerance, linearity tolerance, schematic, date code. (Special marking optional).

ENVIRONMENTAL CHARACTERISTICS

Operating Temperature Range: −55°C to +105°C (−67°F to +221°F).
Power Rating: 5 Watts at 40°C derated to 0 Watts at 105°C.
Temperature Cycling: Per MIL-R-12934, para. 4.6.18, Test Method MIL-STD-202B, Method 102A, Condition D.
High Temperature Exposure: +85°C for 1000 Hours Per MIL-R-12934, para. 4.6.23.
Low Temperature Exposure: −65°C for 24 Hours Per MIL-R-12934, para. 4.6.22.
Vibration: 10-55 Hz .06 DA, 10-500 Hz 10g's, MIL-STD-202B, Method 204A, Condition A.
Shock: 18 shocks at 15g's 11 milliseconds; 18 shocks at 30g's 11 milliseconds; MIL-STD-202B, Method 205, Condition A & B.
Acceleration: 30g's 3 planes Per MIL-STD-12934, para. 4.6.24.2.
Humidity: Per MIL-R-12934, para. 4.6.28, MIL-STD-202B, Method 103A Condition B.
Dielectric Strength: 1,000 volts RMS Per MIL-R-12934, para. 4.6.13. MIL-STD-202B, Method 301.
Sand and Dust: Per MIL-E-5272C, para. 4.11.
Salt Spray: Per MIL-STD-202B, Method 101A, Condition A, (Note: Requires special processing to comply).
Fungus: Per MIL-E-5272C, para. 4.8 Proc. I (Note: Requires special processing to comply).
Load Life: 1,000 hours Per MIL-R-12934, para. 4.6.20.

STANDARD RESISTANCE SPECIFICATIONS

Standard Resistance	Resistance Tolerance	Standard Lin. Type And Tolerance	Resolution: Number of Turns of Wire	Resolution: %	Maximum Voltage Across Resistance Element (40°C)	Maximum Current Through Resistance Element (40°C) in Amps.	TEMPERATURE COEFFICIENT—(PPM/°C): Resistance Wire	TEMPERATURE COEFFICIENT—(PPM/°C): Potentiometer	Amphenol Part Number
1.15	±10%	±0.1% Independent	—	Infinite	2.4	2.08	90	130	205-010
2.9	±10%	±0.1% Independent	—	Infinite	3.8	1.32	90	130	205-030
25	±10%	±0.1% Zero-Based	2,520	.040	11.2	.450	500	650	205-250
50	±3%	±0.1% Zero-Based	3,230	.031	15.9	.316	500	650	205-500
100	±3%	±0.1% Zero-Based	3,820	.026	22.3	.223	500	650	205-101
200	±3%	±0.1% Zero-Based	6,100	.0164	31.6	.158	10	60	205-201
500	±3%	±0.1% Zero-Based	5,150	.0195	50.0	.100	±10	±60	205-501
1,000	±3%	±0.1% Zero-Based	6,200	.0162	72.0	.070	±10	±60	205-102
2,000	±3%	±0.1% Zero-Based	7,800	.0141	100.0	.050	±10	±60	205-202
5,000	±3%	±0.1% Zero-Based	9,170	.0109	160.0	.0315	±10	±60	205-502
10,000	±3%	±0.1% Zero-Based	8,300	.0120	222.0	.0225	±10	±50	205-103
20,000	±3%	±0.1% Zero-Based	10,900	.0092	318.0	.0159	10	60	205-203
30,000	±3%	±0.1% Zero-Based	13,000	.0077	390.0	.0128	5	45	205-303
50,000	±3%	±0.1% Zero-Based	17,000	.0059	500.0	.0100	5	45	205-503
100,000	±3%	±0.1% Zero-Based	18,750	.0053	710.0	.0070	5	45	205-104
200,000	±5%	±0.1% Zero-Based	19,600	.0051	1000.0	.0050	±5	±45	205-204
300,000	±5%	±0.1% Zero-Based	27,000	.0037	1000.0	.0040	±5	±45	205-304

HOW TO ORDER

When placing an order for Standard Micropot® Potentiometers, refer to part number listed under STANDARD RESISTANCE SPECIFICATIONS.

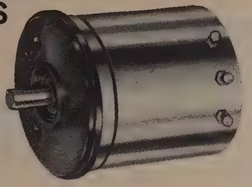
SPECIAL OPTIONS

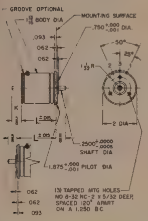
Many models are offered with special resistances, linearities, tolerances, mountings, markings taps and shafts upon request. Refer to SPECIAL OPTIONS section.

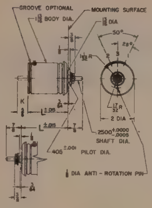
PRECISION POTENTIOMETERS

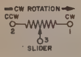
BUNKER RAMO AMPHENOL

900 SERIES




GROOVE OPTIONAL
1 13/16 BODY DIA
MOUNTING SURFACE
.750 +.000 -.001 DIA.
.093
062
062
50°
25°
1 1/32 R
2
3
1
E
K
5/8
L ±.015
2 DIA
.2500 +.0000 -.0005 SHAFT DIA
1.875 +.000 -.001 PILOT DIA
062
062
093
(3) TAPPED MTG HOLES NO 8-32 NC-2 x 5/32 DEEP, SPACED 120° APART ON A 1.250 BC





Furnished with
3/8-32 Hex Nut
3/8 Lockwasher

Fraction Tol. are ±1/64 unless noted.
Decimal Tol. are ±.005 unless noted.

ELECTRICAL CHARACTERISTICS

Standard Resistance Range: 1 ohm to 100,000 ohms (see Standard Resistance Specifications).
Standard Resistance Tolerance: ±10% 1 to 25 ohms; ±5% 50 ohms; ±3% 100 to 100,000 ohms.
Linearity Types Available: Independent, Zero-Based, Absolute, Terminal.
Standard Linearity Type & Tolerance: ±0.1% Absolute.
Power Dissipation: 5 watts at 40°C.
Electrical Rotation: 3600° (90° electrical overtravel optional).
Standard End Resistance: 0.1% maximum. End Resistance shall be .5% max. for slide wire units.
Standard Resolution Range (see Standard Resistance Specifications): Infinite to .005%.
Additional Taps: Center Tap.
Standard Tap Tolerance: ±2°.
Insulation Resistance: 1,000 Megohms Minimum.
Noise: 100 ohms ENR maximum.

MECHANICAL CHARACTERISTICS

Mounting Types Available: Servo and Bushing (see Outline Dimensions).
Physical Dimensions: See Outline Dimensions.
Bearing Types: Servo and Tapped Hole — Ball Bearing.
Bushing — Sleeve Bearing.
Weight: Servo, Tapped Hole, and Bushing — Single Section, 5.9 oz. max. Each additional section, 3.85 oz. max.
Ganging Capability: 3 sections maximum.
Coil Length: 49.062″.
Mechanical Rotation: 3600° +10° −0° (90° Mechanical overtravel optional).
Stop Strength: 10 in./lbs.
Moment of Inertia: 20 gm cm².
Torque (Single Section): Servo and Tapped Hole — 1.5 oz/in. Starting, 1.0 oz/in. Running. Bushing Mount — 1.5 oz/in. Starting, 1.0 oz./in. Running.
Materials: Housing — Phenolic.
Shaft — Stainless Steel.
End Caps: Anodized Aluminum.
Mounting Hardware — Nut, Brass, Nickel Plated. Washer; Steel, Cadmium Plated.
Terminals — Hot Tin Dipped.
Terminal Type: Turret.
Rotational Life: 2,000,000 revolutions.
Backlash: None.
Terminal Marking and Location: See Outline Dimensions:

FEATURES

- ±0.1% absolute linearity.
- ±0.025% terminal, zero-based or independent linearity.
- Unique "scanning" wiper improves rotational life up to 2,000,000 revolutions.
- Long 49-inch mandrel gives ultra-high resolution.
- Patented precision Leadscrew gives ultra-accurate repeatable setting without hysteresis.
- Screw adjustments position contact to 100% output.
- Spring-loaded carrier arms insure zero-backlash.
- Molded in element and terminals for high concentricity and resistance to shock and vibration.
- 2″ diameter
- Ten turns.
- Wirewound
- Military-industrial.

Mounting Type	"L" Dimension and Model Number Per Number of Ganged Cups 1	2	3
Bushing, One End	2.250 - 901B	4.125 - 902B	5.968 - 903B
Bushing, Both Ends	2.656 - 901BB	4.531 - 902BB	6.359 - 903BB
Bushing, Rear Shaft	2.250 - 901BK	4.125 - 902BK	5.968 - 903BK
Servo, One End	2.062 - 901S	3.937 - 902S	5.781 - 903S
Servo, Both Ends	2.281 - 901SS	4.156 - 902SS	6.000 - 903SS
Servo, Rear Shaft	2.062 - 901SK	3.937 - 902SK	5.781 - 903SK

Shaft: Standard Length — Bushing Mount 7/8″; Servo and Tapped Hole Mount 5/8″.
Standard Diameter — .2500 +.0000 −.0005.
Max. End Play — Bushing .010; Servo .005.
Max. Radial Play — Bushing .003; Servo .001.
Shaft Runout — Bushing .002 T.I.R.; Servo .001 T.I.R.
Mounting Diameter (Pilot): (See Outline Dimensions) —
Pilot Diameter Runout — Bushing .003 T.I.R. Servo .001 T.I.R.
Pilot Diameter Face Runout — Bushing .002 T.I.R. Servo .002 T.I.R.
Standard Marking: Manufacturers' name and nomenclature, resistance value and tolerance, linearity tolerance, schematic, date code. (Special marking optional).

ENVIRONMENTAL CHARACTERISTICS

Operating Temperature Range: −55°C to +125°C (−67°F to +257°F).
Power Rating: 5 Watts at 40°C derated to 0 Watts at 125°C.
Temperature Cycling: Per MIL-R-12934, para. 4.6.18, Test Method MIL-STD-202B, Method 102A, Condition D.
High Temperature Exposure: +85°C for 1000 Hours Per MIL-R-12934, para. 4.6.23.
Low Temperature Exposure: −65°C for 24 Hours Per MIL-R-12934, para. 4.6.22.
Vibration: 10 to 55 Hz, .06 DA through 50 to 2,000 Hz, 15g's Per MIL-R-12934, para. 4.6.24, Test Method MIL-STD-202B, Method 204.
Shock: 18 shocks, 50g's 11 MS; MIL-R-12934, para. 4.6.25, MIL-STD-202, Method 205.
Acceleration: 30g's 3 Planes Per MIL-R-12934, para. 4.6.24.2.
Humidity: Per MIL-R-12934, para. 4.6.28.
Dielectric Strength: 1,000 volts RMS at room conditions, 350 volts RMS at 70,000 feet per MIL-R-12934, para. 4.6.13.
Sand and Dust: Per MIL-E-5272C, para. 4.11.
Salt Spray: Per Test Method MIL-STD-202B, Method 101A, Condition A (Requires special processing to comply).
Fungus: Per MIL-E-5272C, Proc. I, para. 4.8.
Load Life: 1,000 hours Per MIL-R-12934, para. 4.6.20.

STANDARD RESISTANCE SPECIFICATIONS

Standard Resistance	Resistance Tolerance	Linearity Tolerance (Absolute)	Resolution: Number of Turns of Wire	Resolution: %	Max. Volts Across Element (40°C)	Max. Amps Through Element (40°C)	Temperature Coefficient—(PPM/°C): Resistance Wire	Temperature Coefficient—(PPM/°C): Potentiometer	Amphenol Part Number†: Bushing 1 One End	Amphenol Part Number†: Servo 2 One End	Amphenol Part Number†: Bushing Both Ends	Amphenol Part Number†: Servo Both Ends
1	±10%	±0.1%(Ind.)	—	Infinite	2.2	2.25	90	130	901B-010	901S-010	901BB-010	901SS-010
3	±10%	±0.1%(Ind.)	—	Infinite	1.0	3.85	90	130	901B-030	901S-030	901BB-030	901SS-030
25	±10%	±0.1%(Ind.)	3,195	.0310	11.2	0.450	500	650	901B-250	901S-250	901BB-250	901SS-250
50	±5%	±0.1%(Ind.)	4,060	.0247	15.9	0.316	500	650	901B-500	901S-500	901BB-500	901SS-500
100	±3%	±0.1%	4,930	.0202	22.3	0.223	500	650	901B-101	901S-101	901BB-101	901SS-101
200	±3%	±0.1%	6,100	.0164	31.8	0.160	500	650	901B-201	901S-201	901BB-201	901SS-201
500	±3%	±0.1%	5,300	.0189	50.0	0.100	±10	±60	901B-501	901S-501	901BB-501	901SS-501
1,000	±3%	±0.1%	6,200	.0162	72.0	0.070	±10	±60	901B-102	901S-102	901BB-102	901SS-102
2,000	±3%	±0.1%	7,800	.0128	100.0	0.050	±10	±60	901B-202	901S-202	901BB-202	901SS-202
5,000	±3%	±0.1%	9,180	.0109	160.0	0.0315	±10	±60	901B-502	901S-502	901BB-502	901SS-502
10,000	±3%	±0.1%	10,200	.0098	222.0	0.0225	±10	±60	901B-103	901S-103	901BB-103	901SS-103
20,000	±3%	±0.1%	12,750	.00785	318.0	0.0159	±10	±60	901B-203	901S-203	901BB-203	901SS-203
30,000	±3%	±0.1%	12,850	.00779	390.0	0.0128	±5	±45	901B-303	901S-303	901BB-303	901SS-303
50,000	±3%	±0.1%	17,100	.00585	500.0	0.0100	±5	±45	901B-503	901S-503	901BB-503	901SS-503
100,000	±3%	±0.1%	18,700	.00535	710.0	0.0070	±5	±45	901B-104	901S-104	901BB-104	901SS-104

†If ordering a ganged unit, specify model number under outline dimensions, and give specifications for each cup, eg. 902B, Cup A: 1000Ω, Cup B: 2000Ω. (Cup A refers to mounted cup). 1 For bushing mount with rear shaft extension, specify BK. eg. 901BK-010. 2 For servo mount with rear shaft extension, specify SK. eg. 901SK-010.

HOW TO ORDER

When placing an order for Standard Micropot® Potentiometers, refer to part number listed under STANDARD RESISTANCE SPECIFICATIONS.

SPECIAL OPTIONS

Many models are offered with special resistances, linearities, tolerances, mountings, markings, taps and shafts upon request. Refer to SPECIAL OPTIONS section.

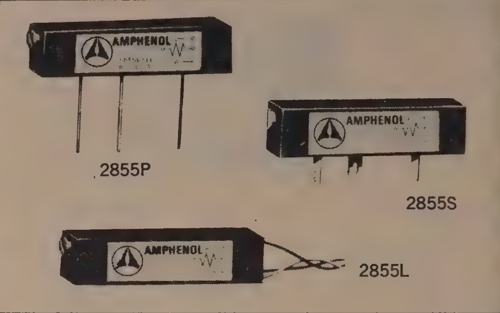
TRIMMING POTENTIOMETERS

BUNKER RAMO AMPHENOL

2855 SERIES

FEATURES

- Meets or exceeds all requirements of MIL-R-22097 style RJ11.
- Cermet element offers infinite resolution . . . wide resistance range.
- TC of 100 ppm/°C is standard.
- Multi-finger contact reduces CRV to a minimum and enhances rotational life.
- Gold strap terminations welded directly to resistance element.
- Temperature to 150°C.
- Humidity-Proof.
- 1¼″ Rectangular.
- Cermet.

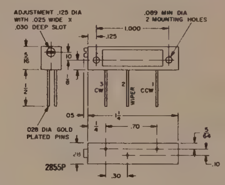

AMPHENOL
2855P
AMPHENOL
2855S
AMPHENOL
2855L

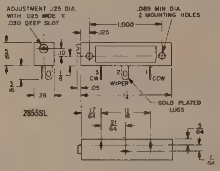
How to Order

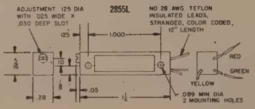
When requesting a quotation or placing an order for Standard Micropot® Trimmers refer to part number listed under STANDARD RESISTANCE SPECIFICATIONS.

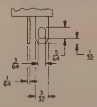
Special Options

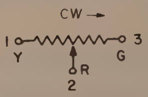
Special resistances, performance tolerances, markings, and lead lengths are available upon request. Refer to SPECIAL OPTIONS Catalog Sheet.


ADJUSTMENT .125 DIA WITH .025 WIDE X .030 DEEP SLOT
.089 MIN DIA 2 MOUNTING HOLES
1.000
.125
5/16
10
1/8
1/2
3 CW
2 WIPER
1 CCW
05
1¼
1/4
.70
028 DIA GOLD PLATED PINS
5/64
28
.10
2855P
.30


ADJUSTMENT .125 DIA. WITH 025 WIDE X .030 DEEP SLOT
.089 MIN DIA 2 MOUNTING HOLES
1.000
.125
5/16
.10
3 CW
2 WIPER
1 CCW
.05
.28
1¼
GOLD PLATED LUGS
2855SL
17/64
21/64
7/64


ADJUSTMENT 125 DIA WITH 025 WIDE X .030 DEEP SLOT
2855L
NO 28 AWG TEFLON INSULATED LEADS, STRANDED, COLOR CODED, 12" LENGTH
125
1.000
5/16
10
1/8
.05
.28
1¼
RED
GREEN
YELLOW
.089 MIN DIA 2 MOUNTING HOLES


3/64
5/64
1/32
1/64
3/32



TOLERANCES
.00 ±.010
.000 ±.005
Fractions ±1/64

Standard Resistance Specifications

Resistance (Ohms) Resistance Tol. ±10%	Resolution	Max. Volts at 85°C Amb.	Amphenol Part Number† P Terminal	S Terminal	L Terminal
20	Infinite	3.87	2855P-200	2855S-200	2855L-200
50	Infinite	6.12	2855P-500	2855S-500	2855L-500
100	Infinite	8.66	2855P-101	2855S-101	2855L-101
200	Infinite	12.24	2855P-201	2855S-201	2855L-201
500	Infinite	19.36	2855P-501	2855S-501	2855L-501
1,000	Infinite	27.38	2855P-102	2855S-102	2855L-102
2,000	Infinite	38.72	2855P-202	2855S-202	2855L-202
5,000	Infinite	61.23	2855P-502	2855S-502	2855L-502
10,000	Infinite	86.60	2855P-103	2855S-103	2855L-103
20,000	Infinite	122.47	2855P-203	2855S-203	2855L-203
25,000	Infinite	136.91	2855P-253	2855S-253	2855L-253
50,000	Infinite	193.64	2855P-503	2855S-503	2855L-503
100,000	Infinite	273.86	2855P-104	2855S-104	2855L-104
250,000	Infinite	300.00	2855P-254	2855S-254	2855L-254
500,000	Infinite	300.00	2855P-504	2855S-504	2855L-504
1,000,000	Infinite	300.00	2855P-105	2855S-105	2855L-105

†The last three digits of the part number represent the resistance in standard code. For panel mount add letter M after part number, e.g. —2855P-501M.

Electrical Characteristics

Resistance Values: 20 to 1 megohm (see Standard Resistance Specifications).

Resistance Tolerance: ±10%.

Resolution: Infinite.

End Resistance: 2% of total resistance or 20 ohms, whichever is greater.

Contact Resistance Variation: 3% of total resistance or 20 ohms, whichever is greater.

Continuity: Continuous and unidirectional; maintained for full mechanical range.

Usable Potentiometer Range: 100%

Insulation Resistance: Per MIL-R-22097.

Electrical Output: Linear with shaft adjustment.

Mechanical Characteristics

Number of Shaft Adjustment Turns: 22 Turns.

Mechanical Stops: Contact idles with no electrical discontinuity.

Shaft Torque: 8.0 oz. in. max.

Rotational Life: 200 cycles min. with no discontinuity.

Terminal Types: P per MIL-R-22097, Style RJ11, plus S configuration. P = Printed circuit; L = Teflon insulated stranded leads; S = Solder lugs.

Mounting Bracket Available: Amphenol Model 999; Refer to Trimmer Mounting Hardware Catalog Sheet.

Stacking: Mounting holes provided (see Outline Dimensions).

Terminal Strength: Per MIL-R-22097.

Weight: 5 grams approx.

Volume: 109 cu. in.

Marking: Standard manufacturer marking: Mfrs. name and nomenclature, wiring diagram, resistance, date code. (Special marking optional.)

Solderability: Per MIL-R-22097.

Environmental Characteristics

Operating Temperature Range: —55°C to +150°C (—67°F to +302°F).

Power Rating: ¾ watt at 85° derated to zero at 150°C

Temperature Coefficient of Potentiometer: ±100 ppm/°C.

Temperature Cycling (Thermal Shock): Per MIL-R-22097.

Low Temperature Operation: —55°C per MIL-R-22097.

High Temperature Exposure: +150°C per MIL-R-22097.

Vibration: Per MIL-R-22097.

Humidity-Moisture Resistance: Per MIL-R-22097.

Immersion (Leak Test): Per MIL-R-22097.

Dielectric Strength: 900 volts RMS at room conditions, 350 volts RMS at 80,000 feet per MIL-R-22097.

Salt Spray: Per MIL-R-22097.

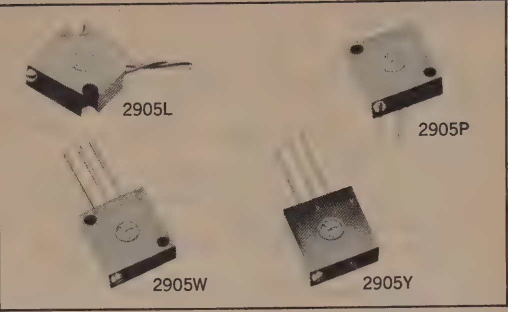
Fungus: Non-nutrient materials per MIL-E-5272.

Load Life: 1,000 hours per MIL-R-22097.

TRIMMING POTENTIOMETERS

BUNKER RAMO AMPHENOL

2905 SERIES


2905L
2905P
2905W
2905Y

FEATURES

- Meets or exceeds all requirements of MIL-R-22097 style RJ22.
- Cermet element offers infinite resolution . . . wide resistance range.
- TC of 100 ppm/°C is standard.
- Molded-in terminal pins for greater strength and reliability.
- Gold strap terminations welded directly to resistance element minimizing IR loss.
- MIL-R-22097 RJ22.
- Temperature to 150°C.
- Humidity-Proof.
- ½″ Square.
- Cermet.

How to Order

When requesting a quotation or placing an order for Standard Micropot® Trimmers refer to part number listed under STANDARD RESISTANCE SPECIFICATIONS

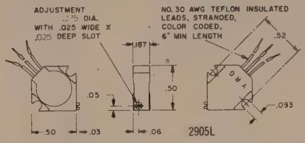
Special Options

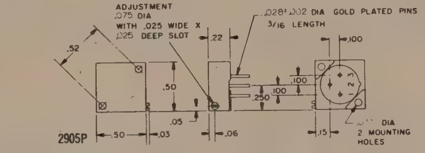
Special resistances, performance tolerances, markings, and lead lengths are available upon request. Refer to SPECIAL OPTIONS Catalog Sheet.

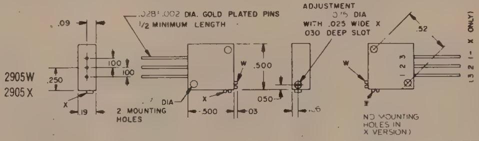
Standard Resistance Specifications

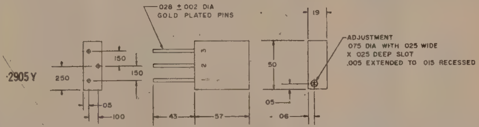
Resistance (Ohms) Resistance Tol. ±10%	Resolution	Max. Volts at 85°C Amb.	Amphenol Part Number† P Terminal	L Terminal	W Terminal	X Terminal	Y Terminal
10	Infinite	2.2	2905P-100	2905L-100	2905W-100	2905X-100	2905Y-100
20	Infinite	3.1	2905P-200	2905L-200	2905W-200	2905X-200	2905Y-200
50	Infinite	5.0	2905P-500	2905L-500	2905W-500	2905X-500	2905Y-500
100	Infinite	7.0	2905P-101	2905L-101	2905W-101	2905X-101	2905Y-101
200	Infinite	10.0	2905P-201	2905L-201	2905W-201	2905X-201	2905Y-201
500	Infinite	15.8	2905P-501	2905L-501	2905W-501	2905X-501	2905Y-501
1,000	Infinite	22.3	2905P-102	2905L-102	2905W-102	2905X-102	2905Y-102
2,000	Infinite	31.6	2905P-202	2905L-202	2905W-202	2905X-202	2905Y-202
5,000	Infinite	50.0	2905P-502	2905L-502	2905W-502	2905X-502	2905Y-502
10,000	Infinite	70.7	2905P-103	2905L-103	2905W-103	2905X-103	2905Y-103
20,000	Infinite	100.0	2905P-203	2905L-203	2905W-203	2905X-203	2905Y-203
25,000	Infinite	111.0	2905P-253	2905L-253	2905W-253	2905X-253	2905Y-253
50,000	Infinite	158.0	2905P-503	2905L-503	2905W-503	2905X-503	2905Y-503
100,000	Infinite	223.0	2905P-104	2905L-104	2905W-104	2905X-104	2905Y-104
250,000	Infinite	300.0	2905P-254	2905L-254	2905W-254	2905X-254	2905Y-254
500,000	Infinite	300.0	2905P-504	2905L-504	2905W-504	2905X-504	2905Y-504
1,000,000	Infinite	300.0	2905P-105	2905L-105	2905W-105	2905X-105	2905Y-105
2,000,000	Infinite	300.0	2905P-205	2905L-205	2905W-205	2905X-205	2905Y-205
2,500,000	Infinite	300.0	2905P-255	2905L-255	2905W-255	2905X-255	2905Y-255
5,000,000	Infinite	300.0	2905P-505	2905L-505	2905W-505	2905X-505	2905Y-505
10,000,000	Infinite	300.0	2905P-106	2905L-106	2905W-106	2905X-106	2905Y-106

†The last three digits of the part number represent the resistance in standard code. For panel mount add letter M after part number, e.g. —2905P-500M.

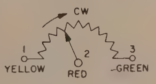

ADJUSTMENT
.075 DIA.
WITH .025 WIDE X
.025 DEEP SLOT
NO. 30 AWG TEFLON INSULATED
LEADS, STRANDED,
COLOR CODED,
6" MIN LENGTH
.187
.52
.50
.05
.093
.50
.03
.06
Y R G
2905L


ADJUSTMENT
.075 DIA
WITH .025 WIDE X
.025 DEEP SLOT
.028±.002 DIA GOLD PLATED PINS
3/16 LENGTH
.22
.100
.52
.50
.100
.100
.250
.05
.50
.03
.06
.15
DIA
2 MOUNTING
HOLES
1 2 3
2905P


.09
.028±.002 DIA. GOLD PLATED PINS
1/2 MINIMUM LENGTH
ADJUSTMENT
.075 DIA
WITH .025 WIDE X
.030 DEEP SLOT
.52
2905W
2905X
.250
100
100
W
.500
X
.19
DIA
2 MOUNTING
HOLES
X
.500
.03
.050
.06
W
1 2 3
(3 2 1 - X ONLY)
(NO MOUNTING
HOLES IN
X VERSION)


.028 ±.002 DIA
GOLD PLATED PINS
.19
ADJUSTMENT
.075 DIA WITH .025 WIDE
X .025 DEEP SLOT
.005 EXTENDED TO .015 RECESSED
2905Y
.250
.150
.150
1 2 3
.50
.05
.100
.43
.57
.05
.06

See SPECIAL OPTIONS page for Stack Strap and Panel Mount Options.


CW
1
2
3
YELLOW
RED
GREEN

TOLERANCES
.00 ±.010
.000 ±.005
Fractions ±1/64

Electrical Characteristics

Resistance Values: 10 ohms to 10 megohms (see Standard Resistance Specifications).

Resistance Tolerance: ±10%.

Resolution: Infinite.

End Resistance: 2% of total resistance or 20 ohms, whichever is greater.

Contact Resistance Variation: 3% of total resistance or 20 ohms, whichever is greater.

Usable Potentiometer Range: 100%

Insulation Resistance: Per MIL-R-22097.

Electrical Output: Linear with shaft adjustment.

Mechanical Characteristics

Number of Shaft Adjustment Turns: 25 turns.

Mechanical Stops: Contact idles with no electrical discontinuity.

Shaft Torque: 5.0 oz. in. max.

Rotational Life: 200 cycles min. with no discontinuity.

Terminal Types: P and L per MIL-R-22097, Style RJ22, plus W, X and Y configuration. P = Printed circuit pins; L = Teflon insulated stranded leads; W, X & Y = Printed circuit pins.

Mounting Bracket Available: Amphenol Model 2949; refer to Trimmer Mounting Hardware Catalog Sheet.

Stacking: Mounting holes provided (see Outline Dimensions). Pads provide air space between units.

Terminal Strength: Per MIL-R-22097.

Weight: Approx. 3 grams.

Volume: .055 cu. in.

Marking: Standard manufacturer marking: Mfrs. name and nomenclature, wiring diagram, resistance, date code. (Special marking optional.)

Solderability: Per MIL-R-22097.

Environmental Characteristics

Operating Temperature Range: —55°C to +150°C (—67°F to +302°F).

Power Rating: ½ watt at 85°C derated to zero at 150°C.

Temperature Coefficient of Potentiometer: ±100 ppm/°C.

Thermal Shock: Per MIL-R-22097.

Low Temperature Operation: Per MIL-R-22097.

High Temperature Operation: Per MIL-R-22097.

Vibration: Per MIL-R-22097.

Shock: Per MIL-R-22097.

Humidity-Moisture Resistance: Per MIL-R-22097.

Immersion (Leak Test): Per MIL-R-22097.

Dielectric Strength: 900 volts RMS at room conditions, 350 volts RMS at 80,000 feet per MIL-R-22097.

Salt Spray: Per MIL-R-22097.

Fungus: Non-nutrient materials per MIL-E-5272.

Load Life: 1,000 hours per MIL-R-22097.

TRIMMING POTENTIOMETERS

BUNKER RAMO AMPHENOL

2305 SERIES

FEATURES

- **Meets or exceeds all requirements of MIL-R-22097 style RJ24.**
- **Cermet element offers infinite resolution . . . wide resistance range.**
- **TC as low as 100 ppm/°C is standard.**
- **Precious metal contact reduces CRV to a minimum and enhances rotational life.**
- **Molded-in terminal pins for greater strength and reliability.**
- **Gold strap terminations welded directly to resistance element.**
- **MIL-R-22097 RJ24.**
- **Temperature to 150°C.**
- **Humidity-Proof.**
- **3/8" Square.**
- **Cermet.**

How to Order

When requesting a quotation or placing an order for Standard Micropot® Trimmers refer to part number listed under STANDARD RESISTANCE SPECIFICATIONS

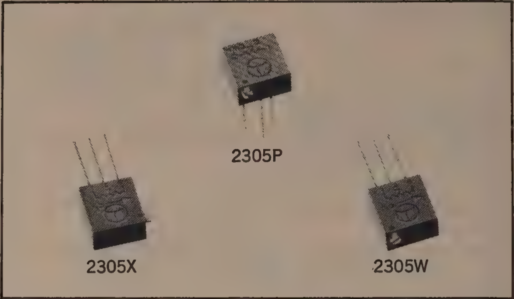
Special Options

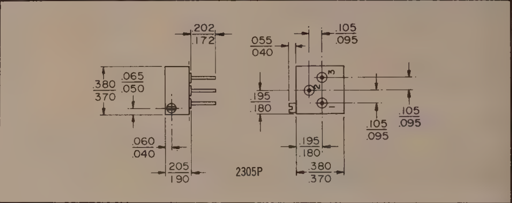
Special resistances, performance tolerances, markings, and lead lengths are available upon request. Refer to SPECIAL OPTIONS Catalog Sheet.

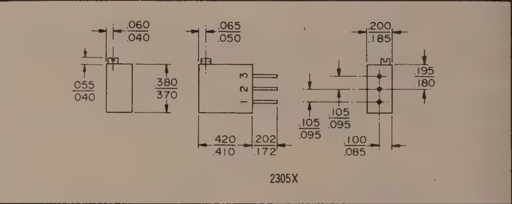
Standard Resistance Specifications

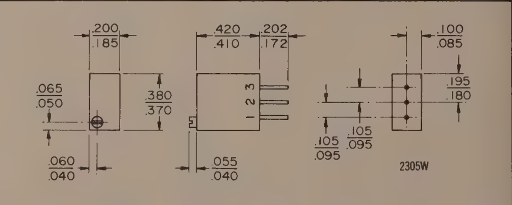
Resistance (Ohms) Resistance Tol. ±10%	Resolution	Max. Volts at 85°C Amb.	Amphenol Part Number† P Terminal	W Terminal	X Terminal
1,000,000	Infinite	300.0	2305P-105	2305W-105	2305X-105
20	Infinite	3.1	2305P-200	2305W-200	2305X-200
50	Infinite	5.0	2305P-500	2305W-500	2305X-500
100	Infinite	7.0	2305P-101	2305W-101	2305X-101
200	Infinite	10.0	2305P-201	2305W-201	2305X-201
500	Infinite	15.8	2305P-501	2305W-501	2305X-501
1,000	Infinite	22.3	2305P-102	2305W-102	2305X-102
2,000	Infinite	31.6	2305P-202	2305W-202	2305X-202
5,000	Infinite	50.0	2305P-502	2305W-502	2305X-502
10,000	Infinite	70.7	2305P-103	2305W-103	2305X-103
20,000	Infinite	100.0	2305P-203	2305W-203	2305X-203
25,000	Infinite	111.0	2305P-253	2305W-253	2305X-253
50,000	Infinite	158.0	2305P-503	2305W-503	2305X-503
100,000	Infinite	223.0	2305P-104	2305W-104	2305X-104
250,000	Infinite	300.0	2305P-254	2305W-254	2305X-254
500,000	Infinite	300.0	2305P-504	2305W-504	2305X-504

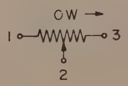
†The last three digits of the part number represent the resistance in standard code.











Adjustment .080/.070 dia. with .025/.015 wide x .030/.020 deep slot.

.020/.016 dia. gold plated pins.

Electrical Characteristics

Resistance Values: 20 ohms to 1 megohm (see Standard Resistance Specifications).

Resistance Tolerance: ±10%.

Resolution: Infinite.

End Resistance: 2% of total resistance or 20 ohms, whichever is greater.

Contact Resistance Variation: 3% of total resistance or 20 ohms, whichever is greater.

Usable Potentiometer Range: 100%

Insulation Resistance: Per MIL-R-22097.

Electrical Output: Linear with shaft adjustment.

Mechanical Characteristics

Number of Shaft Adjustment Turns: 25 turns.

Mechanical Stops: Contact idles with no electrical discontinuity.

Shaft Torque: 5.0 oz. in. max.

Rotational Life: 200 cycles min. with no discontinuity.

Terminal Types: P, W and X configurations, style RJ24, per MIL-R-22097. P, W & X = Printed circuit pins.

Terminal Strength: Per MIL-R-22097.

Weight: 1 gram approx.

Volume: .023 cu. in.

Marking: Standard manufacturer marking: Mfrs. name and nomenclature, wiring diagram, resistance, date code. (Special marking optional.)

Solderability: Per MIL-R-22097.

Environmental Characteristics

Operating Temperature Range: −55°C to +150°C (−67°F to +302°F).

Power Rating: 1/2 watt at 85°C derated to zero at 150°C.

Temperature Coefficient of Potentiometer: ±100 ppm/°C.

Thermal Shock: Per MIL-R-22097.

Low Temperature Operation: Per MIL-R-22097.

High Temperature Operation: Per MIL-R-22097.

Vibration: Per MIL-R-22097.

Shock: Per MIL-R-22097.

Humidity-Moisture Resistance: Per MIL-R-22097.

Immersion (Leak Test): Per MIL-R-22097.

Dielectric Strength: 900 volts RMS at room conditions, 350 volts RMS at 70,000 feet per MIL-R-22097.

Salt Spray: Per MIL-R-22097.

Fungus: Non-nutrient materials per MIL-E-5272.

Load Life: 1,000 hours per MIL-R-22097.

TRIMMING POTENTIOMETERS

BUNKER RAMO AMPHENOL

2901 SERIES

FEATURES

- Exclusive 100% metallic element offers infinite resolution with excellent low noise characteristics unsurpassed by other infinite resolution elements.
- Performance characteristics compatible with other metal film components.
- Low 50 ppm/°C is standard.
- Internal component design provides low inductance and capacitance.
- Molded-in terminal pins for greater strength and reliability.
- Military-Industrial.
- Temperature to 150°C.
- Humidity-Proof.
- ½″ Square.
- Film-Met™.

U.S. Patent No. 3,353,134; also foreign patents.

How to Order

When requesting a quotation or placing an order for Standard Micropot® Trimmers refer to part number listed under STANDARD RESISTANCE SPECIFICATIONS

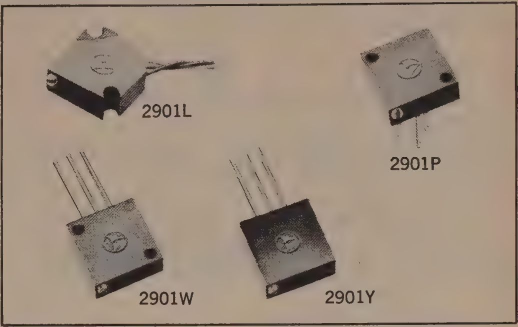
Special Options

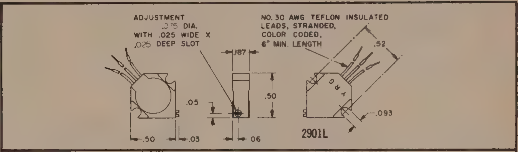
Special resistances, performance tolerances, markings, and lead lengths are available upon request. Refer to SPECIAL OPTIONS Catalog Sheet.

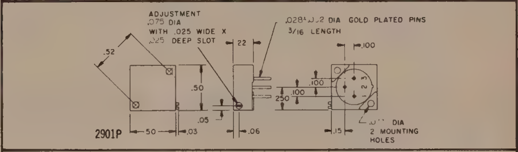
Standard Resistance Specifications

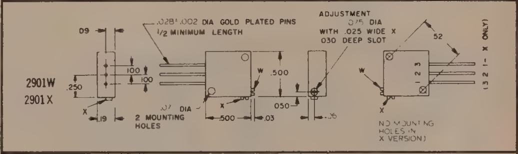
Resistance (Ohms) Resistance Tol. ±10%	Resolution	Max. Volts at 85°C Amb.	Amphenol Part Number†				
			P Terminal	W Terminal	X Terminal	L Terminal	Y Terminal
10	Infinite	2.73	2901P-100	2901W-100	2901X-100	2901L-100	2901Y-100
20	Infinite	3.87	2901P-200	2901W-200	2901X-200	2901L-200	2901Y-200
50	Infinite	6.12	2901P-500	2901W-500	2901X-500	2901L-500	2901Y-500
100	Infinite	8.66	2901P-101	2901W-101	2901X-101	2901L-101	2901Y-101
200	Infinite	12.24	2901P-201	2901W-201	2901X-201	2901L-201	2901Y-201
500	Infinite	19.36	2901P-501	2901W-501	2901X-501	2901L-501	2901Y-501
1,000	Infinite	27.38	2901P-102	2901W-102	2901X-102	2901L-102	2901Y-102
2,000	Infinite	38.72	2901P-202	2901W-202	2901X-202	2901L-202	2901Y-202
5,000	Infinite	61.23	2901P-502	2901W-502	2901X-502	2901L-502	2901Y-502
10,000	Infinite	86.60	2901P-103	2901W-103	2901X-103	2901L-103	2901Y-103
20,000	Infinite	122.47	2901P-203	2901W-203	2901X-203	2901L-203	2901Y-203

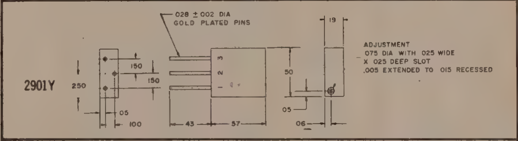
†The last three digits of the part number represent the resistance in standard code. For panel mount add letter M after part number, e.g. —2901P-500M.


2901L
2901P
2901W
2901Y

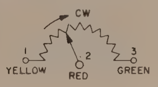

ADJUSTMENT
.075 DIA.
WITH .025 WIDE X
.025 DEEP SLOT
NO. 30 AWG TEFLON INSULATED
LEADS, STRANDED,
COLOR CODED,
6″ MIN. LENGTH
.187
.52
.50
.05
.093
G
R
Y
.50
.03
06
2901L


ADJUSTMENT
.075 DIA
WITH .025 WIDE X
.025 DEEP SLOT
.028±.002 DIA GOLD PLATED PINS
3/16 LENGTH
22
.100
.52
.50
.100
.100
250
1
2
3
.05
2901P
50
.03
.06
.15
DIA
2 MOUNTING
HOLES


.028±.002 DIA GOLD PLATED PINS
1/2 MINIMUM LENGTH
ADJUSTMENT
.075 DIA
WITH .025 WIDE X
030 DEEP SLOT
09
52
(3 2 1 – X ONLY)
100
100
W
.500
1
2
3
2901W
2901 X
.250
X
.19
.07 DIA
2 MOUNTING
HOLES
X
500
.03
050
.06
W
X
NO MOUNTING
HOLES IN
X VERSION)


028 ± 002 DIA
GOLD PLATED PINS
19
ADJUSTMENT
075 DIA WITH 025 WIDE
X 025 DEEP SLOT
.005 EXTENDED TO 015 RECESSED
150
150
3
2
1
50
2901Y
250
05
100
43
57
05
06

See SPECIAL OPTIONS page for Stack Strap and Panel Mount Options.


CW
1
2
3
YELLOW
RED
GREEN

TOLERANCES

.00 ±.010
.000 ±.005
Fractions ±1/64

Electrical Characteristics

Resistance Values: 10 to 20,000 ohms (see Standard Resistance Specifications).

Resistance Tolerance: ±10%.

Resolution: Infinite.

End Resistance: 10 ohms or 10% whichever is less.

Contact Resistance Variation: 2% or 20 ohms, whichever is less.

Usable Potentiometer Range: 100%

Insulation Resistance: Per MIL-R-22097.

Electrical Output: Linear with shaft adjustment.

Mechanical Characteristics

Number of Shaft Adjustment Turns: 25 turns.

Mechanical Stops: Contact idles with no electrical discontinuity.

Shaft Torque: 5.0 oz. in. max.

Rotational Life: 200 cycles min. with no discontinuity.

Terminal Types: P and L per MIL-R-22097, Style RJ22, plus W, X and Y configuration. P = Printed circuit pins; L = Teflon insulated stranded leads. W, X & Y = Printed circuit pins.

Mounting Bracket Available: Amphenol Model 2949; Refer to Trimmer Mounting Hardware Catalog Sheet.

Stacking: Mounting holes provided (see Outline Dimensions). Pads provide air space between units.

Terminal Strength: Per MIL-R-22097.

Weight: Approx. 3 grams.

Volume: .055 cu. in.

Marking: Standard manufacturer marking: Mfrs. name and nomenclature, wiring diagram, resistance, date code. (Special marking optional.)

Solderability: Per MIL-R-22097.

Environmental Characteristics

Operating Temperature Range: −55°C to +150°C (−67°F to +302°F).

Power Rating: ¾ watt at 85° derated to zero at 150°C

Temperature Coefficient of Potentiometer: 50 ppm/°C.

Temperature Cycling (Thermal Shock): Per MIL-R-22097.

Low Temperature Operation: Per MIL-R-22097.

High Temperature Operation: Per MIL-R-22097.

Vibration: Per MIL-R-22097.

Shock: Per MIL-R-22097.

Humidity-Moisture Resistance: Per MIL-R-22097.

Immersion (Leak Test): Per MIL-R-22097.

Dielectric Strength: 900 volts RMS at room conditions, 350 volts RMS at 80,000 feet per MIL-R-22097.

Salt Spray: Per MIL-R-22097.

Fungus: Non-nutrient materials per MIL-E-5272.

Load Life: 1,000 hours per MIL-R-22097.

TRIMMING POTENTIOMETERS

BUNKER RAMO AMPHENOL

2850 SERIES

FEATURES

- Meets or exceeds all requirements of MIL-R-27208 style RT11.
- Design provides a mandrel of maximum length for superior resolution characteristics.
- "Window" design case and silicon "O" ring permanently seals out humidity and dust.
- High temperature diallyl phthalate case functions easily as a stable body for internal circuit components up to 150°C.
- Temperature to 150°C.
- Humidity-Proof.
- 1¼" Rectangular.
- Wirewound.

How to Order

When requesting a quotation or placing an order for Standard Micropot® Trimmers refer to part number listed under STANDARD RESISTANCE SPECIFICATIONS

Special Options

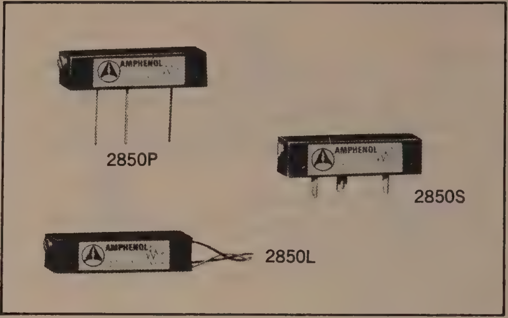
Special resistances, performance tolerances, markings, and lead lengths are available upon request. Refer to SPECIAL OPTIONS Catalog Sheet.

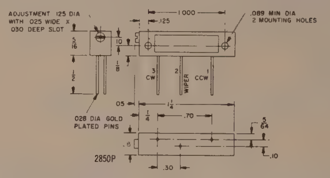
Standard Resistance Specifications

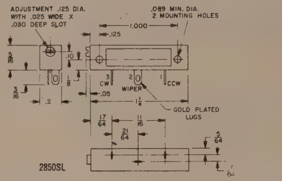
Resistance (Ohms) Resistance Tol. ±5%	Resolution		Max. Volts at 70°C Amb.	Amphenol Part Number†		
	No. of Turns	%		P Terminal	S Terminal	L Terminal
10*	61	1.631	3.1	8250P-100	2850S-100	2850L-100
20*	77	1.296	4.5	2850P-200	2850S-200	2850L-200
50*	100	.980	7.1	2850P-500	2850S-500	2850L-500
100*	154	.650	10.0	2850P-101	2850S-101	2850L-101
200*	192	.520	14.0	2850P-201	2805S-201	2850L-201
500*	176	.569	22.0	2850P-501	2850S-501	2850L-501
1,000*	238	.420	31.0	2850P-102	2850S-102	2850L-102
2,000*	287	.348	45.0	2850P-202	2850S-202	2850L-202
5,000*	344	.291	71.0	2850P-502	2850S-502	2850L-502
10,000*	526	.19	100.0	2850P-103	2850S-103	2850L-103
20,000*	652	.15	141.0	2850P-203	2850S-203	2850L-203

†The last three digits of the part number represent the resistance in standard code. For panel mount add letter M after part number, e.g. —2850P-100M.

*Resistance Values specified Per MIL-R-27208, Style RT11.


AMPHENOL
2850P
AMPHENOL
2850S
AMPHENOL
2850L


ADJUSTMENT .125 DIA WITH .025 WIDE X .030 DEEP SLOT
1.000
.125
.089 MIN DIA 2 MOUNTING HOLES
5/16
.10
1/8
1/2
3 CW
2 WIPER
1 CCW
.05
1¼
1/4
.70
.028 DIA GOLD PLATED PINS
5/64
.8
.10
.30
2850P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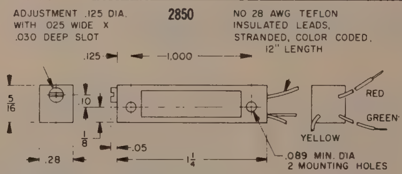
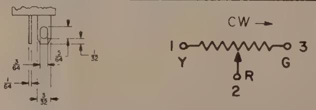
.089 MIN. DIA. 2 MOUNTING HOLES
1.000
.125
5/16
.10
1/8
3/16
.2
3 CW
2 WIPER
1 CCW
.05
1¼
GOLD PLATED LUGS
17/64
11/16
21/64
5/64
2850SL


ADJUSTMENT .125 DIA. WITH .025 WIDE X .030 DEEP SLOT
2850
NO 28 AWG TEFLON INSULATED LEADS, STRANDED, COLOR CODED, 12" LENGTH
.125
1,000
5/16
.10
1/8
.05
.28
1¼
RED
GREEN
YELLOW
.089 MIN. DIA 2 MOUNTING HOLES


3/64
1/64
3/64
1/32
3/32
CW →
1
3
Y
G
R
2

TOLERANCES

.00 ±.010

.000 ±.005

Fractions ±1/64

Electrical Characteristics

Meets All Requirements of MIL-R-27208, Style RT11

Resistance Values: 10 to 20,000 ohms (see Standard Resistance Specifications).

Resistance Tolerance: ±5%.

Resolution: .15% to 1.631% (see Standard Resistance Specifications).

End Resistance: 0.1% or .5 ohm, whichever greatest.

Absolute Minimum Resistance: 0.1% or .5 ohm, whichever greatest.

Noise During Adjustment: 100 ohms ENR maximum.

Continuity: Continuous and unidirectional; maintained for full mechanical range.

Usable Potentiometer Range: 100%.

Insulation Resistance: Per MIL-R-27208.

Electrical Output: Linear with shaft adjustment.

Mechanical Characteristics

Meets All Requirements of MIL-R-27208, Style RT11

Number of Shaft Adjustment Turns: 22 Turns.

Mechanical Stops: Contact idles with no electrical discontinuity.

Shaft Torque: 0.1 oz. in. min.; 8.0 oz. in. max.

Rotational Life: 500 cycles min., with no discontinuity (200 cycles over 50K).

Terminal Types: P and L per MIL-R-27208, Style RT11 plus S. P = Printed circuit pins; L = Teflon insulated stranded leads; S = Solder lugs.

Mounting Bracket Available: Model No. 999, Refer to SPECIAL OPTIONS.

Stacking: Mounting holes provided (see Outline Dimensions).

Terminal Strength: Per MIL-R-27208.

Weight: Approx. 5 grams.

Volume: .109 cu. in.

Markings: Standard manufacturer marking: Mfrs. name and nomenclature, wiring diagram, resistance, date code. Marking per MIL-R-27208 where applicable. (Special marking optional).

Solderability: Per MIL-R-27208.

Environmental Characteristics

Meets All Requirements of MIL-R-27208, Style RT11

Operating Temperature Range: −65°C to +150°C (−85°F to +302°F).

Power Rating: 1 watt at 70°C derated to zero at 150°C.

Temperature Coefficient Resistance Wire: 20 ppm max.

Temperature Coefficient of Potentiometer: 70 ppm/°C max. 30 ppm/°C nom.

Temperature Cycling (Thermal Shock): Per MIL-R-27208.

Low Temperature Operation: Per MIL-R-27208.

High Temperature Exposure: Per MIL-R-27208.

Vibration: Per MIL-R-27208.

Shock: Per MIL-R-27208.

Humidity-Moisture Resistance: Per MIL-R-27208.

Immersion (Leak Test): Per MIL-R-27208.

Dielectric Strength: 900 volts RMS at room conditions, 350 volts RMS at 80,000 feet per MIL-R-27208.

Salt Spray: Per MIL-R-27208.

Fungus: Non-nutrient materials per MIL-E-5272.

Load Life: 1,000 hours, Per MIL-R-27208.

TRIMMING POTENTIOMETERS

BUNKER RAMO AMPHENOL

2851 SERIES

FEATURES

- Exclusive 100% metallic element offers infinite resolution with excellent low noise characteristics unsurpassed by other infinite resolution elements.
- Performance characteristics compatible with other metal film components.
- Low 50 ppm/°C temperature coefficient.
- Internal component design provides low inductance and capacitance.
- Military-Industrial.
- Temperature to 150°C.
- Humidity-Proof.
- 1¼" Rectangular.
- Film-Met™.

U.S. Patent No. 3,353,134; also foreign patents.

How to Order

When requesting a quotation or placing an order for Standard Micropot® Trimmers refer to part number listed under STANDARD RESISTANCE SPECIFICATIONS

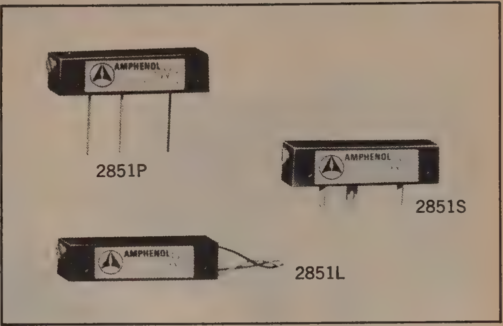
Special Options

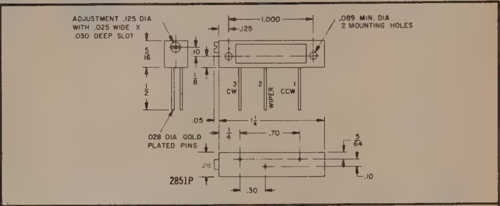
Special resistances, performance tolerances, markings, and lead lengths are available upon request. Refer to SPECIAL OPTIONS Catalog Sheet.

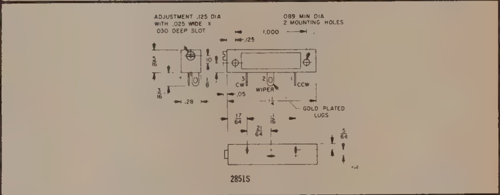
Standard Resistance Specifications

Resistance (Ohms) Resistance Tol. ±10%	Resolution	Max. Volts at 85°C Amb.	Amphenol Part Number† P Terminal	S Terminal	L Terminal
20	Infinite	3.87	2851P-200	2851S-200	2851L-200
50	Infinite	6.12	2851P-500	2851S-500	2851L-500
100	Infinite	8.66	2851P-101	2851S-101	2851L-101
200	Infinite	12.24	2851P-201	2851S-201	2851L-201
500	Infinite	19.36	2851P-501	2851S-501	2851L-501
1,000	Infinite	27.38	2851P-102	2851S-102	2851L-102
2,000	Infinite	38.72	2851P-202	2851S-202	2851L-202
5,000	Infinite	61.23	2851P-502	2851S-502	2851L-502
10,000	Infinite	86.60	2851P-103	2851S-103	2851L-103
20,000	Infinite	122.47	2851P-203	2851S-203	2851L-203

†The last three digits of the part number represent the resistance in standard code. For panel mount add letter M after part number, e.g. —2851P-500M.


AMPHENOL
2851P
2851S
2851L


ADJUSTMENT .125 DIA WITH .025 WIDE X .030 DEEP SLOT
1.000
.125
.089 MIN. DIA 2 MOUNTING HOLES
5/16
.10
1/8
1/2
3 CW
2 WIPER
1 CCW
.05
1¼
.028 DIA GOLD PLATED PINS
1/4
.70
5/64
.28
.10
2851P
.30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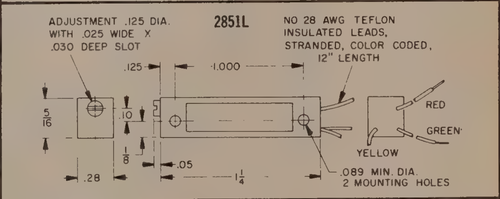
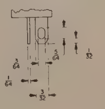
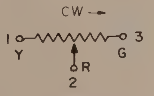
.089 MIN DIA 2 MOUNTING HOLES
1.000
.125
.10
3 CW
2 WIPER
1 CCW
.05
.28
GOLD PLATED LUGS
17/64
21/64
5/64
2851S


ADJUSTMENT .125 DIA. WITH .025 WIDE X .030 DEEP SLOT
2851L
NO 28 AWG TEFLON INSULATED LEADS, STRANDED, COLOR CODED, 12" LENGTH
.125
1.000
5/16
.10
1/8
.05
.28
1¼
RED
GREEN
YELLOW
.089 MIN. DIA. 2 MOUNTING HOLES





TOLERANCES

.00 ±.010
.000 ±.005
Fractions ±1/64

Electrical Characteristics

Resistance Values: 20 to 20,000 ohms (see Standard Resistance Specifications).

Resistance Tolerance: ±10%.

Resolution: Infinite.

End Resistance: 10 ohms or 10% whichever is less.

Contact Resistance Variation: 2% or 20 ohms, whichever is greater.

Continuity: Continuous and unidirectional; maintained for full mechanical range.

Usable Potentiometer Range: 100%

Insulation Resistance: Per MIL-R-22097.

Electrical Output: Linear with shaft adjustment.

Mechanical Characteristics

Number of Shaft Adjustment Turns: 22 turns.

Mechanical Stops: Contact idles with no electrical discontinuity.

Shaft Torque: 8.0 oz. in. max.

Rotational Life: 200 cycles min. with no discontinuity.

Terminal Types: P & L per MIL-R-22097, Style RJ11, plus S configuration. P = Printed circuit; L = Teflon insulated stranded leads; S = Solder lugs.

Mounting Bracket Available: Amphenol Model 999; Refer to Trimmer Mounting Hardware Catalog Sheet.

Stacking: Mounting holes provided (see Outline Dimensions).

Terminal Strength: Per MIL-R-22097.

Weight: 5 grams approx.

Volume: .109 cu. in.

Marking: Standard manufacturer marking: Mfrs. name and nomenclature, wiring diagram, resistance, date code. (Special marking optional.)

Solderability: Per MIL-R-22097.

Environmental Characteristics

Operating Temperature Range: —55°C to +150°C (—67°F to +302°F).

Power Rating: ¾ watt at 85° derated to zero at 150°C

Temperature Coefficient of Potentiometer: 100ppm/°C.

Temperature Cycling (Thermal Shock): Per MIL-R-22097.

Low Temperature Operation: —55°C per MIL-R-22097.

High Temperature Exposure: +150°C per MIL-R-22097.

Vibration: Per MIL-R-22097.

Shock: Per MIL-R-22097.

Humidity-Moisture Resistance: Per MIL-R-22097.

Immersion (Leak Test): Per MIL-R-22097.

Dielectric Strength: 900 volts RMS at room conditions, 350 volts RMS at 80,000 feet per MIL-R-22097.

Salt Spray: Per MIL-R-22097.

Fungus: Non-nutrient materials per MIL-E-5272.

Load Life: 1,000 hours per MIL-R-22097.

Beckman®

Multi-turn (wirewound & hybrids)

PRECISION POTENTIOMETERS

Multi-turn

Housing Diameter (inches)	Number of Turns	Resistance Element	Beckman Model Number	Mounting Type	Bearing Type	Range of Resistance Values (ohms)	Standard Independent Linearity (± %)	Min. Practical Independent Linearity (± %)	Power Rating (watts at °C)	Starting Torque (max., oz.-in.)	Ambient Temperature Range (°C)
7/8″ .875″ (22,225mm)	3	Wire	7363	Servo	Ball	3-32.3K	0.25	0.15	1.5 at 70	0.6	—65 to 125
		Wire	7366	Bushing	Ball	3-32.3K	0.25	0.15	1.5 at 70	0.8	—65 to 125
	5	Wire	7463	Servo	Ball	5-53.8K	0.25	0.15	1.5 at 70	0.6	—65 to 125
		Wire	7466	Bushing	Ball	5-53.8K	0.25	0.15	1.5 at 70	0.8	—65 to 125
	10	Wire	7216	Bushing	Sleeve	10-125K	0.25	0.05	2.0 at 25	0.6	—65 to 85
		Wire	7221	Bushing	Sleeve	10-125K	0.25	0.05	2.0 at 25	0.6	—65 to 85
		Wire	7223	Servo	Ball	10-125K	0.25	0.05	2.0 at 70	0.6	—65 to 125
		Wire	7233	Servo	Ball	250-125K	0.25	0.05	2.0 at 70	0.6	—65 to 125
		Wire	7246	Bushing	Sleeve	10-125K	0.25	0.25	2.0 at 25	2.0	—25 to 85
		Wire	7263	Servo	Ball	10-107.8K	0.20	0.05	2.0 at 70	0.6	—65 to 125
		Wire	7266	Bushing	Sleeve	10-107.8K	0.20	0.05	2.0 at 70	0.8	—65 to 125
		Wire	7276	Bushing	Sleeve	100-100K	0.25	0.08	2.0 at 25	1.5	—25 to 105
		Hybrid	8103	Servo	Ball	5K-100K	0.25	F.Q.	2.0 at 70	0.6	—65 to 125
		Hybrid	8106	Bushing	Sleeve	5K-100K	0.25	F.Q.	2.0 at 70	0.8	—65 to 125
		Hybrid	8136	Bushing	Sleeve	5K-100K	0.25	F.Q.	2.0 at 25	1.5	-25 to 105
1-13/16″ 1.812″ (46,038mm)	3	Wire	C	Bushing	Sleeve	5-194.7K	0.50	0.10	3.8 at 25	3.0	—65 to 85
		Wire	9301	Bushing	Sleeve	30-192.6K	0.25	0.04	3.0 at 70	1.3	—65 to 125
		Wire	9303	Servo	Ball	30-192.6K	0.25	0.04	3.0 at 70	1.3	—65 to 125
		Wire	9323	Servo	Ball	35-194.7K	0.40	0.10	3.0 at 40	3.0	—65 to 85
	10	Wire	A	Bushing	Sleeve	10-648K	0.25	0.05	6.2 at 25	3.0	—65 to 85
		Wire	7601	Bushing	Sleeve	100-650K	0.15	0.025	5.0 at 70	1.3	—65 to 125
		Wire	7603	Servo	Ball	100-650K	0.15	0.025	5.0 at 70	1.3	—65 to 125
		Wire	7623	Servo	Ball	100-648K	0.20	0.05	5.0 at 40	3.0	—65 to 85
		Hybrid	8113	Servo	Ball	10K-220K	0.25	F.Q.	5.0 at 40	3.0	—65 to 85
3-5/16″ 3.312″ (84,138mm)	15	Wire	B	Bushing	Sleeve	40-2 meg	0.5	0.035	10.0 at 40	2.7	-65 to 85
		Wire	BS	Servo	Sleeve	40-2 meg	0.5	0.035	10.0 at 40	2.7	—65 to 85
		Wire	BSP	Servo	Ball	40-2 meg	0.5	0.035	10.0 at 40	2.7	—65 to 85
	25	Wire	D	Bushing	Sleeve	60-3.312 meg	0.5	0.035	15.0 at 40	3.5	—65 to 85
		Wire	DSP	Servo	Ball	60-3.312 meg	0.5	0.035	15.0 at 40	3.5	—65 to 85
	40	Wire	E	Bushing	Sleeve	125-5.3 meg	0.5	0.035	20.0 at 40	3.5	-65 to 85
		Wire	ESP	Servo	Ball	125-5.3 meg	0.5	0.035	20.0 at 40	3.5	—65 to 85

F.Q.— Factory Quote. All specifications subject to change without notice.

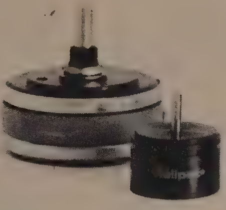
SEE ALSO: Trimming potentiometers, dials—Sec. 4750. DIP resistor packages and DIP interface networks—Sec. 4700. Voltage regulators, DAC/ADC products, operational amplifiers, active filters—Sec. 3130.

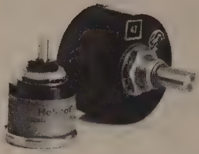
Beckman INSTRUMENTS, INC. HELIPOT DIVISION 2500 Harbor Boulevard, Fullerton, California 92634
(714) 871-4848 • TWX No. 910-592-1260

Beckman®

Single-turn (wirewound, cermet, conductive plastic & hybrid)

PRECISION POTENTIOMETERS





Single-turn

Housing Diameter (inches)	Resistance Element	Beckman Model Number	Mounting Type	Bearing Type	Range of Resistance Values (ohms)	Min. Practical Independent Linearity* (±%)	Power Rating (Watts at °C)	Starting Torque (max., oz.-in.)	Number of Cups	Ambient Temperature Range (°C)
7/8″ .875″ (22,225mm)	Wire	TP	Bushing	Ball	186-15K	0.2	1.25-70	0.1	4	–65 to 125
	Wire	TSP	Servo	Ball	186-15K	0.2	1.25-70	0.1	4	–65 to 125
	Wire	5101	Bushing	Sleeve	186-116K	0.25	0.75-40	0.2	4	–25 to 85
	Wire	5103	Servo	Ball	186-116K	0.25	0.75-40	0.2	4	–25 to 85
	Cermet	6103	Servo	Ball	150-1 meg	0.3	3.0-85	0.5	4	–65 to 150
	C.P.	6153	Servo	Ball	1K-50K	0.15	1.0-70	0.5	4	–65 to 125
	C.P.	6173	Servo	Ball	900-200K	0.15	1.5-70	0.5	4	–65 to 125
	Hybrid	8201	Bushing	Sleeve	500-10K	0.50	F.Q.	0.75 at 40	0.2	–25 to 85
	Hybrid	8203	Servo	Ball	500-10K	0.50	F.Q.	0.75 at 40	0.2	–25 to 85
1-1/16″ 1.062″ (26,988mm)	Wire	5203	Servo	Ball	50-17K	0.15	2.0-85	0.15	4	–65 to 150
	Wire	5211	Bushing	Sleeve	50-25K	0.15	1.0-40	0.4	4	–25 to 85
	Wire	5212	Servo	Sleeve	50-25K	0.15	1.0-40	0.4	4	–25 to 85
	Wire	5213	Servo	Ball	50-25K	0.15	1.0-40	0.3	4	–25 to 85
	Cermet	6213	Servo	Ball	50-1 meg	0.25	5.0-85	0.5	4	–65 to 150
	C.P.	6263	Servo	Ball	1K-50K	0.15	1.5-70	0.5	4	–65 to 125
	C.P.	6273	Servo	Ball	840-200K	0.15	2.0-70	0.5	4	–65 to 125
1-5/16″ 1.312″ (33,338mm)	Wire	5311	Bushing	Sleeve	10-44.6K	0.25	2.0-40	1.0	1	–25 to 85
	Cermet	3301	Bushing	Sleeve	1K-1 meg	0.3	0.75-65	1.0	1	–25 to 105
	Cermet	6301	Bushing	Ball	250-1 meg	0.25	6.0-85	0.7	1	–65 to 150
	Cermet	6303	Servo	Ball	250-1 meg	0.25	6.0-85	0.7	1	–65 to 150
	C.P.	3351	Bushing	Sleeve	1K-50K	0.25	0.75-65	1.0	1	–25 to 105
	C.P.	3371	Bushing	Sleeve	1K-390K	0.25	1.0-65	1.0	1	–25 to 105
	C.P.	6351	Bushing	Ball	1K-50K	0.1	2.0-70	0.7	1	–65 to 125
	C.P.	6353	Servo	Ball	1K-50K	0.1	2.0-70	0.7	1	–65 to 125
1-7/16″ 1.438″ (36,512mm)	Wire	5401	Bushing	Sleeve	25-50K	0.15	2.0-40	1.6	4	–65 to 85
	Wire	5402	Servo	Sleeve	25-50K	0.15	2.0-70	1.6	4	–65 to 125
	Wire	5403	Servo	Ball	25-50K	0.15	2.0-70	0.6	4	–65 to 125
	Wire	5404	Pilot	Sleeve	25-50K	0.15	2.0-70	1.6	4	–65 to 125
	Wire	5405	Pilot	Ball	25-50K	0.15	2.0-70	0.6	4	–65 to 125
2″ 2.000″ (50,800mm)	Wire	5611	Bushing	Sleeve	15-80K	0.10	3.5-70	1.5	4	65 to 125
	Wire	5612	Servo	Sleeve	15-80K	0.10	3.5-70	1.5	4	–65 to 125
	Wire	5613	Servo	Ball	15-80K	0.10	3.5-70	0.8	4	65 to 125
	Wire	5614	Pilot	Sleeve	15-80K	0.10	3.5-70	1.5	4	–65 to 125
	Wire	5615	Pilot	Ball	15-80K	0.10	3.5-70	0.8	4	65 to 125
	Wire	5616	Pilot/Servo	Sleeve	15-80K	0.10	3.5-70	1.5	4	65 to 125
	Wire	5617	Pilot/Servo	Ball	15-80K	0.10	3.5-70	0.8	4	65 to 125
	Cermet	6601	Bushing	Ball	250-1 meg	0.15	10.0-85	1.5	4	–65 to 150
	Cermet	6603	Servo	Ball	250-1 meg	0.15	10.0-85	1.5	4	–65 to 150
	C.P.	6651	Bushing	Ball	1K-50K	0.1	2.5-70	1.5	4	–65 to 125
	C.P.	6653	Servo	Ball	1K-50K	0.1	2.5-70	1.5	4	–65 to 125
	C.P.	6671	Bushing	Ball	1K-336K	0.1	5.0-70	1.5	4	–65 to 125
	C.P.	6673	Servo	Ball	1K-336K	0.1	5.0-70	1.5	4	–65 to 125
2″ 2.000″ (50,800mm)	Hybrid	8211	Bushing	Sleeve	1K-25K	0.5	F.Q.	3.5 at 70	1.5	65 to 125
	Hybrid	8212	Servo	Sleeve	1K-25K	0.5	F.Q.	3.5 at 70	1.5	–65 to 125
	Hybrid	8213	Servo	Ball	1K-25K	0.5	F.Q.	3.5 at 70	0.8	–65 to 125
3″ 3.000″ (76,200mm)	Wire	5711	Bushing	Sleeve	25-145K	0.075	5.0-40	1.5	4	–65 to 85
	Wire	5712	Servo	Sleeve	25-145K	0.075	5.0-40	1.5	4	–65 to 85
	Wire	5713	Servo	Ball	25-145K	0.075	5.0-40	1.3	4	–65 to 85
	Wire	5714	Pilot	Sleeve	25-145K	0.075	5.0-40	1.5	4	–65 to 85
	Wire	5715	Pilot	Ball	25-145K	0.075	5.0-40	1.3	4	–65 to 85

*Values listed are available on special order. Standard Independent Linearity for all Helipot single-turn precision potentiometers is ±0.5%.
LEGEND TO ABBREVIATIONS: **C.P.**—Conductive Plastic. **Pilot**—3 hole/pilot mount. **Pilot/Servo**—Servo/3 hole pilot mount. **FQ**—Factory quote.
All specifications subject to change without notice.

Beckman® INSTRUMENTS, INC. **HELIPOT DIVISION** 2500 Harbor Boulevard, Fullerton, California 92634
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TRIMMER SELECTION GUIDE

TURNS TURNS TURNS TURNS TURNS TURNS TU
SIZE SIZE SIZE SIZE SIZE SIZE SIZE SIZE SIZE SIZE SIZ
POWER POWER POWER POWER
TEMP TEMP TEMP TEMP TEMP TEMP TEMP TEMP TEMP

Trimming Potentiometer Selection...Simplified:

The six index tables on the facing page provide a convenient method of selecting the Helitrim® Cermet Trimming Potentiometer Model best suited to a specific application. These tables relate, in sets of two, four key parameters, i.e., adjustment turns, power rating, unit size, and maximum operating temperature for all trimming potentiometer models. After locating the model which meets your parameter requirements, refer to the detail specification tables. Reliable Helitrim® Cermet Trimming Potentiometers are available in a wide range of sizes, pin spacings, and performance characteristics. For information on non-standard models, contact your local Beckman distributor or sales engineering representative.

Resistance Ordering Information:

After selecting a specific trimmer, list the resistance value desired (10 — 2 MegΩ) after the model number.

Example: 89P R10K

Model — 89P

Resistance Value — R10K

Standard Resistance Values Available Include:

10	100	1K	10K	100K	1 Meg
20	200	2K	20K	200K	2 Meg
—	—	—	25K	250K	
50	500	5K	50K	500K	

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KEY PARAMETER INDEX

Power Rating (Watts) to Unit Size

POWER	MODEL	SIZE
0.5 at 25°C	86P	¾" Long
	66P, 66W, 66X	⅜" Sq.
0.5 at 40°C	91A, 91B, 91C, 91D, 91E, 91S, 91T, 91V, 91W, 91X, 91Y, 91Z	⅜" Dia.
0.5 at 70°C	72P, 72PM, 72PX, 72X, 72XL, 72XW	⅜" Sq.
	62P, 62PA, 62PF, 62PH/82P	¼" Dia.
0.25 at 85°C	64P	¼" Sq.
0.5 at 85°C	63P, 63W, 63X	⅜" Sq.
	61M, 61P, 61PA	¼" Dia.
0.75 at 25°C	89P, 89W, 89X/76P, 77P, 79P	¾" Long
0.75 at 70°C	78L, 78P, 78S	1¼" Long
1.0 at 85°C	55L, 55P, 55S/56L, 56P/58P, 58S	1¼" Long
1.5 at 125°C	50, 53, 54	1¼" Long

Adjustment Turns to Unit Size

TURNS	MODEL	SIZE
1 Turn	61M, 61P, 61PA/62P, 62PA, 62PF, 62PH/82P	¼" Dia.
	91A, 91B, 91C, 91D, 91E, 91S, 91T, 91V, 91W, 91X, 91Y, 91Z	⅜" Dia.
	72P, 72PM, 72PX, 72X, 72XL, 72XW	⅜" Sq.
15 Turns	89P, 89W, 89X/76P, 77P, 79P	¾" Long
18 Turns	86P	¾" Long
20 Turns	66P, 66W, 66X 63L, 63P, 63W, 63X	⅜" Sq.
22 Turns	55L, 55P, 55S/56L, 56P 58P, 58S/78L, 78P, 78S	1¼" Long
22 Turns	64P	¼" Sq.
32 Turns	50, 53, 54	1¼" Long

Unit Size to Maximum Operating Temperature

SIZE	MODEL	TEMP.
¾" Long	76P, 77P, 79P/89P, 89W, 89X/86P	105°C
⅜" Sq.	66P, 66W, 66X	
1¼" Long	78L, 78P, 78S	125°C
⅜" Dia.	91A, 91B, 91C, 91D, 91E, 91S, 91T, 91V, 91W, 91X, 91Y, 91Z	
⅜" Sq.	72P, 72PM, 72PX, 72X, 72XL, 72XW	
¼" Dia.	62P, 62PA, 62PF, 62PH/82P	
⅜" Sq.	63L, 63P, 63W, 63X	150°C
¼" Dia.	61M, 61P, 61PA	
¼" Sq.	64P	150°C
1¼" Long	55L, 55P, 55S/56L, 56P/58P, 58S	175°C
1¼" Long	50, 53, 54	200°C

Adjustment Turns to Power Rating (Watts)

TURNS	MODEL	POWER
18 Turns	86P	0.5 at 25°C
20 Turns	66P, 66W, 66X	
1 Turn	91A, 91B, 91C, 91D, 91E, 91S, 91T, 91V, 91W, 91X, 91Y, 91Z	0.5 at 40°C
1 Turn	62P, 62PA, 62PF, 62PH 72P, 72PM, 72PX, 72X, 72XL, 72XW 82P	0.5 at 70°C
1 Turn	61M, 61P, 61PA	0.5 at 85°C
20 Turns	63P, 63W, 63X	
15 Turns	89P, 89W, 89X/76P, 77P, 79P	0.75 at 25°C
22 Turns	64P	0.25 at 85°C
22 Turns	78L, 78P, 78S	0.75 at 70°C
22 Turns	55L, 55P, 55S/56L, 56P/58P, 58S	1.0 at 85°C
32 Turns	50, 53, 54	1.5 at 125°C

Adjustment Turns to Maximum Operating Temperature

TURNS	MODEL	TEMP.
15 Turns	76P, 77P, 79P/89P, 89W, 89X	105°C
18 Turns	86P	
20 Turns	66P, 66W, 66X	
1 Turn	62P, 62PA, 62PF, 62PH 72P, 72PM, 72PX, 72X, 72XL, 72XW/82P 91A, 91B, 91C, 91D, 91E, 91S, 91T, 91V, 91W, 91X, 91Y, 91Z	125°C
22 Turns	78L, 78P, 78S	
1 Turn	61M, 61P, 61PA	150°C
20 Turns	63P, 63W, 63X	
22 Turns	64P	150°C
22 Turns	55L, 55P, 55S/56L, 56P/58P, 58S	175°C
32 Turns	50, 53, 54	200°C

Power Rating (Watts) to Maximum Operating Temperature

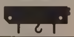
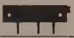
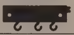
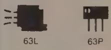
POWER	MODEL	TEMP.
0.5 at 25°C	66P, 66W, 66X 86P	105°C
0.5 at 40°C	91A, 91B, 91C, 91D, 91E, 91S, 91T, 91V, 91W, 91X, 91Y, 91Z	125°C
0.5 at 70°C	62P, 62PA, 62PF, 62PH, 72P, 72PM, 72PX, 72X, 72XL, 72XW 82P	125°C
0.25 at 85°C	64P	150°C
0.5 at 85°C	61M, 61P, 61PA 63P, 63W, 63X	150°C
0.75 at 25°C	89P, 89W, 89X/76P, 77P, 79P	105°C
0.75 at 70°C	78L, 78P, 78S	125°C
1.0 at 85°C	55L, 55P, 55S/56L, 56P/58P, 58S	175°C
1.5 at 125°C	50, 53, 54	200°C

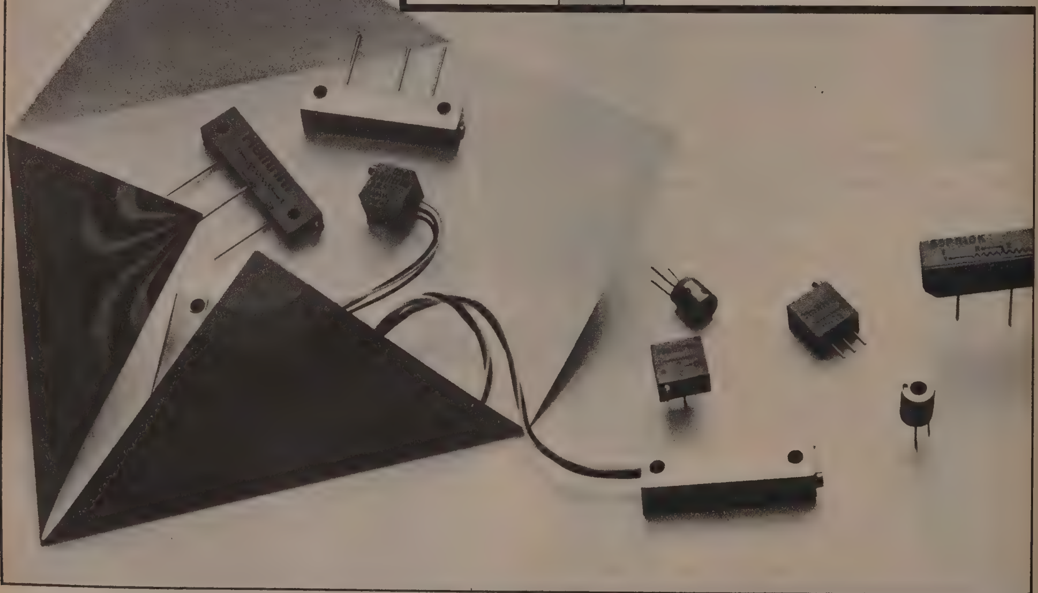
Beckman

MILITARY TRIMMERS

Military Cermet Trimming Potentiometers

Over 80% of the trimmers listed (military & industrial) are locally distributor stocked. Beckman sales representatives carry in-depth stocks of trimmers and offer same-day deliveries on many quantities. Two additional aids are included in this catalog which further simplify trimmer selection. First, note in the general specifications tables (pp 2 & 4) the column with trimmer outlines. These outlines immediately indicate adjustment screw location for each trimmer. Second, a pin specification chart (pp 6 & 7) is included which will provide useful information, by each individual model, on all pin dimensions and spacings.

	MODEL	DIMENSION INCH (MM) (LxWxH)
	50	1¼ (31,8) x 0.297 (7,54) x 5/16 (7,95)
	53	1¼ (31,8) x 0.292 (7,42) x 19/64 (7,54)
	54	1¼ (31,8) x 0.292 (7,42) x 19/64 (7,54)
	55L	1¼ (31,8) x 0.290 (7,37) x 11/32 (8,74)
	55P	1¼ (31,8) x 0.290 (7,37) x 11/32 (8,74)
	55S	1¼ (31,8) x 0.290 (7,37) x 11/32 (8,74)
	56L	1.25 (31,8) x 0.195 (4,95) x 0.320 (8,13)
	56P	1.25 (31,8) x 0.195 (4,95) x 0.320 (8,13)
	58P	1.25 (31,8) x 0.195 (4,95) x 0.320 (8,13)
	58S	1.25 (31,8) x 0.195 (4,95) x 0.320 (8,13)
61M 61P 61PA	61M	¼ (6,35) Dia. x 9/32 (7,14)
	61P	¼ (6,35) Dia. x ¼ (6,35)
	61PA	9/32 (7,14) x 9/32 (7,14) x ⅜ (9,53)
	63L	⅜ (9,53) x ⅜ (9,53) x 0.240 (6,10)
	63P	⅜ (9,53) x ⅜ (9,53) x 3/16 (4,76)
	63W	⅜ (9,53) x 0.240 (6,10) x 0.410 (10,4)
	63X	⅜ (9,53) x 0.240 (6,10) x 0.410 (10,4)
	64P	¼ (6,35) x ¼ (6,35) x 0.170 (4,318)



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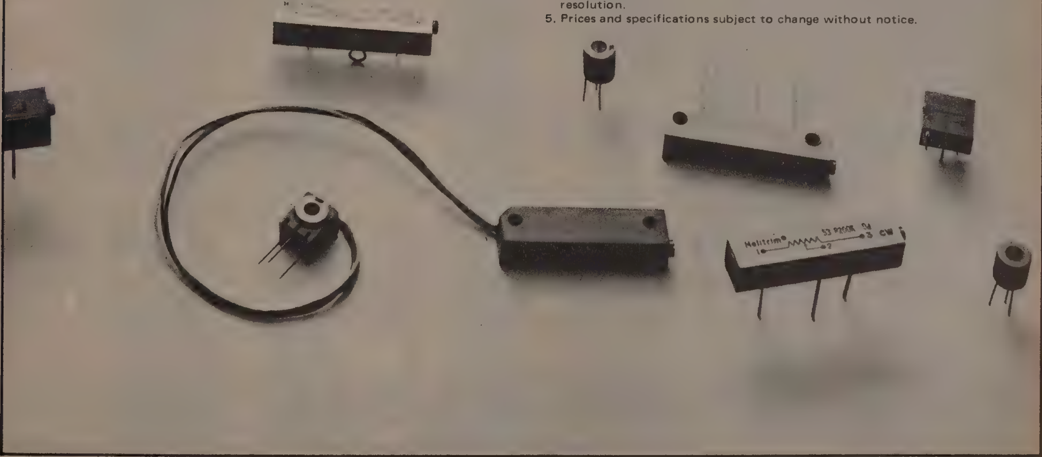
MILITARY TRIMMERS

REMARKS	TURNS	STD. RESIS. RANGE	RESISTANCE TOLERANCE (Note 3)	POWER RATING (WATTS)	TEMPCO (PPM/°C)	MAX. OPER. TEMP.	SEALED	PIN STYLE	STOCK	PRICE 1-9	PRICE 10-24	PRICE 25-99
	32	Note 2	±10% <50Ω, ±20%	1.5 at 125°C	±100	200 C	No	—		$8.80	$8.36	$7.92
	32	Note 2	±10% <50Ω, ±20%	1.5 at 125°C	±100	200 C	No	(A)		7.50	7.13	6.75
	32	Note 2	±10% <50Ω, ±20%	1.5 at 125°C	±100	200 C	No	(A)		7.50	7.13	6.75
	22	Note 2	±10% <50Ω, ±20%	1.0 at 85 C	±100	175 C	Yes	—	Stock	6.05	5.75	5.45
	22	Note 2	±10% <50Ω, ±20%	1.0 at 85 C	±100	175 C	Yes	(A)	Stock	6.05	5.75	5.45
	22	Note 2	±10% <50Ω, ±20%	1.0 at 85 C	±100	175 C	Yes	(A)		6.05	5.75	5.45
QPL/RJ12	22	Note 2	±10% <50Ω, ±20%	1.0 at 85 C	±100	175 C	Yes	—	Stock	6.05	5.75	5.45
QPL/RJ12	22	Note 2	±10% <50Ω, ±20%	1.0 at 85 C	±100	175 C	Yes	(D)	Stock	6.05	5.75	5.45
QPL/RJ12Y	22	Note 2	±10% <50Ω, ±20%	1.0 at 85 C	±100	175 C	Yes	(A)	Stock	6.05	5.75	5.45
	22	Note 2	±10% <50Ω, ±20%	1.0 at 85 C	±100	175 C	Yes	(A)		6.05	5.75	5.45
TO-5 Pins	1	Note 1	±10%	0.5 at 85 C	±100	150 C	Yes	(F)		7.15	6.79	6.44
RJ50	1	Note 1	±10%	0.5 at 85 C	±100	150 C	Yes	(E)	Stock	6.05	5.75	5.45
TO-5 Pins	1	Note 1	±10%	0.5 at 85 C	±100	150 C	Yes	(F)	Stock	7.15	6.79	6.44
	20	Note 2	±10%	0.5 at 85 C	±100	150 C	Yes	—	Stock	7.20	6.84	6.48
RJ-24 TO-5 Pins	20	Note 2	±10%	0.5 at 85 C	±100	150°C	Yes	(F)	Stock	7.20	6.84	6.48
RJ-24	20	Note 2	±10%	0.5 at 85 C	±100	150 C	Yes	(G)	Stock	7.20	6.84	6.48
RJ-24	20	Note 2	±10%	0.5 at 85 C	±100	150 C	Yes	(G)	Stock	7.20	6.84	6.48
RJ-26	22	Note 1	+10%	0.25 at 85°C	±100	150°C	Yes	(F)	Stock	6.00	5.70	5.10

Notes:
1. Standard Resistance Values (Ohms) 10, 20, 50, 100, 200, 500, 1K, 2K, 5K, 10K, 20K, 25K, 50K, 100K, 200K, 250K, 500K, and 1 Meg
2. Standard Resistance Values (Ohms) 10, 20, 50, 100, 200, 500, 1K, 2K, 5K, 10K, 20K, 25K, 50K, 100K, 200K, 250K, 500K, 1 Meg, and 2 Meg
3. Tolerances shown as ±10% are for resistance values ≥100Ω and ≤500Ω. Other values are ±20%.
4. All Helitrim® Cermet Trimming Potentiometers have essentially infinite resolution.
5. Prices and specifications subject to change without notice.



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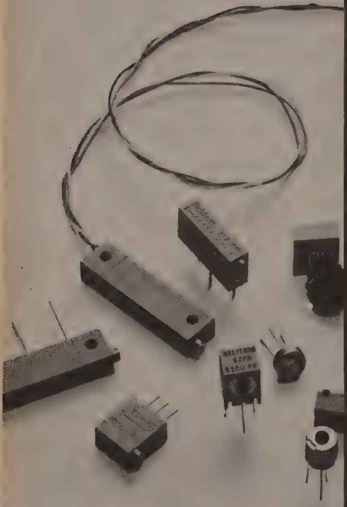
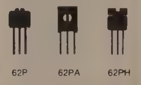
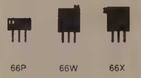
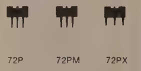
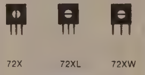
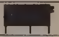
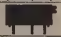
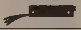
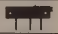
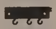
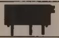
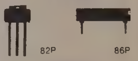
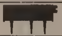
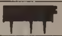
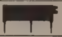
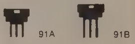
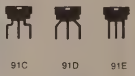
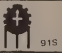
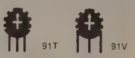
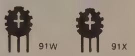
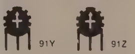
INDUSTRIAL TRIMMERS

Industrial Commercial Cermet Trimming Potentiometers

Notes:

1. Standard Resistance Values (Ohms) 10, 20, 50, 100, 200, 500, 1K, 2K, 5K, 10K, 20K, 25K, 50K, 100K, 200K, 250K, 500K, and 1 Meg
2. Standard Resistance Values (Ohms) 10, 20, 50, 100, 200, 500, 1K, 2K, 5K, 10K, 20K, 25K, 50K, 100K, 200K, 250K, 500K, 1 Meg, and 2 Meg
3. Tolerance shown as ±10% are for resistance values ≥ 100Ω and ≤500KΩ. Other values are ±20%.
4. All Helitrim® Cermet Trimming Potentiometers have essentially infinite resolution.
5. Prices and specifications subject to change without notice.



	MODEL	DIMENSION INCH (MM) (LxWxH)
	62P	¼ (6,35) Dia. x ¼ (6,35)
	62PA	9/32 (7,14) x 0.290 (7,37) x ⅜ (9,53)
	62PH	¼ (6,35) Dia. x 5/16 (7,95)
	66P	⅜ (9,53) x ⅜ (9,53) x 0.200 (5,08)
	66W	⅜ (9,53) x 0.200 (5,08) x 0.41 (10,4)
	66X	⅜ (9,53) x 0.200 (5,08) x 0.41 (10,4)
	72P	⅜ (9,53) x ⅜ (9,53) x 3/16 (4,76)
	72PM	⅜ (9,53) x ⅜ (9,53) x 3/16 (4,76)
	72PX	⅜ (9,53) x ⅜ (9,53) x 3/16 (4,76)
	72X	⅜ (9,53) x 3/16 (4,76) x ⅜ (9,53)
	72XL	⅜ (9,53) x 3/16 (4,76) x ⅜ (9,53)
	72XW	⅜ (9,53) x 3/16 (4,76) x ⅜ (9,53)
	76P	¾ (19,1) x 0.190 (4,83) x 0.340 (8,64)
	77P	0.750 (19,1) x 0.280 (7,11) x 0.360 (9,14)
	78L	1.25 (31,8) x 0.195 (4,95) x 0.320 (8,13)
	78P	1.25 (31,8) x 0.195 (4,95) x 0.320 (8,13)
	78S	1.25 (31,8) x 0.195 (4,95) x 0.320 (8,13)
	79P	0.750 (19,1) x 0.190 (4,83) x 0.360 (9,14)
	82P	0.250 (6,35) Dia. x 0.150 (3,81)
	86P	0.750 (19,05) x 0.250 (6,35) x 0.200 (5,08)
	89P	0.750 (19,05) x 0.190 (4,83) x 0.250 (6,35)
	89W	0.750 (19,05) x 0.190 (4,83) x 0.250 (6,35)
	89X	0.750 (19,05) x 0.190 (4.83) x 0.250 (6,35)
	91A	⅜ (9,53) Dia. x 0.200 (5,08)
	91B	⅜ (9,53) Dia. x 0.250 (6,35)
	91C	⅜ (9,53) Dia. x 0.250 (6,35)
	91D	⅜ (9,53) Dia. x 0.250 (6,35)
	91E	⅜ (9,53) Dia. x 0.250 (6,35)
	91S	⅜ (9,53) x 0.250 (6,35) x 0.385 (9,78)
	91T	⅜ (9,53) x 0.345 (8,76) x 0.385 (9,78)
	91V	⅜ (9,53) x 0.400 (10,2) x 0.385 (9,78)
	91W	⅜ (9,53) x 0.250 (6,35) x 0.385 (9,78)
	91X	⅜ (9,53) x 0.345 (8,76) x 0.385 (9,78)
	91Y	⅜ (9,53) x 0.400 (10,2) x 0.385 (9,78)
	91Z	⅜ (9,53) x 0.250 (6,35) x 0.385 (9,78)

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INDUSTRIAL TRIMMERS

REMARKS	TURNS	STD. RESIS. RANGE	RESISTANCE TOLERANCE (Note 3)	POWER RATING (WATTS)	TEMPCO (PPM/°C)	MAX. OPER. TEMP.	SEALED	PIN STYLE (Page 6-7)	STOCK	PRICE		
										1-9	10-24	25-99
	1	Note 1	±10%	½ at 70°C	±100	125°C	Yes	(E)	Stock	$1.95	$1.85	$1.76
TO-5 Pins	1	Note 1	±10%	½ at 70°C	±100	125°C	Yes	(F)	Stock	2.75	2.61	2.48
	1	Note 1	±10%	½ at 70°C	±100	125°C	Yes	(E)		2.75	2.61	2.48
TO-5 Pins	20	Note 2	±10%	½ at 25°C	±100	105°C	Yes	(F)	Stock	3.85	3.66	3.47
	20	Note 2	±10%	½ at 25°C	±100	105°C	Yes	(G)	Stock	3.85	3.66	3.47
	20	Note 2	±10%	½ at 25°C	±100	105°C	Yes	(G)	Stock	3.85	3.66	3.47
TO-5 Pins	1	Note 2	±10%	½ at 70°C	±100	125°C	Yes	(F)	Stock	.77	.73	.69
	1	Note 2	±10%	½ at 70°C	±100	125°C	Yes	(H)	Stock	.77	.73	.69
	1	Note 2	±10%	½ at 70°C	±100	125°C	Yes	(I)	Stock	.77	.73	.69
	1	Note 2	±10%	½ at 70°C	±100	125°C	Yes	(F)	Stock	.77	.73	.69
	1	Note 2	±10%	½ at 70°C	±100	125°C	Yes	(G)	Stock	.77	.73	.69
	1	Note 2	±10%	½ at 70°C	±100	125°C	Yes	(I)	Stock	.77	.73	.69
RJ-11 Pins	15	Note 2	±10%	¾ at 25°C	±100	105°C	Yes	(A)	Stock	2.15	2.04	1.94
	15	Note 2	±10%	¾ at 25°C	±100	105°C	Yes	(B)	Stock	2.15	2.04	1.94
	22	Note 2	±10%	¾ at 70°C	±100	125°C	Yes	—	Stock	3.25	3.09	2.93
	22	Note 2	±10%	¾ at 70°C	±100	125°C	Yes	(A)	Stock	3.25	3.09	2.93
	22	Note 2	±10%	¾ at 70°C	±100	125°C	Yes	(A)		3.25	3.09	2.93
	15	Note 2	±10%	¾ at 25°C	±100	105°C	Yes	(C)	Stock	2.15	2.04	1.94
	1	Note 1	±10%	½ at 70°C	±100	125°C	Yes	(E)	Stock	1.60	1.52	1.44
TO-116	18	Note 2	±10%	½ at 25°C	±100	105°C	Yes	(J)	Stock	3.50	3.33	3.15
	15	Note 2	±10%	¾ at 25°C	±100	105°C	Yes	(C)	Stock	1.50	1.43	1.35
	15	Note 2	±10%	¾ at 25°C	±100	105°C	Yes	(B)	Stock	1.50	1.43	1.35
RJ-11 Pins	15	Note 2	±10%	¾ at 25°C	±100	105°C	Yes	(A)	Stock	1.50	1.43	1.35
	1	Note 2	±20%	½ at 40°C	±100	125°C	No	(G)	Stock	.60	.57	.54
TO-5 Pins	1	Note 2	±20%	½ at 40°C	±100	125°C	No	(F)	Stock	.60	.57	.54
	1	Note 2	±20%	½ at 40°C	±100	125°C	No	(K)	Stock	.60	.57	.54
	1	Note 2	±20%	½ at 40°C	±100	125°C	No	(L)	Stock	.60	.57	.54
	1	Note 2	±20%	½ at 40°C	±100	125°C	No	(M)	Stock	.60	.57	.54
	1	Note 2	±20%	½ at 40°C	±100	125°C	No	(L)	Stock	.60	.57	.54
TO-5 Pins	1	Note 2	±20%	½ at 40°C	±100	125°C	No	(F)	Stock	.60	.57	.54
	1	Note 2	±20%	½ at 40°C	±100	125°C	No	(K)	Stock	.60	.57	.54
	1	Note 2	±20%	½ at 40°C	±100	125°C	No	(G)	Stock	.60	.57	.54
TO-5 Pins	1	Note 2	±20%	½ at 40°C	±100	125°C	No	(F)	Stock	.60	.57	.54
	1	Note 2	±20%	½ at 40°C	±100	125°C	No	(K)	Stock	.60	.57	.54
	1	Note 2	±20%	½ at 40°C	±100	125°C	No	(L)	Stock	.60	.57	.54

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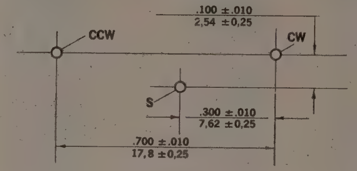
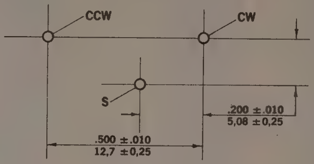
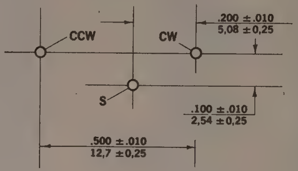
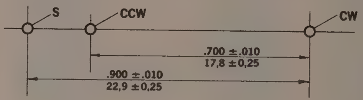
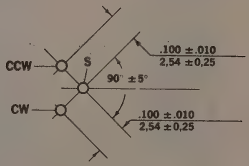
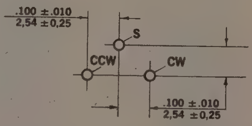
TRIMMER PIN SPECIFICATIONS

MODEL	PIN DIMENSIONS INCH	PIN DIMENSIONS MM	PIN SPACINGS (TOP VIEW) INCH / MM	PIN STYLE
Model 53 Model 55P Model 58P Model 76P Model 78P Model 89X	0.030 ±0.001 0.028 ±0.003 0.028 ±0.003 0.028 ±0.003 0.028 ±0.003 0.028 ±0.003	0,762 ±0,025 0,711 ±0,076 0,711 ±0,076 0,711 ±0,076 0,711 ±0,076 0,711 ±0,076	 .100 ±.010 2,54 ±0,25 CCW CW S .300 ±.010 7,62 ±0,25 .700 ±.010 17,8 ±0,25	(A)
Model 77P Model 89W	0.040 ±0.005 0.034 ±0.005	1,016 ±0,127 0,863 ±0,127	 CCW CW S .200 ±.010 5,08 ±0,25 .500 ±.010 12,7 ±0,25	(B)
Model 79P Model 89P	0.040 ±0.005 0.039 ±0.005	1,016 ±0,127 0,991 ±0,127	 .200 ±.010 5,08 ±0,25 CCW CW S .100 ±.010 2,54 ±0,25 .500 ±.010 12,7 ±0,25	(C)
Model 56P	0.028 ±0.003	0,711 ±0,076	 S CCW CW .700 ±.010 17,8 ±0,25 .900 ±.010 22,9 ±0,25	(D)
Model 61P Model 61PN Model 62P Model 62PF Model 62PH Model 82P Model 82PF	0.017 ±0.003 0.017 ±0.003 0.017 ±0.003 0.017 ±0.003 0.017 ±0.003 0.020 ±0.005 0.020 ±0.005	0,432 ±0,076 0,432 ±0,076 0,432 ±0,076 0,432 ±0,076 0,432 ±0,076 0,508 ±0,127 0,508 ±0,127	 CCW S .100 ±.010 2,54 ±0,25 90° ±5° CW .100 ±.010 2,54 ±0,25	(E)
Model 61M Model 61MN Model 61PA Model 62PA Model 63P* Model 64P* Model 66P* Model 72P Model 72X Model 91B* Model 91T Model 91X*	0.017 ±0.003 0.017 ±0.003 0.017 ±0.003 0.017 ±0.003 0.018 ±0.003 0.018 ±0.003 0.018 ±0.003 0.037 ±0.005 0.037 ±0.005 0.020 ±0.005 0.020 ±0.005 0.020 ±0.005	0,432 ±0,076 0,432 ±0,076 0,432 ±0,076 0,432 ±0,076 0,457 ±0,076 0,457 ±0,076 0,457 ±0,076 0,940 ±0,127 0,940 ±0,127 0,508 ±0,127 0,508 ±0,127 0,508 ±0,127	 .100 ±.010 2,54 ±0,25 S CCW CW .100 ±.010 2,54 ±0,25	(F)

*CW and CCW reversed.

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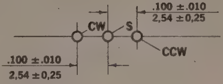
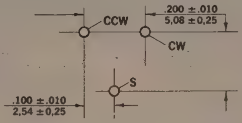
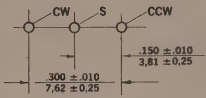
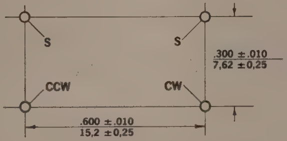
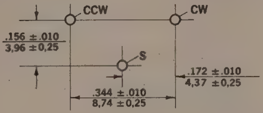
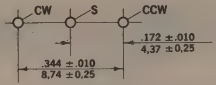
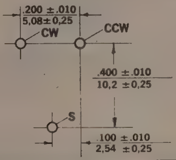
TRIMMER PIN SPECIFICATIONS

MODEL	PIN DIMENSIONS INCH	PIN DIMENSIONS MM	PIN SPACINGS (TOP VIEW) INCH / MM	PIN STYLE
Model 63W Model 63X Model 66W Model 66X Model 72XL Model 91A* Model 91W*	0.024 ±0.005 0.024 ±0.005 0.024 ±0.005 0.024 ±0.005 0.037 ±0.005 0.020 ±0.005 0.020 ±0.005	0,610 ±0,127 0,610 ±0,127 0,610 ±0,127 0,610 ±0,127 0,940 ±0,127 0,508 ±0,127 0,508 ±0,127	 .100 ±.010 2,54 ±0,25 CW S CCW .100 ±.010 2,54 ±0,25	(G)
Model 72PM	0.037 ±0.005	0,940 ±0,127	 .200 ±.010 5,08 ±0,25 CCW CW S .100 ±.010 2,54 ±0,25	(H)
Model 72PX Model 72XW Model 91S*	0.030 ±0.005 0.037 ±0.005 0.020 ±0.005	0,762 ±0,127 0,940 ±0,127 0,508 ±0,127	 CW S CCW .150 ±.010 3,81 ±0,25 .300 ±.010 7,62 ±0,25	(I)
Model 86P (DIP)	0.019 ±0.002	0,483 ±0,05	 S S .300 ±.010 7,62 ±0,25 CCW CW .600 ±.010 15,2 ±0,25	(J)
Model 91C Model 91V* Model 91Y	0.020 ±0.005 0.020 ±0.005 0.020 ±0.005	0,508 ±0,127 0,508 ±0,127 0,508 ±0,127	 CCW CW .156 ±.010 3,96 ±0,25 S .172 ±.010 4,37 ±0,25 .344 ±.010 8,74 ±0,25	(K)
Model 91D Model 91Z*	0.020 ±0.005 0.020 ±0.005	0,508 ±0,127 0,508 ±0,127	 CW S CCW .172 ±.010 4,37 ±0,25 .344 ±.010 8,74 ±0,25	(L)
Model 91E	0.020 ±0.005	0,508 ±0,127	 .200 ±.010 5,08±0,25 CW CCW .400 ±.010 10,2 ±0,25 S .100 ±.010 2,54 ±0,25	(M)

*CW and CCW reversed.

Note: The preceding line drawings indicate pin spacings and are not intended to be used as hole drilling patterns. Local Helipot sales representatives will provide additional specifications on request.

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TRIMMER PANEL MOUNT ADAPTERS

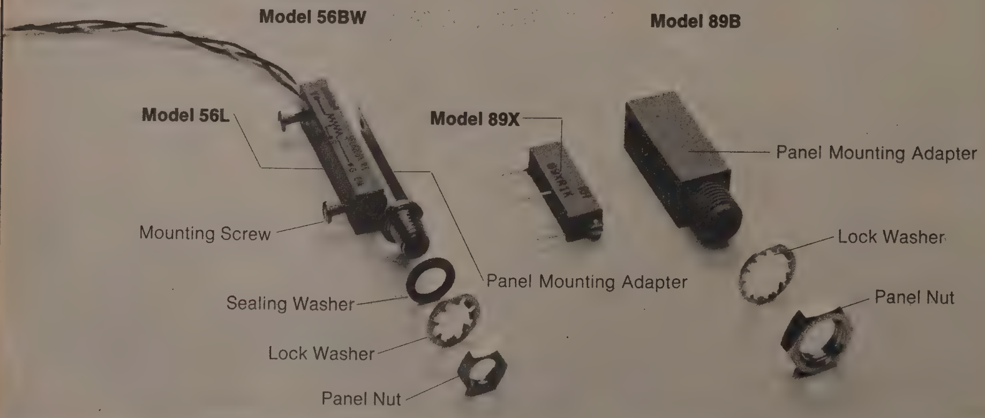
Panel Mounted Models:

Helitrim® Cermet Trimming Potentiometers may be ordered pre-assembled with panel mounting adapter or separately. The following examples and model by model listing should simplify ordering. Beckman sales representatives will provide additional information upon request.

Example: When ordering Model 56L pre-assembled, specify 56LBW.

Example: When ordering Model 56L with separate unassembled panel mounting adapter, specify 56BW plus 56L trimmer.

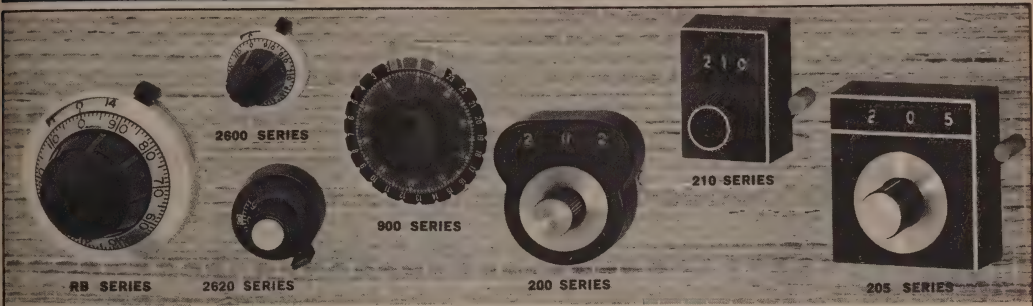
Helitrim Trimming Potentiometer Models	To Order Panel Mounting Adapter Pre-Assembled With Trimmer	To Order Panel Mounting Adapter Separately
50	50B R *(Resistance Value)*	55BW
54	54B R *(Resistance Value)*	55BW
55L	55LB R *(Resistance Value)*	55BW
55S	55SB R *(Resistance Value)*	55BW
56L	56LBW R *(Resistance Value)*	56BW
58S	58SBW R *(Resistance Value)*	56BW
78L	78LBW R *(Resistance Value)*	56BW
78P	78PBW R *(Resistance Value)*	56BW
78S	78SBW R *(Resistance Value)*	56BW
89	89PB R *(Resistance Value)*	89B


Model 56BW
Model 89B
Model 56L
Model 89X
Panel Mounting Adapter
Mounting Screw
Lock Washer
Panel Mounting Adapter
Panel Nut
Sealing Washer
Lock Washer
Panel Nut

Beckman®

Duodial® & Digidial®

TURNS-COUNTING DIALS



Duodial®

RB SERIES—1¹³⁄₁₆″ diameter dials finished in satin chrome with black-filled numerals and divisions (RBD has matte black finish and white-filled numerals and divisions). Built-in vibration-proof locking mechanism—knob and locking lever cap made of black nylon. Models can be used with most potentiometers, or other device, having from 1 to 15 mechanical turns.

2600 SERIES—Miniature ⅞″ diameter versions of the RB Series. Ideally suited for applications where panel space is limited. Primarily for use with ⅞″ diameter multi-turn potentiometers but can be used with devices of any size having from 1 to 15 mechanical turns. All models have satin chrome finish, black-filled numerals and divisions, vibration-proof locking mechanism with black nylon cap, and black nylon knob.

2620 SERIES—Compact 1″ diameter provides panel space savings while retaining excellent readability. White numerals on black background for fiftieths of a turn, and black numerals on white background for full turns. May be used with devices with from 1 to 10 adjustment turns. Positive locking mechanism prevents accidental changes of setting, due to vibration or sudden shock. Rugged black housing and knob help assure long life and carefree operation. Model 2621 is designed for mounting on ⅛″ shafts, Models 2626 and 2627 mount on ¼″ shafts.

900 SERIES—Ideally suited to applications where precise settings and readability are required. 4¾″ diameter permits greater accuracy of setting. Outer dial is graduated in complete turns, inner vernier dial is graduated in hundredths. Settings can be made easily to three significant figures and estimated accurately to a fourth. For rapid changing of settings, an eccentric finger-hole is provided in the adjustment knob. The inner vernier dial and knob are made of plastic to eliminate body capacitance which might affect the setting. Since the knob is connected to the potentiometer shaft, backlash is thereby eliminated.

Digidial®

200 SERIES—Lightweight, compact dials for fast, accurate readings in hundredths of a turn. Reading units are completely encased in a snapon plexiglass cover for convenient indexing. White numerals against a black background may be easily read from a wide angle. No built-in mechanical stops so rotation is limited only by the potentiometer, or other device, to which it is coupled. Locking mechanism in the dial permits settings to be accurately locked into place. Series 200 dials are available in three different knob and housing colors (Model 201—blue cover & knob, Model 202—black cover & knob, Model 203—grey cover & knob). All models have an aluminum knob with an insulating vinyl grip.

205 SERIES—Ideally suited for applications requiring maximum readability, or where large diameter potentiometers are used. ⁵⁄₃₂″ numerals are slightly recessed for protection from glare. Area surrounding the knob is recessed with a fine textured black finish. Friction type locking lever accurately locks dial settings into place.

210 SERIES—Miniature dials that have the same distinctive styling as the 205 Series, yet occupy less than 50% of the panel area. Their small size and excellent readability make them an ideal choice for use with potentiometers having a 1¹³⁄₁₆″ diameter or less. They have die cast zinc case finish with matte black anemel. Brushed aluminum locking lever prevents accidental movement and can be actuated without disturbing the setting.

SEE ALSO: Trimming potentiometers, precision potentiometers—Sec. 4750. DIP resistor packages and DIP interface networks—Sec. 4700. Voltage regulators, DAC/ADC products, operational amplifiers, active filters—Sec. 3130.

Prices and specifications subject to change without notice.

	DUODIAL® MODELS										DIGIDIAL® MODELS			
	RB RBC RBD	RBJ	2601	2606 2607	2621	2626 2627	901	902	903	904	200	205	210	211
Counting Capacity, max. turns	15				10			15	25	40	10			
Diameter, nominal (Duodials)	1¹³⁄₁₆″		⅞″		1″		4¾″				Not Applicable			
Height (Digidials)	Not Applicable										2¹⁄₁₆″	2³⁄₃₂″	1²¹⁄₃₂″	
Width (Digidials)	Not Applicable										1¹⁵⁄₁₆″	1⁶¹⁄₆₄″	1⁷⁄₃₂″	
Depth, from panel face	1″		.791″	²⁹⁄₃₂″	.938″		1¹⁄₃₂″				1¹¹⁄₆₄″	1½″	1⁹⁄₃₂″	
For Shaft diameter	¼″	⅛″	⅛″	¼″	⅛″	¼″	¼″				¼″			⅛″
Max. Shaft extension (from panel face)	1³⁄₁₆″		⁴³⁄₆₄″	²⁵⁄₃₂″	.816″		2³⁄₃₂″				⅞″			
Min. Shaft extension (from panel face)	⁹⁄₁₆″		¹⁵⁄₃₂″	³⁷⁄₆₄″	.620″		1⁵⁄₃₂″				1⁷⁄₃₂″			
Fore Bushing, thread	⅜-32-NEF	¼-32-NEF		⅜-32-NEF	¼-32 NEF	⅜-32 NEF	½-32-NS				⅜-32-NEF			¼-32-NEF
Max Bushing extension (from panel face)	1³⁄₃₂″	¹⁹⁄₆₄″	.270″	¹⁹⁄₆₄″	.335″		¼″				¼″		⁵⁄₃₂″	
Locking Mechanism	Positive Action										Positive Action	Friction Type		
For use with Helipot Precision Potentiometer Models:	7216, 7246 7266, A, C	7221	7221	7216, 7246 7266, A, C	7221	7216, 7246 7266, 7276	901-A, 901C				7216, 7246, 7266, A, C			7221
Price (1-9 Qty)	RB = $ 6.25 RBC } = $10.00 RBD }	$10.00		2606 = $7.75 2607 = $8.25	$5.00	2626 = $4.75 2627 = $5.25	$28.00				201 } 202 } $22.00 205 }	$22.00	$15.00	$15.00

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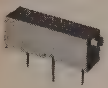
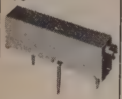
CTS OF BERNE, INC.

SUBSIDIARY OF CTS CORPORATION, ELKHART, INDIANA

WORLD LEADER IN CERMET RESISTOR TECHNOLOGY

INDUSTRIAL CERMET TRIMMERS

CTS Series	Description	Data Sheet	Resis-tance Range	Unit Price 1-9	10-24	25-49
186 	Power: ¾ @ 25°C ½ @ 85°C Max. Temp: 150°C Resist. Tol: ±10% Dim.: .75 x .25 x .190 No. of Turns: 17	3186	50 Ω- 1 Meg Ω	1.94	1.84	1.75
187 	Power: ¾ @ 25°C ½ @ 85°C Max. Temp: 150°C Resist. Tol: ±10% Dim.: .75 x .25 x .190 No. of Turns: 17	3186	50 Ω- 1 Meg Ω	1.94	1.84	1.75
188	Power: ¾ @ 25°C ½ @ 85°C Max. Temp: 150°C Resist. Tol: ±10% Dim.: .75 x .25 x .190 No. of Turns: 17	3186	50 Ω- 1 Meg Ω	1.94	1.84	1.75
345	Power: ¾ @ 25°C ½ @ 85°C Max. Temp: 150°C Resist. Tol: ±20% Dim.: .250 dia. x .180 No. of Turns: 1	3345	50 Ω- 500 KΩ	1.67	1.58	1.47
345Y	Power: ¾ @ 25°C ½ @ 85°C Max. Temp: 150°C Resist. Tol: ±20% Dim.: .250 dia. x .180 No. of Turns: 1 TO-5 Lead Spacing	3345	50 Ω- 500 KΩ	1.69	1.60	1.49
359S	Power: ½ @ 85°C Max. Temp: 125°C Resist. Tol: ±20% Dim.: .434 x .360 x .298 No. of Turns: 1 .100″ Lead Spacing	3360	50 Ω- 1 Meg Ω	1.52	1.42	1.35
359T	Power: ½ @ 85°C Max. Temp: 125°C Resist. Tol: ±20% Dim.: .434 x .360 x .298 No. of Turns: 1 .100″ Lead Spacing	3360	50 Ω- 1 Meg Ω	1.52	1.42	1.35
359X	Power: ½ @ 85°C Max. Temp: 125°C Resist. Tol: ±20% Dim.: .434 x .360 x .298 No. of Turns: 1 TO-5 Term. Spacing	3360	50 Ω- 1 Meg Ω	1.52	1.42	1.35
360S	Power: ½ @ 85°C Max. Temp: 125°C Resist. Tol: ±20% Dim.: .434 x .360 x .298 No. of Turns: 1 .150″ Lead Spacing	3360	50 Ω- 1 Meg Ω	1.52	1.42	1.35
360T	Power: ½ @ 85°C Max. Temp: 125°C Resist. Tol: ±20% Dim.: .434 x .360 x .298 No. of Turns: 1 .150″ Lead Spacing	3360	50 Ω- 1 Meg Ω	1.52	1.42	1.35

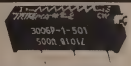
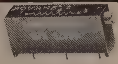
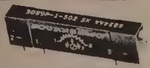
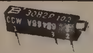
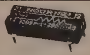
CTS Series	Description	Data Sheet	Resis-tance Range	Unit Price 1-9	10-24	25-49
362S	Power: ½ @ 85°C Max. Temp: 150°C Resist. Tol: ±20% Dim.: .312 x .355 x .300 No. of Turns: 1 .100″ Lead Spacing	3360	50 Ω- 1 Meg Ω	1.52	1.42	1.35
362T	Power: ½ @ 85°C Max. Temp: 150°C Resist. Tol: ±20% Dim.: .312 x .355 x .300 No. of Turns: 1 .100″ Lead Spacing	3360	50 Ω- 1 Meg Ω	1.52	1.42	1.35
362X	Power: ½ @ 85°C Max. Temp: 150°C Resist. Tol: ±20% Dim.: .312 x .355 x .300 No. of Turns: 1 TO-5 Lead Spacing	3360	50 Ω- 1 Meg Ω	1.52	1.42	1.35
362Y	Power: ½ @ 85°C Max. Temp: 150°C Resist. Tol: ±20% Dim.: .312 x .355 x .300 No. of Turns: 1 TO-5 Lead Spacing	3360	50 Ω- 1 Meg Ω	1.52	1.42	1.35
362U	Power: ½ @ 85°C Max. Temp: 150°C Resist. Tol: ±20% Dim.: .312 x .355 x .300 No. of Turns: 1 .200″ Lead Spacing	3360	50 Ω- 1 Meg Ω	1.52	1.42	1.35
375E	Power: ½ @ 70°C Max. Temp: 125°C Resist. Tol: ±20% Dim.: .370 dia. x .150 .100″ Lead Spacing Cent. Term.: .400	3375	50 Ω- 1 Meg Ω	1.49	1.39	1.32
375V	Power: ½ @ 70°C Max. Temp: 125°C Resist. Tol: ±20% Dim.: .370 dia. x .150 .172″ Lead Spacing Cent. Term.: .156	3375	50 Ω- 1 Meg Ω	1.49	1.39	1.32
375S	Power: ½ @ 70°C Max. Temp: 125°C Resist. Tol: ±20% Dim.: .370 dia. x .150 .100″ Lead Spacing	3375	50 Ω- 1 Meg Ω	1.47	1.37	1.30
375T	Power: ½ @ 70°C Max. Temp: 125°C Resist. Tol: ±20% Dim.: .370 dia. x .150 .100″ Lead Spacing	3375	50 Ω- 1 Meg Ω	1.47	1.37	1.30
375X	Power: ½ @ 70°C Max. Temp: 125°C Resist. Tol: ±20% Dim.: .370 dia. x .150 .100″ Lead Spacing TO-5 Lead Spacing	3375	50 Ω- 1 Meg Ω	1.47	1.37	1.30
375Y	Power: ½ @ 70°C Max. Temp: 125°C Resist. Tol: ±20% Dim.: .370 dia. x .150 .100″ Lead Spacing TO-5 Lead Spacing	3375	50 Ω- 1 Meg Ω	1.48	1.38	1.31

ORDERING INFORMATION: Place orders using the following address: CTS OF BERNE, INC., 406E Parr Road, Berne, Indiana 46711 • Call and ask for John Henry at (219) 589-3111 • TWX 810-323-1580

BOURNS INC

TRIMPOT PRODUCTS DIVISION

CERMET TRIMMING POTENTIOMETERS

Choose cermet units for infinite resolution, stability, broad resistance range and good high frequency performance.		Description	Dimensions H x W x L	Terminals	Res. Tol. (%)	Power (Watt) at 70°C	Max. Temp. °C	Nom. Adj. Turns	Humidity Mil Spec	Standard Resistances Ω	PRICES 1-9	10-24	25-49
	**3006**	Commercial TRIMPOT Potentiometer	.25x.19x.75	P,W,Y	±10	0.75	125	15	Yes	10-2 Meg	$1.40	$1.30	$1.21
	**3009**	Commercial E-Z-TRIM Potentiometer	.35x.19x.75	P,Y	±10	0.75 at 25°C	125	20	Yes	10-2 Meg	1.94	1.84	1.75
	**3059**	High Temperature Humidity Proof (RJ12)	.32x.19x1.25	L,P,Y,J	±10	1.0	150	22	Yes	10-2 Meg	3.30	3.14	2.97
	**3082**	Humidity Proof Cermet Element	.10x.15x.50	P	±10	0.3 at 85°C	150	10	Yes	10-2 Meg	7.70	7.13	6.42
	**3099**	Dual In-Line Package	.25x.19x.75	P	±10	1.0	150	20	Yes	10-2 Meg	3.75	3.35	3.00
	3262	Humidity Proof High Temperature (RJ26)	.27x.17x.25	P,W,X	±10	0.25 at 85°C	175	12	Yes	10-1 Meg	7.35	6.83	6.13
	3279	Multi-Turn Commercial	.31x.19x.31	W,X	±10	0.3	150	13	Yes	10-1 Meg	4.24	3.85	3.47
	3292	Thin Line Cermet Element (RJ24)	.15x.375x.375	L,P,W,X	±10	0.5 at 85°C	175	22	Yes	10-1 Meg	6.83	6.49	6.15
	3299	Commercial TRIMPOT Potentiometer	.39x.37x.25	P,W,X	±10	0.5	125	25	Yes	100-1 Meg	1.66	1.54	1.44
	3329	High Performance Cermet Element	.250 dia.x.180	P,H	±10	0.5 at 85°C	150	240°	Yes	10-1 Meg	1.75	1.66	1.57
			.245x.29x.375	W						10-1 Meg	2.50	2.38	2.25
	3339	Four Turn Cermet Element	.300 dia.x.25	P,H,W	±20	0.5 at 85°C	150	4	Yes	10-1 Meg	2.50	2.32	2.09
	3352	Single-Turn Commercial	.415x.365x.145	T,E,P W,H,V	±20	0.75 at 40°C	125	230°	Yes	10-5 Meg	25-49 .54	50-99 .53	100-249 .52
	3353	Single-Turn Carbon Element	$^{19}/_{32}$ dia.x$^{9}/_{32}$	W,P	±20	$\frac{1}{3}$W at 60°C	100	300°	No	500 to 500 Meg	.51	.48	.38
	3359	Single-Turn Cermet Element	.395x.456x.228	W,P	±20	0.75 at 40°C	125	270°	No	100 to 2 Meg	.83	.77	.72
	3386	Single-Turn Commercial	.375x.375x.19	F,P,R,K W,S,H	±10	0.5 at 85°	125	280°	Yes	100-2 Meg	.65	.63	.60

Note: Prices on certain pin configurations and resistances are slightly higher than prices illustrated. Bourns reserves the right to change specs and prices at any time. All prices are F.O.B., Riverside, California, USA.

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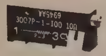
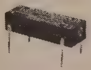
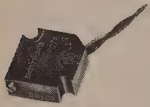
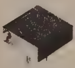
BOURNS INC

TRIMPOT PRODUCTS DIVISION

WIREWOUND TRIMMING POTENTIOMETERS

Choose wirewound units for high power, stability and low temperature coefficient.	Description	Dimensions H x W x L	Terminals	Res. Tol. (%)	Power (Watt) at 70°C	Max. Temp. °C	Nom. Adj. Turns	Humidity Mil Spec	Standard Resistances Ω	PRICES 1-9	10-24	25-49
	220 High Temperature (RT10)	.32x.18x1.00	L,W,P	±5	1.0	175	15	Yes	10-10K 20-30K	$9.50 11.29	$8.80 10.45	$7.92 9.41
	3005 Sealed Commercial E-Z-TRIM Potentiometer	.31x.17x.75	P	±10	1.0 at 40°C	125	20	Steady State	10-25K 50K	2.00 2.40	1.85 2.22	1.75 2.10
	**3007** Commercial E-Z-TRIM Potentiometer	.31x.17x.75	P	±10	1.0 at 40°C	125	20	Steady State	10-25K	2.00	1.85	1.75
	3057 High Temperature Humidity Proof (RTR 12 level M, P) (RT12)	.32x.19x1.25	L,P,Y,J	±5	1.0	150	22	Yes	10-10K 20K 50K 100K	6.22 6.85 7.47 9.45	5.50 6.06 6.60 8.35	4.73 5.25 5.71 7.23
	3070 High Power Fine Resolution	.31x.31x1.06 .36x.31x1.06	L,S,H P	±5	1.5	175	10	Yes	100-20K 50K	16.68 18.98	16.28 18.60	15.89 18.22
	**3095** Industrial Potentiometer Dual In-Line Package	.25x.19x.75	P	±10	1.0	150	18	Yes	10-25K 50K	3.75 5.00	3.35 4.46	3.00 4.00
	**3250** Humidity proof High Temperature (RT22)	.19x.50x.50	L	±5	1.0	175	25	Yes	10-10K 20K & 25K 50K	7.38 8.32 11.00	6.84 7.70 10.20	6.15 6.93 9.17
		.22x.50x.50	P,W W66						10-10K 20K & 25K 50K	7.95 8.77 11.58	7.36 8.12 10.72	6.62 7.31 9.66
	3255 Commercial TRIMPOT Potentiometer	.19x.50x.50 .22x.50x.50	L P,W	±5	1.0 at 50°C	150	25	Steady State	10-10K 20K & 25K 50K	3.51 4.75	3.25 4.40	2.93 3.96
	3260 Humidity Proof High Temperature (RT26)	.25x.25x.17	H,W	±5	0.2	175	11	Yes	10-1K 2K & 5K 10K & 20K 25K	8.25 9.08 11.55 12.10	7.64 8.41 10.70 11.20	6.88 7.57 9.63 10.09
	**3290** Humidity Proof High Temperature (RT24)	.150x.375x.375	L,W,H P	±5	1.0	175	25	Yes	10-10K 20K & 25K 50K	8.06 9.63 11.11	7.46 8.92 10.29	6.72 8.03 9.27
	3305 Sealed Commercial TRIMIT Potentiometer	.31x.25x.375	W	±5	0.5 at 70°C	125	280°	Steady State	10-5K 10K 20-25K	2.48 2.75 3.30	2.38 2.64 3.17	2.28 2.53 3.04
		.31 dia.x.19	P						10-5K 10K 20-25K	1.93 2.20 2.75	1.85 2.11 2.64	1.78 2.02 2.53

Note: Prices on certain pin configurations and resistances are slightly higher than prices illustrated. Bourns reserves the right to change specs and prices at any time. All prices are F.O.B., Riverside, California, USA.

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BOURNS INC

TRIMPOT PRODUCTS DIVISION

MIL-SPEC TRIMMING POTENTIOMETERS

MIL-R-27208

MIL Style	Description	Qualified Resistance
RT-10	TERMINALS: L,P CHARACTERISTIC: C2	10Ω-10K
RT-11	TERMINALS: L,P CHARACTERISTIC: C2	10Ω-20K
RT-12	TERMINALS: L,P,Y CHARACTERISTIC: C2	10Ω-20K
RT-22	TERMINALS: L,P,W,X CHARACTERISTIC: C2	50Ω-20K
RT-24	TERMINALS: L,P,W,X CHARACTERISTIC: C2	10Ω-10K
RT-26	TERMINALS: W,X CHARACTERISTIC: C2	10Ω-5K

MIL-R-39015

MIL Style	Description	Qualified Resistance
RTR-12 LEVEL M, P	TERMINALS: L,P,Y CHARACTERISTIC: D	10Ω-20K
RTR-22 LEVEL M, P	TERMINALS: L,P,W,X CHARACTERISTIC: D	500Ω-20K
RTR-24 LEVEL M, P	TERMINALS: P,W,X CHARACTERISTIC: D	500Ω-10K

MIL-R-39035

MIL Style	Description	Qualified Resistance
RJR-12 LEVEL M	TERMINALS: L,Y CHARACTERISTICS: C,F	10Ω-1 Meg
RJR-24 LEVEL M	TERMINALS: P,W,X CHARACTERISTICS: C,F	200Ω-1 Meg

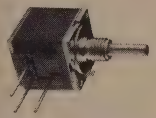
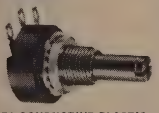
MIL-R-22097

MIL Style	Description	Qualified Resistance
RJ-12	TERMINALS: L,P,Y CHARACTERISTICS: C,F	10Ω-1 Meg
RJ-22	TERMINALS: L,P,W,X CHARACTERISTICS: C,F	10Ω-1 Meg
RJ-24	TERMINALS: L,P,W,X CHARACTERISTICS: C,F	10Ω-1 Meg
RJ-26	TERMINALS: P,W,X CHARACTERISTICS: C,F	10Ω-1 Meg
RJ-50	TERMINAL: P CHARACTERISTICS: C,F	10Ω-1 Meg

BOURNS INC

TRIMPOT PRODUCTS DIVISION

PANEL POTENTIOMETERS

MODEL NO.	Description	Specifications			Resistance Ω	Price Range 1-9	10-24	25-49
MODEL 80 CERMET OR CONDUCTIVE PLASTIC 	Modular ⅝″ Sq. 1-4 Sections ¼″ or ⅜″ Bushing Locking or Non-Locking Single or Dual Concentric Shafts	 Power @ 70°C Lin.-Sgl. Sec. Mult. Sec. Res. Tol. (Std.) CRV Max. Temp. Tempco (ppm/°C) Linearity (Std.)	Cer. 2W 1W ±10% 1% +150°C 150 5%	C-P 1W .5W ±20% 1% +125°C 1000 5%	**Cermet** 50Ω - 5 Meg (Lin.) 1K - 2.5 Meg (Audio)	4.10 to 4.90	2.38 to 2.95	2.07 to 2.57
					C-P 150Ω - 5 Meg (Lin.) 1K - 2.5 Meg (Audio)	3.70 to 4.50	2.15 to 3.50	1.87 to 2.72
3852 CERMET  **3851 CONDUCTIVE PLASTIC**	¾″ Diameter ¼″ or ⅜″ Dia. Bushing Locking or Non-Locking Lugs or PC Pins	 Power @ 70°C Linear Tapers Res. Tol. (Std.) CRV Max. Temp. Min. Temp. Tempco (ppm/°C) Linearity (Std.)	Cer. 2W ±10% 3% +150°C − 65°C 150 5%	C-P 1W ±20% 1% +125°C − 65°C 1000 10%	**Cermet** 50Ω - 5 Meg (Lin.) 1K - 2.5 Meg (Audio)	2.65 to 3.57	2.36 to 3.13	2.31 to 3.02
					C-P 1K - 100K (Lin.) 2K - 50K (Audio)	2.15 to 2.96	1.93 to 2.61	1.88 to 2.40
3856 CERMET — 3¾ TURNS 	¾″ Diameter ⅜″Dia. Bushing ¼″ or ⅛″ Dia. Shaft Lugs or PC Pins	Power Rating @ 70°C Linear Tapers Audio Tapers Res. Tol. (Std.) CRV Ind. Linearity		 2W 1W ±10% 3% 5%	50Ω - 5 Meg (Linear Tapers) 1000 - 2.5 Meg (Audio Tapers)	6.00 to 6.50	5.35 to 5.75	5.09 to 5.44
3859 CERMET **3858 CONDUCTIVE PLASTIC**	¾″ Diameter ⅜″ Dia. Plastic Bushing Snap-in or Threaded	 Power @ 70°C Linear Tapers Res. Tol. (Std.) CRV Max. Temp. Min. Temp. Tempco (ppm/°C) Linearity (Std.)	Cer. 2W ±10% 3% +150°C − 65°C 150 5%	C-P 1W ±20% 1% +125°C − 65°C 1000 10%	**Cermet** 50Ω - 5 Meg (Lin.) 1K - 2.5 Meg (Audio)	2.15 to 2.65	1.91 to 2.31	1.87 to 2.22
					C-P 1K - 5 Meg (Lin.) 2K - 50K (Audio)	1.97 to 2.47	1.80 to 2.20	1.74 to 2.09

Note: Prices on certain pin configurations and resistances are slightly higher than prices illustrated. Bourns reserves the right to change specs and prices at any time. All prices are F.O.B., Riverside, California, USA.

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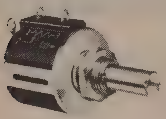
BOURNS INC

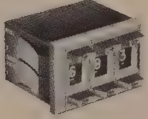
TRIMPOT PRODUCTS DIVISION

PRECISION POTENTIOMETERS/DIALS

STANDARD INDUSTRIAL BUSHING-MOUNT POTENTIOMETERS — PARTIAL LISTING

Model No.	Description	Specifications	Resistances		Price Guide	
				1-4	10-24	50-99
3541 HYBRITRON™ POTENTIOMETER (Hybritron Element provides performance advantages of both wirewound and conductive plastic by utilizing composite construction. See Model 3540 for pictorial illustration.)	7/8″ Diameter 3/4″ Long 10-Turn	Oper. Temp.: −55 to +125°C Linearity: ±0.25% Resis. Tol.: ±10% Temp. Coef.: ±100 ppm/°C Resolution: Infinite Mech. Life: 5,000,000 Shaft Revolutions Output Smoothness: .015% max. Power: 2w @ 70°C	1K-100K	8.40	7.59	6.79
3500 WIREWOUND POTENTIOMETER 	7/8″ Diameter 10-Turn	Oper. Temp.: −65 to 125°C Linearity: ±0.2% Mech. Life: 2,000,000 Rev. Power: 2W @ 70°C Resis. Tol. %: ±3	50Ω-125K 150K, 200K 250K 500K	13.60 27.50 41.39	10.88 22.00 33.11	9.52 19.25 28.97
3540, 3543, 3545 WIREWOUND POTENTIOMETER 	7/8″ Diameter 3/4″ Long 3540 = 10-Turn 3543 = 3-Turn 3545 = 5-Turn	Oper. Temp.: −55 to 125°C Linearity: ±0.25% Resis. Tol. %: ±5 Power: 3540: 2W @ 70°C 3543: 1W @ 70°C 3545: 1.5W @ 70°C Mech. Life: 3540: 1,000,000 Rev. 3543: 300,000 Rev. 3545: 500,000 Rev.	3540: 100Ω to 200K 500K 3543: 20Ω to 50K 3545: 50Ω to 50K	6.25 7.40 7.40	5.65 9.15 7.15 7.15	5.05 6.10 5.85 5.85

KNOBPOT® POTENTIOMETERS

Model No./Description	Specifications	Resistances		Price Guide	
			1-9	10-24	50-99
3600 KNOBPOT Potentiometer 3/4″ Diameter Clockface Readout 	Dial Acc. -VR: ±0.5% Watt Power: 1.5 @ 25°C Elect. Rotation: 3600° Nom. Oper. Temp.: −65 to 85°C Resis. Tol. (%): ±5	100Ω-100K 200K, 250K	21.79 32.19	21.77 31:42	18.16 26.83
3610 KNOBPOT Potentiometer 7/8″ Diameter 10-Turn Digital Readout 	Dial Acc. -VR: ±0.5% Watt Power: 1.5 @ 25°C Elect. Rotation: 3600° Nom. Oper. Temp.: −25 to 85°C Resis. Tol. (%): ±5	100Ω-200K 250K	22.26 30.65	21.73 29.91	18.55 25.54
3680 KNOBPOT Pushbutton Potentiometer 	Dial Acc. -VR: ±0.5% Watts Power: 2 @ 25°C Oper. Temp.: −25 to 85°C Resis. Tol. (%): 1% Rated Life: 100,000 Operations per Decade Resolution: 0.1%	5K to 1 Meg	23.00	21.30	18.19

TURNS-COUNTING DIALS

H-357 SERIES DIGITAL DIAL
7/8″ Knob Diam.

H-490 SERIES
1″ DIAMETER

H-510 SERIES
1 3/8″ DIAMETER

Part No.	Body Finish	Shaft Dia. (Inches)	Brake	Price 10-24
H-491-1	Clear	3/32	No	$8.52
H-492-1	Clear	3/32	Yes	8.52
H-493-1	Black	3/32	No	9.20
H-494-1	Black	3/32	Yes	9.20
H-491-2	Clear	1/8	No	8.52
H-492-2	Clear	1/8	Yes	8.52
H-493-2	Black	1/8	No	9.20
H-494-2	Black	1/8	Yes	9.20
H-491-3	Clear	1/4	No	8.00
H-492-3	Clear	1/4	Yes	8.00
H-493-3	Black	1/4	No	8.66
H-494-3	Black	1/4	Yes	8.66
H-510-1	Clear	1/8	Yes	9.60
H-510-2	Clear	1/4	Yes	9.60
H-357-1	Black	1/4	No	6.95
H-357-2	Black	1/4	Yes	6.95

Note: Prices on certain pin configurations and resistances are slightly higher than prices illustrated. Bourns reserves the right to change specs and prices at any time. All prices are F.O.B., Riverside, California, USA.

MOST MODELS AVAILABLE FROM YOUR LOCAL DISTRIBUTOR

QUALITY SERVICE VALUE

BOURNS INC

TRIMPOT PRODUCTS DIVISION

1200 COLUMBIA AVENUE, RIVERSIDE, CALIFORNIA 92507
PHONE (714) 684-1700 • TWX 910-332-1252 • TELEX 676-423

CLAROSTAT

POTENTIOMETERS AND POWER RESISTORS

PRODUCT INDEX and PRICE GUIDE*

Catalog No.	Price (Stock Res. Values Only)		Pg. No.
	1-9	1-24	
POTENTIOMETERS			
Wirewound (Precision)			
42-900 (50 to 20K ohms)	$22.68		6
42-900 (50K and 100K ohms)	$27.51		6
42JA (50 to 20K ohms)	$16.28		6
42JA (50K and 100K ohms)	$21.19		6
57M	$12.85		6
57M9	$12.85		6
57EJA	$13.31		6
57EJB	$13.31		6
62JA	$ 8.25		7
73JA	$ 4.69		7
Wirewound (Trimmers)			
76JA-2		$10.19	9
76JA-3		$10.19	9
U39		$ .76	9
Wirewound (Industrial Grade)			
49M (5 ohms only)	$7.13		8
49M (10 to 10K ohms)	$6.03		8
49M (15K and 20K ohms)	$7.13		8
49M9 (5 ohms only)	$7.34		8
49M9 (10 to 10K ohms)	$6.25		8
49M9 (15K and 20K ohms)	$7.34		8
43C1 (5 to 10K ohms)		$2.60	8
43C1 (15K to 25K ohms)		$2.95	8
43C1 (30K to 50K ohms)		$3.47	8
43C2 (5 to 10K ohms)		$2.89	8
43C2 (15K to 25K ohms)		$3.25	8
43C2 (30K to 50K ohms)		$3.82	8
58C1 (1 to 10K ohms)		$2.60	8
58C1 (15K to 25K ohms)		$2.95	8
58C1 (30K to 50K ohms)		$3.47	8
58C2 (1 to 10K ohms)		$2.89	8
58C2 (15K to 25K ohms)		$3.25	8
58C2 (30K to 50K ohms)		$3.82	8
Conductive Plastic (Carbon)			
388N	$2.55		2
388L	$2.72		2
470	$1.95	(Plus Setup Charge)	2
RV6N (Military)	$5.00		3
RV6L (Military)	$5.00		3
381N	$2.93		3
381L	$3.15		3
381NS	$4.47		3
381N—Z	$3.23		3
D381N	$7.55		3
380C1	$2.15		4
380C2	$2.48		4
380C3	$2.15		4
53C1	$1.95		4
53C2	$2.25		4
53C3	$1.95		4
53C1—Z	$2.48		4
53C1—RZ	$2.48		4
D53C1	$6.77		4
RV4N (Military)	$1.95		4
RV4L (Military)	$2.25		4
382-5	$3.93		5
383-5	$2.16		5

Catalog No.	Price (Stock Res. Values Only)		Pg. No.
	1-9	1-24	
Cermet			
389N	$2.97		10
389L	$3.14		10
389N—Z	$3.39		10
389-5	$2.80		10
389-5—Z	$3.22		10

Catalog No.	Power Watts	Price Range** Stock Values 1-9	Pg. No.
POWER RESISTORS VITREOUS ENAMEL			
Fixed Resistors (Tubular)			
VPR5F	8	$0.61 to $0.88	11
VPR10F	12	$0.68 to $1.10	11
VPR20H	20	$0.77 to $1.47	11
VP25K	25	$0.80 to $1.86	11
VP50K	50	$1.25 to $3.86	11
VK100N	100	$1.95 to $4.86	11
VK160W	175	$3.06 to $4.18	11
VK200W	225	$3.45 to $4.26	11
Fixed Resistors (Axial Lead)			
VC3D	3.25	$0.65 to $0.85	12
VC5E	6.5	$0.65 to $1.17	12
VC10F	11	$0.70 to $1.29	12
Adjustable Resistors (Tubular)			
VP10FA	12	$0.88 to $1.03	12
VP25KA	25	$0.99 to $1.35	12
VP50KA	50	$1.50 to $2.68	12
VP75KA	75	$2.12 to $2.87	12
VK100NA	100	$2.31 to $3.31	12
VK160WA	175	$3.49 to $4.66	12
VK200WA	225	$3.95 to $4.86	12

Catalog No.	Price 1-9 Qty.	Pg. No.
CLARODIALS		
411	$7.75	7
412	$8.95	7
461	$8.25	7
462	$9.45	7

Catalog No.	Price Net	Pg. No.
DECADE BOX		
240C	$121.05	11
250	$173.25	11

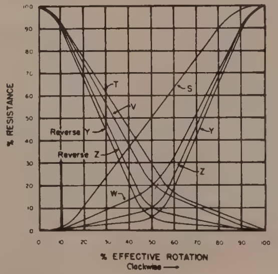
Cat. No.	Packaging	Price Net	Pg. No.
MINIATURE DECADE BOX—Series 260			
260-1	Single Unit	$ 4.57	12
thru	Package of 7	$31.77	12
260-7			

*Prices quoted are for estimation purposes only and are subject to change without notice.
**Exact price is determined by ohmage.

TAPERS: CARBON ELEMENT

GRAPH EXPLANATION COMPOSITION ELEMENT CONTROLS

Taper S	Straight or uniform resistance change with rotation.
Taper T	Right-hand 30% resistance at 50% of C.C.W. rotation.
Taper V	Right-hand 20% resistance at 50% of C.C.W. rotation.
Taper W	Left-hand 20% resistance at 50% of C.W. rotation.
Taper Z	Left-hand (Log. audio) 10% resistance at 50% C.W. rotation.
Rev. Z	Right-hand 10% resistance at 50% C.C.W. rotation.
Taper Y	Left-hand 5% resistance at 50% of C.W. rotation.



MILITARY POTENTIOMETERS

GENERAL LINE PRODUCTS

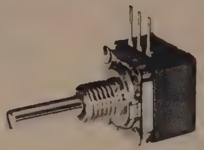
WRITE FOR CATALOG

CLAROSTAT THICK FILM CONDUCTIVE PLASTIC (CARBON) POTENTIOMETERS

BUSHING MOUNTED

½" SQUARE MODULAR/0.5 WATT
SERIES 388

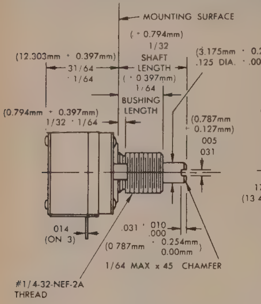
The series 388 is a completely new potentiometer with characteristics exceeding those costing many times more. Manufactured in a controlled environment, the process includes exclusive Clarostat TempMaturing™ to insure a reliable, homogeneous and strain-free resistance element. The modular design allowing free interchange of resistive elements. The potentiometers are manufactured to meet MIL-R-94C specifications where applicable.

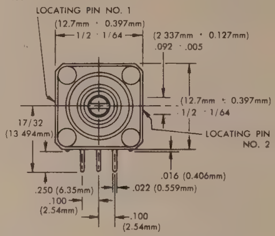


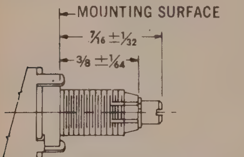
388N

SPECIFICATIONS

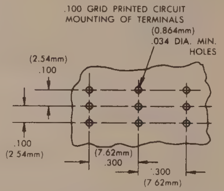
Resistance Tolerance: ±10% up to 500K, ±20% above. **Electrical and Mechanical Rotation:** 295° ± 5°. **Effective Rotation:** 265° ± 5°. **End Resistance:** 4Ω max. linear. **Dielectric Strength:** 750 VAC for 60 sec atm. **Working Voltage:** 350 Vdc across terminals. **Dynamic Noise:** 1.5% total resistance. **Static Noise:** to 30K Ω: −20 DB, 100K Ω: −12 DB, 1 Meg and over: + 3 DB. **Linearity (Independent):** ±5%. **Voltage Coefficient:** .008%/volt (max.). **Rotational Life:** 50,000 cycles. **Power Rating:** .5 watt at 70°C. **Torque Range:** .2 to 4.5 oz.-in. **Stop Torque:** 3 lb. in. **Weight:** .018 lb. (typical). **Functional Output:** Linear. **Insulation Resistance:** 1,000 Meg per MIL std. 202. **Resolution:** Infinite. **Shaft Seal:** Yes. **Corrosion Resistant:** Yes. **Terminal Style:** PC pins.


MOUNTING SURFACE
(12.303mm ± 0.397mm)
31/64 ± 1/64
(± 0.794mm)
1/32
SHAFT LENGTH
(± 0.397mm)
1/64
BUSHING LENGTH
(3.175mm ± 0.254mm)
.125 DIA. ± .001
(0.794mm ± 0.397mm)
1/32 ± 1/64
(0.787mm ± 0.127mm)
.005
.031
.014
(ON 3)
.031 ± .010
.000
(0.787mm ± 0.254mm
0.00mm)
1/64 MAX x 45 CHAMFER
#1/4-32-NEF-2A
THREAD


LOCATING PIN NO. 1
(12.7mm ± 0.397mm)
1/2 ± 1/64
(2.337mm ± 0.127mm)
.092 ± .005
(12.7mm ± 0.397mm)
1/2 ± 1/64
17/32
(13.494mm)
LOCATING PIN NO. 2
.016 (0.406mm)
.250 (6.35mm)
.022 (0.559mm)
.100
(2.54mm)
.100
(2.54mm)


MOUNTING SURFACE
7/16 ± 1/32
3/8 ± 1/64

LOCKING BUSHING TYPE


.100 GRID PRINTED CIRCUIT MOUNTING OF TERMINALS
(0.864mm)
.034 DIA. MIN. HOLES
(2.54mm)
.100
.100
(2.54mm)
(7.62mm)
.300
.300
(7.62mm)

STOCK RESISTANCE VALUES (Linear)

100	5K	250K
250	10K	500K
500	25K	1 Meg.
1K	50K	2.5 Meg.
2500	100K	5 Meg.

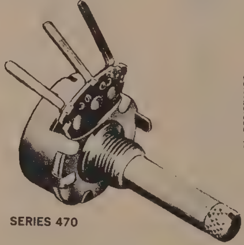
DESCRIPTION

Cat. Nos.	Description
388N	Plain Bushing. (¾" FMS screwdriver slot shaft with ¼" plain bushing)
388L	Locking Bushing. (7/16" FMS slotted shaft with 3/8" split bushing)

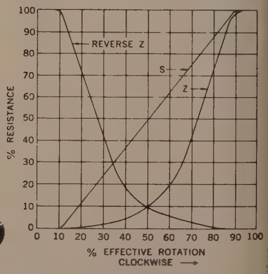
KIT AVAILABLE
A versatile prototype kit featuring a wide variety of assemblies, will soon be available. Watch for further details.

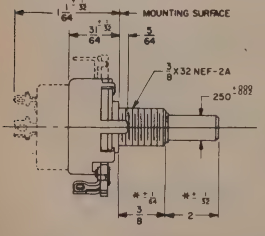
0.5 WATT/SPECIAL ORDER
SERIES 470

Series 470 is an extremely versatile family of high-quality potentiometers. Its multiple configurations and adaptability to any mounting requirements have established its wide use in industry. Particularly, the Series 470 is applicable to radio, television instrumentation and audio work where low noise, close linearity and long rotational life are required. The Series 470 offers a reliable, homogeneous and strain-free conductive plastic resistive element with 2% dynamic noise and 5% independent linearity.

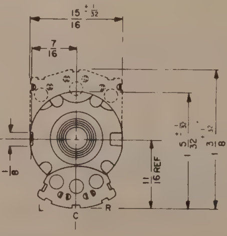


SERIES 470




1 1/64 ± 1/32
MOUNTING SURFACE
31/64 ± 1/32
5/64
3/8 X32 NEF-2A
250 +.000 −.002
3/8
2

Typical dimensions for Series 470


15/16 ± 1/32
7/16
1/8
11/16 REF
5/32
3/8
L
C
R

Many variations available

SPECIFICATIONS

Resistance Range: 150 Ohms to 5 megohms linear; 1K Ohms to 2.5 megohms tapered. **Resistance Tolerance:** Linear up to 500K Ohms, ±10%, Above 500K Ohms, ±20%, Tapers up to 100K Ohms, ±10%, Above 100K Ohms, ±20%. **Linearity:** ±5% Independent. **Power Rating:** Linear—0.5 watts at 40°C., Tapered—0.25 watts at 40°C., Ganged—Panel section is ¾ of single section rating and each additional section is 2/3 of single section rating. Full rating at 40°C derated linearly to zero watts at 120°C. **Electrical Rotation:** 300° ±5° with and without switch. **Tapers:** Right and left hand available. See Chart A. **End Resistance:** Linear Units; 4 Ohms maximum for total resistances up to 250K Ohms, 10 Ohms for resistances 250K Ohms and above. **Dielectric Strength:** 1000 Vac for 60 Seconds at 760 mm Hg., 450 Vac for 60 Seconds at 86 mm Hg. **Working Voltage:** 500 Vdc maximum but power not to exceed rating. **Noise:** 2% of total resistance. 1% available. **Insulation Resistance:** 50 megohms minimum. **Mechanical Rotation:** 300° ±5° without swtich, 330° ±5° with switch, standard. **Stop Torque:** 8 lb.-in. minimum, Standard, 10 lb.-in. minimum, Special. **Operating Torque Range:** Standard bushing each section 0.5 to 6 oz.-in. High torque 6 to 20 oz.-in. Locking bushing 30 oz.-in. minimum with jam nut tightened to 10 lb.-in. **Weight:** .069 lb. **Life:** 50,000 cycles (500 cycles locking bushing types) 10 cycles per minute maximum. **Operating Temperature Range:** −55°C to +120°C.

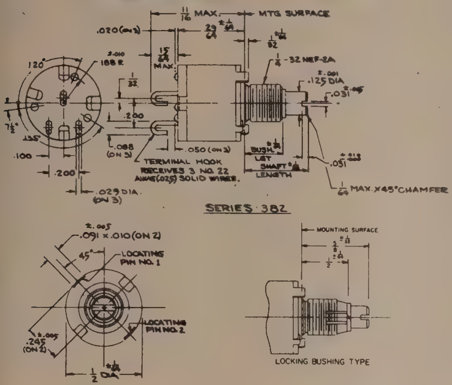
SPECIFICATIONS SUBJECT TO CHANGE WITHOUT NOTICE.

Note: The Series 470 is available on special order only.

CLAROSTAT THICK FILM CONDUCTIVE PLASTIC (CARBON) POTENTIOMETERS

BUSHING MOUNTED

LOW NOISE, MIL GRADE (RV6) 0.5 WATT—SERIES RV6



11/16 MAX.
MTG SURFACE
.020 (ON 3)
29/64
1/4-32 NEF-2A
.125 DIA
.031
120°
.200
.100
.200
.088 (ON 3)
.050 (ON 3)
TERMINAL HOOK RECEIVES 3 NO. 22 AWG (.025) SOLID WIRES.
.029 DIA. (ON 3)
BUSH. LGT
SHAFT LENGTH
.051
1/64 MAX. X 45° CHAMFER
SERIES 382
.091 x .010 (ON 2)
45°
LOCATING PIN NO. 1
LOCATING PIN NO. 2
.245 (ON 2)
1/2 DIA
MOUNTING SURFACE
LOCKING BUSHING TYPE

Series RV6 are high-resolution, highly stable potentiometers for applications requiring miniaturization and reliability. Test equipment, industrial instrumentation, military communications and missiles are some of the areas in which this series meets requirements successfully. Commercial version is Series 382 available on special order. Military version Type 63C.

SPECIFICATIONS

Resistance Tolerance: ±10%. **Power Rating:** 0.5 watt at 70°C. Derated to zero power at 120°C. **Electrical and Mechanical Rotation:** 295° ±5°. **End Resistance:** 5 Ω max. up to 750 Ω. 10 Ω max. above 750 Ω. **Functional Output:** Linear. **Dielectric Strength:** 750 Vac for 60 Seconds at ATM. 350 Vac for 60 Seconds 3.44 in. Hg. **Working Voltage:** 350 Vdc maximum, but power not to exceed rating.

CAT. NO's. AND STOCK VALUES

RV6N AND RV6L

RV6NAY						RV6LAY			
—SD			—SL			—SA		—SD	
101A	103A	254A	254A	501A	153A	101A	104A	101A	101A
103A	254A	254A	501A	153A	101A	104A	101A	253A	251A
153A	504A	504A	102A	253A	251A	154A	251A	503A	501A
253A	105A	105A	252A	503A	501A	254A	501A	104A	102A
503A	205B	101A	502A	104A	102A	504A	102A	154A	252A
404A	255B	251A	103A	154A	252A	105A	252A	254A	502A
154A	505B				502A	205B	502A	604A	
					103A	255B	103A	105A	
					253A	305B	153A		
					503A				

CHART D

OPERATING SHAFT—RV6

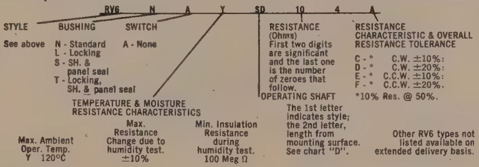
Configuration S—Slotted

Symbol	Shaft Length* With ¼" Bushing N or S	Shaft Length* With ½" Bushing L or T
A	5/8	5/8
D	7/8	7/8
L	3/8	—

*Shaft lengths measured from mounting surface.

ORDERING INFORMATION

RV6 per MIL-R-94 - 0.5 WATT CARBON POTENTIOMETERS



RV6 N A Y SD 10 4 A

STYLE
See above

BUSHING
N - Standard
L - Locking
S - SH. & panel seal
T - Locking, SH. & panel seal

SWITCH
A - None

TEMPERATURE & MOISTURE RESISTANCE CHARACTERISTICS

Max. Ambient Oper. Temp.	Max. Resistance Change due to humidity test.	Min. Insulation Resistance during humidity test.
Y 120°C	±10%	100 Meg Ω

OPERATING SHAFT
The 1st letter indicates style; the 2nd letter, length from mounting surface. See chart "D".

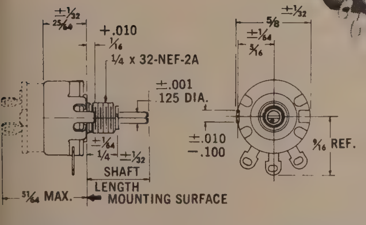
RESISTANCE (Ohms)
First two digits are significant and the last one is the number of zeroes that follow.

RESISTANCE CHARACTERISTIC & OVERALL RESISTANCE TOLERANCE
C - * C.W. ±10%:
D - * C.W. ±20%:
E - * C.C.W. ±10%:
F - * C.C.W. ±20%.
*10% Res. @ 50%.

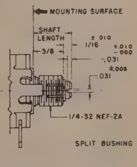
Other RV6 types not listed available on extended delivery basis.

LOW NOISE, MINIATURE, LONG LIFE, 1 WATT—SERIES 381

381L



±1/32
25/64
+.010
−1/16
1/4 x 32-NEF-2A
±.001
.125 DIA.
±1/64
1/4
±1/32
SHAFT LENGTH
5/64 MAX.
MOUNTING SURFACE
5/8
±1/32
±1/64
5/16
±.010
−.100
9/16 REF.



MOUNTING SURFACE
SHAFT LENGTH
±.010
1/16
+.010
−.000
3/8
.031
±.008
.031
1/4-32 NEF-2A
SPLIT BUSHING

Cat. No.	Description
381N	Bushing, Plain, ¼" long. Shaft, ¾" long. FMS SD slotted.
381NS	Bushing (same as 381N) but equipped with a factory attached SPST switch. 1a, 125V (ac or dc).
*381N-Z	Bushing—Z-Taper (see pg. 1)
381L	Locking Bushing, 3/8" long. Shaft, 7/16" long. FMS screwdriver slotted.
D381N	Dual ganged Bushing and shaft same as 381N.

*Note: Insert Resistance value between N and Z for complete Catalog No. eg. 381N-10K-Z.

Series 381, The "Quiet One" is a completely new potentiometer with characteristics exceeding those costing many times more. Manufactured in a controlled environment, the process includes exclusive Clarostat Temp-Maturing(TM) to insure a reliable, homogeneous and strainfree resistance element with 1% dynamic noise and 5% independent linearity. Precision-machine finishing of mechanical parts ensures smoother operation and outstanding mechanical life. Series 381 Potentiometers manufactured to MIL-R-94 specification.

SPECIFICATIONS

Resistance Tolerance: Linear, up to 500K Ω ±10%, above 500K Ω ±20%. Tapers, up to 100K Ω ±10%, above 100K Ω ±20%. **Power Rating (Watts):** 1 watt maximum continuous power rating for linear taper, but voltage not to exceed rating. Full rating at 70°C, derated linearly to zero watts at 120°C. Derate all non-linear tapers by multiplying wattage rating by 0.5. **Mechanical and Electrical Rotation:** 300° ±5° without switch, 325° ±5° with switch. **Dynamic Noise:** Linear single controls maximum initial noise level of 1% of total resistance. Measurement made using a constant current source and oscilloscope detection technique. **Linearity:** ±5% Independent. **Working Voltage:** 350 Vdc across end terminals, but power not to exceed rating. **Effective Rotation:** 270° +0° −10°. **Tapers:** Yes. **Dielectric Strength:** 1,000 VAC for 60 Sec. ATM. **Torque Range:** 0.2-6 oz.-in. **Stop Torque:** 6 lb. min. **Weight:** .017 lb. typical. **Functional Output:** Linear or Taper (see Catalog No's.). **Insulation resistance:** 1,000 Meg Min. **Corrosion Resistant:** Yes.

STOCK VALUES

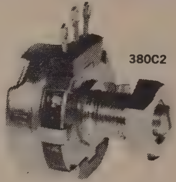
381N, 381NS, 381L LINEAR			DUAL D381N POTENTIOMETERS			TAPERED 381N-Z POTENTIOMETERS		
100	5K	250K	500	5K	50K	10K		250K
250	10K	500K	1000	10K	100K	25K	"Z"	500K
500	25K	1 Meg		25K		50K	Taper	1 Meg
1000	50K	2.5 Meg		Linear		100K		
2500	100K	5 Meg						

CLAROSTAT THICK FILM CONDUCTIVE PLASTIC (CARBON) POTENTIOMETERS

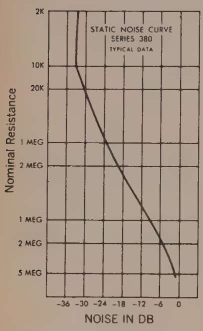
BUSHING MOUNTED

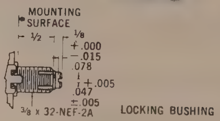
LOW NOISE, LONG LIFE 2 WATT—SERIES 380

380C1

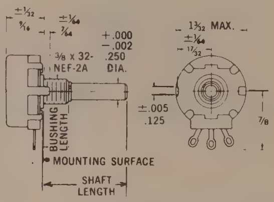

380C2

Like the Series 381 the Series 380 is a "Quiet One". A completely new potentiometer with characteristics exceeding those costing many times more. Manufactured in a controlled environment, the process includes exclusive Clarostat Temp-Maturing$^{(TM)}$ to insure a reliable, homogeneous and strainfree resistance element with 1% dynamic noise and 5% independent linearity. Precision-machine finishing of mechanical parts ensures smoother operation and outstanding mechanical life. Series 380 Potentiometers manufactured to exceed MIL-R-94 specifications. Series 380 C-line Potentiometers feature stainless steel shafts.





LOCKING BUSHING



SPECIFICATIONS

Resistance Tolerance: Up to 1 Megohm ±10%, above 1 Megohm ±20%. **Electrical and Mechanical Rotation:** 312° ±3°. **Effective Rotation:** 270° +10° −0°. **End Resistance:** 4Ω maximum for total resistances up 250K, 10Ω for resistances 250K and higher. **Dielectric Strength:** 1000 Vac for 60 Seconds at ATM pressure. 450 Vac for 60 Seconds 3.4 in. Hg. **Working Voltage:** 500 Vdc across end terminals, but power not to exceed rating. **Power Rating:** 2 watts at 70°C. **Shaft Material:** Stainless steel. **Torque Range:** 1-4 oz.-in. **Operating Temp.:** −55°C to +120°C. **Stop Torque:** 12 lb. in min. **Weight:** .072 lb. (typical). **Functional Output:** Linear. **Insulation Resistance:** 100 Meg. min. **Dynamic Noise:** Linear single controls maximum initial noise level of 1% of Rt. Measurement made using a constant current source and oscilloscope detection technique. **Static Noise:** See Chart. **Linearity:** ±5% Independent. **Voltage Coefficient:** .005%/Volt. maximum. **Rotational Life (Standard):** Rotational life for linear control; 100,000 cycles for units up to and including 100,000 Ohms, except locking type bushing, change not to exceed 5%ΔR, above 100,000 Ohms change not to exceed 10%ΔR.

Cat. No.	Description	Cross Reference	
		Ohmite	Allen-Bradley
380C1	2" round shaft FMS; 3/8" long bushing with 3/8 x 32-NEF-2A thread.	CU	JAIN200P
380C2	5/8" screwdriver slotted shaft FMS; with a 1/2" split locking bushing.	CLU	JAIL040S
380C3	7/8" screwdriver slotted shaft FMS; 3/8" long bushing with 3/8 x 32-NEF-2A thread.	CMU	JAIN056S

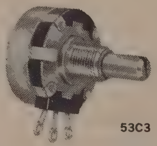
STOCK VALUES

RESISTANCE OHMS (All Units Linear Taper)						
50	750	3500	20K	100K	500K	2.5 Meg
100	1000	5000	25K	150K	750K	3 Meg
150	1500	7500	35K	200K	1 Meg	3.5 Meg
250	2000	10K	50K	250K	1.5 Meg	4 Meg
350	2500	15K	75K	350K	2 Meg	5 Meg
500						

MIL GRADE (STYLE RV4)

2 WATT—SERIES 53

53C2


53C3

A 2-watt potentiometer totally enclosed and sealed against moisture and other environmentals. Meets the need for a high quality resistance device incorporating high-stability under extreme climatic and operational conditions. 1-1/16" diameter and 9/16" deep, brass nickel plated shaft, bushing and stainless steel cover. Terminals, hot tinned.

SPECIFICATIONS (Dimensions same as Series 380)

Resistance Tolerance: Up to 1 megohm ±10%, above 1 megohm ±20%. **Electrical and Mechanical Rotation:** 312° ±3° without switch, 333° ±3° with switch. **End Resistance:** Per MIL-R-94. **Working Voltage:** 500 Vdc across end term, but power not to exceed rating. **Fabricated in accordance with MIL-R-94 Style RV4.** Items not listed are special, prices and information supplied upon request. **Effective Rotation:** 270° −10° +0°. **Dielectric Strength:** 1,000 VAC, 60 Sec. ATM. **Rotational Life:** 25,000 Cycles. **Power Rating:** 2 watt at 70°C. **Torque Range:** 1-4 oz.-in. **Operating Temp.:** −55°C to +120°C. **Stop Torque:** 12 lb.-in. **Weight:** .072 lb. **Functional Output:** Linear. **Insulationg Resistance:** Per MIL-R-94C. **Corrosion Resistant:** MIL-R-94C.

Cat. No.	Description
53C1	2" round shaft FMS; 3/8" long bushing with 3/8 x 32-NEF-2A thread.
53C2	5/8" screwdriver slotted shaft FMS; with a 1/2" split locking bushing.
53C3	7/8" screwdriver slotted shaft FMS; 3/8" long bushing with 3/8 x 32-NEF-2A thread.
53C1SW	Unsealed version of 53C1 available for use with field assembled switches. Order as 53C1 SW see table 1 for switch ordering.
53C1-Z	Same as 53C1 but with Z taper (see chart pg. 2).
53C1-RZ	Same as 53C1 but with Reversed Z taper (see chart pg. 2).
D53C1	Dual ganged. Bushing and shaft same as 53C1.
RV4N	MIL equivalent of Series 53 with plain bushing (see table below).
RV4L	MIL equivalent of Series 53 with shaft lock bushing (see table below).

TABLE 1 SWITCHES FOR 53C1 SW ONLY	
Cat. No.	Description
53-10	SPST—3A-125 Vac
53-20	DPST—3A-125 Vac
53-21	(Mod.) DPST—3A-125 Vac/dc

STOCK VALUES

53C1, 53C2, 53C3 Linear					Dual D53C1	Z-Taper 53C1-Z		Reversed Z-Taper 53C1-RZ
50	1500	20K	250K	3 Meg	10K	500K	150K	10K
100	2000	25K	350K	3.5 Meg	25K	1K	200K	25K
150	2500	35K	500K	4 Meg	50K	2.5K	250K	50K
250	3500	50K	750K	5 Meg	100K	5K	500K	100K
350	5000	75K	1 Meg	7.5 Meg	250K	10K	750K	250K
500	7500	100K	1.5 Meg	10 Meg	500K	15K	1 Meg	300K
750	10K	150K	2 Meg		1 Meg	20K	2 Meg	
1000	15K	200K	2.5 Meg			25K	2.5 Meg	
						50K	5 Meg	
						400K		

CLAROSTAT THICK FILM CONDUCTIVE PLASTIC (CARBON) POTENTIOMETERS

BUSHING MOUNTED

SERIES 53 (CONTINUED)

CAT. NO. RV4N AND RV4L

RV4NAYSB		RV4NAYSD				RV4NAYSK		RV4LAYSA				RV4LAYSD	
101A	503A	500A	152A	353A	754A	101A	503A	500A	152A	353A	754A	101A	503A
251A	104A	101A	252A	503A	105A	251A	104A	101A	252A	503A	105A	251A	104A
501A	254A	151A	352A	753A	155B	501A	254A	151A	352A	753A	155B	501A	254A
102A	504A	251A	502A	104A	205B	102A	504A	251A	502A	104A	205B	102A	504A
252A	105A	351A	752A	154A	255B	252A	105A	351A	752A	154A	255B	252A	105A
502A	255B	501A	103A	254A	355B	502A	255B	501A	103A	254A	355B	502A	255B
103A	505B	751A	153A	354A	505B	103A	505B	751A	153A	354A	505B	103A	505B
253A		102A	253A	504A		253A		102A	253A	504A		253A	

CHART C

OPERATING SHAFT—RV4
Configuration S—Slotted

Symbol	Shaft Length*	
	With 3/8" Bushing N & S	With 1/2" Bushing L & T
A	—	5/8
B	1/2	—
D	7/8	7/8
G	1-1/4	—
J	2	—
K	2-1/2	—

ORDERING INFORMATION (RV4)

RV4 N A Y SD 10 4 A

STYLE
See above

BUSHING
N - Standard
L - Locking
S - Shaft & panel seal
T - Locking, SH. & panel seal

SWITCH
A - None

TEMPERATURE & MOISTURE RESISTANCE CHARACTERISTICS

Max. Ambient Oper. Temp.	Max. Resistance Change due to humidity test.	Min. Insulation Resistance during humidity test.
Y 120°C	±10%	100 Meg Ω

OPERATING SHAFT
The 1st letter indicates style; the 2nd letter, length from mounting surface. See chart "C".

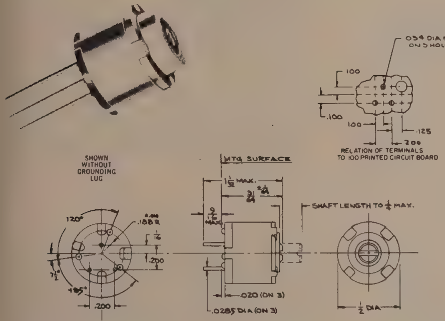
RESISTANCE (Ohms)
First two digits are significant and the last one is the number of zeroes that follow.

RESISTANCE CHARACTERISTIC & OVERALL RESISTANCE TOLERANCE
C - * C.W. ±10%:
D - * C.W. ±20%:
E - * C.C.W. ±10%:
F - * C.C.W. ±20%:
*10% Res. @ 50%.

Other RV4 types not listed available on extended delivery basis.

BUSHINGLESS PC MOUNTED

LOW NOISE, HIGH STABILITY .25 WATT SERIES 382-5


.034 DIA MIN ON 5 HOLES
100
.100
100
.125
.200
RELATION OF TERMINALS TO 100 PRINTED CIRCUIT BOARD
SHOWN WITHOUT GROUNDING LUG
MTG SURFACE
1 1/32 MAX.
31/64 ±1/64
9/16 MAX.
SHAFT LENGTH TO 1/4 MAX.
120°
.188 R
1/16
.200
7 1/2°
105°
.200
.020 (ON 3)
.0285 DIA (ON 3)
1/2 DIA

Cat. No. 382-5 is designed specifically for application on printed circuit boards, this new configuration permits extremely close board-to-board spacing.

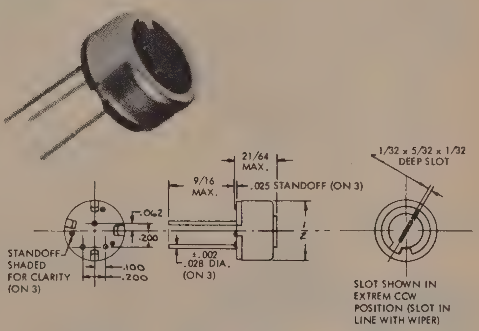
SPECIFICATIONS

Power Rating: .25 watt at 70°C. Derated to zero power at 120°C. **Working Voltage:** 500 Vdc across end terminals, but power not to exceed rating. **Resistance Tolerance:** ±10%. **Mechanical and Electrical Rotation:** 295° ±3°. **Dielectric Strength:** 750 Vac between terminals and ground for 1 minute. **Torque:** 0.5 to 3 oz. in. **Effective Rotation:** 265° +10° −0°. **Dynamic Noise:** 3% max. **Linearity (Independent):** ±5%. **Voltage Coefficient:** .008%/volt (max.) **Rotational Life:** 5,000 cycles. **Operating Temp.:** −55°C to +120°C. **Stop Torque:** 3 lb. in. min. **Functional Output:** Linear. **End Resistance:** 4Ω max. to 250K 10Ω max. above 250K.

STOCK VALUES—RESISTANCE OHMS

100	2.5K	25K	200K
250	5K	50K	250K
500	10K	100K	500K
1K	15K	150K	1 Meg

LOW NOISE, HIGH STABILITY, ECONOMY .375 WATT—SERIES 383-5


21/64 MAX.
9/16 MAX.
.025 STANDOFF (ON 3)
1/32 x 5/32 x 1/32 DEEP SLOT
.062
.200
1/2
STANDOFF SHADED FOR CLARITY (ON 3)
.100
.200
±.002 .028 DIA. (ON 3)
SLOT SHOWN IN EXTREM CCW POSITION (SLOT IN LINE WITH WIPER)

Cat. No. 383-5 is a new, high-resolution, highly stable potentiometer for applications requiring miniaturization and reliability.

SPECIFICATIONS

Resistance Range: 100 ohms to 2.5 megohms linear, only. **Resistance Tolerance:** ±20%. **Power Rating (Watts):** .375 watt maximum continuous power rating for linear tapers, but voltage not to exceed rating. Full rating at 70°C derated linearly to zero watts at 120°C. **Linearity:** ±10% independent. **End Resistance:** Linear 15 ohms maximum. **Dielectric Strength:** 750 Vac for 60 Seconds at ATM. 350 Vac for 60 Seconds 3.44 in H.g. **Working Voltage:** 350 Vdc maximum, but power not to exceed rating. **Resistance-Temperature Characteristics:** See Chart A. **Mechanical Rotation:** 295° ±5°. **Stop Torque:** 2 in. lbs. maximum. **Torque Range:** 0.5 to 4 oz. in. **Max. No. of Sections:** One. **Weight:** .004 lbs.

STOCK VALUES—RESISTANCE OHMS

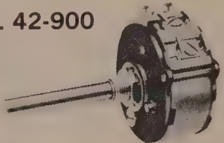
100	2.5K	25K	200K
250	5K	50K	250K
500	10K	100K	500K
1K	15K	150K	1 Meg

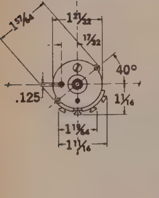
CLAROSTAT WIREWOUND POTENTIOMETERS

PRECISION POTENTIOMETERS

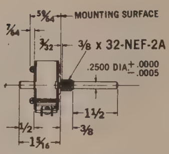
SINGLE TURN, 3 WATT—SERIES 42

CAT. NO. 42-900





1 5/64
1 3/32
17/32
40°
.125
1 1/16
1 13/64
1 11/16



5/64
MOUNTING SURFACE
7/64
3/32
3/8 x 32-NEF-2A
.2500 DIA + .0000 − .0005
1 1/2
1/2
3/8
1 3/16

SPECIFICATIONS

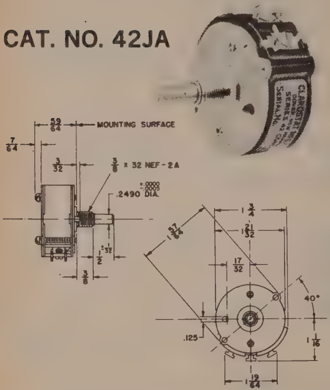
Resistance Tolerance: ±5%. **Functional Output:** Linear. **Tap:** 50% Applied Voltage ±Lin. Tol. **Power Dissipation*:** 3 watts at 40°C. **Effective Rotation:** 300°. **Mechanical Rotation:** 320 ±3 with stop 360° cont. without stop. **Electrical Rotation:** 320° ±3° with stop, 340° ±3° without stop. **Torque:** 3 oz. in. max. **Stop Torque:** 8 lb. in max. **Ambient Temperature:** 105°C max. **Life**:** 250,000 max. cycles. **Speed of Rotation:** 90 RPM max. **Rotor Inertia:** 4.4 approx. gmcm^2 per wiper. **Weight:** 3.2 approx. oz. **Working Voltage:** 350V. **Tapers:** Linear. **Hardware Supplied:** Yes. **Corrosion Resistant:** Yes. **Shaft Material:** Stainless steel. **Shaft Length/Style:** 1-7/8" (from mtg. surface)/Plain. **Bushing Length/Style:** 3/8" (from mtg. surface)/Plain. **Additional Description:** Rear shaft extension.

Used and approved by the millions. Extra tap affords greater electrical versatility. Shaft extension through rear of unit.

Stock Values Res. Ohms	*** Terminal Linearity	Resolution 100/ Total Turns	Temperature Coefficient of Wire
100,000	±0.25%	.053%	±.00002Ω/Ω/°C
50,000	±0.25%	.056%	±.00002Ω/Ω/°C
20,000	±0.25%	.105%	±.00002Ω/Ω/°C
10,000	±0.25%	.125%	±.00002Ω/Ω/°C
5,000	±0.25%	.167%	±.00002Ω/Ω/°C
2,500	±0.25%	.148%	±.00002Ω/Ω/°C
1,000	±0.50%	.191%	±.00002Ω/Ω/°C
500	±0.50%	.174%	.00017Ω/Ω/°C
100	±0.50%	.351%	.00017Ω/Ω/°C
50	±0.50%	.435%	.00017Ω/Ω/°C

***The maximum deviation of the actual output characteristic from a straight reference line extending between zero and the total applied voltage over the actual effective rotation.

CAT. NO. 42JA



53/64
MOUNTING SURFACE
7/64
3/32
3/8 x 32 NEF-2A
.2490 +.0000 −.0005 DIA.
1/32
1/2
3/8
1 3/4
1 21/32
17/32
40°
.125
1 1/16
1 19/64

SPECIFICATIONS

Resistance Tolerance: ±5%. **Functional Output:** Linear. **Power Dissipation*:** 3 watts at 40°C. **Effective Rotation:** 310° nom. **Electrical Rotation:** 330 ±5°. **Mechanical Rotation:** 360° cont. **Torque:** 3 oz. in. max. **Ambient Temperature:** 105°C max. **Life**:** 250,000 max. cycles. **Speed of Rotation:** 90 RPM max. **Rotor Inertia:** 4.4 approx. gmcm^2 per wiper. **Weight:** 3.2 approx. oz. **Tapers:** Linear. **Corrosion Resistant:** Yes. **Hardware Supplied:** Yes. **Shaft Length/Style:** 7/8 (from mtg. surface)/Plain. **Bushing Length/Style:** 3/8 (from mtg. surface)/Plain. **Shaft Material:** Stainless steel.

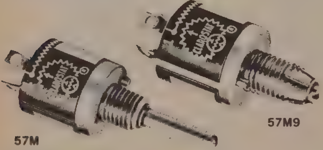
*Derated to zero power at 105°C.
**Depends on design parameters.

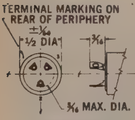
All the same fine qualities and performance tolerances of the Cat. No. 42-900, with the exception of the additional tap, and shaft extension. The ideal unit for extra-dependable potentiometer requirements.

Stock Values Res. Ohms	*** Absolute Linearity	Resolution 100/ Total Turns	Temperature Coefficient of Wire
50,000	±0.5%	.074%	±.00002Ω/Ω/°C
20,000	±0.5%	.10%	±.00002Ω/Ω/°C
10,000	±0.5%	.12%	±.00002Ω/Ω/°C
5,000	±0.5%	.17%	±.00002Ω/Ω/°C
2,500	±0.5%	.14%	±.00002Ω/Ω/°C
1,000	±0.5%	.19%	±.00002Ω/Ω/°C
500	±0.5%	.18%	.00017Ω/Ω/°C
100	±0.1%	.28%	.00017Ω/Ω/°C
50	±1.0%	.35%	.00017Ω/Ω/°C

***The maximum deviation of the actual output characteristic from a straight reference line extending between zero and the total applied voltage over the theoretical effect rotation.

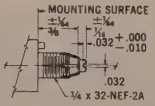
SINGLE TURN, MINIATURE 1.5/2 WATT—SERIES 57





TERMINAL MARKING ON REAR OF PERIPHERY
±1/64
1/2 DIA
3/16
5/16 MAX. DIA.

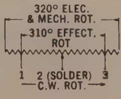
SERIES 57EJA (PLAIN BUSHING) SERIES 57EJB (LOCKING BUSHING) GLASS SEALED TERMINAL BOARD



MOUNTING SURFACE
±1/64
±1/64
3/8
1/16
.032 +.000 −.010
.032
1/4 x 32-NEF-2A

SERIES 57M9 LOCKING BUSHING MOUNTING

*Mounted per MIL-R-19.
57M derated
to zero power at 125°C.
57EJ derated
to zero power at 150°C.

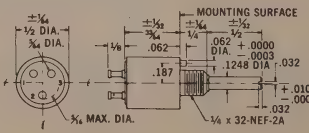


320° ELEC. & MECH. ROT.
310° EFFECT. ROT
1
2 (SOLDER)
3
C.W. ROT.

SCHEMATIC

SPECIFICATIONS

Resistance Tolerance: ±5%. **Independent Linearity:** ±2%. **Functional Output:** Linear. **Temperature Coefficient of Wire:** ±.00002Ω/Ω/°C. **Effective Rotation:** 300° ±5°. **Electrical and Mechanical Rotation:** 320° ±5°. **Power Rating *57M:** 1.5 watts at 40°C. **Power Rating 57EJ:** 2 watts at 70°C. **Dielectric Strength:** 1000 Vac. **Torque:** 6 oz. in. max. **Locking Bushing:** 20 oz. in. min. Torque with Locking Nut tightened to 8 lb. in. **Stop Torque:** 3 lb. in. **Shaft Seal:** Yes. **Weight Approximate:** .25 oz. **Housing:** Corrosion Resistance, per QQ-M-151. **Shaft:** Centerless Ground, Stainless Steel.



±1/64
1/2 DIA.
5/64 DIA.
5/16 MAX. DIA.
MOUNTING SURFACE
±1/32
±1/64
±1/32
33/64
1/4
1/2
1/8
.062
.062 DIA. +.0000 −.0003
.1248 DIA
.032
.187
+.010 −.000
.032
1/4 x 32-NEF-2A

High performance potentiometer packaged in a 1/2" diameter housing. Quality construction throughout. Available in two models; Cat No. 57M rated at 1.5 watts at 40°C and Cat. No. 57EJ rated at 2 watts at 70°C. The high-temperature Cat. No. 57EJ features glass-sealed terminals. Both units are corrosion resistant.

Stock Values Res. Ohms	Resolution 100/Total Turns	Stock Values Res. Ohms	Resolution 100/Total Turns
50	0.16%	5,000	0.45%
100	0.19%	10,000	0.58%
200	0.26%	20,000	0.70%
500	0.30%	50,000	0.91%
1,000	0.35%		

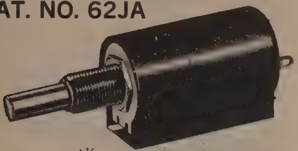
Cat. No.	Description
57M	Plain bushing (3/4" shaft length with 1/4" bushing length (FMS)
57M9	Locking bushing (7/16" shaft length with 3/8" bushing length FMS)
57EJA	Glass seal terminations: Plain bushing (as above)
57EJB	Glass seal terminations: Locking bushing (as above)

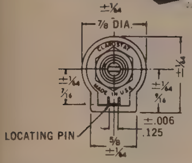
CLAROSTAT WIREWOUND POTENTIOMETERS

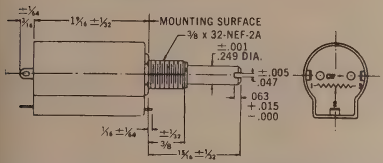
PRECISION POTENTIOMETERS

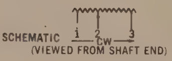
TEN TURN 2 WATT—SERIES 62

CAT. NO. 62JA




±1/64
7/8 DIA.
±1/64
±1/64
3/16
±1/64
3/16
±.006
.125
LOCATING PIN
5/8
±1/64


±1/64
3/16
1 3/16 ±1/32
MOUNTING SURFACE
3/8 x 32-NEF-2A
±.001
.249 DIA.
±.005
.047
.063
+.015
−.000
1/16 ±1/64
±1/32
3/8
15/16 ±1/32


SCHEMATIC
1 2 3
CW
(VIEWED FROM SHAFT END)

SPECIFICATIONS

Resistance Tolerance: ±5%. **Functional Output:** Linear. **Absolute Linearity*:** ±0.25%. **Power Dissipation**:** 2 Watts at 25°C. **Temperature Coefficient of Wire:** ±.000020Ω/Ω/°C. **Dielectric Strength:** 1000 Vac. **Effective Rotation:** 3600 Nom. Degrees. **Electrical and Mechanical Rotation:** 3600 +10° −0°. **Torque:** 3 oz. in. max. **Stop Torque:** 50 oz. in. **Bearings:** Sleeve Bushing. **Insulation Resistance:** 1000 Megohms. **Life:** 100,000 Shaft Rev's. **Maximum Speed of Rotation:** 60 RPM. **Weight:** 1.34 oz. **Shaft Lenght/Style:** 15/16" FMS/Slotted. **Bushing Length/Style:** 3/8"/Plain.

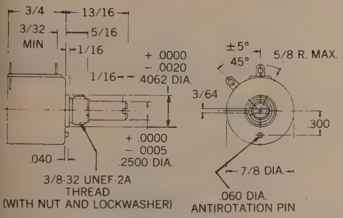
Opens new application areas for the inherent advantages of multi-turn potentiometer design. A precise 10-turn potentiometer offering electrical operating characteristics comparable to units costing far more. The Series 62 was designed specifically for the industrial instrumentation market, based upon the setability and resolution of a quality ten-turn potentiometer including better instrument control and settings for all types of electronic equipment.

Stock Values	Resolution %	Stock Values	Resolution %
100,000	.012	2,500	.022
50,000	.013	2,000	.023
30,000	.016	1,000	.030
25,000	.017	500	.036
20,000	.019	250	.038
10,000	.024	200	.048
5,000	.026	100	.062

*For 250Ω, 200Ω and 100Ω the linearity is ±0.5% absolute.
**Derated Zero Power at 85°C.

TEN TURN, MINIATURE 2 WATT—SERIES 73

CAT. NO. 73JA


3/4
13/16
3/32 MIN
5/16
1/16
+.0000
−.0020
1/16
.4062 DIA.
+.0000
−.0005
.2500 DIA.
.040
3/8-32 UNEF-2A THREAD (WITH NUT AND LOCKWASHER)
±5°
45°
5/8 R. MAX.
3/64
.300
7/8 DIA.
.060 DIA. ANTIROTATION PIN

SPECIFICATIONS

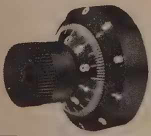
Resistance Tolerance: ±5%. **Electrical/Mechanical Rotation:** 3600 +10° −0°. **Effective Rotation:** 3600 Nom. **End Resistance:** .3% of total res. or 1 ohm whichever is greater. **Dielectric Strength:** 1,000 volts RMS. **Working Voltage:** 450 V max. **Noise (Enr.):** 100 ohms max. **Linearity (Independent):** .25%. **Rotational Life (Max.):** 500,000 cycles. **Power Rating:** 2 watt at 70°. **Shaft Length/Style:** 1/2" screwdriver slot. **Bushing Length/Style:** 5/16 Plain. **Shaft Material:** Stainless steel. **Torque Range:** 1.5 oz. in. max. **Stop Torque** 50 oz. in. min. **Functional Output:** Linear. **Temperature Coefficient of Wire:** ±20 ppm/°C max. **Insulation Resistance:** 1,000 meg at 500V DC.

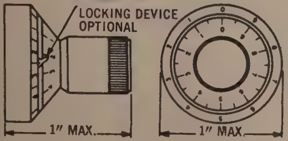
This series has brought the ten-turn potentiometer down in size, down in price and down in wear-outs. Only ¾" body length, priced less than $4.00 in quantity, and a rotational life of 500,000 cycles.

STOCK VALUES

Standard Resistance Values (Ω)	Resolution (%)
100	0.055
200	0.037
500	0.030
1K	0.025
2K	0.021
5K	0.020
10K	0.017
20K	0.015
25K	0.013
50K	0.011
100K	0.009

CLARODIALS
TEN TURN CONCENTRIC SCALE DIALS




LOCKING DEVICE OPTIONAL
1" MAX.
1" MAX.

Calibrated dials designed for multi-turn potentiometers up to ten turns or other rotary devices. Requires only one inch of panel space. The knob attaches directly to the shaft, and the body of the dial is mounted rigidly to the panel. Therefore, accurate readings with a ratio of 1,000 to one for ten turns are provided with zero backlash and reading error.

Material is anodized aluminum.

Mounting requirements 1/4" shaft and 3/8" 32-NEF-2A bushing.

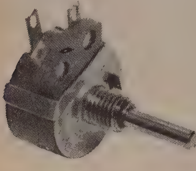
Adapter available for 1/8" diameter shaft.

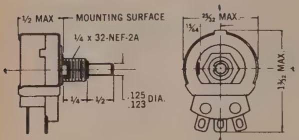
Cat. No.	Description
411	Commercial 10 Turn, Black Anodize 1/4" Shaft, No Lock
412	Commercial 10 Turn, Black Anodize 1/4" Shaft, With Lock
461	Commercial 10 Turn, Clear Anodize 1/4" Shaft, No Lock
462	Commercial 10 Turn, Clear Anodize 1/4" Shaft, With Lock

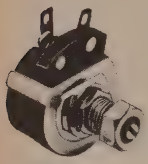
CLAROSTAT WIREWOUND POTENTIOMETERS

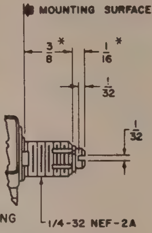
INDUSTRIAL GRADE POTENTIOMETERS

INDUSTRIAL CONTROLS
1.5 WATT—SERIES 49


49M




49M9



OPTIONAL SPLIT BUSHING
JAM NUT SUPPLIED

Tens of thousands of these miniaturized potentiometers have proved the outstanding dependability and performance of the unit. It provides space-savings and electrical performance required in many critical electronic assemblies. Ideal for trimmer requirements for high resolution.

SPECIFICATIONS

Power Rating: 1.5 watts at 40°C, or .005 watt per degree of effective rotation maximum. Derated linearly to zero power at 125°C. **Working Voltage:** 175 volts maximum. **Resistance Tolerance:** ±5%. **Minimum End Resistance:** 1 to 15Ω, 5% of total resistance. Over 15Ω, 3% of total resistance. **Functional Output:** Linear. **Shaft Seal Available:** Yes. **Max. No. of Sections:** 3. **Dielectric Strength:** 1,000 VAC for 60 sec. (ATM). **Stop Torque:** 3 in. lb. (max.). **Effective Rotation:** 300° ±5°. **Mechanical and Electrical Rotation:** 300° ±5°. **Voltage Breakdown:** 100 Vac for 1 minute between terminals and ground. **Torque:** .3 to 6 oz. in. Locking type bushing: 20 oz. in. minimum with jam nut tightened to 10 lb. in. **Typical Weight:** .02 lb. **Insulation Resistance:** 100 Meg (min.).

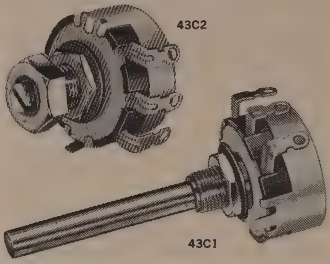
Cat. No.	Description
49M	1/8" round shaft, 3/4" FMS long, with a 1/4" x 32-NEF-2A mounting bushing 1/4" long.
49M9	1/8" diameter x 7/16" FMS long screwdriver slotted shaft with a 1/4" x 32-NEF-2A, 3/8" long locking type bushing.

STOCK VALUES—

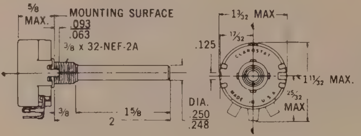
Fabricated in accordance with MIL-R-19 where applicable.

5	50	250	1500	7500
10	100	500	2K	10K
20	150	750	2500	15K
25	200	1K	5K	20K

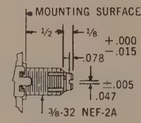
2 WATT—SERIES 43C


43C2

43C1



OPTIONAL LOCKING BUSHING
JAM NUT SUPPLIED



Wire-wound controls designed primarily for industrial applications. All exposed metal parts have corrosion resistant finishes. Terminals have suitable finish for each of soldering. Covers are close-fitting with no cutouts resulting in practically a dust-proof, moisture-proof control.

SPECIFICATIONS

Weight: 0.2 lb. (typical). **Functional Output:** Linear. **Insulation Resistance:** 100 Meg (min.). **Corrosion Resistant:** Yes. **Resistance Tolerance:** ±5%. **Effective Rotation:** 280° ±5°. **Electrical and Mechanical Rotation:** 300° ±5°. **Independent Linearity:** ±2%. **End Resistance:** 1 to 50Ω-0.3Ω, 51 to 100Ω-0.5Ω. Over 100Ω-0.2% of total or 1Ω, whichever is greater. **Working Voltage:** 310 Vdc maximum.

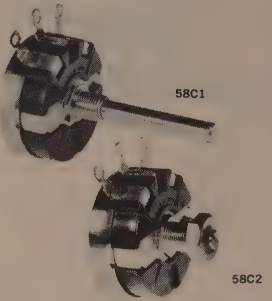
Cat. No.	Description
43C1	2" round shaft FMS; 3/8" long bushing with 3/8-32-NEF-2A thread.
43C2	5/8" FMS screwdriver slotted shaft FMS; with a 1/2" split locking bushing.

STOCK VALUES

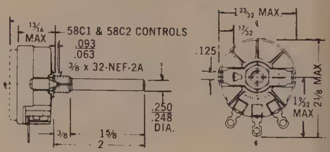
Fabricated in accordance with MIL-R-19 where applicable.

5	75	500	4000	30K
10	100	750	5000	40K
20	150	1000	7500	50K
25	200	1500	10K	
30	250	2000	15K	
40	300	2500	20K	
50	400	3000	25K	

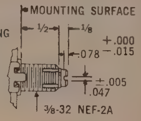
4 WATT—SERIES 58C


58C1

58C2



OPTIONAL LOCKING BUSHING
JAM NUT SUPPLIED



Wire-wound controls designed primarily for industrial applications. All exposed metal parts have corrosion resistant finishes. Terminals have suitable finish for ease of soldering. Covers are close-fitting with no cutouts resulting in practically a dust-proof, moisture-proof control.

SPECIFICATIONS

Resistance Tolerance: ±5%. **Electrical/Mechanical Rotation:** 300° ±5°. **Effective Rotation:** 280° ±5°. **End Resistance:** 1-50Ω .3Ω 51-100Ω .5Ω over 100Ω .26 of total or 1Ω whichever is greater. **Dielectric Strength:** 1,000 vac 60 seconds ATM. **Working Voltage:** 350 Vdc max. **Linearity (Independent):** ±1%. **Mil Spec Reference:** MIL-R-19. **Element Material:** Wire. **Power Rating:** 4 watt at 40°C. **Torque Range:** 0.5-6 oz. in. **Stop Torque:** 8 in. lbs. max. **Insulation Resistance:** 100 meg. min. **Corrosion Resistant:** Yes.

Cat. No.	Description
58C1	2" round shaft FMS; 3/8" long bushing with 3/8-32 NEF-2A thread.
58C2	5/8" screwdriver slotted shaft FMS; with a 1/2" long split locking bushing.

STOCK VALUES

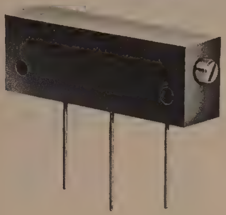
Fabricated in accordance with MIL-R-19 where applicable.

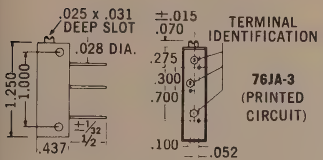
1	20	75	750	5000	30K
2	25	100	1000	7500	40K
4	30	200	1500	10K	50K
6	40	300	2000	15K	
10	50	400	2500	20K	
15	60	500	3000	25K	

CLAROSTAT WIREWOUND POTENTIOMETERS

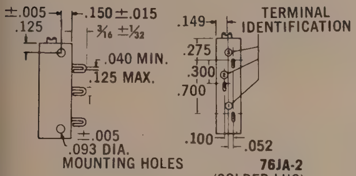
TRIMMING POTENTIOMETERS

MINIATURE MULTITURN
.75 WATT—SERIES 76





76JA-3
(PRINTED CIRCUIT)

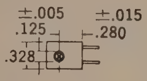


76JA-2
(SOLDER LUG)

SPECIFICATIONS

Power Rating: 3/4 watts at 85°C derated to zero power at 150°. **Resistance Tolerance:** ±5%. **Temperature Coefficient:** ±.0040%/°C. **Absolute Minimum End Resistance:** 0.25% of total resistance maximum or 1Ω. **Electrical/Mechanical Rotation:** 11.5 turns with declutching. **Static Noise (Enr):** 100 ohms (max.) **Stop Torque:** Slip clutch. **Functional Output:** Linear. **Insulation Resistance:** 1,000 Meg (min.). **End Resistance or Over-Travel Resistance:** Maximum increase in resistance to 10% of total resistance. **Effective Rotation:** 11 turns ±1/4 turn. **Torque:** .1 to 8 oz. in. **Dielectric Strength:** 1000V RMS for 1 minute at atmospheric pressure. **Weight:** 0.16 oz. approx.

Cat. No.	Description
76JA-2	Solder Lug Termination
76JA-3	PC Termination

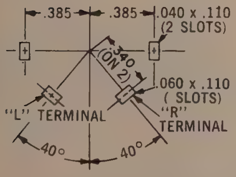


Super Setability! ... made possible through 10 times the resolution ever offered in this popular trimmer configuration. A new approach has made it possible to incorporate approximately 15 times greater winding length. The net result to the user is greater setability on the production line and in the field. Trimming costs in critical circuits drop. Performance of the circuit improves. The package shrinks in size when the Series 76 replaces other high resolution trimmers of several times the size. Panel mounting assembly available.

Stock Values Resistance-Ohms	Nom. Resolution %	Stock Values Resistance-Ohms	Nom. Resolution %
100	0.1	5,000	0.05
200	0.09	10,000	0.04
500	0.08	*20,000	0.036
1,000	0.075	(.001	
2,000	0.06	Wire Min.)	

*(.001 Wire Min.)

BUSHINGLESS
2 WATT—SERIES U39



Universal "Humdinger" Control 2W. Wire-Wound Series U39 is a shaftless potentiometer with the contact arm grounded to the housing. The design of terminals and mounting tabs, meets the following requirements: Above chassis mounting, as a potentiometer or rheostat; printed circuit mounting, as a potentiometer or rheostat. The terminal layout meets the popular industry standards. A fiber adapter plate is furnished with each control for above chassis mounting. Series U39 is ideally suited for radio and television requirements, as well as many industrial applications. Resistance tolerance ±20%. Linear only.

SPECIFICATIONS

Resistance Tolerance: ±20%. **Effective Rotation:** 220° ±5°. **Power Rating:** 2 watts at 40°C. **Terminals:** PC mount. **Torque Range:** 2-10 oz.-in. **Stop Torque:** 3 in.-lbs. max. **Weight:** .009 lb. (typical). **Functional Output:** Linear. **Insulation Resistance:** Ground to case.

Cat. No.	Total Res. Ohms	Cat. No.	Total Res. Ohms	Cat. No.	Total Res. Ohms
U39-1.5	1.5	U39-300	300	U39-1500	1500
U39-5	5	U39-500	500	U39-2000	2000
U39-8	8	*U39-500-100	500	*U39-2000-100	2000
U39-15	15	U39-600	600	U39-3000	3000
U39-50	50	U39-650	650	*U39-3000-700	3000
U39-75	75	U39-700	700	U39-4000	4000
U39-100	100	*U39-700-200	700	*U39-4000-350	4000
U39-125	125	U39-800	800	*U39-4000-1000	4000
U39-150	150	*U39-800-50	800	U39-5000	5000
U39-175	175	U39-1000	1000		
U39-200	200	*U39-1000-100	1000		

*with bias resistance (U39B).

CLAROSTAT CERMET POTENTIOMETERS

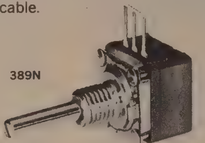
BUSHING MOUNTED

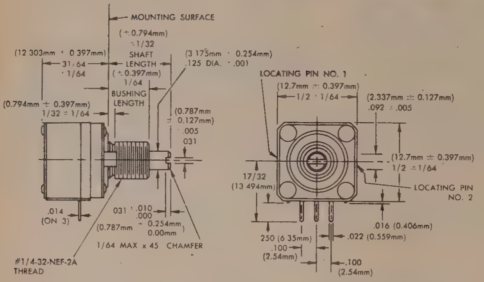
1/2" SQUARE MODULAR 1 WATT

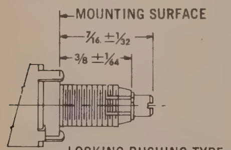
SERIES 389

The series 389 is a completely new potentiometer with characteristics exceeding those costing many times more. Manufactured in a controlled environment, the process includes exclusive Clarostat TempMaturing™ to insure a reliable, homogeneous and strain-free resistance element. The modular design allowing free interchange of resistive elements. These potentiometers are manufactured to meet MIL-R-94C specifications where applicable.

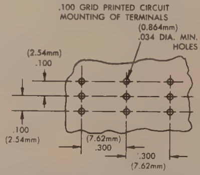
389N




MOUNTING SURFACE
(±0.794mm) ±1/32 SHAFT LENGTH
(12 303mm ± 0 397mm) 31/64 ± 1/64
(3 175mm ± 0.254mm) .125 DIA. ± .001
(±0.397mm) 1/64 BUSHING LENGTH
(0.794mm ± 0.397mm) 1/32 ± 1/64
(0.787mm ± 0.127mm) .005 031
.014 (ON 3)
031 +.010 .000 (0.787mm +0.254mm 0.00mm)
1/64 MAX x 45 CHAMFER
#1/4-32-NEF-2A THREAD
LOCATING PIN NO. 1
(12.7mm ± 0.397mm) 1/2 ± 1/64
(2.337mm ± 0.127mm) .092 ± .005
(12.7mm ± 0.397mm) 1/2 ± 1/64
17/32 (13 494mm)
LOCATING PIN NO. 2
.016 (0.406mm)
250 (6 35mm)
.022 (0.559mm)
.100 (2.54mm)
.100 (2.54mm)


MOUNTING SURFACE
7/16 ±1/32
3/8 ±1/64

LOCKING BUSHING TYPE


.100 GRID PRINTED CIRCUIT MOUNTING OF TERMINALS
(0.864mm) .034 DIA. MIN. HOLES
(2.54mm) .100
.100 (2.54mm)
(7.62mm) .300
.300 (7.62mm)

STOCK RESISTANCE VALUES

389N, 389L LINEAR		
100	5K	250K
250	10K	500K
500	25K	1 Meg.
1K	50K	2.5 Meg.
2500	100K	5 Meg.
Z—Taper 389N-Z		
100	5K	250K
250	10K	500K
500	25K	1 Meg.
1K	50K	
2500	100K	

SPECIFICATIONS

Resistance Tolerance: ±10%. **Electrical and Mechanical Rotation:** 295° ±5°. **Effective Rotation:** 250° ±5°. **End Resistance:** 4Ω max. linear. **Dielectric Strength:** 900 VAC for 60 Sec. ATM. **Working Voltage:** 350 Vdc across terminals. **Dynamic Noise:** 3% total resistance. **Static Noise:** 100Ω/sq es −24 DB, 10K Ω/sq es −9 DB, 100K Ω/sq es +1 DB. **Linearity (Independent):** ±5%. **Voltage Coefficient:** .008%/volt (max.). **Rotational Life:** 25,000 cycles. **Power Rating:** 1 watt at 85°C. **Torque Range:** .2 to 4.5 oz.-in. **Operating Temperature:** −55°C to +150°C. **Stop Torque:** 3 lb.-in. **Weight:** .018 lb. (typical). **Functional Output:** Linear or tapered. **Insulation Resistance:** 100 Meg per MIL std 202. **Resolution:** Infinite. **Shaft Seal:** Yes. **Corrosion Resistant:** Yes. **Terminal Style:** PC pins.

Cat. No.	Description
389N	Plain Bushing (3/4" FMS screwdriver slotted shaft with 1/4" plain bushing)
389L	Locking Bushing (7/16" FMS screwdriver slotted shaft with 3/8" locking bushing).
389N-Z*	Z—taper. Same as 389N mounting

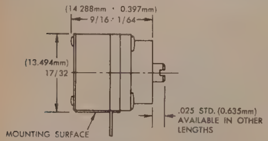
*For complete catalog number add resistance value from chart between N- and -Z.

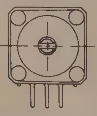
BUSHINGLESS PC MOUNTED

1/2 WATT SERIES 389-5

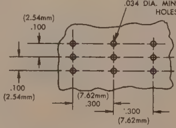
CAT. NO. 389-5 and 389-5-Z

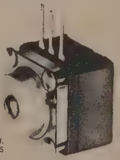
The potentiometer 389-5 and 389-5-Z are similar in characteristics to the 389 Series (see above). However, they are designed for bushingless mounting on a PC board and have a flush screwdriver slot for adjustment. Check the appropriate specifications for the 389 series. Note that 389-5 and 389-5-Z have power ratings of 0.5 watt at 85°C.


(14 288mm ± 0.397mm) 9/16 ± 1/64
(13.494mm) 17/32
.025 STD. (0.635mm) AVAILABLE IN OTHER LENGTHS
MOUNTING SURFACE



.100 GRID PRINTED CIRCUIT MOUNTING OF TERMINALS


(0.864mm) .034 DIA. MIN. HOLES
(2.54mm) .100
.100 (2.54mm)
(7.62mm) .300
.300 (7.62mm)



STOCK RESISTANCE VALUES

(Linear)		
100	5K	250K
250	10K	500K
500	25K	1 Meg.
1K	50K	2.5 Meg.
2500	100K	5 Meg.
(Z Taper)		
100	5K	250K
250	10K	500K
500	25K	1 Meg.
1K	50K	
2500	100K	

SPECIFICATIONS

(see 389 Series above)

CLAROSTAT POWER RESISTORS

FIXED RESISTORS TUBULAR

VITREOUS ENAMEL/GREEN OHM V™

Vitreous enamel, wire-wound power resistors are engineered to meet highest quality specifications. Wire windings are finest grade resistance alloy. Designed for utmost reliability and stability under adverse conditions. Teal green enamel finish withstands over-heating without peeling or cracking. Tolerance, ±5% except values under 1 ohm, ±10%. VPR types (up to 20 watts) have wire lead and lug terminals. VP and VK types (25 watts and up) have lug terminals, and mounting bracket.

LUG AND LEAD 8, 12 AND 20 WATT —SERIES VPR

8-WATT SERIES VPR-5-F CORE 1" x 5/16"

Ohms	Ohms	Ohms	Ohms	Ohms	Ohms	Ohms	Ohms
1	50	750	4500	12	300	1750	12.5K
1.5	75	800	5000	15	350	2000	15K
2	100	900	6000	20	400	2250	17.5K
3	125	1000	7000	25	450	2500	20K
4	150	1100	7500	30	500	3000	22.5K
5	200	1200	8000	35	600	3500	25K
7.5	225	1250	9000	40	700	4000	
10	250	1500	10K				

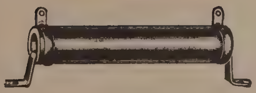
12-WATT SERIES VPR-10-F CORE 1-3/4" x 5/16"

Ohms	Ohms	Ohms	Ohms	Ohms	Ohms	Ohms	Ohms	Ohms	Ohms
0.4	30	500	3000	13.5K	5	200	1200	8000	25K
1	35	600	3500	14.3K	7.5	225	1250	8500	30K
1.2	40	700	4000	15K	10	250	1500	9000	35K
1.3	50	750	4500	16K	12	300	1750	10K	40K
1.5	75	800	5000	17.5K	15	350	2000	11K	45K
2	100	900	6000	18K	20	400	2250	12K	50K
3	125	1000	7000	20K	25	450	2500	12.5K	
4	150	1100	7500	22.5K					

20-WATT SERIES VPR-20-H CORE 2" x 7/16"

Ohms	Ohms	Ohms	Ohms	Ohms	Ohms	Ohms	Ohms	Ohms	Ohms
0.4	350	1850	7500	55K	75	850	3500	25K	90K
0.6	400	2000	8000	60K	100	1000	4000	30K	95K
0.8	500	2250	9000	65K	150	1200	4500	35K	100K
5	650	2400	10K	70K	200	1250	5000	40K	
10	700	2500	12.5K	75K	250	1500	6000	45K	
25	750	2750	15K	80K	300	1750	7000	50K	
50	800	3000	20K	85K					

LUG ONLY 25 TO 225 WATT —SERIES VP AND VK



25-WATT SERIES VP-25-K CORE 2" x 9/16"

Ohms	Ohms	Ohms	Ohms	Ohms	Ohms	Ohms	Ohms	Ohms	Ohms
1	50	800	5000	30K	5	200	2500	12K	60K
2	75	1000	6000	35K	10	250	3000	15K	70K
3	100	1500	7500	40K	15	500	3500	20K	80K
4	150	2000	10K	50K	25	750	4000	25K	100K

50-WATT SERIES VP-50-K CORE 4" x 9/16"

Ohms	Ohms	Ohms	Ohms	Ohms	Ohms	Ohms	Ohms	Ohms	Ohms
1	100	1000	7500	50K	10	400	3000	20K	175K
2	150	1250	8000	75K	25	500	4000	25K	200K
3	200	1500	10K	100K	50	750	5000	30K	225K
4	250	2000	12K	125K	75	800	6000	35K	250K
5	300	2500	15K	150K					

100-WATT SERIES VK-100-N CORE 6-1/2" x 3/4"

Ohms	Ohms	Ohms	Ohms	Ohms	Ohms	Ohms	Ohms	Ohms	Ohms
1	75	750	7500	60K	5	200	2500	25K	
2	100	1000	10K	75K	10	250	3000	30K	
3	125	1500	15K	100K	25	300	4000	40K	
4	150	2000	20K	200K	50	500	5000	50K	

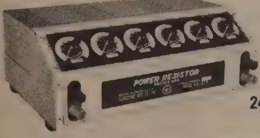
175-WATT SERIES VK-160-W CORE 8-1/2" x 1-1/8"

Ohms	Ohms	Ohms	Ohms	Ohms	Ohms	Ohms	Ohms	Ohms	Ohms
1	50	750	7500	50K	5	150	2500	25K	
2	75	1000	10K	60K	10	250	3000	30K	
3	100	1500	15K	75K	25	500	5000	40K	
4	125	2000	20K	100K					

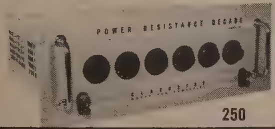
225-WATT SERIES VK-200-W CORE 10-1/2" x 1-1/8"

Ohms	Ohms	Ohms	Ohms	Ohms	Ohms	Ohms	Ohms	Ohms	Ohms
1	50	750	7500	40K	5	200	2500	20K	100K
2	75	1000	10K	50K	10	250	3000	25K	
3	100	1500	12K	60K	25	500	5000	30K	
4	150	2000	15K	75K					

POWER RESISTOR DECADE BOX



240C



250

The Resistance Decade Box, Model 240-C for bench use — Model 250 for rack mounting, provides any resistance from 1 to 999,999 ohms for working circuits at the flip of a switch. Six front-panel dials enable selection in 1 ohm increments, the total value being read directly from the dial. Each decade has a power rating of 225 watts maximum, 1,000 Vdc or 660 Vac maximum.

Resistance changing switches are of the type that prevent a resistance breakdown between steps, thus protecting delicate meters and measuring instruments in the circuit. Knobs indicate the resistance value being used at a glance.

Clarostat GREENOHM Power Resistors are used throughout. These components are wire-wound power resistors on ceramic tubes and coated with an exclusive Clarostat inorganic cold-setting cement, providing the most rugged, long-lasting, trouble-free power resistor available. The resistors are mounted in rigid metal supports. Overall length: 240C: 13″ long x 8½″ deep x 5¾″ high, weight 11½ lbs. 250: 19″ long x 13¾″ deep x 7″ high (fits in standard 19″ relay rack), weight 18½ lbs.

Suggested Uses: Resistance determination, Load Resistance, Meter Multiplier, Calibrating Meters, providing any desired ohmage as a universal power resistor.

Decade No.	1	2	3	4	5	6
Max. Current Rating (amps)	5	1.5	.5	.15	0.5	.005
Resistance Tolerance	5%	2%	2%	2%	2%	2%

CLAROSTAT POWER RESISTORS

ADJUSTABLE RESISTORS

VITREOUS ENAMEL/ GREEN OHM V™

Same construction as Greenohm V fixed resistors. Tolerance: ±10%. **Core Size:** VP-10-FA, 1-3/4" x 5/16" dia.; VP-25-KA, 2" x 9/16" dia.; VP-50-KA, 4" x 9/16" dia.; VP-75-KA, 6" x 9/16" dia.; VK-100-NA, 6-1/2" x 3/4" dia.; VK-160-WA, 8-1/2" x 1-1/8" dia.; VK-200-WA, 10-1/2" x 1-1/8" dia.

STOCK VALUES

12 TO 75-WATT

12-WATT SERIES VP-10-FA

Ohms	Ohms	Ohms	Ohms	Ohms
1	50	500	2500	8000
2	75	600	3000	8500
3	100	750	3500	9000
5	150	800	4000	10K
7.5	200	1000	4500	
10	250	1250	5000	
15	300	1500	6000	
20	350	2000	7000	
25	400	2250	7500	

25-WATT SERIES VP-25-KA

Ohms	Ohms	Ohms	Ohms	Ohms
1	50	750	3500	9000
2	75	800	4000	10K
3	100	1000	4500	12K
5	150	1250	5000	15K
7.5	200	1500	6000	20K
10	250	2000	7000	25K
15	300	2250	7200	
20	400	2500	7500	
25	500	3000	8000	

50-WATT SERIES VP-50-KA

Ohms	Ohms	Ohms	Ohms	Ohms
1	100	1250	6000	25K
2	150	1500	7000	30K
3	200	2000	7200	35K
4	250	2250	7500	40K
5	300	2500	8000	50K
10	400	3000	9000	60K
20	500	3500	10K	75K
25	750	4000	12K	80K
50	800	4500	15K	100K
75	1000	5000	20K	

75-WATT SERIES VP-75-KA

Ohms	Ohms	Ohms	Ohms	Ohms
1	200	2000	7200	35K
2	250	2250	7500	40K
3	300	2500	8000	45K
4	400	3000	9000	50K
5	500	3500	10K	60K
10	750	4000	12K	80K
15	800	4500	15K	100K
25	1000	5000	20K	
50	1250	6000	25K	
100	1500	7000	30K	

100 TO 225-WATT

100-WATT SERIES VK-100-NA

Ohms	Ohms	Ohms	Ohms	Ohms
1	25	400	3500	40K
2	50	500	5000	50K
3	100	750	10K	75K
4	150	1000	15K	100K
5	200	1500	20K	
10	250	2000	25K	
15	300	2500	30K	

175-WATT SERIES VK-160-WA

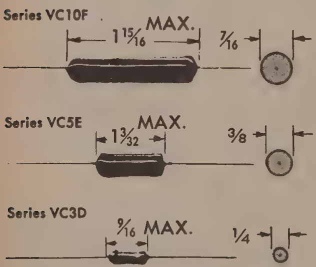
Ohms	Ohms	Ohms	Ohms	Ohms
1	10	250	5000	30K
2	25	500	10K	40K
3	50	1000	15K	50K
4	100	1500	20K	75K
5	150	2500	25K	100K

225-WATT SERIES VK-200-WA

Ohms	Ohms	Ohms	Ohms	Ohms
1	20	200	2500	30K
2	25	250	5000	40K
3	50	300	10K	50K
4	75	500	15K	75K
5	100	1000	20K	100K
10	150	1500	25K	

FIXED RESISTORS AXIAL LEAD

AXIAL LEAD 3.25, 6.5 AND 11 WATTS —SERIES VC



Lead Length: 1½"   Lead Diameter: .032

Axial lead resistors are particularly adapted to printed circuit, terminal board, and point-to-point wiring applications. These resistors save considerable space because of the elimination of mounting brackets and terminal lugs. Standard resistance tolerance is ±5% for 1 ohm and higher and tolerance below 1 ohm is ±10%. Finished with Clarostat's new vitreous shade of teal green.

3.25-WATT SERIES VC3D

Ohms	Ohms	Ohms	Ohms	Ohms	Ohms	Ohms	Ohms	Ohms	Ohms	Ohms	Ohms
1	27	125	470	1.5K	4.7K	10	50	270	800	2.7K	8K
1.5	30	150	500	1.75K	5K	12	56	300	820	3K	8.2K
2	33	180	560	1.8K	5.6K	15	68	330	900	3.3K	9K
3	35	200	600	2K	6K	18	75	350	1K	3.5K	10K
4	39	220	680	2.2K	6.6K	20	82	390	1.1K	3.9K	
5	40	225	700	2.25K	7K	22	100	400	1.2K	4K	
7.5	47	250	750	2.5K	7.5K	25	120	450	1.25K	4.5K	

6.5-WATT SERIES VC5E

Ohms	Ohms	Ohms	Ohms	Ohms	Ohms	Ohms	Ohms	Ohms	Ohms	Ohms	Ohms
1	30	180	600	2.2K	7K	12	68	350	1.1K	4K	17.5K
1.5	33	200	680	2.25K	7.5K	15	75	390	1.2K	4.5K	18K
2	35	220	700	2.5K	8K	18	82	400	1.25K	4.7K	20K
3	39	225	750	2.7K	8.2K	20	100	450	1.5K	5K	22K
4	40	250	800	3K	9K	22	120	470	1.75K	5.6K	22.5K
5	47	270	820	3.3K	10K	25	125	500	1.8K	6K	25K
7.5	50	300	900	3.5K	12.5K	27	150	560	2K	6.8K	
10	56	330	1K	3.9K	15K						

Standard Packing—10 Per Carton

11-WATT SERIES VC10F

Ohms	Ohms	Ohms	Ohms	Ohms	Ohms	Ohms	Ohms	Ohms	Ohms	Ohms	Ohms	Ohms	Ohms
1	30	180	600	2.2K	7K	20K	12	68	350	1.1K	4K	12K	39K
1.5	33	200	680	2.25K	7.5K	22K	15	75	390	1.2K	4.5K	12.5K	40K
2	35	220	700	2.5K	8K	22.5K	18	82	400	1.25K	4.7K	13.5K	45K
3	39	225	750	2.7K	8.2K	25K	20	100	450	1.5K	5K	15K	47K
4	40	250	800	3K	8.5K	27K	22	120	470	1.75K	5.6K	16K	50K
5	47	270	820	3.3K	9K	30K	25	125	500	1.8K	6K	17.5K	
7.5	50	300	900	3.5K	10K	33K	27	150	560	2K	6.8K	18K	
10	56	330	1K	3.9K	11K	35K							

PRECISION RESISTANCE DECADE BOX

MINIATURIZED CLARO-DEC

The most flexible innovation yet in precision resistance decade boxes, the Claro-Dec serves many applications with all the versatility needed for the job. Claro-Decs (within established parameters of current) are used whenever accurate steps of resistance values between .1 ohms and 900K ohms, ±1%* are required. Selection of desired steps of resistance is accomplished by insertion of a banana plug into the proper, marked front panel hole on the unit. Individual or multiple Claro-Dec units are flush panel or breadboard mounted with equal ease. Units may be physically ganged by sliding the molded-in tongue-and-groove together and electrically series connected with a supplied wire jumper or accessory banana plug.

Model	Total Res. of Decade (Ohms)	Resistance Per Step (Ohms)	Accuracy (+C)*	Maximum Current
260-1	0.9	0.1	±5%	1 Amp
260-2	9	1.0	±1%	350 Ma
260-3	90	10	±1%	100 Ma
260-4	900	100	±1%	35 Ma
260-5	9K	1K	±1%	10 Ma
260-6	90K	10K	±1%	3.5 Ma
260-7	900K	100K	±1%	1.0 Ma

*C-Contact resistance, .005-.03 ohms, typical, .01 ohms.

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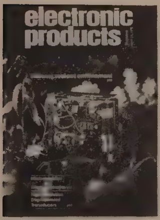

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CARTER POTENTIOMETERS

RECTILINEAR / WIRE WOUND / CONDUCTIVE PLASTIC

Carter Manufacturing Corp. is an organization of engineers and craftsmen specializing in the unusual in potentiometers and switch engineering and their manufacture. Since our founding in 1955 we have developed full capability in wire wound and conductive plastic potentiometers. We welcome the opportunity to work with you for your unique requirements as well as standard commercial or mil types.

RECTILINEAR POTENTIOMETERS / WIRE OR CONDUCTIVE PLASTIC

ST476, ST510
MOUNTING—
THREADED BUSHING STD.
CLAMPS - SPECIAL
CARTER MFG. CORP.
HUDSON, MASS.
S/N 33295
ST632
CARTER MANUFACTURING CORPORATION
ST403
ST632, ST646

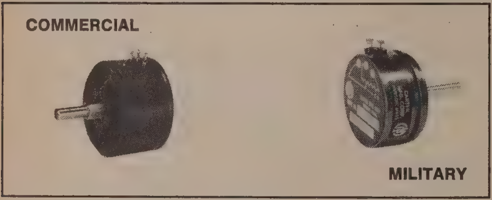
Carter manufactures many custom variations of rectilinear potentiometers. When requesting quotations please specify stroke, resistance, linearity, any taps, any switching, environmental requirements and quantity.

Wire wound and conductive plastic elements can also be furnished for special requirements.

Type	Size	Stroke	Res.Ω	Std. Lin.	Spl. Lin.	Elements	Watts 125°
ST476	½″ Dia.	To 8″	50K/″ Max.	2% Stroke	1% Stroke	1 or 2	1
ST510	¾″ Dia.	To 12″	100K/″ Max.	2% Stroke	1% Stroke	1 or 2	1.5
ST403	1¼″ x 1¼″	To 36″	150K/″ Max.	2% Stroke	1% Stroke	1 or 2	2
ST632	5⁄16″ x ½″	To 4″	60K/″ Max.	2% Stroke	1% Stroke	1	.25
ST646	½″ x ½″	To 6″	50K/″ Max.	2% Stroke	1% Stroke	1 or 2	1

WIRE WOUND / CONDUCTIVE PLASTIC / SINGLE TURN POTENTIOMETERS

MILITARY / COMMERCIAL


COMMERCIAL
MILITARY

GENERAL SPECIFICATIONS

Resistance Tolerance: WW ±5%, C/P ±10% Std. (Spl. avail.).
Function Angles: Spl. available.
Rotation: WW with stops, continuous available.
C/P continuous, stops available.
Taps: WW taps to single turn of wire with positive elimination of failure.
C/P taps of low resistance or zero width available.
Power Rating: To zero watts at 150°C.
Ambient Temp.: −65°C to +125°C std. (to 150°C available).

MIL STANDARDS / WIRE WOUND

Size	½″	⅞″	11⁄16″	17⁄16″	1⅝″	1¾″	2″	3″
Type	120	118	223	157	136	160	119	236
Mil. Size	05	09	11	15	17	18	20	30
Function Angle	320°	320°	320°	320°	320°	320°	350°	350°
Std. Lin.	±.5%	±.4%	±.3%	±.25%	±.2%	±.18%	±.15%	±.1%
Spl. Lin.	±.3%	±.25%	±.2%	±.1%	±.1%	±.09%	±.09%	±.07%
Max. Res.	75KΩ	100KΩ	100KΩ	150KΩ	150KΩ	175KΩ	200KΩ	500KΩ
Watts	2	3	3.5	4	4	4	4.5	5

MIL STANDARDS / CONDUCTIVE PLASTIC

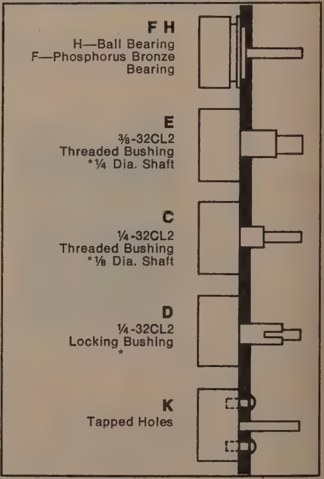
Size	½″	⅞″	11⁄16″	17⁄16″	1⅝″	1¾″	2″	3″
Type	CP120	CP118	CP223	CP157	CP136	CP160	CP119	CP236
Mil. Size	05	09	11	15	17	18	20	30
Function Angle	320°	340°	340°	345°	345°	345°	345°	345°
Std. Lin.	±.7%	±.5%	±.5%	±.4%	±.4%	±.35%	±.3%	±.25%
Spl. Lin.	±.2%	±.1%	±.05%	±.04%	±.04%	±.03%	±.03%	±.01%
Max. Res.	60KΩ	100KΩ	150KΩ	150KΩ	175KΩ	200KΩ	250KΩ	400KΩ
Watts	1	1.4	1.6	2	2.2	2.6	3	5

COMMERCIAL PLASTIC HOUSING / WIRE WOUND

CONDUCTIVE PLASTIC

Size	2″	3″	Size	2″	3″
Type	508	511	Type	CP508	CP511
Mil. Size	—	—	Mil. Size	—	—
Function Angle	320°	320°	Function Angle	345°	345°
Std. Lin.	±.25%	±.25%	Std. Lin.	±1%	±.7%
Spl. Lin.	±.2%	±.2%	Spl. Lin.	±.5%	±.25%
Max. Res.	250KΩ	500KΩ	Max. Res.	250KΩ	400KΩ
Watts	3	5	Watts	3	5

MOUNTING ARRANGEMENTS


F H
H—Ball Bearing
F—Phosphorus Bronze Bearing
E
⅜-32CL2
Threaded Bushing
*¼ Dia. Shaft
C
¼-32CL2
Threaded Bushing
*⅛ Dia. Shaft
D
¼-32CL2
Locking Bushing
*
K
Tapped Holes

CARTER MANUFACTURING CORPORATION
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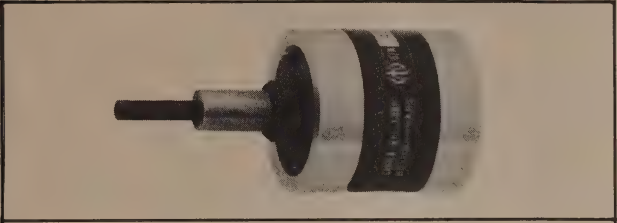
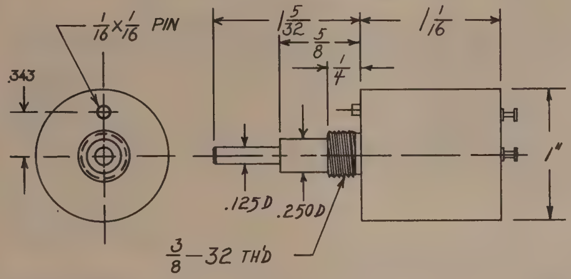
VERNIER DRIVE potentiometers

TYPE CP651 1" DIA.
conductive plastic standard

TYPE 651 1" DIA.
wire wound available





These specifications are Carter Manufacturing Corporation standards, however, they do not express the limit of our capability. Frequently applications call for requirements not illustrated by the catalog sheet. Carter welcomes the opportunity to supply your unique needs.

Carter offers the greatest versatility in instrument potentiometers featuring dual control with a direct drive outer shaft and a vernier drive inner shaft. A directly calibrated dial can be mounted on the outer shaft and fine smooth control obtained on the inner shaft.

Vernier ratios of 10:1 and 5:1 are available as standard. The resistance elements are conductive plastic but wire wound can be made. Functions are linear as standard but non-linear can be designed.

These potentiometers are ideal for instruments where fine, smooth control is required such as RC tuning in signal generators, variable frequency filters and wherever fine rotating control of output is desired.

The types and sizes shown are present standards but the dual drive feature can be incorporated into your custom designed potentiometers.

ELECTRICAL SPECIFICATIONS

ELEMENT:
Conductive Plastic
RESISTANCE VALUES:
1000 Ω, 2500Ω, 5000Ω standard
Other values available
RESISTANCE TOLERANCE:
±10%, tighter tolerances available
FUNCTION:
Linear ±2% standard, ±1% & .5% available
non-linear available

ELECTRICAL ANGLE:
300° ±3° standard
Any angle less than 345° available
ROTATION:
Continuous, stops available
TAPS:
None. Available at center or other angles
POWER:
1W at 85°C derated to 0 at 125°C

GENERAL SPECIFICATIONS

HIGH VOLTAGE BREAKDOWN:
1000 VRMS
AMBIENT TEMPERATURE RANGE:
−50°C to +125°C
TEMPERATURE COEFFICIENT
−50°C to +85°C −200 PPM MAX.
+85°C to +125°C −300 PPM MAX.

LOAD LIFE:
2000 Hours
SERVICE LIFE
1,000,000 Revolutions
ENVIRONMENTAL PERFORMANCE AND OTHER DESIGN CRITERIA PER MIL-R-39023

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CIC Infinite Resolution PRECISION COMPONENTS

ROTARY Single-Turn POTENTIOMETERS

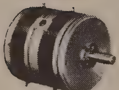
LINEAR-FUNCTIONAL/SINE-COSINE

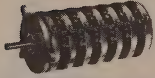
#53

#78

#105 (Ganged)

#205


#206 (Ganged)


#175 (Ganged Special)

SPECIFICATIONS

	LINEAR	SINE-COSINE
Mechanical Rotation	360° Continuous	
Electrical Function Angle	350° Nominal	360°
Resistance Range	0.5KΩ-2 MegΩ	500Ω-50KΩ/Quad.
Best Linearity or Conformity	.1% ÷ Inch of Dia.	.3% P-P ÷ Inch of Dia.
Virtual Resolution	1/250,000	
Wattage	Diameter x 2 Watt(s)	
Temperature Range	−55°C to +125°C	
Taps, Maximum No.	Diameter x 6	
Starting Torque (In.—Oz.)	Diameter x .15	Diameter x .3
Guaranteed Life (at 100 R.P.M.)	To 30 Million Cycles Depending on Circuitry	

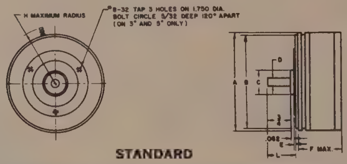
DIMENSIONS

MODEL	53 Linear	78 Linear	105 Linear 106 Sin-Cos	155 Linear 156 Sin-Cos	175 Linear 176 Sin-Cos	175S 205S 305S Linear	205 Linear 206 Sin-Cos	305 Linear 306 Sin-Cos	505 Linear 506 Sin-Cos
A	1/2	7/8	1 1/32	1 5/16	1 3/4	—	2	3	5
B*	.4375	.7500	1.0300	1.3125	1.5620	—	1.8750	2.8750	4.8750
C*	—	—	—	—	—	—	—	.7500	.7500
D*	.1250	.1250	.1250	.1250	.2500	—	.2500	.2500	.2500
E	.060	.040	.040	.062	.060	—	.060	.047	.047
F	.500	.635	.635	.725	.985	.725 Each add'l cup adds only .200" Length	.985	1.350	1.870
H	**	19/32	11/16	29/32	1 1/32		1 5/32	1 13/16	2 13/16
K	3/8	3/8	3/8	3/8	3/8		3/8	3/8	3/8
L	5/8	3/4	3/4	3/4	3/4		3/4	3/4	3/4

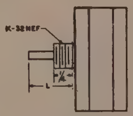
*+.0000
 —.0005
**Axial Rear Terminations

Low Torque-Low Inertia Pots are Available in 1¾" O.D.

	177 Linear	178 Sin-Cos
Torque, In.-Oz.	.1	.2
Inertia, Oz.-In.²	.025	.065


H MAXIMUM RADIUS
8-32 TAP 3 HOLES ON 1.750 DIA. BOLT CIRCLE 5/32 DEEP 120° APART (ON 3" AND 5" ONLY)
A
B
C
D
J
.048
E
L
F MAX.

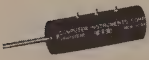
STANDARD



BUSHING MOUNT

ROTARY Multi-Turn POTENTIOMETERS

LINEAR-FUNCTIONAL


#5010

#7814

#20010

SPECIFICATIONS

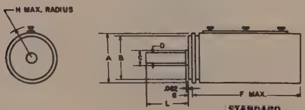
MODEL	5010	7810**	7820**	7813/7814***	20010
Mechanical Rotation	3600° +20° —0°	3700° MIN.	7200° +100° —0°	3600° +100° —0°	3600° +110° —0°
Electrical Function Angle	3600° ±10°	3600° ±10°	7200° ±10°	3600° ±5°	3600° ±5°
Resistance Range	5KΩ—500KΩ	250Ω—125KΩ		5KΩ—1.5 MegΩ	5KΩ—3 MegΩ
Best Linearity or Conformity	0.1%	.075%	.05%	0.05%	0.01%
Virtual Resolution (Typical)	1/150,000	1/200,000		1/400,000	
Wattage at 25°C	2	1		2	4
Temperature Range	−55°C to +125°C				
Taps Maximum No.*	1		2	1	
Starting Torque(In.Oz.)at25°C	0.2	1.5		0.5	1.0
Guaranteed Life (at 100 R.P.M.)	To 100 x 10⁶ Revolutions Depending on Circuitry				
Stop Strength	10 IN.-OZ. MAX.			75 IN.-OZ.	160 IN.-OZ.

*For voltage reference, specify 0° width taps. For current carrying, specify zero resistance taps.
**Available in Dual Units, same case dimensions and available up to 100 turns (360,000°).
***Model 7813 same as 7814 except for axial rear terminations.

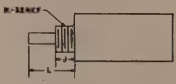
DIMENSIONS

MODEL	5010	7810	7820	7814	20010
A	.500	.875			2.000
B*	.4735	.750		.750	1.875
C	.188	.273		—	
D*	0.937	.1875		.1250	.250
E	.062				.035
F	1.531	1.953		1.875	2.625
H	.400	.600		.562	**
J	.250				312
K	.250	.375			
L	.625	.750		.500	.750

*+.0000
 —.0005
**Axial Rear Terminations



STANDARD



BUSHING MOUNT

CIC COMPUTER INSTRUMENTS CORPORATION/92 MADISON AVE., HEMPSTEAD, N.Y. 11550/516-483-8200

C I C Infinite Resolution PRECISION COMPONENTS

LINEAR MOTION POTENTIOMETERS

LINEAR-FUNCTIONAL

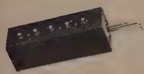
SPECIFICATIONS

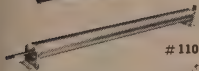
MODEL	110*	111*	112	113*	120	116**	117	118**	119*
Electrical Stroke	To 60″	To 28″	To 12″	To 4″	To 1″	To 1.2″	To 1.5″	To 1.25″	To 10″
Cross Section Configuration	○	☐	☐	○	☐	☐	☐		○
Resistance Range	250Ω/in. to 200KΩ/in.	150Ω/in to 200KΩ/in.		500Ω/in. to 250KΩ/in. 1		150Ω/in. to 125KΩ/in.	250Ω/in. to 125KΩ/in.	500Ω/in. to 250KΩ/in.	350Ω/in. to 250KΩ/in.
Best Linearity	0.2% ÷ Length of Electrical Stroke								
Virtual Resolution	1/400,000								
Wattage	1 Watt per Inch of Stroke								
Temperature Range	−55° to +125°C								
Taps Maximum No.***	4	To Suit		1		To Suit	1		
Starting Force Oz. at 25°C	16	8	4	8	4		8		
Life	30 Million Strokes, Depending on Circuitry								
Shaft Misalignment Feature	Available			Not Available		Available	Not Avail.	Available	

*Available in Dual Units, same case dimensions.
**Available in Dual Unit providing the resistance and function of both elements is the same.
***For voltage reference, specify zero width taps. For current carrying, specify zero resistance taps.
****Threaded, ball, spring-return and other shaft endings available.

DIMENSIONS

MODEL	110*	111*	112	113*	120	116**	117	118**	119*
A	—	1.00	.500	—	.312	.500	.967	.875	—
B	—	1.00	1.10	—	.500	1.100	.635	.500	—
C	2.50	—	—	.500	—	—	—	—	.750
D	.50	.250	.187	.125	.125	.1875	.1565	.1875	
X	Length of Mech. Travel +6″	Length of Mech. Travel +1.125″	Length of Mech. Travel +1.210″	Length of Mech. Travel +1.375″	2.00	Length of Mech. Travel +1.210″	3.01″	2.50″	Length of Mech. Travel +2.00″


#111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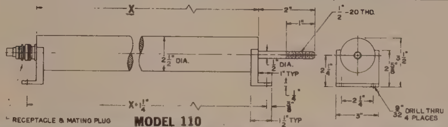
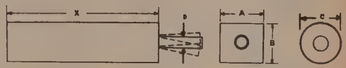
#113

#120



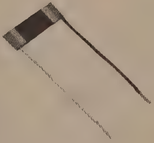
MODEL 110



Potentiometers Elements

For those applications in which space and/or cost is at a premium C.I.C. can provide custom resistive elements with wiper assemblies designed for use as position sensors in high performance strip chart and graphic recorders, DC torquers, process controllers, accelerometers, gyros, pressure transducers, electronic weighing instruments, volume controls, and studio broadcast equipment. These elements are available with track lengths to 12″ with linear and non-linear outputs including sine-cosine and log functions to accuracies of 0.001″. Low noise is assured with mirror-smooth finish. Wire leads, terminals or special mounting features are readily provided.

The following elements are typical of units recently produced. For technical details including standard element specifications and pricing information, please contact our sales engineering staff.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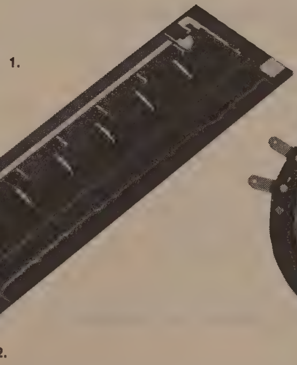
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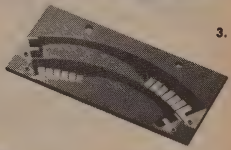
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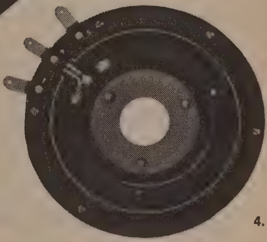

4.

1. Pointer or stylus pen feedback position with ½″ track accurate to 0.25% linearity with over 25 million cycles life.
2. 100db function generator over 5″ track for graphic recorder accurate to ±0.4db with linear retransmitting element.
3. Sine and cosine elements for quadrasonic panner used in studio recording.
4. Low torque element mounted on scale pointer shaft indicates weight to better than 0.02%.

C I C

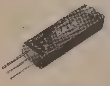
COMPUTER INSTRUMENTS CORPORATION/92 MADISON AVE., HEMPSTEAD, N.Y. 11550/516-483-8200

DEPENDABLE DALE® TRIMMERS

TRIMMER QUICK REFERENCE GUIDE

- New space-saving low profile models with cermet and wirewound elements
- Mil models including E-Rel
- Panel mount models available in most series

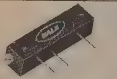
MILITARY GRADE TRIMMER POTENTIOMETERS

ILLUSTRATION	MODEL	SEAL† TYPE	CONFIGURATION	STANDARD RESISTANCE & TOLERANCE	POWER RATING	OPERATING TEMP. RANGE	ADJUSTMENT TURNS	HEIGHT	WIDTH	LENGTH
 RT-10**	691	1	• Alternate position Printed Circuit Pins 22 AWG	10 ohms to 100K ohms ±5%	1 watt at 70° C, derated to 0 at 175° C	−65° C to 175° C	15±2	.18	.32	1.00
	680	1	• Printed Circuit Pins 22 AWG							
	697*	2	• 28 AWG Stranded Teflon Leads							
	692*	2	• 26 AWG Solid Leads							
RT-11**	1287	1	• Printed Circuit Pins 21 AWG	10 ohms to 100K ohms ±5%	1 watt at 70° C, derated to 0 at 175° C	−65° C to 175° C	25±2	.28	.31	1.25
	1288*	2	• Stranded Teflon Leads 28 AWG							
	1299*	1	• Spade Type Solder Lug							
RT-12**	1680	1	• Printed Circuit Pins 21 AWG	10 ohms to 100K ohms ±5%	1 watt at 70° C, derated to 0 at 175° C	−65° C to 175° C	22±3	.19	.32	1.25
	1697*	2	• Stranded Teflon Leads 28 AWG							
	1692*	2	• 22 AWG Solid Wire							
	1690*	2	• Solder Lug							
RTR-12	1880	3	• Printed Circuit Pins, Gold Plated Nickel	10 ohms to 20K ohms ±5%	.75 watt at 85° C, derated to 0 at 150° C	−65° C to 150° C	22±3	.19	.32	1.25
	1897	3	• 28 AWG Stranded Teflon Insulated Leads							

*Indicates model is also available in Panel Mount version. **10 ohms to 20K ohms.

COMMERCIAL/INDUSTRIAL GRADE POTENTIOMETERS

WIREWOUND ELEMENT

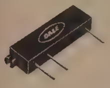
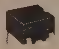
ILLUSTRATION	MODEL	SEAL† TYPE	CONFIGURATION	STANDARD RESISTANCE & TOLERANCE	POWER RATING	OPERATING TEMP. RANGE	ADJUSTMENT TURNS	HEIGHT	WIDTH	LENGTH
	2187	4	• Printed Circuit Pins 21 AWG	10 ohms to 100K ohms ±10%	1 watt at 70° C, derated to 0 at 125° C	−65° C to 125° C	25±2	.28	.31	1.25
	2188*	4	• Stranded Vinyl Leads 28 AWG							
	2199*	4	• Spade Type Solder Lug							
	2387	4	Printed Circuit Terminals	10 ohms to 50K ohms ±10%	0.5 watt at 25° C, derated to 0 at 105° C	−55° C to 105° C	15 turns nominal	.36	.28	1.00
	2317	5								
	2389	4	Hook-type Solder Lugs							
	2319	5								
	2487	4	Printed Circuit Terminals	10 ohms to 50K ohms ±10%	1 watt at 40° C, derated to 0 at 125° C	−55° C to 125° C	20 turns nominal	.31	.16	.75
	2417	5								
	721	5	Printed Circuit Terminals	10 ohms to 50K ohms ±10%	1.0 watt at 70°C, derated to 0 at 125°C	−65°C to 125°C	22±3	.25	.165	.75
	723	5								
	724	5	*Complete specifications on following pages.*							
**	727	5	Printed Circuit Terminals, machine insertable	10 ohms to 50K ohms ±10%	1 watt at 70°C, derated to 0 at 125°C	−65°C to 125°C	22±3	.19	.25	.75
	729	5	Printed Circuit Terminals, hand insertable *Complete specifications on following pages.*							

*Indicates model is also available in Panel Mount version. **Also available in transparent case model, see following pages.

DEPENDABLE DALE® TRIMMERS

COMMERCIAL/INDUSTRIAL GRADE POTENTIOMETERS

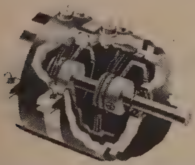
CERMET ELEMENT

ILLUSTRATION	MODEL	SEAL† TYPE	CONFIGURATION	STANDARD RESISTANCE & TOLERANCE	POWER RATING	OPERATING TEMP. RANGE	ADJUSTMENT TURNS	HEIGHT	WIDTH	LENGTH
*	781 783 784	5 5 5	} Printed Circuit Terminals *Complete specifications on following pages.*	10 ohms to 2 Megohms ±10%	1 watt at 70° C, derated to 0 at 125° C	−55° C to 125° C	22±3	.25	.165	.75
*	787 789	5 5	} Printed Circuit Terminals, machine insertable } Printed Circuit Terminals, hand insertable *Complete specifications on following pages.*	10 ohms to 2 Megohms ±10%	1 watt at 70° C, derated to 0 at 125° C	−55° C to 125° C	22±3	.19	.25	.75
	8487 8417	4 5	} Printed Circuit Terminals	10 ohms to 2 Megohms ±10% 100Ω thru 500K ±20% all other values	.75 watt at 25° C, derated to 0 at 125° C	−55° C to 125° C	20 turns nominal	.31	.16	.75
	817	6	• Printed Circuit Pins 26 AWG	10 ohms to 2 Megohms ±10% 100Ω thru 500K ±20% all other values	.3 watt at 85° C, derated to 0 at 150° C	−65° C to 150° C	10 turns nominal	.15	.10	.50
	85 85A	5 5	• Printed Circuit Terminals, machine insertable • Printed Circuit Terminals, hand insertable	10 ohms to 1 Megohm ±20%	.5 watt at 25° C, derated to 0 at 125° C	−55° C to 125° C	12 turns nominal	.19	.265	.28
	87 87A	5 5	• Printed Circuit Terminals, machine insertable • Printed Circuit Terminals, hand insertable	10 ohms to 1 Megohm ±20%	.5 watt at 25° C, derated to 0 at 125° C	−55° C to 125° C	Single turn	.19	.265	.28

*Also available in transparent case model, see following pages.

†SEAL TYPE IDENTIFICATION

1. Immersion proof per MIL-R-27208
2. Humidity proof per MIL-STD-202, Method 106
3. Sealed per MIL-R-39015
4. Humidity proof per MIL-STD-202, Method 103, Condition B
5. Immersion proof – sealed for board washing, leak tested in 70° C water
6. Immersion proof per MIL-R-22097



PRECISION POTENTIOMETERS – SINGLE TURN

• Precision machined anodized aluminum cups • Molded Diallyl Phthalate liners • Welded tap and terminal construction • Precious metal wipers and slip rings • Flush clamp bands • Gold-plated terminals • Precision sleeve or ball bearings • Centerless ground stainless steel shafts • Single or ganged units.

SPECIFICATIONS:
- Meet requirements of MIL-R-12934 and NAS-710
- Eight physical sizes, 3/4″ to 3″ diameter
- Electrical angles and functions to specification
- Special mechanical configurations available

ORDERING INFORMATION

WHERE TO ORDER:
From your Authorized Dale Distributor, your Dale Representative, or Dale Electronics, Inc., Box 609, Columbus, Nebraska 68601 – PHONE 564-3131 AREA CODE 402 TWX 910-626-8314

TERMS: 1% 10 – Net 30 **F.O.B. POINT:** Columbus, Nebraska

SPECIAL CHARGES:

Minimum Order Charge	$35.00
Minimum Item Charge	$15.00

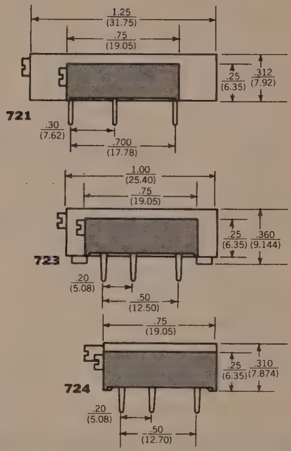
DALE ELECTRONICS, INC.
P. O. Box 609, Columbus, Nebraska 68601
A subsidiary of The Lionel Corporation

DEPENDABLE DALE® TRIMMERS

LOW COST - HIGH PERFORMANCE
LOW PROFILE - WIREWOUND

FEATURES

- All-metal screw and one-piece clutch prevents overtravel damage
- Patented side collector provides excellent setting stability
- A full watt in less space at 70° C
- Three terminal spacings identical to larger models.
- Sealed for production soldering
- 25-turn screwdriver adjustment for better adjustability
- All-welded internal construction


1.25
(31.75)
.75
(19.05)
.25
(6.35)
.312
(7.92)
721
.30
(7.62)
.700
(17.78)
1.00
(25.40)
.75
(19.05)
.25
(6.35)
.360
(9.144)
723
.20
(5.08)
.50
(12.50)
.75
(19.05)
.25
(6.35)
.310
(7.874)
724
.20
(5.08)
.50
(12.70)

STANDARD RESISTANCE VALUES AND NOMINAL RESOLUTION

Standard tolerance ±10%, lower tolerance available.

Resistance (Ohms)	Resolution (%)	Resistance (Ohms)	Resolution (%)
10	1.45	1K	.47
20	1.12	2K	.42
50	.89	5K	.30
100	.81	10K	.25
200	.70	20K	.21
500	.68	50K	.18

PRINTED CIRCUIT PINS

Model	Location
721	.300 x .700 x .100
723	.200 x .500 x .200
724	.200 x .500 x .100

When ordering, specify model, resistance and tolerance.

DEPENDABLE DALE® TRIMMERS

SPECIFICATIONS

ELECTRICAL

Resistance Range: 10 ohms to 50K ohms

Standard Resistance Tolerance: ±10%

Absolute Minimum Resistance: 0.5% or 1.0 ohm, whichever is greater

Mechanical Life: 200 cycles
Max. Res. Change: ±2%

ENR Noise: 100 ohms maximum

Insulation Resistance, 500 VDC: 100 Megohms minimum

Temperature Coefficient: ±50 PPM/° C maximum

Electrical Adjustment: 22 ± 3 turns

MECHANICAL

Shaft Torque: 5.0 oz./in. maximum

Mechanical Adjustment: 25 ± 3 turns

Mechanical Stops: None. Clutch mechanism permits overtravel without damage

Weight: 2.0 grams maximum

Markings: Dale Part No., Terminal Resistance Value and Date Code

ENVIRONMENTAL

Power Rating: 1.0 watt at +70°C, derated to 0 at +125°C

Operating Temperature Range: −65°C to +125°C

Immersion Proof: Sealed for board washing.
Leak tested at +70°C

Shock: Per MIL-STD-202, Method 202, 50G
Contact Bounce: 0.1 millisecond maximum
Max. Wiper Shift: 1% plus resolution

Vibration: Per MIL-STD-202, Method 201, 20G
Contact Bounce: 0.1 millisecond max.
Max. Wiper Shift: 1% plus resolution

Dielectric Strength: Per MIL-STD-202, Method 301
Room Condition: 1000 VRMS
At 70,000 feet: 250 VRMS

Thermal Shock: 5 cycles −65°C to +125°C
Resistance Shift: ±2% maximum
Max. Wiper Shift: ±1%

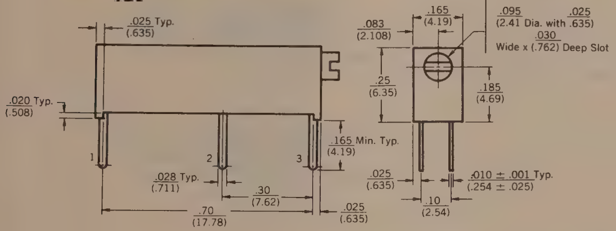
High Temperature Exposure: 250 hours at +125°C
Resistance Shift: ±2% maximum
Max. Wiper Shift: ±1%

Load Life: 1000 hours, 1 watt at +70°C
Maximum Shift: ±2%

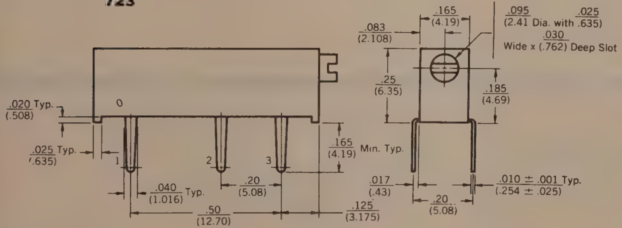
DIMENSIONS AND TERMINAL CONFIGURATIONS

Dimensions in inches
(Dimensions in millimeters)

721


.025 Typ. (.635)
.020 Typ. (.508)
1
2
3
.165 Min. Typ. (4.19)
.028 Typ. (.711)
.30 (7.62)
.70 (17.78)
.025 (.635)
.083 (2.108)
.165 (4.19)
.095 (2.41 Dia. with .025 .635)
.030 Wide x (.762) Deep Slot
.25 (6.35)
.185 (4.69)
.025 (.635)
.010 ± .001 Typ. (.254 ± .025)
.10 (2.54)

723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.025 Typ. (.635)
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2
3
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.040 (1.016) Typ.
.20 (5.08)
.50 (12.70)
.125 (3.175)
.083 (2.108)
.165 (4.19)
.095 (2.41 Dia. with .025 .635)
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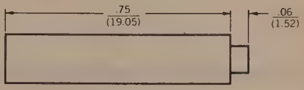
.010 ± .001 Typ. (.254 ± .025)
.20 (5.08)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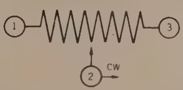
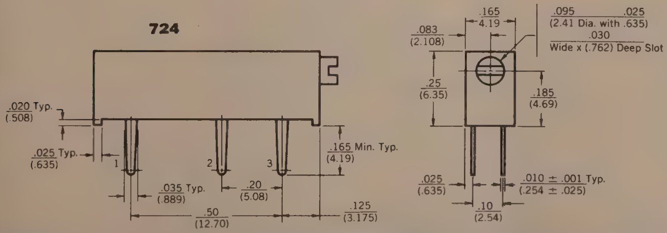
.06 (1.52)

SCHEMATIC



724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.025 Typ. (.635)
1
2
3
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.50 (12.70)
.125 (3.175)
.083 (2.108)
.165 4.19
.095 (2.41 Dia. with .025 .635)
.030 Wide x (.762) Deep Slot
.25 (6.35)
.185 (4.69)
.025 (.635)
.010 ± .001 Typ. (.254 ± .025)
.10 (2.54)

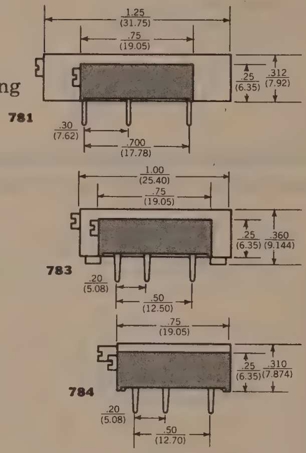
TOLERANCE INCHES .XXX ± .005
.XX ± .010
(TOLERANCE MM) .XXX ± .127
.XX ± .254

DEPENDABLE DALE® TRIMMERS

LOW COST - HIGH PERFORMANCE
LOW PROFILE - CERMET

FEATURES

- All-metal screw and one-piece clutch prevents overtravel damage
- Patented side collector provides excellent setting stability by allowing use of larger element
- A full watt in less space at 70° C
- Three terminal spacings identical to larger models.
- Sealed for production soldering
- 25-turn screwdriver adjustment for better adjustability
- 1% contact resistance variation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.75 (19.05)
.25 (6.35)
.312 (7.92)
781
.30 (7.62)
.700 (17.78)
1.00 (25.40)
.75 (19.05)
.25 (6.35)
.360 (9.144)
783
.20 (5.08)
.50 (12.50)
.75 (19.05)
.25 (6.35)
.310 (7.874)
784
.20 (5.08)
.50 (12.70)

STANDARD RESISTANCE VALUES

Ohms	Ohms
10	20K
20	25K
50	50K
100	100K
200	200K
500	250K
1K	500K
2K	1 Meg.
5K	2 Meg.
10K	

PRINTED CIRCUIT PINS

Model	Location
781	.300 x .700 x .100
783	.200 x .500 x .200
784	.200 x .500 x .100

When ordering, specify model, resistance and tolerance.

DEPENDABLE DALE® TRIMMERS

SPECIFICATIONS

ELECTRICAL

Resistance Range: 10 ohms to 2 Megohms

Standard Resistance Tolerance: ±10%

Absolute Minimum Resistance: 2 ohms max.

Temperature Coefficient: ±100 PPM/° C

Mechanical Life: 200 cycles without discontinuity

Contact Resistance Variation: 1 ohm or 1%, whichever is greater.

Insulation Resistance, 500 VDC: 100 Megohms minimum

Resolution: Essentially infinite

Adjustability: Output Resistance = ±0.10%
Output Voltage Ratio = ±0.05%

Input Voltage: 400 VDC (RMS) or within power rating, whichever is less

Electrical Adjustment: 22 ± 3 turns

MECHANICAL

Shaft Torque: 5.0 oz./in. maximum

Mechanical Adjustment: 25 ± 3 turns

Mechanical Stops: None. Clutch mechanism permits overtravel without damage

Weight: 2.0 grams maximum

Marking: Dale Part Number, Terminal Numbers, Resistance Value and Date Code

ENVIRONMENTAL

Power Rating: 1.25 watt at +25°C
1.00 watt at +70°C
.25 watt at +125°C

Operating Temperature Range: −55°C to +125°C

Immersion Proof: Sealed for board washing.
Leak tested at +70°C

Shock: Per MIL-STD-202, Method 202, 50G
Contact Bounce: 0.1 millisecond maximum
Max. Wiper Shift: 1% plus resolution

Vibration: Per MIL-STD-202, Method 201, 20G
Contact Bounce: 0.1 millisecond max.
Max. Wiper Shift: 1% plus resolution

Dielectric Strength: Per MIL-STD-202, Method 301
Room Condition: 1000 VRMS
At 70,000 feet: 250 VRMS

Thermal Shock: 5 cycles −65°C to +125°C
Resistance Shift: ±2% maximum
Max. Wiper Shift: ±1%

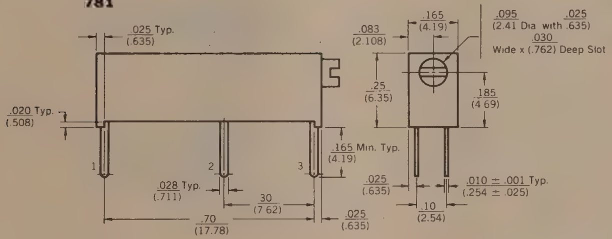
High Temperature Exposure: 250 hours at +125°C
Resistance Shift: ±2% maximum
Max. Wiper Shift: ±1%

Load Life: 1000 hours, 1 watt at +70°C
Maximum Shift: ±2%

DIMENSIONAL AND TERMINAL CONFIGURATIONS

Dimensions in inches
(Dimensions in millimeters)

781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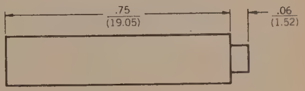
(.635)
.020 Typ.
(.508)
1
2
3
.028 Typ.
(.711)
.30
(7.62)
.70
(17.78)
.025
(.635)
.165 Min. Typ.
(4.19)
.083
(2.108)
.165
(4.19)
.095 .025
(2.41 Dia with .635)
.030
Wide x (.762) Deep Slot
.25
(6.35)
.185
(4.69)
.025
(.635)
.010 ± .001 Typ.
(.254 ± .025)
.10
(2.54)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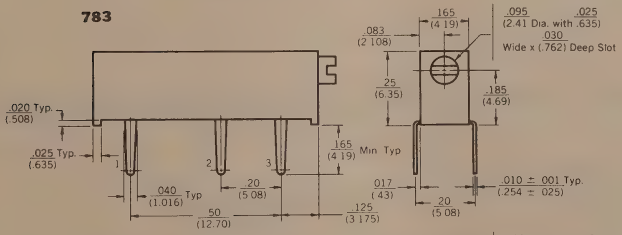
(19.05)
.06
(1.52)

783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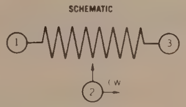
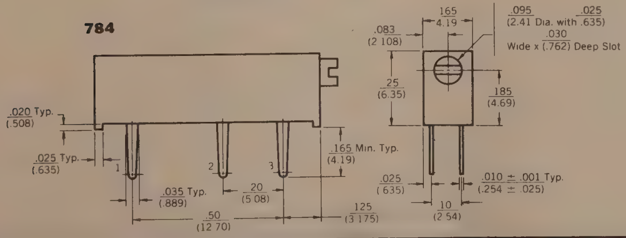
.025 Typ.
(.635)
1
2
3
.040 Typ
(1.016)
.20
(5.08)
.50
(12.70)
.165
(4.19) Min Typ
.083
(2.108)
.165
(4.19)
.095 .025
(2.41 Dia. with .635)
.030
Wide x (.762) Deep Slot
.25
(6.35)
.185
(4.69)
.017
(.43)
.125
(3.175)
.20
(5.08)
.010 ± .001 Typ.
(.254 ± .025)


SCHEMATIC
1
3
2
CW

TOLERANCE INCHES .XXX ± .005
.XX ± .010
(TOLERANCE MM) .XXX ± .127
.XX ± .254

784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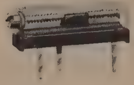
(.508)
.025 Typ.
(.635)
1
2
3
.035 Typ.
(.889)
.20
(5.08)
.50
(12.70)
.165 Min. Typ.
(4.19)
.083
(2.108)
.165
(4.19)
.095 .025
(2.41 Dia. with .635)
.030
Wide x (.762) Deep Slot
.25
(6.35)
.185
(4.69)
.025
(.635)
.125
(3.175)
.10
(2.54)
.010 ± .001 Typ.
(.254 ± .025)

DEPENDABLE DALE® TRIMMERS

LOW COST - HIGH PERFORMANCE
LOW PROFILE - CERMET

981

983

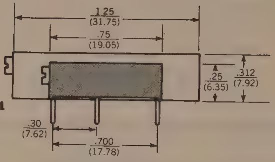


984

NEW TRANSPARENT CASE MODELS

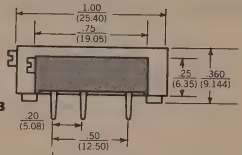
FEATURES

- Transparent cover for determining wiper location
- All-metal screw and one-piece clutch prevents overtravel damage
- Patented side collector provides excellent setting stability by allowing use of larger element
- A full watt in less space at 70° C
- Three terminal spacings identical to larger models.
- Sealed for production soldering
- 25-turn screwdriver adjustment for better adjustability
- 1% contact resistance variation



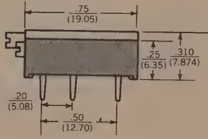
981

1.25
(31.75)
.75
(19.05)
.25
(6.35)
.312
(7.92)
.30
(7.62)
.700
(17.78)



983

1.00
(25.40)
.75
(19.05)
.25
(6.35)
.360
(9.144)
.20
(5.08)
.50
(12.50)



984

.75
(19.05)
.25
(6.35)
.310
(7.874)
.20
(5.08)
.50
(12.70)

STANDARD RESISTANCE VALUES

Ohms	Ohms
10	20K
20	25K
50	50K
100	100K
200	200K
500	250K
1K	500K
2K	1 Meg.
5K	2 Meg.
10K	

PRINTED CIRCUIT PINS

Model	Location
981	.300 x .700 x .100
983	.200 x .500 x .200
984	.200 x .500 x .100

When ordering, specify model, resistance and tolerance.

DEPENDABLE DALE® TRIMMERS

SPECIFICATIONS

ELECTRICAL

Resistance Range: 10 ohms to 2 Megohms

Standard Resistance Tolerance: ±10%

Absolute Minimum Resistance: 2 ohms max.

Temperature Coefficient: ±100 PPM/° C

Mechanical Life: 200 cycles without discontinuity

Contact Resistance Variation: 1 ohm or 1%, whichever is greater.

Insulation Resistance, 500 VDC: 100 Megohms minimum

Resolution: Essentially infinite

Adjustability: Output Resistance = ±0.10%
Output Voltage Ratio = ±0.05%

Input Voltage: 400 VDC (RMS) or within power rating, whichever is less

Electrical Adjustment: 22 ± 3 turns

MECHANICAL

Shaft Torque: 5.0 oz./in. maximum

Mechanical Adjustment: 25 ± 3 turns

Mechanical Stops: None. Clutch mechanism permits overtravel without damage

Weight: 2.0 grams maximum

Marking: Dale Part Number, Terminal Numbers, Resistance Value and Date Code

Solvent Resistance: Consult representative if using solvents other than Freon PC, Freon TF, Isopropyl Alcohol, Methyl or Ethyl Alcohol for cleaning.

ENVIRONMENTAL

Power Rating: 1.25 watt at +25°C
1.00 watt at +70°C
.25 watt at +125°C

Operating Temperature Range: −55°C to +125°C

Immersion Proof: Sealed for board washing.
Leak tested at +70°C

Shock: Per MIL-STD-202, Method 202, 50G
Contact Bounce: 0.1 millisecond maximum
Max. Wiper Shift: 1% plus resolution

Vibration: Per MIL-STD-202, Method 201, 20G
Contact Bounce: 0.1 millisecond max.
Max. Wiper Shift: 1% plus resolution

Dielectric Strength: Per MIL-STD-202, Method 301
Room Condition: 1000 VRMS
At 70,000 feet: 250 VRMS

Thermal Shock: 5 cycles −65°C to +125°C
Resistance Shift: ±2% maximum
Max. Wiper Shift: ±1%

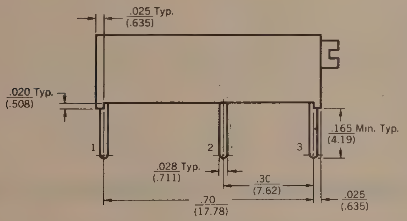
High Temperature Exposure: 250 hours at +125°C
Resistance Shift: ±2% maximum
Max. Wiper Shift: ±1%

Load Life: 1000 hours, 1 watt at +70°C
Maximum Shift: ±2%

DIMENSIONS AND TERMINAL CONFIGURATIONS

Dimensions in inches
(Dimensions in millimeters)

981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.020 Typ. (.508)
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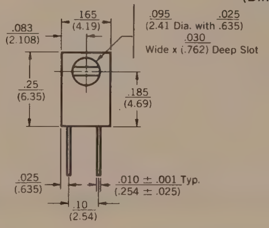
1
2
3
.028 Typ. (.711)
.30 (7.62)
.70 (17.78)
.025 (.635)


.083 (2.108)
.165 (4.19)
.095 (2.41 Dia. with .635)
.025
.030
Wide x (.762) Deep Slot
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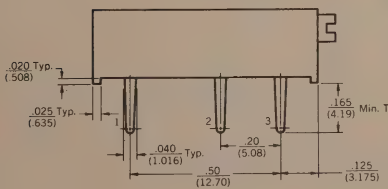
.185 (4.69)
.025 (.635)
.010 ± .001 Typ. (.254 ± .025)
.10 (2.54)

983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.025 Typ. (.635)
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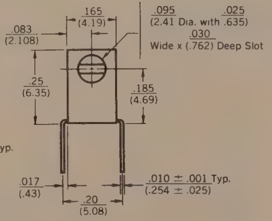
1
2
3
.040 (1.016) Typ.
.20 (5.08)
.50 (12.70)
.125 (3.175)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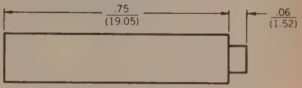
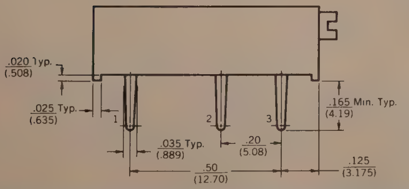
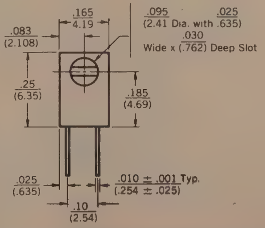
.165 (4.19)
.095 (2.41 Dia. with .635)
.025
.030
Wide x (.762) Deep Slot
.25 (6.35)
.185 (4.69)
.017 (.43)
.010 ± .001 Typ. (.254 ± .025)
.20 (5.08)

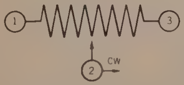

.75 (19.05)
.06 (1.52)

984


.020 Typ. (.508)
.025 Typ. (.635)
.165 Min. Typ. (4.19)
1
2
3
.035 Typ. (.889)
.20 (5.08)
.50 (12.70)
.125 (3.175)


.083 (2.108)
.165 4.19
.095 (2.41 Dia. with .635)
.025
.030
Wide x (.762) Deep Slot
.25 (6.35)
.185 (4.69)
.025 (.635)
.010 ± .001 Typ. (.254 ± .025)
.10 (2.54)

SCHEMATIC

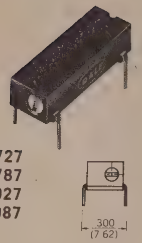


TOLERANCE INCHES .XXX ± .005
.XX ± .010
(TOLERANCE MM) .XXX ± .127
.XX ± .254

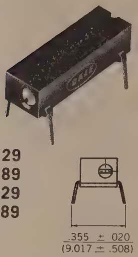
DEPENDABLE DALE® TRIMMERS

DUAL-IN-LINE - WIREWOUND & CERMET MACHINE OR HAND INSERTABLE

(Includes Transparent Case Models)



727
787
927
987



729
789
929
989

MODELS	BLACK CASE	TRANSPARENT CASE
WIREWOUND	727 729	927 929
CERMET	787 789	987 989

FEATURES

- All-metal screw and one-piece clutch prevents overtravel damage
- Patented side collector provides excellent setting stability
- Dissipates 1 watt at 70° C
- Sealed for production soldering
- All-welded internal construction
- 25-turn screwdriver adjustment for better adjustability

STANDARD RESISTANCE VALUES AND NOMINAL RESOLUTION

Standard tolerance ±10%, lower tolerance available.

WIREWOUND MODELS

Resistance (Ohms)	Resolution %
10	1.45
20	1.12
50	.89
100	.81
200	.70
500	.68
1K	.47
2K	.42
5K	.30
10K	.25
20K	.21
50K	.18

CERMET MODELS

Ohms	Ohms
10	20K
20	25K
50	50K
100	100K
200	200K
500	250K
1K	500K
2K	1 Meg.
5K	2 Meg.
10K	

PRINTED CIRCUIT PINS

Model	Location
729 789 929 989	.355 x .600 Free Position .300 x .600 Inserted
727 787 927 987	.300 x .600 Free Position

When ordering, specify model, resistance and tolerance.

DEPENDABLE DALE® TRIMMERS

SPECIFICATIONS

ELECTRICAL

Resistance Range: Wirewound = 10 ohms to 50K ohms. Cermet = 10 ohms to 2 Megohms

Standard Resistance Tolerance: ±10%

Absolute Minimum Resistance: Wirewound = 0.5% or 1.0 ohm, whichever is greater; Cermet = 2 ohms maximum

Mechanical Life: 200 cycles

ENR Noise: Wirewound = 100 ohms maximum

Contact Resistance Variation: Cermet = standard 1 ohm or 1%, whichever is greater.

Insulation Resistance, 500 VDC: 100 Megohms minimum

Temperature Coefficient: Wirewound = ±50 PPM/°C maximum. Cermet = ±100 PPM/°C standard

Adjustability: Cermet Output Resistance = ±0.10%
Voltage Ratio = ±0.05%
Wirewound – (See Resolution Table)

Input Voltage: Cermet = 400 VDC (RMS) or within power rating, whichever is less

Electrical Adjustment: 22 ± 3 turns

MECHANICAL

Shaft Torque: 5.0 oz./in. maximum

Mechanical Adjustment: 25 ± 3 turns

Mechanical Stops: None. Clutch mechanism permits overtravel without damage

Weight: 2.0 grams maximum

Marking: Dale Part No., Terminal Numbers, Resistance Value and Date Code

Solvent Resistance: Consult representative if using solvents other than Freon PC, Freon TF, Isopropyl Alcohol, Methyl or Ethyl Alcohol for cleaning transparent cases.

ENVIRONMENTAL

Power Rating: 1.0 watt at 70°C, derated to 0 at 125°C

Operating Temperature Range: Wirewound = –65°C to +150°C. Cermet = –55°C to +125°C

Immersion Proof: Sealed for board washing. Leak tested in 70°C water

Shock: Per MIL-STD-202, Method 201, 50G
Contact Bounce: 0.1 millisecond max.
Wirewound Max. Wiper Shift: 1% plus resolution

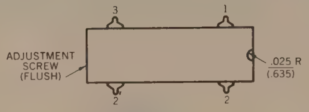
Vibration: Per MIL-STD-202, Method 201, 20G
Contact Bounce: 0.1 millisecond max.
Wirewound Max. Wiper Shift: 1% plus resolution

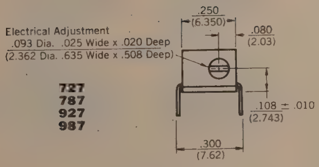
Dielectric Strength: Per MIL-STD-202, Method 301
Room Condition: 1000 VRMS
At 70,000 feet: 250 VRMS

Load Life: 1000 hours, 1 watt at 70°C
Maximum Shift: ±2%

DIMENSIONS AND TERMINAL CONFIGURATIONS

Dimensions in inches
(Dimensions in millimeters)


3
1
ADJUSTMENT SCREW (FLUSH)
.025 R
(.635)
2
2


Electrical Adjustment
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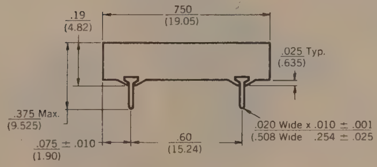
(2.362 Dia. .635 Wide x .508 Deep)
.250
(6.350)
.080
(2.03)
.108 ± .010
(2.743)
.300
(7.62)

727
787
927
987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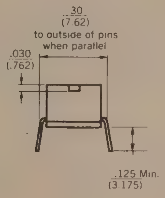
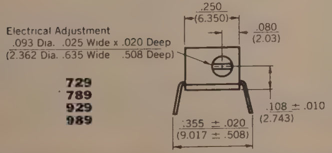
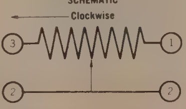
(4.82)
750
(19.05)
.025 Typ.
(.635)
.375 Max.
(9.525)
.075 ± .010
(1.90)
.60
(15.24)
.020 Wide x .010 ± .001
(.508 Wide .254 ± .025


30
(7.62)
to outside of pins when parallel
.030
(.762)
.125 Min.
(3.175)


Electrical Adjustment
.093 Dia. .025 Wide x .020 Deep
(2.362 Dia. .635 Wide .508 Deep)
.250
(6.350)
.080
(2.03)
.108 ± .010
(2.743)
.355 ± .020
(9.017 ± .508)

729
789
929
989

SCHEMATIC


Clockwise
3
1
2
2

TOLERANCE INCHES .XXX ± .005
XX ± .010
(TOLERANCE MM) .XXX ± .127
.XX ± .254

3200 ⅞″ dia.(3)

3500 1 1/16″ dia.

3700 2″ dia.

3230 ⅞″ dia.

3250 ⅞″ dia.

3600 1¾″ dia.

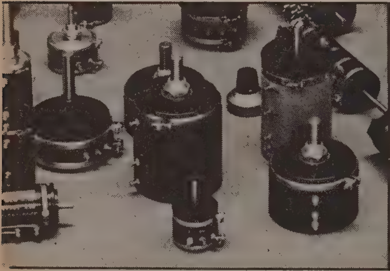
DUNCAN precision wirewound multi-turn potentiometers

	MILITARY			COMMERCIAL		
ELECTRICAL	3200	3500	3700	3230	3250	3600
Electrical Travel	3600° +4° /-0°	3600° +1° /-0°	3600° +1° /-0°	3600° +10° /-0°	3600° +10° /-0°	3600° +4° /-0°
Normal Resistance Range (Ohms)	100-100K	100-200K	100-300K	100-100K	100-100K	100-300K
Resistance Tolerance: Std.	±3%	±3%	3±%	±3%	±5%	±3%
Power Rating (Watts)	2.5	5	7	2.5	2	7
Linearity: Std.	±0.25%	±0.15%	±0.1%	±0.25%	±.25%	±0.25%
Noise, ENR Max. (Ohms)	100	100	100	100	100	100
Insulation Resistance (Meg. Ohms)	1,000	1,000	1,000	1,000	1,000	1,000
Tempco of Pot, Maximum	.007%/°C	.007%/°C	.007%/°C	.007%/°C	.007%/°C	.007%/°C
MECHANICAL						
Mechanical Travel Turns	10(1)	10(1)	10(2)	10	10	10(2)
Mechanical Life, Revolutions	2,000,000	2,000,000	2,000,000	2,000,000	500,000	2,000,000
Ganged Cups, Maximum	2	2	2	N/A	N/A	2
Taps, Maximum Number	46	110	135	46	N/A	135
Weight (oz): Single Cup	1.3	4.0	4.5	1.3	0.5	3.7
Torque: Start/Run Bushing	0.5/0.5	N/A	1.5/1.2	0.6/0.5	1.0/1.0	1.5/1.2
(oz-in) Start/Run Servo	0.5/0.4	1.0/0.8	1.2/0.8	N/A	N/A	N/A
ENVIRONMENTAL						
Temperature Range (°C), Std.	-65 to +125	-65 to +125	-65 to +125	-55 to + 105	-25 to + 85	-55 to + 105
Meets MIL-R-12934 For: Shock	Yes	Yes	Yes	N/A (4)	N/A	N/A (4)
Humidity	Yes	Yes	Yes	N/A (4)	N/A	N/A (4)
Vibration	Yes	Yes	Yes	N/A (4)	N/A	N/A (4)

(1) Also available in 3- & 5-turn rotation.
(2) Also available in 3-turn rotation.
(3) Also available in ¾″ diameter.

(4) Environmental specs for commercial pots: enclosed construction, 10G at 2,000 cycles vibration, 50G shock.

N/A means not applicable.



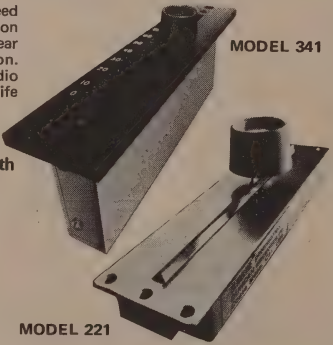
DUNCAN ELECTRONICS
SUBSIDIARY

SYSTRON DONNER

PRECISION POTENTIOMETERS

SLIDELINE® CONTROLS

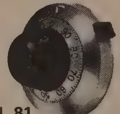
APPLICATIONS: Motor speed and lighting controls; position indicating or control of linear movement; audio signal attenuation. Available in linear and audio functions. Element is same long-life RESOLON conductive plastic as used in military precision pots.

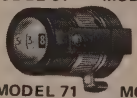


Model	Stroke	Overall Length
221	2.75″	4.25″
321	2.60″	4.30″
341	4.60″	6.30″
345	4.10″	6.30″

Miniature Turns-Counting
DIALS

MODEL 61


MODEL 81


MODEL 71

MODEL 76

Precision designed dials enable accurate positioning of multi-turn devices. Despite compact size, all dials afford optimum readability from any angle and feature positive-action locks. They require minimum in panel drilling and mounting hardware. Write for complete specs on all models.

DUNCAN ELECTRONICS 2865 FAIRVIEW ROAD ☐ COSTA MESA, CALIFORNIA 92626 ☐ PHONE: (714) 545-8261 ☐ TWX 910-595-1128

1200 ⅞" dia.

1300 1¹⁄₁₆" dia.

1500 1⁷⁄₁₆" dia.

1600 1¾" dia.

1700 2" dia.

1800 3" dia.

1230 ⅞" dia.

1630 1¾" dia.

DUNCAN precision wirewound single-turn potentiometers

MILITARY						COMMERCIAL	
1200	1300	1500	1600	1700	1800	1230	1630
354° ±2°	354° ±2°	354° ±2°	354° ±1°	356° ±1°	358° ±1°	354° ±2°	354° ±2°
100-20K	100-30K	100-50K	100-50K	100-60K	100-100K	100-20K	100-50K
+5%	±5%	±3%	±3%	±3%	±3%	±5%	±5%
1.25	2	3	4	.5	7	1.25	4
±0.5%	±0.5%	±0.5%	±0.5%	±0.5%	±0.5%	±0.5%	±0.5%
100	100	100	100	100	100	100	100
1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000
.007%/°C	.007%/°C	.007%/°C	.007%/°C	.007%/°C	.007%/°C	.007%/°C	.007%/°C
1	1	1	1	1	1	1	1
2,000,000	2,000,000	2,000,000	2,000,000	2,000,000	2,000,000	2,000,000	2,000,000
6	6	8	8	8	8	6	6
9	9	19	24	26	41	9	24
0.6	0.8	2.2	2.8	3.3	6.5	0.6	3.0
0.2/0.2	0.2/0.2	1.3/0.9	1.4/1.0	1.5/1.1	1.7/1.3	0.3/0.3	2.0/1.5
0.1/0.1	0.15/0.15	0.6/0.4	0.7/0.5	0.8/0.6	1.0/0.8	N/A	N/A
—65 to + 125	—65 to + 125	—65 to + 125	—65 to + 125	—65 to + 125	—65 to + 125	—55 to + 105	—55 to + 105
Yes	Yes	Yes	Yes	Yes	Yes	N/A (4)	N/A (4)
Yes	Yes	Yes	Yes	Yes	Yes	N/A (4)	N/A (4)
Yes	Yes	Yes	Yes	Yes	Yes	N/A (4)	N/A (4)

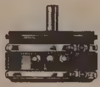
Note: Lockwasher & Hex Nut supplied with all Bushing Models.

1220 ⅞" dia.

1320 1¹⁄₁₆" dia.

1520 1⁷⁄₁₆" dia.

1620 1¾" dia.


1720 2" dia.

1820 3" dia.

RESOLON® conductive plastic single-turn potentiometers

MILITARY

ELECTRICAL	1220	1320	1520	1620	1720	1820
Theoretical Electrical Travel (1)	320°	320°	340°	340°	350°	350°
Normal Resistance Range (Ohms)	1K-20K	1K-30K	1K-50K	1K-75K	1K-100K	1K-125K
Extended Resistance Range (Ohms)	500-75K	500-100K	500-125K	750-135K	750-150K	1K-250K
Resistance Tolerance: Standard	10%	10%	10%	10%	10%	10%
Best Practical	2%	2%	2%	2%	2%	2%
Power Rating (Watts) (2)	0.5	0.75	1.0	1.5	2.0	3.0
Linearity: Standard	±0.5%	±0.5%	±0.5%	±0.5%	±0.5%	±0.5%
Best Practical	±0.2%	±0.15%	±0.10%	±.075%	±.05%	±.04%
Output Smoothness	0.1% of Total Applied Voltage					
Insulation Resistance (Meg Ohms)	1,000	1,000	1,000	1,000	1,000	1,000
Dielectric, Volts RMS	1,000	1,000	1,000	1,000	1,000	1,000
Voltage Across Terminals, Max., DC	400	400	400	400	400	400
Tempco of Pot, Maximum	—.03%/°C	—.03%/°C	—.03%/°C	—.03%/°C	—.03%/°C	—.03%/°C
MECHANICAL						
Mechanical Travel	360° Continuous					
Mechanical Life, Revolutions	20,000,000	20,000,000	20,000,000	20,000,000	20,000,000	20,000,000
Ganged Cups, Maximum	6	6	8	8	8	8
Taps, Maximum Number	9	9	19	24	26	41
Moment of Inertia (gm-cm2)	0.2	0.2	4.0	4.5	5.0	8.5
Weight (oz): Single Cup	0.6	0.8	2.2	2.8	3.3	6.5
Each Additional Cup	0.2	0.5	0.7	0.7	1.0	1.4
Stop Strength (oz-in)	N/A	N/A	N/A	N/A	N/A	N/A
Torque (oz-in): Starting, Servo	0.1	0.15	0.6	0.7	0.8	1.0
Running, Servo	0.1	0.15	0.4	0.5	0.6	0.8
ENVIRONMENTAL						
Temperature Range (°C) Standard	—65 to + 125	—65 to + 125	—65 to + 125	—65 to + 125	—65 to + 125	—65 to + 125
Meets MIL-R-39023 for: Humidity	Yes	Yes	Yes	Yes	Yes	Yes
Vibration	Yes	Yes	Yes	Yes	Yes	Yes
Shock	Yes	Yes	Yes	Yes	Yes	Yes

(1) Greater angles available.
(2) Rated at 60°C. Derated linearly to zero at 125°C.

COMPANY HISTORY

Post Office Box 890
1320 Flaxmill Road
Huntington, Indiana 46750
Telephone (219) 356-4300
TWX 810-333-1530

E-SYSTEMS INC.
Memcor Division
MANUFACTURERS OF
MEMCOR
ELECTRONIC COMPONENTS

OUR HISTORY — AND WE ARE PROUD OF IT . . .

SINCE 1945

TRU-OHM®

. . . a quality line of resistive products

SINCE 1963

TRU-OHM®

HARDWICK HINDLE

. . . a quality line of resistive products

SINCE 1965

MEMCOR INC.

. . . a quality line of resistive products

SINCE 1967

MEMCOR

. . . a quality line of resistive products

TODAY

E-SYSTEMS INC.
Memcor Division
MANUFACTURERS OF
MEMCOR
ELECTRONIC COMPONENTS

. . . a quality line of resistive products

E-SYSTEMS INC.
Memcor Division
MANUFACTURERS OF
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WIREWOUND RHEOSTATS

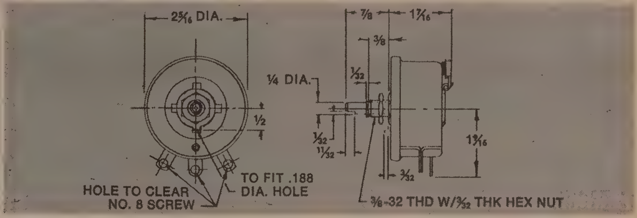
Post Office Box 890
1320 Flaxmill Road
Huntington, Indiana 46750
Telephone (219) 356-4300
TWX 810-333-1530

E-SYSTEMS INC.
Memcor Division
MANUFACTURERS OF
MEMCOR
ELECTRONIC COMPONENTS

50 WATTS/STD. RESISTANCE 1-10,000 OHMS

WT. 0.32 LBS.

Ohms	Max. Amps	Steps (Approx.)
1	7.070	44
2	5.000	44
4	3.530	44
6	2.880	74
8	2.500	82
12	2.040	85
16	1.760	89
22	1.500	98
35	1.190	126
50	1.000	111
80	.790	143
125	.630	177
150	.575	175
225	.470	203
300	.408	215
500	.316	286
800	.250	286
1000	.224	360
1600	.176	368
2500	.141	463
3500	.119	510
5000	.100	442
8000	.079	560
10000	.070	567



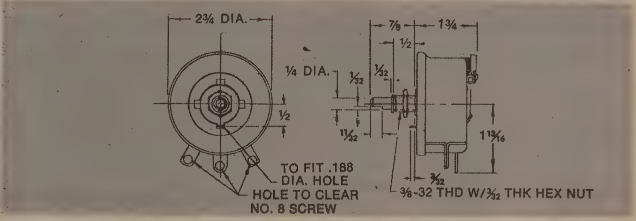
FEATURES:
- Vitreous enamel bonds core and base together for uniform heat dissipation and structural integrity.
- Wiper tracks are buffed and polished to assure smooth rotation and uniform wiper contact.
- High strength ceramic hub is used to insulate the shaft and bushing from live parts.
- Wiper design assures minimum backlash.
- The cores on larger rheostats are enameled prior to winding to increase core strength and impove bond between wire and core.
- Rheostats are provided with three terminals to allow use as potentiometers.
- UL approved.
- All wattage sizes are available to MIL-R-22.
- Welded terminals and termination guarantees positive electrical connections.
- Available with quick connect terminals.

SPECIFICATIONS:
- Resistance Tolerance ±10% . . . Closer Tolerances Available.
- Running Torque - .25 To 2 Inch Pound.
- Rotation 300° ±5%.
- Standard Resistance 1 - 10,000 Ohm.
- Mounting For Panels Up To ¼″.

75 WATTS/STD. RESISTANCE 1-10,000 OHMS

WT. 0.52 LBS.

Ohms	Max. Amps	Steps (Approx.)
1	8.660	27
2	6.120	28
5	3.880	54
7.5	3.160	51
16	2.170	131
25	1.730	113
50	1.230	143
75	1.000	134
100	.866	180
200	.612	186
300	.500	217
400	.433	230
500	.388	291
750	.316	345
1000	.274	351
1500	.224	434
2000	.194	450
2500	.173	448
5000	.123	590
7500	.100	544
10000	.087	568



FEATURES:
- Vitreous enamel bonds core and base together for uniform heat dissipation and structural integrity.
- Wiper tracks are buffed and polished to assure smooth rotation and uniform wiper contact.
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- Rheostats are provided with three terminals to allow use as potentiometers.
- UL approved.
- All wattage sizes are available to MIL-R-22.
- Welded terminals and termination guarantees positive electrical connections.
- Available with quick connect terminals.

SPECIFICATIONS:
- Resistance Tolerance ±10% . . . Closer Tolerances Available.
- Running Torque - .5 To 2 Inch Pound.
- Rotation 300° ±5%.
- Standard Resistance 1 - 10,000 Ohm.
- Mounting For Panels Up To ¼″.

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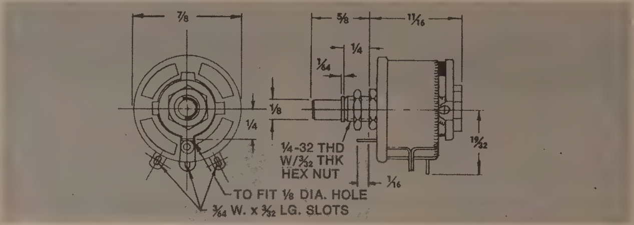
TWX 810-333-1530

WIREWOUND RHEOSTATS

12½ WATT/STD. RESISTANCE 1-5000 OHMS

WT. 0.6 OZ.

Ohms	Max. Amps	Steps (Approx.)
1	3.53	28
2	2.50	29
3	2.04	38
6	1.44	35
10	1.12	50
15	.91	70
25	.71	72
35	.60	82
50	.50	92
75	.41	105
100	.35	102
125	.32	110
175	.27	155
250	.22	170
350	.19	190
500	.16	210
750	.13	200
1000	.11	260
1500	.091	209
2500	.071	323
5000	.050	340



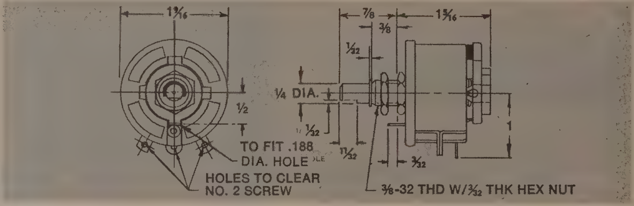
FEATURES:
- Vitreous enamel bonds core and base together for uniform heat dissipation and structural integrity.
- Wiper tracks are buffed and polished to assure smooth rotation and uniform wiper contact.
- High strength ceramic hub is used to insulate the shaft and bushing from live parts.
- Wiper design assures minimum backlash.
- The cores on larger rheostats are enameled prior to winding to increase core strength and impove bond between wire and core.
- Rheostats are provided with three terminals to allow use as potentiometers.
- UL approved.
- All wattage sizes are available to MIL-R-22.
- Welded terminals and termination guarantees positive electrical connections.
- Available with quick connect terminals.

SPECIFICATIONS:
- Resistance Tolerance ±10% . . . Closer Tolerances Available.
- Running Torque - 1 To 6 Inch Ounce.
- Rotation 300° ±5%.
- Standard Resistance 1 - 5000 Ohm.
- Mounting For Panels Up To ⅛″.

25 WATTS/STD. RESISTANCE 1-5000 OHMS

WT. 0.19 LBS.

Ohms	Max. Amps	Steps (Approx.)
1	5.000	30
2	3.540	29
3	2.880	51
6	2.040	50
8	1.770	52
10	1.580	52
15	1.290	74
25	1.000	95
35	.845	107
50	.707	97
75	.575	117
100	.500	123
125	.445	155
175	.375	171
250	.316	159
350	.267	210
500	.222	245
750	.182	286
1000	.155	305
1500	.129	380
2500	.100	300
3500	.084	335
5000	.070	380



FEATURES:
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- Wiper tracks are buffed and polished to assure smooth rotation and uniform wiper contact.
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- Rheostats are provided with three terminals to allow use as potentiometers.
- UL approved.
- All wattage sizes are available to MIL-R-22.
- Welded terminals and termination guarantees positive electrical connections.
- Available with quick connect terminals.

SPECIFICATIONS:
- Resistance Tolerance ±10% . . . Closer Tolerances Available.
- Running Torque - .25 To .5 Inch Pound.
- Rotation 300° ±5%.
- Standard Resistance 1 - 5000 Ohm.
- Mounting For Panels Up To ¼″.

WIREWOUND RHEOSTATS

12½ Watt/Std. Resistance 1-5000 Ohms
25 Watt/Std. Resistance 1-5000 Ohms

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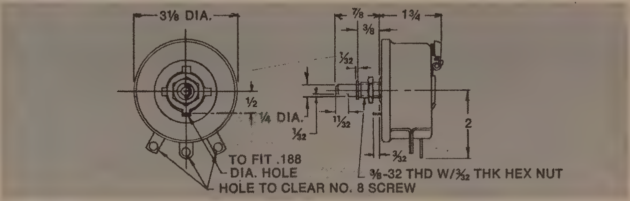
Post Office Box 890
1320 Flaxmill Road
Huntington, Indiana 46750
Telephone (219) 356-4300
TWX 810-333-1530

WIRewound RHEOSTATS

100 WATTS/STD. RESISTANCE 1-10,000 OHMS

WT. 0.64 LBS.

Ohms	Max. Amps	Steps (Approx.)
1	10.000	33
2	7.070	33
3	5.750	30
5	4.470	57
7.5	3.650	60
10	3.160	57
16	2.500	124
25	2.000	107
50	1.410	135
75	1.150	158
100	1.000	168
200	.707	213
300	.575	259
400	.500	270
500	.447	269
750	.365	319
1000	.316	330
1500	.258	402
2000	.224	417
2500	.200	515
5000	.141	560
7500	.115	495
10000	.100	673



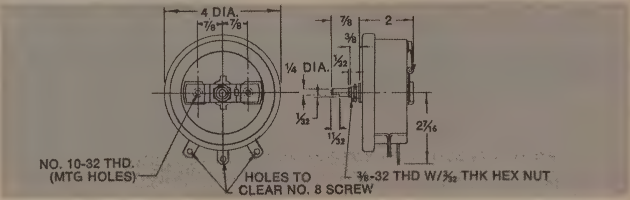
FEATURES:
- Vitreous enamel bonds core and base together for uniform heat dissipation and structural integrity.
- Wiper tracks are buffed and polished to assure smooth rotation and uniform wiper contact.
- High strength ceramic hub is used to insulate the shaft and bushing from live parts.
- Wiper design assures minimum backlash.
- The cores on larger rheostats are enameled prior to winding to increase core strength and impove bond between wire and core.
- Rheostats are provided with three terminals to allow use as potentiometers.
- UL approved.
- All wattage sizes are available to MIL-R-22.
- Welded terminals and termination guarantees positive electrical connections.
- Available with quick connect terminals.

SPECIFICATIONS:
- Resistance Tolerance ±10% . . . Closer Tolerances Available.
- Running Torque - .5 To 2 Inch Pound
- Rotation 300° ±5%.
- Mounting For Panels Up To ¼″.
- Standard Resistance 1 - 10,000 Ohm.

150 WATTS/STD. RESISTANCE 1-10,000 OHMS

WT. 1.1 LBS.

Ohms	Max. Amps	Steps (Approx.)
1	12.300	44
2	8.650	43
3	7.070	74
5	5.480	78
7.5	4.470	81
10	3.880	77
15	1.163	130
25	2.450	114
35	2.070	125
50	1.735	142
75	1.415	170
100	1.225	177
150	1.000	215
200	.865	229
250	.775	285
350	.655	315
500	.548	366
750	.447	335
1250	.346	453
1800	.288	497
2250	.259	511
3000	.224	526
4500	.182	630
7500	.141	894
10000	.122	929


4 DIA.
⅞
⅞
⅞
2
⅜
¼ DIA.
1⁄32
1⁄32
11⁄32
2 7⁄16
NO. 10-32 THD. (MTG HOLES)
HOLES TO CLEAR NO. 8 SCREW
⅜-32 THD W/3⁄32 THK HEX NUT

FEATURES:
- Vitreous enamel bonds core and base together for uniform heat dissipation and structural integrity.
- Wiper tracks are buffed and polished to assure smooth rotation and uniform wiper contact.
- High strength ceramic hub is used to insulate the shaft and bushing from live parts.
- Wiper design assures minimum backlash.
- The cores on larger rheostats are enameled prior to winding to increase core strength and impove bond between wire and core.
- Rheostats are provided with three terminals to allow use as potentiometers.
- UL approved.
- All wattage sizes are available to MIL-R-22.
- Welded terminals and termination guarantees positive electrical connections.
- Available with quick connect terminals.

SPECIFICATIONS:
- Resistance Tolerance ±10% . . . Closer Tolerances Available.
- Running Torque - .5 to 3 Inch Pound.
- Rotation 300° ±5%.
- Mounting For Panels Up To ¼″ Or By Means Of F.H. Screws.
- Standard Resistance 1 - 10,000 Ohm.

WIREWOUND RHEOSTATS

100 Watts/Std. Resistance 1-10,000 Ohms
150 Watts/Std. Resistance 1-10,000 Ohms

E-SYSTEMS INC.
Memcor Division
MANUFACTURERS OF
MEMCOR
ELECTRONIC COMPONENTS

WIREWOUND RHEOSTATS

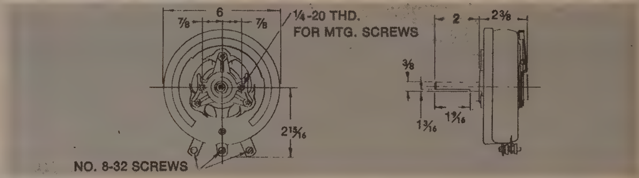
Post Office Box 890
1320 Flaxmill Road
Huntington, Indiana 46750
Telephone (219) 356-4300
TWX 810-333-1530

E-SYSTEMS INC.
Memcor Division
MANUFACTURERS OF
MEMCOR
ELECTRONIC COMPONENTS

225 WATTS/STD. RESISTANCE 1-2500 OHMS

WT. 2 LBS.

Ohms	Max. Amps	Steps (Approx.)
1	15.000	42
2	10.600	42
3	8.660	43
4	7.500	57
5	6.710	57
7.5	5.490	61
10	4.740	103
15	3.870	109
25	3.000	115
50	2.120	183
75	1.730	192
100	1.500	268
150	1.220	256
200	1.060	337
300	.866	323
400	.750	343
700	.567	484
900	.500	493
1200	.433	520
1500	.387	647
1750	.358	603
2000	.336	650
2500	.300	652



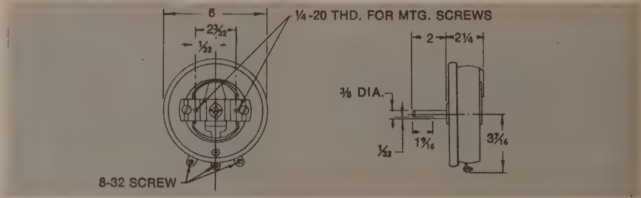
FEATURES:
- Vitreous enamel bonds core and base together for uniform heat dissipation and structural integrity.
- Wiper tracks are buffed and polished to assure smooth rotation and uniform wiper contact.
- High strength ceramic hub is used to insulate the shaft and bushing from live parts.
- Wiper design assures minimum backlash.
- The cores on larger rheostats are enameled prior to winding to increase core strength and impove bond between wire and core.
- Rheostats are provided with three terminals to allow use as potentiometers.
- UL approved.
- All wattage sizes are available to MIL-R-22.
- Welded terminals and termination guarantees positive electrical connections.
- Available with quick connect terminals.

SPECIFICATIONS:
- Resistance Tolerance ±10% . . . Closer Tolerances Available.
- Running Torque - 2.5 To 4 Inch Pound.
- Rotation 310° ±5%.
- Mounting For Panels Up To 1¼". Two ¼"-20 By 1½" Flat Head Screws Are Supplied.
- Standard Resistance 1 - 2500 Ohm.

300 WATTS/STD. RESISTANCE 1-2500 OHMS

WT. 2.6 LBS.

Ohms	Max. Amps	Steps (Approx.)
1	17.320	50
2	12.240	52
3	10.000	52
4	8.660	78
5	7.750	78
7.5	6.320	72
10	5.480	78
15	4.470	144
25	3.460	135
50	2.450	218
75	2.000	225
100	1.730	285
150	1.410	342
200	1.220	363
300	1.000	424
400	.866	454
700	.655	504
900	.578	528
1200	.500	546
1500	.447	678
1750	.414	626
2000	.387	700
2500	.346	708



FEATURES:
- Vitreous enamel bonds core and base together for uniform heat dissipation and structural integrity.
- Wiper tracks are buffed and polished to assure smooth rotation and uniform wiper contact.
- High strength ceramic hub is used to insulate the shaft and bushing from live parts.
- Wiper design assures minimum backlash.
- The cores on larger rheostats are enameled prior to winding to increase core strength and impove bond between wire and core.
- Rheostats are provided with three terminals to allow use as potentiometers.
- UL approved.
- All wattage sizes are available to MIL-R-22.
- Welded terminals and termination guarantees positive electrical connections.
- Available with quick connect terminals.

SPECIFICATIONS:
- Resistance Tolerance ±10% . . . Closer Tolerances Available.
- Running Torque - 2.5 To 5 Inch Pound.
- Rotation 370° ±5%.
- Mounting For Panels Up To 1¼". Two ¼"-20 By 1½" Flat Head Screws Are Supplied.
- Standard Resistance 1 - 2500 Ohm.

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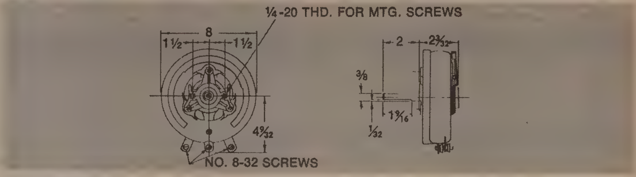
TWX 810-333-1530

WIREWOUND RHEOSTATS

500 WATTS/STD. RESISTANCE 1-2500 OHMS

WT. 4 LBS.

Ohms	Max. Amps	Steps (Approx.)
1	22.300	69
2	15.800	75
3	12.900	78
4	11.200	73
5	10.000	103
8	7.900	103
12.1	6.300	103
16	5.600	188
25	4.470	204
50	3.160	206
80	2.520	327
125	2.000	327
175	1.690	423
250	1.410	488
325	1.240	500
500	1.000	609
750	.817	727
1000	.707	771
1500	.577	935
2000	.500	980
2500	.447	968



FEATURES:

- Vitreous enamel bonds core and base together for uniform heat dissipation and structural integrity.
- Wiper tracks are buffed and polished to assure smooth rotation and uniform wiper contact.
- High strength ceramic hub is used to insulate the shaft and bushing from live parts.
- Wiper design assures minimum backlash.
- The cores on larger rheostats are enameled prior to winding to increase core strength and impove bond between wire and core.
- Rheostats are provided with three terminals to allow use as potentiometers.
- UL approved.
- All wattage sizes are available to MIL-R-22.
- Welded terminals and termination guarantees positive electrical connections.
- Available with quick connect terminals.

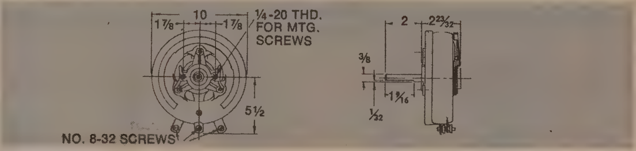
SPECIFICATIONS:

- Resistance Tolerance ±10% . . . Closer Tolerances Available.
- Running Torque - 4.5 To 7 Inch Pound.
- Rotation 325° ±3%.
- Mounting For Panels Up To 1¼″. Two ¼″-20 By 1½″ Flat Head Screws Are Supplied.
- Standard Resistance 1 - 2500 Ohm.

750 WATTS/STD. RESISTANCE 1-2500 OHMS

WT. 7.6 LBS.

Ohms	Max. Amps	Steps (Approx.)
1	27.400	71
2	19.400	103
3	15.800	94
5	12.200	102
8	9.650	98
10	8.650	138
16	6.820	140
25	5.470	138
50	3.870	248
80	3.060	250
100	2.740	248
160	2.170	446
200	1.940	442
300	1.580	540
400	1.370	583
600	1.117	684
750	1.000	686
1200	.791	870
1800	.646	1042
2500	.547	1170



FEATURES:

- Vitreous enamel bonds core and base together for uniform heat dissipation and structural integrity.
- Wiper tracks are buffed and polished to assure smooth rotation and uniform wiper contact.
- High strength ceramic hub is used to insulate the shaft and bushing from live parts.
- Wiper design assures minimum backlash.
- The cores on larger rheostats are enameled prior to winding to increase core strength and impove bond between wire and core.
- Rheostats are provided with three terminals to allow use as potentiometers.
- UL approved.
- All wattage sizes are available to MIL-R-22.
- Welded terminals and termination guarantees positive electrical connections.
- Available with quick connect terminals.

SPECIFICATIONS:

- Resistance Tolerance ±10% . . . Closer Tolerances Available.
- Running Torque 3.5 To 7 Inch Pound.
- Rotation 330° ±3%.
- Mounting For Panels Up To 1¼″. Two ¼″-20 By 1½″ Flat Head Screws Are Supplied.
- Standard Resistance 1 - 2500 Ohm.

WIREWOUND RHEOSTATS

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E-SYSTEMS INC.
Memcor Division
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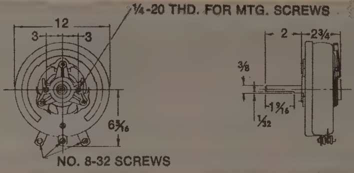
1000 WATTS/STD. RESISTANCE 1-2000 OHMS



WT. 10 LBS.

Ohms	Max. Amps	Steps (Approx.)
1	31.600	86
2	22.400	115
3	18.300	125
5	14.100	122
8	11.200	116
10	10.000	114
16	7.900	164
25	6.330	181
50	4.470	321
75	3.650	301
100	3.160	321
160	2.500	328
225	2.110	608
300	1.830	640
400	1.580	685
500	1.410	687
750	1.150	806
1000	1.000	855
1500	.816	1026
2000	.630	1080

FEATURES:

- Vitreous enamel bonds core and base together for uniform heat dissipation and structural integrity.
- Wiper tracks are buffed and polished to assure smooth rotation and uniform wiper contact.
- High strength ceramic hub is used to insulate the shaft and bushing from live parts.
- Wiper design assures minimum backlash.
- The cores on larger rheostats are enameled prior to winding to increase core strength and impove bond between wire and core.
- Rheostats are provided with three terminals to allow use as potentiometers.
- UL approved.
- All wattage sizes are available to MIL-R-22.
- Welded terminals and termination guarantees positive electrical connections.
- Available with quick connect terminals.

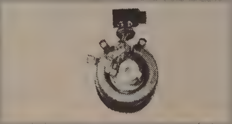
SPECIFICATIONS:

- Resistance Tolerance ±10% . . . Closer Tolerances Available.
- Running Torque 3.5 To 7 Inch Pound.
- Rotation 335° ±3%.
- Mounting For Panels Up To 1¼″. Two ¼″-20 By 1½″ Flat Head Screws Are Supplied.
- Standard Resistance 1 - 2000 Ohm.

SPECIAL RHEOSTATS

TAPER WINDINGS

WITH TOGGLE SWITCH

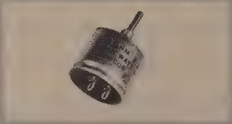


"OFF" POSITION & MICRO-SWITCH

360° ROTATION

DUST PROOF 50 WATT

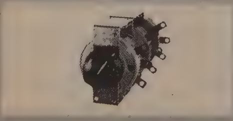
DUST PROOF 12.5 WATT



SPECIAL TAPS

RE

TANDEM ASSEMBLY



THE FOLLOWING UNITS ARE AVAILABLE FOR MIL-R-22

Part No.	Military Style	Description	Wattage	Shaft Diameter
RP-0012	M22/01	Unenclosed	12½	⅛
RD-0012	M22/02	Enclosed	6½	⅛
RP-0025	M22/03	Unenclosed	25	¼
RD-0025	M22/04	Enclosed	12½	¼
RP-0050	M22/05	Unenclosed	50	¼
RD-0050	M22/06	Enclosed	25	¼
RP-0075	M22/07	Unenclosed	75	¼
RP-0100	M22/08	Unenclosed	100	¼
RP-0150	M22/09	Unenclosed	150	¼
RP-0225	M22/10	Unenclosed	225	⅜
RP-0300	M22/11	Unenclosed	300	⅜
RP-0500	M22/12	Unenclosed	500	⅜
RP-0750	M22/13	Unenclosed	750	⅜
RP-1000	M22/14	Unenclosed	1000	⅜

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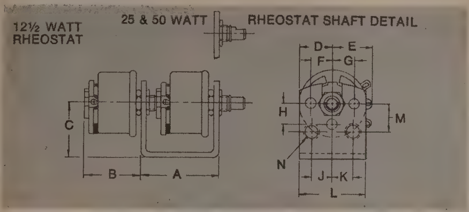
RHEOSTAT HARDWARE

TANDEM MOUNTING KITS AND HARDWARE 12½, 25, 50 WATT

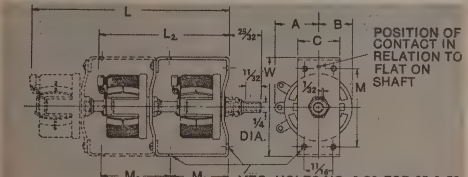


THE FOLLOWING KITS ARE AVAILABLE FOR CUSTOMER/FACTORY ASSEMBLY.*

A	B	C	D	E	F	G	H	J	K	L	M	N	Tandem Rheostats
1 7/16	11/16	21/32	3/8	19/32	.250	.250	.250	—	—	3/4	—	—	TR2-12½ Watt
2 9/32	1 5/16	1 5/16	9/16	1	—	—	—	13/32	13/32	1 1/4	9/16	10-32	TR2-25 Watt
2 9/32	1 7/16	15/16	9/16	1 9/16	—	—	—	13/32	13/32	1 1/4	9/16	10-32	TR2-50 Watt

* Specify "Tandem Assy" when ordering factory assembled unit. Resistance value of "A" & "B" rheostat is required.

MULTIPLE MOUNTED ASSEMBLIES

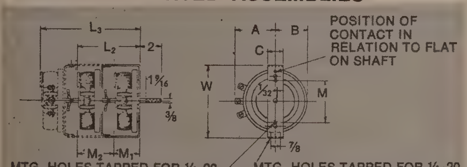


POSITION OF CONTACT IN RELATION TO FLAT ON SHAFT

MTG. HOLES NO. 8-32 FOR 25 & 50 WATT & NO. 10-32 FOR 75, 100 & 150 WATT.

Rheo. Type	Cat. No. 2 In Tandem	Cat. No. 3 In Tandem	A	B	C	L_2	L_3	M_1	M_2	M	N
R-12½	TR-12½-2	TR-12½-3	19/32	7/16	3/4	2 9/64	3 25/64	1	1 1/4	1	1 3/8
R-25	TR-25-2	TR-25-3	15/16	25/32	1	3 1/2	5 1/2	1 11/16	2	1 7/8	2 3/8
R-50	TR-50-2	TR-50-3	1 9/16	1 5/32	1	3 1/2	5 1/2	1 11/16	2	2 1/2	3
R-75	TR-75-2	TR-75-3	1 25/32	1 3/8	1 1/4	4 3/8	6 7/8	1 11/16	2 1/2	3 5/8	4 1/4
R-100	TR-100-2	TR-100-3	1 29/32	1 9/16	1 1/4	4 3/8	6 7/8	1 11/16	2 1/2	3 5/8	4 1/4
R-150	TR-150-2	TR-150-3	2 9/32	3	1 1/4	4 3/4	7 1/4	1 15/16	2 1/2	4 1/4	5

MULTIPLE MOUNTED ASSEMBLIES



POSITION OF CONTACT IN RELATION TO FLAT ON SHAFT

MTG. HOLES TAPPED FOR 1/4-20 SCREWS WHEN IN TAN. OF 2. WHEN IN TAN. OF 3 THE TAPPED HOLES WILL BE 3/8-16.

MTG. HOLES TAPPED FOR 1/4-20 SCREWS TOP & BOTTOM OF FRAME.

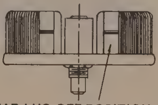
Rheo. Type	Cat. No. 2 In Tandem	Cat. No. 3 In Tandem	A	B	C	L_2	L_3	M_1	M_2	M	N
R300	TR-300-2	TR-300-3	3 7/16	3	1 1/2	6 1/16	9 9/16	2 1/2	3 1/2	2 3/8	7

OFF-POSITION 12½ TO 300 WATTS

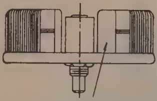
The off-positions listed below are available in all wattage sizes from 12½ watts through 300 watts.

Dead sections or off-positions are available at any point of the winding area other than the extreme ends.

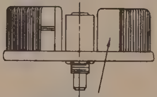
If required, the terminal end of the lug can be removed. Add the suffix letter "O" to the style ordered for this feature.



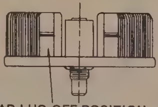
DEAD LUG OFF POSITION
RIGHT POSITION RS-30
(RESISTANCE WIRE SEPARATED FROM INDICATED TERMINAL)



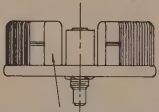
DEAD SECTION OFF POSITION
RIGHT POSITION RS-32
(INDICATED TERMINAL SET IN FROM END OF CORE)



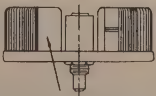
DEAD SECTION OFF POSITION
WITH DETENT
RIGHT POSITION RS-34
(ROUNDED TIE WIRE PLACED AT INDICATED END OF ROTATION)



DEAD LUG OFF POSITION
LEFT POSITION RS-31
(RESISTANCE WIRE SEPARATED FROM INDICATED TERMINAL)



DEAD SECTION OFF POSITION
LEFT POSITION RS-33
(INDICATED TERMINAL SET IN FROM END OF CORE)



DEAD SECTION OFF POSITION
WITH DETENT
LEFT POSITION RS-35
(ROUNDED TIE WIRE PLACED AT INDICATED END OF ROTATION)

KNOBS AND DIALS

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TWX 810-333-1530

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2519

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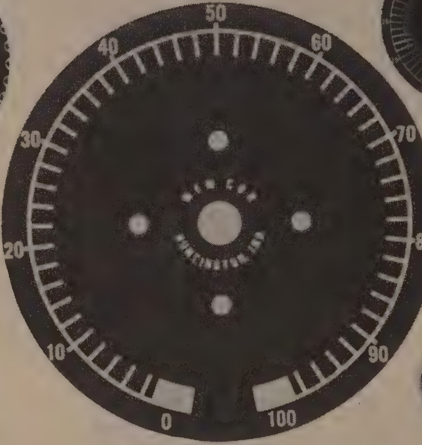
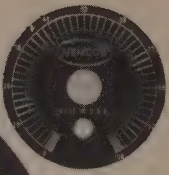


2492-020-003


2491-020-002

2511
2521

2512
2520

2491-020-001

2400

2510

2514

2506

2507

2505

2508

KNOB DESCRIPTION	KNOB DIA.	HOLE DIA.	CAT. NO.	10 DIGIT NOS.
SKIRTED KNOB	¾	⅛	2400	2491-010-005
BAR KNOB, 1¼″ LONG	—	¼	2505	2491-010-010
BAR KNOB, 1¼″ LONG WITH BRASS BUSHINGS	—	¼	2506	2491-010-011
BAR KNOB, 1½″ LONG WITH BRASS BUSHINGS	—	¼	2507	2491-010-012
BAR KNOB, 2¼″ LONG	—	¼	2508	2491-010-013
FINGER-GRIP KNOB	1⅝	¼	2510	2491-010-014
FINGER-GRIP KNOB WITHOUT POINTER	2⅜	¼	2511	2492-010-016
FINGER-GRIP KNOB WITH POINTER	2⅜	¼	2512	2492-010-001
FINGER-GRIP KNOB WITH POINTER	2⅜	⅜	2520	2492-010-002
FINGER-GRIP KNOB WITHOUT POINTER	2⅜	⅜	2521	2492-010-019
SKIRTED KNOB	1½	¼	2514	2491-010-017
HANDWHEEL WITH BRASS BUSHING	3⅜	⅜	2518	2492-010-003
HANDWHEEL WITH BRASS BUSHING AND POINTER	3⅜	⅜	2519	2492-010-004
BAR KNOB, 2¼″ LONG WITH BRASS BUSHING	—	¼	2522	2491-010-021

DIAL DESCRIPTION	RHEOSTAT SIZE	PART NO.
1⅜ Diameter — Black on Aluminum	12½, 25, 50	2491-020-001
2³⁄₁₆ Diameter — Black on Aluminum	75, 100, 150, 225, 300	2491-020-002
5½ Diameter — Black on Aluminum	500, 750, 1000	2492-020-003

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KNOBS AND DIALS

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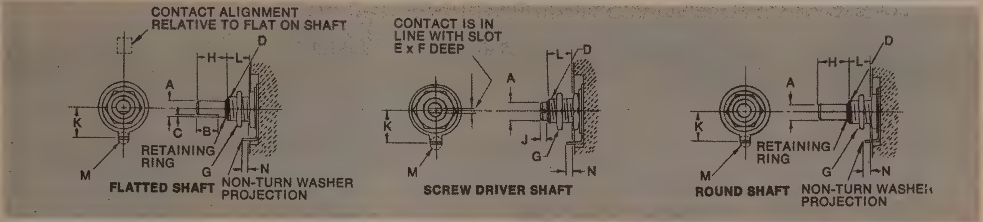
RHEOSTAT OPTIONAL FEATURES

SHAFT AND BUSHING OPTIONS

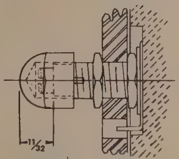
THE FOLLOWING OPTIONAL FEATURES ARE AVAILABLE FOR 12½-150 WATT RHEOSTATS


CONTACT ALIGNMENT RELATIVE TO FLAT ON SHAFT
D
H
L
A
K
C
B
RETAINING RING
M
G
N
FLATTED SHAFT
NON-TURN WASHER PROJECTION
CONTACT IS IN LINE WITH SLOT E x F DEEP
L
D
A
K
J
G
M
N
SCREW DRIVER SHAFT
D
H
L
A
K
RETAINING RING
M
G
N
ROUND SHAFT
NON-TURN WASHER PROJECTION

Shaft Dia. A	Max. Panel	Bushing Proj. L	Thd. D	Flat		Slot		NUT G	Shaft Ext. H	Shaft Ext. J	TAB LOC. K	TAB HOLE M	N
				B	C	E	F						
1/8	1/16	3/16	1/4-32	Spec	Spec	1/32	3/64	1/16	3/8	3/32	1/4	1/8	1/16
	1/8	1/4	1/4-32	Spec	Spec	1/32	3/64	1/16	3/8	3/32	1/4	1/8	1/16
	1/4	3/8	1/4-32	Spec	Spec	1/32	3/64	1/16	3/8	3/32	1/4	1/8	1/16
1/4	1/8	1/4	3/8-32	11/32	1/32	3/64	1/16	3/32	1/2	3/32	1/2	3/16	3/32
	1/4	3/8	3/8-32	11/32	1/32	3/64	1/16	3/32	1/2	3/32	1/2	3/16	3/32
	1/2	5/8	3/8-32	11/32	1/32	3/64	1/16	3/32	1/2	3/32	1/2	3/16	3/32
	3/4	7/8	3/8-32	11/32	1/32	3/64	1/16	3/32	1/2	3/32	1/2	3/16	3/32
	1	1 1/8	3/8-32	11/32	1/32	3/64	1/16	3/32	1/2	3/32	1/2	3/16	3/32
	1 1/2	1 5/8	3/8-32	11/32	1/32	3/64	1/16	3/32	1/2	3/32	1/2	3/16	3/32
	2	2 1/8	3/8-32	11/32	1/32	3/64	1/16	3/32	1/2	3/32	1/2	3/16	3/32

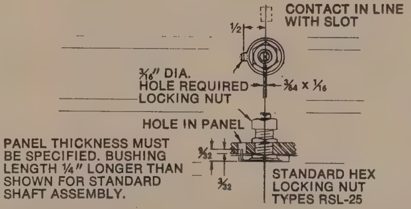
LOCKING DEVICES

SHAFT ASSEMBLIES CAN BE SUPPLIED WITH A SUPPLEMENTAL LOCKING DEVICE TO PREVENT SHIFTING OF A RESISTANCE SETTING.
A TAPERED NUT TIGHTENS A SPLIT BUSHING AGAINST THE SHAFT FOR THE LOCKING ACTION.



CAP HEX NUT
TYPE RLS-26

FIGURE ABOVE SHOWS TYPICAL SCREWDRIVER SHAFT LOCKING DEVICE. HOWEVER FLATTED OR ROUND SHAFTS CAN HAVE LOCKING DEVICES WITH THE RLS-25 LOCKING NUT.


CONTACT IN LINE WITH SLOT
1/2
3/16″ DIA. HOLE REQUIRED
3/64 x 1/16
LOCKING NUT
HOLE IN PANEL
PANEL THICKNESS MUST BE SPECIFIED. BUSHING LENGTH 1/4″ LONGER THAN SHOWN FOR STANDARD SHAFT ASSEMBLY.
9/32
3/32
STANDARD HEX LOCKING NUT TYPES RSL-25

HOW TO ORDER MEMCOR RHEOSTATS

1. Give Memcor type and wattage
   i.e. R25 = Rheostat 25 watt
2. Give ohmic value and resistance tolerance required
3. Specify if any mounting hardware is required
4. Specify if any other special features are required
   i.e. Special tapers for rheostats

If there are special requirements, a two or three digit alpha call out will appear after the ohmic value; these digits will be assigned by the factory.

RESISTANCE VALUE CODE

X XXX

NUMBER OF DECIMALS TO MOVE TO THE RIGHT

BASIC RESISTANCE VALUE

EXAMPLE:
3100 = 100Ω
2100 = 10Ω
1100 = 1Ω
0100 = 0.1Ω

EXAMPLE MEMCOR PART NUMBER

RHEOSTAT = XXXXXX XXXX XX

RH 0025 1100 JAB

TYPE RHEOSTAT
RH = Vitreous Rheostat

WATTAGE
0025 = 25 Watts

RESISTANCE
1100 = 1Ω

SPECIAL FEATURE
JAB = Screw Driver Shaft

RHEOSTAT OPTIONAL FEATURES

Shaft and Bushing Options
Locking Devices
How to Order Memcor Rheostats

E-SYSTEMS INC.
Memcor Division
MANUFACTURERS OF
MEMCOR
ELECTRONIC COMPONENTS

PRECISION POTENTIOMETERS

PRODUCTS AVAILABLE FROM FACTORY STOCK
VOLUME PRODUCTION CAPABILITIES • HYBRID DESIGNS

IMPORTANT

The products shown on the next three pages are low cost precision conductive plastic potentiometers which are available from factory stock. These products are not sold through distributors. Deliveries range from a few days to two weeks.

The last two NEI pages show our custom design capabilities in wirewound and conductive plastic.

In both custom and standard products, NEI has volume production facilities capable of handling millions of units.

"HYBRID" PRECISION POTENTIOMETERS

Since 1958, NEI has been supplying precision potentiometers with either conductive plastic or wirewound elements, depending on each customer's requirements. Each type of element excels in certain characteristics. In general, wirewound elements have lower temperature coefficients of resistance, lower end voltages, and closer as-manufactured linearity. Conductive plastic elements have better resolution (virtually infinite); they can be trimmed to achieve superior linearities because of their infinite resolution; and the smoother surface and higher wear-resistance of the conductive plastic materials yield at least an order of magnitude superiority in mechanical life. (There are additional differences affecting performance and manufacturing cost, but they relate primarily to the design philosophies and manufacturing techniques of the various manufacturers.)

Usually, customer needs can be met by one or the other ... conductive plastic or wirewound technology. Occasionally, however, a requirement comes along which calls for performance characteristics achievable only by using a combination of the two technologies. Until fairly recently, this was not feasible, and the customer had to settle for the better of the two. Over the past few years, techniques have been developed which not only make this "hybrid" approach feasible, but could make it one of the most important developments in the history of potentiometers.

NEI's debut in the hybrid field involved certain types of recorders and x-y plotters that had been using wirewound potentiometer elements for many years. The recorder manufacturers knew that conductive plastic elements would improve the performance of their instruments; however, replacement of the wirewound elements would have necessitated complete redesign of the span-adjusting circuits in the instruments, using active as well as passive elements. NEI developed a means of coating the wirewound elements with conductive plastic in such a way that the superior temperature coefficient characteristics of the wire were retained, while overall performance was improved through the infinite resolution and superior wear characteristics of the conductive plastic.

"Hybrid" elements have since been developed which combine the better features of each technology with virtually no degradation of performance from the better of the two. These elements yield combined performance characteristics which cannot be attained through any "pure" element technology.

Currently, all "hybrid" elements are produced by coating the wiper path of a wirewound element with conductive plastic. The materials and geometries are usually chosen so that nearly all the current flows in the wirewound element, thereby yielding performance similar to that of "pure" wirewounds for most electrical characteristics except noise and resolution. Noise, resolution, and wear characteristics are similar to those for "pure" conductive plastic elements.

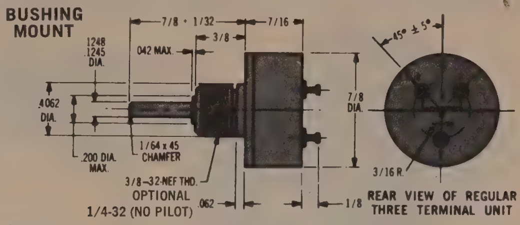
new england instrument company

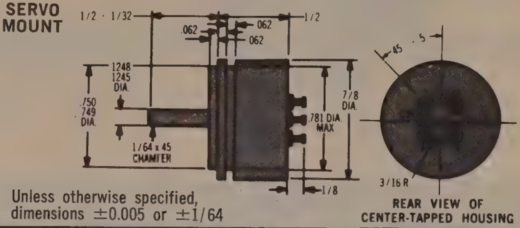
KENDALL LANE · NATICK, MASS. 01760 · (617) 873-9711 · TWX: 710-360-0398

PRECISION POTENTIOMETERS

ECONOPOT® STANDARD CONDUCTIVE PLASTIC MODELS
7/8" DIAMETER • LOW COST • FROM FACTORY STOCK

nej
nej
NEW ENG


BUSHING MOUNT
7/8 · 1/32
7/16
3/8
1248
.1245
DIA.
042 MAX.
.4062
DIA.
1/64 x 45
CHAMFER
.200 DIA.
MAX.
3/8–32-NEF THD.
OPTIONAL
1/4-32 (NO PILOT)
.062
1/8
7/8
DIA.
45° ± 5°
3/16 R.
REAR VIEW OF REGULAR
THREE TERMINAL UNIT


SERVO MOUNT
1/2 · 1/32
1/2
.062
062
062
1248
1245
DIA.
.750
749
DIA.
1/64 x 45
CHAMFER
.781 DIA.
MAX
7/8
DIA.
1/8
45 · 5
3/16 R
REAR VIEW OF
CENTER-TAPPED HOUSING

Unless otherwise specified,
dimensions ±0.005 or ±1/64

ORIGINAL HIGH RELIABILITY ECONOPOT

5 MILLION CYCLE LIFE • ±10% RESISTANCE • −65°C TO +125°C
PRECISION BALL BEARINGS (SERVO MODELS)

MODEL NUMBER	OUTPUT SMOOTHNESS	INDEPENDENT LINEARITY (STANDARD)	TOTAL RESISTANCE ±10%	PRICE (500 PCS. OR MORE)
SERVO MODELS				
78ESA102	0.5%	1%	1K	$13.60
78ESA502	0.5%	1%	5K	13.60
78ESA103	0.5%	1%	10K	13.60
78ESB102	0.25%	0.5%	1K	16.45
78ESB502	0.25%	0.5%	5K	16.45
78ESB103	0.25%	0.5%	10K	16.45
78ESC102	0.15%	0.25%	1K	19.55
78ESC502	0.15%	0.25%	5K	19.55
78ESC103	0.15%	0.25%	10K	19.55
BUSHING MODELS				
78EBA102	0.5%	1%	1K	11.55
78EBA502	0.5%	1%	5K	11.55
78EBA103	0.5%	1%	10K	11.55
78EBB102	0.25%	0.5%	1K	14.40
78EBB502	0.25%	0.5%	5K	14.40
78EBB103	0.25%	0.5%	10K	14.40
78EBC102	0.15%	0.25%	1K	17.50
78EBC502	0.15%	0.25%	5K	17.50
78EBC103	0.15%	0.25%	10K	17.50

CHARACTERISTICS — ALL MODELS

Terms, definitions and test methods per VRCI standards unless otherwise specified.

PARAMETER	VALUE
Standard Total Resistance Values	1K, 5K, & 10K per table
Standard Independent Linearity	1%, 0.5% & 0.25% per table
Theoretical Electrical Travel	340°
Standard Output Smoothness	0.5%, 0.25% & 0.15% per table
Standard Life Expectancy	5,000,000 revolutions
Resolution	Essentially infinite
Standard End Voltage	1% maximum
Standard Power Rating	1 watt @ 70°C, derated linearly to 0 @ 125°C
Insulation Resistance	1000 Megohms min. @ 500 VDC
Dielectric Withstanding Voltage	750 volts rms
Standard Torque	1.0 oz.-in. max. — bushing
Weight	16 grams max. — servo
Shock	Per MIL-STD-202, Method 205, condition C
Vibration	Per MIL-STD-202, Method 205, condition C
Operating Temperature	−65°C to +125°C

INDUSTRIAL ECONOPOT® MODEL C

2 MILLION CYCLE LIFE • ±20% RESISTANCE • OILITE BEARINGS (SERVO MODELS)

MODEL NUMBER	OUTPUT SMOOTHNESS	INDEPENDENT LINEARITY (STANDARD)	TOTAL RESISTANCE ±20%	PRICE (500 PCS. OR MORE)
BUSHING MODELS				
78CBA102	0.5%	1%	1K	$ 5.49
78CBA502	0.5%	1%	5K	5.49
78CBA103	0.5%	1%	10K	5.49
78CBB102	0.25%	0.5%	1K	8.75
78CBB502	0.25%	0.5%	5K	8.75
78CBB103	0.25%	0.5%	10K	8.75
SERVO MODELS				
78CSA102	0.5%	1%	1K	7.60
78CSA502	0.5%	1%	5K	7.60
78CSA103	0.5%	1%	10K	7.60
78CSB102	0.25%	0.5%	1K	9.75
78CSB502	0.25%	0.5%	5K	9.75
78CSB103	0.25%	0.5%	10K	9.75
78CSC102	0.15%	0.25%	1K	12.25
78CSC502	0.15%	0.25%	5K	12.25
78CSC103	0.15%	0.25%	10K	12.25

CHARACTERISTICS — ALL MODELS

Terms, definitions and test methods per VRCI standards unless otherwise specified.

PARAMETER	VALUE
Resistance Tolerance	±20%
Standard Life Expectancy	2,000,000 revolutions
Dielectric Withstanding Voltage	500 volts rms
Bearings (Servo models)	Oilite

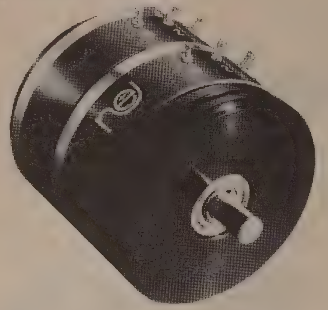
ALL OTHER SPECIFICATIONS ARE AS SHOWN FOR THE ORIGINAL HIGH RELIABILITY ECONOPOT® (SEE ABOVE).

new england instrument company

KENDALL LANE · NATICK, MASS. 01760 · (617) 873-9711 · TWX: 710-360-0398

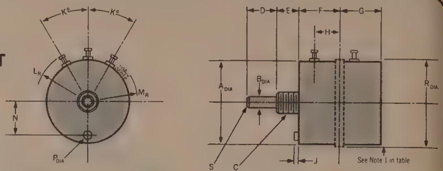
PRECISION POTENTIOMETERS

ECONOPOT® MKII STANDARD CONDUCTIVE PLASTIC MODELS
6 DIAMETERS • GANGABLE • LOW COST • FROM FACTORY STOCK

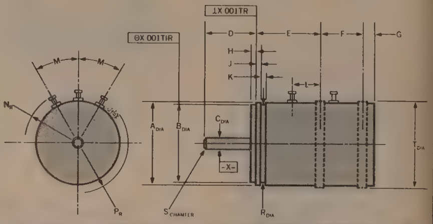


ALL MODELS FEATURE NEI's RESISTOFILM™ (PATENT #3,457,537)

BUSHING MOUNT MODELS (MOUNTING HARDWARE SUPPLIED)



SERVO MOUNT MODELS (PRECISION BALL BEARINGS)



HOUSING DIAMETER (INCHES)	MODEL NUMBER	MOUNTING TYPE	RANGE OF RESISTANCE ±10%	STANDARD INDEPENDENT LINEARITY (±%)	POWER RATING (WATTS)
0.500	50 BF	Bushing	1K-20K	1 and 0.5	0.5
0.500	50 SF	Servo	1K-20K	1 and 0.5	0.5
0.750	34 BF	Bushing	1K-50K	1 and 0.5	0.7
0.750	34 SF	Servo	1K-50K	1 and 0.5	0.7
0.875	78 BF	Bushing	1K-50K	1, 0.5, 0.25	1.0
0.875	78 SF	Servo	1K-50K	1, 0.5, 0.25	1.0
1.062	116 SF	Servo	1K-50K	1, 0.5, 0.25	1.0
1.250	114 BF	Bushing	1K-50K	1, 0.5, 0.25	1.0
1.437	176 SF	Servo	1K-100K	1, 0.5, 0.25	2.0
2.000	200 BF	Bushing	1K-100K	1, 0.5, 0.25	2.0
2.000	200 SF	Servo	1K-100K	1, 0.5, 0.25	2.0

GENERAL SPECIFICATIONS

PARAMETER	VALUE
Theoretical Travel	340°
Electrical Overtravel	5° min. each end
End Voltage	1.5% max.
Dielectric Withstanding Voltage	1000 V rms
Travel Resolution	virtually infinite
Output Smoothness	0.125% (MIL-R-39023)
Standard Life Expectancy	10 Million Revolutions
Mechanical Travel	360° continuous
Starting Torque (servo models)	1st cup-0.5 oz.-in. max. Ea. add'l cup-0.3 oz.-in. max.

DIMENSIONS — BUSHING MODELS

TYPE	A ±.005	B +.0000 −.0003	C CL2 THD.	D ±.030	E ±.015	F MAX.	G MAX.	H ±.005	J MAX.	K ±2°	L MAX.	M MAX.	N ±.005	P ±.003	**R MAX.	S CHAMFER ±.010 ±5°
50	.500	.1248	¼x32	⅜	⅜	.562	.510	.250	.062	30°	.550	.530	.281	.062	.770	1/64x45°
34	.750	.1248	¼x32	⅜	⅜	.562	.510	.250	.062	30°	.550	.530	.281	.062	.770	1/64x45°
78	.875	.1248	¼x32	⅜	⅜	.727	.510	.355	.062	30°	.605	.605	.312	.062	.900	1/64x45°
114	1.250	.2498	⅜x32	⅜	⅜	.855	.800	.500	.062	30°	.818	.850	.531	.093	1.320	1/32x45°
200	2.000	.2498	⅜x32	⅜	⅜	1.000	.960	.685	.067	25°	1.165	1.152	.531	.125	2.000	1/32x45°

DIMENSIONS — SERVO MODELS

TYPE	A ±.005	B +.0000 −.0005	C +.0000 −.0003	D ±.030	E MAX.	F MAX.	*G MAX.	H ±.005	J ±.005	K MIN.	L ±.015	M ±2°	N MAX.	P MAX.	R MAX.	S ±.010 ±5°	**T MAX.
50	.500	.4375	.1248	.500	.500	.500	.145	.062	.062	.007	.250	30°	.550	.530	.630	.015x45°	.770
34	.750	.625 .624	.1248	.500	.625	.505	.145	.062	.062	.007	.250	30°	.550	.530	.630	.015x45°	.770
78	.875	.750 .749	.1248	.625	.790	.505	.145	.062	.062	.057	.355	30°	.605	.605	.781	.015x45°	.900
116	1.062	.9688	.1248	.625	.790	.505	.145	.062	.062	.057	.355	25°	.680	.680	.975	.015x45°	1.090
176	1.437	1.3125	.2498	.625	.910	.505	.201	.062	.062	.088	.355	20°	.910	.910	1.312	.030x45°	1.472
200	2.000	1.8750	.2498	.625	.910	.505	.201	.062	.093	.088	.355	15°	1.170	1.152	1.875	.030x45°	2.000

TYPE NO.	MODEL	RESISTOFILM	NO. OF CUPS	LIN. TOL.	RESISTANCE
78	S	F	1	B	103

116 = 1 1/16″
176 = 1 7/16″

S = SERVO
B = BUSHING

A = ±1%
B = ±0.5%
C = ±0.25%

Resistance (Ohms)

1,000 = 102
5,000 = 502
10,000 = 103
25,000 = 253
50,000 = 503
100,000 = 104

ORDERING INFORMATION

Type shown would be a ⅞″ servo mount single cup with 0.5 linearity having a resistance value of 10,000Ω

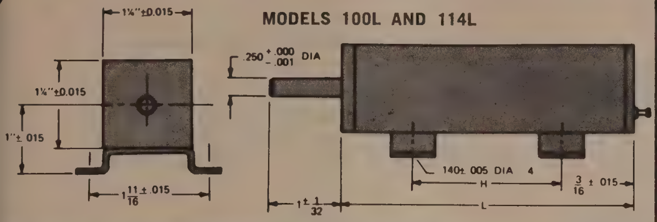
new england instrument company

KENDALL LANE · NATICK, MASS. 01760 · (617) 873-9711 · TWX: 710-360-0398

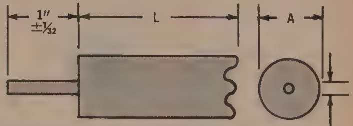
PRECISION POTENTIOMETERS

ECONOPOT® STANDARD LINEAR MOTION MODELS
CONDUCTIVE PLASTIC UNITS FEATURING NEI's RESISTOFILM™

MODELS 100L AND 114L



MODEL 50LMF



REMOVABLE, ADJUSTABLE
MOUNTING BRACKETS SUPPLIED
WITH ROUND CROSS-SECTION UNITS

MODEL	ELECTRICAL STROKE, E	MECHANICAL STROKE, M	A	B	C	H	L
100L	SPECIFY (UP TO 30")	E + 3⁄32"	1"	7⁄8"	1 7⁄16"	E + 1"	E + 3"
114L	SPECIFY (UP TO 30")	E + 3⁄32"	1¼"	1"	1 11⁄16"	E + 1"	E + 3"
50LMF	SPECIFY (UP TO 6")	E + 3⁄32"	½"	N.A.	N.A.	N.A.	E + 2"

SPECIFICATIONS

ELECTRICAL

Resistance per inch of stroke length:	50K ohms per inch maximum
Stroke length, Standard:	up to 30"
Special:	up to 100"
Number of Elements:	single or dual
Total Resistance Tolerance:	±10%
Independent Linearity, Standard:	±1%
Special:	±0.1% (for stroke lengths over 4")
Power Rating:	0.5 watts per inch stroke at 25°C
Resolution:	essentially infinite
Insulation Resistance:	1000 megohms minimum

MECHANICAL

Case Width, Standard:	1" or 1¼" square & ½" O.D. round
Starting Torque:	4 oz.-in.
Taps:	available (specify location & type i.e.: current or voltage)
Mounting:	flanges or brackets available
Connectors:	available

Note: The shaft can be rotated without detrimental effect to the unit.

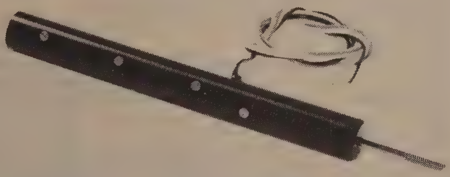
OTHER LINEAR MOTION DESIGNS AVAILABLE

HIGH RELIABILITY DUAL-ELEMENT UNITS

Originally designed to be a rocket propellant valve position monitor, this unit has two potentiometer elements (one for control and one for telemetry), plus a single-pole double-throw switch. Linearity tolerance is only ±0.001" and position reference must be maintained after repeated linear shaft accelerations of 3000 G's. 24 were used in each rocket.

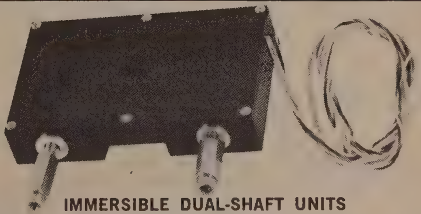
MINIATURE DOUBLE-ENDED UNITS

LMFL-101 Dimensions: ¼"W x 5⁄16"D x 1¼"L. This conductive plastic design features a double-ended shaft extension and can be actuated from either end, sensing a stroke length of 0.18". High accuracy, long life and infinite resolution characterize this unit. Total resistance is 10K ohms.



WIREWOUND ROUND CROSS-SECTION UNITS

LMWS-205 This wirewound unit is typical of linear motion units designed to meet specific configuration requirements. It features a precisely located center tap, a resistance of 2K ohms ±5%, 0.1% resolution, and an absolute linearity of 0.5%. Mechanical stroke length is 2".



IMMERSIBLE DUAL-SHAFT UNITS

LMFT-121 Dimensions: 1¾"L x 2⅞"W x ½"D. This unique package was designed specifically for total immersion in water. It features two separate elements independently actuated. Both are center tapped, with leads provided. Total resistance is 5K ohms with 1% accuracy and ¾" stroke length.

new england instrument company

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nej

PRECISION POTENTIOMETERS

CUSTOM DESIGNS
SINGLE-TURN PRECISION CONDUCTIVE PLASTIC

½″ DIAMETER
55FT SERIES

¾″ DIAMETER
34FT SERIES

⅞″ DIAMETER
78FT SERIES

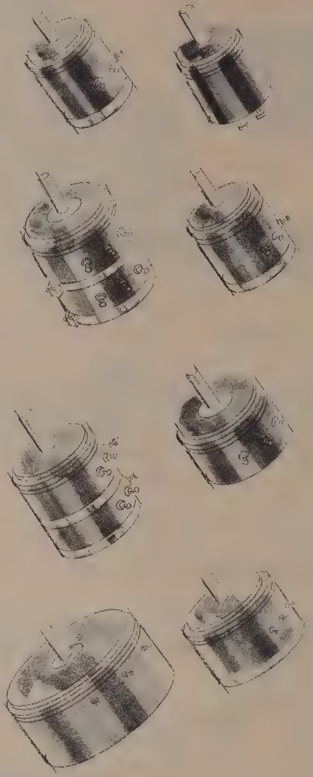
1 1/16″ DIAMETER
116FT SERIES

1 7/16″ DIAMETER
176FT SERIES

1⅝″ DIAMETER
158FT SERIES

2″ DIAMETER
200FT SERIES

3″ DIAMETER
300FT SERIES



- LINEAR OR NONLINEAR FUNCTIONS
- MULTIPLE TAPS AVAILABLE
- SINGLE OR MULTI-CUP UNITS
- SERVO OR BUSHING MOUNTS
- AVAILABLE WITH SPRING RETURNS, STOPS, SWITCHES, MOTORS, ETC. DESIGNED IN

GENERAL SPECIFICATIONS — CONDUCTIVE PLASTIC

Resistance Tolerance
Standard: ±10%

Theoretical Electrical Travel
Standard: 340°

Ambient Temperature Range
Standard: −55°C to +150°C

Travel Resolution
Essentially infinite

Bearings
Stainless steel ball bearings are standard.

Mechanical Rotation
Normally continuous; however, stops are available.

Life
50 million revolutions

SERIES	DIAMETER	NOMINAL RESISTANCE RANGE	NOMINAL POWER RATING	MAXIMUM STARTING TORQUE	NOMINAL ACCURACY
55 FT	½″	1K to 10K	0.5W @ 25°C	0.35 oz.-in.	±1.0%
34 FT	¾″	1K to 20K	1.0W @ 25°C	0.35 oz.-in.	±0.75%
78 FT	⅞″	1K to 25K	1.0W @ 25°C	0.35 oz.-in.	±0.75%
116 FT	1 1/16″	1K to 50K	1.0W @ 25°C	0.35 oz.-in.	±0.5%
176 FT	1 7/16″	1K to 75K	1.5W @ 25°C	0.50 oz.-in.	±0.5%
158 FT	1⅝″	1K to 75K	2.0W @ 25°C	0.50 oz.-in.	±0.5%
200 FT	2″	1K to 100K	3.0W @ 25°C	0.75 oz.-in.	±0.3%
300 FT	3″	1K to 100K	5.0W @ 25°C	1.0 oz.-in.	±0.25%

VALUES SHOWN ABOVE ARE NOMINAL. FOR SPECIFIC REQUIREMENTS, REFER TO NEI'S COMPLETE CATALOG OR CONTACT OUR APPLICATIONS ENGINEERING DEPARTMENT.

WAFERPOT™ SINGLE-TURN PRECISION CONDUCTIVE-PLASTIC POTENTIOMETERS

(LINEAR & NONLINEAR FUNCTION POTENTIOMETERS SPECIFICALLY DESIGNED FOR HIGH-DENSITY PACKAGING)

		MODEL 116 FT	MODEL 176 FT	MODEL 200 FT
MECHANICAL	Body Diameter	1 1/16″	1 7/16″	2″
	Length (single cup only)	.680	.680	.680
	Length each additional cup	.200	.200	.200
	Starting Torque	.35 oz.-in. max.	.50 oz.-in. max.	.75 oz.-in. max.
	(per cup, additional)	.25 oz.-in. max.	.35 oz.-in. max.	.50 oz.-in. max.
TYPICAL SPECIFICATIONS	Standard Resistance Values	1 K to 50K	1K to 75K	1K to 100K
	Standard Resistance Tolerance	±10%	±10%	±10%
	Standard Accuracy	±0.5%	±0.5%	±0.3%
ELECTRICAL	Travel Resolution (essentially infinite for all models)			
	Electrical Function Angle	340° ±5°	340° ±5°	340° ±5°
	Power Rating @ 25°C (derates linearly to 0 watts @ 125°C)	1.0 watt	1.5 watts	3.0 watts

nej **new england instrument company**

KENDALL LANE · NATICK, MASS. 01760 · (617) 873-9711 · TWX: 710-360-0398

PRECISION POTENTIOMETERS

CUSTOM DESIGNS
SINGLE-TURN PRECISION WIREWOUND TYPES

RELATIVE MERITS OF CONDUCTIVE PLASTIC AND WIREWOUND

The major advantages of conductive plastic potentiometers over wirewounds are infinite resolution and longer life. In most other respects, the two types are comparable. NEI has made it a strong point over the years to maintain **balanced** capability in conductive plastic and wirewound potentiometers. Each has its advantages in given applications, and NEI is the **only** company that can objectively recommend and supply either type.

GENERAL SPECIFICATIONS — WIREWOUND

Resistance Tolerance
Standard: ±5%

Theoretical Electrical Travel
Standard: 340°

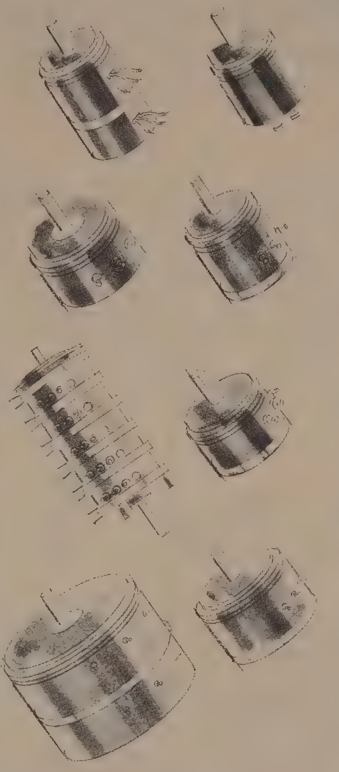
Ambient Temperature Range
Standard: −55°C to +125°C
Special: −55°C to +150°C

Bearings
Stainless steel ball-bearings are standard.

Mechanical Rotation
Normally continuous; however, stops are available.

SERIES	DIAMETER	NOMINAL RESISTANCE RANGE	NOMINAL POWER RATING	MAXIMUM STARTING TORQUE	NOMINAL ACCURACY
55W	½″	100Ω to 50K	2W @ 25°C	0.5 oz.-in.	±3.0%
34W	¾″	100Ω to 100K	2W @ 25°C	0.45 oz.-in.	±2.0%
78W	⅞″	100Ω to 150K	2.5W @ 25°C	0.4 oz.-in.	±1.0%
116W	1 1/16″	100Ω to 150K	3W @ 25°C	0.4 oz.-in.	±0.75%
176W	1 7/16″	100Ω to 250K	3W @ 25°C	0.5 oz.-in.	±0.5%
158W	1⅝″	500Ω to 350K	3.5W @ 25°C	0.65 oz.-in.	±0.5%
200W	2″	500Ω to 500K	4W @ 25°C	0.80 oz.-in.	±0.40%
300W	3″	500Ω to 750K	6W @ 25°C	1.0 oz.-in.	±0.25%

VALUES SHOWN ABOVE ARE NOMINAL. FOR SPECIFIC REQUIREMENTS, REFER TO NEI'S COMPLETE CATALOG OR CONTACT OUR APPLICATIONS ENGINEERING DEPARTMENT.



½″ DIAMETER
55W SERIES

¾″ DIAMETER
34W SERIES

⅞″ DIAMETER
78W SERIES

1 1/16″ DIAMETER
116W SERIES

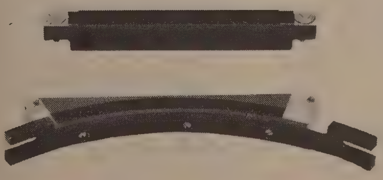
1 7/16″ DIAMETER
176W SERIES

1⅝″ DIAMETER
158W SERIES

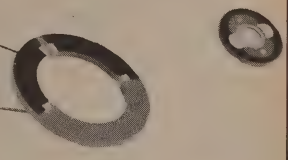
2″ DIAMETER
200W SERIES

3″ DIAMETER
300W SERIES

WIREWOUND & CONDUCTIVE PLASTIC ELEMENTS & ASSEMBLIES



- LINEAR MOTION
- ROTARY MOTION
- LINEAR FUNCTIONS
- NONLINEAR FUNCTIONS
- SECTOR OR FULL 360°
- ELEMENTS INSTALLED IN YOUR SPECIAL ASSEMBLIES & FULLY TESTED IN OUR ENVIRONMENTAL LABORATORY



new england instrument company
KENDALL LANE · NATICK, MASS. 01760 · (617) 873-9711 · TWX: 710-360-0398

MINELCO

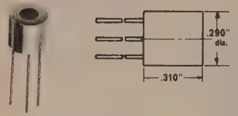
DIVISION OF GENERAL TIME

A TALLEY INDUSTRIES COMPANY

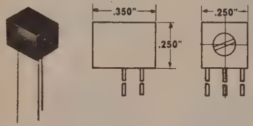
135 SOUTH MAIN STREET ■ THOMASTON, CONNECTICUT 06787 ■ PHONE 203-283-8261 ■ TWX 710-475-1091

Minelco Miniature Trimmer Potentiometers

Minelco Miniature Trimmers are recognized as the smallest potentiometers in the world. They are available in a variety of mountings, termination and adjusting styles, and satisfy most installation requirements. They meet all applicable environmental specifications for military systems. Because of their small size, lightness of weight, sturdy construction and high reliability, these potentiometers lend themselves to airborne and space exploration applications.

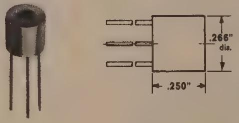


Model MP2

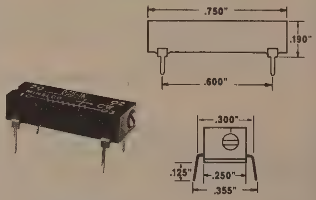


Model MP5

Model MF2
Model MF2S



Model DC5
Model DW5



Models MP2 and MP5
WIREWOUND

Designed for printed circuit mounting and utilize a precious metal alloy wiper. Both are single turn units that rotate 360 degrees mechanically, are O-Ring sealed and humidity sealed. Standard resistance values range from 20 to 15K ohms.
Model MP2 is a top adjustment trimmer.
Model MP5 offers right angle adjustment.
See Bulletin TP-11 for detailed specifications.

Models MF2 and MF2S
METAL FILM

These Metalic Film Trimmers are designed for printed circuit use. They are the smallest trimmer available incorporating the following features in a micro-miniature package: infinite resolution, temperature coefficient <100 ppm, 10 to 100K ohms standard resistance values, and a .250'' x .270'' size.
Model MF2 rotates 360° continuous.
Model MF2S rotates 300° with stop.
See Bulletin MF2 and MF2S for detailed specifications.

Models DC5 and DW5
CERMET and WIREWOUND

Cermet and Wirewound trimmer pots can be manually or automatically inserted. They are sealed against humidity, liquids, potting and soldering compounds. Operating temperatures range from -55°C to +125°C, with a T.C. of 50 ppm/°C on Wirewound and 100 ppm/°C on Cermet. Standard resistance range: 10 to 2 megohms. Designed with stand-off for more efficient circuit board cleaning.
See Bulletins TP14 and TP15 for detailed specifications.

More Miniature Trimmer Potentiometers

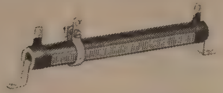
—wirewound — single turn — 20 to 25K ohms — ¼ to ¾ watt

See Bulletin P-67 for detailed specifications.

Model No.	PC1	PC2	MS1	MS2	MS4	MS5	MS7	MS37
Applications All models meet applicable military specifications except where noted.	Potted circuits. Insulated-board mounting. Become fixed resistor after potting. Stud mount.	Potted circuits. Printed-circuit mounting. Becomes fixed resistor after potting.	General purpose. Rear chassis, panel or board mounting. Vertical adjustment.	General purpose. Printed-circuit mounting. Vertical adjustment.	General purpose. Chassis, board mounting. Horizontal adjustment.	General purpose. Printed-circuit mounting. Horizontal adjustment.	General purpose. Front panel or chassis mounting. Vertical adjustment.	High power. Chassis, panel or board mounting. Vertical adjustment.
	L .250'' Dia .250''	L .250'' Dia .250''	L .305'' Dia .250''	L .335'' Dia .250''	H&W .250'' L .375''	H&W .250'' L .375''	L .545'' Dia .250''	L .475'' Dia .375''

OHMITE® dividohm® type 210 adjustable vitreous enameled resistors

SERIES 210



"Dividohm" resistors make ideal voltage dividers for original equipment and replacement in transmitters, rectifiers and other apparatus. Such tapped "bleeders" are made by using one or more adjustable lugs, as required. "Dividohms" are also handy for obtaining odd resistance values, for adjusting circuits, and for use on equipment which must be set to meet various line voltages.

"Dividohm" resistors are vitreous enameled resistors on which a narrow strip has been left uncovered to expose a portion of each turn. Contact to any wire in this strip is made by an embossed contact on the adjustable lug (supplied).

WATT RATING: **The stated wattage rating applies only when the entire resistance is in the circuit.** When the adjustable lug is set at an intermediate point, the wattage rating is reduced in approximately the same proportion, i.e., if the lug is set at half the resistance, the wattage is reduced by one-half. A safe rule to follow is to make sure that the maximum rated current is not exceeded. This should be carefully checked particularly if the resistor will be used as a voltage divider with several adjustable lugs. Resistance tolerance is ±10% for the total resistance value.

	12 WATT Core: 1¾"x5/16"D. Mtg. Ctr: 2 3/16"— Av. Wt. .02 lb. Std. Mtg. Brkt.* No. 5		25 WATT Core: 2"x9/16"D. Mtg. Ctr: 2¾"— Av. Wt. .05 lb. Std. Mtg. Brkt.* No. 9		50 WATT Core: 4"x9/16"D. Mtg. Ctr: 4¾"— Av. Wt. .09 lb. Std. Mtg. Brkt.* No. 9		75 WATT Core: 6"x9/16"D. Mtg. Ctr: 6¾"— Av. Wt. .15 lb. Std. Mtg. Brkt.* No. 9		100 WATT Core: 6½"x¾"D. Mtg. Ctr: 7⅜"— Av. Wt. .20 lb. Std. Mtg. Brkt.* No. 12		175 WATT Core: 8½"x1⅛"D. Mtg. Ctr: 9⅜"— Av. Wt. .50 lb. Std. Mtg. Brkt.* No. 18		225 WATT Core: 10½"x1⅛"D. Mtg. Ctr: 11⅜"— Av. Wt. .62 lb. Std. Mtg. Brkt.* No. 18	
Resist. Ohms	Catalog No.[1]	Max. Amps.	Catalog No.[1]	Max. Amps.	Catalog No.[1]	Max. Amps.	Catalog No.[1]	Max. Amps.	Catalog No.[1]	Max. Amps.	Catalog No.[1]	Max. Amps.	Catalog No.[1]	Max. Amps.
1	**1001**	3.46	**0360**	5.00	**0560A**	7.07	0769A	8.66	**0956A**	10.0	1156A	13.2	**1356A**	15.00
2	**1002**	2.45	**0360B**	3.54	**0560B**	5.00	0769B	6.12	**0956B**	7.07	1156B	9.35	**1356B**	10.60
3	1003	2.00	0361	2.88	0560C	4.07	0769C	5.00	**0956C**	5.77	1156C	7.63	**1356C**	8.67
4					0560D	3.53	0769D	4.33	**0956D**	5.00	1156D	6.60	**1356D**	7.50
5	**1004**	1.54	**0362**	2.24	**0560**	3.16	0769	3.87	**0956**	4.47	1156	5.92	**1356**	6.72
7.5	1005	1.26	0362B	1.82										
10	**1006**	1.09	**0363**	1.58	**0561**	2.23	0770	2.74	**0957**	3.16	**1157**	4.18	**1357**	4.74
15	1007	.89	0364	1.29			0771	2.24						
20	1008	.77	**0364B**	1.12										
25	**1009**	.69	**0365**	1.00	**0562**	1.41	0772	1.73	**0958**	2.00	**1158**	2.64	**1358**	3.00
50	**1010**	.49	**0366**	.71	**0563**	1.00	0773	1.22	**0959**	1.41	1159	1.87	**1359**	2.12
75	**1011**	.40	**0367**	.58	**0564**	.82								
100	**1012**	.34	**0368**	.50	**0565**	.71	0774	.86	**0960**	1.00	**1160**	1.32	**1360**	1.50
150	**1013**	.28	0369	.41	**0566**	.58								
200	**1014**	.24	0370	.35	**0567**	.50	0774B	.61						
250	1015	.22	**0371**	.32	**0568**	.45	0775	.55	**0960B**	.63	1160B	.84	**1360B**	.95
300	1016	.20	**0371B**	.29	0568B	.41	**0775B**	.50						
350	1017	.18												
400	1018	.17	0371C	.25	0568C	.35	0775C	.43						
500	**1019**	.15	**0372**	.22	**0569**	.32	0776	.39	**0961**	.45	1161	.59	**1361**	.67.
600	1020	.14												
750	**1021**	.13	0373	.18	0570	.26	0777	.32						
800	1022	.12	0374	.17	0571	.25	(0777B)	.30						
1000	**1023**	.11	**0375**	.16	**0572**	.22	0778	.27	**0962**	.32	1162	.42	**1362**	.47
1250	1024	.098	0375B	.14	0572B	.20	0778B	.24						
1500	**1025**	.089	0376	.13	0573	.18	0779	.22	0962B	.26	**1162B**	.34	**1362B**	.39
2000	**1026**	.077	**0377**	.12	0574	.16	0780	.19						
2250	1027	.073	0377B	.11	(0574B)	.15	(0780B)	.18						
2500	**1028**	.069	**0378**	.10	0575	.14	(0781)	.17	**0963**	.20	1163	.26	**1363**	.30
3000	1029	.063	0379	.091	0576	.13	(0781B)	.16						
3500	1030	.058	0380	.084	0576B	.12	(0782)	.15						
4000	1031	.055	0381	.079	0577	.11	0782B	.14						
4500	1032	.052	0381B	.074	0577B	.10	(0782C)	.13						
5000	**1033**	.049	**0382**	.070	0578	.10	0783	.12	0964	.14	**1164**	.19	**1364**	.21
6000	1034	.045	0383	.064	0578B	.091	(0783B)	.11						
7000	1035	.042	0383B	.060	0578C	.084	(0783C)	.10						
7500	1036	.040	0384	.057	0579	.081	(0784)	.10						
8000	1037	.039	0384B	.055	0580	.079	(0784B)	.096						
8500	(1038)	.037												
9000	1039	.036	0384C	.052	(0580B)	.074	(0784C)	.091						
10000	**1040**	.035	0385	.050	0581	.071	0785	.086	0965	.10	1165	.13	**1365**	.15
12000			0386	.042	0582	.064	(0785B)	.079						
15000			0387	.036	0583	.057	(0786)	.070	0966	.081	(1166)	.11	1366	.13
20000			0388	.031	0584	.050	(0787)	.061	0967	.071	(1167)	.094	1367	.11
25000			0389	.028	0585	.045	0788	.054	0968	.063	(1168)	.083	1368	.095
30000					0586	.036	(0789)	.050	(0969)	.058	(1169)	.076	(1369)	.087
35000							(0790)	.046						
40000					0587	.029	(0791)	.043	0970	.050	(1170)	.066	1370	.075
45000							(0792)	.035						
50000					0588	.026	(0793)	.033	0971	.045	(1171)	.059	1371	.067
60000					(0589)	.024	(0794)	.030						
75000									(0972)	.032	(1172)	.048	1372	.055
80000					0590	.021	(0795)	.026						
100000					0591	.018	(0796)	.023	0973	.028	1173	.042	1373	.047

* Mounting brackets are automatically supplied in individual unit packs; supplied only when specified in bulk packs.

[1] Popular items appear in BOLD print and are usually in stock at authorized Ohmite stocking distributors. Items in LIGHT FACE print are available from stocking distributors but are not normally stocked in depth. Parentheses indicate non-stock standard items subject to a minimum handling charge per item.

adjustable lugs

One "Screw Driver Type Adjustable Lug" is supplied with each unit. Lugs with a silver contact button can be ordered from the table shown below.

MOVING THE LUGS: Lugs always should be loosened completely before moving and not moved except while the current is off, in order to protect the exposed wire from mechanical or electrical injury and to protect the operator from dangerous voltages.

STANDARD

Core Diam. Inches	Screw Driver Type New Cat. No.	Screw Driver Type Old Cat. No.	Bakelite Knob Type New Cat. No.	Bakelite Knob Type Old Cat. No.
5/16	2115	1058	—	—
9/16	2121	0358	2122	0359
¾	2125	1958	2126	1959
1⅛	2133	2158	2134	2159

With SILVER CONTACT BUTTONS

Core Diam. Inches	Screw Driver Type New Cat. No.	Screw Driver Type Old Cat. No.	Bakelite Knob Type New Cat. No.	Bakelite Knob Type Old Cat. No.
5/16	2116	2161	—	—
9/16	2123	2164	2124	2165
¾	2127	2166	2128	2167
1⅛	2135	2170	2136	2171

This adjustable lug, while is illustrated at left, features two advantages — ease of adjustment and less chance of damaging the resistance wire while moving lugs. Available for 1⅛" cores.
Catalog No. **2160**

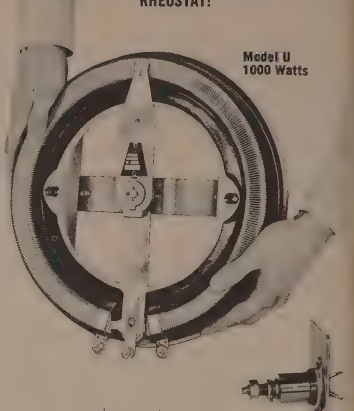
OHMITE® vitreous enameled rheostats (potentiometers)

Now, Ohmite offers TWELVE sizes in its line of famous rheostats.

In all Ohmite rheostats, the resistance wire is wound on a solid ceramic core. The turns are locked in place with tough, protective vitreous enamel or Ohmicone® silicone ceramic. Pivoted, universal action mounting of the brush, assures perfect contact. Metal-graphite contact brushes, varied to fit current and resistance, insure good contact with negligible wear of the wire. Terminals at each end of the winding permit connection of the unit as a potentiometer.

Model C
7½ Watts

NOW, FOR ITS RATING, INDUSTRY'S SMALLEST RHEOSTAT!

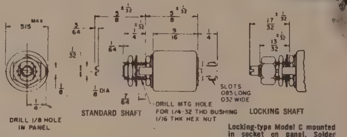

Model U
1000 Watts

Dimensions and Other Parameters	Mod. C Encl.	Model E Unencl.	Model E Encl.	Model H	Model J	Model G	Model K	Model L	Model P	Model N	Model R	Model T	Model U
Rated Watts	7½	12½		25	50	75	100	150	225	300	500	750	1000
Resistance Range - Ohms	10 to 5,000	1 to 15,000		1 to 25,000	0.5 to 50,000	0.5 to 50,000	0.5 to 50,000	0.5 to 50,000	1 to 30,000	1 to 50,000	1 to 20,000	1 to 15,000	1 to 20,000
Overall Diameter	.515	⅞	1¾4	1⁹⁄₁₆	2⁵⁄₁₆	2¾	3⅛	4	5	6	8	10	12
Overall Depth Behind Panel	⅞	¹¹⁄₁₆	1⁵⁄₃₂	1⅜	1⅜	1¾	1¾	2	2⅛	2⅜	2⅛	3	3
Weight - Lbs.	.017	.037	.053	0.19	0.32	0.52	0.64	1.1	2	2.6	4	7.6	10
Mtg. Centers (Dimension "M")	(Single-Hole Mounting)								⅞	1³⁄₁₆	1½	1⅞	3

MODEL "C" — 7½ WATT* — STANDARD & LOCKING SHAFT

Ohms	Amps	Standard Shaft Catalog No.¹	Locking Shaft Catalog No.¹
10	.86	4908	4948
15	.71	4909	(4949)
25	.55	4910	(4950)
35	.46	(4911)	(4951)
50	.39	4912	(4952)
75	.32	(4913)	(4953)
100	.27	4914	4954
150	.22	(4915)	(4955)
200	.19	4916	(4956)
250	.17	4917	(4957)
350	.15	4918	4958
500	.12	4919	(4959)
750	.10	(4920)	(4960)
1000	.086	4921	4961
1500	.071	(4922)	(4962)
2500	.055	(4923)	4963
3500	.046	(4924)	(4964)
5000	.039	4925	4965

*Rating on metal panel — unit is silicone-ceramic coated.


.515 MAX
DRILL 1/8 HOLE IN PANEL
1/8 DIA
STANDARD SHAFT
DRILL MTG HOLE FOR 1/4-32 THD BUSHING 1/16 THK HEX NUT
SLOTS .085 LONG .032 WIDE
LOCKING SHAFT

Locking-type Model C mounted in socket on panel. Solder terminals fit transistor socket.

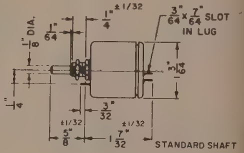
MODEL C ENCLOSED

MODEL "E" — 12½ WATT* — UNENCLOSED & ENCLOSED

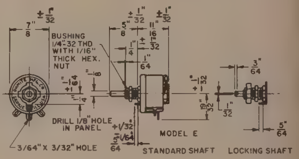
Total Ohms	Max. Amps	Steps Appr.	Unenclosed: Standard Shaft Cat. No.¹	Unenclosed: Locking Shaft Cat. No.¹	Enclosed: Std. Shaft Cat. No.
1	3.53	32	**0101**	L0101	(W0101)
2	2.50	28	**0102**	L0102	(W0102
2.5	2.24	31	(0102A)	(L0102A)	(W0102A)
3	2.04	33	0103	L0103	(W0103)
5	1.58	61	0103A	L0103A	(W0103A)
6	1.44	58	**0104**	L0104	(W0104)
8	1.25	61	**0105**	L0105	(W0105)
10	1.12	76	**0106**	L0106	(W0106)
15	.91	64	0107	L0107	(W0107)
25	.71	67	**0108**	L0108	(W0108)
35	.60	73	**0109**	L0109	(W0109)
50	.50	83	**0110**	L0110	(W0110)
75	.41	101	**0111**	L0111	(W0111)
100	.35	106	**0112**	L0112	(W0112)
125	.32	132	**0113**	L0113	(W0113)
150	.29	125	0113A	L0113A	(W0113A)
175	.27	146	**0114**	L0114	(W0114)
200	.25	132	0114A	L0114A	(W0114A)
250	.22	128	**0115**	L0115	(W0115)
350	.19	149	**0116**	L0116	(W0116)
500	.16	213	**0117**	L0117	(W0117)
750	.13	193	**0118**	L0118	(W0118)
1,000	.11	257	**0119**	L0119	(W0119)
1,500	.091	255	**0120**	L0120	(W0120)
2,500	.071	277	**0121**	L0121	(W0121)
3,500	.060	313	**0122†**	L0122†	(W0122)†
5,000	.050	355	**0123†**	L0123†	(W0123)†
7,500	.041‡	299	4190†	L4190†	(W4190)†
10,000	.035‡	398	**4191†**	L4191†	(W4191)†
12,500	.031‡	434	(4192)†	(L4192)†	(W4192)†
15,000	.029‡	521	4193†	L4193†	(W4193)†

*Rating on metal panel. †Silicone-ceramic coating. ‡7.5KΩ = 305V. max; 10KΩ, 12.5KΩ, and 15KΩ = 350V. max.

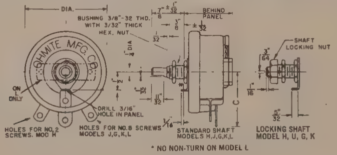
MODEL E ENCLOSED


1/8" DIA.
1/64"
1/4"
±1/32
3/64" x 7/64" SLOT IN LUG
3/64
3/32
±1/32
5/8"
±1/32
1 7/32"
STANDARD SHAFT

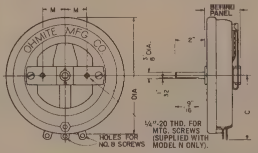
MODEL E UNENCLOSED


7/8"
BUSHING 1/4-32 THD. WITH 1/16" THICK HEX. NUT
DRILL 1/8" HOLE IN PANEL
3/64" x 3/32" HOLE
MODEL E
STANDARD SHAFT
LOCKING SHAFT

MODELS H, J, G, K, L*


DIA.
BUSHING 3/8"-32 THD. WITH 3/32" THICK HEX. NUT
BEHIND PANEL
OHMITE MFG. CO.
SHAFT LOCKING NUT
ON L ONLY
DRILL 3/16" HOLE IN PANEL
HOLES FOR NO.2 SCREWS. MOD H
HOLES FOR NO.8 SCREWS MODELS J,G,K,L
STANDARD SHAFT MODELS H,J,G,K,L
LOCKING SHAFT MODEL H, U, G, K
* NO NON-TURN ON MODEL L

MODELS P, N, R, T, U


M
M
BEHIND PANEL
OHMITE MFG. CO.
3/8 DIA.
DIA
C
HOLES FOR NO. 8 SCREWS
1/4"-20 THD. FOR MTG. SCREWS (SUPPLIED WITH MODEL N ONLY).

25 WATT MODEL "H" — UL Listed

Locking Shaft	Std. Shaft	Total Ohms	Max. Amps	Steps Approx.
L0140	**0140**	1	5.000	30
L0141	**0141**	2	3.540	30
L0142	**0142**	3	2.880	31
L0143	**0143**	6	2.040	50
L0144	**0144**	8	1.770	53
L0145	**0145**	10	1.580	52
L0146	**0146**	15	1.290	67
L0147	**0147**	25	1.000	89
L0148	**0148**	35	.845	98
L0149	**0149**	50	.707	80
L0150	**0150**	75	.575	107
L0151	**0151**	100	.500	142

50 WATT MODEL "J" — UL Listed

Catalog No.¹	Total Ohms	Max. Amps	Steps Approx.
0308	0.5	10.000	24
0309	1	7.070	44
0310	2	5.000	43
0311	4	3.530	42
0312	6	2.880	45
0313	8	2.500	43
0314	12	2.040	86
0315	16	1.760	91
0316	22	1.500	100
0317	35	1.190	125
0318	50	1.000	112
0319	80	.790	143
0320	125	.630	176

75 WATT MODEL "G" — UL Listed

Catalog No.¹	Total Ohms	Max. Amps	Steps Approx.
1100	0.5	12.300	27
(1101)	1	8.660	27
1102	2	6.120	30
1103	3	5.000	28
1104	5	3.880	53
1105	7.5	3.160	50
1106	10	2.740	53
1107	16	2.170	91
1108	25	1.730	113
1109	50	1.230	142

100 WATT MODEL "K" — UL Listed

Catalog No.¹	Total Ohms	Max. Amps	Steps Approx.
0440	0.5	14.100	33
0441	1	10.000	33
0442	2	7.070	32
0443	3	5.750	39
0444	5	4.470	57
0445	7.5	3.650	60
0446	10	3.160	57
0447	16	2.500	88
0448	25	2.000	109
0449	50	1.410	137

150 WATT MODEL "L" — UL Listed

Catalog No.¹	Total Ohms	Max. Amps	Steps Approx.
0524	0.5	17.300	29
0525	1	12.300	41
0526	2	8.650	40
0527	3	7.070	42
0528	5	5.480	44
0529	7.5	4.470	75
0530	10	3.880	79
0531	15	3.163	75
0532	25	2.450	120
0533	35	2.070	133
0534	50	1.735	151

Continued on next page

OHMITE MFG. CO., a North AMERICAN PHILIPS company / 3601 W. Howard St., Skokie, Illinois 60076 / (312) 675-2600 / TWX 910-223-0805 / TELEX 72-4433

OHMITE® vitreous enameled rheostats (potentiometers)

25 WATT
MODEL "H" — UL Listed

Locking Shaft	Std. Shaft	Total Ohms	Max. Amps	Steps Approx.
L0152	**0152**	125	.445	139
L0153	**0153**	175	.373	154
L0154	**0154**	250	.316	177
L0155	**0155**	350	.267	197
L0156	**0156**	500	.222	220
L0157	**0157**	750	.182	261
L0158	**0158**	1,000	.155	278
L0159	**0159**	1,500	.129	267
L0160	**0160**	2,500	.100	341
L0161	**0161**	3,500	.084	315
L0162	**0162**	5,000	.070	355
L4200	4200†	7,500	.058	439
L4201†	**4201†**	10,000	.050	476
L4202†	**4202†**	15,000	.041	431
L4203†	**4203†**	20,000	.035	422
L4204†	**4204†**	25,000	.032	527

†Silicone-ceramic coating, 500V max. for 10KΩ and above. Not UL listed.

50 WATT
MODEL "J" — UL Listed

Catalog No.[1]	Total Ohms	Max. Amps	Steps Approx.
0321	150	.575	170
0322	225	.470	199
0323	300	.408	211
0324	500	.316	284
0325	800	.250	282
0326	1,000	.224	352
0327	1,600	.176	355
0328	2,500	.141	449
0329	3,500	.119	496
0330	5,000	.100	459
0331	8,000	.079	576
0332	10,000	.070	565
4210†	15,000	.058	568
4211†	20,000	.050	599
4212†	25,000	.045	573
4213†	30,000	.041	688
(4214†)	40,000	.035	673
4215†	50,000	.032	842

†Silicone-ceramic coating. 750V max. for 15KΩ and above. Not UL listed.

75 WATT
MODEL "G" — UL Listed

Catalog No.[1]	Total Ohms	Max. Amps	Steps Approx.
1110	75	1.000	134
1111	100	.866	178
1112	200	.612	180
1113	300	.500	211
1114	400	.433	223
1115	500	.388	279
(1116)	750	.316	338
1117	1,000	.274	356
(1118)	1,500	.224	420
1119	2,000	.194	443
(1120)	2,500	.173	441
(1121)	5,000	.123	564
(1122)	7,500	.100	547
1123	10,000	.087	572

100 WATT
MODEL "K" — UL Listed

Catalog No.[1]	Total Ohms	Max. Amps	Steps Approx.
0450	75	1.150	163
0451	100	1.000	172
0452	200	.707	216
0453	300	.575	261
0454	400	.500	272
0455	500	.447	269
0456	750	.365	326
0457	1,000	.316	343
0458	1,500	.258	404
0459	2,000	.224	426
0460	2,500	.200	426
0461	5,000	.141	543
0462	7,500	.115	528
0463	10,000	.100	704

150 WATT
MODEL "L" — UL Listed

Catalog No.[1]	Total Ohms	Max. Amps	Steps Approx.
0535	75	1.415	179
0536	100	1.225	190
0537	150	1.000	225
0538	200	.865	239
0539	250	.775	236
0540	350	.655	265
0541	500	.548	296
0542	750	.447	352
0543	1,250	.346	473
0544	1,800	.288	537
0545	2,250	.259	529
0546	3,000	.224	558
0547	4,500	.182	667
0548	7,500	.141	714
0549	10,000	.122	952

225 WATT
MODEL "P" — UL Listed

Catalog No.[1]	Total Ohms	Max. Amps	Steps Approx.
(1250)	1.0	15.000	42
1251	2.0	10.600	41
1252	3.0	8.660	61
(1253)	4.0	7.500	58
1254	5.0	6.710	57
(1255)	7.5	5.490	60
1256	10.0	4.740	115
1257	15.0	3.870	108
1258	25.0	3.000	114
1259	50.0	2.120	218
1260	75.0	1.730	206
1261	100	1.500	275
1262	150	1.220	259
1263	200	1.060	345
1264	300	.866	326
1265	400	.750	342
1266	700	.567	483
1267	900	.500	484
1268	1,200	.433	513
1269	1,500	.387	641
(1270)	1,750	.358	603
(1270A)	2,000	.336	690
1271	2,500	.300	679

300 WATT
MODEL "N" — UL Listed

Catalog No.[1]	Total Ohms	Max. Amps	Steps Approx.
0650	1.0	17.320	56
0651	2.0	12.240	51
0652	3.0	10.000	51
0653	4.0	8.660	77
0654	5.0	7.750	76
0655	7.5	6.320	72
0656	10.0	5.480	76
0657	15.0	4.470	144
0658	25.0	3.460	134
0659	50.0	2.450	230
0660	75.0	2.000	275
0661	100	1.730	288
0662	150	1.410	345
0663	200	1.220	364
0664	300	1.000	433
0665	400	.866	456
0666	700	.655	500
0667	900	.578	517
0668	1,200	.500	541
0669	1,500	.447	676
(0670)	1,750	.414	625
(0670A)	2,000	.387	714
0671	2,500	.346	720

500 WATT
MODEL "R"

Catalog No.[1]	Total Ohms	Max. Amps	Steps Approx.
0849	1.0	22.300	56
0850	1.5	18.200	71
(0851)	2.0	15.800	75
(0852)	2.5	14.100	78
0853	3.0	12.900	79
0854	4.0	11.200	74
0855	5.0	10.000	104
0856	8.0	7.900	104
0857	12.5	6.300	115
0858	16.0	5.600	186
0859	25.0	4.470	205
0860	40.0	3.540	206
0872	50.0	3.160	205
0861	80.0	2.520	316
0862	125	2.000	388
0863	175	1.690	434
0864	250	1.410	490
0865	325	1.240	505
0866	500	1.000	614
0867	750	.817	735
0868	1,000	.707	769
0869	1,500	.577	932
(0870)	2,000	.500	971
0871	2,500	.447	962

750 WATT
MODEL "T"

Catalog No.[1]	Total Ohms	Max. Amps	Steps Approx.
1300	1.0	27.400	72
(1301)	1.5	22.300	72
(1302)	2.0	19.400	96
(1303)	2.5	17.300	101
(1304)	3.0	15.800	96
(1305)	4.0	13.600	94
1306	5.0	12.200	104
1307	8.0	9.650	100
(1308)	10.0	8.650	139
(1309)	12.5	7.750	138
1310	16.0	6.820	139
1311	25.0	5.470	137
1312	50.0	3.870	246
(1313)	80.0	3.060	381
1314	100	2.740	376
1315	160	2.170	476
1316	200	1.940	469
1317	300	1.580	562
1318	400	1.370	593
1319	600	1.117	705
1320	750	1.000	694
1321	1,200	.791	889
(1322)	1,800	.646	1,050
(1322A)	2,000	.610	935
(1323)	2,500	.547	1,170

1000 WATT
MODEL "U"

Catalog No.[1]	Total Ohms	Max. Amps	Steps Approx.
1450	1.0	31.600	91
1451	1.5	25.800	90
1452	2.0	22.400	90
1453	2.5	20.000	127
1454	3.0	18.300	114
1455	4.0	15.800	120
1456	5.0	14.100	124
1457	8.0	11.200	118
1458	10.0	10.000	117
(1459)	12.5	8.950	163
1460	16.0	7.900	166
1461	25.0	6.330	162
1462	50.0	4.470	327
1463	75.0	3.650	307
1464	100	3.160	446
1465	175	2.390	490
1466	225	2.110	630
1467	300	1.830	661
1468	400	1.580	704
1469	500	1.410	695
1470	750	1.150	828
1471	1,000	1.000	870
1472	1,500	.816	1,040
1473	2,500	.633	1,100

[1] Popular items appear in BOLD print and are usually in stock at authorized Ohmite stocking distributors. Items in LIGHT FACE print are available from stocking distributors but are not normally stocked in depth. Parentheses indicate non-stock standard items subject to a minimum handling charge per item.

OHMITE® molded composition potentiometers

STYLE CMU MIL STYLE RV4N

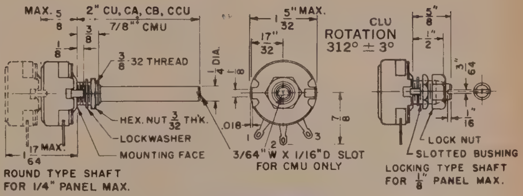
Ohmite molded composition potentiometers (Type AB) provide high quality and dependable performance.

Because the resistance element is a thick, solid-molded ring, longer life and smoother operation are obtained. This is due also to the molded composition contact. Units are dust and splash proof, fungus and corrosion resistant and meet the requirements of military specification MIL-R-94.

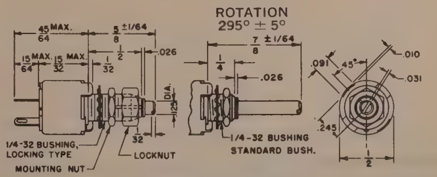
STOCK "POTS" — MIL Units are stamped with MIL and Commercial Designations.

	Type AB (1 5/32" Dia.) Rated 2 Watts						Type AS (1/2" Dia.) Rated 1/2 Watt	
	Single Unit 7/8" Shaft	Single Unit 2" Shaft			Locking	Dual	Miniature Locking	Miniature 7/8" Shaft
Resist.	Style CMU (Linear) Comm. & MIL	Style CU (Linear)	Style CA (CW log)	Style CB (CCW log)	Style CLU (Linear) Comm. & MIL	Style CCU (Linear)	Style AS (Linear) Comm. & MIL	Style ASM (Linear) Comm. & MIL
Range or Limited Ohmic Values	50 to 5.0 Meg.	50 to 5.0 Meg.	0.1 Meg. .25 Meg. .5 Meg. 1.0 Meg. 2.5 Meg.	10,000 25,000 50,000	50 to 5.0 Meg.	10,000 25,000 50,000 1.0 Meg. .25 Meg. .5 Meg. 1.0 Meg.	50 to 5.0 Meg.	50 to 5.0 Meg.
Weight	.064 lb.	.084 lb.			.070 lb.	.123 lb.	.017 lb.	.017 lb.

FOR STOCK ITEMS, CALL LOCAL REPRESENTATIVE LISTED IN INDEX



TYPE AB POTENTIOMETERS



TYPE AS POTENTIOMETERS

OHMITE MFG. CO., a North AMERICAN PHILIPS company / 3601 W. Howard St., Skokie, Illinois 60076 / (312) 675-2600 / TWX 910-223-0805 / TELEX 72-4433

Spectrol

TRIMMING POTENTIOMETERS

Actual size

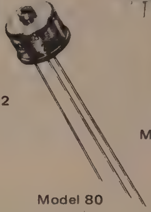
Models 40, RT12

Model 47

Model 50

Models 51, RT24

Models 55, RT22


Model 80

Model 84

WIREWOUND

MODEL NO.	NOMINAL SIZE (INCHES)	NOM. ADJ. TURNS	TERMINAL[1] STYLE	RESISTANCE TOLERANCE %	MAXIMUM POWER RATING (WATTS)	TEMPCO (PPM/° C)	STANDARD RESISTANCE RANGE (OHMS)	U.S. 50 PC. UNIT PRICE
40 (RT 12 Available)	1.25 Long	22	L,PC,SH	±5	1.0 @ 70° C	±50	10Ω–10K	2.68
							20K	3.15
							50K	5.38
							100K	6.46
47 (Clear Lid Available)	0.75 Long	20	PC	±10	1.0 @ 40° C	±50	10Ω–20K	Contact Factory
50	0.38 Square	23	L,PC	±5	0.75 @ 85° C	±50	10Ω–10K	5.60
							20K	6.32
							50K	6.75
51 (RT 24 Available)	0.38 Square	23	PC	±5	0.75 @ 85° C	±50	10Ω–10K	4.16
							20K	4.60
55 (RT 22 Available)	0.50 Square	23	L,PC	±5	1.5 @ 70° C	±50	10Ω–10K	5.60
							20K	6.32
							50K	6.75
80	0.35 Dia.	310°	PC	±5	1.0 @ 50° C	±50	10Ω–10K	3.73
							20K	4.16
							50K	4.53
84	0.50 Dia. (Base)	300°	PC,SH	±5	1.5 @ 70° C	±50	Screw Driver 10Ω–10K	2.94
							20K	3.30
							Knob 10Ω–10K	3.59
							20K	4.01
							Panel Mt. 10Ω–10K	4.66
							20K	5.17

[1] TERMINATIONS: L – COLOR CODED LEAD WIRES, SH – SOLDER HOOKS, PC – PRINTED CIRCUIT PINS.

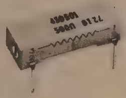
NOTE: ALL TRIMMERS ARE DISTRIBUTOR AUTHORIZED ITEMS.

Spectrol

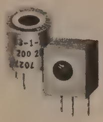
TRIMMING POTENTIOMETERS

Actual size

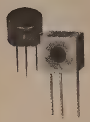
Model 43



Model 45



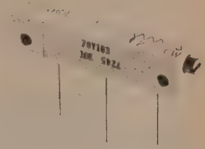
Model 53



Model 62

Model 63

Model 64



Model 70

MODEL NO.	NOMINAL SIZE (INCHES)	NOM. ADJ. TURNS	TERMINAL[1] STYLE	RESISTANCE TOLERANCE %	MAXIMUM POWER RATING (WATTS)	TEMPCO (PPM/° C)	STANDARD RESISTANCE RANGE (OHMS)	U.S. 50 PC. UNIT PRICE
43	0.75 Long	20	PC	±10	0.75 @ 25° C	±100 (100 Ω–2 Meg) –100 to (10 Ω, 20, 50 Ω) +200	10 Ω–2 Meg.	1.15
45	0.75 Long	20	PC (Dual in Line)	±10	0.75 @ 25° C	±100 (100 Ω–2 Meg) –100 to (10 Ω, 20, 50 Ω) +200	10 Ω–2 Meg.	2.01
53	0.34 Dia. Top Adjust 0.31 x 0.34 Side Adjust	240°	PC	±20 (±10 Available)	0.5 @ 85° C	±100 (100 Ω– 1 Meg) 0 to (10 Ω, 20 Ω, 50 Ω) +450	10 Ω– 1 Meg.	1.59
62	0.25 Dia. Top Adjust 0.24 x 0.18 Side Adjust	220°	PC	20 (±10 Available)	0.75 @ 25° C	±100 (100 Ω– 1 Meg) 0 to (10 Ω, 20 Ω, 50 Ω) +450	10 Ω– 1 Meg.	1.45
63	0.38 Square	270°	PC	±20	0.5 @ 70° C	±100 (100 Ω –2 Meg) 0 to +250 (10, 20, 50 Ω)	10 Ω–2 Meg.	0.70
64	0.38 Square	25	PC	± 20	0.5 @ 70° C	± 100 (100Ω–2 Meg) 0 to +250 (10, 20, 50Ω)	10 Ω–2 Meg.	1.46
70	1.25 Long	22	L, PC, SH	±10	1.0 @ 85° C	±100 (100 Ω –2 Meg) 0 to (10 Ω, 20 Ω, 50 Ω) +450	10 Ω–1 Meg.	1.79

Spectrol

PRECISION POTENTIOMETERS

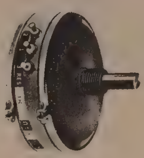
All units shown ½ actual size

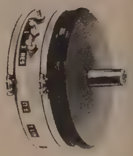
Model 140

Model 152

Model 152 (Servo)

Model 702


Model 302


Model 302 (Servo)

SINGLE TURN

MODEL NO.	NOMINAL DIA.[2] (INCHES)	RESISTANCE RANGE (OHMS)	STANDARD RESISTANCE TOLERANCE	LINEARITY TOLERANCE		MAXIMUM POWER RATING (WATTS)	MOUNTING AVAILABLE	U.S. 50 PC. UNIT PRICE
				STANDARD	BEST PRACTICAL[1]			
100	1.312	5 to 39K	± 3% (± 5% below 50 Ω)	5Ω to 100 Ω ±1.0% 100Ω to 39K ± 0.5%	±.15%	2.75 @ 40° C	Bushing Servo	15.15 19.05
122	1.062	5 to 142K (Bushing 119K Max.)	± 3% (±5% below 20Ω)	5Ω to 200 Ω ± 1.0% 200Ω to 142K ± 0.5%	±.20%	1.5 @ 70° C	Bushing Servo	14.80 17.10
▶ 132	1.312	5 to 39K	± 3% (± 5% below 50 Ω)	5Ω to 200 Ω± 1.0% 200Ω to 39K ± 0.5%	±.20%	2.75 @ 40° C	Bushing	6.30
▶ 140	.500	50 to 70K	± 5%	± 1.0%	±.50%	2.0 @ 40° C	Bushing	5.50
152	.875	5 to 40K	± 3% (±5% below 50Ω)	5Ω to 500 Ω ±1.0% 500Ω and above± 0.5%	±.35%	2.0 @ 40° C	Bushing Servo	5.70 9.70
202	1.750	5 to 65K	± 3% (± 5% below 50Ω)	5Ω to 50Ω ± 1.0% 50Ω to 500 Ω ±.50% 500Ω to 65 K ±.25%	±.15%	3.5 @ 70° C	Bushing Servo	17.30 19.95
302	2.000	5 to 85K	±3% (± 5% below 50Ω)	5Ω to 50 Ω ±1.0% 50Ω to 200 Ω ±.50% 200Ω to 85KΩ ±.25%	±.10%	4.0 @ 70° C	Bushing Servo	20.65 23.20
402	3.000	10 to 155K	±3% (± 5% below 100Ω)	10Ω to 200 Ω ±.50% 200Ω to 155K ±.25%	±.75%	6.0 @ 70° C	Bushing Servo	26.90 28.25
702	.875	5 to 109K (Bushing 91K Max.)	±3% (± 5% below 20Ω)	5Ω to 500 Ω ±1.0% 500Ω to 109K ± 0.5%	±.25%	1.25 @ 70° C	Bushing Servo	13.95 15.95

[1] BEST PRACTICAL LINEARITY FIGURES SHOWN FOR THE VARIOUS MODELS APPLY TO HIGHER RESISTANCE UNITS. CONSULT FACTORY WITH SPECIFIC REQUIREMENTS.

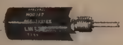
[2] SIZES SHOWN ARE FOR THE BUSHING MOUNT VERSIONS. SHAFT DIA. .125" FOR MODELS 122, 140, 502, 552, 702, AND CW05; .094" FOR MODELS 162 AND 164; .250" FOR ALL OTHER MODELS.

▶ DISTRIBUTOR AUTHORIZED ITEM.

Spectrol

PRECISION POTENTIOMETERS

All units shown ½ actual size

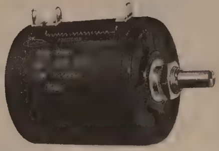


Model 162

Model HEL 05

Model 534

Model 534 (2 Section)



Model 860

				LINEARITY TOLERANCE					
MODEL NO.	NOMINAL DIA[2] (INCHES)	RESISTANCE RANGE (OHMS)	STANDARD RESISTANCE TOLERANCE	STANDARD	BEST PRACTICAL[1]	MAXIMUM POWER RATING (WATTS)	MOUNTING AVAILABLE	U.S. 50 PC. UNIT PRICE	
▶ 533	.875	5 to 60K	±5%	±.25%	±.15%	1.0 @ 70° C	Bushing Servo	5.50 11.00	3 TURN
552	.875	5 to 45K	±3% (±5% below 50Ω)	±.25%	±.125%	1.0 @ 70° C	Bushing Servo	15.55 18.00	
▶ 830	1.812	15 to 155K	±3% (±5% below 100Ω)	±.25%	±.05%	3.0 @ 40° C	Bushing	8.75	
852	1.812	15 to 155K	±3% (±5% below 100Ω)	±.25%	±.05%	2.0 @ 70° C	Bushing Servo	17.10 20.50	
▶ 535	.875	5 to 100K	±5%	±.25%	±.10%	1.5 @ 70° C	Bushing Servo	5.50 11.00	5 TURN
▶ 162 164	.500	100 to 105K	±5%	±.30%	±.15%	2.0 @ 40° C	162 Bushing 164 Servo	9.70 12.55	10 TURN
502	.875	15 to 152K	±3% (±5% below 100Ω)	±.25%	±.05%	2.0 @ 70° C	Bushing Servo	15.55 18.00	
▶ 534	.875	10 to 200K	±5%	±.25%	±.075%	2.0 @ 70° C	Bushing Servo	5.05 10.55	
802	1.812	20 to 519K	±3% (±5% below 200Ω)	±.25%	±.025%	5.0 @ 70° C	Bushing Servo	17.10 20.50	
▶ 860	1.812	20 to 519K	±3% (±5% below 200Ω)	±.25%	±.075%	8.0 @ 40° C	Bushing	8.75	
HEL 05	.500	50 to 100K	±5% (±10% below 100Ω)	±1.0%	±.25%	1.5 @ 40° C	Bushing Flange	6.70	

Spectrol

CONDUCTIVE PLASTIC AND CERMET POTENTIOMETERS

All units shown ½ actual size

Model 126

Model 138

Model 158

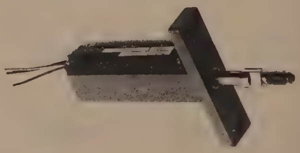
Model 208

Model 708

SINGLE TURN

MODEL NO.	NOMINAL DIA. (INCHES)	RESISTANCE RANGE (OHMS)	RESISTANCE TOLERANCE	LINEARITY	MAXIMUM POWER RATING (WATTS)	OUTPUT SMOOTHNESS	TEMPCO (PPM/° C)	MOUNTING AVAILABLE	U.S. 50 PC. UNIT PRICE
126	1.062	500 to 50K	±10% (Special to ±5%)	±0.5% (Special to ±.15%)	0.6 @ 70° C	0.1%	±400	Servo	Contact Factory
128	1.062	500 to 50K	±10% (Special to ± 5%)	± 0.5% (Special to ±.15%)	1.25 @ 70° C	0.1%	±400	Bushing Servo	21.95 26.05
138	1.312	500 to 100K	±10% (Special to ±2%)	± 0.5%	2.0 @ 40° C	0.1%	±500	Bushing	9.30
158	.875	500 to 100K	±10% (Special to ±2%)	±1.0% (Special to ±.25%)	1.0 @ 40° C	0.1%	±500	Bushing Servo	8.55 11.10
208	1.750	500 to 50K	± 10% (Special to± 5%)	± 0.3% (Special to ± 0.1%)	1.75 @ 70° C	0.1%	±400	Bushing Servo	27.75 30.70
308	2.000	1K to 100K	± 10% (Special to± 5%)	±.25% (Special to ±.05%)	2.0 @ 70° C	0.1%	±400	Bushing Servo	29.50 32.45
408	3.000	1K to 100K	± 10% (Special to ± 5%)	±0.2% (Special to ±.03%)	3.0 @ 70° C	0.1%	±400	Bushing Servo	35.00 36.95
708	.875	500 to 50K	±10% (Special to ± 5%)	± 0.5% (Special to± 0.2%)	1.0 @ 70° C	0.1%	±400	Bushing Servo	21.60 25.60
139	1.312	500 to 1 Meg.	± 10% (Special to ±2%)	±0.5%	5.0 @ 40° C	0.1% Maximum	±100 (50K - 300K)	Bushing	12.35
159	.875	100 to 2 Meg.	±10% (Special to± 2%)	±1.0% (Special to ±.25%)	3.5 @ 40° C	0.1% Maximum	±100 (500 Ω-2 Meg)	Bushing Servo	11.40 15.40

SPECIAL DESIGNS



The Spectrol group offers a unique capability in providing special designs to meet individual customer requirements and has an engineering and manufacturing record for specials that is unsurpassed in the industry. Unlimited options are available on the basic models listed in this Short Form Catalog In cases where required, completely special designs are created.

Non-standard configurations, non-linear functions, spring return mechanisms, special torque devices, detents, sector potentiometers, linear motion potentiometers, concentric shaft controls, clutch–brake mechanisms and many other specials have been furnished.

Contact your Spectrol representative for further information.

Spectrol

SWITCHES AND MULTIDIALS®

All units shown actual size

SUBMINIATURE SWITCHES

Model 87-11-XX

Model 87-21-XX

Model 87-31-XX

MODEL NO.[1]	NOMINAL DIA. (INCHES)	SWITCH ACTION	CONTACT CURRENT RATING	LIFE AT RATED CURRENT	CONTACT RESISTANCE (OHMS)	DESCRIPTION	U.S. 50 PC. UNIT PRICE*
87-11-XX	.500	Positive Detent, 36° Indexing, Stops	250MA @ 28VDC	4,000 Switching Operations, Per Position	.05 Maximum	Screwdriver Adjust	3.25
87-21-XX	.550	Positive Detent, 36° Indexing, Stops	250MA @ 28VDC	4,000 Switching Operations, Per Position	.05 Maximum	Knob Adjust	3.80
87-31-XX	.500	Positive Detent, 36° Indexing, Stops	250MA @ 28 VDC	4,000 Switching Operations, Per Position	.05 Maximum	Bushing Panel Mounting	4.20

TYPICAL SWITCH APPLICATIONS

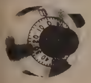
- Logic switching.
- Internal switching device for optional equipment add-ons.
- Test point switching.
- Adapting main-frame computers to peripheral equipment.
- Standardizing printed circuit boards.
- Selecting operational voltages.
- Selecting calibration resistors.

NUMBER OF POLES AND ACTIVE POSITIONS

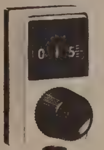
NUMBER OF POLES	ACTIVE POSITIONS	ACTIVE TERMINAL PIN NUMBERS	BASIC PART NUMBER
SINGLE-POLE	1	1 (ON–OFF)	87-XX-11
	2	1 and 2	87-XX-12
	3	1 thru 3	87-XX-13
	4	1 thru 4	87-XX-14
	5	1 thru 5	87-XX-15
	6	1 thru 6	87-XX-16
	7	1 thru 7	87-XX-17
	8	1 thru 8	87-XX-18
	9	1 thru 9	87-XX-19
	10	1 thru 10	87-XX-10
TWO-POLE	1	3 and 8 (ON–OFF)	87-XX-21
	2	2, 3, 7, and 8	87-XX-22
	3	2, 3, 4, 7, 8, and 9	87-XX-23
	4	1 thru 4, 6 thru 9	87-XX-24
	5	1 thru 10	87-XX-25
THREE-POLE	1	1, 4, and 8 (ON–OFF)	87-XX-31
	2	1, 2, 4, 5, 8, and 9	87-XX-32
	3	1 thru 6, 8 thru 10	87-XX-33

MULTIDIALS®

All units shown ½ actual size

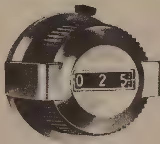

Model 11

Model 16


Model 15-1-11

Model 15-2-11

Model 21


Model 25-1-13

Model 25-4-13

MODEL NO.	NOMINAL DIA. (INCHES)	NUMBER OF TURNS	MINOR SCALE DIVISION	SHAFT BORE (INCHES)	FINISH	U.S. 50 PC. UNIT PRICE
11-1-31	1.000	11	1/50 Turn	.250	Satin Chrome ■	6.95
15-1-11	H 1.750 W 1.000	10 (3 Digit)	1/500 Turn	.250	Satin Chrome	9.70
15-2-11	H 1.750 W 1.000	100 (4 Digit)	1/500 Turn	.250	Satin Chrome	11.40
16-1-11	.875	15	1/50 Turn	.250	Brushed Metal	6.85
21-1-11	1.812	15	1/100 Turn	.250	Satin Chrome ■	6.72
25-1-13	1.812	11 (3 Digit)	1/500 Turn	.250	Satin Chrome	16.65
25-4-13	1.812	100 (4 Digit)	1/500 Turn	.250	Satin Chrome	17.95

[1] LAST TWO DIGITS DENOTE POLE/POSITION, E.G., SINGLE POLE UP TO 10 POSITIONS, 2 POLE UP TO 5 POSITIONS, AND 3 POLE UP TO 3 POSITIONS.

*PRICES SHOWN FOR SINGLE POLE VERSIONS ONLY.

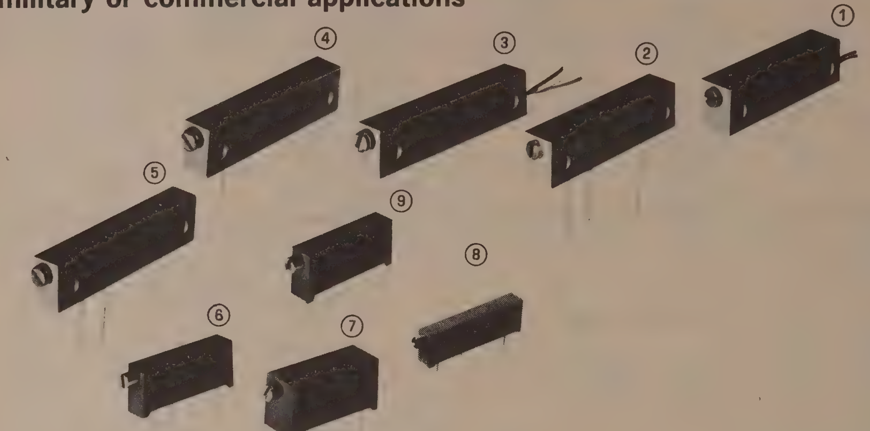
■ MODELS 11 AND 21 ALSO AVAILABLE WITH BRUSHED CHROME FINISH (11-1-31/21–1-31)

NOTE: ALL STANDARD SWITCHES AND DIALS ARE DISTRIBUTOR AUTHORIZED ITEMS.

TRW® IRC POTENTIOMETERS

CIRCUITRIM® RECTANGULAR TRIMMER POTENTIOMETERS

CERMET (Non-wirewound) or Wirewound provide the widest choice for military or commercial applications



Available from TRW/IRC Distributors

CERMET (Non-wirewound) TRW/IRC Metal Glaze®

Illus.	Package L x W x H	TRW/IRC Type	Military Style or Designation	Resistance Ranges ±10% Std.		Terminals	Adjust Turns (Nom)	Power (Watts)
				MIL-Qual.	TRW/IRC			
3	1.25 x .19 x .32	450-00	RJ12L	10Ω-1 MegΩ	10Ω-1 MegΩ	Leads	22	.75 @ 85°C
4	1.25 x .19 x .32	450-10	RJ12P	10Ω-1 MegΩ	10Ω-1 MegΩ	P.C. Pins	22	.75 @ 85°C
5	1.25 x .19 x .32	450-20	RJ12Y	10Ω-1 MegΩ	10Ω-1 MegΩ	P.C. Pins	22	.75 @ 85°C
3	1.25 x .19 x .34	45-00	—	—	100Ω-1 MegΩ ±20%	Leads	22	.75 @ 70°C
4	1.25 x .19 x .34	45-10	—	—	100Ω-1 MegΩ ±20%	P.C. Pins	22	.75 @ 70°C
5	1.25 x .19 x .34	45-20	—	—	100Ω-1 MegΩ ±20%	P.C. Pins	22	.75 @ 70°C
6	.75 x .16 x .31	960-20	—	—	10Ω-1 MegΩ	P.C. Pins	20	.75 @ 25°C
7	.75 x .27 x .35	980-20	—	—	10Ω-1 MegΩ	P.C. Pins	20	.75 @ 25°C
9	.75 x .16 x .31	989-20	(RJ11P Pin Placement)	—	10Ω-1 MegΩ	P.C. Pins	20	.75 @ 25°C

WIREWOUND

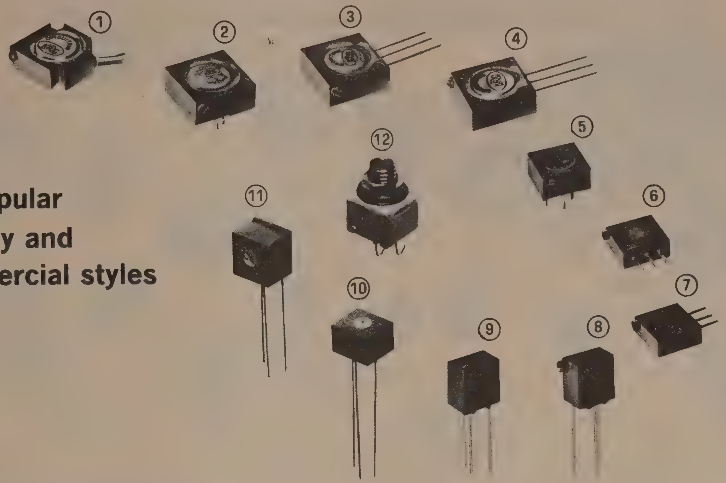
Illus.	Package L x W x H	TRW/IRC Type	Military Style or Designation	Resistance Ranges		Terminals	Adjust Turns (Nom)	Power (Watts)
				MIL-Qual.	TRW/IRC			
1	1.25 x .28 x .32	60-00	RT11CL	—	10Ω-50K ±10%	Leads	22	1.0 @ 70°C
2	1.25 x .28 x .32	60-20	RT11CP	—	10Ω-50K ±10%	P.C. Pins	22	1.0 @ 70°C
3	1.25 x .19 x .32	400-00	RT12C2L	100Ω-20K	10Ω-50K ±5%	Leads	22	.75 @ 85°C
4	1.25 x .19 x .32	400-10	RT12C2P	100Ω-20K	10Ω-50K ±5%	P.C. Pins	22	.75 @ 85°C
5	1.25 x .19 x .32	400-20	RT12C2Y	100Ω-20K	10Ω-50K ±5%	P.C. Pins	22	.75 @ 85°C
3	1.25 x .19 x .34	40-00	—	—	10Ω-50KΩ ±10%	Leads	22	1.0 @ 50°C
4	1.25 x .19 x .34	40-10	—	—	10Ω-50KΩ ±10%	P.C. Pins	22	1.0 @ 50°C
5	1.25 x .19 x .34	40-20	—	—	10Ω-50KΩ ±10%	P.C. Pins	22	1.0 @ 50°C
1	1.25 x .28 x .32	600-00	RT11CP	—	10Ω-50K ±5%	Leads	22	1.0 @ 70°C
2	1.25 x .28 x .32	600-20	RT11CP	—	10Ω-50K ±5%	P.C. Pins	22	1.0 @ 70°C
1	1.25 x .19 x .32	60-00	—	—	10Ω-50KΩ ±10%	Leads	22	1.0 @ 70°C
2	1.25 x .19 x .32	60-10	—	—	10Ω-50KΩ ±10%	P.C. Pins	22	1.0 @ 70°C
—	1.25 x .19 x .32	60-201	—	—	10Ω-50KΩ ±10%	Hook Pins	22	1.0 @ 70°C
8	1″ x .31 x .16	901-20	RT11P-RT12Y	—	10Ω-50K ±5%	P.C. Pins	28	1.0 @ 70°C
6	.75 x .16 x .31	910-20	—	—	10Ω-20K ±10%	P.C. Pins	20	1.0 @ 40°C
7	.75 x .27 x .35	930-20	—	—	10Ω-20K ±10%	P.C. Pins	20	1.0 @ 40°C

NOTES: RT11 and RJ11 Mil. Type Trimmers have been removed from Gov't and Mil. Procurement Lists. Future Procurement should call for RT12 and RJ12 Types.
Trimmer Type 989-20 has .7 x .1 Pin Spacing.
#12-28 Bushing Mount Fixture available for all 1.25″ trimmers. #10-32 used on Type 901-60.

TRW/IRC POTENTIOMETERS, an ELECTRONIC COMPONENTS DIVISION OF TRW INC. 2801 — 72nd St. North, ST. PETERSBURG, FLA. 33733 (813) 347-2181 TWX 810-863-0357

TRW® IRC POTENTIOMETERS

CIRCUITRIM® SQUARE AND CUBE MULTI-TURN TRIMMERS



All popular military and commercial styles

Available from TRW/IRC Distributors

CERMET (Non-wirewound) TRW/IRC Metal Glaze®

Illus.		Package L x W x H	TRW/IRC Type	Military Style or Designation	Resistance Ranges ±10%***		Terminals	Adjust Turns (Nom)	Power (Watts)
					MIL-Qual.	IRC			
1	½″	.5 x .5 x .19	255-00	RJ22CL	10Ω-1 MegΩ	10Ω-1 MegΩ	Leads	25	.75 @ 70°C
2		.5 x .5 x .22	255-10	RJ22CP	10Ω-1 MegΩ	10Ω-1 MegΩ	P.C. Pins Bottom	25	.75 @ 70°C
3		.5 x .5 x .19	255-207*	RJ22CX	10Ω-1 MegΩ	10Ω-1 MegΩ	P.C. Pins Edge	25	.75 @ 70°C
4		.5 x .5 x .19	255-208*	RJ22CW	10Ω-1 MegΩ	10Ω-1 MegΩ	P.C. Pins Edge	25	.75 @ 70°C
1	½″	.5 x .5 x .19	25-00	—	—	100Ω-1 MegΩ ±20%	Leads	25	.75 @ 70°C
2		.5 x .5 x .22	25-10	—	—	100Ω-1 MegΩ ±20%	P.C. Pins Bottom	25	.75 @ 70°C
3		.5 x .5 x .19	25-207*	—	—	100Ω-1 MegΩ ±20%	P.C. Pins Edge	25	.75 @ 70°C
4		.5 x .5 x .19	25-208*	—	—	100Ω-1 MegΩ ±20%	P.C. Pins Edge	25	.75 @ 70°C
5	⅜″	.375 x .375 x .195	750-10	RJ24CP	10Ω-1 MegΩ	10Ω-1 MegΩ	P.C. Pins Bottom	19	.5 @ 70°C
6		.375 x .375 x .21	750-207*	RJ24X	—	10Ω-1 MegΩ	P.C. Pins Edge	19	.5 @ 70°C
7		.375 x .375 x .21	750-208*	RJ24W	—	10Ω-1 MegΩ	P.C. Pins Edge	19	.5 @ 70°C
5	⅜″	.375 x .375 x .195	75-10	—	—	100-1 MegΩ	P.C. Pins Bottom	19	.5 @ 70°C
6		.375 x .375 x .21	75-207*	—	—	100-1 MegΩ	P.C. Pins Edge	19	.5 @ 70°C
7		.375 x .375 x .21	75-208*	—	—	100-1 MegΩ	P.C. Pins Edge	19	.5 @ 70°C
8	5⁄16″	.312 x .312 x .19	850-20	—	—	10Ω-1 MegΩ	P.C. Pins Edge	13	.3 @ 70°C
9		.312 x .312 x .19	850-208	—	—	10Ω-1 MegΩ	P.C. Pins Edge	13	.3 @ 70°C

WIREWOUND

Illus.		Package L x W x H	TRW/IRC Type	Military Style or Designation	Resistance Ranges ±5% Std.		Terminals	Adjust Turns (Nom)	Power (Watts)
					MIL-Qual.	IRC			
1	½″	.5 x .5 x .19	205-00	RT22C2L	50Ω-20K	10Ω-50K	Leads	25	1.0 @ 70°C
2		.5 x .5 x .22	205-10	RT22C2P	50Ω-20K	10Ω-50K	P.C. Pins Bottom	25	1.0 @ 70°C
3		.5 x .5 x .19	205-207*	RT22C2X	50Ω-20K	10Ω-50K	P.C. Pins Edge	25	1.0 @ 70°C
4		.5 x .5 x .19	205-208*	RT22C2W	50Ω-20K	10Ω-50K	P.C. Pins Edge	25	1.0 @ 70°C
1	½″	.5 x .5 x .19	20-00	—	—	50Ω-20KΩ ±10%	Leads	25	1.0 @ 50°C
2		.5 x .5 x .22	20-10	—	—	50Ω-20KΩ ±10%	P.C. Pins Bottom	25	1.0 @ 50°C
3		.5 x .5 x .19	20-207*	—	—	50Ω-20KΩ ±10%	P.C. Pins Edge	25	1.0 @ 50°C
4		.5 x .5 x .19	20-208*	—	—	50Ω-20KΩ ±10%	P.C. Pins Edge	25	1.0 @ 50°C
5	⅜″	.375 x .375 x .195	700-10	RT22C2P	10Ω-10K	10Ω-20K	P.C. Pins Bottom	21	.75 @ 70°C
6		.375 x .375 x .21	700-207*	RT22X	—	10Ω-20K	P.C. Pins Edge	21	.75 @ 70°C
7		.375 x .375 x .21	700-208*	RT22W	—	10Ω-20K	P.C. Pins Edge	21	.75 @ 70°C
5	⅜″	.375 x .375 x .195	70-10	—	—	50Ω-20KΩ ±10%	P.C. Pins Bottom	21	.75 @ 70°C
6		.375 x .375 x .21	70-207*	—	—	50Ω-20KΩ ±10%	P.C. Pins Edge	21	.75 @ 70°C
7		.375 x .375 x .21	70-208*	—	—	50Ω-20KΩ ±10%	P.C. Pins Edge	21	.75 @ 70°C
12		.375 x .375 x .340	320**	—	—	50Ω-20K	Hook Pins Rear	1	1.0 @ 60°C
12	⅜″	.375 x .375 x .340	32	—	—	50Ω-20KΩ ±10%	Hook Pins Rear	1	1.0 @ 60°C
8	5⁄16″	.312 x .312 x .19	800-20	—	—	10Ω-20K	P.C. Pins Edge	15	.6 @ 70°C
9		.312 x .312 x .19	800-208*	—	—	10Ω-20K	P.C. Pins Edge	15	.6 @ 70°C
10		.312 x .312 x .234	300	—	—	50Ω-20K	P.C. Pins Bottom	1	.6 @ 60°C
11		.312 x .296 x .344	310	—	—	50Ω-20K	P.C. Pins Edge	1	1.0 @ 60°C
10	5⁄16″	.312 x .312 x .234	30	—	—	50Ω-20KΩ ±10%	P.C. Pins Bottom	1	0.5 @ 60°C
11		.312 x .312 x .344	31	—	—	50Ω-20KΩ ±10%	P.C. Pins Edge	1	0.5 @ 60°C

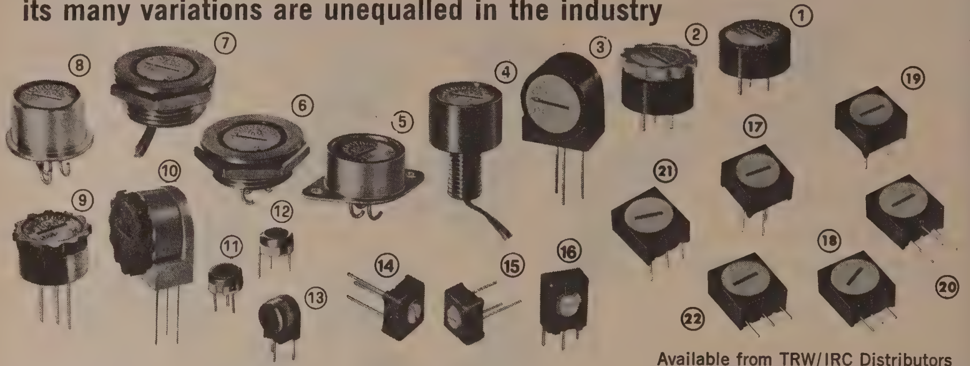
*Suffix 207 denotes Lead Screw Location 90° from Pins. **#10-32 bushing on Type 320. ***Unless otherwise indicated.
Suffix 208 denotes Lead Screw Location 180° from Pins.

TRW/IRC POTENTIOMETERS, an ELECTRONIC COMPONENTS DIVISION OF TRW INC. 2801 — 72nd St. North, ST. PETERSBURG, FLA. 33733 (813) 347-2181 TWX 810-863-0357

TRW® IRC POTENTIOMETERS

CIRCUITRIM® 100 — The World's most experienced — Most versatile ¼″ and ½″ SINGLE TURN TRIMMERS

its many variations are unequalled in the industry



Available from TRW/IRC Distributors

Illus.	TRW/IRC Type***	Description	Pin Spacing & Mounting	Adjustment Control	Resistance Range & Tolerance	Power (Watts)

SINGLE TURN — WIREWOUND

1	100*	½″ Round x .235 High	.1″ Radius, Flat	Top S.D. Slot	10Ω-50K ±5%	1.0 @ 70°C
2	110	½″ Round x .325 High	.1″ Radius, Flat	Top S.D. & Knob	10Ω-50K ±5%	1.0 @ 70°C
3	106-2	½″ Wide x .56 High	.1″ Radius, Vertical	Side S.D. Slot	10Ω-50K ±5%	1.0 @ 70°C
4	108-4	½″ Wide x .56 High	.1″ Radius, Vertical	Side S.D. & Knob	10Ω-50K ±5%	1.0 @ 70°C
5	101-5	½″ Round x .265 High	.1″ Radius, Flange	Top S.D. Slot	10Ω-50K ±5%	1.0 @ 70°C
6	102-5	¾″ Round x .250 Deep	.1″ Radius, Flush	Top S.D. Slot	10Ω-50K ±5%	1.0 @ 70°C
7	103-6	¾″ Round x .315 Deep	10″ Leads, Flush	Top S.D. Slot	10Ω-50K ±5%	1.0 @ 70°C
8	118-7	½″ Round x .312 High	10″ Leads, Flat	Top S.D. Slot	10Ω-50K ±5%	1.0 @ 70°C
9	500	½″ Round x .325 High	.1″ Radius, Flat	Top S.D. & Knob	10Ω-50K ±5%	1.0 @ 70°C
10	506	½″ Wide x .56 High	.1″ Radius, Vertical	Top S.D. & Knob	10Ω-50K ±5%	1.0 @ 70°C

SINGLE TURN — METAL GLAZE® — CERMET

1	150*	½″ Round x .235 High	.1″ Radius, Flat	Top S.D. Slot	10Ω-2 MegΩ ±10%	.75 @ 70°C
2	160	½″ Round x .325 High	.1″ Radius, Flat	Top S.D. & Knob	10Ω-2 MegΩ ±10%	.75 @ 70°C
3	156-2	½″ Wide x .56 High	.1″ Radius, Vertical	Side S.D. Slot	10Ω-2 MegΩ ±10%	.75 @ 70°C
4	158-4	½″ Wide x .56 High	.1″ Radius, Vertical	Side S.D. & Knob	10Ω-2 MegΩ ±10%	.75 @ 70°C
5	151-5	½″ Round x .265 High	.1″ Radius, Flange	Top S.D. Slot	10Ω-2 MegΩ ±10%	.75 @ 70°C
6	152-5	¾″ Round x .250 Deep	.1″ Radius, Flush	Top S.D. Slot	10Ω-2 MegΩ ±10%	.75 @ 70°C
7	103-6	¾″ Round x .315 Deep	10″ Leads, Flush	Top S.D. Slot	10Ω-2 MegΩ ±10%	.75 @ 70°C
8	118-7	½″ Round x .312 High	10″ Leads, Flat	Top S.D. Slot	10Ω-2 MegΩ ±10%	.75 @ 70°C
9	550	½″ Round x .235 High	.1″ Radius, Flat	Top S.D. & Knob	10Ω-2 MegΩ ±30%	.75 @ 70°C
10	556	½″ Wide x .56 High	.1″ Radius, Vertical	Side S.D. & Knob	10Ω-2 MegΩ ±30%	.75 @ 70°C
17	76-10	⅜″ Square x .28 High	.1″ Radius, Flat	Top S.D. Slot	100Ω-1 MegΩ ±10%	.5 @ 70°C
18	76-30	⅜″ Square x .28 High	.2″ Radius, Flat	Top S.D. Slot	100Ω-1 MegΩ ±10%	.5 @ 70°C
19	76-50**	⅜″ Square x .28 High	.15 Inline, Flat	Top S.D. Slot	100Ω-1 MegΩ ±10%	.5 @ 70°C
20	76-20**	.2 x .37 x .42 High	.10 Inline, Vertical	Side S.D. Slot	100Ω-1 MegΩ ±10%	.5 @ 70°C
21	76-40**	.2 x .37 x .42 High	.10 Radius, Vertical	Side S.D. Slot	100Ω-1 MegΩ ±10%	.5 @ 70°C
22	76-70**	.2 x .37 x .42 High	.15 Inline, Vertical	Side S.D. Slot	100Ω-1 MegΩ ±10%	.5 @ 70°C

**Also available with C.W. rotation.
***Available with 0.5W @ 85°C rating, testing to MIL-R-22097, as 760 Series, all styles.

¼″ SINGLE TURN METAL GLAZE® — CERMET

11	170*	¼″ Round x .17 High	.1″ Radius, Flat	Top S.D. Slot	10Ω-1 MegΩ ±20%	.5 @ 85°C
12	171	¼″ Round x .18 High	.1″ Radius, Flat	Top S.D. Slot	10Ω-1 MegΩ ±20%	.5 @ 85°C
13	172	¼″ Wide x .31 High	.1″ Radius, Vertical	Side S.D. Slot	10Ω-1 MegΩ ±20%	.5 @ 85°C
14	180	¼″ Square x .18 High	.1″ Radius Flat	Top S.D. Slot	100Ω-1 MegΩ	.5 @ 70°C
15	181	¼″ Square x .18 High	.1″ Centers Flat	Top S.D. Slot	100Ω-1 MegΩ	.5 @ 70°C
16	182	¼″ Square x .312 High	.1″ Centers Flat	Side S.D. Slot	100Ω-1 MegΩ	.5 @ 70°C

*Basic Mechanical/Electrical Components for these respective series. Mounting variations and type and location of adjustment controls provide versatility and change in model numbering.

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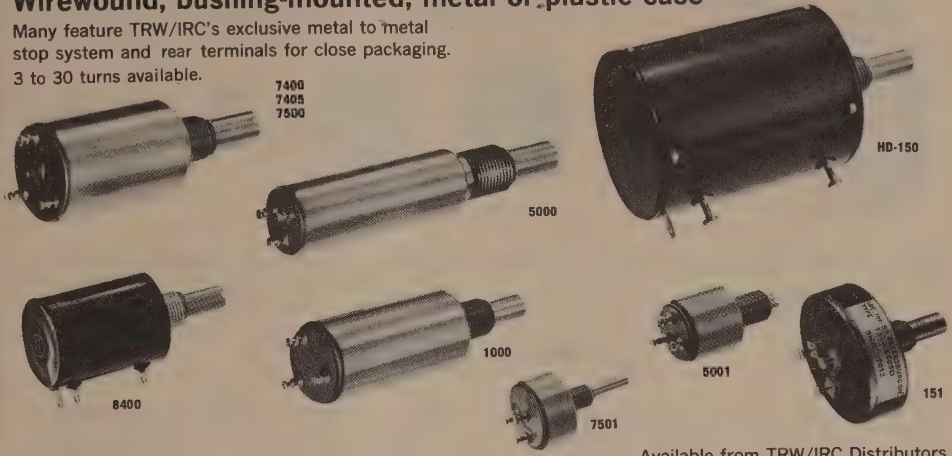
TRW® IRC POTENTIOMETERS

PRECISION SINGLE TURN and MULTI-TURN POTENTIOMETERS

Wirewound, bushing-mounted, metal or plastic case

Many feature TRW/IRC's exclusive metal to metal stop system and rear terminals for close packaging. 3 to 30 turns available.



Available from TRW/IRC Distributors

Specifications	Type 5000 ½″ Dia. Metal Case	Type 5001 ½″ Dia. Metal Case	Type 7400 ¾″ Dia. Metal Case	Type 7405 ¾″ Dia. Metal Case	Type 7500 ¾″ Dia. Metal Case
Electrical					
Resistance Range & Tol.	25Ω-100K ±5%	10Ω-50K ±5%	100Ω-100K ±5%	100Ω-50K ±5%	50Ω-250K ±5%
Power Rating	1.5W @ 40°C	2.0W @ 40°C	3.0W @ 40°C	2.0W @ 40°C	3.0W @ 40°C
Operating Temp. Range	−55°C to +125°C	−65°C to +150°C	−65°C to +125°C	−65°C to +125°C	−55°C to +125°C
Linearity (Indep., Std.)	±5%	±5%	±0.25%	±0.5%	±.25%
Rotation	3600° +4° −0°	320° ±5°	3600° +6° −0°	1800° +6° −0°	3600° +4° −0°
Mechanical					
Dimensions (Dia. x L.B.P.)	½″ x 1 39/64″	½″ x ½″	¾″ x 1¼″	¾″ x 15/16″	¾″ x 1 21/32″
Bushing (Dia. x L.)	⅜″ x ½″	¼″ x ⅜″	⅜″ x 7/16″	⅜″ x 7/16″	⅜″ x ½″
Shaft (Dia. x L.)	¼″ x ½″	⅛″ x ⅛″	¼″ x ½″	¼″ x ½″	¼″ x ½″
Rotation	3600° +4° −0°	320° ±5°	3600° +6° −0°	1800° +6° −0°	3600° +4° −0°

Specifications	Type 7501 ¾″ Dia. Metal Case	Type 1000 1″ Dia. Metal Case	Type 8400 ⅞″ Dia. Phenolic Case	Type HD-150 1½″ Dia. Phenolic Case	Type 151 1½″ Dia. Metal Case
Electrical					
Resistance Range & Tol.	50Ω-75K ±5%	500Ω-200K ±5%	25Ω-100K ±5%	500Ω-600K ±5%	100Ω-100K ±5%
Power Rating	2.25W @ 40°C	3.0W @ 40°C	3.0W @ 40°C	5.0W @ 40°C	3.5W @ 40°C
Operating Temp. Range	−65°C to +150°C	−55°C to +125°C	−55°C to +105°C	−55°C to +100°C	−65°C to +150°C
Linearity (Indep., Std.)	±1%	±0.5%	±.25%	±3%	±0.5%
Rotation	345° ±5°	3600° +4° −0°	3600° +10° −0°	3600° +4° −0°	350° ±5°
Mechanical					
Dimensions (Dia. x L.B.P.)	¾″ x ⅜″	1″ x 1 11/32″	⅞″ x 1⅛″	1½″ x 2.0″	1½″ x ½″
Bushing (Dia. x L.)	¼″ x ⅜″	⅜″ x ½″	⅜″ x 5/16″	⅜″ x 5/16″	⅜″ x ½″
Shaft (Dia. x L.)	¼″ x ½″	¼″ x ½″	¼″ x ½″	¼″ x ½″	¼″ x ½″
Rotation	Cont.	3600° +4° −0° Available in 2 to 15 Turns	3600° +15° −0° Also Avail. in 3 & 5 Turns	3600° +4° −0° Also Avail. in 3 & 5 Turns	Cont.

Note: Consult factory for Shaft and Bushing Modifications, Center Taps, Intermediate Turns, best Practical Resistance and Linearity Tolerances and Moisture or Hermetic Sealing.

REVODEX® TURNS COUNTING DIALS

Eliminate reading errors.

RD-400
Series
1″ Dia. 10 Turns

RDK-400
Series
1″ Dia. 15 Turns

Revodex® Dials are adaptable to all IRC Precision Potentiometers without need for extra panel holes. Life tested for one quarter million cycles. Available in black or clear anodized finish, with or without lock.

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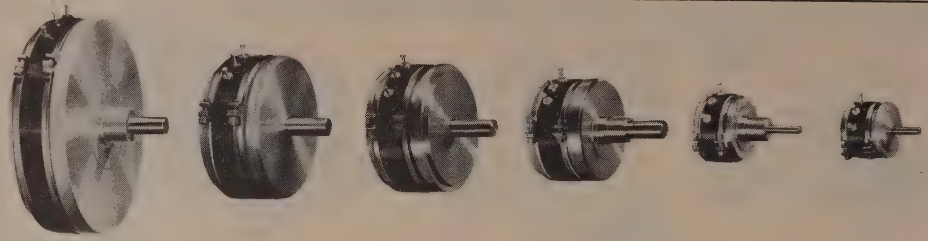
For your local distributor, see EEM pages 2-898 and 2-899.

TRW® IRC POTENTIOMETERS

PRECISION POTENTIOMETERS

7/8″ to 3″ Diameter 1 to 6 Watts



These high performance devices will equal or exceed the appropriate military specifications, as well as those of competitive devices.

Factory services will supply a wide range of mechanical, electrical and environmental modifications. Standard options include special shafts, shaft seals, stops, anti-rotation pins . . . multicup assembly, voltage taps, 1% T.R. tolerance and independent linearity as low as 0.1%.

SPECIFICATIONS

Mfr's Model	Size	Mounting	Linearity*	Power	Torque Starting/ Running	Weight Oz. (gm)	Resistance Range
0871-0001	.875 Dia. x .620	Servo ⅛ Shaft	±.5	1W @ 70°C	0.15	0.6	50, 100, 200, 500, 1K, 2K, 5K, 10K, 20K, 50K
0871-0002	.875 Dia. x .645	Bushing ⅛ Shaft	±.5	1W @ 70°C	0.15	0.6	
1061-0001	1.062 Dia. x .67	Servo ⅛ Shaft	±.5	1.5W @ 70°C	0.15	0.8	50, 100, 200, 500, 1K, 2K, 5K, 10K, 20K, 50K
1061-0002	1.062 Dia. x .645	Bushing ⅛ Shaft	±.5	1.5W @ 70°C	0.15	0.8	
1441-0001	1.437 Dia. x .800	Servo ¼ Shaft	±.5	2W @ 70°C	0.5	1.7	50, 100, 200, 500, 1K, 2K, 5K, 10K, 20K, 50K
1441-0002	1.437 Dia. x .850	Bushing ¼ Shaft	±.5	2W @ 70°C	0.5	1.7	
1751-0001	1.750 Dia. x .800	Servo ¼ Shaft	±.25	2.5W @ 70°C	0.5	2.2	50, 100, 200, 500, 1K, 2K, 5K, 10K, 20K, 50K
1751-0002	1.750 Dia. x .850	Bushing ¼ Shaft	±.25	2.5W @ 70°C	0.5	2.3	
2001-0001	2.00 Dia. x .800	Servo ¼ Shaft	±.25	4W @ 70°C	0.5	3	50, 100, 200, 500, 1K, 2K, 5K, 10K, 20K, 50K
2001-0002	2.00 Dia. x .850	Bushing ¼ Shaft	±.25	4W @ 70°C	0.5	3	
3001-0001	3.00 Dia. x .800	Servo ¼ Shaft	±.25	6W @ 70°C	0.5	5.5	50, 100, 200, 500, 1K, 2K, 5K, 10K, 20K, 50K
3001-0002	3.00 Dia. x .850	Bushing ¼ Shaft	±.25	6W @ 70°C	0.5	5.3	

% RESOLUTION

Model	50Ω	100Ω	200Ω	500Ω	1KΩ	2KΩ	5KΩ	10KΩ	20KΩ	50KΩ	100KΩ
0871	.361	.292	.233	.173	.152	.149	.107	.090	.070	.059	—
1061	.301	.231	.188	.140	.115	.131	.106	.085	.067	.052	—
1441	.253	.201	.172	.143	.106	.087	.093	.072	.058	.044	—
1751	.228	.179	.137	.113	.097	.076	.081	.071	.047	.039	—
2001	—	.177	.138	.111	.089	.066	.071	.065	.044	.033	.027
3001	—	.125	.099	.076	.062	.050	.038	.041	.033	.027	.025

ELECTRICAL CHARACTERISTICS

Resistance Tolerance: ±3%
Effective Electrical Angle: 350° ±2°
End Settings: 1Ω or 0.1% whichever is greater
Noise Ohms ENR: 100 maximum
Dielectric Strength: MIL-R-12934
Sea Level: 1,000 volts AC minimum
Insulation Resistance, 500 volts DC: 1,000 megohms min.

MECHANICAL & PHYSICAL CHARACTERISTICS

Mechanical Angle: Continuous
Shaft Runout: .001 in. (.025mm) T.I.R.
Shaft End Play: .005 in. (.127mm) T.I.R.
Shaft Radial Play: .002 in. (.051mm) T.I.R.
Pilot Surface Runout: .0015 in. (.0381mm) T.I.R.
Lateral Runout: .002 in. (.051mm) T.I.R.
Rotational Life: 1,000,000 shaft revolutions

MECHANICAL & PHYSICAL CHARACTERISTICS (Cont'd)

Moment of Inertia: 16.0 gm cm^2
Ganging: 15 cups maximum
Terminals: Gold plated turrets

ENVIRONMENTAL CHARACTERISTICS

Operating Temperature Range: −65°C to 125°C
Temperature Coefficient of Wire: 20 ppm/°C maximum
Humidity: MIL-R-12934, humidity cycling
Vibration: MIL-R-12934, high frequency
Wiper Bounce: 0.1 millisecond maximum
Wiper Shift: 1.0% maximum
Shock: MIL-R-12934, 100G
Wiper Bounce and Wiper Shift: Same as vibration
Rotational Load Life: MIL-R-12934 par. 4.6.20.2, 1,000 hrs.
Resistance Shift: 5.0% maximum
Salt Spray: MIL-R-12934

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VISHAY RESISTIVE SYSTEMS GROUP

OF VISHAY INTERTECHNOLOGY, INC.

63 LINCOLN HIGHWAY, MALVERN, PA. 19355 • PHONE: (215) 644-1300
• TWX: 510-668-8944

PRECISION TRIMMERS — HIGH PRECISION

Vishay Bulk Metal® trimmers feature a unique combination of precision, stability, TCR, resolution and setability not available elsewhere. These trimmers are designed to conform to Mil-R-39035, types RJR12 and RJR26.

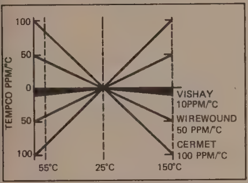
1200 Series
1¼″ rectangular

1240 Series
¼″ Square

Model	Description	Term Style	Mil Style	Resistance	Tol	TCR (ppm/°C)	Power	No. of Turns
1202, 3P	1¼″ Rect.	In Line Pins	RJR12	5Ω to 10K	5%, 10%	10, 20	½ w @ 85°C	25
1202, 3Y	1¼″ Rect.	Staggered Pins	RJR12	5Ω to 10K	5%, 10%	10, 20	½ w @ 85°C	25
1202, 3L	1¼″ Rect.	Wire Leads	RJR12	5Ω to 10K	5%, 10%	10, 20	½ w @ 85°C	25
1202, 3LB	1¼″ Rect.-Panel Mt.	Wire Leads	RJR12	5Ω to 10K	5%, 10%	10, 20	½ w @ 85°C	25
1240X	¼″ Square Edge Mt. Side Adj.	TO-5 Pins	RJR26	5Ω to 5K	5%	10	¼ w @ 85°/C	20
1240W	¼″ Square Edge Mt. Top Adj.	TO-5 Pins	RJR26	5Ω to 5K	5%	10	¼ w @ 85°/C	20
1240P	¼″ Square Side Adj.	TO-5 Pins	RJR26	5Ω to 5K	5%	10	¼ w @ 85°/C	20

THE BEST TEMPCO

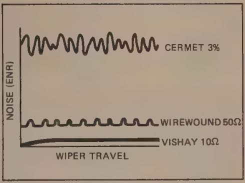
10 ppm/°C



Self compensating characteristics are inherent in the proprietary Bulk Metal® process and produce a dome-shaped T.C. curve with a typical TCR of 5ppm/°C (absolute maximum TCR of 10ppm/°C for all values).

THE LOWEST NOISE

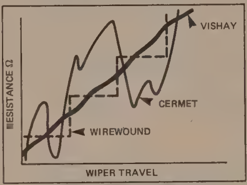
10 Ω ENR



A multi-fingered precious metal alloy wiper in contact with the highly conductive surface of multiple resistance paths virtually eliminates both dynamic noise and catastrophic failures.

THE BEST RESOLUTION SETABILITY

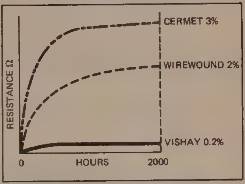
0.05%



The Vishay Bulk Metal® process and the unique patented design assures an accurate setability of less than 0.05% regardless of value while wirewound technology ranges from 1.55% to 0.25%.

THE BEST LOAD LIFE

0.2 %



Only the Vishay Bulk Metal® element can provide a stability of 0.2% max. △R through a 2,000 hour load life.

REON POTENTIOMETERS — ½″ DIA. HOT-MOLDED CARBON

Reon hot molded carbon potentiometers provide stepless and infinitely adjustable resistance values. These lightweight units are made with a unique one-piece cast aluminum alloy housing which provides for their ruggedness and excellent heat dissipating characteristics.

A special carbon collector brush is designed to provide for minimum element wear, long rotational life, and low operating noise.

ELEMENT:
½″ diameter molded carbon

RESISTANCE RANGE:
100Ω to 5 Megohms

TOLERANCE:
10%, 20%

ROTATION:
295° ±5°

RESOLUTION:
Infinite

END RESISTANCE:
Less than the requirements of Mil-R-94 D

NOISE:
3% max., 1% avg.

INSULATION RESISTANCE:
100 Megohm min.

DIELECTRIC WITHSTANDING VOLTAGE:
750 Vrms for 1 min at Atmospheric pressure

RESISTANCE TAPER:
A, B, C, D, E, F

POWER RATING:
RV6, B Series 1/2W at 70°C
H, CL, CK Series 1/4W at 70°C
Derate linearly to 0 W at 120°C

TERMINAL TYPES:
RV6, B Series — Lug Type
H Series — $\frac{5}{64}$″ PC Pin Type
CL, CK Series — $\frac{3}{16}$″ PC Pin Type

SHAFTS:
RV6, B Series — Stainless Steel slotted (⅜″ to 1″)
CL Series — Plastic screwdriver adj.
CK Series — Plastic thumb knob adj.
H Series — Stainless Steel slotted ($\frac{3}{32}$″)

STANDARD SHAFT OPTIONS:
⅜″ (slotted) Military "SL," Reon "S12"
½″ (slotted) Military "SB," Reon "S16"
⅝″ (slotted) Military "SA," Reon "S20"
⅞″ (slotted) Military "SD," Reon "S28"

STANDARD BUSHING OPTIONS: (Plain and Waterseal)
¼″ Military NA, SA, Reon BA2B, BS2B
⅜″ (Locking) Military None, Reon BL3B
½″ (Locking) Military LA, TA, Reon BL4B, BT4B

PANEL MOUNTED

STANDARD
BUSHING

REON TYPE B
or MIL TYPE RV6
All Mil types
available.

PRINTED CIRCUIT MOUNT

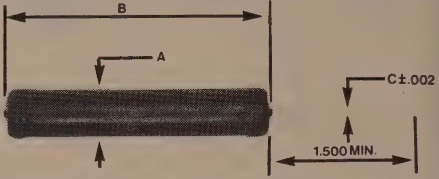
PLASTIC
SCREW
ADJUST.

TYPE CL
Other styles
available.

POWER TEL LABS INC.

1050 SECOND ST. MANCHESTER, N.H. 03102 TWX 710-220-1844 Tel. (603) 625-8994

TYPE EL silicone power



MEET OR EXCEEDS MIL-R-26

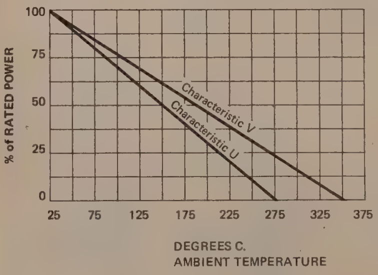
Silicone coated units with axial leads provide maximum power dissipation using the smallest package.

These may be made using standard inductive winding or non-inductive winding. Care must be taken when specifying non-inductive winding as it is possible to achieve only one half the resistance value specified for inductive winding.

A cost savings may be realized as compared to many other precision type units.

Resistance tolerances to 0.05% are available in this series.

Tel Labs Style	Mil Desig. (RW)	Diameter (A)	Length (B)	Lead Size (C)	Wattage 275°C	Wattage 350°C	Radial Leads (special)	Radial Leads Size
EL¼		.090±.031	.215±.031	.020	0.5W	1.0W	Yes	–
EL½		.090±.031	.280±.031	.020	0.5W	1.0W	Yes	.020
EL1A	RW70	.090±.031	.395±.031	.020	1.0W	1.25W	Yes	.020
EL1B		.090±.031	.530±.031	.020	1.0W	1.25W	Yes	.020
EL1C		.135±.031	.335±.031	.025	1.0W	2.0W	No	–
EL2		.250±.031	.625±.062	.032-.040	3.0W	4.0W	Yes	.032
EL2A		.187±.031	.825±.062	.032	3.25W	4.5W	Yes	.032
EL2B		.187±.031	.625±.062	.032	3.0W	3.5W	Yes	.032
EL2C		.250±.031	.562±.062	.032-.040	3.0W	4.0W	Yes	.032
EL2D		.250±.031	.500±.062	.032-.040	3.0W	4.0W	Yes	.032
EL2E	RW59, 69	.195±.031	.500±.062	.025	2.5W	3.5W	No	–
EL2F		.187±.031	.500±.062	.032	2.5W	3.0W	Yes	.032
EL2G		.187±.031	.430±.062	.032	2.5W	3.0W	Yes	.032
EL2H		.187±.031	.385±.062	.032	2.5W	3.0W	Yes	.032
EL21	RW79	.195±.031	.560±.062	.032	3.0W	3.5W	Yes	.032
EL3		.295±.031	.500±.062	.032-.040	3.0W	4.0W	Yes	.032
EL5	RW74	.290±.062	.925±.093	.032-.040	5.0W	6.0W	Yes	.032
EL5A	RW57, 67	.350±.062	1.000±.093	.032-.040	5.0W	6.5W	Yes	.032
EL7		.290±.062	1.200±.093	.032-.040	5.0W	6.5W	Yes	.032
EL7A		.350±.062	1.360±.093	.032-.040	5.0W	7.0W	Yes	.032
EL10A	RW58, 68	.350±.062	1.815±.093	.040	10.0W	12.0W	Yes	.032



STYLE	RESISTANCE 0.05% 0.1% 0.25% 0.5%	RESISTANCE 1% 2% 3% 5%	NORMAL TEMPERATURE COEFFICIENT ± 90 PPM	± 50 PPM	± 30 PPM	± 20 PPM
EL¼	10^ - 950^	1^ - 3.4K	Below 1^	1^ to 6.9^	7^ to 999^	1K - 3.5K
EL½	10^ - 1K	1^ - 7K	Below 1^	1^ to 9.9^	10^ to 799^	800^ - 7K
EL1A	1^ - 2K	.1^ - 10K	Below 1^	1^ to 9.9^	10^ to 999^	1K - 10K
EL1B	1^ - 4K	.1^ - 12K	Below 1^	1^ to 0.9^	10^ to 1.34K	1.35K - 12K
EL1C	1^ - 2K	.1^ - 10K	Below 1^	1^ to 9.9^	10^ to 999^	1K - 10K
EL2	1^ - 12K	.1^ - 40K	Below 1^	1^ to 9.9^	10^ to 4.69K	4.7K - 40K
EL2A	1^ - 10K	.1^ - 35K	Below 1^	1^ to 9.9^	10^ to 3.49K	3.5K - 35K
EL2B	1^ - 8K	.1^ - 30K	Below 1^	1^ to 9.9^	10^ to 2.99K	3.0K - 30K
EL2C	1^ - 8K	.1^ - 30K	Below 1^	1^ to 9.9^	10^ to 2.99K	3.0K - 30K
EL2D	1^ - 7.5K	.1^ - 27K	Below 1^	1^ to 9.9^	10^ to 2.49K	2.5K - 27K
EL2E	1^ - 8K	.1^ - 30K	Below 1^	1^ to 9.9^	10^ to 2.99K	3.0K - 30K
EL2F	1^ - 4K	.1^ - 20K	Below 1^	1^ to 9.9^	10^ to 2.99K	3.0K - 20K
EL2G	1^ - 2K	.1^ - 10K	Below 1^	1^ to 9.9^	10^ to 2.99K	3.0K- 10K
EL2H	1^ - 2K	.1^ - 9K	Below 1^	1^ to 9.9^	10^ to 2.99K	3.0K - 9K
EL21	1^ - 8K	.1^ - 30K	Below 1^	1^ to 9.9^	10^ to 2.99K	3.0K - 30K
EL3	1^ - 8.3K	.1^ - 30.5K	Below 1^	1^ to 9.9^	10^ to 2.99K	3.0K - 30.5K
EL5	.5^ - 22K	.1^ - 70K	Below 1^	1^ to 9.9^	10^ to 7.49K	7.5K - 70K
EL5A	.5^ - 35K	.1^ - 90K	Below 1^	1^ to 9.9^	10^ to 8.39K	8.4K - 90K
EL7	.5^ - 35K	.1^ - 90K	Below 1^	1^ to 9.9^	10^ to 8.24K	8.25K - 90K
EL7A	.5^ - 45K	.1^ - 100K	Below 1^	1^ to 9.9^	10^ to 9.99K	10K - 100K
EL10A	.5^ - 75K	.1^ - 275K	Below 1^	1^ to 9.9^	10^ to 30.99K	31K - 175K

We do just one thing, and one thing well!

POWER TEL LABS INC.

1050 SECOND ST. MANCHESTER, N.H. 03102 TWX 710-220-1844 Tel. (603) 625-8994

Beryllium Oxide Core

Use of beryllium core allows greater power ratings than exhibited by conventional resistors of equal size.

TEL LABS STYLE	MIL DESIG. (RW)	DIAMETER (A)	LENGTH (B)	LEAD SIZE (C)	Wattage Rating U 275° C	Wattage Rating V 350° C	Maximum Resistance MIL	Maximum Resistance TEL LABS
BL1	RW81	.078 ± .015	.265 ± .015	.020	1	1.5	649^	3.4K
BL2		.090 ± .031	.395 ± .031	.020	1.5	2	– – –	4.9K
BL3	RW80	.090 ± .031	.395 ± .031	.020	2.25	2.75	3.16K	10.2K
BL4		.187 ± .031	.625 ± .062	.032	4	5	– – –	25.0K
BL4A		.187 ± .031	.825 ± .062	.032	4.5	6.5	– – –	42.2K
BL5		.250 ± .031	.500 ± .062	.032 - .040	5	7	– – –	33.0K
BL6		.250 ± .031	.625 ± .062	.032 - .040	6	8	– – –	47.0K
BL7		.300 ± .062	.950 ± .093	.032 - .040	7	10	– – –	96.0K
BL10		.300 ± .062	1.218 ± .093	.032 - .040	10	12	– – –	155.0K
BL10A		.350 ± .062	1.815 ± .093	.040	15	18	– – –	275.0K

Same derating as shown on opposite page.

Units are manufactured using stainless steel end caps, all welded construction and high quality resistance wire.

Coating is of high quality silicone to withstand high temperature operation.

Standard tolerances and temperature coefficient as well as specials are available.

Units are supplied with axial leads.

Non-Inductive (Aryton-Perry) specify as "BLN". Maximum resistance (per chart below) would have to be divided by two.

TYPE EH chassis mount aluminum housed

All welded construction

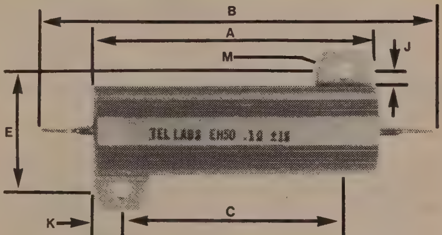
Special molding compound and process assures positive transfer of heat to the case and mounting chassis.

Resistance ranges — per chart below and lower values upon investigation.

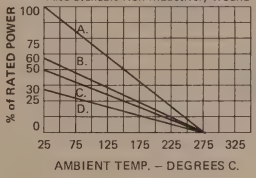
Tolerances — .01% thru 5% — close tolerances on low ohms per application only.

For Non-Inductive, add "N" to style number. Maximum resistance value must be decreased by at least one half of maximum value listed in chart.

Units manufactured to meet or exceed the requirements of MIL-R-18546D.



Also available Non-Inductively Wound



EH5 3.0 GRAMS
EH10 5.6 GRAMS
EH25 11.7 GRAMS
EH50 25.0 GRAMS

A. EH5, 10, 25, 50 Mounted
B. EH10 Unmounted
C. EH5, 25 Unmounted
D. EH50 Unmounted

TEL LABS STYLE	A ±.031	C ±.005	E ±.005
EH5	.600	.444	.490
EH10	.750	.562	.625
EH25	1.062	.718	.781
EH50	1.937	1.562	.843

MOUNTING

EH25, 50 5x7x2 Aluminum Chassis
EH5, 10 4x6x2 Aluminum Chassis

TEL LABS STYLE (Anodyzed)	WATTAGE Mounted	WATTAGE Unmounted	RESISTANCE RANGE 1% - 5%	TEMP. COEFFICIENT ±50 PPM	TEMP. COEFFICIENT ±20 PPM
EH5	8W	4W	0.1Ω to 22K	0.1Ω to 30Ω	OVER 30Ω
EH10	10W	6W	0.1Ω to 40K	0.1Ω to 50Ω	OVER 50Ω
EH25	25W	10W	0.1Ω to 70K	0.1Ω to 100Ω	OVER 100Ω
EH50	50W	12W	0.1Ω to 250K	0.1Ω to 300Ω	OVER 300Ω

Meets or exceeds MIL R-18546D.

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PRECISION TEL LABS INC.

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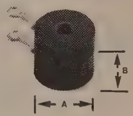
SL series series



MIL R 93D DESIG.	TEL LABS STYLE	A ± .015	B ± .031	MAX. VALUE MIL.	MAX. VALUE COMM.	WATTAGE MIL.	WATTAGE COMM.	MAX. V. MIL.	MAX. V. COMM.	HOLE CLEARANCE SCREW #
	SL21	.500	.500		350K	0.25W	0.5W	300	600	6
RB16	SL31	.500	.687	1 MEG.	1.5 MEG.	0.33W	0.6W		600	6
RB17	SL50	.562	1.000	2 MEG.	3.5 MEG.	0.5W	1.0W	600	1200	6
RB18	SL60	.750	1.250	3.01 MEG.	4.25 MEG.	0.75W	1.5W	600	1200	6
RB19	SL70	.906	2.125	6.03 MEG.	10 MEG.	1.0W	2.0W	900	2400	6

Conformal and Shell encapsulated

Excellent under critical environmental conditions Available with .032 Leads. Specify Letter "X" after style (SL21X)

Temperature Coefficients from 0±20 PPM°C to 0±5 PPM/ °C

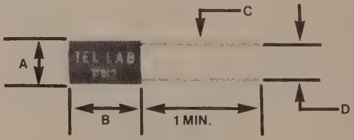
Matching in sets to 2 PPM

NonInductively Wound

Stabilities available on a production basis to 0.005%/year.

TYPE PW series

Conformal and Shell Encapsulated. Designed Specifically for Printed Circuit Applications. Temperature coefficients from 0±20 PPM to 0±5 PPM Matching to 2 PPM. Inductive or Noninductive Winding. Stabilities available on a production basis to 0.005%/year.



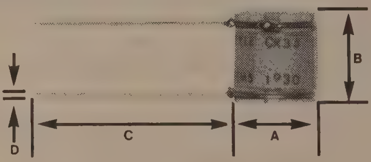
Mil R 93D Desig.	Tel Labs Style	A ± .015	B ± .032	C	D ± .015	MAX. Mil.	VALUE Comm.	WATTAGE Mil.	WATTAGE Comm.	MAX. V. Mil.	MAX. V. Comm.
RB71	PW1	.250	.312	.025	.200	100K	125K	.125W	.15W		300
	PW2	.250	.406	.025	.200		175K		.2W		600
RB70	PW20	.375	.500	.032	.200, .250	301K	375K	.250W	.33W	150	600
	PW40	.468	.625	.032	.250, .300		500K		.3W		600
	PW31	.500	.625	.032	.250, .300		1.75 Meg		.6W		600
	PW10	.406	1.250	.032	.250, .300		1.0 Meg		1.0W		1200
	PW50	.531	1.000	.032	.250, .300		3.0 Meg		1.0W		1200

TYPE CR CA CL series

CERAMIC CORE RESISTORS
"CR" Ceramic Radial Leads
"CA" Ceramic Axial Leads
"CL" Ceramic Lugs

Ceramic spool type unit. Windings sealed in varnish. Hole provided for screw mounting. Operate from -65°C to 105°C. Inherently good stability.

Excellent for use under laboratory conditions and most commercial applications.



Style	Diameter A ±.015	Length B ±.031	Lead Diam. D	Max Value (.0005 Wire)	Wattage	Max. V	Hole (clearance) Screw #
CR16	.250	.250	0.20	100K	0.1W	200	0
CR1	.250	.406	.020-0.25	400K	0.15W	400	2
CR23	.281	.343	.020-.025	250K	0.15W	200	2
CR18	.343	.312	.020-.025	400K	0.2W	200	6
CR2	.250	.687	.020-.025	1.25 Meg.	0.25W	400	0
CR20	.375	.437	.020-.032	1.0 Meg.	0.25W	200	4
CR25	.500	.437	.025-.032	1.5 Meg.	0.33W	400	6
CR27	.375	.656	.025-.032	1.5 Meg.	0.5W	400	4
CR31	.500	.625	.025-.032	3.0 Meg.	0.5W	400	6
CR35	.500	.562	.025-.032	3.25 Meg.	0.5W	400	6
CR53	.500	1.000	.025-.032	6.0 Meg.	1.0W	800	6
CR60	.750	1.250	.025-.032	6.0 Meg.	1.5W	800	6
CR71	.812	2.093	.025-.032	20.0 Meg.	2.5W	1600	6

1. All units above may be supplied with Axial Leads, specify "CA".
2. Lugs may be supplied on the following; CL25, CL31, CL35, CL53, CL60, CL71

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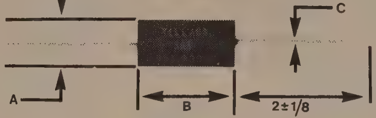
TYPE SA epoxy



DESIGNED TO MEET OR EXCEED MILR93D
All units represented may be modified for minimum inductance and capacitive effects at frequencies above the audio range. Rise and decay time characteristics are measured from 10% to 90% of peak pulse amplitude with a 100 kilocycle pulse input.

Temperature coefficients are available to 0 ± 4PPM/ °C. and T.C. matches are available to 2PPM/°C.

Stabilities of 0.005% per year are available on a production basis.

Tel Labs Style	Mil R93D Desig.	Diam. A ± .015	Length B ± .031	Lead Diam. C.	MAX. VALUE Mil.	MAX. VALUE Comm.	WATTAGE Mil.	WATTAGE Comm.	MAX. VOLTAGE Mil.	MAX. VOLTAGE Comm.
SA1	RB55	.250	.500	.032	226 K	1.1 Meg	.15W	.3W	400	400
SA2	RB54	.250	.750	.032	448 K	2 Meg	.25W	.4W	300	400
SA3	RB53	.375	.750	.032	750 K	8 Meg	.333W	.5W	300	400
SA4	RB52	.375	1.000	.032	1.5 Meg	10 Meg	.5W	.75W	600	800
SA5	RB57	.500	1.000	.032	2 Meg	16 Meg	.75W	1.0W	800	1000
SA6	RB58	.500	1.531	.032	3 Meg	24 Meg	1.0W	1.5W	900	1200
SA7	RB59	.500	2.031	.032	5.11 Meg	24 Meg	1.25W	2.0W	1200	1800
SA11		.250	.625	.032		400 K		.33W		800
SA13		.312	.937	.032		1.2 Meg		.5W		800
SA16	RB56	.250	.375	.032	127 K	205 K	.125W	.25W	200	200
SA19		.250	.250	.032		500 K		.2W		200
SA18		.500	.500	.032		3 Meg		.5W		.500

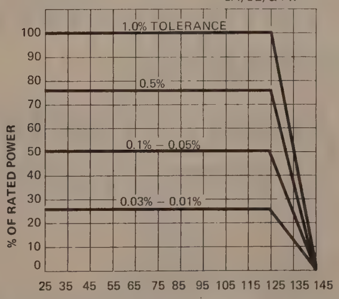
subminiatures

Tel Labs Style	Diameter A ±.015	Length B ±.031	Lead Diam. C.	Maximum Value	Maximum Wattage	Maximum Voltage
SA9	.135	.312	.025	400 K	.08W	100
SA10	.185	.500	.025	500 K	.2W	100
SA17	.109	.270	.020	200 K	.05W	100
SA20	.165	.500	.025	400 K	.150W	100, 200
SA21	.187	.375	.025	500 K	.125W	100, 200
SA22	.150	.400	.025	190 K	.07W	100
SA24	.125	.250	.020	75 K	.05W	100
SA25	.110	.300	.020	85 K	.05W	100
SA26	.125	.375	.025	140 K	.05W	100
SA29	.100	.300	.025	80 K	.05W	100
SA30	.200	.405	.025	550 K	.13W	100
SA31	.100	.220	.020	70 K	.04W	100

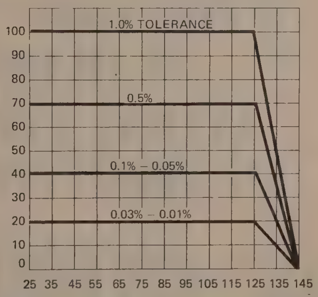
Derating Charts

standard series

SA, SL, & PW



subminiatures



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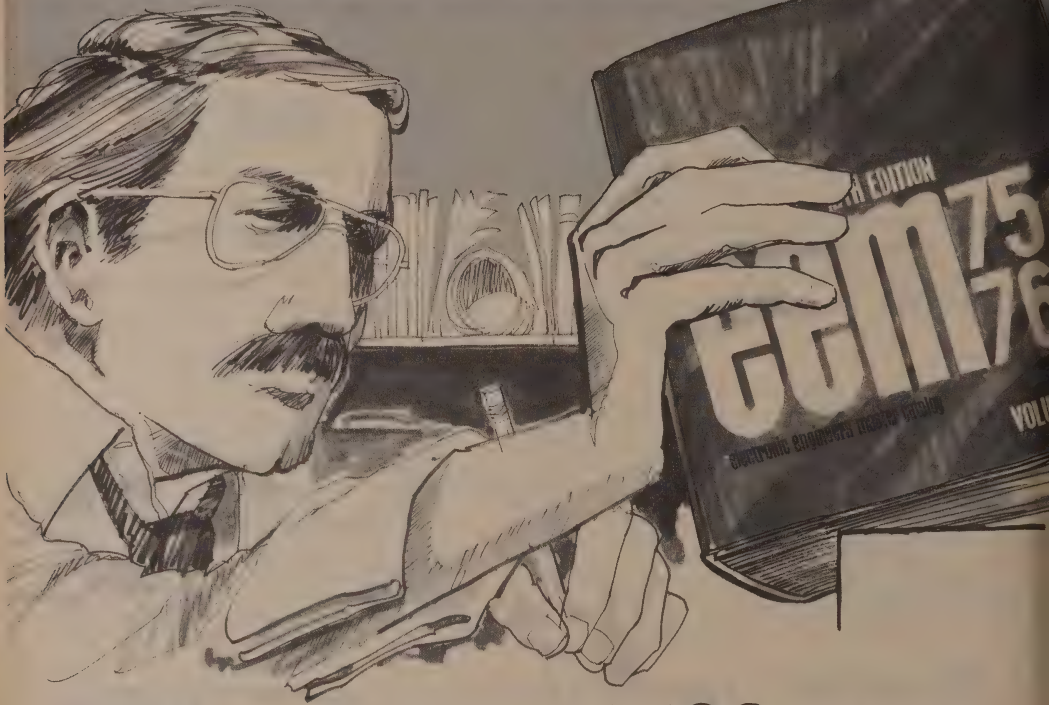
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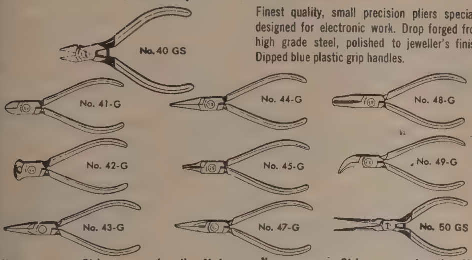
MEADVILLE, PA. 16335

Little Champ PRECISION PLIERS

Finest quality, small precision pliers specially designed for electronic work. Drop forged from high grade steel, polished to jeweller's finish. Dipped blue plastic grip handles.



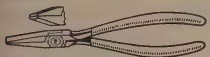
No.	Style	Length	Net
40GS	Flush Cutting, Sharp Nose Diagonal, Coiled Spring	4¼"	$7.60
41G	Diagonal Cutter	4¼"	6.00
41GS	Diagonal Cutter, Coiled Spring	4¼"	6.50
42G	End Cutting Nipper	4"	6.00
43G	Needle Nose, No Side Cutter, Plain Nose	4¾"	5.50
43GS	Needle Nose, No Cutter, Plain Nose, Coiled Spring	4¾"	6.00

No.	Style	Length	Net
44G	Plain Nose	4¾"	$5.20
45G	Round Nose	4½"	5.50
47G	Needle Nose, Side-Cutter, Nose Serrations	4¾"	6.20
47GS	Needle Nose, Side Cutter, Nose Serrations, Coiled Spring	4¾"	6.70
48G	Transverse End Cutter	4¾"	6.00
49G	Curved Needle Nose	4½"	5.80
50GS	Extra Long Needle Nose, Coiled Spring	5¾"	6.80

Specially Designed ELECTRONICS PLIERS

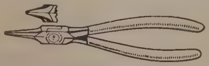
Four matched, long-reach pliers with precision matched jaws, hand honed cutting edges. Drop forged of special analysis steel, properly heat treated. Polished finish. Smooth, dipped plastic, blue grips.

No.	Size	Net
718G	8"	$6.00
728G	7½"	7.00
738G	8"	6.00
748G	8"	6.00



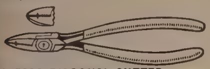
NO. 718G FLAT NOSE PLIERS

Precision-matched jaws give firm grip in hard-to-reach places.



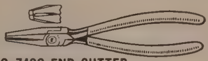
NO. 738G ROUND NOSE PLIERS

You can pick up a hair with these precision machined points.



NO. 728G DIAGONAL CUTTER

Patented wire-stripping notch that **really works!**



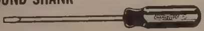
NO. 748G END CUTTER

Fine enough to cut a human hair, sturdy enough to cut 12 gauge copper wire.

SCREWDRIVERS

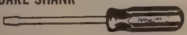
Blades forged from tough chrome vanadium steel. Tips ground lengthwise for greater end strength and snug fit in screw slot. Opaque blue plastic (UL) handles are shockproof, breakproof and shaped for non-slip grip.

ROUND SHANK



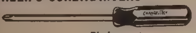
No.	Blade Size, In.	List	No.	Blade Size, In.	Net
181RD	1/8 x 1	$1.12	31610RD	3/16 x 10	$2.20
3164RD	3/16 x 4	1.66	144RD	1/4 x 4	2.10
3166RD	3/16 x 6	1.76	146RD	1/4 x 6	2.20
3168RD	3/16 x 8	2.06	5166RD	5/16 x 6	2.48

SQUARE SHANK



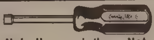
No.	Blade Size, In.	List	No.	Blade Size, In.	Net
141SQ	1/4 x 1	$1.38	5166SQ	5/16 x 6	$2.62
3164SQ	3/16 x 4	1.76	5168SQ	5/16 x 8	2.88
144SQ	1/4 x 4	2.12	388SQ	3/8 x 8	3.68
146SQ	1/4 x 6	2.34	3812SQ	3/8 x 12	5.08
148SQ	1/4 x 8	2.48			

PHILLIPS SCREWDRIVERS



No.	Blade Size, In.	Net
102-SP	1/4 x 1 5/16	$2.02
101-P	3/16 x 3	1.88
102-P	1/4 x 4	2.20
103-P	5/16 x 6	2.92
104-P	3/8 x 8	3.58

NUTDRIVERS



Hex	Lgth.	Net	Hex	Lgth.	Net
3/16	3	$2.06	11/32	3	$2.06
7/32	3	2.06	3/8	3	2.06
1/4	3	2.06	7/16	3 1/8	2.48
9/32	3	2.06	1/2	3 1/8	2.48
5/16	3	2.06			

SCREWDRIVER KIT

Pocket-size, handy bench sets, color coded. Special E-Z Grip handle included.

SCREWDRIVER KIT SD-5

Includes:

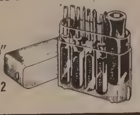
5 Screwdrivers:

3/32", 1/8", 5/32", 3/16", 1/4"

3 Phillips Head:

No. 0, No. 1 and No. 2

Net: $8.64



NUTDRIVER KIT

Pocket-size, handy bench sets, color coded. Special E-Z Grip handle included.

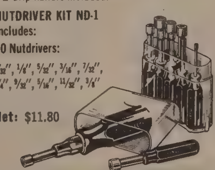
NUTDRIVER KIT ND-1

Includes:

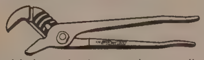
10 Nutdrivers:

3/32", 1/8", 5/32", 3/16", 7/32",
1/4", 9/32", 5/16", 11/32", 3/8"

Net: $11.80



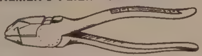
TONGUE AND GROOVE PLIERS



The **original, genuine** tongue and groove plier. Patented, non-slip undercut channels. Patented reinforcing rib for extra strength. Dipped plastic grips optional at slight extra cost.

No.	Size	Adjust	Capacity	Net
420	9½"	5	1½"	$5.40
424	4½"	4	½"	4.80
426	6½"	5	⅞"	4.20
430	10"	7	2"	5.60
440	12"	7	2¼"	6.00
460G	16"	8	4¼"	9.00

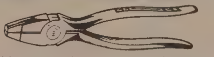
LINEMEN'S PLIER—Bevel Nose



Polished steel finish. Knurled grips. Side cutter. Dipped plastic grips optional at slight extra cost.

No.	Size	Net
3046	6"	$6.50
3047	7"	6.80
3048	8½"	8.00

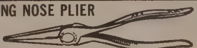
LINEMEN'S PLIER—Rounded Nose



Polished steel finish. Knurled grips. Side cutter. Dipped plastic grips optional at slight extra cost.

No.	Size	Net
346	6"	$6.50
347	7"	6.80
348	8½"	8.00

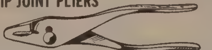
LONG NOSE PLIER



Point 3/32" round. Polish steel finish. Knurled grips. Dipped plastic grips optional at slight extra cost.

No.	Size	Side Cutter	Net
317	7½"	With	$6.50
3017	7½"	Without	5.40
326	6"	With	5.90
3026	6"	Without	4.90

SLIP JOINT PLIERS



Thin Nose. Polished steel. Wire cutting shear

No.	Size	Net
516	6"	$4.30

With Side Cutter. Polished steel. Precision tool with fine cutting edge.

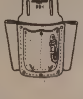
No.	Size	Net
537	7"	$7.00

Heavy Duty With Cutter. Finest quality. Polished steel.

No.	Size	Net
546	6"	$4.30
548	8"	5.00
5410	10"	5.30

TOOL HOLSTERS

Highest quality top grain leather. Stress points reinforced with rivets. Convenient knife or wrench snap.

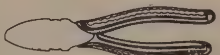


No.	Size	No. Pkts.	Net
1	9¼" x 8½"	5	$9.64
2	9¼" x 10½"	5	10.74

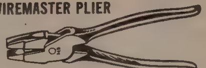
SUPERIOR PLASTIC GRIPS

For maximum hand comfort, durable molded plastic grips. Blue color for good visibility, reduce plier loss. Easy to install. Order by desired grip size.

Plier Size	Grip Size	Net
6"	Small	$1.02
7"	Medium	1.10
8", 9½", 10"	Large	1.20



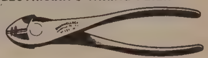
WIREMASTER PLIER



Finest wire-cutting plier ever made. Joint rivet closer to cutting provides 40% more cutting power than standard design pliers. Special enclosed-joint construction holds cutter edges in perfect alignment for life of plier. Dipped plastic grips optional at slight extra cost.

No.	Size	Net
349	9"	$9.90

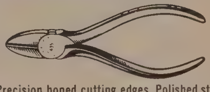
ELECTRICIAN'S WIRING PLIER



Triple-use wiring plier: Cuts, strips insulation, loops wire. Patented wire stripping notches strip insulation from 14 and 12 gauge copper wire quickly, cleanly. Dipped plastic grips optional at slight extra cost.

No.	Size	Net
337-W	7"	$6.80

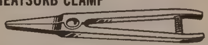
DIAGONAL CUTTER—Box Joint



Precision honed cutting edges. Polished steel finish. Knurled grips. Dipped plastic grips optional at slight extra cost.

No.	Size	Net
435	5"	$5.50
436	6"	6.00
437	7"	6.70

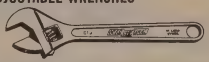
HEATSORB CLAMP



Specially designed "heat sink" that prevents heat damage to electronic components during soldering. Also a handy, self-gripping "third hand" that holds and retrieves small parts in close work.

No.	Size	Net
46	5"	$2.20

ADJUSTABLE WRENCHES

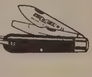


Drop forged of special analysis steel. Chrome plated. Dipped plastic grips optional at slight extra cost.

No.	Size	Cap.	Net	No.	Size	Cap.	Net
804	4"	½"	$5.30	810	10"	1⅛"	$7.80
806	6"	¾"	5.40	812	12"	1 15/16"	11.30
808	8"	15/16"	6.10	815	15"	1 11/16"	17.00

ELECTRICIAN'S KNIFE

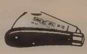
2½" precision-honed blade.
3" self-locking screwdriver.
Unbreakable phenolic plastic handle.



No.	Closed Length	Net
11	3¾"	$6.38

SKINNING KNIFE

3" precision-honed blade.
Self-locking. Unbreakable phenolic plastic handle.



No.	Closed Length	Net
10	4"	$7.30

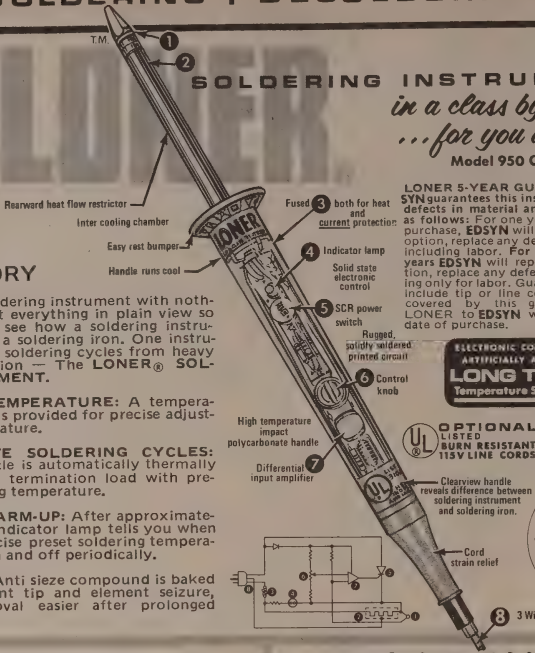
SOLDERING + DESOLDERING + RESOLDERING

FOR HOME AND INDUSTRY EDSYN® PRODUCTS

LONER T.M. SOLDERING INSTRUMENT

in a class by itself ...for you alone!

Model 950 CL080



① Temperature sensor
② 50 watt forward flow heat element
Rearward heat flow restrictor
Inter cooling chamber
Easy rest bumper
Handle runs cool
Fused ③ both for heat and current protection
④ Indicator lamp
Solid state electronic control
⑤ SCR power switch
Rugged, solidly soldered printed circuit
⑥ Control knob
High temperature impact polycarbonate handle
Differential ⑦ input amplifier
Clearview handle reveals difference between soldering instrument and soldering iron.
Cord strain relief
⑧ 3 Wire Cord

LONER® STORY

FEATURES: A soldering instrument with nothing to hide, we left everything in plain view so that you can best see how a soldering instrument differs from a soldering iron. One instrument performs all soldering cycles from heavy to micro termination — The **LONER® SOLDERING INSTRUMENT.**

SETTING THE TEMPERATURE: A temperature control knob is provided for precise adjustment of tip temperature.

FAST ACCURATE SOLDERING CYCLES: Each soldering cycle is automatically thermally balanced to match termination load with precise preset soldering temperature.

FAST INITIAL WARM-UP: After approximately 45 seconds an indicator lamp tells you when you are at the precise preset soldering temperature by blinking on and off periodically.

NO STICK TIPS: Anti sieze compound is baked onto tip to prevent tip and element seizure, making tip removal easier after prolonged operation.

LONER 5-YEAR GUARANTEE: EDSYN guarantees this instrument against defects in material and workmanship as follows: For one year from date of purchase, **EDSYN** will repair or, at its option, replace any defective part **free** including labor. **For an additional 4 years EDSYN** will repair, or at its option, replace any defective part charging only for labor. Guarantee does not include tip or line cord. For service covered by this guarantee return LONER to **EDSYN** with evidence of date of purchase.

ELECTRONIC COMPONENTS ARTIFICIALLY AGED FOR LONG TERM Temperature STABILITY

OPTIONAL LISTED BURN RESISTANT 115V LINE CORDS

UL listing from tip to plug

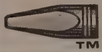
AN INDEPENDENT LABORATORY • UL® • TESTING FOR PUBLIC SAFETY

Triple Mate PERFECT SOLDERING TIPS

Designed Exclusively for the LONER and Tip16 Soldering Instruments

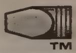
Work Rated as GOOD, BETTER or BEST for:
1. HEAT TRANSFER
2. DURABILITY
3. THERMAL LOAD IN WATTS

LONG SPADE
Part No. LT081



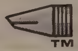
1 BETTER
2 BETTER
3 15-25

SPADE
Part No. LT082



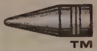
1 BEST
2 BETTER
3 20-30

SOLDASIP®
Part No. LT083



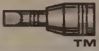
1 GOOD
2 GOOD
3 15-25

PROBE
Part No. LT084



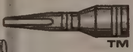
1 BETTER
2 BETTER
3 15-25

SHORT SPADE
Part No. LT085



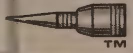
1 GOOD
2 BETTER
3 10-25

MINI SPADE
Part No. LT086



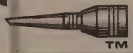
1 GOOD
2 BETTER
3 5-20

NEEDLE POINT
Part No. LT087



1 GOOD
2 BETTER
3 5-15

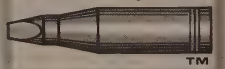
MINI ANGLE FACE
Part No. LT097



1 GOOD
2 BETTER
3 5-15

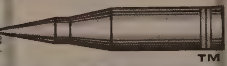
HEAVY SPADE
Part No. HS106

1 BEST
2 BEST
3 25-50



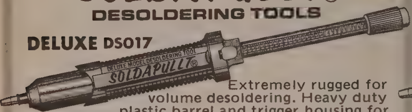
HEAVY PROBE
Part No. HP107

1 BEST
2 BEST
3 25-50



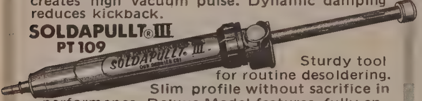
SOLDAPULLT® DESOLDERING TOOLS

DELUXE DS017



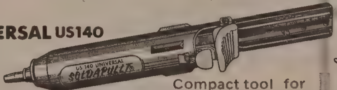
Extremely rugged for volume desoldering. Heavy duty plastic barrel and trigger housing for long, dependable operation. Simple twist-lock separation for fast cleaning. Oversize plunger fully enclosed for safety. Heavy mainspring creates high vacuum pulse. Dynamic damping reduces kickback.

SOLDAPULLT® III PT 109



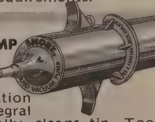
Sturdy tool for routine desoldering. Slim profile without sacrifice in performance. Deluxe Model features; fully enclosed plunger shaft; dynamic damping for very low recoil. Preferred by many technicians. Quickly desolders average size components and wiring.

UNIVERSAL US140



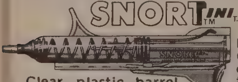
Compact tool for convenient tool box storage. Precision molded plastic barrel and low mass plunger creates rapid vacuum impulse with negligible recoil. Three position plunger adjusts loading span to fit large or small hands. Ample vacuum for most circuit board desoldering requirements.

SNORT™ AIR and VACUUM PUMP SN104



Operates similiary to bellows or squeeze bulb. Two-piece plastic construction with built-in spring. Integral cleaning shaft automatically cleans tip. Tool snaps apart easily for routine cleaning.

SNORTINI™ MINI VACUUM PUMP MV 124



Clear plastic barrel shows when cleaning is necessary.

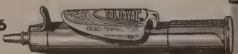
Mini size less than 6". Ideal for desoldering IC's, transistors, etc. yet ample for larger ¼ watt resistors.

SOLDAVAC® DESOLDERING TOOLS

DELUXE DS101

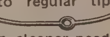
For home electronics projects and appliance repair technicians. Ample power for desoldering most consumer products. Special features include fully enclosed plunger shaft for safety, clear plastic barrel for inspecting moving parts. Plunger depresses for compact storage.

STANDARD SV026

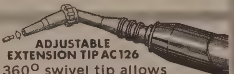


Designed for the hobbiest and home electronics enthusiast. Simplified construction for a low priced but effective desoldering tool. Ample vacuum for removing solder from small wiring and miniature components found in transistor radios and Hi-Fi's.

MICRO EXTENSION TIP insert into regular tip



Tip cleaner needle and spot-tie aid.



ADJUSTABLE EXTENSION TIP AC126

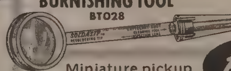
360° swivel tip allows angular adjustment without loss of vacuum. Quickly snaps on or off regular tips.

SOLDASIP® RESOLDERING WICK

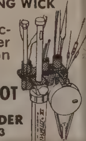
SW091

Press braid against faulty connection with heated tip, old solder is drawn up leaving connection clean for resoldering.

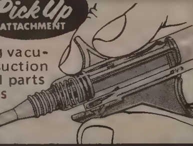
BURNISHING TOOL
BT028



TOOL DEPOT HANDY TOOL HOLDER
TD123



VACUUM *Pick Up* ATTACHMENT



Miniature pickup easily snaps onto designated vacuum pump tips. Plunger creates strong vacuum at the small rubber suction cup. Easily retrieves small parts as ball bearings, transistors and IC packs from recessed areas.

HOW TO *Choose* AND *Use* THE WORLD'S

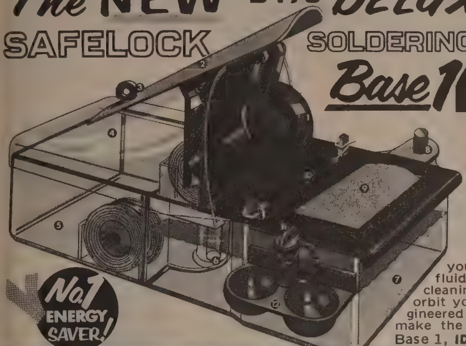
SOLDER Ability!

EDSYN pioneer in SolderABILITY, presents FANOVISION – graphic motion in a training manual designed to stimulate the mind to SAVE TIME on the line. Available at $7.95

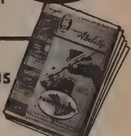
FANOVISION T.M.

AT PARTICIPATING DISTRIBUTORS ONLY

INTRODUCING The NEW B170 DELUXE SAFELOCK SOLDERING STATION Base 1 idle-rest®


No.1 ENERGY SAVER!
1
2
3
4
5
6
7
8
9
10
11
12

NEW...
144 PAGE TRAINING MANUAL
OVER 1,000 ILLUSTRATIONS
IT'S FAN TO LEARN!

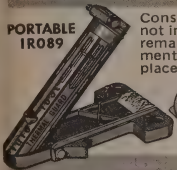


with all these New! features that make it the first fully Engineered Soldering Station!

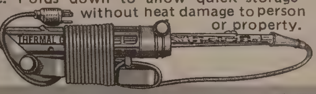
Again **EDSYN**® projects the Soldering Technician into the 21st Century, with the NEW Deluxe Base 1 **IDLE-REST**® Professional Soldering Tool Holder. COMPLETE for storing instruments in a clean, safe, energy saving, static environment, protected by dual safety locks. At your finger tips NEW conveniences as wider base, fluid reservoir, force pump, larger sponge, and twin cleaning sinks, speed up your job performance as you orbit your work station. Blast off with the first fully engineered soldering station to reach your technical sphere – make the quickest recovery with a sound turn around – Base 1, **IDLE-REST**® Tool Holder.

❶ TOOL SUPPORT
❷ TOOL RELEASE
❸ TOOL RELEASE LOCK
❹ THERMAL COVER
❺ STORAGE CHAMBER
❻ MOUNT PORT
❼ RESERVOIR
❽ PUMP
❾ SPONGE
❿ SPONGE COVER PLATE
⓫ SELECTOR VALVE
⓬ CLEANING BASINS

PORTABLE IR089

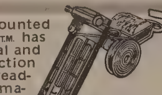

THERMAL GUARD

Consumes only 9 watts of power when not in use. Polycarbonate outer jacket remains cool. Tips and heating element last longer. Safety lock holds tool in place. Folds down to allow quick storage without heat damage to person or property.



idle-rest®

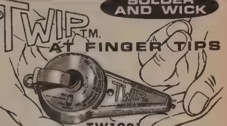
Bench mounted IDLE-REST T.M. has same thermal and Polycarbonate construction as portable model. Threaded bushing allows permanent installation on bench top. Two spools of solder, accessory apron and sponge included.



BENCH MOUNTED IR088

SOLDER AND WICK

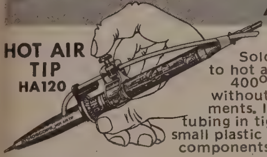
TWIP T.M. AT FINGER TIPS



TW108

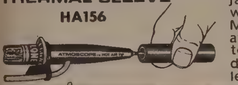
ATMOSCOPE T.M. ACCESSORIES

HOT AIR TIP HA120



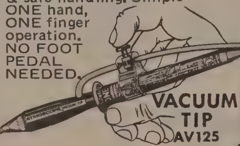
Converts LONER Soldering Instrument to hot air generator up to 400°F. Solder as usual without removing attachments. Ideal for shrinking tubing in tight areas, forming small plastic parts, heat testing components, etc. Operates on low pressure air.

Silicone Rubber THERMAL SLEEVE HA156

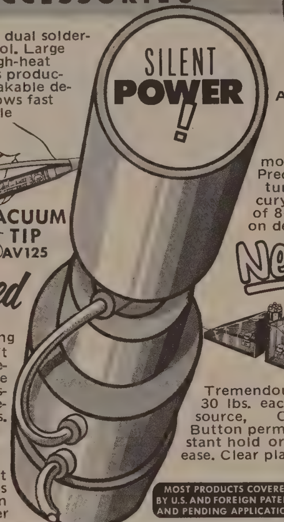

LONER
ATMOSCOPE T.M. HOT AIR TIP

Complete protection of adjacent components or wiring when using ATMOSCOPE Hot Air Tip attachment. Resists hi-temperature, keeps radiated heat to a safe level.

Converts LONER to a dual soldering and desoldering tool. Large mass head provides high-heat reserve for continuous production line work. Unbreakable desoldering chamber allows fast & safe handling. Simple ONE hand, ONE finger operation. NO FOOT PEDAL NEEDED.



VACUUM TIP AV125

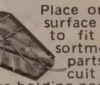

SILENT POWER!

New!

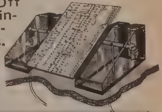
VACUUM PUMPS
Automatic Closed-Loop Self Regulating Vacuum Control 100% Pneumatic

High vacuum without motors or electrical parts. Precision trouble-free venturi, vacuum to 22" mercury, from shop air supply of 80 to 120 PSI. Operates on demand, compact, whisper quiet.

New! **VACUUM HOLDING FIXTURES**



Place on any flat surface as desired to fit wide assortment of parts and circuit boards. Tremendous holding power up to 30 lbs. each. Connect to vacuum source. On/Off Button permits instant hold or release. Clear plastic.

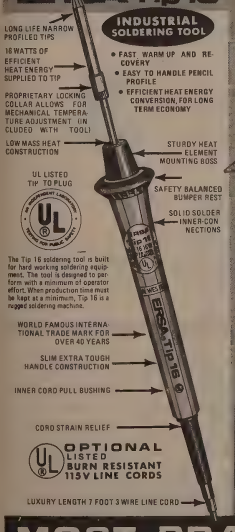


MOST PRODUCTS COVERED BY U.S. AND FOREIGN PATENTS AND PENDING APPLICATIONS

ERSA Tip 16

INDUSTRIAL SOLDERING TOOL

- FAST WARM UP AND RECOVERY
- EASY TO HANDLE PENCIL PROFILE
- EFFICIENT HEAT ENERGY CONVERSION, FOR LONG TERM ECONOMY

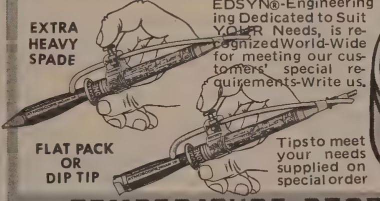

LONG LIFE NARROW PROFILED TIPS
16 WATTS OF EFFICIENT HEAT ENERGY SUPPLIED TO TIP
PROPRIETARY LOCKING COLLAR ALLOWS FOR MECHANICAL TEMPERATURE ADJUSTMENT (INCLUDED WITH TOOL)
LOW MASS HEAT CONSTRUCTION
STURDY HEAT ELEMENT MOUNTING BOSS
SAFETY BALANCED BUMPER REST
SOLID SOLDER INNER-CONNECTIONS
UL LISTED TIP TO PLUG
WORLD FAMOUS INTERNATIONAL TRADE MARK FOR OVER 40 YEARS
SLIM EXTRA TOUGH HANDLE CONSTRUCTION
INNER CORD PULL BUSHING
CORD STRAIN RELIEF
LUXURY LENGTH 7 FOOT 3 WIRE LINE CORD
ERSA Tip 16

The Tip 16 soldering tool is built for hard working soldering equipment. The tool is designed to perform with a minimum of operator effort. When production time must be kept at a minimum, Tip 16 is a rugged soldering machine.

OPTIONAL LISTED BURN RESISTANT 115V LINE CORDS

ATMOSCOPE T.M. Customerized SPECIAL PURPOSE TIPS

EDSYN®-Engineering Dedicated to Suit YOUR Needs, is recognized World-Wide for meeting our customers' special requirements-Write us.

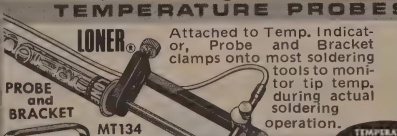


EXTRA HEAVY SPADE

FLAT PACK OR DIP TIP

Tips to meet your needs supplied on special order

TEMPERATURE PROBES and ACCESSORIES

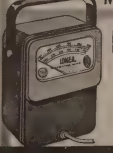


LONER® PROBE and BRACKET MT134

Attached to Temp. Indicator, Probe and Bracket clamps onto most soldering tools to monitor tip temp. during actual soldering operation.

Essential for obtaining tip temp. Sensitive probe measures temp. on any flat or curved surface. Slim handle, long tip reaches into recessed areas. Burn resistant cord.

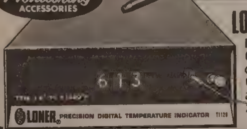
LONER® TEMPERATURE PROBE TP110



LONER® ANALOG (DIAL) METER LTM95

Dial meter, accurate °C and °F scale covers soldering tip temp. range 400°F to 900°F. Type J Thermocouple lead, calibration seals included.

TEMPERATURE Monitoring ACCESSORIES


613
LONER PRECISION DIGITAL TEMPERATURE INDICATOR T1128

LONER® DIGITAL TEMPERATURE INDICATOR T1128

Precision instru. temp. range 0°F to 1600°F Integrated circuit A/D processing ± 0.5°F accuracy. ½" high characters. Type J lead. 115 or 220 VAC — 50 Watts.

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MOST PRACTICAL SOLDER HANDLING TOOLS

ALL NEW
BLOW PROOF

PROBE IV

Check four functions with one instrument! GC's new PROBE IV lets you test for:

✓Continuity	✓Polarity
✓Voltage	✓Digital Logic

without carrying a multitude of instruments AND . . . PROBE IV is lightweight, pocket-size, and comes with its own self-protective carrying pouch. Features positive overvoltage protection in the continuity mode.

5104 **$14.95**

CONECUT . . . MAKES CHASSIS PUNCHES OBSOLETE!

Drill a burr-free hole in seconds in sheet or tube. Saves time—no center punch hole—no pilot hole. Any number of diameter holes can be drilled—the further the tool advances, the larger the hole.

CONECUT SIZES:

3400	Drills holes from 1/4" – 13/16"	**$12.95**
3405	Drills holes from 5/8" – 1-3/16"	**19.95**
3425	Cutting Compound (1 oz. tube)	**2.50**

3400

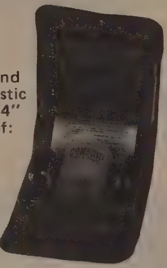
3405

3425

Set of two Conecut burr-free drills and cutting compound in convenient plastic carrying pouch. Hole size range: 1/4" to 1-3/16". Kit contains one each of:

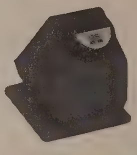
3400	No. 1 Drill
3405	No. 2 Drill
3425	Cutting Compound
3420	**CONECUT KIT**

$34.95

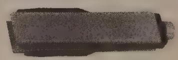


RE-TIP®

Cleans soldering iron tips instantly. Simply insert hot iron tip into RE-TIP and then withdraw—all contaminants are instantly removed. Uniformly cleans tips up to 1/4" dia.—prevents contaminated solder joints. Prolongs life tip; tips solder faster, longer. With base for use in shop, or hand held for portable use and tool box.



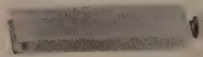
9482	RE-TIP base & cartridge	$6.25
9483	Portable RE-TIP (Refill Cartridge Only; Bubble Carded)	2.65
9484	Refill Cartridge only (Boxed)	2.65



PUL-N-INSERTIC®

Inserts or extracts I.C.'s quickly, easily—without damage, while providing maximum protection to I.C.'s leads. Also acts as a heat sink when desoldering I.C.'s. Constructed of high impact plastic. Versatile—for use on the product line, in rework area in the field.

9481 **$4.95**



INSERTIC®

Designed to allow quick, accurate positioning for insertion of I.C.'s. Easy to load—will not damage I.C. and provides maximum protection to leads. Scientifically shaped for sure, fatigue-free handling—speeds up I.C. insertion time. Constructed of high impact plastic for years of service. Ideal for use in manufacturing or by the service technician.

9480 **$2.95**

QUICK PICK

Fast, easy method of removing transistors and capacitors. Quick Pick leaves hands free to desolder leads and hold circuit board. Made of non-magnetic material. 7 different tools fit more than 25 outlines of transistors and can capacitors. Each tool is approx. .028 size, larger than part being removed. Color coded for fast, easy selection.

9216	(Kit of 7 tools)	$6.55
9217	(Red, size: .312-.335")	.94
9218	(White, size: .287-.310")	.94
9219	(Blue, size: .262-.285")	.94
9220	(Yellow, size: .212-.235")	.94
9221	(Green, size: .222-.245")	.94
9222	(Mustard, size: .162-.185")	.94
9223	(Orange, size: .183-.206")	.94

AUTOMATIC WIRE STRIPPER

Equipped with "Trig-O-Matic" stay-open feature, this stripper is especially suited for stripping fine and stranded wires. Stay-open feature keeps wires from being crushed. "Off" and "On" mechanism enables use as automatic or standard model. At touch of thumb, trigger releases and jaws go back in place. Interchangeable blades. Patent No. 2,622,461.

744	12 to 22 wire	$8.84	744-D	16 to 22 wire	$8.84
744-A	14 to 30 wire	8.84	744-I	8 to 22 wire	8.84
744-B	10 to 18 wire	8.84			

SOLDER-WICK 5' spool

Desolder any connection in seconds. Solder-Wick absorbs molten solder instantly. Eliminates component damaging heat buildup.

684 Size 2—yellow label for miniature printed circuit boards. Pad Size: .060 to .125. $1.64

685 Size 4—blue label for commercial Printed circuit boards and connectors. Pad size: .190 and larger. $1.85

SERVICE TECHNICIAN AND INDUSTRIAL CATALOG FR-75

Nearly 2,000 items fully illustrated and described—the complete line of GC chemicals, hardware, alignment tools, printed circuit and technical aids and universal replacement parts.

WRITE FOR CATALOG FR-75

GARDNER DENVER Wire-Wrap* TOOLS

FOR SOLDERLESS WRAPPED CONNECTIONS

AIR POWERED WIRE-WRAP* TOOLS

Air powered tools from Gardner-Denver feature low maintenance and dependability for high production service. Bearing mounted, precision engineered rotary vane motors require only air line lubrication for long, dependable operation. Pistol grip or straightline models are available. The tools will wrap 18 thru 32 gauge wire. A backforce nose assembly is an optional feature.

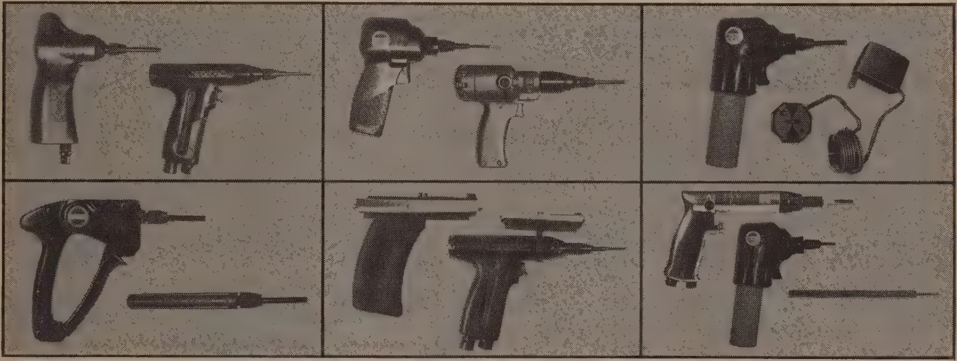
The 14TA1 Strapping Tool (upper left) economically and efficiently makes continuous wire strapping to interconnect terminals with 18 thru 30 gauge bare wire, forming a buss bar of permanent, wrapped connections.

ELECTRIC POWERED WIRE-WRAP TOOLS

The 110 Volt 14B1, with heavy duty aluminum housing, is recommended for high production applications. The 110 Volt 14XA2, lightweight, solid state model, is double insulated and recommended for limited production and service work. Both styles are available with backforce nose assemblies.

BATTERY POWERED WIRE-WRAP TOOLS

Gardner-Denver battery powered Wire-Wrap tools have been designed for installation, service, repair, or special production, and are especially suited for 30 gauge wire application. They are equipped with a rechargeable nickel-cadmium battery and battery charger package. Thousands of connections are possible from one battery charge, depending on the size of wire being wrapped.



MANUALLY OPERATED WIRE-WRAP TOOLS

The new 14HP-1C hand squeeze Wire-Wrap tool is ideal for telephone installers, electronic technicians and servicemen, when air or electric power is not available. It features a strong, lightweight Lexan housing and a universal collet for all wrapping bits. This tool makes quality wrapped connections with 22 thru 26 gauge wire.

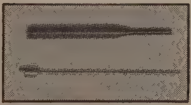
The manual Wire-Wrap tool is excellent for repair or service work in hard-to-reach locations and is designed to wrap 18 thru 30 gauge wire.

CUTTING AND SKINNING TOOLS

The cutting and skinning tool can be either a completely independent hand-held tool or an accessory for mounting on all Gardner-Denver air, electric, or battery powered Wire-Wrap tools. It is designed for cutting and skinning 24 thru 30 gauge wire.

WIRE-WRAP UNWRAPPING TOOLS

Unwrap tools are offered in air powered, electric, battery, hand squeeze and manual styles, with models for removing either right-hand or left-hand wraps.



WRAPPING BITS AND SLEEVES

Gardner-Denver offers the latest technology and largest selection of wrapping bits and sleeves for making solderless wrapped electrical connections. This list shows only a representative assortment. For complete specifications and application information, contact your nearest Gardner-Denver representative or our Grand Haven, Michigan factory.

SOLDERLESS WRAPPING BIT SPECIFICATIONS

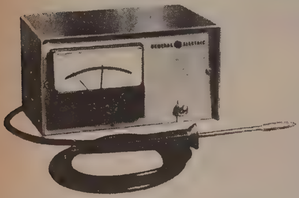
AWG	WRAPPING BIT PART NO.	WRAPPING SLEEVE PART NO.	BIT TYPE	TERMINAL HOLE DIAMETER	TERMINAL HOLE DEPTH	MAXIMUM INSULATION DIAMETER
18	504222	18285	STD	.074	1.00	
20	507356	18840	STD	.074	1.00	
20	26495	26245	MOD	.074	1.00	.059
22	505413	18840	STD	.074	1.00	
22	504939	507939	MOD	.074	1.00	.052
22	18632	18840	STD	.086	1.00	
22-24	500131	18840	STD	.074	1.00	
24	502134	502129	STD	.044	1.00	
24	505415	502129	MOD	.044	1.00	.044
24	512058	512056	STD	.0745	1.00	
24	26263	18840	MOD	.074	1.125	.046
26	505279	507100	STD	.039	.750	
26	506445	507100	MOD	.039	.750	.031
26	502118	512056	MOD	.069	1.000	.041
26	504910	512056	STD	.074	1.000	
28	509278	507100	MOD	.036	.750	.030
28	505373	512056	STD	.074	1.000	
30	507063	507100	MOD	.0355	.750	.023
30	507573	507100	MOD	.037	.750	.023
30	507502	507100	MOD	.045	.750	.027
30	501381	512056	MOD	.065	1.000	.027
30	501194	502129	MOD	.069	1.000	.027
30	519936	507100	MOD	.039	.750	.027
30-32	500353	507100	STD	.039	.750	

*Registered Trademark of Gardner-Denver Company

GARDNER-DENVER COMPANY, GRAND HAVEN DIVISION, GRAND HAVEN, MICHIGAN 49417 (616) 842-0200

SOLDERING IRONS

TEMPERATURE CONTROLLED SOLDERING IRON — 120 VOLTS; UP TO 135 WATTS

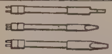


2½-ounce temperature controlled soldering iron maintains selected temperature which can be varied for wide range of work without changing irons or tips. The iron's 135-watt capacity enables it to handle high-mass joints, yet its precision temperature control makes it suitable for the smallest of microminiature jobs without exceeding temperature limitations. Ideal for high production and high quality work, laboratory use, service shops, and wherever temperature limits are specified.

Description	Cat. No.
Complete Iron — Includes Control Box, Handle and Cordset, and ⅛-inch and ³⁄₁₆-inch Chisel Tip and Heater	6A490

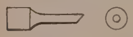
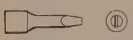
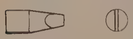
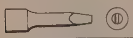
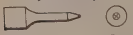
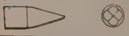
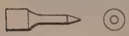
PENLINE-120 SOLDERING IRONS — 120 VOLTS; 25, 30, 40 AND 45 WATTS

Lowest cost GE iron; ideally suited for light to medium production in electronics, communications, and allied industries, for repair and maintenance operations, and by the "do-it-yourself" electronics kit builder.

Handle and 6-foot Cordset			
	Two-conductor		6D400*
	Three-conductor, with NEMA standard plug		6D400G2*
Tip and Heater Units — Ironclad			
	³⁄₁₆" Chisel Tip	30 watts	6D410*
	⁵⁄₃₂" Chisel Tip	30 watts	6D411*
	⅜" Chisel Tip	45 watts	6D412*
Heater for Threaded Tips			
		25 watts	6D415
		30 watts	6D414
		40 watts	6D413*

Use interchangeable threaded tips listed below.

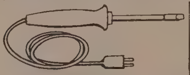
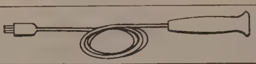
INTERCHANGEABLE THREADED TIPS
For Penline-120, Pistol-grip, Lightweight, and Midget Irons

Description (Copper Tip, Surface Plating)		Cat. No.
Spade Tips 	¹⁄₁₆" Dia—Nickel	6D4P1
	³⁄₃₂" Dia—Ironclad	6D4P2
	⅛" Dia—Nickel	6D4P3
	⁵⁄₃₂" Dia—Ironclad	6D4P4
Chisel Tips 	¹⁄₁₆" Dia—Nickel	6D4P5
	¹⁄₁₆" Dia—Ironclad	6D4P21
	³⁄₃₂" Dia—Ironclad	6D4P6
	⅛" Dia—Nickel	6D4P7
	⅛" Dia—Ironclad	6D4P22
	⁵⁄₃₂" Dia—Ironclad	6D4P8
	³⁄₁₆" Dia—Nickel	6D4P9
	⁷⁄₃₂" Dia—Ironclad	6D4P10
	⁵⁄₃₂" Dia—Nickel	6D4P11
	³⁄₁₆" Dia—Ironclad	6D4P12
Long Chisel Tips 	³⁄₁₆" Dia—Nickel	6D4P13
	⁷⁄₃₂" Dia—Ironclad	6D4P14
Pyramid Tips 	⅛" Dia—Nickel	6D4P15
	⁵⁄₃₂" Dia—Ironclad	6D4P16
	¹¹⁄₃₂" Dia—Nickel	6D4P17
	⅜" Dia—Ironclad	6D4P18
Cone Tips 	⅛" Dia—Nickel	6D4P19
	⁵⁄₃₂" Dia—Ironclad	6D4P20

* UL Listed.

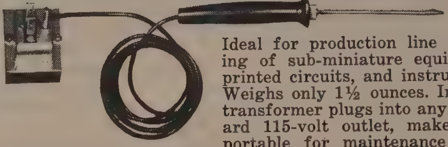
LIGHTWEIGHT SOLDERING IRONS — 120 VOLTS; 40 AND 60 WATTS

Ideal for light and medium production-line soldering and maintenance and repair operations in electronics and communications industries. Tip and heater units can be changed in seconds.

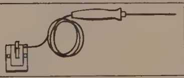
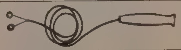
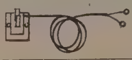
	Description	Cat. No.
Complete Iron — Includes handle and 6-foot cordset, and tip and heater unit — 60 watts		
	¼" Ironclad Chisel Tip	6A273*
	³⁄₁₆" Ironclad Pyramid Tip	6A283*
	³⁄₁₆" Ironclad Chisel Tip	6A283G23
Handle and 6-foot Cordset		
	Two-conductor	6A273G62
	Three-conductor with NEMA standard plug	6A273G63
Tip and Heater Units — 60 watts		
	¼" Ironclad Chisel Tip	6A300 6A274†
	³⁄₁₆" Ironclad Pyramid Tip	6A301
	³⁄₁₆" Ironclad Chisel Tip	6A301G4
Heater Units for Threaded Tips		
	40 watts	6A304
	60 watts	6A301G7

Use interchangeable threaded tips listed in first column.
† Finned one side only.

MINIATURE SOLDERING IRONS — 6 VOLTS, 12 WATTS

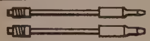
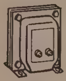
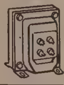
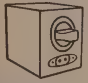


Ideal for production line soldering of sub-miniature equipment, printed circuits, and instruments. Weighs only 1½ ounces. Integral transformer plugs into any standard 115-volt outlet, makes iron portable for maintenance work.

	Description		Cat. No.
Complete Iron — Includes tip and heater unit, 6-foot cordset, and transformer with grounded plug.			
	⅛" Chisel Tip	3" Shank	6A428G3
	⅛" Chisel Tip	6" Shank	6A428G4
	⅛" Pyramid Tip	3" Shank	6A428G7
	⅛" Pyramid Tip	6" Shank	6A428G8
Complete Iron Less Transformer — Includes tip and heater unit, and 6-foot cordset with terminals			
	⅛" Chisel Tip	3" Shank	6A428G5
	⅛" Chisel Tip	6" Shank	6A428G6
Renewal Tip and Heater Units			
	⅛" Chisel Tip	3" Shank	6A429G3
	⅛" Chisel Tip	6" Shank	6A429G4
	⅛" Pyramid Tip	3" Shank	6A429G5
	⅛" Pyramid Tip	6" Shank	6A429G6
Handle and Cordset Only			
	6-foot Cordset with Terminals		6A428G62
Renewal Transformer — Includes — 6-foot integral cordset			
	6-volt Secondary 115-volt Primary		6A430

MIDGET SOLDERING IRONS — 6 VOLTS; 18 to 45 WATTS (with transformers)

A versatile iron for light production in electronics, and communication industries — handles like a pencil, weighs but 1¾ oz. Tip renewal is easy and fast — complete tip and heater unit can be changed in a few seconds. Heat output can be varied from 25 to 45 watts with standard GE transformers.

Description			Cat. No.
Handle and 6-foot cordset			
	For single- and 4-tap transformers		6A203
	For transformer with 3-heat switch		6A203G2
Tip and Heater Units — All ironclad tips			
	¼" Chisel Tip	25 watts	6A211
	⅛" Cone Tip	25 watts	6A213
	3/16" Pyramid Tip	25 watts	6A215
	3/16" Chisel Tip	25 watts	6A217
	⅜" Chisel Tip	45 watts	6A211G31
Heater for Threaded Tips			
	25 watts		6A221
Transformers for Midget Iron — 115-volt Primary‡			
	Single Tap 6.3-volt secondary		6A362G2
	Four Tap 5.4/5.7/6.0/6.3-volt secondary		6A364G2
	With 3-conductor Cordset & Hubbell No. 5246 Plug		6A364G3
	With Three-heat Switch 4.9/6.3/6.9-volt secondary For use only with Handle and Cordset 6A203G2.		6A434

‡ Single- and four-tap transformers are available with 240-volt primary in quantities of 36 or more, specify catalog number desired and note on order, "except with 240-volt primary." Use interchangeable threaded tips.

MIGHTY MIDGET SOLDERING IRON — 12 VOLTS; 100 WATTS

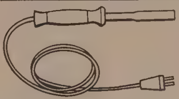
A lightweight iron with high heat capacity for heavy soldering where larger irons, up to 200 watts, prove unwieldy for rapid repetitive soldering, such as production soldering of tuner chassis, tinware, can seams, etc.

Handle and Cordset — Two-conductor			
			6A210G61
Tip and Heater Unit — Ironclad			
	½" Chisel Tip	60 watts	6A211G54
	½" Chisel Tip	80 watts	6A211G50
	½" Chisel Tip	100 watts	6A211G33
Transformer for Mighty Midget — 115-volt primary			
	Four Tap — for 55/70/85/100 watts (115-volt primary, 12-volt secondary)		6A364G7

* UL Listed.

6A160 SERIES SOLDERING IRONS — 120 VOLTS§, 75 TO 140 WATTS

Ideal for medium to heavy production, and maintenance and repair operations. Available with any of 12 different tips, calorized or ironclad.

Description		Cat. No.
Complete Iron Less Tip — Includes 6-foot two-conductor cordset		
	75 Watts	6A161*
	100 Watts	6A162*
	110 Watts	6A162G6*
	125 Watts	6A162G3*
	140 Watts	6A162G12

Tips — Fit all irons listed above

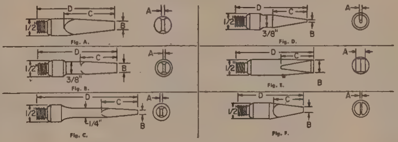


Fig.		A	B	C	D	
A. ½"-Dia. Chisel	Calorized	1/32	3/16	1½	2⅜	6D1P1
	Ironclad	1/16	7/32	1½	2⅜	6D1P2
	Calorized	1/16	7/32	2¾	4	6D1P3
	Ironclad	3/32	¼	2¾	4	6D1P4
	Calorized	5/32	¼	1¼	2⅛	6D1P11
B. ⅜"-Dia. Chisel	Ironclad	1/16	3/16	1⅛	2⅜	6D1P8
	Calorized	1/32	9/32	1⅛	2⅜	6D1P6
	Ironclad	1/16	5/16	1⅛	2⅜	6D1P7
C. ¼"-Dia. Chisel	Ironclad	1/16	⅛	1	3⅛	6D1P5
D. Cone	Ironclad	1/16	1/16	13/16	2 3/16	6D1P12
E. Pointed Chisel	Ironclad	¼	13/32	1	1⅞	6D1P9
	Ironclad	¼	13/32	1	2⅜	6D1P10
F. Slim Chisel	Ironclad	1/16	5/32	⅞	2	6D1P19

Renewal Heater — 120 Volts (Also available for 240-volt operation.)		
	75 Watts	6A31
	100 Watts	6A32
	110 Watts	7C342
	125 Watts	8A88
	140 Watts	7C616

GENERAL ELECTRIC HEATING SALES OFFICES

Ariz: Phoenix, Montgomery Brothers, Inc., 2225 N. 7th St., 85011, (602) 253-3431.
Calif: Burlingame, Montgomery Bros., Inc., 1831 Bayshore Hwy., 94010, (415) 697-6500.
Los Angeles, Montgomery Bros., Inc., 4820 District Blvd., 90058, (213) 589-6321.
San Diego, Montgomery Bros., Inc., 3762 Midway Drive, 92110, (714) 224-1212.
Colo: Denver, Montgomery Bros., Inc., 2124 S. Birch St., 80222, (303) 759-2749.
Conn: Hamden, Godfrey & Associates, P.O. Box 5541, 06518, (203) 281-1795.
Woodstock, Godfrey & Associates, P.O. Box 164, 06281, (203) 928-0332.
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Ill: Glen Ellyn, Boston-Blackaller Associates, 650 Roosevelt Rd., 60137, (312) 858-6320.
Ind: Indianapolis, George E. Booth Co., 1681 Expo Lane, 46224, (317) 248-9261.
Iowa: Des Moines, The Walling Co., P.O. Box 981, 50304, (515) 288-6091.
La: Baton Rouge, Alford, Woods & Childs, P.O. Box 15622, 70815, (504) 275-5480.
Lake Charles, Alford, Woods & Childs, P.O. Box 5835, 70601, (318) 439-8173.
Monroe, Alford, Woods & Childs, P.O. Box 6076, 71201, (318) 323-3671.
New Orleans, Alford, Woods & Childs, P.O. Box 23572, 70123, (504) 737-4181.
Mich: Detroit, Indust'l Burner Systems, 16911 W. Eight Mile Rd., 48235, (313) 835-5100.
Minn: Minneapolis, J. H. Cox Co., 1314 Broadway N.E., 55413, (612) 789-2535.
Mo: Kansas City, Boschert Equipment Co., 207 Westport Rd., 64111, (816) 561-4050.
St. Louis, Brandwine Equipment Co., 1353 Baur Blvd., 63132, (314) 993-5810.
Neb: Omaha, The Walling Co., 3030 N. 21st St., 68110, (402) 342-7044.
NJ: Caldwell, Hemmel Co., P.O. Box 267, 07006, (201) 228-2220.
NY: Buffalo, Hemmel Co., P.O. Box 764, 14240, (716) 634-9873.
NC: Charlotte, Sloan Associates, Inc., 3230-N Piper Lane, 28208, (704) 523-2122.
Ohio: Cincinnati, Stelter & Brinck, Inc., 5541 Bridgetown Rd., 45211, (513) 574-0880.
Hudson, Angus McArn Co., P.O. Box 256, 44236, (216) 656-2577.
Ore: Portland, Montgomery Brothers, Inc., 935 N.W. 19th Ave., 97209, (503) 223-4197.
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Utah: Salt Lake City, Montgomery Brothers, Inc., 2089 W. 2300S, 84119, (801) 363-3555.
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Wash: Seattle, Montgomery Brothers, Inc., 5616 Sixth Ave. S., 98108, (206) 762-4100.

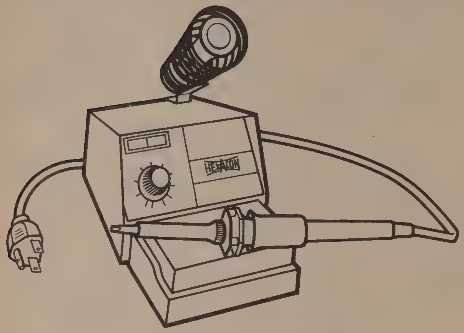
SOLDERING IRONS

HEXACON

VOLTAGE RANGE: 6 to 240 • OPERATE IDENTICALLY ON A.C. OR D.C., ANY CYCLE
STANDARD VOLTAGES 110/120, 220/240 • SPECIFY VOLTAGE ON ORDER

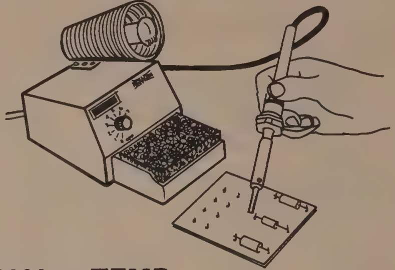
Equipped with extra flexible, high temperature approved cords. Three wire cords available with all irons. Nickel chromium replaceable heating elements, insulated with finest mica, protected by rugged outer housing. Replaceable tips.

POSI-GROUND® AVAILABLE TO PROTECT VOLTAGE SENSITIVE COMPONENTS



THERM-O-TRAC 1001
Controlled Heat Soldering Station

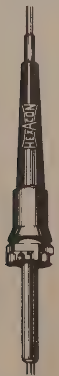
- Temperature sensor "up front" where it belongs
- All solid state electronic switching
- Dial selected temperatures from 500° F to 720° F
- Variation of no more than + 10° F at 720° F idling
- No magnetic field or voltage leakage—safe for sensitive circuitry
- Wide selection of XTRADUR Long Life Tips



DIAL-a-TEMP
Soldering Station

- Isolated, low voltage power supply
- Posi-Ground® construction eliminates all voltage leakages for protection of sensitive components
- Internally fused for added safety
- Infinitely variable temperatures from 350° F to 950° F easily selected by dialing
- On-Off Switch with Indicator Light
- Two standard models available:
  Catalog No. 1520—Uses 3/16" Tip
  Catalog No. 1524—Uses 1/4" Tip
- No special tip requirements—uses standard Xtradur and Durotherm Long-Life plug tips

HEXACON MINIRONS



DUROTHERM and XTRADUR tips

- Rugged quality construction that will withstand production line conditions
- Slim-line case promotes maximum visibility
- Lightweight—perfect balance
- Full wattage range 15 to 60 watts

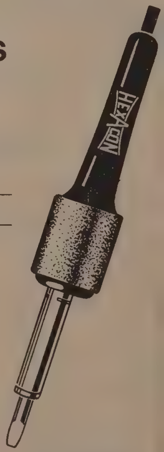
SLIM LINE CASE—
SLIM LINE HANDLE

Cat. No.	Watts	Tip Dia.
21A	15	1/8"
21A	20	1/8"
21A	25	1/8"
22A	25	3/16"
22A	30	3/16"
22A	35	3/16"
23A	25	1/4"
23A	30	1/4"
23A	40	1/4"
23A	50	1/4"
23A	60	1/4"

SUPER PENCIL IRONS

- Standard for dependability in production throughout industry.
- Strong fiberglass handle with cool cork finger grip
- Precision wound heavy-duty industrial element

Cat. No.	Watts	Tip Dia.
25S	20	1/8"
25S	25	1/8"
25S	30	1/8"
25S	35	1/8"
25S	40	1/8"
26S	30	3/16"
26S	35	3/16"
26S	40	3/16"
26S	50	3/16"
24S	25	1/4"
24S	30	1/4"
24S	40	1/4"
24S	50	1/4"
24S	60	1/4"

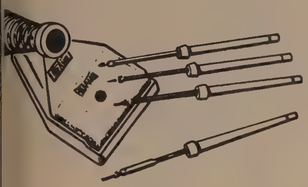


DUROTHERM and XTRADUR tip

HEXACON

SOLDERING IRONS

MICRO-MINI IRON AND STAND

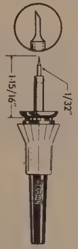


Iron Specifications

No.	Temp.
M 65 M 65K	650
M 70 M 70K	700
M 75 M 75K	750
M 85 M 85K	850
M 065	650
M 070	700
M 075	750
M 085	850

Tip Kit "K" includes Holder, Iron plus 7 Tips

HEXACON HORNET IRONS



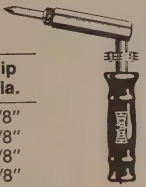
H 10 K Kit (12 watts)
H 11 K Kit (17 watts)
H 14 K Kit (20 watts)

- Lightweight
- Cool Handle

Kits include iron, 2 tips and sponge.

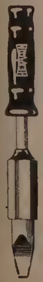
DUROTHERM and XTRADUR tips

HEAVY DUTY HATCHET IRONS

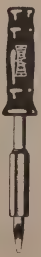


Cat. No.	Watts	Tip Dia.	Cat. No.	Watts	Tip Dia.
70H	100	3/8"	153H	175	3/8"
74H	125	1/4"	155H	200	3/8"
100H	110	3/8"	200H	200	5/8"
116H	175	3/8"	300H	300	7/8"
150H	150	3/8"			

HEAVY-DUTY SCREW TIP IRONS

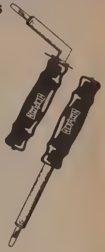


Cat. No.	Watt	Tip Dia.
85	90	1/2
120	120	5/8
170	175	1
225	250	1-1/8
350	350	1-3/8
500	500	1-5/8
700	700	1-3/4
800	800	1-3/4

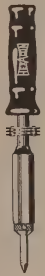


PINPOINT IRONS

DUROTHERM and XTRADUR tips

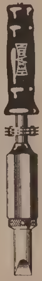


P25	25	1/8"	25H	25	1/8"
P25	35	1/8"	25H	35	1/8"
P25	50	1/8"	25H	50	1/8"
P26	30	3/16"	26H	30	3/16"
P26	40	3/16"	26H	35	3/16"
P26	50	3/16"	26H	50	3/16"
P24	40	1/4"	24H	40	1/4"
P24	50	1/4"	24H	50	1/4"
P24	60	1/4"	24H	60	1/4"

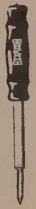


HEAVY DUTY PLUG-TIP IRONS

Cat. No.	Watt	Tip Dia.	Cat. No.	Watt	Tip Dia.
P70	100	3/8	P151	175	1/2
P100	110	3/8	P152	200	1/2
P115	150	3/8	P200	200	5/8
P116	175	3/8	P250	250	5/8
P150	150	3/8	P300	300	7/8
P153	175	3/8	P550	550	1-1/8
P155	200	3/8			

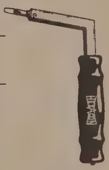


POWERHOUSE IRONS

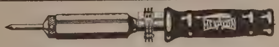


Cat. No.	Watts	Tip Dia.	Cat. No.	Watts	Tip Dia.
30S	80	1/4"	P34	80	1/4"
P30	40	1/4"	P34	90	1/4"
P30	60	1/4"	P35	80	5/16"
P30	75	1/4"	P35	90	5/16"
P30	80	1/4"	P35	100	5/16"
P34	70	1/4"			

POWERHOUSE IRONS (Hatchet Type)



Cat. No.	Watt	Tip Dia.	Cat. No.	Watt	Tip Dia.
30H	40	1/4"	34H	70	1/4"
30H	50	1/4"	34H	80	1/4"
30H	60	1/4"	34H	90	1/4"
60H	70	1/4"	35H	80	5/16"
30H	75	1/4"	35H	90	5/16"
30H	75	1/4	35H	90	5/16"
30H	80	1/4"	35H	100	5/16"



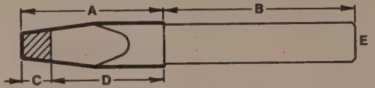
"COPPER MISER" IRONS

Cat. No.	Watts	Tip Dia.
P114	100	1/4"
P154	150	1/4"
P238	200	3/8"
P212	200	1/2"
P338	300	3/8"

SOLDERING IRON TIPS

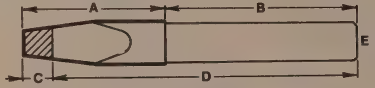
DUROTHERM Iron plated with patented stainless steel bonded to copper shank. Precision ground to tolerance of .001. Lectrotin on working surface and immunized over entire surface.

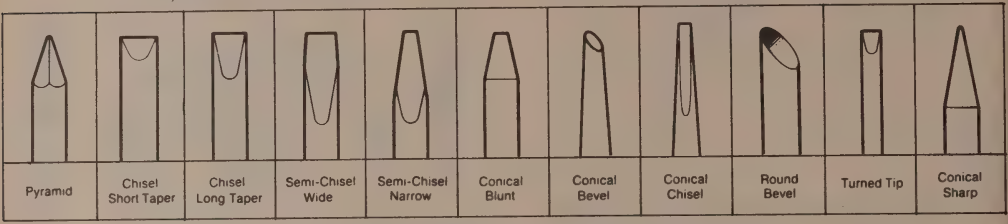
A. Heavy Iron Coating
B. Scale resistant Stainless Steel
C. Pretinned Lectrotin
D. Immunized Nickel and Chrome
E. Iron, Nickel and Chrome coated



XTRADUR Heavy Iron plated over OFHC Copper alloy with shank precision ground to tolerance of .001. Pretinned with Lectrotin process and immunized with Nickel and Chrome.

A. Heavy Iron Coating
B. Iron, Nickel and Chrome
C. Pretinned Lectrotin
D. Immunized Nickel and Chrome
E. Iron, Nickel and Chrome coated





CATALOG NUMBERS ARE FOR DUROTHERM TIPS. FOR XTRADUR, SEE NOTES

Tip No.	Style of Point	Tip No.	Style of Point	Tip No.	Style of Point
1/8" x 2-1/4" Fit Iron Nos. 25S, P25, 25H, 21A					
HT248D	Pyramid	**HT222D**	Conical, blunt	**HT693D**	R.B., TT 1/16"
HT249D	Chisel, short	**HT331D**	Conical, sharp	**HT104D**	R.B., TT 1/32"
HT376D	Chisel, long	**HT638D**	Round, bevel	**HT216D**	R.B., groove
HT560D	Semi-chisel	**HT361D**	Chisel, TT 1/16"	**HT244D**	Conical, bevel
3/16" x 2-1/4" Fit Iron Nos. 26S, P26, 26H, 22A					
HT251D	Pyramid	**HT190D**	Semi-chisel, W	**HT290D**	Chisel, TT 1/8"
HT294D	Chisel, short	**HT214D**	Conical, blunt	**HT548D**	S-chisel, N, TT 1/8"
HT195D	Chisel, long	**HT281D**	Conical, sharp	**HT479D**	Conical TT 1/8"
HT207D	Semi-chisel, N	**HT288D**	Pyramid, TT 1/8"	**HT220D**	R.B., TT 1/16"
1/4" x 2-1/4" Fit Iron Nos. 24S, P24, 24H, 23A					
HT325D	Pyramid	**HT102D**	Round, bevel	**HT513D**	Conical, TT 1/8"
HT553D	Chisel, short	**HT586D**	Conical, S-chisel	**HT463D**	Chisel, L, TT 3/16"
HT313D	Semi-chisel, W	**HT691D**	Chisel, TT 1/16"	**HT841D**	S-chisel, N. TT 1/8"
HT397D	Semi-chisel, M	**HT699D**	S-chisel, Lg. TT 1/8"	**HT692D**	Chisel, L, TT 1/8"
HT417D	Semi-chisel, N	**HT451D**	Chisel, L, TT 1/8"	**HT552D**	S-chisel, 3/8" Shank
HT418D	Conical, blunt	**HT324D**	Chisel, S, TT 1/8"		
1/4" x 2-3/4" Fit Iron Nos. P30, 30H, P34, 34H					
HT252D	Pyramid	**HT263D**	Pyramid, TT 1/8"	**HT452D**	Conical, TT 1/8"
HT253D	Chisel, short	**HT264D**	Chisel, SH, TT 1/8"	**HT580D**	Conical, TT 3/16"
HT202D	S-chisel, Wide	**HT356D**	Chisel, M, TT 1/8"	**HT473D**	Chisel, TT 3/16"
HT426D	S-chisel, N	**HT685D**	Chisel, Lg, TT 1/8"	**HT130D**	Round, bevel
HT131D	Conical, sharp				
1/4" x 3" Extra long for P30, 30H, P34, 34H. Also for competitive makes					
HT468D	Chisel, long	**HT708D**	S-chisel, N, Lg	**HT487D**	Chisel, Lg, TT 1/8"
HT299D	Semi-chisel, W	**HT453D**	Conical, bevel	**HT519D**	Chisel, Lg, TT 1/8"
HT328D	Semi-chisel, N	**HT234D**	Chisel, Lg, TT 5/32"	**HT362D**	Conical groove
1/4" x 3-3/4" Extra long for P30, 30H, P34, 34H. Also for competitive makes.					
HT563D	Pyramid, long	**HT691D**	Semi-chisel, N	**HT603D**	Chisel, Lg, TT 1/8"
HT188D	Chisel, long	**HT626D**	Pyramid, TT, 1/8"	**HT391D**	Semi-chisel, N
HT382D	Semi-chisel, W	**HT698D**	S-chisel, TT 1/8"	**HT277D**	Chisel, Lg, TT 3/16"
1/4" x 4" Fit Irons P114, P154, P214.					
HT495D	Chis., Lg, TT 3/16"	**HT494D**	Semi-chisel, N	**HT496D**	Chisel, long
1/4" x 4-1/4" Fit Irons P114, P154					
HT258D	Pyramid	**HT230D**	Semi-chisel, W	**HT460D**	Conical, bevel
HT259D	Chisel, short				
3/8" x 4-1/4" Fit Iron Nos. P100, P150, P238, P338, 100H, 150H					
HT255D	Pyramid	**HT266D**	Chisel, Sh, TT 1/4"	**HT177D**	S-chisel, W, TT 1/4"
HT493D	Chisel, short	**HT335D**	Chisel, Lg, TT 1/4"	**HT577D**	S-chisel, N, TT 1/4"
HT151D	Chisel, long	**HT108D**	Conical, sharp	**HT145D**	Chisel, Sh, TT 3/16"
HT183D	Semi-chisel, N	**HT114D**	Conical, blunt, Sm	**HT475D**	S-chisel, N. TT 3/16"
HT593D	Semi-chisel, W	**HT240D**	Conical, blunt M	**HT481D**	Chisel, N. Sh, TT 1/8"
HT265D	Pyramid, TT 1/4"				
3/8" x 4" Fit Iron Nos. P100, P150, P238, 100H, 150H; Extra long for P70, 70H; Also other makes.					
HT566D	Pyramid	**HT365D**	Semi-chisel, thin	**HT4300**	Round, bevel
HT198D	Chisel, short	**HT370D**	S-chisel, Lg, N	**HT319D**	S-chisel, N, TT 1/4"
HT918D	S-chisel, Sh, M	**HT140D**	Semi-chisel, W		

Tip No.	Style of Point	Tip No.	Style of Point	Tip No.	Style of Point
3/8" x 3-3/4" Fit Iron Nos. P70, 70H; Also fit other makes					
HT254D	Pyramid	**HT339D**	S-chisel, N, TT 1/4"	**HT291D**	S-chisel, W, TT 1/
HT488D	Chisel, short	**HT129D**	Semi-chisel, W	**HT510D**	Conical, sharp
1/2" x 4" Fit Iron Nos. P151, 151H, P152, P212					
HT323D	Chisel, short blunt	**HT2030**	Conical, blunt		
HT1630	Semi-chisel, N	**HT1940**	Semi-chisel, thin		
HT444D	S-chisel, long taper				
1/2" x 4-1/4" Fit Iron Nos. P151, P212, 151H					
HT257D	Pyramid	**HT293D**	Chisel, short	**HT446D**	S-chisel, Lg, Tap
HT123D	S-chisel N, TT 3/8"				
5/8" x 4" Fit Iron Nos. P125, P200, 200H, P250					
HT256D	Pyramid	**HT891D**	Chisel, long	**HT178D**	Semi-chisel, W
5/8" x 4-1/4" Fit Iron Nos. P200, P250, 200H					
HT260D	Pyramid	**HT371D**	Semi-chisel, N	**HT499D**	Chisel, long
7/8" x 4-3/4" Fit Iron Nos. P300, 300H					
HT261D	Chisel, short	**HT179D**	Semi-chisel, W		
1-1/8" x 5-1/4" Fits No. 500					
HT262X	Chisel	**HT229X**	Semi-chisel	**HT233X**	Pyramid

Special types available upon request.

SCREW TIPS All Conventional Semi-chisel Types

Fits Hexacon Xtradur

Tip No.	Dia.	Thread	Iron No.	Tip No.	Dia.	Thread	Iron No.
HT268X	1/2"	5/16-18	60 and 85	**HT272X**	1-1/8"	5/8-11	225
				HT273X	1-3/8"	5/8-11	350
HT269X	5/8"	5/16-18	120	**HT274X**	1-5/8"	5/8-11	500
HT271X	1"	1/2-13	170	**HT275X**	1-3/4"	5/8-11	700

HORNET TIPS

TIPS FOR IRONS Nos. H10 and H11

No.	Dia.	No.	Dia.	No.	Dia.
HT866D	1/32"	**HT896D**	1/16"	**HT871X**	1/8"
HT867D	1/32"	**HT864X**	1/8"	**HT873X**	1/8"
HT868D	1/16"	**HT870X**	1/8"		

TIPS FOR IRON No. H14

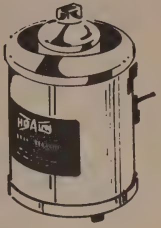
No.	Dia.	No.	Dia.	No.	Dia.
HT654X	1/8"	**HT656X**	3/16"	**HT658X**	1/8"
HT655X	1/8"	**HT657X**	3/16"	**HT659X**	1/8"

CATALOG NOS. shown are for DUROTHERM. For XTRADUR substitute "X" for "D"; cost approximately 10% less than DUROTHERM.

SAMPLE TIPS for your evaluation. Ask for new Tip Sketch Catalog with detailed sketches of 250 Standard Coated Tips.

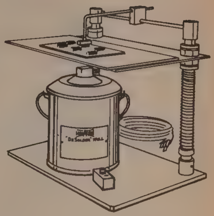
HEXACON SOLDERING ACCESSORIES

MICRO-CIRCUITRY DESOLDER WELL



- Safe operation . . . will not damage components or boards
- Desolders whole areas at a time
- Semi-automatic . . . plugs in anywhere 110-120 volts or 220-240 volts AC
- Light, portable, all parts replaceable
- 3 wire grounded construction
- No training required . . . simple operation

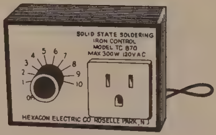
MODEL 9100
Work Position Stage



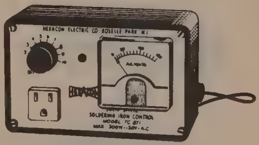
- Adjustable locator with detachable head can be changed to accommodate wide variety of components
- Lightweight inexpensive fixturing board can be cut to fit different sizes and shapes of PC boards
- Tension easily adjustable to weight of individual board assemblies
- Precision designed and manufactured for maximum flexibility and long use

Temperature Control Units

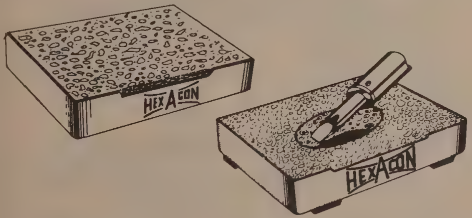
- Controlled AC input provided from 0-95% of line voltage
- Capacity 300 watts on 115 volts
- Solid state circuitry includes built-in fuse protection
- Idling temperature may be readily controlled
- Thermal working zones may be varied by adjusting input control
- Use same iron for different capacity jobs
- Calibrate control settings to maintain proper working ranges as required by government specifications
- Rugged design provides long maintenance, free operational life


SOLID STATE SOLDERING IRON CONTROL MODEL TC 870 MAX 300W 120V AC
0
1
2
3
4
5
6
7
8
9
10
HEXACON ELECTRIC CO ROSELLE PARK, N.J.

Model 870
3 wire grounded design.
Size 1⅝" x 4".
Weight 10 oz.


HEXACON ELECTRIC CO ROSELLE PARK N.J.
SOLDERING IRON CONTROL MODEL TC 871 MAX 300W - 120V - AC

Model 871
3 wire design. Comes with voltmeter for visual indication of voltage input to iron. Size 2" x 6¼".
Weight 18 oz.



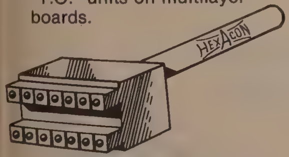
TIP CLEANING SPONGE

Insures reliability of soldered joints and extends tip life. Eliminates contamination caused by wiping rags. Low-sulfur, pure cellulose fine pore sponge. New dross reservoir promotes cleaner sponge surface and prevents overwiping.

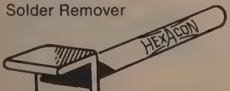
No. 810 Complete unit (solid sponge)
No. 812 Complete unit (sponge with hole)
No. 8101 Solid sponge only
No. 8121 Sponge with hole

DE-SOLDERING TIPS

For the fast removal and replacement of "I.C." or "T.O." units on multilayer boards.



I.C. Solder Remover



Tunnel Tip

I.C. Remover (¼" shanks)

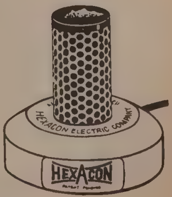
Model	Leads
R910	10
R914	14
R916	16

Tunnel Tips (¼" shanks)

Model	Leads
895F	10
897F	14
898F	16

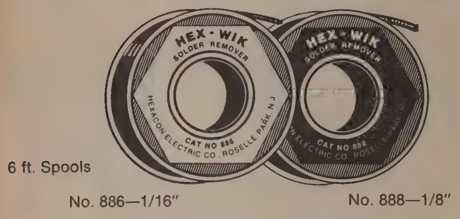
940 SERIES MINI-POT
4 models (temperatures 500° F-800° F)

- Designed for stripping, tinning and soldering heat strippable wires
- Precision wound elements. Entire assembly is grounded for safety
- 3-wire, grounded HI-TEMP (SP3N) cords with NEMA type plugs
- Cool, green, porcelain base, rubber nonskid mount. Can be used in clean room without marring bench
- Compact, lightweight, will not tip over
- All parts are replaceable



SOLDERING ACCESSORIES

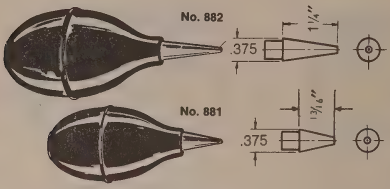
HEXACON


HEX-WIK SOLDER REMOVER
CAT NO 886
HEXACON ELECTRIC CO. ROSELLE PARK, N.J.
HEX-WIK SOLDER REMOVER
CAT NO 888
HEXACON ELECTRIC CO. ROSELLE PARK, N.J.
6 ft. Spools
No. 886—1/16″
No. 888—1/8″

Longer lengths available.

HEX-WIK SOLDER REMOVER

- The easiest and most economical method of desoldering printed wiring boards without measling, delamination or lifted pads.
- Simplifies removal and replacement of components
- Can be used for solder removal on plated thru and multi-layer printed wiring board assemblies
- Braid processed for long shelf life insures greater capillary action
- Available in 2 sizes 1/16″ for micro work; 1/8″ for larger connections
- Meets all military and government specifications

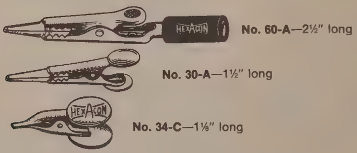

No. 882
.375
1¼″
No. 881
.375
13/16″

SOLDER SUCKER

A handy inexpensive tool for the quick removal of solder. Small, lightweight and easy to use. Teflon tiplets easily changed or replaced.

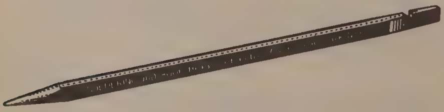
No. 882 1¼″ tiplet (complete)
No. 8820 Tiplet only

No. 881 13/16″ tiplet (complete)
No. 8810 Tiplet only


HEXACON
No. 60-A—2½″ long
No. 30-A—1½″ long
HEXACON
No. 34-C—1⅛″ long

HEAT SINKS with Chrome Plated Copper Tipped Clips

Protect heat sensitive components such as transistors and diodes from thermal damage.

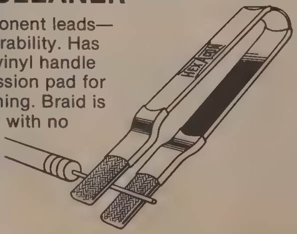


FIBERGLASS SOLDER AID

For inspecting, probing, unsoldering and assembly of printed circuits and other components. Non-conductive. Eliminates scratched circuit boards, broken wire strands.
Cat. No. 800G

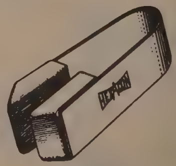
BRAID CLEANER

Cleans component leads—insures solderability. Has comfortable vinyl handle grip; compression pad for contour cleaning. Braid is held securely with no loose ends.
Cat. No. 860



ERASER CLEANER

Designed primarily for the removal of oxides and contamination from P.C. boards and component leads.
Cat. No. 850



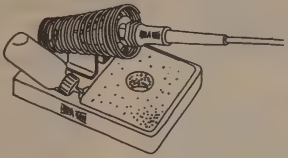
SOLDERING IRON HOLDERS

HEAT GUARD SOLDERING IRON HOLDERS

- Cool, safe holder assembly
- Full operator protection
- Protect iron and tip
- Conserve energy — nonheat sinking

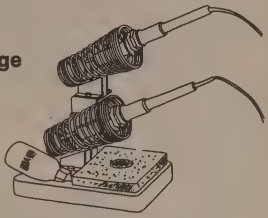
MODEL 890
Ceramic Base with Reservoir and Sponge

- For instrument irons
- Water injection keeps sponge wet
- Non-skid base — can be used in clean room without marring bench
- Base easily cleaned



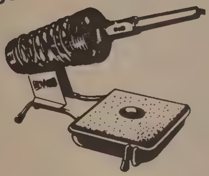
MODEL 891
Ceramic Base with Reservoir and Sponge

- Same features as Model 890
- Holds two irons
- Irons positioned to prevent cord tangling



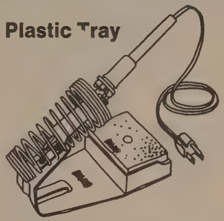
MODEL 892
Chrome Base with Sponge

- For instrument irons
- Non-skid stand — can be used in clean room without marring bench
- Sturdy wire construction
- Easily cleaned



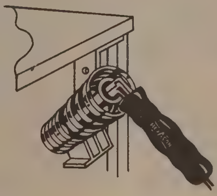
MODEL 892A
Plated Steel Base with Plastic Tray

- Designed for instrument irons
- Stable, safe, sturdy construction
- Detachable high temperature plastic tray — easily cleaned



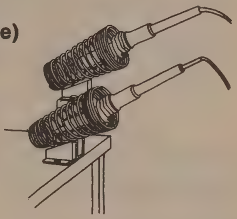
MODEL 893
Bench Mounted

- For under-bench mounting
- Angle adjustable for operator convenience and safety
- Sturdy construction — easily cleaned



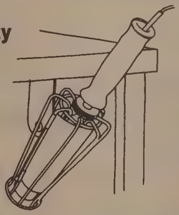
MODEL 894
Bench Mounted (Double)

- Irons positioned to prevent cord tangling
- Sturdy construction — easily cleaned
- May be adapted for under-bench mounting



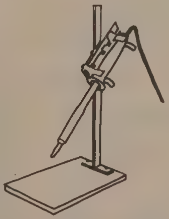
MODEL 899
Bench Mounted Heavy Duty

- Rugged design for heavy duty irons
- May be mounted above or below bench
- Holder angle easily adjustable
- Open frame results in cooler iron operation



MODEL 8900
Sturdi-Stand

- Frees operators hands for work handling
- Angle and height of iron easily adjusted
- Sturdy, rigid construction insures stability



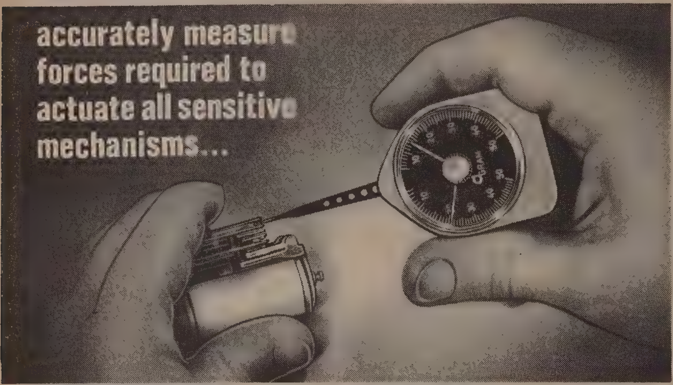
OTHER MODELS AVAILABLE

For complete information on Soldering Irons and Accessories, write for Catalog "Soldering Irons." Write for complete tip catalog with 250 standard sizes and shapes. Custom tips designed to specifications.

HEXACON ELECTRIC CO. 156 West Clay Ave., Roselle Park, N.J. U.S.A.

JONARD GAUGES: Dynamometer dial - Spring tension - Push-pull type

gauges are a must in all departments...



- ■ RESEARCH & DEVELOPMENT
- ■ PRODUCTION
- ■ QUALITY CONTROL
- ■ MAINTENANCE & REPAIR

use them for:

- ● TELECOMMUNICATION EQUIPMENT
- ● PRECISION INSTRUMENTS
- ● BUSINESS MACHINES

Produced in 2 sizes and a total of 13 ranges . . . Simple to use. Just place point of gauge arm perpendicular to force to be measured and read clockwise or counter-clockwise.

All gauges retain reading after measurement . . . No need to look at dial while measuring. Max. reading pointer moves to max. reading +0.01% and remains there until reset.

Small Gauges						Large Gauges		
Jonard type	Range (grams)	Conv. in ounces	Jonard type	Range (grams)	Conv. in ounces	Jonard type	Range (grams)	Conv. in ounces
GD-1	0-10	⅜	GD-10	10-100	3½	GD-50	61-500	18
GD-2	2-20	¾	GD-15	15-150	5¼	GD-100	100-1000	32
GD-3	4-35	1-5/16	GD-20	20-200	7	GD-200	200-2000	70
GD-5	6-50	1¾	GD-25	30-250	9	GD-400	400-4000	140
			GD-30	40-350	12			

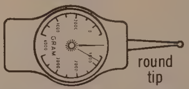
dynamometer type

Indispensable for adjustment of pressure, starting torque or spring tension, where accuracy is required for proper operation. Simple to operate. Measures in both directions—clockwise and counter-clockwise. Gauges are equipped with maximum reading, pointer that retains reading.

Extreme precision and durability built in . . . Made of hard-tempered annealed beryllium copper springs, unbreakable glass face and protected by rigid fitted plastic case.

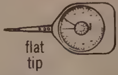
LARGE GAUGE

1½" dial
Weight: 14 oz.



SMALL GAUGE

2½" dial
Weight: 4½ oz.



spring type

set and accurately check tension of relay springs, electro-mechanical devices and delicate electronic components

made in 3 basic types:

CENTER ZERO, HEAVY DUTY and PRESET TYPE

All have engraved scales, front and back and can be used both vertically and horizontally.

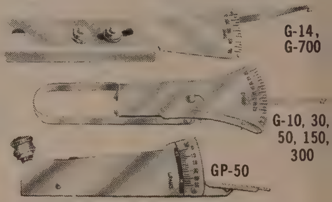
CENTER ZERO—Reads left or right. Adjustable blade, handle closes for protection. 1½" w. × 5" lg. overall.

G-10, 30, 50, 150 & 300
G-10 0-10 gr. **(Weco #70F)** ....1 gr. cal.
G-30 0-30 gr. **(Weco #70H)** ....2 gr. cal.
G-50 0-50 gr. **(Weco #70D)** ....5 gr. cal.
G-150 0-150 gr. **(Weco #70J)**.........10 gr. cal.
G-300 0-300 gr. ....25 gr. cal.

HEAVY DUTY—Measure tension of heavier springs. Long spring arm for easy reach.

G-700 0-700 gr. **(Weco #62B)** Cal. in 50 gr. steps

G-14 0-1,400 gr. **(Weco #158A)** Cal. in 100 gr. steps
1½" w. × 7½" lg. overall.

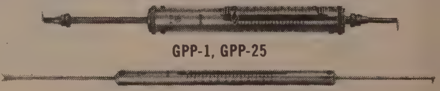


PRESET TYPE—Set to required tension by turning screw. Accurate and precise indication that will go no farther than your setting.

GP-50 (Weco dwg. #KN-102873) 0-50 Cal. in 5 gr. steps. Overall length 5¼".

push-pull type

Easy to use in confined areas. With adjustable shafts. Tubular construction with full scale accuracy. Engraved scales. Measure tension or compression of spring loaded devices, actuated levers, relays, microswitches, triggers, pull-pins, pull tests of fine wires, etc.



GPP-1 0-1,000 gr. **(Weco #79B) (Dwg #KN-102874)** Cal. in 50 gr. steps, ⅝" × 9¼" lg.
GPP-2 0-110 gr. **(Weco #79C)** Cal. in 5 gr. steps, ⅜" × 11" lg.

GPP-5 Two scales, 0-500 gr. and 0-16 oz. in. Cal. in 50 gr. and 1 oz. in. steps. ⅜" × 11" lg.

GPP-25 Two scales, 0-2,500 gr. and 0-80 oz. in. Cal. in 100 gr. and 4 oz. in. steps. ⅝" × 9¼" lg.

FOR PRICES AND TERMS, SEE PRICE LISTS L-25 AND L-35

JIC TOOLS *Precision tools for electronics, telecommunications and aerospace*

JONARD INDUSTRIES CORP. *134 marbledale road•tuckahoe, new york 10707• phone (914) 793-0700*
TWX 710-562-0107 • TELEX 996570

JONARD BURNISHERS AND CLEANERS

diamond abrasive - contact burnishing tools

cleans contacts effectively!

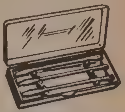
Exclusive advantages:

- Powerful diamond abrasive
- Flexible
- Long lasting
- Dielectric
- Non-clogging

Only minimum pressure needed to produce perfectly polished contact faces, due to uniformity of diamond particles. Nominal removal of material will not alter gap. Flexible-dielectric plastic shaft permits access to awkward areas. Relays can be serviced without power shutoff. **Single spatulas supplied in plastic vial.**

D-200 Coarse —.019" thick, double faced. 6" lg.
D-300 Medium —.017" thick, double faced, 6" lg.
D-400 Fine —.011" thick, single face, 6" lg.

K-234 "Diamfile" Kit: Consists of 3, assorted or all of one type of above spatulas, in rigid plastic case:



complete assortment of pocket type burnishers for every application...

ECONOMY BURNISHERS. Leave no grit or dust and will not affect contact points. Plastic handles for working on live contacts.

OB-1 For fine contacts. Abrasive coated, 3½" lg. 3/16" wide, .007" thick. Pkg. 12 pcs.
Pkg. 48 pcs.

OB-2 For extra-fine contacts. 3½" lg. x ¼" wide. .010" thick . . . . Pkg. 12 pcs.
Pkg. 48 pcs.

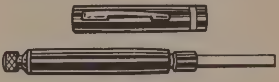
OB-3 General purpose type. Abrasive, coated plated. Hard molded handle. 3½" lg., ¼" wide, .010" thick. Pkg. 12 pcs. • Pkg. 24 pcs.

OB-4 For industrial use. Abrasive, coated plated. Hard molded handle. 3½" lg. ¼" wide, .020" thick. .Pkg. 12 pcs.
Pkg. 24 pcs.

POCKET-TYPE BURNISHERS. Used for cleaning general type contacts. Supplied with 6 non-residual abrasive replaceable blades and/or 6 rods stored in pen barrel, as noted. Pen made of sturdy plastic for dielectric work. Length 4½". Diameter ⅜". Blade: 3/16" wide, 1¾" long, .007" or .0035" thick.

PB-3 Pen with 6 blades, .0035" thick.
PB-3R (Weco #265C) Same as PB-3 plus 6 abrasive rods.
PB-7 Pen with 6 blades, .007 thick.
B-3 (Weco #266E) Pkg. 25 Repl. blades for PB-3 and PB-3R (.0035")
B-3R (Weco #266C) Pkg. 50 Repl. rods for PB-3R.

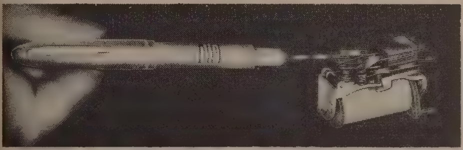
B-7 Pkg. 25 Repl. blades for PB-7 (.007").



PB TYPE

no grit or dust left on contacts with penfile type units

PENFILE POCKET CLEANER-BURNISHER WITH 12 REPLACEMENT BLADES



For all type contacts. Non-residual, do not leave grit or dust on contacts. Hard-tempered steel blade surface insures minimum contact wear. Adjustment of blade—length and rigidity—by varying depth in chuck. Plastic cap for work on "live" contacts. Length 5½", Dia. ⅜".

P-4 PENFILE with 12 blades, ¼" wide, 1¼" long, .007" thick.
P-6 PENFILE with 12 blades, 3/16" wide, 1¾" long, .007" thick.
RB-4 Replacement blades for **P-4**, Pkgs. 25 pcs.

RB-6 Replacement blades for **P-6**, Pkgs. 25 pcs.

Also available with diamond blades on request.

BC-23

BC-23 BANK CLEANER TOOL

For rotary switches and stepping relays. Dielectric handle for work on "live" equipment. Curved blade has fine abrasive coating. Dia. 1½", overall length 6"

after burnishing: *wash* and *clean* with our effective sprays...

KONTACT 60-SPRAY CLEANER

Specially formulated for contacts, switches, controls, etc. Dissolves oxidation and carbonaceous build-up. Leaves protective film. Non-conductive. Will not break circuit or harm insulation. Has injector for hard-to-reach areas. Net Wt. 6 oz.
K-60

JIC-22 ELECTRO-WASH and DEGREASER

Eliminates: Grease—Dirt—Oil and oxidation by powerful flushing spray. Quickly, safely, effectively.

- LEAVES NO RESIDUE
- SAFE ON ALL MAT'LS
- HARMLESS TO PLASTICS
- NON-CONDUCTIVE
- NON-FLAMMABLE
- DOES NOT CONTAIN CARBON-TET

Leaves components like NEW! Especially made for: P.C.'s, tuners, phone, switching systems, instrumentation, central-office equipment, motors, relays & many other complex mechanisms. 24 oz. Economy can.
JIC-22 Standard pkg: 6 pcs. —12 pcs.

JIC-33 ELECTRO LUBRI-FOAM

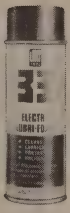
Cleans • Lubricates • Protects • Polishes

For ALL electronic/electro-mechanical actuated devices and components.
• EXCLUSIVE FOAMING ACTION • WILL NOT RUN, DRIP, DRY OUT OR CAKE UP • CLEANS, POLISHES AND LUBRICATES CONTACTS • ELIMINATES DISTORTION AND NOISE • SAFE ON ALL PLASTICS • NON-FLAMMABLE

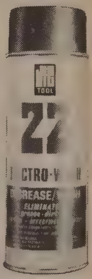
Primarily designed for GOLD, SILVER and precious metal contacts.

New synthetic chemical provides long lasting lubrication which will withstand extremes of temperature and keep contacts clean, polished and lubricated. 8 oz. can.
JIC-33 Standard pkg: 12 pcs. —24 pcs.

6 oz.



8 oz.



24 oz.

FOR PRICES AND TERMS, SEE PRICE LISTS L-25 AND L-35

JIC TOOLS *Precision tools for electronics, telecommunications and aerospace*

JONARD INDUSTRIES CORP. *134 marbledale road•tuckahoe, new york 10707• phone (914) 793-0700*

TWX 710-562-0107 • TELEX 996570

JONARD

UNIVERSAL INSTALLATION, SERVICE, ADJUSTMENT & MAINTENANCE KIT- TK-500

NOW! with just ONE kit...| you can INSTALL, SERVICE, ADJUST & MAINTAIN - Telecommunication Systems - Central Office Systems (inside and outside the plant) and switchboards.

This specially designed kit contains ALL the ESSENTIAL and BASIC tools required for the above jobs

Now work on Cross-Bar, PBX, PABX, Penta Conta, cross-bar switch/Casino, springs relays, rotary stepping switches and many other jobs out of ONE kit!

A carefully made SELECTION of tools to fill your needs and simplify your work.

FEATURES:

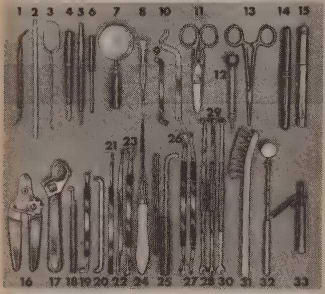
TOP QUALITY TOOLS: Precision, finely machined and finished to give dependable, durable service.

REMOVABLE BOARDS: Easy selection and instant use of ALL tools.

● EXTRA POCKETS FOR YOUR TOOLS. ●SEPARATE COMPARTMENTS FOR NOTES & PAPERS. ● HANDY PLASTIC BOX FOR SMALL PARTS.

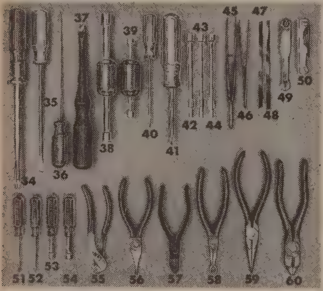
All 76 tools are securely mounted in individual pockets in a highly durable, scratch resistant BARCO case. Withstands years of abuse. Complete kit weighs only 16 lbs. and is 5-½"h. x 18-¼"w. x 16-¼"d.

TK-500	Complete set of tools with case
TK-500NC	Tools alone without case
TK-500M	Complete set of tools with case and meter
TKC-50	Tool Case alone
MK-650	Meter and accessories



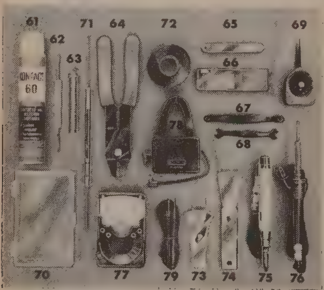
All 3 boards can be removed---for INSTANT SELECTION of ALL tools!

TOOL NO.	JONARD TYPE	DESCRIPTION
1	S-457	Wire and spring aid
2	S-389	Orange stick
3	M-120	Hook Spring, pull
4	PB-3R	Pocket type burnisher w/blds. & rods
5	S-381	Test probe
6	SA-7	Spring adjuster, .015" slot
7	K-605	Hand magnifier
8	SD-63	Jewelers screwdriver
9	AB-20	Armature adjuster
10	SB-22	Stop bender
11	FS-66	Filament scissor
12	J-23	Screwdriver, guide pin
13	M-100S	Retriever clamp (straight)
14	OS-84	Precision oiler
15	K-606	Penlight
16	WS-61	Wire stripper
17	K-607	Adjustable wrench
18	SA-8	Spring adjuster, .058" slot
19	SA-6A	Spring adjuster, .029" slots
20	SA-24	Spring adj. .040" & .028 slots
21	SA-175	Spring adjuster .031" slot
22	SA-20	Spring adjuster .024" slots
23	SA-2	Spring adjuster .023" slots
24	M-103	Swiss needle file set
25	SA-25	Spring adjuster .032" slot
26	SA-16	Spring adjuster .031" slots
27	SA-17	Spring adjuster .023" slots
28	DW-4	Offset adj. wrench, ⅛"
29	DW-16	Offset adj. wrench, 3/16"
30	DW-32	Offset adj. wrench, 7/32"
31	WB-65	Wire brush, nickel/silver
32	IM-64	Inspection mirror
33	S-339	Lamp extractor, switchboard



Separate compartments for papers..Extra pockets for your additional tools.

TOOL NO.	JONARD TYPE	DESCRIPTION
34	K-608	Screwholding screwdriver
35	K-609	Standard 6" screwdriver
36	M-140	Beryllium copper screwdriver
37	K-610	Std. screwdriver (insulated)
38	M-311	Skt. wrench, 3/8" x 7/16", 7" lg.
39	M-110	Skt. wrench, 9/32" x 5/16", 4" lg.
40	K-611	Standard screwdriver (light)
41	M-160	Comb. Phillips/std. screwdriver
42	M-160-5	Nut driver, 5/16"
43	M-160-11	Nut driver, 11/32"
44	M-160-3	Nut driver, 3/8"
45	TW-63	Tweezer, curved pts., insul.
46	TW-57	Tweezer, type AA, fine pt.
47	S-448	Offset screwdriver, angled
48	S-451	Offset screwdriver, .028" tips
49	M-130	Ratchet, Offset screwdriver
50	K-612	Allen wrench set
51	K-601	Midget screwdriver, std. No. 0
52	K-602	Midget screwdriver, Phillips No. 0
53	K-603	Midget nut driver, 3/16" hex
54	K-604	Midget nut driver, ¼" hex
55	PL-4	Groove-grip plier, midget
56	PL-8	Duck bill plier, spring
57	PLS-2	Diag. angle, cutting/stripping plier
58	PLS-5	Heat coil plier, 6" lg.
59	PL-10	Nose cutting plier
60	PL-7	Lineman's plier, 7" lg.



Reference sheet about tools & kit included..also handy compartmented plastic box for small parts.

TOOL NO.	JONARD TYPE	DESCRIPTION
61	K-60	Contact cleaner spray
62	K-614	Solder aid
63	K-615	Solder
64	K-616	Crimping and cutting tool
65	T-720N	Straight thickness gauge
66	T-271	Wire thickness gauge set
67	M-78	Box wrench, ¼" x 9/32" hex
68	M-76	Open end wrench, ¼" x 15/64"
69	GD-15	Tension gauge, dyn., 15-150gr.
70	K-617	Plastic box w/spaces f/parts
71	GPP-2	Push-pull gauge, 0-110gr.
72	K-618	Vinyl electrical tape
73	G-50	Spring tension gauge, 0-50gr.
74	G-700	Sprg.tens. gauge, hvy.duty, 0-700gr.
75	K-619	Circuit tester
76	SI-25	Soldering iron
77	TM-31	Meter
78	TA-10	Adapter
79	TL-1	Test leads

Reorder tools by
Jonard type No.

OPTIONAL METER ACCESSORY

MK-650 Consists of 1 Multi-meter, 1 Ammeter adapter and set of test leads. Available optional extra.

FOR PRICES AND TERMS, SEE PRICE LISTS L-25 AND L-35

JIC TOOLS *Precision tools for electronics, telecommunications and aerospace*

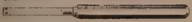
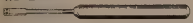
BULLETIN FL-9

JONARD **INDUSTRIES CORP.** *134 marbledale road•tuckahoe, new york 10707• phone (914) 793-0700*
TWX 710-562-0107 • TELEX 996570

JONARD QUIK-WRAP® *devices make more uniform, mechanically stable, permanent WIRE WRAP connections!*

HAND WRAPPING TOOLS

No bits or sleeves are needed with these handy tools. Use them for shop, service and production wrapping or special requirements.

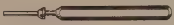
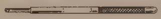
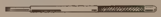
JONARD#	GAUGE	DESCRIPTION
WD-2000 	20	Single ended, .071"x .625" deep.
WD-2400 	24	Single ended, .075"x .625" deep.
WD-2001	20	Single ended, w/tunnel, .075"x .625" deep.
WD-2224	22-24	Single ended, w/tunnel, .075"x .625" deep.
WD-2225	22-24	Single ended, .075"x .800" deep.
WD-2600	26	Single ended, .075"x .750" deep.
WDI-2224 (Weco # 635A)	22-24	Special; insulated, .073" x .750" deep.
WDI-2426 (Weco # 635B)	24-26	Standard; insulated, .073" x .750" deep.

BARE GROUND STRAPPING TOOLS

WDG-2224	22-24	Aluminum anodized handle, knurled, continuous feed.
WDG-2600	26	Aluminum anodized handle, knurled, continuous feed.

HAND UNWRAPPING TOOLS

Like the wrapping tools, these hand unwrapping tools have no separate bits and sleeves. Use them in any location. No power needed.

JONARD#	GAUGE	DESCRIPTION
UDLR-2026	20-26	Double ended, left and right hand, .070"x .750" deep each end.
UDL-2027	20-26	Double ended, left hand, 052" one end, .070" other x 1.25" deep hole.
UDL-2426	24-26	Double ended, left hand, .066" one end, .073" other end, 1" deep hole.
UDR-2426	24-26	Double ended, right hand, .066" one end, .073" other end, 1" deep hole.
UDL-2026	20-26	Single ended, left hand, .070"x .750" deep.
UDL-2028 	20-26	Single ended, left hand, insulated, .070"x 2.360" deep, wire release type.
UD-2224 (Weco #'s KS-16492, R-3328)	22-24	Single ended, plastic handle, .070" dia. hole, wire release type, insulated.
UDL-2427 	24-26	Single ended, left hand, .072"x 1.81" deep hole.
UDR-2427 	24-26	Single ended, right hand, .072"x 1.81" deep hole.

KITS - *Convenient to use... easy access... all tools at your fingertips...*

WRAPPING TOOL KIT • KW-350

A set of wrapping tools, selected to handle the most popular wire wrap connections.

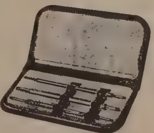
Handsomely fitted in a durable leather finished case for maximum protection of tools.

WDI-2426 Standard; insulated, .073"x .750" deep hole.

WD-2225 Single ended, w/tunnel, .075"x .625" deep hole.

WD-2000 Single ended, .071"x .625" deep hole.

UNWRAPPING TOOL KIT • KU-360



A set of unwrapping tools, selected to handle the most popular wire unwrap connections.

Set complements the above wrapping tool kit.

Handsomely fitted in a durable leather finished case for maximum protection of tools.

UDL-2027 Double ended, left hand, .052"/.070" x 1.25" deep hole.

UDLR-2026 Double ended, left and right hand, .070"x .750" deep hole.

UDR-2426 Double ended, right hand, .066" .073" with 1" deep hole.

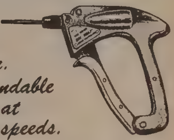
Manual QUIK-WRAP® GUNS & ACCESSORIES ...

UG-360
UNWRAP TOOL

Unwrap bits are listed here

WIRE GAUGE	QUIK - UNWRAP BIT JONARD PART NO.
20-26	BU-2026
20-26	BUP-2026 (For power tools)

WG-350
CHUCK TYPE



Easy, to use. Make dependable connections at production speeds.

SLEEVE BIT

The following table lists the necessary bits and sleeves for the wire size and terminal you are working with.

WIRE GAUGE	Regular	*Modified	Terminal Hole Dia. x Depth	QUIK-WRAP BIT JONARD PART NO.	QUIK-WRAP SLEEVE JONARD PART NO.
24-26	✓		.075"x .750"	BW-2426	SW-2426
22-24	✓		.075"x .807"	BW-2224	SW-2224
24-26		✓	.075"x .750"	BWM-2426	SW -2224
22		✓	.075"x .750"	BWM-2200	SW-2224

*Modified wrap includes additional 1½ turns with insulation on terminal.

If you cannot find the wrapping tool you need, Jonard will produce it custom to your specifications and requirements.

FOR PRICES AND TERMS, SEE PRICE LISTS L-25 and L-35

JIC TOOLS *Precision tools for electronics, telecommunications and aerospace*

JONARD INDUSTRIES CORP. *134 marbledale road•tuckahoe, new york 10707• phone (914) 793-0700*

TWX 710-562-0107 • TELEX 996570

MASTER Appliance Corporation FLAMELESS HEAT TOOLS

A Complete Broad Line for Your Every Need

HEAT GUN

Standard Models

STANDARD MODELS

Standard Model	Temp. F.°	Voltage	Amp.
HG-201	220/320	120	5
HG-202	220/320	230	2.6
HG-301	475/600	120	12
HG-302	475/600	230	6.3
HG-501	650/950	120	14
HG-502	650/950	230	7.5
HG-751	1000/1150	120	18.5
HG-752	1000/1150	230	9.5

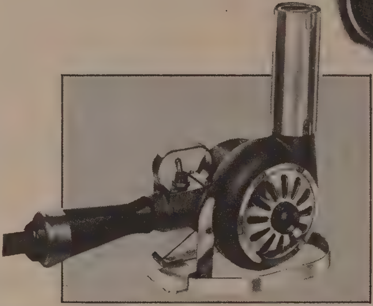
Los Angeles approved and chrome models also available

- ★ **CONTOURED, COMFORT-FIT HANDLE.** Gives operator secure grip and balance — at all times. Insures firm, positive control of gun.
- ★ **CONVENIENT 3-WAY SWITCH.** Provides the option of hot, cold or off at the flick of a finger.
- ★ **DOUBLE-JACKETED HEATER HOUSING.** Inner barrel is chrome-plated to prevent rust, corrosion.
- ★ **POWERFUL, HI-SPEED UNIVERSAL MOTOR.** None better made! Perfectly balanced.
- ★ **STURDY, DIE-CAST ALUMINUM HOUSING.** Gives the protection needed against hard knocks in the shop. Lightweight. Reduces arm fatigue.
- ★ **QUIET, EFFICIENT TURBO-FAN.** Cools Motor. Delivers correct heat and velocity where you need it.
- ★ **ADJUSTABLE AIR-INTAKE SHUTTER.** Gives you exact degree of heat you want. Varies velocity — open shutter to decrease temperature, close shutter to increase temperature.
- ★ **ADJUSTABLE, REMOVABLE "SLIDE-ON" BASE.** Standard equipment. 5¾" triangular. Adjusts to support gun in various positions.*
- ★ **FLUSH BRUSH HOLDERS.** Brushes can be changed in 60 seconds; easy access — no need to disassemble unit.
- ★ **BIG 1-3/16" DIAMETER NOZZLE.** Designed to direct a powerful flow of heat on the *exact area* you want. Accommodates a variety of attachments.
- ★ **8-FOOT CORD, OIL RESISTANT NEOPRENE, 3-WIRE MOLDED PLUG.** Size of cord complies with safety code for each gun's amperage requirements. Lighter cords than those provided by Master are potentially dangerous to operator. Special cord lengths and plugs to your specifications are available.

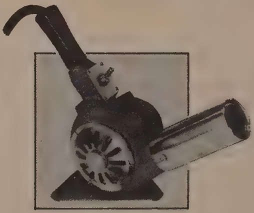
UL Listed Models

MASTER Heat Guns are U.L. & CSA. listed, Models HG1201U, HG1301U, HG1501U. L.A. listed Models available for all heat guns. Specify "U.L. listed" or "L.A. listed". All U.L. and L.A. models have same basic Specifications shown on chart.

U.L. Listed Heat Guns Meet O.S.H.A. Requirements

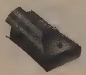


U.L. Listed Heat Gun



ATTACHMENTS

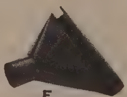
A



B

C

D



E

F

U.L. LISTED MODELS

Model	Temp. F.°	Voltage	Amp.
HG-1201-U	220/320	120	5
HG-1301-U	475/600	120	12
HG-1501-U	650/950	120	14

U.L. Listed models feature "Mitey-Mite" fuse, trigger guard that covers the switch, a permanently attached stand, and U.L. Listed wiring

Attachments: a. exclusive cone ha ¼" orifice that focuses heat on concentrated area and a patente adjustable air diffuser that eliminate back pressure and heat loss. Part No A-206-HG. **b. Nozzle adapter** — required for baffles A-145-HG an A-150-HG. Part No. A-100-HG. **c Baffle** — for tubing to ¾" OD, requires A-100-G adapter. Part No. A-145-HG. **d. Baffle** — for tubing to 1¼ OD, requires A-100-HG nozzle adapte Part No. A-150-HG. **e. Extra wid baffle** — for long tubing to ¾" OD Part No. A-203-HG. **f. Baffle** — for tubing to 1¾" OD. Part No. A-205-HG

MASTER APPLIANCE CORP. • 2420 18TH STREET • RACINE, WISCONSIN • (414) 633-7791

MASTER-MITE T.M. HEAT GUN

ECONOMICAL • RUGGED • LIGHT • VERSATILE

Gun with
Standard 650° F.
Nozzle

Compact heat tool for heat shrinking and other industrial uses. Delivering up to 800° F . . . weighs only 1¾ lbs. with nozzle. Three interchangeable nozzle heating elements, high impact plastic housing.

7 ft. three conductor-grounded cord for 120 V., 60 Hz., 5.4 amp input. Air cooled barrels deliver 700 feet/minute air velocity and 3.8 CFM of volume. 650° F. nozzle and deflector adapter standard. Otherwise specify element of your choice.

*U.L. Listed

SEE MASTER'S COMPLETE LINE CATALOG FOR INFORMATION ABOUT OTHER HEAT TOOL MODELS.

SUGGESTED NOZZLES FOR HEAT SHRINKABLES

Type Tubing	Common or Trade Designation	Approx. Shrink Temp.*** (° F.)	Sugg. Heat Nozzle
Polyester	Mylar*	175	Blue
Polyvinyl Chloride	PVC; Vinyl	250	Silver
Irradiated Polyvinyl Chloride	PVC; Vinyl	250	Silver
Irradiated Butyl	—	250	Silver
Irradiated Polyolefin	—	275	Silver
Polyfluorinated Ethylene Propylene	FEP	300	Silver
Polyvinylidene Fluoride	Kynar**	350	Silver
Irradiated Neoprene	—	350	Silver
Irradiated Silicone	—	350	Silver
Polytetrafluoroethylene	Teflon*; PTFE; TFE	621	Black

*Reg. Trade Name of DuPont
**Reg. Trade Name of Pennsalt
***Based on latest available information

REPLACEMENT HEATING-ELEMENT NOZZLES

Color	Avg. Outlet Temp. (½" from Nozzle)	Voltage	Wattage	Cat. No.
Blue	500° F	120	340	20012
Silver	650° F	120	475	20013
Black	800° F	120	525	20014
Blue	500° F	230	340	20033
Silver	650° F	230	475	20034
Black	800° F	230	525	20035

ATTACHMENTS

Catalog No.	Description	
40060	DEFLECTOR ADAPTER encapsules shrink tubing with even heat. Standard equipment.	
40061	PIN POINT ADAPTER ¼" Concentration of heat	

ORDERING INFORMATION

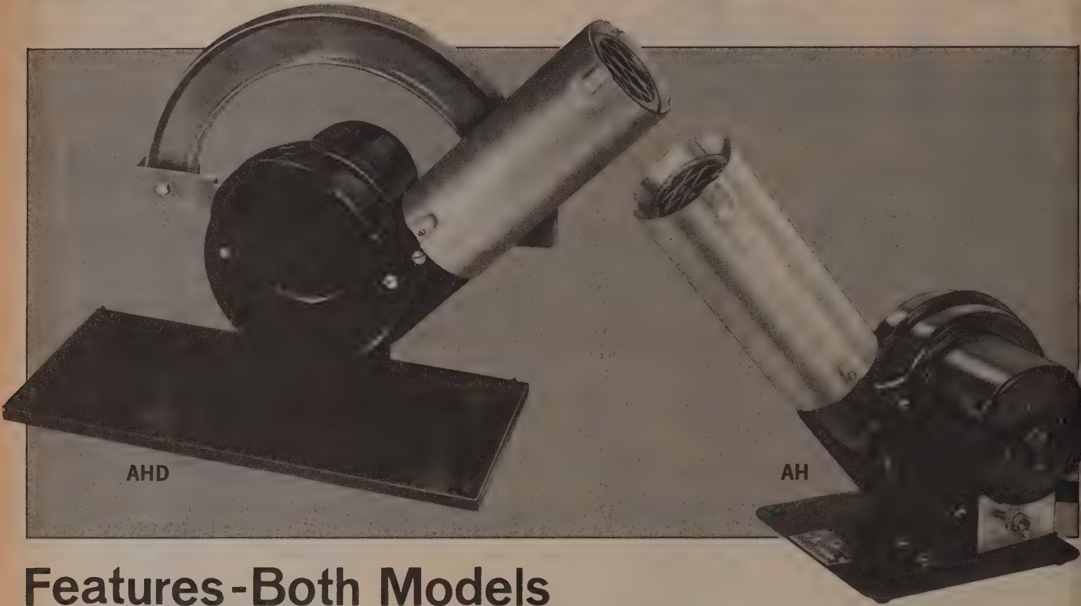
Description	Shipping Weight	Voltage	Model
Heat Gun with nozzle	3 lbs.	120	10008*
Heat Gun with nozzle	3 lbs.	230	10009
Heat Gun Kit	4 lbs.	120	10011
Heat Gun Kit	4 lbs.	230	10012

Kit includes 3 elements, both attachments.

MASTER APPLIANCE CORP. • 2420 18TH STREET • RACINE, WISCONSIN • (414) 633-7791

MASTER Appliance Corporation FLAMELESS HEAT BLOWERS

Continuous flow of air up to 800° F.



Features-Both Models

- ★ **HEAVY-DUTY INDUCTION-TYPE MOTOR FOR CONTINUOUS OPERATION.** Rugged construction insures steady, dependable service day-in, day-out. No brushes to wear out.
- ★ **OVERSIZE TURBO FAN.** Cools the motor. Maintains correct velocity. Built for longer life, peak heat-output efficiency.
- ★ **BIG 2" DIAMETER NOZZLE.** Speeds the job. Directs a steady flow of the correct heat on the work area.
- ★ **CONVENIENT 3-WAY MASTER CONTROL SWITCH.** Lets you switch from hot to unheated air to off at the flick of a finger. Doubles as cooling fan or hot air blower.
- ★ **STURDY 6" x 6" BASE.** Tailor-made for mounting on benches, walls, machines, presses. Perfect for assembly/production line operations.
- ★ **ADJUSTABLE INTAKE ORIFICE.** Controls temperature to heat range required. Open orifice wide for lowest temperature, close partly to reduce air volume and increase the temperature.
- ★ **CONVENIENT REMOVABLE HANDLE.** For portable use, hold blower in any position with this curved well balanced handle. For easy mobility, carry the blower from one place to another.
- ★ **ADJUSTABLE REMOVABLE 6" x 13" BASE.** Provides full 90-degree flexibility. Suited for bench, machine or wall mounting. Large size provides extra secure base when not permanently mounted.

AH SERIES

Model	Temp. F.°	Voltage A.C.	Amp.
AH-301	350	120	10
AH-302	350	230	5.2
AH-501	475	120	14
AH-502	475	230	7.3
AH-751	630	120	18
AH-752	630	230	9.4

AHD SERIES

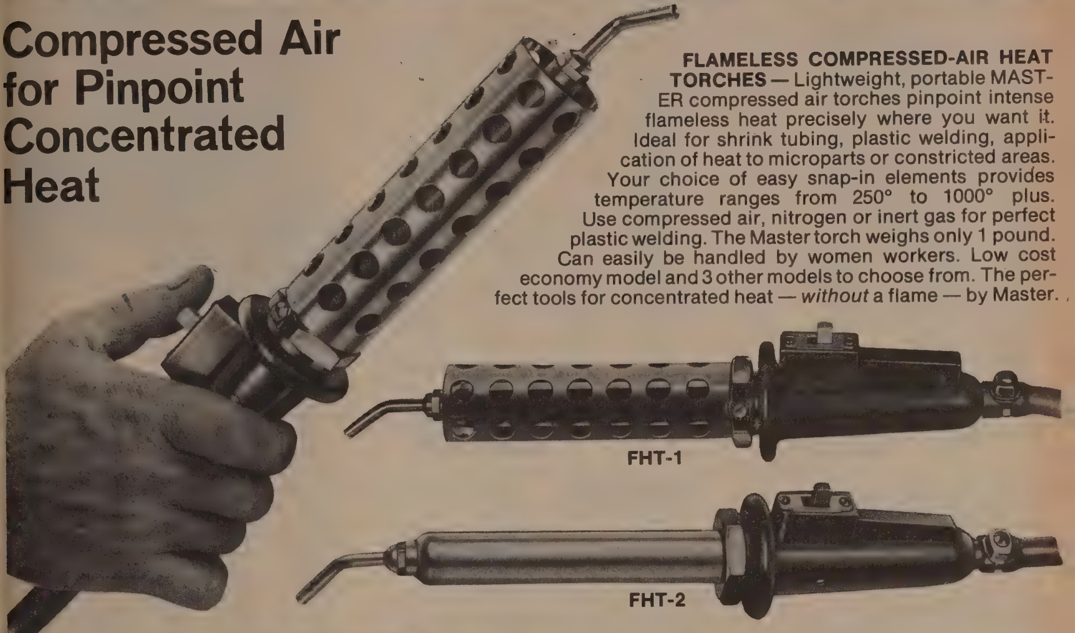
Deluxe Model	Temp. F.°	Voltage A.C.	Amp.
AHD-301	350	120	10
AHD-302	350	230	5
AHD-501	475	120	14
AHD-502	475	230	6
AHD-751	630	120	18
AHD-752	630	230	11

MASTER APPLIANCE CORP. • 2420 18TH STREET • RACINE, WISCONSIN • (414) 633-7791

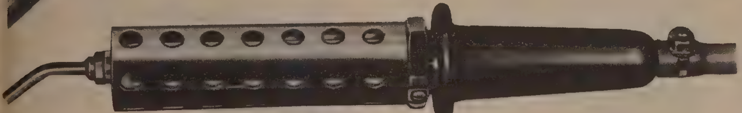
MASTER Appliance Corporation FLAMELESS HEAT TORCHES

Compressed Air for Pinpoint Concentrated Heat

FLAMELESS COMPRESSED-AIR HEAT TORCHES — Lightweight, portable MASTER compressed air torches pinpoint intense flameless heat precisely where you want it. Ideal for shrink tubing, plastic welding, application of heat to microparts or constricted areas. Your choice of easy snap-in elements provides temperature ranges from 250° to 1000° plus. Use compressed air, nitrogen or inert gas for perfect plastic welding. The Master torch weighs only 1 pound. Can easily be handled by women workers. Low cost economy model and 3 other models to choose from. The perfect tools for concentrated heat — *without* a flame — by Master.


FHT-1

FHT-2


FHT-3

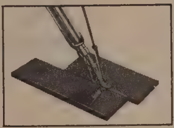
FHT-4

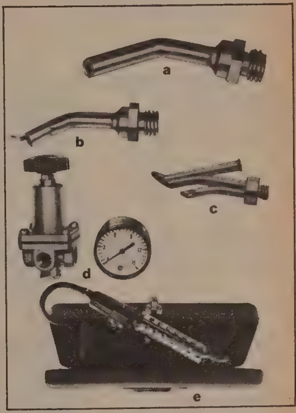
HEAT TORCHES

Model	Description
FHT-1	With Switch and Shield
FHT-2	With Switch Only
FHT-3	With Shield Only
FHT-4	No Switch or Shield

TORCH ELEMENTS

Element Wattage	Temperatures/ Air Pressure	Temperatures/ Air Pressure
250	250° F / 8 p.s.i.	500° F / 2 p.s.i.
350	350° F / 8 p.s.i.	700° F / 2 p.s.i.
450	450° F / 8 p.s.i.	850° F / 2 p.s.i.
550	550° F / 8 p.s.i.	1050° F / 2 p.s.i.





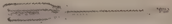
Accessories and attachments: a. Universal multipurpose tip; supplied with each torch. Part No. SS-1. **b. Combination welding and tacking tip;** eliminates need for two tips during welding. Part No. SS-2. **c. Universal highspeed welding tips;** for $\frac{1}{8}$'' and $\frac{5}{32}$'' plastic welding rod. Part No. SS-3. For $\frac{3}{16}$'' plastic welding rod, Part No. SS-4. Either size. **d. Air gauge and regulator;** Part No. A-207-FT. **e. Steel carrying case;** Part No. A-201-FT. **Stand** (not shown); holds torch when not in use; supplied with torch. Part No. A-202-FT.

MASTER APPLIANCE CORP. • 2420 18TH STREET • RACINE, WISCONSIN • (414) 633-7791

Screw Drivers & Nut Drivers

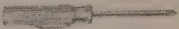
UNCONDITIONALLY GUARANTEED

ROUND BLADE SCREW DRIVERS



Stock No.	Blade Size Inches	O. A. Length	Weight per Pkg.
Pocket Clip Standard Package 12			
A010	3/32 x 1-3/8	3-1/8	1/2 lb.
A230-2	1/8 x 2	3-3/4	1/2 lb.
A130-2	1/8 x 2	3-7/8	1/2 lb.
A130-3	1/8 x 3	4-7/8	1/2 lb.
A116-2	3/32 x 2	4-1/2	1/2 lb.
A116-3	3/32 x 3	5-1/2	1/2 lb.
A116-4	3/32 x 4	6-1/2	1/2 lb.
A131-2	1/8 x 2	4-1/2	1/2 lb.
Electrician & Cabinet Styles Standard Package 6			
A216-2	1/8 x 2	4-3/4	1/2 lb
A216-3	1/8 x 3	5-3/4	1/2 lb.
A216-4	1/8 x 4	6-3/4	1/2 lb.
A216-6	1/8 x 6	8-3/4	1/2 lb.
A216-8	1/8 x 8	10-3/4	1/2 lb.
A216-10	1/8 x 10	12-3/4	1/2 lb.
A316-3	3/16 x 3	6-1/2	1 lb.
A316-4	3/16 x 4	7-1/2	1 lb.
A316-6	3/16 x 6	9-1/2	1 lb.
A316-8	3/16 x 8	11-1/2	1 lb.
A316-10	3/16 x 10	13-1/2	1-1/2 lbs.

PHILLIPS BLADE SCREW DRIVERS



Stock No.	Point No.	Overall Length	Weight Per Pkg.
Genuine Phillips Standard Package 6			
P01	0	5-1/4	-1/2 lb.
P1	1	6-1/2	1 lb
P2	2	7-5/8	1-1/2 lbs.
P3	3	10	2 lbs.
P4	4	12-1/2	3-1/2 lbs.
Pocket Clip Standard Package 6			
P12	0	5	1/2 lb.
Stubby Phillips Standard Package 6			
P5	2	3-7/8	1 lb.
P6	1	3	1/2 lb.

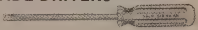
BERYLLIUM COPPER NON-MAGNETIC SCREW DRIVER

Standard Package 6

Stock No.	Blade Diameter and Length	O. A. Length	Weight Per Pkg.
VB210	1/8 x 10	12-3/4	1 lb.

INSULATED BLADE DRIVERS

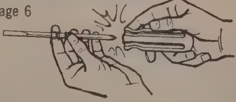
Standard Package 6



Stock No.	Blade Dia. & Length	O. A. Lgth.	Color Key	Weight Per Pkg.
VR261	1/8 x 6	9	Grey	1/2 lb.
VR361	3/16 x 6	9-1/2	Black	1 lb.

REVERSIBLE BLADE DRIVERS

Standard Package 6

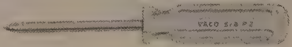


Stock No.	Type and Size of Blade	Weight per Pkg.
DU1	#1 Phil. x 1/8 Reg.	1 lb.
DU2	#1 Phil. x 3/16 Reg.	1 lb.
DUH4	#2 Phil. x 1/4 Reg.	1-1/2 lbs.
DU5	#2 Phil. x 1/4 Reg. (Stubby)	1 lb.
DU11	#1 Phil. x 3/16 Reg. plus 1/4 hex.	1-1/2 lbs.
DUP12	#1 Phil. x #2 Phil.	1-1/2 lbs.
DU34	3/16 Reg. x 1/4 Reg.	1-1/2 lbs.

Stock No.	Blade Size Inches	O. A. Length	Weight per Pkg.
Keystone Styles Standard Package 6			
A416-3	1/4 x 3	6-5/8	1-1/2 lbs.
A416-4	1/4 x 4	7-5/8	1-1/2 lbs.
A416-6	1/4 x 6	9-5/8	1-1/2 lbs.
A416-8	1/4 x 8	11-5/8	1-1/2 lbs.
A416-10	1/4 x 10	13-5/8	2 lbs.
A516-4	5/16 x 4	8	1-1/2 lbs.
A516-6	5/16 x 6	10	2 lbs.
A516-8	5/16 x 8	12	2-1/2 lbs.
Stubby Styles Standard Package 6			
A132	1/4 x 1-1/4	3	1 lb.
A135	5/16 x 1-3/4	3-7/8	1 lb.

Offset Drivers Standard Package 6

Stock No.	For Screw No.	O. A. Lgth.	Weight per Pkg.
V01	2 to 6	3	1/2 lb.
V02	6 to 10	4	1/2 lb.
V03	8 to 12	5	1 lb.
V04	12 to 16	6	1-1/2 lbs.



Extra Long Blade Phillips
Standard Package 6

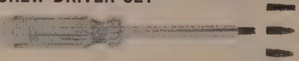
Stock No.	Point No.	Overall Length	Weight Per Pkg.
P18	1	11-1/2	1 lb.
P28	2	11-5/8	1-1/2 lbs.
P212	2	15-5/8	2-1/2 lbs.
P202*	2	23-5/8	1 lb. ea.

*Carded—Individually

Offset Phillips Standard Package 6

P120	Dble. End	#1&#2	1/2 lb.
P230	Dble. End	#2&#3	1 lb.
P340	Dble. End	#3&#4	1-1/2 lbs.

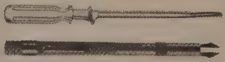
VACOMATIC ALL MAGNETIC SCREW DRIVER SET



No. 70035—Magnetic shank holds choice of 4 bits magnetically. Includes 3/16 and 9/32 regular plus #1 and #2 Phillips bits. 9" long. Carded. Std. pkg. 6.

SCREW LAUNCHERS

For Straight Slot Screws
Standard Package 6



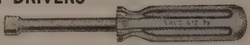
Stock No.	Blade Size	O. A. Length	Weight per Pkg.
K21*	1/8 x 3	5-3/4	1/2 lb.
K23	1/8 x 3	5-3/4	1/2 lb.
K28	1/8 x 8	10-3/4	1 lb.
K34	3/16 x 4	7-1/2	1 lb.
K36	3/16 x 6	9-1/2	1 lb.
K38	3/16 x 8	11-1/2	1-1/2 lbs.
K44	1/4 x 4	7-5/8	1-1/2 lbs.
K46	1/4 x 6	9-5/8	1-1/2 lbs.
K48	1/4 x 8	11-5/8	2 lbs.

*Specially ground tip for use on miniature screws

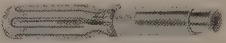
Phillips Screw Launchers
Standard Package 6

Stock No.	Length	
K13	3	
K14 (Pocket Clip)	5	Fits all
K15	5	sizes of
K16	7	Phillips
K19	9	Screws

NUT DRIVERS



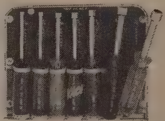
Stock No.	Hex Size	O. A. Lgth.	Handle Color	Wt. per Pkg. Lbs.
3" Shaft Length Standard Package 6				
S6	3/16	6-5/8	Black	1
S7	7/32	6-5/8	Amber	1
S8	1/4	6-5/8	Red	1
S9	9/32	6-5/8	Amber	1
S10	5/16	6-5/8	Amber	1
S11	11/32	6-5/8	Green	1
S12	3/8	6-5/8	Blue	1
S14	7/16	7	Brown	1-1/2
S16	1/2	7	Orange	1-1/2
Extra Large Hex Size 4" Shaft Length Standard Package 6				
S18	9/16	8	Amber	1-1/2
S20	5/8	8	Amber	1-1/2
Stubby Style 1¼" Shaft Length Standard Package 6				
SS8	1/4	3-1/2	Amber	1
SS10	5/16	3-1/2	Amber	1
SS12	3/8	3-1/2	Amber	1
Extra Long 6" Shaft Length Standard Package 6				
S66	3/16	9-5/8	Black	1
S86	1/4	9-5/8	Red	1
S106	5/16	9-5/8	Amber	1-1/2
S116	11/32	9-5/8	Green	1-1/2
S126	3/8	9-5/8	Blue	1-1/2
S146	7/16	10	Brown	1-1/2
S166	1/2	10	Orange	1-1/2
Super Long 18" Shaft Length Standard Package 3				
S818	1/4	21-5/8	Amber	3 lbs.
S1018	5/16	21-5/8	Amber	3 lbs.
Magnetic Nut Drivers Magnet in Shank				
S8M	1/4	6-5/8	Red	1 lb.
S10M	5/16	6-5/8	Amber	1 lb.
S86M	1/4	9-5/8	Red	2 lbs.
S106M	5/16	9-5/8	Amber	2 lbs.
S818M	1/4	21-5/8	Amber	3 lbs.
S1018M	5/16	21-5/8	Amber	3 lbs.



Self Adjusting Nut Driver

No. SA711—Adjusts itself automatically to fit hex head bolts or nuts from 1/4 to 7/16". Simply press and turn. Tempered steel sockets. Std. pkg. 6.

NUT DRIVER KITS & SETS



No. K7—Stand up—hang up kit contains the following drivers: S6, S8, S10, S11, S12, S14, and S16. Individually boxed. Wt. 1-1/2 lbs. each.

METRIC NUT DRIVERS

3" Length Solid Shaft Bright Blue Handles Standard Pkg. 6.
No. 70200 Metric Nut Driver Set in Metal Stand contains one each of 10 nut drivers above. Measures 7 x 3-1/8 x 7-1/8. Wt. 2-1/2 lbs.

Stock No.	Hex Size	O.A. Lgth.	Weight per Pkg.
70204	4mm	6-3/4	1 lb.
70245	4.5mm	6-3/4	1 lb.
70205	5mm	6-3/4	1 lb.
70255	5.5mm	6-3/4	1 lb.
70206	6mm	6-3/4	1 lb.
70207	7mm	6-3/4	1 lb.
70208	8mm	6-3/4	1 lb.
70209	9mm	6-3/4	1 lb.
70210	10mm	7	1-1/2 lbs.
70211	11mm	7-1/8	1-1/2 lbs

VACO®

Super Case & Problem Solving Tools

UNCONDITIONALLY GUARANTEED

THE NEW SUPER CASE

No. 70260—Vaco Super Case holds 48 of the most popular screw drivers, wrenches, pliers, nut drivers and problem solving tools. All store conveniently in sturdy simulated leather case—vinyl tool pockets on removable pallets. Large lid pocket for catalogs, bottom storage area for meters, testers, etc.

Contents

Electrical Tester

No. 70008 Continuity Tester
No. 70129 100-500 Volt Circuit Tester
No. 70219 Twin Head Tester
No. AN2 High Frequency Tester

Screw Drivers

DUL Reversible 3/16 Regular and #1 Phillips
DUH4 Reversible 1/4" Regular and #2 Phillips
BD144 1/4"x4" Bulldriver
71002 #2 Phillips with Cushion Grip Handle
74164 1/4"x4" Regular with Cushion Grip Handle
R20 #2 Point Square Recess (Robertson)
R10 #1 Point Square Recess (Robertson)
CH540 Clutch Head
F710 Reed & Prince (Frearson)
P-2 #2 Genuine Phillips
P-1 #1 Genuine Phillips
P-6 #1 Phillips Stubby
A132 1/4"x1-1/4" Stubby
A130-2-1/8"x2" with Pocket Clip
70035 Magnetic—2 Regular, 2 Phillips Bits
K46 1/4"x6" Split Blade Screw Launcher
K34 3/16"x4" Split Blade Screw Launcher
K23 1/8"x3" Split Blade Screw Launcher
K15 Phillips Split Blade Screw Launcher

Hollow Shaft Nut Drivers

S6 3/16"	S12 3/8"
S8 1/4"	S14 7/16"
S10 5/16"	S16 1/2"
S11 11/32"	

Wrenches

7706 6" Adjustable
1214 Ratchet Box, 3/8"x7/16"

Professional Pliers

8203 6" Diagonal Cutter
8102 6" Needle Nose with Cutter
8105 6" Long Nose
8202 5" Diagonal Cutter
8602 6" Vacgruv Adjustable
9101 Midget Long Nose
9201 Midget Diagonal Cutter

Crimping Tool & Wire Stripper

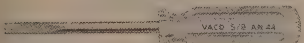
1963 Crimping Tool with Bolt Slicer, Strips & Cuts Wire
WS150 Wire Stripper and Cutter for 24 to 12 HWG

Problem Solving Tools

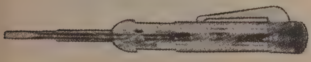
70128—8 ft. Tape Measure
HK17—Folding Hex Keg Wrench, 7 Sizes
P120—Phillips Offset Driver
V02—Regular Offset Driver
TT31—3 in 1 Tipping Tool
ST49—Spring Tool
220—Snap Ring Plier, External Type

PROBLEM SOLVING TOOLS

Standard Package 6



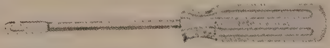
	Stock No.	O.A. Length	Wt. Per Std. Pkg.
Neon Tester Screw Drivers	**AN2**	5-1/2	1/2 lb.
	AN44	7-5/8	1 lb.



100-500V Circuit Tester and Driver	**TK500**	4-1/2	1/2 lb.

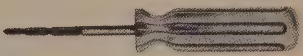
	Stock No.	O.A. Length	Wt. Per Std. Pkg.
6/12V Tester and Probe	**TK550**	7-3/4	1-1/2 lbs.

Continuity Tester	**70008**	7-3/4	2 lbs.



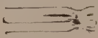
Spring Tool	**ST49**	7-1/2	1-1/2 lbs.

Stock No.	O.A. Length	Wt. Per Std. Pkg.
FS165	11-1/4	1 lb.



3-in-1 Tapping Tool	**TT31** **ZT31**—Handle w/Z-tang Tap.	6	1-1/2 lbs.

Wire Stripper	**WSC150**	—	1 lb.



No. 99-1 (Handle)

No. 99-811 (3/16" Regular)

No. 99-250 (1/4" Regular)

No. 99-821 (No. 1 Phillips)

No. 99-822 (No. 2 Phillips)

No. 99-6 (3/16" Hex)

No. 99-7 (7/32" Hex)

No. 99-8 (1/4" Hex)

No. 99-9 (9/32" Hex)

No. 99-10 (5/16" Hex)

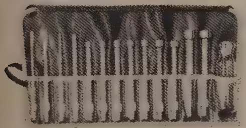
No. 99-11 (11/32" Hex)

No. 99-12 (3/8" Hex)

No. 99-14 (7/16" Hex)

No. 99-16 (1/2" Hex)

VACOMBO KITS



No. 99000 Vacombo Kit with Interchangeable Blades includes special heavy duty handle; 3/16 and 1/4" regular bits; #1 and #2 Phillips bits; and 3/16, 7/32, 1/4, 9/32, 5/16, 11/32, 3/8, 7/16, and 1/2" hex nut driver bits. Specially designed for electronic technicians. Size, 12-3/4 x 7".

New 99000 Series Components are available individually for replacement use. Specify by number. Packed 6 to a box.

No. ZS60 Kit—A versatile and complete hex nut driver kit for radio, TV or any work requiring speedy nut setting. Super hard sockets. Size, 6-1/2 x 7". Wt. 1 lb.

No. ZSX61 Kit—Same as ZS60 except includes 5" blade extension.

No. ZA70 Hex Key Set—Ideal for service technician in any trade. Includes 1/16, 5/64, 3/32, 1/8, 5/32 and 3/16" hex bits plus handle. Wt. 1 lb.

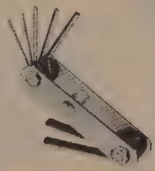
No. ZF40 (Bristol Type) Kit—Designed to service all popular sizes of fluted spline or Bristol Type recess head screws used on electronic and electrical equipment, air conditioning, refrigeration, and office machines.

HEX KEY WRENCHES IN PLASTIC POUCHES

Standard Pkg. 3

Stock No.	Description	Wt. per 3
SLK7	Short Arm 7 Pc.	1 lb.
SLK11	Short Arm 11 Pc.	2 lbs.
SLK13	Short Arm 13 Pc.	2 lbs.
LLK7	Long Arm 7 Pc.	1-1/2 lbs.
LLK11	Long Arm 11 Pc.	3-1/2 lbs.
LLK13	Long Arm 13 Pc.	3-1/2 lbs.
XLK9	Ext. Long 9 Pc.	4 lbs.
70161	Foot Long 7 Pc.	4 lbs.
70172	Odd Ball 7 Pc.	1 lb.
LM10	Metric 10 Pc.	3-1/2 lbs

FOLDING TYPE HEX KEY WRENCH SETS



No. HK17—Versatile pocket type set has .050, 1/16, 5/64, 3/32, 1/8, 5/32, and 3/16" hex blades. Wt. 1-1/2 lbs. Standard package 6.

No. 70147—Large size folding hex set has 1/8, 5/32, 3/16, 7/32, 1/4 and 5/16" blades. Standard package 3.

No. 70156—Metric folding hex set has 1.27 mm, 1.5 mm, 2 mm, 2.5 mm, 3 mm, 4 mm, and 5 mm blades. Standard package 6.

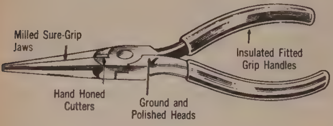
VACO PRODUCTS COMPANY • 510 North Dearborn St. • Chicago, Ill. 60610 • Phone: (312) 467-0123

VACO® Professional Pliers & Torque Commander Sets

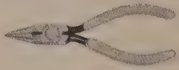
UNCONDITIONALLY GUARANTEED

PRECISION PLIERS

Vaco Pliers are black oxide finished with Cushion Grip Handles
Standard Package 3

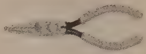


Short Needle Nose W/Cutter



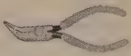
Stock No.	Size	Wt. Per Std. Pkg.
8101	5"	1 lb.

Long Needle Nose W/Cutter



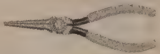
Stock No.	Size	Wt. Per Std. Pkg.
8102	6"	1 lb.
8103	7"	1-1/2 lbs.

Curved Needle Nose



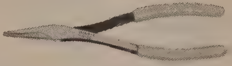
Stock No.	Size	Wt. Per Std. Pkg.
8104	6"	1 lb.

Long Nose



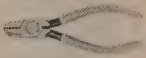
Stock No.	Size	Wt. Per Std. Pkg.
8105	6"	1 lb.
70013	6"	1 lb.

Long Reach Needle Nose



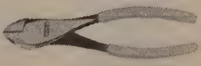
Stock No.	Size	Wt. Per Std. Pkg.
8106	7-1/2"	1-1/2 lbs.

Diagonal Cutters



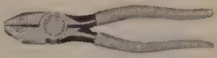
Stock No.	Size	Wt. Per Std. Pkg.
8201	4-1/2"	1 lb.
8202	5"	1 lb.
8203	6"	1-1/2 lbs.
8204	7-1/2"	2 lbs.

Heavy Duty Diagonal Cutter



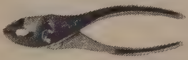
Stock No.	Size	Wt. Per Std. Pkg.
8205	7-1/4"	2 lbs.

H. D. Lineman's Side Cutter



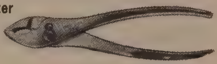
Stock No.	Size	Wt. Per Std. Pkg.
8301	6-1/2"	1-1/2 lbs.
8302	7-1/2"	2 lbs.
8303	8-3/4"	3-1/2 lbs.

H. D. Slip Joint Chrome Finish



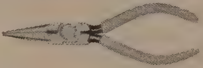
Stock No.	Size	Wt. Per Std. Pkg.
8401	6-1/2"	1-1/2 lbs.
8402	8"	2 lbs.

Slip Joint w/Cutter Chrome Finish



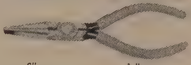
Stock No.	Size	Wt. Per Std. Pkg.
8403	6-1/2"	2 lbs.

Long Flat Nose W/Cutter



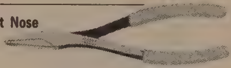
Stock No.	Size	Wt. Per Std. Pkg.
8501	6"	1 lb.

Long Flat Nose



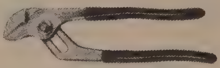
Stock No.	Size	Wt. Per Std. Pkg.
8502	6"	1 lb.

Long Reach Flat Nose



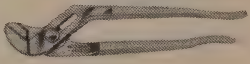
Stock No.	Size	Wt. Per Std. Pkg.
8503	7-1/2"	1-1/2 lbs.

Vacgruv Adjustable Chrome Finish



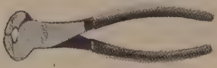
Stock No.	Size	Wt. Per Std. Pkg.
8602	6"	1-1/2 lbs.

Vacgruv Adjustable Chrome Finish



Stock No.	Size	Wt. Per Std. Pkg.
8604	10"	2-1/2 lbs.

Flush End Nip Plier

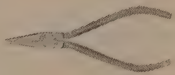


Stock No.	Size	Wt. Per Std. Pkg.
70012	7"	2-1/2 lbs.

MIDGET PLIERS

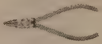
Individually Carded
Standard Package 3

Long Nose



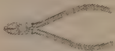
Stock No.	Size	Wt. Per Std. Pkg.
150001	4-1/2"	1/2 lb.

Round Nose



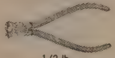
Stock No.	Size	Wt. Per Std. Pkg.
150002	4-1/2"	1/2 lb.

Diagonal Cutter



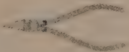
Stock No.	Size	Wt. Per Std. Pkg.
150003	4-1/2"	1/2 lb.

End Cutter



Stock No.	Size	Wt. Per Std. Pkg.
150004	4-1/2"	1/2 lb.

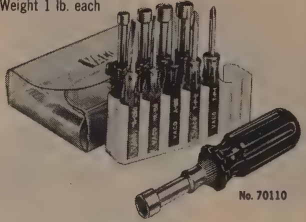
Flat Nose



Stock No.	Size	Wt. Per Std. Pkg.
150005	4-1/2"	1/2 lb.

TORQUE COMMANDER SETS

Standard Package 1
Individually Boxed
Weight 1 lb. each



No. 70110

No. 70101

No. 70105

No. 70101 8-Piece Screw Driver Set consists of Torque Commander handle and one each of: #0, #1, and #2 genuine Phillips, 3/32, 1/8, 3/16, 1/4, and 5/16" regular straight slot drivers.

No. 70103 10-Piece Nut Driver Set consists of Torque Commander handle and one each of: 3/32, 1/8, 5/32, 3/16, 7/32, 1/4, 9/32, 5/16, 11/32, and 3/8" nut drivers.

No. 70105 10-Piece (Allen Type) Hex Key Set consists of Torque Commander handle and one each of: 1/16, 5/64, 3/32, 7/64, 1/8, 9/64, 5/32, 3/16, 7/32, and 1/4" hex recess drivers.

No. 70110 10-Piece Combination Set (Screw Drivers and Nut Drivers) consisting of Torque Commander handle and one each of: #1 and #2 genuine Phillips, 1/8, 3/16, and 1/4" regular slot, 3/16, 1/4, 5/16, 11/32, and 3/8" nut drivers.

No. 70137 10-Piece Square Recess Set consists of Torque Commander handle and one each of: #00, #0, #1, #2, and #3 square recess (Robertson), 1/8, 3/16, and 1/4" regular slot, and #1 and #2 Phillips drivers.

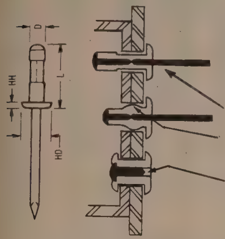
No. 70139 10-Piece Mobile Home Set consists of Torque Commander handle and one each of: 3/32, 1/8, 3/16, and 1/4" regular slot, #1 and #2 Phillips, 1/4" hex nut driver, 5/32" clutch head, and #1 and #2 square recessed drivers.

No. 70170 10-Piece Metric Hex Key Set consists of Torque Commander handle and one each of: 1.27 mm, 1.55 mm, 2 mm, 2.5 mm, 3 mm, 4 mm, 4.5 mm, 5 mm, 5.5 mm, and 6 mm drivers.

Specialty Fasteners & Application Tools

UNCONDITIONALLY GUARANTEED

POW'RIVETS AND POW'RIVETERS



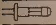
VACO POW'RIVETS are the only blind rivets to adapt to hole size variance, and pull up snug regardless of material thickness (within grip range). That's why 4 sizes do the job of 14 ordinary rivets.

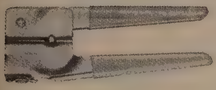
Steps To Apply

Step 1—Insert Pow'Rivet into hole.

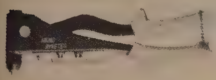
Step 2—Mandrel is drawn by Pow'Riveter. Pow'Rivet expands to fill hole.

Step 3—Mandrel snaps off when Pow'Rivet is headed over.

Illustration	Stock No.	Dia. "D"	Lgth. "L"	Grip Range	Head Dia. "HD"	Head Ht. "HH"	Hole Size
	425	1/8	.400	To .250	.215	.044	.136
	528	5/32	.470	To .280	.255	.057	.166
	631	3/16	.530	To .312	.349	.070	.199
	**650**	3/16	.720	To .500	.349	.070	.199
	400	Assortment Pak					



No. 495 POW'RIVETER is newly designed with offset handles for easier application. Pulls up 1/8" and 5/32" Pow'Rivets forming waterproof, dustproof applications every time. Sample supply of Pow'Rivets included. Individually carded. Wt. 1-1/2 lbs. each.

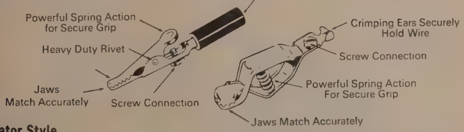


No. 70197 DELUXE POW'RIVETER for professional application of Vaco Pow'Rivets. Four interchangeable heads for use on 3/32, 1/8, 3/32 and 3/16" size rivets. Pouched for convenient storage. Wt. 2 lbs. each.

No. 175002 PROFESSIONAL POW'RIVETER has streamlined head for reaching into deep openings. Includes interchangeable nose pieces for use with 1/8, 5/32 and 3/16" size rivets. Features exclusive outside jaw adjustment, and 2-position stroke adjustment. Wt. 2 lbs. each.

ALLIGATOR & GENERAL PURPOSE CLIPS

Standard Package 50 clips per Box,
5 Boxes per Carton.

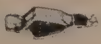


Alligator Style

Non-Insulated
Length 2"—
Jaw Opening
5/16"

Insulated
Length
2-3/8"—Jaw
Opening
5/16"

Mini-Gator Style



Length
1-3/32"—Jaw
Opening
3/16"

General Purpose Style

Insulating Boots

Stock No.	Material	Insulation Color
19310	Steel	—
19311	Copper	—
59310	Steel	Black
69310	Steel	Red
59311	Copper	Black
69311	Copper	Red
19312	Steel	—
19313	Copper	—

Stock No.	Length	Jaw Opening
19314	1-1/2	5/16
19315	2	1/2
19324 (25 Amp)	—	1
19325 (50 Amp)	—	1-1/4

Stock No.	For No.	Color
19316	19310	Black
19317	or 19311	Red

SNAP RINGS & SNAP RING PLIERS

Snap rings serve one major function—they fit into grooves and furnish a shoulder for holding, locking, or positioning components in housings and bores (internal type) and on shafts and studs (external type). As hard tempered springs, their shear strength—and thus their thrust and impact cpaacity—is unusually high.

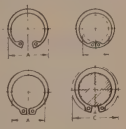
Snap Rings Available in 2 Convenient Pak Sizes

"D" PAKS—Ideal for small quantity user. Plastic boxes packed 5 to standard package.

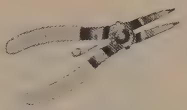
"C" PAKS—100 rings per box for larger user. Packed 5 to a standard carton.

Internal Snap Rings

External Snap Rings



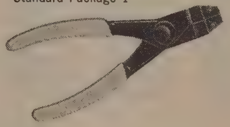
Snap Ring Pliers w/Spring
Standard Package 3



Internal
No. 210 (Straight Tip)
No. 210-45 (45° Tip)
No. 210-90 (90° Tip)

External
No. 220 (Straight Tip)
No. 220-45 (45° Tip)
No. 220-90 (90° Tip)

Interchangeable Tip Pliers w/Spring
Standard Package 1



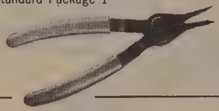
No. 445—INTERNAL with 4 Sets Interchangeable Tips.

No. 446—EXTERNAL with 4 Sets Interchangeable Tips

No. 444—POUCHED SET of Internal & External with 4 Sets Interchangeable Tips.

No. 448—Set of replacement tips.

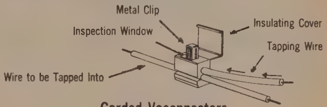
Convertible Snap Ring Pliers
Standard Package 1



The all purpose snap ring plier that can be used for either internal or external by moving thumb screw to other hole.

No. 70195 (Fits rings 3000-X37 to 3000-X100 and 3100-25 to 3100-87).

No. 70234 (Fits rings 3000-X102 to 3000-X162 and 3100-93 to 3100-143).



VACONNECTORS

New exclusive design Vaconnector solves wire tapping problems on all electrical work up to 300 volts. No stripping of tapping wire and no cutting of circuit or "run" wire. Easily applied with slip-joint pliers. Three sizes to handle most any job.

3-way vaconnector
VACO
3-way vaconnector

Carded Vaconnectors
Standard Package 5

Stock No.	Fits Wire	Color
B67303	18-14	Blue
B67406	14-12	Yellow
B67407	18-14 & 14-12	Brown
B67000	Assortment of Above	
B67305	Ass't of 67303, 67302 & 67405	
B67408	Ass't of 67302 & 67405	

Vaconnector "C" Pak
(100 pieces)
Bulk Package
Standard Package 1

Available in each of the three Vaconnector sizes for large installers. Measures 6 x 3-5/8 x 3-1/2. Wt. 1 lb.

Stock No.	Fits Wire	Color
C67303	18-14	Blue
C67406	14-12	Yellow
C67407	18-14 & 14-12	Brown

VACO PRODUCTS COMPANY • 510 North Dearborn St. • Chicago, Ill. 60610 • Phone: (312) 467-0123

SINCE 1864
WALL BRAND
MADE IN USA

Lenk

SOLDERING PRODUCTS

The linking of these two fine, time-tested names makes available to soldering tool users the largest variety of soldering products ever offered by one company

SOLDERING GUNS • IRONS
PENCILS • TIPS • DESOLDERER
SOLDERS • TORCHES AND FUELS

18HD
14HD
14-18HD
38WH
12WH
12-38WH
58WH
58-12WH
78WH
78-58WH

HD Type and WH Type Heavy-duty Irons

Wallbrand heavy-duty irons are engineered for highest efficiency performance. Rugged construction assures long-life for demanding production line needs. No radionic interference. Triple-life resistance wire wound on pure mica and constant tip temperature with extra fast recovery permits continuous heavy-duty use. 120 volts AC or DC. Other voltages available on request. Handles remain cool after long hours of operation. Tips are easily changed. Special irons customized to particular requirements.

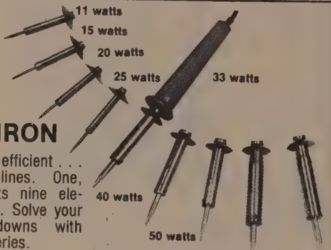
Model	Watt Input	Tip Dia.	Length W/O Tip	Thermo/ Gram Value
18HD	25	1/8″	6⅝″	300
14HD	40	1/4″	7½″	900
38WH	80	3/8″	10¼″	1500
12WH	125	1/2″	10¼″	2000
12-38WH	125	3/8″	10¼″	2000
12-38HC	155	3/8″	10¼″	3500
58WH	200	5/8″	12¼″	3500
58-12WH	200	3/8″	12¼″	3500
78WH	300	7/8″	12⅜″	5400
78-58WH	300	5/8″	12⅜″	5400

Lenk

LP TORCHES
TORCH FUELS
CORE SOLDERS
PENCIL-TYPE IRONS

LENK
BUTANE
TORCH FUEL
CORE
SOLDER
LENK
ACID CORE
SOLDER
WORKSHOP TESTED
ELECTRIC
SOLDERING
IRON
LENK
PENCIL TYPE
MINIATURE
DESIGN

NO. 490 NO. 400 NO. 17A NO. 15AT NO. 16 NO. 18



XLS PENCIL IRON

Versatile . . . reliable . . . efficient . . . ideal for production lines. One, ever-cool handle accepts nine elements from 11w to 75w. Solve your production line slow-downs with Wall's XLS pencil iron series.

LIGHTWEIGHT PENCIL-TYPE IRON FOR HEAVY DUTY SOLDERING 80 to 100 WATTS

638 XLS

A much needed model between the heavy-duty irons and the light pencils – a sturdy tool for high performance. Cool, comfortable, unbreakable polycarbonate handle. Elements are industrial quality precision wound on highest quality mica, easily replaced in the field. 2 or 3 wire neoprene cord.

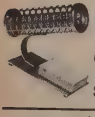
Model	Tip Size	Watts	Volts
638XLS	3/8”	80-100	120

214LT

Trig-R-Heat Gun

Feather light 14 oz. gun has no transformer. Reaches hard-to-get at spots easily. Tips will not deform. Heats and recovers instantly. Rugged, precision built. Tip and element assemblies changed easily.

Model	Tip Size	Max. Watts	Min. Watts	AC/DC Volts	Weight W/O Cord
214LT	1/4″	400	150	120	14 oz.
212LT	1/2″	500	300	120	24 oz.
TIP AND ELEMENT ASSEMBLY					
214TE	1/4″	400	150	120	6 oz.
212TE	1/2″	500	300	120	16 oz.



SPH Soldering Pencil Holder

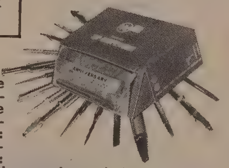
Adjusts to any angle
(SIH not shown)
SPH for up to 5/8” shaft
SIH for up to 1” shaft

CORDLESS

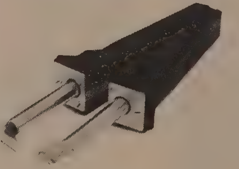
NICKEL CADMIUM BATTERY POWERED
Complete with recharger

Has built-in light. Compact - just 8” with tip. Weighs only 6 oz. Heats fast - about 5 seconds. One finger control. Small tip for pinpoint work. Recharges overnight. Can be used while recharging. Over 700°F tip temperature. Solders up to 100 joints per charge.

Tips and Tip Dispenser



Tip sizes from 1/8″ through 7/8″ in wide variety of configurations for specific industrial and commercial needs. Three grades — **Anniversary type:** Super finished, iron and chrome plated. **Wallklad:** Iron coated and chrome plated. For production and critical lab use. **Wallbrand:** Commercial, copper, nickel plated. Wall's own iron plating facilities produce high quality long-life tips. 1/8″ through 3/8″ iron plated or copper tips available in handy tip dispenser. Tips individually sealed in color-coded continuous belting, plastic envelope.



IC EXTRACTOR

Desolder and remove IC packs intact and salvageable. Desolder 2 and 3 lead components. Wall's new 500/IC Extractor goes where others can't . . . stays cool and comfortable . . . reaches operating temperature in 5 minutes. Factory pre-tinned. Chrome plated.

WALL-LENK MANUFACTURING COMPANY
BOX 3349 KINSTON, N. C. 28501 TEL. 919/527-4186

Industrial soldering irons and pencils are built to exceed Federal specification W-S-570. Wallbrand soldering products are UL and CSA listed.

WALL
BRAND

ESTABLISHED 1864
Quality Soldering Products For
Industry, Government, Shop, Home

NOW – the

HEAVY DUTY IRON

638A-XLS

LIGHTWEIGHT PENCIL

A sturdy tool for high performance

FROM THE WALL RESEARCH LABORATORY COMES THIS INTERMEDIATE SOLDERING IRON FOR MANY USES

The Wall 638A-XLS is designed as a much-needed model between the heavy irons and the light pencils.

It provides a pencil-type handle on an iron that uses a ⅜″ diameter tip and will handle considerably heavier soldering operations than our 614XLS-HR (which has a maximum of 75 watts).

This is a lightweight pencil-type iron that is engineered to do heavy duty soldering.

ANOTHER ALL-AMERICAN DEVELOPMENT BY WALL

AMERICAN DESIGNED, AMERICAN MADE
BY SKILLED CRAFTSMEN

SPECIFICATIONS

WATTAGE: 80 and 100 watts at 120 volts. Other wattages and voltages are available on special order.

TIPS: Standard ⅜″ diameter plug type.

CORE: High temperature non-scaling material is used to eliminate tip set screw freezing and give long element life.

SHAFT: Stainless Steel.

HANDLE: Blue unbreakable polycarbonate — cool, comfortable. No metal liner. The element threads directly to the handle. Strong, secure, simple connection of element to the handle.

CORD: 2 or 3 wire neoprene.

SET SCREW: Stainless Steel.

ELEMENTS: The elements are industrial quality precision wound on highest quality mica. They are easily replaced in the field. The element is unscrewed from the handle and one screw and 2 wire nuts are removed to change the element.

WALL MANUFACTURING COMPANY

P. O. BOX 3349 KINSTON, N. C. 28501
TELEPHONE 919/527-4186

abbott 60~/400~ P.C. transformers

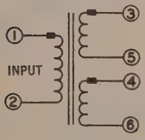
SPECIFICATIONS	6PC SERIES	4PC SERIES
INPUT PRIMARY:	115 vac, 50-400 Hz, 1 Phase	115 vac, 380-420 Hz, 1 Phase
REGULATION:	20% or less from no load to full load	10% or less from no load to full load
SECONDARY VOLTAGE TOLERANCE:	Within 5% of listed output voltage when measured at full load and 115 vac input	
INSULATION TEST:	1000 vac	
OPERATING TEMPERATURE:	85°C maximum ambient	
CONSTRUCTION:	Printed circuit pin plug-in	
TYPICAL EFFICIENCY RANGE:	72%-76%	90%-93%
OPTIONS AVAILABLE:	Other output voltages and 230 vac input are available. Please consult our nearest office for complete information.	

features

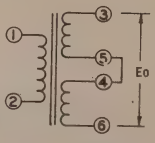
- For Printed Circuits
- Close Regulation
- 85°C Operation
- Small Size
- Stock Delivery

The miniature power transformers listed on this page are specifically designed for mounting on printed circuit boards. Two lines are available: the 6PC Series for 60 Hz application, and the 4PC Series for 400 Hz. Small size, reliability and sensible prices are major features of these OEM transformers. Take a good look at these Models. If you don't find what you want, call us for a special quotation.

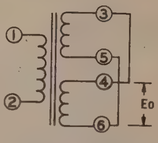
			60~				400~			
Output Volts (F.L.)	Size	Weight Lbs. Typ.	Output Cur. (Amps) Parallel Connection	Series Connection	Model No.	Price 1-4 pcs.	Output Cur. (Amps) Parallel Connection	Series Connection	Model No.	Price 1-4 pcs.
5V Parallel 10VCT Series	1	0.20	0.300	0.150	6PC5-1	$5.20	2.0	1.0	4PC5-10	$6.20
	2	0.33	0.800	0.400	6PC5-4	5.35	5.0	2.5	4PC5-25	7.65
	3	0.56	1.500	0.750	6PC5-7	5.60	8.0	4.0	4PC5-40	8.75
6.3V Parallel 12.6VCT Series	1	0.20	0.238	0.119	6PC6-1	5.20	1.58	0.79	4PC6-10	6.20
	2	0.33	0.636	0.318	6PC6-4	5.35	4.00	2.0	4PC6-25	7.65
	3	0.56	1.190	0.595	6PC6-7	5.60	8.0	4.0	4PC6-50	8.75
8V Parallel 16VCT Series	1	0.20	0.186	0.093	6PC8-1	5.20	1.25	0.625	4PC8-10	6.20
	2	0.33	0.500	0.250	6PC8-4	5.35	3.12	1.56	4PC8-25	7.65
	3	0.56	0.936	0.468	6PC8-7	5.60	6.2	3.1	4PC8-50	8.75
10V Parallel 20VCT Series	1	0.20	0.150	0.075	6PC10-1	5.20	1.0	0.5	4PC10-10	6.20
	2	0.33	0.400	0.200	6PC10-4	5.35	2.5	1.25	4PC10-25	7.65
	3	0.56	0.750	0.375	6PC10-7	5.60	5.0	2.5	4PC10-50	8.75
12V Parallel 24VCT Series	1	0.20	0.124	0.062	6PC12-1	5.20	0.832	0.416	4PC12-10	6.20
	2	0.33	0.334	0.167	6PC12-4	5.35	2.5	1.25	4PC12-25	7.65
	3	0.56	0.62	0.312	6PC12-7	5.60	4.2	2.1	4PC12-50	8.75
17V Parallel 34VCT Series	1	0.20	0.088	0.044	6PC17-1	5.20	0.588	0.294	4PC17-10	6.20
	2	0.33	0.236	0.118	6PC17-4	5.35	1.47	0.735	4PC17-25	7.65
	3	0.56	0.440	0.220	6PC17-7	5.60	2.94	1.47	4PC17-50	8.75
20V Parallel 40VCT Series	1	0.20	0.074	0.037	6PC20-1	5.20	0.500	0.250	4PC20-10	6.20
	2	0.33	0.200	0.100	6PC20-4	5.35	1.25	0.625	4PC20-25	7.65
	3	0.56	0.374	0.187	6PC20-7	5.60	2.50	1.25	4PC20-50	8.75
28V Parallel 56VCT Series	1	0.20	0.052	0.026	6PC28-1	5.20	0.356	0.178	4PC28-10	6.20
	2	0.33	0.144	0.072	6PC28-4	5.35	0.892	0.446	4PC28-25	7.65
	3	0.56	0.266	0.133	6PC28-7	5.60	1.78	0.89	4PC28-50	8.75
44V Parallel 88VCT Series	1	0.20	0.034	0.017	6PC44-1	5.20	0.226	0.113	4PC44-10	6.20
	2	0.33	0.092	0.046	6PC44-4	5.35	0.568	0.284	4PC44-25	7.65
	3	0.56	0.170	0.085	6PC44-7	5.60	1.12	0.56	4PC44-50	8.75
60V Parallel 120VCT Series	1	0.20	0.024	0.012	6PC60-1	5.20	0.166	0.083	4PC60-10	6.20
	2	0.33	0.068	0.034	6PC60-4	5.35	0.416	0.208	4PC60-25	7.65
	3	0.56	0.124	0.062	6PC60-7	5.60	0.82	0.41	4PC60-50	8.75



BASIC CIRCUIT



SERIES CONNECTED



PARALLEL CONNECTED

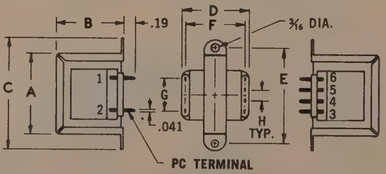
QUANTITY DISCOUNTS

1-4 pcs.	— price listed.
5-9 pcs.	— less 4% of the 1-4 piece price.
10-24 pcs.	— less 8% of the 1-4 piece price.
25-49 pcs.	— less 13% of the 1-4 piece price.
50-99 pcs.	— less 19% of the 1-4 piece price.
Above 100 pcs.	— Contact nearest office for an exact quotation.

All Prices subject to change without notice.

SIZE	A	B	C	D	E	F	G	H
1	1.46	1.22	2.06	1.13	1.75	1.00	.600	.200
2	1.72	1.40	2.35	1.23	2.00	1.10	.750	.250
3	1.96	1.65	2.81	1.43	2.37	1.30	.750	.250

DIMENSIONAL TOLERANCE: .XX = ±.02 .XXX = ±.007



EASTERN OFFICE: 1224 Anderson Ave./Fort Lee, New Jersey 07024 (201) 224-6900

abbott transistor

TRANSFORMER DIVISION

5180 W Jefferson Blvd. / Los Angeles 90016
(213) 938-0155 Telex: 69-1398

abbott 60 ∿ industrial power transformers

specifications

INPUT PRIMARY: 115 VAC (50 to 65 Hz), 1 phase

REGULATION: 15% max. from no load to full load

SECONDARY VOLTAGE TOLERANGE: Within 5% of listed output voltage when measured at full load and 115 VAC input

INSULATION TEST: 1500 VAC

OPERATING TEMP.: 80°C maximum ambient

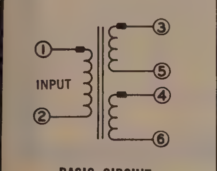
APPROXIMATE EFFICIENCY: Ranges from 80% to 90%

CONSTRUCTION: Commercial grade using Grain Oriented Silicon Iron for core and heavy insulated synthetic film magnet wire with class "B" rating. Vacuum impregnated with a high quality insulating varnish having a class "H" rating

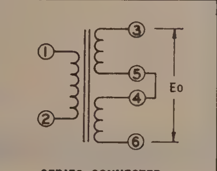
For 230 VAC input (at no additional cost) add suffix "A" to standard model number. Example: 6B5-10A. Other outputs and/or inputs available on request.

Output Volts (F.L.)	Output Current (Amps)		Size	Weight Lbs. Typ.	Model Number	Price 1-4 pcs.
	Parallel Connection	Series Connection				
5 V Parallel 10 V.C.T. Series	2.0	1.0	1	1.2	6B5-10	$ 7.32
	3.0	1.5	2	1.5	6B5-15	8.15
	6.0	3.0	3	2.2	6B5-30	9.39
	12.0	6.0	4	3.0	6B5-60	11.89
	18.0	9.0	5	4.3	6B5-90	14.66
	26.0	13.0	6	5.5	6B5-130	17.36
	32.0	16.0	7	7.0	6B5-160	20.37
6.3 V Parallel 12.6 V.C.T. Series	1.60	0.80	1	1.2	6B6-10	7.32
	2.40	1.20	2	1.5	6B6-15	8.15
	4.80	2.40	3	2.2	6B6-30	9.39
	9.40	4.70	4	3.0	6B6-60	11.89
	14.4	7.20	5	4.3	6B6-90	14.66
	20.6	10.3	6	5.5	6B6-130	17.36
	25.4	12.7	7	7.0	6B6-160	20.37
8 V Parallel 16 V.C.T. Series	1.20	0.60	1	1.2	6B8-10	7.32
	1.80	0.90	2	1.5	6B8-15	8.15
	3.60	1.80	3	2.2	6B8-30	9.39
	7.60	3.80	4	3.0	6B8-60	11.89
	11.2	5.60	5	4.3	6B8-90	14.66
	16.2	8.10	6	5.5	6B8-130	17.36
	20.0	10.0	7	7.0	6B8-160	20.37
10 V Parallel 20 V.C.T. Series	1.0	0.5	1	1.2	6B10-10	7.32
	1.5	0.75	2	1.5	6B10-15	8.15
	3.0	1.5	3	2.2	6B10-30	9.39
	6.0	3.0	4	3.0	6B10-60	11.89
	9.0	4.5	5	4.3	6B10-90	14.66
	13.0	6.5	6	5.5	6B10-130	17.36
	16.0	8.0	7	7.0	6B10-160	20.37
12 V Parallel 24 V.C.T. Series	0.82	0.41	1	1.2	6B12-10	7.32
	1.24	0.62	2	1.5	6B12-15	8.15
	2.50	1.25	3	2.2	6B12-30	9.39
	5.0	2.50	4	3.0	6B12-60	11.89
	7.5	3.75	5	4.3	6B12-90	14.66
	10.82	5.41	6	5.5	6B12-130	17.36
	13.32	6.66	7	7.0	6B12-160	20.37

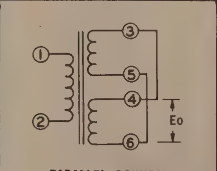
Output Volts (F.L.)	Output Current (Amps)		Size	Weight Lbs. Typ.	Model Number	Price 1-4 pcs.
	Parallel Connection	Series Connection				
17 V Parallel 34 V.C.T. Series	0.58	0.29	1	1.2	6B17-10	$ 7.32
	0.88	0.44	2	1.5	6B17-15	8.15
	1.76	0.88	3	2.2	6B17-30	9.39
	3.52	1.76	4	3.0	6B17-60	11.89
	5.28	2.64	5	4.3	6B17-90	14.66
	7.64	3.82	6	5.5	6B17-130	17.36
	9.40	4.70	7	7.0	6B17-160	20.37
20 V Parallel 40 V.C.T. Series	0.5	0.25	1	1.2	6B20-10	7.32
	0.74	0.37	2	1.5	6B20-15	8.15
	1.5	0.75	3	2.2	6B20-30	9.39
	3.0	1.5	4	3.0	6B20-60	11.89
	4.5	2.25	5	4.3	6B20-90	14.66
	6.5	3.25	6	5.5	6B20-130	17.36
	8.0	4.0	7	7.0	6B20-160	20.37
28 V Parallel 56 V.C.T. Series	0.36	0.18	1	1.2	6B28-10	7.32
	0.52	0.26	2	1.5	6B28-15	8.15
	1.06	0.53	3	2.2	6B28-30	9.39
	2.14	1.07	4	3.0	6B28-60	11.89
	3.20	1.60	5	4.3	6B28-90	14.66
	4.64	2.32	6	5.5	6B28-130	17.36
	5.70	2.85	7	7.0	6B28-160	20.37
44 V Parallel 88 V.C.T. Series	0.22	0.11	1	1.2	6B44-10	7.32
	0.34	0.17	2	1.5	6B44-15	8.15
	0.68	0.34	3	2.2	6B44-30	9.39
	1.36	0.68	4	3.0	6B44-60	11.89
	2.04	1.02	5	4.3	6B44-90	14.66
	2.94	1.47	6	5.5	6B44-130	17.36
	3.62	1.81	7	7.0	6B44-160	20.37
60 V Parallel 120 V.C.T. Series	0.16	0.08	1	1.2	6B60-10	7.32
	0.250	0.125	2	1.5	6B60-15	8.15
	0.50	0.25	3	2.2	6B60-30	9.39
	1.0	0.50	4	3.0	6B60-60	11.89
	1.5	0.75	5	4.3	6B60-90	14.66
	2.16	1.08	6	5.5	6B60-130	17.36
	2.66	1.33	7	7.0	6B60-160	20.37



BASIC CIRCUIT



SERIES CONNECTED



PARALLEL CONNECTED

QUANTITY DISCOUNTS

1-4 pcs.	- price listed.
5-9 pcs.	- less 4% of the 1-4 piece price.
10-24 pcs.	- less 8% of the 1-4 piece price.
25-49 pcs.	- less 13% of the 1-4 piece price
50-99 pcs.	- less 19% of the 1-4 piece price.
Above 100 pcs.	- Contact nearest office for an exact quotation.

All Prices subject to change without notice.

Size	A	B	C	D	E	F	HOLE*	
1	1.95	1.62	2.31	2.37	—	2.87	.18	FIG. 1
2	2.26	1.87	2.68	2.81	—	3.12	.18	FIG. 1
3	2.57	2.12	3.06	3.12	—	3.56	.18	FIG. 1
4	2.81	2.37	3.37	2.25	2.12	2.70	.2 x .3	FIG. 2
5	3.12	2.62	3.75	2.50	2.25	2.86	.2 x .3	FIG. 2
6	3.44	2.87	4.12	2.75	2.37	2.98	.2 x .3	FIG. 3
7	3.75	3.12	4.50	3.00	2.50	3.11	.2 x .3	FIG. 3

DIMENSIONAL TOLERANCE = ±.06
TERMINATION: SOLDER LUGS

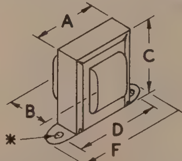


FIG. 1

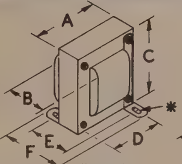


FIG. 2

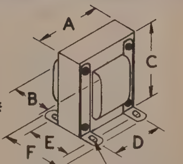


FIG. 3

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TRANSFORMER DIVISION

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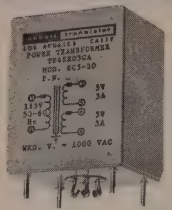
(213) 938-0155 Telex: 69-1398

abbott 60 ~ MIL-T-27D power transformers



specifications

INPUT PRIMARY: 115 VAC, (50 to 65 Hz), 1 phase

REGULATION: 10% no load to full load

SECONDARY VOLTAGE TOLERANCE: Within 3% of listed output voltage when measured at full load and 115 VAC input

INSULATION TEST: 1500 VAC

OPERATING TEMP.: 90°C (194°F), maximum ambient

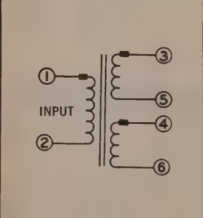
CONSTRUCTION: To MIL-T-27D, grade: 4, class "S", life "X" (10,000 hrs.), case: steel (see model No. for size)

WORKING VOLTAGE: 1000 VAC

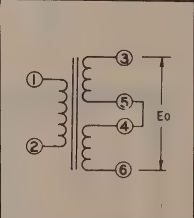
EFFICIENCY: Ranges from 80% to 90% typical

Output Volts (F.L.)	Output Current (Amps) Parallel Connection	Output Current (Amps) Series Connection	Size	Weight Lbs. Typ.	Model No.	Price 1-4 pcs.
5V Parallel 10 V.C.T. Series	1.00	0.50	EB	1.2	6C5-5	$23.00
	3.00	1.50	FA	2.2	6C5-15	26.00
	6.00	3.00	GA	3.3	6C5-30	31.00
	12.00	6.00	HA	4.7	6C5-60	38.00
	20.00	10.00	JA	7.4	6C5-100	46.00
6.3 V Parallel 12.6 V.C.T. Series	0.80	0.40	EB	1.2	6C6-5	23.00
	2.38	1.19	FA	2.2	6C6-15	26.00
	4.76	2.38	GA	3.3	6C6-30	31.00
	9.52	4.76	HA	4.7	6C6-60	38.00
	20.00	10.00	JA	7.4	6C6-126	46.00
8 V Parallel 16 V.C.T. Series	0.62	0.31	EB	1.2	6C8-5	23.00
	1.86	0.93	FA	2.2	6C8-15	26.00
	3.72	1.86	GA	3.3	6C8-30	31.00
	7.44	3.72	HA	4.7	6C8-60	38.00
	17.50	8.75	JA	7.4	6C8-140	46.00
	20.00	10.00	KA	9.8	6C8-160	54.00
10 V Parallel 20 V.C.T. Series	0.50	0.25	EB	1.2	6C10-5	23.00
	1.50	0.75	FA	2.2	6C10-15	26.00
	3.00	1.50	GA	3.3	6C10-30	31.00
	6.00	3.00	HA	4.7	6C10-60	38.00
	14.00	7.00	JA	7.4	6C10-140	46.00
	17.00	8.50	KA	9.8	6C10-170	54.00
12 V Parallel 24 V.C.T. Series	0.40	0.20	EB	1.2	6C12-5	23.00
	1.20	0.60	FA	2.2	6C12-15	26.00
	2.40	1.20	GA	3.3	6C12-30	31.00
	4.80	2.40	HA	4.7	6C12-60	38.00
	11.60	5.80	JA	7.4	6C12-140	46.00
	14.16	7.08	KA	9.8	6C12-170	54.00

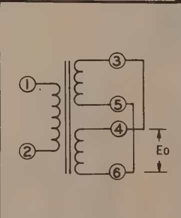
Output Volts (F.L.)	Output Current (Amps) Parallel Connection	Output Current (Amps) Series Connection	Size	Weight Lbs. Typ.	Model No.	Price 1-4 pcs.
17 V Parallel 34 V.C.T. Series	0.30	0.15	EB	1.2	6C17-5	$23.00
	0.88	0.44	FA	2.2	6C17-15	26.00
	1.76	0.88	GA	3.3	6C17-30	31.00
	3.35	1.76	HA	4.7	6C17-60	38.00
	8.20	4.10	JA	7.4	6C17-140	46.00
	10.00	5.00	KA	9.8	6C17-170	54.00
20 V Parallel 40 V.C.T. Series	0.24	0.12	EB	1.2	6C20-5	23.00
	0.72	0.36	FA	2.2	6C20-15	26.00
	1.44	0.72	GA	3.3	6C20-30	31.00
	2.88	1.44	HA	4.7	6C20-60	38.00
	7.00	3.50	JA	7.4	6C20-140	46.00
	8.50	4.25	KA	9.8	6C20-170	54.00
28 V Parallel 56 V.C.T. Series	0.18	0.09	EB	1.2	6C28-5	23.00
	0.54	0.27	FA	2.2	6C28-15	26.00
	1.08	0.54	GA	3.3	6C28-30	31.00
	2.16	1.08	HA	4.7	6C28-60	38.00
	5.00	2.50	JA	7.4	6C28-140	46.00
	6.06	3.03	KA	9.8	6C28-170	54.00
44 V Parallel 88 V.C.T. Series	0.10	0.05	EB	1.2	6C44-5	23.00
	0.30	0.15	FA	2.2	6C44-15	26.00
	0.60	0.30	GA	3.3	6C44-30	31.00
	1.20	0.60	HA	4.7	6C44-60	38.00
	3.16	1.58	JA	7.4	6C44-140	46.00
	3.86	1.93	KA	9.8	6C44-170	54.00
60 V Parallel 120 V.C.T. Series	0.08	0.04	EB	1.2	6C60-5	23.00
	0.24	0.12	FA	2.2	6C60-15	26.00
	0.48	0.24	GA	3.3	6C60-30	31.00
	0.96	0.48	HA	4.7	6C60-60	38.00
	2.32	1.16	JA	7.4	6C60-140	46.00
	2.82	1.41	KA	9.8	6C60-170	54.00



BASIC CIRCUIT



SERIES CONNECTED



PARALLEL CONNECTED

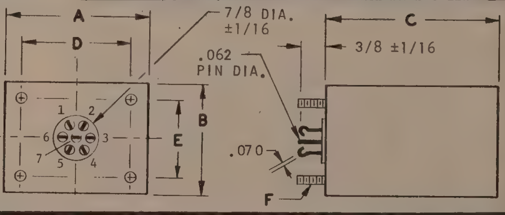
QUANTITY DISCOUNTS

1-4 pcs.	- price listed.
5-9 pcs.	- less 4% of the 1-4 piece price.
10-24 pcs.	- less 8% of the 1-4 piece price.
25-49 pcs.	- less 13% of the 1-4 piece price.
50-99 pcs.	- less 19% of the 1-4 piece price.
Above 100 pcs.	- Contact nearest office for an exact quotation.

All Prices subject to change without notice.

Size	A	B	C	D	E	F
EB	1.938	1.812	2.438	1.375	1.250	6-32 x ⅜
FA	2.312	2.062	3.125	1.688	1.438	6-32 x ⅜
GA	2.750	2.375	3.812	2.125	1.750	6-32 x ⅜
HA	3.062	2.625	4.250	2.297	1.859	8-32 x ⅜
JA	3.562	3.062	4.875	2.625	2.125	8-32 x ⅜
KA	3.938	3.375	5.250	3.000	2.438	10-32 x ½

DIMENSIONAL TOLERANCE:
DIMENSIONS A, B, C, D, E, AND F PER MIL-T-27D.



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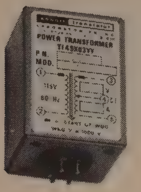


features

- Quality MIL-spec 60 Hz power transformers
- Hermetically sealed
- to meet MIL-T-27D
- 105°C ambient operation
- 5 to 5000 volts
- 5 to 300 watts

DELIVERY IS FROM STOCK

specifications

INPUT PRIMARY: 115 VRMS, 60 Hz ±5 Hz, 1 phase

INSULATION TEST: 1750 VRMS or 150% of secondary voltage (whichever is higher)

CONSTRUCTION: To MIL-T-27D, grade: 4, class: "S", life: "X" (10,000 hrs.) case: steel

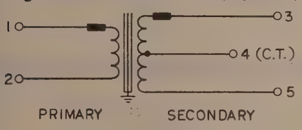
ENVIRONMENT: 105°C maximum ambient temperature. Encapsulated to meet MIL-STD-810B for vibration, shock, acceleration, sand, dust, humidity, salt spray, fungus, sunshine, rain, explosion and altitude (to a vacuum)

WORKING VOLTAGE: 1000 VAC for all transformers with secondary voltages up to and including 1200 VAC; 80% of rated secondary voltage for all others

SECONDARY VOLTAGE TOLERANCE: Within 3% of listed output voltage when measured at full load and 115 VAC input

OUTPUT SECONDARY: See voltage and current of specific models listed. Standard models with outputs from 63 to 5,000 VAC are also available from stock. Contact our nearest office for your free copy of our complete brochure.

TYPICAL CIRCUIT DIAGRAM



▬ refers to in-phase points

SIZE CHART

Case Size	Width (in.)	Depth (in.)	Height (in.)
A1	1½	1¾	2⅜
A2	1¾	2¹⁄₁₆	2¾
A3	1⅞	2⅜	3⅛
A4	2	2⅜	3⅛
A5	2⅛	2¹¹⁄₁₆	3½
A6	2¼	2¹¹⁄₁₆	3½
A7	2⅝	3⅛	4⅛
A8	2⅞	3⁷⁄₁₆	4½
A9	3⅛	3¾	4⅞
A10	3⅜	4¹⁄₁₆	5¼
A11	3⅞	4¹¹⁄₁₆	6

Complete size chart and dimensional drawing are shown in our 12 page brochure.

Output Volt	Output Current (Amps)	Size	Wt. lbs.	Model Number	Price 1 pc.	Price 2-4 pcs.
5.0	1.00	A1	1.0	5P5CT	$45.12	$37.60
	2.00	A2	1.5	10P5CT	46.44	38.70
	3.00	A3	2.0	15P5CT	48.72	40.60
	4.00	A4	2.5	20P5CT	53.88	44.90
	6.00	A5	3.0	30P5CT	54.36	45.30
	8.00	A6	3.3	40P5CT	55.56	46.30
	16.00	A7	5.0	80P5CT	62.88	52.40
6.3	0.79	A1	1.0	5P6.3CT	45.12	37.60
	1.58	A2	1.5	10P6.3CT	46.44	38.70
	2.38	A3	2.0	15P6.3CT	48.72	40.60
	3.16	A4	2.5	20P6.3CT	53.88	44.90
	4.76	A5	3.0	30P6.3CT	54.36	45.30
	6.35	A6	3.3	40P6.3CT	55.56	46.30
	12.70	A7	5.0	80P6.3CT	62.88	52.40
	19.00	A8	6.5	120P6.3CT	64.20	53.50
8.0	0.67	A1	1.0	5P8CT	45.12	37.60
	1.25	A2	1.5	10P8CT	46.44	38.70
	1.88	A3	2.0	15P8CT	48.72	40.60
	2.50	A4	2.5	20P8CT	53.88	44.90
	3.76	A5	3.0	30P8CT	54.36	45.30
	5.00	A6	3.3	40P8CT	55.56	46.30
	10.00	A7	5.0	80P8CT	62.88	52.40
	15.00	A8	6.5	120P8CT	64.20	53.50
	20.00	A9	8.2	160P8CT	74.04	61.70
10.0	0.50	A1	1.0	5P10CT	45.12	37.60
	1.00	A2	1.5	10P10CT	46.44	38.70
	1.50	A3	2.0	15P10CT	48.72	40.60
	2.00	A4	2.5	20P10CT	53.88	44.90
	3.00	A5	3.0	30P10CT	54.36	45.30
	4.00	A6	3.3	40P10CT	55.56	46.30
	8.00	A7	5.0	80P10CT	62.88	52.40
	12.00	A8	6.5	120P10CT	64.20	53.50
	16.00	A9	8.2	160P10CT	74.04	61.70
	20.00	A10	10.5	200P10CT	83.04	69.20
12.6	0.40	A1	1.0	5P12.6CT	45.12	37.60
	0.79	A2	1.5	10P12.6CT	46.44	38.70
	1.19	A3	2.0	15P12.6CT	48.72	40.60
	1.59	A4	2.5	20P12.6CT	53.88	44.90
	2.38	A5	3.0	30P12.6CT	54.36	45.30
	3.18	A6	3.3	40P12.6CT	55.56	46.30
	6.35	A7	5.0	80P12.6CT	62.88	52.40
	9.53	A8	6.5	120P12.6CT	64.20	53.50
	12.70	A9	8.2	160P12.6CT	74.04	61.70
	15.90	A10	10.5	200P12.6CT	83.04	69.20
14	0.36	A1	1.0	5P14CT	45.12	37.60
	0.72	A2	1.5	10P14CT	46.44	38.70
	1.07	A3	2.0	15P14CT	48.72	40.60
	1.43	A4	2.5	20P14CT	53.88	44.90
	2.15	A5	3.0	30P14CT	54.36	45.30
	2.86	A6	3.3	40P14CT	55.56	46.30
	5.72	A7	5.0	80P14CT	62.88	52.40
	8.59	A8	6.5	120P14CT	64.20	53.50
	11.40	A9	8.2	160P14CT	74.04	61.70
	14.30	A10	10.5	200P14CT	83.04	69.20
16	0.34	A1	1.0	5P16CT	45.12	37.60
	0.68	A2	1.5	10P16CT	46.44	38.70
	0.94	A3	2.0	15P16CT	48.72	40.60
	1.25	A4	2.5	20P16CT	53.88	44.90
	1.87	A5	3.0	30P16CT	54.36	45.30
	2.50	A6	3.3	40P16CT	55.56	46.30
	5.00	A7	5.0	80P16CT	62.88	52.40
	7.50	A8	6.5	120P16CT	64.20	53.50
	10.00	A9	8.2	160P16CT	74.04	61.70
	12.50	A10	10.5	200P16CT	83.04	69.20
	18.70	A11	17.0	300P16CT	84.36	70.30
18	0.28	A1	1.0	5P18CT	45.12	37.60
	0.56	A2	1.5	10P18CT	46.44	38.70
	0.83	A3	2.0	15P18CT	48.72	40.60
	1.11	A4	2.5	20P18CT	53.88	44.90
	1.67	A5	3.0	30P18CT	54.36	45.30
	2.21	A6	3.3	40P18CT	55.56	46.30
	4.44	A7	5.0	80P18CT	62.88	52.40
	6.68	A8	6.5	120P18CT	64.20	53.50
	8.89	A9	8.2	160P18CT	74.04	61.70
	11.10	A10	10.5	200P18CT	83.04	69.20
	16.70	A11	17.0	300P18CT	84.36	70.30
20	0.25	A1	1.0	5P20CT	45.12	37.60
	0.50	A2	1.5	10P20CT	46.44	38.70
	0.75	A3	2.0	15P20CT	48.72	40.60
	1.00	A4	2.5	20P20CT	53.88	44.90
	1.50	A5	3.0	30P20CT	54.36	45.30
	2.00	A6	3.3	40P20CT	55.56	46.30
	4.00	A7	5.0	80P20CT	62.88	52.40
	6.00	A8	6.5	120P20CT	64.20	53.50
	8.00	A9	8.2	160P20CT	74.04	61.70
	10.00	A10	10.5	200P20CT	83.04	69.20
	15.00	A11	17.0	300P20CT	84.36	70.30
22	0.23	A1	1.0	5P22CT	45.12	37.60
	0.45	A2	1.5	10P22CT	46.44	38.70
	0.68	A3	2.0	15P22CT	48.72	40.60
	0.91	A4	2.5	20P22CT	53.88	44.90
	1.36	A5	3.0	30P22CT	54.36	45.30
	1.82	A6	3.3	40P22CT	55.56	46.30
	3.64	A7	5.3	80P22CT	62.88	52.40
	5.45	A8	6.5	120P22CT	64.20	53.50
	7.27	A9	8.2	160P22CT	74.04	61.70
	9.10	A10	10.5	200P22CT	83.04	69.20
	13.60	A11	17.0	300P22CT	84.36	70.30
25	0.20	A1	1.0	5P25CT	45.12	37.60
	0.40	A2	1.5	10P25CT	46.44	38.70
	0.60	A3	2.0	15P25CT	48.72	40.60
	0.80	A4	2.5	20P25CT	53.88	44.90
	1.20	A5	3.0	30P25CT	54.36	45.30
	1.60	A6	3.3	40P25CT	55.56	46.30
	3.20	A7	5.0	80P25CT	62.88	52.40
	4.80	A8	6.5	120P25CT	64.20	53.50
	6.40	A9	8.2	160P25CT	74.04	61.70
	8.00	A10	10.5	200P25CT	83.04	69.20
	12.00	A11	17.0	300P25CT	84.36	70.30
28	0.18	A1	1.0	5P28CT	45.12	37.60
	0.36	A2	1.5	10P28CT	46.44	38.70
	0.54	A3	2.0	15P28CT	48.72	40.60
	0.71	A4	2.5	20P28CT	53.88	44.90
	1.07	A5	3.0	30P28CT	54.36	45.30
	1.43	A6	3.3	40P28CT	55.56	46.30
	2.86	A7	5.0	80P28CT	62.88	52.40
	4.29	A8	6.5	120P28CT	64.20	53.50
	5.72	A9	8.2	160P28CT	74.04	61.70
	7.10	A10	10.5	200P28CT	83.04	69.20
	10.70	A11	17.0	300P28CT	84.36	70.30
31	0.16	A1	1.0	5P31CT	45.12	37.60
	0.32	A2	1.5	10P31CT	46.44	38.70
	0.48	A3	2.0	15P31CT	48.72	40.60
	0.64	A4	2.5	20P31CT	53.88	44.90
	0.97	A5	3.0	30P31CT	54.36	45.30
	1.29	A6	3.3	40P31CT	55.56	46.30
	2.58	A7	5.0	80P31CT	62.88	52.40
	3.87	A8	6.5	120P31CT	64.20	53.50
	5.17	A9	8.2	160P31CT	74.04	61.70
	6.40	A10	10.5	200P31CT	83.04	69.20
	9.67	A11	17.0	300P31CT	84.36	70.30
35	0.14	A1	1.0	5P35CT	45.12	37.60
	0.29	A2	1.5	10P35CT	46.44	38.70
	0.43	A3	2.0	15P35CT	48.72	40.60
	0.57	A4	2.5	20P35CT	53.88	44.90
	0.86	A5	3.0	30P35CT	54.36	45.30
	1.14	A6	3.3	40P35CT	55.56	46.30
	2.28	A7	5.0	80P35CT	62.88	52.40
	3.43	A8	6.5	120P35CT	64.20	53.50
	4.57	A9	8.2	160P35CT	74.04	61.70
	5.71	A10	10.5	200P35CT	83.04	69.20
	8.59	A11	17.0	300P35CT	84.36	70.30
39	0.13	A1	1.0	5P39CT	45.12	37.60
	0.26	A2	1.5	10P39CT	46.44	38.70
	0.38	A3	2.0	15P39CT	48.72	40.60
	0.51	A4	2.5	20P39CT	53.88	44.90
	0.77	A5	3.0	30P39CT	54.36	45.30
	1.03	A6	3.3	40P39CT	55.56	46.30
	2.05	A7	5.0	80P39CT	62.88	52.40
	3.07	A8	6.5	120P39CT	64.20	53.50
	4.10	A9	8.2	160P39CT	74.04	61.70
	5.12	A10	10.5	200P39CT	83.04	69.20
	7.69	A11	17.0	300P39CT	84.36	70.30
43	0.12	A1	1.0	5P43CT	45.12	37.60
	0.23	A2	1.5	10P43CT	46.44	38.70
	0.35	A3	2.0	15P43CT	48.72	40.60
	0.46	A4	2.5	20P43CT	53.88	44.90
	0.70	A5	3.0	30P43CT	54.36	45.30
	0.93	A6	3.3	40P43CT	55.56	46.30
	1.85	A7	5.0	80P43CT	62.88	52.40
	2.79	A8	6.5	120P43CT	64.20	53.50
	3.70	A9	8.2	160P43CT	74.04	61.70
	4.64	A10	10.5	200P43CT	83.04	69.20
	6.95	A11	17.0	300P43CT	84.36	70.30
48	0.10	A1	1.0	5P48CT	45.12	37.60
	0.21	A2	1.5	10P48CT	46.44	38.70
	0.31	A3	2.0	15P48CT	48.72	40.60
	0.42	A4	2.5	20P48CT	53.88	44.90
	0.63	A5	3.0	30P48CT	54.36	45.30
	0.83	A6	3.3	40P48CT	55.56	46.30
	1.63	A7	5.0	80P48CT	62.88	52.40
	2.50	A8	6.5	120P48CT	64.20	53.50
	3.33	A9	8.2	160P48CT	74.04	61.70
	4.17	A10	10.5	200P48CT	83.04	69.20
	6.26	A11	17.0	300P48CT	84.36	70.30
55	0.09	A1	1.0	5P55CT	45.12	37.60
	0.18	A2	1.5	10P55CT	46.44	38.70
	0.27	A3	2.0	15P55CT	48.72	40.60
	0.36	A4	2.5	20P55CT	53.88	44.90
	0.55	A5	3.0	30P55CT	54.36	45.30
	0.73	A6	3.3	40P55CT	55.56	46.30
	1.46	A7	5.0	80P55CT	62.88	52.40
	2.18	A8	6.5	120P55CT	64.20	53.50
	2.91	A9	8.2	160P55CT	74.04	61.70
	3.64	A10	10.5	200P55CT	83.04	69.20
	5.46	A11	17.0	300P55CT	84.36	70.30

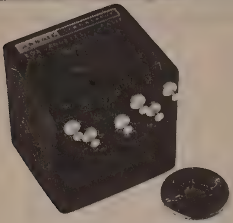
Standard models with outputs from 63 to 5,000 VAC are also available from stock. Contact our nearest office for your free copy of our complete brochure.

EASTERN OFFICE: 1224 Anderson Ave./Fort Lee, New Jersey 07024 (201) 224-6900

abbott transistor
TRANSFORMER DIVISION

5180 W Jefferson Blvd. / Los Angeles 90016
(213) 938-0155
Telex 69-1398

abbott 400 ∿ MIL-T-27D power transformers



Built to meet the specifications of MIL-T-27D, long life and reliability are major features of these hermetically sealed, ruggedly built power transformers. Encased in epoxy fiberglass and capable of operation at high temperatures, these units have a wide variety of uses in airborne, space and missile applications, and industry as well, where small size and dependability are prime factors. The model 4A series come in power levels of 7 watts, 10 watts, 25 watts, and 50 watts at any voltage between 5 and 120 VAC. The MIL-T-27D, type designation of these units is TF5SX03ZZ. Send us your special requirements.

Output Volts (F.L.)	Output Current (Amps)		Size	Weight Lbs. Typ.	Model Number	Price 1-4 pcs.
	Parallel Connection	Series Connection				
5 V Parallel 10 V.C.T. Series	1.40	0.70	1	.26	4A5-7	16.00
	2.00	1.00	2	.30	4A5-10	16.75
	5.00	2.50	3	.47	4A5-25	19.00
	8.00	4.00	4	.77	4A5-40	21.00
6.3 V Parallel 12.6 V.C.T. Series	1.11	0.55	1	.26	4A6-7	16.00
	1.58	0.79	2	.30	4A6-10	16.75
	4.00	2.00	3	.47	4A6-25	19.00
	8.00	4.00	4	.77	4A6-50	21.00
8 V Parallel 16 V.C.T. Series	0.874	0.437	1	.26	4A8-7	16.00
	1.25	0.625	2	.30	4A8-10	16.75
	3.12	1.56	3	.47	4A8-25	19.00
	6.24	3.12	4	.77	4A8-50	21.00
10 V Parallel 20 V.C.T. Series	0.70	0.35	1	.26	4A10-7	16.00
	1.00	0.50	2	.30	4A10-10	16.75
	2.50	1.25	3	.47	4A10-25	19.00
	5.00	2.50	4	.77	4A10-50	21.00
12 V Parallel 24 V.C.T. Series	0.58	0.29	1	.26	4A12-7	16.00
	0.84	0.42	2	.30	4A12-10	16.75
	2.08	1.04	3	.47	4A12-25	19.00
	4.16	2.08	4	.77	4A12-50	21.00
17 V Parallel 34 V.C.T. Series	0.411	0.205	1	.26	4A17-7	16.00
	0.588	0.294	2	.30	4A17-10	16.75
	1.47	0.735	3	.47	4A17-25	19.00
	2.94	1.47	4	.77	4A17-50	21.00
20 V Parallel 40 V.C.T. Series	0.350	0.175	1	.26	4A20-7	16.00
	0.50	0.250	2	.30	4A20-10	16.75
	1.25	0.625	3	.47	4A20-25	19.00
	2.50	1.25	4	.77	4A20-50	21.00
28 V Parallel 56 V.C.T. Series	0.250	0.125	1	.26	4A28-7	16.00
	0.356	0.178	2	.30	4A28-10	16.75
	0.892	0.446	3	.47	4A28-25	19.00
	1.78	0.89	4	.77	4A28-50	21.00
44 V Parallel 88 V.C.T. Series	0.158	0.079	1	.26	4A44-7	16.00
	0.226	0.113	2	.30	4A44-10	16.75
	0.568	0.284	3	.47	4A44-25	19.00
	1.12	0.56	4	.77	4A44-50	21.00
60 V Parallel 120 V.C.T. Series	0.116	0.058	1	.26	4A60-7	16.00
	0.166	0.083	2	.30	4A60-10	16.75
	0.416	0.208	3	.47	4A60-25	19.00
	0.82	0.41	4	.77	4A60-50	21.00

features

- 105°C Ambient Operation
- Built to Meet MIL-T-27D
- 5 to 120 Volts
- 7 to 50 Watts

specifications

INPUT PRIMARY: 115 V, 400 Hz ±20 Hz, 1 phase

REGULATION: 10% no load to full load

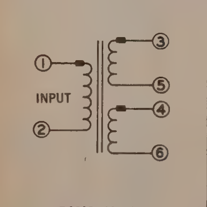
SECONDARY VOLTAGE TOLERANCE: Within 5% when measured at full load and 115 VAC input

INSULATION TEST: 1500 VAC

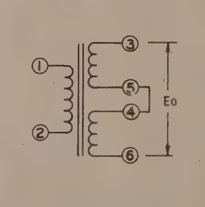
CONSTRUCTION: To MIL-T-27D, grade: 5, class: "S", life: "X" (10,000 hrs.) case: smaller (see drawing)

ENVIRONMENT: Encapsulated to meet MIL-STD-810B, including vibration, temperature to 105°C, shock, sand, dust, humidity, saltspray, fungus, sunshine, rain, explosion, and altitude (to a vacuum). NOTE: For high altitude operation, encapsulate terminals

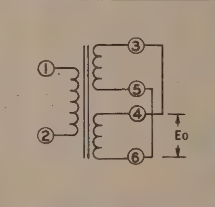
OUTPUT SECONDARY: See voltage and current of specific models listed



BASIC CIRCUIT



SERIES CONNECTED



PARALLEL CONNECTED

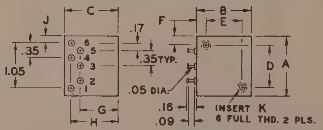
QUANTITY DISCOUNTS

1-4 pcs.	- price listed.
5-9 pcs.	- less 4% of the 1-4 piece price.
10-24 pcs.	- less 8% of the 1-4 piece price.
25-49 pcs.	- less 13% of the 1-4 piece price
50-99 pcs.	- less 19% of the 1-4 piece price.
Above 100 pcs.	- Contact nearest office for an exact quotation.

All Prices subject to change without notice.

Size	A	B	C	D	E	F	G	H	J	K
1	1.37	1.25	1.31	1.00	.87	.19	1.00	1.19	.16	4-40
2	1.50	1.37	1.37	1.12	1.00	.19	1.06	1.25	.22	4-40
3	1.75	1.50	1.56	1.25	1.00	.25	1.25	1.44	.35	6-32
4	2.00	1.62	1.81	1.50	1.12	.25	1.50	1.69	.47	6-32

DIMENSIONAL TOLERANCE = ±.02, EXCEPT F, G, H, J = ±.04



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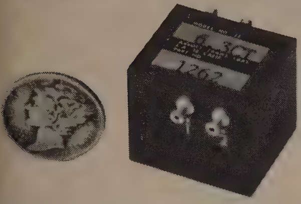
TRANSFORMER DIVISION

abbott 400 ~ transformers



features

- Hermetically sealed
- 105°C operation
- To meet MIL-T-27D
- Designed exclusively for 400 Hz
- For aerospace application
- Molded diallyl phthalate

DELIVERY IS FROM STOCK

specifications

Input Primary
115V, 400 Hz ±20 Hz, 1 phase

Regulation
10% no load to full load

Secondary Voltage Tolerance
Within 5% when measured at full load and 115 VAC input

Insulation Test
2500 VDC or 150% of secondary voltage (whichever is higher)

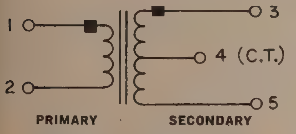
Construction
To MIL-T-27D, grade: 5, class: "S", life: "X" (10,000 hrs.) case: smaller

Environment
Encapsulated to meet MIL-STD-810B, including vibration to Proc. XII, temperature to 105°C, shock, sand, dust, humidity, saltspray, fungus, sunshine, rain, explosion, and altitude (to a vacuum)

Output Secondary
See voltage and current of specific models listed

Standard models with outputs from 350 to 5,000 VAC are also available from stock. Contact our nearest office for your free copy of our complete brochure.

TYPICAL CIRCUIT DIAGRAM



"■" refers to in-phase points

Case Size	Width (in.)	Depth (in.)	Height (in.)	Weight (lbs.)
A	0.87	0.74	0.78	0.06
B	1.25	1.19	0.88	0.12
C	1.43	1.24	1.27	0.26
D	1.47	1.28	1.40	0.29
E	2.31	1.52	1.75	0.75
F	2.75	2.71	2.31	1.84

Output Volt	Output Current (Amps)	Size	Sec. DCR (ohms)	Model Number	Price 1 Pc.	Price 2-4 Pcs.
5.0	0.400	A	0.60	2E5CT	$28.80	$24.00
	1.200	B	0.144	6E5CT	26.40	22.00
	3.000	C	0.046	15E5CT	27.60	23.00
	4.800	D	0.040	24E5CT	31.20	26.00
	16.000	E	0.009	80E5CT	33.60	28.00
	35.000	F	0.012	175E5CT	66.00	55.00
6.3	0.317	A	1.06	2E6.3CT	28.80	24.00
	0.950	B	0.24	6E6.3CT	26.40	22.00
	2.380	C	0.088	15E6.3CT	27.60	23.00
	3.800	D	0.107	24E6.3CT	31.20	26.00
	12.800	E	0.016	80E6.3CT	33.60	28.00
	27.800	F	0.019	175E6.3CT	66.00	55.00
8.0	0.250	A	1.63	2E8CT	28.80	24.00
	0.750	B	0.396	6E8CT	26.40	22.00
	1.880	C	0.135	15E8CT	27.60	23.00
	3.000	D	0.140	24E8CT	31.20	26.00
	10.000	E	0.017	80E8CT	33.60	28.00
	22.000	F	0.010	175E8CT	66.00	55.00
10	0.200	A	2.50	2E10CT	28.80	24.00
	0.600	B	0.587	6E10CT	26.40	22.00
	1.500	C	0.27	15E10CT	27.60	23.00
	2.400	D	0.180	24E10CT	31.20	26.00
	8.000	E	7.2	80E10CT	33.60	28.00
	17.500	F	0.020	175E10CT	66.00	55.00
12.6	0.158	A	4.10	2E12.6CT	28.80	24.00
	0.475	B	0.99	6E12.6CT	26.40	22.00
	1.180	C	0.32	15E12.6CT	27.60	23.00
	1.900	D	0.225	24E12.6CT	31.20	26.00
	6.350	E	0.030	80E12.6CT	33.60	28.00
	13.900	F	0.021	175E12.6CT	66.00	55.00
14	0.142	A	5.59	2E14CT	28.80	24.00
	0.428	B	1.11	6E14CT	26.40	22.00
	1.070	C	0.35	15E14CT	27.60	23.00
	1.720	D	0.32	24E14CT	31.20	26.00
	5.600	E	0.04	80E14CT	33.60	28.00
	12.500	F	0.022	175E14CT	66.00	55.00
16	0.125	A	6.63	2E16CT	28.80	24.00
	0.375	B	1.58	6E16CT	26.40	22.00
	0.940	C	0.54	15E16CT	27.60	23.00
	1.500	D	0.35	24E16CT	31.20	26.00
	5.000	E	0.05	80E16CT	33.60	28.00
	10.900	F	0.025	175E16CT	66.00	55.00
18	0.111	A	9.00	2E18CT	28.80	24.00
	0.333	B	2.21	6E18CT	26.40	22.00
	0.832	C	0.74	15E18CT	27.60	23.00
	1.330	D	0.40	24E18CT	31.20	26.00
	4.450	E	0.08	80E18CT	33.60	28.00
	9.700	F	0.027	175E18CT	66.00	55.00
20	0.100	A	10.9	2E20CT	28.80	24.00
	0.300	B	2.78	6E20CT	26.40	22.00
	0.750	C	1.4	15E20CT	27.60	23.00
	1.200	D	0.48	24E20CT	31.20	26.00
	4.000	E	0.09	80E20CT	33.60	28.00
	8.750	F	0.020	175E20CT	66.00	55.00
22	0.091	A	14.6	2E22CT	28.80	24.00
	0.273	B	2.80	6E22CT	26.40	22.00
	0.680	C	0.92	15E22CT	27.60	23.00
	1.090	D	0.63	24E22CT	31.20	26.00
	3.630	E	0.12	80E22CT	33.60	28.00
	7.900	F	0.020	175E22CT	66.00	55.00
25	0.080	A	20.4	2E25CT	28.80	24.00
	0.240	B	3.60	6E25CT	26.40	22.00
	0.600	C	1.3	15E25CT	27.60	23.00
	0.900	D	0.68	24E25CT	31.20	26.00
	3.200	E	0.13	80E25CT	33.60	28.00
	7.000	F	0.042	175E25CT	66.00	55.00
28	0.071	A	30.0	2E28CT	28.80	24.00
	0.214	B	4.20	6E28CT	26.40	22.00
	0.535	C	1.83	15E28CT	27.60	23.00
	0.855	D	0.98	24E28CT	31.20	26.00
	2.850	E	0.14	80E28CT	33.60	28.00
	6.250	F	0.043	175E28CT	66.00	55.00
31	0.064	A	25.6	2E31CT	28.80	24.00
	0.192	B	5.71	6E31CT	26.40	22.00
	0.485	C	1.62	15E31CT	27.60	23.00
	0.772	D	1.27	24E31CT	31.20	26.00
	2.470	E	0.18	80E31CT	33.60	28.00
	5.650	F	0.061	175E31CT	66.00	55.00
35	0.057	A	29.5	2E35CT	28.80	24.00
	0.171	B	6.89	6E35CT	26.40	22.00
	0.428	C	2.28	15E35CT	27.60	23.00
	0.685	D	1.70	24E35CT	31.20	26.00
	2.280	E	0.28	80E35CT	33.60	28.00
	5.000	F	0.098	175E35CT	66.00	55.00
39	0.051	A	38.6	2E39CT	28.80	24.00
	0.154	B	9.39	6E39CT	26.40	22.00
	0.384	C	2.54	15E39CT	27.60	23.00
	0.615	D	2.20	24E39CT	31.20	26.00
	2.050	E	0.32	80E39CT	33.60	28.00
	4.480	F	0.110	175E39CT	66.00	55.00
43	0.046	A	44.3	2E43CT	28.80	24.00
	0.139	B	10.25	6E43CT	26.40	22.00
	0.348	C	2.85	15E43CT	27.60	23.00
	0.556	D	2.42	24E43CT	31.20	26.00
	1.860	E	0.35	80E43CT	33.60	28.00
	4.060	F	0.114	175E43CT	66.00	55.00
48	0.041	A	57.	2E48CT	$28.80	$24.00
	0.125	B	15.30	6E48CT	26.40	22.00
	0.312	C	4.05	15E48CT	27.60	23.00
	0.500	D	3.27	24E48CT	31.20	26.00
	1.660	E	0.40	80E48CT	33.60	28.00
	3.650	F	0.160	175E48CT	66.00	55.00
55	0.036	A	89.	2E55CT	28.80	24.00
	0.109	B	17.30	6E55CT	26.40	22.00
	0.262	C	7.2	15E55CT	27.60	23.00
	0.435	D	3.83	24E55CT	31.20	26.00
	1.450	E	0.67	80E55CT	33.60	28.00
	3.170	F	0.196	175E55CT	66.00	55.00
63	0.031	A	100.	2E63CT	28.80	24.00
	0.095	B	24.9	6E63CT	26.40	22.00
	0.238	C	6.51	15E63CT	27.60	23.00
	0.380	D	5.35	24E63CT	31.20	26.00
	1.270	E	0.71	80E63CT	33.60	28.00
	2.770	F	0.20	175E63CT	66.00	55.00
70	0.028	A	139	2E70CT	28.80	24.00
	0.085	B	27.1	6E70CT	26.40	22.00
	0.214	C	9.4	15E70CT	27.60	23.00
	0.342	D	8.10	24E70CT	31.20	26.00
	1.140	E	0.80	80E70CT	33.60	28.00
	2.500	F	0.25	175E70CT	66.00	55.00
80	0.025	A	163.	2E80CT	28.80	24.00
	0.075	B	39.0	6E80CT	26.40	22.00
	0.198	C	13.4	15E80CT	27.60	23.00
	0.300	D	9.0	24E80CT	31.20	26.00
	1.000	E	0.92	80E80CT	33.60	28.00
	2.180	F	0.34	175E80CT	66.00	55.00
90	0.022	A	218.	2E90CT	28.80	24.00
	0.067	B	41.0	6E90CT	26.40	22.00
	0.166	C	15.9	15E90CT	27.60	23.00
	0.267	D	12.5	24E90CT	31.20	26.00
	0.890	E	1.08	80E90CT	33.60	28.00
	1.940	F	0.38	175E90CT	66.00	55.00
100	0.020	A	283.	2E100CT	28.80	24.00
	0.060	B	59.5	6E100CT	26.40	22.00
	0.150	C	16.8	15E100CT	27.60	23.00
	0.240	D	14.4	24E100CT	31.20	26.00
	0.800	E	1.64	80E100CT	33.60	28.00
	1.750	F	0.52	175E100CT	66.00	55.00
110	0.018	A	392.	2E110CT	28.80	24.00
	0.054	B	62.3	6E110CT	26.40	22.00
	0.136	C	22.1	15E110CT	27.60	23.00
	0.218	D	19.5	24E110CT	31.20	26.00
	0.728	E	2.03	80E110CT	33.60	28.00
	1.590	F	0.72	175E110CT	66.00	55.00
123	0.016	A	495.	2E123CT	28.80	24.00
	0.048	B	96.0	6E123CT	26.40	22.00
	0.122	C	30.7	15E123CT	27.60	23.00
	0.195	D	21.9	24E123CT	31.20	26.00
	0.650	E	2.35	80E123CT	33.60	28.00
	1.420	F	0.81	175E123CT	66.00	55.00
138	0.014	A	550.	2E138CT	28.80	24.00
	0.043	B	133.0	6E138CT	26.40	22.00
	0.108	C	36.0	15E138CT	27.60	23.00
	0.174	D	30.3	24E138CT	31.20	26.00
	0.580	E	3.17	80E138CT	33.60	28.00
	1.260	F	1.14	175E138CT	66.00	55.00
157	0.038	B	153.0	6E157CT	26.40	22.00
	0.095	C	53.	15E157CT	27.60	23.00
	0.152	D	36.1	24E157CT	31.20	26.00
	0.508	E	3.60	80E157CT	33.60	28.00
	1.100	F	1.31	175E157CT	66.00	55.00
175	0.034	B	168.0	6E175CT	26.40	22.00
	0.085	C	56.	15E175CT	27.60	23.00
	0.136	D	49.5	24E175CT	31.20	26.00
	0.455	E	5.50	80E175CT	33.60	28.00
	1.000	F	1.87	175E175CT	66.00	55.00
200	0.030	B	248.0	6E200CT	26.40	22.00
	0.071	C	65.	15E200CT	27.60	23.00
	0.120	D	57.	24E200CT	31.20	26.00
	0.400	E	5.60	80E200CT	33.60	28.00
	0.875	F	2.65	175E200CT	66.00	55.00
220	0.027	B	278.	6E220CT	26.40	22.00
	0.068	C	91.5	15E220CT	27.60	23.00
	0.109	D	79.	24E220CT	31.20	26.00
	0.364	E	8.1	80E220CT	33.60	28.00
	0.790	F	2.92	175E220CT	66.00	55.00
250	0.024	B	407.	6E250CT	26.40	22.00
	0.060	C	141.	15E250CT	27.60	23.00
	0.096	D	114.	24E250CT	31.20	26.00
	0.320	E	11.2	80E250CT	33.60	28.00
	0.700	F	3.95	175E250CT	66.00	55.00
275	0.021	B	417.	6E275CT	26.40	22.00
	0.054	C	146.	15E275CT	27.60	23.00
	0.087	D	120.	24E275CT	31.20	26.00
	0.290	E	13.6	80E275CT	33.60	28.00
	0.635	F	4.65	175E275CT	66.00	55.00
310	0.019	B	592.	6E310CT	26.40	22.00
	0.048	C	160.	15E310CT	27.60	23.00
	0.077	D	180.	24E310CT	31.20	26.00
	0.266	E	14.1	80E310CT	33.60	28.00
	0.565	F	6.80	175E310CT	66.00	55.00

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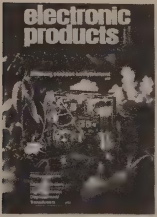

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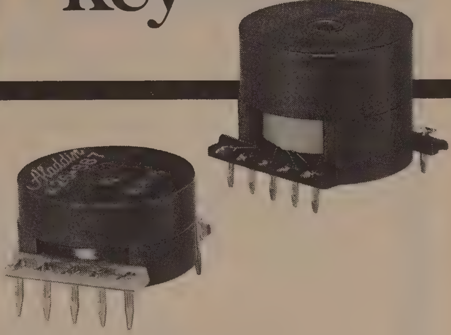


there's a coil

Data lovers, how do these frequencies grab you?

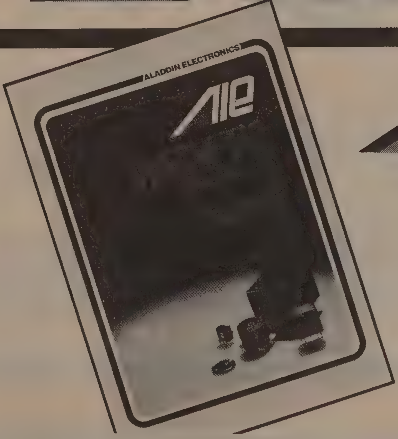
600Hz
697Hz
770Hz
852Hz
941Hz
1070Hz
1098Hz
1200Hz
1209Hz
1270Hz
1336Hz
1477Hz
1633Hz
1950Hz
2025Hz
2050Hz
2150Hz
2200Hz
2225Hz
2250Hz
2350Hz

Applications:
As fixed and adjustable inductors for low frequency filters. As transformers for tone frequencies used in push button telephone oscillator circuits and data sets; coupling and impedance matching applications.

Features:
High and low profile units, p/c mounting, fine tuning, tuning adjustment at least ± 3% from nominal, TC matches polystyrene capacitors, high Q — custom designs, impregnated coils, for extreme environments.

data coils by Aladdin

Data Coils, Transformers, Inductors, Filters? We've Got Those Too!
We feature our latest innovations in coils, transformers, inductors and filters in a six-page *Magnetic Components for Telephony* booklet. Telephony applications and configurations are highlighted, making it easier for you to select components. No charge, of course!



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Aladdin ELECTRONICS

innovators in ferromagnetic components for data processing, data communications and precision industries

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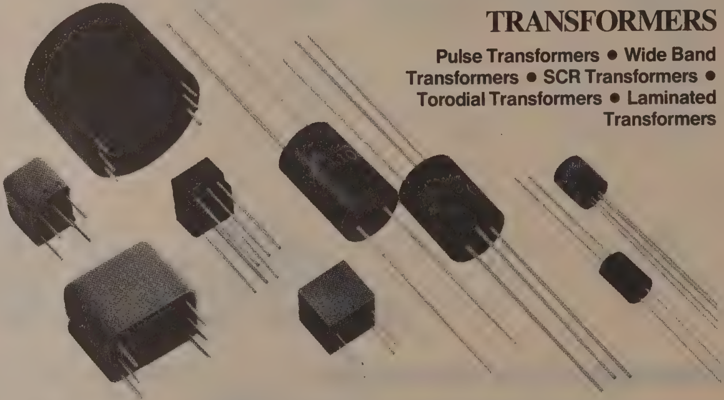
A concise catalog of Aladdin's most frequently ordered stock components—data coils, transformers, filters, inductors and strip delay lines. They're all available *from stock* (on a 48-hour shipping schedule in quantities up to 250). For your copy, write: Aladdin Electronics, P.O. Box 7263, Nashville, Tennessee 37210.



TRANSFORMERS

Pulse Transformers • Wide Band Transformers • SCR Transformers • Torodial Transformers • Laminated Transformers

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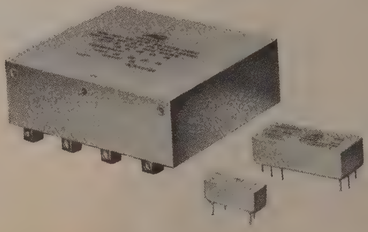

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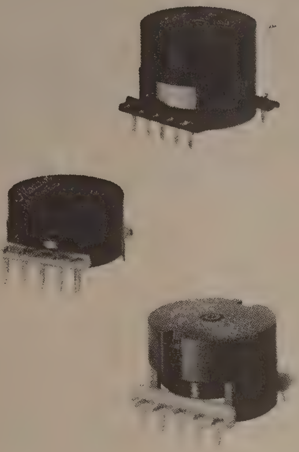

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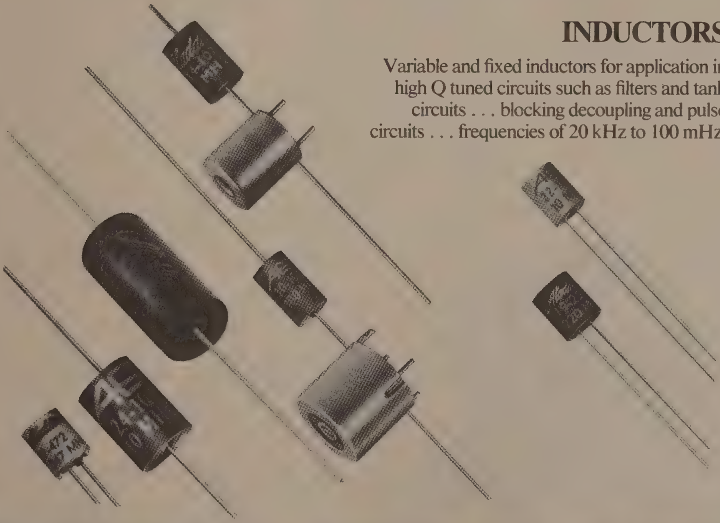
Data coils in a complete spectrum of frequencies, all utilizing communication-grade ferrite pot cores to assure a high Q factor and excellent temperature stability of inductors while utilizing a small core area.

Applications: as fixed and adjustable inductors for low frequency filters . . . as transformers for tone frequencies used in push-button telephone oscillator circuits and data sets . . . coupling and impedance-matching applications.

Features: High and low profile units, p/c mounting, fine tuning, tuning adjustment at least ±3% from nominal, TC matches polystyrene capacitors, high Q—custom designs, impregnated coils for extreme environments.

INDUCTORS

Variable and fixed inductors for application in high Q tuned circuits such as filters and tank circuits . . . blocking decoupling and pulse circuits . . . frequencies of 20 kHz to 100 mHz.



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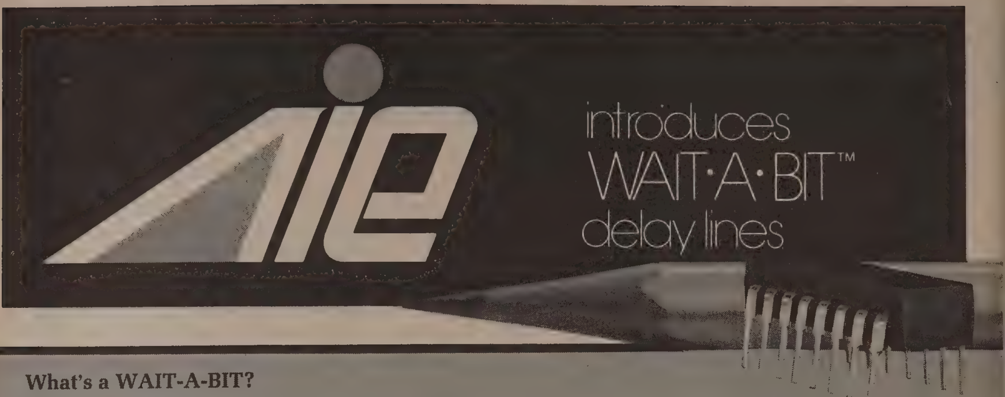


introduces WAIT·A·BIT™ delay lines

What's a WAIT-A-BIT?

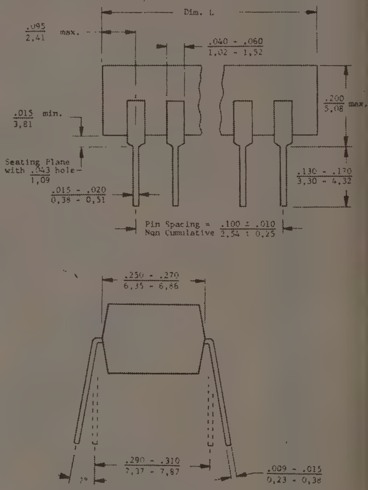
- New computer delay line technology—totally unlike conventional lumped or distributed parameter delay lines
- Shorter delays for pulse synchronization and pulse shaping in fast computing machines
- Can be cascaded for timing applications
- Tested automatically for delay time to a precision of ± 0.02 ns, rise time, prepulse distortion, and pulse top distortion
- Tested in conformance with the applicable paragraphs of MIL-D-23859 and MIL-STD-202. Sampled per MIL-STD-105, Level II, 0.4% A.Q.L.

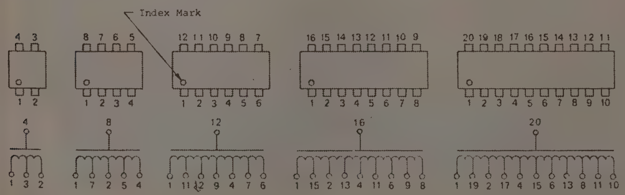
TYPICAL DIP "WAIT-A-BIT" DELAY LINES

	PART NUMBER	PINS	TAPS	IMPEDANCE (±10%)	DELAY TIME ns (±0.5 max.)	RISE TIME* ns (max.)	DCR ohms (max.)
	880-0207-20	20	10	50	7	3	3
	880-0205-20	20	10	50	5	3	3
	880-0204-16	16	8	50	4	3	3
	880-0203-12	12	6	50	3	3	2
	880-0202-08	8	4	50	2	3	2
	880-0201-04	4	2	50	1	3	1
	880-0310-20	20	10	75	10	4	3.5
	880-0307-20	20	10	75	7.5	3	3.5
	880-0306-16	16	8	75	6	3	3
	880-0304-12	12	6	75	4.5	3	2
	880-0303-08	8	4	75	3	3	2
	880-0301-04	4	2	75	1.5	3	1
→	880-0414-20	20	10	100	14	5	4
→	880-0410-20	20	10	100	10	4	4
→	880-0410-16	16	8	100	10	4	4
→	880-0408-16	16	8	100	8	4	3.5
	880-0406-12	12	6	100	6	4	3
	880-0404-08	8	4	100	4	4	2
	880-0402-04	4	2	100	2	4	1

Prepulse and Pulse Top Distortion = ±10%
Dielectric Strength = 50 vdc min.
Specifications are tentative and subject to revision
→ = These parts now available.

*** Input Rise Time = 2.0 ns**


Dim. L
.095 / 2,41 max.
.040 - .060 / 1,02 - 1,52
.200 / 5,08 max.
.015 / 3,81 min.
Seating Plane with .043 / 1,09 hole
.015 - .020 / 0,38 - 0,51
.130 - .170 / 3,30 - 4,32
Pin Spacing = .100 ± .010 / 2,54 ± 0,25 Non Cumulative
.250 - .270 / 6,35 - 6,86
.290 - .310 / 7,37 - 7,87
7°
.009 - .015 / 0,23 - 0,38


Index Mark
4 3
1 2
8 7 6 5
1 2 3 4
12 11 10 9 8 7
1 2 3 4 5 6
16 15 14 13 12 11 10 9
1 2 3 4 5 6 7 8
20 19 18 17 16 15 14 13 12 11
1 2 3 4 5 6 7 8 9 10
4
1 3 2
8
1 7 2 5 4
12
1 11 12 9 4 7 6
16
1 15 2 13 4 11 6 9 8
20
1 19 2 17 4 15 6 13 8 11 10

No. of Pins	Dim "L" Max.	
	inch	mm
4 Pin Unit	.280	7,11
8 Pin Unit	.480	12,19
12 Pin Unit	.680	17,27
16 Pin Unit	.880	22,35
20 Pin Unit	1.080	27,43

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SOMERVILLE, N.J. 08876
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FERRORESONANT TRANSFORMERS

SPECIFICATIONS:

Input Voltage	100 to 130V/200 to 260V
Frequency	60HZ
Output Voltage	117V
Voltage Regulation	+ 1% Line & Load
Response Time	1HZ
Total Harmonic Distortion	4% MAX

Model No.	Rating VA	Input Volts	Output Volts	Dimensions (Inches) Length	Width	Height
F601	100	100-130	117	7-3/4	4-1/2	5-3/8
F602	200	100-130	117	8-1/2	4-1/2	5-3/8
F605	500	100-130	117	8-3/4	4-1/2	5-3/8
F610	1,000	100-130	117	10-1/2	7-1/8	8-1/4
F615	1,500	100-130	117	11	7-1/8	8-1/4
F620	2,000	200-260	117	11-3/4	7-1/8	8-1/4
F630	3,000	200-260	117	13	10-5/8	12

- Available for OEM's uncased. Change prefixes to T.
- Available at 50HZ and 400HZ.
- Available at other voltages and multiple output voltages.

HIGH VOLTAGE CONTROL TRANSFORMERS

SPECIFICATIONS:

Frequency	60HZ +5% (50HZ available)
Voltage Regulation	5% NL to FL
Insulation Resistance	100 Meg ohm Min.
Insulation	NEMA Class B
Dielectric	25KV BIL

Model No.	Rating KVA	Primary Volts	Secondary Volts
M1218	0.75	2400	115/230
M1219	0.75	4160	115/230
M1272	1.5	2400	115/230
M1237	1.5	4160	115/230
M1261	2.0	2400	115/230
M1231	2.0	4160	115/230
M1232	3.0	2400	115/230
M1245	3.0	4160	115/230

Motor Controllers • Frequency Converters • Uninterruptible Power
Programmable Power • Battery Chargers • Transformers

BOURNS INC
MAGNETICS DIVISION

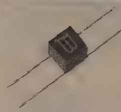
MICROMINIATURE

TRANSFORMERS & INDUCTORS

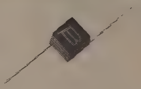
MODEL 4211 MICROTRANSFORMER

.125″ x .125″ x .125″

Standard Part Numbers — Stock Available



Transformer P/N	Turns Ratio Pri:Sec	Typical Impedance Ω Pri	Typical Impedance Ω Sec	DCR Ω Pri	DCR Ω Sec	Rated Power MW 10KHz
4211-0001	1:1	15	15	0.85	0.90	25
4211-0002	1:1	1K	1K	105	125	25
4211-0003	1:1	10K	10K	870	1035	25
4211-0004	1:2	10	40	1.3	4.7	25
4211-0005	1.2	100	400	10	46	25
4211-0006	1:2	500	2000	37	224	25
4211-0007	1:4	10	160	0.75	17	25
4211-0008	1:5	10	250	1.3	40	25



MODEL 4221 MICROINDUCTOR

.125″ x .125″ x .125″

Standard Part Numbers — Stock Available

Inductor P/N	Inductance* Hy(min) @ 1 V, 1 KHz	DCR Ω	DC ma
4221-0001	0.5h	230	0
4221-0002	3.5h	2000	0
4221-0003	0.1h	53	0
4221-0004	1.0h	525	0

Special Order Modifications Available

MODEL 4210 MICROTRANSFORMER

.250″ x .250″ x .250″

Standard Part Numbers — Stock Available

4210-
1051
6535B

Transformer P/N	Turns Ratio Pri:Sec	Typical Impedance Ω		DCR Ω		Rated Power MW			DC ma	Application
		Pri	Sec	Pri	Sec	400 Hz	1000 Hz	2000 Hz		
4210-0010	4.46:1	10,000 CT	500	1022	118	5	50	200	0.5	Output
4210-0011	5:1	25,000 CT	1,000	1130	145	2	25	100	.25	Interstage
4210-0012	1:1	1,000 CT	1,000 CT	90	110	5	50	200	.25	Isolation
4210-0013	1:1	10,000 CT	10,000 CT	600	746	4	50	200	0	Driver
4210-0014	1.22:1	900 CT	600	102	83	5	50	200	.75	Output
4210-0015	1:1	10,000	10,000 CT	600	746	4	50	200	0	Isolation
4210-0016	2.24:1	10,000	2,000 CT	1010	282	5	50	200	.25	Driver
4210-0017	3.53:1	150 CT	12	19	1.4	5	50	200	3.0	Output
4210-0018	3.16:1	500 CT	50 CT	55	6	5	50	200	1.5	Output
4210-0019	6.12:1	120 CT	3.2 CT	13	.6	5	50	200	3.0	Output
4210-0020	1.53:1	1,500 CT	600	231	93	5	50	200	1.5	Output
4210-0021	4.46:1	10,000 CT	500 CT	1022	118	5	50	200	.5	Driver
4210-0022	2.89:1	10,000	1,200 CT	1022	248	5	50	200	.5	Driver
4210-0023	5:1	25,000 CT	1,000 CT	1130	145	2	25	100	.25	Interstage
4210-0024	5:1	25,000	1,000	1130	145	2	25	100	.25	Interstage
4210-0025	1:1	600 CT	600 CT	69	23	5	50	200	1.0	Output
4210-0026	1:1	10,000	10,000	600	746	4	50	200	0	Isolation
4210-0028	5:1	30,000	1,200	1180	290	4	25	100	0	Interstage
4210-0030	1:1.1	500 CT	600	46	82	5	50	200	1.0	Output

4220-
R6
65038

MODEL 4220 MICROINDUCTOR

.250″ x .250″ x .250″

Standard Part Numbers — Stock Available

Inductor P/N	Inductance Hy (min) @ 1 V, 1 KHz	Q MIN @ 1 V, 1 KHz	DCR Ω	DC ma*
4220-0001	66	.75	2100	0
4220-0006	2	4	1495	2.0
4220-0007	.08	5	25	4.0
4220-0008	3.5	3.5	1495	1.0
4220-0009	6.0	4.5	1495	.25
4220-0010	.1	6	54	4.0
4220-0011	1	4	364	.25
4220-0012	.5	5.5	223	.75
4220-0013	50	.75	1495	0
4220-0014	.7	5.0	364	1.5
4220-0015	.2	5.0	38	1.5
4220-0016	4.5	3.5	1495	.75

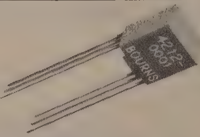
Inductor P/N	Hy (min) @ 1 V, 1 KHz	Q MIN @ 1 V, 1 KHz	DCR Ω	DC ma*
4220-0001	66	.75	2100	0
4220-0006	2	4	1495	2.0
4220-0007	.08	5	25	4.0

* With DC current applied — approximately — 10% drop in inductance occurs

MODEL 4212 MICROTRANSFORMER

.310″ x .410″ x .465″

Standard Part Numbers — Stock Available



Transformer P/N	Turns Ratio Pri:Sec	Typical Impedance Ω		DCR Ω		Rated Power MW at 300 Hz	DC ma	Application
		Pri	Sec	Pri	Sec			
4212-0001	14.1:1	200,000	1,000	5300	120	12	0	Input
4212-0002	7.1:1	50,000 CT	1,000 CT	3800	90	25	0	Input
4212-0003	5:1	25,000 CT	1,000 CT	1600	95	30	0.5	Interstage
4212-0004	4.47:1	20,000 CT	1,000 CT	1500	100	30	0.5	Interstage
4212-0005	1:1	10,000 CT	10,000 CT	1000	1300	45	1	Output Isolation
4212-0006	2.24:1	10,000 CT	2,000 CT	1000	300	45	1	Driver
4212-0007	2.58:1	10,000 CT	1,500 CT	1000	260	45	1	Driver
4212-0008	2.88:1	10,000 CT	1,200 CT	1000	220	45	1	Driver
4212-0009	1.58:1	5,000 CT	2,000 CT	490	300	45	1	Driver
4212-0010	1.58:1	1,500 CT	600	160	95	65	3	Output
4212-0011	1:1	600 CT	600 CT	70	95	65	3	Output Isolation
4212-0012	1:1.09	500 CT	600 CT	65	95	65	3	Output
4212-0013	2:1 : 1	10,000	10,000 CT 2,500 Split	1000	1300*	45	1	Output Isolation
4212-0014	1:1	1,000 CT	1,000 CT	80	100	65	2.5	Output Isolation
4212-0015	2:1 : 1	600	600 CT 150 Split	70	95*	65	3	Output Isolation
4212-0016	4.47:1	10,000 CT	500 CT	1000	80	45	1	Driver
4212-0017	56:1	10,000	3.2	1200	0.8	65	1	Output
4212-0018	1:1.42	300 CT	600	41	98	65	7	Output
4212-0019	22.3:1	1,600 CT	3.2	186	0.8	65	2.5	Output

* Total DCR of split secondaries in series

4222-
0001
BOURNS

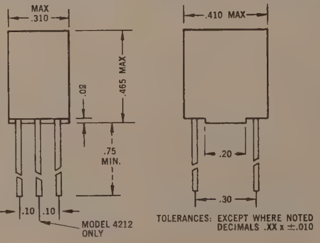
MODEL 4222 MICROINDUCTOR

.310″ x .410″ x .465″

Standard Part Numbers — Stock Available

Inductor P/N	Inductance Hy(min) @ 300 Hz	Q MIN @ 1 V, 1 KHz	DCR Ω	DC ma*
4222-0001	6 at 15 V	5.0	1800	2.0
4222-0002	3.5 at 5 V	4.0	1200	2.0
4222-0003	1.25 at 3 V	3.5	180	2.0
4222-0004	0.3 at 3 V	3.0	40	4.0
4222-0005	0.1 at 3 V	2.0	15	5.0

Special Order Modifications Available



TOLERANCES: EXCEPT WHERE NOTED
DECIMALS .XX x ±.010

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INDUSTRIAL/COMMERCIAL TRANSFORMERS

MINIATURE PLUG-IN POWER TRANSFORMERS FOR PRINTED CIRCUIT APPLICATIONS
Standard Part Numbers — Stock Available

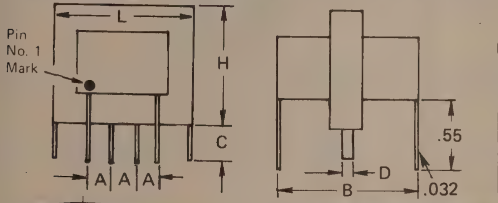
This series of power transformers includes units for transistorized control and instrumentation applications. Primaries are rated at 115 V, 50 to 500 Hz and dual secondaries provide voltages from 4 to 38 volts parallel connected, and 8 to 76 volts series connected. Load regulation will not exceed 20%.

Model No.	Output V.A.	Series Connection	Parallel Connection	Dimensions L	W	H	A	B	C	D	Wt. Oz
PW-9000	1.2	8 V CT @ 0.150A	4 V @ 0.300A	1.44	1.04	1.24	.197	0.93	.28	.197	3.1
PW-9001	4.2	8 V CT @ 0.525	4 V @ 1.05	1.68	1.42	1.38	.236	1.35	.28	.315	5.6
PW-9002	10.0	8 V CT @ 1.25	4 V @ 2.50	1.95	1.48	1.65	.236	1.40	.32	.395	9.0
PW-9003	1.2	15 V CT @ 0.080	7.5 V @ 0.160	1.44	1.04	1.24	.197	0.93	.28	.197	3.1
PW-9004	4.2	15 V CT @ 0.280	7.5 V @ 0.560	1.68	1.42	1.38	.236	1.35	.28	.315	5.6
PW-9005	10.0	15 V CT @ 0.670	7.5 V @ 1.34	1.95	1.48	1.65	.236	1.40	.32	.395	9.0
PW-9006	1.2	30 V CT @ 0.040	15 V @ 0.080	1.44	1.04	1.24	.197	0.93	.28	.197	3.1
PW-9007	4.2	30 V CT @ 0.140	15 V @ 0.280	1.68	1.42	1.38	.236	1.35	.28	.315	5.6
PW-9008	10.0	30 V CT @ 0.330	15 V @ 0.660	1.95	1.48	1.65	.236	1.40	.32	.395	9.0
PW-9009	1.2	54 V CT @ 0.022	27 V @ 0.044	1.44	1.04	1.24	.197	0.93	.28	.197	3.1
PW-9010	4.2	54 V CT @ 0.080	27 V @ 0.160	1.68	1.42	1.38	.236	1.35	.28	.315	5.6
PW-9011	10.0	54 V CT @ 0.190	27 V @ 0.380	1.95	1.48	1.65	.236	1.40	.32	.395	9.0
PW-9012	1.2	76 V CT @ 0.016	38 V @ 0.032	1.44	1.04	1.24	.197	0.93	.28	.197	3.1
PW-9013	4.2	76 V CT @ 0.055	38 V @ 0.110	1.68	1.42	1.38	.236	1.35	.28	.315	5.6
PW-9014	10.0	76 V CT @ 0.132	38 V @ 0.264	1.95	1.48	1.65	.236	1.40	.32	.395	9.0

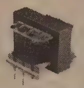
DUAL PRIMARY FOR 115 V OR 230 V POWER TRANSFORMERS

Part No.	Output V.A.	Input Voltage VRMS Series Connection	Input Voltage VRMS Parallel Connection	Output Voltage
PW-9500	1.2	230	115	24 V CT @ 0.5 A
PW-9501	4.2	230	115	24 V CT @ .18 A
PW-9502	10.0	230	115	24 V CT @ .42 A

Part No.	Dimensions L	W	H	A	B	C	D	Wt. Oz
PW-9500	1.44	1.04	1.24	.197	0.93	.19	.125	3.1
PW-9501	1.68	1.42	1.38	.236	1.35	.28	.125	5.6
PW-9502	1.95	1.48	1.65	.236	1.40	.32	.187	9.0

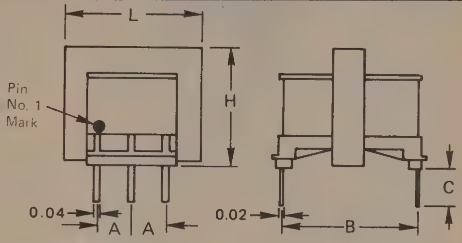


MINIATURE PLUG-IN AUDIO TRANSFORMERS FOR PRINTED CIRCUIT APPLICATIONS
Standard Part Numbers — Stock Available



This series of transformers covers input, output and driver applications with a broad frequency response of ±3db from 300-10,000 Hz. It features precision molded terminals for rapid insertion and the primary and secondary windings may be reversed. These units are ideal for impedance matching.

Model No.	Power Level MW	*	Impedance PriΩ	Impedance SecΩ	Turns Ratio Pri:Sec	DC Resistance PriΩ	DC Resistance SecΩ	Dimensions L	W	H	A	B	C	Wt Oz
AU-9000	300	I	1K CT	200K CT	1:13.7	100	2500	1.02	.92	.85	.25	.72	.236	1.12
AU-9001	300	I	500 CT	500 CT	1:1.05	40	53	1.02	.92	.85	.25	.72	.236	1.12
AU-9002	300	I	20K CT	2K CT	2.98:1	1250	185	1.02	.92	.85	.25	.72	.236	1.12
AU-9003	150	I	100 CT	10 CT	2.84:1	18	1.3	0.78	.55	.71	.187	.421	.197	0.55
AU-9004	150	I	5K CT	7.5K CT	1:1.22	520	520	0.78	.55	.71	.187	.421	.197	0.55
AU-9005	150	I	5K CT	10K CT	1:1.48	520	970	0.78	.55	.71	.187	.421	.197	0.55
AU-9006	150	I	5K CT	80K CT	1:3.93	420	3500	0.78	.55	.71	.187	.421	.197	0.55
AU-9007	150	I	500 CT	150 CT	1.75:1	42	14	0.78	.55	.71	.187	.421	.197	0.55
AU-9008	150	II	1.2K	20K CT	1:4.2	140	1350	0.78	.55	.71	.187	.421	.197	0.55
AU-9009	150	II	1500	500 CT	1.67:1	100	45	0.78	.55	.71	.187	.421	.197	0.55
AU-9010	150	II	10K	200 CT	7.1:1	760	16	0.78	.55	.71	.187	.421	.197	0.55
AU-9011	150	II	10K	2K CT	2.24:1	760	140	0.78	.55	.71	.187	.421	.197	0.55
AU-9012	150	II	10K	3K CT	1.83:1	750	230	0.78	.55	.71	.187	.421	.197	0.55



CONVERTER TRANSFORMERS

These Transformers are designed for use in self saturating DC to DC or DC to AC converters. They can be used at switching frequencies from 15 KHz to 50 KHz. Utilization of ferrite cores yields efficiencies up to 80%.

Transformer P/N	Typical Input Voltage DC	Turns Ratio Input	Turns Ratio Output	Turns Ratio Feedback	Typical Power Output
PW-0038	3-6	1 CT	2.8 CT	0.4 CT	500 MW
PW-0044	5-8	1 CT	1.125 CT	0.125 CT	500 MW
PW-0046	3-6	1 CT	2.7 CT	0.47 CT	1000 MW
PW-0096	10-15	1 CT	6.5	0.25	4000 MW

BOURNS INC
MAGNETICS DIVISION

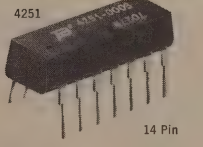
PULSE TRANSFORMERS

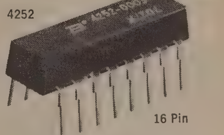
MODEL 4251 .260″ x .200″ x .750″ DUAL-IN-LINE PULSE TRANSFORMER **14 PIN**

Transformer P/N	Turns Ratio Pri:Sec	Primary Pulse Induct. μH (Min.)	ET Const. Volt μSec	Leakage Induct. μH (Max.)	Coupling Capac. pf (Max.)	DC ResistanceΩ(Max.) (1-14) (5-10) Pri	(2-13) (6-9) Sec	(3-12) (7-8) Tert
4251-0001	1:1:1	8	1.0	0.30	7	0.16	0.16	0.16
4251-0002	2:1:1	8	1.0	0.70	5	0.16	0.12	0.12
4251-0003	1:1:1	30	2.1	0.30	9	0.19	0.19	0.19
4251-0004	2:1:1	30	2.1	0.70	7	0.19	0.13	0.13
4251-0005	1:1:1	57	2.8	0.30	11	0.34	0.34	0.34
4251-0006	2:1:1	57	2.8	0.70	7	0.34	0.25	0.25
4251-0007	1:1:1	130	2.0	0.30	11	0.34	0.34	0.34
4251-0008	2:1:1	130	2.0	0.70	7	0.34	0.25	0.25
4251-0009	1:1:1	230	2.7	0.30	13	0.55	0.55	0.55
4251-0010	2:1:1	230	2.7	0.70	9	0.55	0.32	0.32
4251-0011	1:1:1	430	3.8	0.30	18	0.75	0.75	0.75
4251-0012	2:1:1	430	3.8	0.70	11	0.75	0.38	0.38

MODEL 4252 .260″ x .200″ x .860″ DUAL-IN-LINE PULSE TRANSFORMER **16 PIN**

Transformer P/N	Turns Ratio Pri:Sec	Primary Pulse Induct. μH (Min.)	ET Const. Volt μSec	Leakage Induct. μH (Max.)	Coupling Capac. pf (Max.)	DC ResistanceΩ(Max.) Pri	Sec
4252-0001	1:1	8	1.0	0.25	7	0.16	0.16
4252-0002	2:1	8	1.0	0.50	5	0.16	0.12
4252-0003	1:1	30	2.1	0.25	9	0.19	0.19
4252-0004	2:1	30	2.1	0.50	7	0.19	0.13
4252-0005	1:1	57	2.8	0.25	11	0.34	0.34
4252-0006	2:1	57	2.8	0.50	7	0.34	0.25
4252-0007	1:1	130	2.0	0.25	11	0.34	0.34
4252-0008	2:1	130	2.0	0.50	7	0.34	0.25
4252-0009	1:1	230	2.7	0.25	13	0.55	0.55
4252-0010	2:1	230	2.7	0.50	9	0.55	0.32
4252-0011	1:1	430	3.8	0.25	18	0.75	0.75
4252-0012	2:1	430	3.8	0.50	11	0.75	0.38





7328J
PL-9008

TRIGGER TRANSFORMERS
PL 9000 SERIES

Part No.	Turns Ratio ±10%	Primary Inductance (μH Min.)	Leakage Inductance (μH Max.)	Interwinding Capacity (pf Max.)	1-2, 3-4, 5-6 DCR (Ω Max.)
PL-9001	1:1	200	3.0	800	1.5 - 1.5
PL-9002	1:1	500	6.0	1500	4.5 - 4.5
PL-9003	1:1	1000	12.0	2000	8 - 8
PL-9004	1:1	2000	13.0	2800	22 - 22
PL-9005	1:1	5000	15.0	3500	18 - 18
PL-9006	1:1:1	200	3.0	800	2 - 2 - 2

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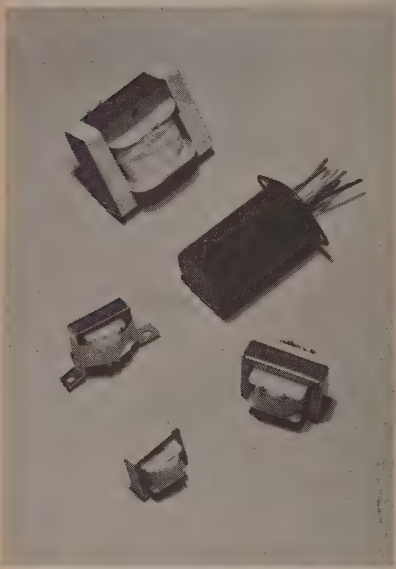
Douglas Randall

DIVISION OF WALTER KIDDE & COMPANY, INC. • 6 PAWCATUCK AVE., PAWCATUCK, CONN. 02891 • (203) 599-1750

Kidde

Special Transformers



AUDIO TRANSFORMERS — Subsonic to ultrasonic
  Coupling —
  Input — Shielded, low level
  Interstage —
  Matching —
  Output —

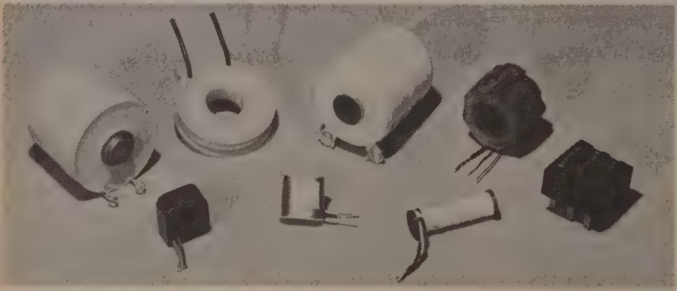
AUTO TRANSFORMERS
HIGH VOLTAGE — To 10,000 V test
ISOLATION — All frequencies, static shield
LOW VOLTAGE —

POWER TRANSFORMERS — To 500 VA, 50/60 Hz or 400 Hz
  Bias
  Filament
  Multiple Winding
  Plate

CONSTRUCTIONS —
  Open frame, End Bell, Channels, Cased,
  Molded, Potted, Varnish Impregnated
  P.C. Mount

BOBBIN & INTERWEAVE WINDING
ALL TEMPERATURE CLASSES.

Custom Coils



- BOBBIN WOUND
- TUBE WOUND
- INTERLEAVE WOUND
- INTERWEAVE WOUND
- ENCAPSULATED
- VARNISH IMPREGNATED
- MOLDED
- POTTED

Douglas Randall manufactures specialty transformers and custom wound coils for special requirements and unique applications. Engineering assistance and rapid prototype service are available for new designs. Douglas Randall has perfected a special technique to produce molded coils with or without inserts in moderate quantities at low initial tooling costs. A few typical examples of these molded coils are illustrated above.

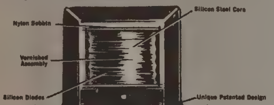
WALL PLUG-IN LOW VOLTAGE

CONVERTERS/INVERTERS/CHARGERS

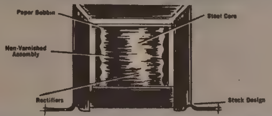
To insure high quality and top performance in our plug-in power supplies and chargers, we make our own low voltage

TRANSFORMERS

using superior materials in a smaller sized unit. The years of successfully satisfying the unique needs of the industry with specialty transformers is "at your service".



WHY IS THIS LOW COST DYNAMIC TRANSFORMER BETTER THAN THIS



STOCK TRANSFORMER COSTING MORE.

In addition to those advantages already pointed out, DYNAMIC TRANSFORMERS can be made to your SPECIFICATIONS in days and in most cases with NO COST for prototypes.

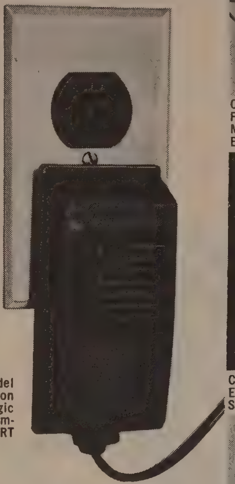
TRANSFORMERS FOR ALL REASONS

- ☐ Patented, U/L listed
- ☐ Internal or External
- ☐ Wall-mounted
- ☐ Fast-charging
- ☐ Power conversion
- ☐ Conversion/charging
- ☐ Printed circuit
- ☐ Sub-miniature
- ☐ Ferro-resonant
- ☐ Multi-input
- ☐ Multi-output

THE TRANSFORMATION OF POWER

A unique brochure explaining the many advantages and application possibilities of Dynamic's patented U/L listed transformers, converters, chargers and power supplies, technical data sheets and bulletins, are available on specific products. A request on your letterhead or phone our Sales Engineering Department WPX-1.

Designed to be listed under the U/L • CSA SPECIFICATIONS



Illustrated at right is the Model 3-1743 presently in production for use with a keyboard logic circuit. Suitable for minicomputers, calculators, remote CRT terminals, etc.

Dynamic Instrument Corp. has designed, developed and patented a complete range of low-voltage, filtered, transistor-regulated power supplies and chargers designed to supply the necessary power to a vast variety of Electronic equipment.

Utilizing a wall plug-in type unit eliminates or greatly reduces the problems involved with UL listing your product. They also remove the major heat source, reduce size and weight, and also greatly increase your design flexibility. The latest design applications of the Dynamic wall plug-in supplies are in conjunction with such sophisticated equipment as mini-computers, calculators, keyboard logic circuits, and remote CRT Terminals.

Just call or write: Dept. WPX-1.

Dynamic's product range and capabilities also cover:

POWER CONVERSION

AC-AC for products requiring low-level AC voltage. AC-DC for small electric motor driven products that do not use batteries.

SECONDARY BATTERY CHARGING

Dynamic Chargers for charging Nickel-Cadmium; Lead-Acid and Manganese-Alkaline Batteries.

AC-DC CONVERSION/CHARGING

Dynamic Converter-Chargers providing rechargeability or instant use of battery operated products.

FAST CHARGING SYSTEMS

Dynamic design and production capability relative to Fast Charging Systems.

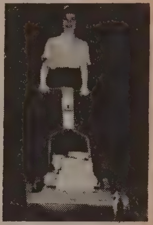
TRANSFORMERS

Internal, External and Wall-Mounted Dynamic Transformers.

SPECIALTY TRANSFORMERS

Dynamic Plug-In, Printed Circuit Transformers; Sub-Miniature Transformers; Ferro-resonant Transformers; Multi-Input Voltage and Multi-Output Voltage Transformers.

CONVERTER/CHARGER FOR PORTABLE MEDICAL-ELECTRONIC EQUIPMENT



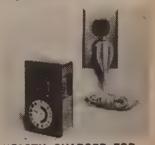
CHARGER FOR BATTERY ELECTRIC-STARTER SYSTEMS

CHARGER FOR BATTERY OPERATED TOYS

CONVERTER/"FAST" CHARGER FOR MINI-CALCULATORS

CONVERTER/CHARGER FOR MOTER DRIVEN CAMERAS

AC CONVERTER FOR PORTABLE ELECTRONIC EQUIPMENT



"FAST" CHARGER FOR ELECTRONIC FLASH

DYNAMIC INSTRUMENT CORP.

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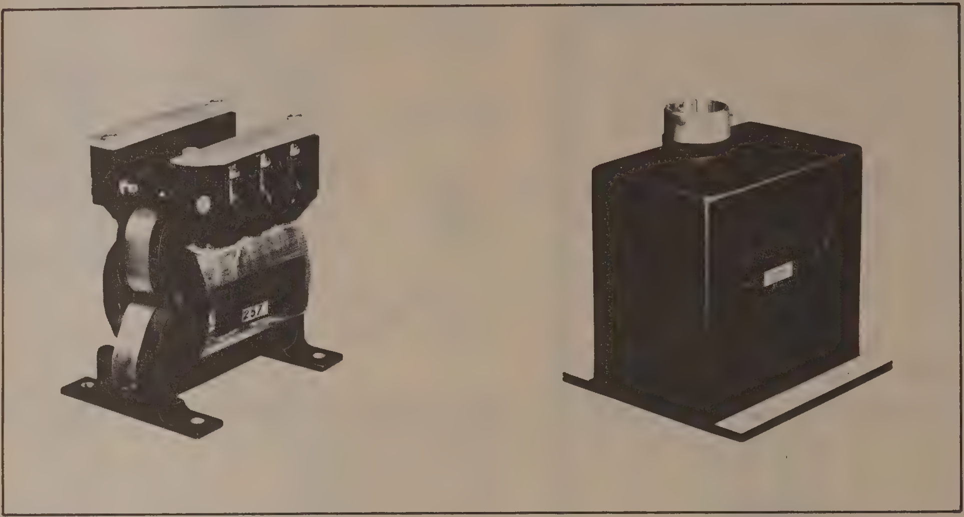
electrocube transformers

Aluminum Foil Wound



Electro Cube aluminum foil wound transformers are available in the standard models listed on the reverse and also to customer requirements as isolation or auto transformers for frequencies from 25 cycles into the kilocycle range. Units may be single or multi-phase. Open frame, shell enclosure and hermetically sealed configurations can be furnished.

Advantages of these foil wound transformers over conventional wire wound units include:

- higher operating efficiency
- reduced weight
- improved thermal efficiency
- higher temperature operation
- improved regulation
- internal losses
- improved volume efficiency

The ability of a transformer to dissipate heat affects its maximum rating. Electro Cube foil wound coils have the ability to dissipate large amount of heat because there is a direct metallic path to each end of the coil from any point within the coil. Special end treatment of the coil including attachment to a heat sink, can make possible significantly reduced operating temperatures.

Wire wound coils, by comparison, are more difficult to cool. As a result of a limited heat path a lower coefficient of heat transfer and increased resistance due to heat and vice versa, the heat is greatest in that part of the coil least capable of dissipating it. Heat generated by conductors deep within the coil must pass through many thermal barriers of the insulation between the wires.

In addition to thermal efficiency, the materials in Electro Cube foil transformers permit use with higher operating temperatures than are possible with wire coils with equivalent insulation ratings. This also contributes to reduced weight and volume.

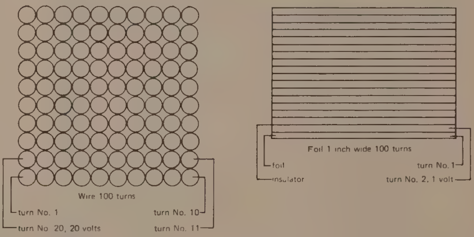


Figure 1. Typical coil sections with 100 volts excitation.

Figure 1 shows the relative difference in volume required for a 100 turn wire coil and an equivalent foil coil, and the relative use of space for insulation and conductors. It also shows voltage stress and insulation requirements for the two configurations. At 1 volt per turn there would be 20 volts between the 20th and first turn of the wire coil. When the top layer is finished, the last turn may lay against one of the first, resulting in a voltage difference of up to 100 volts. The foil coil never has more than 1 volt between any two conductors, or a 100 to 1 advantage over the wire coil, in this example.

The physical arrangement of the foil windings promotes a lower leakage reactance or power loss in the transformer, which contributes to efficiency and regulation. Together with the lower I^2R loss of the windings, this allows the use of fewer circular mils of conductor area to meet required efficiency and regulation requirements.

electrocube transformers

Auto transformer Specifications

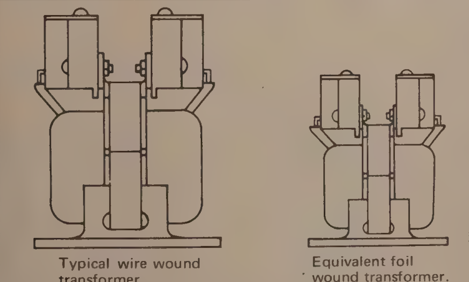
Style		Open coil & core (conformal coated)							Hermetically sealed aluminum case, tin plated, painted black		
Model		FT1004	FT1006	FT1002	FT1005	FT1003	FT1013	FT1001	FT1007	FT1008	FT1009
Rating		350 VA	500 VA	750 VA	750 VA	1.75 KVA	1.75 KVA	2.5 KVA	150 VA	350 VA	750 VA
Input voltage (@ 400 Hz)		110/114/ 118	110/114/ 118	115	110/114/ 118	115	115	115	110/114/ 118	110/114/ 118	90/95/ 110
Output voltage (@ 400 Hz)		28	57 & 97	28	28	200/280/ 350	230	29	28	28	28
Efficiency (%)		96	95	95	95	95	95	92	90	90	90
Regulation (%)		5	5	4	5	3	3	4	5	5	5
No. terminals		5	6	3	5	5	3	3			
Terminal stud size		10-32	10-32	10-32	10-32	10-32	10-32	10-32			
Weight (lbs max)		.83	.73	1.2	1.32	2.3	2.2	2.7	0.7	1.0	1.99
Size	W	2.25	2.25	2.25	2.25	3.50	3.50	3.5	2.30	2.70	3.05
	L	3.0	3.0	3.00	3.0	3.60	3.60	3.75	3.05	3.05	3.26
	H	3.0	2.75	3.37	3.37	3.75	3.75	4.0	3.12	3.12	3.65

Construction: aluminum foil/Mylar insulation, epoxy impregnated.

Since it is not necessary to duplicate the circular mil area of a copper wire wound transformer and because of the efficient use of the winding area it is possible to use a smaller core volume to support the flux density required for any given load. The smaller core and the lighter weight of the aluminum foil all contribute to a reduction in weight and volume.

ADDITIONAL PRODUCTS AND CAPABILITIES:

Electro Cube manufactures wire wound and foil wound transformers, both laminated and C-core, toroids and special inductors. Through company funded development and testing, Electro Cube introduced the first commercially available autotransformers in 10KVA and lower ratings, and has developed processing techniques that make these devices reliable and economical. Electro Cube also can supply aluminum foil chokes with advantages similar to those of foil wound transformers. Electro Cube also manufactures precision film capacitors, EMI filters and RC networks.



Typical wire wound transformer.

Equivalent foil wound transformer.

Figure 2.

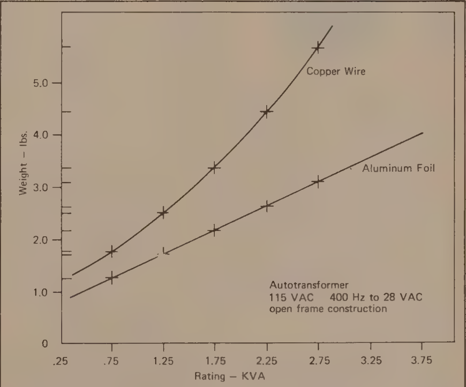


Figure 3. Weight comparison – copper wire vs aluminum foil coil transformers.

electrocube

1710 South Del Mar Avenue
San Gabriel, California 91776
Telephone: (213) 283-0511
TWX: 910-589-1609

FREED TRANSFORMER CO., INC.

SUB–MINIATURE TRANSISTOR AUDIO TRANSFORMERS

These high quality miniature transformers are high efficiency audio components featuring hermetic sealing for maximum protection against electrolysis and subsequent corrosion of fine wires caused by moisture penetration. The units are constructed in accordance with MIL-T-27 Specifications. Transistor transformers can also be supplied in an open or encapsulated type of construction.

TYPE		TSA	TNA	TPA	TTA
MAX. POWER		300 MW	1 W	3 W	5 W
FREQ. RESPONSE		.3-15 KHz ±2 DB	.2 — 15 KHz ±2 DB	..15-15 KHz ±2 DB	·15-15 KHz ±2 DB
SIZE	UNCASED	————	————	3/16 x 19/32 x 3/4	1 7/16 x 13/16 x 13/16
	CASED MIL-T-27 -4RX	3/16 D., 15/32 H.	5/16 D. x 21/32 H.	15/16 D. x 11/16 H.	15/16 D. x 1 3/16 H.
	MOLDED MIL-T-27 -5RX	1/2 D. x 1/2 H.	19/32 x 17/32 x 17/32	7/8 x 25/32 x 17/32	1 5/32 x 1 x 31/32

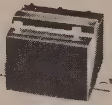
MATCHING IMP.		TSA			TNA			TPA			TTA		
Pri.	Sec.	Cat. No.	Max. I (MA) Total Pri.	Max I dc (MA) Unbal. ½ Pri.	Cat. No.	Max. I (MA) Total Pri.	Max I dc (MA) Unbal. ½ Pri.	Cat. No.	Max. I (MA) Total Pri.	Max I dc (MA) Unbal. ½ Pri.	Cat. No.	Max. I (MA) Total Pri.	Max I dc (MA) Unbal. ½ Pri.
150 (CT)	3.2	28	44	12	28	81	16	30	140	20	15	180	50
150 (CT)	12	29	44	12	29	81	16	31	140	20	17	180	50
150 (CT)	50	30	44	12	30	81	16	32	140	20	18	180	50
300 (CT)	3.2	31	32	8	31	58	14	33	100	16	20	130	35
300 (CT)	12	32	32	8	32	58	14	34	100	16	21	130	35
300 (CT)	50	33	32	8	33	58	14	35	100	16	22	130	35
500 (CT)	500	34	25	6	34	45	10	36	78	12	1	130	25
600 (SP)	3.2	1	23	6	1	41	8	1	71	10	23	100	25
600 (SP)	12	2	23	6	2	41	8	2	71	10	24	91	25
600 (SP)	50	35	23	6	35	41	8	3	71	10	25	91	25
600 (SP)	600 (SP)	3	23	6	3	41	8	4	71	10	26	91	25
600 (SP)	1.2K (CT)	22	23	6	22	41	8	37	71	10	7	91	25
1K (CT)	3.2	36	17	4	36	32	6	38	55	8	19	91	20
1K (CT)	12	37	17	4	37	32	6	39	55	8	27	71	20
1K (CT)	50	26	17	4	26	32	6	40	55	8	13	71	20
1.2K (SP)	3.2	4	16	4	4	29	6	5	50	8	28	65	15
1.2K (SP)	12	5	16	4	5	29	6	6	50	8	29	65	15
1.2K (SP)	50	38	16	4	38	29	6	7	50	8	30	65	15
1.2K (SP)	600 (SP)	6	16	4	6	29	6	8	50	8	31	65	15
2K (SP)	3.2	7	12	3	7	22	5	9	39	6	10	50	12
2K (SP)	12	8	12	3	8	22	5	10	39	6	32	50	12
2K (SP)	600 (SP)	9	12	3	9	22	5	11	39	6	33	50	12
4K (SP)	3.2	10	9	2	10	16	3	12	27	4	11	35	10
4K (SP)	12	11	9	2	11	16	3	13	27	4	34	35	10
4K (SP)	600 (SP)	12	9	2	12	16	3	14	27	4	9	35	10
10K (SP)	3.2	13	5	1	13	10	2	15	17	3	35	22	9
10K (SP)	12	14	5	1	14	10	2	16	17	3	36	22	9
10K (CT)	50	39	5	1	39	10	2	17	17	3	37	22	9
10K (SP)	600 (SP)	15	5	1	15	10	2	18	17	3	38	22	9
10K	1K	40	5	1	40	10	1.5	19	17	1.8	39	22	5
10K	10K (SP)	16	5	1	16	10	1.5	20	17	1.8	40	22	5
20K (CT)	50	25	4	.8	25	7	1	21	12	2	12	16	6
20K (CT)	600 (CT)	41	4	.8	41	7	1	22	12	2	16	16	6
25K (CT)	600 (CT)	23	3	.8	23	7	1	23	11	2	8	14	4
25K (CT)	1.2K (CT)	21	3	.8	21	7	1	24	11	2	5	14	4
50K (CT)	6 (CT)	18	2	.6	18	4	1	25	8	1	3	10	3
50K (CT)	500 (CT)	17	2	.6	17	4	1	26	8	1	2	10	3
50K (CT)	1.2K (CT)	20	2	.6	20	4	1	27	8	1	6	10	3
100K (CT)	1K (CT)	27	2	.4	27	3	.8	28	5	1	14	7	2
100K (CT)	1.2K (CT)	19	2	.4	19	3	.8	29	5	1	4	7	2

TTA, TPA UNCASED

TPA MOLDED

TTA, TPA CASED

TNA MOLDED


TTA MOLDED

TUA, TSA, TNA CASED
TSA MOLDED

TYPE	TUA	SIZE	
MAX. POWER	100 MW	UNCASED	
FREQ. RESPONSE	.4-15 KHz ±2 DB	CASED MIL-T-27 -4RX	11/32 D. x 1/2 H.
		MOLDED	————

MATCHING IMP.					MATCHING IMP.				
Pri.	Sec.	Cat. No.	Max. I (MA) Total Pri.	Max. I dc (MA) Unbal. ½ Pri.	Pri.	Sec.	Cat. No.	Max. I (MA) Total Pri.	Max. I dc (MA) Unbal. ½ Pri.
150 (CT)	3.2	16	26	10	2K (CT)	3.2	28	7	2.5
150 (CT)	12	17	26	10	2K (CT)	12	29	7	2.5
150 (CT)	50	21	26	10	2K (CT)	600	30	7	2.5
300 (CT)	3.2	20	18	7	4K (CT)	3.2	8	5	1.5
300 (CT)	12	19	18	7	4K (CT)	12	9	5	1.5
300 (CT)	50	22	18	7	4K (CT)	600	10	5	1.5
500 (CT)	500	23	13	5	10K (CT)	3.2	7	3	1
600 (CT)	3.2	1	13	5	10K (CT)	12	11	3	1
600 (CT)	12	2	13	5	10K (CT)	50	12	3	1
600 (CT)	50	13	13	5	10K (CT)	600	15	3	1
600 (CT)	600	3	13	5	10K (CT)	1K	18	3	1
600 (CT)	1.2K	24	13	5	10K	10K (CT)	31	3	1
1K (CT)	3.2	4	10	3.5	20K (CT)	50	32	2	.8
1K (CT)	12	25	10	3.5	20K (CT)	600 (CT)	33	2	.8
1K (CT)	50	14	10	3.5	25K (CT)	600 (CT)	34	2	.8
1.2K (CT)	3.2	26	9	3.5	25K (CT)	1.2K (CT)	35	2	.8
1.2K (CT)	12	5	9	3.5	50K (CT)	6 (CT)	36	1	.6
1.2K (CT)	50	27	9	3.5	50K (CT)	500 (CT)	37	1	.5
1.2K (CT)	600	6	9	3.5	50K (CT)	1.2K (CT)	38	1	.5

CT = Center Tap. SP = Split Winding.

MINIATURE AUDIO TRANSFORMERS

These high quality, miniature transformers feature hermetically sealed for maximum protection from moisture penetration with subsequent electrolysis and corrosion of fine wires. While primarily intended for non-military equipment, these units are constructed in accordance with MIL-T-27 Specifications.

Frequency response:
±2DB 30-20,000 Hz
* ±2DB 200-10,000 Hz
All units supplied in DM-20 cases

Catalog No.	Application	MIL Type	Impedance Level Ohms Primary	Impedance Level Ohms Secondary	Max. Power Level DBM	Ratio	Equivalent Shielding D.B.	Max. Pri. D.C. per Side Ma.	D.C. Unbalance Ma.	Catalog No.
PMA 1	Line or microphone to single or push-pull grids.	TF4RX10YY	50/200/500	60,000 C.T.	+8	1:11		0	0	PMA 1
PMA 2	Dynamic microphone or speaker voice coil to single or P.P. grid.	TF4RX10YY	4/8	60,000 C.T.	+8	1:86.6		0	0	PMA 2
PMA 3	Line or microphone to single or push-pull grids. Magnetically shielded.	TF4RX10YY	50/200/500	60,000 C.T.	+8	1:11	30	0	0	PMA 3
PMA 4	Single triode plate to single or push-pull grids.	TF4RX10YY	15,000	60,000 C.T.	+8	1:2		0	0	PMA 4
PMA 5*	Single triode plate to push-pull grids.	TF4RX12YY	15,000	60,000 C.T.	+8	1:2		2	2	PMA 5*
PMA 6	Single triode plate to multiple line.	TF4RX16YY	15,000	50/200/500	-8	5.48:1		0	0	PMA 6
PMA 7*	Single triode plate to multiple line.	TF4RX12YY	15,000	50/200/500	-8	5.48:1		2	2	PMA 7*
PMA 8	Push-pull triode plates to multiple line.	TF4RX12YY	30,000 C.T.	50/200/500	−8	7.75:1		2	0.25	PMA 8
PMA 9	Crystal mike or pickup to multiple line.	TF4RX16YY	60,000 C.T.	50/200/500	+8	11:1		0	0	PMA 9
PMA 10	Mixing or matching.	TF4RX16YY	50/200	50/200/500	-8	1:1.50		0	0	PMA 10
PMA 11	Parallel Feed Reactor.	TF4RX20YY	40 hy, 3 ma dc, 3500 ohms d.c. resistance							PMA 11
PMA 12	Microphone or line to grid.	TF4RX10YY	50/200/500 C.T.	60,000 C.T.	+5	1.11		0	0	PMA 12
PMA 13	Mixing and matching.	TF4RX16YY	150/600	600 C.T.	-8	1.1		0	0	PMA 13
PMA 14	Single triode plate to push-pull grids.	TF4RX15YY	15,000	95,000 Split	+5	1:2.5		0	0	PMA 14
PMA 15*	Single triode plate to push-pull grids.	TF4RX15YY	15,000	95,000 Split	15	1:2.5		4	4	PMA 15*

CASE DIMENSIONS

DM-20 CASE

Height:	1 9/16″
Dia.:	15/16″
Mtg. Cen.:	1 1/8″ to 1 7/32″
Mtg. 2 holes:	166 x .120
Flange Lgth.:	1 13/32″
Flange D.:	.975″

MINIATURE TRANSISTOR TRANSFORMERS

Catalog No.	MIL Type	Impedance Ohms					Frequency Response	Unbalance Primary Current	D.C. Resistance Ohms		Max. Power Output	Catalog No.
		Pri.	Ct.	Sec.	Ct.	D.B.	Hz	M.A./D.C.	Pri.	Sec.	M.W.	
TMA 1*	TF4RX16YY	500		500		1	200 to 15,000	0	18	24	250	TMA 1*
TMA 2*	TF4RX12YY	50K		500		2	300 to 15,000	3	2,200	49	250	TMA 2*
TMA 3*	TF4RX13YY	50K		6		2	300 to 15,000	3	2,200	.55	250	TMA 3*
TMA 4*	TF4RX12YY	100K		1.2K	✓	3	300 to 15,000	1	2,790	95	100	TMA 4*
TMA 5*	TF4RX12YY	25K		1 2K	✓	2	200 to 15,000	3	1,740	110	250	TMA 5*
TMA 6*	TF4RX12YY	50K		1 2K	✓	2	300 to 15,000	3	2 200	106	250	TMA 6*
TMA 7*	TF4RX17YY	600/150		1 2K	✓	1	200 to 15 000	4	30	95	250	TMA 7*
TMA 8*	TF4RX12YY	25K		600		2	200 to 15,000	3	1,740	61	250	TMA 8*
TMA 9*	TF4RX12YY	4K	✓	600/150	✓	1	200 to 15,000	1	274	43	250	TMA 9*
TMA 10*	TF4RX13YY	2K		3.2		2	200 to 15,000	10	160	.28	250	TMA 10*
TMA 11*	TF4RX13YY	4K	✓	3 2		1	200 to 15 000	1	274	.26	250	TMA 11*
TMA 12*	TF4RX13YY	20K		50		2	300 to 15,000	4	1,340	2 9	250	TMA 12*
TMA 13*	TF4RX17YY	1K		50		2	300 to 15,000	8	42 6	2 5	250	TMA 13*
TMA 14*	TF4RX16YY	100K		1K		2	300 to 15,000	0	1,550	16 8	100	TMA 14*

*When ordering open units specify TMO — when ordering encapsulated units specify TMC.

FREED TRANSFORMER COMPANY. INC.

FREED TRANSFORMER CO., INC.

MIL-T-27 COMPONENTS

TRANSISTOR SUPPLY TRANSFORMERS
TST SERIES

Manufactured and Guaranteed to Specifications MIL-T-27

TST-6 — Frequency 57 Hz to 63 Hz — Primary 115 volts units with * primary 115 and/or 230 volts

TST-4 — Frequency 380 Hz to 1000 Hz — Primary 115 volts

TST units can be supplied in commercial type construction (channel or shell type with leads).

**When ordering specify (6) for 57 to 63 Hz and (4) for 380 to 1000 Hz

D.C. to RMS Conversion Chart

Resistive or Inductive Loads		Capacitive Loads	
Full Wave Center Tapped	Full Wave Bridge	Full Wave Center Tapped	Full Wave Bridge
E_{RMS} = 2.22 Edc	E_{RMS} = 1.11 Edc	E_{RMS} = 1.6 Edc	E_{RMS} = .8 Edc
I_{RMS} = .75 Idc	I_{RMS} = 1.05 Idc	I_{RMS} = 1.1 Idc	I_{RMS} = 1.55 Idc
Edc – should include voltage drop across reactor and voltage drop across one diode for F.W.C.T. and voltage drop across two diodes for F.W. Bridge			

	R.M.S. Output		Case	
Part No.	Volt	Amp	—4	—6
TST(**)-1	6.3 CT	.30	AH	AH
TST(**)-2	6.3 CT	.60	AH	AJ
TST(**)-3	12.6 Split	.80	AJ	EB
TST(**)-4	12.6 Split	1.5	AJ	FA
TST(**)-5	12.6 Split	2.0	AJ	GB*
TST(**)-6	25.2 Split	1.5	EB	GA*
TST(**)-7	25.2 Split	4.0	GB	JA*
TST(**)-8	30 Split	.50	AJ	FA
TST(**)-9	30 Split	1.0	AJ	GB*
TST(**)-10	30 Split	1.5	EB	GA*
TST(**)-11	30 Split	2.0	FA	HA*
TST(**)-12	40 Split	.50	AJ	FA
TST(**)-13	40 Split	1.0	EB	GA*
TST(**)-14	40 Split	1.5	FA	HA*
TST(**)-15	40 Split	2.0	FA	JB*
TST(**)-16	50 Split	.50	AJ	GB*
TST(**)-17	50 Split	1.0	FA	GA*
TST(**)-18	50 Split	1.5	FA	JB*
TST(**)-19	50 Split	2.0	GB	JA*
TST(**)-20	60 Split	.50	AJ	GB*
TST(**)-21	60 Split	1.0	FA	HA*
TST(**)-22	60 Split	1.5	FA	JA*
TST(**)-23	70 Split	.50	EB	GA*
TST(**)-24	70 Split	1.0	FA	JB*
TST(**)-25	70 Split	1.5	GB	JA*
TST(**)-26	80 Split	.25	AJ	FA
TST(**)-27	80 Split	.50	EB	GA*
TST(**)-28	80 Split	1.0	FA	JB*
TST(**)-29	90 Split	.25	AJ	GB*
TST(**)-30	90 Split	.50	EB	GA*
TST(**)-31	90 Split	1.0	FA	JA*
TST(**)-32	100 Split	.25	AJ	GB*
TST(**)-33	100 Split	.50	FA	GA*
TST(**)-34	100 Split	1.20	GA	KB*

STANDARD MILITARY AUDIO TRANSFORMERS
Frequency Response 300-10,000 Hz ±2 DB

Catalog No.	Application	Type Designation	Impedance Level in Ohms Primary	Impedance Level in Ohms Secondary	Ratio	Max. Power Level DBM	Pri. D.C. Per Side in Ma	Max. D.C. unbalance	Case
MGA 1	Transformer; interstage, single or P.P. plates to single or P.P. grid	TF4RX15AJ	10,000 C.T.	90,000 split and C.T.	1:3 overall	+15	10	10	AJ
MGA 2	Transformer; matching 600 ohm line to voice coil.	TF4RX16AJ	600 split	4, 8, 16	6.12:1 overall	+33	0	0	AJ
MGA 3	Transformer; input, 600 ohm line to single or P.P. grids.	TF4RX10AJ	600 split	135,000 C.T.	1:15	+15	0	0	AJ
MGA 4	Transformer; matching, 600 ohm line to 600 ohm line.	TF4RX16AJ	600 split	600 split	1:1	+15	0	0	AJ
MGA 5	Transformer; output, single plate 7,600 ohm, 4,800 ohm to 600 ohm line.	TF4RX13AJ	7,600 tap @ 4,800	600 split	3.56:1	+33	40	40	AJ
MGA 6	Transformer; output, single plate 7,600 ohm, 4,800 ohm to voice coil.	TF4RX13AJ	7,600 tap @ 4,800	4, 8, 16	21.8:1	+33	40	40	AJ
MGA 7	Transformer; output, single or P.P. plates to 600 ohm line.	TF4RX13AJ	15,000 C.T.	600 split	5:1	+33	10	10	AJ
MGA 8	Transformer; output, P.P. plates to 600 ohm line.	TF4RX13AJ	24,000 C.T.	600 split	6.32:1	+30	10	1	AJ
MGA 9	Transformer; output, P.P. plates to 600 ohm line.	TF4RX13AJ	60,000 C.T.	600 split	10:1	+27	10	1	AJ

STANDARD MILITARY POWER AND FILAMENT TRANSFORMERS
Primary 105/115/125V 60~

SINGLE PHASE 400 Hz, AND THREE PHASE 60 AND 400 Hz TRANSFORMERS CAN BE SUPPLIED ON SPECIAL ORDER.

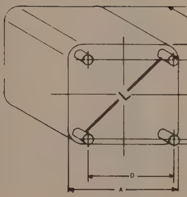
Catalog No.	MIL-T-27 Type Designation	Hi Volt	D.C. Volts	D.C. Amps	Fil. No. 1	Fil. No. 2	Case
MGP 1	TF4RX03HA001	200/100/0/100/200	185	.070	5 6. 3V @ 2A	6. 3V @ 3A	HA
MGP 2	TF4RX03JB002	650 C.T.	260	.070	5/6. 3V @ 2A	6. 3V @ 4A	JB
MGP 3	TF4RX03KB006	650 C.T.	245	.150	6. 3V @ 5A	5V @ 3A	KB
MGP 4	TF4RX03LB003	800 C.T.	318	.175	5V @ 3A	6. 3V @ 8A	LB
MGP 5	TF4RX03MB004	900 C.T.	345	.250	5V @ 3A	6. 3V @ 8A	MB
MGP 6	TF4RX02KB001	700 C.T.	255	.250			KB
MGP 7	TF4RX02LB002	1100 C.T.	419	.250			LB
MGP 8	TF4RX02NB003	1600 C.T.	640	.250			NB

Catalog No.	MIL-T-27 Type Designation	Secondary Volts	Secondary Current Amps	Secondary Test Volts RMS	Case
MGF 1	TF4RX01EB002	2.5	3.0	2,500	EB
MGF 2	TF4RX01GB003	2.5	10.0	2,500	GB
MGF 3	TF4RX01FB004	5.0	3.0	2,500	FB
MGF 4	TF4RX01HB005	5.0	10.0	2,500	HB
MGF 5	TF4RX01FB006	6.3	2.0	2,500	FB
MGF 6	TF4RX01GB007	6.3	5.0	2,500	GB
MGF 7	TF4RX01JB008	6.3	10.0	2,500	JB
MGF 8	TF4RX01KB009	6.3	20.0	2,500	KB
MGF 9	TF4RX01JB012	2.5	10.0	10,000	JB
MGF 10	TF4RX01KB013	5.0	10.0	10,000	KB

PULSE TRANSFORMERS

Catalog No.	MIL Type	Blocking Osc.	Inter-stage Coupling	Low Power Output	Pulse Voltage Kilovolts	Pulse Duration Micro-seconds	Duty Rate	No. of Windings	Test Voltage KV., RMS	Character-istic Impedance Ohms	Case No.
MPT-1	TF4RX35YY	✓	✓		0.25/0.25/0.25	0.2-1.0	.004	3	0.7	250	DM-20
MPT-2	TFR4X35YY	✓	✓		0.25/0.25	0.2-1.0	.004	2	0.7	250	DM-20
MPT-3	TF4RX35YY	✓	✓		0.5/0.5/0.5	0.2-1.5	.002	3	1,0	250	DM-18
MPT-4	TF4RX35YY	✓	✓		0.5/0.5	0.2-1.5	.002	2	1.0	250	DM-18
MPT-5	TF4RX35YY	✓	✓		0.5/0.5/0.5	0.5-2.0	.002	3	1.0	500	DM-20
MPT-6	TF4RX35YY	✓	✓		0.5/0.5	0.5-2.0	.002	2	1.0	500	DM-20
MPT-7	TF4RX35YY	✓	✓	✓	0.7/0.7/0.7	0.5-1.5	.002	3	1.5	200	DM-18
MPT-8	TF4RX35YY	✓	✓	✓	0.7/0.7	0.5-1.5	.002	2	1.5	200	DM-18
MPT-9	TF4RX35YY	✓	✓	✓	1.0/1.0/1.0	0.7-3.5	.002	3	2.0	200	DM-18
MPT-10	TF4RX35YY	✓	✓	✓	1.0/1.0	0.7-3.5	.002	2	2.0	200	DM-18
MPT-11	TF4RX35YY	✓	✓	✓	1.0/1.0/1.0	1.0-5.0	.002	3	2.0	500	DM-01
MPT-12	TF4RX35YY	✓	✓	✓	0.15/0.15/0.3/0.3	0.2-1.0	.004	4	0.7	700	DM-8

MIL CASES, NOMINAL DIMENSIONS, INCHES



Mil Case	A	B	C	D	L	E	Mtg. Studs	Wt. Lbs.
AH	1 5/16	1 5/16	1 3/4		1 1/4		6-32 x 3/8	3/8
AJ	1 5/8	1 5/8	2 3/8	1 3/16		1 3/16	6-32 x 3/8	2/3
EA	1 15/16	1 13/16	2 3/4	1 3/8		1 1/4	6-32 x 3/8	1
EB	1 15/16	1 13/16	2 7/16	1 1/8		1 1/4	6-32 x 3/8	7/8
FA	2 5/16	2 1/16	3 1/8	1 11/16		1 7/16	6-32 x 3/8	1 3/4
FB	2 5/16	2 1/16	2 1/2	1 11/16		1 7/16	6-32 x 3/8	1 1/2
GA	2 3/4	2 3/8	3 13/16	2 1/8		1 3/4	6-23 x 3/8	3 1/2
GB	2 3/4	2 3/8	2 13/16	2 1/8		1 3/4	6-32 x 3/8	2 1/2
HA	3 1/16	2 5/8	4 1/4	2 19/64		1 55/64	8-32 x 3/8	4 1/2
HB	3 1/16	2 5/8	3 3/16	2 19/64		1 55/64	8-32 x 3/8	3 1/2
JA	3 9/16	3 1/16	4 7/8	2 5/8		2 1/8	8-32 x 3/8	6
JB	3 9/16	3 1/16	3 7/8	2 5/8		2 1/8	8-32 x 3/8	5
KA	3 15/16	3 3/8	5 1/4	3		2 7/16	10-32 x 1/2	8 1/2
KB	3 15/16	3 3/8	4 5/16	3		2 7/16	10-32 x 1/2	7

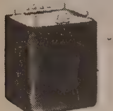
FREED TRANSFORMER COMPANY, INC. 1795 WEIRFIELD ST. (Ridgewood) Brooklyn, N. Y. 11227

FREED TRANSFORMER CO., INC.

TRANSISTORIZED CONVERTERS—TDC LINE

For DC/DC conversion from low voltage DC sources to high voltage DC output. Stock units are available in power capabilities to 45 watts with input voltages of 6, 12, 24, 28, and 48 volts.

All TDC converters are hermetically sealed and oil filled. Outputs are filtered with ripple less than .1%. Operating temperatures from −55°C to +70°C. They are ruggedly built to withstand shock and vibration.



CAT. #	NOM. VDC INPUT	VDC OUT	MAX 1 OUT MA	CASE SIZE
TDC 6-15-05	6	150	50	
TDC 12-30-15	12	300	150	2⅝ x 2½ x 3½
TDC 12-25-12	12	250	120	2⅝ x 2¼ x 3½
TDC 12-30-05	12	300	50	2 x 2¼ x 3½
TDC 12-20-05	12	200	50	2 x 2¼ x 3⅛
TDC 12-12-12	12	120	120	2 x 2¼ x 3
TDC 12-2.4-100	12	24	1000	2¼ x 2⅝ x 3½
TDC 28-30-15	28	300	150	2⅝ x 2¼ x 3½
TDC 28-25-12	28	250	120	2⅝ x 2¼ x 3½
TDC 28-30-05	28	300	50	2 x 2¼ x 3⅛
TDC 28-30-05	28	200	50	2 x 2¼ x 3⅛
TDC 48-20-15	48	200	150	2⅝ x 2¼ x 3½
TDC 48-30-15	48	300	150	2⅝ x 2¼ x 3½

DC TO AC TRANSISTOR INVERTERS—TAC LINE

115 volt outputs at 60 Hz at powers ranging from 50 VA to 350 VA.

Output wave form-square wave; Output frequency – 60 Hz ±1 Hz;

Hermetically sealed-oil filled; Maximum operating temperature – 70°C.

AVAILABLE TYPES:

CAT. #	NOM. VDC IN	OUTPUT VA	SIZE
TAC 6-50	6	50	4⅛ x 3½ x 4½
TAC 12-50	12	50	4⅛ x 3½ x 4½
TAC 12-90	12	90	4⅛ x 3½ x 4⅞
TAC 12-175	12	175	5 x 4⅛ x 6
TAC 28-50	28	50	4⅛ x 3½ x 4½
TAC 28-100	28	100	4⅛ x 3½ x 4⅞
TAC 28-175	28	175	5 x 4⅛ x 6
TAC 28-250	28	250	5½ x 5 x 6¾
TAC 28-350	28	350	5½ x 5 x 6¾
TAC converters are also available with 400 Hz outputs in three models:			
TAC 12-100-4	12	100	4½ x 3½ x 4½
TAC 28-150-4	28	150	4⅛ x 3½ x 4½
TAC 28-250-4	28	250	5 x 4⅛ x 6

DC TO AC TRANSISTOR INVERTERS—PTC LINE

A new line of DC/AC inverters for operation from a 12 volt D.C. source. Output is square wave, 115 volts RMS at 60 Hz. Regulated to ±2 Hz over an input voltage range of 10.5 to 13.5 VDC.

Efficiency on all units is 80% min. at full load. Ambient temperature to 55°C.

Available models listed below:

CAT. #	VA OUT	SIZE	MTG.
PTC 12-15	15	3 x 2½ x 4	1⁹⁄₁₆ x 1¹³⁄₁₆
PTC 12-50	50	3½ x 3 x 4¹³⁄₁₆	2 x 2¾
PTC 12-100	100	5⅞ x 4 x 5¼ HI	3¼ x 3⅛
PTC 12-175	175	7⅝ x 4¹³⁄₁₆ x 5¼ HI	6 x 3½

PTC 12-15 and PTC 12-50 are supplied with 4-terminal headers for input and output connections.

PTC 12-100 and PTC 12-175 use barrier strip terminals and in addition have an auxiliary output receptacle.

DC TO AC TRANSISTOR INVERTERS — VC LINE

A low priced efficient transistor inverter for applications not requiring frequency regulation closer than ±5 Hz is available in 15 VA and 100 VA output capabilities. Input nominal 12 V.D.C. Output square wave 115 volt.

Cat. #	Power	Freq.	Size
VC 12-15	15 watt	55-65 Hz	3 x 3⅛ x 3¾ Hi.
VC 12-100	100 watt	55-65 Hz	4½ x 3½ x 4½ Hi.

MCV – CONSTANT VOLTAGE TRANSFORMERS – MCV

(FERRO-RESONANT TRANSFORMERS)

The MCV line of constant voltage transformers provides accurate regulation against line and/or load variations, without the use of tubes or moving parts.

Input Voltage Range
95 to 130

Rated output within ± 2% of nominal value. Regulation automatically maintained within ± 1%. Regulation from 25% to full load ± 2%.

- MILITARY SPECIFICATIONS
- NO TUBES
- COMMERCIAL
- NO MOVING PARTS
- ACCURATE REGULATIONS
- FAST RESPONSE
- FULLY AUTOMATIC
- SUPPLIED WITH CONDENSERS

Reg. Output in R.M.S. Volts	Output in V.A. P.F-1	CATALOG NUMBERS			
		60 Cycles		400 Cycles	
		Comm.	Military*	Comm.*	Military*
115	5	MCV65LC	MCV65LM	MCV45LC	MCV45LM
115	25	MCV625LC	MCV625LM	MCV425LC	MCV425LM
115	75	MCV675LC	MCV675LM	MCV475LC	MCV475LM
115	125	MCV6125LC	MCV6125LM	MCV4125LC	MCV4125LM
115	175	MCV6175LC	MCV6175LM	MCV4175LC	MCV4175LM
115	250	MCV6250LC	MCV6250LM	MCV4250LC	MCV4250LM
115	375	MCV6375LC	MCV6375LM	MCV4375LC	MCV4375LM
115	500	MCV6500LC	MCV6500LM	MCV4500LC	MCV4500LM
115	750	MCV6750LC	MCV6750LM	MCV4750LC	MCV4750LM
115	1000	MCV61000LC	MCV61000LM	MCV41000LC	MCV41000LM
26	5	MCV654FC	MCV654FM	MCV454FC	MCV454FM
26	25	MCV6254FC	MCV6254FM	MCV4254FC	MCV4254FM
26	75	MCV6754FC	MCV6754FM	MCV4754FC	MCV4754FM
26	125	MCV61254FC	MCV61254FM	MCV41254FC	MCV41254FM
6.4	5	MCV65FC	MCV65FM	MCV45FC	MCV45FM
6.4	25	MCV625FC	MCV625FM	MCV425FC	MCV425FM
6.4	75	MCV675FC	MCV675FM	MCV475FC	MCV475FM
6.4	125	MCV6125FC	MCV6125FM	MCV4125FC	MCV4125FM

*Condensers are not provided with units. Where condensers are provided they are external to units.

AVAILABLE UPON REQUEST
MAGNETIC AMPLIFIERS AND SATURABLE TRANSFORMERS

FREED TRANSFORMER COMPANY, INC. 1795 WEIRFIELD ST. (Ridgewood) Brooklyn, N.Y. 11227

FREED TRANSFORMER CO., INC.

HERMETICALLY SEALED MINIATURE AND SUB-MINIATURE FILTERS TO MIL-F-18327

Freed Standard Filters are **Hermetically Sealed Miniature and Sub-Miniature** high performance components designed for both production and laboratory applications in the Communications and Electronic industry. In order to achieve attenuation requirements not obtainable with one single filter, one can combine several standard filters of different transmission characteristics. Wide Band Pass characteristics are obtainable by combining low and high Pass Units. The astatic construction of inductive components together with special shielding reduces the hum pick-up of the standard filters.

Low Pass Filters: The attenuation characteristics of Low Pass Filters are 6db or less at cut-off frequency • **ILP-ILM Interstage Low Pass Filter.** Characteristic impedance 10,000 ohms, in and out • **LLP-LLM Line Low Pass Filter.** Characteristic Impedance 500 to 600 ohms, in and out • **High Pass Filters:** The attenuation characteristics of High Pass Filters are 6db or less at cut-off frequency • **IHP-IHM Interstage High Pass Filter.** Characteristic Impedance 10,000 ohms, in and out. • **LHP-LHM Line High Pass Filter.** Characteristic Impedance 500 to 600 ohms, in and out • **Band Pass Filters:** The attenuation characteristics of Band Pass Filters are 2db or less at plus or minus 3% of center frequency • **IBP-IBM Interstage Band Pass Filter.** Normal input impedance — 10,000 ohms. Output impedance .5 megohms. Effective voltage step-up 2:1. (Output voltage to source voltage.) • **LBP-LBM Line Band Pass Filter.** Nominal input impedance 500 to 600 ohms. Output impedance .5 megohms. Effective voltage step-up 5:1. (Output voltage to source voltage.)

Special filters in all six types are available upon request.

MINIATURE

Catalog No.	Cut-off Frequency Hz
ILP- 100	100
ILP- 200	200
ILP- 300	300
ILP- 500	500
ILP- 750	750
ILP- 1,000	1,000
ILP- 1,500	1,500
ILP- 2,000	2,000
ILP- 2,500	2,500
ILP- 3,000	3,000
ILP- 5,000	5,000
ILP- 7,000	7,000
ILP- 10,000	10,000
ILP- 15,000	15,000
ILP- 20,000	20,000
ILP- 23,000	23,000
ILP- 25,000	25,000
ILP- 32,000	32,000
ILP-130,000	130,000
ILP-150,000	150,000
LLP- 500	500
LLP- 1,000	1,000
LLP- 1,500	1,500
LLP- 1,600	1,600
LLP- 2,000	2,000
LLP- 2,500	2,500
LLP- 3,000	3,000
LLP-16,000	16,000
LLP-20,000	20,000
LLP-70,000	70,000
LLP-80,000	80,000

Low Pass Filters

attenuation ≧35 Db at 1.5 x Fc ≧ 40 Db at 2 x Fc

Catalog No.	Cut-off Frequency Hz
IHP- 200	200
IHP- 250	250
IHP- 300	300
IHP- 400	400
IHP- 500	500
IHP- 1,000	1,000
IHP- 2,000	2,000
IHP- 3,000	3,000
IHP-10,000	10,000
IHP-15,000	15,000
LHP- 200	200
LHP- 300	300
LHP- 400	400
LHP- 500	500
LHP- 800	800
LHP- 1,000	1,000
LHP- 2,000	2,000
LHP- 6,000	6,000
LHP-10,000	10,000

High Pass Filters

attenuation ≧35 Db at .67 x Fc ≧40 Db at .5 Fc

Catalog No.	Cut-off Frequency Hz
IBP- 100	100
IBP- 200	200
IBP- 250	250
IBP- 400	400
IBP- 500	500
IBP- 700	700
IBP- 800	800
IBP- 900	900
IBP- 1,000	1,000
IBP- 1,500	1,500
IBP- 2,000	2,000
IBP- 3,000	3,000
IBP- 5,000	5,000
IBP- 7,200	7,200
IBP-10,000	10,000
IBP-12,000	12,000
IBP-15,000	15,000
IBP-30,000	30,000
IBP-57,600	57,600
LBP- 100	100
LBP- 300	300
LBP- 400	400
LBP- 600	600
LBP- 800	800
LBP- 1,000	1,000
LBP- 1,500	1,500
LBP- 2,000	2,000
LBP- 3,000	3,000
LBP- 7,200	7,200
LBP-10,000	10,000
LBP-14,400	14,400
LBP-20,000	20,000
LBP-28,800	28,800

Band Pass Filters

attenuation ≧40 Db at 0.5 x Fc and 2 x Fc

SUB-MINIATURE

Catalog No.	Cut-off Freq. Hz	Case No.
ILM- 300	300	DF-01
ILM- 500	500	DF-01
ILM- 750	750	DF-01
ILM- 1,000	1,000	DF-01
ILM- 1,500	1,500	DF-01
ILM- 2,000	2,000	DF-01
ILM- 2,500	2,500	DF-01
ILM- 3,000	3,000	DF-01
ILM- 5,000	5,000	DF-01
ILM- 7,000	7,000	DF-01
ILM- 10,000	10,000	DF-01
ILM- 15,000	15,000	DF-01
ILM- 20,000	20,000	DF-01
ILM- 23,000	23,000	DF-01
ILM- 25,000	25,000	DF-01
ILM- 32,000	32,000	DF-01
ILM-130,000	130,000	DF-01
ILM-150,000	150,000	DF-01
LLM- 500	500	DF-03
LLM- 1,000	1,000	DF-03
LLM- 1,500	1,500	DF-02
LLM- 1,600	1,600	DF-02
LLM- 2,000	2,000	DF-02
LLM- 2,500	2,500	DF-02
LLM- 3,000	3,000	DF-02
LLM-16,000	16,000	DF-02
LLM-20,000	20,000	DF-02
LLM-70,000	70,000	DF-02
LLM-80,000	80,000	DF-02

Low Pass Filters

attenuation ≧30 Db at 1.5 x Fc ≧40 Db at 2 x Fc

Catalog No.	Cut-off Freq. Hz	Case No.
IHM- 300	300	DF-01
IHM- 400	400	DF-01
IHM- 500	500	DF-01
IHM- 1,000	1,000	DF-01
IHM- 2,000	2,000	DF-01
IHM- 3,000	3,000	DF-01
IHM-10,000	10,000	DF-01
IHM-15,000	15,000	DF-01
LHM- 300	300	DF-03
LHM- 400	400	DF-03
LHM- 500	500	DF-03
LHM- 800	800	DF-03
LHM- 1,000	1,000	DF-02
LHM- 2,000	2,000	DF-02
LHM- 6,000	6,000	DF-02
LHM-10,000	10,000	DF-02

High Pass Filters

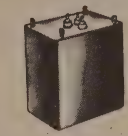
attenuation ≧30 Db at .67 x Fc ≧40 Db at .5 Fc

Catalog No.	Cut-off Freq. Hz	Case No.
IBM- 400	400	DF-02
IBM- 500	500	DF-02
IBM- 700	700	DF-02
IBM- 800	800	DF-02
IBM- 900	900	DF-02
IBM- 1,000	1,000	DF-02
IBM- 1,500	1,500	DF-02
IBM- 2,000	2,000	DF-01
IBM- 3,000	3,000	DF-01
IBM- 5,000	5,000	DF-01
IBM- 7,200	7,200	DF-01
IBM-10,000	10,000	DF-01
IBM-12,000	12,000	DF-01
IBM-15,000	15,000	DF-01
IBM-30,000	30,000	DF-01
IBM-57,600	57,600	DF-01
LBM- 300	300	DF-02
LBM- 400	400	DF-02
LBM- 600	600	DF-02
LBM- 800	800	DF-02
LBM- 1,000	1,000	DF-01
LBM- 1,500	1,500	DF-01
LBM- 2,000	2,000	DF-01
LBM- 3,000	3,000	DF-01
LBM- 7,200	7,200	DF-01
LBM-10,000	10,000	DF-01
LBM-14,400	14,400	DF-01
LBM-20,000	20,000	DF-01
LBM-28,800	28,800	DF-01

Band Pass Filters

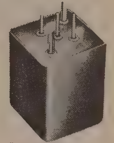
attenuation ≧35 Db at 0.5 x Fc and 2 x Fc

ALL MINIATURE FILTERS ARE SUPPLIED IN DF-1 CASE



DF-1 CASE

Height: 2½"
Width: 1$\frac{11}{16}$"
Depth: 1$\frac{3}{16}$"
Mtg. Cen.: 1¼"x¾"
Studs: 4 6-32x⅜"
Knockout: ⅞" dia.



DF CASE STYLE DF-01

Height: 1⅜"
Width: ¾"
Depth.: ¾"
Mtg. Cen.: $\frac{9}{16}$" Diag.
Studs: 2 ÷ 4-40

DF-02

Height: 1⅜"
Width: 1"
Depth.: 1"
Mtg. Cen.: ¾" Diag.
Studs: 2 ÷ 4-40

DF-03

Height: 1¾"
Width: 1"
Depth.: 1"
Mtg. Cen.: ¾"
Studs: 2 ÷ 4-40

SUBMINIATURE TELEMETERING BAND PASS FILTERS

Type No.	Center Frequency Fo - in Hz	Band Width <3DB	Stop Band Attenuation
MTN-.4	.4	±7½%	≧ 38 DB @ 1.75 & .58 Fo
MTN-.56	.56	±7½%	≧ 38 DB @ 1.75 & .58 Fo
MTN-.73	.73	±7½%	≧ 38 DB @ 1.75 & .58 Fo
MTN-.96	.96	±7½%	≧ 38 DB @ 1.75 & .58 Fo
MTN-1.3	1.3	±7½%	≧38 DB @ 1.75 & .58 Fo
MTN-1.7	1.7	±7½%	≧ 38 DB @ 1.75 & .58 Fo
MTN-2.3	2.3	±7½%	≧ 38 DB @ 1.75 & .58 Fo
MTN-3.0	3.0	±7½%	≧ 38 DB @ 1.75 & .58 Fo
MTH-3.9	3.9	±7½%	≧ 38 DB @ 1.75 & .58 Fo
MTN-5.4	5.4	±7½%	≧ 38 DB @ 1.75 & .58 Fo
MTN-7.35	7.35	±7½%	≧ 38 DB @ 1.75 & .58 Fo
MTH-10.5	10.5	±7½%	≧ 38 DB @ 1.75 & .58 Fo
MTN-14.5	14.5	±7½%	≧ 38 DB @ 1.75 & .58 Fo
MTN-22	22	±7½%	≧ 38 DB @ 1.75 & .58 Fo
MTN-30	30	±7½%	≧ 38 DB @ 1.75 & .58 Fo
MTN-40	40	±7½%	≧ 38 DB @ 1.75 & .58 Fo
MTN-52.5	52.5	±7½%	≧ 38 DB @ 1.75 & .58 Fo
MTN-70	70	±7½%	≧ 38 DB @ 1.75 & .58 Fo
MTN-22	22	±15%	≧ 40 DB @ 2.5 & .4 Fo
MTW-30	30	±15%	≧ 40 DB @ 2.5 & .4 Fo
MTW-40	40	±15%	≧ 40 DB @ 2.5 & .4 Fo
MTW-52.5	52.5	±15%	≧ 40 DB @ 2.5 & .4 Fo
MTW-70	70	±15%	≧ 40 DB @ 2.5 & .4 Fo

DF-C1	CASE SIZES	DF-02
¾ x ¾ x 1⅜		1 x 1 x 1⅜
MTN-2.3 Thru MTW-70		MTN-4 Thru MTN 1.7

NULL "T" FILTERS SERIES 1950

Standard models are available for 30, 60 and 120 cycles in a wide range of impedances. Each network will give a minimum of 50 db attenuation at the null frequency.

The null frequency is adjusted to a tolerance of ±2%.

All Null T Filters are hermetically sealed.

Prices on request.

Catalog No.	Frequency
NTF- 30	30 Hz
NTF- 60	60 Hz
NTF-120	120 Hz

FREED TRANSFORMER COMPANY. INC. 1795 WEIRFIELD ST. (Ridgewood) Brooklyn, N. Y. 11227

FREED TRANSFORMER CO., INC.

TOROIDAL INDUCTORS

Using the latest developments in the field of magnetic materials and new impregnation and molding techniques the Freed Transformer Co. makes available to the industry the most extensive line of toroidal inductors.

Freed toroids are available in three types of constructions. Open units coated with a special high temperature extremely low loss compound, hermetically sealed in metal cases or molded in special **Freed Epoxy Resin.** Both hermetically sealed and molded units meet the latest military specification MIL-T-27A(graded 1 or 4 and 2 or 5 respectively.)Freed toroidal inductors are supplied with either molypermalloy or carbonyl iron powder cores

1. Temperature Stabilization:

The molypermalloy and carbonyl iron powder cores have a temperature coefficient of inductance. Depending on the degree of temperature stabilization the cores have different temperature coefficients. The degree of stabilization is denoted by a two-letter code.

SF	Non-stabilized cores, ±2½% inductance variations from —55°C to +85°C.
SN	Non-stabilized cores, +2% inductance variations from —55°C to +85°C.
SE	Temperature stabilized cores, +0.1% to —0.4% inductance variations from —1.5°C to +54°C.
SB	Temperature stabilized cores, ±0.1% inductance variations from +13°C to +35°C.
SD	Temperature stabilized cores, ±0.1% inductance variations from —1.5°C to +54°C.
SW	Temperature stabilized cores, ±0.25% inductance variations from —54°C to +85°C.
SM	Temperature stabilized cores, ±.25% —65°C to +125°C.
SP	Temperature stable carbonyl iron cores, ±0.3% inductance variations from —55°C to +85°C.

The temperature (stabilization) coefficient of an inductor will depend upon the nominal inductance value, operating frequency and A.C. voltage across the coil. Under some unfavorable working conditions the temperature coefficient of inductance corresponding to a given stability characteristic may be exceeded.

Toroids with special requirements such as tapped toroids, toroidal transformers, molded and cased units with dimensions other than standard sizes and high temperature toroids can be supplied on request. Our engineering and laboratory facilities are available for consultation, research and development.

TOROIDAL INDUCTORS

Type	Ω/H	Max. Norm. Idc	Max. Norm. Iac	Max. Norm. Vac	Uncased	Mold	Case	Frequency
TI- 1	70	55	73.5	0.46	OS-8	MR-6	DT-3, DT-5	1–15 KHz
TI- 1A	68	75	90.5	0.57	OS-9	MR-7	DT-4	1–15 KHz
TI- 2	160	90	135	0.85	OS-6	MR-5	DT-3, DT-5	10–50 KHz
TI- 3	600	100	67	0.42	OS-6	MR-5	DT-3, DT-5	50–200 KHz
TI- 3A	310	150	240	1.5	OS-10	MR-8	DT-4	50–200 KHz
TI- 4	110	55	67	0.42	OS-5	MR-4	DT-2, DM-11	1–15 KHz
TI- 5	260	28	35	0.22	OS-3	MR-3	DT-1, DM-2	1–15 KHz
TI- 6	230	75	125	0.80	OS-10	MR-8	DT-4	10–50 KHz
TI- 7	480	40	53	0.33	OS-3	MR-3	DT-1, DM-2	10–50 KHz
TI- 8	1,500	50	80	0.5	OS-3	MR-3	DT-1, DM-2	30–75 KHz
TI- 9	150	200	240	1.5	OS-10	MR-3	DT-4	30–75 KHz
TI-10	430	125	270	1.7	OS-7	MR-5	DT-3, DT-5	30–75 KHz
TI-11	30	120	190	1.2	OS-11	MR-10	DT-4	1–15 KHz
TI-12	45	100	160	1	OS-9	MR-8	DT-4	1–15 KHz
TI-13	55	140	175	1.1	OS-9	MR-8	DT-4	10–50 KHz
TI-14	580	150	—	—	OS-5	MR-4	DT-2, DM-11	10–100 KHz
TI-15	900	100	—	—	OS-3	MR-3	DT-1, DM-2	10–100 KHz
TI-16	600	16	21	0.13	OS-1	MR-1, MS-1	DST-1	1–15 KHz
TI-17	1,200	20	29	0.18	OS-1	MR-1, MS-1	DST-1	10–50 KHz
TI-18	2,600	30	40	0.25	OS-1	MR-1, MS-1	DST-1	30–75 KHz

Type	Ω/H	Max. Norm. Idc	Max. Norm. Iac	Max. Norm. Vac	Uncased	Mold	Case	Frequency
TI-19	4,500	25	29	0.18	OS-1	MR-1, MS-1	DST-1	50–200 KHz
TI-20	2,750	100	*	*	OS-4	MR-3A	DT-2	20KHz–2MHz
TI-21	1,200	350	*	*	OS-1	MR-1, MS-1	DT-1	100KH –10MHz
TI-22	5,600	210	*	*	OS-2	MR-2	DT-1	50KHz–5MHz
TI-23	7,000	250	*	*	OS-2	MR-2	DT-1	50KHz–5MHz
TI-24	330	15	18	0.11	OS-1	MR-1, MS-1	DST-1	200Hz–12KHz
TI-25	200	20	24	0.15	OS-12	MR-2	DT-1	200Hz–12KHz
TI-26	150	25	32	0.20	OS-3	MR-3	DT-1, DM-3	200Hz–12KHz
TI-27	76.5	50	62	0.39	OS-5	MR-4	DT-2, DM-11	200Hz–12KHz
TI-28	48.5	50	64	0.40	OS-8	MR-6	DT-3, DT-5	200Hz–12KHz
TI-29	33.5	70	88	0.55	OS-9	MR-7	DT-4	200Hz–12KHz
TI-30	28	100	135	0.84	OS-9	MR-8	DT-4	200Hz–12KHz
TI-31	19.5	100	136	0.85	OS-11	MR-10	DT-4	200Hz–12KHz
TI-32	48.5	6	14.5	0.09	OS-3	MR-3	DT-1, DM-2	100Hz–10KHz
TI-33	2,150	8	13	0.08	OS-13	MR-11	DT-6	1–15 KHz
TI-34	1,700	8	9.5	0.06	OS-14	MR-11	DT-6	1–15 KHz
TI-35	4,100	10	18	0.11	OS-13	MR-11	DT-6	10–50 KHz
TI-36	3,950	10	11	0.07	OS-14	MR-11	DT-6	10–50 KHz
TI-37	23.5	10	32	0.20	OS-5	MR-14	DT-2, DM-11	100Hz–10KHz
TI-38	100	4	9.5	0.06	OS-1	MR-1, MS-1	DST-1	100Hz–10KHz

*TI-20 through TI-23 have a very low voltage coefficient and inductance will change very little with voltage. Because of high frequency application, the maximum voltage is limited rather by breakdown than by saturation.

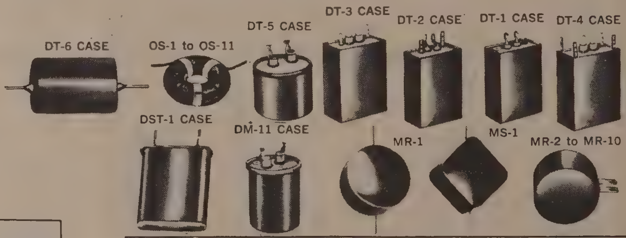
$$\text{Normalized } V_{AC} = \frac{V}{F}\,\frac{1}{\sqrt{L_H}}$$

$$\text{Normalized } I_{AC} = I_{AC}\sqrt{L_H}$$

$$\text{Normalized } I_{DC} = I_{DC}\sqrt{L_H}$$

where F —operating frequency in Hz
L_H —inductance in henries
Iac—A.C. current in MA
Idc—D.C. current in MA
V —A.C. voltage across the core

CASED, UNCASED AND MOLDED UNITS



UNCASED		
Type	O.D.	Hi.
OS-1	⅝″	5/16″
OS-2	⅞″	⅜″
OS-3	1″	⅜″
OS-4	1″	9/16″
OS-5	1 5/16″	⅝″
OS-6	1⅝″	⅞″
OS-7	1 11/16″	⅝″
OS-8	1⅞″	11/16″
OS-9	2¼″	1⅛″
OS-10	2⅜″	1¼″
OS-11	2⅝″	1⅛″
OS-12	13/16″	⅜″
OS-13	⅜″	¼″
OS-14	7/16″	7/32″

MOLDED			
Type	O.D.	Hi.	Clearance Hole Mounting
MR-1	⅞″	13/32″	Pig Tails
MR-2	1 1/16″	½″	No. 4
MR-3	1 3/16″	½″	No. 6
MR-3A	1 3/16″	11/16″	No. 6
MR-4	1½″	¾″	No. 8
MR-5	1⅞″	1″	No. 8
MR-6	2⅛″	⅞″	No. 8
MR-7	2⅜″	1 5/16″	No. 10
MR-8	2½″	1⅜″	No. 10
MR-9	2⅝″	1 7/16″	No. 10
MR-10	2⅞″	1⅜″	No. 10
MR-11	7/16″	¼″	Pig Tails
MS-1	25/32″x25/32″	13/32″	Pig Tails

CASED							
Type	Hi.	Dia.	Length	Width	Mtg.	Mtg. Cen.	Cutout
DT-1	1 7/32″		1 1/16″	½″	2 4-40 inserts	¾″	5/16″ x ½″.
DT-2	1¾″		1 7/16″	13/16″	2 6-32 studs	⅞″ x 9/32″	⅜″ x 11/16″
DT-3	2″		1 25/32″	⅞″	2 6-32 studs	1¼″ x ⅜″	⅜″ x ¾″
DT-4	3⅛″		2¾″	1 5/16″	4 8-32 studs	2 1/16″ x 11/16″	¾″ x ⅜″
DT-5	1 3/16″	1 13/16″			2 6-32 inserts	1⅛″	⅜″ x 1″
DT-6	⅝″	½″			Pig Tails		
DM-2	1″	1⅛″			2 4-40 inserts	⅝″	⅜″ x ⅞″
DM-11	1½″	1⅜″			2 6-32 inserts	⅞″	⅜″ x ⅞″
DST-1	25/32″		¾″	11/32″	¼″ long pins	To fit ½″ crystal socket	

FREED TRANSFORMER COMPANY. INC.

FREED TRANSFORMER CO., INC.

LOW FREQUENCY TOROIDAL INDUCTORS

Freq. Range	100 ~ to 10 KC			200 ~ to 12 KC							
TYPE	TI-38	TI-32	TI-37	TI-24	TI-25	TI-26	TI-27	TI-28	TI-29	TI-30	TI-31
Temp. Stability	SF	SF	SF	SN	SN	SN	SN	SN	SN	SN	SN
Size: Uncased Case Mold	OS1 DST1 MR1, MS1	OS3 DT1, DM2 MR3	OS5 DT2, DM11 MR4	OS1 DST1 MR1, MS1	OS12 DT1 MR2	OS3 DT1, DM2 MR3	OS5 DT2, DM11 MR4	OS8 DT3, DT5 MR6	OS9 DT4 MR7	OS9 DT4 MR8	OS11 DT4 MR10
Nominal Inductance	Catalog Number										
1 MH				F2400	F2450	F2500	F2550	F2600	F2650	F2700	F2750
2 MH				F2401	F2451	F2501	F2551	F2601	F2651	F2701	F2751
3 MH				F2402	F2452	F2502	F2552	F2602	F2652	F2702	F2752
5 MH	F3550			F2403	F2453	F2503	F2553	F2603	F2653	F2703	F2753
7.5 MH	F3551			F2404	F2454	F2504	F2554	F2604	F2654	F2704	F2754
10 MH	F3552			F2405	F2455	F2505	F2555	F2605	F2655	F2705	F2755
15 MH	F3553			F2406	F2456	F2506	F2556	F2606	F2656	F2706	F2756
20 MH	F3554			F2407	F2457	F2507	F2557	F2607	F2657	F2707	F2757
30 MH	F3555			F2408	F2458	F2508	F2558	F2608	F2658	F2708	F2758
50 MH	F3556	F2800	F4000	F2409	F2459	F2509	F2559	F2609	F2659	F2709	F2759
75 MH	F3557	F2801	F4001	F2410	F2460	F2510	F2560	F2610	F2660	F2710	F2760
100 MH	F3558	F2802	F4002	F2411	F2461	F2511	F2561	F2611	F2661	F2711	F2761
150 MH	F3559	F2803	F4003	F2412	F2462	F2512	F2562	F2612	F2662	F2712	F2762
200 MH	F3560	F2804	F4004	F2413	F2463	F2513	F2563	F2613	F2663	F2713	F2763
300 MH	F3561	F2805	F4005	F2414	F2464	F2514	F2564	F2614	F2664	F2714	F2764
400 MH	F3562	F2806	F4006	F2415	F2465	F2515	F2565	F2615	F2665	F2715	F2765
500 MH	F3563	F2807	F4007	F2416	F2466	F2516	F2566	F2616	F2666	F2716	F2766
750 MH	F3564	F2808	F4008	F2417	F2467	F2517	F2567	F2617	F2667	F2717	F2767
1 H	F3565	F2809	F4009	F2418	F2468	F2518	F2568	F2618	F2668	F2718	F2768
1.25 H	F3566	F2810	F4010	F2419	F2469	F2519	F2569	F2619	F2669	F2719	F2769
1.5 H	F3567	F2811	F4011	F2420	F2470	F2520	F2570	F2620	F2670	F2720	F2770
1.75 H	F3568	F2812	F4012	F2421	F2471	F2521	F2571	F2621	F2671	F2721	F2771
2 H	F3569	F2813	F4013	F2422	F2472	F2522	F2572	F2622	F2672	F2722	F2772
2.25 H	F3570	F2814	F4014		F2473	F2523	F2573	F2623	F2673	F2723	F2773
2.5 H	F3571	F2815	F4015		F2474	F2524	F2574	F2624	F2674	F2724	F2774
3 H	F3572	F2816	F4016		F2475	F2525	F2575	F2625	F2675	F2725	F2775
3.5 H	F3573	F2817	F4017		F2476	F2526	F2576	F2626	F2676	F2726	F2776
4 H	F3574	F2818	F4018		F2477	F2527	F2577	F2627	F2677	F2727	F2777
4.5 H	F3575	F2819	F4019		F2478	F2528	F2578	F2628	F2678	F2728	F2778
5 H	F3576	F2820	F4020		F2479	F2529	F2579	F2629	F2679	F2729	F2779
7.5 H	F3577	F2821	F4021		F2480	F2530	F2580	F2630	F2680	F2730	F2780
10 H	F3578	F2822	F4022		F2481	F2531	F2581	F2631	F2681	F2731	F2781
15 H		F2823	F4023			F2532	F2582	F2632	F2682	F2732	F2782
20 H		F2824	F4024			F2533	F2583	F2633	F2683	F2733	F2783
25 H			F4025								
30 H									F2684	F2734	F2784
40 H									F2685	F2735	F2785
50 H									F2686	F2736	F2786
75 H											F2787
100 H											F2788

LOW FREQUENCY TOROIDAL INDUCTORS

Freq. Range	1 KC to 15 KC								
TYPE	TI-33	TI-34	TI-16	TI-5	TI-4	TI-1	TI-1A	TI-12	TI-11
Temp. Stability	SN	SN	SN	SN, SE, SD	SN, SD, SW	SN	SN, SD, SW	SN, SD, SW	SN, SD, SW
Size: Uncased Case Mold	OS13 DT6 MR11	OS14 DT6 MR11	OS1 DST1 MR1, MS1	OS3 DT1, DM2, MR3	OS5 DT2, DM11, MR4	OS8 DT3, DT5, MR6	OS9 DT4 MR7	OS9 DT4 MR8	OS11 DT4 MR10
Nominal Inductance	Catalog Number								
.25 MH	F2850	F2900							
.5 MH	F2851	F2901							
.75 MH	F2852	F2902							
1 MH	F2853	F2903	F2050				F1500	F1655	F1747
1.5 MH	F2854	F2904							
2 MH	F2855	F2905					F1501	F1656	F1748
2.5 MH	F2856	F2906							
3 MH	F2857	F2907	F2051				F1502	F1657	F1749
4 MH	F2858	F2908					F1503	F1658	F1750
5 MH	F2859	F2909	F2052	F1700	F850	F800	F1504	F1659	F1751
7.5 MH	F2860	F2910					F1505	F1660	
10 MH	F2861	F2911	F2053	F1701	F851	F801	F1506	F1661	F1752
12.5 MH	F2862	F2912							
15 MH	F2863	F2913	F2054	F1702	F852	F802	F1507	F1662	F1753
17.5 MH	F2864	F2914							
20 MH	F2865	F2915							
25 MH	F2866	F2916							
30 MH	F2867	F2917	F2055	F1703	F853	F803	F1508	F1663	F1754
50 MH		F2918	F2056	F1704	F854	F804	F1509	F1664	F1755
75 MH		F2919	F2057	F1705	F855	F805	F1510	F1665	F1756
100 MH		F2920	F2058	F1706	F856	F806	F1511	F1666	F1757
150 MH			F2059	F1707	F857	F807	F1512	F1667	F1758
200 MH			F2060	F1708	F858	F808	F1513	F1668	F1759
300 MH			F2061	F1709	F859		F1514	F1669	F1760
400 MH			F2062	F1710	F860		F1515	F1670	F1761
500 MH			F2063	F1711	F861	F809	F1516	F1671	F1762
600 MH				F1712	F862		F1517	F1672	
700 MH				F1713	F863				
750 MH			F2064			F810	F1518	F1673	F1763
800 MH				F1714	F864				
900 MH				F1715	F865				
1.0 HY			F2065	F1716	F866	F811	F1519	F1674	F1764
1.25 HY			F2066	F1717	F867	F812			
1.5 HY			F2067	F1718	F868	F813	F1520	F1675	F1765
1.75 HY			F2068	F1719	F869	F814			
2 HY			F2069	F1720	F870	F815	F1521	F1676	F1766
2.25 HY					F871	F816			
2.5 HY					F872	F817	F1522	F1677	F1767
2.75 HY					F873	F818			
3 HY					F874	F819	F1523	F1678	F1768
3.5 HY					F875	F820	F1524	F1679	F1769
4 HY					F876	F821	F1525	F1680	F1770
4.5 HY					F877	F822	F1526	F1681	F1771
5 HY					F878	F823	F1527	F1682	F1772
6 HY						F824	F1528	F1683	
7 HY						F825	F1529	F1684	
7.5 HY									F1773
8 HY						F826	F1530	F1685	
9 HY						F827	F1531	F1686	
10 HY						F828	F1532	F1687	F1774
12 HY							F1533	F1688	
15 HY						F829	F1534	F1689	F1775
17 HY							F1535	F1690	
20 HY						F830	F1536	F1691	F1776
25 HY							F1537	F1692	F1777
30 HY							F1538	F1693	F1778
40 HY									F1779
50 HY									F1780

FREED TRANSFORMER CO., INC.

MEDIUM FREQUENCY TOROIDAL INDUCTORS

Freq. Range	10 KC to 50 KC							30 KC to 75 KC			
TYPE	TI-35	TI-36	TI-17	TI-7	TI-6	TI-2	TI-13	TI-18	TI-8	TI-10	TI-9
Temp. Stability	SN	SN	SN	SN	SN, SD SW	SD	SN	SN	SN, SD	SB	SB
Size Uncased Case Mold	OS13 DT6 MR11	OS14 DT6 MR11	OS1 DST1 MR1, MS1	OS3 DT1, DM2 MR3	OS5 DT2, DM11 MR4	OS6 DT3, DT5 MR5	OS9 DT4 MR8	OS1 DST1 MR1, MS1	OS3 DT1, DM2 MR3	OS7 DT3, DT5 MR5	OS10 DT4 MR9
Nominal Inductance	Catalog Number										
.1 MH			F2100					F2140	F1821		
.2 MH			F2101					F2141	F1822		
.25 MH	F2950	F3000									
.3 MH			F2102					F2142	F1823		
.4 MH			F2103					F2143	F1824		
.5 MH	F2951	F3001	F2104	F1781				F2144	F1825		
.75 MH	F2952	F3002									
1 MH	F2953	F3003	F2105	F1782	F1726	F1800	F1629	F2145	F1826	F1579	F1554
1.5 MH	F2954	F3004									
2 MH	F2955	F3005	F2106	F1783	F1727	F1801	F1630	F2146	F1827	F1580	F1555
2.5 MH	F2956	F3006									
3 MH	F2957	F3007	F2107	F1784	F1728	F1802	F1631	F2147	F1828	F1581	F1556
4 MH	F2958	F3008	F2108		F1729	F1803	F1632	F2148	F1829	F1582	F1557
5 MH	F2959	F3009	F2109	F1785	F1730	F1804	F1633	F2149	F1830	F1583	F1558
7.5 MH	F2960	F3010	F2110	F1786	F1731		F1634	F2150	F1831	F1584	F1559
10 MH	F2961	F3011	F2111	F1787	F1732	F1805	F1635	F2151	F1832	F1585	F1560
12.5 MH	F2962	F3012									
15 MH	F2963	F3013	F2112	F1788	F1733	F1806	F1636	F2152	F1833	F1586	F1561
17.5 MH		F3014									
20 MH		F3015	F2113	F1789	F1734			F2153	F1834		
25 MH		F3016		F1790					F1835		
30 MH		F3017	F2114	F1791	F1735	F1807	F1637	F2154	F1836	F1587	F1562
40 MH				F1792					F1837		
50 MH			F2115	F1793	F1736	F1808	F1638	F2155	F1838	F1588	F1563
75 MH			F2116	F1794	F1737	F1809	F1639	F2156	F1839	F1589	F1564
100 MH			F2117	F1795	F1738	F1810	F1640	F2157	F1840	F1590	F1565
150 MH				F1796	F1739	F1811	F1641			F1591	F1566
200 MH				F1797	F1740	F1812	F1642			F1592	F1567
250 MH					F1741						
300 MH					F1742	F1813	F1643				F1568
400 MH						F1814	F1644				F1569
500 MH					F1743	F1815	F1645				F1570

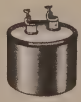
CASED, UNCASED AND MOLDED UNITS

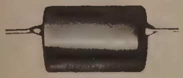
DT-1 CASE

DT-2 CASE

DT-3 CASE

DT-4 CASE

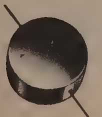

DT-5 CASE


DT-6 CASE

DST-1 CASE

DM-2 CASE

DM-11 CASE


MR-1

MR-2 to MR-10

MS-1

OS-1 to OS-11

FREED TRANSFORMER CO., INC.

HIGH FREQUENCY TOROIDAL INDUCTORS

Freq. Range	10 KC to 100 KC		50 KC to 200 KC			20KC to 2 MC	50 KC to 5 MC		100 KC to 10 MC
TYPE	**TI-15**	**TI-14**	**TI-19**	**TI-3**	**TI-3A**	**TI-20**	**TI-22**	**TI-23**	**TI-21**
Temp. Stability	SN	SN	SN	SD	SB	SP	SP	SP	SP
Size Uncased Case Mold	OS3 DT1, DM2 MR3	OS5 DT2, DM11 MR4	OS1 DST 1 MR1, MS1	OS6 DT3, DT5 MR5	OS10 DT4 MR8	OS4 DT2 MR3A	OS2 DT1 MR2	OS2 DT1 MR2	OS1 DT1 MR1, MS1
Nominal Inductance	Catalog Number								
.010 MH							F2270	F2301	F2240
.015 MH							F2271	F2302	F2241
.020 MH							F2272	F2303	F2242
.030 MH							F2273	F2304	F2243
.040 MH							F2274	F2305	F2244
.050 MH						F2201	F2275	F2306	F2245
.075 MH							F2276	F2307	F2246
.100 MH	F1870		F2180	F1846		F2202	F2277	F2308	F2247
.125 MH									F2248
.150 MH							F2278	F2309	F2249
.200 MH	F1871		F2181	F1847		F2203	F2279	F2310	
.300 MH	F1872		F2182	F1848		F2204	F2280	F2311	
.400 MH	F1873		F2183	F1849			F2281	F2312	
.500 MH	F1874		F2184	F1850		F2205	F2282	F2313	
.600 MH			F2185				F2283		
.700 MH			F2186				F2284		
.750 MH						F2206			
.800 MH			F2187						
.900 MH			F2188						
1 MH	F1875	F1920	F2189	F1851		F2207			
1.5 MH						F2208			
2 MH	F1876	F1921	F2190	F1852		F2209			
2.5 MH						F2210			
3 MH	F1877	F1922	F2191	F1853		F2211			
3.5 MH						F2212			
4 MH	F1878	F1923	F2192	F1854		F2213			
4.5 MH						F2214			
5 MH	F1879	F1924	F2193	F1855		F2215			
7.5 MH	F1880	F1925		F1845					
10 MH	F1881	F1926		F1844	F1856				
15 MH	F1882	F1927			F1857				
20 MH	F1883	F1928			F1858				
25 MH	F1884								
30 MH	F1885	F1929			F1859				
40 MH	F1886				F1860				
50 MH	F1887	F1930			F1861				
75 MH	F1888	F1931			F1862				
100 MH	F1889	F1932			F1863				
150 MH		F1933							
200 MH		F1934							
250 MH		F1935							
300 MH		F1936							

FREED TRANSFORMER COMPANY, INC. 1795 WEIRFIELD ST. (Ridgewood) Brooklyn, N. Y. 11227

FREED TRANSFORMER CO., INC.

COMMERCIAL GRADE COMPONENTS

These components are designed to meet the demand for low-cost replacement parts for commercial electronic equipment.

The best commercially available materials have been utilized in the design of these units, to insure reliability and excellent performance characteristics. Vacuum impregnation with a non-hygroscopic varnish to prevent penetration of humidity are employed to give these units long life and trouble-free performance.

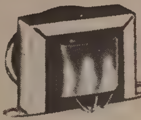
230-115 V, 50-60 C.P.S. Stepdown Transformers rated from 25 V A up to 5,000 V A Rating and line booster transformers are included in this series.

All units, with only a few exceptions, are uncased or of shell-type construction.

Isolation transformers and Stepdown transformers are equipped with line cord and receptacle.

DC

Case No.	Height	Width	Depth	Mtg. Centers	Mtg. Studs
DC2B	3½	2⅝	2¼	2x1¾	(4)8-32
DC4A	3¾	3⅛	3	2½x2½	(4)8-32
DC5C	4⅞	4⅛	3½	3⅛x2⅝	(4)10-32
DC6A	4⅞	5	4⅛	3¾x3	(4)10-32
CH40	1 7/16	2⅜	1 3/16	2	(2)3/16
CH50	1 11/16	2 13/16	1¾	2⅜	(2)3/16
CH60	2	3¼	1¾	2 13/16	(2)3/16
CH62	2	3¼	2⅛	2 13/16	(2)3/16
CH70	2 5/16	3 11/16	2¼	3⅛	(2)3/16
CH80	2⅝	4	2⅝	3 9/16	(2)3/16
FV10	3 1/16	2½	2 9/16	2x2	(4)13/64x21/64
FV12	3 1/16	2½	2 11/16	2x2⅛	(4)13/64x21/64
FV22	3 7/16	2 13/16	2⅞	2¼x2¼	(4)3/16x⅜
FV30	4 1/32	3⅛	3	2½x2¼	(4)13/64x21/64
HB718	6¼	6½	8½	4¾x4½	(4)9/32x21/32
HB728	6¼	6½	9¾	4¾x5¾	(4)9/32x21/32
HB828	6⅝	7 5/16	9⅞	5⅝x5¾	(4)9/32x21/32
HB920	6⅝	7⅞	10¼	6½x7 5/16	(4)9/32x21/32
HS300	2⅝	3	2½	2½x2	(4)3/16x⅜
HS303	2⅞	3	2½	2½x2	(4)3/16x⅜
HS306	3¼	3	2½	2½x2	(4)3/16x⅜
HS307	3⅜	3	2½	2½x2	(4)3/16x⅜
HS503	3½	3¾	3⅛	3⅛x2½	(4)3/16x⅜
HS505	3¾	3¾	3⅛	3⅛x2½	(4)3/16x⅜
HS603	3¾	4½	3¾	3¾x3	(4)3/16x⅜
HS605	4	4½	3¾	3¾x3	(4)3/16x⅜
HS606	4 5/16	4½	3¾	3¾x3	(4)3/16x⅜
HS610	4⅝	4½	3¾	3¾x3	(4)3/16x⅜
HS612	4⅞	4½	3¾	3¾x3	(4)3/16x⅜
HS708	5⅞	5¼	4⅜	4⅜x3½	(4)9/32x21/32
HS709	6	5¼	4⅜	4⅜x3½	(4)9/32x21/32
VS100	2 11/32	1⅞	2¼	1½x1 7/16	(4)3/16x⅜
VS300	3 5/32	2⅝	2¾	2x1 11/16	(4)3/16x⅜
VS303	3 5/32	2⅝	3	2x1 15/16	(4)3/16x⅜
VS304	3 29/32	4¼	3¼	2½x3	(4)3/16x⅜
VS306	3 5/32	2⅝	3⅜	2x2 1/16	(4)3/16x⅜
VS307	3 5/32	2⅝	3½	2x2 7/16	(4)3/16x⅜
VS401	3 9/16	2 15/16	3¼	2¼x1 15/16	(4)3/16x⅜
VS501	3 29/32	3¼	3⅜	2½x2 1/16	(4)3/16x⅜
VS503	3 29/32	3¼	3⅝	2½x2 5/16	(4)3/16x⅜
VS505	3 29/32	3¼	3⅞	2½x2⅝	(4)3/16x⅜
VS506	3 29/32	3¼	4¼	2¼x3	(4)3/16x⅜
VS508	3⅝	2⅝	3⅛	2x2⅛	(4)3/16x⅜
VS601	4 21/32	3⅞	3⅝	3x2 7/16	(4)3/16x⅜
VS603	4 21/32	3⅞	3⅞	3x2 11/16	(4)3/16x⅜
VS604	4 21/32	3⅞	4	3x2⅞	(4)3/16x⅜
VS605	4 21/32	3⅞	4⅛	3x2 15/16	(4)3/16x⅜
VS606	4 21/32	3⅞	4¼	3x3⅛	(4)3/16x⅜
VS610	4 21/32	3⅞	4¾	3x3 9/16	(4)3/16x⅜
VS611	4 21/32	3⅞	4⅞	3x3 11/16	(4)3/16x⅜
VS612	4 21/32	3⅞	5	3x3 13/16	(4)3/16x⅜
VS700	5 7/16	3⅞	5	3½x3¼	(4)3/16x⅜
VS706	5 7/16	4 9/16	5½	3½x3¾	(4)3/16x⅜
VS708	5 7/16	4 9/16	5¾	3½x4	(4)9/32x21/32
VS709	5 7/16	4 9/16	5⅞	3½x4⅛	(4)9/32x21/32
VS714	5 7/16	4 9/16	6½	3½x4¾	(4)3/16x⅜
VS718	5 7/16	4 9/16	7	3½x5¼	(4)9/32x21/32
VS728	5 7/16	4 9/16	8¼	3½x6½	(4)3/16x⅜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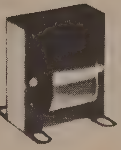
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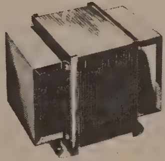
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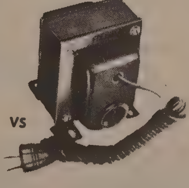

VS

COMMERCIAL GRADE CHOKES

Catalog No	Inductance in Henries	Rated Current D C Ma	D C Resistance	Dielectric Test Voltage	Case Number
RGC 17	40	15	2000	1000	CH 40
RGC 1	4	40	200	1000	CH 40
RGC 2	9	40	400	1000	CH 40
RGC 3	6	50	400	1000	CH 40
RGC 18	20	50	425	1500	CH 60
RGC 4	10	55	400	1500	CH 50
RGC 19	3	75	200	1500	CH 40
RGC 5	10	75	250	1500	CH 60
RGC 6	10	75	250	1500	VS 100
RGC 7	6	100	150	1500	CH 60
RGC 8	6	100	150	1500	VS 100
RGC 9	1.5	150	100	1500	CH 60
RGC 10	3.5	150	100	1500	VS 100
RGC 20	12	160	180	2500	VS 306
RGC 11	2	200	60	1500	CH 60
RGC 12	2	200	60	1500	VS 100
RGC 13	3.7	200	65	1500	CH 80
RGC 21	2	200	100	2500	VS 303
RGC 14	3.7	200	65	1500	VS 300
RGC 15	2.8	300	65	1500	CH 80
RGC 16	2.8	300	65	1500	VS 300
RGC 22	5	300	65	2500	VS 308

FILAMENT TRANSFORMERS

All primaries are for 115V, 50/60 c.p.s.

Catalog No.	Secondary Voltage	Secondary Current Amps	Secondary Test Voltage RMS	Case Size
TF 1	2.5 (C.T.)	7.5	1500	CH60
TF 2	2.5 (C.T.)	10	1500	CH70
TF 3	2.5 (C.T.)	5	7500	DC2B
TF 4	2.5 (C.T.)	10	7500	DC4A
TF 5	5.0 (C.T.)	4	1500	CH60
TF 6	5.0 (C.T.)	6	1500	CH70
TF 7	5.0 (C.T.)	10	1500	CH80
TF 8	5.0 (C.T.)	10	1500	FV10
TF 9	5.0 (C.T.)	20	2500	FV30
TF 10	5.0 (C.T.)	20	10,000	DC6A
TF 11	6.3 (C.T.)	1.35	1500	CH50
TF 12	6.3 (C.T.)	3	1500	CH60
TF 13	6.3 (C.T.)	5	1500	CH70
TF 14	6.3 (C.T.)	7	1500	FV12
TF 15	6.3 (C.T.)	10	1500	FV22
TF 16	10 (C.T.)	5	2500	CH80
TF 17	10 (C.T.)	5	2500	FV10
TF 18	10 (C.T.) or 11 (C.T.) (tapped primary)	12 or 11	7500	DC-5C
TF 19	12.6 (C.T.)	2	1500	CH62

TF 3, 4, 10 & 18 supplied with terminals. All others with leads.

AUTO TRANSFORMERS

To be used as step-down transformer. Equipped with standard receptacle and line cord.

Catalog No.	Transformation	VA Rating	Weight (lbs.)	Case Size
SDT 1*	230/115 V. 50/60 c.p.s.	25	1	CH-60
SDT 2*	230/115 V. 50/60 c.p.s.	50	1¼	CH-62
SDT 3	230/115 V. 50/60 c.p.s.	50	2½	VS-300
SDT 4	230/115 V. 50/60 c.p.s.	100	3	VS-401
SDT 5	230/115 V. 50/60 c.p.s.	200	5	VS-501
SDT 6	230/115 V. 50/60 c.p.s.	300	6½	VS-601
SDT 7	230/115 V. 50/60 c.p.s.	400	8	VS-604
SDT 8	230/115 V. 50/60 c.p.s.	500	11	VS-611
SDT 9	230/115 V. 50/60 c.p.s.	750	15	VS-706
SDT 10	230/115 V. 50/60 c.p.s.	1000	23	VS-718
SDT 11	230/115 V. 50/60 c.p.s.	1500	29½	VS-728
SDT 12*	230/115 V. 50/60 c.p.s.	2000	37	HB-718

*Supplied with leads without line cord and receptacle.

ISOLATION TRANSFORMERS

Electrostatic shield between primary and secondary. Equipped with standard receptacle and line cord.

Catalog Number	Primary Voltage 50/60 c.p.s.	Secondary Voltage	VA Rating	Case Size
IT 1	115	115	50	VS-401
IT 2	115	115	100	VS-503
IT 3	115	115	300	VS-700
IT 4	115	115	500	VS-714
IT 5*	220/440	110/220	250	VS-612
IT 6*	220/440	110/220	500	VS-714

*Supplied with leads without line cords and receptacle.

Variac® Adjustable Autotransformers

VARIAC® MANUALLY OPERATED AUTOTRANSFORMERS

The General Radio Variac autotransformer is a continuously variable unit used to control AC voltage. Features the Duratrak® contact surface, a uniform silver-alloy coating to prevent injurious high-temperature oxidation and resultant brush-track deterioration — track will show no significant wear after 1,000,000 cycles of brush operation. Variac autotransformers are highly efficient, have high thermal capacity, can withstand very high short-term overloads, and do not affect waveform or power factor. Other features: Good regulation; smooth control; long life; linear output voltage; low maintenance; easy installation. All necessary mounting hardware is included with each unit. Portable types, indicated by T in Model No., have an overload protection reset switch, line switch, convenience outlet, and a 6-ft. two- or three-wire line cord. Manually operated and motor-driven Variacs are available in a wide variety of voltage and current ratings, with or without cases. All except portable units can be equipped with ball bearings at slightly higher prices; ball bearings, indicated by BB in Model No. of manually operated units, are included with 4- and 6-gang types. **Angle of Rotation:** 320°. **Line Frequency:** 50 and/or 60 Hz unless otherwise specified. **Input Voltages:** 120, 208, 240 or 280 volts. **Output Voltages:** 0-120/140, 0-208, 0-240/280, 0-480 or 0-560 volts, continuously adjustable. **Current Ratings:** 2 to 300 amps.

W30 Basic Uncased Unit

W2 Basic Uncased Unit

W5M Single Unit Cased

W8 Single Unit Uncased

U2 Uncased

SINGLE-PHASE MODELS

MANY MODELS, AS NOTED, LISTED UNDER UL RE-EXAMINATION SERVICE AND CSA

120-VOLT INPUT UNITS

Line voltage connection output, 0-120 volts; overvoltage connection output, 0-140 volts.

Model No.	Output Amps		kVA	Description	Size, Inches			Shpg. Lbs.
	Rated	Max.			W.	D.↓	H.	
U2	2.25‡	3.0‡	0.36	Uncased	3	2⅞	3¼	5
W2M	2.0	2.6	0.31	Cased†	4⅛	4⅜	5 9/16	9
W2	2.4	3.1	0.37	Uncased†	3¼	3 15/16	3¼	6
W5M	5.0	6.5	0.78	Cased†§	4⅞	4⅜	6 9/16	13
W5	6.0	7.8	0.94	Uncased†§	4½	3 15/16	4½	12
W5LM	7.1	9.2	1.1	Cased¶	4⅞	4⅜	6 9/16	13
W5L	8.5	11.0	1.32	Uncased¶	4½	3 15/16	4½	12
W8	8.5	11.0	1.32	Uncased	4½	4 7/16	4½	15
W8L	10.0	13.0	1.56	Uncased¶	4½	4 7/16	4½	15
W10	10.0	13.0	1.56	Uncased†§	5¾	4 11/16	5¾	18
W10M	10.0	13.0	1.56	Cased†§	6¾	5¼	9 15/32	21
W20	20.0	26.0	3.12	Uncased†§	7½	4⅝	7½	27
W20M	20.0	26.0	3.12	Cased†	8⅝	5⅜	11 15/16	27
W30M	28.0	32.0	3.84	Cased	11	5¾	14¾	46
W30	30.0	36.0	4.32	Uncased	10	4 3/32	10¾	36
W50M	40.0	45.0	5.40	Cased†§	13 7/16	7¼	16 27/32	74
W50	50.0	50.0	6.00	Uncased†§	12½	6 7/32	12½	65
W30G2M	56.0	64.0	7.7	2-Gang W30M▲	11⅜	11½	14 15/16	83
W30G2	60.0	72.0	8.6	2-Gang W30▲	10	11 5/16	10¾	77
W50G2M	80.0	90.0	10.8	2-Gang W50M▲	13 13/16	16⅛	17 1/16	160
W30G3M	84.0	96.0	11.5	3-Gang W30M▲	11⅜	16⅛	14 15/16	115
W50G2	100.0	100.0	12.0	2-Gang W50▲	12½	15 15/16	12½	147
W30G3	90.0	108.0	13.0	3-Gang W30▲	10	15 15/16	10¾	108
W50G3M	120.0	135.0	16.2	3-Gang W50M▲	13 13/16	22½	17 1/16	221
W50G3	150.0	150.0	18.0	3-Gang W50▲	12½	22 5/16	12½	206
W50G4BBM	160.0	180.0	21.6	4-Gang W50BBM▲	13 13/16	28⅞	17 1/16	313
W50G4BB	200.0	200.0	24.0	4-Gang W50BB▲	12½	28 11/16	12½	288
W50G6BBM	240.0	270.0	32.4	6-Gang W50BBM▲	13 13/16	41⅝	17 1/16	430
W50G6BB	300.0	300.0	36.0	6-Gang W50BB▲	12½	41 7/16	12½	400

240-VOLT INPUT UNITS

Line voltage connection output, 0-240 volts; overvoltage connection output, 0-280 volts. All types except portable units can also use a 120-volt input.

Model No.	Output Amps		kVA	Description	Size, Inches			Shpg. Lbs.
	Rated	Max.			W.	D.↓	H.	
W5H	2.0	2.6	0.62	Uncased†	4½	3 15/16	4½	10
W5HM	2.0	2.6	0.62	Cased†	4⅞	4⅜	6 9/16	13
W10H	4.0	5.2	1.25	Uncased†	5¾	4 11/16	5¾	18
W10HM	4.0	5.2	1.25	Uncased†	6¾	5¼	9 15/32	21
W20H	8.0	10.4	2.50	Uncased†§	7½	4⅝	7½	27
W20HM	8.0	10.4	2.50	Cased†	8⅝	5⅜	11 15/16	31
W30H	12.0	15.6	3.74	Uncased	10	4 3/32	10¾	36
W30HM	12.0	15.6	3.74	Cased	11	5¾	14¾	46
W50HM	20.0	31.0	7.45	Cased†§	13 7/16	7¼	16 27/32	76
W50H	25.0	32.5	7.80	Uncased†§	12½	6 7/32	12½	67
W30HG2	24.0	31.2	7.50	2-Gang W30H▲	10	11 5/16	10¾	75
W30HG2M	24.0	31.2	7.50	2-Gang W30HM▲	11⅜	11½	14 15/16	81
W30G2M	28.0	32.0	7.70	2-Gang W30M•■	11⅜	11½	14 15/16	83
W30G2	30.0	36.0	8.60	2-Gang W30•■	10	11 5/16	10¾	77
W50HG2M	40.0	62.0	14.90	2-Gang W50HM▲	13 13/16	16⅛	17 1/16	165
W50HG2	50.0	65.0	15.60	2-Gang W50H▲	12½	15 15/16	12½	153
W50HG3M	60.0	93.0	22.30	3-Gang W50HM▲	13 13/16	22½	17 1/16	230
W50HG3	75.0	97.5	23.4	3-Gang W50H▲	12½	22 5/16	12½	214
W50HG4BBM	80.0	124.0	29.8	4-Gg. W50HBBM▲	13 13/16	28⅞	17 1/16	328
W50HG4BB	100.0	130.0	31.2	4-Gang W50HBB▲	12½	28 11/16	12½	300
W50HG6BBM	120.0	186.0	44.6	6-Gg. W50HBBM▲	13 13/16	41⅝	17 1/16	458
W50HG6BB	150.0	195.0	46.8	6-Gang W50HBB▲	12½	41 7/16	12½	428

*kVA ratings — normal input line voltage times maximum current: maximum current can be drawn at maximum voltage for line voltage connection only. †CSA Approved. ††Listed ratings are for metal panel mountings, ratings in air, 2.0 and 2.5 amps respectively. §Listed under Re-examination Service of UL. ¶For 60 Hz only; no overvoltage connection supplied. • Series-connected windings; do not use with grounded load. ▲ Parallel-connected windings; one or more W50-P1 chokes required (see below). ■Also can be used at 120-volt input with 2x the output ratings shown. ↓Depth behind panel except cased types (excluding knobs).

ACCESSORIES FOR VARIACS

REPLACEMENT BRUSHES

Model No.	For Variac Model
VB-1	M2, U2, V2, W2, W5H
VB-2	M5, V5, W5, W5L
VB-3	W8, W8L
VBT-6†	W50
VBT-7†	W50H
VBT-8†	M20, W20
VBT-10	M10, W10
VBT-11	W10H
VBT-12†	W20H
VBT-13†	W30
VBT-14†	W30H

† Brush set.

MODEL W50-P1 CHOKE FOR PARALLEL COMBINATIONS

When windings of identical Variacs are paralleled to obtain higher load ratings, it is recommended to use one or more chokes to limit excess circulating current in the event that brushes accidentally get out of line. Use 1 choke for 2 Variacs in parallel; 3 chokes for 3 Variacs; 4 chokes for 5 Variacs; 6 chokes for 6 Variacs. Parallel operation of units smaller than Model W30 is not recommended since the next larger unit is more economical. For W50 Series Variacs, the choke can be mounted directly on the terminal plates.

General Radio

300 BAKER AVENUE, CONCORD, MASS. 01742

NEW YORK [N. Y.] (212) 964-2722, [N. J.] (201) 791-8990
BOSTON (617) 646-0550 • DAYTON (513) 294-1500
CHICAGO (312) 992-0800 • WASHINGTON, D. C. (301) 948-7071
ATLANTA (404) 394-5380 • LOS ANGELES (714) 540-9830
SAN FRANCISCO (415) 948-8233 • DALLAS (214) 234-3357
TORONTO (416) 252-3395 • ZURICH (01) 55 24 20

Variac® Adjustable Autotransformers

VARIAC® MANUALLY OPERATED AUTOTRANSFORMERS

W-TYPE MANUAL THREE-PHASE GANGED MODELS

240-VOLT INPUT GANGED UNITS

All units listed require an input of 240 volts except W5LG3M. W5LG3, and W8LG3, which require 208 volts. All have an output range of 0-240 volts except types with H in Model No., 0-280 volts, and types with L in Model No., 0-208 volts. Ball bearings are included with 4- and 6-gang types; available for other types at extra cost.

Model No.	Output Amps		kVA*	Description	Size, Inches			Shpg. Lbs.
	Rated	Max.			W.	D.↓	H.	
W5LG3M	7.1	9.2	3.31	3-Gang W5LM†‡	5 1/8	13 3/32	6 3/4	32
W5LG3	8.5	11.0	3.96	3-Gang W5L†‡	4 1/2	12 15/16	4 1/2	30
W8LG3	10.0	13.0	4.68	3-Gang W8L†‡	4 1/2	14 3/4	4 1/2	36 1/2
W5HG2	2.0	2.6	1.08	2-Gang W5H§	4 1/2	8 13/16	4 1/2	21
W5HG2M	2.0	2.6	1.08	2-Gang W5HM§	5 1/8	8 31/32	6 3/4	23
W2G3M	2.0	2.6	1.08	3-Gang W2M†¶	4 3/8	12 15/16	5 3/4	21
W2G3	2.4	3.1	1.29	3-Gang W2†¶	3 1/4	12 3/16	3 1/4	19
W10HG2	4.0	5.2	2.16	2-Gang W10H§	5 3/4	10 7/16	5 3/4	33
W10HG2M	4.0	5.2	2.16	2-Gang W10HM§	7 1/8	10 5/8	9 11/16	37
W5G3M	5.0	6.5	2.70	3-Gang W5M†¶	5 1/8	13 3/32	6 3/4	32
W5G3	6.0	7.8	3.24	3-Gang W5†¶	4 1/2	12 15/16	4 1/2	30
W8G3	8.5	11.0	4.57	3-Gang W8†¶	4 1/2	14 3/4	4 1/2	36
W20HG2	8.0	10.4	4.32	2-Gang W20H§#	7 1/2	10 5/16	7 1/2	55
W20HG2M	8.0	10.4	4.32	2-Gang W20HM§#	9	10 1/2	12 1/16	59
W10G3	10.0	13.0	5.40	3-Gang W10†¶	5 3/4	15 1/8	5 3/4	48
W10G3M	10.0	13.0	5.40	3-Gang W10M†¶	7 1/8	15 5/16	9 11/16	54
W30HG2	12.0	15.6	6.48	2-Gang W30H§#	10	11 5/16	10 3/4	75
W30HG2M	12.0	15.6	6.48	2-Gang W30HM§#	11 3/8	11 1/2	14 15/16	81
W20G3	20.0	26.0	10.80	3-Gang W20†¶#	7 1/2	14 7/8	7 1/2	78
W20G3M	20.0	26.0	10.80	3-Gang W20M†¶#	9	15 1/16	12 1/16	84
W50HG2M	20.0	31.0	12.90	2-Gang W50HM§#	13 13/16	16 1/8	17 1/16	165
W30G3M	28.0	32.0	13.30	3-Gang W30M†¶#	11 3/8	16 1/8	14 15/16	115
W50HG2	25.0	32.5	13.50	2-Gang W50H§#	12 1/2	15 15/16	12 1/2	153
W30G3	30.0	36.0	15.00	3-Gang W30†¶#	10	15 15/16	10 3/4	108
W50G3M	40.0	45.0	18.70	3-Gang W50M†¶#	13 13/16	22 1/2	17 1/16	221
W50G3	50.0	50.0	20.80	3-Gang W50†¶#	12 1/2	22 5/16	12 1/2	206
W50HG4BBM	40.0	62.0	25.80	4-Gg. W50HBBM§#	13 13/16	28 7/8	17 1/16	328
W50HG4BB	50.0	65.0	27.00	4-Gg. W50HBB§#	12 1/2	28 11/16	12 1/2	300
W50G6BBM	80.0	90.0	37.40	6-Gg. W50BBM†¶#▲	13 13/16	41 5/8	17 1/16	430
W50G6BB	100.0	100.0	41.60	6-Gg. W50BB†¶#▲	12 1/2	41 7/16	12 1/2	400

480-VOLT INPUT GANGED UNITS

All Variacs listed are for "Y" connection. Overvoltage circuits are not recommended. Ball bearings are included with 6-gang types; available for remaining types at extra cost. Output voltage range, 0-480 volts.

Model No.	Output Amps		kVA*	Description	Sizes, Inches			Shpg. Lbs.
	Rated	Max.			W.	D.↓	H.	
W5HG3	2.0	2.6	2.16	3-Gang W5H	4 1/2	12 15/16	4 1/2	29
W5HG3M	2.0	2.6	2.16	3-Gang W5HM	5 1/8	13 3/32	6 3/4	31
W10HG3	4.0	5.2	4.32	3-Gang W10H	5 3/4	15 1/8	5 3/4	46
W10HG3M	4.0	5.2	4.32	3-Gang W10HM	7 1/8	15 5/16	9 11/16	52
W20HG3	8.0	10.4	8.65	3-Gang W20H	7 1/2	14 7/8	7 1/2	73
W20HG3M	8.0	10.4	8.65	3-Gang W20HM	9	15 1/16	12 1/16	81
W30HG3	12.0	15.6	13.00	3-Gang W30H	10	15 15/16	10 3/4	107
W30HG3M	12.0	15.6	13.00	3-Gang W30HM	11 3/8	16 1/8	14 15/16	113
W50HG3M	20.0	31.0	25.80	3-Gang W50HM	13 13/16	22 1/2	17 1/16	230
W50HG3	25.0	32.5	27.00	3-Gang W50H	12 1/2	22 5/16	12 1/2	214
W50HG6BBM	40.0	62.0	51.50	6-Gang W50HBBM▲	13 13/16	41 5/8	17 1/16	458
W50HG6BB	50.0	65.0	54.00	6-Gang W50HBB▲	12 1/2	41 7/16	12 1/2	428

* kVA ratings — normal input line voltage times maximum current; maximum current can be drawn at maximum voltage for line voltage connection only. † "Y"-circuit connected. ‡ For 60 Hz only; no overvoltage connection. § Open-delta circuit connected. ¶ Overvoltage connection not recommended. ▲ See previous page for W50-P1 Choke for parallel combinations. ↓ Depth behind panel except cased types (excluding knobs). # Also for single-phase 120-volts input.

SINGLE-PHASE PORTABLE VARIACS

Portable, metered, cased Variacs with 2-wire or 3-wire cord and receptacle, and convenient carrying handle. Meter accuracy is 3% of full scale except 5% for ammetered Model W20HMT3A. Power switch disconnects both sides of line. Meters are switchable under load. Types MT and MT3 have overvoltage connections and corresponding dial scales; line-voltage connections and dial scales on special order.

120-VOLT INPUT

All units have max, output voltage range of 0-140 volts except W5LMT3 which has 0-120 volts. Models W5MT and W10MT come in 2-wire version; all others in 3-wire version.

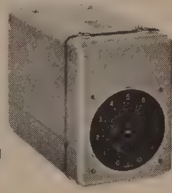
Model No.	Rated Output, Amps	Meter Range (full-scale)			Size, Inches			Shpg. Weight Lbs.
		Amps	Watts	V	W.	D.	H.	
W5MT*†	5.0	……	……	……	4 7/8	4 3/8	6 9/16	15
W5MT3*†	5.0	……	……	……	4 7/8	4 3/8	6 9/16	15
W5MT3VM	5.0	……	……	150	4 7/8	4 3/8	6 9/16	19
W5MT3A	5.0	1/5	……	150	6 3/4	5 1/4	9 1/2	19
W5MT3W	5.0	……	150/750	150	6 3/4	5 1/4	9 1/2	19
W5MT3AW	5.0	1/5	150/750	150	11 15/16	5 3/8	8 5/8	21
W5LMT3§	7.1	……	……	……	4 7/8	4 3/8	6 9/16	18
W8MT3	10.0	……	……	……	5 3/8	6 1/8	7	16
W8MT3VM	10.0	……	……	150	5 3/8	6 1/8	7	16
W10MT†	10.0	……	……	……	6 3/4	5 1/4	9 1/2	24
W10MT3†	10.0	……	……	……	6 3/4	5 1/4	9 1/2	24
W10MT3A	10.0	2/10	……	150	8 5/8	5 3/8	11 15/16	30
W10MT3W	10.0	……	300/1500	150	8 5/8	5 3/8	11 15/16	30
W20MT3A	18.0	20	……	150	8 5/8	5 3/8	11 15/16	34
W20MT3†	18.0	……	……	……	8 5/8	5 3/8	11 15/16	23

240-VOLT INPUT

All units have max. output voltage range of 0-280 volts. Models W5HMT and W10HMT come in 2-wire cord and receptacle; all others in 3-wire cord and receptacle.

W5HMT†	2.0	……	……	……	4 7/8	4 3/8	6 9/16	15
W10HMT	4.0	……	……	……	6 3/4	5 1/4	9 1/2	24
W10HMT3†	4.0	……	……	……	6 3/4	5 1/4	9 1/2	24
W20HMT3†	8.0	……	……	……	8 5/8	5 3/8	11 15/16	35
W20HMT3A	8.0	10	……	300	8 5/8	5 3/8	11 15/16	31

* Listed under UL Re-examination Service. † CSA Approved. § 60 Hz only.


W10G3M
3-Gang
Cased

W5G3
3-Gang
Uncased

W30G6BB
6-Gang
Uncased

W8MT3VM

W8MT3

Variac® Adjustable Autotransformers

VARIAC® MANUAL AND MOTOR-DRIVEN AUTOTRANSFORMERS

M-TYPE MANUAL MODELS FOR 350-1200 Hz OPERATION

For use at line frequencies between 350 and 1200 Hz. Equivalent to their Type-W counterparts, but smaller and lighter, and provide better regulation at 400 Hz than 60 Hz models. Conform to most military specifications for shock, vibration, salt spray, tropicalization, altitude, humidity and temperature.

SINGLE-PHASE 120-VOLT INPUT UNITS

Line voltage connection output, 0-120 volts; overvoltage connection output, 0-140 volts.

Model No.	Output Amps		kVA*	Description	Shpg. Wt. Lbs.
	Rated	Max.			
M2	2.4	3.1	0.37	Uncased	4
M5	6.0	7.8	0.94	Uncased	6
M10	10.0	13.0	1.56	Uncased	11
M20	20.0	26.0	3.12	Uncased	18

* kVA ratings — normal input line voltage times maximum current; maximum current can be drawn at maximum voltage for line voltage connection only.

SINGLE-PHASE 240-VOLT INPUT UNITS

Line voltage connection output, 0-240 volts; overvoltage connection output, 0-280 volts.

Model No.	Output Amps		kVA*	Description	Shpg. Wt. Lbs.
	Rated	Max.			
M2G2	2.4	3.1	0.74	2-Gang M2	6
M5G2	6.0	7.8	1.88	2-Gang M5	12
M10G2	10.0	13.0	3.12	2-Gang M10	18
M20G2	20.0	26.0	6.24	2-Gang M20	34

THREE-PHASE 240-VOLT INPUT UNITS

Line voltage connection output, 0-240 volts; overvoltage connection not recommended.

Model No.	Output Amps		kVA*	Description	Shpg. Wt. Lbs.
	Rated	Max.			
M2G3	2.4	3.1	1.29	3-Gang M2	9
M5G3	6.0	7.8	3.24	3-Gang M5	14
M10G3	10.0	13.0	5.40	3-Gang M10	27
M20G3	20.0	26.0	10.80	3-Gang M20	48

MOTOR DRIVEN MODELS

All W- and M-type Variac autotransformers, both single and ganged, can be supplied with motor drives. Motors are fully enclosed, two-phase gear-reduction servo types having very low moments of inertia; the motor mounting plate is attached to the base end of the autotransformer by means of four heavy corner posts. Gear coupling is used to facilitate precise alignment, eliminate phase shift problems, and permit a number of drive speeds by simple change of gears. Three basic internal-geared motor speeds are available which, with a selection of standard coupling gears, makes possible the assembly of units having nominal full-traverse (320°) speeds of 2, 4, 8, 16, 32, 64 or 128 seconds at 60 Hz (approximately 20% slower at 50 Hz). The 2- and 4-second units are intended for high-speed servo applications; slower speed models are primarily for remote positioning. Cases are available for most models as indicated. **All motor-driven Variacs are furnished complete with ball bearings, a 120-volt phase-shift capacitor, and an adjustable microswitch for setting traverse limits.**

HOW TO ORDER

```
W 5 H G 3      D 8 C K      M
A ——┘          B ——┘        C┘
```

A **Basic Unit Prefix:** Select from table below the desired basic Variac unit, as described elsewhere in these pages.

B **Motor Indicator Suffix:** Add appropriate suffix for each Variac as indicated by an X in columns below. Suffix indicates seconds for 320° traverse.

C **Case Suffix:** Add final suffix **M** if case available and desired. Case fully encloses both motor and Variac.

Variac Prefix No.	Motor Indicator: D ( ) CK							
	2	4	8	16	32	32	64	128
M2	X	X	X	X	....	X	X	....
M2G2	X	X	X	X	....	X	X	....
M2G3	....	X	X	X	....	X	X	....
M5	X	X	X	X	....	X	X	....
M5G2	X	X	X	X	....	X	X	....
M5G3	....	X	X	X	....	X	X	....
M10	X	X	X	X	X	....	X	X
M10G2	....	X	X	X	X	....	X	X
M10G3	....	....	X	X	X	....	X	X
M20	....	X	X	X	X	....	X	X
M20G2	....	....	X	X	X	....	X	X
M20G3	....	....	X	X	X	....	X	X
W2	X	X	X	X	....	X	X	....
W2G2	X	X	X	X	....	X	X	....
W2G3	....	X	X	X	....	X	X	....
W5	X	X	X	X	....	X	X	....
W5G2	X	X	X	X	....	X	X	....
W5G3	....	X	X	X	....	X	X	....
W5H	X	X	X	X	....	X	X	....
W5HG2	X	X	X	X	....	X	X	....
W5HG3	....	X	X	X	....	X	X	....
W5L	X	X	X	X	....	X	X	....
W5LG2	X	X	X	X	....	X	X	....
W5LG3	....	X	X	X	....	X	X	....
W8	X	X	X	X	....	X	X	....
W8G2	X	X	X	X	....	X	X	....
W8G3	....	X	X	X	....	X	X	....
W8L	X	X	X	X	....	X	X	....
W8LG2	X	X	X	X	....	X	X	....
W8LG3	....	X	X	X	....	X	X	....
W10	X	X	X	X	X	....	X	X
W10G2	....	X	X	X	X	....	X	X
W10G3	....	....	X	X	X	....	X	X
W10H	X	X	X	X	X	....	X	X
W10HG2	....	X	X	X	X	....	X	X
W10HG3	....	....	X	X	X	....	X	X
W20	....	X	X	X	X	....	X	X
W20G2	....	....	X	X	X	....	X	X
W20G3	....	....	X	X	X	....	X	X
W20H	....	X	X	X	X	....	X	X
W20HG2	....	....	X	X	X	....	X	X
W20HG3	....	....	X	X	X	....	X	X
W30	....	X	X	X	X	....	X	X
W30G2	....	....	....	X	X	....	X	X
W30G3	....	....	....	....	X	....	X	X
W30H	....	X	X	X	X	....	X	X
W30HG2	....	....	....	X	X	....	X	X
W30HG3	....	....	....	....	X	....	X	X
W50	....	....	....	X	X	....	X	X
W50G2	....	....	....	....	X	....	X	X
W50G3	....	....	....	....	X	....	X	X
W50G4	....	....	....	....	....	....	....	X
W50G6	....	....	....	....	....	....	....	X
W50H	....	....	....	X	X	....	X	X
W50HG2	....	....	....	....	X	....	X	X
W50HG3	....	....	....	....	X	....	X	X
W50HG4	....	....	....	....	....	....	....	X
W50HG6	....	....	....	....	....	....	....	X

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FERROTRAN
ELECTRONICS CO., INC.

MINIATURE TRANSFORMERS

Extremely small rectifier transformers with single or dual secondary winding for electronic designers who wish to design their own solid state power supplies. 115 volt A.C. input, 55-450 cycles ratings below give D.C. outputs for rectifier circuits with condenser input.

SUBMINIATURE UNITS

Channel-frame (1⅜"x1⅛"x1").

Model	Sec. D.C., Volts	Sec. D.C., Current	Price
SM-1	10C.T.	80ma	$12.50
SM-2	15C.T.	60	12.50
SM-3	20C.T.	50	12.50
SM-4	30C.T.	30	12.50
SM-5	12, 12C.T.	30	16.00
SM-6	15, 15C.T.	25	16.00
SM-7	40	25	13.00
SM-8	50	20	13.00
SM-9	60	17	13.00
SM-10	70	15	13.00

MINIATURE UNITS

Channel-frame (1⅝"x1⅜"x1⅛").

Model	Sec. D.C., Volts	Sec. D.C., Current	Price
R-1	40C.T.	35ma	$11.50
R-2	30C.T.	50	11.50
R-3	20C.T.	75	11.50
R-4	10C.T.	160	11.50
R-5	20, 20C.T.	50	13.50
R-6	15, 15C.T.	50	13.50
R-7	10, 10C.T.	75	13.50
R-8	6. 6C.T.	100	13.50
R-9	50	30	11.50
R-10	60	27	12.00
R-11	70	22	12.00
R-12	80	20	12.00
R-13	90	18	12.00
R-14	100	18	12.50
R-15	120	15	12.50
R-16	150	15	13.00
R-17	180	10	13.00
R-18	200	10	13.00

The R Series also available in epoxy case for printed circuit boards. 1⅝"x1⅞"x1½".

INTERMEDIATE UNITS

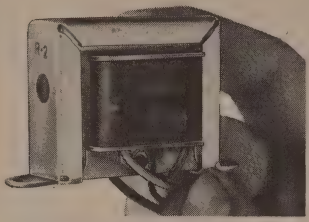
Channel-frame (2"x1⅝"x1¼").

Model	Sec. D.C., Volts	Sec. D.C., Current	Price
I-1	10C.T.	300ma	$10.00
I-2	15C.T.	250	10.00
I-3	20C.T.	200	10.00
I-4	25C.T.	175	10.50
I-5	30C.T.	140	10.50
I-6	40C.T.	125	10.50
I-7	20, 20C.T.	125	12.50
I-8	15, 15C.T.	125	12.50
I-9	10, 10C.T.	150	12.50
I-10	50	80	11.00
I-11	75	60	11.50
I-12	100	35	11.50
I-13	150	30	12.00
I-14	180	30	12.00
I-15	200	25	12.00

SUBMINIATURE PC UNITS

Encapsulated transformers in a grey epoxy housing mounted on rigid epoxy forms; incorporates pins for direct soldering to printed circuit boards. 1⅝"x1¼"x1¼".

Model	Sec. D.C., Volts	Sec. D.C., Current	Price
SM-1A	10	80ma	$13.00
SM-2A	15	60	13.00
SM-3A	20	50	13.00
SM-4A	30	30	14.00
SM-5A	12, 12	30	15.00
SM-6A	15, 15	25	16.00



R-2 CHANNEL FRAME TRANSFORMER

Transformers shown on this page priced and specified for channel-frame mounting.

STANDARD UNITS

Channel-frame (2¼"x2"x1⅝").

Model	Sec. D.C., Volts	Sec. D.C., Current	Price
S-1	10C.T.	670ma	$10.50
S-2	15C.T.	500	10.50
S-3	20C.T.	300	11.00
S-4	30C.T.	225	11.00
S-5	50C.T.	125	11.50
S-6	20, 20C.T.	150	13.50
S-7	15, 15C.T.	200	13.50
S-8	10, 10C.T.	300	13.50
S-9	75	120	11.50
S-10	100	70	11.50
S-11	120	60	12.00
S-12	150	45	12.00
S-13	200	35	12.00

CM SERIES

Channel-frame (2⅝"x2 3⁄16"x1¾").

Model	Sec. D.C., Volts	Sec. D.C., Current	Price
CM-1	10C.T.	1.0a	$11.00
CM-2	15C.T.	.75	11.00
CM-3	20C.T.	.60	11.00
CM-4	30C.T.	.40	11.00
CM-5	40C.T.	.3a	11.00
CM-6	80	.14	11.00
CM-7	100	.12	11.00
CM-8	120	.10	12.00
CM-9	150	.07	12.00
CM-10	175	.06	12.00
CM-11	200	.05	12.00

DESIGN INFORMATION

CENTER TAP — All center-tapped units are specified C.T. The ratings, therefore, are for a full-wave circuit. All others are designed for a bridge circuit.

TEST VOLTAGE — 1000 volts, D.C. between primary and secondary, and between secondary windings.

INSULATION — Nylon bobbin; insulating paper between each layer.

LEADS — Flexible leads rated for 105°C.

DUAL SECONDARIES — Transformers shown with two output units give indicated current from each tap.

All transformers listed may be wound for 220 volts, A.C. input.

SPECIAL TRANSFORMERS

There is no extra charge to design transformers with output voltages similar to those shown on this page. Call us for our free estimate. You can rely on our prompt service.

HIGH CURRENT UNITS

Channel-frame (3"x2½"x2").

Model	Sec. D.C., Volts	Sec. D.C., Current	Price
H-1	10C.T.	1.3amp	$14.00
H-2	15C.T.	1.3	14.00
H-3	20C.T.	1.0	14.00
H-4	30C.T.	0.7	14.00
H-5	40C.T.	0.4	14.00
H-6	20, 20C.T.	0.5	16.00
H-7	15, 15C.T.	0.7	16.00
H-8	10, 10C.T.	1.0	16.00
H-9	80	.225	14.00
H-10	100	.180	14.00
H-11	120	.150	14.50
H-12	150	.130	14.50
H-13	175	.110	15.00
H-14	200	.100	15.00
H-15	225	90ma	15.00
H-16	250	80	15.50
H-17	275	70	15.50
H-18	300	65	15.50
H-19	400	50	16.00
H-20	500	40	16.00

RT SERIES

Channel-frame (3¾"x2⅝"x3").

Model	Sec. D.C., Volts	Sec. D.C., Current	Price
RT-1	10C.T.	5amp	$17.00
RT-2	15C.T.	3.5	17.00
RT-3	20C.T.	2.5	17.00
RT-4	30C.T.	1.7	17.00
RT-5	40C.T.	1.3	17.00
RT-6	50	1.0	17.00
RT-7	75	.7	18.00
RT-8	100	.5	18.00
RT-9	120	.5	19.00
RT-10	150	.4	19.00
RT-11	180	.4	19.00
RT-12	200	.35	19.00

ISOLATION TRANSFORMERS

Model	Sec. D.C., Volts	Sec. D.C., Current	Price
IH	115	170ma	$14.00

ENCASED TRANSFORMERS

All listed transformers are available fully encapsulated in a MIL-T-27 can.

The cost of such units is an additional $10.00 for single secondary transformers and $12.00 additional for dual secondary units.

Standard connectors are of the hooked solder pin type, mounted dead center on the stud side of the case.

SEE SECTION 4000
FOR LIST OF FERROTRAN POWER SUPPLIES

FERROTRAN ELECTRONICS COMPANY, INC.
683 BROADWAY • NEW YORK, N.Y. 10012 • PHONES: (212) 254-5810; 254-5636

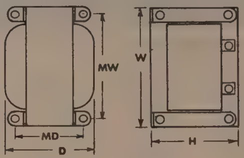
K.G.S. electronics, inc.

kgs electronics

2029 North Lincoln Avenue • Pasadena, California 91103 • Telephone (213) 798-0787

POWER TRANSFORMERS AND HIGH CURRENT CHOKES

- Primary Voltage = 115 V RMS, 60 Hz (Will Operate to 400 Hz).
- Transformer Regulation is 5% No Load to Full Load.
- Transformers Rated for 45°C Temperature Rise.
- All Transformers Have Two Secondary Windings. They Can Be Connected for Parallel or Series Operation.
- Available Immediately from Stock.
- Secondary Voltages between the Standard Units Available.
- All Chokes Have Two Identical Coils. They Can be Connected in Parallel or Series.
- All Chokes and Transformers Rated for Class R Performance Per MIL-T-27C.



TRANSFORMERS

Power Watts	Part No.	Secondary	
		Es VRMS	Curr. ARMS
100	100-12.8	12.8	8
100	100-28	28	4
100	100-36	36	3
100	100-56	56	2
250	250-12.8	12.8	20
250	250-28	28	9
250	250-36	36	7
250	250-56	56	4.5
500	500-12.8	12.8	40
500	500-28	28	18
500	500-36	36	14
500	500-56	56	9
1000	1000-28	28	36
1000	1000-36	36	28
1000	1000-56	56	18

INDUCTANCE TABLE

Part No.	Series			Parallel		
	Ind. MH	Curr. ADC	DC Res. Ohm	Ind. MH	Curr. ADC	DC Res. Ohm
100-8L	8	6.0	.06	2	12	.015
100-40L	40	3.0	.35	10	6	.09
100-60L	60	2.5	.56	15	5	.14
100-160L	160	1.6	1.35	40	3.3	.34
250-4L	4	15.0	.037	1	30	.009
250-16L	16	8.0	.146	4	16	.037
250-28L	28	6.0	.20	7	12	.05
250-60L	60	4.0	.50	15	8	.125
500-2L	2	34.0	.016	0.5	68	.004
500-8L	8	15.0	.05	2	30	.012
500-16L	16	13.0	.09	4	26	.022
500-28L	28	8.0	.22	7	16	.055
1000-4L	4	30.0	.026	1	60	.007
1000-6L	6	25.0	.038	1.5	50	.01
1000-16L	16	17.0	.10	4	34	.025

TRANSFORMER

Power VA	Dimensions in Inches						Wt. Lb.
	W	H	D	MW	MD	A	
100	3 3/8	2 13/16	3 1/2	2 13/16	3	7/32 x 5/16	5
250	4 1/2	3 3/4	4	3 3/4	3 1/8	7/32 x 5/16	10
500	5 1/4	4 3/8	4 1/2	4 3/8	3 1/2	9/32 x 13/32	16
1000	6 3/8	5 5/16	6	5 5/16	4 1/2	9/32 x 1/2	30

CHOKES

100	3 3/8	2 13/16	3 1/8	2 13/16	2 3/4	7/32 x 5/16	5
250	4 1/8	3 7/16	4 5/16	3 7/16	3 1/2	7/32 x 5/16	10
500	5 1/4	4 3/8	4 1/2	4 3/8	3 1/4	9/32 x 13/32	16
1000	6 3/8	5 5/16	6	5 5/16	4 1/4	9/32 x 1/2	27

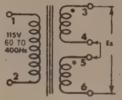
HOW TO ORDER

- **CHOKES**

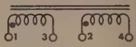
100 - 8L
VA Rating — Series Inductance in Millihenries

- **TRANSFORMERS**

100 - 28
VA Rating — Secondary RMS Voltage



TRANSFORMERS



CHOKES

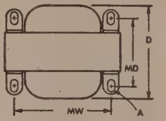
AUTO TRANSFORMERS

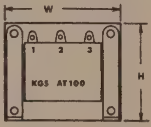
FEATURE:

- Small size and weight
- 50/60 Hz operation
- Regulation 5%
- Open frame construction
- Designed to meet MIL-T-27C per TF6RX01

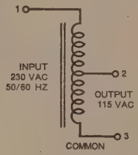
APPLICATIONS:

- Step down, 230 VAC to 115 VAC (Fig. I)
- Step up, 115 VAC to 230 VAC (Fig. II)
- Other voltages*, 5V to 600 VAC @ 30A max., available on special order



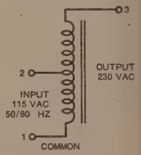


TRANSFORMER CONNECTIONS:



2:1 STEP DOWN

FIGURE I



1:2 STEP UP

FIGURE II

Part No.	Power VA	Dimensions in Inches ±1/16						Wt. Lb.
		W	H	D (Max.)	MD	MW	A	
AT100	100	3.38	2.81	3.00	2.12	2.81	7/32 x 5/16	3
AT200	200	3.38	2.81	3.70	3.00	2.81	7/32 x 5/16	5
AT500	500	4.50	3.75	4.25	3.12	3.75	7/32 x 5/16	10
AT1000	1000	5.25	4.38	4.75	3.62	4.38	9/32 x 13/32	16
AT2000	2000	7.06	6.06	5.75	3.75	5.81	5/16 x 11/16	30

HOW TO ORDER

1. Standard Parts Listed: By Part Number
2. Non-Standard Parts: Specify*

AT100 - Input AC - Output AC
Part No. & VA Rating — 115 V or 230 V — Desired* Voltage

400 Hz POWER TRANSFORMERS

- Available immediately from stock.
- Secondary voltages between the standard units at no additional cost.
- Allow two weeks for non-standard voltage transformers.

APPLICATIONS:

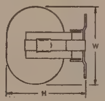
- Isolation
- Power supplies
- Step-down

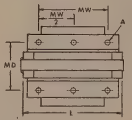
DESIGN INFORMATION:

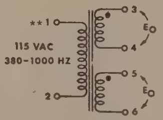
- Transformers designed to meet MIL-T-27C per

TF - 8 - R - X - — - ZZ
Transformer
Open Type
105°C
10,000 Hrs. Minimum
(02) Rectified & (01) Unrectified Loads
Open Type

- All primaries 115 VAC 380-1000 Hz.
- Transformer regulation is 6% no load to full load.
- All transformers have two secondary windings. They can be connected for parallel or series operation.







VA Rating	Part No.	Dual Secondary			
		Eo (RMS)		Amps (RMS)	
		P*	S*	P*	S*
100	CC100-6.3 CC100-26	6.3 26	12.6 52	16 4	8 2
250	CC250-6.3 CC250-26	6.3 26	12.6 52	40 10	20 5
500	CC500-6.3 CC500-26	6.3 26	12.6 52	80 19	40 9.5
750	CC750-6.3 CC750-26	6.3 26	12.6 52	120 30	60 15

*P = Parallel; S = Series

VA Rating	Overall Dimensions			Mounting Dimensions			Hole A	Wt. Lb.
	W	H	L	MW	MW/2	MD		
100	2.00	2.50	2.56	2.00	NA	1.37	.156	1.2
250	3.38	3.38	3.25	2.50	NA	1.43	.156	2.5
500	4.50	4.38	4.00	3.62	1.81	2.00	.196	6.0
750	4.75	4.50	4.25	3.62	1.81	2.00	.196	7.0

HOW TO ORDER

CC - 100 - 6.3 - **
"C" Core
VA Rating
Secondary Volts

**Specify primary voltage if other than 115 VAC.

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kgs electronics

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CURRENT TRANSFORMERS

FEATURE:

- Accurate and expedient method of measuring AC current to 1000 amps.
- Convenient and easy method to convert AC current to AC or DC voltage.
- Measures AC current with minimum interaction from metering circuits
- Transforms primary current in accordance to IpNp = IsNs
- Rated Class R (105°C) minimum per MIL-T-27C.
- Insulation Test Voltage: 1500 VAC @ 60 Hz.

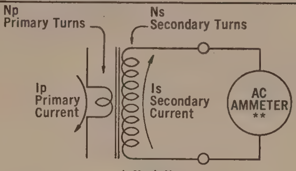
SERIES DESCRIPTION

Series	Description
CT	60-400 Hz toroidal type. Primary is single turn provided by insulated conductor under test. Secondary drives 1A or 5A AC ammeter.
CMC	60-400 Hz EI type. Multiple-turn primary transforms AC current to proportional AC secondary voltage, Es across Rs, for AC or DC control.
CTA	60-3K Hz multi primary current range toroidal type. This Series conveniently converts low AC voltmeter range into AC current meter. Rs supplied per schematic.

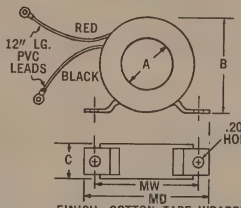
CT SERIES

CT Series Size	Primary Current Amps	Secondary			Dimensions in Inches					Wt. (lb.)
		Meter Current Amps	V RMS @ 60 Hz Max.	Burden @ 60 Hz VA Max. **	A	B	C	MD	MW	
11	20	1	.5	.5	.90	2.62	1.12	3.31	2.68	.7
	30	1	2.5	1						
	50	1	4	2						
	100	1	9	2						
51	40	5	.5	2.5	1.00	3.25	1.50	3.75	3.12	1.2
	50	5	1	5						
	60	5	1.5	5						
	100	5	2.5	5						
52	150	5	3	5	1.40	3.50	1.55	4.25	3.62	1.6
	200	5	5	5						
	300	5	7	5						
	400	5	9	5						
53	500	5	3	5	2.00	4.00	1.30	4.75	4.12	1.4
	600	5	4	5						
	800	5	5	5						
	1000	5	6	5						

**Max. Burden for 2% Accuracy: .48 ohms for 1A Ammeter, .02 ohms for 5A Ammeter.


Np
Primary Turns
Ns
Secondary Turns
Ip
Primary
Current
Is
Secondary
Current
AC
AMMETER
**

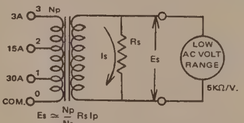
IpNp-IsNs
AC AMMETER and RANGE EXTENSION
CT SERIES SCHEMATIC


RED
12" LG.
PVC
LEADS
BLACK
A
B
.204
HOLE
C
MW
MD

FINISH: COTTON TAPE WRAPPED
AND EPOXY DIPPED
CT SERIES

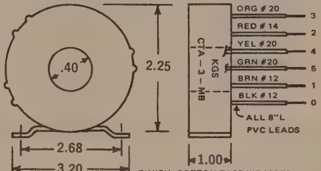
CTA SERIES

CTA Series Part No.	Primary Current Amps	Secondary	
		Full Scale Deflection @ 5KΩ/VAC	Tracking Deviation ±%
CTA-3-MB	3A 15A, 30A	3	2


3A
3
Np
15A
2
30A
1
COM.
0
Rs
Is
Es
LOW
AC VOLT
RANGE
5KΩ/V.

$E_s \simeq \frac{N_p}{N_s} R_s I_p$

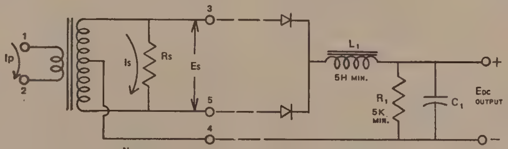
AMPS/VOLTS CONVERTER
CTA SERIES SCHEMATIC


.40
2.25
2.68
3.20
1.00
ORG # 20
RED # 14
YEL # 20
GRN # 20
BRN # 12
BLK # 12
3
2
4
5
1
0
ALL 8"L
PVC LEADS
KGS
CTA-3-MB

FINISH: COTTON TAPE WRAPPED
AND EPOXY DIPPED
CTA SERIES

CMC SERIES

CMC Series Size	Primary Current Amps *	Burden @ 60 Hz RS (ohms)	Secondary	Tracking Deviation ±% Es
			Es RMS @ 60 Hz Max.	
37	0-1	1K	20	3
	0-5	1K	20	3
	0-10	1K	20	3
	0-20	1K	20	3
	0-30	1K	20	3


1
Ip
2
Is
Rs
Es
3
5
4
L1
5H MIN.
R1
5K
MIN.
C1
+
EDC
OUTPUT
−

$E_{DC} \cong 0.4 \frac{N_p}{N_s} R_s I_p$ for $R_1 \gg R_s$, R_1 = TOTAL LOAD; L_1 = CHOKE

AC AMPS/DC VOLTS CONVERTER
CMC SERIES SCHEMATIC

AVAILABILITY:

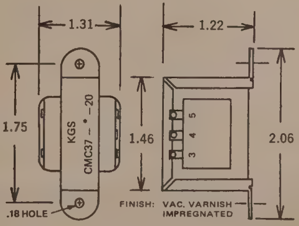
- Standard units listed generally available from stock.
- Allow 4 weeks delivery for non-standard units.

HOW TO ORDER

CT11 - 20 - * - MB
Mounting bracket
Secondary meter current
Primary current to be measured
Series type and size

CTA SERIES — Order by Part Number

CMC37 - * - 20
Secondary RMS voltage, Es
Primary current
Series


1.31
1.22
1.75
1.46
2.06
.18 HOLE
KGS
CMC37 - * - 20
5
4
3
FINISH: VAC. VARNISH
IMPREGNATED

CMC SERIES

K.G.S.
electronics, inc.

kgs electronics

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ISOLATION TRANSFORMER

- Applied for UL listing*
- Built-in line cord and plug*
- Built-in voltage meter
- Built-in circuit breaker protection
- 60 Hz portable
- Electrostatic shield
- Low leakage current
- Hospital grade plug & receptacle available*

*Medical equipment

APPLICATION:
- Isolation Transformer

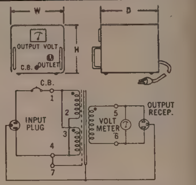
HOW TO ORDER

IT - 500 - XX

ISOLATION TRANSFORMER — IT
VA RATING — 500
SECONDARY VOLTAGE IF OTHER THAN 115 VAC — XX

Power Rating VA	Part No.	Voltage Primary VAC	Voltage Sec. VAC	Dimensions in Inches W	Dimensions in Inches D	Dimensions in Inches H	App. Wt. Lbs.
500	IT-500	115	115	6.00	7.00	5.00	20
1000	IT-1000	115	115	6.87	8.00	6.00	35
1500	IT-1500	115	115	8.00	9.00	6.50	50
2000	IT-2000	115	115	8.00	9.00	6.50	60

Leakage Current	
Input Polarity	Output (Term. 5) to Earth Gnd. Leak
Normal	5 μA Typ.
Reversed	5 μA Typ.

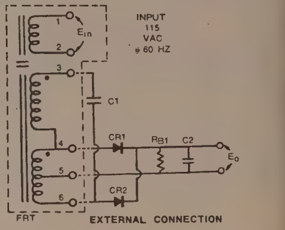


FERRO-RESONANT TRANSFORMER

Ferro-Resonant Transformer (FRT) provides a stable transient-free, regulated DC voltage with short-circuit protection and superior dynamic characteristic. A series of these FRT's are available from KGS ELECTRONICS at almost any output voltage.

FEATURE:
- Wide choice of output voltage from 6 VDC to 240 VDC and up to 500 VA, 20 Amps maximum.
- Designed for maximum efficiency for the given size.
- Line regulation is ±1% (See schematic).
- With an additional resonant capacitor to C1 (about 50%), ±1% line regulation is realized at 95 VAC input with slight increase in overall output voltage Eo.
- No load to full load regulation is 5% to 10% depending on the bleeder value.

APPLICATION:
- Replacement of conventional power transformer for transient suppression.
- Economical and reliable DC power supply, battery charger, etc.



STANDARD RATING AND SIZE

VA Unit	W (in.)	H (in.)	D (in.)	MW (in.)	MD (in.)	LAM (in.)	A (in.)	Wt. (lb.)	Suggested Value* C1 (μF)	Suggested Value* C2 (μF)	Suggested Value* RB1 (Watt)
50	3.13	3.78	2.75	2.62	2.13	1.12	13/64 x 21/64	5	1.0	10K	10
100	5.00	3.75	3.40	4.25	2.50	1.50	13/64 x 21/64	8	1.5	22K	20
200	5.25	5.75	4.00	4.38	2.25	1.12	9/32 x 9/16	12	2.0	40K	25
300	5.25	5.75	4.25	4.38	2.62	1.50	9/32 x 9/16	15	3.0	60K	50
400	5.25	5.75	4.75	4.38	3.12	2.00	9/32 x 9/16	19	4.0	80K	75
500	5.25	5.75	5.50	4.38	3.62	2.50	9/32 x 9/16	23	5.0	100K	100

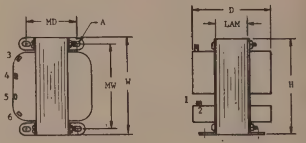
*1. C1 is a liq-filled AC capacitor, GE type 45F, 660 VAC, or equivalent (supplied at additional cost).

*2. C2 is an aluminum, Computer Grade electrolytic capacitor. K = 1000 WVDC = 1.3 Eo and the capacitance value is based on 25 VDC output voltage, Eo. Use the following equation for the output voltage, Eo other than 25 VDC:

$C2 = (5 \cdot \frac{VA}{Eo}) \cdot K$ — μF Where:
VA = VA rating of the output
Eo = DC output voltage

*3. R_{B1} is a recommended 10% bleeder load approximately calculated by $R_{B1} = \frac{10(Eo)^2}{(VA)}$ — Ohms

*4. Output voltage Eo, is held within ±2% of nominal with suggested values of C1, C2, and R_{B1}.



HOW TO ORDER (Sample shown)

FRT 200 28

Ferro-Resonant Transformer — FRT
VA Rating (See Table and Note) — 200
DC Output Voltage (6 VDC to 240 VDC) — 28

SQUARE CORE SWITCHING TRANSFORMERS

DESIGN FEATURE:
- Designed to meet: *MIL-T-27C

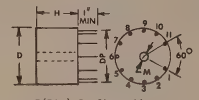
TF - 5 - S - X - — - ZZ

Encapsulated — 5
130°C Temp. — S
Life > 10,000 hrs. — X
Unrectified (01) Rectified (02) — —

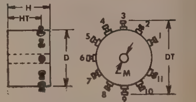
Vibration • Humidity • Altitude • High Shock

- Insulation Test Voltage: 500 VDC.
- Tolerance: ±5%.
- Switching efficiency of 95% attainable.
- Isolated feedback windings.
- Secondary can be connected in series or parallel.
- Output power greater than 50 VA should be driven from another stage.
- Terminals for general application.
- Pins for printed circuit installation.
- Nomenclature simplified for ease of design selection.

APPLICATION:
- DC to AC inverter.
- DC to DC converter.
- DC isolation to output AC or DC.
- DC to step-up or step-down.
- Volt-second support, saturable reactor.



P(Pin) Configuration
Tinned Copper Pin #22AWG except #20 AWG for S17 and S20 size



T(Terminal) Configuration
Not available in S8 & S10 size

TABLE I — STANDARD SIZE

S Size	Dimensions in Inches D	Dimensions in Inches H	Dimensions in Inches DT	Dimensions in Inches HT	Dimensions in Inches DP	Dimensions in Inches M	Wt. (oz.)
8	.87	.62	None	None	.77	None	.45
10	1.06	.62	None	None	.90	None	.90
12	1.29	1.00	1.62	.81	1.15	.166	1.80
15	1.50	1.00	1.88	.81	1.35	.166	4.00
17	1.75	1.00	2.13	.81	1.60	.166	4.80
20	2.00	1.25	2.38	1.05	1.80	.166	6.80

TABLE II STANDARD RATING

S Size	Rating VA	SW Freq. KHz
8	.4	.4
	1.0	1.0
	2.0	2.5
	4.0	*10.0
10	1.0	.4
	2.5	1.0
	5.0	2.5
	10.0	*10.0
12	2.0	.4
	5.0	1.0
	10.0	2.5
	20.0	*10.0
15	5.0	.4
	12.0	1.0
	25.0	2.5
	50.0	*10.0
17	12.0	.4
	25.0	1.0
	50.0	2.5
	100.0	*10.0
20	25.0	.4
	50.0	1.0
	100.0	2.5

*NOTE:
1. Add 20% to prices for 10 KHz switching
2. Add 10% to these prices for low profile (.2 inches below the standard height, H) available in Pin Configuration

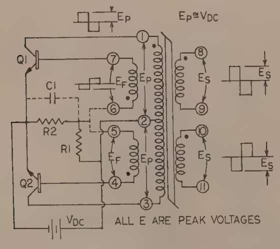
HOW TO ORDER
(Sample shown below)

- Refer to Table I for physical size and cost.
- Refer to Table II for secondary volt-ampere rating and switching frequency that correspond to Table I.
- Recommended % feedback range should be such that it will drive the base of the switching transistor by 1.5 to 2.0 V peak.
- Follow the nomenclature shown below to specify your requirements when placing an order.

S12 - 10 - 2.5 - 28 - 6 - 50 - T or P

Switching Transformer Size — S12
Power Rating in VA — 10
*Switching Frequency in KHz — 2.5
Nominal DC Input Voltage, Vdc ≅ E_P (50 VDC Max.) — 28
Feedback in Percent = $(E_F/E_P) \times 100$** — 6
Secondary Voltages, Es, in Peak (100 V Max.) — 50
Specify Configurations — T or P

$$^{**}E_F = \frac{\text{Feedback in Percent}}{100} \times Vdc$$



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INDUCTORS

Hisonic has long been a leader in the custom development and manufacture of high Q precision inductors. Originally confined to MPP and PI toroidal types, capabilities have been expanded to include ferrite pot core and laminated alloy core types and cover virtually every known construction that applications may require.

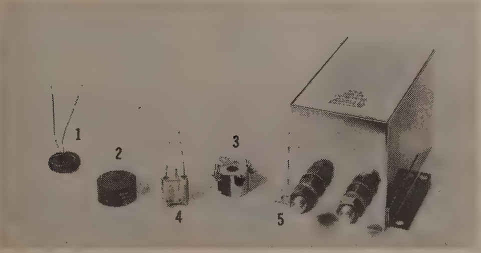
Although Hisonic stocks several series (primarily toroidal) most are custom made to specific requirements which results in less compromise in your applications and usually lower cost.

STANDARD
UNCASED MOLDED METAL CASED

*Toroidal Series	Ind. Range	Max Q	Freq Range	DC R Ohms/MH	Uncased Size
J2	5.6MH to 3.3HY	90	Up to 30KHZ	.50	.620D x .30H
J3	2.7 to 470MH	110	20 to 150KHZ	1.1	.620D x .30H
J4	.56 to 33MH	110	100 to 400KHZ	5.1	.620D x .30H
J5	.10 to 10MH	150	250KHZ to 1.5MHZ	8.9	.620D x .30H
R2	6.8MH to 6.8HY	135	Up to 20KHZ	.18	.960D x .40H
R3	3.3 to 470MH	180	10 to 60KHZ	.39	.960D x .40H
R4	1.2 to 68MH	170	40 to 160KHZ	.90	.960D x .40H
S2	6.8MH to 15HY	160	Up to 15KHZ	.10	1.250D x .62H
S3	3.3 to 560MH	225	10 to 60KHZ	.21	1.250D x .62H
T2	22MH to 39HY	210	Up to 15KHZ	.045	1.850D x .85H
V2	68MH to 68HY	245	Up to 8KHZ	.028	2.400D x .92H
W2	100MH to 100HY	260	Up to 6KHZ	.021	2.700D x 1.05H

*Write for Series Bulletins on electrical and case style details

EXAMPLE *CUSTOM INDUCTORS



P/N	Fig.	Description	Characteristics	Type	Size
26-5103 Series	2	Encaps. PC Mtg.	See R Series Std	Tor.	1.06x.5H
06-4000-27	1	DC Filter Choke	250uH@1.5ADC	Tor.	.970Dx.4H
06-4000-39	3	Var. Ind. PC Mtg.	90-110MH Q250	Pot	.80Dx.5H
26-5034 Series	4	Xtal Case Mtg.	See J Series Std	Tor.	.34x.75x.8H
26-5135-00	5	Shielded Choke	50uH @100ADC	Lam	2.65x5x3H

*Advise requirements for recommended solution and quotation

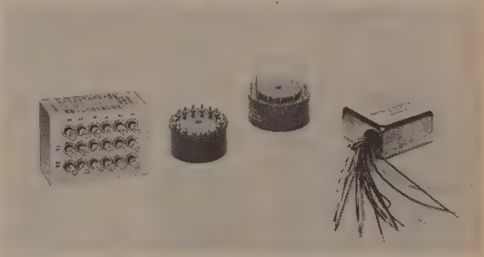
TRANSFORMERS

Hisonic has recognized capabilities in the design and manufacture of transformers, particularly for technically sophisticated custom applications. Thousands of Hisonic converter transformers are "flying" over the world, powering aircraft com/nav equipment. Special signal and matching transformers for both voice and wide video ranges are in use in communication systems.

Constructions include toroidal, pot core and laminated core to commercial and MIL specifications.

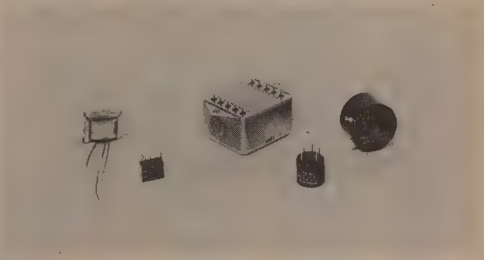
There are few "stock" items, but hundreds of designs and our engineering staff are ready to solve your transformer problems quickly.

EXAMPLE DC CONV/AC POWER



P/N	Input	OP Freq	VA Rating	Output Volts Peak (or RMS)	Size
24-0170-10	10V DC	24KHZ	0.8	20CT	.28x.6x.48H
24-0193-10	14/28V DC	6KHZ	18	4.7,11.5CT,22.5CT,550	1.8 ODx.94H
24-0135-10	14/28V DC	4KHZ	25	9,20CT,1170	1.8x2.0x.88H
24-0107-10	14/28V DC	2KHZ	27	90/45CT,180/25,180/25	2.1 ODx.88H
24-0202-11	14/28V DC	4KHZ	35	9.5CT,22.5CT,100,100	1.8x2.0x.88H
24-0114-10	14/28V DC	400HZ	75	26 , 60	2.9 ODx1.5H
24-0271-10	14/28V DC	5KHZ	80	6.5CT,22.5CT,100,100	2.0x2.0x1.0H
24-0277-10	42V DC	10KHZ	200	100	2.0x2.5x1.2H
24-0177-10	10V AC	400HZ	2	1.4,1.4,10 (RMS)	1.9 ODx.86H
24-0169-10	26V AC	400HZ	17	21/13CT (RMS)	1.0x1.4x1.3H
24-0215-10	115V AC	400HZ	180	20,27,27,42 (RMS)	3.2x3.8x4.1H

EXAMPLE SIGNAL/PULSE/MATCH



P/N	Description	Impedance	Response	Level	Size
24-0239-11	Video Range Match	150:150,25	100KHZ−2.5MHZ	60mw	.63x.63x.44H
24-0275-10	Wide Band Match	135CT.1000	1KHZ-2MHZ	4mw	1.1 ODx.75H
24-0205-10	Voice Range Hybrid	600:600+600	300−3000HZ	100mw	1.0x1.0x1.0H
24-0240-10	Wide Band Hybrid	600:600+600	50HZ−50KHZ	1mw	1.8x2.0x1.0H
24-0171-10	Radio Freq. Hybrid	50:100+100	700KHZ−4MHZ	10mw	.75 ODx.85H
24-0153-10	Pulse Match	10K:40K	tp1.2ms,tr60μs	25mw	.53x.53x.7H
24-0180-10	Pulse Output	5:600w/tap	tp.4μs,tr.2μs	6KW	1.5 ODx.8H

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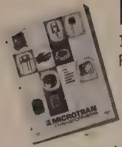

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M1550	$134.70	M11-M	14.25	M8105	30.90	MMT13-FB	4.65	MT10-AG	11.25	MT30-P	9.75	PM9-M	12.00	SMT16-FB	6.75
M1551	39.60	M11-P	12.45	M8106	18.30	MMT13-H	8.55	MT10-FB	5.10	MT30-PC	4.65	PM11-M	11.40	SMT16-H	10.05
M1552	11.85	M12-A	12.15	M8107	20.70	MMT13-M	8.70	MT10-H	10.20	MT33-A	12.45	PM13-M	11.40	SMT16-M	9.30
M1553	17.25	M12-AG	15.15	M8108	18.45	MMT16-FB	5.10	MT10-M	10.35	MT33-AG	15.45	PM15-F	5.70	SMT17-FB	6.90
M1554	64.80	M12-FB	6.75	M8109	20.85	MMT16-H	9.00	MT10-P	9.60	MT33-FB	7.05	PM15-M	10.50	SMT17-H	10.50
M1555	23.55	M12-H	13.35	M8110	18.60	MMT16-M	9.60	MT11-A	10.20	MT33-H	13.65	PM17-M	10.95	SMT17-M	9.45
M1556	15.30	M12-M	13.35	M8111	21.00	MMT17-FB	5.25	MT11-AG	12.60	MT33-M	13.65	PM19-M	11.25	SMT18-FB	7.05
M1557	54.75	M12-P	11.40	M8112	15.00	MMT17-H	9.45	MT11-FB	5.25	MT33-P	11.70	PM21-M	11.70	SMT18-H	10.65
M1558	33.60	M13-A	8.40	M8113	34.20	MMT17-M	9.30	MT11-H	11.25	MT33-PC	6.60	PM23-M	11.25	SMT18-M	9.60
M1559	27.60	M13-AG	10.65	M8114	33.00	MMT18-FB	5.40	MT11-M	11.25	MT34-A	12.30	PM25-M	11.55	SMT19-AF	10.50
DCM1-PC	5.40	M13-FB	5.40	M8115	23.55	MMT18-H	9.60	MT11-P	10.20	MT34-AG	15.45	PM27-F	5.55	SMT19-FB	6.60
DCM2-PC	5.55	M13-H	9.90	M8116	34.20	MMT18-M	9.75	MT11-PC	5.25	MT34-FB	7.05	PM27-M	10.20	SMT19-H	9.75
DCM3-PC	5.25	M13-M	10.05	M8117	23.55	MMT19-FB	4.95	MT12-A	8.70	MT34-H	13.65	PM29-M	11.10	SMT19-M	9.30
DCM4-PC;	5.40	M13-P	9.60	M8118	33.00	MMT19-H	8.85	MT12-AG	10.50	MT3Y-M	13.65	PM31-F	7.05	SMT26-FB	6.00
5-PC	each	M13-PC	5.40	M8120	9.15	MMT19-M	8.70	MT12-FB	4.35	MT34-P	11.70	PM31-M	10.65	SMT26-H	9.75
DCM6-PC	5.25	M14-A	11.25	M8121	7.80	MMT21-FB	5.40	MT12-H	9.45	MT35-A	12.30	PM33-F	5.25	SMT26-M	9.00
DCM7-PC	5.70	M14-AG	12.75	M8122	19.65	MMT21-H	9.90	MT12-M	9.60	MT35-AG	15.30	PM33-M	10.50	SMT36-FB	7.05
DCM8-PC	4.95	M14-FB	6.60	M8132	21.30	MMT21-M	9.75	MT12-P	9.00	MT35-FB	6.90	PM34-F	5.85	SMT36-H	10.95
DCM9-PC	4.95	M14-H	11.70	M8133	21.15	MMT25-FB	5.10	MT12-PC	4.05	MT35-H	13.50	PM34-M	10.80	SMT36-M	9.75
DCM10-PC	5.25	M14-M	11.85	M8149	8.10	MMT25-H	9.30	MT13-A	9.75	MT35-M	13.95	PM35-F	5.40	T1104	5.10
DCM11-PC	4.95	M14-P	10.80	M8151	25.65	MMT25-M	9.00	MT13-AG	11.25	MT35-P	11.55	PM35-M	10.05	T2104	4.65
DCM12-PC	5.25	M14-PC	6.30	M8152	17.40	MMT26-FB	4.95	MT13-FB	4.80	MT35-PC	7.20	PM36-F	6.45	T2106	4.95
DCM13-PC	4.80	M15-A	11.40	M8198	4.80	MMT26-H	9.15	MT13-H	10.05	PC2506	7.95	PM36-M	11.10	T2108	4.65
DCM14-PC	4.65	M15-AG	12.90	M8199	5.40	MMT26-M	8.85	MT13-M	10.35	PC2512	8.25	PM37-F	4.95	T2110	4.95
DCM18-PC	5.70	M15-FB	6.75	M8200	6.75	MMT27-FB	5.40	MT13-P	9.45	PC2524	8.40	PM37-M	10.35	T2220	5.85
DCM19-PC	5.25	M15-H	11.85	M8201	7.35	MMT27-H	9.60	MT14-A	9.00	PC2528	8.55	PM38-F	5.40	T2316	4.80
DCM20-PC		M15-M	12.00	M8202	11.70	MMT27-M	9.60	MT14-AG	10.50	PC2608	9.00	PM38-M	10.95	T3220	6.60
thru	4.35	M15-P	10.80	M8203	14.85	MMT28-FB	5.25	MT14-FB	4.35	PC2616	9.15	PM39-F	4.50	T4415	4.80
DCM22-PC	each	M15-PC	6.45	M8204	12.60	MMT28-H	9.45	MT14-H	9.45	PC2624	9.15	PM39-M	9.00	T6112	15.00
DCM51-PC	4.05	M-90	1.65	M8205	19.65	MMT28-M	9.75	MT14-M	9.60	PC2628	9.15	PM40-F	4.35	T7410	6.75
DCM52-PC	3.60	M8018	22.80	M8222	13.20	MMT29-FB	5.40	MT14-P	9.00	PC2632	9.30	PM40-M	8.55	T8410	7.20
DCM53-PC	3.45	M8019	26.10	M8223	18.90	MMT29-H	9.60	MT14-PC	4.05	PC2708	8.85	PM41-F	4.05	UM21-F	6.00
M1-A	13.05	M8020	36.00	M8224	15.75	MMT29-M	9.75	MT15-A	9.30	PC2712	8.85	PM41-M	8.10	UM21-M	10.35
M1-AG	15.60	M8021	31.50	M8242	7.65	MMT30-FB	5.10	MT15-AG	10.80	PC2715	8.85	PM90	1.20	UM22-F	5.10
M1-FB	7.80	M8022	33.00	M8243	9.00	MMT30-H	9.30	MT15-FB	4.35	PC2716	8.85	S100-FB	.21	UM22-M	9.00
M1-H	14.10	M8023	37.80	M8244	12.00	MMT30-M	9.60	MT15-H	9.60	PC2724	8.85	S101-S	12.75	UM23-F	5.25
M1-M	14.10	M8024	31.80	M8245	9.60	MMT31-FB	4.95	MT15-M	10.20	PC2728	8.85	S105-S	15.75	UM23-M	10.50
M1-P	12.00	M8025	16.50	M8246	25.95	MMT31-H	9.15	MT15-P	9.30	PC2732	9.00	S107-S	16.50	UM24-F	4.50
M1-S	15.60	M8026	16.50	M8247	17.40	MMT31-M	9.45	MT18-A	11.10	PC4304	5.25	S118-S	13.65	UM24-M	9.15
M2-A	13.65	M8027	12.30	M8251	13.20	MMT32-FB	5.25	MT18-AG	13.50	PC4312	5.40	S126-S	12.75	UM25-F	4.50
M2-AG	16.65	M8030	19.50	M8255	14.55	MMT32-H	9.75	MT18-FB	6.15	PC4316	5.40	S130-S	13.80	UM25-M	9.15
M2-FB	8.25	M8031	20.40	M8256	15.45	MMT32-M	9.75	MT18-H	11.85	PC4320	5.55	SM1-AF	10.65	UM26-F	4.50
M2-H	14.85	M8032	18.45	M8278	20.70	MMT33-FB	5.25	MT18-M	12.15	PC4408	5.40	SM1-FB	7.20	UM26-M	9.15
M2-M	14.85	M8033	18.45	M8286	10.95	MMT33-H	9.75	MT18-P	10.65	PC4412	5.40	SM1-H	10.05	UM27-F	4.80
M2-P	12.90	M8038	21.30	M8287	10.95	MMT33-M	9.75	MT20-A	12.60	PC4416	5.55	SM1-M	9.90	UM27-M	9.30
M3-A	12.45	M8039	19.65	M8288	12.15	MMT35-FB	5.40	MT20-AG	15.15	PC4424	5.55	SM2-AF	10.50	UM28-F	3.75
M3-AG	14.85	M8041	13.95	M8289	9.00	MMT35-H	9.90	MT20-FB	7.35	PC4428	5.70	SM2-FB	7.05	UM28-M	7.05
M3-FB	7.50	M8042	17.25	M8290	8.70	MMT35-M	9.90	MT20-H;	13.65	PC4432	6.00	SM2-H	9.60	UM29-F	5.25
M3-H	13.20	M8043	22.80	M8291	10.95	MT1-A	10.05	MT20-M	13.65	PC6205	7.65	SM2-M	9.90	UM29-M	8.70
M3-M	13.50	M8044	29.10	M8294	6.15	MT1-AG	11.55	MT20-P	11.85	PC6210	7.65	SM3-AF	9.90	UM30-F	3.60
M3-P	11.70	M8045	25.50	M8295	13.20	MT1-FB	5.40	MT21-A	11.70	PC6211	7.65	SM3-FB	6.30	UM30-M	7.05
M3-PC	7.05	M8046	39.60	M8296	13.80	MT1-H	10.50	MT21-AG	14.25	PC6214	7.65	SM3-H	9.30	UM31-F	6.00
M4-A	11.25	M8050	7.35	MM1-FB	6.15	MT1-M	10.65	MT21-FB	6.45	PC6505	7.20	SM3-M	9.90	UM31-M	10.35
M4-AG	12.75	M8051	13.50	MM1-H	9.75	MT1-P	9.60	MT21-H	12.75	PC6506	6.75	SM4-AF	10.20	UM32-F	6.00
M4-FB	6.60	M8052	15.60	MM1-M	8.55	MT1-PC	5.10	MT21-M	12.75	PC6510	7.20	SM4-FB	6.45	UM32-M	9.15
M4-H	11.70	M8053	15.60	MM2-FB	6.30	MT2-A	10.80	MT21-P	10.65	PC6511	7.20	SM4-H	9.60	UM33-F	6.00
M4-M	11.85	M8055	27.60	MM2-H	9.90	MT2-AG	13.35	MT21-PC	6.30	PC6512	7.05	SM4-M	9.90	UM33-M	9.15
M4-P	10.95	M8056	26.70	MM2-M	8.70	MT2-FB	5.55	MT22-A	11.70	PC6514	7.20	SM5-AF	9.00	UM34-F	6.00
M4-PC	6.30	M8058	11.85	MM3-FB	5.85	MT2-H	11.85	MT22-AG	14.25	PC6524	7.05	SM5-FB	5.55	UM34-M	10.35
M5-A	10.35	M8059	20.85	MM3-H	9.45	MT2-M	11.85	MT22-FB	6.45	PC6528	7.20	SM5-H	8.55	UM35-F	6.30
M5-AG	11.85	M8060	33.60	MM3-M	8.40	MT2-P	10.20	MT22-H	12.75	PC6605	7.20	SM5-M	9.30	UM35-M	10.95
M5-FB	5.70	M8061	58.50	MM4-FB	5.55	MT3-A	10.35	MT22-M	12.75	PC6608	6.90	SM6-AF	10.50	UM36-F	5.55
M5-H	10.80	M8062	69.60	MM4-H	9.15	MT3-AG	11.85	MT22-P	10.95	PC6610	7.20	SM6-FB	6.90	UM36-M	10.95
M5-M	10.95	M8063	10.50	MM4-M	8.25	MT3-FB	5.70	MT23-A	10.05	PC6611	7.20	SM6-H	8.10	UM37-F	5.70
M5-P	10.65	M8064	13.65	MM5-FB	5.55	MT3-H	10.80	MT23-AG	11.55	PC6614	7.20	SM6-M	9.90	UM37-M	9.75
M5-PC	5.70	M8065	36.00	MM5-H	8.85	MT3-M	10.95	MT23-FB	5.10	PC6616	7.05	SMT1-AF	9.15	UM39-F	5.85
M6-A	12.15	M8066	36.00	MM5-M	8.10	MT3-P	9.90	MT23-H	10.35	PC6624	7.05	SMT1-FB	5.40	UM39-M	9.75
M6-AG	13.65	M8067	29.10	MM6-FB	5.85	MT3-PC	5.40	MT23-M	10.65	PC6628	7.05	SMT1-H	8.55	UM90	1.95
M6-FB	7.20	M8068	17.10	MM6-H	9.45	MT5-A	10.20	MT23-P	9.75	PC6632	7.05	SMT1-M	8.40	VM1-FPB	4.20
M6-H	12.45	M8069	9.75	MM6-M	8.40	MT5-AG	11.70	MT23-PC	4.65	PC6705	7.20	SMT3-AF	10.05	VM1-M	8.25
M6-M	12.75	M8070	14.85	MM7-FB	5.40	MT5-FB	5.55	MT24-A	9.60	PC6708	6.75	SMT3-FB	6.45	VM2-FPB	5.70
M6-P	11.25	M8071	32.10	MM7-H	9.00	MT5-H	10.65	MT24-AG	11.10	PC6710	7.20	SMT3-H	9.45	VM2-M	9.90
M6-PC	6.75	M8072	9.15	MM7-M	7.65	MT5-M	10.80	MT24-FB	4.65	PC6711	7.20	SMT3-M	9.00	VM3-FPB	5.10
M7-A	11.40	M8073	5.70	MMT1-FB	4.35	MT5-P	9.90	MT24-H	9.75	PC6712	6.75	SMT4-FB	7.20	VM3-M	9.00
M7-AG	12.90	M8074	6.30	MMT1-H	7.95	MT5-PC	5.25	MT24-M	10.20	PC6714	7.20	SMT4-H	10.80	VM4-FPB	5.70
M7-FB	6.45	M8075	9.75	MMT1-M	8.55	MT6-A	11.40	MT24-P	9.30	PC6715	6.75	SMT4-M	9.60	VM4-M	9.90
M7-H	11.70	M8076	13.65	MMT3-FB	4.80	MT6-AG	12.90	MT24-PC	4.35	PC6716	6.75	SMT5-AF	9.90	VM5-FPB	5.25
M7-M	12.00	M8077	31.80	MMT3-H	8.40	MT6-FB	6.45	MT25-A	10.50	PC6724	6.90	SMT5-FB	6.30	VM5-M	9.45
M7-P	10.95	M8078	38.70	MMT3-M	8.70	MT6-H	11.70	MT25-AG	12.90	PC6728	6.90	SMT5-H	9.30	VM6-FPB	5.85
M7-PC	6.00	M8079	31.50	MMT4-FB	5.70	MT6-M	12.00	MT25-FB	5.55	PC6732	6.90	SMT5-M	8.85	VM6-M	8.85
M8-A	12.75	M8080	17.25	MMT4-H	9.90	MT6-P	10.65	MT25-H	11.25	PC6900-FB	.45	SMT7-AF	10.65	VM7-FPB	4.20
M8-AG	15.30	M8081	9.75	MMT4-M	9.75	MT6-PC	6.00	MT25-M	11.55	PC6905	9.60	SMT7-FB	6.60	VM7-M	8.55
M8-FB	7.50	M8082	10.50	MMT5-FB	4.80	MT7-A	10.65	MT25-P	10.20	PC6910	9.60	SMT7-H	9.90	VM8-FPB	4.35
M8-H	13.80	M8083	21.30	MMT5-H	8.40	MT7-AG	12.15	MT25-PC	5.25	PC6911	9.60	SMT7-M	9.30	VM8-M	8.55
M8-M	13.80	M8084	16.50	MMT5-M	9.15	MT7-FB	5.70	MT26-A	10.65	PC6914	9.60	SMT8-FB	7.20	VM9-FPB	4.35
M8-P	12.45	M8085	36.30	MMT7-FB	5.10	MT7-H	10.95	MT26-AG	13.05	PCL6605	9.75	SMT8-H	10.80	VM9-M	8.55
M9-A	11.85	M8086	26.85	MMT7-H	9.00	MT7-M	11.25	MT26-FB	5.70	PCL6610	9.75	SMT8-M	9.60	VM10-FPB	5.25
M9-AG	14.40	M8087	27.15	MMT7-M	9.60	MT7-P	10.20	MT26-H	11.40	PCL6611	9.75	SMT9-FB	6.60	VM10-M	9.45
M9-FB	6.60	M8088	26.40	MMT8-FB	5.70	MT8-A	11.10	MT26-M	11.70	PCL6614	9.75	SMT9-H	9.90	VM11-FPB	4.05
M9-H	12.90	M8089	17.55	MMT8-H	9.90	MT8-AG	13.50	MT26-P	10.20	PCL6630	10.05	SMT9-M	8.70	VM11-M	7.65
M9-M	12.90	M8090	23.40	MMT8-M	9.75	MT8-FB	6.15	MT26-PC	5.25	PCL6631	10.05	SMT10-AF	9.90	VM12-FPB	5.10
M9-P	11.55	M8091	25.50	MMT9-FB	5.10	MT8-H	11.85	MT29-A	9.60	PCT6230	10.05	SMT10-FB	6.30	VM12-M	8.85
M10-A	13.35	M8094	14.10	MMT9-H	9.30	MT8-M	12.15	MT29-AG	11.10	PCT6530	7.65	SMT10-H	9.30	VM13-FPB	5.25
M10-AG	16.35	M8095	31.80	MMT9-M	8.85	MT8-P	10.65	MT29-FB	4.65	PCT6531	7.65	SMT10-M	8.70	VM13-M	9.60
M10-FB	7.95	M8096	31.80	MMT10-FB	4.95	MT8-PC	5.70	MT29-H	9.90	PCT6630	7.65	SMT12-AF	9.15	VM14-FPB	4.95
M10-H	14.55	M8098	11.25	MMT10-H	8.55	MT9-A	10.80	MT29-M	10.20	PCT6631	7.65	SMT12-FB	5.40	VM14-M	9.60
M10-M	14.55	M8099	12.90	MMT10-M	8.40	MT9-AG	13.20	MT29-P	9.30	PCT6730	7.65	SMT12-H	8.55	VM15-FPB	6.00
M10-P	12.60	M8100	16.20	MMT11-FB	5.10	MT9-FB	5.85	MT29-PC	4.35	PCT6731	7.65	SMT12-M	8.40	VM15-M	9.75
M11-A	13.20	M8101	20.40	MMT11-H	9.30	MT9-H	11.55	MT30-A	10.05	PCT6930	10.05	SMT13-AF	9.75	VM16-FPB	4.50
M11-AG	15.75	M8102	24.60	MMT11-M	9.00	MT9-M	11.85	MT30-AG	11.55	PCT6931	10.05	SMT13-FB	5.55	VM16-M	8.85
M11-FB	7.95	M8103	28.50	MMT12-FB	4.35	MT9-P	10.20	MT30-FB	5.40	PM3-M	12.30	SMT13-H	9.00	VM17-FPB	5.85
M11-H	14.25	M8104	24.90	MMT12-H	7.95	MT9-PC	5.25	MT30-H	10.35	PM5-M	11.40	SMT13-M	8.55	VM17-M	9.90
				MMT12-M	8.55	MT10-A	9.75	MT30-M	10.65	PM7-M	12.00	SMT16-AF	10.80	VM90	1.95

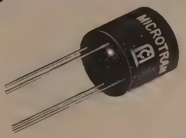
*QUANTITY PRICING SCHEDULE IS AS FOLLOWS: 1-9 NET, 10-49 LESS 10%, 50-99 LESS 16⅔%, 100-249 LESS 33⅓%. CONTACT FACTORY FOR PRICES OVER 249.

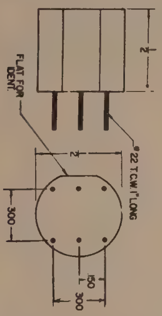
MICROTRAN 145 E. Mineola Ave • Valley Stream, N.Y. 11582
Phone: (516) 561-6050 • TWX: 510-225-8412

VERI & ULTRA MINIATURE TRANSFORMERS

The miniaturized design of this series offers a relatively high power level for condensed module and printed circuit packaging. The entire series is available in open frame and molded construction, thus making it adaptable to many design requirements. Manufactured in accordance with the requirements of MIL-T-27.

FULL TERMINAL ARRANGEMENTS AND COLOR CODE DESIGNATIONS SUPPLIED WITH EACH UNIT





MOLDED UM-M

ULTRA MINIATURE SERIES

To order add -M to Part Number, i.e. UM22-M. Wt.: .14 oz.

MIL DESIGNATION TF5RX††ZZ

††See Family Designation in Chart.

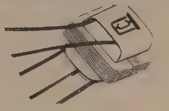
ULTRA-MINIATURE TRANSFORMERS — UM SERIES

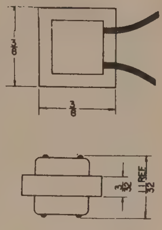
Frequency Response ±2 db 300 to 10,000 Hz
Measured at Level Stated for 300 Hz

These units can be used as input, interstage, output, isolation and other impedance requirements. Primary and secondary windings may be interchanged to obtain required impedance matching. Note: This will result in slightly different impedance ratios than shown.

Part No.	Primary Impedance	Secondary Impedance	Unbal. Pri. DC Ma	Pri. D.C.R.	Sec. D.C.R.	Level @ 300 Hz	Level @ 1 KHz	†† Family
UM26-(*)	400	11	3	35	1.5	15mw	500mw	17
UM27-(*)	400 C.T.	11	6	35	1.5	15mw	500mw	17
UM25-(*)	400	50	3	35	5	15mw	500mw	17
UM29-(*)	600 C.T.	600 C.T.	7	45	60	5mw	400mw	21
UM24-(*)	1,000	50	3	65	10	5mw	500mw	17
UM33-(*)	1,000 C.T.	600	6	80	65	5mw	500mw	17
UM32-(*)	1,500 C.T.	600	5	135	65	5mw	500mw	13
UM39-(*)	2,500 C.T.	600 C.T.	2	250	50	5mw	500mw	13
UM34-(*)	10,000 C.T.	600 C.T.	2	850	40	5mw	500mw	13
UM31-(*)	10,000 C.T.	1,200 C.T.	2	850	120	5mw	500mw	21
UM37-(*)	10,000	2,000 C.T.	1	850	200	5mw	500mw	13
UM35-(*)	15,000 C.T.	15,000 C.T.	1	930	1210	5mw	300mw	15
UM36-(*)	20,000 C.T.	800 C.T.	.5	1100	80	5mw	500mw	13
UM22-(*)	20,000	1,000	0.5	1100	100	5mw	300mw	13
UM23-(*)	20,000	1,200 C.T.	0.5	1100	110	5mw	300mw	13
UM21-(*)	100,000	1,000	0	1900	135	5mw	70mw	16
UM30-(*)	Choke			1.5 hy (0 dc)		0.7 hy (2 ma)	100	20
UM28-(*)	Choke			10 hy (0 dc)		8 hy (0.5 ma)	650	20
UM90	Magnetic Shield Mu-Metal slip-on can for UM-M Series. 20 db shielding.							

*Add either -F, or -M to Part No. to designate construction. See Photos. Power levels shown are for 7½% maximum distortion.





OPEN FRAME UM-F

ULTRA-MINIATURE SERIES

To order add -F to Part Number, i.e. UM22-F. Wt.: .08 oz. 4" color coded leads.

MIL DESIGNATION TF6RX††ZZ

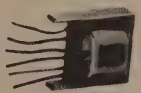
††See Family Designation in Chart.

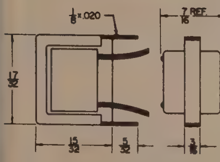
VERI-MINIATURE TRANSFORMERS — VM SERIES

Frequency Response ±2 db 200 to 10,000 Hz

Part No.	Primary Impedance	Secondary Impedance	Unbal. Pri. DC Ma	Pri. D.C.R.	Sec. D.C.R.	Level MW	†† Family
VM1-(*)	50	600	5.5	7	90	15	21
VM7-(*)	500	3.4	3.5	50	.5	15	21
VM16-(*)	500 C.T.	250 C.T.	7.5	50	25	15	17
VM14-(*)	600 C.T.	600 C.T.	7.0	50	65	15	17
VM8-(*)	1,250	3.4	2.0	135	.5	15	21
VM9-(*)	1,250	50	2.0	135	6.5	15	21
VM10-(*)	2,500	2,500 C.T.	1.5	225	215	3	21
VM17-(*)	10,000 C.T.	5,000 C.T.	0	400	300	5	17
VM12-(*)	20,000	1,000	.16	625	85	5	21
VM13-(*)	20,000	1,000 C.T.	.16	625	85	5	21
VM3-(*)	25,000	600	.15	720	45	2.5	21
VM5-(*)	50,000	600	.1	830	55	5	21
VM15-(*)	50,000 C.T.	50,000 C.T.	0	2000	2600	5	15
VM6-(*)	100,000	1,200 C.T.	.07	2000	150	5	21
VM2-(*)	200,000	600	.05	3000	110	2.5	21
VM4-(*)	200,000	1200	.035	3100	165	5	21
VM11-(*)	Choke	20 hy (0 ma)	12 hy (.5 ma)		1000		21
VM90	Magnetic Shield Mu-Metal slip-on can for VM-M Series. 20 db shielding.						

*Add either -FPB, or -M to Part No. to designate construction. See Photos.





PLUG-IN TAB MOUNTED CHANNEL VM-FPB

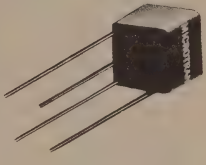
VERI-MINIATURE SERIES

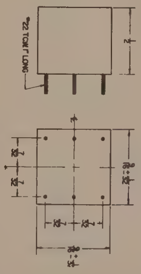
To order add -FPB to Part Number, i.e. VM2-FPB. Wt.: .2 oz. 4" color coded leads.

MIL DESIGNATION TF6RX††ZZ

††See Family Designation in Chart.

Available on special order without channel as VM-F, 7/16" x 7/16" x ½". Wt.: 16 oz.





MOLDED VM-M

VERI-MINIATURE SERIES

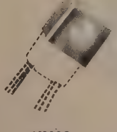
To order add -M to Part Number, i.e. VM2-M, VM9-M. Epoxy molded. Wt.: .25 oz.

MIL DESIGNATION TF5RX††ZZ

††See Family Designation in Chart.

MAGNETIC SHIELDS

Magnetic Shields Designed to Slip On UM-M and VM-M Series

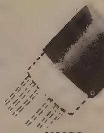


VM90

DIMENSIONS

Part No.	L	W	H*	D
UM90			9/16	19/32
VM90	5/8	5/8	17/32	

*Overall height with can cemented in place.



UM90

SEE PAGE 2•1756 FOR PRICING

MICROTRAN 145 E. Mineola Ave • Valley Stream, N.Y. 11582
Phone: (516) 561-6050 • TWX: 510-225-8412

PICO & SUB MINIATURE TRANSFORMERS

Pico Miniature Transformers — PM Series — are designed to provide maximum utilization of space in miniaturized printed circuit board applications. .10 grid dimensions conform to PC design standards. Installation of these units is accomplished without the additional use of brackets or clips. Manufactured in accordance with the requirements of MIL-T-27.

A variety of compact, low silhouette, constructions makes this series ideal for use in designs requiring maximum space utilization. Your mechanical and environmental considerations can be easily filled with the broad choice of open frame, hermetically sealed and molded constructions. All units in this series are manufactured in accordance with the requirements of MIL-T-27.

FULL TERMINAL ARRANGEMENTS AND COLOR CODE DESIGNATIONS SUPPLIED WITH EACH UNIT

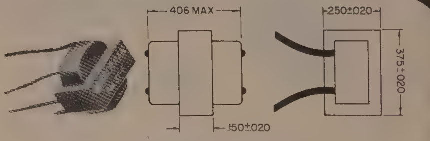
PICO MINIATURE TRANSFORMERS — PM SERIES

Frequency Response ±2 db 300 Hz to 100 KHz†

These units can be used as input, interstage, output, isolation and other impedance requirements. Primary and secondary windings may be interchanged to obtain required impedance matching. Note: This will result in slightly different impedance ratios than shown.

Part No.	Primary Impedance	Secondary Impedance	Unbal. Pri. DC Ma	Pri. D.C.R.	Sec. D.C.R.	Power Level MW	†† Family
PM37-(*)	120 C.T.	3.2	10	16	0.75	50	17
PM38-(*)	300 C.T.	600	7	41	98	50	17
PM35-(*)	500	50	3	60	8	50	17
PM36-(*)	500	500/125 Split	3	72	85	50	17
PM34-(*)	600 C.T.	600 C.T.	3	75	105	50	17
PM33-(*)	1,500 C.T.	600	3	170	95	50	12
PM31-(*)	2,500	2,500 C.T.	1	250	325	50	12
•PM29-(*)	10,000 C.T.	500 C.T.	1	1050	80	50	12
PM27-(*)	10,000	1,200	0.5	1050	280	50	12
•PM23-(*)	10,000 C.T.	1,200 C.T.	1	1050	280	50	12
•PM25-(*)	10,000	1200/300 Split	0.5	1050	280	50	12
•PM19-(*)	10,000 C.T.	2,000 C.T.	1	1000	300	50	12
•PM21-(*)	10,000	2000/500 Split	0.5	1000	300	50	12
•PM17-(*)	10,000 C.T.	10,000 C.T.	1	1000	1300	50	12
PM15-(*)	25,000	1,000	0.25	1700	110	40	12
•PM11-(*)	25,000 C.T.	1,000 C.T.	0.5	1700	110	40	12
•PM13-(*)	25,000	1000/250 Split	0.25	1700	110	40	12
•PM7-(*)	50,000 C.T.	1,000 C.T.	0	3300	75	10	16
•PM9-(*)	50,000	1000/250 Split	0	3300	75	10	16
•PM5-(*)	200,000	1,000	0	5300	110	10	16
•PM3-(*)	200,000 C.T.	1,000 C.T.	0	5300	110	10	16
PM41-(*)	Audio Choke	.3 hy	4	43			20
PM40-(*)	Audio Choke	3.5 hy	2	700			20
PM39-(*)	Audio Choke	6 hy	2	1800			20
PM90	Magnetic Shield Mu-Metal slip-on can for PM-M Series. 20 db shielding.						

*Add either -F, -M to Part No. See Photos Figures PM-M and PM-F.
Power levels shown are for 15% maximum distortion, PM35-20%, PM37-25%.
Frequency response measured as stated power level above.
†PM3 and PM5 — 45 KHz.
•These items not available in open frame construction.

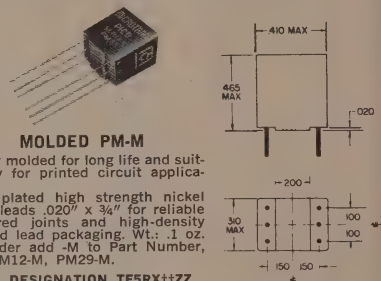


OPEN FRAME PM-F

Pico Miniature size. 4″ #30 plastic leads color coded. Thorough resin impregnation and baking assures reliable life. To order add -F to Part Number, i.e. PM33-F. Wt.: .05 oz.

MIL DESIGNATION TF6RX††ZZ

††See Family Designation in Chart.



MOLDED PM-M

Epoxy molded for long life and suitability for printed circuit applications.
Gold plated high strength nickel alloy leads .020″ x ¾″ for reliable soldered joints and high-density welded lead packaging. Wt.: .1 oz. To order add -M to Part Number, i.e. PM12-M, PM29-M.

MIL DESIGNATION TF5RX††ZZ

††See Family Designation in Chart.

SUB-MINIATURE TRANSFORMERS—SM & SMT SERIES

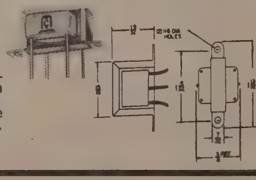
Primary and secondary windings may be interchanged to obtain required impedance matching. Note: This will result in slightly different impedance ratios than shown. These units can be used as input, interstage, output, isolation and other impedance matching requirements.

OPEN FRAME WITH CHANNEL SM-FB

Part No.	Primary Impedance	Secondary Impedance	Pri. DC Unbal. Ma	Oper. Level DBM	Freq. Response ±2 db	†† Family
SM1-(*)	200/50	250,000/62,500	0	6	80-10,000	10
SM3-(*)	10,000	200	3	21	150-10,000	13
SM2-(*)	10,000	90,000	0	8	100-10,000	10
SM4-(*)	30,000	50	1	21	150-10,000	13
SM6-(*)	100,000	60	0.5	21	150-10,000	13
SM5-(*)	Reactor 50 hy @ 1 Mil DC		3,000 Ohms, DC Res.			20
SMT1-(*)	600	600	9	23	200-15,000	17
•SMT26-(*)	600 C.T.	600 C.T.	18	23	200-15,000	17
•SMT9-(*)	600 C.T.	1,200 C.T.	18	23	200-15,000	17
SMT12-(*)	2,000	3.4	5	30	200-15,000	13
SMT19-(*)	2,500	2,500 C.T.	5	26	200-15,000	13
•SMT36-(*)	2,500 C.T.	2,500/625 Split	10	26	200-15,000	13
SMT13-(*)	4,000 C.T.	3.4	5	30	200-15,000	13
•SMT17-(*)	10,000 C.T.	200 C.T.	6	20	200-15,000	13
SMT16-(*)	10,000	1,500 C.T.	1	23	200-15,000	13
SMT10-(*)	25,000	600	2	20	200-15,000	13
SMT7-(*)	25,000	1,200 C.T.	1.5	20	200-15,000	13
•SMT18-(*)	25,000 C.T.	1,200 C.T.	3	20	200-15,000	13
SMT5-(*)	50,000	6	1	20	300-15,000	13
SMT3-(*)	50,000	600	1	20	300-15,000	13
•SMT4-(*)	50,000 C.T.	600 C.T.	2	20	200-15,000	13
•SMT8-(*)	50,000 C.T.	1,200 C.T.	2	20	200-15,000	13

*Add either -AF, -H, -M, -CM, or -FB to Part No. to designate construction. See Photos.
•These items not available in -AF case.

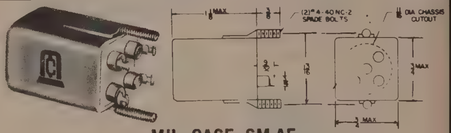
OPEN FRAME WITH CHANNEL SM-FB



To order add -FB to Part Number. i.e. SMT3-FB, SM1-FB. Wt.: ¾ oz. Leads #28 PVC 4″ long.
Available with plug-in tab mounted channel as type SM-FPB 29/32 mtg. centers on Special Order.
Available without mounting channel as type SM-F 9/16x7/8x¾. Wt.: .67 oz. on Spcial Order.

MIL DESIGNATION TF6RX††ZZ

††See Family Designation in Chart.

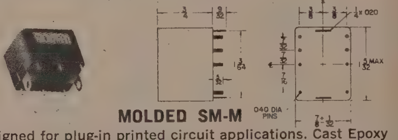


MIL CASE SM-AF

Grey Enamel Finish. Wt.: 1⅛ oz. Supplied with compression sealed ceramic terminals in MIL-T-27B-AF modified case. To order add -AF to Part Number, i.e. SM2-AF, SMT3-AF.

MIL DESIGNATION TF4RX††YY

††See Family Designation in Chart.

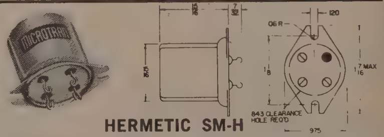


MOLDED SM-M

Designed for plug-in printed circuit applications. Cast Epoxy Resin provides highest resistance to extremes of ambient. Wt.: 1½ oz. To order add -M to Part Number, i.e. SM5-M, SMT5-M.

MIL DESIGNATION TF5RX††ZZ

††See Family Designation in Chart.



HERMETIC SM-H

Gray Enamel Finish. Wt.: 1 oz. High Compression Glass Terminals. To order add -H to Part Number, i.e. SM2-H, SMT3-H.

MIL-DESIGNATION TF4RX††YY

††See Family Designation in Chart.

SEE PAGE 2•1756 FOR PRICING

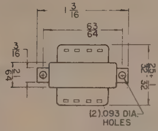
MICROTRAN 145 E. Mineola Ave • Valley Stream, N.Y. 11582
Phone: (516) 561-6050 • TWX: 510-225-8412

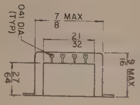
MICRO MINIATURE TRANSFORMERS

The low profile design of this series makes them ideal for use on plug-in printed circuit boards. They are highly suitable where sandwich design requires minimal spacing between modules. Available in a variety of open frame, hermetically sealed, and molded constructions. All units are manufactured in accordance with the requirements of MIL-T-27.

FULL TERMINAL ARRANGEMENTS AND COLOR CODE DESIGNATIONS SUPPLIED WITH EACH UNIT

MICROTRAN
1 2 3





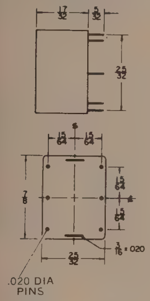
CONTOUR MOLDED MM-CM

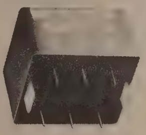
Special Order Only

Designed for chassis mounting with solder terminals on top of transformer. Epoxy contour molding provides greatest resistance to extremes of ambient in smallest possible package. Wt.: ½ oz. To order add -CM to Part Number, i.e. MM2-CM, MMT1-CM.

MIL DESIGNATION TF5RX††ZZ

††See Family Designation in Chart.



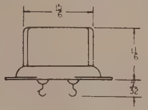


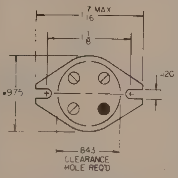
MOLDED MM-M

Designed for plug-in printed circuit applications. Cast Epoxy resin provides highest resistance to extremes of ambient. Wt.: ½ oz. To order add -M to Part Number, i.e. MM2-M, MMT2-M.

MIL DESIGNATION TF5RX††ZZ

††See Family Designation in Chart.



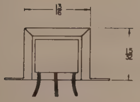


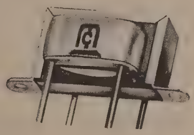
HERMETIC MM-H

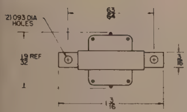
Grey Enamel Finish. High Compression Glass Terminals. Wt.: ¾ oz. To order add -H to Part Number, i.e. MM2-H, MMT3-H.

MIL DESIGNATION TF4RZ††YY

††See Family Designation in Chart.







OPEN FRAME WITH CHANNEL MM-FB

To order add -FB to Part Number, i.e. MMT3-FB, MM1-FB. Leads #28 PVC 4″ long.

Available with plug-in tab mounted channel as type MM-FPB, 23/32″ mounting centers on Special Order.

Available without channel as type MM-F ¾″ x 7/16″ x 13/32″. Wt.: .38 oz. on Special Order.

MIL DESIGNATION TF6RX††ZZ

††See Family Designation in Chart.

MICRO-MINIATURE TRANSFORMERS — MM SERIES

Primary and secondary windings may be interchanged to obtain required impedance matching. Note: This will result in slightly different impedance ratios than shown. These units can be used as input, interstage, output, isolation and other impedance matching requirements.

Part No.	Primary Impedance	Secondary Impedance	Pri. DC Unbal. Ma	Oper. Level DBM	Freq. Response ±2 db	†† Family
MM1-(*)	200/50	250,000/62,500	0	4	200-10,000	10
MM3-(*)	10,000	200	3	20	150-10,000	13
MM2-(*)	10,000	90,000	0	4	150-10,000	10
MM4-(*)	30,000	50	1	20	150-10,000	13
MM7-(*)	30,000	1,200	0.5	20	200-10,000	13
MM6-(*)	100,000	60	0.5	20	250-10,000	13
MM5-(*)	Reactor 50 hy @ 1 Mil DC	4,700 Ohms DC Res.				20

MICRO-MINIATURE SERIES — MMT SERIES

Part No.	Primary Impedance	Secondary Impedance	Pri. DC Unbal. Ma	Oper. Level DBM	Freq. Response ±2 db	†† Family
MMT1-(*)	600	600	8	22	200-15,000	17
MMT26-(*)	600 C.T.	600 C.T.	16	22	200-15,000	17
MMT33-(*)	600 C.T.	600/150 Split	16	22	200-15,000	17
MMT9-(*)	600 C.T.	1,200 C.T.	16	22	200-15,000	17
MMT32-(*)	600 C.T.	1,200/300 Split	16	22	200-15,000	17
MMT12-(*)	2,000	3.4	5	28	200-15,000	13
MMT31-(*)	2,000 C.T.	500 C.T.	10	28	200-15,000	13
MMT19-(*)	2,500	2,500 C.T.	2	23	200-15,000	13
MMT13-(*)	4,000 C.T.	3.4	5	28	200-15,000	13
MMT11-(*)	4,000 C.T.	600 C.T.	5	28	200-15,000	12
MMT21-(*)	4,000 C.T.	600/150 Split	5	28	200-15,000	13
MMT25-(*)	7,500 C.T.	600 C.T.	4	22	200-15,000	13
MMT30-(*)	7,500 C.T.	1,200 C.T.	4	22	200-15,000	13
MMT35-(*)	10,000 C.T.	150/37.5 Split	2	20	200-15,000	13
MMT17-(*)	10,000 C.T.	200 C.T.	6	20	200-15,000	13
MMT16-(*)	10,000	1,500 C.T.	1	20	200-15,000	13
MMT28-(*)	10,000 C.T.	1,500 C.T.	2	20	200-15,000	13
MMT29-(*)	10,000 C.T.	10,000 C.T.	2	20	200-15,000	13
MMT10-(*)	25,000	600	1	20	200-15,000	13
MMT27-(*)	25,000 C.T.	600 C.T.	2	20	200-15,000	13
MMT7-(*)	25,000	1,200 C.T.	1	20	200-15,000	13
MMT18-(*)	25,000 C.T.	1,200 C.T.	2	20	200-15,000	13
MMT5-(*)	50,000	6	1	20	200-15,000	13
MMT3-(*)	50,000	600	0.7	20	200-15,000	13
MMT4-(*)	50,000 C.T.	600 C.T.	1.4	20	200-15,000	13
MMT8-(*)	50,000 C.T.	1,200 C.T.	1.4	20	200,15,000	13

*Add either -H, -M, -CM, or -FB to Part No. to designate construction. See Photos.

SEE PAGE 2•1756 FOR PRICING

MICROTRAN 145 E. Mineola Ave • Valley Stream, N.Y. 11582
Phone: (516) 561-6050 • TWX: 510-225-8412

MINIATURE AUDIO MINIATURE TRANSISTOR TRANSFORMERS

This group of transformers is often referred to as "the designers series." It offers an extensive range of open frame, hermetically sealed, plug-in, printed circuit, contour molded and plug-in molded construction.

In this series, MICROTRAN offers the widest spectrum of electrical and mechanical specifications. ALL TRANSFORMERS LISTED ARE AVAILABLE IN THE CONSTRUCTIONS ILLUSTRATED. All units are manufactured in accordance with the requirements of MIL-T-27.

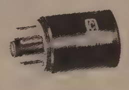
FULL TERMINAL ARRANGEMENTS AND COLOR CODE DESIGNATIONS SUPPLIED WITH EACH UNIT

MINIATURE TRANSFORMERS — M & MT SERIES

All items shown in charts below are available in any of the mechanical packages shown. These units can be used as input, interstage, output, isolation and other impedance matching applications. Primary and secondary windings may be interchanged to obtain required impedance matching. Note: This will result in slightly different impedance ratios than shown.

Part No.	Primary Impedance	Secondary Impedance	Pri. DC Unbal. Ma	Oper. Level DBM	Freq. Response ±2 db	†† Family
M3-(*)	7.5/30	50,000	0	5	20-20,000	10
•M12-(*)	50/250 C.T.	50/250/600 C.T.	0	8	20-20,000	16
•M1-(*)	50/250/600 C.T.	50,000	0	5	20-20,000	10
M1-S	Same as M1 above — with dual nickel alloy shield.					
•M2-(*)	50/250/600 C.T.	50,000 C.T.	0	5	20-20,000	10
M14-(*)	200	½ Megohm	0	9	80-3,000	10
M15-(*)	10,000	1 Megohm	0	11	100-2,500	10
•M8-(*)	15,000	50/250/600 C.T.	0	8	20-20,000	16
•M9-(*)	15,000	50/250/600 C.T.	4	21	150-20,000	13
M4-(*)	15,000	60,000	0	6	20-15,000	10
M5-(*)	15,000	60,000	4	14	200-20,000	15
M6-(*)	15,000	95,000 C.T.	0	5	20-15,000	10
M7-(*)	15,000	95,000 C.T.	4	11	200-20,000	15
•M10-(*)	30,000 C.T.	50/250/600 C.T.	0	8	30-50,000	16
•M11-(*)	50,000	50/250/600 C.T.	0	5	20-20,000	16
M13-(*)	Reactor	300 hy 0 DC	50 hy @ 3 ma		6000 Ohms D.C.R.	20
M90	Magnetic Shield Mu-Metal slip-on can for MA Series. 25 db shielding.					
•MT2-(*)	100	10 C.T./40 C.T.	100	27	200-20,000	17
MT30-(*)	250 C.T.	500	10	30	200-15,000	17
MT23-(*)	250 C.T.	1000	10	30	200-15,000	17
MT14-(*)	400	10	50	25	200-20,000	17
•MT15-(*)	500 C.T.	210	30	27	300-20,000	17
MT1-(*)	600	600	10	23	200-15,000	17
‡MT35-(*)	600	600 C.T. & 600 C.T.	0	5	40-20,000	16
MT26-(*)	600 C.T.	600 C.T.	20	23	200-15,000	17
MT9-(*)	600 C.T.	1,200 C.T.	4	23	200-15,000	17
MT33-(*)	600/150 Split	600/150 Split	20	23	200-20,000	17
•MT22-(*)	600/150 Split	1,200 C.T.	4	23	200-15,000	17
MT29-(*)	1600 C.T.	450	15	30	200-15,000	13
MT12-(*)	2,000	3.4	10	32	200-15,000	13
MT24-(*)	2,500	600 C.T.	10	32	200-15,000	13
•MT13-(*)	4,000 C.T.	3.4	3	32	200-15,000	13
MT11-(*)	4,000 C.T.	600 C.T.	3	32	200-15,000	13
MT21-(*)	4,000 C.T.	600/150 Split	3	32	200-15,000	13
MT25-(*)	7,500 C.T.	600 C.T.	8	32	200-15,000	12
•MT34-(*)	10,000/2,500 Split	2000/500 Split	4	20	200-20,000	13
•MT10-(*)	25,000	600	3	22	200-15,000	13
•MT7-(*)	25,000	1,200 C.T.	3	22	200-15,000	13
•MT18-(*)	25,000 C.T.	1,200 C.T.	6	22	200-15,000	13
MT5-(*)	50,000	6	3	20	300-15,000	13
MT3-(*)	50,000	600	3	20	300-15,000	13
MT8-(*)	50,000 C.T.	1,200 C.T.	3	20	300-15,000	13
•MT20-(*)	50,000 C.T.	1200/300 Split	3	20	300-15,000	13
MT6-(*)	100,000	1,200 C.T.	1.4	17	200-15,000	13

*Add either -AG, -H, -M, -CM, -P, -PC, -A, or -FB to Part No. to designate construction. See Photos.
‡For telephone line coupling or hybrid telephone line.
•These items not available in -PC construction.

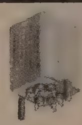


OCTAL PLUG-IN M-P

Sealed Plastic Housing. Wt.: 2 oz. To order add -P to Part Number, i.e. MT3-P, M1-P. Diameter 1$\frac{13}{32}$". Height above mtg. surface 1$\frac{15}{32}$".

MIL DESIGNATION TF6RX††ZZ

††See Family Designation in Chart.

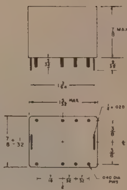


MIL CASE M-AG

Grey Enamel Finish. Wt.: 2⅜ oz. Supplied with compression sealed ceramic terminals in MIL-T-27B AG case (modified). To order add -AG to Part Number, i.e. M2-AG, MT3-AG.

MIL DESIGNATION TF4RX††YY

††See Family Designation in Chart.

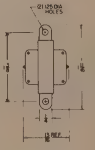


MOLDED M-M

Designed for plug-in printed circuit applications. Cast Epoxy resin provides highest resistance to extremes of ambient. Wt.: 1¾ oz. To order add -M to Part Number, i.e. M2-M, MT3-M.

MIL DESIGNATION TF5RX††ZZ

††See Family Designation in Chart.



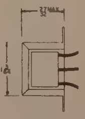
OPEN FRAME WITH CHANNEL M-FB

Wt.: 1.13 oz. To order add -FB to Part Number, i.e. MT3-FB, M1-FB. From stock. Leads 4" long. #28 PVC.

Special Order

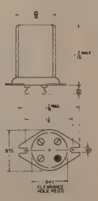
Available with plug-in tab channel, 1$\frac{1}{32}$ mounting centers as type M-FPB.

Available without channel as type M-F ¾"x1"x1$\frac{3}{16}$". Wt.: 1 oz.



MIL DESIGNATION TF6RX††ZZ

††See Family Designation in Chart.



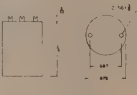
HERMETIC M-H

Grey Enamel Finish. Wt.: 1¼ oz. High Compression Glass Terminals. To order add -H to Part Number, i.e. M2-H, MT3-H, from stock.

.120 holes instead of slots, available **Special Order Only.**

MIL DESIGNATION TF4RX††YY

††See Family Designation in Chart.

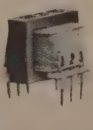


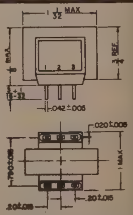
ALUMINUM CASED M-A

Supplied with 2-56 screws. Wt.: 1.25 oz. To order add -A to Part Number, i.e. MT3-A, M1-A.

MIL DESIGNATION TF3RX††YY

††See Family Designation in Chart.





OPEN FRAME PRINTED CIRCUIT M-PC

Wt.: 1.2 oz. To order add -PC to Part Number, i.e. MT3-PC, M3-PC.

MIL DESIGNATION TF6RX††ZZ

††See Family Designation in Chart.

MT21-PC, MT33-PC, MT35-PC have 8 — .025 x .015 pins on .150 centers.

SEE PAGE 2•1756 FOR PRICING

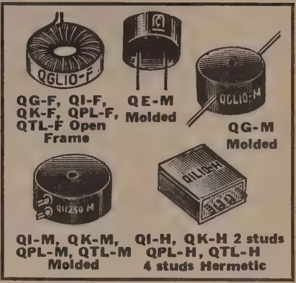
MICROTRAN 145 E. Mineola Ave • Valley Stream, N.Y. 11582
Phone: (516) 561-6050 • TWX: 510-225-8412

MINIATURIZED INDUSTRIAL & MIL TOROIDAL INDUCTORS

ULTRA-MINIATURE TOROIDAL INDUCTORS — QE-M SERIES

Affords new application opportunities in high density packaging. Ultra miniaturized with low height design. Exceptionally high "Q" and wide frequency range. Available on special order with ±1% inductance tolerance. Frequency range of QEL Series 1 to 300 kHz; QEM, 3 to 500 kHz. Accuracy, ±2%. Molded in epoxy resin with .020″ x 2″ gold-plated nickel alloy leads. Size: .450″ dia. x .285″.

		QEL-M Series					QEM-M Series		
Part No.	Inductance	Typ. DC Res., Ohms	Typ. Dist. Cap., pF	Net Ea., Lots of 1-9★	Part No.	Inductance	Typ. DC Res., Ohms	Typ. Dist. Cap., pF	Net Ea., Lots of 1-9★
QEL1-M	1 mH	2.1	25	$9.45	QEM05-M	.5 mH	2.1	20	$10.65
QEL2-M	2 mH	3.6	30	9.45	QEM1-M	1 mH	3.8	30	10.65
QEL5-M	5 mH	7.3	35	9.90	QEM2-M	2 mH	6.2	35	10.95
QEL10-M	10 mH	15.8	45	10.35	QEM5-M	5 mH	15.9	45	11.40
QEL15-M	15 mH	20	45	10.50	QEM10-M	10 mH	19	50	11.70
QEL25-M	25 mH	32	50	10.65	QEM15-M	15 mH	42	55	11.85
QEL50-M	50 mH	69	50	11.10	QEM25-M	25 mH	88	60	12.15
QEL100-M	100 mH	185	70	11.25	QEM50-M	50 mH	193	70	12.30



QG-F, QI-F, QK-F, QPL-F, QTL-F Open Frame

QE-M Molded

QG-M Molded

QI-M, QK-M, QPL-M, QTL-M Molded

QI-H, QK-H 2 studs QPL-H, QTL-H 4 studs Hermetic

MICRO-MINIATURE TOROIDAL INDUCTORS — QG SERIES

Frequency range of QGL Series, to 20 kHz; QGM Series, 2 to 100 kHz. Accuracy, ±2%. **QG-F:** Open frame, microcrystalline wax dipped with 4″ #28 plastic leads. Size: ⅝″ dia. x $\frac{9}{32}$″. **QG-M:** Molded in high temperature epoxy resin with .020″ x 2″ gold plated nickel alloy leads. Leads may be bent downward for plug-in printed circuit use. Size: ⅞″ dia. x ⅜″. **QGH:** Hermetically sealed **on Special Order Only ($25.00** set-up charge in lots of 1-249). **Size:** $\frac{11}{16}$″ dia. x $\frac{13}{32}$″. **QG-HC:** Hermetic crystal can. **Special Order Only;** prices set-up charge same as QG-H Series. Size: $\frac{23}{32}$″ x $\frac{11}{32}$″ x $\frac{49}{64}$″.

QGL SERIES

Part No.	Inductance	Typ. DC Res., Ohms	Typ. Dist. Cap., pF	Net Each, Lots of 1-9★		
				-F	-H	-M
QGL5-	5 mH	2.5	30	$5.10	$10.95	$8.40
QGL10-	10 mH	5	33	5.25	11.25	8.55
QGL15-	15 mH	8	34	5.40	11.40	8.70
QGL30-	30 mH	17	37	5.55	11.55	8.85
QGL50-	50 mH	28	40	5.70	11.70	9.00

Part No.	Inductance	Typ. DC Res., Ohms	Typ. Dist. Cap., pF	Net Each, Lots of 1-9★		
				-F	-H	-M
QGL100-	100 mH	50	42	$5.85	$12.00	$9.45
QGL250-	250 mH	130	46	6.60	12.45	9.90
QGL500-	500 mH	290	48	7.05	12.90	10.35
QGL1000-	1.0 H	530	51	8.55	14.40	11.85
QGL1500-	1.5H	825	53	10.50	16.50	13.95

QGM SERIES

QGM1-	1 mH	1.4	22	5.40	10.80	8.70
QGM2-	2 mH	2.5	25	5.55	10.95	8.85
QGM5-	5 mH	6	28	5.85	11.25	9.15
QGM10-	10 mH	12	31	6.00	11.40	9.30

QGM15-	15 mH	18	32	6.15	11.55	9.45
QGM25-	25 mH	30	35	6.45	11.70	9.75
QGM50-	50 mH	52	37	6.75	12.00	10.05
QGM100-	100 mH	115	39	7.35	12.90	10.35

SUBMINIATURE TOROIDAL INDUCTORS — QIL SERIES

Frequency range to 20 kHz; accuracy, ±2%. **QIL-M:** Molded in high temperature epoxy with silver plated turret lugs. Size: $1\frac{3}{16}$″ dia. x ½″. **QIL-H:** Hermetically sealed in metal case with Teflon® terminals. Size: $1\frac{1}{16}$″ x ½″ x $1\frac{7}{32}$″. **QIL-F:** Open frame. Microcrystalline wax dipped with 4″ #28 plastic leads. Size: 1″ dia. x $\frac{13}{32}$″.
®Registered DuPont Trademark

QIL3-	3 mH	.73	36	4.20	8.55	7.05
QIL5-	5 mH	1.1	38	4.20	8.55	7.05
QIL10-	10 mH	2.1	40	4.20	8.55	7.05
QIL15-	15 mH	3.3	42	4.20	8.55	7.20
QIL25-	25 mH	5.3	45	4.35	8.85	7.20
QIL50-	50 mH	11	47	4.35	9.00	7.35
QIL100-	100 mH	22	49	4.50	9.60	7.65

QIL150-	150 mH	34	50	4.95	9.75	7.80
QIL250-	250 mH	55	53	5.10	9.75	8.25
QIL500-	500 mH	95	55	5.85	10.65	9.00
QIL1000-	1.0 H	210	57	6.75	11.55	9.90
QIL1500-	1.5 H	335	59	8.40	13.20	11.55
QIL2500-	2.5 H	550	61	9.90	14.70	13.20

MINIATURE TOROIDAL INDUCTORS — QK SERIES

Frequency range of QKL Series, to 10 kHz; QKM Series, 5 to 50 kHz. Accuracy, ±2%. **QK-F:** Open frame, microcrystalline wax dipped; 4″ #28 plastic leads. Size: 1¼″ dia. x ⅝″. **QK-H:** Hermetic with Teflon terminals. Size: $1\frac{15}{32}$″ x $\frac{25}{32}$″ x $1\frac{47}{64}$″. **QK-M:** Molded in high temperature epoxy resin; silver plated turret lugs. Size: 1⅜″ dia. x ¾″; #8 clearance hole.

QKL SERIES

QKL5-	5 mH	.62	60	5.25	10.65	9.30
QKL10-	10 mH	1.1	66	5.40	10.80	9.45
QKL15-	15 mH	1.7	68	5.55	11.10	9.60
QKL25-	25 mH	2.8	72	5.70	11.25	9.75
QKL50-	50 mH	6	76	5.85	11.85	10.05
QKL100-	100 mH	11	81	6.00	12.00	10.35
QKL150-	150 mH	17	83	6.15	12.15	10.65

QKL250-	250 mH	28	87	6.45	12.45	10.95
QKL500-	500 mH	63	91	6.75	12.90	11.40
QKL1000-	1.0 H	110	96	7.20	13.35	11.85
QKL1500-	1.5 H	175	98	7.80	14.25	12.75
QKL2500-	2.5 H	275	103	8.55	15.15	13.35
QKL5000-	5 H	645	106	9.90	16.05	14.55
QKL10,000-	10 H	1175	112	10.65	16.95	15.45

QKM SERIES

QKM2-	2 mH	.45	52	6.00	11.25	9.75
QKM5-	5 mH	1.1	58	6.15	11.40	9.90
QKM10-	10 mH	2.5	62	6.30	11.55	10.05
QKM25-	25 mH	6.5	70	6.45	12.15	10.35
QKM50-	50 mH	11	74	6.60	12.45	10.65

QKM100-	100 mH	25	79	6.90	12.60	11.10
QKM250-	250 mH	65	87	7.65	13.50	12.00
QKM500-	500 mH	115	92	8.10	14.10	12.60
QKM1000-	1.0 H	250	97	8.70	14.70	13.20

HIGH-Q TOROIDAL INDUCTORS — QPL SERIES

Frequency range to 10 kHz; accuracy, ±2%. **QPL-F:** Open frame, microcrystalline wax dipped; 4″ #24 leads. Size: $1\frac{15}{16}$″ dia. x ⅞″. **QPL-H:** Hermetically sealed with Teflon terminals. Size: $1\frac{15}{16}$″ x $1\frac{1}{16}$″ x $2\frac{9}{32}$″. **QPL-M:** Molded in high temperature epoxy resin; silver plated turret lugs. Size: 2″ dia. x 1″.

QPL25-	25 mH	1.5	100	6.90	15.75	12.15
QPL50-	50 mH	2.5	105	7.05	15.90	12.30
QPL100-	100 mH	6	110	7.20	16.05	12.45
QPL250-	250 mH	15	115	7.35	16.20	12.60
QPL500-	500 mH	25	120	7.50	16.35	12.75
QPL1000-	1.0 H	60	125	7.80	16.65	13.20
QPL1500-	1.5 H	90	130	8.10	16.95	13.35

QPL2500-	2.5H	150	133	8.70	17.25	13.65
QPL5000-	5.0 H	350	138	9.45	17.70	14.10
QPL7500	7.5 H	525	140	10.05	18.15	14.55
QPL10,000	10 H	600	142	11.10	18.45	14.85
QPL15,000-	15 H	900	146	12.00	19.80	15.60
QPL25,000-	25 H	1500	150	13.05	21.60	17.40

HIGH-Q TOROIDAL INDUCTORS — QTL SERIES

Frequency range to 15 kHz; accuracy, ±2%. **QTL-F:** Open frame, microcrystalline wax dipped; 4″ #24 leads. Size: $2\frac{7}{16}$″ dia. x 1″. **QTL-H:** Hermetic, Teflon terminals. Size: $2\frac{9}{16}$″ x $1\frac{5}{16}$″ x $2\frac{13}{16}$″. **QTL-M:** Molded in epoxy resin. Size: 2⅞″ dia. x 1⅜″.

QTL25-	25 mH	0.85	127	11.85	22.20	25.20
QTL50-	50 mH	1.5	136	12.00	23.25	25.50
QTL100-	100 mH	2.8	144	12.45	23.40	25.65
QTL150-	150 mH	3.9	149	12.90	23.55	26.10
QTL250-	250 mH	7	156	13.20	24.00	26.70
QTL500-	500 mH	15	164	13.50	24.75	27.75
QTL1000-	1.0 H	27	173	14.40	24.90	28.50

QTL1500-	1.5H	40	177	15.75	25.20	29.40
QTL2500-	2.5 H	70	184	17.25	26.40	30.60
QTL5000-	5 H	140	192	18.00	27.60	32.10
QTL10,000-	10 H	270	200	18.90	28.50	33.00
QTL15,000-	15 H	430	205	21.15	30.90	35.40
QTL25,000	25 H	850	212	23.55	33.60	37.80
QTL50,000-	50 H	1500	221	26.10	36.00	40.20

IMMEDIATE DELIVERY FROM STOCKING DISTRIBUTORS

† ORDER BY COMPLETE MICROTRAN NO. (QGLF-5)

★ Quantity pricing schedule is as follows: 1-9 net, 10-49 less 10%, 50-99 less 16⅔%, 100-249 less 33⅓%. Contact factory for prices over 249.

MICROTRAN 145 E. Mineola Ave • Valley Stream, N.Y. 11582
Phone: (516) 561-6050 • TWX: 510-225-8412

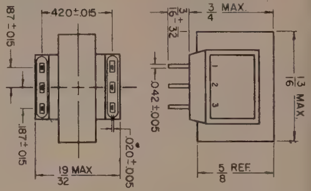
DECI-MINIATURE — FOR PRINTED CIRCUITS LOW LEVEL INPUT TRANSFORMERS

DECI-MINIATURE TRANSFORMERS — DCM SERIES

Frequency Response 200-15,000 Hz + 2 db

These units can be used as input, interstage, output, isolation and other impedance requirements. Primary and secondary windings may be inter-changed to obtain required impedance matching. Note: This will result in slightly different impedance ratios than shown.

Part No.	Primary Impedance	Secondary Impedance	Pri. DC Unbal. Ma	Oper. Level DBM
DCM1-PC	25,000 C.T.	1,200 C.T.	2	18
DCM2-PC	15,000 C.T.	15,000 C.T.	3	19
DCM3-PC	15,000 C.T.	600 C.T.	3	19
DCM4-PC	10,000 C.T.	5,000 C.T.	4	20
DCM5-PC	10,000	2,500/625 Split	2	20
DCM6-PC	10,000 C.T.	1,500 C.T.	4	20
DCM7-PC	5,000 C.T.	80,000 C.T.	6	15
DCM8-PC	4,000 C.T.	1,200 C.T.	6	20
DCM9-PC	4,000 C.T.	600 C.T.	6	20
DCM10-PC	4,000	600/150 Split	3	20
DCM11-PC	2,500 C.T.	2,500 C.T.	8	20
DCM12-PC	2,500	2,500/625 Split	4	20
DCM13-PC	2,500 C.T.	625 C.T.	8	20
DCM14-PC	2,500 C.T.	200 C.T.	8	20
DCM18-PC	600 C.T.	50,000 C.T.	16	20
DCM19-PC	600	8,000/2,000 Split	8	20
DCM20-PC	600 C.T.	200 C.T.	16	20
DCM21-PC	600 C.T.	600 C.T.	16	20
DCM22-PC	250 C.T.	600 C.T.	25	20
DCM51-PC	Choke	10 hy @ 0 ma DC	5 hy @ 3 ma DC	300 Ohms DCR
DCM52-PC	Choke	5 hy @ 0 ma DC	2 hy @ 5 ma DC	155 Ohms DCR
DCM53-PC	Choke	2.5 hy @ 0 ma DC	1 hy @ 7 ma DC	75 Ohms DCR



DECI-MINIATURE DCM-SERIES

New Industrial/Commercial grade miniature printed circuit transformers. Rigid terminals provide fixed mounting centers usually found in expensive molded transformers. Wt.: .5 oz.

LOW LEVEL CHOPPER INPUT TRANSFORMERS

Used in Servo, measuring, and coupling circuits as an Input Transformer for low level amplifiers. Efficiently transfers 30 to 500 C.P.S. transducer or thermocouple signals to instrument amplifiers at signal levels from .5 Mu V to .5V. Low hum pick-up assured by three Mu-Metal shields. High permeability core provides high efficiency and low distortion. Resin potted to minimize magnetostrictive microphonics. Electrostatic shield brought out to external ground connection to eliminate chassis currents.

Request Engineering Application Bulletin F184

Part No.	Turn Ratio Full Pri. To Full Sec.	½ Pri. To Full Sec.	Ind. of Full Pri. @ .5V 60 Hz	Imped. of Full Pri. @ .5V 60 Hz	DC Resistance Full Pri.	Sec.	Fig.
M8025	1:7.7	1:15.4	17.5 hy	6,600	365	4,140	B
M8026	1:3.2	1:6.4	60 hy	22,500	455	3,500	B
M8052	1:4.53	1:9.06	90 hy	34,000	760	5,220	B
M8053*	1:0.5	1:1	140 hy	53,000	920	653	B
M8112	1:0.5	1:1	450 hy	80,000	2,300	1,600	B
M8525	1:7.7	1:15.4	17.5 hy	6,600	365	4,140	BB
M8526	1:3.2	1:6.4	60 hy	22,500	455	3,500	BB
M8552	1:4.53	1:9.06	90 hy	34,000	760	5,220	BB
M8553*	1:0.5	1:1	140 hy	53,000	920	653	BB

*Secondary is center tapped. All Units 90 dB Magnetic Shielding.

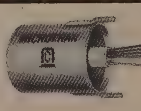


Fig. B

TRIPLE MU-METAL CASE

6-32 x ⅜″ mounting studs on 1½″ centers. Wt.: 5 oz. 1⅜″ Dia. x 1²³⁄₃₂″ Ht.

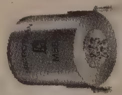


Fig. BB

HERMETICALLY SEALED

Hermetically sealed to meet MIL-T-27. Triple Mu-Metal case, high compression glass terminals, 6-32 x ⅜″ mounting studs on 1½″ centers; 1″ dia. cut-out for terminals. Wt.: 5 oz.

LOW LEVEL MICROPHONE INPUT TRANSFORMERS

These Broadcast Fidelity Input Transformers are Double Mu-metal Shielded

Part No.	Primary Impedance	Secondary Impedance	Magn. Shldg.	Level DBM	Freq. Resp. ±2 db	H	D	W	Fig.
M8027	200	40,000	25	+5	50-20,000	2¾	1³⁄₁₆x⅞	2	D
M8030*	200/50 C.T.	50,000	65	+5	20-20,000	2⅛	1⅛	6	C
M8031	600 C.T./150	50,000	65	+5	30-20,000	2⅛	1⅛	6	C
M8032†	250 C.T.	50,000	65	+5	20-20,000	2⅛	1⅛	6	C
M8033†	50 C.T.	50,000	65	+5	20-20,000	2⅛	1⅛	6	C
M1-S	50/250/600 C.T.	50,000	65	+5	20-20,000	1¹⁷⁄₃₂	1¹⁄₁₆	3	M-S

*M8030 is designed as a replacement for Ampex No. 1733-1
†M8032 and M8033 mates with sockets on many RCA amplifiers.

SHIELDED PLUG-IN

M8030-1 have 8 pins. M8023-3 have 9 pins. Matches many amplifiers.

SHIELDED CASED

Mounting Centers, 1¾₁₆″ 6-32 x ⅜″ studs.

IN-LINE MICROPHONE

Single Mu-Metal shield, electrostatic shield, 20″ shielded cable is to be terminated with desired connector.

SEE PAGE 2•1756 FOR PRICING

MICROTRAN 145 E. Mineola Ave • Valley Stream, N.Y. 11582
Phone: (516) 561-6050 • TWX: 510-225-8412

MICROPHONE/TRANSDUCER INPUT TRANSFORMERS

FOR: PROFESSIONAL SOUND STUDIOS — BROADCAST MIXING CONSOLES — CONTROL AND INSTRUMENT AMPLIFIERS

EQUIVALENT TO IMPORTED EUROPEAN STUDIO GRADE TRANSFORMERS

Additional Ratings Available On Special Order

FEATURES:

- **WIDE BANDWIDTH — BROAD FREQUENCY RESPONSE:** Provided by special gapless lamination construction.
- **EXTREMELY LOW DISTORTION:** Provided by high nickel alloy magnetic core material.
- **NEGLIGIBLE HUM PICK-UP:** Due to nested Mu-Metal shields and unique gapless core construction.
- **SUBMINIATURE SIZE:** Permits close spacing to adjacent circuitry.
- **EASE OF MOUNTING AND ORIENTATION:** Single stud mounting of S100-S Series permits rotation for minimum hum pick-up.
- **POLARIZING VOLTAGE FOR CONDENSER MICROPHONES:** Primaries with split windings or center tap permit simplex +48V powering or +9 to +12V parallel or simplex powering arrangement.
- **LOW MICROPHONICS:** Resin potted to minimize magnetostrictive microphonics normally experienced in low level circuitry.
- **ELECTROSTATIC SHIELDING:** Electrostatic shield brought out to external ground connection eliminates chassis currents.

LOW LEVEL INPUT TRANSFORMERS

Power level range up to +0 dbm. Other impedance ratios available on special order — contact factory.

Part No.	Nominal Turns Ratio Pri:Sec	Nominal Impedance Ratio Primary	Secondary	Typical Open Circuit Primary Imped. @ 50 Hz†	Frequency Response‡	Fig.	Replaces Beyer P/N
S101-S	1:20	12.5**	5,000	100	30-20,000 Hz ±.5 db	-S	TR-BV35704
S101-SP*	1:20	12.5**	5,000	100	30-20,000 Hz ±.5 db	-SP	STR-BV37704
S105-S	1:15	200	45,000	2,000	30-20,000 Hz ±.5 db	-S	TR-145/BV35570
S105-SP*	1:15	200	45,000	2,000	30-20,000 Hz ±.5 db	-SP	STR-145/BV37570
S107-S	1:15	200/50 Split	45,000	2,000	30-20,000 Hz ±.5 db	-S	TR-145/BV35545
S107-SP*	1:15	200/50 Split	45,000	2,000	30-20,000 Hz ±.5 db	-SP	STR-145/BV37545
S118-S	1:5	200/50 Split	5,000	2,000	30-20,000 Hz ±.5 db	-S	TR-145/BV35802
S118-SP*	1:5	200/50 Split	5,000	2,000	30-20,000 Hz ±.5 db	-SP	STR-145/BV37802
S126-S	1:1	600 C.T.	600	3,750	30-20,000 Hz ±.5 db	-S	TR-145/BV35508
S126-SP*	1:1	600 C.T.	600	3,750	30-20,000 Hz ±.5 db	-SP	STR-145/BV37508
S130-S	1:1	10,000	10,000	100,000	30-20,000 Hz ±.5 db	-S	TR-145/BV35590
S130-SP*	1:1	10,000	10,000	100,000	30-20,000 Hz ±.5 db	-SP	STR-145/BV37590
S100-FB	Right angle mounting bracket for S100-S Series					-FB	

†Designed for optional bridging termination use to provide additional 6 db output voltage gain.
‡Frequency response measured with source equal to nominal primary impedance and with unloaded secondary except 100K load on S105 and S107 Series.
*Special order only. Contact factory.
**Designed to couple record head to F.E.T. input.

MICROTRAN
S101-S

Fig. -S

SINGLE THREADED STUD MOUNTING

Double Mu-Metal shielding. 3" color coded leads. 5/16" Dia. stud provided with nut. 5/8" Dia. x 13/16" Ht.

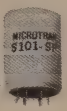


Fig. -SP

PRINTED CIRCUIT MOUNTED

Double Mu-Metal shielded. 3/4" Dia. x 1 1/16" Ht. 7-.040 pins 1/8" Ht.

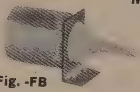


Fig. -FB

RIGHT ANGLE MOUNTING BRACKET

For low profile horizontal mounting of -S Series stud mounted transformers. Supplied with two #2-56 x 1/4" self-tapping screws. M.C. 3/8".

TELEPHONE COUPLING TRANSFORMERS

FOR INTERCONNECT OF VOICE/DATA MODEM TERMINALS TO TELEPHONE LINES

Designed to meet telephone company requirements for data and voice access arrangements. Provides line isolation and matching — prevents line imbalance. Permits optimum use of voice-grade telephone lines for broadband data signals. Wide dynamic signal level capability — low distortion.

- **FREQUENCY RESPONSE:** 300-3500 Hz ±0.5 db
- **LEVEL:** −45 dbm to +7 dbm
- **LONGITUDINAL BALANCE:** 45 db Min.
- **DISTORTION:** 0.5% Max.
- **IMPEDANCE MATCHING:** ± 10% over entire frequency range
- **RETURN LOSS:** 26 db Min.

Part No.	Application	Primary Impedance	Secondary Impedance	Fig. No.
T1104	Coupling	600	600	1
T2104	Coupling	600	600	1
T2106	Coupling	600 C.T.	600 C.T.	1
T2108	Coupling	600	900	1
T2110	Coupling*	900	900	1
T6112	Coupling*	600	900, 600 @ 60 ma DC	2
T2220	Hybrid‡	600	600/600	1
T3220	Hybrid‡	600	600/600	1
T2316	Bridging	4,000	600	1
T4415	Holding Coil	2.0 hy @ 60 ma, 1.3 hy @ 100 ma DC 180Ω		1
T7410	Holding Coil	1.0 hy @ 0 ma, 0.8 hy @ 25 ma DC, 225Ω		3
T8410	Holding Coil	1.0 hy @ 0 ma, 0.8 hy @ 40 ma DC, 113Ω		3

‡2 required for Hybrid Operation, Trans-Hybrid loss 45 db typical. *Electrostatic Shield.
Available on special order with other ratings and construction.

DIMENSIONS

Size Series	Fig.	A	B	C	D	E	F	G	Wt. Oz.
T1000	1	3/4	7/16	§	.484	.235‡	19/32	.040*	.4
T2000	1	49/64	23/32	§	.420	.187‡	11/16	.041	.5
T3000	1	1 1/64	27/32	§	.781	.200	61/64	.041	1.2
T4000	1	1 15/32	1 3/16	1 13/64	1.00	.312‡	1 5/32	.041	3.5
T6000	2	1 61/64	1 41/64	1 11/16	1.30	.400	1 15/32	.041	9.5

§Do not have standoff. *Round pins .040" dia.
‡Pin location 2 and 5 not used on T1104, T2104, T2108, T2316, and T4415, pin spacing is 2E.

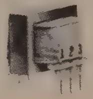
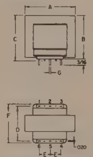


Fig. 1
Plug-in printed circuit construction. Vacuum varnish impregnated.



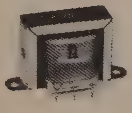
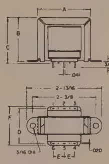


Fig. 2
Plug-in printed circuit construction with mounting channel. Vacuum varnish impregnated.



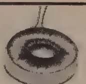
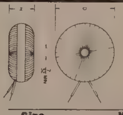


Fig. 3
High-Q Toroid. Microcrystalline wax impregnated. Supplied with 4" #28 leads.



Size Series	D	H	Wt. Oz.
T7400	1	13/32	3/4
T8400	1 1/4	5/8	2

REQUEST ENGINEERING APPLICATION BULLETIN F232

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MICROTRAN 145 E. Mineola Ave • Valley Stream, N.Y. 11582
Phone: (516) 561-6050 • TWX: 510-225-8412

DC TO DC CONVERTER TRANSFORMERS

APPLICATIONS: • Portable Radiation Monitors • Infra-Red Detectors • Op-Amp Power Supplies • DC Isolation • Geodetic-Oceanographic-Medical Equipment • Mobile Equipment • High Intensity Flashers • DC Supply for Modular Equipment

A BROAD SELECTION OF RATINGS AND DESIGNS TO FILL YOUR CIRCUIT REQUIREMENTS

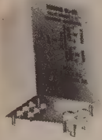
FIG. A

FIG. B

FIG. C

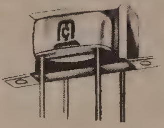
FIG. D

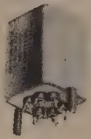
FIG. E

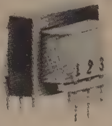
FIG. F

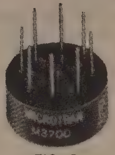
FIG. G

FIG. H

Select the Unit That Meets Your Power and Size Requirements	Cat. No.	Total VA▲ Output	DC Input Volts	DC Output**				Switch Freq. Hz Approx.	Schematic No.	Typical Transistor	Dimensions					Type of Construction	Fig. No.	Approx. Weight Oz.
				Bridge Volts	MA	C.T. Full Wave Volts	MA				D	W	H	Mtg. MD	Centers MW			
NEW 25 mw to 190 mw High Voltage Low Power Miniature Design	M8149	25 mw	3	1000*	25 μA	—	—	400	3	2N670	1 1/64	61/64	27/32	—	—	Plug-in Printed Circuit	F	1.25
	M8050	25 mw	3	1000*	25 μA	—	—	400	3	2N670	1 11/16	13/16	27/32	1 3/8	—	Laminated — Open Frame	D	1.25
	M8051	25 mw	3	1000*	25 μA	—	—	400	3	2N670	1	1	1 3/8	1 1/8	—	Laminated — MIL Case AG	E	2.4
	M8073	25 mw	4	425-500*	50 μA	—	—	50-3K†	5	2N1305	3/8	3/8	3/8	—	—	Laminated — Open Frame	B	.1
	M8074	50 mw	3	535*	90 μA	—	—	400	6	2N414	1 11/16	13/16	27/32	1 3/8	—	Laminated — Open Frame	D	1.25
	M8072	190 mw	2.7	480*	400 μA	—	—	800	2	2N1307	1 11/16	13/16	27/32	1 3/8	—	Laminated — Open Frame	D	1.25
	M8120	190 mw	28	480*	400 μA	—	—	3.5K	9	2N4355	1 11/16	13/16	27/32	1 3/8	—	Laminated — Open Frame	D	1.25
NEW 3 VA Displays Nixie-Panaplex SP-300/SP-700	M8121	3	5	190	15	—	—	20K	11	2N6121	9/16 D x 11/32 H — ‡					Pot Core — Open Frame	H	.3
5 VA High Voltage Low Profile Encapsulated	M8115	5	13.8	±250 or 500■	10	250	20	6K	8	2N3054	1 1/4 D x 3/4 H — .140 Cl. Hole					Toroid — Encapsulated	C	1.1
	M8117	5	28	±250 or 500■	10	250	20	6K	7	2N3054	1 1/4 D x 3/4 H — .140 Cl. Hole					Toroid — Encapsulated	C	1.1
NEW	M8122	5	5	±15 or 30	175	15	350	20K	7	2N3055	7/8 D x 1/2 H					Molded Toroid Plug-in	G	1.1
30 VA High Switching Frequency Low Profile Encapsulated	M8132	30	13.8	±15 or 30■	1000	15	2000	20K	7	2N3055	1 1/4 D x 3/4 H — .140 Cl. Hole					Toroid — Encapsulated	C	1.1
	M8133	30	28	±15 or 30■	1000	15	2000	20K	7	2N3055	1 1/4 D x 3/4 H — .140 Cl. Hole					Toroid — Encapsulated	C	1.1
40 VA High Voltage Hermetic	M8036	40	13.6	±225 or 450■	90	225	155	800	1	2N442	2 5/16	2 1/16	3 1/8	1 11/16	1 7/16	Laminated — MIL Case FA	A	1 1/4 lbs.
50 VA Medium Power Low Profile Encapsulated	M8113	50	13.8	±14 or 28■	1750	14	3500	2.5K	7	2N3055	2 1/8 D x 1 1/4 H — .170 Cl. Hole					Toroid — Encapsulated	C	6
	M8114	50	28	±14 or 28■	1750	14	3500	2.5K	7	2N3055	2 1/8 D x 1 1/4 H — .170 Cl. Hole					Toroid — Encapsulated	C	6
	M8116	50	13.8	±35 or 70■	700	35	1400	2.5K	7	2N3055	2 1/8 D x 1 1/4 H — .170 Cl. Hole					Toroid — Encapsulated	C	6
	M8118	50	28	±35 or 70■	700	35	1400	2.5K	7	2N3055	2 1/8 D x 1 1/4 H — .170 Cl. Hole					Toroid — Encapsulated	C	6
125 VA High Voltage High Power Hermetic	M8035	125	13.6	±250 or 500■	250	250	420	800	1	2N442	2 3/4	2 3/8	3 13/16	2 1/8	1 3/4	Laminated — MIL Case GA	A	2 1/4 lbs.
	M8034	125	28	±250 or 500■	250	250	420	800	1	2N174	2 3/4	2 3/8	3 13/16	2 1/8	1 3/4	Laminated — MIL Case GA	A	2 1/4 lbs.

‡Supplied with 4-40 nylon mounting screw and nut in center hole.

▲Full wave and C.T. loads may be simultaneously drawn, but for continuous duty, total V.A. output should not be exceeded.

■For positive and negative voltage supply as utilized in op-amp and similar circuitry, use secondary circuit #10.

*Output when used with suggested schematic. **Based on approximately 1 volt drop per rectifier. †Frequency depends on load and bias conditions.

ALL TRANSFORMERS ARE SUPPLIED WITH ENGINEERING BULLETIN, LISTING COMPONENT VALUES & SCHEMATICS

SEE PAGE 2•1756 FOR PRICING

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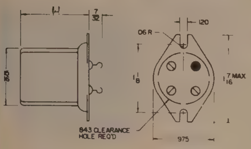
400 Hz POWER SUPPLY TRANSFORMERS

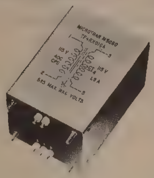
On special order certain units may be obtained in alternate constructions such as Epoxy molded, or open frame. Also available with modified electrical specifications.

FULL TERMINAL ARRANGEMENTS AND COLOR CODE DESIGNATIONS SUPPLIED WITH EACH UNIT

HERMETICALLY SEALED FIGURE A

Per MIL-T-27
MIL DESIGNATION TF4RX01XX





HERMETIC — FIGURE B

Height (H) for M8063 — $\frac{11}{16}$", M8069 — $\frac{15}{16}$", M8058, M8075, M8081, M8082 — $1\frac{7}{16}$".
MIL DESIGNATION TF4RX01YY

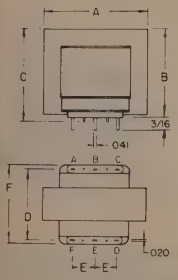
TOROIDAL MOLDED FIGURE C

Molded with ½" pins for printed circuit applications.
MIL DESIGNATION TF5SX01XX

400 Hz PLUG-IN PC POWER

Compact design for miniature solid-state circuitry. Precision spaced molded-in terminals for power supplies, control equipment, instrument and similar applications. Dual secondaries may be connected in series or parallel for varied voltage and current requirements. **115 V Primary.**

Cat. No.	Secondary Parallel	Secondary Series
PC4304	3.15V @ .1A	6.3V C.T. @ .05A
PC4312	12.6V @ .026A	25.2V C.T. @ .013A
PC4316	28V @ .012A	56V C.T. @ .006A
PC4320	35V @ .01A	70V C.T. @ .005A
PC4408	6.3V @ 0.60A	12.6V C.T. @ .30A
PC4412	12.6V @ .030A	25.2V C.T. @ .15A
PC4416	28V @ 0.14A	56V C.T. @ .07A
PC4424	40V @ 0.10A	80V C.T. @ .05A
PC4428	58V @ .066A	116V C.T. @ .033A
PC4432	115V @ .010A, 12.6V @ .150A	



plug-in
printed circuit

DIMENSIONS

Series	A	B	C	D	E	F	Wt. Oz.
PC4300	$\frac{49}{64}$	$\frac{23}{32}$	†	.420	.187	$\frac{11}{16}$	.5
PC4400	$1\frac{1}{64}$	$\frac{27}{32}$	†	.781	.200	$\frac{61}{64}$	1.2

†Do not have standoff.

400 Hz POWER SUPPLY TRANSFORMERS

For Silicon Rectifier Circuitry, and Filament Applications

PRIMARY 105/115/125 VOLTS MIL DESIGNATION TF4RX01XX

Part No.	Secondary AC Volts	Secondary RMS Amps	Rectifier Circuit C.T. Full Wave DC Volts**	Rectifier Circuit F.W. Bridge DC Volts**	Fig. A Mil Case XX
M8063†	2.85	.045	1.5 (Series)	3	YY Fig. B
	2.85	.045			
M8064†	6.3 C.T.	.6	1.9	3.8	AH
M8075†	6.3 C.T.	.3	1.9	3.8	YY Fig. B
M8076†	12.6 C.T.	.3	4.7	9.4	AH
M8039	12.6	.8	10.5 (Series)	21 (Series)	AJ
	12.6 C.T.	.8			
M8077	12.6	2	10.5 (Series)	21 (Series)	FA
	12.6 C.T.	2			
M8038	12.6	.3			
	12.6	.3	16 (Series)	32 (Series)	AJ
	12.6	.3			
M8018	18.5 C.T.	1	7.4	14.8	EA
M8019	18.5 C.T.	3	7.4	14.8	FA
M8065	26 C.T.	1.5	10.8	21.6	EA
M8066	26 C.T.	3	10.7	21.5	FA
M8079	26 C.T.	4	10.8	21.6	HA
M8067	30 C.T.	1.5	12.5	25	FB
M8020	35 C.T.	3	14.5	29	GA
M8068	40 C.T.	.2	17	34	AJ
M8041†	50 C.T.	.25	21.5	43	AH
M8080	50 C.T.	.20	21.5	43	AJ
M8069†	60 C.T.	.003	26	52	YY Fig. B
M8070†	65 C.T.	.170	28.4	56.8	AH
M8081†	65 C.T.	.030	28.4	56.8	YY Fig. B
M8021	70 C.T.	1	30	60	FA
M8071	80 C.T.	.90	35	70	FA

**DC Output Volts for resistive or inductive rectifier loads. Output Volts based on approximately 1 Volt drop per rectifier.
†Primary 115 Volts only.

400 Hz TOROIDAL POWER TRANSFORMERS

Toroidal cores permit smaller height and package and greater efficiency. Size and savings up to 30%. Epoxy molded. Printed circuit pins can be bent for chassis mounting. Low phase shift. See Figure C for illustration.

For Applications Requiring Minimum Size and Weight

PRIMARY 115 VOLTS MIL DESIGNATION TF5SX01ZZ

Part No.	Secondary Volts	Secondary Current ma	V. A.	Dimensions O.D.	Dimensions Height	Nominal Wt. Oz.
M8106	28 C.T.	320	9	$1\frac{5}{32}$	1⅛	2
M8107	28 C.T.	710	20	1½	1¼	4
M8108	56 C.T.	160	9	$1\frac{5}{32}$	1⅛	2
M8109	56 C.T.	356	20	1½	1¼	4
M8110	115 C.T.	78	9	$1\frac{5}{32}$	1⅛	2
M8111	115 C.T.	170	20	1½	1¼	4

.170 Clearance Hole for #8 Screw.

400 Hz ISOLATION POWER TRANSFORMERS

Center Tap Permits Use In Either F.W. Bridge or F.W.C.T. Circuitry

ELECTROSTATIC SHIELDING MIL DESIGNATION TF4RX01XX

Part No.	Input Voltage	Output Voltage	Current RMS Amps	V.A. Rating	Fig. A Mil Case XX
M8082	26	12.6 C.T.	.15	1.9	YY Fig. B
		12.6	.15	1.9	
M8058	115	115 C.T.	.017	2	YY Fig. B
M8083	115	115 C.T.	.030	10	AJ
		12.6 C.T.	.25	Total	
		12.6	.25		
M8084	115	115 C.T.	.12	14	AJ
M8059	115	115 C.T.	.35	40	EB
M8085	115	115 C.T.	.7	80	FA
M8060	115	115 C.T.	1.3	150	GA
M8061*	115	115 C.T.	2.6	300	JA
M8062*	115	115 C.T.	4.4	500	KA

*Primary 105/115/125 Volts.

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PLUG-IN PRINTED CIRCUIT POWER TRANSFORMERS

115V & 115/230V 50/60 Hz PRIMARY

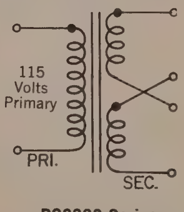
- **Compact Design for Miniaturized Solid State Circuitry**
- **Precision Spaced Molded-in Terminals**

For applications such as power supplies, instruments, and control equipment. Constructed per MIL-T-27 Grade 6 Class R. Class S available on special order.

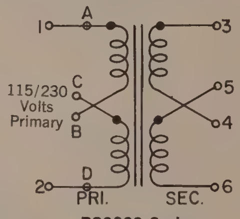
Dual secondaries may be parallel connected to obtain twice the current, or series connected to give twice the voltage of one winding.

Lugs on PC2000 Series provide for 115/230V primary voltage options without changes in PC board.

115V Primary		115/230V Primary		Secondary			
				Parallel Connected		Series Connected	
Part No.	Fig.	Part No.	Fig.	AC Volts	RMS Amps	AC Volts	RMS Amps
SERIES PC6500/PC2500				**1½ WATT SERIES**			
PC6506	C	PC2506	A	6.3	.250	(Single Secondary)	
PC6512	C	PC2512	A	12.6	.120	25.2 C.T.	.060
PC6524	C	PC2524	A	40.0	.040	80.0 C.T.	.020
PC6528	C	PC2528	A	58.0	.026	116.0 C.T.	.013
SERIES PC6600/PC2600				**4½ WATT SERIES**			
PC6608	D	PC2608	B	6.3	.700	12.6 C.T.	.350
PC6616	D	PC2616	B	28.0	.156	56.0 C.T.	.078
PC6624	D	PC2624	B	40.0	.110	80.0 C.T.	.055
PC6628	D	PC2628	B	58.0	.066	116.0 C.T.	.033
PC6632	D	PC2632	B	115.0V @ .020A and 12.6V @ .150A			
SERIES PC6700/PC2700				**7½ WATT SERIES**			
PC6708	D	PC2708	B	6.3	1.200	12.6 C.T.	.600
PC6712	D	PC2712	B	12.6	.600	25.2 C.T.	.300
PC6715	D	PC2715	B	20.0	.370	40.0 C.T.	.185
PC6716	D	PC2716	B	28.0	.270	56.0 C.T.	.135
PC6724	D	PC2724	B	40.0	.180	80.0 C.T.	.090
PC6728	D	PC2728	B	58.0	.130	116.0 C.T.	.065
PC6732	D	PC2732	B	115.0V @ .025A and 12.6V @ .250A			



PC6000 Series



PC2000 Series

DIMENSIONS

Series	Fig.	A	B	C	D	E 6-Pin	E 8-Pin	F	G	H	Wt. Oz.
PC6200/PCT6200	E	1¹⁄₆₄	²⁷⁄₃₂	†	1.274	—	.150	1⅜	—	—	2.3
PC2500	A	1²⁵⁄₆₄	1¹¹⁄₆₄	1¹³⁄₆₄	1.00	.312	—	1⁵⁄₃₂	—	—	3.2
PC6500/PCT6500	C	1²⁵⁄₆₄	1¹¹⁄₆₄	1¹³⁄₆₄	1.00	.312	.200	1⁵⁄₃₂	—	—	3.2
PC2600	B	1⁴⁵⁄₆₄	1²⁵⁄₆₄	1⁷⁄₁₆	1.10	.400	—	1¼	2	2⅜	6.5
PC6600/PCT6600	D	1⁴⁵⁄₆₄	1²⁵⁄₆₄	1⁷⁄₁₆	1.10	.400	.250	1¼	2	2⅜	6.5
PCL6600	F	1⁵¹⁄₆₄	1¹³⁄₃₂	1³⁄₁₆	—	Send For Pin Layout		—	—	—	6.6
PC2700	B	1⁶¹⁄₆₄	1⁴¹⁄₆₄	1¹¹⁄₁₆	1.30	.400	—	1¹⁵⁄₃₂	2⅜	2¹³⁄₁₆	9.5
PC6700/PCT6700	D	1⁶¹⁄₆₄	1⁴¹⁄₆₄	1¹¹⁄₁₆	1.30	.400	.250	1¹⁵⁄₃₂	2⅜	2¹³⁄₁₆	9.5
PC6900/PCT6900	E	1⁴¹⁄₆₄	1¹¹⁄₃₂	1²⁵⁄₆₄	2.10	.400	.250	2¼	*	—	12.0

*PC6900-FB mounting bracket avail. on special order; four ⁵⁄₃₂″ holes on 1⅜″ x 2″ ctrs.

†Do not have standoff.

PC2500 Series

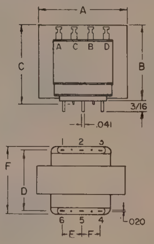
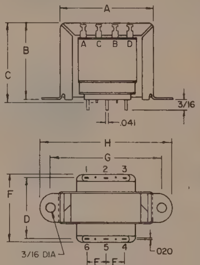


Fig. A

PC2600/PC2700 Series



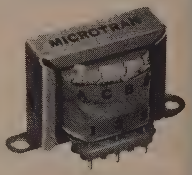


Fig. B

PC6500 Series — 6 Pins
PCT6500 Series — 8 Pins

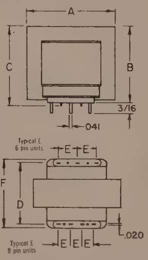
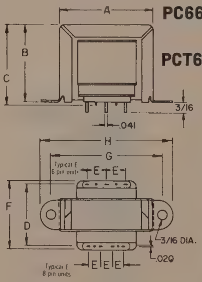


Fig. C

PC6600 & PC6700 Series — 6 Pins
PCT6600 & PCT6700 Series — 8 Pins



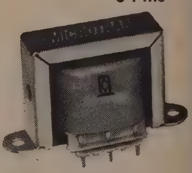


Fig. D

Series PC6500/PCT6500 (Fig. C) may also be used for point to point wiring by cementing the transformer with the terminals opposite mounting surface.

Series PC6600/PCT6600 and PC6700/PCT6700 (Fig. D) may also be supplied for point to point wiring on special order with terminals opposite mounting surface. To order, add -FBR to P/N, i.e. PC6604-FBR and add $10.00 lot set-up charge.

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PLUG-IN PRINTED CIRCUIT POWER TRANSFORMERS

FOR LOGIC & OP AMP POWER SUPPLIES

PLUG-IN PRINTED CIRCUIT POWER TRANSFORMERS FOR +5V, AND ±15V, DC POWER SUPPLIES

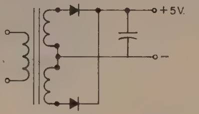
For construction of low cost, miniaturized, regulated and unregulated DC power supplies for latest solid-state digital and linear circuitry. Permits packaging flexibility unobtainable with prepackaged power supplies. Low-profile, miniaturized construction permits close stacking of PC boards. Precision spaced molded-in terminals.

Dimensions/Figs. on Facing Page.

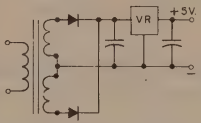
TRANSFORMERS FOR +5V DC UNREGULATED AND REGULATED POWER SUPPLIES

	Secondary				DC Output			
	Parallel Connected		Series Connected					
Part No.	AC Volts	RMS Amps	AC Volts	RMS Amps	C.T. F.W. DC Volts	Current ma DC	Schematic No.	Fig. No.
PC6205	4.50	0.18	9.0 C.T.	0.09	+5	75	1	E
PC6505	4.50	0.36	9.0 C.T.	0.18	+5	150	1	C
PC6605	4.50	1.10	9.0 C.T.	0.55	+5	450	1	D
PCL6605*	4.50	1.10	9.0 C.T.	0.55	+5	450	1	F
PC6705	4.50	2.00	9.0 C.T.	1.00	+5	825	1	D
PC6905	4.50	5.00	9.0 C.T.	2.50	+5	2000	1	E
PC6210	7.75	0.12	15.5 C.T.	0.06	+8.5**	50	2	E
PC6510	7.75	0.22	15.5 C.T.	0.11	+8.5**	90	2	C
PC6610	7.75	0.64	15.5 C.T.	0.32	+8.5**	265	2	D
PCL6610*	7.75	0.64	15.5 C.T.	0.32	+8.5**	265	2	F
PC6710	7.75	1.20	15.5 C.T.	0.60	+8.5**	500	2	D
PC6910	7.75	3.10	15.5 C.T.	1.55	+8.5**	1300	2	E

*All primaries 115V 50/60 Hz except PCL6605 and PCL6610 which have 115/230V 50/60 Hz primaries.
**+8.5 DC output volts for input to +5V IC Voltage Regulator, see Schematic 2.



SCHEMATIC #1
UNREGULATED

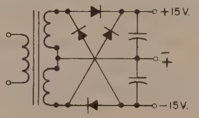


SCHEMATIC #2
REGULATED

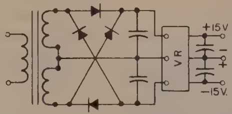
TRANSFORMERS FOR ±15V DC DUAL OUTPUT UNREGULATED AND REGULATED POWER SUPPLIES

	Secondary				DC Output			
	Parallel Connected		Series Connected					
Part No.	AC Volts	RMS Amps	AC Volts	RMS Amps	C.T. F.W. DC Volts	Current ma DC	Schematic No.	Fig. No.
PC6211	12.0	0.07	24.0 C.T.	0.035	±15	22	3	E
PC6511	12.0	0.13	24.0 C.T.	0.065	±15	40	3	C
PC6611	12.0	0.40	24.0 C.T.	0.200	±15	120	3	D
PCL6611*	12.0	0.40	24.0 C.T.	0.200	±15	120	3	F
PC6711	12.0	0.76	24.0 C.T.	0.380	±15	220	3	D
PC6911	12.0	1.90	24.0 C.T.	0.950	±15	550	3	E
PC6214	16.0	0.05	32.0 C.T.	0.025	±20**	15	4	E
PC6514	16.0	0.10	32.0 C.T.	0.050	±20**	30	4	C
PC6614	16.0	0.30	32.0 C.T.	0.150	±20**	90	4	D
PCL6614*	16.0	0.30	32.0 C.T.	0.150	±20**	90	4	F
PC6714	16.0	0.56	32.0 C.T.	0.280	±20**	165	4	D
PC6914	16.0	1.40	32.0 C.T.	0.700	±20**	410	4	E

*All primaries 115V 50/60 Hz except PCL6611 and PCL6614 which have 115/230V 50/60 Hz primaries.
**±20 DC output volts for input to ±15V output IC Voltage Regulator, see Schematic 4.



SCHEMATIC #3
UNREGULATED

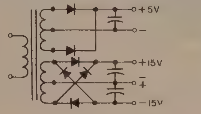


SCHEMATIC #4
REGULATED

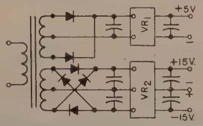
TRANSFORMERS FOR +5V AND ±15V DC TRIPLE OUTPUT UNREGULATED AND REGULATED POWER SUPPLIES

	Secondary #1		Secondary #2		DC Output #1		DC Output #2			
Part No.	AC Volts	RMS Amps	AC Volts	RMS Amps	C.T. F.W. DC Volts	Cur. ma DC	C.T. C.W. DC Volts	Cur. ma DC	Schematic No.	Fig. No.
PCT6230	9.0 C.T.	0.048	24.0 C.T.	0.020	+5	40	±15	12	5	E
PCT6530	9.0 C.T.	0.072	24.0 C.T.	0.032	+5	60	±15	20	5	C
PCT6630	9.0 C.T.	0.240	24.0 C.T.	0.080	+5	200	±15	50	5	D
PCL6630*	9.0 C.T.	0.240	24.0 C.T.	0.080	+5	200	±15	50	5	F
PCT6730	9.0 C.T.	0.480	24.0 C.T.	0.160	+5	400	±15	100	5	D
PCT6930	9.0 C.T.	1.200	24.0 C.T.	0.440	+5	1000	±15	275	5	E
PCT6531	15.5 C.T.	0.048	32.0 C.T.	0.020	+8.5**	40	±20**	12	6	C
PCT6631	15.5 C.T.	0.140	32.0 C.T.	0.058	+8.5**	115	±20**	35	6	D
PCL6631*	15.5 C.T.	0.140	32.0 C.T.	0.058	+8.5**	115	±20**	35	6	F
PCT6731	15.5 C.T.	0.300	32.0 C.T.	0.100	+8.5**	250	±20**	60	6	D
PCT6931	15.5 C.T.	0.690	32.0 C.T.	0.298	+8.5**	575	±20**	175	6	E

*All primaries 115V 50/60 Hz except PCL6630 and PCL6631 which have 115/230V 50/60 Hz primaries.
**+8.5 and ±20 DC output volts are for inputs to +5V and ±15V IC Voltage Regulators, see Schematic 6.



SCHEMATIC #5
UNREGULATED



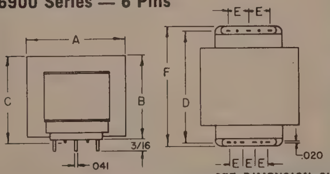
SCHEMATIC #6
REGULATED

ALL TRANSFORMERS ARE SUPPLIED WITH ENGINEERING BULLETIN LISTING SUGGESTED COMPONENTS

Bulletin provides typical schematics and suggested components for low-cost, miniaturized, unregulated and regulated power supplies. Regulated units have short circuit, thermal overload and overvoltage protection, and have the following typical specifications: Input 105-125V; Output Voltage ±.1V; Load and Line Regulation .1% each; Ripple 1mV RMS.

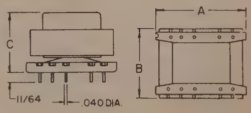
PC/PCT6200 & PCT6900 Series — 8 Pins
PC6900 Series — 6 Pins

Fig. E



PCL6600 Series

Fig. F



SEE DIMENSION CHART ON FACING PAGE

SEE PAGE 2•1756 FOR PRICING

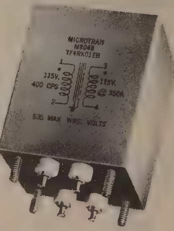
MICROTRAN 145 E. Mineola Ave • Valley Stream, N.Y. 11582
Phone: (516) 561-6050 • TWX: 510-225-8412

60 Hz POWER TRANSFORMERS

Designed for solid-state and low voltage applications. All units shown are manufactured in accordance with the requirements of MIL-T-27.

FULL TERMINAL ARRANGEMENTS AND COLOR CODE DESIGNATIONS SUPPLIED WITH EACH UNIT

HERMETICALLY SEALED
PER MIL-T-27
MIL DESIGNATION TF4RX01XX
Also available in open frame construction, see next page.



METHOD OF APPROXIMATING SECONDARY AC CURRENT REQUIREMENTS

Since transformers may be used in many possible configurations, the current ratings shown above are AC-RMS secondary winding currents. When selecting the "Secondary Amp" rating, the conversion chart shown below may be helpful. For exact values of secondary current requirements, use curves prepared by O.H. SHADE "Proc of IRE7/43 Analysis of Rectifier Operation."

Rectifier Type	Filter Type	Approx. Secondary RMS Current
Full Wave Center-Tap	Choke Input	.7 Times DC Current
Full Wave Center-Tap	Capacitor Input	1.2 Times DC Current
Full Wave Bridge	Choke Input	Equal to DC Current
Full Wave Bridge	Capacitor Input	1.8 Times DC Current

60 Hz POWER SUPPLY TRANSFORMERS

For Silicon Rectifier Circuitry, and Filament Applications

PRIMARY 105/115/125 VOLTS MIL DESIGNATION TF4RX01XX

Part No.	Secondary AC Volts	Secondary RMS Amps	Rectifier Current C.T. Full Wave DC Volts**	F.W. Bridge DC Volts**	Fig. A Mil Case XX
M8042	6.3 C.T.	.6	1.9	3.8	AJ
M8043	6.3 C.T.	2.0	1.9	3.8	FB
M8086	6.3 C.T.	6.0	1.9	3.8	GA
M8087	12.6 C.T.	3.0	4.7	9.4	GA
M8044	12.6 12.6 C.T.	2.0 2.0	10.5 (Series)	21 (Series)	JB
M8022	18.5 C.T.	3.0	7.4	14.8	JB
M8088	26 C.T.	2.5	10.8	21.6	HA
M8152	28 C.T.	.15	11.7	23.4	AJ
M8045	28 C.T.	.6	11.7	23.4	FA
M8055	30 C.T.	2.5	12.5	25	JA
M8023	35 C.T.	3.0	14.5	29	KA
M8089	40 C.T.	.1	17	34	AJ
M8090	40 C.T.	.3	17	34	EA
M8091	40 C.T.	.75	17	34	GB
M8046	49 C.T.	2.5	21	42	LA
M8024	70 C.T.	1.0	30	60	JA
M8056	80 C.T.	.6	35	70	HA

**DC Output for resistive or inductive loads. Output volts based on approx. 1V drop per rectifier.

60 Hz ISOLATION/POWER TRANSFORMERS

Center Tap Permits Use In Either F.W. Bridge or F.W.C.T. Circuitry Electrostatic Shielding

MIL DESIGNATION TF4X01XX

Part No.	Input Voltage	Output Voltage	Current RMS Amps	V. A. Rating	Fig. A Mil Case XX
M8094	115	115 C.T.	.0085	1	AH
M8095	115	115 C.T. 12.6 C.T. 12.6	.030 .25 .25	3.5 3.15 3.15	EA
M8151	115	115 C.T.	.13	15	FA
M8096*	115	115 C.T.	.35	40	GA
M8078*	115	115 C.T.	.9	100	KA

*Primary 105/115/125 Volts.

FILTER INDUCTORS

1500 Test Volt — May be connected in series or parallel for inductive requirements. Part Numbers listed on left are hermetically sealed per **MIL DESIGNATION TF4RX04XX.** Part Numbers listed on right are open frame construction.

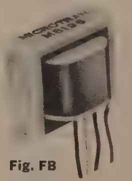


Fig. FB

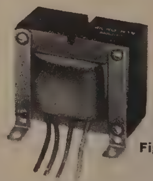


Fig. K

HERMETIC Part No.	Fig. A Mil Case XX	Series Connected Inductance Henrys	Series Connected DC Amps	Series Connected DCR Ohms	Parallel Connected Inductance Henrys	Parallel Connected DC Amps	Parallel Connected DCR Ohms	OPEN FRAME Part No.	Open Frame Dimensions L	Open Frame Dimensions W	Open Frame Dimensions H	Open Frame Dimensions Mtg. Centers	Open Frame Dimensions Fig.
M8098	AH	3.5	.050	200	.875	.10	50	M8198	2⅛	1⅛	1³⁄₁₆	1¾	FB
M8099	AJ	1.0	.15	65	.25	.30	16	M8199	2⅜	1¼	1½	2	FB
M8100	EB	.5	.3	30	.125	.6	7.5	M8200	2¹³⁄₁₆	1⅜	1⅝	2⅜	FB
M8101	FB	.32	.6	16	.08	1.2	4	M8201	3¼	1⅝	1¹⁵⁄₁₆	2¹³⁄₁₆	FB
M8102	JA	.2	1.0	4	.05	2.0	1	M8202	3⅜	2⅜	3³⁄₃₂	2¹³⁄₁₆x2⅛	K
M8103	JA	.07	2.5	.84	.0175	5.0	.21	M8203	3¾	2⅞	3¹⁵⁄₃₂	3⅛x2½	K
M8104	JA	.022	4.0	.4	.0055	8.0	.1	M8204	3⅜	2¾	3³⁄₃₂	2¹³⁄₁₆x2½	K
M8105	KA	.022	5.0	.2	.0055	10.0	.05	M8205	4½	3⅛	4¹⁄₃₂	3¾x2½	K

SEE PAGE 2•1756 FOR PRICING

MICROTRAN 145 E. Mineola Ave • Valley Stream, N.Y. 11582
Phone: (516) 561-6050 • TWX: 510-225-8412

60 Hz POWER TRANSFORMERS

60 Hz CONTROL & POWER SUPPLY TRANSFORMERS

For Relays, Silicon Rectifiers Circuitry, and Filament Application Primary 105/115/125 Volts

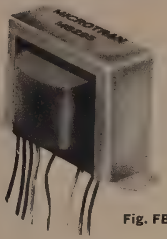


Fig. FB

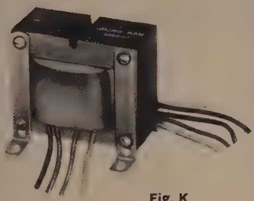


Fig. K

Part No.	Secondary AC Volts	Secondary RMS Amps	Rectifier Circuit C.T. Full Wave DC Volts**	Rectifier Circuit F.W. Bridge DC Volts**	Dimensions L	Dimensions W	Dimensions H	Mounting Centers	Figure
M8242	6.3 C.T.	.6	1.9	3.8	2⅜	1⅜	1½	2	FB
M8243	6.3 C.T.	2.0	1.9	3.8	3¼	1⅝	1 15/16	2 13/16	FB
M8286	6.3 C.T.	6.0	1.9	3.8	3 11/16	2⅛	2¼	3⅛	FB
M8287	12.6 C.T.	3.0	4.7	9.4	3 11/16	2⅛	2¼	3⅛	FB
M8247†	12 12	4.0 4.0	9.9 (Series)	19.8 (Series)	4⅛	3⅛	3¾	3 7/16x2½	K
M8244	12.6 C.T. 12.6	2.0 2.0	10.5 (Series)	21 (Series)	3⅜	2⅞	3 3/32	2 13/16x2½	K
M8222	18.5 C.T.	3.0	7.4	14.8	3⅜	2½	3 3/32	2 13/16x2⅛	K
M8288	26 C.T.	2.5	10.8	21.6	3	2¾	2¾	2½x2⅜	K
M8245	28 C.T.	.6	11.7	23.4	3¼	2⅛	1 15/16	2 13/16	FB
M8255	30 C.T.	2.5	12.5	25	3¾	2¾	3 15/32	3⅛x2¼	K
M8223	35 C.T.	3.0	14.5	29	4⅛	3	3¾	3 7/16x2⅜	K
M8289	40 C.T.	.1	17	34	2⅜	1⅜	1½	2	FB
M8290	40 C.T.	.3	17	34	2 13/16	1⅝	1⅝	2⅜	FB
M8291	40 C.T.	.75	17	34	3 11/16	2⅛	2¼	3⅛	FB
M8246	49 C.T.	2.5	21	42	4½	3¼	4 1/32	3¾x2½	K
M8224	70 C.T.	1.0	30	60	3¾	2¾	3 15/32	3⅛x2¼	K
M8256	80 C.T.	.6	35	70	3	2⅝	2¾	2½x2⅜	K

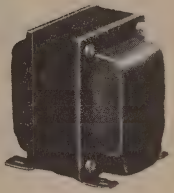
†Scondary may be connected in series to provide 24 Volts @ 4.0 Amps or parallel for 12 Volts @ 8.0 Amps.
**DC Output for resistive or inductive loads. Output volts based on approximately 1 Volt drop per rectifier.

50-60 Hz STEP-DOWN AUTO TRANSFORMERS

240/220V to 120/110V, 50/60 cycle. Equipped with secondary standard receptacle. 6′ U.L. approved line cord. Baked Enamel Finish.

Part No.	Application	Dimensions L	Dimensions W	Dimensions H	Mounting Centers	Weight
M1552	80 Watt Capacity	3 23/32	2½	2 9/32	3⅛	3.5 lbs.
M1556	100 Watt Capacity	3⅛	2⅞	3½	1¾x2¼	4 lbs.
M1553	150 Watt Capacity	3¼	2⅞	3½	2¼x2⅜	5 lbs.
M1555	250 Watt Capacity	3⅞	3¼	3⅞	2 11/16x2½	6 lbs.
M1559	350 Watt Capacity	3¾	3⅞	4⅝	2 7/16x3	7 lbs.
M1558	500 Watt Capacity	4⅞	3⅞	4⅝	3 9/16x3	12 lbs.
M1551	750 Watt Capacity	5½	4½	5⅜	3¼x3½	16 lbs.
M1557	1000 Watt Capacity	7	4½	5⅜	5¼x3½	25 lbs.
M1554	1500 Watt Capacity	8	4½	5⅜	6¼x3½	29 lbs.
M1550*	2000 Watt Capacity	8½	4⅜	6	6 5/16x3 7/16	37 lbs.

*Secondary supplied with 1 foot #14-2 wire stripped cable.



VERTICAL END BELL

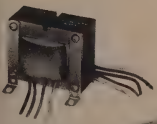


Fig. K

60 Hz ISOLATION & POWER TRANSFORMERS

Center Tap Permits Use In Either F.W. Bridge or F.W.C.T. Circuitry Electrostatic Shielding

Part No.	Input Voltage	Output Voltage	Current RMS Amps	V. A. Rating	Dimensions L	Dimensions W	Dimensions H	Mounting Centers	Figure
M8294	115	115 C.T.	.0085	1	2⅛	1⅛	1 3/16	1¾	FB
M8295	115	115 C.T. 12.6 C.T. 12.6	.030 .25 .25	3.5 3.15 3.15	2 13/16	1⅛	1⅝	2⅜	FB
M8251	115	115 C.T.	.13	15	3¼	1⅝	1 15/16	2 13/16	FB
M8296*	115	115 C.T.	.35	40	4	2¼	2 9/16	3 9/16	FB
M8278*	115	115 C.T.	.9	100	3¾	3¼	3 15/32	3⅛x2¾	K

*Primary 105/115/125 Volts.

Fig. FB

SEE PAGE 2•1756 FOR PRICING

MAGNETICO SCOTT-T-TRANSFORMERS MAGNETICO

FEATURES: Precision • Repeatability • Stability • No System Trimming Required

SYNCHRO TO RESOLVER CONVERTER TRANSFORMERS

Part No.	Input Voltage Line to Line	Output Voltage RMS Sine & Cos	Frequency Hz.	Input Z K Ohm	Typical Load K Ohm	Accuracy Arc Seconds	Size Inches	Weight Oz.
50890	11.8	6	400	20	100	4 min.	1 x ½ x 7/16	.5
10472	11.8	6	400	10	10	5 min.*	¾ x 1½ x ⅜	.6
11870	90	6 CT.	60	500	100	60	1.1 x 2.1 x 1.1	4
12092	90	6 CT.	400	5000	100	60	1.1 x 2.1 x 1.1	4
12094	90	6 CT.	60 & 400	500	100	60	1.1 x 2.1 x 1.1	4
50460	90	6	400	60	10	60	⅞ x 1⅝ x 11/16	2
50642	11.8	6	400	30	10	60	⅞ x 1⅝ x 11/16	2
50725	90	6	400	500	100	60	13/16 x 1½ x ⅝	1.5
50726	90	6 CT.	400	500	100	60	13/16 x 1½ x ⅝	1.5
50727	90	3	400	500	100	60	13/16 x 1½ x ⅝	1.5
50728	90	3 CT.	400	500	100	60	13/16 x 1½ x ⅝	1.5
50737	11.8	6	400	10	100	60	13/16 x 1½ x ⅝	1.5
50738	11.8	6 CT.	400	10	100	60	13/16 x 1½ x ⅝	1.5
50739	11.8	3	400	10	100	60	13/16 x 1½ x ⅝	1.5
50740	11.8	3 CT.	400	10	100	60	13/16 x 1½ x ⅝	1.5
9652	11.8	5	400	100	10	30	1⅜ x 2¾ x ⅞	5
9514	90	4.25	400	1000	10	30	1⅜ x 2¾ x ⅞	5
9561	11.8	1.75	400	10	10	2 min.	1 x 2 x .65	3

*10472A, 3 Min.

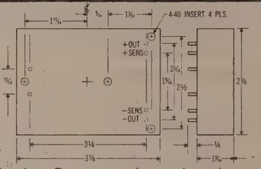
RESOLVER TO SYNCHRO CONVERTER TRANSFORMERS

Part No.	Input Voltage 2 Phase, 4 Wire	Output Voltage 3 Phase, 3 Wire (L-L)	Frequency Hz.	Load Typical Minimum Ohms (L-L)	Input Z Typical Ohms Open CKT	Accuracy Arc Minutes	Size Inches	VA Rating
10084	11.8	11.8	400	150	2K	2	1 x 2 x .65H	1
10086	6.0	11.8	400	150	1K	2	1 x 2 x .65H	1
10088	9.0	11.8	400	300	2K	1.5	1⅜ x 2¾ x .65H	0.5
10090	9.0	90	400	2500	2K	1.5	1⅜ x 2¾ x ⅞H	3.2
11999	7.0	11.8	400	50	500	2	2 x 4 x 1H	2.8
50749	7.2	90	60	8000	700	1	1½ x 3⅜ x 1¼H	1
12186	7.0	90	60	4000	250	1	2 x 4 x 1½H	2
52020	9	11.8	400	14	100	3.5	1½ x 2½ x 1¼	10
52021	9	90	400	800	100	3.5	2 x 4 x 1¼	10
52155	5.9	11.8	400	150	200	2	⅞ x 1⅝ x 11/16H	1
52156	5.9	90	400	8000	200	2	⅞ x 1⅝ x 11/16H	1
52023	9	90	60	800	100	3.5	4 x 8 x 2	10

REGULATED DC POWER SUPPLIES

MODEL 452

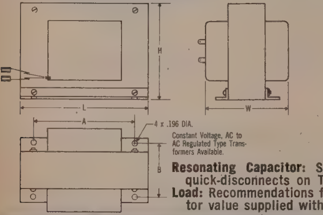
Input: 105-125 VAC. 60 to 400 Hz.
Output: 5 VDC +/− 1% 0- 1 amp.
Temp. Range: −20C to +70°C.
Load Reg: 0.1%.
Line Reg: 0.1%.
Ripple: 5 MV Max.
Stability: +/− 0.1% after warmup.
Temp. Coeff: 0.02%/°C.
Overload Protection: Current Limit Fold Back.



Remote Sensing: To use remote sensing, +sense is connected to +output at the load, and −sense is connected to −output at the load. If the remote sense feature is not used +sense must be connected to +output, and −sense must be connected to −output at the output pins.
Over Volt. Option: SCR Crowbar.

MODEL 453 is rated for 15 VDC, 0 to .33 amps, 15 MV ripple.
MODEL 454 is rated for 5 VDC, 45 VA, larger volume, write for detail spec.
MODEL 455 is rated for 15 VDC, 45 VA, larger volume, write for detail spec.

SELF REGULATING TRANSFORMERS
REGULATED DC OUTPUT

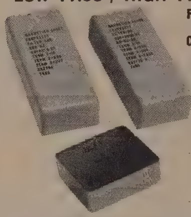

H
L
W
A
B
4 x .196 DIA.
Constant Voltage, AC to AC Regulated Type Transformers Available.

Application: For operation into external FWB with capacitor filters.
DC Voltages: Fixed, from 5 to 30 VDC.
Line Reg: ±1% DC for 115 ±10% VRMS, 60 Hz input.
Ripple: RMS, 10% of DC average.
Load Regulation: ±10%.
Resonating Capacitor: Supplied for connection to quick-disconnects on TFMR.
Load: Recommendations for diodes and filter capacitor value supplied with units.

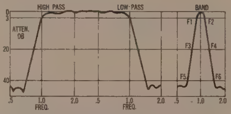
Magnetico Part No.	Max. DC Volt-Amps	Dimensions in Inches				
		L	W	H	A	B
52005	20	3⅜	1 15/16	2⅞	2 15/16	1½
52006	40	3⅜	2 11/16	2⅞	2 15/16	2¼
52007	60	4⅛	2 7/16	3⅝	3 9/16	1¾
52008	80	5	2¼	3⅝	4¼	1⅞
52009	150	5 1/16	3	4 7/16	4⅜	2

Resonating capacitor requires 1½ x 2¼ x H mounting volume. Recommended DC output voltages 5, 6, 12, 24, 30. Order by part number (for rated VA) followed by DC voltage desired such as 52005-12 for 12 VDC @ 20 VA Rated.

LC FILTERS
LOW PASS / HIGH PASS / BAND PASS / BAND STOP



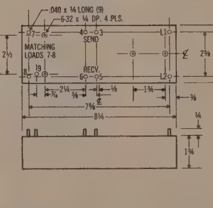
Filters: All types of filters, 200 Hz to 30 MHz, including high performance elliptic function filters.
Computer aided design, with worst case tolerance studies, provide optimum performance, less critical component choice, and makes custom units as simple as "Standards."



For prompt quote provide: Type, Insertion Loss, Desired Attenuation Characteristic, Source Z and Load Z, Quantity and delivery requirements.

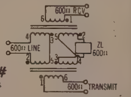
AUDIO HYBRID

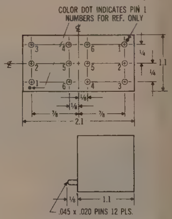
PART #
50819



Imped.: 600 ohm or 900 ohm.
Freq. Response: +/− 0.2 dB — 100 to 4000 Hz.
Longitudinal Bal.: 60 dB Min. — 200 to 3600 Hz.
Insertion Loss: 5 dB Max. — 300 to 3400 Hz.
Trans. Hybrid Loss: 50 dB Min. — 300 to 3400 Hz.
Return Loss: 26 dB Min. — 200 to 3600 Hz.
Operating Level: −30 to +10 DEM.
Maximum Current DC at which unit meets all specs: 0 to 150 MADC to terminals 1 to 2 either polarity.

PART #
51084





Freq. Resp.: ±0.5 dB 300 to 3500 Hz.
Long. Bal.: 45 dB Min.
Distortion: 0.5% Max.
Imped. Match: ±10% 300 to 3500 Hz.
Return Loss: 26 dB Min.
Trans-Hybrid Loss: 45 dB typical.

LET MAGNETICO QUOTE "ALL" YOUR REQUIREMENTS • THE BEST IN TRANSFORMERS
FILTERS • AUDIO HYBRIDS • POWER SUPPLIES

LAMINATED
TELEPHONE
MATCHING
PRECISION
INDUCTORS

MAGNETICO INC.

182 MORRIS AVENUE, HOLTSVILLE, N.Y. 11742
TELEPHONE: (516) 654-1166

TOROIDAL WINDING
SCOTT-T
INVERTER
CURRENT
WIDEBAND

WIDEBAND TRANSFORMERS

North Hills

UNBALANCED TO BALANCED TRANSFORMERS

Balanced secondaries center-tapped and dc-isolated from primaries. Mid-band insertion loss less than 0.5 dB. Bandwidth defined at low frequency end by 3 dB drop from mid-band response, at high end by max. VSWR of 1.25.

LOW POWER SERIES (1W)

Series	Radio Frequency		Medium Frequency		Video*	
Cases	BA, BB, HB		BA, BB		LA, LB	
Unb./Bal. (Ω)	Type No.	Bandwidth MHz	Type No.	Bandwidth MHz	Type No.	Bandwidth MHz
50:50	0001	.1-125	0010	.01-80	0009	.001-25
50:75	0101	.1-125	0111	.01-80	0104	.001-25
50:90	0200	.1-125	0202	.01-60	0203	.001-20
50:100	0300	.1-100	0301	.01-60	0311	.001-20
50:124	0307	.1-100	0302	.01-60	0306	.001-20
50:135	0310	.1-100	0312	.01-60	0303	.001-18
50:150	0400	.1-100	0401	.01-60	0415	.001-15
50:200	0500	.1-100	0520	.01-60	0511	.001-15
50:300	0501	.1-100	0521	.01-50	0517	.001-12
50:450	0600	.1-65	0602	.01-40	0603	.001-10
50:600	0700	.1-65	0703	.01-32	0706	.001-8
50:800	0800	.1-60	0801	.01-25	0802	.001-7
50:1200	0900	.1-30	0902	.01-15	0904	.001-6
75:50	1000	.1-100	1001	.01-60	1002	.001-25
75:75	1100	.1-100	1112	.01-60	1102	.001-25
75:90	1200	.1-100	1201	.01-60	1202	.001-20
75:100	1300	.1-100	1310	.01-60	1314	.001-20
75:124	1302	.1-100	1311	.01-60	1301	.001-20
75:135	1317	.1-100	1315	.01-60	1312	.001-20
75:150	1400	.1-100	1405	.01-60	1404	.001-16
75:200	1500	.1-100	1513	.01-60	1516	.001-15
75:300	1501	.1-100	1514	.01-60	1502	.001-15
75:450	1600	.1-60	1601	.01-40	1602	.001-12
75:600	1700	.1-60	1707	.01-32	1704	.001-10
75:800	1800	.1-30	1801	.01-20	1802	.001-10
75:1200	1900	.1-30	1905	.01-15	1902	.001-9
75:1850	1906	.1-15	1901	.01-8	1903	.001-6

*EXTENDED VIDEO SERIES Response down to 20 Hz

Type No.	Unb./Bal.	Bandwidth	Case Styles
0014	50:50	20 Hz-6 MHz	PB
0113	50:75	20 Hz-6 MHz	PB
0315	50:100	20 Hz-6 MHz	PB
0522	50:200	20 Hz-4 MHz	PB
1003	75:50	20 Hz-6 MHz	PB
1111	75:75	20 Hz-6 MHz	LA, LB
1307	75:110	20 Hz-6 MHz	LA, LB
1309	75:124	20 Hz-9 MHz	PB
1408	75:150	20 Hz-6 MHz	PB
1520	75:300	20 Hz-4 MHz	PB

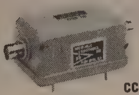
HIGH POWER SERIES

Power Level	10 W	25 W	100 W	1 kW
Cases	HB	BA, BB	BA, BB	KA
MHz Range	.1-30	.1-30	.5-30	2-32
Unb./Bal. (Ω)	Type No.	Type No.	Type No.	Type No.
50:50	0008	0011	0012	0013
50:75	0108	0109	0105	0107
50:100	0309	0308	0304	0314
50:150	0406	0402	0404	0407
50:200	0519	0512	0516	0515
50:300	0514	0518	0506	0513
50:450	0604	0605	0606	0601
50:600	0705	0701	0704	0702
75:75	1105	1110	1118	1108
75:100	1306	1304	1305	1316
75:150	1406	1401	1403	1407
75:200	1517	1519	1512	1518
75:300	1515	1510	1505	1511
75:450	1603	1604	1605	1606
75:600	1709	1703	1708	1705

MANY VARIATIONS AND CUSTOM DESIGNS ALSO AVAILABLE

ISOLATION TRANSFORMERS UNBALANCED TO UNBALANCED

Ground Isolation in 50 and 75Ω Coaxial Systems



CC, PA

CD

- Flat frequency, linear phase response.
- Insulated BNC connectors.
- 140 dB isolation at power frequencies.

Type No.	Impedance	Bandwidth
0005-CC	50:50	1 kHz-25 MHz
1103-CC	75:75	1 kHz-25 MHz
0112-CC	50:75	1 kHz-25 MHz
1117-CC	75:75	10 Hz- 5 MHz
1116-PA	75:75	20 Hz-20 MHz

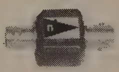
10 KV Isolation for Public Utility Data Transmission

6 kHz to 2.5 MHz bandwidths.

1115-CD: 75Ω coax to 75Ω coax.
1313-CD: 75Ω coax to 124Ω balanced line.
75-202-CF: Two 75Ω coax inputs to 124Ω balanced line in hybrid arrangement.

ULTRA-WIDE COAXIAL MATCHING TRANSFORMERS

Unbalanced to unbalanced transformers. BNC input and output connectors. Low VSWR. 0.1-300 MHz. Available in JA case only.



0003-JA	50:50	Phase Reversing
1106-JA	75:75	Phase Reversing
0102-JA	50:75	Impedance Adapters
0201-JA	50:90	Impedance Adapters
1203-JA	75:90	Impedance Adapters

SUBMINIATURE SERIES

NA molded case. 0.1-300 MHz bandwidth.

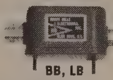
.6 x .6 x .4"

0003-NA 1106-NA 2200-NA	50: 50 75: 75 90: 90	Unbalanced to Unbalanced Phase Reversing
0007-NA 1107-NA 2201-NA	50: 50 75: 75 90: 90	Unbalanced to Unbalanced Phase Reversing DC Isolated
0002-NA 0508-NA 1506-NA	50: 12.5 50:200 75:300	Unbalanced to Unbalanced Non-Inverting
0004-NA 0509-NA 1101-NA 1507-NA	50: 50 50:200 75: 75 75:300	Unbalanced to Balanced
0510-NA 1508-NA	50:200 75:300	Balanced to Balanced

CASE STYLES

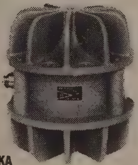
HB

BA, LA



BB, LB
PB

OVERALL DIMENSIONS (Inches)



KA

Case	L	W	H
BA	2.3	1.3	1.2
BB	2.6	1.3	1.2
CC	3.5	1.7	1.6
HB	0.9	0.9	0.7
KA	5.4	4.6	5.5
LA	2.8	1.7	1.3
LB	3.2	1.7	1.3
PA	3.0	4.0	2.0
PB	3.0	3.6	2.0

North Hills Electronics, INC.

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See Section 3450 for Wideband Hybrids and Power Dividers and Section 1800 for Coils.

SPECIALISTS IN SPECIAL TRANSFORMERS

POWER & ELECTRONIC

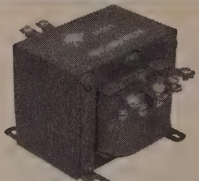
Your one source for all types...designed and manufactured
to your specifications or actual requirements

NWL designs and manufactures transformers:

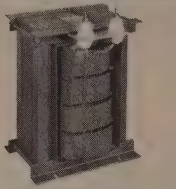
FURNACE
FILAMENT
HEATING
LIGHTING
SCR CONTROLS
PLATE
HIGH FREQUENCY
INSTRUMENT
PHASE CHANGING
WELDING
HIGH VOLTAGE
TESTING
HIGH REACTANCE
OUTPUT

also

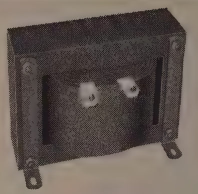
SATURABLE CORE REACTORS
CHOKES
AC REACTORS
PACKAGED CONTROLS
AIR CORE REACTORS



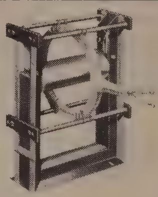
Instrument transformers, current and potential, 1-10,000 amperes, 1-50,000 volts. High accuracy, through type, bus bar, indoor and outdoor.



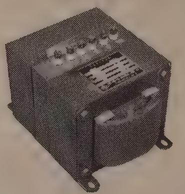
Plate, audio and modulation transformers in sizes from 50 VA to 100 KVA and up to 100,000 volts.



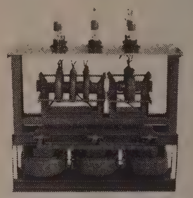
Chokes, linear and swinging. 0.1 millihenry to 10 henry.



Filament transformers, single and multiple. Up to 100,000 volts, dry and oil types.



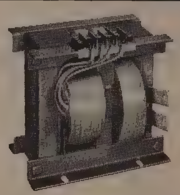
Saturable Core Reactors, from 50 VA to 500 KVA. Single and 3 phase.



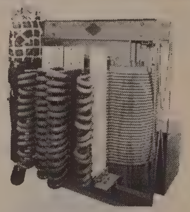
Rectifying transformers and supplies, 1, 2 or 3 phase. 1 to 3,000 amperes, up to 500 KVA.

Oil filled specialty and high voltage transformers up to 300 KVA.

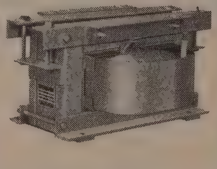
Heating transformers for resistance and induction furnaces. All types. Up to 1200 KVA.



High impedance type transformers, from 50 VA to 50 KVA and up to 10,000 volts.



High power and high current water-cooled transformers.



Reactors, 50 VA to 500 KVA. AC and DC. Linear and swinging.

Solid State SCR Power Controllers.

NWL TRANSFORMERS

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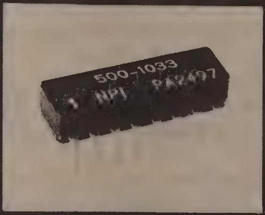
SPECIAL PULSE TRANSFORMERS AND INDUCTORS FOR
TECHNOLOGY MARKETING, INCORPORATED

******** *CORE MEMORIES* ********

As a prime supplier to TECHNOLOGY MARKETING, INCORPORATED, NPI has developed many pulse transformers and inductors for the latest core memory designs. This new generation of memory systems uses "time shared" electronics to increase system speed and greatly reduce the system cost. These transformers play a major part in achieving memory design goals of 800–900 ns cycle time for a 32k, single card memory with a manufacturing system cost of less than 0.2 cents/bit! NPI pulse transformers provide outstanding reliability, temperature stability, and fast response and recovery (permitting double pulse operation at up to 80% duty cycle–without external damping resistors). They are available in a variety of turns ratios and inductance values and are supplied in industry-standard 16 pin DIP or Dual In-line (DIL) case styles. For more information on applying these pulse transformers to your system, contact NPI or: TECHNOLOGY MARKETING, INC., 3170 Red Hill Avenue, Costa Mesa, California 92626, Phone: (714) 979-1100, TWX: (910) 595-1717.

TECHNOLOGY MARKETING – NPI CROSS REFERENCE TABLE

TMI	NPI	TMI	NPI	TMI	NPI
500-0002	PA 2609	500-1093	PA 2554	500-9072	PA 2312
500-0003	PA 2576	500-1099	NP 2856	500-9073	PA 2313
500-0004	PA 2619	500-1100	NP 2884	500-9084	PA 2323
500-1003	PA 2486	500-1138	PA 2567	500-9085	PA 2322
500-1031	PA 2496	500-9013	PA 2289	500-9086	PA 2383
500-1032	PA 2498	500-9019	PA 2488	500-9091	PA 2346
500-1033	PA 2497	500-9032	PA 2290	500-9093	PA 2391
500-1034	PA 2490	500-9033	PA 2291	500-10045	PA 2412
500-1035	PA 2491	500-9042	PA 2420	610-1129	PA 2569
500-1046	PA 2503	500-9047	PA 2465	610-1049	PA 2516
500-1048	PA 2518	500-9049	PA 2410	610-9035	PA 2393-1
500-1051	PA 2519	500-9050	PA 2292		



OTHER NPI PRODUCTS

NEEDLEWIRES For Core Memory Stringing
PARYLENE COATING SERVICE For Cores, PC Boards and Substrates
TRANSFORMERS, INDUCTORS AND COILS For Electronics and Electrical Applications
DC–DC CONVERTER TRANSFORMERS AND POWER MODULES For Calculators
SCR AND TRIAC TRIGGER TRANSFORMERS For Power and Motor Speed Control

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NPI

NANO PULSE INDUSTRIES, LTD.
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MANUFACTURING COMPANY

HIGH QUALITY INDUCTIVE COMPONENTS FOR COMPUTER AND INDUSTRIAL APPLICATIONS

Coils
Inductors
Delay Lines
Transformers

El-Rad has been an important supplier of the electronics industry since 1944, the very beginning of the industry's most rapid and exciting growth period.

Constantly building on a policy of product quality, carefully controlled, El-Rad for years has been a prime source of critical components such as coils, delay lines, and pulse transformers; for instruments, radar, computer, and military applications; even miniature but rugged assemblies destined for outer space.

El-Rad engineers, with their skilled know-how, work closely with your own engineering department on all design requirements. The result—design solutions in a minimum of time.

At your command is a sample service that is backed by a well-equipped laboratory, and a very capable model shop. There, working with the most accurate of test and measuring instruments, the emphasis is on practicality, so that the sample you choose can be easily produced in large quantities when desired.

Volume production of critical units and assemblies, requires a stable and skilled work force, which El-Rad provides. El-Rad can give you unusually quick service no matter where you are.

SPECIALISTS IN PRODUCING DIFFICULT-TO-MANUFACTURE INDUCTANCE ITEMS REQUIRED BY THE ELECTRONICS INDUSTRY

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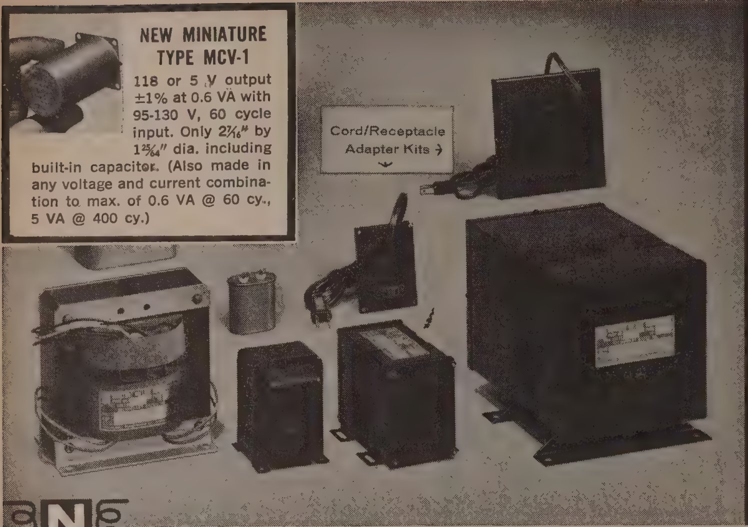
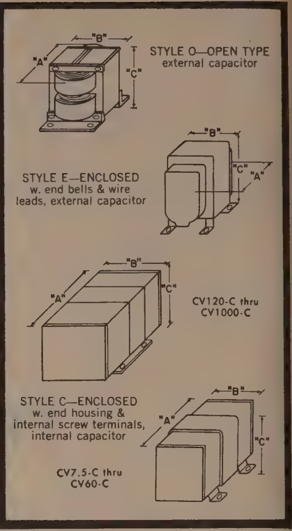


NEW MINIATURE TYPE MCV-1

118 or 5 V output ±1% at 0.6 VA with 95-130 V, 60 cycle input. Only 2 7/16" by 1 25/64" dia. including built-in capacitor. (Also made in any voltage and current combination to max. of 0.6 VA @ 60 cy., 5 VA @ 400 cy.)



NTC

CONSTANT VOLTAGE TRANSFORMERS

STATIC-MAGNETIC VOLTAGE REGULATING TRANSFORMERS

NORMAL HARMONIC TYPES

- Output capacity from 0.5 to 3,000 VA
- Instantaneous, continuous voltage regulation
- No tubes or manual adjustments
- Ratings made to order at low cost
- Compact, single-unit design
- Low-cost open types for component applications
- Heavy-duty, enclosed types for accessory uses
- Single or multiple secondaries

NTC constant voltage transformers maintain output voltages within one percent with input voltage fluctuations up to 15 percent. Regulation is instantaneous, continuous and completely automatic. Operating on principles of ferroresonance, the transformers have no tubes, moving parts or separate saturable reactors.

Most important, the design of NTC constant voltage transformers enables their outputs to be made exactly to your specifications—and at decidedly low cost even in small quantities. With only a few basic lamination configurations and windings, virtually any output voltage/current combination can be obtained. *Since the transformers are designed to your specific requirements they often eliminate costly circuitry and expensive components.*

POWER SUPPLIES, too . . . Neshaminy's engineering skills are at your service for the design and quantity production of complete, regulated power supplies in any capacity and rating. Let us discuss your next requirement.

Model	Regulated Output Voltage	Input Voltage Range (60 cycles)	VA Output	Nominal Mounting Centers	Approx. Overall Dimensions, Inches A B C	Approx. Net Wt., lbs.	Style
MCV-1	5 or 118	95-130	0.6	1 3/16 x 1 3/16	1 25/64 dia. x 2 7/16	6 oz	—
CV7.5—E	6.3 or 118	95-130	7.5	2⅜ x 1⅛	2½ x 4 x 2¾	3	E
CV7.5—C	6.3 or 118	95-130	7.5	3 x 1⅝	4⅝ x 3⅞ x 2¾	4	C
CV15—E	6.3 or 118	95-130	15	2⅜ x 1½	2⅞ x 4 x 2¾	4	E
CV15—C	6.3 or 118	95-130	15	3 x 2	5 x 3⅞ x 2¾	5	C
CV30—E	6.3 or 118	95-130	30	2⅜ x 2¼	3⅝ x 4 x 2¾	6	E
CV30—C	6.3 or 118	95-130	30	3 x 2¾	5¾ x 3⅞ x 2¾	7	C
CV60—E	6.3 or 118	95-130	60	2⅜ x 3⅛	4½ x 4 x 2¾	8	E
CV60—C	6.3 or 118	95-130	60	3 x 3⅝	6⅝ x 3⅞ x 2¾	9	C
CV120—O	6.3 or 118	95-130	120	2 5/16 x 5 3/16	4 x 5⅞ x 5¾	12	O
CV120—C	6.3 or 118	95-130	120	4⅝ x 6⅛	9⅜ x 7 1/16 x 6	14	C
CV150—O	6.3 or 118	95-130	150	2 5/16 x 5 3/16	4 x 5⅞ x 5¾	14	O
CV150—C	6.3 or 118	95-130	150	4⅝ x 6⅛	9⅜ x 7 7/16 x 6	16	C
CV250—O	118	95-130 or 190-260	250	2 11/16 x 5 3/16	4⅜ x 5⅞ x 5¾	24	O
CV250—C	118	95-130 or 190-260	250	4⅝ x 6⅛	9¾ x 7 7/16 x 6	27	C
CV500—O	118	95-130 or 190-260	500	3 15/16 x 5 3/16	5⅝ x 5⅞ x 5¾	35	O
CV500—C	118	95-130 or 190-260	500	4⅝ x 6⅛	11 x 7 7/16 x 6	38	C
CV1000—O	118	95-130 or 190-260	1000	5 3/16 x 6 11/16	8⅜ x 5⅞ x 5¾	52	O
CV1000—C	118	95-130 or 190-260	1000	4¾ x 6⅛	14⅞ x 7 7/16 x 6	56	C

TYPICAL STANDARD MODELS

1% output regulation. Closer regulation to order. Output contains approx 14% total rms harmonic content. SPECIAL MODELS can be made quickly to exact requirements in any step-up or step-down ratio of voltage to current within the desired VA rating and with single or multiple secondaries, with or without centertaps. CV models also available for 50 cycles, and MCV models for 50 or 400 cycles.

NOTES

1. Cord/Receptacle kits, similar to that shown in illustration are available on all "C" style transformers of 118 VAC output rating.
2. Specify required input voltage range on CV transformers from 250 to 1000 VA.
3. To specify output voltage required (6.3 or 118 VAC) add voltage to model number (Example — 15 VA cased transformer with 118 VAC output would be model #CV15-118).
4. "C" style units have built-in capacitors. Styles "E" and "O" have external capacitors.

Send us your requirements for a prompt quotation.

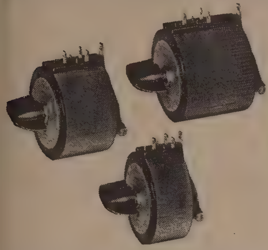
NESHAMINY TRANSFORMER COMPANY

Furlong, Pa. 18925
(215) 794-7411

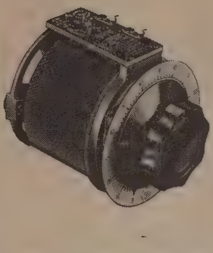
NTC is a division of the Neshaminy Electronic Corporation

Prices and specifications subject to change without notice

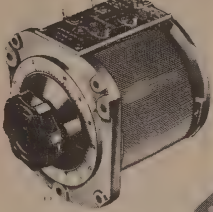
OHMITE® variable transformers



VT1, VT02, VT3 SERIES, SINGLE UNCASED
The VT1, rated 1 ampere, is the smallest commercial variable transformer available.



VT5 SERIES, SINGLE, UNCASED



VT10 SERIES, SINGLE, UNCASED

VT25 SERIES, UNCASED

Unique for the design innovations they incorporate, Ohmite "OHMITRAN" v.t.® variable transformers include exclusive field-proven features. They offer long, low maintenance operation with excellent regulation at any voltage setting within the rated load plus an output free of waveform distortion. (Ratings shown at right are for use in free air.) Enclosed units, units with meters, 2 & 3 in tandem and 3 phase models are available in most models in the basic series.

FEATURES

- Positive current transfer — specially designed brushes are connected through high conductivity contact arms to large slip ring which contacts a wide area of the collector ring.
- Adjustable shaft extends from either side.
- Mounts interchangeable with virtually all other comparable types.
- Direct reading, two scale dial — calibrated for overvoltage connection on front, line voltage connection on reverse side.
- Overvoltage options available.
- UL and CSA listings available in certain models.
- Easily replaceable brushes
- Clockwise or counter-clockwise operation on Series VT5, VT10 and VT25

ENCLOSURES

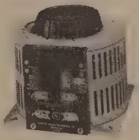
Type	Available for:	Features
B	VT25	EXPOSES TRANSFORMER'S TERMINAL RANGE & MOUNTING BASE
E	All	FOR PERMANENT MOUNTING ON PANEL, ETC.
F	All	STANDARD PORTABLE LINE CORD, OUTLET SOCKET, FUSE
G	VT8 VT25	DELUXE PORTABLE CIRCUIT BREAKER, OVERVOLTAGE — NO OVERVOLTAGE SELECTOR, HANDLE DOUBLES AS EASEL
Metered	VT8 VT25	VOLTMETER VOLTMETER + AMMETER VOLTMETER + WATTMETER

Series Catalog No.	Wt. Lbs.	Dimensions	
		Base	Depth
VT1	1.5	2⅞″ Diam.	1 13/16″
VT02	2.25	2⅞″ Diam.	2 5/16″
VT3	3	2⅞″ Diam.	2 13/16″
VT5	5.25	3 9/16″ Diam.	3⅝″
VT10	10.25	4⅞″ x 5 11/16″	4½″
VT25	22	7½″ x 7½″	4½″

BASIC SERIES

Cat. No.	Input Volts	Freq. Hz.	Description	Output Volts	Output Amps
VT1	120	50 60	Basic Uncased Model	0-120 0-132	1.3
VT1F	120	60	Portable Enclosure	0-132	1.0
VT1N	120	60	Basic Uncased Model	0-120	1.5
VT1NF	120	60	Portable Enclosure	0-120	1.2
VT02	120	50 60	Basic Uncased Model	0-120 0-132	2.0
VT02F	120	60	Portable Enclosure	0-132	1.75
VT02N	120	60	Basic Uncased Model	0-120	2.5
VT02NF	120	60	Portable Enclosure	0-120	2.0
VT2LN	40	60	Hi-Amps, Low Volts	0-40	5.0
VT3	120	50 60	Basic Uncased Model	0-120 0-132	3.0
VT3N	120	60	Basic Uncased Model	0-120	3.3
*VT5	120	50 60	Basic Uncased Model	0-120 0-140	4.75
VT5F	120	60	Portable Enclosure	0-140	4.75
VT4LN	40	50	Hi-Amps, Low Volts	0-40	12.0
*VT10	120	50 60	Basic Uncased Model	0-120 0-140	10.0
VT10F	120	60	Portable Enclosure	0-140	10.0
VT10G	120	50 60	Deluxe Portable Enclosure	0-120 0-140	8.0
VT10H	240	50 60	Basic Uncased Model	0-240 0-280	4.0
VT8LN	40	50	Hi-Amps, Low Volts	0-40	22.0
*VT25	120	50 60	Basic Uncased 20A Model	0-120 0-140	25.0
VT25B	120	50 60	"B" Type Enclosure	0-120 0-140	25.0
VT25H	240	50 60	Basic Uncased Model	0-240 0-280	11.0
VT25HB	240	50 60	"B" Type Enclosure	0-240 0-280	11.0
VT25G	120	50 60	Deluxe Portable Enclosure	0-120 0-140	20.0
VT25F	120	50 60	Portable Enclosure	0-120 0-140	25.0

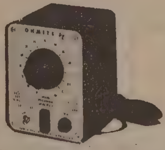
*Models VT5, VT10 and VT25 have replaced the industry standard VT4, VT8 and VT20 Models.



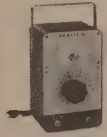
VT25B

VT02E

VT10G



VT5F

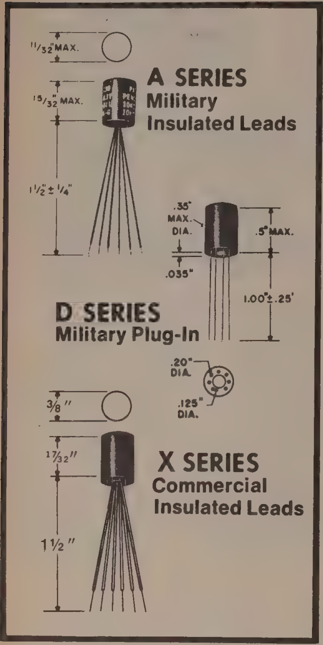


VT10GCV
(with voltmeter)

FOR STOCK ITEMS, CALL LOCAL REPRESENTATIVE LISTED IN INDEX

OHMITE MFG. CO., a North AMERICAN PHILIPS company / 3601 W. Howard St., Skokie, Illinois 60076 / (312) 675-2600 / TWX 910-223-0805 / TELEX 72-4433

PICO's ultra-miniature transformers



SPECIFICATIONS

- MIL-T-27 . . . .
  All **MILITARY** Units Are Designed to MIL-T-27 and Are Hermetically Sealed in a Metal Case
  Transformers are Type TF5R21ZZ.
  Inductors are TF5R20ZZ.
- FREQUENCY RESPONSE: . . . . .
  ±3 db, 300 Hz - 100 KHz At 1.0 Milliwatt
- MAXIMUM DISTORTION: . . . . . .
  5% With Rated Power Level at 1 KHz
- DIELECTRIC STRENGTH: . . . . .
  All Units Tested at 200 V RMS
- INSULATION RESISTANCE: . . . . .
  Greater than 10,000 Megohms at 300 V DC
- WEIGHT: . . . .
  1/10 Ounce
- OPERATING TEMPERATURE: . .
  -55° c to 105° c (All Units Can Be Supplied to Class S Requirements 130° c maximum)
  Commercial Units have maximum operating temperature of +85°C
- TERMINALS: . . . .
  Solid .016 Diameter Conductor. Conductor is Gold Plated, Nickel-Iron Core Wire (Dumet) in Accordance with MIL-STD-1276 Type D
- THERMAL SHOCK: . . . .
  25 Cycles, Method 107C, MIL-STD-202D, Test Condition A-1

Send for new 36 page Pico Catalog

(All PICO Products are patented)

PICO PART NUMBER			PRIMARY IMPEDANCE OHMS	SECONDARY IMPEDANCE OHMS	POWER MILLIWATTS at 1 KHz	PRIMARY UNBALANCED DC CURRENT ma	PRIMARY DC RESISTANCE OHMS	SECONDARY DC RESISTANCE OHMS	PICO PRICES 1-9 *		
A-Series Insulated Leads	D-Series PLUG-IN	X-Series Comm							A-Series	D-Series	X-Series
A1020	D4020	X10200	40	40	600	15	4	4.8	$ 7.66	$ 8.04	$ 5.66
A1025	D4025	X10250	80 ct	32 split	600	12	9.8	6	9.63	10.11	7.11
A1030	D4030	X10300	120 ct	3.2	600	10	10	0.46	7.30	7.67	5.40
A1035	D4035	X10350	120 ct	60 ct	600	10	12	6	9.63	10.11	7.11
A1040	D4040	X10400	120 ct	120 ct	600	10	12	16	9.63	10.11	7.11
A1045	D4045	X10450	150 ct	12	600	10	11	1.5	7.30	7.67	5.40
A1050	D4050	X10500	150 ct	50	600	10	15	5	8.11	8.52	5.99
A1055	D4055	X10550	150 ct	100	600	10	15	10	8.11	8.52	5.99
A1060	D4060	X10600	150 ct	150 ct	600	10	15	17	9.63	10.11	7.11
A1065	D4065	X10650	150	600 ct	600	10	15	60	8.11	8.52	5.99
A1070	D4070	X10700	300 ct	12	600	7	20	1.6	7.30	7.67	5.40
A1075	D4075	X10750	300 ct	50	600	7	30	5	8.11	8.52	5.99
A1080	D4080	X10800	300 ct	150	600	7	30	15	8.11	8.52	5.99
A1085	D4085	X10850	300 ct	300 ct	600	7	30	36	9.63	10.11	7.11
A1090	D4090	X10900	300 ct	600	600	7	19	89	7.66	8.04	5.66
A1092	D4092	X10920	300 ct	600 ct	600	7	30	60	9.63	10.11	7.11
A1095	D4095	X10950	320 ct	3.2	600	7	20	0.46	7.30	7.67	5.40
A1100	D4100	X11000	400	10	600	8	40	1	7.66	8.04	5.66
A1105	D4105	X11050	400 ct	40 split	600	8	46	8	9.63	10.11	7.11
A1110	D4110	X11100	400	100	600	8	40	10	7.66	8.04	5.66
A1115	D4115	X11150	400 ct	120 split	600	8	46	26	9.63	10.11	7.11
A1120	D4120	X11200	400 ct	200	600	8	40	20	8.11	8.52	5.99
A1125	D4125	X11250	400 ct	400 split	600	8	46	74	9.63	10.11	7.11
A1130	D4130	X11300	400 ct	1000 ct	600	8	40	100	11.06	11.61	8.18
A1135	D4135	X11350	400 ct	2000 ct	600	8	40	200	11.06	11.61	8.18
A1140	D4140	X11400	400 ct	4000 ct	600	8	45	550	9.97	10.47	7.37
A1145	D4145	X11450	500 ct	50 ct	600	3	50	5	8.57	9.00	6.33
A1150	D4150	X11500	500	50	600	3	60	8	6.90	7.25	5.10
A1155	D4155	X11550	*500	500	600	3	50	60	8.57	9.00	6.33
A1160	D4160	X11600	500 ct	500 ct	600	3	50	60	8.57	9.00	6.33
A1165	D4165	X11650	500 ct	600	600	5.5	31	90	7.66	8.04	5.66
A1170	D4170	X11700	500 ct	600 ct	600	5.5	50	68	8.57	9.00	6.33
A1175	D4175	X11750	600	3.2	600	3	60	0.58	6.90	7.25	5.10
A1180	D4180	X11850	600 ct	12	600	5	43	1.5	7.66	8.04	5.66
A1185	D4185	X11850	600 ct	50	600	5	60	5	7.66	8.04	5.66
A1190	D4190	X11900	640 ct	3.2	600	5	43	0.46	7.66	8.04	5.66
A1195	D4195	X11950	700	100	600	4	70	10	7.66	8.04	5.66
A1200	D4200	X12000	800 ct	3.2	600	4	51	0.46	7.66	8.04	5.66
A1205	D4205	X12050	800 ct	12	600	4	50	1.5	7.66	8.04	5.66
A1210	D4210	X12100	800 ct	800	600	4	80	80	8.57	9.00	6.33
A1215	D4215	X12150	900 ct	600	600	4	52	89	7.66	8.04	5.66
A1220	D4220	X12200	1000 ct	12	600	3.5	70	1.5	7.66	8.04	5.66
A1225	D4225	X12250	1000 ct	50 ct	600	3.5	100	5	8.57	9.00	6.33
A1230	D4230	X12300	1000	50	600	3	110	8	6.90	7.25	5.10
A1235	D4235	X12350	1000 ct	50	600	3	110	8	8.57	9.00	6.33
A1240	D4240	X12400	1000 ct	1000 ct	600	3	100	100	8.57	9.00	6.33
A1245	D4245	X12450	1000 ct	4000 split	600	3	100	400	11.06	11.61	8.18
A1250	D4250	X12500	1060 ct	3.2	600	3.5	70	0.38	7.66	8.04	5.66
A1255	D4255	X12550	1200	3.2	600	2	100	0.5	6.90	7.25	5.10
A1260	D4260	X12600	1200	1200	600	2	120	120	6.90	7.25	5.10
A1265	D4265	X12650	1500 ct	12	600	3	105	1.5	7.66	8 04	5.66
A1270	D4270	X12700	*1500 ct	600 ct	600	3	150	60	11.06	11.61	8.18
A1275	D4275	X12750	1500 ct	600	600	3	85	89	7.66	8 04	5.66
A1280	D4280	X12800	1500 ct	600 ct	600	3	150	60	8.57	9.00	6.33
A1285	D4285	X12850	*1500	1500	600	3	150	150	8.57	9.00	6.33
A1290	D4290	X12900	1600 ct	3.2	600	3	109	0.38	7.66	8.04	5.66
A1295	D4295	X12950	2000 ct	2000 split	600	3	195	125	9.97	10.47	7.37
A1300	D4300	X13000	1000 ct	16,000 split	125	3.5	120	940	9.97	10.47	7.37
A1305	D4305	X13050	2000 ct	8000 split	125	3	195	450	9.97	10.47	7.37
A1310	D4310	X13100	3000	3000	125	2	300	300	8.04	8.44	5.94
A1315	D4315	X13150	*4000 ct	8000 ct	125	2	320	590	9.97	10.47	7.37
A1320	D4320	X13200	7500 ct	12	125	1	500	1.6	8.04	8.44	5.94
A1325	D4325	X13250	7500 ct	50	125	1	750	5	8.57	9.00	6.33
A1330	D4330	X13300	7500	100	125	1	750	10	8.57	9.00	6.33
A1335	D4335	X13350	7500	600	125	1	750	60	9.42	9.89	6.96
A1340	D4340	X13400	7500	2500	125	1	750	250	9.42	9.89	6.96
A1345	D4345	X13450	*7500 ct	7500 ct	125	1	750	750	11.06	11.61	8.18
A1350	D4350	X13500	8000 ct	3.2	125	1	500	0.38	8.04	8.44	5.94

*Discount Prices: 1-9 Net; 10-24 less 10%; 25-49 less 16%; 50-99 less 23%; 100-499 less 30%

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stock to one week

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PICO Electronics, Inc.

50 South MacQuesten Pkwy. Mt. Vernon, New York 10551 • phone 914-699-5514

TRANSFORMERS

PICO PART NUMBER		PRIMARY IMPEDANCE OHMS	SECONDARY IMPEDANCE OHMS	POWER MILLIWATTS at 1 KHz	PRIMARY UNBALANCED DC CURRENT ma	PRIMARY DC RESISTANCE OHMS	SECONDARY DC RESISTANCE OHMS	PICO PRICES 1-9 *	
B-Series Insulated Leads	C-Series (Plug-In)							B-Series	C-Series
B2360	C3360	*8000 ct	1200 ct	125	1	800	120	9.97	10.47
B2365	C3365	*9000 ct	9000 ct	125	1	850	950	9.97	10.47
B2370	C3370	10,000	3.2	125	1	790	0.6	7.66	8.04
B2375	C3375	10,000	100	125	1	1000	10	8.45	8.87
B2380	C3380	10,000	500 ct	125	1	850	50	8.45	8.87
B2385	C3385	10,000 ct	500 ct	125	1	870	50	9.97	10.47
B2390	C3390	10,000	1000	125	1	1000	100	8.45	8.87
B2395	C3395	10,000	1200 ct	125	1	850	130	8.45	8.87
B2400	C3400	10,000 ct	1200 ct	125	1	870	130	9.97	10.47
B2405	C3405	10,000 ct	1500 ct	125	1	850	115	9.22	9.68
B2410	C3410	10,000	2000 ct	125	1	1000	200	9.42	9.89
B2415	C3415	10,000 ct	2000 split	125	1	620	220	9.97	10.47
B2420	C3420	10,000 ct	2000 ct	125	1	870	180	9.97	10.47
B2425	C3425	10,000	2000 ct	125	1	850	180	8.45	8.87
B2430	C3430	10,000	5000	125	1	1000	500	9.97	10.47
B2435	C3435	10,000	7500	125	1	1000	750	9.97	10.47
B2440	C3440	10,000 ct	10,000 ct	125	1	970	1200	9.63	10.11
B2445	C3445	*10,000	10,000	125	1	1000	1300	9.63	10.11
B2450	C3450	15,000	10,000	60	0.75	1500	1000	9.63	10.11
B2455	C3455	20,000	500	60	0.5	2000	50	9.63	10.11
B2460	C3460	20,000	800	60	0.5	800	140	7.66	8.04
B2465	C3465	20,000 ct	800 ct	60	0.5	800	140	8.81	9.25
B2470	C3470	20,000	1000	60	0.5	2000	100	9.63	10.11
B2475	C3475	20,000 ct	1000 split	60	0.5	800	110	11.06	11.61
B2480	C3480	20,000	5000	60	0.5	2000	500	9.63	10.11
B2485	C3485	20,000	10,000	60	0.5	2000	1000	9.63	10.11
B2490	C3490	20,000	20,000	60	0.5	2000	2300	9.63	10.11
B2495	C3495	30,000	5000	60	0.25	2800	500	9.97	10.47
B2500	C3500	30,000	10,000	60	0.25	2800	1000	9.97	10.47
B2505	C3505	30,000	30,000	60	0.25	2800	3500	9.97	10.47
B2510	C3510	40,000 ct	400 split	60	0	2800	38	11.06	11.61
B2515	C3515	40,000	1000	60	0	2800	90	11.06	11.61
B2520	C3520	40,000	2000	60	0	2800	200	11.06	11.61
B2525	C3525	40,000 ct	4000 ct	60	0	2800	370	11.06	11.61
B2530	C3530	40,000	10,000	60	0	2800	930	11.06	11.61
B2535	C3535	40,000	20,000	60	0	2800	2000	11.06	11.61
B2540	C3540	40,000	40,000	60	0	2800	3500	11.06	11.61
B-Shield	C-Shield	Magnetic shield—mu metal case						1.20	1.20

*Discount Prices: 1-9 Net; 10-24 less 10%; 25-49 less 16%; 50-99 less 23%; 100-499 less 30%

Ordering Instructions: No minimum. Net 30 days F.O.B. Mt. Vernon, New York. P.O. Box 1206

PICO's
ultra-miniature transformers

B SERIES
Military Insulated Leads

C SERIES
Military Plug-In

FEATURES

- EXTREME RESISTANCE TO THERMAL SHOCK
- ULTRA MINIATURE SIZE
- PICO IS APPROVED QPL SOURCE (MIL-T-27)
- MAGNETIC SHIELDS AVAILABLE
- ELECTROSTATIC SHIELDING CAN BE ADDED
- VARIATION OF STANDARD DESIGNS AVAILABLE
- PRIMARY AND SECONDARY WINDINGS CAN BE USED EITHER AS INPUT OR OUTPUT
- SPECIAL PRODUCTION TECHNIQUES ENSURE UNIFORM SIZE AND LEADS WHICH ARE FREE OF ENCAPSULANT. NO MENISCUS IN LEAD AREA.
- EVERY UNIT IN THIS CATALOG CAN BE MADE WITH A 300 THERMAL CYCLE GUARANTEE USING PICO'S SPECIAL SR CONSTRUCTION. CONTACT FACTORY FOR DETAILS

(All PICO Products are patented)

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INDUCTORS

TWO VALUES OF INDUCTANCE, EACH AT A PARTICULAR VALUE OF DC CURRENT, ARE LISTED FOR EACH INDUCTOR. ALL INDUCTORS WITH SPLIT WINDINGS HAVE MEASUREMENTS LISTED FOR BOTH SERIES CONNECTIONS AND PARALLEL CONNECTIONS.

SINGLE WINDINGS

PICO PART NUMBER		INDUCTANCE HENRIES	DC CURRENT ma	DC RESISTANCE OHMS	PICO PRICES 1-9 *	
B-Series Insulated Leads	C-Series (Plug-In)				B-Series	C-Series
B2570	C3570	0.1 .08	4 10	25	6.14	6.45
B2575	C3575	0.9 0.5	2 6	105	6.14	6.45
B2580	C3580	2.5 0.9	2 4	630	6.14	6.45
B2585	C3585	4.5 1.2	2 4	2300	7.30	7.67

SPLIT WINDINGS

PICO PART NUMBER		INDUCTANCE HENRIES	DC CURRENT ma	DC RESISTANCE OHMS	PICO PRICES 1-9 *	
B-Series Insulated Leads	C-Series (Plug-In)				B-Series	C-Series
B2590	C3590	SERIES { 0.1 .08 PARALLEL { .025 .02	4 10 8 20	25 6.5	7.66	8.04
B2595	C3595	SERIES { 0.9 0.5 PARALLEL { 0.23 0.13	2 6 4 12	105 26	7.66	8.04
B2600	C3600	SERIES { 2.5 0.9 PARALLEL { 0.6 0.23	2 4 4 8	630 160	7.66	8.04
B2605	C3605	SERIES { 4.5 1.2 PARALLEL { 1.1 0.3	2 4 4 8	2300 575	8.11	8.52

*Discount Prices: 1-9 Net; 10-24 less 10%; 25-49 less 16%; 50-99 less 23%; 100-499 less 30%

Ordering Instructions: No minimum. Net 30 days F.O.B. Mt. Vernon, New York. P.O. Box 1206

**Delivery:
Stock to one week**

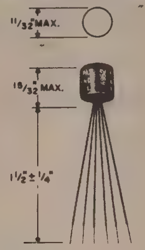
*For immediate engineering assistance or to place an order—**Call Toll Free 800-431-1064***

PICO Electronics, Inc.

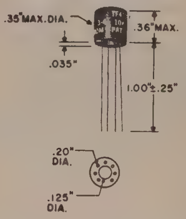
50 South MacQuesten Pkwy. Mt. Vernon, New York 10551 • phone 914-699-5514

PICO's ultra-miniature transformers

B SERIES
Military Insulated Leads



C SERIES
Military Plug-In



SPECIFICATIONS

- MIL-T-27: . . . .
  All Units Are Designed to MIL-T-27 and Are Hermetically Sealed in a Metal Case
  Transformers are Type TF5R21ZZ.
  Inductors are TF5R20ZZ.
- FREQUENCY RESPONSE: . .
  ±3 db, 400 Hz - 100 KHz At 1.0 Milliwatt
- MAXIMUM DISTORTION: . .
  5% With Rated Power Level at 1 KHz
- DIELECTRIC STRENGTH: . .
  All Units Tested at 200 V RMS
- INSULATION RESISTANCE: .
  Greater than 10,000 Megohms at 300 V DC
- WEIGHT: . . . .
  1/15 Ounce
- OPERATING TEMPERATURE:
  -55° c to 105° c (All Units Can Be Supplied to Class S Requirements 130° c maximum)
- TERMINALS: . . . .
  Solid .016 Diameter Conductor. Conductor is Gold Plated, Nickel-Iron Core Wire (Dumet) in Accordance with MIL-STD-1276 Type D
- THERMAL SHOCK: . . . . .
  25 Cycles, Method 107C, MIL-STD-202D, Test Condition A-1

Send for new 36 page Pico Catalog

(All PICO Products are patented)

PICO PART NUMBER		PRIMARY IMPEDANCE OHMS	SECONDARY IMPEDANCE OHMS	POWER MILLIWATTS at 1 KHz	PRIMARY UNBALANCED DC CURRENT ma	PRIMARY DC RESISTANCE OHMS	SECONDARY DC RESISTANCE OHMS	PICO PRICES 1-9 *	
B-Series Insulated Leads	C-Series (Plug-In)							B-Series	C-Series
B2020	C3020	40	40	600	15	4	5	$ 7.66	$ 8.04
B2025	C3025	80 ct	32 split	600	12	11.5	4	9.63	10.11
B2030	C3030	120 ct	3.2	600	10	10	0.38	7.30	7.67
B2035	C3035	120 ct	60 ct	600	10	10	6	9.63	10.11
B2040	C3040	120 ct	120 ct	600	10	11	12	9.63	10.11
B2045	C3045	150 ct	12	600	10	11	1.5	7.30	7.67
B2050	C3050	150 ct	50	600	10	15	5	8.11	8.52
B2055	C3055	150 ct	100	600	10	15	10	8.11	8.52
B2060	C3060	150 ct	150 ct	600	10	14	16	9.63	10.11
B2065	C3065	150	600 ct	600	10	15	60	8.11	8.52
B2070	C3070	300 ct	12	600	7	20	1.6	7.30	7.67
B2075	C3075	300 ct	50	600	7	30	5	8.11	8.52
B2080	C3080	300 ct	150	600	7	30	15	8.11	8.52
B2085	C3085	300 ct	300 ct	600	7	29	31	9.63	10.11
B2090	C3090	300 ct	600	600	7	20	89	7.66	8.04
B2091	C3091	300 ct	600 ct	600	7	20	89	9.63	10.11
B2095	C3095	320 ct	3.2	600	7	20	0.38	7.30	7.67
B2100	C3100	400	10	600	8	40	1	7.66	8.04
B2105	C3105	400 ct	40 split	600	8	50	6.5	9.63	10.11
B2110	C3110	400	100	600	8	40	10	7.66	8.04
B2115	C3115	400 ct	120 split	600	8	45	25	9.63	10.11
B2120	C3120	400 ct	200	600	8	40	20	8.11	8.52
B2125	C3125	400 ct	400 split	600	8	50	89	9.63	10.11
B2130	C3130	400 ct	1000 ct	600	8	40	100	11.06	11.61
B2135	C3135	400 ct	2000 ct	600	8	40	200	11.06	11.61
B2140	C3140	400 ct	4000 ct	600	8	45	365	9.97	10.47
B2145	C3145	500 ct	50 ct	600	3	65	8.5	8.45	8.87
B2150	C3150	500	50	600	3	65	8.5	6.90	7.25
B2155	C3155	*500	500	600	3	45	55	8.45	8.87
B2160	C3160	500 ct	500 ct	600	5.5	49	52	8.45	8.87
B2165	C3165	500 ct	600	600	5.5	32	89	7.66	8.04
B2170	C3170	500 ct	600 ct	600	5.5	32	89	8.45	8.87
B2175	C3175	600	3.2	600	3	60	0.5	6.90	7.25
B2180	C3180	600 ct	12	600	5	43	1.5	7.66	8.04
B2185	C3185	600 ct	50	600	5	60	5	7.66	8.04
B2190	C3190	640 ct	3.2	600	5	43	0.38	7.66	8.04
B2195	C3195	700	100	600	5	70	10	7.66	8.04
B2200	C3200	800 ct	3.2	600	4	50	0.38	7.66	8.04
B2205	C3205	800 ct	12	600	4	50	1.5	7.66	8.04
B2210	C3210	800 ct	800	600	4	78	82	8.45	8.87
B2215	C3215	900 ct	600	600	4	53	90	7.66	8.04
B2220	C3220	1000 ct	12	600	3.5	70	1.5	7.66	8.04
B2225	C3225	1000 ct	50 ct	600	3	110	8.5	8.45	8.87
B2230	C3230	1000	50	600	3	110	8.5	6.90	7.25
B2235	C3235	1000 ct	50	600	3	110	8	8.45	8.87
B2240	C3240	1000 ct	1000 ct	600	3	98	105	8.45	8.87
B2245	C3245	1000	4000 split	600	3	100	425	11.06	11.61
B2250	C3250	1060 ct	3.2	600	3.5	70	0.38	7.66	8.04
B2255	C3255	1200	3.2	600	2	110	0.45	6.90	7.25
B2260	C3260	1200	1200	600	3	110	125	6.90	7.25
B2265	C3265	1500 ct	12	600	3	105	1.5	7.66	8.04
B2270	C3270	1500 ct	600 ct	600	3	87	90	6.90	7.25
B2275	C3275	1500 ct	600	600	3	87	90	7.66	8.04
B2285	C3285	*1500	1500	600	3	140	155	8.45	8.87
B2290	C3290	1600 ct	3.2	600	3	109	0.38	7.66	8.04
B2295	C3295	2000 ct	2000 split	600	3	180	110	9.97	10.47
B2300	C3300	1000 ct	16,000 split	125	3.5	120	1600	9.97	10.47
B2305	C3305	2000 ct	8000 split	125	3	180	440	9.97	10.47
B2310	C3310	3000	3000	125	3	280	340	8.11	8.52
B2315	C3315	*4000 ct	8000 ct	125	2	300	530	9.97	10.47
B2320	C3320	7500 ct	12	125	1	500	1.6	8.45	8.87
B2325	C3325	7500 ct	50	125	1	750	5	8.45	8.87
B2330	C3330	7500	100	125	1	750	10	8.45	8.87
B2335	C3335	7500	600	125	1	750	60	9.42	9.89
B2340	C3340	7500	2500	125	1	750	250	9.42	9.89
B2345	C3345	*7500	7500	125	1	725	875	9.97	10.47
B2350	C3350	8000 ct	3.2	125	1	500	0.38	8.45	8.87
B2355	C3355	8000	1000	125	1	800	100	9.42	9.89

*Discount Prices: 1-9 Net; 10-24 less 10%; 25-49 less 16%; 50-99 less 23%; 100-499 less 30%

* INCLUDES ELECTROSTATIC SHIELD

Ordering Instructions: No minimum. Net 30 days F.O.B. Mt. Vernon, New York. P.O. Box 1206

Delivery:
Stock to one week

*For immediate engineering assistance or to place an order—**Call Toll Free 800-431-1064***

PICO Electronics, Inc.

50 South MacQuesten Pkwy. Mt. Vernon, New York 10551 • phone 914-699-5514

PICO PART NUMBER			PRIMARY IMPEDANCE OHMS	SECONDARY IMPEDANCE OHMS	POWER MILLIWATTS at 1 KHz	PRIMARY UNBAL-ANCED DC CURRENT	PRIMARY DC RESISTANCE OHMS	SECONDARY DC RESIS-TANCE OHMS	PICO PRICES 1-9 *		
A-Series Insulated Leads	D-Series Plug-In	X-Series Comm							A-Series	D-Series	X-Series
A1355	D4355	X13550	8000	1000	125	1	800	100	9.42	9.89	6.96
A1360	D4360	X13600	*8000 ct	1200 ct	125	1	640	115	9.97	10.47	7.37
A1365	D4365	X13650	*9000 ct	9000 ct	125	1	850	1080	10.38	10 90	7.68
A1370	D4370	X13700	10,000	3.2	125	1	790	0.6	7.66	8.04	5.66
A1375	D4375	X13750	10,000	100	125	1	1000	10	8.45	8.87	6.25
A1380	D4380	X13800	10,000	500 ct	125	1	780	50	8.45	8.87	6.25
A1385	D4385	X13850	10,000 ct	500 ct	125	1	1000	50	10.24	10.75	7.57
A1390	D4390	X13900	10,000	1000	125	1	1000	100	8.45	8.87	6.25
A1395	D4395	X13950	10,000	1200 ct	125	1	780	110	8.45	8.87	6.25
A1400	D4400	X14000	10,000 ct	1200 ct	125	1	1000	120	10.24	10.75	7.57
A1405	D4405	X14050	10,000 ct	1500 ct	125	1	780	125	9.22	9.68	6.82
A1410	D4410	X14100	10,000	2000 ct	125	1	1000	200	9.42	9.68	6.96
A1415	D4415	X14150	10,000 ct	2000 split	125	1	550	225	9.97	10.47	7.37
A1420	D4420	X14200	10,000 ct	2000 ct	125	1	1000	200	10.24	10.75	7.57
A1425	D4425	X14250	10,000	2000 ct	125	1	780	190	8.45	8.87	6.25
A1430	D4430	X14300	10,000	5000	125	1	1000	500	9.87	10.36	7.29
A1435	D4435	X14350	10,000	7500	125	1	1000	750	9.87	10.36	7.29
A1440	D4440	X14400	10,000 ct	10,000 ct	125	1	975	1175	9.63	10.11	7.11
A1445	D4445	X14450	*10,000	10,000	125	1	1000	1000	10.74	11.28	7.94
A1450	D4450	X14500	15,000	10,000	60	0.5	1500	1000	10.74	11.28	7.94
A1455	D4455	X14550	20,000	500	60	0.5	1600	60	9.63	10.11	7.11
A1460	D4460	X14600	20,000	800	60	0.5	825	110	7.66	8.04	5.66
A1465	D4465	X14650	20,000 ct	800 ct	60	0.5	830	110	8.81	9.25	6.51
A1470	D4470	X14700	20,000	1000	60	0.5	1600	130	9.63	10.11	7.11
A1475	D4475	X14750	20,000 ct	1000 split	60	0.5	800	110	9.97	10.47	7.37
A1480	D4480	X14800	20,000	5000	60	0.5	1600	550	9.63	10.11	7.11
A1485	D4485	X14850	20,000	10,000	60	0.5	1600	1100	9.63	10.11	7.11
A1490	D4490	X14900	20,000	20,000	60	0.5	1600	1850	9.63	10.11	7.11
A1495	D4495	X14950	30,000	5000	60	0.25	1700	500	10.74	11.28	7.94
A1500	D4500	X15000	30,000	10,000	60	0.25	1700	1000	10.74	11.28	7.94
A1505	D4505	X15050	30,000	30,000	60	0.25	1700	2000	10.74	11.28	7.94
A1510	D4510	X15100	40,000 ct	400 split	60	0.25	1700	60	10.74	11.28	7.94
A1515	D4515	X15150	40,000	1000	60	0.25	1700	115	10.74	11.28	7.94
A1520	D4520	X15200	40,000	2000	60	0.25	1700	225	10.74	11.28	7.94
A1525	D4525	X15250	40,000 ct	4000 ct	60	0.25	1700	450	11.13	11.69	8.23
A1530	D4530	X15300	40,000	10,000	60	0.25	1700	1200	10.74	11.28	7.94
A1535	D4535	X15350	40,000	20,000	60	0.25	1700	2300	10.74	11.28	7.94
A1540	D4540	X15400	40,000	40,000	60	0.25	1700	2000	10.74	11.28	7.94
A1545	D4545	X15450	d 100,000	100	30	0	7900	17	12.31	12.93	9.10
A1550	D4550	X15500	*d100,000 ct	500 ct	30	0	7900	85	12.31	12.93	9.10
A1555	D4555	X15550	d 100,000	10,000	30	0	7900	1700	11.85	12.44	8.76
A1560	D4560	X15600	d 200,000	1000	30	0	8500	100	11.85	12.44	8.76
A1565	D4565	X15650	d 200,000 ct	1000 ct	30	0	8500	100	12.59	13.22	9.31
A1570	D4570	X15700	d 200,000	10,000	30	0	8500	1000	14.03	14.73	10.37
A1575	D4575	X15750	d 200,000 ct	20,000	30	0	8500	2900	14.03	14.73	10.37
A1580	D4580	X15800	d 250,000	1000	30	0	10,000	125	14.03	14.73	10.37
A Shield	D Shield		Magnetic shield—mu metal case						1.20	1.20	

* INCLUDES ELECTROSTATIC SHIELD   d RESPONSE AT 100 KHz NOT WITHIN 3db

PICO's
ultra-miniature transformers

A SERIES
Military Insulated Leads

D SERIES Military Plug-In

X SERIES
Commercial Insulated Leads

FEATURES

- EXTREME RESISTANCE TO THERMAL SHOCK
- ULTRA MINIATURE SIZE
- PICO IS APPROVED QPL SOURCE (MIL-T-27)
- MAGNETIC SHIELDS AVAILABLE
- ELECTROSTATIC SHIELDING CAN BE ADDED
- VARIATION OF STANDARD DESIGNS AVAILABLE
- PRIMARY AND SECONDARY WINDINGS CAN BE USED EITHER AS INPUT OR OUTPUT
- SPECIAL PRODUCTION TECHNIQUES ENSURE UNIFORM SIZE AND LEADS WHICH ARE FREE OF ENCAPSULANT. NO MENISCUS IN LEAD AREA.
- EVERY UNIT IN THIS CATALOG CAN BE MADE WITH A 300 THERMAL CYCLE GUARANTEE USING PICO'S SPECIAL SR CONSTRUCTION. CONTACT FACTORY FOR DETAILS

POWER TRANSFORMERS (FREQ. 380 - 1000 Hz)

PICO PART NUMBER			PRIMARY VOLTAGE (VOLTS)	SECONDARY VOLTAGE (VOLTS)	SECONDARY CURRENT MILLIAMPS	PICO PRICES 1-9 *		
A Series	D Series	X Series				A	D	X
A1705	D4605	X17050	28	6.3 6.3	30 30	9.97	10.47	7.37
A1710	D4610	X17100	28	6.3	60	8.45	8.87	6.25
A1715	D4615	X17150	* 28	28	10	9.97	10.47	7.37
A1720	D4620	X17200	*115	115	2	11.06	11.61	8.18
A1725	D4625	X17250	115	57.5	4	11.06	11.61	8.18
A1730	D4630	X17300	115	6.3	40	11.06	11.61	8.18

Send for new 36 page Pico Catalog

(All PICO Products are patented)

INDUCTORS

TWO VALUES OF INDUCTANCE, EACH AT A PARTICULAR VALUE OF DC CURRENT, ARE LISTED FOR EACH INDUCTOR. ALL INDUCTORS WITH SPLIT WINDINGS HAVE MEASUREMENTS LISTED FOR BOTH SERIES CONNECTIONS AND PARALLEL CONNECTIONS.

SINGLE WINDINGS

PICO PART NUMBER			INDUCTANCE HENRIES	DC CURRENT ma	DC RESISTANCE OHMS	PICO PRICES 1-9 *		
A-Series	D-Series	X-Series				A	D	X
A1820	D4700	X18200	.075 .018	10 20	10.5	6.14	6.45	4.54
A1830	D4705	X18300	0.3 0.15	4 20	25	6.14	6.45	4.54
A1840	D4710	X18400	1.25 0.5	2 11	100	6.20	6.51	4.58
A1850	D4715	X18500	3.5 1.0	2 5	560	6.14	6.45	4.54
A1860	D4720	X18600	6.0 1.5	2 5	2100	7.30	7.67	5.40
A1870	D4725	X18700	20.0 8.0	1 3	5100	9.22	9.68	6.83

SPLIT WINDINGS

PICO PART NUMBER			INDUCTANCE HENRIES	DC CURRENT ma *	DC RESISTANCE OHMS	PICO PRICES 1-9 *		
A Series	D Series	X Series				A	D	X
A1880	D4730	X18800	SERIES .075 .06 PARALLEL .018 .015	10 30 20 60	10.5 2.6	7.30	7.67	5.40
A1890	D4735	X18900	SERIES 0.3 0.15 PARALLEL .075 .04	4 20 8 40	25 6.2	8.11	8.52	5.99
A1900	D4740	X19000	SERIES 3.5 1.0 PARALLEL 0.9 0.25	2 5 4 10	560 140	8.11	8.52	5.99
A1910	D4745	X19100	SERIES 6.0 1.5 PARALLEL 1.5 0.38	2 5 4 10	2100 525	8.11	8 52	5.99
A1920	D4750	X19200	SERIES 20 8 PARALLEL 5 2	1 3 2 6	5100 1275	9.97	1047	7.37

Delivery— stock to one week

*For immediate engineering assistance or to place an order—**Call Toll Free 800-431-1064***

PICO Electronics, Inc.

50 South MacQuesten Pkwy. Mt. Vernon, New York 10551 • phone 914-699-5514

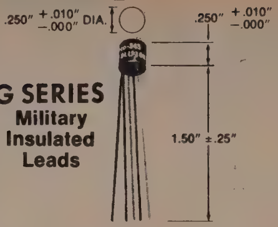
PICO's ultra-miniature AUDIO: transformers

1/4"x1/4"

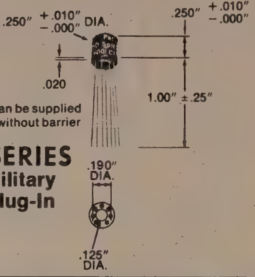
FEATURES

- EXTREME RESISTANCE TO THERMAL SHOCK
- ULTRA MINIATURE SIZE
- PICO IS APPROVED QPL SOURCE (MIL-T-27)
- MAGNETIC SHIELDS AVAILABLE
- ELECTROSTATIC SHIELDING CAN BE ADDED
- VARIATION OF STANDARD DESIGNS AVAILABLE
- SPECIAL PRODUCTION TECHNIQUES ENSURE UNIFORM SIZE AND LEADS WHICH ARE FREE OF ENCAPSULANT. NO MENISCUS IN LEAD AREA
- EVERY UNIT IN THIS CATALOG CAN BE MADE WITH A 300 THERMAL CYCLE GUARANTEE USING PICO'S SPECIAL SR CONSTRUCTION. CONTACT FACTORY FOR DETAILS.

TRANSFORMERS



G SERIES
Military Insulated Leads



Unit can be supplied without barrier

F SERIES
Military Plug-In

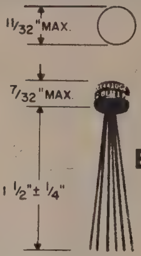
SPECIFICATIONS

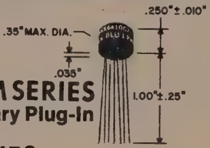
- MIL-T-27:
  All Units Are Designed to MIL-T-27 and Are Hermetically Sealed in a Metal Case
  Transformers are Type TF5R21ZZ.
  Inductors are TF5R20ZZ.
- FREQUENCY RESPONSE:
  ±3 db, 400 Hz - 250 KHz At 1.0 milliwatt
- MAXIMUM DISTORTION:
  5% With Rated Power Level at 1 KHz
- DIELECTRIC STRENGTH:
  All Units Tested at 200 V RMS
- INSULATION RESISTANCE:
  Greater than 10,000 Megohms at 300 V DC
- WEIGHT:
  1.1 GRAMS
- OPERATING TEMPERATURE:
  -55° c to 105° c (All Units Can Be Supplied to Class S Requirements 130° c maximum)
- TERMINALS:
  Solid .012 Diameter Conductor. Conductor is Gold Plated, Nickel-Iron Core Wire (Dumet) in Accordance with MIL-STD-1276 Type D. Lead Spacing is 7 Leads 45° Apart on a .19" Diameter Circle.
- THERMAL SHOCK:
  25 Cycles, Method 107C, MIL-STD-202D, Test Condition A-1

PICO's ultra-miniature PULSE transformers

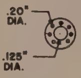
FEATURES

- EXTREME RESISTANCE TO THERMAL SHOCK
- ULTRA MINIATURE SIZE
- BUILT TO MIL-T-21038
- MAGNETIC SHIELDS AVAILABLE
- ELECTROSTATIC SHIELDING CAN BE ADDED
- VARIATION OF STANDARD DESIGNS AVAILABLE
- SPECIAL PRODUCTION TECHNIQUES ENSURE UNIFORM SIZE AND LEADS WHICH ARE FREE OF ENCAPSULANT. NO MENISCUS IN LEAD AREA.
- EVERY UNIT IN THIS CATALOG CAN BE MADE WITH A 300 THERMAL CYCLE GUARANTEE USING PICO'S SPECIAL SR CONSTRUCTION. CONTACT FACTORY FOR DETAILS.





M SERIES
Military Plug-In

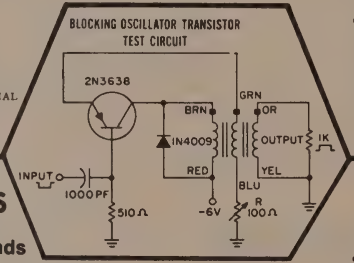


E SERIES
Military Insulated Leads

SPECIFICATIONS

- MIL-T-21038:
  All Units are Designed to MIL-T-21038 and are Hermetically Sealed in a Metal Case
- DIELECTRIC STRENGTH:
  All Units Tested at 200 V RMS
- INSULATION RESISTANCE:
  Greater than 10,000 Megohms at 300 V DC
- WEIGHT:
  1/20 Ounce
- OPERATING TEMPERATURE:
  -55° c to 105° c (All Units Can Be Supplied to Class S Requirements 130° c maximum)
- TERMINALS:
  Solid .012 Diameter Conductor. Conductor is Gold Plated, Nickel-Iron Core Wire (Dumet) in Accordance with MIL-STD-1276 Type D
- THERMAL SHOCK:
  25 Cycles, Method 107C, MIL-STD-202D, Test Condition A-1

BLOCKING OSCILLATOR TRANSISTOR TEST CIRCUIT

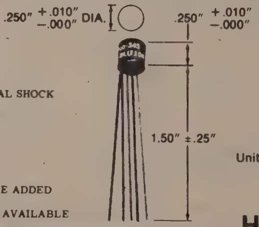


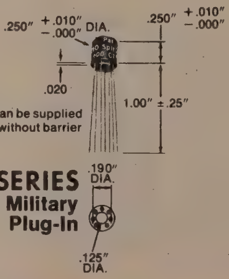
PICO's ultra-miniature PULSE transformers

FEATURES

- EXTREME RESISTANCE TO THERMAL SHOCK
- ULTRA MINIATURE SIZE
- BUILT TO MIL-T-21038
- MAGNETIC SHIELDS AVAILABLE
- ELECTROSTATIC SHIELDING CAN BE ADDED
- VARIATION OF STANDARD DESIGNS AVAILABLE
- SPECIAL PRODUCTION TECHNIQUES ENSURE UNIFORM SIZE AND LEADS WHICH ARE FREE OF ENCAPSULANT. NO MENISCUS IN LEAD AREA.
- EVERY UNIT IN THIS CATALOG CAN BE MADE WITH A 300 THERMAL CYCLE GUARANTEE USING PICO'S SPECIAL SR CONSTRUCTION. CONTACT FACTORY FOR DETAILS

J SERIES
Military Insulated Leads





Unit can be supplied without barrier

H SERIES
Military Plug-In

SPECIFICATIONS

- MIL-T-21038:
  All Units Are Designed to MIL-T-21038 and Are Hermetically Sealed in a Metal Case
- DIELECTRIC STRENGTH:
  All Units Tested at 200 V RMS
- INSULATION RESISTANCE:
  Greater than 10,000 Megohms at 300 V DC
- WEIGHT:
  1.1 GRAMS
- OPERATING TEMPERATURE:
  -55° c to 105° c (All Units Can Be Supplied to Class S Requirements 130° c maximum)
- TERMINALS:
  Solid .012 Diameter Conductor. Conductor is Gold Plated, Nickel-Iron Core Wire (Dumet) in Accordance with MIL-STD-1276 Type D. Lead Spacing is 7 Leads 45° Apart on a 19" Diameter Circle.
- THERMAL SHOCK:
  25 Cycles, Method 107C, MIL-STD-202D, Test Condition A-1

Delivery:
Stock to one week

*For immediate engineering assistance or to place an order—**Call Toll Free 800-431-1064***

PICO Electronics, Inc.

50 South MacQuesten Pkwy. Mt. Vernon, New York 10551 • phone 914-699-5514

TRANSFORMERS

CO PART NUMBER		PRIMARY IMPEDANCE OHMS	SECONDARY IMPEDANCE OHMS	POWER MILLIWATTS at 1 KHz	PRIMARY UNBALANCED DC CURRENT ma	PRIMARY DC RESISTANCE OHMS	SECONDARY DC RESISTANCE OHMS	PICO PRICES 1-9 *	
-Series	G-Series							F-Series	G-Series
F5705	G6005	50	50	100	5.0	7.5	9.0	$ 9.90	$ 9.43
F5710	G6010	100	100	100	5.0	15	18	9.90	9.43
F5715	G6015	120 ct	3.2	100	4.5	15	0.75	9.90	9.43
F5720	G6020	150 ct	12 split	100	4.0	20	2.4	10.75	10.24
F5725	G6025	300 ct	600 split	100	3.0	40	90	10.75	10.24
F5730	G6030	400 ct	400 split	100	2.5	54	58	11.53	10.98
F5735	G6035	500 ct	50 split	100	2.0	62	10	11.53	10.98
F5740	G6040	500	600	100	2.0	62	90	10.75	10.24
F5745	G6045	600 ct	600 split	100	2.0	70	90	11.53	10.98
F5750	G6050	900 ct	600	100	1.5	130	90	11.83	11.27
F5755	G6055	1K ct	1K split	100	1.5	110	140	11.83	11.27
F5760	G6060	1.5K ct	600 split	100	1.2	175	69	11.83	11.27
F5765	G6065	2K ct	8K split	80	1.0	200	1000	12.68	12.08
F5770	G6070	10K ct	500 split	80	0.5	1000	60	12.98	12.36
F5775	G6075	10K	500	80	0.5	1000	60	12.68	12 08
F5780	G6080	10K ct	1.2K split	80	0.5	1100	160	12.98	12.36
F5785	G6085	10K	1.2K	80	0.5	1100	130	12.68	12.08
F5790	G6090	10K ct	2K split	80	0.5	1100	250	12.98	12.36
F5795	G6095	10K ct	10K ct	80	0.5	1100	1100	11.83	11.27
F5800	G6100	10K	10K	80	0.5	1100	1100	11.53	10.98
F5805	G6105	10K ct	10K split	80	0.5	1100	1100	12.98	12.36
F5810	G6110	25K ct	1K split	50	0.3	2100	130	13.77	13.11
F5815	G6115	25K	1K	50	0.3	2100	130	12.98	12.36
F5820	G6120	30K ct	1.2K	50	0.3	2300	180	13.77	13.11

INDUCTORS

PICO PART NUMBER		INDUCTANCE HENRIES		DC CURRENT ma *	DC RESISTANCE OHMS	PRICES 1-9 *	
F-Series	G-Series					F-Series	G-Series
F5825	G6125	SERIES PARALLEL	10.0 2.75 2.5 .65	0 2 0 4	2250 560	10 75	10.24
F5830	G6130	SERIES PARALLEL	5.5 1.5 1.3 .40	0 2 0 4	1000 250	10.75	10.24
F5835	G6135	SERIES PARALLEL	.85 .25 .21 .06	1 6 2 12	240 60	10.75	10.24
F5840	G6140	SERIES PARALLEL	.6 .15 .15 .04	0 5 0 10	144 36	10.75	10.24

* Discount Prices: 1-9 Net; 10-24 less 10%; 25-49 less 16%; 50-99 less 23%; 100-499 less 30%

Ordering Instructions: No minimum. Net 30 days F.O.B. Mt. Vernon, New York. P.O. Box 1206

Send for new 36 page Pico Catalog

(All PICO Products are patented)

MILITARY DESIGNATION TP6RX4410CZ TURNS RATIO 4:4:1

ICO PART NUMBER		COUPLING CIRCUIT CHARACTERISTICS								BLOCKING OSCILLATOR CIRCUIT					D.C. RESISTANCE			PICO PRICES 1-9 *	
E-Series	M-Series	P. WIDTH μ SEC.	VOLT OUT	RISE TIME μ SEC.	% OVER SHOOT	DROOP %	% BACK SWING	IMP IN/OUT	FREQ RESP. WITHIN 2DB	P. WIDTH μ SEC.	RISE TIME μ SEC.	% OVER SHOOT	DROOP %	% BACK SWING	BRN RED	OR YEL	GRN BLU	E-Series	M-Series
E5020	M5300	0.05	10	0.018	0	0	10	50	150 KHz-30 MHz	0.05	0.02	0	0	35	0.21	0.23	0.13	6.68	7.40
E5040	M5305	0.1	10	0.02	0	0	5	50	100 KHz-17 MHz	0.1	0.025	0	0	25	0.47	0.56	0.17	6.68	7.40
E5060	M5310	0.2	8	0.035	0	0	5	100	16 KHz-10 MHz	0.2	0.030	0	0	15	1.0	1.25	0.37	6.68	7.40
E5080	M5315	0.5	8	0.06	0	0	0	100	7 KHz-3.3 MHz	0.5	0.05	0	0	15	1.5	1.80	0.54	6.68	7.40
E5100	M5320	1	8	0.15	0	0	5	100	7 KHz-2.3 MHz	1	0.08	0	0	15	2.5	3.1	0.9	6.68	7.40
E5120	M5325	2	8	0.17	0	0	10	100	2.2 KHz-1.3 MHz	2	0.10	0	0	15	3.0	3.7	1.1	6.68	7.40
E5140	M5330	3	8	0.20	0	0	10	100	1.7 KHz-1.5 MHz	3	0.20	0	0	15	4.9	6.0	1.8	6.68	7.40
E5160	M5335	5	8	0.20	0	15	25	200	1.8 KHz-1.5 MHz	5	0.30	0	0	3	8.0	9.7	2.9	6.68	7.40
E5180	M5340	10	8	0.4	0	15	20	200	1.5 KHz-1.2 MHz	10	0.35	0	5	10	13.0	15.8	4.7	6.68	7.40
MILITARY DESIGNATION TP6RX5310CZ TURNS RATIO 5:3:1																			
E5200	M5345	0.1	8	0.01	0	0	5	140/50	170 KHz-32 MHz	0.1	0.01	0	0	20	0.55	0.40	0.15	6.68	7.40
E5220	M5350	1	8	0.05	0	6	10	280/100	12.5 KHz-3.3 MHz	1	0.02	5	5	5	3.0	2.2	0.9	6.68	7.40
E5240	M5355	5	8	0.09	0	12	25	560/200	15 KHz-4 MHz	5	0.05	0	10	10	9.5	7.0	2.6	6.68	7.40

COUPLING CIRCUIT MEASUREMENTS MADE WITH BRN-RED AS INPUT AND YEL - OR AS OUTPUT, GRN-BLU WINDING IS OPEN: INPUT VOLTAGE = 1V.

MILITARY DESIGNATION TP7RX4410CZ TURNS RATIO 4:4:1

PICO PART NUMBER		COUPLING CIRCUIT CHARACTERISTICS							BLOCKING OSCILLATOR CIRCUIT					PICO PRICES 1-9 *	
H-Series	J-Series	P Width μSec	Volt Out	Rise Time	% Over Shoot	Droop %	% Back Swing	Imp* in/out,	P Width μSec	Rise Time	% Over Shoot	Droop %	% Back Swing	H-Series	J-Series
H5400	J5600	0.05	0.2	0.01	0	0	20	50	0.05	0.01	0	0	35	9.60	8.88
H5405	J5605	0.1	0.5	0.015	0	0	20	50	0.1	0.012	0	0	25	9.60	8.88
H5410	J5610	0.2	1.2	0.02	0	0	20	100	0.2	0.02	0	0	15	9.60	8.88
H5415	J5615	0.5	1.5	0.023	0	5	25	100	0.5	0.023	0	5	15	9.60	8.88
H5420	J5620	1	1.5	0.025	0	20	28	100	1	0.03	0	10	15	9.60	8 88
H5425	J5625	2	1.5	0.028	0	15	23	100	2	0.035	0	10	15	9.60	8 88
H5430	J5630	3	1.5	0.030	0	15	28	100	3	0.04	0	10	15	9.60	8.88
H5435	J5635	5	2	0.035	0	20	20	200	5	0.040	0	15	15	9.60	8.88
H5440	J5640	10	2	0.05	0	25	25	200	10	0.060	0	15	10	9.60	8.88
H5445	J5645	15	2	0.06	0	25	18	200	15	0.07	0	15	15	9.60	8.88
H5450	J5650	25	3	0.1	0	30	30	500	25	0.08	0	15	15	9.60	8.88
H5455	J5655	50	3	0.3	0	20	20	500	50	0.2	0	10	5	9.60	8.88
H5460	J5660	100	6	0.4	0	15	18	500	100	0.35	0	10	15	9.60	8.88

*COUPLING CIRCUIT MEASUREMENTS MADE WITH BRN-RD AS INPUT AND YEL-OR AS OUTPUT, GRN-BLU WINDING IS OPEN.

Delivery— stock to one week

For immediate engineering assistance or to place an order— ***Call Toll Free 800-431-1064***

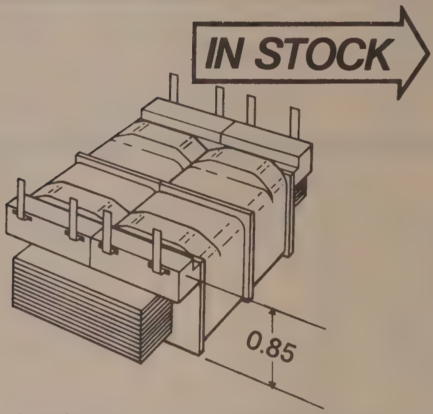
PICO Electronics, Inc.

50 South MacQuesten Pkwy. Mt. Vernon, New York 10551 • phone 914-699-5514

PROMEMCO, INC.

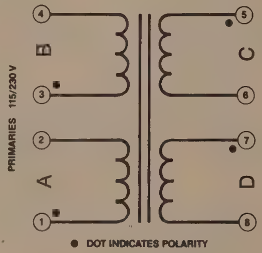
POWER TRANSFORMERS

- Low profile
- P.C. Mounting
- Multi-output
- Computer grade



PART No.	SERIES OUTPUT (60 Hz)	PARALLEL OUTPUT (60 Hz)	1—4 PC PRICE
7—10	10 VCT—700 MA	5 V—1.4 A	$7.50
7—12	12.6 VCT—550 MA	6.3 V—1.1 A	
7—16	16 VCT—400 MA	8 V—800 MA	
7—20	20 VCT—350 MA	10 V—700 MA	
7—24	24 VCT—290 MA	12 V—580 MA	
7—34	34 VCT—200 MA	17 V—400 MA	$7.90
7—40	40 VCT—175 MA	20 V—350 MA	
7—56	56 VCT—120 MA	28 V—240 MA	
7—88	88 VCT— 75 MA	44 V—150 MA	
7—120	120 VCT— 55 MA	60 V—110 MA	
7—230	230 VCT— 30 MA	115 V— 60 MA	
7—5/12	(1—2) 115 V Input (3—4) 15 V—100 MA (5—6) 6 V—530 MA (7—8) 15 V—100 MA		$10.00

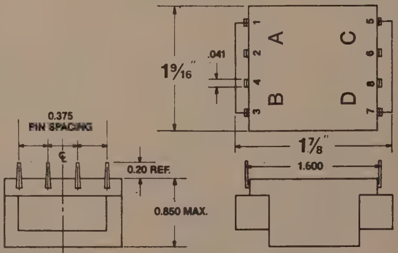
■ 115/230 V INPUT ■ 50/60HZ and 400 HZ OPERATION ■ 7 VA and 13 VA RATING ■ LOW RADIATED FIELD ■ COMPUTER GRADE CONSTRUCTION ■ 7 OZ. WEIGHT ■ 0.85 IN. MAX. HIGH ■ 40° C TEMPERATURE RISE



These low profile printed circuit mounting, computer grade, power transformers are rated at 7VA (13VA at 400 HZ). Optimum power ratings for the low temperature rise are made possible by over-winding primaries and secondaries, and the use of high quality lamination steel.

The winding configuration minimizes radiated field effects and assures efficient coupling of primary to secondary. Isolated secondaries allow for positive regulators to be employed.

Special designs are available on request. Customization of input/output ratios, operating frequency and operating temperature classification is possible. The unique bobbin design permits the addition of winding taps (up to 4) and electrostatic shielding when required.

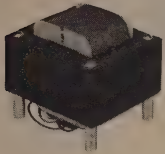


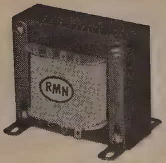
PROMEMCO, INC.

181 BRIDGE ROAD / HAUPPAUGE / NEW YORK 11787 / 516 582-9388

CUSTOM DESIGN

... At Off-the-Shelf Prices!





PRINTED CIRCUIT TYPE

TRANSFORMERS

COILS AND FILTER CHOKES

BUILT THE WAY YOU WANT THEM - WITH TYPICAL 2-3 WEEK DELIVERY

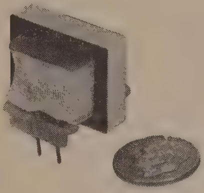
115/230 VAC
50 - 400 Hz.
Power to 450 Watts
100% Tested

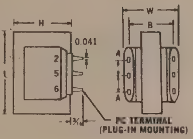
PRIMARY — Dual or Single
SECONDARY — Dual or Single
OUTPUT — A Wide Variety
FRAMES — With or Without

Personal
DESIGN ASSISTANCE
From Prototype
To Production

TYPICAL P-C MODELS

SECONDARY VOLTS	PART NUMBER	SECONDARY Ma		DIMENSIONS				
		Series	Parallel	L	W	H	A	B
10 V.C.T. or 5 V SERIES 10 V.C.T. PARALLEL 5 V @ 2 X	AD-10-120 AD-10-440 AD-10-1,000	120 440 1,000	240 880 2,000	1-3/8 1-5/8 1-7/8	1-1/8 1-1/4 1-7/16	1-3/16 1-3/8 1-5/8	.312 .400 .400	1.00 1.10 1.30
20 V.C.T. or 10 V SERIES 20 V.C.T. PARALLEL 10 V @ 2 X CURRENT	AD-20-60 AD-20-220 AD-20-500	60 220 500	120 440 1,000	1-3/8 1-5/8 1-7/8	1-1/8 1-1/4 1-7/16	1-3/16 1-3/8 1-5/8	.312 .400 .400	1.00 1.10 1.30
24 V.C.T. or 12 V SERIES 24 V.C.T. PARALLEL 12 V @ 2 X CURRENT	AD-24-50 AD-24-180 AD-24-450	50 180 450	100 360 900	1-3/8 1-5/8 1-7/8	1-1/8 1-1/4 1-7/16	1-3/16 1-3/8 1-5/8	.312 .400 .400	1.00 1.10 1.30
34 V.C.T or 17 V SERIES 34 V.C.T. PARALLEL 17 V @ 2 X CURRENT	AD-34-35 AD-34-125 AD-34-300	35 125 300	70 250 600	1-3/8 1-5/8 1-7/8	1-1/8 1-1/4 1-7/16	1-3/16 1-3/8 1-5/8	.312 .400 .400	1.00 1.10 1.30
40 V.C.T. or 20 V SERIES 40 V.C.T. PARALLEL 20 V @ 2 X CURRENT	AD-40-30 AD-40-110 AD-40-250	30 110 250	60 220 500	1-3/8 1-5/8 1-7/8	1-1/8 1-1/4 1-7/16	1-3/16 1-3/8 1-5/8	.312 .400 .400	1.00 1.10 1.30
88 V.C.T. or 44 V SERIES 88 V.C.T. PARALLEL 44 V @ 2 X CURRENT	AD-88-15 AD-88-50 AD-88-120	15 50 120	30 100 240	1-3/8 1-5/8 1-7/8	1-1/8 1-1/4 1-7/16	1-3/16 1-3/8 1-5/8	.312 .400 .400	1.00 1.10 1.30
120 V.C.T. or 60 V SERIES 120 V.C.T. PARALLEL 60 V @ 2 X CURRENT	AD-120-10 AD-120-35 AD-120-85	10 35 85	20 70 170	1-3/8 1-5/8 1-7/8	1-1/8 1-1/4 1-7/16	1-3/16 1-3/8 1-5/8	.312 .400 .400	1.00 1.10 1.30





RoMarNetics Inc.

18728 BRYANT ST.
NORTHRIDGE, CALIF. 91324
(213) 886-1812

POWERSTAT® Variable Transformers

New epoxy-coated POWERKOTE Coils make the POWERSTAT line the most outstanding value in variable transformers today. *Without increase in price, size or weight,* only POWERSTAT Variable Transformers give an average of 20% higher current ratings, 10:1 greater overload capability, longer life, greater resistance to fungus, salt spray and other contaminating atmospheres. POWERKOTE Coil commutator bars are embedded in place preventing steady-state operating temperature and severe overloads from distorting the commutator.

POWERSTAT Variable Transformers are designed to deliver continuously adjustable voltage from a-c power lines. They introduce no waveform distortion and feature rugged construction, precious metal plated commutators, excellent regulation, high efficiency and conservative ratings. All manually operated types listed in the charts except the 10B-12, EN116B-EN216B and EN117B-EN217B Series are available with motor drives if desired. Motor-driven speeds are 5, 15, 30 or 60 seconds for full range travel on all except types having -4, -5, or -6 suffixes which do not offer the 5-second speed. Single types in the 116B-216B, 117B-217B, 126-226 and 136B-236B Series are also offered with 2- or 3-wire cord-plug sets. 1156D-1256D Series types are available in ratings to 244 kva.

ADJUSTABLE SPEED DRIVES

All motor-driven units i
the 116B-216B, 117B-217B
126-226, 136B-236B an
146-246 Series are avail
able with adjustable spee
drives which permit the output voltage of th
transformer to be controlled over the full rang
of zero to maximum output voltage at speed
ranging from 5 seconds to 200 seconds. All co
trol circuitry is solid-state and adaptable fo
present speed systems. The Adjustable Spee
Control Potentiometer BHP65455-G1 can b
remotely located from the variable transforme

RATINGS AND SPECIFICATIONS

INPUT		OUTPUT					TYPE	Ship. Wt. Lbs.
			Const. Current Load		Const. Impedance Load			
Volts	Cycles	Volts	Max. Amp.	Max. KVA	Max. Amp.	Max. KVA		
10B-12 SERIES								
Single Phase								
120	50/60	0-120	2.25*	0.27	3‡	0.36	10B	2½
120	60	0-132	2.25*	0.30	—	—		
240	50/60	0-240	0.7*	0.17	0.9‡	0.22	12	2½
240	50/60	0-264	0.5**	0.13	—	—		
240	50/60	0-240	2.25*	0.54	3‡	0.72	10B-2	6
240	60	0-264	2.25*	0.59	—	—		
480	50/60	0-480	0.7*	0.34	0.9‡	0.43	12-2	6
480	50/60	0-528	0.5**	0.26	—	—		
Three Phase								
120	50/60	0-120	2.25*	0.47	3‡	0.62	10B-2	6
120	60	0-132	2.25*	0.51	—	—		
240	50/60	0-240	0.7*	0.29	0.9‡	0.37	12-2	6
240	50/60	0-264	0.5**	0.23	—	—		
240	60	0-240	2.25*	0.94	3‡	1.2	10B-3	8½
480	50/60	0-480	0.7*	0.58	0.9‡	0.75	12-3	8½
480	60	0-528	0.5**	0.46	—	—		
21-22 SERIES								
Single Phase								
120	50/60	0-120	4.5	0.54	6.5	0.78	21	6
120	50/60	0-140	4.5	0.63	—	—		
240	50/60	0-240	2.25	0.54	3.25	0.78	22	6
240	50/60	0-280	2.25	0.63	—	—		
240	50/60	0-240	4.5	1.1	6.5	1.6	21-2	13½
240	50/60	0-280	4.5	1.3	—	—		
480	50/60	0-480	2.25	1.1	3.25	1.6	22-2	13½
480	50/60	0-560	2.25	1.3	—	—		
Three Phase								
120	50/60	0-120	4.5	0.94	6.5	1.4	21-2	13½
120	50/60	0-140	4.5	1.1	—	—		
240	50/60	0-240	2.25	0.94	3.25	1.4	22-2	13½
240	50/60	0-280	2.25	1.1	—	—		
240	50/60	0-240	4.5	1.9	6.5	2.7	21-3	19
240	60	0-280	4.5	2.2	—	—		
480	50/60	0-480	2.25	1.9	3.25	2.7	22-3	19
480	60	0-560	2.25	2.2	—	—		

*Rating when mounted on metal panel. On bracket or nonmetallic panel, derate 10B Series to 1.75 amp., 12 Series to 0.5 amp.
‡Rating when mounted on metal panel. On bracket or nonmetallic panel, derate 10B Series to 2.5 amp., 12 Series to 0.75 amp.
**0.7 amp. maximum in range from 0 to line voltage when mounted on metal panel.

INPUT		OUTPUT					TYPE	Ship. Wt. Lbs.
			Const. Current Load		Const. Impedance Load			
Volts	Cycles	Volts	Max. Amp.	Max. KVA	Max. Amp.	Max. KVA		
116B-216B and 117B-217B SERIES†								
Single Phase								
120	50/60	0-120	10	1.2	13	1.6	116B	12
120	50/60	0-140	10	1.4	—	—		
120	60	0-120	12	1.4	15	1.8	117BT	12
240	50/60	0-240	3.5	0.84	5	1.2	216B	12
240	50/60	0-280	3.5	0.98	—	—		
240	60	0-240	5	1.2	7	1.7	217BT	12
240	50/60	0-240	10	2.4	13	3.1	116BT-2	24
240	50/60	0-280	10	2.8	—	—		
240	60	0-240	12	2.9	15	3.6	117BT-2	24
480	50/60	0-480	3.5	1.7	5	2.4	216BT-2	24
480	50/60	0-560	3.5	2.0	—	—		
480	60	0-480	5	2.4	7	3.4	217BT-2	24
Three Phase								
120	50/60	0-120	10	2.1	13	2.7	116BT-2	24
120	50/60	0-140	10	2.4	—	—		
120	60	0-120	12	2.5	15	3.1	117BT-2	24
240	50/60	0-240	3.5	1.5	5	2.1	216BT-2	24
240	50/60	0-280	3.5	1.7	—	—		
240	60	0-240	5	2.1	7	2.9	217BT-2	24
240	50/60	0-240	10	4.2	13	5.4	116BT-3	36
240	60	0-280	10	4.8	—	—		
240	60	0-240	12	5.0	15	6.2	117BT-3	36
480	50/60	0-480	3.5	2.9	5	4.2	216BT-3	36
480	60	0-560	3.5	3.4	—	—		
480	60	0-480	5	4.2	7	5.8	217BT-3	36
EN116B-EN216B and EN117B-EN217B SERIES								
Single Phase								
120	50/60	0-120	8	0.96	13	1.6	EN116B	15
120	50/60	0-140	8	1.1	—	—		
120	60	0-120	10	1.2	14.5	1.7	EN117B	15
240	50/60	0-240	3	0.72	4.5	1.1	EN216B	15
240	50/60	0-280	3	0.84	—	—		
240	60	0-240	4.4	1.1	5.8	1.4	EN217B	15
240	50/60	0-240	8	1.9	13	3.1	EN116B-2	28
240	50/60	0-280	8	2.2	—	—		
240	60	0-240	10	2.4	14.5	3.5	EN117B-2	28
480	50/60	0-480	3	1.4	4.5	2.2	EN216B-2	28
480	50/60	0-560	3	1.7	—	—		
480	60	0-480	4.4	2.1	5.8	2.8	EN217B-2	28
Three Phase								
120	50/60	0-120	8	1.7	13	2.7	EN116B-2	28
120	50/60	0-140	8	1.9	—	—		
120	60	0-120	10	2.1	14.5	3.0	EN117B-2	28
240	50/60	0-240	3	1.2	4.5	1.9	EN216B-2	28
240	50/60	0-280	3	1.5	—	—		
240	60	0-240	4.4	1.8	5.8	2.4	EN217B-2	28
240	50/60	0-240	8	3.3	13	5.4	EN116B-3	39
240	60	0-280	8	3.9	—	—		
240	60	0-240	10	4.2	14.5	6.0	EN117B-3	39
480	50/60	0-480	3	2.5	4.5	3.7	EN216B-3	39
480	60	0-560	3	2.9	—	—		
480	60	0-480	4.4	3.7	5.8	4.8	EN217B-3	39

†Also available with open construction. Suffix U when ordering.

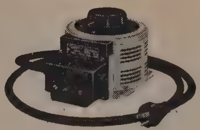
THE
SUPERIOR ELECTRIC
COMPANY

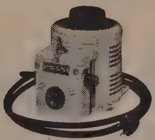
1000 MIDDLE STREET, BRISTOL, CONN. 06010
PHONE: (203) 582-9561

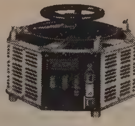
with POWERKOTE® COILS

TYPE 10B

TYPE 21


TYPE 3PN126


TYPE 116B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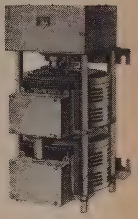
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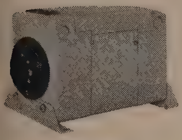
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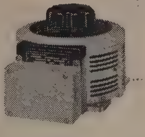
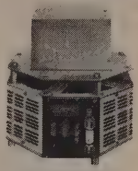

TYPE 136BT

TYPE 146

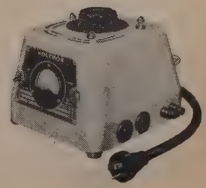

TYPE 5MB1156D

INPUT		OUTPUT					TYPE	Ship. Wt. Lbs.
Volts	Cycles	Volts	Const. Current Load		Const. Impedance Load			
			Max. Amp.	Max. KVA	Max. Amp.	Max. KVA		
126-226 SERIES†								
Single Phase								
120 120	50/60 50/60	0-120 0-140	15 15	1.8 2.1	20 —	2.4 —	126	17
240 240	50/60 50/60	0-240 0-280	7.5 7.5	1.8 2.1	10 —	2.4 —	226	17
240 240	50/60 50/60	0-240 0-280	15 15	3.6 4.2	20 —	4.8 —	126-2	32
480 480	50/60 50/60	0-480 0-560	7.5 7.5	3.6 4.2	10 —	4.8 —	226-2	32
Three Phase								
120 120	50/60 50/60	0-120 0-140	15 15	3.1 3.6	20 —	4.2 —	126-2	32
240 240	50/60 50/60	0-240 0-280	7.5 7.5	3.1 3.6	10 —	4.2 —	226-2	32
240 240	50/60 60	0-240 0-280	15 15	6.2 7.3	20 —	8.3 —	126-3	49
480 480	50/60 60	0-480 0-560	7.5 7.5	6.2 7.3	10 —	8.3 —	226-3	49
136B-236B SERIES†								
Single Phase								
120 120	50/60 50/60	0-120 0-140	22 22	2.6 3.1	28 —	3.4 —	136B	25
120 120	50/60 50/60	0-120 0-140	44 44	5.3 6.2	56 —	6.7 —	136B-2§	52
240 240	50/60 50/60	0-240 0-280	10 10	2.4 2.8	13 —	3.1 —	236B	25
240 240	50/60 50/60	0-240 0-280	22 22	5.3 6.2	28 —	6.7 —	136B-2	52
480 480	50/60 50/60	0-480 0-560	10 10	4.8 5.6	26 —	6.2 —	236B-2	52
Three Phase								
120 120	50/60 50/60	0-120 0-140	22 22	4.6 5.3	28 —	5.8 —	136B-2	52
240 240	50/60 50/60	0-240 0-280	10 10	4.2 4.8	13 —	5.4 —	236B-2	52
240 240	50/60 60	0-240 0-280	22 22	9.1 10.7	28 —	11.6 —	136B-3	76
480 480	50/60 60	0-480 0-560	10 10	8.3 9.7	13 —	10.8 —	236B-3	76
146-246 SERIES†								
Single Phase								
120 120	50/60 50/60	0-120 0-140	30 30	3.6 4.2	35 —	4.2 —	146	38
120 120	50/60 50/60	0-120 0-140	60 60	7.2 8.4	70 —	8.4 —	146-2§§	83
240 240	50/60 50/60	0-240 0-280	15 15	3.6 4.2	19 —	4.6 —	246	38
240 240	50/60 50/60	0-240 0-280	30 30	7.2 8.4	35 —	8.4 —	146-2	83
480 480	50/60 50/60	0-480 0-560	15 15	7.2 8.4	19 —	9.1 —	246-2	83
146-246 SERIES† (contd.)								
Three Phase								
120 120	50/60 50/60	0-120 0-140	30 30	6.2 7.3	35 —	7.3 —	146-2	83
240 240	50/60 50/60	0-240 0-280	15 15	6.2 7.3	19 —	7.9 —	246-2	83
240 240	50/60 60	0-240 0-280	30 30	12.5 14.5	35 —	14.5 —	146-3	125
480 480	50/60 60	0-480 0-560	15 15	12.5 14.5	19 —	15.8 —	246-3	125
1156D-1256D SERIES†								
Single Phase								
120 120	50/60 50/60	0-120 0-140	50 50	6.0 7.0	55 —	6.6 —	1156D	82
120 120	50/60 50/60	0-120 0-140	100 100	12.0 14.0	110 —	13.2 —	1156D-2P	169
120 120	50/60 50/60	0-120 0-140	150 150	18.0 21.0	165 —	19.8 —	1156D-3P	272
240 240	50/60 50/60	0-240 0-280	28 28	6.7 7.8	28 —	6.7 —	1256D	82
240 240	50/60 50/60	0-240 0-280	50 50	12.0 14.0	55 —	13.2 —	1156D-2S	156
240 240	50/60 50/60	0-240 0-280	56 56	13.4 15.7	56 —	13.4 —	1256D-2P	169
240 240	50/60 50/60	0-240 0-280	84 84	20.2 23.5	84 —	20.2 —	1256D-3P	272
240 240	50/60 50/60	0-240 0-280	100 100	24.0 28.0	110 —	26.4 —	1156D-4PS	361
480 480	50/60 50/60	0-480 0-560	28 28	13.4 15.7	28 —	13.4 —	1256D-2S	156
480 480	50/60 50/60	0-480 0-560	56 56	26.9 31.4	56 —	26.9 —	1256D-4PS	361
Three Phase								
120 120	50/60 50/60	0-120 0-140	50 50	10.4 12.1	55 —	11.4 —	1156D-2D	155
240 240	50/60 50/60	0-240 0-280	28 28	11.6 13.6	28 —	11.6 —	1256D-2D	155
240 240	50/60 60	0-240 0-280	50 50	20.8 24.2	55 —	22.9 —	1156D-3Y	230
240 240	50/60 50/60	0-240 0-280	100 100	41.6 48.5	110 —	45.7 —	1156D-6Y	507
480 480	50/60 60	0-480 0-560	28 28	23.3 27.2	28 —	23.3 —	1256D-3Y	235
480 480	50/60 60	0-480 0-560	56 56	46.6 54.3	56 —	46.6 —	1256D-6Y	507

†Also available with open construction. Suffix U when ordering.
§Requires also one paralleling choke type T5000B.
§§Requires also one paralleling choke type T6053.

VOLTBOX® A-C POWER SUPPLY

Contains POWERSTAT Variable Transformer, voltmeter, three output receptacles, two 5-WAY Binding Posts, "on-off" switch, line-load meter switch, fuse and six-foot cord-plug. Type UC1MB ratings are 120 volt, single phase 50/60 hertz input and 0-140 volt 10 ampere, 1.4 kva output.



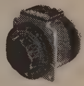
POWERSTAT® *Variable Transformers*

WITH POWERKOTE® COILS

40-VOLT SERIES

Meet high current, low voltage requirements of low voltage power supplies and a wide range of transistor circuit applications. Manually-operated and motor-driven single, 2- and 3-gang single phase types available.

TYPE 10B-40



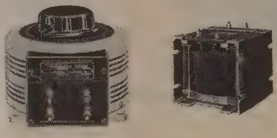
TYPE 21-40

40-VOLT SERIES

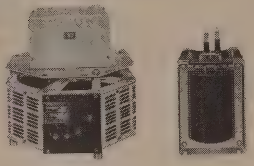
INPUT		OUTPUT						
			Const. Current Load		Const. Impedance Load			
Volts	Hertz	Volts	Max. Amps.	Max. KVA	Max. Amps.	Max. KVA	TYPE	Ship. Wt. Lbs.
Single Phase								
40	60	0 40	7	0 28	9	0 36	10B 40	3½
			18	0 72	22	0 88	21-40	6
			25	1 0	30	1 2	116BU-40	11

LINE CORRECTORS

Used to correct line voltage variations to maintain a constant output voltage or to supply a limited range of output voltage from a stable a-c source. Manually operated and motor-driven types available.



TYPE LC2106D



TYPE 5MBLC2115E

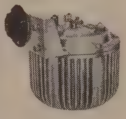
LINE CORRECTOR SERIES

INPUT		OUTPUT				
Volts	Hertz	Volts	Max. Amps.	Max. KVA	TYPE	Ship. Wt. Lbs.
Used as Line Corectors — SINGLE PHASE						
95 135	50/60	115	52	6 0	LC2106D	80
95 135	50/60	115	130	15 0	LC2115E	200
195 255	50/60	230	32 5	7 5	LC2207D	85
205-250	50/60	230	120	27 5	LC2228E	205
400 520	50/60	460	40	18.4	LC2418E	205
Used as Line Correctors — THREE PHASE						
195-255	50/60	230	50	20 0	LC3220YD	241
195-255	50/60	230	113	45 0	LC3245YE	615
195-255	50/60	230	175	70.0	LC3270DE	795
400 520	50/60	460	33	26.3	LC3425YD	230
400-520	50/60	460	100	79.7	LC3475YE	630
420-500	50/60	460	131	104	LC34100YE	630

When units of the LC series are used as limited range adjustable transformers the input voltage is the output voltage shown in the above chart and the output voltage is the input voltage shown in the above chart.

OIL-COOLED AND EXPLOSION-PROOF

Oil-cooled units substantially increase ratings above equivalent air-cooled types and provide a measure of safety. Explosion-proof models are Underwriters' Laboratories listed for Class 1, Group D service. Both are manually operated only.



OIL-COOLED TYPE 0-116B

EXPLOSION-PROOF TYPE X-116

OIL-COOLED

INPUT		OUTPUT				
Volts	Hertz	Volts	Max. Amps.	Max. KVA	TYPE††	Ship. Wt. Lbs.
120	50/60	0 120	15	1.8	0-116B	32
120	50/60	0 140	15	2 1		
120	50/60	0 140	30	4 2	0-1126	100
240	50/50	0 240	6	1 4	0-216B	32
240	50/60	0 280	6	1 7		
240	50/60	0 280	18	5 0	0 1226	105

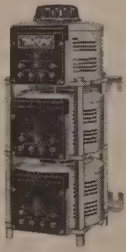
†† Other Types available on special order

EXPLOSION-PROOF

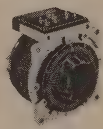
120	50/60	0-120	7 5	0 90	X-116	47
120	50/60	0-140	7 5	1 0		
120	50/60	0 140	12	1 7	X 1126	142
240	50/60	0 240	3	0 72	X-216	47
240	50/60	0-280	3	0 84		
240	50/60	0 280	6	1 7	X-1226	142

LW136B SERIES

Have three windings. Connections can be made for operation as a source of adjustable low output voltage, a line voltage corrector or a limited range variable transformer. Manually operated and motor-driven, open and enclosed construction types available. Full connections and ratings on request.



TYPE LW136B-3



TYPE LW136BU

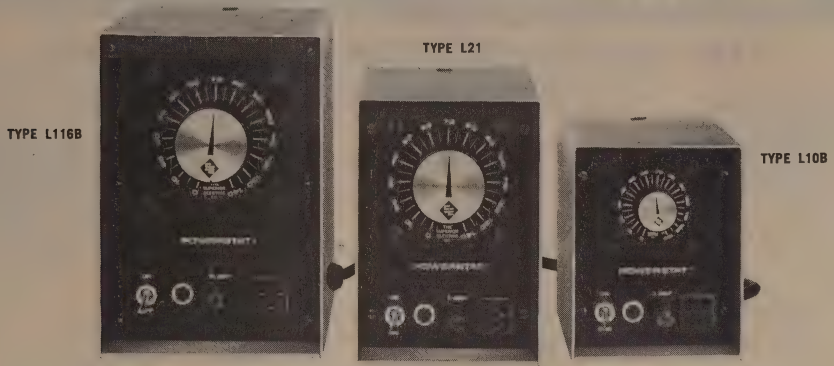
LW136B SERIES

INPUT		OUTPUT‡‡				
Volts	Hertz	Volts	Max. Amps.	Max. KVA	TYPE	Ship. Wt. Lbs.
Single Phase						
120/240	50/60	15 0-15	35	0 52	LW136B	25
120/240/480	50/60	30 0 30	35	1 0	LW136B 2	52
120/240	50/60	45-0-45	35	1 6	LW136B-3	76
120/240	50/60	0 30	25	0 75	LW136B	25
120/240/480	50/60	0-60	25	1 5	LW136B 2	52
120/240	50/60	0 90	25	2 2	LW136B 3	76
Three Phase						
120/240	50/60	0 30	25	1 3	LW136B-2	52
120/240	50/60	0 30	43 3	2 2	LW136B 3	76
120/240	50/60	0-52	25	2 2	LW136B-3	76
240/480	60	0-35	43 3	2 6	LW136B-3	76
240/480	60	0 60	25	2 6	LW136B 3	76

‡‡ LW136B Series ratings are for use as low voltage isolated output transformer.

THE SUPERIOR ELECTRIC COMPANY
1000 MIDDLE STREET • BRISTOL, CONN. 06010 • PHONE: (203) 582-9561

TOTALLY ENCLOSED L SERIES POWERSTAT® Variable Transformers

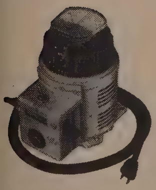


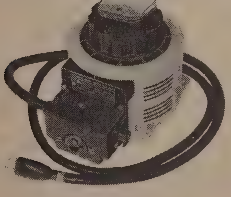
Designed to meet OSHA requirements. For maximum protection and safety, all models are equipped with a grounded NEMA cord-plug assembly, on-off switch, pilot light, grounded output receptacle and fuse. Type L116B has an integrally designed nonprojecting handle. Controls on the panel are recessed for protection from accidental bumping. All models have slots at the rear to accept wall hanger brackets. They may be hung anywhere and easily removed for use in another location. Type L21 and L116B have POWERKOTE coils.

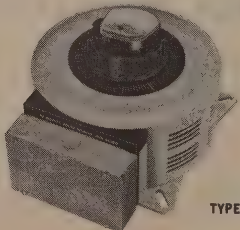
INPUT		OUTPUT			
			CONSTANT CURRENT LOAD		
VOLTS	HERTZ	VOLTS	MAX. AMP.	MAX. KVA	TYPE
120	60	0-132	1.75	0.23	L10B
120	50/60	0-140	4.5	0.63	L21
120	50/60	0-140	10	1.4	L116B

STATIONARY METERED KNOB POWERSTAT® Variable Transformers

- FOR BACK-OF-PANEL OR GENERAL UTILITY MOUNTING
- ACCURATE VOLTMETER REMAINS STATIONARY INSIDE KNOB RIM. . . DOES NOT TURN WITH THE KNOB
- AVAILABLE IN TYPES TO 4 KVA
- MAXIMUM APPLICATION FLEXIBILITY
- SAVES PANEL SPACE, WIRING AND INSTALLATION COSTS


TYPE VS116B


TYPE VS3PN126


TYPE VS146T

TYPE VS150

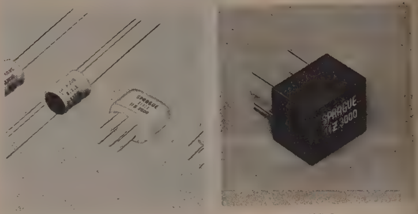
GENERAL UTILITY MOUNTING – Single units (those listed in charts without -2 or -3 suffixes) in the 116B-216B, 117B-217B, 126-226, 136B-236B and 146-246 series are also available with knobs incorporating direct-reading voltmeters. Voltmeters remain stationary as the knob rim is turned, have an accuracy of ±3% of full scale and are insensitive to stray magnetic fields. When ordering, add VS prefix to the type number given in the charts.

BACK-OF-PANEL MOUNTING – Standard cataloged POWERSTAT Variable Transformers in the 21-22 through the 146-246 series designed or adaptable for back-of-panel mounting can be combined with Metered Knob Assemblies. Models for 120 volt service require Metered Knob Assembly VS150 having a 0-150 volt scale and units for 240 volt use require Metered Knob Assembly VS300 having a 0-300 volt scale. Existing models can be retrofitted also.

SPRAGUE PULSE TRANSFORMERS

TYPE 11Z TRIGATE® PULSE TRANSFORMERS

- Specifically designed for commercial and industrial SCR triggering applications where low cost and excellent performance are required.
- Single-ended pulse transformers are designed with leads especially intended for mounting on printed wiring boards; these units are self supporting.
- Balanced pulse characteristics and energy transfer between windings.
- Minimum saturation effect to allow operation where increased pulse widths are required.
- Fast pulse rise time and increased current capability to prevent SCR di dt failure.
- Operating temperature range of —10 C to +70 C.
- For complete technical data, see latest issue of Sprague Engineering Bulletin 40,003.



UNIT 1 UNIT 2 UNIT 3

Turns Ratio	Catalog Number	Size	Min. Lp (μH)	Max. LL (μH)	Max. Cc (pF)	Max. DCR (Ω)	60 Cycle Dielectric Test (Volts RMS)	Max. 60 Cy A-C Line Voltage (Volts RMS)
FLEXIBLE LEAD DESIGN (Unit 1 in photo)								
1:1	11Z12	.593″ D. x .828″ L.	200	3	800	1.5-1.5	1600	240
1:1:1	11Z13	.593″ D. x .828″ L.	200	3	800	2-2-2	1600	240
2:1	11Z14	.593″ D. x .828″ L.	1000	10	1300	10-2	1600	240
2:1:1	11Z15	.593″ D. x .828″ L.	1000	15	1300	10-2-2	1600	240
5:1	11Z16	.593″ D. x .828″ L.	5000	1500	400	19-3	1600	240
PLUG-IN DESIGN with THERMOPLASTIC SHEATH (Unit 2 in photo)								
1:1	11Z2000	.775″ W. x .968″ L. x .800″ H.	200	3.0	800	1.5-1.5	1600	240
1:1	11Z2001	.775″ W. x .968″ L. x .800″ H.	1000	12.0	2000	8-8	1600	240
2:1	11Z2003	.775″ W. x .968″ L. x .800″ H.	1000	10.0	1300	10-2	1600	240
5:1	11Z2004	.775″ W. x .968″ L. x .800″ H.	5000	1500	400	19-3	1600	240
1:1:1	11Z2100	.775″ W. x .968″ L. x .800″ H.	200	3.0	800	2-2-2	1600	240
1:1:1	11Z2101	.775″ W. x .968″ L. x .800″ H.	1000	12.0	2000	10-10-10	1600	240
2:1:1	11Z2103	.775″ W. x .968″ L. x .800″ H.	1000	15.0	1300	10-2-2	1600	240
5:1:1	11Z2104	.775″ W. x .968″ L. x .800″ H.	5000	1500	400	20-4-4	1600	240
PLUG-IN DESIGN with PRE-MOLDED CASE (Unit 3 in photo)								
1:1	11Z3000	.775″ W. x .950″ L. x .750″ H.	200	3.0	800	1.5-1.5	1600	240
1:1	11Z3001	.775″ W. x .950″ L. x .750″ H.	1000	12.0	2000	8-8	1600	240
1:1	11Z3002	.775″ W. x .950″ L. x .750″ H.	5000	15.0	3500	18-18	1600	240
2:1	11Z3003	.775″ W. x .950″ L. x .750″ H.	1000	10.0	1300	10-2	1600	240
5:1	11Z3004	.775″ W. x .950″ L. x .750″ H.	5000	1500	400	19-3	1600	240
1:1:1	11Z3100	.775″ W. x .950″ L. x .750″ H.	200	3.0	800	2-2-2	1600	240
1:1:1	11Z3101	.775″ W. x .950″ L. x .750″ H.	1000	12.0	2000	10-10-10	1600	240
1:1:1	11Z3102	.775″ W. x .950″ L. x .750″ H.	5000	15.0	3500	27-27-27	1600	240
2:1:1	11Z3103	.775″ W. x .950″ L. x .750″ H.	1000	15.0	1300	10-2-2	1600	240
5:1:1	11Z3104	.775″ W. x .950″ L. x .750″ H.	5000	1500	400	20-4-4	1600	240

TYPE 66Z SCR TRIGGER TRANSFORMERS

- Pre-molded construction permits slightly lower cost than fully-molded units without sacrifice in humidity resistance.
- Small size for use on pc boards and in encapsulated modular packages. Case measures .400″ W. x .785″ L. x .312″ H.
- For complete technical data, refer to latest issue of Sprague Engineering Bulletin 40,004.

Turns Ratio	Catalog Number	Min. Lp (μH)	Max. LL (μH)	Max. Cc (pF)	Typ. Vμsec Output Winding	60 Cycle Dielectric Test (Volts RMS)	Max. 60 Cy A-C Line Voltage
1:1:1	66Z900	700	300	25	60	1000	240
1:1:1	66Z903	700	300	25	60	2200	550
1:1:1	66Z930	4800	25	50	110	1000	240
1:1:1	66Z932	4800	25	50	110	2200	550

IND-EEM-66-PPAR

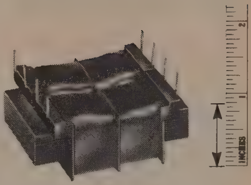
All sizes subject to change without notice

FROM STOCK

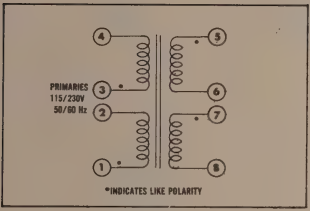
flat plug-in power transformers

FOR PRINTED CIRCUIT APPLICATIONS

ALLOW **ONE INCH** CARD SPACING



MAXIMUM HEIGHT OF 0.850 INCHES — Allows stacking with 1 inch space between PC cards.
6 VA @ 50/60 HZ — in 0.850 inch height, 7 oz. weight - 40°C max. temperature rise.
HUM-BUCKING CONSTRUCTION — Reduced magnetic field - balanced windings.
DUAL PRIMARIES — 115/230 V - 50/60 HZ



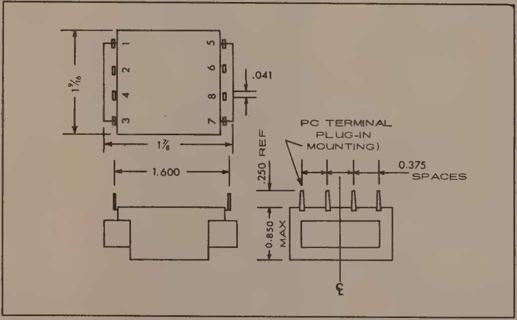
PART NUMBER	SECONDARY* SERIES	PARALLEL
LP-10-600	10V CT @ 600 MA	5V @ 1.2A
LP-12-450	12.6V CT @ 450 MA	6.3V @ 900 MA
LP-16-350	16V CT @ 350 MA	8V @ 700 MA
LP-20-300	20V CT @ 300 MA	10V @ 600 MA
LP-24-250	24V CT @ 250 MA	12V @ 500 MA
LP-34-170	34V CT @ 170 MA	17V @ 340 MA
LP-40-150	40V CT @ 150 MA	20V @ 300 MA
LP-56-100	56V CT @ 100 MA	28V @ 200 MA
LP-88-65	88V CT @ 65 MA	44V @ 130 MA
LP-120-50	120V CT @ 50 MA	60V @ 100 MA
LP-230-25	230V CT @ 25 MA	115V @ 50 MA

*CORRESPONDS TO 30% REGULATION, I.E., NO LOAD SECONDARY VOLTAGE IS 30% HIGHER THAN FULL LOAD.

Signals "LP" series of PC plug-in power transformers offer the main advantage of 0.850 inch height with a 6VA rating at 50/60 Hz. This allows its use in PC boards stacked with 1 inch centers.

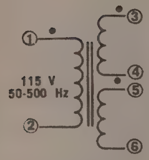
Construction is semi-toroidal (hum bucking) which results in a reduced radiated magnetic field and balanced windings. All materials used are at least class S in rating.

The dual primary and secondary windings offer a large diversity of output combinations with a 115/230V input. The voltages and currents are deal for power applications in semi-conductor control and instrumentation such as single or dual output DC supplies and isolated control circuit and reference supplies.

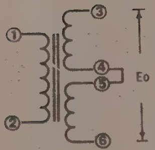


miniature plug-in power transformers

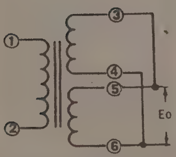
SINGLE 115V PRIMARY
TYPE PC-6 PINS



BASIC SCHEMATIC



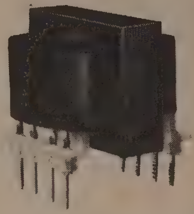
SERIES CONNECTED



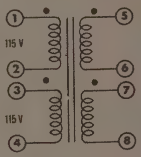
PARALLEL CONNECTED

PRIMARY 50/500 Hz		SECONDARY RMS RATING*		SIZE (VA)
Single 115V (6 Pin)	Dual 115/230V (8 Pin)	Series	Parallel	
PC 10-90	DPC 10-90	10V C.T. @ 90MA	5V @ 180MA	1.0
PC 10-120	DPC 10-120	10V C.T. @ 120MA	5V @ 240MA	1.2
PC 10-440	DPC 10-440	10V C.T. @ 440MA	5V @ 880MA	4.4
PC 10-1000	DPC 10-1000	10V C.T. @ 1A	5V @ 2A	10
PC 10-2400	DPC 10-2400	10V C.T. @ 2.4A	5V @ 4.8A	24
PC 12-70	DPC 12-70	12.6V C.T. @ 70MA	6.3V @ 140MA	1.0
PC 12-100	DPC 12-100	12.6V C.T. @ 100MA	6.3V @ 200MA	1.2
PC 12-350	DPC 12-350	12.6V C.T. @ 350MA	6.3V @ 700MA	4.4
PC 12-800	DPC 12-800	12.6V C.T. @ 800MA	6.3V @ 1.6A	10
PC 12-2000	DPC 12-2000	12.6V C.T. @ 2A	6.3V @ 4A	24
PC 16-55	DPC 16-55	16V C.T. @ 55MA	8V @ 110MA	1.0
PC 16-75	DPC 16-75	16V C.T. @ 75MA	8V @ 150MA	1.2
PC 16-260	DPC 16-260	16V C.T. @ 260MA	8V @ 520MA	4.4
PC 16-640	DPC 16-640	16V C.T. @ 640MA	8V @ 1.28A	10
PC 16-1500	DPC 16-1500	16V C.T. @ 1.5A	8V @ 3A	24
PC 20-45	DPC 20-45	20V C.T. @ 45MA	10V @ 90MA	1.0
PC 20-60	DPC 20-60	20V C.T. @ 60MA	10V @ 120MA	1.2
PC 20-220	DPC 20-220	20V C.T. @ 220MA	10V @ 440MA	4.4
PC 20-500	DPC 20-500	20V C.T. @ 500MA	10V @ 1A	10
PC 20-1200	DPC 20-1200	20V C.T. @ 1.2A	10V @ 2.4A	24
PC 24-35	DPC 24-35	24V C.T. @ 35MA	12V @ 70MA	1.0
PC 24-50	DPC 24-50	24V C.T. @ 50MA	12V @ 100MA	1.2
PC 24-180	DPC 24-180	24V C.T. @ 180MA	12V @ 360MA	4.4
PC 24-450	DPC 24-450	24V C.T. @ 450MA	12V @ 900MA	10
PC 24-1000	DPC 24-1000	24V C.T. @ 1A	12V @ 2A	24
PC 34-25	DPC 34-25	34V C.T. @ 25MA	17V @ 50MA	1.0
PC 34-35	DPC 34-35	34V C.T. @ 35MA	17V @ 70MA	1.2
PC 34-125	DPC 34-125	34V C.T. @ 125MA	17V @ 250MA	4.4
PC 34-300	DPC 34-300	34V C.T. @ 300MA	17V @ 600MA	10
PC 34-700	DPC 34-700	34V C.T. @ 700MA	17V @ 1.4A	24
PC 40-20	DPC 40-20	40V C.T. @ 20MA	20V @ 40MA	1.0
PC 40-30	DPC 40-30	40V C.T. @ 30MA	20V @ 60MA	1.2
PC 40-110	DPC 40-110	40V C.T. @ 110MA	20V @ 220MA	4.4
PC 40-250	DPC 40-250	40V C.T. @ 250MA	20V @ 500MA	10
PC 40-600	DPC 40-600	40V C.T. @ 600MA	20V @ 1.2A	24
PC 56-15	DPC 56-15	56V C.T. @ 15MA	28V @ 30MA	1.0
PC 56-20	DPC 56-20	56V C.T. @ 20MA	28V @ 40MA	1.2
PC 56-80	DPC 56-80	56V C.T. @ 80MA	28V @ 160MA	4.4
PC 56-180	DPC 56-180	56V C.T. @ 180MA	28V @ 360MA	10
PC 56-420	DPC 56-420	56V C.T. @ 420MA	28V @ 840MA	24
PC 88-10	DPC 88-10	88V C.T. @ 10MA	44V @ 20MA	1.0
PC 88-15	DPC 88-15	88V C.T. @ 15MA	44V @ 30MA	1.2
PC 88-50	DPC 88-50	88V C.T. @ 50MA	44V @ 100MA	4.4
PC 88-120	DPC 88-120	88V C.T. @ 120MA	44V @ 240MA	10
PC 88-270	DPC 88-270	88V C.T. @ 270MA	44V @ 540MA	24
PC 120-8	DPC-120-8	120V C.T. @ 8MA	60V @ 16MA	1.0
PC 120-10	DPC 120-10	120V C.T. @ 10MA	60V @ 20MA	1.2
PC 120-35	DPC 120-35	120V C.T. @ 35MA	60V @ 70MA	4.4
PC 120-85	DPC 120-85	120V C.T. @ 85MA	60V @ 170MA	10
PC 120-200	DPC 120-200	120V C.T. @ 200MA	60V @ 400MA	24

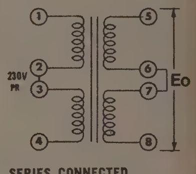
*See Table on opposite page for method of determining RMS Secondary Current.



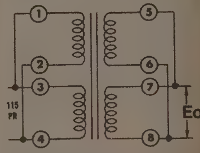
DUAL 115/230V PRIMARY
TYPE DPC-8 PINS



BASIC SCHEMATIC



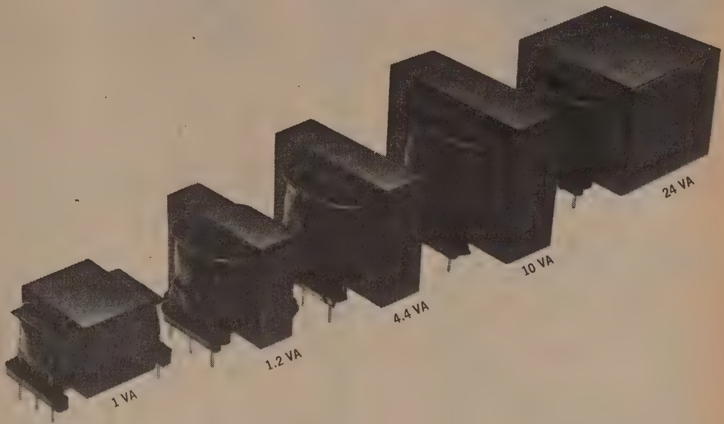
SERIES CONNECTED



PARALLEL CONNECTED

SIGNAL TRANSFORMER CO., INC. / 1 JUNIUS STREET / BROOKLYN, NEW YORK 11212 / (212) 498-5111 / TELEX 12-5709

for printed circuit applications



Signal has the most complete and diversified selection of miniature plug-in power transformers. All items are stocked in depth for immediate off-the-shelf delivery.

Primary ratings of 115V (Style PC - 6 Pin) or Dual 115/230V (Style DPC - 8 Pin) are standard for the entire line.

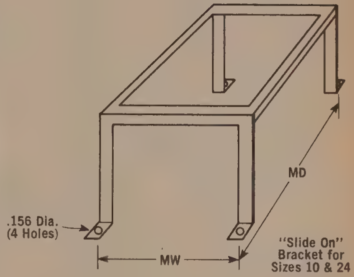
Size 1.0 is used extensively where height is a limiting factor since its height of 0.83 inches allows 1 inch spacing of PC boards. Size 24 is unusual since 24 watt PC transformers are not readily available, especially with a height of 1⅜ inches.

The RMS current ratings are based on a load regulation of 15-20% and **not** on temperature rise (except for the largest item, size 24). Therefore, these ratings may be exceeded without overheating, if the additional drop in full load voltage is acceptable. There is, of course, a limit and it would be best to check with our engineering department on specific units.

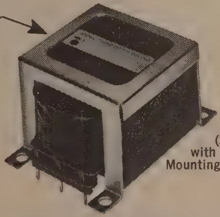
DIMENSIONS

SIZE (VA)	L	W	H	A-6 (6 Pin)	A-8 (8 Pin)	B	WT. (oz.)	OPTIONAL BRACKET* No.	MW	MD
1.0	1	1⅜	0.83	0.250	0.200	1.200	2.5	—	—	—
1.2	1⅜	1⅛	1³⁄₁₆	0.312	0.200	1.000	3	—	—	—
4.4	1⅝	1¼	1⅜	0.400	0.250	1.100	5	—	—	—
10	1⅞	1⁷⁄₁₆	1⅝	0.400	0.250	1.300	9	10-BR	1⁴¹⁄₆₄	1⅛
24	1⅝	2¼	1⅜	0.400	0.250	2.100	12	24-BR	1⅜	2

*An optional "Slide On" Mounting Bracket is available for sizes 10 and 24. The brackets do not use up any extra "Floor Space" but add ¹⁄₃₂" to the height of the transformer.



"Slide On" Bracket for Sizes 10 & 24



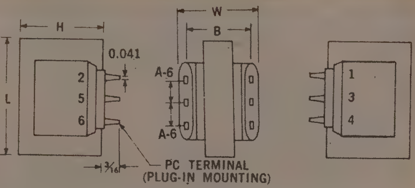
Size 24 (24VA) Unit with 24-BR Slide-on Mounting Bracket.

METHOD OF DETERMINING SECONDARY CURRENT RATINGS

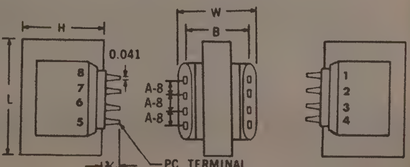
Rectifier Type	Filter Type	RMS Secondary Current
Full Wave Center-Tap	Choke Input	.7 x DC Amps
Full Wave Center-Tap	Capacitor Input	1.2 x DC Amps
Full Wave Bridge	Choke Input	= to DC Amps
Full Wave Bridge	Capacitor Input	1.8 x DC Amps

CUSTOM VARIATIONS

Signal has the facilities to provide rapid quotations and delivery of prototypes of your special PC transformer needs. Large quantity runs can be scheduled with reasonable lead times. Please submit your requirements and be assured of our prompt response.



TYPE PC 6 PINS



TYPE DPC 8 PINS

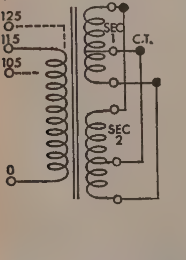
SIGNAL TRANSFORMER CO., INC. / 1 JUNIUS STREET / BROOKLYN, NEW YORK 11212 / (212) 498-5111 / TELEX 12-5709

SHIPPED FROM STOCK IMMEDIATELY

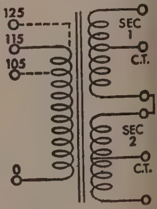
rectifier power transformers

IDEAL FOR USE IN SINGLE OR DUAL DC POWER SUPPLIES

SECONDARY VOLTS	Part No.	Primary Volts 50-500 CPS	RMS Secondary Amps		Mtg. Style	L	W	H	ML	MW	Mtg. Screw	Appr. Lbs.
			Series	Parallel								
10 or 5 V C.T. Series 0 - 2.5 - 5 - 7.5 - 10 V Parallel 0 - 2.5 - 5 V @ 2 x Current	10-0.1	115	0.1	0.2	C	2	1½	1¾	1²³⁄₃₂	—	#8	0.3
	10-0.25	115	0.25	0.5	C	2⅜	1½	2	2	—	#8	0.5
	10-0.5	115	0.5	1.0	C	2⅜	1¾	2	2	—	#8	0.8
	10-1	115	1	2	C	2⅞	1¾	2⁵⁄₁₆	2⅜	—	#8	1.0
	10-2	115	2	4	C	3⅛	2⅛	2¾	2¹³⁄₁₆	—	#8	1.5
	10-4	115	4	8	C	3⁹⁄₁₆	2⅜	3¹⁄₁₆	3⅛	—	#8	2.3
	10-6	115	6	12	B	3⅜	2¾	2¹³⁄₁₆	2¹³⁄₁₆	2⅛	#8	3.3
	10-8	115	8	16	B	3⅜	3⅛	2¹³⁄₁₆	2¹³⁄₁₆	2½	#8	4.0
	10-12	115	12	24	B	3¾	3¼	3⅛	3⅛	2½	#8	5.0
	10-25	115	25	50	B	4½	3¾	3¾	3¾	2¾	#10	8.7
	10-50	105, 115, 125	50	100	B	5¼	5½	4⅜	4⅜	3⅝	¼	17.0
	10-100	105, 115, 125	100	200	B	6⅜	7¼	5⁵⁄₁₆	5⁵⁄₁₆	4⅜	¼	34.5
12.8 or 6.4 C.T. Series 0 - 3.2 - 6.4 - 9.6 - 12.8 V Parallel 0 - 3.2 - 6.4 V @ 2 x Current	12.8-0.1	115	0.1	0.2	C	2	1½	1¾	1²³⁄₃₂	—	#8	0.3
	12.8-0.25	115	0.25	0.5	C	2⅜	1½	2	2	—	#8	0.5
	12.8-0.5	115	0.5	1	C	2⅞	1⅝	2⁵⁄₁₆	2⅜	—	#8	0.8
	12.8-1	115	1	2	C	2⅞	2	2⁵⁄₁₆	2⅜	—	#8	1.2
	12.8-2A	115	2	4	C	3⅛	2⅛	2¾	2¹³⁄₁₆	—	#8	1.5
	12.8-2	115	2	4	B	3	2½	2½	2½	2	#8	2.3
	12.8-4	115	4	8	B	3	2⅞	2½	2½	2⅜	#8	2.8
	12.8-6	115	6	12	B	3⅜	3¹⁄₁₆	2¹³⁄₁₆	2¹³⁄₁₆	2½	#8	4.0
	12.8-8	115	8	16	B	3¾	3⅛	3⅛	3⅛	2¼	#8	4.5
	12.8-12	115	12	24	B	4⅛	3¼	3⁷⁄₁₆	3⁷⁄₁₆	2⅜	#10	6.0
	12.8-25	115	25	50	B	5¼	4¼	4⅜	4⅜	2⅞	#10	12.5
	12.8-50	105, 115, 125	50	100	B	5¼	6	4⅜	4⅜	3⅛	¼	20.7
	12.8-100	105, 115, 125	100	200	B	6⅜	7¼	5⁵⁄₁₆	5⁵⁄₁₆	4⅜	¼	34.5
16 or 8 V C.T. Series 0 - 4 - 8 - 12 - 16 V Parallel 0 - 4 - 8 @ 2 x Current	16-0.1	115	0.1	0.2	C	2	1⅝	1¾	1²³⁄₃₂	—	#8	0.4
	16-0.25	115	0.25	0.5	C	2⅜	1¾	2	2	—	#8	0.7
	16-0.5	115	0.5	1	C	2⅞	1⅝	2⁵⁄₁₆	2⅜	—	#8	0.8
	16-1	115	1	2	C	2⅞	2	2⁵⁄₁₆	2⅜	—	#8	1.2
	16-2	115	2	4	C	3⅛	2¼	2¾	2¹³⁄₁₆	—	#8	1.7
	16-4	115	4	8	B	3⅜	2¾	2¹³⁄₁₆	2¹³⁄₁₆	2⅛	#8	3.3
	16-6	115	6	12	B	3¾	3⅛	3⅛	3⅛	2¼	#10	4.5
	16-8	115	8	16	B	3¾	3½	3⅛	3⅛	2⅝	#10	5.4
	16-12	115	12	24	B	4⅛	3⅞	3⅝	3⁷⁄₁₆	3	#10	7.9
	16-25	115	25	50	B	4½	5⅜	4	3¾	4	#10	14.5
	16-50	105, 115, 125	50	100	B	6⅜	5¾	5⁵⁄₁₆	5⁵⁄₁₆	3¾	¼	26.5
	16-100	105, 115, 125	100	200	B	7½	7½	6⅜	6¾	4⅝	¼	50.0
24 or 12 C.T. Series 0 - 6 - 12 - 18 - 24 V Parallel 0 - 6 - 12 V @ 2 x Current	24-0.1	115	0.1	0.2	C	2⅜	1½	2	2	—	#8	0.5
	24-0.25	115	0.25	0.5	C	2⅞	1¾	2⁵⁄₁₆	2⅜	—	#8	1.0
	24-0.5	115	0.5	1	C	2⅞	2	2⁵⁄₁₆	2⅜	—	#8	1.2
	24-1A	115	1	2	C	3⅛	2⅛	2¾	2¹³⁄₁₆	—	#8	1.5
	24-1	115	1	2	B	3	2½	2½	2½	2	#8	2.3
	24-2	115	2	4	B	3	2⅞	2½	2½	2⅜	#8	2.9
	24-4	115	4	8	B	3¾	3⅛	3⅛	3⅛	2¼	#8	4.5
	24-6	115	6	12	B	4⅛	3¼	3⁷⁄₁₆	3⁷⁄₁₆	2⅜	#10	5.8
	24-8	115	8	16	B	4⅛	3⅞	3⅝	3⁷⁄₁₆	3	#10	7.9
	24-12	105, 115, 125	12	24	B	4½	4½	3¾	3¾	3⅜	#10	11.0
	24-20	105, 115, 125	20	40	B	5¼	4¾	4⅜	4⅜	3⅜	¼	15.3
	24-25	105, 115, 125	25	50	B	5¼	5⅝	4⅜	4⅜	4⅛	¼	19.5
	24-50	105, 115, 125	50	100	B	6⅜	6¼	5⁵⁄₁₆	5⁵⁄₁₆	4⅜	¼	31.3
	24-100	115/230	100	200	B	7½	7	6⅜	6¾	4⅛	¼	43
36 or 18 V C.T. Series 0 - 9 - 18 - 27 - 36 V Parallel 0 - 9 - 18 V @ 2 x Current	36-0.1	115	0.1	0.2	C	2⅜	1⅝	2	2	—	#8	0.5
	36-0.25	115	0.25	0.5	C	2⅞	1⅝	2⁵⁄₁₆	2⅜	—	#8	0.8
	36-0.5	115	0.5	1	C	3⅛	2	2¾	2¹³⁄₁₆	—	#8	1.3
	36-1A	115	1	2	C	3⁹⁄₁₆	2⅜	3¹⁄₁₆	3⅛	—	#8	2.3
	36-1	115	1	2	B	3	2¾	2½	2½	2¼	#8	2.6
	36-2	115	2	4	B	3⅜	2¹⁵⁄₁₆	2¹³⁄₁₆	2¹³⁄₁₆	2⅜	#8	3.8
	36-4	115	4	8	B	4⅛	3⅜	3⁷⁄₁₆	3⁷⁄₁₆	2⅝	#10	6.8
	36-6	115	6	12	B	4½	3¾	3¾	3¾	2¾	#10	8.7
	36-8	105, 115, 125	8	16	B	4½	4½	4⅛	3¾	3⅜	#10	11.0
	36-12	105, 115, 125	12	24	B	5¼	5	4⅜	4⅜	3⅜	¼	15.0
	36-20	105, 115, 125	20	40	B	6⅜	5⅜	5⁵⁄₁₆	5⁵⁄₁₆	3⅜	¼	22.8
	36-25	105, 115, 125	25	50	B	6⅜	5¾	5⁵⁄₁₆	5⁵⁄₁₆	3¾	¼	26.5
	36-30	105, 115, 125	30	60	B	6⅜	6	5⁵⁄₁₆	5⁵⁄₁₆	4⅜	¼	31.5
	36-50	115/230	50	100	B	6⅜	7¼	5⁵⁄₁₆	5⁵⁄₁₆	5⅛	¼	40.0
	36-100	115/230	100	200	B	7½	9	6¼	6¾	5⁷⁄₁₆	¼	63.5
56 or 28 V C.T. Series 0 - 14 - 28 - 42 - 56 V Parallel 0 - 14 - 28 V @ 2 x Current	56-0.1	115	0.1	0.2	C	2⅜	1¾	2	2	—	#8	.8
	56-0.25	115	0.25	0.5	C	2⅞	2	2⁵⁄₁₆	2⅜	—	#8	1.2
	56-0.5	115	0.5	1	C	3⅛	2¼	2¾	2¹³⁄₁₆	—	#8	1.7
	56-1	115	1	2	B	3⅜	2⅞	2¹³⁄₁₆	2¹³⁄₁₆	2¼	#8	3.5
	56-2	115	2	4	B	3¾	3¼	3⅛	3⅛	2½	#8	5.0
	56-4	115	4	8	B	4⅛	3¾	3⁷⁄₁₆	3⁷⁄₁₆	3	#10	7.7
	56-6	115	6	12	B	5¼	4¼	4⅜	4⅜	2⅞	#10	12.0
	56-8	105, 115, 125	8	16	B	5¼	5	4⅜	4⅜	3⅝	¼	17.0
	56-12	105, 115, 125	12	24	B	6⅜	5¼	5⁵⁄₁₆	5⁵⁄₁₆	3⅜	¼	22.0
	56-25	105, 115, 125	25	50	B	6⅜	7⅛	5⁵⁄₁₆	5⁵⁄₁₆	5⅛	¼	38.0
	56-50	115/230	50	100	B	7½	7½	6¼	6¾	4⅞	¼	56.3
	56-100	115/230	100	200	B	7½	11¼	6¼	6¾	8¼	¼	95.0



PARALLEL CONNECTED SECONDARIES



SERIES CONNECTED SECONDARIES

All transformers are designed conservatively for a max of 45°C rise above ambient, for use on 115V power line from 50-500 cps. Only prime raw materials are used. Units are thoroughly impregnated and baked with Signal's own high gloss black baking varnish. The transformers and chokes are rugged in construction, well-insulated, and have a consistently uniform appearance. All ratings are at full load current continuous operation.

Electrical ratings have been chosen to cover a wide range of applications. All transformers have two center-tapped secondary windings.

SIGNAL TRANSFORMER CO., INC. / 1 JUNIUS STREET / BROOKLYN, NEW YORK 11212 / (212) 498-5111 / TELEX 12-5709

rectifier power transformers

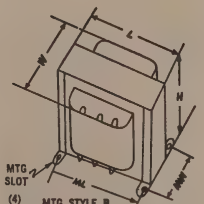
IDEAL FOR USE IN SINGLE OR DUAL DC POWER SUPPLIES

0.1 TO 200 AMPS
2.5 TO 300 VOLTS

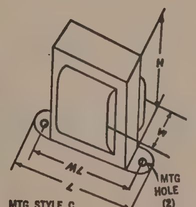
SECONDARY VOLTS	Part No.	Primary Volts 50-500 CPS	RMS Secondary Amps Series	RMS Secondary Amps Parallel	Mtg. Style	L	W	H	ML	MW	Mtg. Screw	Appr. Lbs.
68 or 34 C.T. Series 0 - 17 - 34 - 51 - 68 V Parallel 0 - 17 - 34 V @ 2 x Current	68-0.1	115	0.1	0.2	C	2⅞	1⅝	2 5/16	2⅜	—	#8	0.8
	68-0.25	115	0.25	0.5	C	2⅞	2	2 5/16	2⅜	—	#8	1.2
	68-0.5A	115	0.5	1	C	3⅛	2¼	2¾	2 13/16	—	#8	1.7
	68-0.5	115	0.5	1	B	3	2¾	2½	2½	2¼	#8	2.7
	68-1	115	1	2	B	3⅜	2 15/16	2 13/16	2 13/16	2⅜	#8	3.8
	68-2	115	2	4	B	4⅛	3⅜	3 7/16	3 7/16	2⅝	#10	6.8
	68-4	115	4	8	B	4½	4½	4⅛	3¾	3⅜	#10	11.5
	68-6	105, 115, 125	6	12	B	5¼	5	4⅜	4⅜	3⅜	¼	15.0
	68-8	105, 115, 125	8	16	B	5¼	5½	4⅜	4⅜	3⅞	¼	19.0
	68-12	105, 115, 125	12	24	B	6⅜	5¾	5 5/16	5 5/16	3¾	¼	26.5
	68-25	115/230	25	50	B	6⅜	7¼	5 5/16	5 5/16	5⅛	¼	39.7
	68-50	115/230	50	100	B	7½	9	6¼	6¾	5 7/16	¼	58.5
80 or 40 C.T. Series 0 - 20 - 40 - 60 - 80 V Parallel 0 - 20 - 40 V @ 2 x Current	80-0.1	115	0.1	0.2	C	2⅞	1⅝	2 5/16	2⅜	—	#8	0.8
	80-0.25	115	0.25	0.5	C	3⅛	2	2¾	2 13/16	—	#8	1.3
	80-0.5A	115	0.5	1	C	3 9/16	2⅜	3 1/16	3⅛	—	#8	2.2
	80-0.5	115	0.5	1	B	3	2¾	2½	2½	2¼	#8	2.8
	80-1	115	1	2	B	3⅜	3 1/16	2 13/16	2 13/16	2½	#8	4.0
	80-2	115	2	4	B	4⅛	3⅜	3 7/16	3 7/16	2⅝	#10	6.8
	80-4	115	4	8	B	5¼	4¼	4⅜	4⅜	2⅞	¼	12.3
	80-6	105, 115, 125	6	12	B	5¼	5½	4¾	4⅜	3⅞	¼	19.0
	80-8	105, 115, 125	8	16	B	6⅜	5¼	5 5/16	5 5/16	3¼	¼	20.5
	80-12	105, 115, 125	12	24	B	6⅜	6	5 5/16	5 5/16	4⅛	¼	29.0
	80-25	115/230	25	50	B	7½	6½	6¼	6¾	3⅞	¼	40.3
	80-50	115/230	50	100	B	7½	9	6¼	6¾	6½	¼	78.0
88 or 44 C.T. Series 0 - 22 - 44 - 66 - 88 V Parallel 0 - 22 - 44 V @ 2 x Current	88-0.1	115	0.1	0.2	C	2⅞	1¾	2 5/16	2⅜	—	#8	1.0
	88-0.25	115	0.25	0.5	C	3⅛	2⅛	2¾	2 13/16	—	#8	1.5
	88-0.5	115	0.5	1	B	3 9/16	2⅜	3 1/16	3⅛	—	#8	2.2
	88-1	115	1	2	B	3¾	3	3⅛	3⅛	2¼	#8	4.5
	88-2	115	2	4	B	4⅛	3⅜	3 7/16	3 7/16	2⅝	#10	6.8
	88-4	115	4	8	B	5¼	4½	4⅜	4⅜	3⅛	¼	13.4
	88-6	105, 115, 125	6	12	B	5¼	5½	4¾	4⅜	3⅞	¼	19.0
	88-8	105, 115, 125	8	16	B	6⅜	5⅜	5 5/16	5 5/16	3⅜	¼	22.8
	88-12	105, 115, 125	12	24	B	6⅜	6½	5 5/16	5 5/16	4⅝	¼	35.0
	88-25	115/230	25	50	B	7½	8	6¼	6¾	5⅝	¼	62.0
	88-50	115/230	50	100	B	7½	11	6¼	6¾	8⅝	¼	100.0
120 or 60 C.T. Series 0 - 30 - 60 - 90 - 120 V Parallel 0 - 30 - 60 V @ 2 x Current	120-0.5	115	0.5	1.0	B	3⅜	2⅞	2 13/16	2 13/16	2¼	#8	3.2
	120-1	115	1	2	B	3¾	3⅜	3⅛	3⅛	2¾	#8	5.8
	120-2	115	2	4	B	4½	3¾	3¾	3¾	2¾	#10	8.5
	120-4	115	4	8	B	5¼	5½	4⅜	4⅜	3⅞	¼	17.0
	120-6	105, 115, 125	6	12	B	6⅜	6	5 5/16	5 5/16	3⅞	¼	27.0
	120-8	105, 115, 125	8	16	B	6⅜	6½	5 5/16	5 5/16	4⅝	¼	34.0
	120-12	105, 115, 125	12	24	B	6⅜	7¼	5 5/16	5 5/16	5⅜	¼	42.0
	120-20	105, 115, 125	20	40	B	7½	8	6¼	6¾	5⅜	¼	57.0
160 or 80 C.T. Series 0 - 40 - 80 - 120 - 160 V Parallel 0 - 40 - 80 V @ 2 x Current	160-0.5	115	0.5	1	B	3⅜	3 1/16	2 13/16	2 13/16	2½	#8	4.0
	160-1	115	1	2	B	4⅛	3⅝	3 7/16	3 7/16	2⅝	#10	6.5
	160-2	115	2	4	B	4½	4⅜	3¾	3¾	3⅜	#10	11.0
	160-4	105, 115, 125	4	8	B	6⅜	5¼	5 5/16	5 5/16	3¼	¼	21.0
	160-8	105, 115, 125	8	16	B	6⅜	6¾	5 5/16	5 5/16	4⅞	¼	36.0
	160-12	115/230	12	24	B	7½	6½	6¼	6¾	3⅞	¼	39.8
180 or 90 C.T. Series 0 - 45 - 90 - 135 - 180 V Parallel 0 - 45 - 90 @ 2 x Current	180-0.5	115	0.5	1	B	3¾	3⅜	3⅛	3⅛	2¾	#8	5.8
	180-1	115	1	2	B	4⅛	3⅞	3⅝	3 7/16	3	#10	8.2
	180-2	115	2	4	B	5¼	5	4⅜	4⅜	3⅝	¼	15.8
	180-4	115	4	8	B	6⅜	5¾	5 5/16	5 5/16	3¾	¼	27.0
	180-6	105, 115, 125	6	12	B	6⅜	7¼	5 5/16	5 5/16	5⅛	¼	37.0
	180-8	105, 115, 125	8	16	B	6⅜	7¾	5 5/16	5 5/16	5⅝	¼	42.0
	180-12	105, 115, 125	12	24	B	7½	8¼	6¼	6¾	5⅝	¼	62.0
230 or 115 C.T. Series 0-57½-115-172½-230 V Parallel 57½ - 115 V @ 2 x Current	230-0.5	115	0.5	1	B	3¾	3⅝	3⅛	3⅛	3	#8	6.5
	230-1	115	1	2	B	4½	3¾	3¾	3¾	3	#10	9.4
	230-2	115	2	4	B	5¼	4¾	4⅜	4⅜	3⅜	¼	14.5
	230-4	105, 115, 125	4	8	B	6⅜	6	5 5/16	5 5/16	4⅛	¼	28.4
	230-6	105, 115, 125	6	12	B	6⅜	7¼	5 5/16	5 5/16	5⅛	¼	38.0
300 or 150 C.T. Series 0-75-150-225-300V Parallel 0 - 75 - 150 V @ 2 x Current	300-0.5	115	0.5	1	B	4½	3½	3¾	3¾	2½	#10	7.0
	300-1	115	1	2	B	5¼	4⅛	4⅜	4⅜	3	¼	12.8
	300-2	115	2	4	B	5¼	5¾	4⅜	4⅜	4½	¼	21.0
	300-4	105, 115, 125	4	8	B	6⅜	5¾	5 5/16	5 5/16	3⅞	¼	27.5

METHOD OF DETERMINING SECONDARY CURRENT RATINGS

RECTIFIER TYPE	FILTER TYPE	RMS SECONDARY CURRENT
Full Wave Center-Tap	Choke Input	.7 × DC Amps
Full Wave Center-Tap	Capacitor Input	1.2 × DC Amps
Full Wave Bridge	Choke Input	= to DC Amps
Full Wave Bridge	Capacitor Input	1.8 × DC Amps



MTG STYLE B



MTG STYLE C

filter chokes 0.5 to 1000 amps

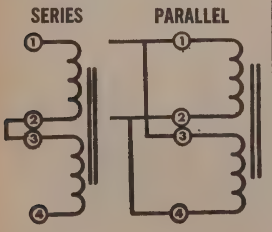
Signal's line of filter chokes is the most extensive available. It is designed to complement the selection of Rectifier Power Transformers so that a set may be specified for power supplies using inductive filters.

The inductance ratings given are minimum values guaranteed at full DC current. All resistance ratings are maximum values. Special variations or intermediate values of inductance, current, or resistance can be supplied promptly and accurately.

FOR MECHANICAL DIMENSIONS REFER TO TRANSFORMER OUTLINES ON PREVIOUS PAGE

PART No.	IND. (MHY)	CURR. (Amps)	RES. (Ohms)	MTG. STYLE	L	W	H	ML	MW	MTG. SCREW	APPR. LBS.
CH-0.5	400	0.5	4.0	C	3⅛	2⅛	2¾	2¹³⁄₁₆	—	#8	1.5
CH-1	100	1	1.5	B	3	2½	2½	2½	2	#8	2.3
CH-2	70	2	0.9	B	3⅜	2¾	2⅞	2¹³⁄₁₆	2⅛	#8	3.2
CH-4	70	4	0.6	B	3¾	3⅛	3¼	3⅛	2½	#8	5.3
CH-6	40	6	0.4	B	3¾	3⅝	3¼	3⅛	3	#8	6.5
CH-8	30	8	0.3	B	4⅛	3⅝	3½	3⁷⁄₁₆	3	#10	8
CH-12	15	12	0.1	B	5¼	4	4⁷⁄₁₆	4⅜	3⅛	#10	13.7
CH-16	15	16	.08	B	5¼	4⅝	4⁷⁄₁₆	4⅜	3⅝	#10	17.5
CH-20	7	20	.05	B	5¼	4	4⁷⁄₁₆	4⅜	3⅛	#10	13.3
CH-25	5	25	.025	B	5¼	4¾	4⁷⁄₁₆	4⅜	3⅞	#10	17.8
CH-30	4	30	.01	B	6⅜	5	5⅜	5⁵⁄₁₆	3⅜	¼	24.4
CH-50	1.4	50	0.01	B	6⅜	5¼	5⅜	5⁵⁄₁₆	3¾	¼	26.7
CH-100	0.5	100	0.005	B	6⅜	6¼	5⅜	5⁵⁄₁₆	4⅛	¼	31.4
CH-200	0.3	200	0.001	B	7½	7	6½	6¾	4⅛	¼	48.0
CH-250	0.3	250	0.00115	B	7½	8	6½	6¾	5⅛	¼	56.0
CH-500	0.055	500	0.00027	B	7½	6½	6½	6¾	4⅛	¼	50.0
CH-1000	0.015	1,000	0.000065	B	7½	6½	6½	6¾	4⅜	¼	70.0

dual chokes for lower inductance applications

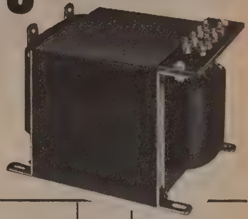


Part No.	Series Connected Ind. (MHY)	Series Connected Curr. (Amps)	Series Connected Res. (Ohms)	Parallel Connected Ind. (MHY)	Parallel Connected Curr. (Amps)	Parallel Connected Res. (Ohms)	Mtg. Style	Dimensions L	Dimensions W	Dimensions H	Dimensions ML	Dimensions MW	Mtg. Screw	Appr. Lbs.
CL-1-2	72	1	1.4	18	2	0.35	C	2⅞	1¾	2⁵⁄₁₆	2⅜	—	#8	0.9
CL-2-4	40	2	0.7	10	4	0.18	C	3⅛	2⅛	2¾	2¹³⁄₁₆	—	#8	1.5
CL-4-8	20	4	0.3	5	8	0.075	B	3	2⅞	2½	2½	2¼	#8	3.0
CL-6-12	12	6	0.15	3	12	0.038	B	3⅜	3¹⁄₁₆	2¹³⁄₁₆	2¹³⁄₁₆	2½	#8	4.0
CL-12-24	4.8	12	0.052	1.2	24	0.013	B	3⅜	3⁵⁄₁₆	2¹³⁄₁₆	2¹³⁄₁₆	3	#8	5.3
CL-25-50	1.2	25	0.012	0.3	50	0.003	B	3¾	3⅜	3⅜	3⅛	2¾	#8	6.0
CL-50-100	0.5	50	0.0043	0.12	100	0.0011	B	4½	3¾	3¾	3¾	2½	#8	8.0

Signal's Dual Chokes are supplied with 2 windings which may be series or parallel connected with rating shown on chart. This line is basically designed for applications requiring lower inductance values at high currents, such as low voltage, DC supplies or SCR filters. Ideal for use to reduce ripple in our ferro-resonant (CDC) line.

very high current transformers and chokes

250 to 1400 amperes

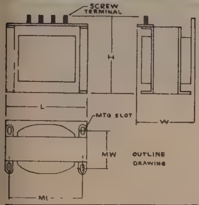


TRANSFORMERS

Part No.	Secondary Volts	Secondary Amps. Nominal (45°C rise)	Secondary Amps. Max. (100°C rise)	Dimensions L	W	H	ML	MW	Mtg. Screw	Appr. Lbs.
6-250	6	250	350	7½	5	7¼	6¾	3 9/16	¼	32
9-250	9	250	350	7½	5¾	7¼	6¾	4 5/16	¼	40
12-250	12	250	350	7½	6¼	7¼	6¾	4 13/16	¼	48
6-500	6	500	700	7½	6	7¼	6¾	4 9/16	¼	40
9-500	9	500	700	7½	8½	7¼	6¾	6 1/16	¼	60
12-500	12	500	700	7½	9	7¼	6¾	7 9/16	¼	80
3-1000	3	1000	1400	7½	6	7¼	6¾	4 9/16	¼	40
6-1000	6	1000	1400	7½	9	7¼	6¾	7 9/16	¼	80

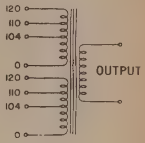
CHOKES

Part No.	Inductance (Milli-hy)	Current (Amperes)	Resis. (Ohms)	L	W	H	ML	MW	Mtg. Screw	Appr. Lbs.
CH-250	.3	250	.00115	7½	8	6¼	6¾	5⅛	¼	56
CH-500	.055	500	.00027	7½	6½	6¼	6¾	4⅛	¼	50
CH-1000	.015	1000	.000065	7½	7½	6¼	6¾	5⅛	¼	70

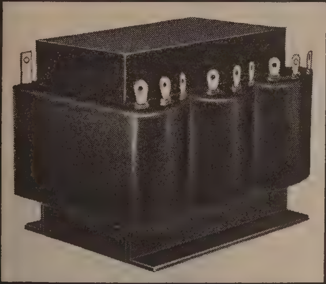


As shown on the schematic diagram dual primaries are provided. This permits parallel connection for 104, 110, or 120 volts or series connection for 208, 214, 220, 230, and 240 volts. Frequency range is 50 to 500 cps.

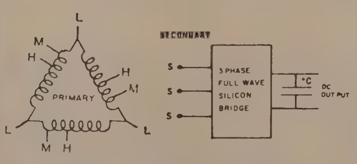
It is important to note that primary taps may be used to adjust the secondary voltages. Line voltages up to 125V (parallel) or 250V (series) may be used on the lowest primary tap. Nickel plated screw terminals are provided on a heavy phenolic board for easy primary connections



3 phase HIGH CURRENT RECTIFIER TRANSFORMERS

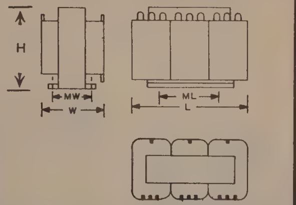


SCHEMATIC DIAGRAM



*C — Optional, no capacitor will give DC output shown at approx. 5% ripple.

MECHANICAL DIMENSIONS



DC OUTPUT VOLTAGE

PART NO.	PRI TAP "L" SUPPLY VOLTAGE 208	PRI TAP "L" SUPPLY VOLTAGE 220	PRI TAP "M" SUPPLY VOLTAGE 208	PRI TAP "M" SUPPLY VOLTAGE 220	PRI TAP "H" SUPPLY VOLTAGE 208	PRI TAP "H" SUPPLY VOLTAGE 220	DC RATED AMPS	APPROX. DIMENSIONS L	W	H	ML	MW	APX. LBS.
3PH 24-50	24	25	26	27.5	28	30	50	7¾	6	5½	4.8	4⅞	35
3PH 24-100	24	25	26	27.5	28	30	100	11½	5	8¼	7.2	4	62
3PH 24-200	24	25	26	27.5	28	30	200	11½	8⅝	8¼	7.2	6¼	90
3PH 48-30	42	44	47	50	52	55	30	7¾	6	5½	4.8	4⅞	35
3PH 48-60	42	44	47	50	52	55	60	11½	5	8¼	7.2	4	62
3PH 48-120	42	44	47	50	52	55	120	11½	8⅝	8¼	7.2	6¼	90

At higher power loads (above 2-3 KVA) it becomes inefficient to use single phase 115 or 230 volt standard lines. With this in mind, our engineering staff has developed a line of 3 phase transformers for use off 208 or 220V 3 phase power lines. These offer the significantly higher conversion efficiency and lighter power line drain of 3 phase systems.

Since the principal application of these items is in high power dc power supplies, output ratings are given in dc voltage and current assuming the use of a 3 phase full wave rectifier.

step down auto transformers 50/60 cycle

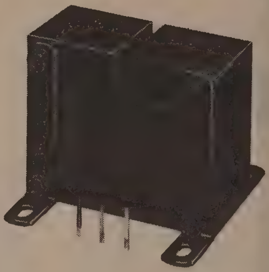
ENCLOSED
STYLE "EB"

100-2000 VA — 230/115V

VA	Cat. No.	Width	Depth	Height	Mtg. Centers	Lbs.
120	112	2⅞	2⅞	3½	2¼ x 1¾	2.5
150	115	2⅞	3⅛	3½	2¼ x 2	3.2
200	120	2⅞	3¼	3½	2¼ x 2⅛	3.5
250	125	2⅞	3⅝	3½	2¼ x 2½	4.2
300	130	3¼	3⅝	3⅞	2½ x 2 7/16	5
500	150	3¼	4⅝	3⅞	2½ x 3 7/16	8
750	175	3¼	5⅝	3⅞	2½ x 4 7/16	11
1000	1100	4½	5	5⅜	3½ x 3½	13
1500	1150	4½	6	5⅜	3½ x 4½	20
2000	1200	4½	7	5⅜	3½ x 5½	25

UL APPROVED 2 PRONG LINE CORD
RECEPTACLE LOW REGULATION.
BLACK ENAMEL FINISH.

VA	Cat. No.	Width	Depth	Height	Mtg. Centers	Lbs.
120	112-OF	3⅜	2⅜	2⅞	2 13/16 x 1⅞	2.5
150	115-OF	3⅜	2⅝	2⅞	2 13/16 x 2⅛	3.2
200	120-OF	3⅜	2¾	2⅞	2 13/16 x 2¼	3.5
250	125-OF	3⅜	3⅛	2⅞	2 13/16 x 2⅝	4.2
300	130-OF	3¾	3¼	3⅛	3⅛ x 2½	5
500	150-OF	3¾	4¼	3⅛	3⅛ x 3½	8
750	175-OF	3¾	5¼	3⅛	3⅛ x 4½	11
1000	1100-OF	5¼	4½	4⅜	4⅜ x 3⅛	13
1500	1150-OF	5¼	5½	4⅜	4⅜ x 4⅛	20
2000	1200-OF	5¼	6½	4⅜	4⅜ x 5⅛	25

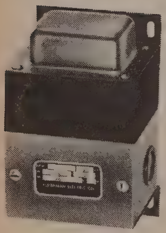


OPEN FRAME
STYLE "OF"
(May be used step-up
or step-down)

BLACK ENAMEL FINISH.
8" LEADS
INEXPENSIVE VERSION
FOR USE IN EQUIPMENT.

heavy duty-3 to 6 kva

230/115V OR 115/230V
MAY BE USED STEP-UP OR STEP-DOWN



STYLE "JB"

"JB." VERY LOW REGULATION. BLACK ENAMEL ENCLOSURES PANEL MOUNTED. KNOCKOUTS ON ALL SIDES OF JUNCTION BOX.

KVA	Cat. No.	Width	Depth	Height	Mtg. Centers	Lbs.
3	1300	9⅛	9	6½	8⅛ x 4¼	35
4	1400	9⅛	9½	6½	8⅛ x 4¾	41
5	1500	9⅛	10	6½	8⅛ x 5¼	47
6	1600	9⅛	11¼	6½	8⅛ x 6½	60

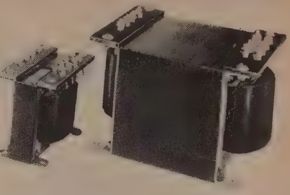
"OF". BLACK ENAMEL FINISH. OPEN FRAME. 8" LEADS. INEXPENSIVE VERSION FOR USE IN EQUIPMENT

KVA	Cat. No.	Width	Depth	Height	Mtg. Centers	Lbs.
3	1300-OF	7⅛	5½	6⅛	5 13/16 x 3¾	30
4	1400-OF	7⅛	6	6⅛	5 13/16 x 4¼	36
5	1500-OF	7⅛	6½	6⅛	5 13/16 x 4¾	41
6	1600-OF	7⅛	7¾	6⅛	5 13/16 x 6	54

STYLE "OF"

SIGNAL TRANSFORMER CO., INC. / 1 JUNIUS STREET / BROOKLYN, NEW YORK 11212 / (212) 498-5111 / TELEX 12-5709

industrial grade step-up or step-down power isolation-auto transformers

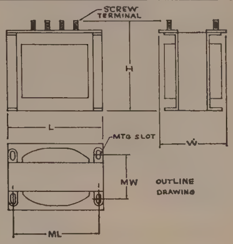


HIGH DEGREE OF VERSATILITY OFFERS MANY POSSIBLE VOLTAGE RATINGS

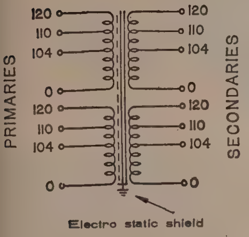
AVAILABLE FROM STOCK FOR IMMEDIATE SHIPMENT

The "DU' and "SU" lines are designed for a maximum of 55°C rise above ambient for use on standard power lines from 50 to 500 Cps. Only prime raw materials are used. Units are thoroughly impregnated and baked with Signal's own high gloss black baking varnish. The transformers are rugged in construction, well-insulated and have a consistently uniform appearance. All ratings are at full load current, continuous operation.

Heavy ¼ inch phenolic terminal boards are provided with plated brass screws and flat washers (10-32 on ¼ and ½ KVA, ¼-20 on larger sizes). Connections can be easily made with a nut driver. It is also simple to alter the inter-connections to change transformer ratings. **Electro static shields are provided grounded to the core.** The connection is made with a lug to ground and may be opened if an ungrounded shield is desired.



DU series 110/220 Dual Primary to 110/220 V. Dual Sec. (Primary & Secondary may be reversed)

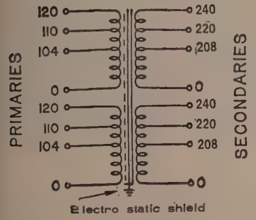


As shown on the schematic diagram the "DU" line is designed with dual primaries and secondaries. All four windings are identically rated at 0/104/110/120 volts. This permits series or parallel connections on either primary or secondary. Therefore, a nominal 110 to 110 volt, 220 to 220 volt, 110 to 220 volt, or 220 to 110 volt transformer can be set up. The winding taps permit intermediate series ratings such as 208, 214, or 230 volts.

It is also possible to make auto-transformer connections by connecting a primary group in series with a secondary group. Such nominal ratings as 440 to 220 volts or 220 to 440 volts can be set-up, in addition to the standard ratings described above. A further advantage to auto-transformer connection is the fact that the KVA rating of a particular type is **doubled.**

Part No.	KVA	Series Secondaries		Parallel Secondaries		Mechanical Dimensions					Mtg. & Term. Screw	Appr. Lbs.
		Volts	Max. Amps	Volts	Max. Amps	L (Max.)	W (Max.)	H (Max.)	ML ± 1/32	MW ± 1/16		
DU-¼	¼	0/208/220/240	1.1	0/104/110/120	2.2	5 5/16	4¼	5¼	4⅜	2½	#10	12
DU-½	½	0/208/220/240	2.3	0/104/110/120	4.6	5 5/16	5 5/16	5¼	4⅜	3⅝	#10	18
DU-1	1	0/208/220/240	4.5	0/104/110/120	9	7 9/16	6¼	7¼	6¾	4⅛	¼	33
DU-2	2	0/208/220/240	9	0/104/110/120	18	7 9/16	8¼	7¼	6¾	6	¼	56
DU-3	3	0/208/220/240	14	0/104/110/120	28	7 9/16	9¼	7¼	6¾	7	¼	70
DU-5	5	0/208/220/240	23	0/104/110/120	46	7 9/16	10¾	7¼	6¾	8½	¼	89
DU-7.5	7.5	0/208/220/240	31	0/104/110/120	62	9	9	8	7½	6½	¼	105
DU-10	10	0/208/220/240	41	0/104/110/120	83	9	12	8	7½	9	¼	150

SU series 110/220 Dual Primary to 220/440 V. Dual Sec. (Primary & Secondary may be reversed)



"SU" transformers are similar to "DU" types except that a 220/440 V secondary is provided.

Part No.	KVA	Series Secondaries		Parallel Secondaries		Mechanical Dimensions					Mtg. & Term. Screw	Appr. Lbs.
		Volts	Max. Amps	Volts	Max. Amps	L (Max.)	W (Max.)	H (Max.)	ML ±1/32	MW ±1/16		
SU-¼	¼	0/416/440/480	0.55	0/208/220/240	1.1	5 5/16	4¼	5¼	4⅜	2½	#10	12
SU-½	½	0/416/440/480	1.15	0/208/220/240	2.3	5 5/16	5 5/16	5¼	4⅜	3⅝	#10	18
SU-1	1	0/416/440/480	2.25	0/208/220/240	4.5	7 9/16	6¼	7¼	6¾	4⅛	¼	33
SU-2	2	0/416/440/480	4.5	0/208/220/240	9	7 9/16	8¼	7¼	6¾	6	¼	56
SU-3	3	0/416/440/480	7	0/208/220/240	14	7 9/16	9¼	7¼	6¾	7	¼	70
SU-5	5	0/416/440/480	11.5	0/208/220/240	23	7 9/16	10¾	7¼	6¾	8½	¼	89
SU-7.5	7.5	0/416/440/480	15.5	0/208/220/240	31	9	9	8	7½	6½	¼	105
SU-10	10	0/416/440/480	20.5	0/208/220/240	41	9	12	8	7½	9	¼	150

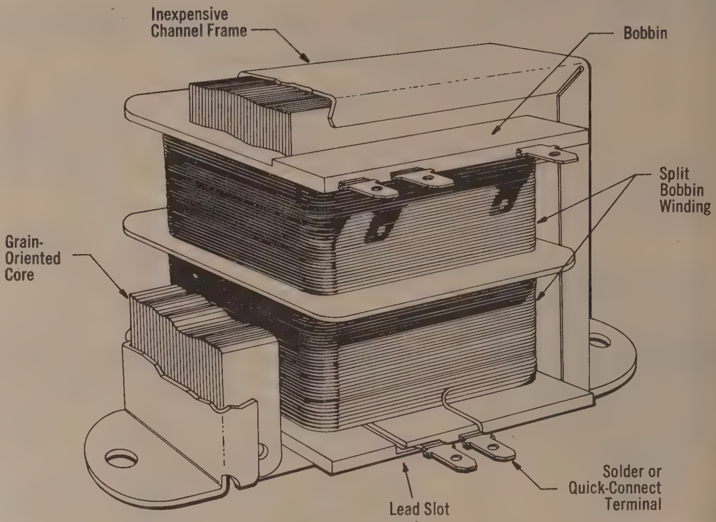
SIGNAL TRANSFORMER CO., INC. / 1 JUNIUS STREET / BROOKLYN, NEW YORK 11212 / (212) 498-5111 / TELEX 12-5709

cut weight, size and cost with

Until the advent of Signal's "2-4-1" Series not much had been done in the design and development of small power transformers to reduce weight and cost.

By incorporating a number of factors into the design of these types we have succeeded in developing a line where for a given VA rating, size, weight, and price are all reduced almost 50%. Hence the name "241" line.

The following features were incorporated into the "241" Series designs:


Inexpensive Channel Frame
Bobbin
Split Bobbin Winding
Grain-Oriented Core
Solder or Quick-Connect Terminal
Lead Slot

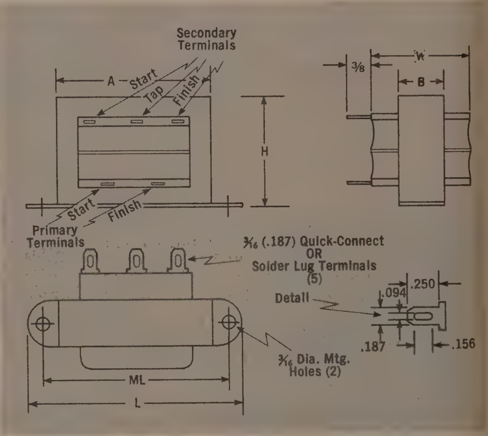
Grain-Oriented Core: By using this type of transformer lamination, with higher saturation flux density and lower core losses, it is possible to reduce the amount of steel and copper required for a given VA rating. Result—less space and weight—lower cost.

Bobbin Winding: Gives more effective utilization of winding area so that the space required for winding is reduced. Automated bobbin winding operation reduces winding time. Again — less space and weight — time savings — lower cost.

Split Bobbin: This special design "splits" the primary and secondary so that they are wound side by side, separated by a bobbin wall. They are not wound concentrically. The result is a better performing design which saves on assembly cost. There is no cross-over of primary and secondary leads, no taping is required over the primary to insulate it from the secondary, a "lead slot" in the bobbin wall eliminates the need to tape start leads. Aside from saving labor costs, the added isolation between windings reduces the capacitance and coupling and minimizes the need for an electro-static shield. 2500V hipot is standard.

Special Terminals: Which are in the bobbin wall can be used as 3⁄16 (.187) quick-connects or as solder lugs. This can solve user application problems.

Class "S" Insulation: Rated 125°C maximum total temperature means these designs can be used continuously in ambient temperatures up to 85°C.


Secondary Terminals
A
Start
Tap
Finish
H
3⁄8
W
B
Start
Finish
Primary Terminals
3⁄16 (.187) Quick-Connect OR Solder Lug Terminals (5)
Detail
.094
.250
.187
.156
3⁄16 Dia. Mtg. Holes (2)
ML
L

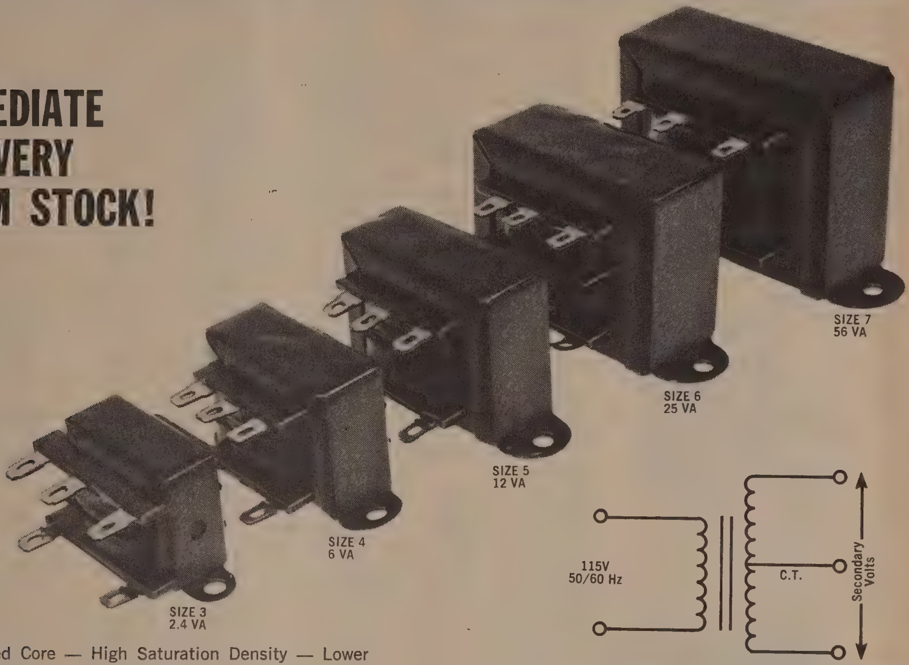
DIMENSIONS

SIZE	VA	L	W	H	A	B	ML	LBS.
3	2.4	2 1⁄16	1 1⁄16	1 3⁄16	1 5⁄8	9⁄16	1 3⁄4	0.25
4	6	2 3⁄8	1 1⁄4	1 3⁄8	1 11⁄16	11⁄16	2	0.44
5	12	2 13⁄16	1 3⁄8	1 5⁄8	1 15⁄16	13⁄16	2 3⁄8	0.7
6	25	3 1⁄4	1 11⁄16	1 15⁄16	2 5⁄16	1 1⁄16	2 13⁄16	1.1
7	56	3 11⁄16	1 13⁄16	2 1⁄4	2 11⁄16	1 1⁄16	3 1⁄8	1.7

SIGNAL TRANSFORMER CO., INC. / 1 JUNIUS STREET / BROOKLYN. NEW YORK 11212 / (212) 498-5111 / TELEX 12-5709

“2 for 1” series of small power transformers

IMMEDIATE DELIVERY FROM STOCK!



- Grain-Oriented Core — High Saturation Density — Lower Core Loss — Less Steel and Copper.
- Bobbin Wound — Maximum Utilization of Winding Area — Space and Size Reduced.
- Split Bobbin — Non-Concentric Winding — Lower Capacitance — Better Insulation — 2500V Hipot — No Need for Electro-Static Shield.
- Special Terminal — Solder or Quick-Connect.

METHOD OF DETERMINING SECONDARY CURRENT RATINGS WHEN USED IN RECTIFIER CIRCUIT

Rectifier Type	Filter Type	RMS Secondary Current
Full Wave Center-Tap	Choke Input	.7 x DC Amps
Full Wave Center-Tap	Capacitor Input	1.2 x DC Amps
Full Wave Bridge	Choke Input	= to DC Amps
Full Wave Bridge	Capacitor Input	1.8 x DC Amps

CUSTOM VARIATIONS

Signal is equipped to quote on custom variations of our “241” Types. This service is restricted to designs with a single primary and single secondary, with or without center-tap (a maximum of 5 terminals). The power limit is approximately 60 to 70 VA.

We answer requests promptly and can deliver prototypes in one to three weeks. Production runs can be scheduled with very reasonable lead times.

SECONDARY			SECONDARY		
Volts	Amps	Part No.*	Volts	Amps	Part No.*
10 V. C.T.	0.25A	241-3-10	**28 V.** C.T.	0.085A	241-3-28
	0.6	241-4-10		0.2	241-4-28
	1.2	241-5-10		0.42	241-5-28
	2.5	241-6-10		0.9	241-6-28
	5.0	241-7-10		2.0	241-7-28
12.6 V. C.T.	0.2A	241-3-12	**36 V.** C.T.	0.065A	241-3-36
	0.5	241-4-12		0.17	241-4-36
	1.0	241-5-12		0.35	241-5-36
	2.0	241-6-12		0.7	241-6-36
	4.0	241-7-12		1.5	241-7-36
16 V. C.T.	0.15A	241-3-16	**48 V.** C.T.	0.05A	241-3-48
	0.4	241-4-16		0.125	241-4-48
	0.8	241-5-16		0.25	241-5-48
	1.5	241-6-16		0.5	241-6-48
	3.5	241-7-16		1.2	241-7-48
20 V. C.T.	0.12A	241-3-20	**56 V.** C.T.	0.045A	241-3-56
	0.3	241-4-20		0.11	241-4-56
	0.6	241-5-20		0.22	241-5-56
	1.25	241-6-20		0.45	241-6-56
	2.8	241-7-20		1.0	241-7-56
24 V. C.T.	0.1A	241-3-24	**120 V.** C.T.	0.02A	241-3-120
	0.25	241-4-24		0.05	241-4-120
	0.5	241-5-24		0.1	241-5-120
	1.0	241-6-24		0.2	241-6-120
	2.4	241-7-24		0.5	241-7-120

*Explanation of Part Number Series — 2-4-1 Size — 4 Sec. Volts — 36

SIGNAL TRANSFORMER CO., INC. / 1 JUNIUS STREET / BROOKLYN, NEW YORK 11212 / (212) 498-5111 / TELEX 12-5709

TRANSFORMERS

PRICE LIST

MAY 1, 1974

Part No.	User Net
10-0.1	$5.75
10-0.25	6.00
10-0.5	6.20
10-1	6.70
10-2	8.40
10-4	10.80
10-6	14.30
10-8	15.10
10-12	17.00
10-25	26.50
10-50	42.00
10-100	71.00
12.8-0.1	5.80
12.8-0.25	6.15
12.8-0.5	6.60
12.8-1	7.15
12.8-2A	8.30
12.8-2	10.00
12.8-4	12.00
12.8-6	13.80
12.8-8	14.30
12.8-12	19.25
12.8-25	29.70
12.8-50	44.00
12.8-100	72.00
16-0.1	6.00
16-0.25	6.25
16-0.5	6.50
16-1	7.25
16-2	8.60
16-4	13.00
16-6	15.50
16-8	16.80
16-12	20.20
16-25	37.50
16-50	65.00
16-100	85.00
24-0.1	6.05
24-0.25	6.50
24-0.5	7.00
24-1A	8.00
24-1	9.80
24-2	11.40
24-4	13.90
24-6	18.50
24-8	22.80
24-12	28.80
24-20	38.00
24-25	44.50
24-50	70.00
24-100	102.00
36-0.1	6.10
36-0.25	6.75
36-0.5	7.55
36-1A	9.00
36-1	10.20
36-2	13.00
36-4	18.75
36-6	23.80
36-8	27.25
36-12	34.50
36-20	60.00
36-25	70.00
36-30	73.00
36-50	80.00
36-100	157.00
56-0.1	6.35
56-0.25	7.50
56-0.5	8.20
56-1	12.20
56-2	15.25
56-4	24.00
56-6	31.00
56-8	35.80
56-12	58.00
56-25	78.00
56-50	145.00
56-100	219.00

Part No.	User Net
68-0.1	$6.55
68-0.25	7.70
68-0.5A	8.35
68-0.5	10.90
68-1	12.30
68-2	17.10
68-4	29.50
68-6	32.00
68-8	36.50
68-12	63.00
68-25	80.00
68-50	148.00
80-0.1	6.65
80-0.25	8.40
80-0.5A	9.10
80-0.5	11.20
80-1	13.15
80-2	19.25
80-4	32.90
80-6	37.50
80-8	46.00
80-12	71.50
80-25	95.00
80-50	175.00
88-0.1	6.85
88-0.25	8.75
88-0.5	9.30
88-1	13.60
88-2	19.50
88-4	34.00
88-6	38.20
88-8	47.40
88-12	73.20
88-25	98.00
88-50	178.50
120-0.5	12.80
120-1	18.00
120-2	24.00
120-4	38.00
120-6	58.00
120-8	70.00
120-12	78.00
120-20	110.00
160-0.5	13.50
160-1	19.40
160-2	29.00
160-4	44.00
160-8	69.00
160-12	88.00
180-0.5	13.90
180-1	21.50
180-2	31.70
180-4	50.50
180-6	70.00
180-8	74.00
180-12	105.00
230-0.5	18.30
230-1	24.30
230-2	39.00
230-4	69.00
230-6	75.00
300-0.5	18.90
300-1	31.30
300-2	43.50
300-4	73.00
CH-0.5	5.50
CH-1	8.00
CH-2	9.40
CH-4	14.40
CH-6	17.60
CH-8	22.20
CH-12	29.00
CH-16	32.40
CH-20	30.40
CH-25	42.50

Part No.	User Net
CH-30	$51.00
CH-50	58.70
CH-100	66.50
CH-200	106.00
CH-250	115.00
CH-500	123.00
CH-1000	138.00
CL-1-2	5.40
CL-2-4	6.60
CL-4-8	11.00
CL-6-12	12.80
CL-12-24	19.00
CL-25-50	20.30
CL-50-100	25.00
6-250	100.00
9-250	130.00
12-250	140.00
6-500	138.00
9-500	180.00
12-500	223.00
3-1000	147.00
6-1000	237.00
3PH-24-50	140.00
3PH-24-100	200.00
3PH-24-200	320.00
3PH-48-30	140.00
3PH-48-60	200.00
3PH-48-120	320.00
DU-¼	41.50
DU-½	52.90
DU-1	89.00
DU-2	128.00
DU-3	181.00
DU-5	239.00
DU-7.5	307.00
DU-10	375.00
SU-¼	42.70
SU-½	54.40
SU-1	90.70
SU-2	130.00
SU-3	184.00
SU-5	241.00
SU-7.5	310.00
SU-10	378.00
112	12.00
115	12.85
120	13.70
125	14.80
130	17.00
150	21.00
175	27.50
1100	36.00
1150	45.00
1200	55.00
1300	88.00
1400	105.00
1500	115.00
1600	130.00
112-OF	9.30
115-OF	9.90
120-OF	10.70
125-OF	12.00
130-OF	13.80
150-OF	18.00
175-OF	24.00
1100-OF	32.00
1150-OF	43.00
1200-OF	52.00
1300-OF	74.00
1400-OF	90.00
1500-OF	102.00
1600-OF	115.00

Part No.	User Net
PC 10-90	$4.80
PC 10-120	4.60
PC 10-440	4.80
PC 10-1000	5.05
PC 10-2400	6.65
PC 12-70	4.80
PC 12-100	4.60
PC 12-350	4.80
PC 12-800	5.05
PC 12-2000	6.65
PC 16-55	4.80
PC 16-75	4.60
PC 16-260	4.80
PC 16-640	5.05
PC 16-1500	6.65
PC 20-45	4.80
PC 20-60	4.60
PC 20-220	4.80
PC 20-500	5.05
PC 20-1200	6.65
PC 24-35	4.80
PC 24-50	4.60
PC 24-180	4.80
PC 24-450	5.05
PC 24-1000	6.65
PC 34-25	4.80
PC 34-35	4.60
PC 34-125	4.80
PC 34-300	5.05
PC 34-700	6.65
PC 40-20	4.80
PC 40-30	4.60
PC 40-110	4.80
PC 40-250	5.05
PC 40-600	6.65
PC 56-15	4.80
PC 56-20	4.60
PC 56-80	4.80
PC 56-180	5.05
PC 56-420	6.65
PC 88-10	4.80
PC 88-15	4.60
PC-88-50	4.80
PC 88-120	5.05
PC 88-270	6.65
PC 120-8	4.80
PC 120-10	4.60
PC 120-35	4.80
PC 120-85	5.05
PC 120-200	6.65
DPC 10-90	5.80
DPC 10-120	5.50
DPC 10-440	5.70
DPC 10-1000	6.00
DPC 10-2400	7.60
DPC 12-70	5.80
DPC 12-100	5.50
DPC 12-350	5.70
DPC 12-800	6.00
DPC 12-2000	7.60
DPC 16-55	5.80
DPC 16-75	5.50
DPC 16-260	5.70
DPC 16-640	6.00
DPC 16-1500	7.60
DPC 20-45	5.80
DPC 20-60	5.50
DPC 20-220	5.70
DPC 20-500	6.00
DPC 20-1200	7.60

Part No.	User Net
DPC 24-35	$5.80
DPC 24-50	5.50
DPC 24-180	5.70
DPC 24-450	6.00
DPC 24-1000	7.60
DPC 34-25	5.80
DPC 34-35	5.50
DPC 34-125	5.70
DPC 34-300	6.00
DPC 34-700	7.60
DPC 40-20	5.80
DPC 40-30	5.50
DPC 40-110	5.70
DPC 40-250	6.00
DPC 40-600	7.60
DPC 56-15	5.80
DPC 56-20	5.50
DPC 56-80	5.70
DPC 56-180	6.00
DPC 56-420	7.60
DPC 88-10	5.80
DPC 88-15	5.50
DPC 88-50	5.70
DPC 88-120	6.00
DPC 88-270	7.60
DPC 120-8	5.80
DPC 120-10	5.50
DPC 120-35	5.70
DPC 120-85	6.00
DPC 120-200	7.60
10-BR	.35
24-BR	.35
LP 10-600	7.60
LP 12-450	7.60
LP 16-350	7.60
LP 20-300	7.80
LP 24-250	7.80
LP 34-170	7.80
LP 40-150	7.80
LP 56-100	8.00
LP 88-65	8.00
LP 120-50	8.00
LP 230-25	8.00
ALL 241-3-	3.30
ALL 241-4-	3.70
ALL 241-5-	4.35
ALL 241-6-	5.15
ALL 241-7-	6.50

OEM DISCOUNT SCHEDULE

Qty.	Discount
1-4	NET
5-9	10%
10-24	23%
25-49	32%
50-99	40%
100-249	48%

Terms: Net 30 Days on Approved Credit. F.O.B. Factory, N.Y.

PRICES SUBJECT TO CHANGE WITHOUT NOTICE!

SIGNAL TRANSFORMER CO., INC. / 1 JUNIUS STREET / BROOKLYN, NEW YORK 11212 / (212) 498-5111 / TELEX 12-5709

STERLING
TRANSFORMER

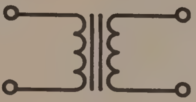
step-up/step-down ISOLATION – AUTO transformers

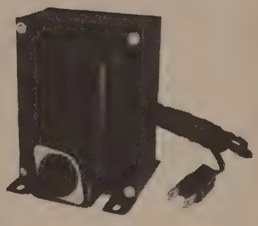
STEP-DOWN ISOLATION TRANSFORMERS

PRIMARY: 240 Volts • 50/60 HZ • Line Cord and Plug*
SECONDARY: 120 Volts • Standard Female Receptacle
• Electrostatic Shield • UL Approved Cord and Plug.

Cat No.	VA Watts	Style	DIMENSIONS L	W	H	Mounting Centers M1	M2	Appr. Wt.	Net Price
S2-50	50	A	2 29/32	3 7/16	3½	2¼	1 13/16	3	$14.81
S2-100	100	A	3 7/32	3⅞	3⅞	2½	2 3/16	5	19.15
S2-150	150	A	3 17/32	4⅜	4¼	2¾	2 13/16	7	21.74
S2-220	220	A	3 27/32	4⅝	4⅝	3	3 1/16	9.5	24.17
S2-330	330	A	4 17/32	5¼	5 7/16	3½	3¼	14.5	35.43
S2-500	500	A	4 17/32	6¼	5 7/16	3½	4¼	21	38.64
S2-700	700	A	5½	5 15/16	6 9/16	4¼	3½	25	45.46
S2-1000	1000	A	5½	6 15/16	6 9/16	4¼	4½	35	76.83
S2-1500	1500	B	9	7¾	6 5/16	8¼	4⅜	42	91.81
S2-2200	2200	B	9	9⅜	6 5/16	8¼	6	65	112.74
S2-3300	3300	B	9	11⅝	6 5/16	8¼	8¼	95	177.16

**Style A Only; Style B — Knockouts for Conduit Connectors.*





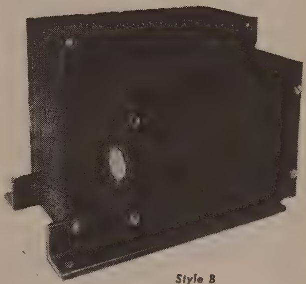
Style A

ISOLATION TRANSFORMERS

PRIMARY: 120 Volts • 50/60 HZ • Line Cord and Plug*
SECONDARY: 120 Volts • Standard Female Receptacle
• Electrostatic Shield • UL Approved Cord and Plug.

Cat No.	VA Watts	Style	DIMENSIONS L	W	H	Mounting Centers M1	M2	Appr. Wt.	Net Price
S1-50	50	A	2 29/32	3 7/16	3½	2¼	1 13/16	3	$14.81
S1-100	100	A	3 7/32	3⅞	3⅞	2½	2 3/16	5	19.15
S1-150	150	A	3 17/32	4⅜	4¼	2¾	2 13/16	7	21.74
S1-220	220	A	3 27/32	4⅝	4⅝	3	3 1/16	9.5	24.17
S1-330	330	A	4 17/32	5¼	5 7/16	3½	3¼	14.5	35.43
S1-500	500	A	4 17/32	6¼	5 7/16	3½	4¼	21	38.52
S1-700	700	A	5½	5 15/16	6 9/16	4¼	3½	25	45.46
S1-1000	1000	A	5½	6 15/16	6 9/16	4¼	4½	35	76.83
S1-1500	1500	B	9	7¾	6 5/16	8¼	4⅜	42	91.81
S1-2200	2200	B	9	9⅜	6 5/16	8¼	6	65	112.74
S1-3300	3300	B	9	11⅝	6 5/16	8¼	8¼	95	177.16

**Style A Only; Style B — Knockouts for Conduit Connectors.*



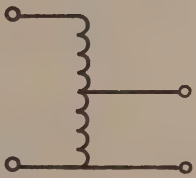
Style B

STEP-DOWN AUTO TRANSFORMERS

PRIMARY: 240 Volts • 50/60 HZ • Line Cord and Plug*
SECONDARY: 120 Volts • Standard Female Receptacle
• UL Approved Cord and Plug.

Cat No.	VA Watts	Style	DIMENSIONS L	W	H	Mounting Centers M1	M2	Appr. Wt.	Net Price
SA-100	100	A	2 29/32	3 7/16	3½	2¼	1 13/16	3	$13.20
SA-150	150	A	2 29/32	3¾	3½	2¼	2⅛	4	15.14
SA-200	200	A	3 7/32	3⅞	3⅞	2¼	2 3/16	5	19.33
SA-300	300	A	3 17/32	4⅜	4¼	2¾	2 13/16	7	24.64
SA-450	450	A	3 27/32	4⅝	4⅝	3	3⅙	9½	27.54
SA-650	650	A	4 17/32	5¼	5 7/16	3½	3¼	14½	32.53
SA-1000	1000	A	4 17/32	6¼	5 7/16	3½	4¼	21	37.84
SA-1500	1500	A	5½	5 15/16	6 9/16	4¼	3½	25	54.75
SA-2000	2000	A	5½	6 15/16	6 9/16	4¼	4½	35	67.80
SA-3000	3000	B	9	7¾	6 5/16	8¼	4⅜	42	93.41
SA-4500	4500	B	9	9⅜	6 5/16	8¼	6	65	120.79
SA-6500	6500	B	9	11⅝	6 5/16	8¼	8¼	95	169.11
SA-8000**	8000	B	10⅝	9⅝	8¼	9⅝	6⅛	90	193.26
SAB-5300†	5300	A	5¾	8 5/16	4	3¾	6½	17.5	86.97

**Style A Only **60 HZ Only Style B — Knockouts for Conduit Connector*
†Step-up/down Auto Transformer. Connections for 208/230 V or 230/208 V, 23 Amp 50/60 HZ



STERLING TRANSFORMER CORP
510 DRIGGS AVENUE • BROOKLYN, NEW YORK 11211 • TELEPHONE: (212) 782-4200

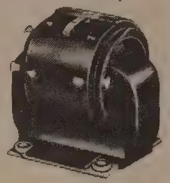
STERLING
TRANSFORMER

ENCAPSULATED 400 cps transformers

CLIPPER SERIES

Fig.	Cat. No.	Sec. Volts	Sec. Amp	Insul. Volts (RMS)	Pri. Volts	Mold Size	Net Price
19	4C1	6.3 CT	0.8	1500	115	SM3	$22.22
19	4C2	6.3 CT	1.2	1500	115	SM2	22.22
19	4C3	6.3 CT	6.8	1500	110/115/120	2	35.67
20	4C4	6.3 6.3	4.9 2.7	1500	115	3	31.89
19	4C5	6.3 CT	7.2	1500	115	35	37.04
21	4C6	6.3 6.3 6.3	7 7 1.5	1500 1500 1500	120	35	36.07
22	4C7	6.3 CT 6.3 CT	7 7	1500 1500	120	4	42.93
21	4C8	6.3 6.3 6.3	13.7 2.9 0.3	1500 1500 1500	115	4	42.93
19	4C9	6.3 CT	12.3	1500	115	5	39.70
21	4C11	6.3 6.3 6.3	2.4 2.5 2.7	1500	115	3	39.70
19	4C26	6.3 CT	2	1500	115	SM1	28.27
19	4C27	6.3 CT	3	1500	115	1A	29.39
19	4C28	6.3 CT	5	1500	115	2	30.44
19	4C29	5 CT	3	2500	115	SM1	28.27
19	4C30	5 CT	6	2500	115	2	30.44
19	4C31	8.5 CT	12	1500	115	5	39.66
19	4C32	8.5 CT	23	1500	115	7	43.96
19	4C33	8.5 CT	35	1500	115	8	47.92
19	4C34	8.5 CT	45	1500	115	9	57.81
18	4C12	14.1	3	1500	115	3	30.25
19	4C35	21 CT	4.5	1500	115	5	39.66
19	4C13	21 CT	9	1500	115	7	34.31
19	4C36	21 CT	18	1500	115	9	57.81
19	4C10	20 CT	0.6	1500	115	SM1	28.27

FREQUENCY
380-1000 cps



FOR MINIMUM SIZE &
MINIMUM WEIGHT
- CONTOUR MOLDED
- HIPERSIL CORES

MIL-T27C
Specifications

MIL Type
TF5SX01ZZ
85°C Max. Ambient
130°C Max.
Oper. Temp.

HIGH SHOCK
EXTREME
ENVIRONMENT
CONDITIONS
LIGHTWEIGHT FOR
AIRBORNE USE
10,000 HOUR
PLUS-LIFE
SERVO
APPLICATIONS
ISOLATIONS
POWER SUPPLIES
AIRBORNE CONTROL
CIRCUITS
MISSILE CIRCUITS

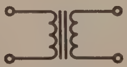


FIG. 18

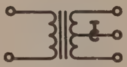


FIG. 19

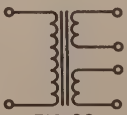


FIG. 20

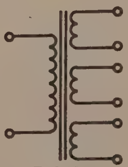


FIG. 21

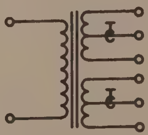


FIG. 22

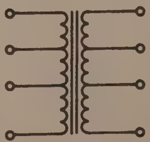


FIG. 23

STERLING TRANSFORMER CORPORATION

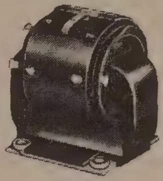
510 DRIGGS AVENUE • BROOKLYN, NEW YORK 11211 • TELEPHONE: (212) 782-4200

STERLING
TRANSFORMER

ENCAPSULATED 400 cps transformers
CLIPPER SERIES

Fig.	Cat. No.	Sec. Volts	Sec. Amp.	Insul. Volts (RMS)	Pri. Volts	Mold Size	Net Price
19	4C37	21 CT	24	1500	115	10	$69.42
19	4C38	24 CT	4	1500	115	5	39.66
19	4C39	24 CT	8	1500	115	7	43.96
19	4C40	24 CT	16	1500	115	9	57.81
19	4C41	24 CT	21	1500	115	10	69.42
18	4C14	26	0.5	1500	115	SM1	27.57
19	4C15	26 CT	1.5	1500	115	3	28.50
19	4C23	26 CT	3	1500	115	4	34.31
19	4C24	26 CT	5	1500	115	6	40.03
22	4C16	28 CT 6.3 CT	0.8 7	1500	115	3	42.86
19	4C42	41 CT	2.3	1500	115	5	39.66
19	4C43	41 CT	4.5	1500	115	7	43.96
19	4C44	41 CT	9	1500	115	9	57.81
19	4C45	41 CT	12	1500	115	10	69.42
19	4C46	48 CT	2	1500	115	5	39.66
19	4C47	48 CT	4	1500	115	7	43.96
19	4C48	48 CT	8	1500	115	9	57.81
19	4C49	48 CT	10	1500	115	10	69.42
19	4C25	52 CT	2	1500	115	5	39.66
19	4C17	52 CT	0.2	1500	115	SM1	30.76
19	4C18	90 CT	4.5	1500	115	9	57.81
18	4C19	115	.05	1500	115	SM2	22.72
18	4C21	115	2.8	1500	115	8	47.08
23	4C20	105/115/125	0.4	1500	105/115/125	2	32.69
23	4C50	105/115/125	1	1500	105/115/125	6	41.47
23	4C51	105/115/125	2.4	1500	105/115/125	8	48.63
23	4C52	105/115/125	3.2	1500	105/115/125	9	53.30
23	4C53	105/115/125	4	1500	105/115/125	10	70.38
18	4C22	334	.025	1500	115	SM1	25.96

FREQUENCY
380-1000 cps



FOR MINIMUM SIZE & MINIMUM WEIGHT
- CONTOUR MOLDED
- HIPERSIL CORES

MIL-T27C
Specifications

MIL Type
TF5SX01ZZ
85°C Max. Ambient
130°C Max.
Oper. Temp.

HIGH SHOCK
EXTREME
ENVIRONMENT
CONDITIONS
LIGHTWEIGHT FOR
AIRBORNE USE
10,000 HOUR
PLUS-LIFE
SERVO
APPLICATIONS
ISOLATIONS
POWER SUPPLIES
AIRBORNE CONTROL
CIRCUITS
MISSILE CIRCUITS

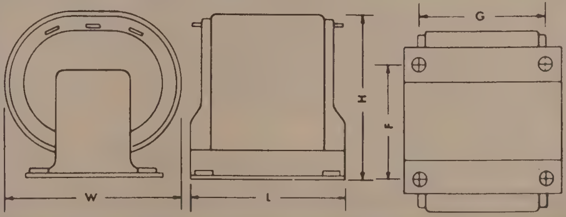
Mold No.	Overall Dimen.			Mtg. Dimen.		App. Wt. (Lbs.)	Mtg. Meth.
	L	W	H	F	G		
SM3	1 1/32	1 5/16	1 1/4	1	Note 1	0.06	Note 1
SM2	1 1/2	1 1/4	1 11/16	1	Note 1	0.10	Note 1
SM1	1 1/2	1 1/2	1 11/16	1 1/8	Note 1	0.16	Note 1
1	1 13/16	1 7/8	1 13/16	1 1/4	1 7/16	0.25	Note 2
1A	1 11/16	1 17/32	1 13/16	1 5/32	1 1/8	0.25	Note 2
2	2	1 15/16	2 1/8	1 9/32	1 1/4	0.40	Note 2
3	2 5/16	1 13/16	2 1/8	1 9/32	1 7/16	0.45	Note 2
35	2 1/16	2 3/8	2 3/16	1 17/32	1 11/16	0.70	Note 2
4	2 5/16	2 3/8	2 9/16	1 17/32	1 11/16	0.90	Note 2
5	2 3/4	2 3/8	2 7/8	1 17/32	2 3/16	1.20	Note 2
6	2 3/4	2 5/8	3 1/8	1 17/32	2 3/16	1.50	Note 2
7	3	2 7/8	3 3/8	1 25/32	2 1/2	2.00	Note 2
8	3 3/8	2 7/8	3 3/8	1 25/32	2 1/2	2.50	Note 2
83	3 3/4	3 1/4	3 3/8	2 1/4	3	3.25	Note 3
86	3 3/4	3 3/4	3 3/8	2 3/4	3 1/8	4.25	Note 3
9	4 1/16	3 3/8	3 7/8	2 3/16	3 1/2	5.00	Note 3
10	4 1/2	3 15/16	3 15/16	2 3/4	3 1/8	6.00	Note 3

Note 1 —
SM Series are two hole mounting with holes on center line. #4-40 Pem nuts are fastened to the bracket.

Note 2 —
#6-32 Pem nuts on bracket are standard.

Note 3 —
#8-32 Pem nuts on bracket are standard.

- All primaries 380-1000 cps
- Dielectric test voltages:
  PRIMARIES 1500 Volts RMS
  SECONDARIES 1500 Volts RMS
- Epoxy resin used as encapsulant
- Prices subject to change without notice



STERLING TRANSFORMER CORPORATION

510 DRIGGS AVENUE • BROOKLYN, NEW YORK 11211 • TELEPHONE: (212) 782-4200

transistor transformers

STERLING
TRANSFORMER

UNIVERSAL DC POWER MODULE TRANSFORMERS

High reliability transformers having a tapped primary and single or dual secondary windings which may be connected F.W. bridge or F.W. center tap so as to obtain a wide range of DC voltages and current ratings.

INPUT PRIMARY 115 volts 50-500 cps

TYPE	FIG.		F.W. BRIDGE								F.W. CT			MIL STD'D* HERM SEAL TF 45x02		INDUST. OPEN FRAME	
		AC VOLT	40 5	32.25	28.5	24	20.25	16 5	12	8.25	40.5	24	16.5				
		DC VOLT	53.0	41.0	34	25	24	18	12	6	24	12	6.6	Style	Net Pr.	Style	Net Pr.
7K1	1	DC AMP	.025	.035	.040	.042	.055	.042	.070	.085	.042	.055	.068	H	$20.77	F	$12.72
		INPUT CAP	(.1)	(.1)	(.1)	(.1)	(.2)	(.2)	(.2)	(.2)	(.2)	(.2)	(.2)				
7K2	1	DC AMP	.085	.12	.13	.14	.18	.14	.23	.23	.14	.17	.21	H	22.87	L	14.81
		INPUT CAP	(.1)	(.1)	(.1)	(.1)	(.2)	(.2)	(.2)	(.2)	(.2)	(.2)	(.2)				
7K3	1	DC AMP	.48	.60	.60	.64	1.0	.8	1.2	1.52	.8	.883	.92	H	25.53	F	13.13
		INPUT CAP	(.5)	(.5)	(.5)	(.5)	(1.0)	(1.0)	(2.0)	(2.0)	(1.0)	(1.0)	(2.0)				
7K4	1	DC AMP	1.2	1.5	1.5	1.6	2.5	2.0	3.0	3.8	2.0	2.2	2.8	H	35.10	L	21.57
		INPUT CAP	(.5)	(.5)	(.5)	(.5)	(1.0)	(1.0)	(2.0)	(2.0)	(1.0)	(1.0)	(2.0)				
7K5	1	DC AMP	3.0	3.5	3.8	4.0	6.0	4.5	7.5	9.0	4.5	5.5	6.7	H	51.05	L	36.49
		INPUT CAP	(1.0)	(1.0)	(1.0)	(1.0)	(2.0)	(2.0)	(4)	(4)	(2.0)	(2.0)	(2.0)				
7K6	1	DC AMP	7.5	8.5	9.5	10	15	11	19	23	11	13.5	17	H	85.03	L	58.27
		INPUT CAP	(4.0)	(4.0)	(4.0)	(4.0)	(4.0)	(6.0)	(12)	(12)	(6)	(6)	(12)				
TYPE	FIG.	AC VOLTS	81	64.5	57.0	48	40.5	33	24	16 5	81	48	33				
		DC VOLT	106	82	68	50	48	36	24	12	48	24	13				
7K7	2	DC AMP	0.6	0.75	0.75	0.8	1.25	1.0	1.5	1.9	1.0	1.1	1.4	H	36.12	L	22.55
		INPUT CAP	(.125)	(.125)	(.125)	(.125)	(.25)	(.25)	(.5)	(0.5)	(.25)	(.25)	(.5)				

TYPE	FIG.	PRI TAP	F.W. BRIDGE							F.W. CT					MIL STD * HERM SEAL		INDUST. OPEN FRAME	
			SEC.		CHOKE INPUT		CAP INPUT			CHOKE INPUT		CAP INPUT						
			AC Volt	AC Amp	DC Volt	DC Amp	DC Volt	DC Amp	Cap	DC Volt	DC Amp	DC Volt	DC Amp	Cap	Style	Net Pr.	Style	Net Pr.
7K8	3	—	20CT	0.3	16.5	0.3	26	0.2	(.2)	8	0.43	12	0.3	(.5)	H	$18.12	F	$9.17
7K9	3	—	20CT	0.6	16.5	0.6	26	0.4	(.4)	9	0.85	13	0.6	(1.0)	H	22.87	F	13.94
			F.W. BRIDGE															
					SEC. in PARALLEL CONN.					SEC. in SERIES CONN.								
7K10	4	L	17	1.5	14	3.0	18.5	2.0	(1.0)	28	1.5	45	1	(.5)	H	$33.01	L	$21.57
		H	21.5	1.5	17.5	3.0	25	2.0	(1.0)	35	1.5	36	1	(.5)				
7K11	4	L	17	4	14	8.0	18.5	5.0	(2.0)	28	4.0	45	2.5	(1.0)	H	53.14	L	38.01
		H	21.5	4	17.5	8.0	25	5.0	(2.0)	35	4.0	36	2.5	(1.0)				
7K12	4	L	17	9	14	18.0	18.5	12.0	(6.0)	28	9.0	45	6	(4.0)	H	81.32	L	59.75
		H	21.5	9	17.5	18.0	25	12.0	(6.0)	35	9.0	36	6	(4.0)				
7K13	4	L	34	4.5	28	9.0	43	6.0	(4.0)	56	4.5	85	3 0	(1.0)	H	81.32	L	59.75
		H	43	4.5	35	9.0	56	6.0	(4.0)	70	4.5	110	3.0	(1.0)				
7K14	4	L H	10	20	8.2	20	10	13	(12)	—	—	—	—	—	H	47.82	L	36.97

*FOR MILITARY USE REDUCE DC AMP 20%. Note Input Cap = (K) 1000 MFD. in Rectifier Circuit.

HIGH CURRENT TRANSFORMERS AND CHOKES

115V. 50-500 CPS

TRANSFORMERS

TYPE	FIG.	SEC. IN PARALLEL		SEC. IN SERIES		Net Price
		AC Volt	AC Amp	AC Volt	AC Amp	
7K15	5	3.2/6.4	16	3.2/6.4/9.6/12.8	8	$13.82
7K16	5	3.2/6.4	24	3.2/6.4/9.6/12.8	12	16.37
7K17	5	3.2/6.4	50	3.2/6.4/9.6/12.8	25	34.60
7K18	5	3.2/6.4	100	3.2/6.4/9.6/12.8	50	47.94
7K19	5	6/12	16	6/12/18/24	8	22.97
7K20	5	6/12	24	6/12/18/24	12	28.74

TYPE	FIG.	SEC. IN PARALLEL		SEC. IN SERIES		Net Price
		AC Volt	AC Amp	AC Volt	AC Amp	
7K21	5	6/12	50	6/12/18/24	25	$45.94
7K22	5	6/12	100	6/12/18/24	50	68.89
7K23	5	9/18	16	9/18/27/36	8	30.28
7K24	5	9/18	24	9/18/27/36	12	29.18
7K25	5	9/18	50	9/18/27/36	25	56.91
7K26	5	9/18	100	9/18/27/36	50	82.36

CHOKES

TYPE	FIG.	INDUCTANCE (Millihenries)	D.C. Amps	DCR (Ω)	Net Price
7K27	9	30	8	0.3	$20.77
7K28	9	15	12	0.1	26.81

TYPE	FIG.	INDUCTANCE (Millihenries)	D.C. Amps	DCR (Ω)	Net Price
7K29	9	5	25	0.025	$42.09
7K30	9	1.4	50	0.01	57.37

STERLING TRANSFORMER CORP.

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transistor transformers

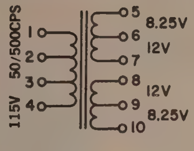
115V 50/500CPS
1
2
3
4
5
6
7
8
9
10
8.25V
12V
12V
8.25V

FIG. 1

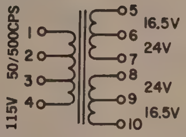
115V 50/500CPS
1
2
3
4
5
6
7
8
9
10
16.5V
24V
24V
16.5V

FIG. 2

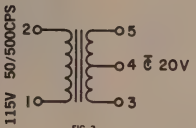
115V 50/500CPS
2
1
5
4 C̄ 20V
3

FIG. 3

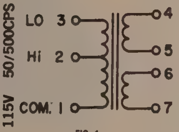
115V 50/500CPS
LO 3
Hi 2
COM. 1
4
5
6
7

FIG. 4

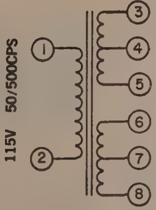
115V 50/500CPS
1
2
3
4
5
6
7
8

FIG. 5

TYPE	STYLE	FIG.	L	W	H	M1	M2	MTG. HOLES	STUDS
7K1	H	8	1 5/16	1 5/16	1 3/4	1 1/4	—	—	(2) 6-32
	F	6	2 1/8	1 1/4	1 1/4	1 3/4	—	(2) 3/16	—
7K2	H	8	1 5/8	1 5/8	2 3/8	1 3/16	1 3/16	—	(4) 6-32
	L	7	1 3/8	1 5/8	2 1/8	1 1/16	1 3/8	(4) 5/32	—
7K3	H	8	2 5/16	2 1/16	3 1/8	1 11/16	1 7/16	—	(4) 6-32
	F	6	3 3/4	2	2 5/16	3 1/8	—	(2) 3/16	—
7K4	H	8	3 1/16	2 5/8	4 1/4	2 19/64	1 55/64	—	(4) 8-32
	L	7	2 7/8	2 5/8	3 7/16	2 1/4	2 1/8	(4) 13/64	—
7K5	H	8	3 15/16	3 3/8	5 1/4	3	2 7/16	—	(4) 10-32
	L	7	3 7/8	3 1/2	4 5/8	3	2 1/2	(4) 13/64	—
7K6	H	8	5 1/2	4 1/2	6 3/4	3 3/4	3	—	(4) 1/4-20
	L	7	4 7/16	4 1/2	5 3/8	3 1/2	3 3/8	(4) 9/32	—
7K7	H	8	3 1/16	2 5/8	4 1/4	2 19/64	1 55/64	—	(4) 8-32
	L	7	2 7/8	2 5/8	3 7/16	2 1/4	2 1/8	(4) 13/64	—
7K8	H	8	1 15/16	1 13/16	2 7/16	1 3/8	1 1/4	—	(4) 6-32
	F	6	2 7/8	1 1/2	1 11/16	2 3/8	—	(2) 3/16	—
7K9	H	8	1 15/16	1 13/16	2 3/4	1 3/8	1 1/4	—	(4) 6-32
	F	6	3 5/16	2 1/4	2	2 13/16	—	(2) 3/16	—
7K10	H	8	3 1/16	2 5/8	4 1/4	2 19/64	1 55/64	—	(4) 8-32
	L	7	2 7/8	2 1/2	3 7/16	2 1/4	2	(4) 13/64	—
7K11	H	8	4 5/16	3 11/16	5 9/16	3 5/16	2 11/16	—	(4) 10-32
	L	7	3 7/8	3 5/8	4 5/8	3 5/16	2 3/4	(4) 13/64	—
7K12	H	8	5 7/8	4 3/4	6 11/16	4 1/8	3 1/2	—	(4) 1/4-20
	L	7	4 1/2	5 1/4	5 3/8	3 1/2	4 1/8	(4) 9/32	—
7K13	H	8	5 7/8	4 3/4	6 11/16	4 1/8	3 1/2	—	(4) 1/4-20
	L	7	4 1/2	5 1/4	5 3/8	3 1/2	4 1/8	(4) 9/32	—
7K14	H	8	3 15/16	3 3/8	5 1/4	3	2 7/16	—	(4) 10-32
	L	7	3 7/8	3 1/2	4 5/8	3	2 1/2	(4) 13/64	—
7K15	L	9	3 13/16	3	3 3/16	3 1/8	2 1/4	(4) 13/64	—
7K16	L	9	4 3/16	3 1/4	3 1/2	3 7/16	2 3/8	(4) 13/64	—
7K17	L	9	5 3/8	4 1/4	4 5/8	4 3/8	2 7/8	(4) 9/32	—
7K18	L	9	5 3/8	5 3/4	4 5/8	4 3/8	4 1/8	(4) 9/32	—
7K19	L	9	4 3/16	3 7/8	3 1/2	3 7/16	3	(4) 13/64	—
7K20	L	9	4 9/16	4 1/2	3 7/8	3 3/4	3 3/8	(4) 13/64	—
7K21	L	9	5 3/8	5 3/4	4 5/8	4 3/8	4 1/8	(4) 9/32	—
7K22	L	9	6 1/2	6 3/8	5 5/8	5 5/16	4 3/8	(4) 9/32	—
7K23	L	9	4 9/16	4 3/8	3 7/8	3 3/4	3 3/8	(4) 13/64	—
7K24	L	9	5 3/8	4 7/8	4 5/8	4 3/8	3 3/8	(4) 9/32	—
K725	L	9	6 1/2	6	5 5/8	5 5/16	3 3/4	(4) 9/32	—
7K26	L	9	6 1/2	7 3/4	5 5/8	5 5/16	5 1/8	(4) 9/32	—
7K27	L	9	4 3/16	3 5/8	3 1/2	3 7/16	3	(4) 13/64	—
7K28	L	9	5 3/8	4 1/4	4 5/8	4 3/8	3 1/8	(4) 9/32	—
7K29	L	9	5 3/8	4 3/4	4 5/8	4 3/8	3 7/8	(4) 9/32	—
7K30	L	9	6 1/2	5 3/4	5 5/8	5 5/16	4 1/8	(4) 9/32	—

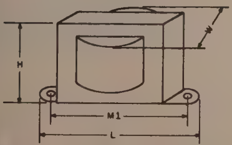

FIG. 6

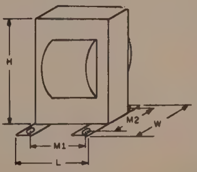

FIG. 7

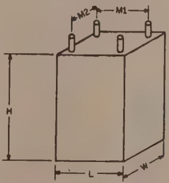

FIG. 8

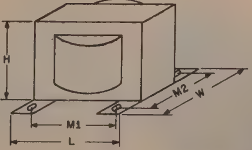

FIG. 9

STERLING TRANSFORMER CORP.
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STACO *variable transformers*

The most versatile and reliable voltage controls available today are variable autotransformers. They are widely used as basic components in the control of voltage, current, power, heat, speed, light and electro-mechanical force in many industrial and laboratory applications.

Staco Variable Autotransformers deliver continuously adjustable output voltage from AC power lines without introducing any wave form distortion or SCR generated noise. All STACO variables offer precious metal-plated commutators, excellent regulation, high efficiency, conservative ratings and feature extremely rugged construction which includes a high temperature foundation material for the commutator surface. This material provides a transformer with a greater tolerance to transients and short term overloads, effectively increasing the reliability of the transformer.

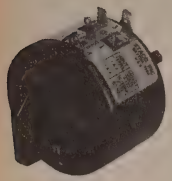


FIG. A

Models are available in various configurations from 1.75 to 300 ampere rating. Choose from panel mounted units, cord and plug types, ganged and/or motor-driven metered models and fully portable deluxe models with or without metering.

Your STACO distributor is capable of assisting you in selecting the particular transformer best suited for your application. Should you require a special or non-standard product for your particular need, STACO's Engineering staff will respond quickly with solutions to your requirements. Often it just requires minor revisions to standard components enabling STACO to keep your costs at a minimum.

Prices shown are List Prices. Contact your STACO distributor or Representative for quantity discount schedule.

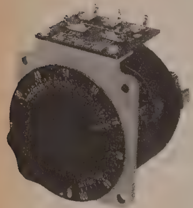


FIG. B

120 VOLT INPUT SINGLE PHASE PANEL MOUNTING

Available in cased or uncased units designed for mounting on panels 1/4" to 5/8" thick. Most units also can be bench mounted.

MFG. TYPE NO.	FIG.	OUTPUT VOLTS	OUTPUT AMPS	KVA	SIZE (INCHES) H x W x D	WT. LBS.	PRICE
171	A	*0-120/132	1.75	0.23	2-13/16 x 2-1/16	3.0	$ 14.96
201	A	*0-120/132	2.0	0.26	2-13/16 x 2-1/16	3.0	15.23
221	A	*0-120/132	2.25	0.30	2-13/16 x 2-1/4	3.2	15.70
251	A	*0-120/132	2.5	0.33	2-13/16 x 2-7/16	3.5	16.12
291	A	*0-120/132	3.0	0.40	2-13/16 x 2-7/16	3.5	16.59
371	B	*0-120/140	3.75	0.53	3-3/4 x 3-3/4 x 3-1/4	5.0	24.00
501	B	0-120/140	5.0	0.70	3-3/4 x 3-3/4 x 3-5/16	6.0	24.11
1010	B	0-120/140	10.0	1.4	5-5/16 x 5 x 4-3/16	12.0	31.75
1010CT	H	0-120/140	10.0	1.4	6-7/8 x 5 x 4-7/16	12.0	42.49
1210	B	**0-120	12.0	1.4	5-5/16 x 5 x 4-3/16	12.0	34.10
1210CT	H	**0-120	12.0	1.4	6-7/8 x 5 x 4-7/16	12.0	44.10
1510	C	0-120/140	15.0	2.1	6-1/8 x 6-5/8 x 4-3/8	20.0	58.21
2510	C	0-120/140	25.0	3.5	8-3/16 x 7-5/8 x 4-1/8	23.0	84.67
2510CT	J	0-120/140	25.0	3.5	9-5/8 x 7-5/8 x 4-1/8	23.0	101.75
5010	C	0-140	50.0	7.0	12-1/2 x 12-1/2 x 6-1/2	60.0	213.15
5010CT	J	0-140	50.0	7.0	15-5/8 x 14 x 6-1/2	60.0	238.20

CT refers to enclosed coil and terminals *60 cycle operation only at overvoltage **60 cycle operation only

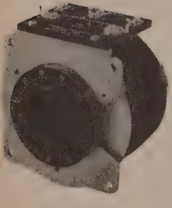


FIG. C

240 VOLT INPUT SINGLE PHASE PANEL MOUNTING

Designed for mounting on panels 1/4" to 5/8" thick

MFG. TYPE NO.	FIG.	OUTPUT VOLTS	OUTPUT AMPS	KVA	SIZE (INCHES) H x W x D	WT. LBS.	PRICE
252	A	0-240/264	0.8	0.19	2-13/16 x 2-7/16	3.5	$ 25.28
1020	B	0-240/280	3.5	0.98	5-5/16 x 5 x 4-3/16	12.0	38.22
1020CT	H	0-240/280	3.5	0.98	6-7/8 x 5 x 4-7/16	12.0	47.28
1220	B	**0-240	5.0	1.2	5-5/16 x 5 x 4-3/16	12.0	40.57
1220CT	H	**0-240	5.0	1.2	6-7/8 x 5 x 4-7/16	12.0	49.98
1520	C	0-240/280	9.5	2.7	6-1/8 x 6-5/8 x 4-13/16	20.0	58.21
1520CT	J	0-240/280	9.5	2.7	6-3/8 x 9-1/8 x 5	20.0	73.08
2520	C	0-240/280	10.0	2.8	8-3/16 x 7-5/8 x 4-1/8	23.0	84.67
2520CT	J	0-240/280	10.0	2.8	9-5/8 x 7-5/8 x 4-1/8	23.0	101.75
5020	C	0-240/280	28.0	7.8	12-1/2 x 12-1/2 x 6-1/2	60.0	205.80
5020CT	J	0-240/280	28.0	7.8	15-5/8 x 14 x 6-1/2	60.0	238.20

**60 Cycle Operation Only

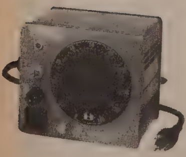


FIG. D

120 VOLT INPUT SINGLE PHASE CORD & PLUG TYPE

All models feature a protective housing for coil and terminal board and have line cord, matching receptacle, switch, pilot light, fuse and are connected for clockwise knob rotation. Models available with 2 conductor line cord and receptacle (2PF) or a 3-conductor grounded line cord and receptacle (3PN)

MFG. TYPE NO.	FIG.	OUTPUT VOLTS	OUTPUT AMPS	KVA	SIZE (INCHES) H x W x D	WT. LBS.	PRICE
2PF171	D	**0-132	1.75	0.23	3-15/16 x 3-15/16 x 3-1/2	3.5	$ 29.45
3PN171	D	**0-132	1.75	0.23	3-15/16 x 3-15/16 x 3-1/2	3.5	35.39
2PF371	D	*0-120/140	3.75	0.53	5-3/8 x 6-1/16 x 5-5/8	7.0	35.39
3PN371	D	*0-120/140	3.75	0.53	5-3/8 x 6-1/16 x 5-5/8	7.0	41.27
2PF501	D	0-120/140	5.0	0.70	5-3/8 x 6-1/16 x 5-5/8	9.0	38.85
3PN501	D	0-120/140	5.0	0.70	5-3/8 x 6-1/16 x 5-5/8	9.0	44.78
2PF1010	E	0-120/140	10.0	1.4	5 x 6-7/8 x 5-5/8	12.0	42.92
3PN1010	E	0-120/140	10.0	1.4	5 x 6-7/8 x 5-5/8	12.0	49.50
2PF1210	E	**0-120	12.0	1.4	5 x 6-7/8 x 5-5/8	12.0	50.09
3PN1210	E	**0-120	12.0	1.4	5 x 6-7/8 x 5-5/8	12.0	55.86
2PF1510	F	0-120/140	15.0	2.1	5-7/8 x 6-3/8 x 9	21.0	81.73
3PN1510	F	0-120/140	15.0	2.1	5-7/8 x 6-3/8 x 9	21.0	81.73
2PF2210	F	0-140	22.0	2.4	5-5/8 x 7-5/8 x 10-3/4	24.0	118.78
3PN2210	F	0-140	22.0	2.4	5-5/8 x 7-5/8 x 10-3/4	24.0	118.78

*60 cycle operation only on overvoltage
**60 cycle operation only

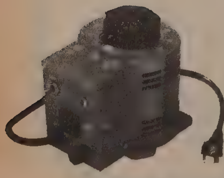


FIG. E

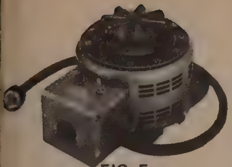


FIG. F

240 VOLT INPUT SINGLE PHASE CORD AND PLUG TYPE

Same physical specifications as 120 volt cord and plug types.

MFG. TYPE NO.	FIG.	OUTPUT VOLTS	OUTPUT AMPS	KVA	SIZE (INCHES) H x W x D	WT. LBS.	PRICE
2PF1020	E	0-240/280	3.5	0.98	5 x 6-7/8 x 5-5/8	12.0	$51.16
3PN1020	E	0-240/280	3.5	0.98	5 x 6-7/8 x 5-5/8	12.0	58.21
2PF1220	E	**0-240	5.0	1.2	5 x 6-7/8 x 5-5/8	12.0	56.54
3PN1220	E	**0-240	5.0	1.2	5 x 6-7/8 x 5-5/8	12.0	59.39
2PF1520	F	0-240/280	9.5	2.7	5-7/8 x 6-3/8 x 9	21.0	83.19
3PN1520	F	0-240/280	9.5	2.7	5-7/8 x 6-3/8 x 9	21.0	83.19
2PF2520	F	0-280	10.0	2.8	5-5/8 x 7-5/8 x 10-3/4	24.0	118.78
3PN2520	F	0-280	10.0	2.8	5-5/8 x 7-5/8 x 10-3/4	24.0	118.78

**60 cycle operation only

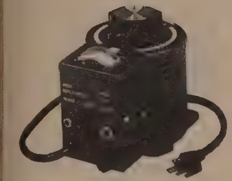


FIG. G

120 VOLT & 240 VOLT INPUT METERED CORD & PLUG TYPES

Staco's new series of Metered Cord & Plug type variable transformers eliminate the need for separate metering. Featuring an accurate, high quality pivot and jewel meter conveniently located atop the enclosure for easy, accurate readout. 120V models have 0-150V meter, 240V models have 0-300V meter.

MFG. TYPE NO.	FIG.	INPUT VOLTS	OUTPUT VOLTS	OUTPUT AMPS	KVA	SIZE (INCHES) H x W x D	WT. LBS.	PRICE
2PF1010V	G	120	0-140	10.0	1.4	5 x 6-7/8 x 5-5/8	12.0	$68.09
3PN1010V	G	120	0-140	10.0	1.4	5 x 6-7/8 x 5-5/8	12.0	70.35
2PF1020V	G	240	0-280	3.5	0.98	5 x 6-7/8 x 5-5/8	12.0	77.81
3PN1020V	G	240	0-280	3.5	0.98	5 x 6-7/8 x 5-5/8	12.0	80.12

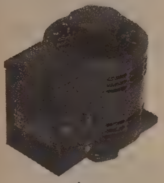


FIG. H

120 VOLT INPUT VARIABLE ISOLATION TRANSFORMERS

An exclusive by STACO, for use where the safety of isolation is required. The output voltage is completely isolated from the power line (input voltage). Additional outputs are available on uncased models. These outputs include voltage doubler, series and non-isolated when hooked to the proper terminal supplied.

MFG. TYPE NO.	FIG.	OUTPUT VOLTS	OUTPUT AMPS	KVA	SIZE (INCHES) H x W x D	WT. LBS.	PRICE
J201	B	0-140	2.0	0.28	5-5/6 x 5 x 4-3/4	7.0	$ 49.77
J401	B	0-140	4.0	0.56	6-1/8 x 6-5/8 x 4-7/16	13.0	109.31
J901	C	0-140	9.0	1.26	8-3/16 x 7-5/8 x 4-3/4	25.0	146.48

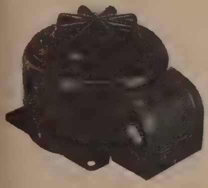


FIG. J

DELUXE VARIABLE TRANSFORMERS

Fully portable deluxe models, available with or without metering. Suitable for use in any industrial, classroom or laboratory application. All units supplied in a ventilated case of extruded aluminum and baked-epoxy painted steel. Permanent etched legends, convenient carrying handle, control knobs with positive stops, output receptacles and switches on front panel, pilot lights, circuit breakers, and full view meters.

MFG. TYPE NO.	FIG.	INPUT VOLTS	OUTPUT VOLTS	OUTPUT AMPS	KVA	SIZE (INCHES) H x W x D	WT. LBS.	PRICE
E171	K	**120	0-132	1.75	0.23	4-3/8 x 10-13/16 x 3-5/8	8.0	$ 41.27
E371	K	120	0-120/140	3.75	0.52	6-1/8 x 11-1/4 x 5	15.0	49.51
E501	K	120	0-120/140	5.0	0.7	6-1/8 x 11-1/4 x 5	16.0	51.87
E501V	L	120	0-120/140	5.0	0.7	6-1/8 x 17-5/8 x 5-7/8	20.0	94.40
E501VA	L	120	0-120/140	5.0	0.7	10 x 15-1/16 x 5-7/8	25.0	156.24
E501VAW	L	120	0-120/140	5.0	0.7	10 x 15-1/16 x 5-7/8	28.0	245.18
E1010	K	120	0-120/140	10.0	1.4	6-1/8 x 11-15/16 x 5-7/8	20.0	91.93
E1010V	L	120	0-120/140	10.0	1.4	6-3/16 x 17-5/8 x 5-7/8	27.0	117.86
E1010VA	L	120	0-120/140	10.0	1.4	10 x 15-1/16 x 5-7/8	33.0	185.69
E1010VAW	L	120	0-120/140	10.0	1.4	10 x 15-1/16 x 5-7/8	35.0	272.90

V = Voltmeter VA = Voltmeter, Ammeter VAW = Voltmeter, Ammeter, Wattmeter

**60 cycle operation only

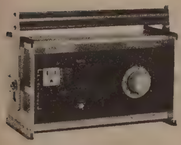


FIG. K

DELUXE ISOLATED VARIABLE TRANSFORMERS

MFG. TYPE NO.	FIG.	INPUT VOLTS	OUTPUT VOLTS	OUTPUT AMPS	KVA	SIZE (INCHES) H x W x D	WT. LBS.	PRICE
EJ201V†	L	120	0-140	2.0	0.28	6-3/16 x 17-5/8 x 5-7/8	16.0	$ 113.30
EJ401V†	L	120	0-140	4.0	0.56	10 x 15-1/32 x 5-7/8	30.0	146.48
EJ901V†	L	120	0-140	9.0	1.26	10 x 16-5/32 x 7-1/2	43.0	207.17

†Denotes deluxe variable transformers

EJ201V, EJ401V, EJ901V have 0-140 VAC and 0-140 VDC isolated outputs at full rated current available from banana jacks.

Prices shown are List Prices. Contact your STACO distributor or Representative for quantity discount schedule.

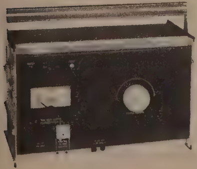


FIG. L

STACO
INCORPORATED
2240 E. Third St., Dayton, Ohio 45403
(513) 253-1191 • TWX: 810/459-1798 • TELEX: 288-032

For information on pushbutton switches, indicators, and pushbutton matrix switch systems, see our pages in the Displays & Readouts section, pages 2•1114, 2•1115.

Technitrol, Inc.

H CASE TRANSFORMERS (Also available in all cases shown)

Turns Ratio Tolerance ±5%	Part No.	Lm µH ±20%	Leakage Inductance Max. Value in µH L		Winding Resistance Max. Value in Ohms			Interwinding Cap. Max. Value in pF		Effective Distributed Capacity Shunting Winding N_1 Max. Value in pF C_D (1, 3, 5 gnd)	ET Rating Volt-µsec Minimum
			L_L (N_1-N_2)	L_L (N_1-N_3)	R(N_1)	R(N_2)	R(N_3)	C_1 (N_1-N_2)	C_1 (N_1-N_3)		
1:1:1	11PHC	2,000	1.2	1.2	2.7	2.7	2.7	47	47	5	20
	11LHA	750	0.7	0.7	1.8	1.8	1.8	26	26	4	14
	11HHB	250	0.5	0.5	1.1	1.1	1.1	16	16	4	9
	11EHA	70	0.7	0.7	1.8	1.8	1.8	23	23	4	9
	11DHB	48	0.5	0.5	1.4	1.4	1.4	21	21	4	8
	11BHC	25	0.4	0.4	1.1	1.1	1.1	15	15	4	5.8
	11AHA	15	0.4	0.4	0.9	0.9	0.9	13	13	4	4.6
	118HA	7.5	0.4	0.4	0.7	0.7	0.7	11	11	4	3.5
2:1:1	21PHA	2,500	7.0	8.4	2.8	1.6	1.6	24	22	6	22
	21LHA	750	4.0	4.2	1.7	1.0	1.0	13	12.8	4.5	14
	21HHA	250	2.5	2.6	1.0	0.7	0.7	10	9.7	4	9
	21EHA	70	2.0	2.1	1.8	1.0	1.0	13.7	12.4	4	9
	21DHA	48	1.9	2.0	1.4	0.8	0.8	13	11	4	8
	21BHA	24	1.5	1.6	1.1	0.7	0.7	9.7	8.9	4	5.8
	21AHA	13.5	1.0	1.1	0.9	0.6	0.6	8.5	7.9	3	4.4
	218HA	6.7	0.8	0.9	0.7	0.5	0.5	7.2	6.5	3	3.4
3:1:1	31PHA	2,500	6.5	7.0	2.8	1.2	1.2	21	17	5	22
	31LHA	750	4.0	4.4	1.7	0.8	0.8	10.5	9.1	4	14
	31HHA	250	1.8	2.0	1.0	0.6	0.6	9	8	4	9
	31EHA	68	2.8	3.3	1.8	0.8	0.8	10.8	10.5	4	9
	31DHA	52	2.5	3.0	1.4	0.7	0.7	10.5	9.5	4	8
	31BHA	25	1.8	1.9	1.1	0.6	0.6	8	7.3	3	5.8
	31AHA	15	1.6	1.7	0.9	0.5	0.5	7.2	6.5	3	4.6
	318HA	7.5	1.3	1.4	0.7	0.4	0.4	6.1	5.9	3	3.5
3:3:1	33PHA	2,500	3.0	8.0	2.8	3.1	1.2	30	17	6	22
	33LHA	750	1.3	5.0	1.7	1.8	0.8	18	9.1	5	14
	33HHA	250	0.9	2.0	1.0	1.1	0.6	12	8	5	9
	33EHA	68	1.2	6.0	1.8	1.8	0.8	18.3	10.5	5	9
	33DHA	52	1.0	3.1	1.4	1.4	0.7	16.8	9.2	5	8
	33BHA	25	0.7	1.9	1.1	1.1	0.6	12.4	7.5	4	5.8
	33AHB	15	0.7	1.7	0.9	0.9	0.5	10.3	6.6	4	4.6
	338HA	7.5	0.6	1.4	0.7	0.7	0.4	8.6	5.9	4	3.5
4:2:1	42PHA	2,500	5.0	6.0	2.8	1.6	0.9	24	13.6	5.5	22
	42LHA	750	2.5	4.0	1.7	1.0	0.7	13	7.9	4.5	14
	42HHA	250	1.5	2.4	1.0	0.7	0.5	10	7.2	4	9
	42EHA	77	3.5	5.7	1.8	1.0	0.7	14.2	9.4	4.5	9
	42DHA	53	2.8	5.0	1.4	0.8	0.6	12	8.1	4	8
	42CHA	28	1.8	2.5	1.1	0.7	0.4	10	6.9	4	6
	42AHA	13.5	1.3	2.3	0.9	0.6	0.4	8.2	6.1	4	4.4
	429HA	8.8	1.0	2.2	0.7	0.5	0.4	7.5	5.6	3	3.7

Case	L	W	H
H	.500	.350	.250
G	.650	.425	.350
A	.790	.495	.3125
F	.365	.235	.400
K	.560	.560	.450
M	.500	.350	.250
Z	.485	.350	.350

- Leads Out Bottom
- Temperature Stable and Special Low Leakage Versions Available
- Many Other Units Available in Other Cases and Combinations of Parameters
- **Contact Factory Direct or Write for Catalog**

BALANCED CENTER TAPPED TRANSFORMERS

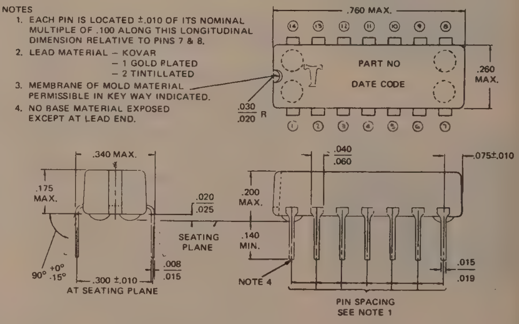
Turns Ratio Tolerance ±2%	Part No.	mH ±20%	Leakage Inductance Max. Value in µH L_L (N_1-N_3)	Winding Resistance Max. Value in Ohms		Interwinding Cap. Max. Value in pF C_1 (N_1-N_3)	Effective Distributed Capacity Shunting Winding N_1 Max. Value in pF C_D (1, 6 gnd)	ET Rating Volt-µsec Minimum
				R(N_1)	R(N_3)			
1CT:1CT	1ZSHA	6.0	1.26	5.0	5.0	78	9	32
	1ZPHA	2.2	.78	2.9	2.9	42	7	21
	1ZKHA	.40	.56	1.4	1.4	15	5	10.5
	1ZGHA	.14	.49	0.9	0.9	9.7	4.5	6.8

DUAL-IN-LINE PACKAGING

Up to four pulse transformers can be mounted on a common lead frame and encapsulated by transfer moulding. This new concept is compatible with the "DIL" packaging of the Integrated Circuit Industry. The lead frame has no exposed base metal. Optimum pin arrangements and elevated seating plane of the case allow maximum clearance above pad area to enhance board cleaning after assembly and to accommodate other circuits without danger of shorting to the case pins. Controlled manufacturing processes and automatic selection and grading of cores provides maximum reliability. Improved features of the new DIL packages include automated handling for test and insertion, increased PC board packing density, uniform and repetitive PC board hole layout, and minimum ultimate cost.

Specialists in pulse transformers and completely transfer molded, welded DIP delay lines under 3/16" high — to 250 ns.

14 LEAD — TECO #166-2100-245 — (See Note 2)


NOTES
1. EACH PIN IS LOCATED ±.010 OF ITS NOMINAL MULTIPLE OF .100 ALONG THIS LONGITUDINAL DIMENSION RELATIVE TO PINS 7 & 8.
2. LEAD MATERIAL – KOVAR
   – 1 GOLD PLATED
   – 2 TINTILLATED
3. MEMBRANE OF MOLD MATERIAL PERMISSIBLE IN KEY WAY INDICATED.
4. NO BASE MATERIAL EXPOSED EXCEPT AT LEAD END.

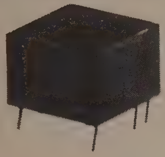
Technitrol, Inc.

1952 E. Allegheny Avenue
Philadelphia, Pa. 19134 (215) 426-9105

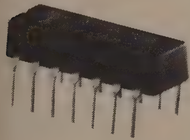
Technitrol, Inc.

LEAD CENTERS (Centered in Case)

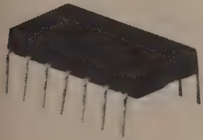
Across Max. Dim.	Across Min. Dim.
.400	.10
.500	.15
.600	.20
.140	.15
.400	.20
.400	.10
.375	.125



Z



DIP



Special

G CASE TRANSFORMERS (Also available in A, K cases)

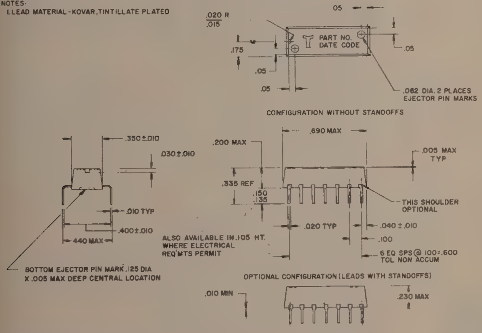
Turns Ratio Tolerance ±5%	Part No.	Lm mH ±20%	Leakage Inductance Max. Value in μH L_L (N_1-N_2)	L_L (N_1-N_3)	Winding Resistance Max. Value in Ohms R(N_1)	R(N_2)	R(N_3)	Interwinding Cap. Max. Value in pF C_1 (N_1-N_2)	C_1 (N_1-N_3)	Effective Distributed Capacity Shunting Winding N_1 Max. value in pF C_D (1, 3, 5 gnd)	ET Rating Volt-μsec Minimum
1:1:1	11GGA	0.12	0.5	0.5	1.0	1.0	1.0	13.0	13.0	5	10
	11KGB	0.5	0.7	0.7	1.9	1.9	1.9	24.0	24.0	7	21
	11NGB	1.4	0.9	0.9	2.9	2.9	2.9	36.8	36.8	8	35
	11RGD	5.0	2.2	2.2	5.3	5.3	5.3	77.0	77.0	9	67
	11UGA	12.5	3.0	3.0	8.9	8.9	8.9	127.0	127.0	16	105
2:1:1	21GGA	0.12	1.4	1.5	1.0	0.6	0.6	9.3	7.9	4	10
	21KGA	0.5	2.4	2.5	1.9	1.0	1.0	14.3	12.6	6	21
	21NGB	1.4	2.6	2.7	2.9	1.6	1.6	20.3	17.6	7	35
	21RGA	5.0	7.0	9.1	5.3	2.9	2.9	38.5	33.6	10	67
	21UGA	12.5	12.0	14.5	8.9	4.6	4.6	57.5	39.4	12	105
3:1:1	31GGA	0.12	2.0	2.1	1.0	0.5	0.5	7.9	7.1	4	10
	31KGA	0.5	3.8	3.9	1.9	0.8	0.8	13.8	12.4	6	21
	31NGA	1.3	5.1	5.2	2.9	1.2	1.2	15.9	14.1	8	35
	31RGB	5.0	6.7	7.8	5.3	2.0	2.0	31.6	26.1	12	67
	31UGA	12.5	13.3	15.0	8.9	3.2	3.2	43.5	36.2	15	105
3:3:1	33GGA	0.12	1.3	2.4	1.0	1.0	0.5	11.1	6.9	5	10
	33KGA	0.5	1.4	2.5	1.9	1.9	0.8	19.9	11.4	7	21
	33NGA	1.3	1.5	3.6	2.9	2.9	1.2	28.6	14.8	8	35
	33RGB	5.0	4.5	9.0	5.3	5.3	2.0	49.5	24.7	13	67
	33UGA	12.5	12.5	14.0	8.9	8.9	3.2	75.0	40.0	16	105
4:2:1	42GGB	0.12	1.2	2.8	1.0	0.6	0.5	8.9	6.5	5	10
	42KGA	0.5	2.6	3.4	1.9	1.0	0.6	13.4	9.0	6	21
	42NGA	1.4	3.0	6.5	2.9	1.6	0.9	20.3	12.8	8	35
	42RGA	5.0	6.0	8.0	5.3	2.9	1.4	34.1	20.1	11	67
	42UGA	12.5	12.0	20.0	8.9	4.6	2.4	55.0	30.0	12	105

BALANCED CENTER TAPPED TRANSFORMERS

Turns Ratio Tolerance ±2%	Part No.	Lm mH ±20%	Leakage Inductance Max. Value in μH L_L (N_1-N_3)	Winding Resistance Max. Value in Ohms R(N_1)	R(N_3)	Interwinding Cap. Max. Value in pF C_1 (N_1-N_3)	Effective Distributed Capacity Shunting Winding N_1 Max. Value in pF C_D (1, 6 gnd)	ET Rating Volt-μsec Minimum
1CT:1CT	1ZMGA	1.0	1.5	2.8	2.8	30	9	30
	1ZQGA	3.3	2.0	4.8	4.8	54	11	55
	1ZTGA	11.0	3.0	8.6	8.6	125	14	96
	1ZWGA	33.0	5.0	15.2	15.2	240	21	180

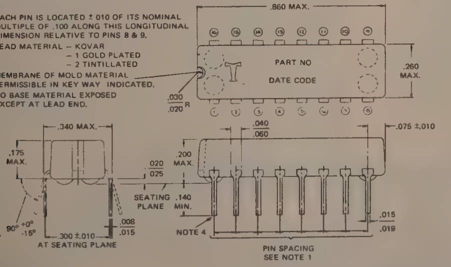
SPECIAL DIP — TECO #166-2100-267

NOTES:
1. LEAD MATERIAL - KOVAR, TINTILLATE PLATED


.020 R
.015
05
.175
PART NO.
DATE CODE
.05
.05
.05
.062 DIA. 2 PLACES
EJECTOR PIN MARKS
CONFIGURATION WITHOUT STANDOFFS
.350±.010
.030±.010
.010 TYP
.400±.010
.440 MAX
BOTTOM EJECTOR PIN MARK .125 DIA
X .005 MAX DEEP CENTRAL LOCATION
.690 MAX
.200 MAX
.005 MAX
TYP
.335 REF
.150
.135
THIS SHOULDER
OPTIONAL
.020 TYP
.040 ± .010
.100
ALSO AVAILABLE IN .105 HT.
WHERE ELECTRICAL
REQ'MTS PERMIT
6 EQ SPS @ .100=.600
TOL NON ACCUM
OPTIONAL CONFIGURATION (LEADS WITH STANDOFFS)
.010 MIN
.230 MAX

16 LEAD — TECO #166-2100-247 — (See Note 2)

NOTES:
1. EACH PIN IS LOCATED ± .010 OF ITS NOMINAL MULTIPLE OF .100 ALONG THIS LONGITUDINAL DIMENSION RELATIVE TO PINS 8 & 9.
2. LEAD MATERIAL – KOVAR
   – 1 GOLD PLATED
   – 2 TINTILLATED
3. MEMBRANE OF MOLD MATERIAL PERMISSIBLE IN KEY WAY INDICATED.
4. NO BASE MATERIAL EXPOSED EXCEPT AT LEAD END.


.860 MAX.
16
15
14
13
12
11
10
9
PART NO
DATE CODE
.260
MAX.
.030
.020 R
1
2
3
4
5
6
7
8
.340 MAX.
.175
MAX.
90° +0°
-15°
.300 ±.010
AT SEATING PLANE
.008
.015
.020
.025
SEATING
PLANE
.140
MIN.
.200
MAX.
.040
.060
.075 ±.010
NOTE 4
.015
.019
PIN SPACING
SEE NOTE 1

DUAL-IN-LINE PACKAGING

Contact Local Representative or Factory Direct With Specific Application or Requirements.

ELECTRICAL CHARACTERISTICS

L_m — UP to 2.0 mh maximum for 1:1 turns ratio.
UP to 8.0 mh maximum for inductors.
"Special Dip"
UP to 5.0 mh maximum for 1:1 turns ratio.
UP to 20.0 mh maximum for inductors.

L_L — As low as 0.02% of L_m for the highest permeability cores when C_I is not critical.

C_I — As low as 3.0 pfd for the highest permeability cores when L_L is not critical.

$L_L \times C_I$ — Lowest $L_L \times C_I$ product available in the industry.

POWER

"ET" ratings up to 7.0 volt μsec. for an L_M = 1.0 mh.

"Special Dip" "ET" ratings up to 15 volt μsec. for an L_M = 2.0 mh.

Specialists in pulse transformers and completely transfer molded, welded DIP delay lines under 3/16" high — to 250 ns.

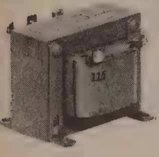
Technitrol, Inc.
1952 E. Allegheny Avenue
Philadelphia, Pa. 19134 (215) 426-9105

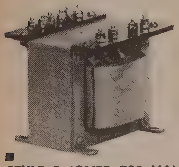
TODD ENGINEERED

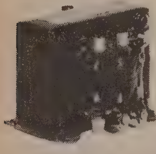
- NAME PLATES
- WIRING DIAGRAMS

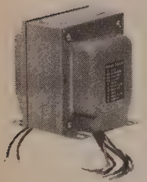
HIGH CURRENT TRANSFORMERS

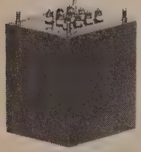
- 45° TEMP. RISE
- MINIMUM REGULATION


STYLE B


STYLE B (OVER 700 VA)


STYLE BE


STYLE V


STYLE CM

FOUR STYLES STOCKED IN DEPTH

SECONDARY VOLTS TAP VOLTS	PART NO.	PRIMARY VOLTS 50-500 Hz	RATING VA	SECONDARY AMPS (RMS) SERIES HOOKUP	SECONDARY AMPS (RMS) PARALLEL HOOKUP
10 VOLTS Series 2.5 - 5 - 7.5 - 10 Parallel 2.5 - 5	10 02	115	20	2	4
	10 05	115	50	5	10
	10 10	115	100	10	20
	10 20	115	200	20	40
12.6 VOLTS Series 3.1 - 6.3 - 9.4 - 12.6 Parallel 3.1 - 6.3	12 02	115	24	2	4
	12 05	115	60	5	10
	12 10	115	120	10	20
	12 20	115	240	20	40
24 VOLTS Series 6 - 12 - 18 - 24 Parallel 6 - 12	24 01	115	24	1	2
	24 02	115	48	2	4
	24 04	115	96	4	8
	24 06	115	144	6	12
	24 08	115	192	8	16
	24 12	105, 115, 125	288	12	24
	24 20	105, 115, 125	480	20	40
	24 25	105, 115, 125	600	25	50
	24 30	105, 115, 125	720	30	60
	24 50	105, 115, 125	1200	50	100
	24 100	115, 230	2400	100	200
36 VOLTS Series 9 - 18 - 27 - 36 Parallel 9 - 18	36 00	115	18	0.5	1
	36 01	115	36	1	2
	36 02	115	72	2	4
	36 04	115	144	4	8
	36 06	115	216	6	12
	36 08	105, 115, 125	288	8	16
	36 12	105, 115, 125	432	12	24
	36 20	105, 115, 125	720	20	40
	36 25	105, 115, 125	900	25	50
	36 30	105, 115, 125	1080	30	60
	36 50	115, 230	1800	50	100
	36 100	115, 230	3600	100	200
56 VOLTS Series 14 - 28 - 42 - 56 Parallel 14 - 28	56 00	115	28	0.5	1
	56 01	115	56	1	2
	56 02	115	112	2	4
	56 04	115	224	4	8
	56 06	115	336	6	12
	56 08	105, 115, 125	448	8	16
	56 12	105, 115, 125	672	12	24
	56 25	105, 115, 125	1400	25	50
	56 50	115, 230	2800	50	100
	56 100	115, 230	5600	100	200
64 VOLTS Series 16 - 32 - 48 - 64 Parallel 16 - 32	64 00	115	32	0.5	1
	64 01	115	64	1	2
	64 02	115	128	2	4
	64 04	115	256	4	8
	64 06	115	384	6	12
	64 08	105, 115, 125	512	8	16
	64 12	105, 115, 125	768	12	24
	64 25	105, 115, 125	1600	25	50
	64 50	115, 230	3200	50	100
80 VOLTS Series 20 - 40 - 60 - 80 Parallel 20 - 40	80 00	115	40	0.5	1
	80 01	115	80	1	2
	80 02	115	160	2	4
	80 05	115	400	5	10
	80 10	105, 115, 125	800	10	20
	80 25	115, 230	2000	25	50
	80 50	115, 230	4000	50	100
120 VOLTS Series 30 - 60 - 90 - 120 Parallel 30 - 60	120 00	115	60	0.5	1
	120 01	115	120	1	2
	120 02	115	240	2	4
	120 04	115	480	4	8
	120 08	105, 115, 125	960	8	16
	120 12	105, 115, 125	1400	12	24
	120 20	105, 115, 125	2400	20	40
180 VOLTS Series 45 - 90 - 135 - 180 Parallel 45 - 90	180 00	115	90	0.5	1
	180 01	115	180	1	2
	180 02	115	360	2	4
	180 05	115	640	5	10
	180 10	105, 115, 125	1800	10	20
230 VOLTS Series 57.5 - 115 - 172.5 - 230 Parallel 57.5 - 115	230 00	115	115	0.5	1
	230 01	115	230	1	2
	230 02	115	460	2	4
	230 05	105, 115, 125	1150	5	10
	230 08	115, 230	1840	8	16
300 VOLTS Series 75 - 150 - 225 - 300 Parallel 175 - 150	300 00	115	150	0.5	1
	300 01	115	300	1	2
	300 02	115	600	2	4
	300 05	105, 115, 125	1500	5	10

DC TO RMS CONVERSION CHART

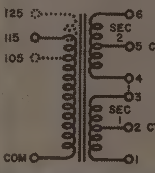
SECONDARY RMS CURRENT = DC CURRENT × FACTOR BELOW

	Choke Input Filter or Inductive Load	Resistive Load	Capacitor Input Filter or Capacitive Load
FULL WAVE BRIDGE	1.0	1.0	1.8
FULL WAVE C.T.	.7	1.0	1.15

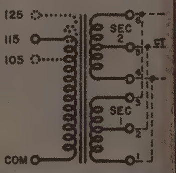
CERTIFIED DATA AVAILABLE

CUSTOM VARIATIONS QUOTED PROMPTLY

SERIES HOOKUP



PARALLEL HOOKUP



TODD SYSTEMS "HIGH CURRENT TRANSFORMERS & CHOKES" are designed for use in high power rectifier circuits, and high current A.C. applications. "TODD ENGINEERED" designs feature a nominal temperature rise of 45°C., at full load, thus providing outstanding overload capacity. All designs utilize extremely low regulation, varying from 10% in the smallest to 1% in the larger units.

Four styles . . . select the type best suited for your lab, test rigs, OEM or production equipment

ALL PRICES AND DATA SUBJECT TO CHANGE WITHOUT NOTICE

QUALITY ENGINEERED • PRECISION BUILT

TODD SYSTEMS INC.

4 RADFORD PLACE
YONKERS, N. Y., U.S.A.
(914) 963-3400

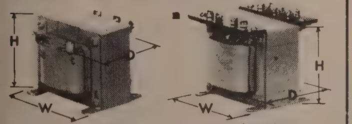
TODD ENGINEERED

HIGH CURRENT TRANSFORMERS

MECHANICAL SPECIFICATIONS • • • • • • • • • • • • SPECIFY STYLE REQUIRED

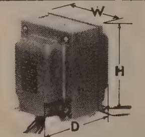
• BRACKET MTD. (STYLE B) • ENCAPSULATED (STYLE BE)						STYLE B	STYLE BE	• FULLY MTD. SHELLS (STYLE V)						STYLE V	• HERMETIC SEALED MIL-T (STYLE CM)						STYLE CM	
H	W	D	MW	MD	WGT.	PRICE	PRICE	H	W	D	MW	MD	WGT.	PRICE	H	W	D	MW	MD	WGT.	PRICE	PART NO.
2½	3	2⅛	2½	1½	1¼	9.86	27.08	3	2½	2¼	2	1¼	1¼	9.50	3 13/16	3½	3	2⅝	2⅛	2⅛	46.39	10 02
2½	3	2⅝	2½	2⅛	2½	14.01	33.53	3	2½	2⅞	2	1⅞	2½	12.57	3 13/16	3½	3	2⅝	2⅛	3½	51.91	10 05
3⅛	3¾	3¼	3⅛	2⅜	4¼	24.20	47.36	3⅞	3¼	3⅝	2½	2⅜	4¾	22.02	4 7/16	4½	3⅝	3 5/16	2 11/16	6½	59.92	10 10
3¾	4½	3⅞	3¾	2⅝	8¼	30.73	61.45	4½	3¾	4⅛	3	3	8¾	26.90	5 7/16	5	4¼	4 1/16	3 5/16	12	79.15	10 20
2½	3	2⅛	2½	1⅝	1½	11.81	28.75	3⅛	2½	2⅜	2	1¼	1¾	11.74	3 13/16	3½	3	2⅝	2⅛	2¾	48.17	12 02
2½	3	3	2½	2⅜	3	15.11	35.15	3⅛	2½	3⅛	2	2	3¼	13.13	3 13/16	3½	3	2⅝	2⅛	4¾	53.35	12 05
3¼	3¾	3⅝	3⅛	2⅛	5¼	25.93	51.27	3⅞	3¼	3⅝	2½	2½	5¼	23.16	4 7/16	4¼	3⅝	3 5/16	2 11/16	7½	67.52	12 10
3¾	4½	4⅛	3¾	2¾	9	33.15	67.24	4½	3¾	4¼	3	3⅛	9½	29.72	6¼	5¾	4⅞	4⅜	3½	12½	83.04	12 20
2½	3	2⅛	2½	1¾	1¾	11.74	28.52	3⅛	2½	2⅝	2	1½	2¼	11.58	3 13/16	3½	3	2⅝	2⅛	3⅜	47.83	24 01
2½	3	2½	2½	2	2¼	13.94	33.31	3⅛	2½	2⅞	2	1¾	2½	13.19	3 13/16	3½	3	2⅝	2⅛	3¾	51.27	24 02
3⅛	3¾	3⅜	3⅛	2⅛	4¼	17.74	39.17	3¾	3⅛	3⅜	2½	2⅛	4¼	15.68	4 7/16	4¼	3⅝	3 5/16	2 11/16	6¼	56.17	24 04
3½	4⅛	3⅜	3 7/16	2 5/16	6¼	24.25	50.13	4⅛	3½	3⅝	2¾	2½	6¾	21.43	4⅞	4⅝	3 15/16	3 11/16	3	9½	66.95	24 06
3½	4⅛	4	3 7/16	3	9	27.36	54.86	4¼	3½	4⅜	2¾	3⅜	8½	24.89	4⅞	4⅝	3 15/16	3 11/16	3	11½	73.13	24 08
3¾	4½	4⅞	3¾	3⅜	12	35.74	71.59	4½	3¾	5	3	3¾	12½	32.21	5 7/16	5	4¼	4 1/16	3 5/16	16	86.05	24 12
4⅜	5¼	5	4⅜	3½	16½	46.54	86.39	5¼	4⅜	5½	3½	3⅞	17	42.54	6¼	5¾	4⅞	4⅜	3½	22	98.10	24 20
4⅜	5¼	5⅝	4⅜	3⅞	19½	71.28	106.63	5¼	4⅜	6	3½	4⅜	20	58.79	6¼	5¾	4⅞	4⅜	3½	24½	132.21	24 25
■ 4⅜	5¼	6	4⅜	4⅜	21¼	74.95	112.71	5¼	4⅜	6⅜	3½	4¾	22	62.03	7½	6⅞	5 13/16	5 5/16	4¼	27½	140.13	24 30
■ 5⅜	6⅜	6⅜	5 5/16	5⅜	39	96.50	138.67	6½	5½	7⅜	4¼	5 5/16	43	85.36	7½	6⅞	5 13/16	5 5/16	4¼	52	174.90	24 50
■ 6⅛	7 1/16	8	5⅞	6½	64	139.67	201.95								8¾	8	6¾	6¾	5½	74	260.52	24 100
2 3/16	2⅝	1⅜	2 3/16	1½	1	9.62	25.81	2¾	2¼	2¼	1¾	1½	1¼	9.34	3 13/16	3½	3	2⅝	2⅛	2	45.52	36 00
2½	3	2⅛	2½	1⅞	1⅞	12.73	29.72	3⅛	2½	2¾	2	1⅝	2	12.21	3 13/16	3½	3	2⅝	2⅛	3	49.78	36 01
2⅞	3⅜	2¾	2 13/16	2¼	3¼	15.44	35.78	3½	2⅞	3¼	2¼	2 3/16	3⅝	13.77	4¼	3⅞	3 5/16	3	2 7/16	5¼	54.22	36 02
3½	4⅛	3½	3 7/16	2½	6¾	21.32	45.00	4¼	3½	4	2¾	2⅞	6¾	18.50	4⅞	4⅝	3 15/16	3 11/16	3	9½	62.17	36 04
3¾	4½	4¼	3¾	2⅝	8¼	31.27	62.33	4⅝	3⅞	4⅛	3	2⅞	9¼	28.37	5 7/16	5	4¼	4 1/16	3 5/16	13	79.96	36 06
3¾	4½	5⅛	3¾	3½	12½	35.74	71.59	4⅝	3⅞	5	3	3⅞	12¼	32.21	5 7/16	5	4¼	4 1/16	3 5/16	17	86.05	36 08
4 7/16	5¼	5¼	4⅜	3⅝	16¾	44.06	84.14	5½	4½	5¾	3½	4 1/16	17¼	40.22	6¼	5¾	4⅞	4⅜	3½	22	96.49	36 12
■ 5⅜	6⅜	4⅝	5 5/16	3¾	24	74.95	112.71	6½	5½	5¾	4¼	3¾	25	62.03	7½	6⅞	5 13/16	5 5/16	4¼	31	140.13	36 20
■ 5⅜	6⅜	5½	5 5/16	4	30	83.47	121.23	6½	5½	6	4¼	4	28	70.67	7½	6⅞	5 13/16	5 5/16	4¼	34	151.70	36 25
■ 5 5/16	6⅜	6	5 5/16	4¾	33	89.57	131.85	6½	5½	6¾	4¼	4¾	36	78.60	7½	6⅞	5 13/16	5 5/16	4¼	43	163.89	36 30
■ 6¼	7 1/16	7½	5⅞	6⅛	55	117.86	171.73								8¼	7 9/16	6⅝	5 13/16	4¾	61	218.56	36 50
■ 7½	9	9	7½	7	105	196.63	303.09															36 100
2 13/16	2⅝	1½	2 13/16	1⅝	1¼	12.11	28.98	2¾	2¼	2⅜	1¾	1¾	1⅝	11.17	3 13/16	3½	3	2⅝	2⅛	2¾	48.52	56 00
2½	3	2⅞	2½	2¼	2⅞	14.29	33.99	3	2⅝	2⅞	2	2	3¼	12.56	3 13/16	3½	3	2⅝	2⅛	4	52.44	56 01
3⅛	3¾	3¼	3⅛	2⅜	4¼	18.50	40.45	3⅞	3¼	3½	2½	2 5/16	4¾	16.12	4 7/16	4¼	3⅝	3 5/16	2 11/16	7½	58.30	56 02
3½	4⅛	4	3 7/16	3	9	27.84	55.25	4¼	3½	4½	2¾	3⅜	8½	23.71	4⅞	4⅝	3 15/16	3 11/16	3	12½	71.84	56 04
4⅜	5¼	4½	4⅜	2⅞	12	38.98	76.07	5 7/16	4½	4¾	3½	3⅛	12½	34.40	6¼	5¾	4⅞	4⅜	3½	16	90.38	56 06
4⅜	5¼	5	4⅜	3⅝	16¾	58.12	85.17	5 7/16	4½	5⅝	3½	4	18	40.52	6¼	5¾	4⅞	4⅜	3½	22½	96.02	56 08
■ 5 5/16	6⅜	4⅝	5 5/16	3 7/16	24	68.30	109.67	6½	5½	5½	4¼	3½	25	60.81	7½	6⅞	5 13/16	5 5/16	4¼	31	137.09	56 12
■ 5 5/16	6⅜	6⅜	5 5/16	5 5/16	39	101.85	148.23	6½	5½	7¼	4¼	5¼	39	82.42	7½	6⅞	5 13/16	5 5/16	4¼	45	190.53	56 25
■ 6¼	7 1/16	8½	5⅞	7¼	78	155.31	234.52								8¾	8	6¾	6¾	5½	85	285.56	56 50
■ 7½	9	11	7½	9	140	242.98	403.29															56 100
2½	3	2¼	2½	1⅞	2	12.73	31.58	3	2½	2⅝	2	1¾	2	11.42	3 13/16	3½	3	2⅝	2⅛	3¼	49.78	64 00
2½	3	2¾	2½	2⅜	3	15.16	35.26	3⅛	2⅝	3⅛	2	2⅛	2⅛	13.25	4 7/16	4¼	3⅝	3 5/16	2 11/16	3¾	53.47	64 01
3⅛	3¾	3¼	3⅛	2⅜	5	19.82	42.87	3⅞	3⅛	3⅝	2½	2⅜	4¾	18.78	5 15/16	4⅝	3 15/16	3 11/16	4⅞	7¼	60.60	64 02
3¾	4½	4⅜	3¾	3⅛	10	30.31	58.86	4⅝	3¾	4½	3	3⅜	11	25.94	5 7/16	5	4¼	4 1/16	3 5/16	15½	75.24	64 04
3¾	4½	5½	3¾	4⅜	15	41.21	79.76	4⅝	3¾	4⅞	3	3⅝	16	37.16	6¼	5¾	4⅞	4⅜	3½	22	93.15	64 06
4⅜	5¼	5⅛	4⅜	3¾	18	48.78	87.97	5½	4½	5⅞	3½	4¼	19¼	45.21	6¼	5¾	4⅞	4⅜	3½	25	99.91	64 08
■ 5½	6⅜	4⅞	5 5/16	3¾	27	77.38	114.66	6½	5½	5¾	4¼	3¾	27	64.82	7½	6⅞	5 13/16	5 5/16	4¼	32½	145.00	64 12
■ 6¼	7 1/16	7¼	5 13/16	5⅜	50	108.55	158.91								7½	6⅞	5 13/16	5 5/16	4¼	57	230.31	64 25
■ 7⅝	9	8¼	7½	6⅜	95	173.48	265.52								10⅜	8	6¾	6¾	5½	103	311.87	64 50
2½	3	2⅝	2½	2⅛	2½	13.72	32.38	3	2½	2⅞	2	2	2½	13.03	3 13/16	3½	3	2⅝	2⅛	3¾	50.59	80 00
2 13/16	3⅜	2⅞	2 13/16	2¼	3½	16.22	36.87	3½	2⅞	3¼	2¼	2¼	3⅝	14.51	4¼	3⅞	3 5/16	3	2 7/16	5¼	55.02	80 01
3 7/16	4⅛	3¼	3 7/16	2½	6½	22.94	47.41	4¼	3½	4	2¾	2⅞	6¾	19.76	4⅞	4⅝	3 15/16	3 11/16	3	9	64.87	80 02
4⅜	5¼	5	4⅜	3½	17	42.41	81.09	5 7/16	4½	5½	3½	3¾	17½	38.26	4 7/16	4¼	3⅝	3 5/16	2 11/16	21½	93.87	80 05
■ 5½	6⅜	5	5⅜	3⅞	30	79.37	118.73	6½	5½	6	4¼	4	31	66.19	7½	6⅞	5 13/16	5 5/16	4¼	36½	148.01	80 10
■ 6¼	7⅛	5⅞	5 13/16	4½	44	124.31	180.99								8¼	7 9/16	6⅝	5 13/16	4¾	48½	229.84	80 25
■ 7⅝	9	9¼	7½	7⅜	115	215.42	340.05															80 50
2 13/16	3⅜	2⅝	2 13/16	2⅛	3	14.64	34.68	3 7/16	2⅞	3⅛	2¼	2	3	13.03	4¼	3⅞	3 5/16	3	2 7/16	4¾	53.01	120 00
3⅛	3¾	3⅜	3⅛	2⅜	5	19.25	41.54	3⅞	3¼	3½	2½	2¼	4⅞	16.82	4 7/16	4¼	3⅝	3 5/16	2 11/16	6¾	59.35	120 01
3¾	4½	4⅝	3¾	3⅜	11	29.37	57.55	4⅝	3⅞	4⅝	3	3⅜	10½	25.37	5 7/16	5	4¼	4 1/16	3 5/16	14	74.90	120 02
4⅜	5¼	4⅞	4⅜	3½	16	46.09	85.56	5½	4½	5½	3 7/16	4	17	42.11	6¼	5⅜	4⅞	4⅜	3½	21¼	97.14	120 04
■ 5⅜	6⅜	6½	5 5/16	4½	35	86.25	125.87	6⅜	5 7/16	6⅜	4¼	4½	34	75.67	7½	6⅞	5 13/16	5 5/16	4¼	40½	158.71	120 08
■ 5⅜	6⅜	6⅞	5 5/16	5¾	45	104.59	152.18	6⅜	5 7/16	7⅝	4¼	5¾	47	97.44	7½	6⅞	5 13/16	5 5/16	4¼	51½	193.51	120 12
■ 6¼	7⅛	8¼	5 13/16	6⅜	64	139.66	201.95								8¼	7 9/16	6⅝	5 13/16	4¾	70½	260.52	120 20
3⅛	3¾	3⅜	3⅛	2⅛	4¼	17.34	38.15	3⅞	3 3/16	3½	2½	2¼	4¾	14.92	4 7/16	4¼	3⅝	3 5/16	2 11/16	6⅝	56.22	180 00
3 7/16	4⅛	3⅜	3 7/16	2½	5¾	24.41	49.78	4¼	3½	3⅞	2¾	2⅞	6½	21.12	4⅞	4⅝	3 15/16	3 11/16	3	8¾	67.24	180 01
4⅜	5¼	4¾	4⅜	3¼	15	38.74	73.36	5 7/16	4½	5⅜	3½	3⅛	15¾	33.19	6¼	5¾	4⅞	4⅜	3½	19½	88.36	180 02
■ 5 5/16	6⅜	5¾	5 5/16	4⅜	34	82.05	121.27	6⅜	5 7/16	6⅜	4¼	4⅜	32	70.47	7½	6⅞	5 13/16	5 5/16	4¼	39¼	151.30	180 05
■ 6¼	7 1/16	7½	5⅞	6⅛	54	168.54	171.73								7½	6⅞	5 13/16	5 5/16	4¼	57½	218.56	180 10
3⅛	3¾	3⅜	3⅛	2½	5	19.03	41.37	3⅞	3⅛	3⅝	2½	2½	5¼	16.48	4 7/16	4¼	3⅝	3 5/16	2 11/16	7½	59.46	230 00
3½	4⅛	4	3 7/16	3⅛	9½	28.24	55.56	4¼	3½	4⅝	2¾	3½	8½	24.53	4⅞	4⅝	3 15/16	3 11/16	3	11¼	72.89	230 01
4⅜	5¼	5¼	4⅜	4	18	46.70	84.70	5 7/16	4½	5⅞	3½	3⅝	18	40.43	6¼	5¾	4⅞	4⅜	3½	21¾	102.81	230 02
■ 5⅜	6⅜	6	5 5/16	4¾	36	91.63	134.90	6⅜	5 7/16	6⅞	4¼	4⅞	36	82.97	7½	6⅞	5 13/16	5 5/16	4¼	41	169.97	230 05
■ 6¼	7 1/16	7½	5⅞	6⅛	54	120.86	174.73								8¼	7 9/16	6½	5 13/16	4¾	59¼	221.68	230 08
3¾	4½	3½	3¾	2¼	6	22.17	46.47	4½	3¾	3¾	3	2⅝	6½	19.11	4⅞	4⅝	3 15/16	3 11/16	3	9	63.82	300 00
4⅜	5¼	4	4⅜	3⅛	12½	33.15	64.34	5½	4½	5	3½	3⅜	13½	28.55	6¼	5¾	4⅞	4⅜	3½	16¾	80.20	300 01
4⅜	5¼	5⅝	4 5/16	4¾	23	53.22	90.25	5½	4½	6⅝	3½	5	24	48.15	6¼	5¾	4⅞	4⅜	3½	27½	102.26	300 02
■ 5 5/16	6⅜	7⅛	5 5/16	6¼	49	107.21	155.94	6½	5½	8	4¼	6	48	99.95	7½	6⅞	5 13/16	5 5/16	4¼	52½	198.83	300 05

Add 3/16 to H W D for Style BE

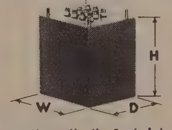


STYLE B:
- "Open Frame" Bracket Mounted
- Double Vacuum Varnish Impregnated

STYLE BE:
- Conforms to MIL-T-27B
- Epoxy Encapsulation added to Style B



STYLE V:
- Fully Enclosed in Metal Shells
- Ease of "Wiring with Leads"
- Attractive Appearance
- Dbl Vacuum Varnish Impregnated



STYLE CM:
- Hermetically Sealed to MIL-T-27B
- Environment Proof
- Attractive Gray Finish
- Permanent Name Plate

QUALITY ENGINEERED • PRECISION BUILT

TODD SYSTEMS INC

4 RADFORD PLACE
YONKERS, N. Y., U.S.A.
(914) 963-3400

TODD ENGINEERED LINE ISOLATION .... HIGH CURRENT CHOKES

LINE ISOLATION

OUTPUT 115 VOLTS 50/60 HERTZ *UL* COMPONENTS

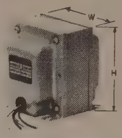
STRAIGHT ISOLATION

ELECTROSTATIC SHIELD CONNECTED TO CORE

TWO STYLES

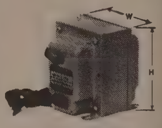
CATALOG NUMBER	WATTS (VA)	INPUT VOLTS	HIPOT TEST VOLTS	DIMENSIONS H	W	D	MW	MD	WGT.	STYLE LO PRICE	STYLE LRG PRICE
LI-25	25	115	1500	3⅛	2⅝	2½	2	1½	1⅝	18.44	23.32
LI-50	50	115	1500	3½	2⅞	3	2¼	1⅞	3	20.01	25.78
LI-100	100	115	1500	3½	2⅞	3½	2¼	2¼	4	26.32	31.75
LI-175	175	115	1500	4⅝	3⅞	3⅞	3	2¾	7	28.66	36.32
LI-250	250	115	1500	4⅝	3⅞	4⅜	3	3¼	10	40.23	47.65
LI-350	350	115	1500	4⅝	3⅞	5¼	3	4⅛	14	54.27	61.07
LI-500	500	115	1500	6	4⅜	5⅛	3⁷⁄₁₆	3⅜	17½	68.69	77.26
LI-750	750	115	1500	6	4⅜	6⅜	3⁷⁄₁₆	4½	24	112.95	121.20
LI-1000	1000	115	1500	6	4⅜	7¼	3⁷⁄₁₆	5½	30	125.43	134.70
LI-1500	1500	115	1500	6½	5½	7½	4¼	5⅜	42	150.80	158.99
LI-2000	2000	115	1500	6½	5½	9	4¼	6⅞	58	182.96	193.88
LI-100-1	100	230	2000	3½	2⅞	3½	2¼	2¼	4	25.76	32.78
LI-250-1	250	230	2000	4⅝	3⅞	4⅜	3	3¼	10	39.80	48.30
LI-500-1	500	230	2000	6	4⅜	5⅛	3⁷⁄₁₆	3⅜	17½	70.70	80.68
LI-1000-1	1000	230	2000	6	4⅜	7¼	3⁷⁄₁₆	5½	30	133.76	145.75
LI-1500-1	1500	230	2000	6½	5½	7½	4¼	5⅜	42	154.20	164.99
LI-2000-1	2000	230	2000	6½	5½	9	4¼	6⅞	58	181.39	194.96

STYLE LO



LEAD WIRE TERMINALS

STYLE LRG



LINE CORD RECEPTACLE (W/GROUND)

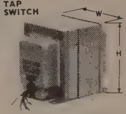
ADJUSTABLE ISOLATION

ELECTROSTATIC SHIELD CONNECTED TO CORE

- PRIMARY TAPPED
- TWO STYLES

CATALOG NUMBER	WATTS (VA)	INPUT VOLTS	HIPOT TEST VOLTS	DIMENSIONS H	W	D	MW	MD	WGT.	STYLE LO PRICE	STYLE LRG PRICE
LI-50-2	50	105/115/125	1500	3½	2⅞	3⅞	2¼	2½	3	25.27	30.38
LI-100-2	100	105/115/125	1500	3½	2⅞	4⅜	2¼	3	4½	34.25	40.45
LI-250-2	250	105/115/125	1500	4⅝	3⅞	5⅛	3	4	11½	45.10	52.83
LI-500-2	500	105/115/125	1500	6	4⅜	5⅞	3⁷⁄₁₆	4⅛	19	84.11	93.17
LI-1000-2	1000	105/115/125	1500	6	4⅜	8⅛	3⁷⁄₁₆	6⅜	34	173.65	183.63
LI-50-3	50	210/230/250	2000	3½	2⅞	3⅞	2¼	2½	3	29.37	34.22
LI-100-3	100	210/230/250	2000	3½	2⅞	4⅜	2¼	3	4½	39.59	44.53
LI-250-3	250	210/230/250	2000	4⅝	3⅞	5⅛	3	4	11½	44.06	52.69
LI-500-3	500	210/230/250	2000	6	4⅜	5⅞	3⁷⁄₁₆	4⅛	19	83.79	92.23
LI-1000-3	1000	210/230/250	2000	6	4⅜	8⅛	3⁷⁄₁₆	6⅜	34	172.23	181.70

STYLE LO



LEAD WIRE TERMINALS

STYLE LRG

TAP SWITCH
W
H

LINE CORD RECEPTACLE (W/GROUND)

HI-POWER ISOLATION

ELECTROSTATIC SHIELD CONNECTED TO CORE

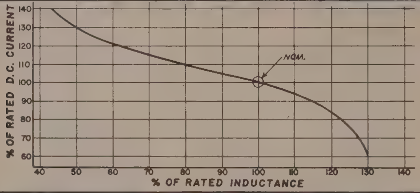
BRACKET MOUNTED

CATALOG NUMBER	WATTS (VA)	INPUT VOLTS	HIPOT TEST VOLTS	DIMENSIONS H	W	D	MW	MD	WGT.	PRICE
LI-2500-4	2500	115/230	2000	6⅛	7⅛	8¾	5⅞	7	60	202.93
LI-3000-4	3000	115/230	2000	7½	9	7⅞	7½	6½	95	363.54
LI-4000-4	4000	115/230	2000	7½	9	9	7½	7⅝	113	432.64
LI-5000-4	5000	115/230	2000	7½	9	10¼	7½	8⅞	135	460.64
LI-6000-4	6000	115/230	2000	7½	9	11¾	7½	10¼	168	470.60
LI-2500-5	2500	230/460	2500	6⅛	7⅛	8¾	5⅞	7	60	214.77
LI-3000-5	3000	230/460	2500	7½	9	7⅞	7½	6½	95	380.97
LI-4000-5	4000	230/460	2500	7½	9	9	7½	7⅝	113	459.41
LI-5000-5	5000	230/460	2500	7½	9	10¼	7½	8⅞	135	490.54
LI-6000-5	6000	230/460	2500	7½	9	11¾	7½	10¼	168	521.04

SCREW TERMINALS

HIGH CURRENT CHOKES

50/500 HERTZ | DIMENSIONS REFER TO HIGH CURRENT XFMR SKETCHES



- **Matching styles complement high current transformers**
- **Wide variety of compatible current ratings**

INDUCTANCE VARIATION

Graph indicates typical variation of inductance (%) when used at D.C. currents (%) other than the rated values.

Chokes operated at D. C. currents higher than rated value must be run on an intermittent basis to avoid overheating.

CATALOG NUMBER	INDUCTANCE (mh)	D.C. CURRENT (AMPS)	RESISTANCE (OHMS)	• BRACKET MTD. (STYLE B) • ENCAPSULATED (STYLE BE)						STYLE B	STYLE BE
				H	W	D	MW	MD	WGT.	PRICE	PRICE
CH-00	200	.5	3.00	2¼	2⅝	2	2	1¾	1½	7.82	19.45
CH-01	100	1	1.50	2½	2	2⅛	2½	2	2¼	8.57	22.98
CH-02	80	2	.95	2½	3	2½	2½	2	2½	9.39	28.38
CH-04	60	4	.65	3⅛	3¾	3¼	3⅛	2½	5¼	15.87	34.46
CH-05	50	5	.40	3⅛	3¾	3⅜	3⅛	2¾	5¾	16.56	37.64
CH-06	40	6	.30	3⅛	3¾	3⅜	3⅛	2¾	6	17.13	38.80
CH-08	30	8	.20	3½	4⅛	3⅞	3⅜	3	8	17.84	41.46
CH-12	20	12	.10	4⁷⁄₁₆	5¼	4½	4⅜	3⅜	15½	40.82	69.20
CH-16	15	16	.08	4⁷⁄₁₆	5¼	4⅝	4⅜	3⅜	14¼	43.70	78.01
CH-20	10	20	.055	4⁷⁄₁₆	5¼	4½	4⅜	3½	15½	47.34	85.88
CH-25	7	25	.03	4⁷⁄₁₆	5¼	5	4⅜	4	18½	49.43	92.31
CH-30	5	30	.02	5⅜	6⅜	4½	5¼	3¼	21	64.07	122.08
CH-40	3½	40	.018	5⅜	6⅜	4⅝	5¼	3½	23	69.26	127.34
CH-50	2	50	.010	5⅜	6⅜	4¾	5¼	3⅝	25	70.36	132.81
CH-100	.7	100	.004	5⅜	6⅜	5	5¼	3⅞	29	77.38	142.57
CH-200	.35	200	.0007	6⅛	7⅛	6¾	5⅞	5½	43	94.43	164.49

CATALOG NUMBER	• FULLY MTD. SHELLS (STYLE V)						STYLE V	• HERMETICALLY SEALED MIL-T (STYLE CM)						STYLE CM
	H	W	D	MW	MD	WGT.	PRICE	H	W	D	MW	MD	WGT.	PRICE
CH-00	2⅝	2¼	2¼	1¾	1⅝	1¾	8.00	3⅛	3	2⁹⁄₁₆	2⁵⁄₁₆	1⅞	2⅛	29.53
CH-01	3⅛	2½	2⅝	2	1¾	2¼	8.91	3¹³⁄₁₆	3½	3	2⅝	2⅛	3¼	34.51
CH-02	3⅛	2½	2½	2	1¾	2½	9.91	3¹³⁄₁₆	3½	3	2⅝	2⅛	3½	38.80
CH-04	3⅞	3⁵⁄₁₆	3¾	2½	2¼	6	16.27	4⁷⁄₁₆	4¼	3⅝	3⁵⁄₁₆	2¹¹⁄₁₆	7¼	43.09
CH-05	3⅞	3⁵⁄₁₆	4	2½	3	6½	16.96	4⁷⁄₁₆	4¼	3⅝	3⁵⁄₁₆	2¹¹⁄₁₆	8	48.47
CH-06	3⅞	3⁵⁄₁₆	4	2½	3	6½	17.50	4⁷⁄₁₆	4¼	3⅝	3⁵⁄₁₆	2¹¹⁄₁₆	8⅝	50.49
CH-08	4⅛	3½	4⅜	2¾	3⅜	8½	18.47	4⅞	4⅝	4	3¹¹⁄₁₆	3	11⅛	55.48
CH-12	5⁷⁄₁₆	4½	5	3½	3½	14	39.49	6¼	5¾	4⅞	4⅜	3½	21	72.09
CH-16	5⁷⁄₁₆	4½	5¼	3½	3¾	15	42.69	6¼	5¾	4⅞	4⅜	3½	22½	82.79
CH-20	5⁷⁄₁₆	4½	5⅜	3½	3⅞	16	45.55	6¼	5¾	4⅞	4⅜	3½	24	92.31
CH-25	5⁷⁄₁₆	4½	5⅞	3½	4⅜	19½	47.59	6¼	5¾	4⅞	4⅜	3½	26½	106.60
CH-30	6½	5⁷⁄₁₆	5½	4¼	3¼	24	64.56	7½	6⅞	5¹³⁄₁₆	5⁵⁄₁₆	4¼	29½	125.90
CH-40	6½	5⁷⁄₁₆	5¾	4¼	3½	25	69.64	7½	6⅞	5¹³⁄₁₆	5⁵⁄₁₆	4¼	32½	139.21
CH-50	6½	5⁷⁄₁₆	5¾	4¼	3½	26	70.96	7½	6⅞	5¹³⁄₁₆	5⁵⁄₁₆	4¼	34	144.39
CH-100	6½	5⁷⁄₁₆	6⅛	4¼	3⅞	31	78.90	7½	6⅞	5¹³⁄₁₆	5⁵⁄₁₆	4¼	41	154.13
CH-200														

QUALITY ENGINEERED .... PRECISION BUILT

TODD SYSTEMS INC

4 RADFORD PLACE YONKERS, N. Y., U.S.A. (914) 963-3400

TODD ENGINEERED

STEPDOWN AUTOTRANSFORMERS

CONVERT DOMESTIC APPLIANCES FOR USE ON FOREIGN VOLTAGES

50/60 HERTZ—*UL* COMPONENTS

• FOR STEP-UP USE MOST UNITS CAN BE REVERSED OR REWIRED

PORTABLE MODEL

220/240 INPUT
110/120 OUTPUT

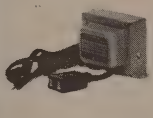
CATALOG NUMBER	RATING WATTS	WEIGHT LBS.	DIMENSIONS H	W	D	PRICE
SD-35	20	7/8	1½	2	2⅝	11.91
SD-36	40	1¼	1 7/16	2⅛	3½	13.07
SD-37	60	1 5/16	1 7/16	2⅛	3½	15.05
SD-41	80	1 7/16	1 7/16	2⅛	3½	15.80

LINE CORD • RECEPTACLE

NORMAL DUTY MODEL

220/240 INPUT
110/120 OUTPUT

CATALOG NUMBER	RATING WATTS	WEIGHT LBS.	DIMENSIONS H	W	D	PRICE
SD-24	50	1⅝	2¼	2¾	2¼	10.59
SD-21	65	1⅝	2¼	2¾	2¼	11.10
SD-25	80	1¾	2¼	2¾	2⅜	11.91
SD-23	100	1¾	2¼	2¾	2⅜	12.59
SD-26	125	2⅜	2⅝	3 1/16	2½	14.10
SD-27	150	2⅜	2⅝	3 1/16	2½	14.79

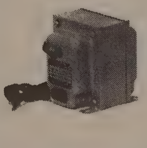


LINE CORD • PIGTAIL

HEAVY DUTY MODEL

220/240 INPUT
110/120 OUTPUT

CATALOG NUMBER	RATING WATTS	WEIGHT LBS.	DIMENSIONS H	W	D	PRICE
SD-15	75	2	3⅛	2⅝	3⅛	15.27
SD-16	100	2¼	3⅛	2⅝	3¼	15.40
SD-17	150	3½	3⅛	2⅝	3⅞	17.32
SD-38	200	3¾	3⅛	2⅝	4	20.29
SD-12	250	5½	4⅝	3⅞	3⅜	23.68
SD-18	350	6½	4⅝	3⅞	3⅝	27.63
SD-11	500	9¾	4⅝	3⅞	4¼	33.61
SD-19	750	12	4⅝	3⅞	5	41.90
SD-13	1000	13¾	4⅝	3⅞	5¼	54.84
SD-14	1500	19	4⅝	3⅞	6⅝	65.02
SD-20	2000	24½	6	4⅜	6⅜	127.50
SD-39	2500	35½	6½	5½	6⅝	220.23

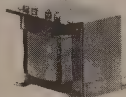


LINE CORD • RECEPTACLE

INDUSTRIAL MODEL

208/220/240 INPUT
110/120 OUTPUT

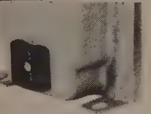
CATALOG NUMBER	RATING WATTS	WEIGHT LBS.	DIMENSIONS H	W	D	PRICE
SD-28	3000	47	6⅛	7 1/16	6¼	247.64
SD-29	4000	54	6⅛	7 1/16	7⅛	323.33
SD-22	5000	59	6⅛	7 1/16	7½	357.95
SD-30	6000	70	6⅛	7 1/16	8½	380.63



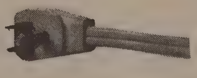
SCREW TERMINALS

ACCESSORIES

AVAILABLE FOR USE WHERE APPLICABLE

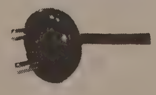


3 WIRE RECEPTACLE



3 WIRE LINE CORD

PLUG ADAPTERS



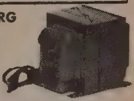
FOREIGN PLUGS

3 TAP REFRIGERATION

188/210
210/236 → 105V-50Hz
236/260 115V-60Hz

CATALOG NUMBER	RATING WATTS	WEIGHT LBS.	DIMENSIONS H	W	D	PRICE
SD-31LRG	350	6½	4⅝	3⅞	4⅜	44.88
SD-32LRG	550	9¼	4⅝	3⅞	5	47.99
SD-33LRG	750	12	4⅝	3⅞	5¾	57.39
SD-34LRG	1000	16¼	4⅝	3⅞	7	73.04
SD-40LRG	1500	23	4⅝	3⅞	8½	96.89

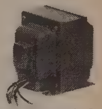
STYLE LRG



LINE CORD • RECEPTACLE
(GROUNDED)

CATALOG NUMBER	RATING WATTS	WEIGHT LBS.	DIMENSIONS H	W	D	PRICE
SD-31LO	350	6¼	4⅝	3⅞	4½	42.63
SD-32LO	550	9	4⅝	3⅞	5⅛	44.56
SD-33LO	750	12	4⅝	3⅞	5½	52.49
SD-34LO	1000	16	4⅝	3⅞	6½	69.47
SD-40LO	1500	22	4⅝	3⅞	8	89.86

STYLE LO



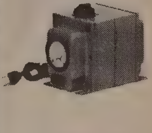
LEAD WIRE TERMINALS

MULTI-TAPPED VOLTAGE REGULATOR

METER • SWITCH

TYPE	PRIMARY VOLTS (SELECTOR SWITCH TAPS)								OUTPUT VOLTS
11	84	92	100	108	115	122	130	138	115
12	84	92	100	108	115	122	130	138	208, 230
21	170	185	200	215	230	245	260	275	115
22	170	185	200	215	230	245	260	275	208, 230

CATALOG NUMBER	TYPE	RATING WATTS	WGT. LBS.	DIMENSIONS H	W	D	PRICE
MVR-17	11 or 22	150	4⅝	4⅝	3⅞	5	51.80
MVR-18	11 or 22	350	6½	4⅝	3⅞	5½	59.70
MVR-11	11 or 22	500	8	4⅝	3⅞	5¾	67.15
MVR-19	11 or 22	750	11	4⅝	3⅞	6⅝	79.97
MVR-13	11 or 22	1000	13¼	4⅝	3⅞	7⅛	101.16
MVR-14	11 or 22	1500	17	6	4⅜	7⅜	138.60
MVR-20	11 or 22	2000	22	6	4⅜	8¼	207.13
MVR-17	12 or 21	150	6	4⅝	3⅞	5⅛	58.44
MVR-18	12 or 21	350	9	4⅝	3⅞	5⅞	70.43
MVR-11	12 or 21	500	12½	4⅝	3⅞	6¾	81.30
MVR-19	12 or 21	750	15	4⅝	3⅞	7¼	100.07
MVR-13	12 or 21	1000	18¾	6	4⅜	7½	124.27
MVR-14	12 or 21	1500	24	6	4⅜	8½	172.48
MVR-20	12 or 21	2000	30½	6	4⅜	9¼	242.66



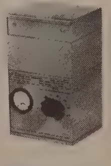
UL LINE CORD
& RECEPTACLE

PANEL MOUNTED VOLTAGE REGULATOR

METER • SWITCH
JUNCTION BOX

TYPE	PRIMARY VOLTS (SELECTOR SWITCH TAPS)								OUTPUT VOLTS
11	84	92	100	108	115	122	130	138	115
12	84	92	100	108	115	122	130	138	208, 230
21	170	185	200	215	230	245	260	275	115
22	170	185	200	215	230	245	260	275	208, 230

CATALOG NUMBER	TYPE	RATING WATTS	WGT. LBS.	DIMENSIONS H	W	D	PRICE
PVR-20	11 or 22	2000	29	5⅜	6⅜	11¼	461.76
PVR-28	11 or 22	3000	40	5⅜	6⅜	12¼	533.79
PVR-29	11 or 22	4000	49	5⅜	6⅜	13⅜	588.59
PVR-22	11 or 22	5000	57	5⅜	6⅜	14⅝	618.12
PVR-30	11 or 22	6000	63	6⅛	7⅛	13¾	645.86
PVR-20	12 or 21	2000	44	6⅛	7⅛	13	535.63
PVR-28	12 or 21	3000	58	6⅛	7⅛	14	624.88
PVR-29	12 or 21	4000	78	6⅛	7⅛	15½	666.13
PVR-22	12 or 21	5000	91	6⅛	7⅛	16½	707.42
PVR-30	12 or 21	6000	105	6⅛	7⅛	18	744.68



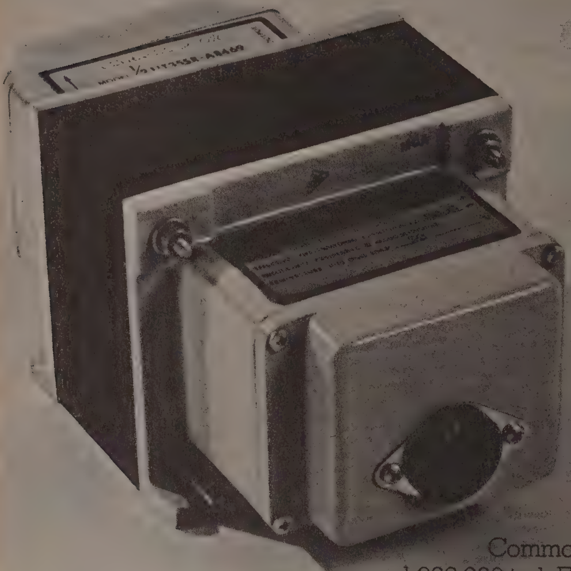
- JUNCTION BOX
- LEAD TERMINALS

QUALITY ENGINEERED . . . . PRECISION BUILT

TODD SYSTEMS INC.

4 RADFORD PLACE YONKERS, N.Y. U.S.A. (914) 963-3400

Topaz Ultra-Isolation Transformers will solve your power line noise problems. We guarantee it.



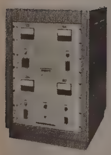
Pete Jorgensen, Magnetics Production Manager at Topaz, was asked recently why the performance of Topaz Ultra-Isolation Transformers is so exceptional. He answered by saying, "Because we have people who have been winding and shielding transformers for 10 years, and they do it unusually well."

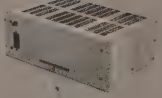
Topaz Ultra-Isolation Transformers protect electronic equipment from noisy power lines and protect clean power lines from noise-generating equipment. The unique Topaz box shielding techniques and the meticulous care taken during manufacturing guarantee the effectiveness of Topaz transformers.

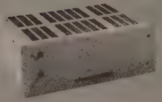
Common-mode noise is attenuated by more than 1,000,000 to 1. Effective capacitance between windings is less than 0.0005 picofarads.

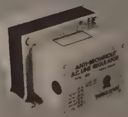
So if power line noise is your problem, write or phone. We'll prove that Topaz Ultra-Isolation Transformers will solve your problem. We guarantee it — or your money back.

Or your money back.









Other Products • Uninterruptible Power Systems • Inverters • Frequency Changers • AC Line Regulators

Topaz is also a major supplier of **custom** power conversion equipment. Contact us.

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TOPAZ
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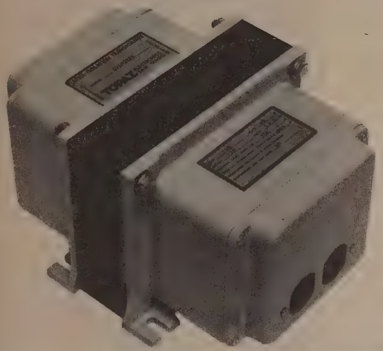
page 4

ULTRA-ISOLATION TRANSFORMERS

For eliminating power line noise problems associated with sensitive equipment



TOPAZ ULTRA - ISOLATION TRANSFORMERS are available in single-phase and three-phase versions, from 125 VA to 45,000 VA, and in step-up and step-down configurations, some with provisions for use on several different power line voltages. They are especially designed for these applications:

1. For isolating sensitive instrumentation from noisy power lines.
2. For isolating sensitive power lines from noisy equipment.
3. For isolating noisy equipment from noise-sensitive equipment when both share the same AC power source.
4. For maximum attenuation of common-mode noise (noise between ground and power lines).
5. For excellent attenuation of transverse-mode noise (line-to-line output noise) caused by common-mode noise at the input.
6. For completion of electrostatic guarding of equipment which is protected by an electrostatic shield.
7. For applications in which leakage currents must be kept below critical low levels.

TYPICAL SPECIFICATIONS

Common-Mode Noise Rejection:
.005 pF—greater than 125 dB
.001 pF—greater than 140 dB
.0005pF—greater than 146 dB

Common-Mode to Transverse-Mode Noise Rejection:
Greater than 125 dB at 1 kHz

Electromagnetic Noise:
Less than 0.1 gauss (-20 dB) at 18 in. radius

Standard Voltage Ratings:
120 (for 110, 115, 120 V lines*)
240 (for 208, 220, 230, 240 V lines*)
480 (for 360 440, 480 V lines*)
*Maximum current = VA rating ÷ Nominal Voltage Rating

Operating Voltages:
To 110% of nominal

Operating Frequency:
57 to 63 Hz

Featuring. . .
- **Excellent Common-Mode Noise Rejection**
- **Very Low Leakage Current**
- **Unique Box-Shielded Design**
- **Single-Phase and Three-Phase Models**
- **50Hz, 60Hz and 400Hz Models**
- **Money-Back Guarantee**

STANDARD 60 Hz SINGLE-PHASE STOCK MODELS

MODEL NUMBER GUARANTEED EFFECTIVE CAPACITANCE				Primary VAC (Nominal)	Secondary VAC (Nominal)	Terminations	Wt. (Lbs.)	Price Each
Power Rating	< .005 pF	≤ .001 pF	≤ .0005 pF					
125 VA	1/811T25SR			120	120	Receptacle	11	$ 75
125		1/811T21SR		120	120	Receptacle	11	105
125			1/811T35SR	120	120	Receptacle	11	140
125	1/811T25ST			120	120	Terminals	10	75
125		1/811T21ST		120	120	Terminals	10	105
125			1/811T35ST	120	120	Terminals	10	140
500 VA	1/211T25SR			120	120	Receptacle	18	120
500		1/211T21SR		120	120	Receptacle	18	155
500			1/211T35SR	120	120	Receptacle	18	205
500	1/211T25ST			120	120	Terminals	17	120
500		1/211T21ST		120	120	Terminals	17	155
500			1/211T35ST	120	120	Terminals	17	205
1.0 kVA	0111T25SR			120	120	Duplex	32	200
1.0	0131T25SR			240	120	Duplex	32	200
1.0	0111T25ST			120	120	Terminals	30	200
1.0	0131T25ST			240	120	Terminals	30	200
1.0	0133T25ST			240	240	Terminals	30	200
1.0	0155T25FT			125/250■	115/230	Terminals	67	500
1.0	0111T25FT			120	120	Terminals	67	425
1.0		0111T21SR		120	120	Duplex	32	250
1.0		0131T21SR		240	120	Duplex	32	250
1.0		0111T21ST		120	120	Terminals	30	250
1.0		0131T21ST		240	120	Terminals	30	250
1.0		0133T21ST		240	240	Terminals	30	250
1.0		0155T21FT		125/250■	115/230	Terminals	67	625
1.0		0111T21FT		120	120	Terminals	67	510
1.0			0111T35SR	120	120	Duplex	32	335
1.0			0131T35SR	240	120	Duplex	32	335
1.0			0111T35ST	120	120	Terminals	30	335
1.0			0131T35ST	240	120	Terminals	30	335
1.0			0133T35ST	240	240	Terminals	30	335
1.0			0155T35FT	125/250■	115/230	Terminals	67	830
1.0			0111T35FT	120	120	Terminals	67	710

MODEL NUMBER GUARANTEED EFFECTIVE CAPACITANCE				Primary VAC (Nominal)	Secondary VAC (Nominal)	Terminations	Wt. (Lbs.)	Price Each
Power Rating	≤ .005 pF	≤ .001 pF	≤ .0005 pF					
2.5 kVA	0211T25SR			120	120	Duplex	45	305
2.5	0231T25SR			240	120	Duplex	45	305
2.5		0211T21SR		120	120	Duplex	45	380
2.5		0231T21SR		240	120	Duplex	45	380
2.5			0211T35SR	120	120	Duplex	45	510
2.5			0231T35SR	240	120	Duplex	45	510
2.5	0211T25ST			120	120	Terminals	44	305
2.5	0231T25ST			240	120	Terminals	44	305
2.5	0233T25ST			240	240	Terminals	44	305
2.5		0211T21ST		120	120	Terminals	44	380
2.5		0231T21ST		240	120	Terminals	44	380
2.5		0233T21ST		240	240	Terminals	44	380
2.5			0211T35ST	120	120	Terminals	44	510
2.5			0231T35ST	240	120	Terminals	44	510
2.5			0233T35ST	240	240	Terminals	44	510
5.0 kVA	0511T25FT			120	120	Terminals	111	565
5.0	0511T25ST			120	120	Terminals	66	460
5.0	0531T25ST			240	120	Terminals	66	460
5.0	0533T25ST			240	240	Terminals	66	460
5.0	0541T25ST			480	120	Terminals	66	460
5.0		0511T21FT		120	120	Terminals	111	710
5.0		0511T21ST		120	120	Terminals	66	575
5.0		0531T21ST		240	120	Terminals	66	575
5.0		0533T21ST		240	240	Terminals	66	575
5.0		0541T21ST		480	120	Terminals	66	575
5.0			0511T35FT	120	120	Terminals	111	945
5.0			0511T35ST	120	120	Terminals	66	770
5.0			0531T35ST	240	120	Terminals	66	770
5.0			0533T35ST	240	240	Terminals	66	770
5.0			0541T35ST	480	120	Terminals	66	770
10 kVA	1033T25ST			240	240	Terminals	164	820
10		1033T21ST		240	240	Terminals	164	1045
10			1033T35ST	240	240	Terminals	164	1390
10	1065T25BT			240/480	120/240	Conduit	222	1430
10		1065T21BT		240/480	120/240	Conduit	222	1800
10			1065T35BT	240/480	120/240	Conduit	222	2490
15 kVA	1533T25ST			240	240	Terminals	203	995
15		1533T21ST		240	240	Terminals	203	1245
15			1533T35ST	240	240	Terminals	203	1660
15	1565T25BT			240/480	120/240	Conduit	269	1640
15		1565T21BT		240/480	120/240	Conduit	269	2050
15			1565T35BT	240/480	120/240	Conduit	269	2730
20 kVA	2065T25BT			240/480	120/240	Conduit	332	1840
20		2065T21BT		240/480	120/240	Conduit	332	2300
20			2065T35BT	240/480	120/240	Conduit	332	3050

■Consists of (2) 125 coils with taps at 102, 110, and 118 volts

The models listed above are generally in stock; hundreds of other models are available on short notice.

LG 25
March 1975
Supersedes LG 19

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SOLUTIONS TO POWER PROBLEMS

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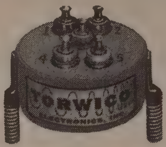
TORWICO ELECTRONICS LEADER IN MAGNETIC COMPONENTS

TINYMAX
Miniature 400 Cycle Power Transformers

This Case style available in 1.5 through 250 VA



This Case style available in 1.5 through 9 VA

TINYMAX
CONDENSED PERFORMANCE DATA FOR STANDARD TINYMAX 400 CYCLE POWER TRANSFORMERS

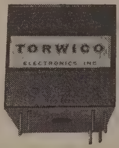
VA Rating	Secondary Voltage-VRMS* (Choose any one voltage within limits listed)	O.D. ±1/32	Height ±1/32	Nominal Weight	Nominal Regulation	Nominal Temp. Rise MIL-T-27 (with no heat sink)
1.5	6.0 to 300	1″	15/32″	0.89 oz.	20%	13°C
1.5 (with electrostatic shield)	6.0 to 300	1″	19/32″	1.1 oz.	15%	13°C
3	6.0 to 300	1″	19/32″	1.1 oz.	15%	15°C
3 (with electrostatic shield)	6.0 to 300	1″	13/16″	1.5 oz.	10%	15°C
6	6.0 to 300	1″	13/16″	1.5 oz.	10%	18°C
6 (with electrostatic shield)	6.0 to 300	1″	1 1/16″	2 oz.	8%	18°C
9	6.0 to 300	1″	1 1/16″	2 oz.	8%	23°C
9 (with electrostatic shield)	6.0 to 300	1 3/8″	1 1/8″	3.5 oz.	7%	23°C
16	6.0 to 300	1 3/8″	1 1/8″	3.5 oz.	7%	25°C
25	6.0 to 300	1 3/8″	1 3/8″	4.5 oz.	6%	36°C
50	6.0 to 300	2″	1 1/2″	10 oz.	2.5%	26°C
75	10 to 300	2″	1 3/4″	12 oz.	2.5%	32°C
100	12 to 300	2 1/4″	2″	17 oz.	2%	35°C
250	26 to 300	2 7/8″	2″	27.5 oz.	1.5%	47°C

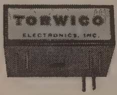
*with primary 115V, 400 cps

TINYMAX Power Transformers are hermetically sealed in drawn steel cases and shall meet all requirements of MIL-T-27; Military Designation: TF4S01YY.

24 hour delivery for prototype quantities. Don't settle for less—Prices on these custom-engineered transformers equal those of competitive shelf items—Phone today for your comprehensive TINYMAX catalog.

TINYMAX
POWER TRANSFORMERS FOR PRINTED CIRCUIT APPLICATIONS





VA Rating	Secondary Voltage—VRMS* (Choose any one voltage within limits listed)	Dimensions ±1/32″	Nominal Weight	Nominal Regulation	Nominal Temp. Rise
1.5	6.0 to 300	1 1/16″ square x 7/16″ tall	0.75 oz.	20%	13°C
3	6.0 to 300	1 1/16″ square x 9/16″ tall	1.0 oz.	15%	15°C
6	6.0 to 300	1 1/16″ square x 3/4″ tall	1.25 oz.	10%	18°C
9	6.0 to 300	1 1/16″ square x 1″ tall	1.63 oz.	8%	23°C

*with primary 115V, 400 cps

TINYMAX Power Transformers for printed circuit applications are hermetically sealed in thermoset plastic and shall meet all requirements of MIL-T-27; Military Designation: TF5SX01ZZ.

TORWICO
ELECTRONICS INC. LAKEWOOD, N. J.

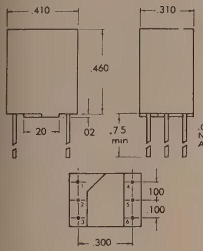
TOROTEL INC.

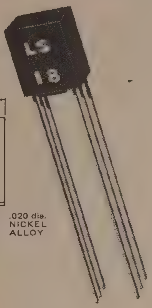
13402 SOUTH 71 HIGHWAY, GRANDVIEW, MO. 64030
PHONE: (816) 761-6314 TWX 910-777-7037

SUBMINIATURE AUDIO TRANSFORMERS

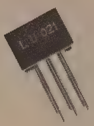
PROTOTYPES IN 48 HOURS UPON REQUEST

LT & LS SERIES

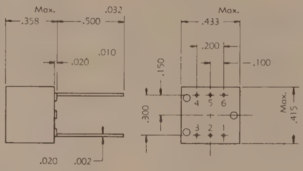


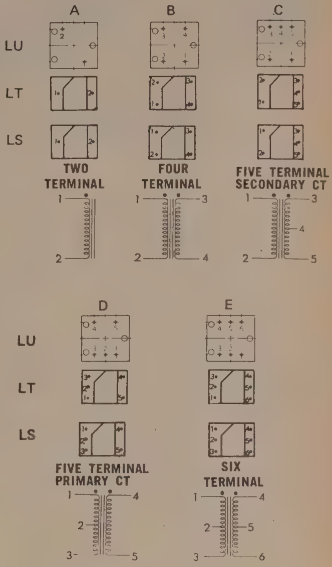


LU SERIES



Wt. 0.1 oz.





The LS Series is electrically and mechanically the same as the LT Series except for phase relationships between terminals.

LS, LT, and LU Series transformers have successfully passed the rigid requirements of MIL-T-27B, Class R, Grade 5.

Subminiature in size, weighing less than 0.1 ounce, these transformers have tenth inch grid spacing between terminals and are ideally suited for transistor circuit applications which utilize printed circuit board design. All three series have risers on mounting surfaces to facilitate inspection and board cleaning, and also to prevent moisture traps.

A wide range of standard designs are available which meet the requirements of most common applications and allow for rapid delivery of prototype quantities. Special designs are also available in all three types.

The new LU Series exhibits the same electrical characteristics as the LS and LT Series but has been packaged in a "thin line" configuration to allow for closer board spacing for "card cage" applications or where height dimensions are critical.

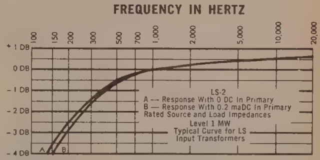
MAGNETIC SHIELDING

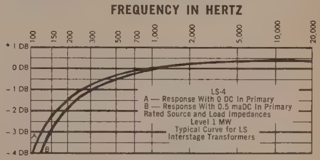
LS and LT Series transformers are available with magnetic shields when required. Overall dimensions of transformers with the magnetic shield added are .365 max. x .465 max. x .531 max.

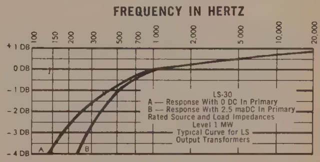
To order transformers with shields installed add 500 to dash numbers shown in the table below. For example: to order an LS-22 with shield, specify LS-522.

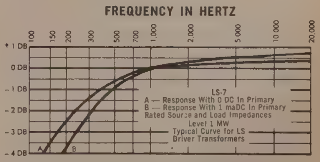
LS, LT or LU No.	MIL-T-27A Designation	Application	Primary Impedance	DC Res. Pri. Ohms	DC ma Pri.	Secondary Impedance	Max. Power MW	Term. Layout
2	TF5RX16ZZ	Input	50,000-CT	3800	.2	1000-CT	25	E
4	TF5RX13ZZ	Interstage	20,000/30,000	1700	.5	800/1200	40	B
5	TF5RX13ZZ	Interstage	20,000/30,000-CT	1700	.5	800/1200-CT	40	E
6	TF5RX13ZZ	Interstage	10,000/12,000-CT	1050	1	1500/1800-CT	50	E
7	TF5RX13ZZ	Driver	10,000/12,000-CT	1050	1	1200/1500-CT	50	E
8	TF5RX13ZZ	Driver	10,000/12,000-CT	1050	1	2000/2500-CT	50	E
9	TF5RX13ZZ	Driver	10,000/12,000-CT	1050	1	500/600-CT	50	E
10	TF5RX17ZZ	Output	500/600	60	3	50/60	50	B
11	TF5RX17ZZ	Output	1000/1200	145	3	50/60	50	B
12	TF5RX17ZZ	Output	600	70	3	3.2	50	B
13	TF5RX13ZZ	Output	1200	120	2	3.2	50	B
14	TF5RX13ZZ	Output	10,000	1160	1	3.2	50	B
15	TF5RX17ZZ	Output	150/200-CT	18	10	12/16	50	D
16	TF5RX17ZZ	Output	300/400-CT	38	7	12/16	50	D
17	TF5RX17ZZ	Output	600/800-CT	75	4.5	12/16	50	D
18	TF5RX17ZZ	Output	1000/1330-CT	120	3.5	12/16	50	D
19	TF5RX13ZZ	Output	1500/2000-CT	180	3	12/16	50	D
20	TF5RX13ZZ	Output	7500/10,000-CT	820	1	12/16	50	D
21	TF5RX13ZZ	Output	300-CT	37	7	600	50	D
22	TF5RX17ZZ	Output	500-CT	60	3	600	50	D
23	TF5RX17ZZ	Output	900-CT	100	4	600	50	D
24	TF5RX17ZZ	Output	1500-CT	170	3	600	50	D
25	TF5RX17ZZ	Output	120/150-CT	15	10	3.2/4	50	D
26	TF5RX17ZZ	Output	320/400-CT	40	6	3.2/4	50	D
27	TF5RX17ZZ	Output	600/750-CT	70	4.5	3.2/4	50	D
28	TF5RX17ZZ	Output	800/1000-CT	100	4	3.2/4	50	D
29	TF5RX13ZZ	Output	1200/1500-CT	125	3	3.2/4	50	D
30	TF5RX13ZZ	Output	1600/2000-CT	190	2.5	3.2/4	50	D
31	TF5RX13ZZ	Output	8000/10,000-CT	820	1	3.2/4	50	D
32	TF5RX13ZZ	Output	10,000-CT	1000	1	10,000-CT	50	E
33	TF5RX13ZZ	Driver	10,000/12,000	1050	1	500/600-CT	50	C
34	TF5RX13ZZ	Driver	20,000	1700	.3	1000	50	B
35	TF5RX17ZZ	Output	1000	135	3	50	50	B
36	TF5RX17ZZ	Output	400-CT	40	3	11	50	D
37	TF5RX13ZZ	Driver	10,000/12,000	1050	1	2000/2500-CT	50	C
38	TF5RX17ZZ	Output	600-CT	72	3	600-CT	50	E
39	TF5RX13ZZ	Output	10,000	1000	1	10,000 split	50	*
40	TF5RX17ZZ	Output	600	72	3	600 split	50	*
41	TF5RX13ZZ	Input	25,000-CT	4300	0.6	1000-CT	30	E
42	TF5RX17ZZ	Isolation	600-CT	90	4	600-CT	30	E
101	TF5RX20ZZ	Choke	6 H @ 2 ma	1700				A
102	TF5RX20ZZ	Choke	1.25 H @ 2 ma	180				A
103	TF5RX20ZZ	Choke	3.5 H @ 2 ma	1100				A
104	TF5RX20ZZ	Choke	.3 H @ 4 ma	42				A

*PRIMARY TERM. 1-2; SECONDARY TERM. 3-4, 5-6









The above are typical response curves up to 20 kHz however many items in this series have useful frequency ranges up to 100 kHz and beyond.

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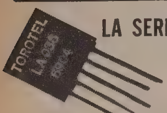
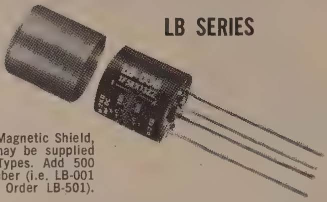
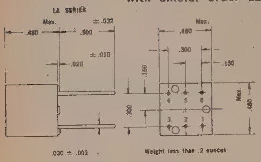
LA SERIES

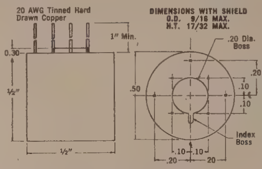


LB SERIES



The LB-500 Magnetic Shield, as shown, may be supplied for all LB Types. Add 500 to Dash Number (i.e. LB-001 with Shield. Order LB-501).

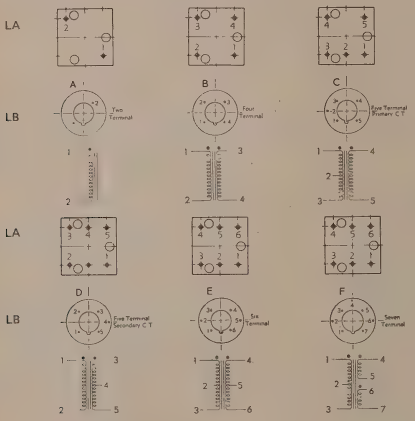


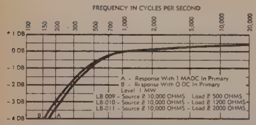


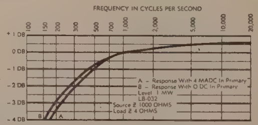
Torotel LA and LB Series Transformers are manufactured to MIL-T-27B, Grade 5, Class S specification. These series have 0.1 grid spaced terminals for printed circuit application. Both types have risers on mounting surfaces to prevent the formation of moisture traps and to facilitate cleaning of board assemblies.

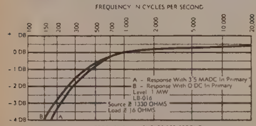
The LA Series is electrically the same as the LB Series, but is packaged in a .460 inch cube with smaller outline dimensions for application where this configuration is more suitable.

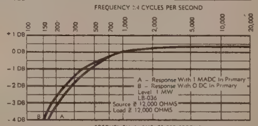
Leads are made of 20 AWG Tinned Hard Drawn Copper. Units utilizing Dumet Wire are available on special request.

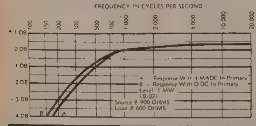


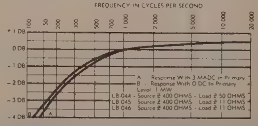












LA, LB No.	MIL Designation	Application	Primary Impedance	DC mA in Pri.	Secondary Impedance	Nom. Pri. Res.	MW Level @ 1 kHz	Term. Lay-out
001	TF5SX13ZZ	Interstage	20,000 30,000	.5 .5	800 1200	850	50	B
002	TF5SX17ZZ	Output	500 600	3 3	50 60	60	100	B
003	TF5SX13ZZ	Output	1000 1200	3 3	50 60	115	100	B
004	TF5SX17ZZ	Output	600	3	3.2	60	100	B
005	TF5SX13ZZ	Output	1200	2	3.2	115	100	B
006	TF5SX13ZZ	Output	10,000	1	3.2	790	100	B
007	TF5SX16ZZ	Input Other Application	200,000 500	0 0	1000 100,000	8500	25	B
008	TF5SX20ZZ	Reactor 3.5 H @ 2 maDC, 1 H @ 5 maDC				630		A
009	TF5SX13ZZ	Output or Driver	10,000 12,000	1 1	500-CT 600-CT	800	100	D
010	TF5SX13ZZ	Driver	10,000 12,000	1 1	1200-CT 1500-CT	800	100	D
011	TF5SX13ZZ	Driver	10,000 12,000	1 1	2000-CT 2500-CT	800	100	D
012	TF5SX17ZZ	Single or PP Output	150-CT 200-CT	10 10	12 16	11	500	C
013	TF5SX17ZZ	Single or PP Output	300-CT 400-CT	7 7	12 16	20	500	C
014	TF5SX17ZZ	Single or PP Output	600-CT 800-CT	5 5	12 16	43	500	C
015	TF5SX17ZZ	Single or PP Output	800-CT 1070-CT	4 4	12 16	51	500	C
016	TF5SX13ZZ	Single or PP Output	1000-CT 1330-CT	3.5 3.5	12 16	71	500	C
017	TF5SX13ZZ	Single or PP Output	1500-CT 2000-CT	3 3	12 16	108	500	C
018	TF5SX13ZZ	Single or PP Output	7500-CT 10,000-CT	1 1	12 16	505	500	C
019	TF5SX17ZZ	Output to Line	300-CT	7	600	19	500	C
020	TF5SX17ZZ	Output to Line to Line or Mixing	500-CT	5.5	600	31	500	C
021	TF5SX17ZZ	Output to Line	900-CT	4	600	53	500	C
022	TF5SX13ZZ	Output to Line	1500-CT	3	600	86	500	C
023	TF5SX13ZZ	Interstage	20,000-CT 30,000-CT	.5 .5	800-CT 1200-CT	850	100	E
024	TF5SX16ZZ	Input Other Application	200,000-CT 500-CT	0 0	1000-CT 100,000-CT	8500	25	E
025	TF5SX13ZZ	Interstage	10,000-CT 12,000-CT	1 1	1500-CT 1800-CT	800	100	E
026	TF5SX20ZZ	Reactor 6 H @ 2 maDC 1.5 H @ 5 maDC				2100		A
027	TF5SX20ZZ	Reactor 1.2 H @ 2 maDC, .5 H @ 11 maDC				100		A
028	TF5SX20ZZ	Reactor .3 H @ 4 maDC .15 H @ 20 maDC				31		A
029	TF5SX17ZZ	Single or PP Output	120-CT 150-CT	10 10	3.2 4	10	500	C
030	TF5SX17ZZ	Single or PP Output	320-CT 400-CT	7 7	3.2 4	20	500	C
031	TF5SX17ZZ	Single or PP Output	640-CT 800-CT	5 5	3.2 4	43	500	C
032	TF5SX17ZZ	Single or PP Output	800-CT 1000-CT	4 4	3.2 4	51	500	C
033	TF5SX13ZZ	Single or PP Output	1060-CT 1330-CT	3.5 3.5	3.2 4	71	500	C
034	TF5SX13ZZ	Single or PP Output	1600-CT 2000-CT	3 3	3.2 4	109	500	C
035	TF5SX13ZZ	Single or PP Output	8000-CT 10,000-CT	1 1	3.2 4	505	100	C
036	TF5SX13ZZ	Isolation or Interstage	10,000-CT 12,000-CT	1	10,000-CT 12,000-CT	950	100	E
037	TF5SX13ZZ	Driver	10,000-CT 12,000-CT	1 1	1200-CT 1500-CT	800	100	E
038	TF5SX13ZZ	Driver	10,000-CT 12,000-CT	1 1	2000-CT 2500-CT	800	100	E
039	TF5SX13ZZ	Driver	10,000-CT 12,000-CT	1 1	500-CT 600-CT	800	100	E
040	TF5SX16ZZ	Input	100,000	0	1000	1700	70	B
041	TF5SX13ZZ	Driver	20,000	.5	1000	1000	100	B
042	TF5SX13ZZ	Driver	20,000	.5	1200-CT	1000	100	D
043	TF5SX17ZZ	Output	1000	3	50	60	100	B
044	TF5SX17ZZ	Output	400	3	50	30	100	B
045	TF5SX17ZZ	Output	400	3	11	30	100	B
046	TF5SX17ZZ	Single or PP Output	400-CT	3	11	30	500	C
047	TF5SX20ZZ	Reactor 10 H @ 0 maDC, 8 H @ .5 maDC				650		A
048*	TF5SX13ZZ	Isolation or Interstage Ratio 1:1:1	2000-CT 2500-CT	3 3	8000 split 10,000 split	195	100	F
049*	TF5SX13ZZ	Interstage	10,000-CT 12,000-CT	1 1	2000 split 2400 split	560	100	F
050*	TF5SX13ZZ	Interstage	20,000-CT 30,000-CT	.5 .5	1000 split 1500 split	800	100	F
051*	TF5SX13ZZ	Interstage	40,000-CT 50,000-CT	.25 .25	400 split 500 split	1700	50	F
052*	TF5SX17ZZ	Interstage or Output	400-CT 500-CT	8 6	400 split 500 split	46	500	F
053*	TF5SX17ZZ	Interstage	400-CT 500-CT	8 6	120 split 150 split	46	500	F
054*	TF5SX17ZZ	Interstage	400-CT 500-CT	8 6	40 split 50 split	46	500	F
055*	TF5SX17ZZ	Interstage	80-CT 100-CT	12 10	32 split 40 split	9.8	500	F
056	TF5SX16ZZ	Input	50,000-CT	.3	1000-Ct	1900	50	E
057	TF5SX17ZZ	Output	600-CT 750-CT	4.5	3.2 4.0	40	500	C
058	TF5SX13ZZ	Output	1200-CT 1500-CT	3	3.2 4	100	500	C
059	TF5SX16ZZ	Input	100K-CT	0	1000-CT	3300	25	E
060	TF5SX13ZZ	Driver	10K-CT	1	600-CT	1100	100	E
061	TF5SX13ZZ	Interstage	4K-CT	2	10K-CT	440	500	E
062	TF5SX17ZZ	Output to Line	1000-CT	3	600-CT	110	500	E
063	TF5SX11ZZ	Input	600-CT	4	25K-CT	65	100	E
064	TF5SX17ZZ	Isolation	600-CT	4	600-CT	67	100	E
065	TF5SX17ZZ	Output	600-CT	4	60	65	100	C
066	TF5SX17ZZ	Output	600-CT	4	4	65	100	C
500		Magnetic Shielding Case						

*These LA Types have no Primary C-T

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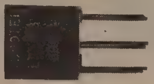
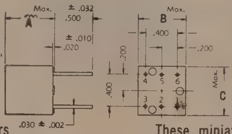
AUDIO TRANSFORMERS LL & LR SERIES





Series	A	B	C
LL	.600	.590	.590
LR	.925	.800	.710

These tiny, versatile "LL" transformers are provided with .020 risers and 0.1 grid spacing for printed circuit board applications and are manufactured to MIL-T-27, Grade 5, Class S specifications.

RESPONSE: ±1 db 200 to 50,000 Hz
DISTORTION: 10% Max. at rated power, 200 to 50,000 HZ
WEIGHT: 0.4 OZ

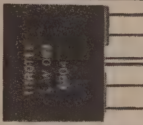
LL No.	MIL-T-27 Designation	Application	Impedance Ohms		DC Resistance Ohms		Max. Pri DC (ma)	Max. 200 Hz Pwr* (mw)
			Pri	Sec.	Pri	Sec		
001	TF5SX16ZZ	Input	100K-CT	1000-CT	6000	60	0	150
002	TF5SX16ZZ	Interstage	25K-CT	1000-CT	2800	120	0	150
003	TF5SX13ZZ	Interstage	10K-CT	10K-CT	1100	1200	1	150
004	TF5SX13ZZ	Driver	10K-CT	1500-CT	1100	200	1	150
005	TF5SX13ZZ	Output to Line	10K-CT	600-CT	1100	75	1	150
006	TF5SX13ZZ	Interstage	4000-CT	10K-CT	440	1200	1.5	150
007	TF5SX17ZZ	Output to Line	1000-CT	600-CT	100	60	3	150
008	TF5SX17ZZ	Output	1000-CT	4	100	0.4	3	150
009	TF5SX11ZZ	Input	600-CT	25K-CT	65	3500	4	150
010	TF5SX17ZZ	Isolation	600-CT	600-CT	65	75	4	150
011	TF5SX17ZZ	Output	600-CT	60	65	7	4	150
012	TF5SX17ZZ	Output	600-CT	4	65	0.5	4	150
013	TF5SX13ZZ	Driver	10K-CT	2000-CT	1100	240	1	150
014	TF5SX13ZZ	Driver	10K-CT	500-CT	1100	65	1	150
015	TF5SX17ZZ	Line to Line	500-CT	600-CT	55	75	4.5	150
016	TF5SX17ZZ	Output to Line	300-CT	600-CT	33	75	5.5	150

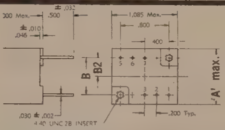
These miniaturized "LR" transformers are manufactured to MIL-T-27, Grade 5, Class S specifications and are ideally suited for a wide range of printed circuit applications.

RESPONSE: ±1 db 200 to 20,000 Hz
DISTORTION: 10% Max. at rated power, 200 to 20,000 Hz
WEIGHT: 1.0 OZ

LR No.	MIL-T-27 Designation	Application	Impedance Ohms		DC Resistance Ohms		Max. Pri DC (ma)	Max. 200 Hz Pwr* (mw)
			Pri	Sec.	Pri	Sec		
001	TF5SX13ZZ	Interstage	25K-CT	1000-CT	2600	110	0.5	750
002	TF5SX13ZZ	Interstage	10K-CT	10K-CT	1000	1100	1	750
003	TF5SX13ZZ	Driver	10K-CT	1500-CT	1000	165	1	750
004	TF5SX13ZZ	Output to Line	10K-CT	600-CT	1000	70	1	750
005	TF5SX13ZZ	Output	10K-CT	4	1000	0.5	1	750
006	TF5SX13ZZ	Interstage	4000-CT	10K-CT	400	1100	1.5	750
007	TF5SX13ZZ	Output	1500-CT	15	150	2	2.5	750
008	TF5SX17ZZ	Output to Line	1000-CT	600-CT	100	70	3	750
009	TF5SX17ZZ	Output	1000-CT	4	100	0.5	3	750
010	TF5SX11ZZ	Input	600-CT	25K-CT	60	2900	4	750
011	TF5SX17ZZ	Isolation	600-CT	600-CT	60	70	4	750
012	TF5SX17ZZ	Output	600-CT	60	60	6.5	4	750
013	TF5SX17ZZ	Output	600-CT	15	60	2	4	750
014	TF5SX17ZZ	Output	600-CT	4	60	0.5	4	750
015	TF5SX17ZZ	Output to Line	250	600-CT	25	70	7	750
016	TF5SX13ZZ	Driver	10K-CT	2000-CT	1000	110	1	750
017	TF5SX13ZZ	Driver	10K-CT	500-CT	1000	110	1	750
018	TF5SX17ZZ	Line to Line	500-CT	600-CT	50	70	4.5	750
019	TF5SX17ZZ	Output to Line	300-CT	600-CT	30	70	5.5	750

AUDIO TRANSFORMERS LW & LY SERIES





Series	A	B	B_2
LW	.900	.600	.300
LY	1.125	.800	.400

"LW" series transformers are manufactured to MIL-T-27, Grade 5, Class S specifications. Riser areas and 0.1 grid spacing make these units ideal for printed circuit board applications.

RESPONSE: ±1 db 100 to 10,000 Hz
DISTORTION: 1.5% Max. at 60 MW, 200 to 10,000 Hz
WEIGHT: 2.0 OZ.

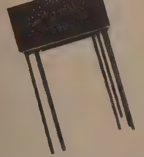
LW No.	MIL-T-27 Designation	Application	Impedance Ohms		DC Resistance Ohms		Max. Pri DC (ma)	Max. 200 Hz Pwr* (watt)
			Pri	Sec.	Pri	Sec		
001	TF5SX13ZZ	Interstage	10K-CT	10K-CT	800	1050	1	3.5
002	TF5SX13ZZ	Output to Line	10K-CT	600-CT	800	60	1	3.5
003	TF5SX13ZZ	Output	10K-CT	4	800	0.5	1	3.5
004	TF5SX13ZZ	Output	1500-CT	15	110	1.5	2.5	3.5
005	TF5SX17ZZ	Output to Line	1000-CT	600-CT	75	60	3	3.5
006	TF5SX17ZZ	Output	1000-CT	4	75	0.5	3	3.5
007	TF5SX11ZZ	Input	600-CT	25K-CT	45	2700	4	2.5
008	TF5SX17ZZ	Isolation	600-CT	600-CT	45	60	4	3.5
009	TF5SX17ZZ	Output	600-CT	60	45	6.5	4	3.5
010	TF5SX17ZZ	Output	600-CT	15	45	1.5	4	3.5
011	TF5SX17ZZ	Output	600-CT	4	45	0.5	4	3.5
012	TF5SX17ZZ	Output to Line	250	600-CT	20	60	7	3.5
013	TF5SX13ZZ	Interstage	25K-CT	1000-CT	2500	85	0.5	2.5
014	TF5SX13ZZ	Driver	10K-CT	2000-CT	800	170	1	3.5
015	TF5SX13ZZ	Driver	10K-CT	500-CT	800	50	1	3.5
016	TF5SX17ZZ	Line to Line	500-CT	600-CT	50	60	4.5	3.5
017	TF5SX17ZZ	Output to Line	300-CT	600-CT	30	60	5.5	3.5
018	TF5SX13ZZ	Interstage	2500-CT	10K-Split	200	900	1.5	3.5

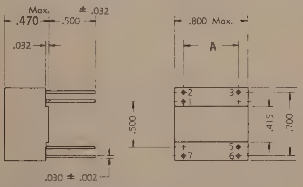
"LY" series transformers are highly compact, efficient units with power output ratings to 7.5 watts. These transformers are manufactured to MIL-T-27, Grade 5, Class S specifications.

RESPONSE: ±1 db 60 to 10,000 Hz
DISTORTION: 1% Max. at 250 MW, 200 to 10,000 Hz
10% Max. at rated power, 200 to 10,000 Hz
WEIGHT: 2.5 OZ.

LY No.	MIL-T-27 Designation	Application	Impedance Ohms		DC Resistance Ohms		Max. Pri DC (ma)	Max. 200 Hz Pwr* (watt)
			Pri	Sec.	Pri	Sec		
001	TF5SX13ZZ	Interstage	10K-CT	10K-CT	700	900	1	6
002	TF5SX13ZZ	Output to Line	10K-CT	600-CT	700	55	1	6
003	TF5SX13ZZ	Output	10K-CT	4	700	0.4	1	6
004	TF5SX13ZZ	Output	1500-CT	15	100	1.5	2.5	7.5
005	TF5SX17ZZ	Output to Line	1000-CT	600-CT	65	55	3	7.5
006	TF5SX17ZZ	Output	1000-CT	4	65	0.4	3	7.5
007	TF5SX17ZZ	Isolation	600-CT	600-CT	40	55	4	7.5
008	TF5SX17ZZ	Output	600-CT	60	40	6	4	7.5
009	TF5SX17ZZ	Output	600-CT	15	40	1.5	4	7.5
010	TF5SX17ZZ	Output	600-CT	4	40	0.4	4	7.5
011	TF5SX17ZZ	Output to Line	250	600-CT	16	55	7	7.5
012	TF5SX13ZZ	Driver	10K-CT	2000-CT	700	150	1	6
013	TF5SX13ZZ	Driver	10K-CT	500-CT	700	45	1	6
014	TF5SX17ZZ	Line to Line	500-CT	600-CT	45	55	4.5	7.5
015	TF5SX17ZZ	Output to Line	300-CT	600-CT	27	55	5.5	7.5
016	TF5SX13ZZ	Interstage	2500-CT	10K-Split	170	800	1.5	7.5

AUDIO TRANSFORMERS — LH & LK SERIES





"LK/LH" Series transformers are the ultimate in compactness and their .470 HT and 0.1 grid spacing provide a most efficient .5" board spacing unit. Designed to meet MIL-T-27C, Grade 5, Class S.

RESPONSE: ±1 db 200 to 10,000 Hz
DISTORTION: 10% Max. at rated power, 200 to 10,000 Hz
WEIGHT: 0.75 OZ

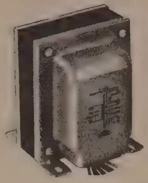
Series	A
LK	.700
LH	.600

LJ No.	Application	Impedance Ohms		DC Resistance Ohms		Max. Pri DC (ma)	Max. 200 Hz Pwr* (mw)
		Pri	Sec	Pri	Sec		
001	Interstage	25K-CT	1000-CT	1325	53	0.5	300
002	Interstage	10K-CT	10K-CT	510	525	1	325
003	Driver	10K-CT	1500-CT	510	80	1	325
004	Output to Line	10K-CT	600-CT	510	31	1	325
005	Output	10K-CT	4	510	0.3	1	325
006	Interstage	4000-CT	10K-CT	200	525	1.5	325
007	Output	1500-CT	15	75	1	2.5	325
008	Output to Line	1000-CT	600-CT	50	31	3	325
009	Output	1000-CT	4	50	0.3	3	325
010	Input	600-CT	25K-CT	30	1500	4	300
011	Isolation	600-CT	600-CT	30	31	4	325
012	Output	600-CT	60	30	3	4	325
013	Output	600-CT	15	30	1	4	325
014	Output	600-CT	4	30	0.3	4	325
015	Output to Line	250	600-CT	13	31	7	325
016	Driver	10K-CT	2000-CT	510	106	1	325
017	Driver	10K-CT	500-CT	510	26	1	325
018	Line to Line	500-CT	600-CT	25	31	4.5	325
019	Output to Line	300-CT	600-CT	15	31	5.5	325
020	Isolation- Ratio 1:1:1	2000-CT	8K Split	100	425	2	300
021	Isolation	10K-CT	2K Split	510	106	1	300

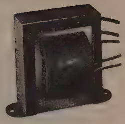
* These power ratings are based upon lowest frequency operation. Much higher ratings are possible at higher operating frequencies.

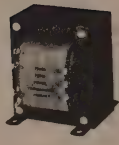
Litton **TRIAD-UTRAD**
Distributor Services

FILAMENT TRANSFORMERS
single secondary / 50-60 Hz


A Case

X Case


Z Case


U Case

Type No.	Secondary Volts	Secondary Amps	Primary Volts	RMS Test Voltage	Case Type	Connections or Lead Holes Used	Case Dimension H	Case Dimension W	Case Dimension D	Mounting Dimension MW	Mounting Dimension MD
F-1X# F-301X	2.5 CT	3	115 115/230	1500	X	Leads	1 5/8	2 13/16	1 5/8	2 3/8	
F-6X# F-306X	2.5 CT	6	115 115/230	Pri. 1500 Sec. 2500	X	Leads	1 15/16	3 5/16	1 3/4	2 13/16	
F-3X#	2.5 CT	10	115	Pri. 1500 Sec. 3000	X	Leads	2 9/32	3 3/4	2 1/8	3 1/8	
F-5U	2.5 CT	10	115	Pri. 1500 Sec. 7500	U	Leads	3 1/16	2 1/2	2 7/16	2	1 7/8
F-7X	5 CT	3	115	1500	X	Leads	1 15/16	3 5/16	2	2 13/16	
F-8X	5 CT	6	115	1500	X	Leads	2 9/32	3 3/4	2 1/8	3 1/8	
F-12X	5 CT	8	115	2500	X	Leads	2 19/32	4	2 1/4	3 9/16	
F-9U	5.2 CT	13	115	1500	U	Leads	3 7/16	2 13/16	3 1/4	2 1/4	2 3/8
F-9A					A	1–Leads	3 19/32	2 21/32	3 3/8	2 1/4	2 3/8
F-15U#	5 CT	15	115	Pri. 1500 Sec. 3000	U	Leads Lugs	3 1/2	2 7/8	2 11/16	2 1/4	2 3/16
F-10U#	5 CT	14	115	Pri. 1500 Sec. 10,000	U	Leads	3 13/16	3 3/16	3 1/4	2 1/2	2 9/16
F-11U	5.2 CT	24	115	1500	U	Leads	3 13/16	3 3/16	3 7/8	2 1/2	3 1/16
F-13X F-313X	6.3	.6	115 115/230	1500	X	Leads	1 3/8	2 3/8	1 3/8	2	
R-84K	6.3‡	.6	115	Pri. 1500 Sec. 3500	K	2–Leads	2 3/4	2 1/4	2 11/16	1 1/2	2 3/8
F-14X# F-314X	6.3 CT	1.2	115 115/230	Pri. 1500 Sec. 2500	X	Leads	1 5/8	2 13/16	1 5/8	2 3/8	
F-14Z#	6.3 CT	1.2	115	Pri. 1500 Sec. 2500	Z	Leads	1 15/16	2 3/8	1 5/8	2	
F-52X	6.3‡	1.2	115	Pri. 1500 Sec. 5000	X	Leads	1 15/16	3 5/16	1 3/4	2 13/16	
F-51X#	6.3–5‡	2	115	Pri. 1500 Sec. 5000	X	Leads	1 15/16	3 5/16	2	2 13/16	
F-53X	6.3	4	115	Pri. 1500 Sec. 5000	X	Leads	2 19/32	4	2 1/4	3 9/16	
F-43X#	6.3	4	115	1500	X	Leads	1 15/16	3 5/16	2	2 13/16	
F-16X F-316X	6.3 CT	3	115 115/230	Pri. 1500 Sec. 2500	X	Leads	1 15/16	3 5/16	2	2 13/16	
F-18A	6.3 CT	6	115	1500	A	1–Leads	3 3/16	2 21/32	2 5/8	2	1 11/16
F-18X F-318X	6.3 CT	6	115 115/230	1500	X	Leads	2 19/32	4	2 1/4	3 9/16	
F-19X†	6.3 CT–6 CT	6	115	2000	X	Leads	2 19/32	4	2 1/4	3 9/16	
F-21A	6.3 CT	10	115	1500	A	1–Leads	3 19/32	2 31/32	3 1/8	2 1/4	2
F-20U†	6.3 CT–6 CT	11	115	Pri. 1500 Sec. 3000	U	Leads	3 1/2	2 7/8	3	2 1/4	2 7/16
F-17U#	6.3 CT Lo-Cap.	15	115	Pri. 1500 Sec. 10,000	U	Pri. Leads Sec. Leads	4 1/4	3 1/2	3 3/4	2 3/4	2 13/16
F-22A	6.3 CT	20	115	2000	A	2–Leads	3 7/8	3 9/32	4 1/8	2 1/2	3
F-24U†	7.5 CT– 6.3 CT	8	115	Pri. 1500 Sec. 3000	U	Leads	3 1/2	2 7/8	2 13/16	2 1/4	2 5/16
F-28U†	7.5 CT– 6.3 CT	25	115	Pri. 1500 Sec. 3000	U	Leads & Lugs	4 5/8	3 13/16	3 5/8	3	3 1/16
F-31X	10 CT	3	115	2000	X	Leads	2 9/32	3 3/4	2 1/8	3 1/8	
F-33U	10 CT	5	115	2000	U	Leads	3	2 1/2	2 5/8	2	2 1/16
F-23U	10 CT	7	115	1500	U	Leads	3 1/2	2 7/8	2 15/16	2 1/4	2 7/16
F-35U	10 CT	10	115	2000	U	Leads	4 1/8	4 1/2	3 1/4	2 3/4	2 7/16
F-29U†	12 CT–11 CT 10 CT	11	115	Pri. 1500 Sec. 3000	U	Leads	4 3/8	3 1/2	3 3/8	2 3/4	2 9/16
F-70X	12.6 CT	1.0	115	1500	X	Leads	1 15/16	3 5/16	1 3/4	2 13/16	
F-25X F-325X	12.6 CT	1.5	115 115/230	1500	X	Leads	1 15/16	3 5/16	2	2 13/16	

‡ Static shield. † Tapped primary to produce lower voltages. # 60 cycle operation

Litton TRIAD-UTRAD
Distributor Services

All units in case type X also available on special order with shields added as type SX or with channel frame removed.

FILAMENT / single secondary / 50-60 Hz (Continued)

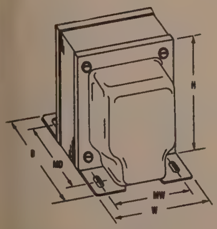
Type No.	Secondary		Primary Volts	RMS Test Voltage	Case Type	Connections or Lead Holes Used	Case Dimension			Mounting Dimension	
	Volts	Amps					H	W	D	MW	MD
F-44X # F-344X	12.6 CT	2	115 115/230	1500	X	Leads	1 15/16	3 5/16	2	2 13/16	
F-26X # F-326X	12.6 CT	2.5	115 115/230	1500	X	Leads	2 9/32	3 11/16	2	3 1/8	
F-40X # F-340X	26.8 CT	1	115 115/230	1500	X	Leads	1 15/16	3 5/16	2	2 13/16	
F-55X F-355X	26.8 CT	1.7	115 115/230	1500	X	Leads	2 19/32	4	2 1/4	3 9/16	
F-57X	25.2 CT	1	115	1500	X	Leads	1 15/16	3 5/16	2	2 13/16	
F-41X # F-341X	25.2 CT	2	115 115/230	1500	X	Leads	2 19/32	4	2 1/4	3 9/16	
F-56X	25.2 CT	2.8	115	1500	X	Leads	2 21/32	4	2 1/4	3 9/16	
F-50X #	Sec. 6.3–5 Pri. 6.3–5 Special Fil. Line Matching Transformer	2		Pri. 500 Sec. 5000	X	Leads	1 15/16	3 5/16	2	2 13/16	
F-45X # F-345X	24 CT	1	115 115/230	1500	X	Leads	1 15/16	3 5/16	2	2 13/16	
F-46X #	24	1	115	1500	X	Leads	1 15/16	3 11/16	2 1/8	2 13/16	
F-54X F-354X	35 CT	1.5	115 115/230	1500	X	Leads	2 19/32	4	2 1/4	3 9/16	
F-58A	50 CT	5	115	1500	A	Leads	4 5/8	3 15/16	4 1/2	3	3 3/8
F-59X	60 CT	.4	115	1500	X	Leads	1 15/16	3 5/16	2	2 13/16	

FILAMENT / multiple secondary / primary 115 volt, 50-60 Hz

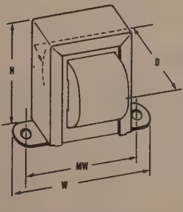
Type No.	Secondary		RMS Test Voltage	Case Type	Connections or Lead Holes Used	Case Dimension			Mounting Dimension	
	Volts	Amps				H	W	D	MW	MD
F-27U	10 CT 2.5 CT	10 10	1500 7500	U	Leads	4 3/8	3 1/2	3 3/4	2 3/4	2 9/16
F-32A	6.3 CT* 6.3 CT*	3 3	1500	A	1–Leads	3 3/16	2 21/32	2 5/8	2	1 11/16
F-34A	6.3 CT* 6.3* 6.3* 6.3*	1.75 1.75 1.75 1.75	1500	A	2–Leads	3 3/16	2 21/32	3	2	2 1/16
F-36A	6.3 CT* 6.3* 6.3* 6.3*	3.5 3.5 3.5 3.5	1500	A	1–Leads	3 7/8	3 9/32	3 1/2	2 1/2	2 3/8
F-42A	12.6 CT* 12.6*	2.5 2.5	1500	A	1–Leads	3 19/32	2 21/32	3 1/8	2 1/4	2
F-83A¶ #	12.6 CT* 12.6 CT*	5 5	Pri. 1500 Sec. 2500	A	2–Leads	3 7/8	3 9/32	3 3/4	2 1/2	2 5/8

* Windings may be connected in series to obtain their combined voltage when properly phased. Current will be equal to the current of the lowest winding. Example: Two 6.3V. windings @ 2A. in series would be 12.6V. @ 2A. Windings may also be connected in parallel to obtain combined current. Example: Two 6.3V. windings @ 2A. in parallel would be 6.3V. @ 4A.

CT for Center Tap. ¶ Tapped primary 105-115-125. # 60 cycle operation.



A Case



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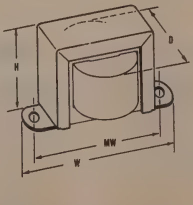
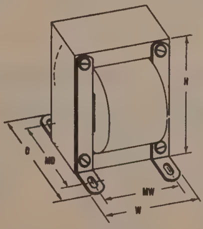


X Case



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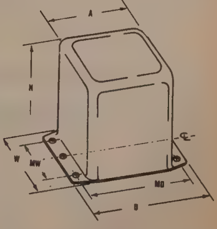


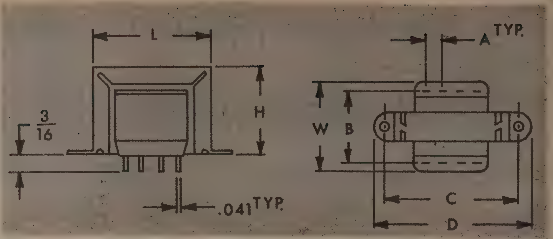
K Case

TRIAD-UTRAD

Litton Distributor Services

A

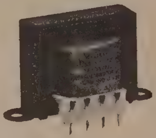
B

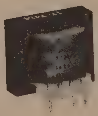


LOW-VOLTAGE, LOW-CURRENT PLUG-IN PRINTED CIRCUIT POWER TRANSFORMERS 115 volts, 50/60 Hz Primary

Cat. No.	Fig.	Output Watts	SECONDARY Series Conn.	SECONDARY Parallel Conn.	Dimensions H.	Dimensions W.	D.	L.	A.	B.	Pin Dim.	
F-131P	B	1 1/2	8V CT @ .188A	4V @ .376A	1 1/8	1 25/64	1 5/32	1 25/64	5/16	1	3/16	.041
F-132P	B	1 1/2	15V CT @ .100A	7.5V @ .200A	1 1/8	1 25/64	1 5/32	1 25/64	5/16	1	3/16	.041
F-133P	B	1 1/2	30V CT @ .050A	15V @ .100A	1 1/8	1 25/64	1 5/32	1 25/64	5/16	1	3/16	.041
F-134P	B	1 1/2	54V CT @ .028A	27V @ .056A	1 1/8	1 25/64	1 5/32	1 25/64	5/16	1	3/16	.041
F-135P	B	1 1/2	76V CT @ .020A	38V @ .040A	1 1/8	1 25/64	1 5/32	1 25/64	5/16	1	3/16	.041
F-136P	B	1 1/2	116V CT @ .013A	58V @ .026A	1 1/8	1 25/64	1 5/32	1 25/64	5/16	1	3/16	.041
F-137P	B	1 1/2	40V CT @ .038A	20V @ .076A	1 1/8	1 25/64	1 5/32	1 25/64	5/16	1	3/16	.041
F-141XP	A	4 1/2	8V CT @ .562A	4.0V @ 1.124A	1 25/64	2 3/8	1 1/4	1 45/64	13/32	1 3/32	3/16	.041
F-142XP	A	4 1/2	15V CT @ .300A	7.5A @ .600A	1 25/64	2 3/8	1 1/4	1 45/64	13/32	1 3/32	3/16	.041
F-143XP	A	4 1/2	30V CT @ .150A	15V @ .300A	1 25/64	2 3/8	1 1/4	1 45/64	13/32	1 3/32	3/16	.041
F-144XP	A	4 1/2	54V CT @ .084A	27V @ .168A	1 25/64	2 3/8	1 1/4	1 45/64	13/32	1 3/32	3/16	.041
F-145XP	A	4 1/2	76V CT @ .060A	38V @ .120A	1 25/64	2 3/8	1 1/4	1 45/64	13/32	1 3/32	3/16	.041
F-146XP	A	4 1/2	116V CT @ .033A	58V @ .066A	1 25/64	2 3/8	1 1/4	1 45/64	13/32	1 3/32	3/16	.041
F-147XP	A	4 1/2	40V CT @ .112A	20V @ .224A	1 25/64	2 3/8	1 1/4	1 45/64	13/32	1 3/32	3/16	.041
F-151XP	A	7 1/2	8V CT @ .940A	4.0V @ 1.880A	1 41/64	2 13/16	1 15/32	1 61/64	13/32	1 5/16	3/16	.041
F-152XP	A	7 1/2	15V CT @ .500A	7.5V @ 1.000A	1 41/64	2 13/16	1 15/32	1 61/64	13/32	1 5/16	3/16	.041
F-153XP	A	7 1/2	30V CT @ .250A	15V @ .500A	1 41/64	2 13/16	1 15/32	1 61/64	13/32	1 5/16	3/16	.041
F-154XP	A	7 1/2	54V CT @ .140A	27V @ .280A	1 41/64	2 13/16	1 15/32	1 61/64	13/32	1 5/16	3/16	.041
F-155XP	A	7 1/2	76V CT @ .100A	38V @ .200A	1 41/64	2 13/16	1 15/32	1 61/64	13/32	1 5/16	3/16	.041
F-156XP	A	7 1/2	116V CT @ .065A	58V @ .130A	1 41/64	2 13/16	1 15/32	1 61/64	13/32	1 5/16	3/16	.041
F-157XP	A	7 1/2	40V CT @ .188A	20V @ .376A	1 41/64	2 13/16	1 15/32	1 61/64	13/32	1 5/16	3/16	.041

115/230 volts, 50/60 Hz Dual Primary


A-1, A-2


B-1

C

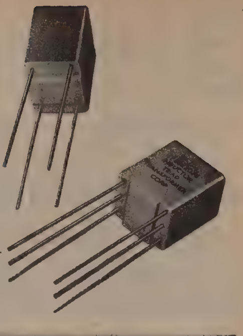
F-333P	B-1	1 1/2	30V CT @ .050A	15V @ .100A	1 1/8	1 1/8	–	1 3/8	13/64	1	3/16	.041
F-348XP	A-1	4 1/2	12.6V CT @ .350A	6.3V @ .700A	1 3/8	1 1/4	2 3/8	1 5/8	1/4	1 7/64	3/16	.041
F-349XP	A-1	4 1/2	16V CT @ .280A	8V @ .560A	1 3/8	1 1/4	2 3/8	1 5/8	1/4	1 7/64	3/16	.041
F-350XP	A-1	4 1/2	24V CT @ .180A	12V @ .360A	1 3/8	1 1/4	2 3/8	1 5/8	1/4	1 7/64	3/16	.041
F-358XP	A-1	4 1/2	20V CT @ .225A	10V @ .450A	1 3/8	1 1/4	2 3/8	1 5/8	1/4	1 7/64	3/16	.041
F-359XP	A-2	10	24V CT @ .450A	12V @ .900A	1 5/8	1 7/16	2 13/16	1 7/8	1/4	1 5/16	3/16	.041
F-362XP	A-2	10	20V CT @ .500A	10V @ 1.0A	1 5/8	1 7/16	2 13/16	1 7/8	1/4	1 5/16	3/16	.041
F-363XP	A-1	7 1/2	230V CT @ .020A	115V @ .040A	1 3/8	1 1/4	2 3/8	1 5/8	1/4	1 7/64	3/16	.041
F-365XP	A-2	10	12.6V CT @ .800A	6.3V @ 1.6A	1 5/8	1 7/16	2 13/16	1 7/8	1/4	1 5/16	3/16	.041
F-366XP	A-2	10	16V CT @ .640A	8V @ 1.28A	1 5/8	1 7/16	2 13/16	1 7/8	1/4	1 5/16	3/16	.041

PLUG-IN PRINTED CIRCUIT AUDIO TRANSFORMERS

Cat. No.	Fig.	Output MW.	Primary Impedance	Secondary Impedance	Pri. D.C. Unbalance	Dimensions H.	Dimensions W.	D.	Pin Dim.	
TY-141P	C	100	10,000 CT	10,000 CT	4 ma.	5/8	13/16	19/32	3/16	.042
TY-142P	C	100	10,000 CT	2,000 CT	4 ma.	5/8	13/16	19/32	3/16	.042
TY-143P	C	100	10,000 CT	1,500 CT	4 ma.	5/8	13/16	19/32	3/16	.042
TY-144P	C	100	15,000 CT	15,000 CT	4 ma.	5/8	13/16	19/32	3/16	.042
TY-145P	C	100	600 CT	600 CT	15 ma.	5/8	13/16	19/32	3/16	.042

TRIAD-UTRAD

Litton Distributor Services

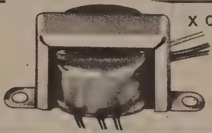


RED SPEC TRANSISTOR TRANSFORMERS

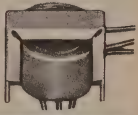
Features of the reliable Red Specs: solid epoxy molded case . . . legible, permanent circuit data on every unit . . . base mounting pad for ready inspection of all solder joints . . . high-strength .020-diameter nickel alloy leads . . . no stripping or tinning required . . . operating voltage: 150 volts DC . . . exceptional operation from 100 to 100,000 cycles . . . base dimensions of only .310 by .410 inch . . . total height of just .465 inch . . . weight: 1/10 ounce . . . lowest possible fatigue factor . . . dry hydrogen-annealed Trialloy, deep-drawn .020-inch case available for providing as much as 20 to 45 db magnetic shielding.

Type No.	Mil Type Number	Power Level in MW	Application	Matching Impedance		Max MA DC Unbalanced in Primary	DC Resistance	
				Primary	Secondary		Primary	Secondary
SP-4	TF5SX16ZZ	10	Input	200,000 CT	1,000 CT	0	5300	100
SP-5	TF5SX16ZZ	25	Input	50,000 CT	1,000 CT	0	3800	75
SP-7	TF5SX16ZZ	10	Input	200,000	1,000	0	5300	100
SP-11	TF5SX13ZZ	40	Interstage	25,000/20,000	1,000/800	.5	1700	115
SP-13	TF5SX13ZZ	40	Interstage	25,000 CT/20,000 CT	1,000 CT/800 CT	.5	1700	115
SP-20	TF5SX13ZZ	50	Driver	10,000 CT	1,200 CT	1	1050	200
SP-21	TF5SX13ZZ	50	Driver	10,000 CT	2,000 CT	1	1050	330
SP-22	TF5SX13ZZ	50	Driver	10,000	2,000 CT/500§	1	1050	146/168§
SP-29	TF5SX13ZZ	50	Driver	10,000 CT	500 CT	1	1050	80
SP-32	TF5SX17ZZ	50	Output	500	50	3	60	8
SP-33	TF5SX17ZZ	50	Output	1,000	50	3	145	8
SP-42	TF5SX17ZZ	50	Output	150 CT	12	10	18	2.7
SP-50	TF5SX17ZZ	50	Output	500 CT	600	3	67	98
SP-51	TF5SX17ZZ	50	Output	900 CT	600	4	104	96
SP-52	TF5SX13ZZ	50	Output	1,500 CT	600	3	168	92
SP-66	TF5SX13ZZ	50	Output-Isolation	10,000 CT	10,000 CT	1	1000	1300
SP-67	TF5SX17ZZ	50	Output-Isolation	600 CT	600 CT	3	72	92
SP-68	TF5SX13ZZ	50	Output-Isolation	10,000	10,000 CT/2500§	1	1000	565/650§
SP-69	TF5SX17ZZ	50	Output-Isolation	600	600 CT/150§	3	72	40/45§
SP-70	TF5SX17ZZ	50	Output-Isolation	600	600	3	72	92
SP-106	TF5SX20ZZ	—	Audio Choke	6HY	—	2	1700	—
SP-107	TF5SX20ZZ	—	Audio Choke	1.25HY	—	2	180	—

CT for Center Tap. § Split Secondary.



X Case



XT Case

MINIATURE AUDIO TRANSFORMERS

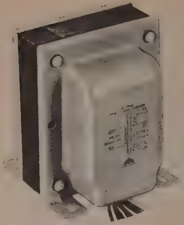
Highly dependable Triad Trijets open frame units, Climatite treated (both coil and core) for protection against moisture and for prevention of lamination chatter.

Type No.	Power Output	Application	Matching Impedance		DC Resistance		Overall Turns Ratio	Frequency Response ± 3DB	RMS Test Volts	Case Type	Case Dimension			Mounting Dimension
			Primary	Secondary	Primary	Secondary					H	W	D	MW
T-1X‡	1MW.	Line or Mike to Grid	600/250/50	50,000	80	3200	1:9.16	60–15,000	500	X	⅝	1 7/32	¾	1
T-20X	10MW.	Output–Plate to Line	15,000	600/250/50	1330	58	5:1	60–15,000	500	X	⅝	1 7/32	¾	1
T-31X‡	10MW.	Line to Line	600/250/50	600/250/50	55	80	1:1	50–15,000	500	X	⅝	1 7/32	¾	1
T-33X‡	10MW.	Isolation–High Impedance	5000 CT	5000 CT	1500	2200	1:1	60–15,000	500	X	⅝	1 7/32	¾	1
T-34X	20MW.	Transistor or Line to Transistor or Line	500 CT 2 MA. D.C.	500 CT/125§	45	55	1:1.03	50–20,000	500	X	⅝	1 9/32	11/16	1 1/16
T-35X	10MW.	Transistor or Line to Transistor	600 CT 1 MA. D.C.	2000 CT/500§	68	200	1:1.7	50–20,000	500	X	⅝	1 7/32	¾	1
T-102X	–	Coupling Reactor	6 HY. or 3 MA. D.C.	4 HY– 6 MA. D.C.	295	–	–	–	500	X	⅝	1 7/32	¾	1

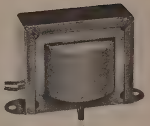
§ Split winding. CT for Center Tap. ‡ Static shield.

TRIAD-UTRAD

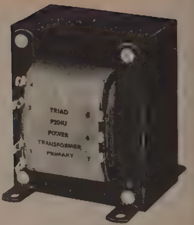
Litton Distributor Services



A Case



X Case



U Case

UNIVERSAL RECTIFIER POWER primary 50-60 Hz

Type No.	Primary Volts	Secondary AC Volts	Secondary AC Amps	DC Volts Half Wave	DC Volts Bridge	RMS Test Voltage	Case Type	Connections	Case Dimension H	Case Dimension W	Case Dimension D	Mounting Dimension MW	Mounting Dimension MD
F-47U	115	0–17–18	3	6–7	13–14	1500	U	Leads	3	2½	2¾	1⅝	2⅜
F-347U	115/230												
F-48U	115	0–17–18	6	6–7	13–14	1500	U	Leads	3¹³⁄₁₆	3³⁄₁₆	3³⁄₁₆	2½	2¹¹⁄₁₆
F-49U	115	36*	3	13	26	1500	U	Leads	4⅝	3¹³⁄₁₆	3¾	3	3¹⁄₁₆
		36*	3	13	26								
F-60U	115	0–6.5–13–19.5–26	3	9	18	1500	U	Leads	3⅜	2¹³⁄₁₆	2⅝	2¼	2³⁄₁₆
F-360U	115/230												
F-61U	115	0–24–27–30–33–36	3	13	26	1500	U	Leads	3¾	3⅛	3¼	2½	2⅝
F-361U	115/230												
F-67U #	110–120	0–24–27–30–33–36	8	13	26	1500	U	Leads	4⅝	3¹³⁄₁₆	4⅜	3	3⁵⁄₁₆
F-63U	115	0–8–9*	2	–	6 – 7	1500	U	Leads	3⅛	2⁹⁄₁₆	2⁹⁄₁₆	2	2¹⁄₁₆
		0–8–9*	2	–	6 – 7								
F-64U	115	0–7–8–9	7	–	5–6–7	1500	U	Leads	3⅜	2¹³⁄₁₆	2¾	2¼	2³⁄₁₆
F-364U	115/230												
F-62U #	105–115–125	9*	10	–	7	1500	U	Leads	4⅝	3¹³⁄₁₆	5¼	3	4⁹⁄₁₆
		9*	10	–	7								
		9*	10	–	7								
		9*	10	–	7								
F-68U #	115	9 CT*	3.5	–	7	1500	U	Leads	3¹³⁄₁₆	3³⁄₁₆	3⁵⁄₁₆	2½	2⁷⁄₁₆
		9*	3.5	–	7								
		9*	3.5	–	7								
		9*	3.5	–	7								
F-65U	110–120	0–140–150–160	.75	60	115	1500	U	Leads	3¹³⁄₁₆	3³⁄₁₆	3⅜	2½	2¹³⁄₁₆
F-74U	117	28 CT*	2	–	–	1500	U	Lugs	3¹³⁄₁₆	3¹³⁄₁₆	3¼	2½	2⅝
		28 CT*	2	–	–								
F-79U #	115	0–24–26–28–30	15	11.4	22.8	1500	U	Leads, Lugs	3¹³⁄₁₆	4⅝	5½	3¾	4⁹⁄₁₆

* Windings may be connected in series to obtain their combined voltage when properly phased. Current will be equal to the current of the lowest winding. Example: Two 6.3V. windings @ 2A. in series would be 12.6V. @ 2A. Windings may also be connected in parallel to obtain the combined current. Example: Two 6.3V. windings @ 2A. in parallel would be 6.3V. @ 4A.

‡ Static Shield. # 60 cycle operation. † Tapped primary to produce lower voltages. § Split winding. **CT** for Center Tap.

LOW VOLTAGE RECTIFIER / transistor drive voltage, 50-60 Hz

Type No.	Primary Volts	Secondary AC Volts	Secondary AC Amps	DC Volts Half Wave	DC Volts Bridge	RMS Test Voltage	Case Type	Connections	Case Dimension H	Case Dimension W	Case Dimension D	Mounting Dimension MW	Mounting Dimension MD
F-94X	115†	10–20 CT–40 CT	.035	15	30	1500	X	Leads	1⅜	2⅜	1⅜	2	
F-90X	115†	10–20 CT–40 CT	.1	15	30	1500	X	Leads	1⅝	2¹³⁄₁₆	1⅝	2⅜	
F-91X	115†	10–20 CT–40 CT	.3	15	30	1500	X	Leads	2⁹⁄₃₂	3¹¹⁄₁₆	2	3⅛	
F-93X	115†	10–20 CT–40 CT	.75	15	30	1500	X	Leads	2¹⁹⁄₃₂	4	2¼	3⁹⁄₁₆	
F-92A	115†	10–20 CT–40 CT	1	15	30	1500	A	Leads (2 Holes)	3³⁄₁₆	2²¹⁄₃₂	3	2	2¹⁄₁₆

UNIVERSAL RECTIFIER POWER / primary 117 volts, 50-60 Hz

Type No.	Secondary No. 1 AC Volts	Secondary DC Amps Full Wave CT	Secondary DC Amps Bridge	Secondary No. 2 AC Volts	Secondary No. 2 DC Amps	RMS Test Volts	Case Type	Connections	Case Dimensions H	Case Dimensions W	Case Dimensions D	Mounting Dimension MW	Mounting Dimension MD
F-200A	13 or 18 @ .9 ADC	–	–	13 or 18 @ .9 ADC		1000	A	Leads	3³⁄₃₂	2²¹⁄₃₂	2⅞	2	2
F-202U	11.0 to 29.5	2.0	1.25	–		1000	U	Lugs	3	2½	3	2	2⅛
F-203U	12.0 to 30.0	4.0	2.0	–		1000	U	Lugs	3⅜	2¹³⁄₁₆	3¼	2¼	2⅜
F-204U	11.5 to 29.0	8.0	4.0	–		1000	U	Lugs	3¾	3⅛	4⅛	2½	2⅞
F-205U	12.0 to 29.5	12.0	6.0	–		1000	U	Lugs	4⅛	3⁷⁄₁₆	5⅛	2¾	3¼

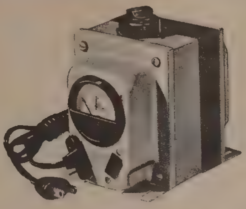
LOW VOLTAGE LOW CURRENT / primary 117 volts, 50-60 Hz

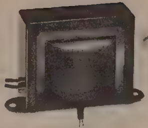
Type No.	Secondary Volts	Secondary Amps	RMS Test Voltage	Case Type	Connections or Lead Holes Used	Case Dimension H	Case Dimension W	Case Dimension D	Mounting MW	Mounting MD
F-112X	14 CT	0.25	1500	X	Leads	1⅜	2⅜	1⅜	2	
F-113X	12	0.15	1500	X	Leads	1⅜	2⅜	1⅜	2	
F-114X	12	0.7	1500	X	Leads	1⅝	2¹³⁄₁₆	1⅝	2⅜	
F-115X	24 CT	0.085	1500	X	Leads	1³⁄₁₆	2¹⁄₁₆	1¼	1¾	
F-116X	24 CT	0.2	1500	X	Leads	1⅜	2⅜	1½	2	
F-117X	24 CT	0.4	1500	X	Leads	1⅝	2¹³⁄₁₆	1⅝	2⅜	

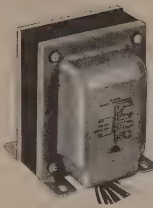
TRIAD-UTRAD

Litton Distributor Services

M Case


MM Case


X Case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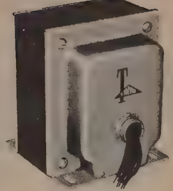

AC Case

ISOLATION / 50-60 Hz

Type No.	Output Watts (VA)	Primary Volts	Secondary AC Volts ± 5%	Secondary AC Amps	RMS Test Voltage	Case Type	Connections	Lead Holes Used	Case Dimension H	Case Dimension W	Case Dimension D	Mounting Dimension MW	Mounting Dimension MD
N-48X	15	115	115	.13	1500	X	Leads	–	1 15/16	3 5/16	2	2 13/16	–
N-49X	35	115	57.5-115§	.3	1500	X	Leads	–	2 9/32	3 11/16	2 1/8	3 1/8	–
N-51X#	35	115	115	.3	1500	X	Leads	–	2 9/32	3 11/16	2 1/8	3 1/8	–
N-68X	50	115–230§	115	.435	1500	X	Leads	–	2 9/32	3 11/16	2 1/8	3 1/8	–
N-53M	85	115	115	.74	1500	M	6′ Cord, Plug & Socket	–	3 19/32	2 31/32	3 5/8	2 1/4	2 3/8
N-53MG*											4 1/2		3
N-54M	150	115	115	1.3	1500	M	6′ Cord, Plug & Socket	–	3 7/8	3 9/32	4 1/4	2 1/2	3
N-54MG*											5 1/8		3 1/2
N-73A	150	115	115–230§	.65	1500	A	Leads	1	3 7/8	3 9/32	3 7/8	2 1/2	2 3/4
N-74A	150	115	57.5–115§	1.3	1500	A	Leads	1	3 7/8	3 9/32	3 7/8	2 1/2	2 3/4
N-67A	150	115–230§	115	1.3	1500	A	Leads	2	3 7/8	3 9/32	4 1/8	2 1/2	3
N-55M	250	115	115	2.17	1500	M	6′ Cord, Plug & Socket	–	4 5/8	3 15/16	5	3	3 7/8
N-55MG*		115											
N-255MG*		230											
N-66A	250	115–230§	115	2.17	1500	A	Leads	2	4 5/8	3 15/16	4 5/8	3	3 5/8
N-57M	500	115	115	4.35	1500	M	6′ Cord, Plug & Socket	–	5 5/16	4 1/2	6 1/4	3 1/2	5 1/8
N-57MG*		115											
N-257MG*		230											
N-59M	1000	115	115	8.7	1500	M	6′ Cord, Plug & Socket	–	5 5/16	4 1/2	8	3 1/2	6 7/8
N-59MG*		115											
N-259MG*		230											

STEPDOWN AUTOFORMERS / 50-60 Hz

Type No.	Output Watts (VA)	Primary Volts	Secondary Volts ± 5%	Secondary RMS Amps	RMS Test Voltage	Case Type	Connections	Case Dimension H	Case Dimension W	Case Dimension D	Mounting Dimension MW	Mounting Dimension MD
N-1X	50	230	115	.435	1500	X	Leads	2 9/32	3 11/16	2	3 1/8	–
N-3M	85	230	115	.74	1500	M	6′ Cord & Plug & Socket	3 19/32	2 31/32	2 7/8	2 1/4	1 5/8
N-4M	150	230	115	1.3	1500	M	"	3 19/32	2 31/32	3 5/8	2 1/4	2 3/8
N-5M	250	230	115	2.17	1500	M	"	3 7/8	3 9/32	4 1/4	2 1/2	3
N-7M N-7MG†	600	230	115	5.22	1500	M	"	4 5/8	3 15/16	5	3	3 7/8
N-9M N-9MG†	1250	230	115	10.85	1500	M	"	5 5/16	4 1/2	6 1/4	3 1/2	5 1/8
N-11M N-11MG†	2000	230	115	17.4	1500	M	"	5 5/16	4 1/2	8	3 1/2	6 7/8

SIGNALING / 60 Hz

Type No.	Primary Volts	Secondary AC Volts	Amps	RMS Test Voltage	Case Type	Connections	Case Dimension H	Case Dimension W	Case Dimension D	Mounting Dimension MW	Mounting Dimension MD
F-102X	115	4–8–12–16–20–24	2	2500	X	Leads	2 9/32	3 11/16	2 1/2	3 1/8	
F-104U	115	4–8–12–16–20–24	4	2500	U	Leads	3 1/2	2 7/8	2 9/16	2 1/4	2 1/16

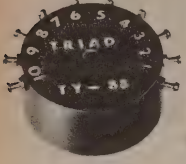
UNIVERSAL ISOLATION

Have four 115-volt windings. Both primary and secondary may be connected for 115 or 230 volts.

Type No.	Output Watts (VA) Isolation	Output Watts (VA) Autoformer	RMS Test Voltage	Case Type	Connections	Lead Holes Used	Case Dimension H	Case Dimension W	Case Dimension D	Mounting Dimension MW	Mounting Dimension MD
N-64AC	500	1000	1500	AC	Leads	1 Conduit	5 5/16	4 1/2	5 1/2	3 1/2	3 7/8

TRIAD-UTRAD
Litton Distributor Services

TRANSISTOR POWER SUPPLY TRANSFORMERS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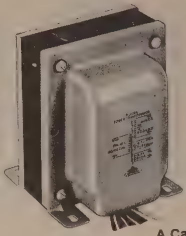
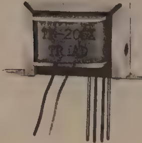
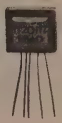
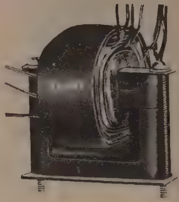

A Case

Type L


Type X


Type TZ


Type S

EPOXY MOLDED TOROIDAL TYPE / dc to dc

Type No.	D.C. Source Volts	D.C. Volts out of Rectifier F.W. Bridge	D.C. Volts out of Rectifier F.W. C.T.	D.C. Milliamps. Maximum	Case Type	Dimensions—Inches T	Dimensions—Inches D	Dimensions—Inches H	Dimensions—Inches M	Weight Lbs.
TY-78	12.6	250	125	100	EE	½	1¾	11/16	11/64	.35
TY-79	12.6	300	150	200	EE	¾	1¾	1	11/64	.35
TY-80	12.6	325	162.5	150	EE	¾	1¾	1	11/64	.35
TY-81	12.6	375	187.5	200	EE	¾	2	1	11/64	.50
TY-82	12.6	450	225	150	EE	¾	2	1	11/64	.50
TY-83	12.6	500	250	250	EE	1⅛	2¾	1⅜	3/16	.85
TY-84	12.6	600	300	200	EE	1⅛	2¾	1⅜	3/16	1.00
TY-85	12.6	600	300	350	EE	1⅝	2⅞	1⅞	13/64	2.00
TY-86	12.6	425	212.5	350	EE	1⅛	2¾	1⅜	3/16	1.00
TY-88	28	250	125	80	EE	13/32	1 5/16	9/16	7/64	.25
TY-89	28	300	150	100	EE	½	1¾	11/16	11/64	.35
TY-90	28	325	162.5	200	EE	¾	1¾	1	11/64	.35
TY-91	28	375	187.5	200	EE	¾	2	1	11/64	.50
TY-92	28	450	225	200	EE	¾	2	1	11/64	.50

OPEN AND VERTICAL SHIELDED TYPES / dc to ac

Type No.	Primary D.C.	Secondary	Case Type	Dimensions—Inches H	Dimensions—Inches W	Dimensions—Inches D	Mounting Dimensions MW	Mounting Dimensions MD
TY-468	28	110-115-125v 400cps 60 watts	L	1⅞	2¼	2	1⅞	1⅜
TY-462	12	110-115-125v 400cps 60 watts	L	1⅞	2¼	2	1⅞	1⅜
TY-75A	12	110-115-125v 60cps 115 watts	A	3⅞	3 9/32	3½	2½	2⅜
TY-76A	12	110-115-125v 60cps 60 watts	A	3 3/16	2 21/32	2⅝	2	1 11/16

OPEN TYPE / 12 volt dc to dc

Type No.	D.C. Volts out of Rectifier F.W. Bridge	D.C. Volts out of Rectifier F.W. C.T.	D.C. Milliamperes Maximum	Dimensions—Inches H	Dimensions—Inches W	Dimensions—Inches D	MW
TY-68S	250	125	65	1¾	1¾	1 11/32	1½
TY-74S	600	300	200	2	4⅛	3	3¾
TY-77S†	670	335	180	2	4⅛	3	3¾

OPEN TYPE / dc to dc converter

Type No.	*Typical operation Input	*Typical operation Output	Case Type	Dimensions—Inches H	Dimensions—Inches W	Dimensions—Inches D	MW
TY-200X	3 v.DC @ 20 ma.	1050 v.DC @ 25 μa.	X	13/16	1⅝	⅞	1⅜
TY-201TZ	4 v.DC @ 15 ma.	500 v.DC @ 50 μa.	TZ	7/16	½	7/16	—
TY-202X	4 v.DC @ 45 ma.	550 v.DC @ 80 μa.	X	13/16	1⅝	⅞	1⅜

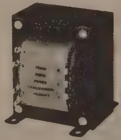
* May vary with circuit components, load requirements, etc. † Has additional winding for bias in SSB transmitters.

CONTROL TRANSFORMERS

6, 12, 24 volt secondaries

For use with relays, solenoids, small motors, speed changers, pumps, heating elements, control valves for fluids and gases, fans and blowers, electronic tubes, automatic assembly equipment, recording devices, elevators, door openers, low voltage lamps and similar applications.

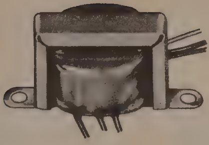
Z Case


U Case

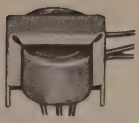
Type No.	Primary	Secondary Parallel	Secondary Series	VA Rating	Case Type	Connections	Height Overall	Base Area	Mtg. Dim.
F-105Z	115V/230V 50/60 CPS on all	6V @ 2A	12V @ 1A	12	Z	Lugs	2⅜	2⅞ x 1¾	2⅜
F-106Z		6V @ 4A	12V @ 2A	24	Z	Lugs	2¾	3⅛ x 2	2 13/16
F-107Z		12V @ 4A	24V @ 2A	48	Z	Lugs	3⅛	3⅝ x 2⅜	3⅛
F-108U		12V @ 8A	24V @ 4A	96	U	Lugs	3½	2⅞ x 3	2¼ x 2¼
F-109U		12V @ 16A	24V @ 8A	192	U	Lugs	4⅛	3¾ x 3½	3 x 2¾

TRIAD-UTRAD

Litton Distributor Services



X Case



XT Case

MINIATURE AUDIO TRANSISTOR TRANSFORMERS

Type No.	Power Output Watts	Application	Matching Impedance Primary	Matching Impedance Secondary	DC Resistance Primary	DC Resistance Secondary	Overall Turns Ratio	RMS Test Volts	Case Type	Connections	Case Dimension H	Case Dimension W	Case Dimension D	Mounting Dimension MW
TY-27XT	.01	Output-Single or P.P. to Line	500 CT 2MA D.C.	500 CT	37.5	51.5	1:1	500	XT	Leads	1/2	9/16	1/2	9/16
TY-32X	.2	Interstage-Sgl or P.P. to P.P.	200 CT 2MA D.C.	2000 CT	29	233	3.18:1	1000	X	Leads	13/16	1 5/8	1	1 3/8
TY-34X	.2	Interstage-Sgl or P.P. to Sgl or P.P.	400 CT 5MA D.C.	2000 CT	41	128	2.25:1	500	X	Leads	13/16	1 5/8	1	1 3/8
TY-35X TY-35XT	.1	Interstage-Sgl or P.P. to Sgl or P.P.	500 CT 2MA D.C.	150 CT	57	32	1.82:1	500	X XT	Leads	5/8	1 9/32	11/16	1 1/16 51/64
TY-36X	.2	Interstage-Sgl to Sgl or P.P.	2000 2MA D.C.	1500 CT	165	140	1.15:1	500	X	Leads	13/16	1 5/8	1	1 3/8
TY-37X TY-37XT	.2	Interstage-Sgl or P.P.to Sgl or P.P.	2000 CT 4MA D.C.	8000 CT	200	550	1:2	500	X XT	Leads	13/16	1 5/8	1	1 3/8 1 1/16
TY-39X	.2	Output-P.P. to V.C.	4000 CT 4MA D.C.	16/8/4	333	1.8	15.7:1	500	X	Leads	13/16	1 5/8	1	1 3/8
TY-44X	.2	Output-Sgl to V.C.	1000 10MA D.C.	16/8/4	181	3.8	7.9:1	500	X	Leads	13/16	1 5/8	1	1 3/8
TY-45X TY-45XT	.2	Output-Sgl or P.P. to VC.	500 CT 5MA D.C.	16/8/4	56	3.8	5.2:1	500	X XT	Leads	13/16	1 5/8	1	1 3/8 1 1/16
TY-47X	.2	Output-Sgl or P.P. to V.C.	2000 CT 10MA D.C.	16/8/4	260	3.95	11.2:1	500	X	Leads	13/16	1 5/8	1	1 3/8
TY-49X	.3	Interstage-Sgl or P.P. to Sgl or P.P.	500 CT 12MA D.C.	5000 CT	40	245	1:3.15	500	X	Leads	1 3/8	2 3/8	1 3/8	2
TY-50X	.04	Input-Sgl to Sgl or P.P.	125000 0 D.C.	2000 CT	5500	120	8:1	500	X	Leads	13/16	1 5/8	1	1 3/8
TY-51X TY-51XT	.05	Driver-Sgl or P.P. to Sgl or P.P.	2000 CT 10MA D.C.	200 CT	748	120	3.16:1	500	X XT	Leads	5/8	1 9/32	11/16	1 1/16 51/64
TY-52X	.1	Driver-Sgl or P.P. to Sgl or P.P.	20000 CT 1MA D.C.	2000 CT	2140	327	3.17:1	500	X	Leads	13/16	1 5/8	1	1 3/8
TY-56X	.05	Interstage-Sgl to Sgl or P.P.	10000 1MA D.C.	2000 CT	1034	334	2.24:1	500	X	Leads	13/16	1 5/8	1	1 3/8
TY-57X	.2	Output-Sgl or P.P. to V.C.	250 CT 10MA D.C.	16/8/4	34.6	3.7	3.94:1	500	X	Leads	13/16	1 5/8	1	1 3/8
TY-58X	.2	Output-Sgl or P.P. to V.C.	125 CT 15MA D.C.	8/4	16	2.2	3.97:1	500	X	Leads	13/16	1 5/8	1	1 3/8

SMOOTHING FILTER REACTORS

Type No.	Current DC MA	Inductance† Henries	Resistance Ohms	RMS Test Voltage	Case Type	Connections	Lead Holes Used	Case Dimension H	Case Dimension W	Case Dimension D	Mounting Dimensions MW	Mounting Dimensions MD
C-85X	10	1.5	70	2500	X	Leads	–	1 1/4	2 1/8	1 1/8	1 3/4	
C-30X	15	50	3500	1500	X	Leads	–	1 3/8	2 3/8	1 1/2	2	
C-1X	20	15	1000	1000	X	Leads	–	1 3/16	2 1/16	1 1/4	1 3/4	
C-84X	30	12	400	1500	X	Leads	–	1 3/8	2 3/8	1 3/8	2	
C-3X	50	10	500	1500	X	Leads	–	1 5/8	2 13/16	1 1/2	2 3/8	
C-4X	50	4	360	1500	X	Leads	–	1 3/8	2 3/8	1 3/8	2	
C-6X	65	5	330	1500	X	Leads	–	1 5/8	2 13/16	1 1/2	2 3/8	
C-5X	75	12	390	1000	X	Leads	–	1 15/16	3 5/16	1 3/4	2 13/16	
C-7X	90	10	270	1000	X	Leads	–	1 15/16	3 5/16	2	2 13/16	
C-9X	90	4	100	1500	X	Leads	–	1 15/16	3 5/16	1 3/4	2 13/16	
C-14A	200	6	150	1500	A	Leads	1	3 3/16	2 21/32	2 5/8	2	1 11/16
C-14X	200	6	150	1500	X	Leads	–	2 19/32	4	2 1/4	3 9/16	
C-16A	200	10	150	2500	A	Leads	1	3 1/2	2 31/32	3 1/2	2 1/4	2 3/8
C-21X	225	1.5	65	1500	X	Leads	–	1 15/16	3 5/16	1 3/4	2 13/16	
C-24X	240	1	50	1500	X	Leads	–	1 5/8	2 13/16	1 1/2	2 3/8	
C-27X	290	.7	30	1500	X	Leads	–	1 5/8	2 13/16	1 1/2	2 3/8	
C-36X	300	.5	30	1500	X	Leads	–	1 3/8	2 3/8	1 1/2	2	
C-34X	350	.6	35	1500	X	Leads	–	1 5/8	2 13/16	1 1/2	2 3/8	
C-28X	350	1	35	1500	X	Leads	–	1 15/16	3 5/16	2	2 13/16	
C-29X	375	1.5	50	1500	X	Leads	–	2 9/32	3 11/16	2	3 1/8	
C-40X	600	.32	10	1500	X	Leads	–	1 15/16	3 5/16	2	2 13/16	
C-47U	1A/2A	.3/.075§	3/.75	1500	U	Leads	–	3 1/2	2 7/8	3 3/16	2 1/4	2 11/16
C-56U	2.0	.035	.75	1500	U	Lugs	–	2 1/4	2 5/8	2	2 3/16	1 3/4
C-48U	2.5A/5A	.08/.02§	.61/.155	1500	U	Leads	–	3 13/16	3 3/16	3 9/16	2 1/2	3 1/16
C-57U	4.0	.025	.55	1500	U	Lugs	–	3 1/8	3 3/8	2 1/4	2 13/16	2 1/8
C-49U	5A/10A	.032/.008§	.19/.05	1500	U	Leads	–	4 1/4	3 1/2	3 5/8	2 3/4	3 1/16
C-58U	8.0	.01	.15	1500	U	Lugs	–	3 1/8	3 3/4	3	3 1/8	2 1/2
C-59U	12.5	.01	.10	1500	U	Lugs	–	3 1/2	4 1/8	3	3 7/16	2 3/8

There is more catalog data available to you at your fingertips than ever before...when you

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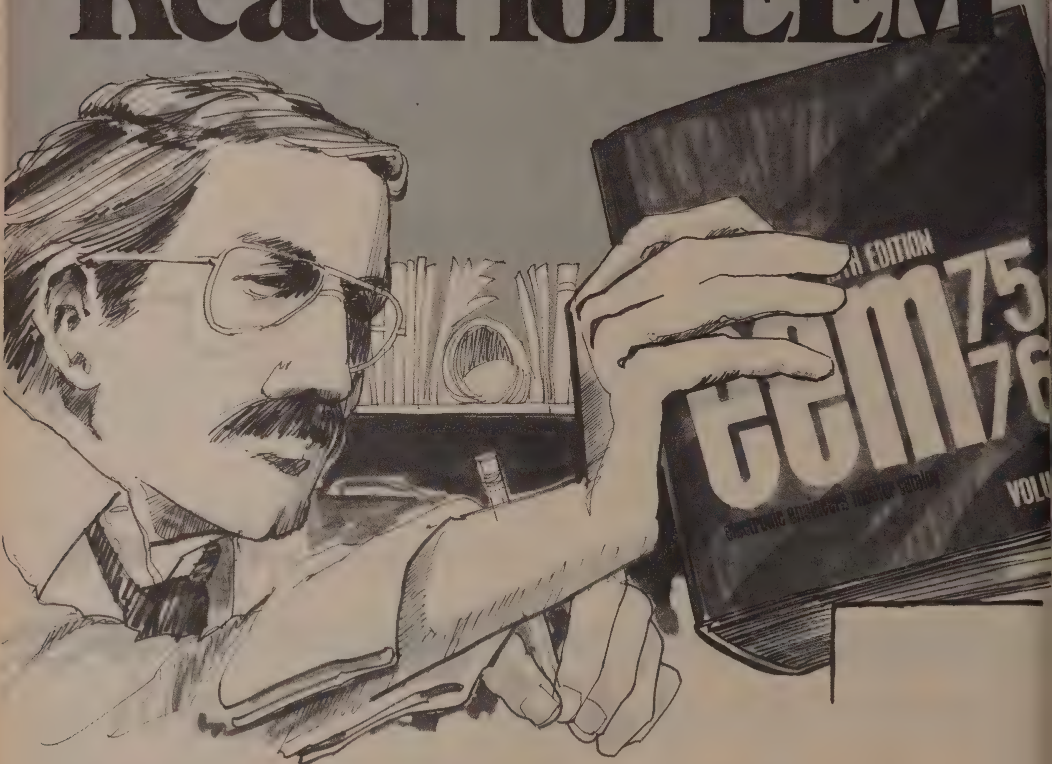
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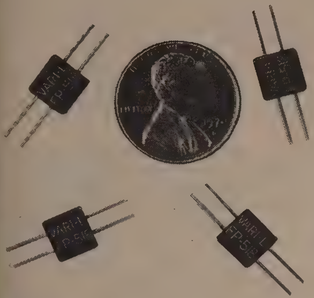
Z-MATCH

RF/ PULSE TRANSFORMERS

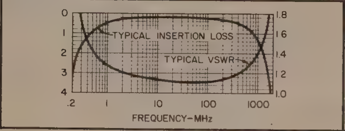

VARI-L
FP-518

SUBMINIATURE SIZE
MIC SUBSTRATE COMPATIBLE
DESIGNED TO MEET MIL-T-55631

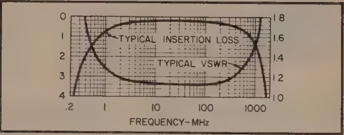
- **0.5 dB INSERTION LOSS**
- **UP TO 1.5 GHz BANDWIDTH**
- **12.5 TO 600 OHM IMPEDANCE RANGE**
- **BALANCED AND UNBALANCED CONFIGURATIONS**

Their small size, easily solderable or weldable planar ribbon leads, and high performance/high reliability design makes the FP Series transformers ideal for MIC substrate and conventional printed circuit applications.

TYPICAL PERFORMANCE



Model FP-518



Model FP-522

SPECIFICATIONS

MODEL	DESCRIPTION	GUARANTEED		TYPICAL		PACKAGE	SCHEMATIC	PRICE
		—1 dB Bw MHz-MIN.	MAX. VSWR 2-400 MHz	—3 dB Bw MHz-TYP.	TYP. VSWR —1 dB Bw			
FP-502	50 ohm unbal:12.5 ohm unbal	1-500	1.4:1	.25-750	2.1	Fig. E	Fig. C	$20.80
FP-504	50 ohm unbal:25 ohm unbal	1-500	1.4:1	.25-750	2:1	Fig. E	Fig. C	$20.80
FP-510	50 ohm unbal:50 ohm bal	.5-750	1.3:1	.25-2000	1.3:1	Fig. E	Fig. D	$15.55
FP-512	50 ohm unbal:50 ohm unbal phase reversing DC isolated	1-750	1.3:1	.25-1500	1.3:1	Fig. E	Fig. B	$15.55
FP-514	50 ohm unbal:75 ohm unbal	1-600	1.3:1	.25-1200	1.8:1	Fig. E	Fig. C	$20.80
FP-516	50 ohm unbal:100 ohm unbal	1-600	1.3:1	.25-1200	1.8:1	Fig. E	Fig. C	$20.80
FP-518	50 ohm unbal:200 ohm unbal	1-600	1.3:1	.25-1000	2:1	Fig. E	Fig. C	$15.55
FP-522	50 ohm unbal:200 ohm bal	1-500	1.3:1	.25-1000	1.5:1	Fig. F	Fig. A	$20.80
THE FOLLOWING MODELS ARE HIGHER IMPEDANCE AND COVER A REDUCED FREQUENCY RANGE.								
FP-528	50 ohm unbal:200 ohm bal DC isolated, center-tapped	1-400	*1.3:1	.25-600	1.8:1	Fig. F	Fig. A	$20.80
FP-530	50 ohm unbal:450 ohm unbal	1-100	*1.3:1	.25-150	1.8:1	Fig. E	Fig. C	$20.80
FP-532	50 ohm unbal:600 ohm bal DC isolated, center-tapped	1-100	*1.3:1	.25-150	1.8:1	Fig. F	Fig. A	$20.80

*Max. VSWR 1-50 MHz

SCHEMATICS & PACKAGES

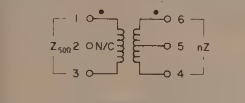
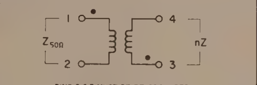

1
2 ON/C
3
6
5
4
$Z_{50\Omega}$
nZ

Figure A


1
2
4
3
$Z_{50\Omega}$
nZ

PINS 2 & 3 MUST BE RF GROUNDED.

Figure B

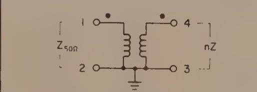

1
2
4
3
$Z_{50\Omega}$
nZ

Figure C

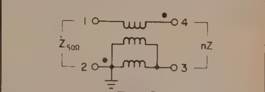

1
2
4
3
$Z_{50\Omega}$
nZ

Figure D

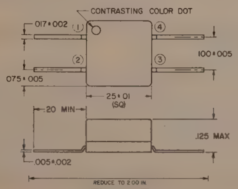

CONTRASTING COLOR DOT
.017±.002
①
②
③
④
.100±.005
.075±.005
.25±.01
(SQ)
.20 MIN
.125 MAX
.005±.002
REDUCE TO 2.00 IN.

Figure E

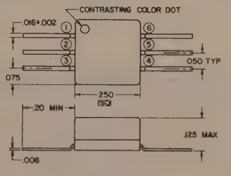
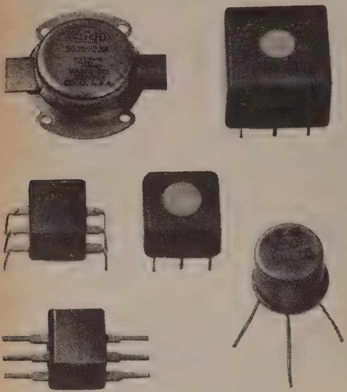

CONTRASTING COLOR DOT
.016±.002
①
②
③
④
⑤
⑥
.050 TYP
.075
.250
(SQ)
.20 MIN
.125 MAX
.008

Figure F

VARI-L CO., INC. • 3883 MONACO PARKWAY • DENVER, COLORADO 80207 • (303) 321-1511 • TWX 910-931-0590

WIDE BAND TRANSFORMERS

Z-MATCH



Applications include: Impedance Matching and Interstage Coupling in wide band solid-state circuits, Phase Detection, Voltage/Current Step-up or Step-down, and Pulse Transformation. Available in three figurations, they have become a standard in the industry and are on numerous spec. control drawings for high-reliability military and industrial equipment. They are qualified to MIL-T-55631 and are recommended for a temperature range of −55°C to +85°C. VSWR is 1.3:1 maximum to within one octave of the upper and lower 1 dB bandwidth limits. Midband insertion loss .5 dB maximum. Power handling ability for the HF and LF types is 2 watts (tending to increase toward the high end of the range) and 1 watt for TO and DP types, except for units which have the model number preceded by *. These are rated at .5 watt max.

HF and LF types are epoxy-encapsulated and have terminals of phosphor bronze, silver plated. Packaging techniques employed have been evolved over 20 years of continuous production experience, and, although improvements are being investigated constantly, quality is the primary consideration in evaluating the effects of any innovation in methods. TO and DP types, housed in transistor and DIP packages respectively, have the same 100% encapsulated features. Write for applicable bulletins.

NOTE: New Model Number System

To avoid confusion in specifying and/or ordering, we have adopted a new model numbering system as shown in the tables. We ask that the new numbers be used except in cases where the old number is already on a drawing or spare parts list, in which case we will make the translation in our Sales Department.

HIGH FREQUENCY TRANSFORMER SPECIFICATIONS

OLD MODEL NO.	NEW MODEL NUMBERS			DESCRIPTION NUMBERS REPRESENT WINDING IMPEDANCES IN OHMS	RANGE OF FREQUENCY RESP. FOR −1 dB MAX.	SCHEMATIC NUMBER	PRICE 1-9
	HF SERIES	TO SERIES	DP SERIES				
5012.5A	HF-102			50 unbal./12.5 unbal.	500 KHz - 1 GHz	2G(N=4)	$20.80
		TO-202	DP-302	50 unbal./12.5 unbal.	500 KHz - 500 MHz	2G(N=4)	$20.80
5050C	HF-110			50 unbal./50 bal. symm.	100 KHz - 700 MHz	2E	$15.55
		TO-210	DP-310	50 unbal./50 bal. symm.	500 KHz - 500 MHz	2E	$15.55
5050F	HF-112			50 unbal./50 unbal. ph. rev. DC isol.	250 KHz - 500 MHz	2C	$15.55
		TO-212	DP-312	50 unbal./50 unbal. ph. rev. DC isol.	250 KHz - 700 MHz	2C	$15.55
5075A	HF-114			50 unbal./75 unbal.	1 MHz - 300 MHz	2B(N=1.5)	$20.80
		TO-214	DP-314	50 unbal./75 unbal. ph. rev.	500 KHz - 300 MHz	2B(N=1.5)	$20.80
*50100A	HF-116			50 unbal./100 unbal.	100 KHz - 200 MHz	2G(N=.5)	$20.80
		TO-216	DP-316	50 unbal./100 unbal.	500 KHz - 400 MHz	2G(N=.5)	$20.80
50200A	HF-118	TO-218	DP-318	50 unbal./200 unbal.	500 KHz - 500 MHz	2F(N=4)	$15.55
50200E	HF-122			50 unbal./200 bal. symm.	250 KHz - 1 GHz	2I	$20.80
		TO-222	DP-322	50 unbal./200 bal. symm.	500 KHz - 500 MHz	2I	$20.80
50200F	HF-124			50 unbal./200 unbal. ph. rev. DC isol.	400 KHz - 500 MHz	2D	$15.55
		TO-224	DP-324	50 unbal./200 unbal. ph. rev. DC isol.	1 MHz - 500 MHz	2D	$15.55
*50200H	HF-128			50 unbal./200 bal. symm. DC isol.	100 KHz - 200 MHz	2K(N=4)	$20.80
		TO-228	DP-328	50 unbal./200 bal. symm. DC isol.	250 KHz - 200 MHz	2K(N=4)	$20.80
50450A	HF-130			50 unbal./450 unbal.	50 KHz - 50 MHz	2F(N=9)	$20.80
		TO-230	DP-330	50 unbal./450 unbal.	500 KHz - 150 MHz	2F(N=9)	$20.80
*50600H	HF-132			50 unbal./600 bal. DC isol.	100 KHz - 100 MHz	2K(N=12)	$20.80
		TO-232	DP-332	50 unbal./600 bal. DC isol.	500 KHz - 200 MHz	2K(N=12)	$20.80
7575C	HF-136			75 unbal./75 bal.	250 KHz - 1 GHz	2E	$15.55
		TO-236	DP-336	75 unbal./75 bal.	400 KHz - 500 MHz	2E	$15.55
*75124H	HF-138	TO-238	DP-338	75 unbal./124 bal. DC isol.	50 KHz - 25 MHz	2K(N=1.65)	$20.80
75300E	HF-144			75 unbal./300 bal. symm.	500 KHz - 900 MHz	2I	$20.80
		TO-244	DP-344	75 unbal./300 bal. symm.	500 KHz - 500 MHz	2I	$20.80
100100B	HF-148			100 unbal./100 unbal. ph. rev.	500 KHz - 1 GHz	2B(N=1)	$12.90
		TO-248	DP-348	100 unbal./100 unbal. ph. rev.	500 KHz - 750 MHz	2B(N=1)	$12.90
100100C	HF-150			100 unbal./100 bal.	250 KHz - 1 GHz	2E	$15.55
		TO-250	DP-350	100 unbal./100 bal.	250 KHz - 750 MHz	2E	$15.55

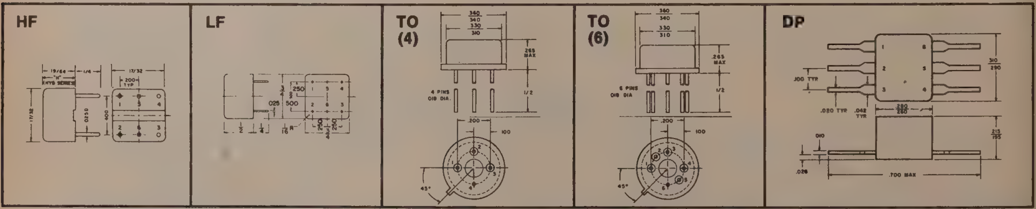


FIGURE 1 WIDE BAND TRANSFORMER OUTLINE DRAWINGS

LOW FREQUENCY TYPES

The wide range of applicability of the Z-Match line of high frequency wide band transformers attracted the attention of customers who, in addition to R.F., were working in the high audio, super-sonic, and ultra-sonic regions. As a result of their continued requests we designed the LF series presented below using the same time-proven construction techniques and high reliability features. Power handling ability, VSWR, and insertion loss figures are approximately the same as the HF series described above. Write for applicable bulletins.

Please order LF transformers by the new model number shown, for new designs.

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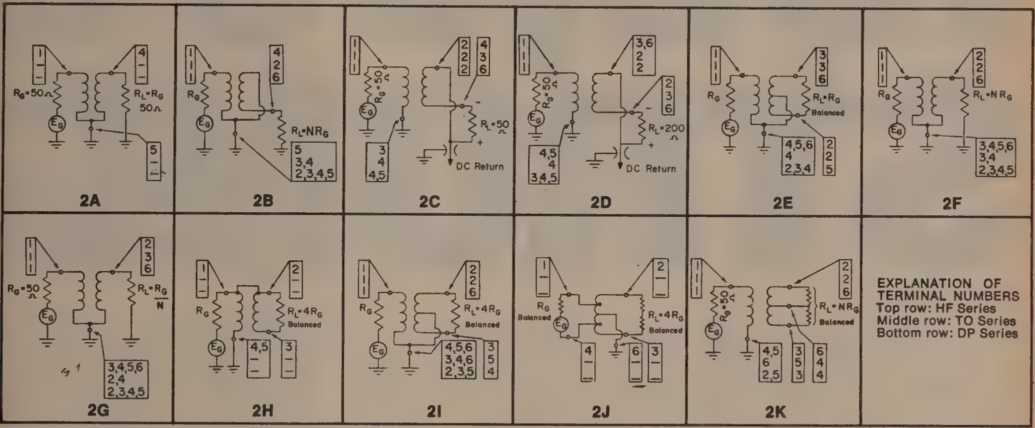
WIDE BAND TRANSFORMERS (CONT.)

LOW FREQUENCY TRANSFORMER SPECIFICATIONS

OLD MODEL NO.	NEW MODEL NO.	DESCRIPTION NUMBERS REPRESENT WINDING IMPEDANCES IN OHMS	RANGE OF FREQUENCY RESP. FOR —1 dB MAX.	SCHEMATIC NUMBER	PRICE 1 - 9
LF-5012.5A	LF-402	50 unbal./12.5 unbal.	10 KHz - 100 MHz	2G(N=4)	$20.80
LF-5050B	LF-408	50 unbal./50 unbal. ph. rev.	10 KHz - 100 MHz	2B(N=1)	$12.90
LF-5050C	LF-410	50 unbal./50 bal. symmetrical	10 KHz - 100 MHz	2E	$15.55
LF-5050F	LF-412	50 unbal./50 unbal. ph. rev. DC isol.	10 KHz - 100 MHz	2C	$15.55
LF-50200A	LF-418	50 unbal./200 unbal.	10 KHz - 100 MHz	2F(N=4)	$15.55
LF-50200E	LF-422	50 unbal./200 bal. symmetrical	10 KHz - 100 MHz	2I	$20.80
LF-50200F	LF-424	50 unbal./200 unbal. DC isol.	10 KHz - 50 MHz	2D	$15.55
LF-50200H	LF-428	50 unbal./200 bal. DC isolated	10 KHz - 50 MHz	2K(N=4)	$20.80
LF-50450A	LF-430	50 unbal./450 unbal.	10 KHz - 25 MHz	2F(N=9)	$20.80
LF-50600H	LF-432	50 unbal./600 bal. DC isolated	10 KHz - 25 MHz	2K(N=12)	$20.80
LF-50800H	LF-452	50 unbal./800 bal. DC isolated	10 KHz - 10 MHz	2K(N=16)	$22.50
LF-501800H	LF-454	50 unbal./1800 bal. DC isolated	10 KHz - 5 MHz	2K(N=36)	$25.00
LF-7575B	LF-434	75 unbal./75 unbal. ph. rev.	15 KHz - 100 MHz	2B(N=1)	$12.90
LF-7575C	LF-436	75 unbal./75 bal.	15 KHz - 100 MHz	2E	$15.55
LF-75124H	LF-438	75 unbal./124 bal. DC isolated	10 KHz - 10 MHz	2K(N=1.65)	$20.80
LF-100100B	LF-448	100 unbal./100 unbal. ph. rev.	10 KHz - 100 MHz	2B(N=1)	$12.90
LF-100100C	LF-450	100 unbal./100 bal.	10 KHz - 100 MHz	2E	$15.55



EXPLANATION OF TERMINAL NUMBERS
Top row: HF Series
Middle row: TO Series
Bottom row: DP Series

FIGURE 2 SCHEMATICS

POWER WIDE BAND TRANSFORMER

This series was developed for solid state applications in transmitters to permit the cascading of power transistors. The shape was made microstrip compatible and provided with a wide mounting skirt for heat dissipation. They have been used as antenna couplers and for interstage coupling in Class A linear amplifiers. Per Fig. 3, they will handle up to 50 watts at room temperature, derating ½% per °C at higher temperatures. Write for applicable bulletins.

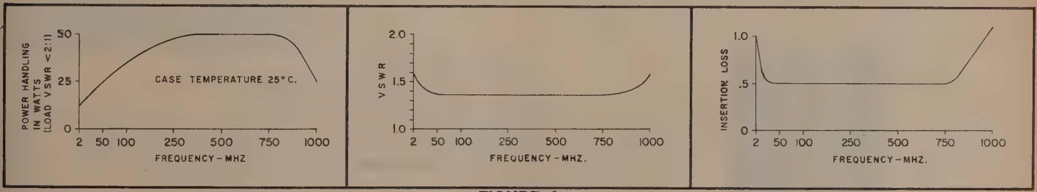


FIGURE 3

POWER WIDE BAND TRANSFORMER SPECIFICATIONS

MODEL	DESCRIPTION	RANGE OF FREQUENCY RESPONSE = —1 dB MAX.	PRICE 1 - 9
50W5012.5A	50 ohm unbal./12.5 ohm unbal.	2 MHz - 1 GHz	$ 90.00
50W5050C	50 ohm unbal./50 ohm bal. symmetrical	2 MHz - 1 GHz	$ 90.00
50W505A	50 ohm unbal./5 ohm unbal.	2 MHz - 750 MHz	$110.00
50W50200E	50 ohm unbal./200 ohm bal. symmetrical	2 MHz - 1.5 GHz	$110.00
50W50200A	50 ohm unbal./200 ohm unbal.	2 MHz - 750 MHz	$110.00

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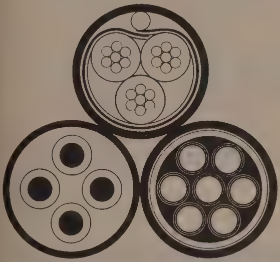

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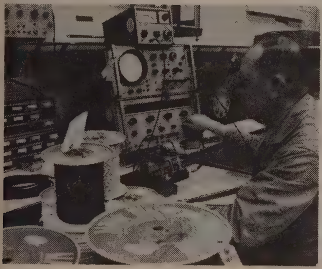

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QUICK CUSTOM CABLE

Hook-Up Wire

Type MW-Uncovered PVC-MIL-W-76B

DESCRIPTION:
Solid or extra flexible stranded tinned copper, color coded **medium wall** polyvinylchloride insulation. **(Nom. wall thickness .016″.)**

CHARACTERISTICS:
Temperature rating −40°C to +80°C, Voltage rating 1000 volts. Resistant to acids, alkalis, oil, flame, moisture and fungus.
Passes FR-1 vertical flame test.

STRANDED					
Alpha No.	Type Designation	Conductor Size	Conductor Strand	Nom. O.D.	Stock* Colors
1550	MW-C 24(7)U	24	7/32	.059″	1-27
1551	MW-C 22(7)U	22	7/30	.064″	1-27
1553	MW-C 20(10)U	20	10/30	.073″	1-27
1555	MW-C 18(16)U	18	16/30	.084″	1-27
1557	MW-C 16(26)U	16	26/30	.095″	1-19
1559	MW-C 14(41)U	14	41/30	.110″	1-19
1560	MW-C 12(65)U	12	65/30	.125″	1-19
SOLID					
1561/24	MW-C 24(1)U	24	1	.055″	1-19
1561	MW-C 22(1)U	22	1	.060″	1-19
1563	MW-C 20(1)U	20	1	.066″	1-19
1565	MW-C 18(1)U	18	1	.074″	1-19

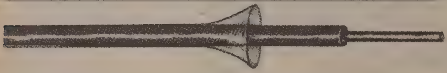
STANDARD SPOOL PUT-UP: 100 FT., 1000 FT.

***STOCK COLORS**
1—White
2—Black
3—Red
4—Green
5—Yellow
6—Light Blue
7—Brown
8—Orange
9—Gray (slate)
10—Violet (purple)
11—White/Black
12—White/Red
13—White/Green
14—White/Yellow
15—White/Blue
16—White/Brown
17—White/Orange
18—White/Gray
19—White/Violet
20—White/Black/Red
21—White/Black/Green
22—White/Black/Yellow
23—White/Black/Blue
24—White/Black/Brown
25—White/Black/Orange
26—White/Black/Gray
27—White/Black/Violet

Type MW-Nylon Jacket MIL-W-76B

DESCRIPTION:
Extra flexible stranded tinned copper, color coded **medium wall** polyvinylchloride insulation, clear nylon (polyamide) jacket overall. **(Nom. wall thickness .016″.)**

CHARACTERISTICS:
Temperature rating −40°C tc +90°C. Voltage rating 1000 volts. Resistant to acids, alkalis, oil, flame, moisture and fungus.



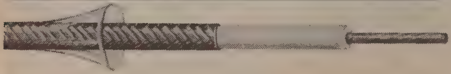
Alpha No.	Type Designation	Conductor Size	Conductor Strand	Nom. Jkt. Thickness	Nom. O.D.	Stock Colors
1504	MW-C 22(7)J	22	7/30	.003″	.072″	White, Black, Red
1505	MW-C 20(10)J	20	10/30	.003″	.079″	White
1506	MW-C 18(16)J	18	16/30	.003″	.090″	White
1507	MW-C 16(26)J	16	26/30	.004″	.103″	White
1508	MW-C 14(41)J	14	41/30	.004″	.118″	White
1509	MW-C 12(65)J	12	65/30	.005″	.135″	White

STANDARD SPOOL PUT-UP: 100 FT., 1000 FT.

Type MW-Shielded-Nylon Jacket-MIL-W-76B

DESCRIPTION:
Stranded tinned copper, white **medium wall** polyvinylchloride insulation, braided tinner copper shield, 80% minimum coverage, clear nylon (polyamide) jacket overall, (which can be striped to order for color identification). **(Nom. wall thickness .016″.)**

CHARACTERISTICS:
Temperature rating −40°C to +90°C. Voltage rating 1000 volts. Resistant to acids, alkalis, oil, flame, moisture and fungus.



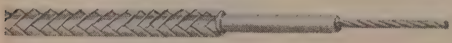
Alpha No.	Type Designation	Conductor Size	Conductor Strand	Nominal Jacket	Nominal O.D.
1370	MW-C 24(7)SJ	24	7/32	.003″	.085″
1371	MW-C 22(7)SJ	22	7/30	.003″	.092″
1372	MW-C 20(7)SJ	20	7/28	.003″	.100″
1373	MW-C 18(19)SJ	18	19/30	.003″	.110″
1374	MW-C 16(19)SJ	16	19/29	.004″	.120″
1375	MW-C 14(19)SU	14	19/27	.004″	.140″
1376	MW-C 12(19)SU	12	19/25	.005″	.156″

STANDARD SPOOL PUT-UP: 100 FT., 1000 FT.

Type MW-Glass Braid MIL-W-76B

DESCRIPTION:
Extra flexible stranded tinned copper, white **medium wall** polyvinylchloride insulation, color coded flame retardant lacquered glass braid overall. **(Nom. wall thickness .016″.)**

CHARACTERISTICS:
Temperature rating −40°C to +80°C. Voltage rating 1000 volts. Resistant to acids, alkalis, oil, flame, moisture and fungus.
Passes FR-1 vertical flame test.



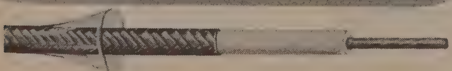
Alpha No.	Type Designation	Conductor Size	Conductor Strand	Nominal O.D.	Stock* Colors
1590	MW-C 22(7)B	22	7/30	.080″	1-6
1591	MW-C 20(10)B	20	10/30	.085″	1-6
1592	MW-C 18(16)B	18	16/30	.090″	1-6
1593	MW-C 16(26)B	16	26/30	.105″	1-6
1594	MW-C 14(41)B	14	41/30	.120″	1
1595	MW-C 12(65)B	12	65/30	.135″	1

STANDARD SPOOL PUT-UP: 100 FT., 1000 FT.
ALSO AVAILABLE TO ORDER CUT, STRIPPED AND TINNED.

Type MW-Glass Braid Shielded-MIL-W-76B

DESCRIPTION:
Extra flexible stranded tinned copper, white **medium wall** polyvinylchloride insulation, white flame retardant lacquered glass braid with tinned copper shield overall, 80% coverage. **(Nom. wall thickness .016″.)**

CHARACTERISTICS:
Temperature rating −40°C to +80°C. Voltage rating 1000 volts. Resistant to acids, alkalis, oil, flame, moisture and fungus.
Passes FR-1 vertical flame test.



Alpha No.	Type Designation	Conductor Size	Conductor Strand	Stock	Color
1194/24	MW-C 24(7)BS	24	7/32	.091″	White
1194/22	MW-C 22(7)BS	22	7/30	.097″	White
1194	MW-C 20(10)BS	20	10/30	.105″	White
1196	MW-C 18(16)BS	18	16/30	.117″	White
1197	MW-C 16(26)BS	16	26/30	.129″	White

STANDARD SPOOL PUT-UP: 100 FT., 1000 FT.

ALPHA WIRE CORPORATION

Hook-Up Wire

Type LW-Uncovered PVC MIL-W-76B

REGULAR TINNED CONDUCTOR

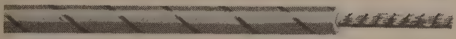
DESCRIPTION:

Stranded tinned copper, color coded **light wall** polyvinylchloride insulation. (**Nom. wall thickness .010″.**)

CHARACTERISTICS:

Temperature rating −40°C to +80°C. Voltage rating 300 volts. Resistant to acids, alkalis, oil, flame, moisture and fungus.

Passes FR-1 vertical flame test.



Alpha No.	Type Designation	Conductor Size	Conductor Strand	Nom. O.D.	Stock* Colors
1685	LW-C 30(7)U	30	7/38	.033″	1-19
1686	LW-C 28(7)U	28	7/36	.035″	1-19
1687	LW-C 26(7)U	26	7/34	.038″	1-19
1688	LW-C 24(7)U	24	7/32	.043″	1-19
1689	LW-C 22(7)U	22	7/30	.049″	1-19
1690	LW-C 20(7)U	20	7/28	.060″	1-19

STANDARD SPOOL PUT-UP: 100 FT., 1000 FT.

***STOCK COLORS**

1—White
2—Black
3—Red
4—Green
5—Yellow
6—Light Blue
7—Brown
8—Orange
9—Gray (slate)
10—Violet (purple)
11—White/Black
12—White/Red
13—White/Green
14—White/Yellow
15—White/Blue
16—White/Brown
17—White/Orage
18—White/Gray
19—White/Violet

(Other striped combinations available to order.)

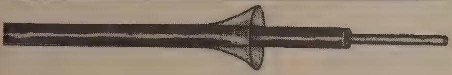
Type LW-Nylon Jacket MIL-W-76B

DESCRIPTION:

Stranded tinned copper, color coded **light wall** polyvinylchloride insulation, clear nylon (polyamide) jacket overall. Nominal jacket thickness, .002″. (**Nom. wall thickness .010″.**)

CHARACTERISTICS:

Temperature rating −40°C to +90°C. Voltage rating 300 volts. Resistant to acids, alkalis, oil, flame, moisture and fungus.



Alpha No.	Type Designation	Conductor Size	Conductor Strand	Nom. O.D.	Stock* Colors
1677	LW-C 26(7)J	26	7/34	.042″	1-19
1678	LW-C 24(7)J	24	7/32	.047″	1-19
1679	LW-C 22(7)J	22	7/30	.053″	1-19
1680	LW-C 20(7)J	20	7/28	.065″	1-19

STANDARD SPOOL PUT-UP: 100 FT., 500 FT., 1000 FT.

Type HW-Uncovered PVC MIL-W-76B

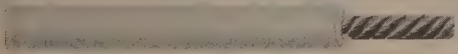
DESCRIPTION:

Stranded tinned copper, color coded **heavy wall** polyvinylchloride insulation.

CHARACTERISTICS:

Temperature rating −40°C to +80°C. Resistant to acids, alkalis, oil, flame, moisture and fungus.

Passes FR-1 vertical flame test.



Alpha No.	Type Designation	Conductor Size	Conductor Strand	Nom. Wall Thick.	Volt Rating	Nom. O.D.	Stock* Colors
1571	HW-C 22(7)U	22	7/30	.032″	2500	.092″	1-6
1573	HW-C 20(10)U	20	10/30	.032″	2500	.100″	1-6
1575	HW-C 18(16)U	18	16/30	.032″	2500	.112″	1-6
1577	HW-C 16(26)U	16	26/30	.032″	2500	.126″	1, 2, 3
1579	HW-C 14(41)U	14	41/30	.045″	600	.170″	1, 2, 3
1651	HW-C 12(65)U	12	65/30	.045″	600	.186″	1, 2, 3
1653	HW-C 10(105)U	10	105/30	.045″	600	.210″	1, 2, 3
1655	HW-C 8(133)U	8	133/29	.045″	600	.260″	1, 2, 3

STANDARD SPOOL PUT-UP: 100 FT., 1000 FT.

Type B-Pre-Bonded Conductor MIL-W-16878D

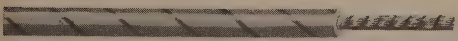
DESCRIPTION:

Each strand of the conductor is double tinned and then heated, which bonds the individual strands together for easy stripping. Color coded .010″ polyvinylchloride insulation. The insulation meets requirements of MIL-W-16878D.

CHARACTERISTICS:

Temperature rating −55°C to +105°C. Voltage rating 600 volts. Resistant to acids, alkalis, oil, flame, moisture, solvents, and fungus.

Passes FR-1 vertical flame test.



APPLICATION:

A pre-bonded conductor is the ideal construction when leads are to be cut and stripped for point to point wiring. The pre-bonded conductor maintains much of the flexibility of an ordinary stranded wire but reduces processing and handling costs on soldering, retwisting of strands after stripping and hand tinning operations. Since the individual strands are bonded, expensive induction heating equipment is unnecessary.

Alpha No.	Type Designation	Conductor Size	Conductor Strand	Nom. Wall Thickness	Nom. O.D.	Stock* Colors
3154	B-24	24	7/32	.010″	.044″	1-19
3155	B-22	22	7/30	.010″	.051″	1-19
3156	B-20	20	7/28	.010″	.059″	1-19
3157	B-18	18	7/26	.010″	.070″	1-19

STANDARD SPOOL PUT-UP: 100 FT., 1000 FT.

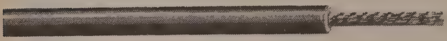
ALPHA WIRE CORPORATION

Hook-Up Wire

Type B-Uncovered PVC MIL-W-16878D

DESCRIPTION:
Stranded tinned copper, color coded. .010″ polyvinylchloride insulation.

CHARACTERISTICS:
Temperature rating −55°C to +105°C. Voltage rating 600 volts. Resistant to acids, alkalis, oil, flame, moisture, solvents, and fungus. Passes FR-1 vertical flame test.



Alpha No.	Type Designation	Conductor		Nom. Wall Thickness	Nom. O.D.	Stock* Colors
		Size	Strand			
1850	B-32	32	7/40	.010″	.028″	1-19
1851	B-30	30	7/38	.010″	.032″	1-19
1852	B-28	28	7/36	.010″	.034″	1-19
1853	B-26	26	7/34	.010″	.038″	1-19
1854	B-24	24	7/32	.010″	.043″	1-19
1854/19	B-24	24	19/36	.010″	.043″	1-19
1855	B-22	22	7/30	.010″	.050″	1-19
1855/19	B-22	22	19/34	.010″	.050″	1-19
1856	B-20	20	7/28	.010″	.058″	1-19
1856/19	B-20	20	19/32	.010″	.058″	1-19
1857	B-18	18	7/26	.010″	.068″	1-19
1857/19	B-18	18	19/30	.010″	.068″	1-19
1858/19	B-16	16	19/29	.010″	.077″	1-19
1859/19	B-14	14	19/27	.010″	.091″	1-19

STANDARD SPOOL PUT-UP: 100 FT., 1000 FT.

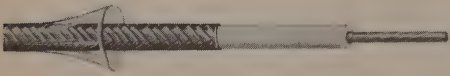
*STOCK COLORS

1—White
2—Black
3—Red
4—Green
5—Yellow
6—Light Blue
7—Brown
8—Orange
9—Gray (slate)
10—Violet (purple)
11—White/Black
12—White/Red
13—White/Green
14—White/Yellow
15—White/Blue
16—White/Brown
17—White/Orange
18—White/Gray
19—White/Violet

Type B-Nylon Jacket MIL-W-16878D

DESCRIPTION:
Stranded tinned copper, color coded. .010″ polyvinylchloride insulation, clear nylon (polyamide) jacket overall.

CHARACTERISTICS:
Temperature rating −55°C to +115°C. Voltage rating 600 volts. Resistant to acids, alkalis, oil, flame, moisture, solvents, and fungus.



Alpha No.	Type Designation	Conductor		Nom. Wall Thick.	Nom. Jkt. Thick.	Nom. O.D.	Stock* Colors
		Size	Strand				
1863	B-26	26	7/34	.010″	.003″	.044″	1-19
1864	B-24	24	7/32	.010″	.003″	.049″	1-19
1864/19	B-24	24	19/36	.010″	.003″	.049″	1-19
1865	B-22	22	7/30	.010″	.003″	.056″	1-19
1865/19	B-22	22	19/34	.010″	.003″	.056″	1-19
1866	B-20	20	7/28	.010″	.003″	.064″	1-19
1866/19	B-20	20	19/32	.010″	.003″	.064″	1-19
1867	B-18	18	7/26	.010″	.003″	.074″	1-19
1867/19	B-18	18	19/30	.010″	.003″	.074″	1-19
1868/19	B-16	16	19/29	.010″	.003″	.085″	1-19
1869/19	B-14	14	19/27	.010″	.004″	.099″	1-19

STANDARD SPOOL PUT-UP: 100 FT., 1000 FT.

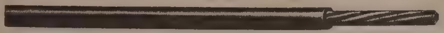
ALPHA WIRE CORPORATION

Hook-Up Wire

Type C-Uncovered PVC MIL-W-16878D

DESCRIPTION:
Stranded tinned copper, color coded .016″ polyvinylchloride insulation.

CHARACTERISTICS:
Temperature rating −55°C to +105°C. Voltage rating 1000 volts. Resistant to acids, alkalis, oil, flame, moisture, solvents, and fungus. Passes FR-1 vertical flame test.



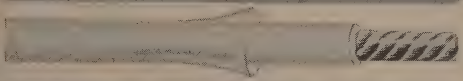
Alpha No.	Type Designation	Conductor Size	Conductor Strand	Nom. Wall Thickness	Nominal O.D.	Stock* Colors
1830	C-24	24	7/32	.016″	.058″	1-19
1831	C-22	22	7/30	.016″	.064″	1-19
1832	C-20	20	7/28	.016″	.072″	1-19
1833	C-18	18	7/26	.016″	.082″	1-19
1834	C-16	16	19/29	.016″	.091″	1, 11-19
1835	C-14	14	19/27	.016″	.105″	1, 11-19
1836	C-12	12	19/25	.016″	.124″	1, 11-19

STANDARD SPOOL PUT-UP: 100 FT., 1000 FT.

Type C-Nylon Jacket MIL-W-16878D

DESCRIPTION:
Stranded tinned copper, color coded .016″ polyvinylchloride insulation, clear nylon (polyamide) jacket overall.

CHARACTERISTICS:
Temperature rating −55°C to +115°C. Voltage rating 1000 volts. Resistant to acids, alkalis, oil, flame, moisture, solvents, and fungus.



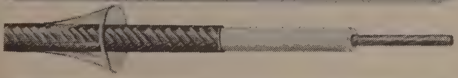
Alpha No.	Type Designation	Conductor Size	Conductor Strand	Nom. Thick. Wall	Nom. Jkt. Thick.	Nom. O.D.	Stock* Colors
1840	C-24	24	7/32	.016″	.002″	.065″	1-19
1841	C-22	22	7/30	.016″	.003″	.072″	1-19
1842	C-20	20	7/28	.016″	.003″	.079″	1-19
1843	C-18	18	7/26	.016″	.003″	.090″	1-19
1844	C-16	16	19/29	.016″	.004″	.099″	1, 11-19
1845	C-14	14	19/27	.016″	.004″	.114″	1, 11-19
1846	C-12	12	19/25	.016″	.005″	.135″	1, 11-19

STANDARD SPOOL PUT-UP: 100 FT., 1000 FT.

Type C-Shielded Nylon Jacket-MIL-W-16878D

DESCRIPTION:
Stranded tinned copper, white .016″ polyvinylchloride insulation, braided tinned copper shield, 90% coverage, clear nylon (polyamide) jacket overall (which can be striped to order for color identification).

CHARACTERISTICS:
Temperature rating −55°C to +115°C. Voltage rating 1000 volts. Resistant to acids, alkalis, oil, flame, moisture, solvents, and fungus.



Alpha No.	Type Designation	Conductor Size	Conductor Strand	Thickness Nom. Wall	Nom. Jkt. Thickness	Nom. O.D.
1470	C-24	24	7/32	.016″	.005″	.091″
1471	C-22	22	7/30	.016″	.005″	.098″
1472	C-20	20	7/28	.016″	.005″	.105″
1473	C-18	18	19/30	.016″	.005″	.115″
1474	C-16	16	19/29	.016″	.005″	.125″
1475	C-14	14	19/27	.016″	.005″	.142″
1476	C-12	12	19/25	.016″	.005″	.156″

STANDARD SPOOL PUT-UP: 100 FT., 1000 FT.

Type D-Uncovered PVC MIL-W-16878D

DESCRIPTION:
Stranded tinned copper, color coded polyvinylchloride insulation.

CHARACTERISTICS:
Temperature rating −55°C to +105°C. Voltage rating 3000 volts. Resistant to acids, alkalis, oil, flame, moisture, solvents, and fungus. Passes FR-1 vertical flame test.

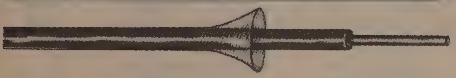
Alpha No.	Type Designation	Conductor Size	Conductor Strand	Nom. Wall Thickness	Nominal O.D.	Stock* Colors
1870	D-24	24	7/32	.029″	.082″	1, 2, 3
1871	D-22	22	7/30	.029″	.088″	1, 2, 3
1872	D-20	20	7/28	.029″	.096″	1, 2, 3
1873	D-18	18	7/26	.029″	.106″	1, 2, 3
1874	D-16	16	19/29	.029″	.115″	1, 2, 3
1875	D-14	14	19/27	.029″	.129″	1, 2, 3
1876	D-12	12	19/25	.034″	.158″	1, 2, 3
1877	D-10	10	37/26	.037″	.185″	1
1878	D-8	8	133/29	.040″	.247″	1
1879	D-6	6	133/27	.040″	.290″	1

STANDARD SPOOL PUT-UP: 100 FT., 1000 FT.
ALSO AVAILABLE TO ORDER CUT, STRIPPED AND TINNED.

Type D-Nylon Jacket MIL-W-16878D

DESCRIPTION:
Stranded tinned copper, color coded polyvinylchloride insulation. Sizes 24-6, clear nylon (polyamide) jacket overall.

CHARACTERISTICS:
Temperature rating −55°C to +115°C. Voltage rating 3000 volts. Resistant to acids, alkalis, oil, flame, moisture, solvents, and fungus.



CLEAR NYLON JACKET

Alpha No.	Type Designation	Conductor Size	Conductor Strand	Nom. Thick. Wall	Nom. Jkt. Thick.	Nom. O.D.	Stock* Colors
1880	D-24	24	7/32	.029″	.004″	.090″	1, 2, 3
1881	D-22	22	7/30	.029″	.004″	.096″	1, 2, 3
1882	D-20	20	7/28	.029″	.004″	.104″	1, 2, 3
1883	D-18	18	7/26	.029″	.004″	.114″	1, 2, 3
1884	D-16	16	19/29	.029″	.005″	.125″	1, 2, 3
1885	D-14	14	19/27	.029″	.005″	.139″	1, 2, 3
1886	D-12	12	19/25	.034″	.005″	.168″	1, 2, 3
1887	D-10	10	37/26	.037″	.006″	.197″	1
1888	D-8	8	133/29	.040″	.009″	.265″	1
1889	D-6	6	133/27	.040″	.010″	.310″	1

STANDARD SPOOL PUT-UP: 100 FT., 1000 FT.
ALSO AVAILABLE TO ORDER CUT, STRIPPED AND TINNED.

*STOCK COLORS
1—White
2—Black
3—Red
4—Green
5—Yellow
6—Light Blue
7—Brown
8—Orange
9—Gray (slate)
10—Violet (purple)
11—White/Black
12—White/Red
13—White/Green
14—White/Yellow
15—White/Blue
16—White/Brown
17—White/Orange
18—White/Gray
19—White/Violet

ALPHA WIRE CORPORATION

UL HOOK-UP WIRE

300 Volts 80°C UL 1007

Passes FR-1 vertical flame test.
Stranded tinned copper, color coded polyvinylchloride insulation.
Temperature rating −10°C to +80°C.
Nom. wall thickness — .016″ STOCK COLORS: 1-19

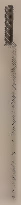
CSA STYLE TR-64
1/64″ NOM. WALL THICKNESS

ALPHA NO.	CONDUCTOR SIZE	STRAND	NOM. O.D.
3050	24	7/32	.057″
3051	22	7/30	.065″
3053	20	10/30	.071″
3055	18	16/30	.080″
3057	16	26/30	.095″

STANDARD SPOOL PUT-UP: 100 FT., 1000 FT

600 Volts 105°C UL 1015

Passes FR-1 vertical flame test.
Stranded tinned copper, color coded polyvinylchloride insulation.
Temperature rating −10°C to +105°C.
Nom. wall thickness — .032″ STOCK COLORS: 1-10



CSA STYLE TEW-105
1/32″ NOM. WALL THICKNESS

ALPHA NO.	CONDUCTOR SIZE	STRAND	NOM. O.D.
3071	22	7/30	.095″
3073	20	10/30	.102″
3075	18	16/30	.112″
3077	16	26/30	.125″
3079	14	41/30	.142″

STANDARD SPOOL PUT-UP: 100 FT., 1000 FT.

Semi-Rigid PVC
300 Volts 80°C UL 1061

Stranded tinned copper, color coded semi-rigid polyvinylchloride insulation.

Temperature rating −10°C to +80°C, 300 volts in business machine or electronic computers only.

Internal wiring of computers, and other office and control equipment.

ALPHA NO.	CONDUCTOR SIZE	STRAND	NOM. WALL THICKNESS	NOM. O.D.
3250	24	7/32	.009″	.042″
3251	22	7/30	.009″	.048″
3252	20	7/28	.009″	.056″

STANDARD SPOOL PUT-UP: 100 FT., 1000 FT.

Uncovered PVC
600 Volts 80°C UL 1011

Stranded tinned copper, color coded heavy wall polyvinylchloride insulation.

Temperature rating —40 C to +80 C.

ALPHA NO.	TYPE DESIGNATION	CONDUCTOR SIZE	STRAND	NOM. WALL THICK-NESS	NOM. O.D.	STOCK COLORS
2571	HW-C 22(7)U	22	7/30	.032″	.092″	1-6
2573	HW-C 20(10)U	20	10/30	.032″	.100″	1-6
2575	HW-C 18(16)U	18	16/30	.032″	.112″	1-6
2577	HW-C 16(26)U	16	26/30	.032″	.126″	1,2,3
2579	HW-C 14(41)U	14	41/30	.045″	.170″	1,2,3
2551	HW-C 12(65)U	12	65/30	.045″	.186″	1,2,3
2553	HW-C 10(105)U	10	105/30	.045″	.210″	1,2,3
2555	HW-C 8(133)U	8	133/29	.045″	.260″	1,2,3

STANDARD SPOOL PUT-UP: 100 FT., 1000 FT.

Nylon Jacket
300 Volts 80°C UL 1008

Stranded tinned copper, color coded .016″ polyvinylchloride insulation, clear nylon (polyamide) jacket overall.

ALPHA NO.	TYPE DESIGNATION	CONDUCTOR SIZE	STRAND	NOM. JKT. THICK.	NOMINAL O.D.	STOCK COLORS
3840	C-24	24	7/32	.002″	.065″	1-19
3841	C-22	22	7/30	.003″	.072″	1-19
3842	C-20	20	7/28	.003″	.079″	1-19
3843	C-18	18	7/26	.003″	.090″	1-19
3844	C-16	16	19/29	.004″	.099″	1 & 11-19

STANDARD SPOOL PUT-UP: 100 FT., 1000 FT.

Nylon Jacket 80°C UL 1004

Stranded tinned copper, color coded **light wall** polyvinylchloride insulation, clear nylon (polyamide) jacket overall.
Nominal Jacket Thickness, .002″ **(Nom. wall thickness .010″.)**

Temperature rating −40°C to +80°C.

ALPHA NO.	TYPE DESIGNATION	CONDUCTOR SIZE	STRAND	NOM. O.D.	COLORS
3677	LW-C 26(7)J	26	7 34	.042″	1-19
3678	LW-C 24(7)J	24	7/32	.047″	1-19
3679	LW-C 22(7)J	22	7 30	.053″	1-19
3680	LW-C 20(7)J	20	7/28	.065″	1-19

STANDARD SPOOL PUT-UP: 100 FT., 1000 FT.

Teflon 200°C UL 1212, 1213

Single conductor stranded silver plated copper, extruded TFE Teflon insulation.
Temperature rating −65 C to +200 C.
Resistant to acid, alkalis, oil, flame, moisture, solvents and fungus.
Nom. wall thickness — .010″. Stock Colors 1-19

ALPHA NO.	CONDUCTOR SIZE	STRAND	NOM. O.D.
6850	32	7/40	.029″
6851	30	7/38	.032″
6852	28	7/36	.036″
6853	26	7/34	.040″
6853/19	26	19/38	.041″
6854	24	19/36	.045″
6854/7	24	7/32	.044″
6855	22	19/34	.051″
6855/7	22	7/30	.050″
6856	20	19/32	.059″
6856/7	20	7/28	.058″

STANDARD SPOOL PUT-UP: 100 FT., 1000 FT.

Teflon 200°C UL 1164, 1180

Single conductor stranded silver plated copper, TFE extruded Teflon insulation.
Temperature rating −65 C to +200 C.
Resistant to acid, alkalis, oil, flame, moisture, solvents and fungus.
Nom. wall thickness — .014″. Stock Colors 1-19

ALPHA NO.	CONDUCTOR SIZE	STRAND	NOM. O.D.
6874	24	19/36	.055″
6875	22	19/34	.062″
6876	20	19/32	.070″
6877	18	19/30	.080″
6878	16	19/29	.089″

STANDARD SPOOL PUT-UP: 100 FT., 1000 FT.

STOCK COLORS

1—White
2—Black
3—Red
4—Green
5—Yellow
6—Light Blue
7—Brown
8—Orange
9—Gray (slate)
10—Violet (purple)
11—White/Black
12—White/Red
13—White/Green
14—White/Yellow
15—White/Blue
16—White/Brown
17—White/Orange
18—White/Gray
19—White/Violet

Other solid colors and striped combinations available to order.

ALPHA WIRE CORPORATION

Ribbon Cable MIL-W-16878D

MIL-W-16878D—TYPES B & C—UL-FR-I ROUND CONDUCTOR, FLAT BONDED

DESCRIPTION:
Round conductor,flat bonded ribbon cable has all the advantages of a flat compact profile plus ease of termination and stripping. Saves space, simplifies cable identification, simple to separate and terminate individual conductors. With all standard wire connectors, jacks, pins and terminations. Each conductor, stranded tinned copper, color coded PVC insulation, conductors specially bonded into flat configuration.

Passes FR-1 vertical flame test.

CHARACTERISTICS:	**Type B**	**Type C**
Voltage Rating:	600 Volts	1000 Volts
Temp. Rating:	−55°C to +105°C	−55°C to +105°C

MIL-W-16878D TYPE B

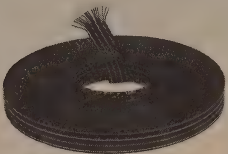
NOM. WALL .010″

ALPHA NO.	NUMBER CONDUCTORS	CONDUCTOR SIZE	CONDUCTOR STRAND	NOMINAL O.D. WIDTH X THICKNESS IN INCHES
3530	10	22	19/34	.510 X .051
3531	15	22	19/34	.765 X .051
3532	20	22	19/34	1.05 X .051
3533	30	22	19/34	1.57 X .051
3540	10	24	19/36	.440 X .044
3541	15	24	19/36	.662 X .044
3542	20	24	19/36	.883 X .044
3543	30	24	19/36	1.35 X .044
3550	10	26	7/34	.392 X .039
3551	15	26	7/34	.587 X .039
3552	20	26	7/34	.783 X .039
3553	30	26	7/34	1.19 X .039
3560	10	28	7/36	.351 X .035
3561	15	28	7/36	.523 X .035
3562	20	28	7/36	.701 X .035
3563	30	28	7/36	1.06 X .035
3570	10	30	7/38	.311 X .032
3571	15	30	7/38	.482 X .032
3572	20	30	7/38	1.05 X .032
3573	30	30	7/38	.965 X .032

STANDARD PUT-UP — 100 FEET (Larger put-ups available on special request.)
Special constructions, colors, sizes and types of conductor are available to special order.

MIL-W-16878-D — TYPE C — U.L.2444

NOM. WALL .016″—300 VOLTS—80°C



ALPHA NO.	NO. OF COND.	CONDUCTOR SIZE	CONDUCTOR STRAND	NOM. O.D. WIDTH THICKNESS
3505	5	22	7/30	.065″ x .320″
3510	10	22	7/30	.065″ x .640″
3515	15	22	7/30	.065″ x .960″
3520	20	22	7/30	.065″ x 1.92″

STANDARD SPOOL PUT-UP: 100 FT., 500 FT., 1000 FT.

COLOR CODE OF CONDUCTORS

1—Brown
2—Red
3—Orange
4—Yellow
5—Green
6—Blue
7—Violet
8—Grey
9—White
10—Black

Unshielded Aircraft Wire

Shielded Aircraft Wire

MIL-W-5086A

DESCRIPTION:
MIL-W-5086A — Type I — AN-22 thru AN-12 — Single conductor stranded tinned copper, white polyvinylchloride insulation, clear nylon, (polyamide) jacket overall.
MIL-W-5086A — Type II — AN-22 thru AN-12 — Single conductor stranded tinned copper, white polyvinylchloride insulation, white glass braid, clear nylon (polyamide) jacket overall.
MIL-W-5086A — Type II — AN-10 thru AN-0000 — Single conductor stranded tinned copper, white polyvinylchloride insulation, white glass braid, flame retardant nylon lacquered nylon braid overall.

CHARACTERISTICS:
Temperature rating: −55°C to +105°C. Voltage rating: 600 volts. Resists effects of water, oil, aircraft fuels, hydraulic fluid, skydral, ethyleneglycol, alcohol, dilute acids, alkalis, fungus and abrasion.

UNJACKETED SHIELDED CABLE (MIL-C-7078A Type 1)
Base Wire MIL-W-5086A Type 1

DESCRIPTION:
Each conductor stranded tinned copper, color coded polyvinylchloride insulation. Clear nylon jacket on each conductor, cabled, braided tinned copper shield overall. 85% coverage per Type 1 MIL-5086A, Type 1 MIL-C-7078A.

CHARACTERISTICS:
Temperature rating: −55°C to +105°C. Voltage rating: 600 volts. Resists effects of water, oil, aircraft fuels, hydraulic fluid, skydral, ethyleneglycol, alcohol, dilute acids, alkalis, fungus and abrasion.

UNSHIELDED (MIL-W-5086A) TYPE I

ALPHA NO.	MIL TYPE DESIGNATION	CONDUCTOR SIZE	CONDUCTOR STRAND	NOMINAL O.D.
1381	AN-22	22	19/34	.068″
1382	AN-20	20	19/32	.078″
1383	AN-18	18	19/30	.088″
1384	AN-16	16	19/29	.098″
1385	AN-14	14	19/27	.117″
1386	AN-12	12	19/25	.137″

UNSHIELDED (MIL-W-5086A) TYPE II

1341	AN-22	22	19/34	.075″
1342	AN-20	20	19/32	.085″
1343	AN-18	18	19/30	.095″
1344	AN-16	16	19/29	.105″
1345	AN-14	14	19/27	.125″
1346	AN-12	12	19/25	.143″
1387	AN-10	10	49/27	.189″
1388	AN-8	8	133/29	.240″
1389	AN-6	6	133/27	.293″
1389/1	AN-1	1	817/30	.470″
1389/4	AN-4	4	133/25	.355″
1389/2	AN-2	2	665/30	.425″
1389/0	AN-0	0	1045/30	.525″
1389/00	AN-00	00	1330/30	.590″
1389/000	AN-000	000	1661/30	.645″
1389/0000	AN-0000	0000	2104/30	.715″

STANDARD SPOOL PUT-UP: 100 FT., 1000 FT.

ALPHA NO.	NO. OF COND.	MIL TYPE & DESIG.	CONDUCTOR SIZE	CONDUCTOR STRAND	NOM. O.D. (inches)	NOM. NET WT. LBS. PER M/FT.
1391	1	AN-22	22	19/34	.090	9.4
1391/2	2	AN-22	22	19/34	.160	23.1
1392	1	AN-20	20	19/32	.100	11.6
1392/2	2	AN-20	20	19/32	.180	33.8
1393	1	AN-18	18	19/30	.110	15.4
1393/2	2	AN-18	18	19/30	.200	37.5
1394	1	AN-16	16	19/29	.120	17.6

NYLON JACKETED SHIELDED CABLE (MIL-C-7078A Type 2)

Base Wire MIL-W-5086A Type 1

DESCRIPTION:
Each conductor stranded tinned copper, color coded PVC insulation clear nylon jacket on each conductor, cabled, braided tinned copper shield. 85% coverage. Clear nylon jacket overall. Per Type 1 MIL-W-5086A; per Type 2 MIL-C-7078A.

ALPHA NO.	NO. OF COND.	MIL TYPE DESIG.	CONDUCTOR SIZE	CONDUCTOR STRAND	NOM. JKT. THICKNESS	NOM. O.D. (inches)	NOM. NET WT. LBS. PER M/FT.
6460	1	AN-22	22	19/34	.005	.100	10.2
6461	2	AN-22	22	19/34	.005	.170	23.6
6462	3	AN-22	22	19/34	.005	.180	29.7
6463	1	AN-20	20	19/32	.005	.110	12.0
6464	2	AN-20	20	19/32	.005	.190	34.2
6465	3	AN-20	20	19/32	.005	.200	27.2
6466	1	AN-18	18	19/30	.005	.120	16.3
6467	2	AN-18	18	19/30	.005	.210	39.3
6468	3	AN-18	18	19/30	.005	.220	40.7
6469	1	AN-16	16	19/29	.005	.130	18.4
6470	1	AN-14	14	19/27	.005	.150	26.0
6471	1	AN-12	12	19/25	.005	.170	35.8

COLOR CODE OF CONDUCTORS:

1—White
2—1 White/Blue, 1 White/Red
3—1 White/Blue, 1 White/Red, 1 White/Yellow

ALPHA WIRE CORPORATION

RX-7000 Irradiated — Heat Resistant Hook-Up Wire MIL-W-16878 D -UL-1429, 1430, 1472

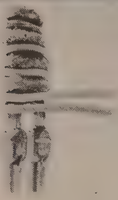
- HIGH RELIABILITY
- SOLDER IRON RESISTANCE
- INCREASED STRENGTH
- ELIMINATES PRODUCTION DAMAGE

For:
- Appliances
- Computer wiring
- Business Machines
- Instrumentation and control systems

RX-7000 is a newly developed hookup wire with an insulation made of irradiated Polyvinylchloride compound (PVC). The Irradiation process results in an insulation far superior to ordinary PVC.

Passes FR-1 vertical flame test.

RX-7000 withstands higher temperatures than ordinary PVC and, even in direct contact with a soldering iron, will not shrink back, melt, blow or deform. Because of this ability to resist solder iron heat, it is the ideal material to use where high reliability is essential and is particularly valuable in the wiring of tight, high-density systems.



RX7000 and vinyl hook-up wire wrapped over tip of heated solder iron. RX7000 does not burn or char.

UL STYLE 1430 (105°C) — 300 VOLTS
.016 NOM. WALL THICKNESS

ALPHA NO.	CONDUCTOR SIZE	CONDUCTOR STRAND	NOM. O.D. (INCHES)
7130	24	7/32	.056
7131	22	7/30	.062
7132	20	7/28	.070
7133	18	7/26	.080
7134	16	19/.0117	.091

STANDARD SPOOL PUT-UP: 100 FT., 1000 FT.

UL STYLE 1429
SOLID AND STRANDED (+80°C)
.010 NOM. WALL THICKNESS

7149	26	7/34	.038
7150	24	7/32	.043
7151	22	7/30	.050
7153	20	7/28	.068
7155	18	7/26	.068
7157	16	19/.0117	.077
7161	22	solid	.045
7161/24	24	solid	.040
7163	20	solid	.054

STANDARD SPOOL PUT-UP: 100 FT., 1000 FT.

UL STYLE 1472 — STRANDED (+80°C) — 300 VOLTS
.0075 NOM. WALL THICKNESS

ALPHA NO.	CONDUCTOR SIZE	CONDUCTOR STRAND	NOM. O.D. (INCHES)
7070	30	7/38	.028
7071	28	7/36	.032
7072	26	7/34	.034
7073	24	7/32	.040
7074	22	7/30	.045
7075	20	7/28	.054

STANDARD SPOOL PUT-UP: 100 FT., 1000 FT.

MIL-W-16878/D TYPE B STRANDED (+105°C) 600 VOLTS
.010 NOM. WALL THICKNESS

ALPHA NO.	CONDUCTOR SIZE	CONDUCTOR STRAND	NOM. O.D. (INCHES)
7053	26	7/34	.038
7054	24	7/32	.043
7054/19	24	19/36	.043
7055	22	7/30	.050
7055/19	22	19/34	.050
7056	20	7/28	.058
7056/19	20	19/32	.058
7057	18	7/26	.068
7057/19	18	19/30	.068
7058/19	16	19/.0117	.077

MIL-W-16878/D TYPE C — STRANDED + 105°C — 1000 VOLTS
.016 NOM. WALL THICKNESS

ALPHA NO.	CONDUCTOR SIZE	CONDUCTOR STRAND	NOM. O.D. (INCHES)
7030	24	7/32	.058
7031	22	7/30	.064
7032	20	7/28	.072
7033	18	7/26	.082
7034	16	19/29	.091
7035	14	19/27	.105
7036	12	19/25	.124

STANDARD SPOOL PUT-UP: 100 FT., 1000 FT.

STOCK COLORS

1—White
2—Black
3—Red
4—Green
5—Yellow
6—Light Blue
7—Brown
8—Orange
9—Gray (slate)
10—Violet (purple)
11—White/Black
12—White/Red
13—White/Green
14—White/Yellow
15—White/Blue
16—White/Brown
17—White/Orange
18—White/Gray
19—White/Violet

Tefzel Computer Wire

150°C — 300 VOLTS

Passes FR-1 vertical flame test.

EXTREMELY RUGGED AND FLEXIBLE WIRE-WRAP WIRE

Description: Solid silver-plated OFHC copper conductor. Tefzel insulation (copolymer of ethylene and tetra fluourethylene)

Characteristics: Tefzel is a newly developed insulation that provides a high temperature, thin-wall wire suitable for wire wrap insulation. Tefzel has high cut-thru and abrasion resistance and long flex life. The material has a low dielectric constant of 2.6. Temperature range is from −100°C to +150°C continuous.
Like Teflon, Tefzel is chemically inert, with no known solvent and is rated non-burning or self-extinguishing.

Application: Computer wire, aircraft instrumentation, point-to-point wiring in all compact packaging modules.

SPOOLS

ALPHA NUMBER	CONDUCTOR SIZE	WALL THICKNESS (inches)	NOMINAL O.D. (inches)	STOCK COLORS
1805	30	.005	.019	1–10
1806	28	.005	.023	1–10
1807	26	.005	.026	1–10
1808	24	.005	.029	1–10

STANDARD SPOOL PUT-UP: 100 FT., 1000 FT.

Kynar Wire

— 125°C — 300 VOLTS

Passes FR-1 vertical flame test.

FOR WIRE WRAP CONNECTIONS.

Description: Solid, silver-plated, oxygen-free, high conductivity (OFHC) copper conductor, extruded Kynar® (Polyvinylidene fluoride) insulation.

Characteristics: Operating temperature though 125°C continuous (U.L. rated at 105°C).
Extremely tough; high cut-through resistance.
Self-extinguishing; will not support combustion.
Resistant to most chemicals and solvents.
Excellent ultra-violet and weathering resistance.

Applications: Designed for use in automatic wire wrapping equipment for applications in the computer and related industries.

ALPHA NO.	COND. SIZE	NOM. WALL THICKNESS	NOM. OD	STOCK COLORS
5951	30	.005″	.020″	1-10
5952	28	.005″	.023″	1-10
5953	26	.005″	.026″	1-9
5954	24	.005″	.030″	1-6

STANDARD PUT-UP: 1000 FT.

CUT LENGTHS — TEFZEL & KYNAR

STOCK COLORS:

1. White
2. Black
3. Red
4. Green
5. Yellow
6. Blue
7. Brown
8. Orange
9. Slate
10. Violet

Other sizes, colors and putups available on special order.

CUT LENGTHS: Specially cut and both-end stripped lengths for automatic and manual wire-wrap machines and tools. Specify Alpha number and length of wire insulated. Packaged in handy plastic tubes.

ALPHA NUMBER	COND. GAUGE	LENGTHS OF INSULATED SECTION OF WIRE	LENGTH OF EACH STRIPPED END	NO. OF PIECES PER PACKAGE
5951	30	4″-6″-8″-10″-12″	15/16	200
5952	28	4″-6″-8″-10″-12″	1-1/32	200
5953	26	4″-6″-8″-10″-12″	1-1/2	200
5954	24	4″-6″-8″-10″-12″	1-5/16	200

ALPHA WIRE CORPORATION

Unshielded Intercom Cable

PAIRED CONDUCTORS — PLASTIC JACKET

Passes FR-1 vertical flame test.

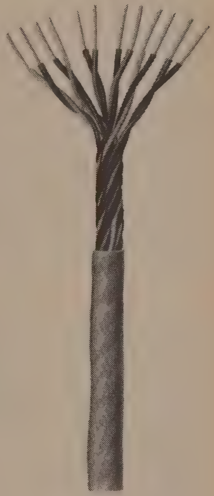
DESCRIPTION: Each conductor tinned copper, color coded polyvinylchloride insulation, conductors twisted into pairs, gray polyvinylchloride jacket overall. Suitable for outdoor installations.

APPLICATIONS: Balanced intercom systems. Annunciators. Telephones. Nurses call systems. Control circuit cable. Electronic computer cable. Multiple speaker cable. Signal systems. Alarm systems.

CHARACTERISTICS: Suggested operating temperature: —20°C to +80°C. Suggested operating voltage: 200 volts.

22 GAUGE — SOLID CONDUCTORS — 200 VOLTS

ALPHA NO.	NO. OF PAIRS	NO. OF COND.	COND. SIZE	COND. STRAND	NOM. WALL THICKNESS	NOM. JKT. THICKNESS	NOM. O.D.
1300 ©	1	2	22 Solid	1	.010″	.025″	.140″
1302 ©	2	4	22 Solid	1	.010″	.025″	.208″
1304 ©	3	6	22 Solid	1	.010″	.025″	.220″
1305	4	8	22 Solid	1	.010″	.025″	.238″
1307	6	12	22 Solid	1	.010″	.025″	.275″
1307/9	9	18	22 Solid	1	.010″	.025″	.320″
1308/11	11	22	22 Solid	1	.010″	.025″	.340″
1309	13	26	22 Solid	1	.010″	.030″	.370″
1309/15	15	30	22 Solid	1	.010″	.030″	.393″
1310	16	32	22 Solid	1	.010″	.025″	.411″
1311	19	38	22 Solid	1	.010″	.030″	.436″
1312	23	46	22 Solid	1	.010″	.030″	.477″
1313	27	54	22 Solid	1	.010″	.040″	.521″



22 GAUGE — STRANDED CONDUCTORS — 200 VOLTS

1316	1	2	22	7/30	.010″	.025″	.150″
1317	2	4	22	7/30	.010″	.025″	.225″
1318	3	6	22	7/30	.010″	.025″	.238″
1319	4	8	22	7/30	.010″	.025″	.260″
1320	5	10	22	7/30	.010″	.025″	.290″
1322	6	12	22	7/30	.010″	.035″	.320″
1323	9	18	22	7/30	.010″	.035″	.370″
1324	11	22	22	7/30	.010″	.035″	.400″
1327	15	30	22	7/30	.010″	040″	.450″
1327/19	19	38	22	7/30	.010″	.040″	.480″
1328	23	46	22	7/30	.010″	.040″	.530″
1329	27	54	22	7/30	.010″	.040″	.708″
1329/41	41	82	22	7/30	.010″	.040″	.710″
1330	51	102	22	7/30	.010″	.045″	.800″

18 GAUGE — STRANDED CONDUCTORS — 400 VOLTS

1133	3	6	18	16/30	.016″	.037″	.356″
1136	6	12	18	16/30	.016″	.045″	.540″
1139	9	18	18	16/30	.016″	.055″	.616″
1142	12	24	18	16/30	.016″	.055″	.654″
1145	15	30	18	16/30	.016″	.060″	.760″
1149	19	38	18	16/30	.016″	.070″	.830″
1151	27	54	18	16/30	.016″	.070″	.965″

STANDARD SPOOL PUT-UP: 100 FT., 500 FT., 1000 FT.

QCC

Variations in construction, color, put-up, gauge, etc. of products on this page are available through Alpha's QCC service.

PAIR NO. COLOR COMBINATION

1—Black paired with Red
2—Black paired with White
3—Black paired with Green
4—Black paired with Blue
5—Black paired with Brown
6—Black paired with Yellow
7—Black paired with Orange
8—Red paired with Green
9—Red paired with White
10—Red paired with Blue
11—Red paired with Yellow
12—Red paired with Brown
13—Red paired with Orange
14—Green paired with Blue
15—Green paired with White
16—Green paired with Brown
17—Green paired with Orange

PAIR NO. COLOR COMBINATION

18—Green paired with Yellow
19—White paired with Blue
20—White paired with Brown
21—White paired with Orange
22—White paired with Yellow
23—Blue paired with Brown
24—Blue paired with Orange
25—Blue paired with Yellow
26—Brown paired with Orange
27—Brown paired with Yellow
28—Purple paired with Red
29—Purple paired with White
30—Purple paired with Green
31—Purple paired with Blue
32—Purple paired with Brown
33—Purple paired with Yellow
34—Purple paired with Orange

PAIR NO. COLOR COMBINATION

35—Purple paired with Slate
36—Purple paired with Black
37—Slate paired with Red
38—Slate paired with White
39—Slate paired with Green
40—Slate paired with Blue
41—Slate paired with Brown
42—Slate paired with Yellow
43—Slate paired with Orange
44—Slate paired with Black
45—White/Black paired w. Red
46—White/Black paired w. Green
47—White/Black paired w. Blue
48—White/Black paired w. Brown
49—White/Black paired w. Yellow
50—White/Black paired w. Orange
51—White/Black paired w. Purple

© Color Blend

All items on this page available in standard gray jacket or colored black, brown, metallic blue or bronze. Items indicated with © available in above colors and additionally—white, tan, orange, red, yellow, blue and green Jackets.

ALPHA WIRE CORPORATION

Unshielded Audio Cable

UL
2509

MULTI-CONDUCTOR — PLASTIC JACKET

Passes FR-1 vertical flame test.

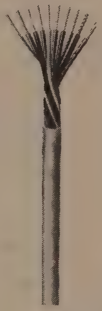
DESCRIPTION: Each conductor tinned copper, color coded polyvinylchloride insulation, conductors twisted, gray polyvinylchloride jacket overall. Suitable for outdoor installations.

APPLICATIONS: Intercoms. Interconnecting cables. Remote control circuits. Telephones. Telemetering connecting cable. "Baby Sitter" intercom.

CHARACTERISTICS: Suggested Operating Temperature: −20°C to +80°C.

SOLID

ALPHA NO.	NO. OF COND.	CONDUCTOR		NOM. WALL THICKNESS	NOMINAL JACKET	NOMINAL O.D.	SUGG. OPER. VOLTAGE
		SIZE	STRAND				
1793	2	22	1	.010″	.020″	.130″	200 V
1794	3	22	1	.010″	.020″	.140″	200 V
1794/4	4	22	1	.010″	.020″	.160″	200 V
1795	2	20	1	.016″	.020″	.170″	350 V
1796	3	20	1	.016″	.020″	.180″	350 V
1796/4	4	20	1	.016″	.020″	.200″	350 V
1797	2	18	1	.016″	.020″	.190″	350 V
1798	3	18	1	.016″	.020″	.200″	350 V
1798/4	4	18	1	.016″	.020″	.220″	350 V
1799	2	16	1	.016″	.020″	.215″	350 V
1799/3	3	16	1	.016″	.020″	.230″	350 V
1799/4	4	16	1	.016″	.020″	.250″	350 V



STANDARD SPOOL PUT-UP: 100 FT., 500 FT., 1000 FT.

COLOR CODE OF CONDUCTORS: 1—Black 2—Red 3—White 4—Green

STRANDED

1893 *	2	22	7/30	.010″	.020″	.135″	200 V
1894 *	3	22	7/30	.010″	.020″	.145″	200 V
1894/4 *	4	22	7/30	.010″	.020″	.170″	200 V
1895 ©	2	20	10/30	.016″	.020″	.180″	350 V
1896	3	20	10/30	.016″	.020″	.190″	350 V
1896/4	4	20	10/30	.016″	.020″	.215″	350 V
1896/6	6	20	10/30	.016″	.020″	.255″	350 V
1896/8	8	20	10/30	.016″	.020″	.270″	350 V
1896/10	10	20	10/30	.016″	.020″	.335″	350 V
1896/12	12	20	10/30	.016″	.020″	.350″	350 V
1897 ©	2	18	16/30	.016″	.020″	.200″	350 V
1898	3	18	16/30	.016″	.020″	.210″	350 V
1898/6	6	18	16/30	.016″	.020″	.290″	350 V
1898/8	8	18	16/30	.016″	.025″	.315″	350 V
1898/4	4	18	16/30	.016″	.020″	.240″	350 V
1898/10	10	18	16/30	.016″	.025″	.370″	350 V
1898/12	12	18	16/30	.016″	.025″	.385″	350 V
1898/15	15	18	16/30	.016″	.030″	.445″	350 V
1898/19	19	18	16/30	.016″	.030″	.470″	350 V
1898/25	25	18	16/30	.016″	.035″	.558″	350 V
1899	2	16	26/30	.016″	.020″	.225″	350 V
1899/3	3	16	26/30	.016″	.020″	.245″	350 V
1899/4	4	16	26/30	.016″	.020″	.270″	350 V
1891	2	14	41/30	.016″	.020″	.260″	350 V
1891/3	3	14	41/30	.016″	.020″	.280″	350 V
1892	2	12	65/30	.016″	.020″	.300″	350 V
1892/3	3	12	65/30	.016″	.020″	.320″	350 V

* THESE ITEMS NOT LISTED BY UL

STANDARD SPOOL PUT-UP: 100 FT., 500 FT., 1000 FT.

COLOR CODE OF CONDUCTORS

1—Black
2—Red
3—White
4—Green
5—Orange
6—Blue
7—Brown
8—Yellow
9—Purple
10—Slate
11—Pink
12—Tan
13—Red/Green
14—Red/Yellow
15—Red/Black
16—White/Black
17—White/Red
18—White/Green
19—White/Yellow
20—White/Blue
21—White/Brown
22—White/Orange
23—White/Gray
24—White/Violet
25—White/Black/Red

QCC

Variations in construction, color, put-up, gauge, etc. of products on this page are available through Alpha's QCC service.

© Color Blend

All items on this page available in standard gray jacket or colored black, brown, metallic blue or bronze. Items indicated with © available in above colors and additionally—white, tan, orange, red, yellow, blue and green Jackets.

ALPHA WIRE CORPORATION

Unshielded Audio Cable

MULTI-CONDUCTOR — PLASTIC JACKET

QCC

Variations in construction, color, put-up, gauge, etc of products on this page are available through Alpha's QCC service

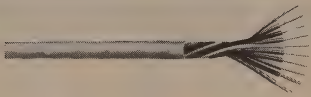
DESCRIPTION: Passes FR-1 vertical flame test. Each conductor stranded tinned copper, color coded polyvinylchloride insulation, conductors twisted, gray polyvinylchloride jacket overall. Suitable for outdoor installations.

APPLICATIONS: Unbalanced intercom systems. Low voltage relay control cable. P.A. systems. Electronic computer cable. Interconnecting cables. Remote control circuits. Telephones. Telemetering connecting cable. "Baby Sitter" intercom.

CHARACTERISTICS: Suggested Operating Temperature: −20°C to +80°C.

MULTI-CONDUCTOR 22 GAUGE

ALPHA NO.	NO. OF COND.	CONDUCTOR SIZE	STRAND	NOM. WALL THICKNESS (Inches)	NOM. JKT. THICKNESS (Inches)	NOM. O.D. (Inches)
1172 ©	2	22	7/30	.010	.020	.140
1173 ©	3	22	7/30	.010	.020	.145
1174 ©	4	22	7/30	.010	.020	.170
1175 ©	5	22	7/30	.010	.020	.175
1176 ©	6	22	7/30	.010	.020	.185
1177 ©	7	22	7/30	.010	.020	.190
1178 ©	8	22	7/30	.010	.020	.200
1179	9	22	7/30	.010	.020	.225
1180	10	22	7/30	.010	.020	.235
1181	12	22	7/30	.010	.020	.255
1181/15	15	22	7/30	.010	.020	.280
1181/20	20	22	7/30	.010	.020	.310
1181/25	25	22	7/30	.010	.020	.340
1181/30	30	22	7/30	.010	.020	.365
1181/40	40	22	7/30	.010	.025	.425
1181/50	50	22	7/30	.010	.035	.500
1181/60	60	22	7/30	.010	.035	.530



COLOR CODE OF CONDUCTORS

1—Black
2—Red
3—White
4—Green
5—Orange
6—Blue
7—Brown
8—Yellow
9—Purple
10—Slate
11—Pink
12—Tan
13—Red/Green
14—Red/Yellow
15—Red/Black
16—White/Black
17—White/Red
18—White/Green
19—White/Yellow
20—White/Blue
21—White/Brown
22—White/Orange
23—White/Gray
24—White/Violet
25—White/Black/Red
26—White/Black/Green
27—White/Black/Yellow
28—White/Black/Blue
29—White/Black/Brown
30—White/Black/Orange
31—White/Black/Slate
32—White/Black/Purple
33—White/Black/Black
34—White/Red/Black
35—White/Red/Red
36—White/Red/Green
37—White/Red/Blue
38—White/Red/Brown
39—White/Red/Purple
40—White/Green/Black
41—White/Green/Red
42—White/Green/Green
43—White/Green/Blue
44—White/Green/Brown
45—White/Green/Purple
46—White/Blue/Black
47—White/Blue/Red
48—White/Blue/Green
49—White/Blue/Blue
50—White/Blue/Brown
51—White/Blue/Purple
52—White/Brown/Black
53—White/Brown/Red
54—White/Brown/Green
55—White/Brown/Blue
56—White/Brown/Brown
57—White/Brown/Purple
58—White/Purple/Red
59—White/Purple/Green
60—White/Purple/Blue

MULTI-CONDUCTOR COMBINATION GAUGES

ALPHA NO.	NO. OF COND.	CONDUCTOR SIZE	STRAND	NOM. WALL THICKNESS (INCHES)	NOM. JKT. THICKNESS (INCHES)	NOM O.D. (INCHES)	COLOR CODE CONDUCTOR
1826	6	4-22 2-18	7x30 16x30	.010 .018	.025	.225	Grn., Wht., Brn., Blue Blk., Red
1827	7	5-22 2-18	7x30 16x30	.010 .018	.028	.248	Grn., Wht., Brn., Blue Orng., Blk., Red
1828	8	6-22 2-18	7x30 16x30	.010 .018	.028	.250	Grn., Wht., Brn., Blue, Orng., Yel. Blk., Red

STANDARD SPOOL PUT-UP: 100 FT., 500 FT., 1000 FT.

Unshielded Control & Audio Cable

INNER CONDUCTORS — 600 VOLTS — 80°C

DESCRIPTION: Passes FR-1 vertical flame test.

Each conductor, stranded tinned copper, color coded PVC insulation with mylar wrap, chrome gray PVC jacket overall. Working voltage — 600 volts. Operative temperature −20°C.-+80°C. Inner conductors meet UL Style 1011.

APPLICATION:

Used as industrial control cable for telemetry and automatic control. Widely used as a heavy-duty communications and signaling cable.

16 GAUGE — 19/29 STRANDING
Insulation Thickness — 1/32 inches

ALPHA NO.	No. of Conductors	Jacket Thickness (Inches)	Nom. O.D. (Inches)
1064	4	.045	.377
1065	5	.045	.406
1067	7	.045	.458
1069	9	.045	.513
1072	12	.060	.604
1075	15	.060	.654
1079	19	.065	.720
1085	25	.065	.824

14 GAUGE — 19/27 STRANDING
Insulation Thickness — 3/64 inches

ALPHA NO.	No. of Conductors	Jacket Thickness (Inches)	Nom. O.D. (Inches)
1274	4	.045	.500
1275	5	.060	.563
1277	7	.060	.634
1279	9	.065	.754
1282	12	.065	.773
1285	15	.080	.905

Standard Spool Put-up: 100 ft., 250 ft., 500 ft., 1000 ft.

COLOR CODE OF CONDUCTORS

1 — Black
2 — White
3 — Red
4 — Green
5 — Orange
6 — Blue
7 — White/Black
8 — Red/Black
9 — Green/Black
10 — Orange/Black
11 — Blue/Black
12 — Black/White
13 — Red/White
14 — Green/White
15 — Blue/White
16 — Black/Red
17 — White/Red
18 — Orange/Red
19 — Blue/Red
20 — Red/Green
21 — Orange/Green
22 — Black/White/Red
23 — White/Black/Red
24 — Red/Black/White
25 — Green/Black/White

ALPHA WIRE CORPORATION

Foil Shielded Jacketed Cable

UL STYLE 2092, 2093 & 2094 *

MYLAR SUPPORTED ALUMINUM FOIL SHIELD

DESCRIPTION:
Each conductor stranded tinned copper, color coded polyethylene insulation, conductors cabled, wrapped mylar supported aluminum foil shield, 100% coverage with drain wire laid parallel, aluminum foil facing outward to provide maximum ground, gray pvc jacket overall.

CHARACTERISTICS:
Operating temperature: −20°C to +60°C. Operating voltage: 400 volts. Light weight, reduces cable diameter, and provides 100% shield coverage.

ALPHA NO.	NO. OF COND.	CONDUCTOR SIZE	STRAND	NOM. WALL THICK. (INCHES)	NOM. JKT. THICK. (INCHES)	NOM. O.D. (INCHES)	COND. COLOR CODE
2400	2	24	7/32	.016	.020	.160	1, 3
2401 ©	2	22	7/30	.016	.020	.170	1, 3
2402 ©	2	22	7/30	.016	.020	.170	1, 2
2403 ©	3	22	7/30	.016	.020	.185	1, 2, 3
2404	4	22	7/30	.016	.020	.210	1, 2, 3, 4
2411 ©	2	20	10/30	.016	.020	.186	1, 3
2412 ©	2	20	10/30	.016	.020	.186	1, 2
2413	3	20	10/30	.016	.020	.205	1, 2, 3
2414	4	20	10/30	.016	.020	.225	1, 2, 3, 4
2421 ©	2	18	16/30	.016	.020	.210	1, 3
2422 ©	2	18	16/30	.016	.020	.210	1, 2
2423	3	18	16/30	.016	.020	.230	1, 2, 3
2424	4	18	16/30	.016	.020	.255	1, 2, 3, 4
2432	2	16	26/30	.016	.020	.245	1, 2
2433	3	16	26/30	.016	.020	.270	1, 2, 3
2442	2	14	41/30	.020	.030	.310	1, 3
2444	2	12	65/30	.020	.030	.350	1, 3

COLOR CODE OF CONDUCTORS: 1.-BLACK 2.-RED 3.-CLEAR 4.-GREEN

* 2 COND.—2092 3 COND.—2093 4 COND.—2094

STANDARD SPOOL PUT-UP: 100 FT., 500 FT., 1000 FT.

Miniature Foil Shielded Cable

TWO 22 GAUGE CONDUCTORS.

DESCRIPTION:
Each conductor tinned solid or stranded copper, color coded polypropolene insulation, aluminum/Mylar foil shield, drain wire, gray vinyl jacket overall.

APPLICATIONS:
Designed for space-saving in miniature and sub-miniature instrumentation and audio applications.

200 volts, −55°C — +105°C

ALPHA NO.	CONDUCTOR SIZE	STRAND	NOM. WALL THICKNESS (INCHES)	NOM. JKT. THICKNESS (INCHES)	NOM. O.D. (INCHES)
2460	22	Solid	.008	.018	.118
2461	22	7/30	.008	.020	.135

Color Code Of Conductors — Black, Red

STANDARD SPOOL PUT-UP: 100 FT., 500 FT., 1000 FT.

Foil Shielded Audio & Data Cable

INDIVIDUALLY SHIELDED MULTIPLE PAIRS — PLASTIC JACKET

DESCRIPTION:
Each conductor, tinned copper, color coded, high density polypropolene conductors twisted into pairs. 20 gauge tinned copper drain wire. Mylar-supported aluminum foil shield, aluminum facing inward. Chrome Gray PVC jacket overall.

CHARACTERISTICS:
Mutual conductance between conductors of a pair, 25 pf/ft. Capacitance of a single conductor to shield, 45 pf/ft.

APPLICATIONS:
For audio, R.F. and pulse applications requiring superior circuit isolation.

#22 — SOLID

ALPHA NO.	NO. OF PAIRS	NO. OF COND.	COND. STRAND	NOM. WALL THICK. (Inches)	NOM. JKT. THICK. (Inches)	NOM. O.D. (Inches)
6000	3	6	1	.010	.025	.235
6002	6	12	1	.010	.030	.318
6004	9	18	1	.010	.030	.371
6006	11	22	1	.010	.035	.414
6008	15	30	1	.010	.040	.485

#22 — STRANDED

ALPHA NO.	NO. OF PAIRS	NO. OF COND.	COND. STRAND	NOM. WALL THICK. (Inches)	NOM. JKT. THICK. (Inches)	NOM. O.D. (Inches)
6010	3	6	7 30	.010	.025	.252
6012	6	12	7/30	.010	.030	.342
6014	9	18	7/30	.010	.035	.410
6016	11	22	7/30	.010	.040	.457
6018	15	30	7/30	.010	.040	.523
6020	19	38	7/30	.010	.050	.570
6022	27	54	7/30	.010	.055	.687

#18 — STRANDED

ALPHA NO.	NO. OF PAIRS	NO. OF COND.	COND. STRAND	NOM. WALL THICK. (Inches)	NOM. JKT. THICK. (Inches)	NOM. O.D. (Inches)
6023	3	6	16/30	.016	.035	.372
6024	6	12	16/30	.016	.045	.555
6025	9	18	16/30	.016	.055	.620
6026	12	24	16/30	.016	.070	.765
6027	15	30	16/30	.016	.070	.830

STANDARD SPOOL PUT-UP: 100 FT., 500 FT., 1000 FT.

PAIR NO. COLOR COMBINATION OF PAIRS

1—Black paired with Red
2—Black paired with White
3—Black paired with Green
4—Black paired with Blue
5—Black paired with Brown
6—Black paired with Yellow
7—Black paired with Orange
8—Red paired with Green
9—Red paired with White
10—Red paired with Blue
11—Red paired with Yellow
12—Red paired with Brown
13—Red paired with Orange
14—Green paired with Blue
15—Green paired with White
16—Green paired with Brown
17—Green paired with Orange
18—Green paired with Yellow
19—White paired with Blue
20—White paired with Brown
21—White paired with Orange
22—White paired with Yellow
23—Blue paired with Brown
24—Blue paired with Orange
25—Blue paired with Yellow
26—Brown paired with Orange
27—Brown paired with Yellow

QCC

Variations in construction, color, put up, gauge, etc. of products on this page are available through Alpha's QCC service

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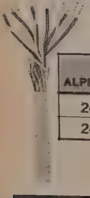
Multiple Pairs Foil Shielded Overall

22 GAUGE, 38, 51 PAIRS

DESCRIPTION:
Tinned solid copper conductors, with vinyl or polyethylene color coded insulation, cabled in pairs. Aluminum/Mylar foil shield overall. Stranded copper drain wire, chrome vinyl jacket.

APPLICATIONS:
Communications, telephone and sound systems, control and instrumentation cables.



ALPHA NO.	NO. OF PAIRS	COND. SIZE	INSULATION TYPE	THICKNESS (INCHES)	NOM. JKT. THICKNESS (INCHES)	NOM. O.D. (INCHES)
2450	38	22	PE	.008	.045	.605
2451	51	22	Vinyl	.010	.050	.728

PAIR NO. COLOR COMBINATION

1 — Blue p.w. White
2 — Orange p.w. White
3 — Green p.w. White
4 — Brown p.w. White
5 — Slate p.w. White
6 — Blue-White striped p.w. White
7 — Blue-Orange p.w. White
8 — Blue-Green striped p.w. White
9 — Blue-Brown striped p.w. White
10 — Blue-Slate striped p.w. White
11 — Orange-White striped p.w. White
12 — Orange-Green striped p.w. White
13 — Orange-Brown striped p.w. White
14 — Orange-Slate striped p.w. White
15 — Green-White striped p.w. White
16 — Green-Brown striped p.w. White
17 — Green-Slate striped p.w. White
18 — Brown-White striped p.w. White
19 — Brown-Slate striped p.w. White
20 — Slate-White striped p.w. White
21 — Blue p.w. Red
22 — Orange p.w. Red
23 — Green p.w. Red
24 — Brown p.w. Red
25 — Slate p.w. Red

(NOTE: p.w. — paired with)

PAIR NO. COLOR COMBINATION

26 — Blue-White striped p.w. Red
27 — Blue-Orange striped p.w. Red
28 — Blue-Green striped p.w. Red
29 — Blue-Brown striped p.w. Red
30 — Blue-Slate striped p.w. Red
31 — Orange-White striped p.w. Red
32 — Orange-Green striped p.w. Red
33 — Orange-Brown striped p.w. Red
34 — Orange-Slate striped p.w. Red
35 — Green-White striped p.w. Red
36 — Green-Brown striped p.w. Red
37 — Green-Slate striped p.w. Red
38 — Brown-White striped p.w. Red
39 — Brown-Slate striped p.w. Red
40 — Slate-White striped p.w. Red
41 — Blue p.w. Black
42 — Orange p.w. Black
43 — Green p.w. Black
44 — Brown p.w. Black
45 — Slate p.w. Black
46 — Blue-White striped p.w. Black
47 — Blue-Orange striped p.w. Black
48 — Blue-Green striped p.w. Black
49 — Blue-Brown striped p.w. Black
50 — Blue-Slate striped p.w. Black
51 — Orange-White striped p.w. Black

ALPHA WIRE CORPORATION

Spiral Shielded Plastic Jacketed Cable

DESCRIPTION: Passes FR-1 vertical flame test.
Each conductor stranded or solid tinned copper, color coded polyvinylchloride insulation, conductors twisted, spiral wrapped copper shield, gray polyvinylchlodide jacket. Nominal jacket thickness .020.

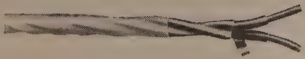
CHARACTERISTICS:
Use of spiral shield makes pigtailing off extremely simple and fast. Excellent for production line work. Provides 95% shielded coverage for audio and RF frequencies. Suggested operating temperature: −20°C to +80°C.

Braided Shielded Jacketed Cable

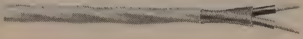
DESCRIPTION: Passes FR-1 vertical flame test.
Each conductor tinned copper, color coded polyvinylchloride insulation, conductors twisted, braided copper shield, gray polyvinylchloride jacket overall. Suitable for outdoor installations.

CHARACTERISTICS:
A conventional type of braided shield providing approximately 75% coverage is particularly desirable where flexibility is required. The copper shield allows ease of pigtail soldering. Shield construction provides additional cable strength. Operating temperature: −20°C to +80°C. Nominal jacket thickness .020.

APPLICATIONS:
For public address and sound systems, ideal for recording studios, amateur radio transmitters, shielded power or electronic circuits, wherever an economical shielded cable is required.



UL
1007
FR-1



ALPHA NO.	NO. OF COND.	CONDUCTOR		NOM. WALL THICKNESS	NOM. O.D.	SUGG. WORKING VOLTAGE
		SIZE	STRAND			
2255	2	22	Solid	.016″	.170″	350V
2254/1	1	22	7/30	.016″	.115″	350V
2254 ©	2	22	7/30	.016″	.175″	350V
2254/3	3	22	7/30	.016″	.190″	350V
2254/4	4	22	7/30	.016″	.200″	350V
2254/6	6	22	7/30	.016″	.235″	350V
2256/1	1	20	10/30	.016″	.130″	350V
2256 ©	2	20	10/30	.016″	.195″	350V
2256/3	3	20	10/30	.016″	.210″	350V
2256/4	4	20	10/30	.016″	.225″	350V
2256/6	6	20	10/30	.016″	.265″	350V
2258/1	1	18	16/30	.016″	.135″	350V
2258 ©	2	18	16/30	.016″	.230″	350V
2258/3	3	18	16/30	.016″	.235″	350V
2258/4	4	18	16/30	.016″	.245″	350V
2260	2	16	26/30	.016″	.240″	350V
2260/3	3	16	26/30	.016″	.245″	350V
2265	2	14	41/30	.020″	.285″	450V
2265/3	3	14	41/30	.020″	.290″	450V
2268	2	12	65/30	.020″	.325″	450V
2268/3	3	12	65/30	.020″	.330″	450V

STRANDED

ALPHA NO.	NO. OF COND.	CONDUCTOR		NOM. WALL THICKNESS	NOM. O.D.	SUGG. WORKING VOLTAGE
		SIZE	STRAND			
1735	1	22	7/30	.016″	.125″	350V
1736 ©	2	22	7/30	.016″	.185″	350V
1737	3	22	7/30	.016″	.200″	350V
1738	4	22	7/30	.016″	.210″	350V
1740	1	20	10/30	.016″	.135″	350V
1741 ©	2	20	10/30	.016″	.200″	350V
1742	3	20	10/30	.016″	.220″	350V
1743	4	20	10/30	.016″	.230″	350V
1745	1	18	16/30	.016″	.145″	350V
1746 ©	2	18	16/30	.016″	.235″	350V
1747	3	18	16/30	.016″	.245″	350V
1747/4	4	18	16/30	.016″	.255″	350V
1748	2	16	26/30	.016″	.250″	350V
1749	3	16	26/30	.016″	.255″	350V
1750	2	14	41/30	.020″	.290″	450V
1751	3	14	41/30	.020″	.295″	450V
1760	2	12	65/30	.020″	.335″	450V
1761	3	12	65/30	.020″	.340″	450V

SOLID

1775*	2	22	1	.016″	.175″	350V
1779	2	20	1	.016″	.210″	350V
1783	2	18	1	.016″	.220″	350V

*With 22 AWG solid tinned copper ground wire under braided copper shield.

© Color Blend

All items on this page available in standard gray jacket or colored black, brown, metallic blue or bronze. Items indicated with © available in above colors and additionally—white, tan, orange, red, yellow, blue and green. Jackets.

QCC

Variations in construction, color, put-up, gauge, etc. of products on this page are available through Alpha's QCC service.

STANDARD SPOOL PUT-UP: 100 FT., 500 FT., 1000 FT.

COLOR CODE OF CONDUCTORS
1—Black 2—Red 3—White 4—Green 5—Yellow 6—Blue

ALPHA WIRE CORPORATION

UL

1150

Shielded Microphone Cable

PLASTIC JACKET UL STYLE 1150*

DESCRIPTION:

1702-1706: Single conductor, stranded tinned copper, white polyethylene insulation, braided or spiral wrapped tinned copper shield, gray polyvinylchloride jacket overall.

1709-1712: Each conductor stranded tipped copper, color coded polyethylene insulation, cabled with fillers, wrap, braided or spiral wrapped tinned copper shield, gray polyvinylchloride jacket overall.

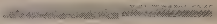
APPLICATIONS:

1702-1706: All high impedance microphones, lapel, ribbon, velocity, crystal contact, hi-fi interconnecting cables.

1709-1712: All low impedance microphones — carbon, condenser, dynamic.

CHARACTERISTICS:

Suggested operating temperature: −20°C to +80°C.



ALPHA NO.	NO. OF COND.	CONDUCTOR SIZE	CONDUCTOR STRAND	NOM. WALL THICKNESS	*CAPACITY NOM./FT.	SUG. WORK. VOLTAGE	TYPE OF SHIELD	NOM. O.D.
1702	1	26	3/34† 4/34†	.016″	38 mmf.	1000	Spiral Wrapped	.110″
1703	1	24	10/34	.020″	35 mmf.	3500	Braided	.145″
1704•	1	24	10 34	.040″	23 mmf.	5000	Braided	.190″
1705	1	24	10/34	.016″	45 mmf.	1000	Spiral Wrapped	.110″
1706•	1	20	26 34	.030″	36 mmf.	4000	Braided	.175″
1709	2	24	10 34	.016″	38 mmf.	1000	Spiral Wrapped	.190″
1710	2	22	16 34	.025″	31 mmf.	1000	Braided	.230″
1712	2	20	26 34	.015″	45 mmf.	600	Braided	.245″

STANDARD SPOOL PUT-UP: 100 FT., 500 FT., 1000 FT.

* Between one conductor and remaining conductors connected to shield.

† Three strands of tinned copper and four strands of tinned copperweld.

•UL LISTING ONLY 1704 & 1706

COLOR CODE OF CONDUCTORS

1—White 2—Black

Shielded Microphone Cable

RUBBER AND NEOPRENE JACKETS

DESCRIPTION:

Each conductor stranded tinned copper, color coded rubber insulation, wrap, braided tinned copper shield, cotton wrap, tough black rubber or neoprene jacket overall.

APPLICATIONS:

1248-1449: All high impedance microphone, broadcast and heavy duty studio use, communication and audio systems.

1250-1450/16: All low impedance microphone, broadcast and heavy duty studio use. Can also be used for control circuits, video and audio interconnection cable, and as electronic power cables.

CHARACTERISTICS:

Suggested operating temperature: −20°C to +60°C.

Rubber jacketed cable suited for standard duty indoor use.

Neoprene jacketed cable suited for heavy duty outdoor use and direct burial. Will resist oil, acid, sunlight, aging and abrasion.

ALPHA NO.	NO. OF COND.	CONDUCTOR SIZE	CONDUCTOR STRAND	NOM. WALL THICKNESS	TYPE OF JKT.	*NOM. CAP. MMF/FT.	NOM. O.D.
1248†	1	20	26/34	.025″	Rubber	97	.190″
1249	1	20	26/34	.040″	Rubber	60	.230″
1249/18	1	18	41/34	.040″	Rubber	69	.240″
1449	1	18	41/34	.040″	Neoprene	69	.240″
1250	2	20	26/34	.020″	Rubber	68	.270″
1250/18	2	18	41/34	.020″	Rubber	78	.295″
1450	2	18	41/34	.020″	Neoprene	78	.295″
1450/16	2	16	65/34	.025″	Neoprene	82	.335″

STANDARD SPOOL PUT-UP: 100 FT., 500 FT., 1000 FT.

* Between one conductor and remaining conductors (if any) connected to shield.

† Mylar wrap under tinned copper shield.

COLOR CODE OF CONDUCTORS

1—Black
2—White

QCC

Variations in construction, color, put up, gauge, etc. of products on this page are available through Alpha's QCC service

Color Blend

All cables on this page available in standard gray jacket or colored black, brown, metallic blue or bronze.

UL

1354

Low Capacitance Shielded Microphone Cable

CELLULAR FOAM POLYETHYLENE INSULATION — PLASTIC JACKET

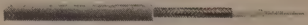
DESCRIPTION:

Single conductor, stranded tinned copper, white foam polyethylene insulation, braided tinned copper shield, chrome gray polyvinylchloride jacket.

Two conductors, stranded tinned copper, color coded foam polyethylene insulation, 1 white and 1 black, cabled with fillers, textile wrap, braided tinned copper shield, chrome gray polyvinylchloride jacket.

CHARACTERISTICS:

Suggested operating temperature: −20°C to +80°C. Low loss foam polyethylene provides lower capacitance and attenuation than standard solid polyethylene microphone cables, thereby increasing the effective length of usable cable without loss of signal.



ALPHA NO.	NO. OF COND.	CONDUCTOR SIZE	CONDUCTOR STRAND	NOM. WALL THICKNESS	*CAPACITY NOM./FT.	NOM. JKT. THICKNESS	NOM. O.D.
2311	1	24	10/34	.035″	20 mmf	.030″	.180″
2312	1	24	10/34	.055″	15 mmf	.030″	.225″
2323	2	22	16/34	.035″	††	.030″	.300″

STANDARD SPOOL PUT-UP: 100 FT., 500 FT., 1000 FT.

* Between one conductor and remaining conductors connected to shield.

† Three strands of tinned copper and four strands of tinned copperweld.

†† Cond. to shield = 19 MMF
Cond. to shield = 12 MMF

COLOR CODE OF CONDUCTORS

1—White 2—Black

UL

1007

FR-1

Communication & Intercom Combination Cables

Passes FR-1 vertical flame test.

INNER CONDUCTORS MEET UL 1007 & FR-1

SHIELDED & UNSHIELDED COMBINATIONS FOR AUDIO & INSTRUMENTATION

DESCRIPTION:

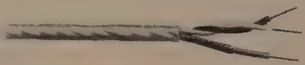
Each conductor stranded, tinned copper, color coded PVC or polypropolene insulation, braided, tinned or aluminum mylar over conductors forming shield. Unshielded conductors paired. Foil shielded cables have solid tinned copper drain for grounding.

APPLICATIONS:

For all station-to-station wiring where shield is necessary to eliminate cross-talk. Used in instrumentation wiring or in various circuits requiring parted or total signal isolation.

CHARACTERISTICS:

Suggested operatng temperature: −20°C to +80°C. 350 volts.



ALPHA NO.	CONDUCTOR TOTAL NO.	CONDUCTOR NO. SHLD.	CONDUCTOR SIZE	CONDUCTOR STRAND	INSULATION MATL.	INSULATION NOM. THKNS. (Inches)	SHIELD MATL.	NOM. O.D. (Inches)	COLOR CODE
1243	3	1	22	7/30	PVC	.016	BRAID	.200	Wht. — Shld. Blk., Red — Unshld.
2464	4	2	22	7/30	PP	.008	FOIL	.165	Red, Blk. — Shld. Grn., Wht. — Unshld.
1243/4	4	2	22	7/30	PVC	.016	BRAID	.180X .285	Blk., Wht. — Shld. Blk., Red — Unshld.
1243/6	4 (2 prs.)	4	22	7/30	PVC	.016	BRAID	.180X .315	Blk., Wht. — Shld. Blk., Red — Shld.
1243/5	5	3	22	7/30	PVC	.016	BRAID	.200X .300	Blk., Wht., Red — Shld. Blk., Red — Unshld.
1243/3	3	2	20	7/28	PE	.014	FOIL	.212	Blk., Red — Shld. Clear — Unshld.
2465	4	2	20	7/28	PVC	.015	FOIL	.233	Blk., Red — Shld. Grn., Wht. — Unshld.

STANDARD SPOOL PUT-UP: 100 FT., 500 FT., 1000 FT.

ALPHA WIRE CORPORATION

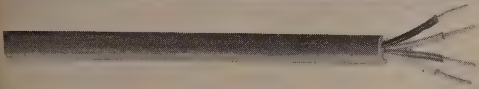
Telephone Station Cable

Description:

Solid, annealed 22-gauge bare copper conductor, color coded polyethylene insulation, conductors cabled with PVC jacket overall. Jacket designed to resist weathering and abrasion.

Application:

Telephone and intercom installation. May be used in building duct or outside installations. Cable may be easily installed to baseboards or walls with staple gun or clamps.
Insulation thickness .015″.



22-GAUGE SOLID CONDUCTOR

ALPHA NO.	NO. OF CONDUCTORS	JACKET THICKNESS (Inches)	NOM. O.D. (Inches)	COLOR CODE CONDUCTORS	STANDARD PUT-UP
1202	2	.020	.155	Red, green	100′-500′-1000′ spools
1203	3	.020	.163	Red, green yellow	100′-500′-1000′ spools
1204	4	.022	.185	Red, green yellow, black	100′-500′-1000′ spools

JACKET COLOR: BEIGE

Headset Cable

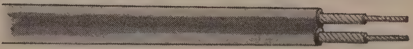
FOR LANGUAGE LABORATORIES

DESCRIPTION:

Conductors consist of combination tinned copper and copperweld strands, color coded, polyethelene insulation. Spiral wrapped, tinned copper shield. Chrome, gray, vinyl jacket. Flat configuration.

APPLICATION:

Extra sturdy, steel reinforced conductor and polyethylene jacket resists pulling and abrasion. Designed for two channel stereo application in audio-visual education, language laboratories, etc.



Conductor Colors — Red & Clear

Alpha No.	No. of Cond.	Conductor Size	Conductor Strand	Insulation Thickness (Inches)	Jacket Thickness (Inches)	Nom. O.D. (Inches)
1985	2	25	7/33	.017	.020	108 x .215

Standard Spool Put-up: 100 ft., 250 ft., 500 ft., 1000 ft.

Miniature Shielded Cable

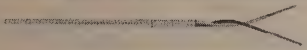
CLEAR PLASTIC JACKET

DESCRIPTION:

Each conductor stranded tinned copper, color coded polyvinylchloride insulation, conductors twisted, fine braided tinned copper shield overall, clear polyvinylchloride jacket overall.

CHARACTERISTICS:

Suggested operating temperature: −20°C to +80° C.
Suggested operating voltage: 200V. Cond. size 28, Strand 7/36.



ALPHA NO.	NO. OF COND.	NOM. WALL THICKNESS	NOM. JKT. THICKNESS	NOM. O.D.
1120	2	.010″	.010″	.105″
1121	3	.010″	.010″	.115″
1122	4	.010″	.010″	.120″

STANDARD SPOOL PUT-UP: 100 FT., 500 FT., 1000 FT.
COLOR CODE OF CONDUCTORS: 1—Black 2—Red 3—White 4—Green

Plastic Speaker Cable Colored and Clear Insulation

DESCRIPTION:

Conductors parallel, stranded bare copper, color coded polyvinylchloride insulation, conductors separate easily when slit apart.

APPLICATION:

Hi-Fi speaker cable, miniature juke box speaker connection and rear auto speaker extension cable. Clear insulation will blend with interior room decor.

CHARACTERISTICS:

Suggested Operating Temperature: −20°C to +60°C. No. of cond.: 2.

ALPHA NO.	CONDUCTOR SIZE	CONDUCTOR STRAND	NOM. WALL THICKNESS	NOM. O.D.	STOCK COLORS
1944*	24	7/32	.016″	.057″ x .120″	Brn., Blk., Wh., Gray, Tan
1945*	24	7/32	.016″	.057″ x .120″	Clear
1948*	22	Solid	.016″	.057″ x .120″	Gray.
1949*	20	7/28	.020″	.073″ x .146″	Gray, Clear
1977	18	41/34	.032″	.115″ x .215″	Brn., Blk., Wh., Gray, Clear
1979 †	18	41/34	.032″	.115″ x .215″	Clear

STANDARD SPOOL PUT-UP: 100 FT., 250 FT., 500 FT., 1000 FT.
*1 Conductor Tinned, 1 Bare.
†U.L. Listed

Hi-Fi and Stereo Interconnecting Cable Phono Wire

DESCRIPTION

1115 and 1116:

Each conductor stranded tinned copper, color coded polyvinylchloride insulation, conductors twisted.

1101-1107:

Each conductor stranded tinned copper, color coded polyvinylchloride insulation, conductors twisted with an extra tight lay for flexibility. When shielded the overall shield has been specially designed for extreme limpness so as not to impede the movement of the phono arm when tracking.

CHARACTERISTICS:

Suggested Operating Temperature: 55°C to +105°C.

ALPHA NO.	NO. OF COND.	CONDUCTOR SIZE	CONDUCTOR STRAND	NOM. WALL THICKNESS	NOM. O.D.	SUGG. OPER. VOLTAGE	COLOR CODE
UNSHIELDED							
1115	2	30	7/38	.010″	.065″	200V	Black & Red
1116	3	30	7/38	.010″	.070″	200V	Blk., Red & White
STEREO (Unshielded)							
1101	3	32	7/40	.010″	.053″	200V	Blk., Red & White
1102	4	32	7/40	.010″	.061″	200V	Blk., Rd., Wh. & Gr.
STEREO (Shielded)							
1105	2	32	7/40	.010″	.055″	200V	Black & Red
1107	4	32	7/40	.010″	.068″	200V	Blk., Rd., Wh. & Gr.

STANDARD SPOOL PUT-UP: 100 FT., 1000 FT.

QCC

Variations in construction, color, put-up, gauge, etc. of products on this page are available through Alpha's QCC service

ALPHA WIRE CORPORATION

Shielded Control and Instrumentation Cable

GENERAL PURPOSE MULTI-CONDUCTOR RUBBER INSULATED AND RUBBER JACKET

DESCRIPTION:
Each conductor, stranded tinned copper, color coded rubber insulation, cabled with fillers where necessary, wrap, braided tinned copper shield, wrap, tough black rubber jacket overall.

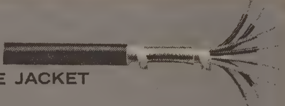
CHARACTERISTICS:
Suggested Operating Temperature: −20°C to +60°C.

ALPHA NO.	NO. OF COND.	CONDUCTOR SIZE	CONDUCTOR STRAND	NOM. WALL THICKNESS	NOM. JKT. THICKNESS	NOM. O.D.
1250/18	2	18	41/34	.020″	.035″	.295″
1250	2	20	26/34	.020″	.035″	.270″
1251	3	20	26/34	.020″	.035″	.285″
1252	4	20	26/34	.020″	.035″	.305″
1253	5	20	26/34	.020″	.035″	.330″
1254	6	20	26/34	.020″	.035″	.345″
1255	7	20	26/34	.020″	.035″	.355″
1255/8	8	20	26/34	.020″	.035″	.385″
1255/10	10	20	26/34	.020″	.035″	.440″
1255/12	12	20	26/34	.020″	.065″	.525″
1255/15	15	20	26/34	.020″	.065″	.595″
1255/20	20	20	26/34	.020″	.065″	.660″

STANDARD SPOOL PUT-UP: 100 FT., 500 FT., 1000 FT.

See color code of conductors below.

HEAVY-DUTY MULTI-CONDUCTOR RUGGED NEOPRENE JACKET



DESCRIPTION:
Each conductor stranded tinned copper, color coded rubber insulation, cabled with fillers where necessary, wrap, braided tinned copper shield, wrap, black neoprene jacket overall.

CHARACTERISTICS:
Operating Temperature: −20°C to +60°C. 300 Volts.

#18 GAUGE CABLE

ALPHA NO.	NO. OF COND.	CONDUCTOR SIZE	CONDUCTOR STRAND	NOM. WALL THICKNESS	NOM. JKT. THICKNESS	NOM. O.D.
1450	2	18	41/34	.020″	.035″	.295″
1451	3	18	41/34	.020″	.035″	.305″
1452	4	18	41/34	.020″	.035″	.330″
1454	6	18	41/34	.020″	.035″	.370″
1456	8	18	41/34	.020″	.035″	.420″
1458	10	18	41/34	.020″	.035″	.480″
1459	12	18	41/34	.020″	.065″	.555″
1459/15	15	18	41/34	.020″	.065″	.640″
1459/20	20	18	41/34	.020″	.065″	.730″

#16 GAUGE CABLE

1450/16	2	16	65/34	.025″	.035″	.335″
1451/16	3	16	65/34	.025″	.035″	.355″
1452/16	4	16	65/34	.025″	.035″	.385″
1454/16	6	16	65/34	.025″	.040″	.445″
1456/16	8	16	65/34	.025″	.040″	.510″

#14 GAUGE CABLE

1400	2	14	41/30	.030″	.040″	.395″
1401	3	14	41/30	.030″	.040″	.425″
1402	4	14	41/30	.030″	.040″	.455″
1404	6	14	41/30	.030″	.040″	.515″

#12 GAUGE CABLE

1410	2	12	65/30	.030″	.040″	.440″
1411	3	12	65/30	.030″	.040″	.465″

#10 GAUGE CABLE

1420	2	10	105/30	.030″	.040″	.495″

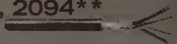
STANDARD SPOOL PUT-UP: 100 FT., 500 FT., 1000 FT.

COLOR CODE OF CONDUCTORS

1—Black
2—White
3—Red
4—Green
5—Yellow
6—Blue
7—Brown
8—Orange
9—Slate
10—Purple
11—White/Black (Braid)
12—White/Red (Braid)
13—White/Green (Braid)
14—White/Yellow (Braid)
15—White/Blue (Braid)
16—White/Brown (Braid)
17—White/Purple (Braid)
18—White/Slate (Braid)
19—Black/Red (Braid)
20—Black/Yellow (Braid)

GENERAL PURPOSE MULTI-CONDUCTOR PLASTIC JACKETED CABLE

UL STYLE 2373*, 2093+, 2094**



DESCRIPTION:
Each conductor, stranded tinned copper, color coded, polyethylene insulation, cabled with fillers where necessary, wrap, braided tinned copper shield, chrome gray polyvinylchloride jacket overall.

CHARACTERISTICS:
Suggested Operating Temperature: −20°C to +60°C. Suggested Operating Voltage: 600 Volts.

ALPHA NO.	NO. OF COND.	CONDUCTOR SIZE	CONDUCTOR STRAND	NOM. WALL THICKNESS	NOM. JKT. THICKNESS	NOM. O.D.
1712*	2	20	26/34	.014″	.030″	.245″
1713+	3	20	26/34	.014″	.035″	.250″
1715**	4	20	26/34	.014″	.035″	.260″
1716	5	20	26/34	.014″	.035″	.275″
1717	6	20	26/34	.014″	.035″	.300″
1719	8	20	26/34	.014″	.035″	.330″
1721	10	20	26/34	.014″	.035″	.375″
1723	12	20	26/34	.014″	.035″	.380″
1726	15	20	26/34	.014″	.035″	.410″
1728	20	20	26/34	.014″	.035″	.455″

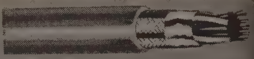
STANDARD SPOOL PUT-UP: 100 FT., 500 FT., 1000 FT.

COLOR CODE OF CONDUCTORS

1—Black
2—White
3—Red
4—Green
5—Yellow
6—Blue
7—Brown
8—Orange
9—Slate
10—Purple
11—White/Black
12—White/Red
13—White/Green
14—White/Yellow
15—White/Blue
16—White/Brown
17—White/Purple
18—White/Slate
19—Black/Red
20—Black/Yellow

MIL-W-16878D

TYPE B & C CABLES



DESCRIPTION:
Each conductor stranded tinned copper. Color coded, polyvinylchloride insulation, cabled, mylar wrap. Braided tinned copper shield 90% coverage, chrome gray polyvinylchloride jacket overall.
Temperature rating −55°C to +105°C.

MINIATURE SHIELDED CONTROL CABLE — 600 VOLT

TYPE B CONDUCTOR

ALPHA NO.	NO. OF COND.	CONDUCTOR SIZE	CONDUCTOR STRAND	NOM. WALL THICKNESS	NOM. JACKET	NOM. O.D.
3302	2	B-28	7/36	.010″	.012″	.125″
3303	3	B-28	7/36	.010″	.012″	.130″
3304	4	B-28	7/36	.010″	.012″	.140″
3306	6	B-28	7/36	.010″	.015″	.170″
3308	8	B-28	7/36	.010″	.015″	.175″
3310	10	B-28	7/36	.010″	.018″	.210″
3312	12	B-28	7/36	.010″	.018″	.215″
3315	15	B-28	7/36	.010″	.020″	.230″
3320	20	B-28	7/36	.010″	.022″	.260″

STANDARD SPOOL PUT-UP: 100 FT., 500 FT., 1000 FT.

18 GAUGE HEAVY DUTY SHIELDED CONTROL CABLE — 1000 VOLT

TYPE C CONDUCTOR

3405	5	C-18	19/30	.016″	.025″	.300″
3408	8	C-18	19/30	.016″	.030″	.350″
3410	10	C-18	19/30	.016″	.035″	.405″
3412	12	C-18	19/30	.016″	.035″	.430″
3415	15	C-18	19/30	.016″	.040″	.470″
3420	20	C-18	19/30	.016″	.045″	.530″
3430	30	C-18	19/30	.016″	.055″	.650″

16 GAUGE SHIELDED CONTROL CABLE — 1000 VOLT

ALPHA NO.	NO. OF COND.	CONDUCTOR SIZE	CONDUCTOR STRAND	NOM. WALL THICKNESS (INCHES)	NOM. JKT. THICKNESS (INCHES)	NOM. O.D. (INCHES)
3444	4	16	19/29	.016	.031	.326
3445	5	16	19/29	.016	.032	.346
3446	6	16	19/29	.016	.034	.369
3448	8	16	19/29	.016	.041	.424
3450	10	16	19/29	.016	.044	.470
3452	12	16	19/29	.016	.048	.511

STANDARD SPOOL PUT-UP: 100 FT., 500 FT., 1000 FT.

COLOR CODE OF CONDUCTORS (CONFORMS TO MIL-C-915)

1—Black
2—White
3—Red
4—Green
5—Orange
6—Blue
7—White/Black
8—Red/Black
9—Green/Black
10—Orange/Black
11—Blue/Black
12—Black/White
13—Red/White
14—Green/White
15—Blue/White
16—Black/Red
17—White/Red
18—Orange/Red
19—Blue/Red
20—Red/Green
21—Orange/Green
22—Black/White/Red
23—White/Black/Red
24—Red/Black/White
25—Green/Black/White
26—Orange/Black/White
27—Blue/Black/White
28—Black/Red/Green
29—White/Red/Green
30—Red/Black/Green

ALPHA WIRE CORPORATION

Unshielded Control Cable

UL
SO

HEAVY-DUTY MULTI-CONDUCTOR RUGGED NEOPRENE JACKET — 600 VOLTS

DESCRIPTION:
Each conductor stranded bare copper, color coded rubber insulation, cabled with fillers where necessary, wrap over conductors, heavy duty black neoprene jacket overall. 600 volt operating voltage.

APPLICATIONS:
Remote control of automatic electrical equipment and sub-stations, telemetering, voltage pressure and motor control, signal transmission. Flexible heavy duty neoprene jacketed cable, recommended for outside installation, cable resists oil, ozone, sunlight, moisture, abrasion and impact.

HEAVY-DUTY MULTI-CONDUCTOR

18 GAUGE # 41/34 BARE COPPER — 2/64″ INSULATION THICKNESS

ALPHA NO.	NO. OF COND.	NOM. JKT. THICKNESS	NOM. O.D.
4505	5	.078″	.485″
4506	6	.078″	.510″
4508	8	.078″	.560″
4509	9	.078″	.595″
4510	10	.078″	.620″
4514	14	.094″	.710″

16 GAUGE # 65/34 BARE COPPER — 2/64″ INSULATION THICKNESS

ALPHA NO.	NO. OF COND.	NOM. JKT. THICKNESS	NOM. O.D.
4605	5	.078″	.520″
4606	6	.078″	.540″
4607	7	.078″	.540″
4608	8	.078″	.580″
4610	10	.094″	.720″
4612	12	.094″	.745″
4614	14	.094″	.765″
4616	16	.094″	.810″
4619	19	.094″	.840″
4620	20	.094″	.890″
4622	22	.094″	.920″
4624	24	.109″	1.000″
4626	26	.109″	1.030″
4630	30	.109″	1.080″
4637	37	.109″	1.130″
4640	40	.109″	1.210″
4644	44	.109″	1.275″
4650	50	.125″	1.320″
4660	60	.125″	1.470″

14 GAUGE # 41/30 BARE COPPER — 3/64″ INSULATION THICKNESS

ALPHA NO.	NO. OF COND.	NOM. JKT. THICKNESS	NOM O.D.
4705	5	.095″	.675″
4706	6	.094″	.705″
4707	7	.094″	.710″
4708	8	.094″	.760″
4709	9	.094″	.810″
4710	10	.094″	.870″
4712	12	.094″	.900″

12 GAUGE # 65/30 BARE COPPER — 3/64″ INSULATION THICKNESS

ALPHA NO.	NO. OF COND.	NOM. JKT. THICKNESS	NOM O.D.
4805	5	.094″	.740″
4806	6	.094″	.790″
4807	7	.094″	.790″
4808	8	.094″	.820″
4809	9	.109″	.900″
4810	10	.109″	1.010″
4812	12	.109″	1.040″
4816	16	.109″	1.160″
4818	18	.109″	1.220″

10 GAUGE #104/30 BARE COPPER — 3/64″ INSULATION THICKNESS

ALPHA NO.	NO. OF COND.	NOM. JKT. THICKNESS	NOM O.D.
4825	5	.094″	.800″
4826	6	.094″	.850″
4828	8	.094″	.910″
4830	10	.109″	1.120″

STANDARD SPOOL PUT-UP: CUT TO SPECIFIC LENGTHS— ALL ORDERS NON-CANCELLABLE **COLOR CODE:** The color code of neoprene jacketed control cables conforms to I.P.C.E.A. standards either with full color code or surface printed with color name and number.

GENERAL PURPOSE MULTI-CONDUCTOR RUBBER INSULATED & RUBBER JACKET

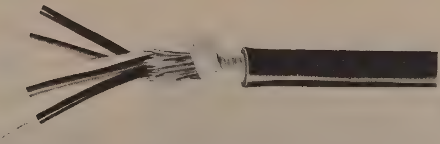
DESCRIPTION:
Each conductor stranded tinned copper, color coded rubber insulation, cabled with fillers, where necessary, wrap, tough black rubber jacket overall.

Nominal wall thickness .020″. Nominal jacket thickness .035″.

CHARACTERISTICS:
Suggested operating temperature −20°C to +60°C.

ALPHA NO.	NO. OF COND.	CONDUCTOR SIZE	STRAND	NOM. O.D.
1244	2	20	26/34	.240″
1245	3	20	26/34	.255″
1246	4	20	26/34	.275″
1247	5	20	26/34	.300″
1247/6	6	20	26/34	.315″
1247/7	7	20	26/34	.325″
1247/8	8	20	26/34	.360″
1247/10	10	20	26/34	.410″
1247/12	12	20	26/34	.435″
1247/15	15	20	26/34	.505″
1247/20	20	20	26/34	.570″

STANDARD SPOOL PUT-UP: 100 FT., 500 FT., 1000 FT.



COLOR CODE OF CONDUCTORS

1—Black
2—White
3—Red
4—Green
5—Yellow
6—Blue
7—Brown
8—Orange
9—Slate
10—Purple
11—White/Black (Braid)
12—White/Red (Braid)
13—White/Green (Braid)
14—White/Yellow (Braid)
15—White/Blue (Braid)
16—White/Brown (Braid)
17—White/Purple (Braid)
18—White/Slate (Braid)
19—Black/Red (Braid)
20—Black/Yellow (Braid)

QCC

Variations in construction, color, put-up, gauge, etc of products on this page are available through Alpha's QCC service

ALPHA WIRE CORPORATION

Teflon Cables Shielded

Fire Resistant for Alarm Systems

Braid over Shield

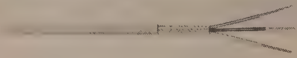
UL 1212, 1213 CONDUCTORS / MIL-W-16878 D / TYPE E

DESCRIPTION:

Each conductor stranded silver plated copper, Type E extruded TFE .010″ insulation, color coded, cabled, braided silver plated copper shield, 90% coverage, braided white fused Teflon impregnated, fiberglass braid overall.

CHARACTERISTICS:

Temperature rating −65°C to +200°C. Voltage rating 600 volts. Resistant to acids, alkalis, oil, flame, moisture, solvents and fungus. Passes FR-1 vertical flame test.



Alpha No.	No. of Cond.	W/TFE Braid
24 GAUGE - 19/36 STRAND		
2811	1	.083
2811/2	2	.126
2811/3	3	.134
2811/4	4	.146
2811/5	5	.159
2811/6	6	.172
2811/7	7	.172
2811/8	8	.186
2811/9	9	.200
2811/10	10	.217
2811/12	12	.224
2811/15	15	.254
22 GAUGE - 19/34 STRAND		
2814	1	.089
2814/2	2	.138
2814/3	3	.146
2814/4	4	.160
2814/5	5	.175
2814/6	6	.190
2814/7	7	.190
2814/8	8	.206
2814/9	9	.222
2814/10	10	.241
2814/12	12	.254
2814/15	15	.282
20 GAUGE - 19/32 STRAND		
2817	1	.097
2817/2	2	.156
2817/3	3	.165
2817/4	4	.182
2817/5	5	.196
2817/6	6	.214
2817/7	7	.214
2817/8	8	.232
2817/9	9	.256
2817/10	10	.278
18 GAUGE - 19/30 STRAND		
2819	1	.107
2819/2	2	.176
2819/3	3	.186
2819/4	4	.206
2819/5	5	.226
2819/6	6	.252
2819/7	7	.252
2819/8	8	.274
2819/9	9	.295
2819/10	10	.322
16 GAUGE - 19/29 STRAND		
2820	1	.117
2820/2	2	.198
2820/3	3	.203
2820/4	4	.223
2820/5	5	.250
2820/6	6	.274
2820/7	7	.274
2820/8	8	.297
14 GAUGE - 19/27 STRAND		
2804	1	.131
2804/2	2	.225
2804/3	3	.244
2804/4	4	.269
2804/5	5	.296
2804/6	6	.324
12 GAUGE - 19/25 STRAND		
2803	1	.150
2803/2	2	.268
2803/3	3	.285
2803/4	4	.314

TFE Tape Jacket over Shield

UL 1212, 1213 CONDUCTORS / MIL-W-16878 D / TYPE E

DESCRIPTION:

Each conductor stranded silver plated copper, Type E extruded TFE .010″ insulation, color coded, cabled, braided silver plated copper shield, 90% coverage, sintered wrapped white Teflon tape jacketed overall.

CHARACTERISTICS:

Temperature rating −65°C to +2000°C. Voltage rating 600 volts. Resistant to acids, alkalis, oil, flame, moisture, solvents and fungus. Passes FR-1 vertical flame test.

Alpha No.	No. of Cond.	W/TFE Tape Wrap
24 GAUGE - 19/36 STRAND		
2821	1	.095
2821/2	2	.138
2821/3	3	.146
2821/4	4	.158
2821/5	5	.171
2821/6	6	.184
2821/7	7	.184
2821/8	8	.198
2821/9	9	.212
2821/10	10	.229
2821/12	12	.236
2821/15	15	.266
22 GAUGE - 19/34 STRAND		
2824	1	.101
2824/2	2	.150
2824/3	3	.158
2824/4	4	.172
2824/5	5	.187
2824/6	6	.202
2824/7	7	.202
2824/8	8	.218
2824/9	9	.234
2824/10	10	.253
2824/12	12	.266
2824/15	15	.294
20 GAUGE - 19/32 STRAND		
2827	1	.109
2827/2	2	.168
2827/3	3	.177
2827/4	4	.194
2827/5	5	.208
2827/6	6	.226
2827/7	7	.226
2827/8	8	.246
2827/9	9	.268
2827/10	10	.290
18 GAUGE - 19/30 STRAND		
2829	1	.119
2829/2	2	.188
2829/3	3	.198
2829/4	4	.218
2829/5	5	.238
2829/6	6	.264
2829/7	7	.264
2829/8	8	.286
2829/9	9	.307
2829/10	10	.334
16 GAUGE - 19/29 STRAND		
2826	1	.129
2826/2	2	.210
2826/3	3	.215
2826/4	4	.235
2826/5	5	.262
2826/6	6	.286
2826/7	7	.286
2826/8	8	.309
14 GAUGE - 19/27 STRAND		
2825	1	.143
2825/2	2	.237
2825/3	3	.256
2825/4	4	.281
2825/5	5	.308
2825/6	6	.336
12 GAUGE - 19/25 STRAND		
2823	1	.162
2823/2	2	.280
2823/3	3	.297
2823/4	4	.326

No Outer Jacket

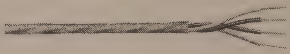
UL 1212, 1213 CONDUCTORS / MIL-W-16878 D / TYPE E

DESCRIPTION:

Each conductor stranded silver plated copper, Type E extruded TFE .010″ insulation, braided silver plated copper shield over conductor(s), 90% coverage.

CHARACTERISTICS:

Temperature rating −65°C to +200°C. Voltage rating 600 volts. Resistant to acids, alkalis, oil, flame, moisture, solvents and fungus. Passes FR-1 vertical flame test.



Alpha No.	No. of Cond.	Nom. O.D.
24 GAUGE - 19/36 STRAND		
2809	1	.069
2809/2	2	.112
2809/3	3	.120
2809/4	4	.132
2809/5	5	.145
2809/6	6	.158
2809/7	7	.158
2809/8	8	.172
2809/9	9	.186
2809/10	10	.203
2809/12	12	.210
2809/15	15	.240
22 GAUGE - 19/34 STRAND		
2812	1	.075
2812/2	2	.124
2812/3	3	.132
2812/4	4	.146
2812/5	5	.161
2812/6	6	.176
2812/7	7	.176
2812/8	8	.192
2812/9	9	.208
2812/10	10	.227
2812/12	12	.240
2812/15	15	.268
20 GAUGE - 19/32 STRAND		
2815	1	.083
2815/2	2	.142
2815/3	3	.151
2815/4	4	.168
2815/5	5	.182
2815/6	6	.200
2815/7	7	.200
2815/8	8	.218
2815/9	9	.242
2815/10	10	.264
18 GAUGE - 19/30 STRAND		
2818	1	.093
2818/2	2	.162
2818/3	3	.172
2818/4	4	.192
2818/5	5	.212
2818/6	6	.238
2818/7	7	.238
2818/8	8	.260
2818/9	9	.281
2818/10	10	.308
16 GAUGE - 19/29 STRAND		
2807	1	.103
2807/2	2	.184
2807/3	3	.189
2807/4	4	.209
2807/5	5	.236
2807/6	6	.259
2807/7	7	.259
2807/8	8	.283
14 GAUGE - 19/27 STRAND		
2806	1	.117
2806/2	2	.211
2806/3	3	.230
2806/4	4	.255
2806/5	5	.282
2806/6	6	.310
12 GAUGE - 19/25 STRAND		
2805	1	.136
2805/2	2	.254
2805/3	3	.271
2805/4	4	.300

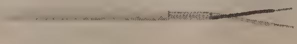
FEP Extruded Jacket over Shield

DESCRIPTION:

Each conductor stranded silver plated copper, Type E extruded TFE insulation color coded, cabled, braided silver plated copper shield 90% coverage, extruded FEP white Teflon jacket overall.

CHARACTERISTICS:

Temperature rating −65°C to +200°C. Voltage rating 600 volts. Resistant to acids, alkalis, oil, flame, moisture, solvents and fungus. Extruded FEP Teflon jacket is tough and abrasion resistant. Passes FR-1 vertical flame test.



Alpha No.	No. of Cond.	Conductor Size	Conductor Strand	Nom. Wall Thick.	Nom. Jkt. Thick.	Nom. O.D.	Nom. Cap. in MMF Shield to Cond.	Nom. Cap. in MMF Cond. to Cond.
2831	1	24	19/36	.010″	.010″	.085″	45	—
2831/2	2	24	19/36	.010″	.010″	.130″	35	25
2831/3	3	24	19/36	.010″	.010″	.135″	35	20
2834	1	22	19/34	.010″	.010″	.091″	55	—
2834/2	2	22	19/34	.010″	.010″	.150″	45	25
2834/3	3	22	19/34	.010″	.010″	.158″	35	25
2837	1	20	19/32	.010″	.010″	.100″	55	—
2837/2	2	20	19/32	.010″	.010″	.168″	95	25
2837/3	3	20	19/32	.010″	.010″	.178″	85	25

STANDARD SPOOL PUT-UP: 100 FT., 1000 FT. — CABLES CONTAINING 5 OR MORE CONDUCTORS ARE ALSO AVAILABLE BY THE FOOT; MIN. ORDER 25 FT.

COLOR CODE OF CONDUCTORS

1—White
2—Black
3—Red
4—Green
5—Yellow
6—Blue
7—Brown
8—Orange
9—Slate
10—Violet
11—White/Black
12—White/Brown
13—White/Red
14—White/Orange
15—White/Yellow

OTHER TYPES, SIZES, CONSTRUCTIONS AVAILABLE THROUGH ALPHA QCC*

*Quick Custom Cable

ALPHA WIRE CORPORATION

15/5 PVC Nylon Control Cable 600 Volts 90° C

UL

PT-N

MEETS UL, ASTM, IPCEA S-61-402

DESCRIPTION:
Bare stranded copper conductor, .015 PVC insulation, .005 nylon jacket over each conductor, moisture resistant tape, black PVC jacket overall. Conductors color coded per IPCEA.

APPLICATION:
Widely used for all types of control and signal circuits. Moisture resistant, suitable for underground burial.

AWG NUMBER 16 (26 x 30)

ALPHA No.	No. of Cond.	Jacket Thick. (In.)	Approx. O.D. (In.)
7500	2 (Flat)	.045	.200 x .295
7501	2	.045	.310
7502	3	.045	.310
7503	4	.045	.335
7504	5	.045	.360
7505	6	.045	.395
7506	8	.045	.420
7507	8	.045	.420
7508	9	.045	.455
7509	10	.045	.490
7511	12	.045	.505
7513	14	.060	.560
7514	15	.060	.590
7515	16	.060	.590
7517	18	.060	.620
7518	19	.060	.620
7519	20	.060	.650
7520	21	.060	.650
7521	22	.060	.680
7522	23	.060	.680
7523	24	.060	.720

20/10 PE Nylon Unshielded Station Control Cable

HEAVY-DUTY MULTI-CONDUCTOR PLASTIC JACKET—600 VOLTS

DESCRIPTION:
Each conductor stranded bare copper, .020 polyethylene insulation,* .010″ polyvinylchloride jacket over each conductor, color coded, cabled with filters where necessary, moisture resistant tape, black polyvinylchloride jacket overall. 600 volt operating voltage.

APPLICATIONS:
Remote control of automatic electrical equipment, recording and relaying devices, telemetering, switchgear operations and indicators, substation operation, temperature voltage, pressure and motor control, dimensional tolerance on automatic quality control.

16 GAUGE — 26 ′30 BARE COPPER

ALPHA NO.	NO. OF COND.	NOM. JKT. THICKNESS	NOM. O.D.
4102	2	.045″	.320″
4103	3	.045″	.340″
4105	5	.045″	.400″
4106	6	.045″	.435″
4107	7	.045″	.435″
4108	8	.045″	.480″
4110	10	.060″	.580″
4112	12	.060″	.590″
4114	14	.060″	.605″
4116	16	.060″	.665″
4119	19	.060″	.690″
4121	21	.060″	.735″
4122	22	.060″	.760″
4124	24	.060″	.805″
4126	26	.060″	.805″
4130	30	.080″	.900″
4137	37	.080″	.965″
4140	40	.080″	1.010″
4150	50	.080″	1.100″
4160	60	.080″	1.200″
14 GAUGE —19/27 BARE COPPER			
4202	2 Rd.	.045″	.380″
4203	3 Rd.	.045″	.390″
4204	4	.045″	.425″
4205	5	.045″	.465″
4206	6	.045″	.520″
4207	7	.045″	.520″
4208	8	.060″	.580″
4209	9	.060″	.635″
4210	10	.060″	.690″
4212	12	.060″	.705″
4214	14	.060″	.750″
4216	16	.060″	.785″
4219	19	.060″	.835″
4224	25	.080″	1.010″
4227	27	.080″	1.200″
4230	30	.080″	1.070″
4234	34	.080″	1.140″
4237	37	.080″	1.160″
4240	40	.080″	1.175″
12 GAUGE —19/25 BARE COPPER			
4302	2 Twin	.045″	.415″
4303	3 Rd.	.045″	.445″
4304	4	.045″	.485″
4305	5	.045″	.530″
4306	6	.045″	.610″
4307	7	.060″	.610″
4308	8	.060″	.660″
4309	9	.060″	.700″
4310	10	.060″	.770″
4312	12	.060″	.790″
4314	14	.060″	.830″
4315	15	.080″	.915″
4316	16	.080″	.915″
4318	18	.080″	.970″
4319	19	.080″	.970″
4320	20	.080″	1.020″
4322	22	.080″	1.050″
4325	25	.080″	1.130″
4327	27	.080″	1.050″
4330	30	.080″	1.200″
4334	34	.080″	1.270″
4337	37	.080″	1.285″

STANDARD SPOOL PUT-UP: CUT TO SPECIFIC LENGTHS — MIN. 25 FT. ALL ORDERS

* 16 gauge — .015″ Polyethylene Insulation
14 & 12 gauge — .020″ Polyethylene Insulation

NON-CANCELLABLE

COLOR CODE: The color code of Plastic - jacketed control cables conforms to I.P.C.E.A standards either with full color code or surface printed with color name and number.

All items this page available cut to customer's length requirement. Minimum order 25 ft. per item. All orders non-cancellable.

ALPHA WIRE CORPORATION

Irradiated Conductor Cable 600 Volts 105°C

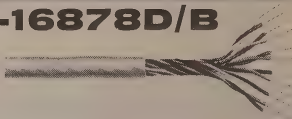
IRRADIATED INNER CONDUCTORS WILL NOT MELT OR CHAR AT SOLDER IRON HEAT RESISTS ABRASION. Passes FR-1 vertical flame test.

DESCRIPTION: Stranded tinned copper conductors, color-coded, irradiated PVC (RX-7000) insulation, (braided, tinned copper shield,) white PVC jacket overall.

A miniature shielded cable with both military specifications and UL listings. Ideal for application on crowded circuit boards where terminals must be soldered. Prevents shrink-back, melting or charring when used in production line soldering. RX-7000 insulation is far tougher and more abrasion-resistant than ordinary non-irradiated PVC.

MIL-W-16878D/B

UL
1429



Nom. Jacket Thickness — .025" Nom. Insulation Thickness — .010"

UNSHIELDED

ALPHA NO.	NO. OF COND.	CONDUCTOR SIZE	CONDUCTOR STRAND	NOM. O.D. (INCHES)
6621	1	24	7/32	.090
6622	2	24	7/32	.129
6623	3	24	7/32	.139
6624	4	24	7/32	.150
6631	1	22	7/30	.098
6632	2	22	7/30	.149
6633	3	22	7/30	.155
6634	4	22	7/30	.168
6641	1	20	7/28	.105
6642	2	20	7/28	.163
6643	3	20	7/28	.178
6644	4	20	7/28	.187
6651	1	18	7/26	.115
6652	2	18	7/26	.182
6653	3	18	7/26	.193
6654	4	18	7/26	.212

SHIELDED

ALPHA NO.	NO. OF COND.	CONDUCTOR SIZE	CONDUCTOR STRAND	NOM. O.D. (INCHES)
7621	1	24	7/32	.115
7622	2	24	7/32	.158
7623	3	24	7/32	.164
7624	4	24	7/32	.176
7631	1	22	7/30	.122
7632	2	22	7/30	.172
7633	3	22	7/30	.180
7634	4	22	7/30	.193
7661	1	20	7/28	.130
7662	2	20	7/28	.188
7663	3	20	7/28	.197
7664	4	20	7/28	.212
7671	1	18	7/26	.140
7672	2	18	7/26	.208
7673	3	18	7/26	.218
7674	4	18	7/26	.237

Color Code of Conductors:
1. White 2. Black 3. Red 4. Green

STANDARD SPOOL PUT-UP:
100 FT., 500 FT., 1000 FT.

QCC

Variations in construction, color, put-up, gauge, etc of products on this page are available through Alpha's QCC service

Shielded - Nylon PVC Conductors

Passes FR-1 vertical flame test.

DESCRIPTION:
Each conductor stranded tinned copper, .010" polyvinylchloride insulation, color coded, clear nylon (polyamide) jacket, conductors cabled, braided tinned copper shield 90% coverage, white polyvinylchloride jacket overall.

CHARACTERISTICS:
Temperature rating −55°C to +105°C. Voltage rating 600 volts, resistant to acids, alkalis, oil, flame, moisture, fungus, solvents Nom. wall thickness, .010". Nom. nylon thickness, .003".

MIL-W-16878D/B

ALPHA NO.	NO. OF COND.	CONDUCTOR SIZE	CONDUCTOR STRAND	NOM. OVERALL JACKET (In.)	NOM. O.D. (In.)
3200	1	26	7/34	.010	.087
3201	2	26	7/34	.014	.138
3202	3	26	7/34	.014	.142
3203	4	26	7/34	.016	.162
3210	1	24	19/36	.010	.092
3211	2	24	19/36	.016	.152
3212	3	24	19/36	.016	.161
3213	4	24	19/36	.017	.172
3220	1	22	19/34	.010	.100
3221	2	22	19/34	.016	.168
3222	3	22	19/34	.017	.178
3223	4	22	19/34	.019	.194
3230	1	20	19/32	.010	.106
3231	2	20	19/32	.019	.186
3232	3	20	19/32	.019	.196
3233	4	20	19/32	.021	.218
3240	1	18	19/30	.012	.120
3241	2	18	19/30	.021	.210
3242	3	18	19/30	.022	.227
3243	4	18	19/30	.023	.250
3245	1	16	19/29	.016	.137
3246	2	16	19/29	.023	.236
3247	3	16	19/29	.023	.240
3248	4	16	19/29	.025	.274

STANDARD SPOOL PUT-UP: 100 FT., 500 FT., 1000 FT.
Color Code: 1. White 2. Black 3. Red 4. Green

22 GAUGE, 5-12 CONDUCTOR CABLE.

ALPHA NO.	NO. OF COND.	CONDUCTOR SIZE	CONDUCTOR STRAND	NOM. OVERALL JACKET (In.)	NOM. O.D. (In.)
3335	5	22	19/34	.020	.212
3336	6	22	19/34	.020	.235
3337	8	22	19/34	.025	.257
3340	10	22	19/34	.025	.284
3342	12	22	19/34	.030	.310

STANDARD IPCEA COLOR CODE

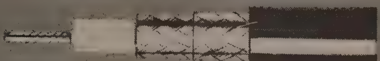
Color Blend

All cables available in standard white jackets or may be colored grey, black, brown, metallic blue, bronze, tan, orange, red, yellow, blue or green.

ALPHA WIRE CORPORATION

Coaxial Cables

POLYETHYLENE DIELECTRIC



ALL TYPES LISTED CONFORM TO LATEST REVISION MIL-C-17: C-Bare Copper, TC-Tinned Copper, SC-Silver Covered Copper, CW-Copper Covered Steel, PE-Solid Polyethylene, SSP-Semi Solid Polyethylene, BP-Black Polyethylene—Type IIIA, NP-Natural Polyethylene—Type III, V-Polyvinylchloride—Type I, NCV-Non-Contaminating Polyvinylchloride—Type IIA.

ALPHA No.	RG Cable Type	Inner Conductor			Dielectric		Shields			Jacket		Armor (.0126 Alum. Wire)	Opr. Volts RMS	Lbs. Per M/Ft.	Nom. Imped. Ohms	Nom. Cap. MMF/Ft.
		Mat.	Strand	Nom. O.D.	Mat.	O.D.	Inner	Outer	O.D.	Mat.	O.D.					
9006A	6A/U	CW	1	.0285	PE	.189	SC	C	.264	NCV	.336		2700	74	75	20
9008	8/U	C	7/.0285	.086	PE	.295	C	—	.340	V	.415		5000	105	52	29.5
9008A	8A/U	C	7/.0285	.086	PE	.295	C	—	.340	NCV	.415		5000	99	52	29.5
9009B	9B/U	SC	7/.0285	.086	PE	.285	SC	SC	.355	NCV	.430		5000	126	50	30
9011	11/U	TC	7/.0159	.048	PE	.295	C	—	.340	V	.415		5000	94	75	20.5
9011A	11A/U	TC	7/.0159	.048	PE	.292	C	—	.340	NCV	.412		5000	89	75	20.5
9012A	12A/U	TC	7/.0159	.048	PE	.292	C	—	.340	NCV	.412	.475	5000	113	75	20.5
9014A	14A/U	C	1	.102	PE	.383	C	C	.463	NCV	.558		7000	201	52	29.5
9017A	17A/U	C	1	.188	PE	.695	C	—	.760	NCV	.885		11000	462	52	29.5
9019A	19A/U	C	1	.250	PE	.925	C	—	.990	NCV	1.135		14000	720	52	29.5
9022B	22B/U	C	Two 7/.0152	.047	PE	.291	TC	TC	.355	NCV	.430		1000	124	95	16
9055	55/U	C	1	.032	PE	.121	TC	TC	.176	NP	.206		1900	31	53.5	28.5
9055B	55B/U	SC	1	.032	PE	.121	TC	TC	.176	BP	.206		1900	32	53.5	28.5
9058	58/U	C	1	.032	PE	.121	TC	—	.150	V	.200		1900	24	53.5	28.5
9058A	58A/U	TC	19/.0071	.0375	PE	.120	TC	—	.150	V	.199		1900	25	50	29.5
9058C	58C/U	TC	19/.0071	.0375	PE	.120	TC	—	.150	NCV	.199		1900	25	50	29.5
9059	59/U	CW	1	.0253	PE	.150	C	—	.191	V	.250		2300	36	73	21
9059B	59B/U	CW	1	.023	PE	.150	C	—	.191	NCV	.246		2300	36	75	20.5
9062	62/U	CW	1	.025	SSP	.151	C	—	.191	V	.250		750	34	93	13.5
9062A	62A/U	CW	1	.025	SSP	.151	C	—	.191	NCV	.249		750	34	93	13.5
9063B	63B/U	CW	1	.0253	SSP	.295	C	—	.340	NCV	.415		1000	78	125	10
9071B	71B/U	CW	1	.025	SSP	.151	C	TC	.208	BP	.250		750	42	93	13.5
9174	174/U	CW	7/.0063	.019	PE	.060	TC	—	.088	V	.105		1500	7	50	30
9212	212/U	SC	1	.056	PE	.189	SC	SC	.265	NCV	.336		3000	85	50	29.5
9213	213/U	C	7/.0296	.090	PE	.292	C	—	.340	NCV	.412		5000	100	50	30.5
9214	214/U	SC	7/.0296	.090	PE	.292	SC	SC	.360	NCV	.432		5000	129	50	30.5
9215	215/U	C	7/.0296	.090	PE	.292	C	—	.340	NCV	.412	.475	5000	122	50	30.5
9217	217/U	C	1	.106	PE	.380	C	C	.463	NCV	.555		7000	202	50	30
9218	218/U	C	1	.195	PE	.690	C	—	.760	NCV	.880		11000	457	50	30
9219	219/U	C	1	.195	PE	.690	C	—	.760	NCV	.880	.945	11000	507	50	30
9223	223/U	SC	1	.036	PE	.120	SC	SC	.176	NCV	.216		1900	36	50	30

All dimensions are maximum except where indicated.

TEFLON DIELECTRIC

CONDUCTORS SILVER PLATED COPPERWELD

CHARACTERISTICS: Operating temperature 200°C.

ALPHA No.	RG Type	Cond.	Nom. Wall Thick.	Nom. Jkt. Thick.	Jacket Type	Max. O.D.	Cap. Nom.	Imped. Ohms	Max. Oper. Voltage
9178B	178B/U	7/.004	.012	.010	Extruded FEP	.075	27.9	50±2	1000
9179B	179B/U	7/.004	.021	.010	Extruded FEP	.105	20.4	75±3	1200
9180B	180B/U	7/.004	.045	.010	Extruded FEP	.145	15.3	93±2	850
9187A	187A/U	7/.004	.024	.012	Fused TFE Tape	.110	19.5	75±3	1200
9188A	188A/U	7/.0067	.020	.012	Fused TFE Tape	.110	27.5	50±2	1200
9195A	195A/U	7/.004	.045	.014	Fused TFE Tape	.155	14.5	95±3	1500
9196A	196A/U	7/.004	.011	.012	Fused TFE Tape	.080	28.5	50±2	1000

CATV, MATV, CCTV Coaxial Cable

6/U, 8/U, 11/U, 59U TYPES.

These cables are designed specifically for commercial and CATV, MATV and CCTV applications.

ALPHA NO.	TYPE	SIZE		DIELECTRIC* MATERIAL	SHIELD°	JACKET MATERIAL	NOM. O.D.	NOM. IMPEDANCE (ohms)	CH. 2	CH. 5	CH. 13	CH. 14	CH. 33	STOCK COLORS
9843	6/U	18 solid	BC	Foam PE	Foil	PVC	.242	75	1.5	1.9	3.1	5.0	7.0	Blk., Wht., Gray
9846	8/U	13 (7X21)	BC	Foam PE	BBC	PVC	.407	50	1.2	1.7	2.5	3.9	5.5	Black Only
9847	11/U	14 solid	BC	Foam PE	BBC	PE	.405	75	1.0	1.3	2.1	3.6	4.8	Black Only
9848	58/U	20 solid	BC	Foam PE	BTC	PVC	.195	50	4.2	4.7	7.0	10.4	15.3	Black Only
9830	59/U	22 solid	BCW	Solid PE	BBC	PVC	.242	75	2.0	2.7	4.5	6.8	10.0	Black Only
9840	59/U	22 solid	BCW	Foam PE	BBC	PVC	.242	75	2.2	2.8	4.5	6.0	9.8	Black Only
9844	59/U	22 solid	BCW	Foam PE	Foil	PVC	.218	80	1.9	2.6	3.8	6.5	9.1	Blk., Wht., Gray

*BBC — Braided Bare Copper
BTC — Braided Tinned Copper
Foil — Aluminum/Polyester Tape with 4-28 AWC Tinned Copper-weld drain wires
BCW — Bare Copper Weld
BC — Bare Copper
Foam PE — Unicellular Foamed Polyethylene

STANDARD PUT-UP: 1000 FT.

Computer Cables

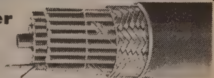
Passes FR-1 vertical flame test.

Computer Cable

UL STYLE 2343
DESCRIPTION:
Each conductor stranded tinner copper. Color coded 80°C PVC insulation. Cabled with PVC fillers, .001″ clear mylar wrap. Braided tinned copper shield (85% coverage). Gray PVC jacket.
APPLICATION:
Interconnection of computer modules.

Alpha No.	No. of Cond.	Cond. Gauge	Strand	Wall Thick. (In.)	Jacket Thick. (In.)	Nom. O.D. (In.)
2458	6	18	16/30	.016	.062	.394

Computer Coaxial Cable



UL STYLE 2386 — DESIGNED FOR INTERCONNECTION OF DATA SYSTEM COMPONENTS

Individual mini. coax cables, grouped together under common overall shield (where indicated) and jacket.

Individual miniature coax cables consist of #26 AWG solid silver-plated copper conductor, air-spaced, flame-retardant polyethylene dielectric (.025″ polyethylene thread helically wound around conductor; overall .018″ polyethylene tube) spiral-wrapped 29 AWG tinned copper drain wire, braided tinned copper shield, overall .016″ PVC jacket. Nom. diam. .155″.

The completed cable is constructed of the miniature coaxial cables (described above) cabled with PVC fillers, clear mylar wrap, overall gray PVC jacket.

Shielded cables employ braided tinned copper shields with spirally-wrapped #26 AWG solid copper alloy drain wires.

APPLICATION:
These cables are specifically designed for the most widely used computer systems. Used for interconnection of modules and data transmission.

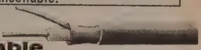
CHARACTERISTICS OF COAXIAL CONDUCTORS
Nom. Imped., 95 ohms; Attenuation at 400 MC Max., 10.2 db/100 ft.; Velocity Propogation, 83%; Voltage 750 volts max.; Jacket Thick., .085″.

Alpha No.	No. of Indiv. Coaxial Cables	Nominal O.D. (In.)
UNSHIELDED		
2453	20	.978
2454	24	1.075
SHIELDED		
2456*	24	1.110

*Jacket Thickness, .080″

Above items available cut to customer's length requirement. Minimum order 25 ft. per item. All orders non-cancellable.

Micro-Miniature Coaxial Cable



50, 75, 100 OHM IMPEDANCES FOR COMPUTER, INSTRUMENTATION AND ULTRA-COMPACT WIRING
DESCRIPTION:
Center conductor, solid silver-plated copper with 40 micro-inch minimum plating. Cellular polypropylene or FEP *Teflon dielectric. Aluminized Mylar shield, 30 AWG, solid silver-plated copper drain wire — parallel to center conductor. Flame-retardant Vylex (laminated Mylar*) blue-colored jacket overall. Dielectric mat'l. cellular polypropylene #9450, FEP.
CHARACTERISTICS:
Extremely small and flexible with high cut-through resistance. Provides uniform characteristic impedance, low losses and low propogation delays. Cross-talk kept to minimum.
APPLICATION:
Computer wiring, high density packaging, point-to-point wiring, micro miniature systems.

Alpha No.	Impedance (Ohm)	Conductor AWG	Nom. Cable O.D. (In.)
9500	100	32	.080
9475	75	30	.065
9450	50	32	.040

Standard Put-up — 100 Ft.

*T.M. DuPont

Neoprene Welding Cable

DESCRIPTION:
Stranded bare copper conductor, tape wrap, black neoprene rubber insulation.

CHARACTERISTICS:
Lightweight, flexible cables with high resistance to abrasion, impact, flexing, and twisting.

RECOMMENDED CABLE SIZES:
The sizes of cable recommended by the Machine Group of the NEMA Electric Welding Section for standard hand welding equipment based on lengths up to 90 ft. that is, 45 ft. of welding cable and 45 ft. of return cable, are as follows:

100 — Ampere Welder — 4 AWG
150 — Ampere Welder — 3 AWG
200 — Ampere Welder — 2 AWG
300 — Ampere Welder — 1/0 AWG
400 — Ampere Welder — 2/0 AWG
500 — Ampere Welder — 2/0 AWG
600 — Ampere Welder — 3/0 AWG

ALPHA NO.	CONDUCTOR SIZE	CONDUCTOR STRAND	NOM. OVERALL DIAMETER (Inches)
6112	6	266/30	0.38″
6113	4	420/30	0.43″
6114	3	532/30	0.43″
6115	2	665/30	0.51″
6116	1	833/30	0.54″
6117	1/0	1057/30	0.61″
6118	2/0	1317/30	0.67″
6119	3/0	1622/30	0.74″
6120	4/0	2109/30	0.86″

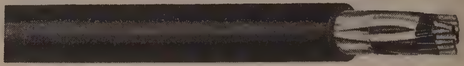
ALPHA NO.	IPCEA CABLE RATING CURRENT(1) CARRYING CAPACITY (Amperes)	IPCEA CABLE RATING VOLTAGE DROP PER 100 FT. AT 60° C (Volts)	APPROX. NET WT. LB. PER M/FT.
6112	75	3.58	134
6113	100	3.18	187
6114	150	3.70	233
6115	200	3.92	299
6116	250	3.88	365
6117	300	3.72	457
6118	375	3.68	555
6119	450	3.51	698
6120	550	3.41	871

All items this page available cut to customer's length requirement. Minimum order 25 ft. per item.
All orders non-cancellable.

Telemetering & Supervisory Shielded Control Cable

DESCRIPTION:
Each conductor bare solid copper, high molecular weight polyethylene insulation, color coded, twisted into pairs, cabled with a non-hygroscopic binder tape .008″ aluminum shield, black polyethylene jacket overall. Operating voltage 300 volts.
Double jacketed types, (3903-4060 below) same except for additional inner black polyethylene jacket over binder, and .005″ copper shield.

APPLICATIONS:
Remote control of rocket recording data and test-firing control, transmission of signals which telemeter temperature, voltage pressure, etc. control of multiple circuits, measuring devices, quality control equipment, radar antenna. For aerial, duct and conduit installations.
Double jacketed types have higher dielectric strength and suited for direct burial installations.



22 AWG SOLID NOM. INSUL. THICKNESS .015″

ALPHA NO.	NO. OF PAIRS	NOM. JKT. THICKNESS	NOM. O.D.	APPROX. LBS./M′
3706	6	.060″	.51″	108
3712	12	.060″	.62″	171
3718	18	.060″	.71″	210
3725	25	.060″	.79″	266
3750	50	.070″	1.05″	510

19 AWG SOLID NOM. INSUL. THICKNESS .015″

ALPHA NO.	NO. OF PAIRS	NOM. JKT. THICKNESS	NOM. O.D.	APPROX. LBS./M′
3806	6	.060″	.56″	140
3812	12	.060″	.70″	232
3818	18	.060″	.80″	301
3825	25	.060″	.91″	426
3850	50	.070″	1.20″	767

16 AWG SOLID NOM. INSUL. THICKNESS .020″

ALPHA NO.	NO. OF PAIRS	NOM. JKT. THICKNESS	NOM. O.D.	APPROX. LBS./M′
3863	3	.060″	.56″	160
3864	6	.060″	.69″	240
3865	12	.060″	.88″	400
3866	18	.070″	1.04″	560
3867	25	.070″	1.18″	720
3868	50	.080″	1.62″	1350

DOUBLE JACKET — HEAVY DUTY
22 AWG SOLID NOM. INSUL. THICKNESS .015″

ALPHA NO.	NO. OF PAIRS	NOM. JKT. THICKNESS INNER	NOM. JKT. THICKNESS OUTER	NOM. O.D.	APPROX. LBS./M′
3906	6	.047″	.060″	.56″	149
3912	12	.047″	.060″	.67″	226
3918	18	.047″	.060″	.76″	281
3925	25	.047″	.060″	.84″	374
3950	50	.047″	.070″	1.10″	645

19 AWG SOLID NOM. INSUL. THICKNESS .015″

ALPHA NO.	NO. OF PAIRS	NOM. JKT. THICKNESS INNER	NOM. JKT. THICKNESS OUTER	NOM. O.D.	APPROX. LBS./M′
4006	6	.047″	.060″	.61″	200
4012	12	.047″	.060″	.75″	297
4018	18	.047″	.060″	.85″	415
4025	25	.047″	.080″	.96″	558
4050	50	.047″	.070″	1.25″	929

COLOR CODE: Fully color coded in accordance with REA standards.

ALPHA WIRE CORPORATION

Tinned Copper Braid

TO MIL SPEC QQ-B-575A, ASTM-B-33

FLAT

DESCRIPTION: A woven tinned copper braid which is manufactured completely round as outlined in Mil Spec QQ-B-575. Each strand of the braid is soft drawn tinned copper wire. The braid is self-supporting and maintains its round configuration. The percentage of shielding coverage is 95% or more when placed over a mandrel of an equivalent diameter to the inside braid diameter.

APPLICATIONS: Maximum shielding against electrostatic interference for wires, cables and other components. Also as a protective covering against mechanical abrasion and stresses.

TUBULAR

DESCRIPTION: A woven braid, composed of tinned copper strands, which is rolled flat at time of manufacture to a specific width depending upon construction.

APPLICATIONS: Flat braid is usually employed for its current carrying capacity and its extreme flexibility. It is generally used as a high current conductor at low voltages. Battery grounding is typical of this application. It is also used as a bonding strap in vehicles and aircraft to help eliminate ignition interference. Because of its extreme flexibility it can be used in confined areas or as electrical connections on moving parts.

FLAT BRAID

APPLICATIONS: A woven braid, composed of tinned copper strands, which is rolled flat at time of manufacture to a specific width depending upon construction.

ALPHA No.	Nom. I.D. When Rounded	Braid Construction AWG of Indiv. Ends	Carriers	Total No. of Indiv. Ends	Approx. AWG Equiv.	Nom. Circular Mills	*Current Carrying Capacity (Amps)	Put-up Code
1221	.025	36	8	8	27	200	4.0	1, 2, 3
1222	1/32"	36	16	16	24	400	6.0	1, 2, 3
1223	3/64"	36	24	24	22	600	7.0	1, 2, 3
1224	3/32"	36	16	48	19	1200	11.0	1, 2, 3
1229	1/8"	36	24	72	18	1800	16.0	1, 2, 3
1230	3/16"	36	24	120	15	3000	25.0	1, 2, 3
1231	1/4"	36	24	168	14	4200	32.0	1, 2, 3
1232	3/8"	36	48	288	12	7200	46.0	1, 2, 3
1233/2	1/2"	36	48	384	10	9600	53.0	1, 2, 3
1233	5/8"	36	48	384	10	9600	53.0	1, 2, 3
1234	3/4"	36	48	832	7	20800	85.0	1, 2, 3
1235	1"	36	48	832	7	20800	85.0	1, 2, 3
1239	1 3/8"	30	48	336	5	33700	100.0	1, 2, 3
1240	1 1/2"	30	48	528	3	53064	150.0	1
1241	1 3/4"	30	48	1248	00	125424	280.0	1
1242	2"	30	48	1536	000	154368	310.0	1
1242/4	3"	30	48	2256	0000	225000	390.0	1, 2

*Values shown are for bare cable in free air at 30°C (86°F) and intended as a reference guide only. Actual values will depend on permissible temperature rise, permissible voltage drop and other conditions of service.

OVAL COMMERCIAL BRAID

2132	1/16"	34	16	32	19	1192	11.0	1, 2, 3
2138	11/64"	34	24	120	14	4770	32.0	1, 2, 3
2140	3/16"	34	24	144	13	5724	38.0	1, 2
2142	1/4"	34	24	168	12	6678	41.0	1, 2
2144	3/8"	34	24	192	11	7632	46.0	1, 2
2146	1/2"	34	48	336	9	13356	62.0	1
2148	5/8"	34	48	384	8	14264	64.0	1
2150	11/16"	34	48	480	7	19080	81.0	1
2152	25/32"	34	48	528	7	20988	85.0	1

TINNED COPPER TUBULAR BRAID

2160	1/32"	36	24	24	22	600	7.0	1, 2
2162	1/16"	36	24	48	19	1200	11.0	1, 2
2163	5/64"	36	24	72	18	1800	16.0	1, 2
2164	7/64"	36	24	96	16	2400	19.0	1, 2
2166	1/8"	36	24	120	15	3000	25.0	1, 2
2167	5/32"	36	24	240	12	6000	40.0	1, 2
2168	11/64"	36	24	168	14	4200	32.0	1, 2
2170	13/64"	34	24	192	11	7630	46.0	1
2171	1/4"	36	24	384	10	9600	53.0	1
2171/1	9/32"	30	24	120	9	12060	60.0	1
2172	3/8"	36	48	384	10	9600	53.0	1
2173	7/16"	30	24	240	6	24120	90.0	1
2174	1/2"	36	48	528	9	13200	62.0	1
2175	9/16"	30	48	480	3	48240	145.0	1
2175/1	21/32"	30	48	768	1	77180	190.0	1
2176	25/32"	36	48	864	7	21600	88.0	1

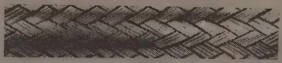
EXTRA LARGE TINNED COPPER TUBULAR BRAID

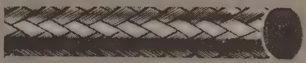
2177	7/8"	30	48	336	5	33700	100.0	1, 2
2178	1"	30	48	384	4	38600	120.0	1, 2
2179	1 1/8"	30	48	432	4	43330	130.0	1, 2
2180	1 1/4"	30	48	480	3	48150	145.0	1, 2
2181	1 3/8"	30	48	528	3	53000	150.0	1, 2
2182	1 1/2"	30	48	576	2	57775	165.0	1, 2

SILVER PLATED TUBULAR BRAID

APPLICATIONS: Silver plated braid is used where a high operating temperature (200°C) and corrosion resistance is required.

2191	1/16"	36	24	48	19	1200	11.0	1, 2
2193	7/64"	36	24	96	16	2400	19.0	1, 2
2194	1/8"	36	24	120	15	3000	25.0	1, 2
2195	5/32"	36	24	240	12	6000	40.0	1, 2
2196	11/64"	36	24	168	14	4200	32.0	1, 2
2197	13/64"	34	24	192	11	7640	46.0	1, 2
2198	1/4"	36	24	384	10	9600	53.0	1, 2





PUT-UP CODE: 1-50 FT., 2-100 FT. 3-250 FT.

ALPHA WIRE CORPORATION

Low Leakage Medical Safety Cable

UL
SJT

300 VOLTS 66% LESS LEAKAGE THAN CONVENTIONAL SJT POWER CORD LOW MUTUAL CAPACITANCE

DESCRIPTION

A specially designed low leakage power cable that greatly reduces danger of electrical shock in medical and dental applications. Each conductor stranded and annealed copper. Insulation color coded FEP Teflon . Low dielectric constant polyethylene fillers provide wider conductor spacing. Paper tape wrap over core with red PVC jacket overall. Maximum leakage, 10 ft. length at 120 V is 6 microamperes to green, 16 microamperes through jacket.

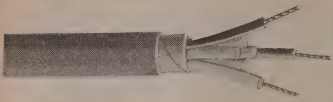
APPLICATION

The inherent danger of electrical shock due to faulty internal or power connections on medical test and analytical equipment is greatly reduced by use of this cable. The wider conductor spacing necessary for low leakage is obtained by utilization of the special low dielectric constant fillers and core.

* T.M. DuPont

3 CONDUCTOR
Black — White — Green

This item cut to customer's requirements — Min. 25′ per item non-cancellable



ALPHA NUMBER	COND. SIZE AWG	NOMINAL THICKNESS INSULATION	JACKET	NOMINAL O.D.
1980	18	.031″	.050″	.430″
1981	16	.031″	.050″	.475″

Bus Bar Tinned Copper

SOLID WIRE — SOFT DRAWN

DESCRIPTION: Pure electrolytic soft, drawn, solid, copper properly annealed and tinned for quick soldering.

APPLICATIONS: Winding of coils. Antennas. Point to point wiring. Bus-bar. Component leads. Ground wire.

SPECIFICATIONS MIL-W-3861 TYPE S — QQ-W-343 TYPE S — ASTM-B-33

ALPHA NO.	CONDUCTOR SIZE	NOMINAL CIRCULAR MIL AREA	NOMINAL O.D.
299/3	30 AWG	100.5	.010″
299/2	28 AWG	159.8	.013″
299/1	26 AWG	254.1	.016″
299	24 AWG	404.0	.020″
298	22 AWG	642.4	.025″
297	20 AWG	1022.0	.033″
296	18 AWG	1642.0	.040″
295	16 AWG	2583.0	.051″
286	14 AWG	4107.0	.065″
289	12 AWG	6530.0	.082″
292	10 AWG	10380.0	.103″
292/8	8 AWG	16510.0	.129″
292/6	6 AWG	26250.0	.162″

STANDARD SPOOL PUT-UP: 100 FT., 1000 FT.

Antenna-Aerial Wire

APPLICATIONS Recommended especially for ship, short-wave and transmitter antennas where

1161-1164: high tensile strength and corrosion resistance is required

1161 and 1163: Government specification MIL-W-13276 and MIL-W-13074.

APPLICATIONS For short wave and transmitter antennas. Suitable for commercial and

136 and 112: amateur use. Easy to install, no "backlash."

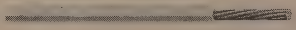
ALPHA NO.	CONDUCTOR SIZE	STRAND	BREAKING STRENGTH	CONDUCTOR TYPE	NOMINAL O.D.
1161	12	7/20	650 Lbs.	Silicon Bronze	.100″
1163	10	7/18	1000 Lbs.	Silicon Bronze	.122″
1164	8	7/16	1600 Lbs.	Silicon Bronze	.150″
136	16	7/24	—	Bare Copper	.060″
112	14	7/22	—	Bare Copper	.075″

STANDARD SPOOL PUT-UP: 100 FT., 500 FT., 1000 FT.

Teflon Hook-Up Wire

Type E MIL-W-16878D

DESCRIPTION: Stranded silver plated copper, .010″ nominal wall thickness extruded TFE Teflon insulation −65°C to +200°C, voltage rating 600 volts.



ALPHA NO.	CONDUCTOR SIZE	STRAND	MIN. O.D.
5851	30	7/38	.028″
5852	28	7/36	.031″
5853	26	7/34	.035″
5854	24	19/36	.040″
5854/7	24	7/32	.039″
5855	22	19/34	.046″
5855/7	22	7/30	.045″
5856	20	19/32	.054″
5856/7	20	7/28	.053″
5857	18	19/30	.064″
5858	16	19/29	.073″

***STOCK COLORS**
1—White
2—Black
3—Red
4—Green
5—Yellow
6—Light Blue
7—Brown
8—Orange
9—Gray (slate)
10—Violet (purple)
11—White/Black
12—White/Red
13—White/Green
14—White/Yellow
15—White/Blue
16—White/Brown
17—White/Orange
18—White/Gray
19—White/Violet

STANDARD SPOOL PUT-UP: 100 FT., 1000 FT.
ALSO AVAILABLE TO ORDER CUT, MARKED AND STRIPPED

ALPHA WIRE CORPORATION

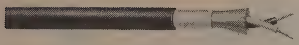
Service & Power Cords

UL

DESCRIPTION: RUBBER PORTABLE CORDS, TYPE SV, SJ,
Each conductor stranded bare copper, separator, color coded rubber insulation, cabled with fillers, separator, tough black rubber jacket overall.

NEOPRENE PORTABLE CORDS, TYPE SVO, SJO, & SO
Each conductor stranded bare copper, separator, color coded, rubber insulation cabled with fillers, separator, black neoprene jacket overall. Oil, grease, ozone, acid, moisture resistant.

CHARACTERISTICS & APPLICATIONS:
Suggested Operating Temperatures: −20°C to +60°C.



U.L. TYPE	TYPE OF USAGE	VOLTAGE RATING
SV, SVO	Light appliances such as fans, mixers, and office equipment.	300V
SJ, SJO	Medium appliances, small motors, tools, amplifiers, speakers.	300V
SO	Heavy duty equipment, generators, heaters, tools, air-conditioners.	600V

RUBBER PORTABLE CORD 300 VOLT — NOM. JKT. THICKNESS .032″
STATIONARY SERVICE

ALPHA NO.	TYPE	NO. OF COND.	COND. SIZE	NOM. THICKNESS INS.	CURRENT CARRYING CAPACITY IN AMPS	NOM. O.D.
1951	SV	2	18	.016″	7	.250″
1951/3	SV	3	18	.016″	7	.260″
1952	SJ	2	18	.032″	7	.305′
1952/3	SJ	3	18	.032″	7	.330″
1953	SJ	2	16	.032″	10	.330′
1953/3	SJ	3	16	.032″	10	.360′

NEOPRENE PORTABLE CORD 300 VOLT — NOM. JKT. THICKNESS .032″
STATIONARY SERVICE

1931	SVO	2	18	.016″	7	.250″
1932	SJO	2	18	.032″	7	.305″
1932/3	SJO	3	18	.032″	7	.330″
1933	SJO	2	16	.032″	10	.330″
1933/3	SJO	3	16	.032″	10	.360″

STANDARD SPOOL PUT-UP: 50 FT., 100 FT., 250 FT.

COLOR CODE OF CONDUCTORS: 1—White 2—Black 3—Green 4—Red

NEOPRENE 600 VOLT PORTABLE CORD — TYPE SO

ALPHA NO.	NO. OF COND.	COND. SIZE	NOM. THICKNESS INS.	NOM. THICKNESS JKT.	CURRENT CARRYING CAPACITY IN AMPS	NOM. O.D.
1934	2	18	.030″	.060″	7	.390″
1934/3	3	18	.030″	.060″	7	.405″
1934/4	4	18	.030″	.060″	6	.435″
1935	2	16	.030″	.060″	10	.405″
1935/3	3	16	.030″	.060″	10	.430″
1935/4	4	16	.030″	.060″	8	.485″
1936	2	14	.045″	.075″	15	.530″
1936/3	3	14	.045″	.075″	15	.560″
1936/4	4	14	.045″	.075″	12	.605″
1937	2	12	.045″	.090″	20	.600″
1937/3	3	12	.045″	.090″	20	.635″
1937/4	4	12	.045″	.090″	16	.665″
1938	2	10	.045″	.090″	25	.640″
1938/3	3	10	.045″	.090″	25	.690″
1938/4	4	10	.045″	.090″	20	.745″

STANDARD SPOOL PUT-UP: 50 FT., 100 FT., 250 FT.

Replacement Cord Sets

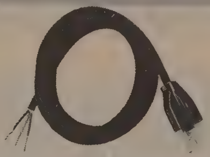
– 300 VOLTS – 7 AMPS.

DESCRIPTION: Heavy duty, abrasion resistant replacement cord sets. Conductor bare copper, vinyl or rubber, color coded insulation, cotton fillers, rubber or vinyl jacket overall. One end fitted with molded two or three conducter male plug, one end jacket stripped back, 1½ inches with ⅝ inches bare conductors exposed.

APPLICATION: TYPE SV - SVT
For small tools, business machines and light-duty equipment.
TYPE SJ - SJT
For heavier duty tools, electric saws, small motors, grinders, saws and sanders.

UL
SV - SVT
SJ - SJT

PACKAGING: All cords sets available in individual boxes or coiled and tied in bulk packages.



UL TYPE SV, SVT — COND. SIZE 18 *STD. PKG. 1 & 25 PIECES

ALPHA NO.	UL TYPE	NO. COND.	COND SIZE	STRAND	CORD LENGTH (FEET)	CORD MATERIAL	COLOR	NOM. O.D. (INCHES)
600	SV	2	18	41/34	6	Rubber	Black	.245
602	SV	2	18	41/34	9	Rubber	Black	.245
775	SV	3	18	41/34	6	Rubber	Black	.267
776	SV	3	18	41/34	8	Rubber	Black	.267
777	SVT	3	18	41/34	6	Vinyl	Gray	.257

UL TYPE SJ, SJT — 3 CONDUCTORS

615	SJ	3	18	16/30	6	Rubber	Black	.330
778	SJ	3	18	16/30	8	Rubber	Black	.330
616	SJ	3	18	16/30	9	Rubber	Black	.330
779	SJT	3	18	16/30	8	Vinyl	Gray	.330
618	SJ	3	16	26/30	6	Rubber	Black	.365

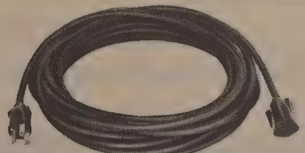
*Packed one to box or bulk packed, No. 616 and 618 1 and 10 pieces.

Extension Cord Sets

U.L. AND C.S.A. LISTED

DESCRIPTION:
Extension cord sets manufactured for lasting service with a flexible 2 or 3 conductor quality black rubber cord. This rugged cord has a black molded plastic male and female plug on either end to fit conventional sockets and plugs. Extension cords have a 300 volt rating

APPLICATION:
Small business machines, vacuum cleaners, lamps, movie projectors, or any other home appliance. 3 conductor cord used when 1 conductor requires grounding.



2-CONDUCTOR

ALPHA NO.	COND. SIZE	COND. STRAND	AMP RATING	U.L. TYPE	NOM. O.D.	CORD LENGTH (FT.)
620	18	41/34	7	SV	.245″	6
628	16	26/30	10	SJ	.325″	10

3-CONDUCTOR — AMP RATING 7, TYPE SJ

ALPHA NO.	COND. SIZE	COND. STRAND	NOM. O.D. OF CORD	CORD LENGTH (FT.)
636	18	16/30	.330″	10
638	18	16/30	.330″	25
640	16	26/30	.365″	15
642	16	26/30	.365″	25
644	16	26/30	.365″	50

ALPHA WIRE CORPORATION

Neoprene Retractile Communication Cords

RETRACTILE COMMUNICATION COIL CORDS

Retracted Lengths 2 & 4 Feet — Extended Lengths 12 & 25 Feet

DESCRIPTION:

Multi-conductor communication cord manufactured with extra flexible #23 AWG-21/36 tinned soft cadmium copper for maximum flex life. Insulated with rubber for communication circuits of maximum 120 working volts.

ALPHA NO. 2 FT. LGTHS.	ALPHA NO. 4 FT. LGTHS.	NO. OF CONDS.	NOM. COIL O.D.	CORD O.D.
680/2	680/4	2	3/4″	.215″
681/2	681/4	3	13/16″	.220″
682/2	682/4	4	15/16″	.250″
683/2	683/4	5	1-1/16″	.285″
684/2	684/4	6	1-1/8″	.305″
685/2	685/4	7	1-1/4″	.320″

COLOR CODE OF CONDUCTORS

1—Black
2—White
3—Red
4—Green
5—Blue
6—Yellow
7—Brown

RETRACTILE COMMUNICATION CORDS (Shielded)

Retracted Lengths 2 & 4 Feet — Extended Lengths 12 & 25 Feet

DESCRIPTION: Same as above, except that shielded conductors are individually shielded with a cadmium copper shield to eliminate external electrical interference.

ALPHA NO. 2 FT. LGTHS.	ALPHA NO. 4 FT. LGTHS.	NO. OF CONDS.	CONDUCTOR SIZE	CONDUCTOR STRAND	VOLTAGE RATING	SHIELDING	NOM. COIL O.D.	NOM. O.D. CORD	COLOR CODE OF CONDUCTORS
690/2	690/4	1	24	41/40	75	Shielded	⅝″	.160″	White
692/2	692/4	2	1-23 1-24	21/36 41/40	120 75	Unshielded Shielded	⅞″	.240″	Black White
694/2	694/4	3	2-23 1-24	21/36 41/40	120 75	Unshielded Shielded	⅞″	.240″	Black & Red White
696/2	696/4	4	2-23 2-24	21/36 41/40	120 75	Unshielded Individually Shielded	1″	.270″	Red & Black White & Green

MINIATURE RETRACTILE COMMUNICATIONS CORDS

Retracted Length 2 Feet — Extended Length 10 Feet

DESCRIPTION: A small diameter plastic cord with stranded tinned copper conductors for maximum flexibility, insulated and jacketed with polyvinylchloride. Each cord is available in a 2 ft. retracted length with a 6″ straight lead on each end.

ALPHA NO.	NO. OF CONDS.	CONDUCTOR SIZE	CONDUCTOR STRAND	AMP RATING	VOLT RATING	NOM. COIL O.D.	NOM. CORD O.D.
651	2	28	19/40	0.5	100	½″	.135″
652	4	28	19/40	0.5	100	½″	.150″

For 3 conductor, use 4 conductor with one lead unused

COLOR CODE OF CONDUCTORS

1—Black
2—White
3—Green
4—Red

PVC Retractile Communication Cords

RETRACTED LENGTHS 1, 2, 3 & 4 FEET EXTENDED LENGTHS 6, 12, 18 & 25 FT.

DESCRIPTION:

Durable, long lasting plastic retractile coil cords. Economically priced, but offering maximum flex resistance and long life. Each conductor is stranded tinned copper P.V.C. insulation and P.V.C. jacket over all.

CHARACTERISTICS:

Suggested operating temperature: —20°C to +60°C. 23 AWG conductor — 21/36 strands, 120 volts, 1 amp.

UNSHIELDED

1 FT LGTHS	2 FT LGTHS	3 FT LGTHS	4 FT LGTHS	NO. OF CONDS.	NOM. COIL O.D.	NOM. CORD O.D.
702	702/2	702/3	702/4	2	¾″	.200
703	703/2	703/3	703/4	3	¾″	.210
704	704/2	704/3	704/4	4	13/16″	.240
705	705/2	705/3	705/4	5	1″	.285
706	706/2	706/3	706/4	6	1⅛″	.305
707	707/2	707/3	707/4	7	1¼″	.320
			708/4	8	1 3/32″	.360
			710/4	10	1 5/32″	.380
			712/4	12	1 7/32″	.410
			715/4	15	1 9/32″	.470

COLOR CODE:

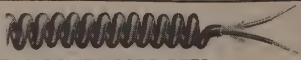
1. Black
2. White
3. Red
4. Green
5. Blue
6. Yellow
7. Brown
8. Orange
9. White/Black
10. White/Red
11. White/Green
12. White/Blue
13. White/Yellow
14. White/Brown
15. White/Orange

SHIELDED

Braided tinned copper shield

2 FT LGTHS	4 FT LGTHS	NO. OF CONDS.	NOM. COIL O.D.	NOM. CORD O.D.	SHIELDED	COLOR CODE OF CONDUCTORS
720/2	720/4	1	⅝″	.160	Shielded	White
722/2	722/4	2	⅞″	.225	Individually Shielded	White & Black
723/2	723/4	3	1″	.250	2 Unshielded 1 Shielded	Black & Red White
724/2	724/4	4	1¼″	.270	2 Unshielded 2 Individually Shielded	Red & Green White & Black

Neoprene Retractile Power Cords



Retracted Lengths 2 & 4 Feet — Extended Lengths 12 & 25 Feet

ALPHA NO. 2 FT. LGTHS.	ALPHA NO. 4 FT. LGTHS.	NO. OF CONDS.	CONDUCTOR SIZE	CONDUCTOR STRAND	U.L. TYPE	AMP RATING	VOLT RATING	NOM. COIL O.D.	NOM. O.D. CORD
660/2	660/4	2	18	41/34	SVO	7	300	7/8″	.260″
760/2	760/4	3	18	41/34	SVO	7	300	1″	.275″
661/2	661/4	2	18	41/34	SJO	7	300	1-3/16″	.320″
662/2	662/4	3	18	41/34	SJO	7	300	1-3/8″	.350″
663/2	663/4	4*	18	41/34	SJO	5.6	300	1-7/16″	.385″
664/2	664/4	2	16	65/34	SJO	10	300	1-3/8″	.360″
665/2	665/4	3	16	65/34	SJO	10	300	1-7/16″	.390″
666/2	666/4	4*	16	65/34	SJO	8	300	1-1/2″	.425″
670/2	670/4	3	16	41/34	SO	10	600	1-13/16″	.470″
671/2	671/4	4*	16	65/34	SO	8	600	1-7/8″	.500″
673/2	673/4	3	14	41/30	SO	15	600	2-1/8″	.560″
674/2	674/4	4*	14	41/30	SO	12	600	2-1/4″	.605″

COLOR CODE OF CONDUCTORS

1—Black
2—White
3—Green
4—Red

RETRACTILE POWER CORD SETS

Retracted Length 18″ — Extended Length 7½ Feet

DESCRIPTION: Coiled power cord with a sturdy molded male plug on one end.

ALPHA NO.	NO. OF CONDS.	CONDUCTOR SIZE	CONDUCTOR STRAND	U.L. TYPE	NOM. COIL O.D.	NOM. O.D. CORD
654	2	18	41/34	SVO	7/8″	.260″
656	3	18	41/34	SJO	1-3/8″	.350″
657	2	16	65/34	SJO	1-3/8″	.360″
658	3	16	65/34	SJO	1-7/16″	.390″

COLOR CODE OF CONDUCTORS

1—Black
2—White
3—Green

RETRACTILE TEST LEAD WIRE

Retracted Length 12″ — Extended Length 6 Feet

ALPHA NO.	CONDUCTOR SIZE	CONDUCTOR STRAND	AMP. RATING	VOLT RATING	NOM. COIL O.D.	NOM. O.D. CORD	COLOR CODE
650	20	41/36	4	5,000	¾″	.165″	BLACK OR RED.

ALPHA WIRE CORPORATION

Test Lead Wire

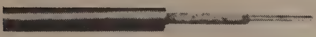
DESCRIPTION:

Single conductor, extra flexible stranded tinned soft annealed copper, separator, color coded rubber insulation, smooth satin finish. Available in black, red. No. 1639 also available in green.

APPLICATIONS:

As test leads in analyzers, oscillators, multi-meters, and all other types of testing apparatus or wherever an extra flexible insulated wire is required. Heavy duty type designed for television, therapeutic equipment, analyzers, oscillators, etc.

Suggested operating temperature: −20°C to +60°C.



ALPHA NO.	CONDUCTOR SIZE	CONDUCTOR STRAND	NOM. WALL THICKNESS	VOLTAGE BREAKDOWN	SUGG. WORKING VOLTAGE	NOM. O.D.
1632	20	41 36	.040″	6,000 ††	1500 V	.125″
1635	20	41/36	.047″	12,000 ††	3000 V	.140″
1636	18	65/36	.045″	20,000 ††	5000 V	.140″
1638	18	65/36	.090″	29,000 ††	10000 V	.230″
1639	18	65/36	.047″	20,000 ††	5000 V	.145″

STANDARD SPOOL PUT-UP: 100 FT., 500 FT., 1000 FT.

††60 Cycles *Military type specification MIL-W-13169B

E-Z-Strip Lamp Cord

Conductors parallel, stranded extra flexible bare copper, polyvinylchloride jacket overall. Slit in jacket to permit "E-Z" separation. Plastic insulation. 2 conductors. UL listed.

ALPHA NO.	CONDUCTOR SIZE	CONDUCTOR STRAND	NOM. WALL THICKNESS	U/L TYPE	NOMINAL O.D.	STOCK COLORS
1977	18	41/34	.032″	SPT-1	.215″ x .115″	Brn., Blk., Wh., Gray, Tan
1978	18	41/34	.045″	SPT-2	.285″ x .150″	Brown
1979	18	41/34	.032″	SPT-1	.215″ x .115″	Clear

STANDARD SPOOL PUT-UP: 100 FT., 250 FT., 500 FT., 1000 FT.

Measuring and Coiling Machine

EASY TO USE – HAND OPERATED

The ideal unit for in-plant or distributor use for measuring and dispensing small coils of wire from larger spools or coils.

Set-up consists of a heavy-duty measuring unit with capacity to 10,000 feet. Digital register accurately indicates feet and inches dispensed in large, easy-to-read numerals. Measuring unit has spring-loaded rollers that are easily set for proper tension by adjusting control knob. All type of wire and cable, from small gauge hook-up wire to large cables, may easily and accurately be measured. Unit has capacity up to one inch O.D. wire and cable.

Wire winder has adjustable arms that may be set to the desired size coil. After coiling, arms open to flat position so coil may easily be removed.

Dispensing reel designed to hold all diameters of spools, reels or coils. Alpha No. W-MD-I

Cable Clamps

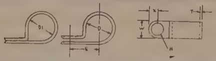
FOR WIRE, CABLE, TUBING — DURABLE, LIGHTWEIGHT, NON-ABRASIVE

ETHYL CELLULOSE CLAMPS: −65°F to +175°F.

An all-purpose clamp that has excellent corrosion, moisture and shock-resistant properties. Specially treated with ultra-violet inhibitor compound for long-lasting outdoor as well as inside applications.

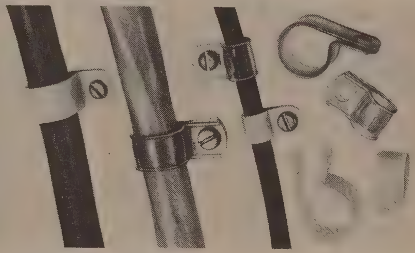
NYLON CLAMPS: MIL-C-21565 (NAS), MIL-P-17091-B, MIL-P-20693, MIL-STD-24E −60°F to +175°F.

Ideal for high temperature applications, for application to surfaces subject to vibration or mechanical stress. Inside surfaces are smooth, with rounded edges to prevent jacket chafing and damage.



CELLULOSE	NYLON	D (Inches)	DI (Inches)
CCL-⅛	NCL-⅛	⅛	.115
CCL-3/16	NCL-3/16	3/16	.172
CCL-¼	NCL-¼	¼	.234
CCL-5/16	NCL-5/16	5/16	.297
CCL-⅜	NCL-⅜	⅜	.359
CCL-7/16	NCL-7/16	7/16	.422
CCL-½	NCL-½	½	.484
CCL-9/16	NCL-9/16	9/16	.547
CCL-⅝	NCL-⅝	⅝	.609
CCL-11/16	NCL-11/16	11/16	.672
CCL-¾	NCL-¾	¾	.734
CCL-⅞	NCL-⅞	⅞	.859
CCL-1	NCL-1	1	.984
CCL-1⅛	NCL-1⅛	1⅛	1.102
CCL-1¼	NCL-1¼	1¼	1.227
CCL-1⅜	NCL-1⅜	1⅜	1.352
CCL-1½	NCL-1½	1½	1.477

STANDARD PACKAGE 100-1000 pieces



DIMENSIONS

Clamp Thickness (T)	NCL-⅛ — NCL-½ — .050″ All other clamps — .060″
Clamp Width (W)	NCL-⅛ — NCL-½ — ⅜ All other clamps — ½
Mounting Hole Dia. (H)	
Distance from clamp edge to mounting hole (X)	— 7/32″

LAB KITS

An assortment of clamps designed for the laboratory and prototype work.

CCL - KIT - 1 — Sizes ⅛″-½″ — 250 pieces
CCL - KIT - 2 — Sizes 9/16″-1½″ — 100 pieces

NCL - KIT - 1 — Sizes ⅛″-½″ — 250 pieces
NCL - KIT - 2 — Sizes 9/16″-1½″ — 100 pieces

STOCK COLORS

Cellulose (CCL) Amber,
Nylon (NCL) White, Black

ALPHA WIRE CORPORATION

Alpha can supply you with all your tubing needs... Ready to use! Cut & marked!

These catalog pages contain the industry's largest selection of tubing — all available in standard packages from your Alpha stocking distributor. Alpha also offers you the opportunity to save both time and cost by purchasing these same items through your distributor, **specially cut to size or marked.**

Markings are hot stamped in accordance with UL specifications. We can print circuit numbers, letters, company names or any other identifying information you require in choice colors.

Automatic precision equipment can cut your tubing to the exact length necessary to simplify your production or installation requirements.

These services are available at nominal charges with prompt delivery. Contact your Alpha sales representative or see your local Alpha distributor for full details.

The chart provided can help you specify your requirements. Use this chart to determine how many feet you will need of any tubing to produce the required number of tubing pieces. For further information or specifications call your Alpha rep.

Everything in tubing in all sizes, colors, packages-marked & cut to your specifications

Estimator Chart for Cut Tubing Pieces

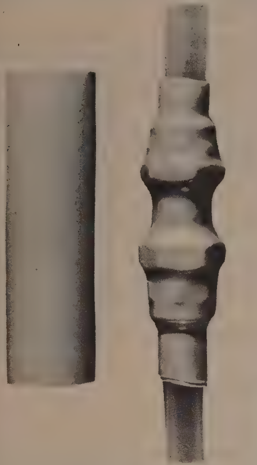
Chart relates the length of tubing required, to the necessary footage to make 1,000 pieces; and to number of individual pieces that can be cut from 1,000′ of material.

Length Inches	Ft. Req. per M Pieces	No. Pieces in 1M Ft.		Length Inches	Ft. Req. per M Pieces	No. Pieces in 1M Ft.		Length Inches	Ft. Req. per M Pieces	No. Pieces in 1M Ft.		Length Inches	Ft. Req. per M Pieces	No. Pieces in 1M Ft.
				3 1/16	255.2	3,950		6 1/16	505.2	1,975		9 1/16	755.2	1,300
1/8	10.4	96,000		3 1/8	260.5	3,850		6 1/8	510.4	1,950		9 1/8	760.4	1,300
3/16	15.7	64,000		3 3/16	265.7	3,800		6 3/16	515.6	1,925		9 3/16	765.7	1,300
1/4	20.9	48,000		3 1/4	270.9	3,700		6 1/4	520.8	1,900		9 1/4	770.8	1,275
5/16	26.1	38,400		3 5/16	276.1	3,650		6 5/16	526.0	1,900		9 5/16	776.1	1,275
3/8	31.3	32,000		3 3/8	281.3	3,600		6 3/8	531.3	1,875		9 3/8	781.3	1,275
7/16	36.5	27,500		3 7/16	286.5	3,500		6 7/16	536.5	1,850		9 7/16	786.5	1,250
1/2	41.7	24,000		3 1/2	291.7	3,450		6 1/2	541.7	1,825		9 1/2	791.7	1,250
9/16	46.9	21,400		3 9/16	296.9	3,400		6 9/16	546.9	1,800		9 3/16	796.9	1,250
5/8	52.1	19,200		3 5/8	302.1	3,350		6 5/8	552.1	1,800		9 5/8	802.1	1,225
11/16	57.3	17,500		3 11/16	307.3	3,300		6 11/16	557.3	1,775		9 11/16	807.3	1,225
3/4	62.5	16,000		3 3/4	312.5	3,200		6 3/4	562.5	1,775		9 3/4	812.5	1,225
13/16	67.7	14,800		3 13/16	317.7	3,150		6 13/16	567.7	1,750		9 13/16	817.7	1,200
7/8	73.0	13,750		3 7/8	323.0	3,100		6 7/8	572.9	1,725		9 7/8	823.0	1,200
15/16	78.2	12,800		3 15/16	328.2	3,050		6 15/16	578.1	1,725		9 15/16	828.1	1,200
1	83.4	12,000		4	333.4	3,000		7	583.4	1,700		10	833.3	1,200
1 1/16	88.6	11,300		4 1/16	338.6	2,950		7 1/16	588.5	1,700		10 1/16	838.5	1,175
1 1/8	93.8	10,700		4 1/8	343.8	2,800		7 1/8	593.7	1,650		10 1/8	843.7	1,175
1 3/16	99.0	10,100		4 3/16	349.0	2,850		7 3/16	598.9	1,650		10 3/16	848.9	1,150
1 1/4	104.2	9,600		4 1/4	354.2	2,800		7 1/4	604.2	1,650		10 1/4	854.1	1,150
1 5/16	109.4	9,150		4 5/16	363.3	2,775		7 5/16	609.4	1,625		10 5/16	859.4	1,150
1 3/8	114.6	8,750		4 3/8	364.6	2,725		7 3/8	614.6	1,625		10 3/8	864.5	1,150
1 7/16	119.8	8,350		4 7/16	369.9	2,700		7 7/16	619.8	1,600		10 7/16	869.8	1,125
1 1/2	125.0	8,000		4 1/2	375.0	2,650		7 1/2	625.0	1,600		10 1/2	875.0	1,125
1 9/16	130.2	7,700		4 9/16	380.3	2,625		7 9/16	630.2	1,575		10 9/16	880.2	1,125
1 5/8	135.5	7,400		4 5/8	385.4	2,575		7 5/8	635.4	1,575		10 5/8	885.4	1,125
1 11/16	140.7	7,150		4 11/16	390.7	2,550		7 11/16	640.6	1,550		10 11/16	890.6	1,100
1 3/4	145.9	6,900		4 3/4	395.9	2,525		7 3/4	645.8	1,550		10 3/4	895.9	1,100
1 13/16	151.1	6.650		4 13/16	401.1	2,475		7 13/16	651.0	1,525		10 13/16	901.0	1,100
1 7/8	156.3	6,400		4 7/8	406.2	2,450		7 7/8	656.2	1,500		10 7/8	906.2	1,100
1 15/16	161.5	6,200		4 15/16	411.5	2,425		7 15/16	661.4	1,500		10 15/16	911.5	1,075
2	166.7	6,000		5	416.7	2,400		8	666.7	1,500		11	916.7	1,075
2 1/16	171.9	5,850		5 1/16	421.9	2,350		8 1/16	671.9	1,475		11 1/16	921.8	1,075
2 1/8	177.1	5,650		5 1/8	427.1	2,325		8 1/8	677.1	1,475		11 1/8	927.0	1,075
2 3/16	182.3	5,500		5 3/16	432.3	2,300		8 3/16	682.3	1,450		11 3/16	932.2	1,050
2 1/4	187.5	5,350		5 1/4	437.5	2,275		8 1/4	687.5	1,450		11 1/4	937.4	1,050
2 5/16	192.7	5,200		5 5/16	442.8	2,250		8 15/16	692.7	1,425		11 5/16	942.7	1,050
2 3/8	198.0	5,100		5 3/8	447.9	2,225		8 3/8	698.0	1,425		11 3/8	947.9	1,050
2 7/16	203.2	4.950		5 7/16	453.2	2,200		8 7/16	703.2	1,400		11 7/16	953.1	1,025
2 1/2	208.4	4,800		5 1/2	458.4	2,175		8 1/2	708.4	1,400		11 1/2	958.3	1,025
2 9/16	213.6	4,700		5 9/16	463.6	2,150		8 9/16	713.6	1,400		11 9/16	963.5	1,025
2 5/8	218.8	4,600		5 5/8	468.8	2,125		8 5/8	718.7	1,375		11 5/8	968.7	1,025
2 11/16	224.0	4,500		5 11/16	474.0	2,100		8 11/16	723.9	1,375		11 11/16	973.9	1,000
2 3/4	229.2	4,400		5 3/4	479.2	2,075		8 3/4	729.2	1,350		11 3/4	979.1	1,000
2 13/16	234.4	4,300		5 13/16	484.4	2,050		8 13/16	734.4	1,350		11 13/16	984.3	1,000
2 7/8	239.6	4,200		5 7/8	489.6	2,025		8 7/8	739.6	1,350		11 7/8	989.5	1,000
2 15/16	244.8	4,100		5 15/16	494.8	2,000		8 15/16	744.8	1,325		11 15/16	994.7	1,000
3	250.0	4,000		6	500.00	2,000		9	750.0	1,325		12	1,000.	1,000

ALPHA WIRE CORPORATION

Irradiated Polyolefin Shrinkable Tubing

FIT®-221
POLYOLEFIN



MIL-I-23053/5
UL RECOGNIZED COMPONENT*
AMS-3636B, 3637B

The single most widely used type of FIT Shrinkable Tubing, FIT-221 is manufactured from irradiated cross-linked polyolefin. FIT-221 is an all-purpose tubing with excellent physical, chemical and electrical properties. It meets the most stringent military and industrial requirements for a highly reliable, thin wall insulation.

CHARACTERISTICS:
High resistance to fungus and chemicals. Self-extinguishing. Will not crack or peel.

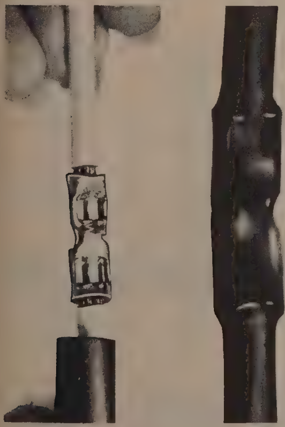
APPLICATIONS:
General purpose insulation, strain relief, jacketing material and as component insulation. Material is easily and permanently marked.

SPECIFICATIONS:
Operating Temperature—55° C to +135° C. Shrinkage Temperature: 135° C. Tensile strength: 2500 psi. Ultimate elongation: 400%. Longitudinal shrinkage: 5% maximum. Dielectric strength: 1300 volts/mil. Non-flammable—self-extinguishing. Specific gravity: 1.3 maximum.

Alpha No. and Size	Min. I.D. Before Shrinkage (Inches)	Recovered I.D. After Shrinkage (Inches)	Recovered Nom. Wall Thickness (Inches)	Standard Package 4' Lengths	Standard Package 2' Lengths	Standard Package 6" Lengths	Bulk Pkg. 4' Lgths.
				Total Ftg.	Total Ftg.	Total Ftg.	Total Ftg.
FIT-221-3/64"	.046	.023	.016	100'	100'	20'	1,000
FIT-221-1/16"	.063	.031	.017	100'	100'	18'	1,000
FIT-221-3/32"	.093	.046	.020	100'	100'	16'	1,000
FIT-221-1/8"	.125	.062	.020	100'	100'	14'	1,000
FIT-221-3/16"	.187	.093	.020	100'	100'	12'	1,000
FIT-221-1/4"	.250	.125	.025	100'	100'	10'	1,000
FIT-221-3/8"	.375	.187	.025	100'	100'	8'	1,000
FIT-221-1/2"	.500	.250	.025	20'	20'	7'	200
FIT-221-3/4"	.750	.375	.030	20'	20'	6'	200
FIT-221-1"	1.000	.500	.035	20'	20'	4'	200
FIT-221-1 1/2"	1.500	.750	.040	20'	20'	2.5'	200
FIT-221-2"	2.000	1.000	.045	20'	20'	1.5'	200
FIT-221-3"	3.000	1.500	.050	8'	8'	1'	100
FIT-221-4"	4.000	2.000	.055	8'	8'	.5'	100

STOCK COLORS—Black, White, Red, Yellow, Blue, and Clear.
STANDARD PACKAGE FIT-221 Tubing is available ONLY in the specified packages.
When ordering, indicate package desired.
*UL marked tubing available on request.

MAY BE CUT AND MARKED TO YOUR SPECIFICATIONS.



PACKAGED ASSORTMENTS

FIT-221—Assorted sizes and colors per box—contains an assortment of 6" lengths in various sizes and colors. Every length identified as to size and supplied in black, white, red, yellow, blue, and clear.

Alpha No.		Tubing Size Range	Lengths Per Box
FIT-221	MS-1	3/64" thru 3/16"	30
FIT-221	MS-2	1/4" thru 3/4"	16
FIT-221	MS-3	1" thru #4	10

Pre-cut lengths of FIT-221 in the two most popular cut sizes. Packaged in poly bags and boxes. Specify size.

Alpha No. and Size	No. Cut Pcs. ½" or 1"	Alpha No. and Size	No. Cut Pcs. ½" or 1"
FIT-221-3)64"	1000	FIT-221-3/8"	1000
FIT-221-1/16"	1000	FIT-221-1/2"	100
FIT-221-3/32"	1000	FIT-221-3/4"	100
FIT-221-1/8"	1000	FIT-221-1"	100
FIT-221-3/16"	1000	FIT-221-1-1/2"	100
FIT-221-1/4"	1000	FIT-221-2"	100

ALPHA WIRE CORPORATION

Irradiated Vinyl Shrinkable Tubing

FIT-105
VINYL

MINIMAL LONGITUDINAL SHRINKAGE
MIL I-23053/2, AMS 3582

A specially formulated polyvinylchloride tubing, that is mechanically strong, extremely flexible and significantly different from non-irradiated heat shrinkable tubing. Unlike non-irradiated PVC tubing, FIT-105 shrinks evenly and will not split when shrunk. Non-irradiated tubing has a much greater waste factor, with longitudinal shrinkage approximately 20%. FIT-105 will shrink less than 10% of its original length.

CHARACTERISTICS:

Extremely flexible. Will not cold flow or melt. Easily marked.

SHRINKAGE RATIO:

To 50% of original size (2:1) when temperature of 175°C (347°F.) is applied.

Controlled shrinkage within seven seconds at 166°C (325°F.)

LONGITUDINAL SHRINKAGE

Less than 10%.

APPLICATIONS:

Jacketing of cable harnesses, insulation and covering of components, bus bar insulation, tab disconnects; jacketing of cable cores with many of the qualities of the finest extruded plastic jackets.

SPECIFICATIONS:

Temperature operating range: —35°C. to +105°C. Minimum shrink temperature: 175°C. Tensile Strength: 2600 psi. Elongation: 250%. Dielectric strength: 750 volts/mil. Flame resistance: Non-burning. Fungus resistant. Fluid Resistant to: Hydrocarbons, solvents, aqueous solutions, acids, bases.

DIMENSIONS CHART

Alpha No. and Size	Minimum I.D. Before Shrinking (Inches)	Recovered I.D. After Shrinking (Inches)	Nominal Wall Thickness (Inches)	Standard Put-up (Feet)
FIT-105-3/64	.046	.023	.020	25, 100, 500
FIT-105-1/16	.062	.031	.020	25, 100, 500
FIT-105-3/32	.093	.046	.020	25, 100, 200
FIT-105-1/8	.125	.062	.025	25, 100, 200
FIT-105-3/16	.187	.093	.025	25, 100, 200
FIT-105-1/4	.250	.125	.025	25, 100, 200
FIT-105-3/8	.375	.187	.030	25, 100, 200
FIT-105-1/2	.500	.250	.030	25, 100
FIT-105-3/4	.775	.375	.035	25, 100
FIT-105-1	1.000	.500	.040	25, 100
FIT-105-1-1/2	1.500	.750	.045	25, 100
FIT-105-2	2.000	1.000	.050	10, 25, 50

Stock Color: Black.
Long Lengths—Packaging: Maximum Three Lengths Per Put-Up.

PACKAGED ASSORTMENTS

FIT-105-MS—Assorted sizes per box—contains an assortment of 6" lengths in various sizes. Every length identified as to size and supplied in black only.

Alpha No.	Tubing Size Range	Lengths Per Box
FIT-105-MS-1	3/64" thru 1/4" (6 sizes)	10 lengths per size (60 lengths)
FIT-105-MS-2	3/8" thru 1" (4 sizes)	10 lengths per size (40 lengths)

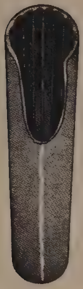
MAY BE CUT AND MARKED
TO YOUR SPECIFICATIONS.
SEE PAGE 3.

ALPHA WIRE CORPORATION

Shrinkable Cable and Connector Sleeves

FIT-700

ASTM-D 2671



FIT-700 sleeves are made with an inner pre-coating of moisture-resistant mastic. When heated, the tubing shrinks down while the mastic flows to totally encapsulate the wire splice or connector and the cable insulation.

Two types available: **Standard Wall Sleeves**—used in most general applications where wall thickness is adequate—for use up to cable rated at 600 volts. **Heavy wall sleeves**—for applications where extra mechanical protection or minimum wall thickness is needed or where Western Underground Specifications must be met.

CHARACTERISTICS:
Tough—ideal for URD direct burial installations. Provides exceptional mechanical protection. Excellent electrical insulation and environmental sealing. Protects against moisture penetration. Corrosion resistant.

SHRINKAGE RATIO:
To 1/3 of original size when temperature of 132°C. (275°F.) is applied.

APPLICATIONS:
Protection of underground or overhead cables, splices, crab joints, distribution assemblies, coaxial cables, telephone connectors. Usage in many applications having large diameter differences between cable OD's and connector OD's.

SPECIFICATIONS:
Temperature operating range:—40°C. to +135°C. Minimum shrink temperature: 132°C. (275°F.) Tensile strength: 2400 psi. Dielectric strength: 300 volts/mil.

STANDARD WALL SLEEVES

Alpha No.	Min. I.D. Expanded (Inches)	Max. Reg. I.D. (Inches)	Nom. Reg. Wall Thickness (Inches)	Stnd. Lengths (Inches)
FLT-700-1	.750	250	075	6-9-12
FIT-700-2	1 300	400	080	6-9-12
FIT-700-3	1.500	500	080	6-9-12
FIT-700-4	2.000	750	080	9
FIT-700-5	2.750	1 000	080	6-12

HEAVY WALL SLEEVES

Alpha No.	Min. I.D. Expanded (Inches)	Max. Reg. I.D. (Inches)	Nom. Reg. Wall Thickness (Inches)	Stnd. Lengths (Inches)
FIT-700-21	750	220	110	6-9-12
FIT-700-22	1.200	300	170	6-9-12
FIT-700-23	1 500	500	170	6-9-12
FIT-700-24	2 000	.600	.170	6-9-12
FIT-700-25	3.300	1.000	.170	6-12
FIT-700-26	4 500	1.500	.170	6-12

Stock Color: Black.

STANDARD PACKAGE
Packaged in Boxes,
With One Size Per Box

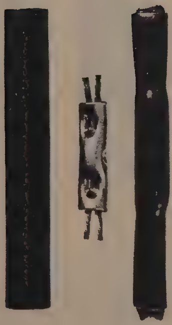
Length of Sleeve	No. Lengths Per Pkg.
6"	12
9"	8
12"	6

ASSORTMENT
FIT-700 MS-1
10—6" lengths including all sizes of **standard wall** sleeves
FIT-700 MS-2
10—6" lengths including all sizes of **heavy wall** sleeves

Irradiated Polyolefin Adhesive-Lined Shrinkable Tubing

FIT-750
ADHESIVE LINED POLYOLEFIN

For Sealing, Protecting Electronic Components and Splices



FIT-750 is a newly developed polyolefin tubing with a specially designed adhesive lining that melts as the tubing is shrunk. The thermoplastic adhesive adheres to a wide variety of plastic, rubber and metal surfaces. When heated to 121°C, the tubing shrinks to one-half of its supplied size while the adhesive melts and completely coats the object.

CHARACTERISTICS: Protects parts form moisture and corrosion.

SPECIFICATIONS: Tubing—Tensile strength: 1500 psi. Elongation: 200% minimum. Low temperature flex:—55°C. Heat aging: 336 hr/175°C, 150% elongation. Dielectric strength: 500 volts/mil. Fungus resistance: Does not support growth. Water absorption: 24 hr/25°C, 0.5% maximum. Adhesive—Peel strength: Polyethylene, 20 lb/in. width; Neoprene, 10 lb/in. width; PVC, 30 lb/in. width; Lead, 5 lb/in. width; Steel, 15 lb/in. width; Thickness applied, .005 in.

Alpha No. and Size	Supplied Diameter (Inches)	Recovered Diameter (Inches)	Recommended Wall Thickness	Standard Package 4' Length
FIT-750-1/4	.250	.125	.025	100'
FIT-750-3/8	.375	.187	.025	100'
FIT-750-1/2	.500	.250	.025	100'
FIT-750-3/4	.750	.375	.030	100'
FIT-750-1	1.000	.500	.035	100'
FIT-750-1-1/2	1.500	.750	.040	100'

Stock Color: Black.

ALPHA WIRE CORPORATION

FIT-300
SURFACE IRRADIATED POLYOLEFIN

Irradiated Polyolefin Shrinkable Tubing

MIL-I-23053/4, AMS 3664
OUTER WALL AREA SHRINKS—INNER WALL AREA MELTS

A unique one piece, surface irradiated heat shrinkable tubing made from irradiated cross-linked polyolefins upon heating. As the inner area of the wall melts, and is forced into crevices and interstices the outer area of the tubing wall shrinks. Upon cooling, the entire mass becomes a rigid, tough homogenous molding.

CHARACTERISTICS:
Semi-rigid. Encapsulates. Moisture-proofs.

SHRINKAGE RATIO:
As high as 6 to 1, shrinks when temperature of 135°C (275°F) is applied. Less than 10% longitudinal shrinkage.

APPLICATIONS:
Moisture-proof encapsulation of components, electrical cable junctions and splices; mechanical shield for covering rough surfaces; vibration shield.

SPECIFICATIONS:
Temperature Opearating Range:—55°C to +110°C. Minimum Shrink Temperature: +135°C. Tensile strength: 2,500 psi, Elongation: 400%. Dielectric strength: 1,100 volts/mil. Flame Resistance: Not flame retardant. Fluid Resistance: Hydrocarbons, solvents, aqueous solutions, acids, bases.

DIMENSIONS CHART

Alpha No. and Size	Min. I.D. Before Shrinkage (Inches)	Recovered Max. I.D. After Shrinkage (Inches)	Nominal Recovered Tot. Wall Thickness (Inches)	Nominal Recovered Meltable Wall Thickness (Inches)	Standard Packages 4′ Lgths. Total Footage	Standard Packages 6″ Lgths. Total Footage	Stock Colors
FIT-300-1/8″	.125	.023	.038	.020	100′	7′	Brown, Black
FIT-300-3/16″	.187	.060	.043	.025	100′	6′	Slate, Black
FIT-300-1/4″	.250	.080	.047	.027	100′	5′	White, Black
FIT-300-3/8″	.375	.135	.050	.030	100′	4′	Red, Black
FIT-300-1/2″	.500	.195	.055	.035	20′	3′	Blue, Black
FIT-300-3/4″	.750	.313	.065	.040	20′	2′	Yellow, Black
FIT-300-3/10*″	.300	.050	.100	.065	100′	2′	Blue, Black

*Heavy walled tubing for use where a large volume of meltable material is needed.

MAY BE CUT AND MARKED TO YOUR SPECIFICATIONS.

FIT-600
NEOPRENE

Irradiated Neoprene Shrinkable Tubing

MIL R-46846 TYPE 1, CLASS 1
MIL I-23053/1, AMS 3623

A highly flexible, durable, heavy wall, heat shrinkable neoprene tubing. Manufactured from a specially formulated neoprene that provides a unique combination of outstanding physical properties.

CHARACTERISTICS:
Rugged—highly abrasion resistant. Shrinks to approximately 50% size. Will not split or crack when shrunk over irregularly shaped objects. Inert.

SHRINKAGE RATIO:
To approximately 50% of original size when temperature of 175°C. (346 F.) is applied. Less than 10% longitudinal shrinkage.

APPLICATIONS:
Fabrication of in-house short-run cables and harnesses, prototypes, repairs, and where special protection from abrasion is required over individual wires or jacketed cables.

SPECIFICATIONS:
Minimum shrink temperature: 175°C. (346°F.) Tensile strength: 1,800 psi. Elongation: 250%. Dielectric strength: 300 volts/mil. Self-extinguishing. Resistant to fungus, chemicals, solvents.

DIMENSIONS CHART

Alpha No. and Size	Minimum I.D. Before Shrinkage (Inches)	Recovered I.D. After Shrinkage (Inches)	Nominal Wall Thickness (Inches)	Standard Put-up (Feet)
FIT-600-1 4	250	143	035	25 100
FIT-600-3 8	375	214	040	25 100
FIT-600-1 2	500	.286	.048	25.100
FIT-600-5.8	.625	375	.052	25.100
FIT-600-3.4	.750	.428	.057	25.100
FIT-600-7.8	.875	.500	.065	25.100
FIT-600-1	1 00	570	070	25 100
FIT-600-1-1.4	1 25	714	087	25 100
FIT-600-1-1/2	1.50	.857	.095	25.100
FIT-600-1-3/4	1.75	1.00	.107	25.100
FIT-600-2	2.00	1.14	.110	25.100
FIT-600-3	3.00	1.71	.125	25.50

PACKAGED ASSORTMENTS
Assorted Sizes of 6″ Lengths

Alpha No.	Tubing Size Range	Lengths Per Box
FIT-600 MS-1	1 4 -7 8′	12
FIT-600 MS-2	7/8″-3″	12

Stock Color: Black.

Heat Shrinkable Tubing

FIT-521

TERMINAL SLEEVES SHRINKS AND MELTS

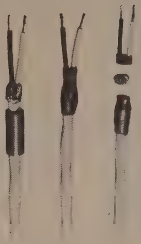
One Size Fits Most Applications / 4½ to 1 Shrinkage Ratio
Meltable Inner Wall Encapsulates Terminal in Tough Moisture-proof Sleeve

FIT-521 is a flame-retardant polyolefin tubing that has been selectively cross-linked. When heat of 135°C is applied, the inner wall melts while the outer wall shrinks down. As a result, terminal is completely encapsulated and insulated in a hard, tough, molding Because of its enlarged shrinkage ratio, FIT-521 may be used over irregularly shaped objects and easily slips over most common wire terminals, including ring, spade and lug types.

STANDARD PACKAGE					
4′ LENGTHS		CUT PIECES			
Tot. Ftg.	No. Lgths.	½″ Lgth. Tot. Ftg.	No. Pieces	1″ Lgth. Tot. Ftg.	No. Pieces
100′	25	25	600	25	300

CHARACTERISTICS
Tensile Strength, 1500 psi
Ult. Elongation, 200 min.
Spec. Gravity, 1.35 max.
Low Temp. Flex., no cracking at −55°C
Flammability, ASTMD - 876
Fungus, Solvent, Oil and Water Resistant

DIMENSIONS
Min. Expanded I.D. as Supplied, .315″
Max. Recovered I.D., .070″
Longitudinal Shrinkage, 15% max.
Standard Color, black
Nom. Rec. Wall, .055″



FIT-295

SEMI-RIGID TUBING

UL — SAE — AMS LISTED / For Maximum Strength At All Stress Points / MIL-1-23053/6

Alpha FIT-295 Shrinkable Tubing is designed to provide maximum mechanical strength at stress or connection points. An extremely strong, heavy wall, abrasion-resistant, extruded tubing FIT-295 is supplied in expanded form and easily slips over the object to be covered.

When a temperature of approximately 275°F (135°C) is applied, Alpha FIT-295 immediately returns to its predetermined size (approximately ½ smaller) and forms a permanent tight-fitting mechanical bond. Longitudinal shrinkage is less than 5% when completely recovered.

Controlled shrinkage to the correct predetermined size takes place within seven seconds at 275°F to 300°F.

DIMENSIONS CHART — Stock Color: Black

		(Dimen. in Inches)			(Dimen. in Feet)	
ALPHA No.	Size	Min. I.D. Before Shrinking	Recov'd I.D. Shrinking	Nom. Thick.	Standard Pkg.* 4′ Lgths. Tot. Ftg.	6″ Lgths. Tot. Ftg.
FIT-295-3/64	3/64	.046	.023	.020	100	20
FIT-295-1/16	1/16	.063	.032	.020	100	18
FIT-295-3/32	3/32	.093	.045	.020	100	16
FIT-295-1/8	1/8	.125	.063	.020	100	14
FIT-295-3/16	3/16	.187	.093	.025	100	12
FIT-295-1/4	1/4	.250	.125	.025	100	10
FIT-295-3/8	3/8	.375	.187	.030	100	8
FIT-295-1/2	1/2	.500	.250	.030	20	7

PACKAGED ASSORTMENTS

FIT-295-MS — Contains an assortment of 6″ lengths in all sizes. Every length identified as to size.

ALPHA No.	Tubing Size Range	Lengths Per Box
FIT-295-MS-1	3/64″ thru ½″ (8 sizes)	5 lengths per size (40 lengths)

FIT-200

TERMINAL INSULATION / 4 SIZES FIT MOST CONNECTORS / UL LISTED

Shrinks 2.3 to 1 (58% Shrinkage) / 125°C 600 Volts / Four Sizes Fit Most Electrical Connectors

FIT-200 is an irradiated semi-rigid industrial grade polyolefin that is designed primarily as a strain relief and insulation for electrical terminals of all types. FIT-200 is available in black only.
Because of its 58% shrinkage ratio, the four sizes of FIT-200 will easily fit over most of the common electrical terminations in use today.
FIT-200 shrinks at a temperature of 275°F to 300°F. Longitudinal shrinkage is 10% maximum, FIT-200 provides excellent insulation and mechanical relief and may be easily marked or cut to size.
Available in 4′ Lengths — 6″ Lengths or ready to use pre-cut 1″ pieces.

DIMENSIONS CHART

	(Dimen. in Inches)			Recommended Terminal Sizes (Inches)		Standard Pkgs. (Dimen. in Feet)		
ALPHA No.	Min. Expanded I.D.	Max. Recov'd I.D.	Nom. Recov'd Wall	Ring, Spade Male Disconnect Width Up To	Female Disconnect	4′ Lgths. Tot. Ftg.	6″ Lgths. Tot. Ftg.	Cut Pieces 1″ Lgths. Tot. Ftg.
FIT-200-1	.220	.095	.025	.220	1/8	100	12	15
FIT-200-2	.300	.125	.025	.300	3/16	100	10	12
FIT-200-3	.350	.150	.027	.350	1/4	100	8	10
FIT-200-4	.460	.200	.030	.460	3/8	20	7	8

PACKAGED ASSORTMENTS: FIT-200-MS-1, 120, 1″ cut pieces, all sizes — FIT-200-MS-2, 60, 6″ lengths, all sizes

ALPHA WIRE CORPORATION

Heat Shrinkable Tubing

FIT-350

IRRADIATED KYNAR TUBING

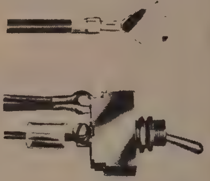
MIL-I-23053-4 / UL, SAE, AMS Listed

High Temperature Tubing. Clear and non-flammable. A tough, thin wall tubing with outstanding cut-through and abrasion resistance. Semi-rigid polyvinylidene fluoride.

DIMENSIONS CHART — Stock Color: Clear

	(Dimen. in Inches)			Standard Pkg.	
ALPHA No.	Minimum I.D. Before Shrinking	Recovered I.D. After Shrinking	Recovered Nom. Wall Thickness	4′ Lgths. Tot. Ftg.	6″ Lgths. Tot. Ftg.
FIT-350-3/64	.046	.023	.010	100	16
FIT-350-1/16	.063	.031	.010	100	14
FIT-350-3/32	.093	.046	.010	100	12
FIT-350-1/8	.125	.062	.010	100	10
FIT-350-3/16	.187	.093	.010	100	8
FIT-350-1/4	.250	.125	.012	100	6
FIT-350-3/8	.375	.187	.012	100	4
FIT-350-1/2	.500	.250	.012	20	2
FIT-350-3/4	.750	.375	.017	20	1
FIT-350-1	1.000	.500	.019	20	.5

Standard Package: FIT-350 tubing is available only in the specified packages. When ordering, indicate package desired (6″ or 4′).



FIT-500

HIGH TEMPERATURE TEFLON

— CONFORMS TO: MIL-I-23053/12

Continuous Operating Range −67°C, +250°C / Outstanding Chemical and Solvent Resistance
Non-Flammable / High Mechanical Strength and Lowest Coefficient of Friction

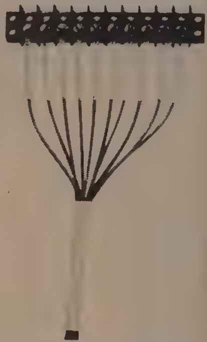
FIT-500 heat shrinkable tubing has the same high resistance to chemical and corrosive agents as ordinary Teflon tubing (Alpha TFT-200 and TFT-250). It is non-burning non-corrosive and has excellent electrical characteristics that remain stable throughout its electrical range.

When a temperature of 327°C is applied to FIT-500, the tubing shrinks to approximately 65% of its supplied size returning to its original pre-determined diameter. Longitudinal shrinkage is less than 10%.

FIT-500 forms a tight, flexible, protective covering for wires, and electronic components, is recommended for use as a mechanical shield and is ideal for friction-proofing.

DIMENSIONS CHART — Stock Color: Natural

	(Dimen. in Inches)			
ALPHA No.	Min. I.D. Before Shrinking	Recov'd I.D. After Shrinking	Nom. Recov'd Wall Thick.	Standard Pkg. 2′ Lgths. Tot. Ftg.
FIT-500-30	.030	.022	.009	100
FIT-500-28	.035	.025	.009	100
FIT-500-26	.040	.028	.010	100
FIT-500-24	.050	.032	.010	100
FIT-500-22	.055	.037	.010	100
FIT-500-20	.060	.044	.012	100
FIT-500-18	.076	.052	.012	100
FIT-500-16	.093	.063	.012	100
FIT-500-14	.121	.078	.012	100
FIT-500-12	.153	.096	.012	50
FIT-500-10	.191	.116	.012	50
FIT-500- 8	.240	.144	.015	50
FIT-500- 6	.302	.178	.015	20
FIT-500- 4	.370	.224	.015	20
FIT-500- 2	.340	.278	.015	20
FIT-500- 0	.470	.347	.015	20



FIT-400

FEP. TEFLON REQUIRES LESS HEAT / 400°C OPERATING TEMPERATURE

Shrinkage Ratio, 2:1 (50% Shrinkage) / Designed for Use with Heat-Sensitive Components

All of the outstanding electrical, chemical and mechanical advantages of Teflon* tubing are now available in FEP tubing, without the drawback of high shrinkage temperature requirements.

Heat-sensitive components, solid state devices, solder joints, may now be insulated with FEP Teflon* without damage. FEP tubing is applied as a natural, transparent tubing and requires heat of 200°F-350°F to shrink.

PACKAGED ASSORTMENTS
Assorted Sizes of 6″ Lengths

ALPHA No.	Tubing Size Range	Lengths Per Box
FIT-400-MS-1	24-9	18
FIT-400-MS-2	8-0	18

FEP TEFLON TUBING

DIMENSIONS CHART — Stock Color: Natural

		(Dimen. in Inches)			
ALPHA No.	Size (AWG)	Expanded Inside Dia.	Recov'd Inside Dia.	Nom. Wall Thick.	Standard† Pkg. (Feet)
FIT-400-24	24	.032	.027	.008	100
FIT-400-22	22	.037	.032	.008	100
FIT-400-20	20	.046	.039	.008	100
FIT-400-18	18	.061	.049	.008	100
FIT-400-16	16	.076	.061	.009	100
FIT-400-14	14	.093	.072	.009	100
FIT-400-12	12	.116	.089	.009	100
FIT-400-10	10	.142	.114	.010	100
FIT-400-9	9	.159	.124	.010	100
FIT-400-8	8	.181	.143	.010	100
FIT-400-7	7	.198	.158	.011	100
FIT-400-6	6	.227	.180	.011	100
FIT-400-5	5	.249	.198	.011	100
FIT-400-4	4	.292	.226	.011	100
FIT-400-3	3	.312	.249	.011	100
FIT-400-2	2	.367	.280	.012	100
FIT-400-1	1	.400	.311	.012	100
FIT-400-0	0	.442	.349	.012	100

†Lengths

Sizes 24 — 6-random lengths, min. 3′ each
Sizes 5 — 0-random lengths, min. 1′ each

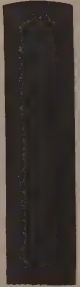
FIT-100

NON-IRRADIATED — INDUSTRIAL GRADE — ECONOMICALLY PRICED

FIT-100 is a flexible, thin-wall PVC tubing that shrinks to 50% of its diameter when heated to 200°F. After shrinking, FIT-100 forms a smooth, tight-fitting mechanical and electrical insulation. FIT-100 has high strength and good dielectric properties and resists most chemicals and oils. The material is resistant to sunlight, moisture and fungus. Longitudinal shrinkage is 20%.

DIMENSIONS CHART — Stock Colors: Black and Clear

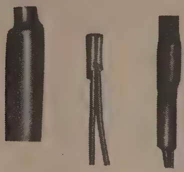
	(Dimen. in Inches)		
ALPHA No.	Expanded I.D.	Recovered I.D.	Recovered Wall Thick.
FIT-100-1/8″	.125	.063	.025
FIT-100-3/16″	.188	.093	.025
FIT-100-1/4″	.250	.125	.025
FIT-100-3/8″	.375	.187	.025
FIT-100-1/2″	.500	.250	.025
FIT-100-3/4″	.750	.375	.025
FIT-100-1″	1.00	.500	.025

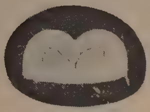


ALPHA WIRE CORPORATION

Heat Shrinkable Tubing Products — Fit® Caps and Boots

FIT-CAP-P





FIT-CAP-P COMPLETELY POTS CONNECTIONS / ASSURES ABSOLUTE ELECTRICAL PROTECTION

Type P potting FIT-CAPS offer an inexpensive method of encapsulating crimped electrical connections. When heated with any Alpha heat tool, the outer jacket quickly shrinks, forcing the meltable inner wall to flow into every irregularity of the crimp.

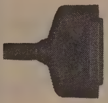
Absolute electrical protection is assured since it is impossible to produce Type P caps with pinholes or weak areas. Type P caps have proven quick and easy to apply in comparison with tape wrapping and slip-on tubing. P-Caps can be applied in half the time as consumed by other insulating methods.

Typical Dielectric Strength — 1100 volts per MIL. **Volume Resistivity — 10^{16} ohm-cm. minimum.**

DIMENSIONS CHART — Stock Color: Black — Standard Package: 100, 1000 Pieces

ALPHA No.	(Dimen. in Inches) Overall Length	I.D. Before Shrinking	Recovered I.D.	Nominal Thickness
CAP-P-1/8	.875	.125	.023	.045
CAP-P-3/16	1.060	.187	.060	.062
CAP-P-1/4	1.120	.250	.080	.078
CAP-P-3/8	1.375	.375	.090	.082
CAP-P-1/2	1.500	.500	.090	.100

FIT-BOOTS



FIT-BOOTS — FOR D-SUBMINIATURE CONNECTORS* SHRINKS TIGHT OVER CONNECTOR SHELLS

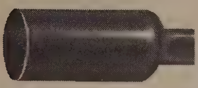
Designed specifically for subminiature rectangular connectors manufactured by ITT-CANNON, CINCH and Amphenol-Borg. FIT-BOOTS replace metal molds and plotting forms used on molded harnesses. FIT-BOOTS provide a strain relief, a convenient handle, and seal out contaminents. The boots are molded of a heat shrinkable, modified polyolefin compound with excellent physical and electrical properties. Any Alpha Heat Gun may be used to shrink boots.

* T.M. I.T.T. — CANNON

DIMENSIONS CHART

	TOP ENTRY Fits		END ENTRY Fits		SIDE ENTRY Fits	
ALPHA No.	Cannon-Cinch	Amphenol Series-17	ALPHA No.	Cannon-Cinch	ALPHA No.	Cannon-Cinch
FIT-BOOT-1	DE-9	XX09X	FIT-BOOT-6	DE-9	FIT-BOOT-11	DE-9
FIT-BOOT-2	DA-15	XX15X	FIT-BOOT-7	DA-15	FIT-BOOT-12	DA-15
FIT-BOOT-3	DB-25	XX25X	FIT-BOOT-8	DB-25	FIT-BOOT-13	DB-25
FIT-BOOT-4	DC-37	XX37X	FIT-BOOT-9	DC-37	FIT-BOOT-14	DC-37
FIT-BOOT-5	DD-50	XX50X	FIT-BOOT-10	DD-50	FIT-BOOT-15	DD-50

FIT-CAPS



IRRADIATED POLYOLEFIN FIT-CAPS

Made of flame resistant, extremely tough, abrasion-resistant polyolefin tubing, the caps shrink and seal the ends of one or more wires, making a firmly encapsulated, moisture-resistant termination. Controlled shrinkage to the correct predetermined size takes place within seven seconds at 275°F to 300°F. Shrinkage Ratio 2:1.

DIMENSIONS CHART — Standard Package: 100, 1000 Pieces

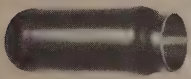
ALPHA No.	(Dimen. in Inches) Min. I.D. Before Shrinking	Recovered I.D. After Shrinking	Nominal Wall Thickness	Nominal Length	Stock Colors
CAP-1	.063	.025	.016	3/4	White
CAP-2	.125	.050	.020	1	Red
CAP-3	.250	.100	.025	1 1/4	Slate
CAP-5	.350	.175	.035	1 1/3	Brown
CAP-4	.500	.250	.040	1 1/2	Black

SELF-ENCAPSULATING FIT-CAPS

Molded caps are made of a molded, heat shrinkable, cross-linked polyolefin with two inserts. The insert at the closed end of the cap melts and flows between the splice forming a moisture proof encapsulation. The insert near the open end acts as a dam, preventing the molten material from flowing out beyond the cap. Cap shrinks and melts at 275°F.

DIMENSIONS CHART — Stock Color: Black — Standard Package: 10, 25 Pieces

ALPHA No.	(Dimen. in inches) Min. I.D. Before Shrinking	Recovered I.D. After Shrinking	Nominal Inner Wall Thickness	Nominal Outer Wall Thickness	Nominal Length
CAP-11	.160	.080	.013	.040	1.12
CAP-12	.250	.120	.020	.050	1.25
CAP-15	.360	.180	.030	.060	1.50



MOLDED FIT-CAPS

Alpha molded FIT-CAPS are made of molded polyolefin that shrinks when heated (275°F) to a predetermined size and shape. Molded FIT-CAPS provide a tough, abrasion resistant outer covering for wire and cable terminations. Shrinkage ratio, 2:1.

DIMENSIONS CHART — Stock Color: Black — Standard Package: 10, 25 Pieces

ALPHA No.	(Dimen. in inches) Min. I.D. Before Shrinking	Recovered I.D. After Shrinking	Nominal Wall Thickness	Nominal Length
CAP-21	.16	.08	.04	1.12
CAP-22	.25	.12	.05	1.15
CAP-22	.36	.18	.06	1.40
CAP-24	.50	.25	.07	1.87
CAP-25	.75	.37	.08	2.70
CAP-26	1.00	.50	.09	3.50
CAP-27	1.50	.75	.10	4.00
CAP-28	2.00	1.00	.11	4.50

ALPHA WIRE CORPORATION

MOISTURE RESISTANT FEEDTHROUGH SEAL

IRRADIATED HEAT SHRINKABLE TUBING

MEETS MIL-1-81765, MIL-E-917, MIL-STD-454

- **Only five sizes covers cables from .38"—2½"**
- **Reduces installation time and costs**

Alpha's FIT-Seals are a molded heat-shrinkable part that provides a moisture-proof, strain-relieved feedthrough with maximum simplicity and reliability.

FIT-Seals may be used for ship-board, aircraft, instrument electrical, control box, or cabinet applications. The FIT-Seal replaces more complex feedthroughs that require many sizes to cover a complete range and several parts. Fit-Seals may be used with plastic jacketed or armored cables or piping. The seal contains two parts, a sealing boot and a retaining ring. Installation requires access to only one side of an enclosure and quick shrinkage may be accomplished with any Alpha heat-gun.

Heat causes the molded boot to shrink tightly against the cable while a pre-coated adhesive melts and flows to fill all voids and establish a moistureproof seal.

Performance meets or exceeds requirements established for U.S. Navy and Coast Guard Vessels.

FIT-JACS

Fit-Jacs are preformed shapes that provide excellent mechanical, environmental and electrical protection for solid state devices. A convenient and easy way to protect delicate and valuable components. Fit-Jacs shrink instantly to their predetermined size and configuration when only the extended lower "skirt" is heated. Shrinking may be accomplished by use of hot air gun or soldering iron.

Fit-Jac material remains clear after shrinkage so that printed nomenclature on devices may easily be identified.

SPECIFICATIONS:

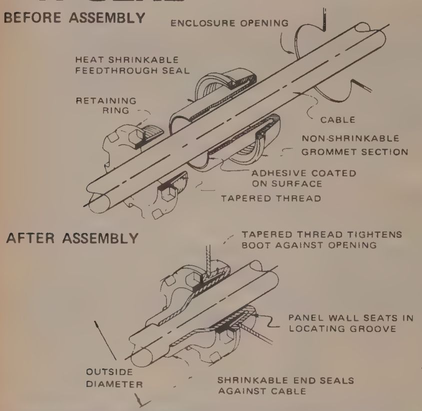
Fit-Jac 1-5

Operating Temp.: 135°C; Dielectric Strength: 1300V/Mil; Shrink Temp.: 275°F.

Fit-Jac 6, 7

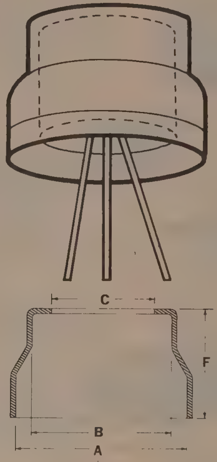
Operating Temp.: 175°C; Dielectric Strength 1500V/Mil; Shrink Temp.: 350°F.

FIT-SEAL


BEFORE ASSEMBLY
ENCLOSURE OPENING
HEAT SHRINKABLE FEEDTHROUGH SEAL
RETAINING RING
CABLE
NON-SHRINKABLE GROMMET SECTION
ADHESIVE COATED ON SURFACE
TAPERED THREAD
AFTER ASSEMBLY
TAPERED THREAD TIGHTENS BOOT AGAINST OPENING
PANEL WALL SEATS IN LOCATING GROOVE
OUTSIDE DIAMETER
SHRINKABLE END SEALS AGAINST CABLE

ALPHA NO.	CABLE O.D. RANGE (inches)	DRILLED OR PUNCHED HOLE
FIT-SEAL-2	.38 - .70	1.285 ± .030
FIT-SEAL-3	.65 - 1.05	1.750 ± .030
FIT-SEAL-4	1.00 - 1.35	2.055 ± .030
FIT-SEAL-5	1.28 - 1.80	2.930 ± .030
FIT-SEAL-6	1.77 - 2.50	3.808 ± .030

Standard Package: One seal per box



ALPHA NO.	DESIGNED TO INSULATE	MA-TERIAL	A +.015	B +.015	C Max.	F +.025
FIT-JAC 1	DIODE-P2-X	FIT-295	.410	.290	.215	.400
FIT-JAC 2	JEDEC TO-5	FIT-295	.410	.335	.250	.345
FIT-JAC 3	JEDEC TO-18	FIT-295	.255	.200	.150	.260
FIT-JAC 4	JEDEC TO-39	FIT-295	.410	.325	.250	.250
FIT-JAC 5	JEDEC TO-99	FIT-295	.410	.335	.250	.265
FIT-JAC 6	JEDEC TO-5	FIT-350	.410	.335	.250	.345
FIT-JAC 7	JEDEC TO-18	FIT-350	.255	.200	.150	.260

Standard Package: 100 pieces

FIT-KITS

THE IDEAL R & D, OR PROTOTYPE SAMPLERS

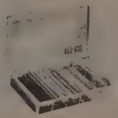
FIT-KIT-1

Contains more than 70 - 6" lengths of 7 widely used types of Fit-Tubing in a variety of colors. A compartmented clear plastic box allows easy storage and quick identification. KIT-1 includes lengths of FIT-105, FIT-221, FIT-295, FIT-300, 350, FIT-CAPS and FIT MARKERS. Box measures 6½" x 11" x 2".

FIT-KIT-2

Contains all the items in FIT-KIT-1 **plus** 6" lengths of FIT-200, FIT-400, FIT-500, FIT-600, FIT-700, and 1" cut pieces of FIT-200 and FIT-521. This kit is the complete engineering, prototype, or laboratory inventory of all Alpha Fit-Tubing products.

KIT-2 consists of two 6½" x 11" x 2" compartmented clear plastic boxes packed in cardboard sleeve.



ALPHA WIRE CORPORATION

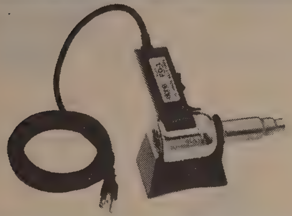
Miniature Hot Air Gun FG-1

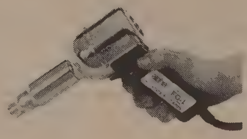
A new miniature heat gun that has been developed for shrinking all fit tubing. A durable, electric motor driven unit that delivers a high volume of air to the nozzle. Easily replaceable heat elements. 3 position rocker switch. Lightweight — Use as bench or hand unit. Heating element, part no. HS-1 is easily replaced.

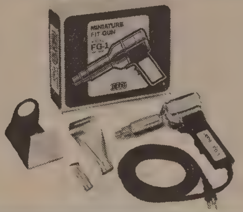
AMPERAGE RATING — 7
OPERATING VOLTAGE — 115 AC
WEIGHT OF GUN — 1½ lbs.

TYPICAL TEMPERATURES
175°C (347°F) without adapter
205°C (401°F) with adapter only
230°C (446°F) with tubing reflector
Temperatures will vary with fluctuations in line voltage.

Operation: For optimum shrinking, an initial 60-second warm-up time is recommended. For longer element life, run 30-seconds with cooling on, before switching gun off.







Hot Air Gun

TURBO FAN — PROVIDES TEMPERATURES UP TO 1000°F. HG-1 TO 500° F HG-2 750° TO 1000°F.

DESCRIPTION:
Flameless, quiet operating, hot air torches that may be used for portable operations or secured permanently to a bench by means of a mounting bracket.
Heavy duty construction to withstand continuous operation use, the HG-1 is the recommended tool for shrinking ALL FIT tubing, except FIT 500 Teflon tubing. Both have adjustable air intake to control temperature and a double jacketed housing of die cast aluminum. Equipped with an 8 ft. neoprene jacketed 3-wire cord and plug and adaptor for 2 prong receptacle.

HG-1 & HG-2

SPECIFICATIONS:	
Voltage	115v, AC/DC
Amperage	14 amp
Air Volume	35 CFM at 3000 FPM velocity
Overall height	8″
Nozzle length	4″
Overall length	11″
Nozzle diameter	1 5/32″
Base plate	5¾″ each side (triangular shaped)
Power cord	8′ neoprene jacketed 3 conductor cord with adaptor for 2 prong receptacle.

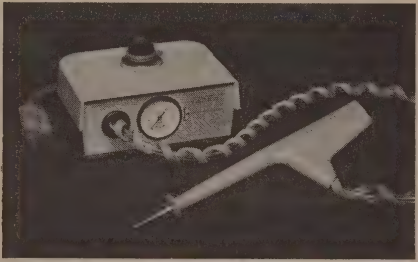
Hot Air Pencil FG-4

CONTROLS AIRFLOW TEMPERATURE, VELOCITY AND DIRECTION

Designed specifically for precise selective heating of smaller diameter tubing and sleeves. Heat may be concentrated exactly where it is required resulting in labor saving installation and repair.

Allows operator to work in crowded circuit areas without damaging heat-sensitive components and wire with a minimum of fatigue. Utilizes factory or shop compressed air supply.

Unit complete with stand, regulator, needle point tip, sleeve reflector, and tubing reflector.
Input Power — 120 VAC, 4 AMP.
Airflow — 60 PSIG MIN., 4 CFM.



HOT AIR PENCIL FG-4

Infra-Red Heat Gun FG-5

SHRINKS TUBING SAFELY — IN SECONDS!
UTILIZES INFRARED ENERGY — NO MOVING PARTS — NOISELESS

Used for all shrinkable tubing products. Just press the switch and a burst of infrared energy shrinks tubing in seconds. May be used as a hand gun or as a permanent bench tool. Ellipsoidal reflector focuses heat from a quartz iodine lamp onto the tubing. Most of visible light is optically filtered to eliminate eyestrain. Reflectors designed to allow operator to observe the entire shrinking process, minimizing faulty installation.

The gun is noiseless, light-weight and eliminates annoying heat buildup. Unit comes with easily interchangeable tubing reflectors and small sleeve reflector. Replacement parts are readily available.

Input Power — 105-120 VAC, 50-60 HZ, 4.2 AMP.
Normal Lamplife — More than 1000 hours (intermittent).
Weight — 1.6 lbs.

Flame Torch Kit FG-10

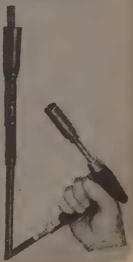
IDEAL PROPANE TORCH FOR IN-FIELD USE
SUPPLIES SOFT YELLOW FLAME FOR SHRINKING TUBING WITHOUT DAMAGE

The FG-10 flame torch has been specifically designed for shrinking tubing without scorching or damaging encapsulated material, wire or cable. The FG-10 provides a flame of even temperature without the hard blue flame present in ordinary propane units.

FG-10 Includes:
- 1 — Pistol grip torch.
- 1 — Valve assembly with control knob for attachment to ordinary propane bottle (not supplied). Assembly includes belt clip and torch holding hook.
- 1 — 6′ L.P.G. propane hose*.

> NOTE:
> FG-10 Flame Torch, as all flame devices, should be used only where safety regulations and working conditions permit.

*(Other lengths of L.P.G. hose may be used. Available from local suppliers.)



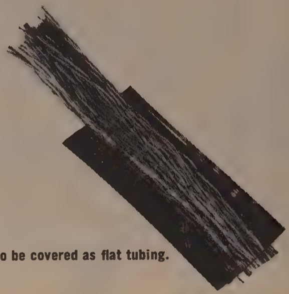
ALPHA WIRE CORPORATION

Alpha Zipper Tubing

UL Recognized Component — Easy To Use
Ideal for Prototypes — Short Run Cables
Adds Extra Mechanical Protection
Eliminates Tape-Wrapping or Other "Make-Do" Jacketing Material

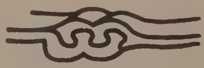
Alpha zipper tubing allows you to jacket any group of wires or cables in just seconds. It is the ideal jacketing material for all short run and prototype cable applications. Zipper tubing is ideal for use in the plant, on the job, in the field or anywhere where extra protection or a short run or prototype cable jacket is needed.

Zipper tubing is supplied on a spool and consists of a plastic jacket with matching tracks on each side. When the zipper tubing is formed into a circular shape, the two tracks at each end interlock to form a continuous and circling cable jacket. Closure of zipper tubing is simplified by use of a slide that matches the track and will lock continuously as it is pulled. The end result is a permanent jacket or protective cover.


Place wire to be covered as flat tubing.

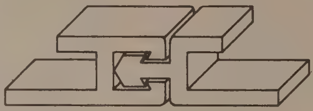
Standard Track

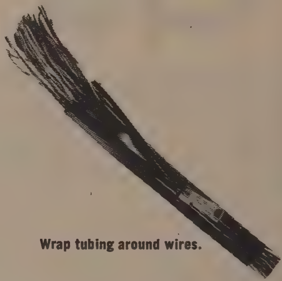
Standard track allows the material to be easily opened at any point to make breakouts, or bring other lines into the cable line being jacketed.



Loc-Trac®

Alpha has developed a new type of track, Loc-Track®, that provides a permanent, flex-resistant seal. This track will not pop open even when the jacketed material is bent in a U-shape. It requires no sealant or any adhesive to hold together.




Wrap tubing around wires.

Specifications for all types of Alpha Zipper Tubing

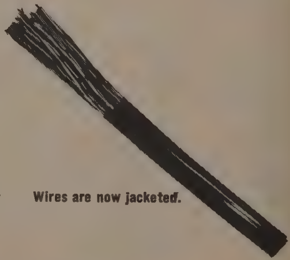
Material:	Polyvinylchloride
Track Thickness (when closed):	Std. .095" Loc-Trac® .150
Dielectric Strength V/mil:	759
Tensile Strength P.S.I.:	3810
Ultimate Elongation:	255%
Operating Temperature Upper Limit:	106°C
Cold Brittleness:	−86°C
Fungus-proof:	Will Not Support Fungus
Flammability:	Self-extinguishing
Lateral Pull Strength (unsealed):	42.7 pounds/inch
Lateral Pull Strength (permanently sealed):	59.8 pounds/inch

Zip up with slider provided.

Accessories

PB-200 (Seals Standard Track Zipper Tubing) —Special Compound Liquid Sealer. Available in sizes: 1 oz., 2 oz., 4 oz., 1 pt., 1 pt., 1 gal. Each container is supplied with a brush for easy application of the sealer. 4 oz. of PB-200 will seal approximately 1000 ft.

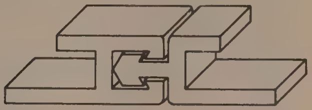
AB-295 — Standard Track. **AB-395** Loc-Trac® Metal Sliders. 1 supplied free with every 25 feet. Additional sliders may be ordered separately.


Wires are now jacketed.

ALPHA WIRE CORPORATION

Zipper Tubing

LOC-TRAC®



Loc-Trac® ZIP-41 All Purpose

MIL-I-631 D/C PVC TUBING—20° C—+105° C .020 WALL THICKNESS

Alpha No.	Diameter (Inches)	Approx. Flat Width (Inches)	Stock Colors
ZIP-41-1/2"	1/2	2	Clear, Black
ZIP-41-5/8"	5/8	2-3/8	Clear, Black
ZIP-41-3/4"	3/4	2-3/4	Clear, Black
ZIP-41-7/8"	7/8	3-1/8	Clear, Black
ZIP-41-1"	1	3-9/16	Clear, Black
ZIP-41-1-1/8"	1-1/8	3-15/16	Clear, Black
ZIP-41-1-1/4"	1-1/4	4-1/8	Clear, Black
ZIP-41-1-1/2"	1-1/2	4-7/8	Clear, Black
ZIP-41-1-3/4"	1-3/4	5-5/8	Clear, Black
ZIP-41-2"	2	6-3/8	Clear, Black
ZIP-41-2-1/4"	2-1/4	7-1/2	Clear, Black
ZIP-41-2-1/2"	2-1/2	8-1/4	Clear, Black
ZIP-41-2-3/4"	2-3/4	9-1/8	Clear, Black
ZIP-41-3"	3	10	Clear, Black
ZIP-41-3-1/4"	3-1/4	10-3/4	Clear, Black
ZIP-41-3-1/2"	3-1/2	11-1/2	Clear, Black
ZIP-41-3-3/4"	3-3/4	12-1/4	Clear, Black
ZIP-41-4"	4	13	Clear, Black

Standard Put-up: 100 Ft., 50 Ft., 25 Ft.

Loc-Trac® ZIP-41M Heavy Duty

MIL-I-631 D/C PVC TUBING—20° C—+105° C .040 WALL THICKNESS

Alpha No.	Diameter (Inches)	Approx. Flat Width (Inches)	Stock Colors
ZIP-41M-1/2"	1/2	2	Clear, Black
ZIP-41M-5/8"	5/8	2-3/8	Clear, Black
ZIP-41M-3/4"	3/4	2-3/4	Clear, Black
ZIP-41M-7/8"	7/8	3-1/8	Clear, Black
ZIP-41M-1"	1	3-9/16	Clear, Black
ZIP-41M-1-1/8"	1-1/8	3-15/16	Clear, Black
ZIP-41M-1-1/4"	1-1/4	4-1/8	Clear, Black
ZIP-41M-1-1/2"	1-1/2	4-7/8	Clear, Black
ZIP-41M-1-3/4"	1-3/4	5-5/8	Clear, Black
ZIP-41M-2"	2	6-3/8	Clear, Black
ZIP-41M-2-1/4"	2-1/4	7-1/2	Clear, Black
ZIP-41M-2-1/2"	2-1/2	8-1/4	Clear, Black
ZIP-41M-2-3/4"	2-3/4	9-1/8	Clear, Black
ZIP-41M-3"	3	10	Clear, Black
ZIP-41M-3-1/4	3-1/4	10-3/4	Clear, Black
ZIP-41M-3-1/2"	3-1/2	11-1/2	Clear, Black
ZIP-41M-3-3/4"	3-3/4	12-1/4	Clear, Black
ZIP-41M-4"	4	13	Clear, Black

Standard Put-up: 100 Ft.

Loc-Trac® ZIP-60 Foil Shielded

ALUMINUM FOIL LAMINATED BETWEEN PVC JACKETS

MIL-I-631 D/C PVC TUBING—20° C—+105° C .020 WALL THICKNESS

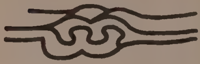
Alpha No.	Diameter (Inches)	Approx. Flat Width (Inches)	Stock Colors
ZIP-60-1/2"	1/2	2	Gray
ZIP-60-5/8"	5/8	2-3/8	Gray
ZIP-60-3/4"	3/4	2-3/4	Gray
ZIP-60-7/8"	7/8	3-1/8	Gray
ZIP-60-1"	1	3-9/16	Gray
ZIP-60-1-1/8"	1-1/8	3-15/16	Gray
ZIP-60-1-1/4"	1-1/4	4-1/8	Gray
ZIP-60-1-1/2"	1-1/2	4-7/8	Gray
ZIP-60-1-3/4"	1-3/4	5-5/8	Gray
ZIP-60-2"	2	6-3/8	Gray
ZIP-60-2-1/4"	2-1/4	7-1/2	Gray
ZIP-60-2-1/2"	2-1/2	8-1/4	Gray
ZIP-60-2-3/4"	2-3/4	9-1/8	Gray
ZIP-60-3"	3	10	Gray
ZIP-60-3-1/4"	3-1/4	10-3/4	Gray
ZIP-60-3-1/2"	3-1/2	11-1/2	Gray
ZIP-60-3-3/4"	3-3/4	12-1/4	Gray
ZIP-60-4"	4	13	Gray

Standard Put-up: 100 Ft.

ALPHA WIRE CORPORATION

Zipper Tubing

STANDARD TRACK



Standard ZIP-31 All Purpose

MIL-I-631 D/C PVC TUBING—20°C—+105°C .020 WALL THICKNESS

Alpha No.	Diameter (Inches)	Approx. Flat Width (Inches)	Stock Colors
†ZIP-31-1/4"	1/4	1-15/16	Clear, Black
†ZIP-31-3/8"	3/8	1-5/8	Clear, Black
ZIP-31-1/2"	1/2	2	Clear, Black
ZIP-31-5/8"	5/8	2-3/8	Clear, Black
ZIP-31-3/4"	3/4	2-3/4	Clear, Black
ZIP-31-7/8"	7/8	3-1/8	Clear, Black
ZIP-31-1"	1	3-9/16	Clear, Black
ZIP-31-1-1/8"	1-1/8	3-15/16	Clear, Black
ZIP-31-1-1/4"	1-1/4	4-1/8	Clear, Black
ZIP-31-1-1/2	1-1/2	4-7/8	Clear, Black
ZIP-31-1-3/4"	1-3/4	5-5/8	Clear, Black

Alpha No.	Diameter (Inches)	Approx. Flat Width (Inches)	Stock Colors
ZIP-31-2"	2	6-3/8	Clear, Black
ZIP-31-2-1/4"	2-1/4	7-1/2	Clear, Black
ZIP-31-2-1/2"	2-1/2	8-1/4	Clear, Black
ZIP-31-2-3/4"	2-3/4	9-1/8	Clear, Black
ZIP-31-3"	3	10	Clear, Black
ZIP-31-3-1/4"	3-1/4	10-3/4	Clear, Black
ZIP-31-3-1/2"	3-1/2	11-1/2	Clear, Black
ZIP-31-3-3/4"	3-3/4	12-1/4	Clear, Black
ZIP-31-4"	4	13	Clear, Black

Standard Put-up: 25 Ft./50 Ft./100 Ft.

Standard ZIP-31M Heavy Duty

MIL-I-631 D/C PVC TUBING—20°C—+105°C .040 WALL THICKNESS

Alpha No.	Diameter (Inches)	Approx. Flat Width (Inches)	Stock Colors
†ZIP-31M-1/4"	1/4	1-5/16	Clear, Black
†ZIP-31M-3/8"	3/8	1-5/8	Clear, Black
ZIP-31M-1/2"	1/2	2	Clear, Black
ZIP-31M-5/8"	5/8	2-3/8	Clear, Black
ZIP-31M-3/4"	3/4	2-3/4	Clear, Black
ZIP-31M-7/8"	7/8	3-1/8	Clear, Black
ZIP-31M-1"	1	3-9/16	Clear, Black
ZIP-31M-1-1/8"	1-1/8	3-15/16	Clear, Black
ZIP-31M-1-1/4"	1-1/4	4-1/8	Clear, Black
ZIP-31M-1-1/2"	1-1/2	4-7/8	Clear, Black
ZIP-31M-1-3/4"	1-3/4	5-5/8	Clear, Black

Alpha No.	Diameter (Inches)	Approx. Flat Width (Inches)	Stock Colors
ZIP-31M-2"	2	6-3/8	Clear, Black
ZIP-31M-2-1/4"	2-1/4	7-1/2	Clear, Black
ZIP-31M-2-1/2"	2-1/2	8-1/4	Clear, Black
ZIP-31M-2-3/4"	2-3/4	9-1/8	Clear, Black
ZIP-31M-3"	3	10	Clear, Black
ZIP-31M-3-1/4"	3-1/4	10-3/4	Clear, Black
ZIP-31M-3-1/2"	3-1/2	11-1/2	Clear, Black
ZIP-31M-3-3/4"	3-3/4	12-1/4	Clear, Black
ZIP-31M-4"	4	13	Clear, Black

Standard Put-up: 100 Ft.

Standard ZIP—50 Foil Shielded

ALUMINUM FOIL LAMINATED BETWEEN PVC JACKETS
MIL-I-631 D/C PVC TUBING—20°C—+105°C .020 WALL THICKNESS

Alpha No.	Diameter (Inches)	Approx. Flat Width (Inches)	Stock Colors
†ZIP-50-1/4"	1/4	1-5/16	Gray
†ZIP-50-3/8"	3/8	1-5/8	Gray
ZIP-50-1/2"	1/2	2	Gray
ZIP-50-5/8"	5/8	2-3/8	Gray
ZIP-50-3/4"	3/4	2-3/4	Gray
ZIP-50-7/8"	7/8	3-1/8	Gray
ZIP-50-1"	1	3-9/16	Gray
ZIP-50-1-1/8"	1-1/8	3-15/16	Gray
ZIP-50-1-1/4"	1-1/4	4-1/8	Gray
ZIP-50-1-1/2"	1-1/2	4-7/8	Gray
ZIP-50-1-3/4"	1-3/4	5-5/8	Gray

Alpha No.	Diameter (Inches)	Approx. Flat Width (Inches)	Stock Colors
ZIP-50-2"	2	6-3/8	Gray
ZIP-50-2-1/4"	2-1/4	7-1/2	Gray
ZIP-50-2-1/2"	2-1/2	8-1/4	Gray
ZIP-50-2-3/4"	2-3/4	9-1/8	Gray
ZIP-50-3"	3	10	Gray
ZIP-50-3-1/4"	3-1/4	10-3/4	Gray
ZIP-50-3-1/2"	3-1/2	11-1/2	Gray
ZIP-50-3-3/4"	3-3/4	12-1/4	Gray
ZIP-50-4"	4	13	Gray

Standard Put-up: 100 Ft.

†Because of small inside diameter, these sizes cannot be closed by using the slider. The tracks must be closed by manual pressure.
AVAILABLE IN 20 SIZES: 1/4" — 4"

ALPHA WIRE CORPORATION

PVC-105 Polyvinylchloride Plastic Tubing

UL LISTED ASTM D-876, D-9222 MIL-I-6310 TYPE F, FORM U, GRADE C, CLASS 1, CATEGORY 1

DESCRIPTION: The superior mechanical, thermal, and electrical properties of Alpha PVC-105, coupled with its economical cost have led to an ever increasing use of this all-purpose insulating material. Another major advantage of Alpha PVC-105 is its high degree of flexibility, which is maintained even under severe environmental conditions.

Rated for temperatures as high as 105°C, PVC-105 has a high dielectric strength that remains unaffected by increasing temperature throughout its range. PVC-105 maintains a high resistance to the agents of heat, oil, chemical corrosion and fungi with no loss in tensile strength, or flexibility. Other features include an exceptional resistance to abrasion and indefinite shelf life.

Alpha PVC-105 is compounded with first quality, non-migratory resinous type plasticizers. Carefully selected stabilizers and modifiers added in the manufacturing process, counteract chemical and environmental degradation. Under adverse conditions Alpha PVC-105 retains its flexibility which permits it to cling to and protect irregular shapes. An unusually simple to handle insulating material, PVC-105 "snakes" well under all environmental conditions.

APPLICATIONS: Designed and manufactured for general electronic, aircraft and electrical applications involving temperatures as high as 105°C. Especially useful to protect wires and cables subject to abrasion or where a flexible tubing with a high degree of resistivity to oil, chemicals or solvents is necessary.

Cut-Pieces

Pre-cut, ready to use tubing pieces in ½" and 1" lengths are available from stock. Cut pieces are available from stock in packages of 100, 500, 1000 pieces. When ordering specify Alpha number, add suffex CP, length of cut piece, ½" or 1" and quantity (100, 500, 1000).

DIMENSIONS CHART

ALPHA NO.	SIZE	NOM. INSIDE DIA. (Inch.)	NOM. WALL THICKNESS (Inch.)	STOCK COLORS	STANDARD PUT-UPS
PVC-105/24	24	.022	.013	1-6	100', — 1000' Spools
PVC-105/22	22	.027	.012	1-6	100', — 1000' Spools
PVC-105/20	20	.034	.016	1-6	100', — 1000' Spools
PVC-105/19	19	.038	.016	1-6	100', — 1000' Spools
PVC-105/18	18	.042	.016	1-6	100', — 1000' Spools
PVC-105/17	17	.047	.016	1-6	100', — 1000' Spools
PVC-105/16	16	.053	.016	1-6	100', — 1000' Spools
PVC-105/15	15	.059	.016	1-6	100', — 1000' Spools
PVC-105/14	14	.066	.016	1-6	100', 500', — Spools
PVC-105/13	13	.076	.016	1-6	100', 500', — Spools
PVC-105/12	12	.085	.016	1-6	100', 500', — Spools
PVC-105/11	11	.095	.016	1-6	100', 500', — Spools
PVC-105/10	10	.106	.016	1-6	100', 500', — Spools
PVC-105/9	9	.118	.020	1-6	100', 500', — Spools
PVC-105/8	8	.133	.020	1-6	100', 500', — Spools
PVC-105/7	7	.148	.020	1-6	100', 500', — Spools
PVC-105/6	6	.166	.020	1-6	100', 500', — Spools
PVC-105/5	5	.186	.020	1-6	100', 500', — Spools
PVC-105/4	4	.208	.020	1-6	100', 250', — Coils
PVC-105/3	3	.234	.020	1-6	100', 250', — Coils

ALPHA NO.	SIZE	NOM. INSIDE DIA. (Inch.)	NOM. WALL THICKNESS (Inch.)	*STOCK COLORS	STANDARD PUT-UPS
PVC-105/2	2	.263	.020	1-6	100', 250' Coils
PVC-105/1	1	.294	.020	1,2,3	100', 250' Coils
PVC-105/0	0	.330	.020	1,2,3	100', 250' Coils
PVC-105/5/16"	5/16"	.312	.025	1,2,3	100', 250' Coils
PVC-105/3/8"	3/8"	.375	.025	1,2,3	100', 250' Coils
PVC-105/7/16"	7/16"	.438	.025	1,2,3	100', — Coils
PVC-105/1/2" A	1/2"	.500	.025	1,2,3	100', — Coils
PVC-105/9/16"	9/16"	.562	.030	1,2,3	100', — Coils
PVC-105/5/8"	5/8"	.625	.030	1,2,3	100', — Coils
PVC-105/3/4"	3/4"	.750	.035	1,2,3	50', — Coils
PVC-105/7/8"	7/8"	.875	.035	1,2,3	50', — Coils
PVC-105/1"	1"	1.000	.035	1,2,3	50', — Coils
PVC-105/1 1/8"	1 1/8"	1.125	.035	1,2	50', — Coils
PVC-105/1 1/4"	1 1/4"	1.250	.040	1,2	50', — Coils
PVC-105/1 3/8"	1 3/8"	1.375	.040	1,2	50', — Coils
PVC-105/1 1/2"	1 1/2"	1.500	.045	1,2	50', — Coils
PVC-105/1 3/4"	1 3/4"	1.750	.055	1,2	50', — Coils
PVC-105/2"	2"	2.000	.060	1,2	50', — Coils
PVC-105/2 1/4"	2 1/4"	2.250	.065	1,2	50', — Coils
PVC-105/2 1/2"	2 1/2"	2.500	.070	1,2	50', — Coils

* STOCK COLORS 1—Clear 2—Black 3—White 4—Yellow 5—Red 6—Green

*UL FILE NO. ON REQUEST

PVC-80 Extruded Low Temperature Vinyl Tubing

LOW TEMPERATURE VINYL — MIL-I-7444C CLASS I, TYPE I (Clear), TYPE III (Black) −67.8°C TO +80°C

PVC-80 tubing maintains its flexibility and brittleness resistance to −67.8°C. An ideal insulating material where adverse temperatures and weathering conditions prevail. It is easily marked and cut. Has good corrosion resistance and fungus resistant characteristics.

CHARACTERISTICS: Operating temp. −67.8°C to +80°C. Highly flexible. High cut-through resistance. Flame resistant.

APPLICATIONS: All harnessing, component and cable protection where extreme low temperature conditions prevail.

SPECIFICATIONS: Tensile strength 2000 psi. Min. vol. resistivity 10^9 ohmcm. Dielectric constant max. at 1 KC—4.5.

Alpha No. and Size (AWG)	Nom. Inside Dia. (Inch.)	Nom. Wall Thick. (Inch.)	STANDARD PUT-UPS	Alpha No. and Size (AWG)	Nom. Inside Dia. (Inch.)	Nom. Wall Thick. (Inch.)	STANDARD PUT-UPS
PVC-80-24	.022	.012	25', 100', 500', 1000'*	PVC-80-2	.263	.020	25', 100', 250'**
PVC-80-22	.027	.012	25', 100', 500', 1000'*	PVC-80-1	.294	.020	25', 100', 250'**
PVC-80-20	.034	.016	25', 100', 500', 1000'*	PVC-80-0	.330	.020	25', 100', 250'**
PVC-80-19	.038	.016	25', 100', 500', 1000'*	PVC-80-5/16"	.312	.025	25', 100', 250'**
PVC-80-18	.042	.016	25', 100', 500', 1000'*	PVC-80-3/8"	.375	.025	25', 100'**
PVC-80-17	.047	.016	25', 100', 500', 1000'*	PVC-80-7/16"	.438	.025	25', 100'**
PVC-80-16	.053	.016	25', 100', 500', 1000'*	PVC-80-1/2"	.500	.025	25', 100'**
PVC-80-15	.059	.016	25', 100', 500', 1000'*	PVC-80-9/16"	.562	.030	25', 50'**
PVC-80-14	.066	.016	25', 100', 500'*	PVC-80-5/8"	.625	.030	25', 50'**
PVC-80-13	.076	.016	25', 100', 500'*	PVC-80-3/4"	.750	.035	25', 50'**
PVC-80-12	.085	.016	25', 100', 500'*	PVC-80-7/8"	.875	.035	25', 50'**
PVC-80-11	.095	.016	25', 100', 500'*	PVC-80-1"	1.000	.035	25', 50'**
PVC-80-10	.106	.016	25', 100', 500'*	PVC-80-1 1/8"	1.125	.035	25'**
PVC-80-9	.118	.020	25', 100', 500'*	PVC-80-1 1/4"	1.250	.040	25'**
PVC-80-8	.133	.020	25', 100', 500'*	PVC-1 3/8"	1.375	.040	25'**
PVC-80-7	.148	.020	25', 100', 500'*	PVC-80-1 1/2"	1.500	.045	25'**
PVC-80-6	.166	.020	25', 100', 500'*	PVC-80-1 3/4"	1.750	.055	25'**
PVC-80-5	.186	.020	25', 100', 500'*	PVC-80-2"	2.000	.060	25'**
PVC-80-4	.208	.020	25', 100', 250'**	PVC-80-2 1/4"	2.250	.065	25'**
PVC-80-3	.234	.020	25', 100', 250'**	PVC-80-2 1/2"	2.500	.070	25'**

MAY BE CUT AND MARKED TO YOUR SPECIFICATIONS

STOCK COLORS: Clear and Black.

*Spools **Coils

ALPHA WIRE CORPORATION

Teflon Extruded Tubing

DESCRIPTION: Alpha Teflon Tubing is unmatched by any other type of tubing for use in electrical applications at high frequencies and temperatures. Teflon is rated for continuous operation at 250°C, and retains an exceptional toughness and its flexibility throughout its temperature range.

Alpha Teflon Tubing has the further advantage of a high degree of resistance to flexural fatigue and repetitive stresses; coefficient of friction lower than that of any other known solid; and a dielectric constant and power factor lower than that of any other known solid. This tubing will not crack or become brittle during aging.

Because of its resistance to soldering iron temperature, Alpha Teflon Tubing will not shrink back during the soldering process. Alpha Teflon Tubing will not melt and flow as do conventional thermoplastic materials. At high frequencies, its dielectric strength is many times that of other insulating materials.

Alpha Teflon Tubing is chemically inert, has zero moisture absorption and its insulation resistance properties are unaffected by heat aging or temperature use up to 250°C.

APPLICATIONS: A thin flexible insulation, Alpha Teflon tubing permits a miniaturization and compactness of design never before possible. Invaluable in any application where a high heat resistant, flexible, non-flammable, chemical solvent and corrosion-resistant material is required.

MEETS MIL-I-22129C
AMS 3651, 3653 FED. SPEC. P-403A

THIN WALL TEFLON TUBING (TFT-200)

ALPHA NO.	SIZE	NOM. INSIDE DIA. (Inch.)	NOM. WALL THICK-NESS (Inch.)	STOCK COLORS	STANDARD PUT-UPS
TFT-200/30	30	.012	.009	Nat., Blk.,	100′ Spools
TFT-200/28	28	.015	.009	Nat., Blk.,	100′ Spools
TFT-200/26	26	.018	.010	Nat., Blk.,	100′ Spools
TFT-200/24	24	.022	.010	Nat., Blk.,	100′ Spools
TFT-200/22	22	.027	.010	Nat., Blk.,	100′ Spools
TFT-200/20	20	.034	.012	Nat., Blk.,	100′ Spools
TFT-200/19	19	.038	.012	Nat., Blk.,	100′ Spools
TFT-200/18	18	.042	.012	Nat., Blk.,	100′ Spools
TFT-200/17	17	.047	.012	Nat., Blk.,	100′ Spools
TFT-200/16	16	.053	.012	Nat., Blk.,	100′ Spools
TFT-200/15	15	.059	.012	Nat., Blk.,	100′ Spools
TFT-200/14	14	.066	.012	Nat., Blk.,	100′ Spools
TFT-200/13	13	.076	.012	Nat., Blk.,	100′ Spools

ALPHA NO.	SIZE	NOM. INSIDE DIA. (Inch.)	NOM. WALL THICK-NESS (Inch.)	STOCK COLORS	STANDARD PUT-UPS
TFT-200/12	12	.085	.012	Nat., Blk.,	100′ Spools
TFT-200/11	11	.095	.012	Nat., Blk.,	100′ Spools
TFT-200/10	10	.106	.012	Nat., Blk.,	100′ Spools
TFT-200/9	9	.118	.015	Nat., Blk.,	100′ Coils*
TFT-200/8	8	.133	.015	Nat., Blk.,	100′ Coils*
TFT-200/7	7	.148	.015	Natural Only	100′ Coils*
TFT-200/6	6	.166	.015	Natural Only	100′ Coils*
TFT-200/5	5	.186	.015	Natural Only	100′ Coils*
TFT-200/4	4	.208	.015	Natural Only	100′ Coils*
TFT-200/3	3	.234	.015	Natural Only	100′ Coils*
TFT-200/2	2	.263	.015	Natural Only	100′ Coils*
TFT-200/1	1	.294	.015	Natural Only	100′ Coils*
TFT-200/0	0	.330	.015	Natural Only	100′ Coils*

* RANDOM LENGTHS PACKED IN 100′ COILS

STANDARD WALL TEFLON TUBING (TFT-250)

Similar in characteristics to TFT-200 (Thin Wall Tubing), but for use in application where additional dielectric values and mechanical strength are necessary

ALPHA NO.	SIZE	NOM. INSIDE DIA. (Inch.)	NOM. WALL THICK-NESS (Inch.)	STOCK COLORS	STANDARD PUT-UPS
TFT-250/24	24	.022	.012	Natural Only	100′ Spools
TFT-250/22	22	.027	.012	Natural Only	100′ Spools
TFT-250/20	20	.034	.016	Natural Only	100′ Spools
TFT-250/19	19	.038	.016	Natural Only	100′ Spools
TFT-250/18	18	.042	.016	Natural Only	100′ Spools
TFT-250/17	17	.047	.016	Natural Only	100′ Spools
TFT-250/16	16	.053	.016	Natural Only	100′ Spools
TFT-250/15	15	.059	.016	Natural Only	100′ Spools
TFT-250/14	14	.066	.016	Natural Only	100′ Spools
TFT-250/13	13	.076	.016	Natural Only	100′ Spools
TFT-250/12	12	.085	.016	Natural Only	100′ Spools
TFT-250/11	11	.095	.016	Natural Only	100′ Spools

ALPHA NO.	SIZE	NOM. INSIDE DIA. (Inch.)	NOM. WALL THICK-NESS (Inch.)	STOCK COLORS	STANDARD PUT-UPS
TFT-250/10	10	.106	.016	Natural Only	100′ Spools
TFT-250/9	9	.118	.020	Natural Only	100′ Coils*
TFT-250/8	8	.133	.020	Natural Only	100′ Coils*
TFT-250/7	7	.148	.020	Natural Only	100′ Coils*
TFT-250/6	6	.166	.020	Natural Only	100′ Coils*
TFT-250/5	5	.186	.020	Natural Only	100′ Coils*
TFT-250/4	4	.208	.020	Natural Only	100′ Coils*
TFT-250/3	3	.234	.020	Natural Only	100′ Coils*
TFT-250/2	2	.263	.020	Natural Only	100′ Coils*
TFT-250/1	1	.294	.020	Natural Only	100′ Coils*
TFT-250/0	0	.330	.020	Natural Only	100′ Coils*

* RANDOM LENGTHS PACKED IN 100′ COILS

ALPHA WIRE CORPORATION

TFT 200-250-300-400 Extruded Teflon Tubing (TFE)

MIL-I-22129C, AMS-3651B, 3655, 3653 — FED. SPEC. P-403A
−65°C TO +260°C OPERATING TEMPERATURE

Alpha Teflon Tubing offers all the unique thermal, electrical and mechanical properties of Teflon. Teflon Tubing is rated for continuous operation at 260°C and retains an exceptional toughness and flexibility throughout its range. At high frequencies, the dielectric strength of Teflon is many times that of other insulating materials. Teflon Tubing is completely inert and has zero moisture absorbtion. Standard wall Teflon (TFT-250) has the same characteristics as thin wall tubing (TFT-200) but is used where higher dielectric values and additional mechanical strength is required.

CHARACTERISTICS: Operating temperature, −65°C to +260°C. High dielectric strength. Chemically inert. Zero moisture absorbtion.

APPLICATIONS: Insulation of components, connectors, all electrical and electronic apparatus requiring high thermal insulation and superior dielectric qualities.

SPECIFICATIONS: Tensile strength 5000-75000 PSI. Completely non-flammable. Min. Vol. Res. 10^{17} Ohm-cm. Ultimate elongation — 300-500%. Dielectric strength — 1400 V/Mil. Dielectric constant — 2.2. Abrasion resistance — fair.

TFT-200 THIN WALL

ALPHA NO. AND SIZE	NOM. INSIDE DIA. (INCH.)	NOM. WALL THICK. (INCH.)	STANDARD PUT-UPS	ALPHA NO. AND SIZE	NOM. INSIDE DIA. (INCH.)	NOM. WALL THICK. (INCH.)	STANDARD PUT-UPS	ALPHA NO. AND SIZE	NOM. INSIDE DIA. (INCH.)	NOM. WALL THICK. (INCH.)	STANDARD PUT-UPS
†TFT-200/30	.012	.009	100′, 1000′	†TFT-200/16	.053	.012	100′, 1000′	‡TFT-200/7	.148	.015	100′ Coils*
†TFT-200/28	.015	.009	100′, 1000′	†TFT-200/15	.059	.012	100′, 1000′	‡TFT-200/6	.166	.015	100′ Coils*
†TFT-200/26	.018	.010	100′, 1000′	†TFT-200/14	.066	.012	100′, 500′	‡TFT-200/5	.186	.015	100′ Coils*
†TFT-200/24	.022	.010	100′, 1000′	†TFT-200/13	.076	.012	100′, 500′	‡TFT-200/4	.208	.015	100′ Coils*
†TFT-200/22	.027	.010	100′, 1000′	†TFT-200/12	.085	.012	100′, 500′	‡TFT-200/3	.234	.015	100′ Coils*
†TFT-200/20	.034	.012	100′, 1000′	†TFT-200/11	.095	.012	100′, 500′	‡TFT-200/2	.263	.015	100′ Coils*
†TFT-200/19	.038	.012	100′, 1000′	†TFT-200/10	.106	.012	100′, 500′	‡TFT-200/1	.294	.015	100′ Coils*
†TFT-200/18	.042	.012	100′, 1000′	†TFT-200/9	.118	.015	100′, 500′	‡TFT-200/0	.330	.015	100′ Coils*
†TFT-200/17	.047	.012	100′, 1000′	‡TFT-200/8	.133	.015	100′ Coils*				

STOCK COLORS: †Natural, Black. ‡Natural Only. *RANDOM LENGTHS PACKED IN 100′ COILS.

TFT-250 STANDARD WALL

ALPHA NO. AND SIZE	NOM. INSIDE DIA. (INCH.)	NOM. WALL THICK. (INCH.)	STANDARD PUT-UPS	ALPHA NO. AND SIZE	NOM. INSIDE DIA. (INCH.)	NOM. WALL THICK. (INCH.)	STANDARD PUT-UPS	ALPHA NO. AND SIZE	NOM. INSIDE DIA. (INCH.)	NOM. WALL THICK. (INCH.)	STANDARD PUT-UPS
TFT-250/24	.022	.012	100′, 1000′	TFT-250/14	.066	.016	100′, 500′	TFT-250/6	.166	.020	100′ Coils*
TFT-250/22	.027	.012	100′, 1000′	TFT-250/13	.076	.016	100′, 500′	TFT-250/5	.186	.020	100′ Coils*
TFT-250/20	.034	.016	100′, 1000′	TFT-250/12	.085	.016	100′, 500′	TFT-250/4	.208	.020	100′ Coils*
TFT-250/19	.038	.016	100′, 1000′	TFT-250/11	.095	.016	100′, 500′	TFT-250/3	.234	.020	100′ Coils*
TFT-250/18	.042	.016	100′, 1000′	TFT-250/10	.106	.016	100′, 500′	TFT-250/2	.263	.020	100′ Coils*
TFT-250/17	.047	.016	100′, 1000′	TFT-250/9	.118	.020	100′, 500′	TFT-250/1	.294	.020	100′ Coils*
TFT-250/16	.053	.016	100′, 1000′	TFT-250/8	.133	.020	100′ Coils*	TFT-250/0	.330	.020	100′ Coils*
TFT-250/15	.059	.016	100′, 1000′	TFT-250/7	.148	.020	100′ Coils*				

STOCK COLORS: Natural. *RANDOM LENGTHS PACKED IN 100′ COILS.

TFT-300 — TEFLON TUBING FRACTIONAL SIZES MIL-I-22129C AMS 3653 FED. SPEC. P-403A

Same specifications as TFT-250, but sized by fractional increments.

ALPHA NO. AND SIZE	NOM. I.D. (Inch.)	NOM. WALL THICK. (INCH.
TFT-300-⅛	.125	.020
TFT-300-³⁄₁₆	.192	.020
TFT-300-¼	.255	.020
TFT-300-⁵⁄₁₆	.321	.020
TFT-300-⅜	.387	.025
TFT-300-⁷⁄₁₆	.451	.025
TFT-300-½	.515	.025
TFT-300-⅝	.643	.025
TFT-300-¾	.772	.030
TFT-300-⅞	.902	.035
TFT-300-1	1.030	.035
TFT-300-1¼	1.287	.040
TFT-300-1½	1.550	.040

STOCK COLOR: Natural.
STANDARD PUT-UP: 50′ RANDOM LENGTHS.

TFT-400 — TEFLON TUBING EXTRA THIN WALL

All the electrical, mechanical and chemical characteristics of Teflon, with an extra thin wall.

ALPHA NO. AND SIZE	INSIDE DIA. (INCH.)	NOM. WALL THICK. (INCH.)	STANDARD PUT-UP	ALPHA NO. AND SIZE	INSIDE DIA. (INCH.)	NOM. WALL THICK. (INCH.)	STANDARD PUT-UP
TFT-400-30	.012	.006	100′, 500′, 1000′*	TFT-400-14	.066	.008	100′, 500′*
TFT-400-28	.015	.006	100′, 500′, 1000′*	TFT-400-13	.076	.008	100′, 500′*
TFT-400-26	.018	.006	100′, 500′, 1000′*	TFT-400-12	.085	.008	100′, 500′*
TFT-400-24	.022	.006	100′, 500′, 1000′*	TFT-400-11	.095	.008	100′, 500′*
TFT-400-22	.027	.006	100′, 500′, 1000′*	TFT-400-10	.106	.008	100′, 500′*
TFT-400-20	.034	.006	100′, 500′, 1000′*	TFT-400-9	.118	.008	100′, 500′**
TFT-400-19	.038	.006	100′, 500′, 1000′*	TFT-400-8	.133	.008	100′, 500′**
TFT-400-18	.042	.006	100′, 500′, 1000′*	TFT-400-7	.148	.008	100′, 500′**
TFT-400-17	.047	.006	100′, 500′, 1000′*	TFT-400-6	.166	.010	100′**
TFT-400-16	.053	.006	100′, 500′, 1000′*	TFT-400-5	.186	.010	100′**
TFT-400-15	.059	.006	100′, 500′, 1000′*	TFT-400-4	.208	.010	100′**

STOCK COLORS: Natural, Black, White, Red, Green, Blue, Orange, Violet, Brown, Gray, Yellow.
*Spools **Coils

ALPHA WIRE CORPORATION

Lacing Cords and Tapes

MIL-T-713 & MIL-T-43435

TYPES OF LACING CORD

Flat Braided Tape: This tape has been specifically designed to create a wider contact area with the insulation, so that it does not flow away from the contact point. It is more flexible and easier on the user's hands. When knotted it will not slip, and is recommended for all types of harness work.

Round Twisted Cord: This type, while it may be used for plastic and rubber insulated wire, is particularly suited for wire having a secondary insulation or those utilizing a textile as an insulating material.

MATERIALS

Nylon: Synthetic fiber, resistant to: Fungus, flame, acids, abrasion. Excellent tensile strength, lightweight, small size.

Dacron: Retains all the above characteristics of nylon, plus: less elongation, better resistance to acids, no appreciable discoloration.

FINISHES

ge: A synthetic rubber-like resin formulated with a non-mercuric compound which lends the finish fungicidal properties. This finish permits easier handling and better knot retention. This finish has a melting point in excess of 190°F and will soften, but not flow, at 140°F.

mw: A micro-crystalline wax with a melting point above 130°F compounded with a fungicide which does not contain either copper or mercuric materials. Excellent knot retention, yet finish does not have too great a "waxy" feel to the user. MW is soft, pliable, easy to tie and meets Government Spec. MIL-T-713.

am: A thermoplastic synthetic resin with a melting point above 350°F for use where a "wax-free" type is specified. It is non-dusting or flaking, dry finish with good knot tying qualities.

sr: A special continuous coating of fungistatic synthetic rubber containing no corrosive compounding ingredients. Knots tied with this finish will not slip. It is extremely pliable and soft and will not injure the user's hands. This finish will not flake or dust.

NYLON TWISTED CORD MIL-T-713 — WH., BLK.

NO.	CLASS	TYPE	TENSILE STRENGTH	FINISH	NOM. DIAM. (Inches)	YARDS PER POUND	STANDARD PUT-UP
LC-113	I	P TWINE	70 lbs.	MW	.050	560	8 oz. Spls.
LC-114	II	P TWINE	48 lbs.	MW	.035	750	8 oz. Spls.
LC-115	III	P TWINE	32 lbs.	MW	.030	1180	8 oz. Spls.

NYLON & DACRON FLAT BRAIDED TAPE MIL-T-43435 — 500 YD. SPLS. WH., BLK.

NO.	SIZE	TYPE	TENSILE STRENGTH	FINISH	NOM. WIDTH (Inches)	NOM. THICK. (Inches)	MATERIAL
LC-136	3	I	50 lbs.	B (MW)	.090 3/32	.012	Nylon
LC-162	3	II	50 lbs.	B (MW)	.090 3/32	.012	Dacron

NYLON FLAT BRAIDED TAPE — WH., BLK.

NO.	TENSILE STRENGTH	FINISH	NOMINAL WIDTH (Inches)	NOMINAL THICKNESS (Inches)	STANDARD PUT-UP
LC-132	50 lbs.	GE	3/32	.014	500 yd. Tubes
LC-134	30 lbs.	MW	1/16	.010	500 yd. Spls.
LC-136	50 lbs.	MW	3/32	.014	500 yd. Spls.
LC-140	50 lbs.	SR	3/32	.014	500 yd. Spls.
LC-143	50 lbs.	AM	3/32	.014	500 yd. Spls.

Teflon Coated Fiberglass Lacing Tape

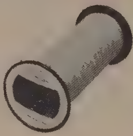
A braided flat tape that is easy to handle and will remain securely tied even when subject to shock, vibration and continued handling. Teflon lubricated glass fibers minimize end fray. Operating temperature to 550°F — up to 1,000°F for shorter periods.

CHARACTERISTICS:

Operating temperature −350°F to +550°F. Self-extinguishing. No elongation, creep or tension relaxation. High tensile strength. Resists all chemicals and contaminants.

APPLICATIONS:

For bundling and harnessing wires and cables subject to high temperature environments.



Alpha No.	Break Strength Min. Avg. Lbs.	Nom. Width (Inches)	Nom. Thickness (Inches)	Nom. Weight lbs./K Yds.	Standard Put-up Spool/ Yards
LC-201	40	.048	.012	1.8	500
LC-202	80	.062	.014	2.2	500
LC-203	100	.078	.016	3.0	250
LC-204	130	.090	.016	3.2	250
LC-205	170	.125	.016	4.4	250
LC-206	250	.225	.018	8.2	250

Standard Color: Natural (White).

Spiral Wrap Tubing

FOR PERMANENT OR TEMPORARY WIRE AND CABLE HARNESSING AND BUNDLING

AVAILABLE IN FIVE TYPES TO FIT ALL APPLICATIONS

- Easy to Apply
- Meets Military and UL Specifications
- Holds Wire Bundles Securely
- Permits Leadoffs or Tapoffs at Any Point

Wire harnessing, cabling and bundling work is simplified with the use of Alpha's SW Series spiral wrap tubing. SW tubing clings tightly to the wire and cable being bundled, yet is flexible and simple to apply. All types maintain elasticity even when bent around sharp edges or subject to repeated handling.

Breakouts or tapoff connections may be made through the openings of the wrap. SW spiral wrap is constructed from several semi-rigid tubing types and then cut on a continual spiral.

POLYETHYLENE

For general use. Meets Fed. Spec. L-P 390, MIL-I-631D, Type A MIL-P-26692, MIL-E-16400, MIL-P-3803, MIL-E-5400F.

NYLON

Higher temperature to 240°F (121°C). Meets MIL-M-20693A, MIL-17091B.

FLAME-RESISTANT POLYETHYLENE

Self-extinguishing. Meets ASTM D635, UL-70, MIL-E-500F.

TEFLON

Temperatures to 250°C non-flammable. Meets MIL-I-22129C, AMS 3653C.

ULTRA VIOLET RESISTANT POLYETHYLENE

Heavy duty, abrasion resistant. For outdoor use, resists effects of sunlight and weathering.

Alpha Number	Material	Nom. O.D. (Inches)	Nom. Wall Thickness (Inches)	Pitch (Inches)	Max. Diam. Inner Wire Bundle (Inches)	Color	Standard Put-up (Feet)
SW-1	Polyethylene	.125	.031	.250	1/2	Natural	25, 100, 500
SW-2		250	046	375	2		25, 100, 500
SW-3		.375	.052	.437	3		25, 100
SW-4		.500	.060	.562	4		25, 100
SW-5		.750	.065	.750	5		25, 100
SW-6		1.000	.095	1.000	6		25, 100
SW-10	Flame Resistant Polyethylene	.125	.031	.250	1/2	White	25, 100, 500
SW-11		.250	.046	.375	2		25, 100, 500
SW-12		.375	.052	.437	3		25, 100
SW-13		.500	.060	.562	4		25, 100
SW-14		.750	.065	.750	5		25, 100
SW-20	Nylon	125	016	250	1/2	Natural	25, 100, 500
SW-21		.250	.025	.375	2		25, 100, 500
SW-22		.375	.035	.437	3		25, 100
SW-23		.500	.035	.562	4		25, 100
SW-30	Teflon	.125	.030	.250	1/2	Natural	25, 100
SW-31		.250	.030	.375	2		25, 100
SW-32		.375	.030	.437	2-1/2		25, 100
SW-33		.500	.030	.562	3		25, 100
SW-34		.750	.030	.750	3-1/2		25, 100
SW-35		1.000	.040	1.000	4		25, 100
SW-40	Ultra-Violet Resistant Polyethylene	.125	.030	.250	1/2	Black	
SW-41		.250	.045	375	2		25, 100, 500
SW-42		.375	.050	.437	3		25, 100, 500
SW-43		.500	.060	.562	4		25, 100
SW-44		.750	.065	.750	5		25, 100
SW-45		1.000	.095	1.000	6		25, 100

ALPHA WIRE CORPORATION

Acrylic Impregnated Fiberglass Sleeving

PIF-150

MIL-I-3190C, GRADE C-1, NEMA TYPE 6, CLASS F INSULATION +155°C

Alpha's PIF-150 sleeving is a Class F (155°C) electrical insulation made of a closely woven fiberglass, thoroughly impregnated, then coated with modified acrylic resins. Extremely tough and flexible, AIF tubing can be knotted, bent or formed into any shape without loss of dielectric.

CHARACTERISTICS: Continuous use at 155°C. Won't blister or flow at 225°C for 15 minutes. Extremely tough and flexible. Compatible with most insulating and encapsulating materials.

APPLICATIONS: Motor leads, transformer leads, insulation over terminations, coils and components.

SPECIFICATIONS: Abrasive resistant, in accordance with MIL-T-5438. Rate of burning, NEMA-VSI-1962 and MIL-I-3190C. Min. volume resistivity, 10^{10} (OHM-cm). Dielectric constant, max. at 1 KC. 2.5 Corona resistance, good. Resistant to oils, acids and alkalis.

ALPHA NO. AND SIZE (AWG)	NOM. I.D. (INCH.)	STANDARD PUT-UP	ALPHA NO. AND SIZE (AWG)	NOM. I.D. (INCH.)	STANDARD PUT-UP
PIF-150-24	.022	100′, 500′, 1000′	PIF-150-6	.166	25′, 100′*
PIF-150-22	.027	100′, 500′, 1000′	PIF-150-5	.186	25′, 100′*
PIF-150-20	.034	100′, 500′, 1000′	PIF-150-4	.208	25′, 100′*
PIF-150-18	.042	100′, 500′, 1000′	PIF-150-3	.234	25′, 100′*
PIF-150-17	.047	100′, 400′, 1000′	PIF-150-2	.263	25′, 100′*
PIF-150-16	.053	100′, 500′, 1000′	PIF-150-1	.294	25′, 100′*
PIF-150-15	.059	100′, 500′, 1000′	PIF-150-0	.338	25′, 100′*
PIF-150-14	.066	100′, 500′	PIF-150-⅜″	.387	25′, 100′*
PIF-150-13	.076	100′, 500′	PIF-150-7/16″	.450	25′, 100′*
PIF-150-12	.085	100′, 500′	PIF-150-½″	.512	25′, 100′*
PIF-150-11	.095	100′, 500′	PIF-150-⅝″	.640	25′, 100′*
PIF-150-10	.106	100′, 500′	PIF-150-¾	.768	25′, 100′*
PIF-150-9	.118	100′, 500′	PIF-150-⅞″	.893	25′, 100′*
PIF-150-8	.133	100′, 500′	PIF-150-1″	1.018	25′, 100′*
PIF-150-7	.148	100′, 500′			

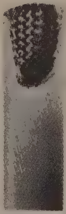
*Sizes 6 to 1″ packaged in 36″ lgths. **STOCK COLOR:** Natural.

Vinyl Impregnated Fiberglass Sleeving

PIF-130

MIL-I-3190B, CLASS B, GRADE B (130°C)

Woven fiberglass braid impregnated with a heat resistant, extremely tough and flexible plastic insulation. Fiberglass treated to remove all organic matter and resist fraying. Completely compatible with all insulation and conductor types.



CHARACTERISTICS: Resistant to bending, knotting and twisting. Fray resistant. Will not support combustion. High chemical resistance. Simple to "pushback." Fungus resistant.

APPLICATIONS: Motor, generator and transformer leads. Component protection.

SPECIFICATIONS: Max. low temperature flexibility, −20°C. Dielectric strength, 4000 volts. Oil resistant. Tensile strength, 1500 PSI, min. Ultimate elongation, 350%.

ALPHA NO.	SIZE	WALL THICKNESS MAX. (INCHES)	WALL THICKNESS MIN. (INCHES)	STANDARD PUT-UP
PIF-130-24	24	.022	.016	100′, 500′, 1000′ Spools
PIF-130-22	22	.022	.016	100′, 500′, 1000′ Spools
PIF-130-20	20	.022	.016	100′, 500′, 1000′ Spools
PIF-130-18	18	.022	.016	100′, 500′, 1000′ Spools
PIF-130-16	16	.028	.020	100′, 500′, 1000′ Spools
PIF-130-14	14	.028	.020	100′, 500′ Spools
PIF-130-12	12	.028	.020	100′, 500′ Spools
PIF-130-10	10	.028	.020	100′, 500′ Spools
PIF-130-8	8	.028	.020	100′, 500′ Spools
PIF-130-6	6	.028	.020	100′, 250′ Spools
PIF-130-4	4	.036	.026	100′, 250′ Spools
PIF-130-2	2	.036	.026	100′, 250′ Spools
PIF-130-0	0	.042	.030	100′ Coils
PIF-130-⅜″	⅜″	.042	.030	100′ Coils
PIF-130-7/16″	7/16″	.042	.030	100′ Coils
PIF-130-½″	½″	.042	.030	100′ Coils
PIF-130-⅝″	⅝″	.042	.030	100′ Coils
PIF-130-¾″	¾″	.042	.030	100′ Coils
PIF-130-⅞″	⅞″	.042	.030	100′ Coils
PIF-130-1″	1″	.042	.030	100′ Coils

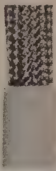
STOCK COLOR: Black.

Silicone Rubber Coated Fiberglass Sleeving

PIF-200

MIL-I-3190C, MIL-I-8057, NEMA TYPE 5, CLASS H (200°C), GRADE A (800V)

A closely woven (braided) fiberglass, uniformly coated with silicone rubber. Provides extreme flexibility to −85°C and heat protection to 200°C. The fiberglass sleeving material is heat set, cuts clearly and will not fray. PIF-200 is easy to handle and extremely tough with superior physical and electrical properties. Easy to "pushback" and form over components, connections and cables.



CHARACTERISTICS: Highly flexible—without loss of dielectric strength. Abrasive resistant. Flame resistant — meets NEMA and ASTM standards. Superior resistance to weather, fungus, ozone and sunlight. Compatible with all insulating materials.

APPLICATIONS: Insulating electrical connections, motor leads, transformer leads, components and connections in appliances, instruments and all types of electrical apparatus.

SPECIFICATIONS: Heat aging, 1000 hours at 250°C without dielectric change. Maximum brittle point, 70°C. Cut-through resistance, excellent. Insulation resistance, 1,000,000 meg-ohms/ft. Tensile strength, 800-1000 PSI. Dielectric constant, 3.2 maximum at 1 KC.

ALPHA NO. AND SIZE (AWG)	INSIDE DIAMETER (INCHES) MAX.	MIN.	STANDARD PUT-UP
PIF-200-24	.027	.020	100′, 500′, 1000′ Spools
PIF-200-22	.032	.025	100′, 500′, 1000′ Spools
PIF-200-20	.039	.032	100′, 500′, 1000′ Spools
PIF-200-18	.049	.040	100′, 500′, 1000′
PIF-200-17	.053	.047	100′, 500′, 1000′
PIF-200-16	.060	.051	100′, 500′, 1000′ Spools
PIF-200-15	.067	.059	100′, 500′, 1000′ Spools
PIF-200-14	.073	.064	100′, 500′
PIF-200-13	.080	.072	100′, 500′ Spools
PIF-200-12	.089	.080	100′, 500′ Spools
PIF-200-11	.103	.091	100′, 500′ Spools
PIF-200-10	.112	.102	100′, 500′ Spools
PIF-200-9	.124	.114	100′, 500′ Spools
PIF-200-8	.141	.130	100′, 500′ Spools
PIF-200-7	.158	.144	100′, 500′ Spools
PIF-200-6	.178	.162	25′, 100′*
PIF-200-5	.198	.181	25′, 100′*
PIF-200-4	.226	.204	25′, 100′*
PIF-200-3	.249	.229	25′, 100′*
PIF-200-2	.278	.258	25′, 100′*
PIF-200-1	.311	.290	25′, 100′*
PIF-200-0	.347	.325	25′, 100′*
PIF-200-⅜″	.401	.375	25′, 100′*
PIF-200-7/16″	.462	.438	25′, 100′*
PIF-200-½″	.524	.501	25′, 100′*
PIF-200-⅝″	.655	.625	25′, 100′*

*Sizes 6 to ⅝″ packaged in 36″ lengths. **STOCK COLOR:** Natural.

Braided Fiberglass Sleeving

PIF-240

CLASS C (240°C) INSULATION, NEMA VSI-1962

An extremely flexible, abrasion resistant sleeving, ideal for applications necessitating insulation to operate at 240°C (1200°F). Heat treated to remove all organic matter and to render the glass braid fray-resistant. Completely compatible with all insulation and conductor types.

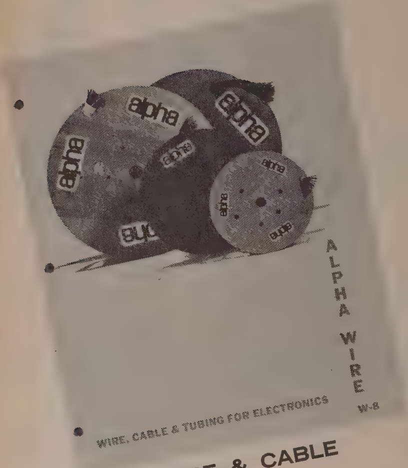
CHARACTERISTICS: Extreme flexibility. Fray resistant. Flame resistant. Chemical resistant. Fungus resistant.

ALPHA NO. AND SIZE (AWG)	NOM. I.D. (INCH.)	APPROX. WALL (INCH.)	ALPHA NO. AND SIZE (AWG)	NOM. I.D. (INCH.)	APPROX. WALL (INCH.)
PIF-240-24	.022	.012	PIF-240-6	.166	.015
PIF-240-22	.027	.012	PIF-240-5	.186	.015
PIF-240-20	.034	.012	PIF-240-4	.208	.015
PIF-240-18	.042	.012	PIF-240-3	.234	.018
PIF-240-17	.047	.013	PIF-240-2	.263	.018
PIF-240-16	.053	.013	PIF-240-1	.294	.018
PIF-240-15	.059	.015	PIF-240-0	.338	.018
PIF-240-14	.066	.015	PIF-240-⅜″	.387	.022
PIF-240-13	.076	.015	PIF-240-7/16″	.450	.022
PIF-240-12	.085	.015	PIF-240-½″	.512	.022
PIF-240-11	.095	.015	PIF-240-⅝″	.640	.022
PIF-240-10	.106	.015	PIF-240-¾″	.768	.022
PIF-240-9	.118	.015	PIF-240-⅞″	.893	.022
PIF-240-8	.133	.015	PIF-240-1″	1.018	.022
PIF-240-7	.148	.015			

STANDARD PUT-UP: 100 FT. **STOCK COLOR:** Natural.

ALPHA WIRE CORPORATION

WRITE FOR COMPLETE LITERATURE ON . . .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WIRE & CABLE

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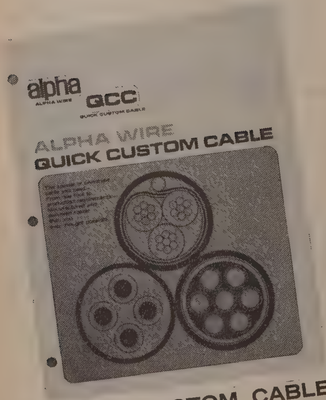
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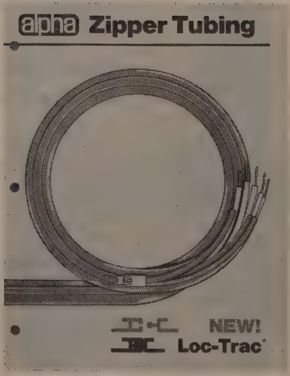
QUICK CUSTOM CABLE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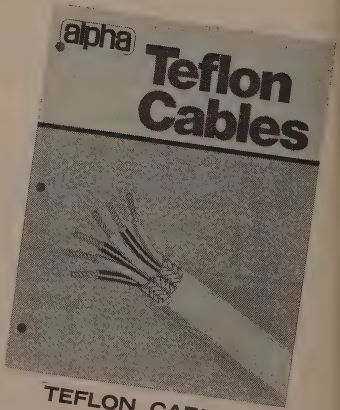
Loc-Trac

ZIPPER TUBING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Teflon Cables

TEFLON CABLES

ALPHA WIRE CORPORATION

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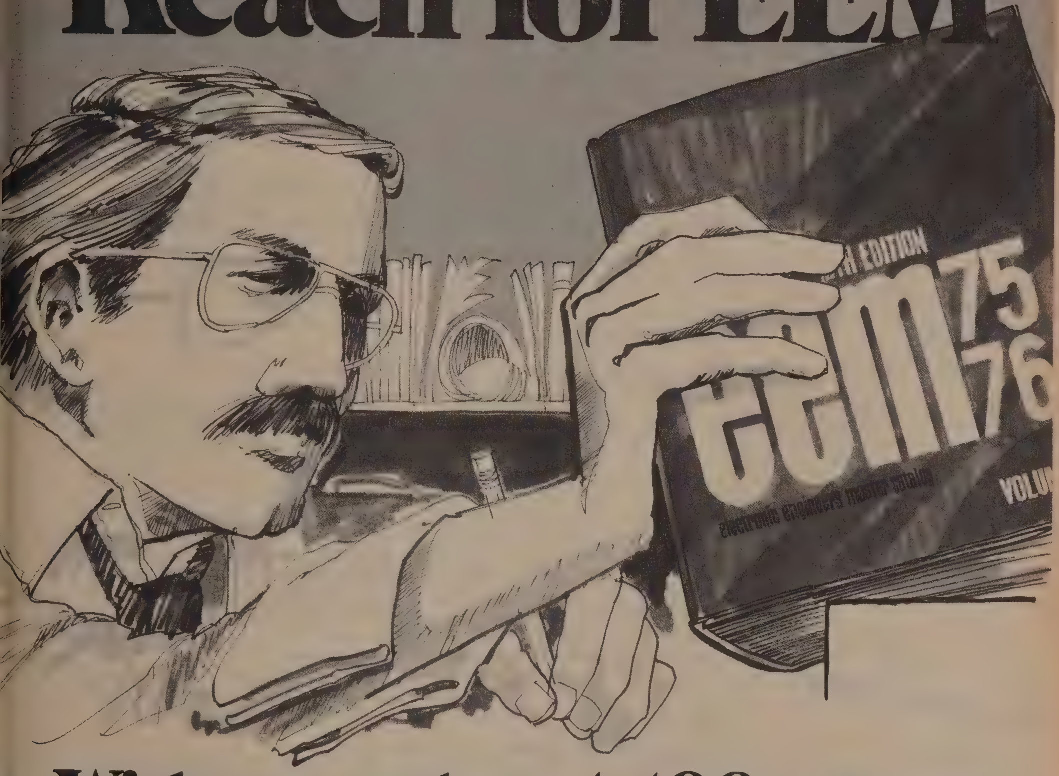
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BELDEN

shielded sound and broadcast audio cables

TWO CONDUCTOR SHIELDED CABLES

<table>
<tr><th>Description</th><th>Trade Number</th><th>AWG & (Stranding)</th><th>Insulation Thickness (Inch)</th><th>Jacket Thickness (Inch)</th><th>Nom. O.D. (Inch)</th><th>Cond. Color Coding</th><th>Percent Shield Coverage</th><th>Nom. *Cap. (pF/ft)</th><th>Nom. **Cap. (pF/ft)</th><th>Suggested Working Voltage</th><th>Standard Spool Lengths in ft.</th></tr>
<tr><td rowspan="2">
BELDFOIL®</td><td>8640</td><td>28 (Solid)</td><td>.0025</td><td>.020</td><td>.090</td><td>Blk, Red</td><td>100</td><td>55</td><td>105</td><td>100</td><td>250, 500</td></tr>
<tr><td></td><td colspan="10"><i>Solid copper, GEOSOL™ insulated (solderable—no stripping required), twisted pair, BELDFOIL aluminum-polyester shield, 30 AWG solid tinned Copperweld ▲ drain wire, WHITE vinyl jacket. Maximum operating temperature 105°C.</i>
Ideal for Instrumentation and Audio Console Work where Subminiaturization is Required. The BELDFOIL shield combines high cable reliability with ease of termination.</td></tr>
<tr><td rowspan="4">
BELDFOIL</td><td>8450•</td><td>22 (Solid)</td><td>.006</td><td>.018</td><td>.118</td><td>Blk, Red</td><td>100</td><td>40</td><td>76</td><td>200</td><td>100, 250, 500, T-1000 (Convert-a-pak)</td></tr>
<tr><td>8451•</td><td>22 (7x30)</td><td>.008</td><td>.020</td><td>.135</td><td>Blk, Red</td><td>100</td><td>34</td><td>67</td><td>200</td><td>100, 250, 500, T-1000 (Convert-a-pak)</td></tr>
<tr><td>★9451</td><td>22 (7x30)</td><td>.008</td><td>.020</td><td>.135</td><td>Blk, Red</td><td>100</td><td>34</td><td>67</td><td>200</td><td>500, T-1000 (Convert-a-pak)</td></tr>
<tr><td></td><td colspan="10"><i>The jacket and shield on 9451 are bonded so both can be removed on automatic stripping equipment.</i>
<i>Tinned copper, polypropylene insulated, twisted pair, stranded (8450 solid) tinned copper drain wire, BELDFOIL aluminum-polyester shield, paper wrap, 8450 and 8451 BLACK or GRAY vinyl jacket, 9451 GRAY vinyl jacket.</i>
Belden's Miniature Type Broadcast Audio and Instrumentation Cables occupy ½ to ⅔ less space than standard cables. The BELDFOIL shield combines high cable reliability with ease of termination.</td></tr>
<tr><td rowspan="2">
BELDFOIL</td><td>9452</td><td>24 (19x36)</td><td>.008</td><td>.020</td><td>.135</td><td>Blk, Red</td><td>100</td><td>30</td><td>58</td><td>200</td><td>100, 500, 1000</td></tr>
<tr><td></td><td colspan="10"><i>Tinned copper, polypropylene insulated, twisted pair, noise reducing tape, 24 AWG stranded tinned copper drain wire, BELDFOIL aluminum-polyester shield, BLACK vinyl jacket.</i>
Balanced pair instrumentation cable featuring short lay cabling to minimize pick-up of electromagnetic interference and special conductive textile tape to minimize microphonic noise.</td></tr>
<tr><td rowspan="8">
BELDFOIL</td><td>8641•</td><td>24 (7x32)</td><td>.014</td><td>.025</td><td>.160</td><td>Blk, Clear</td><td>100</td><td>22</td><td>42</td><td>350</td><td>100, 500, 1000</td></tr>
<tr><td>8761•</td><td>22 (7x30)</td><td>.014</td><td>.025</td><td>.167</td><td>Blk, Clear</td><td>100</td><td>24</td><td>47</td><td>350</td><td>500, 1000</td></tr>
<tr><td>8762•</td><td>20 (7x28)</td><td>.014</td><td>.028</td><td>.196</td><td>Blk, Clear</td><td>100</td><td>27</td><td>49</td><td>350</td><td>100, 250, 500, 1000</td></tr>
<tr><td>8760•</td><td>18 (16x30)</td><td>.018</td><td>.028</td><td>.222</td><td>Blk, Clear</td><td>100</td><td>24</td><td>44</td><td>450</td><td>250, 500, 1000</td></tr>
<tr><td>8719</td><td>16 (19x29)</td><td>.025</td><td>.030</td><td>.274</td><td>Blk, Clear</td><td>100</td><td>24</td><td>47</td><td>600</td><td>500, 1000</td></tr>
<tr><td>8720•</td><td>14 (19x27)</td><td>.032</td><td>.035</td><td>.340</td><td>Blk, Clear</td><td>100</td><td>24</td><td>47</td><td>750</td><td>500, 1000</td></tr>
<tr><td>8718•</td><td>12 (19x25)</td><td>.037</td><td>.040</td><td>.400</td><td>Blk, Clear</td><td>100</td><td>25</td><td>49</td><td>1000</td><td>500, 1000</td></tr>
<tr><td></td><td colspan="10"><i>Tinned copper, polyethylene insulated, twisted pair, BELDFOIL aluminum-polyester shield, stranded tinned copper drain wire, (24 AWG for 8641, 22 AWG for 8761, and 20 AWG for 8760 and 8762, 18 AWG for 8719, 16 AWG for 8720, 14 AWG for 8718), chrome vinyl jacket.</i>
The BELDFOIL shield combines high cable reliability with ease of termination.</td></tr>
<tr><td rowspan="2">
BELDFOIL</td><td>★9154</td><td>20 (7x28)</td><td>.012</td><td>.031</td><td>.194</td><td>Blk, Red</td><td>100</td><td>60</td><td>100</td><td>300</td><td>500, 1000</td></tr>
<tr><td></td><td colspan="10"><i>Tinned Copper, vinyl insulated, twisted pair, BELDFOIL aluminum-polyester shield, 22 AWG stranded tinned copper drain wire, rose gray vinyl jacket.</i>
Underwriters' Laboratories, Inc. Listed (Wires, Mics.) 90V Max.</td></tr>
<tr><td rowspan="4">
BELDFOIL
High Temperature
TEFLON and
Silicone △</td><td>83394</td><td>22 (7x30)</td><td>.015</td><td>.030</td><td>.204</td><td>Blk, Wht</td><td>100</td><td>22</td><td>42</td><td>1000 DC</td><td>25, 100, 500</td></tr>
<tr><td></td><td colspan="10"><i>Tinned copper, insulated with FEP TEFLON■, twisted pair, noise reducing tape, 22 AWG (7x30) nickel coated copper drain wire, special BELDFOIL shield, red</i> Silicone rubber jacket. +150°C maxi~~mum~~, −70°C minimum operating temperature. <i>Jacket working voltage: 1000V DC, shield to ground.</i></td></tr>
<tr><td>83393</td><td>20 (7x28)</td><td>.020</td><td>.030</td><td>.245</td><td>Blk, Red</td><td>100</td><td>22</td><td>42</td><td>1000 DC</td><td>25, 100, 500</td></tr>
<tr><td></td><td colspan="10"><i>Tinned copper, insulated with FEP TEFLON, twisted pair, noise reducing tape, 20 AWG (10x30) nickel coated copper drain wire, special BELDFOIL shield, yellow</i> Silicone rubber jacket. +150°C maximum, −70°C minimum operating temperature.
<i>Jacket working voltage: 1000V DC, shield to ground.</i></td></tr>
</table>

★New Item

•Belden U.S. Patent 3,032,604.

▲Trademark of Copperweld Steel Co.

■Trademark of DuPont

▨ **Passes the FR-1 vertical flame test.**

△ For additional high temperature shielded cables see Belden page 8.

**Capacitance between conductors.*

***Capacitance between 1 conductor and other conductor connected to shield.*

shielded sound, broadcast audio cables and instrumentation cables

BELDEN

TWO CONDUCTOR SHIELDED CABLES (Cont'd)

Description	Trade Number	AWG & (Stranding)	Insulation Thickness (Inch)	Jacket Thickness (Inch)	Nom. O.D. (Inch)	Cond. Color Coding	Percent Shield Coverage	Nom. *Cap. (pF/ft.)	Nom. **Cap. (pF/ft.)	Suggested Working Voltage	Standard Spool Lengths in ft.
	8437	22 (Solid)	.015	.025	.200	Blk, Red	88	48	85	200	500, 1000
	8441	22 (16x34)	.015	.025	.210	Blk, Red	86	49	86	200	100, 500, 1000
		Tinned copper, vinyl insulated, twisted pair, 8437 solid tinned copper drain wire, 8441 stranded tinned copper drain wire, tinned copper braid shield, black vinyl jacket. **For other multi-conductor braid shielded cables see Belden page 7.**									
	8739	22 (Solid)	.015	.025	.160	Blk, Red	97.0	38	66	350	100, 500, 1000
	8737	22 (7x30)	.015	.025	.170	Blk, Red	97.0	40	70	350	100, 250, 500, 1000
	8759	20 (7x28)	.015	.025	.195	Blk, Red	88.6	47	79	350	100, 500, 1000
	8790	18 (7x26)	.020	.028	.231	Red, Wht	81.5	53	92	450	100, 250, 500, 1000
	8780	16 (19x29)	.023	.030	.266	Blk, Wht	88.0	57	98	450	100, 500, 1000
		Tinned copper, vinyl insulated, twisted pair, tinned copper spiral wrapped shield, chrome vinyl jacket.									
	8208	18 (16x30)	.020	.025	.255	Red, Wht	80.0	46	77	200	100, 500, 1000
		Tinned copper, rubber insulated, twisted pair, separator, braided tinned copper shield, chrome vinyl jacket.									

INSTRUMENTATION CABLES

Instrumentation cable provides the vital communications link between sensing devices and read-out equipment. Because of the many and diverse conditions of environment and stress under which instrumentation cables must transmit information—in usuable form, without distortion or change—cable characteristics should always be carefully matched with the specific requirements of the particular application.

The scientific, medical and industrial uses of instrumentation cable are vast and ever growing. Some of the common uses for instrumentation cable are in the measurement of pressure, speed, resistance and temperature.

Belden manufactures a wide variety of precision instrumentation wire using several types of insulating materials, conductors and shields to meet a wide variety of electrical, physical and thermal requirements.

Many Belden Instrumentation Cables are unique in the field and have been engineered for specific application problems.

THREE CONDUCTOR SHIELDED CABLES

Description	Trade Number	AWG & (Stranding)	Insulation Thickness (Inch)	Jacket Thickness (Inch)	Nom. O.D. (Inch)	Cond. Color Coding	Percent Shield Coverage	Nom. *Cap. (pF/ft.)	Nom. **Cap. (pF/ft.)	Suggested Working Voltage	Standard Spool Lengths in ft.
	8731	22 (Solid)	.015	.025	.178	Blk, Red, Wht	76.2	36	63	350	500, 1000
	8791	18 (7x26)	.020	.028	.236	Blk, Red, Wht	78.2	47	84	450	100, 500, 1000
		Tinned copper, vinyl insulated, conductors cabled, tinned copper spiral wrapped shield, chrome vinyl jacket.									
 BELDFOIL®	**9770•**	22 (7x30)	.008	.020	.145	Blk, Red, Wht	100	32	60	200	250, 500, 1000
		Tinned copper, polypropylene insulated, conductors cabled, BELDFOIL aluminum-polyester shield, 22 AWG stranded tinned copper drain wire, brown vinyl jacket.									

For underground burial recommendations of all types of vinyl, polyethylene, Hypalon and neoprene jacketed cables, please write for Technical Data Bulletin T/8-6.

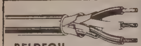
•Belden U.S. Patent 3,032,604.

▨ **Passes the FR-1 vertical flame test.** **Capacitance between conductors.* ***Capacitance between 1 conductor and other conductors connected to shield.*

BELDEN

shielded instrumentation, strain gauge and communication cables

THREE CONDUCTOR SHIELDED CABLES (Cont'd)

Description	Trade Number	AWG & (Stranding)	Insulation Thickness (Inch)	Jacket Thickness (Inch)	Nom. O.D. (Inch)	Cond. Color Coding	Percent Shield Coverage	Nom. *Cap. (pF/ft.)	Nom. **Cap. (pF/ft.)	Suggested Working Voltage	Standard Spool Lengths in ft.
BELDFOIL®	8771•	22 (7x30)	.014	.025	.175	Blk, Red, Clear	100	23	41	350	250, 500, 1000
	8772•	20 (7x28)	.014	.028	.200	Blk, Red, Clear	100	27	51	350	500, 1000
	8770•	18 (16x30)	.018	.028	.236	Blk, Red, Clear	100	24	48	450	500, 1000
	8618•	16 (19x29)	.025	.030	.300	Blk, Red, Clear	100	26	50	600	500, 1000
		Tinned copper, polyethylene insulated, conductors cabled, BELDFOIL aluminum-polyester shield, stranded tinned copper drain wire (22 AWG for 8771, 20 AWG for 8770 and 8772, and 18 AWG for 8618), ***CHROME*** *vinyl jacket, (8772* ***ROSE-GRAY*** *or* ***CHROME****).*									
 **BELDFOIL High Temperature TEFLON and Silicone △**	83395	22 (7x30)	.015	.030	.213	Blk, Red, Wht	100	20	35	1000 DC	25, 100, 500
		Tinned copper, insulated with FEP TEFLON, conductors cabled, noise reducing tape, 22 AWG (7x30) nickel coated copper drain wire, special BELDFOIL shield, red Silicone rubber jacket. ***+150°C maximum, −70°C minimum operating temperature.*** *Jacket working voltage: 1000V DC, shield to ground.*									
	8643	30 (7x38)	.005	.010	.086	Blk, Red, Wht	95	25	43	200	100, 250
		Tinned copper, polypropylene insulated, conductors cabled around textile strength member, tinned copper braid shield, chrome vinyl jacket. **For other multi-conductor braid shielded cables see Belden page 7.**									
	8735	22 (7x30)	.015	.025	.199	Blk, Red, Wht	70	34	60	350	15, 50, 100, 500, 1000
		Tinned copper, vinyl insulated, conductors cabled, tinned copper braid shield, chrome vinyl jacket.									

FOUR CONDUCTOR SHIELDED CABLES

Description	Trade Number	No. of Cond.	AWG & (Stranding)	Insulation Thickness (Inch)	Jacket Thickness (Inch)	Nom. O.D. (Inch)	Cond. Color Coding	Percent Shield Coverage	Nom. *Cap. (pF/ft.)	Nom. **Cap. (pF/ft.)	Suggested Working Voltage	Standard Spool Lengths in ft.
BELDFOIL®	8434•	4	25 (7x33) 3 copper 4 Copperweld	.013	.020	.165	Red, Blk, Grn, Clear	100	25	40	400	100, 500, 1000
			Tinned copper, polyethylene insulated, black and red conductors under BELDFOIL aluminum-polyester shield, stranded drain wire, green and clear conductors under over-all BELDFOIL aluminum-polyester shield, chrome vinyl jacket. Pairs cabled on common axis to reduce diameter. θ									
BELDFOIL	8723•	4	22 (7x30)	.008	.019	.165	Red, Blk, Grn, Wht	100	35	62	400	100, 500, 1000
			Tinned copper, polypropylene insulated, black and red under a BELDFOIL aluminum-polyester shield, green and white under a BELDFOIL aluminum-polyester shield, 24 AWG stranded tinned copper common drain wire, chrome vinyl jacket. Pairs cabled on common axis to reduce diameter. θ									
BELDFOIL	8728	4	22 (7x30)	.008	.026	.198	Red, Blk, Grn, Wht	100	35	62	400	500, 1000
			Tinned copper, polypropylene insulated, conductors cabled in pairs, each pair BELDFOIL aluminum-polyester shielded with 24 AWG stranded tinned copper drain wire, polyester film over each shield, overall BELDFOIL aluminum-polyester shield and 24 AWG stranded tinned copper drain wire, chrome vinyl jacket. Pairs cabled on common axis to reduce diameter. θ									
BELDFOIL	8729•	4	22 (19x34)	.015	.050	.265	Red, Blk, Grn, Clear	100	22	42	600	500, 1000
			Tinned copper, polyethylene insulated, conductors cabled, BELDFOIL aluminum-polyester shield, 3—23 AWG solid tinned Copperweld and 1—25 AWG stranded tinned Copperweld drain wires, white vinyl jacket. Belden U.S. Patent 3,673,316 and Belden Canadian Patent 875,187.									
BELDFOIL **High Temperature TEFLON and Silicone △**	83396	4	22 (7x30)	.015	.030	.222	Red, Blk, Wht	100	20	35	1000 DC	25, 100, 500
			Tinned copper, insulated with FEP TEFLON, conductors cabled, noise reducing tape, 22 AWG (7x30) nickel coated copper drain wire, special BELDFOIL shield, red Silicone rubber jacket. ***+150°C maximum, −70°C minimum operating temperature.*** *Jacket working voltage: 1000V DC, shield to ground.*									

☐ **Passes the FR-1 vertical flame test.** •*Belden U.S. Patent 3,032,604.*

θ*Request Technical Data Bulletin T/8-21 before planning high and low level circuits in the same cable.*

**Capacitance between conductors.*

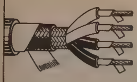
***Capacitance between 1 conductor and other, conductors connected to shield.*

△ *For additional high temperature shielded cables see Belden page 8.*

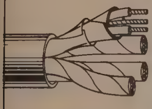
shielded instrumentation, strain gauge and communication cable

BELDEN

FOUR CONDUCTOR SHIELDED CABLES (Cont'd)

Description	Trade Number	No. of Cond.	AWG & (Stranding)	Insulation Thickness (Inch)	Jacket Thickness (Inch)	Nom. O.D. (Inch)	Cond. Color Coding	Percent Shield Coverage	Nom. *Cap. (pF/ft)	Nom. **Cap. (pF/ft)	Suggested Working Voltage	Standard Spool Lengths in ft.
	8404	4	20 (26x34)	.015	.033	.248	Red, Blk, Grn, Clear	87	25	45	600	15, 100, 250, 500, 1000
		Tinned copper, polyethylene insulated, conductors cabled, rayon braid, tinned copper braid shield, chrome vinyl jacket. **For other multi-conductor braid shielded cables see Belden page 7.**										
	8407	4	16 (65x34)	.032	.043	.422	Red, Blk, Grn, Wht	84	30	55	600	100, 250
		Tinned copper, separator, rubber insulated, conductors cabled, rayon braid, tinned copper braid shield, cotton wrap, black neoprene jacket. **For other multi-conductor braid shielded cables see Belden page 7.**										
	8424	4	20 (26x34)	.020	.040	.295	Red, Blk, Grn, Wht	83.5	35	60	600	50, 100, 250, 500, 1000
		Tinned copper, cotton wrap, rubber insulated, conductors cabled, rayon braid, tinned copper braid shield, cotton wrap, black rubber jacket. **For other multi-conductor braid shielded cables see Belden page 7.**										
	★9155•	2 shielded 2 unshielded	20 (7x28) 18 (16x30)	.018 .018	.031	.256	Blk, Red, Grn, Wht	100	22	40	300	500, 1000
		Tinned copper, polyethylene insulated, BELDFOIL aluminum-polyester shield over 20 AWG twisted pair, 22 AWG stranded tinned copper drain wire, rose gray vinyl jacket. *Underwriters' Laboratories, Inc. Listed (Style 2094).*										
	8724•	2 shielded 2 unshielded	22 (7x30) 22 (7x30)	.008 .008	.019	.165	Red, Blk, Grn, Wht	100	34	67	200	250, 500, 1000
BELDFOIL®	8722•	2 shielded 2 unshielded	20 (7x28) 20 (7x28)	.015 .015	.028	.230	Red, Blk, Grn, Wht	100	60	99	350	500, 1000
		Tinned copper, 8722 vinyl insulated 8724 polypropylene insulated, BELDFOIL aluminum-polyester shield over 2 conductors, stranded tinned copper drain wire (22 AWG for 8722 and 24 AWG for 8724), 8724 CHROME, 8722 CHROME or WHITE vinyl jacket. Pairs cabled on common axis to reduce diameter. ϴ										
	8732	2 shielded 2 unshielded	22 (7x30) 22 (7x30)	.015 .015	.030	.188x .296	Blk, Clear Blk, Clear	62	21	37	350	100, 500, 1000
		Tinned copper, polyethylene insulated, conductors cabled, tinned copper braid shield over 1 pair, chrome vinyl jacket.										
	8730•	2 shielded 2 unshielded	22 (7x30) 22 (7x30)	.008 .008	.030	.205	Red, Blk, Grn, Wht	100	34	67	200	500, 1000
BELDFOIL		*Tinned copper, polypropylene insulated, BELDFOIL aluminum-polyester shield over 1 pair with 24 AWG stranded tinned copper drain wire, chrome vinyl jacket. Pairs cabled on separate axes for reduced magnetic coupling.*										

MULTIPLE PAIR AUDIO, COMMUNICATION AND INSTRUMENTATION CABLES

Description	Trade Number	No. of Cond.	AWG & (Stranding)	Insulation Thickness (Inch)	Jacket Thickness (Inch)	Nom. O.D. (Inch)	Cond. Color Coding	Percent Shield Coverage	Nom. *Cap. (pF/ft)	Nom. **Cap. (pF/ft)	Suggested Working Voltage	Standard Spool Lengths in ft.
	9784•	12 (6 Pair)	24 (7x32)	.020	.037	.494	See chart on Page 10	100	12	22	60	500, 1000
		Tinned copper, foam polypropylene insulation, conductors cabled, each pair individually BELDFOIL shielded with 24 AWG drain wire, chrome vinyl jacket.										
BELDFOIL	8725•†°	8 (4 Pair)	20 (7x28)	.015	.030	.360	Red, Blk Grn, Wht Wht/Red, Wht/Blk Wht/Grn, Wht/Yel	100	27	49	400	500, 1000
		Tinned copper conductors, polypropylene insulated, four groups of two conductors with 22 AWG drain wire, each group individually BELDFOIL shielded with polyester tape wrap, chrome vinyl jacket.										

☐ **Passes the FR-1 vertical flame test.** ★**New Item** •*Belden U.S. Patent 3,032,604.*

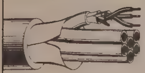
ϴRequest Technical Data, Bulletin T/8-21 before planning high and low level circuits in same cable.
†Cabled around common axis—request Technical Data Bulletin T/8-21 before planning high and low level circuits in same cable.
°Color code is per the Western Regional Strain Gauge Standard.

**Capacitance between conductors. **Capacitance between 1 conductor and other conductors connected to shield.*

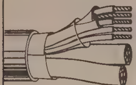
BELDEN

audio and communication cables

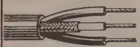
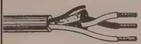
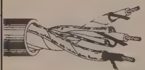
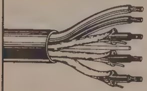
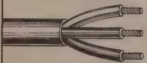
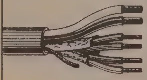
MULTIPLE TRIPLETS AUDIO, COMMUNICATION AND INSTRUMENTATION CABLES

Description	Trade Number	No. of Cond.	AWG & (Stranding)	Insulation Thickness (Inch)	Jacket Thickness (Inch)	Nom. O.D. (Inch)	Cond. Color Coding	Percent Shield Coverage	Nom. *Cap. (pF/ft)	Nom. **Cap. (pF/ft)	Suggested Working Voltage	Standard Spool Lengths in ft.
	9771•	21 7 (Triplets)	22 (7x30)	.008	.045	.550	Blk, Red, Grn	100	32	60	300	500
	9772•	36 12 (Triplets)	22 (7x30)	.008	.060	.740	Blk, Red, Grn	100	32	60	300	500
BELDFOIL™		*Tinned copper, polypropylene insulated, conductors cabled in triplets each shielded with BELDFOIL aluminum-polyester shield, 22 AWG stranded tinned copper drain wire, with .020" white vinyl jacket, individual triplet jackets identified by color coded stripes, triplets cabled, overall chrome vinyl jacket.*										

MULTIPLE QUADS AUDIO AND COMMUNICATION CABLES

Description	Trade Number	No. of Cond.	AWG & (Stranding)	Insulation Thickness (Inch)	Jacket Thickness (Inch)	Nom. O.D. (Inch)	Cond. Color Coding	Percent Shield Coverage	Nom. *Cap. (pF/ft)	Nom. **Cap. (pF/ft)	Suggested Working Voltage	Standard Spool Lengths in ft.
	8726•	12 3 (Quads) *Cabled around common axis.*	22 (7x30)	.008	.035	.330	Red, Blk, Grn, Wht	100	34	67	200	100, 500, 1000
	8727•	28 7 (Quads) *Cabled around common axis.*	22 (7x30)	.008	.040	.450	Red, Blk, Grn, Wht	100	34	67	200	100, 500, 1000
BELDFOIL		*Tinned copper, polypropylene insulated, cabled in quads, BELDFOIL shield over black and red conductors, 24 AWG stranded tinned copper drain wire. Each quad is 8724 (on Belden page 4) except for tape shield folding and a clear polyester tape instead of a vinyl jacket. Shields color coded, overall chrome vinyl jacket. Request Technical Data Bulletin T/8-21 before planning high and low level circuits in same cable.*										

SPECIAL AUDIO AND COMMUNICATION CABLES

Description	Trade Number	No. of Cond.	AWG & (Stranding)	Insulation Thickness (Inch)	Jacket Thickness (Inch)	Nom. O.D. (Inch)	Cond. Color Coding	Percent Shield Coverage	Nom. *Cap. (pF/ft)	Nom. **Cap. (pF/ft)	Suggested Working Voltage	Standard Spool Lengths in ft.
	8734	3 1 shielded 2 unshielded	22 (7x30) 22 (7x30)	.015 .015	.025	.194	Wht Blk, Red	82	—	79	350	100, 500, 1000
		Tinned copper, vinyl insulated, tinned copper braid shield over 1 conductor, 3 conductors cabled, chrome vinyl jacket.										
	8763•	3 2 shielded 1 unshielded	20 (7x28) 20 (7x28)	.014 .014	.028	.210	Blk, Red Clear	100	26	48	350	500, 1000
BELDFOIL		*Tinned copper, polyethylene insulated, conductors cabled, BELDFOIL aluminum-polyester shield over 2 conductors, 20 AWG stranded tinned copper drain wire, chrome vinyl jacket.*										
	8733•	3 Conductors shielded	22 (7x30)	.014	.030	.205	Blk, Red, Clear	100	—	51	350	100, 500
BELDFOIL		*Tinned copper, polyethylene insulated, each conductor separately BELDFOIL aluminum-polyester shielded, drain wire for each conductor is tinned cadmium bronze ribbon under BELDFOIL, conductors cabled, chrome vinyl jacket.*										
	8788•	5 3 shielded 2 unshielded	22 (7x30) 22 (7x30)	.015 .015	.028	.236	Blk, Red, Grn Yel, Blue	100	—	125	350	500
BELDFOIL		*Tinned copper, vinyl insulated, 3 conductors each separately BELDFOIL shielded, drain wire for each conductor is tinned cadmium bronze ribbon under BELDFOIL, 2 conductors unshielded, cabled around a non-hygroscopic filler, chrome vinyl jacket.*										
	8783	3 Conductors unshielded	1-20 (10x30) 2-16 (26x30)	.020 .020	.025	.250	Blue, Grn, Org	—	—	—	450	100, 500
		Tinned copper, vinyl insulated, conductors cabled, chrome vinyl jacket.										
	8786•	6 4 shielded 2 unshielded	24 (7x32) 22 (7x30)	.015 .015	.028	.256	Blk, Grn, Red, Yel Blu, Wht	100	—	—	350	100, 500
BELDFOIL		*Tinned copper, vinyl insulated, conductors cabled, 4 conductors cabled under BELDFOIL aluminum-polyester shield, 2 conductors unshielded, 22 AWG drain wire, chrome vinyl jacket.*										

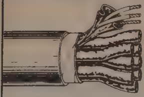
▨ **Passes the FR-1 vertical flame test.** •*Belden U.S. Patent 3,032,604.*

**Capacitance between conductors.* ***Capacitance between 1 conductor and other conductors connected to shield.*

shielded paired audio, sound and data cables

BELDEN

MULTIPLE PAIR INDIVIDUALLY SHIELDED AUDIO AND SOUND CABLES

Description	Trade Number	No. of Pairs	Stranding	Insulation Thickness (Inch)	Jacket Thickness (Inch)	Nom. O.D. (Inch)	Nom. *Cap. (pF/ft)	Nom. **Cap. (pF/ft)	Standard Spool Lengths in ft.
22 GAGE VINYL INSULATION  **BELDFOIL®**	8767•	3	Solid	.013	.037	.279	40	77	100, 500, 1000
	8768•	6	Solid	.013	.037	.394	40	77	100, 500, 1000
	8764•	9	Solid	.013	.040	.440	40	77	100, 500, 1000
	8765•	11	Solid	.013	.040	.485	40	77	100, 500, 1000
	8766•	15	Solid	.013	.045	.540	40	77	100, 500, 1000

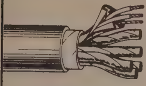
22 AWG Tinned copper, vinyl insulated, twisted pairs, each pair and its drain wire under BELDFOIL aluminum-polyester shield, overall chrome vinyl jacket. 300 Volts suggested working voltage.

Insulation resistance between shields. 100 megohms/M' nom.
Capacitance between adjacent shields. . . . . .115 pF/ft nom.
Voltage breakdown between adjacent shields. 1500 volts nom.
Working voltage between adjacent shields. . . .50 volts max.

Underwriters' Laboratories, Inc. Listed (Style 2464)

Vinyl insulation is used for ease of stripping and soldering. Recommended for audio frequency applications requiring excellent circuit isolation.

MULTIPLE PAIR INDIVIDUALLY SHIELDED AUDIO AND DATA CABLES

Description	Trade Number	No. of Pairs	AWG & (Stranding)	Insulation Thickness (Inch)	Jacket Thickness (Inch)	Nom. O.D. (Inch)	Nom. *Cap. (pF/ft)	Nom. **Cap. (pF/ft)	Standard Spool Lengths in ft.
18 AND 22 GAGE POLYPROPYLENE INSULATION  **BELDFOIL**	8777•	3	22 (7x30)	.010	.030	.265	30	55	100, 250, 500, 1000
	8778•	6	22 (7x30)	.010	.037	.394	30	55	100, 250, 500, 1000
	8774•	9	22 (7x30)	.010	.040	.440	30	55	100, 250, 500, 1000
	8775•	11	22 (7x30)	.010	.040	.485	30	55	100, 250, 500, 1000
	★9768•	12	22 (7x30)	.010	.040	.485	30	55	100, 250, 500, 1000
	8776•	15	22 (7x30)	.010	.045	.540	30	55	100, 250, 500, 1000
	★9769•	17	22 (7x30)	.010	.055	.610	30	55	100, 250, 500, 1000
	8769•	19	22 (7x30)	.010	.055	.620	30	55	100, 250, 500, 1000
	8773•	27	22 (7x30)	.010	.070	.760	30	55	100, 250, 500, 1000
			250, 500 & 1000 ft. lengths +20% —0 length tolerance.						
	★9873•	3	20 (10x30)	.013	.035	.330	30	55	100, 250, 500, 1000
	★9874•	6	20 (10x30)	.013	.040	.470	30	55	100, 250, 500, 1000
	★9875•	9	20 (10x30)	.013	.045	.530	30	55	100, 250, 500, 1000
	★9876•	11	20 (10x30)	.013	.045	.575	30	55	100, 250, 500, 1000
	★9877•	12	20 (10x30)	.013	.045	.575	30	55	100, 250, 500, 1000
	★9878•	13	20 (10x30)	.013	.055	.620	30	55	100, 250, 500, 1000
	★9879•	15	20 (10x30)	.013	.055	.660	30	55	100, 250, 500, 1000
	9773•	3	18 (16x30)	.016	.035	.372	30	55	500, 1000
	9774•	6	18 (16x30)	.016	.045	.545	30	55	500, 1000
	9775•	9	18 (16x30)	.016	.055	.620	30	55	500, 1000
	9776•	12	18 (16x30)	.016	.070	.765	30	55	500, 1000
	9777•	15	18 (16x30)	.016	.070	.830	30	55	500, 1000

Tinned copper, polypropylene insulated, twisted pairs, each pair and its stranded tinned copper drain wire (22 AWG on 22 AWG and 20 AWG series, 20 AWG on 18 AWG series) under BELDFOIL aluminum-polyester shield, overall chrome vinyl jacket. 300 volts suggested working voltage for 22 AWG; 350 volts for 20 AWG; 400 volts for 18 AWG.

Insulation resistance between shields 100 megohms/M' nom.
Capacitance between adjacent shields. . . . . .115 pF/ft nom.
Voltage breakdown between adjacent shields. 1500 volts nom.
Working voltage between adjacent shields. . . .50 volts max.

Recommended for audio, pulse and radio frequency applications requiring superior circuit isolation. Polypropylene insulation is used for excellent high frequency properties and mechanical toughness.

★New Item ☐ **Passes the FR-1 vertical flame test.** *•Belden U.S. Patent 3,032,604.*

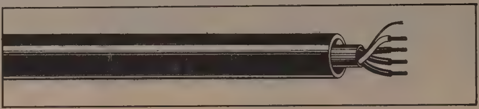
**Capacitance between conductors.* ***Capacitance between 1 conductor and other conductor connected to shield.*

BELDEN

direct burial, audio and data cables
mil-w-16878 shielded cables

DIRECT BURIAL CABLES

Most Belden standard or special cable can be supplied in matching conduit for direct burial installations. This means a lower initial cost than cable and conduit purchased separately, plus it eliminates the expense of pulling cable. Conduit manufactured with black, high molecular weight polyethylene that meets REA and ASTM requirements.

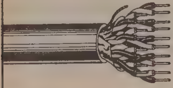


MULTIPLE PAIR INDIVIDUALLY SHIELDED DIRECT BURIAL, AUDIO AND DATA CABLE

Description	Trade Number	No. of Pairs	AWG & (Stranding)	Insulation Thickness (Inch)	Jacket Thickness (Inch)	Nom. O.D. (Inch)	Nom. *Cap. (pF/ft)	Nom. **Cap. (pF/ft)	Standard Spool Lengths in ft
	★9883•	3	20 (10x30)	.013	.040	.340	30	55	500, 1000
BELDFOIL®	★9886•	6	20 (10x30)	.013	.045	.480	30	55	500, 1000

Tinned copper, polypropylene insulated, BELDFOIL aluminum-polyester shield over individually twisted pairs with 22 AWG stranded tinned copper drain wire, black High Density Polyethylene jacket.
This cable is especially designed for direct burial installation.

MULTIPLE PAIR SHIELDED SOUND AND CONTROL CABLE

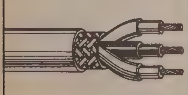
	★9302	2	22 (Solid)	.015	.028	.211	35	—	100, 500, 1000
	★9306	6	22 (Solid)	.010	.035	.315	35	—	100, 500, 1000
	★9309	9	22 (Solid)	.010	.037	.364	35	—	100, 500, 1000
	★9315	15	22 (Solid)	.010	.040	.430	35	—	100, 500, 1000
BELDFOIL	★9319	19	22 (Solid)	.010	.040	.455	35	—	100, 500, 1000
FR-1	★9327	27	22 (Solid)	.010	.045	.560	35	—	100, 500, 1000

Tinned copper, vinyl insulated twisted pairs, overall BELDFOIL aluminum-polyester shield, stranded tinned copper drain wire, chrome vinyl jacket. **Underwriters' Laboratories, Inc. Listed (Wires, Misc.) 90V Max.**

MULTI-CONDUCTOR SHIELDED CABLES

MIL-W-16878-TYPE B SHIELDED CABLES
All of these cables have passed the FR-1 vertical flame test

Suitable for general purpose use in communications and instrumentation applications. Cables have excellent resistance to moisture, weather, ozone, acids, alkali and flame.

Description	Trade Number	No. of Cond.	AWG & (Stranding)	Insulation Thickness (Inch)	Nom. Nylon Thickness (Inch)	Jacket Thickness (Inch)	Nom. O.D. (Inch)	Cond. Color Coding	Percent Shield Cov.	Nom. *Cap. (pF/ft)	Nom. **Cap. (pF/ft)	Standard Spool Lengths in Ft.
	9971	1	24 (19x36)	.010	.003	.010	.090	Wht	93	—	75	100, 500, 1000
	9961	1	20 (19x32)	.010	.003	.010	.109	Wht	93	—	100	100, 500, 1000
	9951	1	16 (19x29)	.010	.003	.016	.139	Wht	93	—	125	100, 500, 1000
	9972	2	24 (19x36)	.010	.003	.016	.156	Wht, Blk	91	40	70	100, 500, 1000
	9962	2	20 (19x32)	.010	.003	.020	.192	Wht, Blk	92	55	95	100, 500, 1000
	9952	2	16 (19x29)	.010	.003	.025	.238	Wht, Blk	92	70	120	100, 500, 1000
	**9973**	3	24 (19x36)	.010	.003	.016	.164	Wht, Blk, Red	91	40	70	100, 500, 1000
	9963	3	20 (19x32)	.010	.003	.020	.202	Wht, Blk, Red	91	55	95	100, 500, 1000
	9953	3	16 (19x29)	.010	.003	.025	.250	Wht, Blk, Red	91	70	120	100, 500, 1000
	9974	4	24 (19x36)	.010	.003	.016	.171	Wht, Blk, Red, Grn	92	40	70	100, 500, 1000
	9964	4	20 (19x32)	.010	.003	.020	.212	Wht, Blk, Red, Grn	92	55	95	100, 500, 1000
	9954	4	16 (19x29)	.010	.003	.023	.270	Wht, Blk, Red, Grn	91	70	120	100, 500, 1000

Stranded tinned copper, vinyl insulated, clear nylon jacket, conductors cabled, tinned copper braid shield, white vinyl jacket.
Suggested working voltage —600 volts

Manufactured to current Government specifications and subsequent revisions. **★New Item** **FR-1 or ☐ Passes the FR-1 vertical flame test.**

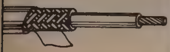
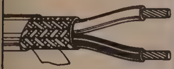
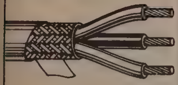
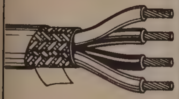
**Capacitance between conductors.* ***Capacitance between one conductor and other conductors connected to shield.* *● Belden U.S. Patent 3,032,604.*

high temperature shielded cables

BELDEN

MULTIPLE CONDUCTOR CABLE INSULATED WITH TEFLON
MIL-W-16878 TYPE E SHIELDED CABLES

All of these cables have passed the FR-1 vertical flame test.

Description	Trade Number	AWG & (Stranding)	Insulation Thickness (Inch)	Jacket Thickness (Inch)	Nom. O.D. (Inch)	Conductor Color Coding	Percent Shield Coverage	Nom. *Cap. (pF/ft)	Nom. **Cap. (pF/ft)	Standard Spool Lengths in Feet
 **SINGLE CONDUCTOR**	**83301**	30 (7x38)	.010	.010	.074	Wht	90	—	30	100, 500, 1000
	83302	28 (7x36)	.010	.010	.078	Wht	90	—	35	100, 500, 1000
	83303	26 (7x34)	.010	.010	.082	Wht	90	—	40	100, 500, 1000
	83304	24 (19x36)	.010	.010	.088	Wht	90	—	51	100, 500, 1000
	83305	22 (19x34)	.010	.010	.094	Wht	90	—	60	100, 500, 1000
	83306	20 (19x32)	.010	.010	.103	Wht	90	—	67	100, 500, 1000
	83307	18 (19x30)	.010	.010	.113	Wht	90	—	75	100, 500, 1000
	83308	16 (19x29)	.011	.012	.123	Wht	90	—	89	100, 500, 1000
 **TWO CONDUCTOR**	**83315**	30 (7x38)	.010	.010	.106	Wht, Blk	90	15	27	100, 500, 1000
	83316	28 (7x36)	.010	.010	.112	Wht, Blk	90	18	32	100, 500, 1000
	83317	26 (7x34)	.010	.010	.120	Wht, Blk	90	20	36	100, 500, 1000
	83318	24 (19x36)	.010	.010	.132	Wht, Blk	90	22	40	100, 500, 1000
	83319	22 (19x34)	.010	.010	.144	Wht, Blk	90	26	46	100, 500, 1000
	83320	20 (19x32)	.010	.012	.162	Wht, Blk	90	28	52	100, 500, 1000
	83321	18 (19x30)	.010	.012	.188	Wht, Blk	90	30	55	100, 500, 1000
	83322	16 (19x29)	.011	.012	.200	Wht, Blk	90	33	59	100, 500, 1000
 **THREE CONDUCTOR**	**83330**	30 (7x38)	.010	.010	.111	Wht, Blk, Red	90	14	25	100, 500, 1000
	83331	28 (7x36)	.010	.010	.117	Wht, Blk, Red	90	17	30	100, 500, 1000
	83332	26 (7x34)	.010	.010	.126	Wht, Blk, Red	90	19	33	100, 500, 1000
	83333	24 (19x36)	.010	.010	.136	Wht, Blk, Red	90	22	38	100, 500, 1000
	83334	22 (19x34)	.010	.012	.156	Wht, Blk, Red	90	24	41	100, 500, 1000
	83335	20 (19x32)	.010	.012	.175	Wht, Blk, Red	90	27	45	100, 500, 1000
	83336	18 (19x30)	.010	.012	.196	Wht, Blk, Red	90	28	52	100, 500, 1000
	83337	16 (19x29)	.011	.012	.218	Wht, Blk, Red	90	30	56	100, 500, 1000
 **FOUR CONDUCTOR**	**83345**	30 (7x38)	.010	.010	.119	Wht, Blk, Red, Grn	90	13	24	100, 500, 1000
	83346	28 (7x36)	.010	.010	.126	Wht, Blk, Red, Grn	90	16	28	100, 500, 1000
	83347	26 (7x34)	.010	.010	.135	Wht, Blk, Red, Grn	90	18	32	100, 500, 1000
	83348	24 (19x36)	.010	.012	.151	Wht, Blk, Red, Grn	90	20	36	100, 500, 1000
	83349	22 (19x34)	.010	.012	.166	Wht, Blk, Red, Grn	90	23	40	100, 500, 1000
	83350	20 (19x32)	.010	.012	.185	Wht, Blk, Red, Grn	90	25	44	100, 500, 1000
	83351	18 (19x30)	.010	.012	.215	Wht, Blk, Red, Grn	90	27	50	100, 500, 1000
	83352	16 (19x29)	.011	.014	.235	Wht, Blk, Red, Grn	90	29	54	100, 500, 1000

Stranded silver coated copper conductors, insulated with Type E extruded TFE TEFLON, color coded, cabled, braided silver plated copper shield, white TFE TEFLON tape wrapped jacket.
MIL-SPEC: MIL-W-16878 Type E
TEMPERATURE RATING: —65°C to 200°C
VOLTAGE: 600 Volts (RMS)

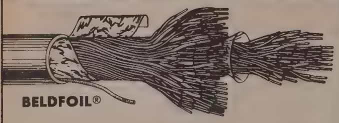
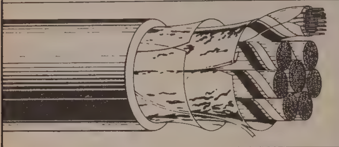
Manufactured to Current Government Specifications and Subsequent Revisions. ☐ **Passes the FR-1 vertical flame test.**

*Capacitance between conductors. **Capacitance between one conductor and other conductors connected to shield.

shielded paired sound and control cables data, instrumentation and computer cables

BELDEN

38, 51 AND 102 PAIR CABLES

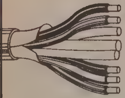
Description	Trade Number	No. of Pairs	AWG & (Stranding)	Insulation Thickness (Inch)	Jacket Thickness (Inch)	Nom. O.D. (Inch)	Standard Spool Lengths in ft.
	8752• ▨	38	22 (Solid)	.008	.045	.600	250, 500, 1000
		All lengths +20% —0 Length Tolerance					
BELDFOIL®	8751• ▨	51	22 (Solid)	.010	.050	.700	250, 500, 1000, 1500
		All lengths +20% —0 Length Tolerance					
	9753 ▨	102	22 (Solid)	.010	.085	1.100	250, 500, 1000, 1500
		All lengths +20% —0 Length Tolerance					

Tinned copper, 8751 and 9753 vinyl insulated, 8752 polypropylene insulated, twisted pairs, BELDFOIL aluminum-polyester shield overall, 22 AWG (7x30) stranded drain wire, chrome vinyl jacket. 200 Volts suggested working voltage.

For color coding information on 8751 and 8752 write for Technical Data Bulletin T/8-4.
For color coding information on 9753 write for Technical Data Bulletin T/8-22.

SPECIAL DATA, INSTRUMENTATION AND COMPUTER CABLES

These cables are intended for those applications with special requirements such as miniature size, low capacitance for minimum signal distortion or good electrical characteristics. They are recommended for both analog and digital systems. Special cable designs are available to satisfy unique physical and electrical requirements.

	Trade Number	No. of Cond.	AWG & (Stranding)	Insulation Thickness (Inch)	Jacket Thickness (Inch)	Nom. O.D. (Inch)	Cond. Color Coding	Percent Shield Coverage	Nom. *Cap. (pF/ft)	Nom. **Cap. (pF/ft)	Suggested Working Voltage	Standard Spool Lengths in ft
	9640 ▨	3 Shielded	28 (Solid)	.0025	.015	.087	Blk, Red, Blue	100	60	110	100	25, 50
		2 Shielded					Grn, Wht					

Solid copper, GEOSOL™ insulated (solderable—no stripping required), conductors cabled, 3 conductor group shielded from 2 conductor group (Patent No. 3,291,891), overall BELDFOIL aluminum-polyester shield, white vinyl jacket. **105°C maximum operating temperature.**

This miniature 5 conductor cable which consists of a shielded pair and a shielded triplet is ideal for use in instrumentation work where miniaturization is required. The patented construction offers circuit isolation between groups as well as overall shielding from external noise sources making it adaptable to low level signal circuits.

Description	Trade Number	AWG & (Stranding) Material	Insulation	Shield and Material	Jacket	Nom. O.D. (Inch)	Nom. Imp. (Ohms)	Nom. Vel. of Prop.	Nom. Cap. (pF/ft)	Nom. Attenuation per 100' MHz	Nom. Attenuation per 100' db	Standard Spool Lengths in ft
	8700	28 (Solid) tinned copper	Polypropylene	Bare copper braid	Black vinyl	.054	32	66%	48	400	55.0	25, 50, 100, 250
		91 Percent shield coverage.										
	9754	26 (Solid) silver coated cadmium copper	Semi-solid flame retardant Polyethylene	BELDFOIL with two silver coated cadmium copper drain wires	Gray vinyl	.166	95	84%	13.5	100 200 300 400	4.2 5.8 7.0 8.0	500, 1000
					Underwriters' Laboratories, Inc., Listed (Style 1299)							
	9272	2 Cond. 20 (7x28) tinned copper	Polyethylene color coded	Tinned copper braid	Blue vinyl	.242	78	66%	19.7	100 200 400 900	7.5 11.0 16.0 25.0	100, 500, 1000
	9271	2 Cond. 25 (7x33) tinned copper	Polyethylene color coded	BELDFOIL with stranded tinned copper drain wire	Blue vinyl	.242	124	66%	12.2	1 10 20 50	0.6 1.7 2.3 3.6	100, 500, 1000

▨ **Passes the FR-1 vertical flame test.** *•Belden U.S. Patent 3,032,604.*

**Capacitance between conductors.*
***Capacitance between 1 conductor and other conductors connected to shield.*

ELECTRONIC DIVISION/BELDEN CORPORATION, P.O. BOX 1331, RICHMOND, IN 47374 (317) 966-6661

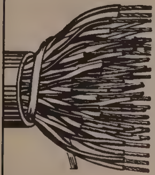
BELDEN

unshielded paired sound and control cables

MULTIPLE PAIR UNSHIELDED SOUND AND CONTROL CABLES

All of these cables have passed the FR-1 vertical flame test.

TYPICAL APPLICATION: Balanced line sound systems.
Made with 80°C vinyl plastic compounds for high dielectric strength and the best physical properties, such as free stripping, small diameter and tear resistance. It also resists the effects of water, sun, oil, grease and ozone. The conductors are paired with a short-lay twist for conductor balance, providing a quiet circuit, free from cross talk.

Description	Trade Number	No. of Pairs	AWG & (Stranding)	Insulation Thickness (Inch)	Jacket Thickness (Inch)	Nom. O.D. (Inch)	Suggested Working Voltage	Standard Spool Lengths in ft.
		22 SOLID Underwriters' Laboratories, Inc. Listed (Wires, Misc.) 90V Max.						
ALL CONSTRUCTIONS: *Tinned copper, vinyl insulated, twisted pairs, chrome vinyl jacket.*	8740	1	22 (Solid)	.015	.025	.150	300	100, T-500, and T-1000 (Convert-a-Pak)
	8741	2	22 (Solid)	.015	.028	.201	300	100, 1000, T-500 (Convert-a-Pak)
	8742	3	22 (Solid)	.015	.030	.240	300	100, 500, 1000
	8757	4	22 (Solid)	.015	.030	.255	300	500, 1000
	★9158	5	22 (Solid)	.012	.040	.298	300	500, 1000
	8743	6	22 (Solid)	.010	.035	.305	200	100, 500, 1000
	★9160	8	22 (Solid)	.012	.040	.336	300	500, 1000
	8744	9	22 (Solid)	.010	.037	.354	200	100, 500, 1000
	8753	11	22 (Solid)	.010	.037	.384	200	100, 500, 1000
	8754	13	22 (Solid)	.010	.037	.409	200	100, 500, 1000
	8745	15	22 (Solid)	.010	.040	.420	200	100, 500, 1000
	8755	19	22 (Solid)	.010	.040	.480	200	500, 1000
	8756	23	22 (Solid)	.010	.040	.510	200	500, 1000
	8746	27	22 (Solid)	.010	.045	.550	200	250, 500, 1000, 2000
		All lengths +20% −0 Length Tolerance						
		22 STRANDED						
	9744	2	22 (7x30)	.015	.028	.230	300	500, 1000
	9745	3	22 (7x30)	.015	.030	.280	300	500, 1000
	9746	4	22 (7x30)	.015	.030	.295	300	500, 1000
	8747	6	22 (7x30)	.010	.035	.320	200	100, 500, 1000
	8748	9	22 (7x30)	.010	.037	.389	200	100, 500, 1000
	9747	12	22 (7x30)	.010	.040	.440	200	500, 1000
	8749	15	22 (7x30)	.010	.040	.455	200	100, 500, 1000
	9748	19	22 (7x30)	.010	.040	.520	200	500, 1000
	9749	23	22 (7x30)	.010	.045	.570	200	500, 1000
	8750	27	22 (7x30)	.010	.045	.595	200	250, 500, 1000, 2000
		All lengths +20% −0 Length Tolerance						
		20 STRANDED Underwriters' Laboratories, Inc. Listed (Wires, Misc.) 90V Max.						
	★9750	3	20 (10x30)	.012	.040	.301	300	100, 500, 1000
	★9751	6	20 (10x30)	.012	.040	.370	300	100, 500, 1000
	★9752	9	20 (10x30)	.012	.040	.447	300	100, 500, 1000
	★9755	15	20 (10x30)	.012	.040	.535	300	100, 500, 1000
		18 STRANDED 8690, 9156, 9157 and 9161 are Underwriters' Laboratories, Inc. Listed (Wires, Misc.) 90V Max.						
	9740	1	18 (16x30)	.018	.030	.220	400	500, 1000
	★9156	2	18 (16x30)	.012	.035	.241	300	500, 1000
	8690	3	18 (16x30)	.018	.037	.362	400	100, 500, 1000
	★9157	4	18 (16x30)	.012	.040	.353	300	500, 1000
	★9159	5	18 (16x30)	.012	.050	.409	300	500, 1000
	8691	6	18 (16x30)	.018	.045	.550	400	100, 500, 1000
	★9161	8	18 (16x30)	.012	.050	.469	300	500, 1000
	8692	9	18 (16x30)	.018	.055	.638	400	100, 500, 1000
	9741	12	18 (16x30)	.018	.055	.690	400	500, 1000
	9742	15	18 (16x30)	.018	.060	.800	400	500, 1000
	9743	19	18 (16x30)	.018	.070	.880	400	500, 1000

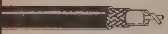
★New Item ☐ Passes the FR-1 vertical flame test.

ELECTRONIC DIVISION/BELDEN CORPORATION, P.O. BOX 1331, RICHMOND, IN 47374 (317) 966-6661

BELDEN

data instrumentation and computer cables two conductor unshielded cables

SPECIAL DATA, INSTRUMENTATION AND COMPUTER CABLES (Cont'd)

Description	Trade Number	AWG & (Stranding) Material	Insulation Nom. Core O.D. (Inch)	Shield and Material	Jacket	Nom. O.D. (Inch)	Nom. Imp. (Ohms)	Nom. Vel. of Prop.	Nom. Cap. (pF/ft)	Nom. Attenuation per 100' MHz	Nom. Attenuation per 100' db	Standard Spool Lengths in ft.
200 OHM VIDEO TWINAX	★9851	2 cond. 29 AWG Solid Silver Coated Copperweld	Cellular Flame Retardant Polyethylene	BELDFOIL overall	Chrome vinyl	.245	200	76%	6.7	—	—	100, 500, 1000
				Underwriters' Laboratories, Inc., Listed (Style 2606)								
DUAL—200 OHM VIDEO TWINAX	★9852	Same as above except 4 cond.	Same as above	BELDFOIL over pairs and overall	Black vinyl	.490	200	78%	6.5	—	—	100, 500, 1000
				Underwriters' Laboratories, Inc., Listed (Style 2606)								
	★9269 62A/U	22 AWG Solid bare Copperweld	Semi-Solid Polyethylene (.146)	1 Bare Copper	Black Non-Contaminating vinyl	.242	93	84%	13.5	100 200 400 900	3.1 4.4 6.3 11.0	500, 1000, 2000
				Underwriters' Laboratories, Inc., Listed (Style 1354)								
FR-1 	★9268 62A/U Type	22 AWG Solid bare Copperweld	Semi-solid Flame Retardant Polyethylene (.146)	1 Bare Copper	Black vinyl	.264	93	80%	14.5	100 200 400 900	3.1 4.4 6.3 11.0	500, 1000, 2000
				Underwriters' Laboratories, Inc., Listed (Style 1354)								

COPPER TAPE SHIELDED PAIRED CABLES

Description	Trade Number	No. of Cond.	AWG & (Stranding)	Insulation Thickness (Inch)	Jacket Thickness (Inch)	Nom. O.D. (Inch)	Cond. Color Coding	Percent Shield Coverage	Nom. *Cap. (pF/ft)	Nom. **Cap. (pF/ft)	Suggested Working Voltage	Standard Spool Lengths in ft.
	★9853	6 3 (Pairs)	22 (Solid)	.010 plus .0025 Nylon	.042	.299	Wht/Blu Wht/Org Wht/Grn	100	38	64	300	100, 250, 500, 1000
	★9856	12 6 (Pairs)	22 (Solid)	.010 plus .0025 Nylon	.050	.450	Wht/Blu Wht/Org Wht/Grn Wht/Brn Wht/Gry Red/Blu	100	38	64	300	100, 250, 500, 1000
	Tinned Copper, vinyl insulated with Nylon over, Copper foil tape shielded twisted pairs, black vinyl jacket. Similar to MIL-C-23437 except Copper foil shield in place of copper braid.											

TWO CONDUCTOR UNSHIELDED CABLES

Description	Trade Number	AWG & (Stranding)	Insulation Thickness (Inch)	Jacket Thickness (Inch)	Conductor Color Coding	Available Jacket Colors	Nominal O.D. (Inch)	Suggested Working Voltage	Standard Spool Lengths in ft.
	8781	22 (Solid)	.016	—	1 cond. tinned	Chrome	.060x .120	100	100, 500, 1000
	8782	24 (7x32)	.017	—	1 cond. tinned	Chrome, Sand, White, Clear	.058x .115	300	25, 50, 100, 500, 1000
Copper, vinyl insulated *PARALLEL*	8649	20 (7x28)	.020	—	1 cond. tinned	Chrome, Clear	.073x .146	300	100, 500, 1000
Without JACKET	8481	22 (Solid) bare	.015	—	Brn, Tan	—	.112	350	100, 500, 1000
	★9151	22 (7x30)	.012	—	Brown or White 1 cond. tinned	—	.108	300	500, 1000
					Underwriters' Laboratories, Inc. Listed (Misc. Wire)				
Copper, vinyl insulated, *CABLED*	★9152	20 (10x30)	.012	—	Brown or White 1 cond. tinned	—	.125	300	500, 1000
					Underwriters' Laboratories, Inc. Listed (Misc. Wire)				
	8482	19 (Solid) bare	.015	—	Brn, Tan	—	.130	350	100, 500, 1000
	8492	19 (Solid)	.025	—	Brown or White 1 cond. tinned	—	.170	600	1000
	★9153	18 (16x30)	.012	—	Brown or White 1 cond. tinned	—	.142	300	500, 1000
					Underwriters' Laboratories, Inc. Listed (Misc. Wire)				

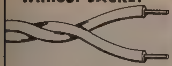
★New Item **Capacitance between conductors.* ***Capacitance between 1 conductor and other conductor connected to shield.*

FR-1 or ☐ Passes the FR-1 vertical flame test.

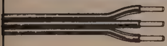
BELDEN

two and three conductor unshielded cables
control and audio cables

TWO CONDUCTOR UNSHIELDED CABLES (Cont'd)

Description	Trade Number	AWG & (Stranding)	Insulation Thickness (Inch)	Jacket Thickness (Inch)	Conductor Color Coding	Available Jacket Colors	Nominal O.D. (Inch)	Suggested Working Voltage	Standard Spool Lengths in Ft.
Without JACKET 	**8460**	18 (7x26) tinned	.020	—	Blk. Wht	—	.175	450	100, 500, 1000
	8470	16 (19x29) tinned	.023	—	Blk. Wht	—	.195	600	500, 1000
With JACKET 	**8740**	22 (Solid) tinned	.015	.025	Blk, Red	Chrome	.150	200	100, T-500 and T-1000 (Convert-a-pak)
SOLID	**8442**	22 (7x30) tinned	.015	.025	Blk, Red	Chrome, Rose Gray	.165	350	500, 1000
		8442—Underwriters' Laboratories, Inc. Listed (Wires, Mics.) 90V Max.							
	8205	20 (10x30) tinned	.018	.025	Blk, Red	Chrome	.190	350	100, 500, 1000
						Rose Gray			500, 1000
		8205—Underwriters' Laboratories, Inc. Listed (Wires, Misc.) 90V Max.							
	8486	19 (Solid) bare	.015	.025	Brn, Tan	Chrome	.162	350	500, 1000
STRANDED	**8461**	18 (7x26) tinned	.020	.028	Blk, Wht	Chrome	.226	450	100, 500, 1000
						Rose Gray			500, 1000
		8461—Underwriters' Laboratories, Inc. Listed (Wires, Misc.) 90V Max.							
Copper, vinyl insulated, twisted pair, vinyl jacket.	**9740**	18 (16x30) tinned	.018	.030	Blk, Red	Chrome	.220	400	500, 1000
	8471	16 (19x29) tinned	.023	.030	Blk, Wht	Chrome	.256	600	500, 1000
	8473	14 (19x27) tinned	.031	.035	Blk, Wht	Chrome	.332	600	500, 1000
	8477	12 (19x25) tinned	.031	.040	Blk, Wht	Chrome	.384	600	500, 1000

THREE CONDUCTOR UNSHIELDED CABLES

Description	Trade Number	AWG & (Stranding)	Insulation Thickness (Inch)	Jacket Thickness (Inch)	Conductor Color Coding	Nominal O.D. (Inch)	Suggested Working Voltage	Standard Spool Lengths in ft.
	**8701**	22 (Solid)	.016	—	Chrome 1 condr. tinned	.060x .190	100	100, 500, 1000
		Copper, vinyl insulated, PARALLEL						
Without JACKET 	**8483**	19 (Solid)	.015	—	Brn, Gray, Tan	.132	350	100, 500, 1000
					Bare copper, vinyl insulated, CABLED.			
With JACKET 	**8443**	22 (7x30) tinned	.010	.025	Blk, Grn, Red	.150	200	25, 100, 250, 500, 1000
	8487	19 (Solid) bare	.015	.025	Brn, Gray, Tan	.180	350	500, 1000
		Copper, vinyl insulated, CABLED, chrome vinyl jacket.						

VINYL MULTIPLE CONDUCTOR CONTROL AND AUDIO CABLES (NOT PAIRED)

Description	Trade Number	No. of Cond.	AWG & (Stranding)	Insulation Thickness (Inch)	Jacket Thickness (Inch)	Nom. O.D. (Inch)	Color Code Chart No.	Suggested Working Voltage	Standard Spool Lengths in ft.
22 GAGE	**8443**	3	22 (7x30)	.010	.025	.150	1	200	25, 100, 250, 500, 1000
	8444	4	22 (7x30)	.010	.025	.168	1	200	25, 100, 250, 500, 1000
	8445	5	22 (7x30)	.010	.025	.180	1	200	25, 100, 250 500, 1000
	9430	7	22 (7x30)	.010	.025	.200	1	200	500, 1000
	8456	10	22 (7x30)	.010	.030	.260	1	200	100, 500, 1000
	8457	12	22 (7x30)	.010	.030	.260	1	200	100, 500, 1000
	8458	15	22 (7x30)	.010	.040	.320	2R	200	100, 500, 1000
	9431	20	22 (7x30)	.010	.040	.345	2R	200	500, 1000
Tinned copper, vinyl insulated, conductors cabled, chrome vinyl jacket.	**8459**	25	22 (7x30)	.010	.040	.370	2R	200	100, 500, 1000
	9432	30	22 (7x30)	.010	.040	.400	2R	200	500, 1000
	9433	40	22 (7x30)	.010	.040	.455	2R	200	500, 1000
	9434	50	22 (7x30)	.010	.045	.500	2R	200	500, 1000

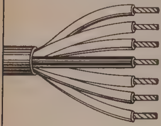
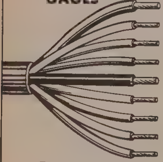
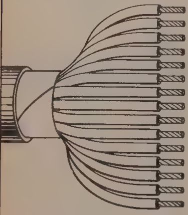
For color coding refer to Belden page 14. ▨ **Passes the FR-1 vertical flame test.**

BELDEN

multiple conductor unshielded cables

VINYL MULTIPLE CONDUCTOR CONTROL AND AUDIO CABLES (NOT PAIRED)

All of these cables have passed the FR-1 vertical flame test.

Description and Gauge	Trade Number	No. of Cond.	AWG & (Stranding)	Insulation Thickness (Inch)	Jacket Thickness (Inch)	Nom. O.D. (Inch)	Color Code Chart No.	Suggested Working Voltage	Standard Spool Lengths in ft.
20 & 18 GAGE All of the 20 Gage cables are Underwriters Laboratories Inc. Listed (Wires, Misc.). Tinned copper, vinyl insulated, conductors cabled, chrome vinyl jacket.	★9444	4	20 (10x30)	.012	.030	.208	1	300	100, 500, 1000
	★9445	5	20 (10x30)	.012	.030	.230	1	300	100, 500, 1000
	★9439	7	20 (10x30)	.012	.030	.250	1	300	100, 500, 1000
	★9455	9	20 (10x30)	.012	.035	.310	1	300	100, 500, 1000
	★9457	12	20 (10x30)	.012	.035	.330	1	300	100, 500, 1000
	★9458	15	20 (10x30)	.012	.040	.380	2	300	100, 500, 1000
 Tinned copper, vinyl insulated, conductors cabled, chrome vinyl jacket.	8489	4	18 (16x30)	.018	.030	.250	1	400	100, 250, 500, 1000
	8465	5	18 (16x30)	.018	.037	.286	1	400	100, 250, 500, 1000
	8467	7	18 (16x30)	.018	.037	.324	1	400	100, 250, 500, 1000
	8469	9	18 (16x30)	.018	.037	.379	1	400	100, 250, 500, 1000
	8466	12	18 (16x30)	.018	.040	.412	2R	400	100, 250, 500, 1000
	8468	15	18 (16x30)	.018	.045	.490	2R	400	100, 500, 1000
	8619	19	18 (16x30)	.018	.045	.505	2R	400	500, 1000
	9626	25	18 (16x30)	.018	.060	.600	2R	400	500, 1000
COMBINATION GAGES  Tinned copper, vinyl insulated, conductors cabled, chrome vinyl jacket.	8446	6	4-22 (7x30) 2-18 (16x30)	.010 .018	.025	.222	1	200 400	15, 100, 250, 500, 1000
	8447	7	5-22 (7x30) 2-18 (16x30)	.010 .018	.028	.246	1	200 400	100, 250, 500, 1000
	8448	8	6-22 (7x30) 2-18 (16x30)	.010 .018	.028	.250	1	200 400	15, 100, 250, 500, 1000
	8449	9	7-22 (7x30) 2-18 (16x30)	.010 .018	.028	.261	1	200 400	15,100, 250, 500, 1000
16 & 14 GAGE  Tinned copper, vinyl insulated, conductors cabled, chrome vinyl jacket.	8620	4	16 (19x29)	.030	.045	.375	2	600	100, 500, 1000
	9620	5	16 (19x29)	.030	.045	.405	2	600	100, 500, 1000
	8621	7	16 (19x29)	.030	.045	.455	2R	600	100, 500, 1000
	9621	9	16 (19x29)	.030	.045	.510	2R	600	500, 1000
	8622	12	16 (19x29)	.030	.060	.600	2R	600	100, 500, 1000
	8623	15	16 (19x29)	.030	.060	.685	2R	600	100, 500, 1000
	8624	19	16 (19x29)	.030	.065	.715	2R	600	100, 500, 1000
	9622	25	16 (19x29)	.030	.065	.820	2R	600	500, 1000
	8627	4	14 (19x27)	.045	.045	.495	2	600	100, 500, 1000
	9623	5	14 (19x27)	.045	.060	.560	2	600	100, 500, 1000
	8628	7	14 (19x27)	.045	.060	.630	2R	600	100, 500, 1000
	8629	12	14 (19x27)	.045	.065	.770	2R	600	100, 500, 1000

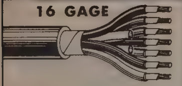
★New Item ☐ Passes the FR-1 vertical flame test. For color coding refer to Belden page 14. 2R Same as IPCEA except ring band striping.

multiple conductor unshielded cables and telephone cables

BELDEN

TYPE SO NEOPRENE MULTIPLE CONDUCTOR CONTROL CABLES (NOT PAIRED)

General purpose industrial and utility control applications, remote control of automatic electric equipment and motor control. Heavy duty neoprene jacket offers excellent resistance to oils, acids, oxidation, weathering, ozone, abrasion and impact.

Description	Trade Number	No. of Cond.	AWG & (Stranding)	Insulation Thickness (Inch)	Jacket Thickness (Inch)	Nom. O.D. (Inch)	Color Code Chart No.	Suggested Working Voltage	Standard Spool Lengths in ft.
16 GAGE  Bare copper, rubber insulated, conductors cabled with fillers, black neoprene jacket.	**9420**	5	16 (65x34)	.032	.078	.520	2R	600	100, 500, 1000
	9422	7	16 (65x34)	.032	.078	.560	2R	600	100, 500, 1000
	9424	9	16 (65x34)	.032	.078	.610	2R	600	100, 500, 1000
	9425	12	16 (65x34)	.032	.094	.720	2R	600	100, 500, 1000
	9427	16	16 (65x34)	.032	.094	.800	2R	600	100, 500, 1000
	9429	20	16 (65x34)	.032	.094	.880	2R	600	100, 500

Underwriters' Laboratories, Inc. Listed.

ELECTRICAL POWER AND CONTROL CABLES—MIL-C-3432

Electrical power and control cables intended for use in electrical and electronic applications. These cables are intended for military applications to transmit power and control signals. These medium duty cables are suitable for small portable tools, sound equipment, radio receivers and motor leads. The tough flexible jacket is resistant to the mechanical abuse and extreme humidity and temperature conditions normally encountered in the intended applications.

Description	Trade Number	Type Designation	No. of Cond.	AWG & (Standing)	Insulation Thickness (Inch)	Jacket Thickness (Inch)	Nom. O.D. (Inch)	Suggested Working Voltage	Standard Spool Lengths in ft.
	9215	CO-02 MGF (2/18) 0310	2	18 (41x34)	.033	.039	.310	600	500, 1000
	9216	CO-02 MGF (2/16) 0335	2	16 (65x34)	.033	.047	.335	600	500, 1000
	9217	CO-02 MGF (2/14) 0400	2	14 (41x30)	.036	.047	.400	600	500, 1000
	9218	CO-03 MGF (3/18) 0340	3	18 (41x34)	.033	.047	.340	600	500, 1000
	9219	CO-03 MGF (3/16) 0365	3	16 (65x34)	.033	.047	.365	600	500, 1000
		Tinned copper conductors, rubber insulated, cabled with fillers, cotton serve, black rubber jacket. Conductor color coding: (1) White, (2) Black, (3) Green.							

Manufactured to current Government specifications and subsequent revisions.

COLOR CODE Chart No. 1

Conductor	Color
1st	Black
2nd	Red
3rd	Green
4th	White
5th	Brown
6th	Blue
7th	Orange
8th	Yellow
9th	Purple
10th	Gray
11th	Pink
12th	Tan

18 Gage conductors in cables 8446 through 8449 are Black and Red.

IPCEA COLOR CODE Chart No. 2 & 2R

(Insulated Power Cable Engineers Association)

2R—These Cables feature a ring band striping.

Conductor	Color	Conductor	Color	Conductor	Color
1st	Black	18th	Orange/Red	35th	Wht/Red/Org
2nd	White	19th	Blue/Red	36th	Org/Wht/Blue
3rd	Red	20th	Red/Green	37th	Wht/Red/Blue
4th	Green	21st	Orange/Green	38th	Blk/Wht/Grn
5th	Orange	22nd	Blk/Wht/Red	39th	Wht/Blk Grn
6th	Blue	23rd	Wht/Blk/Red	40th	Red/Wht/Grn
7th	White/Black	24th	Red/Blk/Wht	41st	Grn/Wht/Blue
8th	Red/Black	25th	Grn/Blk/Wht	42nd	Org/Red/Grn
9th	Green/Black	26th	Org/Blk/Wht	43rd	Blue/Red/Grn
10th	Orange/Black	27th	Blue/Blk/Wht	44th	Blk/Wht/Blue
11th	Blue/Black	28th	Blk/Red/Grn	45th	Wht/Blk/Blue
12th	Black/White	29th	Wht/Red/Grn	46th	Red/Wht/Blue
13th	Red/White	30th	Red/Blk/Grn	47th	Grn/Org/Red
14th	Green/White	31st	Grn/Blk/Org	48th	Org/Red/Blue
15th	Blue/White	32nd	Org/Blk/Grn	49th	Blue/Red/Org
16th	Black/Red	33rd	Blue/Wht/Org	50th	Blk/Org/Red
17th	White/Red	34th	Blk/Wht/Org		

TELEPHONE CABLES

Description	Trade Number	No. of Cond.	AWG & (Stranding)	Insulation Thickness (Inch)	Jacket Thickness (Inch)	Nom. O.D. (Inch)	Cond. Color Coding	Standard Spool Lengths in ft.
Bare copper, polyethylene insulated, conductors cabled, rose gray vinyl jacket.	**8795**	2	22 (Solid)	.016	.022	.160	Red, Grn	T-500 (Convert-a-pak) and 1000' spools
	8794	3	22 (Solid)	.016	.022	.168	Red, Grn, Yel	T-500 (Convert-a-pak) and 1000' spools
			Underwriters' Laboratories, Inc. Listed (Wires, Misc.) 90V Max.					
	9794	4	22 (Solid)	.016	.025	.190	Grn, Red, Yel, Blk	T-500 (Convert-a-pak) and 1000' spools
			Underwriters' Laboratories, Inc. Listed (Wires, Misc.) 90V Max.					

▨ Passes the FR-1 vertical flame test.

BELDEN

microphone and shielded power supply cables

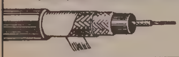
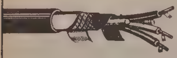
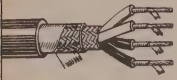
MICROPHONE CABLES

Belden Microphone Cables are designed for flexible service at audio frequencies. They are used not only for microphones, but also for home entertainment equipment, instruments, tape recorders and shielded power supplies.

Shielded single conductor cables are used in high impedance systems, while multiple conductor cables are used in low impedance applications.

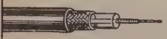
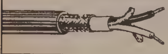
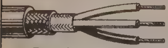
All cables are precision-engineered and manufactured to transmit clear signals and to cancel out hum pick-up and crosstalk interference. They are designed to withstand the flexing and normal abuse of studio, laboratory and home usage.

RUBBER, HYPALON■ AND NEOPRENE MICROPHONE AND SHIELDED POWER SUPPLY CABLES

Description	Trade Number	No. of Cond.	AWG & (Stranding)	Insulation Thickness (Inch)	Jacket Thickness (Inch)	Nom. O.D. (Inch)	Percent Shield Coverage	Suggested Working Voltage	Impedance (Ohms)	Nom. *Cap. (pF/ft)	Nom. **Cap. (pF/ft)	Standard Spool Lengths in ft.
SINGLE CONDUCTOR	**8410**	1	25 (7x33)	.063	.025	.245	80	3000 DC	52	—	33	25, 50, 100, 250, 500
		*3 strands copper, 4 strands Copperweld tinned, cellulose yarn braid, rubber insulated, rayon braid, tinned copper braid shield, cellulose yarn wrap, black rubber jacket.*										
MINIATURE	**8413**	2	24 (45x40)	.019	.025	.190	100	300	—	30	55	15, 25, 50, 100, 250, 500
	**8406**	3	24 (45x40)	.019	.025	.223	100	300	—	35	60	100, 500
		Tinned cadmium bronze, cotton serve, rubber insulated, cabled with fillers, 100% coverage conductive textile wrap shield, tinned copper braid shield, cotton serve, black rubber jacket.										
	8412	2	20 (26x34)	.020	.043	.268	84	600	—	30	55	25, 50, 100, 250, 500, 1000
MULTIPLE CONDUCTOR	▨ **8402**	2 *Brown Hypalon jacket.*	20 (26x34)	.020	.040	.268	84	600	—	30	55	100, 250, 500
	8428	2 *Black neoprene jacket.*	18 (41x34)	.022	.038	.295	91	600	—	35	60	100, 500, 1000
	▨ **8408**	2 *Brown Hypalon jacket—Heavy Duty*	16 (65x34)	.032	.040	.385	84	600	—	30	55	100, 500
	8423	3	20 (26x34)	.020	.040	.277	84	600	—	35	60	50, 100, 250, 500, 1000
	8424	4	20 (26x34)	.020	.040	.295	83.5	600	—	35	60	50, 100, 250, 500, 1000
Tinned copper, cotton wrap, rubber insulated, conductors cabled, rayon braid, tinned copper braid shield, cotton wrap, black rubber jacket.	▨ **8407**	4 *Black neoprene jacket—Heavy Duty*	16 (65x34)	.032	.043	.422	84	600	—	30	55	100, 250
	8425	5	20 (26x34)	.020	.040	.323	76	600	—	35	60	100, 250
	8426	6	20 (26x34)	.020	.040	.349	90	600	—	35	60	100, 250
	8427	7	20 (26x34)	.020	.043	.360	90	600	—	35	60	100, 250
	8418	8	20 (26x34)	.020	.043	.386	92	600	—	35	60	100, 250

CONDUCTOR COLOR CODING: (1) White, (2) Black, (3) Red, (4) Green, (5) Blue, (6) Brown, (7) Yellow, (8) Orange.

VINYL MICROPHONE AND SHIELDED POWER SUPPLY CABLES

SINGLE CONDUCTOR	**8411**	1	25 (7x33)	.020	.020	.144	72	3500 DC	52	—	40	15, 25, 50, 100, 250, 500, 1000
	**8401**	1	25 (7x33)	.043	.025	.200	74	5000 DC	57	—	25	15, 25, 50, 100, 250, 500, 1000
		3 strands copper, 4 strands Copperweld tinned, braided textile, polyethylene insulated, tinned copper braid shield, chrome vinyl jacket.										
MINIATURE	▨ **8420**	2	24 (45x40)	.015	.020	.185	77	500	—	22	40	15, 25, 50, 100, 250, 500
		*Tinned cadmium bronze, cotton wrap, polyethylene insulated, cabled with fillers, rayon braid, tinned copper braid shield, chrome vinyl jacket.*										
MULTIPLE CONDUCTOR 	**8422**	2	22 (16x34)	.023	.023	.231	87	1000	—	18	32	15, 25, 50, 100, 250, 500, 1000
Tinned copper, polyethylene insulated, conductors cabled, rayon braid, tinned copper braid shield, chrome vinyl jacket.	▨ **8403**	3	20 (26x34)	.015	.033	.244	89	600	—	25	45	15, 50, 100, 250, 500, 1000
	▨ **8404**	4	20 (26x34)	.015	.033	.248	87	600	—	23	40	15, 100, 250, 500, 1000
	▨ **8405**	5	20 (26x34)	.015	.035	.275	83	600	—	23	40	250, 500, 1000

CONDUCTOR COLOR CODING: (1) Clear, (2) Black, (3) Red, (4) Green, (5) Blue ■*Trademark of DuPont.*

▨ **Passes the FR-1 vertical flame test.**

PLASTIC CABLES RECOMMENDED FOR: Lower capacitance, lower loss, greater ozone and oil resistance, lighter weight, smaller diameter.
RUBBER CABLES RECOMMENDED FOR: Greater abrasion and impact resistance and extra limpness so cable will lie flat on stage or studio floor.
NEOPRENE AND HYPALON CABLES RECOMMENDED FOR: Outside use, cold weather applications. Resistant to effects of sun, oil and ozone.

*Capacitance between conductors. **Capacitance between 1 conductor and remaining conductors (if any) connected to shield.

retractile cables and cords

BELDEN

RETRACTILE CORDS

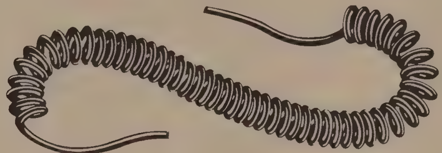
Retractile cords keep telephone and microphone cables from tangling and cluttering desk tops, communications consoles and the front seats of motor vehicles. Belden manufactures a full line of high quality retractile coiled cord products for a wide number of applications.

Belden retractile cables and cords are used for telephone equipment; ham and citizen band radios; hand and desktop microphones; language lab equipment; musical instruments; mobile controls and mobile communications equipment and for a variety of assorted industrial applications.

The specially designed conductors and shields of Belden retractile cords are constructed to withstand rugged use and to minimize replacement frequency.

Belden's full line of rectractile cords shown in this catalog will meet most of your requirements. For any custom or unusual cord and cable application contact Belden's Special Custom Design Center

RETRACTILE MICROPHONE CABLES



Trade Number	No. of Cond.	AWG & (Stranding)	Insulation Thickness (Inch)	Jacket Thickness (Inch)	Nominal O.D. (Inch)	Nominal Coil O.D. (Inch)	Percent Shield Coverage	Nominal ***Cap. (pF/cord)	Retracted Length (Inch)	Practical Extended Length (Feet)	Standard Put-Up
8409	4 unshielded	28 (7x36)	.005	.050	.165	9/16	No shield	—	12	6	1
	Tinned copper, nylon insulated, neoprene jacket. 6" straight portion at each end cut blunt.										
8415	4 unshielded	23 (21x36)	.020	.055	.250	7/8	No shield	—	11½	6	1, 50
	5 strands TCW, 16 strands TC, rubber insulated, paper tape, neoprene jacket. 6" straight portion at each end cut blunt.										
9415	4 unshielded	23 (21x36)	.020	.055	.250	7/8	No shield	—	30	15	1, 15
	5 strands TCW, 16 strands TC, rubber insulated, paper tape, neoprene jacket. 6" straight portion at each end cut blunt.										
8499	1 shielded	24 (45x40)	.019	.043	.170	11/16	80	285	7½	4	1
	Tinned cadmium bronze, rubber insulated, spiral TC shield, cotton wrap, neoprene jacket. 6" straight portion at each end cut blunt.										
8605	1 shielded	24 (19x36)	.021	.042	.160	11/16	87	680	21½	12	1
	Tinned copper, polypropylene insulated, spiral TC shield, Gray PVC jacket. 6" straight portion at each end cut blunt.										
8497	3 1 shielded 2 unshielded	23 (21x36)	.020	.046	.250	7/8	100	510	11½	6	1, 50
	5 strands TCW, 16 strands TC, rubber insulated, conductive textile wrap shield plus BELDFOIL® aluminum-polyester shield with drain wire same as conductors, paper tape, neoprene jacket. 6" straight portion at each end cut blunt.										
9417	3 1 shielded 2 unshielded	23 (21x36)	.020	.046	.250	7/8	100	1200	30	15	1, 15
	5 strands TCW, 16 strands TC, rubber insulated, conductive textile wrap shield plus BELDFOIL aluminum-polyester shield with drain wire same as conductors, paper tape, neoprene jacket. 6" straight portion at each end cut blunt.										
8491	4 2 individually shielded 2 unshielded	23 (21x36)	.020	.050	.275	1 1/16	100	510	12	6	1
		5 strands TCW, 16 strands TC, rubber insulated, conductive textile wrap shield plus BELDFOIL aluminum-polyester shield with drain wire same as conductors, paper tape, neoprene jacket. 6" straight portion at each end cut blunt.									
9416	4 2 individually shielded 2 unshielded	23 (21x36)	.020	.050	.275	15/16	100	1200	30	15	1, 15
	5 strands TCW, 16 strands TC, rubber insulated, conductive textile wrap shield plus BELDFOIL aluminum-polyester shield with drain wire same as conductors, paper tape, neoprene jacket. 6" straight portion at each end cut blunt.										
8490	5 unshielded	23 (21x36)	.020	.045	.265	7/8	No shield	—	11½	6	1
	5 strands TCW, 16 strands TC, rubber insulated, paper tape, neoprene jacket. 6" straight portion at each end cut blunt.										

CONDUCTOR COLOR CODING: (1) White, (2) Black, (3) Red, (4) Green, (5) Blue.

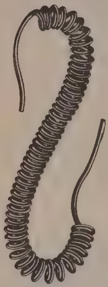
***Capitance of shielded conductor.

BELDEN

retractile power control cables and telephone cords

NEOPRENE RETRACTILE POWER CONTROL CABLES

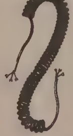
Underwriters' Laboratories, Inc. Listed. Certified to C.S.A. Standards.

Description	Trade Number	No. of Cond.	Type	AWG & (Stranding)	Insulation Thickness (Inch)	Jacket Thickness (Inch)	Nom. O.D. (Inch)	Nom. Coil O.D. (Inch)	Retracted Length (Inch)	Practical Extended Length (Feet)	Standard Put-Up
	**8601**	2	SVO	18 (41x34)	.016	.045	.270	15/16	12	6	1
	9476	2	SVO	18 (41x34)	.016	.045	.270	15/16	24	12	1,15
	9477	2	SVO	18 (41x34)	.016	.045	.270	15/16	48	25	1,15
	9478	3	SVO	18 (41x34)	.016	.045	.275	15/16	24	12	1,15
	9479	3	SVO	18 (41x34)	.016	.045	.275	15/16	48	25	1,15
	8602	3	SJO	18 (41x34)	.031	.045	.360	1⅜	12	6	1
	9480	3	SJO	18 (41x34)	.031	.045	.360	1⅜	24	12	1
	9481	3	SJO	18 (41x34)	.031	.045	.360	1⅜	48	25	1
	8603	3	SJO	16 (65x34)	.031	.045	.370	1 7/16	12	6	1
	9484	3	SJO	16 (65x34)	.031	.045	.370	1 7/16	24	12	1
	9485	3	SJO	16 (65x34)	.031	.045	.370	1 7/16	48	25	1
	9482	4	SJO	18 (41x34)	.031	.045	.385	1 7/16	24	12	1
	9483	4	SJO	18 (41x34)	.031	.045	.385	1 7/16	48	25	1

Bare copper, paper wrap, rubber insulated, cabled with fillers, paper tape wrap, black neoprene jacket. 12" straight portion each end (except 6" straight portion on 8601, 8602, 8603). Jacket removed 1½" each end.

Conductor Color Coding: (1) White, (2) Black, (3) Green, (4) Red.

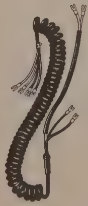
VINYL RETRACTILE TELEPHONE CORDS

Description	Trade Number	No. of Cond.	AWG & (Stranding)	Insulation Thickness (Inch)	Jacket Thickness (Inch)	Nom. O.D. (Inch)	Nom. Coil O.D. (Inch)	Retracted Length (Inch)	Practical Extended Length (Feet)	Standard Put-Up
	**8495**	3	23 (21x36)	.020	.041	.220	⅞	10	4½	1

Bare cadmium bronze, vinyl insulated, conductors cabled, paper tape wrap, black vinyl jacket. One end stripped 2¾", spade terminals attached and hook strain relief clamped over jacket. Other end stripped 3 7/16" and spade terminals attached.

Conductor Color Coding: (1) White, (2) Black, (3) Red.

Black Jacket only.

Description	Trade Number	No. of Cond.	AWG & (Stranding)	Insulation Thickness (Inch)	Jacket Thickness (Inch)	Nom. O.D. (Inch)	Nom. Coil O.D. (Inch)	Retracted Length (Inch)	Practical Extended Length (Feet)	Standard Put-Up
	**9443**	4	31 (Tinsel)	.010	.031	.195	¾	10½	5	1,15
	9440	4	31 (Tinsel)	.010	.031	.195	¾	22	10	1,15
	9441	4	31 (Tinsel)	.010	.031	.195	¾	33	15	1,15
	9442	4	31 (Tinsel)	.010	.031	.195	¾	48	25	1,15

Tinsel conductors, vinyl insulated, vinyl jacket. One end stripped 7", spade terminals attached and hook strain relief clamped over jacket. Other end has red and black conductors pulled out of jacket and cut to 3" length, spade terminals attached, molded plastic strain relief, 6¾" jacket remains on 2 white conductors, spade terminals attached.

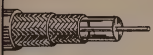
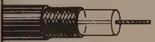
Jacket colors available in black, light beige or white.

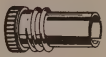
75 OHM PRECISION VIDEO CABLES

The 9231 is a precision 75 ohm Video cable manufactured with rigid control of concentricity and all dimensional tolerances offering superior return loss characteristics; a quality Video transmission cable which provides exceptional picture definition and eliminates problems resulting from periodicity. It has a non-contaminating vinyl jacket for more flexibility. The double braid 8281 75 ohm Video cable is made to tight tolerances for excellent return loss performance. Our 8279, miniature 75 ohm Video cable is for applications where space is critical. The gray vinyl and black polyethylene jackets are made of non-contaminating, non-migratory compounds.

Typical Application: Video signal transmission in Color and Monochrome TV studios.

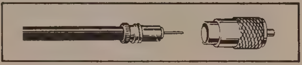
100% SWEEP TESTED

Description	Trade Number	AWG & (Stranding) Material	Nom. O.D. (Inch)	Percent Shield Coverage	Nom. Impedance (Ohms)	Nom. Velocity of Propagation	Nom. Cap. (pF/ft.)	Nom. Attenuation per 100' kHz or MHz	db	Standard Spool Lengths in ft.
	▨ **9231***	20 (Solid) bare copper	.304	96.4	75	66%	21	10 kHz 100 kHz 1 MHz 4.5 MHz 10 MHz 100 MHz	.06 .08 .25 .45 .78 2.70	500, 1000
			Conductor, polyethylene insulated, tinned copper double braid shield, gray non-contaminating vinyl jacket. Nom. Core O.D. .198" **Underwriters' Laboratories, Inc. Listed (Style 1354)**							
	8281*	20 (Solid) bare copper	.304	96.4	75	66%	21	10 kHz 100 kHz 1 MHz 4.5 MHz 10 MHz 100 MHz	.06 .08 .25 .45 .78 2.70	500, 1000
			Conductor, polyethylene insulated, tinned copper double braid shield, black polyethylene jacket. Nom. Core O.D. .200"							
 **Miniature**	**8279****	23 (7x31) bare compacted copper	.220	96	75	66%	21	10 kHz 100 kHz 1 MHz 4.5 MHz 10 MHz 100 MHz	.14 .15 .35 .80 1.30 4.90	100, 250, 500
			Conductor, polyethylene insulated, tinned copper braid shield, black polyethylene jacket. Nom. Core O.D. .146" Compacted conductor combines impedance uniformity of solid conductor and "nick-resistance" of stranded conductor.							

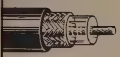
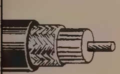
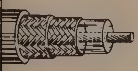
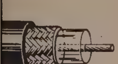


For Use on 9231 and 8281.

8299 Adapter for use with PL-259 connector. 25 in a box.



COAXIAL CABLES***

Description	Trade Number	RG No.	AWG & (Stranding) Material	Insulation Nom. Core O.D. (Inch)	No. of Shields and Material	Jacket	Nom. O.D. (Inch)	Nom. Imp. (Ohms)	Nom. Vel. of Prop.	Nom. Cap. (pF/ft.)	Nom. Attenuation per 100' MHz	db	Standard Spool Lengths in ft.
	▨ **8237**	8/U JAN- C-17A	13 (7x21) bare copper	Poly- ethylene (.285)	1 bare copper	Black vinyl	.405	52	66%	29.5	100 200 400 900	2.0 3.0 4.7 7.8	50, 100, 500, 1000
	▨ **9251**	8A/U MIL- C-17D	13 (7x21) bare copper	Poly- ethylene (.285)	1 bare copper	Black non- contaminat- ing vinyl	.405	52	66%	29.5	100 200 400 900	2.0 3.0 4.7 7.8	100, 500, 1000
					Underwriters' Laboratories, Inc. Listed (Style 1354)								
	▨ **8214**	8/U Type	11 (7x19) bare copper	Cellular Poly- ethylene (.285)	1 bare copper	Black vinyl	.405	50	78%	26.0	50 100 200 300 400	1.2 1.8 2.6 3.3 3.8	50, 100, 500, 1000
					Underwriters' Laboratories, Inc. Listed (Style 1354)								
	▨ **8242**	9/U JAN- C-17A	13 (7x21) silver coated copper	Poly- ethylene (.280)	2-inner- silver coated outer- bare copper	Gray non- contaminat- ing vinyl	.420	51	66%	30.0	100 200 400 900	1.9 2.8 4.1 6.5	100, 1000
					Underwriters' Laboratories, Inc. Listed (Style 1354)								
	▨ **8238**	11/U JAN- C-17A	18 (7x26) tinned copper	Poly- ethylene (.285)	1 bare copper	Black vinyl	.405	75	66%	20.5	100 200 400 900	2.0 2.9 4.2 6.5	100, 500, 1000
	▨ **8261‡**	11A/U MIL- C-17D	18 (7x26) tinned copper	Poly- ethylene (.285)	1 bare copper	Black non- contaminat- ing vinyl	.405	75	66%	20.5	100 200 400 900	2.0 2.9 4.2 6.5	500, 1000

‡Manufactured to current Government specifications and subsequent revisions. ▨ **Passes the FR-1 vertical flame test.**

**Request Technical Data Bulletin T/8-16 for connector information.*
***Request Technical Data Bulletin T/8-17 for connector information.*
****RG/U cables combine low capacitance and low attenuation. The virgin polyethylene insulation assures constant electrical characterstics regardless of changes in frequency or temperature. Note: Max. rating of polyethylene in 80°C (176°F).*

REQUEST QUOTATIONS ON PRODUCTION QUANTITIES OF RG/U CABLES NOT LISTED.

ELECTRONIC DIVISION/BELDEN CORPORATION, P.O. BOX 1331, RICHMOND, IN 47374 (317) 966-6661

BELDEN

RG/U transmission line cables

COAXIAL CABLES (Cont'd)

Description	Trade Number	RG No.	AWG & (Stranding) Material	Insulation Nom. Core O.D. (Inch)	No. of Shields and Material	Jacket	Nom. O.D. (Inch)	Nom. Imp. (Ohms)	Nom. Vel. of Prop.	Nom. Cap. (pF/ft.)	Nom. Attenuation per 100' MHz	db	Standard Spool Lengths in ft.
	9250	22B/U MIL-C-17D	2 cond. 18 (7x.0152) bare copper, one conductor has tinned center strand	Poly-ethylene (.285)	2 tinned copper	Black non-contaminating vinyl	.420	95	66%	16.0	100 200 400 900	3.0 4.5 6.8 11.0	100, 500, 1000
	8240	58/U JAN-C-17A	20 (Solid) bare copper	Poly-ethylene (.116)	1 tinned copper	Black vinyl	.195	53.5	66%	28.5	100 200 400 900	4.1 6.2 9.5 14.5	25, 50, 100, 500, 1000
					Underwriters' Laboratories, Inc. Listed (Style 1354)								
	8259	58A/U JAN-C-17A	20 (19x.0071) tinned copper	Poly-ethylene (.116)	1 tinned copper	Black vinyl	.195	50	66%	30.8	100 200 400 900	5.3 8.2 12.6 20.0	25, 50, 100, 500, 1000
	8262†	58C/U MIL-C-17D	20 (19x.0071) tinned copper	Poly-ethylene (.116)	1 tinned copper	Black non-contaminating vinyl	.195	50	66%	30.8	100 200 400 900	5.3 8.2 12.6 20.0	500, 1000
					Underwriters' Laboratories, Inc. Listed (Style 1354)								
	8219	58A/U Type	20 (19x32) tinned copper	Cellular Poly-ethylene (.116)	1 tinned copper	Black vinyl	.195	50	78%	26.0	100 200 400 900	4.8 6.9 10.1 15.5	100, 500, 1000
					Underwriters' Laboratories, Inc. Listed (Style 1354)								
	8241	59/U JAN-C-17A	22 (Solid) bare Copperweld	Poly-ethylene (.146)	1 bare copper	Black vinyl	.242	73	66%	21.0	100 200 400	3.4 4.9 7.1	25, 50, 100, 500, 1000
					Underwriters' Laboratories, Inc. Listed (Style 1354)								
	8263‡	59B/U MIL-C-17D	.023 (Solid) bare Copperweld	Poly-ethylene (.146)	1 bare copper	Black non-contaminating vinyl	.242	75	66%	20.5	100 200 400 900	3.4 4.9 7.1 11.1	500, 1000
	★9259	59/U Type	22 (6x30) bare (1x29) copper	Cellular poly-ethylene (.146)	1 bare copper	Black vinyl	.242	75	78%	17.3	100 200 400	2.6 3.8 5.6	50, 100, 500, 1000
					Recommend for camera to recorder to monitor connections. Stranded center conductor adds the flexibility needed to resist severe twisting, bending and other stresses which occur in many CCTV applications. *100% SWEEP TESTED.* Underwriters' Laboratories, Inc. Listed (Style 1354)								
	8254	62/U JAN-C-17A	22 (Solid) bare Copperweld	Semi-solid Poly-ethylene (.146)	1 bare copper	Black vinyl	.242	93	84%	13.5	100 200 400 900	3.1 4.4 6.3 11.0	100, 500, 1000
	★9269‡	62A/U	22 AWG Solid Bare Copper weld	Semi-Solid Poly-ethylene (.146)	1 bare Copper	Black non-contaminating vinyl	.242	93	84%	13.5	100 200 400 900	3.1 4.4 6.3 11.0	500, 1000, 2000
					Underwriters' Laboratories, Inc., Listed (Style 1354)								
	8255	62B/U MIL-C-17D	24 (7x32) bare Copperweld	Semi-solid Poly-ethylene (.146)	1 bare copper	Black non-contaminating vinyl	.242	93	84%	13.5	100 200 400 900	3.1 4.4 6.3 11.0	500, 1000
					Underwriters' Laboratories, Inc. Listed (Style 1354)								
FR-1 	**★9268**	62A/U Type	22 AWG Solid Bare Copper-weld	Semi-solid Flame Retardant Poly-ethylene (.146)	1 bare copper	Black vinyl	.264	93	80%	14.5	100 200 400 900	3.1 4.4 6.3 11.0	500, 1000, 2000
					Underwriters' Laboratories, Inc., Listed (Style 1354)								
	9252	122/U MIL-C-17D	22 (27x36) tinned copper	Poly-ethylene (.096)	1 tinned copper	Black non-contaminating vinyl	.160	50	66%	30.8	100 200 400 900	7.0 11.0 16.5 28.0	100, 500, 1000
					Underwriters' Laboratories, Inc. Listed (Style 1354)								
	83241 TEFLON	141A/U MIL-C-17D	18 (Solid) silver coated Copperweld	TFE TEFLON (.116)	1 silver coated copper	Brown fiber glass	.190	50	69.5%	29.0	400	9.0 Max.	100, 500, 1000
	83242‡ TEFLON	142B/U MIL-C-17D	18 (Solid) silver coated Copperweld	TFE TEFLON (.116)	2 silver coated copper	Tinted Brown FEP	.195	50	69.5%	29.0	400	9.0 Max.	100, 500, 1000

★ New Item ‡Manufactured to current Government specifications and subsequent revisions.

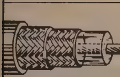
FR-1 or ☐ Passes the FR-1 vertical flame test.

REQUEST QUOTATIONS ON PRODUCTION QUANTITIES OF RG/U CABLES NOT LISTED.

RG/U transmission line cables

BELDEN

COAXIAL CABLES (Cont'd)

Description	Trade Number	RG No.	AWG & (Stranding) Material	Insulation Nom. Core O.D. (Inch)	No. of Shields & Material	Jacket	Nom. O.D. (Inch)	Nom. Imp. (Ohms)	Nom. Vel. of Prop.	Nom. Cap. (pF/ft.)	Nom. Attenuation per 100' MHz	db	Standard Spool Lengths in ft.
	8216	174/U MIL-C-17D	26 (7x34) bare Copperweld	Poly-ethylene (.060)	1 tinned copper	Black vinyl	.100	50	66%	30.8	100 200 400	8.8 13.0 20.0	100, 500, 1000
					Underwriters' Laboratories, Inc. Listed (Style 1418)								
	83265‡ TEFLON	178B/U MIL-C-17D	30 (7x38) silver coated Copperweld	TFE TEFLON (.034)	1 silver coated copper	Tinted Brown FEP	.070	50	69.5%	29.0	400	29.0 Max.	100, 500
	83264‡ TEFLON	179B/U MIL-C-17D	30 (7x38) silver coated Copperweld	TFE TEFLON (.063)	1 silver coated copper	Tinted Brown FEP	.100	75	69.5%	19.5	400	21.0 Max.	100, 500, 1000
	83266‡ TEFLON	180B/U MIL-C-17D	30 (7x38) silver coated Copperweld	TFE TEFLON (.102)	1 silver coated copper	Tinted Brown FEP	.140	95	69.5%	15.0	400	17.0 Max.	100, 500
	8267‡	213/U MIL-C-17D	13 (7x21) bare copper	Poly-ethylene (.285)	1 bare copper	Black non-contaminating vinyl	.405	50	66%	30.8	100 200 400 900	2.0 3.0 4.7 7.8	500, 1000
					Underwriters' Laboratories, Inc. Listed (Style 1354)								
	**8268**	214/U MIL-C-17D	13 (7x.0296) silver coated copper	Poly-ethylene (.285)	2 silver coated copper	Black non-contaminating vinyl	.425	50	66%	30.8	100 200 400 900	2.0 3.0 4.7 7.8	500, 1000
					Underwriters' Laboratories, Inc. Listed (Style 1354)								
	9273‡	223/U MIL-C-17D	19 (Solid) silver coated copper	Poly-ethylene (.116)	2 silver coated copper	Black non-contaminating vinyl	.206	50	66%	30.8	100 200 400 900	4.8 7.0 10.0 16.0	100, 500, 1000
					Underwriters' Laboratories, Inc. Listed (Style 1354)								
	83284‡ TEFLON	316/U MIL-C-17D	26 (7x.0067) silver coated Copperweld	TFE TEFLON (.060)	1 silver coated copper	Tinted Brown FEP	.098	50	69.5%	29.0	400	20.0 max.	100, 500, 1000
	9221	—	30 (7x38) tinned copper	Cellular Poly-propylene (.056)	1 tinned copper	Black vinyl	.097	75	78%	17.4	100 200 400 900	10.5 17.0 26.5 49.0	25, 100, 500
					Underwriters' Laboratories, Inc. Listed (Style 1375)								
	8218	—	27 (7x35) bare Copperweld	Poly-ethylene (.100)	1 tinned copper	Black vinyl	.150	75	66%	20.5	100 200 400 900	5.7 8.4 12.5 23.0	100, 500, 1000
Twinaxial	**8227**	—	20 (7x28) 1 tinned copper 1 bare copper	Poly-ethylene (.240)	1 tinned copper	Black vinyl	.325	100	66%	15.5	100 200 300 400	4.1 6.4 8.4 10.2	500
Twinaxial	**9272**	—	20 (7x28) tinned copper	Poly-ethylene color coded	1 tinned copper	Blue vinyl	.242	78	66%	19.7	100 200 400 900	7.5 11.0 16.0 25.0	100, 500, 1000
		Twinaxial transmission line cables offer low-loss signal transmission which remains unaffected by outside signals or noise fields. Recommended for RF applications requiring a cross talk free, balanced operation.											
Triaxial	**9222**	—	20 (7x28) tinned copper	Poly-ethylene (.116)	2 tinned copper	Yellow vinyl	.242	50	66%	30.8	100 200 400 900	5.0 7.0 10.3 16.2	100, 500,
			Conductor, polyethylene insulated, tinned copper braid shield, polyethylene insulated, tinned copper braid shield, yellow vinyl jacket.										
Triaxial	**★9267**	59/U Type Double Shield	20 (Solid) bare copper	Cellular Poly-ethylene (.146)	2 bare copper	Black Neoprene	.360	75	78%	17.3	1 50 100 300	0.3 1.8 2.6 4.8	100, 500, 1000
			Bare copper conductor, cellular polyethylene insulated, bare copper braid shield, polyethylene insulated, bare copper braid shield, black neoprene jacket.										
		100% SWEEP TESTED.											

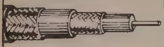
★New Item **REQUEST QUOTATIONS ON PRODUCTION QUANTITIES OF RG/U CABLES NOT LISTED.**

‡Manufactured to current Government specifications and subsequent revisions.

BELDEN

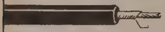
RG/U transmission line cables catv-matv coaxial cables

COAXIAL CABLES (Cont'd)

Description	Trade Number	RG No.	AWG & (Stranding) Material	Insulation Nom. Core O.D. (Inch)	No. of Shields and Material	Jacket	Nom. O.D. (Inch)	Nom. Imp. (Ohms)	Nom. Vel. of Prop.	Nom. Cap. (pF/ft.)	Nom. Attenuation per 100' MHz	db	Standard Spool Lengths in ft.
Triaxial  *Conductor, cellular polyethylene insulated, bare copper braid shield, polyethylene insulated, bare copper braid shield, black polyethylene jacket.*	**8232**	59/U Type Double Shield *100% SWEEP TESTED.*	20 (Solid) bare Copperweld	Cellular Poly-ethylene (.146)	2 bare copper	Black Poly-ethylene	.315	75	78%	17.3	50 100 200 300 400	1.8 2.6 3.8 4.8 5.6	500, 1000, 2000
	8233	11/U Type Double Shield *100% SWEEP TESTED.*	14 (Solid) bare copper	Cellular Poly-ethylene (.285)	2 bare copper	Black Poly-ethylene	.475	75	78%	17.3	50 100 200 300 400	1.0 1.5 2.2 2.8 3.3	500, 1000, 2000
	8700	—	28 (Solid) tinned copper	Poly-propylene (.023)	1 bare copper	Black vinyl	.054 *91 Percent shield coverage.*	32	66%	48.0	400	55.0	25, 50, 100, 250

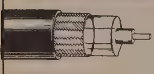
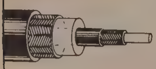
test prod wire and high voltage cables

TEST PROD WIRE

Description	Trade Number	AWG & (Stranding)	Insulation Thickness (Inch)	Nom. O.D. (Inch)	Breakdown Voltage	Suggested Working Voltage‡	Standard Package	Standard Spool Lengths in ft.
 *Tinned copper, separator, rubber insulated, red or black*	**8899**	18 (65x36) *7' of red and 7' of black.	.045	.144 **Also available in blue, white, gray, green or yellow.	20,000	5,000	—	10, 14*, 25**, 100**, 500**, 1000
	8897	18 (65x36)	.045	.144	20,000 **Manufactured per MIL-W-13169**	5,000	—	500
	8898	18 (65x36)	.088	.230	29,000	10,000	—	10, 25, 100, 500
Miniature	**8890**	24 (45x40)	.019	.066	10,000	1,000	—	25, 100, 500
	8878 With Prods	20 (42x36)	.063 *Stranded tinned copper, rubber insulated with 4" long solderless threaded plastic "phone tip" test prod ⅜" diameter on one end and 1" long solderless threaded plastic "phone tip" test prod ⅜" diameter on the other end. 5 ft. in length retracts to 8 inches. Is recommended for use with multimeters.*	.173	20,000	5,000	1 pair Red and Black	—
	8879 Without Prods	20 (42x36)	.063 *Tinned copper, rubber insulated, 5 ft. in length retracts to 8 inches.*	.173	20,000	5,000	1 pair Red and Black	—

‡For intermittent duty only. All breakdown voltages and suggested working voltages are AC RMS values.

HIGH VOLTAGE CABLE

Description	Trade Number	AWG & (Stranding)	Insulation Thickness (Inch)	Jacket Thickness (Inch)	Nom. O.D. (Inch)	Jacket Color	Breakdown Voltage	Suggested Working Voltage	Standard Spool Lengths in ft.
	**8870**	22 (Solid) Copperweld *Solid Copperweld, conductive polyethylene§, polyethylene insulation, tinned copper braid equipotential sheath, black polyethylene jacket.*	.142	.020	.440	Black	160,000 DC	80,000 DC	100, 250
	**8871**	16 (Braided) *Tinned copper braid (CMA equivalent to 16 AWG) over solid polyethylene rod, black conductive polyethylene§, clear polyethylene insulation, tinned copper braid, black polyethylene jacket.*	.270	.025	.830	Black	400,000 DC	200,000 DC	25, 100, 250

§KORONA-GUARD™ over inner conductor combined with a copper wire braid over the dielectric provides uniform distribution of voltage stress. Very high-voltage DC cable for applications from 200 KVDC to 400 KVDC is available from Belden on special order. Contact Electronic Sales Service Department for AC or pulse applications.

BELDEN

SHIELDING AND BONDING CABLES

Cables conforming to QQB575 can be manufactured on a special order basis.
Braided tinned copper.
Standard Spool: 10, 50, 250 feet.°

Trade Number	Stranding	Approx. CMA	Recommended Current (Amps.)	Nom. I.D. Round (Inch)	Nom. Flat Width (Inch)
8676	16x36	400	5.5	1/32	3/64
8674	24x36	600	7.5	3/64	1/16
8652	96x40	920	10.0	1/16	3/32
8653	48x36	1200	12.0	3/32	7/64
8654	72x36	1800	16.0	7/64	1/8
8664	96x36	2400	20.0	1/8	5/32
8660	96x34	3800	27.0	9/64	3/16
8668	120x34	4700	30.0	5/32	7/32
8663	168x34	6700	38.0	7/32	1/4
8661	192x34	7600	42.0	9/32	5/16
8669	336x34	13300	61.5	13/32	7/16
8672	528x36	13200	61.0	—	9/16
8671	864x36	21600	84.0	—	15/16
8662	576x34	22900	88.0	—	19/32
8655	360x30	36000	120.0	—	5/8
8670	480x30	48000	145.0	—	3/4
8656	576x30	57600	165.0	—	7/8
8657	768x30	76800	195.0	—	1 1/16
8658	1056x30	105600	235.0	—	1 3/8
8659	1680x30	168000	320.0	—	1 1/2

°8657, 8658, 8659 Available only in 10′ & 50′ put-ups.

Dimensions shown are approximate, due to pliable nature of braided cables. For additional sizes, see current BRAIDED AND STRANDED COPPER CABLE CATALOG.

hook-up and lead wire

STYLE 1061 300V—80°C THIN WALL HOOK-UP WIRE

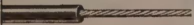
Underwriters' Laboratories, Inc. Listed. **All of these hook-up wires have passed the FR-1 vertical flame test.**

Description	Trade Number	AWG & (Stranding)	Insulation Thickness (Inch)	Nominal O.D. (Inch)	Stock Colors	Standard Spool Lengths in ft.
 Tinned copper, semi-rigid vinyl insulation.	**★9977**	28 (Solid)	.009	.031	1, 2, 3, 4, 5, 7, 8, 9, 10, 13	1000
	9976	26 (Solid)	.009	.034	1, 2, 3, 4, 5, 7, 8, 9, 10, 13	1000
	9975	24 (Solid)	.009	.038	1, 2, 3, 4 5, 7, 8, 9, 10, 13	1000

Suitable for wire wrap applications.

IRRADIATED PVC HOOK-UP WIRE

Underwriters' Laboratories, Inc. Listed. **All of these hook-up wires have passed the FR-1 vertical flame test.**

Description	Trade Number	MIL-W-16878 Type	Style No.	AWG & (Stranding)	Nom. Insulation Thickness (Inch)	Nom. O.D. (Inch)	Stock Colors	Standard Spool Lengths in ft.
 *Tinned cppper, Irradiated PVC Insulated.*	**83402**	B-26∧	1429	26 (Solid)	.010	.039	2, 4, 5, 6, 9, 10	1000
	83403	B-24∧	1429	24 (Solid)	.010	.044	2, 4, 5, 6, 9, 10	1000
	83404	B-22∧	1429	22 (Solid)	.010	.050	2, 4, 5, 6, 9, 10	1000
	83412	B-26	1429	26 (7x34)	.010	.039	2, 4, 5, 6, 9, 10	1000
	83413	B-24	1429	24 (7x32)	.010	.044	2, 4, 5, 6, 9, 10	1000
	83414	B-22	1429	22 (7x30)	.010	.050	2, 4, 5, 6, 9, 10	1000
	83415	B-20	1429	20 (7x28)	.010	.058	2, 4, 5, 6, 9. 10	1000
	83416	B-18	1429	18 (7x26)	.010	.068	9 & 10	1000
	83423	B-24	1429	24 (19x36)	.010	.045	1 thru 10	1000
	83424	B-22	1429	22 (19x34)	.010	.051	1 thru 10	1000
	83425	B-20	1429	20 (19x32)	.010	.059	9	1000
	83443	C-24	1430	24 (7x32)	.016	.058	1 thru 10	1000
	83444	C-22	1430	22 (7x30)	.016	.064	9 & 10	1000
	83445	C-20	1430	20 (7x28)	.016	.072	9 & 10	1000
	83446	C-18	1430	18 (7x26)	.016	.082	9	1000

Manufactured to current Government specifications and subsequent revisions.

★New Item

▨ **Passes the FR-1 vertical flame test.**

∧ *Solid Conductor not recognized in MIL-W-16878.*

STOCK COLORS

1 Brown
2 Red
3 Orange
4 Yellow
5 Green
6 Light Blue
7 Violet (purple)
8 Gray (slate)
9 White
10 Black
13 Dark Blue

BELDEN

high temperature wire and cable

TEFLON

TEFLON is a fluorinated thermoplastic with outstanding thermal, physical and electrical properties. However, the basic resin and the processing costs are relatively high, therefore, TEFLON is generally restricted to applications requiring its special characteristics.

Belden TEFLON wire products are highly recommended for miniature cable applications, because of their superior thermal and electrical properties. TEFLON is especially suitable for internal wiring—soldering applications where insulation melt back is a specific problem. Belden wiring products, insulated with TEFLON are outstanding in their resistance to oil, oxidation, heat, sunlight, flame and their ability to remain flexible at low temperatures. They all have excellent resistance to ozone, water, alcohol, gasoline, acids, alkalis, aromatic hydrocarbons and solvents.

TYPE E—MIL-W-16878 TEFLON—600V—200°C HOOK-UP WIRE

All Of These Hook-Up Wires Have Passed The FR-1 Vertical Flame Test.

Description	Trade Number	Type Designation	AWG & (Stranding)	Insulation Thickness (Inch)	Nom. O.D. (Inch)	Stock Colors	Standard Spool Lengths in Ft.
Concentrically stranded silver coated copper conductor insulated with extruded TFE TEFLON.	**83000**	E-30	30 (7x38)	.010	.033	1 thru 10	100 ,500, 1000
	83001	E-28	28 (7x36)	.010	.036	1 thru 10	100, 500, 1000
	83002	E-26	26 (7x34)	.010	.041	1 thru 10	100, 500, 1000
	83003	E-24	24 (19x36)	.010	.046	1 thru 10	100, 500
	83004	E-24	24 (7x32)	.010	.045	1 thru 10	100, 500, 1000
	83005	E-22	22 (7x30)	.010	.051	1 thru 10	100, 500, 1000
	83006	E-22	22 (19x34)	.010	.052	1 thru 10	100, 500, 1000
	83007	E-20	20 (19x32)	.010	.060	1 thru 10	100, 500, 1000
	83008	E-20	20 (7x28)	.010	.059	1 thru 10	100, 500
	83009	E-18	18 (19x30)	.010	.071	1 thru 10	100, 500, 1000
	83010	E-16	16 (19x29)	.010	.080	1 thru 10	100, 500, 1000

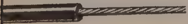
TYPE EE—MIL-W-16878 TEFLON—1000V—200°C HOOK-UP WIRE

All Of These Hook-Up Wires Have Passed The FR-1 Vertical Flame Test.

Description	Trade Number	Type Designation	AWG & (Stranding)	Insulation Thickness (Inch)	Nom. O.D. (Inch)	Stock Colors	Standard Spool Lengths in Ft.
Concentrically stranded silver coated copper conductor insulated with extruded TFE TEFLON.	**83023**	EE-24	24 (19x36)	.014	.053	1 thru 10	100, 500
	83025	EE-22	22 (7x30)	.014	.058	1 thru 10	100, 500
	83026	EE-22	22 (19x34)	.014	.060	1 thru 10	100, 500, 1000
	83027	EE-20	20 (19x32)	.014	.068	1 thru 10	100, 500, 1000
	83028	EE-20	20 (7x28)	.014	.066	1 thru 10	100, 500
	83029	EE-18	18 (19x30)	.014	.079	1 thru 10	100, 500, 1000
	83030	EE-16	16 (19x29)	.014	.086	1 thru 10	100, 500, 1000

TYPE ET—MIL-W-16878 TEFLON—250V—200°C MINIATURE HOOK-UP WIRE

All Of These Hook-Up Wires Have Passed The FR-1 Vertical Flame Test.

Description	Trade Number	Type Designation	AWG & (Stranding)	Insulation Thickness (Inch)	Nom. O.D. (Inch)	Stock Colors	Standard Spool Lengths in Ft.
 *Concentrically stranded silver coated copper conductor insulated with extruded TFE TEFLON.*	**83041**	ET-32	32 (7x40)	.006	.021	1 thru 10	100, 1000
	83043	ET-30	30 (7x38)	.006	.024	1 thru 10	100, 1000
	83045	ET-28	28 (7x36)	.006	.027	1 thru 10	100, 1000
	83046	ET-26	26 (7x34)	.006	.031	1 thru 10	100, 1000
	83047	ET-24	24 (7x32)	.006	.036	1 thru 10	100, 1000
	83048	ET-24	24 (19x36)	.006	.037	1 thru 10	100, 1000
	83049	ET-22	22 (7x30)	.006	.042	1 thru 10	100, 1000
	83050	ET-22	22 (19x34)	.006	.044	1 thru 10	100, 1000

Manufactured to current Government specifications and subsequent revisions.

☐ **Passes the FR-1 vertical flame test.**

STOCK COLORS

1 Brown
2 Red
3 Orange
4 Yellow
5 Green
6 Light Blue
7 Violet (purple)
8 Gray (slate)
9 White
10 Black

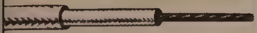
ELECTRONIC DIVISION/BELDEN CORPORATION, P.O. BOX 1331, RICHMOND, IN 47374 (317) 966-6661

hook-up and lead wire, mil-w-16878 hook-up wire

BELDEN

STYLE 1009 & 1014—90°C (CSA-TYPE TRB)

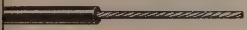
Underwriters' Laboratories, Inc., Listed. All of these hook-up wires have passed the FR-1 vertical flame test.

Description	Trade Number	AWG & (Stranding)	Insulation Thickness (Inch)	Nom. O.D. (Inch)	Stock Colors	Standard Spool Lengths in ft.
 *Tinned copper, vinyl insulated, cotton braid, lacquered.*	**8937**	22 (7x30)	.016	.091	1, 2, 3, 4, 5, 9, 10, 13	100, 1000
	8936	20 (10x30)	.017	.098	1, 2, 3, 4, 5, 9, 10, 13	100, 1000
	8935	18 (16x30)	.017	.113	1, 2, 3, 4, 5, 9, 10, 13	100, 1000
	8934	16 (26x30)	.017	.126	1, 2, 3, 4, 5, 9, 10, 13	100, 500
	8933*	14 (41x30)	.031	.177	1, 2, 3, 4, 5, 9, 10, 13	100, 500

Rated 600V peak for electronic circuits only—300V for other applications. Style 1009.
*Rated 2500V peak for electronic circuits only—600V for other applications. Style 1014.

STYLE 1015 600V—105°C (CSA-600V-TYPE TEW)

Underwriters' Laboratories, Inc., Listed. All of these hook-up wires have passed the FR-1 vertical flame test.

 *Tinned copper, vinyl insulated.*	**8920**	22 (7x30)	.031	.095	1, 2, 3, 4, 5, 9, 10, 13	100, 1000, 5000
	8919	20 (10x30)	.031	.102	1, 2, 3, 4, 5, 9, 10, 13	100, 1000, 4000
	8918	18 (16x30)	.031	.112	1, 2, 3, 4, 5, 9, 10, 13	100, 1000, 4000
	8917	16 (26x30)	.031	.126	1, 2, 3, 4, 5, 9, 10, 13	100, 500, 1000
	8916	14 (41x30)	.031	.141	1, 2, 3, 4, 5, 9, 10, 13	100, 500

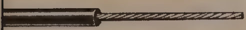
Rated 2500V peak for electronic circuits.

MIL-W-16878 HOOK-UP WIRE

Covers insulated wire for the internal wiring of meters, panels and electrical or electronic equipment at temperatures ranging from 105°C to 200°C. The many types available in different voltages and thermal ratings are listed on the following pages to meet your individual requirements. For 200°C wire and cable, see Belden pages 8 & 23. Multi-conductor Mil-Spec cables can be found on pages 7, 8 & 14.

TYPE B—MIL-W-16878—VINYL—600V-105°C

All of these hook-up wires have passed the FR-1 vertical flame test.

Description	Trade Number	Type Designation	AWG & (Stranding)	Insulation Thickness (Inch)	Nom. O.D. (Inch)	Stock Colors on Standard Spools	
						100	1000
 *Tinned copper, vinyl insulated.*	**8599**	B-32	32 (7x40)	.010	.029	1 thru 10	1 thru 10
	8598	B-30	30 (7x38)	.010	.032	1 thru 10	1 thru 10
	8597	B-28	28 (7x36)	.010	.035	1 thru 10	1 thru 10
	8505	B-26	26 (7x34)	.010	.039	1 thru 10 14 thru 22	1 thru 10 14 thru 22
	8509	B-24	24 (19x36)	.010	.045	1 thru 10	1 thru 10
	8504	B-24	24 (7x32)	.010	.044	1 thru 10 14 thru 22	1 thru 10 14 thru 22
	8503	B-22	22 (7x30)	.010	.050	1 thru 10 14 thru 22	1 thru 10 14 thru 22
	8502	B-20	20 (7x28)	.010	.058	1 thru 10 14 thru 22	1 thru 10 14 thru 22
	8501	B-18	18 (7x26)	.010	.068	1 thru 10 14 thru 22	1 thru 10 14 thru 22
	8500	B-16	16 (19x29)	.010	.077	1 thru 10 14 thru 22	1 thru 10 14 thru 22

▨ **Passes the FR-1 vertical flame test.**

Manufactured to current Government specifications and subsequent revisions.

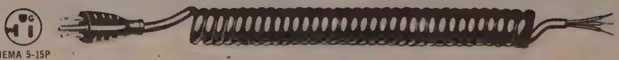
THREE CONDUCTOR POWER SUPPLY CORDS

TYPE SJO NEOPRENE (RETRACTILE)

CONVENIENCE AND SAFETY. Dangling cords can be messy, troublesome and unsafe. Retractile cords stay neat, allow free movement of the appliance or tool, and prevent accidents. Rubber insulation and neoprene jackets retain full retracting memory through thousands of stretching cycles.

Tan Flag Label.

Certified to C.S.A. Standards

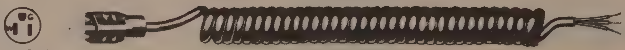


NEMA 5-15P

MOLDED VINYL GROUNDING PLUG PH-185

OUTER JACKET STRIPPED 1½", CONDUCTORS STRIPPED ½" AND TINNED

Trade Number	Retracted Length (inches)	Practical Extended Lgth. (ft.)	AWG (Stranding)	Nom. O.D. (inches)	Rating	Type of Cordage	Color
17447	12	6	18 (41x34)	.360	1250 Watts 10A-125V	SJO Neoprene	Black



NEMA 5-15P

MOLDED VINYL GROUNDING PLUG PH-173

OUTER JACKET STRIPPED 1½", CONDUCTORS STRIPPED ½" AND TINNED

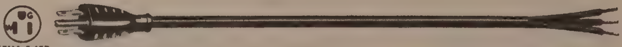
Trade Number	Retracted Length (inches)	Practical Extended Lgth. (ft.)	AWG (Stranding)	Nom. O.D. (inches)	Rating	Type of Cordage	Color
17448	12	6	16 (65x34)	.370	1625 Watts 13A-125V	SJO Neoprene	Black
17449	24	12	16 (65x34)	.370	1625 Watts 13A-125V	SJO Neoprene	Black

TYPE SJT VINYL, SJ RUBBER AND SJO NEOPRENE

For all tools such as sanders, saws, grinders and polishers requiring grounding. Three conductor cords now mandatory for drills ⅛" and larger by Underwriters' Laboratories, Inc.

Tan Flag Label.

Certified to C.S.A. Standards



NEMA 5-15P

MOLDED VINYL GROUNDING PLUG PH-185

OUTER JACKET STRIPPED 2", CONDUCTORS STRIPPED AND TWISTED ⅝"

Trade Number	Length of Cord (ft.)	AWG (Stranding)	Nom. O.D. (Inches)	Rating	Type of Cordage	Color
17406	6	18 (16x30)	.328	1250 Watts 10A-125V	SJ Rubber	Black
17405	6	18 (16x30)	.328	1250 Watts 10A-125V	SJT Vinyl	Gray
17408	8	18 (16x30)	.328	1250 Watts 10A-125V	SJ Rubber	Black
17407	8	18 (16x30)	.328	1250 Watts 10A-125V	SJT Vinyl	Gray
17409	8	18 (16x30)	.328	1250 Watts 10A-125V	SJO Neoprene	Black
17412	12	18 (41x34)	.328	1250 Watts 10A-125V	SJ Rubber	Black
17419	9	16 (65x34)	.353	1625 Watts 13A-125V	SJ Rubber	Black
17422	12	16 (65x34)	.353	1625 Watts 13A-125V	SJ Rubber	Black
17425	15	16 (65x34)	.353	1625 Watts 13A-125V	SJ Rubber	Black

TWO CONDUCTOR POWER SUPPLY CORDS

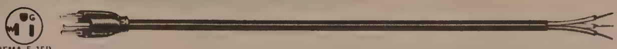
Information and Application

TYPE SV RUBBER AND SVT VINYL

Three conductor SV and SVT cords now recognized as a Standard for some small tools, business machines and instruments which previously required a three conductor SJ Cord.

Tan Flag Label.

Certified to C.S.A. Standards



NEMA 5-15P

MOLDED VINYL GROUNDING PLUG PH-290B

OUTER JACKET STRIPPED 1½", CONDUCTORS STRIPPED AND TWISTED ⅝"

Trade Number	Length of Cord (ft.)	AWG (Stranding)	Nom. O.D. (Inches)	Rating	Type of Cordage	Color
17236	6	18 (41x34)	.265	1250 Watts 10A-125V	SV Rubber	Black
17238	8	18 (41x34)	.265	1250 Watts 10A-125V	SV Rubber	Black
17237	6	18 (41x34)	.253	1250 Watts 10A-125V	SVT Vinyl	Gray
17239	8	18 (41x34)	.253	1250 Watts 10A-125V	SVT Vinyl	Gray

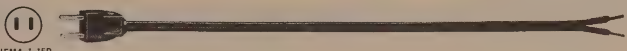
Information and Application

TYPE SPT VINYL AND SP RUBBER PARALLEL LAMP CORDS

For Lamps, Radios, Desk Fans and Small Appliances. Long life plastic resists cracking and aging. Popular lengths and colors.

Tan Flag Label.

17106, 17109 & 17112 are Certified to C.S.A. Standards



NEMA 1-15P

MOLDED VINYL PLUG PH-289A

CONDUCTORS SPLIT 1", STRIPPED AND TWISTED ⅝"

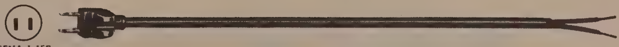
Trade Number	Length of Cord (ft.)	AWG (Stranding)	Nom. O.D. (Inches)	Rating	Type of Cordage	Color
17106	6	18 (41x34)	.110 x .207	1250 Watts 10A-125V	SPT-1 Vinyl	Brown, Gray or Ivory
17109	9	18 (41x34)	.110 x .207	1250 Watts 10A-125V	SPT-1 Vinyl	Brown, White
17112	12	18 (41x34)	.110 x .207	1250 Watts 10A-125V	SPT-1 Vinyl	Brown, White
17126	6	18 (41x34)	.110 x .213	1250 Watts 10A-125V	SP-1 Rubber	Brown
17129	9	18 (41x34)	.110 x .213	1250 Watts 10A-125V	SP-1 Rubber	Brown

TYPE SVT VINYL AND SV RUBBER

For Food Mixers, Blenders and Small Appliances.

Tan Flag Label.

Certified to C.S.A. Standards



NEMA 1-15P

MOLDED VINYL CORD-HOLDER PLUG PH-289E

OUTER JACKET STRIPPED 1½", CONDUCTORS STRIPPED AND TWISTED ⅝"

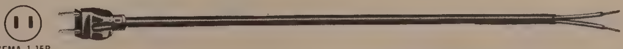
Trade Number	Length of Cord (ft.)	AWG (Stranding)	Nom. O.D. (Inches)	Rating	Type of Cordage	Color
17205	6	18 (41x34)	.243	1250 Watts 10A-125V	SVT Vinyl	Black, Gray
17206	6	18 (41x34)	.245	1250 Watts 10A-125V	SV Rubber	Gray

TYPE SJ RUBBER

For Mixers, Blenders, Washing Machines and Appliances using fractional horse power motors that do not require a three conductor grounding cord.

Tan Flag Label.

Certified to C.S.A. Standards



NEMA 1-15P

MOLDED VINYL CORD-HOLDER PLUG PH-289F

OUTER JACKET STRIPPED 1½", CONDUCTORS STRIPPED AND TWISTED ⅝"

Trade Number	Length of Cord (ft.)	AWG (Stranding)	Nom. O.D. (Inches)	Rating	Type of Cordage	Color
17308	8	18 (16x30)	.298	1250 Watts 10A-125V	SJ Rubber	Black
17310	10	18 (16x30)	.298	1250 Watts 10A-125V	SJ Rubber	Black

BELDEN

Power Cords

TWO CONDUCTOR POWER SUPPLY CORDS

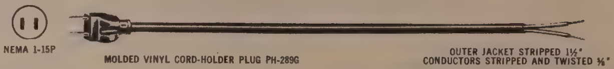
Information and Application

TYPE SJ RUBBER

For Mixers, Blenders, Washing Machines and Appliances using fractional horse power motors that do not require a three conductor grounding cord.

Tan Flag Label.

Certified to C.S.A. Standards


NEMA 1-15P
MOLDED VINYL CORD-HOLDER PLUG PH-289G
OUTER JACKET STRIPPED 1½"
CONDUCTORS STRIPPED AND TWISTED ⅜"

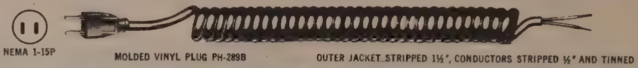
Trade Number	Length of Cord (ft.)	AWG (Stranding)	Nom. O.D. (Inches)	Rating	Type of Cordage	Color
17328	8	16 (26x30)	.323	1625 Watts 13A-125V	SJ Rubber	Black
17330	10	16 (26x30)	.323	1625 Watts 13A-125V	SJ Rubber	Black

TYPE SVO NEOPRENE (RETRACTILE)

CONVENIENCE AND SAFETY. Dangling cords can be messy, troublesome and unsafe. Retractile cords stay neat, allow free movement of the appliance or tool, and prevent accidents. Rubber insulation and neoprene jackets retain full retracting memory through thousands of stretching cycles.

Tan Flag Label.

Certified to C.S.A. Standards


NEMA 1-15P
MOLDED VINYL PLUG PH-289B
OUTER JACKET STRIPPED 1½", CONDUCTORS STRIPPED ½" AND TINNED

Trade Number	Retracted Length (inches)	Practical Extended Lgth (ft.)	AWG (Stranding)	Nom. O.D. (Inches)	Rating	Type of Cordage	Color
17249	12	6	18 (41 x 34)	.270	1250 Watts 10A-125V	SVO Neoprene	Black

BUSINESS MACHINE CORDS

TYPE SJT AND SVT VINYL

17359 fits Burroughs, Monroe and Victor 10 key Adding Machines as well as late Friden models and the Burroughs Sensimatic Bookkeeping Machine and Pentron Tape Recorder (Triumph model) which requires a dummy center contact. Features CORD-HOLDER plug. 17260 fits Revere Projectors and many business machines which do not require a dummy center contact.

Blue Flag Label.

Certified to C.S.A. Standards

NEMA 1-15P
MOLDED VINYL CORD-HOLDER PLUG PH-289F
MOLDED VINYL CONNECTOR PH-104 WITH DUMMY CENTER CONTACT

Trade Number	Length of Cord (ft.)	AWG (Stranding)	Nom. O.D. (Inches)	Rating	Type of Cordage	Color
17359	10	18 (16x30)	.298	875 Watts 7A-125V	SJT Vinyl	Gray

NEMA 1-15P
MOLDED VINYL CORD-HOLDER PLUG PH-289E
MOLDED VINYL CONNECTOR PH-103

Trade Number	Length of Cord (ft.)	AWG (Stranding)	Nom. O.D. (Inches)	Rating	Type of Cordage	Color
17260	8	18 (41x34)	.243	875 Watts 7A-125V	SVT Vinyl	Gray

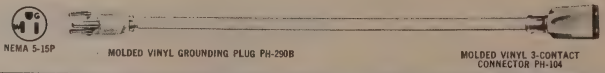
THREE CONDUCTOR PROJECTOR AND BUSINESS MACHINE CORDS

TYPE SVT VINYL

Can be used for Revere and Eastman Kodak projectors, Friden, Victor, Hewlett-Packard, Marchant business machines, and DuKane audio equipment.

Blue Flag Label.

Certified to C.S.A. Standards


NEMA 5-15P
MOLDED VINYL GROUNDING PLUG PH-290B
MOLDED VINYL 3-CONTACT CONNECTOR PH-104

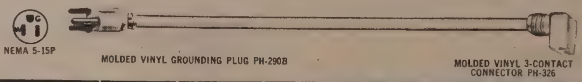
Trade Number	Length of Cord (ft.)	AWG (Stranding)	Nom. O.D. (Inches)	Rating	Type of Cordage	Color
17258	8	18 (41x34)	.253	875 Watts 7A-125V	SVT Vinyl	Gray

TYPE SVT VINYL

Can be used on Wollensak tape recorder and other equipment with .109" pins

Blue Flag Label

Certified to C.S.A. Standards


NEMA 5-15P
MOLDED VINYL GROUNDING PLUG PH-290B
MOLDED VINYL 3-CONTACT CONNECTOR PH-326

Trade Number	Length of Cord (ft.)	AWG (Stranding)	Nom. O.D. (Inches)	Rating	Type of Cordage	Color
★17257	8	18 (41x34)	.253	875 Watts 7A-125V	SVT Vinyl	Gray

★New Item

THREE CONDUCTOR BUSINESS MACHINE CORD AND RECEPTACLE

Information and Application

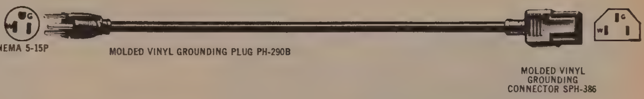
TYPE SVT VINYL

For use on U.S. and Canadian electronic instruments, business machines, test equipment, desk top computers and appliances. Federal Stock No. FSN-6150-351-3405. Connector mates with 17252 or Switchcraft EAC-301

Blue Flag Label   Certified to C.S.A. Standards

★17252 RECESSED POWER RECEPTACLE

The recessed power receptacle mates with the 17250 cord set. May be used for equipment for use in the U.S., Canada and European countries. Rating: 250V, 6 AMPS.


NEMA 5-15P
MOLDED VINYL GROUNDING PLUG PH-290B
MOLDED VINYL GROUNDING CONNECTOR SPH-386
G
W

Trade Number	Length of Cord (ft)	AWG (Standing)	Nom. O.D. (inches)	Rating	Type of Cordage	Color
★17250	7½	18 (41x34)	.253	1250 Watts 10A-125V	SVT Vinyl	Black

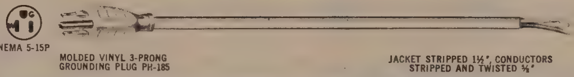
THREE CONDUCTOR COMMERCIAL VACUUM CLEANER CORDS

TYPE SJT VINYL

These three conductor power supply cords are for use with commercial vacuum cleaners and other appliances requiring grounding.

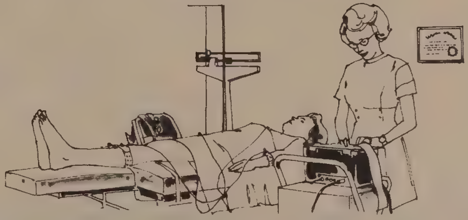
Tan Flag Label.

Certified to C.S.A. Standards


NEMA 5-15P
MOLDED VINYL 3-PRONG GROUNDING PLUG PH-185
JACKET STRIPPED 1½", CONDUCTORS STRIPPED AND TWISTED ⅛"
G

Trade Number	Length of Cord (ft.)	AWG (Stranding)	Nom. O.D. (Inches)	Rating	Type of Cordage	Color
17276	20	16 (26x30)	.353	1625 Watts 13A-125V	SJT Vinyl	Gray
★17403	32	16 (26x30)	.353	1625 Watts 13A-125V	SJT Vinyl	Gray

Belden SJT Type Low-Leakage 60-cycle Power Cords reduce the hazards of shock due to current leakage between the two conductors and from the conductors out through the jacket. Maximum leakage at 120 VAC is 6 microamps to green and 16 microamps to jacket. Designed for hospital use and critical medical applications.

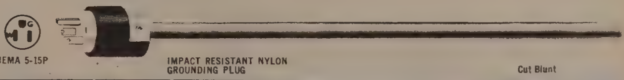


LOW-LEAKAGE POWER CORDS PATENT PENDING

TYPE SJT VINYL LOW-LEAKAGE

This power cord reduces the hazards of shock due to current leakage between the two conductors and from the conductors out through the jacket.

Tan Flag Label


NEMA 5-15P
IMPACT RESISTANT NYLON GROUNDING PLUG
Cut Blunt
G

Trade Number	Length of Cord (ft.)	AWG (Stranding)	Nom. O.D. (Inches)	Rating	Type of Cordage	Color
★17301	8	16 (65x34)	.580	1625 Watts 13A-125V	SJT Vinyl Low-Leakage	Gray

★New item.

Cimco

TEFLON* INSULATED HIGH TEMPERATURE WIRE, CABLE AND TUBING

Cimco manufactures both standard and custom-made wire and cable for aircraft, missiles, computers, electronic assemblies, and many other applications using TEFLON* insulated cable, tubing and hook-up wire.

BONDING TREATMENT Surface treatment to increase bondability for use with potting compounds.

*REGISTERED DUPONT TRADEMARK

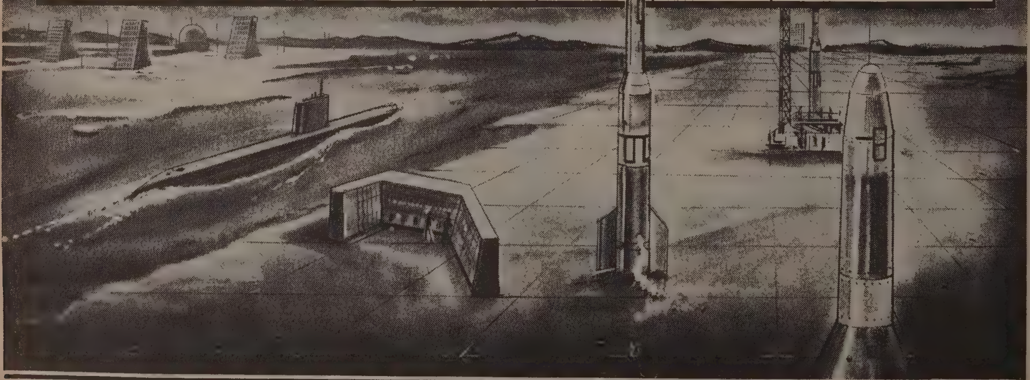
WRITE FOR CATALOG ON COMPLETE SPECIFICATIONS

Cimco

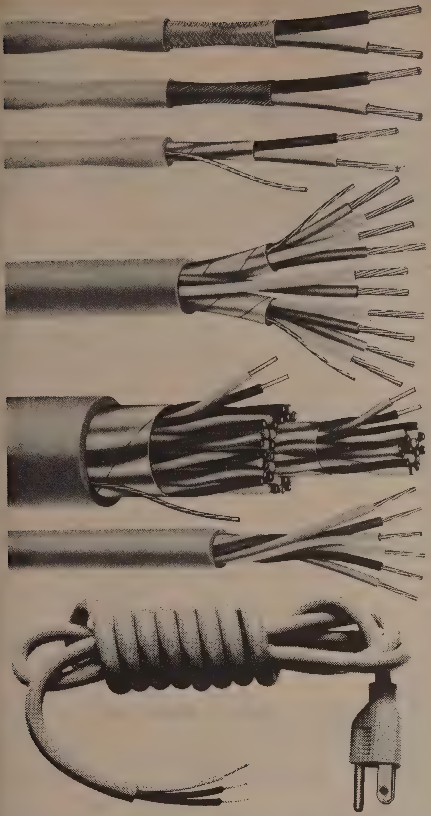
wire & cable co. 250 W. CRESCENT AVE.,
ALLENDALE, N. J. 07401 PHONE 201-327-2522

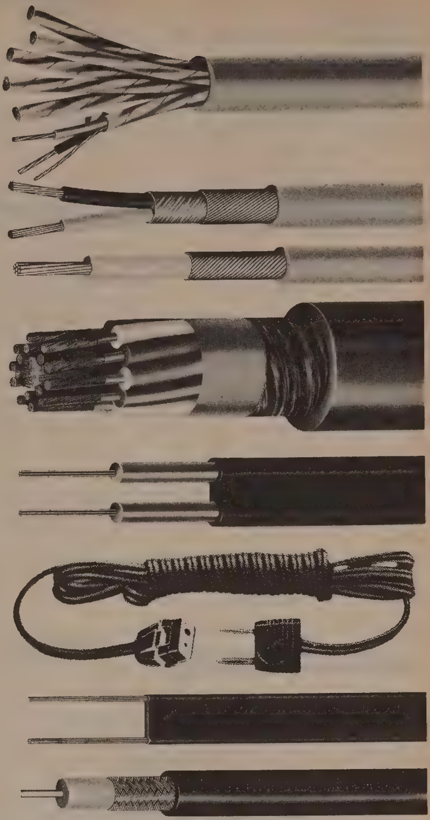
SPECIFICATIONS

WIRE, CABLE OR TUBING	PRIMARY INSULATION	COLORS MIL-STD-104	OPERATING TEMPERATURE	JACKETS	SHIELDING	REMARKS
High Temperature Hook-up Wire	Teflon, Extruded	Solid & Striped	−90°C - +260°C	———	Silver Plated or Tinned Copper	Conforms to MIL-W-16878 Types E, EE & ET or other special specifications as required.
Cables A	Teflon, Extruded Teflon Tape Wrapped	Solid & Striped	−54°C - +105°C	PVC	Silver Plated or Tinned Copper	Any combinations of conductors and shielding required.
Cables B	Teflon, Extruded Teflon Tape Wrapped	Solid & Striped	−54°C - +120°C	Nylon Braid Nylon Extruded	Silver Plated or Tinned Copper	Any combinations of conductors and shielding required.
Cables H	Teflon, Extruded Teflon Tape Wrapped	Solid & Striped	−90°C - +260°C	Fiberglass-Teflon	Silver Plated Copper	Any combinations of conductors and shielding required.
Cables C	Teflon, Extruded Teflon Tape Wrapped	Solid & Striped	−90°C - +260°C	Teflon Tape	Silver Plated Copper	Any combinations of conductors and shielding required.
Airframe Wire	Teflon Tape Plus Impregnated Glass	Solid Only	−60°C - +260°C	———	———	MIL-W-7139B
Miniature Coaxial Cable	Teflon, Extruded	Jackets Only Solid & Striped	−90°C - +260°C	Teflon Tape, Fiberglass-Teflon Nylon & PVC	Silver Plated or Tinned Copper	Conforms to MIL-C-17B
Low Capacitance Cable	Teflon Air-weave	Natural	−90°C - +260°C −90°C - +260°C −54°C - +105°C −54°C - +120°C	Teflon Tape, Fiberglass-Teflon PVC Nylon	Silver Plated or Tinned Copper	Special constructions as low as 8.0 mmf/ft.
High Voltage Cable	Teflon Tape	Solid & Striped	−90°C - +260°C	Teflon Tape, Fiberglass-Teflon	Silver Plated Copper	High voltage lead wire or cable excellent corona resistance characteristics
Tubing—Thinwall, Standard wall, Lightweight	Teflon, Extruded	Solid	−90°C - +260°C	———	———	Conforms to MIL-I 22129 -AMS 3655, 3653, 3654



COLUMBIA®





Columbia is complete!

Whatever you need in wire, cable and cordsets—Columbia has the product for you...all top quality...one of the largest lines in the industry.

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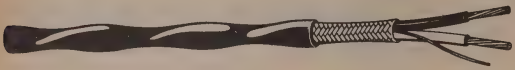
SHIELDED AUDIO CABLE

BRAID SHIELD, PVC JACKET, DRAIN WIRE



Stock Color: Black jacket.

Construction: Tinned copper conductors, color-coded PVC insulation, conductors cabled, tinned copper braid shield, tinned copper drain wire, PVC jacket overall.

Specifications: −20°C to +60°C. Passes FR-1 vertical flame test.

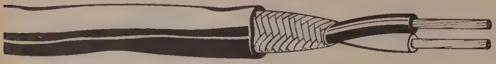
Color Code: Black, Red.

Applications: Shielded cable for recording studios, radio transmitters, sound systems, broadcast use.

Put-up: 100′, 500′ and 1000′ spools (other Put-ups also available).

Columbia No.	No. of Cond.	Size AWG	Stranding	Nom. Insul. Thck.	Nom. Jkt. Thck.	Nom. O.D. In.
2676	2	22	Solid	.015	.025	.200
2677	2	22	16/34	.015	.025	.210

BRAID SHIELD, PVC JACKET



Stock Color: Chrome gray jacket.

Construction: Tinned copper conductors, color-coded PVC insulation, conductors cabled, tinned copper braid shield, PVC jacket overall.

Specifications: −20°C to +60°C. Passes FR-1 vertical flame test.

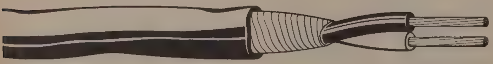
Color Code: Black, Red, White, Green.

Applications: Shielded cable for recording studios, radio transmitters, sound systems and electronic circuits where shielding is required.

Put-up: 100′, 500′ and 1000′ spools (other Put-ups also available).

Columbia No.	No. of Cond.	Size AWG	Stranding	Nom. Insul. Thck.	Nom. Jkt. Thck.	Nom. O.D. In.
2695	2	20	Solid	.015	.025	.205
2696	2	18	Solid	.015	.025	.220
2679	2	22	7/30	.015	.025	.200
2678	3	22	7/30	.015	.025	.210
2680	4	22	7/30	.015	.025	.225
2681	2	20	10/30	.015	.025	.215
1332	3	20	10/30	.015	.025	.225
2683	4	20	10/30	.015	.025	.245
2686	2	18	16/30	.018	.025	.245
2687	3	18	16/30	.018	.025	.260
2688	4	18	16/30	.018	.025	.280
2689	2	16	26/30	.018	.025	.270
2690	3	16	26/30	.018	.025	.285
2691	2	14	41/30	.020	.030	.320
2692	3	14	41/30	.020	.030	.335
2693	2	12	65/30	.020	.030	.360
2694	3	12	65/30	.020	.030	.380

SPIRAL SHIELD, PVC JACKET



Stock Color: Chrome gray jacket.

Construction: Tinned copper conductors, color-coded PVC insulation, conductors cabled, tinned copper spiral wrapped shield, PVC jacket overall.

SPIRAL SHIELD, PVC JACKET (CONT'D)

Specifications: −20°C to +60°C. Passes FR-1 vertical flame test.

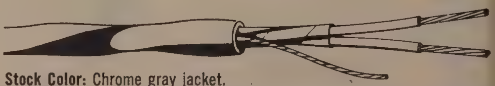
Color Code: Black, Red, White, Green, Yellow, Blue.

Applications: Cable for recording studios, radio transmitters, sound systems and electronic circuits where shielding is required. Spiral shield allows ease of pigtail soldering.

Put-up: 100′, 500′ and 1000′ spools (other Put-ups also available).

Columbia No.	No. of Cond.	Size AWG	Stranding	Nom. Insul. Thck.	Nom. Jkt. Thck.	Nom. O.D. In.
2884	2	22	Solid	.015	.025	.175
2885	3	22	Solid	.015	.025	.180
2882	2	22	7/30	.015	.025	.175
1335	3	22	7/30	.015	.025	.190
1337	4	22	7/30	.015	.025	.210
1341	6	22	7/30	.015	.025	.245
2888	2	20	10/30	.015	.025	.200
2893	3	20	10/30	.015	.025	.210
2769	4	20	10/30	.015	.025	.225
2770	6	20	10/30	.015	.025	.265
2892	2	18	16/30	.020	.025	.230
2768	3	18	16/30	.020	.025	.245
2894	4	18	16/30	.020	.025	.265
2895	2	16	26/30	.023	.025	.255
2896	3	16	26/30	.018	.025	.270
2897	2	14	41/30	.020	.025	.290
2898	3	14	41/30	.020	.030	.320
2899	2	12	65/30	.020	.030	.345
2900	3	12	65/30	.020	.030	.365

MYLAR/ALUMINUM FOIL SHIELDED AUDIO CABLE



Stock Color: Chrome gray jacket.

Construction: Tinned copper conductors, color-coded polyethylene insulation, conductors cabled, wrapped with Flexfoil® mylar supported aluminum foil shield with foil facing to outside, stranded tinned copper drain wire, PVC jacket overall.

Specifications: −20°C to +60°C. Jacket only passes FR-1 vertical flame test.

Color Code: Black, Clear, Red, Green.

Applications: 100% shielded cable for recording studios, broadcast sound systems and electronic circuits where RF shielding is required.

Put-up: 100′, 500′ and 1000′ spools (other Put-ups also available).

Columbia No.	No. of Cond.	AWG (Stranding)	Jacket Thck. In.	Nom. Insul. In.	Nom. O.D. In.
2513	2	24 (7/32)	.025	.015	.160
2514	2	22 (7/30)	.025	.015	.170
2526	3	22 (7/30)	.025	.015	.180
2523	4	22 (7/30)	.025	.015	.195
2524	2	20 (10/30)	.025	.015	.185
2525	3	20 (10/30)	.028	.015	.205
2534	2	18 (16/30)	.028	.018	.222
2535	3	18 (16/30)	.028	.018	.236
2536	2	16 (26/30)	.030	.025	.285
2537	3	16 (26/30)	.030	.025	.300
2538	2	14(41/30)	.032	.035	.350
2539	2	12(65/30)	.037	.040	.410

MINIATURE SIZE

Requires ½ to ⅔ less space than standard broadcast cables. Same construction as above, but with color-coded polypropylene insulation, .008″ thick. Color Code: 1, Black; 2, Red; 3, White.

Columbia No.	No. of Cond.	AWG (Stranding)	Jacket Thck. In.	Nom. Insul. In.	Nom. O.D. In.
2515	2	22 (Solid)	.018	.008	.125
2516	2	22 (7/70)	.020	.008	.135
2517	3	22 (7/30)	.020	.008	.145

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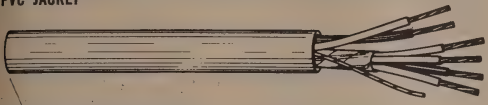
SPECIAL SHIELDED AUDIO & COMMUNICATION CABLE
PVC JACKET



Stock Color: Chrome gray jacket.
Construction: Tinned copper conductors, color-coded PVC insulation, 4 conductors cabled, Flexfoil® aluminum/polyester shield over 4 cabled conductors, 22 gauge TC drain wire, 2 conductors unshielded, PVC jacket overall.
Specifications: −20°C to +60°C.
Applications: Special cable for audio and communications use.
Put-up: 100′, 500′ and 1000′ spools. (Other put-ups also available.)

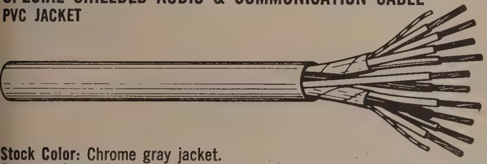
Cat. No.	No. of Cond.	Cond. Size	Cond. Strand.	Nom. Insul. Thck. (In.)	Nom. Jkt. Thck. (In.)	% Shld. Cov.	Sugg. Work. Volt.	Nom. O.D. (In.)
01345	6	4-24 shielded	7/32	.015	.028	100	350V	.258
		2-22 unshielded	7/30					

■ PASSES THE FR-1 VERTICAL FLAME TEST.

COLOR CODE OF CONDUCTORS

Shielded				Unshielded	
Cond.	Color	Cond.	Color	Cond.	Color
1	Black	3	Red	1	Blue
2	Green	4	Yellow	2	White

SPECIAL SHIELDED AUDIO & COMMUNICATION CABLE
PVC JACKET



Stock Color: Chrome gray jacket.
Construction: Tinned copper conductors, color-coded PVC insulation, cabled in 2 quads, each quad with 24 gauge tinned drain wire, Flexfoil® shield over each quad, plus 2 unshielded conductors, PVC jacket overall. Foil facing to inside.
Specifications: −20°C to +60°C.
Applications: Special cable for audio and communications use.
Put-up: 100′ and 500′ spools. (Other put-ups also available.)

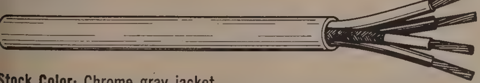
Cat. No.	No. of Cond.	Cond. Size	Cond. Strand.	Nom. Insul. Thck. (In.)	Nom. Jkt. Thck. (In.)	% Shld. Cov.	Sugg. Work. Volt.	Nom. O.D. (In.)
04085	10	4-24 shielded	7/32	.012	.030	100	350V	.310
		4-24 shielded	7/32	.012		100		
		2-22 unshielded	7/30	.015				

■ PASSES THE FR-1 VERTICAL FLAME TEST.

COLOR CODE OF CONDUCTORS

1st Quad		2nd Quad		Unshielded	
Cond.	Color	Cond.	Color	Cond.	Color
1	Gray	1	Red	1	White
2	White	2	Brown	2	Blue
3	Blue	3	Yellow		
4	Green	4	Orange		

SHIELDED INSTRUMENTATION & COMMUNICATION QUAD CABLE
PVC JACKET



Stock Color: Chrome gray jacket.
Construction: Tinned copper conductors, color-coded PVC insulation, tinned copper braid shield over one conductor, conductors cabled, PVC jacket overall.
Specifications: −20°C to +60°C.
Applications: Special cable for audio, communications and instrumentation use.
Put-up: 100′, 250′ and 500′ spools. (Other put-ups also available.)

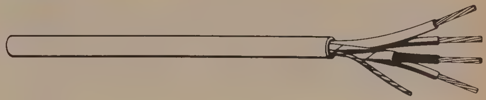
SHIELDED INSTRUMENTATION & COMMUNICATION QUAD CABLE
PVC JACKET (CONTINUED)

Cat. No.	No. of Cond.	Cond. Size	Cond. Strand.	Nom. Insul. Thck. (In.)	Nom. Jkt. Thck. (In.)	App. % Shld. Cov.	Sugg. Work. Volt.	Nom. O.D. (In.)
01336	4	1-20 shielded 3-20 unshielded	10/30	.015	.025	82	300V	.220

COLOR CODE OF CONDUCTORS

Shielded		Unshielded			
Cond.	Color	Cond.	Color	Cond.	Color
1	White	1	Black	3	Green
		2	Red		

SHIELDED INSTRUMENTATION & COMMUNICATION QUAD CABLE
PVC JACKET



Stock Color: Chrome gray jacket.
Construction: Tinned copper conductors, color-coded polypropylene insulation, each pair shielded with Flexfoil® aluminum polyester shield, stranded tinned copper drain wire, cables paired on common axis to reduce O.D., PVC jacket overall. Foil facing to outside. Drain wire 24 gauge, 7/32.
Specifications: −20°C to +60°C.
Applications: Special cable for audio, communications and instrumentation use.
Put-up: 100′, 500′ and 1000′ spools. (Other put-ups also available.)

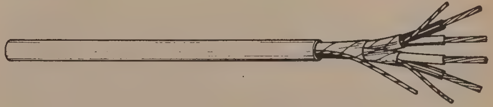
Cat. No.	No. of Cond.	Cond. Size	Cond. Strand.	Nom. Insul. Thck. (In.)	Nom. Jkt. Thck. (In.)	% Shld. Cov.	Sugg. Work. Volt.	Nom. O.D. (In.)	Nom. Cap.* PF/Ft.	Nom. Cap.** PF/Ft.
01352	4	22	7/30	.008	.025	100	400V	.170	35	62

*Capacitance between conductors.
**Capacitance between one conductor and other conductor connected to shield.

COLOR CODE OF CONDUCTORS

No. 1 pair .... Black, red
No. 2 pair .... Green, white

SHIELDED INSTRUMENTATION & COMMUNICATION QUAD CABLE
PVC JACKET



Stock Color: Chrome gray jacket.
Construction: Tinned copper conductors, color-coded polypropylene insulation, cabled in pairs, each pair Flexfoil® alumuminum/polyester shielded, with stranded tinned copper drain wire, overall Flexfoil® aluminum fail/polyester shields and stranded, 24 gauge, 7/32, tinned copper drain wire, cabled on common axis to reduce O.D., PVC jacket overall.
Specifications: −20°C to +60°C.
Applications: Special cable for audio, communications and instrumentation use.
Put-up: 500′ and 1000′ spools. (Available put-ups also available.)

Cat. No.	No. of Cond.	Cond. Size	Cond. Strand.	Nom. Insul. Thck. (In.)	Nom. Jkt. Thck. (In.)	% Shld. Cov.	Sugg. Work. Volt.	Nom. O.D. (In.)	Nom. Cap.* PF/Ft.	Nom. Cap.** PF/Ft.
01353	4	22	7/30	.008	.025	100	400V	.195	35	62

*Capacitance between conductors.
**Capacitance between one conductor and other conductor connected to shield.

COLOR CODE OF CONDUCTORS

No. 1 pair .... Black, red
No. 2 pair .... Green, white

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SHIELDED INSTRUMENTATION & COMMUNICATION QUAD CABLE
PVC JACKET

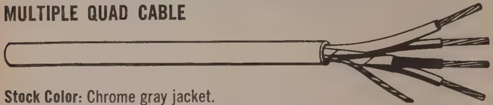
Stock Color: Chrome gray jacket.
Construction: Tinned copper conductors, color-coded polyethylene insulation, cabled, filled where required, clear mylar wrap, tinned copper braid shield, PVC jacket overall.
Specifications: −20°C to +60°C. Suggested working voltage 600V.
Applications: Special cable for audio, communications and instrumentation use.
Put-up: 100′, 500′ and 1000′ spools. (Other put-ups also available.)

Cat. No.	No. of Cond.	Cond. Size	Cond. Strand.	Nom. Insul. Thck. (In.)	Nom. Jkt. Thck. (In.)	App. % Shld. Cov.	Sugg. Work. Volt.	Nom. O.D. (In.	Nom. Cap. * PF/ FT.	Nom. Cap. ** PF/ FT.
01644	4	20	26/34	.015	.045	87	600V	.290	25	45

*Capacitance between conductors.
**Capacitance between one conductor and other conductor connected to shield.

Color Code: Black, white, red, green.

SHIELDED INSTRUMENTATION/COMMUNICATION MULTIPLE QUAD CABLE



Stock Color: Chrome gray jacket.
Construction: Tinned copper conductors. Cat. No. 1340 color-coded polypropylene insulation. Cat. No. 1331 color coded PVC insulation. Cat. No. 1343 color coded polyethylene insulation. Flexfoil® aluminum foil/polyester shield (foil facing to outside) over 2 conductors, stranded tinned copper drain wire (Cat. No. 1340 - 24 gauge, Cat. No. 1331 and 1343 - 22 gauge), one shielded pair and 2 singles cabled on common axis to reduce O.D., PVC jacket overall.
Specifications: −20°C to +60°C. Suggested working voltage: Cat. No. 1340 — 200V, Cat. No. 1331 and 1343 — 350V, Cat. No. 1331 entire cable passes FR-1, Cat. Nos. 1340 and 1343 jacket only passes FR-1.
Color Code: Shielded – Black Red; Unshielded – Green White.
Applications: Special cable for audio, communications and instrumentation use.
Put-up: 100′, 250′, 500′ and 1000′ spools (other Put-ups also available).

Columbia No.	No. of Cond.	AWG (Stranding)	Nom. Insul. In.	Jacket Thck. In.	Nom. O.D. In.
01340	4	22 (7/30)	.008	.020	.168
01331	4	20 (10/30)	.015	.025	.215
01343	4	2-20 (10/30) Shld 2-18 (16/30) Unshld	.018 .018	.031	.256

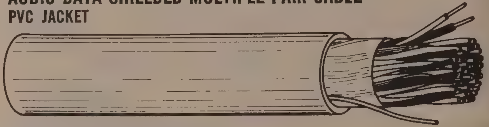
INDIVIDUALLY SHIELDED MULTIPLE PAIR AUDIO/DATA CABLE

Stock Color: Chrome gray jacket.
Construction: Tinned copper conductors, color-coded polypropylene insulation, cabled in pairs, each pair and its drain wire under Flexfoil® aluminum foil/polyester shield, PVC jacket overall.
Jacket: +60°C. Conductors: +105°C. Suggested working voltage: 22 gauge — 300V; 20 gauge — 350V: 18 gauge — 400V. 100 Megohms/M insulation resistance between shields. 115PF/FT. capacitance between adjacent shields. 1500V voltage breakdowns between adjacent shields. 50V working voltage between adjacent shields. 22 gauge and 20 gauge series — 22 gauge drain wire; 18 gauge series — 20 gauge drain wire. JACKET ONLY PASSES FR-1 VERTICAL FLAME TEST.
Color Code: Chart II Page 2•1915
Applications: For audio RF and pulse applications requiring superior circuit isolation. The use of polypropylene insulation results in excellent high frequency properties and mechanical durability.
Put-up: 100′, 500′ and 1000′ spools.**

INDIVIDUALLY SHIELDED MULTIPLE PAIR AUDIO/DATA CABLE (CONT'D)

Columbia No.	No. of Pairs	No. of Cond.	AWG (Stranding)	Nom. Insul. Thick.	Jacket Thick. In.	Nom. O.D. In.
06040	3	6	22 (7/30)	.008	.030	.265
06041	6	12	22 (7/30)	.008	.035	.320
06042	9	18	22 (7/30)	.008	.040	.380
06043	11	22	22 (7/30)	.008	.040	.415
06059	12	24	22 (7/30)	.008	.040	.430
06044	15	30	22 (7/30)	.008	.045	.510
06060	17	34	22 (7/30)	.008	.055	.525
06045	19	38	22 (7/30)	.008	.055	.550
06046	27	54	22 (7/30)	.008	.070	.670
06052	3	6	20 (10/30)	.013	.035	.315
06053	6	12	20 (10/30)	.013	.040	.420
06054	9	18	20 (10/30)	.013	.045	.500
06055	11	22	20 (10/30)	.013	.045	.545
06056	12	24	20 (10/30)	.013	.045	.560
06057	13	26	20 (10/30)	.013	.055	.610
06058	15	30	20 (10/30)	.013	.055	.640
06047	3	6	18 (16/30)	.016	.035	.375
06048	6	12	18 (16/30)	.016	.045	.495
06049	9	18	18 (16/30)	.016	.055	.575
06050	12	24	18 (16/30)	.016	.070	.705
06051	15	30	18 (16/30)	.016	.070	.785

AUDIO DATA SHIELDED MULTIPLE PAIR CABLE
PVC JACKET



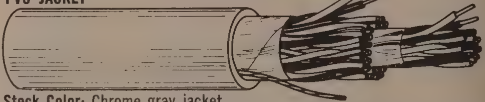
Stock Color: Chrome gray jacket.
Construction: Tinned copper conductors, color-coded PVC insulation, cabled in pairs, overall Flexfoil® aluminum foil/polyester shield, stranded tinned copper drain wire, PVC jacket overall.
Specifications: −20°C to +60°C. UL listed (Wires Misc.). 90V max.
Put-up: 100′, 500′ and 1000′ spools. (Other put-ups also available.)

Cat. No.	No. of Pairs	No. of Cond.	Cond. Size	Cond. Strand.	Nom. Insul. Thck. (In.)	Nom. Jkt. Thck. (In.)	Nom. O.D. (In.)	Nom. Cap.* PF/ FT.
01670	2	4	22	Solid	.015	.025	.210	35
01671	6	12	22	Solid	.010	.025	.285	35
01672	9	18	22	Solid	.010	.030	.340	35
01673	15	30	22	Solid	.010	.035	.435	35
01674	19	38	22	Solid	.010	.035	.465	35
01675	27	54	22	Solid	.010	.045	.570	35

*Capacitance between conductors.

SEE COLOR CODE, Chart II Page 2•1915

AUDIO/SOUND 38 & 51 PAIR SHIELDED CABLE
PVC JACKET



Stock Color: Chrome gray jacket.
Construction: Tinned copper conductors, color-coded polypropylene insulation (Cat. No. 06438) or PVC insulation (Cat. No. 06451) conductors cabled in pairs, Flexfoil® aluminum foil/polyester shield provides 100% coverage with foil facing to outside, 22 gauge 7/30 tinned copper drain wire laid parallel, PVC jacket overall.
Jacket: +60°C. Conductors: +105°C. Cat. No. 06438: JACKET ONLY PASSES FR-1 VERTICAL FLAME TEST. Cat. No. 06451: ENTIRE CABLE PASSES FR-1 VERTICAL FLAME TEST. Suggested working voltage 200V.
Applications: Multiple pair cable for audio and sound use with overall shield.
Put-up: Cut to specified length. Minimum 25′, maximum 1500′.

Cat. No.	No. of Pairs	No. of Cond.	Cond. Size	Cond. Strand.	Nom. Insul. Thck. (In.)	Nom. Jkt. Thck. (In.)	Nom. O.D. (In.)
06438	38	76	22	Solid	.008	.045	.565
06451	51	102	22	Solid	.010	.050	.685

Color Code Top Next Page.

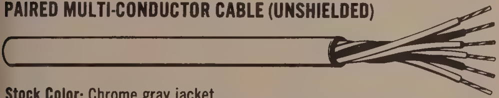
AUDIO/SOUND 38 & 51 PAIR SHIELDED CABLE (CONT'D)

PVC JACKET

No. of Pairs	Color Coding ☐
1	Blue p/w White
2	Orange p/w White
3	Green p/w White
4	Brown p/w White
5	Slate (Gray) p/w White
6	Blue/White striped p/w White
7	Blue/Orange striped p/w White
8	Blue/Green striped p/w White
9	Blue/Brown striped p/w White
10	Blue/Slate (Gray) striped p/w White
11	Orange/White striped p/w White
12	Orange/Green striped p/w White
13	Orange/Brown striped p/w White
14	Orange/Slate (Gray) striped p/w White
15	Green/White striped p/w White
16	Green/Brown striped p/w White
17	Green/Slate (Gray) striped p/w White
18	Brown/White striped p/w White
19	Brown/Slate (Gray) striped p/w White
20	Slate (Gray)/White striped p/w White
21	Blue p/w Red
22	Orange p/w Red
23	Green p/w Red
24	Brown p/w Red
25	Slate (Gray) p/w Red
26	Blue/White striped p/w Red
27	Blue/Orange striped p/w Red
28	Blue/Green striped p/w Red
29	Blue/Brown striped p/w Red
30	Blue/Slate (Gray) striped p/w Red
31	Orange/White striped p/w Red
32	Orange/Green striped p/w Red
33	Orange/Brown striped p/w Red
34	Orange/Slate (Gray) striped p/w Red
35	Green/White striped p/w Red
36	Green/Brown striped p/w Red
37	Green/Slate (Gray) striped p/w Red
38	Brown/White striped p/w Red
39	Brown/Slate (Gray) striped p/w Red
40	Slate (Gray)/White striped p/w Red
41	Blue p/w Black
42	Orange p/w Black
43	Green p/w Black
44	Brown p/w Black
45	Slate (Gray) p/w Black
46	Blue/White striped p/w Black
47	Blue/Orange striped p/w Black
48	Blue/Green striped p/w Black
49	Blue/Brown striped p/w Black
50	Blue/Slate (Gray) striped p/w Black
51	Orange/White striped p/w Black

☐ First color in stripe combination is body color. Second or third colors are stripes. Example: White/Black/Red. Other striped combinations available to order.

PAIRED MULTI-CONDUCTOR CABLE (UNSHIELDED)



Stock Color: Chrome gray jacket.

Construction: Tinned copper conductors, color-coded PVC insulation, conductors paired with a short lay twist for conductor balance providing a circuit free from cross talk, pairs cabled, PVC jacket overall.

Specifications: —20°C to +60°C. Passes FR-1 vertical flame test.

Color Code: consult factory.

Applications: Heavy-duty intercom and audio cable for intercom systems, signal systems, annunciators, nurse's call systems, multiple speaker systems, control circuit cables.

Put-up: 100′, 500′ and 1000′ spools.**

Columbia No.	No. of Pairs	No. of Cond.	AWG (Stranding)	Jacket Thick. In.	Nom. Insul. Thick.	Nom. O.D. In.
SOLID CONDUCTORS UL listed (Wires, Misc.) 90V max.						
04008	1	2	22 (Solid)	.025	.015 200V	.150
04010	2	4	22 (Solid)	.025	.015 300V	.210
04014	3	6	22 (Solid)	.025	.015 300V	.225
04015	4	8	22 (Solid)	.025	.015 300V	.240
04016	5	10	22 (Solid)	.025	.012 300V	.260
04017	6	12	22 (Solid)	.025	.012 200V	.280
04018	7	14	22 (Solid)	.025	.012 200V	.295
04019	8	16	22 (Solid)	.025	.012 300V	.305
04020	9	18	22 (Solid)	.030	.012 200V	.335
04022	11	22	22 (Solid)	.030	.012 200V	.370
04024	13	26	22 (Solid)	.035	.012 200V	.410
04026	15	30	22 (Solid)	.035	.012 200V	.430
04028	16	32	22 (Solid)	.035	.012 200V	.440
04029	19	38	22 (Solid)	.035	.012 200V	.460
04031	23	46	22 (Solid)	.040	.012 200V	.525
04030	27	54	22 (Solid)	.040	.012 200V	.565
04032	41	82	22 (Solid)	.045	.012 200V	.685
04038	51	102	22 (Solid)	.060	.012 200V	.765
STRANDED CONDUCTORS						
06010	2	4	22 (7/30)	.025	.010 300V	.210
06014	3	6	22 (7/30)	.025	.010 300V	.230
06015	4	8	22 (7/30)	.025	.010 300V	.250
06017	6	12	22 (7/30)	.025	.010 200V	.275
06019	9	18	22 (7/30)	.030	.010 200V	.295
06023	12	24	22 (7/30)	.030	.010 200V	.385
06026	15	30	22 (7/30)	.040	.010 200V	.455
06027	19	38	22 (7/30)	.035	.010 200V	.470
06028	23	46	22 (7/30)	.040	.010 200V	.530
06030	27	54	22 (7/30)	.040	.010 200V	.570

PAIRED MULTI-CONDUCTOR CABLE (Cont'd)

Columbia No.	No. of Pairs	No. of Cond.	AWG (Stranding)	Jacket Thick. In.	Nom. Insul. Thick.	Nom. O.D. In.
STRANDED CONDUCTORS (CONT'D)						
06032	31	62	22 (7/30)	.050	.010 200V	.635
06033	41	82	22 (7/30)	.060	.010 200V	.730
06025	51	102	22 (7/30)	.060	.010 200V	.780
UL listed (Wires, Misc.) 90V max.						
06113	3	6	20 (10/30)	.025	.015 300V	.260
06114	6	12	20 (10/30)	.030	.015 300V	.350
06115	9	18	20 (10/30)	.035	.015 300V	.447
06116	15	30	20 (10/30)	.040	.015 300V	.585
06101	1	2	18 (16/30)	.030	.018 400V	.220
UL listed (Wires, Misc.) 90V max.						
06118	2	4	18 (16/30)	.035	.018 400V	.316
06103	3	6	18 (16/30)	.035	.018 400V	.330
06119	4	8	18 (16/30)	.035	.018 400V	.370
06120	5	10	18 (16/30)	.035	.018 400V	.400
06106	6	12	18 (16/30)	.045	.018 400V	.550
UL listed (Wires, Misc.) 90V max.						
06121	8	16	18 (16/30)	.040	.018 400V	.500
06109	9	18	18 (16/30)	.040	.018 400V	.545
06110	12	24	18 (16/30)	.050	.018 400V	.640
06111	15	30	18 (16/30)	.060	.018 400V	.750
06112	19	38	18 (16/30)	.060	.018 400V	.800

CONDUCTOR COLOR CODE CHART II

No. Prs.	Paired Colors	No. Prs.	Paired Colors	No. Prs.	Paired Colors
1	Black, Red	18	Green, Yellow	35	Purple, Slate
2	Black, White	19	White, Blue	36	Purple, Black
3	Black, Green	20	White, Brown	37	Slate, Red
4	Black, Blue	21	White, Orange	38	Slate, White
5	Black, Brown	22	White, Yellow	39	Slate, Green
6	Black, Yellow	23	Blue, Brown	40	Slate, Blue
7	Black, Orange	24	Blue, Orange	41	Slate, Brown
8	Red, Green	25	Blue, Yellow	42	Slate, Yellow
9	Red, White	26	Brown, Orange	43	Slate, Orange
10	Red, Blue	27	Brown, Yellow	44	Slate, Black
11	Red, Yellow	28	Purple, Red	45	W/B*, Red
12	Red, Brown	29	Purple, White	46	W/B*, Green
13	Red, Orange	30	Purple, Green	47	W/B*, Blue
14	Green, Blue	31	Purple, Blue	48	W/B*, Brown
15	Green, White	32	Purple, Brown	49	W/B*, Yellow
16	Green, Brown	33	Purple, Yellow	50	W/B*, Orange
17	Green, Orange	34	Purple, Orange	51	W/B*, Purple

* White body with black stripe.

DUAL CHANNEL AUDIO CABLE SHIELDED

PVC JACKET

Stock Color: Chrome gray jacket.

Applications: Each conductor 3 strands tinned copper, 4 strands tinned copperweld, color-coded polyethylene insulation over each conductor, each conductor individually shielded with tinned copper spiral shield, conductors laid parallel, PVC jacket overall, red conductor ridged for polarity identification.

Specifications: —20°C to +60°C.

Construction: Dual channel audio cable for language laboratories, audio laboratories and head sets. Rip-type construction for easy separation of conductors when split apart.

Put-up: 100′, 250′ and 500′ spools. (Other put-ups also available.)

Cat. No.	No. of Cond.	Cond. Size	Cond. Strand.	Nom. Insul. Thck. (In.)	Nom. Jkt. Thck. (In.)	Nom. O.D. (In.)	Nom. Cap.* PF/Ft.
01375	2	25	7/33	.020	.020	.110 x .220	35 each channel

*Capacitance between conductor and shield.
This cable also available with aluminum foil Mylar (and individual drain wires) in lieu of spiral shield.

COLOR CODE OF CONDUCTORS

Cond.	Color
1	Clear
2	Red

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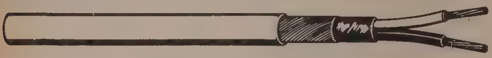
TWO-CONDUCTOR MICROPHONE CABLE

SPIRAL SHIELD



Stock Color: Silver gray jacket.

Construction: Tinned copper conductors, color-coded polyethylene insulation, cabled with fillers, textile wrap, spiral tinned copper shield, high gloss Flexlife® jacket.

Specifications: −20°C to +60°C.

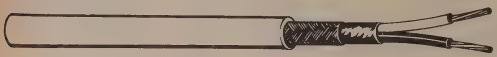
Color Code: White, Black.

Applications: For use with low impedance microphones. Flexlife jacket provides extreme flexibility, high abrasion resistance and outstanding appearance.

Put-up: 100′, 250′, 500′ and 1000′spools (other Put-ups also available).

Columbia No.	Impedance	AWG (Stranding)	Nom. Insul. Thick. In.	Jkt.Thick. In.	Nom. O.D. In.
1323	Low	22 (16/34)	.025	.025	.225
1328	Min. Low	24 (10/34)	.016	.030	.190

BRAIDED SHIELD



Stock Color: Silver gray jacket.

Construction: Tinned copper conductors, color-coded polyethylene insulation, cabled with fillers, textile wrap, braided tinned copper shield, high gloss Flexlife jacket.

Specifications: −20°C to +60°C.

Color Code: White, Black.

Applications: For use with low impedance microphones. Flexlife jacket provides extreme flexibility, high abrasion resistance and outstanding appearance.

Put-up: 100′, 250′, 500′ and 1000′spools (other Put-ups also available).

Columbia No.	Impedance	AWG (Stranding)	Nom. Insul. Thick. In.	Jkt. Thick. In.	Nom. O.D. In.
1322	Low	22 (16/34)	.025	.025	.235

ONE-CONDUCTOR MICROPHONE CABLE

SPIRAL SHIELD

Stock Color: Silver gray jacket. (Cat. No. 01359 available in black jacket.)

Construction: Single conductor 3/33 strands tinned copper, 4/33 strands tinned copperweld, white foam polyethylene dielectric, spiral tinned copper shield, high gloss Flexlife® jacket.

Specifications: −20°C to +60°C.

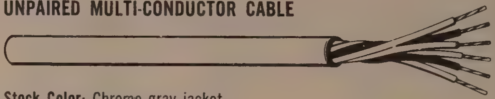
Applications: For use with high impedance microphones and hi-fi interconnecting cables. Flexfoam dielectric (foam polyethylene) provides as much as 35% lower capacitance than the best standard solid polyethylene dielectric microphone cables. Flexfoam cables are the most flexible plastic microphone cable available, with limpness almost equal to rubber and with better abrasion resistance.

Put-up: 100′, 250′, 500′ and 1000′spools (other Put-ups also available).

Columbia No.	Microphone Type	Thick. In. Insulation	Thick. In. Jacket	Nom. Cap. MMF/Ft.	Nom. O.D. In.
1359	Min.	.016	.012	39	.085
1369	Lapel	.030	.020	19	.130
1389	Crystal	.050	.025	18	.185
1395	Crystal	.075	.030	11	.245
1314*	Crystal	.040	.020	25	.155

* Solid polyethylene dielectric.

UNPAIRED MULTI-CONDUCTOR CABLE



Stock Color: Chrome gray jacket.

Construction: Tinned copper conductors (Cat. Nos. 02754 and 02755 are bare copper), color-coded PVC insulation, PVC jacket overall, conductors cabled.

Specifications: −20°C to +60°C. All items pass FR-1 vertical flame test.

Color Code: Chart III.

Applications: PA systems, unbalanced intercom systems, interconnecting cables, remote control circuits, telephones, low-voltage relay control cables.

Put-up: 100′, 500′ and 1000′ spools (other Put-ups also available).

SOLID CONDUCTORS

Columbia No.	No. of Cond.	AWG (Stranding)	Nom. Insul. Thick. In.	Nom. Jacket Thick. In.	Nom. O.D. In.
4008	2	22 (1)	.012	.025	.150
4310	3	22 (1)	.012	.025	.150
4311	2	20 (1)	.015	.025	.175
2754	2	19 (1)	.015	.025	.180
2755	3	19 (1)	.015	.025	.190

STRANDED CONDUCTORS

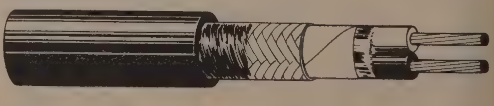
6348	2	22 (7/30)	.015	.025	.165
4062	3	22 (7/30)	.010	.025	.160
4063	4	22 (7/30)	.010	.025	.170
4064	5	22 (7/30)	.010	.025	.185
4066	6	22 (7/30)	.010	.025	.200
4088	7	22 (7/30)	.010	.025	.200
4065	8	22 (7/30)	.010	.025	.215
4070	9	22 (7/30)	.010	.025	.230
4071	10	22 (7/30)	.010	.025	.250
4067	12	22 (7/30)	.010	.025	.260
4073	15	22 (7/30)	.010	.025	.320
4069	18	22 (7/30)	.010	.030	.315
4075	20	22 (7/30)	.010	.030	.330
4076	25	22 (7/30)	.010	.030	.370
4077	30	22 (7/30)	.010	.030	.385
4078	40	22 (7/30)	.010	.040	.455
4079	50	22 (7/30)	.010	.040	.500
4087	60	22 (7/30)	.010	.040	.535
6351	2	20 (10/30)	.015	.025	.190
6352	3	20 (10/30)	.015	.025	.200
6353	4	20 (10/30)	.015	.025	.215
6355	5	20 (10/30)	.015	.030	.240
6356	7	20 (10/30)	.015	.030	.265
6357	9	20 (10/30)	.015	.035	.310
6358	15	20 (10/30)	.015	.040	.395
2830	2	18 (16/30)	.018	.025	.220
2831	3	18 (16/30)	.018	.025	.230
2404	4	18 (16/30)	.018	.025	.255
2405	2	16 (26/30)	.023	.025	.250
2406	3	16 (26/30)	.023	.025	.265
2409	2	14 (41/30)	.030	.030	.332
2410	2	12 (65/30)	.030	.030	.370

CONDUCTOR COLOR CODE CHART III.

No. 2754 has red and white conductors; No. 2755 has red, white and green; Nos. 2830, 2405, 2409 and 2410 have black and white. All other cables above have conductors as indicated in this table. First color is body; second or third colors are stripes.

No.	Color	No.	Color	No.	Color
1	Black	10	Gray	19	White/Yellow
2	Red	11	Pink	20	White/Blue
3	White	12	Tan	21	White/Brown
4	Green	13	Red/Green	22	White/Orange
5	Orange	14	Red/Yellow	23	White/Gray
6	Blue	15	Red/Black	24	White/Violet
7	Brown	16	White/Black	25	White/Black/Red
8	Yellow	17	White/Red		
9	Purple	18	White/Green		

SHIELDED CONTROL CABLE



Stock Color: Black jacket.

Construction: Tinned copper conductors, color-coded rubber insulation, cabled, filled where required, clear mylar wrap, tinned copper braided shield, cotton wrap, neoprene jacket or rubber jacket.

Specifications: −20°C to +60°C. Suggested working voltage 350V.

SHIELDED CONTROL CABLE (CONT'D)

Color Code: Chart IV.

Applications: Control circuits, video and audio interconnecting cables, broadcast and studio use. Precision engineered to prevent cross-talk and eliminate hum pick-up. Neoprene and rubber jackets are resistant to impact and abrasion and have extra limpness. For outside installations, neoprene is recommended being resistant to oil, ozone, moisture and sunlight.

Put-up: 100′, 500′ and 1000′ spools (other Put-ups also available).

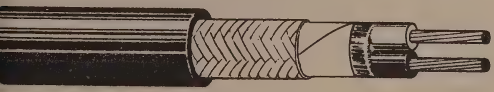
RUBBER JACKET — HEAVY DUTY

Columbia No.	No. of Cond.	AWG (Stranding)	Nom. Insul. Thick. In.	Nom. Jacket Thick. In.	Nom. O.D. In.
1303	2	18 (41/34)	.020	.035	.295
1300	1	20 (26/34)	.040	.035	.230
1302	2	20 (26/34)	.020	.035	.270
1304	3	20 (26/34)	.020	.035	.285
1305	4	20 (26/34)	.020	.035	.305
1308	5	20 (26/34)	.020	.035	.330
1310	6	20 (26/34)	.020	.035	.345
1312	7	20 (26/34)	.020	.035	.360
1313	8	20 (26/34)	.020	.035	.385
1315	10	20 (26/34)	.020	.035	.440
1316	12	20 (26/34)	.020	.065	.525
1317	15	20 (26/34)	.020	.065	.595
1325	20	20 (26/34)	.020	.065	.660

NEOPRENE JACKET — HEAVY DUTY

1201	1	18 (41/34)	.040	.035	.240
1202	2	18 (41/34)	.020	.035	.295
1203	3	18 (41/34)	.020	.035	.305
1204	4	18 (41/34)	.020	.035	.330
1206	6	18 (41/34)	.020	.035	.370
1208	8	18 (41/34)	.020	.035	.420
1210	10	18 (41/34)	.020	.035	.480
1212	12	18 (41/34)	.020	.065	.555
1215	15	18 (41/34)	.020	.065	.640
1220	20	18 (41/34)	.020	.065	.730
1602	2	16 (65/34)	.025	.035	.335
1603	3	16 (65/34)	.025	.035	.355
1604	4	16 (65/34)	.025	.035	.385
1606	6	16 (65/34)	.025	.040	.445
1608	8	16 (65/34)	.025	.040	.510
1610	10	16 (65/34)	.025	.040	.575
1612	2	14 (41/30)	.030	.040	.395
1613	3	14 (41/30)	.030	.040	.425
1614	4	14 (41/30)	.030	.040	.455
1616	6	14 (41/30)	.030	.040	.515
1622	2	12 (65/30)	.030	.040	.440
1623	3	12 (65/30)	.030	.040	.465
1624	4	12 (65/30)	.030	.040	.505
1632	2	10 (105/30)	.030	.040	.495
1633	3	10 (105/30)	.030	.040	.520

OLYETHYLENE INSULATION AND PVC JACKET



tock Color: Chrome gray jacket.

onstruction: Tinned copper conductors, color-coded polyethylene insulation, cabled, filled where required, clear mylar wrap, tinned copper braid shield, PVC jacket overall.

pecifications: −20°C to +60°C. Suggested working voltage 600V. Jacket only passes FR-1 vertical flame test.

olor Code: Chart IV.

pplications: Low capacity cable for control circuits, video and audio interconnecting cables, broadcast and studio use. Precision engineered to prevent cross-talk and eliminate hum pick-up. Low capacitance, light weight.

ut-up: 100′, 500′ and 1000′ spools. (Other put-ups also available.)

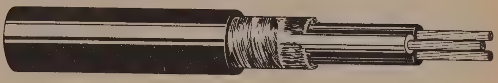
SHIELDED CONTROL CABLE (CONT'D)

CONDUCTORS 20 GA 26/34 STR T.C.

Columbia No.	No. of Cond.	Nom. Insul. Thick. In.	Nom. Jacket Thick. In.	Nom. O.D. In.
1642	2	.015	.040	.250
1643	3	.015	.045	.270
1644	4	.015	.045	.290
1645	5	.015	.045	.310
1646	6	.015	.045	.325
1648	8	.015	.045	.350
1650	10	.015	.045	.390
1652	12	.015	.045	.405
1655	15	.015	.045	.440
1660	20	.015	.045	.480

UNSHIELDED CONTROL CABLE

RUBBER INSULATION AND RUBBER JACKET



Stock Color: Black jacket.

Construction: Tinned copper conductors, color-coded rubber insulation, cabled, filled where required, cotton wrap, rubber jacket.

Specifications: −20°C to +60°C. Suggested working voltage 350V.

Color Code: Chart IV.

Applications: Control circuits, broadcast and studio use, traffic and fire alarm control, temperature control systems, other multiple control applications. Resistant to impact and abrasion. Extra limpness.

Put-up: 100′, 500′ and 1000′ spools (other Put-ups also available).

CONDUCTORS 20 GA 26/34 STR T.C.

Columbia No.	No. of Cond.	Nom. Insul. Thick. In.	Nom. Jacket Thick. In.	Nom. O.D. In.
3602	2	.020	.035	.240
3603	3	.020	.035	.255
3604	4	.020	.035	.275
3605	5	.020	.035	.300
3606	6	.020	.035	.315
3607	7	.020	.035	.325
3608	8	.020	.035	.360
3610	10	.020	.035	.410
3612	12	.020	.035	.435
3615	15	.020	.035	.505
3620	20	.020	.035	.570

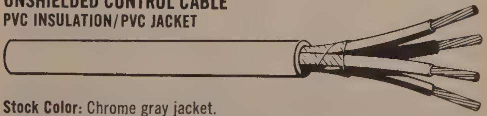
CONDUCTOR COLOR CODE CHART IV.

First color is body color; second color is stripe.

No.	Color	No.	Color	No.	Color
1	Black	8	Orange	15	White/Blue
2	White	9	Gray (Slate)	16	White/Brown
3	Red	10	Purple	17	White/Purple
4	Green	11	White/Black	18	White/Gray
5	Yellow	12	White/Red	19	Black/Red
6	Blue	13	White/Green	20	Black/Yellow
7	Brown	14	White/Yellow		

UNSHIELDED CONTROL CABLE

PVC INSULATION/PVC JACKET



Stock Color: Chrome gray jacket.

Construction: Tinned copper conductors, color-coded PVC insulation, mylar binder overall (no mylar binder on Cat. Nos. 02404, 02420, 02421, 02422), PVC jacket, conductors cabled.

Specifications: −20°C to +60°C. Suggested working voltage: 18GA — 400V, 16GA - 12GA — 600V. Pass FR-1 vertical flame test.

Color Code: Chart V (Page 2•1918) 18GA cables UL (wires, misc.).

Applications: Interconnecting cables for electronic equipment, control circuits, broadcast and studio use, temperature control systems.

Put-up: 100′, 500′ and 1000′ spools (other Put-ups also available).

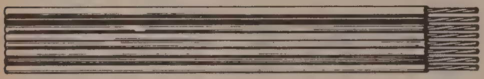
UNSHIELDED CONTROL CABLE
PVC INSULATION / PVC JACKET (CONT'D)

Columbia No.	No. of Cond.	AWG (Stranding)	Nom. Insul. In.	Jacket Thck. In.	Nom. O.D. In.
02404	4	18 (16/30)	.018	.030	.260
02420	5	18 (16/30)	.018	.037	.300
02421	7	18 (16/30)	.018	.037	.324
02422	9	18 (16/30)	.018	.037	.379
02412	12	18 (16/30)	.018	.040	.430
02423	15	18 (16/30)	.018	.045	.490
02424	19	18 (16/30)	.018	.045	.515
02433	25	18 (16/30)	.018	.060	.625
02425	4	16 (19/29)	.030	.045	.375
02434	5	16 (19/29)	.030	.045	.410
02426	7	16 (19/29)	.030	.045	.445
02435	9	16 (19/29)	.030	.045	.510
02427	12	16 (19/29)	.030	.060	.610
02428	15	16 (19/29)	.030	.060	.675
02429	19	16 (19/29)	.030	.065	.725
02436	25	16 (19/29)	.030	.065	.830
02430	4	14 (19/27)	.045	.045	.485
02437	5	14 (19/27)	.045	.060	.560
02431	7	14 (19/27)	.045	.060	.605
02438	9	14 (19/27)	.045	.065	.715
02432	12	14 (19/27)	.045	.065	.800
02439	15	14 (19/27)	.045	.080	.920
02440	4	12 (65/30)	.045	.045	.540
02442	7	12 (65/30)	.045	.060	.675
02444	10	12 (65/30)	.045	.080	.900

CONDUCTOR COLOR CODE CHART V

No.	Color	No.	Color	No.	Color
1	Black	10	Orange/Black	19	Blue/Red
2	White	11	Blue/Black	20	Red/Green
3	Red	12	Black/White	21	Orange/Green
4	Green	13	Red/White	22	Black/White/Red
5	Orange	14	Green/White	23	White/Black/Red
6	Blue	15	Blue/White	24	Red/Black/White
7	White/Black	16	Black/Red	25	Green/Black/White
8	Red/Black	17	White/Red		
9	Green/Black	18	Orange/Red		

CONTROL CABLE MULTI-CONDUCTOR FLAT RIBBON
PVC INSULATION



Stock Color: See table below.
Construction: Tinned copper conductors, color-coded PVC insulation per MIL-W-16878 Type C, conductors bonded to form flat ribbon cable.
Specifications: −55°C to +105°C. Suggested working voltage 1000V.
Applications: Circuit connections, interconnecting assemblies; wiring harnesses for sliding drawers, drop panels and racks. Reduces installation time, space and weight. Conductors easily separated for termination. Resistant to oil, flame, acids, moisture, fungus and solvents. Contact factory for custom designed ribbon cables consisting of different gauge sizes and number of conductors.
Put-up: 100′, 500′ and 1000′ spools. (Other put-ups also available.)

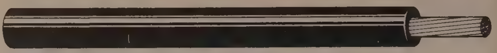
Cat. No.	No. of Cond.	Cond. Size	Cond. Strand.	Nom. Insul. Thck. (In.)	Nom. O.D. (In.)
06625	4	22	7/30	.016	.065 x .260
06626	8	22	7/30	.016	.065 x .520
06627	12	22	7/30	.016	.065 x .780
06628	16	22	7/30	.016	.065 x 1.040
06629	20	22	7/30	.016	.065 x 1.300

COLOR CODE OF CONDUCTORS

Cond.	Color	Cond.	Color	Cond.	Color	Cond.	Color	Cond	Color
1	Black	5	Yellow	9	Gray	13	Red	17	Blue
2	Brown	6	Green	10	White	14	Orange	18	Violet
3	Red	7	Blue	11	Black	15	Yellow	19	Gray
4	Orange	8	Violet	12	Brown	16	Green	20	White

☐ First color in stripe combination is body color. Second or third colors are stripes. Example: White/Black/Red. Other solid colors and striped combinations available to order.

SPECIAL CONSTRUCTIONS AVAILABLE.
CONSULT FACTORY.



UL HOOK UP WIRE STYLE 1015, CSA TYPE TEW

Stock Colors: See table below.
Construction: Tinned copper conductor, color-coded PVC insulation.
Specifications: —40°C to +105°C, 600V. Resistant to acids, oil, alkalis, flame, moisture and fungus.
Color Code: Chart VI.
Applications: Internal wiring of electronic and electrical equipment.
Put-up: 100′ and 1000′ spools (other Put-ups also available).

Columbia No.	AWG (Stranding)	Nom. Insul. Thick. In.	Voltage Rating	Nom. O.D. In.
2117	22 (1)	.032	600	.090
2118	20 (1)	.032	600	.097
2119	18 (1)	.032	600	.105
2100	24 (7/32)	.032	600	.088
2101	22 (7/30)	.032	600	.095
2102	20 (10/30)	.032	600	.102
2103	18 (16/30)	.032	600	.112
2104	16 (26/30)	.032	600	.125
2105	14 (41/30)	.032	600	.142

UL HOOK UP WIRE UL STYLE 1007 CSA TR-64

Stock Colors: See table below.
Construction: Tinned copper conductor, color-coded PVC insulation.
Specifications: —40°C to +80°C, 300V. Resistant to acids, oil, alkalis, flame, moisture and fungus.
Applications: Internal wiring of electronic and electrical equipment.
Color Code: Chart VI.
Put-up: 100′ and 1000′ spools (other Put-ups also available).

Columbia No.	AWG (Stranding)	Nom. Insul. Thick. In.	Voltage Rating	Nom. O.D. In.
2003	24 (1)	.016	300	.054
2004	22 (1)	.016	300	.059
2028	20 (1)	.016	300	.066
2052	18 (1)	.016	300	.079
2053	16 (1)	.016	300	.089
2015	24 (7/32)	.016	300	.056
2016	22 (7/30)	.016	300	.062
2040	20 (10/30)	.016	300	.071
2064	18 (16/30)	.016	300	.080
2065	16 (26/30)	.016	300	.095

STOCK COLORS CHART VI.

1	White	3	Red	5	Yellow	7	Brown	9	Gray (slate)
2	Black	4	Green	6	Light Blue	8	Orange	10	Violet (purple)

Stripe combinations also available — consult factory.

RUBBER TEST LEAD WIRE

Stock Colors: See table below.
Stock Color: Black or Red. (Other colors available on special order.)
Construction: Extra flexible stranded tinned soft annealed copper conductor, color-coded rubber insulation.
Specifications: —20°C to +60°C. All breakdown voltages and suggested working voltages are AC RMS values.
Applications: Test lead wire for use in multimeters, analyzers, oscillators and other applications requiring extra flexible insulated wire.
Put-up: 250′, 500′ and 1000′ spools (other Put-ups also available).

Columbia No.	Color*	AWG (Stranding)	Nom. Insul. Thick. In.	Sug. Working Voltage	Nom. O.D. In.
1326	*	20 (41/36)	.040	1,500V	.125
1319	*	20 (41/36)	.047	3,000V	.140
1321	*	18 (65/36)	.045	5,000V	.140
1318	*	18 (65/36)	.088	10,000V	.230

* Available in red or black; please specify.

PLASTIC TEST LEAD WIRE

Stock Color: Black or red. (Other colors available on special order.)
Construction: Extra flexible stranded tinned soft annealed copper conductor, color-coded extra flexible, high gloss Flexlife® plastic insulation.
Specifications: —20°C to +60°C, 5000V. Insulation resistant to acids, oil, alkalis, flame, moisture and fungus. All breakdown voltages and suggested working are AC RMS values.

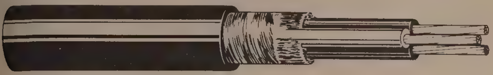
PLASTIC TEST LEAD WIRE (CONT'D)

Applications: Test lead wire for use in multimeters, analyzers, oscillators, and other applications requiring extra flexible insulated wire. Flexlife plastic insulation is durable and has a high-gloss finish.

Put-up: 250′ and 500′ spools (other Put-ups also available).

Columbia No.	Color*	AWG (Stranding)	Nom. Insul. Thick. In.	Sug. Working Voltage	Nom. O.D. In.
01320	Black or Red	18 (65/36)	.045	5,000V	.140

PORTABLE SERVICE AND POWER CORD



Copper: Bare soft annealed. Stranding per ASTM-B-174 and ASTM-B-173.

Insulation of inner conductors: Synthetic Rubber (SBR) per IPCEA Pub. No. S-19-81 (4th Edition) Part 3.7.1 (SBR); N.E.M.A. Publication No. WC-3-1964; and UL Subject 62, Class 3.

Temperature Range: 60°C (140°F) to −37°C (−35°F).

Color Code Conductors: 2 conductor — Black, White; 3 conductor — Black, White, Green; 4 conductor — Black, White, Green, Red.

Foundation: Conductors twisted together with fillers to make a round core: separator over core.

Neoprene Jacket: Black Neoprene: 60°C (140°F to −37°C (−35°F) per IPCEA Pub. No. S-19-81 (4th Edition) Part 7.7.5.1; NEMA Pub. No. WC-3-1964; ASTM D-752; and UL Subject 62, Class 15.

Rubber Jacket: Black Synthetic Rubber (SBR) 60°C (140°F) to −37°C (−35°F) per IPCEA Pub. No. S-19-81 (4th Edition) Part 7.7.5.1; NEMA Pub. No. WC-3-1964; and UL Subject 62, Class 6.

Jacket Marking: All sizes surface printed* showing gauge, number of conductors, voltage and type.

Neoprene Use: For heavy (SO) and light (SJO) service such as tools, power extensions, motor and welding leads, portable machinery, floor polishers and sanders, battery chargers, portable stage light, garage portable lights, sound equipment, washing machines, refrigerators, sewing machines, and other electrical equipment. Type SVO — for vacuum cleaners, home food mixers, office equipment, and other light duty requirements.

Rubber Use: For heavy (S) and light (SJ) service such as tools, power extensions, motor and welding leads, portable machinery, floor polishers and sanders, battery chargers, portable stage lights, garage portable lights, sound equipment, washing machines, refrigerators, sewing machines, and other electrical equipment. Type SV — For vacuum cleaners, home food mixers, office equipment, and other light duty requirements.

Neoprene Environment: For use in areas where exposed to oil, ozone, grease, chemicals or solvents.

Rubber Environment: Useful cord life is reduced where exposed to oil, ozone, grease, chemicals or solvents. Cords to be used in such environments are Neoprene SO.

NEOPRENE JACKET

Columbia No.	No. of Cond.	Size AWG	Type	Volt Rating	Nom. Insul.	Current Amps	Nom. O.D. In.
1477	2	18	SVO	300V	1/64	7	.250
1478	2	18	SJO	300V	2/64	7	.305
1479	3	18	SJO	300V	2/64	7	.330
1481	2	16	SJO	300V	2/64	10	.330
1482	3	16	SJO	300V	2/64	10	.360
1484	2	18	SO	600V	2/64	7	.385
1485	3	18	SO	600V	2/64	7	.400
1487	2	16	SO	600V	2/64	10	.400
1488	3	16	SO	600V	2/64	10	.425

RUBBER JACKET

Columbia No.	No. of Cond.	Size AWG	Type	Volt Rating	Nom. Insul.	Current Amps	Nom. O.D. In.
1420	2	18	SV	300V	1/64	7	.250
1425	2	18	SJ	300V	2/64	7	.305
1435	3	18	SJ	300V	2/64	7	.330
1438	4	18	SJ	300V	2/64	6	.370
1445	2	16	SJ	300V	2/64	10	.330
1450	3	16	SJ	300V	2/64	10	.360
1448	4	16	SJ	300V	2/64	8	.400
1500	2	14	S	600V	3/64	15	.527
1505	3	14	S	600V	3/64	15	.557
1509	4	14	S	600V	3/64	12	.602
1510	2	12	S	600V	3/64	20	.597
1515	3	12	S	600V	3/64	20	.632

RUBBER JACKET (CONT'D)

Columbia No.	No. of Cond.	Size AWG	Type	Volt Rating	Nom. Insul.	Current Amps	Nom. O.D. In.
1517	2	10	S	600V	3/64	25	.637
1519	3	10	S	600V	3/64	25	.687

PLASTIC JACKET CONSTRUCTION

Copper: Bare soft drawn annealed, Class K stranding per ASTM-B-174 and ASTM-B-173.

Insulation: Polyvinyl chloride, resistant to oils, water, acids, alkalies and ozone. 60°C — UL Class II. Black, gray and white SVT.

Temperature Range: 60°C (140°F) to −20°C (−4°F).

Color Code Conductors: 2 conductor — black, white.
3 conductor — black, white, green.

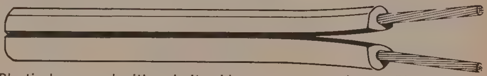
Foundation: Conductors twisted together with fillers to make a round core; separator over core.

Jacket: 60°C. Black, gray or white (SVT) or black (SJT) UL Class II, non marking 60°C (140°F) to −20°C (−4°F) polyvinyl chloride, resistant to oil, water, acid, alkali, ozone and abrasion. Jacket meets specifications per ASTM-D-1047. SVT jacket ribbed to help cord remain clean.

Columbia No.	No. of Cond.	Size AWG	Type	Voltage Rating	Nom. Insul.	Current Amps	Nom. O.D. In.
01554	2	18	SVT	300V	1/64	7	.250
01556	3*	18	SVT	300V	1/64	7	.264
01496	2	18	SJT	300V	2/64	7	.305
01497	3	18	SJT	300V	2/64	7	.330
01498	2	16	SJT	300V	2/64	10	.325
01499	3	16	SJT	300V	2/64	10	.355

*Two Conductor W/3rd Conductor for Grounding Only.

TYPE SPT LAMP AND POWER CORD

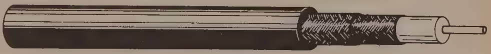


Plastic lamp cord with polarity ridge over one conductor. Rip type construction. UL Listed. For fans, lamps, radios, TV, stereo speakers, signs, etc. Specify Brown, White, Gray or Black.

Columbia No.	No. of Cond.	AWG (Strand)	Type	Current Amps	Nom. O.D. In.
1415	2	18 (41/34)	SPT-1	7	.107 x .210
1402	2	16 (65/34)	SPT-2	10	.155 x .296

RG TYPE COAXIAL CABLES

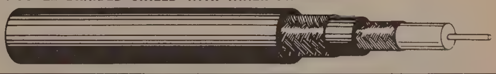
DOUBLE BRAIDED SHIELD



RG/U No.	Cat. No.	Jkt.	Shld.	Di-elec. Matl.	Cond. Ea.	Nom. O.D. (In.)	Nom. % of Vel.	Nom. Cap.	Features
6A	01168	PVC	Double Brd BC	PE	21 BCW	.336	66	20.5	Flexlife®

• Max. Shield Coverage • Nom. Impedance 75 ohms • Tested for 100% Sweep

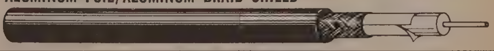
DOUBLE BRAIDED SHIELD WITH INNER PE JACKET



RG/U No.	Cat. No.	Jkt.	Shld.	Di-elec. Matl.	Cond. Ea.	Nom. O.D. (In.)	Nom. % of Vel.	Nom. Cap.	Features
11	05027	PE	Double Brd BC	FPE	14 BC	.475	78	17.3	Permaline®

• Max. Shield Coverage • Nom. Impedance 75 ohms • Tested for 100% Sweep

ALUMINUM FOIL/ALUMINUM BRAID SHIELD



RG/U No.	Cat. No.	Jkt.	Shld.	Di-elec. Matl.	Cond. Ea.	Nom. O.D. (In.)	Nom. % of Vel.	Nom. Cap.	Features
6	05775	PVC	—	FPE	18 BC	.270	78	17.3	
59	05776	PVC	—	FPE	20 BCW	.242	78	17.3	
59	05780	PVC	—	FPE	20 BCW	.242	78	17.3	UL 1594
59	05770	PVC	—	FPE	22 BCW	.242	78	16.3	100% Swept
59	05781	PVC	—	FPE	20 BCW	.242 x .375	78	17.3	Messenger

• Max. Shield Coverage • Nom. Impedance 75 ohms •

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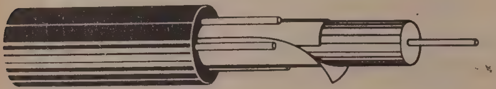
RG TYPE COAXIAL CABLES (CONT'D)

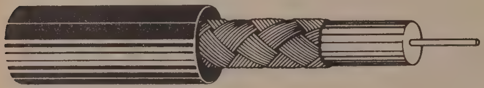
ALUMINUM FOIL WITH SOLID TINNED COPPERWELD DRAIN WIRES



RG/U No.	Cat. No.	Jkt.	Shld.	Di-elec. Matl.	Cond. Ea.	Nom. O.D. (In.)	Nom. % of Vel.	Nom. Cap.*	Features
11	05026	PVC	—	FPE	14 BC	.380	78	17.3	UL 1594
59	05750	PVC	—	PE	22 BCW	.242	66	20.5	Dura Color®
59	05755	PVC	—	FPE	22 BCW	.242	78	17.5	Foam Dura Color®
59/6	05760	PVC	—	FPE	18 BC	.242	78	17.5	Super Dura Color®
59/6	05761	PVC	—	FPE	18 BC	.380 x .242	78	16.3	Messenger

• Max. Shield Coverage • Nom. Impedance 75 ohms • Tested for 100% Sweep

BRAID SHIELD



RG/U No.	Cata-log No.	Shield Cover-age	Jkt.	Shld.	Di-elec-tric Mat'l.	Condr. Ga.	Nom. O.D. (Ins.)	Nom. Imp. (Ω)	Nom. % Vel. of Prop.	Nom. Cap. mmf/ft.	Features	Tested
8	01154	MIL	PVC	BC	PE	13(7x21)BC	.405	52	66	29.5	JANC17A	—
8	01198	Max.	PVC	BC	FPE	11(7x19)BC	.405	50	78	26	Super flex®	—
8	05015	Max.	PE	BC	FPE	11(7x19)BC	.405	50	78	26	Perma-foam®	—
8	01113	Comm'l	PVC	BC	PE	13(7x21)BC	.405	50	—	29.5	—	—
8	01109	Comm'l	PVC	BC	FPE	13(7x21)BC	.405	50	—	26	—	—
8	05013	Comm'l	PE	BC	FPE	13(7x21)BC	.405	50	—	26	—	—
11	01160	MIL	PVC	BC	PE	18(7x26)TC	.405	75	66	20.5	—	—
11	05025	Max.	PE	BC	FPE	14BC	.405	75	78	17.3	Perma-line	100% Sweep
11	05020	Max.	PE	BC	FPE	14 BC	.760x .405	75	78	17.3	Messen-ger	100% Sweep
58	01166	MIL	PVC	TC	PE	20BC	.195	53.5	66	28.5	UL1594	—
58	05045	Max.	PE	TC	FPE	20BC	.195	53	78	26	Perma-line®	—
58A	01178	MIL	PVC	TC	PE	20(19str)TC	.195	50	66	30.8	JANC17A	—
58A	01188	Max.	PVC	TC	FPE	20(19str)TC	.195	50	78	26	Super-flex®	—
58	01117	Comm'l	PVC	TC	PE	20BC	.195	50	—	28.5	—	—
58	01116	Comm'l	PVC	TC	FPE	20BC	.195	50	—	26	—	—
59	01104	MIL	PVC	BC	PE	22BCW	.242	73	66	21	UL1594	100% Sweep
59	01102	Max.	PE	BC	FPE	20BCW	.242	75	78	17.3	—	—
59	01103	Max.	PVC	BC	FPE	22strBC	.242	75	78	17.3	UL1594	100% Sweep
59	01105	Max.	PVC	BC	FPE	22BCW	.242	75	78	16.3	UL1594	100% Sweep
59	01135	Max.	PVC	BC	FPE	22BCW	.242	75	78	16.3	Super-flex®	100% Sweep
59	05035	Max.	PE	BC	FPE	22BCW	.242	75	78	16.3	Perma-foam®	100% Sweep
59	05038	Max.	PE	BC	FPE	22BCW	.400x .242	75	78	16.3	Messen-ger	100% Sweep
59	01110	Comm'l	PVC	BC	PE	22BCW	.242	75	—	21	—	—
59	01112	Comm'l	PVC	BC	FPE	22BCW	.242	75	—	16.3	—	—
59	05135	Comm'l	PE	BC	FPE	22BCW	.242	75	—	16.3	—	—
174	01156	Max.	PVC	TC	PE	26(7x34) BCW	.100	50	66	30.8	—	—

Max. = Maximum Coverage
Mil. = Military
Comm'l. = Commercial
PE = Polyethylene
FPE = Foam Polyethylene
PVC = Polyvinyl Chloride

BRD = Braid
BC = Bare Copper
BCW = Bare Copperweld
TC = Tinned Copper
STR = Stranded

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Low loss Foam Coaxial Cable Assemblies for citizens band, commercial, amateur, and marine installations.

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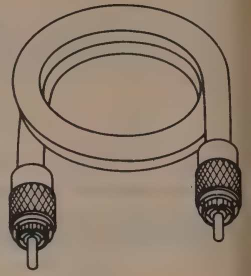

Part Number	Description	
	RG8/U TYPE	
90803-62	3′	RG8/U Type foam Cable PL-259 both ends
90820-62	20′	RG8/U Type foam Cable PL-259 both ends
90821-62	20′	RG8/U Type foam Cable PL-259 One End — Spade Lugs Other End
90850-62	50′	RG8/U Type foam Cable PL-259 both ends
90875-63	75′	RG8/U Type foam Cable PL-259 both ends
90800-63	100′	RG8/U Type foam Cable PL-259 both ends
	RG58/U TYPE	
95818-62	18″	RG58/U Type foam Cable PL-259 both ends
95803-62	3′	RG58/U Type foam Cable PL-259 both ends
95812-62	12′	RG58/U Type foam Cable PL-259 both ends
95813-62	12′	RG58/U Type foam Cable PL-259 One End — Spade Lugs Other End
95820-62	20′	RG58/U Type foam Cable PL-259 both ends
95821-62	20′	RG58/U Type foam Cable PL-259 One End — Spade Lugs Other End
95850-62	50′	RG58/U Type foam Cable PL-259 both ends
95875-62	75′	RG58/U Type foam Cable PL-259 both ends
95800-62	100′	RG58/U Type foam Cable PL-259 both ends

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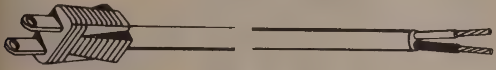
POWER SUPPLY AND REPLACEMENT CORDS

Molded plastic male cap on one end. Other end has outer jacket removed, conductors stripped; all cords hanked. UL Listed. Rated for 125 VAC. For portable tools, appliances, etc.

TWO-CONDUCTOR

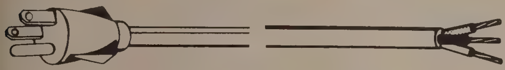
Outer Jacket Stripped 1½", Conductors Stripped ⅝" — UL Listed.



Columbia No.	AWG Size	Type	Length Ft.	Rating Amps	Color
20250	18	SV	6	10	Black
20254	18	SV	12	10	Black
20327	18	SVT	6	10	Black
24516	18	SJ	6	10	Black
20258	18	SJ	10	10	Black
24546	18	SJT	6	10	Gray
24549	18	SJT	9	10	Gray
20260	16	SJ	8	13	Black
20262	16	SJ	10	13	Black

THREE-CONDUCTOR

SV and SVT Cords — Outer Jacket Stripped 1½", Conductors Stripped ⅝". SJ and SJT Cords — Outer Jacket Stripped 2". Conductors Stripped ⅝". S Cords — Outer Jacket Stripped 2". Conductors Stripped ¾". UL Listed and Meet OSHA Requirements.

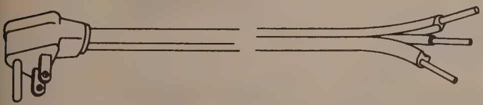


Columbia No.	AWG Size	Type	Length Ft.	Rating Amps	Color
20330*	18	SVT	6	10	Gray
20331*	18	SVT	8	10	Gray
20264	18	SJ	6	10	Black
20314	18	SJ	8	10	Black
20317	18	SJ	12	10	Black
24936	18	SJT	6	10	Gray
24939	18	SJT	9	10	Gray
24926	16	SJ	6	13	Black
20324	16	SJ	8	13	Black
24929	16	SJ	9	13	Black
24932	16	SJ	12	13	Black
24946	16	SJT	6	13	Gray
24949	16	SJT	9	13	Gray
20332	14	S	9	15	Black

*Also available in rubber (Type SV).

POWER SUPPLY CORDS — GENERAL PURPOSE

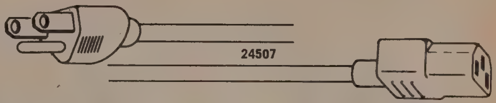
Right angle cap, free end split 1¼", Stripped ⅝", Grounding Conductor — UL Listed.

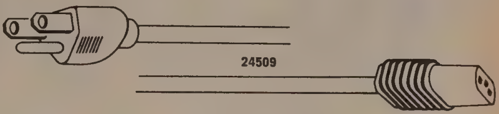


Columbia No.	Cord Type	Length Ft.	Color	Type Package	Rating
24108	16/3 SPT	8	Gray	Bulk	13A-125V

BUSINESS MACHINE POWER SUPPLY CORDS

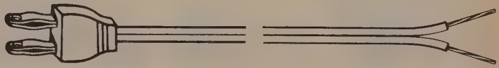
UL Listed.





Columbia No.	Cord Type	Length Ft.	Color	Type Package	Rating
24507	18/3 SVT	8	Gray	Hanked	10A-125V
24509	18/3 SVT	8	Gray	Hanked	10A-125V

SMALL APPLIANCE CORDS

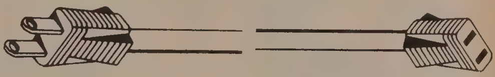


Columbia No.	AWG Size	Type	Length Ft.	Rating Amps	Color
24586	18/2	SPT-1	6	10	Brown or White
24589	18/2	SPT-1	9	10	
24597	18/3	SPT-1	8	10	

EXTENSION CORDS

Molded plastic cap and connector. UL Listed. For portable cord appliances, business machines, etc. Rated at 125 VAC. All cords hanked.

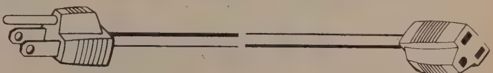
TWO-CONDUCTOR



Columbia No.	AWG Size	Type	Length Ft.	Rating Amps	Color
20272	18	SV	6	10	Black
26010	18	SJ	10	10	Black
26025	18	SJ	25	10	Black
26110	16	SJ	10	13	Black

THREE-CONDUCTOR

Rubber — UL Listed — Meets OSHA Requirements. For Indoor Use.



Columbia No.	AWG Size	Type	Length Ft.	Rating Amps	Color
20288	18	SJ	10	10	Black
26525	18	SJ	25	10	Black
20294	16	SJ	15	13	Black
26625	16	SJ	25	13	Black

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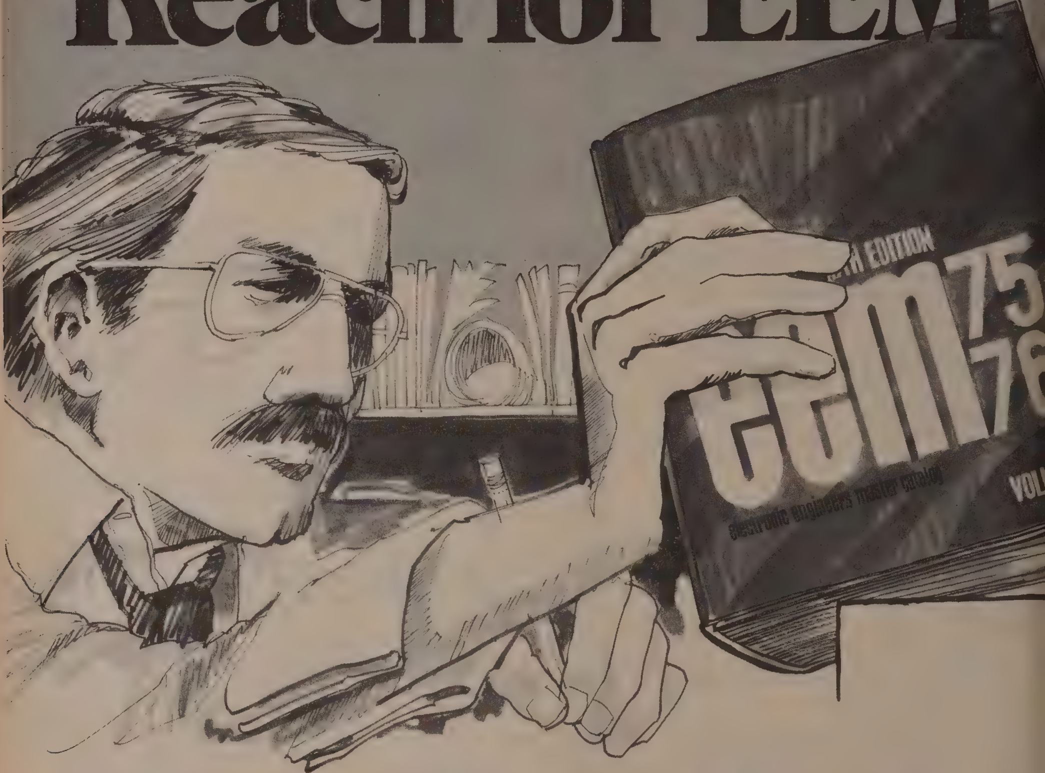
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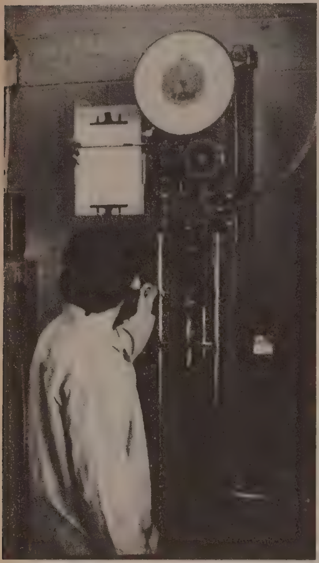
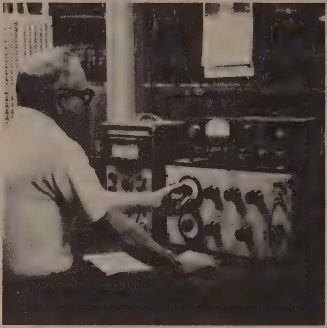
RESEARCH AND DEVELOPMENT...



Research and Development, along with constant quality control checks on the physical, electrical and dimensional characteristics of wire and cable, gives assurance of a consistently reliable product.



This infra-red spectrophotometer characterizes organic materials used in the manufacture of wire and cable by measuring the radiation absorbed at various wave lengths.

At Cyprus Wire & Cable Company, research and development is a day-in, day-out program, assuring you of a thoroughly developed, uniformly high-quality product.

Consolidated's recognized reputation for high-quality merchandise and its own engineering and testing facilities are supported by the modern research and development laboratories at Cyprus' R&D Center. Here metallurgists, electrical engineers, chemists and scientists of many disciplines combine their talents to develop better products for you.

The never-ending search for new and better materials for Consolidated Wire products is a way of life at Cyprus' R&D Laboratories. This is where the quality control we're so proud of begins.

Supporting this program of research and development at the laboratory level, every foot of wire that leaves the plant must pass rigid inspections. These products meet or exceed all relevant Underwriters Laboratories, IPCEA, NEMA and other standards.

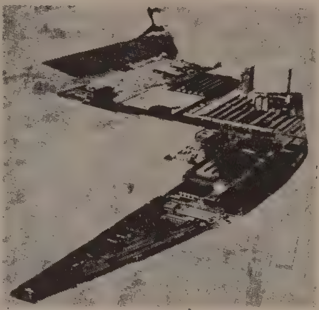
CONSOLIDATED

PRODUCTION...

Production by modern wire producing and processing facilities guarantees you a dependable source of supply.

The latest plastic insulating materials, tested in the Cyprus labs, are integrated into the manufacturing facilities to insure Consolidated's customers of the most modern materials for the finished product. As new materials and techniques are developed, they are integrated into the line. The Cyprus/Consolidated coalition represents years of experience and know-how in wire and cable manufacture.

Cyprus Wire & Cable facilities comprise all the necessary equipment for the processing of wire from refined copper bar rod and aluminum to a variety of finished products. Consolidated's own enviable position of providing superior service is strengthened by the facilities of Cyprus Wire & Cable. Here is a plant that never stands still. As newer and more sophisticated equipment and manufacturing methods are developed, Cyprus modernizes. Modernization and expansion programs for Cyprus' facilities, mean that you can count on prompt and reliable service from Consolidated.



Here's the more than 236 acres of Cyprus Rome plant, research laboratories and executive offices in Rome, New York.

Metallurgical microscope gives visual analysis and permits photo micrography of the crystalline structure of electrical conductor and other metal samples used in the manufacture of wire and cable.

A Brabender Plasti-Carder and a laboratory extruder in Research and Development assure that the best possible extrusion techniques are employed resulting in the manufacture of a superior product.

CONSOLIDATED

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517	45	1311	40	1501	44	2830	43	4212	35	4449	28	4622	41
518	45	1312	40	1502	44	2831	43	4214	35	4450	28	4623	41
522	45	1314	40	1504	46	2850	43	4217	35	4451	28	4624	13 & 41
531	45	1315	40	1517	46	2852	43	4222	35	4452	28	4625	13 & 41
532	45	1316	40	1581	46	2854	43	4224	35	4453	28	4626	13 & 41
541	45	1317	40	1600	46	2856	43	4227	35	4454	28	4700	30
542	45	1318	40	1602	46	2857	43	4232	35	4455	28	4701	30
551	45	1319	40	1701	18	2858	43	4234	35	4457	29	4702	30
552	45	1320	40	1702	18	2859	43	4237	35	4458	29	4703	30
615	46	1321	40	1703	18	2870	43	4242	35	4459	29	4704	30
635	46	1322	40	1704	18	2871	43	4244	35	4460	29	4705	30
801	15	1323	40	1705	18	2872	43	4247	35	4461	29	4706	30
803	15	1324	40	1706	18	2873	43	4252	35	4462	29	4707	30
811	15	1325	40	1707	18	2874	43	4254	35	4463	29	4708	30
813	15	1326	40	1708	18	2875	43	4257	35	4464	29	4709	30
816	15	1340	40	1709	18	3006	44	4262	35	4465	29	4710	30
817	15	1341	40	1710	18	3008	44	4264	35	4466	28	4711	30
819	15	1342	40	1711	18	3421	39	4267	35	4467	28	4712	30
821	15	1343	40	1712	18	3451	39	4272	35	4468	28	4713	30
823	15	1344	40	1713	18	3461	39	4274	35	4469	28	4714	30
827	15	1345	40	1714	18	3465	39	4307	35	4470	28	4715	30
831	15	1346	40	1715	18	3466	39	4312	35	4471	28	4716	30
833	15	1347	40	1716	18	3467	39	4314	35	4472	28	4717	30
837	15	1348	40	1717	18	3468	39	4317	35	4474	28	4718	30
841	15	1349	40	1718	18	3501	39	4322	35	4475	28	4719	30
843	15	1350	40	1719	18	3521	39	4324	35	4476	29	4720	30
846	15	1351	40	1721	19	3551	39	4327	35	4477	29	4721	30
847	15	1386	40	1722	19	3561	39	4332	35	4478	29	4722	30
851	15	1387	40	1723	19	3601	39	4334	35	4479	29	4723	30
856	15	1388	40	1724	19	3621	39	4337	35	4480	29	4724	30
861	15	1389	40	1725	19	3651	39	4342	35	4481	29	4725	30
865	15	1390	40	1726	19	3661	39	4344	35	4482	28	4726	30
866	15	1391	40	1727	19	3786	39	4347	35	4483	28	4727	30
869	15	1392	40	1728	19	3791	39	4352	35	4484	28	4728	30
871	15	1393	40	1732	19	3796	39	4354	35	4485	28	4729	30
875	15	1394	40	1733	19	3801	39	4357	35	4486	28	4730	30
876	15	1395	40	1734	19	3811	39	4362	35	4487	28	4731	30
879	15	1396	40	1735	19	3815	39	4364	35	4488	29	4732	30
881	15	1397	40	1736	19	3816	39	4367	35	4489	29	4733	30
885	15	1398	40	1737	19	3817	39	4372	35	4490	29	4734	30
889	15	1399	40	1738	19	3818	39	4374	35	4491	29	4735	30
890	15	1401	34	1740	19	3819	39	4401	28	4492	29	4736	30
891	15	1402	34	1741	19	3821	39	4402	28	4493	29	4737	30
892	15	1406	34	1742	19	3831	39	4403	28	4494	29	4738	30
893	15	1407	34	1743	19	3841	39	4404	29	4495	29	4739	30
894	15	1410	34	2000	37 & 38	3845	39	4405	28	4496	29	4740	30
901	13	1436	38	2010	38	3846	39	4406	29	4497	29	4741	30
902	13	1440	38	2506	44	3847	39	4407	29	4498	29	4742	30
903	13	1445	38	2509	44	3848	39	4408	29	4499	29	4743	30
904	13	1450	38	2516	44	3851	39	4409	29	4500	33	4744	30
920	13	1455	18	2519	44	3861	39	4410	28	4502	33	4745	30
921	13	1456	18	2706	44	3871	39	4411	29	4503	33	4746	30
922	13	1457	19	2709	44	4026	36	4412	28	4504	33	4747	30
923	13	1458	19	2712	44	4027	36	4415	28	4506	33	4748	30
924	13	1459	19	2715	44	4028	36	4419	28	4507	33	4749	30
925	13	1460	18	2801	43	4029	36	4422	29	4509	33	4750	30
926	13	1461	19	2802	43	4030	36	4423	29	4510	33	4751	30
1001	41	1462	18	2803	43	4031	36	4426	29	4515	33	4752	30
1002	41	1463	18	2804	43	4032	36	4427	29	4517	33	4753	30
1006	41	1464	18	2805	43	4036	36	4428	29	4518	33	4754	30
1007	41	1465	18	2806	43	4038	36	4429	29	4521	33	4755	31
1045	42	1466	18	2807	43	4041	36	4430	29	4524	33	4756	31
1048	42	1467	18	2808	43	4042	36	4432	28	4525	33	4757	31
1051	42	1470	34	2809	43	4043	36	4433	28	4527	33	4758	31
1056	42	1478	34	2810	43	4044	36	4435	28	4530	32	4759	31
1061	42	1479	34	2811	43	4051	36	4436	28	4532	32	4761	30
1066	42	1481	44	2812	43	4052	36	4437	28	4535	32	4762	31
1091	42	1482	44	2813	43	4053	36	4438	28	4538	33	4840	25
1096	42	1483	44	2814	43	4056	36	4439	28	4559	32	4845	25
1101	42	1484	44	2815	43	4057	36	4440	28	4569	32	4850	25
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5124	34	5481	21	6112	23	7640	27	9001	7	9313	10	9710	12
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5142	34	5484	21	6150	23	7704	27	9004	7	9316	10	9714	12
5144	34	5485	21	6170	23	7705	27	9005	7	9317	10	9715	12
5148	34	5486	21	6175	23	7706	27	9006	7	9318	10	9716	12
5151	22	5487	21	6200	23	7707	27	9007	7	9320	10	9717	12
5152	22	5488	21	6220	23	7708	27	9010	7	9321	10	9718	12
5153	22	5489	21	6250	23	7709	27	9011	7	9323	10	9719	12
5155	22	5490	21	6300	23	7710	27	9012	7	9324	10	9720	12
5156	22	5491	21	6400	23	7712	27	9013	7	9325	10	9721	12
5157	22	5492	21	6606	23	7714	27	9014	7	9400	11	9722	12
5158	22	5493	21	6610	23	7715	27	9015	7	9401	11	9723	12
5159	22	5511	16	6612	23	7716	27	9016	7	9402	11	9724	12
5161	22	5516	16	6615	23	7718	27	9017	7	9403	11	9725	12
5165	22	5526	16	6618	23	7719	27	9018	7	9404	11	9800	14
5167	22	5538	16	6620	23	7720	27	9019	7	9405	11	9801	14
5171	22	5541	16	6625	23	7722	27	9020	7	9410	11	9802	14
5181	22	5543	16	6630	23	7725	27	9021	7	9411	11	9803	14
5191	22	5547	16	6640	23	7727	27	9022	7	9412	11	9804	14
5201	22	5551	16	6650	23	7730	27	9023	7	9413	11	9805	14
5205	22	5556	16	6675	23	7734	27	9024	7	9414	11	9806	14
5211	22	5557	16	6706	23	7737	27	9025	8	9415	11	9807	14
5221	22	5561	16	6710	23	7802	27	9026	8	9500	11	9808	14
5226	22	5568	16	6712	23	7803	27	9027	8	9501	11	9809	14
5231	22	5569	16	6715	23	7804	27	9028	8	9502	11	9810	14
5236	22	5570	17	6718	23	7805	27	9029	8	9503	11	9811	14
5241	22	5571	17	6720	23	7806	27	9030	8	9504	11	9812	14
5251	22	5572	17	6725	23	7807	27	9031	8	9505	11	9813	14
5271	22	5573	17	6750	23	7808	27	9032	8	9506	11	9814	14
5286	22	5574	17	6775	23	7809	27	9033	8	9507	11	9815	14
5289	22	5575	17	7001	44	7810	27	9034	8	9508	11	9820	14
5292	22	5576	17	7002	44	7812	27	9035	8	9509	11	9821	14
5297	22	5577	17	7003	44	7815	27	9036	8	9600	13	9822	14
5303	20	5578	17	7004	44	7816	27	9037	8	9601	13	9823	14
5306	20	5579	17	7005	44	7820	27	9038	8	9602	13	9824	14
5309	20	5580	17	7006	44	7902	27	9039	8	9603	13	9825	14
5311	20	5581	17	7007	44	7903	27	9040	8	9604	13	9826	14
5315	20	5582	17	7008	44	7904	27	9041	8	9605	13	9827	14
5323	20	5583	17	7502	27	7905	27	9042	8	9606	13	9828	14
5326	20	5584	17	7503	27	7906	27	9100	9	9607	13	9829	14
5329	20	5585	17	7505	27	7907	27	9101	9	9608	13	9830	14
5331	20	5586	17	7506	27	7908	27	9102	9	9609	13	9831	14
5335	20	5587	17	7507	27	7909	27	9103	9	9610	13	9832	14
5339	20	5588	17	7508	27	7910	27	9104	9	9611	13	9833	14
5347	20	5589	17	7510	27	7912	27	9105	9	9612	13	9834	14
5353	20	5590	17	7512	27	7915	27	9106	9	9613	13	9835	14
5356	20	5591	17	7514	27	7916	27	9107	9	9614	13	9836	14
5359	20	5594	17	7516	27	7920	27	9108	9	9615	13	9837	14
5362	20	5596	17	7519	27	8006	24	9110	9	9616	13	9838	14
5365	20	5597	17	7521	27	8012	24	9111	9	9620	13	9839	14
5400	21	5601	20	7522	27	8016	24	9112	9	9621	13	9840	14
5401	21	5603	20	7524	27	8018	24	9200	9	9622	13	9841	14
5406	21	5606	20	7526	27	8025	24	9201	9	9623	13	9842	14
5411	21	5609	20	7530	27	8050	24	9202	9	9624	13	9843	14
5416	21	5612	20	7537	27	8100	24	9203	9	9625	13	9844	14
5421	21	5615	20	7540	27	8110	24	9204	9	9626	13	9845	14
5426	21	5619	20	7550	27	8112	24	9205	9	9627	13	9846	14
5431	21	5627	20	7560	27	8118	24	9210	9	9628	13	9847	14
5432	21	5640	35	7602	27	8125	24	9211	9	9629	13	9848	14
5434	21	5641	35	7603	27	8150	24	9212	9	9630	13	9849	14
5438	21	5642	35	7604	27	8200	24	9213	9	9631	13	9850	14
5440	21	5643	35	7605	27	8220	24	9214	9	9632	13	9851	14
5442	21	5644	35	7606	27	8306	24	9215	9	9633	13	9852	14
5446	21	5645	35	7607	27	8310	24	9300	10	9634	13	9853	14
5448	21	5646	35	7608	27	8312	24	9301	10	9635	13	9854	14
5450	21	5901	16	7609	27	8318	24	9302	10	9636	13	9855	14
5460	21	5902	16	7610	27	8320	24	9303	10	9700	12	9856	14
5470	21	6006	23	7612	27	8325	24	9304	10	9701	12	9857	14
5471	21	6012	23	7614	27	8350	24	9305	10	9702	12	9858	14
5472	21	6018	23	7616	27	8406	24	9306	10	9703	12	9859	14
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5474	21	6050	23	7624	27	8412	24	9308	10	9705	12		
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CONSOLIDATED

CONSOLIDATED WIRE & ASSOCIATED CORPORATIONS
1633 S. CLINTON ST. • (312) 421-4441 • Cable Address: "CON WIRE" • CHICAGO, ILL. 60616

MIL-W-76

TYPE MW — VINYL — 1000V — 80C

Tinned copper, vinyl insulated, medium wall. The polyvinylchloride insulation is flame and ozone resistant and is inert to most chemicals, oils, and solvents.

STRANDED CONDUCTOR

Catalog Number	Type Designation	Size & (Stranding)	Insulation Thickness (Inch)	Nom. O.D. (Inch)	Stock Colors on Standard Spools 100′	500′	1000′
9001	MW-C-24-(7)-U	24(7x32)	.017	.058	As Listed	As Listed	As Listed
9002	MW-C-22-(7)-U	22(7x30)	.017	.064	As Listed	As Listed	As Listed
9003	MW-C-20-(10)-U	20(10x30)	.017	.070	As Listed	As Listed	As Listed
9004	MW-C-18-(16)-U	18(16x30)	.017	.080	As Listed	As Listed	As Listed
9005	MW-C-16-(26)-U	16(26x30)	.019	.098	As Listed	As Listed	As Listed
9006	MW-C-14-(41)-U	14(41x30)	.020	.111	As Listed	As Listed	As Listed
9007	MW-C-12-(65)-U	12(65x30)	.020	.130	As Listed	As Listed	As Listed

SOLID CONDUCTOR

Catalog Number	Type Designation	Size & (Stranding)	Insulation Thickness (Inch)	Nom. O.D. (Inch)	Stock Colors on Standard Spools 100′	500′	1000′
9010	MW-C-22-(1)-U	22 (Solid)	.017	.059	As Listed	As Listed	As Listed
9011	MW-C-20-(1)-U	20 (Solid)	.017	.066	As Listed	As Listed	As Listed
9012	MW-C-18-(1)-U	18 (Solid)	.017	.074	As Listed	As Listed	As Listed
9013	MW-C-16-(1)-U	16 (Solid)	.017	.085	As Listed	As Listed	As Listed

Stock Colors*

0	Black
1	Brown
2	Red
3	Orange
4	Yellow
5	Green
6	Dark Blue
7	Violet (Purple)
8	Gray (Slate)
9	White
11	Tan
12	Pink
13	Light Blue
90	White/Black
91	White/Brown
92	White/Red
93	White/Orange
94	White/Yellow
95	White/Green
96	White/Blue
97	White/Violet
98	White/Gray
901	White/Black/Brown
902	White/Black/Red
903	White/Black/Orange
904	White/Black/Yellow
905	White/Black/Green
906	White/Black/Blue
907	White/Black/Violet
908	White/Black/Gray

TYPE MW — SHIELDED — 1000V — 80C

Tinned copper, polyvinylchloride insulation. Medium wall, tinned copper shield overall.

Catalog Number	Type Designation	Size & (Stranding)	Insulation Thickness (Inch)	Nom. O.D. (Inch)	Stock Colors on Standard Spools 100′	500′	1000′
9014	MW-C-24-(7)-S	24(7x32)	.017	.082	9	9	9
9015	MW-C-22-(7)-S	22(7x30)	.017	.088	9	9	9
9016	MW-C-20-(10)-S	20(10x30)	.017	.094	9	9	9
9017	MW-C-18-(16)-S	18(16x30)	.017	.104	9	9	9
9018	MW-C-16-(26)-S	16(26x30)	.019	.122	9	9	9
9019	MW-C-14-(41)-S	14(41x30)	.020	.135	9	9	9
9020	MW-C-12-(65)-S	12(65x30)	.020	.154	9	9	9

Stock Colors*: 9 Vinyl insulation. White only.

TYPE MW — SHIELDED — NYLON JACKET — 1000V — 80C

Tinned copper, polyvinylchloride insulation. Medium wall, tinned copper shield, nylon jacket.

Catalog Number	Type Designation	Size & (Stranding)	Insulation Thickness (Inch)	Nom. O.D. (Inch)	Stock Colors on Standard Spools 100′	500′	1000′
9021	MW-C-22-(7)-SJ	22(7x30)	.017	.095	9	9	9
9022	MW-C-20-(7)-SJ	20(10x30)	.017	.101	9	9	9
9023	MW-C-18-(16)-SJ	18(16x30)	.017	.112	9	9	9
9024	MW-C-16-(19)-SJ	16(26x30)	.019	.131	9	9	9

Stock Colors*: 9 Vinyl insulation. White only.

* Stock Color Numbers in Accordance to Military Type Designation and EIA Color Coding.

CONSOLIDATED WIRE & ASSOCIATED CORPORATIONS

1633 S. CLINTON ST. • (312) 421-4441 • Cable Address: "CON WIRE" • CHICAGO, ILL. 60616

MIL-W-76

TYPE MW — GLASS BRAID — 1000V — 80C

Tinned copper, polyvinylchloride insulated. Medium wall, lacquered glass braid overall.

Catalog Number	Type Designation	Size & (Stranding)	Insulation Thickness (Inch)	Nom. O.D. (Inch)	Stock Colors on Standard Spools 100′	500′	1000′
9025	MW-C-22(7)-B	22(7x30)	.017	.076	As Listed	As Listed	As Listed
9026	MW-C-20(10)-B	20(10x30)	.017	.084	As Listed	As Listed	As Listed
9027	MW-C-18(16)-B	18(16x30)	.017	.094	As Listed	As Listed	As Listed
9028	MW-C-16(26)-B	16(26x30)	.019	.112	As Listed	As Listed	As Listed
9029	MW-C-14(41)-B	14(41x30)	.020	.125	9,90 thru 98	9,90 thru 98	9,90 thru 98
9030	MW-C-12(65)-B	12(65x30)	.020	.144	9, 90, 92	9, 90, 92	9, 90, 92

Stock Colors*

0	Black
1	Brown
2	Red
3	Orange
4	Yellow
5	Green
6	Dark Blue
7	Violet (Purple)
8	Gray (Slate)
9	White
90	White/Black
91	White/Brown
92	White/Red
93	White/Orange
94	White/Yellow
95	White/Green
96	White/Blue
97	White/Violet
98	White/Gray

TYPE MW — GLASS BRAID — SHIELDED — 1000V — 80C

Tinned copper, polyvinylchloride insulated. Medium wall, lacquered glass braid, tinned copper shield overall.

Catalog Number	Type Designation	Size & (Stranding)	Insulation Thickness (Inch)	Nom. O.D. (Inch)	Stock Colors on Standard Spools 100′	500′	1000′
9031	MW-C-22(7)-BS	22(7x30)	.017	.102	9	9	9
9032	MW-C-20(7)-BS	20(10x30)	.017	.108	9	9	9
9033	MW-C-18(16)-BS	18(16x30)	.017	.108	9	9	9
9034	MW-C-16(19)-BS	16(26x30)	.019	.136	9	9	9
9035	MW-C-14(19)-BS	14(41x30)	.020	.149	9	9	9
9036	MW-C-12(19)-BS	12(65x30)	.020	.168	9	9	9

9 Vinyl insulation. White only.

TYPE MW — NYLON JACKET — 1000V — 90C

Tinned copper, polyvinylchloride insulated. Medium wall, clear nylon jacket overall.

Catalog Number	Type Designation	Size & (Stranding)	Insulation Thickness (Inch)	Nom. O.D. (Inch)	Stock Colors on Standard Spools 100′	500′	1000′
9037	MW-C-22(7)-J	22(7x30)	.017	.069	As Listed	As Listed	As Listed
9038	MW-C-20(10)-J	20(10x30)	.017	.075	As Listed	As Listed	As Listed
9039	MW-C-18(16)-J	18(16x30)	.017	.086	As Listed	As Listed	As Listed
9040	MW-C-16(26)-J	16(26x30)	.019	.106	As Listed	As Listed	As Listed
9041	MW-C-14(41)-J	14(41x30)	.020	.118	0, 1, 3, 4, 5, 9	0, 1, 3, 4, 5, 9	0, 1, 3, 4, 5, 9
9042	MW-C-12(65)-J	12(65x30)	.020	.139	0, 1, 3, 4, 5, 9	0, 1, 3, 4, 5, 9	0, 1, 3, 4, 5, 9

0	Black
1	Brown
2	Red
3	Orange
4	Yellow
5	Green
6	Dark Blue
7	Violet (Purple)
8	Gray (Slate)
9	White
90	White/Black
91	White/Brown
92	White/Red
93	White/Orange
94	White/Yellow
95	White/Green
96	White/Blue
97	White/Violet
98	White/Gray

* Stock Color Numbers in Accordance to Military Type Designation and EIA Color Coding.

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MIL-W-76

TYPE HW — VINYL — Gauges 16-22 2500V, Gauges 6-14 600 — 80C

Tinned copper, polyvinylchloride insulated. Heavy wall.

Catalog Number	Type Designation	Size & (Stranding)	Insulation Thickness (Inch)	Nom. O.D. (Inch)	Stock Colors on Standard Spools 100′	500′	1000′
9100	HW-C-22(7)-U	22(7x30)	.034	.098	As Listed	As Listed	As Listed
9101	HW-C-20(10)-U	20(10x30)	.034	.104	As Listed	As Listed	As Listed
9102	HW-C-18(16)-U	18(16x30)	.034	.114	As Listed	As Listed	As Listed
9103	HW-C-16(26)-U	16(26x30)	.034	.128	0, 2, 9	0, 2, 9	0, 2, 9
9104	HW-C-14(41)-U	14(41x30)	.048	.171	0, 2, 9	0, 2, 9	0, 2, 9
9105	HW-C-12(65)-U	12(65x30)	.048	.191	0, 2, 9	0, 2, 9	0, 2, 9
9106	HW-C-10(105)-U	10(105x30)	.048	.214	0, 2, 9	0, 2, 9	0, 2, 9
9107	HW-C-8(133)-U	8(133x29)	.048	.261	0, 2, 9	0, 2, 9	0, 2, 9
9108	HW-C-6(133)-U	6(133x27)	.048	.296	0, 2, 9	0, 2, 9	0, 2, 9

Stock Colors*

0 Black
1 Brown
2 Red
3 Orange
4 Yellow
5 Green
6 Dark Blue
7 Violet (Purple)
8 Gray (Slate)
9 White

TYPE HW — GLASS BRAID — 600V — 80C

Tinned copper, polyvinylchloride insulated. Heavy wall, lacquered glass braid.

Catalog Number	Type Designation	Size & (Stranding)	Insulation Thickness (Inch)	Nom. O.D. (Inch)	Stock Colors on Standard Spools 100′	500′	1000′
9110	HW-C-10(105)-B	10(105x30)	.048	.232	As Listed	As Listed	As Listed
9111	HW-C-8(133)-B	8(133x29)	.048	.279	As Listed	As Listed	As Listed
9112	HW-C-6(133)-B	6(133x27)	.048	.314	As Listed	As Listed	As Listed

9 White
90 White/Black
92 White/Red

TYPE LW — VINYL — 300V — 80C

Tinned copper, polyvinylchloride insulated. Light wall.

Catalog Number	Type Designation	Size & (Stranding)	Insulation Thickness (Inch)	Nom. O.D. (Inch)	Stock Colors on Standard Spools 100′	500′	1000′
9200	LW-C-30(7)-U	30(7x38)	.011	.034	0 thru 9	0 thru 9	0 thru 9
9201	LW-C-28(7)-U	28(7x36)	.011	.037	As Listed	As Listed	As Listed
9202	LW-C-26(7)-U	26(7x34)	.011	.041	As Listed	As Listed	As Listed
9203	LW-C-24(7)-U	24(7x32)	.011	.046	As Listed	As Listed	As Listed
9204	LW-C-22(7)-U	22(7x30)	.012	.054	As Listed	As Listed	As Listed
9205	LW-C-20(10)-U	20(10x30)	.012	.060	As Listed	As Listed	As Listed

0 Black
1 Brown
2 Red
3 Orange
4 Yellow
5 Green
6 Dark Blue
7 Violet (Purple)
8 Gray (Slate)
9 White
90 White/Black
91 White/Brown
92 White/Red
93 White/Orange
94 White/Yellow
95 White/Green
96 White/Blue
97 White/Violet
98 White/Gray

TYPE LW — NYLON JACKET — 300V — 90C

Tinned copper, polyvinylchloride insulated. Light wall, clear nylon jacket overall.

Catalog Number	Type Designation	Size & (Stranding)	Insulation Thickness (Inch)	Nom. O.D. (Inch)	Stock Colors on Standard Spools 100′	500′	1000′
9210	LW-C-30(7)-J	30(7x38)	.011	.039	0 thru 9	0 thru 9	0 thru 9
9211	LW-C-28(7)-J	28(7x36)	.011	.042	As Listed	As Listed	As Listed
9212	LW-C-26(7)-J	26(7x34)	.011	.046	As Listed	As Listed	As Listed
9213	LW-C-24(7)-J	24(7x32)	.011	.051	As Listed	As Listed	As Listed
9214	LW-C-22(7)-J	22(7x30)	.012	.059	As Listed	As Listed	As Listed
9215	LW-C-20(10)-J	20(10x30)	.012	.065	As Listed	As Listed	As Listed

0 Black
1 Brown
2 Red
3 Orange
4 Yellow
5 Green
6 Dark Blue
7 Violet (Purple)
8 Gray (Slate)
9 White
90 White/Black
91 White/Brown
92 White/Red
93 White/Orange
94 White/Yellow
95 White/Green
96 White/Blue
97 White/Violet
98 White/Gray

* Stock Color Numbers in Accordance to Military Type Designation and EIA Color Coding.

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MIL-W-16878

TYPE B—VINYL — 600V — 105C

Tinned copper, polyvinylchloride insulated.

Catalog Number	Type Designation	Size & (Stranding)	Insulation Thickness (Inch)	Nom. O.D. (Inch)	Stock Colors on Standard Spools 100′	500′	1000′
9300	B-32	32(7x40)	.010	.029	0 thru 9	0 thru 9	0 thru 9
9301	B-30	30(7x38)	.010	.032	0 thru 9	0 thru 9	0 thru 9
9302	B-28	28(7x36)	.010	.035	0 thru 9, 90 thru 98	0 thru 9, 90 thru 98	0 thru 9, 90 thru 98
9303	B-26	26(7x34)	.010	.039	0 thru 9, 90 thru 98	0 thru 9, 90 thru 98	0 thru 9, 90 thru 98
9304	B-24	24(19x36)	,010	.045	9,90thru98	9,90thru98	9,90thru98
9305	B-24	24(7x32)	.010	.044	As Listed	As Listed	As Listed
9306	B-22	22(19x34)	.010	.051	9,90thru98	9,90thru98	9,90thru98
9307	B-22	22(7x30)	.010	.050	As Listed	As Listed	As Listed
9308	B-20	20(19x32)	.010	.059	As Listed	As Listed	As Listed
9309	B-20	20(7x28)	.010	.058	As Listed	As Listed	As Listed
9310	B-18	18(19x30)	.010	.069	As Listed	As Listed	As Listed
9311	B-18	18(7x26)	.010	.068	0 thru 9, 90 thru 98	0 thru 9, 90 thru 98	0 thru 9, 90 thru 98
9312	B-16	16(19x29)	.010	.077	0 thru 9, 90 thru 98	0 thru 9, 90 thru 98	0 thru 9, 90 thru 98

Stock Colors*

0	Black
1	Brown
2	Red
3	Orange
4	Yellow
5	Green
6	Dark Blue
7	Violet (Purple)
8	Gray (Slate)
9	White
11	Tan
12	Pink
13	Light Blue
90	White/Black
91	White/Brown
92	White/Red
93	White/Orange
94	White/Yellow
95	White/Green
96	White/Blue
97	White/Violet
98	White/Gray

TYPE B—VINYL-NYLON JACKET — 600V — 115C

Tinned copper, polyvinylchloride insulated, nylon jacket overall.

Catalog Number	Type Designation	Size & (Stranding)	Insulation Thickness (Inch)	Nom. O.D. (Inch)	Stock Colors on Standard Spools 100′	500′	1000′
9313	B-32	32(7x40)	.010	.035	0 thru 9	0 thru 9	0 thru 9
9314	B-30	30(7x38)	.010	.038	0 thru 9	0 thru 9	0 thru 9
9315	B-28	28(7x36)	.010	.041	As Listed	As Listed	As Listed
9316	B-26	26(7x34)	.010	.045	As Listed	As Listed	As Listed
9317	B-24	24(19x36)	.010	.051	As Listed	As Listed	As Listed
9318	B-24	24(7x32)	.010	.050	As Listed	As Listed	As Listed
9319	B-22	22(19x34)	.010	.057	As Listed	As Listed	As Listed
9320	B-22	22(7x30)	.010	.056	As Listed	As Listed	As Listed
9321	B-20	20(19x32)	.010	.065	As Listed	As Listed	As Listed
9322	B-20	20(7x28)	.010	.064	As Listed	As Listed	As Listed
9323	B-18	18(19x30)	.010	.075	9,90thru98	9,90thru98	9,90thru98
9324	B-18	18(7x26)	.010	.074	As Listed	As Listed	As Listed
9325	B-16	16(19x29)	.010	.083	As Listed	As Listed	As Listed

Stock Colors*

0	Black
1	Brown
2	Red
3	Orange
4	Yellow
5	Green
6	Dark Blue
7	Violet (Purple)
8	Gray (Slate)
9	White
90	White/Black
91	White/Brown
92	White/Red
93	White/Orange
94	White/Yellow
95	White/Green
96	White/Blue
97	White/Violet
98	White/Gray

* Stock Color Numbers in Accordance to Military Type Designation and EIA Color Coding.

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MIL-W-16878

TYPE C — VINYL — 1000V — 105C

Tinned copper, polyvinylchloride insulated.

Catalog Number	Type Designation	Size & (Stranding)	Insulation Thickness (Inch)	Nom. O.D. (Inch)	Stock Colors on Standard Spools		
					100′	500′	1000′
9400	C-24	24(7x23)	.018	.060	9,90thru98	9,90thru98	9,90thru98
9401	C-22	22(7x30)	.018	.066	As Listed	As Listed	As Listed
9402	C-20	20(7x28)	.018	.074	As Listed	As Listed	As Listed
9403	C-18	18(7x26)	.018	.084	As Listed	As Listed	As Listed
9404	C-16	16(19x29)	.018	.093	9,90thru98	9,90thru98	9,90thru98
9405	C-14	14(19x27)	.018	.107	9,90thru98	9,90thru98	9,90thru98

TYPE C — VINYL-NYLON JACKET — 1000V — 115C

Tinned copper, polyvinylchloride insulated, nylon jacket overall.

Catalog Number	Type Designation	Size & (Stranding)	Insulation Thickness (Inch)	Nom. O.D. (Inch)	Stock Colors on Standard Spools		
					100′	500′	1000′
9410	C-24	24(7x32)	.018	.066	9,90thru98	9,90thru98	9,90thru98
9411	C-22	22(7x30)	.018	.072	As Listed	As Listed	As Listed
9412	C-20	20(7x28)	.018	.080	As Listed	As Listed	As Listed
9413	C-18	18(7x26)	.018	.091	As Listed	As Listed	As Listed
9414	C-16	16(19x29)	.018	.100	9,90thru98	9,90thru98	9,90thru98
9415	C-14	14(19x27)	.018	.114	9,90thru98	9,90thru98	9,90thru98

TYPE D — VINYL — 3000V — 105C

Tinned copper, polyvinylchloride insulated.

Catalog Number	Type Designation	Size & (Stranding)	Insulation Thickness (Inch)	Nom. O.D. (Inch)	Stock Colors on Standard Spools		
					100′	500′	1000′
9500	D-24	24(7x23)	.030	.084	9,90thru98	9,90thru98	9,90thru98
9501	D-22	22(7x30)	.030	.090	As Listed	As Listed	As Listed
9502	D-20	20(7x28)	.030	.098	As Listed	As Listed	As Listed
9503	D-18	18(7x26)	.030	.108	As Listed	As Listed	As Listed
9504	D-16	16(19x29)	.030	.117	9,90thru98	9,90thru98	9,90thru98
9505	D-14	14(19x27)	.030	.131	9,90thru98	9,90thru98	9,90thru98
9506	D-12	12(19x25)	.035	.160	9,90thru98	9,90thru98	9,90thru98
9507	D-10	10(37x26)	.035	.181	9,90thru98	9,90thru98	9,90thru98
9508	D-8	8(133x29)	.040	.245	9,90thru98	9,90thru98	9,90thru98
9509	D-6	6(133x27)	.040	.290	9,90thru98	9,90thru98	9,90thru98

Stock Colors*	
0	Black
1	Brown
2	Red
3	Orange
4	Yellow
5	Green
6	Dark Blue
7	Violet (Purple)
8	Gray (Slate)
9	White
90	White/Black
91	White/Brown
92	White/Red
93	White/Orange
94	White/Yellow
95	White/Green
96	White/Blue
97	White/Violet
98	White/Gray

* Stock Color Numbers in Accordance to Military Type Designation and EIA Color Coding.

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MIL-W-5086 AIRCRAFT WIRE & CABLE TYPES 1 & 2 — 600 VOLT

UNSHIELDED

Additional Description — MIL-W-5086 Type I — AN-22 thru AN-12
Stranded tinned copper, white polyvinylchloride, clear nylon jacket insulation.

Catalog Number	Type Designation	Size & (Stranding)	Nom. O.D. (Inch)	Spec. Type	Stock Colors on Standard Spools 100′	500′	1000′	Stock Color*
9700	AN-22	22(19x34)	.068	No. 1	9	9	9	White only (9)
9701	AN-20	20(19x32)	.078	No. 1	9	9	9	
9702	AN-18	18(19x30)	.088	No. 1	9	9	9	
9703	AN-16	16(19x29)	.098	No. 1	9	9	9	
9704	AN-14	14(19x27)	.117	No. 1	9	9	9	
9705	AN-12	12(37x28)	.137	No. 1	9	9	9	

Additional Description — MIL-W-5086 Type II — AN-22 thru AN-12
Stranded tinned copper, white polyvinylchloride insulation, saturated glass braid, clear nylon jacket.

Catalog Number	Type Designation	Size & (Stranding)	Nom. O.D. (Inch)	Spec. Type	100′	500′	1000′
9706	AN-22	22(19x34)	.075	No. 2	9	9	9
9707	AN-20	20(19x32)	.085	No. 2	9	9	9
9708	AN-18	18(19x30)	.095	No. 2	9	9	9
9709	AN-16	16(19x29)	.105	No. 2	9	9	9
9710	AN-14	14(19x27)	.125	No. 2	9	9	9
9711	AN-12	12(37x28)	.143	No. 2	9	9	9

Additional Description — MIL-W-5086 Type II — AN-10 thru AN-00
Stranded tinned copper, white polyvinylchloride insulation, saturated glass braid, nylon braid, nylon lacquer.

Catalog Number	Type Designation	Size & (Stranding)	Nom. O.D. (Inch)	Spec. Type	100′	500′	1000′
9713	AN-10	10(37x26)	.189	No. 2	9	9	9
9714	AN-8	8(133x29)	.240	No. 2	9	9	9
9715	AN-6	6(133x27)	.293	No. 2	9	9	9
9716	AN-4	4(133x25)	.355	No. 2	9	9	9
9717	AN-2	2(665x30)	.425	No. 2	9	9	9
9718	AN-0	0(1045x30)	.525	No. 2	9	9	9
9719	AN-00	00(1330x30)	.590	No. 2	9	9	9

MIL-C-7078 — TYPE II — 600 VOLT

SHIELDED

Additional Description — MIL-W-5086 Type I — AN-22 thru AN-12
Stranded tinned copper, white polyvinylchloride insulation, nylon jacket, braided tinned copper shield. Nylon outer jacket.

Catalog Number	Type Designation	Size & (Stranding)	Nom. O.D. (Inch)	Spec. Type	100′	500′	1000′
9720	AN-22	22(19x34)	.092	No. II	9	9	9
9721	AN-20	20(19x32)	.102	No. II	9	9	9
9722	AN-18	18(19x30)	.112	No. II	9	9	9
9723	AN-16	16(19x29)	.122	No. II	9	9	9
9724	AN-14	14(19x27)	.141	No. II	9	9	9
9725	AN-12	12(19x25)	.161	No. II	9	9	9

* Stock Color Numbers in Accordance to Military Type Designation and EIA Color Coding.

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TEFLON

TYPE E MIL-W-16878 — 600 VOLTS

Concentrically stranded silver coated copper conductor, extruded TFE Teflon insulated.

Catalog Number	Type Designation	Size & (Stranding)	Nom. O.D. (Inch)
9600	E-32	32(7x40)	.032
9601	E-30	30(7x38)	.032
9602	E-28	28(7x36)	.035
9603	E-26	26(19x38)	.039
9604	E-26	26(7x34)	.039
9605	E-24	24(19x36)	.044
9606	E-24	24(7x32)	.044
9607	E-22	22(19x34)	.050
9608	E-22	22(7x30)	.050
9609	E-20	20(19x32)	.058
9610	E-20	20(7x28)	.058
9611	E-18	18(19x30)	.069
9612	E-18	18(7x26)	.069
9613	E-16	16(19x29)	.080
9614	E-14	14(19x27)	.095
9615	E-12	12(19x25)	.115
9616	E-10	10(37x26)	.131

TYPE EE MIL-W-16878 — 1000 VOLTS

Concentrically stranded silver coated copper conductor, extruded TFE Teflon insulated.

Catalog Number	Type Designation	Size & (Stranding)	Nom. O.D. (Inch)
9620	EE-32	32(7x40)	.042
9621	EE-30	30(7x38)	.042
9622	EE-28	28(7x36)	.045
9623	EE-26	26(19x38)	.049
9624	EE-26	26(7x34)	.049
9625	EE-24	24(19x36)	.054
9626	EE-24	24(7x32)	.054
9627	EE-22	22(19x34)	.060
9628	EE-22	22(7x30)	.060
9629	EE-20	20(19x32)	.068
9630	EE-20	20(7x28)	.068
9631	EE-18	18(19x30)	.079
9632	EE-18	18(7x26)	.079
9633	EE-16	16(19x29)	.089
9634	EE-14	14(19x27)	.110
9635	EE-12	12(19x25)	.129
9636	EE-10	10(37x26)	.149

RRADIATED PVC

U.L. STYLE 1429 AND 1534 — FLAME RETARDANT

Catalog Number	AWG Size	Stranding	Style	Insul. Thick. (Inch)	Nom. O.D. (Inch)
920	26	7x34T.C.	1429	.010	.039
921	24	7x32T.C.	1429	.010	.044
922	22	7x30T.C.	1429	.010	.050
923	20	7x28T.C.	1429	.010	.058
924	18	7x26T.C.	1429	.010	.068
925	16	19x29T.C.	1429	.010	.077
926	14	19x27T.C.	1534	.016	.091

Underwriter's Laboratories, Inc. Listed — Equal to MIL-W-16878 Type "B".

YNAR INSULATED HOOKUP WIRE FOR WIRE WRAP APPLICATIONS

Especially suited for computer, business machine usage and other areas where space is limited. (For automatic point to point application.)

The conductor is OFHC (Oxygen Free High Conductivity) Annealed Copper, Silver Plated.

The insulation is Kynar, a Vinylidene Fluoride Plastic with unique characteristics.

Mechanically Tough; Operating Temperature Up to 125°C Continuous, Assigned U.L. Rating 105°C.

Catalog Number	AWG Size	Stranding	Insul. Thick. (Inch)	Nom. O.D. (Inch)	U.L. Style
901	30	Solid	.005	.020	1422 & 1426
902	28	Solid	.005	.023	1422 & 1426
903	26	Solid	.005	.026	1422 & 1426
904	24	Solid	.005	.030	1422 & 1426

IGH VOLTAGE AND ANODE LEAD CABLE

U.L. STYLE 3239 — FLAME RETARDANT

Catalog Number	AWG Size	Stranding*	Rulan Insul. Thick. (Inch)	PVC Jacket (Inch)	Nom. O.D. (Inch)
4624	22	7x30T.C.	.025	.020	.120
4625	22	7x30T.C.	.030	.020	.130
4626	22	7x30T.C.	.045	.020	.160

* Can also furnish pre-bond overcoat and topcoat conductor.

NOTE: Minimum purchase per item 1000 ft.

CONSOLIDATED WIRE & ASSOCIATED CORPORATIONS

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SHIELDED TEFLON CABLES — MIL-W-16878

Each conductor stranded silver plated copper Type E extruded Teflon .010" insulation — 90% braided silver copper shield, also supplied with either a Teflon impregnated Fiberglass braid or Teflon fused tape overall jacket.

Temperature rating −65°C to +260°C. Voltage rating 600 volts.

Catalog Number	Number of Conductors	Size & (Stranding)	Nom. O.D. (Inch)	Catalog Number	Number of Conductors	Size & (Stranding)	Nom. O.D. (Inch)

NO OUTER COVERING OVER SHIELD

9800	1	24(19x36)	.069	9808	1	20(19x32)	.083
9801	2	24(19x36)	.112	9809	2	20(19x32)	.142
9802	3	24(19x36)	.120	9810	3	20(19x32)	.151
9803	4	24(19x36)	.132	9811	4	20(19x32)	.168
9804	1	22(19x34)	.075	9812	1	18(19x30)	.093
9805	2	22(19x34)	.124	9813	2	18(19x30)	.162
9806	3	22(19x34)	.132	9814	3	18(19x30)	.172
9807	4	22(19x34)	.146	9815	4	18(19x30)	.192

Stock Colors: 1 — Black; **2** — White; **3** — Red; **4** — Green.

Catalog Numbers 9800 thru 9859. Specify color coding when ordering. Standard spool put up Catalog Numbers 9800 thru 9859: 100 ft., 500 ft., 1000 ft.

TEFLON TAPE WRAP JACKET OVER SHIELD

9820	1	24(19x36)	.084	9830	3	20(19x32)	.167
9821	2	24(19x36)	.128	9831	4	20(19x32)	.184
9822	3	24(19x36)	.135	9832	1	18(19x30)	.109
9823	4	24(19x36)	.148	9833	2	18(19x30)	.178
9824	1	22(19x34)	.090	9834	3	18(19x30)	.189
9825	2	22(19x34)	.140	9835	4	18(19x30)	.208
9826	3	22(19x34)	.148	9836	1	16(19x29)	.123
9827	4	22(19x34)	.162	9837	2	16(29x29)	.200
9828	1	20(19x32)	.099	9838	3	16(19x29)	.218
9829	2	20(19x32)	.158	9839	4	16(19x29)	.235

TEFLON IMPREGNATED BRAID OVER SHIELD

9840	1	24(19x36)	.081	9850	3	20(19x32)	.163
9841	2	24(19x36)	.126	9851	4	20(19x32)	.180
9842	3	24(19x36)	.133	9852	1	18(19x30)	.106
9843	4	24(19x36)	.144	9853	2	18(19x30)	.174
9844	1	22(19x34)	.088	9854	3	18(19x30)	.185
9845	2	22(19x34)	.137	9855	4	18(19x30)	.205
9846	3	22(19x34)	.144	9856	1	16(19x29)	.120
9847	4	22(19x34)	.158	9857	2	16(19x29)	.195
9848	1	20(19x32)	.097	9858	3	16(19x29)	.213
9849	2	20(19x32)	.154	9859	4	16(19x29)	.228

Color Numbers in accordance to Military Type Designation and EIA Color Coding.
NOTE: Minimum purchase per item 1000 ft.

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UL LISTED HOOK-UP WIRE

ROME SYNTHINOL — UL TYPE HOOK-UP AND LEAD WIRES

TINNED COPPER

UL-300V-80C (CSA — TR-64) FR-1 Flame Test

Catalog Number	Size AWG	Stranding	Nom. Ins. Thickness	Volts	Max. Dia. (Inches)
803	24	Solid	1/64	300	.055
801	22	Solid	1/64	300	.065
811	20	Solid	1/64	300	.071
841	18	Solid	1/64	300	.080
817	16	Solid	1/64	300	.094
819	24	7 x No. 32	1/64	300	.059
821	22	7 x No. 30	1/64	300	.069
831	20	10 x No. 30	1/64	300	.078
846	18	16 x No.30	1/64	300	.085
816	16	26 x No. 30	1/64	300	.095
881	20 2/Condr.	10 x No. 30	.025	300	.170

UL-600V-105C (CSA-TEW) FR-1 Flame Test

Catalog Number	Size AWG	Stranding	Nom. Ins. Thickness	Volts	Max. Dia. (Inches)
851	22	Solid	1/32	600	.097
856	20	Solid	1/32	600	.104
861	18	Solid	1/32	600	.112
866	22	7 x No. 30	1/32	600	.102
871	20	10 x No. 30	1/32	600	.110
876	18	16 x No. 30	1/32	600	.119
890	16	26 x No. 30	1/32	600	.127
891	14	41 x No. 30	1/32	600	.141
892	12	65 x No. 30	1/32	600	.160
893	10	105 x No. 30	1/32	600	.194
894	8	133 x No. 29	3/64	600	.255

*"TOPCOAT" COPPER CONDUCTOR

*Stranded copper conductor passed through molten tin bath bonding individual strands together.

UL-300V-80C (CSA — TR-64) FR-1 Flame Test

Catalog Number	Size AWG	Stranding	Nom. Ins. Thickness	Volts	Max. Dia. (Inches)
813	24	7 x No. 32	1/64	300	.059
823	22	7 x No. 30	1/64	300	.069
833	20	10 x No. 30	1/64	300	.078
843	18	16 x No. 30	1/64	300	.085

UL-600V-105C (CSA-TEW) FR-1 Flame Test

Catalog Number	Size AWG	Stranding	Nom. Ins. Thickness	Volts	Max. Dia. (Inches)
865	22	7 x No. 30	1/32	600	.102
875	20	10 x No. 30	1/32	600	.110
885	18	16 x No. 30	1/32	600	.119

*"HEAVY TIN" COPPER CONDUCTOR

*Stranded "Double" Tin Copper Conductor — Tinning sufficiently thick to allow fusing of strands during induction heating.

UL-300V-80C (CSA — TR-64) FR-1 Flame Test

Catalog Number	Size AWG	Stranding	Nom. Ins. Thickness	Volts	Max. Dia. (Inches)
827	22	7 x No. 30	1/64	300	.069
837	20	10 x No. 30	1/64	300	.078
847	18	16 x No. 30	1/64	300	.085

UL-600V-105C (CSA-TEW) FR-1 Flame Test

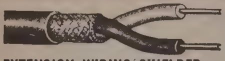
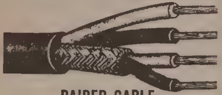
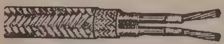
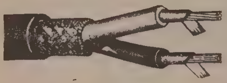
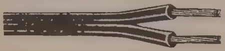
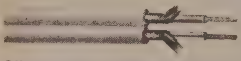
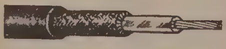
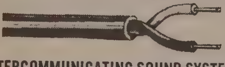
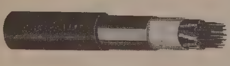
Catalog Number	Size AWG	Stranding	Nom. Ins. Thickness	Volts	Max. Dia. (Inches)
869	22	7 x No. 30	1/32	600	.102
879	20	10 x No. 30	1/32	600	.110
889	18	16 x No. 30	1/32	600	.119

Stock Colors: Black, Blue, Brown, Green, Orange, Pink, Red, Gray, Violet, White, Yellow.

Standard spool size available subject to manufacturing put-up.

DATA, INSTRUMENTATION AND SOUND SYSTEM CABLES

STANDARD SPOOL PUT-UP: 100 FT., 250 FT., 500 FT. and 1000 FT.

	Catalog Number	Type	Size & Stranding	Specifications and General Applications	Insul. Thickness (Inches)	Nom. Dia. (Inches)
 EXTENSION WIRING SHIELDED — PLASTIC JACKET	5511	2 Condr.	22 Solid	Tinned copper vinyl plastic insulation, wires twisted together — 1 condr. red — 1 condr. black — and a spiral tinned copper shield with .020″ tubed gray vinyl plastic jacket.	.015	.170
 PAIRED CABLE SHIELDED — PLASTIC JACKET	5516	2 Pair 4 Condr.	22 7x30	Stranded tinned copper vinyl plastic insulation. 2 pair cabled (4 conductors — 1 pair black & white with braided tinned copper shield mylar tape — 1 pair black & brown unshielded — both pair bunched and .020″ gray vinyl plastic jacket overall.	.015	.168x .276
 EXTENSION SPEAKERS SHIELDED — FOR LONG RUNS	5526	2 Condr.	20 10x30	Tinned copper vinyl plastic insulation, wires twisted together — 1 condr. red — 1 condr. black — closely woven tinned copper shield.	.015	.215
 EXTENSION SPEAKERS SHIELDED — PLASTIC JACKET	5568	2 Condr.	22 7x30	Tinned copper vinyl plastic insulation, 2 condrs. — cabled black and red — tinned copper spiral wrapped shield .023″ chrome vinyl plastic jacket.	.015	.166
	5569	3 Condr.	22 7x30	Tinned copper vinyl plastic insulation, 3 condrs. — cabled black, red, white — tinned copper spiral shield — chrome vinyl plastic jacket.	.015	.193
	5538	2 Condr.	18 16x30	Stranded tinned copper vinyl plastic insulation, wires twisted together, 1 condr. red, 1 condr. white. Spiral tinned copper shield and .020″ gray vinyl plastic jacket overall.	.015	.225
	5543	2 Condr.	20 10x30	Same as 5538 1 condr. red — 1 condr. black.	.015	.185
	5541	2 Condr.	18 16x30	Stranded tinned copper vinyl plastic insulation, wires twisted together. 1 condr. red — 1 condr. white, closely woven braided tinned copper shield and .020″ gray vinyl plastic jacket overall.	.015	.260
 JUKE BOX SPEAKER CABLE	5547	2 Condr.	24 7x32	Stranded 1 condr. bare copper — 1 condr. tinned copper. 2 condrs. parallel vinyl plastic insulation. Colors: gray, white, brown, clear.	.015	.058x .115
 DUAL CHANNEL AUDIO CABLE FOR STEREO & LANGUAGE LABORATORIES	5587	2 Condr.	24 7x32	Tinned copper conductor. Spiral tinned copper individual shield, .020″ gray vinyl jacket.	.018	.106x .213
 ELECTRIC GUITARS — HIGH IMPEDANCE LAPEL MICROPHONES	5551	1 Condr.	22 16x34	Stranded tinned copper polyethylene insulation closely spiral tinned copper shield with .020″ gray vinyl jacket.	.020	.135
INTERCOMMUNICATING SOUND SYSTEM	5556	2 Condr.	19 Solid	Bare copper vinyl plastic insulation, wires twisted together — 1 condr. brown — 1 condr. tan.	.015	.115
	5561	3 Condr.	19 Solid	Same as 5556 — 1 condr. brown — 1 condr. tan — 1 condr. gray.	.015	.132
 INTERCOMMUNICATING SOUND SYSTEM	5557	2 Condr.	19 Solid	Same as 5556 except .025″ outer gray PVC jacket.	.015	.162
 SHIELDED PAIRED CONTROL CABLE	5901	38 Pair	22 Solid	Tin copper polypropylene insulation. Color coded twisted pairs. Overall mylar aluminum foil shield. 22 AWG (7x30) T.C. drain. .045″ gray plastic jacket.	.008	.600
	5902	51 Pair	22 Solid	Tin copper vinyl insulation. Color coded. Same as 5901 except .050″ gray plastic jacket.	.010	.700

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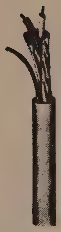
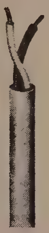
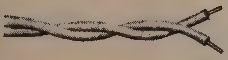
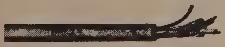
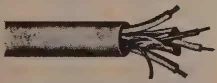
INTERCOMMUNICATION AND SOUND SYSTEM CABLES

STANDARD SPOOL PUT-UP: 100 FT., 500 FT., 1000 FT.

	Catalog Number	Type	Size & Stranding	Specifications and General Applications	Nom. Jkt. Thickness (Inches)	Nom. Dia. (Inches)
 SHIELDED 2 AND 3 CONDUCTOR	5572	2 Condr.	22 7x30	Tinned copper conductors. .016″ Polyethylene insulation color coded black and red. Mylar aluminum shield stranded tinned copper drain wire gray vinyl jacket.	.025	.170
	5573	2 Condr.	20 10x30	Same as 5572 color coded black and white.	.025	.200
	5574	2 Condr.	18 16x30	Same as 5573	.030	.225
	5575	2 Condr.	16 26x30	Same as 5573	.030	.250
	5589	2 Condr.	14 41x30	Same as 5573	.030	.320
	5596	2 Condr.	12 19x25	Same as 5573	.040	.400
	5576	3 Condr.	22 7x30	Same as 5572 color coded black, white and red.	.025	.210
	5577	3 Condr.	20 10x30	Same as 5576	.025	.235
	5578	3 Condr.	18 16x30	Same as 5576	.025	.240
	5590	3 Condr.	16 26x30	Same as 5576	.030	.255
	5591	3 Condr.	14 41x30	Same as 5576	.030	.285
 UNSHIELDED WITH JACKET	5579	2 Condr.	22 7x30	Tinned copper conductors. .015″ Vinyl insulation. Color coded black and red.	.020	.165
	5580	2 Condr.	20 10x30	Same as 5579 color coded black and white.	.025	.190
	5581	2 Condr.	18 16x30	Same as 5580	.030	.225
	5582	2 Condr.	16 26x30	Same as 5580	.030	.245
	5583	2 Condr.	14 41x30	Same as 5580	.030	.310
	5597	2 Condr.	12 19x25	Same as 5580	.040	.380
 WITHOUT JACKET	5584	2 Condr.	22 Solid	Tinned copper conductors. .015″ Vinyl insulation twisted. Color coded brown and tan.		.115
	5585	2 Condr.	18 16x30	.018″ insulation. Same as 5584. Color coded black and white.		.175
	5586	2 Condr.	16 26x30	.020″ insulation. Same as 5585.		.195
 MINIATURE BROADCAST AUDIO CABLE	5570	2 Condr.	22 7x30	Tinned copper .010″ Polyethylene insulation color coded black and red. Mylar aluminum shield stranded tinned copper drain wire gray vinyl jacket.	.016	.140
	5588	2 Condr.	22 Solid	Same as 5570	.016	.120
 2 PAIR MINIATURE AUDIO AND SOUND CABLE	5594	2 Pair	22 7x30	Tinned copper polypropylene insulation. Each pair shielded. Mylar aluminum shield and drain wire. Color coded same as 5571.	.019	.165
	5571	2 Pair	22 7x30	Tinned copper .009″ Polyethylene insulation 1 pair black and red with Mylar aluminum shield. I pair white and green both pairs twisted with stranded tinned copper ground wire gray vinyl jacket.	.019	.165

SHIELDED AND JACKETED CABLES CONTROL AND MICROPHONE TYPE

SHIELDED RUBBER JACKET

SHIELDED AND JACKETED CABLES CONTROL AND MICROPHONE TYPE MULTI-CONDUCTOR CABLES

Catalog Number	No. of Condr.	Size & (Stranding)	Special Use	Specifications	Finished O.D. (Inches)	Nom. Capac. per ft. (mmf)
1460	1	20(26x34)	Crystal microphone	Tinned copper, wall of live rubber; cotton fillers and wrap; tinned copper braid shield; cotton wrap rubber jacket overall.	.240	33.
1462	2	20(26x34)	Low impedance microphones	Same as 1460; color coded	.268	68.
1456	2	18(41x34)	Heavy duty studio cable	Same as 1460; color coded	.295	80.
1463	3	20(26x34)	Low impedance microphones	Same as 1460; color coded	.277	85.
1464	4	20(26x34)	Low impedance microphones	Same as 1460; color coded	.295	95.
1465	5	20(26x34)	Interconnecting power cable for all electronic uses	Same as 1460; color coded	.323	
1466	6	20(26x34)	Same as 1465	Same as 1460; color coded	.349	
1467	7	20(26x34)	Same as 1465	Same as 1460; color coded	.360	
1455	8	20(26x34)	Same as 1465	Same as 1460; color coded	.386	

SHIELDED NEOPRENE JACKET

Catalog Number	No. of Condr.	Size & (Stranding)	Specifications	Finished O.D. (Inches)
1701	1	18(41x34)	Tinned copper, yarn serve; wall of live rubber; cotton fillers and wrap; tinned copper braid shield; cotton wrap neoprene jacket overall.	.235
1702	2	18(41x34)	Same as 1701, color coded	.295
1703	3	18(41x34)	Same as 1701, color coded	.305
1704	4	18(41x34)	Same as 1701, color coded	.330
1708	6	18(41x34)	Same as 1701, color coded	.430
1709	8	18(41x34)	Same as 1701, color coded	.465
1710	10	18(41x34)	Same as 1701, color coded	.480
1711	12	18(41x34)	Same as 1701, color coded	.550
1712	15	18(41x34)	Same as 1701, color coded	.630
1713	20	18(41x34)	Same as 1701, color coded	.725

SHIELDED NEOPRENE JACKET

Catalog Number	No. of Condr.	Size & (Stranding)	Specifications	Finished O.D. (Inches)
1705	2	16(65x34)	Same as 1701, color coded	.320
1706	3	16(65x34)	Same as 1701, color coded	.340
1707	4	16(65x34)	Same as 1701, color coded	.355
1714	2	14(41x30)	Same as 1701, color coded	.395
1715	3	14(41x30)	Same as 1701, color coded	.425
1716	4	14(41x30)	Same as 1701, color coded	.450
1717	2	12(65x30)	Same as 1701, color coded	.440
1718	3	12(65x30)	Same as 1701, color coded	.465
1719	4	12(65x30)	Same as 1701, color coded	.500

Stock Colors

1 Black
2 White
3 Red
4 Green
5 Yellow
6 Blue
7 Brown
8 Orange
9 Gray (slate)
10 Purple
11 White/Black
12 White/Red
13 White/Green
14 White/Yellow
15 White/Blue
16 White/Brown
17 White/Purple
18 White/Gray (slate)
19 Black/Red
20 Black/Yellow

STANDARD SPOOL PUT-UP: 100 FT., 500 FT., 1000 FT.

CONSOLIDATED WIRE & ASSOCIATED CORPORATIONS
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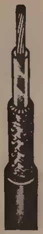
CONTROL CABLES SHIELDED AND UNSHIELDED

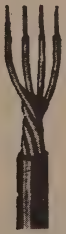
SHIELDED PLASTIC JACKET



Catalog Number	No. of Cond.	Size & (Stranding)	Special Use	Specifications	Finished O.D. (Inches)	Nom. Capac. per ft. (mmf)	Stock Colors
1721	1	24(7x32)	Low Capacitance	Tinned copper polyethylene insulation with a close spiral tinned copper shield. Gray vinyl plastic jacket.	.132	29.	1 Black 2 White 3 Red 4 Green 5 Yellow 6 Blue 7 Brown 8 Orange 9 Gray (slate) 10 Purple 11 White/Black 12 White/Red 13 White/Green 14 White/Yellow 15 White/Blue 16 White/Brown 17 White/Purple 18 White/Gray 19 Black/Red 20 Black/Yellow
1461	1	22(16x34)	Lapel microphone	Same as 1721	.125	36.	
1457	1	22(16x34)	Crystal, Ribbon and other high impedance microphones	Same as 1721 except heavier polyethylene insulation on conductor.	.200	25.	
1458	2	22(16x34)	Low impedance microphones and control cable	Tinned copper conductors polyethylene insulation conductors; black and clear. Cabled with fillers rayon serve, spiral tinned copper shield. Gray vinyl plastic jacket.	.231	32.	
1459	1	20(26x34)	Lapel microphone	Tinned copper wire, with polyethylene to .087″ O.D. with a closely tinned copper shielded braid, and a heavy black plastic jacket overall.	.175	40.	
1722	2	20(26x34)	Same as 1458	Same as 1458 except braided tin copper shield.	.245	32.	
1723	3	20(26x34)	Same as 1458	Same as 1722	.250	45.	
1724	4	20(26x34)	Same as 1458	Same as 1722	.255	45.	
1725	5	20(26x34)	Same as 1458	Same as 1722	.275	45.	
1726	6	20(26x34)	Same as 1458	Same as 1722	.300		
1727	7	20(26x34)	Same as 1458	Same as 1722	.330		
1728	8	20(26x34)	Same as 1458	Same as 1722	.375		
1740	10	20(26x34)	Same as 1458	Same as 1722	.380		
1741	12	20(26x34)	Same as 1458	Same as 1722	.385		
1742	15	20(26x34)	Same as 1458	Same as 1722	.415		
1743	20	20(26x34)	Same as 1458	Same as 1722	.455		

SHIELDED AND JACKETED CABLES CONTROL AND MICROPHONE TYPE MULTI-CONDUCTOR CABLES

UNSHIELDED RUBBER JACKET



Catalog Number	No. of Cond.	Size & (Stranding)	Insulation Thickness (Inches)	Jacket Thickness (Inches)	Finished O.D. (Inches)
1732	2	20(26x34)	.020	.035	.240
1733	3	20(26x34)	.020	.035	.255
1734	4	20(26x34)	.020	.035	.275
1735	5	20(26x34)	.020	.035	.300
1736	6	20(26x34)	.020	.035	.315
1737	7	20(26x34)	.020	.035	.325
1738	8	20(26x34)	.020	.035	.360

STANDARD SPOOL PUT-UP: 100 FT., 500 FT., 1000 FT.

CONSOLIDATED WIRE & ASSOCIATED CORPORATIONS CONSOLIDATED

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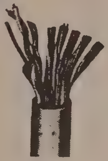
MULTIPLE PAIR SHIELDED AND UNSHIELDED CABLE
MULTIPLE PAIR INDIVIDUALLY SHIELDED AUDIO AND DATA CABLE

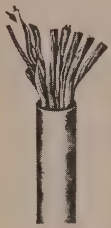
22 AWG SOLID



SHIELDED PAIRS

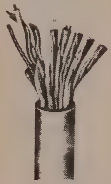
Catalog Number	Type	Size & Stranding	Specifications and General Applications	Nom. Jkt. Thickness (Inches)	Nom. Dia. (Inches)
5303	3 Pair	22 Solid	Tinned copper conductor .010". Polypropylene insulation. Mylar aluminum shield and tinned copper drain wire, each pair. Overall gray vinyl jacket.	.028	.250
5306	6 Pair	22 Solid	Same as 5303	.037	.330
5309	9 Pair	22 Solid	Same as 5303	.040	.390
5311	11 Pair	22 Solid	Same as 5303	.040	.420
5315	15 Pair	22 Solid	Same as 5303	.045	.485

22 AWG STRANDED



Catalog Number	Type	Size & Stranding	Specifications and General Applications	Nom. Jkt. Thickness (Inches)	Nom. Dia. (Inches)
5323	3 Pair	22 7x30 Overall	Tinned copper .010" polypropylene insulation. Mylar aluminum shield and tinned copper drain wire each pair. Overall gray vinyl jacket.	.030	.265
5326	6 Pair	22 7x30	Same as 5323	.037	.355
5329	9 Pair	22 7x30	Same as 5323	.040	.425
5331	11 Pair	22 7x30	Same as 5323	.040	.455
5335	15 Pair	22 7x30	Same as 5323	.045	.525
5339	19 Pair	22 7x30	Same as 5323	.055	.575
5347	27 Pair	22 7x30	Same as 5323	.070	.705

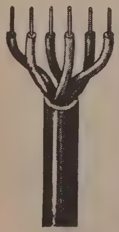
18 AWG STRANDED



Catalog Number	Type	Size & Stranding	Specifications and General Applications	Nom. Jkt. Thickness (Inches)	Nom. Dia. (Inches)
5353	3 Pair	18 16x30	Tin copper .016" polypropylene insulation. Mylar aluminum shield and tinned copper drain wire each pair. Overall gray vinyl jacket.	.035	.372
5356	6 Pair	18 16x30	Same as 5353	.045	.555
5359	9 Pair	18 16x30	Same as 5353	.055	.620
5362	12 Pair	18 16x30	Same as 5353	.070	.765
5365	15 Pair	18 16x30	Same as 5353	.070	.830

MULTIPLE PAIR UNSHIELDED AUDIO CABLE

18 AWG STRANDED



Catalog Number	Type	Size & Stranding	Specifications and General Applications	Nom. Jkt. Thickness (Inches)	Nom. Dia. (Inches)
5601	1 Pair	18 16x30	Tin copper .016" vinyl insulation cabled into pairs. Overall gray vinyl jacket.	.020	.220
5603	3 Pair	18 16x30	Same as 5601	.035	.362
5606	6 Pair	18 16x30	Same as 5601	.045	.540
5609	9 Pair	18 16x30	Same as 5601	.055	.615
5612	12 Pair	18 16x30	Same as 5601	.055	.650
5615	15 Pair	18 16x30	Same as 5601	.060	.760
5619	19 Pair	18 16x30	Same as 5601	.070	.830
5627	27 Pair	18 16x30	Same as 5601	.070	.965

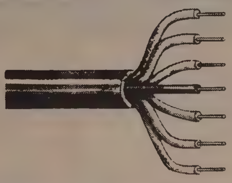
Color Coding For Paired Intercom Cables

PAIRED INTERCOMMUNICATING CABLES COLOR CODING Identification is simple with Consolidated Intercom Cables because they are all color coded. See chart below.

1. Black paired with Red
2. Black paired with White
3. Black paired with Green
4. Black paired with Blue
5. Black paired with Yellow
6. Black paired with Brown
7. Black paired with Orange
8. Red paired with White
9. Red paired with Green
10. Red paired with Blue
11. Red paired with Yellow
12. Red paired with Brown
13. Red paired with Orange
14. Green paired with White
15. Green paired with Blue
16. Green paired with Yellow
17. Green paired with Brown
18. Green paired with Orange
19. White paired with Blue
20. White paired with Yellow
21. White paired with Brown
22. White paired with Orange
23. Blue paired with Yellow
24. Blue paired with Brown
25. Blue paired with Orange
26. Brown paired with Yellow
27. Brown paired with Orange

STANDARD SPOOL PUT-UP: 100 FT., 500 FT., 1000 FT.

UNSHIELDED AUDIO CABLE MULTICONDUCTOR — PLASTIC JACKET



STRANDED CONDUCTORS — 300 VOLTS

Catalog Number	Type	Size & Stranding	Specifications and General Applications	Nom. Diam. (Inches)
22 AWG				
5400	2 Cond.	**22** 7x30	Tinned copper conductor .010″ vinyl-plastic insulated cabled gray vinyl plastic jacket overall	.130
5401	3 Cond.	**22** 7x30	Same as 5400	.145
5406	4 Cond.	**22** 7x30	Same as 5400	.175
5411	5 Cond.	**22** 7x30	Same as 5400	.180
5416	6 Cond.	**22** 7x30	Same as 5400	.205
5421	7 Cond.	**22** 7x30	Same as 5400	.215
5426	8 Cond.	**22** 7x30	Same as 5400	.225
5431	9 Cond.	**22** 7x30	Same as 5400	.245
5432	10 Cond.	**22** 7x30	Same as 5400	.250
5434	12 Cond.	**22** 7x30	Same as 5400	.260
5438	16 Cond.	**22** 7x30	Same as 5400	.268
5440	20 Cond.	**22** 7x30	Same as 5400	.300
5442	25 Cond.	**22** 7x30	Same as 5400	.330
5446	30 Cond.	**22** 7x30	Same as 5400	.375
5448	40 Cond.	**22** 7x30	Same as 5400	.425
5450	50 Cond.	**22** 7x30	Same as 5400	.500
5460	60 Cond.	**22** 7x30	Same as 5400	.530

STRANDED CONDUCTORS — 600 VOLTS

Catalog Number	Type	Size & Stranding	Specifications and General Applications	Nom. Diam. (Inches)
16 AWG				
5480	4 Condr.	**16** 19x29	Tin Copper .030″ PVC cables .045″ Gray outer PVC Jkt.	.375
5488	5 Condr.	**16** 19x29	Same as 5480	.405
5481	7 Condr.	**16** 19x29	Same as 5480	.455
5489	9 Condr.	**16** 19x29	Same as 5480	.510
5482	12 Condr.	**16** 19x29	Same as 5480 Except .060″ Jacket	.600
5483	15 Condr.	**16** 19x29	Same as 5480 Except .060″ Jacket	.650
5484	19 Condr.	**16** 19x29	Same as 5480 Except .065″ Jacket	.715
5490	25 Condr.	**16** 19x29	Same as 5480 Except .065″ Jacket	.820
14 AWG				
5485	4 Condr.	**14** 19x27	Tin copper .045″ PVC cabled .045″ Gray outer PVC Jkt.	.495
5491	5 Condr.	**14** 19x27	Same as 5485 Except .060″ Jacket	.560
5486	7 Condr.	**14** 19x27	Same as 5485 Except .060″ Jacket	.630
5492	9 Condr.	**14** 19x27	Same as 5485 Except .065″ Jacket	.750
5487	12 Condr.	**14** 19x27	Same as 5485 Except .065″ Jacket	.770
5493	15 Condr.	**14** 19x27	Same as 5485 Except .080″ Jacket	.900

STRANDED CONDUCTORS — 400 VOLTS

Catalog Number	Type	Size & Stranding	Specifications and General Applications	Nom. Diam. (Inches)
18 AWG				
5470	4 Condr.	**18** 16x30	Tin copper .018″ PVC cabled .030″ Gray outer PVC Jkt.	.250
5471	5 Condr.	**18** 16x30	Same as 5470 Except .037″ Jacket	.295
5472	7 Condr.	**18** 16x30	Same as 5470 Except .037″ Jacket	.324
5473	9 Condr.	**18** 16x30	Same as 5470 Except .037″ Jacket	.379
5474	12 Condr.	**18** 16x30	Same as 5470 Except .040″ Jacket	.412
5475	15 Condr.	**18** 16x30	Same as 5470 Except .065″ Jacket	.475
5476	19 Condr.	**18** 16x30	Same as 5470 Except .045″ Jacket	.505
5477	25 Condr.	**18** 16x30	Same as 5470 Except .060″ Jacket	.600

Color Coding For Multiple Intercom Cables

CHART 1*

1 Black
2 Red
3 Green
4 White
5 Brown
6 Blue
7 Orange
8 Yellow
9 Purple
10 Slate
11 Pink
12 Tan

CHART 2**

1 Black
2 White
3 Red
4 Green
5 Orange
6 Blue
7 White/Black
8 Red/Black
9 Green/Black
10 Orange/Black
11 Blue/Black
12 Black/White
13 Red/White
14 Green/White
15 Blue/White
16 Black/Red
17 White/Red
18 Orange/Red
19 Blue/Red
20 Red/Green
21 Orange/Green
22 Black/White/Red
23 White/Black/Red
24 Red/Black/White
25 Green/Black/White
26 Orange/Black/White
27 Blue/Black/White
28 Black/Red/Green
29 White/Red/Green
30 Red/Black/Green
31 Green/Black/Orange
32 Orange/Black/Green
33 Blue/White/Orange
34 Black/White/Orange
35 White/Red/Orange
36 Orange/White/Blue
37 White/Red/Blue
38 Black/White/Green
39 White/Black/Green
40 Red/White/Green
41 Green/White/Blue
42 Orange/Red/Green
43 Blue/Red/Green
44 Black/White/Blue
45 White/Black/Blue
46 Red/White/Blue
47 Green/Orange/Red
48 Orange/Red/Blue
49 Blue/Red/Orange
50 Black/Orange/Red
51 White/Black/Orange
52 Red/Orange/Black
53 Green/Red/Blue
54 Orange/Black/Blue
55 Blue/Black/Orange
56 Black/Orange/Green
57 White/Orange/Green
58 Red/Orange/Green
59 Green/Black/Blue
60 Orange/Green/Blue

* Catalog No.'s 5400 thru 5434 and 5470 thru 5473 Color Coding Chart 1
** Catalog No.'s 5438 thru 5460 and 5474 thru 5493 Color Coding Chart 2

STANDARD SPOOL PUT-UP: 100 FT., 500 FT., 1000 FT.

CONSOLIDATED WIRE & ASSOCIATED CORPORATIONS

1633 S. CLINTON ST. • (312) 421-4441 • Cable Address: "CON WIRE" • CHICAGO, ILL. 60616

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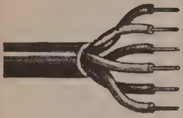
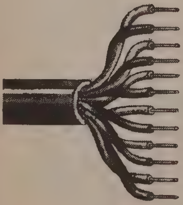
UNSHIELDED INTERCOM CABLE

PAIRED CONDUCTORS SOLID AND STRANDED PLASTIC JACKET





Catalog Number	Type	Size & (Stranding)	Specications and General Applications	Nominal Diameter (Inches)
STRANDED				
5201	1 Pr. 2 Condr.	22 Solid	Tinned copper conductor .010″ vinyl plastic insulation. Cabled, gray vinyl plastic jacket overall	.130
5205	2 Pr. 4 Condr.	22 Solid	Same as 5201	.190
5211	3 Pr. 6 Condr.	22 Solid	Same as 5201	.220
5221	5 Pr. 10 Condr.	22 Solid	Same as 5201	.250
5226	6 Pr. 12 Condr.	22 Solid	Same as 5201	.275
5231	7 Pr. 14 Condr.	22 Solid	Same as 5201	.280
5236	8 Pr. 16 Condr.	22 Solid	Same as 5201	.300
5241	9 Pr. 18 Condr.	22 Solid	Same as 5201	.320
5251	11 Pr. 22 Condr.	22 Solid	Same as 5201	.340
5271	15 Pr. 30 Condr.	22 Solid	Same as 5201	.400
5286	27 Pr. 54 Condr.	22 Solid	Same as 5201	.510
5289	31 Pr. 62 Condr.	22 Solid	Same as 5201	.555
5292	41 Pr. 82 Condr.	22 Solid	Same as 5201	.630
5297	51 Pr. 102 Condr.	22 Solid	Same as 5201	.735
SOLID				
5151	1 Pr. 2 Condr.	22(7x30)	Tinned copper conductor .010″ vinyl plastic insulation. Cabled, gray vinyl plastic jacket overall	.145
5152	2 Pr. 4 Condr.	22(7x30)	Same as 5151	.210
5153	3 Pr. 6 Condr.	22(7x30)	Same as 5151	.230
5155	5 Pr. 10 Condr.	22(7x30)	Same as 5151	.265
5156	6 Pr. 12 Condr.	22(7x30)	Same as 5151	.290
5157	7 Pr. 14 Condr.	22(7x30)	Same as 5151	.300
5158	8 Pr. 16 Condr.	22(7x30)	Same as 5151	.320
5159	9 Pr. 18 Condr.	22(7x30)	Same as 5151	.355
5161	11 Pr. 22 Condr.	22(7x30)	Same as 5151	.370
5165	15 Pr. 30 Condr.	22(7x30)	Same as 5151	.450
5167	27 Pr. 54 Condr.	22(7x30)	Same as 5151	.570
5171	31 Pr. 62 Condr.	22(7x30)	Same as 5151	.635
5181	41 Pr. 82 Condr.	22(7x30)	Same as 5151	.710
5191	51 Pr. 102 Condr.	22(7x30)	Same as 5151	.800

Color Coding For Paired Intercom Cables

PAIRED INTERCOMMUNICATING CABLES COLOR CODING

Identification is simple with Consolidated Intercom Cables because they are all color coded. See chart below.

1 Black prd. w. Red
2 Black prd. w. White
3 Black prd. w. Green
4 Black prd. w. Blue
5 Black prd. w. Brown
6 Black prd. w. Yellow
7 Black prd. w. Orange
8 Red prd. w. Green
9 Red prd. w. White
10 Red prd. w. Blue
11 Red prd. w. Yellow
12 Red prd. w. Brown
13 Red prd. w. Orange
14 Green prd. w. Blue
15 Green prd. w. White
16 Green prd. w. Brown
17 Green prd. w. Orange
18 Green prd. w. Yellow
19 White prd. w. Blue
20 White prd. w. Brown
21 White prd. w. Orange
22 White prd. w. Yellow
23 Blue prd. w. Brown
24 Blue prd. w. Orange
25 Blue prd. w. Yellow
26 Brown prd. w. Orange
27 Brown prd. w. Yellow
28 Purple prd. w. Red
29 Purple prd. w. White
30 Purple prd. w. Green
31 Purple prd. w. Blue
32 Purple prd. w. Brown
33 Purple prd. w. Yellow
34 Purple prd. w. Orange
35 Purple prd. w. Slate
36 Purple prd. w. Black
37 Slate prd. w. Red
38 Slate prd. w. White
39 Slate prd. w. Green
40 Slate prd. w. Blue
41 Slate prd. w. Brown
42 Slate prd. w. Yellow
43 Slate prd. w. Orange
44 Slate prd. w. Black
45 White/Black prd. w. Red
46 White/Black prd. w. Green
47 White/Black prd. w. Blue
48 White/Black prd. w. Brown
49 White/Black prd. w. Yellow
50 White/Black prd. w.
51 White/Black prd. w. Purple

STANDARD SPOOL PUT-UP: 100 FT., 500 FT., 1000 FT. ALL ITEMS.

CONSOLIDATED

CONSOLIDATED WIRE & ASSOCIATED CORPORATIONS
1633 S. CLINTON ST. • (312) 421-4441 • Cable Address: "CON WIRE" • CHICAGO, ILL. 60616

TELEPHONE AND COMMUNICATION CABLE

AERIAL AND DUCT INSTALLATION — MEETS REA-PE-22

DESCRIPTION: Each conductor bare solid copper, color coded polyethylene insulation, insulated conductors paired, pairs cabled with non-hygroscopic tape wrap, .008″ corrugated aluminum shield, black polyethylene jacket overall.

CHARACTERISTICS: Average mutual capacitance — .083 microfarads/mile. Minimal cross talk.

APPLICATIONS: A tough, long lasting communication cable that can withstand moisture, ultra-violet and weathering.

Catalog Number	No. of Pairs	Nom. Jkt. Thick. (Inches)	Nom. O.D. (Inches)	Ship. Wt. Lbs. M/Ft.
#22 AWG — SOLID				
6606	6	.060	.420	95
6612	12	.060	.490	137
6618	18	.060	.560	201
6625	25	.060	.630	245
6650	50	.060	.800	420
6675	75	.060	.980	596
6610	100	.070	1.120	807
6615	150	.070	1.320	1,083
6620	200	.070	1.500	1,485
6630	300	.080	1.810	2,160
6640	400	.090	2.050	2,705
#19 AWG — SOLID				
6706	6	.060	.500	136
6712	12	.060	.630	235
6718	18	.060	.730	318
6725	25	.060	.820	419
6750	50	.070	1.120	753
6775	75	.070	1.320	1,070
6710	100	.080	1.520	1,455
6715	150	.080	1.790	2,051
6720	200	.090	2.090	2,657

DIRECT BURIAL INSTALLATION — MEETS REA-PE-23

DESCRIPTION: Each conductor bare solid copper, color coded polyethylene insulation, insulated conductors paired, pairs cabled with non-tygroscopic tape wrap, polyethylene inner jacket, .005″ corrugated copper, or .010″ corrugated aluminum shield, black polyethylene jacket overall.

CHARACTERISTICS: Average mutual capacitance .166 microfarads/mile. Minimal cross talk.

APPLICATIONS: Impervious to moisture, abrasion resistant, suitable for direct burial.

#22 AWG — SOLID				
6006	6	.040	.480	150
6012	12	.040	.550	170
6018	18	.040	.620	241
6025	25	.040	.690	302
6050	50	.040	.860	478
6075	75	.040	1.040	680
6100	100	.040	1.180	886
6150	150	.050	1.400	1,258
6200	200	.050	1.560	1,557
6300	300	.060	1.890	2,173
6400	400	.060	2.130	2,853
#19 AWG — SOLID				
6106	6	.040	.560	168
6112	12	.040	.690	290
6118	18	.040	.790	367
6125	25	.040	.880	480
6170	50	.050	1.180	871
6175	75	.050	1.400	1,246
6110	100	.050	1.580	1,568
6250	150	.060	1.890	2,236
6220	200	.060	2.170	2,986

STANDARD PUT-UP: CUT TO SPECIFICATION — MIN. 25 FT. — COLOR CODE — per IPCEA.

CONSOLIDATED WIRE & ASSOCIATED CORPORATIONS

CONSOLIDATED

1633 S. CLINTON ST. • (312) 421-4441 • Cable Address: "CON WIRE" • CHICAGO, ILL. 60616

TELEMETERING AND DATA SHIELDED CONTROL CABLE

DESCRIPTION: Each conductor bare solid copper, high molecular weight polyethylene insulation, color coded, twisted into pairs, cabled with a non-hygroscopic binder tape .008″ aluminum shield, black polyethylene jacket overall. Operating voltage 300 volts.

Double jacketed types (8306-8420 below), same except for additional inner black polyethylene jacket over binder, and .005″ copper shield, or .010″ aluminum shield.

APPLICATIONS: Remote control of rocket recording data and test-firing control, transmission of signals which telemeter temperature, voltage pressure, etc. control of multiple circuits, measuring devices, quality control equipment, radar antenna. For aerial, duct and conduit installations.

Double jacketed types have higher dielectric strength and suited for direct burial installations.

Catalog Number	No. of Pairs	Nom. Insul. Thick. (Inches)	Nom. Jkt. Thick. (Inches)	Nom. O.D. (Inches)	Approx. Lbs. M/Ft.
#22 AWG — SOLID					
8006	6	.012	.060	.420	95
8012	12	.012	.060	.490	137
8018	18	.012	.060	.560	201
8025	25	.012	.060	.630	245
8050	50	.012	.060	.800	420
8100	100	.012	.060	1.120	807
8200	200	.012	.060	1.500	1,485
#19 AWG — SOLID					
8016	6	.015	.060	.500	136
8112	12	.015	.060	.630	235
8118	18	.015	.060	.730	318
8125	25	.015	.060	.820	419
8150	50	.015	.060	1.120	753
8110	100	.015	.060	1.520	1,455
8220	200	.015	.060	2.090	2,657

DOUBLE JACKET — HEAVY DUTY

Catalog Number	No. of Pairs	Nom. Insul. Thick. (Inches)	Nom. Jkt. Thick. (Inches)		Nom. O.D. (Inches)	Approx. Lbs. M/Ft.
			Inner	Outer		
#22 AWG — SOLID						
8306	6	.012	.047	.040	.480	150
8312	12	.012	.047	.040	.550	170
8318	18	.012	.047	.040	.620	241
8325	25	.012	.047	.040	.690	302
8350	50	.012	.047	.040	.860	478
8310	100	.012	.047	.050	1.180	886
8320	200	.012	.047	.050	1.560	1,597
#19 AWG — SOLID						
8406	6	.015	.047	.040	.560	168
8412	12	.015	.047	.040	.690	290
8418	18	.015	.047	.040	.790	367
8425	25	.015	.047	.040	.880	480
8450	50	.015	.047	.040	1.180	871
8410	100	.015	.047	.050	1.580	1,568
8420	200	.015	.047	.050	2.220	2,986

STANDARD PUT-UP: CUT TO SPECIFICATION — MIN. 25 FT.

CONSOLIDATED

CONSOLIDATED WIRE & ASSOCIATED CORPORATIONS

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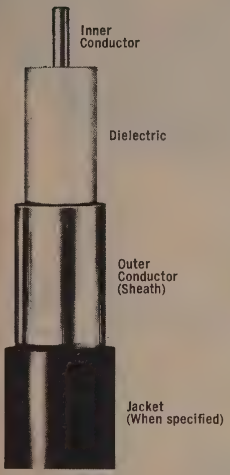
UNIFOAM CABLE SPECIFICATIONS



Trade Size	0.412″	½″	¾″
Catalog Number, Plain	4840	4850	4875
Catalog Number, Jacketed	4845	4855	4880
Dimensions, Packaging, Weight			
Inner conductor diameter, Inches	0.078 ±.001	0.098 ±.001	0.146 ±.001
Sheath O.D., Inches	0.412 Nom.	0.500 Nom.	0.750 Nom.
Maximum, Inches	0.418	0.507	0.760
Minimum, Inches	0.406	0.493	0.740
Max.-Min. at any section, Inches	0.009 Max.	0.010 Max.	0.015 Max.
Nominal wall, Inches	0.025	0.025	0.037
Jacket (when specified) O.D., Inches	0.512 Nom.	0.600 Nom.	0.850 Nom.
Jacket thickness, Inches	0.050 Nom.	0.050 Nom.	0.050 Nom.
Standard Length, Feet	1200 ±10%	1200 ±10%	1200 ±10%
Net Weight, Lbs./M Ft. Plain	76	107	231
Net Weight, Lbs./M Ft. Jacketed	105	141	285
Reel, Flange Dia., Inches	28 or 33	33	48
Traverse, Inches	18	18	24
Mechanical Properties			
Conductor Adhesion, Lbs. (Force required to extract conductor from 12″ section)	75 Min.	100 Min.	150 Min.
Max. Pulling Tension, Lbs.	155	190	420
Min. Bending Radius, Inches	4.5	5.0	7.5
Electrical Characteristics			
Capacitance, pf/ft.	16.7 ±1	16.7 ±1	16.7 ±1
Velocity of Propagation, %	81 ±3	81 ±3	81 ±3
Characteristic Impedance, Ohms	75 ±2	75 ±2	75 ±2
*Inner Conductor DC Resistance @ 68F, Ohms/M Ft.	1.71 ±0.5	1.08 ±.03	0.49 ±.02
*Outer Conductor DC Resistance @ 68F, Ohms/M Ft.	0.44 ±.02	0.36 ±.02	0.16 ±.01
Dielectric Strength, Insulation	3.5 kv	4.3 kv	5 kv
Dielectric Strength, Jacket	5 kv	5 kv	5 kv

*Conductor resistance at any temperature t(F°) may be determined by multiplying these values by the following:
Inner conductor: [1+0.00218 (t-68)]
Outer conductor: [1+0.00224 (t-68)]

SWEEP TESTING — STRUCTURAL UNIFORMITY

Each length of Consolidated Unifoam CATV cable is checked for structural uniformity over the frequency range of 5 - 220 MHz. This includes the 88 - 105 MHz FM band and the 105 - 174 MHz band, as well as all 12 VHF TV channels. Factory acceptance standards require that each length of cable have a Structural Return Loss (SRL) at least 28 db. down at any frequency within this range. The 28 db. value is not subject to any frequency weighting factors.

Consolidated Unifoam CATV cable

Inner Conductor: High purity (99.9% minimum) soft, uncoated copper

Dielectric: Cellular polyethylene

Outer Conductor (sheath): High purity (99.6% minimum) seamless aluminum

Jacket (when specified): Black, high molecular weight polyethylene

CONSOLIDATED WIRE & ASSOCIATED CORPORATIONS

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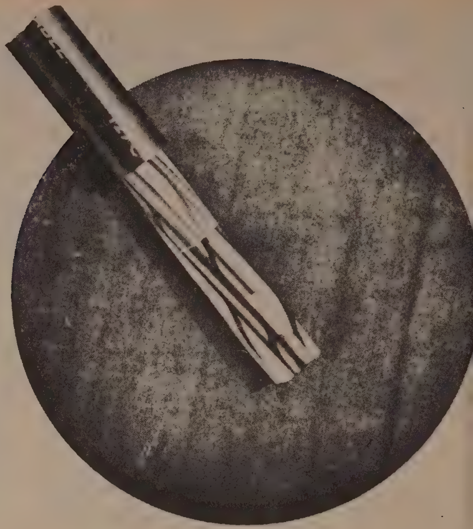

CYPRUS CONTROL CABLES TYPES CT-B and CT-C

TYPES CT-B/CT-C

Meeting IPCEA-NEMA standards for use on both AC and DC circuits, these control cables are designed to handle a wide range of applications. Lighter in weight, smaller in diameter and more flexible than conventional rubber insulated multi-conductors cables, Cyprus CT Thermoplastic insulated control cables are easy to handle, store and install.

Cyprus/Rome CT control cables are available with various types of copper, bronze or copper clad stainless shielding to provide electrostatic or electromagnetic protection. Shielding also provides added physical protection and acts as a positive deterrent against rodent or insect attack.

Synthinol (polyvinylchloride) is used for jacketing individual conductors as well as for an over-all jacket. Synthinol provides added resistance to heat and to chemical and corrosive attack. It also provides mechanical protection and is a flame retardant barrier for the cable insulation.

600 volt rated Type CT-B cables are primarily for use in general applications, while 1000 volt rated Type CT-C cables are more frequently used in connection with heavy magnetic trip devices, where induced over-voltages may occur.

Both CT-B and CT-C are made with bare stranded copper conductors, individually insulated and fully color-coded. These cables are suitable for all types of installations — aerial, conduit, duct, tray, direct burial — in wet or dry locations.

USES:

In power generating stations and substations as wel as throughout industry in both manufacturing and processing plants.

RATINGS:

For AC and DC circuits. Type CT-B is rated 600 volts. Type CT-C, 1000 volts. Both are recommended for operation at 90°C. maximum continuous conductor temperature.

INSULATION:

Polyethylene insulation is used on individual conductors since it has proven superior to many other dielectric materials used on solid insulated cables. This material is particularly well suited for DC circuits in moist locations where electro-osmosis may be a problem.

Along with its important outstanding electrical properties, polyethylene also resists acids, alkalies and oils. It is thus capable of standing up well under many hazardous environmental conditions.

CONSOLIDATED

CONSOLIDATED WIRE & ASSOCIATED CORPORATIONS

1633 S. CLINTON ST. • (312) 421-4441 • Cable Address: "CON WIRE" • CHICAGO, ILL. 60616

UNSHIELDED STATION CONTROL CABLE

HEAVY DUTY MULTI-CONDUCTOR PLASTIC JACKET — TYPE CT-B CONTROL CABLE — 600 VOLTS

DESCRIPTION: Each conductor, stranded bare copper, .020″ polyethylene insulation, .010″ polyvinylchloride jacket over each conductor, color coded, cabled with fillers where necessary, moisture resistant tape, black polyvinylchloride jacket overall. 600 volt operating voltage. Approved per IPCEA-NEMA standards.

Catalog Number	No. of Cond.	Nom. Jkt. Thick. (Inches)	Nom. O.D. (Inches)	Catalog Number	No. of Cond.	Nom. Jkt. Thick. (Inches)	Nom. O.D. (Inches)
16 GAUGE — 26/30 BARE COPPER							
7502	2	.045	.330	**7519**	19	.060	.690
7503	3	.045	.350	**7521**	21	.060	.730
7505	5	.045	.410	**7522**	22	.060	.760
7506	6	.045	.440	**7524**	24	.060	.810
7507	7	.045	.440	**7526**	26	.060	.820
7508	8	.045	.480	**7530**	30	.060	.900
7510	10	.045	.580	**7537**	37	.060	.960
7512	12	.045	.600	**7540**	40	.060	1.00
7514	14	.045	.630	**7550**	50	.080	1.10
7516	16	.045	.660	**7560**	60	.080	1.19
14 GAUGE — 7/22 BARE COPPER							
7602	2 Twin	.045	*	**7614**	14	.060	.744
7603	3 Rd.	.045	.419	**7616**	16	.060	.798
7604	4	.045	.425	**7619**	19	.060	.808
7605	5	.045	.462	**7624**	24	.080	.947
7606	6	.045	.481	**7627**	27	.080	1.002
7607	7	.045	.502	**7630**	30	.080	1.110
7608	8	.060	.556	**7634**	34	.080	1.118
7609	9	.060	.622	**7637**	37	.080	1.124
7610	10	.060	.657	**7640**	40	.080	1.290
7612	12	.060	.696				
12 GAUGE — 7/20 BARE COPPER							
7702	2 Twin	.045	**	**7715**	15	.060	.832
7703	3 Rd.	.045	.460	**7716**	16	.060	.901
7704	4	.045	.471	**7718**	18	.080	.928
7705	5	.045	.523	**7719**	19	.080	.943
7706	6	.045	.564	**7720**	20	.080	.966
7707	7	.060	.599	**7722**	22	.080	1.01
7708	8	.060	.644	**7725**	25	.080	1.09
7709	9	.060	.690	**7727**	27	.080	1.129
7710	10	.060	.727	**7730**	30	.080	1.168
7712	12	.060	.775	**7734**	34	.080	1.201
7714	14	.060	.807	**7737**	37	.080	1.257
10 GAUGE — 7/18 BARE COPPER							
7802	2	.045	.27x.45	**7809**	9	.060	.777
7803	3	.045	.483	**7810**	10	.060	.830
7804	4	.060	.569	**7812**	12	.080	.915
7805	5	.060	.618	**7815**	15	.080	.93
7806	6	.060	.640	**7816**	16	.080	.99
7807	7	.060	.671	**7820**	20	.080	1.11
7808	8	.060	.700				
9 GAUGE — 19/22 BARE COPPER							
7902	2	.045	.29x.48	**7909**	9	.060	.831
7903	3	.045	.526	**7910**	10	.060	.900
7904	4	.060	.604	**7912**	12	.080	.978
7905	5	.060	.659	**7915**	15	.080	.99
7906	6	.060	.670	**7916**	16	.080	1.10
7907	7	.060	.716	**7920**	20	.080	1.70
7908	8	.060	.760				

* Flat Dimension .233″ x .366″

** Flat Dimension .252″ x .404″

CONSOLIDATED WIRE & ASSOCIATED CORPORATIONS

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RG TYPE COAXIAL CABLES

Non-Contaminating Low Temp. Black Jkt.		Vinyl & Poly. Jackets		Armor O.D.	Jacket O.D.	Vinyl Jacket	Shields		Dielectric O.D.	Center Conductor	V.P. %	Cap. Mmfd./ Ft.	Max. Oper. Volts Rms.	Nom. Imp. Ohms
Number RG/U	Catalog Number	Number RG/U	Catalog Number				Outer	Inner						
5B	4432				.332	Black	S	S	.185	.053S	65.9	29.5	3000	50
6A	4433				.332	Black	C	C	.185	21CW	65.9	20	2700	75
		8	4415		.405	Black		C	.285	7/21	65.9	29.5	4000	52
8A	4435				.405	Black		C	.285	7/.0296	65.9	30.5	4000	52
		9	4436		.420	Gray	C	S	.280	7/21S	65.9	30	4000	51
9A	4437				.420	Gray	S	S	.280	7/21S	65.9	30	4000	51
9B	4438				.425	Black	S	S	.285	7/.0296S	65.9	30.5	4000	50
10A	4439			.475	.405	Black		C	.285	7/.0296	65.9	30.5	4000	50
		11	4419		.405	Black		C	.285	7/26T	65.9	20.5	4000	75
11A	4440				.405	Black		C	.285	7/26T	65.9	20.5	4000	75
12A	4441			.475	.405	Black		C	.285	7/26T	65.9	20.5	4000	75
13A	4443				.425	Black	C	C	.285	7/26T	65.9	20.5	4000	75
14A	4468				.545	Black	C	C	.370	.106	65.9	30	5500	52
17A	4482				.870	Black		C	.680	.188C	65.9	29.5	11000	52
18A	4483			.945	.870	Black		C	.680	.188C	65.9	29.5	11000	52
		21	4444		.322	Gray	S	S	.185	16N	65.9	29	2700	53
21A	4445				.332	Black	S	S	.185	.053N	65.9	30	2700	50
		22	4471		.405	Black		T	.285	Two 7/.0152	65.9	16	1000	95
22B	4475				.420	Black	T	T	.285	Two 7/.0152	65.9	16	1000	95
		29	4446		.184	Poly		T	.116	20	65.9	28.5	1900	53.5
		54A	4469		.250	Poly		T	.178	7/.0152	65.9	26.5	3000	58
		55	..4447		.206	Poly	T	T	.116	20	65.9	28.5	1900	53.5
55A	4448				.216	Black	S	S	.116	.035S	65.9	29.5	1900	50
55B	4484				.206	Black	T	T	.116	20S	65.9	28.5	1900	53.5
		58	4405		.195	Black		T	.116	20	65.9	28.5	1900	53.5
58A	4449				.195	Black		T	.116	19/.0071T	65.9	29.5	1900	50
58B	4474				.195	Black		T	.116	20	65.9	28.5	1900	53.5
58C	4450				.195	Black		T	.116	19/.0071T	65.9	29.5	1900	50
		59	4401		.242	Black		C	.146	22CW	65.9	21	2300	73
		59	4402		.242	Gray		C	.146	22CW	65.9	21	2300	73
59	4403				.242	White		C	.146	22CW	65.9	21	2300	73
59A	4451				.242	Black		C	.146	.023CW	65.9	20.5	2300	75
59B	4470				.242	Black		C	.146	.023CW	65.9	20.5	2300	75
		62	4452		.242	Black		C	.146**	22CW	84	13.5	750	93
62A	4453				.242	Black		C	.146**	22CW	84	13.5	750	93
62B	4472				.242	Black		C	.146	7x32CW	84	13.5	750	93
		63	4454		.405	Black		C	.285**	22CW	84	10	1000	125
63B	4455				.405	Black		C	.285**	22CW	84	10	1000	125
71A	4466				.245	Black	T	T or C	.146**	22CW	84	13.5	750	93
71B	4485				.250	Black	T	C	.146	22CW	84	13.5	750	93
74A	4486			.615	.545	Black	C	C	.370	10C	65.9	29.5	7000	52
79B	4487			.475	.405	Black		C	.285	22CW	84	10	1000	125
		83	4410		.405	Black		C	.240	10C	65.9	44	2000	35
		100	4412		.242	Black		C	.146	19/.0147C	65.9	44	2000	35

** Semi-Solid Dielectric

N—Nichrome

C—Copper

S—Silvered Copper

CW—Copperweld

T—Tinned Copper

F—Formvar

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RG TYPE COAXIAL CABLES

Non-Contaminating Low Temp. Black Jkt.		Vinyl & Poly. Jackets					Shields							
Number RG/U	Catalog Number	Number RG/U	Catalog Number	Armor O.D.	Jacket O.D.	Vinyl Jacket	Outer	Inner	Dielectric O.D.	Center Conductor	V.P. %	Cap. Mmfd./Ft.	Max. Oper. Volts Rms.	Nom. Imp. Ohms
		108	**4464**		.235	Black		T	.079 ea.	Two 7/28T	68	23.5	1000	78
108A	**4465**				.235	Black		T	.079 ea.	Two 7/28T	65.9	23.5	1000	78
		111	**4422**	.480	.420	Gray	T	T	.285	Two 7/.152T	65.9	16	1000	95
111A	**4423**			.490	.420	Gray	T	T	.285	Two 7/.152T	65.9	16	1000	95
		114	**4426**		.405	Black		C	.285	.007CW		6.8	1000	185
114A	**4427**				.405	Black		C	.285	.007CW		6.8	1000	185
122	**4457**				.160	Black		T	.096	27/36T	65.9	29.5	1900	50
130	**4428**				.625	Black		T	.472	Two 7/21C	65.9	17	3000	95
131	**4429**			.710	.625	Black		T	.472	Two 7/21C	65.9	17	3000	95
133A	**4430**				.405	Black		C	.285	21C	65.9	16.2	1000	95
		164	**4404**		.870	Black		C	.680	.1045C			10000	75
		177	**4406**		.895	Black	S	S	.680	.195C			11000	50
		181	**4407**		.640	Black		C	.210	Two 7/26C		12	3500	125
212	**4488**				.332	Black	S	S	.185	.0556S	65.9	29.5	3000	50
213	**4489**				.405	Black		C	.285	7X.0296C	65.9	29.5	5000	50
214	**4490**				.425	Black	S	S	.285	7X.0296C	65.9	29.5	5000	50
215	**4497**				.475	Black		C	.285	7/.029C	65.9	29.5	4000	50
216	**4491**				.425	Black	C	C	.285	7X26TC	65.9	20.5	5000	75
217	**4492**				.545	Black	C	C	.370	.106C	65.9	29.5	7000	50
218	**4493**				.870	Black		C	.680	.195C	65.9	29.5	11000	50
219	**4494**			.945	.870	Black		C	.680	.195C	65.9	29.5	11000	50
		220	**4408**		1.120	Black		C	.910	.260C	65.9	29.5	14000	50
		221	**4409**	1.195	1.120	Black		C	.910	.260C	65.9	29.5	14000	50
222	**4495**				.332	Black	S	S	.185	.0556N	65.9	29.0	2700	50
223	**4496**				.216	Black	S	S	.116	.035S	65.9	29.5	1900	50
		224	**4411**	.615	.545	Gray	C	C	.370	.106C	65.9	29.5	5500	52

INIATURE COAXIAL CABLE

		174	**4459**		.105	Black		T	.060**	7/.0063CW		30		50

OAM POLYETHYLENE COAXIAL CABLE

		8	**4477**		.405	Black		C	.285	7/21C	80	24.5	1500	50
11	**4476**				.405	Black		C	.285	14C	80	16.5	3000	75
		58	**4498**		.195	Black		T	.116	20C	80	28.5	1900	53.5
		59	**4478**		.242	Black		C	.107	22CW	80	17	500	72
62	**4479**				.242	Black		C	.146	.023CW	80	14.5	700	93

OAM POLYETHYLENE TRIAXIAL CABLE DOUBLE SHIELD DOUBLE JACKET

11	**4480**				.460	Black	C	C	.285	14C	80	16.5	3000	75
59	**4481**				.315	Black	C	C	.107	.032CW	80	17	500	72

RIAXIAL CABLE DOUBLE SHIELD DOUBLE JACKET

RG/U Type	Catalog Number	Impedance In Ohms	Jacket Diameter	Vinyl Jacket	Shields		O.D. Dielectric	Inner Conductor	V.P. %	Cap. Mmfd./Ft.	Max. Oper. Volts Rms.
					1st	2nd					
Triaxial 58A	**4463**	50	.285	Black	T	T	.116	19 .0071T	65.9	28.5	1900
Triaxial 59	**4460**	73	.325	Black	C	C	.146	22CW	65.9	21.0	2300
Triaxial 11	**4461**	75	.460	Black	C	C	.285	14C	65.9	20.5	4000
Triaxial 8	**4462**	52	.490	Black	C	C	.285	7/21C	65.9	29.5	4000

Semi-Solid Dielectric N—Nichrome C—Copper S—Silvered Copper CW—Copperweld T—Tinned Copper F—Formvar

CONSOLIDATED WIRE & ASSOCIATED CORPORATIONS

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TEFLON COAXIAL CABLE

Number RG/U	Catalog Number	Inner Conductor	Dielectric Material	Nominal Diameter of Dielectric (Inch)	Type of Shielding Braids	Protective Covering	Nominal Over-all Diameter (Inch)	Nominal Capacitance (Mmfd/Ft.)	Maximum Operating Voltage (Volts Rms)	Nominal Imped. (Ohms)
62C	4700	.0253 Silver Covered Copper Steel	F-3	.146	Silver Covered Copper Single Braid	V	.242	14.5	750	93
87A	4701	7/.032 Silver Covered Copper	F-1	.280	Silver Coated Copper Double Braid	V	.425	29.5	5000	50
94	4702	19/.0025 Silver Covered Copper	F-2	.292	Copper Double Braid	V	.445	29.0	7000	50
94A	4703	19/.0254 Silver Plated Copper	F-2	.370	Copper Double Braid	V	.500	27.0	7000	50
115	4704	7/.028 Silver Covered Copper	F-2	.250	Silver Coated Copper Double Braid	V	.375	29.5	5000	50
115A	4705	7/.028 Silver Covered Copper	F-2	.255	Silver Coated Copper Double Braid	V	.415	29.5	5000	50
116	4706	7/.032 Silver Covered Copper	F-1	.280	Silver Coated Copper Double Braid	V with armor	.490	29.5	5000	50
117	4707	.188 Copper	F-1	.620	Copper Single Braid	V	.730	29.0	7000	50
117A	4708	.188 Copper	F-1	.620	Copper Single Braid	V	.730		7000	50
118	4709	.188 Copper	F-1	.620	Copper Single Braid	V with armor	.795	29.0	7000	50
118A	4710	.188 Copper	F-1	.620	Copper Single Braid	V with armor	.780		7000	50
119	4711	.102 Copper	F-1	.332	Copper Double Braid	V	.465	29.0	6000	50
120	4712	.102 Copper	F-1	.332	Copper Double Braid	V with armor	.525	29.0	6000	50
126	4713	7/.0203 Karma or Equal	F-1	.185	Karma or Equal Single Braid	V	.280	29.0	3000	50
140	4714	.025 Silver Coated Copper Steel	F-1	.146	Silver Coated Copper Single Braid	V	.233	21.0	2300	75
141	4715	.0359 Silver Plated Copper Weld	F-1	.116	Silver Coated Copper Single Braid	V	.190	28.5	1900	50
141A	4716	.039 Silver Covered Copper Steel	F-1	.116	Silver Coated Copper Single Braid	V	.190	28.5	1900	50
142	4717	.0359 Silver Covered Copper Steel	F-1	.116	Silver Coated Copper Double Braid	V	.206	28.5	1900	50
142A	4718	.039 Silver Covered Copper Steel	F-1	.116	Silver Coated Copper Double Braid	V	.206	28.5	1900	50
142B	4719	.039 Silver Covered Copper Steel	F-1	.116	Silver Coated Copper Double Braid	FEP	.195	28.5	1900	50
143	4720	.057 Silver Plated Copper Weld	F-1	.185	Silver Coated Copper Double Braid	V	.325	28.5	3000	50
143A	4721	.059 Silver Covered Copper Steel	F-1	.185	Silver Coated Copper Double Braid	V	.325	28.5	3000	50
144	4722	7/.0179 Silver Covered Copper Steel	F-1	.285	Silver Coated Copper Single Braid	V	.410	20.5	5000	75
146	4723	.007 Copper Covered Steel	F-3	.285	Copper Single Braid	V	.375	6.0	1000	190
161	4724	7/38 Silver Plated Cadmium Bronze	F-1	.057	Single Silver Copper	Extruded Black Nylon	.090	20.0	1000	70
165	4725	7/.032 Silver Covered Copper	F-1	.285	Silver Covered Copper Single Braid	V	.410		5000	50
166	4726	7/.032 Silver Covered Copper	F-1	.285	Silver Covered Copper Single Braid	V with armor	.460		5000	50
178	4727	7/.0039 Silver Plated Copper Weld	F-1	.036	Silver Plated Copper Single Braid	KEL-F	.079	27.9	1000	50
178A	4728	7/.004 Silver Covered Copper Steel	F-1	.034	Silver Plated Copper Single Braid	KEL-F	.075	27.9	1000	50
178B	4729	7/.004 Silver Covered Copper Steel	F-1	.034	Silver Covered Copper Single Braid	FEP	.075		1000	50
179	4761	7/.004 Silver Covered Copper Steel	F-1	.063	Silver Covered Copper Single Briad	KEL-F	.100		1200	75

Continued on following page

F-1 — Solid Teflon F-2 — Taped Teflon F-3 — Air Spaced Teflon
V — High Temperature Lacquer Impregnated Fiberglass Braid with Teflon Tape Between Shield and Jacket.
VI — Polyester Fiber Impregnated with High Temperature Lacquer over Wrapped or Extruded Silicone Impregnated Fiberglass
IIA — Low Temperature Black Polyvinylchloride Non-Contaminating
FEP — Fluorinated Ethylene Propylene Copolymar, 200° Teflon
TFE — Tertafluoride Ethylene Propylene Copolymar, 250°C Teflon

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TEFLON COAXIAL CABLE

Number RG/U	Catalog Number	Inner Conductor	Dielectric Material	Nominal Diameter of Dielectric (Inch)	Type of Shielding Braids	Protective Covering	Nominal Over-all Diameter (Inch)	Nominal Capacitance (Mmfd/Ft.)	Maximum Operating Voltage (Volts Rms)	Nominal Imped. (Ohms)
179A	4730	7/.004 Silver Covered Copper Steel	F-1	.063	Silver Plated Copper Single Briad	KEL-F	.105	20.0	1200	75
179B	4731	7/.004 Silver Covered Copper Steel	F-1	.063	Silver Covered Copper Single Braid	FEP	.105		1200	75
180	4732	7/.0039 Silver Covered Copper Steel	F-1	.103	Silver Plated Copper Single Braid	KEL-F	.141	15.3	1500	93
180A	4733	7/.004 Silver Covered Copper Steel	F-1	.102	Silver Plated Copper Single Braid	KEL-F	.145	14.5	1500	95
180B	4734	7/.004 Silver Covered Copper Steel	F-1	.102	Silver Covered Copper Single Braid	FEP	.145		1500	95
187	4735	7/.004 Silver Covered Copper Steel	F-1	.060	Silver Covered Copper Single Braid	Teflon	.110		1200	75
187A	4736	7/.004 Silver Covered Copper Steel	F-1	.060	Silver Covered Copper Single Braid	TFE	.110		1200	75
188	4737	7/.0067 Silver Covered Copper Steel	F-1	.060	Silver Covered Copper Single Braid	Teflon	.110		1200	50
188A	4738	7/.0067 Silver Covered Copper Steel	F-1	.060	Silver Covered Copper Single Braid	TFE	.110		1200	50
195	4739	7/.004 Silver Covered Copper Steel	F-1	.102	Silver Covered Copper Single Braid	Teflon	.155		1500	95
195A	4740	7/.004 Silver Covered Copper Steel	F-1	.102	Silver Covered Copper Single Braid	TFE	.155		1500	95
196	4741	7/.004 Silver Covered Copper Steel	F-1	.034	Silver Covered Copper Single Braid	Teflon	.080		1000	50
196A	4742	7/.004 Silver Covered Copper Steel	F-1	.034	Silver Covered Copper Single Braid	TFE	.080		1000	50
209	4743	19/.037 Silver Covered Copper	F-3	.500	Silver Covered Copper Double Braid	VI	.750		3200	50
210	4744	.0253 Silver Covered Copper Steel	F-3	.146	Silver Covered Copper Single Braid	V	.242	14.5	750	93
211	4745	.190 Copper	F-1	.620	Copper Single Braid	V	.730		7000	50
211A	4746	.190 Copper	F-1	.620	Copper Single Braid	V	.730		7000	50
225	4747	7/.0312 Silver Covered Copper	F-1	.285	Silver Covered Copper Double Braid	V	.430		5000	50
226	4748	19/.0254 Silver Covered Copper	F-2	.370	Copper Double Braid	V	.500		7000	50
227	4749	7/.0312 Silver Covered Copper	F-1	.285	Silver Covered Copper Double Braid	V with armor	.490		5000	50
228	4750	.190 Copper	F-1	.620	Copper Single Braid	V with armor	.795		7000	50
228A	4751	.190 Copper	F-1	.620	Copper Single Braid	V with armor	.795		7000	50
235	4752	7/.028 Copper	F-2	.255	Silver Covered Copper Double Braid	VI	.490		5000	50
279	4762	19/.005 Silver Covered Copper Steel	F-1	.110	Silver Covered Copper Single Braid	V	.145	17.3	1500	75
280	4753	.1144 Copper	F-2	.327	Silver Covered Copper Double Braid	IIA	.480	27.5	4000	50
281	4754	19/.0378 Silver Covered Copper	F-2	.500	Silver Covered Copper Double Braid	VI	.750	29.5	4000	50
301	4755	7/.0203 Karma	F-1	.185	Karma Single Braid	FEP	.245	29.0	3000	50
302	4756	.025 Silver Covered Copper Steel	F-1	.146	Silver Covered Copper Single Braid	FEP	.206	21.0	2300	75
303	4757	.039 Silver Covered Copper Steel	F-1	.116	Silver Covered Copper Single Braid	FEP	.170	28.5	1900	50
304	4758	.059 Silver Covered Copper Steel	F-1	.185	Silver Covered Copper Double Braid	FEP	.280	28.5	3000	50
316	4759	7/.0067 Silver Covered Copper Steel	F-1	.060	Silver Covered Copper Single Braid	FEP	.102		1200	50

F-1 — Solid Teflon F-2 — Taped Teflon F-3 — Air Spaced Teflon
V — High Temperature Lacquer Impregnated Fiberglass Braid with Teflon Between Shield and Jacket.
VI — Polyester Fiber Impregnated with High Temperature Lacquer over Wrapped or Extruded Silicone Impregnated Fiberglass
IIA — Low Temperature Black Polyvinylchloride Non-Contaminating
FEP — Fluorinated Ethylene Propylene Copolymar, 200° Teflon
TFE — Tertafluoride Ethylene Propylene Copolymar, 250°C Teflon

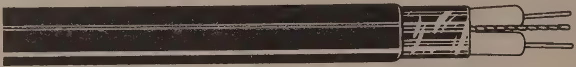
SHIELDED AND UNSHIELDED—"CONCO-FOAM"
(Low Loss Foam Polyethylene All Channel Color TV Cable)

Conco-Foam assures excellent VHF, UHF, Color and B/W TV reception in uncongested and fringe regions. Will provide far greater signal than any other unshielded twin lead cable. Assures highest efficiency even when exposed to weathering and atmospheric conditions.

Conco-Foam assures excellent VHF, UHF, Color and B/W TV reception in crowded areas where reception is critical. Mylar-aluminum shielding provides strong and clean signals, eliminating electrical noise and ghost signals. Conco-Foam can be attached to mast, installed in gutters, conduit, or underground.

AWG and Stranding	Color	Nom. O.D. (Inches)	Nom. Velocity of Propagation	Nom. Cap. (Mmf/Ft.)	Nom. Attenuation Per 100′	Spool Put-Up*
4530 "CONCO-FOAM"						
20 - 7 Strands	Black	.150 x .410	80.3%	4.9	100MC/1.04 DB 500MC/3.5 DB 900MC/4.5 DB	**50′, 100′ **75′ 500′, 1000′
4532 "CONCO-FOAM"						
22 - 7 Strands	Black	.160 x .400	80%	5.3	100MC/1.4 DB 500MC/3.8 DB 900MC/5.6 DB	500′, 1000′

Bare Copper, 2 conductors parallel, white Conco-Foam insulation, overall Black polyethylene jacket with web.
** Furnished individually packed coils.



AWG and Stranding	Color	Nom. O.D. (Inches)	Nom. Velocity of Propagation	Nom. Cap. (Mmf/Ft.)	Nom. Attenuation Per 100′	Spool Put-Up*
4535 SHIELDED "CONCO-FOAM"						
22 - 7 Strands	Black	.275 x .455	76.5%	6.8	50MC/2.0 DB 100MC/2.8 DB 200MC/4.1 DB 400MC/5.9 DB 675MC/7.5 DB	**50′, 100′ **75′ 500′, 1000′

Copperweld, 2 conductors, white Conco-Foam insulation, mylar aluminum foil shield, stranded tin copper drain wire, outer Black polyethylene jacket.
* Spade terminals available with Catalog 4535.
** Furnished individually packed coils.

MATV - CATV COAXIAL CABLE — 75 ohm 82 channel

100% Sweep Tested to provide quality free operation.

AWG and Stranding	Primary Insulation	Shield and Material	Jacket	Nom. O.D. (Inches)	Nom. Imp. Ohms	Nom. Vel. of Prop.	Nom. Cap.
4575 82 CHANNEL COLOR COAX 75 OHMS							
18 Solid Bare Copper	Cellular Polyethylene	Mylar Aluminum Foil Shield & 4 Drain Wires	White, Black Gray, PVC	.242	75	78%	17.3
4585 82 CHANNEL COLOR COAX 75 OHMS							
18 Solid Bare Copper	Cellular Polyethylene	Mylar Aluminum Foil Shield & Aluminum Braid	Black PVC	.242	75	78%	17.3
4559 82 CHANNEL COLOR COAX 75 OHMS							
22 Solid Bare Copperweld	Cellular Polyethylene	Mylar Aluminum Foil Shield & 4 Drain Wires	White, Black PVC	.242	75	78%	16.8
4569 82 CHANNEL COLOR COAX 75 OHMS							
22 Solid Bare Copperweld	Cellular Polyethylene	Mylar Aluminum Foil Shield & Aluminum Braid	Black PVC	.242	75	78%	16.3

Conco-Color—AX is manufactured for distribution systems carrying both UHF and VHF. Cable loss is about half of ordinary RG59/U coax and less than twin lead. Ideal for homes and stores.

AWG and Stranding	Primary Insulation	Dielectric O.D. (Inches)	Shield	Jacket	Nominal O.D. (Inches)	Spool Put-Up
4582 CONCO-COLOR — AX 82 CHANNEL CABLE						
18 Solid Bare Copper	Foam Polyethylene	.184	34 AWG Braid Bare Copper	Black PVC	.270	500′, 1000′

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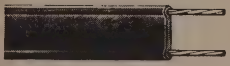
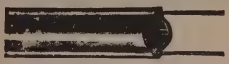
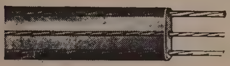
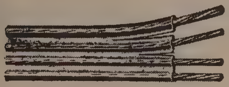
TELEVISION AND ROTOR CABLE









Nominal Electrical Properties

Catalog Number	Type	Size & Stranding	Specifications and General Applications	Nom. Diam. (Inches)	Fre-quency (mc)	Atten-uation Per 100 Ft.	Imped-ance (Ohms)	Velocity of Propa-gation (%)	Capaci-tance Per Ft. (Mmf)
4500	2 Condr.	22 7x30	Both conductors bare copper; flexible stranding; conductors parallel; insulated with brown polyethylene.	.055 x .365	50	.72	300	85	4.6
4503	2 Condr.	20 7x28	Same as 4500	.072 x .400	50	.72	300	85	4.6
4504	2 Condr.	20 7x28	Same as 4500	.080 x .400	50	.72	300	85	4.6
4506	2 Condr.	20 7x28	Same as 4500	.100 x .400	50	.72	300	85	4.6
4527	2 Condr. Round	20 7x28	Copper conductors; tubular design protects against exterior hazards. USE: For UHF and VHF.	.350	30	.63	300	84	5.6
4507	3 Condr.	20 7x28	Two bare, one tinned copper conductor; flexible stranding; conductors parallel; clear polyethylene insulation. USE: Same as 4503.	.072 x .365	50	.72	300	85	4.6
4509	4 Condr.	20 7x28	Same as 4503 except three conductors bare copper, one conductor tinned. Brown polyethylene insulation overall. USE: Rotor Aerials.	.072 x .400	50	.72	300	85	4.6
4510	4 Condr.	20 7x28	Same as 4509	.072 x .400	50	.72	300	85	4.6
4517	5 Condr.	20 7x28	Same as 4509	.072 x .400	50	.72	300	85	4.6
4515	4 Condr.	22 7x30	Copper conductors. .010 thermoplastic insulation over each conductor color coded with gray jacket overall. USE: Rotor Aerials.	.160					
4518	5 Condr.	22 7x30	Same as 4515	.170					
4521	8 Condr.	22 7x30	Same as 4515	.205					
4524	4 Condr.	20 7x28	Same as 4515	.180					
4525	5 Condr.	20 7x28	Same as 4515	.190					
4538	8 Condr.	6x22 7x30 2x18 16x30	Same as 4515 For heavy duty rotors.	.250					

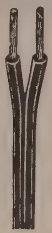
STANDARD SPOOL PUT-UP: 100 FT., 500 FT., 1000 FT.

CONSOLIDATED WIRE & ASSOCIATED CORPORATIONS

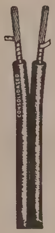
1633 S. CLINTON ST. • (312) 421-4441 • Cable Address: "CON WIRE" • CHICAGO, ILL. 60616

STEREO, PHONO, AND SPEAKER CABLES

SPEAKER CABLE



Catalog Number	Type	Size & Stranding	Special Use	Specifications	Finished O.D. (Inches)
5137	2 Condr.	24 7x32	Juke box speaker cable.	Stranded 1 conductor bare copper — 1 conductor tinned copper — 2 conductors parallel .015 vinyl plastic insulation. Colors: gray, brown, white clear.	.058 x .115
5142	2 Condr.	22 7x30	Speaker Cable "PLT"	Same as 5148. Colors: clear, gray, brown, black, white.	.060 x .120
5140	2 Condr.	20 10x30	Lamp Cord "PLT"	Two conductors bare copper parallel .015 vinyl insulation. Colors: black, gray, brown, white clear. 1 conductor ribbed for identification.	.080 x .165
5144	2 Condr.	20 26x34	Lamp Cord "XT"	Same as 5140 except .032 vinyl insulation.	.100 x .190
5148	2 Condr.	18 16x30	Speaker Cable "PLT"	Stranded 1 conductor bare copper — 1 conductor tinned copper — 2 conductors parallel .016 vinyl insulation. Color: clear.	.090 x .185



RUBBER PARALLEL PORTABLE CORDAGE

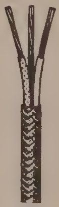
Catalog Number	Type	Size & Stranding	U.L. Type	Nom. Insulation Thickness (Inches)	Nom. O.D. (Inches)
4072	2 Condr.	18(41x34)	SP-1	1/32	.220 x .120
4074	2 Condr.	16(65x34)	SP-2	3/64	.300 x .160

PLASTIC PARALLEL PORTABLE CORDAGE

Catalog Number	Type	Size & Stranding	U.L. Type	Nom. Insulation Thickness (Inches)	Nom. O.D. (Inches)
4077	2 Condr.	18(41x34)	SPT-1	1/32	.215 x .115
4079	2 Condr.	16(65x34)	SPT-2	3/64	.300 x .160

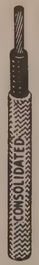
Colors: Black, Brown, White, Gray.

STANDARD SPOOL PUT-UP: 25 FT., 50 FT., 100 FT., 250 FT., 500 FT., 1000 FT.



MULTI-CONDUCTOR PHONO CABLE

Catalog Number	Type	Size & Stranding	Special Use	Specifications	Finished O.D. (Inches)
5123	3 Condr.	Two 16 26x30 One 18 10x30	Phono and Juke box cable.	2 conductors No. 16 - 1/64" thermoplastic insulation, 1 conductor No. 20 - 1/64" thermoplastic insulation, all individually color coded. All conductors grouped into cable form with gray vinyl plastic jacket.	.215
5124	4 Condr.	18 Solid	Phono and Juke box cable.	Same as 5123	.225



STEREO CABLE — HI-FI, STEREO

Catalog Number	Type	Size & Stranding	Specifications	Insul. Thick. (Inches)	Finished O.D. (Inches)
1470	1 Condr.	24 16x.005	Bare copper; flexible stranding; vinylite plastic insulation; tinned copper braid — SHIELDED.	.010	.070
1478	2 Condr.	32 7x40	Tinned copper: flexible stranding. Vinyl Plastic insulation; Black and Red.	.009	.050
1401	3 Condr.	32 7x40	Same as 1478. Black, Red, White.	.009	.055
1402	4 Condr.	32 7x40	Same as 1478. Black, Red, Green, White.	.009	.070
1479	2 Condr.	32 7x40	Same as 1478 and tinned copper braid — SHIELDED.	.009	.057
1406	3 Condr	32 7x40	Same as 1401 and tinned copper braid — SHIELDED.	.009	.063
1407	4 Condr.	32 7x40	Same as 1402 and tinned copper braid — SHIELDED.	.009	.070
1410	2 Condr.	32 7x40	Individually SHIELDED and twisted conductors.	.009	.055 x .055

STANDARD SPOOL PUT-UP: 100 FT., 500 FT., 1000 FT.

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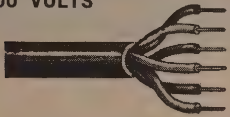
1633 S. CLINTON ST. • (312) 421-4441 • Cable Address: "CON WIRE" • CHICAGO, ILL. 60616

UNSHIELDED MULTICONDUCTOR CABLE — PLASTIC JACKET

STRANDED CONDUCTORS 300 VOLTS



Catalog Number	Type	Size & Stranding	Specifications and General Applications	Nom. Diam. (Inches)	Color Coding For Multiple Intercom Cables
5640	2 Condr.	20(10x30)	Tin copper .012 PVC ins. minimum .020 gray PVC jacket.	.180	CHART 1* 1 Black 2 Red 3 Green 4 White 5 Brown 6 Blue 7 Orange 8 Yellow 9 Purple 10 Slate 11 Pink 12 Tan
5641	3 Condr.	20(10x30)	Same as 5640	.190	
5642	4 Condr.	20(10x30)	Same as 5640	.208	
5643	5 Condr.	20(10x30)	Same as 5640	.225	
5644	7 Condr.	20(10x30)	Same as 5640	.240	
5645	9 Condr.	20(10x30)	Same as 5640	.300	
5646	12 Condr.	20(10x30)	Same as 5640	.320	
STANDARD SPOOL PUT-UP: 100 FT., 500 FT., 1000 FT.					

ELECTRICAL CORDAGES — UNDERWRITERS APPROVED

RUBBER SHEATHED SERVICE CORD

UNDERWRITERS APPROVED

SPECIFICATIONS AND APPLICATION

Extra flexible bare copper cotton served. 1/32″ rubber insulation color coded conductors cable with fillers, cotton wrap and black, tough rubber jacket.

For all electronic equipment, household appliances, garden and power tools.

Catalog Number	Type	AWG Size	U.L. Type	Current Carrying Capacity	Voltage Rating	Nom. O.D. (Inches)
4202	2 Condr.	18	SV	5 Amps.	300	.250
4207	2 Condr.	18	SJ	5 Amps.	300	.310
4212	3 Condr.	18	SJ	5 Amps.	300	.345
4214	4 Condr.	18	SJ	5 Amps.	300	.360
4217	2 Condr.	16	SJ	7 Amps.	300	.340
4222	3 Condr.	16	SJ	7 Amps.	300	.375
4224	4 Condr.	16	SJ	7 Amps.	600	.395
4227	2 Condr.	18	S	5 Amps.	600	.390
4232	3 Condr.	18	S	5 Amps.	600	.405
4234	4 Condr.	18	S	5 Amps.	600	.435
4237	2 Condr.	16	S	7 Amps.	600	.410
4242	3 Condr.	16	S	7 Amps.	600	.430
4244	4 Condr.	16	S	7 Amps.	600	.485
4247	2 Condr.	14	S	15 Amps.	600	.540
4252	3 Condr.	14	S	15 Amps.	600	.560
4254	4 Condr.	14	S	15 Amps.	600	.605
4257	2 Condr.	12	S	20 Amps.	600	.605
4262	3 Condr.	12	S	20 Amps.	600	.635
4264	4 Condr.	12	S	20 Amps.	600	.665
4267	2 Condr.	10	S	25 Amps.	600	.640
4272	3 Condr.	10	S	25 Amps.	600	.690
4274	4 Condr.	10	S	25 Amps.	600	.745

NEOPRENE SHEATHED SERVICE CORD

UNDERWRITERS APPROVED

SPECIFICATIONS AND APPLICATION

Same specifications as 4200 Series except black Neoprene jacket.

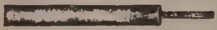
For all types of equipment exposed to oils, acid and excessive moisture.

4307	2 Condr.	18	SJO	5 Amps.	300	.310
4312	3 Condr.	18	SJO	5 Amps.	300	.345
4314	4 Condr.	18	SJO	5 Amps.	300	.360
4317	2 Condr.	16	SJO	7 Amps.	300	.340
4322	3 Condr.	16	SJO	7 Amps.	300	.375
4324	4 Condr.	16	SJO	7 Amps.	600	.395
4327	2 Condr.	18	SO	5 Amps.	600	.390
4332	3 Condr.	18	SO	5 Amps.	600	.405
4334	4 Condr.	18	SO	5 Amps.	600	.435
4337	2 Condr.	16	SO	7 Amps.	600	.410
4342	3 Condr.	16	SO	7 Amps.	600	.430
4344	4 Condr.	16	SO	7 Amps.	600	.485
4347	2 Condr.	14	SO	15 Amps.	600	.540
4352	3 Condr.	14	SO	15 Amps.	600	.560
4354	4 Condr.	14	SO	15 Amps.	600	.605
4357	2 Condr.	12	SO	20 Amps.	600	.605
4362	3 Condr.	12	SO	20 Amps.	600	.635
4364	4 Condr.	12	SO	20 Amps.	600	.665
4367	2 Condr.	10	SO	25 Amps.	600	.640
4372	3 Condr.	10	SO	25 Amps.	600	.690
4374	4 Condr.	10	SO	25 Amps.	600	.745
STANDARD PUT-UP: 25 FT., 50 FT., 100 FT., 250 FT.						

AUTOMOTIVE CABLES

Manufactured to meet all specifications (S.A.E.)
Standards Society of Automotive Engineers

PLASTIC INSULATED AUTOMOTIVE WIRE

	Catalog Number	Size & Stranding	Description and Application	Colors Available (Specify)	Nom. Dia. (Inches)
PRIMARY WIRE 	4026	18 16x30	Bare Copper Flexible Stranding Tough Plastic Insulation. Resistant to Flame, Oil, Gasoline, Grease, Acid, Fungus and most solvents.	Red-Black	.092
	4027	16 19x29	Same as 4026	Red-Blue-Black-Green-Yellow-Brown-White	.105
	4028	14 19x27	Same as 4026	Red-Blue	.123
	4029	12 19x25	Same as 4026	Black-Green-Red-Blue	.183
	4030	10 19x23	Same as 4026	Black	.183
	4038	8 19x21	Same as 4026	Black	.215
	4036	6 37x21	Same as 4026	Black	.283
SPARK PLUG WIRE 7 MM. 	4032	16 19x29	Same as 4026 Except Red Plastic Jacket. Recommended where excessive exposure to Oil, Acid and Alkali is encountered.	Red	.276
RED PLASTIC	STANDARD SPOOL PUT-UP: 25 FT., 100 FT., 500 FT., 1000 FT.				

RUBBER INSULATED AUTOMOTIVE WIRE

SPARK PLUG WIRE 7 MM. **Black Neoprene Sheathed**	4031	16 19x29	Tinned Copper—Black Hypalon Sheathed. Recommended for all Passenger Cars, Light Trucks, Tractors and Marine Engines.	Black	.276
PRIMARY LACQUERED WIRE 	4051	14 19x27	Same as 4010	Yellow-Red & Black Markers	.147
	4056	14 19x27	Same as 4010	Black	.147
	4052	12 19x25	Same as 4010	Yellow-Red & Black Markers	.175
	4057	12 19x25	Same as 4010	Black	.175
	4053	10 19x23	Same as 4010	Yellow-Red & Black Markers	.190
	4058	10 19x23	Same as 4010	Black	.190
BATTERY CHARGING WIRE 	4041	12 65x30	Bare Copper Paper Wrapped Tough Rubber Compound Resistant to Acid, etc.	Black	.205
	4042	10 105x30	Same as 4041	Black	.228
	4043	8 49x25	Same as 4041	Black	.253
	4044	6 49x23	Same as 4041	Black	.314
	STANDARD SPOOL PUT-UP: 25 FT., 100 FT., 500 FT., 1000 FT.				

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PROTECTA-METAL SPOOLS

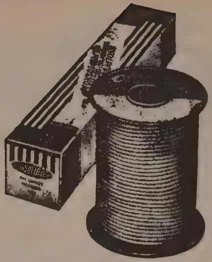
Popular, profitable specialty wire packaged for easy selling in radio-electrical, scientific, specialty and hardware.

Wide variety of sizes and insulations.

Keeps stock in perfect order, always saleable.

Supplied on spools as shown and in heavier weights.

Here is a handy and convenient way to stock small quantities of wire. It prevents wire from matting or tangling.



MAGNET WIRE No. 2000

The correct wire for practically any application. Magnet wire is indispensible in the manufacture and repair of both radio and audio frequency coils, transformers, chokes, speaker field coils, short wave coils, tuners, transmitters, etc. Also widely used in the construction and repair of motors, generators, dynamos, etc.

Larger Quantities At Same Per Pound List

SPECIAL MAGNET WIRES

In addition to the standard listing shown here, we maintain an extensive stock of all other sizes in round rectangular and square magnet wire.

	Plain Enamel			Single Formvar			Heavy Formvar			
Size	¼ Lb.	½ Lb.	1 Lb.	¼ Lb.	½ Lb.	1 Lb.	¼ Lb.	½ Lb.	1 Lb.	Size
14	$0.85	$1.40	$ 2.51	$1.10	$ 1.90	$ 3.40	$1.20	$ 2.00	$ 3.65	14
15	$0.86	$1.45	$ 2.55	$1.15	$ 2.00	$ 3.40	$1.20	$ 2.10	$ 3.70	15
16	$0.90	$1.50	$ 2.60	$1.20	$ 2.10	$ 3.50	$1.30	$ 2.10	$ 3.75	16
17	$0.92	$1.55	$ 2.60	$1.22	$ 2.15	$ 3.50	$1.30	$ 2.25	$ 3.80	17
18	$0.95	$1.60	$ 2.60	$1.30	$ 2.20	$ 3.60	$1.35	$ 2.30	$ 3.85	18
19	$0.97	$1.62	$ 2.65	$1.35	$ 2.25	$ 3.60	$1.40	$ 2.35	$ 3.90	19
20	$0.98	$1.65	$ 2.70	$1.38	$ 2.30	$ 3.74	$1.40	$ 2.40	$ 3.90	20
21	$1.00	$1.70	$ 2.80	$1.40	$ 2.30	$ 3.75	$1.45	$ 2.40	$ 4.00	21
22	$1.02	$1.71	$ 2.85	$1.40	$ 2.35	$ 4.00	$1.48	$ 2.50	$ 4.10	22
23	$1.04	$1.72	$ 3.00	$1.42	$ 2.40	$ 4.10	$1.50	$ 2.50	$ 4.15	23
24	$1.06	$1.74	$ 3.15	$1.45	$ 2.45	$ 4.20	$1.55	$ 2.55	$ 4.75	24
25	$1.08	$1.85	$ 3.30	$1.50	$ 2.55	$ 4.40	$1.70	$ 2.75	$ 5.00	25
26	$1.10	$1.90	$ 3.40	$1.55	$ 2.60	$ 4.65	$1.80	$ 2.85	$ 5.50	26
27	$1.12	$1.94	$ 3.50	$1.60	$ 2.70	$ 4.85	$1.90	$ 3.00	$ 5.60	27
28	$1.15	$2.00	$ 3.70	$1.70	$ 2.80	$ 5.00	$2.00	$ 3.05	$ 5.80	28
29	$1.17	$2.07	$ 3.80	$1.75	$ 2.85	$ 5.20	$2.02	$ 3.20	$ 5.90	29
30	$1.26	$2.14	$ 3.85	$1.80	$ 3.00	$ 5.25	$2.04	$ 3.40	$ 6.00	30
31	$1.38	$2.20	$ 4.00	$2.00	$ 3.10	$ 5.50	$2.40	$ 3.60	$ 6.60	31
32	$1.39	$2.26	$ 4.02	$2.00	$ 3.20	$ 5.65	$2.40	$ 3.75	$ 6.75	32
33	$1.43	$2.40	$ 4.20	$2.05	$ 3.40	$ 5.85	$2.50	$ 3.95	$ 7.00	33
34	$1.46	$2.70	$ 4.35	$2.20	$ 3.80	$ 6.05	$2.60	$ 4.25	$ 7.25	34
35	$1.66	$2.90	$ 4.85	$2.40	$ 4.00	$ 6.75	$2.80	$ 4.55	$ 8.00	35
36	$2.45	$3.95	$ 7.00	$3.60	$ 5.65	$ 9.75	$4.25	$ 6.75	$10.00	36
37	$2.61	$4.40	$ 7.80	$4.00	$ 6.00	$10.25	$4.75	$ 7.25	$12.00	37
38	$2.81	$4.75	$ 8.70	$4.65	$ 6.90	$11.75	$5.60	$ 7.50	$14.00	38
39	$3.16	$5.65	$ 9.50	$5.00	$ 8.00	$13.00	$6.00	$ 9.50	$16.00	39
40	$4.01	$8.00	$13.00	$7.60	$11.75	$17.50	$8.50	$13.10	$22.00	40

VARIOUS OTHER INSULATIONS

Film	Technical Classification
ENAMEL	oleoresinous
FORMVAR	poly vinyl acetal
POLY THERMALEZE	
SODEREZE	polyurethane
THERMALEZE	epoxide polyester
NYFORM	formvar, nylon sheath
NYLEZE	polyurethane nylon sheath
NYLON	....
BONDEZE	....
GRIPEZE	....
LECTRON	acrylic
ISONSEL	terephthalic polyester
ALKANVAR	terephthalic polyester
SYLKYD ENAMELED	
COTTON AND COMBINATIONS	
SILK AND COMBINATIONS	
CELANESE AND COMBINATIONS	
GLASS AND COMBINATIONS	
PAPER AND COMBINATIONS	

	Double Cotton Covered			Single Nyleze			Heavy Nyleze			
Size	¼ Lb.	½ Lb.	1 Lb.	¼ Lb.	½ Lb.	1 Lb.	¼ Lb.	½ Lb.	1 Lb.	Size
14	$1.25	$2.40	$ 4.35	$1.20	$ 2.00	$ 3.60	$1.20	$ 2.00	$ 3.75	14
15	$1.30	$2.65	$ 4.40	$1.24	$ 2.15	$ 3.75	$1.25	$ 2.10	$ 3.80	15
16	$1.35	$2.70	$ 4.75	$1.30	$ 2.25	$ 3.85	$1.30	$ 2.20	$ 4.00	16
17	$1.38	$2.75	$ 4.80	$1.35	$ 2.30	$ 3.95	$1.35	$ 2.30	$ 4.10	17
18	$1.40	$2.80	$ 4.95	$1.37	$ 2.35	$ 4.00	$1.40	$ 2.40	$ 4.15	18
19	$1.44	$2.85	$ 5.25	$1.40	$ 2.40	$ 4.00	$1.45	$ 2.50	$ 4.20	19
20	$1.46	$2.95	$ 5.50	$1.45	$ 2.45	$ 4.05	$1.50	$ 2.60	$ 4.30	20
21	$1.64	$3.15	$ 5.75	$1.48	$ 2.50	$ 4.10	$1.55	$ 2.65	$ 4.40	21
22	$1.72	$3.25	$ 6.00	$1.50	$ 2.51	$ 4.20	$1.60	$ 2.70	$ 4.50	22
23	$1.84	$3.45	$ 6.25	$1.54	$ 2.58	$ 4.40	$1.62	$ 2.75	$ 4.60	23
24	$1.92	$3.65	$ 6.70	$1.58	$ 2.60	$ 4.60	$1.65	$ 2.80	$ 5.00	24
25	....	....	....	$1.65	$ 2.70	$ 4.75	$1.75	$ 3.00	$ 5.50	25
26	....	....	....	$1.67	$ 2.75	$ 5.10	$1.85	$ 3.10	$ 5.60	26
27	....	....	....	$1.70	$ 2.85	$ 5.25	$1.90	$ 3.20	$ 5.80	27
28	....	....	....	$1.75	$ 2.90	$ 5.50	$1.95	$ 3.30	$ 6.10	28
29	....	....	....	$1.80	$ 3.00	$ 5.70	$2.00	$ 3.50	$ 6.30	29
30	....	....	....	$1.88	$ 3.15	$ 5.80	$2.10	$ 3.60	$ 6.50	30
31	....	....	....	$2.00	$ 3.25	$ 5.95	$2.40	$ 3.75	$ 7.00	31
32	....	....	....	$2.15	$ 3.35	$ 6.00	$2.45	$ 4.00	$ 7.30	32
33	....	....	....	$2.20	$ 3.60	$ 6.25	$2.60	$ 4.10	$ 7.50	33
34	....	....	....	$2.30	$ 3.80	$ 6.75	$2.70	$ 4.50	$ 7.75	34
35	....	....	....	$2.40	$ 4.15	$ 7.25	$2.90	$ 5.00	$ 8.25	35
36	....	....	....	$2.80	$ 5.75	$ 8.00	$4.00	$ 6.50	$11.75	36
37	....	....	....	$3.40	$ 6.50	$ 9.75	$4.50	$ 7.50	$12.50	37
38	....	....	....	$4.00	$ 7.25	$11.25	$5.50	$ 8.25	$14.00	38
39	....	....	....	$4.75	$ 8.25	$12.50	$6.10	$ 9.75	$14.50	39
40	....	....	....	$9.00	$17.40	$31.75	$8.75	$11.00	$16.00	40

CONSOLIDATED WIRE & ASSOCIATED CORPORATIONS CONSOLIDATED

1633 S. CLINTON ST. • (312) 421-4441 • Cable Address: "CON WIRE" • CHICAGO, ILL. 60616

RESISTANCE WIRE

BARE NICKEL CHROMIUM — No. 2000

Size	1 Oz.	¼ Lb.	1 Lb.	Size	1 Oz.	¼ Lb.	1 Lb.
14	....	$1.85	$ 6.95	28	$1.38	$ 3.30	$13.10
15	....	$1.90	$ 7.05	29	$1.50	$ 3.73	$13.95
16	....	$1.95	$ 7.15	30	$1.65	$ 3.95	$14.75
17	....	$2.00	$ 7.25	31	$1.70	$ 4.10	$15.30
18	....	$2.05	$ 7.30	32	$1.75	$ 4.25	$15.91
19	....	$2.10	$ 7.50	33	$1.95	$ 4.60	$18.30
20	$1.00	$2.20	$ 7.65	34	$2.10	$ 5.20	$20.90
21	$1.05	$2.25	$ 8.10	35	$2.25	$ 5.69	$21.95
22	$1.08	$2.35	$ 8.49	36	$2.50	$ 6.15	$22.84
23	$1.12	$2.60	$ 9.30	37	$3.30	$ 8.00	$29.80
24	$1.14	$2.75	$10.10	38	$4.10	$10.05	$36.28
25	$1.25	$2.90	$10.90	39	$4.25	$10.40	$39.50
26	$1.30	$3.15	$11.65	40	$4.50	$11.20	$42.15
27	$1.35	$3.20	$12.50				

BUS BAR WIRE — No. 2000

BARE COPPER WIRE				TINNED COPPER WIRE			
Size	¼ Lb.	½ Lb.	1 Lb.	Size	¼ Lb.	½ Lb.	1 Lb.
14	$0.90	$1.68	$2.70	14	$1.05	$1.85	$2.90
15	$0.95	$1.70	$2.76	15	$1.15	$1.90	$3.00
16	$1.00	$1.80	$3.10	16	$1.20	$2.10	$3.20
17	$1.01	$1.88	$3.15	17	$1.25	$2.15	$3.30
18	$1.02	$1.90	$3.16	18	$1.30	$2.25	$3.35
19	$1.05	$1.92	$3.20	19	$1.35	$2.30	$3.45
20	$1.06	$1.94	$3.25	20	$1.40	$2.35	$3.55
21	$1.06	$1.96	$3.35	21	$1.44	$2.40	$3.60
22	$1.07	$1.98	$3.45	22	$1.46	$2.45	$3.65
23	$1.10	$2.00	$3.50	23	$1.48	$2.47	$3.70
24	$1.12	$2.04	$3.56	24	$1.50	$2.48	$3.80
25	$1.12	$2.04	$3.58	25	$1.55	$2.50	$3.82
26	$1.14	$2.10	$3.62	26	$1.57	$2.52	$3.85
27	$1.20	$2.18	$3.66	27	$1.59	$2.54	$4.00
28	$1.24	$2.20	$3.75	28	$1.60	$2.65	$4.40
29	$1.26	$2.22	$3.85	29	$1.65	$2.75	$4.50
30	$1.28	$2.26	$3.90	30	$1.68	$2.80	$4.55
31	$1.30	$2.30	$3.94	31	$1.75	$2.90	$4.65
32	$1.32	$2.32	$3.96	32	$1.77	$3.00	$4.70
33	$1.34	$2.34	$4.06	33	$1.80	$3.50	$4.84
34	$1.36	$2.35	$4.25	34	$1.85	$3.55	$4.86
35	$1.37	$2.40	$4.40	35	$1.90	$3.60	$5.00
36	$1.38	$3.00	$5.75	36	$2.40	$4.20	$6.75
37	$1.90	$3.40	$6.00	37	$2.50	$4.50	$7.00
38	$1.92	$3.60	$6.25	38	$2.55	$4.70	$7.40
39	$1.94	$3.75	$6.50	39	$2.60	$4.80	$7.50
40	$2.00	$4.25	$6.60	40	$2.65	$4.90	$7.75

MAGNET WIRE — No. 2010

Size Wire	Plain Enameled	Size Wire	Plain Enameled	Size Wire	Plain Enameled	Size Wire	Plain Enameled
14	25 Ft.	22	133 Ft.	30	590 Ft.	38	1980 Ft.
16	40 Ft.	24	200 Ft.	32	805 Ft.	40	2430 Ft.
18	48 Ft.	26	292 Ft.	34	1150 Ft.		
20	85 Ft.	28	420 Ft.	36	1560 Ft.		

BARE NICKEL CHROMIUM RESISTANCE CHART

B & S Gauge	Ohms Per Ft. 68°F	B & S Gauge	Ohms Per Ft. 68°F
14	.1648	28	4.251
15	.2078	29	5.286
16	.2595	30	6.750
17	.3333	31	8.523
18	.4219	32	10.55
19	.5208	33	13.39
20	.6592	34	17.00
21	.8310	35	21.52
22	1.055	36	27.00
23	1.322	37	33.33
24	1.671	38	42.19
25	2.107	39	55.10
26	2.670	40	70.24
27	3.348		

ANNUNCIATOR (BELL) WIRE

ELECTRIC AND RADIO WIRE CABLE CORPORATION
CHICAGO ILLINOIS
CONSOLIDATED CORPORATION

SUPPLIED IN ASSORTED COLORS
An all around utility wire consisting of a single and two conductors of No. 18 wire, plastic insulation.

Catalog Number	Type
1450	Single Conductor
1445	Two Conductor Twisted

STANDARD SPOOL PUT-UP:
¼ LB., ½ LB., 1 LB., 7 LB.

PHOSPHOR BRONZE DIAL CABLE

BRAIDED phosphor bronze over a pure black linen, lubricated core for exceptional strength and wearing qualities.

Cat. No.	Size (Ins.)	Stranding	Dia. (Ins.)
1436	⅛	16x36	.125

STRANDED phosphor bronze over a concealed white nylon core for exceptional flexibility. Manufactured to highest precision standards, insuring utmost accuracy.

Cat. No.	Size (Ins.)	Stranding	Dia. (Ins.)
1440	⅛	42x35	.125

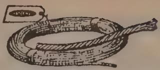
STANDARD SPOOL PUT-UP:
25 FT., 100 FT., 500 FT., 1000 FT.

CONSOLIDATED

CONSOLIDATED WIRE & ASSOCIATED CORPORATIONS
1633 S. CLINTON ST. • (312) 421-4441 • Cable Address: "CON WIRE" • CHICAGO, ILL. 60616

AERIAL WIRE

COPPER



	Catalog Number	Size	Stranding	Breaking Strength Pounds	Type	Nom. Dia. (Inches)
STRANDED BARE	3501	18	7x26	67 Lbs.	Bare Copper	.046
	3521	16	7x24	106 Lbs.	Bare Copper	.057
	3551	14	7x22	167 Lbs.	Bare Copper	.072
	3561	12	7x20	262 Lbs.	Bare Copper	.092
STRANDED TINNED	3601	18	7x26	67 Lbs.	Tinned Copper	.046
	3621	16	7x24	106 Lbs.	Tinned Copper	.057
	3651	14	7x22	167 Lbs.	Tinned Copper	.072
	3661	12	7x20	262 Lbs.	Tinned Copper	.092
SOLID BARE	3801	15	Solid	98 Lbs.	Bare Copper	.057
	3811	14	Solid	124 Lbs.	Bare Copper	.064
	3786	12	Solid	197 Lbs.	Bare Copper	.080
	3791	10	Solid	314 Lbs.	Bare Copper	.102
	3796	8	Solid	480 Lbs.	Bare Copper	.128
AERIAL AND BUS BAR SOLID TINNED	3848	30	Solid	....	Tinned Copper	.010
	3847	28	Solid	....	Tinned Copper	.013
	3846	26	Solid	....	Tinned Copper	.016
	3819	24	Solid	12 Lbs.	Tinned Copper	.020
	3818	22	Solid	20 Lbs.	Tinned Copper	.025
	3817	20	Solid	31 Lbs.	Tinned Copper	.032
	3816	18	Solid	49 Lbs.	Tinned Copper	.040
	3815	16	Solid	73 Lbs.	Tinned Copper	.051
	3821	14	Solid	124 Lbs.	Tinned Copper	.064
	3831	12	Solid	197 Lbs.	Tinned Copper	.081
	3841	10	Solid	314 Lbs.	Tinned Copper	.102
	3845	8	Solid	480 Lbs.	Tinned Copper	.128
SOLID ENAMELED	3851	14	Solid	124 Lbs.	Enameled	.064
	3861	12	Solid	197 Lbs.	Enameled	.082
	3871	10	Solid	314 Lbs.	Enameled	.102

STANDARD PUT-UP: 50 FT., 75 FT., 100 FT., 1000 FT.

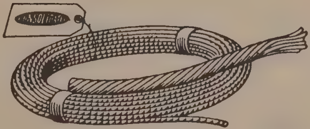
PHOSPHOR BRONZE

Recommended for short wave and transmitting aerials.

Tested and used by Army and Navy.

Amazing improvement for reception and transmission.

Phosphor bronze is recognized as the most efficient, practical wire obtainable for short wave and transmitting aerials. It will not stretch or sag and is superinductive.



	Catalog Number	Size	Stranding	Breaking Strength Pounds	Type	Nom. Dia. (Inches)
PHOSPHOR BRONZE	3421	16	7x24	230 Lbs.	Bronze	.058
	3451	14	7x22	360 Lbs.	Bronze	.073
	3461	12	7x20	570 Lbs.	Bronze	.092
	3465	10	7x18	895 Lbs.	Bronze	.116
	3466	8	7x16	1400 Lbs.	Bronze	.146
	3467	6	7x14	2200 Lbs.	Bronze	.184
	3468	4	7x12	3400 Lbs.	Bronze	.232

STANDARD PUT-UP: 500 FT., 1000 FT.

TINNED COPPER SHIELDING

SHIELDING AND BONDING TYPE CABLE

	Catalog Number	Approx. I.D. (Inches)	Size & Number of Wires	Approx. AWG	Carrying Capacity in Amperes
FLAT BRAID 	1386	1/32	16x36	24	7
	1387	3/64	24x36	23	7
	1388	3/32	48x36	19	12
	1389	7/64	72x36	18	14
	1390	1/8	96x36	18	15
	1391	3/16	120x36	15	23
	1392	1/4	168x36	14	30
	1393	3/8	288x36	11	50
	1394	1/2	386x36	10	55
	1395	5/8	528x36	10	61
	1396	3/4	832x36	7	80
	1397	25/32	832x36	7	80
	1398	1	912x36	7	84
	1399	1 3/8	336x30	7	105
TUBULAR BRAID PER QQ-B-575 	1310	1/32	24x36	22	7
	1311	1/16	48x36	19	11
	1312	5/64	72x36	18	16
	1314	7/64	96x36	16	19
	1315	1/8	120x36	15	25
	1316	5/32	240x36	12	40
	1317	11/64	168x36	14	32
	1318	13/64	192x34	11	46
	1319	1/4	384x36	10	53
	1320	9/32	120x30	9	60
	1321	3/8	384x36	10	53
	1322	7/16	240x30	6	90
	1323	1/2	528x36	9	62
	1324	9/16	480x30	3	145
	1325	21/32	768x30	1	190
	1326	25/32	864x36	7	88
OVAL COMMERCIAL BRAID 	1340	1/32	24x34	20	9
	1341	1/16	32x34	19	11
	1342	7/64	64x34	16	20
	1343	1/8	72x34	15	25
	1344	11/64	120x34	14	32
	1345	3/16	144x34	13	38
	1346	1/4	168x34	12	41
	1347	3/8	192x34	11	46
	1348	1/2	336x34	9	62
	1349	5/8	384x34	8	64
	1350	11/16	480x34	7	81
	1351	25/32	528x34	7	85

STANDARD SPOOL PUT-UP: 50 FT., 100 FT., 250 FT., 500 FT., 1000 FT.

CONSOLIDATED

CONSOLIDATED WIRE & ASSOCIATED CORPORATIONS
1633 S. CLINTON ST. • (312) 421-4441 • Cable Address: "CON WIRE" • CHICAGO, ILL. 60616

TEST PROD WIRE

CONSOLIDATED

Single conductor, extra flexible stranded tinned soft annealed copper, wrap, color coded rubber insulation.

STANDARD SPOOL PUT-UP: 10 FT., 100 FT., 250 FT., 500 FT., 1000 FT.

Catalog Number	Size	Stranding	Nom. Wall Thickness (Inches)	Voltage Breakdown	Nom. O.D. (Inches)
1001	20	41x36	.043	10,000	.140
1002	18	65x36	.045	12,000	.140
1006	18	65x36	.088	25,000	.230

MILITARY TYPE MIL-W-131169B

Catalog Number	Size	Stranding	Nom. Wall Thickness (Inches)	Voltage Breakdown	Nom. O.D. (Inches)
1007	18	65x36	.047	12,000	.150

HIGH VOLTAGE AND ANODE LEAD CABLE

Flame Retardant Polyethylene Plastic Insulation for high voltage leads to cathode-ray tubes in television receivers, oscilloscopes, power supplies and other uses, requiring a high-voltage cable. Special features: minimum surface leakage, corona resistance and high dielectric strength.

STANDARD SPOOL PUT-UP: 25 FT., 100 FT., 250 FT., 500 FT., 1000 FT.

U.L. STYLE 3239 (FR-1)

Catalog Number	Size	Stranding	Description	Ins.	Working Volts	Nom. O.D. (Inches)
4601	20	7x28	Extra flexible tinned copper wire; Flame retardant Polyethylene Plastic Insulation; red cellulose acetate yarn braid with 2 white tracers; lacquer coating.	.035	10,000	.136
4611	20	7x28	Same as No. 4601 except heavier insulation; solid red braid.	.065	20,000	.198
4616	20	10x30	Extra flexible tinned copper flame retardant polyethylene insulation, white.	.035	10,000	.108
4621	20	10x30	Same as No. 4616 except heavier insulation, white and red.	.065	20,000	.168
4622	18	41x34	Same as No. 4621 except .015″ red PVC outer jacket.	.057	40,000	.195
4623	22	7x30	Same as No. 4622 except outer .020″ PVC jacket. Colors: black, red and blue.	.030	17,000	.130
4624*	22	7x30	Tin copper rulan insulation PVC jacket UL style 3239 "FR—1".	.025	20,000	.120
4625*	22	7x30	Same as 4624	.030	30,000	.130
4626*	22	7x30	Same as 4624	.045	40,000	.160

* Can also furnish pre-bond overcoat and topcoat conductor on catalog numbers 4624, 4625, and 4626.

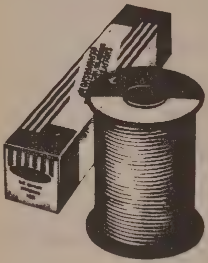
HOOK-UP WIRE

STA-PUT PUSHBACK

STRIPS AND REMAINS BACK FOR CLEAN TERMINAL

Seven colors for each: Black, Blue, Brown, Green, Red, Yellow, White. Be sure to specify color when ordering. Packaged in handsome 3-color display carton for easy merchandising by dealer.

Catalog Number	Size	Stranding	Specifications	Finished O.D. (Inches)
1048	18	16x30	Tinned copper conductor; cotton serve and cotton braid thorough paraffin impregnation.	.072
1101	20	10x30	Same as 1048	.068
1091	22	7x30	Same as 1048	.066
1045	18	Solid	Same as 1048	.070
1106	20	Solid	Same as 1048	.067
1096	22	Solid	Same as 1048	.065



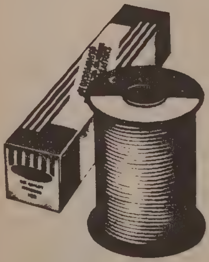
HI-Q LO-LOSS PUSHBACK

High efficiency wire ideal for use where high conductivity with negligible loss is essential.
Push-back insulation will not creep.
7 colors: Black, Blue, Brown, Green, Red, Yellow, White.

Catalog Number	Size	Stranding	Specifications	Finished O.D. (Inches)
1051	22	7x30	Tinned pure copper; serve of cellulose acetate yarn; cotton braid overall with high gloss lacquer.	.065
1056	20	10x30	Same as 1051	.066
1061	22	Solid	Same as 1051	.064
1066	20	Solid	Same as 1051	.065

STRANDED RUBBER HOOK-UP AND LEAD-IN WIRE

Catalog Number	Size	Stranding	Specifications	Insulation Thickness (Inches)	Finished O.D. (Inches)
1121	20	10x30	Highly flexible, tinned copper, paper served, live non-cracking wall of black rubber insulation.	1/32	.102
1126	18	16x30	Same as 1121	1/64	.085
1131	18	16x30	Same as 1121	1/32	.115
1111	18	16x30	Soft drawn tinned copper wire; cotton wrap; colored rubber overall insulation.	1/64	.090



EXTRA FLEXIBLE AC-DC ANTENNA CORD

Recommended for use as an antenna wire for AC-DC radio sets, for antenna loops and all other purposes where an extremely flexible covered wire is required. May be used for replacement purposes or original installations.

Catalog Number	Size	Stranding	Specifications	Insulation Thickness (Inches)	Finished O.D. (Inches)
1161	24	16x36	16 strands No. 36 tinned copper wire, covered with a brown vinyl plastic insulation.	.010	.050

STANDARD SPOOL PUT-UP: 25 FT., 100 FT., 1000 FT.

CONSOLIDATED

CONSOLIDATED WIRE & ASSOCIATED CORPORATIONS

1633 S. CLINTON ST. • (312) 421-4441 • Cable Address: "CON WIRE" • CHICAGO, ILL. 60616

RETRACTILE COIL CORDS

POWER CORDS (Underwriters' Approved)

ALL JACKETING NEOPRENE — ALL CORDS 48″ RETRACTED, APPROX. 25′ EXTENDED

Catalog Number	Condr. AWG	Stranding	U.L. Type	Cordage O.D. (Inches)	Coil O.D. (Inches)	Amp Rating	Max. Working Voltage
2801	2/18	41x34	SVO	.250	1	7	300
2802	2/18	41x34	SJO	.310	1¼	7	300
2803	3/18	41x34	SJO	.330	1½	7	300
2804	4/18	41x34	SJO	.360	1½	5.6	300
2805	2/16	65x34	SJO	.330	1½	10	300
2806	3/16	65x34	SJO	.365	1½	10	300
2807	3/16	65x34	SO	.470	1⅞	10	600
2808	4/16	65x34	SJO	.395	1⅝	8	300
2809	4/16	65x34	SO	.500	1⅞	8	600
2810	5/16	65x34	SO	.550	1⅞	8	600
2811	2/14	41x30	SO	.535	2	15	600
2812	3/14	41x30	SO	.560	2⅛	15	600
2813	4/14	41x30	SO	.605	2¼	12	600
2814	2/12	65x30	SO	.605	2¼	20	600
2815	3/12	65x30	SO	.635	2⅜	20	600
2816	4/12	65x30	SO	.665	2½	16	600

* Conductor Color Coding: 1—Black, 2—White, 3—Green, 4—Red, 5—Blue

POWER CORDS

ALL JACKETING NEOPRENE — ALL CORDS 48″ RETRACTED, APPROX. 25′ EXTENDED

Catalog Number	Condr. AWG	Stranding	Cordage O.D. (Inches)	Coil O.D. (Inches)	Amp Rating	Max. Working Voltage
2820	5/18	41x34	.440	1¾	5.6	300
2821	7/18	41x34	.500	1⅞	5.6	300
2822	2/12 4/18	65x30 41x34	.610	2¼	17 6	600 600
2824	6/16	65x34	.545	2	8	600
2825	6/16 1/14	65x34 41x30	.575	2⅛	8	600
2827	7/12	65x30	.775	2¾	16	300

TEST LEADS (Red or Black)

24″ RETRACTED, APPROX. 12′ EXTENDED

Catalog Number	Condr. AWG	Cordage O.D. (Inches)	Coil O.D. (Inches)	Amp Rating	Max. Working Voltage
2830	1/20 Black	.165	¾	4	1000
2831	1/20 Red	.165	¾	4	1000

SHIELDED AND TINSEL MICROPHONE CORDS

ALL JACKETING NEOPRENE
ALL CORDS 48″ RETRACTED, APPROX. 25′ EXTENDED

Catalog Number	Condr. AWG	Cordage O.D. (Inches)	Coil O.D. (Inches)
2850	1/24 (S)	.160	⅝
2852	1/23 1/24 (S)	.200	¹³⁄₁₆
2854	2/23 1/24 (S)	.240	⅞
2856	2/23 1/24 (S)	.270	1¼
2857	3 Tinsel	.201	¹³⁄₁₆
2858	4 Tinsel	.220	⅞
2859	5 Tinsel	.285	1

* Conductor Color Coding: 1—Black, 2—White, 3—Red, 4—Green, 5—Blue
(S) SHIELDED

COMMUNICATION AND ELECTRONIC CONTROL CORDS

ALL JACKETING NEOPRENE
ALL CORDS 48″ RETRACTED, APPROX. 25′ EXTENDED

Multi-conductors stranded communication cord No. 23 AWG, tinned copper wire. Lengths can be cut to exact requirement. Maximum working voltage 120 volts. Current carrying capacity 1 ampere Nom. cond. resistance .022 ohms per linear foot.

Catalog Number	Condr. AWG	Stranding	Cordage O.D. (Inches)	Coil O.D. (Inches)
2870	2/23	21x36	.200	¾
2871	3/23	21x36	.210	¾
2872	4/23	21x36	.240	⅞
2873	5/23	21x36	.285	1
2874	6/23	21x36	.305	1⅛
2875	7/23	21x36	.320	1¼

* Conductor Color Coding: 1—Black, 2—White, 3—Red, 4—Green, 5—Blue, 6—Yellow, 7—Brown

CORD SETS

TV POWER SUPPLY (CHEATER) PLASTIC CORD

Underwriters' Approved

Extra flexible parallel cord type SPT-1 (P.O.T.). Soft molded connector and attached soft molded cap.

No. 2506 6 Ft. Cord Set
No. 2509 9 Ft. Cord Set
No. 2516 6 Ft. Cord Set—"Polarized"
No. 2519 9 Ft. Cord Set—"Polarized"

CUBE TAP EXTENSION CORD

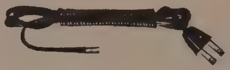
Underwriters' Approved

3-way extension tap Type SPT-1 (P.O.T.). Flexible cord and soft molded-on cap.

No. 2706 6 Ft. Cord Set
No. 2709 9 Ft. Cord Set
No. 2712 12 Ft. Cord Set
No. 2715 15 Ft. Cord Set

REPLACEMENT POWER CORD SET

Underwriters' Approved

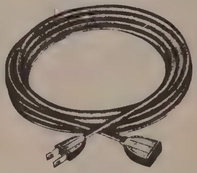


Extra flexible parallel cord type SPT-1 (P.O.T.) and soft molded-on cap—hanked—ends of cord stripped and tinned.

No. 3006 6 Ft. Cord Set
No. 3008 8 Ft. Cord Set

POWER EXTENSION CORD

WITH MOLDED-ON CAP AND CONNECTOR



UL LISTED CORD

Modern design extension power cords with approved molded-on caps and connector. Packed in individual clear plastic bags for easy identification. Consolidated power cords for both indoor and outdoor.

2 CONDUCTOR UL LISTED

Catalog Number	Length	Type
7001	25 Ft.	No. 18—2/c
7001	50 Ft.	No. 18—2/c
7001	100 Ft.	No. 18—2/c
7002	25 Ft.	No. 16—2/c
7002	50 Ft.	No. 16—2/c
7002	100 Ft.	No. 16—2/c
7003	25 Ft.	No. 14—2/c
7003	50 Ft.	No. 14—2/c
7003	100 Ft.	No. 14—2/c
7004	25 Ft.	No. 12—2/c
7004	50 Ft.	No. 12—2/c
7004	100 Ft.	No. 12—2/c

3 CONDUCTOR UL LISTED

Catalog Number	Length	Type
7007	25 Ft.	No. 18—3/c
7007	50 Ft.	No. 18—3/c
7007	100 Ft.	No. 18—3/c
7008	25 Ft.	No. 16—3/c
7008	50 Ft.	No. 16—3/c
7008	100 Ft.	No. 16—3/c
7005	25 Ft.	No. 14—3/c
7005	50 Ft.	No. 14—3/c
7005	100 Ft.	No. 14—3/c
7006	25 Ft.	No. 12—3/c
7006	50 Ft.	No. 12—3/c
7006	100 Ft.	No. 12—3/c

MULTI-COLOR CABLES

FLEXIBLE COTTON BRAIDED

For speakers, tester, battery hook-up, etc.
STANDARD SPOOL PUT-UP: 100 FT., 250 FT., 500 FT., 1000 FT.

Catalog Number	Type	Size	Stranding	Specifications	Insulation Thickness (Inches)	Finshed O.D. (Inches)
1481	1 Conductor	20	10x30	Tinned flexible copper; plastic insulation; bunched individual conductors; heavy brown cotton braid over-all; color coded.	1/64	.150
1482	2 Conductors	20	10x30	Same as 1481	1/64	.175
1483	3 Conductors	20	10x30	Same as 1481	1/64	.200
1484	4 Conductors	20	10x30	Same as 1481	1/64	.275
1485	5 Conductors	20	10x30	Same as 1481	1/64	.250
1486	6 Conductors	20	10x30	Same as 1481	1/64	.260
1487	7 Conductors	20	10x30	Same as 1481	1/64	.275
1488	8 Conductors	20	10x30	Same as 1481	1/64	.300
1489	9 Conductors	20	10x30	Same as 1481	1/64	.310
1490	10 Conductors	20	10x30	Same as 1481	1/64	.325
1494	11 Conductors	20	10x30	Same as 1481	1/64	.335

ANALYZER CABLE

STANDARD SPOOL PUT-UP: 100 FT., 250 FT., 500 FT., 1000 FT.

Catalog Number	Type	Size	Stranding	Specifications	Insulation Thickness (Inches)	Finshed O.D. (Inches)
1501	8 Conductors	2-14 6-18	41x30 16x30	Extra flexible tinned copper; plastic insulation; color coded; Brown cotton braid overall.	1/64	.300
1502	9 Conductors	2-14 7-18	41x30 16x30	Same as 1501	1/64	.320

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AERIAL KITS FOR EVERY RADIO RECEIVER

Consolidated Aerial Kits are made up with the same painstaking care that has always featured our assemblies. All materials and parts are of highest standard and are guaranteed as to Length, Weight, Size and Count as Specified. If your needs are not answered in the stock listings below, write us regarding your special requirements.

50 FOOT SERIES

THE PRICE LEADER No. 506	50 feet 7x26 Bare Copper Aerial Wire 25 feet No. 16 Rubber Covered Lead-in Wire 1 Adjustable Ground Clamp 2 Porcelain Insulators 2 Porcelain Nail Knobs 1 Window Lead-in Strip Installation Instructions
No. 507	Contains 1 Underwriter Approved Lightning Arrestor, otherwise same as No. 506
A SUPER VALUE No. 501	50 feet 7x26 Bare Copper Aerial Wire 35 feet No. 16 Rubber Covered Lead-in Wire 1 Adjustable Ground Clamp 2 Porcelain Insulators 2 Porcelain Nail Knobs 1 Window Lead-in Strip Installation Instructions
No. 502	Contains 1 Underwriter Approved Lightning Arrestor, otherwise same as No. 501
DE LUXE AERIAL No. 512	50 feet 7x22 Tinned Aerial Wire 35 feet No. 16 Rubber Covered Lead-in Wire 1 Underwriter Approved Lightning Arrestor 2 Porcelain Insulators 2 Porcelain Nail Knobs 1 Shur Grip Ground Clamp 1 Duco Window Lead-in Strip Installation Instructions

60 FOOT SERIES

No. 516 PRICE KIT	Contains 60 feet 7x26 Bare Copper Aerial Wire, otherwise same as No. 501.
No. 517	Contains 60 feet 7x26 Bare Copper Aerial Wire, 1 Underwriter Approved Lightning Arrestor, otherwise same as No. 501.
No. 518 AERIAL	Contains 60 feet 7x22 Tinned Aerial Wire, otherwise same as No. 512.

75 FOOT SERIES

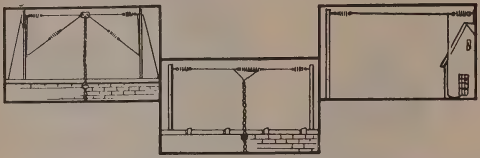
75 FOOT SPECIAL No. 531	75 feet 7x26 Bare Copper Aerial Wire 25 feet No. 16 Rubber Covered Lead-in Wire 1 Adjustable Ground Clamp 2 Porcelain Insulators 2 Porcelain Nail Knobs 1 Window Lead-in Strip Installation Instructions
No. 532	Contains 1 Underwriter Approved Lightning Arrestor, otherwise same as No. 531.
SUPERFINE AERIAL No. 522	75 feet 7x24 Tinned Aerial Wire 25 feet No. 16 Rubber Covered Lead-in Wire 1 Underwriter Approved Lightning Arrestor 2 Porcelain Insulators 2 Porcelain Nail Knobs 1 Shur Grip Ground Clamp 1 Duco Window Lead-in Strip Installation Instructions

100 FOOT SERIES

EXTRA VALUE No. 541	100 feet 7x26 Bare Copper Aerial Wire 25 feet No. 16 Rubber Covered Lead-in Wire 1 Adjustable Ground Clamp 2 Porcelain Insulators 2 Porcelain Nail Knobs 1 Window Lead-in Strip Installation Instructions
No. 542	Contains 1 Underwriter Approved Lightning Arrestor, otherwise same as No. 541.
No. 551	Contains 100 feet 7x24 Copper Aerial Wire, otherwise same as No. 541.
No. 552	Contains 100 feet 7x24 Aerial Wire, 1 Underwriter Approved Lightning Arrestor, otherwise same as No. 541.

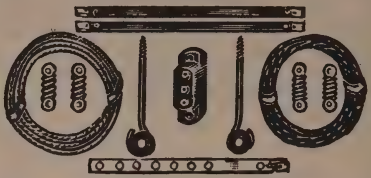
No. 615 UNIVERSAL LIMITED ALL-WAVE ANTENNA SYSTEM

WITH BALANCED TRANSMISSION



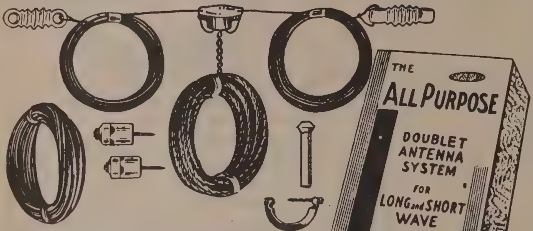
The various types of Marconi and Doublet Antenna systems which may be erected with this kit are all extremely efficient, being based on advanced antenna design which permits uniform reception on the short wave bands and eliminates local noise interference which is so prevalent at the higher frequencies. Effectively eliminates interference set up by power transformers, street cars, and other electrical equipment. The kit provides complete parts for the erection of practically every type of limited antenna of double or other design. An instruction sheet packed with each kit gives detailed instructions for the various type of aerials that may be erected.

LIST OF PARTS



1—100 ft. coil Bare Aerial Wire
1—50 ft. coil Twisted Rubber Covered Transmission Line
4—Porcelain Insulators
1—Doublet Lightning Arrestor
1—Doublet Window Lead-in Strip
1—Ground Clamp
Installation Instructions
Attractive 3 Colored Carton

No. 635 LIMITED ALL-PURPOSE DOUBLET ANTENNA KIT



FULLY ASSEMBLED — ATTRACTIVELY PACKAGED

The Super Limited All-Purpose Doublet Antenna System is sold as a completely assembled unit. The coils of double wire are joined and soldered to the twisted transmission lead-in. Insulators are also attached ready for instant installation.

A TRUE DOUBLET — FOR BOTH SHORT AND LONG WAVE RECEPTION

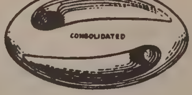
A scientifically designed, high efficiency doublet, all wave antenna system for limited world-wide reception. Kit is complete in all details, ready assembled for quick, convenient installations. Only the finest parts are used in its assembly, assuring utmost efficiency in operation. On all modern types of superheterodyne receivers tuning two or three bands, this limited All-Purpose Doublet antenna will show a marked improvement in reception. Also provides a remarkable pick-up in signal strength on the short wave 16-49 meter band. Both units of the doublet, because of their length and method of assembly are tuned to the opposite ends of the short wave range, providing for uniform pick-up efficiency on all intervening frequencies.

COMPLETELY ASSEMBLED SYSTEM

2—30 ft. coils 7x24 Bare Copper Wire
1—50 ft. coil Twisted and Braided overall Transmission Wire
3—3-inch Porcelain Insulators
1—10 ft. coil Ground Wire
1—Ground Clamp
2—Porcelain Nail Knobs
1—Instruction Sheet

RADIO SPECIALTIES

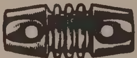
AIRPLANE INSULATOR



No. 1581

A specially designed insulator that provides great tensile strength. A valuable accessory for the serviceman who specializes in antenna installation. Made of highly glazed porcelain, shaped to shed moisture.

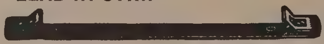
PORCELAIN INSULATOR



No. 1600

A sturdily constructed insulator at a price that defies competition. Made of the highest grade porcelain, with a high gloss finish that sheds moisture.

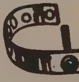
DUCO LACQUERED LEAD-IN-STRIP



No. 1504

Made of soft drawn flexible copper, covered with a heavy black cotton braid. The braid is thoroughly weatherproofed, with a number of coats of Duco Lacquer. Made extra thin to assure its use on snug fitting casements. Highly polished finish — absolutely weatherproofed. Contains a Fahnestock clip at each end.

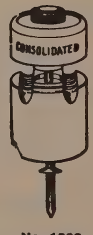
ZINC STRAP CLAMP



No. 1517

A well made zinc clamp which provides positive contact with a permanent connection. Regularly finished with a strong, over-sized copper nut and bolt. A Fahnestock clips is provided for the lead-in connection. For use in all sizes of pipe up to 2 inches in diameter.

PORCELAIN NAIL KNOBS



No. 1602

Porcelain Nail Knobs are a necessity for aerial lead-in and for all types of outside wiring. They are made of durable porcelain with correctly grooved jaws that hold firmly with a bulldog grip, without piercing the insulation. Nail is rust-resisting and provided with a stop to prevent separation of the units. Top buffer pad prevents breakage during installation.

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CROSS REFERENCE CHART
BELDEN — CONSOLIDATED
COMPARABLE OR IDENTICAL

(See Respective Page Number for Complete Description)

Belden Number	Consolidated Number	Belden Number	Consolidated Number	Belden Number	Consolidated Number	Belden Number	Consolidated Number	Belden Number	Consolidated Number
8000	3551	8403	1723	8527	9007	8742	5211	9252	4457
8002	3521	8404	1724	8528	9012	8743	5226	9273	4496
8008	2000	8405	1725	8529	9011	8744	5241	9415	2872
8009	2000	8407	1707	8530	9010	8745	5271	9416	2856
8011	3831	8408	1705	8531	9013	8746	5286	9417	2854
8012	3821	8410	1460	8535	9039	8747	5156	9430	5421
8013	3815	8411	1721	8536	9038	8748	5159	9431	5440
8014	1161	8412	1462	8537	9037	8749	5165	9432	5446
8019	3816	8415	2872	8541	9700	8750	5167	9433	5448
8020	3817	8416	5587	8542	9701	8751	5902	9434	5450
8021	3818	8418	1455	8543	9702	8752	5901	9435	1401
8022	3819	8419	1406	8544	9703	8753	5251	9436	1402
8023	3846	8422	1458	8545	9704	8758	5526	9437	1407
8024	3847	8423	1463	8546	9705	8759	5543	9439	5644
8025	3848	8424	1464	8547	9719	8760	5574	9444	5642
8040	2000	8425	1465	8548	9718	8761	5572	9445	5643
8041	2000	8426	1466	8549	9717	8762	5573	9455	5645
8042	2000	8427	1467	8550	9716	8764	5309	9457	5646
8043	2000	8428	1702	8551	9715	8765	5311	9477	2801
8044	2000	8429	1479	8552	9714	8766	5315	9481	2802
8045	2000	8430	1478	8553	9713	8767	5303	9483	2803
8046	2000	8431	1470	8554	9711	8768	5306	9485	2806
8047	2000	8437	5511	8555	9710	8769	5339	9620	5488
8048	2000	8441	5568	8556	9709	8770	5578	9621	5489
8049	2000	8442	5579	8557	9708	8771	5576	9622	5490
8050	2000	8443	5401	8558	9707	8772	5577	9623	5491
8051	2000	8444	5406	8559	9706	8773	5347	9624	5492
8052	2000	8445	5411	8561	9030	8774	5329	9625	5493
8053	2000	8446	5416	8562	9029	8775	5331	9626	5477
8054	2000	8447	5421	8563	9028	8776	5335	9740	5601
8055	2000	8448	4538	8564	9027	8777	5323	9741	5612
8056	2000	8449	5431	8565	9026	8778	5326	9742	5615
8057	2000	8450	5588	8566	9025	8781	5584	9743	5619
8058	2000	8451	5570	8567	9215	8782	5547	9744	5152
8059	2000	8452	4202	8568	9214	8783	5123	9745	5153
8060	2000	8455	1735	8569	9213	8790	5538	9770	5576
8061	2000	8456	5432	8570	9212	8850	9725	9773	5353
8062	2000	8457	5434	8571	9211	8851	9724	9774	5356
8063	2000	8458	5438	8580	9108	8852	9723	9775	5359
8064	2000	8459	5442	8581	9107	8853	9722	9776	5362
8065	2000	8460	5585	8582	9106	8854	9721	9777	5365
8066	2000	8461	5581	8583	9105	8855	9720	83000	9601
8067	2000	8462	4072	8584	9104	8866	4622	83001	9602
8068	2000	8463	4517	8585	9103	8868	4623	83002	9604
8069	2000	8464	4509	8586	9102	8869	4624	83003	9605
8070	2000	8465	5471	8596	9302	8874	2507	83004	9606
8071	2000	8466	5474	8598	9301	8879	2830-1	83005	9608
8072	2000	8467	5472	8599	9300	8880	9020	83006	9607
8073	2000	8468	5475	8601	2801	8881	9019	83007	9609
8074	2000	8469	5473	8602	2803	8882	9017	83008	9610
8075	2000	8470	5586	8603	2806	8883	9015	83009	9611
8076	2000	8471	5582	8618	5590	8884	9018	83010	9613
8077	2000	8472	4217	8619	5476	8886	9016	83023	9625
8078	2000	8473	5583	8620	5480	8887	9014	83025	9628
8079	2000	8477	5597	8621	5481	8888	4077	83026	9627
8080	2000	8478	4207	8622	5482	8889	2509	83027	9629
8081	2000	8481	5584	8623	5483	8892	9023	83028	9630
8082	2000	8482	5556	8624	5484	8893	9021	83029	9631
8083	2000	8483	5561	8627	5485	8894	9024	83030	9633
8084	2000	8484	4524	8628	5486	8895	2506	83241	4716
8085	2000	8485	4525	8629	5487	8896	9022	83242	4719
8086	2000	8486	5557	8649	5140	8897	1007	83264	4731
8205	5580	8488	4521	8653	1388	8898	1006	83265	4729
8208	5541	8489	5470	8654	1389	8899	1002	83266	4734
8212	4478	8490	2873	8661	1393	8916	891	83267	4736
8213	4476	8491	2856	8662	1397	8917	890	83269	4738
8214	4477	8492	5556	8664	1390	8918	876	83270	4742
8215	4433	8495	2873	8669	1394	8919	871	83282	4757
8216	4459	8497	2854	8671	1398	8920	866	83284	4759
8221	4478	8499	2850	8672	1395	8950	9405	83304	9820
8228	4575	8500	9312	8674	1387	8951	9404	83305	9824
8230	4503	8501	9311	8676	1386	8952	9403	83306	9828
8232	4481	8502	9309	8680	4036	8953	9402	83307	9832
8233	4480	8503	9307	8681	4038	8954	9401	83308	9836
8235	4523	8504	9305	8682	4030	8955	9400	83318	9821
8237	4415	8505	9303	8683	4029	8956	9415	83319	9825
8238	4419	8507	9308	8684	4028	8957	9414	83320	9828
8240	4405	8508	9306	8685	4027	8958	9413	83321	9833
8241	4401	8509	9304	8689	4031	8959	9412	83322	9837
8242	4436	8510	9325	8690	5603	8960	9411	83333	9322
8243	4438	8511	9324	8691	5606	8963	9509	83334	9826
8254	4452	8512	9322	8692	5609	8964	9508	83335	9830
8255	4472	8513	9320	8718	5596	8965	9507	83336	9834
8258	4485	8514	9318	8719	5575	8966	9506	83337	9838
8259	4449	8515	9316	8720	5589	8967	9505	83348	9823
8261	4440	8516	9323	8723	5594	8968	9504	83349	9827
8262	4450	8517	9321	8724	5571	8969	9503	83350	9831
8263	4470	8518	9319	8731	5569	8970	9502		
8267	4489	8519	9317	8732	5516	8971	9501	83351	9835
8268	4490	8520	9006	8735	5569	9085	4532	83352	9839
8275	4527	8521	9005	8737	5568	9090	4535	83412	920
8285	4532	8522	9004	8738	5501	9233	4559	83413	921
8290	4535	8523	9003	8739	5511	9234	4559	83414	922
8401	1457	8524	9002	8740	5201	9250	4475	83415	923
8402	1462	8525	9001	8741	5205	9251	4435	83416	924

CROSS REFERENCE CHART
ALPHA — CONSOLIDATED
COMPARABLE OR IDENTICAL

(See Respective Page Number for Complete Description)

Alpha Number	Consolidated Number	Alpha Number	Consolidated Number	Alpha Number	Consolidated Number	Alpha Number	Consolidated Number	Alpha Number	Consolidated Number
112	3551	1172	5400	1307/9	5241	1505	9038	1775	5511
136	3521	1173	5401	1308/11	5251	1506	9039	1793	5201
286	3821	1174	5406	1309/15	5271	1507	9040	1828	4538
289	3831	1175	5411	1313	5286	1508	9041	1830	9400
292	3841	1176	5416	1313/31	5289	1509	9042	1831	9401
392-8	3845	1177	5421	1313/41	5292	1550	9001	1832	9402
295	3815	1178	5426	1314	5297	1551	9002	1833	9403
296	3816	1179	5431	1316	5151	1553	9003	1834	9404
297	3817	1181	5434	1317	5152	1555	9004	1835	9405
298	3818	1181/15	5438	1318	5153	1557	9005	1840	9410
299	3819	1181/20	5440	1320	5155	1559	9006	1841	9411
299/1	3846	1181/25	5442	1322	5156	1560	9007	1842	9412
299/2	3847	1181/30	5446	1323	5159	1561	9010	1843	9413
299/3	3848	1181/40	5448	1324	5161	1563	9011	1844	9414
650	2830/1	1181/50	5450	1327	5165	1565	9012	1846	9415
660/4	2801	1181/60	5460	1329	5167	1567	9013	1850	9300
661/4	2802	1182	1482	1329/31	5171	1571	9100	1851	9301
662/4	2803	1183	1483	1329/41	5181	1573	9101	1852	9302
663/4	2804	1184	1484	1330	5191	1575	9102	1853	9303
664/4	2805	1186	1486	1341	9706	1577	9103	1854	9305
665/4	2806	1187	1487	1342	9707	1579	9104	1854/19	9304
666/4	2808	1188	1488	1343	9708	1590	9025	1855	9307
670/4	2807	1190	1490	1344	9709	1591	9026	1855/19	9306
671/4	2809	1194	9032	1345	9710	1592	9027	1856	9309
672/4	2811	1194/22	9031	1346	9711	1593	9028	1856/19	9308
673/4	2812	1196	9033	1350	9014	1594	9029	1857	9311
674/4	2813	1197	9034	1351	9015	1595	9030	1857/19	9310
675/4	2814	1200	1470	1352	9016	1632	1001	1858/19	9312
676/4	2815	1222	1386	1353	9017	1636	1002	1860	9313
677/4	2816	1223	1387	1354	9018	1638	1006	1861	9314
680/4	2870	1224	1388	1365	9019	1639	1007	1862	9315
681/4	2871	1229	1390	1356	9020	1640	4624	1863	9316
682/4	2872	1230	1391	1371	9021	1641	4616	1864	9318
683/4	2873	1231	1392	1372	9022	1642	4621	1864/19	9317
684/4	2874	1232	1393	1373	9023	1645	4622	1865	9320
685/4	2875	1233	1395	1374	9024	1651	9105	1865/19	9319
690/4	2850	1233/2	1394	1381	9700	1653	9106	1866	9322
692/4	2852	1234	1396	1382	9701	1655	9107	1866/19	9321
694/4	2854	1235	1398	1383	9702	1657	9108	1867	9324
696/4	2856	1239	1399	1384	9703	1675	9210	1867/19	9323
1064	5480	1243/4	5516	1385	9704	1676	9211	1868/19	9325
1065	5488	1244	1732	1386	9705	1677	9212	1870	9500
1067	5481	1245	1733	1387	9713	1678	9213	1871	9501
1069	5489	1246	1734	1388	9714	1679	9214	1872	9502
1072	5482	1247	1735	1389	9715	1680	9215	1873	9503
1075	5483	1247/6	1736	1389/4	9716	1685	9200	1874	9504
1079	5484	1247/7	1737	1389/2	9717	1686	9201	1875	9505
1085	5490	1247/8	1738	1389/0	9718	1687	9202	1876	9506
1100	1478	1249	1460	1389/00	9719	1688	9203	1877	9507
1101	1401	1250	1462	1400	1714	1689	9204	1878	9508
1102	1402	1250/18	1456	1401	1715	1690	9205	1879	9509
1105	1479	1251	1463	1402	1716	1702	1461	1891	5583
1106	1406	1252	1464	1410	1717	1703	1721	1893	5400
1107	1407	1253	1465	1411	1718	1704	1457	1894	5401
1110	1410	1254	1466	1449	1701	1705	1461	1894/4	5406
1133	5603	1255	1467	1450	1702	1706	1459	1895	5640
1136	5606	1255/8	1455	1450/16	1705	1710	1458	1896	5641
1142	5612	1274	5485	1451	1703	1712	1722	1896/4	5642
1145	5615	1275	5491	1451/16	1706	1713	1723	1896/12	5646
1149	5619	1277	5486	1452	1704	1715	1724	1897	5581
1151	5627	1279	5492	1452/16	1707	1716	1725	1898/4	5470
1157	4509	1282	5487	1454	1708	1717	1726	1898/12	5474
1158	4517	1285	5493	1456	1709	1719	1728	1898/15	5475
1159	3421	1300	5201	1458	1710	1721	1740	1898/19	5476
1160	3451	1302	5205	1459	1711	1723	1741	1898/25	5477
1161	3461	1304	5211	1459/15	1712	1726	1742	1899	5582
1163	3465	1307	5226	1459/20	1713	1728	1743	1900	5584
1164	3466	1307/7	5231	1504	9037	1746	5541	1912	5556

CONSOLIDATED

CONSOLIDATED WIRE & ASSOCIATED CORPORATIONS

1633 S. CLINTON ST. • (312) 421-4441 • Cable Address: "CON WIRE" • CHICAGO, ILL. 60616

CROSS REFERENCE CHART

ALPHA — CONSOLIDATED (Continued)

COMPARABLE OR IDENTICAL

(See Respective Page Number for Complete Description)

Alpha Number	Consolidated Number	Alpha Number	Consolidated Number	Alpha Number	Consolidated Number	Alpha Number	Consolidated Number	Alpha Number	Consolidated Number
1918	881	2163	1312	2821/4	9823	4107	7507	5952	902
1921	5585	2164	1314	2824	9824	4108	7508	5953	903
1924	5586	2166	1315	2824/2	9825	4110	7510	5954	904
1932	4307	2167	1316	2824/3	9826	4112	7512	6000	5303
1932/3	4312	2168	1317	2824/4	9827	4114	7514	6002	5306
1932/4	4314	2170	1318	2827	9828	4116	7516	6004	5309
1933	4317	2171	1319	2827/2	9829	4119	7519	6006	5311
1933/3	4322	2171/1	1320	2827/3	9830	4121	7521	6008	5315
1933/4	4324	2172	1321	2827/4	9831	4122	7522	6010	5323
1934	4327	2173	1322	2829	9832	4124	7524	6012	5326
1934/3	4332	2174	1323	2829/2	9833	4126	7526	6014	5329
1934/4	4334	2175	1324	2829/3	9834	4130	7530	6016	5331
1935	4337	2175/1	1325	2829/4	9835	4137	7537	6018	5335
1935/3	4342	2176	1326	2850	9600	4150	7550	6020	5339
1935/4	4344	2254	5568	2851	9601	4160	7560	6022	5347
1936	4347	2254/1	5551	2852	9602	4202	7602	6460	9720
1936/3	4352	2254/3	5569	2853	9604	4203	7603	6463	9721
1936/4	4354	2256	5543	2854	9603	4204	7604	6466	9722
1937	4357	2258	5543	2854/7	9606	4205	7605	6469	9723
1937/3	4362	2402	5572	2855	9607	4206	7606	6470	9724
1937/4	4364	2403	5576	2855/7	9608	4207	7607	6471	9725
1938	4367	2412	5573	2856	9609	4208	7608	6630	4524
1938/3	4372	2413	5577	2856/7	9610	4209	7609	6631	4525
1938/4	4374	2422	5574	2857	9611	4210	7610	6632	4521
1944	5547	2423	5578	2858	9613	4212	7612	7053	920
1945	5547	2432	5575	2859	9614	4214	7614	7054	921
1946	5140	2433	5590	2859/10	9616	4216	7616	7055	922
1947	5140	2442	5589	2859/12	9615	4219	7619	7056	923
1951	4202	2443	5591	2874	9625	4224	7624	7057	924
1952	4207	2444	5596	2875	9627	4227	7627	7058	925
1952/3	4212	2450	5901	2876	9629	4230	7630	9006A	4433
1952/4	4214	2451	5902	2877	9631	4234	7634	9008	4415
1953	4217	2460	5588	2878	9633	4237	7637	9008A	4435
1953/3	4222	2461	5570	2879	9634	4240	7640	9009B	4438
1953/4	4224	2809	9800	2879/10	9636	4302	7702	9011	4419
1954	4227	2809/2	9801	2879/12	9635	4303	7703	9011A	4440
1954/3	4232	2809/3	9802	3050	819	4304	7704	9012A	4441
1954/4	4234	2809/4	9803	3051	821	4305	7705	9014A	4468
1955	4237	2811	9840	3053	831	4306	7706	9017A	4482
1955/3	4242	2811/2	9841	3055	846	4307	7707	9022B	4475
1955/4	4244	2811/3	9842	3071	866	4308	7708	9055	4447
1956	4247	2811/4	9843	3073	871	4309	7709	9055B	4484
1956/3	4252	2812	9804	3075	876	4310	7710	9058	4405
1956/4	4254	2812/2	9805	3077	890	4312	7712	9058A	4449
1957	4257	2812/3	9806	3079	891	4314	7714	9058C	4450
1957/3	4262	2812/4	9807	3706	8006	4315	7715	9059	4401
1957/4	4264	2814	9844	3712	8012	4316	7716	9059B	4470
1958	4267	2814/2	9845	3718	8018	4318	7718	9062	4452
1958/3	4272	2814/3	9846	3725	8025	4319	7719	9062A	4453
1958/4	4274	2814/4	9847	3750	8050	4320	7720	9063B	4455
1967	4027	2815	9808	3806	8016	4322	7722	9071B	4485
1977	5148	2815/2	9809	3812	8112	4325	7725	9161	4724
1979	5148	2815/3	9810	3818	8118	4327	7727	9174	4459
1982	4079	2815/4	9811	3825	8125	4330	7730	9178B	4729
1985	5587	2817	9848	3850	8150	4334	7734	9179B	4731
2130	1340	2817/2	9849	3906	8306	4337	7737	9180B	4734
2132	1341	2817/3	9850	3912	8312	5160	4503	9187A	4736
2134	1342	2817/4	9851	3918	8318	5165	4506	9188A	4738
2136	1343	2818	9812	3925	8325	5851	9601	9195A	4740
2138	1344	2818/2	9813	3950	8350	5852	9602	9196A	4742
2140	1345	2818/3	9814	4006	8406	5853	9604	9212	4488
2142	1346	2818/4	9815	4012	8412	5854	9605	9213	4489
2144	1347	2819	9852	4018	8418	5854/7	9606	9214	4490
2146	1348	2819/2	9853	4025	8425	5855	9607	9215	4497
2148	1349	2819/3	9854	4050	8450	5855/7	9608	9217	4492
2150	1350	2819/4	9855	4102	7502	5856	9609	9218	4493
2152	1351	2821	9820	4103	7503	5856/7	9610	9219	4494
2160	1310	2821/2	9821	4105	7505	5857	9611	9223	4496
2162	1311	2821/3	9822	4106	7506	5858	9613	9224	4411
						5951	901	9316	4759

MILITARY AND GOVERNMENT SPECIFICATIONS WIRES AND CABLES

WE WELCOME YOUR INQUIRIES FOR THE FOLLOWING, SPECIFY TYPE DESIGNATION

SPECIFICATION

MIL-C-17C
MIL-W-76B
MIL-C-442B
MIL-W-583B
MIL-I-631D
MIL-C-915A
MIL-C-1892
MIL-C-1907
MIL-C-2194D
MIL-C-2486C
MIL-C-2681
MIL-C-3078
MIL-W-3093
MIL-W-3104
MIL-C-3162A
MIL-C-3432B
MIL-C-3458A
MIL-C-3849
MIL-W-3861
MIL-C-3883
MIL-C-3884
MIL-L-3930B
MIL-C-4921
MIL-W-5086A
MIL-C-5136B
MIL-C-5186
MIL-C-5252B
MIL-W-5274A
MIL-C-5756B
MIL-C-5898A
MIL-L-6477B
MIL-C-7072A
MIL-C-7078A
MIL-W-7139A
MIL-W-8777A
MIL-C-8817
MIL-E-9085A
MIL-E-9088A
MIL-C-9660
MIL-C-10065A
MIL-C-10255
MIL-P-10255
MIL-C-10392B
MIL-C-10581B
MIL-P-10582
MIL-C-10769
MIL-C-10820B
MIL-C-10993A
MIL-C-11060

SPECIFICATION

MIL-C-11097A
MIL-C-11311
MIL-C-11440
MIL-C-11540
MIL-C-12349
MIL-C-12432B
MIL-C-12881
MIL-W-12995
MIL-C-13017
MIL-C-13021
MIL-W-13074
MIL-W-13075
MIL-C-13077
MIL-W-13169B
MIL-C-13268
MIL-C-13273
MIL-W-13276
MIL-C-13294B
MIL-C-13486A
MIL-C-13745
MIL-C-13770
MIL-C-13777C
MIL-C-13892
MIL-C-15479C
MIL-C-16839C
MIL-W-16878D
MIL-C-17235
MIL-C-17621
MIL-C-17818
MIL-C-18266
MIL-C-18869A
MIL-C-18913
MIL-C-18959A
MIL-C-18961A
MIL-C-18962A
MIL-W-19150A
MIL-W-19381A
MIL-C-19547
MIL-W-19583
MIL-C-19654
MIL-C-19787B
MIL-C-19883A
MIL-C-21609
MIL-C-22759
MIL-C-23206
MIL-C-25038
MIL-C-25326
MIL-C-25622
MIL-C-27072

SPECIFICATION

MIL-C-27212A
MIL-C-27300A
MIL-C-27500
MIL-C-55036
MIL-C-55040

BUR. YARDS & DOCKS
SPEC. 9YG

AIR FORCE MANUAL
AFM-88-15

J-C-90a
J-C-94
J-C-98
J-C-103b
J-C-129a
J-C-138

INTERIM
J-C-129b
J-C-0094a
J-C-00103c
J-C-00115

CORPS. of ENGRS.
GUIDE SPEC. 303-01
1404.04

QQ-W-343
QQ-A-351d
QQ-A-365b
QQ-B-575

CAA-701c
CAA-893b

L-824

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CONSOLIDATED WIRE & ASSOCIATED CORPORATIONS
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DABURN electronics & cable corp.

WIRE • CABLE • TUBING • MIL/COMM • SWITCHES • ELECTRONIC HARDWARE

DAFLEX 105 PLASTIC TUBING

105°C POLYVINYLCHLORIDE (PVC) MEETS MIL-I-631D SPECS

Specifically compounded vinyl resins for superior all around performance. UL approved for 105°C, conforms to Spec MIL-I-631D Type F, Form U, Grades A and C. Class 1 and 2, Category 1. Resistant to heat, oil, water, chemical corrosion, fungi and aging. Very hi abrasion resistance. Will retain its flexibility. Suitable for covering and protecting wires and cables. Designed for electrical, electronic and aircraft applications. Non-flammable. Meets ASTM—D876, ASTM—D922.

D105 compounded with non-migratory resin type plasticizors. Retains its flexibility, permitting it to cling and protect irregular shapes. D105 snakes well under practically all conditions.

DIMENSIONAL TOLERANCES OF DAFLEX 105

DAFLEX No.	Size	Old Daburn No.	Nom. I.D.	Nom. Wall	Specify Std. Put-Up Spool or Coil	ASTM Tolerance, Inches		Wall Thickness Inches
D105-24	24	808	.022″	.012″	25′, 100′, 1000′	.020	.027	.012 ± .002
D105-22	22	811	.027″	.012″	25′, 100′, 1000′	.025	.032	.012 ± .002
D105-20	20	813	.034″	.016″	25′, 100′, 1000′	.032	.039	.016 ± .003
D105-19	19	—	.038″	.016″	100′, 1000′	.044	.036	.016 ± .003
D105-18	18	814	.042″	.016″	25′, 100′, 1000′	.040	.049	.016 ± .003
D105-17	17	—	.047″	.016″	100′, 1000′	.054	.045	.016 ± .003
D105-16	16	815	.053″	.016″	25′, 100′, 1000′	.051	.061	.016 ± .003
D105-15	15	—	.059″	.016″	100′, 500′	.067	.057	.016 ± .003
D105-14	14	816	.066″	.016″	25′, 100′, 500′	.064	.072	.016 ± .003
D105-13	13	—	.076″	.016″	100′, 500′	.080	.072	.016 ± .003
D105-12	12	817	.085″	.016″	25′, 100′, 500′	.081	.089	.016 ± .003
D105-11	11	—	.095″	.016″	100′, 500′	.101	.091	.016 ± .003
D105-10	10	825	.106″	.016″	25′, 100′, 500′	.102	.112	.016 ± .003
D105-9	9	—	.118″	.020″	100′, 500′	.124	.114	.020 ± .003
D105-8	8	818	.135″	.020″	25′, 100′, 500′	.129	.141	.020 ± .003
D105-7	7	—	.148″	.020″	100′, 500′	.158	.144	.020 ± .003
D105-6	6	826	.166″	.020″	25′, 100′, 250′	.162	.178	.020 ± .003
D105-5	5	—	.186″	.020″	100′, 250′	.198	.182	.020 ± .003
D105-4	4	819	.208″	.020″	25′, 100′, 250′	.204	.224	.020 ± .003
D105-3	3	—	.234″	.020″	100′, 250′	.249	.229	.020 ± .003
D105-2	2	820	.263″	.020″	100′, 250′	.258	.278	.020 ± .003
D105-1	1	—	.295	.020″	100′, 250′	.311	.289	.020 ± .003
D105-0	0	—	.330″	.020″	100′, 250′	.347	.325	.020 ± .003
D105-5/16″	5/16″	821	.312″	.025″	100′, 250′	.3125	.334	.025 ± .003
D105-3/8″	3/8″	822	.375″	.025″	100′, 250′	.375	.399	.025 ± .003
D105-7/16″	7/16″	—	.438″	.025″	100′, 250′	.462	.438	.025 ± .003
D105-1/2″	1/2″	823	.500″	.025″	100′, 250′	.500	.524	.025 ± .003
D105-9/16″	9/16″	—	.562″	.030″	50′, 100′	.592	.562	.030 ± .003
D105-5/8″	5/8″	824	.625″	.030″	50′, 100′	.625	.655	.030 ± .005
D105-3/4″	3/4″	827	.750″	.035″	50′, 100′	.750	.786	.035 ± .005
D105-7/8″	7/8″	860	.875″	.035″	50′, 100′	.875	.911	.035 ± .005
D105-1″	1″	861	1.000″	.035″	50′	1.000	1.036	.035 ± .005
D105-1 1/8″	1 1/8″	—	1.125″	.040″	50′	1.125	1.161	.035 ± .005
D105-1 1/4″	1 1/4″	862	1.250″	.040″	50′	1.250	1.286	.040 ± .005
D105-1 3/8″	1 3/8″	—	1.375″	.040″	50′	1.375	1.411	.040 ± .005
D105-1 1/2″	1 1/2″	863	1.500″	.045″	50′	1.500	1.536	.045 ± .005
D105-1 3/4″	1 3/4″	863	1.750″	.055″	50′	1.812	1.750	.055 ± .008
D105-2″	2″	829	2.000″	.060″	50′	2.000	2.070	.060 ± .010
D105-2 1/4″	2 1/4″	864	2.250″	.065″	50′	2.250	2.330	.065 ± .010
D105-2 1/2″	2 1/2″	865	2.500″	.070″	50′	2.500	2.590	.070 ± .010

IN STOCK

PROPERTIES OF DAFLEX-105 TUBING

Recommended for Temperatures to
105°C (220°F)

•

Low Temperature Flexibility to
−30°C

•

Dielectric Strength — .020″ Wall
800 V/MIL

•

Dielectric Constant
6.0

•

Tensile Strength — Min. (PSI)
2700

•

Ultimate Elongation
300%

•

Oil Resistance
Excellent

•

Fungus Resistance
Excellent

•

Flammability
Self-Extinguishing

•

Corrosion and Abrasion Resistance
Excellent

COLORS AVAILABLE FROM STOCK:
All sizes 24 thru 2½″: Clear, black, white.

ALSO STOCKED—Sizes 2 thru 7: Clear, black, white, yellow.
Sizes 8 thru 14: All above plus green, red.
Sizes 15 thru 24: All above plus blue. **Additional Colors Available.**

INDUSTRIAL, MEDICAL & LABORATORY TUBING AVAILABLE

ALL THE ABOVE TUBING CAN BE ORDERED CUT OR CUT AND MARKED TO YOUR SPECIFICATIONS

DAFLEX AND DAFLON TUBING

PLASTIC - FIBERGLASS - TEFLON TUBING COMPARATIVE PROPERTIES CHART

DAFLEX AND DAFLON TUBING	D105	D74	D130	D1200	DTT500 DTT550
Maximum Operating Temperature	105°C	80°C	130°C	1200°F	Continuous Service 250°C
Maximum Low Temperature Flexibility	−30°C	−67°C	−20°C	—	−90°C
Dielectric Strength Dry-V/MIL	1000 @ .015 Wall 900 @ .030 Wall	650 @ .015 Wall 300 @ .030 Wall	4000	Determined by Space Factor	1400 @ .010 Wall 850 @ .020 Wall
Dielectric Constant	6.0	4.5	7.0	—	2.2
Flammability	Self-Extinguishing	Self Extinguishing	Self Extinguishing	Will not burn	Non-flammable
Tensile Strength (PSI)	2700-3300	2200	1500-2000 (coating material only)	—	5000 - 7500
Ultimate Elongation	300 - 400%	375 - 450%	300 - 400%	—	300 - 500%
Minimum Volume Resistance Ohm-CM	10^{10}	—	10^7	—	10^{17}
Fungus Resistance	Excellent	Excellent	Good	Excellent	Completely Inert
Oil Resistance	Excellent	Excellent	Excellent	Excellent	Superior
Abrasion Resistance	Excellent	Fair	Excellent	—	Fair
Chemical Corrosion Resistance	Excellent	Good	Excellent	Excellent	Completely Inert
Applicable Specs	MIL-I-631D UL E-51336 Grade A & C Type F, Form U Class 1 & 2 Category 1 ASTM-D876 ASTM-D922 MIL-T-5438	MIL-I-7444B MIL-I-22076B	MIL-I-3190B Class B, Grade B ASTM-D372 NEMA-VS-1 MIL-I-21557 MIL-T-5438 UL E-20344	NEMA VSI	MIL-T-22129C MIL-P-14078A AMS-3651B AMS-3653 AMS-3654 AMS-3655 MIL-C-17D UL E-33531
Gamma Radiation Dosage to 25% Degradation Ergs/Gram	10^{10}	10^9	10^9	—	10^7
Corona Resistance	Excellent	Good	Excellent	—	Good

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DAFLEX AND DAFLON COMPARATIVE PROPERTIES CHART • DAPRENE TUBING • MIL-SPEC

DAFLEX AND DAFLON SHRINKABLE PRODUCTS COMPARATIVE PROPERTIES CHART

DAFLEX & DAFLON HEAT SHRINKABLE TUBING	Neoprene* SH-162	Vinyl (PVC) In Colors SH-265	Heavy Wall PVC SH-267	Irradiated Polyolefin SH-275	Semi-Rigid Polyolefin SH-290	Tefzel* SH-300
Continuous Operating Temperature	212°F	105°C 220°F	105°C 221°F	135°C 275°F	135°C 275°F	180°C 356°F
Shrinkage Temperature	160°F	95°C 200°F	95°C 200°F	120°C 250°F	120°C 250°F	149°C 300°F
Shrinkage Ratio Minimum	2:1 (50%)	2:1 (50%)	2:1 (50%)	2:1 (50%)	2:1 (50%)	1⅓:1
Longitudinal Change	15%	10%	10%	5%	5%	—
Tensile Strength, PSI Minimum	1800	2000	2000	2400	2600	6500
Ultimate Elongation %	800	200	200	400	400	200
Low Temperature Flexibility	−55°C −67°F	−10°C +14°F	−10°C +14°F	−55°C −67°F	−55°C −67°F	−67°C −85°F
Specific Gravity (ASTM D792)	1.40	1.40	1.40	1.30 Color Tubing 1.0 Clear Tubing	1.26 Color Tubing 1.0 Clear Tubing	1.70
V/MIL. Minimum Dielectric Strength (ASTM D149)	200	700	600	500	500	400
Water Absorption Maximum (MIL-I-23053)	1.0%	1%	1%	.1%	.1%	.03%
Fungus Resistance (MIL-I-7444)	Good	Excellent	Excellent	Excellent	Excellent	Excellent
Corrosion (MIL-I-23053)	Good	2.0% Max. Per MIL-I-631	2.0% Max. Per MIL-I-631	Non-corrosive	Non-corrosive	Non-corrosive
Flammability (MIL-I-23053)	Self-Ext.	Self-Ext.	Self-Ext.	Self-Ext.†	Self-Ext.†	Non-flammable
Resistance to Soldering Iron	Poor	Poor	Poor	Good	Good	Excellent
Applicable Specs	MIL-R-46846 MIL-I-23053B/1 UL E-33531	MIL-I-20353/2 MIL-I-631 ASTM-D-792 ASTM-D-149 ASTM-D-638 ASTM-D-150 MIL. STD. 104 UL E-51336	MIL. STD. 104 UL E-20344 ASTM-D-792 MIL-I-631	MIL-I-23053/5 MIL-I-7444B ASTM-D-792 ASTM-D-149 ASTM-D-638 ASTM-D-150 ASTM-14-53T ASTM-150-54T MIL. STD. 104 L-P 406 UL E-51336	MIL-I-2353B MIL-I-7444B ASTM-D-792 ASTM-D-149 ASTM-D-638 ASTM-D-150 MIL. STD. 104 UL E-51336	SH-300
Temperature Limits	−67 to 212°F	−25 to +221°F	−25 to +221°F	−67 to +275°F	−67 to +275°F	−150 to +350°F

*Dupont. ®Pennsalt Chemical Co. †Clear tubing is not flame retardant.

DAPRENE™ HEAT SHRINKABLE NEOPRENE TUBING

This tubing meets or exceeds MIL-R-46846 and MIL-I-23053B/I. Shrinks down 50% of its supplied inside diameter, upon exposure to heat of 160°F — will remain elastomeric — with no cracks. Longitudinal shrinkage 15% upon complete shrinkage. Partial shrinkage begins at 130°F. Will protect solder joints, terminals, fittings, pipes; used for harnessing, and jacketing wires, medical equipment, etc. Resists corrosion, chemicals, flame; good mechanical and electrical strength. Available in expanded sizes from ¼" through 4". **COLOR:** Black. Tubing must be stored below 100°F.

PROPERTIES:

ELECTRICAL
Dielectric Strength: Min. 200 V/Mil.
Volume Resistivity: Ohm/Cm, 10^{10} Min.

CHEMICAL
Solvent Resistance: Excellent.
Corrosion Resistance: Good.
Water Absorption: 1.0% Max.
Flammability: Self Extinguishing 15 Sec.

PHYSICAL
Temperature Range: −67°F to 212°F.
Elongation: 300% Min.
Tensile Strength: Min. 1800 PSI.
Specific Gravity: 1.40 Max.
Heat Resistance: 212°F for 96 Hrs.
Heat Shock: 301°F for 5 Hrs. No Cracking.
Hardness: Shore A Durometer 85±5.

STORAGE INSTRUCTIONS
For Maximum Dimensional Stability:
1 Month Under 100°F, 12 Months
Under 70°F. Avoid Direct Sunlight.

DAPRENE™ SH162 HEAT SHRINKABLE NEOPRENE TUBING 2:1

DABURN Cat. No.	Size	I.D. Before Shrinking As Supplied	Recovered Dimensions (After Heating) I.D. Maximum	Recovered Dimensions (After Heating) Wall Thickness
SH162-¼"	¼"	.250"	.125"	.035" ± .010"
SH162-⅜	⅜"	.375"	.188"	.040" ± .010"
SH162-½"	½"	.500"	.250"	.048" ± .015"
SH162-⅝"	⅝"	.625"	.313"	.052" ± .015"
SH162-¾"	¾"	.750"	.375"	.057" ± .015"
SH162-⅞"	⅞"	.875"	.438"	.065" ± .015"
SH162-1"	1"	1.000"	.500"	.070" ± .020"
SH162-1¼"	1¼"	1.250"	.625"	.087" ± .020"
SH162-1½"	1½"	1.500"	.750"	.095" ± .020"
SH162-1¾	1¾"	1.750"	.875"	.107" ± .020"
SH162-2"	2"	2.000"	1.000"	.110" ± .020"

STD. PKGE.: 100 ft. (random lengths — 10 ft. minimum). * Neoprene—Dupont.

FOR SHRINKING TUBING SEE PAGE 6 FOR HEAT GUN AND ACCESSORIES

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AND HEAVY WALL SHRINKABLE PVC TUBING • SHRINKABLE TUBING ASSORTMENTS

DAFLEX AND DAFLON SHRINKABLE PRODUCTS COMPARATIVE PROPERTIES CHART

Kynar® SH-350	Teflon* FEP SH-400	4:1TFE SH-421	Shrink/Melt Teflon* SM-450	Teflon* TFE SH-621	Shrinkable Tape ST-275	Shrinkable Polyolefin Boots/Transistors	Melt Liner DML
232°C 450°F	200°C 400°F	288°C 500°F	232°C 450°F	250°C 480°F	125°C 257°F	135°C 275°F	—
175°C 347°F	184°C 300°F	327°C 621°F	327°C 621°F	327°C 621°F	121°C 250°F	135°C 275°F	135°C 275°F
2:1 (50%)	1¼:1	4:1	1⅖:1	1½:1	1⅓:1 (30%)	—	—
10%	10-20%	10-20%	5-25%	10-20%	30%	—	—
4500	3000	3000	2500	3000	1200	1500	2000
150	200	200	200	200	200	250 Min.	200
−55°C −67°F	−67°C −85°F	−67°C −85°F	−170°C −275°F	−67°C −85°F	−55°C −67°F	−55°C −67°F	−75°C −100°F
1.8	2.16	2.2	2.17	2.20	1.2 Max.	1.4	1.0
1000	500	500	500	500	115	200	800
.5%	.01%	.01%	—	.01%	.1%	.2%	.1%
Excellent	Excellent	Excellent	Excellent	Excellent	Excellent	Pass	Excellent
Non-corrosive	Non-corrosive	Non-corrosive	Non-corrosive	Non-corrosive	Non-corrosive	Non-corrosive	Non-corrosive
Self-Ext.	Non-flammable	Non-flammable	Non-flammable	Non-flammable	Self-Ext.	Self-Ext.	—
Good	Excellent	Excellent	Excellent	Excellent	Good	Good	Poor
ASTM-D-638 ASTM-D-570 ASTM-D-876 ASTM-D-792 ASTM-D-257 MIL-I-7444	MIL-I-23053/11	MIL-I-23053/12 AMS-3584	SM-450	MIL-I-20353B MIL-I-22129C MIL-I-7444B ASTM-D-638 ASTM-D-149 ASTM-D-792 ASTM-D-150 MIL. Std. 104 L-P 406	ASTM-D-150 ASTM-D-1000 ASTM-D-570 ASTM-D-638 ASTM-D-792 MIL. Std. 104	MIL-I-7444 ASTM-D-570 ASTM-D-257 ASTM-D-149 ASTM-D-412 ASTM-D-792	ASTM-D-570 ASTM-D-150 ASTM-D-876 ASTM-D-638
−67 to 450°F	−275 to +400°F	−275 to +400°F	−275 to +450°F	−275 to +500°F	−67 to +257°F	−67 to +275°F	—

DABURN SHRINKABLE HEAVY WALL POLYVINYLCHLORIDE TUBING

This heavy wall PVC tubing shrinks 50% in diameter when heated to 200°F for one minute or less, and has the same characteristics as the DAFLEX SH-265 All Purpose Series, except for its heavier wall. The heavier wall allows for additional protection where industry requires. DAFLEX SH-267 Tubing meets or exceeds the performance requirements of MIL-I-20353/2 Class 2 but **not** the dimensional requirements because of the wall thickness. It meets or exceeds UL specs, including FR-1.

DAFLEX Cat. No.	Equiv. I.D. AWG	Nom. Expanded I.D. As Supplied	Recovered† Max. I.D.	Recovered† Nom. Wall	Std. Pkg.
SH-267-⅛″	14	.125″ 3.16mm	.063″ 1.57mm	.032″ .081mm	1000′
SH-267-³⁄₁₆″	12-10	.187″ 4.76mm	.093″ 2.38mm	.032″ .081mm	1000′
SH-267-¼″	8	.250″ 6.35mm	.125″ 3.16mm	.032″ .081mm	1000′
SH-267-⁵⁄₁₆″	6	.312″ 7.93mm	.156″ 3.95mm	.032″ .081mm	500′
SH-267-⅜″	4	.375″ 9.53mm	.187″ 4.76mm	.032″ .081mm	500′
SH-267-½″	2	.500″ 12.70mm	.250″ 6.35mm	.032″ .081mm	500′

†When full recovery is allowed.
COLOR: Black. Additional colors available to order.

DABURN SHRINKABLE POLYVINYLCHLORIDE ALL PURPOSE

SHRINKABLE RATIO: 2:1 (50%)

Flexible, shrinks 50% on heat application, approximately 15% longitudinal contraction. Suitable for insulating components and cables in varying shapes and diameters. Has a higher resistance to oils than low density polyethylene. Conforms to MIL-I-631D, Type F, Form U, Grade A and C, Class 1 and 2, Cat. 1. Controlled shrinkage on application of heat to predetermined size takes place at temperatures below 200°F (one minute or less). For maximum dimensional stability: Store under 100°F for 1 month; under 85°F for 4 months; under 70°F for 12 months. Meets or exceeds MIL-I-23053B/2 Class 2. File No. E-51336. UL approved. **OPERATING TEMP.:** −20°C to +105°C.

FR-1 CAT. NOS. INDICATE EXPANDED SIZE

DAFLEX Cat. No.	Equiv. I.D. AWG	Before Shrinking As Supplied Expanded I.D.	Max. Recovered I.D.	Recovered Nom. Wall†	Standard Package
SH-265-¹⁄₁₆″	22-20	.063″	.031″	.020″	100′, 250′, 1000′
SH-265-³⁄₃₂″	18-16	.093″	.046″	.020″	100′, 250′, 1000′
SH-265-⅛″	14	.125″	.062″	.020″	100′, 250′, 1000′
SH-265-³⁄₁₆″	12-10	.187″	.093″	.020″	100′, 250′, 1000′
SH-265-¼″	8	.250″	.125″	.025″	100′, 250′, 1000′
SH-265-⁵⁄₁₆″	6	.312″	.156″	.025″	100′, 250′, 500′
SH-265-⅜″	4	.375″	.187″	.025″	100′, 100′, 500′
SH-265-½″	2	.500″	.250″	.025″	25′, 100′, 500′
SH-265-¾″		.750″	.375″	.030″	25′, 100′, 500′
SH-265-1″		1.000″	.500″	.035″	25′, 50′, 500′
SH-265-1½″		1.500″	.750″	.035″	25′, 50′, 100′
SH-265-2″		2.000″	1.000″	.040″	25′, 50′, 100′

COLORS: Black, White, Clear, Red. Additional colors available.
†When full recovery is allowed.

SHRINKABLE TUBING ASSORTMENTS

DAFLEX Cat. No.	Lengths Per Pack	Tubing Size
SH-265-PA1	30	¹⁄₁₆″ thru ³⁄₁₆″
SH-265-PA2	16	¼″ thru ¾″
SH-265-PA3	10	1″

COLORS: Black, White, Clear, Red. Each pack contains an assortment of 6″ lengths in mixed sizes and colors (specify).

FOR SHRINKING TUBING SEE PAGE 6 FOR HEAT GUN AND ACCESSORIES

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SHRINKABLE IRRADIATED POLYOLEFIN TUBING • PACKAGED ASSORTMENTS TEFZEL* • KYNAR®

SHRINKABLE IRRADIATED POLYOLEFIN TUBING

This series is designed for maximum mechanical strength at stress or points of connection. It is strong and abrasion resistant and is supplied in expanded sizes. It insulates, jackets, splices, encapsulates, weatherproofs components, connectors, cables and irregular shaped objects. When exposed to heat (300°F) the tubing shrinks 50% in diameter, 5% longitudinal contraction. Controlled shrinkage to exact requirement takes place. Meets or exceeds MIL-I-23053B/5 Class 1 and 2. Available with UL approval. UL File No. E-51336. AMS 3636B 3637A.

Cat. Nos. Indicate EXPANDED Size. Shrinkage Ratio: 2:1 (50%)

DAFLEX SH-275 All Purpose	DAFLEX SH-290 Semi-Rigid	Equiv. I.D. AWG	Before Shrinkage As Supplied Expand. I.D.	Recovered I.D.	Recovered Nom. Wall*	Standard Package
SH-275-1/16″	SH-290-1/16″	22-20	.063″	.031″	.016″	100′, 250′
SH-275-3/32″	SH-290-3/32″	18-16	.093″	.046″	.020″	100′, 250′
SH-275-1/8″	SH-290-1/8″	14	.125″	.062″	.020″	100′, 250′
SH-275-3/16″	SH-290-3/16″	12-10	.187″	.093″	.020″	100′, 250′
SH-275-1/4″	SH-290-1/4″	8	.250″	.125″	.025″	100′, 250′
SH-275-5/16″	SH-290-5/16″	6	.312″	.156″	.025″	100′,200′
SH-275-3/8″	SH-290-3/8″	4	.375″	.187″	.025″	100′,200′
SH-275-1/2″	SH-290-1/2″	2	.500″	.250″	.025″	100′,200′
SH-275-3/4″	SH-290-3/4″	3/8	.750″	.375″	.030″	100′,200′
SH-275-1″		1/2	1.000″	.500″	.035″	100′,200′
SH275-1 1/2″		3/4″	1.500″	.750″	.040″	12′* ,24′**
SH275-2″		1″	2.000″	1.000″	.045″	12′**,24′**
SH275-3″		1 1/2″	3.000″	1.500″	.050″	12′**,24′**
SH275-4″		2″	4.000″	2.000″	.055″	12′**,24′**

STOCK COLORS: Black, White, Red, Clear. Additional colors available. Although processed by hi-energy radiation the **Daflex SH-275** and **SH-290** shrinkable tubings **do not** at any time become radiocative or possess any residual radioactivity. *Wall thickness will be less if recovery is restricted.
**4′ lengths. SHRINKABLE POLYOLEFIN END CAPS & TAPE AVAILABLE.

SPECIFICATIONS—All Tests Made on Tubing in Recovered Dimension

Continuous Operating Temp: 135°C	Shrinkage Ratio: 2:1 (50%)
Longitudinal Change: 5% Max.	Dielectric Strength: 500 V/MIL Min.
Tensile Strength: 1500 PSI Min.	Dielectric Constant: 2.87 Max.
Ultimate Elongation: 200% Min.	Corrosive Resistance: Non-Corrosive
Special Gravity: 1.29 Max.	Resistance to Soldering Iron: Excellent
Low Temp. Flexibility (—54°C): No Cracking	Fuel, Oil, Solvent, Acid, Alkali, Hydraulic Fluid Resistance: Excellent

PACK ASSORTMENTS

DAFLEX Cat. No.	Lengths Per Pack	Tubing Size
SH-275-PA1	30	1/16″ thru 3/16″
SH-275-PA2	16	1/4″ thru 3/4″
SH-275-PA3	10	1″

COLORS: Black, White, Clear, Red. Each pack contains an assortment of 6″ lengths in mixed sizes and colors (specify).

DAFLEX MELTABLE LINER

DAFLEX Meltable Liner Series. DML, in conjunction with heat shrinkable tubing, allows the encapsulation of one end, of both ends, or of the entire unit. It will prevent corrosion and moisture penetration. DML is economical because only the amount actually necessary to seal, need be used. DAFLEX DML is a thermoplastic tubing which flows, melts and sticks to most low temperature plastics, fabrics and many metals, upon the application of heat. It begins to melt and flow at 175°F.

NOTE: **End Caps** may be made relatively inexpensively by slipping a piece of DML into shrinkable tubing, placing both over an object and heating. While the tubing is still warm, simply punch one end with a pair of pliers and allow to cool. Note: This liner is to be used **in conjunction with** shrinkable tubing.

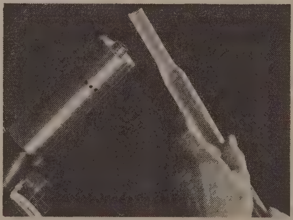
DAFLEX Cat. No.	For Heat Shrinkable Tubing Having An Expanded I.D. of	Supplied I.D. (Minimum)	Supplied O.D. (Minimum)	Standard Put-Up
DML-3/32″	.093″ 2.38mm	.054″ 1.35mm	.084″ 2.10mm	100′, 500′, 1000′
DML-1/8″	.125″ 3.18mm	.089″ 2.22mm	.115″ 2.87mm	100′, 500′, 1000′
DML-3/16″	.187″ 4.76mm	.151″ 3.77mm	.177″ 4.42mm	100′, 500′, 1000′
DML-1/4″	.250″ 6.35mm	.210″ 5.25mm	.248″ 6.20mm	100′, 500′
DML-3/8″	.375″ 9.53mm	.337″ 8.42mm	.375″ 9.37mm	100′, 200′
DML-1/2″	.500″ 12.70mm	.437″ 10.9mm	.475″ 11.8mm	100′, 200′
DML-3/4″	.750″ 19.05mm	.693″ 17.3mm	.739″ 18.4mm	100′, 200′
DML-1″	1.00″ 25.40mm	.940″ 23.5mm	.985″ 24.6mm	100′
DML-1 1/2″	1.50″ 38.10mm	1.440″ 36.0mm	1.48″ 37.0mm	100′

STANDARD COLOR: Clear. Other colors available to order.
Special cut lengths available to order.

Properties	Method of Test	Result
Tensile Strength	ASTM D 638-6 IT	2,000 PSI
Ultimate Elongation	ASTM D 638-6 IT	200%
Density	ASTM D 1505	.093
Operating Temperature		−75° to 100°C
Dielectric Strength	ASTM D 876	800 Volts Mil
Dielectric Constant	ASTM D 150	2.70
Dissipation Factor	ASTM D 150	0.01
Water Absorption	ASTM D 570	0.1%
Solvent Resistance		Good
Oil Resistance		Excellent
Hydraulic Fluid Resistance		Excellent
Acid and Alkali Resistance		Excellent
Fungus Resistance		Inert
Corrosion Resistance		Non-Corrosive
Standard Color		Clear

DAFLEX SHRINKABLE TEFZEL* TUBING

DAFLEX SH-300 Shrinkable Tefzel Tubing is the new high-temperature polymer designed to offer an unusual combination of ruggedness, chemical resistance and dielectric properties, over a very wide temperature range. While Tefzel is much like Teflon*, it is superior in mechanical ruggedness. It shrinks 30% and is non-flammable in air. It shrinks down at 300°F (150°C) and will operate up to 230° for short periods. **Operating Temperature:** —54°C to +180°C.



DAFLEX Cat. No.	Size	Minimum Expanded I.D.	Maximum Recovered† I.D.	Recovered† Wall
SH-300-3/16″	3/16″	.187″	.025″	.012″
SH-300-1/4″	1/4″	.250″	.166″	.015″
SH-300-3/8″	3/8″	.375″	.250″	.015″
SH-300-1/2″	1/2″	.500″	.345″	.015″
SH-300-3/4″	3/4″	.750″	.500″	.020″
SH-300-1″	1″	1.00″	.665″	.025″
SH-300-1 1/4″	1 1/4″	1.25″	.835″	.030″

STANDARD COLOR: Transparent. Shrinks 30%
Standard Package: 100′ (4′ Lengths).
*Dupont †When full recovery is allowed.

DAFLEX HEAT SHRINKABLE IRRADIATED KYNAR® TUBING

DAFLEX KYNAR, a semi-rigid shrinkable polyvinylidene fluoride tubing, is free from flaws, pin holes, seams, cracks or inclusions. It is a tough, high temperature, thin wall tubing with high cut through and abrasion resistance. It shrinks 50% in diameter and 10% longitudinally when heated to approximately 347°F. DAFLEX Shrinkable KYNAR tubing will not cold flow, melt or split when shrunk over irregularly shaped objects. Conforms to MIL-I-23053/8. **Operating Temperature:** —55°C to +175°C.

DAFLEX Cat. No.	Expanded I.D. As Supplied	Recovered I.D. Max.	Recovered Wall	Standard Package 4′ Lgths. Tot. Ftg.	Standard Package 6″ Lgths. Tot. Ftg.
SH-350-3/64″	.046″	.023″	.010″	100	16
SH-350-1/16″	.063″	.031″	.010″	100	14
SH-350-3/32″	.093″	.046″	.010″	100	12
SH-350-1/8″	.125″	.062″	.010″	100	10
SH-350-3/16″	.187″	.093″	.010″	100	8
SH-350-1/4″	.250″	.125″	.012″	100	6
SH-350-3/8″	.375″	.187″	.012″	100	4
SH-350-1/2″	.500″	.250″	.012″	20	2
SH-350-3/4″	.750″	.375″	.017″	20	1
SH-350-1″	1.000″	.500″	.019″	20	.5

*Dupont ®Pennsalt Chemical Co. **STANDARD COLOR:** Clear.

ALL THE ABOVE TUBING CAN BE ORDERED CUT OR CUT AND MARKED TO YOUR SPECIFICATIONS

DABURN ELECTRONICS & CABLE CORP. • 2360 HOFFMAN ST., BRONX, N.Y. 10458 (212) 295-0050 TWX 710-593-4145

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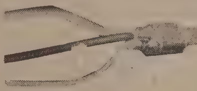
HEAT SHRINKABLE TEFLON* TUBING • FEP • TFE • DUAL WALL

DUAL-WALL TEFLON* ENCAPSULATING SHRINKABLE TUBING

NEW DAFLON SM-450 is a new dual wall shrink and melt Teflon tubing which gives a tight, moisture-proof seal. It is made from two types of Teflon. The outer wall is TFE Teflon and the inner lining is FEP Teflon. When heated to 400°F the FEP melts and at 621°F the TFE shrinks tightly. The FEP is squeezed into a solid or near solid mechanical encapsulation. DAFLEX SM-450 tubing protects against most environmental hazards involving pull, vibration, moisture, chemicals, etc. It may be used over wires, terminals, splices, connectors and as a strain relief and end cap.

Operating Temperature: 450°F.



DAFLON Cat. No.	Nom. I.D. Size	Nom. Expanded I.D.	Nom. Expanded Wall	Recovered I.D.
SM-450-1	1/32″	.036″ .92mm	.022″	.000″**
SM-450-2	1/16″	.060″ 1.52mm	.028″	.000″**
SM-450-3	1/8″	.130″ 3.30mm	.031″	.000″**
SM-450-4	5/32″	.160″ 4.06mm	.032″	.000″**
SM-450-5	3/16″	.190″ 4.83mm	.035″	.062″
SM-450-7	1/4″	.250″ 6.35mm	.036″	.125″
SM-450-9	11/32″	.350″ 8.89mm	.036″	.190″
SM-450-11	7/16″	.450″ 11.43mm	.055″	.312″
SM-450-13	11/16″	.700″ 17.78mm	.055″	.440″
SM-450-16	1″	.950″ 24.13mm	.065″	.680″

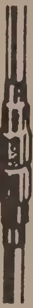
Standard Package: 100′ in 1 to 3 ft. lengths. Special lengths available to order.
**Will fully close off.

DAFLON SH-400 (FEP)

Made with Modified TEFLON‡ FEP will shrink over inserted objects upon exposure to moderate heat. Heretofore, many joints, parts, components, devices could not be protected because of hi temperature required for shrinkage. FEP TEFLON‡, which has a continuous service temperature of 400°F., will shrink at 300°F. Supplied in natural (transparent) color. Complete shrinkage at 350°F. Now, many heat sensitive products can use the permanent protection of TEFLON.* Will not burn or support flame, long lengths available. Will not split or melt. Extruded. Meets MIL-I-23053/11.

DABURN Cat. No.	Size	I.D.	Min. Exp. I.D.	Recovered Max. I.D.	Recovered Wall Thickness*
SH-400-24	24	.023″	.031″	.027″	.008″
SH-400-22	22	.028″	.036″	.032″	.008″
SH-400-20	20	.034″	.045″	.039″	.008″
SH-400-18	18	.042″	.060″	.049″	.008″
SH-400-16	16	.053″	.075″	.061″	.009″
SH-400-14	14	.066″	.092″	.072″	.009″
SH-400-12	12	.085″	.115″	.089″	.009″
SH-400-10	10	.108″	.141″	.114″	.010″
SH-400-9	9	.118″	.158″	.124″	.010″
SH-400-8	8	.136″	.180″	.143″	.010″
SH-400-7	7	.148″	.197″	.158″	.011″
SH-400-6	6	.170″	.225″	.180″	.011″
SH-400-5	5	.186″	.248″	.198″	.011″

*All items on this page are available cut to length or cut and marked.



DABURN Cat. No.	Size	I.D.	Min. Exp. I.D.	Recovered Max. I.D.*	Recovered Wall Thickness*
SH-400-4	4	.214″	.290″	.226″	.011″
SH-400-3	3	.234″	.310″	.249″	.011″
SH-400-2	2	.268″	.365″	.280″	.012″
SH-400-1	1	.294″	.400″	.311″	.012″
SH-400-0	0	.336″	.440″	.349″	.012″
SH-400-3/8	3/8″	.375″	.500″	.383″	.015″
SH-400-7/16	7/16″	.437″	.580″	.448″	.020″
SH-400-1/2	1/2″	.500″	.666″	.510″	.020″
SH-400-5/8	5/8″	.625″	.830″	.637″	.025″
SH-400-3/4	3/4″	.750″	1.000″	.764″	.030″
SH-400-7/8	7/8″	.875″	1.170″	.891″	.035″
SH-400-1″	1″	1.000″	1.330″	1.020″	.035″

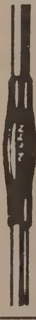
STANDARD PACKAGE: 100 Ft., 4 Ft. Min. Length. ‡ DUPONT
*When full recovery permitted.

DAFLON SHRINK SERIES SH-621

TFE TUBING MIL-I-23053/12

Made of modified TEFLON‡ polytetrafluorethylene will shrink when heated to 621°F. Suitable where hi temp protection is required. Extruded. Will not support combustion, dielectric strength (20 Mil Wall) 850 V/M, low temp. brittle point −66°F, superior chemical resistance.

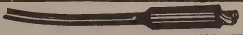
DAFLON Cat. No.	Nominal Tubing Size	Minimum Expanded I.D.	Recovered Dimensions Maximum I.D.	Recovered Dimensions Wall Thickness
SH-621-26	26	.046″	.022″	.009″
SH-621-24	24*	.050″	.027″	.010″
SH-621-22	22*	.055″	.032″	.010″
SH-621-20	20*	.060″	.039″	.012″
SH-621-19	19	.065″	.043″	.012″
SH-621-18	18*	.076″	.049″	.012″
SH-621-17	17	.085″	.054″	.012″
SH-621-16	16*	.093″	.061″	.012″
SH-621-15	15	.110″	.067″	.012″
SH-621-14	14*	.120″	.072″	.012″
SH-621-13	13	.140″	.080″	.012″
SH-621-12	12*	.150″	.089″	.012″
SH-621-11	11	.170″	.101″	.012″
SH-621-10	10*	.191″	.112″	.012″



DAFLON Cat. No.	Nominal Tubing Size	Minimum Expanded I.D.	Recovered Dimensions Maximum I.D.	Recovered Dimensions Wall Thickness
SH-621-9	9	.205″	.124″	.015″
SH-621-8	8†	.240″	.141″	.015″
SH-621-7	7	.270″	.158″	.015″
SH-621-6	6†	.302″	.178″	.015″
SH-621-5	5	.320″	.198″	.015″
SH-621-4	4†	.370″	.224″	.015″
SH-621-3	3	.390″	.249″	.015″
SH-621-2	2†	.430″	.278″	.015″
SH-621-1	1	.450″	.311″	.015″
SH-621-0	0†	.470″	.347″	.015″
SH-621-3/8	3/8″†	.560″	.399″	.020″
SH-621-7/16	7/16″†	.655″	.462″	.020″
SH-621-1/2	1/2″†	.750″	.524″	.020″

STANDARD PACKAGE: 100 Feet. Additional Sizes and Colors to Order.
STANDARD PUT-UP: 36″ Straight Lengths — One Foot Minimums Size 11 thru 1/2″; Size 26-14 3′ Min. Length.
WALL TOLERANCES: 26 thru 22 ± .002; 20 thru 10 ± .003; 9 thru 0 ± .004.
†Stock sizes.

DAFLEX 4:1 SHRINKABLE PTFE TUBING



DAFLON SH-421 Shrinkable Teflon Tubing recovers to approximately 25% of its expanded size when heated to the gel point (621°F). Thus it is now possible to use shrinkable Teflon tubing, with its excellent chemical and physical properties, over objects which require more than the standard 2:1 shrinkdown ratio (see SH-621).

NOTE: Tubing should be allowed to recover **at least 50%**.
Conforms to MIL-I-23053/12 and AMS-3584. **Operating Temp.:** −85°F to +500°F.

DAFLON Cat. No.	Nom. Size	Expanded Min. I.D.	Recovered Max. I.D.	Recovered Nom. Wall	User Cost
SH-421-5/64	5/64″	.078″	.025″	.009″	$52.50/C′
SH-421-1/8	1/8″	.125″	.038″	.010″	53.82/C′
SH-421-3/16	3/16″	.187″	.050″	.012″	62.25/C′

DAFLON Cat. No.	Nom. Size	Expanded Min. I.D.	Recovered Max. I.D.	Recovered Nom.* Wall	User Cost
SH-421-1/4	1/4″	.250″	.063″	.012″	78.00/C′
SH-421-5/16	5/16″	.312″	.079″	.012″	90.75/C′
SH-421-3/8	3/8″	.375″	.096″	.012″	99.75/C′
SH-421-1/2	1/2″	.500″	.144″	.015″	146.25/C′
SH-421-5/8	5/8″	.625″	.178″	.015″	196.50/C′
SH-421-3/4	3/4″	.750″	.225″	.015″	240.00/C′
SH-421-7/8	7/8″	.875″	.244″	.015″	295.50/C′
SH-421-1	1″	1.000″	.278″	.015″	324.00/C′
SH-421-1 1/4	1 1/4″	1.250″	.347″	.015″	465.00/C′

Standard Package: 100′ in 4 ft. lengths. Tubing may be ordered cut to length.
STANDARD COLOR: Natural (Clear). *When full recovery is allowed.

DABURN No. HG1 — Heat Gun for SH-162, SH-265, SH-267, SH-275, SH-290, ST-275, SH-300 Series.
DABURN No. HG2 — Heat Gun for SH-400, SH-421, SH-621, SH-450, SH-350 Series.

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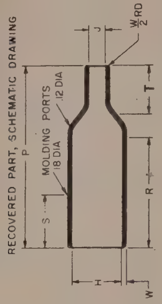
HEAT SHRINKABLE MOLDED BOOTS • HEAT GUN

DAFLEX SHRINKABLE MOLDED PARTS

DAFLEX SHRINKABLE MOLDED PARTS are made from expanded, irradiated polyolefin. When heated to 275°F they recover (shrink) to a pre-determined configuration. These parts provide a tough outer covering with excellent electrical, mechanical, and thermal insulation as well as affording cosmetic appearance to assemblies and terminations.



DAFLEX STRAIGHT SHRINKABLE BOOTS

They are larger at one end so that they can accommodate electrical connectors and terminations.

Dimensions in Inches

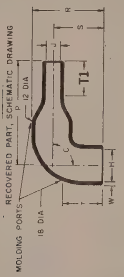
DAFLEX Cat. No.	H Min. Exp.	H Max. Rec.	J Min. Exp.	J Max. Rec.	P Rec. ±20%	R Rec. ±10%	S Rec. ±10%	T Rec. ±10%	W ±20% Rec.
DB-313-23	.92	.41	.92	.22	1.50	.90	.60	.40	.06
DB-313-24	1.12	.56	1.12	.26	2.18	1.30	.70	.65	.07
DB-313-25	1.22	.70	1.22	.28	2.60	1.50	.70	.70	.07
DB-313-26	1.42	.88	1.42	.33	2.90	1.70	.70	.70	.07
DB-313-27	1.68	1.11	1.68	.39	3.90	2.50	.70	.70	.08
DB-313-28	2.04	1.38	2.04	.62	4.90	2.60	1.00	1.60	.12
DB-313-29	2.60	1.75	2.60	.80	6.35	3.55	1.00	1.90	.15

Standard Package: 5

AS SUPPLIED

FULLY RECOVERED

DAFLEX RIGHT ANGLE BOOTS



Dimensions in Inches

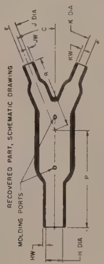
DAFLEX Cat. No.	H Min. Exp.	H Max. Rec.	J Min. Exp.	J Max. Rec.	P Rec. ± 10%	R Rec. ± 10%	S Rec. ± 10%	T Rec. ± 10%	T_1 Rec. ± 10%	W Rec. ±10%
DB-333-24	1.12	.56	1.12	.26	1.06	.95	.73	.70	.28	.06
DB-333-25	1.25	.70	1.25	.28	1.40	1.20	.81	.70	.34	.07
DB-333-26	1.50	.88	1.50	.33	1.70	1.40	.90	.70	.50	.07
DB-333-27	1.70	1.10	1.70	.38	2.10	1.70	1.10	.70	.62	.08
DB-333-28	2.06	1.38	2.06	.62	3.10	2.10	1.30	1.00	1.20	.13

Standard Package: 5
NOTE: C — Exp. ±10°, 180 — Rec. ±5°, 90

AS SUPPLIED (EXPANDED)

FULLY RECOVERED

DAFLEX TRANSITIONS



Daflex Transitions protect break outs of wire and cable in an electrical harness. Standard configurations are the "1 to 2" variety. "1 to 3" is available to order.

Dimensions in Inches

DAFLEX Cat. No.	H Min. Exp.	H Max. Rec.	J & K Min. Exp.	J & K Max. Rec.	P Rec. ± 10%	R Rec. ± 10%	HW Rec. ± 20%	JW & KW Rec. ± 20%	C Exp. ±10°	C Rec. ±5°
DT-493-12	.52	.24	.26	.12	.88	.76	.06	.04	.10	22.5
DT-493-13	1.06	.49	.52	.24	1.81	1.55	.10	.06	.10	22.5
DT-493-14	1.52	.71	1.06	.49	2.58	3.22	.12	.10	.10	22.5

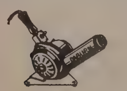
Standard Package: 5

AS SUPPLIED (EXPANDED)

FULLY RECOVERED

HOT AIR GUN AND ACCESSORIES

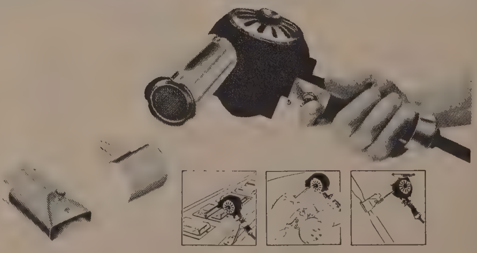
FOR DAFLEX SHRINKABLE TUBING



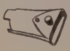
DABURN Cat. No.

- **HG1** — For SH-162, SH-265, SH-267, SH-275, SH-290, ST-275, SH-300 Series.
- **HG2** — For SH-400, SH-421, SH-621, SH-450, SH-350 Series.

A flameless heat source; light in weight; portable and/or permanent mounting.



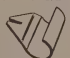
ADAPTOR HGA-02



Concentrates heat and allows use of baffle.

BAFFLE PLATE HGB-01

For tubing up to 1¼" O.D. Made to concentrate hot air.



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PER MIL-W-16878D PLASTIC HOOK-UP WIRE • MIL-W-5086 • MIL-C-7078

TYPE B — HIGH TEMPERATURE VINYL 600 VOLT — PER MIL-W-16878D

DESCRIPTION: One conductor stranded tinned copper, with −55°C to +105°C rated high temperature thermoplastic, light wall insulation.

TYPE B — UNCOVERED VINYL

DABURN Cat. No.	Mil-W-16878D Type Designation	Size AWG	Conductor Strand	Nom. O.D.
2500/32	B-32	32	7/40	.028″
2500/30	B-30	30	7/38	.030″
2500/28	B-28	28	7/36	.033″
2500/26	B-26	26	7/34	.037″
2500/24	B-24	24	7/32	.043″
2501/24	B-24	24	19/36	.043″
2500/22	B-22	22	7/30	.048″
2501/22	B-22	22	19/34	.048″
2500/20	B-20	20	7/28	.057″
2501/20	B-20	20	19/32	.057″
2500/18	B-18	18	7/26	.067″
2501/18	B-18	18	19/30	.067″
2500/16	B-16	16	19/29	.077″
2500/14	B-14	14	19/27	.091″

Available with Braided Shield Overall.

STD. PUT-UP: 100 Ft., 1000 Ft. Prebonded tinned copper conductor avail. to order.

TYPE B — NYLON JACKET

DABURN Cat. No.	Mil-W-16878D Type Designation	Size AWG	Conductor Strand	Nom. O.D.
2510/32	B-32	32	7/40	.032″
2510/30	B-30	30	7/38	.036″
2510/28	B-28	28	7/36	.039″
2510/26	B-26	26	7/34	.042″
2510/24	B-24	24	7/32	.047″
2511/24	B-24	24	19/36	.047″
2510/22	B-22	22	7/30	.053″
2511/22	B-22	22	19/34	.053″
2510/20	B-20	20	7/28	.065″
2511/20	B-20	20	19/32	.065″
2510/18	B-18	18	7/26	.075″
2511/18	B-18	18	19/30	.075″
2510/16	B-16	16	19/29	.085″
2510/14	B-14	14	19/27	.099″

STD. PUT-UP: 100 Ft., 1000 Ft. **NYLON JACKET THICKNESS:** 32-20 .002, 18-16 .003

STOCK COLORS: Black, Red, Brown, Blue, Orange, White, Yellow, Green, Gray, Purple, White/Black, White/Red, White/Green, White/Yellow, White/Blue, White/Brown, White/Orange, White/Gray, White/Violet.

TYPE C — HIGH TEMPERATURE VINYL 1000 VOLT

SPECIFICATION MIL-W-16878D

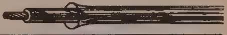
DESCRIPTION: One conductor similar to Type B — Heavier wall Hi-Temp. Thermoplastic insulation. Nom. wall .016″.

TYPE C — UNCOVERED VINYL

DABURN Cat. No.	Mil-W-16878D Type Designation	Size AWG	Minimum Strand	Nom. O.D.
2515/24	C-24	24	7/32	.058″
2515/22	C-22	22	7/30	.064″
2515/20	C-20	20	7/28	.072″
2515/18	C-18	18	7/26	.082″
2515/16	C-16	16	19/29	.091″
2515/14	C-14	14	19/27	.105″
2515/12	C-12	12	19/25	.135″

STD. PUT-UP: 100 Ft.-1000 Ft. Available with Braided Shield Overall.

TYPE C — NYLON JACKET



DABURN Cat. No.	Mil-W-16878D Type Designation	Size AWG	Conductor Strand	Nom. O.D.
2520/24	C-24	24	7/32	.061″
2520/22	C-22	22	7/30	.070″
2520/20	C-20	20	7/28	.079″
2520/18	C-18	18	7/26	.090″
2520/16	C-16	16	19/29	.099″
2520/14	C-14	14	19/27	.114″
2520/12	C-12	12	19/25	.135″

STD. PUT-UP: 100 Ft., 1000 Ft. **NYLON JACKET THICKNESS:** 24 .002, 22-18, .003, 16-14 .004

STOCK COLORS: Black, Red, Brown, Blue, Orange, White, Yellow, Green, Gray, Purple. Also available in tracer colors.

TYPE D — HIGH TEMPERATURE VINYL 3000 VOLT

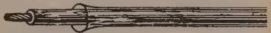
SPECIFICATION MIL-W-16878D

DESCRIPTION: One conductor stranded tinned copper similar to Type C — Heavier wall Hi-Temp. thermoplastic insulation. Nom. wall: 24 thru 14 .032″, 12 thru 6 .040″, 4 thru 2 .045″.

TYPE D — UNCOVERED VINYL

DABURN Cat. No.	Mil-W-16878D Type Designation	Size AWG	Conductor Strand	Nom. O.D.
2525/24	D-24	24	7/32	.084″
2525/22	D-22	22	7/30	.089″
2525/20	D-20	20	10/30	.097″
2525/18	D-18	18	16/30	.107″
2525/16	D-16	16	26/30	.116″
2525/14	D-14	14	41/30	.130″
2525/12	D-12	12	65/30	.163″
2525/10	D-10	10	105/30	.182″
2525/8	D- 8	8	133/29	.247″
2525/6	D- 6	6	133/27	.291″
2525/4	D- 4	4	133/25	.355″
2525/2	D- 2	2	665/30	.425″

STD. PUT-UP: 100 Ft.-1000 Ft.

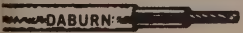


TYPE D — NYLON JACKET

DABURN Cat. No.	Mil-W-16878D Type Designation	Size AWG	Conductor Strand	Nom. O.D.
2525N/24	D-24	24	7/32	.090″
2525N/22	D-22	22	7/30	.096″
2525N/20	D-20	20	10/30	.104″
2525N/18	D-18	18	16/30	.114″
2525N/16	D-16	16	26/30	.125″
2525N/14	D-14	14	41/30	.139″
2525N/12	D-12	12	65/30	.168″
2525N/10	D-10	10	105/30	.197″
2525N/8	D- 8	8	133/29	.265″
2525N/6	D- 6	6	133/27	.310″

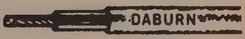
STD. PUT-UP: 100 Ft., 1000 Ft. Nylon Jacket; Clear Polymide.

ALL THE ABOVE CAN BE ORDERED CUT AND STRIPPED TO YOUR SPECIFICATIONS.



AIRCRAFT PLASTIC HOOK-UP WIRE

SPECIFICATIONS MIL-W-5086A and MIL-C-7078A (105°C Rating)



DESCRIPTION: Type 1 MIL-W-5086A — One conductor stranded tinned copper with plastic insulation nylon jacket overall. **Type 2 MIL-W-5086A** — One conductor stranded tinned copper, plastic insulation, nylon lacquered glass braid. Color: White. Additional colors available to order.

MIL-W-5086A UNSHIELDED (Supersedes AN-J-C-48A) — 600 V RATING

DABURN Cat. No.	Mil. Type	Type	Conductor Strand.	Nom. O.D.
2601/22	AN-22	No. 1	19/34	.070″
2601/20	AN-20	No. 1	19/32	.080″
2601/18	AN-18	No. 1	19/30	.090″
2601/16	AN-16	No. 1	19/29	.100″
2601/14	AN-14	No. 1	19/27	.120″
2601/12	AN-12	No. 1	19/25	.140″
2602/22	AN-22	No. 2	19/34	.068″
2602/20	AN-20	No. 2	19/32	.078″
2602/18	AN-18	No. 2	19/30	.088″
2602/16	AN-16	No. 2	19/29	.098″

DABURN Cat. No.	Mil. Type	Type	Conductor Strand.	Nom. O.D.
2602/14	AN-14	No. 2	19/27	.117″
2602/12	AN-12	No. 2	19/25	.137″
2602/10	AN-10	No. 2	37/26	.189″
2602/8	AN-8	No. 2	133/29	.240″
2602/6	AN-6	No. 2	133/27	.297″
2602/4	AN-4	No. 2	133/25	.355″
2602/2	AN-2	No. 2	665/30	.412″
2602/0	AN-0	No. 2	1045/30	.518″
2602/00	AN-00	No. 2	1330/30	.588″

STANDARD PUT-UP: 100 Ft., 1000 Ft.

MIL-C-7078A SHIELDED (Supersedes AN-C-168) 600 V RATING

DESCRIPTION: One conductor stranded tinned copper w/plastic insulation, nylon jacket w/tinned copper shielded braid overall. Color: White under shield. Additional types to order.

DABURN Cat. No.	Size AWG	Mil. Type	Type	Conductor Strand.	Nom. O.D.
2605/22	22	AN-22	No. 1	19/34	.100″
2605/20	20	AN-20	No. 1	19/32	.110″
2605/18	18	AN-18	No. 1	19/30	.124″

DABURN Cat. No.	Size AWG	Mil. Type	Type	Conductor Strand.	Nom. O.D.
2605/16	16	AN-16	No. 1	19/29	.139″
2605/14	14	AN-14	No. 1	19/27	.158″
2605/12	12	AN-12	No. 1	19/25	.177″

STANDARD PUT-UP: 100 Ft., 1000 Ft. ALL WIRE ON THIS PAGE CAN BE CUT AND STRIPPED TO YOUR SPECIFICATION.

DABURN ELECTRONICS & CABLE CORP. • 2360 HOFFMAN ST., BRONX, N.Y. 10458 (212) 295-0050 TWX 710-593-4145

DABURN

DABURN electronics & cable corp.

WIRE • CABLE • TUBING • MIL/COMM • SWITCHES • ELECTRONIC HARDWARE

TEFLON* HOOK-UP WIRE • MIL-SPEC • UL • TYPE F AND FF PER MIL-W-16878D

TEFLON* WIRE
TYPE E — 600 VOLTS

SPEC. MIL-W-16878D

High Temperature Rating −90°C to +250°C

Single conductor, stranded silver plated copper, .010″ TFE Teflon® insulation. Acid, alkalis, oil, flame, moisture, fungus, solvent resistant.

DABURN Extruded Cat. No.	DABURN Wrapped Cat. No.	Size MIL Type Designation	Strand	Max. Dia. Over Insul.
2401	—	E-32	7/40	.033″
2402	—	E-30	7/38	.036″
2403	2415/28	E-28	7/36	.039″
2404	2415/26	E-26	7/34	.043″
2404S	—	E-26(1)	1	.040″
2405	2415/24	E-24	19/36	.048″
2405-7	—	E-24	7/32	.048″
2405S	—	E-24(1)	1	.045″
2406	2415/22	E-22	19/34	.054″
2406-7	—	E-22	7/30	.054″
2406S	—	E-22(1)	1	.048″
2407	2415/20	E-20	19/32	.062″
2407-7	—	E-20	7/28	.062″
2407S	—	E-20(1)	1	.056″
2408	2415/18	E-18	19/30	.074″
2409	2415/16	E-16	19/29	.079″
2409/14	—	E-14	19/27	.097″
2409/12	—	E-12	19/25	.120″
2409/10	—	E-10	37/26	.139″

STD. PUT-UP: 100 Ft., 500 Ft., 1000 Ft.
COLORS: Black, Brown, Red, Orange, Yellow, Green, Blue, Purple, Gray, White, White/Black, White/Red, White/Green, White/Yellow, White/Blue, White/Brown, White/Orange, White/Gray, White/Violet.
Additional special custom construction available to order.

TEFLON* WIRE

MIL-W-16878D — TYPE EE
Extruded (1000 Volts) MIL-W-16878D

DESCRIPTION: Single conductor silver plated copper wire concentrically stranded and insulated with .016 TFE extruded TEFLON* insulation.
TEMPERATURE RATING: −90°C to +260°C, 1000 volts.

DABURN Cat. No.	Mil Type Designation	Size AWG	Strand	Nom. O.D.
2428/24	EE-24	24	19/36	.055″
2428/22	EE-22	22	19/34	.062″
2428/20	EE-20	20	19/32	.070″
2428/18	EE-18	18	19/30	.080″
2428/16	EE-16	16	19/29	.089″
2428/14	EE-14	14	19/27	.106″
2428/12	EE-12	12	19/25	.124″
2428/10	EE-10	10	37/26	.145″
2428/8 (wrapped)	EE-8	8	133/29	.210″

STANDARD SPOOL PUT-UP: 250 Ft., 500 Ft., 1000 Ft. Solid conductors available.
EE-6 and EE-4 wrapped are available to order.
STOCK COLORS: 1—White, 2—Black, 3—Red, 4—Green, 5—Yellow, 6—Blue, 7—Brown, 8—Orange, 9—Gray (Slate), 10—Violet (Purple).

SUBMINIATURE TEFLON* HOOK-UP WIRE
PER MIL-W-16878D — TYPE ET — 250 VOLTS, 200°C

Thin miniature hook-up wire is suitable in miniature slip ring assemblies, as interconnecting wire between wafers in microminiature electronic circuitry, instrument wire, medical wire, subminiature thermo-couple lead wire, strain gauge wire, etc. Provides lighter weight, greater flexibility and hi temperature resistance. Size Nos. 32 thru 20 conform to MIL-W-16878D type ET 250 volts, 200°C. Silver plated copper conductor.

DABURN Cat. No.	Mil Type	AWG Size	Min. Strand	Nom. O.D.
2427/36	—	36	7/44	.018″
2427/34	—	34	7/42	.020″
2427/32	ET-32	32	7/40	.021″
2427/30	ET-30	30	7/38	.024″
2427/28	ET-28	28	7/36	.027″
2427/26	ET-26	26	7/34	.031″
2427/24	ET-24	24	7/32	.036″
2427/22	ET-22	22	7/30	.042″
2427/20	ET-20	20	7/28	.049″

STANDARD SPOOL PUT-UPS: 500 Ft., 1000 Ft.
Microminiature Teflon hook-up wire available to order.

TEFLON* TFE AIRFRAME LEAD WIRE MIL-W-7139B

CLASS 1: 600V Silver Coated Copper Conductor for −65°C to +200°C Operation.
CLASS 2: 600V Nickel Coated Copper Conductor for +260°C Operation.

DABURN Cat. No. Class 1	DABURN Cat. No. Class 2	Size AWG	Strand	Nom. O.D.
2426-22	2425-22	22	19/34	.085″
2426-20	2425-20	20	19/32	.095″
2426-18	2425-18	18	19/30	.110″
2426-16	2425-16	16	19/29	.130″
2426-14	2425-14	14	19/27	.143″
2426-12	2425-12	12	19/25	.163″

STANDARD SPOOL PUT-UPS: 500 Ft., 1000 Ft.
STANDARD COLOR: Class: 1 — White/Blue Tracer; Class 2 — White/Orange Tracer.
ADDITIONAL SIZES AVAILABLE.

UL TEFLON* WIRE
UL STYLE 1213

Silver plated conductors of extruded TFE.
Nom. wall .010″. UL rated for 105°C.

DABURN No.	Size	Strand	Nom. O.D.
2410/32	32	7/40	.029″
2410/30	30	7/38	.032″
2410/28	28	7/36	.036″
2410/26	26	19/38	.040″
2410/26-7	26	7/34	.041″
2410/24	24	19/36	.045″
2410/24-7	24	7/32	.044″
2410/22	22	19/34	.051″
2410/22-7	22	7/30	.050″
2410/20	20	19/32	.059″
2410/20-7	20	7/28	.058″

STD. PUT-UP: 1000′. UL Style 1212 available to order.
Nickel conductors available to order. Tracer colors available.

UL STYLE 1180 — 300V — 200°C

Silver plated conductors of extruded TFE. Nom. wall 1/64″. UL rated for 200°C. Nickel plated conductors available to order.

DABURN No.	Size	Strand	Nom. O.D.
2411/24	24	19/36	.055″
2411/22	22	19/34	.064″
2411/20	20	19/32	.070″
2411/18	18	19/30	.080″
2411/16	16	19/29	.089″

STD. COLORS: 1—Black, 2—Brown, 3—Red, 4—Orange, 5—Yellow, 6—Green, 7—Blue, 8—Violet, 9—Gray, 10—White.
Tracer colors available.

UL STYLE 1164 — 300V — 150°C

Silver plated conductors of extruded TFE. Nom. wall 1/64″. UL rated for 150°C. Nickel plated conductors available to order.

DABURN No.	Size	Strand	Nom. O.D.
2412/24	24	19/36	.055″
2412/22	22	19/34	.064″
2412/20	20	19/32	.070″
2412/18	18	19/30	.080″
2412/16	16	19/29	.090″

STD. COLORS: 1—Black, 2—Brown, 3—Red, 4—Orange, 5—Yellow, 6—Green, 7—Blue, 8—Violet, 9—Gray, 10—White.
Tracer colors available.

SILICONE RUBBER HOOK-UP WIRE

MIL-W-16878D — TYPES F & FF

TYPE F — 600V • TYPE FF — 1000V
Single conductor, stranded tinned copper. Extruded silicone rubber overall. Temp. to 200°C.

DABURN No.	MIL Type Designation	Size AWG	Strand	Nom. O.D.
2620/28	F-28	28	7/36	.046″
2622/28	FF-28	28	7/36	.078″
2620/26	F-26	26	7/34	.050″
2622/26	FF-26	26	7/34	.082″
2620/24	F-24	24	19/36	.055″
2622/24	FF-24	24	19/36	.087″
2620/22	F-22	22	19/34	.062″
2622/22	FF 22	22	19/34	.094″
2620/20	F-20	20	19/32	.070″
2622/20	FF-20	20	19/32	.102″
2620/18	F-18	18	19/30	.080″
2622/18	FF-18	18	19/30	.112″
2620/16	F-16	16	19/29	.088″
2622/16	FF-16	16	19/29	.120″
2620/14	F-14	14	19/27	.118″
2622/14	FF-14	14	19/27	.165″
2620/12	F-12	12	19/25	.137″
2622/12	FF-12	12	19/25	.184″
2622/10	FF-10	10	37/26	.205″
2622/8	FF-8	8	133/29	.290″
2622/6	FF-6	6	133/27	.333″
2622/4	FF-4	4	133/25	.390″

COLOR: White. Additional colors, sizes and types to order, thru size 4/0
STD. PUT-UP: 500 Ft., 1000 Ft.

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*TEFLON—Dupont

ALL ITEMS ON THIS PAGE AVAILABLE CUT TO LENGTH

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DABURN

DABURN electronics & cable corp.

WIRE • CABLE • TUBING • MIL/COMM • SWITCHES • ELECTRONIC HARDWARE

TFE • FEP TEFLON* CABLES • H FILM KAPTON* WIRE

MIL-W-16878D INSTRUMENTATION—SHIELDED • UNSHIELDED

DESCRIPTION: One or more conductors, each conductor silver plated concentrically stranded copper wire, Type E Extruded TFE .010" insulation. When shielded, braided silver plated copper shield over conductor(s), 90% shield coverage. When covered, either a TEFLON* impregnated fiberglass braid or a .010" TEFLON* fused, double reversed tape jacket overall. Fungus, solvent, moisture, flame, acid, alkali and oil resistant Multiconductors are twisted.

TEMPERATURE RATING: −65°C to +260°C. **VOLTAGE RATING:** 600 Volts

TEFLON* IMPREGNATED BRAID OVER SHIELD

Daburn No.	Conds.	AWG Size	Strand	Nom. O.D.	Daburn No.	Conds.	AWG Size	Strand	Nom. O.D.
2444	1	26	7/34	.075"	2447	1	20	19/32	.093"
2444/2	2	26	7/34	.119"	2447/2	2	20	19/32	.154"
2445	1	24	19/36	.081"	2447/3	3	20	19/32	.163"
2445/2	2	24	19/36	.126"	2447/4	4	20	19/32	.180"
2445/3	3	24	19/36	.133"	2447/5	5	20	19/32	.195"
2445/4	4	24	19/36	.144"	2448	1	18	19/30	.097"
2445/5	5	24	19/36	.156"	2448/2	2	18	19/30	.162"
2446	1	22	19/34	.088"	2448/3	3	18	19/30	.172"
2446/2	2	22	19/34	.137"	2448/4	4	18	19/30	.192"
2446/3	3	22	19/34	.144"	2448/5	5	18	19/30	.207"
2446/4	4	22	19/34	.158"	2449	1	16	19/29	.117"
2446/5	5	22	19/34	.172"	2449/2	2	16	19/29	.196"

STANDARD SPOOL PUT-UPS: 250 Ft., 500 Ft., 1000 Ft.
CONDUCTOR COLOR CODE: 1—White, 2—Black, 3—Red, 4—Green, 5—Yellow.

SHIELDED BRAID OVERALL

Daburn Cat. No.	Conds.	AWG Size	Strand	Nom. O.D.	Daburn Cat. No.	Conds.	AWG Size	Strand	Nom. O.D.
2434	1	26	7/34	.066"	2437	1	20	19/32	.082"
2434/2	2	26	7/34	.104"	2437/2	2	20	19/32	.142"
2435	1	24	19/36	.068"	2437/3	3	20	19/32	.151"
2435/2	2	24	19/36	.112"	2437/4	4	20	19/32	.168"
2435/3	3	24	19/36	.120"	2437/5	5	20	19/32	.180"
2435/4	4	24	19/36	.132"	2438	1	18	19/30	.093"
2435/5	5	24	19/36	.140"	2438/2	2	18	19/30	.162"
2436	1	22	19/34	.075"	2438/3	3	18	19/30	.172"
2436/2	2	22	19/34	.124"	2438/4	4	18	19/30	.191"
2436/3	3	22	19/34	.132"	2438/5	5	18	19/30	.210"
2436/4	4	22	19/34	.146"	2439	1	16	19/29	.103"
2436/5	5	22	19/34	.154"	2439/2	2	16	19/29	.184"

STANDARD SPOOL PUT-UPS: 250 Ft., 500 Ft., 1000 Ft.
CONDUCTOR COLOR CODE: 1—White, 2—Black, 3—Red, 4—Green, 5—Yellow.

H FILM KAPTON* WIRE — DALITE™

HIGH TEMPERATURE HOOK-UP AND AIRFRAME WIRE 200°C CONTINUOUS TEMPERATURE RATING (a)

INSULATED WITH DUPONT KAPTON* POLYIMIDE FILM WITH TEFLON* — FEP HEAT SEALED COATING CONFORMS TO MIL-W-60904 & MIL-W-81381.
CHARACTERISTICS: Dalite™ insulated wire provides high temperature stability, low temperature flexibility, high radiation resistance, resistance to cold flow, impervious to most chemicals, high dielectric strength, low dielectric constant, smaller diameters and lighter weight than any other comparable wire used for continuous operation up to 200°C. This hook-up wire meets the test requirements of MIL-W-16878 for 300 V, 600 V and 1000 V with **smaller wall thicknesses, weight and dimensions.**
(a) Temperature based on lowest temperature rating of materials in the insulation — FEP 200°C. Will pass 96 hour heat age tests at 250°C per MIL-W-16878.
DESCRIPTION: Single conductor, silver plated annealed copper conductors, Type H* Polyimide film with Teflon* FEP coating tape wrapped.

DABURN No.	Type Designation	Size AWG	Strand	Voltage Rating (rms)	Nom. Wall	Nom. O.D.	Weight Per 1000' (lbs.)
2490/30	HF 30	30	7/38	600	.0045"	.021"	0.52
2495/30	HHF 30	30	7/38	1000	.006"	.024"	0.57
2490/28	HF 28	28	7/36	600	.0045"	.024"	0.75
2495/28	HHF 28	28	7/36	1000	.006"	.027"	0.83
2490/26	HF 26	26	7/34	600	.0045"	.028"	1.11
2495/26	HHF 26	26	7/34	1000	.006"	.031"	1.21
2490/24	HF 24	24	19/36	600	.0045"	.034"	1.78
2495/24	HHF 24	24	19/36	1000	.006"	.037"	1.90
2490/22	HF 22	22	19/34	600	.0045"	.041"	2.71
2495/22	HHF 22	22	19/34	1000	.006"	.044"	2.86
2490/20	HF 20	20	19/32	600	.0045"	.049"	4.18
2495/20	HHF 20	20	19/32	1000	.006"	.052"	4.35
2490/18	HF 18	18	19/30	600	.0045"	.059"	6.46
2495/18	HHF 18	18	19/30	1000	.006"	.062"	6.67
2490/16	HF 16	16	19/29	600	.0045"	.066"	8.16
2495/16	HHF 16	16	19/29	1000	.006"	.069"	8.39

STD. COLOR: Natural Gold. Striping and solid colors available. Variations of conductor material—to special order.
STD. PUT-UP: 1000 Ft.
*DUPONT

TEFLON* TAPE WRAP JACKET OVER SHIELD

Daburn No.	Conds.	AWG Size	Strand	Nom. O.D.	Daburn No.	Conds.	AWG Size	Strand	Nom. O.D.
2454	1	26	7/34	.078"	2457	1	20	19/32	.099"
2454/2	2	26	7/34	.125"	2457/2	2	20	19/32	.158"
2455	1	24	19/36	.084"	2457/3	3	20	19/32	.167"
2455/2	2	24	19/36	.128"	2457/4	4	20	19/32	.184"
2455/3	3	24	19/36	.135"	2457/5	5	20	19/32	.204"
2455/4	4	24	19/36	.148"	2458	1	18	19/30	.109"
2455/5	5	24	19/36	.162"	2458/2	2	18	19/30	.178"
2456	1	22	19/34	.090"	2458/3	3	18	19/30	.189"
2456/2	2	22	19/34	.140"	2458/4	4	18	19/30	.208"
2456/3	3	22	19/34	.148"	2458/5	5	18	19/30	.230"
2456/4	4	22	19/34	.162"	2459	1	16	19/29	.130"
2456/5	5	22	19/34	.183"	2459/2	2	16	19/29	.230"

STANDARD SPOOL PUT-UPS: 250 Ft., 500 Ft., 1000 Ft.
CONDUCTOR COLOR CODE: 1—White, 2—Black, 3—Red, 4—Green, 5—Yellow.

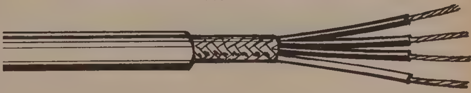
NO SHIELD—TEFLON* IMPREGNATED FIBERGLASS OVERALL

Daburn Cat. No.	Conds.	AWG Size	Strand	Nom. O.D.	Daburn Cat. No.	Conds.	AWG Size	Strand	Nom. O.D.
2464	1	26	7/34	.040"	2467	1	20	19/32	.058"
2464/2	2	26	7/34	.080"	2467/2	2	20	19/32	.118"
2465	1	24	19/36	.044"	2467/3	3	20	19/32	.127"
2465/2	2	24	19/36	.088"	2467/4	4	20	19/32	.144"
2465/3	3	24	19/36	.096"	2467/5	5	20	19/32	.156"
2465/4	4	24	19/36	.108"	2468	1	18	19/30	.069"
2465/5	5	24	19/36	.116"	2468/2	2	18	19/30	.138"
2466	1	22	19/34	.051"	2468/3	3	18	19/30	.148"
2466/2	2	22	19/34	.100"	2468/4	4	18	19/30	.167"
2466/3	3	22	19/34	.108"	2468/5	5	18	19/30	.186"
2466/4	4	22	19/34	.122"	2469	1	16	19/29	.086"
2466/5	5	22	19/34	.131"	2469/2	2	16	19/29	.172"

STANDARD SPOOL PUT-UPS: 250 Ft., 500 Ft., 1000 Ft.
CONDUCTOR COLOR CODE: 1—White, 2—Black, 3—Red, 4—Green, 5—Yellow.
Special cable constructions and colors available.

FEP TEFLON* CABLE

FEP EXTRUDED JACKET OVER SHIELD



DESCRIPTION: Each conductor silver plated stranded copper wire, Type E extruded TFE .010" insulation. Color coded, cabled, braided silver plated copper shield — 90% coverage, FEP white teflon jacket overall.

TEMPERATURE RATING: −65°C to +200°C. **VOLTAGE RATING:** 600 V.

DABURN No.	Conds.	AWG Size	Strand	Nom. O.D.
2480	1	24	19/36	.085"
2480/2	2	24	19/36	.130"
2480/3	3	24	19/36	.135"
2480/4	4	24	19/36	.148"
2481	1	22	19/34	.091"
2481/2	2	22	19/34	.150"
2481/3	3	22	19/34	.158"
2481/4	4	22	19/34	.172"
2482	1	20	19/32	.100"
2482/2	2	20	19/32	.168"
2482/3	3	20	19/32	.178"
2482/4	4	20	19/32	.193"
2483	1	18	19/30	.110"
2483/2	2	18	19/30	.188"
2483/3	3	18	19/30	.207"
2483/4	4	18	19/30	.222"
2484	1	16	19/29	.123"
2484/2	2	16	19/29	.220"

CONDUCTOR COLOR CODE: 1—White, 2—Black, 3—Red, 4—Green
STD. PUT-UP: 500 Ft., 1000 Ft.
*Dupont

ALL ITEMS ON THIS PAGE AVAILABLE CUT TO LENGTH

DABURN ELECTRONICS & CABLE CORP. • 2360 HOFFMAN ST., BRONX, N.Y. 10458 (212) 295-0050 TWX 710-593-4145

DABURN

DABURN electronics & cable corp.

WIRE • CABLE • TUBING • MIL/COMM • SWITCHES • ELECTRONIC HARDWARE

COMPUTER WIRE • UL WIRE WRAP • HIGH TEMPERATURE WIRE

KYNAR® HOOK-UP WIRE— UL APPROVED

300V — 125°C

Suitable for wire-wrap applications. High cut through resistance. Self-extinguishing. Resistant to most chemicals and solvents. Ultra-violet and weather resistant.

DESCRIPTION: Solid, silver plated, oxygen-free, high conductivity (OFHC) copper conductor, extruded Kynar (polyvinylidene fluoride insulation. To UL Style #1422.

DABURN No.	Size	Nom. Ins. Wall	Nom. O.D. ±.001″	Stock‡ Colors
D1422/30	30	.005″	.020″	1-10
D1422/28	28	.005″	.023″	1-10
D1422/26	26	.005″	.026″	1-9
D1422/24	24	.005″	.030″	1-6

PUT-UP: 1000 Ft., 10,000 Ft. Special Hub Spools. Other UL styles to order.

KYNAR HOOK-UP WIRE—Cut, Stripped Lengths

Cut to length. Each end stripped. Ready for use on automatic and/or manual wire-wrap machines and tools. Packaged in tubes, 200 pieces per size.

DABURN Cat. No.	Length of Insulation†	Length Stripped Each End	No. Pcs. Per Pkg.	Stock Colors
D1422-30	4″-6″-8″-10″-12″	15/16″	200	1-10
D1422-28	4″-6″-8″-10″-12″	1 1/32″	200	1-10
D1422-26	4″-6″-8″-10″-12″	1 1/2″	200	1-9
D1422-24	4″-6″-8″-10″-12″	1 5/16″	200	1-6

†When ordering indicate Cat. No., length and color; i.e. D1422-30-8″-6. Kynar #30 cut 8″ long. Light Blue Color. ®Pennsalt Chemical Co.

TEFZEL* COMPUTER WIRE

300V — 150°C

Suitable for high temperature, thin wall wire-wrap computer applications. It has high cut-through, abrasion and chemical resistance, a dielectric constant of 2.6 Tefzel passes IEEE Standard 383-1974 vertical flame test for cables in nuclear power plants suitable for use in computers, aircraft instrumentation and wirewrap applications.

DESCRIPTION: Solid silver plated, oxygen-free, high conductivity (OFHC) copper conductor, Tefzel (a modified copolymer of ethylene and tetrafluoroethylene) overall.

DABURN Cat. No.	Size	Nom. Ins. Wall	Nom. O.D.	Stock Colors
D1522-30	30	.005″	.019″	1-10
D1522-28	28	.005″	.023″	1-10
D1522-26	26	.005″	.026″	1-10
D1522-24	24	.005″	.029″	1-10

TEFZEL* WIRE — Cut, Stripped Lengths

Packaged cut to length and stripped. Ready to use on point-to-point terminations. Each tube has 200 pieces per size.

DABURN Cat. No.	Length of Insulation	Nom. Length Stripped Each End	Stock Colors
D1522-30	4″-6″-8″-10″-12″	15/16″	1-10
D1522-28	4″-6″-8″-10″-12″	1 1/32″	1-10
D1522-26	4″-6″-8″-10″-12″	1 1/2″	1-9
D1522-24	4″-6″-8″-10″-12″	1 5/16″	1-6

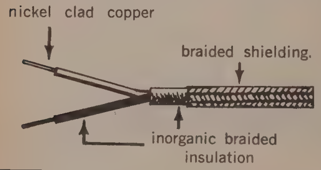
*Dupont

COLORS: 1—White, 2—Black, 3—Red, 4—Green, 5—Yellow, 6—Light Blue 7—Brown, 8—Orange, 9—Gray, 10—Violet. Additional colors to order.

DABURN HIGH TEMPERATURE LEAD WIRE

Small Diameters and High Temperature performance make an outstanding combination for these unique constructions. Basic wire conforms to MIL-W-3861 spec. shielding per MIL-N-46026A. 600V RMS.

800°F TEMPERATURE RATING



One conductor high temperature aircraft and missile lead wire for operation between 500°F and 800°F. Nickel clad copper conductors with glass braided fiber insulation impregnated with silicone varnish. Multiconductor and shielded construction will be manufactured to customer's specifications.

DABURN Cat. No.	Size	Strand	CMA	Nom. O.D.
2497/18	18	19/.010″	1900	.085″
2497/20	20	19/.008″	1216	.075″
2497/22	22	19/.0063″	755	.070″

STANDARD PUT-UP: 500 Ft., 1000 Ft.

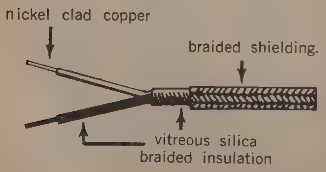
1500°F TEMPERATURE RATING

One conductor high temperature radiation resistant aircraft and missile lead wire for operation between 800°F and 1500°F. Nickel clad copper conductors with inorganic, braided insulation. Useful up to 1500°F providing moisture resistance is not required. Multiconductor and shielded construction can be made to customer's specs.

DABURN Cat. No.	Size	Strand	CMA	Nom. O.D.
2498/18	18	19/.010″	1900	.085″
2498/20	20	19/.008″	1216	.075″
2498/22	22	19/.0063″	755	.070″

STANDARD PUT-UP: 500 Ft., 1000 Ft.

2000°F TEMPERATURE RATING



One conductor high temperature radiation resistant aircraft and missile lead wire for operation between 1500°F and 2000°F. Nickel clad copper conductors with vitreous silica braided insulation and a braided shielding. Useful up to 2000°F providing no initial moisture resistance or abrasion resistance is required. Multiconductor construction can be made to customer's specifications.

DABURN Cat. No.	Size	Strand	CMA	Nom. Insulation Thickness	Braid Ni. Shield	Nom. O.D.
2499/18	18	19/.010″	1900	.025″	16-5-36	.122″
2499/20	20	19/.008″	1216	.025″	24-3-36	.112″
2499/22	22	19/.0063″	755	.027″	24-3-36	.108″

STANDARD PUT-UP: 500 Ft., 1000 Ft.

DABURN ELECTRONICS & CABLE CORP. • 2360 HOFFMAN ST., BRONX, N.Y. 10458 (212) 295-0050 TWX 710-593-4145

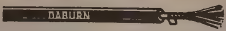
DABURN

DABURN electronics & cable corp.

WIRE • CABLE • TUBING • MIL/COMM • SWITCHES • ELECTRONIC HARDWARE

UL & CSA HOOK-UP WIRE • KYNAR® KINKLESS TEST LEAD WIRE SILICONE RUBBER LEAD WIRE • HIGH VOLTAGE CABLE • SHIELDED HOOK-UP WIRE

RUBBER KINKLESS TEST LEAD WIRE



Suitable as Test Lead Wire in analyzers, instruments, oscillators, meters, etc. Wherever extra flexibility and limpness is necessary. Single conductor, extra flexible stranded soft tinned copper, separator, wall color coded rubber, smooth wax finish.

OPERATING TEMPERATURE: −20°C to +60°C. **COLORS:** Red, Black.

DABURN No.	Size	Strand	Nom. Insul. Wall	Sugg. Voltage	O.D. Nom. •
2715	20	41/36	3/64″	3,000V	.137″
2716	18	65/36	3/64″	5,000V	.145″
*2718	18	65/36	3/64″	5,000V	.145″
2717	18	65/36	5/64″	10,000V	.210″

* Types WS-16/U Black, WS17/U Red Per MIL-W-13169.

STD. PUT-UP: 100 Ft., 500 Ft., 1000 Ft.

PLASTIC KINKLESS TEST LEAD WIRE

Soft formulation vinyl maximum flexibility. Temperature stability from −80°C to +115°C. Exceed requirements for MIL-I-3930A Type JP (PVC). Suitable for test leads, etc. Resistant to gasoline and oil. Excellent abrasion Resistance.

DESCRIPTION: One conductor tinned copper stranded, special formulation vinyl insulation — smooth surface.

OPERATING TEMPERATURE: −80°C to +115°C, 5000V rating.

COLORS: Black, Red, Yellow, Green, White, Blue.

DABURN No.	Size	Strand	Ins.	Nom. O.D.
2722/22	22	26/36	.032″	.100″
2722/20	20	26/34	.032″	.104″
2722/18	18	65/36	.032″	.112″
2722/16	16	65/34	.032″	.129″

STD. PUT-UP: 100 Ft., 500 Ft., 1000 Ft.

UL PLASTIC HOOK-UP WIRE

300 VOLT UL APPROVED — 80°C

STYLE 1007, CSA TR-64

DABURN No.	Size	Strand	Nom. Ins. Wall	Nom. O.D.
2628/24	24	7/32	.016″	.057″
2628/22	22	7/30	.016″	.065″
2628/20	20	10/30	.016″	.070″
2628/18	18	16/30	.016″	.080″
2628/16	16	26/30	.016″	.095″

COLORS: Black, Red, Green, Yellow, Blue, Brown, White, Orange, Gray, Purple.

STD. PUT-UP: 100 Ft., 500 Ft., 1000 Ft.

SEMI-RIGID BUSINESS MACHINE WIRE — U.L.

300 VOLT 80°C — STYLE 1061

Stranded tinned copper, color coded semi-rigid polyvinlchloride insulation. Has Temperature Rating of −10°C to +80°C, 300 volts in electronic computers or business machines only.

DESCRIPTION: One Conductor stranded tinned copper, semi-rigid PVC.

DABURN No.	Size	Strand	Nom. Ins. Wall	Nom. O.D.
2660/26	26	7/34	.009″	.039″
2660/24	24	7/32	.009″	.041″
2660/22	22	7/30	.009″	.048″
2660/20	20	7/28	.009″	.056″
2660/18	18	7/26	.009″	.072″

STD. PUT-UP: 500 Ft., 1000 Ft. Available with Solid Conductor.

600 VOLT 80°C — STYLE 1011

DESCRIPTION: One conductor stranded annealed tinned copper, PVC insulation.

DABURN No.	Type Designation	Size	Strand	Nom. Ins. Wall	Nom. O.D.	Stock* Colors
2611/22	HW-C 22(7)U	22	7/30	.033″	.092″	1-10
2611/20	HW-C 20(10)U	20	10/30	.033″	.100″	1-10
2611/18	HW-C 18(16)U	18	16/30	.033″	.112″	1-10
2611/16	HW-C 16(26)U	16	26/30	.033″	.126″	1-5
2611/14	HW-C 14(41)U	14	41/30	.045″	.170″	1-5
2611/12	HW-C 12(65)U	12	65/30	.045″	.186″	1-4
2611/10	HW-C 10(105)U	10	105/30	.045″	.210″	1-4
2611/8	HW-C 8(133)U	8	133/29	.045″	.260″	1-4

STD. PUT-UP: 100 Ft., 1000 Ft.

COLORS: 1—White, 2—Black, 3—Red, 4—Green, 5—Yellow, 6—Light Blue, 7—Brown, 8—Orange, 9—Gray, 10—Violet. * Additional colors to order.

SILICONE RUBBER LEAD WIRE

600 VOLT — 200°C

FLEXIBILITY FROM −104°C TO +400°F

Suitable for high-heat and hi-frequency applications. Resistant to acids, alkali, oil. Retains physical properties under extremes. Low power factor, low dielectric constant. Tinned copper, stranded, silicone rubber insulation, glass braid, lacquered. Color: White. Additional Colors Available.

DESCRIPTION: One conductor, tinned copper strands, silicone rubber insulation, glass braid, lacquered.

STOCK COLOR: White.

DABURN No.	Size	Strand	Nom. Ins. Wall	Nom. O.D.
2625/22	22	7/30	1/32″	.105″
2625/20	20	10/30	1/32″	.121″
2625/18	18	16/30	1/32″	.128″
2625/16	16	26/30	1/32″	.144″
2625/14	14	41/30	1/32″	.165″
2625/12	12	65/30	1/32″	.185″
2625/10	10	65/28	3/64″	.240″
2625/8	8	84/27	1/16″	.320″

STD. PUT-UP: 100 Ft., 500 Ft., 1000 Ft.

HI-VOLTAGE CABLE

One conductor, stranded copper tinned, rulan — flame retardant — polyethylene insulation, braided tinned copper overall when shielded. Used as hi-voltage leads in electronic equipment to minimize RF radiation in equipment.

DESCRIPTION: One conductor; stranded copper tinned; rulan (flame retarding type) polyethylene insulation. Available white/red tracer. Temp. Rating: 105°C.

Shielded: Same as above with tinned copper braided shield overall. Special construction available to order.

Daburn No.	Size AWG	Strand	Nom. Ins.Wall	Voltage Breakdown AC	Voltage Breakdown DC	Nom. O.D.
UNSHIELDED						
2641	22	7/30	.047″	5,000	10,000	.124″
2642	20	10/30	.047″	5,000	10,000	.125″
2643	20	10/30	.068″	10,000	20,000	.168″
2644	18	16/30	.047″	5,000	10,000	.134″
2645	18	16/30	.068″	10,000	20,000	.178″
2648	18	16/30	.095″	16,000	40,000	.235″
2649	18	16/30	.124″	26,000	60,000	.285″
SHIELDED						
2652	20	10/30	.095″	16,000	40,000	.252″
2655	18	16/30	.095″	16,000	40,000	.255″
2656	16	26/30	.095″	16,000	40,000	.276″

STD. PUT-UP: 100 Ft., 500 Ft., 1000 Ft.

KYNAR® WIRE

300V — 125°C UL APPROVED

Suitable for wire wrap applications. High cut through resistance. Self-extinguishing. Resistant to most chemicals and solvents. Ultra-violet and weather resistant.

DESCRIPTION: Solid, silver plated, oxygen-free, high conductivity (OFHC) copper conductor, extruded Kynar (polyvinylidene fluoride) insulation. To UL Style #1422.

DABURN No.	Size	Nom. Ins. Wall	Nom. O.D. ±.001″	Stock* Colors
D1422/30	30	.005″	.020″	1-10
D1422/28	28	.005″	.023″	1-10
D1422/26	26	.005″	.026″	1-9
D1422/24	24	.005″	.030″	1-6

COLORS: 1—White, 2—Black, 3—Red, 4—Green, 5—Yellow, 6—Light Blue, 7—Brown, 8—Orange, 9—Gray, 10—Violet. *Additional colors to order.

PUT-UP: 100 Ft., 10,000 Ft. Special Hub Spools. Other UL styles to order.

SHIELDED HOOK-UP WIRE

One conductor, tinned copper stranded, polyvinylchloride insulation, lacquered glass braid, overall tinned copper shielded braid.

OPERATING TEMPERATURE: −20°C to +60°C. 600V Rating

DABURN No.	Size	Strand	Nom. Wall	Nom. O.D.
2727/22	22	7/30	.016″	.095″
2727/20	20	10/30	.016″	.105″
2727/18	18	16/30	.016″	.125″
2727/16	16	26/30	.016″	.135″
2727/14	14	41/30	.016″	.155″
2727/12	12	65/30	.016″	.175″
2727/10	10	105/30	.025″	.200″

STD. PUT-UP: 1000 Ft.

600 VOLT UL APPROVED — 105°C (CSA 600V — 90°C)

STYLE 1015, CSA TR-32

Resistant to acids, alkalis, oil, flame, fungus and moisture. Temperature Rating: −10°C to +105°C.

DESCRIPTION: One conductor stranded annealed copper tinned, plastic insulation.

DABURN No.	Size	Strand	Nom. Ins. Wall	Nom. O.D.
STRANDED				
2630	22	7/30	.032″	.095″
2631	20	10/30	.032″	.102″
2632	18	16/30	.032″	.112″
2633	16	26/30	.032″	.126″
2633/14	14	41/30	.032″	.142″
SOLID				
2635/22	22	1	.032″	.095″
2635/20	20	1	.032″	.102″

COLORS: Black, Red, Green, Yellow, Blue, White, Orange, Gray, Purple.
STANDARD PUT-UP: 100 Ft., 500 Ft., 1000 Ft.

®Pennsalt Chemical Co. **ALL THE ABOVE MAY BE ORDERED CUT AND/OR STRIPPED AND/OR MARKED TO ORDER**

DABURN ELECTRONICS & CABLE CORP. • 2360 HOFFMAN ST., BRONX, N.Y. 10458 (212) 295-0050 TWX 710-593-4145

DABURN

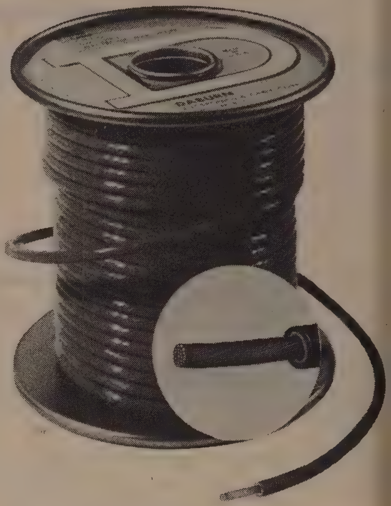
DABURN electronics & cable corp.

WIRE • CABLE • TUBING • MIL/COMM • SWITCHES • ELECTRONIC HARDWARE

HI-VOLT CORONA RESISTANT TEFLON* CABLE©

Voltage Rating at Sea Level • Voltage Rating at 80,000 feet, approximately 1/3 lower

• Minimum life expectancy: 10,000 hours.



SMALL SIZE:
You do not need bulky, thick, insulation jacketing as used with silicone rubber and polyethylene insulations to get your hi-voltage requirements. Wire used is MIL-SPEC QQ-W-343 and MIL-W-16878D. Insulation used conforms to and surpasses MIL-SPEC-W-16878D

AVOID CORONA PROBLEMS:
Corona resistant Teflon construction is specifically designed to retard and prevent corona penetration.
Temperature variations from −60° to +300°C have no life effect on the corona resistant Teflon. In addition, there is no stress or crack failure under severe, adverse conditions including mechanical strain, moisture, corona or chemical conditions.

DESCRIPTION:
Single Conductor, Stranded Silver Plated Copper, Corona Resistant Teflon* Insulation.

TEMPERATURE RATING:
−90°C to +250°C.

VOLTAGE RATING:
Based on insulation thickness.

AVAILABLE COLORS:
White, Black, Red, Green, Yellow, Lt. Blue, Brown, Orange, Gray, Violet. (Also available in tracer colors)

PUT-UP: 250′, 500′, 1000′

*DUPONT

ADDITIONAL SIZES AND VOLTAGES AVAILABLE

DABURN No.	AWG Size	Strand	Voltage Rating		Max. O.D.
			AC	DC	
CRT-12-2	12	19/25	2500	10,000	.142″
CRT-12-2.5	12	19/25	3750	12,500	.152″
CRT-12-3	12	19/25	4500	15,000	.162″
CRT-12-3.5	12	19/25	5300	17,500	.172″
CRT-12-4	12	19/25	6000	20,000	.182″
CRT-12-5	12	19/25	7500	25,000	.202″
CRT-12-6.5	12	19/25	10,000	32,500	.232″
CRT-12-8	12	19/25	12,000	40,000	.262″
CRT-12-10	12	19/25	15,000	50,000	.302″
CRT-14-2	14	19/27	2500	10,000	.124″
CRT-14-2.5	14	19/27	3750	12,500	.134″
CRT-14-3	14	19/27	4500	15,000	.144″
CRT-14-3.5	14	19/27	5300	17,500	.154″
CRT-14-4	14	19/27	6000	20,000	.164″
CRT-14-5	14	19/27	7500	25,000	.184″
CRT-14-6.5	14	19/27	10,000	32,500	.214″
CRT-14-8	14	19/27	12,000	40,000	.244″
CRT-14-10	14	19/27	15,000	50,000	.284″
CRT-16-2	16	19/29	2500	10,000	.109″
CRT-16-2.5	16	19/29	3750	12,500	.119″
CRT-16-3	16	19/29	4500	15,000	.129″
CRT-16-3.5	16	19/29	5300	17,500	.139″
CRT-16-4	16	19/29	6000	20,000	.149″
CRT-16-5	16	19/29	7500	25,000	.169″
CRT-16-6.5	16	19/29	10,000	32,500	.199″
CRT-16-8	16	19/29	12,000	40,000	.229″
CRT-16-10	16	19/29	15,000	50,000	.269″
CRT-18-2	18	19/30	2500	10,000	.102″
CRT-18-2.5	18	19/30	3750	12,500	.112″
CRT-18-3	18	19/30	4500	15,000	.122″
CRT-18-3.5	18	19/30	5300	17,500	.132″
CRT-18-4	18	19/30	6000	20,000	.142″
CRT-18-5	18	19/30	7500	25,000	.162″
CRT-18-6.5	18	19/30	10,000	32,500	.192″
CRT-18-8	18	19/30	12,000	40,000	.222″
CRT-18-10	18	19/30	15,000	50,000	.262″
CRT-20-2	20	19/32	2500	10,000	.092″
CRT-20-2.5	20	19/32	3750	12,500	.102″
CRT-20-3	20	19/32	4500	15,000	.112″
CRT-20-3.5	20	19/32	5300	17,500	.122″
CRT-20-4	20	19/32	6000	20,000	.132″
CRT-20-5	20	19/32	7500	25,000	.152″
CRT-20-6.5	20	19/32	10,000	32,500	.192″
CRT-20-8	20	19/32	12,000	40,000	.212″
CRT-20-10	20	19/32	15,000	50,000	.252″
CRT-22-2	22	19/34	2500	10,000	.084″
CRT-22-2.5	22	19/34	3750	12,500	.094″
CRT-22-3	22	19/34	4500	15,000	.104″
CRT-22-3.5	22	19/34	5300	17,500	.114″
CRT-22-4	22	19/34	6000	20,000	.124″
CRT-22-5	22	19/34	7500	25,000	.144″
CRT-22-6.5	22	19/34	10,000	32,500	.174″
CRT-22-8	22	19/34	12,000	40,000	.204″
CRT-22-10	22	19/34	15,000	50,000	.244″
CRT-24-2	24	19/36	2500	10,000	.077″
CRT-24-2.5	24	19/36	2750	12,500	.087″
CRT-24-3	24	19/36	4500	15,000	.097″
CRT-24-3.5	24	19/36	5300	17,500	.107″
CRT-24-4	24	19/36	6000	20,000	.117″
CRT-24-5	24	19/36	7500	25,000	.137″
CRT-24-6.5	24	19/36	10,000	32,500	.167″
CRT-24-8	24	19/36	12,000	40,000	.197″
CRT-24-10	24	19/36	15,000	50,000	.237″
CRT-26-2	26	7/34	2500	10,000	.071″
CRT-26-2.5	26	7/34	3750	12,500	.081″
CRT-26-3	26	7/34	4500	15,000	.091″
CRT-26-3.5	26	7/34	5300	17,500	.101″
CRT-26-4	26	7/34	6000	20,000	.111″
CRT-26-5	26	7/34	7500	25,000	.131″
CRT-26-6.5	26	7/34	10,000	32,500	.161″
CRT-26-8	26	7/34	12,000	40,000	.191″
CRT-26-10	26	7/34	15,000	50,000	.231″
CRT-28-2	28	7/36	2500	10,000	.067″
CRT-28-2.5	28	7/36	3750	12,500	.077″
CRT-28-3	28	7/36	4500	15,000	.087″
CRT-28-3.5	28	7/36	5300	17,500	.097″
CRT-28-4	28	7/36	6000	20,000	.117″
CRT-28-5	28	7/36	7500	25,000	.127″
CRT-28-6.5	28	7/36	10,000	32,500	.157″
CRT-28-8	28	7/36	12,000	40,000	.187″
CRT-28-10	28	7/36	15,000	50,000	.227″

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WIRE • CABLE • TUBING • MIL/COMM • SWITCHES • ELECTRONIC HARDWARE

NEW FLAT RIBBON CABLE • TYPES B & C PER MIL-W-16878D•UL FR-1

SOLID COLORS

DESCRIPTION: Each conductor is stranded T.C. with extruded PVC insulation, bonded together to form a flat ribbon cable. Conductors separate easily for clean terminations with standard wire connectors, jacks and pins. Ribbon cable saves space and time on circuit interconnecting assemblies, wiring harnesses, sliding drawers and drop assemblies and simplifies identification. Resists acid, alkalis, flame, moisture, oil, solvents and fungus.

TEMPERATURE RATING: −55°C to +105°C. Insulation meets or exceeds UL FR1 vertical flame test.

Per MIL-W-16878D — TYPE B — 600 V

DABURN No.	Cond.	Size	Strand	Nom. Wall	Nom. O.D.
1805/10	10	22	19/34	.010″	.510″ x .051″
1805/15	15	22	19/34	.010″	.765″ x .051″
1805/20	20	22	19/34	.010″	1.20″ x .051″
1805/30	30	22	19/34	.010″	1.53″ x .051″
1806/10	10	24	19/36	.010″	.430″ x .043″
1806/15	15	24	19/36	.010″	.645″ x .043″
1806/20	20	24	19/36	.010″	.860″ x .043″
1806/30	30	24	19/36	.010″	1.30″ x .043″
1807/10	10	26	7/34	.010″	.370″ x .037″
1807/15	15	26	7/34	.010″	.555″ x .037″
1807/20	20	26	7/34	.010″	.740″ x .037″
1807/30	30	26	7/34	.010″	1.11″ x .037″
1808/10	10	28	7/36	.010″	.340″ x .034″
1808/15	15	28	7/36	.010″	.510″ x .034″
1808/20	20	28	7/36	.010″	.680″ x .034″
1808/30	30	28	7/36	.010″	1.020″ x .034″
1809/10	10	30	7/38	.010″	.310″ x .031″
1809/15	15	30	7/38	.010″	.465″ x .031″
1809/20	20	30	7/38	.010″	.620″ x .031″
1809/30	30	30	7/38	.010″	.930″ x .031″

Per MIL-W-16878D — TYPE C — UL2444

DABURN No.	Cond.	Size	Strand	Nom. Wall	Nom. O.D.
1823/5	5	22	7/30	.016″	.065″ x .325″
1823/10	10	22	7/30	.016″	.065″ x .650″
1823/15	15	22	7/30	.016″	.065″ x .975″
1823/20	20	22	7/30	.016″	.065″ x 1.300″

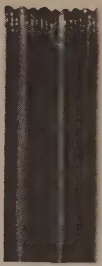
STANDARD PUT-UP: 100 Ft., 1000 Ft.

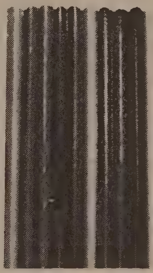
COLOR CODE: Solid Colors.

COLOR CODE: 1—Brown, 2—Red, 3—Orange, 4—Yellow, 5—Green, 6—Blue, 7—Violet, 8—Gray, 9—White 10†—Black.

†Beyond 10 conductors, code is repeated.

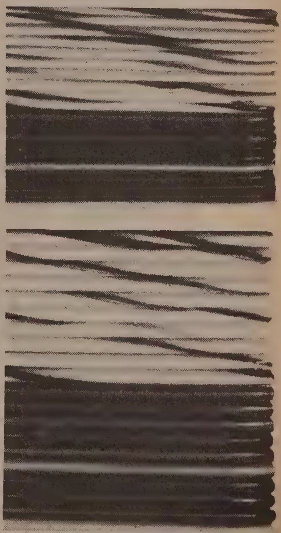
SOLID COLORS





INDIVIDUALLY COLOR CODED WITH STRIPES

INDIVIDUAL COLORS



Per MIL-W-16878D — TYPE B — 600 V

DESCRIPTION: Each conductor stranded tinned copper, polyvinylchloride insulation, bonded to form flat ribbon cable. Conductors are color coded and separate easily for clean terminations. Saves space, time on circuit and interconnecting assemblies, wiring harnesses, sliding drawers and drop assemblies.
Rated: −55°C to +105°C

DABURN No.	Cond.	Size	Strand	Nom. Wall	Nom. O.D.
1804/4	4	24	7/32	.010″	.043″ x .172″
1804/8	8	24	7/32	.010″	.043″ x .344″
1804/12	12	24	7/32	.010″	.043″ x .516″
1804/16	16	24	7/32	.010″	.043″ x .688″
1804/20	20	24	7/32	.010″	.043″ x .860″

STD. PUT-UP: 250 Ft., 500 Ft., 1000 Ft.

CONDUCTOR COLOR CODE: Same as noted below for C-22 Series.

Per MIL-W-16878D TYPE C

VOLTAGE RATING: 1000 VOLTS

DABURN No.	Cond.	Size	Strand	Nom. Wall	Nom. O.D.
1822/4	4	22	7/30	.016″	.065″ x .260″
1822/8	8	22	7/30	.016″	.065″ x .520″
1822/12	12	22	7/30	.016″	.065″ x .780″
1822/16	16	22	7/30	.016″	.065″ x 1.040″
1822/20	20	22	7/30	.016″	.065″ x 1.300″

STD. PUT-UP: 250 Ft., 500 Ft., 1000 Ft.

CONDUCTOR COLOR CODE — INDIVIDUALLY CODED:

1—White
2—Black
3—Red
4—Green
5—Yellow
6—Lt. Blue
7—Brown
8—Orange
9—Gray
10—Violet
11—Wh/Black
12—Wh/Red
13—Wh/Green
14—Wh/Yellow
15—Wh/Blue
16—Wh/Brown
17—Wh/Orange
18—Wh/Gray
19—Wh/Violet
20—Wh/Blk/Red

ADDITIONAL SIZES & TYPES
AVAILABLE TO ORDER

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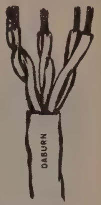
HEAVY DUTY TWISTED PAIRS INTERCOM CABLES — (Stranded)

Where larger conductors are indicated, we suggest these No. 18 gauge cables. Rugged yet flexible — abrasion resistant. Gray vinyl jacket overall.
Standard intercom color coding for paired cables applies 300V.



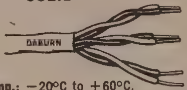
DABURN No.	Pairs	Cond.	Size	Nom. O.D.
3003/3	3	6	18-16/30	.365″
3003/6	6	12	18-16/30	.560″
3003/9	9	18	18-16/30	.650″
3003/15	15	30	18-16/30	.875″

STD. PUT-UP: 500 Ft., 1000 Ft.

PLASTIC INTERCOMMUNICATION CABLES

TWISTED PAIRS — SOLID

Each Cond. #22 **Solid** Tinned Copper, .010″ wall (Operating Temp. −20°C to +60°C). Vinyl plastic insulation, conductors color coded, twisted pairs, cabled, gray vinyl jacket overall. Suitable for outdoor installations.
Operating Voltage: 200 Volts. **Operating Temp.:** −20°C to +60°C.

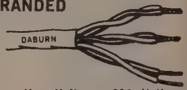


DABURN No.	Pairs	Cond.	Size	Nom. Jacket	Nom. O.D.
3000	1	2	22 Solid	.020″	.130″
3000/2	2	4	22 Solid	.020″	.205″
3000/3	3	6	22 Solid	.020″	.215″
3000/6	6	12	22 Solid	.020″	.275″
3000/9	9	18	22 Solid	.020″	.310″
3000/11	11	22	22 Solid	.020″	.340″
3000/13	13	26	22 Solid	.025″	.385″
3000/15	15	30	22 Solid	.025″	.390″
3000/16	16	32	22 Solid	.025″	.415″
3000/27	27	54	22 Solid	.035″	.505″
3000/31	31	62	22 Solid	.035″	.555″
3000/41	41	82	22 Solid	.035″	.630″
3000/51	51	102	22 Solid	.045″	.735″
3000/76	76	152	22 Solid	.070″	.970″
3000/101	101	202	22 Solid	.080″	1.140″

STD. PUT-UP: 100 Ft., 500 Ft., 1000 Ft. Other pairs available to order.

TWISTED PAIRS — STRANDED

Each Cond. #22 7/30 Tinned Copper, .010″ wall vinyl plastic insulation, conductors color coded, twisted pairs, cabled, gray vinyl jacket overall. Suitable outdoor installations.
Operating Temperature: −20°C to +60°C. **Operating Voltage:** 200 Volts.



DABURN No.	Pairs	Cond.	Size	Strand	Nom. O.D.
3002	1	2	22	7/30	.145″
3002/2	2	4	22	7/30	.210″
3002/3	3	6	22	7/30	.225″
3002/4	4	8	22	7/30	.235″
3002/5	5	10	22	7/30	.245″
3002/6	6	12	22	7/30	.290″
3002/9	9	18	22	7/30	.350″
3002/11	11	22	22	7/30	.365″
3002/15	15	30	22	7/30	.455″
3002/19	19	38	22	7/30	.480″
3002/23	23	46	22	7/30	.530″
3002/27	27	54	22	7/30	.570″
3002/31	31	62	22	7/30	.635″
3002/41	41	82	22	7/30	.710″
3002/51	51	102	22	7/30	.800″

STD. PUT-UP: 100 Ft., 500 Ft., 1000 Ft.

CONDUCTOR COLOR CODE CHART FOR PAIRED INTERCOM CABLES

PAIR NO. COLOR COMBINATION

1—Black paired with Red
2—Black paired with White
3—Black paired with Green
4—Black paired with Blue
5—Black paired with Brown
6—Black paired with Yellow
7—Black paired with Orange
8—Red paired with Green
9—Red paired with White
10—Red paired with Blue
11—Red paired with Yellow
12—Red paired with Brown
13—Red paired with Orange
14—Green paired with Blue
15—Green paired with White
16—Green paired with Brown
17—Green paired with Orange

PAIR NO. COLOR COMBINATION

18—Green paired with Yellow
19—White paired with Blue
20—White paired with Brown
21—White paired with Orange
22—White paired with Yellow
23—Blue paired with Brown
24—Blue paired with Orange
25—Blue paired with Yellow
26—Brown paired with Orange
27—Brown paired with Yellow
28—Purple paired with Red
29—Purple paired with White
30—Purple paired with Green
31—Purple paired with Blue
32—Purple paired with Brown
33—Purple paired with Yellow
34—Purple paired with Orange

PAIR NO. COLOR COMBINATION

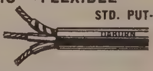
35—Purple paired with Slate
36—Purple paired with Black
37—Slate paired with Red
38—Slate paired with White
39—Slate paired with Green
40—Slate paired with Blue
41—Slate paired with Brown
42—Slate paired with Yellow
43—Slate paired with Orange
44—Slate paired with Black
45—White/Black paired w. Red
46—White/Black paired w. Green
47—White/Black paired w. Blue
48—White/Black paired w. Brown
49—White/Black paired w. Yellow
50—White/Black paired w. Orange
51—White/Black paired w. Purple

MULTI-CONDUCTOR — PLASTIC JACKET

UNSHIELDED AUDIO — FLEXIBLE

Each Cond. #22 7/30 Tinned Copper, stranded, .010″ wall plastic insulation, color coded, twisted, gray vinyl jacket overall. Suitable for signal, P.A. systems, computer cable—for outdoor use.

STD. PUT-UP: 500 Ft.



Operating Voltage: 200 Volts. **Operating Temperatures:** −20°C to +60°C.

DABURN No.	Cond.	Size	Strand	Nom. Wall	Nom. Jacket	Nom. O.D.
3054/2	2	22	7/30	.010″	.020″	.140″
3054/3	3	22	7/30	.010″	.020″	.145″
3054/4	4	22	7/30	.010″	.020″	.170″
3054/5	5	22	7/30	.010″	.020″	.175″
3054/6	6	22	7/30	.010″	.020″	.185″
3054/7	7	22	7/30	.010″	.020″	.190″
3054/8	8	22	7/30	.010″	.020″	.200″
3054/9	9	22	7/30	.010″	.020″	.225″
3054/10	10	22	7/30	.010″	.020″	.235″
3054/12	12	22	7/30	.010″	.020″	.255″
3054/15	15	22	7/30	.010″	.020″	.280″
3054/20	20	22	7/30	.010″	.020″	.310″
3054/25	25	22	7/30	.010″	.020″	.340″
3054/30	30	22	7/30	.010″	.020″	.365″
3054/40	40	22	7/30	.010″	.025″	.425″
3054/50	50	22	7/30	.010″	.035″	.500″
3054/60	60	22	7/30	.010″	.035″	.530″

STD. PUT-UP: From 2 thru 7 cond. 500 ft.; from 8 thru 30 cond. 250 ft.

MULTI-CONDUCTOR COLOR CODE CHART

CONDUCTOR COLOR CODE:

1 — Black
2 — Red
3 — White
4 — Green
5 — Orange
6 — Blue
7 — Brown
8 — Yellow
9 — Violet
10 — Slate
11 — Pink
12 — Tan
13 — Red/Green
14 — Red/Yellow
15 — Red/Black
16 — White/Black
17 — White/Red
18 — White/Green
19 — White/Yellow
20 — White/Blue
21 — White/Brown
22 — White/Orange
23 — White/Gray
24 — White/Violet
25 — White/Black/Red
26 — White/Black/Green
27 — White/Black/Yellow
28 — White/Black/Blue
29 — White/Black/Brown
30 — White/Black/Orange
31 — White/Black/Slate
32 — White/Black/Purple
33 — White/Black/Black
34 — White/Red/Black
35 — White/Red/Red
36 — White/Red/Green
37 — White/Red/Blue
38 — White/Red/Brown
39 — White/Red/Purple
40 — White/Green/Black
41 — White/Green/Red
42 — White/Green/Green
43 — White/Green/Blue
44 — White/Green/Brown
45 — White/Green/Purple
46 — White/Blue/Black
47 — White/Blue/Red
48 — White/Blue/Green
49 — White/Blue/Blue
50 — White/Blue/Brown
51 — White/Blue/Purple
52 — White/Brown/Black
53 — White/Brown/Red
54 — White/Brown/Green
55 — White/Brown/Blue
56 — White/Brown/Brown
57 — White/Brown/Purple
58 — White/Purple/Red
59 — White/Purple/Green
60 — White/Purple/Blue

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AUDIO, DATA SHIELDED, MICROPHONE AND CONTROL CABLES

COLOR CODE CHART FOR PAIRED INTERCOM CABLES SEE PAGE 2•1986

AUDIO & DATA SHIELDED CABLE
INDIVIDUALLY ALUMINUM MYLAR FOIL SHIELDED PAIRS
STRANDED CONDUCTOR

DESCRIPTION: Each conductor **stranded,** copper tinned, hi density polyethylene insulation, color coded, conductors — twisted pairs. #22 **stranded** tinned copper wire. Aluminum foil mylar shield over each pair and copper tinned drain wire. Overall chrome grey PVC jacket. Nom. cap. between conds. of a pair, 25 PF/FT. Capacitance of a single conductor to shield, 45 PF/FT.

Sugg. Working Voltage: 300V.

DABURN Cat. No.	No. of Pairs	No. of Conds.	Cond. Strand	Nom. Wall	Nom. Jkt.	Nom. O.D.
2932/3	3	6	7/30	.010″	.025″	.235″
2932/6	6	12	7/30	.010″	.030″	.320″
2932/9	9	18	7/30	.010″	.035″	.370″
2932/11	11	22	7/30	.010″	.040″	.415″
2932/15	15	30	7/30	.010″	.040″	.485″
2932/19	19	38	7/30	.010″	.050″	.530″
2932/27	27	54	7/30	.010″	.055″	.645″

STD. PUT-UP: 500 Ft., 1000 Ft. **Construction variations to order.**

INDIVIDUALLY SHIELDED PAIRS — STRANDED COND.

DESCRIPTION: Polyethylene insulated, individually twisted and shielded pairs of #22 stranded T.C., cabled with #24 AWG stranded T.C. drain wire. Chrome PVC jacket overall. Nom. capacitance between conductors 35 pf/ft.

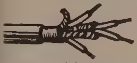
DABURN Cat. No.	No. of Pairs	No. of Conds.	Cond. Strand	Nom. Wall	Nom. Jkt.	Nom. O.D.
2933/2	2	4	7/30	.008″	.020″	.200″

INDIVIDUALLY SHIELDED MULTIPLE PAIR — SOLID COND.

This construction reduces the bulk in required cables. Multipaired #22 **solid** tinned copper, vinyl insulated .013″, cabled in pairs. Aluminum foil mylar shield over each pair and drain wire, overall gray vinyl jacket. Nom. Cap. between Conds. 40 MMF/Ft. Nom. Cap. between 1 Cond. and others connected to shield — 77 MMF/Ft.

DABURN Cat. No.	Pairs	Conds.	Nom. Jacket	Nom. O.D.
2930/3	3	6	.030″	.252″
2930/6	6	12	.037″	.345″
2930/9	9	18	.040″	.410″
2930/11	11	22	.040″	.458″
2930/15	15	30	.045″	.510″
2930/19	19	38	.055″	.630″
2930/27	27	54	.070″	.770″

STD. PUT-UP: 500 Ft., 1000 Ft. **Construction Variations Available to Order.**



ALUMINUM MYLAR FOIL SHIELD PLASTIC JACKETED CABLE

Extremely light in weight, provides 100% shield coverage — small diameters. Each cond. tinned copper, stranded color coded polyethylene insulation, twisted, drain wire, aluminum mylar foil shield, gray polyvinylchloride jacket overall. Drain wire provides quick and easy grounding.

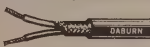
OPERATING TEMPERATURE: −20°C to +60°C. **OPERATING VOLTAGE:** 400 Volts.

DABURN Cat. No.	Cond.	Size	Strand	Nom. Wall	Nom. Jacket	Nom. O.D.
2960	2	22	7/30	.015″	.020″	.160″
2960/3	3	22	7/30	.015″	.020″	.185″
2960/4	4	22	7/30	.015″	.020″	.205″
2961	2	20	10/30	.015″	.020″	.185″
2961/3	3	20	10/30	.015″	.020″	.205″
2961/4	4	20	10/30	.015″	.020″	.225″
2962	2	18	16/30	.017″	.020″	.220″
2962/3	3	18	16/30	.017″	.020″	.235″
2962/4	4	18	16/30	.017″	.020″	.255″
2963	2	16	26/30	.017″	.020″	.255″
2963/3	3	16	26/30	.017″	.020″	.275″
2964	2	14	41/30	.017″	.020″	.295″
2964/3	3	14	41/30	.017″	.020″	.305″

STD. PUT-UP: 500 Ft., 1000 Ft.

CONDUCTOR COLOR CODE: 1—Black, 2—Red; 3—White, 4—Green.

SHIELDED CABLE
PLASTIC JACKETED BRAIDED COPPER SHIELD



Suitable for P.A. and sound systems, installation in schools, hospitals and institutions, transmitters, electronic circuits, etc. Construction allows ease of pigtailing. Shield provides additional strength for cable. Each conductor tinned copper, PVC insulation, color coded, twisted, braided T-C shield, gray PVC jacket overall. Suitable for outdoor installations.

OPERATING TEMPERATURE: −20°C to +60°C.

DABURN Cat. No.	Cond.	Size	Strand	Nom. Wall	Nom. Jacket	Operating Voltage	Nom. O.D.
2970	2	22	7/30	.017″	.020″	350V	.175″
2970/3	3	22	7/30	.017″	.020″	350V	.195″
2971	2	20	10/30	.017″	.020″	350V	.195″
2971/3	3	20	10/30	.017″	.020″	350V	.215″
2972	2	18	16/30	.017″	.020″	350V	.235″
2972/3	3	18	16/30	.017″	.020″	350V	.245″
2974	2	16	26/30	.017″	.020″	350V	.255″
2974/3	3	16	26/30	.017″	.020″	350V	.260″
2975	2	14	41/30	.020″	.020″	450V	.290″
2975/3	3	14	41/30	.020″	.020″	450V	.295″
2976	2	12	65/30	.020″	.020″	450V	.235″
2976/3	3	12	65/30	.020″	.020″	450V	.340″

CONDUCTOR COLOR CODE: 1—Black, 2—Red, 3—White.

STD. PUT-UP: 500 Ft., 1000 Ft.

SHIELDED PLASTIC MICROPHONE CABLE

Will withstand abuse and is resistant to oil, moisture, aging. Have low capacitance, Hi insulation resistance and low attenuation. Will not strain or mark.

2772 — For hi impedance microphone

2773 — For crystal, ribbon, etc. mikes. All are suitable for hi-fi interconnecting cables.

2774 — For hi impedance lapel mikes.

OPERATING TEMPERATURE: −20°C to +60°C.

SHIELDED MICROPHONE CABLE ONE CONDUCTOR

Uses tinned copper spiral shield — for ease in soldering — extremely flexible-plastic.

DABURN Cat. No.	Cond.	Size	Strand	Shield	Nom. Cap./Ft. MMF	Sugg. Work Voltage	Nom. O.D.
2770	1	25	7/33	Spiral	23	3000	.159″
2771	1	25	7/33	Spiral	33	1000	.120″
2772	1	20	26/34	Braid	36	4000	.175″
2773	1	25	7/33*	Braid	34	3500	.144″
2774	1	25	7/33*	Braid	23	5000	.190″

* 3 strand tinned copper, 4 strand tinned copperweld.

MULTICONDUCTOR MICROPHONE CABLE

Each conductor tinned copper, polyethylene insulation — color coded, twisted with fillers, textile wrap, tinned copper braid shield, gray vinyl jacket overall.

OPERATING TEMPERATURE. -20°C to +60°C, †Spiral T.C. Shield

DABURN Cat. No.	Cond.	Size	Strand	Nom. Cap./Ft.	Sugg. Work. Voltage	Nom. O.D.
2782	2	22	16/34	31 MMF	1000	.231″
2782/20	2	20	26/34	45 MMF	600	.240″
2782/24†	2	24	10/34	38 MMF	1000	.190″

SHIELDED ULTRA LOW CAPACITY MICROPHONE CABLE
Plastic Jacket — Cellular Foam Polyethylene Insulation
BRAIDED SHIELD

DESCRIPTION: Constructed with white foam polyethylene insulation, braided tinned copper shield, chrome gray vinyl jacket. The low loss foam polyethylene construction has lower capacitance and attenuation than standard polyethylene mike cables as much as 50%. This increases the effective length of cable as much as 50% without signal loss.

OPERATING TEMPERATURE −20°C to +60°C.

DABURN Cat. No.	Cond.	Size	Strand	Nom. Cap./Ft.	Nom. Jacket	Nom. O.D.
2690	1	26	7/34*	30MMF	.020″	.114″
2691	1	24	10/34	20MMF	.030″	.180″
2692	1	24	10/34	15MMF	.030″	.220″
2693	2	22	16/34	11MMF	.030″	.295″

STD. PUT-UP: 100 Ft., 250 Ft., 500 Ft., 1000 Ft.

CONDUCTOR COLOR CODE: 1—White, 2—Black.

* 3 strands tinned copper, 4 strands tinned copperweld.

PLASTIC JACKETED AUDIO AND MULTICONDUCTOR CABLE
SPIRAL WRAPPED COPPER SHIELD

Suitable for P.A. and sound systems, schools, hospitals, institutions, recording studios, paging and call systems. Each conductor copper tinned, plastic insulation, color coded. twisted, spiral wrapped tinned, copper shield, gray plastic jacket. Temp.: −20 to +60°C. Simplifies pigtailing. Provides almost 100% shielding coverage.

DABURN Cat. No.	Cond.	Size	Strand	Nom. Insul.	Nom. Jacket	Sugg. Working Voltage	Nom. O.D.
2949	2	22	1	.017″	.020″	350V	.170″
2950	2	22	7/30	.017″	.020″	350V	.170″
2950/1	1	22	7/30	.017″	.020″	350V	.115″
2950/3	3	22	7/30	.017″	.020″	350V	.190″
2950/4	4	22	7/30	.017″	.020″	350V	.200″
2950/6	6	22	7/30	.017″	.020″	350V	.235″
2952	2	20	10/30	.017″	.020″	350V	.190″
2952/1	1	20	10/30	.017″	.020″	350V	.129″
2952/3	3	20	10/30	.017″	.020″	350V	.205″
2952/4	4	20	10/30	.017″	.020″	350V	.222″
2952/6	6	20	10/30	.017″	.020″	350V	.260″
2953	2	18	16/30	.017″	.020″	350V	.230″
2953/1	1	18	16/30	.017″	.020″	350V	.133″
2953/3	3	18	16/30	.017″	.020″	350V	.230″
2953/4	4	18	16/30	.017″	.020″	350V	.245″
2954	2	16	26/30	.017″	.020″	350V	.235″
2954/4	4	16	26/30	.017″	.020″	350V	.255″
2954/3	3	16	26/30	.017″	.020″	350V	.245″
2955	2	14	41/30	.020″	.025″	450V	.285″
2955/3	3	14	41/30	.020″	.025″	450V	.292″
2955/4	4	14	41/30	.020″	.025″	450V	.310″
2956	2	12	65/30	.020″	.025″	450V	.325″
2956/3	3	12	65/30	.020″	.025″	450V	.335″

STD. PUT-UP: 250 Ft., 500 Ft., 1000 Ft.

CONDUCTOR COLOR CODE: 1—Black, 2—Red, 3—White, 4—Green.

CONSTRUCTION VARIATION TO ORDER

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DABURN

DABURN electronics & cable corp.

WIRE • CABLE • TUBING • MIL/COMM • SWITCHES • ELECTRONIC HARDWARE

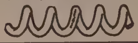
Long Lasting Service — useful wherever cords must change length or position. Extend to approximately six times its retracted length. Returns to its original shape or length when released. Eliminates tangling, twisting or knots. Cords are UL and CSA approved.

RETRACTILE POWER CORDS

RETRACTED LENGTHS: 1, 2, 3 & 4 FT. • EXTENDED LENGTHS: 6, 12, 18 & 25 FT.

UL APPROVED — NEOPRENE JACKETED CORD

Operating Temperature: −20°C to +60°C



DABURN CAT. NOS.	RETRACTED LENGTHS										
4 Ft.* Length	3 Ft. Length	2 Ft. Length	1 Ft. Length	No. Conds.	Size	Strand	UL‡ and CSA Type	Amps	Volt Rating	Coil Nom. O.D.	Cord Nom. O.D.
986-4	986-3	986-2	986-1	2	18	41/34	SVO	7	300	7/8″	.250″
986/3-4	986/3-3	986/3-2	986/3-1	3	18	41/34	SVO	7	300	1″	.275″
987-4	—	—	—	2	18	41/34	SVT	7	300	7/8″	.250″
989-4	989-3	989-2	989-1	2	18	41/34	SJO	7	300	1 3/16″	.310″
989/3-4	989/3-3	989/3-2	989/3-1	3	18	41/34	SJO	7	300	1 3/8″	.330″
989/4-4	989/4-3	989/4-2	989/4-1	4	18	41/34	SJO	5.6	300	1 7/16″	.360″
989/5-4	—	989/5-2	—	5	18	41/34	—	5.6	300	1 3/4″	.440″
989/7-4	—	989/7-2	—	7	18	41/34	—	5.6	300	1 7/8″	.500″
990-4	—	—	—	2	18	41/34	SJT	7	300	1 3/16″	.310″
991-4	991-3	991-2	991-1	2	16	65/34	SJO	10	300	1 3/8″	.330″
991/3-4	991/3-3	991/3-2	991/3-1	3	16	65/34	SJO	10	300	1 7/16″	.365″
991/4-4	991/4-3	991/4-2	—	4	16	65/34	SJO	8	300	1 5/8″	.395″
991/5-4	—	991/5-2	—	5	16	65/34	SO	8	600	2″	.540″
991/6-4	—	991/6-2	—	6	16	65/34	—	8	600	2 1/8″	.550″
991/7-4	—	991/7-2	—	7	6/16 1/14	#16-65/34 #14-41/30	— —	#16-8 #14-12	600	2 1/4″	.600″
993-4	993-3	993-2	—	2	14	41/30	SO	15	600	2″	.535″
993/3-4	993/3-3	993/3-2	—	3	14	41/30	SO	15	600	2 1/8″	.560″
993/4-4	993/4-3	993/4-2	—	4	14	41/30	SO	12	600	2 1/4″	.605″
994-4	994-3	994-2	—	2	12	65/30	SO	20	600	2 1/4″	.605″
994/3-4	994/3-3	994/3-2	—	3	12	65/30	SO	20	600	2 3/8″	.635″
994/4-4	994/4-3	994/4-2	—	4	12	65/30	SO	16	600	2 1/2″	.665″
994/6-4	—	994/6-2	—	6	2/12 4/18	#12-65/30 #18-41/34	— —	#12-17 #18-6	600	2 1/4″	.605″
994/7-4	—	994/7-2	—	7	12	65/30	—	16	600	2 5/8″	.775″

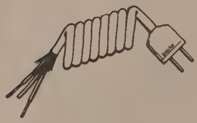
‡ Wherever UL type is shown, approved by CSA Testing Laboratories.
* Preferred Put-up.

Std. Pkg. 5

CONDUCTOR COLOR CODE: 1-Black, 2-White, 3-Green, 4-Red, 5-Blue, 6-Brown, 7-Yellow.

UL APPROVED RETRACTILE POWER CORD SETS

18″ Retracted — Approx. 9 Ft. Extended — 300V — UL Approved



For portable use. Mobile and office equipment. Neoprene jacketed cord sets with molded male plug on one end.
OPERATING VOLTAGE 300 VOLTS

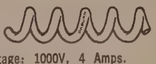
DABURN Cat. No.	Conds.	AWG Size	Strand	Type UL	Coil O.D.	Cord O.D.
980	2	18	41/34	SVO	7/8″	.250″
980/3	3	18	41/34	SVO	1″	.275″
981	2	18	41/34	SJO	1 3/16″	.310″
981/3	3	18	41/34	SJO	1 3/8″	.330″
982	2	16	65/34	SJO	1 3/8″	.330″
982/3	3	16	65/34	SJO	1 7/16″	.365″

CONDUCTOR COLOR CODE: 1-Black. 2-White. 3-Green.

Std. Pkg. 10

RETRACTILE TEST LEAD WIRE

Stretch coiled kinkless test lead wire description. 12″ coil — stretches to approx. 6 feet. One conductor #20 stranded copper rubber insulation .165 O.D. Colors: Red, Black. Coil O.D. 3/4″. Working Voltage: 1000V, 4 Amps.

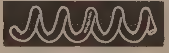


DABURN No.	Lgth.	Size	Strand	Coil O.D.	Cord O.D.
984 A	12″	20	41/36	3/4″	.165″
984	24″	20	41/36	3/4″	.165″

12″ Extends Approx. 6 Ft.
24″ Extends Approx. 12 Ft.

Specify Color, Red or Black
Std. Pkg. 6

DABURN MINIATURE RETRACTILE COMMUNICATION CORDS

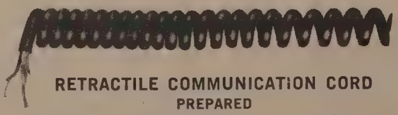


2 Feet Retracted — 10 Ft. Extended

Miniature size. Suitable for compact equipment. Black plastic jacket overall.
Operating Temperature: −20°C to +60°C

Std. Pkg. 10

DABURN No.	Conds.	Size	Strand	Coil O.D.	Cond. O.D.
975/28	2	28	19/40 T.C.	1/2″	.135″
977/28	4	28	19/40 T.C.	1/2″	.150″



RETRACTILE COMMUNICATION CORD

PREPARED

Retracted length 12″ — extended length 6 feet.

Same as our regular communication cord but each end is prepared, stripped and tinned as indicated.

Daburn No.	No. Cond.	Size & Strand	Coil O.D.	Cord O.D.	PREPARED
966	3	#23-21/36	13/16″	.220″	**1 END:** L'gth 1½″. Conductor stripped and tinned Other end: Total L'gth 1½″ jacket removed.
967	4	#23-21/36	15/16″	.250″	**1 END:** Total length 1″. Conductors stripped and tinned Other end. Total lgth 1½″ jacket removed.
968	5	#23-21/36	1-1/16″	.285″	**1 END:** Total l'gth 4⅛″. Conductors stripped and tinned. Other end: Total l'gth 4⅛″ conds. stripped and tinned.

CONDUCTOR COLOR CODE: 1-Black, 2-White, 3-Red, 4-Green, 5-Blue
Std. Pkg. 10.

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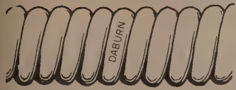

RETRACTILE COMMUNICATION CORDS

RETRACTILE COMMUNICATION COIL CORDS

RETRACTED LENGTHS 2, 3 & 4 FT. — EXTENDED LENGTHS 12, 18 & 25 FT.

Multi-conductors stranded extra flexible #23 AWG 21/36 tinned soft copper for long flex life. Neoprene or "Danyon" plastic jacketed cable for long life. 120 volt working, current carrying capacity 1 amp. Nom. cond. resist. .022 ohms per linear foot, .185 ohms per retracted foot.

For communication equipment such as ham operations, telephone car carriers, radio equipment, head sets, etc.

OPERATING TEMPERATURE: −20°C to +60°C **MAXIMUM VOLTAGE:** 100V

DANYON PLASTIC JACKETED

DABURN Cat. Nos. Retracted Lengths 4 Ft.†	3 Ft.	2 Ft.	No. Cond.	Size	Strand	Nom. Coil O.D.	Nom. Cord O.D.
975D-4	**975D-2**	**975D-2**	2	23	21/36	⅝″	.220″
976D-4	**976D-3**	**976D-2**	3	23	21/36	¾″	.230″
977D-4	**977D-3**	**977D-2**	4	23	21/36	⅞″	.255″
978D-4	**978D-3**	**978D-2**	5	23	21/36	1″	.265″
978D/6-4	**978D/6-3**	**978D/6-2**	6	23	21/36	1⅛″	.305″
978D/7-4	**978D/7-3**	**978D/7-2**	7	23	21/36	1 3/16″	.325″
978D/8-4	**978D/8-3**	**978D/8-2**	8	23	21/36	1¼″	.360″
978D/10-4	**978D/10-3**	**978D/10-2**	10	23	21/36	1⅜″	.380″
978D/12-4	**978D/12-3**	**978D/12-2**	12	23	21/36	1½″	.390″
978D/15-4	**978D/15-3**	**978D/15-2**	15	23	21/36	1⅝″	.400″

CONDUCTOR COLOR CODE: 1—Black, 2—White, 3—Red, 4—Green, 5—Blue, 6—Yellow, 7—Brown, 8—Orange, 9—White/Black Tracer, 10—White/Red Tracer, 11—White/Green Tracer, 12—White/Blue Tracer, 13—White/Yellow Tracer, 14—White/Brown Tracer, 15—White/Orange Tracer. †Preferred Put-Up **Std. Pkg.:** 5

NEOPRENE JACKETED

DABURN Cat. Nos. Retracted Length 4 Ft.	No. Cond.	Size	Strand	Nom. Coil O.D.	Nom. Cord O.D.
975-4	2	23	21/36	¾″	.200″
976-4	3	23	21/36	13/16	.210″
977-4	4	23	21/36	⅞″	.240″
978-4	5	23	21/36	1″	.285″
978/6-4	6	23	21/36	1⅛″	.305″
978/7-4	7	23	21/36	1¼″	.320″
—	—	—	—	—	—
—	—	—	—	—	—
—	—	—	—	—	—
978/15-4	15	23	21/36	1½″	.470″

CONDUCTOR COLOR CODE: 1—Black, 2—White, 3—Red, 4—Green, 5—Blue, 6—Yellow, 7—Brown.

SHIELDED RETRACTILE COMMUNICATION CORDS

RETRACTED LENGTHS 1, 2 & 4 FT. — EXTENDED LENGTHS 6, 12 & 25 FT.

Single and multi-conductors. Shielded mike cables. Neoprene or "Danyon" plastic jacketed shielded conductors are individually shielded. Shield can be pigtailed for soldering. Safe — Reliable.

OPERATING TEMPERATURE: −20°C to +60°C

DANYON PLASTIC JACKETED

DABURN Cat. Nos. Retracted Lengths 4 Ft.†	2 Ft.	1 Ft.	No. Cond.	Size	Strand	Nom. Coil O.D.	Nom. Cord O.D.	Volt Rating	Capacitance MMF Lin. Ft.	MMF Retr. Ft.
995D-4	**995D-2**	**995D-1**	1	24(S)	41/40	⅝″	.160″	75	56	440
999D-4	**999D-2**	**999D-1**	2	2-23 (Ind. S & J)	21/36	⅞″	.225″	100	56	450
997D-4	**997D-2**	**997D-1**	3	2-23 1-23(S)	21/36	1⅛″	.250″	100	56	450
998D-4	**998D-2**	**998D-1**	4	2-23 2-23 (Ind. S & J)	21/36	1⅛″	.290″	100	56	450

†Preferred Put-Up. **STANDARD PACKAGE:** 10. **CONDUCTORS ARE COLOR CODED.**

NEOPRENE JACKETED

DABURN Cat. Nos. Retracted Lengths 4 Ft.	No. Cond.	Size	Strand	Nom. Coil O.D.	Nom. Cord O.D.	Volt Rating	Capacitance MMF Lin. Ft.	MMF Retr. Ft.
995-4	1	24(S)	41/40	⅝″	.160″	75	56	440
996-4	2	1-23 1-24(S)	21/36 41/40	¾″	.210″	100 75	56	450
997-4	3	2-23 1-24(S)	21/36 41/40	⅞″	.240″	100 75	56	450
998-4	4	2-23 2-24(S**)	21/36 41/40	1″	.270″	100 75	56	450

STANDARD PACKAGE: 10. **CONDUCTORS ARE COLOR CODED.** **Individually shielded.

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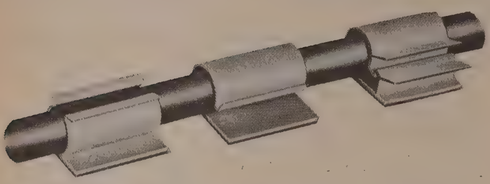
DABURN FASTENING DEVICES

STIK KLIPS™ • TENSION CLIPS • COMPONENT CLIPS • WIRE TIES

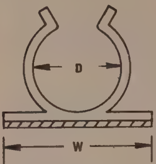
DABURN STIK KLIPS™ — SELF ADHESIVE



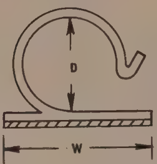
For fast secure mounting on smooth surfaces. No need to screw, nail or staple in place. Fastens in a flash — just peel off the protective backing and press in place on a clean, dry surface. For best results allow a few seconds for adhesive to set before applying lead.

These plastic clips are insulating, strong and elastic. They have many uses, such as keeping telephone wires off the floor, holding wire, cable, tubing, rods, etc. in position.

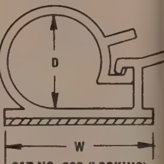
Material: PVC
Color: Gray
Temp. Range: −10°F to +175°F



CAT. NO. 660



CAT NO. 670

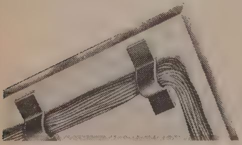


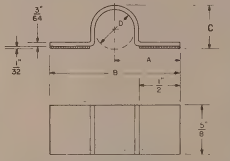
CAT NO. 680 (LOCKING)

DABURN Cat. No.	D	W	Std. Pkg.
660-⅛	⅛″	¾″	100, 1000
660-¼	¼″	¾″.	100, 1000
660-⅜	⅜″	¾″	100, 1000
660-½	½″	1″	100, 1000
660-¾	¾″	1″	100, 1000
670-⅛	⅛″	¾″	100, 1000
670-¼	¼″	¾″	100, 1000
670-⅜	⅜″	¾″	100, 1000
670-½	½″	1″	100, 1000
670-¾	¾″	1″	100, 1000
680-¼	¼″	¾″	100, 1000
680-½	½″	1″	100, 1000
680-¾	¾″	1″	100, 1000

OVER-THE-TOP STIK KLIP™

MATERIAL: PVC
COLOR: Black
TEMP. RANGE: −30°F to +170°F





Daburn's "over-the-top Stik Klip" is a fast and convenient self adhesive clip. Simply remove the protective paper backing of the adhesive tape and press into place. The unique configuration of the Stik-Klip allows for channeling of wire or tubing bundles up to ½″ in diameter.

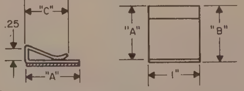
DABURN Cat. No.	Dimensions Are Nominal Inches A	B	C	D*
690-⅛	41/64″	1 7/32″	11/64″	⅛″
690-¼	45/64″	1 7/16″	19/64″	¼″
690-⅜	49/64″	1 17/32″	27/64″	⅜″
690-½	53/64″	1 21/32″	35/64″	½″

STANDARD PACKAGE: 100 Ft., 1000 Ft. *Object should be less than.

RIBBON CABLE STIK KLIPS™

COLOR: Gray
TEMP. RANGE: −30°F to +170°F

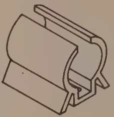
Daburn Ribbon Cable Stik Klips are designed for holding laminated or round conductor ribbon cable in place between components. This plastic, self-adhesive clip has a serrated edge which prevents slippage and allows runs of ribbon cable horizontally, vertically or diagonally. Maximum recommended thickness of cable is .245″.

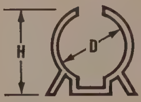


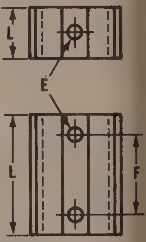
DABURN Cat. No.	A $+\frac{1}{16}''$ $-0''$	B	C
675-½	.500″	.56″	.30″
675-1	1.00″	1.05″	.85″

STANDARD PACKAGE: 100 Ft., 1000 Ft.

DABURN COMPONENT CLIPS







Hold and insulate, electrical and electronic components, accessories — spare parts. Holds firmly and still permits fast and easy insertion. Convenient for fastening clips and retainers for transistors, batteries, fuses, capacitors, resistors, lamps, etc. These Daburn clips are made of black vinyl (polyvinylchloride). Has high dielectric strength. Can be mounted with screws, rivets or other fastening means.

MATERIAL: Rigid Vinyl.
TEMPERATURE RANGE: −20° to +165°F.
STANDARD PACKAGE: 100, 1000.

DABURN Stock No.	D* Diam.	H Height	L Length	E Diam. of Hole	F Dist. Bet. Holes
600-¼″	¼″	13/32″	½″	3/32″	—
600-5/16″	5/16″	15/32″	½″	3/32″	—
600-⅜″	⅜″	½″	½″	3/32″	—
600-7/16″	7/16″	½″	½″	3/32″	—
600-½″	½″	⅝″	½″	3/32″	—
600-9/16″	9/16″	⅝″	½″	3/32″	—
600-⅝″	⅝″	⅝″	½″	3/32″	—
600-11/16″	11/16″	¾″	½″	5/32″	—
600-¾″	¾″	⅞″	½″	5/32″	—
600-⅞″	⅞″	1″	½″	5/32″	—
600-1″	1″	1¼″	1⅛″	5/32″	¾″
600-1⅜″	1⅜″	1 15/32″	1⅛″	5/32″	¾″
600-1½″	1½″	1¾″	1¾″	5/32″	¾″

FOR ADDITIONAL FASTENING DEVICES, PAGES 25, 26.

*Diameter of product to be held.

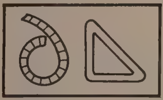
DABURN

DABURN electronics & cable corp.

WIRE • CABLE • TUBING • MIL/COMM • SWITCHES • ELECTRONIC HARDWARE

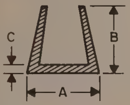
GROMMETS • CLIPS • CABLE CLAMPS • WIRE TIES

NEW DAFLEX FLEXIBLE CONTINUOUS GROMMETS — SOLID OR SERRATED



With only Five sizes you can finish and protect regularly and irregularly shaped openings from causing abrasion and cut-through damage to wires, cables, etc. Just cut the continuous grommet to your desired circumferential length (see the chart below) and slip it on to the edge of the hole. It stays in place securely.

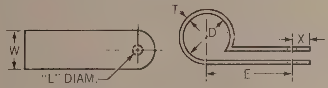
Daflex continuous grommets are available in natural polyethylene* and natural nylon**, solid or serrated. They are packaged in convenient 50 foot and 100 foot put-ups.



DAFLEX Solid Grommet Cat. No.		DAFLEX Serrated Grommet Cat. No.			Nom. Dimensions Inches		
Polyethylene	Nylon	Polyethylene	Nylon	For Panel Thickness	A	B	C
DPG-2	DNG-2	DPGS-2	DNGS-2	to .036″ (#20 Gauge)	.100″	.125″	.040″
DPG-3	DNG-3	DPGS-3	DNGS-3	.037″-.105″ (19-12 Gauge)	.156″	.156″	.045″
DPG-4	DNG-4	DPGS-4	DNGS-4	.106″-.164″ (11-8 Gauge)	.205″	.155″	.045″
DPG-5	DNG-5	DPGS-5	DNGS-5	.165″-.187″	.280″	.185″	.045″
DPG-6	DNG-6	DPGS-6	DNGS-6	.188″-.250″	.328″	.188″	.045″

*Conforms to MIL-I-631 **Conforms to MIL-M-22096 Ty4

NYLON CABLE CLAMPS



MADE OF DU PONT "ZYTEL" 101 NYLON RESIN

Meets MIL-P-26093A and MIL-P-17091A Amend. 2

Light and tough these nylon cable clamps are used as a clamp, strain relief, clip hanger, fastener or strap. Smooth non-abrasive surfaces, rounded edges will not cause shorts or grounds in cable. Insoluble in solvents, gasoline, oils, hydraulic fluids, alcohol, acids, alkalies. Temperature range −60°F to +300°F. Does not support combustion. Inside matte finish. Prevents slippage and is self aligning. Snaps on cable. Meets MIL-P-20693A specs. fungus resistant.

DABURN No.	To Fit Size	D	E	W	T	L	X
625	1/8″	.125	.316	3/8	.050	.177	.227
626	3/16″	.187	.378	3/8	.050	.177	.277
627	1/4″	.250	.409	3/8	.050	.177	.227
628	5/16″	.312	.441	3/8	.050	.177	.277
629	3/8″	.375	.471	3/8	.050	.177	.277
630	7/16″	.437	.519	3/8	.050	.177	.277
631	1/2″	.500	.550	3/8	.050	.177	.277
631A	9/16″	.563	.625	1/2	.060	.177	.227
632	5/8″	.625	.634	1/2	.060	.177	.227
632A	11/16″	.687	.752	1/2	.060	.177	.227
633	3/4″	.750	.718	1/2	.060	.177	.227
634	7/8″	.875	.760	1/2	.060	.177	.227
635	1″	1.000	.802	1/2	.060	.177	.227
636	1 1/8″	1.125	.968	1/2	.062	.204	.250
637	1 1/4″	1.250	1.156	1/2	.062	.204	.250
638	1 1/2″	1.500	1.188	5/8	.070	.204	.250

Std. Pkg. 100, 500, 1000. Teflon Cable Clamps available.

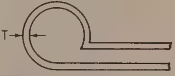
ETHYL CELLULOSE CABLE CLAMPS

Ethocel recommended for general use. Combines light weight and chemical resistance with excellent shock resisting properties in temp. range from −40°F to +185°F. Approved 7-21-44 Army-Navy Aeronautical AN-742. Also made to meet MIL STD. 242A (Ships). Suitable indoor-outdoor. Std. Pkg. 100, 1000.

DABURN No.	To Fit Size	D	E	W	T	L	X
615	1/8″	.125	.325	1/2	.060	.204	7/32
615A	3/16″	.188	.390	1/2	.060	.204	7/32
615B	1/4″	.250	.421	1/2	.060	.204	7/32
615C	5/16″	.313	.457	1/2	.060	.204	7/32
615D	3/8″	.375	.483	1/2	.060	.204	7/32
615E	7/16″	.438	.531	1/2	.060	.204	7/32
616	1/2″	.500	.562	1/2	.060	.204	7/32
616A	9/16″	.563	.625	1/2	.060	.204	7/32
616B	5/8″	.625	.610	1/2	.060	.204	7/32
616C	11/16″	.688	.666	1/2	.060	.204	7/32
616D	3/4″	.750	.766	1/2	.060	.204	7/32
616E	7/8″	.875	.813	1/2	.060	.204	7/32
617	1″	1.000	.906	1/2	.060	.204	7/32
617A	1 1/8″	1.125	.969	1/2	.060	.204	7/32
617B	1 1/4″	1.250	1.156	1/2	.060	.204	7/32
617C	1 1/2″	1.5	1.0625	5/8	.070	.204	7/32

Std. Pkg. 100, 500, 1000. Teflon Cable Clamps available.

DABURN ALUMINUM CABLE CLAMPS

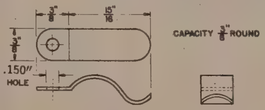


Made of hard drawn aluminum, light weight. Useful when mounting resonant lines, elements for beams, etc. Strong, durable, rust-proof.

DABURN No.	To Fit Size	Width	Length	Thickness	Clearance Hole For	Std. Pkg.
651A	1/8″	1/2″	13/16″	.050″	8	100
651	1/4″	1/2″	7/8″	.050″	8	100
652	5/16″	1/2″	15/16″	.050″	8	100
653	3/8″	1/2″	1″	.050″	8	100
654	1/2″	1/2″	1 1/8″	.050″	8	100
654A	5/8″	1/2″	1 1/4″	.050″	8	50
655	3/4″	3/4″	1 9/16″	.090″	10	50
657	7/8″	3/4″	1 5/8″	.090″	10	50
656	1″	3/4″	1 3/4″	.090″	10	50
656A	1 1/8″	3/4″	1 7/8″	.090″	10	50

NYLON TENSION CLIPS

Holds cable-wire-tubing-pipe-panels-many and varied uses. Made of nylon, they are insulating, non-corrosive and weather resistant. Easily fastened, easily removed. Strong and elastic.

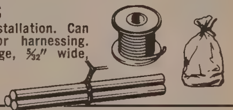


DABURN Cat. No.	STD. PKG.
641	100, 1000

Natural Color

TEMPERATURE: +10°F to +170°F

PLASTIC WIRE TIES



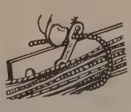
Useful for temporary or permanent installation. Can be adapted for immediate bundling or harnessing. Plastic insulated. Has .016″ steel gauge, 5/32″ wide, 30 lb. test.

TEMPERATURE: −20°F to +200°F.

DABURN Cat. No.		Standard Package
603	Plastic Wire Ties	100′, 500′, 1000′

COLORS: White. Blue. Red. Green. Yellow. Additional colors available.

DABURN PUSH BUTTON WIRE TIES



Push button wire ties for harnessing wire. 5″ in length, each tie is adjustable to 16 different diameters. Made of strong polyethylene, it is inert chemically and heat resistant. Breaking strength 45 to 95 lbs. After the tie is placed in hole for anchoring, wires can be replaced or added by loosening tie and pulling tight again. Designed to fit .250″ to .265″ hole in a .031″ to .140″ thick panel. Material conforms to Spec. LP590.

Temp. to +200°F

DABURN Cat. No.	(Specify Color)	Standard Package
601-4A	Red, Blue, Yellow	100, 1000

DABURN ELECTRONICS & CABLE CORP. • 2360 HOFFMAN ST., BRONX, N.Y. 10458 (212) 295-0050 TWX 710-593-4145

DABURN

DABURN electronics & cable corp.

WIRE • CABLE • TUBING • MIL/COMM • SWITCHES • ELECTRONIC HARDWARE

ELECTRONIC LACING CORDS AND TAPES • HEAT GUN • SPIRAL WRAP • ANTENNA KIT

LACING CORD-TAPE TO MEET MIL-T-713C TYPE P* AND MIL-T-43435 COMP. P-TYPE S

NYLON FLAT BRAIDED LACING TAPE

Nylon fiber flat braided impregnated with MW microcrystalline fungicidal wax. Stays flat. Designed to create a wider contact to distribute the stress. Flexible. Won't slip when knotted. Resistant to fungus, flame, abrasion, acids, MIL-T-43435 (new) supersedes MIL-T-713 (old).

Daburn No.	Color	(New) Size	(Old) Class	Nom. Width	Nom. Thickness	Tensile Strength	Standard Put-Up Tubes
2035	Natural White	1	—	.200″	.014″	150 lbs.	250 yd.
2035B	Black	1	—	.200″	.014″	150 lbs.	250 yd.
2036	Natural White	2	1	.120″	.014″	80 lbs.	250 yd.
2036B	Black	2	1	.120″	.014″	80 lbs.	250 yd.
2037	Natural White	3	2*	.090″	.014″	50 lbs.	500 yd.
2037B	Black	3	2*	.090″	.014″	50 lbs.	500 yd.
2038	Natural White	4	3	.065″	.010″	30 lbs.	500 yd.
2038B	Black	4	3	.065″	.010″	30 lbs.	500 yd.
2039	Natural White	5	4	.046″	.010″	15 lbs.	500 yd.
2039B	Black	5	4	.046″	.010″	15 lbs.	500 yd.

DACRON FLAT BRAIDED LACING TAPE

Dacron fiber flat braided impregnated with non-slip fungicidal finish. Will not cut or damage insulation. Stays flat. Has all characteristics of nylon with elongation, better resistance to acids.

DABURN No.	Color	Nom. Width	Thickness Nom.	Strength Tensile	Standard Put-Up Tubes
2041	Natural White	.120″	.014″	80	250 yd.
2041B	Black	.120″	.014″	80	250 yd.
2042	Natural White	.090″	.014″	48	500 yd.
2042B	Black	.090″	.014″	48	500 yd.
2043	Natural White	.060″	.010″	35	500 yd.
2043B	Black	.060″	.010″	35	500 yd.
2044	Natural White	.046″	.010″	25	500 yd.
2044B	Black	.046″	.010″	25	500 yd.

TEFLON* FIBERGLASS FLAT BRAIDED LACING TAPE

Teflon coated fiberglass flat braided lacing tape bonded for high temp. operations (550°F). Stays flat — for strength, stability. Teflon finish increases strength and abrasion resistant surface. Will not cut or damage insulation.

DABURN No.	Color	Nom. Width	Thickness Nom.	lbs. Test	Standard Put-Up Tubes
2045	White	.170″	.025″	150	250 yd.
2046	White	.120″	.020″	90	250 yd.
2047	White	.080″	.020″	70	500 yd.

TEFLON* FLAT BRAIDED LACING TAPE

for high temperature operations (550°F)

DABURN No.	Color	Nom. Width	Nom. Thickness	Test lbs.	Standard Put-Up Tubes
2048	Brown	.100″	.016″	35	250 yd.
2049	Brown	.075″	.010″	15	500 yd.

ROUND TWISTED NYLON LACING CORD

Manufactured to meet MIL-T-713A Type P specification, Composition P, Classes 3, 2, 1. Wax finish — compounded with fungicide to resist mildew. Easy to tie.

PUT-UP ON 1 LB. TUBES

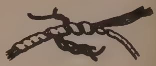
DABURN No.	Color	Class	Tensile Strength	Nom. Diam.	Yds. Per Tube
2070	Natural	1	70 lbs.	.039″	600
2070B	Black	1	70 lbs.	.039″	600
2071	Natural	2	48 lbs.	.029″	800
2071B	Black	2	48 lbs.	.029″	800
2072	Natural	3	32 lbs.	.025″	1140
2072B	Black	3	32 lbs.	.025″	1140
2072/1	Natural	4	20 lbs.	.020″	2400
2072/1B	Black	4	20 lbs.	.020″	2400

ROUND TWISTED LINEN LACING CORD

Manufactured from pure flax treated with microcrystalline wax compounded with fungicide to resist mildew. Classes 1, 2, 3 meet MIL-T-713C Type N specifications.

4 OZ. TUBE DABURN No.	Yds.	8 OZ. TUBE DABURN No.	Yds.	1 LB. TUBES DABURN No. Nat.	DABURN No. Blk.	Yds.	Class	Ply	Diam.	Lb. Test
2073	210	2074	425	2075	—	850	—	4	.036″	22
2076	150	2077	300	2078	2078B	600	3	6	.044″	33
2082	115	2083	235	2084	2084B	470	2	8	.051″	50
2079	100	2080	200	2081	2081B	400	—	9	.054″	56
2085	75	2086	150	2087	2087B	300	1	12	.063″	72

SPIRAL WRAP — PLASTIC TUBING FOR HARNESSES



Available in four formulations: Polyethylene, Rulan (flame retardant) Polyethylene, Nylon and Teflon. Easily applied. Twists on easily. Can be flexed repeatedly without cracking or breaking. Reusable, bends around sharp corners. Expandable.
Per MIL-P-22692, MIL-I-631D, MIL-P-3803

POLYETHYLENE

TEMP. RANGE: −105°F to +200°F

DABURN Cat. No. Natural	Black*	Covers Wire Groups	Outside Diam.	Nom. Wall	Standard Package
605-1/8″	605B-1/8″	1/16″ to 1/2″	1/8″	.031″	100′, 500′, 1000′
605-3/16″	605B-3/16″	1/8″ to 1″	3/16″	.031″	100′, 500′, 1000′
605-1/4″	605B-1/4″	3/16″ to 2″	1/4″	.045″	100′, 500′, 1000′
605-3/8″	605B-3/8″	5/16″ to 3″	3/8″	.058″	100′, 500′, 1000′
605-1/2″	605B-1/2″	3/4″ to 4″	1/2″	.058″	100′, 500′, 1000′

***Black Polyethylene is Ultra Violet Resistant and Recommended for Outdoor Use.**

RULAN (White)

TEMP. RANGE: −10°F to +200°F

606-1/8″		1/16″ to 1/2″	1/8″	.030″	100′, 500′, 1000′
606-1/4″		3/16″ to 1½″	1/4″	.058″	100′, 500′, 1000′
606-3/8″		5/16″ to 2″	3/8″	.058″	100′, 500′, 1000′
606-1/2″		3/4″ to 4″	1/2″	.060″	100′, 500′, 1000′

Per MIL-P-17091B, MIL-P-20693 & MIL-M-22096

NYLON

TEMP. RANGE: −212°F to +300°F

607-1/8″	607B-1/8″	1/16″ to 1/2″	1/8″	.030″	100′, 500′
607-1/4″	607B-1/4″	3/16″ to 2″	1/4″	.025″	100′, 500′
607-3/8″	607B-3/8″	5/16″ to 3″	3/8″	.035″	100′, 500′
607-1/2″	607B-1/2″	3/4″ to 4″	1/2″	.035″	100′, 500′

*** Black Nylon is Recommended for Outdoor Use.**

Per MIL-I-22129

TEFLON (Natural)

TEMP. RANGE: −450°F to +500°F

608-1/8″		1/16″ to 1/2″	1/8″	.031″	100′, 500′
608-1/4″		3/16″ to 2″	1/4″	.030″	100′, 500′
608-3/8″		5/16″ to 2½″	3/8″	.030″	100′, 500′
608-1/2″		3/4″ to 3″	1/2″	.030″	100′, 500′

COLOR: Natural (White).

HOT AIR GUN AND ACCESSORIES

FOR DAFLEX SHRINKABLE TUBING

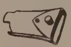
DABURN Cat. No.

HG1 — For SH-162, SH-265, SH-267, SH-275, SH-290, ST-275, SH-300 Series.

HG2 — For SH-400, SH-421, SH-621, SH-450, SH-350 Series.

A flameless heat source; light in weight; portable and/or permanent mounting.

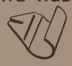
ADAPTOR HGA-02



Concentrates heat and allows use of baffle.

BAFFLE PLATE HGB-01

For tubing up to 1¼″ O.D. Made to concentrate hot air.

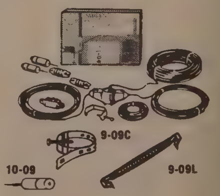


DABURN ALL-WAVE ASSEMBLED ANTENNA KIT

Designed for reception of overseas radio signals & programs. Utilizes the Hertz principle — balanced line consists of:

2—30′ coils 7/24 copper wire (2366/16)
1—40′ coil transmission cable (2996)
1—Center insulator (10-68)
2—Porcelain insulators (10-06)
2—Lead-in strips (9-09L)
1—Ground clamp (9-09C)
2—Nail-on knobs (10-09)

DABURN Cat. No.		Standard Package
9-09	All Wave Kit	12
10-09	Nail-on Knob, Glazed	100
9-09L	Lead-in Strip	50
9-09C	Ground Clamp	50



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DEARBORN

America's Full-Service Source For Wire, Cable, Insulation and Electronic Accessories

- **Aircraft Wire**
- **Appliance and Fixture Wire**
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- **Automotive Wire**
- **Braid — Flat, Oval and Round**
- **Braidless, Silicone Wire**
- **Bus Bar Wire**
- **Coaxial Cable**
- **Computer Cables, U.L.**
- **Cords and Cord Sets**
- **"E", "EE", and "ET" Teflon Wire & Cable**
- **High Voltage Wire**
- **Hookup Wire**
- **Kynar Wire Wrap**
- **Lacing Cord and Twine**
- **Machine Tool Wire "MTW"**
- **Magnet Wire**
- **Microphone Cables**
- **Miniature Shielded Cables**
- **Multi-Conductor Cables**
- **Control Cables - Plastic and Neoprene**
- **Replacement Cords**
- **Rotor Cable**
- **Silicone Wire**
- **Speaker Cable**
- **S, SJ, SJT, SO, SVO, SV, SVT, SPT and HPN Cordage**
- **Test Prod Wire**
- **Welding and Welding Power Supply Cable**
- **PVC Tubing**
- **Teflon Tubing**
- **Heat Shrink Tubing**

■ **WE STOCK** one of the most comprehensive inventories of wire, cable and insulation in the United States. In most cases we can ship your needs within 24 hours.

Dearborn will also custom fabricate to your specifications. Our services include Special Cables, Neoprene Jacketing, Striping, Marking, Numbering, Lettering, Cutting and Stripping, Terminating, Harness Assemblies, Molded Plugs and Cord Sets, and Cabling. Any combination of conductors with special braids or shields can be made into a cable to your exact requirements by our special order department.

We will be pleased to quote on your blueprints, sketches, or job specifications.

■ **YES. WE HAVE IT!**

The vast selection of merchandise listed on the following pages represents only a partial amount of the thousands of wire, cable and insulation items stocked by Dearborn.

Our 52 page catalog will give you full details on the complete Dearborn line. Send for it, or call us for information on stock or special constructions.

U.L. TEFLON* HIGH TEMP LEAD WIRE

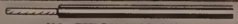
- U.L. Style 1180 — 300 v. — 200°C — .015" TFE Insulation
- U.L. Style 1199 — 600 v — 200°C — .020" TFE Insulation

CONSTRUCTION

Conductors: Conductors are silver plated stranded copper wire. Solid conductors available upon request.
Insulation: Insulation is TFE Extruded Teflon.*

APPLICATIONS

Used where high temperatures and space are a problem. Good abrasion resistance and small O.D.'s at voltage and temperature specified conserve space.



U.L. TEFLON LEAD WIRE

	U.L. STYLE 1180		U.L. STYLE 1199		STOCK COLOR	
AWG SIZE	DEARBORN PART NO.	NOM. O.D.	DEARBORN PART NO.	NOM. O.D.	500'	1000'
26	22607-UL	.050	22607-UL6	.062	0-9	0-9
24	22407-UL	.055	22407-UL6	.067	0-9	0-9
22	22207-UL	.060	22207-UL6	.072	0-9	0-9
20	22007-UL	.068	22007-UL6	.080	0-9	0-9
18	21819-UL	.079	21819-UL6	.091	0-9	0-9
16	21619-UL	.089	21619-UL6	.102	0-9	0-9
14	—	—	21419-UL6	.117	0-9	0-9
12	—	—	21219-UL6	.136	0-9	0-9
10	—	—	21037-UL6	.157	0-9	0-9
8	—	—	†28133-UL6	.231	0,2,9	0,2,9

†28133-UL6 has .032" Insulation.

*DuPont T.M.

CORONA RESISTANT HIGH VOLTAGE WIRE

- **High Dielectric Strength**
- **Abrasion Resistant**
- **Flame Retardant**
- **Easy to Strip**

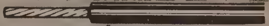
CONSTRUCTION

Conductors: All conductors are tinned copper, flexible stranding. Also available on special order with: silver plated copper conductors, nickel plated copper conductors and pure nickel conductors. Pure nickel increases rating to 260°C (500°F).
Insulation: High temperature, high voltage silicone rubber for easy stripping. High dielectric strength, flame retardant.

APPLICATIONS

Recommended for stoves, heaters, furnaces, dryers, motors, therapeutic devices, signs, lighting fixtures and special electronic devices where high temperatures are incurred. Military applications include use on jet aircraft, atomic submarines and related equipment.

COLOR: Natural.



200°C SILICONE HIGH TEMPERATURE, HIGH VOLTAGE WIRE

DEARBORN NO.	AWG SIZE	WALL THICKNESS	NOM. O.D.	D.C. VOLTAGE LISTING
392245	22 (STR'D)	.045"	.120	10 KV.
392250	22 (STR'D)	.050"	.130	12 KV.
392260	22 (STR'D)	.060"	.150	15 KV.
392275	22 (STR'D)	.075"	.180	20 KV.
392045	20 (STR'D)	.045"	.126	10 KV.
392060	20 (STR'D)	.060"	.156	15 KV
392075	20 (STR'D)	.075"	.186	20 KV.
391845	18 (STR'D)	.045"	.137	10 KV.
391875	18 (STR'D)	.075"	.197	20 KV.
391890	18 (STR'D)	.090"	.227	30 KV.
391645	16 (STR'D)	.045"	.149	10 KV.
391660	16 (STR'D)	.060"	.179	15 KV.
391675	16 (STR'D)	.075"	.209	20 KV.
391690	16 (STR'D)	.090"	.239	30 KV.
391445	14 (STR'D)	.045"	.163	10 KV.
391460	14 (STR'D)	.060"	.193	15 KV.
391475	14 (STR'D)	.075"	.223	20 KV.
391490	14 (STR'D)	.090"	.253	30 KV.
391245	12 (STR'D)	.045"	.185	10 KV.
391290	12 (STR'D)	.090"	.275	30 KV.
391045	10 (STR'D)	.045"	.206	10 KV.
391090	10 (STR'D)	.090"	296	30 KV.
390860	8 (STR'D)	060"	.267	15 KV.
390660	6 (STR'D)	.060"	.304	15 KV.
390460	4 (STR'D)	.060"	.352	15 KV.
390260	2 (STR'D)	.060"	.412	15 KV

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  PVC Tubing 7
  Teflon Tubing 7

DEARBORN
WIRE AND CABLE CO.
9299 EVENHOUSE AVENUE
ROSEMONT, ILLINOIS 60018
All Phones: (312) 696-1000

DEARBORN

MIL-SPEC MIL-W-16878D HOOKUP WIRE TYPES B & C

Single conductor, stranded tinned copper

TYPE B
Insulation PVC .010″ wall thickness, color coded. **Temperature rating:** −55°C to +105°C. **Voltage rating:** 600 volts.

TYPE B — NYLON
Same as above but with clear nylon jacket (.003″ wall) over PVC insulation increasing temperature rating to +115°C.

TYPE B — PREBONDED
Double tinned strands are heated which fuses the individual strands together in order to prevent fraying. Allows easy stripping and insertion in holes in lugs, circuit boards, etc. Color coded .010″ PVC insulation to MIL-W-16878D. **Temperature rating:** −55°C to +105°C. **Voltage rating:** 600 volts.

TYPE C
Insulation PVC .017″ wall thickness. **Temperature rating:** −55°C to +105°C. **Voltage rating:** 1000 volts.

TYPE C — NYLON
Same as above but with clear nylon jacket which increases temperature rating to +115°C.

TYPE C — SHIELD AND NYLON JACKET
Basic type C with 90% coverage braided tinned copper shield and clear nylon .005″ jacket overall.

COLOR CODE ON HOOKUP WIRE: 0—Black • 1—Brown • 2—Red • 3—Orange • 4—Yellow • 5—Green • 6—Blue • 7—Violet • 8—Grey • 9—White • 90—White/Black • 91—White/Brown • 92—White/Red • 93—White/Orange • 94—White/Yellow • 95—White/Green • 96—White/Blue • 97—White/Violet • 98—White/Gray

OTHER COLORS AND STRIPE COMBINATIONS AVAILABLE UPON REQUEST

105°C TYPE B, 600 VOLT

DEARBORN NO.	MIL TYPE	SIZE	STRANDING	NOM. O.D.	WALL THICKNESS	STOCK COLORS
173207	B-32	32	7/40	.028	.010	0-9
173007	B-30	30	7/38	.032	.010	0-9
172807	B-28	28	7/36	.034	.010	0-9 & 90-98
172607	B-26	26	7/34	.038	.010	0-9 & 90-98
172619	B-26	26	19/38	.038	.010	0-9 & 90-98
172407	B-24	24	7/32	.044	.010	0-9 & 90-98
172419	B-24	24	19/36	.044	.010	0-9 & 90-98
172207	B-22	22	7/30	.051	.010	0-9 & 90-98
172219	B-22	22	19/34	.051	.010	0-9 & 90-98
172007	B-20	20	7/28	.058	.010	0-9 & 90-98
172019	B-20	20	19/32	.058	.010	0-9 & 90-98
171807	B-18	18	7/26	.068	.010	0-9 & 90-98
171819	B-18	18	19/30	.068	.010	0-9 & 90-98
171619	B-16	16	19/29	.077	.010	0-9 & 90-98
171419	B-14	14	19/27	.091	.010	0-9 & 90-98

STOCK PUT UP: 100 FT., 1000 FT., AND BULK

105°C TYPE B, BONDED CONDUCTOR, 600V.

DEARBORN NO.	MIL TYPE	SIZE	STRANDING	NOM. O.D.	WALL THICKNESS	STOCK COLORS
192407	B-24	24	7/32	.043	.010	0-9 & 90-98
192207	B-22	22	7/30	.050	.010	0-9 & 90-98
192007	B-20	20	7/28	.058	.010	0-9 & 90-98
191807	B-18	18	7/26	.068	.010	0-9 & 90-98

STOCK PUT UP: 100 FT., 1000 FT., AND BULK

115°C TYPE B, NYLON JACKET (.003″), 600 V.

DEARBORN NO.	MIL TYPE	SIZE	STRANDING	NOM. O.D.	WALL THICKNESS	STOCK COLORS
183207	B-32	32	7/40	.035	.010	0-9 & 90-98
183007	B-30	30	7/38	.039	.010	0-9 & 90-98
182807	B-28	28	7/36	.041	.010	0-9 & 90-98
182607	B-26	26	7/34	.044	.010	0-9 & 90-98
182619	B-26	26	19/38	.044	.010	0-9 & 90-98
182407	B-24	24	7/32	.050	.010	0-9 & 90-98
182419	B-24	24	19/36	.050	.010	0-9 & 90-98
182207	B-22	22	7/30	.057	.010	0-9 & 90-98
182219	B-22	22	19/34	.057	.010	0-9 & 90-98
182007	B-20	20	7/28	.064	.010	0-9 & 90-98
182019	B-20	20	19/32	.064	.010	0-9 & 90-98
181807	B-18	18	7/26	.074	.010	0-9 & 90-98
181819	B-18	18	19/30	.074	.010	0-9 & 90-98
181619	B-16	16	19/29	.085	.010	0-9 & 90-98
181419	B-14	14	19/27	.099	.010	0-9 & 90-98

STOCK PUT UP: 100 FT., 1000 FT., AND BULK

105°C TYPE C, 1000 VOLT

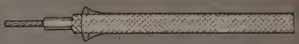
DEARBORN NO.	MIL TYPE	SIZE	STRANDING	NOM. O.D.	WALL THICKNESS	STOCK COLORS
202407	C-24	24	7/32	.058	.017	0-9 & 90-98
202419	C-24	24	19/36	.058	.017	0-9 & 90-98
202207	C-22	22	7/30	.065	.017	0-9 & 90-98
202219	C-22	22	19/34	.065	.017	0-9 & 90-98
202007	C-20	20	7/28	.072	.017	0-9 & 90-98
202019	C-20	20	19/32	.072	.017	0-9 & 90-98
201807	C-18	18	7/26	.082	.017	0-9 & 90-98
201819	C-18	18	19/30	.082	.017	0-9 & 90-98
201619	C-16	16	19/29	.092	.017	0-9 & 90-98
201419	C-14	14	19/27	.105	.017	0-9 & 90-98

STOCK PUT UP: 100 FT., 1000 FT., AND BULK

115°C TYPE C, NYLON JACKET (.003″), 1000 V.

DEARBORN NO.	MIL TYPE	GAUGE SIZE	STRANDING	NOM. O.D.	WALL THICKNESS	STOCK COLORS
212407	C-24	24	7/32	.064	.017	0-9 & 90-98
212419	C-24	24	19/36	.064	.017	0-9 & 90-98
212207	C-22	22	7/30	.071	.017	0-9 & 90-98
212219	C-22	22	19/34	.071	.017	0-9 & 90-98
212007	C-20	20	7/28	.079	.017	0-9 & 90-98
212019	C-20	20	19/32	.079	.017	0-9 & 90-98
211807	C-18	18	7/26	.090	.017	0-9 & 90-98
211819	C-18	18	19/30	.090	.017	0-9 & 90-98
211619	C-16	16	19/29	.100	.017	0-9 & 90-98
211419	C-14	14	19/27	.113	.017	0-9 & 90-98

STOCK PUT UP: 100 FT., 1000 FT., AND BULK



115°C TYPE C, SHIELDED, NYLON JACKET, 1000 V.

DEARBORN NO.	MIL TYPE	GAUGE SIZE	STRANDING	NOM. O.D.	WALL THICKNESS	STOCK COLORS
222407	C-24	24	7/32	.086	.017	9 Only
222207	C-22	22	7/30	.093	.017	9 Only
222007	C-20	20	7/28	.102	.017	9 Only
221819	C-18	18	19/30	.112	.017	9 Only
221619	C-16	16	19/29	.122	.017	9 Only
221419	C-14	14	19/27	.138	.017	9 Only

STOCK PUT UP: 100 FT., 1000 FT., AND BULK

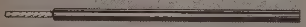
CROSS-LINKED IRRADIATED HOOKUP WIRE

XLV DUAL SERVICE HOOKUP WIRE

UL AND MIL-SPEC HOOKUP AND LEAD WIRE

CROSS-LINKED POLYVINYL CHLORIDE INSULATION

MIL-W-16878/2 — TYPE C

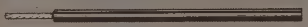


XLV U.L. STYLE 1430

DEARBORN NO.	MIL TYPE	U.L. STYLE	AWG SIZE STRANDING	NOM. INSUL. THICK'S	NOM. O.D.	STOCK COLORS	STOCK PUT UP (FT)
272407	C-24	1430	24 (7/32)	.016	.058	0-9	1000
272407F	C-24	1430	24 (7/32)	.016	.058	0-9	1000
272207	C-22	1430	22 (7/30)	.016	.064	0-9	1000
272207F	C-22	1430	22 (7/30)	.016	.064	0-9	1000
272007	C-20	1430	20 (7/28)	.016	.072	0-9	1000
272007F	C-20	1430	20 (7/28)	.016	.072	9 only	1000
271819	C-18	1430	18 (19/30)	.016	.082	9 only	1000
271807F	C-18	1430	18 (7/26)	.016	.082	9 only	1000
271619	C-16	1430	16 (19/29)	.016	.092	9 only	1000
271419	C-14		14 (19/27)	.016	.105	9 only	1000
271219	C-12		12 (19/25)	.016	.124	9 only	1000

F — SUFFIX INDICATES FUSED OR PREBONDED STRANDS

MIL-W-16878/1 — TYPE B



XLV U.L. STYLE 1429

DEARBORN NO.	MIL TYPE	U.L. STYLE	AWG SIZE STRANDING	NOM. INSUL. THICK'S	NOM. O.D.	STOCK COLORS	STOCK PUT UP (FT)
252807	B-28	1429	28 (7/36)	.010	.035	0-9	1000
252607	B-26	1429	26 (7/34)	.010	.039	0-9	1000
252607F	B-26	1429	26 (7/34)	.010	.039	0-9	1000
252407	B-24	1429	24 (7/32)	.010	.044	0-9	1000
252407F	B-24	1429	24 (7/32)	.010	.044	0-9	1000
252419	B-24	1429	24 (19/36)	.010	.045	0-9	1000
252207	B-22	1429	22 (7/30)	.010	.050	0-9	1000
252207F	B-22	1429	22 (7/30)	.010	.050	0-9	1000
252219	B-22	1429	22 (19/34)	.010	.051	0-9	1000
252007	B-20	1429	20 (7/28)	.010	.058	0-9	1000
252007F	B-20	1429	20 (7/28)	.010	.058	0-9	1000
252019	B-20	1429	20 (19/32)	.010	.059	0-9	1000
251819	B-18	1429	18 (19/30)	.010	.068	9 only	1000
251807	B-18	1429	18 (7/26)	.010	.068	9 only	1000
251807F	B-18	1429	18 (7/26)	.010	.068	9 only	1000
251619	B-16	1429	16 (19/29)	.010	.078	9 only	1000
252601	NOT MIL SPEC TYPE	1429	26 (1)	.010	.039	0-9	1000
252401		1429	24 (1)	.010	.044	0-9	1000
252201		1429	22 (1)	.010	.050	0-9	1000

F — SUFFIX INDICATES FUSED OR PREBONDED STRANDS

All above can be supplied in multi-conductor, with shield and XLV jacket or multi-conductor, and XLV jacket.

COLOR CODE ON HOOKUP WIRE: 0—Black • 1—Brown • 2—Red • 3—Orange • 4—Yellow • 5—Green • 6—Blue • 7—Violet • 8—Grey • 9—White

OTHER COLORS AND STRIPE COMBINATIONS AVAILABLE UPON REQUEST

THE XLV IS ESPECIALLY SUITABLE FOR AEROSPACE, MILITARY AND INDUSTRIAL ELECTRONIC EQUIPMENT

Dual service hook-up wire insulated with a polyvinyl chloride which has been cross-linked by an irradiation process. This process changes the linear molecular configuration of the PVC and connects molecules through a network of chemical bonds. This specially processed insulation "XLV" becomes extremely burn-thru and heat resistant. The shrinkback or heat flow normally encountered when applying a hot soldering iron does not occur when using "XLV" hook-up wire.

This resistance to heat also prevents distortion of the insulation when the wire is subjected to temporary overloads and high temperatures.

Cross linking the PVC by irradiation also increases the abrasion resistance and makes it much superior to regular vinyl insulations.

The table below lists both the UL and military specifications to which "XLV" wire is manufactured.

Note that since the military and U.L. specifications vary, the temperature and voltage ratings assigned differ for the same wire as per the chart.

SPECIFICATIONS	MAX. OPER. TEMPS.	MAXIMUM VOLTAGE
MIL-W-16878/1 TYPE B	105°C	600 V. RMS
U.L. AWM STYLE 1429	80°C	Voltage not specified for general appliance hook-up usage. 300 volt peak for electronic use only.
MIL-W-16878/2 TYPE C	105°C	1000 V. RMS.
U.L. AWM STYLE 1430	105°C	300 VOLT RMS 600 VOLT PEAK For electronic use only.

See other U.L. & CSA products starting with page 21.

DEARBORN WIRE AND CABLE CO. 9299 Evenhouse Avenue, Rosemont, Illinois 60018 • Phone (312) 696-1000

DEARBORN

MIL-W-16878D TEFLON* HOOKUP WIRE

TYPE E, 600 VOLT
Single conductor, stranded or solid silver plated copper, extruded TFE Teflon insulation. **Voltage rating:** 600 volts. **Temperature rating:** −65°C to +200°C.

TYPE EE, 1000 VOLT
Same as Type E, except for insulation thickness and voltage rating of 1000 volts.

TYPE E, SPIRAL WRAPPED FUSED TEFLON
Same as Type E — 600 volt but with spiral wrapped fused Teflon insulation.

TYPE EE, SPIRAL WRAPPED FUSED TEFLON
Same as Type EE, but with spiral wrapped fused Teflon insulation.

TYPE E, SPIRAL WRAPPED FUSED TEFLON

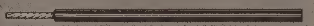
DEARBORN NO.	TYPE & CONDUCTOR AWG SIZE	STRAND'G	NOM. WALL THICKNESS	NOM. O.D.	STOCK COLORS 100′	1000′
13207W	E-32	7/40	.010	.029	0-9	0-9
13007W	E-30	7/38	.010	.032	0-9	0-9
12807W	E-28	7/36	.010	.035	0-9	0-9
12619W	E-26	19/38	.010	.040	0-9	0-9 & 90-98
12607W	E-26	7/34	.010	.039	0-9	0-9 & 90-98
12419W	E-24	19/36	.010	.045	0-9	0-9 & 90-98
12407W	E-24	7/32	.010	.044	0-9	0-9 & 90-98
12219W	E-22	19/34	.010	.052	0-9	0-9 & 90-98
12207W	E-22	7/30	.010	.050	0-9	0-9 & 90-98
12019W	E-20	19/32	.010	.060	0-9	0-9 & 90-98
12007W	E-20	7/28	.010	.058	0-9	0-9 & 90-98
11819W	E-18	19/30	.010	.070	0-9	0-9 & 90-98
11807W	E-18	7/26	.010	.068	0-9	0-9 & 90-98
11619W	E-16	19/29	.011	.077	0-9	0-9 & 90-98
11419W	E-14	19/27	.011	.094	0-9	0-9 & 90-98
11219W	E-12	19/25	.012	.113	0-9	0-9 & 90-98
11037W	E-10	37/26	.012	.135	0-9	0-9 & 90-98

STOCK PUT UP: 100 FT., 1000 FT., AND BULK

TYPE EE, 1000 VOLT

DEARBORN NO.	TYPE & CONDUCTOR AWG SIZE	STRAND'G	NOM. WALL THICKNESS	NOM. O.D.	STOCK COLORS 100′	1000′
23207	EE-32	7/40	.015	.039	0-9	0-9
23007	EE-30	7/38	.015	.042	0-9	0-9
22807	EE-28	7/36	.015	.045	0-9	0-9
22607	EE-26	7/34	.015	.049	0-9	0-9 & 90-98
22619	EE-26	19/38	.015	.050	0-9	0-9 & 90-98
22407	EE-24	7/32	.015	.054	0-9	0-9 & 90-98
22419	EE-24	19/36	.015	.055	0-9	0-9 & 90-98
22207	EE-22	7/30	.015	.060	0-9	0-9 & 90-98
22219	EE-22	19/34	.015	.062	0-9	0-9 & 90-98
22007	EE-20	7/28	.015	.068	0-9	0-9 & 90-98
22019	EE-20	19/32	.015	.070	0-9	0-9 & 90-98
21819	EE-18	19/30	.015	.079	0-9	0-9 & 90-98
21619	EE-16	19/29	.016	.089	0-9	0-9 & 90-98
21419	EE-14	19/27	.017	.105	0-9	0-9 & 90-98
21219	EE-12	19/25	.017	.124	0-9	0-9 & 90-98
21037	EE-10	37/26	.017	.145	0-9	0-9 & 90-98
28133	EE-8	133/29	.020	.207	0,2,9	0,2,9

STOCK PUT UP: 100 FT., 1000 FT., AND BULK



TYPE E, 600 VOLT

DEARBORN NO.	TYPE & CONDUCTOR AWG SIZE	STRAND'G	NOM. WALL THICKNESS	NOM. O.D.	STOCK COLORS 100′	1000′
13207	E-32	7/40	.010	.029	0-9	0-9
13007	E-30	7/38	.010	.032	0-9	0-9
12807	E-28	7/36	.010	.036	0-9	0-9
12619	E-26	19/38	.010	.040	0-9	0-9 & 90-98
12607	E-26	7/34	.010	.039	0-9	0-9 & 90-98
12419	E-24	19/36	.010	.045	0-9	0-9 & 90-98
12407	E-24	7/32	.010	.044	0-9	0-9 & 90-98
12219	E-22	19/34	.010	.052	0-9	0-9 & 90-98
12207	E-22	7/30	.010	.050	0-9	0-9 & 90-98
12019	E-20	19/32	.010	.060	0-9	0-9 & 90-98
12007	E-20	7/28	.010	.058	0-9	0-9 & 90-98
11819	E-18	19/30	.010	.070	0-9	0-9 & 90-98
11807	E-18	7/26	.010	.068	0-9	0-9 & 90-98
11619	E-16	19/29	.011	.077	0-9	0-9 & 90-98
11419	E-14	19/27	.011	.094	0-9	0-9 & 90-98
11219	E-12	19/25	.012	.113	0-9	0-9 & 90-98
11037	E-10	37/26	.012	.135	0-9	0-9 & 90-98
SOLID CONDUCTOR						
13201	E-32	1/32	.010	.029	0-9	0-9
13001	E-30	1/30	.010	.032	0-9	0-9
12801	E-28	1/28	.010	.035	0-9	0-9
12601	E-26	1/26	.010	.039	0-9	0-9
12401	E-24	1/24	.010	.044	0-9	0-9
12201	E-22	1/22	.010	.050	0-9	0-9
12001	E-20	1/20	.010	.058	0-9	0-9

STOCK PUT UP: 100 FT., 1000 FT., AND BULK

**Not MIL Spec.

TYPE EE, SPIRAL WRAPPED FUSED TEFLON

DEARBORN NO.	TYPE & CONDUCTOR AWG SIZE	STRAND'G	NOM. WALL THICKNESS	NOM. O.D.	STOCK COLORS 100′	1000′
23207W	EE-32	7/40	.015	.039	0-9	0-9
23007W	EE-30	7/38	.015	.042	0-9	0-9
22807W	EE-28	7/36	.015	.045	0-9	0-9
22607W	EE-26	7/34	.015	.049	0-9	0-9 & 90-98
22619W	EE-26	19/38	.015	.050	0-9	0-9 & 90-98
22407W	EE-24	7/32	.015	.054	0-9	0-9 & 90-98
22419W	EE-24	19/36	.015	.055	0-9	0-9 & 90-98
22207W	EE-22	7/30	.015	.060	0-9	0-9 & 90-98
22219W	EE-22	19/34	.015	.062	0-9	0-9 & 90-98
22007W	EE-20	7/28	.015	.068	0-9	0-9 & 90-98
22019W	EE-20	19/32	.015	.070	0-9	0-9 & 90-98
21819W	EE-18	19/30	.015	.088	0-9	0-9 & 90-98
21619W	EE-16	19/29	.016	.089	0-9	0-9 & 90-98
21419W	EE-14	19/27	.017	.105	0-9	0-9 & 90-98
21219W	EE-12	19/25	.017	.124	0-9	0-9 & 90-98
21037W	EE-10	37/26	.017	.145	0-9	0-9 & 90-98
28133W	EE-8	133/29	.020	.207	0,2,9	0,2,9

STOCK PUT UP: 100 FT., 1000 FT., AND BULK

COLOR CODE ON HOOKUP WIRE: 0—Black • 1—Brown • 2—Red • 3—Orange • 4—Yellow • 5—Green • 6—Blue • 7—Violet • 8—Grey • 9—White • 90—White/Black • 91—White/Brown • 92—White/Red • 93—White/Orange • 94—White/Yellow • 95—White/Green • 96—White/Blue • 97—White/Violet • 98—White/Gray

OTHER COLORS AND STRIPE COMBINATIONS AVAILABLE UPON REQUEST

* Du Pont T.M.

MIL-W-16878D SHIELDED TEFLON* CABLES

- **NO OUTER COVERING OVER SHIELD**
- **TEFLON IMPREGNATED BRAID OVER SHIELD**
  Braided natural or white Teflon impregnated fiberglass braid overall.
- **FEP EXTRUDED JACKET OVER SHIELD**
  Tough abrasion resistant extruded white FEP Teflon jacket overall.
- **TEFLON TAPE WRAP JACKET OVER SHIELD**
  Sintered wrapped white Teflon tape jacketed overall.

Each conductor stranded silver plated copper, Type E extruded TFE Teflon .010″ color coded insulation. Braided silver plated copper shield, 90% coverage. **Voltage rating:** 600 volts. **Temperature rating:** −65°C to +200°C. Resistant to acids, alkalis, oil, flame, moisture, solvents and fungus.

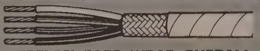
*Dupont T.M.

NO OUTER COVERING OVER SHIELD

DEARBORN NO.	NO. OF COND.	CONDUCTOR AWG SIZE	CONDUCTOR STRANDING	NOM O.D. AT MAX. WIDTH HIGH POINT	PUT UP (FT.)
42401	1	24	19/36	.069	100 & 1000
42402	2	24	19/36	.112	100 & 1000
42403	3	24	19/36	.120	100 & 1000
42404	4	24	19/36	.132	100 & 1000
42201	1	22	19/34	.075	100 & 1000
42202	2	22	19/34	.124	100 & 1000
42203	3	22	19/34	.132	100 & 1000
42204	4	22	19/34	.146	100 & 1000
42001	1	20	19/32	.083	100 & 1000
42002	2	20	19/32	.142	100 & 1000
42003	3	20	19/32	.153	100 & 1000
42004	4	20	19/32	.168	100 & 1000
41801	1	18	19/30	.093	100 & 1000
41802	2	18	19/30	.162	100 & 1000
41803	3	18	19/30	.172	100 & 1000
41804	4	18	19/30	.192	100 & 1000
41601	1	16	19/29	.103	100 & 1000
41602	2	16	19/29	.184	100 & 1000
41603	3	16	19/29	.200	100 & 1000
41604	4	16	19/29	.230	100 & 1000

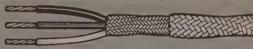
EXTRUDED JACKET OVER SHIELD

DEARBORN NO.	NO. OF COND.	CONDUCTOR AWG SIZE	CONDUCTOR STRANDING	NOM O.D. AT MAX. WIDTH HIGH POINT	PUT UP (FT.)
72401	1	24	19/36	.085	100 & 1000
72402	2	24	19/36	.130	100 & 1000
72403	3	24	19/36	.135	100 & 1000
72201	1	22	19/34	.091	100 & 1000
72202	2	22	19/34	.150	100 & 1000
72203	3	22	19/34	.158	100 & 1000
72001	1	20	19/32	.100	100 & 1000
72002	2	20	19/32	.168	100 & 1000
72003	3	20	19/32	.178	100 & 1000
71801	1	18	19/30	.110	100 & 1000
71802	2	18	19/30	.188	100 & 1000
71803	3	18	19/30	.207	100 & 1000
71601	1	16	19/29	.123	100 & 1000
71602	2	16	19/29	.220	100 & 1000
71603	3	16	19/29	.235	100 & 1000



TEFLON TAPE WRAP OVERALL

DEARBORN NO.	NO. OF COND.	CONDUCTOR AWG SIZE	CONDUCTOR STRANDING	NOM O.D. AT MAX. WIDTH HIGH POINT	PUT UP (FT.)
62401	1	24	19/36	.095	100 & 1000
62402	2	24	19/36	.140	100 & 1000
62403	3	24	19/36	.147	100 & 1000
62404	4	24	19/36	.159	100 & 1000
62201	1	22	19/34	.102	100 & 1000
62202	2	22	19/34	.154	100 & 1000
62203	3	22	19/34	.162	100 & 1000
62204	4	22	19/34	.176	100 & 1000
62001	1	20	19/32	.110	100 & 1000
62002	2	20	19/32	.170	100 & 1000
62003	3	20	19/32	.175	100 & 1000
62004	4	20	19/32	.213	100 & 1000
61801	1	18	19/30	.120	100 & 1000
61802	2	18	19/30	.190	100 & 1000
61803	3	18	19/30	.219	100 & 1000
61804	4	18	19/30	.237	100 & 1000
61601	1	16	19/29	.130	100 & 1000
61602	2	16	19/29	.230	100 & 1000
61603	3	16	19/29	.240	100 & 1000
61604	4	16	19/29	.270	100 & 1000



TEFLON IMPREGNATED BRAID OVERALL

DEARBORN NO.	NO. OF COND.	CONDUCTOR AWG SIZE	CONDUCTOR STRANDING	NOM O.D. AT MAX. WIDTH HIGH POINT	PUT UP (FT.)
52401	1	24	19/36	.081	100 & 1000
52402	2	24	19/36	.126	100 & 1000
52403	3	24	19/36	.133	100 & 1000
52404	4	24	19/36	.144	100 & 1000
52201	1	22	19/34	.088	100 & 1000
52202	2	22	19/34	.137	100 & 1000
52203	3	22	19/34	.144	100 & 1000
52204	4	22	19/34	.158	100 & 1000
52001	1	20	19/32	.097	100 & 1000
52002	2	20	19/32	.154	100 & 1000
52003	3	20	19/32	.163	100 & 1000
52004	4	20	19/32	.180	100 & 1000
51801	1	18	19/30	.106	100 & 1000
51802	2	18	19/30	.174	100 & 1000
51803	3	18	19/30	.185	100 & 1000
51804	4	18	19/30	.205	100 & 1000
51601	1	16	19/29	.117	100 & 1000
51602	2	16	19/29	.196	100 & 1000
51603	3	16	19/29	.225	100 & 1000
51604	4	16	19/29.	.255	100 & 1000

COLOR CODE OF CONDUCTORS: 1st Conductor—White • 2nd Conductor—Black • 3rd Conductor—Red • 4th Conductor—Green

DEARBORN WIRE AND CABLE CO. 9299 Evenhouse Avenue, Rosemont, Illinois 60018 • Phone (312) 696-1000

DEARBORN

UNSHIELDED AUDIO CABLE

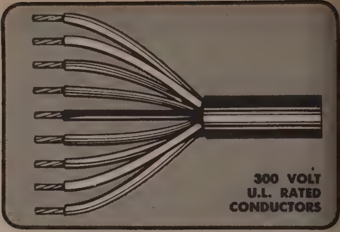
MULTICONDUCTOR PLASTIC JACKETED

Stranded or solid tinned copper conductors. Color coded polyvinylchloride insulation. Conductors cabled and covered with a gray PVC jacket overall. Suitable for outdoor usage. Recommended for P.A. systems, intercom connecting cables, remote control circuits, relay circuits, telephones, and telemetering circuits.

All inner conductors are U.L. styles as follows: No. 22 - Style 1061, Nos. 20, 18 and 16 are Style 1007, No. 14 and No. 12 are Styles 1335 and 1336.

Temperature ratings

On Style 1061 and 1007 are −10°C to +80°C; on Styles 1335 and 1336 ratings are −10°C to +90°C.



NO. 22 AWG MULTI-CONDUCTOR

DEARBORN NO.	NO. OF COND.	SIZE	STRAND-ING	NOM. WALL THICK.	NOM. JKT. THICK.	NOM. O.D.	COLOR CODE CHART
832202	2	22	7/30	.010	.020	.140	1
832203	3	22	7/30	.010	.020	.145	1
832204	4	22	7/30	.010	.020	.170	1
832205	5	22	7/30	.010	.020	.175	1
832206	6	22	7/30	.010	.020	.185	1
832207	7	22	7/30	.010	.020	.190	1
832208	8	22	7/30	.010	.020	.200	1
832209	9	22	7/30	.010	.020	.225	1
832210	10	22	7/30	.010	.020	.235	1
832212	12	22	7/30	.010	.020	.255	1
832215	15	22	7/30	.010	.020	.280	2
832220	20	22	7/30	.010	.020	.310	2
832224	24	22	7/30	.010	.020	.325	2
832225	25	22	7/30	.010	.020	.330	2
832230	30	22	7/30	.010	.020	.365	2
832240	40	22	7/30	.010	.025	.452	2
832250	50	22	7/30	.010	.035	.500	2
832260	60	22	7/30	.010	.035	.530	2

NO. 20 AWG MULTI-CONDUCTOR

DEARBORN NO.	NO. OF COND.	SIZE	STRAND-ING	NOM. WALL THICK.	NOM. JKT. THICK.	NOM. O.D.	COLOR CODE CHART
832002	2	20	10/30	.016	.020	.180	1
832003	3	20	10/30	.016	.020	.190	1

NO. 18 AWG MULTI-CONDUCTOR

DEARBORN NO.	NO. OF COND.	SIZE	STRAND-ING	NOM. WALL THICK.	NOM. JKT. THICK.	NOM. O.D.	COLOR CODE CHART
831802	2	18	16/30	.018	.020	.200	2
831803	3	18	16/30	.018	.025	.210	2
831804	4	18	16/30	.018	.030	.250	1
831805	5	18	16/30	.018	.037	.286	1
831806	6	18	16/30	.018	.037	.310	1
831807	7	18	16/30	.018	.037	.325	1
831808	8	18	16/30	.018	.037	.350	1
831809	9	18	16/30	.018	.037	.379	1
831812	12	18	16/30	.018	.040	.417	2
831815	15	18	16/30	.018	.045	.490	2
831819	19	18	16/30	.018	.045	.505	2

NO. 16 AWG MULTI-CONDUCTOR

DEARBORN NO.	NO. OF COND.	SIZE	STRAND-ING	NOM. WALL THICK.	NOM. JKT. THICK.	NOM. O.D.	COLOR CODE CHART
831602	2	16	19/29	.030	.025	.256	2
831603	3	16	19/29	.030	.030	.300	2
831604	4	16	19/29	.030	.045	.375	2

NO. 14 AWG MULTI-CONDUCTOR

DEARBORN NO.	NO. OF COND.	SIZE	STRAND-ING	NOM. WALL THICK.	NOM. JKT. THICK.	NOM. O.D.	COLOR CODE CHART
831402	2	14	19/27	.031	.035	.332	2
831403	3	14	19/27	.031	.035	.400	2
831404	4	14	19/27	.045	.045	.495	2

NO. 12 AWG MULTI-CONDUCTOR

DEARBORN NO.	NO. OF COND.	SIZE	STRAND-ING	NOM. WALL THICK.	NOM. JKT. THICK.	NOM. O.D.	COLOR CODE CHART
831202	2	12	19/25	.031	.040	.384	2
831203	3	12	19/25	.031	.040	.425	2

COLOR CODE CHART NO. 1

1—Black
2—Red
3—Green
4—White
5—Brown
6—Blue
7—Orange
8—Yellow
9—Purple
10—Slate
11—Pink
12—Tan
13—Red/Green
14—Red/Yellow
15—Red/Black
16—White/Black
17—White/Red
18—White/Green
19—White/Yellow
20—White/Blue
21—White/Brown
22—White/Orange
23—White/Gray
24—White/Violet
25—White/Black/Red
26—White/Black/Green
27—White/Black/Yellow
28—White/Black/Blue
29—White/Black/Brown
30—White/Black/Orange

COLOR CODE CHART NO. 2 (IPCEA)

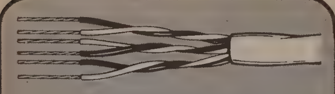
1—Black
2—White
3—Red
4—Green
5—Orange
6—Blue
7—White/Black
8—Red/Black
9—Green/Black
10—Orange/Black
11—Blue/Black
12—Black/White
13—Red/White
14—Green/White
15—Blue/White
16—Black/Red
17—White/Red
18—Orange/Red
19—Blue/Red
20—Red/Green
21—Orange/Green
22—Black/White/Red
23—White/Black/Red
24—Red/Black/White
25—Green/Black/White
26—Orange/Black/White
27—Blue/Black/White
28—Black/Red/Green
29—White/Red/Green
30—Red/Black/Green
31—Green/Black/Orange
32—Orange/Black/Green
33—Blue/White/Orange
34—Black/White/Orange
35—White/Red/Orange
36—Orange/White/Blue
37—White/Red/Blue
38—Black/White/Green
39—White/Black/Green
40—Red/White/Green
41—Green/White/Blue
42—Orange/Red/Green
43—Blue/Red/Green
44—Black/White/Blue
45—White/Black/Blue
46—Red/White/Blue
47—Green/Orange/Red
48—Orange/Red/Blue
49—Blue/Red/Orange
50—Black/Orange/Red
51—White/Black/Orange
52—Red/Orange/Black
53—Green/Red/Blue
54—Orange/Black/Blue
55—Blue/Black/Orange
56—Black/Orange/Green
57—White/Orange/Green
58—Red/Orange/Green
59—Green/Black/Blue
60—Orange/Green/Blue

STANDARD PUT UP FOR ALL ABOVE — 100′, 500′, 1000′

UNSHIELDED PAIRED CONDUCTORS INTERCOM CABLES

PAIRED CONDUCTOR, PLASTIC JACKETED CABLES

Stranded or solid tinned copper conductors. Color coded polyvinylchloride .010″ insulation. Conductors are twisted into pairs, cabled and jacketed overall with a gray PVC jacket. Temperature rating: −20°C to +80°C. Conductors are **U.L. Style 1061.** Suitable for outdoor usage. Recommended for remote control circuits, relay circuits, balanced intercom systems, multiple speaker cable, telephones, call systems, etc. **Suggested operating voltage:** 300 volts maximum.

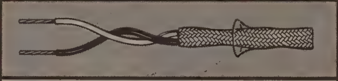


STRANDED CONDUCTOR MULTIPLE TWISTED PAIRS U.L. INNER CONDUCTORS

DEARBORN NO.	NO. OF PAIRS	NO. OF COND.	COND. SIZE	STRAND-ING	NOM. JKT. THICK.	NOM. O.D.
862201	1	2	22	7/30	.020	.145
862202	2	4	22	7/30	.020	.210
862203	3	6	22	7/30	.020	.225
862204	4	8	22	7/30	.020	.240
862205	5	10	22	7/30	.020	.265
862206	6	12	22	7/30	.020	.290
862209	9	18	22	7/30	.020	.355
862211	11	22	22	7/30	.020	.365
862215	15	30	22	7/30	.025	.450
862219	19	38	22	7/30	.025	.480
862223	23	46	22	7/30	.030	.530
862227	27	54	22	7/30	.035	.570
862231	31	62	22	7/30	.040	.635
862241	41	82	22	7/30	.040	.710
862251	51	102	22	7/30	.045	.800

MINIATURE CABLE/Shielded Clear Plastic Jacket

Tinned copper conductors, insulated with color coded polyvinylchloride. Conductors are twisted and shielded with a fine braided tinned copper shield. Clear, .010″ polyvinylchloride jacket overall. **Suggested maximum operating voltage:** 200 V. **Temperature rating:** −20°C to +60°C.



DEARBORN NO.	NO. OF COND.	COND. SIZE	STRAND-ING	NOM. WALL THICK.	NOM. O.D.	STOCK PUT UP (FT.)
942802	2	28	7/36	.010	.105	100, 500 & 1000
942803	3	28	7/36	.010	.115	100, 500 & 1000
942804	4	28	7/36	.010	.120	100, 500 & 1000

COLOR CODE OF CONDUCTORS: 1—Black • 2—Red • 3—White • 4—Green.

COLOR CODING OF PAIRS

PAIR NO.	COLOR COMBINATION
1	Black paired with Red
2	Black paired with White
3	Black paired with Green
4	Black paired with Blue
5	Black paired with Yellow
6	Black paired with Brown
7	Black paired with Orange
8	Red paired with White
9	Red paired with Green
10	Red paired with Blue
11	Red paired with Yellow
12	Red paired with Brown
13	Red paired with Orange
14	Green paired with White
15	Green paired with Blue
16	Green paired with Yellow
17	Green paired with Brown
18	Green paired with Orange
19	White paired with Blue
20	White paired with Yellow
21	White paired with Brown
22	White paired with Orange
23	Blue paired with Yellow
24	Blue paired with Brown
25	Blue paired with Orange
26	Brown paired with Yellow
27	Brown paired with Orange
28	Purple paired with Red
29	Purple paired with White
30	Purple paired with Green
31	Purple paired with Blue
32	Purple paired with Brown
33	Purple paired with Yellow
34	Purple paired with Orange
35	Purple paired with Slate
36	Purple paired with Black
37	Slate paired with Red
38	Slate paired with White
39	Slate paired with Green
40	Slate paired with Blue
41	Slate paired with Brown
42	Slate paired with Yellow
43	Slate paired with Orange
44	Slate paired with Black
45	White/Black paired with Red
46	White/Black paired with Green
47	White/Black paired with Blue
48	White/Black paired with Brown
49	White/Black paired with Yellow
50	White/Black paired with Orange
51	White/Black paired with Purple

KYNAR

INSULATED HOOKUP WIRE FOR WIRE WRAP APPLICATIONS

Especially suited for computer, business machine usage and other areas where space is limited. (For automatic point to point application.)

The miniaturization of computers and business machines has created special problems in the wiring of components and associated programming equipment. Essentially there is a need for wire with a tough insulation that is resistant to abrasion and cold flow. It should function at operating temperatures up to 125°C. The Wire-Wrap type of termination requires a high conductivity low corrosive surface on the conductor. Dearborn Kynar insulated wire fulfills these needs.

KYNAR HOOK-UP WIRE

DEARBORN NO.	AWG SIZE	INSUL. THICK.	NOM. O.D.	U.L. STYLE	STOCK COLORS AVAILABLE
773001	30(1)	.005″	.0195″	1422	0, 1, 2, 3, 4, 5, 6, 8, 9
772801	28(1)	.0035″	.020″	1432	0, 1, 2, 5, 6, 9
772601	26(1)	.005″	.027″	1422	2, 4, 5, 6, 8, 9
772401	24(1)	.010″	.042″	1327	2, 4, 5, 6, 9

ALL SUPPLIED ON SPECIALLY DESIGNED LARGE HUB REELS, 1,000′ MINIMUM

CODE COLORING: 0—Black • 1—Brown • 2—Red • 3—Orange • 4—Yellow
5—Green • 6—Blue • 7—Violet • 8—Gray • 9—White

DEARBORN

SERVICE, POWER AND REPLACEMENT CORDS AND CORDAGE

U.L. PARALLEL LAMP CORD

DEARBORN NO.	SIZE & NO. OF COND.	STRAND-ING	TYPE OF INSUL.	NOM. WALL	U.L. TYPE	NOM. O.D.
1182S	18/2	41/34	Rubber	.032	SP-1	.220 x .120
1182T	18/2	41/34	Plastic	.032	SPT-1	.215 x .115
1182T2	18/2	41/34	Plastic	.048	SPT-2	.255 x .143
3182N	18/2	41/34	Neoprene	.048	HPN	.272 x .142
3162N	16/2	65/34	Neoprene	.048	HPN	.295 x .150

Stock Colors: 1182S — Available Brown, Black, White. 1182T — Available Brown, Black, White, Gray, Tan, Clear. 1182T2 — Available Brown, Black. 3182N & 3162N —Black only. 1182T2 3182N 3162N — Stock Putups 250 - 1000. 1182S - 1182T — Stock Putups: 25, 100, 500, 1000.

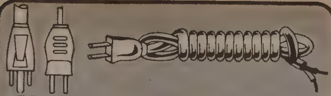
PARALLEL CORD WITH PLUG

DEARBORN NO.	SIZE & NO. OF COND.	STRAND-ING	TYPE OF INSUL.	NOM. O.D.	U.L. TYPE	CORD LENGTH
9650	18/2	41/34	Plastic, Brn.	.110x.207	SPT-1	6 ft.
9651	18/2	41/34	Plastic, Brn.	.110x.207	SPT-1	9 ft.
9652	18/2	41/34	Neoprene	.140x.276	HPN	6 ft.

Construction: 18/2 SPT-1 or HPN cord with a molded plastic plug on one end and other end conductor split 1″ stripped; twisted ⅝″.

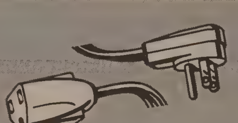
EXTENSION CORDS — 2 CONDUCTOR

DEARBORN NO.	COND. SIZE	COND. STRANDING	RATING (AMPS.)	U.L. STYLE	NOM. O.D.	CORD LENGTH FT.
9620	18/2	41/34	7	SV	.245	6
9622	18/2	41/34	7	*SV	.245	9
9624	18/2	16/30	7	SJ	.300	10
9626	18/2	16/30	7	SJ	.300	25
9628	16/2	26/30	10	SJ	.325	10
9630	16/2	26/30	10	SJ	.325	25
9632	16/2	26/30	10	SJ	.325	50
9634	16/2	26/30	10	SJ	.325	100
3 CONDUCTOR						
9636	18/3	16/30	7	SJ	.330	10
9638	18/3	16/30	7	SJ	.330	25
9639	18/3	16/30	7	SJ	.330	50
9640	16/3	26/30	10	SJ	.365	15
9641	16/3	26/30	10	SJ	.365	10
9642	16/3	26/30	10	SJ	.365	25
9644	16/3	26/30	10	SJ	.365	50



REPLACEMENT CORDS — 2 CONDUCTOR

DEARBORN NO.	COND. SIZE	COND. STRANDING	RATING (AMPS.)	U.L. STYLE	NOM. O.D.	CORD LENGTH FT.
9600	18/2	41/34	7	*SV	.245	6
9602	18/2	41/34	7	*SVT	.245	6
9604	18/2	41/34	7	SVT	.245	6
9606	18/2	16/30	7	SJ	.300	8
9608	18/2	16/30	7	SJ	.300	10
9610	16/2	26/30	10	SJ	.325	8
9612	16/2	26/30	10	SVT	.325	10
3 CONDUCTOR						
9601	18/3	41/34	7	SV	.255	6
9603	18/3	41/34	7	SV	.255	8
9609	18/3	41/34	7	*SVT	.255	6
9615	18/3	16/30	7	SJ	.330	6
9617	18/3	16/30	7	SJ	.330	8
9637	18/3	16/30	7	*SJT	.330	8
9643	18/3	16/30	7	SJO	.330	8
9619	16/3	26/30	10	SJ	.365	9



3 CONDUCTOR AIR CONDITIONER CORDS

DEARBORN NO.	CORD SIZE	COND. STRANDING	U.L. TYPE	NOM. O.D. OF CORD	CORD LENGTH FT.
9645	14	41/30	SPT-3	.175 x .475	3
9646	14	41/30	SPT-3	.175 x .475	6
9647	14	41/30	SPT-3	.175 x .475	9
9648	14	41/30	SPT-3	.175 x .475	12
9649	14	41/30	SPT-3	.175 x .475	15

U.L. PARALLEL LAMP CORD

Stranded extra-flexible bare copper, parallel conductors, insulated with Rubber, (SP-1), or Polyvinyl (SPT-1 -SPT-2) or Neoprene (HPN). JACKET OVERALL. Slit in jacket between conductors for ease in separation. Applications: Small appliances, radios, clocks; the HPN is suitable for coffeemakers, fry pans, soldering irons, etc. **Temperature Rating:** 20°C to +60°C. **Suggested Operating Voltage:** 300 V.

EXTENSION CORD SETS

Flexible, 2 or 3 conductor, high quality black rubber cords. Black molded plastic male plug on one end, molded plastic female plug on other end. Will fit conventional sockets and plugs. **Voltage rating:** 300 volts. The 3 conductor cord is used where 1 conductor requires grounding, such as for hand tools, garden edgers, etc.

* This item supplied in grey

REPLACEMENT CORDS

Flexible high quality black Rubber, Plastic and Neoprene Cords. Types SV and SJ are rubber insulated and jacketed. Types SVT and SJT are plastic insulated and jacketed. Type SJO is rubber insulated and neoprene jacketed. One end has molded black plastic straight plug (either 2 prong or 3 prong depending on 2 or 3 conductor cable). The other end of the jacket is stripped back 1½″ with ⅝″ of the conductors stripped. **Voltage rating:** 300 volts. The 3 conductor cord is used where 1 conductor is required for grounding.

* This item supplied in grey.

AIR CONDITIONER EXTENSION CORDS

Flat, parallel 3 conductor SPT-3, grey plastic cord with a molded 3 blade right angle plug on one end and a female 3 wire U ground connector molded on the other end. **Rating:** 125 volts, 15 Amps.

SHIELDED MICROPHONE, SOUND, AND INTERCOM CABLES

SOUND AND INTERCOM CABLES

Each conductor is solid or stranded tinned copper (See Chart), insulated with color coded polyvinylchloride. Conductors are twisted and shielded with either a spiral wrapped tinned copper shield or a tinned copper braided shield −20°C to +60°C. Ideal for all types of public address or sound work, recording studios, and other types of audio circuits requiring shielding. Sizes 16 thru 22 rated at 350 V working voltage. Sizes 14 and 12 are rated at 450 Volts working voltage. **.020″ nom. jacket**, thk. of chrome PVC.

SPIRAL SHIELDED INTERCOM CABLE

DEARBORN NO.	NO. OF COND.	COND. SIZE	STRANDING	NOM. WALL THICK.	NOM. O.D.
692202	2	22	7/30	.016	.175
692203	3	22	7/30	.016	.190
692204	4	22	7/30	.016	.200
692206	6	22	7/30	.016	.235
692001	1	20	10/30	.016	.130
692002	2	20	10/30	.016	.195
692003	3	20	10/30	.016	.210
692004	4	20	10/30	.016	.225
692006	6	20	10/30	.016	.265
691801	1	18	16/30	.016	.135
691802	2	18	16/30	.016	.230
691803	3	18	16/30	.016	.235
691804	4	18	16/30	.016	.245
691602	2	16	26/30	.016	.240
691603	3	16	26/30	.016	.245
691402	2	14	41/30	.020	.285
691403	3	14	41/30	.020	.290
691202	2	12	65/30	.020	.325
691203	3	12	65/30	.020	.330

STANDARD PUT UPS: 100 Ft., 500 Ft., 1000 Ft.

BRAIDED SHIELD INTERCOM CABLE

DEARBORN NO.	NO. OF COND.	COND SIZE	STRANDING	NOM. WALL THICK.	NOM. O.D.
812202	2	22	Solid	.016	.175
742202	2	22	7/30	.016	.185
742203	3	22	7/30	.016	.200
742204	4	22	7/30	.016	.210
742001	1	20	10/30	.016	.135
812002	2	20	Solid	.016	.210
742002	2	20	10/30	.016	.210
742003	3	20	10/30	.016	.220
742004	4	20	10/30	.016	.230
741801	1	18	16/30	.016	.145
811802	2	18	Solid	.016	.220
741802	2	18	16/30	.016	.235
741803	3	18	16/30	.016	.245
741804	4	18	16/30	.016	.255
741602	2	16	26/30	.016	.250
741603	3	16	26/30	.016	.255
741402	2	14	41/30	.020	.290
741403	3	14	41/30	.020	.295
741202	2	12	65/30	.020	.335
741203	3	12	65/30	.020	.340

STANDARD PUT UP: 100 Ft., 500 Ft., 1000 Ft.

MICROPHONE CABLE

RUBBER OR NEOPRENE JACKETED MIKE CABLE — Stranded tinned copper conductor with color coded rubber insulation. Cotton wrap, braided tinned copper shield; cotton wrap, tough black neoprene or rubber jacket overall.

RUBBER JACKETED MIKE CABLE

DEARBORN NO.	NO. OF COND. & SIZE	STRAND-ING	WALL THICK.	NOM. CAP. PER FT.	NOM. JKT. THICK.	NOM. O.D.
662001	1-20	26/34	.040	60 MMF	.035	.230
662002	2-20	26/34	.020	68 MMF	.035	.270
661801	1-18	41/34	.040	69 MMF	.035	.240
661802	2-18	41/34	.020	78 MMF	.035	.295
NEOPRENE JACKETED MIKE CABLE						
601801	1-18	41/34	.040	69 MMF	.035	.240
601802	2-18	41/34	.020	78 MMF	.035	.295
601602	2-16	65/34	.025	82 MMF	.035	.335

STANDARD PUT UP: 100 Ft., 500 Ft., 1000 Ft.
CAPACITY MEASURED BETWEEN 1 CONDUCTOR AND SHIELD AND ANY OTHER REMAINING CONDUCTORS.

PLASTIC JACKETED MIKE CABLE — Single or 2 conductor stranded tinned copper. White (on 1 conductor) or White and Black (on 2 conductor) polyethylene insulation. Braided or spiral wrapped tinned copper shield, with gray chrome PVC jacket overall.

BRAIDED SHIELD MIKE CABLE

DEARBORN NO.	NO. OF COND. & SIZE	STRAND-ING	WALL THICK.	NOM. CAP. PER FT.	NOM. JKT. THICK.	NOM. O.D.
732001	1-20	26/34	.030	36 MMF	.030	.175
682002	2-20	26/34	.014	45 MMF	.030	.245
SPIRAL SHIELD MIKE CABLE						
722201	1-22	16/34	.016	36 MMF	.020	.125
722401	1-24	7/32	.020	29 MMF	.020	.132
722202	2-22	16/34	.016	32 MMF	.030	.231

STOCK PUT UP: 100 Ft., 500 Ft., 1000 Ft.
CAPACITY MEASURED BETWEEN ONE CONDUCTOR AND REMAINING CONDUCTOR AND SHIELD CONNECTED TOGETHER.

COLOR CODE OF CONDUCTORS: 1—Black • 2—Red • 3—White • 4—Green • 5—Yellow • 6—Blue

DEARBORN WIRE AND CABLE CO. 9299 Evenhouse Avenue, Rosemont, Illinois 60018 • Phone (312) 696-1000

DEARBORN

MULTI-CONDUCTOR UNSHIELDED CONTROL CABLE

NEOPRENE OR PLASTIC

PLASTIC JACKETED 15/5 CONTROL CABLES, 600 VOLT, VN20, 90°C

Stranded bare copper conductors, insulated with .015″* PVC color coded insulation and .005″ Nylon jacket over each conductor; cabled with fillers. Moisture resistant tape, and a black Polyvinylchloride jacket overall. Used for controlling temperature, voltage, pressure and relay circuits and many other electronic and electrical circuits. **All conductors color coded to IPCEA Standards (see bottom, this page).**

* .020″ on sizes 14 and 12; .015″ on size 16.

RUBBER INSULATED CONDUCTORS, NEOPRENE JACKETED

Stranded bare copper conductors, with color coded rubber insulation; cabled with fillers; cotton wrapped; tough Neoprene jacket overall. Used for remote control circuits. Flexible stranding and heavy duty Neoprene jacket combined, make this cable suitable for outdoor usage under extreme conditions. Neoprene jacket resists sunlight, oil, moisture, ozone, abrasion and impact.

NEC COLOR CODE FOR CONTROL CABLES: 1—Black • 2—White • 3—Red • 4—Green • 5—Orange • 6—Blue • 7—Yellow • 8—Brown • 9—Slate • 10—Purple • 11—Black/White • 12—Red/White • 13—Orange/White • 14—Blue/White • 15—Yellow/White • 16—Brown/White • 17—Slate/White • 18—Purple/White • 19—Red/Black • 20 Orange/Black • 21—Blue/Black • 22—Yellow/Black • 23—Brown/Black • 24—Slate/Black • 25—Purple/Black • 26—Black/Red • 27—Blue/Red • 28—Yellow/Red • 29—Brown/Red • 30—Slate/Red • 31—Purple/Red • 32—Black/Orange • 33—Blue/Orange • 34—Yellow/Orange • 35—Brown/Orange • 36—Slate/Orange • 37—Purple/Orange • 38—Black/Blue • 39—Red/Blue • 40—Orange/Blue

IPCEA COLOR CODING: 1—Black • 2—White • 3—Red • 4—Green • 5—Orange • 6—Blue • 7—White/Black • 8—Red/Black • 9—Green/Black • 10—Orange/Black • 11—Blue/Black • 12—Black/White • 13—Red/White • 14—Green/White • 15—Blue/White • 16—Black/Red • 17—White/Red • 18—Orange/Red • 19—Blue/Red • 20—Red/Green

UNSHIELDED CONTROL CABLE (PLASTIC)

DEARBORN NO.	NO. CONDUCTOR	AWG SIZE	JKT. THICKNESS	NOM. O.D.
701602	2	16	.045	.295
701603	3	16	.045	.310
701604	4	16	.045	.335
701605	5	16	.045	.360
701606	6	16	.045	.395
701607	7	16	.045	.395
701608	8	16	.045	.420
701609	9	16	.045	.455
701610	10	16	.045	.490
701611	11	16	.045	.505
701612	12	16	.045	.505
701614	14	16	.060	.560
701616	16	16	.060	.595
701620	20	16	.060	.650
701402	2	14	.045	.325
701403	3	14	.045	.345
701404	4	14	.045	.375
701405	5	14	.045	.405
701406	6	14	.045	.440
701407	7	14	.045	.440
701408	8	14	.045	.475
701409	9	14	.045	.510
701410	10	14	.060	.585
701411	11	14	.060	.605
701412	12	14	.060	.605
701414	14	14	.060	.630
701416	16	14	.060	.665
701420	20	14	.060	.735
701202	2	12	.045	.365
701203	3	12	.045	.385
701204	4	12	.045	.420
701205	5	12	.045	.460
701206	6	12	.060	.500
701207	7	12	.060	.500
701208	8	12	.060	.570
701209	9	12	.060	.615
701210	10	12	.060	.665
701211	11	12	.060	.685
701212	12	12	.060	.685
701214	14	12	.060	.720
701216	16	12	.080	.760
701220	20	12	.080	.880

25 Ft. MINIMUM ORDER — CUT TO LENGTH — NO RETURNS

UNSHIELDED CONTROL CABLES (NEOPRENE)

DEARBORN NO.	NO. COND.	SIZE AWG	INSULATION THICKNESS	JACKET THICKNESS	NOMINAL O.D.
711805	5	18	1/32	5/64	.490
711806	6	18	1/32	5/64	.525
711808	8	18	1/32	5/64	.570
711809	9	18	1/32	5/64	.620
711810	10	18	1/32	5/64	.630
711814	14	18	1/32	6/64	.710
711605	5	16	1/32	5/64	.530
711606	6	16	1/32	5/64	.570
711607	7	16	1/32	5/64	.570
711608	8	16	1/32	5/64	.605
711610	10	16	1/32	6/64	.740
711612	12	16	1/32	6/64	.760
711614	14	16	1/32	6/64	.785
711616	16	16	1/32	6/64	.820
711620	20	16	1/32	6/64	.920
711622	22	16	1/32	6/64	.930
711624	24	16	1/32	7/64	1.010
711626	26	16	1/32	7/64	1.030
711630	30	16	1/32	7/64	1.050
711637	37	16	1/32	7/64	1.140
711640	40	16	1/32	7/64	1.175
711650	50	16	1/32	7/64	1.520
711660	60	16	1/32	7/64	1.610
711405	5	14	3/64	6/64	.695
711406	6	14	3/64	6/64	.750
711407	7	14	3/64	6/64	.760
711408	8	14	3/64	6/64	.820
711409	9	14	3/64	6/64	.925
711410	10	14	3/64	6/64	.930
711412	12	14	3/64	6/64	.935
711205	5	12	3/64	6/64	.750
711206	6	12	3/64	6/64	.810
711207	7	12	3/64	6/64	.870
711208	8	12	3/64	6/64	.920
711209	9	12	3/64	7/64	1.000
711210	10	12	3/64	7/64	1.000
711212	12	12	3/64	7/64	1.050
711216	16	12	3/64	7/64	1.160
711005	5	10	3/64	6/64	.830
711006	6	10	3/64	6/64	.890
711008	8	10	3/64	7/64	1.060
711010	10	10	3/64	7/64	1.160

25 FT. MINIMUM ORDER — CUT TO LENGTH — NO RETURNS

INDIVIDUALLY SHIELDED PAIRS

STRANDED CONDUCTORS

DEARBORN NO.	NO. OF PAIRS	NO. COND.	SIZE & STRANDING	NOM. JKT. THICK.	NOM. O.D.	STOCK PUT UP (FT.)
962201	1	2	22-7/30 ‡	.020	.135	100, 500 & 1000
962203	3	6	22-7/30	.025	.252	100, 500 & 1000
962206	6	12	22-7/30	.030	.342	100, 500 & 1000
962209	9	18	22-7/30	.035	.410	100, 500 & 1000
962211	11	22	22-7/30	.040	.457	100, 500 & 1000
962215	15	30	22-7/30	.040	.523	100, 500 & 1000
962219	19	38	22-7/30	.050	.570	100, 500 & 1000
962227	27	54	22-7/30	.055	.687	100, 500 & 1000
961803	3	6	18-16/30	.035	.372	1000
961806	6	12	18-16/30	.045	.555	1000
961809	9	18	18-16/30	.055	.620	1000
961812	12	24	18-16/30	.070	.765	1000
961815	15	30	18-16/30	.070	.830	1000

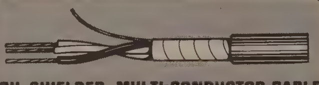
COLOR COMBINATION OF PAIRS

Pair No.
1—Black and Red
2—Black and White
3—Black and Green
4—Black and Blue
5—Black and Yellow
6—Black and Brown
7—Black and Orange
8—Red and White
9—Red and Green

Pair No.
10—Red and Blue
11—Red and Yellow
12—Red and Brown
13—Red and Orange
14—Green and White
15—Green and Blue
16—Green and Yellow
17—Green and Brown
18—Green and Orange

Pair No.
19—White and Blue
20—White and Yellow
21—White and Brown
22—White and Orange
23—Blue and Yellow
24—Blue and Brown
25—Blue and Orange
26—Brown and Yellow
27—Brown and Orange

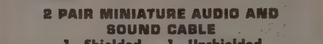
‡ .008″ Polypropylene insulation ▲ Grey or Black Jacket - Specify Color



FOIL SHIELDED, MULTI-CONDUCTOR CABLE

DEARBORN NO.	NO. COND.	AWG SIZE	STRANDING	NOM. JKT. THICK.	NOM. O.D.	STOCK PUT UP (FT.)
972202	2	22	7/30	.025	.167	100, 500 & 1000
972203	3	22	7/30	.025	.175	100, 500 & 1000
972204	4	22	7/30	.025	.190	100, 500 & 1000
972002	2	20	10/30	.025	.195	100, 500 & 1000
972003	3	20	10/30	.025	.200	100, 500 & 1000
972004	4	20	10/30	.028	.215	100, 500 & 1000
971802	2	18	16/30	.028	.223	100, 500 & 1000
971803	3	18	16/30	.028	.236	100, 500 & 1000
971804	4	18	16/30	.028	.250	100, 500 & 1000
971602	2	16	26/30	.030	.275	100, 500 & 1000
971603	3	16	26/30	.030	.300	100, 500 & 1000
971402	2	14	41/30	.035	.340	100, 500 & 1000
971403	3	14	41/30	.035	.400	100, 500 & 1000

Color Code: 1—Black • 2—Clear • 3—Red • 4—Green



2 PAIR MINIATURE AUDIO AND SOUND CABLE
1 - Shielded — 1 - Unshielded

DEARBORN NO.	NO. OF PAIRS	NO. COND.	SIZE & STRANDING	NOM. JKT. O.D.	PUT UP (FT.)
970001	2	4	22-7/30	.165	100, 500 & 1000
970002	2	4	20-10/30	.230	100, 500 & 1000

DATA AND AUDIO CABLE • MINIATURE SOUND CABLE

INDIVIDUALLY SHIELDED MULTIPLE PAIRS

Tinned copper conductors, either stranded or solid (see tables), insulated with high density color coded *.010″ Polyethylene, conductors twisted into pairs. Along with a †22 gauge stranded tinned copper drain wire, each pair is shielded with a Mylar supported aluminum foil shield. Covered with a Grey PVC jacket overall. Used for all circuits requiring isolation between pairs. Especially suitable for multiple audio and data control circuits. Mylar Wrap between shields and jacket.

* .016″ on #18 gauge † #20 on #18 gauge

FOIL SHIELDED, PLASTIC JACKETED, MULTI-CONDUCTOR CABLE

Stranded tinned copper conductors, insulated with .015″‡ thick color coded Polyethylene insulation. Conductors are cabled and, along a No. 22§ tinned copper stranded drain wire laid parallel, are shielded with aluminum foil Mylar backed shield. Gray PVC jacket overall. This type of shielding provides 100% effective shielding and is suitable for audio and data work where cross talk must be reduced to a minimum. **Temperature rating:** −20°C to +60°C. **Operating voltage rating:** 400 volts.

§ No. 20 on No. 18, No. 16, No. 14.
‡.025″ on No. 16, .032″ on No. 14.

2 PAIR MINIATURE AUDIO AND SOUND CABLE

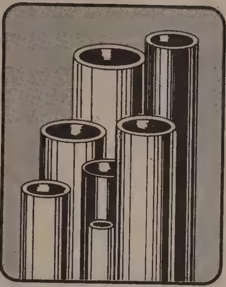
Tinned copper, .009″¶ Polypropylene insulation on 970001. 1 pair of black and red shielded with Mylar aluminum shield. Other pair of white and green twisted, not shielded. Both pairs twisted with #22 stranded T.C. drain wire and chrome vinyl jacket overall.

¶ .015″ PVC on 970002

EXTRUDED TUBING

- PLASTIC
- POLYVINYL CHLORIDE
- HIGH AND LOW TEMPERATURE
- MIL SPEC & U.L.

- TFE TEFLON*
  (MIL-I-22129B)
  - Lightwall
  - Thinwall
  - Standard Wall



LIGHTWALL / TEFLON

Dearborn No.	Size	Nom. I.D. Inches	Nom. Wall Thickness	Stock Put Up (Ft.)
				Spools
LW30	30	.012	.006	100 & 1000
LW28	28	.015	.006	100 & 1000
LW26	26	.018	.006	100 & 1000
LW24	24	.022	.006	100 & 1000
LW22	22	.027	.006	100 & 1000
LW20	20	.034	.006	100 & 1000
LW19	19	.038	.006	100 & 1000
LW18	18	.042	.006	100 & 1000
LW17	17	.047	.006	100 & 1000
LW16	16	.053	.006	100 & 1000
LW15	15	.059	.006	100 & 1000
LW14	14	.066	.008	100 & 500
LW13	13	.076	.008	100 & 500
LW12	12	.085	.008	100 & 500
LW11	11	.095	.008	100 & 500
LW10	10	.102	.008	100 & 500
LW9	9	.114	.008	100 & 500
LW180	1/8	.120	.008	100 & 500
Items below on Coils				
LW8	8	.129	.008	100
LW7	7	.144	.008	100
LW6	6	.162	.010	100
LW5	5	.182	.010	100
LW4	4	.204	.010	100
LW3	3	.229	.010	50
LW140	1/4	.250	.010	50
LW2	2	.258	.010	50
LW1	1	.289	.010	50
LW516	5/16	.313	.012	50
LW0	0	.325	.012	50

"PVC" U.L./MIL 105°C

Dearborn No.	Size	Nom. I.D. Inches	Nom. Wall Thickness	Stock Put Up (Ft.)
SM24	24	.022	.012	100 & 1000
SM22	22	.027	.012	100 & 1000
SM20	20	.034	.016	100 & 1000
SM19	19	.038	.016	100 & 1000
SM18	18	.042	.016	100 & 1000
SM17	17	.047	.016	100 & 1000
SM16	16	.053	.016	100 & 1000
SM15	15	.059	.016	100 & 1000
SM14	14	.066	.016	100 & 500
SM13	13	.076	.016	100 & 500
SM12	12	.085	.016	100 & 500
SM11	11	.095	.016	100 & 500
SM10	10	.106	.016	100 & 500
SM9	9	.118	.020	100 & 500
SM8	8	.133	.020	100 & 500
SM7	7	.148	.020	100 & 500
SM6	6	.166	.020	100 & 500
SM5	5	.186	.020	100 & 200
SM4	4	.208	.020	100 & 200
SM3	3	.234	.020	100 & 200
SM2	2	.263	.020	100 & 200
SM1	1	.294	.020	100 & 200
SM0	0	.330	.020	100 & 200
SM516	5/16	.312	.025	100 & 200
SM380	3/8	.375	.025	50 & 100
SM716	7/16	.438	.025	50 & 100
SM120	1/2	.500	.025	50 & 100
SM916	9/16	.562	.030	50
SM580	5/8	.625	.030	50
SM340	3/4	.750	.035	50
SM780	7/8	.875	.035	50
SM100	1	1.000	.035	50
SM114	1-1/4	1.250	.040	25
SM138	1-3/8	1.375	.040	25
SM112	1-1/2	1.500	.045	25
SM134	1-3/4	1.750	.055	25
SM200	2	2.000	.060	25
SM214	2-1/4	2.250	.065	25
SM212	2-1/2	2.500	.070	25

STOCK COLORS: Black, White, Red, Yellow, Blue, Green and Clear.

THINWALL / TEFLON

Dearborn No.	Size	Nom. I.D. Inches	Nom. Wall Thickness	Stock Put Up (Ft.)
				Spools
TW30	30	.013	.009	100 & 1000
TW28	28	.015	.009	100 & 1000
TW26	26	.018	.009	100 & 1000
TW24	24	.022	.009	100 & 1000
TW22	22	.027	.009	100 & 1000
TW20	20	.034	.012	100 & 1000
TW19	19	.038	.012	100 & 1000
TW18	18	.042	.012	100 & 1000
TW17	17	.047	.012	100 & 1000
TW16	16	.053	.012	100 & 1000
TW15	15	.059	.012	100 & 1000
TW14	14	.066	.012	100 & 500
TW13	13	.076	.012	100 & 500
TW12	12	.085	.012	100 & 500
TW11	11	.095	.012	100 & 500
TW10	10	.106	.012	100 & 500
TW9	9	.118	.015	100 & 500
TW180	1/8	.125	.015	100 & 500
Items below on Coils				
TW8	8	.138	.015	100
TW7	7	.148	.015	100
TW6	6	.166	.015	100
TW5	5	.188	.015	100
TW4	4	.208	.015	100
TW3	3	.234	.015	50
TW140	1/4	.250	.015	50
TW2	2	.263	.015	50
TW1	1	.294	.015	50
TW516	5/16	.312	.015	50
TW0	0	.330	.015	50

STANDARD WALL/TEFLON

Dearborn No.	Size	Nom. I.D. Inches	Nom. Wall Thickness	Stock Put Up (Ft.)
				Spools
SW24	24	.022	.012	100 & 1000
SW22	22	.027	.012	100 & 1000
SW20	20	.034	.016	100 & 1000
SW19	19	.038	.016	100 & 1000
SW18	18	.042	.016	100 & 1000
SW17	17	.047	.016	100 & 1000
SW16	16	.053	.016	100 & 1000
SW15	15	.059	.016	100 & 1000
Items below on Coils				
SW14	14	.066	.016	100 & 500
SW13	13	.076	.016	100 & 500
SW12	12	.085	.016	100 & 500
SW11	11	.095	.016	100 & 500
SW10	10	.106	.016	100 & 500
SW9	9	.118	.020	100 & 500
SW180	1/8	.125	.020	100 & 500
SW8	8	.133	.020	100
SW7	7	.148	.020	100
SW6	6	.166	.020	100
SW5	5	.186	.020	100
SW4	4	.208	.020	100
SW3	3	.234	.020	50
SW140	1/4	.250	.020	50
SW2	2	.263	.020	50
SW1	1	.294	.020	50
SW516	5/16	.313	.020	50
SW0	0	.330	.020	50

■ **POLYVINYL CHLORIDE "SM" 105°C U.L./MIL** This is a high temperature tubing meeting both U.L. and MIL-I-631C, Type F, Form U, Grade C, Class 1, (FUNGUS RESISTANT), Category 1 requirements. **Temperature rating:** −20°C to +105°C. **Specs:** MIL-I-631C, ASTM D-922 Grade C. U.L. File number on request.

■ **TFE TEFLON TUBING** Extruded TFE Teflon in three Wall Thicknesses. Lightwall: (.006″ to .012″), Thinwall: (.009″ to .015″), Standard: (.010″ to .020″).
Operating Temperature Range: −65°C to +250°C. Unaffected by soldering iron temperatures. Dearborn extruded Teflon tubing is chemically inert, has zero moisture absorption and its dielectric strength at high frequencies surpasses other types of insulation even at maximum operating temperatures.
These three wall thicknesses offer an excellent choice for use in miniaturization and compactness of design, especially where high heat, and a chemical solvent and corrosion resistant material is desired.
Meets requirements of— MIL-I-22129B, MIL-P-14077, MIL-P-14078, AMS-3651, AMS-3653.
COLOR CODE: 1—Clear or Natural • 2—Black • 3—Red • Other colors available on Special Order.
* Du Pont Trademark.

DEARBORN

HEAT SHRINKABLE TUBING STYLE ST-301

STYLE ST-301

DEARBORN NO.	EXP. SIZE	MIN. I.D.	REC. I.D.	WALL THICK.	NO. OF LENGTHS PER BOX
100′ — 25 x 4′ LENGTHS PER BOX					6″ LENGTHS
ST-301-3/64	3/64″	.046″	.023″	.016″	40
ST-301-1/16	1/16″	.063″	.031″	.017″	36
ST-301-3/32	3/32″	.093″	.046″	.020″	32
ST-301-1/8	1/8″	.125″	.062″	.020″	28
ST-301-3/16	3/16″	.187″	.093″	.020″	24
ST-301-1/4	1/4″	.250″	.125″	.025″	20
ST-301-3/8	3/8″	.375″	.187″	.025″	16
20′ — 5 x 4′ LENGTHS PER BOX					6″ LENGTHS
ST-301-1/2	1/2″	.500″	.250″	.025″	14
ST-301-3/4	3/4″	.750″	.375″	.030″	12
ST-301-1	1″	1.00″	.500″	.035″	8
ST-301-1½	1½″	1.50″	.750″	.040″	5
ST-301-2	2″	2.00″	1.00″	.045″	3
8′ — 2 x 4′ LENGTHS PER BOX					6″ LENGTHS
ST-301-3	3″	3.00″	1.50″	.050″	2
ST-301-4	4″	4.00″	2.00″	.055″	1

Specify 4′ or 6″ Box When Ordering.
Stock Colors: Clear, Black, Red and White — Specify Color.

STYLE ST-301 POLYOLEFIN HEAT SHRINKABLE TUBING TO MIL-I-23053B/5, U.L. APPROVED

Dearborn Style ST-301 Heat Shrinkable Tubing is an irradiated, thermally stabilized, polyolefin product which meets or exceeds MIL-I-23053B/5, AMS 3636B and AMS 3637B. ST-301 shrinks to 50% of diameter at 121°C (250°F) in 7 seconds, and has an operating temperature range of −55°C (−67°F) to +135°C (+275°F).
MIL-I-23053/5 — CLASS I (COLORED INSULATION)
MIL-I-23053/5 — CLASS II (CLEAR INSULATION)

All sizes are shown and supplied in expanded inside diameters. Stock Colors: Black, Red, White and Clear. Clear is Non-Flame Retardant. All other colors are Flame Retardant under MIL-I-23053B/5. Additional colors available on special order. Supplied in either 4 Ft. or 6 Inch lengths, and 6 Inch Assortments. Suitable for all military applications as well as industrial and commercial uses.
ST-301 Kit Assortments Available in 6″ lengths, Assorted colors AST-301-1-6 — 3/64″ thru 3/16″ (30) Lengths. AST-301-2-6 — 1/4″ thru 3/4″ (16) Lengths.

Detects Faulty Circuits Instantly!

CIRCUIT MONITOR

HELPS PREVENT FIRE DAMAGE, AND LOSS!

The Circuit Monitor detects whether or not proper ground and AC polarity are available from 115 Volt 3 wire power outlets for safe operation of power tools, appliances, office machines, lab and other electrical equipment. It does the job instantly and accurately without the inconvenience of handling probes and meters.

Dearborn No.	Description
5102B	Circuit Monitor in Box.
5012C	Circuit Monitor on Card for Display Rack.

EASY TO USE. Simply plug into 3 wire receptacle and lights on Circuit Monitor will indicate the following:

O & K	Circuit Okay
O only	Improper Ground
K only	Improper Neutral
O & X	Reversed Polarity
K & X	Reversed Ground
None	Power is OFF

DEARBORN

MIL-W-3861 TYPE S, QQ-W-343 TYPE S, ASTM B-33 UNINSULATED TINNED OR SILVER PLATED COPPER WIRE

FLAT BRAID

Tinned copper strands, woven and rolled flat to specific width depending on construction, number of strands, etc.
Used for bonding, straps, grounding, or connecting moving parts. Recommended for high current usage.

TUBULAR BRAID

Tinned copper braid woven in completely round configuration as outlined in MIL-SPEC QQ-B-575. All strands soft drawn tinned copper. Shielding is 95% or more when placed over equivalent diameter mandrel to the inside diameter of the tubular braid. Used as both shielding and protective covering.

***FLAT TINNED COPPER BRAID**

DEARBORN NO.	NOM. FLAT WIDTH (INCHES)	TOT. NO. INDIV. STRANDS	SIZE EACH STRAND AWG	NOM. CIRCULAR MIL AREA	STOCK (PUT UPS (FT.)
91221	.025	8	36	200	100, 500 & 1000
91222	1/32	16	36	400	100, 500 & 1000
91223	3/64	24	36	600	100, 500 & 1000
91224	3/32	48	36	1200	100, 500 & 1000
91229	1/8	72	36	1800	100, 500 & 1000
91230	3/16	120	36	3000	100, 500 & 1000
91231	1/4	168	36	4200	100, 500 & 1000
91232	3/8	288	36	7200	100, 500 & 1000
91233	1/2	384	36	9600	100, 500 & 1000
91234	3/4	832	36	20,800	100, 500 & 1000
91235	1	832	36	20,800	100, 500 & 1000
91239	1-3/8	336	30	33,700	100, 500 & 1000
91240	1-1/2	528	30	53,064	100, 500 & 1000
91241	1-3/4	1248	30	125,424	100, 500 & 1000
91242	2	1536	30	154,368	100, 500 & 1000

*Commercial Type.

TINNED COPPER TUBULAR BRAID

DEARBORN P/N	SIZE I.D. INCHES	TOTAL NO. INDIVDUAL STRANDS	SIZE EACH STRAND AWG	NOM. CIRCULAR MIL AREA	STOCK PUT UPS (FT.)
92160	1/32	24	36	600	100
92162	1/16	48	36	1200	100
92164	7/64	96	36	2400	100
92166	1/8	120	36	3000	100
92168	11/64	168	36	4200	100
92170	13/64	192	34	7630	100
92171	1/4	384	36	9600	100
92172	3/8	384	36	9600	100
92174	1/2	528	36	13,200	100
92175	9/16	480	30	48,240	100
92176	25/32	864	36	21,600	100
92177	* 7/8	336	30	33,700	50 & 100
92178	*1	384	30	38,600	50 & 100
92179	*1-1/8	432	30	43,330	50 & 100
92180	*1-1/4	480	30	48,150	50 & 100
92181	*1-3/8	528	30	53,000	50 & 100
92182	*1-1/2	576	30	57,775	50 & 100

SOFT DRAWN SOLID WIRE

Properly annealed, pure electrolytic soft, drawn, solid, tinned or silver plated copper wire used for applications such as point to point wiring, component leads, and ground wire.

UNINSULATED TINNED COPPER WIRE

DEARBORN NO.	CONDUCTOR SIZS	NOM. CIRCULAR MIL AREA	NOM. O.D.	STOCK PUT UPS (FT.)
938	38	16.0	.004	100 & 1000
936	36	25.0	.005	100 & 1000
934	34	39.7	.006	100 & 1000
932	32	64.0	.008	100 & 1000
930	30	100.5	.010	100 & 1000
928	28	159.8	.013	100 & 1000
926	26	254.1	.016	100 & 1000
924	24	404.0	.020	100 & 1000
922	22	642.4	.025	100 & 1000
920	20	1,022.0	.033	100 & 1000
918	18	1,642.0	.040	100 & 1000
916	16	2,583.0	.051	100 & 1000
914	14	4,107.0	.065	100 & 1000
912	12	6,530.0	.082	100 & 1000
910	10	10,380.0	.103	100 & 1000
908	8	16,510.0	.129	100 & 1000
906	6	26,250.0	.162	100 & 1000

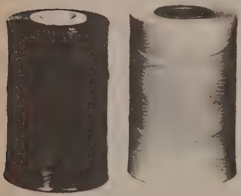
UNINSULATED SILVER PLATED WIRE

DEARBORN NO.	CONDUCTOR SIZS	NOM. CIRCULAR MIL AREA	NOM. O.D.	STOCK PUT UPS (FT.)
922SPC	22	642.4	.025	100 & 1000
920SPC	20	1,022.0	.033	100 & 1000
918SPC	18	1,642.0	.040	100 & 1000
916SPC	16	2,583.0	.051	100 & 1000
914SPC	14	4,107.0	.065	100 & 1000

Suffix SPC denotes Silver Plated Copper

LACING TAPES & TWINE MEETING AND EXCEEDING MILITARY AND COMMERCIAL SPECIFICATIONS.

NYLON LACING TAPE MIL-T-43435 TYPE I



- **INDUSTRIAL PRICING!**
- **SAME DAY SHIPMENT!**

Designed to Meet and Exceed MIL-T-713D, Type P, and MIL-T-43435 Types I, II, and IV, also AMS 3815, AMS 3816, AMS 3817.

FINISHES AND COATINGS

- **W — WAX, MIL SPEC "B"**

A microcrystalline fungicidal wax which exceeds military specifications, provides excellent knot retention and is suitable for either lacing or spot ties.

- **G — SYNTHETIC RUBBER, MIL SPEC "C"**

A special continuous coating of fungicidal synthetic elastomer (rubber) which exceeds Mil Spec requirements, ties easily and exhibits outstanding knot holding characteristics.

- **A — SYNTHETIC RESIN, MIL SPEC "E"**

A synthetic rubber-like resin formulated with fungicidal ingredients. Handling characteristics are excellent, knot retention is outstanding; meets or exceeds Mil Spec requirements. Operational Temperature Ranges: −67°F to +250°F on all items.

NYLON LACING TWINE MIL-T-713D TYPE P
Round twisted nylon fiber impregnated with microcrystalline fungicidal wax.

POLYESTER LACING TAPE MIL-T-43335 TYPE II
Flat braided polyester yarn impregnated with special finishes to military specifications. **Available in 500-yard spools.**

NYLON LACING TAPE MIL-T-43435 TYPE I
Flat braided high-tenacity nylon yarn impregnated with microcrystalline fungicidal wax or impregnations to meet military specifications. **Available in 500-yard spools.**

NYLON LACING TAPE MIL-T-43435 TYPE I

Flat braided high-tenacity nylon yarn impregnated with microcrystalline fungicidal wax or impregnations to meet military specifications. Available in 500-yard spools.

MIL SPEC SIZE	DEARBORN PART NO.	TEST TENSILE STRENGTH	WIDTH	COLOR	FINISH	MIL SPEC FINISH
3	805032W	50 lbs.	.090″	Natural	A	E
3	805032B	50 lbs.	.090″	Black	A	E
4	802534W	25 lbs.	.062″	Natural	W	B
4	802534B	25 lbs.	.062″	Black	W	B
3	805036W	50 lbs.	.090″	Natural	W	B
3	805036B	50 lbs.	.090″	Black	W	B
3	805040W	50 lbs.	.090″	Natural	G	C
3	805040B	50 lbs.	.090″	Black	G	C

POLYESTER LACING TAPE MIL-T-43335 TYPE II

Flat braided polyester yarn impregnated with special finishes to military specifications. Available in 500-yard spools.

MIL SPEC SIZE	DEARBORN PART NO.	TEST TENSILE STRENGTH	WIDTH	COLOR	FINISH	MIL SPEC FINISH
3	805058W	50 lbs.	.090″	Natural	A	E
3	805058B	50 lbs.	.090″	Black	A	E
3	805062W	50 lbs.	.090″	Natural	W	B
3	805062B	50 lbs.	.090″	Black	W	B

NYLON LACING TWINE MIL-T-713D TYPE P

Round twisted nylon fiber impregnated with microcrystalline fungicidal wax.

MIL SPEC CLASS	DEARBORN PART NO.	TEST TENSILE STRENGTH	NOM. DIAM.	PUT UP 1 LB. SPOOL (LENGTH)	COLOR	FINISH	MILSPEC FINISH
1	807013W	70 lbs.	.039″	550 yds.	Natural	W	B
1	807013B	70 lbs.	.039″	550 yds.	Black	W	B
2	804814W	48 lbs.	.029″	750 yds.	Natural	W	B
2	804814B	48 lbs.	.029″	750 yds.	Black	W	B
3	803215W	32 lbs.	.025″	1100 yds.	Natural	W	B
3	803215B	32 lbs.	.025″	1100 yds.	Black	W	B

LOW LOSS FOAM COAXIAL CABLE ASSEMBLIES

For Amateur, Commercial, Marine and Citizens Band Installations

Ready to use assemblies offering amazing new levels of performance. Special tarnish proof finish on PL-259 Connectors defies the elements. The low loss Polyfoam dielectric used in the core of these coaxial cables cuts transmission and receiving losses up to 35%, effecting coverage over greater distances.

NOTE: 50′, 100′ and 250′ cables have PL-259 Connectors attached to both ends. 6′, 15′ and 20′ cables have PL-259 Connector on one end and spade lugs at the opposite end.

RG 58/U TYPE 53.3 OHM

DEARBORN NO.	LENGTH
6058F/CL6	6′ long
6058F/CL15	15′ long
6058F/CL20	20′ long
6058F/C50	50′ long
6058F/C100	100′ long

RG8/U TYPE 50 OHM

DEARBORN NO.	LENGTH
6008F/C50	50′ long
6008F/C100	100′ long

75 OHM

DEARBORN NO.	LENGTH
6059F/C50	50′ long
6059F/C100	100′ long
6059F/C250	250′ long

CONNECTORS AND ADAPTERS ONLY

DEARBORN NO.	DESCRIPTION
UG 175/U	Adapter
PL-259	Connectors

DEARBORN WIRE AND CABLE CO. 9299 Evenhouse Avenue, Rosemont, Illinois 60018 • Phone (312) 696-1000

DEARBORN

MIL SPEC MIL-W-76B HOOKUP WIRE

Single conductor, stranded or solid tinned copper.

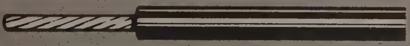
Insulation: PVC. **Temperature rating:** −40°C to +80°C (90°C with nylon jacket). Resistant to acids, alkalis, oils, flame, moisture, solvents and fungus.

TYPE LW
Insulation thickness .010″. Voltage ratings 300 volts.

TYPE MW
Insulation thickness .016″. Voltage rating 1000 volts.

TYPE MW — NYLON JACKET
Insulation thickness .016″. Nylon jacket .002″ to .005″ depending on conductor size. Voltage rating 1000 volts.

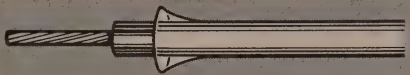
TYPE MW — SHIELDED
Insulation thickness .016″. Braided shield overall, 90% coverage. Voltage rating 1000 volts.



80°C TYPE LW, 300 VOLT

DEARBORN NO.	TYPE DESIGNATION AND SIZE	STRANDING	NOM. O.D.	WALL THICKNESS	STOCK COLORS
STRANDED CONDUCTOR					
283007	LW-C30 (7) U	7/38	.034	.010	0-9 & 90-98
282807	LW-C28 (7) U	7/36	.037	.010	0-9 & 90-98
282607	LW-C26 (7) U	7/34	.041	.010	0-9 & 90-98
282407	LW-C24 (7) U	7/32	.046	.010	0-9 & 90-98
282207	LW-C22 (7) U	7/30	.053	.010	0-9 & 90-98
282007	LW-C20 (7) U	7/28	.060	.010	0-9 & 90-98
SOLID CONDUCTOR					
283001	LW-C30 (1) U	1/30	.031	.010	0-9 & 90-98
282801	LW-C28 (1) U	1/28	.035	.010	0-9 & 90-98
282601	LW-C26 (1) U	1/26	.038	.010	0-9 & 90-98
282401	LW-C24 (1) U	1/24	.042	.010	0-9 & 90-98
282201	LW-C22 (1) U	1/22	.047	.010	0-9 & 90-98
282001	LW-C20 (1) U	1/20	.054	.010	0-9 & 90-98

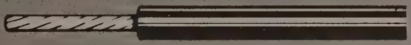
STOCK PUT UP: 100 FT., 1000 FT., AND BULK



90°C TYPE MW, NYLON JK'T. (.003″), 1000 V.

DEARBORN NO.	TYPE DESIGNATION AND SIZE	STRANDING	NOM. O.D.	WALL THICKNESS	STOCK COLORS
312407	MW-C24 (7) J	7/32	.063	.016	0-9
312207	MW-C22 (7) J	7/30	.071	.016	0-9
312010	MW-C20 (10) J	10/30	.078	.016	0-9
311816	MW-C18 (16) J	16/30	.086	.016	0-9
311619	MW-C16 (19) J	19/29	.098	.016	0-9
311419	MW-C14 (19) J	19/27	.113	.016	0, 2, 9
311219	MW-C12 (19) J	19/25	.134	.016	0, 2, 9

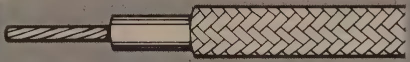
STOCK PUT UP: 100 FT., 1000 FT., AND BULK



80°C TYPE MW, 1000 VOLT

DEARBORN NO.	TYPE DESIGNATION AND SIZE	STRANDING	NOM. O.D.	WALL THICKNESS	STOCK COLORS
STRANDED CONDUCTOR					
302407	MW-C24 (7) U	7/32	.058	.016	0-9 & 90-98
302207	MW-C22 (7) U	7/30	.065	.016	0-9 & 90-98
302010	MW-C20 (10) U	10/30	.072	.016	0-9 & 90-98
301816	MW-C18 (16) U	16/30	.080	.016	0-9 & 90-98
301619	MW-C16 (19) U	19/29	.091	.016	0-9 & 90-98
301419	MW-C14 (19) U	19/27	.105	.016	0-9 & 90-98
301219	MW-C12 (19) U	19/25	.124	.016	0-9 & 90-98
SOLID CONDUCTOR					
302401	MW-C24 (1) U	1/24	.055	.016	0-9 & 90-98
302201	MW-C22 (1) U	1/22	.059	.016	0-9 & 90-98
302001	MW-C20 (1) U	1/20	.066	.016	0-9 & 90-98
301801	MW-C18 (1) U	1/18	.074	.016	0-9 & 90-98
301601	MW-C16 (1) U	1/16	.085	.016	0-9 & 90-98
301401	MW-C14 (1) U	1/14	.098	.016	0-9 & 90-98

STOCK PUT UP: 100 FT., 1000 FT., AND BULK



80°C TYPE MW, SHIELDED, 1000 VOLT

DEARBORN NO.	TYPE DESIGNATION AND SIZE	STRANDING	NOM. O.D.	WALL THICKNESS	STOCK COLORS
332407	MW-C24 (7) S	7/32	.080	.016	9 Only
332207	MW-C22 (7) S	7/30	.087	.016	9 Only
332010	MW-C20 (10) S	10/30	.094	.016	9 Only
331816	MW-C18 (16) S	16/30	.102	.016	9 Only
331619	MW-C16 (19) S	19/29	.113	.016	9 Only
331419	MW-C14 (19) S	19/27	.121	.016	9 Only
331219	MW-C12 (19) S	19/25	.146	.016	9 Only

STOCK PUT UP: 100 FT., 1000 FT., AND BULK

COLOR CODE ON HOOKUP WIRE: 0—Black • 1—Brown • 2—Red • 3—Orange • 4—Yellow • 5—Green • 6—Blue • 7—Violet • 8—Grey • 9—White
90—White/Black • 91—White/Brown • 92—White/Red • 93—White/Orange • 94—White/Yellow • 95—White/Green • 96—White/Blue • 97—White/Violet • 98—White/Gray
OTHER COLORS AND STRIPE COMBINATIONS AVAILABLE UPON REQUEST

DEARBORN WIRE AND CABLE CO. 9299 Evenhouse Avenue, Rosemount, Illinois 60018 • Phone (312) 696-1000

DEARBORN

MIL SPEC MIL-W-76B HOOKUP WIRE

Single conductor stranded tinned copper.

Insulation: PVC with and without shield, with and without lacquered glass braid or nylon jacketing. **Temperature rating:** −40°C to +80°C (90°C with nylon jacket). Resistant to acids, alkalis, oils, flame, moisture, solvents and fungus.

TYPE MW — GLASS BRAID

Insulation thickness .016 with glass braid overall. Voltage rating 1000 volts.

TYPE MW — SHIELDED — NYLON

PVC insulation .016, braided shield 90% coverage, and clear nylon jacket overall.

TYPE MW — GLASS BRAID — SHIELD

Insulation thickness .016 with glass braid and shield overall.

TYPE HW

Insulation thickness .031 on sizes No. 22 thru No. 16, .045 on sizes No. 14 thru No. 6. For voltage rating see chart.

TYPE HW — GLASS BRAID

Same as HW with addition of lacquered glass braid overall.

80°C TYPE MW, GLASS BRAID, 1000 VOLT

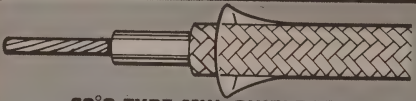
DEARBORN NO.	TYPE DESIGNATION AND SIZE	STRANDING	NOM. O.D.	WALL THICKNESS	STOCK COLORS
322407	MW-C24 (7) B	7/32	.068	.016	0-9, 90 & 92
322207	MW-C22 (7) B	7/30	.075	.016	0-9, 90 & 92
322010	MW-C20 (10) B	10/30	.082	.016	0-9, 90 & 92
321816	MW-C18 (16) B	16/30	.090	.016	0-9, 90 & 92
321619	MW-C16 (19) B	19/29	.101	.016	0-9, 90 & 92
321419	MW-C14 (19) B	19/27	.115	.016	9, 90, 92
321219	MW-C12 (19) B	19/25	.134	.016	9, 90, 92

STOCK PUT UP: 100 FT., 1000 FT., AND BULK

80°C TYPE MW, GLASS BRAID, SHIELDED, 1000 VOLT

DEARBORN NO.	TYPE DESIGNATION AND SIZE	STRANDING	NOM. O.D.	WALL THICKNESS	STOCK COLORS
352407	MW-C24 (7) BS	7/32	.091	.016	9 Only
352207	MW-C22 (7) BS	7/30	.097	.016	9 Only
352010	MW-C20 (10) BS	7/30	.105	.016	9 Only
351816	MW-C18 (16) BS	16/30	.117	.016	9 Only
351619	MW-C16 (19) BS	19/29	.129	.016	9 Only
351419	MW-C14 (19) BS	19/27	.143	.016	9 Only
351219	MW-C12 (19) BS	19/25	.162	.016	9 Only

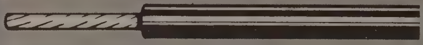
STOCK PUT UP: 100 FT., 1000 FT., AND BULK



80°C TYPE MW, SHIELDED. NYLON JACKET, 1000 VOLT

DEARBORN NO.	TYPE DESIGNATION AND SIZE	STRANDING	NOM. O.D.	WALL THICKNESS	STOCK COLORS
342407	MW-C24 (7) SJ	7/32	.086	.016	9 Only
342207	MW-C22 (7) SJ	7/30	.094	.016	9 Only
342010	MW-C20 (10) SJ	10/30	.101	.016	9 Only
341816	MW-C18 (16) SJ	16/30	.110	.016	9 Only
341619	MW-C16 (19) SJ	19/29	.122	.016	9 Only
341419	MW-C14 (19) SJ	19/27	.137	.016	9 Only
341219	MW-C12 (19) SJ	19/25	.157	.016	9 Only

STOCK PUT UP: 100 FT., 1000 FT., AND BULK



80°C TYPE HW

Nos. 22, 20, 18, 16—2500 VOLTS • Nos. 14, 12, 10, 8, 6—600 VOLTS

DEARBORN NO.	TYPE DESIGNATION AND SIZE	STRANDING	NOM. O.D.	WALL THICKNESS	STOCK COLORS
362207	HW-C22 (7) U	7/30	.095	.031	0-9
362010	HW-C20 (10) U	10/30	.102	.031	0-9
361816	HW-C18 (16) U	16/30	.110	.031	0-9
361619	HW-C16 (19) U	19/29	.121	.031	0, 2, 9
361419	HW-C14 (19) U	19/27	.163	.045	0, 2, 9
361219	HW-C12 (19) U	19/25	.182	.045	0, 2, 9
361037	HW-C10 (37) U	37/26	.205	.045	0, 2, 9
368133	HW-C8 (133) U	133/29	.262	.045	0, 2, 9
366133	HW-C6 (133) U	133/27	.305	.045	0, 2, 9

80°C TYPE HW, GLASS BRAID, 600 VOLT

DEARBORN NO.	TYPE DESIGNATION AND SIZE	STRANDING	NOM. O.D.	WALL THICKNESS	STOCK COLORS
371037	HW-C10 (37) B	37/26	.218	.045	9, 90, 92
378133	HW-C8 (133) B	133/29	.275	.045	9, 90, 92
376133	HW-C6 (133) B	133/27	.318	.045	9, 90, 92

STOCK PUT UP: 100 FT., 1000 FT., AND BULK

COLOR CODE ON HOOKUP WIRE: 0—Black • 1—Brown • 2—Red • 3—Orange • 4—Yellow • 5—Green • 6—Blue • 7—Violet • 8—Grey • 9—White • 90—White/Black • 91—White/Brown • 92—White/Red • 93—White/Orange • 94—White/Yellow • 95—White/Green • 96—White/Blue • 97—White/Violet • 98—White/Gray

OTHER COLORS AND STRIPE COMBINATIONS AVAILABLE UPON REQUEST

DEARBORN

TEFLON* INSULATED AIRCRAFT, MISSILE AND ELECTRONIC WIRE AND CABLE

MIL-W-16878D, TYPE ET

Voltage rating: 250 volts. **Temperature rating:** −65°C to +200°C. Single conductor stranded silver plated copper, extruded TFE Teflon insulation.

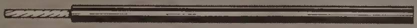
MIL-W-7139B, CLASS I WIRE

Voltage rating: 600 volts. **Temperature rating:** −65°C to +200°C. Silver plated copper, insulated with layers of TFE Teflon, interspersed with layers of Teflon impregnated fiberglass. Color is white with blue tracer. Teflon impregnated fiberglass braid overall.

MIL-W-7139B, CLASS II WIRE

Voltage rating: 600 volts. **Temperature rating:** −65°C to +260°C. Nickel coated copper, insulated with layers of TFE Teflon, interspersed with layers of Teflon impregnated fiberglass. Color is white with orange tracer. Teflon impregnated fiberglass braid overall.

- **All Teflon wire and cable listed here is resistant to acids, alkalis, oil, flame, moisture, solvents, fungus, aircraft fuels, hydraulic fluid, skydral, ethylene glycol and alcohol.**



MIL-W-16878D, TYPE ET, TEFLON

DEARBORN P/N	TYPE & CONDUCTOR AWG SIZE & STRAND.		NOM. WALL THICKNESS	NOM. O.D.	STOCK P.U. (FT.)	STOCK COLORS
33207	**ET-32**	7/40	.006	.021	500 & 1000	0-9
33219	**ET-32**	19/44	.006	.023	500 & 1000	0-9
33007	**ET-30**	7/38	.006	.024	500 & 1000	0-9
33019	**ET-30**	19/42	.006	.024	500 & 1000	0-9
32807	**ET-28**	7/36	.006	.027	500 & 1000	0-9
32819	**ET-28**	19/40	.006	.027	500 & 1000	0-9
32607	**ET-26**	7/34	.006	.031	500 & 1000	0-9
32619	**ET-26**	19/38	.006	.031	500 & 1000	0-9
32407	**ET-24**	7/32	.006	.036	500 & 1000	0-9
32419	**ET-24**	19/36	.006	.036	500 & 1000	0-9
32207	**ET-22**	7/30	.006	.042	500 & 1000	0-9
32219	**ET-22**	19/34	.006	.042	500 & 1000	0-9
32007	**ET-20**	7/28	.006	.050	500 & 1000	0-9
32019	**ET-20**	19/32	.006	.050	500 & 1000	0-9

MIL-W-7139B, CLASS II WIRE

DEARBORN P/N	CONDUCTOR AWG SIZE & STRANDING		NOMINAL O.D. FINISHED WIRE	STOCK PUT UP (FT.)
82219N	**22**	19/34	.087	500 & 1000
82019N	**20**	19/32	.097	500 & 1000
81819N	**18**	19/30	.112	500 & 1000
81619N	**16**	19/29	.132	500 & 1000
81419N	**14**	19/27	.147	500 & 1000
81219N	**12**	19/25	.167	500 & 1000
81037N	**10**	37/26	.197	500 & 1000
88133N	**8**	133/29	.250	500 & 1000
86133N	**6**	133/27	.293	500 & 1000
84133N	**4**	133/25	.350	500 & 1000
82665N	**2**	665/30	.435	500 & 1000
81817N	**1**	817/30	.480	500 & 1000
80001N	**0**	1045/30	.540	500 & 1000
80002N	**00**	1330/30	.590	500 & 1000
80003N	**000**	1665/30	.654	500 & 1000
80004N	**0000**	2109/30	.743	500 & 1000

MIL-W-7139B, CLASS I WIRE

DEARBORN P/N	CONDUCTOR AWG SIZE & STRANDING		NOMINAL O.D. FINISHED WIRE	STOCK PUT UP (FT.)
82219	**22**	19/34	.087	500 & 1000
82019	**20**	19/32	.097	500 & 1000
81819	**18**	19/30	.112	500 & 1000
81619	**16**	19/29	.132	500 & 1000
81419	**14**	19/27	.147	500 & 1000
81219	**12**	19/25	.167	500 & 1000
81037	**10**	37/26	.197	500 & 1000
88133	**8**	133/29	.250	500 & 1000
86133	**6**	133/27	.293	500 & 1000
84133	**4**	133/25	.350	500 & 1000
82665	**2**	665/30	.435	500 & 1000
81817	**1**	817/30	.480	500 & 1000
80001	**0**	1045/30	.540	500 & 1000
80002	**00**	1330/30	.590	500 & 1000
80003	**000**	1665/30	.654	500 & 1000
80004	**0000**	2109/30	.743	500 & 1000

COLOR CODE ON HOOKUP WIRE: 0—Black • 1—Brown • 2—Red • 3—Orange • 4—Yellow • 5—Green • 6—Blue • 7—Violet • 8—Grey • 9—White
OTHER COLORS AND STRIPE COMBINATIONS AVAILABLE UPON REQUEST

*DuPont TM

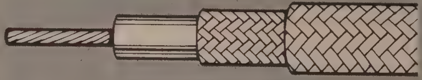
DEARBORN WIRE AND CABLE CO. 9299 Evenhouse Avenue, Rosemount, Illinois 60018 • Phone (312) 696-1000

DEARBORN

MIL SPEC AIRCRAFT WIRE

MIL-W-8777B - MS 25471 SILICONE AIRCRAFT WIRE

These wires are intended for installation in aircraft electrical systems where potential does not exceed 600 volts (RMS). Temperature limits are −55°C to +200°C. Single conductor silver plated copper, silicone rubber insulation, glass and dacron braid impregnated with high temperature lacquer and a white dacron braid and high temperature lacquer overall. Resistant to aircraft fuels, hydraulic fluid, oils, water, skydral, ethyleneglycol, dilute acids, alcohol, alkalis, fungus and abrasion.



MIL-W-8777B - MS 25471 SILICONE AIRCRAFT WIRE

DEARBORN P/N	MIL P/N	AWG SIZE	STRANDING	NOM. O.D.	PUT UP (FT.)
162219	MS 25471-22	22	19/34	.085	100 & 1000
162019	MS 25471-20	20	19/32	.095	100 & 1000
161819	MS 25471-18	18	19/30	.110	100 & 1000
161619	MS 25471-16	16	19/29	.125	100 & 1000
161419	MS 25471-14	14	19/27	.143	100 & 1000
161219	MS 25471-12	12	19/25	.163	100 & 1000
161049	MS 25471-10	10	49/27	.193	100 & 1000
168133	MS 25471-8	8	133/29	.248	100 & 1000
166133	MS 25471-6	6	133/27	.303	100 & 1000
164133	MS 25471-4	4	133/25	.360	100 & 1000

ALSO AVAILABLE

MIL-W-5086A — TYPE III
MIL-W-5274A — TYPE I, CLASS A
MIL-W-5274A — TYPE II, CLASS A
MIL-W-22759 — TYPE I
MS — 21985
MS — 21986
NAS 702, TYPES U AND S, CLASSES A, B, C
NAS 703, TYPES U, S, SJ, CLASSES A AND C

CALL DEARBORN ON ALL YOUR WIRE REQUIREMENTS

MIL-W-5086A UNSHIELDED AIRCRAFT WIRE

For use as airframe wire at temperatures within the range of −55°C to +105°C. Voltage rating is 600 volts. Both types are resistant to water, aircraft fuels, hydraulic fluid, oils, skydral, ethyleneglycol, dilute acids, alcohol, alkalis, fungus and abrasion.

TYPE I — AN-22 THRU AN-12

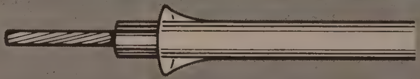
Single conductor stranded tinned copper with white PVC insulation and a clear (polyamide) nylon jacket overall.

TYPE II — AN-22 THRU AN-12

Single conductor stranded tinned copper with white PVC insulation, white glass braid and a clear nylon jacket overall.

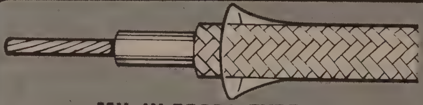
TYPE II — AN-10 THRU AN-0000

Single conductor stranded tinned copper with white PVC insulation, white glass braid, flame retardant nylon lacquered nylon braid overall.



MIL-W-5086A TYPE I

DEARBORN P/N	MIL P/N	AWG SIZE	STRANDING	NOM. O.D.	PUT UP (FT.)
102219	AN-22	22	19/34	.068	100 & 1000
102019	AN-20	20	19/32	.078	100 & 1000
101819	AN-18	18	19/30	.088	100 & 1000
101619	AN-16	16	19/29	.098	100 & 1000
101419	AN-14	14	19/27	.117	100 & 1000
101219	AN-12	12	19/25	.137	100 & 1000



MIL-W-5086A TYPE II

DEARBORN P/N	MIL P/N	AWG SIZE	STRANDING	NOM. O.D.	PUT UP (FT.)
		AN-22 THROUGH AN-12			
112219	AN-22	22	19/34	.075	100 & 1000
112019	AN-20	20	19/32	.085	100 & 1000
111819	AN-18	18	19/30	.095	100 & 1000
111619	AN-16	16	19/29	.105	100 & 1000
111419	AN-14	14	19/27	.125	100 & 1000
111219	AN-12	12	19/25	.143	100 & 1000
		AN-10 THROUGH AN-0000			
111049	AN-10	10	49/27	.189	100 & 1000
118133	AN-8	8	133/29	.240	100 & 1000
116133	AN-6	6	133/27	.293	100 & 1000
114133	AN-4	4	133/25	.355	100 & 1000
112665	AN-2	2	665/30	.425	100 & 1000
111817	AN-1	1	817/30	.470	100 & 1000
110001	AN-0	0	1045/30	.525	100 & 1000
110002	AN-00	00	1330/30	.590	100 & 1000
110003	AN-000	000	1661/30	.645	100 & 1000
110004	AN-0000	0000	2104/30	.715	100 & 1000

DEARBORN

MIL-W-5086A-MIL-C-7078A
SHIELDED AIRCRAFT WIRE FOR ELECTRICAL SYSTEMS

BASE WIRE, MIL-W-5086A, TYPE I, MIL-C-7078A, TYPE I

Stranded tinned copper conductors, with color coded Polyvinylchloride insulation and a clear Nylon jacket on each conductor; cabled, with a braided tinned copper shield (85% coverage) overall.

BASE WIRE, MIL-W-5086A, TYPE II, MIL-C-7078A, TYPE I

Stranded tinned copper conductors, insulated with white PVC, color coded glass braid on each conductor. Each conductor has clear Nylon jacket over glass braid insulation. Conductors are cabled and have braided tinned copper shield (85% coverage) overall.

BASE WIRE, MIL-W-5086A, TYPE I, MIL-C-7078A, TYPE II

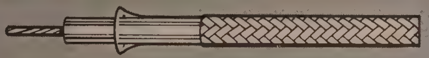
Same as MIL-C-7078A, Type I, Base Wire, MIL-W-5086A, Type I, with addition of a clear Nylon jacket over the shield.

BASE WIRE, MIL-W-5086A, TYPE II, MIL-C-7078A, TYPE II

Same as MIL-C-7078A, Type I, Base Wire, MIL-W-5086A, Type II, with addition of clear Nylon jacket over the shield.

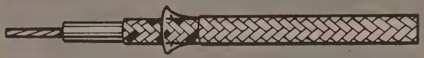
GENERAL CHARACTERISTICS—Temperature rating: —55°C to +105°C. Voltage rating: 600 Volts. Resistant to effects of oil, water, hydraulic fuel, skydrol, aircraft fuels, ethyleneglycol, alcohol, dilute acids, alkalis, fungus, and abrasion.

UNJACKETED SHIELDED CABLE MIL-C-7078A/TYPE I



BASE MIL-W-5086A, TYPE I

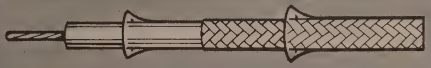
DEARBORN NO.	NO. COND.	MILITARY DESIG. & SIZE	STRANDING	NOM. O.D.	STOCK PUT UPS (FT.)
122201	1	AN-22	19/34	.090	500 & 1000
122202	2	AN-22	19/34	.160	500 & 1000
122203	3	AN-22	19/34	.170	500 & 1000
122001	1	AN-20	19/32	.100	500 & 1000
122002	2	AN-20	19/32	.180	500 & 1000
122003	3	AN-20	19/32	.190	500 & 1000
121801	1	AN-18	19/30	.110	500 & 1000
121802	2	AN-18	19/30	.200	500 & 1000
121803	3	AN-18	19/30	.210	500 & 1000
121601	1	AN-16	19/29	.120	500 & 1000
121401	1	AN-14	19/27	.140	500 & 1000
121201	1	AN-12	19/25	.160	500 & 1000



BASE MIL-W-5086A, TYPE II

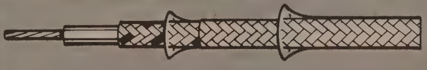
DEARBORN NO.	NO. COND.	MILITARY DESIG. & SIZE	STRANDING	NOM. O.D.	STOCK PUT UPS (FT.)
132201	1	AN-22	19/34	.095	500 & 1000
132202	2	AN-22	19/34	.170	500 & 1000
132203	3	AN-22	19/34	.180	500 & 1000
132001	1	AN-20	19/32	.105	500 & 1000
132002	2	AN-20	19/32	.190	500 & 1000
132003	3	AN-20	19/32	.200	500 & 1000
131801	1	AN-18	19/30	.115	500 & 1000
131802	2	AN-18	19/30	.210	500 & 1000
131803	3	AN-18	19/30	.224	500 & 1000
131601	1	AN-16	19/29	.125	500 & 1000
131401	1	AN-14	19/27	.150	500 & 1000
131201	1	AN-12	19/25	.165	500 & 1000

NYLON JACKETED SHIELDED CABLE MIL-C-7078A/TYPE II



BASE MIL-W-5086A, TYPE I

DEARBORN NO.	NO. COND.	MILITARY DESIG. & SIZE	STRANDING	NOM. O.D.	STOCK PUT UPS (FT.)
142201	1	AN-22	19/34	.100	500 & 1000
142202	2	AN-22	19/34	.170	500 & 1000
142203	3	AN-22	19/34	.180	500 & 1000
142001	1	AN-20	19/32	.110	500 & 1000
142002	2	AN-20	19/32	.190	500 & 1000
142003	3	AN-20	19/32	.200	500 & 1000
141801	1	AN-18	19/30	.120	500 & 1000
141802	2	AN-18	19/30	.210	500 & 1000
141803	3	AN-18	19/30	.220	500 & 1000
141601	1	AN-16	19/29	.130	500 & 1000
141401	1	AN-14	19/27	.150	500 & 1000
141201	1	AN-12	19/25	.170	500 & 1000



BASE MIL-W-5086A, TYPE II

DEARBORN NO.	NO. COND.	MILITARY DESIG. & SIZE	STRANDING	NOM. O.D.	STOCK PUT UPS (FT.)
152201	1	AN-22	19/34	.105	500 & 1000
152202	2	AN-22	19/34	.180	500 & 1000
152203	3	AN-22	19/34	.190	500 & 1000
152001	1	AN-20	19/32	.115	500 & 1000
152002	2	AN-20	19/32	.200	500 & 1000
152003	3	AN-20	19/32	.210	500 & 1000
151801	1	AN-18	19/30	.125	500 & 1000
151802	2	AN-18	19/30	.220	500 & 1000
151803	3	AN-18	19/30	.234	500 & 1000
151601	1	AN-16	19/29	.135	500 & 1000
151401	1	AN-14	19/27	.160	500 & 1000
151201	1	AN-12	19/25	.175	500 & 1000

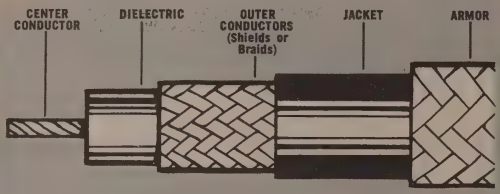
COLOR CODE: 1 Conductor — White • 2 Conductors — 1 White/Blue, 1 White/Red • 3 Conductors — 1 White/Blue, 1 White/Red, 1 White/Yellow.

DEARBORN

RG COAXIAL CABLE

Dearborn has the most complete selection of RG Coaxial Cable in the nation, manufactured to meet the needs of government and industry . . . backed by America's most dependable quality warranty.

Nomenclature



Operating Temperature Limits for Cable Jackets

MILITARY DESIGNATION	JACKET TYPE	TEMPERATURE LIMITS
TYPE I	Black Polyvinylchloride	−40°C to +80°C
TYPE II	Grey Polyvinylchloride	−25°C to +80°C
TYPE IIa	Black or Grey Polyvinylchloride	Under ¼" O.D. −55°C to +90°C Over ¼" O.D. −40°C to +90°C
TYPE IIIa	Black Polyethylene	−55°C to +85°C
TYPE IV	Black Synthetic Rubber	Under ½" −55°C to +80°C Over ½" −40°C to +80°C
TYPE V	Fiberglas Braid	−55°C to +250°C
TYPE VI	Silicon-Rubber Dacron Braid	−55°C to +175°C
TYPE VII	Teflon (PTFE)	−55°C to +250°C
TYPE VIII	Synthetic Rubber	−55°C to +75°C
TYPE IX	Teflon (FEP)	−55°C to +200°C

EXPLANATION OF NOMENCLATURE

CENTER CABLE CONDUCTORS

Center cable conductors may be solid or stranded wires, or in some cases, a tube. Selection is made on the mechanical and electrical properties desired. Solid wires result in lowest cable attentuation. Stranding permits increased cable flexibility but also increases attenuation. Bare, tinned, or silver plated copper wire is usually used for center conductors. Other materials are Copperweld, Cadmium Bronze, Aluminum, Nichrome and Karma.

DIELECTRICS (CABLE)

EXTRUDED POLYETHYLENE

Low cost, flexibility, ease of application, high dielectric strength and low dielectric constant make it well suited for RF applications. It is the most commonly used low temperature cable dielectric.

FOAM CORE (CELLULAR POLYETHYLENE)

An excellent low temperature dielectric formed by expanding polyethylene with millions of bubbles of an inert gas. Its low dielectric constant of 1.5 for Foam Core compared to 2.26 for solid polyethylene permits the design of lower attenuation and low capacity cables.

TEFLON

Teflon will withstand high temperature applications. It has high dielectric strength and a very low dielectric constant. Its ability to withstand exposure to gases and liquids makes it the dielectric selected where other materials would be inadequate.

CABLE OUTER CONDUCTORS

SHIELDS† OR BRAID

The outer conductor is usually made of a metal braid but it can be a solid tube. The braid is used where flexibility is a vital factor; the tubular construction is used where a high degree of shielding is required. Tubular construction also provides lower cable attenuation. Two adjacent braids offer better shielding action than one braid. Generally speaking braids are either copper, tinned copper or silver plated copper.

† Armor

CABLE JACKET TYPES

TYPE I (MIL-C-17)—Decription: Black Polyvinylchloride. **Characteristics:** Excellent weathering and abrasion properties, but is of the contaminating type and will cause cable attenuation to increase with age. Can be used for direct burial.

TYPE II (JAN-C-17A)—Description: Grey Polyvinylchloride. **Characteristics:** A semi-noncontaminating jacket.

TYPE IIA (MIL-C-17)—Description: Black or Grey Polyvinylchloride. **Characteristics:** Noncontaminating. Good weathering and abrasion resistant properties. Can be used for direct burial.

TYPE IIIA (MIL-C-17)—Description: Black Polyethylene. **Characteristics:** Moisture resistant, abrasion resistant, defies ultra violet damage. Noncontaminating; recommended for direct burial.

TYPE IV (MIL-C-17)—Description: Black Synthetic Rubber. **Characteristics:** This jacket material is used only on high voltage pulse cables. The basic material is polymerized chloroprene.

TYPE V (MIL-C-17)—Description: Fiberglas Braid. **Characteristics:** Impregnated with silicone varnish to provide abrasion resistance and a moisture seal.

TYPE VI (MIL-C-17)—Description: Silicone Rubber Dacron Braid. **Characteristiscs:** Two wraps of silicone rubber impregnated fiberglass tape which is fused into a homogeneous layer. A dacron braid is applied, followed by a high temperature fluorocarbon lacquer.

TYPE VII (MIL-C-17)—Description: Teflon (Polytetrafluordethyene). **Characteristics:** Either extruded or tape wrapped. Withstands high temperatures; chemically inert; insoluble in liquids and gases.

TYPE VIII (MIL-C-17)—Description: Synthetic Rubber. **Characteristics:** This material is a polychloroprene compound and is used with only a few pulse cables. Its primary use is as a jacket material for multiconductor cables.

TYPE IX (MIL-C-17)—Description: Teflon (Fluorinated Ethylene Propylene). **Characteristics:** Excellent weathering properties and chemically inert. Maximum operating temperature of 200°C.

RG COAXIAL CABLE

DEARBORN

		PHYSICAL PROPERTIES								ELECTRICAL PROPERTIES				
RG/U No.	Dearborn No.	Armor O.D.	Jkt. O.D.	Jkt. Type	Shields Outer	Shields Inner	Dielectric O.D. & Type	Center Cond.	Lbs. Per 1000 Ft.	Nom. Imped. Ohms	Nom. Cap. Mmfd/ft.	Max. Operating Volt.(Rms)	V.P. %	ENGINEERING DATA
5	6005	—	.332*	I	C	C	.185P	16C	83	52.5	28.5	3000	65.9	—
5A	6005A	—	.338*	II	S	S	.181P	16S	83	50.5	28.5	3000	65.9	Replaced 212/U
5B	6005B	—	.328*	IIa	S	S	.181P	16S	83	50.0	28.5	3000	65.9	Now designated as 212/U
6	6006	—	.332*	II	C	S	.185P	21CW	80	75.0	20.0	2700	65.9	Replaced by 6A
6A	6006A	—	.332*	IIa	C	S	.185P	21CW	80	75.0	20.0	2700	65.9	Small video cable
7	6007	—	.370*	I	—	C	.250ASP	19C	80	97.0	12.5	1000	84.0	Replaced by 63B/U
8	6008	—	.405*	I	—	C	.285P	7/21C	105	52.0	29.5	5000	65.9	—
8A	6008A	—	.405*	IIa	—	C	.285P	7/21C	105	52.0	29.5	5000	65.9	Now designated as 213/U
9	6009	—	.420*	II Grey	C	S	.280P	7/21S	128	51.0	30.0	5000	65.9	—
9A	6009A	—	.420*	II Grey	S	S	.280P	7/21S	128	51.0	30.0	5000	65.9	—
9B	6009B	—	.405*	IIa	S	S	.280P	7/21S	127	50.0	30.0	5000	65.9	Now designated as 214/U
10	6010	.475*	.405	II	—	C	.285P	7/21C	129	52.0	29.5	5000	65.9	Replaced by 10A/U
10A	6010A	.475*	.405	IIa	—	C	.285P	7/21C	129	52.0	29.5	5000	65.9	84/U with armor now desig. 215/U
11	6011	—	.405*	I	—	C	.285P	7/26TC	92	75.0	20.5	5000	65.9	Medium flexible video cable
11A	6011A	—	.405*	IIa	—	C	.285P	7/26T	92	75.0	20.5	5000	65.9	—
12	6012	.475*	.405	II Grey	—	C	.285P	7/26TC	116	75.0	20.5	5000	65.9	Replaced by 12A/U
12A	6012A	.475*	.405	IIa	—	C	.285P	7/26TC	114	75.0	20.5	5000	65.9	11A/U with armor
13	6013	—	.420*	I	C	C	.280P	7/26TC	121	74.0	20.5	5000	65.9	—
13A	6013A	—	.420*	IIa	C	C	.280P	7/26TC	121	74.0	20.5	5000	65.9	Now designated as 216/U
14	6014	—	.545*	II Grey	C	C	.370P	10C	205	52.0	29.5	7000	65.9	Replaced by 14A/U
14A	6014A	—	.545*	IIa	C	C	.370P	10C	205	52.0	29.5	7000	65.9	Now designated as 217/U
15	6015	—	.545*	I	C	C	.370P	15CW	197	75.0	20.5	5000	65.9	Replaced by 11A/U & 12A/U
17	6017	—	.870*	II Grey	—	C	.680P	.188C	463	52.0	29.5	11,000	65.9	—
17A	6017A	—	.870*	IIa	—	C	.680P	.188C	460	52.0	29.5	11,000	65.9	Now designated as 218/U
18	6018	.945*	.870	IIa	—	C	.680P	.188C	515	52.0	29.5	11,000	65.9	Replaced by 18A/U
18A	6018A	.945*	.870	II	—	C	.680P	.188C	515	52.0	29.5	11,000	65.9	Now designated as 219/U
19	6019	—	1.120*	II	—	C	.910P	.250C	740	52.0	29.5	14,000	65.9	Replaced by 19A/U
19A	6019A	—	1.120*	IIa	—	C	.910P	.250C	740	52.0	29.5	14,000	65.9	Now designated as 220/U
20	6020	1.195*	1.120	II	—	C	.910P	.250C	800	52.0	29.5	14,000	65.9	Replaced by 20A/U
20A	6020A	1.195*	1.120	IIa	—	C	.910P	.250C	800	52.0	29.5	14,000	65.9	Now designated as 221/U
21	6021	—	.332*	II	S	S	.185P	16N	87	53.0	29.0	2700	65.9	Replaced by 21A/U
21A	6021A	—	.332*	IIa	S	S	.185P	16N	80	53.0	29.0	2700	65.9	Now designated as 222/U
22	6022	—	.405*	I	—	TC	.285P	Two 7/.0152C	103	95.0	16.0	1000	65.9	—
22A	6022A	—	.420*	II	TC	TC	.285P	Two 7/.0152C	131	95.0	16.0	1000	65.9	Replaced by 22B/U
22B	6022B	—	.420*	IIa	TC	TC	.285P	Two 7/.0152C	130	95.0	16.0	1000	—	Twin cond. bal. cable (paired)
23	6023	—	.650 .945*	I	C	C	Two Cores .380P	Two 7/21	380	125.0	12.0	3000	—	Replaced by 23A/U
23A	6023A	—	.650 .945*	IIa	C	C	Two Cores .380P	Two 7/21C	360	125.0	12.0	3000	—	—
24	6024	.735* 1.034	.650* .945*	I	C	C	.380P	Two 7/21C	430	125.0	12.0	3000	—	Replaced by 24A/U
24A	6024A	.735* 1.034	.650* .945*	IIa	C	C	Two Cores .380P	Two 7/21C	410	125.0	12.0	3000	—	Replaced by 23A/U with armor
29	6029	—	.184*	III	—	TC	.116P	20C	21	53.0	28.5	1900	65.9	Replaced by 58/U
34	6034	—	.625*	I	—	C	.455P	7/.21C	230	71.0	21.5	5200	65.9	Replaced by 34B/U
34A	6034A	—	.630*	IIa	—	C	.460P	7/.0249	224	75.0	20.5	6500	65.9	Replaced by 34B/U
34B	6034B	—	.630*	IIa	—	C	.460P	7/.0249	224	75.0	21.5	6500	65.9	Hi-power, low atten. flexible cable
35	6035	.945*	.870	II	—	C	.680P	9c	458	71.0	—	10,000	65.9	Replaced by 35B/U
35A	6035A	.945*	.870	IIa	—	C	.680P	9c	454	71.0	—	10,000	65.9	Replaced by 35B/U
35B	6035B	.945*	.870	IIa	—	C	.680P	.1045C	454	75.0	—	10,000	65.9	Hi-power low attenuation. Same as 164/U armored

* Nominal Overall Diameter

KEY TO ABBREVIATIONS:

C—Bare Copper
S—Silvered Copper
P—Polyethylene
CW—Copperweld
CT—Bare Coppertube
N—Nichrome
TC—Tinned Copper
ASP—Air Spaced Polyethylene
SSP—Semi-Solid Polyethylene
CCP—Conductive Coated Polyethylene
T—Teflon
TT—Teflon Tape
AST—Air Spaced Tetrafluorethylene
K—KARMA
SCW—Silvered Copperweld
SCB—Silver Plated Cadmium Bronze

DEARBORN

RG COAXIAL CABLE

PHYSICAL PROPERTIES / ELECTRICAL PROPERTIES

RG/U No.	Dearborn No.	Armor O.D.	Jkt. O.D.	Jkt. Type	Shields Outer	Shields Inner	Dielec-tric O.D. & Type	Center Cond.	Lbs. Per 1000 Ft.	Nom. Imped. Ohms	Nom. Cap. Mmfd/ft.	Max. Operating Volt.(Rms)	V.P. %	ENGINEERING DATA
54	6054	—	.275*	I	—	C	.185P	7/26C	41	58.0	21.0	2500	—	Replaced by 54A/U
54A	6054A	—	.250*	III	—	TC	.178P	7/.0152C	40	58.0	27.0	3000	—	—
55	6055	—	.206*	III	TC	TC	.116P	20C	36	53.0	28.5	1900	65.9	Replaced by 55B/U
55A	6055A	—	.216*	IIa	S	S	.116P	.035S	34	50.0	30.5	1900	65.9	Replaced by 223/U
55B	6055B	—	.206*	IIIa	TC	TC	.116P	20S	34	53.5	28.5	1900	65.9	—
57	6057	—	.625*	I	—	TC	.472P	Two 7/21C	248	95.0	16.0	3000	65.9	Replaced by 57A/U
57A	6057A	—	.625*	IIa	—	TC	.472P	Two 7/21C	225	95.0	16.0	3000	65.9	—
58	6058	—	.195*	I	—	TC	.116P	20C	28	53.5	28.5	1900	65.9	—
58A	6058A	—	.195*	I	—	TC	.116P	19/.0071TC	29	52.0	28.5	1900	65.9	—
58B	6058B	—	.195*	IIa	—	TC	.116P	20C	25	53.5	28.5	1900	65.9	—
58C	6058C	—	.195*	IIa	—	TC	.116P	19/.0071TC	25	50.0	28.5	1900	65.9	—
59	6059	—	.242*	I	—	C	.146P	22CW	32	73.0	21.0	2300	65.9	Video cable
59A	6059A	—	.242*	IIa	—	C	.146P	.023CW	32	75.0	20.5	2300	65.9	Replaced by 59B
59B	6059B	—	.242*	IIa	—	C	.146P	.023CW	32	75.0	21.5	2300	65.9	—
62	6062	—	.242*	I	—	C	.146ASP	22CW	38	93.0	13.5	750	84.0	—
62A	6062A	—	.242*	IIa	—	C	.146ASP	22CW	37	93.0	13.5	750	84.0	Low capacitance cable
62B	6062B	—	.242*	IIa	—	C	.146ASP	7/32CW	30	93.0	13.5	750	84.0	Similar to 62A/U
62C	6062C	—	.242	V	—	S	.146AST	22SCW	36	93.0	13.5	750	84.0	Reassigned 210/U
63	6063	—	.405*	I	—	C	.285ASP	22CW	88	125.0	10.0	1000	84.0	Replaced by 63B/U
63B	6063B	—	.405*	IIa	—	C	.285ASP	22CW	84	125.0	10.0	1000	84.0	Low capacitance air spaced cable
71	6071	—	.250*	I	TC	C	.146ASP	22CW	46	93.0	13.5	750	84.0	Replaced by 71B/U
71A	6071A	—	.250*	I	TC	TC	.146ASP	22CW	46	93.0	13.5	750	84.0	—
71B	6071B	—	.250*	IIIa	TC	TC	.146ASP	22CW	45	93.0	13.5	750	84.0	—
74	6074	.615*	.545	II	C	C	.370P	10C	234	52.0	29.5	5500	65.9	Replaced by 74A/U
74A	6074A	.615*	.545	IIa	C	C	.370P	10C	236	52.0	29.5	7000	65.9	Now designated as 224/U
—	6075sm	—	.150	I	—	C	.100P	7/.0056CW	.7	75.0	20.5	2500	65.9	Subminiature
79	6079	.475*	.405	I	—	C	.285ASP	22CW	136	125.0	10.0	1000	84.0	Replaced by 79B/U
79A	6079A	.415*	.405	I	—	C	.285P	22CW	114	125.0	11.0	1000	—	Replaced by 79B/U
79B	6079B	.475*	.405	IIa	—	C	.285ASP	22CW	111	125.0	10.0	1000	84.0	63B/U with armor
83	6083	—	.405*	I	—	C	.240P	10C	122	35.0	44.0	2000	—	—
85A	6085A	Ld. Shth. Armor 1.565	.870	IIa	—	C	.680P	9C	2,910	75.0	21.5	10,000	65.9	RG84A/U with armor special
87A	6087A	—	.425	V	S	S	.280T	7/20S	174	50.0	29.5	5000	69.5	Replaced by 225/U
88A/u	6088A	—	.515*	IV	4 TC	—	—	19/.0117TC	180	45.0	50.0	—	—	Pulse cable formerly 88B/U
94	6094	—	.445*	V	C	C	.292TT	19/.0225S	247	50.0	27.0	7000	70.0	Replacement only, new design 226/U
94A	6094A	—	.500*	V	C	C	.370TT	19/.0224S	445	50.0	27.0	7000	—	Reassigned 226/U
100	6100	—	.242*	I	—	C	.146P	10/.0147C	74	35.0	44.0	2000	—	—
108	6108	—	.235*	II	—	TC	OverEa.Cond. .079P	Two 7/28TC	31	78.0	24.5	1000	68.0	Replaced by 108A/U
108A	6108A	—	.235*	IIa	—	TC	OverEa.Cond. .079P	Two 7/28TC	30	78.0	20.0	1000	68.0	Shielded twisted pair
111	6111	.490*	—	II	TC	TC	.285P	Two 7/.0152C	146	95.0	16.0	1000	65.9	22A/U with armor
111A	6111A	.490*	.420	IIa	TC	TC	.285P	Two 7/.0152C	145	95.0	16.0	1000	65.9	22B/U with armor
114	6114	—	.405*	I	—	C	.285ASP	33CW	87	185.0	6.8	1000	88.0	Low capacitance cable
114A	6114A	—	.405*	IIa	—	C	.285SSP	33CW	87	185.0	7.5	1000	88.0	Special low capacitance cable
115	6115	—	.375	V	S	S	.250TT	7/21S	139	50.0	29.5	5000	70.0	Used where expan. & contrac. are prob.
115A	6115A	—	.415	V	S	S	.250TT	7/21S	159	50.0	29.5	5000	70.0	—
116	6116	.475	.425	V	S	S	.280T	7/20S	224	50.0	29.5	5000	69.5	Replaced by 227/U
117	6117	—	.730	V	—	C	.620T	.188C	450	50.0	29.0	7000	69.5	Replaced by 211/U
117A	6117A	—	.730	V	—	C	.620T	.188C	450	50.0	29.0	7000	69.5	Replaced by 211A/U
118	6118	.795	.730	V	—	C	.620T	.188C	610	50.0	29.0	7000	69.5	Replaced by 228/U

* Nominal Overall Diameter

DEARBORN

PHYSICAL PROPERTIES										ELECTRICAL PROPERTIES				
					Shields									
RG/U No.	Dearborn No.	Armor O.D.	Jkt. O.D.	Jkt. Type	Outer	Inner	Dielec-tric O.D. & Type	Center Cond.	Lbs. Per 1000 Ft.	Nom. Imped. Ohms	Nom. Cap. Mmfd/ft.	Max. Operating Volt.(Rms)	V.P. %	ENGINEERING DATA
118A	6118A	.780	.730	V	—	C	.620T	.188C	600	50.0	29.5	7000	69.5	Replaced by 228A/U
119	6119	—	.465	V	C	C	.332T	.102C	225	50.0	29.5	6000	69.5	——
120	6120	.525	.465	V	C	C	.332T	.102C	282	50.0	29.5	6000	69.5	119/U with armor
122	6122	—	.160*	IIa	—	TC	.096P	27/36TC	20	50.0	29.5	1900	65.9	Similar to 58A/U except smaller
126	6126	—	.280	V	—	K	.185T	7/24K	76	50.0	28.5	3000	68.5	High attenuation
130	6130	—	.625*	I	—	TC	.472P	Two 7/.0285C	220	95.0	17.0	8000	—	Same as 57A/U except more flexible
131	6131	.710*	.625*	I	—	TC	.472P	Two 7/.0285C	295	95.0	17.0	8000	—	130/U with armor
133	6133	—	.405*	I	—	C	.280P	21C	94	95.0	16.2	4000	—	Replaced by 133A/U
133A	6133A	—	.405*	IIa	—	C	.280P	21C	89	95.0	16.2	4000	—	——
140	6140	—	.233	V	—	S	.146T	.025SCW	45	75.0	21.0	2300	69.5	High temperature similar to 59A/U
141	6141	—	.190	V	—	S	.116T	.0359SCW	35	50.0	28.5	1900	69.5	——
141A	6141A	—	.190	V	—	S	.116T	.039SCW	32	50.0	28.5	1900	69.5	High temperature similar to 58C/U
142	6142	—	.206	V	S	S	.116T	.0359SCW	45	50.0	28.5	1900	69.5	——
142A	6142A	—	.206	V	S	S	.116T	.039SCW	45	50.0	28.5	1900	69.5	High temperature similar to 55A/U
142B	6142B	—	.195	IX	S	S	.116T	.039SCW	42	50.0	28.5	1900	69.2	——
143	6143	—	.325	V	S	S	.185T	.057SCW	102	50.0	28.5	3000	69.5	——
143A	6143A	—	.325	V	S	S	.185T	.059SCW	102	50.0	28.5	3000	69.5	High temperature similar to 58/U
144	6144	—	.410	V	—	S	.285T	7/25SCW	120	75.0	20.5	5000	69.5	High temperature similar to 11/U
146	6146	—	.375	V	—	C	.285AST	.007CW	108	190.0	6.0	1000	—	High temperature, low capacitance
149	6149	—	.405	I	—	TC	.285CCP	7/26TC	92	75.0	20.5	5000	65.9	11/U low noise
150	6150	.475	.405	I	—	TC	.285CCP	7/26TC	116	75.0	20.5	5000	65.9	149/U with armor
161	6161	—	.082	External Nylon Blk.	—	S	.057T	7/.004SCB	6.1	70.0	20.0	1000	69.5	——
164	6164	—	.870	IIa	—	C	.680P	.1045C	389	75.0	21.0	10,000	65.9	35B/U less armor
165	6165	—	.410	V	—	S	.285T	7/.032S	140	50.0	29.5	5000	69.5	——
166	6166	.460	.410	V	—	S	.285T	7/.032S	172	50.0	29.5	5000	69.5	165/U with armor
174	6174	—	.100	I	—	TC	.060P	7/34CW	7.5	50.0	30.0	1500	65.9	——
174A	6174A	—	.100	IIa	—	TC	.060P	7/0063	.8	50.0	30.8	1500	—	Miniature data trans.
177	6177	—	.895	IIa	S	S	.680P	.195C	460	50.0	30.5	1100	65.9	——
178	6178	—	.079	KEL-F	—	S	.036T	7/.0039S	5.4	50.0	27.9	1000	69.5	Replacement only, new design 178B/U
178A	6178A	—	.075	KEL-F	—	S	.034T	7/.004SCW	6	50.0	27.9	1000	69.5	Replacement only, new design 178B/U
178B	6178B	—	.075	IX	—	S	.034T	7/.004SCW	6.2	50.0	28.5	1000	69.5	——
179	6179	—	.090	KEL-F	—	S	.056T	7/.004SCW	8	70.0	19.5	1000	69.5	Replacement only, new design 179A/U
179A	6179A	—	.105	KEL-F	—	S	.063T	7/.004SCW	9.6	75.0	19.5	1200	69.5	Replacement only, new design 179B/U
179B	6179B	—	.105	IX	—	S	.063T	7/.004SCW	9.6	75.0	19.5	1200	69.5	High temperature miniaturized cable
180	6180	—	.141	KEL-F	—	S	.103T	7/.004SCW	18	93.0	15.5	1500	69.5	——
180A	6180A	—	.145	KEL-F	—	S	.102T	7/.004SCW	19	95.0	15.0	1800	69.5	Replacement only, new design 180B/U
180B	6180B	—	.145	IX	—	S	.102T	7/.004SCW	19	95.0	15.0	1500	69.5	——
181	6181	—	.640	IIa	—	C	.210P	Two 7/26C	200	12.5	12.0	3500	—	Unbalanced cable
187	6187	—	.110	VII	—	S	.063T	7/.004SCW	11	75.0	19.5	1200	69.5	Replacement only, new design 187A/U
187A	6187A	—	.110	VII	—	S	.060T	7/.004SCW	11	75.0	19.5	1200	69.5	High temperature miniaturized cable
188	6188	—	.110	VII	—	S	.060T	7/.0067SCW	11	50.0	29.0	1200	69.5	Replacement only, new design 188A/U
188A	6188A	—	.110	VII	—	S	.060T	7/.0067SCW	11	50.0	29.0	1200	69.5	High temperature miniaturized cable
195	6195	—	.155	VII	—	S	.102T	7/.004SCW	21	95.0	15.0	1500	69.5	Same as 189B/U except H.O.conductor
195A	6195A	—	.155	VII	—	S	.102T	7/.004SCW	21	95.0	15.0	1500	69.5	For FEP jacket type, refer to 180B/U
196	6196	—	.080	VII	—	S	.034T	7/.004SCW	5.8	50.0	28.5	1000	69.5	High temperature miniaturized cable
196A	6196A	—	.080	VII	—	S	.034T	7/.004SCW	5.9	50.0	28.5	1000	69.5	For Fep jacket type, refer to 178B/U
209	6209	—	.745	VI	S	S	.500AST	19/.0378S	432	50.0	26.5	3200	84.0	High power, high flex coaxial
210	6210	—	.242	V	—	S	.146AST	22SCW	40	93.0	14.5	750	84.0	Replaces 62C/U

KEY TO ABBREVIATIONS:

* Nominal Overall Diameter

C—Bare Copper	P—Polyethylene	N—Nichrome	ASP—Air Spaced Polyethylene	T—Teflon	K—KARMA
S—Silvered Copper	CW—Copperweld	TC—Tinned Copper	SSP—Semi-Solid Polyethylene	TT—Teflon Tape	SCW—Silvered Copperweld
	CT—Bare Coppertube		CCP—Conductive Coated Polyethylene	AST—Air Spaced Tetrafluorethylene	SCB—Silver Plated Cadmium Bronze

DEARBORN

RG COAXIAL CABLE

PHYSICAL PROPERTIES										ELECTRICAL PROPERTIES				
					Shields									
RG/U No.	Dearborn No.	Armor O.D.	Jkt. O.D.	Jkt. Type	Outer	Inner	Dielectric O.D. & Type	Center Cond.	Lbs. Per 1000 Ft.	Nom. Imped. Ohms	Nom. Cap. Mmfd/ft.	Max. Operating Volt.(Rms)	V.P. %	ENGINEERING DATA
211	6211	—	.730	V	—	C	.620T	.190C	450	50.0	29.0	7000	69.5	Formerly 117/U
211A	6211A	—	.730	V	—	C	.620T	.190C	450	50.0	29.5	7000	69.5	Formerly 117A/U
212	6212	—	.332	IIa	S	S	.185P	.0556S	83	50.0	29.5	3000	65.9	Formerly 5B/U
213	6213	—	.405	IIa	—	C	.285P	7/.0296C	120	50.0	29.5	3000	65.9	Formerly 8A/U
214	6214	—	.425	IIa	S	S	.285P	7/.0296S	127	50.0	29.5	3000	65.9	Formerly 9B/U
215	6215	.475	.405	IIa	—	C	.285P	7/.0296C	149	50.0	29.5	3000	65.9	Formerly 10A/U
216	6216	—	.425	IIa	C	C	.285P	7/261C	130	75.0	20.5	5000	65.9	Formerly 13A/U
217	6217	—	.545	IIa	C	C	.370P	.106C	220	50.0	29.5	7000	65.9	Formerly 14A/U
218	6218	—	.870	IIa	—	C	.680P	.195C	467	50.0	29.5	11,000	65.9	Formerly 17A/U
219	6219	.945	.870	IIa	—	C	.680P	.195C	515	50.0	29.5	11,000	65.9	Formerly 18A/U
220	6220	—	1.120	IIa	—	C	.910P	.260C	740	50.0	29.5	14,000	65.9	Formerly 19A/U
221	6221	1.195	1.120	IIa	—	C	.910P	.260C	800	50.0	29.5	14,000	65.9	Formerly 20A/U
222	6222	—	.332	IIa	S	S	.185P	.0556N	84	50.0	29.0	2700	65.9	Formerly 21A/U
223	6223	—	.216	IIa	S	S	.116P	.035S	36	50.0	29.5	1900	65.9	Formerly 55A/U
224	6224	.615	.545	IIa	C	C	.370P	.106C	236	50.0	29.5	7000	65.9	Formerly 74A/U
225	6225	—	.430	V	S	S	.285T	7/.0312S	174	50.0	29.5	5000	69.5	Formerly 87A/U
226	6226	—	.500	V	C	C	.370TT	19/.0254S	247	50.0	29.5	7000	70.0	Formerly 94A/U
227	6227	.490	.430	V	S	S	.285T	7/.0312S	224	50.0	29.5	5000	69.5	Formerly 116/U
228	6228	.795	.730	V	—	C	.620T	.190C	625	50.0	29.5	7000	69.5	Formerly 118/U
228A	6228A	.784	.730	V	—	C	.620T	.190C	625	50.0	29.5	7000	69.5	Formerly 118A/U
235	6235	—	.470	VI	S	S	.255TT	7/.028S	180	50.0	29.5	5000	70.0	115A/U with Type VI jacket
264	6264	—	.750 .245	I	C	Over Ea. C	.176P	Four 19/27C	340	40.0	38.0	—	65.9	Four individual coaxials cabled together
264A	6264A	—	.750	IIa	C	Over Ea. C	.176P	Four 19/27C	340	40.0	38.0	—	65.9	Four individual coaxials cabled together
280	6280	—	.480	IIa	S	S	.327AST	.114C	179	50.0	27.5	4000	—	——
281	6281	—	.750	VI	S	S	.500AST	19/.0378S	400	50.0	29.0	4000	—	——
298	6298	—	.650	Poly Foamed	—	—	.115P	7/24CW	108	—	—	—	—	MIL-C-22667A
301	6301	—	.245	IX	—	K	.185T	7/.0203K	65	50.0	29.0	3000	—	Same as 126/U except for FEP jacket
302	6302	—	.206	IX	—	S	.146T	.025SCW	45	75.0	21.0	2300	69.5	Same as 140/U except for FEP jacket
303	6303	—	.170	IX	—	S	.116T	.039SCW	35	50.0	28.5	1900	69.5	Same as 141A/U except for FEP jacket
304	6304	—	.280	IX	S	S	.185T	.059SCW	102	50.0	28.5	3000	69.5	Same as 143A/U except for FEP jacket
307A	6307A	—	.270	Poly Foamed	S	S	—	19/.0058S	51	—	75.0	—	—	Special triaxial
316	6316	—	.102	IX	—	S	.060T	7/.0067SCW	11	50.0	29.0	1200	69.5	Same as 188/U except for FEP jacket
317	6317	—	.710	IV	—	TC	.446T	Two Cores 7/.0290	—	95.0	15.4	10,000	—	Water blocked
318	6318	—	1.125	IIIa	—	1.005 CT	.795SSP	OD .358 ID .287	53	50.0	22.0	44KW	—	——
319	6319	—	2.000	IIIa	—	1.83 CT	1.57SSP	OD .688 ID .588	104	50.0	22.0	145KW	—	——
321	6321	—	2.850	None	—	2.85 CT	SSP	OD 1.14	121	50.0	21.7	320KW	—	——
322	6322	—	3.040	PE	—	2.85 CT	SSP	OD 1.14	178	50.0	21.7	320KW	—	——
323	6323	—	1.060	PE	—	.980 CT	Foam	.312CT	42	50.0	25.6	1480	—	——
324	6324	—	.980	None	—	.980 CT	Foam	.312CT	32	50.0	25.6	1480	—	——
325	6325	—	.350	PUR	S	S	.26P	19/.0200SAL	10	50.0	26.3	750	—	Low loss
326	6326	—	.697	PUR	S	S	.55P	19/.040SAL	24	50.0	26.3	1700	—	Low loss
327	6327	—	1.010	PUR	S	S	.84	19/.064SAL	55	50.0	26.3	2500	—	Low loss
328	6328	—	1.460	IV	ITC IGS	ITC	1.065R	.485TCB	146	25.0	85.0	20,000	—	——
329	6329	—	.700	IV	ITC IGS	ITC	.380R	19/.0117	35.3	50.0	50.0	15,000	—	——

* Nominal Overall Diameter

DEARBORN WIRE AND CABLE CO. 9299 Evenhouse Avenue, Rosemount, Illinois 60018 • Phone (312) 696-1000

DEARBORN

PHYSICAL PROPERTIES / ELECTRICAL PROPERTIES

RG/U No.	Dearborn No.	Armor O.D.	Jkt. O.D.	Jkt. Type	Shields		Dielectric O.D. & Type	Center Cond.	Lbs. Per 1000 Ft.	Nom. Imped. Ohms	Nom. Cap. Mmfd/ft.	Max. Operating Volt.(Rms)	V.P. %	ENGINEERING DATA
					Outer	Inner								
330	6330	—	.242	—	—	IS	Foam	S	—	50.0	25.0	—	—	——
331	6331	—	.600	IIIa	—	.500 Al. Tube	.450Foam	.162C	18.7	50.0	25.0	2500	—	RG231 jacketed
332	6332	—	.875	None	—	.875 Al. Tube	.801F	.280C	46.6	50.0	25.0	4500	—	Per MIL-C-23806
333	6333	—	1.015	IIIa	—	.875 Al. Tube	.801F	.288C	54.8	50.0	25.0	4500	—	RG332 jacketed
334	6334	—	.500	None	—	.500 Al. Tube	.450F	.098C	10.9	75.0	17.0	2500	—	Per MIL-C-23806
335	6335	—	.625	IIIa	—	.500 Al. Tube	.450F	.098C	19.3	75.0	17.0	2500	—	RG334 jacketed
336	6336	—	.875	None	—	.875 Al. Tube	.801F	.173C	31.5	75.0	17.0	4000	—	Per MIL-C-23806
337														——
359														——
360	6360	—	.825	IIIa	—	.750 Al. Tube	.676F	.243C	39.7	50.0	25.0	4000	—	Per MIL-C-23806
366	6366	—	.620	IIIa	—	.540 CT	Foam	160C	—	50.0	26.6	4000	—	——
367	6367	—	5.200	IIIa	—	.500 Corr. CT	Corr.CT	—	459	50.0	21.7	830KW	—	——
369	6369	—	.470	IIIa	—	.390 Al. Tube	.318P	.117C	14.0	50.0	24.0	700	—	——
370	6370	—	.390	None	—	.390 Al. Tube	.318P	.117C	10	50.0	24.0	700	—	——
372														
373														
374	6374	—	.650	Foam	—	—	.160P	.0285C	9.7	—	—	—	—	Buoyant antenna
375										—	—	—	—	——
376	6376	—	1.060	IIIa	—	Corr. Al. Tube	Foam	.312CT	39	50.0	26.0	6000	—	——
377	6377	—	.530	None	—	.530 Al. Tube	T	.165S Tube	17	50.0	24.0	1000	—	——
378	6378	—	2.000	IIIa	—	1.830 Al. Tube	SSP	.713CT	62	50.0	22.1	145KW	—	——
379														——
381														
382			1.625	—	—	Al. Tube	—	—	—	50.0	—	—	—	——
383	6383	—	.650	Foam	—	—	P	2 Cond. .0403	—	100.0	—	—	—	200016 tens. Twisted par.
384	6384	—	.650	Foam	—	Flat C Braid	P	.0508C	—	50.0	30.8	—	—	Buoyant antenna 600 psig
385	6385	—	.660	Option	—	.500 Corr. Al.	.425SS PTFE	.153SC	17.8	50.0	25.0	1500	—	Low loss
386	6386	—	.650	Foam	—	—	P	.0508CCS	—	—	—	—	—	400 lb. break
388	6388	—	.545	IIIa	—	.144 S	P	SC	—	50.0	30.8	—	—	Watertight see RG14A
389	6389	—	.875	IIIa	S	S	.635PE	.250C AL	36.6	50.0	22.8	2000	—	Replace RG189
391	6391	—	.405	IIa	—	TC	.285PE	7/.0159TC	9.2	72.0	—	5000	—	Low noise
392	6392	.475	.405	IIa	—	TC	.285PE	7/.0159TC	11.4	72.0	—	5000	—	RG391 Armored
393	6393	—	.390	IX	S	S	.285T	7/.0312	16.5	50.0	29.4	5000	—	Moisture proof RG225
397	6397	—	.360	IX	S	S	.270AST	7/.032S	12.5	50.0	28.0	2000	—	Low loss RG393
400	6400	—	.195	IX	S	S	.116T	19/.007SPC	5	50.0	29.3	1900	—	——
401	6401	—	.250	None	—	.250 CT	.215T	.0645SPC	8.1	50.0	29.3	3000	—	Semiflex RG304
402	6402	—	.141	None	—	.141 Tube	.119T	.036SCCS	3.2	50.0	29.3	2500	—	Semiflex RG142B
403	6403	—	.116	IX	S	S	.034T	7/.004S	.7	50.0	29.3	2500	—	Triaxial RG178B
404	6404	—	.075	IX	—	S	.034T	7/.004SCCS	.55	50.0	31.5	2000	—	.ow noise RG178B

KEY TO ABBREVIATIONS:

* Nominal Overall Diameter

C—Bare Copper
S—Silvered Copper
P—Polyethylene
CW—Copperweld
CT—Bare Coppertube
SAL — Silvered Aluminum
N—Nichrome
TC—Tinned Copper
ASP—Air Spaced Polyethylene
SSP—Semi-Solid Polyethylene
CCP—Conductive Coated Polyethylene
PE — Polyethylene
T—Teflon
TT—Teflon Tape
AST—Air Spaced Tetrafluorethylene
PUR — Polyurethane
K—KARMA
SCW—Silvered Copperweld
SCB—Silver Plated Cadmium Bronze
CORR — Corrugated

DEARBORN WIRE AND CABLE CO. 9299 Evenhouse Avenue, Rosemount, Illinois 60018 • Phone (312) 696-1000

DEARBORN

TRIAXIAL CABLE DOUBLE SHIELD, DOUBLE JACKET

RG/U TYPE	DEARBORN NO.	JACKET O.D.	JACKET TYPE	OUTER SHIELDS	INNER SHIELDS	DIELECTRIC O.D. & TYPE	CENTER CONDUCTOR	LBS. PER 1000 FT.	NOM. IMPED. OHMS	NOM. CAP. MMFD/FT.	MAX. OPERATING VOLT. (RMS)	V.P. %
58A	6058AT	.285	1	TC	TC	.116P	19/0071TC	62	52	28.5	1900	65.9
59	6059T	.305	1	C	C	.146P	22CW	88	73	21.0	2300	65.9
11	6011T	.460	1	C	C	.285P	7/26TC	178	75	20.5	5000	65.9
8	6008T	.490	1	C	C	.285P	7/21TC	188	52	29.5	5000	65.9

LOW LOSS COAXIAL CABLE WITH (FOAM) CELLULAR POLYETHYLENE DIELECTRIC

Compared to ordinary RG/U cable of similar size, the attenuation of cellular polyethylene (Foam Core) dielectric cable is reduced by as much as 35%. These cables are well suited for CATV, Closed Circuit or MATV; ideal for use in amateur, commercial or citizen band installations. All are made to adapt to unusual terrain problems and resist damage from weather extremes.

RG/U TYPE	DEARBORN NO.	JACKET O.D.	JACKET TYPE	SHIELD	DIELECTRIC O.D. & TYPE	CENTER CONDUCTOR	LBS. PER 1000 FT.	NOM. IMPED. OHMS	NOM. CAP. MMFD/FT.	MAX. OPERATING VOLT. (RMS)	V.P. %
8	6008F	.405	I	C	.285 FC	7/19C	93	50	24.5	1500	80
11	6011F	.405	I	C	.285 FC	7/26C	88	75	16.5	1300	80
58	6058F	.195	I	C	.116 FC	20C	21.5	50	17.0	1000	80
59	6059F	.242	I	C	.146 FC	20C	32	75	17.3	1000	80

FOAM POLYETHYLENE TRIAXIAL CABLE DOUBLE SHIELD, DOUBLE JACKET

11	6011FT	.475	1	C	.285 FC	14C	178	75	16.5	1300	80
59	6059FT	.315	1	C	.146 FC	22CW	88	75	17.3	1000	80

AUTOMOTIVE WIRE

TYPE G.P.T. — SAE, TYPE I, PRIMARY WIRE

Single conductor, stranded bare copper. Color coded polyvinylchloride insulation. Resistant to grease, oil, gasoline, acid and ageing.

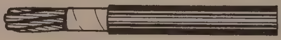
G.P.T. SAE TYPE 1 AUTOMOTIVE WIRE

DEARBORN NO.	AWG SIZE	STRAND-ING	NOM. WALL THICK-NESS	NOM. O.D.	STOCK COLORS	STOCK PUT UP (FT.)	DEARBORN NO.	AWG SIZE	STRAND-ING	NOM. WALL THICK-NESS	NOM. O.D.	STOCK COLORS	STOCK PUT UP (FT.)
992007	**20**	7/28	.023	.084	2, 0	100 & 1000	991219	**12**	19/25	.026	.142	0, 1, 2, 4, 5, 6, 9	100 & 1000
991816	**18**	16/30	.023	.093	2, 0	100 & 1000	991019	**10**	19/23	.031	.175	2, 9, 0	100 & 500
991619	**16**	19/29	.023	.102	0, 1, 2, 4, 5, 6, 9	100 & 1000	990865	**8**	65/26	.040	.230	2, 0	100 & 500
991419	**14**	19/27	.023	.117	0, 1, 2, 4, 5, 6, 9	100 & 1000	990649	**6**	49/23	.049	.282	2, 0	100 & 500

WELDING CABLE

INDUSTRO-FLEX NEOPRENE WELDING CABLE

The Industro-Flex Neoprene series is a new development which utilizes No. 30 stranding. It has a smaller O.D. and still retains flexibility at lower prices than the standard Neoprene welding cable.



NEOPRENE AND RUBBER WELDING CABLES

These cables are constructed of stranded bare copper conductors, with a tape wrap and either a neoprene or rubber jacket overall as specified in tables below. All have extra fine stranding, are extremely flexible and have high resistance to abrasion, impact, flexing and twisting.

INDUSTRO-FLEX NEOPRENE WELDING CABLE

DEARBORN NO.	AWG SIZE	STRAND-ING	NOM. O.D.	CURRENT CARRYING CAP. (AMPS)	PUT UP SOLD PER FT.
820600	**6**	259/30	.376	75	25′ Min.
820400	**4**	413/30	.420	100	25′ Min.
820300	**3**	532/30	.455	150	25′ Min.
820200	**2**	665/30	.495	200	25′ Min.
820100	**1**	840/30	.550	250	25′ Min.
820001	**1/0**	1050/30	.615	300	25′ Min.
820002	**2/0**	1323/30	.690	375	25′ Min.
820003	**3/0**	1680/30	.740	450	25′ Min.
820004	**4/0**	2121/30	.835	500	25′ Min.

NEOPRENE WELDING CABLE

DEARBORN NO.	AWG SIZE	STRAND-ING	NOM. O.D.	CURRENT CARRYING CAP. (AMPS)	PUT UP SOLD PER FT.
500600	**6**	1050/36	.400	75	25′ Min.
500400	**4**	1057/34	.450	100	25′ Min.
500300	**3**	1344/34	.490	150	25′ Min.
500200	**2**	1680/34	.560	200	25′ Min.
500100	**1**	2142/34	.610	250	25′ Min.
500001	**1/0**	2667/34	.680	300	25′ Min.
500002	**2/0**	3360/34	.730	375	25′ Min.
500003	**3/0**	4270/34	.810	450	25′ Min.
500004	**4/0**	5355/34	.900	500	25′ Min.

RUBBER WELDING CABLE

DEARBORN NO.	AWG SIZE	STRAND-ING	NOM. O.D.	CURRENT CARRYING CAP. (AMPS)	PUT UP SOLD PER FT.
510600	**6**	1050/36	.400	75	25′ Min.
510400	**4**	1057/34	.450	100	25′ Min.
510300	**3**	1344/34	.490	150	25′ Min.
510200	**2**	1680/34	.560	200	25′ Min.
510100	**1**	2142/34	.610	250	25′ Min.
510010	**1/0**	2667/34	.680	300	25′ Min.
510002	**2/0**	3360/34	.730	375	25′ Min.
510003	**3/0**	4270/34	.810	450	25′ Min.
510004	**4/0**	5355/34	.900	550	25′ Min.

COLOR CODE: 0—Black • 1—Brown • 2—Red • 3—Orange • 4—Yellow • 5—Green • 6—Blue • 7—Violet • 8—Gray • 9—White.

DEARBORN WIRE AND CABLE CO. 9299 Evenhouse Avenue, Rosemount, Illinois 60018 • Phone (312) 696-1000

DEARBORN

SERVICE AND POWER CORDS-RUBBER NEOPRENE AND PLASTIC

U.L. LISTED & C.S.A. APPROVED

GENERAL CHARACTERISTICS

Temperature rating: −20°C to +60°C.

Voltage rating: Types SV, SVT, SJ, SJT, and SJO are 300 V rated; Type S and SO are 600 V rated. On SJO two types are listed: Stationary and Constant Service. Constant Service has more flexible stranding.

TYPES SV, SJ AND S/RUBBER CORD CONSTRUCTION

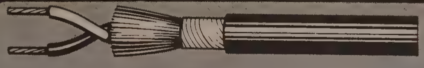
Conductors are stranded bare copper. Separator, color coded rubber insulation, cabled with fillers. Separator and tough rubber jacket overall.

TYPES SVT AND SJT PLASTIC CORDS

Types SVT and SJT are plastic insulated and plastic jacketed. Construction is same as SV and SJ. Jacket is black.

TYPES SJO AND SO/NEOPRENE CORD CONSTRUCTION

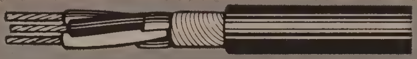
Conductors are stranded bare copper. Separator, color coded rubber insulation cabled with fillers. Separator and black neoprene jacket overall. Resistant to oil, grease, ozone, acid and moisture.



300 VOLT, RUBBER & NEOPRENE CORDS

DEARBORN NO.	U.L. TYPE	SIZE & NO. OF COND.	NOM. INSUL. THICK.	NOM. JKT. THICK.	NOM. O.D.	STOCK PUT UP (FT.)
SV & SJ RUBBER (STATIONARY SERVICE)						
1182V	SV	18/2	.016	.032	.245	50, 100, 250 & 1000
1183V	SV	18/3	.016	.032	.255	50, 100, 250 & 1000
1182	SJ	18/2	.032	.032	.305	50, 100, 250 & 1000
1183	SJ	18/3	.032	.032	.330	50, 100, 250 & 1000
1184	SJ	18/4	.032	.032	.370	50, 100, 250 & 1000
1162	SJ	16/2	.032	.032	.330	50, 100, 250 & 1000
1163	SJ	16/3	.032	.032	.360	50, 100, 250 & 1000
1164	SJ	16/4	.032	.032	.400	50, 100, 250 & 1000
1142	SJ	14/2	.032	.032	.370	50, 100, 250 & 1000
1143	SJ	14/3	.032	.032	.390	50, 100, 250 & 1000
1144	SJ	14/4	.032	.032	.420	50, 100, 250 & 1000
SVT & SJT PLASTIC CORDS						
8182	SVT	18/2	.016	.032	.245	50, 100, 250 & 1000
8183	SVT	18/3	.016	.032	.255	50, 100, 250 & 1000
*8184	SVT	18/4	.016	.032	.265	50, 100, 250 & 1000
7183	SJT	18/3	.032	.032	.330	50, 100, 250 & 1000
7163	SJT	16/3	.032	.032	.360	500 & 1000
SJO,SVO NEOPRENE (STATIONARY SERVICE)						
3182	SJO	18/2	.032	.032	.305	50, 100, 250 & 1000
3182V	SVO	18/2	.032	.032	.305	50, 100, 250 & 1000
3183	SJO	18/3	.032	.032	.330	50, 100, 250 & 1000
3184	SJO	18/4	.032	.032	.370	50, 100, 250 & 1000
3162	SJO	16/2	.032	.032	.330	50, 100, 250 & 1000
3163	SJO	16/3	.032	.032	.360	50, 100, 250 & 1000
3164	SJO	16/4	.032	.032	.400	50, 100, 250 & 1000
3142	SJO	14/2	.032	.032	.370	50, 100, 250 & 1000
3143	SJO	14/3	.032	.032	.390	50, 100, 250 & 1000
3144	SJO	14/4	.032	.032	.420	50, 100, 250 & 1000
SJO NEOPRENE (CONSTANT SERVICE)						
3182C	SJO	18/2	.032	.032	.305	50, 100, 250 & 1000
3183C	SJO	18/3	.032	.032	.330	50, 100, 250 & 1000
3184C	SJO	18/4	.032	.032	.370	50, 100, 250 & 1000
3162C	SJO	16/2	.032	.032	.330	50, 100, 250 & 1000
3163C	SJO	16/3	.032	.032	.360	50, 100, 250 & 1000
3164C	SJO	16/4	.032	.032	.400	50, 100, 250 & 1000

*NOT UL LISTED.



600 VOLT RUBBER & NEOPRENE HEAVY DUTY CORDS

DEARBORN NO.	U.L. TYPE	SIZE & NO. OF COND.	NOM. INSUL. THICK.	NOM. JKT. THICK.	NOM. O.D.	STOCK PUT UP (FT.)
TYPE S, RUBBER						
2182	S	18/2	.030	.060	.390	50, 100, 250 & 1000
2183	S	18/3	.030	.060	.405	50, 100, 250 & 1000
2184	S	18/4	.030	.060	.435	50, 100, 250 & 1000
2162	S	16/2	.030	.060	.405	50, 100, 250 & 1000
2163	S	16/3	.030	.060	.430	50, 100, 250 & 1000
2164	S	16/4	.030	.060	.485	50, 100, 250 & 1000
2142	S	14/2	.045	.075	.530	50, 100, 250 & 1000
2143	S	14/3	.045	.075	.560	50, 100, 250 & 1000
2144	S	14/4	.045	.075	.605	50, 100, 250 & 1000
2122	S	12/2	.045	.090	.600	50, 100 & 250
2123	S	12/3	.045	.090	.635	50, 100 & 250
2124	S	12/4	.045	.090	.665	50, 100 & 250
2102	S	10/2	.045	.090	.640	50, 100 & 250
2103	S	10/3	.045	.090	.690	50, 100 & 250
2104	S	10/4	.045	.090	.745	50, 100 & 250
2082	S*	8/2	.050	.090	.700	50 & 100
2083	S*	8/3	.050	.090	.750	50 & 100
2084	S*	8/4	.050	.090	.820	50 & 100
2062	S*	6/2	.050	.100	.820	50 & 100
2063	S*	6/3	.050	.100	.885	50 & 100
2064	S*	6/4	.050	.100	.975	50 & 100

DEARBORN NO.	U.L. TYPE	SIZE & NO. OF COND.	NOM. INSUL. THICK.	NOM. JKT. THICK.	NOM. O.D.	STOCK PUT UP (FT.)
TYPE SO, NEOPRENE						
4182	SO	18/2	.030	.060	.390	50, 100, 250 & 1000
4183	SO	18/3	.030	.060	.405	50, 100, 250 & 1000
4184	SO	18/4	.030	.060	.435	50, 100, 250 & 1000
4162	SO	16/2	.030	.060	.405	50, 100, 250 & 1000
4163	SO	16/3	.030	.060	.430	50, 100, 250 & 1000
4164	SO	16/4	.030	.060	.485	50, 100, 250 & 1000
4142	SO	14/2	.045	.075	.530	50, 100, 250 & 1000
4143	SO	14/3	.045	.075	.560	50, 100, 250 & 1000
4144	SO	14/4	.045	.075	.605	50, 100, 250 & 1000
4122	SO	12/2	.045	.090	.600	50, 100 & 250
4123	SO	12/3	.045	.090	.635	50, 100 & 250
4124	SO	12/4	.045	.090	.665	50, 100 & 250
4102	SO	10/2	.045	.090	.640	50, 100 & 250
4103	SO	10/3	.045	.090	.690	50, 100 & 250
4104	SO	10/4	.045	.090	.745	50, 100 & 250
4082	SO	8/2	.050	.090	.700	50 & 100
4083	SO	8/3	.050	.090	.750	50 & 100
4084	SO	8/4	.050	.090	.820	50 & 100
4062	SO	6/2	.050	.090	.820	50 & 100
4063	SO	6/3	.050	.090	.885	50 & 100
4064	SO	6/4	.050	.090	.975	50 & 100

DEARBORN

APPLIANCE AND FIXTURE WIRE

U.L. LISTED

SILICONE RUBBER TYPES

HIGH TEMPERATURE BRAIDLESS SILICONE RUBBER WIRE

Braidless silicone is easy stripping, and has excellent physical strength and mechanical properties. Recommended for stoves, dryers, motors and electronic devices where high temperatures are incurred. All conductors are of stranded tinned copper. U.L. Style 3212 — Sizes 10 thru 22; U.L. Style 3213 — Sizes 2 thru 8; U.L. Style 3214 — Sizes 00 thru 1.

HIGH TEMPERATURE SILICONE RUBBER WIRE WITH GLASS BRAID

High temperature silicone rubber insulation for easy stripping. Lacquered glass braid overall gives additional abrasion resistance. Lacquer prevents fraying of braid. Used for appliance and hookup wire. U.L. Style 3071 on AWG Sizes: Nos. 18, 16, 14, and 12. U.L. Style 3075 on AWG Size No. 10.

150°C, BRAIDLESS SILICONE, 600 VOLT

DEARBORN NO.	AWG SIZE	STRANDING	WALL THICKNESS	NOM. O.D.	STOCK COLORS	STOCK PUT UP (FT.)
392207	22	7/30	3/64	.129	9	500
392010	20	10/30	3/64	.135	0, 9	500
391816	18	16/30	3/64	.143	0, 2, 9	500
391626	16	26/30	3/64	.156	0, 2, 9	500
391441	14	41/30	3/64	.173	0, 2, 9	100 & 500
391265	12	65/30	3/64	.194	0, 2, 9	100 & 500
391065	10	65/28	3/64	.228	0, 9	100 & 500
390854	8	54/25	4/64	.295	0, 9	100 & 500
390684	6	84/25	4/64	.338	0, 9	100 & 500
394133	4	133/25	4/64	.397	0, 9	100 & 250
392259	2	259/26	4/64	.467	0, 9	100 & 250
391259	1	259/25	5/64	.542	0, 9	100 & 250
390001	0	259/24	5/64	.594	0, 9	100 & 250
390002	00	259/23	5/64	.674	0, 9	100 & 250

200°C, SILICONE, GLASS BRAID- 600 VOLT

DEARBORN NO.	AWG SIZE	STRANDING	WALL THICKNESS	NOM. O.D.	STOCK COLORS	STOCK PUT UP (FT.)
431816	18	16 x 30	1/32	.131	0, 9	500
431626	16	26 x 30	1/32	.144	0, 9	500
431441	14	41 x 30	1/32	.159	0, 9	500
431241	12	41 x 28	1/32	.180	0, 9	500
431065	10	65 x 28	3/64	.236	0, 9	500

ASBESTOS INSULATED TYPES

TYPE AA. U.L. Style C-2130, 150°C; 300 Volts. Designed for wiring of electric ranges, grills, space heaters and other types of electrical heating devices where heat but not moisture is present. Maximum copper temperature is 200°C (392°F).

TYPE AF. U.L. Style AF 3200, 150°C; 300 Volts. Stranded copper conductor; tape, felted asbestos insulation — flame, heat and moisture resistant. Approved for all types of interior illumination, particularly fluorescent devices, and all high wattage units, especially where socket temperatures exceed 90°C (194°F).

150°C TYPE AA, ASBESTOS, 300 VOLT

DEARBORN NO.	AWG SIZE	STRANDING	WALL THICKNESS	NOM. O.D.	STOCK COLORS	STOCK PUT UP (FT.)
451665	16	65/34	.075	.210	White	250
451400	14	104/34	.075	.230	White	250
451200	12	168/34	.075	.250	White	250
451000	10	261/34	.085	.285	White	250
450800	8	471/34	.085	.335	White	250
450600	6	665/34	.090	.390	White	250
450400	4	1057/34	.090	.425	White	250
450200	2	1680/34	.090	.500	White	250

150°C TYPE AF, 300 VOLT

DEARBORN NO.	AWG SIZE	STRANDING	WALL THICKNESS	NOM. O.D.	STOCK COLORS	STOCK PUT UP (FT.)
481816	18	16/30	1/32	.111	0, 2, 9	500
481626	16	26/30	1/32	.123	0, 2, 9	500
481441	14	41/30	1/32	.141	0, 2, 9	500
481265	12	65/30	3/64	.191	0, 2, 9	500
481000	10	105/30	3/64	.217	0, 2, 9	250

VINYL INSULATED WIRE

VINYL, COTTON BRAID, LACQUERED INSULATED WIRE

U.L. Styles 1009, 1014, 1025, 1265. Stranded tinned copper conductor, PVC insulation color coded; lacquered cotton braid overall. Excellent resistance to abrasion. Wide usage in electronic and transformer industries.

VINYL, LACQ'D COTTON BRAID

DEARBORN NO.	SIZE AWG	STRANDING	PVC INSUL. THK.	NOM. O.D.	UL STYLE	STOCK COLOR	STOCK PUT UP (FT.)
90°C — 300 VOLT							
472207F	22	7/30	1/64	.091	1009	0-6, 9	250 & 1000
472207	22	7/30*	1/64	.091	1009	0-6, 9	250 & 1000
472010F	20	10/30	1/64	.098	1009	0-6, 9	250 & 1000
472010	20	10/30*	1/64	.098	1009	0-6, 9	250 & 1000
471816	18	16/30	1/64	.113	1009	0-6, 9	250 & 1000
471626	16	26/30	1/64	.126	1009	0-6, 9	250 & 1000
90°C — 600 VOLT							
471441	14	41/30	1/32	.177	1014	0,2,4,5,9	250 & 1000
471265	12	65/30	1/32	.199	1014	0, 2	250
471065	10	65/28	1/32	.222	1014	0 Only	250
470884	8	84/27	3/64	.293	1025	0 Only	250
470684	6	84/25	4/64	.369	1265	0 Only	250

* Bonded

COLOR CODE: 0—Black • 1—Brown • 2—Red • 3—Orange • 4—Yellow • 5—Green • 6—Blue • 7—Violet • 8—Gray • 9—White.
OTHER COLORS AVAILABLE ON SPECIAL ORDER

STYLE 1007, U.L. HOOK-UP WIRE

Voltage rating: 300 Volts. Temperature rating: −10°C to +80°C. 1/64″ Polyvinylchloride insulation over stranded tinned copper.

STYLE 1061, U.L. SEMI-RIGID BUSINESS MACHINE WIRE

Voltage rating: 300 Volts. Temperature rating: −10°C to +80°C. .009″ Polyvinylchloride insulation over solid or stranded tinned copper.

"TEW" FLAME RETARDANT, FR-1 STYLES 1015, 1028, 1283, 1284 600 VOLT, 105°C AND FR-1 STYLE 1007, 300 VOLT, 80°C

The polyvinylchloride insulation used on this series has the necessary additives that enable the wire to pass the Vertical Flame Test as prescribed by the Underwriter Laboratories for this UL style. All this wire is imprinted with the symbol FR-1 indicating it is covered by the above specifications. See page 22 for high voltage Flame Resistant wire.

DEARBORN

THERMOPLASTIC INSULATED HOOKUP WIRE

U.L. AND C.S.A. APPROVED

X-L POLYETHYLENE, U.L. STYLES 3173, 3199, 125°C — 600 VOLT, 105°C — 300 VOLT

The Polyethylene insulation used on this series of lead wire is chemically cross-linked, which increases the moisture resistance, solvent resistance and aging characteristics. When momentary high temperatures caused by overloads or shorts occur, the insulation does not deform as quickly as if not cross-linked. Typical applications include small motors, control panels, dry transformers, etc. **Recommended maximum baking cycles:** 300°F for 24 hrs. — 325°F for 12 hrs. — 350°F for 8 hours.

300 VOLT, 80° C,U.L. STYLE 1007

DEARBORN PART NO.	AWG SIZE	STRAND-ING	NOM. O.D.	NOM. WALL THICK.
402801	28	1/28	.047	1/64
402807	28	7/36	.049	1/64
402601	26	1/26	.050	1/64
402607	26	7/34	.052	1/64
402607F	26	7/34	.052	1/64
402401	24	1/24	.055	1/64
402407	24	7/32	.058	1/64
402407F	24	7/32	.058	1/64
402201	22	1/22	.059	1/64
402207	22	7/30	.065	1/64
402207F	22	7/30	.065	1/64
402001	20	1/20	.066	1/64
402010	20	10/30	.070	1/64
402010F	20	10/30	.070	1/64
401801	18	1/18	.074	1/64
401816	18	16/30	.080	1/64
401816F	18	16/30	.080	1/64
401601	16	1/16	.085	1/64
401626	16	26/30	.094	1/64

PUT UP: 500 FT., 1000 FT., AND BULK
STOCK COLORS: 0-9

U.L. SEMIRIGID STYLE 1061

DEARBORN NO.	AWG SIZE	STRAND-ING	NOM. WALL	NOM. O.D.	STANDARD PUT UP (FT.)	STOCK COLORS
422601	26	1/26	.009	.036	500, 1000 & 5000	0-9
422607	26	7/34	.009	.037	500, 1000 & 5000	0-9
422401	24	1/24	.009	.041	500, 1000 & 5000	0-9
422407	24	7/32	.009	.042	500, 1000 & 5000	0-9
422201	22	1/22	.009	.046	500, 1000 & 5000	0-9
422207	22	7/30	.009	.049	500, 1000 & 5000	0-9
422001	20	1/20	.009	.052	500, 1000 & 5000	0-9
422007	20	7/28	.009	.057	500, 1000 & 5000	0-9
422010	20	10/30	.009	.057	500, 1000 & 5000	0-9
421801	18	1/18	.009	.060	500, 1000 & 5000	0-9
421807	18	7/26	.009	.067	500, 1000 & 5000	0-9
421816	18	16/30	.009	.067	500, 1000 & 5000	0-9
421626	16	26/30	.009	.076	500, 1000 & 5000	0-9

XL - 125° C - 600 VOLT U.L. STYLE 3173

DEARBORN NO.	AWG SIZE	STRAND-ING	NOM. WALL	NOM. O.D.	STANDARD PUT UP (FT.)	STOCK COLORS
752207	22	7/30	1/32	.094	1000 & 5000	0 only
752010	20	10/30	1/32	.102	1000 & 5000	0 only
751816	18	16/30	1/32	.112	1000 & 5000	0 only
751626	16	26/30	1/32	.125	1000 & 5000	0 only
751441	14	41/30	1/32	.143	1000 & 5000	0 only
751265	12	65/30	1/32	.164	1000 & 3000	0 only
751065	10	65/28	1/32	.187	1000 & 2000	0 only

XL - 105° C - 300 VOLTS U.L. STYLE 3199

DEARBORN NO.	AWG SIZE	STRAND-ING	NOM. WALL	NOM. O.D.	STANDARD PUT UP (FT.)	STOCK COLORS
762207	22	7/30	1/64	.066	1000 & 5000	0, 2, 4, 5, 9
762010	20	10/30	1/64	.072	1000 & 5000	0, 2, 4, 5, 9
761816	18	16/30	1/64	.082	1000 & 5000	0, 2, 4, 5, 9
761626	16	26/30	1/64	.109	1000 & 5000	0, 2, 4, 5, 9

FR-1 105° C — 600 VOLT, U.L. STYLES 1015, 1028, 1283, 1284

DEARBORN NO.	AWG SIZE	STRAND-ING	NOM. O.D.	NOM. WALL THICK.	UL TYPE
782601	26	1/26	.080	1/32	1015
782607	26	7/34	.083	1/32	1015
782607F	26	7/34	.083	1/32	1015
782401	24	1/24	.085	1/32	1015
782407	24	7/32	.088	1/32	1015
782407F	24	7/32	.088	1/32	1015
782201	22	1/22	.093	1/32	1015
782207	22	7/30	.095	1/32	1015
782207F	22	7/30	.095	1/32	1015
782001	20	1/20	.098	1/32	1015
782010	20	10/30	.100	1/32	1015
782010F	20	10/30	.100	1/32	1015
781801	18	1/18	.104	1/32	1015
781816	18	16/30	.110	1/32	1015
781816F	18	16/30	.110	1/32	1015
781601	16	1/16	.115	1/32	1015
781626	16	26/30	.124	1/32	1015
781401	14	1/14	.130	1/32	1015
781441	14	41/30	.141	1/32	1015
781201	12	1/12	.145	1/32	1015
781265	12	65/30	.160	1/32	1015
781001	10	1/10	.166	1/32	1015
781000	10	105/30	.194	1/32	1015
788133	8	133/29	.255	3/64	1028
786133	6	133/27	.335	4/64	1283
784133	4	133/25	.390	4/64	1283
782133	2	133/23	.460	4/64	1283
782665	2	665/30	.470	4/64	1283
781259	1	259/25	.525	5/64	1284
781836	1	836/30	.535	5/64	1284
780001	1/0	1045/30	.580	5/64	1284
780002	2/0	1330/30	.640	5/64	1284
780003	3/0	1661/30	.680	5/64	1284
780004	4/0	2107/30	.785	5/64	1284

FR-1 80° C — 300 VOLT, STYLE 1007

DEARBORN NO.	AWG SIZE	STRAND-ING	NOM. O.D.	NOM. WALL THICK.	UL TYPE
792407	24	7/32	.057	1/64	1007
792207	22	7/30	.065	1/64	1007
792010	20	10/30	.071	1/64	1007
791816	18	16/30	.080	1/64	1007
791626	16	26/30	.095	1/64	1007

(F) After number indicates fused or prebonded.

PUT UP: STYLES 1015 AND 1028: 500 FT., 1000 FT., AND BULK; STYLES 1283 AND 1284: 100 FT. AND 1000 FT.; STYLE 1007: 1000 FT. AND 5000 FT.
STOCK COLORS: STYLES 1015 AND 1028: 0-9; STYLES 1283 AND 1284: 0, 2, 9; STYLE 1007: 0-9.

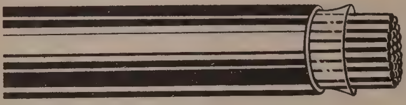
COLOR CODE ON HOOKUP WIRE: 0—Black • 1—Brown • 2—Red • 3—Orange • 4—Yellow • 5—Green • 6—Blue • 7—Violet • 8—Grey • 9—White
Consult Factory for Further Details on Striped Colors

DEARBORN WIRE AND CABLE CO. 9299 Evenhouse Avenue, Rosemount, Illinois 60018 • Phone (312) 696-1000

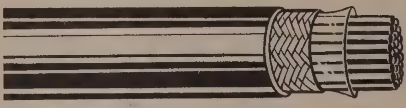
DEARBORN

U.L. LISTED

COMPUTER TYPE MINIATURE CONTROL CABLES MULTI-CONDUCTOR STYLES 2343 AND 2344



MULTI-CONDUCTOR, UNSHIELDED



MULTI-CONDUCTOR, SHIELDED

The cables listed below, multiconductor, with or without shield are designed for computer use.

The individual conductors are stranded tinned copper. Numbers 22, 24 are 7 strand, No. 20 is 19 strand. Insulated with .010" wall of PVC to MIL-W-16878D Type B. On this usage, conductors are rated 105°C and 600 V. working voltage. The conductors also meet UL Style 1061, rated 80°C, 300 V. working voltage.

Conductors are cabled by the planetary method and laid contra-helically for best flexibility, with a Mylar tape barrier placed under shields. All shielded cables are of tinned copper braid overall of 85% - 90% coverage per MIL-C-7078.

The jacket over the shield is black 105°C Vinyl per MIL-I-631 Type F. All materials are fungus resistant and self extinguishing.

All items approved under UL STYLE 2343 or 2344* for computer usage: +80°C, 300 Volts. On non-UL service can be used at 40°C to +105°C, 600 Volts.

MULTI-CONDUCTOR UNSHIELDED CABLES

DEARBORN NO.	NO. OF COND.	COND. SIZE	COND. O.D.	JACKET WALL	NOM. O.D.	WEIGHT LBS./M
562405	5	24	.044	.062	.220	32
562407	7	24	.044	.062	.250	40
562412	12	24	.044	.062	.300	53
562415	15	24	.044	.062	.330	65
562419	19	24	.044	.062	.340	73
562427	27	24	.044	.062	.390	85
562437	37	24	.044	.062	.420	120
562448	48	24	.044	.062	.470	142
562460	60	24	.044	.062	.510	170
562205	5	22	.050	.062	.260	40
562207	7	22	.050	.062	.275	48
562212	12	22	.050	.062	.330	72
562215	15	22	.050	.062	.350	85
562219	19	22	.050	.062	.370	96
562227	27	22	.050	.062	.430	130
562237	37	22	.050	.062	.480	163
562248	48	22	.050	.062	.530	210
562260	60	22	.050	.062	.570	255
562005	5	20	.058	.062	.275	49
562007	7	20	.058	.062	.290	59
562012	12	20	.058	.062	.360	90
562015	15	20	.058	.062	.390	110
562019	19	20	.058	.062	.410	128
562027	27	20	.058	.062	.490	166
562037	37	20	.058	.062	.520	220
562048	48	20	.058	.062	.580	275
562060	60	20	.058	.062	.640	335

MULTI-CONDUCTOR, OVERALL SHIELD CABLES

DEARBORN NO.	NO. OF COND.	COND. SIZE	COND. O.D.	JACKET WALL	NOM. O.D.	WEIGHT LBS./M
572405	5	24	.044	.062	.245	44
572407	7	24	.044	.062	.275	55
572412	12	24	.044	.062	.325	68
572415	15	24	.044	.062	.350	80
572419	19	24	.044	.062	.365	88
572427	27	24	.044	.062	.415	102
572437	37	24	.044	.062	.445	140
572448	48	24	.044	.062	.495	172
572460	60	24	.044	.062	.535	205
572205	5	22	.050	.062	.285	50
572207	7	22	.050	.062	.295	58
572212	12	22	.050	.062	.355	87
572215	15	22	.050	.062	.380	101
572219	19	22	.050	.062	.395	111
572227	27	22	.050	.062	.455	150
572237	37	22	.050	.062	.510	193
572248	48	22	.050	.062	.560	245
572260	60	22	.050	.062	.600	295
572005	5	20	.058	.062	.300	59
572007	7	20	.058	.062	.315	69
572012	12	20	.058	.062	.385	105
572015	15	20	.058	.062	.415	137
572019	19	20	.058	.062	.435	158
572027	27	20	.058	.062	.515	196
572037	37	20	.058	.062	.550	255
572048	48	20	.058	.062	.610	320
572060	60	20	.058	.062	.670	385

COLOR CODE — MULTI-CONDUCTOR

0—Black
1—Brown
2—Red
3—Orange
4—Yellow
5—Green
6—Blue
7—Violet
8—Grey
9—White
10—White/Black
11—White/Brown
12—White/Red
13—White/Orange
14—White/Yellow
15—White/Green
16—White/Blue
17—White/Violet
18—White/Grey
19—White/Black/Brown
20—White/Black/Red
21—White/Black/Orange
22—White/Black/Yellow
23—White/Black/Green
24—White/Black/Blue
25—White/Black/Violet
26—White/Black/Grey
27—White/Brown/Red
28—White/Brown/Orange
29—White/Brown/Yellow
30—White/Brown/Green
31—White/Brown/Blue
32—White/Brown/Violet
33—White/Brown/Grey
34—White/Red/Orange
35—White/Red/Yellow
36—White/Red/Green
37—White/Red/Blue
38—White/Red/Violet
39—White/Red/Grey
40—White/Orange/Yellow
41—White/Orange/Green
42—White/Orange/Blue
43—White/Orange/Violet
44—White/Orange/Grey
45—White/Yellow/Green
46—White/Yellow/Blue
47—White/Yellow/Violet
48—White/Yellow/Grey
49—White/Green/Blue
50—White/Green/Violet
51—White/Green/Grey
52—White/Blue/Violet
53—White/Blue/Grey
54—White/Violet/Grey
55—White/Black/Brown/Red
56—White/Black/Brown/Orange
57—White/Black/Brown/Yellow
58—White/Black/Brown/Green
59—White/Black/Brown/Blue
60—White/Black/Brown/Violet

PUT UP: 500 FT. AND 1000 FT. NO DEPOSIT REELS

DEARBORN

COMPUTER TYPE MINIATURE CONTROL CABLES STYLES 2343 AND 2344, PAIRED CABLES

U.L. LISTED

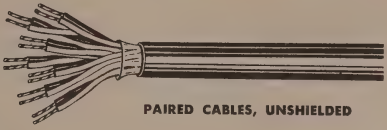
The paired cables listed below, with or without shield are designed for computer use.

The individual conductors are stranded tinned copper. Numbers 22, 24 are 7 strand, No. 20 is 19 strand. Insulated with .010″ wall of PVC to MIL-W-16878D Type B. On this usage, conductors are rated 105°C and 600 V. working voltage. The conductors also meet UL Style 1061, rated 80°C, 300 V. working voltage.

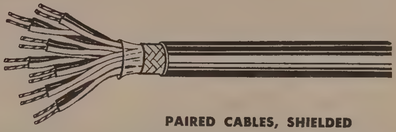
Pairs are cabled by the planetary method and laid contra-helically for best flexibility, with a Mylar tape barrier placed under shields. All shielded cables are of tinned copper braid overall of 85% - 90% coverage per MIL-I-7078.

The jacket over the shield is black 105°C Vinyl per MIL-I-631 Type F. All materials are fungus resistant and self extinguishing.

All items approved under UL STYLE 2343 or 2344* for computer usage: +80°C, 300 Volts. On non-UL service can be used at 40°C to +105°C, 600 Volts.



PAIRED CABLES, UNSHIELDED



PAIRED CABLES, SHIELDED

PAIRED CABLES, UNSHIELDED

DEARBORN NO.	NO. OF PAIRS	COND. SIZE	COND. O.D.	JACKET WALL	NOM. O.D.	WEIGHT LBS./M
582405	5	24	.044	.062	.330	52
582407	7	24	.044	.062	.350	60
582412	12	24	.044	.062	.435	90
582415	15	24	.044	.062	.485	110
582419	19	24	.044	.062	.505	126
582427	27	24	.044	.062	.590	167
582437	37	24	.044	.062	.660	216
582448	48	24	.044	.062	.745	270
582460	60	24	.044	.062	.815	325
582205	5	22	.050	.062	.365	56
582207	7	22	.050	.062	.390	82
582212	12	22	.050	.062	.470	120
582215	15	22	.050	.062	.545	145
582219	19	22	.050	.062	.560	170
582227	27	22	.050	.062	.600	230
582237	37	22	.050	.062	.750	300
*582248	48	22	.050	.062	.850	375
*582260	60	22	.050	.062	.980	460
582005	5	20	.058	.062	.395	82
582007	7	20	.058	.062	.440	108
582012	12	20	.058	.062	.540	163
582015	15	20	.058	.062	.600	196
582019	19	20	.058	.062	.630	235
582027	27	20	.058	.062	.745	320
582037	37	20	.058	.062	.820	420
*582048	48	20	.058	.080	.950	530
*582060	60	20	.058	.080	1.040	650

PAIRED CABLES WITH OVERALL SHIELD

DEARBORN NO.	NO. OF PAIRS	COND. SIZE	COND. O.D.	JACKET WALL	NOM. O.D.	WEIGHT LBS./M
592405	5	24	.044	.062	.355	67
592407	7	24	.044	.062	.375	75
592412	12	24	.044	.062	.460	115
592415	15	24	.044	.062	.510	140
592419	19	24	.044	.062	.530	161
592427	27	24	.044	.062	.620	211
592437	37	24	.044	.062	.690	266
592448	48	24	.044	.062	.775	330
*592460	60	24	.044	.062	.845	390
592205	5	22	.050	.062	.390	77
592207	7	22	.050	.062	.415	100
592212	12	22	.050	.062	.495	150
592215	15	22	.050	.062	.575	185
592219	19	22	.050	.062	.580	210
592227	27	22	.050	.062	.670	280
592237	37	22	.050	.062	.780	357
*592248	48	22	.050	.062	.880	445
*592260	60	22	.050	.062	.960	535
592005	5	20	.058	.062	.420	102
592007	7	20	.058	.062	.465	123
592012	12	20	.058	.062	.570	203
592015	15	20	.058	.062	.630	241
592019	19	20	.058	.062	.660	280
592027	27	20	.058	.062	.775	380
*592037	37	20	.058	.080	.850	490
*592048	48	20	.058	.080	.980	605
*592060	60	20	.058	.080	1.070	735

COLOR CODING ON TWISTED PAIRS

1. White with Black
2. White with Brown
3. White with Red
4. White with Orange
5. White with Yellow
6. White with Green
7. White with Blue
8. White with Violet
9. White with Grey
10. Black with Brown
11. Black with Red
12. Black with Orange
13. Black with Yellow
14. Black with Green
15. Black with Blue
16. Black with Violet
17. Black with Grey
18. Brown with Red
19. Brown with Orange
20. Brown with Yellow
21. Brown with Green
22. Brown with Blue
23. Brown with Violet
24. Brown with Grey
25. Red with Orange
26. Red with Yellow
27. Red with Green
28. Red with Blue
29. Red with Violet
30. Red with Grey
31. Orange with Yellow
32. Orange with Green
33. Orange with Blue
34. Orange with Violet
35. Orange with Grey
36. Yellow with Green
37. Yellow with Blue
38. Yellow with Violet
39. Yellow with Grey
40. Green with Blue
41. Green with Violet
42. Green with Grey
43. Blue with Violet
44. Blue with Grey
45. Violet with Grey
46. White/Black with Black
47. White/Black with Brown
48. White/Black with Red
49. White/Black with Orange
50. White/Black with Yellow
51. White/Black with Green
52. White/Black with Blue
53. White/Black with Violet
54. White/Black with Grey
55. White/Brown with Black
56. White/Brown with Brown
57. White/Brown with Red
58. White/Brown with Orange
59. White/Brown with Yellow
60. White/Brown with Green

PUT UP: 500 FT. AND 1000 FT. NO DEPOSIT REELS

DEARBORN WIRE AND CABLE CO. 9299 Evenhouse Avenue, Rosemount, Illinois 60018 • Phone (312) 696-1000

DEARBORN

U.L. LISTED HIGH TEMPERATURE TEFLON* WIRE

U.L.
LISTED

Dearborn supplies a variety of high temperature insulated wires that are listed by the Underwriters Laboratories. The types shown here fall into the category of appliance wiring material (AWM) and are covered by the Flexible Cord and Fixture Wire Standard and UL Standard 758.1 for insulated single conductor appliance wiring material. Among a variety of requirements, the latter document assigns ratings regarding the duty group, flame retardance, temperature rating, voltage rating, service flexibility, resistance to abnormal temperature, oil resistance, water resistance and gasoline resistance where applicable. All of the following Underwriters styles are flame retardant and will satisfy the FR-1 designation of UL.

This section lists only the most commonly used conductors. In many instances, the Underwriter's Laboratories allow the use of other materials. Consult factory for further details.

* DuPont TM

U.L. STYLES 1164 & 1180

DEARBORN NO.	AWG SIZE	STRANDING	NOM. O.D. OVER INSULATION INCH (MM)
22801UL3	28	Solid	.042(1.07)
22807UL3	28	7/36	.045(1.14)
22819UL3	28	19/40	.045(1.14)
22601UL3	26	Solid	.045(1.14)
22607UL3	26	7/34	.048(1.22)
22619UL3	26	19/38	.048(1.22)
22401UL3	24	Solid	.049(1.24)
22407UL3	24	7/32	.053(1.35)
22419UL3	24	19/36	.053(1.35)
22201UL3	22	Solid	.054(1.37)
22207UL3	22	7/30	.060(1.52)
22219UL3	22	19/34	.060(1.52)
22001UL3	20	Solid	.061(1.55)
22007UL3	20	7/28	.068(1.73)
22019UL3	20	19/32	.068(1.73)
21807UL3	18	7/26	.079(2.00)
21819UL3	18	19/30	.079(2.00)
21619UL3	16	19/29	.086(2.18)
21419UL3	14	19/27	.102(2.59)
21219UL3	12	19/25	.120(3.05)

STOCK COLORS: 0-9

U.L. STYLES 1226 & 1227

DEARBORN NO.	AWG SIZE	STRANDING	NOM. O.D. OVER INSULATION INCH (MM)
13201AUL	32	Solid	.027(.686)
13207AUL	32	7/40	.029(.734)
13001AUL	30	Solid	.029(.734)
13007AUL	30	7/38	.032(.813)
12801AUL	28	Solid	.032(.813)
12807AUL	28	7/36	.035(.889)
12601AUL	26	Solid	.035(.889)
12607AUL	26	7/34	.038(.965)
12619AUL	26	19/38	.038(.965)
12401AUL	24	Solid	.040(1.02)
12407AUL	24	7/32	.043(1.09)
12419AUL	24	19/36	.043(1.09)
12201AUL	22	Solid	.046(1.17)
12207AUL	22	7/30	.050(1.27)
12219AUL	22	19/34	.050(1.27)
12001AUL	20	Solid	.054(1.37)
12007AUL	20	7/28	.058(1.47)
12019AUL	20	19/32	.058(1.47)

STOCK COLORS: 0-9

U.L. STYLES 1198 & 1199

DEARBORN NO.	AWG SIZE	STRANDING	NOM. O.D. OVER INSULATION INCH (MM)
22601UL6	26	Solid	.060(1.52)
22607UL6	26	7/34	.063(1.60)
22619UL6	26	19/38	.063(1.60)
22401UL6	24	Solid	.064(1.63)
22407UL6	24	7/32	.068(1.73)
22419UL6	24	19/36	.068(1.73)
22201UL6	22	Solid	.069(1.75)
22207UL6	22	7/30	.077(1.96)
22219UL6	22	19/34	.077(1.96)
22001UL6	20	Solid	.079(2.00)
22007UL6	20	7/28	.083(2.11)
22019UL6	20	19/32	.083(2.11)
21807UL6	18	7/26	.093(2.36)
21819UL6	18	19/30	.093(2.36)
21619UL6	16	19/29	.101(2.57)
21419UL6	14	19/27	.116(2.95)
21219UL6	12	19/25	.136(3.45)
21037UL6	10	37/26	.157(3.99)
28133UL6	8	133/29	.237(5.94)
26133UL6	6	133/27	.268(6.81)
24133UL6	4	133/25	.321(8.15)
22665UL6	2	665/30	.401(10.2)
21836UL6	1	836/30	.474(12.1)

STOCK COLORS: 0-2-9

U.L. STYLES 1330 & 1331

DEARBORN NO.	AWG SIZE	STRANDING	NOM. O.D. OVER INSULATION INCH (MM)
22601AUL6	26	Solid	.060(1.52)
22607AUL6	26	7/34	.063(1.60)
22619AUL6	26	19/38	.063(1.60)
22401AUL6	24	Solid	.064(1.63)
22407AUL6	24	7/32	.068(1.73)
22419AUL6	24	19/36	.068(1.73)
22201AUL6	22	Solid	.069(1.75)
22207AUL6	22	7/30	.077(1.96)
22219AUL6	22	19/34	.077(1.96)
22001AUL6	20	Solid	.079(2.00)
22007AUL6	20	7/28	.083(2.11)
22019AUL6	20	19/32	.083(2.11)
21807AUL6	18	7/26	.093(2.36)
21819AUL6	18	19/30	.093(2.36)
21619AUL6	16	19/29	.101(2.57)
21419AUL6	14	19/27	.116(2.95)
21219AUL6	12	19/25	.136(3.45)
21037AUL6	10	37/26	.157(3.99)
28133AUL6	8	133/29	.237(5.94)
26133AUL6	6	133/27	.268(6.81)
24133AUL6	4	133/25	.321(8.15)
22665AUL6	2	665/30	.401(10.2)
21836AUL6	1	836/30	.474(12.1)

STOCK COLORS: 0-9

U.L. STYLES 1212 & 1213

DEARBORN NO.	AWG SIZE	STRANDING	NOM. O.D. OVER INSULATION INCH (MM)
13201UL	32	Solid	.027(.686)
13207UL	32	7/40	.029(.734)
13219UL	32	19/44	.029(.734)
13001UL	30	Solid	.029(.734)
13007UL	30	7/38	.032(.813)
13019UL	30	19/42	.032(.813)
12801UL	28	Solid	.032(.813)
12807UL	28	7/36	.035(.889)
12819UL	28	19/40	.035(.889)
12601UL	26	Solid	.035(.889)
12607UL	26	7/34	.038(.965)
12619UL	26	19/38	.038(.965)
12401UL	24	Solid	.040(1.02)
12407UL	24	7/32	.043(1.09)
12419UL	24	19/36	.043(1.09)
12201UL	22	Solid	.046(1.17)
12207UL	22	7/30	.050(1.27)
12219UL	22	19/34	.050(1.27)
12001UL	20	Solid	.054(1.37)
12007UL	20	7/28	.058(1.47)
12019UL	20	19/32	.058(1.47)

STOCK COLORS: 0-9

OTHER U.L. STYLES AVAILABLE UPON REQUEST

UL STYLE	VOLTAGE	TEMP. (C)	INSULATION
1332	300	200°	FEP
1333	300	150°	FEP
1335		200°	FEP-H
1371		105°	TFE
1394		200°	TFE-H
1508	30	105°	Tetzel
1512		105°	TFE
1513		105°	Tetzel
1516		105°	Tetzel
1517		105°	Tetzel
1523		105°	Tetzel
1538	90	105°	FEP
1558		125°	Tetzel
1570	600	250°	TFE
1586		105°	Tetzel
1609	125	105°	Tetzel

UL STYLES 1164 AND 1180

CONDUCTOR: Silver plated copper. On special order nickel plated copper conductors are available. **INSULATION:** Extruded "Teflon" TFE, .013" min. (average) wall. **TEMPERATURE RATING:** UL 1180-200°C. **VOLTAGE RATING:** 300 volts rms. **USE:** For internal wiring of appliances, also suitable for immersion in gasoline, gasoline vapor and 80°C oil. **TEMPERATURE IDENTIFICATION MARKER:** UL 1164-Brown, UL 1180-Black. Dearborn standard temperature identification is a longitudinally applied stripe in size 18 AWG and larger. Sizes 20 AWG and smaller do not require temperature identification. Upon request and at an additional charge, surface printing can be provided.

UL STYLES 1198 AND 1199

CONDUCTOR: Silver plated copper. On special order nickel plated copper conductors are available under series 3XTN-UL. **INSULATION:** Extruded "Teflon" TFE, .020" min. (average) wall. **TEMPERATURE RATING:** UL 1198-150°C. UL 1199-200°C. **VOLTAGE RATING:** 600 volts rms, 2500 volts peak for electronic use. **USE:** Internal wiring of appliances, also suitable for immersion in gasoline, gasoline vapor and 80°C oil. **TEMPERATURE IDENTIFICATION MARKER:** UL 1198-Brown. UL 1199-Black. Dearborn standard temperature identification is a longitudinally applied stripe in size 18 AWG and larger. Sizes 20 AWG and smaller do not require temperature identification. Upon request and at an additional charge, surface printing can be provided. Consult factory for availability of sizes 1/0 thru 4/0.

UL STYLES 1212 AND 1213

CONDUCTOR: Silver plated copper. On special order, nickel plated copper or silver plated high strength high conductivity copper alloy conductors are available. **INSULATION:** Extruded "Teflon" TFE, .008" min. (average) wall. **TEMPERATURE RATING:** UL 1212 and UL 1213-105°C. **VOLTAGE RATING:** Not specified. **USE:** In office appliances where exposed to temperatures not exceeding 80°C or 105°C or to oil at temperatures not exceeding 60°C, and where not subjected to undue mechanical abuse. Temperature identification on the wire is not required on these styles. Consult factory for tracer or stripe on special.

DEARBORN

U.L.
LISTED

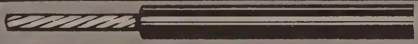
UL STYLES 1226 AND 1227

CONDUCTOR: Tin plated copper. Constructions with silver plated copper or silver plated high strength high conductivity copper alloy are available on request. **INSULATION:** Extruded "Teflon" FEP, .008" min. (average) wall. **TEMPERATURE RATING:** UL 1226-80°C. UL 1227-105°C. **VOLTAGE RATING:** Not specified. **USE:** In office appliances where exposed to temperatures not exceeding 80°C and 105°C or oil at temperatures not exceeding 60°C, and where not subjected to undue mechanical abuse. Temperature identification of the wire is not required for these styles.

UL STYLES 1330 AND 1331

CONDUCTOR: Tin plated copper. **INSULATION:** Extruded "Teflon" FEP. .020" min. (average) wall, sizes 26-10 AWG, .030" min. (average) wall, sizes 8-2 AWG **TEMPERATURE RATING:** UL 1330-200°C, may be used with tin plated copper conductors only where the individual strand diameter is .015" (26 AWG) or larger. UL 1331-150°C. **VOLTAGE RATING:** 600 volts rms. **USE:** For general appliance wiring where not subjected to temperatures exceeding 200°C for style 1330 (see above limiting note), or 150°C for style 1331. Suitable for immersion in gasoline, gasoline vapor and 80°C oil. Constructions with silver plated copper are available on request; this version has an unrestricted 200°C temperature rating for style 1330. For sizes 18 AWG and larger, temperature identification is indicated by a black marker thread for style 1330 and a brown marker thread for style 1331, located under the insulation. Sizes 20 AWG and smaller do not require temperature identification.

CSA APPROVED HIGH TEMPERATURE TEFLON APPLIANCE WIRE



CSA INSULATION REQUIRED MIN. AVG. WALL	CSA VOLTAGE RATING	CSA TEMPERATURE RATING DEGREES (C)	WIRE SIZES
.010	150	150	32-16
.016(1/64")	300	200	28-12
.031(1/32")	600	200	28-12

STANDARD WALL INSULATION RATED AT 300 VOLTS AND 200°C

CONDUCTOR: Silver plated copper; constructions with nickel plated copper or nickel conductors can be supplied. Consult factory for details. **INSULATION:** Extruded "Teflon" TFE, 1/64" (0.4mm) minimum wall thickness. Surface printed for product identification in sizes 24 AWG and larger. **USE:** For internal wiring of electronic, photographic, refrigeration and air conditioning equipment, ballast and incandescent lampholder leads, ovens, flood lights, business machines, clothes dryers and electric stoves.

STOCK COLORS: AWG SIZES 12 THROUGH 24 = 0-2-9. AWG SIZES 26 THROUGH 28 = 0-9.

THIN WALL INSULATION RATED AT 150 VOLTS AND 150°C

CONDUCTOR: Silver plated copper. Constructions with nickel plated copper or nickel conductor can be supplied. Consult factory for details. **INSULATION:** Extruded "Teflon "TFE, .010" (0.25mm) min. average wall thickness. Surface printed for product identification in sizes 24 AWG and larger. **USE:** For internal wiring of process control and computer equipment.

STOCK COLORS: AWG SIZES 16 THROUGH 24 = 0-2-9. AWG SIZES 26 THROUGH 32 = 0-9.

* For availability of other color and stripe combinations, consult factory.

HEAVY WALL INSULATION RATED AT 600 VOLTS AND 200°C

CONDUCTOR: Silver plated copper. Constructions with nickel plated copper or nickel conductor can be supplied. Consult factory for details. **INSULATION:** Extruded "Teflon" TFE, 1/32" (0.79mm) min. wall thickness. Surface printed for product identification in sizes 24 AWG and larger. **USE:** For internal wiring of electronic, photographic, refrigeration and air conditioning equipment, ballast and incandescent lampholder leads, infrared ovens, flood lights, business machines, clothes dryers and electric stoves.

STOCK COLORS: 0-2-9.

STANDARD WALL

DEARBORN NO.	AWG SIZE	STRANDING	NOM. O.D. OVER INSULATION INCH (MM)
22801CSA	28	Solid	.048(1.29)
22807CSA	28	7/36	.050(1.34)
22819CSA	28	19/40	.050(1.34)
22601CSA	26	Solid	.051(1.37)
22607CSA	26	7/34	.054(1.45)
22619CSA	26	19/38	.054(1.45)
22401CSA	24	Solid	.055(1.40)
22407CSA	24	7/32	.059(1.59)
22419CSA	24	19/36	.059(1.59)
22201CSA	22	Solid	.060(1.52)
22207CSA	22	7/30	.065(1.75)
22219CSA	22	19/34	.065(1.75)
22001CSA	20	Solid	.068(1.73)
22007CSA	20	7/28	.073(1.96)
22019CSA	20	19/32	.073(1.96)
21819CSA	18	19/30	.082(2.21)
21619CSA	16	19/.0117	.089(2.26)
21419CSA	14	19/.0147	.103(2.62)
21219CSA	12	19/.0185	.122(3.10)

THIN WALL

DEARBORN NO.	AWG SIZE	STRANDING	NOM. O.D. OVER INSULATION INCH (MM)
13201CSA	32	Solid	.031(.787)
13207CSA	32	7/40	.032(.813)
13219CSA	32	19/44	.033(.838)
13001CSA	30	Solid	.033(.838)
13007CSA	30	7/38	.035(.889)
13019CSA	30	19/42	.035(.889)
12801CSA	28	Solid	.036(.914)
12807CSA	28	7/36	.038(.965)
12819CSA	28	19/40	.038(.965)
12601CSA	26	Solid	.039(.991)
12607CSA	26	7/34	.042(1.06)
12619CSA	26	19/38	.042(1.06)
12407CSA	24	7/32	.047(1.19)
12419CSA	24	19/36	.047(1.19)
12207CSA	22	7/30	.053(1.34)
12219CSA	22	19/34	.053(1.34)
12007CSA	20	7/28	.061(1.54)
12019CSA	20	19/32	.061(1.54)
11819CSA	18	19/30	.070(1.77)
11619CSA	16	19/0117	.079(2.01)

HEAVY WALL

DEARBORN NO.	AWG SIZE	STRANDING	NOM. O.D. OVER INSULATION INCH (MM)
22801CSA6	28	Solid	.078(2.10)
22807CSA6	28	7/36	.080(2.15)
22819CSA6	28	19/40	.080(2.15)
22601CSA6	26	Solid	.081(2.18)
22607CSA6	26	7/34	.084(2.26)
22619CSA6	26	19/38	.084(2.26)
22401CSA6	24	Solid	.085(2.16)
22407CSA6	24	7/32	.089(2.39)
22419CSA6	24	19/36	.089(2.39)
22201CSA6	22	Solid	.090(2.28)
22207CSA6	22	7/30	.095(2.55)
22219CSA6	22	19/34	.095(2.55)
22001CSA6	20	Solid	.097(2.46)
22007CSA6	20	7/28	.103(2.77)
22019CSA6	20	19/32	.103(2.77)
21819CSA6	18	19/30	.112(3.01)
21619CSA6	16	19/0117	.120(3.05)
21419CSA6	14	19/0147	.134(3.40)
21219CSA6	12	19/0185	.153(3.88)

COLOR CODE: 0—Black • 1—Brown • 2—Red • 3—Orange • 4—Yellow • 5—Green • 6—Blue • 7—Violet • 8—Grey • 9—White

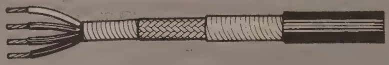
DEARBORN

MULTI-CONDUCTOR SHIELDED AND UNSHIELDED CONTROL CABLES

RUBBER OR NEOPRENE SHIELDED

RUBBER OR NEOPRENE JACKETED. Conductors of stranded tinned copper with color coded .020″ rubber insulation*. Cables with fillers; cotton wrapped; braided tinned copper shield. Cotton wrap and tough black rubber or neoprene jacket overall. Neoprene and rubber jackets are impact and abrasion resistant. Neoprene is recommended for outdoor use because of its oil, ozone, moisture and sunlight resistance. Used for control circuits, studios, audio circuits, etc. Designed to eliminate cross-talk and hum pick-up. **Temperature rating:** −20°C to +60°C.

* .040 on single conductor



SHIELDED CONTROL CABLES (NEOPRENE)

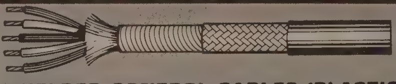
DEARBORN NO.	NO. COND.	SIZE OF COND. AWG	STRAND-ING	NOM. JKT. THICK.	NOM. O.D.	STOCK PUT UP (FT.)
601801	1	**18**	41/34	.035	.240	100, 500 & 1000
601802	2	**18**	41/34	.035	.295	100, 500 & 1000
601803	3	**18**	41/34	.035	.305	100, 500 & 1000
601804	4	**18**	41/34	.035	.330	100, 500 & 1000
601806	6	**18**	41/34	.035	.370	100, 500 & 1000
601808	8	**18**	41/34	.035	.420	100, 500 & 1000
601810	10	**18**	41/34	.035	.480	100, 500 & 1000
601812	12	**18**	41/34	.065	.555	100, 500 & 1000
601815	15	**18**	41/34	.065	.640	100, 500 & 1000
601820	20	**18**	41/34	.065	.730	100, 500 & 1000
601602	2	**16**	65/34	.035	.335	100, 500 & 1000
601603	3	**16**	65/34	.035	.355	100, 500 & 1000
601604	4	**16**	65/34	.035	.385	100, 500 & 1000
601606	6	**16**	65/34	.040	.445	100, 500 & 1000
601608	8	**16**	65/34	.040	.510	100, 500 & 1000
601610	10	**16**	65/34	.040	.575	100, 500 & 1000
601402	2	**14**	41/30	.040	.395	100, 500 & 1000
601403	3	**14**	41/30	.040	.425	100, 500 & 1000
601404	4	**14**	41/30	.040	.455	100, 500 & 1000
601406	6	**14**	41/30	.040	.515	100, 500 & 1000
601202	2	**12**	65/30	.040	.440	100, 500 & 1000
601203	3	**12**	65/30	.040	.465	100, 500 & 1000
601204	4	**12**	65/30	.040	.505	100, 500 & 1000
601002	2	**10**	105/30	.040	.495	100, 500 & 1000
601003	3	**10**	105/30	.040	.520	100, 500 & 1000

SHIELDED CONTROL CABLES (RUBBER)

DEARBORN NO.	NO. COND.	SIZE OF COND. AWG	STRAND-ING	NOM. JKT. THICK.	NOM. O.D.	STOCK PUT UP (FT.)
661801	1	**18**	41/34	.035	.240	100, 500 & 1000
661802	2	**18**	41/34	.035	.295	100, 500 & 1000
662001	1	**20**	36/34	.035	.230	100, 500 & 1000
662002	2	**20**	26/34	.035	.270	100, 500 & 1000
662003	3	**20**	26/34	.035	.285	100, 500, & 1000
662004	4	**20**	26/34	.035	.305	100, 500 & 1000
662005	5	**20**	26/34	.035	.330	100, 500 & 1000
662006	6	**20**	26/34	.035	.345	100, 500 & 1000
662007	7	**20**	26/34	.035	.355	100, 500 & 1000
662008	8	**20**	26/34	.035	.385	100, 500 & 1000
662010	10	**20**	26/34	.035	.440	100, 500 & 1000
662012	12	**20**	26/34	.065	.525	100, 500 & 1000
662015	15	**20**	26/34	.065	.595	100, 500 & 1000
662020	20	**20**	26/34	.065	.660	100, 500 & 1000

PLASTIC — SHIELDED

PLASTIC JACKETED. Conductors of stranded tinned copper, with color coded .014″ thick Polyethylene insulation. Cabled with fillers; wrapped with rayon; shielded with braided tinned copper shield. Covered with chrome grey Polyvinylchloride jacket overall. **Temperature rating:** −20°C to +60°C. **Operating voltage:** 600 V.

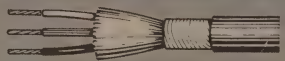


SHIELDED CONTROL CABLES (PLASTIC)

DEARBORN NO.	NO. COND.	SIZE OF COND. AWG	STRAND-ING	NOM. JKT. THICK.	NOM. O.D.	STOCK PUT UP (FT.)
682002	2	**20**	26/34	.030	.245	100, 500 & 1000
682003	3	**20**	26/34	.035	.250	100, 500 & 1000
682004	4	**20**	26/34	.035	.260	100, 500 & 1000
682005	5	**20**	26/34	.035	.275	100, 500 & 1000
682006	6	**20**	26/34	.035	.300	100, 500 & 1000
682008	8	**20**	26/34	.035	.330	100, 500 & 1000
682010	10	**20**	26/34	.035	.375	100, 500 & 1000
682012	12	**20**	26/34	.035	.380	100, 500 & 1000
682015	15	**20**	26/34	.035	.410	100, 500 & 1000
682020	20	**20**	26/34	.035	.455	100,500 & 1000

RUBBER — UNSHIELDED

Stranded tinned copper conductors, color coded rubber insulation. Cabled with fillers; cotton wrapped; tough rubber jacket overall. These cables are extremely flexible and are suitable for heavy duty usage. **Temperature rating:** −20°C to +60°C. Insulation thickness on individual conductors is .020″.



UNSHIELDED CONTROL CABLES (RUBBER)

DEARBORN NO.	NO. COND.	SIZE OF COND. AWG	STRAND-ING	NOM. JKT. THICK.	NOM. O.D.	STOCK PUT UP (FT.)
652002	2	**20**	26/34	.035	.240	100, 500 & 1000
652003	3	**20**	26/34	.035	.255	100, 500 & 1000
652004	4	**20**	26/34	.035	.275	100, 500 & 1000
652005	5	**20**	26/34	.035	.300	100, 500 & 1000
652006	6	**20**	26/34	.035	.315	100, 500 & 1000
652008	8	**20**	26/34	.035	.360	100, 500 & 1000
652010	10	**20**	26/34	.035	.410	100, 500 & 1000
652012	12	**20**	26/34	.035	.435	100, 500 & 1000
652015	15	**20**	26/34	.035	.505	100, 500 & 1000
652020	20	**20**	26/34	.035	.570	100, 500 & 1000

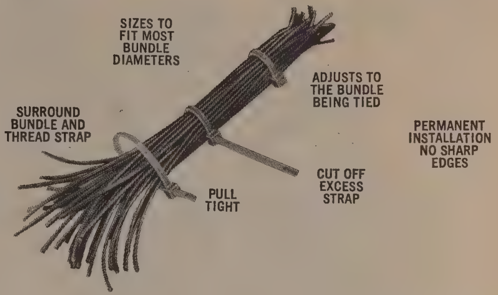
COLOR CODE: 1—Black • 2—White • 3—Red • 4—Green • 5—Yellow • 6—Blue • 7—Brown • 8—Orange • 9—Slate • 10—Purple • 11—White/Black 12—White/Red • 13—White/Green • 14—White/Yellow • 15—White/Blue • 16—White/Brown • 17—White/Purple • 18—White/Slate • 19—Black/Red • 20—Black/Yellow

Grayhill

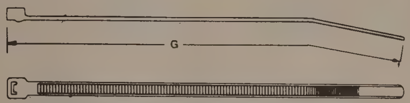
FASTRAPS™ CABLE TIES— SERIES 60

PERMANENT WIRE AND CABLE TIES THREE STYLES — EIGHT LENGTHS STANDARD AND HEAVY DUTY WEIGHTS

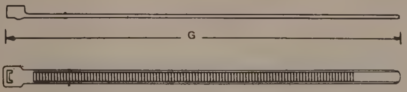
- HIGH DIELECTRIC STRENGTH, HIGH TENSILE STRENGTH AND OUTSTANDING RESILIENCE
- RESISTANCE TO ABSORPTION AND ABRASION, AND CHEMICAL DETERIORATION FROM SOLVENTS, OIL, GREASE
- MOLDED FROM NYLON — WHITE (NATURAL) IS STANDARD COLOR — OTHER COLORS AVAILABLE
- DESIGNED TO MEET MS-3367 AND MIL-S-23190


SIZES TO FIT MOST BUNDLE DIAMETERS
ADJUSTS TO THE BUNDLE BEING TIED
SURROUND BUNDLE AND THREAD STRAP
PERMANENT INSTALLATION NO SHARP EDGES
CUT OFF EXCESS STRAP
PULL TIGHT

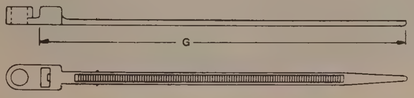
FASTRAPS Bent Tip Cable Tie Designed for Easy Threading
Standard Duty
(Model 6005)



FASTRAPS Straight Tip Cable Tie . . . Provides Maximum Strength
Heavy Duty
(Model 6006)



FASTRAPS Cable Tie with Mounting Hole
Heavy Duty, Straight Tip (Model 6007) .250″ mounting hole
Standard Duty, Bent Tip (Model 6008) .205″ mounting hole



Order Part No.	Bundle Max. Dia.	Min. Tensile Stngth	Length G	Mtg. Hole Dia.
6005-0350 NAT	⅝″	18	3.750	—
6005-0400 NAT	¾″	18	5.125	—
6005-0550 NAT	1¼″	30	6.125	—
6005-0675 NAT	1¾″	50	7.50	—
6005-1100 NAT	3″	50	11.0	—
6005-1400 NAT	4″	50	14.0	—
6006-1400 NAT	3½″	120	14.0	—
6006-2100 NAT	6″	120	21.0	—
6006-2800 NAT	8″	120	28.0	—
6007-1400 NAT	3½″	120	14.0	.250″
6007-2100 NAT	6″	120	21.0	.250″
6007-2800 NAT	8″	120	28.0	.250″
6008-0550 NAT	1¼″	30	6.625	.205″
6008-0675 NAT	1¾″	50	7.875	.205″

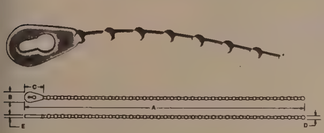
ORDERING INFORMATION:

Color: NAT = White (Natural) Nylon Other colors available (50,000 pc. min. order)

Length: 0350 = 3½″, 0400 = 4″, 0550 = 5½″, 0675 = 6¾″, 1100 = 11″, 1400 = 14″, 2100 = 21″, 2800 = 28″

Basic Stem Number for FASTRAPS Type

REUSABLE, ECONOMICAL WIRE AND CABLE TIES



Stem No.	Material	Available Length (Dimension A Above)	Color Availability
6002	Nylon	4″, 5″, 6″, 8″, 10″	Natural
6003	Polyethylene	4″, 5″, 6″, 8″, 10″	Natural, Red, Yellow, Blue, Green in 10″ only

HOW TO ORDER

Stem No. - Length Color

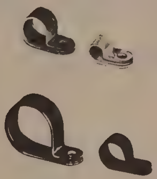
From chart, determines material and color.

Length (Dim. A), 0400 = 4″, 0500 = 5″, 0600 = 6″, 0800 = 8″, 1000 = 10″.

Red = Red, Yel = Yellow, Blu = Blue, Nat = Natural.

Example: 6003-0500 Yel Orders a Yellow Polyethylene beaded chain that is 5″ long.

SCREW-DOWN CABLE CLAMPS



HOW TO ORDER

Stem No. Bundle Dia. Dash. No. Color

From chart, determines material, width, thick., hole size.

From nom. bundle dia. Dash No. chart. (Note Limitations by Stem No.)

(Note limitations in Stem No. Chart.) Nat = Natural, Blk = Black, Amb = Amber.

Example: 6021-08-NAT orders a natural color nylon clamp, ⅜″ wide, with a .203″ hole size which will accommodate a bundle of wires ½″ in diameter.

Dash No.	Bundle Dia.	Dash No.	Bundle Dia.	Dash No.	Bundle Dia.	Dash No.	Bundle Dia.
—02	⅛″	—07	7⁄16″	—12	¾″	—19	13⁄16″
—03	3⁄16″	—08	½″	—13	13⁄16″	—20	1¼″
—04	¼″	—09	9⁄16″	—14	⅞″	—22	1⅜″
—05	5⁄16″	—10	⅝″	—16	1″	—24	1½″
—06	⅜″	—11	11⁄16″	—18	1⅛″		

Stem No.	Material	Width of Clamp	Nom. Thick.	Screw Hole Size	Nom. Bundle Dia. Availability (See Chart)	Color Availability
6021	NYLON	⅜″	.050″	.203″	—02 thru —08	Natural or Black
6022	NYLON	½″	.060″	.203″	—08 thru —24	Natural or Black
6023	POLYPROPYLENE	½″	.060″	.203″	—02 thru —24	Natural
6024	CELLULOSE	½″	.060″	.203″	—02 thru —24	Amber

FASTRAPS Convenience Clamps

Made of lightweight, durable, inert PVC. Adhesive backed for easy mount. Spring loaded — easy to use.

¾″ wide by .050″ nominal thickness. Accepts up to ½″ bundle diameter. Black only.

Part No. 6025-08-BLK

FASTRAPS Tie Mount

Molded nylon, mounting comes with adhesive back and screw hole.

Tie slips through slots and around bundle 1⅞₄″ square.

Accepts #6 screw. Accommodates ties up to .055″ x .190.

Part No. 6030-A-1

TM – Contour Cable is a trademark of Hughes Aircraft Company.

We specialize in flat cable and flexible circuit problems nobody else can crack.

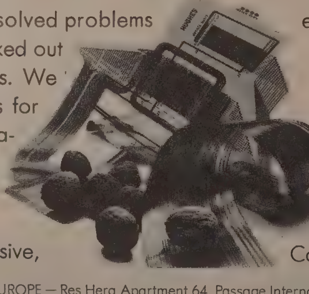
A lot of people make flat cable. A lot of people make flexible circuits. We're one of the few who make both.

But the big difference isn't only what we can manufacture, it's what we can design.

Hughes CONTOUR™ Cable solved problems for the Viking Mars probe. We worked out solutions for the Minuteman missiles. We cracked tough packaging problems for shipboard and airborne systems, radar, sonar, high-speed computers.

And we can crack your tough ones, too.

Not wild-eyed, super-expensive, forever-and-a-day solutions. Practical solutions. Maybe even less-expensive-in-the-long-run solutions.



And once we design it, we'll make it. In one of the industry's newest, most complete facilities.

Think of it this way. If it's simple and easy, anybody can do it, including us. But the tough nut is our specialty.

A tour? Or a consultation to discuss your design requirements? Just call (714) 549-5701 and ask for Dave Cianciulli. Or write: 17150 Von Karman Avenue, Irvine, California 92705.

HUGHES

HUGHES AIRCRAFT COMPANY
CONNECTING DEVICES DIV.

HUGHES MICROELECTRONICS LTD.: EUROPE — Res Hera Apartment 64, Passage International 28, Brussels 1000, Belgium. Telephone 17.91.72
UNITED KINGDOM — Clive House, 12-18 Queens Road, Weybridge, Surrey, England. Telephone Weybridge 47262

Cimco

TEFLON* INSULATED HIGH TEMPERATURE WIRE, CABLE AND TUBING

Cimco manufactures both standard and custom-made wire and cable for aircraft, missiles, computers, electronic assemblies, and many other applications using TEFLON* insulated cable, tubing and hook-up wire.

Cimco

BONDING TREATMENT Surface treatment to increase bondability for use with potting compounds.

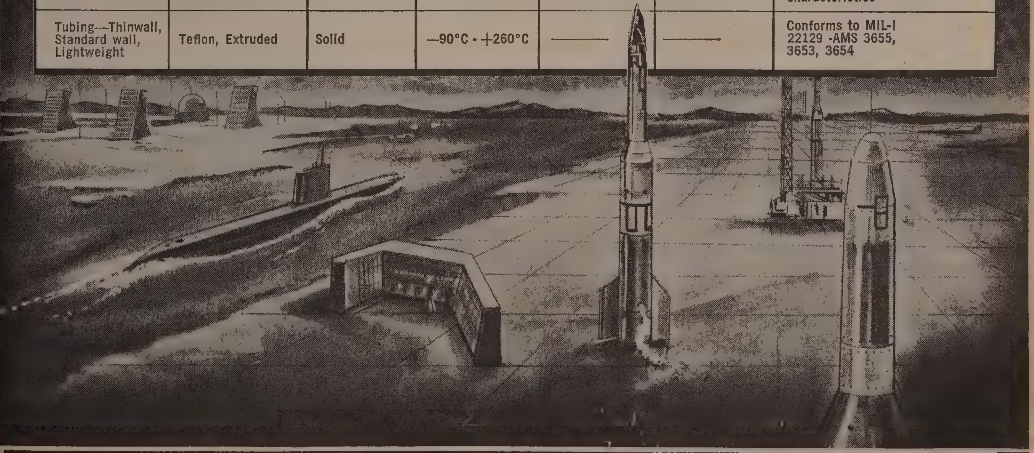
*REGISTERED DUPONT TRADEMARK

WRITE FOR CATALOG ON COMPLETE SPECIFICATIONS

wire & cable co. 250 W. CRESCENT AVE..
ALLENDALE. N. J. 07401 PHONE 201-327-2522

SPECIFICATIONS

WIRE, CABLE OR TUBING	PRIMARY INSULATION	COLORS MIL-STD-104	OPERATING TEMPERATURE	JACKETS	SHIELDING	REMARKS
High Temperature Hook-up Wire	Teflon, Extruded	Solid & Striped	—90°C - +260°C	———	Silver Plated or Tinned Copper	Conforms to MIL-W-16878 Types E, EE & ET or other special specifications as required.
Cables A	Teflon, Extruded Teflon Tape Wrapped	Solid & Striped	—54°C - +105°C	PVC	Silver Plated or Tinned Copper	Any combinations of conductors and shielding required.
Cables B	Teflon, Extruded Teflon Tape Wrapped	Solid & Striped	—54°C - +120°C	Nylon Braid Nylon Extruded	Silver Plated or Tinned Copper	Any combinations of conductors and shielding required.
Cables H	Teflon, Extruded Teflon Tape Wrapped	Solid & Striped	—90°C - +260°C	Fiberglass-Teflon	Silver Plated Copper	Any combinations of conductors and shielding required.
Cables C	Teflon, Extruded Teflon Tape Wrapped	Solid & Striped	—90°C - +260°C	Teflon Tape	Silver Plated Copper	Any combinations of conductors and shielding required.
Airframe Wire	Teflon Tape Plus Impregnated Glass	Solid Only	—60°C - +260°C	———	———	MIL-W-7139B
Miniature Coaxial Cable	Teflon, Extruded	Jackets Only Solid & Striped	—90°C - +260°C	Teflon Tape, Fiberglass-Teflon Nylon & PVC	Silver Plated or Tinned Copper	Conforms to MIL-C-17B
Low Capacitance Cable	Teflon Air-weave	Natural	—90°C - +260°C —90°C - +260°C —54°C - +105°C —54°C - +120°C	Teflon Tape, Fiberglass-Teflon PVC Nylon	Silver Plated or Tinned Copper	Special constructions as low as 8.0 mmf/ft.
High Voltage Cable	Teflon Tape	Solid & Striped	—90°C - +260°C	Teflon Tape, Fiberglass-Teflon	Silver Plated Copper	High voltage lead wire or cable excellent corona resistance characteristics
Tubing—Thinwall, Standard wall, Lightweight	Teflon, Extruded	Solid	—90°C - +260°C	———	———	Conforms to MIL-I 22129 -AMS 3655, 3653, 3654



MARKEL
SINCE 1922

Insulating Tubings and Sleevings— High Temperature Wire and Cable

TEFLON* TFE & FEP, PFA, SILICONE RUBBER, OR TEFZEL* INSULATED LEADWIRE

FLEXLEAD®

MIL-W-16878/D

*TM of DuPont

TYPE	VOLTS	COPPER CONDUCTOR	INSULATION MATERIAL
E	600	Stranded, Silver-Coated	Extruded TFE
E	600		Wrapped Sintered TFE Tape
EE	1000		Extruded TFE
EE	1000		Wrapped Sintered TFE Tape
ET	300		Extruded TFE
ET	300		Wrapped Sintered TFE Tape
K	600	Stranded, Silver-Coated or Tin-Coated	Extruded FEP
KK	1000		
KT	300		
F	600	Stranded, Tin-Coated	Extruded Silicone Rubber
F	600		Extr. S.R. with Silicone Resin-Impregnated Glass Braid Jacket
FF	1000		Extruded Silicone Rubber
FF	1000		Extr. S.R. with Silicone Resin-Impregnated Glass Braid Jacket

MIL-W-22759

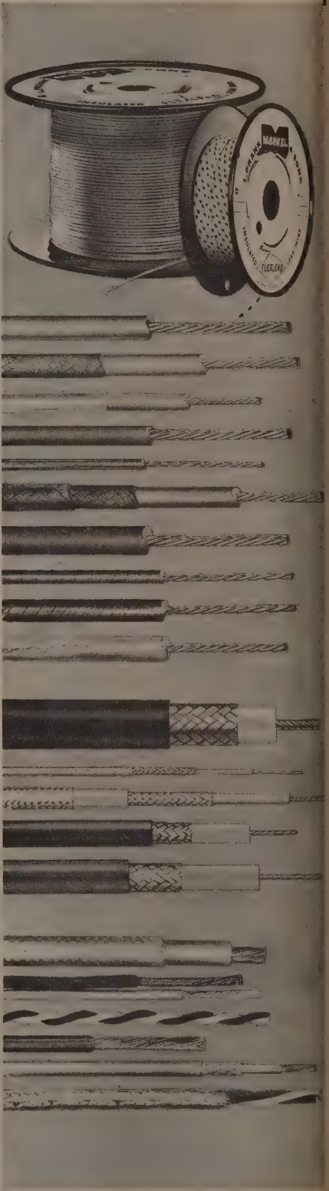
TYPE	VOLTS	COPPER CONDUCTOR		INSULATION MATERIAL
/1	600	Stranded, Silver-Coated		TFE and TFE-Coated Fiberglass
/2	600	Stranded, Nickel-Coated		
/3	600	Stranded, Nickel-Coated		TFE-glass-TFE medium weight
/4	600	Stranded, Silver-Coated		TFE-glass-FEP medium weight
/5	600			Abrasion-resistant Extruded TFE
/6	600	Stranded, Nickel-Coated		
/7	600	Stranded, Silver-Coated		Abrasion-resistant Extruded TFE medium weight
/8	600	Stranded, Nickel-Coated		
/9	1000	Stranded, Silver-Coated		Extruded TFE
/10	1000	Stranded, Nickel-Coated		
/11	600	Stranded, Silver-Coated		
/12	600	Stranded, Nickel-Coated		
/16	600	Stranded, Tin-Coated		ETFE, medium weight
/17	600	Stranded, High-Strength Copper Alloy	Silver-Coated	
/18	600		Tin-Coated	ETFE
/19	600		Silver-Coated	
/20	1000			Extruded TFE
/21	1000		Nickel-Coated	
/22	600		Silver-Coated	
/23	600		Nickel-Coated	

NOTE: While PFA is not specifically called out in MIL-W-16878/D or MIL-W-22759, it will meet all the requirements of the specification where TFE is indicated. In addition, PFA can be extruded in long, continuous fault-free lengths since it is melt-extrudable.

FLEXLEAD Wire for Wire-Wrap Applications. Markel stocks Tefzel-insulated, silver-coated, solid copper conductor wire in the following sizes:

#24	AWG	0.0305 ± .0015
#26	AWG	0.027 ± .0015
#30	AWG	0.0195 ± .001

FLEXLEAD Fused Twisted Pair. This unique Teflon-insulated twisted pair construction finds wide application in computers and similar circuitry. The fusing, which will withstand predetermined pulls to separate the individual wires, keeps the wires evenly twisted for easier assembly and uniform capacitance and inductance. Ask for a test sample and prices.



Insulating Tubings and Sleevings— High Temperature Wire and Cable

MARKEL
SINCE 1922

UL STYLE NUMBERS AVAILABLE

REQ'D STYLE	TYPE INSULATION	SIZE RANGE	WALL THICKNESS	RATING	JACKET REQ'D
1164	TFE	#28-#10	.013"	150°C 300V	
1180	TFE	#28-#10	.013"	200°C 300V	
1198	TFE	#26-4/0	.020" to .045"	150°C 600V	
1199	TFE	#26-4/0	.020" to .045"	200°C 600V	
1212	TFE	#32-#20	.008"	80°C	
1213	TFE	#32-#20	.008"	105°C	
1226	FEP	#32-#20	.008"	80°C	
1227	FEP	#32-#20 #18-#14	.008" .013"	105°C	
1292	FEP	#26-#20	.006"	105°C	Nylon
1330	FEP	#26-4/0	.020" to .045"	200°C 600V	
1331	FEP	#26-4/0	.020" to .045"	150°C 600V	
1332	FEP	#28-#10	.013"	200°C 300V	
1333	FEP	#28-#10	.013"	150°C 300V	
1371	TFE FEP	#32-#6	.0055" to .020"	105°C	
1508	TEFZEL	#32-#20	.0055"	105°C 30V	
1513	TEFZEL	#32-#20	.005"	105°C	
1516	TEFZEL	#32-#20	.004"	105°C	
1517	TEFZEL	#32-#20	.006"	105°C	
1523	TEFZEL	#32-#20	.005"	105°C	
1538	TFE FEP	#32-#6	.0055" to .020"	105°C 125V	
1577	TFE FEP	#32-#16	12 Mils	200°C	
1586	TEFZEL	#32-#6	.0055" to .020"	105°C	
1609	TEFZEL	#32-#6	.0055" to .020"	105°C 125V	
3066	Silicone Rubber	#28-#20	1/32"	200°C 600V	
3067	Silicone Rubber	#28-#20	1/32"	200°C 600V	Fiberglass
3068	Silicone Rubber	#28-#20	1/64"	150°C 300V	Fiberglass
3069	Silicone Rubber	#26-#20	1/32"	150°C 600V	Fiberglass
3070	Silicone Rubber	#18-#12	1/32"	150°C 600V	Fiberglass
3071	Silicone Rubber	#18-#14	1/32"	200°C 600V	Fiberglass
3074	Silicone Rubber	#12	1/32"	200°C 600V	Fiberglass
3075	Silicone Rubber	#10	3/64"	200°C 600V	Fiberglass
3099	Silicone Rubber	#20-#16	1/32"	150°C 300V	
3100	Silicone Rubber	#12	1/32"	150°C 300V	Fiberglass
3101	Silicone Rubber	#10	3/64"	150°C 600V	Fiberglass
3113	Silicone Rubber	#18	1/16"	150°C 600V	
3122	Silicone Rubber	#26-#20	1/64"	200°C 300V	Fiberglass
3123	Silicone Rubber	#24-#16	1/32"	150°C 600V	
3125	Silicone Rubber	#8-#2	1/16"	200°C 600V	Fiberglass
3126	Silicone Rubber	#1-4/0	5/64"	200°C 600V	Fiberglass
3127	Silicone Rubber	#8-#2	1/16"	150°C 600V	Fiberglass
3128	Silicone Rubber	#1-4/0	5/64"	150°C 600V	Fiberglass
3132	Silicone Rubber	#30-#16	1/64"	150°C 300V	
3133	Silicone Rubber	#30-#16	1/32"	150°C 600V	
3134	Silicone Rubber	#18-#12	1/32"	150°C 600V	
3135	Silicone Rubber	#18-#14	1/32"	200°C 600V	
3136	Silicone Rubber	#26-#20	3/64"	150°C 300V	
3137	Silicone Rubber	#26-#20	3/64"	150°C 600V	
3138	Silicone Rubber	#18-#12	3/64"	150°C 600V	
3139	Silicone Rubber	#18-#12	3/64"	200°C 600V	
3140	Silicone Rubber	#26-#20	1/16"	150°C 300V	
3141	Silicone Rubber	#26-#20	1/16"	150°C 600V	
3142	Silicone Rubber	#18-#12	1/16"	150°C 600V	
3143	Silicone Rubber	#18-#12	1/16"	200°C 600V	
3144	Silicone Rubber	#12	3/64"	200°C 600V	Fiberglass
3145	Silicone Rubber	#12	1/16"	200°C 600V	Fiberglass
3180	Silicone Rubber	#32 Min.	.023"	150°C 300V	
3210	Silicone Rubber	#18-#12	1/16"	150°C 600V	Fiberglass
3211	Silicone Rubber	#26-#14	1/32"	150°C 300V	
3212	Silicone Rubber	#26-#10	3/64"	150°C 600V	
3213	Silicone Rubber	#8-#2	1/16"	150°C 600V	
3214	Silicone Rubber	#1-4/0	5/64"	150°C 600V	
3215	Silicone Rubber	#18-#16	1/16"	150°C 600V	
3216	Silicone Rubber	#14-#10	5/64"	150°C 600V	
3239	Silicone Rubber	#24-#10	10KV-.040" 20KV-.050" 25KV-.062" 30KV-.075" 40KV-.097"—All 150°C		
5031	Silicone Asbestos	#26-#16	Special	150°C 300V	
5032	Silicone Asbestos	#26-#16	Special	200°C 600V	
SF-1	Silicone Rubber	#18	1/64"	200°C 300V	Fiberglass
SF-2	Silicone Rubber	#18-#14	1/32"	200°C 600V	Fiberglass
SFF-1	Silicone Rubber	#18	1/64"	150°C 300V	Fiberglass
SFF-2	Silicone Rubber	#18-#14	1/32"	150°C 600V	Fiberglass

CANADIAN STANDARDS ASSOCIATION

CSA	TFE	#32-#16	.011"	150°C 150V	
CSA	TFE	#28-#10	.016"	200°C 300V	
CSA	TFE	#28-#8	.031"	200°C 600V	
CSA	TFE	#28-#8	.047"	200°C 600V	
CSA	TFE	#28-#8	.047"	200°C 1000V	

NOTE: Sizes #18 and larger must be temperature and/or manufacturer marked. Some UL styles and all CSA types require marking of all sizes.

CSA SR-INSULATED EQUIPMENT WIRE TYPES

CSA **SEW-1**	Silicone Rubber	Solid # 22-# 16 Stranded # 18-# 16	16 Mils	200° C 300V	Fiberglass
CSA **SEWF-1**	Silicone Rubber	Stranded # 22-# 16	16 Mils	300V 150°C Copper 200°C Nickel	Fiberglass
CSA **SEW-2**	Silicone Rubber	Solid # 10 # 22-# 12 Stra. # 10 # 18-# 12	47 Mils 31 Mils 47 Mils 31 Mils	200°C 600V	Fiberglass
CSA **SEWF-2**	Silicone Rubber	Stra. # 10 # 22-# 12	47 Mils 31 Mils	600V 150°C Copper 200°C Nickel	Fiberglass

FLEXLEAD MB Bondable Teflon. The Markel MB process can be factory-applied to any of the FLEXLEAD Teflon wires, extruded or tape-wrapped, and renders the surface bondable with commonly used elastomeric and epoxy-base potting and encapsulating compounds. Without affecting the color or electrical properties of the insulation, the MB treatment provides a bond with up to 150 psi pull-out strength, and a surface that is receptive to marking and printing.

FLEXLEAD Coaxial Cables. Markel manufactures a complete line of both standard and special RG/U coaxial cables. In accordance with specifications, types are available with silver-plated copper, plated or unplated copper-covered steel, or bare copper-center conductor; one or two braided shields; tape-wrapped Teflon shield guards; and outer jacketing of impregnated fiberglass braid or Teflon (extruded or tape-wrapped). For complete data, ask for a FLEXLEAD Coaxial Cable Specifications folder.

FLEXLEAD Special Constructions. Because wiring problems cannot always be solved with standard materials, Markel's capacity for engineering high-temperature wire and cable construction to meet particular needs has grown steadily with the demand. We can combine insulations—Teflon, silicone rubber, fiberglass, nylon-shielding, fillers, liners, and jacket materials—with single, twisted-pair or multiple conductors—to provide a special cable construction for any temperature range from —90° to 260°C. For more data ask for a FLEXLEAD Wire and Cable Selector.

Ask for data sheets, prices, and samples of FLEXLEAD wire constructions

1 SOURCE *for* EXCELLENCE *in Insulating Tubings and Sleevings • High Temperature Wire and Cable*

L. FRANK MARKEL & SONS, INC.

NORRISTOWN, PENNSYLVANIA 19404
Telephone: 215-272-8960 • TWX: 510-660-0190

NATIONAL WIRE AND CABLE CORPORATION

136 San Fernando Rd., Los Angeles, Calif. 90031
Phone (213) 225-5611, TWX: 910-321-4155, Fed. Stock Code H4-04569

Partial view of Los Angeles warehouse. Additional warehouses in Orlando, Florida, and San Francisco area.

Why National Wire?

As a manufacturer of wire and cable products . . . with warehouses on both East and West coasts, National Wire & Cable is ready to fill your immediate needs. Choose from our standard lines of wire or cable . . . OR let us design and custom manufacture exactly what you require for your application.

Our wire inventory is now over 160 million feet, and our 500 different standard multi-conductor cables total in excess of 1.3 million feet!

When you call National Wire, you'll find we are especially well equipped to handle your large as well as minimal requirements. If our "standard" items won't meet your application, we have the wire inventory, the machinery, the expertise to come up with exactly what you need. 86,000 square feet of manufacturing area and our expert engineering staff are at your disposal!! All cable components are produced within our own facility in order to assure complete quality control.

Review the following catalog pages. If you need some assistance with your specific requirement, call our factory direct, or call our representative nearest you.

(See list on Page **2**•2046.)

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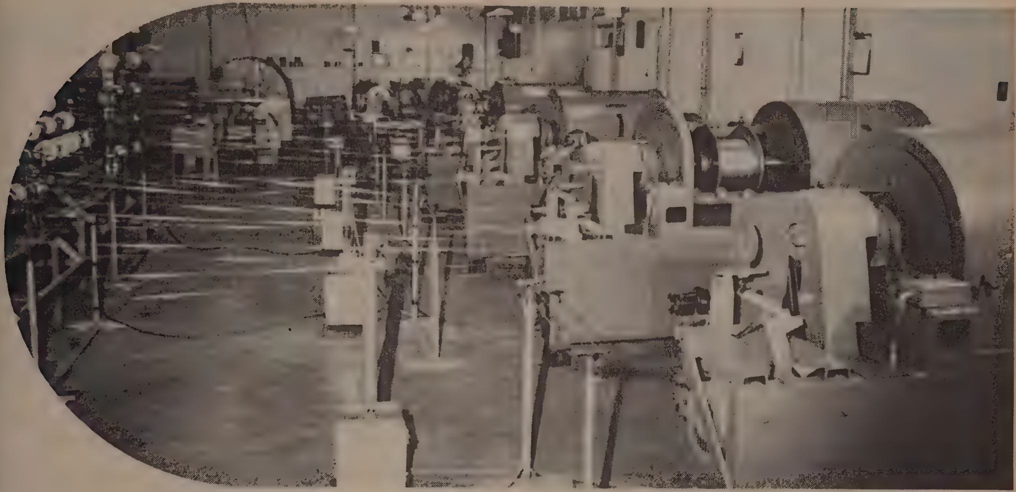
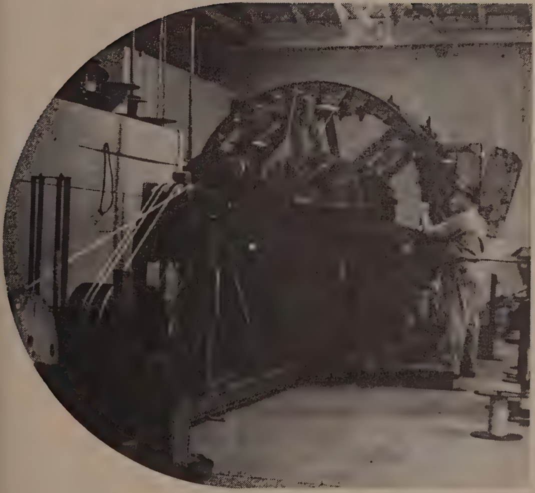


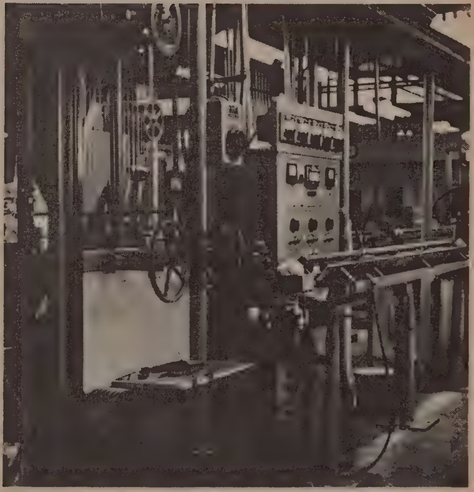
CONDUCTOR STRANDING

Batteries of stranding machines shown in National Wire & Cable's Los Angeles plant.



PLANETARY CABLER

View of National's planetary cablers — one of 22.



WIRE & CABLE EXTRUDING

View of Thermoplastic Extruded — one of many.

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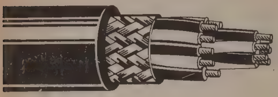
Miniature Signal & Control Cables Single Conductors (NX Series)



(NX1922J shown)

National Wire & Cable Corporation manufactures a complete line of MINIATURE low voltage signal and control cable. Available as cabled pairs or cabled singles, with optional overall shield. Conductors are stranded tinned copper with .010″ wall of vinyl primary insulation for use up to 105°C per MIL-W-16878 Type B. Insulated for 600 volts working voltage. (Also meets U.L. AWM Type 1061; 300 volt, 80°C.) All are coded using 10 standard colors plus stripes on white per MIL-STD-681.

All conductors are planetary cabled and contra-helically laid for optimum flexibility, with a Mylar tape barrier under shields. Shielded cables have a tinned copper braid overall, of 85-90% coverage per MIL-C-7078; and braid angles below 40° for easy pushback.

The outer jacket is black abrasion-resistant 105°C. vinyl meeting MIL-I-631 Type F. All materials are self-extinguishing and fungus resistant. All items are U.L. LISTED STYLE 2343 COMPUTER CABLE; rated 80°C. (Higher temp. ratings apply for any non-U.L. service.)

Standard Putups: 500 and 1000 ft. No-deposit reels. For shorter quantities or specific lengths, consult factory.

IN STOCK

MIL - SPEC U.L. LISTED COMPUTER GRADE STYLE 2343

For light duty, gray jacketed version of these cables in the U.L. Style 2464, see Pages 2•2033-2•2036 NQ Series.

TECHNICAL DATA (all cables)

Insulation Breakdown Voltage:	Greater than 5000 volts AC RMS, 60 cps.
Capacitance:	Nominal capacitance from a wire to all else in a cable ranges from 45. to 70. pf/ft. at 1. kc, depending on gauge and position.
Insulation Leakage:	200. megohms/1000 ft. min. @ 500. VDC from any conductor to all else in cable.
Sheath Leakage:	10. megohms/1000 ft. min. @ 500 VDC from shield or conductor group through sheath to ground.
Temperature Range:	Suitable for continuous use from −40°C. to +105°C. (U.L. Service limited to +80°C.)
Bending Characteristics:	All cables are suitable for flexing to a circle diameter of 6. cable diameters from +105°C. to −20°C. Recommended flex diameter should be greater than 20 cable diameters for flexing at −40°C.

MULTICONDUCTOR STOCK CABLED SINGLES

Cond: 22, 24 are 7 strand; 20 AWG is 19 strand

UNSHIELDED

PART NO.	NO. COND.	COND. AWG	COND. O.D.	JKT. WALL	CABLE O.D.	WEIGHT LB/M′
NX-524 J	5	24	.045	.062	.220	32 Lbs.
NX-724 J	7	24	.045	.062	.250	40 Lbs.
NX-1224J	12	24	.045	.062	.300	53 Lbs.
NX-1524J	15	24	.045	.062	.330	65 Lbs.
NX-1924J	19	24	.045	.062	.340	73 Lbs.
NX-2724J	27	24	.045	.062	.390	85 Lbs.
NX-3724J	37	24	.045	.062	.420	120 Lbs.
NX-4824J	48	24	.045	.062	.470	142 Lbs.
NX-6024J	60	24	.045	.062	.510	170 Lbs.
NX-522 J	5	22	.050	.062	.200	40 Lbs.
NX-722 J	7	22	.050	.062	.270	48 Lbs.
NX-1222J	12	22	.050	.062	.330	72 Lbs.
NX-1522J	15	22	.050	.062	.350	85 Lbs.
NX-1922J	19	22	.050	.062	.370	96 Lbs.
NX-2722J	27	22	.050	.062	.430	130 Lbs.
NX-3722J	37	22	.050	.062	.480	163 Lbs.
NX4822J	48	22	.050	.062	.530	210 Lbs.
NX-6022J	60	22	.050	.062	.570	255 Lbs.
NX-520 J	5	20	.057	.062	.275	49 Lbs.
NX-720 J	7	20	.057	.062	.290	59 Lbs.
NX-1220J	12	20	.057	.062	.360	90 Lbs.
NX-1520J	15	20	.057	.062	.390	110 Lbs.
NX-1920J	19	20	.057	.062	.410	128 Lbs.
NX-2720J	27	20	.057	.062	.490	166 Lbs.
NX-3720J	37	20	.057	.062	.520	220 Lbs.
NX-4820J	48	20	.057	.062	.580	275 Lbs.
NX-6020J	60	20	.057	.062	.640	335 Lbs.

OVERALL SHIELDED

PART NO.	NO. COND.	COND. AWG	COND. O.D.	JKT. WALL	SHIELD AWG	CABLE O.D.	WEIGHT LB/M′
NX-524 SJ	5	24	.045	.062	36	.245	44 Lbs.
NX-724 SJ	7	24	.045	.062	36	.275	55 Lbs.
NX-1224SJ	12	24	.045	.062	36	.325	68 Lbs.
NX-1524SJ	15	24	.045	.062	36	.350	80 Lbs.
NX-1924SJ	19	24	.045	.062	36	.365	88 Lbs.
NX-2724SJ	27	24	.045	.062	36	.415	102 Lbs.
NX-3724SJ	37	24	.045	.062	36	.445	140 Lbs.
NX-4824SJ	48	24	.045	.062	36	.495	172 Lbs.
NX-6024SJ	60	24	.045	.062	36	.535	205 Lbs.
NX-522 SJ	5	22	.050	.062	36	.285	50 Lbs.
NX-722 SJ	7	22	.050	.062	36	.295	58 Lbs.
NX-1222SJ	12	22	.050	.062	36	.355	87 Lbs.
NX-1522SJ	15	22	.050	.062	36	.380	101 Lbs.
NX-1922SJ	19	22	.050	.062	36	.395	111 Lbs.
NX-2722SJ	27	22	.050	.062	36	.455	150 Lbs.
NX-3722SJ	37	22	.050	.062	34	.510	193 Lbs.
NX-4822SJ	48	22	.050	.062	34	.560	245 Lbs.
NX-6022SJ	60	22	.050	.062	34	.600	295 Lbs.
NX-520 SJ	5	20	.057	.062	36	.300	59 Lbs.
NX-720 SJ	7	20	.057	.062	36	.315	69 Lbs.
NX-1220SJ	12	20	.057	.062	36	.385	105 Lbs.
NX-1520SJ	15	20	.057	.062	36	.415	137 Lbs.
NX-1920SJ	19	20	.057	.062	36	.435	158 Lbs.
NX-2720SJ	27	20	.057	.062	36	.515	196 Lbs.
NX-3720SJ	37	20	.057	.062	34	.550	255 Lbs.
NX-4820SJ	48	20	.057	.062	34	.610	320 Lbs.
NX-6020SJ	60	20	.057	.062	34	.670	385 Lbs.

NATIONAL WIRE
AND CABLE CORPORATION

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Miniature Signal & Control Cables Twisted Pairs (NXP Series)

(NXP1924J shown)

National Wire & Cable Corporation manufactures a complete line of MINIATURE low voltage signal and control cable. Available as cabled pairs or cabled singles, with optional overall shield. Conductors are stranded tinned copper with .010″ wall of vinyl primary insulation for use up to 105°C per MIL-W-16878 Type B. Insulated for 600 volts working voltage. (Also meets U.L. AWM Type 1061; 300 volt, 80°C.) All are coded using 10 standard colors plus stripes on white per table below.

All conductors are planetary cabled and contra-helically laid for optimum flexibility, with a Mylar tape barrier under shields. Shielded cables have a tinned copper braid overall, of 85-90% coverage per MIL-C-7078; and braid angles below 40° for easy pushback.

The outer jacket is black abrasion-resistant 105°C. vinyl meeting MIL-I-631 Type F. All materials are self-extinguishing and fungus resistant. All items are U.L. LISTED STYLE 2343 COMPUTER CABLE; rated 80°C. (Higher temp. ratings apply for any non-U.L. service.)

Standard Putups: 500 and 1000 ft. No-deposit reels. For shorter quantities or specific lengths, consult factory.
† Denotes U.L. Style 2344.

IN STOCK MIL-SPEC

U.L. LISTED COMPUTER GRADE STYLE 2343 & 2344

For light duty, gray jacketed version of these cables in the U.L. Style 2464, see Pages 2•2033-2•2036 NQ Series.

TECHNICAL DATA (all cables)

Insulation Breakdown Voltage:	Greater than 5000 volts AC RMS, 60 cps.
Capacitance:	Nominal capacitance from a wire to all else in a cable ranges from 45. to 70. pf/ft. at 1. kc, depending on gauge and position.
Insulation Leakage:	200. megohms/1000 ft. min. @ 500. VDC from any conductor to all else in cable.
Sheath Leakage:	10. megohms/1000 ft. min. @ 500 VDC from shield or conductor group through sheath to ground.
Temperature Range:	Suitable for continuous use from −40°C. to +105°C. (U.L. Service limited to +80°C.)
Bending Characteristics:	All cables are suitable for flexing to a circle diameter of 6. cable diameters from +105°C. to −20°C. Recommended flex diameter should be greater than 20 cable diameters for flexing at −40°C.

Impedance: **(24. AWG pairs)**	**Balanced:**	**87. ohms ±5%**
	Unbalanced:	**52. ohms ±5%**

MULTI-CONDUCTOR STOCK CABLED PAIRS

UNSHIELDED

PART NO.	NO. PAIRS	COND. AWG	COND. O.D.	JKT. WALL	CABLE O.D.	WEIGHT LB/M′
NXP-524 J	5	24	.045	.062	.330	52 Lbs.
NXP-724 J	7	24	.045	.062	.350	60 Lbs.
NXP-1224J	12	24	.045	.062	.435	90 Lbs.
NXP-1524J	15	24	.045	.062	.485	110 Lbs.
NXP-1924J	19	24	.045	.062	.505	126 Lbs.
NXP-2724J	27	24	.045	.062	.590	167 Lbs.
NXP-3724J	37	24	.045	.062	.660	216 Lbs.
NXP-4824J	48	24	.045	.062	.745	270 Lbs.
NXP-6024J	60	24	.045	.062	.815	325 Lbs.
NXP-522 J	5	22	.050	.062	.365	56 Lbs.
NXP-722 J	7	22	.050	.062	.390	82 Lbs.
NXP-1222J	12	22	.050	.062	.470	120 Lbs.
NXP-1522J	15	22	.050	.062	.545	145 Lbs.
NXP-1922J	19	22	.050	.062	.550	170 Lbs.
NXP-2722J	27	22	.050	.062	.640	230 Lbs.
NXP-3722J	37	22	.050	.062	.750	300 Lbs.
NXP-4822J	48	22	.050	.080	.850†	375 Lbs.
NXP-6022J	60	22	.050	.080	.930†	460 Lbs.
NXP-520 J	5	20	.057	.062	.395	82 Lbs.
NXP-720 J	7	20	.057	.062	.440	108 Lbs.
NXP-1220J	12	20	.057	.062	.540	163 Lbs.
NXP-1520J	15	20	.057	.062	.600	196 Lbs.
NXP-1920J	19	20	.057	.062	.630	235 Lbs.
NXP-2720J	27	20	.057	.062	.745	320 Lbs.
NXP-3720J	37	20	.057	.062	.820	420 Lbs.
NXP-4820J	48	20	.057	.080	.950†	530 Lbs.
NXP-6920J	60	20	.057	.080	1.040†	650 Lbs.

OVERALL SHIELDED

PART NO.	NO. PAIRS	COND. AWG	COND. O.D.	JKT. WALL	SHLD. AWG	CABLE O.D.	WEIGHT LB/M′
NXP-524 SJ	5	24	.045	.062	36	.355	67 Lbs.
NXP-724 SJ	7	24	.045	.062	36	.375	75 Lbs.
NXP-1224SJ	12	24	.045	.062	36	.460	115 Lbs.
NXP-1524SJ	15	24	.045	.062	36	.510	140 Lbs.
NXP-1924SJ	19	24	.045	.062	36	.530	161 Lbs.
NXP-2724SJ	27	24	.045	.062	34	.620	211 Lbs.
NXP-3724SJ	37	24	.045	.062	34	.690	266 Lbs.
NXP-4824SJ	48	24	.045	.062	34	.775	330 Lbs.
NXP-6024SJ*	60	24	.045	.062	34	.845	390 Lbs.
NXP-522 SJ	5	22	.050	.062	36	.390	77 Lbs.
NXP-722 SJ	7	22	.050	.062	36	.415	100 Lbs.
NXP-1222SJ	12	22	.050	.062	36	.495	150 Lbs.
NXP-1522SJ	15	22	.050	.062	34	.575	185 Lbs.
NXP-1922SJ	19	22	.050	.062	34	.580	210 Lbs.
NXP-2722SJ	27	22	.050	.062	34	.670	280 Lbs.
NXP-3722SJ	37	22	.050	.062	34	.780	357 Lbs.
NXP-4822SJ	48	22	.050	.080	34	.880†	445 Lbs.
NXP-6022SJ	60	22	.050	.080	34	.960†	535 Lbs.
NXP-520 SJ	5	20	.057	.062	36	.420	102 Lbs.
NXP-720 SJ	7	20	.057	.062	36	.465	123 Lbs.
NXP-1220SJ	12	20	.057	.062	34	.570	203 Lbs.
NXP-1520SJ	15	20	.057	.062	34	.630	241 Lbs.
NXP-1920SJ	19	20	.057	.062	34	.660	280 Lbs.
NXP-2720SJ	27	20	.057	.062	34	.775	380 Lbs.
NXP-3720SJ	37	20	.057	.080	34	.850†	490 Lbs.
NXP-4820SJ	48	20	.057	.080	34	.980†	605 Lbs.
NXP-6020SJ	60	20	.057	.080	34	1.070†	735 Lbs.

COLOR CODING USED IN TWISTED PAIRS

PR#	PAIR COLORS	PR#	PAIR COLORS	PR#	PAIR COLORS	PR#	PAIR COLORS	PR#	PAIR COLORS	PR#	PAIR COLORS
1	White with Black	11	Black with Red	21	Brown with Green	31	Orange with Yellow	41	Green with Violet	51	Wht/Blk with Green
2	White with Brown	12	Black with Orange	22	Brown with Blue	32	Orange with Green	42	Green with Gray	52	Wht/Blk with Blue
3	White with Red	13	Black with Yellow	23	Brown with Violet	33	Orange with Blue	43	Blue with Violet	53	Wht/Blk with Violet
4	White with Orange	14	Black with Green	24	Brown with Gray	34	Orange with Violet	44	Blue with Grey	54	Wht/Ik with Gray
5	White with Yellow	15	Black with Blue	25	Red with Orange	35	Orange with Gray	45	Violet with Gray	55	Wht/Brn with Black
6	White with Green	16	Black with Violet	26	Red with Yellow	36	Yellow with Green	46	Wht/Blk with Black	56	Wht/Brn with Brown
7	White with Blue	17	Black with Gray	27	Red with Green	37	Yellow with Blue	47	Wht/Blk with Brown	57	Wht/Brn with Red
8	White with Violet	18	Brown with Red	28	Red with Blue	38	Yellow with Violet	48	Wht/Blk with Red	58	Wht/Brn with Orange
9	White with Gray	19	Brown with Orange	29	Red with Violet	39	Yellow with Gray	49	Wht/Blk with Orange	59	Wht/Brn with Yellow
10	Black with Brown	20	Brown with Yellow	30	Red with Gray	40	Green with Blue	50	Wht/Blk with Yellow	60	Wht/Brn with Green

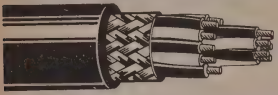
NATIONAL WIRE AND CABLE CORPORATION

136 San Fernando Rd., Los Angeles, Calif. 90031
Phone (213) 225-5611, TWX: 910-321-4155, Fed. Stock Code H4-04569

Heavy Duty Signal & Control Cables Single Conductors (NW Series)

IN STOCK

MIL-SPEC U.L. LISTED — STYLE 2343 & 2344



(NW1918SJ shown)

National Wire & Cable Corporation manufactures a complete line of multiple conductor control cable. Conductors are stranded tinned copper with 1/64" wall of vinyl primary insulation for use up to 105°C per MIL-W-16878 Type C.* Insulated for 1000 volts working voltage. Color coded using 10 standard colors plus stripes on white per MIL-STD-681.

All conductors are planetary cabled and contra-helically laid for optimum flexibility, with a Mylar tape serve over cable bundle. Shielded cables have a tinned copper braid overall, of 85-90% coverage per MIL-C-7078, and braid angles below 40° for easy pushback.

The outer jacket is black abrasion-resistant 105°C vinyl meeting MIL-I-631 Class F. All materials are self-extinguishing and fungus resistant. All cables are U.L. LISTED STYLE 2343; rated 80°C. (Higher temp. ratings apply to any non-U.L. service.) Specify polyurethane sheath for extreme rough usage or low-temp. service.

Standard Putups: 100, 500 and 1000 ft. No-deposit reels. For shorter quantities or specific lengths, consult factory.

* Insulated wires also meet U.L. style 1007 and CSA type TR-64.
† Denotes U.L. Style 2344.

TECHNICAL DATA (all cables)

Insulation Breakdown Voltage:	Greater than 8000 volts AC RMS, 60 cps.
U.L. Voltage Rating:	300 volts RMS AC (appliance use). 600 volts RMS AC (electronic use).
Military Voltage Rating:	1000 volts RMS.
Capacitance:	Nominal capacitance from a wire to all else in the cable ranges from 40 to 65 mmfd per ft., @ 1000 cps; dependent on gauge and position.
Insulation Leakage Res.:	200. megohms/1000 ft. min. at 500 VDC from any conductor to all else in cable.
Sheath Leakage Res.:	10. megohms/1000 ft. min. at 500 VDC from overall shield through sheath to outside world.
Usable Temp. Range:	Suitable for continuous use from +105°C to −55°C.
Cold Bending Capability:	All cables are suitable for flexing to a circle diam. of approx. 6 cable diameters from +105°C to −20°C; Recommended flex diameter should be greater than 20 cable diam. for flexing at −40°C. For continuous flexing applications consult factory.

Conductor sizes 22, 20, 18, 16, 14 & 12 gauge. 22 AWG is 7 strand. All others 19 strand.

UNSHIELDED

PART NO.	NO. COND.	COND. AWG	JKT. THICK	CABLE O.D.	WEIGHT PER M'
NW-722 J	7	22	.060	.315	40 Lbs.
NW-1222J	12	22	.060	.385	70 Lbs.
NW-1922J	19	22	.060	.440	110 Lbs.
NW-2722J	27	22	.060	.510	160 Lbs.
NW-3722J	37	22	.060	.565	200 Lbs.
NW-4822J	48	22	.060	.635	245 Lbs.
NW-6022J	60	22	.060	.695	300 Lbs.
NW-7222J	72	22	.060	.755	360 Lbs.
NW-8822J	88	22	.060	.820	425 Lbs.
NW-10222J	102	22	.080	.920†	485 Lbs.
NW-720 J	7	20	.060	.340	50 Lbs.
NW-1220J	12	20	.060	.420	105 Lbs.
NW-1920J	19	20	.060	.485	160 Lbs.
NW-2720J	27	20	.060	.565	210 Lbs.
NW-3720J	37	20	.060	.630	280 Lbs.
NW-4820J	48	20	.060	.710	360 Lbs.
NW-6020J	60	20	.060	.775	435 Lbs.
NW-7220J	72	20	.080	.885†	485 Lbs.
NW-8820J	88	20	.080	.960†	580 Lbs.
NW-10220J	102	20	.080	1.030†	670 Lbs.
NW-718 J	7	18	.060	.370	75 Lbs.
NW-1218J	12	18	.060	.460	135 Lbs.
NW-1918J	19	18	.060	.535	225 Lbs.
NW-2718J	27	18	.060	.625	300 Lbs.
NW-3718J	37	18	.060	.700	390 Lbs.
NW-4818J	48	18	.060	.790	510 Lbs.
NW-6018J	60	18	.080	.905†	600 Lbs.
NW-7218J	72	18	.080	.985†	720 Lbs.
NW-716 J	7	16	.060	.395	95 Lbs.
NW-1216J	12	16	.060	.495	155 Lbs.
NW-1916J	19	16	.060	.575	230 Lbs.
NW-2716J	27	16	.060	.615	320 Lbs.
NW-3716J	37	16	.060	.755	430 Lbs.
NW-4816J	48	16	.080	.895†	625 Lbs.
NW-6016J	60	16	.080	.975†	750 Lbs.
NW-714 J **	7	14	.060	.435	150 Lbs.
NW-1214J **	12	14	.060	.555	240 Lbs.
NW-1914J **	19	14	.060	.645	370 Lbs.
NW-2714J **	27	14	.060	.760	515 Lbs.
NW-512 J **	5	12	.060	.460	175 Lbs.
NW-712 J **	7	12	.060	.500	225 Lbs.
NW-1212J **	12	12	.060	.680	375 Lbs.
NW-1912J **	19	12	.060	.745	560 Lbs.

OVERALL SHIELDED

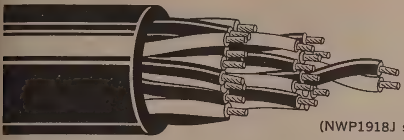
PART NO.	NO. COND	COND AWG	T.C. SHIELD	JKT. THICK	CABLE O.D.	WEIGHT PER M'
NW-722 SJ	7	22	No. 36	.060	.340	55 Lbs.
NW-1222SJ	12	22	No. 34	.060	.410	90 Lbs.
NW-1922SJ	19	22	No. 34	.060	.465	145 Lbs.
NW-2722SJ	27	22	No. 34	.060	.535	200 Lbs.
NW-3722SJ	37	22	No. 34	.060	.590	245 Lbs.
NW-4822SJ	48	22	No. 34	.060	.660	300 Lbs.
NW-6022SJ	60	22	No. 34	.060	.720	355 Lbs.
NW-7222SJ	72	22	No. 34	.060	.780	425 Lbs.
NW-8822SJ	88	22	No. 34	.080	.895†	500 Lbs.
NW-10222SJ	102	22	No. 34	.080	.945†	560 Lbs.
NW-720 SJ	7	20	No. 34	.060	.365	68 Lbs.
NW-1220SJ	12	20	No. 34	.060	.445	125 Lbs.
NW-1920SJ	19	20	No. 34	.060	.510	195 Lbs.
NW-2720SJ	27	20	No. 34	.060	.590	250 Lbs.
NW-3720SJ	37	20	No. 34	.060	.655	325 Lbs.
NW-4820SJ	48	20	No. 34	.060	.735	415 Lbs.
NW-6020SJ	60	20	No. 34	.060	.800	500 Lbs.
NW-7220SJ	72	20	No. 34	.080	.910†	555 Lbs.
NW-8820SJ	88	20	No. 34	.080	1.035†	660 Lbs.
NW-10220SJ	102	20	No. 34	.080	1.055†	750 Lbs.
NW-718 SJ	7	18	No. 34	.060	.395	95 Lbs.
NW-1218SJ	12	18	No. 34	.060	.485	170 Lbs.
NW-1918SJ	19	18	No. 34	.060	.560	265 Lbs.
NW-2718SJ	27	18	No. 34	.060	.650	350 Lbs.
NW-3718SJ	37	18	No. 34	.060	.725	445 Lbs.
NW-4818SJ	48	18	No. 34	.060	.815	575 Lbs.
NW-6018SJ	60	18	No. 34	.080	.930†	680 Lbs.
NW-7218SJ	72	18	No. 34	.080	1.010†	820 Lbs.
NW-716 SJ	7	16	No. 34	.060	.420	125 Lbs.
NW-1216SJ	12	16	No. 34	.060	.520	195 Lbs.
NW-1916SJ	19	16	No. 34	.060	.600	275 Lbs.
NW-2716SJ	27	16	No. 34	.060	.640	375 Lbs.
NW-3716SJ	37	16	No. 34	.060	.780	500 Lbs.
NW-4816SJ	48	16	No. 34	.080	.920†	700 Lbs.
NW-6016SJ	60	16	No. 34	.080	1.000†	830 Lbs.
NW-714 SJ	7	14	No. 34	.060	.465	180 Lbs.
NW-1214SJ	12	14	No. 34	.060	.580	280 Lbs.
NW-1914SJ	19	14	No. 34	.060	.670	420 Lbs.
NW-2714SJ	27	14	No. 34	.060	.785	575 Lbs.
NW-512 SJ	5	12	No. 34	.060	.485	210 Lbs.
NW-712 SJ	7	12	No. 34	.060	.525	265 Lbs.
NW-1212SJ	12	12	No. 34	.060	.705	430 Lbs.
NW-1912SJ	19	12	No. 34	.060	.770	625 Lbs.

**Not listed under UL styles 2343 or 2344 in these gauges.

NATIONAL WIRE
AND CABLE CORPORATION

136 San Fernando Rd., Los Angeles, Calif. 90031
Phone (213) 225-5611, TWX: 910-321-4155, Fed. Stock Code H4-04569

Heavy Duty Signal & Control Cables Twisted Pairs (NWP Series)


(NWP1918J shown)

IN STOCK MIL-SPEC
U.L. LISTED

Identical to National's NW-Series Cables except offered as twisted pairs.

National Wire & Cable Corporation manufactures a complete line of multiple pair control cables. Conductors are of tinned copper strand with 1/64" vinyl primary insulation for use up to 105° C per MIL-W-16878D Type C. Insulated for **1000** volts working voltage. Conductors are color coded using 10 standard basic colors, plus spiral tracers on white per table below.

All pairs are planetary cabled and contra-helically laid with a Mylar tape serve over the cable bundle. The overall jacket is a 105°C black vinyl plastic per MIL-I-631; or may be Neoprene to MIL-R-6855 Class 2 Grade 60 specification. (Neoprene at added cost).

SHIELDED CABLES

National Multiple Conductor SHIELDED CABLES are to the same specifications as above with addition of tinned copper braided shield over cable complex with 85-90% coverage to MIL-C-7078A.

TECHNICAL DATA (all cables)

Insulation Breakdown Voltage:	Greater than 8,000 volts AC RMS, 60 cps.
Capacitance:	Nominal capacitance wire to wire for a pair ranges from 27. to 40. mmfd/ft. Capacitance from both wires tied together measured to all else in common ranges from 35. to 60. mmfd/ft. dependent on gauge and position. Overall shield has negligible effect on W-W capacitance.
Insulation Leakage Res.:	200. megohms / 1000 ft. min. at 500 VDC from any conductor to all else in cable.
Sheath Leakage Res.:	10. megohms / 1000 ft. min. at 500 VDC from overall shield through sheath to outside world.
Usable Temp. Range:	Suitable for continuous use from +105°C to −55°C.
Cold Bending Capability:	All cables are suitable for flexing to a circle diam. of approx. 6 cable diameters from +105°C to −20°C; Recommended flex diameter should be greater than 20 cable diam. for flexing at −40°C. For continuous flexing applications consult factory.

UNSHIELDED OVERALL

PART NO.	NO. OF PAIRS	COND. GA.	JKT. THICK	O.D.	WEIGHT
NWP-722 J	7	22	.045	.470	90 Lbs.
NWP-1222J	12	22	.050	.600	150 Lbs.
NWP-1922J	19	22	.050	.700	200 Lbs.
NWP-2722J	27	22	.055	.830	280 Lbs.
NWP-3722J	37	22	.060	.960	370 Lbs.
NWP-4822J	48	22	.060	1.080	470 Lbs.
NWP-6022J	60	22	.060	1.200	560 Lbs.
NWP-720 J	7	20	.050	.520	120 Lbs.
NWP-1220J	12	20	.050	.660	200 Lbs.
NWP-1920J	19	20	.050	.800	290 Lbs.
NWP-2720J	27	20	.060	.960	420 Lbs.
NWP-3720J	37	20	.060	1.100	500 Lbs.
NWP-4820J	48	20	.060	1.240	620 Lbs.
NWP-6020J	60	20	.060	1.380	750 Lbs.
NWP-718 J	7	18	.050	.580	150 Lbs.
NWP-1218J	12	18	.050	.740	290 Lbs.
NWP-1918J	19	18	.060	.920	400 Lbs.
NWP-2718J	27	18	.060	1.080	560 Lbs.
NWP-3718J	37	18	.060	1.240	750 Lbs.
NWP-4818J	48	18	.060	1.400	900 Lbs.
NWP-716 J	7	16	.050	.640	180 Lbs.
NWP-1216J	12	16	.060	.840	300 Lbs.
NWP-1916J	19	16	.060	1.020	430 Lbs.
NWP-2716J	27	16	.060	1.200	720 Lbs.
NWP-3716J	37	16	.060	1.380	1000 Lbs.

OVERALL SHIELDED

PART NO.	NO. OF PAIRS	COND. GA.	JKT. THICK	O.D.	WEIGHT
NWP-722 SJ	7	22	.045	.495	135 Lbs.
NWP-1222SJ	12	22	.050	.630	206 Lbs.
NWP-1922SJ	19	22	.050	.730	260 Lbs.
NWP-2722SJ	27	22	.055	.860	358 Lbs.
NWP-3722SJ	37	22	.060	.990	460 Lbs.
NWP-4822SJ	48	22	.060	1.110	570 Lbs.
NWP-6022SJ	60	22	.060	1.230	675 Lbs.
NWP-720 SJ	7	20	.050	.550	170 Lbs.
NWP-1220SJ	12	20	.050	.690	260 Lbs.
NWP-1920SJ	19	20	.050	.830	355 Lbs.
NWP-2720SJ	27	20	.060	.990	510 Lbs.
NWP-3720SJ	37	20	.060	1.130	603 Lbs.
NWP-4820SJ	48	20	.060	1.270	735 Lbs.
NWP-6020SJ	60	20	.060	1.410	880 Lbs.
NWP-718 SJ	7	18	.050	.610	205 Lbs.
NWP-1218SJ	12	18	.050	.770	360 Lbs.
NWP-1918SJ	19	18	.060	.950	487 Lbs.
NWP-2718SJ	27	18	.060	1.110	660 Lbs.
NWP-3718SJ	37	18	.060	1.270	865 Lbs.
NWP-4818SJ	48	18	.060	1.430	1030 Lbs.
NWP-716 SJ	7	16	.050	.670	240 Lbs.
NWP-1216SJ	12	16	.060	.870	377 Lbs.
NWP-1916SJ	19	16	.060	1.050	520 Lbs.
NWP-2716SJ	27	16	.060	1.230	830 Lbs.
NWP-3716SJ	37	16	.060	1.410	1330 Lbs.

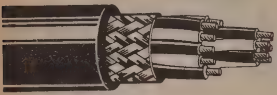
COLOR CODING USED ON TWISTED PAIRS

PR #	PAIR COLORS	PR #	PAIR COLORS	PR #	PAIR COLORS	PR #	PAIR COLORS	PR #	PAIR COLORS	PR #	PAIR COLORS
1.	WHITE WITH BLACK	11.	BLACK WITH RED	21.	BROWN WITH GREEN	31.	ORANGE WITH YELLOW	41.	GREEN WITH VIOLET	51.	WHT/BLK WITH GREEN
2.	WHITE WITH BROWN	12.	BLACK WITH ORANGE	22.	BROWN WITH BLUE	32.	ORANGE WITH GREEN	42.	GREEN WITH GRAY	52.	WHT/BLK WITH BLUE
3.	WHITE WITH RED	13.	BLACK WITH YELLOW	23.	BROWN WITH VIOLET	33.	ORANGE WITH BLUE	43.	BLUE WITH VIOLET	53.	WHT/BLK WITH VIOLET
4.	WHITE WITH ORANGE	14.	BLACK WITH GREEN	24.	BROWN WITH GRAY	34.	ORANGE WITH VIOLET	44.	BLUE WITH GREY	54.	WHT/BLK WITH GRAY
5.	WHITE WITH YELLOW	15.	BLACK WITH BLUE	25.	RED WITH ORANGE	35.	ORANGE WITH GRAY	45.	VIOLET WITH GRAY	55.	WHT/BRN WITH BLACK
6.	WHITE WITH GREEN	16.	BLACK WITH VIOLET	26.	RED WITH YELLOW	36.	YELLOW WITH GREEN	46.	WHT/BLK WITH BLACK	56.	WHT/BRN WITH BROWN
7.	WHITE WITH BLUE	17.	BLACK WITH GRAY	27.	RED WITH GREEN	37.	YELLOW WITH BLUE	47.	WHT/BLK WITH BROWN	57.	WHT/BRN WITH RED
8.	WHITE WITH VIOLET	18.	BROWN WITH RED	28.	RED WITH BLUE	38.	YELLOW WITH VIOLET	48.	WHT/BLK WITH RED	58.	WHT/BRN WITH ORANGE
9.	WHITE WITH GRAY	19.	BROWN WITH ORANGE	29.	RED WITH VIOLET	39.	YELLOW WITH GRAY	49.	WHT/BLK WITH ORANGE	59.	WHT/BRN WITH YELLOW
10.	BLACK WITH BROWN	20.	BROWN WITH YELLOW	30.	RED WITH GRAY	40.	GREEN WITH BLUE	50.	WHT/BLK WITH YELLOW	60.	WHT/BRN WITH GREEN

NATIONAL WIRE AND CABLE CORPORATION

136 San Fernando Rd., Los Angeles, Calif. 90031
Phone (213) 225-5611, TWX: 910-321-4155, Fed. Stock Code H4-04569

Extra Heavy Duty Control Cables Single Conductors (NWH Series)



(NWH1916SJ shown)

National Wire & Cable Corporation manufactures a complete line of extra heavy duty multi-conductor control cables. Conductors are of tinned copper strand with ½₂" wall of polyvinylchloride primary insulation for use up to 105°C.

Insulated conductors meet all of the following specs:†

MIL-W-16878	Type D	3000 volts working
Underwriters Lab.	Type 1015	2500 VOLT ELECTRONIC USE 600 VOLT APPLIANCE USE
I.P.C.E.A. *	Spec. S61-402	600 volts working

Conductors are color coded using 10 standard basic colors, plus spiral tracers on white per MIL-STD. 681.

All conductors are planetary cabled and contra-helically laid with a Mylar tape serve over the cable bundle. The overall jacket is a 105°C black polyvinyl chloride Thermoplastic meeting I.P.C.E.A. S61-402 and MIL-I-631 Class F; or may be Neoprene to MIL-R-6855 Class 2 Grade 60 specification. (Neoprene at added cost).

SHIELDED CABLES

National Multiple Conductor SHIELDED CABLES are to the same specifications as above with addition of tinned copper braided shield over cable complex with 85-90% coverage to MIL-C-7078A. STANDARD PUT-UPS: 500 ft. and 1000 ft. No-deposit reels.

MIL-SPEC & I.P.C.E.A.

TECHNICAL DATA (all cables)

Insulation Breakdown Voltage:	Greater than 12,000 volts AC RMS, 60 cps.
Capacitance:	Nominal capacitance from a wire to all else in the cable ranges from 40 to 65 mmfd per ft., @ 1000 cps; dependent on gauge and position.
Insulation Leakage Res.:	200. megohms / 1000 ft. min. at 500 VDC from any conductor to all else in cable.
Sheath Leakage Res.:	10. megohms / 1000 ft. min. at 500 VDC from overall shield through sheath to outside world.
Usable Temp. Range:	Suitable for continuous use from +105°C to −55°C.
Bending Characteristics:	All cables are suitable for flexing to a circle diameter of 6 cable diameters from +105°C. to −20°C. Recommended flex diameter should be greater than 20 cable diameters for flexing at −40°C. For continuous flexing applications consult factory.

MULTI-CONDUCTOR STOCK CABLES

Conductor sizes 22, 20, 18, 16, 14 & 12 gauge. 22 AWG is 7 strand. All others 19 strand.

UNSHIELDED

PART NO.	NO. COND.	COND. AWG.	JKT. THICK	CABLE O.D.	WEIGHT PER M'
NWH-722 J	7	22	.045	.360	50 Lbs.
NWH-1222J	12	22	.050	.470	85 Lbs.
NWH-1922J	19	22	.060	.560	130 Lbs.
NWH-2722J	27	22	.060	.650	190 Lbs.
NWH-3722J	37	22	.060	.740	240 Lbs.
NWH-4822J	48	22	.080	.830	300 Lbs.
NWH-6022J	60	22	.080	.910	370 Lbs.
NWH-7222J	72	22	.080	.970	450 Lbs.
NWH-8822J	88	22	.080	1.050	530 Lbs.
NWH-10222J	102	22	.080	1.140	600 Lbs.
NWH-720 J	7	20	.040	.360	60 Lbs.
NWH-1220J	12	20	.050	.480	125 Lbs.
NWH-1920J	19	20	.060	.570	190 Lbs.
NWH-2720J	27	20	.060	.680	250 Lbs.
NWH-3720J	37	20	.060	.750	330 Lbs.
NWH-4820J	48	20	.060	.860	420 Lbs.
NWH-6020J	60	20	.080	.930	520 Lbs.
NWH-7220J	72	20	.080	1.040	585 Lbs.
NWH-8820J	88	20	.080	1.120	700 Lbs.
NWH-10220J	102	20	.080	1.220	820 Lbs.
NWH-718 J	7	18	.040	.410	90 Lbs.
NWH-1218J	12	18	.050	.540	160 Lbs.
NWH-1918J	19	18	.060	.660	265 Lbs.
NWH-2718J	27	18	.060	.770	350 Lbs.
NWH-3718J	37	18	.080	.870	470 Lbs.
NWH-4818J	48	18	.080	.980	610 Lbs.
NWH-6018J	60	18	.080	1.080	720 Lbs.
NWH-7218J	72	18	.080	1.300	860 Lbs.
NWH-716 J	7	16	.040	.430	110 Lbs.
NWH-1216J	12	16	.050	.580	180 Lbs.
NWH-1916J	19	16	.060	.700	270 Lbs.
NWH-2716J	27	16	.060	.820	380 Lbs.
NWH-3716J	37	16	.080	.920	510 Lbs.
NWH-4816J	48	16	.080	1.060	725 Lbs.
NWH-6016J	60	16	.080	1.160	880 Lbs.
NWH-714 J	7	14	.050	.510	170 Lbs.
NWH-1214J	12	14	.050	.640	270 Lbs.
NWH-1914J	19	14	.060	.780	410 Lbs.
NWH-2714J	27	14	.080	.920	580 Lbs.
NWH-512 J	5	12	.050	.530	190 Lbs.
NWH-712 J	7	12	.050	.580	250 Lbs.
NWH-1212J	12	12	.060	.780	410 Lbs.
NWH-1912J	19	12	.080	.920	610 Lbs.

OVERALL SHIELDED

PART NO.	NO. COND.	COND. AWG.	T.C. SHIELD	JKT. THICK	CABLE O.D.	WEIGHT PER M'
NWH-722 SJ	7	22	No. 36	.045	.390	65 Lbs.
NWH-1222SJ	12	22	No. 34	.050	.500	105 Lbs.
NWH-1922SJ	19	22	No. 34	.060	.590	170 Lbs.
NWH-2722SJ	27	22	No. 34	.060	.680	240 Lbs.
NWH-3722SJ	37	22	No. 34	.060	.770	300 Lbs.
NWH-4822SJ	48	22	No. 34	.080	.860	360 Lbs.
NWH-6022SJ	60	22	No. 34	.080	.940	440 Lbs.
NWH-7222SJ	72	22	No. 34	.080	1.000	520 Lbs.
NWH-8822SJ	88	22	No. 34	.080	1.080	600 Lbs.
NWH-10222SJ	102	22	No. 34	.080	1.170	680 Lbs.
NWH-720 SJ	7	20	No. 34	.040	.390	80 Lbs.
NWH-1220SJ	12	20	No. 34	.050	.510	145 Lbs.
NWH-1920SJ	19	20	No. 34	.060	.600	225 Lbs.
NWH-2720SJ	27	20	No. 34	.060	.710	290 Lbs.
NWH-3720SJ	37	20	No. 34	.050	.780	375 Lbs.
NWH-4820SJ	48	20	No. 34	.060	.890	475 Lbs.
NWH-6020SJ	60	20	No. 34	.080	.960	580 Lbs.
NWH-7220SJ	72	20	No. 34	.080	1.070	660 Lbs.
NWH-8820SJ	88	20	No. 34	.080	1.150	780 Lbs.
NWH-10220SJ	102	20	No. 34	.080	1.250	900 Lbs.
NWH-718 SJ	7	18	No. 34	.040	.440	110 Lbs.
NWH-1218SJ	12	18	No. 34	.050	.570	195 Lbs.
NWH-1918SJ	19	18	No. 34	.060	.690	305 Lbs.
NWH-2718SJ	27	18	No. 34	.060	.800	400 Lbs.
NWH-3718SJ	37	18	No. 34	.080	.900	520 Lbs.
NWH-4818SJ	48	18	No. 34	.080	1.010	680 Lbs.
NWH-6018SJ	60	18	No. 34	.080	1.110	810 Lbs.
NWH-7218SJ	72	18	No. 34	.080	1.330	940 Lbs.
NWH-716 SJ	7	16	No. 34	.040	.460	140 Lbs.
NWH-1216SJ	12	16	No. 34	.050	.610	220 Lbs.
NWH-1916SJ	19	16	No. 34	.060	.730	315 Lbs.
NWH-2716SJ	27	16	No. 34	.060	.850	435 Lbs.
NWH-3716SJ	37	16	No. 34	.080	.950	580 Lbs.
NWH-4816SJ	48	16	No. 34	.080	1.090	800 Lbs.
NWH-6016SJ	60	16	No. 34	.080	1.160	960 Lbs.
NWH-714 SJ	7	14	No. 34	.050	.540	200 Lbs.
NWH-1214SJ	12	14	No. 34	.050	.670	310 Lbs.
NWH-1914SJ	19	14	No. 34	.060	.810	460 Lbs.
NWH-2714SJ	27	14	No. 34	.080	.950	640 Lbs.
NWH-512 SJ	5	12	No. 34	.050	.560	225 Lbs.
NWH-712 SJ	7	12	No. 34	.050	.610	290 Lbs.
NWH-1212SJ	12	12	No. 34	.060	.810	465 Lbs.
NWH-1912SJ	19	12	No. 34	.080	.950	775 Lbs.

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* All cables meet commercial I.P.C.E.A. Spec. S61-402 for 600. volt service.

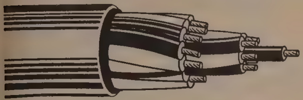
† Commercial voltage ratings are very conservative.

NATIONAL WIRE AND CABLE CORPORATION

136 San Fernando Rd., Los Angeles, Calif. 90031
Phone (213) 225-5611, TWX: 910-321-4155, Fed. Stock Code H4-04569

Miniature Signal & Control Cables Single Conductors (NQ Series)

EXTRA FLEXIBLE — GRAY PVC JACKET


(NQ1928J shown)

GRAY PVC JACKET

National Wire & Cable Corporation manufactures a complete line of highly flexible micro-miniature low-voltage instrument control cable. These are available as cabled pairs or singles, with optional overall shield of either foil with drain or a braided shield.

Conductors are stranded tinned copper with .010″ wall of tough extruded polyvinyl chloride primary insulation, rated for 300 volt use at +80°C under U. L. listed style 1061.* All are color coded using ten standard colors plus white with stripes per MIL-STD-681. Coded pairs use the same sequence as type NXP and NWP.

Conductors are planetary cabled and helically laid for optimum flexibility, with a barrier under braids. Shielded cables have a tinned copper braid of 90% coverage per MIL-C-7078, with braid angles below 40° for easy pushback; or have a 100% coverage foil shield in intimate contact with a drain wire for easy termination. See Section 3 of our master catalog for relative shield effectiveness.

Outer jacket is highly flexible abrasion-resistant gray polyvinyl chloride thermoplastic, meeting the requirements of U.L. listed style 2464.**

All materials are flame retardant and fungus resistant.

Standard Putups: 500 and 1000 ft. No-deposit reels. For shorter quantities or specific lengths, consult factory.

* Wire also meets MIL-W-16878 type B, rated 600 volts, +105°C.

** Jacket material is military rated for +105°C; meets MIL-I-631, Class F.

MIL-SPEC & U.L. LISTED STYLE 2464

TECHNICAL DATA (all cables)

Insulation breakdown voltage:	Greater than 3000 volts AC RMS, 60cps.
Capacitance:	Nominal capacitance from a wire to all else in a cable ranges from 25 to 45 pf/ft at 1kc, depending on gauge and position.
Insulation Leakage:	200 megohms/1000 feet minimum @ 500VDC from conductor to all else in cable.
Sheath Leakage:	10 megohms/1000 feet minimum @ 500VDC from shield or conductor group through sheath to ground.
Temperature Range:	U.L. rating: +80°C per U.L. style 2464. Military: Continuous use from −40°C to +105°C.
Bending Characteristics:	All cables are suitable for flexing to a circle diameter of 6 cable diameters from +105°C to −20°C. Recommended flex diameter should be greater than 20 cable diameters for flexing at −40°. For continuous flexing applications consult the factory.
Foil Shielded Cables:	The nominal overall diameter of foil shielded cables will be .006″ greater than the non-shielded cables of the same conductor count and wire size.
Characteristic Independance: (NQP Paired Cables)	Ranges from 150 ohms to 45 ohms, dependent on wire size (AWG), geometry and drive method. Consult our technical staff for data on specific cable types.

MULTI-CONDUCTOR STOCK CABLED SINGLES

UNSHIELDED CABLES

Part No.	No. Cond.	Cond. AWG	Cond. Diam.	Jkt. Wall	Nom. O/A Diam.	Wght. LB/M'
NQ-228 J	2	28	.034	.031	.135	8
NQ-328 J	3	28	.034	.031	.142	9
NQ-428 J	4	28	.034	.031	.150	11
NQ-528 J	5	28	.034	.031	.161	12
NQ-628 J	6	28	.034	.031	.171	13
NQ-728 J	7	28	.034	.031	.171	14
NQ-828 J	8	28	.034	.031	.196	19
NQ-928 J	9	28	.034	.031	.206	22
NQ-1028 J	10	28	.034	.031	.206	23
NQ-1228 J	12	28	.034	.031	.212	25
NQ-1528 J	15	28	.034	.031	.231	28
NQ-1928 J	19	28	.034	.031	.241	33
NQ-2728 J	27	28	.034	.031	.282	42
NQ-3728 J	37	28	.034	.031	.311	55
NQ-226 J	2	26	.038	.031	.144	9
NQ-326 J	3	26	.038	.031	.150	11
NQ-426 J	4	26	.038	.031	.160	13
NQ-526 J	5	26	.038	.031	.171	15
NQ-626 J	6	26	.038	.031	.183	17
NQ-726 J	7	26	.038	.031	.183	18
NQ-826 J	8	26	.038	.031	.210	23
NQ-926 J	9	26	.038	.031	.222	25
NQ-1026 J	10	26	.038	.031	.222	26
NQ-1226 J	12	26	.038	.031	.228	30
NQ-1526 J	15	26	.038	.031	.249	35
NQ-1926 J	19	26	.038	.031	.261	42
NQ-2726 J	27	26	.038	.031	.306	55
NQ-3726 J	37	26	.038	.031	.339	70
NQ-4826 J	48	26	.038	.031	.384	92

OVERALL SHIELDED CABLES

Part No.	No. Cond.	Cond. AWG	Cond. Diam.	Jkt. Wall	Nom. O/A Diam.	Wght. LB/M'
NQ-228 SJ	2	28	.034	.031	.159	16
NQ-328 SJ	3	28	.034	.031	.165	17
NQ-428 SJ	4	28	.034	.031	.173	20
NQ-528 SJ	5	28	.034	.031	.184	21
NQ-628 SJ	6	28	.034	.031	.194	23
NQ-728 SJ	7	28	.034	.031	.194	24
NQ-828 SJ	8	28	.034	.031	.219	31
NQ-928 SJ	9	28	.034	.031	.229	35
NQ-1028SJ	10	28	.034	.031	.229	36
NQ-1228SJ	12	28	.034	.031	.235	38
NQ-1528SJ	15	28	.034	.031	.254	42
NQ-1928SJ	19	28	.034	.031	.264	48
NQ-2728SJ	27	28	.034	.031	.305	60
NQ-3738SJ	37	28	.034	.031	.333	75
NQ-226 SJ	2	26	.038	.031	.167	17
NQ-326 SJ	3	26	.038	.031	.173	20
NO-426 SJ	4	26	.038	.031	.183	22
NQ-526 SJ	5	26	.038	.031	.194	25
NQ-626 SJ	6	26	.038	.031	.205	28
NQ-726 SJ	7	26	.038	.031	.205	29
NQ-826 SJ	8	26	.038	.031	.233	36
NQ-926 SJ	9	26	.038	.031	.245	39
NO-1026SJ	10	26	.038	.031	.245	40
NQ-1226SJ	12	26	.038	.031	.251	44
NQ-1526SJ	15	26	.038	.031	.272	51
NQ-1926SJ	19	26	.038	.031	.284	58
NQ-2726SJ	27	26	.038	.031	.329	75
NQ-3726SJ	37	26	.038	.031	.362	92
NQ-4826SJ	48	26	.038	.031	.407	117

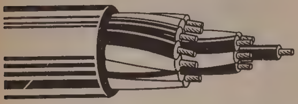
(continued on following page)

NATIONAL WIRE
AND CABLE CORPORATION

136 San Fernando Rd., Los Angeles, Calif. 90031
Phone (213) 225-5611, TWX: 910-321-4155, Fed. Stock Code H4-04569

Miniature Signal & Control Cables Single Conductors (NQ Series)

EXTRA FLEXIBLE — GRAY PVC JACKET



(NQ1928J shown)

MIL-SPEC & U.L. LISTED

STYLE 2464

MULTI-CONDUCTOR STOCK CABLED SINGLES continued from previous page.

UNSHIELDED CABLES

Part No.	No. Cond.	Cond. AWG	Cond. Diam.	Jkt. Wall	Nom. O/A Diam.	Wght. LB/M'
NQ-224 J	2	24	.043	.031	.154	11
NQ-324 J	3	24	.043	.031	.161	13
NQ-424 J	4	24	.043	.031	.172	15
NQ-524 J	5	24	.043	.031	.185	18
NQ-624 J	6	24	.043	.031	.198	21
NQ-724 J	7	24	.043	.031	.198	23
NQ-824 J	8	24	.043	.031	.229	27
NQ-924 J	9	24	.043	.031	.242	30
NQ-1024 J	10	24	.043	.031	.242	32
NQ-1224 J	12	24	.043	.031	.249	37
NQ-1524 J	15	24	.043	.031	.273	44
NQ-1924 J	19	24	.043	.031	.286	53
NQ-2724 J	27	24	.043	.031	.337	70
NQ-3724 J	37	24	.043	.031	.374	93
NQ-4824 J	48	24	.043	.031	.425	120
NQ-6024 J	60	24	.043	.031	.462	145
NQ-222 J	2	22	.050	.031	.166	13
NQ-322 J	3	22	.050	.031	.174	17
NQ-422 J	4	22	.050	.031	.186	20
NQ-522 J	5	22	.050	.031	.201	25
NQ-622 J	6	22	.050	.031	.216	28
NQ-722 J	7	22	.050	.031	.216	31
NQ-822 J	8	22	.050	.031	.251	36
NQ-922 J	9	22	.050	.031	.266	40
NQ-1022 J	10	22	.050	.031	.266	43
NQ-1222 J	12	22	.050	.031	.274	50
NQ-1522 J	15	22	.050	.031	.301	60
NQ-1922 J	19	22	.050	.031	.316	73
NQ-2722 J	27	22	.050	.031	.374	100
NQ-3722 J	37	22	.050	.031	.416	142
NQ-4822 J	48	22	.050	.031	.474	169
NQ-6022 J	60	22	.050	.031	.590	210
NQ-220 J	2	20	.057	.031	.182	17
NQ-320 J	3	20	.057	.031	.191	23
NQ-420 J	4	20	.057	.031	.205	28
NQ-520 J	5	20	.057	.031	.223	33
NQ-620 J	6	20	.057	.031	.240	39
NQ-720 J	7	20	.057	.031	.240	43
NQ-820 J	8	20	.057	.031	.281	51
NQ-920 J	9	20	.057	.031	.298	55
NQ-1020 J	10	20	.057	.031	.288	60
NQ-1220 J	12	20	.057	.031	.307	70
NQ-1520 J	15	20	.057	.031	.339	85
NQ-1920 J	19	20	.057	.031	.356	103
NQ-2729 J	27	20	.057	.031	.423	143
NQ-3720 J	37	20	.057	.031	.472	190
NQ-218 J	2	18	.068	.031	.202	23
NQ-318 J	3	18	.068	.031	.213	29
NQ-418 J	4	18	.068	.031	.229	37
NQ-518 J	5	18	.068	.031	.250	44
NQ-618 J	6	18	.068	.031	.270	52
NQ-718 J	7	18	.068	.031	.270	59
NQ-818 J	8	18	.068	.031	.318	68
NQ-918 J	9	18	.068	.031	.338	75
NQ-1018 J	10	18	.068	.031	.338	82
NQ-1218 J	12	18	.068	.031	.349	96
NQ-1518 J	15	18	.068	.031	.386	117
NQ-1918 J	19	18	.068	.031	.406	144
NQ-2718 J	27	18	.068	.031	.484	206

OVERALL SHIELDED CABLES

Part No.	No. Cond.	Cond. AWG	Cond. Diam.	Jkt. Wall	Nom. O/A Diam.	Wght. LB/M'
NQ-224 SJ	2	24	.043	.031	.177	20
NQ-324 SJ	3	24	.043	.031	.184	22
NQ-424 SJ	4	24	.043	.031	.195	25
NQ-524 SJ	5	24	.043	.031	.208	29
NQ-624 SJ	6	24	.043	.031	.221	33
NQ-724 SJ	7	24	.043	.031	.221	35
NQ-824 SJ	8	24	.043	.031	.252	41
NQ-924 SJ	9	24	.043	.031	.265	45
NQ-1024SJ	10	24	.043	.031	.265	47
NQ-1224SJ	12	24	.043	.031	.272	53
NQ-1524SJ	15	24	.043	.031	.296	61
NQ-1924SJ	19	24	.043	.031	.309	71
NQ-2724SJ	27	24	.043	.031	.360	92
NQ-3724SJ	37	24	.043	.031	.397	118
NQ-4824SJ	48	24	.043	.031	.453	148
NQ-6024SJ	60	24	.043	.031	.490	176
NQ-222 SJ	2	22	.050	.031	.189	23
NQ-322 SJ	3	22	.050	.031	.197	27
NQ-422 SJ	4	22	.050	.031	.209	31
NQ-522 SJ	5	22	.050	.031	.224	37
NQ-622 SJ	6	22	.050	.031	.239	41
NQ-722 SJ	7	22	.050	.031	.239	44
NQ-822 SJ	8	22	.050	.031	.274	52
NQ-922 SJ	9	22	.050	.031	.289	57
NQ-1022SJ	10	22	.050	.031	.289	60
NQ-1222SJ	12	22	.050	.031	.297	67
NQ-1522SJ	15	22	.050	.031	.324	79
NQ-1922SJ	19	22	.050	.031	.339	93
NQ-2722SJ	27	22	.050	.031	.397	125
NQ-3722SJ	37	22	.050	.031	.434	169
NQ-4822SJ	48	22	.050	.031	.502	201
NQ-6022SJ	60	22	.050	.031	.618	245
NQ-220 SJ	2	20	.057	.031	.205	28
NQ-320 SJ	3	20	.057	.031	.214	35
NQ-420 SJ	4	20	.057	.031	.228	41
NQ-520 SJ	5	20	.057	.031	.246	47
NQ-620 SJ	6	20	.057	.031	.263	54
NQ-720 SJ	7	20	.057	.031	.263	58
NQ-820 SJ	8	20	.057	.031	.304	69
NQ-920 SJ	9	20	.057	.031	.321	74
NQ-1020SJ	10	20	.057	.031	.321	79
NQ-1220SJ	12	20	.057	.031	.330	90
NQ-1520SJ	15	20	.057	.031	.362	107
NQ-1920SJ	19	20	.057	.031	.379	126
NQ-2720SJ	27	20	.057	.031	.451	171
NQ-3720SJ	37	20	.057	.031	.500	221
NQ-218 SJ	2	18	.068	.031	.225	35
NQ-318 SJ	3	18	.068	.031	.236	42
NQ-418 SJ	4	18	.068	.031	.252	51
NQ-518 SJ	5	18	.068	.031	.273	60
NQ-618 SJ	6	18	.068	.031	.293	69
NQ-718 SJ	7	18	.068	.031	.293	76
NQ-818 SJ	8	18	.068	.031	.341	88
NQ-918 SJ	9	18	.068	.031	.361	97
NQ-1018SJ	10	18	.068	.031	.361	104
NQ-1218SJ	12	18	.068	.031	.372	119
NQ-1518SJ	15	18	.068	.031	.409	142
NQ-1918SJ	19	18	.068	.031	.434	171
NQ-2718SJ	27	18	.068	.031	.513	238

NATIONAL WIRE
AND CABLE CORPORATION

136 San Fernando Rd., Los Angeles, Calif. 90031
Phone (213) 225-5611, TWX: 910-321-4155, Fed. Stock Code H4-04569

Miniature Signal & Control Cables Twisted Pairs (NQP Series)

EXTRA FLEXIBLE — GRAY PVC JACKET

(NQP1928J shown)

MIL-SPEC & U.L. LISTED

STYLE 2464

GRAY PVC JACKET

National Wire & Cable Corporation manufactures a complete line of highly flexible micro-miniature low-voltage instrument control cable. These are available as cabled pairs or singles, with optional overall shield of either foil with drain or a braided shield.

Conductors are stranded tinned copper with .010" wall of tough extruded polyvinyl chloride primary insulation, rated for 300 volt use at +80°C under U. L. listed style 1061.* All are color coded using ten standard colors plus white with stripes per MIL-STD-681. Coded pairs use the same sequence as type NXP and NWP.

Conductors are planetary cabled and helically laid for optimum flexibility, with a barrier under braids. Shielded cables have a tinned copper braid of 90% coverage per MIL-C-7078, with braid angles below 40° for easy pushback; or have a 100% coverage foil shield in intimate contact with a drain wire for easy termination. See Section 3 of our master catalog for relative shield effectiveness.

Outer jacket is highly flexible abrasion-resistant gray polyvinyl chloride thermoplastic, meeting the requirements of U.L. listed style 2464.**

All materials are flame retardant and fungus resistant.

Standard Putups: 500 and 1000 ft. No-deposit reels. For shorter quantities or specific lengths, consult factory.

* Wire also meets MIL-W-16878 type B, rated 600 volts, +105°C.

** Jacket material is military rated for +105°C; meets MIL-I-631, Class F.

TECHNICAL DATA (all cables)

Insulation breakdown voltage:	Greater than 3000 volts AC RMS, 60cps.
Capacitance:	Nominal capacitance from a wire to all else in a cable ranges from 25 to 45 pf/ft at 1kc, depending on gauge and position.
Insulation Leakage:	200 megohms/1000 feet minimum @ 500VDC from conductor to all else in cable.
Sheath Leakage:	10 megohms/1000 feet minimum @ 500VDC from shield or conductor group through sheath to ground.
Temperature Range:	U.L. rating: +80°C per U.L. style 2464. Military: Continuous use from —40°C to +105°C.
Bending Characteristics:	All cables are suitable for flexing to a circle diameter of 6 cable diameters from +105°C to —20°C. Recommended flex diameter should be greater than 20 cable diameters for flexing at —40°. For continuous flexing applications consult the factory.
Foil Shielded Cables:	The nominal overall diameter of foil shielded cables will be .006" greater than the non-shielded cables of the same conductor count and wire size.
Characteristic Independance: (NQP Paired Cables)	Ranges from 150 ohms to 45 ohms, dependent on wire size (AWG), geometry and drive method. Consult our technical staff for data on specific cable types.

MULTI-CONDUCTOR STOCK CABLED SINGLES

UNSHIELDED CABLES

Part No.	No. Cond.	Cond. AWG	Cond. Diam.	Jkt. Wall	Nom. O/A Diam.	Wght. LB/M'
NQP- 228J	2	28	.034	.031	.206	15
NQP- 328J	3	28	.034	.031	.217	16
NQP- 428J	4	28	.034	.031	.234	20
NQP- 528J	5	28	.034	.031	.255	23
NQP- 628J	6	28	.034	.031	.276	29
NQP- 728J	7	28	.034	.031	.276	28
NQP- 828J	8	28	.034	.031	.325	34
NQP- 928J	9	28	.034	.031	.346	41
NQP-1028J	10	28	.034	.031	.346	39
NQP-1228J	12	28	.034	.031	.357	43
NQP-1528J	15	28	.034	.031	.395	55
NQP-1928J	19	28	.034	.031	.416	61
NQP- 226J	2	26	.038	.031	.222	20
NQP- 326J	3	26	.038	.031	.234	21
NQP- 426J	4	26	.038	.031	.253	26
NQP- 526J	5	26	.038	.031	.277	34
NQP- 626J	6	26	.038	.031	.300	37
NQP- 726J	7	26	.038	.031	.300	38
NQP- 826J	8	26	.038	.031	.355	52
NQP- 926J	9	26	.038	.031	.370	60
NQP-1026J	10	26	.038	.031	.370	51
NQP-1226J	12	26	.038	.031	.382	59
NQP-1526J	15	26	.038	.031	.420	75
NQP-1926J	19	26	.038	.031	.441	85
NQP-2726J	27	26	.038	.031	.530	115

OVERALL SHIELDED CABLES

Part No.	No. Cond.	Cond. AWG	Cond. Diam.	Jkt. Wall	Nom. O/A Diam.	Wght. LB/M'
NQP- 228SJ	2	28	.034	.031	.229	28
NQP- 328SJ	3	28	.034	.031	.240	29
NQP- 428SJ	4	28	.034	.031	.257	35
NQP- 528SJ	5	28	.034	.031	.278	37
NQP- 628SJ	6	28	.034	.031	.299	46
NQP- 728SJ	7	28	.034	.031	.299	45
NQP- 828SJ	8	28	.034	.031	.348	55
NQP- 928SJ	9	28	.034	.031	.369	63
NQP-1028SJ	10	28	.034	.031	.369	61
NQP-1228SJ	12	28	.034	.031	.380	66
NQP-1528SJ	15	28	.034	.031	.423	81
NQP-1928SJ	19	28	.034	.031	.444	88
NQP- 226SJ	2	26	.038	.031	.245	34
NQP- 326SJ	3	26	.038	.031	.257	36
NQP- 426SJ	4	26	.038	.031	.276	42
NQP- 526SJ	5	26	.038	.031	.300	52
NQP- 626SJ	6	26	.038	.031	.323	56
NQP- 726SJ	7	26	.038	.031	.323	57
NQP- 826SJ	8	26	.038	.031	.378	75
NQP- 926SJ	9	26	.038	.031	.393	85
NQP-1026SJ	10	26	.038	.031	.393	76
NQP-1226SJ	12	26	.038	.031	.405	84
NQP-1526SJ	15	26	.038	.031	.448	103
NQP-1926SJ	19	26	.038	.031	.469	115
NQP-2726SJ	27	26	.038	.031	.558	152

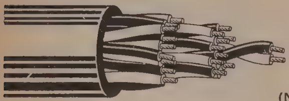
(continued on following page)

NATIONAL WIRE
AND CABLE CORPORATION

136 San Fernando Rd., Los Angeles, Calif. 90031
Phone (213) 225-5611, TWX: 910-321-4155, Fed. Stock Code H4-04569

Miniature Signal & Control Cables Twisted Pairs (NQP Series)

EXTRA FLEXIBLE — GRAY PVC JACKET



(NQP1928J shown)

MIL-SPEC & U.L. LISTED

STYLE 2464

MULTI-CONDUCTOR STOCK CABLED SINGLES continued from previous page.

UNSHIELDED CABLES

Part No.	No. Cond.	Cond. AWG	Cond. Diam.	Jkt. Wall	Nom. O/A Diam.[1]	Wght. LB/M'
NQP- 224J	2	24	.043	.031	.242	24
NQP- 324J	3	24	.043	.031	.256	26
NQP- 424J	4	24	.043	.031	.277	32
NQP- 524J	5	24	.043	.031	.304	40
NQP- 624J	6	24	.043	.031	.330	46
NQP- 724J	7	24	.043	.031	.330	47
NQP- 824J	8	24	.043	.031	.392	65
NQP- 924J	9	24	.043	.031	.410	75
NQP-1024J	10	24	.043	.031	.410	65
NQP-1224J	12	24	.043	.031	.423	74
NQP-1524J	15	24	.043	.031	.471	95
NQP-1924J	19	24	.043	.031	.497	108
NQP-2724J	27	24	.043	.031	.590	141
NQP- 222J	2	22	.050	.031	.266	30
NQP- 322J	3	22	.050	.031	.282	33
NQP- 422J	4	22	.050	.031	.306	42
NQP- 522J	5	22	.050	.031	.336	51
NQP- 622J	6	22	.050	.031	.366	62
NQP- 722J	7	22	.050	.031	.366	64
NQP- 822J	8	22	.050	.031	.436	87
NQP- 922J	9	22	.050	.031	.466	100
NQP-1022J	10	22	.050	.031	.466	88
NQP-1222J	12	22	.050	.031	.472	102
NQP-1522J	15	22	.050	.031	.526	131
NQP-1922J	19	22	.050	.031	.556	143
NQP-2722J	27	22	.050	.031	.662	198
NQP- 220J	2	20	.057	.031	.298	39
NQP- 320J	3	20	.057	.031	.317	45
NQP- 420J	4	20	.057	.031	.344	57
NQP- 520J	5	20	.057	.031	.379	70
NQP- 620J	6	20	.057	.031	.414	85
NQP- 720J	7	20	.057	.031	.414	89
NQP- 820J	8	20	.057	.031	.495	121
NQP- 920J	9	20	.057	.031	.518	139
NQP-1020J	10	20	.057	.031	.518	124
NQP-1220J	12	20	.057	.031	.537	144
NQP-1520J	15	20	.057	.031	.599	176
NQP-1920J	19	20	.057	.031	.634	205
NQP- 218J	2	18	.068	.031	.338	52
NQP- 318J	3	18	.068	.031	.360	60
NQP- 418J	4	18	.068	.031	.392	77
NQP- 518J	5	18	.068	.031	.433	96
NQP- 618J	6	18	.068	.031	.474	117
NQP- 718J	7	18	.068	.031	.474	122
NQP-1218J	12	18	.068	.031	.618	188

OVERALL SHIELDED CABLES

Part No.	No. Cond.	Cond. AWG	Cond. Diam.	Jkt. Wall	Nom. O/A Diam.	Wght. LB/M'
NQP- 224SJ	2	24	.043	.031	.265	39
NQP- 324SJ	3	24	.043	.031	.279	42
NQP- 424SJ	4	24	.043	.031	.300	50
NQP- 524SJ	5	24	.043	.031	.327	59
NQP- 624SJ	6	24	.043	.031	.353	67
NQP- 724SJ	7	24	.043	.031	.353	68
NQP- 824SJ	8	24	.043	.031	.415	91
NQP- 924SJ	9	24	.043	.031	.433	102
NQP-1024SJ	10	24	.043	.031	.433	92
NQP-1224SJ	12	24	.043	.031	.451	102
NQP-1524SJ	15	24	.043	.031	.499	127
NQP-1924SJ	19	24	.043	.031	.525	142
NQP-2724SJ	27	24	.043	.031	.618	185
NQP- 222SJ	2	22	.050	.031	.289	47
NQP- 322SJ	3	22	.050	.031	.305	51
NQP- 422SJ	4	22	.050	.031	.329	62
NQP- 522SJ	5	22	.050	.031	.359	73
NQP- 622SJ	6	22	.050	.031	.389	86
NQP- 722SJ	7	22	.050	.031	.389	88
NQP- 822SJ	8	22	.050	.031	.464	116
NQP- 922SJ	9	22	.050	.031	.494	131
NQP-1022SJ	10	22	.050	.031	.484	119
NQP-1222SJ	12	22	.050	.031	.500	134
NQP-1522SJ	15	22	.050	.031	.554	167
NQP-1922SJ	19	22	.050	.031	.584	180
NQP-2722SJ	27	22	.050	.031	.690	245
NQP- 220SJ	2	20	.057	.031	.321	58
NQP- 320SJ	3	20	.057	.031	.340	65
NQP- 420SJ	4	20	.057	.031	.367	79
NQP- 520SJ	5	20	.057	.031	.402	95
NQP- 620SJ	6	20	.057	.031	.437	112
NQP- 720SJ	7	20	.057	.031	.437	116
NQP- 820SJ	8	20	.057	.031	.523	154
NQP- 920SJ	9	20	.057	.031	.546	174
NQP-1020SJ	10	20	.057	.031	.546	159
NQP-1220SJ	12	20	.057	.031	.565	181
NQP-1520SJ	15	20	.057	.031	.627	216
NQP-1920SJ	19	20	.057	.031	.662	248
NQP- 218SJ	2	18	.068	.031	.361	74
NQP- 318SJ	3	18	.068	.031	.383	83
NQP- 418SJ	4	18	.068	.031	.415	103
NQP- 518SJ	5	18	.068	.031	.461	124
NQP- 618SJ	6	18	.068	.031	.502	148
NQP- 718SJ	7	18	.068	.031	.502	153
NQP-1218SJ	12	18	.068	.031	.646	230

**NATIONAL WIRE
AND CABLE CORPORATION**

136 San Fernando Rd., Los Angeles, Calif. 90031
Phone (213) 225-5611, TWX: 910-321-4155, Fed. Stock Code H4-04569

Digital Data Transmission Cables (D-200 Series)

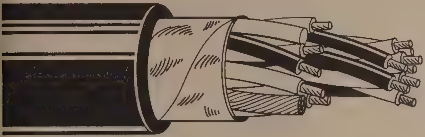
Low Voltage Computer Cable

Manufactured by our affiliate,
Dynatronic Cable Engineering Corp.

THE D-200 SERIES CABLES ARE MULTIPLE-PAIR FLEXIBLE CABLES DESIGNED FOR TRANSMISSION OF DIGITAL PULSE SIGNALS BETWEEN A COMPUTER AND ITS PERIPHERAL EQUIPMENT.

UL LISTED
U.S. Pat. No. 3489844

D-200 XX (XX designates number of pairs)



D-200 XXRF

DESIGN FEATURES OF THE D-200 SERIES DIGITAL DATA CABLE

Unlike conventional flexible cable construction, the primary features offered by the D-200 series data cable are the high and accurately controlled characteristic impedance of every pair, regardless of its position in the cable and special geometry chosen to reduce crosstalk.

ADVANTAGES

1. Less crosstalk and noise from mismatched loads, due to proper matching.
2. Uniform light loading on drivers allows direct I.C. drive, accurate prediction of current demands from power supply, and driver power dissipation.
3. Proper load match reduces re-flection and inversion noise where driver end is not matched to line. (Typical of TTL.)
4. Special geometry and pair construction provides exceptionally close capacitance balance between pair wires, reducing differential crosstalk.

USAGE

We recommend use of balanced drive and differential-input line receivers for lowest crosstalk and best pulse-reduction, utilizing the 110 ohm balanced impedance of the pairs. With such a system, TTL and MECL speeds have been used on D-200 cable at 1 mc data rates over 1000 ft.

Where the system is single-ended drive and receive, all pairs exhibit the 78 ohm impedance. Since these line receivers cannot discriminate between noise and the desired signal, crosstalk limits the cable distance over which transmission is reliable. Typical runs for DTL having 50 ns risetimes are 200 ft. Where risetimes can be slowed to longer than 100 ns, run lengths are practical to 500 ft. Without differential line reception, runs over 500 ft are not recommended for D-200 cable due to external noise aspects.

The D-210 series cable are recommended for high noise or long-run application. (Utilizing individual shields.)

Although use of balanced drive and differential line reception will avoid most noise problems, there are some installations where the expected external noise is unknown but assumed to be very great. Here, the use of data cables having individually-shielded pairs may be considered as conservative engineering practice. The assurance of a lower received noise may justify the increased size, cost and risetime.

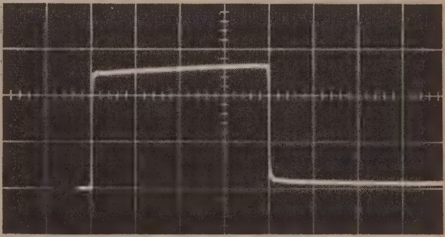
For these high noise-long run applications, Dynatronic Cable Engineering Corp has developed the D-210 series data cables. Electrical performance is essentially the same as the D-200 series cables, which use only an overall shield. An overall tinned-copper shield braid may be specified on either series by the suffix -RF on the part number. Standard D-200 shield is aluminum-mylar foil.

For runs of 1000-5000 ft. or where extra-fast output pulse risetime is required, we offer the D-220 series cable: a larger version of the D-200 series having improved transmission properties with sufficient mechanical strength for long pulls in conduit. Consult factory for technical data.

PULSE TRANSMISSION LOSS in D-series data cables causes a moderate amplitude loss, with definite rounding of the leading and trailing edges from 50% to 90% amplitude. The photos below (for a 1.25 megabit clock rate) show typical waveforms. The D-220 and D-222 series cables offer even lower losses than the D-200 or D-210 cables for long-run or fast-clocked applications.

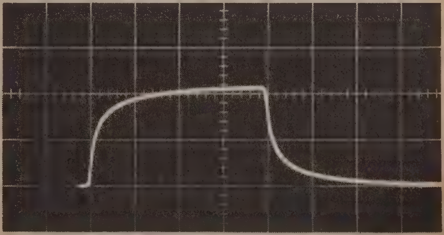
Contact our factory engineering staff for detailed pulse-shape versus distance information, or for special applications.

INPUT PULSE



Horizontal: 200. ns/cm
Vertical : 2. volts/cm

OUTPUT PULSE at 500.FT.



Horizontal: 200. ns/cm
Vertical : 2. volts/cm

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Manufactured by our affiliate, Dynatronic Cable Engineering Corp.

Digital Data Transmission Cables (D-200 Series continued)

Low Voltage Computer Cable

STANDARD DATA CABLE CONSTRUCTIONS — D-200 SERIES

Part No.	No. of Pairs	Cond. AWG.	Delay NS/FT	Cable Diam.	Weight (Lbs. per M Ft.)	UL Style No.
D-200-15	15	24	1.61	.510″	120.	2448
D-200-20	20	24	1.61	.635″	160.	2448
D-200-24	24	24	1.61	.660″	180.	2448
D-200-27	27	24	1.61	.690″	210.	2448
D-200-30	30	24	1.61	.710″	230.	2448
D-200-33	33	24	1.61	.750″	250.	2448
D-200-42	42	24	1.61	.840″	280.	2448
D-200-50	50	24	1.61	.910″	320.	2448

TECHNICAL DATA

All items available in 50 ft. multiples.

Characteristic	Balanced	Single-ended*
Characteristic Impedance	110. ohms ±5%	78. ohms ±4%
Capacitance	14. pf/ft.	21. pf/ft.
Signal Delay	1.61 ns/ft.	1.61 ns/ft.
DC Resistance/100 ft.	5.6 ohms loop	2.8 ohms
Insulation Breakdown	6. KV min. DC	6. KV min. DC
Insulation Resistance	> 1000. megohms/M′	> 1000. megohms/M′
Temperature Range	−20. C up to +80. C	
Min. Bend Radius	6 x cable diameter	

*One conductor of each pair tied to common.

STANDARD DATA CABLE CONSTRUCTIONS — D-210 SERIES INDIVIDUALLY SHIELDED DATA PAIRS

Part. No.	No. of Pairs	Z_o	Delay NS/FT	Cond. AWG.	Cable Diam.	Sheath
D-210-1	1	110.	1.61	24	.220	PVC
D-210-12	12	110.	1.61	24	.980	PVC
D-210-15	15	110.	1.61	24	1.06	PVC
D-210-20	20	110.	1.61	24	1.20	PVC
D-210-30	30	110.	1.61	24	1.42	PVC
D-210-40	40	110.	1.61	24	1.69	PVC
D-210-48	48	110.	1.61	24	1.76	PVC

TECHNICAL DATA

All items available in 50 ft. multiples.

Characteristic	Balanced**	Single-ended*
Characteristic Impedance	110. ohms ±5%	63. ohms ±4%
Capacitance	14. pf/ft.	23.5 pf/ft.
Signal Delay	1.61 ns/ft.	1.61 ns/ft.
DC Resistance/100 ft.	5.6 ohms loop	2.8 ohms
Insulation Breakdown	6. KV min. DC	6. KV min. DC
Insulation Resistance	> 1000. megohms/M′	> 1000. megohms/M′
Temperature Range	−20. C up to +80. C	
Min. Bend Radius	9 x cable diameter	

**Both driven, one inverted. *One conductor of each pair tied to common.

We invite your telephone inquiries for technical information on data cables. Contact Mr. Frank Motley or Mr. Ralph Wells in our Engineering Dept.

NATIONAL WIRE
AND CABLE CORPORATION

136 San Fernando Rd., Los Angeles, Calif. 90031
Phone (213) 225-5611, TWX: 910-321-4155, Fed. Stock Code H4-04569

Military & U.L. RFI Shielded Pair Cables (NTP Series)

(NTP722J shown)

MEETS U.L. STYLE 2343 OR 2344 FOR COMPUTER USE.

INDIVIDUALLY SHIELDED & JACKETED PAIRS

National Wire & Cable Corporation manufactures a complete line of flexible multi-pair cables in which each pair is individually twisted, shielded and plastic-jacketed.

Provides a minimum of crosstalk between signal channels, plus complete isolation between shields. Excellent for analog signals. All jackets moisture-proof. Suitable for use in duct, conduit, aerial or burial installations.

Conductors are stranded tinned copper with .010″ vinyl primary insulation, plus .004″ nylon insulation over the vinyl per MIL-W-16878 Type B. Insulation for 600 volts working rating at 105°C. Color coded: White and black (all conductors are 19 strand.)

Shielding is tinned copper braid with 90% minimum coverage per MIL-C-7078, and shield angle below 40 degrees for easy push-back.

Jackets over shields are extruded 105°C white polyvinyl chloride plastic per MIL-I-631, Class F; Color coded with stripes per MIL-STD-681, starting with 9.

All pairs are planetary cabled and contra-helically laid with a mylar tape serve over the cable bundle. The overall sheath is abrasion-resistant black 105°C vinyl thermoplastic per MIL-I-631, Class F.

Optional overall shielding of cabled bundle is 90% minimum coverage of tinned copper braid applied per MIL-C-7078 over the tape serve under sheath.

Standard Putups: 500 and 1000 ft. No-deposit reels. For shorter quantities or specific lengths, consult factory.

TECHNICAL DATA

Insulation Breakdown Voltage: Greater than 5000 volts RMS, 60 hz.

Capacitance: (mmfd/ft.)

AWG	Wire-Wire	Wire-Shield
22	37	64
20	44	77
16	55	96

Insulation Leakage Resistance: 200 Megohms/1000 ft. min. at 500 VDC from any conductor to all else in cable.

Sheath Leakage Resistance: 10 Megohms/1000 ft. min. at 500 VDC from overall shield through sheath to saline bath at 25°C.

Usable Temperature Range: Suitable for continuous use from +105°C to −55°C when stationary. Flexing service: +105°C to −25°C.

Cold Bending Capability: All cables are suitable for bending to a circle diameter of 8 cable diameters from +105°C to −20°C. Recommended flex diameter should be greater than 20 cable diameters at −40°C.

Crosstalk: Common-mode, adjacent pairs: Worst case, −50 db @ 1 mhz; falling to −100 db below 100 khz. (Ref. MIL-C-23437 for test method.) For 100 ft. test length.

STANDARD CONSTRUCTIONS

WITHOUT OVERALL SHIELD

Part No.	No. Pairs	Cond. AWG	Jacket Thick.	Cable O.D.	Weight Per M′
NTP-722J	7	22	.062	.625	260 Lbs.
NTP-1222J	12	22	.070	.820	435 Lbs.
NTP-1922J	19	22	.080	980	660 Lbs.
NTP-2722J	27	22	.080	1.115	910 Lbs.
NTP-3722J	37	22	.085	1.130	1,200 Lbs.
NTP-4822J	48	22	.090	1.520	1,570 Lbs.
NTP-720J	7	20	.070	.685	300 Lbs.
NTP-1220J	12	20	.080	.890	500 Lbs.
NTP-1920J	19	20	.080	1.065	755 Lbs.
NTP-2720J	27	20	.085	1.270	1,055 Lbs.
NTP-3720J	37	20	.090	1.445	1,400 Lbs.
NTP-716J	7	16	.075	.845	430 Lbs.
NTP-1216J	12	16	.080	1.105	700 Lbs.
NTP-1916J	19	16	.085	1.325	1,075 Lbs.

WITH OVERALL SHIELD

Part No.	No. Pairs	Cond. AWG	Jacket Thick.	Cable O.D.	Weight Per M′
NTP-722SJ	7	22	.062	.650	310 Lbs.
NTP-1222SJ	12	22	.070	.845	500 Lbs.
NTP-1922SJ	19	22	.075	1.005	700 Lbs.
NTP-2722SJ	27	22	.080	1.120	1,000 Lbs.
NTP-3722SJ	37	22	.085	1.355	1,290 Lbs.
NTP-4822SJ	48	22	.090	1.545	1,700 Lbs.
NTP-720SJ	7	20	.070	.710	355 Lbs.
NTP-1220SJ	12	20	.080	.920	570 Lbs.
NTP-1920SJ	19	20	.080	1.090	840 Lbs.
NTP-2720SJ	27	20	.085	1.295	1,155 Lbs.
NTP-3720SJ	37	20	.090	1.470	1,500 Lbs.
NTP-716SJ	7	16	.080	.870	500 Lbs.
NTP-1216SJ	12	16	.080	1.130	795 Lbs.
NTP-1916SJ	19	16	.085	1.350	1,185 Lbs.

High Temperature "Teflon®" Insulated Cables (NZ Series)

MIL-SPEC FOR ROUGH USAGE & EXTREME ENVIRONMENTS

National Wire & Cable Corp., manfactures a standard line of TEFLON®-INSULATED multi-conductor signal and control cables designed for extreme environments and rough usage.

Construction is widely used in aerospace and industrial applications requiring a near-ultimate in cable physical and electrical performance plus high reliability.

Conductors are stranded silver-plated copper, insulated with .010″ of extruded TFE Teflon®; rated at 600 volts working from −65°C to +260°C per MIL-W-16878 Type E. Conductors are color coded using 10 standard colors plus spiral stripes on white per MIL-STD-681. (All conductors are 19 strand.)

All conductors are planetary cabled and contra-helically laid for optimum flexibility, with a Mylar tape wrap over the cabled bundle. The outer sheath is abrasion-resistant black Neoprene per MIL-S-6855, Class 2, Grade 60.

Optional overall shield is a 90% coverage tinned copper braid over the tape wrap per MIL-C-7078.

Standard Putups: 500 and 1000 ft. No-deposit reels. For shorter quantities or specific lengths, consult factory.

® Trademark, E. I. Dupont Co.

TECHNICAL DATA

Insulation Breakdown Voltage: Greater than 4000 volts RMS, 60 hz.

Capacitance: Nominal capacitance from a wire to all else in cable ranges from 25 to 45 mmfd/ft. dependent on gauge and position in cable bundle.

Insulation Leakage Resistance: 5000 Megohms per 1000 ft.; minimum from any wire to all else in cable.

Sheath Leakage Resistance: 20 Megohms/ft. minimum; from shield through sheath to saline bath after 24 hr. at 25°C.

Usable Temperature Range: Suitable for continuous use from −55°C to +75°C in flexing service or stored.

Cold Bending Capability: All cables are suitable for bending to a circle diameter as small as 4 times their diameter from −55°C to +75°C. Continuous flexing to less than 6 times diameter is not recommended below −40°C.

General Performance: All materials are self-extinguishing after exposure to flame. Non-nutrient to fungus. Highly resistant to ozone, oils, mild acids and bases, high humidity.

STANDARD CONSTRUCTIONS

WITHOUT OVERALL SHIELD

Part No.	No. Cond.	Cond. AWG	Jacket Thick.	Cable O.D.	Weight Per M′
NZ-720J	7	20	.062	.300	70 Lbs.
NZ-1220J	12	20	.062	.365	100 Lbs.
NZ-1920J	19	20	.078	.445	145 Lbs.
NZ-2720J	27	20	.078	.505	210 Lbs.
NZ-3720J	37	20	.093	.590	260 Lbs.
NZ-4820J	48	20	.093	.650	330 Lbs.
NZ-6020J	60	20	.093	.705	400 Lbs.
NZ-716J	7	16	.062	.355	95 Lbs.
NZ-1216J	12	16	.078	.470	160 Lbs.
NZ-1916J	19	16	.078	.540	235 Lbs.
NZ-2716J	27	16	.093	.655	325 Lbs.
NZ-3716J	37	16	.093	.720	435 Lbs.
NZ-4816J	48	16	.093	.805	545 Lbs.

WITH OVERALL SHIELD

Part No.	No. Cond.	Cond. AWG	Jacket Thick.	Cable O.D.	Weight Per M′
NZ-720SJ	7	20	.062	.325	80 Lbs.
NZ-1220SJ	12	20	.062	.400	115 Lbs.
NZ-1920SJ	19	20	.078	.470	165 Lbs.
NZ-2720SJ	27	20	.078	.535	240 Lbs.
NZ-3720SJ	37	20	.093	.616	300 Lbs.
NZ-4820SJ	48	20	.093	.675	370 Lbs.
NZ-6020SJ	60	20	.093	.730	450 Lbs.
NZ-716SJ	7	16	.062	.380	110 Lbs.
NZ-1216SJ	12	16	.078	.495	190 Lbs.
NZ-1916SJ	19	16	.078	.565	270 Lbs.
NZ-2716SJ	27	16	.093	.680	370 Lbs.
NZ-3716SJ	37	16	.093	.745	485 Lbs.
NZ-4816SJ	48	16	.093	.830	605 Lbs.

NATIONAL WIRE
AND CABLE CORPORATION

136 San Fernando Rd., Los Angeles, Calif. 90031
Phone (213) 225-5611, TWX: 910-321-4155, Fed. Stock Code H4-04569

Complete Wire & Cable Mill Facilities To Meet Your Needs!

TRY OUR SERVICE, AND SEE!

NATIONAL WIRE & CABLE CORPORATION IS UNIQUE AMONG THE LEADING MANUFACTURERS OF CONTROL AND INSTRUMENTATION CABLE FOR THE ELECTRONIC AND AEROSPACE INDUSTRY. **UNIQUE, DUE TO OUR HUGE WIRE INVENTORY** — OVER 100 MILLION FEET IN STOCK — WHICH ALLOWS VERY RAPID DELIVERY OF CABLE, AND EXCELLENT SERVICE TO OUR WIRE CUSTOMERS.

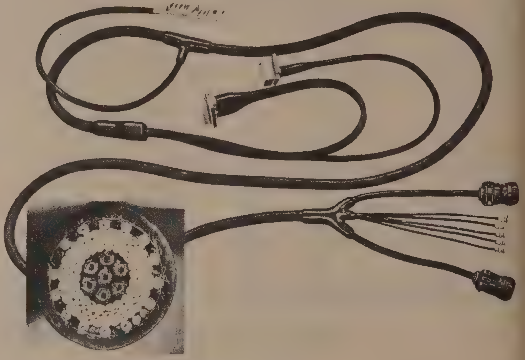
Custom Made Cable to Your Specifications

AVAILABLE PROMPTLY — AND AT LOWER COST THAN YOU MAY SUPPOSE—BECAUSE NATIONAL WIRE HAS:

1. The organization & experience to handle short-runs or rush schedules with consistent quality
2. All types of mill machinery for fabricating cable and all intermediate operations.
3. An enormous wire inventory to draw from for material for your cable (over 100 million feet in stock)
4. Technical consultants to aid you in properly specifying your cable needs and construction

COMPLETE FACILITIES FOR FABRICATING ALL CONSTRUCTIONS

- COPPER CONDUCTOR FABRICATION
- CONDUCTOR INSULATION EXTRUSION
- INSULATION CODING & STRIPPING
- ELECTRICAL SHIELDING
- TWISTING & SUBCABLE FABRICATION
- PLANETARY CABLE FABRICATION
- CABLE SHEATH EXTRUSION
- CABLE ASSEMBLY FABRICATION



Mr. DESIGNER: May we suggest

A. Request a copy of our complete Master Catalog. Write to us on your company letterhead or phone us directly in Los Angeles with your request
Then . . .

B. Check our catalog section and the instrumentation cable section for any of our standard stock cables which may meet your needs.

C. Review our cable designer's check list in the "Technical Information" section of the Master Catalog. Note any topics on which you may need information or recommendations.

D. Call National Wire & Cable Corp. (213-225-5611) and discuss your needs with our Technical Consultants. They speak your language and will have the answers you need.

E. Our Consultants will assist you in design, obtain cost and delivery information, and provide formal quotations and drawings, and assist with sales and procurement liaison.

F. Send us your prints for your custom cables for review and quotation. Where necessary, National Wire and Cable will provide engineering at no cost to fit your needs.

CONTACT NATIONAL WIRE & CABLE CORPORATION OR OUR REPRESENTATIVE FOR ACTION

NATIONAL WIRE AND CABLE CORPORATION

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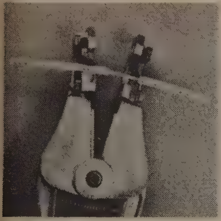
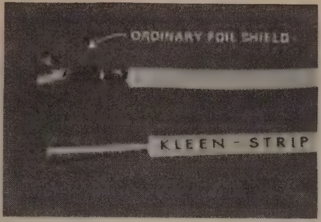
Nafoil Kleen-Strip® Foil-Shielded Audio & Instrumentation Cables (NKS Series)





COMPUTER GRADE U.L. LISTED SELF-STRIPPING FOIL SHIELD

Self stripping feature saves preparation time . . . increases production.

National Wire and Cable Corporation manufactures a full line of small shielded instrumentation cables using our "NAFOIL KLEEN-STRIP self stripping foil shield construction, plus non-fraying NABOND bonded stranded conductors.

Since the foil shield of "NAFOIL KLEEN-STRIP" is integrally fusion-bonded to the cable jacket, stripping the jacket from the end of the cable automatically removes the foil shield in the same operation.

This eliminates hand untwisting and trimming of foil shields. Excellent for automatic machine srtipping.

Insulated conductor and "drain" wire use National's "NABOND" bonded stranded wire which eliminates frayed wire ends. The "NABOND" process lightly bonds the tinning of all strands. "NABOND" wire acts like a solid wire during stripping and wiring operations. Subsequent flexure breaks the bonding and the wire returns to its flexible condition. Offers the convenience of solid wire during manufacture, with the reliability of stranded wire for normal use.

All wires are stranded, bonded, tinned copper with .010" vinyl insulation for use up to +80.C @ 300 volts (U.L. Style 1061). Also rated 105.C @ 600 volts per MIL-W-16878/1.

Foil shield is ½ MIL Mylar with .00035" Aluminum, 50% overlap. Bare drain wire is the same as used in insulated conductors.

Overall jacket is 105 C. polyvinyl chloride thermoplastic per MIL-I-631 Class B and exceeds U.L. requirements. Jacket wall thickness .031". For extra flexible applications, these cables are also available with .002 jacket wall.

TECHNICAL DATA

U.L. Voltage Rating:	300. Volts RMS AC (U.L. Style 1061)
Military Rating:	600. Volts RMS AC (Mil-W-16878/1)
Breakdown Voltage:	Greater than 3000. Volts RMS AC
Insulation Leakage Resistance:	Higher than 200. Megohms per 1000 ft at 500. V.D.C. from any conductor to all else.
Jacket Leakage Resistance:	Higher than 10 Megohms per 1000 ft at 500. V.D.C. from shield through Jacket to water bath.
Capacitance:	See Table Below.
Shield Leakage Capacitance:	Nominal "Look-Through" capacitance from conductor group through the shield to water bath is less than 2.pf/1000 ft. Reinforcing action of bonded jacket reduces "Window" effects caused by flexure.
Usable Temp. Range:	U.L. +80° Military: −40° to +105°C
Cold Bend:	All cables are suitable for flexing to a circle diameter of approx. 6 cable diameters from +80°C to −40°C.

STANDARD "KLEEN-STRIP" SHIELDED CABLES

SINGLE CONDUCTOR SHIELDED & JACKETED	CONDUCTOR AWG & STRANDING	NATIONAL PART NO.	INSULATION DIAMETER	DRAIN WIRE AWG & STRANDING	JACKET THICKNESS	DIAMETER OVER JKT.	CAPACITANCE PF/FT		RESISTANCE OHMS/MFT
							W-S	W-W	
	26 (7)	NKS-261	.038	26 (7)	.022	.108	97.8	—	42.9
	24 (7)	NKS-241	.043	24 (7)	.022	.119	170.9	—	26.8
	22 (7)	NKS-221	.050	22 (7)	.022	.130	131.5	—	16.7
	20 (7)	NKS-201	.057	20 (7)	.022	.148	167.2	—	10.5

2-CONDUCTOR SHIELDED & JACKETED (U.L. STYLE 2464)	CONDUCTOR AWG & STRANDING	NATIONAL PART NO.	INSULATION DIAMETER	DRAIN WIRE AWG & STRANDING	JACKET THICKNESS	DIAMETER OVER JKT.	CAPACITANCE PF/FT		RESISTANCE OHMS/MFT
							W-S	W-W	
	26 (7)	NKS-262	.038	26 (7)	.022	.128	85.6	46.9	42.9
	24 (7)	NKS-242	.043	24 (7)	.022	.140	94.4	51.8	26.8
	22 (7)	NKS-222	.050	22 (7)	.022	.150	115.1	63.1	16.7
	20 (7)	NKS-202	.057	20 (7)	.022	.166	146.29	46.9	10.5

3-CONDUCTOR SHIELDED & JACKETED (U.L. STYLE 2464)	CONDUCTOR AWG & STRANDING	NATIONAL PART NO.	INSULATION DIAMETER	DRAIN WIRE AWG & STRANDING	JACKET THICKNESS	DIAMETER OVER JKT.	CAPACITANCE PF/FT		RESISTANCE OHMS/MFT
							W-S	W-W	
	26 (7)	NKS-263	.038	26 (7)	.022	.134	80.8	44.0	42.9
	24 (7)	NKS-243	.043	24 (7)	.022	.147	89.2	48.6	26.8
	22 (7)	NKS-223	.050	22 (7)	.022	.158	108.7	59.2	16.7
	20 (7)	NKS-203	.057	20 (7)	.022	.175	138.3	75.2	10.5

4-CONDUCTOR SHIELDED & JACKETED (U.L. STYLE 2464)	CONDUCTOR AWG & STRANDING	NATIONAL PART NO.	INSULATION DIAMETER	DRAIN WIRE AWG & STRANDING	JACKET THICKNESS	DIAMETER OVER JKT.	CAPACITANCE PF/FT		RESISTANCE OHMS/MFT
							W-S	W-W	
	26 (7)	NKS-264	.038	26 (7)	.022	.144	79.	42.	42.9
	24 (7)	NKS-244	.043	24 (7)	.022	.158	88.	46.	26.8
	22 (7)	NKS-224	.050	22 (7)	.022	.170	107.	57.	16.7
	20 (7)	NKS-204	.057	20 (7)	.022	.189	136.	73.	10.5

NATIONAL WIRE
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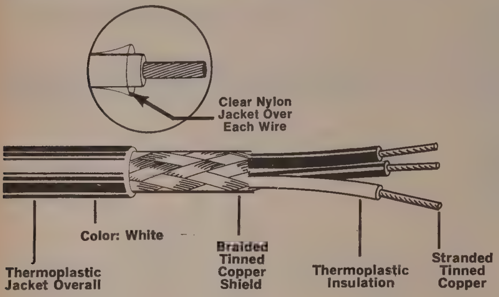
Braided Audio & Instrumentation 1, 2 & 3 Conductor Shielded Cables


Clear Nylon Jacket Over Each Wire
Color: White
Thermoplastic Jacket Overall
Braided Tinned Copper Shield
Thermoplastic Insulation
Stranded Tinned Copper

(3 conductor shielded and jacketed shown)

TYPE B NYLON
SHIELDED AND JACKETED
–54°C TO +105°C
600 VOLTS (WORKING)

TYPE B NYLON SINGLE CONDUCTOR

GAUGE OF CONDUCTORS	NATIONAL CATALOG NUMBER	NO. OF STRANDS PER COND.	GA. OF STRANDS	NOM. DIAM. OVERALL WIRE (INCHES)	NOMINAL VALUES OF CAPACITANCE PER FOOT		NOM. WT. PER 1000 FT. (LBS.)
					WIRE-WIRE MMF/FT	WIRE-SHIELD MMF/FT	
24	NB1936N1SJ	19	36	.097		70.5	16.9
22	NB1934N1SJ	19	34	.110		102.1	18.7
20	NB1932N1SJ	19	32	.120		113.4	21.1
18	NB1930N1SJ	19	30	.123		118.9	24.6
16	NB1929N1SJ	19	29	.134		123.6	27.7

TYPE B NYLON TWO CONDUCTOR

GAUGE OF CONDUCTORS	NATIONAL CATALOG NUMBER	NO. OF STRANDS PER COND.	GA. OF STRANDS	NOM. DIAM. OVERALL WIRE (INCHES)	NOMINAL VALUES OF CAPACITANCE PER FOOT		NOM. WT. PER 1000 FT. (LBS.)
					WIRE-WIRE MMF/FT	WIRE-SHIELD MMF/FT	
24	NB1936N2SJ	19	36	.151	35.1	59.5	24.4
22	NB1934N2SJ	19	34	.170	40.0	61.3	28.4
20	NB1932N2SJ	19	32	.190	47.6	74.9	32.3
18	NB1930N2SJ	19	30	.215	57.6	97.4	40.0
16	NB1929N2SJ	19	29	.236	62.7	106.2	46.1

TYPE B NYLON THREE CONDUCTOR (see illustration)

GAUGE OF CONDUCTORS	NATIONAL CATALOG NUMBER	NO. OF STRANDS PER COND.	GA. OF STRANDS	NOM. DIAM. OVERALL WIRE (INCHES)	NOMINAL VALUES OF CAPACITANCE PER FOOT		NOM. WT. PER 1000 FT. (LBS.)
					WIRE-WIRE MMF/FT	WIRE-SHIELD MMF/FT	
24	NB1936N3SJ	19	36	.165	36.3	67.7	26.8
22	NB1934N3SJ	19	34	.178	40.9	71.8	31.6
20	NB1932N3SJ	19	32	.199	49.6	80.1	38.4
18	NB1930N3SJ	19	30	.229	53.8	87.5	48.8
16	NB1929N3SJ	19	29	.254	60.8	92.5	58.0

*NOTE: Other conductor combinations available on request.

NATIONAL CABLE MOLDING CORPORATION

AN AFFILIATE OF NATIONAL WIRE & CABLE CORPORATION

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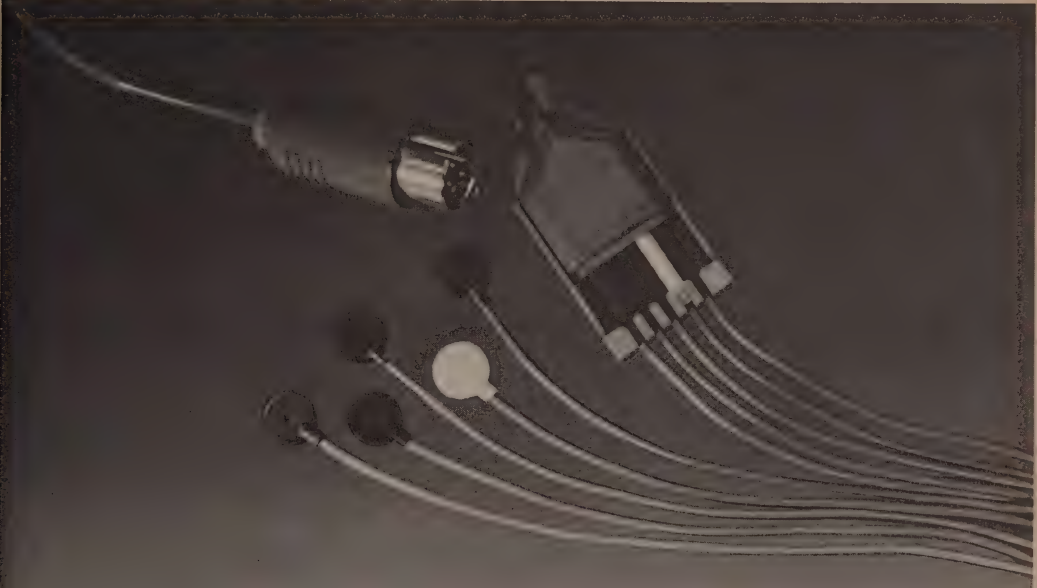
AN AFFILIATE OF NATIONAL WIRE & CABLE CORPORATION

Molded Instrumentation Cables for all Types of Medical & Electronic Applications



SPECIALISTS IN INJECTION-MOLDING OF CONNECTORS DIRECTLY ONTO CABLE!

INTEGRAL-MOLDED ELECTRONIC CABLE/CONNECTOR ASSEMBLIES

Utilizing integral cable molding techniques, National Cable Molding Corporation (NCM) manufactures all components "in-house" from wire insulation to cable manufacture, connector assembly, tooling and molding the entire unit ready for use!

Write or call Mr. Frank W. Motley today for technical information or assistance. Phone: (213) 225-5611.

NATIONAL WIRE
AND CABLE CORPORATION

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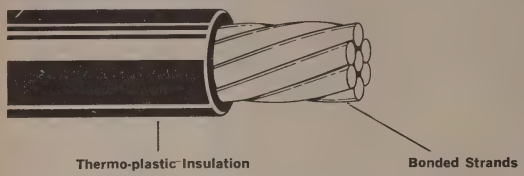
Nabond® Bonded Stranded Electronic Hookup Wire



Colors: 10 standard colors plus tracers on solid colors.

A NABOND* STRANDED CONDUCTOR IN YOUR WIRE ELIMINATES PRE-TINNING BEFORE FORMING WIRE TO A TERMINAL.

1. **Forms just like a solid wire . . . no loose strands.**
2. **Extra tinning ensures better soldering.**
3. **Absolutely smooth and round . . . NOT just a tin dip coat.**

WHAT IT IS:

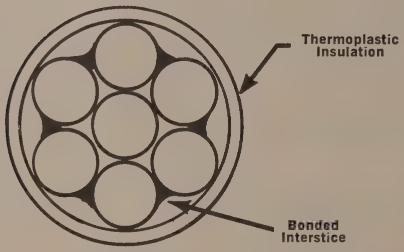
NABOND is a special bonding technique used on the tinned stranded copper conductors in an insulated wire.

The tinning on NABOND strands is slightly heavier than regular. The strands are cabled into a bundle to form the conductor. The conductor is then passed through a special process which lightly bonds the tinning on each strand. The resulting conductor is still smooth and round, yet may be formed as though it were a solid wire, without pre-tinning normally needed to hold the strands.

With repeated flexing, Nabond strand-bonds break free, allowing the stranded conductor to return to its flexible condition.

NABOND is available with either 600 or 300 volt insulation for U.L. service. NABOND exceeds U.L. Appliance Wiring Material requirements for copper conductors.

NABOND ELIMINATES PRE-TINNING!



NABOND is a wire identical to U.L. wires, except that the tinned strands are bonded together.

Pre-tinning is not required before soldering or forming. NABOND strand is smooth and flexible, yet is as easy to form and solder as a solid wire.

	GAUGE (AWG)	NATIONAL CATALOG NUMBER	NO. OF STRANDS	GA. OF STRANDS (AWG)	NOM. DIAM. OF STRANDED CONDUCTOR (INCHES)	NOM. FIN. WIRE DIAM. (INCHES)	MAX. RESISTANCE (dc) AT 25°C OHMS/1000 FT.	NOM. WT. PER 1000 FT. (LBS.)
U.L. AWM STYLE 1061 WITH NABOND FR-1 RATED	26	NB734UB	7	34	.019	.038	42.9	1.5
	24	NB732UB	7	32	.024	.043	26.8	3.0
	22	NB730UB	7	30	.030	.050	16.7	3.8
	20	NB1030UB	10	30	.038	.057	10.5	5.7
	18	NB1630UB	16	30	.048	.068	6.57	8.0
U.L. AWM STYLE 1007 WITH NABOND FR-1 RATED	24	NC732UB	7	32	.024	.058	26.8	3.2
	22	NC730UB	7	30	.030	.063	16.7	4.
	20	NC1030UB	10	30	.038	.072	10.5	6.
	18	NC1630UB	16	30	.048	.082	6.57	8.5

ALSO AVAILABLE IN UL STYLE 1015

10 STANDARD COLORS AND TRACERS

NATIONAL WIRE AND CABLE CORPORATION

136 San Fernando Rd., Los Angeles, Calif. 90031
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U/L Listed Wire

CSA Listed Wire

- Wires listed by the Underwriter's Laboratories, Inc. for operation in an air or an oil environment. U.L. File #E35793.
- Wires listed by the Canadian Standards Association for radio or electronic uses. CSA File #LR-20482

U/L Style 1061

Appliance wiring material available as FR-1 rated 80-degree C Service. .009" semi-rigid vinyl insulation U/L rated: 300-volt service. Meets Mil W-1687D Type B.

GAUGE (AWG)	NATIONAL CATALOG NUMBER	NO. OF STRANDS	GA. OF STRANDS (AWG)	NOM. DIAM. OF STRANDED CONDUCTOR (INCHES)	NOM. FIN. WIRE DIAM. (INCHES)	MAX. RESISTANCE (dc) AT 25°C OHMS/1000 FT.	NOM. WT. PER 1000 FT. (LBS.)
28	N304-736U	7	36	.015	.034	69.0	1.0
26	N304-734U	7	34	.019	.038	42.9	1.5
24†	N304-1936U	19*	36	.024	.043	26.8	2.0
22†	N304-1934U	19*	34	.030	.050	16.7	3.0
20	N304-1932U	19*	32	.038	.057	10.5	4.75
18	N304-1930U	19	30	.048	.068	6.57	6.5
16	N304-1929	19	29	.057	.077	4.85	9.0

U/L Style 1007

Appliance wiring available as FR-1 rated 80-degree C Service. 1/64" vinyl insulation U/L rated: 300 volt appliance, use 600 volt electronic use. Meets Mil-W-1678D Type C. Also approved by CSA as Type TR-64 radio wiring for 90-degree C Service. Colors: 10 standard colors plus tracers on solid colors.

GAUGE (AWG)	NATIONAL CATALOG NUMBER	NO. OF STRANDS	GA. OF STRANDS (AWG)	NOM. DIAM. OF STRANDED CONDUCTOR (INCHES)	NOM. FIN. WIRE DIAM. (INCHES)	MAX. RESISTANCE (dc) AT 25°C OHMS/1000 FT.	NOM. WT. PER 1000 FT. (LBS.)
24 †	N303-1936U	19*	36	.024	.058	26.8	2.75
22 †	N303-1934U	19*	34	.030	.063	16.7	3.75
20	N303-1932U	19*	32	.038	.072	10.5	5.50
18	N303-1930U	19	30	.048	.082	6.57	8.0
16	N303-1929U	19	29	.057	.090	4.85	10.0

U/L Style 1015

Appliance wiring material available as FR-1 rated 105-degree C Service 1/32" vinyl insulation U/L rated, 2500 volts electronic use, 600 volt appliance use. Meets Mil W 18878D Type D. Colors: 10 standard colors plus tracers on solid colors.

GAUGE (AWG)	NATIONAL CATALOG NUMBER	NO. OF STRANDS	GA. OF STRANDS (AWG)	NOM. DIAM. OF STRANDED CONDUCTOR (INCHES)	NOM. FIN. WIRE DIAM. (INCHES)	MAX. RESISTANCE (dc) AT 25°C OHMS/1000 FT.	NOM. WT. PER 1000 FT. (LBS.)
24†	N600-1936U	19*	36	.024	.082	26.8	4.0
22†	N600-1934U	19*	34	.030	.090	16.7	5.2
20†	N600-1932U	19*	32	.038	.098	10.5	7.3
18	N600-1930U	19	30	.048	.108	6.57	10.0
16	N600-1929U	19	29	.057	.117	4.85	12.0
14	N600-1927U	19	27	.071	.130	3.05	17.1
12	N600-1925U	19	25	.090	.162	1.92	27.4
10	N600-4927U	49	27	.111	.181	1.24	38.6

CSA/Type TR-32 Radio Wire

Rated: 90-degree C 600 volt, 1/32" vinyl insulation. Also listed as CSA Appliance Wiring Material 90-degree 600 V. Meets U/L Style 1015 & Mil-W-16878D Type D.

GAUGE (AWG)	NATIONAL CATALOG NUMBER	NO. OF STRANDS	GA. OF STRANDS (AWG)	NOM. DIAM. OF STRANDED CONDUCTOR (INCHES)	NOM. FIN. WIRE DIAM. (INCHES)	MAX. RESISTANCE (dc) AT 25°C OHMS/1000 FT.	NOM. WT. PER 1000 FT. (LBS.)
24 †	N307-732U	*19	36	.024	.082	26.8	4.0
22 †	N307-730U	*19	34	.030	.090	16.7	5.2
20	N307-1932U	*19	32	.038	.098	10.5	7.3
18	N307-1930U	19	30	.048	.108	6.57	10.0
16	N307-1929U	19	29	.057	.117	4.85	12.0
14	N307-1927U	19	27	.071	.130	3.05	17.1
12	N307-1925U	19	25	.090	.162	1.92	27.4
10	N307-4927U	49	27	.111	.181	1.24	38.6

*Also available in 7 strands

CSA Listed Type TR-64 Radio Wire

Rated 90-degree C 300 volt, 1/64" vinyl insulation. Meets U/L Style 1007 & Mil-W-16878D Type C.

GAUGE (AWG)	NATIONAL CATALOG NUMBER	NO. OF STRANDS	GA. OF STRANDS (AWG)	NOM. DIAM. OF STRANDED CONDUCTOR (INCHES)	NOM. FIN. WIRE DIAM. (INCHES)	MAX. RESISTANCE (dc) AT 25°C OHMS/1000 FT.	NOM. WT. PER 1000 FT. (LBS.)
24†	N308-732U	* 7	32	.024	.058	28.4	2.75
22†	N308-730U	* 7	30	.030	.063	19.0	3.50
20	N308-1932U	*19	32	.038	.072	13.12	5.25
18	N308-1930U	19	30	.048	.082	7.89	6.75
16	N308-1929U	19	29	.057	.090	4.97	10.0

†Also available as NABOND

Also available with Nylon Jacket

NATIONAL WIRE
AND CABLE CORPORATION

136 San Fernando Rd., Los Angeles, Calif. 90031
Phone (213) 225-5611, TWX: 910-321-4155, Fed. Stock Code H4-04569

Military Electronic Hookup Wire

MIL-W-16878/1
Type BU

For internal wiring of electronic equipment.

.010″ wall vinyl primary insulation. No outer covering.

—53-degree C to +105-degree C, 600 V, R.M.S. (working).

Also available as NABOND.

Meets U/L Style 1061.

GAUGE (AWG)	NATIONAL CATALOG NUMBER	NO. OF STRANDS	GA. OF STRANDS (AWG)	NOM. DIAM. OF STRANDED CONDUCTOR (INCHES)	NOM. FIN. WIRE DIAM. (INCHES)	MAX. RESISTANCE (dc) AT 25°C OHMS/1000 FT.	NOM. WT. PER 1000 FT. (LBS.)
32	NB740U	7	40	.009	.028	179.0	0.70
30	NB738U	7	38	.012	.031	111.0	0.75
28	NB736U	7	36	.015	.034	69.0	1.0
26	NB734U	7	34	.019	.038	42.9	1.5
24	NB1936U	*19	36	.024	.043	26.8	2.0
22	NB1934U	*19	34	.030	.050	16.7	3.0
20	NB1932U	*19	32	.038	.057	10.5	4.5
18	NB1930U	19	30	.048	.068	6.57	6.5
16	NB1929U	19	29	.057	.077	4.85	9.0
14	NB1927U	19	27	.071	.091	3.05	14.0

*Also available in 7 strands

MIL-W-16878/1
Type BN

For internal wiring of electronic equipment.

Vinyl primary insulation with Nylon jacket overall.

—54-degree C to +115-degree C, 600 V, R.M.S. (working). Meets U/L Style 1006.

GAUGE (AWG)	NATIONAL CATALOG NUMBER	NO. OF STRANDS	GA. OF STRANDS (AWG)	NOM. DIAM. OF STRANDED CONDUCTOR (INCHES)	NOM. FIN. WIRE DIAM. (INCHES)	MAX. RESISTANCE (dc) AT 25°C OHMS/1000 FT.	NOM. WT. PER 1000 FT. (LBS.)
32	NB740N	7	40	.009	.032	179.0	0.75
30	NB738N	7	38	.012	.036	111.0	1.0
28	NB736N	7	36	.015	.039	69.0	1.25
26	NB734N	7	34	.019	.044	42.9	1.75
24	NB1936N	*19	36	.024	.049	26.8	2.25
22	NB1934N	*19	34	.030	.056	16.7	3.25
20	NB1932N	*19	32	.038	.063	10.5	4.75
18	NB1930N	19	30	.048	.074	6.57	7.0
16	NB1929N	19	29	.057	.083	4.85	9.0
14	NB1927N	19	27	.071	.098	3.05	14.7

*Also available in 7 strands

MIL-W-16878/2
Type CU

For internal wiring of meters, panels & electronic equipment, .015″ Wall Vinyl primary insulation (no outer covering). −54° C to +105° C, 1000 Volts, R.M.S. (working).

Also available as NABOND.

Meets U/L Style 1007 and CSA TR-64.

GAUGE (AWG)	NATIONAL CATALOG NUMBER	NO. OF STRANDS	GA. OF STRANDS (AWG)	NOM. DIAM. OF STRANDED CONDUCTOR (INCHES)	NOM. FIN. WIRE DIAM. (INCHES)	MAX. RESISTANCE (dc) AT 25°C OHMS/1000 FT.	NOM. WT. PER 1000 FT. (LBS.)
24	NC1936U	*19	36	.024	.058	26.8	2.75
22	NC1934U	*19	34	.030	.063	16.7	3.75
20	NC1932U	*19	32	.038	.072	10.5	5.50
18	NC1930U	19	30	.048	.082	6.57	8.0
16	NC1929U	19	29	.057	.090	4.85	10.0
14	NC1927U	19	27	.071	.104	3.05	15.0
12	NC1925U	19	25	.090	.124	1.92	24.0

*Also available in 7 strands

MIL-W-L 16878/3
Type DU

Resists the effect of salt water, aviation fuel, motor oil, ethylene glycol and alcohols (methyl or ethyl). .031″ Wall Vinyl primary insulation. No outer covering. —54-degree C to +105-degree, 3000 V, R.M.S. (working). Meets U/L Style 1015 and CSA TR-32.

GAUGE (AWG)	NATIONAL CATALOG NUMBER	NO. OF STRANDS	GA. OF STRANDS (AWG)	NOM. DIAM. OF STRANDED CONDUCTOR (INCHES)	NOM. FIN. WIRE DIAM. (INCHES)	MAX. RESISTANCE (dc) AT 25°C OHMS/1000 FT.	NOM. WT. PER 1000 FT. (LBS.)
24	ND1936U	*19	36	.024	.082	26.8	4.0
22	ND1934U	*19	34	.030	.090	16.7	5.2
20	ND1932U	*19	32	.038	.098	10.5	7.3
18	ND1930U	19	30	.048	.108	6.57	10.0
16	ND1929U	19	29	.057	.117	4.85	12.0
14	ND1927U	19	27	.071	.130	3.05	17.1
12	ND1925U	19	25	.090	.162	1.92	27.4
10	ND4927U	49	27	.111	.181	1.24	38.6
8	ND13329U	133	29	.167	.246	0.726	70.5
6	ND13327U	133	27	.210	.290	0.444	104.0

*Also available in 7 strands.

NOTE: THE ABOVE WIRES COME IN 10 STANDARD COLORS PLUS TRACERS ON SOLID COLORS.

NATIONAL WIRE AND CABLE CORPORATION

136 San Fernando Rd., Los Angeles, Calif. 90031
Phone (213) 225-5611, TWX: 910-321-4155, Fed. Stock Code H4-04569

Nafoam® & Nafoil® Special Shielded Data & Instrumentation Cables

Designed for Low Level or Low Capacitance Needs

All feature extremely low dielectric leakage both in insulation and outer sheath.

Suitable for very long runs in tray or conduit. (1000. ft and up).

SINGLE CONDUCTOR SHIELDED

Part Number	AWG & Stranding	Drain AWG & Stranding	Insulation & Thickness	Jacket Thickness	Nom. O.D.	Shield % Coverage	Capacitance mmfd/ft	Working Voltage	Surge Impedance Ohms	Temp. °F
S10-516	28(7x38)	—	.086″ NAFOAM	.015″ pvc	.242″	TC Braid 90%*	12	3000	120	+180
S10-328-1	22(19x34)	—	.042″ NAFOAM	.020″ pvc	.182″	90% Braid	20.7	1000	60	+180
S10-328-2						100% NAFOIL & Braid	20,7	1000		
S10-680	22(19x34)	22(7x30)	.032″ poly	.016″ pvc	.160″	NAFOIL & Drain	30	3000	—	+180
S10-679	22(19x34)	24(7x32)	.010″ pvc .002″ nylon	.015″ pvc	.120″	100% NAFOIL & Drain	100	600	25	+221

TWO CONDUCTOR SHIELDED

Part Number	AWG & Stranding	Drain AWG & Stranding	Insulation & Thickness	Jacket Thickness	Nom. O.D.	Shield % Coverage	Capacitance mmfd/ft	Working Voltage	Surge Impedance Ohms	Temp. °F
S10-010-1	22(19x34)	—	.042″ NAFOAM	.020″ pvc	.285″	90% Braid	10.6 W-W	1000	120	+180
S10-010-2						100% NAFOIL + Braid				
S10-010-3						NAFOIL only				
S10-681	22(19x34)	22(7x30)	.025″ NAFOAM	.020″ poly	.190″	100% NAFOIL & Drain	15 W-W	600	84	+180
S10-686	22(19x34)	22 (7x30)	.018″ NAFOAM	.020″ poly	.175″	100% NAFOIL & Drain	20	600	63	+180
S10-362-1 *S10-362-2	22(19x34)	22(7x30)	.010″ pvc .002″ nylon	.020″ poly	.163″	100% NAFOIL & Drain	40 W-W	600	52	+221

*Same specifications as S10-362-1 except Jacket Thickness is 020″ pvc.

NATIONAL WIRE AND CABLE CORPORATION

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CONTACT OUR SALES OFFICE OR REPRESENTATIVE NEAREST YOU!

Local Sales Offices & Reps

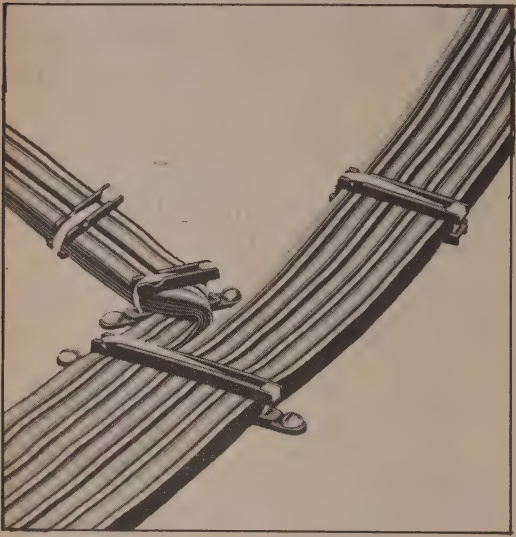
STATE	REPRESENTATIVE	PHONE
Ariz	Phoenix, K. Jahn Co.	602-956-9060
Ark	Ft. Smith, Electro-Related Prod.	501-783-7323
Cal	Los Angeles, National Wire & Cable Corp.	213-225-5611
Cal	San Mateo, National Wire & Cable Corp.	415-344-3066
Cal	La Jolla, Rep Sales Co.	714-454-1500
Colo	Arvada, Arrowhead Sls. Co.	303-423-5556
Conn	Wethersfield, Com/Pak Ltd., Inc.	203-563-4784
Fla	Maitland, J. W. Barrett Assocs.	305-678-0172
Fla	North Miami, J. W. Barrett Assocs.	305-681-4957
Fla	St. Petersburg, J. W. Barrett Assocs.	813-345-3585
Fla	Melbourne, J. W. Barrett Assoc.	305-727-2491
Fla	Orlando, National Wire & Cable Corp.	305-898-3801
Ill	Northfield, H. S. Tollaksen Co.	312-441-6644
Md	Glen Burnie, Faion Lott Co.	301-744-4611
Mass	Needham Heights, Com/Pak Ltd.	617-444-1259
Mich	Southfield, Luebbe Sls. Co.	313-357-0355
Minn	Minneapolis, Technical Assocs.	612-929-6721
Mo	Hazelwood, Production Automation	314-731-2331
Mo	Raytown, Production Automation	816-737-0066
NY	Huntington, National Wire & Cable Corp	516-757-6549
NY	Ontario Center, Kehoe Comp. Sls.	315-524-2491
NY	Ontario Center, National Wire & Cable Corp.	315-524-2401
NC	Charlotte, J. Rudisill Assocs.	704-377-6901
Ohio	Cincinnati, Luebbe Sls. Co.	513-871-4211
Ohio	Cleveland, Luebbe Sls. Co.	216-333-0425
Ohio	Dayton, Luebbe Sls. Co.	513-294-0426
Pa	Delmont, Luebbe Sls. Co.	412-468-4019
Pa	Wynnewood, H. J. Fairbanks Co.	215-642-5816
Tex	Fort Worth, J. H. Gibbs Assocs.	817-237-1455
Utah	Salt Lake City, Arrowhead Sls. Co.	801-487-4716
Wash	Olympia, Bergford Assocs.	206-866-2001

CANADIAN & EUROPEAN REPRESENTATIVES

Germany	Hochwaldstrasse, H. H. Lehmann	2262
England	Surrey, G. A. Stanley Palmer Ltd.	01-979-7254
Downsview	Ontario, Canada, Cantronics Ltd.	412-661-2494

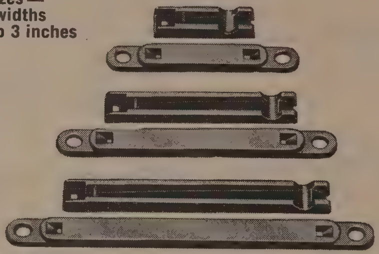
PANDUIT® wiring components

PANDUIT® FLAT CABLE MOUNT *

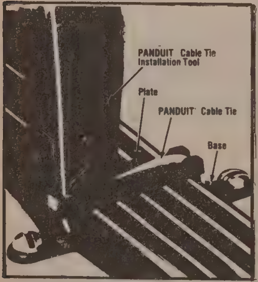


Combination of PANDUIT® Cable Tie and unique Flat Cable Accessory provides . . . secure method of mounting or bundling flat cable

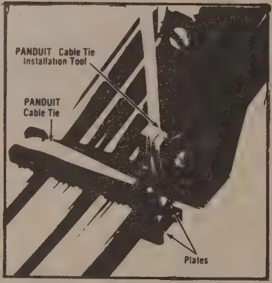
3 sizes — for widths up to 3 inches



MOUNTING APPLICATION



BUNDLING APPLICATION



- Secures stacked cables, folds, and breakouts
- Secures laminated and molded bus bars
- Available in 1″, 2″ and 3″ widths — accommodates flat cable widths of 0-3″
- Secure location of flat cables reduces variations in transmission characteristics such as crosstalk, impedance and capacitance
- Can be used in applications where vibration and strain is a factor
- Strong, 100% nylon — safe, will not damage the flat cable
- Removable and reusable
- Can be used with any type of flat cable

* Patent Pending

SELECTION CHART FOR PANDUIT® FLAT CABLE MOUNTS and PAN-TY® CABLE TIES

For Flat Cable Width (up to)	FOR MOUNTING† Use one (1) each of the following and one (1) cable tie	FOR BUNDLING Use two (2) each of the following and one (1) cable tie	MAXIMUM FLAT CABLE STACK HEIGHT (inches)			
			PANDUIT PAN-TY PLT1.5I Cable Tie	PANDUIT PAN-TY PLT2I Cable Tie	PANDUIT PAN-TY PLT3I Cable Tie	PANDUIT PAN-TY PLT4I Cable Tie
1″	FCPI1 FCBI1(-S10 or -A)	FCPI1	.8	2.0	3.7	5.2
2″	FCPI2 FCBI2(-S10 or -A)	FCPI2	—	1.0	2.7	4.2
3″	FCPI3 FCBI3(-S10 or -A)	FCPI3	—	—	1.7	3.2

Can be mounted with screws or commercial adhesive.

† For base with #10 screw hole use suffix -S10. For base to be mounted with commercial adhesive (supplied by user) use suffix -A.

SOLD THROUGH AUTHORIZED PANDUIT DISTRIBUTORS

PANDUIT CORP. 17301 RIDGELAND AVENUE, TINLEY PARK, ILLINOIS 60477
PHONE (312) 532-1800 TELEX 25-4560

PANDUIT® wiring components

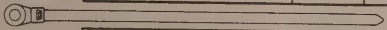
PAN-TY® CABLE TIES

- One-piece, all nylon. No twisting; no metal barbs.
- Self-locking types — hand or tool installed; or releasable types — hand applied.
- Curved tip for faster harnessing.

CABLE TIES

Cat. No. & Cross-section	Bundle Dia. Min./Max.	Approx. Length
PLT1M Miniature Tie	1/16"-¾"	3⅞"
PLT1.5M Miniature Tie	1/16"-1¼"	5½"
PLT1.5I Intermediate Tie	1/16"-1¼"	5½"
PLT2M Miniature Tie	1/16"-2"	8"
PLT2I Intermediate Tie	1/16"-2"	8"
PLT2S Standard Tie	1/16"-1¾"	7¼"
PLT3I Intermediate Tie	1/16"-3"	11½"
PLT3S Standard Tie	1/16"-3"	11½"
PLT4I Intermediate Tie	1/16"-4"	14½"
PLT4S Standard Tie	1/16"-4"	14½"
PLT4H Heavy Tie	3/16"-4"	14½"
PLT8H Heavy Tie	3/16"-9"	30⅝"

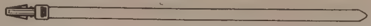
CLAMPS



PLC1M-S4 Miniature Clamp	1/16"-¾" #4 Screw	4⅜"
PLC1.5I-S8 Intermediate Clamp	1/16"-1¼" #8 Screw	6⅛"
PLC2S-S6 Standard Clamp	1/16"-1¾" #6 Screw	7½"
PLC2S-S10 Standard Clamp	1/16"-1¾" #10 Screw	7⅛"
PLC4H-S25 Heavy Clamp	3/16"-4" ¼" Screw	15¼"

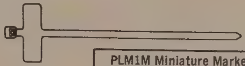
- Low profile design.
- Complete line of cable ties, clamps, push mount ties and markers — meet all applicable Military Specifications.

PUSH MOUNT TIES

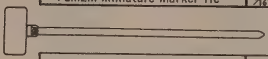


Cat. No. & Cross-section	Bundle Dia. Min./Max.	Approx. Length
PLP1.5I Intermediate Push Mount Tie	1/16"-1¼"	6⅛"
PLP2S Standard Push Mount Tie	1/16"-1¾"	7⅞"

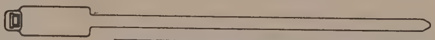
MARKER TIES



PLM1M Miniature Marker Tie	3/16"-¾"	4"
PLM2M Miniature Marker Tie	3/16"-2"	8"



PLF1M Miniature Flag Marker Tie	1/16"-¾"	4⅜"



PLM2S Standard Marker Tie	⅜"-1¾"	7¼"
PLM4S Standard Marker Tie	¾"-4"	14½"

STA-STRAP® CABLE TIES

- All nylon. No twisting; no metal barbs.
- Self locking — hand or tool installed. Releasable prior to final tensioning.

CABLE TIES

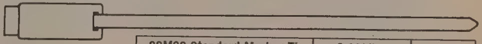
Catalog Number and Cross-section	Bundle Dia. Min./Max.	Approx. Length
SST1M Miniature Tie	0-¾"	4"
SST1.5M Miniature Tie	0-1¼"	5½"
SST1.5I Intermediate Tie	0-1¼"	5½"
SST1.5S Standard Tie	0-1¼"	5¾"
SST2I Intermediate Tie	0-2"	8 3/16
SST2S Standard Tie	0-1¾"	6¾"
SST2H Heavy Tie	0-2"	8"
SST31 Intermediate Tie	0-3"	11"
SST3S Standard Tie	0-3"	11"
SST4I Intermediate Tie	0.4"	14¾"
SST4S Standard Tie	0-4"	15"
SST4H Heavy Tie	0-4"	14¾"
SST8H Heavy Tie	0-8"	27½"

- Complete line of cable ties, clamps and marker ties. Meet all applicable Military Specifications.
- Standard color natural nylon and 10 other colors available.

CLAMPS

Catalog Number and Cross-section	Bundle Dia. Min./Max.	Approx. Length
SSC2S-S6 Standard Clamp SSC2S-S10 Standard Clamp	0-1¾" #6 Screw #10 Screw	7 7/16"
SSC4S-S6 Standard Clamp SSC4S-S10 Standard Clamp	0-4" #6 Screw #10 Screw	15 7/16"
SSC4H-S25 Heavy Clamp	0-4" ¼" Screw	15 7/16"

MARKER TIES



SSM2S Standard Marker Tie	0-1¾"	6¾"
SSM4S Standard Marker Tie	0-4"	14¾"

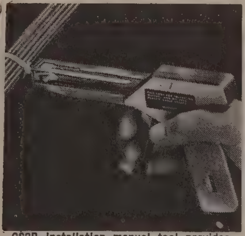
Applicable sizes of PAN-TY and STA-STRAP cable ties are recognized under the Components Program of Underwriters' Laboratories, Inc.

- **Complete Line of Accessories including Mounts and Harness Board Accessories Available**

PANDUIT®

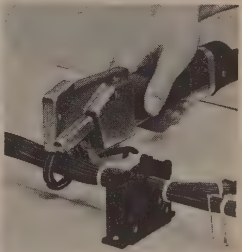
CABLE TIE INSTALLATION TOOLS

A complete tooling program to meet all production requirements for fast, neat harnessing.



GS2B Installation manual tool provides uniform tensioning and cutoff of all PANDUIT® miniature, intermediate and standard cross-section cable ties, clamps and markers; meets MIL-T-81306(AS), MS90387-1. Also available is GS4H manual installation tool for all standard and heavy ties; meets MIL-T-81306(AS), MS-90387-2.

PPTS hand-operated pneumatic cable tie installation tool. Installs all PANDUIT miniature, intermediate and standard cross-section cable ties, clamps and markers. Uses standard 70-80 psi air.



PATIM fully automatic cable tie installation tool. Automatically feeds cable tie around bundle, tensions the tie, and cuts off flush in less than 1 second. Weighs just 1¾ lbs. Accommodates bundles up to ¾" dia.

SOLD THROUGH AUTHORIZED PANDUIT DISTRIBUTORS

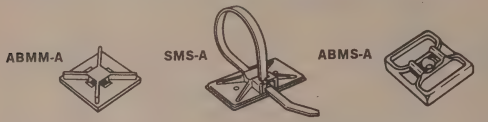
PANDUIT CORP.
17301 RIDGELAND AVENUE, TINLEY PARK, ILLINOIS 60477
PHONE (312) 532-1800 TELEX 25-4560

PANDUIT® wiring components

PANDUIT® MOUNTING & HARNESSING ACCESSORIES

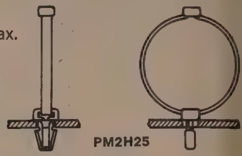
ADHESIVE BACKED MOUNTS

- Just peel backing paper off and apply to clean dry surface.

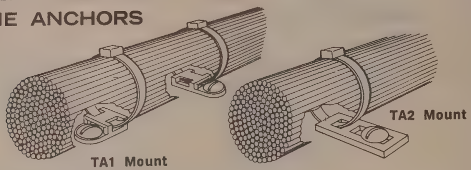


PUSH MOUNT

- For panel thickness ⅛″ max. Hole diam. nom. ¼″.



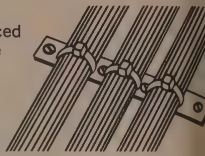
TIE ANCHORS



MULTIPLE TIE PLATES

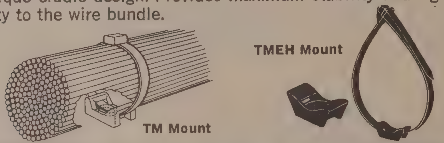
- Used for securing closely spaced parallel wire bundles. Available to hold from 1 to 6 bundles

MTP1S to MTP5S
MTP1H to MTP6H



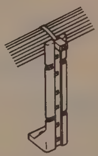
TIE MOUNTS

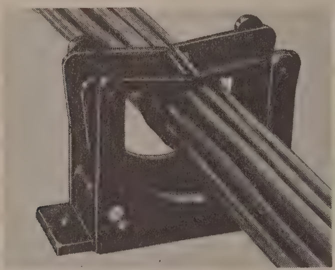
- Unique cradle design. Provides maximum stability and rigidity to the wire bundle.



PAN-POLE® Stand Off

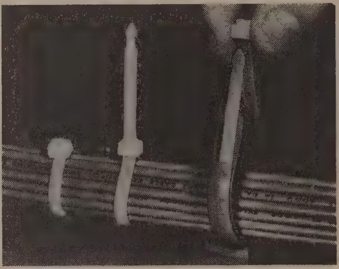
- Supports wire harness above and away from surface.





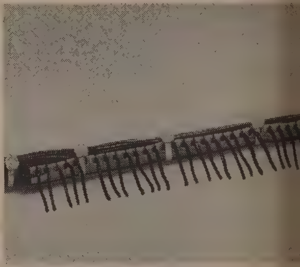
ELASTIC RETAINER (ER.5-E4 and ER1.25-E4)

- Unique, versatile, forms tight uniform harnesses. Two sizes.



PAN-RING® ACCESSORY (PR1 and PR2)

- Automatically threads PANDUIT® STA-STRAP® cable ties into head — speeds harness tying. Two sizes.



FANNING STRIP (FS156 and FSH40)

- Positive method (including strip holder) for assuring that wires are in sophisticated wiring harnesses.

PANDUCT®

PLASTIC WIRING DUCT

- Patented snap-in slot design provides complete accessibility, easiest method of inserting or removing wires, even with terminations attached.
- Unique rounded edge design of fingers protects wire insulation and personnel from cutting and abrasion.
- Non-slip cover prevents vibration slippage. Available for all width sizes.
- Recognized under the Components Program of Underwriters' Laboratories, Inc. Meets J.I.C. requirements. Approved by Canadian Standards Association.
- Standard color: light gray. Standard length: 6 ft.

Nominal Duct Size W x H	Nominal Duct Size W x H	Nominal Duct Size W x H
.5 x .5	1 x 3	3 x 1
.5 x .62	1 x 4	3 x 1.25
.5 x 1	1.5 x 1.5	3 x 2
.5 x 1.25	1.5 x 2	3 x 3
.5 x 1.75	1.5 x 3	3 x 4
.75 x .75	1.5 x 4	3 x 5
.75 x 1	2 x 1	4 x 1.5
.75 x 1.5	2 x 2	4 x 2
.75 x 2	2 x 3	4 x 3
1 x 1	2 x 4	4 x 4
1 x 1.5	2.5 x 3	4 x 5
1 x 2		

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PHONE (312) 532-1800 TELEX 25-4560

PANDUIT® wiring components

PAN-TERM® TERMINALS, SPLICES, DISCONNECTS, WIRE JOINTS and INSTALLATION TOOLS

UL LISTED

Listed by Underwriters' Laboratories, Inc. and approved by Canadian Standards Association. PAN-TERM terminating devices have successfully passed the test requirements of U.L. specification 486 and CSA specification C22.2 No. 65 where indicated in Bulletin T-1 which lists the complete line.

Ring Tongue Terminals— Nylon and Vinyl Self-insulated

Wire range 22-18 and 16-14. Stud sizes 4 through ⅜.
Wire range 12-10. Stud sizes 6 through ⅜.
Expanded and extra-expanded insulation wire range 16-14. Stud sizes 4 through ⅜.
Expanded insulation wire range 12-10. Stud sizes 6 through ⅜.

Ring Tongue Terminals Non-insulated

Wire range 22-18 and 16-14. Stud sizes 4 through ⅜.
Wire range 12-10. Stud sizes 6 through ⅜.

Fork Tongue Terminals

NYLON SELF-INSULATED
Wire range 22-18 and 16-14. Stud sizes 6 through ¼.
Wire range 12-10. Stud sizes 6 through ¼.

VINYL SELF-INSULATED
Wire range 22-18 and 16-14. Stud sizes 6 through 10.
Wire range 12-10. Stud sizes 8 through ¼.
Expanded insulation wire ranges 22-18 and 16-14. Stud sizes 6 through 10.
Expanded insulation wire range 12-10. Stud sizes 8 through ¼.

Fork Tongue— Non-insulated

Wire range 22-18, 16-14 and 12-10.
Stud sizes 6 through ¼.

Flanged Fork Terminals Nylon Self-insulated

Wire range 22-18 and 16-14. Stud sizes 6 through 10.
Wire range 12-10. Stud sizes 8 and 10.

Flanged Fork Terminals Non-insulated

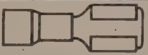
Wire range 22-18. Stud size 8.
Wire range 16-14. Stud sizes 6 and 8.
Wire range 12-10. Stud size 10.

Locking Fork Terminals Vinyl Self-insulated

Wire range 22-18 and 16-14. Stud sizes 6 through 10.
Wire range 12-10. Stud sizes 6 through ¼.
Expanded insulation wire range 22-18 and 16-14. Stud sizes 6 through 10.
Expanded insulation 12-10. Stud sizes 6 through ¼.

Locking Fork Terminals Non-insulated

Wire range 22-18 and 16-14. Stud sizes 6 through 10.
Wire range 12-10. Stud sizes 6 through ¼.



Female Disconnects

NYLON SELF-INSULATED
Wire range 16-14. Tab size .250 x .032, .187 x .020.
VINYL SELF-INSULATED
Wire range 22-18, 16-14 and 12-10*
*(.250 tab size only).
Tab size .250 x .032, .187 x .020, .110 x .020, and .110 x .032

Female Disconnects— Non-insulated

Wire range 22-18, 16-14 and 12-10*
*(.250 tab size only).
Tab size .250 x .032, .187 x .020, .110 x .020, and .110 x .032

Female Disconnects Fully Pre-insulated

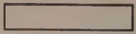
FULLY VINYL INSULATED
Wire range 22-18 and 16-14.
Tab size .250 x .032 and .187 x .020.

Male Disconnects— Vinyl Self-insulated

Wire range 22-18 and 16-14. Tab size .145 x .032 and .250 x .032

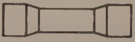
Male Disconnects— Non-insulated

Wire range 22-18 and 20-14. Tab size .145 x .032 and .250 x .032



Butt Type Splices— Nylon Self-insulated

Wire range 22-18, 16-14 and 12-10.



Butt Type Splices— Vinyl Self-insulated

Wire range 22-18, 16-14 and 12-10.

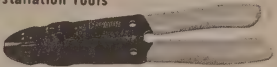
Butt Type Splices— Non-insulated

Wire range 22-18, 16-14 and 12-10.

One Piece Wire Joints— Nylon Self-insulated
Three types range from minimum of 2 #24 wires to a maximum of 4 #12 wires.

One Piece Wire Joints—Non-insulated
Three types ranging from minimum of 2 #14 wires to 4 #10 wires.

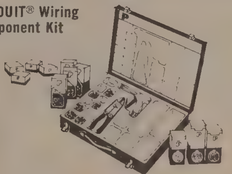
Installation Tools



CT-100 Tool crimps PAN-TERM insulated and non-insulated terminals, splices, disconnects and wire joints on wire ranging from #10 to #22. Also cuts and strips wire, and cuts popular screws.

CT-200 Tool installs non-insulated PAN-TERM terminals, disconnects and splices on wire ranging from #10 to #22.

PANDUIT® Wiring Component Kit



K-205 Combination Kit includes PAN-TY® cable ties, PAN-TERM® terminals and splices, cable tie installation tool and terminal application tool all in durable steel box with convenient compartments. Also available for maintenance and construction wiring are Cable Tie Kits and Terminal Kits.

SOLD THROUGH AUTHORIZED PANDUIT DISTRIBUTORS

PANDUIT CORP. 17301 RIDGELAND AVENUE, TINLEY PARK, ILLINOIS 60477
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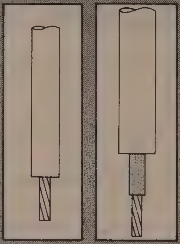
ROWE *Hi-V* Cable, Wire And Interconnections

Rowe Industries high-voltage cable, wire and interconnections are ideally suited for a variety of industrial and military applications including accelerators, radar, x-ray, ECM, etc. Hi-V is available in high-voltage single-conductor, coaxial and triaxial wire, and combines semi-conducting corona-suppressing layers with thermosetting materials to provide noise-free, corona-free cable and wire.

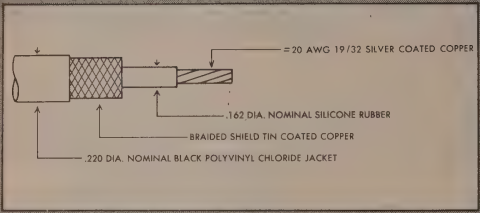
Single Conductor, Unshielded Types

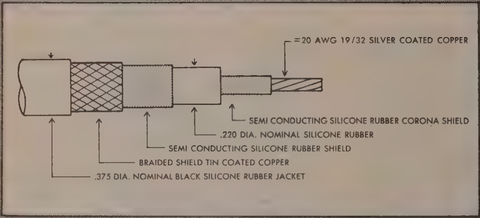


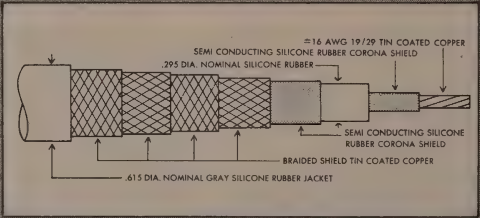
FEATURES:

- 5-60 KVDC minimum voltage ratings.
- 10-20 AWG corona-free, ozone-resistant material.
- 200°C operating temperatures.
- High flexibility at high & low temperatures.

Coaxial Types


=20 AWG 19/32 SILVER COATED COPPER
.162 DIA. NOMINAL SILICONE RUBBER
BRAIDED SHIELD TIN COATED COPPER
.220 DIA. NOMINAL BLACK POLYVINYL CHLORIDE JACKET

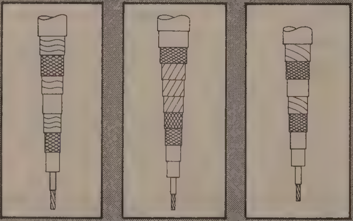

=20 AWG 19/32 SILVER COATED COPPER
SEMI CONDUCTING SILICONE RUBBER CORONA SHIELD
.220 DIA. NOMINAL SILICONE RUBBER
SEMI CONDUCTING SILICONE RUBBER SHIELD
BRAIDED SHIELD TIN COATED COPPER
.375 DIA. NOMINAL BLACK SILICONE RUBBER JACKET


=16 AWG 19/29 TIN COATED COPPER
SEMI CONDUCTING SILICONE RUBBER CORONA SHIELD
.295 DIA. NOMINAL SILICONE RUBBER
SEMI CONDUCTING SILICONE RUBBER CORONA SHIELD
BRAIDED SHIELD TIN COATED COPPER
.615 DIA. NOMINAL GRAY SILICONE RUBBER JACKET

FEATURES:

- 5-100 KV minimum voltage ratings.
- 8-22 AWG corona-free & ozone resistant.
- 80°C to 200°C operating temperature.
- Excellent for high-pulse applications & for use with Rowe high-voltage miniature coaxial connector series, "G" series connectors, RFI-EMI applications, Rowe high-pulse connector series & Rowe R75 connector series. All types offer high flexibility.

Triaxial Types



FEATURES:

- 10-100 KV minimum voltage ratings, conductors to inner shield.
- 1-5 KV minimum voltage ratings, inner shield to outer shield.
- 50-100 PF/ft.
- 8-12 AWG
- 200°C operating temperature.
- Corona-free and ozone-resistant.
- High flexibility.
- For use with Rowe LL and RTX triaxial connector series. Excellent for high pulse applications. Several recommended for RFI-EMI applications.

ROWE
All-Temp
Silicone Rubber Wire and Cable

GIVE us a hellish environment — We love it!

Rowe's silicone rubber insulation gives better performance and endurance than natural rubber and thermoplastic insulation for maintaining circuit integrity while resisting damage from high heat, extreme cold, moisture and the effects of most oils, fuels, solvents and chemicals. It is also highly resistant to fungus and ozone.

"FOREMOST IN SPECIALIZED INTERCONNECTIONS"

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or contact rep (listed under "Sales Offices")

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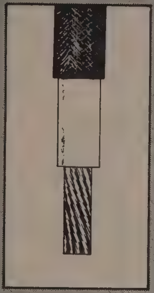
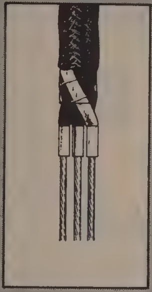
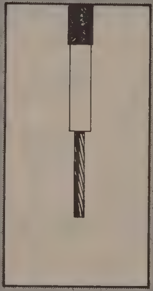
WEST COAST: (213) 235-2070



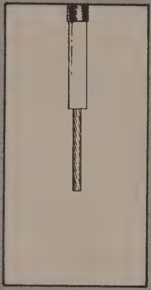
POWER CABLE
for 600 volts and up.



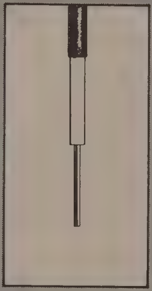
CONTROL CABLE
for 600 volts and up.



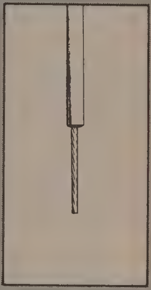
APPLIANCE & FIXTURE WIRE
for 300 volts and up.



APPARATUS & MOTOR LEAD WIRE
for 600 volts and up.



LIGHTING WIRE
for 600-volt transmission with solid tinned copper conductor, silicone rubber insulation and fiberglass braided covering.



NEW, All-Temp NB
especially suited for motor lead wire. No braided covering necessary. Tinned copper, stranded or solid tinned copper conductor. Silicone rubber insulation in ten colors. Ask for application information.

All the above wire and cable feature tinned copper, stranded conductors; silicone rubber insulation, with fiberglass braided covering.

AVAILABLE AS STANDARDS OR CUSTOM DESIGNED.

Fit these features...

Heat stability to 250° • Flexibility to —90°C • Unaffected by severe thermal cycling • Age-resistant • Unaffected by ultraviolet radiation • Resistant to moisture and chemicals • Highly flame retardant • Unaffected by ozone or corona • Tough enough for unbraided lead wires.

with these industries & applications

High heat locations such as furnaces, ovens, ranges • Aircraft, spacecraft, ships, locomotives, polar equipment • Refrigerators, freezers, washers, dryers, cars, trucks • Power tools, radio, television sets, transformers • Power plants, pulverizing mills, foundries, cement plants • Kilns, soaking pits, ceramic ovens • Rolling mills, arc furnaces, steel mills, glass manufacturing • Computers, office equipment • Sanitary, food equipment.

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DESIGN ● DEVELOPMENT ● MANUFACTURING

Specialized Wire and Cable

Since 1947, Rowe Industries has been noted for quality and reliability in high-voltage, corona-free connectors and cable assemblies.

Rowe's expertise has always included the incorporation of wire and cable in cable assemblies, including long experience in molding neoprene, butyl and silicone rubber and using braids of aluminum, copper, fiberglass, dacron and many other materials.

TEST FACILITIES FOR

All-Temp AND

Hi-V WIRE AND CABLE

Life testing facilities.

High-altitude pressure chamber.

RFI-EMI-EMP test chamber.

High-voltage, corona and dielectric test chamber.

Humidity chamber.

DIT-MCO computerized random access testing.

X-Ray Equipment

Hydrostatic pressure testing.

Be sure to see
Rowe Industries High-Voltage,
Corona-Free Connectors
and Cable Assemblies
In Section 2100 of this EEM

- Single contact
- Coaxial (standard, miniature, subminiature)
- Triaxial
- Multiple contact
- Low-voltage, molded-on

We design, develop and manufacture to meet your commercial, industrial and military needs.

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CALL OR SEND FOR LITERATURE

CLIP AND MAIL TODAY

Rowe Industries, 6100 Benore Road, Toledo, Ohio 43612

Gentlemen: Please send technical literature I've checked. Thank you.

- ☐ Corona: simple techniques to eliminate it
- ☐ H.V. In-Line Disconnects and Anode Connectors thru 60 KV
- ☐ Rowe multi-contact H.V. connectors
- ☐ Sub-Miniature H.V. coax connectors thru 15 KV
- ☐ RG cable H.V. connectors (JA Series)
- ☐ Miniature Coax Connectors thru 30 KV
- ☐ Corona-free coax connectors thru 20 KV
- ☐ Corona-free high pulse coax connectors thru 40 KV
- ☐ 75 KV coax connectors (R75 Series)
- ☐ Lanyard/Umbilical Connectors
- ☐ Triaxial Connectors thru 30 KV
- ☐ Triaxial Connectors thru 55 KV
- ☐ Molded-On Interconnections
- ☐ Low-Voltage Multi-Pin Connectors (Insta-Change Series)
- ☐ High-Voltage Cable & Wire
- ☐ "All-Temp" High Temperature Wire and Cable
- ☐ SRML, SF-2, SFF-2, Aircraft & Locomotive

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Company ____________________

Address ____________________

City ____________________ Zip ________

complete shielding accessories & mica

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Bensenville, Illinois 60106
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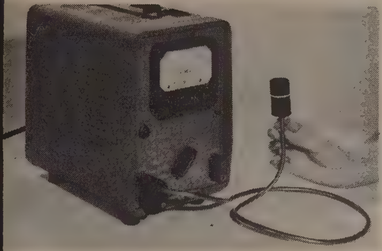
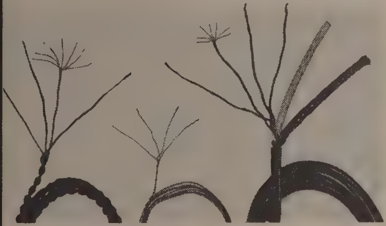


LAB KITS & PROBES

Perfection Mica's recently introduced e.m.i. shielding lab kit contains Netic and Co-Netic shielding material, double-side adhesive tape for shield construction and an LK-101 A.C. magnetic pick-up probe (output 20 millivolts/gauss @ 60Hz) . . . all for only $99.50. Higher sensitivity probes of 60 millivolts/gauss are available on individual order.

COMPONENT SHIELDS

Perfection Mica stocks many standard shield enclosures for relays, reed switches, transformers, CRT's, small motor assemblies, etc. High attenuation shields can also be quickly fabricated for special component or sub-assembly configurations. Call Perfection Mica for a fast estimate on any of your shielding needs.

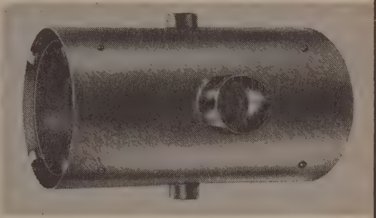


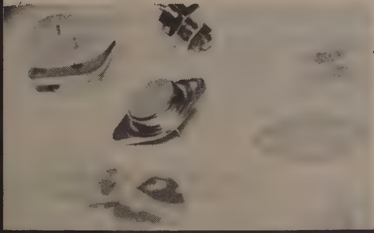
INTER-8 WEAVE CABLE

The special twisted configuration of individual wire leads within Inter-8 Weave Cable provides lower pick-up or radiation between interconnections. Typical performance improvement is −20 db for radiation and −12 db for pick-up. Plain or Co-Netic shielded cables are available in wire size 24 AWG in lengths up to 500 feet.

ZERO GAUSS CHAMBERS

Zero gauss chambers provide the ultimate in magnetic shielding. Perfection Mica's general-purpose zero gauss chamber (ZG-102), offers a significant reduction in both static and time varying fields normally found in laboratory and research environments. A Helmholtz coil system can be incorporated so that known fields can be generated for calibration purposes. Three concentrically spaced Co-Netic chambers with closed ends and two removable covers with openings for cable egress are provided.

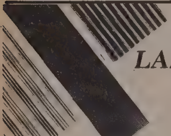




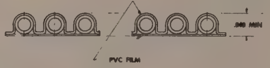
MICA INSULATORS

All types of mica available. Supplied in clear, natural, and built-up sheet stock in thicknesses ranging from .001″ to .062″. Save tooling expense on many varieties of fabricated parts including semi-conductor insulators in .001″ to .003″ thickness with .002″ hole tolerances. Excellent heat dissipation and high dielectric strength improves breakdown protection and efficiency of semi-conductors.

SPECTRA-STRIP COMPLETE RIBBON CABLE INTERCONNECTION SYSTEMS



SPECTRA-STRIP 3C™ LAMINATED RIBBON CABLE

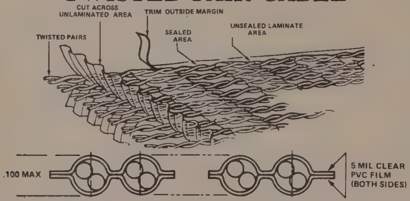


The design flexibility of Laminated 3C (Controlled Characteristics Cable) provides precise spacing of conductors to control such critical parameters as impedance, capacitance, crosstalk and attenuation. Standard with uniform .050" conductor spacing, compatible with standard Insulation Displacement Connectors, (IDCs), 3C cable can also be ordered with other controlled conductor spacing. Round conductors are available from 6 to 32 AWG, insulated or uninsulated. Also available are flat conductors and a variety of standard UL recognized styles.

STANDARD CONFIGURATION

Standard 3C cables are available in 28 AWG 7-strand conductor, with 10 to 60 conductors per cable, laminated between sheets of .005" PVC film. Standard color codes are Br-R-O-Y-Gr-Bl-Vi-Gy-Wh-Blk, repeat; or all gray with one edge red. PVC insulation meets MIL-W-16878D Type B, listed by UL. Special configurations, intermixed sizes, choice of conductor sizes from 6 to 36 AWG, spacing, color coding and insulation are readily available. Up to 100 conductors may be ordered in a single cable. Single-side shielding or ground plane shields are also available to meet specific crosstalk and impedance requirements.

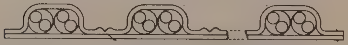
3C™ INTERMITTENT LAMINATE TWISTED PAIR CABLE



Intermittent lamination on 3C Twisted Pair cable permits quick laminate peel-back, untwisting of insulated conductor pairs, and preparation for termination. Unbonded twisted pairs are positioned side by side on controlled centers and laminated between .005" sheets of PVC film at approximately ¾-inch intervals along the length of the cable. Cutting across an unlaminated area provides access to free conductor pairs, easy to separate and terminate.

Intermittent Laminate Twisted Pair cable may be ordered in any color code (with one conductor of each pair either white or black), in uniform or mixed sizes from 22 to 30 AWG, with any standard laminate film, and with any number of twisted pairs up to a maximum cable width of 6 inches.

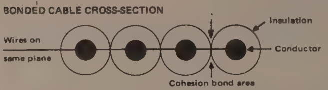
DOUBLE-TWIST™ LAMINATED TWISTED PAIR CABLE



Easier to separate and terminate than bonded twisted pair cable, Spectra-Strip Double-Twist cable incorporates individually-insulated conductors twisted together in pairs, but not bonded to one another. The cable is comprised of a series of two twisted pairs placed side by side, and laminated together intermittently in a "pocket" of PVC film. Grooves or "nip areas" can be incorporated between sets of two twisted pairs, permitting a set to be separated from the main cable without removing lamination from the entire cable. Grooves can be placed anywhere in the cable, after any even-numbered pair.

Double-Twist cable can be ordered with any number of pairs (in multiples of two pairs), in conductor sizes from 22-30 AWG. Conductor sizes can be uniform or mixed. Standard insulation is .005" PVC, with other laminates and thicknesses available. Any color code can be ordered, with one conductor in each pair black or white.

SPECTRA-STRIP® BONDED RIBBON CABLE



Spectra-Strip Bonded flat ribbon cable is compatible with all standard terminating techniques. Constructed of stranded or solid round conductors insulated with PVC and bonded together in a flat plane, bonded cable saves space and reduces costs. Consistent wire geometry assures repeatable and reproducible electrical characteristics, while the bonded cable's flexibility and configuration permit it to conform to package contour. UL-listed styles are available.

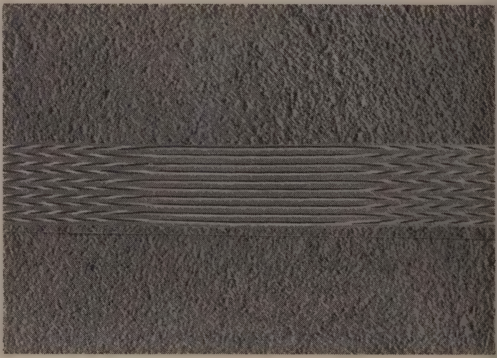
STANDARD CONFIGURATION

Standard bonded cables range from 10 to 30 conductors, 22 to 30 AWG, in 7- or, 19-strand wire. Standard color code is Br-R-O-Y-Gr-Bl-Vi-Gy-Wh-Blk, repeat. Special configurations with solid conductors (26-30 AWG), 2 to 100 conductors, variety of color coding and intermixed conductor sizes may be ordered.

SPECTRA-TWIST® CABLE

Spectra-Twist Bonded twisted pair cable controls crosstalk at less cost than shielding, and is especially useful in communications and data processing applications. Individually insulated round conductors are twisted in pairs and bonded together in a single plane to form a flexible, flat ribbon cable. Spectra-Twist incorporates all the advantages of single-conductor bonded cable: compatibility with standard terminating techniques, consistent, repeatable electrical characteristics, narrowness of width, and conformation to package contour.

NEW! TWIST 'N' FLAT™ LAMINATED TWISTED PAIR CABLE



New Spectra-Strip Twist 'n' Flat™ twisted pair cable provides for multiple conductor termination by alternating lengths of twisted pairs positioned on controlled centers, with areas of untwisted parallel conductors. Termination of one, several, or all twisted pairs in the cable may be made at any of the parallel-conductor areas.

Standard configuration provides 10 twisted pairs of 28 AWG stranded wire, alternately twisted for 18" and separated as parallel conductors for 3". For special applications, any color coding, conductor sizes or standard laminates are available. Any number of twisted pairs may be ordered, up to a maximum of 26 pairs, and lengths of twisted and parallel areas may be varied to customer requirement.

ONLY FROM SPECTRA-STRIP: CUSTOM FLAT RIBBON CABLES AND SYSTEMS

Only Spectra-Strip makes "specials" a standard product line. Many applications ideally require unusual cable configurations, special limitations, mixed conductor sizes (even combinations of single conductors and twisted pairs in a single cable), shields or ground planes, specific color codes or other special considerations not usually met by off-the-shelf standards.

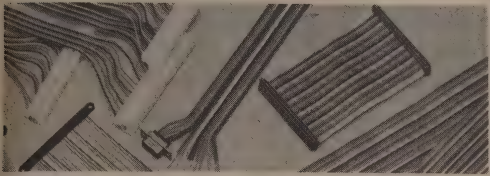
Special requirements are our specialty—give us all available information on your application, and our engineers will devise a ribbon cable solution to your interconnection problem and your budget. Don't settle for what's available; select what you **really** need from Spectra-Strip.

SPECTRA-STRIP

7100 Lampson Avenue, Garden Grove, California 92642 / Tel.: (714) 892-3361 TWX: (910) 596-1314
720 Sherman Avenue, Hamden, Connecticut 06514 / Tel.: (203) 281-3200 TWX: (710) 465-1020

COMPLETE RIBBON CABLE INTERCONNECTION SYSTEMS **SPECTRA-STRIP**

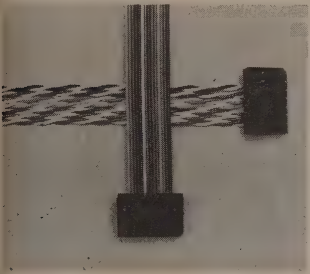
SPECTRA-STRIP CUSTOM CABLE ASSEMBLIES AND HARNESSES



Interconnections have become a critical component in today's sophisticated electronic systems, rather than an unwelcome afterthought. Spectra-Strip's complete selection of flat ribbon cables and components, and our established interconnection design experience enables us to design and produce your complete system or subsystem, ready for installation. Spectra-Strip's manufacturing facilities conserve yours, saving you both time and labor costs on production quantities.

Call on Spectra-Strip for your total interconnection needs. We'll do the job from start to finish, or any portion thereof.

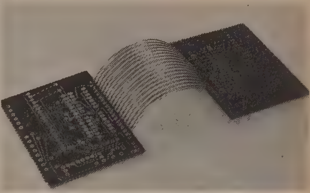
IC INTERCONNECT ASSEMBLIES



Pre-assembled flat ribbon cable IC interconnections from Spectra-Strip provide a fast, efficient and inexpensive solution to complicated bussing and crossovers between PC boards, backplanes and other IC circuitry. Standard with 26 AWG 7-strand wire and 14- or 16-pin Dual-Inline plugs at one or both ends, Spectra-Strip's IC interconnect assemblies are available in other sizes and terminations to suit your specific requirements.

SPECTRA-STRIP JUMPER ASSEMBLIES

Low-cost, labor-saving Spectra-Strip Jumper Assemblies eliminate connectors by providing precise, controlled conductor positioning, with pre-tinned wire leads ready to solder directly to PC boards. Supplied in specified lengths or continuous rolls, pre-stripped at intervals, S-S jumper assemblies are made to your specification from solid or stranded conductors in sizes 22-30 AWG. Specify desired conductor size, pitch, number of conductors, insulation, color coding, assembly length and strip length. Standards are in stock, ready for installation.



FLAT RIBBON CABLE CONNECTORS

Flat ribbon cable users need flat ribbon cable connectors, and Spectra-Strip has a complete selection—Insulation Displacement (IDC) types; straight, right-angle and protected-pin Headers; DIP sockets and plugs for IC connections—whatever your application requires. Complete your flat ribbon cable needs with Spectra-Strip's wide selection of components.

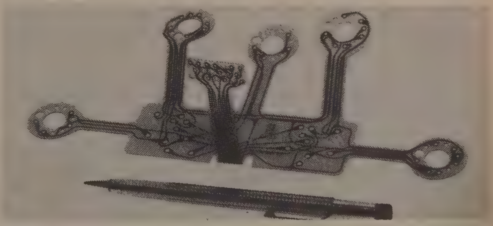
SPECTRA-STRIP HOOK-UP WIRE

All hook-up wire is **not** alike, and Spectra-Strip makes its own wire specifically to insure controlled, consistent quality, concentricity of conductor and insulation, longer flex life, strength and ruggedness for its own cable products. Now the best hook-up wire on the market is available to you at competitive prices, in all standard AWG sizes, ten colors for coding with special colors and stripes available, solid or stranded conductors. Also available is a wide variety of CSA classes and UL recognized styles. Call on Spectra-Strip for better-than-average delivery on **much** better-than-average hook-up wire.

SPECTRA-FLEX™ FLEXIBLE CIRCUITS

Today's electronic designers are rapidly discovering an efficient means of saving space, reducing weight and volume, eliminating expensive connectors, and saving labor costs on assembly, inspection and testing with Spectra-Flex flexible circuits. In some applications, conversion from conventional rigid PC boards to Spectra-Flex circuits has saved as much as 50% in labor costs, 60% in weight and 80% in volume. An entire flexible circuit system becomes a single component, which can be folded up and installed in any available space in your equipment package.

For a total concept in flexible printed circuits, Continental Circuits Corp., a subsidiary of Spectra-Strip, offers a complete service: design analysis, engineering, prototype preparation, drafting and design, material specification, environmental testing, and continuous-process production. Order any quantity, from prototypes to mass production. Contact us for complete details.



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INSTRUMENTATION CONTROL CABLE

CABLES MADE TO ORDER 600 VOLT 105° C

APPLICATIONS: interconnecting cables for electronic equipment, telemetering, instrumentation, control, computers.

CONDUCTORS: stranded, tinned copper per Type "B" to MIL-W-16878D
24 AWG — 7/32 20 AWG — 7/28
22 AWG — 7/30 18 AWG — 7/26

INSULATION: .010 nominal wall semi-rigid 105°C to minus 55°C Vinyl per Type "B" to MIL-W-16878D. 600 volts.

CODED: NUMBERED consecutively in black on white insulation at approximately 1 inch intervals.

CABLED: round with fillers where needed

JACKET: black flexible Vinyl, 105°C to minus 40°C

ENGINEERING CHARACTERISTICS:
Temperature rating 150°C to minus 40°C. Resistant to flame, moisture and many oils and chemicals.

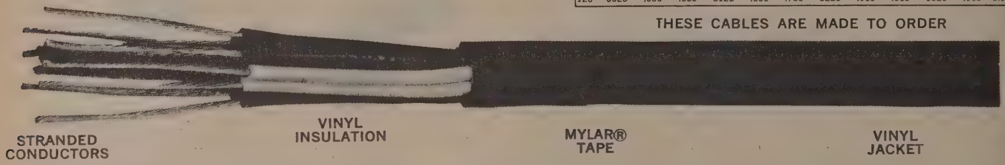
Approximate capacitance between adjacent conductors in pico farads per foot:
24 AWG: 32
22 AWG: 35
20 AWG: 38
18 AWG: 41

CONSTRUCTIONS AS SHOWN ▶

CONSTRUCTIONS AS SHOWN
DIMENSIONS ARE NOMINAL

	24 AWG CONDUCTORS			22 AWG CONDUCTORS			20 AWG CONDUCTORS			18 AWG CONDUCTORS		
No. Cond.	Catalog Number	Jacket Thick.	Cable O.D.	Catalog Number	Jacket Thick.	Cable O.D.	Catalog Number	Jacket Thick.	Cable O.D.	Catalog Number	Jacket Thick.	Cable O.D.
2	5001	.025	.143	5101	.025	.155	5201	.025	.171	5301	.025	.191
3	5002	.025	.150	5102	.025	.163	5202	.025	.181	5302	.025	.202
4	5003	.025	.162	5103	.025	.176	5203	.025	.196	5303	.025	.220
5	5004	.025	.174	5104	.025	.190	5204	.025	.211	5304	.025	.239
6	5005	.025	.187	5105	.025	.205	5205	.025	.229	5305	.025	.259
7	5006	.025	.187	5106	.025	.205	5206	.025	.229	5306	.025	.259
8	5007	.025	.201	5107	.025	.221	5207	.025	.247	5307	.025	.280
9	5008	.025	.214	5108	.025	.236	5208	.025	.265	5308	.025	.301
10	5009	.025	.231	5109	.025	.255	5209	.025	.287	5309	.030	.337
11	5010	.025	.231	5110	.025	.255	5210	.025	.287	5310	.030	.337
12	5011	.025	.238	5111	.025	.263	5211	.025	.297	5311	.030	.348
13	5012	.025	.249	5112	.025	.276	5212	.030	.321	5312	.030	.365
14	5013	.025	.249	5113	.025	.276	5213	.030	.321	5313	.030	.365
15	5014	.025	.263	5114	.025	.291	5214	.030	.339	5314	.035	.395
20	5015	.025	.289	5115	.030	.331	5215	.035	.383	5315	.040	.446
25	5016	.030	.329	5116	.030	.365	5216	.035	.423	5316	.040	.493
30	5017	.030	.347	5117	.035	.396	5217	.040	.457	5317	.045	.531
35	5018	.035	.383	5118	.035	.425	5218	.045	.501	5318	.050	.581
40	5019	.035	.397	5119	.040	.451	5219	.045	.510	5319	.050	.602
45	5020	.040	.437	5120	.040	.485	5220	.050	.569	5320	.050	.649
50	5021	.040	.455	5121	.045	.516	5221	.050	.593	5321	.050	.677
60	5022	.040	.481	5122	.045	.545	5222	.050	.627	5322	.055	.727
70	5023	.045	.535	5123	.050	.605	5223	.055	.695	5323	.060	.805
80	5024	.050	.564	5124	.050	.627	5224	.055	.720	5324	.060	.834
90	5025	.050	.589	5125	.050	.655	5225	.055	.753	5325	.060	.873
100	5026	.050	.633	5126	.055	.715	5226	.060	.821	5326	.065	.951
110	5027	.050	.652	5127	.055	.737	5227	.060	.845	5327	.065	.980
120	5028	.050	.665	5128	.055	.751	5228	.060	.863	5328	.065	1.000

THESE CABLES ARE MADE TO ORDER



CONSTRUCTIONS AS SHOWN

	24 AWG CONDUCTORS			22 AWG CONDUCTORS			20 AWG CONDUCTORS			18 AWG CONDUCTORS		
No. Cond.	Catalog Number	Jacket Thick.	Cable O.D.	Catalog Number	Jacket Thick.	Cable O.D.	Catalog Number	Jacket Thick.	Cable O.D.	Catalog Number	Jacket Thick.	Cable O.D.
2	5001-S	.025	.166	5101-S	.025	.178	5201-S	.025	.194	5301-S	.025	.214
3	5002-S	.025	.173	5102-S	.025	.186	5202-S	.025	.204	5302-S	.025	.225
4	5003-S	.025	.185	5103-S	.025	.199	5203-S	.025	.219	5303-S	.025	.243
5	5004-S	.025	.197	5104-S	.025	.213	5204-S	.025	.234	5304-S	.025	.262
6	5005-S	.025	.210	5105-S	.025	.228	5205 S	.025	.252	5305-S	.025	.282
7	5006-S	.025	.210	5106-S	.025	.228	5206-S	.025	.252	5306-S	.025	.282
8	5007-S	.025	.224	5107 S	.025	.244	5207-S	025	.270	5307-S	.025	.303
9	5008-S	.025	.237	5108-S	.025	.259	5208-S	.025	.288	5308-S	.025	.324
10	5009-S	.025	.254	5109-S	.025	.278	5209-S	.025	.310	5309-S	.030	.367
11	5010-S	.025	.254	5110-S	.025	.278	5210-S	.025	310	5310-S	.030	.367
12	5011-S	.025	.261	5111-S	.025	.286	5211-S	.025	.320	5311-S	.030	.378
13	5012-S	.025	.272	5112-S	.025	.299	5212-S	030	.351	5312-S	.030	.395
14	5013-S	.025	.272	5113-S	.025	.299	5213-S	.030	.351	5313-S	.030	.395
15	5014-S	.025	.286	5114-S	.025	.314	5214-S	.030	.369	5314-S	.035	.425
20	5015-S	.025	312	5115-S	030	.361	5215-S	035	.413	5315-S	.040	.476
25	5016-S	.030	.359	5116 S	.030	.395	5216-S	.035	.453	5316-S	.040	.523
30	5017-S	.030	.377	5117-S	.035	.426	5217-S	.040	.487	5317-S	.045	.561
35	5018-S	.035	.413	5118-S	.035	.455	5218-S	.045	.531	5318-S	.050	.611
40	5019-S	.035	.427	5119-S	.040	.481	5219-S	.045	.540	5319-S	.050	.632
45	5020-S	.040	.467	5120-S	.040	.515	5220-S	.050	.599	5320-S	.050	.679
50	5021-S	.040	.485	5121-S	.045	546	5221-S	050	.623	5321-S	.050	.707
60	5022-S	.040	.511	5122-S	.045	.575	5222-S	.050	.657	5322-S	.055	.757
70	5023-S	.045	.565	5123-S	.050	.635	5223-S	055	.725	5323 S	.060	.835
80	5024-S	.050	.594	5124-S	.050	.657	5224-S	.055	.750	5324-S	.060	.864
90	5025-S	.050	.619	5125-S	.050	.685	5225-S	.055	.783	5325-S	.060	.903
100	5026-S	.050	.663	5126-S	.055	.745	5226-S	.060	.851	5326-S	.065	.981
110	5027-S	.050	.682	5127-S	.055	.767	5227-S	.060	875	5327-S	.065	1.010
120	5028-S	.050	.695	5128-S	055	.781	5228-S	.060	.893	5328-S	.065	1.030

INSTRUMENTATION CONTROL CABLE WITH OVERALL SHIELD 600 VOLT 105° C

APPLICATIONS: interconnecting cables for electronic equipment, telemetering, instrumentation, control, computers.

CONDUCTORS: stranded, tinned copper per type "B" to MIL-W-16878D
24 AWG—7/32 22 AWG—7/30 20 AWG—7/28 18 AWG—7/26

INSULATION: .010 nominal wall semi-rigid 105°C to minus 55°C Vinyl per Type "B" to MIL-W-16878D. 600 volts.

CODED: NUMBERED consecutively in black on white insulation at approximately 1 inch intervals.

CABLED: with fillers where needed for roundness.

OVERALL SHIELD: braided tinned copper, 80% coverage.

JACKET: black flexible Vinyl, 105°C to minus 40°C.

ENGINEERING CHARACTERISTICS:
Temperature rating 105°C to minus 40°C. Resistant to flame, moisture and many oils and chemicals.

Approximate capacitance between adjacent conductors in pico farads per foot:
24 AWG: 32 22 AWG: 35 20 AWG: 38 18 AWG: 41

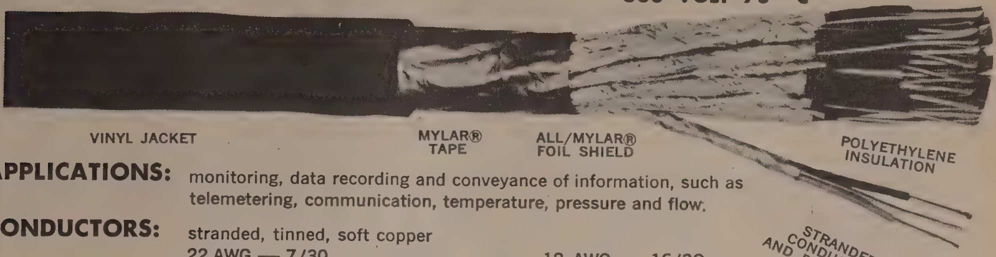
STRANDED CONDUCTORS
VINYL INSULATION
VINYL JACKET
MYLAR® TAPE

◀ Dimensions Are Nominal
These Cables Are Made To Order

®DuPont Trademark

MULTIPLE PAIR CONTROL CABLE, EACH PAIR SHIELDED

300 VOLT 75° C



APPLICATIONS: monitoring, data recording and conveyance of information, such as telemetering, communication, temperature, pressure and flow.

CONDUCTORS: stranded, tinned, soft copper
22 AWG — 7/30
20 AWG — 7/.0121
18 AWG — 16/30
16 AWG — 26/30

INSULATION: high dielectric strength, low loss polyethylene
22 AWG — .015 nominal wall
20 AWG — .015 nominal wall
18 AWG — .020 nominal wall
16 AWG — .020 nominal wall

PAIRS: are formed by twisting 2 conductors with an uninsulated stranded tinned copper drain wire (for terminating shield). 22 AWG and 20 AWG pairs utilize a 22 AWG drain wire; 18 AWG and 16 AWG pairs a 20 AWG drain wire.

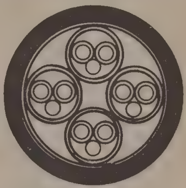
PAIR SHIELDS: each pair is shielded with Mylar® supported Aluminum Foil, spirally wrapped. The aluminum foil is .00035 inch thick and the Mylar® supporting film is .0005 inch thick.

CABLED: round with fillers where needed

BINDER: .001 inch thick Mylar® tape

®DuPont Trademark

JACKET: black flexible Vinyl, 80°C to minus 40°C



CROSS SECTION OF CABLE

ENGINEERING CHARACTERISTICS:

Temperature rating 75°C to minus 40°C. Resistant to flame, moisture and many oils and chemicals. **Approximate capacitance** in pico farads per foot:

	Mutual	Between one cond. and other cond. tied to shield
22 AWG Pair	25	48
20 AWG Pair	30	56
18 AWG Pair	28	53
16 AWG Pair	35	67

CONSTRUCTIONS AS SHOWN

DIMENSIONS ARE NOMINAL — THESE CABLES MADE TO ORDER

	22 AWG PAIRS			20 AWG PAIRS			18 AWG PAIRS			16 AWG PAIRS		
No. airs	Catalog Number	Jacket Thick.	Cable O.D.	Catalog Number	Jacket Thick.	Cable O.D.	Catalog Number	Jacket Thick.	Cable O.D.	Catalog Number	Jacket Thick.	Cable O.D.
2	5401-S	.030	.295	5501-S	.030	.315	5601-S	.035	.390	5701-S	.040	.450
3	5402-S	.030	.315	5502-S	.030	.335	5602-S	.035	.415	5702-S	.040	.480
4	5403-S	.030	.345	5503-S	.030	.365	5603-S	.040	.465	5703-S	.045	.535
5	5404-S	.035	.385	5504-S	.035	.410	5604-S	.045	.520	5704-S	.050	.600
6	5405-S	.035	.420	5505-S	.040	.460	5605-S	.050	.575	5705-S	.050	.655
9	5406-S	.045	.510	5506-S	.045	.545	5606-S	.050	.670	5706-S	.055	.775
2	5407-S	.050	.580	5507-S	.050	.625	5607-S	.055	.765	5707-S	.060	.885
5	5408-S	.050	.645	5508-S	.055	.700	5608-S	.060	.860	5708-S	.065	.995
9	5409-S	.050	.675	5509-S	.055	.735	5909-S	.065	.915	5709-S	.070	1.055
7	5410-S	.060	.830	5510-S	.060	.890	5610-S	.070	1.105	5710-S	.080	1.285
0	5411-S	.070	1.105	5511-S	.075	1.200	5611-S	.080	1.480	5711-S	.090	1.715

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120 pages of the most comprehensive technical information in the wire industry.

Complete Technical Information on Wire & Cable Products.

Wire Tables, Charts and Conversion Factors.

Manual of Coaxial Cable.

Military Specifications Evaluation Guide.

Glossary of Wire & Cable Terminology.

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shigoto cables and cord sets

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That's why Shigoto can help make your ends meet. From hundreds of standard combinations to unusual characteristics that meet your own requirements. Even U.L. and C.S.A. approved. Our volume production for O.E.M.'s in electronics, communications, automotive, appliances, and practically every other industry, takes all the variables out of price-performance differences. Shigoto's ability to consistently produce top quality assemblies, when combined with large quantities, always brings in the prices you need. Unmatched quality has become our standard, our reliability and delivery schedules will become yours. Call, write, or wire your specs. At Shigoto, you'll find we'll go to any ends, to any lengths, to satisfy you.

Shigoto Industries Ltd.

350 Fifth Avenue, New York, N.Y. 10001/ (212) 695-0200/ Telex 224219

One of the World's Largest Manufacturing Importers

TRW® HOLYOKE WIRE & CABLE

TOTAL CAPABILITY IN PRECISION CABLE ASSEMBLIES

At TRW/Holyoke Wire and Cable, "total capability" in the manufacture of precision cable assemblies and harnesses is a blend of complete facilities, advanced technology, and wide experience.

Every manufacturing step — from the drawing of individual copper wires to the attaching of hardware and molding of the connector — is performed internally to achieve maximum cost effectiveness and control of product quality.

Through its complete in-house wire and cable manufacturing facilities, TRW/Holyoke is equipped to fabricate any cable assembly or harness, regardless of its complexity.

Laced or textile braided assemblies, with shielded breakouts and solder or crimp attachment of any single or multiple termination can be supplied. Dies for molded connector assemblies are designed and built internally for a wide range of molding materials.

DRAWING — Copper wire is drawn to a specific diameter on seven machines, each with an average production rate of 6,000 ft./min. Wires as small as 36 AWG (.005″) can be produced.

TINNING — Three tinning lines deposit 40 microinches of tin on the copper wire as it moves through the tinning baths. Each spool picks up wire at a rate of about 300 ft./min. or almost 3 million feet per 8 hour shift.

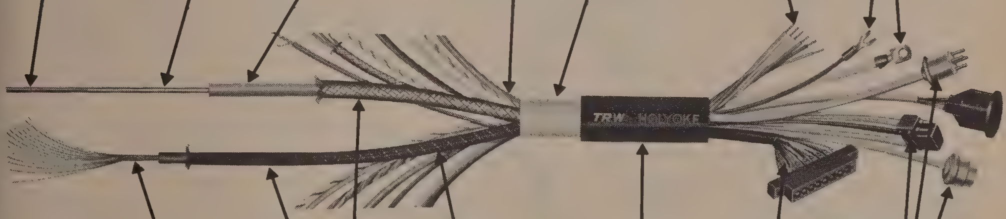
EXTRUDING — By changing the extruding die, insulated wire with insulation thicknesses up to 0.155″ can be produced. The 12 extruding machines at TRW/Holyoke have a combined capacity in excess of 7,000,000 ft. per day.

CABLING — The cabling department has an average capacity of 100,000 ft. of cable per day. This varies greatly with the complexity of the cable. There are additional machines for production of twisted pairs.

WRAPPING — When required, special equipment like this is available for wrapping the cable with mylar shielding or textile binding. Usually, these operations are carried out as part of the cabling process.

CUTTING/STRIPPING — There are numerous machines, capable of preparing lengths of wire from 2 inches to 40 ft. including several which automatically attach terminals as part of the process.

CRIMPING — The assembly department has scores of crimping machines capable of handling the terminals of all major manufacturers. Critical parameters are held to a high degree of precision.



STRANDING — Depending upon the length of the twist or "lay" as well as the diameter of the wire, these 36 machines each produce stranded wire at a rate of 50-100 ft./min., utilizing the total output of the tinning lines.

BRAIDING — The braiding room contains over 400 machines, including "butt" braiders which produce "breakout" textile cables of the type shown on cable assembly page. Capacity is in excess of 2,000,000 ft. per day.

LACQUERING — This department can easily match the total capacity of the braiding room. A number of lacquer and saturant formulations are used to impart anti-fray, flame-retardant, moisture and fungus resistant properties.

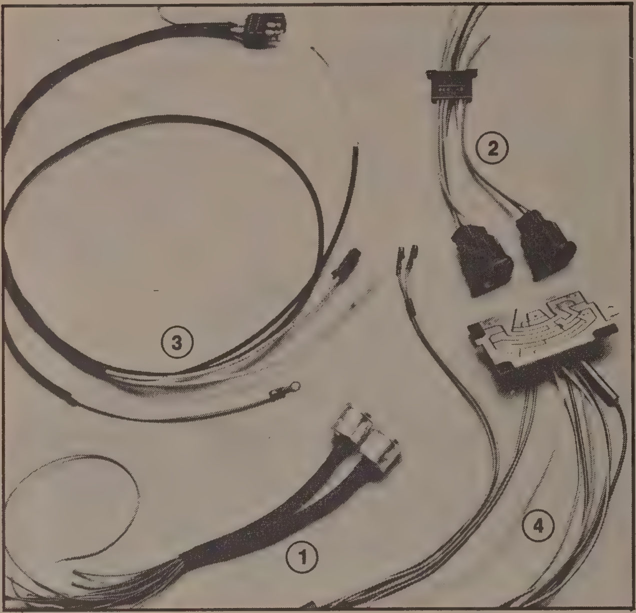
JACKETING — Jacketing of cables is accomplished on the extruding machines with the use of appropriately designed extruding dies and adjustment of temperatures, cooling profile, line speed, etc.

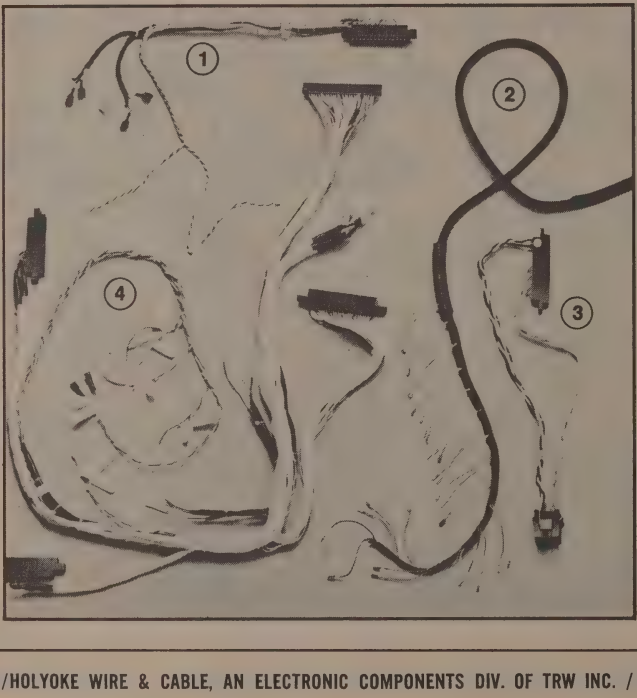
SOLDERING — Over 4,000 sq. ft., with numerous production lines is devoted to soldering in the assembly area. Internally designed jigs and tools are used to obtain maximum production rates.

MOLDING — Fifteen automatic machines, whose output varies with the size and complexity of the part are now in operation. Electrical testing is conducted at the machine as the part is completed.

TRW/HOLYOKE WIRE & CABLE, AN ELECTRONIC COMPONENTS DIV. OF TRW INC. / 720 MAIN STREET / HOLYOKE, MASS. 01040

TRW® HOLYOKE WIRE & CABLE





CABLE ASSEMBLIES

Automotive cable assemblies produced by TRW/Holyoke cover the range from low voltage, low current semiconductor circuit devices to high power, high reliability types — all with the appropriate environmental terminations and connectors.

1. Passenger car rear seat control cable assembly incorporating Y-shaped "break-put" nylon braiding to two solder-terminated female connectors.

2. Dual connector electronic ignition cable assembly with molded grommet and molded-in blade contacts in pull-apart insulator shells.

3. Semi-trailer refrigeration system nylon braided cable assembly, for high reliability control application. Coded aircraft type connectors, terminated with pre-insulated crimped terminals and molded automotive type plug.

4. Automobile climate control cable assembly with crimp insertable contacts in male plugs and crimp contacts riveted to a printed circuit board switch panel.

TRW/Holyoke's most complex assemblies are those supplied to the computer industry. The combining of many type of conductors, terminals and connectors in a single harness is not uncommon. TRW/Holyoke can incorporate special PC boards or connectors provided by the customer, or will purchase these for the customer, in addition to producing any special molding dies that may be required.

Complete testing facilities are available — no matter how complex the harness assembly.

1. Thirty conductor cable assembly with four molded tapehead connectors, 50 position edge connector and miscellaneous wire terminations.

2. Thirty-two conductor cable using unique braiding technique that allows shielding the entire length of each breakout section. Continuous nylon braid to end of breakout combines minimum cable diameter with high flexibility.

3. Fifteen crimp-insertable terminations (4 twisted pairs, 7 single) in nylon plug and PC connector assembly.

4. Sixty-six conductor harness assembly with four crimp insertable terminal edge connectors, crimp plug and miscellaneous terminals.

TRW/HOLYOKE WIRE & CABLE, AN ELECTRONIC COMPONENTS DIV. OF TRW INC. / 720 MAIN STREET / HOLYOKE, MASS. 01040

TRW® HOLYOKE WIRE & CABLE

WIRE & CABLE

The manufacture of single-insulated conductors is a highly technical process that requires precision control of a variety of production parameters, including temperature, wire diameter, die size, and production rate.

Establishment of these parameters is the result of an intimate knowledge of equipment capabilities and material characteristics. At TRW/Holyoke this knowledge is based on over sixty years of experience.

Critical requirements, such as low cross talk levels in telecommunication and EDP cables, minimum impedance discontinuities in RF cables, and enhanced flame retardancy in home entertainment wires and wiring devices, are regularly engineered into products. The requirements of Underwriters' Laboratories fulfilled through design engineering.

Any combination of single wires, twisted pairs, and coaxial cable, in any number, with necessary fillers and bindings can be incorporated into a cable. The only limitation is that the cable diameter not exceed 1.75″; flat braided (woven) cable, up to 0.5″ width. Flat rainbow (ribbon) cable is available with 2 to 43 parallel conductors.

Manufacturing Options

Conductors

Copper, copper covered steel, cadmium bronze, phosphor bronze, precious metal alloys.

10 through 30 AWG

Solid or Stranded or Tinsel

Stranding from 7 to 500 strands

Bare or Tinned

Topcoat, Overcoat, Heavy Tinned — fused

Insulations

Polyethylene

Kynar***

Polypropylene

Polyurethane

Polyvinyl Chloride (PVC)

Silicone Rubber

FEP Teflon**

Nylon

Tefzel**

Insulation wall thickness from .002″ to .155″

Textile Braids

Celanese*

Cotton

Dacron**

Glass

Nylon

Orlon**

Rayon

. . . with or without lacquer

Shieldings

Conductive Vinyl

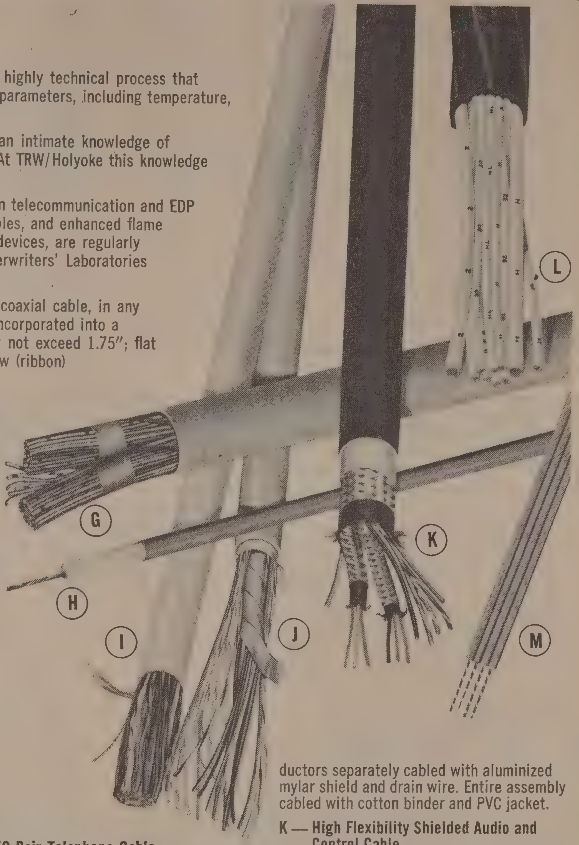
Aluminized Mylar**

Spiral Wrapped and Braided Copper

***Pennwalt Corp. T.M.

**DuPont T.M.

*Celanese Corp. T.M.



G — 52 Pair Telephone Cable

Semi-rigid thin wall insulated #24AWG solid conductors with band marked color coding. Conductors paired with programmed lay for minimum cross-talk. Assembled into 25 pair units with coding binders and four spare conductors, with flexible PVC sheath overall. Overall diameter .625″. Rated at 80°C.

H — High Voltage Lead Wire

Tinned copper conductors, solid or stranded, covered with flame retardant high dielectric strength insulation with 105°C. PVC jacket. Construction is designated as UL style #3239 and can be provided in a variety of conductors and voltage ratings to 40 KV.

I — Telephone Distribution Cable

25 pairs #24AWG solid conductors with thin wall semi-rigid insulation, spiral stripe coded. Pairs cabled with flexible bunch lay. PVC sheath extruded overall with nylon rip-cord under sheath. O.C. is 0.375″.

J — Mini Computer Memory Bank Cable

36 conductors with flexible stranding, PVC insulation and spiral stripe coding. 12 conductors separately cabled with aluminized mylar shield and drain wire. Entire assembly cabled with cotton binder and PVC jacket.

K — High Flexibility Shielded Audio and Control Cable

Cable core of seven #24AWG PVC insulated single conductors and two triple conductor cables of #24AWG stranded conductors PVC insulated with color coded textile braiding. These three conductors are then nylon braided as a unit and copper-braid shielded. The entire cable core is nylon braided and copper shielded with a PVC jacket overall.

L — Power and Control Cable

Nine #18AWG and two #12AWG stranded conductors insulated with 105°C. thermoplastic, then covered with lacquered glass braid and extruded nylon. Cabled with extruded thermoplastic jacket overall. Rated 600 volts, −55°C to +105°C. For on-the-road tractor-trailer interconnection.

M — Environmental Resistant Flat Cable

Four stranded conductors simultaneously insulated with high performance extruded silicone rubber compound to form an extremely flexible high reliability cable for military applications. Rated at 300V., −100°C. to +200°C., moisture, fungus and radiation resistant.

TRW/HOLYOKE WIRE & CABLE, AN ELECTRONIC COMPONENTS DIV. OF TRW INC. / 720 MAIN STREET / HOLYOKE, MASS. 01040

MICRO-COAX *The RELIABLE Semi-*

Micro-Coax semi-rigid coaxial cable transmits and/or receives a high-speed, high-frequency microwave signal. It is the most dependable, predictable way of achieving:

- low loss, total shielding at or near theoretical value
- elimination of radiation leakage
- lowest possible attenuation
- unequalled VSWR performance through 18 GHz
- miniaturization of power componentry

Micro-Coax semi-rigid coaxial cable offers these outstanding performance characteristics:

Attenuation: The solid center conductor of a Micro-Coax Cable provides the optimum geometric surface for transmission. • Impedance Matching: Low VSWR. The dielectric is controlled to exacting tolerances to minimize reflected power loss. • Shielding: Isolation is greater than 130 dB. There is virtually no extraneous signal pick-up. • Packaging: Metallic tubular outer conductor offers minimum size and maximum conductor integrity. Copper jackets can be soldered directly to circuit boards. • Workability: Micro-Coax is easily bent, coiled, stripped, machined, soldered, or connected without impairing performance. Ends can be quickly and dependably prepared.

STANDARD GENERAL PURPOSE 50 OHM MICRO-COAX CABLES

Standard 50 ohm Micro-Coax Cables feature low VSWR and low attenuation covering the entire microwave spectrum. They have good power handling ability and excellent interface dimensions for SMA, SMB, and Type N and TNC connectors.

CABLE PROPERTIES: Copper outer conductors • Teflon® PTFE dielectrics • Wide variety of outer conductor diameters • Capacitance 29.0 pF/ft • Velocity of propagation 70%

TYPICAL APPLICATIONS: Microwave transmission lines • Amplifier shielding or isolation • Totally shielded interconnections • Microwave delay lines

Micro-Coax Part Number	Normal Impedance and Tolerance (ohms)	Outer(1) Conductor Diameter ±.001″	Dielectric Diameter ±.001″	Center Conductor Diameter (inches)	Center Conductor Material	Minimum Inside Bend Radius (inches)	Max. Temp. (°C)	Weight (lbs./100′)	Dielectric Strength (VRMS, 60 Hz)	Safe Maximum Voltage Under Normal Usage (VRMS, 60 Hz)	Higher Order Mode (GHz)	Typical Attenuation (dB/100′)/Power Kilowatts (CW)				
												0.5 GHz	1.0 GHz	5.0 GHz	10.0 GHz	20.0 GHz
UT- 85	50.0±1.5	.0865••	.066	.0201	SPCW	.125	150	1.4	2500	1500	60	13.0/0.221	19.0/0.151	44.0/0.065	64.5/0.045	96.0/0.030
UT- 85C	50.0±1.5	.0865••	.066	.0201	SPC	.125	150	1.4	2500	1500	60	13.0/0.221	19.0/0.151	44.0/0.065	64.5/0.045	96.0/0.030
UT-141	49.0±1.0	.141 •	.116	.0359	SPCW	.250	175	3.2	5000	1900	34	7.5/0.742	11.0/0.506	26.0/0.214	39.5/0.140	60.5/0.091
UT-141A	50.0±1.0	.141 ••	.1185	.0359	SPCW	.250	175	3.2	5000	1900	33	7.5/0.742	11.0/0.506	26.0/0.214	39.5/0.140	60.5/0.091
UT-141AA	50.0±0.5	.141 ••	.1185	.0359	SPCW	.250	175	3.2	5000	1900	33	7.5/0.742	11.0/0.506	26.0/0.214	39.5/0.140	60.5/0.091
UT-141B	50.0±1.0	.141 •	.1185	.0359	SP BeCu	.250	175	3.2	5000	1900	33	8.5/0.742	12.0/0.506	28.0/0.214	41.0/0.140	62.0/0.091
UT-141C	50.0±1.0	.141 ••	.1185	.0359	SPC	.250	175	3.2	5000	1900	33	7.5/0.742	11.0/0.506	26.0/0.214	39.5/0.140	60.5/0.091
UT-141L	50.0±1.0	.141	.1185	.0359	Tophet C1	.250	175	3.2	5000	1900	33	45.0/0.742	57.5/0.506	130.0/0.214	187.0/0.140	268.0/0.091
UT-250A	50.0±0.5	.250 •	.209(2)	.0640	SPC	.375	200	10.0	7000	3000	19	4.3/2.622	6.4/1.762	16.5/0.683	26.0/0.434	41.0/0.275
UT-325A	50.0±1.0	.325(2)	.285(2)	7x .0312	SPC	.750	200	14.6	7500	3000	14	3.0/4.733	5.0/2.840	13.0/1.092	20.5/0.693	
UT-390	50.0±0.5	.390(2)	.330(2)	.102	SPC	.750	200	25.0	12000	6000	12	3.0/5.512	4.5/3.675	12.0/1.378	19.0/0.870	

ULTRAMINIATURE 50 OHM MICRO-COAX CABLES

Ultraminiature 50 ohm Micro-Coax Cables provide maximum impact of signal clarity. They meet the demands of package density, optimum VSWR and attenuation as a function of size. They feature total shielding for the elimination of signal loss and noise, and are ideal for low power, high reliability applications.

CABLE PROPERTIES: Copper outer conductor • Teflon® PTFE or FEP dielectrics • Capacitance 29.0 pF/ft • Ultraminiature sizes • Velocity of propagation 70%

TYPICAL APPLICATIONS: High reliability miniature packages • Miniature delay lines • Printed circuit wiring • High-speed computers

UT- 8	50.0±5.0	.008	.0045	.002	C	.032	85	.10	250	150		141.0/	200.0/	448.0/		
UT-13	50.0±4.0	.013	.010	.0031	SPCW	.063	85	.10	250	150		63.0/	89.5/	202.0/	288.0/	413.0/
UT-20	50.0±3.0	.023	.017	.005	SPCW	.063	85	.10	750	500	240	51.0/0.005	72.0/0.004	163.0/0.002	233.0/0.001	334.0/
UT-34	50.0±3.0	.034 ••	.027	.008	SPCW	.125	100	.19	2000	750	150	32.0/0.019	45.5/0.013	104.0/0.006	149.0/0.004	215.0/0.003
UT-47	50.0±2.5	.047 ••	.037	.0113	SPCW	.125	100	.38	2000	1000	109	22.0/0.035	31.0/0.015	71.5/0.011	103.0/0.007	151.0/0.005
UT-70-50 (Old No. UT-701)	50.0±2.0	.070	.059	.0179	SPC	.125	150	.79	2300	1200	68	14.5/0.163	21.0/0.113	49.0/0.048	71.0/0.033	105.0/0.022

AIR ARTICULATED (SPLINE) 50 OHM MICRO-COAX CABLES

Air articulated cables provide excellent impedance matching, low weight, low loss transmission lines. Although special care must be taken in bending and installation of these cables, they provide properties not found in solid dielectric cables.

CABLE PROPERTIES: Low attenuation • Low weight • Copper or aluminum outer conductors • Tubular copper center conductors • Teflon® PTFE spline dielectrics

TYPICAL APPLICATIONS: Space craft interconnections • Antenna feed cables • Liquid level sensing devices • Low loss receivers

Micro-Coax Part Number	Outer Conductor Diameter ±.002″	Dielectric Diameter ±.001″	Number of TFE Splines	Center Conductor SPCT Outside Diameter ±.001″	Center Conductor Inside Diameter ±.002	Minimum Inside Bend Radius (inches)	Max. Temp. (°C)	Weight (lbs./100′)	Dielectric Strength (VRMS, 60 Hz)	Safe Maximum Voltage Under Normal Usage (VRMS, 60 Hz)	Higher Order Mode (GHz)	Typical Attenuation (dB/100′)/Power Kilowatts (CW)				
												0.5 GHz	1.0 GHz	5.0 GHz	10.0 GHz	12.0 GHz
OFHC Copper																
UT-S-250-50	.250	.221	3	.087	.066	3.0	200	5.6	4000	1400	21.0	3.7/0.46	5.4/0.32	13.8/0.12	21.5/0.08	25.0/0.07
UT-S-325-50	.325	.285	5	.110	.090	5.0	200	9.5	5000	2000	16.4	2.8/0.61	4.2/0.41	11.0/0.15	16.5/0.10	19.0/0.09
UT-S-375-50	.375	.325	5	.125	.085	5.0	200	15.0	5000	2200	14.4	2.5/0.68	3.7/0.46	9.2/0.19	14.3/0.12	17.0/0.10
UT-S-390-50	.390	.340	5	.136	.096	5.0	200	16.3	5000	2200	13.6	2.3/0.74	3.4/0.50	8.0/0.21	12.0/0.14	15.0/0.11
UT-S-500-50	.500	.450	5	.174	.134	6.0	200	21.0	7500	3000	10.4	1.8/0.94	2.7/0.63	6.0/0.28	10.0/0.16	
1100 Aluminum																
UT-S-250-50 AL	.250	.221	3	.087	.066	3.0	200	2.6	4000	1400	21.0	4.2/0.37	6.5/0.26	17.5/0.09	24.3/0.06	27.5/0.05
UT-S-325-50 AL	.325	.285	5	.110	.090	5.0	200	4.5	5000	2000	16.4	3.4/0.49	5.0/0.33	13.2/0.12	20.8/0.08	23.6/0.07
UT-S-390-50 AL	.390	.340	5	.136	.096	5.0	200	7.5	5000	2200	13.6	2.8/0.60	4.2/0.40	11.4/0.15	18.3/0.11	21.0/0.08
UT-S-500-50 AL	.500	.450	5	.174	.134	6.0	200	11.0	7500	3000	10.4	2.3/0.76	3.4/0.51	9.7/0.22	15.9/0.13	

Rigid Coaxial Cable MICRO-COAX®

50 OHM MICRO-COAX CABLES WITH SPECIAL OUTER CONDUCTORS

Aluminum or stainless steel outer conductor materials are used in 50 ohm Micro-Coax Cables to optimize such properties as resistance to corrosion, the ability to withstand temperature extremes, and weight.

CABLE PROPERTIES: Solid Teflon® PTFE or FEP dielectrics • Capacitance 29.0 pF/ft • Velocity of propagation 70% • Resistance to corrosion • Resistance to temperature extremes • Resistance to short-term nuclear atmospheres • Light weight

TYPICAL APPLICATIONS: Any circuitry environment from undersea to outer space in which unusual temperatures are encountered, or in which weight is an important factor

Micro-Coax Part Number	Nominal Impedance and Tolerance (ohms)	Outer Conductor Diameter ±.001"(1)	Dielectric Diameter ±.001"	Center Conductor Diameter (inches)	Center Conductor Material	Minimum Inside Bend Radius (inches)	Max. Temp. (°C)	Weight (lbs./100') or Capacitance (pF/ft)	Dielectric Strength (VRMS, 60 Hz)	Safe Maximum Voltage Under Normal Usage (VRMS, 60 Hz)	Higher Order Mode (GHz)	Typical Attenuation (dB/100')/Power Kilowatts (CW)				
												0.5 GHz	1.0 GHz	5.0 GHz	10.0 GHz	20.0 GHz
UT- 20SS	50.0±3.0	.020	.015	.005	SPCW	.125	150	.10	750	500	240	81.0/0.007	114.0/0.006	258.0/0.003	367.0/0.001	524.0/
UT- 85SS	50.0±1.5	.0865	.066	.0201	SPCW	.250	200	1.3	2500	1500	60	19.5/0.227	28.0/0.115	64.5/0.067	93.5/0.046	137.0/0.031
UT-141SS	50.0±1.0	.141	.118	.0359	SPCW	.500	250	3.1	5000	1900	33	11.0/0.913	16.0/0.622	38.0/0.263	56.0/0.172	83.5/0.112
UT-141 AL (1100)	50.0±1.5	.141	.118	.0359	SPCW	.250	150	1.9	5000	1900	33	8.0/0.527	11.5/0.359	28.0/0.152	41.5/0.099	64.0/0.064
UT-141 AL (5052)	50.0±1.0	.141	.118	.0359	SPCW	.250	175	1.9	5000	1900	33	8.5/0.647	12.5/0.441	30.0/0.187	45.5/0.122	68.0/0.079
UT-250 AL (1100)	50.0±1.0	.250	.209(2)	.064	SPC	.375	175	6.4	7000	3000	19	4.5/1.900	6.8/0.127	17.5/0.496	27.0/0.315	43.0/0.199
UT-250 AL (5052)	50.0±0.5	.250	.209(2)	.064	SPC	.375	200	6.4	7000	3000	19	5.0/0.226	7.0/0.152	18.5/0.591	28.5/0.375	45.0/0.237
UT-325 AL (1100)	50.0±1.5	.325(2)	.285(2)	7x .0312	SPC	.750	175	10.5	7500	3000	14	2.2/0.382	3.3/0.257	9.5/0.965	16.0/0.610	

(1) For plated conductor allow additional +.001".
(2) Dimensional tolerance ±.002".
(3) Dimensional tolerance ±.003".
(4) IP: Irradated polyethylene.

*: Tin-plated (TP)
•: Silver-plated (SP)
SPC: Silver-plated copper.
SPCW: Silver-plated, copper-clad steel.

SPBeCu: Silver-plated beryllium copper.
304SS: Type 304 Stainless steel.
SPCT: Silver-plated copper tube.
AL: Aluminum

10, 15, 25, 70, 75, 93 and 95 OHM MICRO-COAX CABLES

Copper-jacketed Micro-Coax Cables designed to meet close tolerances in both impedance and capacitance. Sizes range from 0.034 inch through 0.250 inch outside diameters. Total shielding eliminates undersized coupling while copper jacket facilities direct soldering.

CABLE PROPERTIES: Copper outer conductors • Teflon® PTFE dielectric • Velocity of propagation 70% • Total shielding

TYPICAL APPLICATIONS: CATV amplifier wiring • Capacitor sections • Low impedance matching for solid state units • Quarter-wave transformer sections

UT- 34-25 (Old No. UT- 25)	25±3.0	.034	.024	.0126	SPCW	.125	100	58.5	500	200	143.7	47.5/0.013	67.5/0.009	153.0/0.004	218.5/0.003	313.5/0.001
UT- 34-95	95±4.0	.034	.027	.0028	SPCW	.125	100	15.4	2000	1000	17.5	40.5/0.013	57.5/0.009	131.0/0.004	188.0/0.003	270.0/0.001
UT- 47-70	70±3.0	.047	.0375	.0071	SPCW	.125	100	20.6	2000	1000	11.8	23.5/0.150	33.5/0.110	77.5/0.045	112.0/0.030	163.0/0.019
UT- 43-10 (Old No. UT-10)	10±3.0	.043	.036	.0285	SPC	.250	100	145.0	500	200	81.0	61.5/0.013	87.0/0.009	179.5/0.004	281.5/0.003	402.5/0.001
UT- 90-25	25±3.0	.090	.073	.040	SPC	.125	175	58.5	1000	750	46.0	15.5/0.182	22.0/0.130	51.5/0.056	75.0/0.038	111.0/0.026
UT- 85-70 (Old No. UT- 70	70±2.0	.085 •	.056	.0113	SPCW	.125	175	20.6	2000	1200	78.0	15.0/0.190	22.0/0.130	50.5/0.057	74.0/0.039	109.5/0.026
UT- 85-75 (Old No. UT-852)	75±1.0	.085	.067	.0113	SPCW	.125	150	19.3	2500	1200	67.0	14.0/0.205	20.0/0.143	46.5/0.062	68.0/0.042	100.5/0.028
UT- 85-93 (Old No. UT-851)	93±1.5	.085	.073	.008	SPCW	.125	150	15.6	2500	1200	65.0	15.0/0.190	21.5/0.133	50.0/0.057	73.0/0.039	107.5/0.027
UT-130-93 (Old No. UT- 93)	93±1.0	.130	.1055	.0113	SPCW	.250	175	15.6	3000	1500	45.0	10.5/0.488	15.0/0.341	36.5/0.140	53.5/0.095	80.5/0.063
UT-141-15	15±3.0	.141	.114	.080	SPC	.250	175	97.0	1000	750	27.0	9.0/0.618	13.0/0.428	32.0/0.173	47.5/0.117	71.5/0.077
UT-141-70	70±1.0	.141	.107	.0201	SPCW	.250	175	20.6	5000	2000	41.0	8.5/0.655	12.5/0.445	30.0/0.185	44.5/0.125	67.5/0.082
UT-141-70C	70±1.0	.141	.107	.0201	SPC	.250	175	20.6	5000	2000	41.0	8.5/0.655	12.5/0.445	30.0/0.185	44.5/0.125	67.5/0.082
UT-141-75	75±1.0	.141 *	.118	.0201	SPCW	.250	175	19.3	5000	2000	38.0	8.0/0.696	11.5/0.484	28.0/0.198	41.5/0.133	63.5/0.087
UT-141-75C	75±1.0	.141	.118	.0201	SPC	.250	175	19.3	5000	2000	38.0	8.0/0.696	11.5/0.484	28.0/0.198	41.5/0.133	63.5/0.087
UT-250-75	75±1.0	.250(2)	.210(2)	.0359	SPCW	.500	200	19.3	7000	3000	21.0	4.5/2.505	6.5/1.735	175.0/0.644	27.0/0.418	42.5/0.265

MICRO-COAX CABLE ASSEMBLIES

The usefulness of Micro-Coax semi-rigid coaxial cable is increased by its ability to be formed or fabricated into simple or complex geometric assemblies. Coiling, bending, stripping, and soldering, attaching connectors and other secondary operations result in delivery of maximum power in minimum space. The fabrication potential of Micro-Coax Cable is practically limitless, meeting mechanical and environmental requirements in phase matching, attenuation and VSWR optimization, assembly, encapsulating and insulating, and delay calibration. UTI provides finished assemblies, pretested and ready for installation.

CONDUCTOR MATERIALS

OUTER CONDUCTOR: Copper, beryllium copper, stainless steel, stainless steel over copper, aluminum 1100, aluminum 5052, silver, lead, phosphor bronze, invar, niobium, brass 70/30. They may be electro-plated with silver, tin, cadmium, gold or solder.

INNER CONDUCTOR: Silver plated copper, silver plated copper-clad steel, unplated copper, stranded copper, silver plated beryllium copper, aluminum, gold, lead, niobium, palladium, stainless steel, Tophet C[1], tungsten, tubular beryllium copper, silver plated tubular beryllium copper, silver plated tubular stainless steel, tubular stainless steel, silver tube over stainless steel tube.

DIELECTRIC OR INSULATING MATERIALS

Solid Teflon TFE[2], solid Teflon FEP[2], Teflon spline TFE, Tefzel[2], solid polyolefin, polyolefin foam, irradiated polyolefin, H film, polyvinylchloride, Mylar[2], magnesium oxide powder, aluminum oxide powder, Kynar[3], kel-F, silicone rubber, nylon.

MICRO-COAX DELAY LINES

Micro-Coax Delay Lines are a highly reliable method of providing short delays in radio frequency and microwave signals. They are available with delays of 5 to 100 nanoseconds as standard or custom units. Comprehensive test data is available on all Micro-Coax Delay Lines.

WAVEGUIDE DELAY LINES

UTI Waveguide Delay Lines are constructed of thin wall aluminum tubing supported by an alloy casting, and thus delay values are frequency sensitive. Waveguide delay lines offer greatly reduced loss when compared with coaxial types. Longer delays can be generated without intermediate amplification. A change in delay characteristics can be utilized to form a pulse compression network to use in calibrating radar, altimeters, and range finding equipment.

1. Trademark W. B. Driver Company. 2. Trademark or tradename duPont. 3. Tradename Pennwalt Corporation.

UNIFORM TUBES, INC.
. . . a UTI Company

COLLEGEVILLE, PA., U.S.A. 19426

Catalogs on Request

PHONE 215/539-0700
TWX: 510-660-6107
TELEX: 84-6428

VICTOR
WIRE AND CABLE CORP.

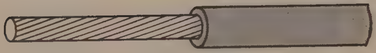
3601 HOLDREGE AVENUE • LOS ANGELES, CALIF. 90016
TELEPHONE (213) 870-9933 •

CERTIFIED WIRE FOR INDUSTRY

QPL *The largest and only "QPL" listed manufacturer of Polyethylene PVC, and Teflon® coaxial cable on the west coast to RG/U call-outs. Manufactured to the latest revision of MIL-C-17D.*

DESC and UL Approved
Approved in-plant test facilities by authorization of DESC and Underwriters Laboratories.

HOOK-UP WIRE



Victor Wire and Cable maintains a large inventory of several types of military and industrial hook-up wires. The military hook-up wires includes, among others — MIL-W-76 . . . MIL-W-5086A Type I, II, III, . . . MIL-C-7078A Type I, II . . . MIL-W-16878D Type B, B/N, C, C/N, D, D/N, E, EE, ET, J, JN, K, KK, KT . . . MIL-W-81044.

Industrial hook-up wires include UL Styles — 1004, 1007, 1011, 1012, 1015, 1061 . . . Hi voltage teflon® wire . . . business machine wire . . . Hi voltage Polyethylene wire . . . Kapton insulated wire . . . test lead wire . . . thermocouple wire.

If you have a special application Victor can design hook-up wire to meet your most exacting requirements.

COAXIAL CABLE

Victor Wire and Cable offers a complete line of Coaxial and Triaxial Cables that meet the requirements of Military Specification MIL-C-17. In addition Victor has designed hundreds of specialty coaxial cables to meet exacting electrical, mechanical, and environmental requirements — low capacitance . . . low attenuation . . . low noise . . . small overall diameter . . . low dielectric constant . . . high flexibility . . . high temperature . . . low temperature.

OUR SPECIALTY

SPECIALLY DESIGNED AND ENGINEERED CABLE
SPECIAL COAXIAL CABLE TO CUSTOMER PRINTS AND ENGINEERED DESIGNS

VICTOR WIRE AND CABLE CORP.

VICTOR
WIRE AND CABLE CORP.

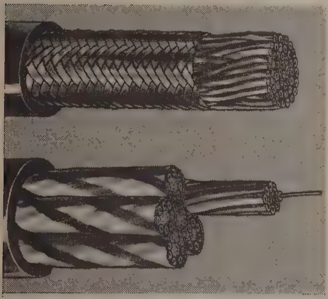
3601 HOLDREGE AVENUE • LOS ANGELES, CALIF. 90016
TELEPHONE (213) 870-9933 •

CERTIFIED WIRE FOR INDUSTRY

QPL *The largest and only "QPL" listed manufacturer of Polyethylene PVC, and Teflon® coaxial cable on the west coast to RG/U call-outs. Manufactured to the latest revision of MIL-C-17D.*

DESC and UL Approved
Approved in-plant test facilities by authorization of DESC and Underwriters Laboratories.

MULTI-CONDUCTOR CABLE



Victor has the capability to supply multi-conductor cable to exacting requirements to meet any environmental conditions. We have manufactured multi-conductor cables for almost every application — radar . . . closed circuit T.V. . . . color T.V. camera cable . . . remote control guidance . . . audio systems . . . monitoring equipment and community antenna systems.

Our Engineering staff is continually designing multi-conductor cables for specific applications. If you have a requirement for a special cable application — call VICTOR.

CABLE ASSEMBLIES

TERMINATIONS, MOLDINGS, HARNESSES

Victor Wire and Cable offers a service that is only equalled by the largest and most sophisticated cable companies. It is important to state that every production stage of termination, molding, and harnessing takes place at Victor Wire and Cable. Therefore we offer a quality controlled, in-house assembly program unequalled in the industry.

Victor Wire and Cable provides all types of termination and assembly work for Coaxial, Multi Conductor cable and harnesses with 100% accuracy and at low cost. Our custom engineering service is qualified to design cables, and cable assemblies to meet the most critical applications. Our customer guarantee is many years of experience.

OUR SPECIALTY

SPECIALLY DESIGNED AND ENGINEERED CABLE
SPECIAL COAXIAL CABLE TO CUSTOMER PRINTS AND ENGINEERED DESIGNS

VICTOR WIRE AND CABLE CORP.

WOVEN ELECTRONICS

P.O. Box 189/Mauldin, South Carolina 29662
Phone (803) 963-5131/TWX-810-287-2091

YOUR COMPLETE SOURCE FOR FLAT INTERCONNECTS

Ribbon Cable

IC Interconnects

Custom Harnesses

A total source for flat interconnect systems, Woven Electronics produces woven cable assemblies to your specifications for conductors, spacing, insulation, color coding, marking—all requirements including special features such as breakouts, fold lines, tinning and connector terminations.

Simple jumpers to massive multi-layer programmed harnesses. Delivered in absolute conformance to your system requirements, ready for drop-in.

Flat woven cabling gives you broadest design capabilities, superior performance and control characteristics of individually insulated leads and precise positioning, without the restrictions of bonded or laminated forms.

CUSTOM CABLE-BILITY UNLIMITED

- Any quantity of leads, up to 400 and more
- Fast, easy lead exposure
- Combine varied sizes and conductor types
- Complete NEMA color code
- Programmed breakouts
- Leads pre-stripped and tinned
- Use standard or specialized connectors
- Any insulation, natural or synthetic
- Flexible, stackable, tackable
- Shielding and jacketing
- Expert technical assistance
- Design and testing services
- Rigid quality assurance

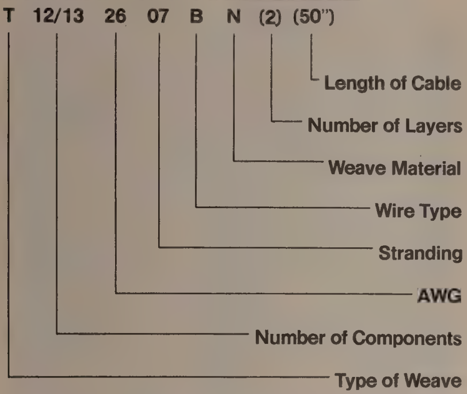
TWISTED SETS
Twisted pairs, triads and quads in single or multiple layers. Facilitates routing. Conserves space in packaging. Rugged and durable. Easy lead exposure without affecting adjacent insulations. Best method of ribbonizing TFE, FEP, polyimide, asbestos, fiberglass and other exotic insulations.

ULTRA-FLEXIBLE CABLES
Extreme flexibility achieved through the use of fine wire strands. Commonly used for in-movement interconnects. Withstands continuous flexing without delamination. Retains insulation continuity.

WOVEN ELECTRONICS

P.O. Box 189/Mauldin, South Carolina 29662
Phone (803) 963-5131/TWX-810-287-2091

ORDERING WOVEN CABLE



Six basic characteristics of woven cable are indicated by this numbering code.

Type of Weave

S—Standard Weave (plain and box weave)

T—Twill Weave

SpT—Stack Weave. Number in parentheses at end of order number designates number of layers.

A—Accordion Fold

PS—Programmed Standard

HS—Woven Harness

CIC—Matched Impedance

C—Covered Cable

Number of Components

Fold lines are indicated by /, between the number of components desired on each side of the fold line. More than one fold line may be indicated in this manner: 12/13/26/12.

TP following number of components indicates they are Twisted Pairs. TT are Traids.

AWG

Size of wire—22, 24, 26, 30, etc.

Stranding

Number of strands required to make up the AWG size.

Wire Type

Using letters from MIL-W-16878D, such as Type B, C, E, ET, EE. Or at this point show UL style of wire required—UL-1007, UL-1061, etc.

Weave Material

A full range of natural and synthetic binding fibers are employed in the production of woven cable—Kapton, Teflon, Nylon, Nomex, or natural blends of cotton and linen.

Most commonly specified:
N—Nylon
NX—Nomex
D—Dacron
Pp—Polypropylene
G—Glass

Number of Layers

When ordering stack-weave cable show number of layers, in parentheses, at end of numbering code.

Length of Cable

When ordering programmed cable (PS, HS, CIC), show length in inches, in parentheses, at end of numbering code. For special requirements, drawings and detailed notes may be used. Dimensional drawings are necessary for all harnesses, accordion fold units and programmed lead units.

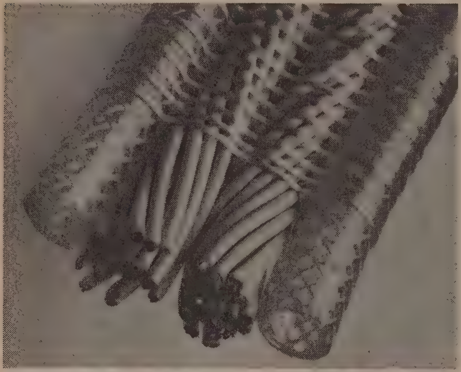
If a special array of conductors is needed, list and number each conductor. Indicate colors required. If using standard NEMA color code and repeat, simply note—"NEMA and repeat."

Woven-in, non-conductor area may be specified for folding and/or cutting. Cut line provides fastest method of lead separation, no hazards of tearing or damaging insulation. Fold lines facilitate compaction from flat to stacked single cable. Allows passage through small openings.

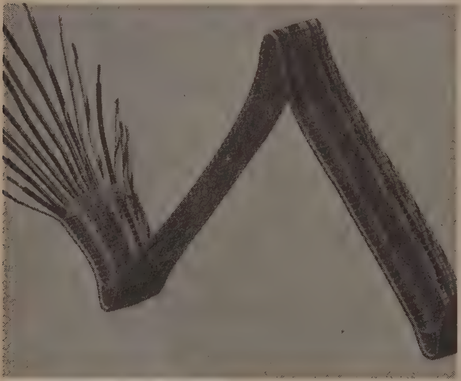
Minimum order	$50.00
Minimum length	100 feet

WOVEN ELECTRONICS

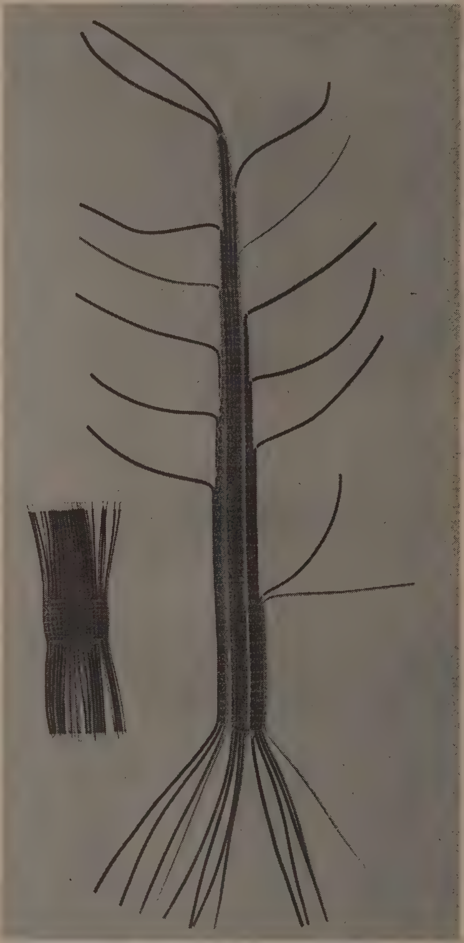
P.O. Box 189/Mauldin, South Carolina 29662
Phone (803) 963-5131/TWX-810-287-2091



MULTI-FUNCTION CABLES
Specialized assemblies for diverse industrial applications. Air, liquid or gas carrying tubes may be woven in a package with electrical conductors. Organize fiber-optic bundles to distribute data—multiple light-emitting diode arrays, etc. Combine varied conductor sizes and functions.



ACCORDION FOLD
Permanently pre-folded. Strain-relief threads at each fold prevent flexing fatigue of conductors. Reinforced edges prevent wear from drawer movements or other obstructions. Any length. Allows varied combinations of conductor types, color, groupings, insulations.

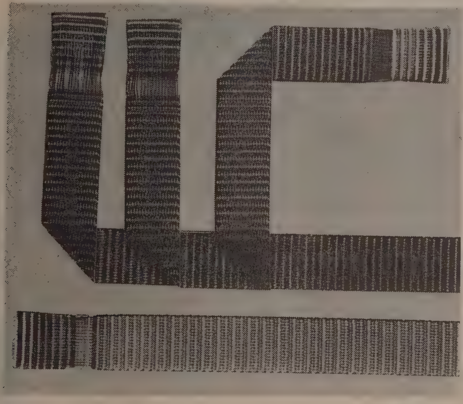


CUSTOM HARNESSES AND JUMPERS
Woven and/or hand-tied to properly match application requirements. Specifically designed and manufactured for your needs. Complete with branches, breakouts, and terminations—connectors as specified. Fully equipped, tooled, ready to plug in. Programmed jumpers for point-to-point hookup.

WOVEN ELECTRONICS

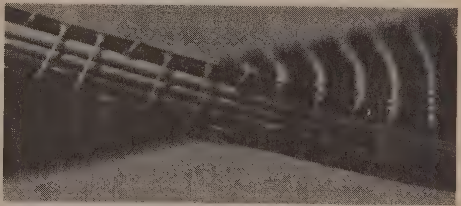
P.O. Box 189/Mauldin, South Carolina 29662
Phone (803) 963-5131/TWX-810-287-2091

STRAIN-RELIEF TABS
Woven-in as part of cable or harness. Tack, epoxy or fasten tab to secure cable in place. Protects termination by relieving pressure from conductor ends.



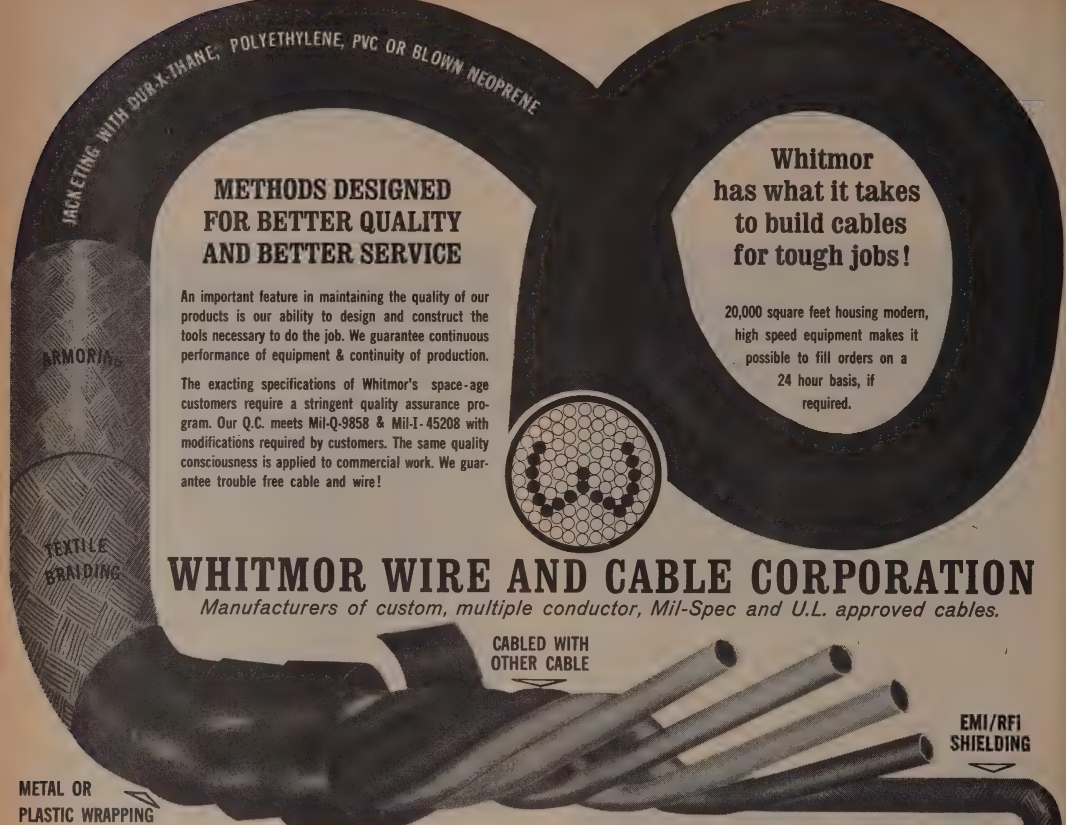
MATCHED IMPEDANCE CABLE
Replaces laminated circuitry to provide increased computer efficiency with less cable bulk. Impedance controlled to less than 10% deviation in acceptable ranges. Fold, roll, twist without delamination or appreciably changing impedance. Configuration of signal lines and position of ground planes minimize crosstalk. Lengths and leads pre-programmed for your application.

INTERCONNECT ASSEMBLIES
Complete IC Interconnect assemblies with standard connectors. Tighter signal control. Higher performance reliability and durability at competitive price levels.



STACK WEAVE CABLES
Multiple layers of parallel lay or twisted sets organize conductors in tight, space-saving pattern. Programmed array maintains precise lead orientation. Conductors of varied sizes, functions and insulations are combined with no risk of tearing or splitting.

FOR ADDITIONAL INFORMATION
A nearby Woven Electronics representative will be pleased to assist. Call collect for the name of our representative in your area, or for full details on Woven Electronics products and application-engineering services.


JACKETING WITH DUR-X-THANE, POLYETHYLENE, PVC OR BLOWN NEOPRENE
ARMORING
TEXTILE BRAIDING
CABLED WITH OTHER CABLE
METAL OR PLASTIC WRAPPING
EMI/RFI SHIELDING

METHODS DESIGNED FOR BETTER QUALITY AND BETTER SERVICE

An important feature in maintaining the quality of our products is our ability to design and construct the tools necessary to do the job. We guarantee continuous performance of equipment & continuity of production.

The exacting specifications of Whitmor's space-age customers require a stringent quality assurance program. Our Q.C. meets Mil-Q-9858 & Mil-I-45208 with modifications required by customers. The same quality consciousness is applied to commercial work. We guarantee trouble free cable and wire!

Whitmor has what it takes to build cables for tough jobs!

20,000 square feet housing modern, high speed equipment makes it possible to fill orders on a 24 hour basis, if required.

WHITMOR WIRE AND CABLE CORPORATION

Manufacturers of custom, multiple conductor, Mil-Spec and U.L. approved cables.

UNSHIELDED							SHIELDED**			
MULTI-CONDUCTOR STOCK CABLES / All wire 19 strand					DUR-X-THANE®		STOCK		DUR-X-THANE®	
PART NO.	COND. AWG	NO. COND.	JKT. THICK.	CABLE O.D.	JKT. THICK.	CABLE O.D.	JKT. THICK.	CABLE O.D.	JKT. THICK.	CABLE O.D.
W-227*	22	7	.040	.280	.030	.260	.040	.305	.030	.285
W-2212*	22	12	.050	.380	.030	.340	.050	.405	.030	.365
W-2219*	22	19	.060	.450	.040	.410	.060	.475	.040	.435
W-2227*	22	27	.060	.530	.040	.490	.060	.555	.040	.515
W-2237*	22	37	.060	.580	.040	.540	.060	.605	.040	.565
W-2248*	22	48	.060	.660	.050	.640	.060	.685	.050	.665
W-2261*	22	61	.060	.710	.050	.690	.060	.735	.050	.715
W-2272*	22	72	.060	.775	.060	.775	.060	.800	.060	.800
W-207*	20	7	.040	.300	.030	.280	.040	.325	.030	.305
W-2012*	20	12	.050	.400	.030	.360	.050	.425	.030	.385
W-2019*	20	19	.060	.475	.040	.435	.060	.500	.040	.460
W-2027*	20	27	.060	.560	.040	.520	.060	.585	.040	.545
W-2037*	20	37	.060	.610	.040	.570	.050	.640	.040	.595
W-2048*	20	48	.060	.700	.050	.680	.060	.725	.050	.705
W-2061*	20	61	.060	.750	.060	.750	.060	.775	.060	.775
W-2072*	20	72	.060	.840	.060	.840	.060	.865	.060	.865
W-187*	18	7	.040	.335	.030	.315	.040	.360	.030	.340
W-1812*	18	12	.050	.450	.040	.430	.050	.475	.040	.455
W-1819*	18	19	.060	.550	.040	.510	.060	.575	.040	.535
W-1827*	18	27	.060	.650	.050	.630	.060	.675	.050	.655
W-1837*	18	37	.060	.720	.050	.700	.060	.745	.050	.725
W-1848*	18	48	.060	.820	.060	.820	.060	.845	.060	.845
W-1861*	18	61	.060	.890	.060	.890	.060	.915	.060	.915
W-1872*	18	72	.060	.995	.060	.995	.060	1.020	.060	1.020
W-167*	16	7	.040	.370	.030	.350	.040	.395	.030	.375
W-1612*	16	12	.050	.500	.040	.480	.050	.525	.040	.505
W-1619*	16	19	.060	.600	.040	.560	.060	.625	.040	.585
W-1627*	16	27	.060	.685	.050	.665	.060	.710	.050	.590
W-1637*	16	37	.060	.755	.060	.755	.060	.780	.060	.780
W-1648*	16	48	.060	.865	.060	.865	.060	.890	.060	.890
W-1661*	16	61	.060	.935	.060	.935	.060	.960	.060	.960
W-147*	14	7	.050	.420	.040	.400	.050	.445	.040	.425
W-1412*	14	12	.050	.550	.040	.530	.050	.575	.040	.555
W-1419*	14	19	.060	.645	.050	.625	.060	.670	.050	.650
W-1427*	14	27	.060	.775	.060	.775	.060	.800	.060	.800
W-125*	12	5	.050	.445	.040	.400	.050	.470	.040	.425
W-127*	12	7	.050	.480	.040	.460	.050	.505	.040	.485
W-1212*	12	12	.060	.650	.050	.650	.060	.675	.050	.675
W-1219*	12	19	.060	.820	.060	.820	.060	.845	.060	.845

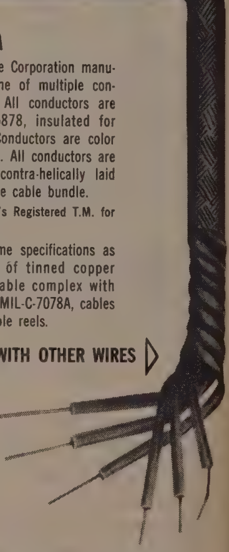
*Designate jacketing desired as follows: V=vinyl X=Dur-X-thane P=polyethylene N=neoprene - Mil-S-6855 - Class 2 - Grade 60
EXAMPLE: W-1827P=Cable w/27 conductors, 18 gauge wire, w/polyethylene jacketing. **Add "S" to PART NO. for Shielded cable.
Other constructions available on request using 1/32″ PVC insulation (3000 V, Military Type D); (600 V, Style 1015 U.L. Commercial)

TECHNICAL DATA

Whitmor Wire and Cable Corporation manufactures a complete line of multiple conductor control cables. All conductors are Type C per MIL-W-16878, insulated for 1000 V and 105° C. Conductors are color coded per MIL-STD 681. All conductors are planetary cabled and contra-helically laid with Mylar tape over the cable bundle.

® Dur-X-thane is Whitmor's Registered T.M. for extruded Polyurethane.

SHIELDED CABLES: Same specifications as above with additions of tinned copper braided shield over cable complex with 85%-95% coverage to MIL-C-7078A, cables shipped on non-returnable reels.


CABLED WITH OTHER WIRES
INDIVIDUAL WIRES
INSULATED, COLOR CODED, LETTERED AND IDENTIFIED.

WHITMOR WIRE AND CABLE CORPORATION
13161 SHERMAN WAY ■ NORTH HOLLYWOOD, CALIFORNIA 91605 ■ PHONE: (213) 764-6296

18TH EDITION

eem 75 76

MANUFACTURERS AND SALES OFFICES DIRECTORY

This index provides an alphabetical listing of manufacturers supplying electronic equipment, instrumentation, components, materials and fabrication services. Included for each company are addresses, phone numbers, TWX numbers where applicable, selected distributors, and who to contact for information on pricing, applications and customer service. A condensed list of products made by the company appears below each name, as well as Federal Supply Code (FSC) numbers, Qualified Parts List (QPL) numbers and minimum order data. When available, free literature is also listed.

Boldfaced listings indicate those manufacturers who have provided catalog data in the white pages of EEM. Volume numbers appear first, before the bullet, the page number is listed after it. Many companies have placed their representative symbol before their names as an aid to identification.

All SYSTEMS, 344 New Albany Rd., Moorestown, N.J., 08057, Tel: 609-234-4420, TWX: 710-897-1190; Empl.: 65

Products manufactured: Amplifiers, Antennas, Cable Assemblies & Harnesses, CATV Systems & Equipment, Coders, Comm. Systems, Comparators, Converters, Counters, Data Acquisition & Reduction Systems, Demodulators, Diplexers, Antenna, Encoders, Generators, Gyros (All Types), Kits, Test Equipment, Modulator/Demodulators, Modulators, All Kinds, Monitors, Mounts, Multipliers, Radar Systems, Receivers, Services, Assembly, Production & Test, Servo Systems, Shifters, Synthesizers, Testers, Timers, Underwater Communication, Detection, Navigation, etc. Equipment

AARON-DAVIS CO., 1720 22nd St., Santa Monica, Cal., 90404, Tel: 213-829-1834; Empl.: 12

Products manufactured: Inverters, Power Supplies

Local Sales Offices & Reps.

Ariz	Phoenix, Cleveland Entprs.	602-264-1969
Cal	San Diego, Rochette & Assocs.	714-282-4616
Cal	San Gabriel, Rochette & Assocs.	213-285-1251
Colo	Littleton, Cleveland Entprs.	303-771-6242
Md	Silver Spring, Rep-Tron	301-593-4844
NM	Albuquerque, Cleveland Entprs.	505-298-7671

ABA INDUSTRIES, INC., Box 517, Pinellas Pk., Fla., 33565, Tel: 813-546-3571; FSC No: 26795; Empl.: 200

For info on price: D. J. Morrison; Application info: B. W. Harting; Customer service: D. J. Morrison; Delivery info: D. J. Morrison

Products manufactured: Antenna Rotators, Antennas, Controls/Control Eqpt., Drives & Drive Mechanisms (Dial), Mounts, Multiplexers, Pedestals, Radar, Services, Assembly, Production & Test, Servo Systems, Tracking Systems

Local Sales Offices & Reps.

Md	Timonium, De Shawn Assocs.	301-252-4878
Tex	Ft. Worth, J. T. Honston Assocs.	817-265-2931

ABACUS CONTROLS INC., 65 Fourth St., Somerville, N.J., 08876, Tel: 201-526-6010; Empl.: 20
p. 1•1026; p. 2•1731

Products manufactured: Amplifiers, Chargers, Battery, Coils Including Assemblies & Forms, Controls/Control Eqpt., Converters, Generators, Inverters, Oscillators, Power Supplies, Protectors, Reactors, Regulators, Shifters, Synthesizers, Testers, Transformers, Voltage Sources

ABACUS ELCTRNS. CORP., 10 Hudson Terr., Dobbs Ferry, N.Y., 10522, Tel: 914-693-1450; Empl.: 25

Products manufactured: Bezels, Shielded & Unshielded, Boards, Printed Circuit, Bushings, Glass, Plastic, Metal, Rubber, Etc., Clamps & Clips, Connectors, Dials, Fasteners, Handles For Cabinets, Circuit Boards, Racks, etc., Locks, Dial & Shaft, Services, Assembly, Production & Test, Sockets, Spacers, Terminal Blocks, Boards & Strips, Terminals

ABBOTT SCREW & MFG. CO., 6525 N. Clark St., Chicago, Ill., 60626, Tel: 312-761-8400; Empl.: 161; Minimum order: $50

For info on price: J. O'Connor; Application info: F. Vosecky; Customer service: F. Harkabus; Delivery info: M. Gerber

Free literature available: Steloc Engineering Guide & Price List, Steloc Engineering Guide & Price List (Distributor), Capability Booklet (Intro. to our facilities)

Products manufactured: Fasteners, Pins

ABBOTT TRANSISTOR LABS., Industrial Div., 5176 W. Jefferson Blvd., Los Angeles, Cal., 90016, Tel: 213-930-1040; Empl.: 12 .... p. 1•1047-1056

Customer service: C. Montour

Products manufactured: Power Supplies

Local Sales Offices & Reps.

NJ	Fort Lee, Abbott Transistors	201-224-6900

abbott transistor

ABBOTT TRANSISTOR LABS, Power Supply Div., 5200 W. Jefferson Blvd., Los Angeles, Cal., 90016, Tel: 213-936-8185, Telex: 69-1398; FSC No: 15755; Empl.: 125; Minimum order: $10 .... p. 1•1038-1046

Customer service: A. Hilbert

Free literature available: 60 page Power Supply Catalog listing complete specifications and prices of over 3500 standard power modules.

Products manufactured: Converters, Inverters, Power Supplies

Local Sales Offices & Reps.

NJ	Fort Lee, Abbott Transistor Lab., Inc.	201-224-6900

ABBOTT TRANSISTOR LABS., Transformer Div., 5176 W. Jefferson Blvd., Los Angeles, Cal., 90016, Tel: 213-930-1040; Empl.: 12 .... p. 2•1720-1725

Customer service: W. Lovett

Free literature available: 12 page transformer catalog of miniature 60 Hz and 400 Hz power transformers.

Products manufactured: Transformers

Local Sales Offices & Reps.

NJ	Fort Lee, Abbott Transistors	201-224-6900

ABESTO CORP., Ackerman St., Bloomfield, N.J., 07003, Tel: 201-338-6814; Minimum order: $25

For info on price: R. Kay; Application info: R. Kay; Customer service: R. Steinman; Delivery info: B. Scarpelli

Products manufactured: Bumpers, Coatings, Grommets, Rubber, Services, Assembly, Production & Test, Tubing

ABLE CABLE DIV., 115 S. Northwest Hwy., Barrington, Ill., 60010, Tel: 312-381-2460; Empl.: 25; Minimum order: $15

Customer service: R. A. Knaack

Products manufactured: Cable Assemblies & Harnesses

Local Sales Offices & Reps.

Ill	Barrington, W. Biery	312-381-7333
Ill	Downers Grove, E. Joyner & Co.	312-968-8383
Tex	Dallas, G. Weinreich & Assoc.	214-321-2800

ABLESTIK LABORATORIES, 833 W. 182nd St., Gardena, Cal., 90248, Tel: 321-6252, TWX: 910-346-7606; FSC No: 21109; Minimum order: $25

For info on price: H. E. Harris; Application info: N. Nygard; Customer service: H. E. Harris; Delivery info: Order Desk

Products manufactured: Adhesives (All Types)

Local Sales Offices & Reps.

Cal	Los Altos, Neal Olson-Ablestik	415-326-8358
Mass	Sudbury, L. J. Maroni Assocs.	617-443-2170
NY	Camillus, H. C. Murray	315-487-0634
NY	Hartsdale, Powell-Pendergraph	914-761-7792
Pa	Colmar, E. Lasky Assocs.	215-822-2510
Tex	Dallas, Waddle Sls. Co.	214-638-2860
Wisc	Milwaukee, Process Technology	414-464-6620

ABRAMS INSTR., 606 E. Shiawassee, Lansing, Mich., 48901, Tel: 517-484-9441, TWX: 810-251-0785; Empl.: 35

Customer service: M. Gates

Products manufactured: Counters, Indicators, Motors, Services, Assembly, Production & Test, Timers

Local Sales Offices & Reps.

Ariz	Scottsdale, J.A. Swanson Assocs.	602-946-6950
Cal	N. Hollywood, Jewett Co.	213-789-8103
Kans	Leawood, Thunderbird Tech. Sls. & Svcs., Inc.	913-642-7220
Kans	Wichita, Thunderbird Tech. Sls. & Svcs., Inc.	314-567-6488
Md	Ellicott City, McCourt Co.	301-465-4515
Mo	St. Louis, Thunderbird Tech. Sls. & Svcs., Inc.	314-567-6488
Ohio	Cincinnati, Loesch Assocs.	606-331-4332
Ohio	Cleveland, Loesch Assocs.	216-241-4581

ACCEL INDL HEAT SINK, 5338 Alhambra, Los Angeles, Cal., 90032, Tel: 213-221-9188

Customer service: Order Desk

Free literature available: Pictorial description of 60 heat sinks available from stock. Economy mounting hole patterns for most often used transistor/semiconductor devices and ordering information to insure customers desired hole pattern lay out and otther features such as length of part & finish.

Products manufactured: Transistor, Diode, Thyristor Heat Dissipators

Local Sales Offices & Reps.

Ala	Huntsville, Repcom	205-852-3305
Cal	San Diego, J.S. Heaton Co.	714-452-1456
Cal	San Francisco, P. O'Neal & Assocs.	415-924-1691
Fla	Ft. Lauderdale, Repcom	305-564-1929
Fla	Melbourne, Repcom	305-254-1877
Fla	Miami Springs, Repcom	305-887-8723
Fla	Orlando, Repcom	305-894-7217
Ga	Warner Robins, Repcom	912-923-1393
Ill	Mt. Prospect, Anatronic Assoc.	312-296-2468
Minn	Minneapolis, C.R. Leeds Co., Div. Jewlemont Corp.	612-333-5393
Ohio	Canton, CSA Equipt. Sls. Co.	216-456-1359

ACCESSORIES FOR ELECTRONICS, 23-25 Bell Blvd., Box 56, Bayside, N.Y., 11360, Tel: 212-939-5474; Empl.: 15

Customer service: P. Johnson

Free literature available: Catalog #723-Transistor Pads, P.C. Jacks & Terminals, Clips, Clamps, Circuit Card Ejectors, Grounding Terminals, Wire Ties, I.C. & Relay Pads, Transistor Covers, Busing - Captive Hardware Flysheet showing P.C. Card Guides, Bobbins, Diode Sleeves, Capacitor Pads & Cone Nuts.

Products manufactured: Bobbins, Winding, Coil & Transformer, Bushings, Glass, Plastic, Metal, Rubber, Etc., Capacitor, Hardware, Clamps & Clips, Connectors, Fasteners, Guides, Circuit Board, Holder & Carriers, Holders, Circuit Board (Production Type), Insulators & Insulation, Jacks (All Types), Packages, Integrated Circuit, Pads, Transistor Mounting, Pins, Plug & Jack Sets, Pullers, Resistor, Hardware, Services, Assembly, Production & Test, Sockets, Spacers, Terminals

Local Sales Offices & Reps.

Cal	Garden Grove, H. Miller	714-893-4670
Cal	Los Angeles, Corcoran Assocs.	213-823-2425
Fla	Hallandale, L.M. Bairstow Assoc.	305-927-2421
Md	Baltimore, Stitzer Assocs.	301-823-2600
Mass	Melrose, Accessories for Elctrns.	617-665-0666
Minn	Brainerd, M. (Red) Johnson	218-963-7875
NY	Buffalo, R.A. Murray Co.	716-632-6913
NY	DeRuyter, S.A. Caputo	315-682-2920
Ohio	Dayton, Buckeye Components	513-278-4279
Pa	Paoli, Stitzer Assocs.	215-644-5500
Wash	Seattle, W. Spaulding Co.	206-282-9173
FOR:	Can., Toronto, Electrorep Ltd.	416-787-1257

ACESSO-WIRE, Box 76, Garnvl. Trm., Garnersville, N.Y., 10923, Tel: 914-947-1220; Empl.: 18; Minimum order: $50

Customer service: S. L. Roth

Products manufactured: Cable Assemblies & Harnesses, Cable, Connectors, Fasteners, Heat Guns, Production, Lubricants, Services, Assembly, Production & Test, Splices, wire (Including, Butt & Cap Types), Terminal Blocks, Boards & Strips, Testers, Wire, Wire & Cable Ties, Wire Markers, Wire Nuts, Wire Strippers

ACCUMET ENGINEERING CORP., 25 Broad St., Hudson, Mass., 01749, Tel: 617-568-8311; Minimum order: $50

Customer service: J. B. Snook

Products manufactured: Crystals, Resistors, Semiconductor Wafer Fabrication, Substrates

ACCURATE ELECTRONICS CO., 2635 So. Wabash Ave., Chicago, Ill., 60616, Tel: 312-225-7500; Empl.: 25; Minimum order: $15

For info on price: D. B. Lytle; Application info: F. DiLegge; Customer service: F. DiLegge; Delivery info: T. Valenziano

Free literature available: Literature describes our products including features, specifications and industries where used. they are broken down into Power Conversion Units, Battery Chargers, Battery Back Up Systems, and Magnet Controllers.

Products manufactured: Chargers, Battery, Power Supplies, Transformers

Local Sales Offices & Reps.

Ill	Chicago, Ropek & Cahill	312-287-7292
NY	New York City, NEPA	212-867-0340
NC	Charlotte, Engineering Sls. Co.	803-253-4004
Ohio	Cleveland, Hird & Son	216-331-7272
Tex	Houston, R & K Engrg. & Sls. Corp.	713-465-8367
Utah	Salt Lake City, D. W. Richardson Co.	801-467-9714
Wisc	Milwaukee, G. T. Stephenson & Assoc.	414-273-7275

ACCURIDE, Div. of Standard Precision, 12311 S. Shoemaker, Santa Fe Springs, Cal., 90670, Tel: 213-944-6236, TWX: 910-338-0256; Minimum order: $35

Products manufactured: Cable Retractors, Simulators

Local Sales Offices & Reps.

Cal	San Jose, Accuride	408-249-4707
Colo	Golden, B. Callister & Assocs.	303-761-0992
Fla	Ft. Lauderdale, Orbe	305-564-8571
Ga	Atlanta, Davidson Co.	404-993-4570
Ill	Arlington Heights, Accuride	312-259-7282
Mass	Holliston, Accuride	617-492-2474
Mich	Grand Rapids, J.E. Mackay Co.	616-451-4990
Minn	Minneapolis, E.C. Elctrn. Sls.	612-831-0229
NY	Kirkville, RMJ Inds.	315-656-7285
Ohio	Troy, R.J. Pugh & Assoc.	513-335-7846
Okla	Tulsa, Blair Engrg.	918-663-9850
Pa	Philadelphia, Accuride	215-233-3000
Tex	Dallas, Blair Engrg.	214-352-8411

ACCUTRONICS-A HAMMOND CORP., 628 North St., Geneva, Ill., 60134, Tel: 312-232-2600, TWX: 910-237-1680; FSC No: 16484; Empl.: 80
p. 1•280-282; p. 2•346,347

For info on price: G. Dewar; Application info: G. Dewar; Customer service: J. Vill Wock; Delivery info: G. Dewar

Free literature available: Catalog covers various types of oscillators from 1Hz to 250 MHz, (3) conversion charts.

Products manufactured: Boards, Printed Circuit, Boards, Printed Wiring, Universal, Delay Lines, Generators, Oscillators

ACDC ELECTRONICS, 401 Jones Rd., Oceanside, Cal., 92054, Tel: 714-757-1880, TWX: 910-322-1470; Empl.: 400; Minimum order: $50 .... p. 1•1027-1036

For info on price: J. Hall; Application info: R. Abbott; Customer service: J. Hall; Delivery info: J. Hall

Products manufactured: Power Supplies, Transformers

Local Sales Offices & Reps.

Ala	Huntsville, Beacon Elctrn. Assocs.	205-881-5031
Ariz	Scottsdale, OEM Specialties	602-948-3360
Cal	Lawndale, Group Three Elctrns Ward Davis Assocs.	213-542-5581
Cal	San Diego, Harvey King, Inc.	714-276-7541
Cal	Sunnyvale, Group Three Elctrns Ward Davis Assocs.	408-245-4392
Colo	Denver, PLS Assocs.	303-771-0140
Conn	Hamden, J & J Assocs.	203-624-7800
Fla	Ft. Lauderdale, Beacon Elctrn. Assocs.	305-776-6074
Fla	Maitland, Beacon Elctrn. Assocs.	305-647-3498
Ga	Atlanta, Beacon Elctrn. Assocs.	404-351-3654
Ill	Des Plaines, Cozzens & Cudahy, Inc.	312-298-3800
Ind	Indianapolis, Cozzens & Cudahy, Inc.	317-244-2456
Md	Kensington, Elctrn. Mktg. Assocs.	301-881-5300
Mass	Burlington, J & J Assocs.	617-272-2606
Mich	Detroit, WKM Assocs.	313-892-2500
Minn	Minneapolis, Cozzens & Cudahy, Inc.	612-884-4336
Mo	Kansas City, Cozzens & Cudahy, Inc.	816-454-5836
Mo	St. Louis, Cozzens & Cudahy, Inc.	314-423-1234
NJ	Fort Lee, Tech. Mktg. Assocs.	201-224-6911
NM	Albuquerque, PLS Assocs.	505-255-2330
NY	East Syracuse, Ossmann Instrs., Inc.	315-437-6666
NY	Rochester, Ossmann Instrs., Inc.	716-328-2230
NY	Vestal, Ossmann Instrs., Inc.	607-785-9947
Ohio	Cleveland, WKM Assocs.	216-267-0445
Ohio	Dayton, WKM Assocs.	513-434-7500
Okla	Norman, Data Mktg. Assocs.	405-364-8320
Pa	King of Prussia, Elctrn. Mktg. Assocs.	215-248-5050
Pa	Pittsburgh, WKM Assocs.	412-892-2953
SC	Spartanburg, Beacon Elctrn. Assocs.	803-583-7615
Tex	Dallas, Data Mktg. Assocs.	214-661-0300
Tex	Houston, Data Mktg. Assocs.	713-686-9627
Tex	San Antonio, Data Mktg. Assocs.	512-828-0937

ACE PLASTIC CO., INC., 91-54 Van Wyck Expwy., Jamacia, N.Y., 11435, Tel: 212-523-5500; Empl.: 100; Minimum order: $25

Customer service: I. Steinberg

Products manufactured: Services, Assembly, Production & Test, Tubing

ACHESON COLLOIDS CO., Div. Acheson Inds., 1635 Washington Ave., Port Huron, Mich., 48060, Tel: 313-984-5581, TWX: 810-231-5265; Empl.: 150; Minimum order: $25

For info on price: J. Anderson; Application info: J. J. Coniglio; Customer service: F. Clary; Delivery info: R. R. Powers

Products manufactured: Chemicals, Coatings, Compounds, Encapsulating, Insulating, Molding, Potting, Conductive Plastic Materials, Fabrics, Conductive, Films, Heaters & Heating Elements, Inks For Thick Film Microcircuits, Insulators & Insulation, Kits, Breadboarding (For Engineers), Kits, Shielding, Lubricants, Materials, Graphite, Materials, Self-Lubricating, Metal Compounds, Foils, Powders, Sheet, Stock, Metal Oxides, Metals, Paints, Plastic Raw Materials, Liquids, Pellets, Powders, Resins, Rubber, Services, Assembly, Production & Test, Shields

Local Sales Offices & Reps.

Cal	LaMirada	714-523-8812
Ga	Atlanta	404-451-7452
Ill	Chicago	312-664-2032
Ind	South Bend	219-272-8511
Mass	Boston	617-662-6787
Mich	Detroit	313-352-6639
NJ	Elizabeth	201-353-0414
NY	Rochester	716-381-7610
Ohio	Cincinnati	513-631-6750
Ohio	Cleveland	216-521-1900
Pa	Melvern	215-644-4886
Tex	Dallas	817-292-4264

ACME BATTERY CORP., 700 Canal St., Stamford, Conn., 06904, Tel: 203-324-4125; Empl.: 40

For info on price: L. M. Dorflinger; Application info: L. Schub; Customer service: L. M. Dorflinger; Delivery info: L. M. Dorflinger

Products manufactured: Batteries

ACME ELECTRIC, 748 Water St., Cuba, N.Y., 14727, Tel: 716-968-2400, TWX: 510-245-2700; Empl.: 1200

For info on price: R. Milne; Application info: D. Chesner; Customer service: R. Milne; Delivery info: R. Milne

Free literature available: Basic Transformer Catalog; Communications Power Products Catalog; PS2L Solid State Load Bank Brochure; Switching Power Supplies, Linear 20KHZ Brochure.

Products manufactured: Chargers, Battery, Chokes, Coils Including Assemblies & Forms, Converters, Eliminators, Battery, Inverters, Loads, Electronic Variable, Power Supplies, Regulators, Transformers

Local Sales Offices & Reps.

Ala	Birmingham, Hopper & McCoy	205-822-2536
Ariz	Phoenix, Abbott Sls. Co.	602-252-6171
Cal	Los Angeles, J. Blesso & Assocs.	213-921-6387
Cal	Oakland, Baxter Co.	415-654-3177
Colo	Denver, Western Reps.	303-986-6025
Conn	Wolcott, G.P. Dannecker	203-879-4005
Fla	Jacksonville, Glenn Assocs.	904-744-1247
Fla	Miami, Glenn Assocs.	305-592-7335
Fla	Orlando, Glenn Assocs.	305-293-7482
Fla	Tampa, Glenn Assocs.	813-879-5890
Ga	Atlanta, Hopper & McCoy	404-872-5802
Haw	Kailua, R.A. Kemp Co.	808-839-5593
Ill	Chicago, Weinstein & White	312-787-0166
Ind	Indianapolis, A.L. Pickens Co.	317-632-9379
Iowa	Cedar Rapids, Arnie Sell & Assocs.	319-393-4225
Iowa	Davenport, Arnie Sell & Assocs.	319-359-1295
Kans	Prairie Village, R.E. Gooley Co.	913-813-0200
Ky	Louisville, A.L. Pickens Co.	502-491-4215
La	New Orleans, Associated Mfrs. Agents	504-522-6267
Md	Pikesville, Wilson Assocs.	301-252-2231
Mich	Detroit, Buschagen Geldersma & Gratch	313-535-6550
Mich	Grand Rapids, Buschagen Geldersma & Gratch	616-361-5335
Minn	St. Paul, H.A. Cullen & Assoc.	612-646-7371
Miss	Jackson, Associated Mfrs. Agents	601-969-0661
Mo	St. Louis, Burgoyne Electrical Sls.	314-521-3162
Neb	Omaha, A. Sell & Assocs.	402-391-4068
NH	Nashua, R.P. Reese	603-883-2407
NJ	Carstadt, R.W. Noel & Co.	201-935-7171
NY	Manlius, E.D. Sweeney	315-682-6915
NY	Rochester, G.N. Mergel	716-334-6909
NY	Vestal, W.J. Frey	607-748-8053
NC	Greensboro, Barber-Ayers & Assoc.	919-273-3829
Ohio	Chagrin Falls, Lusty - Thomson, Inc.	216-543-8181
Ohio	Westerville, P.R. Collier	800-362-2279
Okla	Oklahoma City, J. Pitts	405-232-0011
Pa	Oreland, Cusick Electrical Sls.	215-886-2100
Pa	Pittsburgh, M.F. Smith Assocs.	412-276-5363
Tenn	Memphis, Hicks Sls. Agency	901-396-5725
Tenn	Nashville, Hopper & McCoy	615-883-7557
Tex	Houston, Burrus & Matthews	713-227-5205
Tex	Irving, Burrus & Matthews	214-251-3031
Tex	Longview, Burrus & Matthews	214-758-9841
Va	Richmond, Barber-Ayers & Assoc.	703-288-7772
Wash	Seattle, H.M. Denny Co.	206-282-7200
FOR:	Can., Scarboro, Ont.o, J.H. McKechnie	416-465-5409

ACME ELEC. HEATING CORP., 4685 E. 11th, Hialeah, Fla., 33013

Customer service: J. B. Sampson 305-685-8326

Products manufactured: Cable, Furnaces, Heaters & Heating Elements, Ovens, Solder Pots & Baths, Thermocouples, Elements & Accessories

ACME MODEL ENGRG. CO., 654 Bergen Blvd., Ridgefield, N.J., 07657, Tel: 201-943-7650; Empl.: 16

For info on price: A. Asfar; Application info: F. Risdell; Customer service: F. Parks; Delivery info: A. Arenas

Products manufactured: Boards, Printed Circuit, Bushings, Glass, Plastic, Metal, Rubber, Etc., Chassis, Metal, Clamps & Clips, Eyelets, Fasteners, Holder & Carriers, Labels, Pressure-Sensitive, Adhesive, Printers, Retainers, Services, Assembly, Production & Test, Springs (All Types), Terminal Blocks, Boards & Strips, Terminals, Tubing

ACME PLASTIC PRODUCTS CO., INC., 9629 N. 22nd Ave., Phoenix, Ariz., 85021, Tel: 602-997-9944; Empl.: 6

Products manufactured: Services, Assembly, Production & Test

ACOPIAN CORP., Box 585, Easton, Pa., 18042, Tel: 215-258-5441, TWX: 510-651-4949; FSC No: 14749; Minimum order: $10 .... p. 1•1057

For info on price: J. Joseph; Application info: T. Skopal; Customer service: T. Skopal; Delivery info: J. Joseph

Free literature available: Power supplies offering a choice of performance levels and mechanical configurations. PC-mounting, narrow profile, plug-in, unregulated, premium performance, rack mounting, multiple output.

Products manufactured: Power Supplies, Suppressors

Local Sales Offices & Reps.

Ala	Huntsville, Gentry Assoc.	205-534-9771
Ariz	Scottsdale, Williams Assoc.	602-947-4297
Cal	Los Angeles, Basic Sys. Co.	213-938-2833
Cal	Palo Altos, Held & Mollard, Inc.	415-965-9321
Cal	San Diego, Basic Sys. Co.	714-279-9641
Colo	Denver, Williams Assoc.	303-373-4730
Conn	Enfield, Meas. Equip. Co.	203-745-9050
Fla	Orlando, Gentry Assoc.	305-894-4401
Ill	Wheeling, Potter-Mac Co.	312-541-4600
Kans	Shawnee Mission, Maury & Bettis Co.	913-362-0772
Kans	Wichita, Maury E. Bettis Co.	316-685-7441
Md	Ellicott City, Doss Elctrns.	301-465-1336
Mass	Wakefield, Meas. Equip. Co.	617-245-4870
Mich	Birmingham, J.C. Hofstetter Co.	313-643-7203
Mich	Grand Rapids, J.C. Hofstetter Co.	616-942-0650
Minn	Minneapolis, Kirkeby & Assoc.	612-377-3239
Mo	St. Louis, Maury E. Bettis Co.	314-429-2099
NM	Albuquerque, Williams Assoc.	505-255-1638
NY	Elbridge, L-Tron Corp.	315-689-3787
NY	Latham, L-Tron Corp.	518-785-5032
NY	Tonawanda, L-Tron Corp.	716-691-8887
NY	Woodbury, J.N. Sweeney & Co.	516-692-4222
NC	Charlotte, Jake Rudisill Assoc., Inc.	704-377-6901
Ohio	Dayton, J.C. Hofstetter Co.	513-296-1010
Ohio	Medina, J.C. Hofstetter Co.	216-725-4477
Okla	Tulsa, Norvell Assoc.	918-663-1247
Pa	Ardmore, Martin Elec. Co.	215-649-6332
Pa	Reading, Beil & Whitaker	215-779-2610
Tex	Dallas, Norvell Assocs.	214-350-6771
Tex	Houston, Norvell Assocs.	713-774-2568

ACOUSTIC POWER SYSTEMS, 2061F E. Cerritos, Anaheim, Cal., 92806, Tel: 714-535-5490; Empl.: 5

Customer service: Frank M. Tillou

Free literature available: Reprints of ASME paper entitled "A New Shaker for Modal Testing of Large Structures in the Seismic Frequency Range".

Products manufactured: Testers

Local Sales Offices & Reps.

Cal	Walnut Creek, Dale-Dahl Assocs.	415-933-9595
Colo	Littleton, Eissler Sls. & Svcs.	303-794-1779
Conn	New Haven, Vibration Sls. & Svc.	203-389-1527
Fla	Orlando, Triflex	305-896-3152
NJ	Teaneck, I. Rudnick	201-836-7392
Tex	Dallas, Merit Co.	214-620-0021

ACRODYNE CONTROLS, Box 1044, Janesville, Wisc., 53545, Tel: 608-752-9081; Empl.: 12; Minimum order: $25

Customer service: R. Mowris

Products manufactured: Motors, Relays, Switches

ACROMARK CO., 60 Locust/Dept. 397, Berkeley Hts., N.J., 07922, Tel: 201-464-6474; Empl.: 50

Customer service: W. H. Schmidt

Free literature available: Catalog Pages 410, 610, 630 & 9AH; Also Catalog Page 14 L, 14 M and 20 C.

Products manufactured: Machines/Machinery, Production, Nameplates

Local Sales Offices & Reps.

Cal	Long Beach, J. Dan Culp Sls.	213-531-2591
Cal	Walnut Creek, Advanced Test Sys.	415-937-4225
Colo	Denver, Plateau Machinery Co.	303-758-0135
Ill	Downers Grove, Midwest Tech. Ser.	312-968-4343
Mass	Southwick, Electron Sls. Co.	413-569-3109
Mich	Adrian, E. Loncki	313-263-6539
NY	Skaneateles, Tech-Sonic Assocs.	315-685-6144
NC	High Point, H. Bull	919-882-8997
Ohio	Cincinnati, Lohrer Ind. Equip.	513-574-2700
Tenn	Memphis, E.H. Carlson	901-682-3207
Tex	Houston, Mercer Engrs.	713-529-6121
Wash	Hoodsport, G.M. Earsley Co.	206-877-9707

ACROMAG, INC., 30765 Wixom Rd., Wixom, Mich., 48096, Tel: 313-624-1541; Empl.: 45; Minimum order: $10

Customer service: Sls DePt.

Products manufactured: Amplifiers, Controls/Control Eqpt., Converters, Indicators, Isolators, Monitors, Relays

Local Sales Offices & Reps.

Cal	Palo Alto, Priz Co.	415-326-9333
Cal	Santa Fe Springs, D.A. Matthews/Assoc.	213-693-5432
Colo	Denver, Control Equip. Corp.	303-399-6931
Fla	Jacksonville, L.E. Rogers Co.	904-743-5877
Fla	Ruskin, L.E. Rogers Co.	813-645-1453
Ga	Atlanta, R. Freeman Assocs.	404-261-9066
Ill	Schaumburg, Carvel Engrg. Co.	312-885-8800
La	Baton Rouge, Petro-Chem. Equip. Co.	504-927-4380
La	Metairie, Petro-Chem. Equip. Co.	504-586-9337
Mass	Norwell, Bordewieck Engrg. & Sls.	617-659-4915
Mich	Ann Arbor, H.C. Heym Assocs.	313-971-6552
Mich	Marquette, NWR Elctrns. Corp.	906-226-7578
Mich	Saginaw, H.C. Heym Assocs.	517-799-0873
Minn	Edina, NWR Elctrns. Corp.	612-831-6240
Minn	Virginia, NWR Elctrns. Corp.	218-741-5080
Mo	St. Louis, Scherrer Instr. Co.	314-644-5362
Neb	Omaha, Control Sls., Inc.	402-342-1717
NJ	Montclair, E.C. Smith & Assocs.	201-783-6668
NY	Albany, O.R. Lawrence Co.	518-456-4444
NY	Buffalo, O.R. Lawrence Co.	716-839-4422
NY	New York, E.C. Smith & Assocs.	212-682-6890
NY	Syracuse, O.R. Lawrence Co.	315-455-5587
NC	Matthews, W.K. Hile Co.	704-847-9125
Ohio	Chagrin Falls, J. Kilroy Corp.	216-247-8997
Ohio	Cincinnati, G.H. Drysdale & Assoc.	513-752-2089
Okla	Tulsa, D. Allert Co.	918-743-7706
Ore	Portland, McLaren, Inc.	503-297-2248
Pa	Bridgeville, Instr. Svcs., Inc.	412-221-3601
Pa	Devon, B & A Assocs.	215-688-5173
Tenn	Knoxville, W.K. Hile, Co.	615-588-1061
Tenn	Memphis, M. Watson Co.	901-272-7495
Tex	Houston, Gay Engrg. & Sls.	713-869-3306
Tex	Midland, Gebhart & Boyd Assoc.	915-697-1171
Utah	Salt Lake City, Specialty Sls. Co.	801-262-2979
Va	Chester, W.K. Hile, Co.	804-271-0014
Wash	Bellevue, McLaren, Inc.	206-454-3400
WVa	St. Albans, Instr. Svcs., Inc.	304-722-2953
Wisc	Oconomowoc, Booker Co.	414-873-4000
EXP:	Boston, Extech Int'l.	617-227-7090

ACRON CORP., 1095 Towbin Ave., Lakewood, N.J., 08701, Tel: 201-364-7200; Empl.: 40; Minimum order: $25

For info on price: L. D. Fykse; Application info: S. Heritage; Customer service: S. Heritage; Delivery info: S. Heritage

Free literature available: Acro-lar Dialer; Sound Discriminator - Audio Detector; LG-600 - Burglar-Fire Alarm Panel; Acro-Dial - Reperstory Dialer; Acro-Probe - Logic Probe.

Products manufactured: Alarms, Detectors, Power Supplies, Probes

Local Sales Offices & Reps.

Ariz	Phoenix, Mountain West Alarm	602-263-8831
Cal	Glendale, Detectronics	213-240-4035
Cal	Hayward, Consolidated Communications Corp.	415-886-5115
Conn	New Britain, Newbrite Industries, Ltd.	203-229-1640
Fla	Miami, Gulfstream Assoc.	305-885-2907
Ga	Atlanta, Detectronics	404-875-8601
Ind	Michigan City, S & B Distrs.	219-872-0569
Mass	Watertown, Detectronics	617-929-1245
Mich	Detroit, Alarm Supp. Co.	313-255-2303
Pa	Pittsburgh, Triangle Elctrns. Co.	412-441-9659
Tex	Dallas, Detectronics	214-363-7377

ACTION LABS INC., 3238 Washington Ave. N., Minneapolis, Minn., 55412, Tel: 612-522-4391; Empl.: 45

For info on price: D. R. Kubes; Customer service: D. R. Kubes; Delivery info: D. R. Kubes

Products manufactured: Cable Assemblies & Harnesses, Services, Assembly, Production & Test

ACTIVE CONTROL INSTRUMENTATION, Box 194, E. Northport, N.Y., 11731, Tel: 516-864-2111; Empl.: 6 p. 1•228,229

For info on price: M. Prober; Customer service: Cust. Svc.

Free literature available: Detail sheets (specification control drawings) giving specifications, size, description of operation, applications and ordering information for each of the models shown on catalog page (display ad). Request specific model.

Products manufactured: Alarms, Amplifiers, Controls/Control Eqpt., Converters, Current Sensors, Indicators, Isolators, Monitors, Probes, Protectors, Services, Assembly, Production & Test, Signal Averagers, Transducers

ACTIVE & PASSIVE COMPONENTS, 6 Aerial Way, Syosset, N.Y., 11791, Tel: 516-433-5311, TWX: 510-221-1807; Empl.: 50

For info on price: S. Bernstein; Application info: J. Milton; Customer service: Sls Dept; Delivery info: Sls Dept

Free literature available: Metallized film capacitor catalog R. F. Interference Filter catalog

Products manufactured: Capacitors, Fixed, Filters

Local Sales Offices & Reps.

Ala	Huntsville, Repcom Inc.	205-534-9959
Ariz	Phoenix, R.L. Davis Co.	602-955-2266
Cal	Encino, El Tec Systems	213-981-9881
Cal	Oakland, MHR Sls. Agency	415-569-1564
Fla	Ft. Lauderdale, R. Adams	305-564-1929
Fla	Melbourne, Repcom Inc.	305-254-1877
Fla	Miami Springs, L. Hatfield	305-887-8723
Fla	Orlando, J. Gilbert	305-894-7217
Fla	Seminole, G. Tillett	813-393-0584
Ga	Warner Robins, O. Bowman	912-923-1393
Ill	Glenview, Crimson Engrg. Co.	312-724-1780
Ind	Fort Wayne, W.W. Bieberich, Inc.	219-432-2537
Md	Baltimore, Bernard White & Co.	301-484-5400
Mass	Brookline, Harman Assocs.	617-232-6687
Mich	Detroit, Nicon Assocs.	313-341-7668
Minn	Minneapolis, G. E. Arneson & Co.	612-920-2086
NJ	Cherry Hill, Jay Assocs.	609-662-0399
NJ	Kenilworth, Ventronics, Inc.	201-272-9262
NY	Fayetteville, Graydon-Sherman	315-637-9861
NY	Pittsford, Graydon-Sherman	716-381-8838
Tex	Addison, Southland Comps.	214-233-0603
Tex	Houston, Southland Comps.	713-782-4575
Wash	Kirkland, T. Brian Ind.	206-827-5811
FOR:	Can., Montreal, Solid State Engrg. Co.	514-481-3313

A C TRANSFORMER CORP., 89 Madison St., Newark, N.J., 07105, Tel: 201-589-8574; Empl.: 13; Minimum order: $25

Customer service: G. Giangrande

Products manufactured: Transformers

ACUREX, 485 Clyde, Mountain View, Cal., 94042, Tel: 415-964-3200, TWX: 910-379-6593; Empl.: 385

Customer service: E. L. Rossiter

Free literature available: 1) WDC Brochure - List Standard Products; 2) Torque - Outlines Standard Torque Systems.

Products manufactured: Comm. Systems, Data Acquisition & Reduction Systems, Indicators, Monitors, Transmission Systems, Data

ACUSHNET CAPACITOR CO., 720 Belleville, New Bedford, Mass., 02745, Tel: 617-999-3291, TWX: 710-344-6451; Empl.: 300; Minimum order: $100

For info on price: J. Pedro; Application info: W. O'Mara; Customer service: A. Ovellette; Delivery info: A. Ovellette

Products manufactured: Capacitors, Fixed, Networks

Local Sales Offices & Reps.

Ala	Huntsville, TMA	205-883-7893
Ariz	Tempe, Gassner & Clark	602-968-9037
Cal	Hawthorne, WCV Co.	213-772-4479
Cal	San Carlos, F. Kottmeier	415-592-8333
Colo	Denver, Electrodyne	303-757-7679
Fla	Pompano Beach, TMA	305-942-0774
Ill	Chicago, Gassner & Clark	312-345-4245
Ind	Indianapolis, F. Campisano	513-662-1616
Iowa	Cedar Rapids, Gassner & Clark	319-393-5763
Kans	Leawood, Thunderbird Sls.	913-642-7220
Md	Baltimore, Burgin-Kreh	301-788-5200
Mass	Lexington, J.E. Boeing Co.	617-862-2500
Mich	Detroit, Carrier & Gable	313-444-8980
Minn	Minneapolis, J. Barnes Sls.	612-474-2907
Mo	St. Louis, Thunderbird Sls.	314-567-6488
NJ	Cherry Hill, J. Barrett Assoc.	609-429-1551
NJ	Orange, Comtronic Sls.	516-741-8966
NY	Garden City, Comtronic Sls.	516-741-8966
NY	Ithaca, B. Dean	607-272-2187
NC	Winston-Salem, Burgin-Kreh	919-768-4174
Ohio	Cincinnati, F. Campisano	513-662-1616
Okla	Oklahoma City, Ammon-Rizos	405-373-2748
Pa	Pittsburgh, G. Root Co.	412-561-4125
Tex	Dallas, Ammon-Rizos	214-233-5591
Va	Lynchburg, Burgin-Kreh	703-845-5600
Wash	Seattle, B. Blum Assoc.	206-282-2590

AD AUTOMATION, 830 Linden Ave., Rochester, N.Y., 14625, Tel: 716-381-2370; Empl.: 80; Minimum order: $40

For info on price: M. Boone; Application info: N. Webb; Customer service: N. Webb; Delivery info: M. Boone

Free literature available: ADA 71/7 - Adapt 10K - programmable leakage and continuity tester - testing any complex wiring system up to 10,000 inputs and outputs.

Products manufactured: Testers

Local Sales Offices & Reps.

Cal	So San Francisco, Howard & Co.	415-589-3050
Cal	Van Nuys, Elliott Assoc.	213-781-8454
Md	Riverdale, Riggs Assocs.	301-927-3380
Mass	Chelmsford, S&S Elctrns.	617-273-0115

A. D. DATA SYS., INC., 830 Linden Ave., Rochester, N.Y., 14625, Tel: 716-381-2370; Empl.: 75; Minimum order: $40 .... p. 1•127

For info on price: M. Boone; Application info: N. Webb; Customer service: N. Webb; Delivery info: M. Boone

Free literature available: Brochure: 73-1 Scan-A-Meter - Low Priced Data logger with multiple Analog Input.

Products manufactured: Analyzers, Antenna Switching Matrices, Clocks (All Types), Comm. Systems, Converters, Data Acquisition & Reduction Systems, Data Loggers, Matrices, Computer, Monitors, Multiplexers, Relays, Scanners, Switches, Testers

Local Sales Offices & Reps.

Cal	San Francisco, Howard & Co.	415-589-3050
Cal	Van Nuys, Gordon Elliot	213-873-6862
Md	Riverdale, Riggs Assocs.	301-927-3380
Mass	Chelmsford, S&S Elctrns.	617-256-8731

AD-VANCE MAGNETICS, 226 E. 7th St., Rochester, Ind., 46975, Tel: 219-223-3158, TWX: 810-290-0294; Empl.: 17; Minimum order: $25 .... p. 2•1210,1211

For info on price: J. Loebig; Application info: R. D. Vance; Customer service: K. Nixon; Delivery info: J. Loebig

Free literature available: Magnetic Shielding Alloys, CRT Shields, P-M Shields, Shielding Chambers, Tape Data Protectors, Shielding Foil, Special Fabricated Magnetic Shields, TWT Shields, Storage Tube Shields, Scan Converter Shields, Transformer Shields, Indicator Shields

Products manufactured: Alloys, Chamber, Environmental Test, Containers, Foil, Metal Compounds, Foils, Powders, Sheet, Stock, Pickups, Telephone (For Recording), Shields, Wire Strippers

Local Sales Offices & Reps.

Cal	Los Altos, Frauman Assoc.	415-941-0660
Cal	Pasadena, A-F Sls.	213-681-5631
Conn	Meriden, A. Allison	203-237-9232
Ill	Westchester, Brouillette	312-345-6500
Md	Baltimore, D,K. Jones Assoc.	301-752-0577
NJ	Fairlawn, Harris Assoc.	201-796-5200
Ohio	Dayton, Gemini Inc.	513-890-5394
Pa	Westchester, Curley Assoc.	215-692-6886
Tex	Dallas, Techno Assoc.	214-357-9213

ADALET MFG. CO., Div. Scott & Fetzer Co., 4801 W. 150th St., Cleveland, Ohio, 44135, Tel: 216-267-9000; FSC No: 73389; Empl.: 134; Minimum order: $25

For info on price: J. Larsen; Application info: A. J. Hermanson; Customer service: N. Rutti; Delivery info: N. Rutti

Products manufactured: Boxes, Junction, Outlets & Wall Plates, Bushings, Glass, Plastic, Metal, Rubber, Etc., Cases, Equipment, Instrument, Meter, Switches

Local Sales Offices & Reps.

Ala	Birmingham, C.W. Ashby Co.	205-879-1651
Cal	Emeryville, G.E. Honn Co.	415-653-0737
Cal	Los Angeles, H.R. "Tex" Benike Assocs.	213-263-7451
Colo	Denver, Electrical Agencies Co.	303-623-8245
Fla	W. Palm Beach, Dineen Assocs.	305-968-6332
Ga	Atlanta, All South Agency	404-874-6301
Ill	Rosemont, L. Butter & Assocs., Inc.	312-671-5040
Ind	Indianapolis, Bennett Elec. Sls. Co.	317-257-1426
Kans	Shawnee Mission, Stover & Assocs.	913-649-6600
La	Metairie, General Power & Control Corp.	504-834-1345
Md	Pikesville, Wilson Assocs., Inc.	301-252-2231
Mass	Boston, C.C. Pierce Co., Inc.	617-268-8816
Mich	Detroit, Engel-Klaes Co.	313-342-9220
Minn	Minneapolis, Pinkney & Assocs., Inc.	716-839-3373
Mo	St. Louis, A. Haumesser Co.	314-781-1225
Neb	Omaha, Electrical Prods. Co.	402-393-7350
NM	Albuquerque, R.B. Black Co.	505-265-0144
NY	Bronx, W.D. Schofield Assocs.	212-933-2900
NY	Rochester, Canavan-Scanlon Assocs., Inc.	716-442-0720
NY	Syracuse, Canavan-Scanlon Assocs., Inc.	315-437-1271
NC	Charlotte, Adams-Gamble-Whiting Inc.	704-377-3489
Ohio	Cincinnati, C.J. Leesman Sls. Co.	513-681-2081
Ohio	Columbus, C.J. Leesman Sls. Co.	614-457-4700
Okla	Tulsa, C. Mullen & Assocs.	918-749-4991
Pa	Jenkintown, P. Jacobson Assocs.	215-884-5524
Pa	Pittsburgh, R.E. Grinder	412-242-3533
Tex	Dallas, W.J. Heummer Agency	214-339-3600
Tex	Houston, Ampsco	713-523-7486
Utah	Salt Lake City, B. Cable & Equip. Co.	801-364-3452
Va	Portsmouth, H.K. Spencer	703-488-3041
Wash	Seattle, Strohecker, Inc.	206-623-0357
WVa	Charleston, Skaff Engrg. Co.	304-342-0131
Wisc	Milwaukee, A.W. Schwind Co.	414-276-9988

ADAMS-RUSSELL CO., INC., 280 Bear Hill Rd., Waltham, Mass., 02154, Tel: 617-890-2540, TWX: 710-324-1614; Empl.: 350

For info on price: C.M. Jones; Application info: R.E. Snyder; Customer service: C.M. Jones; Delivery info: C.M. Jones

Free literature available: Application notes "Receiving System Design Using Active Antennas" "Some Considerations in the Specification of a Radio Frequency Distribution System" "RF Matrix Switching System" Catalog of Standard Products

Products manufactured: Amplifiers, Antenna Feed Systems, Antenna Switching Matrices, Antennas, Cable Assemblies & Harnesses, Couplers, Direction Finders, Dividers, Shifters, Switches, Waveguides & Adapters

ADAMS-SMITH INC., Box 363, Needham, Mass., 02192, Tel: 617-263-1400; Empl.: 12

Customer service: R. J. LaBonte

Products manufactured: Computers, Editing Equipment, Tape

ADAMS & WESTLAKE CO., 1025 W. Michigan St., Elkhart, Ind., 46514, Tel: 219-264-1141; Empl.: 642

For info on price: C. H. Goshorn; Application info: J. Borreli; Customer service: C. Goshorn; Delivery info: C. Goshorn

Free literature available: Adlakes extensive line of Mercury Wetted, Mercury Displacement, and Dry Reed Relays and Solid State Devices are illustrated with dimensional diagrams and photos accompanying product descriptions.

Products manufactured: Relays, Switches

Local Sales Offices & Reps.

Ala	Birmingham, M-G Elctrns. & Equip. Co.	205-328-4525
Cal	Santa Fee Springs, Sierra-Pacific Engrg.	213-921-9634
Cal	Walnut Creek, P.W. Jasin Co.	415-935-6339
Conn	Berlin, White Sls. Co.	203-224-0423
Fla	Hollywood, W.B. Wimberly Co.	305-961-0227
Fla	Orlando, W.B. Wimberly Co.	305-425-3083
Ill	Chicago, Adams & Westlake Co.	312-346-6232
Mass	Needham, White Sls. Co.	617-444-3676
Mich	Royal Oak, R.H. Jackson Co.	313-542-5059
Mo	Independence, B. Gribble	816-SY6-4333
Mo	St. Louis, Wells-White Co.	314-726-2511
NJ	Newark, Adams & Westlake Co.	201-623-6532
NY	East Northport, Adams & Westlake Co.	516-368-4096
NY	Fayetteville, M.P. Andrews, Inc.	315-637-5291
Ohio	Cincinnati, Beedle Equip. Co.	513-793-0140
Pa	Pittsburgh, R.F. Clark Co.	412-242-9500
Pa	Radnor, W. Henry Cordray Sls. Co.	215-687-1366
Tex	Addison, Southland Engrg. & Sls., Inc.	214-233-0603
Tex	Houston, Southland Engrg. & Sls., Inc.	713-782-4575
Wash	Seattle, Eicher-Richards Co.	206-LA3-7888
FOR:	Can., Toronto 15, Ont., Lisle-Metrix Ltd.	416-249-9151

Local Distributors

Ala	Birmingham, MG Elctrns. & Equip. Co., 3112 6th Ave. S.	205-328-4525

Directory of Local Distributors Starts on page 401

NJ Fair Lawn, Relay Specialties, 1300 Plaza Rd. 201-797-3313
Okla Tulsa, Radio, 1000 Main St. S. 918-587-9123
Pa McKeesport, Barno Radio Co., 5403 W. Smithfield 412-664-9394

ADAR ASSOCS., INC., 11B North Ave., Burlington, Mass., 01803, Tel: 617-273-1850, TWX: 710-332-6878; Empl.: 55

For info on price: R. Hollenberg; Application info: R. Hollenberg; Customer service: T. Schulte; Delivery info: R. Hollenberg

Free literature available: DR12/20 brochure, DR32 brochure, DR64 brochure, Series 300 - Manual Memory Programmer, Model 550 - Programmer/Verifier, Model 520 - Automated Universal Memory Duplicator, Model 510 - Tape Reader

Products manufactured: Generators, Pulsers, Logic Test, Test Systems, Testers

Local Sales Offices & Reps.
Ala Huntsville, Beacon Elctrns. Assoc. 205-881-5031
Ariz Phoenix, Mesa Engrg. 602-943-9213
Cal Anaheim, F.L. Wolfe, Inc. 714-956-8220
Cal Culver City, F.L. Wolfe, Inc. 213-559-7200
Cal Palo Alto, Coherent Mktg. Assocs. 415-327-2217
Cal San Diego, Mesa Engrg. 714-278-8021
Cal Sunnyvale, Adar West Coast 408-734-3937
Colo Boulder, Mile High Elctrns. 303-444-5615
Fla Fort Lauderdale, Beacon Elctrns. Assoc. 305-776-6074
Fla Maitland, Beacon Elctrns. Assoc. 305-647-3498
Ga Atlanta, Beacon Elctrns. Assoc. 404-351-3654
Md Randallstown, Beacon Elctrns. Assoc. 301-922-1248
Mass Waltham, W.M. Hague Co. 617-899-5600
NJ Wayne, K&J Assocs. 201-694-3334
NY E. Setauket, K&J Assocs. 516-751-8686
NY Rochester, K&J Assocs. 716-232-6640
SC Spartanburg, Beacon Elctrns. Assoc. 803-582-4613
Va Falls Church, Beacon Elctrns. Assoc. 703-534-1673

ADAPTER/CHARGER PRDTS., 7807 N. Poineer Lane, Peoria, Ill., 61614, Tel: 309-691-0810; Empl.: 50

For info on price: P. Smith; Application info: J. Planck

Free literature available: Wall plug-in power supplies and chargers.

Products manufactured: Alarms, Chargers, Battery, Power Supplies

Local Sales Offices & Reps.
Cal Santa Ana, Spectrum Assoc. 714-835-4114
Fla Orlando, Data Rep. Inc. 305-843-5224
Minn Minneapolis, Jos. Co. Sls. Engrg. 612-835-5858

ADC PRODS., 4900 W. 78th St., Minneapolis, Minn., 55435, Tel: 612-835-6800, TWX: 910-576-2832; Empl.: 723; Minimum order: $50 ....p. 2•444-449

Customer service: Communication Comp. Sls.

Free literature available: ADC Products Catalog-Description and price list for ADC's standard communication components.

Products manufactured: Cords, Jacks (All Types), Panels, Plug & Jack Sets, Plugs, Terminal Blocks, Boards & Strips

Local Sales Offices & Reps.
Cal Menlo pk., ADC Western Sls. Office 415-323-1386
Colo Denver, Parker-Webster Co. 303-770-1972
Conn Bloomfield, Zaslow Sls. Co. 203-242-7781
Ill Oakbrook, Whitmore Assocs. 312-325-4727
Minn Minneapolis, ADC Midwestern Sls. Off. 612-835-6800
NJ Cherry Hill, Danco Corp. 609-424-5590
NM Albuquerque, A.Q. Elctrns. 505-255-8701
NY Syracuse, ADC Northeast Sls. Office 315-458-3747
Ohio Cincinnati, J.W. Murray & Assoc. 513-662-1616
Ohio Cleveland, C.A. Robinson Co. 216-381-9049
Tex Dallas, ADC Dallas Sls. Office 214-241-6783

Local Distributors
Fla Jacksonville, Southeast Elctrns., Inc., 1125 Rosselle St., Box 2517
Ga Atlanta, Ack Radio Supply Co., 554 Deering Rd. N.W.
Ga Atlanta, Power & Tele. Sup., Box 43223 404-691-6813
Ga Decatur, Southern Telephone Supply Co., Box 833 404-457-5512
Ill Chicago, Newark Elctrns., 500 N. Pulaski Rd. 312-638-4411
Ind Indianapolis, RA-Dis-Co., 814 N. Senate Ave. 317-637-5571
Kans Lenexa, North Elect. Sup., 10951 Lakeview Ave. 913-888-9800
Mo Kansas City, Alexander Elctrns., 1820 Wyandotte St.
NJ Rahway, Terminal Elctrs., Pinewood St. 201-381-5700
NY New York, Gray Bar Elec. Co., 420 Lexington Ave.
NY New York, Harvey Elctrns., 2 W. 45th St. 212-582-1500
NY Woodbury, Harvey Radio Co., 60 Crossways Park W. 516-921-8700
NC Lexington, Power & Telephone Supply, Box 1063 704-249-0256
Ohio Columbus, Buckeye Tele. Co., 125 Kinnear Rd. 614-488-0655
Ohio Dayton, ESCO, Inc., 221 Crane St. 513-224-9192
Pa Philadelphia, Philadelphia Elec., 112 N. 12th St. 215-568-7400
Tenn Kingsport, Radio Elctrns. Supply, Box 827
Tenn Memphis, Power & Tele. Sup., 2690 Yale Ave. 901-324-8811
Tenn Nashville, Electra Distr. Co., 1914 East End Ave.
Tex Dallas, Southern Telephone Supply, 8808 Sovereign Row 214-631-5340
Tex Ft. Worth, Allied Elctrns., 401 E. 8th St. 817-336-5401
For: Can., Brockville, Ont., Automatic Elec. Supply, 100 Strowger Blvd. 613-342-6621
For: Can., Montreal, Que., Payette Radio Ltd., 730 St. Jacques St. 514-866-6681
For: Can., Toronto, Ont., Electro Sonic Supply, 543 Yonge St. 416-924-9301

ADCOR ELECTRONIC PACKAGING CORP., 50 E. 41st St., New York, N.Y., 10017, Tel: 212-532-6862; Empl.: 10

For info on price: A. Chertoff; Application info: A. Chertoff; Customer service: S. Russell; Delivery info: S. Russell

Free literature available: Universal PC Cards: applications data packaging densities, artwork design parameters, manufacturing specifications. Intermediate & high density connector configurations. Compatable wire-wrapping guards.

Products manufactured: Backpanel Interconnect Systems, Boards, Plug-In, Boards, Printed Circuit, Boards, Printed Wiring, Universal, Connectors, Integrated Circuit Packaging Systems, Services, Assembly, Production & Test

ADCOTECH CORP., 575 Maude Ave., Sunnyvale, Cal., 94086, Tel: 408-733-2820

Customer service: Sls. Dept.

Free literature available: Literature includes a lead straightener ad, sheet covering adcotech product lines, and data sheets on Adcotech's model 4300-S lead straightener, trim & form tools, and Adcotech's line of bench-type air presses.

Products manufactured: Kits, Marking (Dial, Instrument, Equipment, etc.), Machines/Machinery, Production, Services, Assembly, Production & Test, Tools

ADDINGTON LABORATORIES, INC., Corp. Hdqts., 2975 Scott Blvd., Santa Clara, Cal., 95050, Tel: 408-249-8050; Empl.: 180

ADDINGTON LABS, INC., Cable & Connector Div., 1043 DiGiulio Ave., Santa Clara, Cal., 95050, Tel: 408-248-5515, TWX: 910-338-0138

Customer service: J. Campbell

Products manufactured: Cable, Connectors, Feedthrus & Seals, Environmental

Local Sales Offices & Reps.
Cal Fullerton, Engineer System Products 714-879-5500
Md Baltimore, Wright & Assoc. 301-398-3748
NY Huntington Station, Gray & Reed Assoc. 516-433-3333

ADDINGTON LABS., INC., Microwave Comps. Div., 1043 DiGiulio Ave., Santa Clara, Calif., 95050, Tel: 408-248-5511, TWX: 910-338-0138; Empl.: 70

Customer service: L. Becker

Products manufactured: Circulators, Ferrite, Direction Finders, Filters, Isolators, Multiplexers, Shifters, Switches

Local Sales Offices & Reps.
Ariz Phoenix, Elctrn. Enterprises 602-946-9860
Cal Los Altos, Stout-Loeswick 415-948-3265
Colo Boulder, J. Smith & Assocs. 303-442-7100
DC Washington, Applied Eng. Consultants 202-783-7319
Kans Wichita, Eugene Carbiener Assoc. 316-682-5782
Md Ellicott City, Applied Engrg. Consultants 301-465-1272
Mass Lexington, Eugene F. Delfino Co. 617-449-4141
NJ Westfield, Gray & Reed Assoc. 201-233-6116
NM Las Cruces, Elctrn. Enterprises 505-524-0126
NY Huntington Sta., Gray & Reed Assoc. 516-433-3333
NY Syracuse, Lightstone Corp. 315-454-3209
Ohio Dayton, Berberick Assocs. 513-433-0342
Pa Newtown Square, SWR Assoc. 215-356-8550
Tex Dallas, Texas Avionics 214-368-3566
FOR: Can., Georgetown, Ont., RDB Sheppard Agencies Ltd. 416-877-9846

ADDINGTON LABS, INC., Semiconductor Div., 680 W. Maude Ave., Sunnyvale, Cal., 94086, Tel: 408-733-3883, TWX: 910-339-9230

Products manufactured: Diodes

ADDINGTON LABS., INC., Solid State Prods. Div., 680 W. Maude Ave., Sunnyvale, Cal., 94086, Tel: 408-245-6810, TWX: 910-339-9230; Empl.: 120

Customer service: B. White

Products manufactured: Discriminators, Generators, Multipliers, Oscillators

Local Sales Offices & Reps.
Cal Los Altos, Stout-Loeswick 415-948-3265
Cal Los Angeles, Basic Systems Corp. 213-938-2833
Fla Clearwater, Southeastern Component Sales 813-531-8324
Kans Wichita, Eugene Carbiener Assoc. 316-682-5782
Md Silver Springs, Eastern Instrumentation 301-681-6500
Mass Lowell, Russell Engrg. Services 617-458-7146
NM Las Cruces, Electronic Enterprises 505-524-0126
NY Bridgeport, Lightstone Corp. 315-699-5747
NY Huntington Station, Gray & Reed Assoc. 516-433-3333
Ohio Dayton, Ashby Associates 513-252-5627
Pa Newton Square, SWR Assoc. 215-356-8550
Tex Dallas, Texas Avionics 214-363-6324
FOR: Can., Georgetown, Ont., RDB Sheppard Agencies Ltd. 416-877-9846

ADDISON DIV. MUIRHEAD, INC., 1101 Bristol Rd., Mountainside, N.J., 07092, Tel: 201-233-0610, Telex: 13-8275; Empl.: 10; Minimum order: $10

Customer service: R. M. Seelagy

Free literature available: Maze Master - low cost cable tester, Auto Scan - high speed portable fault finder, Auto Trak - self-programming fault finder system, BITS - Backplane Integrated Test System and Short Form Catalog - brief description of each product. Above brochures provided w/specifications and Price List.

Products manufactured: Cable Fault Locators, Test Systems, Testers

Local Sales Offices & Reps.
Ariz Phoenix, Zeus, Inc. 602-253-6104
Cal Corona Del Mar, D. E. Ward 714-675-3839
Cal San Jose, H. Sharpe Assocs. 408-257-3635
Colo Denver, Zeus, Inc. 303-770-4400
Conn Hamden, Instr. Consits. Inc. 203-288-5246
Ill Wheaton, Engrg. Prods. Assoc. 312-653-6826
Iowa Cedar Rapids, Tech. Reps. Inc. 319-363-2489
Md Silver Spring, ARA Elctrns. 301-565-2584
Mass Waban, Instr. Consits., Inc. 617-969-9881
Mich Detroit, Electro Entprs. 313-521-1500
Minn Minneapolis, Engrg. Prods. Assoc. 612-925-1883
Mo Hazelwood, Tech. Reps. Inc. 314-731-5200
Mo Peculiar, Tech. Reps., Inc. 816-737-1414
NM Albuquerque, Zeus, Inc. 505-268-3941
NY DePew, Labtronics 716-685-4111
NY Schenectady, Labtronics 518-372-6649
NY Syracuse, Labtronics 315-454-9314
NY Ulster Park, Labtronics 914-471-2806
Ohio Cleveland, Electro Entprs. 216-261-7670
Ohio Dayton, Electro Entprs. 513-426-6071
Pa Glenside, ARA Elctrns. 215-887-5250
Pa Pittsburgh, Electro Entprs. 412-371-8497
Utah Salt Lake City, Zeus Inc. 810-466-4924
Wash Seattle, J.B. Jolly Co. 206-938-4166

ADDMASTER CORP., 416 Junipero Serra Dr., San Gabriel, Cal., 91776, Tel: 213-285-1121; Empl.: 400

Customer service: D. Moore

Free literature available: "Paper Tape Equipment" - describes Line of Readers and Accessories. "Model 56 Printer" - Description of and Interface Instructions for OEM Printer.

Products manufactured: Printers, Readers

Local Sales Offices & Reps.

Ala	Huntsville, Scientific Devices	205-536-1969
Cal	Los Altos, Sys. Mktg. Consits.	415-968-4180
Colo	Denver, Grifco	303-722-4674
Conn	New Canaan, R.H. Sturdy Co.	203-966-2580
Fla	Fort Lauderdale, Scientific Devices	305-721-4280
Fla	Orlando, Scientific Devices	305-841-8180
Fla	St. Petersburg, Scientific Devices	813-521-1720
Ill	Chicago, Scientific Sls.	312-775-7594
Ind	Indianapolis, Scientific Sls.	317-253-4606
Md	Bethesda, S & S Assocs.	301-654-1434
Mass	Wellesley Hills, R.H. Sturdy Co.	617-235-2330
Minn	Bloomington, Scientific Sls.	612-881-3300
NJ	Ridgewood, Instrumentation Sls.	201-445-5210
NM	Albuquerque, Fry-Gates Co.	505-298-1875
NY	Schenectady, N.W. Alexander & Assoc.	518-377-0581
NC	Burlington, Scientific Devices	919-228-6279
Ohio	Akron, Shamrock Elctrn. Sls.	216-666-3796
Ohio	Dayton, Shamrock Elctrn. Sls.	513-298-3052
Pa	Cambridge Springs, Shamrock Elctrn. Sls.	814-398-8348
Pa	King of Prussia, S & S Assoc.	215-265-3450
Wash	Seattle, Delcom Sls. Co.	206-248-0090

ADEC INC., 12 Kulick Rd., Fairfield, N.J., 07006, Tel: 201-575-1570; Empl.: 30

Customer service: D. L. Wiesen

Products manufactured: Antennas, Handsets, Chestsets, Headphones, Headsets, Etc., Microphone Accessories (Including Stands, Holders, Booms), Microphones, All Kinds, Speaker Systems, Speakers

ADRE CO., Box 6415, Milwaukee, Wisc., 53209, Tel: 414-352-3531; Empl.: 50; Minimum order: $15

Customer service: G.B. Herrider

Free literature available: Adre catalog #F3-271: Benefits, features & prices of contact burnishing tools and kits for maintaining or restoring full power capacity to precious metal electrical contacts.

Products manufactured: Burnishers, Contact, Chemicals, Metal Compounds, Foils, Powders, Sheet, Stock, Tools

ADRET CORPORATION, 1887 Lititz Pike, Lancaster, Pa., 17601, Tel: 717-569-7059, TWX: 510-657-4434

For info on price: P. D. Beckwith; Application info: P. D. Beckwith; Customer service: E. C. Odell; Delivery info: P. D. Beckwith

Free literature available: CATALOG - Covers complete line of Synthesizers (12 models) covering 0.001 Hz to 110 MHz with high spectral purity. All programmable. SERIES 6000 BROCHURE - Programmable Frequency Synthesizers to 600 MHz with 0.01 Hz resolution; and Spectrum Analyzers with 120 db dynamic range, 10 Hz bandwidth and 5 Hz accuracy.

Products manufactured: Analyzers, Generators, Oscillators, Synthesizers

Local Sales Offices & Reps.

Ala	Huntsville, J. L. Highsmith	205-881-3294
Cal	Los Altos, Systems Mark. Cons.	415-941-7122
Cal	S. Pasadena, QPL	213-687-3705
Colo	Englewood, Zeus, Inc.	303-770-4400
Fla	Orlando, J. L. Highsmith & Co.	305-293-5202
Md	Rockville, TE Corp.	301-340-0303
Mass	Stoneham, Ken Corp.	617-438-5464
Mich	Detroit, Electro Sls	313-526-8800
NM	Albuquerque, Trembly Assocs.	505-293-4444
NC	Charlotte, J. L. Highsmith & Co.	704-333-7743
Ohio	Cleveland, Electro Sls	216-261-5440
Pa	Pittsburgh, Electro Sls	412-371-9449
Tex	Richardson, Scientific Sls Co.	214-231-6541
Va	Richmond, J. L. Highsmith & Co.	805-272-5888
Wash	Bellevue, Topp Engin. Sls Corp.	206-747-5400

ADRET CORPORATION cont'd

Advertisment

Programmable Frequency Synthesizers to 600 MHZ with 0.01 HZ resolution, AM, FM, PM, Sweep and Search. Special inquiries invited.

Spectrum Analyzers to 110 MHZ with 120 db dynamic range, 5 HZ accuracy, 10 HZ bandwidth.

ADTOOL CORP., 10 Ronald Dr., Montreal W P Q, Can., Tel: 514-482-2548; Empl.: 18

For info on price: D. Derry; Delivery info: J. St Louis

Products manufactured: Benches, Consoles, Stools, Tables, Cabinets & Accessories, Cases, Equipment, Instrument, Meter, Chemicals, Cleaners & Solvents, Cleaners, Ultrasonic, Cutters, Wire, Hand Operated, Drawers, Sliding, Drivers, Nut, Flux, Brazing & Soldering Materials, Heat Guns, Production, Heat Sinks, Soldering, Lamps, Machines/Machinery, Production, Pliers, Scissors, Screwdrivers, Solder (All Types), Solder Pots & Baths, Soldering Accessories, Soldering Equipment, Soldering Guns, Irons & Desoldering Tools, Tools, Tweezers, Hand & Vacuum, Wire Strippers, Wire Twisters, Wrenches

Local Sales Offices & Reps.

FOR: Can., Montreal West, Que., Adtool Corp.
FOR: Can., Toronto, Ont., Adtool Corp.

ADVANCE CONVERSION DEVICES CO., 109 Eighth St., Passaic, N. J., 07055, Tel: 201-778-0707; Empl.: 24
p. 1•1084,1085

Products manufactured: Chargers, Battery, Controls/Control Eqpt., Converters, Inverters, Monitors, Power Supplies

Local Sales Offices & Reps.

Md	Annapolis, Hayden Assocs.	202-296-6059
Tex	Dallas, Data Aids Assocs.	214-620-1551
Tex	Houston, Data Aids Assocs.	713-862-6685
Wash	Seattle, Datacom Assocs.	206-285-2525

ADVANCE ROSS ELCTRNS. CORP., 135 S. La Salle St., Chicago, Ill., 60603, Tel: 312-KI3-660; Empl.: 110

Customer service: C. Connors

Products manufactured: Cores, Magnetic, Substrates

Local Sales Offices & Reps.

Ill	Chicago, M. Gottlieb Assocs.	312-775-1151
Ind	Fort Wayne, G. Bieberich	219-432-2537
Mass	Carlisle, Carlisle Tech. Sls.	
NJ	Ringwood, Harvey Assocs.	201-962-7871

ADVANCE WEIGHT SYSTEMS, INC., Box 663, 19 S. 10th St., Battle Creek, Mich., 49016, Tel: 616-962-6657; Empl.: 7

Customer service: A. R. Oxley

Free literature available: Brochures and Data Sheets covering our complete line of weigh cells, weight meters and automatic controls for weighing systems.

Products manufactured: Amplifiers, Cells, Load, Indicators, Signal Conditioners & Equipment, Transducers

ADVANCED CIRCUITRY, Litton Systems Inc., 4811 W. Kearney St., Springfield, Mo., 65803, Tel: 417-862-0751, TWX: 910-775-4705; Empl.: 635

Products manufactured: Boards, Printed Circuit, Boards, Printed Wiring, Universal, Circuits, Printed, Multilayer, Terminal Blocks, Boards & Strips

Local Sales Offices & Reps.

Cal	Canoga Park, A.C.D. of Litton	213-884-7230
Cal	Garden Grove, A.C.D. of Litton	714-539-1515
Cal	San Diego, S & R Elctrns.	714-565-8411
Cal	San Jose, A.C.D. of Litton	408-227-3800
Colo	Littleton, A.C.D. of Litton	303-794-6395
Fla	Tampa, A.C.D. of Litton	813-986-4224
Ill	Chicago, Carlson Elctrn. Sls.	312-774-4812
Mass	Woburn, Bel-Mac Corp.	617-935-6810
Mich	Flint, Tech-Neering Ind. Inc.	313-232-7332
Minn	Minneapolis, Giefer Sls. Co.	612-884-2395
NJ	Flanders, A.C.D. of Litton	201-584-0772
NJ	Lakewood, A.C.D. of Litton	201-367-1130
NY	Guilderland, Solder Pot	518-355-1829
Ohio	Englewood, A.C.D. of Litton	513-836-7488
Pa	Ft. Washington, Kirk-Sandell Inc.	215-643-2100
Tex	Plano, A.C.D. of Litton	214-423-4880
Va	Richmond, A.C.D. of Litton	804-794-6268
Wisc	Milwaukee, Carlson Elctrn. Sls.	414-476-2790

ADVANCED DEVICES LAB, 316 Mathew St., Santa Clara, Cal., 95050; Empl.: 93

For info on price: C. H. Handley 408-241-6551; Application info: C. H. Handley; Customer service: C. H. Handley; Delivery info: M. Carter 408-241-9282

Free literature available: Specification sheets

Products manufactured: Controls/Control Eqpt., Detectors, Transducers

Local Sales Offices & Reps.

Cal	Santa Clara	408-241-9282
Ill	Elk Grove Village	312-437-3269
NJ	Long Branch	201-229-7424

ADVANCED DIGITAL RESEARCH, 1901 Old Middfld Way, Mountain View, Cal., 94043, Tel: 415-965-1303; Empl.: 7; Minimum order: $25

Customer service: R. A. Hein

Free literature available: Several data sheets and users manuals.

Products manufactured: Testers

ADVANCED DYNAMIC INSTRS. DIV., Electodyne, Inc., Box 358, Alexandria, Va., 22313, Tel: 703-836-4641; Empl.: 5; Minimum order: $25

Customer service: C. C. Vincentz

Free literature available: Vibration Test Systems brochure covering equipment manufactured, technical specifications and prices.

Products manufactured: Accelerometers, Amplifiers, Analyzers, Calibrators, Equalizers, Meters, Power Supplies, Testers, Transducers

Local Sales Offices & Reps.

Ala	Huntsville, Ridge Instrs. Co.	205-837-3211
Cal	Montebello, TUCUL Engrg. Co.	213-728-7397
Cal	Mt. View, Morse Assocs.	415-968-7722
Fla	Orlando, Newco & Assocs.	305-293-7700
Ga	Tucker, Ridge Instr. Co.	404-939-1554
Ill	Des Plaines, Maher Engrg. Co.	312-824-2124
Md	Silver Spring, ARA Elctrns. of MD.	301-565-2585
Mass	Acton, E.E. Specialists	617-259-9200
NM	Taos, Dyma Electronics	505-758-2686
Ohio	Dayton, LI/Corp.	513-434-6367
Pa	Glenside, ARA Electronics, Inc.	215-887-5250
Tex	Dallas, Merit Co.	214-352-8040
FOR:	Can., Montreal, Que., J. G. Weiss Co. Ltd.	515-489-6887

ADVANCED HIGH VOLTAGE INC., 14532 Arminta St., Van Nuys, Cal., 91402, Tel: 213-997-7222; Empl.: 13
p. 1•1090-1092

Customer service: M. J. Alexander

Free literature available: 32 Page Catalog of High Voltage Sources (and low voltage sources insultated for High Voltage use) to 75 Kilovolts and 400 watts. Inputs are either line (AC) or DC.

Products manufactured: Converters, Loads, Electronic Variable, Power Supplies

Local Sales Offices & Reps.

NY	Great Neck, EAC Assocs.	516-466-9798
Tex	Dallas, Bouco Sls. Assocs.	214-247-6708
Va	Annandale, J. Hopkins & Assoc.	703-323-1641

ADVANCED KINETICS, 1231 Victoria St., Costa Mesa, Calif., 92627, Tel: 714-646-7165; Empl.: 32

For info on price: R. L. Gradishar; Application info: R. W. Waniek; Customer service: R. L. Gradishar; Delivery info: R. L. Gradishar

Products manufactured: Amplifiers, Bolometers, Calibrators, Cameras, Chamber, Environmental Test, Choppers, Coils Including Assemblies & Forms, Controls/Control Eqpt., Current Sources, Demagnetizers, Detectors, Discharge Systems, Energy, Electroplating Equipment & Supplies, Indicators, Integrators, Electronic, Interferometer Systems, Lamps, Lasers & Laser Systems, Magnetizers, Magnetometers, Magnets, Meters, Modulators, All Kinds, Monitors, Power Supplies, Spectrometers, Switches, Testers, Transducers, Tubes

ADVANCED MATERIALS SYSTEMS, 72 Elm St. N., Atteboro, Mass., 02703, Tel: 617-695-1401; Empl.: 100

For info on price: L. Toth; Customer service: C. Landis

Products manufactured: Metals, Services, Assembly, Production & Test, Wire

Local Sales Offices & Reps.

Conn	West Hartford, R.S. Pettigrew & Co.	203-233-8533

Ill	Chicago, Electro-Comp. Sls.	312-763-3636
Mass	West Newton, R.S. Pettigrew & Co.	617-969-5770
NJ	Asbury Park, Lancaster Industrial Sls.	201-988-5401
Pa	Lancaster, Lancaster Industrial Sls.	717-397-2942

ADVANCED MEMORY SYS., INC., 1275 Hammerwood Ave., Sunnyvale, Cal., 94086, Tel: 408-734-4330, TWX: 910-339-9369; Empl.: 650

For info on price: D. Green; Application info: B. Flansburg Ext. 381; Customer service: P. Brown Ext. 300; Delivery info: P. Brown Ext. 300

Free literature available: 6002, 6003, 7001 Data Sheets: Specifications that each product is capable of performing. Application Notes: More technical, Engrg. information on particular product. Bitscoops: Literature dealing with a product or application.

Products manufactured: Integrated Circuit Devices, Memory Systems

Local Sales Offices & Reps.

Ariz	Phoenix, Hecht-Henschen Co.	602-275-4411
Cal	Los Altos, Cain-White Co.	415-948-6533
Cal	Norwalk, Bertrand & Zoolalian	213-921-9791
Cal	Sunnyvale, Advanced Memory Sys.	408-734-1842
Colo	Boulder, R.G. Entprs.	303-447-9211
Ind	Indianapolis, Technical Reps.	317-849-6454
Md	Baltimore, Stemler Assocs.	301-944-8262
Mass	Cambridge, Data Memory Assocs.	617-868-4728
Mass	Randolph, Advanced Memory Sys.	617-828-2181
Mich	Southfield, Luebbe Sls.	313-357-0355
Minn	St. Paul, Cahill Assocs.	612-646-7217
NJ	Barrington, Stemler Assocs.	215-644-3477
NJ	Ridgewood, Instrumentation Sls. Co.	201-445-5210
NY	Plainview, Central Assocs.	516-433-0808
Ohio	Cincinnati, Luebbe Sls.	513-871-4211
Ohio	Cleveland, Luebbe Sls.	216-333-0425
Ohio	Dayton, Luebbe Sls.	513-294-0426
Okla	Tulsa, Norvell Assocs.	918-663-1247
Pa	Delmont, Luebbe Sls.	412-468-4019
Tex	Dallas, Norvell Assocs.	214-350-6771
Tex	Houston, Norvell Assocs.	713-774-2568
Va	Alexandria, Stemler Assocs.	703-548-7818
FOR:	Can., Montreal, Que.I, J.G. Weiss Co.	610-421-3512
FOR:	Can., North Vancouver, B.C., J.G. Weiss Co.	604-987-3833
FOR:	Can., Steinbach, Manitoba, J.G. Weiss Co.	204-326-6405
FOR:	Can., Toronto, Ont., J.G. Weiss Co.	416-766-0843

ADVANCED MICRO DEVICES, 901 Thompson Pl., Sunnyvale, Cal., 94086, Tel: 408-732-2400, TWX: 910-339-9280; Empl.: 750

For info on price: O. Bailey Ext. 341; Application info: S. Simonsen Ext. 266; Customer service: J. Verhelst Ext. 576; Delivery info: J. Verhelst Ext. 570

Products manufactured: Indicators, Integrated Circuit Devices

AP ADVANCED POWER, INCORPORATED
Economy thru Advanced Technology.

ADVANCED POWER INC., 1621 S. Sinclair St., Anaheim, Cal., 92806, Tel: 714-997-0034, TWX: 910-593-1332; Empl.: 45; Minimum order: $25

For info on price: K. Nelson; Application info: G. Mousel; Customer service: K. Nelson; Delivery info: K. Nelson

Free literature available: Controfluxer product catalog #A1173 APS D.C. power supply series bulletin #APS974

Products manufactured: Power Supplies, Regulators, Transformers

Local Sales Offices & Reps.

Ind	Fort Wayne, Advanced Comp Sls	219-432-2546
Ind	Indianapolis, Advanced Comp. Sls.	317-545-6441
Md	Silver Spring, Rep-Tron	301-593-4844
Minn	St. Paul, Northport Engrg	612-698-3841
Ohio	Milford, Knight Tech. Sls.	513-831-1513
Ore	Eugene, J. A. Tudor & Assoc.	503-686-1252
Ore	Portland, J. A. Tudor & Assoc.	503-288-5154
Pa	Norristown, Data Engrg Co.	215-279-8146
Wash	Seattle, J. A. Tudor & Assoc.	206-682-7444
Wash	Spokane, J. A. Tudor & Assoc.	509-327-3328

ADVANCED POWER INC. cont'd

Advertisment

CONTROFLUXER - regulator/filters, AC line;
CONTROFLUXER - DC power supplies;
APS series economy OEM DC power supplies;
High frequency SCR switching Controfluxer DC power supplies;
Custom designed AC & DC power conditioners.

A E G TELEFUNKEN, 570 Sylvan Ave., Englewood Clfs., N.J., 07632, Tel: 201-568-8570, Telex: 135497; Minimum order: $100

Customer service: J. Szafranski

Products manufactured: Amplifiers, Cells, Photoconductive, Photoemissive, Photovoltaic, Circuits, Integrated, Silicon Monolithic, Unpackaged Chips, Crystals, Delay Lines, Detectors, Diodes, Display Devices/Displays, Films, Integrated Circuit Devices, Isolators, Lamps, Monitors, Potentiometers, Power Supplies, Rectifiers, Regulators, Thyristors (Includes Silicon Controlled Rectifiers), Transistors, Tubes, Valves, Vacuum

AEL, INC., Richardson Rd., Colmar, Pa., 18915, Tel: 215-822-2929, TWX: 510-661-4976; Empl.: 1500

Customer service: T. J. Keffer X241

Free literature available: In addition to company capability and facility literature, brochures covering each product line.

Products manufactured: Amplifiers, Analyzers, Antenna Feed Systems, Antenna Switching Matrices, Antenna Towers & Supports, Antennas, Attenuators, Boards, Printed Circuit, Boards, Printed Wiring, Universal, Cable, Circuits, Hybrid, Thick Film, Circuits, Hybrid, Thin-Film, Circuits, Printed, Multilayer, Comm. Systems, Connectors, Converters, Counters, Couplers, Detectors, Diodes, Direction Finders, Display Devices/Displays, Dividers, Drivers, Switch, Duplexers, Microwave, Filters, Generators, Horns, Microwave, Isolators, Limiters, Microwave Integrated Circuits (MIC's), Mixer-Preamplifiers, Microwave, Mixers, Modulators, All Kinds, Mounts, Multipliers, Networks, Oscillators, Power Supplies, Preselector-Mixers, Preselectors, Radar Systems, Receivers, Rectifiers, Services, Assembly, Production & Test, Shifters, Simulators, Switches, Terminals, Testers, Transceivers, Transistors, Transmitters

Local Sales Offices & Reps.

Ala	Huntsville, Reynolds & Assocs., Inc.	205-536-1941
Ariz	Phoenix, Shefler-Kahn Co.	602-258-7893
Cal	Anaheim, Blair Assocs.	714-635-1350
Cal	Inglewood, L & M Engrg.	213-674-6850
Cal	San Jose, L & M Engrg.	408-292-3220
Colo	Denver, Shefler-Kahn Co.	303-232-0873
Fla	Clearwater, Reynolds & Assocs., Inc.	813-726-2373
Fla	Ft. Lauderdale, Reynolds & Assocs., Inc.	305-581-6611
Fla	Hollywood, Reynolds & Assocs., Inc.	305-587-6720
Fla	Palm Beach, Reynolds & Assocs.	305-622-6850
Fla	Satellite Beach, Reynolds & Assocs.	305-773-4700
Fla	St. Petersburg, Reynolds & Assocs.	813-360-1484
Ga	Atlanta, Reynolds & Assocs., Inc.	404-252-5360
Haw	Honolulu, Har-Kom Hawaii, Inc.	808-587-178
Ill	Northfield, Wright Travis Associates	312-441-6055
Md	Timonium, Deshawn Assocs.	301-252-4878
Mass	Needham, Addelco Corp.	617-444-4754
NM	Albuquerque, Shefler-Kahn Co.	505-265-7077
NY	E. Syracuse, Ossmann Instr.	315-437-6666
NY	Melville, ASTROREP Inc.	516-423-2266
NC	Greensboro, Reynolds & Assocs., Inc.	919-275-3725
Ohio	Dayton, Ashby Assocs.	513-252-5627
Pa	Plymouth Meeting, Scientific Devices	215-825-9515
Tex	Irving, Kemco, Inc.	214-255-0537
Wash	Seattle, Rush Drake Assocs.	206-763-2755

AEL COMMUNICATIONS CORP., SUB. OF AMER. ELCTRN. LABS. INC., Box 507, Lansdale, Pa., 19446, Tel: 215-822-2929, TWX: 510-661-4976; Empl.: 100

Free literature available: Covers AELCC facilities and activities in a handsome and resilient 3-ring binder.

Products manufactured: Amplifiers, Attenuators, Cable, CATV Systems & Equipment, Connectors, Converters, Filters, Services, Assembly, Production & Test, Television Systems & Equipment Closed-Circuit

Local Sales Offices & Reps.

Mo	Ballwin, R. Hood	314-227-3212
Pa	Lansdale, J. Sacco	215-822-2929

AEMCO DIV., Midtex, Inc., 1650 Tower Blvd., Mankato, Minn., 56001, Tel: 507-387-6521, TWX: 910-565-2244; Empl.: 600 .... p. 1•1548-1572

Products manufactured: Delays, Time (Excluding Delay Lines, Timers, Delay & Relays, Time-Delays), Panels, Relays, Sockets, Suppressors, Switches, Timers, Transformers

Local Sales Offices & Reps.

Ala	Huntsville, Twentieth Century Mktg.	205-772-9237
Cal	Inglewood, J. Berman Co.	213-776-1281
Cal	Oakland, Moulthrop Sls.	415-261-7676
Colo	Denver, Barnhill Five	303-426-0222
Fla	Maitland, Hutto-Hawkins-Peregoy	305-831-2474
Ill	Downers Grove, Richmar Elctrns. Corp.	312-968-0118
Kans	Overland Park, Beams Co.	913-341-7744
Mich	Detroit, Nicon Assocs.	313-341-7688
NH	Nashua, Bell Controls	603-882-6985
NJ	Ridgewood, Ballou Inc.	201-444-6990
NY	Buffalo, R.F. Lamb Co.	716-832-5517
Ohio	Dayton, K.W. Elctrn. Sls.	513-890-2150
Pa	Philadelphia, Professional Sls. Assoc.	215-676-2918
Tex	Richardson, Oeler & Menelaides	214-234-6334
Wash	Seattle, C.B. Parson & Co.	206-762-7373
EXP:	Montreal 355, Que., Can., Coba Elctrns. Ltd.	514-381-2523

Local Distributors

Ariz	Phoenix, Moltronics, 2746 W. Palm La.	602-272-7951
Cal	Mt. View, Powell Elctrns., 411 Fairchild Dr.	415-964-0820
Cal	San Diego, Moltronics, 7969 Engineer Rd.	714-278-5020
Cal	Santa Clara, Fisher Brownell, 338 L Edward Ave.	408-294-6183
Cal	Santa Clara, Moltronics, 337 Mathew St.	408-244-7600
Cal	Southgate, Moltronics, 5160 E. Imperial Hwy.	213-773-6521
Fla	Oakland Park, Peerless Radio Corp., 1040 N.E. 43rd Ct.	305-566-5966
Ill	Addison, Lectron Control, 524 S. Westgate St., Unit C	312-543-8460
Ill	Arlington Heights, S & R Corp., 2420 East Oakton	312-593-2545
Iowa	Cedar Rapids, J. Vrbik Co., Three 50th Street N.E.	319-377-8244
Mass	Cambridge, Apollo Elctrns., 200 Second St.	617-868-3120
Mass	Lowell, F. McCartin Co., 181 Market St.	617-454-9101
Mo	Kirkwood, Winslow Design & Sls., 206 N. Clay Ave.	
Mo	St. Louis, Electric Controls, 2735 Mercantile Dr.	314-645-2400
NY	Buffalo, Genesee Radio & Parts Co., 2550 Delaware Ave.	716-858-1287
NY	Hempstead, Kahgan Comps., 556 Peninsula Blvd.	516-538-2300
NY	Rochester, Masline Elctrns., 511 Clinton Avenue So.	716-546-5373
NY	Woodside, Switches Unlimited, 49-1143 Ave.	212-651-0945
Ohio	Akron, Sun Radio Co., 110 E. Market St.	216-434-2171
Ohio	Toledo, Fee & McCarthy, Inc.	
Pa	Erie, Erie Corp. Contractors, 1968 Buffalo Rd.	
Tex	Dallas, Component Specialities, 2560 Elctrns. La.	214-357-4576
Tex	Houston, Comp. Specialities, 7313 Ashcroft, Suite 202	713-771-7237
Wisc	Milwaukee, Marsh Elctrns., 6047 W. Beloit Rd.	414-545-6500
For:	Can., Scarborough, Ont., Carsten Elctrns., 52, Howden Rd.	416-751-2371

AERO-MOTIVE MFG CO., 1-94 At Miller Rd., Kalamazoo, Mich., 49001; Minimum order: $20

Customer service: B. Rowe 616-381-1202

Products manufactured: Reels, Cord & Cable

AEROCOM, 3090 S.W. 37th Ave., Miami, Fla., 33133, Tel: 305-448-6503; Empl.: 100

Customer service: F. I. Stacy

Products manufactured: Amplifiers, Comm. Systems, Controls/Control Eqpt., Receivers, Transmitters, Transponders

Local Sales Offices & Reps.

Cal	Los Angeles, Aeronautical Elctrn. Sls. Corp.	213-670-5166

AEROFLEX LABS., INC., South Service Rd., Plainview, N.Y., 11803, Tel: 516-694-6700, TWX: 510-224-6417; Empl.: 150; Minimum order: $100

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For info on price: N. L. Russell; Application info: M. Ruderman; Customer service: A. Garrett; Delivery info: A. Garrett

Free literature available: TQ Series Torquers (MIL-SPEC), Valueline Series Torquers, Brushless DC Motors, Part Nos. Tech Data, and Dimensions for above.

Products manufactured: Antenna Rotators, Antennas, Controls/Control Eqpt., Counters, Motors, Mounts, Pedestals, Radar, Servo Systems, Simulators, Tachometers, Testers, Tracking Systems

Local Sales Offices & Reps.

Cal	Aptos, Allen & Sweeney Assoc.	408-688-7114
Cal	Torrance, Allen & Sweeney Assocs.	213-373-3318
Conn	Thomaston, Tygren Co.	203-264-6880
Ill	Lombard, Quadtron Assocs.	312-627-6800
Kans	Wichita, D & O Engrg. Co.	316-264-7358
Md	Lutherville, P. Knox & Co.	301-252-1288
Mass	Stoneham, K & D Assoc.	617-438-3121
Mich	Farmington Hills, H. Lowell Co.	313-851-7474
Minn	St. Paul, Vikeland Sls.	612-645-4647
Ohio	Fairborne, Tech. Assocs.	513-878-2484
Pa	Jenkintown, Stein Instrumentation	215-885-2370
Tex	Houston, Aid Elctrns.	713-777-3882
Tex	Irving, Aid Elctrns.	214-259-4761
Wash	Seattle, G.M. Gillet & Assoc.	206-284-3344
EXP:	New York City, N.Y., Frathom Co.	212-687-9390

AEROLITE ELEXS CORP., 2207 Summit Ave., Union City, N.J., 07087, Tel: 201-863-2955; Empl.: 60; Minimum order: $50

For info on price: A. Veres; Customer service: A. Veres; Delivery info: D. Palmer

Products manufactured: Alarms, Bells, Buzzers, Gongs, Sirens & Aural Warning Devices, CATV Systems & Equipment, Couplers, Lamps, Services, Assembly, Production & Test, Sockets

AEROSPACE AVIONICS, INC., Airport International Plaza, 110 Wilbur Pl., Bohemia, N.Y., 11716, Tel: 516-589-9200, TWX: 510-228-7889; Empl.: 200

Products manufactured: Amplifiers, Annunciators, Controls/Control Eqpt., Converters, Inverters, Power Supplies

AEROTRONIC ASSOCS., INC., Riverside Dr., Contoocook, N.H., 03229, Tel: 603-746-3141; Empl.: 70

For info on price: M. Longley; Customer service: P. White; Delivery info: P. White

Free literature available: Aerotronic's new model 707-241 (Mem 1024) 80 position dynamic burn-m system for MOS memories is a complete system including plug-in cards (devices), power supplies, clock and line drivers and indicators.

Products manufactured: Chamber, Environmental Test, Clamps & Clips, Heat Exchangers & Systems, Meters, Testers

Local Sales Offices & Reps.

Cal	Mt. View, Aerotronic Assoc. West	415-961-7440
Fla	Longwood, Saber Assocs.	305-422-3686
Ill	Des Plaines, Cozzens & Cudahy	312-298-3600
Ind	Indianapolis, Cozzens & Cudahy	317-244-2456
Minn	Minneapolis, Cozzens & Cudahy	612-884-4336
Mo	St. Louis, Cozzens & Cudahy	314-423-1234
NM	Albuquerque, Electronic Entprs.	505-256-3561

AEROVOX INDS., INC., 740 Belleville Ave., New Bedford, Mass., 02741, Tel: 617-994-9661, TWX: 710-344-6985; Minimum order: $200

Customer service: T. P. Richards

Free literature available: Oil capacitor catalog; Product bulletin on non-PCB "environol" capacitors.

Products manufactured: Capacitors, Fixed

Local Sales Offices & Reps.

Ala	Huntsville, 20th Century Mktg.	205-772-9237
Cal	Woodland Hills, Interstate Mktg. Assocs.	213-883-7606
Del	Greenville, H. Anderson	302-655-2917
Fla	Oviedo, Conley & Assocs.	305-365-3283
Ill	Chicago, T. B. Hunter Assocs.	312-777-2500
Ill	Wheaton, J-C OEM Sls.	312-668-7621
Ind	Indianapolis, F. J. Campisano Co.	317-247-8623
Mass	Lexington, J. E. Boeing Co.	617-862-2500
Mich	Southfield, Carrier & Gable	313-444-8980
Minn	Minneapolis, Comstrand	612-560-5300
Mo	Grandview, Beneke & McCaul	816-765-2998
NJ	Cherry Hill, J. N. Barrett Assocs.	609-429-1551
NY	Garden City, Comtronic Assocs.	516-741-8966
NY	Ithaca, B. Dean	607-272-2187
Ohio	Cincinnati, F. J. Campisano Co.	513-662-1616
Pa	Pittsburgh, G. S. Root & Co.	412-561-4125
Tex	Dallas, Hale & Assocs.	214-250-8791
Tex	Houston, Ammon & Rizos Co.	713-781-6240
Wash	Bellevue, Western Tech. Sls.	206-641-3900

AERTECH INDUSTRIES, 825 Stewart Dr., Sunnyvale, Cal., 94086, Tel: 408-732-0880, TWX: 910-339-9207; Empl.: 326

For info on price: F. Brewer X-467; Customer service: R. Williams X-514; Delivery info: B. Wright X-462

Products manufactured: Amplifiers, Capacitors, Fixed, Circulators, Ferrite, Converters, Couplers, Detectors, Diodes, Diplexers, Antenna, Dividers, Filters, Integrated Circuit Devices, Isolators, Limiters, Microwave Integrated Circuits (MIC's), Mixer-Preamplifiers, Microwave, Mixers, Monitors, Mounts, Multipliers, Oscillators, Preselector-Mixers, Preselectors, Receivers, Tuners

Local Sales Offices & Reps.

Cal	Los Altos, J. Stone & Assocs.	415-948-4563
Cal	Los Angeles, Fetty-Schodenuve, Inc.	213-651-4050
Colo	Boulder, H. Bass & Assocs.	303-499-7509
Fla	Fort Lauderdale, Snow Co.	305-563-2448
Ga	Chamblee, E.G. Holmes & Assocs.	404-451-6161
Ill	Northfield, Feller Assocs.	312-446-8065
Kans	Shawnee Mission, Tech. Sls. Assocs.	913-888-3330
Md	Ellicott City, Doss Elctrns., Inc.	301-465-1336
Mass	Natick, Wayland Engrg Sls	617-655-6080
Mo	St. Louis, Tech. Sls. Assocs.	314-725-5361
NM	Albuquerque, Trembly Assocs.	505-293-4444
NY	Jericho, Dal-tech Devices Inc.	516-433-7448
NY	Syracuse, Syracuse Tech Reps	315-488-0222
Pa	Elkins Park, Snow Assocs.	215-379-4700
Tex	Richardson, Lear Assocs.	214-231-5388
Wash	Seattle, Delcom Sls. Co.	206-248-0090

AETNA ENGRG., 3249 Overland Ave., Los Angeles, Cal., 90034, Tel: 213-836-4016; Empl.: 10

Customer service: T. A. Zimmerman

Products manufactured: Services, Assembly, Production & Test

AFI INDUSTRIES INC., 400 Warburton Pl., Long Branch, N.J., 07740, Tel: 201-229-8300

Products manufactured: Circuits, Hybrid, Thick Film, Multipliers, Rectifiers

AGASTAT DIV., See Control Prods. Div. Amerace Esna

AGFA-GEVAERT, INC., 275 North St., Teterboro, N.J., 07608, Tel: 201-288-4100, TWX: 710-990-6137; Empl.: 750; Minimum order: $100

Customer service: E. Haggerty Ext. 211

Products manufactured: Films, Lenses, Optical & Camera, Paper, Graphic Recording, Tapes, Recording, Magnetic (All Types)

Local Sales Offices & Reps.

Cal	Brisbane, AGFA-GEVAERT, Inc.	415-467-2330
Cal	Glendale, AGFA-GEVAERT, Inc.	213-246-8141
Ga	Atlanta, AGFA-GEVARET, Inc.	404-355-7450
Ill	Chicago, AGFA-GEVAERT, Inc.	312-267-9100
Mass	Waltham, AGFA-GAVAERT, Inc.	617-890-5430
NY	New York, AGFA-GEVAERT, Inc.	212-685-6641
Tex	Dallas, AGFA-GEVAERT, Inc.	214-631-7290

AGNEW-HIGGINS, INC., Box 15423, Santa Ana, Cal., 92705, Tel: 714-893-1301; Empl.: 45

For info on price: A. Urabe; Application info: H. Wildermuth; Customer service: A. Urabe; Delivery info: T. Cobb

Free literature available: Catalog WS 773: comprehensive 12-page summary of clean work stations & clean fume hoods offered with selection guide which explains the effectiveness of the laminar flow principle.

Products manufactured: Air Cleaners & Filters (Shielded & Unshielded), Blowers & Fans & Accessories

Local Sales Offices & Reps.

Cal	Los Angeles, Weightman Assocs.	213-645-6060
Cal	San Francisco, Howard & Co.	415-589-3050
Colo	Denver, Vinson Assocs., Inc.	303-757-5151
Fla	Winter Haven, W.K. Ousley, Inc.	813-294-6441
Ga	Atlanta, Spillane & Assocs.	404-252-5145
Md	Silver Spring, Normco Assocs.	301-567-6569
Mass	Norwood, S. Pierce, Inc.	617-762-3164
NM	Albuquerque, Vinson Assocs., Inc.	505-265-5891
NY	Rochester, T. Ferguson Sls. Inc.	
Ohio	Dayton, H. Noyes & Assocs.	513-274-2871
Tex	San Antonio, Alchem Assocs.	512-434-7596

Advertisment

CLEAN AIR TO WORK IN - From the manufacturers of the world's first laminar flow clean rooms. Laminar/-Flow Clean Work Stations - Modular sizes: tabletop models, floor models, downflow fume hoods, with a full range of accessories: stainless steel counter tops, filter service gauges, etc. Blower-Filter Modules for converting existing rooms into CLEAN rooms. Blower-Filter stand units for converting existing work stations into CLEAN work stations. Free factory consultation on your clean room needs. All equipment guaranteed in writing to meet Fed. Std. 209.

AIKEN INDUSTRIES, 200 Park Ave., New York, N.Y., 10017, Tel: 301-475-8961; Empl.: 50; Minimum order: $50

For info on price: P. R. Hanback; Application info: W. P. Riendeau; Customer service: P. R. Hanback; Delivery info: F. Clark

Products manufactured: Circuit Breakers, Protectors

Local Sales Offices & Reps.

Cal	Oakland, Richard B. Peters Co.	415-835-5135
Cal	Panorama City, C. E. Yost	213-781-8966
Cal	Pasadena, T. W. Yeakle	213-684-2275
Ill	Barrington, Perhats Assocs.	312-381-6380
Mich	Southfield, Eynon-Weyand Assocs.	313-354-3430
Ohio	Cleveland, Rockford Controls Ohio	216-731-5250
Ohio	Dayton, Rockford Controls Ohio	513-278-7362
Pa	Jenkintown, Arnold Assocs.	215-742-0600
Pa	Monroeville, Rockford Controls Ohio	412-373-3531
Wash	Bellevue, Pacific Consultants	206-454-2504
FOR:	Can., Montreal, Que., Major Sls. Dists.	514-844-1720

AIKEN INDUSTRIES, INC., Communications & Electronics Div., 9125 Gaither Rd., Gaithersburg, Md., 20760, Tel: 301-948-5210, TWX: 710-828-9706; Empl.: 220; Minimum order: $100

Customer service: Mktg. Dept.

Free literature available: Trade magazines

Products manufactured: Amplifiers, Antenna Switching Matrices, Comm. Systems, Counters, Dividers, Meters, Receivers, Switches, Tuners

Local Sales Offices & Reps.

Cal	Santa Clara	408-244-8852

AIL, Comac Road, Deer Park, N.Y., 11729, Tel: 516-595-3094, TWX: 510-227-6073; Empl.: 3100

Customer service: R. H. Frechen

Products manufactured: Amplifiers, Analyzers, Detectors, Diplexers, Antenna, Equalizers, Filters, Radar Systems, Radiometers, Receivers, Simulators

Local Sales Offices & Reps.

Cal	Los Angeles, D.O. Ness	213-641-1322
Ohio	Dayton, A.P. Vogel	513-254-3511
Va	Arlington, S. Collin	703-521-3300

AILTECH, 815 Broad Hollow Rd., Farmingdale, N. Y., 11735, Tel: 516-595-6471, TWX: 510-224-6558; Empl.: 200

Products manufactured: Amplifiers, Analyzers, Attenuators, Calibrators, Cavities, Microwave; Converters, Diodes, Gages, Generators, Insertion Loss Measurement Systems, Meters, Mixer-Preamplifiers, Microwave, Mixers, Oscillators, Preselectors, Receivers, Standards, Testers, Transducers, Transmitters

Local Sales Offices & Reps.

Ala	Huntsville, Beacon Electronics	205-881-5031
Ariz	Scottsdale, Inter-Mountain Engrg. Co.	602-947-7379
Cal	La Jolla, Ward/Davis Assoc.	714-459-3351
Cal	Lawndale, Ward/Davis Assoc.	213-542-7740
Cal	Los Angeles, Ailtech, West Coast Oper.	213-965-4911
Cal	Sunnyvale, Ward/Davis Assoc.	408-245-4392
Colo	Boulder, Herb Bass Assoc.	303-499-7509
Fla	Maitland, Beacon Elctrns.	305-647-3498
Fla	Palm Beach Gardens, Beacon Elctrns.	305-622-2770
Ga	Atlanta, Ailtech	404-939-2016
Ill	Chicago, K. Meyers Co.	312-774-6440
Ind	Indianapolis, K. Meyers Co.	317-243-6681
Kans	Shawnee Mission, EIR Co.	913-362-0919
Mass	Burlington, R.J. Sickles Assocs.	617-272-7285
Mich	Detroit, Micro Sls. Corp.	313-482-1229
Minn	Minneapolis, K. Meyers Co.	612-920-7080
Mo	Hazelwood, EIR Co.	314-895-4100
NJ	Palasades Park, Scientific Dev. East	201-945-3962
NM	Albuquerque, Inter-Mountain Engrg. Co.	505-344-2212
NY	East Syracuse, Ossmann Instrs.	315-437-6666
NY	Rochester, Ossmann Instrs.	716-328-2230
Ohio	Dayton, Micro Sls. Corp.	513-885-4171
Ohio	Medina, Micro Sls. Corp.	216-725-4568
Ore	Lake Oswego, Hudson Assoc.	503-227-4916
Pa	Ambler, W & M Assocs.	215-643-4119
SC	Spartanburg, Beacon Elctrns.	803-582-4613
Tex	Houston, Scientific Dev.	713-623-4250
Tex	Richardson, Scientific Dev.	214-231-8106
Tex	San Antonio, Scientific Dev.	512-694-6251
Va	Alexandria, Dyna Rep Co.	703-354-1222
Wash	Bellevue, Hudson Assoc.	206-455-0773
Wash	Seattle, Drake Assoc.	206-763-2755
FOR:	Can., Brampton Ont., Baytronix, Ltd.	416-453-1252
FOR:	Can., Montreal, Quebec, Baytronix Ltd.	514-342-4281
FOR:	Can., Ottawa, Ontario, Baytronix Ltd.	613-728-0113
FOR:	Can., Vancouver, B.C., National Electrolab Ltd.	604-879-9161

AILTECH, 19535 E. Walnut Dr., City of Industry, Cal., 91748, Tel: 213-965-4911; Minimum order: $25

For info on price: B. Philp Ext. 256; Application info: T. D. Eccles Ext. 226; Customer service: B. Philp Ext. 256; Delivery info: B. Philp Ext. 256

Products manufactured: Amplifiers, Analyzers, Gages, Generators, Meters, Oscillators, Preselector-Mixers, Preselectors, Transducers

Local Sales Offices & Reps.

Ala	Huntsville, Beacon	205-881-5031
Ariz	Scottsdale, I.M.E.C.	602-947-7379
Cal	City of Industry	213-965-4911
Cal	San Fran., Ailtech	415-321-2533
Colo	Boulder, Herb Bass Assoc.	303-499-7509
Conn	Hamden, Scientific Devices	203-248-9361
Ga	Atlantic, Beacon	404-351-3654
Ill	Chicago, K. W. Meyers	312-774-6440
Kans	Shawnee Mission, E.I.R. Co.	913-362-0919
Mass	Burlington, R. J. Sickles Assoc.	617-272-7285
NM	Albququerque, I.M.E.C.	505-883-9010
NY	E. Syracuse, Ossmann Instrs.	315-437-6666
NY	Farmingdale, L.I.	516-595-7541
Ohio	Centerville, Micro Sales Corp.	513-885-4171
Pa	Ambler, W & M Assoc.	215-643-4119
Tex	Richardson, Scientific Dev.	214-231-8106
Wash	Seattle, R. S. Drake Assoc.	206-763-2755

AIMSCO INC., 2110 W. Ruffnes St., Seattle, Wash., 98199, Tel: 206-284-5563, TWX: 910-444-1333; Empl.: 25; Minimum order: $10

Customer service: C. Ernst

Free literature available: 832 page fastener guidebook catalog.

Products manufactured: Bushings, Glass, Plastic, Metal, Rubber, Etc., Eyelets, Fasteners, Grommets, Handles For Cabinets, Circuit Boards, Racks, etc., Locks, Dial & Shaft

Local Sales Offices & Reps.

Cal	Oakland	415-836-2405
Colo	Denver	303-892-6650
Ore	Portland	503-223-4377
Utah	Salt Lake City	801-364-0120
Wash	Seattle	206-284-5563

AIPHONE USA, 2116 N. Pacific Ave., Seattle, Wash., 98103, Tel: 206-634-3040, Telex: 32-0288; Empl.: 6

Products manufactured: Comm. Systems

Local Sales Offices & Reps.

Cal	N. Hollywood, Basset & Moore, Inc.	213-877-7129
Cal	Oakland, H. Gabriel Sls.	415-465-5361
Colo	Denver, McLoud & Raymond Co.	303-756-1589
Fla	Maitland, Hutto-Hawkins-Pergoy, Inc.	305-831-2474
Ga	Atlanta, H. W. Phillips Co.	404-237-7564
Ill	Chicago, G. Duvall Co.	312-774-5115
Ind	Mulberry, Maish Sls.	317-296-2322
Mass	Needham, Piper Assocs.	617-449-1144
Mich	Detroit, Burcaw Co. & Assoc.	313-533-7700
Minn	Minneapolis, J. E. M. Anderson Co.	612-823-6459
Mo	Kansas City, K.S.W. Assocs.	816-358-5240
NY	Flushing, Bettan Sls.	212-591-7600
NY	Liverpool, Lewis-Dunnigan Co.	315-622-2133
Ohio	Columbus, Mandabach & Assocs.	614-235-0265
Pa	Levittown, Sher Sls. Co.	215-946-6200
Tex	Dallas, Miller & Assocs.	214-661-5002
Wash	Seattle, R. Merritt Co.	206-682-7337

AIR-O-TRONICS PRODS., Box K, Morrisville, N.Y., 13408, Tel: 315-684-3705; Empl.: 10; Minimum order: $10

Customer service: S. F. Trush

Free literature available: Solid State Timer Catalog & Flexcon Single Contact Flexible Test Connector Flyer

Products manufactured: Connector Adapters, Connectors, Controls/Control Eqpt., Leads, Test & Adaptors, Plug Adapters, Probes, Relays, Socket Adapters, Soldering Accessories, Timers

Local Sales Offices & Reps.

Cal	Los Angeles, W. S. Harmon Co.
Ill	Chicago, Electro-Kinetics

AIR PRODS. & CHEMS., INC., Box 538, Allentown, Pa., 18105, Tel: 215-395-4911, TWX: 510-651-3686; Empl.: 13000

Products manufactured: Chemicals, Coatings, Controls/Control Eqpt., Etchants, Printed Circuit, Plastic Raw Materials, Liquids, Pellets, Powders, Resins, Services, Assembly, Production & Test, Torches, Soldering, Welding & Access.

Local Sales Offices & Reps.

Ala	Birmingham	205-870-5603
Ala	Dothan	205-794-5422
Ala	Mobile	205-433-6513
Ala	Muscle Shoals	205-381-0542
Ark	Little Rock	501-375-1256
Cal	Long Beach	213-830-5200
Cal	Mountain View	415-961-4560
Conn	Glastonbury	203-633-6485
Fla	Dania	305-920-2085
Fla	Jacksonville	904-786-2662
Fla	Panama City	904-763-1672
Fla	Pensacola	904-432-1406
Fla	Tallahassee	904-222-3015
Fla	Tampa	813-621-2477
Ga	Albany	912-432-0538
Ga	Chamblee	404-451-2712
Ga	Columbus	404-323-1349
Ill	Granite City	618-452-8100
Ill	Hillside	312-449-5850
Ind	Shelbyville	317-392-1731
Ind	South Bend	219-288-4941
Iowa	Cedar Rapids	319-366-7371
Iowa	Des Moines	515-243-8131
Iowa	Fort Dodge	515-576-7159
Iowa	Sioux City	712-252-4466
Ky	Louisville	502-451-6340
Ky	Paducah	502-443-4589
La	New Orleans	504-254-1590
Md	Baltimore	301-477-2882
Md	Hyattsville	301-864-2345
Md	Salisbury	301-742-3800
Mass	Framingham	617-879-4810
Mich	Detroit	313-893-7420
Minn	Shakopee	612-445-4610
Miss	Clarksdale	601-624-2547
Miss	Greenwood	601-453-5421
Miss	Jackson	601-366-1433
Miss	Tupelo	601-842-5138
Mo	Kansas City	816-421-5495
Mo	St. Louis	
Neb	Grand Island	308-382-1695
Neb	Lincoln	402-464-3191
Neb	Omaha	402-341-5500
NJ	Camden	609-365-4500
NJ	Iselin	201-548-4600
NJ	Menlo Park	201-548-4600
NY	Rochester	716-436-7780
NC	Asheville	704-254-0958
NC	Charlotte	704-523-9421
NC	Greensboro	919-299-1361
NC	Raleigh	919-828-4462
Ohio	Cleveland	216-781-2800
Ohio	Middletown	513-424-1281
Okla	Oklahoma City	405-232-3456
Okla	Tulsa	918-627-2266
Pa	Creighton	412-226-1511
Pa	Hometown	717-467-2981
Pa	York	717-848-1407
SD	Rapid City	605-342-4490
Tenn	Chattanooga	615-265-1019
Tenn	Kingsport	615-247-7193
Tenn	Knoxville	615-522-5153
Tenn	Memphis	901-947-1141
Tex	Arlington	817-265-5185
Tex	Houston	713-869-7507
Va	Hampton	804-826-5430
Va	Richmond	804-358-4913
Va	Roanoke	703-343-3683
WVa	Parkersburg	304-485-1691
Wisc	Milwaukee	414-494-8785

AIR QUIP-ROBLEYCO, Box 1118, Richardson, Tex., 75080, Tel: 214-234-3285; FSC No: 53507; Empl.: 7

For info on price: D. Roberts; Application info: F. Roberts; Customer service: B. Wessley; Delivery info: D. Roberts

Free literature available: Technical data sheet showing styles, sizes, colors, tolerances and dimensional outline drawings. Sample kit available on request.

Products manufactured: Pullers

Local Sales Offices & Reps.

Ariz	Phoenix, Arrowhead Sales Co.	602-277-7148
Cal	Hawthorne, Emperor Sales	213-679-4080
Cal	Woodland Hills, Cal-Ward Sales	213-883-2202
Colo	Arvada, Arrowhead Sales	303-423-5556
Fla	Tampa, S. K. Wallace Assoc.	813-961-1037
Ga	Jonesboro, S. K. Wallace Assoc.	404-471-6297
Ill	Elk Grove Village, Midwest Meridan Corp.	312-437-6531
Iowa	Cedar Rapids, Midwest Meridan Corp.	319-365-6561
Mass	Wellesley, R. P. Mahan Co.	617-237-1040
Mich	Grand Rapids, Midwest Meridan Corp.	616-949-7798
Mo	St. Louis, Midwest Meridan Corp.	314-878-4441
NJ	Redbank, H.J. Sundermeyer	201-842-0726
NC	Greensboro, S. K. Wallace Assoc.	909-292-0487
Ohio	Dayton, Midwest-Meridan Corp.	513-276-4137
Tenn	Memphis, S. K. Wallace Assoc.	901-682-2281
Tex	Richardson, Robleyco	214-234-3285
FOR:	Can., Toronto, Ont., J-Tronics	416-429-6324

AIR-VAC ENGRG. CO., 100 Gulf St., Milford, Conn., 06460, Tel: 203-874-2541; Empl.: 30; Minimum order: $10

For info on price: M. Sullivan; Application info: L. Vacca; Customer service: C. Lasto; Delivery info: M. Sullivan

Free literature available: Vacuum Handling of small parts; vacuum removal and reflow removal of multi-lead components from P.C.B.; Air operated vacuum pumps capable of 29.7" Hg.

Products manufactured: Pumps, Vacuum, Soldering Accessories, Soldering Equipment, Soldering Guns, Irons & Desoldering Tools, Tools, Tweezers, Hand & Vacuum

Local Sales Offices & Reps.

Cal	Alameda, WILNAT Co.	415-483-9629
Cal	Northridge, P. Dooley Co.	213-360-2231
Conn	Guilford, The Ober Co.	203-453-4361
Fla	Miami, Ludlum Assocs.	305-885-2514
Ga	Roswell, Electro Rep Assocs.	404-993-1332
Ill	Downers Grove, The Tipler Corp.	312-969-4343
Mich	Detroit, E & E Engrg., Inc.	
Minn	Minneapolis, Air Engrg. & Supply	
Mo	Kansas City, Burke Sls. Co.	816-842-5511
NH	Spofford, Bahr Sls. Co.	603-352-5444
NJ	Hohokus, D.J. Fisher Co. Inc.	201-652-0090
NM	Albuquerque, TOLTEC Corp.	505-268-4366
NY	Syracuse, Mr. J. V. Costello	315-472-0322
NC	Charlotte, Electro Rep Assocs.	704-527-2530
Ohio	Medina, McShane	216-725-4568
Tex	Dallas, PESO	214-369-3181

Wash	Seattle, Vandy	206-789-3300
Wisc	Brookfield, D. R. Manecke Co.	414-782-2525
EXP:	Hallandale, Florida, EMEC, Inc.	305-925-6366
FOR:	Can., Toronto, Ontario, Willer Engrg. Ltd.	416-783-3373

AIRBORN, INC., 4321 Airborn Dr., Addison, Tex., 75001, Tel: 214-233-2000; FSC No: 10400; QPL No: Multiple; Empl.: 150; Minimum order: $15 ....p. 2•452-455

For info on price: Order Desk; Application info: Appl. Desk; Customer service: Order Desk; Delivery info: Order Desk

Products manufactured: Connectors, Contacts, Electrical

Local Sales Offices & Reps.

Cal	Los Angeles, Air Born	213-670-7983
Cal	Sunnyvale, Cutlass Elctrns. N.	408-733-5885
Fla	Satellite Beach, Reynolds & Assoc.	305-773-4700
Ga	Atlanta, Reynolds & Assocs.	404-252-5360
NJ	Denville, Grimm, Siegel Assocs., Inc.	201-625-1900
NY	E. Northport, Airborn	516-757-6534
NC	Charlotte, Reynolds & Assocs.	704-527-2536
Wash	Bellevue, B. Waddell	206-822-0211

AIR BORNE CONTROLS, 9939 Glenoaks Blvd., Sun Valley, Cal, 91352

AIRCO INDUSTRIAL GASES, 575 Mountain Ave., Murray Hill, N.J., 07974, Tel: 201-464-8100, TWX: 710-984-7992

Products manufactured: Analyzers, Controls/Control Eqpt., Gages

Local Sales Offices & Reps.

Ariz	Phoenix	602-273-1255
Cal	City of Industry	213-338-5566
Cal	San Leandro	415-483-8560
Conn	New Haven	203-777-4436
Ga	Atlanta	404-351-2850
Ill	Broadview	312-681-8950
Ill	East Alton	618-462-6857
Kans	Lawrence	913-843-1404
La	Metairie	504-887-8596
Mass	South Acton	617-263-7767
Mich	Southfield	313-355-9494
Mich	Southfield	313-355-9494
Minn	St. Paul	612-645-6431
NY	Albany	518-489-3719
NY	Buffalo	716-852-4702
Ohio	Cleveland	216-842-9330
Pa	King of Prussia	215-265-3900
Pa	Pittsburgh	412-562-3700
Wash	Seattle	206-762-7251
Wash	Vancouver	206-695-1255

AIRCO ELCTRNS., Resistor Plant, Bolivar Rd., Box 547, Bradford, Pa., 16701, Tel: 814-362-5536, TWX: 510-695-5921; Empl.: 1000 .... p. 2•368,369,1408,1409

Customer service: R. Butler

Products manufactured: Capacitors, Fixed, Coils Including Assemblies & Forms, Resistors

Local Sales Offices & Reps.

Ala	Huntsville, CSC	205-883-7794
Ariz	Scottsdale, Mercury Eng. Sales	602-945-1927
Cal	El Segundo, Varigon	213-644-3611
Cal	Santa Ana, Dave Tevis Elctrns.	714-558-0268
Cal	Sunnyvale, Quad Rep	408-733-7300
Colo	Boulder, R. G. Enterprises	303-447-9211
Conn	Newton, Gerber Sls.	203-426-3440
Fla	Terra Ceia, CSC	813-360-7460
Ill	Chicago, C. L. Greenslade Sls.	312-561-0156
Ind	Ft. Wayne, J. Kilfoil Co.	219-749-0113
Kans	Shawnee Mission, Mid-America Electronics Mkt.	913-236-4800
Mass	Waltham, Gerber Sales	617-890-8040
Mich	Troy, C. B. Jensen & Assoc.	313-643-0506
Minn	Hopkins, Grayden & Flemmer	612-941-1120
NM	Albuquerque, A. Q. Electronics	505-255-8701
NY	Fayetteville, R. W. Jackson Co.	315-637-3851
NY	Floral Park, MOS Assocs.	516-694-5923
NC	Sanford, CSC	919-832-1897
Ohio	Cincinnati, J. Kilfoil Co.	513-791-6150
Ohio	Cleveland, Perry Lohse & Co.	216-381-4424
Okla	Tulsa, Vista Assoc.	918-627-7557
Pa	Fairview Village, R. Hilderbrand	215-247-6225
Tex	Richardson, Vista Assoc.	214-235-4547
Wash	Seattle, H. S. Thorpe Co.	206-784-3333

AIRCO ELCTRNS., Div. Airco, Inc., Grand Plaza, 945 Grand Ave., Nogales, Ariz., 85621; Tel: 602-287-5851, TWX: 910-973-9794; Empl.: 1000
p. 2•368,369,1408,1409

Products manufactured: Chokes, Coils Including Assemblies & Forms

Refer to Airco Elctrns., Bradford, Pa. for Sales Office information.

AIRCO ELCTRNS., Special Comps. Oper., Packard Rd. at 47th, Niagara Falls, N.Y., 14302, Tel: 716-285-6971, TWX: 710-524-1653; Empl.: 1000
p. 2•368,369,1408,1409

Customer service: E. Westgren

Products manufactured: Networks, Resistors

Refer to Airco Elctrns., Bradford, Pa. for Sales Office Information.

AIRCOM, INC., Rte. 16B, Union, N.H., 03887, Tel: 603-473-2323; Empl.: 10

Free literature available: Catalog E Shows our complete line of catalog passive waveguide components covering the frequency range from 1-90 GHz.

Products manufactured: Adapters, Waveguide, Antennas, Attenuators, Bends & Twists, Microwave, Cavities, Microwave, Couplers, Delay Lines, Detectors, Dividers, Dummy Loads, Filters, Generators, Horns, Microwave, Impedance Converters, Microwave, Junctions, Hybrid, Microwave, Line Strechers, Microwave, Mismatches, Microwave, Precision, Mixers, Mounts, Oscillators, Probes, Shifters, Sliding Loads, Microwave, Slotted Lines, Microwave, Switches, Tees, Terminals, Transmitters, Tuners, Waveguides & Adapters

AIRCRAFT & ELEX SPCLTYS, Box 126, Plainfield, Ind, 46168, Tel: 317-839-2551; FSC No: 00529; Empl.: 150; Minimum order: $15

For info on price: C. W. Martin; Application info: C. Selby; Customer service: C. R. Johnson; Delivery info: C. R. Johnson

Products manufactured: Braid, Cable, Cable Assemblies & Harnesses, Cable, Lead Assemblies & Receptacles, Wire, Wire Shielding

AIRCRAFT APPLIANCES EQPT, 152 E Dr., Brmalea, Ont, Can., Tel: 416-459-0920, TWX: 610-492-4396; Empl.: 250

Customer service: A. R. Doe Ext 234

Products manufactured: Alternators, Generators, Motors, Tachometers

AIRFLYTE ELCTRNS. CO., Box 207, Bayonne, N.J., 07002, Tel: 201-436-2230, TWX: 710-729-4489; Empl.: 60; Minimum order: $25 .... p. 1•932,933

For info on price: J. Piret; Application info: J. Piret; Customer service: D. O'Brien; Delivery info: D. O'Brien

Products manufactured: Brushes & Brush Assemblies, Commutators, Contact Strips, Finger, Contacts, Electrical, Counters, Encoders, Generators, Indicators, Services, Assembly, Production & Test, Slip-Rings & Assemblies, Switches, Terminal Blocks, Boards & Strips, Timers

Local Sales Offices & Reps.

Ariz	Phoenix, N. G. Ganem Co.	602-945-0839
Cal	Pasadena, RDX Corp.	213-681-3451
Cal	Sunnyvale, RDX Corp.	408-734-4500
Conn	No. Haven, Kitchen & Kutchin	203-239-0212
Fla	Miami Bch., Geartner Assocs.	305-861-3661
Fla	Orlando, Geartner Assocs.	305-299-1000
Ill	Park Ridge, RF Specialists	312-698-2044
Ind	Ft. Wayne, R. F. Specialists	219-485-8982
Kans	Prairie Village, R. G. Sls.	913-381-8812
Md	Baltimore, R.P. Luce & Co.	301-752-8200
Mass	Lexington, Kitchen & Kutchin	617-862-8230
NJ	Clifton, Avionics Equip., Inc.	201-772-1956
NY	Rochester, R.P. Kennedy Co.	716-271-6322
Pa	Philadelphia, R.P. Luce & Co.	215-884-8365
Tex	Dallas, Jacobson Co.	214-363-7584
FOR:	Can., Rexdale, Ont., F. Eakin Ltd.	416-638-0451

AIRMATIC/BECKETT-HARCUM, 185 Park Dr., Wilmington, Ohio, 45177, Tel: 513-382-1691; Empl.: 89; Minimum order: $20

Customer service: N. E. Holder

Products manufactured: Air Cleaners & Filters (Shielded & Unshielded), Controls/Control Eqpt., Couplings, Drills & Accessories, Hand & Power, Gages, Switches, Tubing, Valves, Solenoid

AIRPAX ELCTRNS., INC., Cambridge Div., Woods Rd., Cambridge, Md., 21613, Tel: 301-228-4600, TWX: 710-865-9655; Empl.: 550

For info on price: Sales Off; Application info: Sales Off; Customer service: L. Slaughter

Products manufactured: Choppers, Circuit Breakers, Limiters, Protectors, Seals, Switches

Local Sales Offices & Reps.

Ariz	Phoenix, Gramer & Company	602-279-1231
Cal	Mt. View, Airpax Elctrns., Inc.	415-965-0355
Cal	Pico Rivero, Westrep	213-949-2551
Fla	Fern Park, M.G. Assoc.	305-841-8793
Ind	Indianapolis, A.D. Moore Co.	317-291-6550
Iowa	Cedar Rapids, Reid Assocs., Inc.	319-362-6302
La	Bossier City, Deeco Controls	318-746-2141
Md	Silver Spring, Rep-Tron Inc.	301-593-4844
Mass	Wellesley Hills, Airpax Elctrns., Inc.	617-237-2600
Mich	Southfield, Automatic Controls	313-354-1190
Minn	Hopkins, Fred Peterson Co.	612-941-5400
Mo	St. Louis, Harris-Hanson Co.	314-432-3611
NY	Great Neck, J. Di Blasi Assocs., Inc.	516-482-4040
NY	Syracuse, C.W. Floring	315-478-2149
NC	Winston-Salem, L.G. White	919-725-3612
Ohio	Cleveland, Baehr, Greenleaf & Assoc.	216-221-9030
Ohio	Dayton, C.P. Haskell	513-298-3331
Okla	Tulsa, T.J. Ray Co.	918-627-1515
Pa	Pittsburgh, Friday Engrg. Sls.	412-341-1444
Tex	Dallas, Stevens Sls.	214-350-2476
Tex	Houston, Haltom Co.	713-782-5625
Tex	Odessa, Barnco Co.	915-332-0293
Wash	Seattle, Don Smith Sls.	206-633-3160
Wisc	Wauwatosa, Larsen Assocs.	414-258-0529
FOR:	Can., Port Credit, Ont., Leonard Elec., Ltd.	416-274-3454

AIRPAX ELCTRNS., Controls Div., 6801 W. Sunrise Blvd., Ft. Lauderdale, Fla., 33313, Tel: 305-587-1100, TWX: 510-955-9866; Empl.: 200; Minimum order: $25

For info on price: R. Knabe; Application info: R. Knabe; Customer service: M. Morgan; Delivery info: M. Morgan

Free literature available: General Catalog 0200, Meter Catalog 0200G

Products manufactured: Amplifiers, Converters, Counters, Indicators, Meters, Probes, Relays, Switches, Tachometers, Transducers

Local Sales Offices & Reps.

Cal	Mountain View, Airpax Elctrns.	415-965-0355
Cal	Santa Fe Springs, Sls. Engrs. Ltd.	714-521-8673
Colo	Littleton, Aztec Entprs.	303-795-0250
Fla	Fern Park, M.G. Assocs.	305-841-8793
Ill	Chicago, K-W Assoc.	312-792-2618
Ill	Downers Grove, Richmar Elctrns.	312-968-0118
Ind	Indianapolis, Electro Engrg. & Sls.	317-547-5273
Iowa	Cedar Rapids, Reid Assoc.	319-362-6302
La	Baton Rouge, Process Specialty Co.	504-937-0644
La	Bossier City, Deeco Co.	318-742-0856
Md	Phoenix, Rebco Sls	301-592-8907
Mass	Wellesley Hills, Airpax Elctrns.	617-237-2600
Mich	Southfield, Automatic Controls Co.	313-354-1190
Minn	Minneapolis, E.J. Doyle Co.	612-827-5847
Mo	Kansas City, Harris-Hanson Co.	816-444-9494
Mo	St. Louis, Harris-Hanson Co.	314-432-3611
NJ	Wallington, Comp-Tech Sales	201-935-5454
NM	Albuquerque, Aztec Entprs.	505-255-2440
NY	Buffalo, R.M. Newell Co.	716-632-0662
NY	Great Neck, J. DiBlasi Assocs.	516-482-4040
NY	New Hyde Park, Comp-Tech Sls.	516-593-2628
NY	Syracuse, C.W. Floring & Assoc.	315-478-2149
NC	Charlotte, MacGuire & Crawford Instr. Co.	704-366-3454
Ohio	Cincinnati, J.W. Murray & Assoc.	513-662-1616
Ohio	Medina, T-M-T Ind'l. Controls	216-725-7989
Okla	Tulsa, Lucas Controls	918-749-6491
Pa	Harleysville, T. Jackson & Assocs.	215-643-5560
Pa	Pittsburgh, Friday Engrg. Sls.	412-341-1444
Tenn	Hixson, G. Grant Co.	615-875-4633
Tenn	Memphis, Engineered Instrs.	901-743-3402
Tex	Dallas, Stevens Sls.	214-350-2476
Tex	Houston, Haltom Co.	713-782-5625
Tex	Odessa, Barnco, Inc.	915-332-0293
Va	Roanoke, Process Specialties	703-345-5683
Va	Rockville, Virginia Meter & Controls Co.	804-285-4228
Wash	Bellevue, Southwell Controls Ltd.	206-454-1140
Wisc	Wauwatosa, Larsen Assocs.	414-258-0529

AIRPOT CORP., 27 Lois St., Norwalk, Conn., 06851, Tel: 203-846-2021; Minimum order: $10

For info on price: M.E. Barrelle; Application info: L. Wilcox; Customer service: M. Gaberman; Delivery info: M.E. Barrelle

Free literature available: Bulletins showing applications and performance characteristics as well as selection guide for ordering.

Products manufactured: Dampers, Servo, Delays, Time (Excluding Delay Lines, Timers, Delay & Relays, Time-Delays), Mounts, Shafts & Adapters

AIRTROL CORP., 203 W. Hawick St., Rockton, Ill., 61072, Tel: 815-624-8051; Empl.: 30

For info on price: N. K. Anderson; Application info: N. K. Anderson; Customer service: N. K. Anderson; Delivery info: G. Bauer

Free literature available: General Product Brochure spec sheets on individual product lines subfractional shaded pole motors-booster duct fans blazer and zephyr fans.

Products manufactured: Blowers & Fans & Accessories, Motors

Local Sales Offices & Reps.

Ariz	Phoenix, RDX Corp.	602-267-8162
Cal	Los Angeles, R. Meussdorffer & Assocs.	213-788-0771
Cal	San Diego, J. C. Henberger Co.	714-223-7114
Cal	San Francisco, RDX Corp.	408-734-4500
Conn	, SIR Assocs.	203-268-2560
Fla	Orlando, J. K. Kessler & Assocs.	305-323-9282
Fla	Tampa, J. K. Kessler & Assocs.	813-248-5078
Ill	Chicago, Momak Sls.	312-654-4524
Md	Baltimore, Naudain Assocs.	301-442-2270
Mass	Boston, SIR Assocs.	617-861-9646
Mich	Detroit, C. W. Anderson Assocs.	313-642-1250
Minn	Minneapolis, G. E. Arneson & Co.	612-835-2177
NJ	Camden, Naudain Assocs.	609-235-1801
NJ	Newark, P. H. Werner	201-376-9440
NY	Buffalo, E. E. Harries & Co.	716-671-6365
NY	New York, P. H. Werner	201-376-9440
NY	Syracuse, E. E. Harries & Co.	315-637-9871
Ohio	Dayton, Dynel Co.	513-434-6467
Pa	Philadelphia, Naudain Assocs.	609-235-1801
Tex	Dallas, J. B. Guenther	214-691-8500
Tex	Houston, J. B. Guenther	713-468-0232
Wash	Seattle, D. C. Grover & Assocs.	206-588-1310
Wisc	Milwaukee, B. Colman Co.	414-464-5900

AIRTRON, Div. Litton Inds., 200 E. Hanover Ave., Morris Plains, N.J., 07950, Tel: 201-539-5500, TWX: 710-986-7473; FSC No: 80006; Empl.: 350; Minimum order: $35

For info on price: M. Grosso; Application info: E. Strong; Customer service: N. T. Trojanowski

Products manufactured: Amplifiers, Antenna Feed Systems, Antennas, Attenuators, Chokes, Circulators, Ferrite, Couplers, Crystals, Detectors, Dividers, Dummy Loads, Filters, Flanges, Waveguide, Gaskets, Shielding, R-F-Also See Shields, R-F, Isolators, Junctions, Hybrid, Microwave, Limiters, Mixer-Preamplifiers, Microwave, Mixers, Modulators, All Kinds, Oscillators, Shifters, Shutters, Microwave, Strip-Line Components, Microwave, Switches, Tees, Terminals, Tubing, Tuners, Waveguides & Adapters

Local Sales Offices & Reps.

Ariz	Scottsdale, Carter Assocs.	602-947-4355
Cal	Canoga Park, Microwave Tech. Sls.	13-340-0542
Cal	Redwood City, Parks & Pruitt Assoc.	415-364-1640
DC	Wash D.C., T. Britt Assoc.	202-628-0707
Fla	Pompano Beach, Precision Mktg.	305-971-8270
Kans	Olathe, Bob Rush Assocs.	913-782-1177
Md	Baltimore, Frank Dickison-Airtron	301-823-0923
Mass	Lexington, Zieco, Inc.	617-861-8300
NJ	Cherry Hill, H.J. White Co.	609-428-4544
NJ	Fort Lee, Tech. Mktg.	
NY	Liverpool, R & D Assocs.	315-622-2350
Ohio	Dayton, A. Grimm	513-299-8461
Tex	Richardson, Texport Elctrns.	214-690-4004
Wash	Seattle, D. Smith Sls. Co.	206-633-3160

AITKEN COMMUNICATIONS INC., 701 S 10th St., Taft, Cal, 93268, Tel: 805-765-5403; Empl.: 4

Customer service: K. Aitken

Free literature available: Descriptions of and pictures of the two main products - Broadcast Automation and an Oilfield Control Unit.

Products manufactured: Controls/Control Eqpt.

AJAX MAGNETHERMIC CORP., 1745 Overland Ave., N.E., Warren, Ohio, 44482, Tel: 216-372-2529; Empl.: 450

For info on price: J. K. McLaughlin; Application info: R. Hoeek; Customer service: L. Jones; Delivery info: L. Hielman

Products manufactured: Converters, Furnaces, Generators, Heaters & Heating Elements, Motor Electric Generator Sets, Multipliers

AKG DIV., North American Philips Corp., 100 E. 42nd St., New York, N.Y., 10017; Empl.: 20

For info on price: S. R. Ravich 212-697-3600 Ext. 349; Application info: G. Langoon 212-697-3600 Ext. 595; Customer service: W. Kroesen 212-392-0100; Delivery info: L. Kinigson 212-697-3600 Ext. 410

Products manufactured: Handsets, Chestsets, Headphones, Headsets, Etc., Microphone Accessories (Including Stands, Holders, Booms), Microphones, All Kinds, Transducers

Local Sales Offices & Reps.

Cal	Culver City, Marshank Sls. Co.	213-559-2591
Cal	Walnut Creek, MacPherson Sls. Co.	415-937-1482
Colo	Denver, B & B Elctrn. Prods.	303-934-2123
Conn	Stamford, J. B. Anthony Co.	203-585-2027
Fla	Miami, World Wide Prods.	305-754-5475
Ga	Atlanta, Fidelicom Inc.	404-458-3616
Ill	Chicago, T. Pappas & Assocs.	312-685-2338
Iowa	Des Moines, B.E.A.M.S. Inc.	515-282-0292
Md	Silver Spring, Taub Sls. Inc.	301-622-0300
Mass	Natick, VF Sales Inc.	617-237-6544
Mich	Ferndale, Shalco Inc.	313-547-4771
Minn	Minneapolis, T. B. Allen & Assocs.	612-926-7658
NY	Syracuse, Paston-Hunter Co.	315-437-2992
Ohio	Cleveland, J. B. Parent Co.	216-333-9955
Tex	Houston, Wyborny Sls. Co.	713-772-0961
Wash	Seattle, Earl & Brown Co.	206-284-1121

AKRO-MILS, INC., Box 989, Akron, Ohio, 44309, Tel: 216-253-5593; Minimum order: $25

Customer service: D. Martin

Free literature available: Catalog 7-1 Akro-Mils modular storage cabinets. Describes 10 different drawer sizes available in modular cabinets ranging from 1-1/4"x2-3/4"x5-7/8" up to 16-3/4"x3"x11".

Products manufactured: Bins, Part Storage, Cabinets & Accessories, Containers

AKRON PORCELAIN CO., 2719 Cory Ave., Akron, Ohio, 44314, Tel: 216-745-2159; Empl.: 130

Customer service: R.G. McCann

Free literature available: 1. "Electrical Porcelain" 2. Plastic "Sheet" showing custom molded parts.

Products manufactured: Services, Assembly, Production & Test

ALADDIN ELCTRNS., 701 Murfreesboro Rd., Nashville, Tenn., 37210, Tel: 615-748-3335; Empl.: 250; Minimum order: $110 .... p. 2•1727-1730

For info on price: M. Elliott; Application info: J. Marshall; Customer service: M. Elliott; Delivery info: M. Elliott

Products manufactured: Chokes, Coils Including Assemblies & Forms, Delay Lines, Filters, Transformers

Local Sales Offices & Reps.

Cal	Los Altos, Ewing-Foley	415-941-4525
Cal	So. Pasadena, Aladdin Elctrns.	213-799-7714
Colo	Denver, E. W. Johnson Co.	303-985-4810
Fla	Winter Park, Young & Lawrence Assoc.	305-647-6929
Ill	Chicago, Electro-Comp. Sales	312-763-3636
Ind	Indianapolis, Schroeder & Loomis	317-251-4571
Iowa	Cedar Rapids, Seltec Sales Corp.	319-362-8155
Md	Timonium, Barnhill & Assoc.	301-252-6360
Mass	Needham, Deveer Sls. Engrg.	617-444-4200
Mich	Southfield, Luebbe Sls. Co.	513-357-0355
Minn	Minneapolis, F. B. Hill	612-941-5270
Mo	Kansas City, Automatic General Sls.	816-333-8206
NY	Rochester, R.P. Kennedy Co.	716-271-6322
NC	Raleigh, Barnhill & Assoc.	919-876-7825
Ohio	Cincinnati, Luebbe Sls. Co.	513-871-4211
Ohio	Cleveland, Luebbe Sls. Co.	216-333-0425
Pa	Delmont, Luebbe Sls. Co.	412-468-4019
Tex	Dallas, G. Weinreich & Assoc.	214-321-2800
Va	Lynchburg, Barnhill & Assoc.	703-246-4624

ALAN INDUSTRIES INC., PO Box 1203, Columbus, Ind., 47201, Tel: 812-372-8869; FSC No: 52750; Empl.: 15; Minimum order: $10

For info on price: W. Kennedy; Application info: F. Walker; Customer service: F. Walker; Delivery info: W. Kennedy

Products manufactured: Attenuators, Detectors, Dividers, Dummy Loads, Switches, Terminals

Local Sales Offices & Reps.

Ariz	Tempe, Gassner & Clark	602-968-9037
Cal	Los Altos, Stout-Loeswick, Inc.	415-948-3265
Cal	Santa Ana, California Electronic Mktg.	714-835-2702
Cal	Woodland Hills, California Electronic Mktg.	213-884-7867
Fla	Clearwater, Saber Assocs.	813-441-1301
Fla	Lighthouse Point, Saber Assocs.	305-943-3076
Fla	Longwood, Saber Assocs.	305-241-3351
Ga	Woodstock, Saber Assocs.	404-432-9625
Ill	Chicago, K. W. Meyers Co.	312-774-6440
ind	Indianapolis, K. W. Meyers Co.	317-243-6681
Md	Bethesda, S & S Assocs.	301-654-1434
Mass	Waltham, Scientific Devices-New England	617-894-5637
Minn	Minneapolis, K. W. Meyers co.	612-920-7080
NY	Tuckahoe, Asco Elctrns.	914-779-8110
Pa	King of Prussia, S & S Assocs.	215-265-3450
FOR:	Can., Don Mills, Ont., Tech Assocs.	416-445-7490

ALAUN ENGRG., 515 South Palm, Alhambra, Cal, 91803, Tel: 213-289-2172; Minimum order: $25

Customer service: A. Braun

Products manufactured: CATV Systems & Equipment, Comm. Systems, Connector Adapters, Switches

ALBEROX CORP., New Bedford Ind'l. Pk., New Bedford, Mass., 02745, Tel: 617-995-1725; Empl.: 80; Minimum order: $50 .... p. 2•456

For info on price: H. Mathieu; Application info: A. J. Coutu; Customer service: H. Mathieu; Delivery info: H. Mathieu

Free literature available: Alberox High Voltage Terminal Bushings and Custom Ceramic-to-Metal Seals. Catalog 472.

Products manufactured: Bushings, Glass, Plastic, Metal, Rubber, Etc., Connectors, Feedthrus & Seals, Environmental, Headers, Insulators & Insulation, Seals, Services, Assembly, Production & Test, Terminals

Local Sales Offices & Reps.

Cal	Santa Cruz, K. Lloyd	408-426-3424
Fla	Orlando, Buchanan & Abrams Assoc.	305-898-7444
Ill	Chicago, Weldin Sls. Co.	312-267-4944
Ind	Indianapolis, J. C. Butler	317-253-5143
Mass	Weston, J. Goode Assocs.	617-235-3900
NJ	Haddonfield, Keefe Elctrn. Sls. Co.	609-429-4650
NY	Pompey, S. F. Foster Co.	315-677-3333
NY	Valley Stream, Levison Sls. Co.	516-561-9696

ALCO ELECTRONIC PRODS., INC., 1551 Osgood St., North Andover, Mass., 01845, Tel: 617-685-4371, TWX: 710-342-0552; Empl.: 60

p. 1•1926,1927; p. 2•1076-1078

For info on price: L. Fontaine 686-0126; Application info: T. J. Clark 685-4371; Customer service: G. Sweeney 685-4371; Delivery info: G. Sweeney 685-4371

Free literature available: Alco will supply upon request catalogs or data sheets of any products shown in EEM. All literature is self-descriptive.

Products manufactured: Caps, Lenses, Indicator Light, Controls/Control Eqpt., Counters, Display Devices/Displays, Drivers & Decoders For Readouts, Indicators, Keyboards, Alphanumeric & Decimal, Knobs, Lamps, Lights, Meters, Monitors, Power Supplies, Probes, Relays, Sockets, Switch Mounting Plates, Switches, Terminal Blocks, Boards & Strips, Testers

Local Sales Offices & Reps.

Ariz	Phoenix, W. Bert Knight Co.	602-242-3057
Ark	Little Rock, J.Y. Schoonmaker Co.	501-375-2168
Cal	Daly City, R. Del. Bucchia & Assocs.	415-756-1664
Cal	Newport Beach, W. Bert Knight, Inc.	714-833-8250
Colo	Denver, Camel Elctrns. Inc.	303-757-6191
Conn	Newton, Gerber Sls. Corp.	203-426-3440
Fla	No. Miami Beach, Irby & Connolly, Inc.	305-949-5197
Fla	Orlando, Irby & Connolly, Inc.	305-894-8471
Ill	Glen Ellyn, Rockford Controls Co.	312-469-6016
Ind	Greenwood, Valontino-Schillinger E. Assoc.	317-888-2260
Ind	South Bend, Valontino-Schillinger E. Assoc.	219-219-6258
Iowa	Marion, Thomas & Modrcin Assoc.	319-377-6261

Kans	Shawnee Mission, Thomas & Modrcin Assoc.	913-432-2131
Md	Towson, Habco Elctrns.	301-825-9637
Mass	E. Longmeadow, Gerber Sls. Corp.	413-525-3059
Mass	Waltham, Gerber Sls. Corp.	617-890-8040
Mich	Southfield, Champagne Sls. Co.	313-354-0270
Minn	St. Paul, Countryman Assocs.	612-645-9151
Mo	Hazelwood, Thomas & Modrcin Assoc.	314-895-4700
NJ	Keasbey, Addem II	516-567-5900
NY	Dewitt, Tri-Tech Elctrns.	315-446-2881
NY	E. Rochester, Tri-Tech Elctrns.	716-381-2722
NY	Huntington Station, Addem I	516-567-5900
NY	Larchmont, Tri-Tech Elctrns.	914-834-4423
Ohio	Cincinnati, Luebbe Sales Co.	513-871-4211
Ohio	Cleveland, Luebbe Sales Co.	216-333-0425
Ohio	Dayton, Luebbe Sales Co.	513-294-0426
Okla	Tulsa, J.Y. Schoonmaker Co.	918-936-1423
Pa	Feasterville, PSA Inc.	215-355-6244
Pa	Pittsburgh, Trymax Co.	412-823-8400
Tex	Dallas, J.Y. Schoonmaker Co.	214-357-8481
Tex	Houston, J.Y. Schoonmaker Co.	713-926-9510
Utah	Salt Lake City, Camel Elctrns. Inc.	801-355-6181
Va	Lynchburg, Habco Elctrns.	804-384-5236
Wash	Seattle, D. Smith Sls. Co.	206-633-3160
FOR:	Can., Montreal, Que., Canadian Gen. Elec.	514-733-9911
FOR:	Can., Toronto, Ont., Canadian Gen. Elec.	416-537-4481

Local Distributors

Ala	Huntsville, Mock Elctrns., 2310 Memorial Pky. S.	205-539-2401
Cal	Burbank, Woods Co., 2012 Burbank Blvd.	213-849-3211
Cal	Hayward, Dunlap Elctrns., Box 3607	415-783-9260
Cal	Inglewood, Cal. Switch & Signal, 1009 Arbor Vitae	213-776-3550
Cal	Los Angeles, Cal. Elctrns. Supp., 1911 Armacost W.	213-477-8561
Cal	Los Angeles, Elec. Switch, 2478 Fletcher Dr.	213-664-1141
Cal	Mountain View, Abacus Elctrns. Co., 1065 Terra Bella Ave.	415-961-1500
Cal	Oakland, Brill Elctrns., 610 E. 10th St.	415-834-5888
Cal	Palo Alto, Zack Elctrns., 654 High St.	415-326-5432
Cal	Riverside, Elctrn. Supp., 2846 Third	714-787-9220
Cal	Sunnyvale, Acacia Sls., 384 San Aleso	408-735-0100
Cal	Sunnyvale, Cramer/San Francisco, 720 Palomar Ave.	408-739-3011
Fla	Miami, Elctrn. Equip., 2701 N.W. 42nd Ave.	305-871-3500
Fla	Tampa, Lykes Elctrn., 5426 W. Crenshaw	813-229-1885
Ill	Chicago, Newark Elctrns., 500 N. Pulaski Rd.	312-638-4411
Ill	Rosemont, Advent Elctrns., 7110 N. Lyndon Ave.	312-298-4210
Kans	Wichita, Interstate Elctrns., 1330 E. First St.	316-264-6317
Md	Gaithersburg, Pioneer Washington, 9100 Gaither Rd.	301-948-0710
Mass	Bellingham, Dowiak Assocs., 356 Hartford Ave.	617-966-0404
Mass	Burlington, Wilshire Elctrns. N/E, One Wilshire Rd.	617-272-8200
Mass	Framingham, Future Elctrns., 225 Worcester Rd.	617-879-0860
Mass	Lynn, Land Elctrns., 9 Rear Franklin St.	617-592-2220
Mass	Newton, Cramer Elctrns., 85 Wells Ave.	617-969-7700
Mich	Ann Arbor, Advent, 254 S. Wagner Rd.	313-769-8650
Mich	Farmington, Harvey/Michigan, 23461 Ind'l. Pk. Dr.	313-477-1650
Minn	St. Paul, Ragon, 1136 W. Larpenteur St.	612-488-0201
Mo	St. Louis, Olive Elctrn. Supp., 6662 Olive Blvd.	314-863-7800
NJ	Haddonfield, Mid Atlantic Elctrns., 140 Haddon Ave.	609-428-8288
NY	Binghamton, Harvey/Federal Elctrns., Vestal Pky.	607-748-8211
NY	Buffalo, Summit Dist., 916 Main St.	716-884-3450
NY	Farmingdale, Arrow Elctrns., 900 Broad Hollow Rd.	516-694-6800
NY	Hempstead, Elctrn. Equip., 741 Peninsula Blvd.	516-538-5510
NY	Lynbrook, Peerless Radio, 19 Wilbur St.	516-593-2121
Ohio	Columbus, Hughes-Peters, 481 E. 11th Ave.	614-294-5351
Ohio	Dayton, Stotts-Friedman Co., 108 N. Jefferson St.	513-224-1111
Pa	Cornwells Heights, Reliance Merchandizing, 195 Ind'l. Pk.	215-638-8200
Pa	Philadelphia, Almo Elctrns., 9815 Roosevelt Blvd.	215-676-6000
Pa	Pittsburgh, Cameradio, 2801 Liberty	412-391-7400
Tenn	Knoxville, Ind'l. Elctrns., Governor Sevier Hywy.	615-573-7135
Tex	Dallas, All State, 510 S. Good Latimer Expwy.	214-651-0242
Tex	Houston, Lenert Co., 1420 Hutchins St.	713-225-1465
Utah	Salt Lake City, W.H. Bintz Co., 433 W. 3rd South	801-363-5821
Va	Arlington, Arlington Elctrns., 3636 Lee Highway	703-524-2412
Wisc	Milwaukee, Marsh Elctrns., 6047 Beloit Rd.	414-545-6500
For:	Can., Vancouver, B.C., L.A. Varah, 2077 Albert St.	604-873-3211

ALCONOX INC., 217 Park Ave. S., New York, N.Y., 10003, Tel: 212-473-1300; Empl.: 10; Minimum order: $50

For info on price: E. P. Fenlon; Application info: E. P. Fenlon; Customer service: R. Salazar; Delivery info: R. Salazar

Free literature available: Cleaning Guide - outlines proper procedure to obtain clean surfaces, Brochure - describes qualities of our detergents.

Products manufactured: Cleaners & Solvents

ALDEN SYS. CO., INC., Box A, Dept. 262, Westboro, Mass., 01581, Tel: 617-366-8556; Empl.: 5

Customer service: G. Morrison

Free literature available: "More Dollars From Less Space" brochure 22 pages, describes cost cutting techniques in lab and factory production lines. "NPR#28 display utility turntable." "NPR#29 packaging work center."

Products manufactured: Benches, Consoles, Stools, Tables, Recorders

ALDSHIR MFG., 111 Lake, Tuckahoe, N.Y., 10707; Empl.: 8; Minimum order: $25

Customer service: G. Shirley 914-779-1297

Free literature available: Omnidaptor Fact Sheet (Describes world's only universal 45 RPM adaptor). AP-1 Catalog Sheet (Lists all models of replacement 45 RPM adaptors manufactured by Aldshir plus makes and models from original sources and cross-referencing).

Products manufactured: Phonographs, Parts & Accessories

ALERT TECHNOLOGY, INC., 2910 MacArthur Blvd., Northbrook, Ill., 60062, Tel: 312-498-0940; Empl.: 6; Minimum order: $40

Customer service: A. M. Cutshaw

Free literature available: Literature on Digital Probe Checks Integrated Circuit Logic & Ordering Information.

Products manufactured: Probes, Pulsers, Logic Test, Testers

Local Sales Offices & Reps.

Ill	Des Plaines, Coombs Assocs.	312-298-4830
Ind	Ft. Wayne, Coombs Assocs.	219-747-0402
Mo	St. Louis, Coombs Assocs.	314-567-3657
Wisc	Greendale, Coombs Assocs.	414-421-2300

ALESSI INDUSTRIES, 3195 Bldg. C, Airport Loop Dr., Costa Mesa, Cal., 92626, Tel: 714-979-8912; FSC No: 50093; Empl.: 7; Minimum order: $25

Customer service: V. Alessi

Free literature available: Alessi Dice Matrix Test Station; Microprobe Test Station; Micropositioner Test Station; Micropositioner; Test Probe Fixture; Four-Point Probes; Map/Test Station.

Products manufactured: Controls/Control Eqpt., Semiconductor Wafer Fabrication, Testers

Local Sales Offices & Reps.

Ariz	Scottsdale, Electronic Entprs.	602-946-9860
Cal	Palo Alto, Coherent Mktg. Assoc.	415-327-2217
Cal	Santa Ana, Schlines-Richardson	714-832-1949
Ill	Chicago, Electro-Tech Mktg. Assoc.	312-588-4535
Mass	Malden, Controlyne	617-321-1733
NJ	Upper Montclair, Controlyne	201-746-8900
Tex	Richardson, R. S. Marston Co.	214-235-3577
Wash	Seattle, Demarest & Assoc.	206-523-0600

ALFORD MFG. CO., 120 Cross St., Winchester, Mass., 01890, Tel: 617-729-8050, TWX: 710-348-1063; Empl.: 48; Minimum order: $20

Customer service: G. Cohen

Free literature available: Instruments and Components Catalogs

Products manufactured: Adapters, Waveguide, Attenuators, Bridges, Calibrators, Detectors, Diplexers, Antenna, Dividers, Dummy Loads, Junctions, Hybrid, Microwave, Line Strechers, Microwave, Probes, Shifters, Sliding Loads, Microwave, Slotted Lines, Microwave, Switches, Tees, Terminals, Waveguides & Adapters

ALISSA MFG. CO., 2800 La Cienega Ave., Los Angeles, Cal., 90034, Tel: 213-559-7480 .... p. 2•24-27

Products manufactured: Capacitors, Variable, Testers

ALL AMERICAN TOOL & MFG. CO., 8027 Lawndale, Skokie, Ill., 60076, Tel: 312-673-7084; Empl.: 12; Minimum order: $5

For info on price: J.E. McMenamin; Application info: J. E. McMenamin; Customer service: H. Shrude, Engrg.; Delivery info: J.E. McMenamin

Free literature available: Vibration Test Equipment Selector - Agree Type Test Equipment

Products manufactured: Test Equipment, Testers, Vibrators

Local Sales Offices & Reps.

Ariz	Phoenix, Pacific Scientific Co.	602-273-7464
Cal	City of Commerce, Pacific Scientific Co.	213-927-5333
Colo	Boulder, Pacific Scientific Co.	303-237-5210
Kan	Lenexa, S. Sterling Co.	913-888-2995
Mich	Detroit, S. Sterling Co.	313-255-1970
Mo	St. Louis, S. Sterling Co.	314-567-3636
NM	Albuquerque, Pacific Scientific Co.	505-265-6639
NY	Amityville, Testing Machines, Inc.	516-842-5400
Ohio	Cleveland, S. Sterling Co.	216-442-8080
Okla	Tulsa, Pacific Scientific Co.	918-749-1244
Ore	Portland, Pacific Scientific Co.	503-256-1770
Pa	Pittsburgh, S. Sterling Co.	412-922-5720
Tex	Dallas, Pacific Scientific Co.	214-661-3730
EXP:	Evanston, Ill., Inter-Ocean Export Assocs.	312-273-5314
EXP:	Evanston, Ill., Inter-Ocean Export Assocs.	312-273-5314

ALL CHANNEL PRODUCTS CORP., 47-75 48th St., Woodside, N.Y., 11377, Tel: 212-361-8120

Customer service: S.L. Dorosin

Products manufactured: Antennas

Local Sales Offices & Reps.

Cal	Los Angeles, Erlanger Sls. Co.	213-731-2238
Fla	Margate, Florida Elctrns.	305-972-0800
Ga	Atlanta, Kennon-Frazier & Co.	404-351-3145
Ill	Lake Bluff, Gettleman, Litteken, Sabbit & Co.	312-295-1050
Ind	Indianapolis, Haycox	317-251-2777
Minn	St. Paul, G. Johnson Assoc.	612-451-3039
Mo	Raytown, M. Taraski Sls. Co.	816-358-1442
Ohio	Euclid, Hauler-Wade & Assoc.	216-662-5842
Pa	Elkins Park, H. H. Seletsky	215-887-1424
Tex	Houston, S. Katzoff & Assoc.	713-666-1636
Wash	Seattle, Western Reps.	206-284-1671

ALL SHIELD ENCLOSURES, See All-Tronics, Inc.

ALL-TRONICS INC., 45 Bond St., Westbury, N.Y., 11590, Tel: 516-333-3090, TWX: 510-222-3655; Empl.: 45; Minimum order: $50 .... p. 1•538-543

For info on price: M. Herbach; Application info: S. Klein; Customer service: M. Herbach; Delivery info: J. Lametta

Products manufactured: Cabinets & Accessories, Capacitors, Fixed, Coils Including Assemblies & Forms, Containers, Filters, Insertion Loss Measurement Systems, Networks, Services, Assembly, Production & Test, Suppressors

Local Sales Offices & Reps.

Ala	Huntsville, 20th Century Mktg.	
Cal	Los Angeles, C. E. Holmes Co.	213-256-2255
Cal	Palos Verdes Estate, Schulman & Assocs.	213-373-6564
Cal	San Diego, Daniels & Doty	714-560-6266
Cal	San Francisco, Schonin Co., Inc.	415-467-8700
Colo	Denver, Camel Electronics, Inc.	303-757-6191
Fla	Seminole, Massey Assocs.	813-531-4030
Ill	Chicago, Communications Engrs.	312-761-0548
Md	Bethesda, Warner Assocs.	301-469-8904
Mass	Waltham, Betronic Assocs.	617-894-8400

NY	Plainview, R. Smith Assocs.	516-681-3155
NY	Syracuse, Lenard Co.	315-GR 9-9191
NC	Charlotte, B. Henry Assocs.	704-375-8958
Ohio	Dayton, C. V. Clark Co.	513-294-7337
Pa	Easton, Frank Liberman	215-253-3100
Pa	Philadelphia, Mid-Eastern Assocs.	215-842-2810
Tex	Arlington, Kentron Eng. Sls.	817-265-8292
Tex	Dallas, Kentron Eng. Sls.	214-352-7535
Va	McLean, D. Carwithen	703-821-3131
Wash	Bellevue, TMS Enterprises	
FOR:	Can., Mississauga, Ont., D. R. Beattie	416-822-4414
FOR:	Can., Mississauga, Rayshield, c/o David R. Beattie Ltd.	416-822-4414

ALLACO PRODS DIV., Bacon Inds., Inc., 192 Pleasant St., Watertown, Mass., 02172, Tel: 617-926-2550; Empl.: 18; Minimum order: $25

For info on price: Sales Dept.; Application info: T. Willett; Customer service: T. Willett; Delivery info: Sales Dept.

Free literature available: Allaco Products, supplies free Data Sheets on the epoxy & urethane potting compounds & adhesives that we manufacture.

Products manufactured: Adhesives (All Types), Coatings, Compounds, Encapsulating, Insulating, Molding, Potting, Conductive Plastic Materials, Plastic Raw Materials, Liquids, Pellets, Powders, Resins, Rubber

ALLARD INSTR., Div. of Applied Fluidics, 770 Main St., Westbury, N.Y., 11590, Tel: 516-334-8742, TWX: 510-222-8695; Empl.: 17 ..... p. 1•601; p. 2•1121

Customer service: P. Sorrentino

Free literature available: Fluidic leak detector LD100; Century series Electronic leak detector ELD100, ELD200; AFI fluidic controller FC100A; Electromagnetic Indicators (Composite), Type 102, Type 101, Type 104, Type 109, Type 110, Type 108, Type 120, Type 219, Type 129, Type 124.

Products manufactured: Actuators, Annunciators, Display Devices/Displays, Indicators

Local Sales Offices & Reps.

Cal	Pico Rivera, Westrep	213-949-2551

ALLEGHENY LUDLAM STEEL CO., 2000 Oliver Bldg., Pittsburgh, Pa., 15222, Tel: 412-261-5300, TWX: 412-642-3045; Empl.: 20,000

Products manufactured: Foil, Laminations, Seals, Shields

Local Sales Offices & Reps.

Cal	Los Angeles	213-685-9550
Cal	S. San Francisco	415-583-9855
Conn	Windsor	203-688-5241
Ga	Atlanta	404-394-9613
Ill	Chicago	312-774-8600
Mass	Boston	617-879-8342
Mich	Detroit	313-564-6900
Mo	St. Louis	314-991-2900
NY	Buffalo	716-633-8800
NY	New York	914-694-1880
Ohio	Cincinnati	513-351-8000
Okla	Cleveland	216-333-9300
Pa	Philadelphia	215-839-7370
Tenn	Memphis	901-767-6962
Tex	Houston	713-529-2647
Wash	Seattle	206-GL4-6950
Wisc	Milwaukee	414-258-5900

ALLEN AVIONICS, INC., Div. A.K. Allen Co., 255 E. 2nd St., Mineola, N.Y., 11501, Tel: 516-248-8080; Minimum order: $35 ..... p. 1•422-427,532-537

Products manufactured: Attenuators, Coils Including Assemblies & Forms, Delay Lines, Equalizers, Filter Synthesizers, Filters, Networks, Synthesizers

Local Sales Offices & Reps.

Ala	Gadsden, Nickerson Co.	205-547-7718
Cal	Culver City, E.V. Roberts & Assocs.	213-870-9561
Cal	Palo Alto, Adtek Assocs.	415-323-5414
Cal	San Diego, E.V. Roberts & Assocs.	714-565-4535
Colo	Golden, J.F. Hurlbut Co.	303-279-7796
Fla	Oldsmar, Nickerson Co.	813-855-4209
Fla	Tampa, Nickerson Co.	813-885-1416
Ga	Decatur, Nickerson Co.	404-321-4678
Ill	Chicago, Electro-Tech Mktg. Assocs.	312-588-4535
Kans	Prairie Village, Engrg. Svcs.	913-649-4000
Md	Baltimore, D.K. Jones & Assocs.	301-752-0577
Mass	Natick, Wayland Engrg. Sls.	617-655-6080
Minn	Anoka, K. Haugen & Assocs.	612-421-3395
Mo	St. Louis, Engrg. Svcs.	314-997-1515
NJ	Cherry Hill, H.J. White Co.	609-428-4544
NY	Woodbury, J.N. Sweeney & Co.	516-692-4222
NC	Kannapolis, Nickerson Co.	704-932-6772
Ohio	Dayton, Ashby Assocs.	513-252-5627
Tex	Dallas, Texas Avionics	214-368-3566
Wash	Seattle, Underwood & Underwood Inc.	206-243-2133
EXP:	Stamford, Conn., Dage Corp.	203-324-3123

Advertisment

Allen Avionics manufactures passive delay lines, filters, attenuators and passive networks. 3 day delivery on LC filters to customers specifications. We are unique in our field in that we build lumped delay lines having time delay to rise time rations of up to 300/1. We are the sole supplier of the Spiradel delay line.

ALLEN-BRADLEY CO., 1201 S. Second St., Milwaukee, Wisc., 53204, Tel: 414-671-2000, TWX: 910-262-3451; Empl.: 6500 ..... p. 2•1410-1417,1584-1591

Customer service: D. Newmann

Free literature available: Publication RO - Complete bound catalog. Publication 6024 - Brief catalog of line.

Products manufactured: Attenuators, Circuits, Hybrid, Thick Film, Circuits, Hybrid, Thin-Film, Controllers, Programmable, Controls/Control Eqpt., Cores, Magnetic, Isolators, Lights, Magnets, Motors, Networks, Potentiometers, Pullers, Relays, Resistors, Solenoids, Switches, Timers

Local Sales Offices & Reps.

Ala	Birmingham	205-879-4641
Alas	Anchorage, J.A. Tudor & Assoc.	907-274-6350
Ariz	Phoenix, E. P. Weller Co.	602-959-6000
Ark	Little Rock, C.H. Stout Inc.	501-372-2555
Cal	City of Commerce	213-724-5713
Cal	Newport Beach, W.B. Knight Co.	714-833-8250
Cal	South San Francisco	415-871-0200
Colo	Denver	303-936-7303
Conn	Stratford	203-378-7364
Fla	Fort Lauderdale	305-771-0400
Fla	Jacksonville, Van & Smith Co.	904-384-2376
Fla	Miami, C.R. Lee & Assoc.	305-444-7414
Fla	Orlando, Van & Smith Co.	305-425-7026
Fla	Tampa, Van & Smith Co.	813-877-8393
Ga	Atlanta, R.E. Wilson Co.	404-876-8833
Haw	Honolulu, R.J. Austin & Assoc.	808-395-4011
Ill	Chicago	312-922-9302
Ill	Rockford	815-965-8795
Ind	Fort Wayne	219-745-7068
Ind	Indianapolis	317-293-5223
Ind	Merrillville	219-769-7770
Iowa	Bettendorf	319-355-5316
Ky	Louisville, Rietze Co.	502-893-2571
La	Metairie	504-888-2281
La	Shreveport, C.H. Stout of Shreveport Inc.	318-221-5555
Me	Portland	207-772-3555
Md	Baltimore	301-265-5600
Mass	Agawam	413-785-1984
Mass	Framingham	617-879-5900
Mich	Flint	313-232-9341
Mich	Grand Rapids, E.B. Dewey Co.	616-454-1825
Mich	Kalamazoo, E.B. Dewey Co.	616-344-6163
Mich	Lansing	517-393-8600
Mich	Madison Heights	313-583-9400
Minn	St. Paul	612-636-5050
Mo	Kansas City	816-421-4595
Mo	Maryland Heights	314-567-6326
Neb	Omaha, Midwest Equipment Co.	402-734-1020
NJ	Bloomfield	201-338-4600
NM	Albuquerque	505-265-7723
NY	Albany	518-869-5373
NY	Buffalo	716-634-2711
NY	Rochester	716-461-3660
NY	Syracuse	315-463-4501
NC	Charlotte	704-372-3287
NC	Greensboro	919-272-5870
Ohio	Akron	216-253-2106
Ohio	Cincinnati	513-793-7580
Ohio	Cleveland	216-391-2855
Ohio	Columbus	614-263-6881
Ohio	Dayton	513-294-4466
Ohio	Toledo	419-841-7726
Okla	Tulsa, J.W. Elder Co.	918-583-9149
Ore	Eugene, J.A. Tudor & Assoc.	503-686-1252
Ore	Portland, J.A. Tudor & Assoc.	503-288-5154
Pa	Allentown	215-437-2401
Pa	Erie	814-868-8214
Pa	King of Prussia	215-337-1990
Pa	Pittsburgh	412-923-1844
Pa	York	717-848-2239
SC	Greenville	803-235-1280
Tenn	Knoxville	615-588-0591
Tenn	Memphis, C.H. Stout of Tennessee Inc.	901-362-1616
Tenn	Nashville	615-834-1860
Tex	Dallas	214-748-6356
Tex	Houston	713-225-0747
Tex	San Antonio	512-732-4362
Utah	Salt Lake City, Stevens Sls. Co.	801-487-8971
Va	Richmond	804-282-4285
Wash	Seattle, J.A. Tudor & Assoc.	206-682-7444
Wash	Spokane, J.A. Tudor & Assoc.	509-327-3328
WVa	Charleston, S.C. Payne	304-343-1393
Wisc	Appleton	414-731-3202
Wisc	Milwaukee	414-671-2000

Local Distributors

Ariz	Phoenix, Kierulff Elctrns., 2633 East Buckeye Rd.	602-273-7331
Cal	El Segundo, Liberty Elctrns., 124 Maryland St.	213-322-8100
Cal	Los Angeles, Kierulff Elctrns., Inc., 2585 Commerce Way	213-685-5511
Cal	Mountain View, Elmar Elctrns., Inc., 2288 Charleston Rd.	415-961-3611
Cal	San Diego, Kierulff Elctrns., 8797 Balboa Ave.	714-278-2112
Colo	Denver, Cramer/Denver Elctrns., 5465 E. Evans Pl. at Hudson	303-758-2100
Conn	North Haven, Cramer/Conn, 35 Dodge Ave.	203-239-5641
Fla	Hollywood, Cramer/Hollywood, 4035 N. 29th Ave.	305-923-8181
Fla	Orlando, Cramer/Orlando, 345 N. Graham Ave. Box 20214	305-894-1511
Ga	Atlanta, Cramer/Atlanta, 3923 Oakcliff Indl. Ct.	404-448-9050
Ill	Chicago, Newark Elctrns., 500 N. Pulaski Rd.	312-638-4411
Ind	Ft. Wayne, Ft. Wayne Elctrns. Supply, Sub. of Graham Elctrns. Supply, 3606 E. Maumee Ave.	219-423-3422
Ind	Indianapolis, Graham Elctrns. Supply, 133 S. Pa. St.	317-634-8202
Md	Gaithersburg, Cramer/Washington, 16021 Indl. Dr.	301-948-0110
Mass	Newton, Cramer Elctrns., 85 Wells Ave.	617-969-7700
Minn	Minneapolis, Newark-Minneapolis Elctrn., 336 Hoover St., N.E.	612-331-6350
NJ	Somerset, Schweber Elctrns., 43 Belmont Dr.	201-469-6008
NY	Westbury, Schweber Elctrns., Jericho Tpke.	516-334-7474
Ohio	Cincinnati, Newark Elctrns. Corp., 9799-G Princeton Rd.	513-874-5115
Ohio	Cleveland, Schweber Elctrns. Corp., 23880 Commerce Pk. Dr.	216-464-2970
Pa	Philadelphia, Almo Elctrns., Roosevelt Blvd. at Blue Grass Rd.	215-676-6000
Tex	Dallas, Solid State Elctrns. of Tex, 2643 Manana Dr. Box 20299	214-352-2601
Tex	Houston, Harrison Equip., 1616 McGowen Ave.	713-224-9131
Utah	Salt Lake City, Cramer/Utah, 391 West 2500 So.	801-487-4131
Wash	Seattle, Kierulff Elctrns., 5940 Sixth Ave., So.	206-763-1550
For:	Can., Downsview, Ont., Cesco Elctrns., 24 Martin Ross Ave.	416-661-0220
For:	Can., Montreal, Que., Cesco Elctrns. Ltd., 4050 Jean Talon St. W.	514-735-5511
For:	Can., Ottawa, Ont., Cesco Elctrns., 1300 Carling Ave.	613-729-5118
For:	Can.,Que., Cesco Elctrns. Ltd., 98 Rue St. Vallier, Ouest	418-524-4641

ALLEN BRADLEY, Sys. Div., 747 Alpha Dr., Highland Heights, Ohio, 44143, Tel: 216-449-6700, TWX: 810-427-2975; Empl.: 250

For info on price: J. Caputo; Application info: P. Zilko; Customer service: R. Martin; Delivery info: J. Caputo

Free literature available: Allen-Bradley NC Series 4000 and CNC 7300 systems provide full capability for all turning, milling and maching center applications. The numerous features and available options are descibed in two NC brochures. Programmable Controller is expandable, easily programmed by ladder diagrams, and self-checking. Bulleting 1774 discusses solid-state control features and modular construction for memory (up to 8K) and inputs/outputs (1,024) available. Bulletin 1750 and 1755 describe the two versions of PMC. Read-only and Read-write memory are available.

Products manufactured: Controllers, Programmable, Controls/Control Eqpt.

Local Sales Offices & Reps.

Ala	Birmingham, Allen-Bradley Co.	205-879-4641
Alas	Anchorage, Allen-Bradley Co.	907-274-6350
Ariz	Phoenix, Ind'l. Control	602-959-8620
Ark	Little Rock, C.H. Stout, Inc.	501-374-8201
Cal	Los Angeles, Allen-Bradley Co.	213-724-5713
Cal	S. San Francisco, Allen-Bradley Co.	415-761-3225
Colo	Denver, Allen-Bradley	303-936-7303
Conn	Bridgeport, Allen-Bradley	203-378-7364
Fla	Jacksonville, Van & Smith Co.	904-384-2376
Fla	Miami, C.R. Lee & Assoc.	305-444-7414
Fla	Orlando, Van & Smith Co.	305-425-7026
Fla	Tampa, Van & Smith Co.	813-877-8393
Ga	Atlanta, R.E. Wilson Co.	404-876-8833
Haw	Honolulu, R.J. Austin & Assocs.	808-395-4011
Ill	Chicago, Allen-Bradley Co.	312-922-9302
Ill	Rockford, Allen-Bradley Co.	815-965-8795
Ind	Fort Wayne, Allen-Bradley Co.	219-745-7068
Ind	Gary, Allen-Bradley Co.	219-769-7770
Ind	Indianapolis, Allen-Bradley Co.	317-293-5223
Iowa	Davenport, Allen-Bradley Co.	319-355-2831
Ky	Louisville, Rietze Co.	502-893-2571
La	New Orleans, Allen-Bradley Co.	504-888-2281
La	Shreveport, C.H. Stout of Shreveport, Inc.	318-425-5455
Me	Portland, Allen-Bradley Co.	207-772-3555
Md	Baltimore, Allen-Bradley Co.	301-265-5600
Mass	Boston, Allen-Bradley Co.	617-879-5900
Mass	Springfield, Allen-Bradley Co.	413-732-3430
Mich	Detroit, Allen-Bradley Co.	313-583-9400
Mich	Flint, Allen-Bradley Co.	313-232-9341
Mich	Grand Rapids, E.B. Dewey Co.	616-454-1825
Mich	Kalamazoo, E.B. Dewey Co.	616-344-6163
Mich	Lansing, Allen-Bradley Co.	517-393-8600
Minn	St. Paul, Allen-Bradley Co.	612-636-5050
Mo	Kansas City, Allen-Bradley Co.	816-421-4595
Mo	Saint Louis, Allen-Bradley Co.	314-567-6326
Neb	Omaha, Midwest Equip. Co.	402-341-7600
NJ	Bloomfield, Allen-Bradley Co.	201-338-4600
NM	Albuquerque, W. Dolde Sls. Co.	505-256-0307
NY	Albany, Allen-Bradley Co.	518-869-5373
NY	Buffalo, Allen-Bradley Co.	716-873-7617
NY	Rochester, Allen-Bradley Co.	716-461-3660
NY	Syracuse, Allen-Bradley Co.	315-463-4501
NC	Charlotte, Allen-Bradley Co.	704-372-3287
NC	Greensboro, Allen-Bradley Co.	919-272-5870
Ohio	Akron, Allen-Bradley Co.	216-253-2106
Ohio	Cincinnati, Allen-Bradley Co.	513-793-7580
Ohio	Cleveland, Allen-Bradley Co.	216-391-2855
Ohio	Columbus, Allen-Bradley Co.	514-263-5881
Ohio	Dayton, Allen-Bradley Co.	513-294-4466
Ohio	Toledo, Allen-Bradley Co.	419-841-7726
Okla	Tulsa, J.W. Elder Co.	918-583-9149
Ore	Eugene, J.A. Tudor & Assocs.	503-686-1252
Ore	Portland, J.A. Tudor & Assocs.	503-288-5154
Pa	Allentown, Allen-Bradley Co.	215-437-2401
Pa	Erie, Allen-Bradley Co.	814-868-8214
Pa	Philadelphia, Allen-Bradley Co.	215-337-1990
Pa	Pittsburgh, Allen-Bradley Co.	412-923-1844
Pa	York, Allen-Bradley Co.	717-848-2239
SC	Greenville, Allen-Bradley Co.	803-268-1391
Tenn	Knoxville, Allen-Bradley Co.	615-588-0591
Tenn	Memphis, C.H. Stout of Tenn., Inc.	901-362-1616
Tenn	Nashville, Allen-Bradley Co.	615-834-1860
Tex	Dallas, Allen-Bradley Co.	214-748-6356
Tex	Houston, Allen-Bradley Co.	713-225-0747
Tex	San Antonio, Allen-Bradley Co.	512-732-4362
Utah	Salt Lake City, Stevens Sls. Co.	801-467-5489
Va	Norfolk, Allen-Bradley Co.	804-499-0218
Va	Richmond, Allen-Bradley Co.	804-282-4285
Wash	Seattle, J.A. Tudor & Assocs.	206-682-7444
Wash	Spokane, J.A. Tudor & Assocs.	509-327-3328
WVa	Charleston, S.C. Payne-Mgr.	304-343-1393
Wisc	Appleton, Allen-Bradley Co.	414-731-3202
Wisc	Milwaukee, Allen-Bradley Co.	414-671-2000

ALLEN ELCTRNS. DIV., Allen Organ Co., Macungie, Pa., 18062, Tel: 215-965-9801; Empl.: 500; Minimum order: $30

Customer service: M.F. Nelson

Products manufactured: Coils Including Assemblies & Forms, Oscillators

ALLEN MFG. CO., Drawer 570, Hartford, Conn., 06101, Tel: 203-242-8511, TWX: 710-425-0099; Empl.: 420; Minimum order: $50

For info on price: G. Merrick; Application info: M. Kubick; Customer service: G. Merrick; Delivery info: G. Merrick

Products manufactured: Adhesives (All Types), Fasteners, Pins, Screwdrivers, Tools, Wrenches

ALLIANCE MFG. CO., North American Phillips Co., Alliance, Ohio, 44601, Tel: 216-821-5360

Products manufactured: Antenna Rotators, Motors

ALLIED CHEMICAL CORP., Specialty Chemicals Div., Box 1087R, Morristown, N.J., 07960, Tel: 201-455-2000; Empl.: 30000

Products manufactured: Chemicals, Cleaners & Solvents, Etchants, Printed Circuit, Machines/Machinery, Production

Local Sales Offices & Reps.

Cal	Los Angeles
Ill	Palatine
Mass	Burlington
NJ	Saddle Brook
Tex	Houston

ALLIED CONTROL CO., See Gould Inc., Allied Control Div.

ALLIED SYSTEMS CORP., Box 11005, Greensboro, N.C., 27409, Tel: 919-299-2294; Empl.: 25 ....p. 2•458,459

For info on price: E. V. Saude; Customer service: V. Buie; Delivery info: E. V. Saude

Free literature available: Catalogs 567 and 677 offer two complete lines of Patchboard Programming Systems with more than twenty-one models and sizes from 200 positions to 5120 positions with associated Patchcords and Hardware. Special Systems on Request.

Products manufactured: Boards, Programming, Cable Assemblies & Harnesses, Connectors, Contacts, Electrical, Controllers, Programmable, Cords, Covers, Protective (Including Dust), Jack Covers, Kits, Programming Board, Lead Assemblies & Receptacles, Leads, Test & Adaptors, Panels, Pins, Plugs, Probes, Services, Assembly, Production & Test, Splices, wire (Including, Butt & Cap Types), Terminal Blocks, Boards & Strips, Terminals, Tools

Local Sales Offices & Reps.

Ala	Huntsville, Tech-Rep Assocs., Inc.	205-881-5925
Cal	Long Beach, Cairns Engrg. Sls. Corp.	213-432-7444
Cal	San Carlos, Electro Pacific	415-593-1334
Fla	Ft. Lauderdale, Tech-Rep Assocs., Inc.	305-792-0962
Fla	Indian Rocks Beach, Tech-Rep Assocs., Inc.	813-595-2834
Mass	Waltham, ICM Co.	617-891-8059
Minn	Minneapolis, Paul Ericson & Assocs.	612-884-1969
NY	New Hook, R. P. Kennedy Co.	914-876-2700
NY	Rochester, R. P. Kennedy Co.	716-271-6322
Va	Arlington, H. J. Heffernan Co.	703-522-6666

ALLIS-CHALMERS, Box 512, Milwaukee, Wisc., 53201, Tel: 414-475-2000, TWX: 910-262-3444; Empl.: 26000

Products manufactured: Controls/Control Eqpt., Motor & Generator Armatures, Rotors, Stators, Motor Electric Generator Sets, Regulators, Relays, Switches, Transformers

Local Sales Offices & Reps.

Cal	Los Angeles	213-726-0831
Cal	Walnut Creek	415-937-3111
Colo	Lakewood	303-238-7920
Fla	Tampa	813-877-9541
Ga	Atlanta	404-261-3970
Ill	Oak Park	312-383-6600
Ind	Indianapolis	317-783-3265
Mass	Boston	617-482-3700
Mich	Kalamazoo	616-343-1621
Mich	Southfield	313-352-6870
Minn	Bloomington	612-944-1500
Mo	St. Louis	314-991-5270
NJ	Union	201-687-3700
NY	Rochester	716-436-2883
NC	Charlotte	704-364-0412
Ohio	Akron	216-836-7996
Ohio	Cleveland	216-333-9090
Ohio	Norwood	513-351-6700
Ohio	Norwood	513-351-9000
Okla	Tulsa	918-587-9163
Pa	Haverford	215-527-0900
Pa	York	717-755-0942
Tex	Dallas	214-369-7300
Tex	Houston	713-522-1081
Va	Richmond	703-282-7678
Wash	Bellevue	206-454-3481
Wisc	Milwaukee	414-475-4799
Wisc	Milwaukee	414-475-3441

ALMA, Div. Develco Inc., 530 Logue Ave., Mountain View, Cal., 94043, Tel: 415-968-3903, TWX: 910-379-6588; Empl.: 80; Minimum order: $50

For info on price: G. Patterson; Customer service: R. Rondoe

Free literature available: Product Brochures and Application Notes.

Products manufactured: Testers

Local Sales Offices & Reps.

Ala	Huntsville, Saber Assocs.	205-534-3387
Cal	San Diego, QPL, Inc.	714-453-4150
Cal	South Pasadena, QPL, Inc.	213-682-3705
Fla	Lighthouse Point, Saber Assocs.	305-943-3076
Fla	Longwood, Saber Assocs.	305-422-3686
Fla	St. Petersburg, Saber Assocs.	813-441-1301
Ill	Chicago, Sea, Inc.	312-282-6694
Ind	Carmel, Sea, Inc.	317-846-2593
Md	Gaithersburg, Data Time, Inc.	301-948-7666
Md	Randallstown, Beacon North, Inc.	301-922-1248
Mass	Waltham, W.M. Hague Co.	617-899-5600
Minn	Minneapolis, Sea, Inc.	612-425-4455
NJ	Fairfield, KLS Assocs.	201-227-2900
NC	Raleigh, Saber Assocs.	919-787-9675
Pa	Abington, Bach-Stewart Assocs.	215-885-1550
Tex	Austin, Crockett Southwest Co.	512-451-8269
Tex	Irving, Crockett Southwest Co.	214-251-1776
Va	Falls Church, Beacon North, Inc.	703-534-1673
Wash	Seattle, R.S. Drake Assocs.	206-763-2755
Wisc	Waukesha, Sea, Inc.	414-547-6637

Advertisment

Alma manufactures a broad line of integrated circuit (IC) testers which include the models 380C and 480B bench-top digital IC testers, the Alma 550 linear IC tester, the model 720 watch IC/module tester, and the Alma 760 RAM IC tester. Phone your nearest Alma representative (listed above) for a demonstration.

ALMOND INSTRS. CO., 1223 East Edna Pl., Covina, Cal., 91724, Tel: 213-967-4151; Empl.: 45

Products manufactured: Converters, Discriminators, Memory Systems, Modulator/Demodulators, Modulators, All Kinds, Oscillators, Power Supplies, Recorders

ALNOR INSTRUMENT CO., 7301 N. Caldwell Ave., Niles, Ill., 60648, Tel: 312-647-7866; Empl.: 160; Minimum order: $15

For info on price: J. J. Kuska; Application info: M. D. Carlson; Customer service: M. D. Carlson; Delivery info: M. Fink

Free literature available: Temperature measuring & control instruments, air-velocity meters, dew point apparatus & thermocouples

Products manufactured: Controllers, Programmable, Controls/Control Eqpt., Meters, Thermocouples, Elements & Accessories, Wire

Local Sales Offices & Reps.

Ala	Birmingham, Ind'l. Htg. & Finishing Co.	205-822-4456
Alas	Anchorage, Hoteco Div.-Amstan, Inc.	907-274-4485
Ariz	Phoenix, Portis & Assocs.	602-947-4379
Ark	Little Rock, McCallister Equip. Co.	501-375-4474
Cal	Costa Mesa, Tech. Prods. & Controls	714-646-8585
Cal	San Francisco, Elctrn. Engrg. Ltd.	415-593-2189
Colo	Denver, D. E. Bond Assocs.	303-756-1234
Fla	Miami, Florida Precision Inst. Co.	305-324-1731
Ga	Atlanta, Measure-Trol Co.	404-255-7249
Haw	Honolulu, Controls, Inc.	808-841-7333
Ind	Indianapolis, Electro Engrg. Sls.	317-547-5273
Iowa	Cedar Rapids, Mueller Sls. Corp.	319-365-1196
Iowa	Davenport, Mueller Sls. Corp.	319-324-4962
La	New Orleans, M. Erichson Co.	504-834-9360
Md	Baltimore, Jobe & Co.	301-235-3502
Mass	Boston, Osgood Engrg. Co.	617-933-4744
Mich	Detroit, B. Turpin Co.	313-272-0746
Minn	Minneapolis, Mueller Sls. Corp.	612-544-8888
Mo	St. Louis, Ind'l. Svc. Labs.	314-535-5760
NJ	Union City, M. Stock, Inc.	201-864-2140
NY	Buffalo, Thermal Systems, Inc.	716-662-5560
NY	New York City, M. Stock, Inc.	212-227-4380
NY	Rochester, Thermal Systems, Inc.	716-377-1970
NY	Syracuse, Thermal Systems, Inc.	315-458-5202
NC	Charlotte, A.D. Penn Co.	704-847-4426
Ohio	Cincinnati, Beedle Equip. Co.	513-793-0140

Directory of Local Distributors Starts on page 401

Ohio	Cleveland, Alnor Instr. Co.	216-464-2225
Okla	Tulsa, J. Schoeffler Co.	918-742-5331
Ore	Portland, Fairman B. Lee Co.	503-236-9515
Pa	Philadelphia, Wistex	215-337-1240
Pa	Pittsburgh, L.H. Boleky Co.	412-761-8994
Tex	Dallas, Gay Sls. Co.	214-368-2325
Tex	Houston, Patterson Equip. Co.	713-666-1451
Utah	Salt Lake City, Control Equip. Co. of S/L	801-487-7741
Va	Richmond, Virginia Tech. Assoc.	703-266-9654
Wash	Seattle, Fairman B. Lee Co.	206-244-7262
Wisc	Milwaukee, Mueller Sls. Corp.	414-781-5310
EXP:	Chicago, Ill, A. Torres Export	312-539-3663

ALPHA COMPONENTS CORP., 115 Eucalyptus Dr., El Segundo, Cal., 90245, Tel: 213-322-7780; Empl.: 12; Minimum order: $25

For info on price: J. T. Cataldo; Application info: J. T. Cataldo; Customer service: D. J. Hardy; Delivery info: D. J. Hardy

Products manufactured: Blowers & Fans & Accessories, Chargers, Battery, Comm. Systems, Counters, Diodes, Power Supplies, Rectifiers, Relays, Resistors, Transformers, Transistor, Diode, Thyristor Heat Dissipators

Local Sales Offices & Reps.

Ariz	Phoenix, B.G. Sls.	602-266-7252
Cal	Los Angeles, D. Forth Assoc.	213-338-4816
Cal	San Francisco, Weseloh & Assoc.	415-961-0565
Fla	Oldsmar, L. A. Assoc.	813-855-4209
Md	Joppa, J.C. Merican	301-679-6989
Minn	Minneapolis, Smith Sales Co.	612-377-3187
Miss	Greenwood, L.R. Massey	601-453-3038
NY	Brooklyn, I. Brown Co.	212-493-1379
NY	Camillus, Trademark Elex Assoc.	315-488-5518
NY	Northport, Production Sls. Assoc.	516-757-0336
Ore	Portland, Dale Weber Co.	503-234-7671
Tex	Dallas, Techno Assocs.	214-357-9213
EXP:	Calif. Beverly Hills, Itonra International	213-272-0011

ALPHA DATA INCORPORATED, 20750 Marilla Street, Chatsworth, Cal, 91311, Tel: 213-882-6500, TWX: 910-494-4914; Empl.: 35

Customer service: L. T. Lincoln

Free literature available: Magnetic Disc Memories: ALPHA DATA 10-inch and 16-inch Disc Memories are optimized to meet the requirements of your system in terms of storage, capacity, transfer rate and access times. Plug compatible computer/controllers. Integrated Circuit Tester Model 1416:
A new fully automatic digital IC tester designed to evaluate virtually all types of digital TTL and DTL circuits.

Products manufactured: Memory Systems, Testers

Local Sales Offices & Reps.

Ariz	Phoenix, Thorson Co.	602-956-5300
Cal	Mountain View, Scientific Devices	415-964-4230
Cal	San Diego, Mesa Elctrns.	714-278-8021
Colo	Littleton, Data Sys. Mktg.	303-795-1960
Conn	Avon, Instrument Dynamics	203-678-1088
Fla	Lighthouse Point, Saber Assocs.	305-943-3076
Ga	Woodstock, Saber Assocs.	404-432-9625
Haw	Honolulu, Aloha Assocs.	808-941-1574
Ill	Addison, Midwest Mktg. M. R.	312-279-2442
Kans	Mission, Midwest Mktg. M. R.	913-384-3737
Md	Silver Spring, L. G. White & Assocs.	301-585-3141
Mass	Wakefield, Instrument Dynamics	617-245-5100
Mich	Southfield, DATA-TRON	313-354-6421
Mo	Florissant, Midwest Mktg. M. R.	314-831-0342
NJ	Ridgewood, Hansen Assocs.	201-652-7055
NM	Albuquerque, Scientific Devices-Albuquerque	505-268-6729
NY	Schenectady, N. W. Alexander & Assocs.	518-377-0581
NC	Raleigh, Saber Assocs.	919-834-3961
Ohio	Dayton, DATA-TRON	513-223-8421
Ohio	Wickliffe, DATA-TRON	216-585-8421
Pa	Audubon, Holmes Assocs.	215-666-0636
Tex	Houston, Data Appls. Corp.	713-661-4501
Tex	Richardson, Data Appls. Corp.	214-231-4846
Utah	Bountiful, Data Sys. Mktg.	801-295-3457

ALPHA ELECTRONIC SERVICES, 8431 Monroe Ave., Stanton, Cal., 90680, Tel: 714-821-4400; Empl.: 47; Minimum order: $10

For info on price: D. Valdez; Application info: D. E. Lippincott; Customer service: C. Moore; Delivery info: R. Paumier

Free literature available: Catalog containing specifications and applications information on miniature thick film hybrid tone encoders/decoders, tone generators and selective signalling tone devices. Prices are included.

Products manufactured: Circuits, Hybrid, Thick Film, Comm. Systems, Controls/Control Eqpt., Decoders, Encoders, Filters, Generators, Receivers, Transmitters

Local Sales Offices & Reps.

Cal	Hayward, Solid State Comms.	415-785-4610

ALPHA INSTR. INC., 20 Sylvan Rd., Woburn, Mass., 01801, Tel: 617-935-5150, TWX: 710-393-1236; FSC No: 17540; Empl.: 300; Minimum order: $50

For info on price: W. Minks; Application info: J. Richmond; Customer service: H. Miller; Delivery info: H. Miller

Free literature available: Alpha microwave diodes catalog and alpha solid state control devices catalog.

Products manufactured: Attenuators, Detectors, Diodes, Limiters, Switches

Local Sales Offices & Reps.

Ariz	Phoenix, Thorson Co.	602-956-5300
Cal	Los Altos, Stout-Loeswick	415-948-3265
Cal	Los Angeles, Cain Technology	213-476-2251
Colo	Arvada, Cleveland Enter.	303-423-3707
Fla	Clearwater, Southeastern Sls.	813-531-8324
Ill	Park Ridge, RF Specialists	312-698-2044
Ind	Ft. Wayne, RF Specialists	219-485-8982
Md	Glen Burnie, Micro-Comp	301-761-4600
Mass	Lexington, Lancer Assoc.	617-861-1720
Mich	Warren, DEM Elctrns. Sls.	313-755-6660
Mo	St. Louis, Boweng Reps.	314-429-7327
NM	Albuquerque, Cleveland Enter.	505-345-2481
NY	E. Syracuse, Ossmann Instrs.	315-437-6666
NY	Great Neck, Trionic Assocs.	516-466-2300
Ohio	Dayton, Rixan Assocs.	513-278-4216
Pa	Lafayette Hill, M. Lader Co.	215-825-3177
Tex	Dallas, Cain and Co.	214-233-6809

ALPHA METALS, INC., 56 Water St., Jersey City, N.J., 07304, Tel: 201-434-6778, Telex: 125-798; Empl.: 400

Customer service: H. Greenberg

Free literature available: Aplha Product Package - mini catalog, Preforms handbook - primer on use of solder preforms, Ionograph - device measures ionic contamination, Pot-Rite - solder analysis.

Products manufactured: Alloys, Chemicals, Cleaners & Solvents, Cleaners, Ultrasonic, Coatings, Flux, Brazing & Soldering Materials, Forms, Wire, Laminates, Metal Compounds, Foils, Powders, Sheet, Stock, Metal Oxides, Metals, Preforms, Precious Metal, Services, Assembly, Production & Test, Solder (All Types), Soldering Accessories, Standards

Local Sales Offices & Reps.

Cal	Santa Ana	714-547-7315
Cal	Sunnyvale	408-727-0630
Ill	Des Plaines	312-297-0730

ALPHA WIRE CORP., 711 Lidgerwood Ave., Elizabeth, N.J., 07207, Tel: 201-925-8000, TWX: 710-996-5895; Empl.: 250 .... p. 1•44,45; p. 2•1835-1880

For info on price: B. Finn; Application info: T. Reme; Customer service: P. Dietlin; Delivery info: P. Dietlin

Free literature available: T-2 Tubing Catalog, W-8 Wire & Cable Catalog, Teflon Cable Brochure, Zipper Tubing Brochure

Products manufactured: Blowers & Fans & Accessories, Braid, Cable, Cabinets & Accessories, Cable, Caps, Forms & Tapes, Heat Shrinkable, Chassis, Circuit Board Mounting, Chassis, Metal, Clamps & Clips, Cords, Tubing, Wire, Wire Markers, Wire Shielding

Local Sales Offices & Reps.

Ariz	Phoenix, Shefler-Kahn Co., Inc.	602-258-7893
Cal	Inglewood, J. Berman Co.	213-776-1281
Cal	Oakland, Moulthrop Sls., Inc.	415-261-7676
Fla	Maitland, Hutto-Hawkins-Peregory, Inc.	305-831-2474
Ga	Atlanta, Millar Elctrns., Inc.	404-261-6160
Ill	Chicago, GNB Assoc.	312-673-4050
Ind	Indianapolis, Mktg. Engrs., Inc.	317-546-1523
Mich	St. Clair Shores, J.M. Thorpe Co.	313-779-6363
Minn	Minneapolis, Clark R. Gibb Co.	612-377-1200
Mo	Kansas City, L.F. Florence Co.	816-561-7222
NJ	Elizabeth, Alpha Wire Corp.	201-925-8000
NY	Rochester, Marsey Sls., Inc.	716-442-9700
Ohio	Cleveland, Marlow Assocs., Inc.	216-932-0900
Tex	Dallas, J.Y. Schoonmaker Co., Inc.	214-357-8481
Wash	Seattle, Earl & Brown Co., Inc.	206-284-1121
FOR:	Can., Downsview, Ont., F. Eakin, Limited	416-245-3800

A L S ELECTRONICS CORP., 733 E. Edna Pl., Covina, Cal., 91723, Tel: 213-966-7431, TWX: 910-584-1812; Empl.: 40 .... p. 1•1087

For info on price: S. Kurzet; Customer service: Pres.

Products manufactured: Converters, Inverters, Power Supplies

ALTEC DIV., Altec Corp, 1515 S. Manchester Ave., Anaheim, Calif., 92803, Tel: 714-774-2900, TWX: 910-591-1142; Empl.: 1100

Customer service: R. J. Foulies

Products manufactured: Amplifiers, Attenuators, Bridges, Chokes, Coils Including Assemblies & Forms, Comm. Systems, Equalizers, Filters, Generators, Meters, Microphones, All Kinds, Mixers, Networks, Panels, Pickups, Telephone (For Recording), Speaker Systems, Speakers, Transformers

ALTHOR PRODS., 202 Bay 46th St., Brooklyn, N.Y., 11214, Tel: 212-373-7444; FSC No: 14998; Empl.: 7; Minimum order: $2

Customer service: G. Strum

Free literature available: Leaflet UB-72 (with current Price Change List) on Clear Polystyrene Plastic Boxes for storage or display & See-Thru Plastic Drawer Cabinets. Circular BL-74- Blank Labels - Self-Adhesive.

Products manufactured: Cabinets & Accessories, Containers, Labels, Pressure-Sensitive, Adhesive

AMRAD CORPORATION, Box 876, Paris, Tex., 75460, Tel: 214-785-4544, TWX: 910-860-5941

Products manufactured: Capacitor, Hardware, Caps, Forms & Tapes, Heat Shrinkable, Clamps & Clips, Cords, Fasteners, Retainers, Strain Reliefs, Cable & Wire, Tubing, Wire & Cable Ties

Local Sales Offices & Reps.

Ill	Chicago, Ropek-Cahill, Inc.	312-287-7292
Mich	Benton Harbor, Ken-Mor Assocs.	616-927-3134
NY	Flushing, Miller Co.	212-263-4446
Ohio	Cleveland, Loesch Assocs.	216-241-4581

AMATOM ELECTRONIC HARDWARE, Div. MITE Corp., 446 Blake St., New Haven, Conn., 06515, Tel: 203-397-3311; FSC No: 06540; Empl.: 55; Minimum order: $10 .... p. 2•457,1258

For info on price: Sls. Dept.; Application info: W. Bailey; Customer service: F. De Fonzo; Delivery info: M. Cousins

Products manufactured: Bumpers, Bushings, Glass, Plastic, Metal, Rubber, Etc., Caps, Lenses, Indicator Light, Clamps & Clips, Connector Adapters, Connectors, Contacts, Electrical, Couplings, Fasteners, Grommets, Handles For Cabinets, Circuit Boards, Racks, etc., Insulators & Insulation, Knobs, Lamps, Lights, Locks, Dial & Shaft, Pads, Transistor Mounting, Posts, Sockets, Spacers, Splices, wire (Including, Butt & Cap Types), Strain Reliefs, Cable & Wire, Terminal Blocks, Boards & Strips, Terminals

Local Sales Offices & Reps.

Cal	Pasadena, T.W. Yeakle	213-684-2275
Cal	Santa Clara, Novatronix	408-243-9530
Colo	Denver, Novatronix	408-243-9530
Conn	Bethany, Reps. Corp.	203-393-0024
Fla	Miami, S.K. Wallace Assocs.	305-691-1654
Fla	Tampa, S.K. Wallace Assocs.	813-932-3568
Ga	Jonesboro, S.K. Wallace Assocs.	404-471-6297
Ill	Downers Grove, S.W. Anderson Co.	312-964-2600
Ill	Glen Ellyn, S.W. Anderson Co.	312-469-7182
Ind	Crown Point, S.W. Anderson Co.	219-663-1707
Ind	Indianapolis, S.W. Anderson Co.	317-255-1971
Mass	Topsfield, Reps. Corp.	617-426-0541
Minn	Minneapolis, C.E. Bohlig Co.	612-922-7011
NY	New Rochelle, A & M Assocs.	914-235-4672
NY	Syracuse, Lenard Co.	315-479-9191
NC	Greensboro, S.K. Wallace Assocs.	919-292-0487
NC	Kernersville, S.K. Wallace Assocs.	919-993-3993
Ohio	Cincinnati, J.O. Olsen Co.	513-922-2176
Ohio	Cleveland, J.O. Olsen Co.	216-752-5444
Pa	Birchrunville, Jadelectronics Assocs.	215-647-5151
Pa	Pittsburgh, J.O. Olsen Co.	412-279-2550
Tenn	Memphis, S.K. Wallace Assocs.	901-682-2281
Tex	Garland, G.V. Peck Co.	214-341-8311
Tex	Houston, G.V. Peck Co.	713-664-1435
Wash	Seattle, Blum & Assocs.	206-284-4082
Wisc	Milwaukee, S.W. Anderson Co.	414-476-5100

Local Distributors

Cal	Mountian View, Ratel Elctrns., 815 Maude Ave.	415-965-2010
Cal	North Hollywood, J. S. Bennett, 12011 Sherman Rd.	213-875-2631
Cal	Southgate, Reliable Inds. Inc., 10724 Garwick Pl.	213-773-5611
Cal	Sunnyvale, J. S. Bennett, 1060 W. Evelyn Ave.	408-732-2810
Mass	Woburn, J. S. Bennett, 15 Cummings Park	617-935-8020
Minn	Minneapolis, Aero Space Computer Supply, 9270 Bryant Ave. So.	612-884-4725
NY	Briarcliff Manor, Lawrence Tufts Co., Woodside Ave.	212-562-7880

AMBI-TECH INDS. INC., 861 Washington Ave., Westwood, N.J., 07675, Tel: 201-666-0504; Empl.: 12

Customer service: M. C. Baum

Free literature available: Literature describes short*stop and brake*switch electronic motor brakes for osha safety and productivity applications. With no mechanical attachment to motors, units feature smooth, automatic operation and torque adjustment.

Products manufactured: Brakes, Controls/Control Eqpt.

AMBROID CO., 612 Montello St., Brockton, Mass., 02401, Tel: 617-583-6163; Empl.: 10; Minimum order: $15

For info on price: C. McNutt; Application info: L.L. Blyler; Customer service: L. Lawrence; Delivery info: L. Lawrence

Free literature available: Electrical data on adhesives.

Products manufactured: Adhesives (All Types), Cleaners & Solvents

AMCO ENGINEERING CO., 7333 W. Ainslie St., Chicago, Ill., 60656, Tel: 312-867-8500, TWX: 910-221-5192; Empl.: 188; Minimum order: $25

p. 1•49-52

For info on price: J. Witecha; Application info: D. Begitschke; Customer service: F. A. Johnson; Delivery info: J. Knight

Free literature available: Cabinets, Consoles and Racks - Modular - for Electronic or Electrical Systems - OEM, Computer, Military, Test, Educational, Medical, TV & Broadcast. Unlimited color & styling variations are standard

Products manufactured: Benches, Consoles, Stools, Tables, Blowers & Fans & Accessories, Cabinets & Accessories, Cases, Equipment, Instrument, Meter, Frames, Cabinet & Rack, Panels, Racks

Local Sales Offices & Reps.

Ala	Huntsville, Ridge Instr. Co.	205-837-3211
Alas	Anchorage, Arva, Inc.	907-272-5231
Ariz	Phoenix, Gramer & Co.	602-279-1231
Cal	Encino, V & L Assocs.	213-986-9703
Cal	Millbrae, Polach & Bensinger, Inc.	415-697-2525
Colo	Denver, Williams Assocs.	303-373-4730
Conn	Avon, Instr. Dynamics, Inc.	203-678-1088
Fla	Altamonte Springs, WMM Assocs.	305-831-4645
Fla	Clearwater, WMM Assocs.	813-447-2533
Fla	Pompano Beach, WMM Assocs.	305-943-3091
Ga	Tucker, Ridge Instr. Co.	404-939-1554
Haw	Honolulu, Adtech, Inc.	
Ill	Chicago, R.L. Lang & Assocs.	312-867-4241
Ind	Ft. Wayne, McDonald Sls. Co.	219-747-3650
Md	Rockville, L.G. White & Co.	301-770-6556
Mass	Wakefield, Instr. Dynamics, Inc.	617-245-5100
Mich	Detroit, WKM Assocs.	313-892-2500
Minn	St. Paul, Bonament Heyda Co.	612-484-8531
Mo	Kansas City, Forristal-Young Sls. Co.	816-358-6771
Mo	St. Louis, Forristal-Young Sls. Co.	314-645-2360
Neb	Omaha, Forristal-Young Sls. Co.	402-333-0800
NJ	Woodcliff Lake, F&F Assocs.	201-778-6767
NM	Albuquerque, Williams Assocs.	505-255-1638
NY	Coram, F&F Assocs.	516-334-1160
NY	North Syracuse, NACO Elctrns.	315-699-2651
NC	Winston Salem, L.G. White & Co.	919-725-3612
Ohio	Cleveland, WKM Assocs.	216-267-0445
Ohio	Dayton, WKM Assocs.	513-434-7500
Okla	Tulsa, D. Shuhart Co.	918-747-4136
Ore	Portland, Arva, Inc.	503-292-8762
Pa	King of Prussia, White-Keystone	215-265-1817
Pa	Pittsburgh, WKM Assocs.	412-892-2953
Tenn	Oak Ridge, Ridge Instr. Co.	615-483-1311
Tex	Bellaire, Brice Co.	713-666-1788
Tex	Dallas, D. Shuhart Co.	214-239-0185
Wash	Seattle, Arva, Inc.	206-622-0177
EXP:	Mahwah, N.J., Transconco, Inc.	201-825-0473

Local Distributors

Ariz	Phoenix, Gramer Distributing, 100 W. Camelback Rd., Suite 101B	602-279-1231
Cal	Los Angeles, Mil-Comm Dists., 1616 Cotner Ave.	213-478-0525
Cal	San Francisco, Zack Elctrns., 1444 Market St.	415-626-1444
Ind	Indianapolis, Ra-Dis-Co., 814 N. Senate Ave.	317-637-5571
Ind	South Bend, Radio Distributing, 1212 High St.	219-287-2911
Md	Baltimore, Radio Elec. Svc. Co., 1026 Cromwell Bridge Rd.	301-823-0070
Mass	Cambridge, Apollo Elctrns., 101 Binney St.	617-868-3120
NC	Raleigh, Southeastern Radio Supply Co., 414 Hillsborough St.	919-828-2311
Okla	Tulsa, S & S Radio Supply Co., 537 S. Kenosha	918-582-8242
Tex	Houston, Lenert Co., Box 2184	713-225-1465
Wash	Seattle, Ron Merritt Co., 1320 Prospect St.	206-622-0177
Wisc	Madison, Satterfield Elctrns., Box 1438	608-257-4801

AMERICAN AEROSPACE CONTROLS, INC., 131 Verdi St., Farmingdale, N.Y., 11735, Tel: 516-694-5100; Empl.: 30; Minimum order: $25

p. 1•230-232,2330-2332

For info on price: Order Desk; Application info: G. D. D'Abramo; Customer service: G. D. D'Abramo; Delivery info: Mrs. Roberts

Free literature available: General Catalog, Short Form Catalog, Data Sheets on Each Product.

Products manufactured: Current Sensors, Generators, Magnetoresistors, Hall, Monitors, Multipliers, Relays, Transducers

Local Sales Offices & Reps.

Cal	Los Angeles, Dyna Sls. Co.	213-268-1175
Mass	Newton Center, Daner Hayes, Inc.	617-969-4650
Ohio	Cleveland, Instrumentation Sys.	216-486-0782
Ohio	Dayton, Instrumentation Sys.	513-294-2838
Pa	Pittsburgh, Instrumentation Sys.	412-243-1111

AMERICAN AIRLINE FREIGHT SYSTEM, 633 3rd Ave., New York, N.Y., 10017

Customer service: Freight Cust. Sve.

Free literature available: Brochures on all of our product lines from handling a one pound shipment to chartering a 747 freighter.

Products manufactured: Containers

Local Sales Offices & Reps.

Ariz	Phoenix, R. C. Gass	602-273-1221
Cal	Los Angeles, J. C. Boyd	213-776-2520
Cal	San Diego, T. J. Stokes	714-235-5400
Cal	San Francisco, R. C. James	415-761-1300
DC	Washington, H. W. Jones	202-333-6460
Ill	Chicago, R. L. Kragel	312-641-3131
Md	Baltimore, G. J. Martin	301-761-1300
Mass	Boston, M. F. Brueckner	617-567-7700
Mich	Detroit, W. G. Patrick	313-291-7550
Mo	St. Louis, J. P. Bowlin	314-426-5522
NY	Albany, L. H. Larche	518-869-5321
NY	Buffalo, R. H. Butler	716-632-6007
NY	New York, H. W. Coron	212-656-3325
Ohio	Cincinnati, R. R. Trenkamp	606-283-3271
Ohio	Cleveland, M. E. Bradley	216-265-6660
Ohio	Dayton, C. A. Tucker	513-898-5511
Okla	Oklahoma City, R. T. Fitzhugh	405-685-5591
Pa	Philadelphia, T. C. Johnson	215-365-5060
Tex	Dallas, K. M. Miller	214-574-3520
Tex	El Paso, H. P. Hallock	915-778-9484
Tex	Houston, D. J. Charleston	713-228-5237
Tex	San Antonio, G. L. Allison	512-824-1401
Utah	Salt Lake City, J. J. Woerner	801-328-2531
FOR:	Can., Toronto, G. J. Britz	416-676-2511

AMERICAN ALUMINUM CO., 230 Sheffield St., Dept. EEM, Mountainside, N.J., 07092, Tel: 201-AD 3-3500; Empl.: 125

For info on price: T. Moser; Application info: D. Stanley; Customer service: R. R. King; Delivery info: D. Stanley

Free literature available: Literature contains illustrations and brief explanations of engineered products AMALCO has manufactured to our customers specifications.

Products manufactured: Cases, Equipment, Instrument, Meter, Cases, Transit, Chassis, Metal, Containers

Local Sales Offices & Reps.

Ariz	Scottsdale, F. Schoeffler Assocs.	602-948-3470
Cal	Downey, E. Shyffer & Assoc.	213-928-1824
Cal	Palo Alto, Abbott Engrg. Co.	415-327-0830
Colo	Denver, W. Purdy Co.	303-777-1411
Fla	Orlando, Hi-Co Assocs.	305-273-0571
Ga	Decatur, H. M. Walton Co.	404-482-2794
Ill	Northfield, H. S. Tollaksen Co.	312-441-6644
Ind	Indianapolis, Russell Sales Co.	317-547-0188
Md	North East, Progressive Assocs.	301-287-6422
Mich	Birmingham, W. A. Baumstark Co.	313-644-1120
Minn	Wayzata, Schlenker & Assocs.	610-473-5417
Mo	St. Louis, R. Pratt & Assocs.	314-426-0420
NJ	Boonton, Winter Assocs.	201-334-3434
NJ	Collingswood, K. Randall Co.	609-854-3323
NY	Plainview, Flower Hill Prods.	516-420-8555
NY	Rochester, Upstate Component Sls.	716-288-1080
NY	Troy, New-Co Assocs.	518-BE 5-0539
NC	Greensboro, Mfr. Sls. Co.	919-274-2474
Ohio	Bay Village, T. R. Heekin	216-871-6939
Pa	Villanova, C.I.V. Co.	215-525-7054
RI	Peace Dale, G. Forman Co.., Inc.	401-789-3021
Tex	Dallas, J. M. Spell Co.	214-620-0040
Tex	Houston, Traton, Inc.	713-782-8234
WVa	Wheeling, D & L Sls. Co.	304-232-0490

AMERICAN ASTRIONICS, Div. of Technicolor, 291 Kalmus Dr., Costa Mesa, Cal., 92626, Tel: 714-540-4330; Empl.: 30

Products manufactured: Amplifiers, Converters, Data Acquisition & Reduction Systems, Memories, Buffer, Memory Systems

Local Sales Offices & Reps.

Cal	Costa Mesa, American Astronics	714-540-4330
Fla	Orlando, Scientific Devices	305-424-7932
Va	Springfield, Scientific Devices	703-451-6500

AMERICAN CHEMICAL ETCHING, INC., 13730 Desmond St., Pacoima, Cal., 91331, Tel: 213-896-1188; Empl.: 16

Customer service: T. Boyer

Products manufactured: Antennas, Encoders, Laminations, Services, Assembly, Production & Test, Shields, Springs (All Types), Strip-Line Components, Microwave

AMERICAN DESIGN COMPONENTS, 39 Lispenard St., New York, NY, 10013, Tel: 212-WO 6-5650

AMERICAN ELECTRIC CABLE CO., 181 Appleton St., Holyoke, Mass., 01040, Tel: 413-539-9893; Empl.: 100

For info on price: H. Peterson; Application info: W.M. Mayo; Customer service: W.M. Mayo; Delivery info: W.M. Mayo

Products manufactured: Braid, Cable, Cable Assemblies & Harnesses, Cable, Services, Assembly, Production & Test, Solder (All Types), Strips, Wire, Wire Shielding, Wire Strippers, Wire Twisters

Local Sales Offices & Reps.

Cal	Los Altos, Shannon Elctrns.	415-941-2217
Md	Baltimore, Coulbourn DeGreif Inc.	301-247-4646
Mass	Holyoke, American Electric Cable Co.	413-539-9893
Minn	Minneapolis, International Sales Co.	612-831-8423
Mo	Kirkwood, Limmit Manufacturers' Repr.	314-822-3015
NJ	Hohokus, D.J. Fisher Co., Inc.	201-652-0090
NY	E. Syracuse, Mac-Tron Sales & Engrg., Co.	315-422-2425
Ohio	Cleveland, Milber Co.	216-752-7528
Pa	Ardmore, W.K. Metz	215-649-3966
FOR:	Can., Montreal, Que., McIntyre Agencies Ltd.	514-731-9618

AMERICAN ELEC. HEATER, 6110 Cass Ave., Detroit, Mich., 48202, Tel: 313-875-2505; Empl.: 75; Minimum order: $25

For info on price: D. Wilson; Application info: R. S. Edwards; Customer service: D. Wilson; Delivery info: D. Wilson

Products manufactured: Cleaners, Ultrasonic, Heat Guns, Production, Soldering Accessories, Soldering Equipment, Soldering Guns, Irons & Desoldering Tools, Wire Strippers

Local Sales Offices & Reps.

Ariz	Phoenix, Maddox Sls. Co.	602-274-3807
Cal	Pico Rivera, Maddox Sls. Co.	213-949-5433
Cal	San Diego, Maddox Sls. Co.	714-444-6959
Cal	San Francisco, Maddox Sls. Co.	415-431-2953
Colo	Boulder, Mile High Elctr.	303-444-5615
Fla	Clearwater, H.R. Gross Co.	813-446-6649
Ga	Atlanta, Millar Elctr. Inc.	404-261-6160
Ill	Mt. Prospect, American Electrical Heater Co.	312-253-6813
Ind	Indianapolis, Sukup & Cox Inc.	317-253-5501

Iowa	Des Moines, K. Kelly & Co.	515-255-5501
Kans	Shawnee Mission, K. Kelly & Co.	913-722-0000
La	Metairie, F. McKinney Sls. Co.	504-887-1723
Md	New Carrolton, W. A. Brown Co.	301-577-4527
Mass	Wayland, Ellingwood Inc.	617-358-2883
Mo	St. Louis, K. Kelly & Co.	314-968-3800
NM	Albuquerque, Maddox Sls. Co.	505-298-2422
NY	Cicero, Advanced Comps Corp.	315-699-2671
NY	Clinton, Advanced Comp Corp.	315-853-6438
NY	Elmhurst, Wilson Assoc.	212-899-0929
NY	Endicott, Advanced Comp Corp.	607-785-3191
NY	Scottsville, Advanced Comp Corp.	716-889-1429
NC	Raleigh, Millar Elctr. Inc.	919-787-9585
Ohio	Wickliffe, Associate Sls. Co.	216-585-5445
Okla	Tulsa, J.F. McKinney Sls. Co.	918-742-6791
Ore	Portland, J.W. EcKersley Co.	503-246-3183
Pa	Norristown, American Electrical Heater Co.	215-272-4818
Tex	Dallas, J.F. McKinney Sls. Co.	214-631-9450
Tex	Houston, J.F. McKinney Sls. Co.	713-774-3232
Va	Alexandria, W. A. Brown Co.	703-836-1800
FOR:	Can., Downsview, Ontario, Len Finkler Ltd.	416-630-9103
FOR:	Can., Montreal, Quebec, Len Finkler Ltd.	514-342-9800
FOR:	Can., N. Vancouver, B.C., Len Finkler Ltd.	604-988-2713
FOR:	Can., Sherwood Park, Alberta, Len Finkler Ltd.	403-699-2979

AMERICAN ELECTRONIC CONTROLS, 25 Clark Dr., Barrington, N.J., 08007, Tel: 609-546-5792; Empl.: 23

Customer service: R. Patterson

Products manufactured: Controls/Control Eqpt., Deposition Equipment, Vacuum & Accessories, Heaters & Heating Elements, Test Equipment, Testers, Timers

AMERICAN ELECTRONICS, INC., 1600 E Valencia Dr., Fullerton, Cal., 92631, Tel: 714-871-3020, TWX: 910-592-1256; FSC No: 89321; Empl.: 150; Minimum order: $100

Customer service: B. G. Guy 714-871-3020

Free literature available: Hi-Cycle Inductor-Alternators, 400 cycle Motor-Generator Sets, Permanent Magnet DC Motors, Compensated Computing Resolvers & Amplisolvers, DC Motors, Resolvers, Stepper Motors

Products manufactured: Alternators, Converters, Generators, Motor & Generator Armatures, Rotors, Stators, Motor Electric Generator Sets, Motors, Resolvers, Synchro, Servo Systems, Tachometers

Local Sales Offices & Reps.

Cal	Los Angeles, Products Supply Co.	213-659-1858
Cal	Los Angeles, Sumitomo Shoji Amer.	213-627-4783
Ill	Chicago, Engineered Sls Co.	312-867-8434
Ohio	Lakewood, Power Engrg. Sales	216-221-9090
Wash	Seattle, Instrument Lab.	206-283-5850

AMERICAN GAS & CHEMICALS CO., LTD., 511 E. 72nd St., New York, N.Y., 10021, Tel: 212-535-7336; Empl.: 25

Products manufactured: Detectors

AMERICAN INSTR. CO., Div. Travenol Labs. Inc., 8030 Georgia Ave. - Dept. D16-2, Silver Spring, Md., 20910, Tel: 301-JU 9-1727, TWX: 710-825-9621; Empl.: 572

For info on price: R. Dennis; Application info: F. Quinn; Customer service: R. Dennis; Delivery info: R. Dennis

Products manufactured: Alarms, Baths, Controlled Temperature (Air & Liquid), Chamber, Environmental Test, Controls/Control Eqpt., Data Acquisition & Reduction Systems, Indicators

Local Sales Offices & Reps.

Cal	Santa Ana, American Instr. Co.	714-557-2120
Cal	Sausalito, American Instr. Co.	415-332-4726
Colo	Denver, American Instr. Co.	303-422-6313
Fla	Gainesville, American Instr. Co.	904-378-4612
Haw	Kailua, American Instr. Co.	808-254-2491
Ill	Barrington, American Instr. Co.	312-381-5120
Mass	Bedford, American Instr. Co.	617-275-0014
NJ	Collingswood, American Instr. Co.	609-854-6633
NY	Babylon, American Instr. Co.	212-353-3663
NY	Pittsford, American Instr. Co.	716-334-0110
NC	Black Mountain, American Instr. Co.	704-669-6100
Ohio	Cleveland, American Instr. Co.	216-248-5920
Tex	DeSoto, American Instr. Co.	214-224-1222
Tex	Humble, American Instr. Co.	713-446-7551
FOR:	Can., Don Mills, Ont., American Instr. Co.	416-247-0485

AMERICAN LAVA CORP., Sub 3M Co., Cherokee Blvd. & Mfg. Rd., Chattanooga, Tenn., 37405, Tel: 615-265-3411, TWX: 810-573-5216; Empl.: 2000

Products manufactured: Capacitors, Fixed, Circuits, Printed, Multilayer, Coatings, Compounds, Encapsulating, Insulating, Molding, Potting, Cores, Ceramic, Feedthrus & Seals, Environmental, Heat Sinks, Soldering, Holder & Carriers, Insulators & Insulation, Packages, Integrated Circuit, Seals, Services, Assembly, Production & Test, Substrates, Terminals, Thermocouples, Elements & Accessories, Tubes, Tubing

Local Sales Offices & Reps.

Ariz	Scottsdale, American Lava	602-948-6750
Cal	Los Angeles, 3M Co.	213-726-1511
Cal	San Francisco, 3M Co.	415-761-1155
Conn	Orange, American Lava	203-795-3254
Ill	Bedford Park, 3M Co.	312-585-7800
Ind	Indianapolis, American Lava	317-888-2196
Mass	Boston, 3M Co.	617-449-0300
Minn	St. Paul, 3M Co.	612-733-8407
NJ	West Caldwell, 3M Co.	201-227-9100
NY	Phoenix, American Lava	315-695-3335
Ohio	Cleveland, 3M Co.	216-267-1800
Pa	Philadelphia, 3M Co.	215-742-0200
Tenn	Chattanooga, American Lava	615-877-1677
Tex	Dallas, 3M Co.	214-327-7311
Va	Roanoke, American Lava	703-989-3572

AMERICAN MAGNETICS CORP., P.O. Box 8, Carterville, Ill., 62918, Tel: 618-985-4838; Empl.: 120; Minimum order: $25

For info on price: V. R. Stoner; Application info: R. E. Hume; Customer service: V. R. Stoner; Delivery info: R. L. Watson

Products manufactured: Chokes, Coils Including Assemblies & Forms, Reactors, Transformers

Local Sales Offices & Reps.

Fla	Miami, L. P. Hench Co.	305-652-4991
Ind	Fort Wayne, Component/Insulation Corp.	219-485-7114
Iowa	Cedar Rapids, D. Taylor	319-364-2282
Mass	Newton Upper Falls, Brookdale Elctrns. Engrg.	617-244-6969
Mich	Birmingham, Forand Sls. Co.	313-644-0087
NY	Glen Oaks, S. Oser	212-343-4506
NY	Rochester, L. G. Marchese Assoc.	716-342-7664
Ohio	Cleveland, Component/Insulation corp.	216-521-3570
Okla	Tulsa, Component's Inc.	918-583-9149
Pa	Narberth, S. A. Jeffries	215-664-8500
Tex	Dallas, United Comps.	214-324-1448

AMERICAN MAGNETICS, Box R, Oak Ridge, Tenn., 37830, Tel: 615-482-1056; Empl.: 8

For info on price: D. L. Coffey; Application info: K. R. Efferson; Customer service: E. T. Henson; Delivery info: E. T. Henson

Products manufactured: Coils Including Assemblies & Forms, Magnets

AMERICAN MICROSYSTEMS, INC., 3800 Homestead Rd., Santa Clara, Cal., 95051, Tel: 408-246-0330, TWX: 910-338-0018; Empl.: 3000; Minimum order: $50

For info on price: R. Konrad; Application info: R. Konrad; Customer service: M. Jones; Delivery info: M. Jones

Products manufactured: Display Devices/Displays, Integrated Circuit Devices, Semiconductor Wafer Fabrication

Local Sales Offices & Reps.

Instar		
Ariz	Phoenix, Hecht, Henschen & Assocs.	602-275-4411
Cal	Manhattan Beach, American Micro-systems	213-379-2452
Cal	Mountain View, American Micro-systems	415-969-0610
Fla	Altamonte Springs, American Micro-systems	305-830-8889
Ill	Elk Grove Village, American Micro-systems	312-437-6496
Mass	Norwood, American Micro-systems	617-762-0726
Mich	Brighton, Lowrey & Assocs.	313-227-7067
Mich	Livonia, American Micro-systems	313-478-9339
Minn	Minneapolis, American Micro-systems	612-546-3354
NY	Monsey, American Micro-systems	914-352-5333
NY	Syracuse, Precision Sls. Co.	315-458-2223
Okla	Oklahoma City, Parvin Sls. Co.	
Ore	Beaverton, E. S. Chase Co.	503-649-6177
Pa	Ambler, American Micro-systems	215-643-0217
Pa	Pittsburgh, Compu Graphs	412-366-5056
Tex	Addison, Parvin Sls. Co.	214-239-9148
Tex	Houston, Parvin Sls. Co.	713-784-9900
Tex	Richardson, American Micro-systems	214-231-5721
Wash	Edmonds, E. S. Chase Co.	206-774-3586

AMERICAN MONARCH CORP., 2801-37th Ave., N.E., Minneapolis, Minn., 55421, Tel: 612-788-9161; Empl.: 175

For info on price: R. Sutherland; Application info: L. Anderson; Customer service: R. Sutherland; Delivery info: R. Sutherland

Products manufactured: Chassis, Metal, Chokes, Converters, Eliminators, Battery, Inverters, Power Supplies, Testers, Transformers

Local Sales Offices & Reps.

Cal	Santa Clara, Cummings & Assocs.	408-241-3444
Cal	Woodland Hills, Cummings & Assocs.	213-340-6036
Fla	St. Petersburg, Lanagan Sls. Co.	813-822-1192
Ill	Oak Park, Wasson-Gallagher Inc.	312-261-7517
Md	Baltimore, J.A. Maguire & Co.	301-377-0223
Mass	Lexington, Circuit Sls. Co.	617-861-0567
Mich	Birmingham, Forand Sls. Co.	313-644-0087
NJ	Pennsauken, J.A. Maguire & Co.	609-665-5136
NJ	Plainfield, J.A. Maguire & Co.	201-754-6400
NY	Camillus, Ontec	315-488-2203
NY	Fayetteville, Ontec	
NY	Grand Island, Ontec	716-773-9319
NY	Plainview, Preisick Assoc.	516-681-8444
NY	Rochester, Ontec	716-464-8636
NC	Winston Salem, J.A. Maguire & Co.	919-723-5980
Okla	Oklahoma City, Ammon & Rizos Co.	405-373-2748
Okla	Tulsa, Ammon & Rizos Co.	918-633-8518
Tex	Dallas, Ammon & Rizos Co.	214-233-5591
Tex	Houston, Ammon & Rizos Co.	713-729-1233

AMERICAN OPTICAL CORP., Sci. Instr. Div., Eggert & Sugar Rds., Buffalo, N.Y., 14215, Tel: 716-895-4000; Empl.: 1500

Products manufactured: Microscopes

Local Sales Offices & Reps.

Cal	Los Angeles	213-245-6454
Cal	San Francisco	415-826-8300
Colo	Denver	303-321-1010
Ga	Atlanta	404-881-1426
Ill	Chicago	312-671-3506
Md	Silver Spring	301-585-3681
Mass	Boston	617-782-2538
Mich	Detroit	313-962-0919
Minn	Minneapolis	612-823-8261
Mo	St. Louis	314-531-1155
NY	Buffalo	716-895-4000
NY	New York City	212-986-2300
Ohio	Cincinnati	513-421-4414
Ohio	Cleveland	216-241-0737
Pa	Philadelphia	215-568-1448
Pa	Pittsburgh	412-281-9513
Tenn	Memphis	901-525-4401
Tex	Dallas	214-747-8361
Tex	Houston	713-526-1731

AMERICAN POWER DEVICES, 7 Andover St., Andover, Mass., 01810

AMERICAN POWER SYSTEMS CORP., 51 Jackson St., Worcester, Mass., 01608, Tel: 617-753-8103; Empl.: 51

Products manufactured: Power Supplies

Local Sales Offices & Reps.

Cal	Pasadena, P. Nurches Co.	213-681-8957
Conn	Madison, United Comps. Inc.	203-562-4002
Conn	New Haven, United Comps. Inc.	203-502-4002
Mass	Attleboro, United Comps. Inc.	617-225-0556
Mass	Worcester, Ampsco Mktg. Corp.	617-753-8103
NY	Roslyn Heights, Trauco Assoc. Inc.	516-621-3223
RI	Saunderstown, United Comps. Inc	401-295-8342

AMERICAN RADIO RELAY LEAGUE, 225 Main St., Newington, Conn., 06111, Tel: 203-666-1541; Empl.: 80

Free literature available: Catalogue sheets showing our various publications.

Products manufactured: Technical Books

AMERICAN RESCH. CORP., Rte. 6 & New Britain Ave., Farmington, Conn., 06032, Tel: 203-677-2693; Empl.: 15

For info on price: J. Shamroth; Customer service: T. Augustyn

Products manufactured: Chamber, Environmental Test

AMERICAN SAFETY RAZOR, P.O. Box 500, Staunton, Va., 24401

AMERICAN SMELTING & REFINING CO., 120 Broadway, New York, N.Y., 10005

AMERICAN SWITCH CORP., Sadler St., Gloucester, Mass., 01930, Tel: 617-281-2224; Empl.: 8

Customer service: R. T. Armitage

Free literature available: Comprehensive catalog listing all electrical & mechanical specs plus features, new product insert sheets cross reference sheet price schedule, and listing reps. & distributors.

Products manufactured: Switches

Local Sales Offices & Reps.

Ariz	Scottsdale, Chewer Electronic Sls.	602-994-3288
Cal	Encino, V & L Assocs.	213-986-9703
Cal	San Carlos, D.H. Ross Co.	415-591-4411
Colo	Arvada, Cleveland Entprs. Inc.	303-423-3707
Conn	Wallingford, Com-Sale Assocs.	203-269-7964
Fla	Hollywood, W. Ben Wimberly Co.	305-961-8962
Fla	Orlando, W. Ben Wimberly Co.	305-423-2514
Ga	Smyrna, Fausett of Georgia	404-436-5169
Ill	Streamwood, Al Holte & Assocs.	312-837-4066
Ind	Fort Wayne, Needler Sls. Co. Inc.	219-447-2123
Iowa	Cedar Rapids, J. Vrbik Co.	319-377-8244
Md	Baltimore, Bernard White & Co.	301-484-5400
Mass	Gloucester, American Switch Corp.	617-281-2224
Mass	Waltham, Com-Sale Assocs.	617-890-0011
Minn	Minneapolis, Hasse & Assocs.	612-535-2671
Mo	Saint Louis, Gordon Fixman Eng'g. Co.	314-725-5219
NJ	Teaneck, Stan Axelrod Assocs.	201-836-2661
NM	Albuquerque, Cleveland Entprs. Inc.	505-298-7871
NY	Port Washington, P.D. Aaron Assoc.	516-883-0600
NY	Syracuse, Nycom Inc.	315-437-8343
Ohio	Vandalia, W.J. Braver & Assoc., Inc.	513-898-1224
Ohio	Wickliffe, W.J. Braver & Assoc., Inc.	216-943-0801
Pa	Pittsburgh, W.J. Braver & Assoc., Inc.	412-921-3213
Tex	Dallas, McCoy Assocs.	214-350-9931
Tex	Houston, McCoy Assocs.	713-649-5756
Va	Vinton, Fausett of Georgia	703-890-1128
Wash	Seattle, R.K. Squibb, Inc.	206-632-2450

Local Distributors

Ariz	Scottsdale, Vanguard Supply Co., 10333 N. Scottsdale Rd.	602-948-2240
Cal	Anaheim, Henry Radio Co., 931 N. Euclid St.	714-772-9200
Cal	Buena Pk., S.J. Radio Elctrns., 6001 Beach Blvd.	714-521-1906
Cal	Burlingame, Rose Electr. Dist. Co., 846 Stanton Rd.	415-697-0224
Cal	Canoga Pk., Sandy's Electr. Supply, 21305 Saticoy St.	213-346-8353
Cal	Costa Mesa, Mar-Vac Elctrns., 1829 Newport Blvd.	714-540-3280
Cal	Long Beach, Scott Radio Supply, 266 Alamitos Ave.	213-437-8629
Cal	Los Angeles, Control Parts Distributors, 1252 W. Temple St.	213-625-1488
Cal	Los Angeles, Elec. Switches, 2478 Fletcher Dr.	213-664-1141
Cal	San Jose, Peninsula Elctrn. Supply, 980 S. First St.	408-294-8781
Cal	San Rafael, Elctrns. Plus, 823 Fourth St.	415-457-0466
Cal	Santa Monica, Master Distributors, 1553 17th St.	213-395-2637
Cal	Van Nuys, Patane Avionics, 5937 Kester Ave.	213-968-4455
Fla	Miami, Farreys Hdw. Co., 7225 NW Seventh Ave.	305-754-5451
Ill	Streamwood, GTI Supply, 517 Hillside Dr.	312-837-4066
Iowa	Cedar Rapids, Jerry Vrbik Co., Three 50th St. N.E.	319-377-8244
Md	Beltsville, Treeko Sls., 10739 Tucker St.	301-937-8260
Md	Bethesda, Empire Electr. Supply, 4907 Rugby Ave.	301-656-3300
Mass	Cambridge, Apollo Electr., 101 Binney St.	617-868-3120
Mass	Waltham, QPL Elctrn. Distributors, 47 Calvary St.	617-924-4100
Mich	Grand Haven, GTI Supply, Beechtree Marion	616-842-5430
Minn	Minneapolis, Industrial Components, 5280 W. 74th St.	612-831-2666
NH	Londonderry, Yankee Electr. Supply, Grenier Ind. Village	603-625-9746
NJ	Colonia, Pamco Elctrns., 1333 St. George St.	201-574-9366
NJ	Fairfield, Industrial Elctrns., 1275 Bloomfield Ave.	201-575-8420
NJ	Hackensack, Tide Electr., 97 S. State St.	201-488-3900
NJ	Rockaway, Electrospec, 11 Bank St.	201-625-2300
NY	Melville, Prime Electronics, 275 Broadhollow Rd.	516-420-1600
NY	Mt. Vernon, QAR Industrial Elctrn. Sls., 621 S. Columbus Ave.	914-699-2224
NY	Port Washington, Connector Concepts Corp., 735 P. Washington Blvd.	516-883-0600
Ore	Portland, EOFF Electric Co., 509 NW 10th Ave.	503-222-9411
Pa	Philadelphia, Simco Electronics, 3907 N. Broad St.	
Tex	Dallas, All State Elctrns., 510 S. Good Latimer St.	214-748-6533
Tex	Dallas, Dallas Instruments, 10205 Plano Rd.	214-341-2990
Tex	Dallas, KA Elctrn. Sls., 1220 Majesty	214-634-7870
Tex	Fort Worth, Industry Elctrns. Supply, 1818 E. Dagget Ave.	817-531-2961
Tex	Irving, EDCO Elctrns., 614 Plymouth Pk. Ctr.	214-259-7544
Tex	San Antonio, Sherman Elctrns. Supply, 720 San Pedro Ave.	512-226-0247
Tex	Stafford, Southwest Elctrns., 12725 Royal Dr.	713-782-3060
Wash	Seattle, Radar Electric Co., 168 Western Ave. W.	206-282-2511

AMERICAN TECHNICAL CERAMICS, 1 Norden La., Huntington Sta., N.Y., 11746, Tel: 516-271-9600, TWX: 510-226-6993; FSC No: 29990; Empl.: 150 ...... p. 2•28-31

For info on price: Cust. Sls. & Svc.; Application info: W. F. Hamilton; Customer service: Cust. Sls. & Svc.; Delivery info: Cust. Sls. & Svc.

Free literature available: Send for the following ATC literature: "UHF/Microwave Capacitors" product catalog, THE RF CAPACITOR HANDBOOK, "ATC UHF/Microwave Capacitor Kits", RF Capacitor Technical Chart.

Products manufactured: Capacitors, Fixed, Capacitors, Variable

Local Sales Offices & Reps.

Ala	Huntsville, FM Assocs.	205-536-9990
Ariz	Phoenix, Thorson Co.	602-956-5300
Cal	Burbank, Wright Engrg. Co.	213-843-7240
Cal	San Jose, Allgood North	408-288-6731
Fla	Orlando, FM Assocs.	305-851-5710
Fla	Tequesta, FM Assocs.	305-746-3126
Ill	Chicago, Tech. Sls.	312-237-7210
Md	Randallstown, C. Malinow & Co.	301-922-2092
Mass	Natick, Wayland Engrg. Sls.	617-655-6080
Mo	Kansas City, Harris-Hanson Co.	816-444-9494
Mo	St. Louis, Harris-Hanson Co.	314-432-3611
NM	Albuquerque, Technology Marketing Assocs.	303-841-3435
NY	Liverpool, R & D Assocs.	315-622-2350
NY	Syracuse, Nycom, Inc.	315-437-8343
NC	Greensboro, FM Assocs.	919-294-2754
Ohio	Dayton, Berberich Assocs.	513-433-0342
Tex	Addison, Parvin Sls.	214-239-9148
Tex	Houston, Parvin Sls.	713-721-1054
Wash	Bellevue, Thorson Co.	206-455-9180

AMERICAN TIME PRODUCTS, BULOVA WATCH, 61-20 Woodside Ave., Woodside, N.Y., 11377, Tel: 212-335-6000; Minimum order: $100 p. 1•4,295,1006,1007,1124

Customer service: R. Ansell

Products manufactured: Amplifiers, Analyzers, Bridges, Calibrators, Choppers, Coders, Coils Including Assemblies & Forms, Comparators, Controls/Control Eqpt., Crystals, Decoders, Demodulators, Detectors, Drivers, Chopper, Filters, Generators, Indicators, Inverters, Keyers, Tone, Light Choppers, Meters, Modulator/Demodulators, Modulators, All Kinds, Monitors, Oscillators, Power Supplies, Records, Frequency Test, Regulators, Scanners, Servo Systems, Standards, Switches, Timers, Transducers, Tuning Forks

Local Sales Offices & Reps.

Ariz	Scottsdale, Carter Assocs.	602-947-4355
Cal	Palo Alto, A. Barrauck	415-327-7711
Ill	Chicago, Tech. Rep. Inc.	312-761-0548
Minn	Minneapolis, Torkelson Assocs.	612-835-2414
NY	Buffalo, H.C. Johnson Agencies	716-632-7880
NY	Mamaroneck, Cane Tech. Sls.	914-698-4411
Pa	Glenshaw, H.C. Johnson Agencies	716-482-3000
Tex	Richardson, Carl Tinch Sls. Co.	214-231-1322
EXP:	New York, N.Y., C. Tennant	212-679-1300

AMERICAN TRANS-COIL CORP., 124-06 101st Ave, Richmond Hill, N.Y., 11419, Tel: 212-441-5207; Empl.: 50

Customer service: W. T. Clancy

Free literature available: Bulletins listing items we (ATC) supply for specific military equipment ie: AN/GRC-106-Bulletin #125. Items listed are cross referenced to U.S. Govt. Drawings, Fed. Stock No., and O.E.M. Part No.

Products manufactured: Amplifiers, Chokes, Coils Including Assemblies & Forms, Discriminators, Filters, Networks, Oscillators, Reactors, Transformers

Advertisment

American Trans-Coil Specializes in Military type Coils Transformers and Filters Tolerances within one quarter of one percent. For prototype and production quantities of linear permeable tuned R.F. and I.F. transformers, B.F.O.'s discriminator transformers, R.F. oscillators, toroids, networks and filters-active and passive, send your specifications or drawings for responsive quotations.

AMERICAN ULTRAVIOLET, 320 Commerce St., Chatham, N.J., 07928, Tel: 201-635-8355, Telex: 139266; Empl.: 14; Minimum order: $15

For info on price: G. W. Fitzgerald 201-635-8355; Application info: G. W. Fitzgerald 201-635-8355; Customer service: J. S. Raymond 201-635-8356; Delivery info: D. M. Loges 201-635-8357

Products manufactured: Lamps, Lights, Radiometers, Sockets, Ultraviolet Inspection Lighting

AMERICAN USED COMPUTER CORP., Box 68, Kenmore Sta., Boston, Mass., 02215, Tel: 617-261-1100, TWX: 710-321-6388

Products manufactured: Computers, Converters, Memory Systems, Printers, Punched Card Equipment

AMERICAN VECTOR/TDC, 201 Culver Rd., Dayton, N.J., 08810, Tel: 201-329-4683, TWX: 710-983-4448; Empl.: 175 ...... p. 1•1083

Products manufactured: Amplifiers, Controls/Control Eqpt., Converters, Generators, Inverters, Oceanographic Equip. (Electronic), Oscillators, Power Supplies, Regulators, Services, Assembly, Production & Test, Shifters, Signal Conditioners & Equipment, Standards, Testers, Transformers, Transmitters, Underwater Communication, Detection, Navigation, etc. Equipment, Voltage Sources

Local Sales Offices & Reps.

Cal	Inglewood, L & M Engrg. Inc.	213-674-6850
Cal	San Diego, Qualtronics	714-224-6555
Cal	Santa Clara, L & M Engrg. Inc.	408-243-2891
Ill	Chicago, K. W. Meyers Co.	312-774-6440
Ind	Indianapolis, K. W. Meyers Co.	317-243-6681
Md	Silver Spring, Gawler-Knoop Co.	301-589-4406
Mass	Attleboro, Electronic Sls. of New England	617-222-4078
Minn	Minneapolis, K. W. Meyers Co.	612-920-7080

NJ	Englewood, Central Assocs.	201-568-0808
NM	Albuquerque, Rustco Entprs.	505-296-6474
NY	Plainview, Central Assocs.	516-433-0808
NY	Rochester, Scientific Devices	716-334-2445
Ohio	Cleveland, Automated Equip. & Eng.	216-462-2855
Pa	Philadelphia, W. F. Assocs.	215-224-4120
Pa	Pittsburgh, Automated Equip. & Eng.	412-931-7616
Tex	Houston, Scientific Sls. Co.	713-781-2711
Tex	Richardson, Scientific Sls. Co.	214-231-6541
Wash	Seattle, Hayes Tech.	206-763-2210
FOR:	Can., Scarborough, Ontario, J. De Groot Assoc.	416-264-2991

AMERICAN VIDEONETICS CORP., 795 Kifer Rd., Sunnyvale, Cal., 94086, Tel: 408-732-2000, TWX: 910-339-9362; Empl.: 70; Minimum order: $25

For info on price: R. Meyering; Application info: L. Lehman; Customer service: L. Leahman; Delivery info: R. Meyering

Free literature available: 1. Datacord tape memory systems. Product specifications & application notes on all digital recording devices offered by AVC. 2. Magnetic Head Products. All magnetic head products.

Products manufactured: Heads, Recording Playback, Erase, Memory Systems, Recorders

AMERICAN ZETTLER, INC., 16881 Hale Ave., Irvine, Cal., 92705, Tel: 714-540-4190; Empl.: 70

p. 1•1574-1577,1932

Products manufactured: Covers, Protective (Including Dust), Relays, Retainers, Sockets, Solenoids, Switches

Local Sales Offices & Reps.

Ala	S.E. Huntsville, Elmar Assocs.	215-881-0274
Ariz	Tempe, J.F. Hurlbut Co.	602-968-5962
Cal	Mountain View, G.C. Woempner Co.	415-964-5454
Cal	Santa Monica, Rep Assocs.	213-829-5401
Colo	Golden, J.F. Hurlbut Co.	303-279-7996
Conn	North Haven, Forsberg Sls.	203-239-5111
Fla	Maitland, Barrett Assocs.	305-678-0172
Fla	Miami, Barrett Assocs.	305-681-4957
Ga	Atlanta, Elmar Assocs.	404-938-2821
Ill	Elk Grove Village, Knoblock & Assocs.	312-593-5940
Ind	Indianapolis, Quad-El Inc.	317-356-5449
Kans	Shawnee Mission, Florence & Meyer Inc.	913-722-5210
Kans	Wichita, Florence & Meyer Inc.	316-838-7226
Mass	Brockton, Forsberg Sls.	617-522-6300
Minn	Minneapolis, R.W. Marshall Co.	612-929-0457
Mo	St. Charles, Florence & Meyer	314-724-6690
NJ	Cherry Hill, Danco Elctrn. Sls. Corp.	609-424-5590
NY	Alexander, B.H. Tollefson Assocs.	716-591-1219
NY	Auburn, B.H. Tollefson Assocs.	315-253-4109
NY	Lynbrook, MWM Assocs.	516-593-6190
NY	Rochester, B.H. Tollefson Assocs.	716-271-4141
NC	Raleigh, Elmar Assocs.	919-787-2841
Ohio	Cincinnati, R. Makin Assocs.	513-232-5588
Tex	Dallas, R. Martin Assocs.	214-361-8584
Tex	Houston, R. Martin Assocs.	713-462-4077
Wash	Seattle, Thornson Co.	206-455-9180
Wisc	Milwaukee, Devos/Prinz	414-272-0356
For:	Can., Ottawa, Ont., Lake Engrg.	613-729-6090
For:	Can., Richmond, B.C., Lake Engrg.	604-277-0414
For:	Can., Scarborough, Ont., Lake Engrg.	416-751-5980
For:	Can., St. Laurent, Que., Lake Engrg.	514-747-2441
For:	Can., Winnipeg, Man., Lake Engrg.	604-889-7966

AMERICAN ZETTLER, INC. cont'd

Advertisment

Alois Zettler, a Swiss company, is one of the largest relay and switch manufacturers in Europe. American Zettler, a wholly owned subsidiary, follows the traditional Swiss observance of quality and precision. Assembly and checkout facilities in the United States are staffed by highly skilled and experienced circuit analysts who are on call to assist you in specifying any relay or switch application. A complete stock of products assures you of immediate, off-the-shelf delivery. Our engineers will be glad to provide you with free samples of American Zettler relays and switches and discuss your problems at no cost or obligation. Simply call or write one of the Sales-Engineering Representatives listed, or contact our headquarters in Irvine, California.

AMERSIL, INC., 685 Ramsey Ave., Hillside, N.J., 07205, Tel: 201-688-4500; Empl.: 100; Minimum order: $25

Customer service: Sls. Dept.

Free literature available: Amersil Price list EM-9503-3 Covers a complete line of fused quartz and fused silica products designed to meet the exacting specifications required by the electronic industry.

Products manufactured: Machines/Machinery, Production, Quartz, Fused, Silica, Fused, Substrates, Tubing

Local Sales Offices & Reps.

Cal	Pasadena, Amersil, Inc.
Mass	Plymouth, Amersil, Inc.
Ohio	Cleveland, Amersil, Inc.
Tex	Dallas, Roy Tindel & Assocs.
FOR:	Can., Toronto, Ont., Engelhard Inds. Div.

AMETEK, Applies Materials Div., Station Square Two, Paoli, Pa., 19301, Tel: 215-647-2121

Customer service: R. Menard

Free literature available: Electro Deposition of Aluminum-Four-Page Bulletin AM-102 Describes Ametek, Applied Materials Process For Ambient Temperature Electro Deposition of Aluminum.

Products manufactured: Services, Assembly, Production & Test

Advertisment

Selective gold plating of electronic components such as semiconductors and electrical contacts in production quantities. Also, ambient temperature electrodeposition of aluminum on microelectronic parts to provide excellent corrosion resistance and conductivity. Request free descriptive literature from AMETEK, Applied Materials.

AMETEK CONTROLS DIVISION, 880 Pennsylvania Blvd., Feasterville, Pa., 19047, Tel: 215-355-6900; Empl.: 100

Products manufactured: Coils Including Assemblies & Forms, Controls/Control Eqpt., Demodulators, Indicators, Meters, Power Supplies, Transducers, Transformers, Wire

AMETEK, HUNTER SPRING DIVISION, One Spring Ave., Hatfield, Pa., 19440, Tel: 215-822-2971, TWX: 510-661-4888; FSC No: 6635; QPL No: 43560; Empl.: 375; Minimum order: $25

For info on price: A. Haag; Application info: A. Haag; Customer service: R. Hager; Delivery info: A. Haag

Products manufactured: Forms, Wire, Gages, Mounts, Reels, Cord & Cable, Springs (All Types)

AMETEK/LAMB ELECTRIC, 627 Lake St., Kent, Ohio, 44240, Tel: 216-673-3451; Empl.: 1000

For info. on price: R. Page; Application info: E. J. Moore; Customer service: K. Wagner; Delivery info: R. Page

Free literature available: LC 101 - Capabilities Brochure; LC 102 - Product Selection Guide.

Products manufactured: Blowers & Fans & Accessories, Motors, Pumps, Vacuum

Local Sales Offices & Reps.

Cal	Thousand Oaks, J. H. Leadam	805-497-2817
Colo	Denver, N. Novosel	303-623-4583
Ill	Elk Grove, L. L. Chamberlain	312-255-3097
Minn	Minneapolis, L. D. Dykstra	612-888-9044
NJ	Morristown, W. W. Washnock	201-267-3772
NY	Rochester, P. J. Treveiler	716-436-5700
Ohio	Ravenna, S. W. Mackey	216-296-8867

AMF ELECTICAL PRODS., Development Div., 1025 N. Royal St., Alexandria, Va., 22314, Tel: 703-548-7221, TWX: 703-931-4209; Empl.: 243

Customer service: Mrsp. Jensen

Products manufactured: Alarms, Amplifiers, Annunciators, Cable Assemblies & Harnesses, Circuits, Hybrid, Thick Film, Computers, Oceanographic Equip. (Electronic), Transponders, Underwater Communication, Detection, Navigation, etc. Equipment

AMGLO CORP., 5301 Wesley Terr., Rosemont, Ill., 60018, Tel: 312-671-4321; Empl.: 21

Customer service: D. Novy

Products manufactured: Capacitors, Fixed, Flashers, Lamps, Power Supplies, Tubes

AMI/COAST MAGNETICS, INC., 1207 N. LaBrea Ave., Inglewood, Cal., 90301, Tel: 213-673-3245; FSC No: 22558; Empl.: 50

For info on price: A. Jones; Customer service: J. Zarate; Delivery info: A. Jones

AMP CAPITRON DIV./AMP INC., 1595 S. Mt. Joy St., Elizabethtown, Pa., 17022, Tel: 717-367-1105, TWX: 510-657-4561

p. 1•128,129,526,527,1088,1089; p. 2•450,451

Products manufactured: Cable, Connectors, Converters, Filters, Lead Assemblies & Receptacles, Modulators, All Kinds, Networks, Power Drivers, Hybrid (High Current, High Voltage), Power Supplies, Programmers, Punched Card Equipment, Punches, Chassis, Readers, Transformers

Local Sales Offices & Reps.

Cal	Compton	213-537-4490
Cal	Cupertino	408-255-3830
DC	Wash	202-293-6936
DC	Washington	202-293-6939
Fla	Orlando	305-841-7771
Ill	Hoffman-Estates	312-885-0720
Mass	Needham	617-444-4839
NY	Canadaiga	315-394-0930
NY	Manhasset	516-627-5418
Tex	Richardson	214-231-2118

AMP INC., Ind'l. Div., Box 3608, Harrisburg, Pa., 17105, Tel: 717-564-0100, TWX: 510-657-4110; Empl.: 12,000

Products manufactured: Boards, Programming, Cable, Capacitors, Fixed, Clamps & Clips, Connector Adapters, Connectors, Contacts, Electrical, Converters, Cords, Data Acquisition & Reduction Systems, Fasteners, Filters, Jacks (All Types), Kits, Terminal, Lamps, Lead Assemblies & Receptacles, Lights, Machines/Machinery, Production, Modulators, All Kinds, Networks, Panels, Plugs, Power Supplies, Punched Card Equipment, Readers, Relays, Sockets, Splicers, Coaxial Cable, Splices, wire (Including, Butt & Cap Types), Switches, Terminals, Tools, Transformers, Tubing

Local Sales Offices & Reps.

Cal	Compton	213-537-4490
Cal	Cupertino	408-255-3830
DC	Washington	204-484-9596
Ga	Atlanta	404-934-6363
Ill	Elk Grove Village	312-439-5800
Mass	Weston	617-891-7500
Mich	Southfield	313-645-5590
Minn	Minneapolis	12-831-8242
NJ	Cranford	201-276-4382
NY	Pittsford	716-385-2860
Ohio	Columbus	614-486-0276
Pa	Berwyn	215-647-6060
Tex	Dallas	14-357-9151

AMP SPECIAL INDUSTRIES, Valley Forge, Pa., 19482, Tel: 215-647-1000, Telex: 84-6405; Empl.: 600

For info on price: A. Salvucci; Application info: F. Harned; Customer service: A. Salvucci; Delivery info: A. Salvucci

Free literature available: Product information bulletins (data sheets); catalog-most widely used products; brochures-for specific industries, or product mix.

Products manufactured: Boards, Programming, Caps, Forms & Tapes, Heat Shrinkable, Clamps & Clips, Compounds, Encapsulating, Insulating, Molding, Potting, Connectors, Cords, Cutters, Wire, Hand Operated, Ducts, Wiring, Integrated Circuit Packaging Systems, Kits, Connector, Kits, Terminal, Lamps, Machines/Machinery, Production, Punched Card Equipment, Readers, Relays, Sockets, Splices, wire (Including, Butt & Cap Types), Switches, Terminal Blocks, Boards & Strips, Terminals, Tools, Tubing, Wire & Cable Ties, Wire Strippers

Local Sales Offices & Reps.

Alas	Anchorage, Yukon Radio Supp.	
Cal	Compton, AMP Special Industries	213-639-1691
Cal	San Mateo, AMP Special Industries	415-573-7722
Colo	Denver, AMP Special Industries	303-756-9453
Ga	Atlanta, AMP Special Industries	404-939-7604
Haw	Honolulu, AMP Special Industries	538-3774
Ill	Elk Grove Village, AMP Special Industries	312-439-7800
Mass	Weston, AMP Special Industries	617-899-6700
Mich	Southfield, AMP Special Industries	313-557-1210
Minn	Minneapolis, AMP Special Industries	612-927-5444
Mo	Kansas City, AMP Special Industries	816-753-6245
NJ	Cranford, AMP Special Industries	201-276-8300
Ohio	Cincinnati, AMP Special Industries	513-821-6650
Pa	Paoli, AMP Special Industries	215-647-3250
Pa	Philadelphia, AMP Special Industries	215-647-3250
Pa	Pittsburgh, AMP Special Industries	412-344-7900
Tex	Dallas, AMP Special Industries	214-631-0850

AMERICAN MICROWAVE INDS., INC., 140 Fourth Ave., Waltham, Mass., 02154, Tel: 617-890-4750, TWX: 710-324-6377; Empl.: 234

For info on price: E. J. DeVita; Application info: B. W. Cooper; Customer service: C. Lewis; Delivery info: Sls. Dept.

Products manufactured: Adapters, Waveguide, Attenuators, Bends & Twists, Microwave, Cable Assemblies & Harnesses, Caps, Connector, Connector Adapters, Connectors, Couplers, Detectors, Dividers, Dummy Loads, Junctions, Hybrid, Microwave, Microwave Integrated Circuits (MIC's), Mixers, Modulators, All Kinds, Strip-Line Components, Microwave, Switches, Terminals, Tools, Waveguides & Adapters

Local Sales Offices & Reps.

Cal	Anaheim, American Microwave Ind. S/W	714-956-1800
Cal	Santa Clara, American Microwave Ind. N/W	408-249-5172
Colo	Boulder, J. Smith & Assoc.	303-442-7100
Fla	Palm Bay, Spartech Assoc.	305-727-8045
Ga	Smyrna, Spartech Assoc.	404-432-3644
Kans	Shawnee Mission, Tech. Sls. Assoc.	913-888-3330
Md	Lanham, Brimberg Assoc., Inc.	301-552-2200
Mass	Burlington, Burlington Sls.	617-272-7655
NM	Albuquerque, J. Smith & Assocs.	505-265-3406
NY	Syracuse, C.W. Floring & Assoc.	315-478-2149
NY	Tuckohoe, Asco Electronics	914-779-8110
Ohio	Dayton, Genelco	513-299-1819
Ore	Beaverton, Arneson Assoc.	503-646-6064
Pa	Plymouth Meeting, R. Mar Co.	215-825-2841
Tex	Ft. Worth, W. Pat Fralia Co., Inc.	817-738-2394
Wash	Redmond, Desco, Northwest	206-455-9325

AMPEREX ELCTRONIC CORP., Electro-Optical Devices Div., Box 278, Slatersville, R.I., 02876, Tel: 401-762-3800, TWX: 710-382-6332; Empl.: 250 p. 1•2350,2351

Products manufactured: Capacitors, Fixed, Cavities, Microwave, Cells, Photoconductive, Photoemissive, Photovoltaic, Coils Including Assemblies & Forms, Connectors, Couplers, Detectors, Diodes, Intensifiers, Image, Oscillators, Rectifiers, Scanners, Switches, Thyristors (Includes Silicon Controlled Rectifiers), Transistors, Tubes, Yokes

Local Sales Offices & Reps.

Ala	Huntsville, NAPECC	205-543-7351
Ariz	Phoenix, NAPECC	602-279-9588
Cal	N. Hollywood, NAPECC	213-762-2118
Cal	San Diego, NAPECC	714-453-5440
Cal	Santa Clara, NAPECC	408-249-1134
Colo	Denver, NAPECC	303-922-8434
Fla	Ft. Lauderdale, NAPECC	305-772-2840
Ill	Elk Grove Vil., NAPECC	312-593-8220
Ind	Indianapolis, NAPECC	317-257-6547
Mass	Waltham, NAPECC	617-899-7100
Mich	Southfield, NAPECC	313-357-4288
NJ	Rochelle Park, NAPECC	201-843-4810
NY	Hicksville, NAPECC	516-931-6200
Ohio	Dayton, NAPECC	513-278-7351
Pa	King of Prussia, NAPECC	215-265-4240
Tex	Dallas, NAPECC	214-691-2141
Va	Richmond, NAPECC	804-282-6515
Wash	Bellevue, NAPECC	206-746-3600

AMPEREX ELECTRONIC CORP., Hicksville Div., Box 418 - 230 Duffy Ave., Hicksville, N.Y., 11802, Tel: /516-931-6200, TWX: 501-221-1839; Empl.: 400 p. 1•2352,2353

Products manufactured: Amplifiers, Batteries, Cable, Capacitors, Variable, Cavities, Microwave, Cells, Photoconductive, Photoemissive, Photovoltaic, Circulators, Ferrite, Detectors, Diodes, Oscillators, Photomultiplier Tube Housings, Printers, Rectifiers, Spark Gaps, Speaker Systems, Speakers, Switches, Thermocouples, Elements & Accessories, Thyristors (Includes Silicon Controlled Rectifiers), Transducers, Transistors, Tubes, Wire

Local Sales Offices & Reps.

Ala	Huntsville, NAPECC	
Ariz	Phoenix, NAPECC	
Cal	N. Hollywood, NAPECC	
Cal	San Diego, NAPECC	714-453-2925
Cal	Santa Clara, NAPECC	
Col	Denver, NAPECC	
Conn	Shelton, Comark Assocs.	203-929-4884
Fla	Ft. Lauderdale, NAPECC	
Fla	Winter Park, NAPECC	
Ind	Indianapolis, NAPECC	
Ill	Elk Grove Village, NAPECC	312-593-8220
Kans	Olathe, B.C. Elctrn. Sls.	
Mass	Waltham, NAPECC	617-899-7100
Mich	Hazelwood, B.C. Elctrn. Sls.	
Mich	Southfield, NAPECC	
Minn	Minneapolis, Siedare Assocs.	612-533-2294
NJ	Rochelle Park, NAPECC	
NY	Endicott, Tech-Mark, Inc.	607-748-7473
NY	Fairport, Tech-Mark	
NY	Hicksville, NAPECC	
NY	Liverpool, Tech-Mark	
NY	Pleasant Valley, Tech-Mark	
NY	Port Chester, Radiation Elctrns.	
NC	Raleigh, Candor Co.	
Ohio	Dayton, NAPECC	
Ore	Portland, Western Tech. Sls.	
Pa	King of Prussia, NAPECC	
SC	Myrtle Beach, Candor Co.	803-448-5213
Tenn	Chattanooga, Candor Co.	
Tex	Dallas, NAPECC	
Va	Richmond, NAPECC	
Wash	Bellevue, NAPECC	
Wash	Bellevue, Western Technical Sls.	
FOR:	Can. Vancouver, B.C., Philips	
FOR:	Can., Montreal, Que., Philips Elctrns. Inds., Ltd.	
FOR:	Can., Toronto 17, Ont., Philips Elctrns. Inds., Ltd.	

AMPEREX ELECTRONIC CORP., Providence Pike, Slatersville, R.I., 02876, Tel: 401-762-9000, TWX: 710-387-1591; FSC No: 73445; Empl.: 388; Minimum order: $100

For info on price: Cust Svc; Application info: Mktg Svcs; Delivery info: Cust Svc

Products manufactured: Amplifiers, Circuits, Hybrid, Thick Film, Circuits, Hybrid, Thin-Film, Delay Lines, Diodes, Integrated Circuit Devices, Rectifiers, Regulators, Transformers, Transistor, Diode, Thyristor Heat Dissipators, Transistors, Tubes, Yokes

Local Sales Offices & Reps.

Ala	Huntsville	205-534-7351
Ariz	Phoenix	602-279-9588
Cal	North Hollywood	213-762-2118
Cal	San Diego	714-453-9250
Cal	Santa Clara	408-249-1134
Colo	Denver	303-922-8434
Fla	Fort Lauderdale	305-772-2840
Fla	Winter Park	305-678-2522
Ill	Elk Grove Village	312-593-8220
Ind	Indianapolis	317-257-6547
Mass	Waltham	617-899-7100
Mich	Southfield	313-357-4288
NJ	Rochelle Park	201-843-4810
NY	Hicksville	516-931-6200
Ohio	Dayton	513-278-7351
Pa	King of Prussia	215-265-4240
Tex	Dallas	214-691-2141
Va	Richmond	703-282-6515

AMPERITE CO., INC., 600 Palisade Ave., Union City, N.J., 07087, Tel: 201-UN 4-9504; Empl.: 76

Products manufactured: Relays

AMPEX CORP., 401 Broadway, Redwood City, Cal., 94063, Tel: 415-367-2011, TWX: 415-364-9034; Empl.: 14000

Products manufactured: CATV Systems & Equipment, Cores, Magnetic, Demagnetizers, Duplicators, Editing Equipment, Tape, Erasers, Magnetic Tape (Bulk), Heads, Recording Playback, Erase, Memory Systems, Mixers, Recorders, Services, Assembly, Production & Test, Splicing Equipment, Magnetic Tape, Tape Recording Accessories, Tape Search Equipment, Tapes, Recording, Magnetic (All Types), Television Systems & Equipment Closed-Circuit

AMPHENOL CADRE DIV., Bunker Ramo Corp., 20 Valley St., Endicott, N.Y., 13760, Tel: 607-754-4444; Empl.: 750 p. 2•460,461

Customer service: E. Exley

Free literature available: TC-1 Telephone Products Catalog- Standard products such as running cable, delta splices, & custom capabilities. FC-1 describes Cadre's capabilities in custom interconnection, backplane wiring, cable & harness assemblies. ACCESS&T describes our selective decapsulation process.

Products manufactured: Backpanel Interconnect Systems, Boards, Printed Wiring, Universal, Braid, Cable, Cable Assemblies & Harnesses, Cable, Clamps & Clips, Compounds, Encapsulating, Insulating, Molding, Potting, Machines/Machinery, Production, Services, Assembly, Production & Test, Strain Reliefs, Cable & Wire, Strip-Line Components, Microwave

(Refer to Amphenol Sales Div for sales office information)

AMPHENOL CANADA LTD., 44 Metropolitan Rd., Scarborough, (Ont.), Can., Tel: 416-291-4401, TWX: 06-217-676; Empl.: 125 p. 2•460,461

For info on price: R. M. Newbord 416-291-4401; Application info: R. M. Newbord 416-291-4401; Customer service: E. Farquharson 416-291-1621; Delivery info: E. Farqharson 416-291-1621

Free literature available: Catalog FC-3. Containing application data and mechanical, electrical and dimensional specifications on 481 and 482 series filter connector systems. Performance data is also included.

Products manufactured: Connectors, Filters

Refer to Amphenol Sales Div. for sales off. information

AMPHENOL COMPS. GRP. MKTG., Bunker Ramo Corp., 900 Commerce Dr., Oak Brook, Ill., 60521, Tel: 312-654-3100, TWX: 910-651-0191

Products manufactured: Services, Assembly, Production & Test

Refer to Amphenol Sales Div. for sales office information

AMPHENOL COMPONENT MKTG. SVC., 2875 S. 25th Ave., Broadview, Ill., 60153, Tel: 312-345-4260, TWX: 910-226-1961; Minimum order: $50 p. 2•460,461

Customer service: L. F. Edwards

Free literature available: 760 series cooling fan catalog - long life ball bearing & extra thin fans 390 series cooling fans-catalog-lowest cost fans 279 catalog-miniature epoxy encapsulated power supplies

Products manufactured: Blowers & Fans & Accessories, Power Supplies

Local Sales Offices & Reps.

Ala	Huntsville, Young & Lawrence Assoc., Inc.	205-539-6575
Ariz	Phoenix, MR Engineering Sales Co.	602-959-5150
Cal	Los Angeles, M. A. Stolaroff Co.	213-295-7781
Cal	San Diego, M. A. Stolaroff Co.	714-234-6905
Cal	Santa Clara, Nova-Tronix	408-243-9530
Colo	Boulder, Comp. Prods. Sls. Co.	303-444-2730
Fla	Ft. Lauderdale, Young & Lawrence Assoc.	305-563-6717
Fla	St. Petersburg, Young & Lawrence Assoc., Inc.	813-894-0026
Fla	Winter Park, Young & Lawrence Assoc., Inc.	305-647-6929

Ill	DesPlaines, Lincoln, Hodges & Assocs.	312-297-3810
Ind	Indianapolis, Marketing Engineers Inc.	317-546-1523
Kans	Wichita, Dy-Tronic, Inc.	316-943-6221
Md	Baltimore, J.R. Daniels & Co.	301-825-3330
Mass	Lexington, J.E. Boeing Co., Inc.	617-862-2500
Mich	Benton Harbor, Ken-Mor Assocs., Inc.	616-927-3134
Mich	Rochester, Ken-Mor Assocs., Inc.	313-651-1890
Minn	Minneapolis, Milt Westland Assocs.	612-866-5002
Mo	Hazelwood, DY-Tronix Inc.	314-731-5799
Mo	Kansas, Dy-Tronix, Inc.	816-761-6543
NY	Jamaica, S-J Sls. Assocs., Inc.	212-291-3232
NY	Syracuse, C. W. Floring & Assoc.	315-478-2149
NC	Raleigh, Candor Co.	919-876-4999
Ohio	Dayton, The Whelan Corp.	513-434-7551
Pa	King of Prussia, Montero Assocs.	215-265-0634
Pa	Media, W. Reeves Assocs., Inc.	215-566-6709
SC	Myrtle Beach, Candor Co.	803-448-8361
Tenn	Chattanooga, Candor Co.	615-894-7454
Tex	Austin, K&H Sls. Co.	512-836-2842
Tex	Plano, K & H Sls. Co.	214-423-6520
Va	Lynchburg, Candor Co.	804-846-6579
Wash	Bellevue, Ruggles Technical Sls.	206-455-2778
Wisc	Waukesha, Lincoln, Hodges & Assocs.	414-542-3087

Local Distributors

Ariz	Phoenix, Moltronics of Ariz., 2746 West Palm La.	602-272-7951
Cal	Garden Grove, Allied Elctrns., 12311 Industry St.	213-598-6605
Cal	San Carlos, Sterling Elctrns., 1061 Industrial Way	415-592-2353
Cal	San Diego, Moltronics, 7969 Engineer Rd.	
Cal	South Gate, Moltronics, 5610 East Imperial Hwy.	213-773-6521
Cal	Sunnyvale, Acacia Sls., 384 San Aleso Ave.	408-735-0100
Colo	Lakewood, Acacia Sls., 11111 W. 8th Ave.	303-232-2882
Ill	Elgin, Allied Elctrns., 1355 Sleepy Hollow Rd.	312-697-8200
Ind	Fort Wayne, Fort Wayne Elctrns. Supply, 3606 Maumee Ave.	219-423-3422
Ind	Indianapolis, Graham Elctrns., 133 S. Pennsylvania	317-634-8202
Ind	Indianapolis, Meunier Elctrn. Supply, 3409 E. Washington	317-635-3511
Ind	Indianapolis, Ra-Dis-Co., 814 N. Senate Ave.	317-637-5571
Ind	South Bend, Radio Distributing Co., 1212 High St.	219-287-2911
Ky	Louisville, P.I. Burks Co., 842 S. 7th St.	502-589-3960
Md	Baltimore, Technico, 1404 Bare Hills Ave.	301-828-6416
Md	Savage, Pyttronics Inds., 8220 Wellmorr Ct.	301-792-7000
Mass	Braintree, Allied Elctrns., One Century Circle, Campanelli Industrial Pk.	617-848-4150
Mass	Watertown, DRW Elctrns. Corp., 600 Pleasant St.	617-923-1900
Minn	Minneapolis, Industrial Comps., 5280 W. 74th St.	612-831-2666
NY	Binghamton, Federal Elctrns., Box 1208	607-748-8211
NY	Farmingdale, DRW Elctrns. Corp., 100 Milbar Blvd.	516-249-2660
NC	Greensboro, Technico, 6223 Tri Port Ct.	919-294-1065
Ohio	Cincinnati, Schuster Elec. Co., 11320 Grooms Rd.	513-984-1600
Ohio	Medina, DRW Elctrns. Corp., 7409 Spencer Lake Rd.	216-725-6422
Pa	Montgomeryville, Pyttronics Inds., Stump Rd., Box 433	215-643-2850
Tex	Dallas, Solid State Elctrns. Co., 2643 Manana Dr.	214-352-2601
Tex	Fort Worth, Allied Elctrns., 401 E. 8th St.	817-336-5401
Tex	Houston, Solid State Elctrns. Co., Box 36849	
Utah	Salt Lake City, W.H. Bintz Co., 433 W. Third St., Box 1350	801-363-5821
Va	Norfolk, Priest Elctrns., 6431 Tidewater Dr.	703-855-0141
Wash	Seattle, Zepher Elctrns. Sls. Co., 647 Industrial Dr.	206-242-2517

AMPHENOL CONNECTOR DIV., Bunker Ramo Corp., 2801 S. 25th Ave., Broadview, Ill., 60153, Tel: 312-261-2000, TWX: 910-226-1974; Empl.: 1000 p. 2•460,461

Products manufactured: Caps, Connector, Clamps & Clips, Connector Adapters, Connectors, Contacts, Electrical, Lead Assemblies & Receptacles, Plug Adapters, Plugs, Strain Reliefs, Cable & Wire, Thermocouples, Elements & Accessories, Tools

Refer to Amphenol Sales Div. for sales office information.

AMPHENOL CONNECTOR DIV., CONTROLS OPERS., Bunker Ramo Corp., 2801 S. 25th Ave., Broadview, Ill., 60153, Tel: 312-261-2000, TWX: 910-226-1974; Empl.: 250 p. 2•460,461

Products manufactured: Counters, Dials, Gages, Potentiometers, Resistors, Switches, Transducers

Refer to Amphenol Sales Div. for sales office information.

AMPHENOL CONNECTOR DIV., SAMS OPERS., Bunker Ramo Corp., 9201 Independence Ave., Chatsworth, Cal., 91311, Tel: 213-341-0710, TWX: 910-494-1211; Empl.: 500 p. 2•460,461

Products manufactured: Braid, Cable, Cable, Connectors, Feedthrus & Seals, Environmental, Plugs, Services, Assembly, Production & Test, Terminals, Wire

Refer to Amphenol Sales Div. for sales office information.

AMPHENOL IND'L. DIV., Bunker Ramo Corp., 1830 S. 54th Ave., Chicago, Ill., 60650, Tel: 312-242-1000, TWX: 910-229-1541; Empl.: 2000 p. 2•460,461

Products manufactured: Boards, Programming, Caps, Connector, Clamps & Clips, Connector Adapters, Connectors, Contacts, Electrical, Cords, Holder & Carriers, Jacks (All Types), Kits, Connector, Pins, Plugs, Shields, Sockets, Strain Reliefs, Cable & Wire, Terminals, Tools

Refer to Amphenol Sales Div. for sales office information.

AMPHENOL RF DIV., Bunker Ramo Corp., 33 E. Franklin St., Danbury, Conn., 06810, Tel: 203-743-9272, TWX: 710-456-0281; Empl.: 700 p. 2•460,461

For info on price: A. Kasiewicz; Application info: Adv. Mgr.; Customer service: Prod. Mgr.

Products manufactured: Adapters, Waveguide, Antenna Switching Matrices, Arresters, Electrical Surge, Lightning, Cable Assemblies & Harnesses, Cable, Connector Adapters, Connector Blocks, Mother Board, Connectors, Contacts, Electrical, Delay Lines, Feedthrus & Seals, Environmental, Horns, Microwave, Integrated Circuit Packaging Systems, Jack Adapters (All Types), Kits, Connector, Lead Assemblies & Receptacles, Line Strechers, Microwave, Packages, Integrated Circuit, Plug Adapters, Relays, Seals, Shifters, Shutters, Microwave, Slide Rules (Circuitry Computing), Strip-Line Components, Microwave, Switches, Tees, Terminals, Tools, Waveguides & Adapters

Refer to Amphenol Sales Div. for sales office information

AMPHENOL SALES DIV., Bunker Ramo Corp., 2875 S. 25th Ave., Broadview, Ill., 60153, Tel: 312-345-4260, TWX: 910-226-1961 p. 2•460,461

Products manufactured: Cable Assemblies & Harnesses, Caps, Connector, Clamps & Clips, Connector Adapters, Connectors, Contacts, Electrical, Dials, Pins, Plugs, Potentiometers, Power Supplies, Services, Assembly, Production & Test, Shields, Sockets, Strain Reliefs, Cable & Wire, Switches, Tools, Transducers

Local Sales Offices & Reps.

Cal	Los Angeles, Amphenol Sls. Div.	213-649-5015
Cal	San Francisco, Amphenol Sls. Div.	408-732-8990
Colo	Denver, Amphenol Sls. Div.	303-758-8033
DC	Washington, Amphenol Sls. Div.	703-525-2818
Fla	Orlando, Amphenol Sls. Div.	305-647-5504
Ill	Chicago, Amphenol Sls. Div.	312-345-9000
Ind	Indianapolis, L.M. DeVoe Co.	317-257-1227
Kans	Kansas City, Amphenol Sls. Div.	913-888-7223
Mass	Boston, R. Purinton	617-475-7055
Minn	Minneapolis, Amphenol Sls. Div.	612-835-4595
Mo	St. Louis, Amphenol Sls. Div.	314-895-1400
NY	New York, Amphenol Sls. Div.	516-364-2270
NY	Syracuse, Amphenol Sls. Div.	315-455-5786
NC	Greensboro, Amphenol Sls. Div.	919-275-8644
Ohio	Dayton, Amphenol Sls. Div.	513-294-0461
Pa	Philadelphia, Amphenol Sls. Div.	609-234-3434
Tex	Dallas, Amphenol Sls. Div.	214-235-8318
Wash	Seattle, Amphenol Sls. Div.	206-455-2525
EXP:	Broadview, Ill., Amphenol Sls. Div.	312-345-4260

Local Distributors

See Page 2•463 for Amphenol local distributor listings.

AMPLICA INC., 780 Lakefield/Bldg. F, Westlake Village, Cal., 91361, Tel: 213-889-8700, TWX: 910-336-1546; FSC No: 51025; Empl.: 19

Customer service: J.A. Cole

Products manufactured: Amplifiers, Converters, Isolators

Local Sales Offices & Reps.

Cal	Mt. View, D. Lay Assocs.	415-968-7500
Cal	Westlake Village, MCA Repco	213-889-5553
Fla	Clearwater, Southeastern Comp. Sls. Inc.	813-531-8324
Ill	Park Ridge, RF Specialists	312-698-2044
Mass	Reading, Geder-Rotondi Assoc.	617-944-3105
NY	Bayside, R. Diamond	212-423-7330
Pa	Ambler, WM Assocs.	215-643-4119
Tex	Arlington, N&W Sls.	817-461-4443
Va	Alexandria, Vanguard Eng. Sls.	703-768-1660
Wash	Seattle, R. Drake Assoc.	206-763-2755
EXP:	Los Angeles, Cal., Trans-World Trade	213-472-0444
FOR:	Can., Montreal260, Que., Soquelec, Ltd.	514-482-6427

AMPLIFIER RESEARCH CORP., 160 School House Rd., Souderton, Pa, 18964, Tel: 215-723-8181; Empl.: 10 p. 1•2,3

For info on price: D. W. Roth; Application info: D. R. Shepherd; Customer service: D. W. Roth; Delivery info: D. W. Roth

Free literature available: Data Folder: Contains individual data sheets for broad band, high power RF amplifiers giving complete specifications and performance data. Price schedule showing price & delivery for small quantities also included.

Products manufactured: Amplifiers, Transformers

Local Sales Offices & Reps.

Cal	Los Angeles, RF Assocs.	213-478-1586
Cal	Palo Alto, RF Assocs.	415-494-3331
Conn	Hamden, Scientific Devices	203-298-9361
Fla	Orlando, Truex Assocs.	305-859-2160
Ill	Chicago, Elctrn. Instr. Assocs.	312-271-3774
Ind	Indianapolis, Elctrn. Instr. Assocs.	317-257-7231
Md	Woodbine, Morar Assocs.	301-924-2169
Mass	Waltham, Scientific Devices-New England	617-894-5637
NJ	Westfield, Gray & Reed Assocs.	201-233-6116
NY	New York, Gray & Reed Assocs.	516-433-3333
Pa	Melrose Park, R. Meyers Assoc.	215-224-1663
Tex	Dallas, Airep Elctrns. Inc.	214-827-2120
EXP:	Indianapolis, Ind., Texscan Tech. Prods.	317-357-8781
FOR:	Can., Winnipeg R2V-OX1, Electrodesign Ltd.	204-338-5050
FOR:	Can., La Salle 650, Quebec, Electrodesign Ltd.	514-363-5120
FOR:	Can., Ottawa 7, Ont., Electrodesign Ltd.	613-745-0541
FOR:	Can., Toronto 19, Ont., Electrodesign Ltd.	416-787-0991

AMPOWER SEMICONDUCTOR CORP., 375 Kings Highway, Smithtown, N.Y., 11787, Tel: 516-582-6767; FSC No: 52333; Empl.: 45

Customer service: J. Krasny

Free literature available: Short Form Catalog; list of JAN, JAN-TX, JAN-TXV power transistors.

Products manufactured: Transistors

Local Sales Offices & Reps.

Ariz	Scottsdale, Fred Board Assoc.	602-994-9388
Cal	Lafayette, Phillips Assoc.	415-284-2579
Cal	Marina Del Rey, Westaironics	213-821-7958
Fla	Orlando, Geartner Assoc.	305-299-1000
Ill	Bellwood, FIAT Eng'g	312-547-6200
Ind	Ft. Wayne, Delesa Sls.	219-483-9537
Md	Towson, L.H. Kolman Asso.	301-752-8756
NJ	Holbrook, R.O.M.E.	516-488-7777
Ohio	Dayton, Oliver Penrod Assoc.	513-258-2143
Pa	Colmar, E.L. Asso.	215-822-2510
Pa	Erie, ECCO Sls.	814-452-3762
Tex	Richardson, Thornton-Leeper Assoc.	214-231-6891

AMPRO CORP., 2220 Maplewood Ave., Willow Grove, Pa., 19090, Tel: 215-657-3100; Minimum order: $25

For info on price: A. Meyer; Application info: E. M. Mullin; Customer service: H. N. Larkin; Delivery info: R. F. Grochowski

Free literature available: CARTRIDGE TAPE EQUIPMENT - Radio broadcasting and recording studio playback and record, endless loop type equipment. CONSOLES: - Audio mixers, 4 channel thru 12 channel, available in monaural, dual monaural, stereo and dual stereo, rotary and slide faders up to 48 inputs.

Products manufactured: Amplifiers, Cases, Equipment, Instrument, Meter, Recorders, Tape Recording Accessories, Tape Search Equipment, Transports, Tape (all kinds)

AMPROBE INSTR., Div. SOS Consolidated Inc., 630 Merrick Rd., Lynbrook, N.Y., 11563, Tel: 516-LY 3-5600

Products manufactured: Meters, Monitors, Probes, Pyrometers, Recorders, Testers, Transducers

AMTRON DIV., Sippican Corp., 14820 S. Kedzie Ave., Midlothian, Ill., 60445, Tel: 312-389-3955, TWX: 910-689-4494; FSC No: 5808; Empl.: 400; Minimum order: $15

Customer service: L. Burdick

Free literature available: Application Notes: Controls for Automation Switchboard Brochures: Military and Commercial Relays Brochures: Solid State and Time Delay

Products manufactured: Comm. Systems, Controls/Control Eqpt., Counters, Relays, Switchboards, Timers

AMUNEAL MFG. CORP., 4737 Darrah St., Philadelphia, Pa., 19124, Tel: 215-535-3000; FSC No: 23740; Empl.: 35; Minimum order: $25

For info on price: S.M. Kamens; Application info: E. Kunz

Free literature available: Our catalogue describes a complete line of standard and custom shields for magnetic sensitive tubes and components. Sample of Wrap Around Shielding Foil is supplied in our catalogue available for engineering evaluation.

Products manufactured: Foil, Shields

Local Sales Offices & Reps.

Cal	Redwood City, Parks & Pruitt Assocs.	415-364-1640
Cal	Santa Ana, C.E.M., Inc.	714-835-2702
Colo	Denver, Walter Engrg. Assocs.	303-777-5585
Fla	Hallandale, L.M. Bairstow Assocs.	305-927-2421
Ill	Wilmette, Crest Assocs.	312-256-5202
Ind	Indianapolis, Crest Assocs.	317-844-2800
Md	Pikesville, A. Wetterhahn Co.	301-484-6376
Mass	Framingham, L. Roffer Co.	617-877-4900
Mich	Jackson, Norwood Scroggs Co.	517-750-1170
Minn	Minneapolis, R-J, Inc.	612-922-1425
NJ	Oaklyn, A. Wetterhahn Co.	609-858-3003
NY	Queens Village, Buscaglia Assocs.	212-468-3666
Ohio	Cincinnati, R. Makin Assocs.	513-232-5588

Advertisment

Amuneal offers a complete line of standard and custom shields for magnetic-sensitive tubes and components, including weld-fabricated or spun CRT shields, printed circuit shields, drawn can shields, and foil Wrap-Around Shielding, supplied in rolls. Amuneal "U-Tile-Mu" Shielding Tiles, 6"x6" or 12"x12", with pressure-sensitive adhesive backing, provide a simple, versatile means for do-it-yourself magnetic shielding of rooms, test chambers, cabinets, etc. Ask for literature. Free sample of wrap-around shielding included.

A. M. W. CORP., 78 Bow, Arlington, Mass., 02174, Tel: 617-643-9600; Empl.: 25

For info on price: W. C. Mears 617-643-9600; Application info: F. F. Maxant 617-641-0080; Customer service: E. Murphy 617-643-9600; Delivery info: L. Kelly 617-641-0080

Free literature available: Brochures (flyers) on oversewing machine, versamatic, hydropress & linamatic giving characteristics & specifications. Facilities listing of machine shop & assembly equipment & capabilities

Products manufactured: Cams, Machines/Machinery, Production, Services, Assembly, Production & Test

Local Sales Offices & Reps.

Cal	Los Angeles, Gane Brothers & Lane, Inc.	213-RI9-8388
Cal	San Francisco, Gane Brothers & Lane, Inc.	415-396-3290
Ga	Atlanta, Gane Bros. & Lane Inc.	404-758-1411
Ill	Chicago, Gane Bros. & Lane, Inc.	312-666-5840
Mo	St. Souis, Gane Bros. & Lane, Inc.	314-OL2-2700
NY	New York City, Gane Bros. & Lane, Inc.	212-WA5-0400
NY	Port Washington, Robbins & Bendror Assoc.	516-868-7220
Tex	Dallas, Gane Bros. & Lane, Inc.	214-ME7-0700
Wash	Seattle, Gane Bros. & Lane, Inc.	206-622-5454

THE ANACONDA COMPANY BRASS DIVISION, 414 Meadow St., Waterbury, Conn., 06720, Tel: 203-757-2021, TWX: 710-477-0925; Empl.: 5000

Free literature available: Anaconda Publication #C-25 offers electrical properties and uses of copper conductors including physical and electrical uses in engineering design with dimensions, weights, etc.

Products manufactured: Alloys, Bus Bars & Systems, Conduit, Electrical, Tubing

Local Sales Offices & Reps.

Cal	Oakland	415-562-2131
Cal	Paramount	213-636-0321
Colo	Denver	303-534-8764
Conn	Waterbury	203-757-2021
Fla	Tampa	813-839-5363
Ga	Atlanta	404-261-4681
Ill	Hinsdale	312-242-1414
Ind	Indianapolis	317-546-1151
Iowa	Cedar Rapids	319-364-2465
Mass	Braintree	617-848-6680
Mich	Detroit	313-554-3500
Minn	Minneapolis, 612-920-6393	
Miss	Jackson	601-354-4391
Mo	Kansas City	816-753-3341
Mo	St. Louis	314-966-0606
NY	Amherst	716-835-3915
NY	New York City	212-697-1166
NY	Syracuse	315-422-1205
NC	Charlotte	704-568-2422
Ohio	Cincinnati	513-421-9050
Ohio	Cleveland	216-251-1105
Ohio	Worthington	614-888-1985
Pa	Frazer	215-647-0600
Pa	Pittsburgh	412-341-5185
Tex	Dallas	214-368-6311
Tex	Houston	713-529-4741
Wisc	Milwaukee	414-258-7600

THE ANACONDA CO., Wire and Cable Div., Greenwich Office Park 3, Greenwich, Conn., 06830, Tel: 203-661-0090, TWX: 710-579-2970

Products manufactured: Cable, Cams, Wire, Wire Shielding

ANADEX INSTRS., INC., 7833 Haskell Ave., Van Nuys, Cal., 91406, Tel: 213-782-9527, TWX: 910-495-1762; Empl.: 75; Minimum order: $25

For info on price: K. A. Mathews; Application info: A. B. Lappas; Customer service: L. Stanberry; Delivery info: C. Porter

Free literature available: 26-page Catalog describing all Anadex standard products.

Products manufactured: Comparators, Converters, Counters, Detectors, Generators, Meters, Printers, Signal Conditioners & Equipment, Synthesizers, Timers

Local Sales Offices & Reps.

Ala	Huntsville, Currie, Peak & Frazier, Inc.	205-536-5650
Ariz	Scottsdale, PLS Assocs., Inc.	602-957-9110
Cal	Los Altos, J. Stone & Assocs.	415-948-4563
Cal	Los Angeles, Basic Sys.	213-938-2833
Cal	San Diego, Basic Sys.	714-279-9641
Colo	Denver, PLS Assocs.	303-771-0140
Conn	W. Hartford, Instrument Assocs.	203-525-9367
Fla	Orlando, Currie, Peak & Frazier, Inc.	305-855-0843
Ill	Chicago, Pivan Engrg. Co.	312-539-4838
Ind	Indianapolis, Pivan Engrg. Co.	317-253-1681
Kans	Mission, Pivan Engrg. Co.	913-722-1030
Md	Wheaton, SONCO	301-942-9420
Mass	Bedford, Instrument Assocs.	617-275-0700
Mich	Farmington, Carter, McCormic & Peirce, Inc.	313-477-7700
Minn	Minneapolis, Pivan Engrg. Co.	612-537-4501
Mo	St. Louis, Pivan Engrg. Co.	314-567-3636
NJ	Fort Lee, Tech. Mktg. Assocs.	201-224-6911
NM	Albuquerque, PLS Assocs., Inc.	505-255-2330
NY	E. Syracuse, Ossmann Instrs., Inc.	315-437-6666
NY	Rochester, Ossmann Instrs., Inc.	716-328-2230
NY	Vestal, Ossmann Instrs., Inc.	607-785-9947
NC	Greensboro, Currie, Peak & Frazier, Inc.	919-273-3040
Ohio	Cleveland, Carter, McCormic & Peirce, Inc.	216-333-5650
Ohio	Dayton, Carter, McCormic & Peirce, Inc.	513-278-5873
Okla	Norman, Data Mktg. Assocs.	405-364-8320
Pa	Blue Bell, SONCO	215-CH2-8460
Pa	Pittsburgh, Carter, McCormic & Peirce, Inc.	412-824-3760
Tex	Dallas, Data Mktg. Assocs.	14-661-0300
Tex	Houston, Data Mktg. Assocs.	713-686-9627
Wash	Seattle, R.S. Drake Assocs., Inc.	206-763-2755
Wisc	Brookfield, Pivan Engrg. Co.	414-786-1940

ANADYNE, 12741 Los Nietos Rd., Santa Fe Springs, Cal., 90607, Tel: 213-698-7991, TWX: 910-586-1881; Empl.: 100 .... p. 1•1108,1109

Products manufactured: Converters, Power Supplies

Local Sales Offices & Reps.

Ariz	Scottsdale, J. Smith & Assocs.	602-943-4131
Cal	Oakland, Moulthrop Sls. Inc.	415-261-7676
Conn	Durham, Marr Assocs.	203-349-9691
Fla	Ft. Lauderdale, UniRep, Inc.	305-527-1556
Md	Baltimore, Stitzer Assocs.	301-823-2600
Minn	Minneapolis, Bitronics Sls. Co.	612-866-3035
NJ	Wallington, Comp-Tech Sls.	201-935-5454
NM	Albuquerque, J. Smith & Assocs.	505-255-2111
NY	New Hyde Park, Comp-Tech Sls.	516-593-2628
Okla	Tulsa, T. Burton Sls.	918-936-2562
Tex	Addison, Campion Sls. Co.	214-239-9196

ANALOG DEVICES, Box 280, Rte. I, Ind'l. Pk., Norwood, Mass., 02062, Tel: 617-329-4700, TWX: 710-394-6577; Empl.: 1000 .... p. 1•606

For info on price: K. Rutherford Ext. 302; Application info: K. Rutherford Ext. 302; Customer service: P. Bosworth Ext. 380

Free literature available: 1975 PRODUCT GUIDE-272 pages - Contains product descriptions and selection guides to all Analog Devices' product lines. Written for designers of instruments used in electronic measurement and designers of computer based control systems.

Products manufactured: Amplifiers, Capacitors, Fixed, Circuits, Hybrid, Thin-Film, Circuits, Integrated, Silicon Monolithic, Unpackaged Chips, Coatings, Comm. Systems, Comparators, Computers, Converters, Data Acquisition & Reduction Systems, Demodulators, Detectors, Display Devices/Displays, Dividers, Expanders, Data, Films, Hybrid Voltage Regulators, Indicators, Integrated Circuit Devices, Integrators, Electronic, Isolators, Meters, Modulator/Demodulators, Multiplexers, Multipliers, Networks, Potentiometers, Power Supplies, Process Control Systems, References, D-C Voltage, Regulators, Resistors, Resolvers, Synchro, Semiconductor Wafer Fabrication, Services, Assembly, Production & Test, Servo Systems, Substrates, Switches, Synchro Transmitters, Solid-State, Technical Books, Transistors, Transmission Systems, Data

Local Sales Offices & Reps.

Ala	Huntsville, Currie, Peak & Frazier	205-536-5650
Cal	Long Beach, Analog Devices Inc.	213-595-1783
Cal	Los Altos, Analog Devices, Inc.	415-941-4874
Colo	Boulder, Moore/Eiler Assoc.	303-665-3351
Fla	Orlando, Currie, Peak & Frazier	305-855-0843
Ill	Chicago, Analog Devices, Inc.	312-894-3300
Ill	Northfield, Torkelson Assoc.	312-446-9085
Ind	Indianapolis, Torkelson Assoc.	317-244-7867
Kans	Shawnee Mission, Tech. Sales, Assoc.	913-888-3330
Md	Silver Spring, Rep-Tron, Inc.	301-593-4844
Mich	Detroit, Electro Sales Assoc.	313-526-8800
Minn	Minneapolis, Torkelson Assoc.	612-835-2414
Mo	Ferguson, Tech-Sales Assoc.	314-725-5361
NM	Albuquerque, Moore/Eiler Assoc.	505-292-3322
NY	Binghamton, Labtronics, Inc.	607-748-0509
NY	Depew, Labtronics, Inc.	716-685-4111
NY	Syracuse, Labtronics, Inc.	315-454-9314
NY	Ulster Park, Labtronics, Inc.	518-372-6849
NY	Woodbury, Harwood-Sandler Assoc.	516-692-6100
NC	Greensboro, Currie, Peak & Frazier	919-273-3040
Ohio	Cleveland, Electro Sales Assoc.	216-261-5440

Ohio	Dayton, Electro Sales Assoc.	513-426-5551
Pa	Ambler, Wyncote Instru. Co.	215-643-2440
Pa	Middletown, Wyncote Instrumentation Co.	717-944-0950
Pa	Pittsburgh, Electro Sales Assoc.	412-371-9449
Tex	Houston, Data Applications Corp.	713-661-4501
Tex	Richardson, Analog Devices, Inc.	214-231-5094
Tex	San Antonio, Data Applications Corp.	512-732-7176
Wash	Seattle, Avionics Liaison, Inc.	206-767-3870
FOR:	Can., Downsview, Ont., Tracon Elctrns. Corp.	416-638-0052
FOR:	Can., Montreal, Que., Tracan Elctrns. Corp.	514-341-4163
FOR:	Can., Ottawa, Ont., Tracon Elctrns. Corp.	613-820-0269
FOR:	Can., West Vancouver, B.C., Tracan Elctrns. Western Ltd.	604-926-3411

ANALOG DEVICES, RESISTOR PDT., 1665 Buffalo Rd., Rochester, NY, 14624, Tel: 717-247-6773

Free literature available: Custom spec. guide - resistor networks; Custom spec. guide - precircuits; Standard thin film precision resistor networks -

Products manufactured: Attenuators, Circuits, Hybrid, Thin-Film, Cores, Magnetic, Films, Networks, Resistors, Standards

Local Sales Offices & Reps.

Ala	Huntsville, Currie, Peak & Frazier	205-536-5650
Cal	Long Beach, Analog Devices	213-595-1783
Cal	Los Altos, Analog Devices	415-941-4874
Colo	Denver, Moore/Eiler Assocs.	303-449-4262
Fla	Orlando, Currie, Peak & Frazier	305-855-0843
Ill	Northfield, Torkelson Assoc.	312-446-9085
Ill	Rosemount, Analog Devices	312-297-8710
Ind	Indianapolis, Torkelson Assoc.	317-244-7867
Kans	Shawnee Mission, Technical Sls.	913-888-3330
Md	Silver Spring, Reptron, Inc.	301-593-4844
Mich	Detroit, Electro Sls. Assoc.	313-526-8800
Minn	Minneapolis, Torkelson Assoc.	612-835-2414
Mo	Ferguson, Technical Sls.	314-725-5361
NJ	Irvington, Harwood Sandler Assocs.	201-399-3748
NM	Albuquerque, Moore/Eiler Assoc.	505-292-3322
NY	Binghamton, Labtronics, Inc.	607-748-0509
NY	Depew, Labtronics, Inc.	716-685-4111
NY	Syracuse, Labtronics, Inc.	315-454-9314
NY	Woodbury, Harwood-Sandler Assoc.	516-692-6100
NC	Greensboro, Currie, Peak & Frazier	919-273-3040
Ohio	Cleveland, Electro Sls. Assoc.	216-261-5440
Ohio	Dayton, Electro Sls. Assoc.	513-426-5551
Okla	Tulsa, Data Appls. Corp.	214-231-4846
Pa	Ambler, Wycote Instrumentation	215-643-2440
Pa	Pittsburgh, Electro Sls. Assoc.	412-371-9449
Tex	Houston, Data Appls. Corp.	713-661-4501
Tex	Richardson, Data Appls. Corp.	214-231-4846
Tex	San Antonio, Data Appls. Corp.	512-732-7176
Wash	Seattle, Avionics Liason	206-767-3870
FOR:	Can., Downsview, Ont., Tracan	416-638-0052
FOR:	Can., Montreal, Que., Tracan	514-341-4163
FOR:	Can., Ottawa, Ont., Tracon	613-820-0269
FOR:	Can., West Vancouver, B.C., Whittaker Elctrns., Ltd.	604-926-3411

ANALOG DEVICES, Semiconductor Div., 829 Woburn St., Wilmington, Mass, 01887

ANALOGIC CORP., Audubon Rd., Wakefield, Mass., 01880, Tel: 617-246-0300, TWX: 710-348-0425; Empl.: 245; Minimum order: $25 .... p. 1•130-133,602,603

For info on price: Tech. Support Grp.; Application info: W. Appell, Ext. 179; Customer service: R. R. Roediger; Delivery info: G. Fisher, Ext. 126

Free literature available: Data Sheets

Products manufactured: Amplifiers, Calibrators, Converters, Data Acquisition & Reduction Systems, Indicators, Integrated Circuit Devices, Meters, Multiplexers, Power Supplies, Signal Conditioners & Equipment, Standards, Voltage Sources

Local Sales Offices & Reps.

Ala	Huntsville, Reynolds & Assocs.	205-536-1941
Ariz	Scottsdale, BFA Corp.	602-946-4215
Cal	Costa Mesa, Meas. Assocs.	714-540-7160
Cal	San Francisco, Wm. C. Benison	415-398-2211
Colo	Denver, BFA Corp.	303-744-3301
Conn	Guilford, R.H. Sturdy Co.	203-453-5424
Fla	Clearwater, Reynolds & Assoc.	813-726-2373
Fla	Ft. Lauderdale, Reynolds & Assoc.	305-581-6611
Fla	Hollywood, Reynolds & Assoc.	305-987-6720
Fla	Palm Beach Gardens, Reynolds & Assoc.	305-622-4336
Fla	Satellite Beach, ReynoLds & Assoc.	305-773-4700
Fla	St. Petersburg, Reynolds & Assoc.	813-360-1484
Ga	Atlanta, Reynolds & Assoc.	404-252-5360
Ill	Chicago, Berndt Assoc. Inc.	312-283-0713
Ind	Carmel, Berndt Assoc. Inc.	317-844-0114
Md	Baltimore, Jay Co.	301-252-8494
Mass	Wellesley Hills, R.H. Sturdy Co.	617-235-2330
Mich	Detroit, WKM Assocs.	313-892-2500
NJ	Ridgewood, Hansen Assocs.	201-652-7055
NM	Albuquerque, BFA Corp.	505-292-1212
NM	Las Crues, BFA Corp.	505-523-0601
NY	Dewitt, DB Assocs.	315-446-0220
NY	New York City, Hansen Assocs.	212-947-0379
Ohio	Cleveland, WKM Assocs.	216-267-0445
Ohio	Dayton, WKM Assocs.	513-434-7500
Ore	Beaverton, Arneson Assoc.	503-643-5754
Pa	Norristown, Data Engrg. Co.	215-279-8146
Pa	Pittsburgh, WKM Assocs.	412-892-2953
Tex	Dallas, Data Aids Assocs.	214-620-1551
Tex	Houston, Data Aids Assocs.	13-862-6685
Utah	Salt Lake City, BFA Corp.	801-466-6522
Va	McLean, Jay Co.	703-790-5666
Wash	Seattle, Arneson Assoc.	206-762-7664
Wisc	Brookfield, Berndt Assoc.	414-786-6950

ANALYTICAL MEASUREMENTS, 31 Willow St., Chatham, N.J., 07928, Tel: 201-273-7500; Empl.: 35

For info on price: T.P. Scarinzi; Application info: F.G. Paully; Customer service: F.D. Moore; Delivery info: F.G. Paully

Products manufactured: Controls/Control Eqpt., Indicators, Kits, Test Equipment, Recorders

ANAREN MICROWAVE, INC., 185 Ainsley Drive, Syracuse, N.Y., 13205, Tel: 315-476-7901, TWX: 710-541-1507; FSC No: 31597; Empl.: 165

For info on price: D. Gustin; Application info: J. Krastel; Customer service: D. Gustin; Delivery info: D. Gustin

Free literature available: General Product Catalog, Pin Attenuator Bulletins, Balanced Mixer Bulletins, Ultra-Miniature Hybrids Bulletin, Phase/Amplitude Tracking Receiver Front End Catalog, Various Hybrid & Power Divider Bulletins.

Products manufactured: Antenna Feed Systems, Attenuators, Comparators, Converters, Couplers, Demodulators, Detectors, Diodes, Discriminators, Dividers, Junctions, Hybrid, Microwave, Mixers, Modulator/Demodulators, Modulators, All Kinds, Multiplexers, Networks, Shifters, Strip-Line Components, Microwave

Local Sales Offices & Reps.

Ariz	Phoenix, The Thorson Co.	602-956-5300
Cal	Los Angeles, Cain Technology	213-476-2251
Cal	Palo Alto, Waldman Assocs.	415-961-4100
Colo	Denver, The Thorson Co.	303-355-3521
Fla	Palm Bay, Spar Tech Assocs.	305-727-8045
Ga	Smyrna, Spar Tech Assocs.	404-432-3644
Ill	Park Ridge, R.F. Specialists	312-698-2044
Ind	Fort Wayne, R.F. Specialists	219-485-8982
Md	Davidsonville, R.L. Engrg.	301-760-5533
Mass	Reading, Geder-Rotondi Assocs.	617-944-3105
NM	Albuquerque, The Thorson Co.	505-265-5655
NY	Greenvale, Bertram D. Aaron & Co.	516-621-0630
NY	Skaneateles, Robtron	315-685-5731
Pa	Philadelphia, Eastern Instrumentation of Phila., Inc.	215-927-7777
Tex	Houston, Kemco, Inc.	713-467-1061
Tex	Irving, Kemco, Inc.	214-255-0537
Wash	Seattle, Rush S. Drake Assocs., Inc.	206-763-2755

ANCHOR BOLT & SCREW, 2950 W. Grand, Chicago, Ill., 60622, Tel: 312-252-2200; Empl.: 100; Minimum order: $50

Free literature available: "Product Line Sheet" "Fastener Engineering Handbook" - engineering specifications for fasteners "Thread Dimension Card"

Products manufactured: Fasteners

Local Sales Offices & Reps.

Colo	Denver, Central Western Sls.	303-534-4733
Ind	Columbus, Ritter, Inc.	812-372-1534
Iowa	W. Des Moines, Product Comps.	515-277-1783
Mich	Lansing, Marketing Professionals	517-484-0828
Mich	Southfield, Coskey-Gates Assoc.	313-354-5522
Minn	Minneapolis, G.L. Engstrom & Assoc.	612-546-0001
Mo	Maryland Hts., D.F. Adams & Assoc.	314-567-1785
SC	Columbia, G.E. Younginer & Assoc.	803-772-6671
Tex	Houston, Manco Metals	713-664-8084
Wisc	Milwaukee, Anchor Bolt & Screw Co.	414-342-4800

ANCHOR PLASTICS, 36-36 36th, Long Island City, N.Y., 11106, Tel: 212-729-1494, Telex: 12-362; Empl.: 200

For info on price: H. Katz; Application info: H. Katz; Customer service: H. Katz; Delivery info: R. Kuhn

Free literature available: Design Guide- custom extrusions of thermoplastic shapes - tubes, rods, mouldings - fully illustrated. Applications, special surface finishes and fastening data are included.

Products manufactured: Bushings, Glass, Plastic, Metal, Rubber, Etc., Clamps & Clips, Coils Including Assemblies & Forms, Couplings, Dials, Gaskets, Shielding, R-F-Also See Shields, R-F, Phonographs, Parts & Accessories, Retainers, Scales, Dial, Services, Assembly, Production & Test, Shafts & Adapters, Slide Rules (Circuitry Computing), Strips, Tubing

ANCHOR SPECIALTY MFG. INC., 300 Hollister Rd., Teterboro, N.J., 07608, Tel: 201-288-1939; Empl.: 10

Customer service: W. Zablocky

Products manufactured: Cabinets & Accessories, Cable, Clamps & Clips, Jigs And Fixtures, Chassis & Circuit Board, Leads, Test & Adaptors, Panels, Racks, Services, Assembly, Production & Test, Switchboards, Testers

ANDERSEN & ASSOC., WALTHER M.A., 4 Main St. Ext., Tariffville, Conn., 06081, Tel: 203-658-7666; FSC No: 52045; Empl.: 18

For info on price: V. W. Andersen; Application info: R. L. Sawin; Customer service: S. E. Rittenburg; Delivery info: V. W. Andersen

Free literature available: Catalog sheets.

Products manufactured: Controls/Control Eqpt., Decade Boxes, Delay Lines, Memory Systems, Modulator/Demodulators, Standards, Transducers

ANDERSEN LABS., INC., 1280 Blue Hills Ave., Bloomfield, Conn., 06002, Tel: 203-242-0761, TWX: 710-425-2390; Empl.: 300 .... p. 1•428,429,

Customer service: R. T. Ruder

Products manufactured: Delay Lines, Filters, Lasers & Laser Systems, Memory Systems, Modulator/Demodulators, Recorders

ANDERSON JACOBSON, 1065 Morse Ave., Sunnyvale, Cal., 94086, Tel: 408-734-4030; Empl.: 450

Customer service: T. B. Zmach

Products manufactured: Modulator/Demodulators, Terminals, Data Display (including Alphanumeric & Graphic)

Local Sales Offices & Reps.

Cal	Inglewood, Anderson Jacobson	213-674-4051
Cal	San Diego, Anderson Jacobson	714-484-0149
Ga	Atlanta, Anderson Jacobson	404-451-2744
Ill	Northbrook, Anderson Jacobson	312-498-4220
Md	Rockville, Anderson Jacobson	301-424-1767
Mass	Burlington, Anderson Jacobson	617-273-1420
Minn	St. Paul, C. Papeleux	612-333-7228
NJ	Hackensack, Anderson Jacobson	201-488-2525
NY	New York, Anderson Jacobson	212-594-9630
NY	Rochester, Anderson Jacobson	716-436-2420
Ohio	Cincinnati, Anderson Jacobson	513-793-5556
Pa	King of Prussia, Anderson Jacobson	215-265-3446
Pa	Pittsburgh, Chiodo	412-881-8989

ANDREW ANTENNA CO. LTD., 606 Beech St., Whitby, Ont., Can., Tel: 668-3348, TWX: 610-384-2754; Empl.: 120

For info on price: R. Zedic 52; Application info: R. Zedic 52; Customer service: B. Correll 32; Delivery info: B. Correll 32

Free literature available: New product bulletins.

Products manufactured: Antenna Feed Systems, Antennas, Bends & Twists, Microwave, Cable, Connectors, Dehydrators, Waveguides & Adapters

ANDREW CORP., 10500 W. 153rd St., Orland Park, Ill., 60462, Tel: 312-349-3300, TWX: 910-651-3340; Empl.: 600

Customer service: H. Woodbury

Products manufactured: Antennas, Cable, Waveguides & Adapters

Local Sales Offices & Reps.

Cal	Claremont	714-626-3505
Cal	Palo Alto	415-323-3139
Colo	Denver	303-222-1579

Md	Rockville	301-762-1900
NJ	Hawthorne	201-652-1310
Tex	Richardson	214-235-1279

ANGSTROHM PRECISION, INC., Box 1827, Hagerstown, Md., 21740, Tel: 301-739-8722, TWX: 710-853-6834; FSC No: 17745; QPL No: Multiple; Empl.: 250; Minimum order: $50

For info on price: T. M. Hart; Application info: T. M. Hart; Customer service: T. Brown; Delivery info: T. Brown

Free literature available: Literature describing Angstrohm hi-reliability metal film resistors approved to MIL-R-55182 and MIL-R-10509, ladder networks, plus-R large positive temperature coefficient silicon resistors, and vitreous enameled wire-wound ring rheostats approved to MIL-R-22.

Products manufactured: Networks, Potentiometers, Resistors

Local Sales Offices & Reps.

Ala	Huntsville, Twentieth Century Mktg., Inc.	205-772-9237
Ariz	Tempe, Argus Sls.	602-967-8709
Cal	Los Altos, Recht Assocs.	415-941-0338
Cal	Van Nuys, JFD Sls. Office	213-785-0487
Colo	Denver, Camel Elctrns.	303-757-6191
Fla	Clearwater, Perrott Assocs., Inc.	813-531-5513
Fla	Orlando, Perrott Assocs., Inc.	305-275-1132
Ill	Hinsdale, MoMak Sls.	312-654-4524
Ind	Greenwood, Valentine-Schillinger & Assoc.	317-888-2260
Ind	South Bend, Valentine-Schillinger & Assoc.	219-291-6258
Md	Ellicott City, Doss Elctrns., Inc.	301-465-1336
Mass	Framingham, JFD Sls. Office	617-872-4843
Minn	St. Louis Park, Beta Engrg.	612-925-4422
Mo	Blue Springs, CHESCO	816-229-1404
Mo	St. Charles, CHESCO	314-946-6677
NJ	East Hanover, HLM Assoc.	201-386-0794
NY	New Hartford, JFD Sls. Office	315-732-3507
NY	Northport, H L M Assocs.	516-423-1818
Ohio	Chagrin Falls, Pine Sls. Co.	216-247-6198
Ore	Portland, C.K. Shanks & Assoc.	503-292-5656
Pa	Philadelphia, S. K. Macdonald, Inc.	215-545-1205
Pa	Pittsburgh, S. K. Macdonald Inc.	412-366-2643
Tex	Dallas, United Comps.	214-324-1448
Wash	Seattle, C.K. Shanks & Assoc.	206-632-4290
Wisc	Milwaukee, Star Engrg. Sls.	414-645-3680

ANIXTER-MARK, Anixted Comms. Sys., 5439 W. Fargo, Skokie, Ill., 60076, Tel: 312-675-1500; Empl.: 49; Minimum order: $10

Customer service: E.N. Lamarre

Free literature available: Grid Antennas; CB Antennas.

Products manufactured: Antenna Feed Systems, Antennas, Cable Assemblies & Harnesses, Wire

Local Sales Offices & Reps.

Cal	Los Angeles, RF Assocs.	213-478-1586
Cal	Palo Alto, RF Assocs. Co.	415-494-3331
Mass	Waltham, Meas. Consultant Corp.	617-890-4400
NJ	Merchantville, L. Adezro Sls. Co.	609-662-3540

ANN ARBOR TERMINALS, INC., 6107 Jackson Rd., Ann Arbor, Mich., 48103, Tel: 313-769-0926, TWX: 810-223-6033; Empl.: 45 .... p. 1•134-140

For info on price: K. Straith; Application info: K. Straith; Customer service: S. Clark; Delivery info: D. Evans

Free literature available: SHORT FORM CATALOG. 8-page descriptive brochure on entire product line. Provides basic specifications and applications information on all CRT display electronics.

Products manufactured: CATV Systems & Equipment, Display Devices/Displays, Generators, Keyboards, Alphanumeric & Decimal, Memory Systems, Monitors, Television Systems & Equipment Closed-Circuit, Terminal Equipment, Digital, Terminals, Data Display (including Alphanumeric & Graphic), Tubes

Local Sales Offices & Reps.

Ariz	Scottsdale, BFA Corp.	602-946-4215
Cal	Santa Clara, Ann Arbor Terminals	408-249-6046
Colo	Denver, BFA Corp.	303-744-3301
Fla	Orlando, Technical Assocs.	305-894-7531
Ill	Chicago, SEA, Inc.	312-282-6694
Ind	Carmel, SEA, Inc.	317-846-2593
Minn	Minneapolis, SEA, Inc.	612-425-4455
NM	Albuquerque, BFA Corp.	505-296-8303
NM	Las Cruces, BFA Corp.	505-523-0601
Pa	Jenkintown, Stein Instrumentation	215-885-2370
SC	Spartanburg, Technical Assocs.	803-579-2904
Tex	Dallas, Remtek, Inc.	214-387-2855
Utah	Salt Lake City, BFA Corp.	801-466-6522
Wash	Seattle, Rush Drake Assocs.	206-763-2755
Wisc	Milwaukee, SEA, Inc.	414-547-6637

ANNIS R B CO., 1101 N. Delaware, Indianapolis, Ind., 46202, Tel: 317-637-9282; Empl.: 10; Minimum order: $5

Customer service: R. B. Annis

Free literature available: Pocket Magnetometers; Enclosed Demagnetizers; Open Style Demagnetizers; Audiophile Han-D-Kits; Notes on Demagnetizing; Split Core C.Ts; Hi-Flux Magnetic Equip.; Products; Dymograph Balancers; Special Magnetic Equip.

Products manufactured: Coils Including Assemblies & Forms, Demagnetizers, Erasers, Magnetic Tape (Bulk), Indicators, Magnetizers, Magnetometers, Meters, Power Supplies, Recorders, Tape Recording Accessories, Transformers

Advertisment

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METERS, GAUSS Measure magnetic residuals in tape recording equipment, tools & steel parts.
TRANSFORMERS, INSTRUMENT Annis Split Core Current Transformers. Ranges from 150 to 6000/5 amperes. Six sizes. Will operate direct writing recorders.

ANODYNE INC., 1270 N.W. 165th St., N. Miami Beach, Fla., 33169, Tel: 305-621-3641, TWX: 810-848-7200; Empl.: 150; Minimum order: $45

For info on price: E. T. Turney, Jr.; Application info: E. T. Turney, Jr.; Customer service: E. T. Turney, Jr.; Delivery info: D. Pare

Free literature available: Facilities Brochure, Catalog.

Products manufactured: Labels, Pressure-Sensitive, Adhesive, Nameplates

Local Sales Offices & Reps.

Conn	Vernon, G-M Assocs.	203-646-4443
Ind	Fort Wayne, Given Co.	219-432-5585
Mass	Framingham, G-M Assocs.	617-872-4871
Mich	Birmingham, D.L. Touhy Assocs.	313-645-5700
NJ	Marlton, N. Krouse Assocs.	609-424-3543
NJ	Mountain Lakes, Components for Elctrns.	201-334-2921

ANRO ELEX INDS. LTD., 300 Wildcat Rd., Downsview, Ont, Can., Tel: 416-661-2600; Empl.: 85

Customer service: E.H. Jones

Free literature available: Coils and low pressure switches literature.

Products manufactured: Coils Including Assemblies & Forms, Switches

ANSLEY ELCTRNS. CORP., Sub. Thomas & Betts Corp., 3208 Humboldt St., Los Angeles, Cal., 90031, Tel: 213-223-2331, TWX: 910-321-3938; Empl.: 200

Customer service: V. Saccone

Products manufactured: Boards, Printed Circuit, Cable Assemblies & Harnesses, Cable, Circuits, Flexible, Connectors, Jumpers, Strain Reliefs, Cable & Wire, Tools

Local Sales Offices & Reps.

Ala	Huntsville, Technology Mktg.	205-883-7893
Cal	(NO) San Jose, Ansley Elctrns.	408-267-2434
Cal	(SO) San Diego, L.L. Stoakes	714-274-6281
Colo	Littleton, Simpson Assocs.	303-794-8381
Conn	Madison, JEMCO Sls.	203-245-1505
Fla	S.E. Pampano Beach, TMA	305-942-0774
Ill	Des Plaines, Ansley Elctrns. Inc.	312-298-5545
Ind	Fort Wayne, J & B Engrg. Sls. Co.	219-483-2813
Kans	Kansas City, Harris-Hanson Co.	816-444-9494
Md	Baltimore, Burgin Kreh Assoc., Inc.	301-788-5200
Mass	Amherst, JEMCO Sales	617-326-3436
Mich	Grand Rapids, R.P. Urban	616-245-0511
Mo	(East) St. Louis, Harris-Hanson Co.	314-432-3611
NH	Amherst, JEMCO Sls.	617-326-3436
NY	(Upstate) Shortsville, Ansley Elctrns. Corp.	315-289-3400
NC	Winston-Salem, Burgin-Kreh Assoc.	919-768-4174
Okla	Tulsa, R.D. Spooner Co.	918-936-2562
Pa	Doyestown, Ansley Elctrns. Corp.	215-345-1800
Tex	Dallas, R.D. Spooner	214-357-6636
Tex	Houston, R.D. Spooner Co.	713-783-3640
Va	Lynchburg, Burgin-Kreh Assoc., Inc.	804-845-5600

ANTENNA CORP. OF AMERICA, P.O. Box 865, Burlington, Iowa, 52601, Tel: 319-753-1625; Minimum order: $10

Customer service: W. Picker 319-753-2095

Products manufactured: Amplifiers, Antenna Rotators, Antenna Towers & Supports, Antennas, Arresters, Electrical Surge, Lightning, Cable, CATV Systems & Equipment, Connectors, Couplers, Mounts, Television Systems & Equipment Closed-Circuit, Terminals, Transformers, Wire

Local Sales Offices & Reps.

Ariz	El Dorado, D. Bellew Sls.	501-863-8325
Cal	San Carlos, P & J Ents.	415-591-4689
Cal	Van Nuys, A. Szerlip Sls. Co.	213-782-1765
Colo	Greeley, G. Moss Elctrns.	303-353-1452
Fla	Ft. Lauderdale, Sproch Sls.	305-587-3792
Ga	Douglasville, I. Jones	404-942-1596
Ill	Centralia, Bob Dunn Sls. Co.	618-533-1775
Iowa	Wever, W.L. Brookhiser	319-372-2513
Mass	Braintree, Rudolph-MacInnis Assoc.	617-843-0908
Mich	Kentwood, Cecil Geer Co.	616-534-9449
Minn	Minneapolis, HMR	612-920-8200
Mo	Liberty, Lectro Reps	816-781-2522
NJ	Moorestown, DiVincent & Legato Assoc.	609-235-8299
NY	Camillus, Callahan-Ferguson Co.	315-487-3870
NY	Elizabethtown, J. Grandrath	518-962-4500
NY	Yonkers, J. Brown Elec. Sls.	914-779-7330
Tex	Dallas, Townsend Sls. Co.	214-241-7791
Tex	Lewisville, J.M. Greiten	214-434-2870
Wash	Seattle, Fleehart & Sullivan	206-522-1533

ANTENNA DESIGNS, INC., 802 Washington St., Burlington, Iowa, 52601

ANTENNA RESEARCH ASSOCIATES, INC., 11317 Frederick (Box 196), Beltsville, Md., 20705, Tel: 301-937-8888; Empl.: 15; Minimum order: $25

For info on price: H. W. Rapalus; Application info: R. W. Masters; Customer service: H. W. Rapalus; Delivery info: H. W. Rapalus

Free literature available: Technical specification sheets which include a descriptive commentary on the specific systems involved.

Products manufactured: Antenna Feed Systems, Antenna Rotators, Antennas, Couplers, Radar Systems

Local Sales Offices & Reps.

Tex	Corpus Christi	512-882-6591

ANTENNA SPECIALISTS CO., 12435 Euclid Ave., Cleveland, Ohio, 44106

ANTENNACRAFT, Box 1005, Burlington, Iowa, 52601

M M NEWMAN CORP., Antex Div., Marblehead, Mass., 01945, Tel: 617-631-7100; Empl.: 8; Minimum order: $10

For info on price: F. McCarron; Application info: A. Foresta; Customer service: P. Cohen; Delivery info: F. McCarron

Products manufactured: Caps, Forms & Tapes, Heat Shrinkable, Heat Guns, Production, Kits, Cable-End Sealing, Soldering Accessories, Soldering Guns, Irons & Desoldering Tools, Tubing, Wire Markers

ANZAC ELECTRONICS, 39 Green St., Waltham, Mass., 02154

A. P. CIRCUIT CORP., 865 West End Ave., New York, N.Y., 10025, Tel: 212-222-0876 .... p. 1•528,529

Customer service: F. Ellern

Free literature available: Filter Catalog - describes both variable frequency modules and fixed frequency modules. Frequency Covered 0.01 Hz-20 MHz. Examples of applications are included.

Products manufactured: Analyzers, Filters

Local Sales Offices & Reps.

Ohio	Cleveland, S. Sterling	216-442-8080
Va	Fairfax, Shibley Assocs.	703-591-3008

A.P. PRODUCTS, 72 Corwin Dr., Painesville, Ohio, 44077, Tel: 216-357-5597

APAHOUSER CORP. OF N.E., 101 Walnut St., Watertown, Mass., 02172, Tel: 617-924-1500; FSC No: 53721; Empl.: 80

For info on price: F. Gately; Application info: F. Gately; Customer service: F. Gately; Delivery info: I. Goldfine

Products manufactured: Bus Bars & Systems, Cabinets & Accessories, Chassis, Metal, Dials, Panels, Scales, Dial, Services, Assembly, Production & Test, Terminal Blocks, Boards & Strips

APM-HEXSEAL, 44 Honeck St., Englewood, N.J., 07631, Tel: 201-569-5700; Empl.: 80; Minimum order: $50

For info on price: C. J. Czapinski; Application info: C. J. Czapinski; Customer service: S. Hoffman; Delivery info: F. Miller

Free literature available: Environmental seals for switches, sealskrews & nuts, miniature o-rings, armored power connectors, lamp diffusers, custom engineered splash covers.

Products manufactured: Connectors, Fasteners, Feedthrus & Seals, Environmental, Rubber

Local Sales Offices & Reps.

Ariz	Phoenix, Zeus	602-258-7519
Cal	Costa Mesa, Porter Co.	
Cal	Encino, Porter Co.	213-788-2350
Colo	Englewood, Zeus, Inc.	303-770-4400
Conn	Newton, Gerber Sls. Corp.	203-426-3440
Fla	Orlando, Buchanan & Abrams Assoc.	305-898-7444
Ill	Hinsdale, Hill-Gray Assoc.	312-325-4810
Ind	Fort Wayne, Val-Skol Sls., Inc.	219-742-9122
Ind	Indianapolis, Val-Skol Sls., Inc.	317-926-5063
Iowa	Cedar Rapids, Penzner-Mankus Assoc.	319-362-9177
Kans	Overland Park, Penzner-Mankus Assoc.	913-381-0004
Kans	Wichita, Penzner-Mankus Assoc.	316-254-2662
Mass	E. Longmeadow, Gerber Sls. Corp.	413-525-3059
Mass	Waltham, Gerber Sls. Corp.	617-890-8040
Mich	Troy, C.B. Jensen & Assoc.	313-643-0506
Minn	St. Paul, Northport Engrg.	612-698-3841
NM	Albuquerque, Zeus, Inc.	505-256-9831
NY	Great Neck, L. Tylinski Co.	516-466-9070
NY	Syracuse, Rep-Tech, Inc.	315-437-2845
Ohio	Cincinnati, Val-Skol Sls., Inc.	513-563-6790
Ohio	Cleveland Hgts., Val-Skol Sls., Inc.	216-462-2822
Ohio	Columbus, Val-Skol Sls., Inc.	614-291-4123
Pa	Paoli, T. Griffin Co.	215-647-1550
Tex	Dallas, R.P. Votteler	214-823-2320
Utah	Salt Lake City, Zeus, Inc.	801-486-2317
Wash	Seattle, Blum & Assocs.	206-285-2590

API INSTRUMENTS, See LFE Corp., Process Control Div.

APOLLO CORP., 465, Suwa, Takatsuku, Kawasaki, Japan, Tel: 044-811-2161; Empl.: 30

For info on price: M. Kohmoto; Application info: M. Kishita; Customer service: M. Kohmoto; Delivery info: M. Kohmoto

Products manufactured: Lamps, Relays, Tubes

APOLLO LASERS INC., 6357 Arizona Cir., Los Angeles, Cal., 90045, Tel: 213-776-3343, Telex: 69-8204; Empl.: 60; Minimum order: $50

For info on price: R. T. Pitlak; Application info: W. T. Wegner; Customer service: W. T. Wegner

Products manufactured: Lasers & Laser Systems, Scribers, Welding Equipment & Access. (Excluding Equip. for Semiconductor Devices)

APPLETON ELECTRONIC DIV., Appleton Electric Co., 2950 N. Paulina, Chicago, Ill., 60657

APPLIED CIRCUITS, INC., 31-24 14th St., Long Island City, N.Y., 11106, Tel: 212-274-6001; Empl.: 20 p. 2•345

Customer service: Customer Service Dept.

Products manufactured: Boards, Plug-In, Boards, Printed Circuit, Boards, Printed Wiring, Universal

APPLIED CONTROL CO., 1275 Bloomfield Ave., Fairfield, N.J., 07006, Tel: 201-227-5454; Empl.: 23; Minimum order: $100

For info on price: S. Richer; Application info: W. Merel; Customer service: W. Merel; Delivery info: S. Richer

Free literature available: Model 71000 SCR Motor Controls; Model 3000 Series Modular Controllers containing, contractors, signal conditioners, limit alarms, time integral totalizers; Model 7000 Series ARL Lamp Power Supplies

Products manufactured: Alarms, Amplifiers, Annunciators, Chargers, Battery, Comparators, Controls/Control Eqpt., Detectors, Gages, Indicators, Monitors, Power Supplies, Regulators, Relays, Services, Assembly, Production & Test, Servo Systems, Signal Conditioners & Equipment, Testers, Totalizers, Digital

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APPLIED DATA COMMUN., 1509 E. McFadden Ave., Santa Ana, Cal., 92705, Tel: 714-547-6954; Empl.: 12

Customer service: Roger Saville

Free literature available: Series 41 Data Sheets, Tech Notes, Price List-Program Loading Unit Series 42 -3M Tape Cartridge System Series 61 IBM Compatible Floppy Disk System

Products manufactured: Enclosures, Module, Plug-In, Recorders

Local Sales Offices & Reps.

Ariz	Phoenix, Thorson Co.	602-956-5300
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Colo	Golden, J. F. Hurlbut Co.	303-279-7796
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Ga	Atlanta, Reynolds & Assoc.	404-252-5360
Ind	Munster, Bexdata	312-221-1411
Md	Wheaton, Sonco	301-942-9420
Mass	Lynnfield, Newmar	617-245-7960
Minn	Edina, Bexdata	612-835-5220
NY	Rochester, K. & J. Assoc.	716-232-6640
Tex	Richardson, Lear Assoc.	214-231-5388
Wash	Bellevue, Brennen Assoc.	206-454-9332

APPLIED DESIGN CO., 2465 Sheridan Dr., Tonawanda, N.Y., 14150, Tel: 716-837-4400; Empl.: 150

For info on price: T. Y. Smith; Application info: E. A. Berger; Customer service: H. E. Kellar; Delivery info: H. E. Kellar

Free literature available: General Descriptive Literature

Products manufactured: Cases, Equipment, Instrument, Meter, Cases, Transit, Containers, Services, Assembly, Production & Test

APPLIED DIGITAL DATA SYS., INC., 100 Marcus Blvd., Hauppauge, N.Y., 11787, Tel: 516-231-5400, TWX: 510-227-9886; Empl.: 127

For info on price: R. Kaufman; Application info: J. Friedman; Customer service: R. Petrilak; Delivery info: W. Posner

Free literature available: 980, 880, 580, 680, 380, 780, "A" Series, 815 printer, Data Sheets Included

Products manufactured: Computers, Terminal Equipment, Digital, Terminals, Data Display (including Alphanumeric & Graphic)

Local Sales Offices & Reps.

Cal	Los Angeles	714-539-7731
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Fla	Miami	305-279-9179
Ga	Marietta	404-992-2190
Ill	Chicago	312-530-1100
Mass	Boston	617-468-7231
NY	Hauppauge	516-231-5400
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Tex	Houston	713-376-3801

APPLIED ELECTRO TECHNOLOGY, INC., 2220 S. Anne St., Santa Ana, Cal., 92704, Tel: 714-556-6570, TWX: 910-595-1797; FSC No: 52797; Empl.: 20; Minimum order: $25 p. 1•1578,1579

For info on price: L. Daniel; Application info: H. Whitmore; Customer service: L. Daniel; Delivery info: L. Daniel

Free literature available: Phase Sequence Relay Catalog 1A-1; Phase Sequence Indicator Catalog 2A-1; Time Delay Relay Catalog 3B-1; Time Delay Relay Catalog 3A-1; Flasher Catalog 4A-1.

Products manufactured: Circuits, Hybrid, Thin-Film, Clocks (All Types), Controllers, Programmable, Controls/Control Eqpt., Converters, Counters, Current Sensors, Generators, Indicators, Lamp Drivers, Monitors, Power Supplies, Relays, Testers, Timers

APPLIED FLUIDICS INC., 770 Main St., Westbury, N.Y., 11590, Tel: 516-334-8742; Empl.: 20

Customer service: Pat Sorrentino

Free literature available: Brochure on Century Series Electronic Leak Detectors.

Products manufactured: Detectors

Local Sales Offices & Reps.

Cal	Pico Rivera, Westrep	213-949-2551

APPLIED GRAPHICS, 58 Shore, Glenwood Landing, N.Y., 11547, Tel: 516-676-1211; Empl.: 29; Minimum order: $50

Customer service: K. DiMaggio

Free literature available: Applied Graphics PSM 75 pressure sensitive graphic tape catalog containing a comprehensive listing of tapes, screen and color sheets, transfer lettering and related supplies.

Products manufactured: Tapes, Films & Foils, Pressure Sensitive

APPLIED MAGNETICS CORP., Magnetic Head Div., 75 Robin Hill Rd., Goleta, Calif., 93017, Tel: 805-964-4881, TWX: 910-334-1195; Empl.: 3600

For info on price: W.P. Graham; Application info: W.P. Graham; Customer service: J. Patin; Delivery info: J. Patin

Products manufactured: Heads, Recording Playback, Erase

Local Sales Offices & Reps.

Ariz	Scottsdale, Barnhill Five	602-947-5745
Cal	Santa Clara, King Assoc.	408-249-1022
Colo	Denver, Barnhill Five	303-426-0222
Mass	Wakefield, Data Engrg. Svc.	617-245-6666
NJ	Livingston, Graydon-Sherman, Inc.	201-994-9055
NM	Albuquerque, Barnhill Five	505-293-5955
NY	Fayetteville, Graydon-Sherman, Inc.	315-637-9861
Ohio	Dayton, Ashby Assocs., Inc.	513-252-5627
Tex	Richardson, Oeler & Menelaides	214-234-6334
Utah	Salt Lake City, Barnhill Three	801-487-1327

APPLIED MATERIALS INC., 3050 Bowers Ave., Santa Clara, Cal., 95051, Tel: 408-249-5555, Telex: 34-6332; Empl.: 450

Products manufactured: Controllers, Programmable, Controls/Control Eqpt., Generators, Machines/Machinery, Production, Semiconductor Wafer Fabrication, Services, Assembly, Production & Test

APPLIED MICROWAVE, Div. Epsco Inc., 411 Providence Hwy., Westwood, Mass., 02090, Tel: 617-329-1500, TWX: 710-348-0484; FSC No: 15894; Empl.: 150; Minimum order: $25 p. 1•901-904

Customer service: H. Clark

Free literature available: Data sheets/brochures with detailed specifications of high power microwave signal sources and cavity oscillators; ECM, radar, TACAN, altimeter, IFF simulators; and data conversion systems.

Products manufactured: Amplifiers, Cavities, Microwave, Converters, Generators, Modulators, All Kinds, Oscillators, Simulators, Synthesizers, Test Systems, Transmitters

Local Sales Offices & Reps.

Ariz	Scottsdale, PLS Assoc.	602-957-9110
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Cal	San Jose, Mich Assocs.	408-246-7330
Colo	Denver, PLS Assoc.	303-771-0140
Fla	Fort Lauderdale, Snow Co.	305-563-2448
Ill	Northfield, Feller Assoc.	312-446-8065
Mass	Waban, Bawer Assoc.	617-244-6572
NJ	Haworth, Central Assoc.	201-568-0808
NM	Albuquerque, PLS Assoc.	505-255-2330

NY	Plainview, Central Assoc.	516-433-0808
NY	Syracuse, Syracuse Tech. Reps.	315-488-0222
Tex	Fort Worth, Carey Wolf & Assoc.	817-738-1996
Tex	Houston, Carey Wolf & Assoc.	714-721-2442
Va	Annandale, J. Hopkins Assoc.	703-323-1641
Wash	Seattle, Datacom Assoc.	206-285-2525
EXP:	Hallandale, Fla., Emec, Inc.	305-925-6366

APPLIED MOTORS INC., Box 106, 4808 Boeing Dr., Rockford, Ill., 61105, Tel: 815-397-2006; Empl.: 120; Minimum order: $10

For info on price: R. A. Baird; Application info: R. A. Baird; Customer service: J. E. Malinowski; Delivery info: V. M. Gaines

Free literature available: Model BA bulletin - motors for low voltage battery powered systems; Model SR bulletin - motors for SCR speed control systems; Model VC bulletin - motors with integral bridge rectifiers; REDI LINE motor-generator bulletin.

Products manufactured: Motor Electric Generator Sets, Motors

Local Sales Offices & Reps.

Ala	Birmingham, East South Sls. Co.	205-323-2223
Cal	Hawthorne, W. H. Del Mar	213-756-1431
Cal	Mountain View, Claypool Controls Co.	415-968-7488
Conn	Ridgefield, E. S. Williams Co.	203-438-7474
Ill	Chicago, Clarkson Engrg. Co.	312-286-2314
Mass	Marblelead, Canner Assocs.	617-599-4740
Minn	Burnsville, R. E. Norene & Assoc.	612-890-1333
Mo	St. Louis, Terry & Hodges	314-965-0746
NY	Rochester, A. F. Zissler	716-586-6232
Ohio	Dayton, Rockford Controls Ohio	513-278-7362
Okla	Tulsa, Dynamic Component Sls.	918-749-1689
Pa	Broomall, J. C. Whiddett Co.	215-353-6343
Pa	Monroeville, Rockford Controls Ohio	412-373-2531
Tex	Bellaire, Dynamic Component Sls.	713-668-7729
Tex	Dallas, Dynamic Component Sls.	214-363-6191
Wisc	Cedarburg, R. E. Norene & Assoc.	414-377-5440

APPLIED RESEARCH INC., 76 S. Bayles Ave., Port Washington, N.Y., 11050, Tel: 516-883-5700, TWX: 510-223-0822; Empl.: 50 .... p. 2•1276,1277

For info on price: C. G. Costas; Application info: A. M. Scandurra; Customer service: C. G. Costas; Delivery info: C. G. Costas

Products manufactured: Amplifiers, Attenuators, Converters, Couplers, Filters, Multipliers, Switches, Terminals

Local Sales Offices & Reps.

Cal	Anaheim, Blair Assocs.	714-635-1350
Cal	Portola Valley, Kipp Assocs.	415-851-0123
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NY	Bridgeport, Lightstone Corp.	315-699-3209
NY	Port Washington, ARI	516-883-5700
Pa	Newtown Square, SWR Assocs.	215-356-8550
Tex	Dallas, Texas Avionics	214-368-3566
Va	Fairfax, Schibley Assocs.	703-591-3008

APPLIED SYSTEMS CORP., 26401 Harper Ave., St. Clair Shores, Mich., 48081, Tel: 313-779-8700; Empl.: 6

Products manufactured: Alarms, Analyzers, Comm. Systems, Computers, Controllers, Programmable, Controls/Control Eqpt., Data Acquisition & Reduction Systems, Data Loggers, Integrated Circuit Devices, Monitors, Process Control Systems, Recorders, Test Systems, Testers, Timers, Totalizers, Digital, Transmission Systems, Data

A. P. W. CO., INC., 72 W. Main, Rockaway, N. J., 07866, Tel: 201-627-0643; Empl.: 18

For info on price: L. Rowe; Application info: A. Pfeil; Customer service: A. K. Pfeil; Delivery info: A. K. Pfeil

Free literature available: Free Listings

Products manufactured: Coils Including Assemblies & Forms, Solenoids

Local Sales Offices & Reps.

NY	Seaford, H. Abbott	516-781-5256

AQUALARM INC., 544 W. 182nd, Gardena, Cal., 90248, Tel: 213-321-5873; Empl.: 10; Minimum order: $25

Customer service: J. Herscovitz

Free literature available: Brochure - describes alarm system & emphasizes features. Catalogue sheet - lists and shows products and accessories. Installation instructions for-do-it-yourself installation, covers all applications of the different types of switches.

Products manufactured: Alarms, Bells, Buzzers, Gongs, Sirens & Aural Warning Devices, Switches

ARCO ELCTRNS., See PFC Mfg. Div.

ARCO ELECTRONICS INC., Community Drive, Great Neck, N.Y., 11021, Tel: 516-487-0500, TWX: 510-223-0888; Empl.: 490 .... p. 1•1547; p. 2•32-39,619

Products manufactured: Boards, Plug-In, Boards, Printed Circuit, Boards, Printed Wiring, Universal, Boards, Programming, Capacitors, Fixed, Capacitors, Variable, Connector Adapters, Connectors, Networks, Pins, Relays, Socket Adapters, Sockets

Local Sales Offices & Reps.

Cal	Anaheim, Lo-Dan Inc.	714-956-1560
Cal	Chatsworth, Arco Pacific	213-882-8707
Cal	San Carlos, Lo-Dan Inc.	415-592-4600
Cal	San Diego, Lo-Dan Inc.	714-279-6383
Cal	Van Nuys, Obie Mktg. Co.	213-997-1124
Fla	No. Miami, L. Haas Co. Inc.	305-949-9143
Ill	Chicago, Lassers & Co.	312-673-4060
Ind	Indianapolis, Advanced Comp. Sls.	317-545-6441
Mass	Lynn, Keene Sls.	617-595-2300
Mich	Southfield, Reps. Elctrn. Prods.	313-354-9066
Minn	St. Paul, Northport Engrs. Inc.	612-698-3841
NJ	Teaneck, Stan Axelrod Assoc.	201-836-6661
NY	Rochester, L-Mar Assoc.	716-328-5240
Ohio	Cleveland, Marlow Assoc. Inc.	216-932-0900
Ohio	Dayton, Marlow Assoc. Inc.	513-426-6270
Tex	Dallas, Berthold Sls. Co.	214-526-8329
Tex	Dallas, EBR, Inc.	214-942-2716
Wash	Seattle, DMS/Vantage	206-784-6800
Wash	Seattle, Vantage Corp.	206-455-3460
EXP:	Great Neck, Arco N.Y.	516-487-0500

ARCO WIRE & CABLE, 5168 Vineland Ave., N. Hollywood, Cal., 91601, Tel: 213-877-3376; Empl.: 10; Minimum order: $25

For info on price: E.L. Paul; Application info: B.B. Poole; Customer service: B. LeGault; Delivery info: B. LeGault

Free literature available: Line Card

Products manufactured: Cable Assemblies & Harnesses, Cable, Cords, Wire

Advertisment

Thermocouple Wire
High Temperature Wire
Teflon Hookup Wire
Teflon Coaxial Cable
U/L Wire and Cable
Aircraft Wire and Cable

ARCOLECTRIC SWITCH CORP., Box 348, 11120 Chandler Blvd., No. Hollywood, Cal., 91603, Tel: 213-985-3130; Minimum order: $35 p. 1•1959; p. 2•1125

For info on price: L. Lewis; Application info: L. Lewis; Customer service: J. Thomson; Delivery info: L. Lewis

Free literature available: Complete catalog covering switches: Toggle, Push-Button, Rocker etc., and indication lights neon, and lamp holders.

Products manufactured: Caps, Lenses, Indicator Light, Lamp Adapters, Lamps, Lights, Sockets, Switch Handle Boots, Switches

AREMCO PRODS., INC., Box 429, Ossining, N.Y., 10562, Tel: 914-762-0685; Empl.: 12; Minimum order: $25

For info on price: Order Dept.; Application info: R. M. Soberman; Customer service: Order Dept.; Delivery info: Order Dept.

Products manufactured: Adhesives (All Types), Alloys, Cleaners & Solvents, Coatings, Crystals, Drills & Accessories, Hand & Power, Gages, Graphite Parts, Materials, Graphite, Metals, Ovens, Services, Assembly, Production & Test, Substrates, Tools, Tubing

Local Sales Offices & Reps.

Cal	Torrance, Cal. Tech. Svcs.	213-320-1310
Fla	Winterhaven, S&S Sales Reps.	813-293-7304

ARENBERG ULTRASONIC LAB INC., 94 Green, Jamaica Plain, Mass., 02130, Tel: 617-522-8640; Empl.: 17; Minimum order: $20

Customer service: Robert J. Toronto 617-522-4038

Free literature available: Brochures describing our line of ARULAB test equipment including high voltage pulsed RF oscillator, amplifiers, pre-amplifier, attenuators and auxillary equipment.

Products manufactured: Amplifiers, Attenuators, Cable Assemblies & Harnesses, Coils Including Assemblies & Forms, Detectors, Generators, Power Supplies

A.R.F. PRODUCTS, Box 3226, Boulder, Colo., 80303, Tel: 303-443-4844, TWX: 910-940-3446; FSC No: 15196; Empl.: 24

For info on price: J. D. Ellington; Application info: A. B. Przedpelski; Customer service: J. D. Ellington; Delivery info: J. D. Ellington

Products manufactured: Alarms, Amplifiers, Cavities, Microwave, Comm. Systems, Controls/Control Eqpt., Couplers, Data Acquisition & Reduction Systems, Filters, Generators, Meters, Networks, Oscillators, Ovens, Receivers, Synthesizers, Transmitters, Transponders

Local Sales Offices & Reps.

Ariz	Tempe, PLS Assocs.	602-957-9110
Colo	Denver, PLS Assocs.	303-771-0140
NM	Albuquerque, PLS Assocs.	505-255-2330

ARGA CONTROLS, 35 E. Glenarm, Pasedena, Cal., 91105, Tel: 213-682-3314; FSC No: 50290; Empl.: 12; Minimum order: $25

For info on price: D. Umland; Application info: H. Galman; Customer service: H. Galman; Delivery info: A. Raines

Products manufactured: Controllers, Programmable, Controls/Control Eqpt., Converters, Indicators, Meters, Monitors, Relays, Signal Conditioners & Equipment, Transducers

Local Sales Offices & Reps.

Cal	Long Beach, Emerson Kirk Engrg. Co.	213-439-9559
Cal	Oakland, W. Nott & Co.	
Ill	Wilmette, Crest Assocs. Inc.	312-256-5202
Ind	Indianapolis, Crest Assocs.	317-844-2800
Kans	Prairie Village, Engineering Svcs. Co.	913-649-4000
Mo	St. Louis, Engineering Svcs. Co.	314-997-1515
Ore	Beaverton, Arneson Assocs.	503-646-3416
Va	Falls Church, Beacon Elctrn. Assocs.	703-534-1673
Wash	Seattle, Arneson Assocs.	206-762-7664

ARGOS PRODUCTS CO., INC., 600 S. Sycamore St., Genoa, Ill., 60135, Tel: 815-784-5118; Empl.: 85; Minimum order: $25

For info on price: R.M. Johnson; Application info: A.T. Hoyne; Customer service: A. Andree; Delivery info: A. Andree

Free literature available: 1. Eight page sound system components catalog; 2. Twelve page sound column selection and installation guide; 3. Audiophile Sound Systems flyer; 4. Sound column flyer; 5. Engineering Assistance Program brochure.

Products manufactured: Baffles, Speaker, Public Address Systems, Speaker Systems

Local Sales Offices & Reps.

Ark	El Dorado, D. Bellew Sls.	501-863-8325
Cal	Culver City, W. Alderson Co.	213-870-1030
Cal	San Francisco, Meyer, Ross & Fleming, Inc.	415-285-8880
Colo	Denver, K-C Marketers, Inc.	303-733-5561
Fla	North Miami, Winfield Elctrns. Sls.	305-945-6544
Ga	Atlanta, Murphy & Cota	404-875-2525
Haw	Honolulu, G. Piety Factors, Inc.	808-839-9059
Ill	Chicago, G. Mcl. Cole Co.	312-774-3535
Ind	Indianapolis, C. Scheffler Co.	317-253-6337
La	Kenner, D. Bellew Sls.	504-729-4550
Mass	North Scituate, W.A. Hendrickson Co.	617-545-0652
Mich	Plymouth, J. Malcolm Flora, Inc.	313-453-4296
Minn	St. Paul, W. Engelbretson	612-222-2338
Mo	Kansas City, Nevco, Inc.	816-421-1751
NJ	Fort Lee, TMC Sls. Corp.	201-944-5665
NY	Camillus, Callahan-Ferguson	315-487-3870
NC	Burlington, Murphy & Cota	404-875-2525
Ohio	Richfield, Bear Mktg.	216-659-3131
Ore	Salem, B.J. Walling	503-363-6445
Pa	Enon Valley, Nebco Assocs.	216-457-2333
Tenn	Memphis, D. Bellew Sls.	901-365-9437
Tex	Richardson, Campion Sls. Co.	214-238-8145
Va	, Stinson Assocs.	215-896-7378
Wash	Seattle, Pacnor Mktg.	206-284-8020
Wisc	Milwaukee, J. Kiehm	414-545-6083
EXP:	New York, Roburn Agencies, Inc.	212-989-5939

ARI INDS., INC., 9000 King St., Franklin Pk., Ill., 60131, Tel: 312-671-0511, TWX: 910-227-0052; Empl.: 100; Minimum order: $50

For info on price: D. Boyce; Application info: D. Mackenzie; Customer service: E. Kapustka; Delivery info: A. Yavitz

Free literature available: Thermocouples; Heaters; Hi Temp. Cable; Self powered Newtron Detectors; Temp. Controllers.

Products manufactured: Cable, Connectors, Controls/Control Eqpt., Thermocouples, Elements & Accessories, Transducers, Wire

Local Sales Offices & Reps.

Ariz	Scottsdale, Inter-Mountain Engrg.	602-947-7379
Cal	Laguna Beach, Marchi-Barus Assocs.	714-497-1815
Cal	Redwood City, Marchi Assocs.	415-364-3411
Colo	Denver, Davis Assocs.	303-744-6644
Conn	North Haven, Forsberg Sls.	203-239-5111
Ill	Northfield, Istronics	312-446-3231
Ind	Indianapolis, Process Heat & Control	317-542-8331
Md	Baltimore, Wilt Cooke & Comp.	301-685-1511
Mass	Brockton, Forsberg Sls.	617-522-6300
Mich	Clawson, Instr. Specialties	313-435-3311
Minn	Minneapolis, Industra	612-929-6224
Mo	St. Louis, Maise Equip. Co.	314-241-4351
NM	Albuquerque, Rustco Entprs.	505-296-6474
NY	Flushing, Tri-State	212-358-1010
NY	Rochester, Nickles Engrg.	
Ohio	Chagrin Fall, The Jerry Kilroy Corp.	216-247-8997
Ohio	Cincinnati, Schlemmer Assocs.	513-522-8340
Pa	Blue Bell, W. Gregory & Co.	215-643-4702
Tex	Houston, Instrs.	713-225-6626
Va	Richmond, Advance Control Equip. Co.	804-264-2588

ARIES ELECTRONICS, Box 231, Frenchtown, N.J., 08825, Tel: 201-996-4096, TWX: 510-235-3391; FSC No: 51167; Minimum order: $25

Customer service: W. Sinclair

Products manufactured: Boards, Plug-In, Boards, Printed Circuit, Boards, Programming, Connectors, Headers, Jumpers, Packages, Integrated Circuit, Sockets

Local Sales Offices & Reps.

Ariz	Scottsdale, Sales Engrg.	602-945-5781
Cal	Palo, Alto, Engineering Assoc.	415-326-7842
Cal	Pasadena, P. Nurches Co.	213-681-8957
Colo	Wheatridge, Waugaman Assoc.	303-423-1020
Fla	Lighthouse Point, Saber Assoc.	305-943-3076
Ill	Des Plaines, Coombs Assoc.	312-298-4830
Md	Baltimore, J. A. Maguire & Co.	301-377-0223
Mass	Waltham, Betronic Assoc.	617-894-8400
Mich	Lathrup Village, R. C. Nordstrom & Co.	313-559-7373
Mo	Kansas City, L. F. Florence Co.	816-561-7222
NJ	Ho-Ho-Kus, D. J. Fisher Co.	201-652-0092
NJ	Pennsauken, J. A. Maguire & Co.	609-665-5136
NY	Elbridge, L-Tron Corp.	315-689-3787
NC	Winston-Salem, J. A. Maguire & Co.	919-884-7688
Ohio	Dayton, Midwest Mktg. Assoc.	513-433-2511
Tex	Arlington, Ion Assoc.	817-461-9661
Wash	Kirkland, Todd-Brian Inds.	206-827-5811

Local Distributors

Cal	Mt. View, Ratel Elctrns., 815 Maude Ave.	415-965-2010
Fla	Margate, Controlled Dist., 2922 N. State Rd. 7	305-971-4950
Ill	Mundelein, J & R Entprs., 668 Tower Rd.	312-566-2030
Tex	Richardson, Air Quip Sls., 909 Business Pky.	214-234-3285
Utah	Salt Lake, Alta-Land Elec., 2280 Main St.	801-486-7227

ARISTO GRID LAMP PRDTS., 65 Harbor, Port Washington, N.Y., 11050, Tel: 516-767-6575; Empl.: 15; Minimum order: $15

Customer service: P. Hellman

Products manufactured: Lamps, Lights, Ultraviolet Inspection Lighting, X-Ray Inspection Equipment

ARMCO STEEL CORP., 703 Curtis St., Middletown, Ohio, 45043

Products manufactured: Metal Compounds, Foils, Powders, Sheet, Stock

Local Sales Offices & Reps.

Ala	Mountain Brook	205-879-0166
Ariz	Phoenix	602-274-0528
Cal	Los Angeles	213-776-5191
Colo	Englewood	303-761-2414
Ga	Atlanta	404-325-9740
Ill	Chicago	312-782-4082
Ind	Indianapolis	317-257-5491
Iowa	Bettendorf	319-355-7722
Iowa	Des Moines	515-278-2801
Kans	Wichita	316-685-4248
Ky	Louisville	502-426-3120
La	Metairie	504-887-6910
La	Shreveport	318-861-2427
Md	Baltimore	301-825-5300
Mass	Wellesley Hills	617-235-8350
Mich	Detroit	313-444-1144
Mich	Grand Rapids	616-363-7731
Minn	Minneapolis	612-521-7661
Miss	Jackson	601-362-0248
Mo	Clayton	314-727-9385
Mo	Joplin	417-624-0697
Mo	Kansas City	816-483-7666
Mo	Springfield	417-883-5025
Neb	Omaha	402-346-3911
NJ	Englewood Cliffs	201-947-4454
NM	Albuquerque	505-265-5993
NY	Buffalo	716-839-3180
NC	Greensboro	919-273-6927
Ohio	Cleveland	216-464-7474
Ohio	Columbus	614-846-7110
Ohio	Dayton	513-298-4301
Ohio	Fairfax	513-272-0904
Okla	Oklahoma City	405-848-8771
Okla	Tulsa	918-663-2550
Pa	Bala-Cynwyd	215-839-6750
Pa	Pittsburgh	412-391-2900
SD	Sioux Falls	605-336-0063
Tenn	Memphis	901-683-8201
Tenn	Nashville	615-298-5443
Tex	Dallas	214-526-7821
Tex	Houston	713-621-7700
Tex	Lubbock	806-763-2868
Tex	San Antonio	512-736-3166
Wash	Bellevue	206-454-5450
Wisc	Milwaukee	414-271-5628

ARMEL ELECTRONICS, 1601 75th, N. Bergen, N.J., 07047, Tel: 201-869-4300, TWX: 201-868-0069; FSC No: 91663; Empl.: 55; Minimum order: $20

Customer service: V. A. Pasqualino

Products manufactured: Connectors, Sockets, Terminal Blocks, Boards & Strips, Terminals

Local Sales Offices & Reps.

Cal	Culver City, Deangelo, Rothman & Co.	213-398-6239
Md	Baltimore, R. A. Wafer Assocs.	301-744-1133
Mass	Newtown Upper Falls, Brookdale Elctrns.	617-244-6969

ARMSTRONG CORK CO., W. Liberty St., Lancaster, Pa., 17604, Tel: 717-397-0611, TWX: 717-560-4405; Empl.: 24,000

Customer service: S. W. Eby

Free literature available: Armstrong Insulation Products: Sixteen page brochure with complete descriptions and specifications for Armaflex and Armalok insulation materials.

Products manufactured: Adhesives (All Types), Compounds, Encapsulating, Insulating, Molding, Potting, Heaters & Heating Elements, Insulators & Insulation, Seals

Local Sales Offices & Reps.

Cal	Burlingame, Armstrong Cork Co., Ind. Prods. Div.	415-697-3025
Ill	Park Ridge, Armstrong Cork Co., Ind. Products Div.	312-696-3130
Mich	Oak Park, Armstrong Cork Co., Ind. Products Div.	313-968-7700
Mo	St. Louis, Armstrong Cork Co., Ind. Products Div.	314-863-7979
NY	Saddle Brook, Armstrong Cork Co., Ind. Products Div.	201-843-0300
NC	Charlotte, Armstrong Cork Co., Ind. Products Div.	704-372-2720
Ohio	Cincinnati, Armstrong Cork Co., Ind. Prods. Div.	513-563-4160
SC	Greenville, Armstrong Cork Co., Ind. Prods. Div.	803-288-0881

ARNOLD ENGINEERING CO., Box "G", Marengo, Ill., 60152, Tel: 815-568-2000, TWX: 910-642-2790; Empl.: 1500 .... p. 2•1212,1213

Products manufactured: Cores, Ceramic, Cores, Magnetic, Foil, Laminations, Magnetizers, Magnets, Shielding Beads, Ferrite

Local Sales Offices & Reps.

Ariz	Scottsdale, C.T. Fink & Assocs.	602-992-9884
Cal	Fullerton, Arnold Engrg. Co.	714-871-1560
Cal	Menlo Park, Straube Assocs.	415-323-2476
Cal	Palo Alto, Arnold Engrg. Co.	415-326-9302
Cal	San Bernardino, Shankman Assoc.	714-997-0660
Mass	Lexington, Arnold Engrg. Co.	617-862-2804
Mich	Jackson, Arnold Engrg. Co.	517-784-5663
Minn	Minneapolis, F.W. Ladky Assocs.	612-545-1494
Mo	Hazelwood, Centech Inc.	314-731-4220
Mo	Raytown, Centech Inc.	816-358-8100
Neb	Ogallala, Ogallala Elctrns.	308-284-4093
NJ	Leonia, Arnold Engrg. Co.	201-461-8150
NJ	Leonia, Ontec	201-461-8150
NY	Rochester, Ontec	716-464-8636
NC	Raleigh, Arnold Engrg. Co.	919-828-3270
Ohio	Shaker Heights, Arnold Engrg. Co.	216-283-7580
Pa	King of Prussia, H. Hackett Assocs.	215-265-7884
Tex	Dallas, Arnold Engrg. Co.	214-821-4654
Wisc	Madison, F.W. Ladky Assocs.	608-222-0900
Wisc	Milwaukee, F.W. Ladky Assocs.	414-964-8060

ARNOLD MAGNETICS CORP., 11520 Jefferson Blvd., Culver City, Cal., 90230, Tel: 213-870-7014, TWX: 910-343-6468; Empl.: 50; Minimum order: $15 p. 1•1093-1105

For info on price: J. McGann; Application info: R. Pizer; Customer service: J. McGann; Delivery info: J. McGann

Free literature available: Short form catalog Design as you order Toroidal winding machine Dummy Power Supply Sample

Products manufactured: Converters, Counters, Decade Boxes, Filters, Inverters, Machines/Machinery, Production, Power Supplies, Transformers

Local Sales Offices & Reps.

Cal	Mountain View, Nor-Cal Assocs.	415-961-8121
Cal	San Diego, Daniels & Doty Sls. Co.	714-560-6266
Colo	Boulder, Scientific Devices, Intermountain	303-449-9466
Mass	Stoneham, Ken Corp.	617-438-5464
Mo	Kansas, Pem Sls.	314-427-7200
NJ	Wallington, Com-Tech Sls.	201-935-5454
Ohio	Cleveland, Bock Assoc.	216-331-5212
Pa	Media, W. Reeves Assocs.	215-566-6709
Tex	Richardson, Texport Co.	214-690-4004

ARNOUX CORP., 35 Anacapa St., Santa Barbara, Cal., 93101, Tel: 805-963-3476; Empl.: 20 .... p. 1•604,605

Products manufactured: Analyzers, Comm. Systems, Converters, Data Acquisition & Reduction Systems, Data Loggers, Decommutators, Telemetering, Indicators, Meters, Multiplexers, Power Supplies

ARRA INC., Antenna & Radome Resch. Assocs., 15 Harold Ct., Bay Shore, N.Y., 11706, Tel: 516-231-8400, TWX: 510-227-6231; Empl.: 45 .... p. 2•1278,1279

Products manufactured: Adapters, Waveguide, Attenuators, Bends & Twists, Microwave, Calibrators, Couplers, Dividers, Drivers, Switch, Dummy Loads, Duplexers, Microwave, Filters, Junctions, Hybrid, Microwave, Kits, Training Aid, Limiters, Line Strechers, Microwave, Mismatches, Microwave, Precision, Modulators, All Kinds, Oscillators, Shifters, Strip-Line Components, Microwave, Switches, Tees, Terminals, Transmitters, Waveguides & Adapters

Local Sales Offices & Reps.

Ala	Huntsville, Saber Assoc.	205-534-3387
Ariz	Phoenix, R.A. Mayes Co.	602-279-5243
Cal	Los Angeles, R F Assocs. Inc.	213-478-1586
Cal	Palo Alto, R F Assocs. Inc.	415-327-3331
Colo	Boulder, R.A. Mayes Co.	303-444-0782
Fla	Lighthouse Point, Saber Assoc.	305-943-3076
Fla	Longwood, Saber Assoc.	305-422-3686
Fla	St. Petersburg, Saber Assoc.	813-441-1301
Ill	Northfield, Feller	312-446-8065
Iowa	Cedar Rapids, Tech Reps.	319-363-2489
Kans	Olathe, Tech Reps.	913-782-1177
Md	Ellicott City, Doss Elctrns.	301-465-1336
Mass	Cochituate, Micronic Assocs.	617-872-6561
Mo	Hazelwood, Tech. Reps.	314-731-5200
NJ	Hackettstown, EAC Assoc.	201-852-5987
NJ	Newtown Sq., SWR Assoc.	215-356-8550
NM	Albuquerque, R. A. Mayes	505-292-2330
NY	Great Neck, EAC	516-466-9798
NY	Syracuse, Tesco Mktg. Assocs.	315-463-4566
NC	Raleigh, Saber Assoc.	919-834-3961
Pa	Newton Sq., SWR Assocs. Corp.	215-356-8550
Tex	Houston, R.A. Mayes	713-466-8325
Tex	Richardson, R.A. Mayes	214-235-3043
Utah	Centerville, R.A. Mayes Co.	801-292-6781
EXP:	Fla., Hallandale, Emec Inc.	305-925-6366

ARROW-HART, INC., 103 Hawthorn St., Hartford, Conn., 06106, Tel: 203-249-8471, Telex: 99328
p. 1•233-236,1580-1585,1933; p. 2•621

Products manufactured: Caps, Connector, Circuit Breakers, Connector Boxes & Strips, Power Outlet, Connectors, Controls/Control Eqpt., Dials, Lights, Motors, Relays, Switches, Timers

Local Sales Offices & Reps.

Ariz	Phoenix	602-957-2860
Ark	Little Rock, Carlton Bates	501-562-9100
Ark	Marion	901-525-6585
Cal	Cerritos	213-773-1736
Cal	Sacramento	916-444-5769
Cal	San Diego	714-287-1300
Cal	San Rafael	415-472-5071
Cal	Santa Clara	408-249-0515
Conn	Hartford	203-249-8471
Ga	Decatur	404-981-4940
Ill	Bensenville	312-595-7750
La	Metairie	504-733-6287
Md	Baltimore	301-467-6896
Mass	Norwood	617-762-3660
Mich	Southfield	313-352-6810
Minn	Minnetonka	612-935-0173
Mo	St. Louis	314-351-0770
NJ	Cinnaminson	609-829-4777
NJ	Teterboro	201-288-3600
NY	Endicott	607-785-0785
NY	Hamburg	716-649-5322
NY	Herkimer	315-866-0443
NY	Honeoye Falls	716-227-2630
NY	Mt. Vernon, QAR Ind.	914-699-2224
NY	Stuyvesant	518-684-6703
NY	Syracuse	315-479-5595
Ohio	Cincinnati	513-793-8300
Ohio	Cleveland	216-651-7733
Ore	Portland	503-234-4563
Tex	Garland	214-270-5441
Va	Richmond	804-262-9556
Wash	Bellevue	206-747-3730
Wisc	Milwaukee	414-351-0840

ARROW-M, 250 Sheffield Ave., Mountainside, N.J., 07092, Tel: 201-232-4260, Telex: 138-213; Minimum order: $50 .... p. 1•1586-1595

For info on price: T. E. Gottlick; Application info: F. Buccino; Customer service: F. Buccino; Delivery info: F. Buccino

Free literature available: Catalogs, Test Reports, Technical Info.

Products manufactured: Counters, Meters, Relays, Switches

Local Sales Offices & Reps.

Ala	Huntsville, Powertronics	205-852-6347
Ariz	Phoenix, Arrowhead Sls Corp.	602-277-7148
Cal	Pico Rivera, Westrep	213-949-2551
Cal	San Diego, Westrep	714-276-0751
Cal	Santa Clara, Westrep	408-984-0350
Conn	Madison, United Components Inc.	203-562-4002
Fla	Casselberry, E I R Inc.	305-830-9600
Fla	Palm Beach, EIR Inc.	305-585-7957
Fla	Plantation, EIR Inc.	305-791-6390
Ill	Chicago, Brock & Cushman	312-622-4110
Ind	Carmel, Giesting Assoc.	316-844-8171
Mich	Detroit, Nicon Assoc.	313-341-7688
Minn	St. Paul, Skor	612-645-6461
NH	Pelham, United Components Inc.	617-454-2751
NJ	Haddonfield, Thomas Assoc. Inc.	609-854-3011
NJ	Plainfield, Meg Electronic Sls.	201-757-4332
NC	Thomasville, Powertronics	919-476-6727
Ohio	Columbus, T. Mulligan & Assoc.	614-457-2242
RI	Saunderstown, United Components Inc.	617-226-0556
Tex	Addison, Dunbar Assoc.	214-239-7151

Local Distributors

Fla	W. Palm Beach, Nurmi Elctrn. Supply Inc., 1727 Donna Rd.	305-686-8553
NJ	Fair Lawn, Relay Specialties, 1300 Plaza Rd.	201-797-3313
NY	Ontario Center, Pace Elctrn. Prods., Box 161	315-524-2491

ART WIRE & STAMPING CO., 9 Wing Dr., Cedar Knolls, N.J., 07927, Tel: 201-267-2000, Telex: 13-6455; Empl.: 100

Free literature available: Art of Wire Forming; Knurled Terminals; Keyboard Contacts; Wire Forms and Stampings; We Have A Way With Wire.

Products manufactured: Connectors, Forms, Wire, Pins, Services, Assembly, Production & Test, Terminals, Wire

Local Sales Offices & Reps.

Ariz	Scottsdale, J. Hagestad	602-945-8415
Cal	Downey, Corbett-Smith	213-927-2788
Cal	San Francisco, D.R. Cox	415-441-8666
Ind	Indpls, Hoster & Sieloff	317-844-9921
Kans	Kansas City, L. Bruns	913-AT 9-5242
Mich	Detroit, W. Crawford Assoc.	313-836-8121
Minn	St. Paul, R. Bittrick	612-226-6178
Tex	Dallas, P. Scanlon	214-AD 1-4661

ARTECH CORP., 2816 Fallfax Dr., Falls Church, Va., 22042, Tel: 703-560-3292

Free literature available: Brochure contains information on R.F. attenuators, vacuum-ultraviolet lamps and detectors, and testing and coating services.

Products manufactured: Boards, Printed Circuit, Cells, Photoconductive, Photoemissive, Photovoltaic, Crayons, Coatings, Pellets, etc., Temperature Indicating, Detectors

Local Sales Offices & Reps.

Kans	Kansas City, Nevco	816-421-1751

ARTISAN ELCTRNS. CORP., 5 Eastmans Rd., Parsippany, N.J., 07054, Tel: 201-887-7100; Empl.: 150; Minimum order: $15

For info on price: A. Seman; Application info: A. Bastian; Customer service: M. Minter; Delivery info: M. Minter

Free literature available: Specification Data on General Purpose Relays; Specification Data on Industrial Solenoids; Specification Data on Solid State Timers; Specification Data on Solid State Programmers; Cross Reference Literature on General Purpose Relays.

Products manufactured: Annunciators, Coils Including Assemblies & Forms, Controls/Control Eqpt., Delays, Time (Excluding Delay Lines, Timers, Delay & Relays, Time-Delays), Drivers, Solenoid, Flashers, Indicators, Panels, Recorders, Relays, Solenoids, Switches, Testers, Timers

Local Sales Offices & Reps.

Cal	Los Altos, Herb Waldek Assoc.	415-964-4699
Cal	San Gabriel, P.F. Wiley Co.	213-663-8028
Conn	Bloomfield, Zaslow Sls.	203-242-7781
Conn	Milford, Zaslow Sls.	203-878-1094
Fla	Orlando, Geartner Associates	305-299-1000
Ill	Northfield, Such & Assocs. Inc.	312-446-8934
Md	Hyattsville, Eastern Components	301-577-2925
Mass	Lowell, Zaslow Sls.	617-458-8452
Mass	Northboro, Zaslow Sls.	617-393-8150
Mich	Farmington, Oliver Stirling	313-851-7373
Minn	Minneapolis, Delta Assoc.	612-560-6240
NJ	N. Caldwell, Masin-Esco	201-226-2550
NY	Chappaqua, Masin-Esco	914-CE 8-8337
NY	Fayetteville, Graydon-Sherman	315-637-9861
NY	Syosset, Masin-Esco	516-364-0310
Ohio	Cincinnati, G & H Sls. Co.	513-771-8231
Ohio	Grove City, G & H Sls. Co.	614-878-1128
Pa	Philadelphia, Eastern Comps.	215-836-1616
Tex	Irving, Aid Elctrns.	214-159-4761
FOR:	Can., Downsview, Ontario, Zaslow Sls.	416-727-1211

ARTOS ENGRG. CO., 15600 W. Lincoln Ave., New Berlin, Wisc., 53151, Tel: 414-782-3300, Telex: 26-9549; Empl.: 300

For info on price: H. T. Randar; Application info: M. Randar; Customer service: R. O. Dusel; Delivery info: P. Woboril

Products manufactured: Machines/Machinery, Production, Wire Strippers

Local Sales Offices & Reps.

Cal	Fullerton, C. Martin	
Conn	Stamford, Artos Engrg. Co.	
Ga	Atlanta, Artos Engrg.	
Ill	Morton Grove, Artos Engrg. Co.	

ARTRONIC INSTR. CO., 11232 Triangle La., Silver Spring, Md., 20902, Tel: 301-949-1131; FSC No: 09446
p. 1•430,431

Customer service: M. E. Pugh

Free literature available: General catalog.

Products manufactured: Delay Lines, Delays, Time (Excluding Delay Lines, Timers, Delay & Relays, Time-Delays), Filters, Networks, Reactors, Transformers

ARVIN FREQUENCY DEVICES, Elctrn. Sys. Div., Arvin Inds., 15th St. Plant, Columbus, Ind., 47201, Tel: 812-379-3842, TWX: 810-352-1272; Empl.: 30

Products manufactured: Oscillators

Local Sales Offices & Reps.

Cal	Los Angeles, E. Landa	213-879-0770
Cal	San Diego, Tauber Assocs.	714-274-7242
Iowa	Cedar Rapids, HR Brown Sls. Co.	319-366-0635
Mass	Needham, Addelco	617-444-4754
NY	Great Neck, EAC Assocs., Inc.	516-466-9798
EXP:	Chicago, Ill., E.D. Magnus Assocs.	312-334-1502

ASARCO INTERMETALLICS CORP., 120 Broadway, New York, N.Y., 10005

ASHMAN INDUSTRIES (1966) LTD., 66 Brock Rd., Greensville Dundas, Ont., Can., Tel: 416-628-6371; Empl.: 48

For info on price: H. Rushton; Customer service: S. Harathyan; Delivery info: M. Booker

Free literature available: Catalogue

Products manufactured: Benches, Consoles, Stools, Tables, Boards, Plug-In, Boards, Printed Circuit, Cabinets & Accessories, Cable Assemblies & Harnesses, Cases, Equipment, Instrument, Meter, Chassis, Metal, Decade Boxes, Panels, Power Supplies, Racks, Services, Assembly, Production & Test

ASHLAND ELEC. PRODS., 32-02 Queens Blvd., L.I.C., N.Y., 11101, Tel: 212-EX 2-4010; Empl.: 150
p. 1•486,487,934-937

For info on price: R. Lukasik; Application info: R. Lukasik; Customer service: J. Parks; Delivery info: J. Parks

Free literature available: We offer a catalog which describes Ashland's product line, this consists of fractional horsepower electric motors, axial fans and centrifugal blowers. Electrical and mechanical specifications are included.

Products manufactured: Blowers & Fans & Accessories, Motor & Generator Armatures, Rotors, Stators, Motors

Local Sales Offices & Reps.

Cal	Burlingame, W.J. Purdy	415-347-7701
Cal	Los Angeles, C. Repp	213-GR 7-4475
Cal	Sacramento, Wm. J. Purdy Co.	916-481-0971
Colo	Denver, Wm. J. Purdy Co.	303-777-1411
Fla	Fern Park, M. G. Assocs.	305-841-8793
Ill	Chicago, Berndt Assoc.	312-283-0713
Md	Riversdale, Riggs Assocs.	301-927-3380
Mass	Brookline, Harman	617-232-6687
Minn	Minneapolis, Electronic Innovators	612-884-7471
Miss	Corinth, Remco	601-287-5369
NM	Albuquerque, W. J. Purdy Co.	505-266-7959
NY	Brooklyn, Eastern Elctrn. Sls.	212-763-5180
NY	Fairport, TAC Assocs.	716-377-1742
NY	Utica, Elcom Sls.	315-732-6445
Ohio	Akron, Augnat Assocs.	216-725-6087
Pa	Doylestown, T.O.E. Sales	201-568-5747
Tenn	Bristol, Remco	615-968-4196
Tex	Dallas, RMC & Assoc.	214-363-0166
Wash	Kirkland, Todd-Brian	206-827-5811
FOR:	Can., Montreal West, Que., Hooker Elec. Canada	514-487-5151

ASSEMBLED PRODUCTS CO., Box 750, St. Albans, Vt., 05478; Empl.: 22

Customer service: A. Sherry 802-893-4513

Products manufactured: Cable, Relays, Wire

ASSOCIATE GENERAL LABS., INC., 8934 W. Ogden Ave., Brookfield, Ill., 60513, Tel: 312-485-1135; Empl.: 11

Customer service: A. Schroeder

Products manufactured: Machines/Machinery, Production, Services, Assembly, Production & Test

ASSOCIATED ENGRG. & MFG. CORP., 546 Valley Rd., Upper Montclair, N.J., 07043, Tel: 201-783-7800; Empl.: 69; Minimum order: $100

For info on price: D.M. Fox; Application info: D.M. Fox; Customer service: J. Reid; Delivery info: J. Francis

Products manufactured: Caps, Connector, Connectors, Metals, Relays, Sockets, Switches, Terminals, Wire

ASSOCIATED ENVIRONMENTAL SYSTEMS, 360 Merrimack St., Lawrence, Mass., 01842, Tel: 617-683-9501, TWX: 710-342-0765; Empl.: 300; Minimum order: $15

Customer service: D. L. Thomas

Free literature available: Complete catalog of products

Products manufactured: Chamber, Environmental Test, Ovens, Refrigerators, Environmental Test

Local Sales Offices & Reps.

Ala	Birmingham, Dilcher Engrg. Co. Inc.	205-252-3300

Ariz	Scottsdale, Sls. Engrg., Inc.	602-945-5781
Cal	Mountain View, IFM, Inc.	415-961-2828
Cal	Van Nuys, Gordon-Elliot, Inc.	213-873-6862
Conn	East Hartford, E. E. Specialists, Inc.	203-568-1500
Fla	St. Petersburg, Dilcher Engrg. Co. Inc.	813-343-1041
Ga	Atlanta, Dilcher Engrg. Co.	404-261-1678
Ill	Chicago, Midwest Elctrn. Sls.	312-626-0030
Ind	Indianapolis, Midwest Elctrn. Sls.	317-926-3736
Iowa	Cedar Rapids, Midwest Elctrn. Sls.	319-362-4410
Kans	Wichita, Aero-Hill Sls.	316-943-6371
Md	Silver Spring, ARA Elctrns., Inc.	301-565-2584
Mass	Acton, Edcom	617-969-9710
Mich	Detroit, Electro Entprs., Inc.	313-521-1500
Minn	Minneapolis, E. J. Doyle Co.	612-827-5847
NY	Albany, J. A. Reagan Co., Inc.	518-489-4777
NY	Binghamton, J. A. Reagan Co., Inc.	607-723-9661
NY	Great Neck, Trionic Assocs., Inc.	516-466-2300
NY	New Hartford, J. A. Reagan Co., Inc.	315-732-3775
NC	Winston Salem, Radco Co.	919-722-9671
Ohio	Cleveland, Electro Entprs., Inc.	216-261-7670
Ohio	Dayton, Electro Entprs., Inc.	513-426-6071
Pa	Glenside, ARA Elctrns., Inc.	215-887-5250
Tex	Dallas, True Technology Co.	214-691-7870
Wisc	Waukesia, Midwest Elctrn. Sls.	414-542-5129

ASSOCIATED RESEARCH, INC., 6125 W. Howard St., Niles, Ill., 60648, Tel: 312-647-7850; Minimum order: $10 .... p. 1•607

For info on price: R. S. Barnard; Application info: M. Kaltenbach; Customer service: R. S. Barnard; Delivery info: M. Kaltenbach

Products manufactured: Cable Fault Locators, Meters, Power Supplies, Testers

Local Sales Offices & Reps.

Ariz	Scottsdale, Sls. Engrg.	602-945-5781
Ark	Little Rock, Electra-Tech Midsouth	501-562-4090
Cal	Paramount, Brenner-Fiedler Assoc.	213-531-7222
Cal	San Francisco, California Instr. Co.	415-863-0350
Fla	Miami, Ludlum Assocs. Co.	305-592-6523
Fla	Orlando, Ludlum Assocs. Co.	305-894-7761
Ga	Atlanta, Holman-Lobsinger Co.	404-256-9120
Ill	Chicago, Factory Office	312-647-7850
Ind	Indianapolis, C.M. Buck & Assocs.	317-251-1281
Md	Bethesda, Bartlett Assocs.	301-656-3061
Mass	Needham, Northeast Reps.	617-449-3034
Mich	Birmingham, Electro-Mation Assocs.	313-564-6517
Minn	Edina, Ainslie Co.	612-920-2996
Mo	Kansas City, Cleaves-Bessmer-Marietti	816-353-6011
Mo	St. Louis, Fitzgerald Sls. Co.	314-241-4066
Neb	Omaha, F.C. Clatterbaugh Co.	402-331-3950
NY	Brooklyn, Associated Research	212-451-0708
NC	Charlotte, J. Rudisill Assocs.	704-377-6901
Ohio	Brecksville, D & B Engrg. Sls.	216-526-6320
Pa	Pittsburgh, Bollinger & Bradford	412-561-2340
Pa	Wayne, Bartlett Assocs.	215-688-7325
Tex	Dallas, J.Y. Schoonmaker Co.	214-357-8481
Wash	Seattle, D.A. Olson	206-522-6594

ASSOCIATED SPECIALTIES CO., 1751 Main St., Orefield, Pa., 18069, Tel: 215-395-9172

Customer service: V. Laudenslager

Products manufactured: Power Supplies

ASSOCIATED SPRING CORP., 18 Main St., Bristol, Conn., 06010, Tel: 203-582-9581, TWX: 710-454-0592; Empl.: 6,105

For info on price: R. O.. Corley; Application info: S. M. Rimmer; Customer service: R. O. Corley; Delivery info: R. O. Corley

Products manufactured: Fasteners, Forms, Wire, Services, Assembly, Production & Test, Springs (All Types)

Local Sales Offices & Reps.

Cal	Gardena	213-323-4833
Colo	Denver	303-399-2643
Conn	Bristol	203-582-9581
Ga	Atlanta	404-256-2510
Ill	Lombard	312-495-4760
Ill	Mattoon	217-235-5601
Mich	Ann Arbor	313-665-8686
Mich	Plymouth	313-453-6100
NY	Syracuse	315-457-9200
NC	Arden	704-684-7836
Ohio	Dayton	513-253-4131
Pa	Corry	814-665-8241
Tenn	Memphis	901-332-4832
Tex	Dallas	214-631-3441
Wisc	Milwaukee	414-482-1600

ASSOCIATED TESTING LABS., Northwest Ind'l. Pk., Burlington, Mass., 01803, Tel: 617-272-9050; Empl.: 100

Products manufactured: Chamber, Environmental Test, Services, Assembly, Production & Test, Testers

Local Sales Offices & Reps.

Ariz	Scottsdale, Engrg. Sls. Assocs.	602-945-5781
Cal	Mt. View, IFM-North	415-961-2828
Cal	Van Nuys, Gordon-Elliot, Inc.	213-873-6862
NY	Albany, Compar Albany	518-489-7408
NC	Winston-Salem, Radco Co.	919-722-9671
Tex	Dallas, True Technology	713-649-7874
Tex	Houston, True Technology	214-239-7741

ASSOCIATED TESTING LABORATORIES, 9 Brighton Rd., Clifton, N.J., 07012, Tel: 201-473-6455; Empl.: 45

Customer service: D.W. Hanright

Free literature available: Facilities & capabilities brochures describe testing services offered.

Products manufactured: Services, Assembly, Production & Test

ASTATIC CORP., Box 120, Conneaut, Ohio, 44030; Empl.: 500

Products manufactured: Microphone Accessories (Including Stands, Holders, Booms), Microphones, All Kinds

Local Sales Offices & Reps.

Cal	Burlingame, W.J. Purdy Co.	415-347-7701
Cal	Sacramento, W.J. Purdy Co.	916-422-0128
Cal	Van Nuys, M. Roth Sls.	213-989-3738
Colo	Denver, Connors, Inc.	303-934-5829
Conn	Waterbury, Anderson Sls. Assocs.	203-753-2487
Fla	Orlando, Hollingsworth & Still, Inc.	305-671-4515
Ga	Atlanta, Hollingswoth & Still, Inc.	404-394-3270
Ill	Chicago, Markal Sls. Corp.	312-282-5800
Ind	Indianapolis, Sukup & Cox, Inc.	317-253-1215
Iowa	Des Moines, Kathrinus-Kelly & Co.	515-255-4584
Kans	Shawnee Mission, Kathrinus-Kelly & Co.	913-722-0000
La	Chalmette, Cartwright & Bean Inc.	901-276-4442
Md	Silver Spring, Lowery Assocs. Co.	301-439-3542
Mass	Boston, Anderson Sls. Assocs.	617-227-2980
Mich	Southfield, R. Milsk Co.	313-354-3310
Miss	Jackson, Cartwright & Bean Inc.	601-354-1368
Mo	St. Louis, Kathrinus-Kelly & Co.	314-968-3800
NJ	Teaneck, S. Axelrod Assoc.	201-836-6661
NY	Lake Ronkonkoma, S. Axelrod Assoc.	
NY	Syracuse, Paston-Hunter Co., Inc.	315-437-2992
NC	Charlotte, Hollingsworth & Still Inc.	704-536-7047
Ohio	Beachwood, Elctrn. Salesmasters Inc.	216-831-9555
Ohio	Dayton, Elctrn. Salesmasters Inc.	513-837-2379
Ore	Portland, D.G. Weber Co.	503-234-0686
Pa	Broomall, Lowery Assocs. Co.	215-356-5300
Pa	Harrisburg, Lowery Assocs. Co.	215-233-0917
Tenn	Memphis, Cartwright & Bean Inc.	901-276-4442
Tex	Dallas, Maynard & Gunn Sls. Co.	214-742-2384
Tex	Houston, Maynard & Gunn Sls. Co.	713-497-0544
Utah	Bountiful, Connors, Inc.	801-292-4664
Va	Charlottesville, Lowery Assocs. Co.	703-973-6672
Wash	Seattle, D.G. Weber Co.	509-623-5990
Wash	Spokane, D.G. Weber Co.	509-624-3908
EXP:	Plainview, NY, Morhan Exporting Corp.	516-293-5582

ASTRO ELCTRNS., INC., 2478 Fender Ave., Unit "D", Fullerton, Calif., 92631, Tel: 714-526-5581; Empl.: 14; Minimum order: $100

For info on price: C. Jasper; Application info: G. A. Harter; Customer service: G. A. Harter; Delivery info: C. Jasper

Products manufactured: Potentiometers, Resistors

Local Sales Offices & Reps.

Cal	Los Angeles, Component Mktg. Assocs.	213-541-2515
Ohio	Cincinnati, B. Stephens Manufacturers' Rep.	513-921-0350

ASTRO-GEO-MARINE INC., Box 5526, Oxnard, Cal., 93030, Tel: 805-485-3128; FSC No: 51473; Empl.: 10

Customer service: J. E. Fenole

Products manufactured: Converters, Inverters, Power Supplies, Services, Assembly, Production & Test

ASTRO-MED, Div Atlan-Tol Inds. Inc., 639 E. Greenwich Ave., West Warwick, R.I., 02893, Tel: 401-828-4000; Empl.: 35

For info on price: D. Colinan; Application info: E. V. Pizzoti; Customer service: M. Cote; Delivery info: B. Berthiume

Free literature available: (1) "Barebones" Recorders - One, two, three, and four channel low cost recorders; (2) "OEM" Recorders - One, two, three, and four channel recorders; (3) Portable Battery Powered Recorder; (4) Eight channel recorder.

Products manufactured: Paper, Graphic Recording, Recorders

ASTRO CIRCUIT CORP., 540 Main St., Tewksbury, Mass., 01876, Tel: 851-7229, Telex: 947851; Empl.: 140; Minimum order: $100

Customer service: W. J. Galvin

Free literature available: Literature provides a photographic description of facilities as well as a description of capabilities, in design, engineering and manufacturing.

Products manufactured: Circuits, Printed, Multilayer

Local Sales Offices & Reps.

Mass	Randolph, Naton Assocs.	617-986-6417
NY	Roslyn Heights, Productronics Ltd.	516-484-2519

ASTRO DYNAMICS, Northwest Indl. Park, Burlington, Mass., 01803, Tel: 617-272-3900; Empl.: 50; Minimum order: $25

Free literature available: Our literature describes our cooling devices which can help solve any cooling problems one might have, and our flowmeters and flow generators which can measure accurately.

Products manufactured: Blowers & Fans & Accessories, Chamber, Environmental Test, Containers, Controls/Control Eqpt., Data Acquisition & Reduction Systems, Motors, Services, Assembly, Production & Test, Transistor, Diode, Thyristor Heat Dissipators

Local Sales Offices & Reps.

Ariz	Scottsdale, Fryco	602-945-3281
Cal	Orange, Current Prod. Sls.	714-633-7414
Cal	Pasadena, Components Corp.	213-681-7448
Colo	Boulder, Components Prods. Sls. Co.	303-444-2730
Fla	Jupiter, Cherry Assocs.	305-746-4591
Ill	Hillside, TX Sales	312-499-0600
Ind	Ft. Wayne, TX Sales	219-489-4447
Md	Ellicott City, V.P.I., Inc.	301-465-4060
Mass	Reading, Champagne Assocs.	617-944-3011
Mich	Dearborn Heights, Ankofski Assocs.	315-565-6330
Mich	Ferndale, Tiby Co.	313-547-3550
Minn	Minneapolis, Components Group	612-824-4222
NJ	Mt. Ephraim, Burdette Co.	609-931-1300
NY	Northport, Production Sls. Assocs.	516-757-0336
Ohio	Cleveland, Tiby Co.	216-371-5335
Pa	North Wales, V.P.I.	215-368-4233
Tex	Grand Prairie, Howell Sls. Co.	214-262-5153
Va	Merrifield, V.P.I.	703-573-7837

ASTRODATA INC., 240 E. Palais Rd., Anaheim, Cal., 92805, Tel: 714-772-1000, TWX: 910-591-1175; Empl.: 238; Minimum order: $75

For info on price: J. McLendon; Application info: J. McLendon; Customer service: W. J. Konvalinka; Delivery info: W. J. Konvalinka

Products manufactured: Boards, Printed Circuit, Comm. Systems, Counters, Decommutators, Telemetering

ASTRODYNE, INC., Sub. Roanwell Corp., 353 Middlesex Ave., Wilmington, Mass., 01887, Tel: 617-272-3850, TWX: 710-347-0704; Empl.: 60; Minimum order: $25

For info on price: R. G. Vossler; Application info: E. Kuklinski; Customer service: R. Levesque; Delivery info: R. Levesque

Free literature available: Catalog NC-740 Natural Convection Heat Sinks-Outlines and performance graphs Catalog FC-730 Forced Convection Cooling Assemblies - description & performance data Catalog HP-7000 Heat Pipes-description Catalog HE-5740 Heat Exchangers-description-sizers & performance-low pressure.

Products manufactured: Coatings, Compounds, Encapsulating, Insulating, Molding, Potting, Heat Exchangers & Systems, Transistor, Diode, Thyristor Heat Dissipators

Local Sales Offices & Reps.

Ariz	Scottsdale, Inter-Mountain Engrg. Co.	602-947-7379
Cal	Anaheim, Lodan, Inc.	714-956-1560
Cal	Redwood City, Parks & Pruitt Assoc.	415-364-1640
Cal	San Diego, Earle Assoc.	714-278-5441
Colo	Boulder, Mile High Elctrns.	303-444-5615
Fla	Eau Gallie, J.J. Smith & Assoc.	305-254-4206
Ill	Chicago, Ellinger Sls. Corp.	312-763-1570
Kans	Prairie Village, Engrg. Svcs. Co.	913-649-4000
Md	Baltimore, Kaufholz Assoc.	301-488-6561
Mass	Brookline, Harman Assoc.	617-232-6687
Mich	Birmingham, Forand Sls. Co.	313-644-0087
Minn	St. Louis Park, Beta Engrg. Co.	612-925-4422
Mo	St. Louis, Engrg. Svcs. Co.	314-997-1515
NJ	Harrington Park, Metro Tech. Sls.	201-768-8495
NY	East Syracuse, Jones-Sudders Inc.	315-437-9118
NY	Jericho, Metro Tech. Sls.	516-935-3330
NC	Burlington, P.J. Nahser Co.	919-226-8053
Ohio	Cleveland, Component/Insulation Corp.	216-521-3570
Pa	Newtown Square, Kaufholz Assoc.	215-356-5000
Pa	Pittsburgh, J.W. Kight Co.	412-781-8303
Tex	Irving, Lee Sls. Corp.	214-363-3831
Wash	West Seattle, G.M. Gillett Assoc.	206-284-3344
EXP:	Stamford, Conn., J.P. Int'l. Corp.	203-348-2691

ASTROLAB, INC., 1600 Essex St., Rahway, N.J., 07065, Tel: 201-382-8204, TWX: 710-996-5870; Empl.: 36

Products manufactured: Attenuators, Cable, Connector Adapters, Connectors, Dummy Loads, Jack Adapters (All Types), Tees, Terminals, Waveguides & Adapters, Wire Shielding

Local Sales Offices & Reps.

Cal	Los Angeles, Fetty/Schoenduve	213-651-4050
Cal	Palo Alto, E. Rinker	415-321-7041
Fla	Clearwater, Brennan Assocs.	813-446-5006
Wash	Renton, W. Milt Baxley	206-226-0650

ASTRO PRODUCTS CO., 1971 Spear St., S. Burlington, Vt., 05401, Tel: 802-864-7625; Empl.: 41; Minimum order: $25

For info on price: H. Hassen; Customer service: A. Hunyadi

Products manufactured: Cable Assemblies & Harnesses, Cable, Wire

ASTROSYSTEMS, INC., 6 Nevada Dr., Lake Success, N.Y., 11040, Tel: 516-328-1600, TWX: 510-223-0411; Empl.: 150 .... p. 1•142,143

Application info: J. O'Brien; Customer service: D. Bates; Delivery info: D. Lavaglio

Products manufactured: Amplifiers, Bridges, Calibrators, Controllers, Programmable, Controls/Control Eqpt., Converters, Data Acquisition & Reduction Systems, Decade Boxes, Dividers, Encoders, Indicators, Modules, Logic, Encapsulated, Potentiometers, Power Supplies, Repeaters, Servo, Signal Conditioners & Equipment, Standards, Switches, Synchro Transmitters, Solid-State, Testers, Transducers, Transformers

Local Sales Offices & Reps.

Ala	Huntsville, Kemp Engrg.	205-837-4304
Ariz	Scottsdale, Electronic Entprs.	602-946-9860
Cal	Huntington Beach, Wheatcroft Engrg. Co.	714-842-5569
Cal	San Francisco, Wm Benison	415-398-2211
Colo	Denver, Bond Assoc.	303-756-1234
DC	Wash., Astrosystems	202-296-4380
Fla	Orlando, Datarep, Inc.	305-843-5224
Ill	Mt. Prospect, Automation Equip.	312-398-7550
Mass	Lexington, Dimensional Systems	617-862-2700
Mass	Sturbridge, Brandford Controls	617-347-7367
Minn	Minneapolis, Engrg. Prods.	612-925-1883
NJ	West Trenton, Kriegner Sales	609-882-6330
NM	Albuquerque, BFA Corp.	505-296-8303
NM	Las Cruces, Electronic Enterprises	505-524-0126
NY	Cazenovia, P. DeCew, Inc.	315-655-8602
NC	Charlotte, Beck Sls. & Engrg.	704-366-5366
Ohio	Dayton, LI/Corp.	513-434-6367
Okla	Tulsa, Kemp Eng. Co.	918-299-2636
Ore	Portland, Hayes Tech.	503-238-0001
Tex	Addison, Kemp Engrg.	214-661-0400
Tex	Houston, Kemp Engrg. Co.	713-688-1431
Wash	Seattle, Hayes Technical	206-763-2210
Wisc	Wauwatosa, Larson Assoc.	414-258-0529
FOR:	Can., La Salle, Quebec, Electrodesign, Ltd.	514-363-5120
FOR:	Can., Ontario, Electrodesign, Ltd.	613-745-0541
FOR:	Can., Toronto, Electrodesign, Ltd.	416-787-0991

ATEC, INC., Box 19426, Houston, Tex., 77024, Tel: 713-468-7971; Empl.: 48

Products manufactured: Comparators, Controls/Control Eqpt., Counters, Data Acquisition & Reduction Systems, Data Loggers, Indicators, Scanners, Test Systems, Testers, Timers, Totalizers, Digital

ATKOMATIC VALVE CO., INC., Box 11258, 141 Sherman Dr., Indianapolis, Ind., 46201, Tel: 317-357-8421; FSC No: 70642; Empl.: 38; Minimum order: $5

For info on price: R. L. Thompson; Application info: R. B Spear; Customer service: A. E. Richardson; Delivery info: R. L. Thompson

Free literature available: General Bulletin - Brief description of solenoid valve line (enclosed). Catalog No. 68 - Quick value Selection chart, 16-page engineering section, complete description of valve line. 50 pages ring binder. Contains current prices. Free on request.

Products manufactured: Valves, Solenoid

Local Sales Offices & Reps.

Ala	Birmingham, Control Specialists	205-871-9679
Ala	Spanish Fort, Control Specialists	205-433-1453
Ariz	Phoenix, Bews & Wallace Co.	602-275-4496
Ariz	Tucson, Bews & Wallace Co.	602-297-4001
Ark	Little Rock, Murrel Haase & Co.	501-376-7227
Cal	Paramount, Brenner-Fiedler & Assoc.	213-531-7222
Cal	Richmond, Wagner-Denco Sls.	415-237-9054
Colo	Denver, Berry Co.	303-935-4587
Conn	Hamden, Pond Tech. Sls.	203-288-6278
Fla	Orlando, Control Center	305-896-6831
Ga	Atlanta, Rittelmeyer & Co.	404-688-8331
Ill	Chicago, Miller Engrg. Specialties	312-725-0221
Iowa	Cedar Rapids, Skarda Equip. Co.	319-393-3003
Kans	Prairie Village, Parker & Foster	913-381-9330
KY	Louisville, Richard Equip. Co.	502-895-8060
La	Baton Rouge, Del Rio	504-927-9167
Mass	Somerville, Peeco	617-666-4444
Mich	Warren, L.W. Jeffries Co.	313-755-6162
Minn	St. Paul, A-tu-Zee	612-646-6383
Mo	St. Louis, Tepco Ind. Sls.	314-741-1800
Neb	Omaha, Skarda Equip. Co.	402-731-7690
NJ	Rochelle Park, Gale Equip. Co.	201-843-1144
NY	Buffalo, J.W. Simpson Co.	716-634-3995
NY	Syracuse, J.R. Manier	315-446-9533
NC	Charlotte, Mec-Tric Control Co.	704-376-8551
Ohio	Cincinnati, Richard Equip. Co.	513-271-8666
Ohio	Cleveland, Commercial Elec. Prods. Corp.	216-241-2886
Ohio	Toledo, Fred H Hall Co.	419-531-4878
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Okla	Tulsa, Delcon	918-622-6380
Pa	Broomall, John C. Whiddett Co.	215-353-6343
Pa	Pittsburgh, Controlamatic Co.	412-563-4611
Tenn	Memphis, Murrel Hasse & Co.	901-743-4304
Tex	Dallas, Southwestern Controls	214-742-6266
Tex	Houston, Southwestern Controls	713-666-2801
Va	Richmond, Virginia Carolina Controls Co.	804-644-0361
Wash	Seattle, Greaves Co.	206-284-0660
Wisc	New Berlin, D.E. Riley Corp.	414-786-1230
FOR:	Can., Calgary, Alb., Cantech Controls Ltd.	403-252-8151
FOR:	Can., Lachine, Montreal, Que., Cowper Co. Ltd.	
FOR:	Can., Mississauga, Ont., Dycon Ltd.	416-625-4350
FOR:	Can., No. Vancouver, BC, Greaves Ind. Sls. Ltd.	604-988-6755

ATLANTIC LAMINATES, 174 N. Main St., Franklin, N.H., 03235, Tel: 603-934-5736, TWX: 510-298-1170; Minimum order: $80

For info on price: E. Groehl; Application info: L. P. Blanchet; Customer service: J. Dyer; Delivery info: E. Groehl

Free literature available: Polyimide - G 10 - FR 4 - FR 5 - Teflon - Rexolite - Polyester - Plus Special Products and Mass Molding.

Products manufactured: Laminates

Local Sales Offices & Reps.

Cal	San Fernando, MacDonald & Assoc.	213-365-3616
Cal	Santa Clara, Butler Chemical	408-244-4177
Colo	Boulder, R-G Enterprises	303-447-9211
Conn	Southport, JCL Assocs.	203-255-2456
Fla	Winter Park, Young & Lawrence	305-647-6929
Ill	Chicago, Brock & Cushman, Inc.	312-622-4110
Ind	Noblesville, D-M Assocs.	317-773-3600
Minn	Minneapolis, Hamlet & Smith	612-545-3666
Mo	Baldwin, McQuillan Assocs.	314-391-0078
NJ	Rocky Hills, Krone & Rubin Assocs.	609-924-0200
Ohio	Cleveland, Insulation & Components	216-331-4434
Tex	Dallas, Bunker Industries	214-630-1600
Wash	Seattle, H-J Sales	206-522-6980
Wisc	Milwaukee, Hamlet & Smith	414-272-2787

ATLANTIC OPTICAL MOULDING CO., Ellis St., Dudley, Mass., 01570, Tel: 617-943-1746; Empl.: 6

Customer service: J. F. Krysiak

Free literature available: Glass molding of all type of optical and techinical glasses. Lens pressings and "Precision Glass Parts" for Optical, Industrial and Electronic applications.

Products manufactured: Bushings, Glass, Plastic, Metal, Rubber, Etc., Caps, Lenses, Indicator Light, Insulators & Insulation, Lenses, Readout & Display, Services, Assembly, Production & Test, Substrates

ATLANTIC RESEARCH COROPRATION, 5390 Cherokee Avenue, Alexandria, Va, 22314; Empl.: 831

Products manufactured: Alarms, CATV Systems & Equipment, Comm. Systems, Decoders, Detectors, Display Devices/Displays, Graphite Parts, Lasers & Laser Systems, Materials, Graphite, Meters, Power Supplies, Probes, Regulators, Rings, Retaining, Scramblers, Data, Seals, Services, Assembly, Production & Test, Television Systems & Equipment Closed-Circuit, Testers, Tracking Systems, Underwater Communication, Detection, Navigation, etc. Equipment, X-Ray Inspection Equipment

ATLAS ELECTRIC DEVICES, 4114 N. Ravenswood Ave., Chicago, Ill., 60613, Tel: 312-327-4520; Empl.: 95

Products manufactured: Chamber, Environmental Test, Lamps, Lights

ATLAS ENGRG. CORP., 26 Custer St., W. Hartford, Conn., 06110, Tel: 203-246-5651; FSC No: 07001; Empl.: 10; Minimum order: $10

For info on price: C. Schectman; Application info: F. Sweeney; Customer service: C. Schectman; Delivery info: C. Schectman

Products manufactured: Chamber, Environmental Test, Refrigerators, Environmental Test, Services, Assembly, Production & Test

ATLAS EYELETS, Pinkham St., Fairhaven, Mass., 02719, Tel: 617-997-9491

Customer service: A. Pinkham

Products manufactured: Eyelets

Local Sales Offices & Reps.

Ill	Chicago, E.C. Rowell & Co.	312-238-3401

ATLAS FIBRE CO., 6970 N. Central Park Ave., Chicago, Ill., 60645, Tel: 312-465-1234; Empl.: 3; Minimum order: $50

For info on price: L. A. Grusin; Application info: M. L. Grusin; Customer service: R. Welch

Free literature available: Catalog includes samples of material, Prices, & Listing of Grade & Size Range.

Products manufactured: Bushings, Glass, Plastic, Metal, Rubber, Etc., Coils Including Assemblies & Forms, Insulators & Insulation, Services, Assembly, Production & Test

ATLAS SOUND DIV., American Trading & Production Corp., 10 Pomeroy Rd., Parsippany, N.J., 07054, Tel: 201-887-7800; Empl.: 350; Minimum order: $35

For info on price: J. A. Palmieri; Application info: J. A. Palmieri; Customer service: J. Just; Delivery info: J. Just

Free literature available: Catalogue and Technical Data Describing: A) Microphone Stands, Accessories and Fittings, B) Environment-Protected Loudspeakers, Alarm and Signaling, Transducers, Custom Sound Drivers, Intercom and Siren Speakers, Mounting and Transformer Accessories

Products manufactured: Speakers

ATLEE CORP., 8 Gill St., Woburn, Mass., 01801, Tel: 617-933-3510, TWX: 710-393-0176; Empl.: 40

Products manufactured: Bus Bars & Systems, Clamps & Clips, Guides, Circuit Board, Holders, Circuit Board (Production Type), Holders, Crystal, Mounts

Local Sales Offices & Reps.

Cal	Burlingame, J. Logan & Assocs.	415-697-6100
Mass	Woburn, Atlee Corp.	617-933-3510
Mich	Walled Lake, T. Mulligan & Assocs.	313-624-0174
NJ	Madison, Livera-Polk Assocs.	201-377-3220
NY	Roslyn Heights, Livera-Polk Assocs.	516-484-1276
NY	Syracuse, Rep Tech, Inc.	315-437-2845
Ohio	Columbus, T. Mulligan & Assocs.	614-457-2242
FOR:	Can., Richmond, B.C., Lake Engrg. Co.	604-277-0414
FOR:	Can., Scarborough, Ont., Lake Engrg. Co.	416-751-5980
FOR:	Can., St. Laurent, P.Q., Lake Engrg. Co.	514-747-2441

ATMOSPHERE CONTROLS PRDTS., 295 Polaris, Mt. View, Cal., 94043, Tel: 415-969-2690; Empl.: 16

For info on price: J. P. Conroy; Delivery info: W. E. Ellis

Products manufactured: Air Cleaners & Filters (Shielded & Unshielded), Cabinets & Accessories, Dehumidifiers (For Equipment), Services, Assembly, Production & Test

ATOMERGIC CHEMETALS CO., 584 Mineola Ave., Carle Place, N.Y., 11514, Tel: 516-333-5600, TWX: 510-222-5059; Empl.: 30; Minimum order: $25

For info on price: M. Altman; Application info: M. Blum; Customer service: H. J. Gary; Delivery info: E. Krings

Free literature available: 144 page General Product Brochure which lists all the different chemicals, metals, intermetallics, and semiconductor compounds we either produce or supply.

Products manufactured: Alloys, Chemicals, Crystal Blanks, Crystals, Display Devices/Displays, Ferrite Material & Parts, Graphite Parts, Lubricants, Materials, Graphite, Materials, Self-Lubricating, Metal Compounds, Foils, Powders, Sheet, Stock, Metal Oxides, Metals, Quartz, Fused, Semiconductor Wafer Fabrication, Silica, Fused, Substrates, Wire

Local Sales Offices & Reps.

Cal	Los Angeles, Ron Geller	213-836-2777

ATR ELECTRONICS, INC., 300 E. 4th St., St. Paul, Minn., 55101, Tel: 612-222-3791; Minimum order: $25 p. 1•1110,1111

Customer service: A. Goffstein

Free literature available: ATR literature covers ATR DC-AC Inverters, Battery Eliminators, Vibrators, and Standby Power Systems.

Products manufactured: Chargers, Battery, Converters, Eliminators, Battery, Inverters, Power Supplies, Relays, Transformers, Vibrators

AUBURN MFG., Pease Ave. & Stack St., Middletown, Conn., 06457, Tel: 203-346-6631; Minimum order: $25

For info on price: D. Holmes; Application info: M. Weiner; Customer service: D. Holmes; Delivery info: D. Holmes

Free literature available: Gaskets, Shielding; Insulation Materials and Parts; Tapes, Pressure Sensitive; Spacers and Shock & Vibration Mounts as well as additional specific information regarding sealing components and/or materials.

Products manufactured: Bushings, Glass, Plastic, Metal, Rubber, Etc., Fasteners, Gaskets, Shielding, R-F-Also See Shields, R-F, Insulators & Insulation, Mounts, Seals, Shields, Sound Absorbing Materials, Spacers, Tapes, Films & Foils, Pressure Sensitive

Advertisment

Manufacturers of custom-made insulated parts (all materials), shielding RMI/EFI Gaskets, Shock and Vibration Mounts as well as virtually all types of sealing components. Distributor for CHR Products and Dow Corning Sealants RTVs. (CHR products include Silicone Rubber, Sponge and Coated Fabrics, Viton Rubber and Temp-R-Tape and Glas).

AUDIO-TECHNICA U.S., INC., 33 Shiawassee Ave., Fairlawn, Ohio, 44313, Tel: 216-836-0246

Products manufactured: Cleaners & Solvents, Handsets, Chestsets, Headphones, Headsets, Etc., Phonographs, Parts & Accessories

Local Sales Offices & Reps.

Cal	Los Angeles	Pacific Audio Sls.
Cal	Oakland, Paul Seaman Co.	415-562-9241
Colo	Arvada, C B Elctrn. Mktg.	303-422-0561
Ga	East Point, P. Hayden Assocs.	404-766-0261
Ill	Skokie, SER, Inc.	312-673-2250
Ind	Indianapolis, Kingston-Sharkey Assocs.	317-353-9406
Md	Baltimore, David Bros., Co.	301-764-7189
Mass	Wellesley Hills, B. Gedzelman Sls.	617-235-8775
Mich	Buchanan, Riley & Petchell Sls.	616-695-6356
Mich	Detroit, Riley & Petchell Sls.	313-535-7000
Minn	Minneapolis, SER, Inc.	612-894-1388
Mo	Raytown, Mid-West Mktg.	816-358-6638
NJ	Ridgefield, Bi-State Mkts.	201-943-5888
NY	Kenmore, Al Toupkin Sls.	716-873-8839
NY	Spring Valley, B. Gedzelman Sls.	914-EL6-3477
Ohio	Columbus, C.L. Pugh Co.	614-486-9678
Ohio	Newtown, G. Conneen Sls.	215-353-2241
Tex	Houston, L.J. Paul Assocs.	800-231-3501
Wash	Seattle, W.K. Wood Co.	206-246-5111

AUDIO-VIDIO ENGRG. CO., 65 Nancy Blvd., Merrick, N.Y., 11566, Tel: 516-546-4239

Customer service: R. Drucker

Free literature available: Spec. sheet on video hum stop coil model HSC-1 engineering bulletin 1.1 on video hum stop coils.

Products manufactured: Filters

Local Sales Offices & Reps.

Cal	Anaheim, BCD, Inc.	714-528-9505

AUDIO EQUIP. CO., INC., Div. W. Kidde & Co., Inc., 706 Forrest St., Charlottesville, Va., 22901, Tel: 804-977-8050, TWX: 510-587-5461; Empl.: 50

For info on price: L. D. Armentrout; Application info: T. Reed; Customer service: E. Williams; Delivery info: E. Williams

Free literature available: 8-page illustrated catalog on electronic hand-held power megaphones and portable P.A. systems.

Products manufactured: Amplifiers, Speakers

AUDIOSEARS CORP., South St., Stamford, N.Y., 12167, Tel: 607-652-7305; FSC No: 3661; Empl.: 100; Minimum order: $20

For info on price: G. Vicary Mahler; Application info: R. Rusa; Customer service: G. Vicary Mahler; Delivery info: G. Vicary Mahler

Free literature available: Telephone; Handsets, Telepone Operators; Headsets, Miscellaneous; Headsets, Microphones, Earphones; and component parts there of.

Products manufactured: Handsets, Chestsets, Headphones, Headsets, Etc., Microphone Accessories (Including Stands, Holders, Booms), Microphones, All Kinds

Local Sales Offices & Reps.

Cal	Huntington Beach, H. Brunning	714-968-7724
NJ	Medford, Mech. Elec. Sls.	609-654-8209
NY	Geneva, J. Sumers Assocs.	315-789-2238

AUDIOTRONICS, 7428 Bellaire Ave., N. Hollywood, Cal., 91605, Tel: 213-765-2645, Telex: 69-1241; Empl.: 277; Minimum order: $10

For info on price: T. Severdia; Application info: T. Severdia; Customer service: D. Christenson; Delivery info: C. Morey

Products manufactured: Demodulators, Handsets, Chestsets, Headphones, Headsets, Etc., Microphones, All Kinds, Monitors, Phonographs, Parts & Accessories, Public Address Systems, Recorders, Speaker Systems, Terminals, Data Display (including Alphanumeric & Graphic)

AUGAT INC., 33 Perry Ave., Attleboro, Mass, 02703; Empl.: 450; Minimum order: $25 p. 2•632-639

For info on price: D. O'Brien; Application info: G. Howland; Customer service: C. Kiefer; Delivery info: S. Mitchell

Products manufactured: Backpanel Interconnect Systems, Boards, Plug-In, Cabinets & Accessories, Cable Assemblies & Harnesses, Cable, Clamps & Clips, Connector Adapters, Connectors, Drawers, Sliding, Frames, Cabinet & Rack, Heat Sinks, Soldering, Integrated Circuit Packaging Systems, Jacks (All Types), Jumpers, Kits, Breadboarding (For Engineers), Kits, Terminal, Pins, Plug Adapters, Plugs, Racks, Services, Assembly, Production & Test, Socket Adapters, Sockets, Terminals, Tools

Local Sales Offices & Reps.

Ariz	Phoenix, Howe & Howe Sls., Inc.	602-264-7971
Cal	Los Angeles, P. F. Wiley Co.	213-663-8028
Cal	San Carlos, D. H. Ross Co.	415-591-4411
Colo.	Littleton, Simpson Assocs., Inc.	303-794-8381
Conn	New Canaan, Stan Pierce, Inc.	203-966-4630
Fla	Clearwater, H.R. Gross & Co.	813-446-6649
Ga	Atlanta, Cartwright & Bean, Inc.	404-255-5262
Ill	Rolling Meadows, Sumer	312-394-4900
Kans	Shawnee Mission, Lowell-Kangas & Assocs.	913-631-3515
La	Chalmette, Cartwright & Bean, Inc.	504-279-4598
Mich	Ferndale, Hilltronics, Inc.	313-398-5556
Minn	Edina, M. Foster Co.	612-835-2252
Miss	Jackson, Cartwright & Bean, Inc.	601-981-1368
Mo	St. Louis, Lowell-Kangas & Assocs.	314-821-4050
NJ	Cherry Hill, Trinkle Sls., Inc.	609-795-4200
NM	Albuquerque, Piper-Goyne, Inc.	505-265-6794
NY	Mt. Vernon, D. Sonkin Assocs.	914-668-9809
NY	N. Syracuse, D. Allen, Inc.	315-458-7470
NC	Charlotte, Cartwright & Bean, Inc.	704-333-6457
NC	Raleigh, Cartwright & Bean, Inc.	919-832-7128
Ohio	Brecksville, A. Nace Co.	216-526-4323
Ohio	Englewood, A. Nace Co.	513-836-7548
Ore	Portland, C.K. Shanks & Assocs.	503-292-5656
Pa	Pittsburgh, A. Nace Co.	412-922-7225
Tenn	Knoxville, Cartwright & Bean	615-693-7450
Tenn	Memphis, Cartwright & Bean, Inc.	910-276-4442
Tex	Dallas, J.B. Guenther, Inc.	214-691-8500
Tex	Houston, J.B. Guenther, Inc.	713-468-0232
Utah	Salt Lake City, Simpson Assocs., Inc.	801-486-3731
Wash	Seattle, C. K. Shanks & Assoc.	206-632-4290
FOR:	Can., Montreal, Que., A. C. Simmonds & Sons Ltd.	514-352-5250
FOR:	Can., Willowdale, Ont., A. C. Simmonds & Sons Ltd.	416-491-1010

Local Distributors

Ala	Birmingham, ACK Radio Supply Co., 3101 Fourth Ave. So.	205-322-0588
Ala	Huntsville, Cramer/Huntsville, 2310 Bob Wallace Ave. S.W.	205-539-5722
Ariz	Phoenix, Cramer/Ariz., 2643 East University Dr.	602-267-7321
Ariz	Phoenix, Kierulff Elctrns, Inc., 2633 East Buckeye Rd. Box 20007	602-273-7331
Ariz	Phoenix, Sterling Elctrns, Drawer 20867/2001 East University Dr.	602-258-4531
Cal	Agoura, Augat West Sales Office, Box 178	213-889-4567
Cal	Encino, Rush Assoc., 17025 Ventura Boulevard	213-986-8533
Cal	Irvine, Cramer/Los Angeles, 17201 Daimler St.	213-771-8300
Cal	Los Angeles, Kierulff Elctrns, 2585 Commerce Way	213-685-5511
Cal	Mountain View, Elmar Elctrns, 2288 Charleston Rd.	415-961-3611
Cal	San Carlos, Sterling Elctrns, 1061 Industrial Rd.	415-592-2353
Cal	San Deigo, Kierulff Elctrns, 8797 Balboa Ave.	714-278-2112
Cal	San Diego, Cramer/San Diego, 8913 Complex Dr.	714-565-1881
Cal	Sun Valley, Richey Elctrns, Inc., 10871 La Tuna Canyon Rd.	213-875-2862
Cal	Sunnyvale, Cramer/San Francisco, 720 Palomar Ave.	408-739-3011
Colo	Commerce City, Elmar Elctrns, Inc., 6777 East 50th Ave.	303-287-9611
Colo	Denver, Cramer/Denver, 5465 East Evans Place at Hudson	303-758-2100
Colo	Denver, Kierulff Elctrns, Inc., 10890 East 47th Ave.	303-343-7090
Conn	Hamden, Arrow Elctrns, 295 Treadwell St.	203-284-3807
Conn	North Haven, Cramer/Conn., 35 Dodge Ave.	203-239-5641
Fla	Hollywood, Cramer/Hollywood, 4035 N. 29th Ave.	305-923-8181
Fla	Orlando, Cramer/Orlando, 345 North Graham Ave. Box 20214	305-894-1511

Ga	Atlanta, Cramer/Atlanta, 3923 Oakcliff Ind'l Center	404-448-9050
Ill	Chicago, Semiconductor Specialists, Inc., Box 66125/O'Hare Int. Airport	312-279-1000
Ill	Mt. Prospect, Cramer/Chicago, 1911 South Busse Rd.	312-593-8230
Ill	Rosemont, Kieruiff Elctrns, Inc., 9340 William St.	312-678-8560
Ind	Fort Wayne, Fort Wayne Elctrn. Supply, 3606 E. Maumee Ave.	219-423-3422
Ind	Indianapolis, Graham Elctrns Supply, Inc., 133 S. Penn St.	317-634-8202
Ind	Indianapolis, Ra-Dis Company, Inc., 814 North Senate Ave./Box 1064	317-637-5571
Iowa	Cedar Rapids, Deeco, Inc., 2500 16th Ave. S.W.	319-365-7551
Kans	Wichita, Radio Supply Co., 115 Laura Street	316-267-5214
Md	Baltimore, Hamilton/Avnet Elctrns., Box 8647/Friendship Int'l Airport	301-796-5000
Md	Bethesda, Empire Elctrn Supply, 4907 Rugby Ave.	301-656-3300
Md	Gaithersburg, Cramer/Wash., 16021 Industrial Dr.	301-948-0110
Md	Gaithersburg, Kierulff Elctrns, Inc., 16021 Industrial Dr.	301-948-0250
Md	Hanover, Cramer/Baltimore, 7255 Standard Dr.	301-796-5790
Md	Hyattsville, Milgray/Wash., 5405 Lafayette Pl.	301-864-1111
Mass	Boston, DeMambro Elctrns, 1095 Commonwealth Ave.	617-787-1200
Mass	Needham Heights, Kierulff Elctrns, 14 Charles St.	617-449-3600
Mass	Newton, Cramer Elctrns, 85 Wells Ave.	617-969-7700
Mass	Watertown, Sterling Elctrns, 51 Spring St.	617-926-9720
Mich	Ann Arbor, Wedemeyer Elctrns Supply Co., 2280 S. Ind'l Highway	313-665-8611
Mich	Livonia, Cramer/Detroit, 13193 Wayne Rd.	313-425-7000
Mich	Troy, Augat Mid West Sales Office, 2848 Sunridge Drive	313-644-0404
Minn	Edina, Cramer/Minnesota, 7275 Bush Lake Rd.	612-835-7811
Minn	St. Paul, Gopher Elctrns, 2520 West Larpenteur Ave.	612-645-0889
Mo	Kansas City, Walters Radio Supply, Inc., 3635 Main St.	816-531-7015
Mo	St. Charles, Lectronix, Inc., 306 McDonough St. /Box 188	314-723-1120
NJ	Cherry Hill, Cramer/Pa., 12 Springdale Rd.	609-424-5993
NJ	Moonachie, Cramer/NJ, 1 Barrett Ave.	201-935-5600
NJ	Mt. Laurel, Hamilton/Avnet Elctrns, 113 Gaither Dr./East Gate Ind'l Park	609-234-2133
NJ	Mt. Laurel, Kierulff Elctrns, 109 Gaither Dr./East Gate Ind'l Park	609-234-2353
NJ	Pennsauken, Resco Elctrns Div., Airport & Central Highways/Airport Ind'l Park	609-662-4000
NM	Albuquerque, Cramer/NM, 137 Vermont N.E.	505-265-5767
NY	Binghamton, Stack Ind'l Elctrns, 45-49 Wash.	607-723-6326
NY	Bohemia, Car-Lac Elctrn Ind'l Sls, 75 Orville Dr.	516-567-4200
NY	Buffalo, Summit Distrs., 916 Main St.	716-884-3450
NY	East Syracuse, Cramer/Syracuse, 6716 Joy Rd.	315-437-6671
NY	Endwell, Cramer/Binghamton, 3220 Watson Blvd.	607-754-6661
NY	Freeport, Milgray Elctrns, 191 Hanse Ave.	516-546-6000
NY	Hauppauge, Cramer/L.I., 11787/29 Oser Ave.	516-231-5600
NY	Rochester, Cramer/Rochester, 3000 South Winton Rd.	716-275-0300
NY	Rochester, Summit Distrs., 292 Commerce Dr.	716-334-8110
NC	Winston-Salem, Cramer/E. W. Winston-Salem, 938 Burke St.	919-725-8711
NC	Winston-Salem, Kirkman Elctrns, Inc., 901 W. Second St./Drawer K-Salem Station	919-724-0541
Ohio	Cincinnati, Cramer/Tri States, 666 Redna Terrace	513-771-6441
Ohio	Cleveland, Cramer/Cleveland, 5835 Harper Rd.	216-248-8400
Ohio	Cleveland, Milgray/Cleveland, 1821 E. Fortieth St.	216-881-8800
Ohio	Cleveland, Pattison Supply Co., Box 6178/4550 Willow Pkwy	216-441-3000
Ohio	Columbus, Thompson Elctrns Supplies, Inc., 182 East Long St.	614-228-6191
Pa	Monroeville, Cramer/Pittsburgh, 616 Beatty Dr.	412-252-7410
Pa	Pittsburgh, Cameradio Co., 2801 Liberty Ave.	412-288-2600
Tex	Dallas, Cramer/Tex., 13740 Midway Rd.	214-661-9300
Tex	Dallas, Sterling Elctrns, 2875 Merrell Rd.	214-357-9131
Tex	Houston, Sterling Elctrns, 4201 Southwest Freeway/Box 1229	713-623-6600
Utah	Salt Lake City, Cramer/Utah, 391 West 2500 So.	801-487-4131
Utah	Salt Lake City, Standard Supply Co., Box 1047/255 E. 6th South	801-355-2971
Wash	Seattle, Cramer/Seattle, 5602 6th Ave. So.	206-762-5755
Wash	Seattle, Kierulff Elctrns, Inc., 5940 6th Ave. So.	206-763-1550
Wisc	Oak Creek, Cramer/Wisc., 430 West Rawson Ave.	414-764-1700
For:	Can., Downsview, Ont., Cramer/Canada, Alness St., Unit #9	416-661-9222
For:	Can., Edmonton, Alberta, Cardinal Ind'l Elctrns, Ltd., 14804 119th Ave.	403-455-4122
For:	Can., Mississauga (Toronto), Ont., Hamilton-Avnet Int'l (Can.) Ltd., Dorman Rd.	416-677-7432
For:	Can., Montreal, Que., Hamilton-Avnet Int'l (Canada) Ltd., 2670 Paulhus St.	514-331-6443
For:	Can., Ottawa, Ont., Hamilton-Avnet Int'l (Can.) Ltd., 880 Lady Ellen Pl.	913-725-3071
For:	Can., St. Laurent, Que., Cramer/Montreal, 1451 Begin St.	514-331-9101
For:	Can., Vancouver, B.C., R-A-E Ind'l Elctrns Ltd., 1829 Main St.	604-687-2621

AUL INSTRS., INC., 139-30 34th Rd., Flushng, N.Y., 11354, Tel: 212-886-0600; Empl.: 40; Minimum order: $25

For info on price: E. Saul; Application info: S. Kirdahl; Customer service: B. Grenet; Delivery info: B. Grenet

Products manufactured: Analyzers, Attenuators, Bridges, Chargers, Battery, Current Sources, Dividers, Dummy Loads, Generators, Meters, Oscilloscopes, Power Supplies, Receivers, Regulators, Standards

AURIC CORP., 470 Frelinghuysen Ave., Newark, N.J., 07114, Tel: 201-242-4100

For info on price: M. Bick; Application info: J. Lochet; Customer service: S. Siegel; Delivery info: S. Siegel

Products manufactured: Chemicals, Machines/Machinery, Production, Metals, Services, Assembly, Production & Test

AURICH F W & CO, 3601 Gilman Ave. W., Seattle, Wash., 98199, Tel: 206-284-5561, TWX: 910-444-1333; Empl.: 25; Minimum order: $50

For info on price: C. Ernst 206-284-5561; Application info: F. Aurich 206-284-5562; Customer service: M. Weber 206-284-5565; Delivery info: R. Norton 206 284 5566

Free literature available: Fastener Handbook - 128 pages of technical data.

Products manufactured: Fasteners

Local Sales Offices & Reps.

Cal	Oakland	415-836-2405
Wash	Seattle	206-284-5561

AUSTRON, INC., 1915 Kramer, Austin, Tex., 78758, Tel: 512-836-3523, TWX: 910-874-1356; Empl.: 75 .... p. 1•279

Products manufactured: Calibrators, Comm. Systems, Data Acquisition & Reduction Systems, Data Loggers, Indicators, Meters, Monitors, Oscillators, Receivers, Scanners, Standards, Synthesizers

Local Sales Offices & Reps.

Cal	Calabasas, M. Shovlowsky	213-348-3402
Colo	Littleton, Aztec Entprs.	303-795-0250
Del	Newark, Brisco	302-731-5000
Fla	Orlando, R.J. Cheney & Assoc's.	305-894-7371
Ill	Chicago, Megatek, Inc.	312-889-1277
Md	Rockville, T.E. Corp.	301-340-0303
NJ	Haddonfield, Brisco	215-923-1075
NM	Albuquerque, Aztec Entprs.	505-255-2440
NC	Matthews, W.K. Hile Co.	704-847-9125
Tex	Houston, Dixon Engrg., Inc.	713-644-3021
Va	Chester, W.K. Hile Co.	804-271-0014

AUTO TROL CORP., 5650 N. Pecos St., Denver, Colo., 80221, Tel: 303-458-5900; Empl.: 100

Customer service: D. M. McNeill

Products manufactured: Digitizers, Pencil Follower (Inc. Coordinate & Graphic), Drafting Machines, Recorders

Local Sales Offices & Reps.

Cal	Orange, T. Loigu	714-532-1954
Colo	Denver, J. M. Mann	303-458-5900
Md	Lanham, D. L. Wilson	301-459-4448
Mich	Livonia, S. J. Hanson	313-478-8775
NH	Nashua, R. M. Jennings	603-883-9291
NJ	Fair Lawn, P. W. M. Zeman	201-797-8000
Tex	Dallas, G. W. Sickler	214-661-8027

AUTOCON INDS., INC., Sub. Control Data, 2300 Berkshire La. N., Minneapolis, Minn., 55441, Tel: 612-545-2851; Empl.: 400

For info on price: P. T. Durgin; Application info: P. T. Durgin; Customer service: B. Christensen

Free literature available: Computer directed control systems, pressure controllers, tone communications and variable motor speed controllers.

Products manufactured: Alarms, Annunciators, Comm. Systems, Controls/Control Eqpt., Data Acquisition & Reduction Systems, Display Devices/Displays, Indicators, Modulators, All Kinds, Receivers, Scanners, Terminal Equipment, Digital, Transducers, Transmission Systems, Data, Transmitters

Local Sales Offices & Reps.

Ark	Little Rock, McCallister Equip. Co.	501-375-4474
Cal	Man. Beach, James O. Gierlich Co.	213-772-4434
Cal	San Mateo, Ambrosini & Chalmers	415-341-7415
Colo	Denver, Slaybaugh-Thompson	303-238-4379
Fla	Orlando, V. K. Assocs.	305-843-5294
Ga	Atlanta, R. Healey & Asso.	404-351-1861
Ill	Tinley Pk., Ecology Control Sys.	312-429-2338
Ind	Carmel, Wetterlin Eng. Sls.	317-844-3371
Iowa	Ames, Automatic Sys. Co.	515-232-4770
Kan	Shawnee Mis., Ron Heyse & Asso.	913-262-0300
La	Metairie, Parson & Sanderson Co.	504-834-1330
Md	Baltimore, Durling Elec. Co.	301-467-5560
Mass	Sharon, Adcour	617-784-3996
Mich	Detroit, H. V. Burton Co.	313-864-9490
Minn	St. P:aul, Prest Co.	612-690-1537
Miss	Jackson, Hartco Services	601-982-1716
Mo.	St. Louis, Williams Equip. Co.	314-997-1030
NJ	Upper Montclair, R. F. Goodwin Asso.	201-744-8121
NM	Albuquerque, Applied Products	505-298-8611
NY	Orchard Pk., R. H. Perry Co.	716-675-0796
NY	Syracuse, R. H. Perry Co.	315-468-3507
NC	Charlotte, Interstate Utility Sls.	704-377-2636
Ohio	Cincinnati, H. P. Thompson	513-891-4414
Ohio	Cleveland, J. P. Bergren Co.	216-932-9445
Okla	Okla. City, Pumpco	405-235-4341
Ore	Beaverton, David Fry Co.	503-643-5448
Pa	King of Prussia, Reinbrecht Assocs.	215-265-6180
Pa	Pittsburgh, Electrical Engineered Products	412-561-7667
Tenn	Knoxville, Dickey Engrg Co.	615-524-8641
Tenn	Memphis, Van Brocklin & Asso.	901-683-3595
Tex	Dallas, J. F. Rasco Co.	214-747-0108
Tex	Houston, T-Con	713-783-0229
Tex	San Antonio, Powell & Roberts	512-735-9123
Utah	Salt Lake City, Con-Tro-Flow Co.	801-486-3555
Wash	Seattle, Clair Stebbins Co.	206-246-1170
WVa	Charleston, Elec. Eng. Products	304-344-2171
Wisc	Milwaukee, Allan Engrg Co.	414-353-5070

AUTOMATIC DIE CUTTING MCH, 149 Church, New York, N.Y., 10007, Tel: 212-962-7658; Empl.: 31

Customer service: E. E. Cosgrove

Products manufactured: Machines/Machinery, Production, Services, Assembly, Production & Test, Tapes, Electrical Insulation, Tubing

AUTOMATIC ELECTRIC, Industrial Sales Div., Northlake, Ill., 60164

AUTOMATIC COIL, Div. Designatronics Inc., 55 S. Denton Ave., New Hyde Pk., N.Y., 11040, Tel: 516-328-3300, TWX: 510-223-0642

Customer service: M. Scheck

Products manufactured: Chokes, Coils Including Assemblies & Forms, Filters, Transformers

Local Sales Offices & Reps.

Cal	San Mateo, Melvin Sls. Co.	415-349-7444

AUTOMATIC CONNECTOR INC., 400 Moreland Rd., Commack, N.Y., 11735, Tel: 516-543-5000, TWX: 510-226-3744

Directory of Local Distributors Starts on page 401

AUTOMATIC PRODUCTION SYSTEMS INC., 1602 Hylton Rd., Pennsauken, N.J., 08011, Tel: 609-663-7812; Empl.: 25; Minimum order: $25

For info on price: E. A. Summers; Application info: E. Cioli; Customer service: A. Spor

Free literature available: Data sheets describing specifications and features of all products - Data Sheets For DiGiprobe - AP502 Cable Tester, AP 503 Cable Tester, AP600 Cable Tester, OmmiTester 1000, OmniTester 900, OmniTester 2000, OmniTester 3000.

Products manufactured: Analyzers, Test Systems, Testers

Local Sales Offices & Reps.

Cal	N. Hollywood, Crown Elct.	213-877-3550
Conn	Hartford, Victor Assoc.	203-246-5643
Ill	Chicago, Solid State Elec.	312-889-8033
Mass	Framingham, Victor Assoc.	617-879-5710
Minn	Bloomington, E.C. Elctrn. Sls.	612-831-0229
NJ	Cherry Hill, Gordon Co.	609-667-6644
NJ	Wayne, K & J Assoc.	201-694-3334
Ohio	Columbus, Measurement Instrs.	614-488-9753
Tex	Dallas, Data Marketing Assoc.	214-358-4643
FOR:	Can., Toronto, Ont., Neeco, Ind.	416-678-2890

AUTOMATIC TIMING & CONTROLS CO., King of Prussia, Pa., 19406, Tel: 215-265-0200; Empl.: 300

For info on price: J. N. Senior; Application info: W. F. Popjoy; Customer service: W. C. Hannes; Delivery info: M. Burke

Free literature available: Selection Guide; Digital Selection Guide; Photoelectric Design Guide; Complete Catalogs.

Products manufactured: Alarms, Cells, Load, Controls/Control Eqpt., Counters, Delays, Time (Excluding Delay Lines, Timers, Delay & Relays, Time-Delays), Demodulators, Gages, Indicators, Printers, Programmers, Recorders, Relays, Switches, Timers, Transducers, Transformers

Local Sales Offices & Reps.

Ala	Birmingham, Control Equip. Co.	205-TR9-8211
Ariz	Phoenix, Portis & Assocs.	602-947-4379
Cal	San Francisco, Automated Process Controls Co.	415-467-6162
Cal	Van Nuys, Time Trol	213-873-5151
Colo	Denver, D.E. Bond Assoc.	303-756-1234
Conn	Middletown, Mancib Co.	203-347-5629
Fla	Lakeland, A.A. Elec. Div.	813-682-6181
Ga	Atlanta, Control Equip. Co.	404-237-1688
Ill	Glen Ellyn, Rockford Controls Co.	312-469-6016
Ind	Indianapolis, Rockwell Engrg. Co.	317-CL 1-9453
Ky	Louisville, Air-Hydro Power Co.	502-451-1000
La	New Orleans, Mid South Sls. Co.	504-822-3030
Md	Baltimore, Jobe & Co.	301-235-3502
Mass	Burlington, Mancib Co.	617-272-9450
Mich	Brighton, H. H. Barnum Co.	313-229-2961
Mich	Lowell, H. H. Barnum Co.	616-451-0980
Minn	Minneapolis, Automated Controls, Inc.	612-377-7727
Mo	Kansas City, Duncan Sales & Engrg., Inc.	816-523-2908
Mo	University City, E. Mooney Co.	314-725-8875
NJ	Newark, Norman Bragar Co.	201-344-1100
NY	Buffalo, Niagara Electric Sls. Co.	716-886-4000
NY	Rochester, Niagara Electric Sls. Co.	716-271-1223
NY	Syracuse, Niagara Elec. Sls. Co.	315-422-9177
NY	Yonkers, Ross Co.	212-TA4-5424
NC	Charlotte, Brown & Morrison	704-333-0774
Ohio	Cincinnati, Anderson-Bolds, Inc.	513-272-3351
Ohio	Cleveland, Anderson-Bolds, Inc.	216-229-4700
Ohio	Worthington, Anderson-Bolds, Inc.	614-885-3933
Okla	Tulsa, Driscoll Automatic Control Co.	918-747-6625
Ore	Eugene, J. A. Tudor & Assoc.	503-344-9212
Ore	Portland, J. A. Tudor & Assoc., Inc.	503-288-5154
Pa	King of Prussia, Applied Controls, Inc.	215-265-3832
Pa	Pittsburgh, Gilson Engrg. Sls. Inc.	412-931-6114
Tenn	Memphis, Engineered Instrs.	901-743-3402
Tex	Houston, Gettys-Eads-Adair	713-781-3005
Utah	Salt Lake City, Control Equip. Co. of Salt Lake	801-487-7741
Va	Richmond, Jobe & Co.	804-282-6508
Wash	Seattle, J. A. Tudor & Assoc.	206-MU 2-7444
Wash	Spokane, J. A. Tudor & Assoc.	509-FA 7-3328
Wisc	Cedarburg, Automation Engrg. Co.	414-377-7500

AUTOMATION DEVICES, INC., Box A.D., Automation Pk., Fairview, Pa., 16415, Tel: 814-474-5561; Empl.: 60

For info on price: D. Buseck; Application info: L. Kallsen

Products manufactured: Controls/Control Eqpt., Indicators, Machines/Machinery, Production, Sound Absorbing Materials

Local Sales Offices & Reps.

Ariz	Mesa, L.C. Brandt	602-832-0710
Cal	Santa Fe Springs, Automation Devices Western	213-693-3745
Colo	Denver, R.M. Moore	303-222-4858
Conn	Fairfield, W. Whitehead	203-255-4543
Fla	Clearwater, Tangen Drives Inc.	813-446-9871
Ill	Chicago, C. Schanstra	312-344-6580
Md	Riderwood, E. Miles, Jr.	301-823-1434
Mass	Concord, R. Malloy	617-369-8889
Mich	Detroit, J. Bishop	313-538-0595
Minn	Minneapolis, H. West	612-721-6661
Miss	Jackson, P. Patrick	601-982-1621
Mo	St. Louis, E. Benninger	314-381-1300
NJ	Chatham, G. Crawford	201-635-6868
NY	Syracuse, K. Reed	315-478-2232
NY	Yonkers, E. Ross	212-824-5424
NC	Charlotte, J. Dixon	704-366-9661
Ohio	Cleveland, J. Schiefferle	814-838-6163
Ohio	Hicksville, C. Kallsen	419-542-8117
Ohio	Perrysburg, K. Lytle	419-475-4305
Pa	Erie, W. Baker	814-459-5135
Tenn	Memphis, J. Barbour, H. Lewis, C. Walker	901-362-2253
Tex	Dallas, S. Lomax	214-361-1134
Wisc	Milwaukee, J. O'Meara	414-353-7040
EXP:	Can., Niagara Falls, Ont., S. Fisk	416-354-3881

AUTOMATION DISPLAYS INC., Box 1122, Eau Claire, Wisc., 54701, Tel: 715-834-9595; Empl.: 10; Minimum order: $25

Customer service: J.E. Carpentier

Free literature available: The brochure contains pictures of our work to illustrate our capabilities in the information display field.

Products manufactured: Annunciators, Display Devices/Displays, Lamp Drivers, Multiplexers, Switches

Local Sales Offices & Reps.

Ariz	Phoenix, Spectrum Co.	602-997-6324
Cal	Santa Ana, Spectrum Assocs. Inc.	714-835-4114
Ill	Chicago, Bex Data Ltd.	312-221-1411
Mass	Lexington, B & B Assocs.	617-862-5054
Mich	Walled Lake, Berberich Assocs. Inc.	313-624-2211
Minn	Minneapolis, Bex Data Ltd.	612-835-5220
Mo	St. Louis, Bex Data Ltd.	314-872-3357
NJ	Cherry Hill, L.H. Walke Co.	609-424-3766
NJ	Delran, T. McLaughlin Co.	609-461-5243
NM	Albuquerque, Western Consultants	
Ohio	Dayton, Berberich Assocs. Inc.	513-433-0342
Tex	Dallas, T-Square Assocs.	214-369-3173
Wash	Bellevue, Hudson Co.	206-455-0773

AUTOMATION DYNAMICS, Div. ABC Digital, Inc., 25 Charles St., Westwood, N.J., 07675, Tel: 201-666-2458; FSC No: 53089; Empl.: 15

For info on price: B. K. Cheng 201-666-2458; Application info: C. H. Wu 201-666-2554; Customer service: D. Marchak 201-666-2554; Delivery info: R. A. Wood 201-666-2458

Products manufactured: Comparators, Data Acquisition & Reduction Systems, Testers

AUTOMATION INDS., Sperry Div, Shelter Rock Rd., Danbury, Conn., 06810, Tel: 203-748-3581, TWX: 710-456-0392; Empl.: 350; Minimum order: $25

For info on price: B. Hodge; Application info: L. Johnson; Customer service: W. R. Kitchin; Delivery info: F. J. Lynch

Free literature available: Bulletin 105 - Nondestructive Test Equipment and Systems.

Products manufactured: Detectors, Indicators, Magnetometers, Testers, Transducers, X-Ray Inspection Equipment

Local Sales Offices & Reps.

Cal	Chatsworth, Automation Industries, Inc., Sperry Div.	213-882-2600
Cal	Downey, Automation Industries, Inc., Sperry Div.	213-773-6133
Cal	San Jose, Automation Industries, Inc., Sperry Div.	408-244-4520
Ga	Tucker, Automation Industries, Inc., Sperry Div.	404-939-8762
Ill	Rosemont, Automation Industries, Inc., Sperry Div.	312-671-1670
Mich	Warren, Automation Industries, Inc., Sperry Div.	313-756-5540
Ohio	Dayton, Automation Industries, Inc., Sperry Div.	513-274-0892
Ohio	Rocky River, Automation Industries, Inc., Sperry Div.	216-333-5575
Pa	Phoenixville, Automation Industries, Inc., Sperry Div.	215-933-8961
Pa	Pittsburgh, Automation Industries, Inc., Sperry Div.	412-371-3335
Pa	Spring City, Automation Industries, Inc., Sperry Div.	215-948-8220
Tenn	Nashville, Automation Industries, Inc., Sperry Div.	615-256-6607
Tex	Dallas, Automation Industries, Inc., Sperry Div.	214-351-5381
Tex	Houston, Automation Industries, Inc., Sperry Div.	713-774-9650
Va	Falls Church, Automation Industries, Inc., Sperry Div.	703-536-8600
Wash	Renton, Automation Industries, Inc., Sperry Div.	206-228-3170
FOR:	Can., Mississauga, Ont., Automation Ind. (Can.) Ltd., Sperry Div.	416-678-9215

AUTOMATION PRDTS., 3030 Max Roy, Houston, Tex., 77008, Tel: 713-869-0361

For info on price: S. S. Turner; Application info: W. Bouldin Jr.; Customer service: B. J. Williams; Delivery info: J. Robertson

Products manufactured: Controls/Control Eqpt., Densitometers, Electronic, Indicators, Switches

AUTO-SWAGE PRODUCTS INC., 726 River Rd., Shelton, Conn., 06484, Tel: 203-929-1401, Telex: 963542; Empl.: 170; Minimum order: $50

For info on price: R. L. Mikulsky; Application info: R. L. Mikulsky; Customer service: R. L. Mikulsky; Delivery info: R. MacCormack

Products manufactured: Bushings, Glass, Plastic, Metal, Rubber, Etc., Contacts, Electrical, Eyelets, Fasteners, Forms, Wire, Pins, Posts, Rivets, Services, Assembly, Production & Test, Sockets, Spacers, Springs (All Types), Terminals

Local Sales Offices & Reps.

Ariz	Scottsdale, E.E. Black	602-947-2007
Cal	Glendale, Haldeman & Frazier	213-247-3330
Colo	Denver, Industrial Hardware Co.	303-426-1440
Ind	Greensburg, H.K. Feaster	812-663-5689
Minn	Minneapolis, W.R. Maleckar Co.	612-926-7601
NY	Rochester, Gislason Sls.	716-454-4741
Ohio	Beachwood, Davis & Hawley Sls. Co.	216-464-9655
Pa	Broomal, AM Tech. Sls. Co.	215-356-0574
Tex	Richardson, C.D. Price Co.	214-231-4321
EXP:	New York, N.Y., Lang & Zysk	212-227-1743

AUTOSPLICE/DV GEN STAPLE, 220 E. 23rd St., New York City, N.Y., 10010, Tel: 212-674-4369; Empl.: 40; Minimum order: $25

For info on price: B. Glasser; Application info: J. Zahnstecher; Customer service: C. Iadanza; Delivery info: B. Glasser

Free literature available: Autosplice a new splicing system that operates from a continuous spool of spliceband material. In one simultaneous action the machine feeds a length of this spliceband, cuts it and forms it and crimps it around the items to be assembled. Insulsplice - the only machine in the world that operates from a plastic laminated metal strip, and both makes and attaches insulated splices at the same time.

Autopin - this machine operates from a continuous coil of either round or square wire and inserts pins into printed circuit boards, bobbins, etc. Autotab - production machine that inserts pre-stamped terminal directly into printed circuit boards, components, etc.

Products manufactured: Backpanel Interconnect Systems, Clamps & Clips, Connectors, Contacts, Electrical, Fasteners, Forms, Wire, Jumpers, Laminates, Machines/Machinery, Production, Pins, Services, Assembly, Production & Test, Splicers, Coaxial Cable, Splices, wire (Including, Butt & Cap Types), Terminal Blocks, Boards & Strips, Terminals, Tools, Wire, Wire & Cable Ties, Wire Nuts

AUTOTRON, INC., 3269 N. Vermilion St., Box 595, Danville, Ill., 61832, Tel: 217-446-0650

Free literature available: Catalog 76 - contains latest released information on photoelectric controls developments, application survey, 56 complete application sketches and dimensional diagrams for innumerable practical uses.

Products manufactured: Alarms, Controls/Control Eqpt., Counters, Light Sources, Photoelectric

Local Sales Offices & Reps.

Ariz	Mesa, L.C. Brandt Co.	602-832-0710
Ark	Ft. Smith, Electro-Related Prods.	501-646-7756
Cal	Los Angeles, Electro Comps. Distrs.	213-264-7100
Cal	San Francisco, J.M. Krotozyner	415-777-4636
Fla	Ft. Lauderdale, R.D. Jacobs	305-524-1932
Ill	Addison, Lectron Controls Co.	312-543-8460
Mass	Needham, White Sls. Co.	617-444-3676
Mich	Detroit, Basic Service Corp.	313-837-8820
Minn	Minneapolis, Bican Co.	612-827-4734
Mo	Kansas City, Automation Specialties, Inc.	816-421-6646
Mo	St. Louis, Kathrinus, Kelly & Co.	314-968-3800
NY	Elmont, Crane & Egert Corp.	516-488-2100
NY	Rochester, T. Ferguson Sls.	716-482-7757
NC	Charlotte, Electro-Rep Assocs.	704-527-2530
Ohio	Cincinnati, J.W. Murray & Assoc.	513-662-1616
Ohio	Cleveland, C.A. Robinson Co.	216-381-9049
Pa	Paoli, Tyler Griffin Co.	215-644-7710
Tex	Houston, RMA/Southland	713-462-4077
Utah	Salt Lake City, Control Agency	801-466-8601
Wash	Seattle, C.B. Parsons & Co.	206-762-7373
Wisc	Wauwatosa, Larsen Assocs.	414-258-0529
FOR:	Can., Burlington, Ont., Higginson Equip. Sls. Ltd.	416-634-1888

AUTOTRONICS, INC., 2700 Davis Blvd., Joplin, Mo, 64801

AUTRONICS CORP., 180 N. Vinedo Ave., Pasadena, Cal, 91107, Tel: 213-681-3545, TWX: 910-588-1977; FSC No: 03972; Empl.: 40; Minimum order: $25 p. 1•237,1113

For info on price: D. A. McNamara; Application info: C. B. Barnes

Free literature available: Brochure showing custom design capabilities and experience, with typical product catagories. Available direct or through sales representatives.

Products manufactured: Alarms, Controls/Control Eqpt., Converters, Delays, Time (Excluding Delay Lines, Timers, Delay & Relays, Time-Delays), Detectors, Flashers, Generators, Inverters, Monitors, Power Supplies, Relays, Switches, Timers

Local Sales Offices & Reps.

Ariz	Phoenix, Thorson Co.	602-956-5300
Cal	Goleta, Thorson Co.	805-964-8751
Cal	Los Angeles, Thorson Co.	213-937-0790
Cal	Mountain View, Thorson Co.	415-964-9300
Cal	San Diego, Thorson Co.	714-298-8385
Cal	Tustin, Thorson Co.	714-544-5121
Colo	Denver, Thorson Co.	303-355-3521
Kans	Olathe, B.C. Elctrn. Sls.	913-782-6696
Kans	Wichita, B.C. Elctrn. Sls.	316-686-3394
Md	Baltimore, R. P. Luce & Co.	301-752-8200
Mo	Hazelwood, B.C. Elctrn. Sls.	314-731-1255
NJ	Berkeley Hgts., R.P. Luce & Co.	201-464-6440
NM	Albuquerque, Thorson Co.	505-265-5655
NY	New Hyde Pk., R. P. Luce & Co	516-437-4550
Pa	Phila., R. P. Luce & Co.	215-884-8365
Tex	Dallas, Thorson Co.	214-233-5744
Tex	Houston, Thorson Co.	713-771-3504
Wash	Bellevue, Thorson Co.	206-455-9180
Wash	Seattle, Thorson Co.	206-632-0710

AVA ELCTRNS., 242 Pembroke Ave., Landsdowne, Pa, 19050, Tel: 215-284-2500; Empl.: 45; Minimum order: $25

For info on price: Order Dept.; Application info: Mr. Pal; Customer service: Marianne; Delivery info: Marianne

Free literature available: Catalogues of Products.

Products manufactured: Amplifiers, Arresters, Electrical Surge, Lightning, Attenuators, Connector Adapters, Couplers, Panels, Tees, Television Systems & Equipment Closed-Circuit, Terminals, Transformers

Local Sales Offices & Reps.

Cal	Carlsbad, L. J. Erickson	714-726-5270
Fla	Tampa, S. K. Wallace Assoc.	305-691-1654
Ga	Atlanta, S. K. Wallace Assoc.	
Ill	Chicago, M. Gottlieb Assoc.	312-775-1151
Md	Kensington, Forti-Austin Assoc.	301-949-4149
Mass	Wellsley Hill, M. Scott Co.	617-235-0102
Mich	Southfield, Champagne Sls. Co.	313-354-0270
NJ	Fort Lee, TMC Sls. Corp.	201-944-8340
NJ	Willingboro, Forti-Austin Co.	609-871-3720
NY	Syracuse, W. Tauber Co.	315-446-7094
Ohio	Cleveland, J. O. Olsen Co.	216-752-5444
Pa	Pittsburgh, R. Tanner Co.	412-561-4687
Wash	Seattle, W. Lanphear Dist.	206-633-4900

AVANTEK, INC., 3175 Bowers Ave., Santa Clara, Cal., 95051, Tel: 408-249-0700, TWX: 910-339-9274; Empl.: 380

For info on price: B. Goff; Application info: J. Graves; Customer service: J. Dechristofaro; Delivery info: J. Dechristofaro

Free literature available: Component catalog lists the many microwave products manufactured by Avantek. Specs, applications and case outline data are some features

Products manufactured: Amplifiers, CATV Systems & Equipment, Circuits, Hybrid, Thin-Film, Integrated Circuit Devices, Microwave Integrated Circuits (MIC's), Oscillators, Transistors

Local Sales Offices & Reps.

Ala	Huntsville, Gentry Assocs.	205-534-9771
Ariz	Phoenix, Thorson Co.	602-956-5300
Cal	Los Altos, Cain-White & Co.	415-948-6533
Cal	Los Angeles, Cain Technology	213-476-2251
Colo	Denver, Thorson Co.	303-759-0809
DC	Washington, Applied Engrg. Conslts.	301-953-2808
Fla	Orlando, Gentry Assocs.	305-894-4401
Ill	Des Plaines, Cozzens/Cudahy	312-298-3600
Ind	Indianapolis, Cozzens/Cudahy	317-244-2456
Kans	Shawnee Mission, E.I.R.	913-362-0919
Md	Ellicott City, Applied Engrg. Conslts.	301-465-1272
Mass	Burlington, Tritek, Inc.	617-272-4550
Mich	Detroit, Micro Sls. Corp.	313-482-1229
Minn	Minneapolis, Cozzens/Cudahy	612-884-4336
Mo	Hazelwood, E.I.R.	314-895-4100
Mo	St. Louis, Cozzens/Cudahy	314-423-1234
NJ	Fort Lee, Tech. Mktg. Assocs.	201-224-6911
NM	Albuquerque, Thorson Co.	505-265-5655
NY	Skaneateles, Robtron	315-685-5731
NC	Burlington, Gentry Assocs.	919-227-3639
Ohio	Dayton, Micro Sls. Corp.	513-885-4171
Pa	Philadelphia, Eastern Instrumentation	215-927-7777
Tex	Dallas, Thorson Co.	214-233-5744
Tex	Houston, Thorson Co.	713-771-3504
Wash	Seattle, Thorson Co.	206-455-9180

AVIATECH INTL. INC., 4250 Veterans Hwy., Holbrook, N.Y., 11741, Tel: 516-981-9300, Telex: 967892; Empl.: 10

Customer service: G. H. Inhafer

Free literature available: Data sheets on closed circuit low light level TV systems, microphones, headsets and airborne antennas

Products manufactured: Antennas, Handsets, Chestsets, Headphones, Headsets, Etc., Microphones, All Kinds, Television Systems & Equipment Closed-Circuit

AVIATION ELEC., LTD., Sub. Bendix Corp., Box 2140, Station O, Montreal, H4L 4x8 Que., Can., Tel: 514-744-2811, Telex: 05-826688; Empl.: 925

Customer service: C. Watts

Products manufactured: Computers, Potentiometers, Transducers

AVIBANK MFG. INC., 210 S. Victory Blvd., Burbank, Calif., 91503, Tel: 213-843-4330, TWX: 910-498-2215; Empl.: 200; Minimum order: $35

Customer service: L. Slocum

Free literature available: A 100 page catalog of our product in a one-inch hard cover binder.

Products manufactured: Connectors, Fasteners, Pins

Local Sales Offices & Reps.

NY	Smithtown, Avibank Mfg. Inc.	516-979-8045

AVID ELECTRONICS CORP., Box 426, Baldwin, Pl., N.Y., 10505, Tel: 914-628-6952; FSC No: 08842; Empl.: 10; Minimum order: $25

For info on price: D. McVey; Application info: J. Del; Customer service: M. McVey; Delivery info: M. McVey

Free literature available: Components catalog covers sizes, detail dimension and part numbers. Listings include spacers, terminals, plus handles screws and custom fabricated parts-metal and plastic.

Products manufactured: Bushings, Glass, Plastic, Metal, Rubber, Etc., Clamps & Clips, Connectors, Contacts, Electrical, Fasteners, Handles For Cabinets, Circuit Boards, Racks, etc., Insulators & Insulation, Pins, Services, Assembly, Production & Test, Shafts & Adapters, Spacers, Terminal Blocks, Boards & Strips, Terminals

AVIONIC INSTRS. INC., 943 E. Hazelwood Ave., Rahway, N.J., 07065, Tel: 201-382-7100, Telex: 844413; Empl.: 32

Free literature available: Product Manual containing a brochure, price list, specification sheets, and block diagrams upon request.

Products manufactured: Chargers, Battery, Inverters, Regulators

AVIONICS LTD., Box 200, Niagara-On-Lane, Ont., Can., Tel: 416-468-3632; Empl.: 25

Customer service: J. G. Mitchell

Products manufactured: Boards, Plug-In, Boards, Printed Circuit

AVTRON MFG., INC., 10409 Meech Ave., Cleveland, Ohio, 44105, Tel: 216-641-8310, TWX: 810-421-8435; FSC No: 01014; Empl.: 125; Minimum order: $25

For info on price: R. D. Thomas; Application info: R. D. Thomas; Customer service: R. J. Strober; Delivery info: D. C. Garris

Free literature available: Technical Bulletins covering Avtron's complete product line of Drive Stands, Load Banks, Digital Control/Monitor, and Winding Test Equipment upon request.

Products manufactured: Controls/Control Eqpt., Converters, Counters, Dummy Loads, Generators, Heat Sinks, Soldering, Indicators, Loads, Electronic Variable, Meters, Tachometers, Test Systems, Testers

Local Sales Offices & Reps.

Wash	Bellevue, J. Findlay Co.	206-454-5200
Wisc	Appleton, J.K. Luke	414-739-3238

AVX CERAMICS, Box 867, Myrtle Beach, S.C., 29577, Tel: 803-448-3191, TWX: 810-661-2252; FSC No: 9K916; Empl.: 2387 p. 1•530,531; p. 2•2-23

For info on price: F. Fry; Customer service: J. Bodine

Free literature available: GC 74 General Catalogue, FC 74 Filter Catalogue

Products manufactured: Capacitors, Fixed, Filters

Local Sales Offices & Reps.

Ala	Huntsville, Powertronics, Inc.	205-852-6347
Ariz	Tempe, Interstate Mktg. Assoc.	602-968-7201
Cal	Mt. View, Quadrep Inc.	415-964-3532
Cal	Woodland Hills, Interstate Mktg. Assocs.	213-883-7606
Colo	Denver, Zeus	303-771-6200
Fla	Oviedo, Conley & Assocs., Inc.	305-365-3283
Ill	Chicago, T.B. Hunter Assocs.	312-777-2500
Ind	Indianapolis, F.J. Campisano Co.	317-247-8623
Iowa	Cedar Rapids, J.R. Sls. Engrg. Inc.	319-377-8211
Md	Baltimore, Burgin-Kreh Assocs.	301-788-5200
Mass	Lexington, J.E. Boeing Co.	617-862-2500
Mich	Southfield, J.L. Montgomery	313-358-2616
Minn	Minneapolis, Comstrand Inc.	612-560-5300
Mo	Grandview, Beneke & McCaul, Inc.	816-765-2998
NJ	Cherry Hill, J.N. Barrett Assocs.	609-429-1551
NM	Albuquerque, Zeus	505-256-9831
NY	Garden City, Comtronic Assocs.	516-741-8966
NY	Ithaca, B. Dean, Inc.	607-272-2187
NC	Thomasville, Powertronics, Inc.	919-476-6727
NC	Winston-Salem, Burgin-Kreh	919-768-4174
Ohio	Cincinnati, F.J. Campisano Co.	513-662-1616
Ohio	Dayton, Schmidt & Assoc.	513-293-6657
Ohio	South Euclid, F.J. Campisano Co.	216-381-4949
Okla	Oklahoma City, Ammon & Rizos	405-721-2365
Ore	Portland, Western Tech. Sls.	503-297-1711
Pa	Pittsburgh, G.S. Root & Co.	412-561-4125
Tex	Dallas, Ammon & Rizos Co.	214-233-5591
Tex	Houston, Ammon & Rizos Co.	713-729-1233
Utah	Salt Lake City, Zeus	801-486-2317
Va	Lynchburg, Burgin-Kreh Assoc.	804-845-5600
Wash	Bellevue, Western Tech. Sls.	206-641-3900
FOR:	Can., Montreal, Kaytronics Ltd.	514-487-3434

Local Distributors

Ala	Huntsville, Cramer Elctrns., 2310 Bob Wallace Ave.	205-539-5722
Ariz	Phoenix, Cramer Elctrns., 2643 E. University Ave.	602-267-7321
Ariz	Phoenix, R.V. Weatherford, 1917 N. 25th Dr.	602-272-7144
Cal	Anaheim, R.V. Weatherford, 1550 Babbitt Ave.	714-547-0891
Cal	Glendale, R.V. Weatherford, 6921 San Fernando Rd.	213-849-3451
Cal	Inglewood, Newark Elctrns., 4747 W. Centry Blvd.	213-678-0441
Cal	Irvine, Cramer, 17201 Daimler St.	714-979-3000
Cal	Los Angeles, Texas Instruments Supply, 5200 W. 104th St.	213-776-4490
Cal	Palo Alto, R.V. Weatherford, 3240 Hillview Ave.	415-493-5373
Cal	Pomona, R.V. Weatherford, 1095 E. Third St.	714-623-1621

Cal San Diego, Cramer, 8975 Complex Dr. 714-565-1881
Cal San Diego, R.V. Weatherford, 7872 Raytheon Rd. 714-278-7400
Cal Sunnyvale, Cramer, 720 Palomar Ave. 408-739-3011
Cal Woodland Hills, Jaco Elctrns., 21201 Oxnard St. 213-887-6400
Colo Denver, Cramer Elctrns., E. Evans Place 303-758-2100
Colo Denver, Newark Elctrns., 2170 S. Grape St. 303-757-3351
Conn N. Haven, Cramer Elctrns., 35 Dodge Ave. 203-239-5641
Conn Westport, Newark Elctrns., 25 Sylvan Rd. S. 203-226-6921
Fla Ft. Lauderdale, Newark Elctrns., 1360 N.W. 65th Ave. 305-587-2372
Fla Hollywood, Cramer Elec., N. 29th Ave. 305-923-8181
Fla Orlando, Cramer, 345 N. Graham Ave. 305-894-1511
Ill Chicago, Newark Elctrns., 500 N. Pulaski Rd. 312-638-4411
Ill Mt. Prospect, Cramer Elec., 1911 S. Busse Rd. 312-593-8230
Iowa Cedar Rapids, Newark Elctrns., 1019 First Ave. S.W. 319-362-1171
Md Beltsville, Newark Elctrns., 10440 Baltimore Ave. 301-937-5085
Md Gaithersburg, Cramer Elec., Ind'l. Dr. 301-948-0110
Md Hanover, Cramer Elec., 7255 Standard 301-796-5790
Mass Newton, Cramer Elec., 85 Wells Ave. 617-969-7700
Mass Woburn, Newark Elctr., 13A Wheeling Ave. 617-935-8350
Mich Detroit, Newark Elctrns., 20700 Hubbell Ave. 313-548-0250
Mich Livonia, Cramer, 13193 Wayne Rd. 313-425-7000
Mich Wyoming, Newark Elctrns., 3645 Linden Ave. 616-241-6681
Minn Edina, Cramer, 7275 Bush Lake Rd. 612-835-7811
Minn Minneapolis, Newark Elctrns., 336 Hoover St. 612-331-6350
NJ Clark, Texas Instrument Supply, 301 Central Ave. 201-382-6400
NJ Kenilworth, Newark Elctrns., 303 Monroe Ave. 201-272-8410
NJ Moonachie, Cramer Elec., 1 Barrett Ave. 201-935-5600
NM Albuquerque, Cramer Elec., Vermont N.E. 505-265-5767
NM Albuquerque, R.V. Weatherford, 6106 Marble Ave., N.E. 505-842-9868
NY Endwell, Cramer, 3220 Watson Blvd. 607-754-6661
NY Hauppauge, Cramer, 29 Oser Ave. 516-231-5600
NY Hauppauge, Jaco Elctrns., Engineers Rd. 516-273-5500
NY Plainview, Newark Elctrns., 80 Express St. 516-822-5000
NY Rochester, Cramer Elec., 3000 S. Winton Rd. 716-275-0300
NY Rochester, Newark Elctrns., 3000 S. Winton Rd. 716-473-6600
NY Syracuse, Cramer, 6716 Joy Rd. 315-437-6671
NC Winston-Salem, Cramer, 938 Burke St. 919-725-8711
Ohio Cincinnati, Cramer, 666 Redna Terr. 513-771-6441
Ohio Cincinnati, Newark Elctrns., 9799 G. Princeton Rd. 513-874-5115
Ohio Cleveland, Cramer, 5835 Harper Rd. 216-248-8400
Ohio Cleveland, Newark Elctrns., 2028 E. 46th St. 216-361-4700
Pa Cherryhill, Cramer, Springdale Rd. 609-424-5993
Pa Monroeville, Cramer, 616 Beatty Dr. 412-252-7410
Tex Dallas, Cramer, 13740 Midway Rd. 214-661-9300
Tex Dallas, Newark Elctrns., Box 38299 214-271-2511
Tex Dallas, R.V. Weatherford, 10836 Grissom La. 214-243-1571
Tex Dallas, Texas Instrument Supply, 6000 Denton Dr. 214-238-6952
Tex Houston, R.V. Weatherford, 3500 W.T.C. Jester Blvd. 713-688-7406
Tex Houston, Texas Instrument Supply, 3939 Ann Arbor Dr. 713-785-4800
Utah Salt Lake City, Cramer, 391 W. 2500 South 801-487-4131
Utah Salt Lake City, Newark Elctrns., 2540 S. 300 West 801-486-1048
Wash Seattle, Cramer, 5602 6th Ave. S. 206-762-5755
Wash Seattle, R.V. Weatherford, 541 Industry Dr. 206-243-6340
Wisc Brookfield, Newark Elctrns., 3695 N. 126th St. 414-781-2450
Wisc Oak Creek, Cramer, W. Rawson Ave. 414-764-1700

AXEL ELCTRNS., Unit of General Signal, 134-20 Jamaica Ave., Jamaica, N.Y., 11418, Tel: 212-291-3900, TWX: 710-582-2618; FSC No: 13058; Empl.: 180
p. 1•525; p. 2•41

Customer service: J. Alaimo

Products manufactured: Capacitors, Fixed, Filters, Networks, Power Supplies, Transformers

Local Sales Offices & Reps.
Ariz Scottsdale, F. Board Assocs. 602-994-9388
Cal Fremont, Spence Assocs. 415-656-9506
Fla Miami, Reptronics 303-251-5478
Ind Auburn, Tech Line 219-925-1757
Iowa Hiawatha, Gassner & Clark Co. 319-393-5763
Md Baltimore, Burgin-Kreh Assocs. 301-788-5200
Mass Medway, J. Gallagher 617-533-7292
Minn Chanhassen, Barnes Sls. Assocs. 612-474-2907
Mo St. Louis, Repco 314-343-9313
Ohio Cleveland, E.E. Bock & Assocs. 216-331-5212
Ohio Dayton, L.D. Bruno Co. 513-434-1847
Pa Fort Washington, G.C.M. 215-646-7535
Pa Pittsburgh, Automated Equip. & Engrg. 412-931-7616
FOR: Can., Mississauga, Ont., Rayshield 416-822-4414

AYDIN CONTROLS, 414 Commerce Dr., Ft. Washington, Pa., 19034, Tel: 215-542-7800, TWX: 510-661-1520; Empl.: 120; Minimum order: $50

Customer service: J. E. Bauer

Free literature available: "Get the Picture" applications brochure for color graphics and high resolution graphics; Raster Scan Graphic Display Systems; High Resolution Graphics.

Products manufactured: Converters, Display Devices/Displays, Encoders, Generators, Keyboards, Alphanumeric & Decimal, Monitors

Local Sales Offices & Reps.
Cal Palo Alto, P. Papathakis 415-493-3939
Cal Westlake Village, C. T. Morton 213-889-1513
Fla Fort Walton Beach, G. W. Cleveland 904-242-3414
Mass Bedford, R. Claflin 617-275-0296
Tex Dallas, Data Mktg. Assoc. 214-661-0300

AYDIN ENERGY SYSTEMS, 3180 Hanover St., Palo Alto, Cal., 94303, Tel: 415-493-3900, TWX: 910-373-1238; Empl.: 300

For info on price: C. V. Weden; Application info: C. V. Weden; Customer service: K. Hanabusa; Delivery info: K. Hanabusa

Products manufactured: Amplifiers, Comm. Systems, Generators, Modulators, All Kinds, Power Supplies, Reactors, Testers, Transformers, Transmitters

B & B MOTOR & CONTROL, 96 Spring St., New York, N.Y., 10012, Tel: 212-966-5777, Telex: 14-1484; Empl.: 30; Minimum order: $15

For info on price: I. Herman; Application info: D. Shaw; Customer service: M. Penn; Delivery info: K. Palmer

Free literature available: MOTOR SPEED CONTROL CATALOG Motors and controls from 0.02 to 10,000 RPM, 1/2000 to 3/4 HP. MOTOR CATALOG AC and DC systems from 1/2000 to 1-1/8 HP. IMPULSE COUNTER GUIDE Sodeco line of electromechanical impulse counters.

Products manufactured: Controls/Control Eqpt., Counters, Motors

Local Sales Offices & Reps.
Conn Wallingford 203-869-8494
Ind Indianapolis 317-248-0396
NJ Edison 201-420-1466
NY Rochester 716-473-6640

B & F INSTRS., INC., Box 238, Corwells Hgts, Pa., 19020, Tel: 215-639-7100, TWX: 510-667-1516; Empl.: 100; Minimum order: $50

Customer service: E. H. New, Jr.

Free literature available: Bulletins 450A, AN109 Thru AN113 Describe Our Digital Data Acquisition Systems, Bulletins MS10A, EB30, AN106 and 107 Describe Our Digital Data Loggers.

Products manufactured: Amplifiers, Bridges, Cases, Equipment, Instrument, Meter, Converters, Data Acquisition & Reduction Systems, Data Loggers, Indicators, Oscillographs, Direct Writing, Power Supplies, Process Control Systems, Scanners, Signal Conditioners & Equipment

Local Sales Offices & Reps.
Ala Huntsville, Kemp Instrs., Inc. 205-837-4304
Ariz Phoenix, Cleveland Ent. 602-996-6130
Cal Anaheim, FLW 714-956-8220
Cal Culver City, FLW 213-559-7200
Cal North Hollywood, F.L. Wolfe Inc. 213-877-5518
Cal San Diego, F.L. Wolfe, Inc. 714-277-0993
Cal Walnut Creek, D. Dahl Assocs. 415-933-9595
Colo Arvada, Cleveland Entprs., Inc. 303-423-3707
Fla Orlando, RJC Assocs. 305-894-7371
Ill Northfield, Torkelson Assocs. 312-446-9085
Ind Indianapolis, Torkelson Assocs. 317-244-7867
Iowa Cedar Rapids, Palatine Engrg. Sls. 319-365-8071
Kans Andover, Palatine Engrg. Sls. 316-683-7512
Kans Overland Park, Palatine Engrg. Sls. 913-262-5643
Mass Natick, Andruss-Peskin Corp. 617-653-3919
Mich Royal Oaks, Measurement Instrs. 313-352-2144
Minn Minneapolis, Torkelson Assocs. 612-835-2414
Mo St. Louis, Palatine Engrg. Sls. 314-426-7055
NJ Stirling, NBS Assocs. 201-464-8500
NM Albuquerque, Cleveland Entprs., Inc. 505-345-2481
NC Winston-Salem, Radco Co. 919-722-9671
Ohio Cincinnati, Measurement Instrs. 513-531-2729
Ohio Columbus, Measurement Instrs. 614-488-9753
Okla Tulsa, Palatine Sls. 918-622-0321
Ore Portland, Applied Arts and Science 503-233-4683
Pa Jenkintown, PDC Corp. 215-887-9610
Tex Austin, Palatine Sls. 512-451-7463
Tex Houston, Palatine Engrg. Sls. 713-783-1492
Tex Richardson, Palatine Engrg. Sls. 214-231-9489

B & K DYNASCAN, See Dynascan

B & K INSTRUMENTS, INC., 5111 W. 164th St., Cleveland, Ohio, 44142, Tel: 216-267-4800, TWX: 810-421-8266; FSC No: 27591; Empl.: 65; Minimum order: $25

For info on price: L. Stier; Application info: L. Stier; Customer service: T. Romo; Delivery info: L. Stier

Free literature available: New 1974 Short Form Catalog describes briefly the full line of precision transducers and instrumentation for sensing, measuring, and analyzing all aspects of sound and vibration.

Products manufactured: Accelerometers, Amplifiers, Analyzers, Bridges, Calibrators, Comm. Systems, Computers, Filters, Gages, Generators, Kits, Test Equipment, Meters, Microphone Accessories (Including Stands, Holders, Booms), Microphones, All Kinds, Oscillators, Recorders, Services, Assembly, Production & Test, Signal Conditioners & Equipment, Technical Books, Test Equipment, Testers, Transducers

Local Sales Offices & Reps.
Ala Huntsville, Lee Assocs. 205-533-5896
Ariz Phoenix, Barnhill Three, Inc. 602-947-7841
Cal Anaheim, B & K Instrs., Inc. 714-778-2450
Cal San Mateo, B & K Instrs., Inc. 415-574-8100
Colo Denver, Barnhill Three, Inc. 303-934-5505
Conn Hamden, Equip. Sls. Co. 203-248-5581
Fla Winter Haven, Lee Assocs. 813-294-5815
Ill Chicago, Carter Elctrns., Inc. 312-585-5485
Ind Indianapolis, Carter Elctrns., Inc. 317-293-0696
Kans Overland Park, Carter Elctrns., Inc. 913-649-6996
Md Rockville, Farrell Assocs. 301-424-9460
Mass Chelmsford, Equip. Sls. Co. 617-256-8547
Mich Detroit, B & K Instrs. 313-557-1930
Minn Minneapolis, Carter Elctrns., Inc. 612-544-9393
Mo St. Louis, Carter Elctrns., Inc. 314-731-2237
NM Albuquerque, Barnhill Three, Inc. 505-299-7658
NY DeWitt, DB Assocs. 315-446-0220
NY Great Neck, Meas. Technology, Inc. 212-895-7177
NC Raleigh, Lee Assocs., Inc. 919-787-5818
Ohio Cincinnati, B & K Instrs. 513-874-5379
Pa Philadelphia, Letronix, Inc. 215-242-6223
Pa Pittsburgh, B & K Instrs. 412-276-6393
Tex Dallas, Barnhill Two, Inc. 214-231-2573
Tex Houston, Barnhill Two, Inc. 713-688-9971
Wash Seattle, H. Levinson Co. 206-323-5100

Wisc	Milwaukee, Carter Elctrns., Inc.	414-464-5555

BABCOCK ELECTRONICS, Sub Esterline Corp., Box 1499, Costa Mesa, Cal., 92626, Tel: 714-540-1234, TWX: 910-595-1517; Empl.: 500

For info on price: G. W. Henn; Application info: J. M. Brown; Customer service: J. N. Larson; Delivery info: J. N. Larson

Free literature available: Catalogs for military and commercial relays. Full, half and 1/6 size crystal can relays latching and non latching. Time delay relays, voltage sensors, reed relays, general purpose, and solid state relays.

Products manufactured: Relays

Local Sales Offices & Reps.

Ala	Huntsville, Elctrn. Mktg. Assoc.	205-837-6061
Ariz	Phoenix, Chaparral Mfgr. Reps.	602-996-9648
Cal	Los Angeles, E. Landa Co.	213-879-0770
Cal	Redwood City, Warren & Hickey Sls. Co.	415-368-3849
Colo	Englewood, Checkmate Sls.	303-771-4920
Conn	North Haven, Kitchen & Kutchin	203-239-0212
Fla	Clearwater, G.F. Bohman Assoc.	813-422-5606
Fla	Ft. Lauderdale, G.F. Bohman Assocs.	305-564-3061
Fla	Orlando, G.F. Bohman Assocs.	305-855-0274
Ill	Chicago, Carlson Elctrn. Sls.	312-774-4812
Ind	Greenwood, V. Schillinger & Assocs.	317-888-2260
Ind	South Bend, V. Schillinger & Assocs.	219-291-6258
Kans	Olathe, BC Elctrn. Sls.	913-782-6696
Md	Silver Springs, Rep-Tron	301-593-4844
Mass	Lexington, Kitchen & Kutchin	617-862-8230
Minn	Minneapolis, J.J. Exon Co.	612-566-5340
Mo	Hazelwood, BC Elctrn Sls.	314-731-1255
NJ	Haddonfield, Gray Assocs.	609-429-5300
NJ	Teaneck, R.T. Reid Assocs.	201-692-0200
NM	Albuquerque, Data Handling Co.	505-268-4364
NY	North Syracuse, Advanced Comps. Corp.	315-699-2671
NY	Scottsville, Advanced Comps. Corp.	716-889-1429
NC	Winston Salem, Elctrn. Mktg. Assocs.	919-722-5151
Ohio	Cincinnati, Giesting Assocs.	513-931-0812
Ohio	Dayton, Giesting Assocs.	513-293-4044
Ore	Beaverton, Arneson Assocs.	503-643-5754
SC	Greenville, Elctrn. Mktg. Assocs.	803-268-1125
Tex	Richardson, Barry Sls. Co.	214-234-0255
Utah	Salt Lake City, Checkmate Sls.	
Wash	Seattle, Arneson Assocs.	206-762-7664
Wisc	Milwaukee, Carlson Elctrnc. Sls.	414-476-2790
FOR:	an., Montreal, Que., Space Elctrns. Sls. Corp.	514-735-1108
FOR:	Can., Toronto, Ont., Space Elctrn. Sls. Corp.	416-677-4205

BACHARACH INSTRUMENT CO., 625 Alpha Dr., Pittsburgh, Pa., 15238, Tel: 412-782-3500, TWX: 710-664-2085; Empl.: 500

Products manufactured: Alarms, Analyzers, Detectors, Indicators

Local Sales Offices & Reps.

Cal	Canoga Park	213-348-4142
Cal	Mountain View	415-967-7221
Ill	Wheeling	312-541-3293
Mich	Berkley	313-399-7883
NJ	Little Ferry	201-440-4662
Pa	Philadelphia	215-338-5173
Tex	Houston	713-688-7150

BACON INDS., 192 Pleasant St., Watertown, Mass., 02172, Tel: 617-926-2550; Empl.: 18; Minimum order: $25

For info on price: Sales Dept.; Application info: T. Willett; Customer service: T. Willett

Free literature available: Data Sheets on our epoxy, and urathane potting compounds; Data Sheets on our molded rubber line & other services.

Products manufactured: Adhesives (All Types), Coatings, Compounds, Encapsulating, Insulating, Molding, Potting, Conductive Plastic Materials, Plastic Raw Materials, Liquids, Pellets, Powders, Resins, Rubber, Seals, Services, Assembly, Production & Test

BAFCO, INC., 717 Mearns Rd., Warminster, Pa., 18974, Tel: 215-674-1700, TWX: 510-665-6860; Empl.: 21

For info on price: R. France; Application info: A. M. Fuchs; Customer service: R. France; Delivery info: R. France

Free literature available: Catalog 7172 and Tech. Publ. 7172-1 describes the complete line of Frequency Response Analyzers and provide theoretical basis of operation for measurement of dt ratio and phase shift from 0.005 HZ thru 50,000 HZ in poor S/N conditions.

Products manufactured: Actuators, Analyzers, Controls/Control Eqpt., Filters, Meters, Servo Systems, Test Equipment, Testers

Local Sales Offices & Reps.

Cal	Carson, ABCO Co.	213-537-5152
Cal	Santa Clara, Mauldin	415-326-5291
Conn	Newton, Daner-Hayes Inc.	203-426-9094
Fla	Orlando, Truex	305-859-2160
Mass	Newton Centre, Daner-Hayes Inc.	617-969-4650
NY	Rochester, Daner-Hayes Inc.	716-467-5100
Ohio	Dayton, P. Glavinos	513-433-1010
Pa	Melrose Park, R. Meyers Assoc.	215-224-1663

BAGANOFF ASSOCS., INC., 6809 W. Florissant, St. Louis, Mo., 63136, Tel: 831-0956; Empl.: 12

Customer service: E. Brown

Products manufactured: Amplifiers, Analyzers, Comm. Systems, Computers, Converters, Data Acquisition & Reduction Systems, Delay Lines, Generators, Services, Assembly, Production & Test, Testers

BAKER CO., INC., Drawer E - Sanford Airport, Sanford, Me., 04073, Tel: 207-324-8773; Empl.: 80

Products manufactured: Benches, Consoles, Stools, Tables, Cabinets & Accessories, Ovens

Local Sales Offices & Reps.

Ariz	Gilbert, R. Pressnell	602-833-5387
Cal	Dana Point, Dana Scientific Co.	714-495-0492
Cal	Richmond, Tegal Corp.	415-232-1757
Fla	Clearwater, Datco	813-531-4255
Ga	Decatur, B. H. Yates Co.	404-633-6900
Ill	Villa Park, Motordor	312-833-2700
Ind	Indianapolis, Little & Assocs.	317-545-4083
Mass	Cambridge, Rush Assocs.	617-661-1200
Mich	Dearborn, W. Mullins & Assoc.	313-563-3340
Minn	St. Paul, S. Clasen	612-439-6347
Mo	Clayton, Gateway Scientific	314-725-3464
NJ	Newark, Thornton Assocs.	201-622-0905
NC	Cary, R. Petty	919-467-9663
Okla	Okla. City, Oklahoma Air Filter Sls. & Svc.	405-521-9918
Tenn	Memphis, Dickson Instr. Co.	901-452-2612
Tex	Houston, Contamination Control	713-943-1883
Wash	Lake Stevens, Northwest Scientific Instrs.	206-259-0123
FOR:	Can., Oakville, Ont., Cartec	416-844-4561

BAKER, J.T. CHEMICAL CO., Phillipsburg, N.J., 08865, Tel: 201-859-2151, TWX: 510-235-2924; Empl.: 750; Minimum order: $150

For info on price: G. L. Collins; Application info: T. P. Merrick; Customer service: W. D. Alpaugh; Delivery info: W. D. Alpaugh

Free literature available: Product Information Bulletin 174 lists ULTREX(R) products for research, and reagents for the lab with application data, starting materials, purification mmethods, packaging and characterization. "Defined Purity Dopants" describes product features, packaging/price info and examples of actual Certificates of Analysis.

Products manufactured: Chemicals, Cleaners & Solvents, Metal Oxides

Local Sales Offices & Reps.

Cal	Hayward	415-471-6225
Ill	Glen Ellyn	312-469-4224
Ohio	Hudson	216-653-6635
FOR:	Can., Weston, Ont., c/o Richardson-Merrell Canada Ltd.	416-749-8620

BAKNOR INDUSTRIES LTD., 58 Oakwood Ave., N., Port Credit, Ont., L5g3L8, Tel: 416-274-1591, Telex: 06-961252; FSC No: WJ0905; Empl.: 6; Minimum order: $25

For info on price: M.E. Sawicki 416-274-1592; Application info: A.R. von den Baumen 416-274-1721; Customer service: S. DeAmeral 416-274-1591; Delivery info: L. Ruddy 416-274-1591

Free literature available: Spec sheets

Products manufactured: Capacitors, Fixed, Resistors

Local Sales Offices & Reps.

FOR:	Can., Oakville, Ont., Haltronics Ltd.	416-844-2121

BALCO CAPACITORS, Div. Balco Elctrns., Inc., 307 Washington St., Orange, N.J., 07050, Tel: 201-677-1200, TWX: 710-994-5812; FSC No: 5910; Empl.: 50; Minimum order: $50

For info on price: R. W. Hagerty; Application info: R. W. Hagerty; Customer service: L. James; Delivery info: R. W. Hagerty

Free literature available: Precision Film Capacitors, Wrap & Fill Film Capacitors

Products manufactured: Capacitors, Fixed, Networks, Resistors

Local Sales Offices & Reps.

Ariz	Scottsdale, F. Schoeffler Assocs.	
Cal	Culver City Sodaro Co.	213-478-7733
Cal	Van Nuys, Penwarden Entprs.	213-785-0773
Conn	Meriden, Abbitt-Allison	203-237-9232
Ill	Northbrook, R.T. Howlett & Assocs.	312-498-5444
Kans	Overland Park, Bob Rush Assocs.	913-831-4259
NJ	Harrington Pk., Metro Tech. Sls.	201-768-8495
NY	Jericho, Metro Tech. Sls.	516-935-3330
Wash	Seattle, J.B. Jolly	206-938-4166
Wisc	Milwaukee, Gentron Corp.	414-543-8110
EXP:	New York, Multiparts Corp.	212-944-4372
EXP:	Westbury, N.Y., Minthorne Int'l. Inc.	516-334-3303
FOR:	Can., Montreal, Que., Electro Design	514-389-5914
FOR:	Can., Ottowa, Ont., Electro Design	613-745-0541
FOR:	Can., Toronto, Ont., Electrodesign Ltd.	416-787-0991
FOR:	Can., Ville Lasalle, Que., Electrodesign Ltd.	514-363-5120

Local Distributors

Ohio	Dayton, McGuire Prod., 206 Troy St.	513-222-1651
Tex	Houston, Lehert Co., 1420 Hutchins	713-225-1465

BALDWIN ELCTRNS., 1101 McAlmont St., Little Rock, Ark., 72203, Tel: 501-375-7351, TWX: 910-722-7384; Empl.: 435; Minimum order: $20 ....p. 1•144-146

Customer service: S. Berg

Free literature available: Application papers concerning operating characteristics of optical encoders.

Products manufactured: Alarms, Circuits, Hybrid, Thick Film, Controls/Control Eqpt., Converters, Counters, Encoders, Indicators, Motors, Tachometers

Local Sales Offices & Reps.

Ariz	Phoenix, R.A. Mayes Co.	602-279-5243
Cal	Los Angeles, Baldwin Elctrns., Inc.	213-368-1716
Colo	Denver, R.A. Mayes, Co.	303-444-0782
Conn	North Haven, Northeast Reps., Inc.	203-239-2507
Fla	Boca Raton, Conley Assocs.	305-395-6108
Fla	Oviedo, Conley Associates	305-365-3283
Fla	Tampa, Conley Assocs.	813-933-3183
Ill	Chicago, Carlson Elctrns. Sls. Co.	312-774-9022
Kans	Kansas City, Carlson Elctrns. Sls. Co.	913-432-2144
Md	Arnold, Baldwin Elctrns., Inc.	301-757-5904
Mass	Needham Heights, Northeast Reps.	617-449-3034
Minn	Minneapolis, J. J. Exon Co.	612-566-5340
Mo	St. Louis, Carlson Elctrn. Sls. Co.	314-991-0262
NJ	Ridgewood, Instrumentation Sls. Co.	201-445-5210
NM	Albuquerque, R.A. Mayes Co.	505-292-2330
NY	Buffalo, H. C. Johnson Agencies	716-632-7880
NY	Rochester, H.C. Johnson Agencies	716-482-3000
NY	Syracuse, H.C. Johnson Agencies	315-637-9383
Ohio	Cincinnati, Baldwin Elctrns., Inc.	513-231-1786
Ore	Portland, Brett Associates, Inc.	503-232-4184
Pa	Pittsburgh, H.C. Johnson Agencies	412-961-0414
Tex	Fort Worth/Dallas, Carey, Wolf & Associates	817-738-1996
Tex	Houston, Carey, Wolf & Assoc.	713-643-2114
Utah	Salt Lake City, R.A. Mayes Co.	801-292-6781
Wash	Seattle, Brett Associates, Inc.	206-935-8054
Wisc	Wauwatosa, Carlson Elctrns. Sls. Co.	414-476-2790

Ballantine

BALLANTINE LABORATORIES, INC., 90 Fanny Rd., Box 97, Boonton, N.J., 07005, Tel: 201-335-0900, TWX: 710-987-8380; FSC No: 50423; Empl.: 65; Minimum order: $25

For info on price: I. Bromberg; Application info: M. J. Lichtenstein; Customer service: T. Gilbert; Delivery info: N. Lauchaire

Products manufactured: Amplifiers, Calibrators, Counters, Generators, Meters, Oscilloscopes, Probes, Recorders, Services, Assembly, Production & Test, Shunts, Meter, Standards, Thermocouples, Elements & Accessories, Totalizers, Digital, Voltage Sources

Local Sales Offices & Reps.

Ala	Huntsville, Gentry Assoc. Inc.	205-534-9771
Ariz	Scottsdale, Williams Assoc.	602-947-4297
Cal	Irvine, Moxon Elctrns.	714-556-6500
Cal	San Diego, Moxon Elctrns.	714-292-4820
Cal	Santa Clara, Moxon Elctrns.	408-249-2491
Colo	Denver, Williams Assocs.	303-343-2911
Conn	New Haven, Mc Bar Assoc.	203-865-4376
Fla	Melbourne, Gentry Assocs.	305-773-0812
Fla	Orlando, Gentry Assocs.	305-894-4401
Fla	St. Petersburg, Gentry Assocs.	813-867-7820
Ill	Chicago, Scientific Sls.	312-775-7594
Ind	Indianapolis, Scientific Sls.	317-253-4606
Kans	Shawnee Mission, Eir Co.	913-362-0919
Md	Baltimore, Dyna Rep Co.	301-256-3709
Mass	Waltham, McBar Assocs.	617-890-0233
Mich	Royal Oak, Group Ten	313-549-3910
Minn	Bloomington, Scientific Sls.	612-881-3300
Mo	Hazelwood, Eir Co.	314-895-4100
NJ	Haddonfield, Dyna Rep Co.	609-795-1700
NM	Albuquerque, Williams Assocs.	505-255-1638
NY	Mt. Vernon, Q.E.D. Elctrns.	914-664-0080
NY	North Syracuse, NACO Elctrns.	315-699-2651
NY	Schenectady, NACO Elctrns.	518-244-4720
NY	Utica, NACO Elctrns.	315-732-1801
NC	Burlington, Gentry Assocs.	919-227-3639
Ohio	Cleveland, Group Ten	216-486-2800
Ohio	Dayton, Group Ten	513-293-7061
Okla	Norman, Data Mktg. Assoc. Inc.	405-364-8320
Tex	Dallas, Data Mktg. Assocs.	214-661-0300
Tex	Houston, Data Mktg. Assocs.	713-686-9627
Tex	San Antonio, Data Mktg. Assoc. Inc.	512-828-0937
Va	Alexandria, Dyna Rep Co.	703-354-1222
Va	Newport News, Dyna Rep Co.	804-874-7729
Wash	Seattle, Rush S. Drake Assoc.	206-763-2755

BALSTON, INC., Box C, 703 Massachusetts Ave., Lexington, Mass, 02173, Tel: 617-861-7240, Telex: 92-3481

For info on price: D. Weldon; Application info: J. Alpert; Customer service: J. Alpert; Delivery info: C. Mahler

Free literature available: Technical information on the selection and use of high efficiency filters for removal of oil from compressed air. Technical information filtration of deionized water. Summary of applications for high efficiency liquid and gas filters. Quick Reference Chart on Balston High Efficiency Filters.

Products manufactured: Air Cleaners & Filters (Shielded & Unshielded)

Local Distributors

Ala	Mobile, Alabama Controls Co., Box 7154	205-479-2345
Cal	Palo Alto, Priz-Co., 2675 Park Blvd.	415-326-9333
Cal	Paramount, Brenner-Fiedler & Assoc., 16210 Gundry Ave.	213-636-3206
Colo	Denver, Mundix Ind'l Controls, 5495 Marion St.	303-893-2390
Fla	Orlando, Control Center, 1013 E. Montana St.	305-896-6831
Ill	Chicago, A. Stanley & Co., 6059 N. Albany Ave.	312-973-7376
Md	Baltimore, Jobe & Co., 2857 Greenmount Ave.	301-235-3502
Mich	Detroit, Michigan Value & Fitting Co., 17236 E. Warren Ave.	313-884-9415
Minn	Eden Prairie, G. Speaker Co., 14760 Martin Dr.	612-941-5730
Mo	Hazelwood, E. M. Thompson Co., 400 Brooks Dr.	314-731-2688
Mo	Kansas City, E. M. Thompson Co., 208 W. 10th St.	816-471-8248
Neb	Omaha, E. M. Thompson Co., 119 S. 19th St.	402-341-4635
NJ	Moorestown, Salem Scientific, Box 354	609-235-4565
NJ	Springfield, RJM Sls., Box 82	201-467-1210
NY	Buffalo, R.L. Stone Co., 1807 Elmwood Ave.	716-873-1873
NY	Rochester, R.L. Stone Co., Box 9148	716-381-1155
NY	Syracuse, R.L. Stone Co., 2023 Milton Ave.	315-468-2700
NC	Charlotte, Salem Sls. Assocs., Box 9323	704-375-3328
Ohio	Cincinnati, J.R. Douglass Co., Box 31075	513-931-4986
Ohio	Cleveland, F. W. Kirk Co., 15017 Detroit Ave.	216-226-1970
Pa	Pittsburgh, J.F. Kraus & Co., 360 Broadmoor Ave.	412-531-1200
Tenn	Memphis, Centro, Inc., Box 7311	901-526-0518
Tex	Dallas, H & D Distributors, 6211 Denton Dr.	214-351-6478
Tex	Pasadena, Tech-Quip, Inc., Box 6191	713-473-2891
Utah	Provo, Priz-Co., 17 E. 200 North	801-377-5858
Va	Richmond, Jobe & Co., 2508 Grenoblerd	804-282-6508
WVa	So. Charleston, Appalachian Controls Co., Box 8246	304-744-5324
Wisc	Appleton, Guy Speaker Co., 1425 N. Douglas St.	414-739-6066
Wisc	Milwaukee, Guy Speaker Co., 5706 W. Vliet St.	414-258-2325
For:	Can., Mississauga, Ont., Can-Am Instrs. Ltd., 1938 Mattawa Ave.	416-277-4541
For:	Can., Montreal, Que., Can-Am Instrs. Ltd., Box 397, Snowden Po.	514-931-2588

BARBER-COLMAN CO., Motor Div., Dept. S, 12116 Rock St., Rockford, Ill., 61101, Tel: 815-877-0241, TWX: 815-398-0341; Empl.: 5000

Products manufactured: Blowers & Fans & Accessories, Motors, Relays

Local Sales Offices & Reps.

Ala	Huntsville, Candor Co.	205-539-6575
Cal	Menlo Park, Long & Assocs., Inc.	415-327-1300
Cal	Sherman Oaks, R. Meussdorffer & Assoc.	213-788-0771
Colo	Denver, Todd & Assocs., Inc.	303-744-2313
Conn	Berlin, White Sls. Co.	203-224-0423
Ill	Chicago, D. Dolin Sls. Inc.	312-286-6200
Ind	Ft. Wayne, Menze Sls.	219-747-5616
Kans	Overland Park, Penzner-Mankus Assocs.	913-381-0004
Md	Baltimore, Machinery & Equip. Sls. Inc.	301-889-2070
Mass	Needham, White Sls. Co.	617-444-3676
Minn	St. Paul; Northport Engrg.	612-698-3841
Mo	Hazelwood, Penzner-Mankus Assocs.	314-731-4334
NJ	Mt. Laurel, Naudain Assocs.	609-235-1801
NJ	Springfield, P. H. Werner, Inc.	201-376-9440
NY	East Aurora, Harries & Hershaw	716-652-1221
NC	Winston-Salem, Candor Co.	919-924-1480
SC	Myrtle Beach, Candor Co.	803-448-5213
Va	Lynchburg, Candor Co.	703-239-5265
Wisc	Milwaukee, Barber-Colman Co.	414-464-5900
EXP:	Milwaukee, Wis., Dummann World Trade Co.	414-464-0100

BARBER-COLMAN CO., Industrial Instrs. Div., 2711 Rock St., Rockford, Ill., 61101, Tel: 815-877-0241, TWX: 815-398-0341; Empl.: 5000

Customer service: M. Bengston

Free literature available: Ten page brochure describes Barber-Colman's solid state, reprogrammable sequence logic control systems, designed to increase productive machine time by improving cycle time and machine sequence repeatability.

Products manufactured: Actuators, Alarms, Amplifiers, Controllers, Programmable, Controls/Control Eqpt., Converters, Indicators, Meters, Monitors, Process Control Systems, Pyrometers, Recorders, Relays, Signal Conditioners & Equipment, Testers, Thermocouples, Elements & Accessories, Transducers, Wire

Local Sales Offices & Reps.

Ala	Birmingham, Control Equip. Co.	205-879-8211
Ala	Huntsville, Control Equip. Co.	205-883-1330
Cal	Alhambra, Barber-Colman Co., Industrial Instrs. Div.	213-282-9166
Cal	Redwood City, CB Controls	415-364-2313
Cal	San Diego, R. Brainard Co.	714-274-1333
Colo	Denver, Technical Engrg. Sls.-Svc. (TESSCO)	303-744-1119
Conn	Stamford, Barber-Colman Co., Industrial Instrs. Div.	203-325-1367
Fla	Miami, G. Brophy Assoc.	305-444-6253
Fla	Winter Park, Control Equip. Co.	305-647-4496
Ga	Atlanta, Barber-Colman Co., Industrial Instrs. Div.	404-633-2566
Ill	Lincolnwood, Barber-Colman Co., Industrial Instrs. Div.	312-673-4550
Ill	Loves Park, Barber-Colman Co., Industrial Instrs. Div.	815-633-9585
Ill	Rock Island, Barber-Colman Co., Industrial Instrs. Div.	309-786-3351
Ind	Indianapolis, Barber-Colman Co., Industrial Instrs. Div.	317-293-4700
Ind	Lanesville, Barber-Colman Co., Industrial Instrs. Div.	812-952-2653
Kans	Prairie Village, Parker & Foster, Inc.	913-381-9330
La	Baton Rouge, Allen Assocs.	504-293-0644
La	Shreveport, JDJ Sls. Co.	318-865-2393
Md	Laurel, Barber-Colman Co., Industrial Instrs. Div.	301-792-7377
Mass	Canton, Barber-Colman Co., Industrial Instr. Div.	617-828-9496
Mich	Grand Rapids, Barber-Colman Co., Industrial Instrs. Div.	616-245-9217
Mich	Southfield, Barber-Colman Co., Industrial Instrs. Div.	313-358-4210
Minn	Minneapolis, Pyro-Matic Industrials, Inc.	612-786-2222
Mo	St. Louis, Barber-Colman Co., Industrial Instrs. Div.	314-781-9009
NJ	Rochelle Park, Barber-Colman Co., Industrial Instrs. Div.	201-845-8607
NY	Buffalo, Barber-Colman Co., Industrial Instr. Div.	716-875-4413
NC	Charlotte, Barber-Colman Co., Industrial Instrs. Div.	704-372-5492
Ohio	Cincinnati, Barber-Colman Co., Industrial Instrs. Div.	513-791-0900
Ohio	Columbus, Industrial Data Control Co.	614-228-1352
Ohio	Highland Hgts., Barber-Colman Co., Industrial Instrs. Div.	216-461-2480
Ohio	Toledo, Barber-Colman Co., Industrial Instrs. Div.	419-476-6661
Okla	Tulsa, Electrical & Inst. Sls. Co.	918-664-0980
Pa	Frazer, Barber-Colman Co., Industrial Instrs. Div.	215-647-4650
Pa	Pittsburgh; Barber-Colman Co., Industrial Instrs. Div.	412-885-2200
Tenn	Memphis, Combustion & Controls Co.	901-525-7402
Tex	El Paso, Delta Instr. Co.	915-533-4207
Tex	Fort Worth, Barber-Colman Co., Industrial Instrs. Div.	817-732-2818
Tex	Pasadena, ASKCO Instr. Co.	713-472-3688
Utah	Salt Lake City, Control Sys., Inc.	801-364-6425
Va	Richmond, Indamation Co.	804-272-7270
Wash	Bellevue, KAKar Corp.	206-454-1318
WVa	Charleston, Chemac Co.	304-346-0884
Wisc	Appleton, Pyro-Matic Industrials, Inc.	414-739-4247
Wisc	Brookfield, Pyro-Matic Industrials, Inc.	414-781-2222
FOR:	Can., Dorval, Quebec, Barber-Colman of Canada, Ltd., Industrial Instrs. Div.	514-631-9064
FOR:	Can., Vancouver 10, British Columbia, Instrument Service Labs	604-876-3361
FOR:	Can., Weston, Ontario, Barber-Colman of Canada, Ltd., Industrial Instrs. Div.	416-742-6210
FOR:	Can, Edmonton, Alb., Instr. Srvc. Labs.	403-465-3677

BARBER CORP., Box 271, Waynesville, Ohio, 45068, Tel: 513-897-2926; Empl.: 25

For info on price: C. M. Barber; Application info: C. M. Barber; Customer service: M. S. Barber

Products manufactured: Power Supplies, Relays, Solenoids, Switches, Testers

BARDEN CORP., 200 Park Ave., Danbury, Conn., 06810, Tel: 203-744-2211, TWX: 203-744-0097; Empl.: 1100

For info on price: E. V. Silver; Application info: W. W. Warner; Customer service: E. V. Silver; Delivery info: E. V. Silver

Free literature available: Selection & usage guide to precision bearings The Barden linear bearing.

Products manufactured: Bearings

BARKER ELEC. SLS., Box 405, Ship Bottom, NJ, 08008, Tel: 609-494-8209; Empl.: 17

Free literature available: Catalog & Technical Data. Terminal converters vacuum types "U.H.F." & "Standard" patterns. Leaflet - Descriptive Data. New "Wilkins" multicouple with high output (up to 1.6 volts) and extreme accuracy of reversal differences & temperature coefficients.

Products manufactured: Cores, Magnetic, Magnets, Thermocouples, Elements & Accessories

Advertisment

Vacuum Thermocouples, Mfr. L.R. Graham Co. UHF and STANDARD Low Frequency styles from 1mA up. Accurate RMS and true SQUARE LAW outputs with Low Reversal Errors and Compensated Temperature Coefficients. Wide current tracking ratios, long to fast time responses. Single units and matched parameters. Complete technical catalog available.

BARKER PRODS. CO., 344 Central St., Saugus, Mass., 01906, Tel: 617-233-9070, TWX: 617-233-6676; Empl.: 60

Customer service: W. A. Brackett

Free literature available: Catalog

Products manufactured: Connector Adapters, Connectors, Cords, Jack Adapters (All Types), Jacks (All Types), Plug Adapters, Plug & Jack Sets

Local Sales Offices & Reps.

Ariz	Phoenix, R. Fissell Co.	602-264-4031
Cal	Burbank, Koessler Sls. Co.	213-849-5716
Cal	Lafayette, Wilkins-Mason Assocs.	415-284-9200
Colo	Denver, Vines & Co.	303-832-6967
Fla	Ormond Beach, J.F. Thompson Co.	904-677-2298
Ga	Atlanta, Maitland K. Smith	404-939-5838
Ill	Chicago, T. Pappas & Assocs. Inc.	312-685-2338
Mass	Auburndale, Mktg. Elctrn., Inc.	617-527-7753
Mich	Detroit, Riley & Petchell Sls., Inc.	313-535-7000
Minn	Minneapolis, J. E. M. Anderson Co.	612-823-6459
NJ	Montclair, Component Marketers Inc.	201-746-6717
Ohio	Twinsburg, F. Ohman Inc.	216-425-7455
Pa	Wynnewood, Stinson Assocs.	215-896-7378
Tex	Dallas, C. Lucas Sls. Co.	214-330-8181
Wash	Seattle, D. Champlin Co.	206-362-0401
FOR:	Can., Mississauga, Ontario, W. Farrow Assocs., Ltd.	416-625-8151

BARKER & WILLIAMSON, INC., Canal St., Bristol, Pa., 19007, Tel: 215-788-5581; Empl.: 50

Products manufactured: Amplifiers, Analyzers, Antennas, Capacitors, Variable, Chokes, Coils Including Assemblies & Forms, Counters, Couplers, Dummy Loads, Filters, Generators, Meters, Switches, Terminals, Transformers

BARNES ENGRG. CO., 30 Commerce Rd., Stamford, Conn., 06902, Tel: 203-348-5381, TWX: 710-474-3367; Empl.: 400; Minimum order: $25

For info on price: R. Bouton; Application info: R. F. Leftwich; Customer service: R. Bouton; Delivery info: B. Manning

Free literature available: Literature for Infrared Thermometers that make non-contact temperature measurements and Infrared Microscopes and Micro Scanners for non-contact temperature measurements of micro-targets.

Products manufactured: Analyzers, Bolometers, Cameras, Controls/Control Eqpt., Detectors, Microscopes, Pyrometers, Radiometers, Scanners, Standards

Local Sales Offices & Reps.

Cal	Los Altos, J. Stone Assocs.	415-948-4563
Cal	Los Angeles, Basic Systems Co.	213-938-2833
Colo	Evergreen, Mountaintek	303-674-5255
Fla	Casselberry, GPI Instrs.	305-831-6215
Fla	Orlando, E. G. Holmes & Assocs.	305-894-8901
Ga	Chamblee, E. G. Holmes & Assocs.	404-451-6161
Haw	Honolulu, Elctrn. Measurement Corp.	808-847-1138
Ill	Chicago, Carter Elctrns.	312-585-5485
Ind	Indianapolis, Carter Elctrns.	317-293-0696
Kans	Overland Park, Carter Elctrns.	913-649-6996
La	Baton Rouge, SESCO	504-272-3730
Md	Silver Spring, Spectro Systems	301-949-8261
Mass	Marblehead, Northeast Assocs.	617-631-9500
Mich	Detroit, WKM Assocs.	313-892-2500
Minn	Minneapolis, E. J. Doyle Co.	612-827-5847
Mo	Hazelwood, Carter Elctrns.	314-731-2237
NJ	East Orange, Friedman Assocs.	201-673-2500
NM	Albuquerque, Trembly Assocs.	505-293-4444
NY	Fayetteville, M. P. Andrews	315-637-3144
Ohio	Cleveland, WKM Assocs.	216-267-0445
Ohio	Dayton, WKM Assocs.	513-434-7500
Pa	Elkins Park, Snow Assocs.	215-379-4700
Pa	Pittsburgh, WKM Assocs.	412-892-2953
Tex	Houston, SESCO	713-668-7840
Tex	Richardson, SESCO	214-231-9364
Utah	Salt Lake City, Montaintek	810-272-4611
Va	Virginia Beach, E. G. Holmes & Assocs.	804-481-6556
Wash	Seattle, Showalter-Judd	206-624-9020
Wisc	Milwaukee, Carter Elctrns.	414-464-5555

BARNES & REINECKE, INC., 351 E. Ohio St., Chicago, Ill., 60611, Tel: 312-321-0350; Empl.: 250

For info on price: J. E. Smart; Application info: J. E. Smart; Customer service: J. E. Smart; Delivery info: J. G. Ferkan

Products manufactured: Chargers, Battery, Meters

BARON-BLAKESLEE, INC., 1620 S. Laramie Ave., Chicago, Ill., 60650, Tel: 312-656-7300

For info on price: P. Johnson; Application info: P. Johnson; Customer service: J. C. Avery; Delivery info: J. C. Avery

Products manufactured: Cleaners & Solvents, Cleaners, Ultrasonic

Local Sales Offices & Reps.

Cal	Gardena	213-532-0730
Cal	Newark	415-794-6511
Cal	San Diego	714-295-0041
Cal	Santa Fe Springs	213-723-0971
NJ	South Kearny	201-589-5933
NY	Garden City	516-747-8460
Ore	Portland	503-252-3468
Wisc	Oak Creek	414-762-6850

BARTLETT-EMERY INSTRUMENT CORP., 14th & Ave. "M", Ft. Madison, Iowa, 52627, Tel: 319-372-8366; Empl.: 25; Minimum order: $10

Customer service: P. R. Bartlett

Products manufactured: Meters, Shunts, Meter, Testers, Thermocouples, Elements & Accessories

Local Sales Offices & Reps.

Cal	Los Altos, Schwerin Assocs.	415-941-3737
Cal	Malibu, Corman Co.	213-457-7524
Mo	Kansas City, Nevco, Inc.	816-421-1751
Mo	St. Louis, Nevco, Inc.	314-843-7406
Pa	Glenside, W.E. Girard Co.	215-887-4411

BASE TEN SYSTEMS, INC., 3828 Quakerbridge Rd., Trenton, N.J., 08619, Tel: 609-586-7010, TWX: 510-685-5692; Empl.: 100; Minimum order: $300

For info on price: R. E. Van Doren; Application info: J. W. Pflueger, Jr.; Customer service: J. W. Pflueger, Jr.; Delivery info: R. E. Van Doren

Free literature available: 1. Bulletin 1271 - PCM Systems (Airborne Telemetry). 2. Bulletin 2000/4000 - PAM and PCM Telemetry Components. 3. Model 500-480 PCM Decommutator 4. LGK-100 Voice Scan Spectrograph 5. Voiceprint Identification.

Products manufactured: Amplifiers, Comm. Systems, Commutators, Converters, Data Acquisition & Reduction Systems, Decommutators, Telemetering, Generators, Modulators, All Kinds, Monitors, Signal Conditioners & Equipment, Switches, Testers

Local Sales Offices & Reps.

Cal	Saratoga, M. Bergman Co.	408-257-5900
Conn	Hamden, P. Jenks Assocs.	203-281-0810
Mass	Wakefield, P. Jenks Assocs.	617-246-1590
Tex	Dallas, Synthenetics	214-631-1740
EXP:	New York, N.Y., Technitron	212-758-2790

BASF SYSTEMS, Crosby Dr., Bedford, Mass, 01730

BASLER ELECTRIC CO., Box 269, Rte. 143, Highland, Ill., 62249, Tel: 618-654-2341, TWX: 910-996-2522; Empl.: 740

Products manufactured: Amplifiers, Chargers, Battery, Controls/Control Eqpt., Converters, Monitors, Potentiometers, Power Supplies, Reactors, Regulators, Relays, Switchboards, Transformers

Local Sales Offices & Reps.

Ariz	Scottsdale, Piper-Goyne	602-946-4437
Cal	LaHabra, Nolan Assocs.	213-694-2146
Cal	LaMirada, Marrs & Assocs.	213-947-2095
Cal	Palo Alto, Abbott Engrg. Co.	415-327-0830
Colo	Littleton, Piper-Goyne	303-798-8955
Conn	Thomaston, Nelson, Bennett, Skilton Assoc.	203-283-5959
Fla	Jacksonville, Belcher & Assocs.	904-724-7811
Fla	St. Petersburg, Orbe, Inc.	813-894-0687
Ga	Atlanta, Electro Mech Sls. Engrg. Co.	404-393-0444
Ill	Chicago, H. Sam Tollaksen	312-441-6644
La	Chalmette, L. Elliott Co.	504-737-1895
Md	Glen Burnie, Faion Lott Co.	301-744-4611
Mass	Braintree, R.F. Duffy Assocs.	617-335-7724
Mich	Farmington, Miltimore Sls. Inc.	313-476-2446
Minn	Minneapolis, White Sls. Co.	612-929-4661
Mo	North Kansas City, H.J. Weisler & Assocs.	816-421-1679
Mo	St. Louis, H.J. Weisler & Assocs.	314-428-3934
NJ	Cherry Hill, L.H. Walke Co.	609-424-3766
NM	Albuquerque, Piper-Goyne	505-265-6794
NY	Memphis, Aero Sls. Co.	315-458-4774
NY	Roslyn, Seidel Assocs.	516-621-1117
NC	Charlotte, J. Rudisill Assocs.	704-377-6901
NC	Raleigh, Electro Mech Sales Engrg. Co.	919-782-6452
Ohio	Cleveland, A.H. Baier Co., & Assocs.	216-461-6161
Okla	Tulsa, L. Elliott Co.	918-743-7794
Ore	Portland, McLaren Inc.	503-297-2248
Pa	Pittsburgh, Gormley Elec. Co.	412-371-4111
Tex	Dallas, Wm. Reese Assocs.	214-638-6575
Wash	Bellevue, McLaren, Inc.	206-454-3400
EXP:	St. Louis, Mo., Brauner Export Co.	314-426-2600

BAUMKER MFG. CO., 5144 Enterprise, Toledo, Ohio, 43612; Empl.: 8

Products manufactured: Comm. Systems

BAUSCH & LOMB, S.O.P.D, Division, 1400 N. Goodman St., Rochester, N.Y., 14602, Tel: 716-232-6000, TWX: 716-97-8231; Empl.: 5500

Products manufactured: Analyzers, Counters, Lasers & Laser Systems, Lenses, Optical & Camera, Magnifying Glasses, Inspection, Microscopes, Recorders, Scanners

Local Sales Offices & Reps.

Cal	Compton	213-636-9381
Cal	San Francisco	415-863-1580
Ga	Atlanta	404-873-2023
Ill	Deerfield	312-948-9290
Md	Sparks	301-666-2109
NJ	Parsippany	201-263-3300
FOR:	Can., Scarborough 706, Ont.	416-291-7911

BAY LABORATORIES, INC., 20160 Center Ridge Rd., Cleveland, Ohio, 44116, Tel: 216-333-3898; Empl.: 20; Minimum order: $10

Customer service: G. J. Prusha

Products manufactured: Amplifiers, Converters, Data Acquisition & Reduction Systems, Data Loggers, Filters, Indicators, Memory Systems, Monitors, Multiplexers, Signal Conditioners & Equipment

Local Sales Offices & Reps.

Cal	Long Beach, Saber Entprs.	213-595-5646

BAY PRODS., Div. American Metal Works, 8701 Torresdale Ave., Phila., Pa., 19136, Tel: 215-DE8-7300; Empl.: 125

For info on price: A. Gold; Customer service: T. Ford; Delivery info: S. Segal

Free literature available: Bay catalog - #69D Contains product and eng. info.

Products manufactured: Benches, Consoles, Stools, Tables, Cabinets & Accessories, Carts & Dollies, Instrument & Equipment, Containers, Racks

Local Sales Offices & Reps.

Ala	Birmingham, Southern Ind. Sls.	
Ariz	Tucson, Industrial Tool & Supp.	602-624-6656
Cal	Los Angeles, McKinley Eq. Co.	213-263-6931
Cal	San Carlos, James Old & Son	415-591-8231
Del	Wilmington, Bruce Ind. Supp.	302-OL 5-9617
Fla	Tampa, Florida Bin & Shelving Co.	813-626-4101
Ga	Atlanta, Atlanta Bin & Shelving	404-636-4393
Ill	Chicago, A. H. Waprin Assoc.	312-644-7938
Ind	South Bend, Balient Handling Equip.	219-291-6115
Iowa	Cedar Rapids, Allen Supp. Co.	
Md	Bladensburg, Thompson & Cooke Co.	301-864-6380
Md	Cockeysville, Fabricators Inc.	301-666-2720
Mass	Waltham, Alexander Steel Co.	617-891-5780
Mich	Union Lake, Solve Needs Co.	

Minn	Minneapolis, Haldeman-Homme Co.	612-331-4880
NJ	Linden, Reliance Eq. Co.	201-381-0770
NY	Long Island City, A. Liss & Co.	212-392-8484
Pa	Bala-Cynwyd, Material Handling Co.	215-839-3440
RI	Central Falls, Rand Mat'l. Handling Co.	401-751-7657
Tex	Houston, Texas Mat'l Hangling Co.	713-666-5851
Va	Richmond, Bates Co.	804-233-3002
Wash	Seattle, F. T. Crowe & Co.	206-284-8484
Wisc	Milwaukee, Badger-Beau Equip. Co.	414-453-5581

BAYSHORE SYSTEMS CORP., 5404-B Port Royal Rd., Springfield, Va., 22151, Tel: 703-321-9625; Empl.: 25

Products manufactured: Antennas, Decoders, Diplexers, Antenna, Hydrophones & Accessories, Receivers, Recorders, Timers, Transmitters

Local Sales Offices & Reps.

Cal	Millbrae, Ashby Assocs.	415-692-4442
Fla	Orlando, UNIREP	305-295-4817
Minn	New Brighton, Dalska Assocs.	612-631-2941
Ohio	Dayton, Ashby Assocs.	513-252-5627
Pa	Huntingdon Valley, Rabal Assocs.	215-947-4825
RI	Cumberland, Perry Assocs.	

BEAD ELCTRNS., Div. Bead Chain Mfg. Co., 110 Mountain Grove St., Bridgeport, Conn., 06605, Tel: 203-334-4124; Empl.: 150; Minimum order: $40

For info on price: B. M. Krafcik; Application info: A. B. Mudgett; Customer service: B. M. Krafcik; Delivery info: B. M. Krafcik

Free literature available: Bead Electronics catalog listing male and female contacts, leads, connectors, terminals, square wire wrap pins, wire leads, etc.

Products manufactured: Connectors, Contacts, Electrical, Eyelets, Fasteners, Forms, Wire, Jacks (All Types), Pins, Terminals

Local Sales Offices & Reps.

Cal	Los Angeles, Yarbrough Sls. Co.	213-254-5101
Ill	Chicago, Gene F. Sls. Co.	312-545-5562
Ind	Indianapolis, Hoster & Sieloff Assocs., Inc.	317-844-9921
Mass	Needham, A. G. Anderson	617-449-1418
Mich	Orchard Lake, Fox Industries, Inc.	313-363-3105
Minn	Minneapolis, Nygaard Sls. Co.	612-881-3727
NJ	Beach Haven, Dyneers, Inc.	609-492-2869
NY	Lake Grove, Krone & Rubin Assocs.	609-924-0200
NY	Webster, Krone & Rubin Assocs., Inc.	716-671-6709
Va	Williamsburg, Dyneers, Inc.	804-229-3612
Wash	Seattle, F.W. Aurich & Co.	206-284-5561
EXP:	Union City, N.J., Alton Co.	201-865-4080
FOR:	Can., Thornhill, Ont., EMI Sls.	416-889-1204

BEARING INSPECTION, 10041 Shoemaker Ave., Santa Fe Springs, Cal., 90670, Tel: 213-944-6251; Empl.: 32

Customer service: D. L. Hutton

Products manufactured: Analyzers, Bearings, Tools

BECKMAN INSTRS., (AISSD), 2500 Harbor Blvd., Fullerton, Cal., 92634, Tel: 714-871-4848, TWX: 910-592-1260; Empl.: 3500

Products manufactured: Alarms, Amplifiers, Analyzers, Baths, Controlled Temperature (Air & Liquid), Computers, Data Acquisition & Reduction Systems, Densitometers, Electronic, Indicators, Interferometer Systems, Meters, Networks, Oceanographic Equip. (Electronic), Oscillographs, Direct Writing, Oscilloscopes, Paper, Graphic Recording, Probes, Radiometers, Recorders, Scales, Dial, Standards, Technical Books, Testers, Thermocouples, Elements & Accessories

Local Sales Offices & Reps.

Cal	Mountain View	415-326-1970
Colo	Denver	303-371-0950
Ga	Atlanta	404-934-3830
Haw	Honolulu	808-395-9744
Ill	Lincolnwood	312-583-1020
La	Baton Rouge	504-926-5085
Md	Silver Springs	301-622-2500
Mass	Wakefield	617-245-6800
Mich	Southfield	313-424-8800
Minn	Minneapolis	612-835-2202
Mo	Creve Coeur	314-432-5610
NJ	Mountainside	201-232-7600
NC	Durham	919-383-5593
Ohio	Cleveland	216-886-3020
Ohio	Reading	513-761-9560
Pa	Broomall	215-544-2695
Pa	Pittsburgh	412-921-1530
Tex	Dallas, 214-637-1640	
Tex	Houston	713-781-0810
Utah	Salt Lake City	801-467-5471
Wash	Bellevue	206-454-9528
FOR:	Can., Edmonton, Alberta	403-482-3447
FOR:	Can., Montreal 251, Que.	514-735-1376
FOR:	Can., North Vancouver, B.C. 1	604-980-3471
FOR:	Can., Toronto, Ont.	416-251-5251

BECKMAN INSTRS., Cedar Grove Opers., 89 Commerce Rd., Cedar Grove, N.J., 07009, Tel: 201-239-6200, TWX: 710-994-5781; Empl.: 3500

For info on price: J. Short; Application info: P. Wilson; Customer service: J. Short; Delivery info: D. Casale

Free literature available: Beckman Instruments offers Bulletin 505 which provides a capsule look at a wide array of electrical test equipment.

Products manufactured: Bridges, Controls/Control Eqpt., Decade Boxes, Dividers, Indicators, Meters, Oceanographic Equip. (Electronic), Power Supplies, Recorders, Services, Assembly, Production & Test, Testers

Local Sales Offices & Reps.

Cal	Fullerton	714-521-3700
Ga	Atlanta	404-934-3830
Ill	Lincolnwood	312-583-1020
NJ	Cedar Grove	201-239-6200
Pa	Pittsburgh	412-921-1530
Tex	Houston	713-781-0810
Va	Richmond	804-282-0555

BECKMAN INSTRS., Ectrn. Instrs. Div. Ectrn. Instrumentation, 3900 N. River Rd., Schiller Park, Ill., 60176, Tel: 312-671-3300, TWX: 910-253-1820; Empl.: 3500

Products manufactured: Counters, Data Acquisition & Reduction Systems, Generators, Meters, Printers, Signal Conditioners & Equipment, Testers, Transducers

BECKMAN INSTRS., Helipot Div., 2500 Harbor Blvd., Fullerton, Cal., 92634, Tel: 714-871-4848, TWX: 910-592-1260; Empl.: 3500

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Customer service: C. H. Vessey

Free literature available: Hybrid Microcircuit Technical Bulletin. Cermet Trimming Potentiometer Technical Bulletin. Precision Potentiometer Technical Bulletin. Resistor Network Technical Bulletin.

Products manufactured: Amplifiers, Circuits, Hybrid, Thick Film, Converters, Dials, Diodes, Display Devices/Displays, Dividers, Drivers & Decoders For Readouts, Filters, Hybrid Voltage Regulators, Integrated Circuit Devices, IC's, Active Filters, Lamp Drivers, Networks, Potentiometers, Protectors, Regulators, Resistors, Servo Systems, Switches

Local Sales Offices & Reps.

Ala	Huntsville, Murcota Corp.	205-539-8476
Cal	Fullerton, Beckman	714-871-4848
Cal	Mountain View, Beckman Instrs.	415-961-6817
Cal	San Diego, Beckman	714-565-6244
Colo	Denver, Barnhill Five	303-934-5505
Fla	Clearwater, Lynch-Gentry Assocs.	813-443-2697
Fla	Ft. Lauderdale, Lynch-Gentry Assocs.	
Ill	Chicago, Carlson Elctrn. Sls. Co.	312-774-9022
Iowa	Cedar Rapids, Comstrand	319-363-4905
Kans	Overland Park, Sheridan Assocs.	913-383-1636
Md	Silver Spring, Beckman	301-622-2500
Mass	Needham Hgts., Beckman	617-444-9010
Mich	Farmington, Sheridan Assocs.	313-477-3800
Minn	Minneapolis, Comstrand	612-560-5300
Mo	Florissant, Sheridan Assocs.	314-837-5200
NJ	Clifton, Beckman	201-778-8888
NJ	Mt. Laurel, Beckman	609-235-3314
NM	Albuquerque, Barnhill Five	505-299-7658
NY	Buffalo, Ossmann Comp. Sls.	716-832-4271
NY	Kingston, Ossmann Comp. Sls.	914-338-5505
NY	Rochester, Ossmann Comp. Sls. Corp.	716-442-3290
NY	Syracuse, Ossmann Comp. Sls.	315-454-4477
NY	Vestal, Ossmann Comp. Sls.	607-785-9949
NC	Winston-Salem, Murcota Corp.	919-723-1001
Ohio	Cincinnati, Sheridan Assocs.	513-761-5432
Ohio	Cleveland, Sheridan Assocs.	216-524-8120
Ohio	Dayton, Sheridan Assocs.	513-277-8911
Okla	Tulsa, Norvell Assocs.	918-663-1247
Ore	Portland, Almac/Stroum	503-292-3534
Pa	Pittsburgh, Sheridan Assocs.	412-244-1640
Tex	Dallas, Norvell Elctrns., Inc.	214-350-6771
Tex	Houston, Norvell Assocs.	713-774-2568
Wash	Seattle, Almac/Stroum Elctrns.	206-763-2300
FOR:	Can., Toronto, Ont., Beckman	416-251-5251

Local Distributors

Ala	Huntsville, M & C Sls.	205-539-8476
Ala	Huntsville, Powell Elctrns.	205-539-2731
Ariz	Phoenix, Liberty Elctrns.	602-257-1272
Ariz	Tempe, Marshall Inds.	602-968-6181
Cal	El Monte, Marshall Inds.	213-686-0141
Cal	El Segundo, Liberty Elctrns.	213-322-8100
Cal	Irvine, Marshall Inds.	714-556-6400
Cal	Mountain View, Elmar Elctrns.	415-961-3611
Cal	San Diego, Liberty Elctrns.	714-565-9171
Cal	San Diego, Marshall Inds.	714-278-6350
Cal	Sunnyvale, Marshall Inds.	408-732-1100
Colo	Arvada, Marshall Inds.	303-423-9670
Colo	Commerce City, Elmar Elctrns.	303-287-9611
Conn	Hamden, Arrow Elctrns.	203-248-3801
Conn	North Branford, Marshall Inds.	203-484-0488
Fla	Clearwater, Lynch-Gentry Assocs.	813-443-2697
Fla	Miami Springs, Powell Elctrns.	305-885-8761
Fla	Orlando, Powell Elctrns.	305-859-1450
Fla	Winter Park, Lynch-Gentry Assocs.	305-671-7649
Ill	Mount Prospect, Magnuson Elctrns.	312-956-0700
Ill	Rosemont, Advent Elctrns.	312-298-4210
Md	Baltimore, Arrow Elctrns.	301-247-5200
Md	Beltsville, Powell Elctrns.	301-937-4030
Mass	Burlington, Arrow Elctrns.	617-273-0100
Mass	Lexington, Harvey/R & D Elctrns.	617-861-9200
Mass	Newton Highlands, Marshall Inds.	617-965-5115
Mich	Farmington, Sheridan Sls. Co.	313-477-3800
Minn	Bloomington, Arrow Elctrns.	612-888-5522
Minn	St. Paul, Magnuson Elctrns.	612-227-8495
Mo	Florissant, Sheridan Sls. Co.	314-837-5200
NJ	Moorestown, Arrow/Angus	609-235-1900
NJ	Rutherford, Kierulff Elctrns.	201-935-2120
NJ	Saddle Brook, Arrow Elctrns.	201-797-5800
NM	Albuquerque, Elmar Elctrns.	505-292-1111
NY	Buffalo, Ossmann Component Sls. Corp.	716-832-4271
NY	Farmingdale, Arrow Elctrns.	516-694-6800
NY	Farmingdale, Marshall Inds.	516-293-4141
NY	Hicksville, Kierulff Elctrns.	516-433-5530
NY	Kingston, Ossmann Component Sls. Corp.	914-338-5505
NY	Rochester, Ossmann Component Sls. Corp.	716-442-3290
NY	Syracuse, Ossmann Component Sls. Corp.	315-454-4477
NY	Vestal, Ossmann Component Sls. Corp.	607-785-9949
NC	Winston-Salem, M & C Sls.	919-723-1001
Ohio	Cincinnati, Sheridan Sls. Co.	513-761-5432
Ohio	Cleveland, Sheridan Sls. Co.	216-831-0130
Ohio	Dayton, Sheridan Sls. Co.	513-277-8911
Okla	Tulsa, Norvell Elctrns.	918-663-1247
Ore	Portland, Almac/Stroum Elctrns.	503-292-3534
Pa	Philadelphia, Powell Elctrns.	215-365-1900
Pa	Pittsburgh, Sheridan Sls. Co.	412-244-1640
Tex	Dallas, Norvell Elctrns.	214-350-6771
Tex	Houston, Norvell Elctrns.	713-774-2568
Wash	Seattle, Almac/Stroum Elctrns.	206-763-2300
Wash	Seattle, Liberty Elctrns.	206-763-8200
For:	Can., Toronto, Ont., Semad Elctrns.	416-635-9880
For:	Can., Vancouver, BC, Semad Elctrns.	604-434-2622

BECKMAN INSTRS., Information Displays Oper., Box 3579, Scottsdale, Ariz., 85257, Tel: 602-947-8371, TWX: 910-950-1293; Empl.: 150; Minimum order: $100

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For info on price: P. Cornell; Application info: J. Dorrough; Customer service: E. Wilcox; Delivery info: E. Wilcox

Free literature available: 1. Short Form Catalog - Showing photograph, specifications, and brief description of all products. 2. Technical Bulletin - VC-525 Voltage Converter. 3. Catalog Sheet - SM-800 Display Modules. 4. SP-350/330 Character Front-showing actual size & color of Beckman IDO displays. 5. OEM Price List.

Products manufactured: Converters, Display Devices/Displays, Drivers & Decoders For Readouts, Integrated Circuit Devices

Local Sales Offices & Reps.

Ala	Huntsville, Murcota Corp.	205-539-8476
Cal	Fullerton, Beckman Instrs.	714-871-4848
Cal	Mountain View, Beckman Instrs.	415-961-6817
Cal	San Diego, Beckman Instrs.	714-565-6244
Colo	Denver, Barnhill Five	303-934-5505
Fla	Clearwater, Lynch-Gentry Assocs.	813-443-2697
Fla	Ft. Lauderdale, Lynch-Gentry Assocs.	
Fla	Winter Park, Lynch-Gentry Assocs.	305-671-7649

Ill	Chicago, Carlson Elctrn. Sls. Co.	312-774-9022
Iowa	Cedar Rapids, Comstrand	319-363-4905
Kans	Overland Park, Sheridan Assocs.	913-383-1636
Md	Silver Spring, Beckman Instrs.	301-622-2500
Mass	Needham Heights, Beckman Instrs.	617-444-9010
Mich	Farmington, Sheridan Assocs.	313-477-3800
Minn	Minneapolis, Comstrand	612-460-5300
Mo	Florissant, Sheridan Assocs.	314-837-5200
NJ	Clifton, Beckman Instrs.	201-778-8888
NJ	Mt. Laurel, Beckman Instrs.	609-235-3314
NY	Buffalo, Ossmann Comp. Sls.	716-832-4271
NY	Kingston, Ossmann Comp. Sls.	914-338-5505
NY	Rochester, Ossmann Comp. Sls.	716-442-3290
NY	Syracuse, Ossmann Comp. Sls.	315-454-4477
NY	Vestal, Ossmann Comp. Sls.	607-785-9949
NC	Winston-Salem, Murcota Corp.	919-723-1001
Ohio	Cincinnati, Sheridan Assocs.	513-761-5432
Ohio	Cleveland, Sheridan Assocs.	216-524-8120
Ohio	Dayton, Sheridan Assocs.	513-277-8911
Okla	Tulsa, Norvell Assocs.	918-663-1247
Ore	Portland, Almac/Stroum	503-292-3534
Pa	Pittsburgh, Sheridan Assocs.	412-244-1640
Tex	Dallas, Norvell Assocs.	214-350-6771
Tex	Houston, Norvell Assocs.	713-744-2568
Wash	Seattle, Almac/Stroum	206-763-2300
FOR:	Can., Toronto Ont., Beckman Instrs.	416-251-5251

Local Distributors

Ala	Huntsville, M&C Sls.	
Ala	Huntsville, Powell Elctrns./Huntsville, 803 Oster Dr., Box 1095	205-539-2731
Ariz	Phoeniz, Liberty Elctrns./Ariz.	602-257-1272
Ariz	Tempe, Marshall Inds.	602-968-6181
Cal	El Mont, Marshall Inds.	213-686-0141
Cal	El Segundo, Liberty Elctrns.	213-322-8100
Cal	Fullteron, Beckman Instrs.	714-871-4848
Cal	Irvine, Marshall Inds.	714-556-6400
Cal	Mountain View, Elmar Elctrns.	415-961-3611
Cal	San Diego, Liberty Elctrns.	714-565-9171
Cal	San Diego, Marshall Inds.	714-278-6350
Cal	Sunnyvale, Marshall Inds.	408-732-1100
Colo	Denver, Elmar Elctrns./Denver	303-287-9611
Colo	Denver, Marshall Inds.	303-423-9670
Conn	Hamden, Arrow Elctrns.	203-245-3801
Conn	Hamden, Marshall Inds.	203-288-9241
Fla	Clearwater, Lynch-Gentry Assocs.	813-443-2697
Fla	Miami Springs, Powell Elctrns./Fla., 1740 N. W. 69th Ave., Box 514	305-885-8761
Fla	Orlando, Powell Elctrns./Florida, Oakridge Commerce Ctr., 2032 Palmridge Way	305-859-1450
Fla	Winter Park, Lynch-Gentry Assocs.	305-671-7649
Ill	Mt. Prospect, Magnuson Elctrns.	312-956-0700
Ill	Rosemont, Advent Elctrns., 7110 Lyndon St.	312-298-4210
Md	Baltimore, Arrow Elctrns.	301-247-5200
Md	Beltsville, Powell Elctrns./Wash, 10728 Hanna St.	301-937-4030
Mass	Burlington, Arrow Elctrns.	617-273-0100
Mass	Lexington, Harvey/R & D Elctrns.	617-861-9200
Mass	Newton Highlands, Marshall Inds.	617-965-5115
Mich	Farmington, Sheridan Sls. Co.	313-477-3800
Minn	St. Paul, Magnuson Elctrns.	612-227-8495
Mo	Florissant, Sheridan Sls. Co.	314-837-5200
NJ	Mt. Laurel, Arrow/Angus	609-235-1900
NJ	Rutherford, Kierulff Elctrns.	201-935-2120
NJ	Saddlebrook, Arrow Elctrns.	201-797-5800
NY	Buffalo, Ossmann Comp. Sls.	716-832-4271
NY	Farmingdale, Arrow Elctrns.	516-694-6800
NY	Farmingdale, Marshall Inds.	516-293-4141
NY	Hicksville, Kierulff Elctrns.	516-433-5530
NY	Kingston, Ossmann Comp. Sls.	914-338-5505
NY	Rochester, Ossmann Comp Sls.	716-442-3290
NY	Syracuse, Ossmann Comp. Sls.	315-454-4477
NY	Vestal, Ossmann Comp. Sls.	607-785-9949
NC	Winston-Salem, M & C Sls.	919-723-1001
Ohio	Cincinnati, Sheridan Sls. Co.	513-761-5432
Ohio	Cleveland, Sheridan Sls. Co.	216-524-8120
Ohio	Dayton, Sheridan Sls. Co.	513-277-8911
Okla	Tulsa, Norvell Elctrns.	918-663-1247
Ore	Portland, Almac/Stroum	503-292-3534
Pa	Philadelphia, Powell Elctrns./Philadelphia, South Island Rd., Box 8765	215-365-1900
Pa	Pittsburgh, Sheridan Sls. Co.	412-244-1640
Tex	Dallas, Norvell Elctrns.	214-350-6771
Tex	Houston, Norvell Elctrns.	713-774-2568
Wash	Seattle, Almac/Stroum	206-763-2300
Wash	Seattle, Liberty Elctrns./Northwest	206-763-8200
For:	Can., Montreal, Que., Specialty Elctrns.	514-336-4500
For:	Can., Toronto, Ont., Weber Semad Elctrns.	416-635-9880
For:	Can., Vancouver, B.C., Weber Semad Elctrns.	604-434-2622

BECO, INC., 740 Kesler Mill Rd., Salem, Va., 24153, Tel: 703-389-3053; FSC No: 06673; Empl.: 21; Minimum order: $10

For info on price: L. S. Ball; Application info: C. R. Ball, Jr.; Customer service: M. O. Weddle; Delivery info: L. S. Ball

Free literature available: Power Supply Catalog - Lists current models, outlines features, contains glossary of terms & connection modes. Kit Catalog - Describes various kits, parts & plans available.

Products manufactured: Boards, Plug-In, Boards, Printed Circuit, Counters, Kits, Power Supply, Power Supplies, Services, Assembly, Production & Test

BECTON, DICKINSON & CO., Edmont-Wilson Div., 3157 Walnut St., Coshocton, Ohio, 43812, Tel: 614-622-4311; Minimum order: $25

For info on price: D. Cores; Application info: M. Sweet; Customer service: D. Cores

Products manufactured: Calibrators, Meters

BEECHWOOD MFG. CORP., 360 S. Downey Ave., Indianapolis, Ind., 46219, Tel: 317-356-2493; Empl.: 12; Minimum order: $20

Customer service: R. E. Cox

Products manufactured: Cabinets & Accessories, Carts & Dollies, Instrument & Equipment, Cases, Equipment, Instrument, Meter, Chassis, Metal

Local Sales Offices & Reps.

Ala	Huntsville, F.M. Assoc.	205-536-9990
Cal	Mt. View, Connolly & Co.	415-967-6988
Fla	Orlando, F.M. Assoc.	305-851-5710
Fla	West Palm Beach, F.M. Assoc.	305-746-3126
NC	Greensboro, F.M. Associates	919-294-2754
Va	Baileys Crossroads, Q.T. Electronic Sls.	703-671-4357

BEEDE ELECTRICAL INSTR. CO., INC., S. Main St., Penacook, N.H., 00331, Tel: 603-753-6362, TWX: 710-364-6977; Empl.: 500; Minimum order: $25
p. 1•238,239,612,613

Customer service: Sales Dept.

Free literature available: Bltn. Mr-2 Meter Relays; Bltn. T-1 Pyrometer Meter relays; Bltn. T-2 Pyrometers; Bltn. PM-10 Panel Meters

Products manufactured: Meters, Monitors, Motors, Relays, Tachometers

Local Sales Offices & Reps.

Ala	Huntsville, Comp. Sls. Corp.	205-883-7794
Ariz	Phoenix, MR Engineering	602-959-5150
Cal	Los Angeles, Universal Comp. Co.	213-641-4255
Cal	San Carlos, Elctrn. Engrg. Assoc.	415-593-2189
Colo	Denver, Elctrn. Sls, Inc.	303-771-6300
Conn	Farmington, R. Perron & Co.	203-673-4825
Conn	Trumbull, R. Perron & Co.	203-268-9631
Fla	Fort Lauderdale, Comp. Sls. Corp.	305-523-5906
Fla	Indian Harbor Beach, Comp. Sls. Corp.	305-773-0919
Fla	St. Petersburg, Comp. Sls. Corp.	813-894-4366
Fla	Terra Ceia, Comp. Sls. Corp.	813-722-6376
Ill	Skokie, Saffro & Assocs.	312-588-0905
Kans	Leawood, Thunderbird Tech. Sls. & Svc.	913-642-7220
Kans	Wichita, Thunderbird Tech. Sls. & Svc.	316-684-3941
Mass	Norwood, R. Perron & Co.	617-762-8114
Mich	Ann Arbor, O-M Sls. Co.	313-994-6073
Minn	Minneapolis, Wenco Sls.	612-866-3639
Mo	St. Louis, Thunderbird Tech. Sls. & Svc.	314-567-6488
NH	Dover, R. Perron & Co.	603-742-2321
NJ	Ridgewood, Ballou, Inc.	201-444-6990
NY	Buffalo, Ossman Comp. Sls. Corp.	716-832-4271
NY	Kingston, Ossman Comp. Sls. Corp.	914-338-5505
NY	Rochester, Ossman Comp. Sls. Corp.	716-442-3290
NY	Syracuse, Ossman Comp. Sls. Corp.	315-454-4477
NY	Vestal, Ossman Comp. Sls. Corp.	607-785-9949
NC	Raleigh, Comp. Sls. Corp.	919-832-1897
Ohio	Cleveland, D. Steffen & Assocs.	216-461-8333
Ohio	Dayton, D. Steffen & Assocs.	513-293-3146
Pa	Devon, B & A Assocs.	215-687-5173
Tex	Dallas, Southwest Elctrn. Ind.	214-233-9816
Tex	Houston, Southwest Elctrn. Ind.	713-729-1670
Wash	Mercer Island, J. H. Andersen Assocs.	206-232-0484
Wash	Vancouver, J. Anderson & Assoc.	206-256-1475
FOR:	Brampton, Ontario, Can., Mod-Tronic Instr. Ltd.	416-457-6322

Local Distributors

Cal	Los Angeles, Metermaster, 5647 Jillson St.	213-685-4340
Cal	Santa Clara, Dynametron, 3343 Edwards Ave.	408-246-6535
Colo	Denver, Metermaster Inst. Corp., 1165 S. Cherokee St.	303-722-5766
Conn	Middletown, Mancib Co., Randolph & Coe Rds.	203-346-6646
Fla	Pompano Beach, A&M Instr., 6560 SW 7th Ct.	305-972-1610
Ill	Chicago, EIL Instrs., 221 W. 79th St.	312-874-8070
Ill	Oak Park, Pacific Indicator, 6603 W. North Ave.	312-261-1330
Ind	Indianapolis, EIL Instrs., 7061 Twin Oaks Dr., Ste. M	317-545-1373
Kans	Overland Pk., Brooks Elctrn. Svc Co., 3761 W. 95th St.	913-648-3131
Md	Timonium, EIL Instrs., 1830 York Rd.	301-252-1260
Mass	Burlington, Mancib Co., A St. at Middlessex Tpk.	617-272-9450
Mich	Clawson, Instr. Specialties, 1024 W. 14 Mile Rd.	313-435-3311
Minn	Minneapolis, Environ Labs, 9725 Gerard Ave.	612-888-7795
Mo	St. Louis, Scherrer Instrs., 7170 Manchester Ave.	314-644-5362
NY	Rockville Centre, A&M Instr., 5 Nassau St.	516-678-6960
Ohio	Cleveland, Weschler Elec. Corp., 4250 W. 130th St.	216-251-4609
Pa	Pittsburgh, EIL Instrs., 1844 Ardmore Blvd.	412-731-5230
Tex	Houston, Electrical Inst. & Meter Co., 1424 Westheimer St.	713-526-6871
Va	Alexandria, EIL Instrs., Shirley Hwy. at Edsall Rd.	703-354-4330
Wash	Seattle, Eicher-Richards Co., 2727 NE Blakeley St.	206-523-7888

BEHLMAN DIV., CALIFORNIA INSTRS., Div. Aiken Ind., 5150 Convoy St., San Diego, Cal, 92111, Tel: 714-279-8620; FSC No: 16067; Empl.: 80; Minimum order: $25

For info on price: W. W. Hanford; Application info: W. W. Hanford; Customer service: D. Chilcoat; Delivery info: W. W. Hanford

Free literature available: Cimron® digital multimeter selection guide Invertron® AC power source short form catalog.

Products manufactured: Amplifiers, Converters, Generators, Power Supplies, Protectors, Regulators, Transformers, Voltage Sources

Local Sales Offices & Reps.

Ala	Huntsville, FM Assocs.	205-536-9990
Ariz	Scottsdale, Williams Assocs. Inc.	602-947-4297
Cal	Cupertino, T. L. Snitzer Co.	408-257-8333
Cal	Los Angeles, T. L. Snitzer Co.	213-836-6170
Colo	Denver, Williams Assocs. Inc.	303-343-2911
Fla	Orlando, FM Assocs.	305-851-5710
Fla	Tequesta, FM Assoc.	305-746-3128
Haw	Honolulu, Aloha Assocs.	808-941-1574
Ill	Chicago, Sea	312-282-6694
Ind	Carmel, Sea	317-846-2593
Iowa	Cedar Rapids, Palatine Engrg. Sls. Co.	319-365-8071
Kans	Andover, Palatine Engrg. Sls. Co.	316-683-7512
Kans	Overland Pk., Palatine Engrg. Sls. Co.	913-262-5643
La	Baton Rouge, SESCO	504-927-7574
Mass	Needham, Addelco Corp.	617-444-4754
Mich	Detroit, Group Ten	313-549-3910
Minn	Minneapolis, Waytek	612-933-2133
Mo	St. Louis, Palatine Engrg. Sls.	314-426-7055
NM	Albuquerque, Williams Assocs. Inc.	505-255-1638
NY	Great Neck, Eastern Instr. of N.Y.	516-466-9505
NY	North Syracuse, NACO Electronics Inc.	315-899-2651
NC	Greensboro, FM Assocs.	919-294-2754
Ohio	Cleveland, Group Ten	216-486-2800
Ohio	Dayton, Group Ten	513-277-6531
Pa	Philadelphia, Eastern Instr. of Phil.	219-927-7777
Tex	Houston, Sesco	713-668-7840
Tex	Richardson, Sesco	214-231-9364
Va	Annandale, Nine Assocs.	703-256-9105
Wash	Seattle, Datacom Assocs.	206-329-2989

Directory of Local Distributors Starts on page 401

BEHLMAN ENGINEERING CORP., Box 4518, 427 N. Nopal St., Santa Barbara, Cal., 93103, Tel: 805-963-9019 .... p. 1•1114-1119

For info on price: J. Behlman; Application info: H. L. Behlman; Customer service: H. L. Behlman; Delivery info: J. Behlman

Free literature available: Describes Line of A.C. power supplies. Includes price list.

Products manufactured: Converters, Generators, Inverters, Power Supplies, Regulators

Local Sales Offices & Reps.

Ala	Huntsville, Reynolds & Assocs.	205-536-1941
Ariz	Phoenix, R.L. Davis Co.	602-955-2266
Cal	Burbank, Instr. Specialists, Inc.	213-849-7181
Cal	San Diego, Instr. Specialists, Inc.	714-565-2555
Cal	Santa Clara, Instr. Specialists, Inc.	408-244-1505
Conn	Glastonbury, Instr. Reps., Inc.	203-633-0777
Fla	Satellite, Reynolds & Assocs.	305-773-4700
Ga	Atlanta, Reynolds & Assocs.	404-252-5360
Md	Rockville, Farrell Assocs., Inc.	301-424-9460
Mass	Lexington, Instr. Reps., Inc.	617-861-8620
NJ	Ridgefield, Haber-Ramp Corp.	201-945-5250
NM	Albuquerque, Scientific Devices	505-293-3494
Pa	King of Prussia, Letronix	215-265-1020
FOR:	Can., West Hill, Electromechanical Prods.	416-282-3870

BEL FUSE, 203 Van Vorst, Jersey City, N.J., 07302, Tel: 201-432-0463, TWX: 710-730-5301; Empl.: 125 p. 1•432-442,1966

Products manufactured: Circuit Breakers, Coils Including Assemblies & Forms, Converters, Delay Lines, Fuses, Transformers

Local Sales Offices & Reps.

Cal	Burlingame, Leddy Assoc.	415-347-5247
Cal	Escondido, Andrew Elctrn. Sls.	714-743-3015
Cal	Garden Grove, Impact Elctrns.	213-431-3581
Conn	Rowayton, Eastern Tech. Sls.	203-853-8350
Fla	Clearwater, Southeastern Comp. Sls.	813-531-8324
Ill	Chicago, Memac Sls.	312-545-1033
Ind	Indianapolis, Lat-Tronics	317-846-5788
Mass	Waban, QRC Corp.	617-332-9600
Minn	St. Louis Park, Beta Engrg.	612-925-4422
NY	Hempstead, Kahgan Sls.	516-538-2300
NY	Pompey, S.F. Foster Co.	315-677-3333
Pa	Bala Cynwyd, M. Friedman & Assoc.	215-839-3450
Tex	Addison, Parvin Sls.	214-239-9148

BELDEN

BELDEN CORP., Electronic Div., Box 1100, Richmond, Ind., 47374, Tel: 317-966-6661; Empl.: 3783 p. 2•1882-1909

Products manufactured: Braid, Cable, Bus Bars & Systems, Cable Assemblies & Harnesses, Cable, Cords, Cutters, Wire, Hand Operated, Probes, Testers, Welding Equipment & Access. (Excluding Equip. for Semiconductor Devices), Wire

Local Sales Offices & Reps.

Cal	Anaheim	714-991-0645
Cal	Claremont	714-624-7910
Cal	Granada Hills	213-361-7256
Cal	Pleasanton	415-846-8003
Cal	San Mateo	415-348-2060
Cal	West Covina	213-331-2592
Colo	Aurora	303-751-2870
Fla	Boca Raton	305-395-4392
Ga	Lilburn	404-921-3504
Haw	Hololulu	808-531-7548
Ill	Arlington Hts.	312-392-3849
Ill	Batavia	312-879-1625
Ill	Hinsdale	312-654-4462
Ind	Indianapolis	317-849-1945
Iowa	Des Moines	515-278-4343
La	Kenner	504-722-7223
Mass	Framingham Center	617-877-2120
Mich	Novi	313-477-9177
Minn	Burnsville	612-894-3697
Mo	Black Jack	314-355-1495
NH	Exeter	603-772-9007
NJ	Ft. Lee	212-762-8433
NY	Brockport	716-637-2869
NY	Pomona	914-354-0032
NC	Charlotte	704-535-4553
Ohio	Englewood	513-836-3805
Ohio	Medina	216-725-4285
Okla	Tulsa	918-663-5245
Pa	Pittsburgh	412-922-9056
Pa	St. Davids	215-293-0867
Tenn	Bartlett	901-388-9181
Tex	Dallas	214-823-1423
Tex	Houston	713-444-0844
Va	Fairfax	703-273-5771
Wash	Bellevue	206-885-5808
Wisc	Waukesha	414-968-2631

BELL CO., INC., 106 Morrow Ave., Box 92E, Trussville, Ala., 35173, Tel: 205-655-2135; Empl.: 19

For info on price: N. H. Bell; Application info: N. H. Bell; Customer service: N. H. Bell; Delivery info: H. M. Bell

Free literature available: Information on Graphic Sign Systems, Nameplates, and Special Marking applications for all types of business.

Products manufactured: Boards, Printed Circuit, Nameplates, Services, Assembly, Production & Test, Terminal Blocks, Boards & Strips

BELL, INC., F.W., 4949 Freeway Dr. E., Columbus, Ohio, 43229, Tel: 614-888-7501, TWX: 810-337-2851; Empl.: 50; Minimum order: $25 p. 1•614,615,2338,2339

Customer service: D. L. Calvelage

Free literature available: Catalogs which describe in detail all the capabilities and specifications for each of our product lines.

Products manufactured: Analyzers, Generators, Magnetizers, Magnetometers, Meters, Multipliers, Probes, Transducers

Local Sales Offices & Reps.

Cal	Menlo Park, Straube Assocs.	415-323-2476
Cal	Pasadena, P. Nurches Co.	213-796-5844
Colo	Denver, G. Moss Elctrns.	303-985-8815
Colo	Greeley, Gordon Moss Elctrns., Inc.	303-353-1452
Conn	Glastonbury, Instr. Reps.	203-633-0777
Ill	Chicago, Carter Elctrns.	312-585-5485
Ind	Indianapolis, Carter Elctrns.	317-293-0696
Kans	Overland Park, Carter Elctrns.	913-649-6996
Mass	Lexington, Instrument Reps.	617-861-8620
Mich	Detroit, WKM Assocs.	313-892-2500
Minn	Minneapolis, Carter Elctrns.	612-544-9393
Mo	Hazelwood, Carter Elctrns.	314-731-2237
NM	Albuquerque, G. Moss Elctrns.	505-821-6101
NY	Mamaroneck, Cane Tech. Sls.	914-698-4411
NY	Syracuse, Labtronics, Inc.	315-454-9314
Ohio	Cleveland, WKM Assocs.	216-267-0445
Ohio	Dayton, WKM Assocs.	513-434-7500
Ore	Portland, Brett Assocs.	503-232-4184
Pa	Paoli, T. Griffin Co.	215-644-7710
Pa	Pittsburgh, WKM Assocs.	412-892-2953
Tex	Dallas, Carey-Wolf & Assocs.	214-823-5383
Tex	Ft. Worth, Carey-Wolf & Assocs.	817-738-1996
Tex	Houston, Cary-Wolf & Assocs.	713-721-2442
Wash	Seattle, Brett Assocs.	206-935-8054
EXP:	New York, N.Y., J. Plasencia, Inc.	212-867-8084
FOR:	Can., Burnaby B.C., Megatronix Ltd.	604-526-3312
FOR:	Can., Montreal, Megatronix Ltd.	514-488-0404
FOR:	Can., Ottawa, Ont., Megatroix Ltd.	613-729-4004
FOR:	Can., Weston Ont., Megatronix	416-742-8015

BELL & HOWELL, 706 Bostwick Ave., Bridgeport, Conn., 06605, Tel: 203-367-6751, TWX: 710-453-2997; Empl.: 125; Minimum order: $25

For info on price: I. Isdale; Application info: I. Isdale; Customer service: E. Board; Delivery info: E. Board

Free literature available: Hybrid operational amplifier catalog. Electro optical detector bulletin.

Products manufactured: Amplifiers, Cells, Photoconductive, Photoemissive, Photovoltaic, Detectors, Meters

Local Sales Offices & Reps.

Ala	Huntsville, Beacon	205-881-5031
Ariz	Phoenix, Toward Engrg.	602-955-3193
Cal	Chatsworth, Boyle Assocs.	213-773-5982
Cal	Millbrae, Ashby Assocs.	415-692-4442
Fla	Ft. Lauderdale, Beacon Elctrns.	305-776-6074
Fla	Maitland, Beacon	305-647-3498
Ga	Atlanta, Beacon	404-351-3654
Ill	Elmhurst, Schuten Assocs.	312-833-0980
La	Baton Rouge, Response Instr. Serv. & Eng.	504-766-4645
Mass	Brookline, Technology Prods. Group	617-731-0858
Mich	Birmingham, J.C.H. Co.	313-643-7203
Mich	Grand Rapids, J.C.H. Co.	616-942-0650
Minn	Minneapolis, C.E. Bohlig & Co.	612-922-7011
NY	Bay Shore, Brunetta Sls.	516-586-1800
NY	Rochester, Scientific Devices	716-334-2445
Ohio	Dayton, J.C.H. Co.	513-296-1010
Ohio	Medina, J.C.H. Co.	216-241-4880
SC	Spartanburg, Beacon	803-582-4613
Tex	Dallas, Allied Comps.	214-238-0408
Tex	Houston, Allied Comps.	713-782-5408
Va	Falls Church, Beacon North, Inc.	703-534-1673
Wash	Bellevue, Scientific Devices	206-454-0900

BELL & HOWELL CO., Elctrns. & Instrs. Grp., 360 Sierra Madre Villa, Pasadena, Cal., 91109, Tel: 213-443-3211, TWX: 910-587-3440

Products manufactured: Data Acquisition & Reduction Systems, Recorders, Tape Recording Accessories

BELL INDUSTRIES, ELECTRONIC COMPONENTS DIV., 150 W. Cypress Ave., Burbank, Cal., 91502, Tel: 213-846-9302, TWX: 910-498-2207

Products manufactured: Capacitors, Fixed, Filters, Networks

BELL INDUSTRIES, J.W. Miller Div., 19070 Reyes Ave., Compton, Cal., 90221, Tel: 213-537-5200, TWX: 910-346-6740; Empl.: 85; Minimum order: $25 p. 2•370-379

For info on price: A. Bufford; Application info: F. T. Scott; Customer service: A. Bufford; Delivery info: T. Shiffer

Products manufactured: Capacitors, Fixed, Chokes, Coders, Coils Including Assemblies & Forms, Detectors, Discriminators, Filters, Relays, Transformers

Local Sales Offices & Reps.

Ariz	Phoenix, H.A. Moore Sls. Co.	602-274-4558
Ark	El Dorado, D. Bellew Sls., Inc.	501-863-8325
Cal	Gardena, Bidwell Sls. Assocs.	213-770-0300
Cal	Redwood City, Logan Sls. Co.	415-369-6726
Colo	Denver, R.G. Bowen Co., Inc.	303-722-4641
Fla	Maitland, Hutto-Hawkins-Peregoy, Inc.	305-831-2474
Fla	Pompano Beach, Hutto-Hawkins-Peregoy, Inc.	305-943-9593
Ga	Atlanta, Millar Electronics, Inc.	404-261-6160
Ill	Chicago, Markal Sls. Corp.	312-282-5800
Ind	Indianapolis; Elctrn. Reps., Inc.	317-897-9326
La	Kenner, D. Bellew Sls., Inc.	504-729-4550
Md	Baltimore, Par-Nell Sls. Co.	301-655-2944
Mass	North Scituate, W.A. Hendrickson Co.	617-545-0652
Mich	Southfield, Markal Sls. Corp.	313-355-5700
Minn	Minneapolis, C.R. Gibb Co.	612-377-1200
Mo	Raytown, Marty Taraski Sls Co.	816-358-1442
NJ	Englewood, J.J. Bressler, Inc.	201-569-7600
NM	Albuquerque, C.T. Carlberg & Assocs.	505-265-1579
NY	Binghamton, Bucci Assocs.	607-798-7141
NY	Lancaster, Lawrence Ind'l Sls.	716-685-1993
NY	Rochester, Marsey Sls., Inc.	716-442-9700
NC	Raleigh, Millar Elctrns., Inc.	919-787-9564
Ohio	St. Marys, T. Shelby & Co.	419-394-3377
Ore	Portland, Earl & Brown, Co.	503-245-2283
Pa	Holland, Par-Nell Sls. Co.	215-355-9330
Tenn	Memphis, D. Bellew Sls., Inc.	901-365-9437
Tex	Richardson, Campion Sls. Co.	214-238-8145
Wash	Seattle, Earl & Brown Co.	206-284-1121
EXP:	New York City, N.Y., Roburn Agencies, Inc.	212-989-5939

BEMAN MFG., INC., New Cumberland, Pa., 17070, Tel: 717-938-1451, TWX: 510-650-3539; Empl.: 250

Products manufactured: Cable Assemblies & Harnesses, Cable, Caps, Connector, Circuits, Flexible, Clamps & Clips, Connector Adapters, Connectors, Contact Strips, Finger, Contacts, Electrical, Cords, Eyelets, Grommets, Jacks (All Types), Jumpers, Lead Assemblies & Receptacles, Pins, Plug & Jack Sets, Plugs, Resistors, Services, Assembly, Production & Test, Terminal Blocks, Boards & Strips, Terminals, Tools

Local Sales Offices & Reps.

Fla	Fern Park, M & G Assoc.	305-841-8793
Ill	Park Ridge, Metcom Assoc.	312-696-1490
Ind	Kokomo, R. Leib	317-453-1398
Mass	Waltham, Mekkom	617-891-7520
Mich	Bloomfield Hills, Ellinger Sales	313-642-0203
Pa	Philadelphia, Newson Assoc.	215-248-3377

BEMCO, INC., 9908 San Fernando Rd., Pacoima, Cal., 91331, Tel: 213-899-5296, TWX: 910-496-1520; Empl.: 53

For info on price: F. Garacci; Application info: F. Garacci; Customer service: L. Hernandel; Delivery info: F. Garacci

Products manufactured: Chamber, Environmental Test, Heat Exchangers & Systems, Ovens, Services, Assembly, Production & Test, Valves, Vacuum

THE BENDIX CORP., Flight Systems Div., Teterboro, N.J., 07608, Tel: 201-288-2000, TWX: 710-990-6136; Empl.: 2900

Products manufactured: Amplifiers, Annunciators, Controls/Control Eqpt., Gages, Indicators, Motors, Pedestals, Radar, Repeaters, Servo, Resolvers, Synchro, Services, Assembly, Production & Test, Servo Systems, Synchros, Transducers

BENDIX-GUIDANCE SYSTEMS, Teterboro, N.J., 07608, Tel: 201-288-2000, TWX: 201-990-6136; Empl.: 2500

Products manufactured: Accelerometers, Computers, Gyros (All Types), Transducers

Local Sales Offices & Reps.

Cal	Lakewood, Bendix	213-595-4311
DC	Washington, Bendix	202-331-8200
Ohio	Dayton, Bendix	513-276-2154
Wash	Tukwila, Bendix	206-246-8100
EXP:	New York, N.Y., Bendix Int'l	212-262-8000
FOR:	Can., Montreal, Que., Aviation Elec.	314-744-2811

THE BENDIX CORP., Test Systems Div., Teterboro, N.J., 07608, Tel: 201-288-2000, TWX: 710-990-6136; Empl.: 900

Products manufactured: Test Equipment, Test Systems, Testers

BENDIX CORP., Aerospace Sys. Div., 3300 Plymouth Rd., Ann Arbor, Mich., 48107, Tel: 313-665-7766, TWX: 810-223-6041; FSC No: 07038; Empl.: 700

For info on price: B. Maddalena; Application info: B. Maddalena; Customer service: J. O'Doherty; Delivery info: B. Maddalena

Products manufactured: Scanners, X-Ray Inspection Equipment

Local Sales Offices & Reps.

Ala	Huntsville, Bendix Corp.	205-533-0180
Ohio	Dayton, Bendix Corp.	513-276-2154
Va	Arlington, Bendix Corp.	703-841-1200

BENDIX CORP., Avionics Div, Box 9414, Ft. Lauderdale, Fla., 33310, Tel: 305-776-4100, TWX: 510-955-9884; Empl.: 950

For info on price: A. White 316-684-0177; Customer service: E. Casey 305-776-4100; Delivery info: D. Bossle 305-776-4100

Products manufactured: Antennas, Direction Finders, Indicators, Radar Systems, Receivers, Transmitters

Local Sales Offices & Reps.

Cal	Burbank	213-843-4600
Kans	Wichita	316-684-0177
Md	Cockeysville	301-252-7740
Ohio	Dayton	513-224-9214
Tex	Euless	817-267-3641

BENDIX CORP, Communications Div, East Joppa Rd., Towson, Md., 21204, Tel: 301-823-2200, TWX: 710-232-1823; Empl.: 1,000

Products manufactured: Circuits, Hybrid, Thick Film, Circuits, Hybrid, Thin-Film, Coders, Comm. Systems, Microwave Integrated Circuits (MIC's), Modules, Logic, Encapsulated, Multiplexers, Radar Systems, Receivers, Transceivers, Transmitters, Transponders

BENDIX, Electric & Fluid Power Div., Hwy. 35, Eatontown, N.J., 07724, Tel: 201-542-2000, TWX: 710-722-6686; FSC No: 83298; QPL No: Multiple; Empl.: 500

For info on price: G. P. Clericuzio; Application info: J. Breickner; Customer service: G. P. Clericuzio; Delivery info: K. Smith

Free literature available: Developers and manufacturers of electric power systems including rotary AC-DC generators, power conversion systems and electric power supervisory/control equipment.

Products manufactured: Inverters, Power Supplies, Regulators, Transformers

Local Sales Offices & Reps.

Ala	Huntsville, Bendix Corp.	205-539-3673
Cal	Los Angeles, Bendix Corp.	213-377-0170
DC	Washington, Bendix Corp.	202-841-1200
Ohio	Dayton, Bendix Corp.	513-276-2154
Wash	Tukwila, Bendix Corp.	206-246-8107

BENDIX CORP., THE, Electrical Comp. Div., Sidney, N.Y., 13838, Tel: 607-563-9511, TWX: 510-261-7550; Empl.: 3500 .... p. 2•640-642

Customer service: Sls. Dept.

Free literature available: Form SL-100-4, "Electrical Connectors" illustrates and briefly describes the connector product line.

Products manufactured: Adapters, Waveguide, Cable Assemblies & Harnesses, Caps, Connector, Connector Adapters, Connectors, Packages, Integrated Circuit, Switches, Tachometers, Testers

Local Sales Offices & Reps.

Cal	Lakewood	213-920-1711
Cal	Palo Alto	415-494-1224
Fla	Orlando	305-894-6931
Ill	Des Plaines	312-296-7791
Mass	Lexington	617-861-8900
NJ	Teterboro	201-288-1710
NY	New York, Bendic International	
Ohio	Dayton	513-276-2154
Tex	Dallas	214-243-4394
Wash	Tukwila	206-246-8100
FOR:	Can., Montreal, Aviation Elec. Ltd.	

BENDIX CORP., Electrodynamics Div., 11600 Sherman Way, N. Hollywood, Calif., 91605, Tel: 213-765-1010, TWX: 910-499-2151; Empl.: 1200

Products manufactured: Actuators, Comm. Systems, Controls/Control Eqpt., Data Acquisition & Reduction Systems, Hydrophones & Accessories, Radar Systems, Receivers, Servo Systems, Underwater Communication, Detection, Navigation, etc. Equipment, Valves, Solenoid

Local Sales Offices & Reps.

DC	Washington, Bendix Corp., Electrodynamics Div.	202-333-8200

BENDIX CORP. ENVIRONMTL. SCI., 1400 Taylor Ave., Dept. 81, Baltimore, Md., 21204, Tel: 301-825-5200, TWX: 710-232-1805; Empl.: 350

Products manufactured: Alarms, Analyzers, Comm. Systems, Data Acquisition & Reduction Systems, Monitors, Oceanographic Equip. (Electronic), Scanners, Services, Assembly, Production & Test, Signal Conditioners & Equipment, Switches, Synchro Transmitters, Solid-State, Transducers, Transmission Systems, Data

Local Sales Offices & Reps.

EXP:	New York, NY, Bendix Corp., Bendix Int'l.	
FOR:	Can., Montreal, Que., Aviation Elec. Ltd.	514-744-2811

BENDIX CORP., Instr. & Life Support Div., 2734 Hickory Grove Rd., Davenport, Iowa, 52808, Tel: 319-324-9101, TWX: 910-525-1197; Empl.: 750; Minimum order: $30

Customer service: M. J. Gallagher

Free literature available: "Guidelines for Sonic Energy Cleaning", Complete System or Flexible Options Sonic Energy Cleaning", O"How to Evaluate Sonic Energy Cleaning EquipmentO", "Immersible Sonic Cleaning Systems".

Products manufactured: Cleaners & Solvents, Cleaners, Ultrasonic, Generators, Transducers

Local Sales Offices & Reps.

Cal	Los Angeles, Barnard & Assocs.	213-973-5050
Cal	San Francisco, Avionics Liaison Inc.	415-783-1131
Ill	Northfield, Marsland Distributing Co.	312-295-1616
Mass	Concord, H. M. Nazor Assocs.	617-259-8784
Wash	Seattle, Avionics Liaison, Inc.	206-767-3870

BENDIX, Microwave Devices Plant, Hurricane Rd., Franklin, Ind., 46131, Tel: 317-736-6136, TWX: 810-260-2600 .... p. 2•643,1214,1280

Products manufactured: Circulators, Ferrite, Connector Adapters, Connectors, Couplers, Dividers, Dummy Loads, Headers, Isolators, Jack Adapters (All Types), Jacks (All Types), Loads, Electronic Variable, Meters, Monitors, Seals, Services, Assembly, Production & Test, Shifters, Strip-Line Components, Microwave, Terminals, Waveguides & Adapters

Local Sales Offices & Reps.

Ala	Huntsville, 20th Century Mktg.	205-772-9237
Ariz	Phoenix, Shefler Kahn Co.	602-258-7893
Cal	No. Hollywood, Jewett	213-789-8103
Colo	Denver, Gossard	303-985-0602
Conn	Wethersfield, Underwood Sls.	203-563-3046
Fla	Ft. Lauderdale, CBC, Inc.	305-782-0804
Ill	Chicago, Techrep	312-761-0548
La	Metairie, McKinney Sls.	504-887-1723
Md	Baltimore, Components Sls.	301-484-3647
Mass	Chelmsford, Underwood Sls.	617-256-8191
Minn	Minneapolis, F.B. Hill Co.	612-941-5270
Mo	St. Charles, Buse Sls. Co.	314-946-6430
NJ	Paramus, Astrorep, Inc.	
NY	E. Aurora, E.E. Harries & Co.	716-652-1221
NY	Fayetteville, E.E. Harries & Co.	315-637-9871
NY	Melville, Astrorep Inc.	516-432-2266
NY	Webster, E.E. Harries & Co.	716-671-6365
Ohio	Cleveland, Components Inc.	216-842-2737
Okla	Tulsa, McKinney Sls. Co.	918-742-6791
Ore	Portland, C.K. Shanks	503-292-5656
Pa	Feasterville, PSA, Inc.	215-355-6244
Tex	Bellaire, McKinney Sls. Co.	713-774-3232
Tex	Dallas, J. McKinney Sls.	214-631-9450
EXP:	N.Y., N.Y., Bendix Int'l.	212-262-8000
FOR:	Can., Montreal, Aviation Electric Ltd.	514-744-2811

BENDIX CORP., Motor Comps. Div., Elmira, N.Y., 14903, Tel: 607-737-8303, TWX: 510-252-1594; Empl.: 1000; Minimum order: $50

For info on price: F. Loomis 607-737-8254; Application info: F. Loomis 607-737-8254; Customer service: T. Fice 607-737-8254; Delivery info: T. Fice 607-737-8254

Free literature available: New 27 page catalog and application guide describing a complete line of Tooth, multiple Disc and single surface Electric Clutches and brakes with application considerations.

Products manufactured: Brakes, Brushes & Brush Assemblies, Clutches, Power Supplies

Local Sales Offices & Reps.

Ala	Birmingham, Wilcox & Allen	205-592-0356
Cal	Bell Gardens, N. A. D'Arcy Co.	213-773-5511
Cal	San Diego, N. A. D'Arcy Co.	714-274-8700
Conn	Old Lyme, Aid Engrg. Sls. Co.	203-529-7946
Conn	Rocky Hill, Aid Engrg. Sls. Co.	203-673-3692
Ill	Chicago, Halliday-Lenhart	312-446-9320
Mass	Westboro, Aid Engrg. Sls. Co.	617-890-8181
Mich	Birmingham, J. C. Hofstetter Co.	313-643-7203
Mo	Kansas City, Terry & Hodges	913-722-1024
Mo	St. Louis, Terry & Hodges	314-965-0746
NJ	Livington, Varrelman-Gorman Co.	201-992-2505
NY	Centerport, Varrelman-Gorman Co.	212-463-5000
NY	Elmira, Motor Components Div.	607-737-8303
NC	Charlotte, M. R. Snyder Co.	704-377-6571
Ohio	Cincinnati, Fremont & Lewis	513-891-3560
Ore	Portland, N. Rupp Co.	503-228-4311
Pa	Bridgeville, Foster-McClinton Inc.	412-941-4800
Pa	Paoli, Joos Equip. Co.	215-644-5875
Tex	Richardson, D. E. Horman Co.	214-234-2021
Wash	Bellevue, N. Rupp Co.	206-455-2130
Wisc	Wauwatosa, Gille Engrg. Sls.	414-258-4100

BENTHOS, INC., Edgerton Dr., N. Falmouth, Mass., 02556, Tel: 617-563-5917; Empl.: 33; Minimum order: $25

Customer service: B. Eaton

Free literature available: Oceanographic Catalog - summary of equipment deep sea cameras - Edgerton camera system deep sea floats - glass floatation spheres Taptone - vacuum/pressure inspection of cans & containers

Products manufactured: Cameras, Chamber, Environmental Test, Lights, Oceanographic Equip. (Electronic)

BERG ELECTRONICS, Div. I.E. du Pont de Nemours & Co. (Inc.), York Expwy., New Cumberland, Pa., 17070, Tel: 717-938-6711, TWX: 510-650-3538; Empl.: 1200 p. 2•645-652

Products manufactured: Connectors, Contacts, Electrical, Integrated Circuit Packaging Systems, Machines/Machinery, Production, Pins, Sockets, Terminal Blocks, Boards & Strips, Terminals, Tools

Local Sales Offices & Reps.

Cal	Woodland Hills	213-347-8830
Ill	Lincolnwood	312-982-4280
Mass	East Longmeadow	413-525-4228
Minn	Minneapolis	612-835-4820
PA	New Cumberland	717-232-8656

BERKELEY NUCLEONICS, 1198 Tenth St., Berkeley, Cal., 94710, Tel: 415-527-1121; Empl.: 15; Minimum order: $20

Customer service: D. Ellis

Products manufactured: Amplifiers, Calibrators, Delays, Time (Excluding Delay Lines, Timers, Delay & Relays, Time-Delays), Generators, Power Supplies, Simulators

Local Sales Offices & Reps.

DC	Washington, Scientific Sys.	202-726-4161
Ill	Chicago, Corleet & Assoc.	312-626-6726
NY	Syosset, Scientific Sys.	516-921-3737
Tenn	Knoxville, Pulcir, Inc.	615-693-3641

BERKELEY INSTRUMENTS, INC., 1701 Reynolds Ave., Santa Ana, Cal., 92705, Tel: 714-556-0623, TWX: 800-854-3253; Empl.: 25 .... p. 1•616,617

Products manufactured: Alarms, Calibrators, Counters, Generators, Meters, Printers, Testers

Local Sales Offices & Reps.

EXP:	Can., Montreal, Que., Electrodesign, Ltd.	514-363-5120

BERTAN ASSOCS., INC., 180 Miller Pl., Hicksville, N.Y., 11801, Tel: 516-433-3110; FSC No: 6130; Empl.: 48; Minimum order: $50 .... p. 1•1120,1121

Customer service: L. L. Bertan

Free literature available: Short Form Catalog – describes high voltage products and capabilities including high voltage instrumentation, nuclear power supplies, CRT power supplies and other electron beam high voltage power supplies.

Products manufactured: Converters, Meters, Power Supplies, Probes, Testers, Transformers

Local Sales Offices & Reps.

Ariz	Scottsdale, PLS Assoc.	602-957-9110
Cal	Encino, King-Way Assoc.	213-788-4124
Cal	Milbrae, Ashby Assoc.	415-692-4442
Colo	Denver, PLS Assocs.	303-771-0140
Ill	Aurora, D. Smith & Assoc.	312-896-0828
Md	Silver Springs, Spectroscopy Sys.	301-949-8261
Mass	Framingham, Victor Assocs.	617-879-5710
Mich	Farmington, Carter, McCormic & Peirce	313-477-7700
NM	Albuquerque, PLS Assocs.	505-255-2330
Ohio	Cleveland, Carter, McCormic & Peirce	216-333-5650
Ohio	Dayton, Carter, McCormic & Peirce	513-278-5873
Pa	Monroeville, Carter, McCormic & Peirce	412-372-4415
Pa	Windmoor, Spectroscopy Sys.	215-836-1545
Tex	Dallas, Dwayne Clement & Assocs.	214-239-6105

HL

VACUUM THERMOCOUPLES

BEST ELECS. DIV., Harry Levinson Co., 1211 E. Denny Way, Seattle, Wash., 98122, Tel: 206-323-5100, TWX: 910-444-2154; Empl.: 4; Minimum order: $15

Customer service: H. Levinson

Products manufactured: Thermocouples, Elements & Accessories

Local Sales Offices & Reps.

Cal	Menlo Park, Straube Assocs., Inc.	415-323-2476
Colo	Denver, Straube Assocs., Inc.	303-426-0890

Advertisment

Vacuum thermocouples for the measurement of true rms, or power. Matched pairs for Linear rms conversion. Multijunction consisting of 100 prs. in series. True differential type.

BETA TECHNOLOGY, INC., 94 Verdi St., Farmingdale, N.Y., 11735, Tel: 516-293-4313; Empl.: 6

For info on price: E.J. Youskites; Application info: W.S. Douglas; Customer service: W.S. Douglas; Delivery info: W.S. Douglas

Free literature available: Data sheets of standard video products.

Products manufactured: Amplifiers, Comm. Systems, Data Compressors, Digital, Delay Lines, Display Devices/Displays, Dividers, Editing Equipment, Tape, Generators, Meters, Modulator/Demodulators, Modulators, All Kinds, Monitors, Multiplexers, Receivers, Switches, Television Systems & Equipment Closed-Circuit, Test Equipment, Translators, Data, Transmission Systems, Data, Transmitters

BETAMITE ELECTRONIC DEV., 6321 W. Slauson Ave., Culver City, Cal., 90230, Tel: 213-390-3401; Empl.: 12

Products manufactured: Flashers, Relays

Local Sales Offices & Reps.

Ariz	Scottsdale, J.A. Swanson Assoc.	602-947-4379
Cal	San Diego, Andrew Elctrn. Sls.	714-747-3015
Mass	Framingham, victor Assocs.	617-879-5710
Wash	Seattle, Carlyle Tech.	206-ME2-4290

BETATRONIX, INC., 100 Ricefield La., Hauppauge, N.Y., 11787, Tel: 516-543-8780, TWX: 510-226-3748; Empl.: 35

Customer service: H. W. Cashman

Free literature available: Catalog describes, Quality Control System, various Models of Precision Conductive Plastic and Wire-Wound Potentiometers, Special Designs (including switches), and Packaging Capabilities.

Products manufactured: Potentiometers, Rheostats, Switches

BEUKERS LABS., INC., 30 Orville Drive, Bohemia, N.Y., 11716, Tel: 516-567-5100, TWX: 510-288-7888; Empl.: 60; Minimum order: $10

For info on price: F. Fetkowitz; Application info: F. Fetkowitz; Customer service: C. B. Williams; Delivery info: F. Fetkowitz

Products manufactured: Amplifiers, Couplers, Filters, Oscillators, Receivers, Tracking Systems, Transmitters

BF ELCTRNS., 415 S. Nardo, Solana Beach, Calif., 92075, Tel: 714-755-1881; Empl.: 7

Customer service: W. Blair

Free literature available: Detailed specification sheets on our line of telemetry and communication receivers, transmitters, amplifiers, filters, etc.

Products manufactured: Amplifiers, Comm. Systems, Converters, Filters, Generators, Kits, Power Supply, Multipliers, Receivers, Transmitters

BG ELECTRONICS, INC., 9 Elm Ave., Mount Vernon, N.Y., 10550, Tel: 914-664-5591; FSC No: 33791; Empl.: 32

For info on price: W. Bein; Application info: W. Bein; Customer service: W. Bein; Delivery info: A. J. Slasser

Free literature available: Catalog of typical products; Flyer-telegraph tone channel filters; Flyer-speech plus filters.

Products manufactured: Delay Lines, Equalizers, Filters, Networks, Transformers

Local Sales Offices & Reps.

Cal	San Carlos, Westronics Assocs.	415-592-1417
Ill	Arlington Heights, Hagan Sls. Co.	312-394-0617
Md	Annapolis, Hayden Assocs.	202-296-6059
NY	Huntington, Andrews & Andrews Inc.	516-692-8686
Tex	Dallas, J. A. Green Co.	214-631-7450
Tex	Houston, J. A. Green Co.	713-526-2959
EXP:	Lemoyne, PA, Elctrns. Int'l.	717-737-8858

BH ELECTRONICS, 245 E. 6th St., St. Paul, Minn., 55101

B. H. INDUSTRIES, 5784 Venice Blvd., Los Angeles, Cal, 90019, Tel: 213-937-4763; Empl.: 6; Minimum order: $38

Customer service: R. Quiring

Products manufactured: Chargers, Battery, Chokes, Converters, Decade Boxes, Inverters, Power Supplies, Transformers

Local Sales Offices & Reps.

Mass	Lexington, MRI	617-861-6270

BICRON ELCTRNS. CO., Box 807, Barlow St., Canaan, Conn., 06018, Tel: 203-824-5125; Empl.: 70

For info on price: S. Kopcha; Application info: J. Wootton; Customer service: J. Casey; Delivery info: P. Kent

Free literature available: Brochures showing Electro-Mechanical, Electro-Magnetic Assemblies. Solenoid design data sheets. X-Ray, non-contact and Bicron/Vollmer contact gaging and control systems data and specification sheets.

Products manufactured: Chokes, Coils Including Assemblies & Forms, Converters, Generators, Inverters, Reactors, Solenoids, Testers, Transducers, Transformers

Local Sales Offices & Reps.

Va	Vinton, C. Schmitt	703-890-3859

BIDDLE, JAMES G., Township Line & Jolly Rds., Plymouth Meeting, Pa., 19462, Tel: 215-646-9200; Empl.: 197

Products manufactured: Bridges, Cable Fault Locators, Controls/Control Eqpt., Counters, Decade Boxes, Detectors, Indicators, Locators, Open-Short, Meters, Oscillators, Potentiometers, Relays, Services, Assembly, Production & Test, Standards, Testers, Transmitters, X-Ray Inspection Equipment

Local Sales Offices & Reps.

Ala	Huntsville, Col-Ins-Co., Inc.	205-539-1771
Cal	Mountainview, Tech-Ser., Inc.	415-969-9020
Cal	San Diego, Tech-Ser., Inc.	714-222-1121
Cal	Torrance, Tech-Ser, Inc.	213-538-2267
Colo	Denver, Tessco, Inc.	303-744-1119
Conn	Middletown, The Mancib Co.	203-346-6646
Fla	Orlando, Col-Ins-Co., Inc.	305-423-7615
Fla	St. Petersburg, Col-Ins-Co.	813-343-0978
Ga	Atlanta, Williams & Assocs.	404-261-3434
Ill	Chicago, K.W. Meyers Co.	312-774-6440
Ind	Indianapolis, K.W. Meyers Co.	317-243-6681
La	New Orleans, Butler & Land, Inc.	504-722-6363
Md	Silver Spring, Sel-Tronics, Inc.	301-589-3391
Mass	Burlington, The Mancib Co.	617-272-9450
Mich	Royal Oak, Satullo Co.	313-549-3910
Minn	Minneapolis, K.W. Meyers Co.	612-920-7080
Mo	Kansas City, C.B. Fall Co.	816-942-3912
Mo	St. Louis, C.B. Fall Co.	314-968-3850
NJ	Saddlebrook, L & M Assoc.	201-843-8700
NM	Albuquerque, Tech. Marketing Asso.	505-298-4321
NY	Brentwood, L & M Assoc.	516-231-8363
NY	Fayetteville, Savage Sales Co.	315-682-2131
NY	New York, L & M Asso.	212-675-7486
Ohio	Cincinnati, Peter Lax Co.	513-771-4411
Ohio	Cleveland, Peter Lax Co.	216-226-8815
Okla	Tulsa, Butler & Land	918-664-8633
Ore	Portland, Instr. Lab., Inc.	503-234-6683
Pa	Andalusia, L & M Assoc.	215-639-3100
Pa	Pittsburgh, Peter Lax Co.	412-833-5477
Tex	Dallas, Butler & Land, Inc.	214-363-8900
Tex	Houston, Butler & Land, Inc.	713-464-4662
Va	Richmond, Virginia Tech. Assoc.	804-266-9654
Wash	Seattle, Instr. Lab., Inc.	206-283-5850

BIKOR CORPORATION, 1228 253rd St., Harbor City, Cal., 90710, Tel: 213-325-2820 .... p. 1•1122,1123

For info on price: R. Pizer; Application info: J. Zagorin

Free literature available: Summary catalog, proposal drawings per customer's specific needs.

Products manufactured: Converters, Power Supplies, Regulators, Transformers

BIOCOLOGY SYS. INC., 19 Daniel Rd., Fairfield, N.J., 07006, Tel: 201-227-6188; Empl.: 26; Minimum order: $100

For info on price: T. Greco; Application info: T. J. Ramney; Customer service: J. Corteze

Free literature available: Brochures on: White & clean rooms computer rooms laminar flow work stations clean room equipment.

Products manufactured: Air Cleaners & Filters (Shielded & Unshielded), Air Conditioners (For Equipment)

BIOCOM, INC., 9522 W. Jefferson Blvd., Culver City, Cal., 90230, Tel: 213-836-7263; Empl.: 24; Minimum order: $25

Customer service: B. Dickey

Products manufactured: Amplifiers, Bridges, Comm. Systems, Data Acquisition & Reduction Systems, Demodulators, Oscillators, Oscilloscopes, Transducers, Transmitters

BIOMATION, INC., 10411 Bubb Rd., Cupertino, Cal., 95014, Tel: 408-255-3500, TWX: 910-338-0226

For info on price: D. Blecki; Application info: R. Tottingham; Customer service: S. Austin; Delivery info: K. Scott

Free literature available: Short form catalog describes complete line of Waveform Recorders, Logic Analyzers and Logic Recorders.

Products manufactured: Analyzers, Converters, Recorders

Local Sales Offices & Reps.

Ariz	Phoenix, C.W. Fowler Co.	602-274-5537
Cal	La Jolla, Ward/Davis Assoc.	714-459-3351
Cal	Lawndale, Ward/Davis Assoc.	213-542-7740
Cal	Sunnyvale, Ward/Davis Assoc.	408-245-3700
Colo	Denver, C.W. Fowler Co.	303-744-9595
Conn	Hamden, P. Jenks Assoc.	203-281-0810
Fla	Orlando, E.G. Holmes & Assoc.	305-894-8901
Ga	Chamblee, E.G. Holmes & Assoc.	404-451-6161
Ill	Chicago, Pivan Engrg.	312-539-4838
Ind	Indianapolis, Pivan Engrg.	317-253-1681
Kans	Mission, Pivan Engrg.	913-722-1030
Md	Wheaton, Sales Technology	301-340-0015
Mass	Wakefield, P. Jenks Assoc.	617-246-1590
Mich	Detroit, WKM Assoc.	313-434-7500
Minn	Minneapolis, Pivan Engrg.	612-537-4501
Mo	St. Louis, Pivan Engrg.	314-567-3636
NM	Albuquerque, C.W. Fowler Co.	505-299-7676
NY	Dewitt, D.B. Assoc.	315-446-0220
NY	Port Chester, Radiation Elctrns.	914-937-2300

Ohio Cleveland, WKM Assoc. 216-267-0445
Ohio Dayton, WKM Assoc. 513-434-7500
Okla Norman, Data Mktg. Assoc. 405-364-8320
Pa Norristown, Data Engrg. 215-272-1444
Pa Pittsburgh, WKM Assoc. 412-892-2953
Tex Dallas, Data Mktg. Assoc. 214-358-4643
Tex Houston, Data Mktg. Assoc. 713-686-9627
Tex San Antonio, Data Mktg. Assoc. 512-828-0937
Va Virginia Beach, E.G. Holmes Assoc. 804-481-6558
Wash Seattle, Showalter Instrs. 206-455-4922
Wisc Brookfield, Pivan Engrg. 414-786-1940

BIOMETRICS INSTRUMENT CORP., Sub. Varo, Inc., 2201 Walnut, Garland, Tex., 75040, Tel: 214-276-6141, TWX: 910-860-5093; Empl.: 1500 .... p. 1•1528-1531

Products manufactured: Amplifiers, Chargers, Battery, Chokes, Coils Including Assemblies & Forms, Converters, Filters, Generators, Inverters, Power Supplies, Reactors, Rectifiers, Regulators, Testers, Transformers

Local Sales Offices & Reps.
NJ Eatontown, L. Donnelly 201-229-1400
Ohio Dayton, B. Zunke 513-253-8935
Va Arlington, A. Fiedler 703-920-4500

BIRD ELECTRONIC CORP., 30303 Aurora Rd., Solon, Ohio, 44139, Tel: 216-248-1200, TWX: 810-427-2687; FSC No: 70998; Empl.: 185; Minimum order: $5 p. 1•618,619

For info on price: P. Cornell; Customer service: L. Kuklinski; Delivery info: T. Bonsky

Products manufactured: Alarms, Attenuators, Bridges, Calorimeters, Microwave, Connector Adapters, Connectors, Couplers, Detectors, Dummy Loads, Filters, Heat Exchangers & Systems, Meters, Monitors, Probes, Resistors, RFI Measuring Equipment, Switches, Terminals, Testers

Local Distributors
Cal Los Angeles, Henry Radio, 11240 W. Olympic 213-477-6701
NY New York, Barry Elctrns., 512 Broadway 212-925-7000
Pa Trevose, Hamtronics Trevose TV & Elec., 4033 Brownsville 215-357-1400

BIRD, RICHARD H. & CO., INC., 1 Spruce St., Waltham, Mass., 02154, Tel: 617-894-0160; FSC No: 17706; Empl.: 70; Minimum order: $50

Customer service: R. Cameron

Products manufactured: Bearings, Insulators & Insulation, Pins

BIRNBACH CO., INC., 177 Hanse Ave., Freeport, N.Y., 11520, Tel: 516-223-8400; Empl.: 20

Products manufactured: Braid, Cable, Bushings, Glass, Plastic, Metal, Rubber, Etc., Cable, Circuit Breakers, Clamps & Clips, Connectors, Cords, Couplings, Fasteners, Insulators & Insulation, Jack Adapters (All Types), Jacks (All Types), Leads, Test & Adaptors, Pads, Transistor Mounting, Panels, Plug Adapters, Plug & Jack Sets, Plugs, Pointers, Dial, Posts, Probes, Retainers, Socket Adapters, Spacers, Splices, wire (Including, Butt & Cap Types), Switches, Terminal Blocks, Boards & Strips, Terminals, Transistor, Diode, Thyristor Heat Dissipators, Tubing, Wire

Local Sales Offices & Reps.
Fla No. Miami, L. Haas Co. 305-949-9143

BISHOP GRAPHICS, 20450 Plummer St., Chatsworth, Cal., 91311, Tel: 213-993-1000, Telex: 66-2400; Empl.: 70; Minimum order: $15

Customer service: D. Belanger

Free literature available: Bishop Technical Manual and General Catalog - over 84 pages packed with hundreds of time and money-saving tips, plus full details on over 15,000 printed circuit symbols and tapes, light tables, drafting film and vellum.

Products manufactured: Benches, Consoles, Stools, Tables, Boards, Printed Circuit, Drafting Symbols, Dry Transfer, Pressure Sensitive, etc. (Including Lettering), Kits, Printed Circuit, Labels, Pressure-Sensitive, Adhesive, Lenses, Optical & Camera, Tapes, Films & Foils, Pressure Sensitive

Local Sales Offices & Reps.
Cal Irvine, Bishop Graphics Drafting Supply Center 714-979-8952, 213-628-6161
Cal Sunnyvale, Bishop Graphics Drafting Supply Center 408-732-9010

BIVAR, INC., 1617 E. Edinger Ave., Santa Ana, Cal., 92705, Tel: 714-547-5832; Empl.: 7 .... p. 2•1259,1266

Products manufactured: Bushings, Glass, Plastic, Metal, Rubber, Etc., Capacitor, Hardware, Fasteners, Guides, Circuit Board, Handles For Cabinets, Circuit Boards, Racks, etc., Holder & Carriers, Holders, Circuit Board (Production Type), Integrated Circuit Packaging Systems, Pads, Transistor Mounting, Pullers, Racks, Resistor, Hardware, Socket Adapters, Sockets; Spacers, Tubing

Local Sales Offices & Reps.
Ariz Scottsdale, Jack Osborn 602-838-9358
Cal San Diego, Qualtronics Co. 714-560-8955
Cal Santa Clara, L.A. Woods 408-984-7444
Colo Denver, W.J. Purdy Co. 303-777-1411
Fla Winter Park, Young & Lawrence 305-647-6929
Ill Chicago, Kennedy Engrg. 312-631-8283
Iowa Marion, Thomas & Modrcin 319-377-6261
Kans Shawnee Mission, Thomas & Modrcin 913-432-2131
Mass Reading, Kanan Assocs. 617-944-8484
Mich Detroit, Heick & Ralph Assocs. 313-538-3350
Minn Minneapolis, Thurston Assocs. 612-929-7801
Mo Hazelwood, Thomas & Modrcin 314-895-4700
NY Conklin, Comerota Assocs. 607-775-4442
NY Jericho, HRC Comp-Tech 516-832-5550
Ohio Cincinnati, Tri-State Mktg. 513-761-7993
Pa Elkins Park, K.B. Erdman Co. 215-224-1833
Tex Dallas, Elcom Co. 214-352-5006
Wash Seattle, Blum & Assocs. 206-285-2590
EXP: Resea, Cal., Dynatronics International 213-881-8700

BLACK & WEBSTER, INC., 281 Winter St., Waltham, Mass., 02154, Tel: 617-890-9100, TWX: 710-324-1959; Empl.: 60

Customer service: J. Barber

Free literature available: Literature describes electric press type machines for small parts assembly-staking, marking, riveting, swaging, terminal setting, etc. Safety devices for punch presses also presented.

Products manufactured: Machines/Machinery, Production, Tools

BLACKHAWK NETWORKS CORP., 14 N. Parker Dr., Janesville, Wisc., 53545, Tel: 608-752-8701; FSC No: 12724; Empl.: 10

Products manufactured: Filters

Local Sales Offices & Reps.
Ill Chicago, E. Schmeichel Co. 312-524-0307

BLH ELCTRNS., INC., 42 Fourth Ave., Waltham, Mass., 02154, Tel: 617-890-6700, TWX: 710-324-0683; FSC No: 03089; Empl.: 400; Minimum order: $25

For info on price: J. Enman, Ext. 207; Application info: G. Welch, Ext. 388; Customer service: E. Studlien, Ext. 375; Delivery info: Order Services, Ext. 207

Free literature available: General Catalog - 001 - Description and specifications of all BLH Products; including strain gauges and accessories; Load, Pressure, Torque Transducers; Instruments and Systems for stress analysis, process control, Scientific and Test, and Calibration.

Products manufactured: Amplifiers, Bridges, Cells, Load, Gages, Indicators, Recorders, Services, Assembly, Production & Test, Signal Conditioners & Equipment, Testers, Thermocouples, Elements & Accessories, Thermometers, Resistance, Transducers

BLILEY ELECTRIC CO., 2545 W. Grandview Blvd., Erie, Pa., 16512, Tel: 814-838-3571, TWX: 510-696-6886; FSC No: 71034; QPL No: 3098; Empl.: 230; Minimum order: $50 .... p. 1•282,283

For info on price: H. A. Yocum; Application info: F. C. Swartz; Customer service: R. L. Samick; Delivery info: H. A. Yocum

Free literature available: Literature describes our complete product line which includes Quartz Crystals and Related Frequency Control Devices for use in electric equipment as required by various segments (Military and Commercial) of the Electronic Industry.

Products manufactured: Crystal Blanks, Crystals, Delay Lines, Filters, Holders, Crystal, Memory Systems, Mounts, Oscillators, Ovens

Local Sales Offices & Reps.
Cal Los Angeles, Elsner-Rambo Co. 213-664-2928
Conn Meriden, P.R. Sturgeon Co., Inc. 203-237-1112
Fla Maitland, Hutto-Hawkins-Peregoy 305-831-2474
Fla Pompano Beach, Hutto-Hawkins-Peregoy 305-943-9593
Mass Babson Park, P.R. Sturgeon Co. 617-237-3506
NY Buffalo, R.W. Mitscher Co. 716-633-7970
NY Elmont, F. Edwin Schmitt Co. 516-437-8150
NC Raleigh, R.W. Mitscher Co. 919-828-0575
Ore Portland, C.K. Shanks & Assocs. 503-292-5656
Tenn Shelbyville, R.W. Mitscher Co. 615-684-4544
Tex Grand Prairie, Howell Sls., Inc. 214-262-5153
Va Troutville, R.W. Mitscher Co. 804-484-4932
Va Virginia Beach, R.W. Mitscher Co. 804-481-7200
Wash Seattle, C.K. Shanks & Assocs. 206-632-4290
EXP: Plainview, Telesco Int'l. Corp. 516-433-6210
EXP: Stamford, Conn., Dage Corp. 203-324-3123

BLONDER-TONGUE LABS., INC., One Jake Brown Rd., Old Bridge, N.J., 08857, Tel: 201-679-4010; Empl.: 450

For info on price: S. Stone; Application info: R. St. Louis; Customer service: S. Stone; Delivery info: S. Stone

Free literature available: Distributor products catalog MATU professional products catalog

Products manufactured: Amplifiers, Antenna Rotators, Antennas, Attenuators, Boxes, Junction, Outlets & Wall Plates, Bridges, Cabinets & Accessories, Cable, CATV Systems & Equipment, Connector Adapters, Connectors, Converters, Couplers, Detectors, Filters, Generators, Insertion Loss Measurement Systems, Jack Adapters (All Types), Meters, Modulators, All Kinds, Plugs, Power Supplies, Splicers, Coaxial Cable, Switches, Television Systems & Equipment Closed-Circuit, Terminals, Test Equipment, Tools, Transformers

Local Sales Offices & Reps.
Alas Anchorage, H. J. Lang & Assocs 907-279-5741
Ariz Phoenix, Toward Engrg Assoc. 602-955-3193
Cal Los Angeles, Southern: E. N. Strassner Co. 213-666-1511
Cal Redwood City, Northern: Sinai-Johnson 415-365-6263
Colo Denver, R. Bolwen Assocs. 303-744-2501
Fla Port Charlotte, W. F. Hemminger Co. 813-625-6050
Haw Honolulu, G. Piety Factors 808-841-0195
Ill Oak Park, G. Petitt Co. 312-261-0342
Ind Fort Wayne, N. Hoemig Sls Co. 219-747-0828
La New Orleans, Texport Co. 504-486-6073
Mass North Scituate, W. A. Hendrickson Co. 617-545-0652
Mich Brighten, Lectro Sls Co. 313-632-7941
Minn Edina, M. Folster Co. 612-835-2252
Mo Kansas City, Forristal-Young Sls Co. 816-358-6771
Mo St. Louis, Forristal-Young Sls Co. 314-645-2380
NM Albuquerque, C. T. Carlberg & Assocs 505-265-1579
NY Phelps, LSM Assocs Orchard Park 315-548-4891
NY Tuckahoe, L-C-A Sls 914-961-4700
NC Greensboro, Adams & Assocs. 919-272-6838
Ohio Columbus, Weller Elctrn Sls 614-885-7819
Tenn Memphis, Texport Co. 901-683-0880
Tex Dallas, Texport Co. 214-358-3435
Tex Houston, Spivey-LeBoeuf Assocs. 713-649-1221
Tex Richardson, Spivey-LeBoeuf Assocs. 214-231-3190
Utah Salt Lake City, R. Bowen Assocs. 801-299-3920
Wash Seattle, Pacnor Mktg 206-284-8020
EXP: Plainview, N.Y., Morhan Exporting Corp. 516-293-5582
FOR: Can., London, Ont., Telequipment, Ltd. 519-439-8871

BLUE M ELECTRIC CO., 138th & Chatham St., Blue Island, Ill., 60406, Tel: 312-385-9000, TWX: 910-689-3398; Empl.: 250 .... p. 1•468,469

For info on price: H. Mathews; Application info: W. Tranbarger; Customer service: A. Anleitner; Delivery info: H. Mathews

Free literature available: Catalog E-176-192 picturing and describing company's lines of environmental chambers, ovens furnaces and baths, includes complete specifications and performance data.

Products manufactured: Baths, Controlled Temperature (Air & Liquid), Chamber, Environmental Test, Controls/Control Eqpt., Furnaces, Heaters & Heating Elements, Ovens, Programmers, Refrigerators, Environmental Test, Testers

Local Sales Offices & Reps.
Ariz Scottsdale, Blue M Engrg. 602-947-7026
Cal El Monte, Blue M Engrg. 213-442-6672
Cal Sunnyvale, Blue M Engrg. 408-734-8734
Ga Atlanta, Blue M Engrg. 404-237-7644
Mass Framingham, Blue M Engrg. 617-235-8320

Mich Allen Park, Blue M Engrg. 313-381-2123
NY Elmsford, Blue M Equip. Co. 914-592-3883
Ohio Cincinnati, Blue M Engrg. 513-821-6278
Pa Ardmore, Blue M Engrg. 215-649-1448
Tex Garland, Blue M Engrg. 214-272-2509

BLUM, JULIUS & CO., INC., Box 292, Carlstadt, N.J., 07072, Tel: 201-438-4600, TWX: 710-989-0112; Minimum order: $25

Products manufactured: Tubing

BODINE ELECTRIC CO., 2500 W. Bradley Pl., Chicago, Ill., 60618, Tel: 312-IR8-3515, Telex: 25-3646; Empl.: 800; Minimum order: $400 ....p. 1•938

Customer service: M. L. Lindsten

Free literature available: Catalogs: Over 340 stocked motors, gearmotors, and SCR speed/torque controls. 1/2000 thru 1/4 HP. torques .3 Oz-in. thru 342 L6-in. Catalog CDC: Adjustable speed/torque drive systems. Chassis and encased controls for bodine shunt wound and permanent magnet D-C motors and gearmotors

Products manufactured: Controls/Control Eqpt., Motors

Local Sales Offices & Reps.
Cal Los Angeles, C.E. Mello 213-626-9159
Cal Saratoga, E.W. Duemmlein 408-257-0900
Mass Andover, L.R. Cascino 617-470-0050
Mich Grosse Ile, P.S. Miller 313-386-0900
Minn Minneapolis, E.R. Kaye 612-588-2821
Mo Kansas City, Automation Specialties 816-421-6646
NY Buffalo, H. Cardoza 716-834-3377
NY East Syracuse, R.H. Nichols 315-437-2813
NY Massapequa, D.V. Mayorga 516-541-1611
NY Rochester, J.F. Serr 716-586-6226
Ohio Chagrin Falls, D.E. DeWolf 216-543-1591
Ore Portland, D.E. Johnson 503-246-3131
Tex Dallas, General Power Equip. 214-368-4655
Tex Houston, General Power Equip. 713-524-1895
EXP: Ill., Export Dept., Bodine Elec. 312-478-3515

Local Distributors
Ala Mobile, Brownell Electro, Inc., 3450 Armour Dr. 205-479-5405
Cal Antioch, King Bearing, Inc., 109 "I" St. 415-757-4680
Cal Fremont, King Bearing, Inc., 37237 Maple St. 415-797-8552
Cal Fresno, King Bearing, Inc., 2452 S. East Ave. 209-485-7660
Cal Los Angeles, Andrews Hardware, 1610 W. 7th St. at Union 213-HU3-8110
Cal Los Angeles, Minarik Electric Co., 224 East Third St. 213-MA4-3161
Cal Merced, King Bearing, Inc., 847 W. 17th St. 209-722-6218
Cal Modesto, King Bearing, Inc., 2053 Yosemite Blvd. 209-529-2880
Cal Mountain View, King Bearing, Inc., 2133 (A) Leghorn St. 415-968-8316
Cal Oakland, King Bearing, Inc., 541 Julie Ann Way 415-568-6690
Cal Sacramento, King Bearing, Inc., 2779 Del Monte St. 916-372-0790
Cal San Jose, King Bearing, Inc., 1008 S. 2nd St. 408-294-3363
Cal San Leandro, Republic Supply Co., 2025 Pike Ave. 415-EL7-2211
Cal Stockton, King Bearing, Inc., 1350 E. Scotts Ave. 209-464-7661
Cal Tulare, King Bearing, Inc., 360 S. M St. 209-686-4738
Colo Denver, Wazee Electric Co., 2020 W. Barberry Pl. 303-892-7003
Fla Orlando, Brownell Electro, Inc., 307 27th St. 305-843-6770
Ga Hapeville, Brownell Electro, Inc., 3020 Commerce Way 404-762-5181
Ill Chicago, Excel Electric Service Co., 2113 S. Western Ave. 312-VI7-7220
Ill Chicago, Samuel Harris & Co., 114 N. Clinton St. 312-FR2-7272
Ill Rockford, Samuel Harris & Co., 2526 20th St. 815-398-0606
Ill St. Charles, Samuel Harris & Co., 315 Industrial Dr. 312-584-5000
Ill Waukegan, Samuel Harris & Co., 1720 Grand Ave. 312-ON2-0372
La Baton Rouge, Louisiana Bearings, Inc., 2864 Weller Ave. 504-357-0622
La Lake Charles, Behring's Bearing Svc., 1233 3rd St. 318-HE9-9001
Mass Medford, Empire Electrical Co., 54 Mystic Ave. 617-395-5000
Mass Somerville, Electro Sls Co., 100 Fellsway West 617-666-0500
Mich Detroit, Howard Electric Co., 4801 Bellevue Ave. 313-WA3-0430
Minn Minneapolis, Boustead Electric & Mfg., 7135 Madison Ave. W. 612-544-9131
Mo Kansas City, Kronfield-Thorp Elec., 2700 McGee Trafficway 816-BA1-4000
Mo St. Louis, Zeller Electric, Inc., 4250 Hoffmeister Ave. 314-638-9641
NJ Cherry Hill, Motor & Control Sys. Div. of Jos. T. Fewkes & Co., 6 Springdale Road ...609-424-5810
NJ Edison, B & B Motor & Control, 148 U.S. Highway #1 201-420-1466
NY Bingamton, Diehl Binghamton, Inc., 5 Lewis St. 607-772-1760
NY East Syracuse, Diehl Syracuse, Inc., 4413 James St. 315-437-2826
NY N. Y., B & B Motor & Control, 96 Spring St. 212-WO6-5777
NY Rochester, B & B Motor & Control Corp. of Rochester, 3259 Winton Rd. So. 716-473-6640
NC Charlotte, Mize Company, Inc., 513 W. 24th St. 704-ED3-0356
Ohio Cleveland, Reserve Electric Co., 2090 E. 19th St. 216-PR1-5764
Ohio Dayton, Thal Mor Assocs. Inc., 3232 Encrete La. 513-298-9939
Okla Oklahoma City, Dagwell Dixie Co., 816 W. Main St. 405-232-7671
Okla Tulsa, Dagwell Dixie Co., 39 N. Lewis St. 918-932-4231
Ore Portland, Star Machinery Co., 3461 N.W. Yeon Ave. 503-226-3011
Pa Pittsburgh, Braunlich-Roessle Co., 3117-3127 Penn Ave. 412-471-6995
Tenn Memphis, Brownell Electro Inc., 3053 Tranquillity Dr. 901-332-9254
Tenn Nashville, Tennessee Machinery Co., 1133 Polk Ave. 615-242-1742
Tex Baytown, Behring's Bearing Svc., 3307 Market St. 713-583-1911
Tex Beaumont, Behring's Incorporated, 2980 Milam St. 713-TE3-8675
Tex Dallas, Bearing Chain & Supply, 1630 Prudential Dr. 214-ME1-8310
Tex Fort Worth, Bearing Chain & Supply, 217 N. Beach St. 817-TE8-6701
Tex Houston, Behring's Bearing Svc., 1417 Clay At LaBranch 713-CA4-1743
Tex La Marque, Behring's Bearing Svc., 916 Highway 1765 ....713-WE8-8156
Tex Port Arthur, Behring's Incorporated, 1749 7th St. 713-YU5-9333
Tex Tyler, Bearing Chain & Supply, 2500 W. N.W. Loop 323 ....214-LY2-0873
Va Richmond, Industrial Supply Corp., 1905 Westwood Ave. 804-EL5-8041
Wash Seattle, Industrial Electric, 1938 Fairview Ave., E. 206-EA5-3900
Wisc Milwaukee, Trester Service Elec., 3225 N. Pierce St. 414-264-8170
Wisc New Berlin, Electric Sls. & Engrg., 16150 W. Rogers Dr. 414-782-2400
For: Can., Brantford, ON, Renold Canada Ltd., Park Road No. 519-756-6118
For: Can., Edmonton, AB, Renold Canada Ltd., 12253-75th St. 403-474-2431
For: Can., Hampton, NB, Renold Canada Ltd., P.O. Box 180 506-832-5324
For: Can., London, ON, Renold Canada Ltd., 28 Firestone Blvd. 519-453-3420
For: Can., Montreal, PQ, Renold Canada Ltd., 2333 Masson St. 514-527-8701
For: Can., Quebec City, PQ, Renold Canada Ltd., 210 Rue Lee 418-522-2011
For: Can., Rexdale, ON, Renold Canada Ltd., 110 Skyway Ave. 416-741-5732
For: Can., Vancouver, BC, Renold Canada Ltd., 1290 Odlum Dr. 604-255-8455
For: Can., Winnipeg, MB, Renold Canada Ltd., 1302 Notre Dame Ave. 204-772-9541

BODINE CO., 236 Mt. Pleasant Rd., Collierville, Tenn., 38017, Tel: 901-853-7211; Empl.: 30

For info on price: D. Crippen; Application info: R. H. Bodine, Jr.; Customer service: D. Crippen; Delivery info: D. Crippen

Products manufactured: Lighting Equipment, Emergency

Local Sales Offices & Reps.
Cal Los Angeles, E. S. Condon Co. 213-726-7926
Cal San Francisco, Drath-Jacobs 415-467-5642
Colo Denver, Repco-Electro Sls. 303-232-3070
Fla Orlando, Hartman & Assocs. 305-894-4151
Ga Atlanta, J. J. Perry, Jr. 404-237-8239
Haw Honolulu, Pacific Electrical Sls. Agency 808-536-5145
Ill Chicago, Electri-Agency 312-439-5030
Ind Indianapolis, C. M. Buck & Assocs. 317-251-1281
Ky Louisville, Winn-Beck Agency 502-426-1126
La New Orleans, General Manufacturers Agents 504-861-3656
Md Baltimore, A. Daniels 301-752-0982
Mich Detroit, KVA Assocs. 313-892-6000
Minn Minneapolis, Frven & Vedders Sls. 612-922-1642
Miss Jackson, A. Spencer 601-373-5552
Mo Kansas City, B. Andrews Co. 816-931-7196
Mo St. Louis, Consolidated Agencies, Inc. 314-721-1213
NJ Somerville, D. Caughlan & Assocs. 201-725-5623
NY Baldwinsville, R. A. Blann 315-635-6231
NY New York, Mark Sls. Agency 516-221-2995
NC Charlotte, C. Alley Assocs. 704-523-1532
Ohio Cleveland, Verne LaSalle 216-241-3788
Okla Tulsa, Tri-States Sls. Co. 918-836-5342
Pa Pittsburgh, W. G. Cashdollar Assoc. 412-731-7915
Tenn Nashville, Factory Sls. Agency 615-327-9051
Tex Dallas, Lammers-Galvin 214-369-1271
Tex Houston, Lighting & Electrical Sls. 713-923-7781
Tex San Antonio, Hyltin-Ayres 512-828-0624
Wisc Milwaukee, Electric Materials of Wisc. 414-383-0350

BOGEN DIV., Lear Siegler, Inc., Box 500, Paramus, N.J., 07652, Tel: 201-343-5700, TWX: 710-990-5047; Empl.: 332

Free literature available: Six brochures describe Bogen's lines of public address intercoms, telephone-intercoms, school sound consoles, selective radio pocket paging, and pocket paging with voice.

Products manufactured: Amplifiers, Baffles, Speaker, Cases, Equipment, Instrument, Meter, Comm. Systems, Encoders, Microphone Accessories (Including Stands, Holders, Booms), Microphones, All Kinds, Mixers, Public Address Systems, Receivers, Speaker Systems, Speakers, Transformers, Transmitters, Tuners

Local Sales Offices & Reps.
Ala Mobile, Hollingsworth & Still 205-478-8108
Ariz Scottsdale, Marshank Sls. Co. 602-949-9443
Cal Culver City, Marshank Sls. Co. 213-559-2591
Cal Redwood City, Sinai-Johnson 415-365-6263
Cal Sacramento, Sinai-Johnson 916-428-4666
Colo Denver, Ron Bowen & Assocs. 303-744-2501
Fla Umatilla, Hollingsworth & Still 904-669-4738
Ga Atlanta, Hollingsworth & Still Inc. ...404-394-3270
Haw Honolulu, Nylen Brothers 808-538-1171
Ill Chicago, R. R. Hutmacher Assocs. 312-631-3248
Ind Indianapolis, Kingston-Sharkey & Assocs. 317-353-9406
La New Orleans, The Texport Co. 504-486-6073
Md Baltimore, D. H. Brothers Co. 301-764-7189
Mass Wellesley Hills, M. Scott Co. 617-235-0102
Mich Buchanan, Riley & Petchell, Inc. 616-695-6356
Mich Detroit, Riley & Petchell, Inc. 313-535-7000
Minn St. Paul, Skor 612-645-6461
Mo Kansas City, Forristal-Young Sls. Co. 816-358-6771
Mo St. Louis, Forristal-Young Sls. Co. ...314-645-2360
Neb Omaha, Forristal-Young Sls. Co. 402-333-0800
NJ Ridgefield, Bi-State Marketers Inc. 201-943-5888
NM Albuquerque, C.T. Carlberg & Assocs. 505-265-1579
NY Buffalo, Waxman-Currant Sls. Co. 716-873-0442
NC Charlotte, Hollingsworth & Still Inc. 704-536-7047
Ohio Cincinnati, McFadden Sls. Co. 513-825-1224
Ohio Columbus, McFadden Sls. Co. 614-221-3363
Ohio N. Olmstead, Avcom, Inc. 216-777-2060
Okla Tulsa, The Texport Co. 918-939-1727
Ore Salem, Pacnor Mktg. 503-363-6445
Pa Laverock, M. Weinberg Assocs. 215-885-1918
Pa Pittsburgh, F. P. Yarussi Co. 412-221-4676
Tenn Memphis, The Texport Co. 901-683-0880
Tex Austin, Texport Co. 512-928-0096
Tex Houston, The Texport Co. 713-464-2828
Tex Richardson, Texport Co. 214-238-7117
Utah Salt Lake City, R. Bowen & Assocs. 801-363-8801
Wash Seattle, Pacnor Mktg. 206-284-8020
EXP: New York, N.Y., Genex Corp. 212-524-2557

BOKER'S, INC., 3106 Snelling Ave. S, Minneapolis, Minn., 55046

BOONTON ELECTRONICS CORP., Route #287, Parsippany, N.J., 07054, Tel: 201-887-5110, TWX: 710-986-8241; FSC No: 6625; Empl.: 150; Minimum order: $15 .... p. 1•620-625

For info on price: P. Farnsworth Ext. 178; Application info: L. Pokorny Ext. 174; Customer service: P. Farnsworth Ext. 178; Delivery info: P. Farnsworth Ext. 178

Products manufactured: Bridges, Generators, Meters, Semiconductor Wafer Fabrication, Test Systems

Local Sales Offices & Reps.

Ala	Huntsville, J.L. Highsmith, Inc.	205-881-3294
Ariz	Phoenix, Zeus, Inc.	602-253-6104
Cal	North Hollywood, O'Halloran Assoc.	213-877-0173
Cal	Palo Alto, O'Halloran Assoc.	415-326-1493
Cal	San Diego, O'Halloran Assoc.	714-224-2824
Colo	Denver, Zeus, Inc.	303-770-4400
Conn	Hamden, Scientific Devices, Conn.	203-248-9361
Fla	Orlando, J.L. Highsmith, Inc.	305-293-5202
Ill	Chicago, K.W. Meyers Co.	312-774-6440
Ind	Indianapolis, K.W. Meyers Co.	317-243-6681
Kans	Olathe, B. Rush Assoc.	913-782-1177
Md	Silver Spring, Sel-Tronics, Inc.	301-589-3391
Mass	Burlington, R.G. Sickles Assoc.	617-272-7285
Minn	Minneapolis, K.W. Meyers Co.	612-920-7080
NJ	Palisades Park, Scientific Devices East	201-945-3962
NM	Albuquerque, Zeus Inc.	505-268-3941
NY	Rochester, Scientific Devices	716-334-2445
NC	Charlotte, J.L. Highsmith	704-333-7743
Ohio	Centerville, Micro Sales Corporation	513-433-8171
Pa	Melrose Park, R. Meyers Assoc.	215-224-1663
Tex	Dallas, Airep Elctrns. Inc.	214-827-2120
Utah	Salt Lake City, Zeus, Inc.	801-466-4924
Wash	Bellevue, Scientific Devices Northwest	206-454-0900

BORG-WARNER INGERSOLL PRODS., See Ingersoll Prods Div. Borg-Warner

BORG-WARNER THERMOELECTRICS, Dept. Borg-Warner, Wolf & Algonquin Rds., Des Plaines, Ill., 60018, Tel: 312-827-3131; Empl.: 240 .... p. 1•488-491

Products manufactured: Cooling/Heating Modules, Thermoelectric, Heat Exchangers & Systems

Local Sales Offices & Reps.

EXP:	Franklin Park, Ill., Borg-Warner Aerospace Prods. International	312-455-3120

BOSTITCH, Div. of Textron, Inc., Briggs Dr., E. Greenwich, R.I., 02818, Tel: 401-TU 4-2500; Empl.: 2500

Free literature available: Staplers, nailers and fastening systems for industrial and commercial users are described in a 16-page, illustrated BOSTITCH brochure. Specific applications for each tool and system, including Auto-Nailer fastening systems and the BOSS line of forced entry fastening tools are outlined.

Products manufactured: Fasteners, Machines/Machinery, Production

Local Sales Offices & Reps.

Cal	Los Angeles	213-724-0440
Cal	San Francisco	415-648-7200
Ga	Atlanta	404-458-2324
Ill	Northbrook	312-498-6550
Ind	Indianapolis	317-353-2171
Mass	Winchester	617-729-6400
Mich	Farmington	313-477-1200
Mo	Md. Hts.	314-567-6120
NJ	Carlstadt	201-933-8660
NC	Charlotte	704-376-4402
Ohio	Middleburg Heights	216-826-0500
Pa	Montgomeryville	215-643-6200
Tenn	Memphis	901-365-7200
Tex	Dallas	214-631-7580
Wash	Seattle	206-283-6300

BOSTON INSULATED WIRE & CABLE CO., 65 Bay St., Dorchester, Mass., 02125, Tel: 617-265-2102, Telex: 94-0604; FSC No: 71102; Empl.: 200

For info on price: R. Janeway; Customer service: A. Sutkis; Delivery info: R. Janeway

Products manufactured: Cable Assemblies & Harnesses, Cable, Connector Adapters, Connectors, Cords, Wire

Local Sales Offices & Reps.

Cal	Bell, Engr. Ind'l. Prod.	213-588-9161
Cal	Los Angeles, Bos. Ins. W & C Elec. Access. Div.	213-532-9064
Cal	Mill Valley, H.B. Burley III	415-388-2104
Colo	Denver, P. A. Douden Co.	303-744-1497
Conn	Southbury, A. Coscina	617-265-2102
Ga	Atlanta, Hardcastle & Rhyne	404-261-4540
Ga	Tallapoosa, W. Bridges	404-574-2060
Ill	Chicago, Brisky Assocs.	312-597-7890
Ill	Hinsdale, T. Russell	312-641-1045
Kans	Shawnee Mission, Lowell-Kangas & Assocs., Inc.	913-631-3515
La	New Orleans, Case Sls. Co.	504-835-7713
La	New Orleans, Mid-South Sls. Co.	502-822-3030
Md	Columbia, W. Hill	301-752-3558
Mass	North Attleboro, W. Conroy	617-265-2102
Mich	Royal Oak, M. McAuliffe Sls.	313-545-7177
Minn	Minneapolis, C. E. Bohlig Co.	612-922-7011
Mo	St. Louis, Lowell-Kangas & Assocs., Inc.	314-821-4050
NJ	Cherry Hill, J. Schindell Assocs.	609-424-1441
NM	Albuquerque, Sealect Technology, Inc.	505-299-1137
NY	Pittsford, NoCo, Inc.	716-461-4750
NC	Charlotte, Power Engrg. Co.	705-537-8099
Ohio	Chagrin Falls, F. Gunther	216-247-5823
Pa	Ambridge, R. R. Meinert Co.	412-931-6627
Tenn	Knoxville, Engr. Prod. Co.	615-588-3312
Tenn	Memphis, Engr. Prods. Co.	901-327-6622
Tex	Houston, C. A. Richards & Assocs.	713-522-7987
Wash	Seattle, Datacom Assocs.	206-285-2525
FOR:	Can., Hamilton, Ont., Boston Insulated Wire & Cable Co., Ltd.	416-529-7151
FOR:	Can., Montreal 2, Quebec, Boston Insulated Wire & Cable Co., Ltd.	514-866-7151

BOURNS, INC., Instr. Div., 6135 Magnolia, Riverside, Calif., 92506, Tel: 714-684-1700, TWX: 910-332-6103; Empl.: 250

Customer service: J. Pancake

Products manufactured: Accelerometers, Gages, Potentiometers, Resistors, Switches, Transducers, Transformers

Local Sales Offices & Reps.

Aerospace

Ala	Huntsville, Kemp Instrs., Inc.	205-837-4304
Cal	Hayward, Avionics Liaison, Inc.	415-783-1131
Cal	San Diego, L.L. Stoakes Inc.	714-274-6281
Colo	Arvada, Cleveland Entprs.	303-423-3707
Fla	Orlando, Truex Assocs., Inc.	305-859-2160
Iowa	Cedar Rapids, Tech. Reps., Inc.	319-363-2489
Md	Gaithersburg, Wright Co.	301-948-5151
Mass	Natick, Andruss-Peskin Corp.	617-653-3919
Mich	Farmington, Carter, McCormic & Peirce	313-477-7700
Mich	Kalamazoo, Carter, McCormic & Peirce Inc.	616-349-9666
Minn	Minneapolis, Furber Sls. Co.	612-861-1518
Mo	Hazelwood, Tech. Reps., Inc.	314-731-5200
Mo	Independence, Technical Representatives	816-737-1414
NM	Albuquerque, Cleveland Entprs.	505-345-2481
NY	Fayetteville, H. C. Johnson Agency, Inc.	315-637-9383
NY	Guilderland, H.C. Johnson Agency, Inc.	518-456-9681
NY	Melville, Astrorep, Inc.	516-423-2266
NY	Rochester, H. C. Johnson Agency, Inc.	716-482-3000
NY	Williamsville, H. C. Johnson Agency, Inc.	716-632-7880
Ohio	Cleveland, Carter McCormic & Peirce	216-333-5650
Ohio	Dayton, Carter McCormic & Peirce	513-278-5873
Ohio	Worthington, Carter McCormic & Peirce	614-888-4466
Okla	Tulsa, Kemp Engrg. Co.	918-299-2636
Pa	Glenshaw, H. C. Johnson Agency, Inc.	412-961-0414
Pa	Jenkintown, PDC Corp.	215-887-9610
Tex	Addison, Kemp Engrg. Co.	214-661-0400
Tex	Houston, Kemp Engrg. Co.	713-688-1431

Industrial

Ala	Huntsville, Kemp Instrs., Inc.	205-837-4304
Cal	Foster City, Featherstone Assocs.	415-341-1617
Cal	San Diego, L.L. Stoakes Inc.	714-274-6281
Colo	Arvada, Cleveland Entprs.	303-423-3707
Fla	Orlando, Milne Assocs.	305-855-1533
Ill	Schaumburg, Carvel Engrg.	312-882-6088
La	Harvey, Bourns, Inc.	504-362-2043
Md	Gaithersburg, Wright Co.	301-948-5151
Mass	Natick, Andruss-Peskin Corp.	617-653-3919
Mich	Farmington, Carter, McCormic & Peirce	313-477-7700
Mich	Kalamazoo, Carter, McCormic & Peirce Inc.	616-349-9666
Mo	Hazelwood, Tech. Reps., Inc.	314-731-5200
Mo	Independence, Technical Representatives	816-737-1414
NJ	Stirling, NBS Assocs.	201-464-8500
NM	Albuquerque, Cleveland Entprs.	505-298-7671
NY	Fayetteville, H. C. Johnson Agency, Inc.	315-637-9383
NY	Guilderland, H.C. Johnson Agency, Inc.	518-456-9681
NY	Rochester, H. C. Johnson Agency, Inc.	716-482-3000
NY	Williamsville, H. C. Johnson Agency, Inc.	716-632-7880
Ohio	Cleveland, Carter McCormic & Peirce	216-333-5650
Ohio	Dayton, Carter McCormic & Peirce	513-278-5873
Ohio	Worthington, Carter McCormic & Peirce	614-888-4466
Okla	Tulsa, Kemp Engrg. Co.	918-299-2636
Ore	Portland, Brett Assocs., Inc.	503-232-4184
Pa	Glenshaw, H. C. Johnson Agency, Inc.	412-961-0414
Pa	Glenside, Elcom, Inc.	215-885-1325
Tex	Addison, Kemp Engrg. Co.	214-661-0400
Tex	Houston, Kemp Engrg. Co.	713-688-1431
Wash	Seattle, Brett Assocs., Inc.	206-935-8054

BOURNS, INC., Trimpot Prods. Div., 1200 Columbia Ave., Riverside, Cal., 92507, Tel: 714-684-1700, TWX: 910-332-1252; Empl.: 4000 .... p. 2•1420,1623-1626

Customer service: Appl. Eng.

Free literature available: Short-Form Catalog - All Products, Panel Potentiomenter Brochure, Resistor Networks Brochure, Custom Precision Potentiometer Brochure, Trimpot Digest (Application Periodical)

Products manufactured: Dials, Networks, Potentiometers, Resistors

Local Sales Offices & Reps.

Ala	Huntsville, Beacon Elctrns.	205-881-5031
Ariz	Phoenix, Shefler-Kahn Co.	602-258-7893
Cal	Long Beach, Bourns, Inc.	213-774-8000
Cal	Palo Alto, Quad Rep.	415-964-3532
Cal	San Leandro, Quad Rep.	415-352-5942
Colo	Denver, Parker Webster	303-770-1972
Fla	Clearwater, Dyne-A-Mark	813-441-4702
Fla	Ft. Lauderdale, Dyne-A-Mark	305-771-6501
Fla	Orlando, Dyne-A-Mark	305-299-6303
Ga	Atlanta, Beacon Elctrns. Assoc.	404-351-3654
Ill	Chicago, D. Dolin Sls.	312-286-6200
Ill	Southern, Centech	816-358-8100
Ind	Ft. Wayne, G&D Electrn. Sls.	219-432-5586
Md	Glen Burnie, Micro-Comp., Inc.	301-761-4600
Mass	Hingham, Bourns, Inc.	617-749-5800
Mich	Detroit, Rathsburg Assoc.	313-882-1717
Minn	Edina, Mel Foster Co., Inc.	612-835-2252
Mo	Hazelwood, Centech	314-731-4220
Mo	Raytown, Centech	816-358-8100
NJ	Haddonfield, Thomas Assoc.	609-854-3011
NM	Albuquerque, A.Q. Elctrns.	505-255-8701
NY	Ithaca, B. Dean, Inc.	607-272-2187
NY	Melville, Bourns, Inc.	516-271-3500
Ohio	Dayton, Bear Mktg.	513-299-3566
Ohio	Richfield, Bear Mktg	216-659-3131
Ore	Portland, J.J. Backer Co.	503-297-3776
Ore	Salem, J.J. Backer Co.	503-362-0717
Pa	Enon Valley, Nebco Assocs.	216-457-2333
Pa	Philadelphia, Thomas Assoc.	215-627-6615
SC	Spartanburg, Beacon Elctrns.	803-582-4613
Tex	Dallas, Allied Comps., Inc.	214-238-0408
Tex	El Paso, A.Q. Elctrns.	915-545-2363
Tex	Houston, Allied Components	713-691-3961
Wash	Seattle, J. J. Backer Co.	206-285-1300
FOR:	Can., Downsview, Ont., Kaytronics, Ltd.	416-638-5511
FOR:	Can., Montreal, Que., Kaytronics, Ltd.	514-487-3434
FOR:	Can., Vancouver, B.C., L.A. Varah, Ltd.	604-873-3211

Local Distributors

Ala	Huntsville, Cramer/E.W., 2310 Bob Wallace Ave., S.W.	205-539-5722
Ala	Huntsville, Hamilton/Avnet Elctrns., 805 Oster Dr., N.W.	205-533-1170
Ariz	Phoenix, Hamilton/Avnet, 2615 So. 21st St.	602-275-7851
Ariz	Phoenix, Kierulff Elctrns., 2633 E. Buckeye Rd.	602-273-7331
Cal	Chatsworth, Westates Elctrns. Corp., 20151 Bahama St.	213-341-4411
Cal	Culver City, Hamilton Electro Sls., 10912 W. Washington Blvd.	213-558-2121
Cal	Irvine, Cramer/Los Angeles, 17201 Daimler St.	213-771-8300
Cal	Mountain View, Hamilton/Avnet, 575 E. Middlefield Rd.	415-961-7000
Cal	Palo Alto, Kierulff Elctrns., 3969 E. Bayshore Rd.	415-968-6292
Cal	Riverside, Elctrn. Supp. Corp., 2486 Third St.	714-683-7300

Cal	San Diego, Cramer/San Diego, 8975 Complex Dr.	714-565-1881
Cal	San Diego, Hamilton/Avnet, 8917 Complex Dr.	714-279-2421
Cal	Sunnyvale, Cramer/San Francisco, 720 Palomar	408-739-3011
Colo	Denver, Cramer/Denver, 5465 E. Evans Pl.	303-758-2100
Colo	Denver, Hamilton/Avnet, 5921 N. Broadway	303-534-1212
Colo	Denver, Kierulff Elctrns., 10890 E. 47th Ave.	303-371-6500
Conn	Georgetown, Hamilton/Avnet, 643 Danbury Rd.	203-762-0361
Conn	Hamden, Wilshire Elctrns., 2554 State St.	203-281-1166
Conn	North Haven, Cramer Elctrns., 35 Dodge Ave.	203-239-5641
Conn	Norwalk, Harvey Elctrns., 112 Main St.	203-853-1515
Fla	Hollywood, Cramer/E.W., 4035 N. 29th Ave.	305-923-8181
Fla	Hollywood, Hamilton/Avnet, 4020 N. 29th Ave.	305-925-5401
Fla	Orlando, Cramer/E.W., 345 N. Graham Ave.	305-894-1511
Fla	Orlando, Hammond Elctrns., 911 W. Central Blvd.	305-849-6060
Ga	Atlanta, Cramer/E.W., 3923 Oakcliff Ind'l. Ct.	404-448-9050
Ga	Norcross, Hamilton/Avnet, 6700 1-85, Suite 2B	404-448-0800
Ill	Chicago, Newark Elctrns. Corp., 500 N. Pulaski Rd.	312-638-4411
Ill	Mt. Prospect, Cramer Elctrns., 1911 S. Busse Rd.	312-593-8230
Ill	Schiller Park, Hamilton/Avnet, 3901 N. 25th Ave.	312-678-6310
Ind	Fort Wayne, Fort Wayne Elctrns. Supply, 3606 Maumee Ave.	219-423-3422
Ind	Indianapolis, Graham Elctrns. Supp., 133 S. Pennsylvania St.	317-634-8486
Ind	Indianapolis, Pioneer/Indiana, 6408 Castleplace Dr.	317-849-7300
Kans	Lenexa, Hamilton/Avnet, 37 Lexena Ind'l. Ctr.	913-888-8900
La	Lafayette, Ralph's of Lafayette, 3004 Cameron	318-234-4507
Md	Gaithersburg, Cramer/E.W., 16021 Ind'l. Dr.	301-948-0110
Md	Gaithersburg, Pioneer/Washington Elctrns., 9100 Gaither Rd.	301-948-0710
Md	Hanover, Cramer/Baltimore, 7255 Standard Dr.	301-796-5790
Md	Hanover, Hamilton/Avnet, 7255 Standard Dr.	301-796-5000
Mass	Burlington, Hamilton/Avnet Elctrns., 185 Cambridge St.	617-273-2120
Mass	Burlington, Wilshire Elctrns./New England, One Wilshire Rd.	617-272-8200
Mass	Newton, Cramer Elctrns., 85 Wells Ave.	617-969-7700
Mich	Livonia, Hamilton/Avnet, 12870 Farmington Rd.	313-522-4700
Mich	Livonia, Pioneer/Michigan, 13485 Stamford	313-525-1800
Minn	Edina, Cramer/Bonn Co., 7275 Bush Lake Rd.	612-835-7811
Minn	Edina, Hamilton/Avnet, 7683 Washington Ave. S.	612-941-3801
Minn	Minneapolis, Newark Elctrns., 336 Hoover St., N.E.	612-331-6350
Mo	Hazelwood, Hamilton/Avnet, 364 Brookes La.	314-731-1144
NJ	Cedar Grove, Hamilton/Avnet, 218 Little Falls Rd.	201-239-0800
NJ	Cinnaminson, Wilshire Elctrns., 855 Ind'l. Hwy., Unit 5	215-627-1920
NJ	Clifton, Wilshire Elctrns., 312 Clifton Ave.	201-365-2600
NJ	Moonachie, Cramer Elctrns., 1 Barrett Ave.	201-935-5600
NJ	Mount Laurel, Hamilton/Avnet, 113 Gaither Dr., E. Gate Ind'l. Pk.	609-234-2133
NJ	Somerset, Schweber Elctrns., 43 Belmont Dr.	201-469-6008
NM	Albuquerque, Cramer/New Mexico, 137 Vermont, N.E.	505-265-5767
NM	Albuquerque, Elctrn. Parts Co., 2620 Rhode Island, N.E.	505-293-6161
NM	Albuquerque, Hamilton/Avnet Elctrns., 2450 Baylor Dr., S.E.	505-765-1500
NY	Binghamton, Harvey Elctrns., Box 1208	607-748-8211
NY	Buffalo, Standard Elctrns., 3519 Union Rd.	716-685-4220
NY	E. Syracuse, Cramer/Eastern, 6716 Joy Rd.	315-437-6671
NY	E. Syracuse, Hamilton/Avnet, 6500 Joy Rd.	315-437-2641
NY	Endwell, Cramer/Binghamton, 3220 Watson Blvd.	607-754-6661
NY	Hauppauge, Cramer/Esco, 29 Oser Ave.	516-231-5600
NY	Rochester, Cramer, E.W., 3000 S. Winton Rd.	716-275-0300
NY	Rochester, Hamilton/Avnet Elctrns., 167 Clay Rd.	716-442-7820
NY	Westbury, Hamilton/Avnet, 70 State St.	516-333-5800
NY	Westbury, Schweber Elctrns., Jericho Tpke.	516-334-7474
NY	Woodbury, Harvey Elctrns., 60 Crossways Pk. W.	516-921-8700
NC	Winston-Salem, Cramer/E.W., 938 Burke St.	919-725-8711
Ohio	Cincinnati, Hughes-Peters, 4865 Duck Creek Rd.	513-351-2000
Ohio	Cleveland, Hamilton/Avnet Elctrns., 761 Beta Dr.	216-461-1400
Ohio	Cleveland, Pioneer Standard Elctrns., 4800 E. 131 St.	216-587-3600
Ohio	Columbus, Hughes-Peters, 481 E. 11th Ave.	614-294-5351
Ohio	Dayton, Hamilton/Avnet Elctrns., 118 Westpark Rd.	513-433-0610
Ohio	Dayton, Pioneer-Dayton, 1900 Troy St.	513-236-9900
Pa	Montgomery, Pyttronic Inds., Stump Rd.	215-643-2850
Pa	Pittsburgh, Cameradio Elctrns., 2801 Liberty Ave.	412-288-2600
Pa	Pittsburgh, Pioneer/Pittsburgh, 560 Alpha Dr.	412-782-2300
RI	Providence, Wm. Dandreta & Co., 28 Wolcott St.	401-861-2800
Tex	Dallas, Cramer Elctrns., 13740 Midway Rd.	214-350-1355
Tex	Dallas, Hamilton/Avnet, 4445 Sigma Rd.	214-661-8661
Tex	Ft. Worth, Allied Elctrns., 401 E. 8th St.	817-336-5401
Tex	Houston, Hamilton/Avnet, 1216 W. Clay St.	713-526-4661
Tex	Houston, Harrison Equip. Co., Box 3268, 1616 McGowen St.	713-224-9131
Utah	Salt Lake City, Cramer/Utah, 391 W. 2500 S.	801-487-4131
Utah	Salt Lake City, Hamilton/Avnet, 647 W. Billinis Rd.	801-262-8451
Wash	Bellevue, Hamilton/Avnet, 13407 Northrup Way	206-746-8750
Wash	Seattle, Cramer/Seattle, 5602 Sixth Ave. S.	206-762-5755
Wisc	Mequon, Taylor Elec. Co., 1000 W. Donges Bay Rd.	414-241-4321
Wisc	Oak Creek, Cramer/Wisconsin, 430 W. Rawson Ave.	414-764-1700
For:	Can., Downsview, Ont., Cramer Elctrns. Can., Ltd., 920 Alness St., Unit 9	416-661-9222
For:	Can., Mississauga, Ont., Hamilton/Avnet, 6291-19 Dorman Rd.	416-677-7432
For:	Can., Ottawa, Ont., Hamilton/Avnet, 880 Lady Ellen Pl.	613-725-3071
For:	Can., St. Laurent, Que., Hamilton/Avnet, 2670 Paulus	514-331-6443
For:	Can., Toronto 19, Ont., Zentronics Ltd., 185 Bridgeland Ave.	416-789-5111
For:	Can., Vancouver 10, B.C., L.A. Varah Ltd., 2077 Alberta St.	604-873-3211

BOURNS PACIFIC MAGNETIC CORP., Div. Bourns, Inc., Box 1398, Romoland, Cal., 92380, Tel: 714-657-5195, Telex: 67-6446; Empl.: 120; Minimum order: $35 .... p. 1•443; p. 2•381,1732,1733

For info on price: R.F. Miller; Application info: R.F. Miller; Customer service: L. Hall; Delivery info: L. Hall

Products manufactured: Chokes, Coils Including Assemblies & Forms, Delay Lines, Transducers, Transformers

Local Sales Offices & Reps.

Ala	Huntsville, Twentieth Century Mktg., Inc.	205-772-9237
Ariz	Scottsdale, De Angelo, Rothman & Cheever, Inc.	602-948-2240
Cal	Encino, H. Stein	213-986-2016
Cal	Mountain View, Tri-Rep	415-965-1822
Fla	Oviedo, Conley Assocs., Inc.	305-365-3283
Ind	Southbend, Valentine-Schillinger & Assocs.	219-291-6258
Mass	Concord, Bourns Pacific Magnetic Corp.	617-369-6249
Mass	Reading, Kanan Assocs.	617-944-8484
Minn	Edina, M. Foster Co.	612-941-7600
NJ	Long Branch, Bourns Pacific Magnetics Corp.	201-229-5317
NM	Albuquerque, Tri-Tronix	505-265-0172
NY	Huntington Station, Addem 1	516-567-5900
NY	Syracuse, Electra Sls. Corp.	315-455-5783
Ohio	Richfield, N. Bear Mktg.	216-659-3131
Ore	Beaverton, Arneson Assocs.	503-643-5754
SC	Myrtle Beach, Candor Co., Inc.	803-448-5213
Tex	Dallas, Bourns Pacific Magnetics Corp.	214-272-1443
Wash	Seattle, Arneson Assocs.	206-762-7664

BOW SOLDER PRODUCTS, 25 Amsterdam St., Newark, N.J., 07105, Tel: 201-589-2266; Empl.: 25; Minimum order: $100

For info on price: J. Buccine; Customer service: S. Turkus; Delivery info: W. Walzer

Free literature available: Six page catalog showing various types of solders and fluxes available. Technical data and specifications are included.

Products manufactured: Flux, Brazing & Soldering Materials, Solder (All Types)

BOWMAN ELECTRICAL PRODS. CORP., 108 N. Jefferson St., Chicago, Ill., 60606, Tel: 312-372-8556; Empl.: 55

For info on price: J. Swimmer; Application info: S. Rubin; Customer service: M. Mindel; Delivery info: S. Sylan

Free literature available: Descriptive Literature of three models of permanent magnet synchroneous timing motors showing specifications including standard speeds from 1 RPM to 60 RPM.

Products manufactured: Motors

BOWMAR/ALI, INC., Sub. Bowmar Instr. Corp., 531 Main St., Acton, Mass., 01720, Tel: 617-263-8365, TWX: 710-347-1400; Empl.: 600

Customer service: Sls. Dept.

Products manufactured: Analyzers, Calculators, Electrical & Electronic, Clutches, Couplings, Drives & Drive Mechanisms (Dial), Equalizers, Filters, Generators, Limit Stops, Mechanical, Locks, Dial & Shaft, Meters, Telephone Channel Test & Simulator Equipment, Testers

BOWMAR INSTR. CORP., 8000 Bluffton Rd., Ft. Wayne, Ind., 46809, Tel: 219-747-3121, TWX: 810-332-1510; Empl.: 500; Minimum order: $100

For info on price: E. H. Koors X 326; Application info: Prod Mgr; Customer service: Cust Svc Mgr; Delivery info: Prod Mgr

Products manufactured: Actuators, Calculators, Electrical & Electronic, Computers, Controls/Control Eqpt., Counters, Display Devices/Displays, Gearheads & Speed Reducers, Gears & Gear Mechanisms (Precision), Keyboards, Alphanumeric & Decimal, Motors, Printers, Repeaters, Servo, Switches

Local Sales Offices & Reps.

Ala	Huntsville, 20th Century Mktg.	205-772-9237
Ariz	Phoenix, Sheffler-Kahn	602-258-7893
Cal	Chatsworth, Nippon Miniature Bearing Corp.	213-882-4478
Cal	Costa Mesa, Bowmar Instr. Corp.	714-979-7707
Cal	Dublin, Airsupply Co.	415-829-0870
Cal	Santa Monica, Airsupply Co.	213-871-0520
Colo	Denver, Sheffler-Kahn	303-623-1567
Conn	Suffield, T.P. Dunn Assocs.	203-668-0446
Fla	Clearwater, Saber Assoc.	813-441-1301
Fla	Lighthouse Point, Saber Assocs.	305-943-3076
Fla	Longwood, Saber Assocs.	305-422-3686
Ga	Smyrna, Spartech, Inc.	404-432-3644
Ill	Park Ridge, Probe Elect.	312-696-2828
Ind	Fort Wayne, J & B Engrg. Sls. Co.	219-483-2813
Mass	Medway, Gallager Sls. Co.	617-533-7292
Mass	Waltham, Impact Sls. Co.	617-893-2850
Mich	Farmington Hills, H. Lowell Co.	313-851-7474
Mo	St. Charles, Bowmar Instr. Corp.	314-724-7335
NJ	Livingston, Graydon-Sherman, Inc.	201-994-9055
NJ	Matawan, Bowmar Instr. Corp.	201-526-0400
NY	Clinton, Airsupply Co.	315-735-8341
NY	Fayetteville, Graydon-Sherman	315-637-9861
NY	Great Neck, ERA, Inc.	516-822-9890
NY	Pittsford, Graydon-Saerman	315-637-9861
Ohio	Dayton, Whelan Corp.	513-434-7551
Okla	Oklahoma City, Ammon & Rizos	405-373-2748
Tex	Dallas, Ammon & Rizos	214-233-5591
Tex	Houston, Ammon & Rizos	713-729-1233
Wash	Bellevue, Airsupply Co.	206-454-7922

BOWMAR/TIC, INC., 850 Lawrence Dr., Newbury Park, Calif., 91320, Tel: 805-498-2161, TWX: 910-336-1265; Empl.: 200

Customer service: D.W. Gustafson

Free literature available: General precision potentiometer catalog entitled "Upgrade Your System With Our Pots".

Products manufactured: Brakes, Clutches, Potentiometers, Switches, Timers, Transducers, Tubes

Local Sales Offices & Reps.

Cal	Van Nuys, Cardinal Assoc.	213-787-5511
Conn	Suffield, Terrance Dunn & Assoc.	203-668-0446
Ga	Smyrna, Spartech Assoc.	404-432-3644
Ill	Park Ridge, Probe Elctrns.	312-696-2828
Ind	Ft. Wayne, J & B Engrg. Sls.	219-483-2813
Mass	Medway, J. Gallagher Sls.	617-533-7292
Minn	Minnetonka, T.H. Ayre Assoc.	612-474-4125
NY	Buffalo, R.A. Murray Co.	716-632-6913
NY	Plainview, ERA	516-822-9890
Tex	Dallas, Brice Co.	214-233-9808

BRADY CO., W. H., 2221 W. Camden Rd., Milwaukee, Wis., 53201, Tel: 414-332-8100; Minimum order: $30

For info on price: J. Kaiser; Application info: K. Von Sleet; Customer service: J. Young

Products manufactured: Drafting Symbols, Dry Transfer, Pressure Sensitive, etc. (Including Lettering), Heat Guns, Production, Kits, Marking (Dial, Instrument, Equipment, etc.), Labels, Pressure-Sensitive, Adhesive, Machines/Machinery, Production, Nameplates, Switches, Tapes, Films & Foils, Pressure Sensitive, Testers, Tubing, Wire Markers

Local Sales Offices & Reps.

Cal	Redondo Beach	213-373-6869
Cal	San Francisco	415-574-5822
Cal	San Mateo	415-574-5822
Colo	Denver	303-455-6232
Conn	Hartford	203-247-1283
Fla	Tampa	404-636-5581
Ga	Atlanta	404-636-5581
Ill	Chicago	312-827-6108
Ind	Indianapolis	317-545-5500
Kans	Kansas City	816-363-4133
Mass	Waltham	617-893-8390
Mich	Birmingham	313-642-6643
Minn	Minneapolis	612-926-4666
Mo	St. Louis	314-535-3406
NJ	Maplewood	201-763-7274
NY	Huntington	516-433-6088
NY	Rochester	716-442-8857
NC	Charlotte	704-333-0928
Ohio	Chagrin Falls	216-382-5090
Pa	King of Prussia	215-337-1275
Pa	Pittsburgh	412-766-0555
Tenn	Memphis	901-452-2640
Tex	Dallas	214-363-3710
Wash	Medina	206-455-1177
Wisc	Milwaukee	414-332-8100

BRAILSFORD & CO., 670 Milton Rd., Rye, N.Y., 10580, Tel: 914-967-1820; Empl.: 20; Minimum order: $10

For info on price: R.E. Drummond; Application info: R.E. Drummond; Customer service: R.E. Drummond; Delivery info: D.G. Kelly

Free literature available: Brushless D.C. Miniature Axial Fans: Brushless D.C. Miniature Centrifugal Blowers; Brushless D.C. Miniature Diaphragm Pumps, Vacuum or Pressure; Sequence Timers, Low Current D.C., Governed & Nongoverned.

Products manufactured: Blowers & Fans & Accessories, Motors, Pumps, Vacuum, Timers

BRAM METALLURGICAL-CHEM. CO., 245 W. Chelten Ave., Phila., Pa., 19144, Tel: 215-GE 8-4900; Empl.: 2; Minimum order: $50

For info on price: H. H. Bram; Application info: T. G. Bram; Customer service: H. H. Bram; Delivery info: T. G. Bram

Free literature available: "High Purity Metals" card.

Products manufactured: Alloys, Bi-Metals, Thermostatic, Crystals, Foil, Metal Compounds, Foils, Powders, Sheet, Stock, Metals, Quartz, Fused, Services, Assembly, Production & Test, Silica, Fused, Tubing, Wire

BRAMCO CONTROLS DIV., Ledex, Inc., College & South Sts., Piqua, Ohio, 45356, Tel: 513-773-8271; Empl.: 75; Minimum order: $49

For info on price: J. Market; Application info: J. Market; Customer service: A. Burnett; Delivery info: A. Burnett

Free literature available: Catalog 240, Auto-Connect, Radio-Telephone Interconnect, *Catalog 260, Control Head, Mobile Radiotelephone Control Head, Catalog 505, Selective Call, Catalog 512, Identifier System, (ANI) Automatic Number I.D., Catalog 606, 4020, AM Tone Telemetry Sys., Catalog 650, Series 5500 Digital Telemetry Sys. Catalog 750 FSK System

Products manufactured: Alarms, Annunciators, Comm. Systems, Controls/Control Eqpt., Decoders, Detectors, Encoders, Filters, Generators, Monitors, Multiplexers, Oscillators, Receivers, Relays, Standards, Transmission Systems, Data, Transmitters, Transponders

Local Sales Offices & Reps.

Cal	Burbank, RTS Comms.	213-843-3111
Cal	Santa Clara, RTS Comms.	408-247-2310
Conn	Trumbull, SIR Assocs.	203-268-2560
Fla	Orlando, Data Rep. Inc.	305-843-5224
Ill	Arlington Hts., Reshal Assocs.	312-398-7660
Ill	La Grange Park, Bierhaus Sls., Inc.	312-354-5100
Kans	Shawnee Mission, Technical Sls. Assoc.	913-888-3330
Mass	Lexington, SIR Assocs.	617-862-1812
Mich	Lathrup Village, R.C. Nordstrom & Co.	313-559-7373
Minn	Minnetonka, T.H. Ayre Assocs.	612-474-4125
NY	Liverpool, Lewis & Dunnigan Co.	315-622-2133
NY	Oceanside, Bittan Assocs.	516-678-6222
NC	Raleigh, A.B. Andrews & Co.	919-833-5565
Ohio	Dayton, Dynel Co.	513-434-6467
Pa	Philadelphia, V. S. Malta	215-836-5122
Pa	Pittsburg, R.F. Clark Co.	412-242-9500
Tex	Dallas, Elcom	214-352-5006
Wisc	Milwaukee, Bierhaus Sls., Inc.	414-332-0900
EXP:	Dayton, Ohio, Int'l. Sls. Div., Ledex, Inc.	513-224-9891
FOR:	Can., Richmond, B.C., Lake Engrg. Co. Ltd.	604-277-0414
FOR:	Can., Scarborough, Ont., Lake Engrg. Co. Ltd.	416-751-5980
FOR:	Can., St. Laurent 381, Que., Lake Engrg. Co. Ltd.	514-747-2441

BRAND DIELECTRICS, INC., Route 203, N. Windham, Conn., 06256, Tel: 203-423-6321; Empl.: 5

Products manufactured: Compounds, Encapsulating, Insulating, Molding, Potting, Insulators & Insulation, Tapes, Electrical Insulation, Tubing

BRAND-REX CO., Box 498, Willimantic, Conn., 06226, Tel: 203-423-7771; FSC No: 71124; Empl.: 1000; Minimum order: $100

Products manufactured: Cable, Insulators & Insulation, Tubing, Wire

Local Sales Offices & Reps.

Alas	Anchorage, Rostel Co.	907-344-9247
Cal	Santa Ana, Brand-Rex Co.	714-540-7806
Cal	Sunnyvale, Brand-Rex Co.	408-245-3564
Colo	Denver, Brand-Rex Co.	303-759-2751
Fla	Tampa, Brand-Rex Co.	813-876-4632
Ga	Atlanta, Brand-Rex Co.	404-394-9416
Ga	Roswell, E. Rushin Co.	404-993-6498
Ill	Glenview, Brand-Rex Co.	312-729-5600
Ind	Indianapolis, Brand-Rex Co.	317-844-2860
Iowa	Des Moines, KSW Assocs.	515-279-9235
La	Metairie, Aneson Assocs.	504-835-6445
Md	Baltimore, J.A. Maguire & Co.	301-377-0223
Mass	Clinton, Brand-Rex Co.	617-368-8234
Minn	Hopkins, Grayden & Flemmer	612-941-1120
Mo	Kansas City, KSW Assocs.	816-358-5240
Mo	St. Louis, KSW Assocs.	314-781-6111
NJ	Pennsauken, J.A. Maguire & Co.	609-665-5136
NJ	Plainfield, J.A. Maguire & Co.	201-754-6400
NY	Rhinebeck, Brand-Rex Co.	914-297-6296
Ohio	Aurora, Clark Sls. Co.	216-543-5656
Ore	Portland, Brand-Rex Co.	503-292-9189
Pa	Pittsburgh, Brand-Rex Co.	412-371-3290
SC	Greenwood, H. Reynolds	803-229-6801
Tex	Addison, Parvin Sls. Co.	214-239-9148
Tex	Houston, Parvin Sls. Co.	713-721-1054
Wisc	Brookfield, Brand-Rex Co.	414-392-2141

BRANSON CORP., Vanderhoff Ave., Denville, N.J., 07834, Tel: 201-625-0600, TWX: 710-987-8466; FSC No: 99928; Empl.: 40; Minimum order: $25

Customer service: J. Witzler

Free literature available: Complete catalog with applications data & QPL listings

Products manufactured: Relays, Sockets, Switches

Local Sales Offices & Reps.

Fla	Orlando, Perrott Assoc. Inc.	305-275-1132
Kans	Prairie Village, Engrg. Svcs. Co.	913-649-4000
Mo	St. Louis, Engrg. Svcs. Co.	314-726-2233
Ohio	Columbus, T. Mulligan & Assoc.	614-457-2242

BRANSON CLEANING EQUIP. CO., Parrott Dr., Shelton, Conn., 06484, Tel: 203-929-7301, TWX: 710-474-0893; Empl.: 300; Minimum order: $25

For info on price: R. Harvey; Application info: F. Terry; Customer service: R. Harvey; Delivery info: T. Martinez

Free literature available: Bransonics - self-contained ultrasonic cleaners; E - Module - industrial aqueous ultrasonic cleaning equipment; FD-UD Series - industrial solvent ultrasonic cleaning equipment.

Products manufactured: Cleaners, Ultrasonic, Detectors, Generators, Machines/Machinery, Production, Oscillators, Transducers

Local Sales Offices & Reps.

Ariz	Phoenix, H. C. Torrey Assocs.	602-944-0352
Cal	Fullerton, Branson Cleaning Equip.	714-870-6360
Cal	Santa Clara, Branson Cleaning Equip.	408-249-2616
Colo	Denver, Crump Co.	303-426-1443
Fla	Clearwater, MacGregor Assocs.	813-446-7310
Fla	Coral Springs, MacGregor Assocs.	305-752-1924
Ga	Lilburn, MacGregor Assocs.	404-921-1300
Haw	Honolulu, Thom Equip. Co.	808-847-2027
Ill	Des Plaines, Branson Cleaning Equip.	312-824-7175
Kans	Kansas City, Pacific Scientific Co.	913-381-2600
Mass	Woburn, Branson Cleaning Equip.	617-935-8060
Mich	Detroit, Gottsman Machinery Assocs.	313-838-5020
Mo	Saint Louis, Pacific Scientific Co.	314-731-2440
NJ	Stratford, Branson Cleaning Equip.	609-627-2888
NY	Rochester, Branson Cleaning Equip.	716-288-0100
NC	Charlotte, Branson Cleaning Equip.	704-394-7309
Tex	Richardson, Branson Cleaning Equip.	214-234-2477

BRAUN-BUSH CO., 8833 78th St., Woodhaven, N.Y., 11421, Tel: 212-296-3332; Empl.: 26; Minimum order: $10

For info on price: G. Dinnis; Application info: M. Cheney; Customer service: G. Aitken; Delivery info: M. Thompson

Products manufactured: Brushes & Brush Assemblies

BRAUN CO., INC., 4200 31st St. N., St. Petersburg, Fla., 33714, Tel: 813-526-9104; Empl.: 50; Minimum order: $25

For info on price: H. Bonser; Application info: H. Bonser; Customer service: A. de Alcala; Delivery info: E. Clarke

Free literature available: 20 page catalog on standard items- finger stock - contact rings - component clips; single page flyer on welded contacts single page flyer on assemblies.

Products manufactured: Clamps & Clips, Contact Strips, Finger, Contacts, Electrical, Springs (All Types)

Local Sales Offices & Reps.

Cal	Los Angeles, El-Com Inc.	213-223-1353
Conn	Glastonbury, Barton & Caron Inc.	203-633-9417
Ill	Chicago, Brock & Cushman	312-622-4110
Mass	Auburndale, Barton & Caron Inc.	617-332-2021
Mich	Chagrin Falls, Bray Assoc. Inc.	216-247-4474
NC	Charlotte, J.C. Jackson Co.	704-536-2713
Pa	Pittsburgh, Buchanan Sls. Co.	412-782-3324

BRAXTON MFG. CO., Echo Lake Rd. N., Watertown, Conn., 06795, Tel: 203-274-6781; Empl.: 35

For info on price: A. F. Anderson; Application info: J. Triano; Customer service: C. Swanson; Delivery info: B. Lyons

Products manufactured: Eyelets, Services, Assembly, Production & Test

Local Sales Offices & Reps.

Cal	Costa Mesa, Braxton Mfg. Cal.	714-645-7363
Tex	Richardson, Burns Tech. Sls.	214-423-3379

BRELONIX, INC., 106 North 36th St., Seattle, Wash, 98103, Tel: 206-ME 3-1964; Empl.: 10

Customer service: T. A. Rommel

Free literature available: Brochure describing Model SAM-100 Aircraft SSB Transceiver and Accessories.

Products manufactured: Comm. Systems, Couplers, Receivers, Transmitters

BRINKMANN INSTRS., INC., Cantiague Rd., Westbury, N.Y., 11590, Tel: 516-334-7500, TWX: 510-222-8254; Empl.: 150; Minimum order: $15

Customer service: K. Peters

Free literature available: Lauda Circulators, baths and accessories, Metrohm Recording Polarographic Analyzer, Wenking Electronic Potentiostats and Galvanostats

Products manufactured: Baths, Controlled Temperature (Air & Liquid), Potentiometers, Recorders

Local Sales Offices & Reps.

Cal	Burlingame
Cal	Los Angeles
Ill	Des Plaines
Md	Silver Spring
Mo	St. Louis
NY	Syracuse
Ohio	Cincinnati
Ohio	Cleveland
Pa	Philadelphia
Tex	Houston

BRISTOL SAYBROOK CO., 97 Coulter St., Old Saybrook, Conn., 06475, Tel: 203-388-3414; Empl.: 125

Customer service: G. S. Willis

Free literature available: Free application data and ordering information is available on a complete line of synchronous motors and timing devices. Special modifications are available on OEM quantities.

Products manufactured: Delays, Time (Excluding Delay Lines, Timers, Delay & Relays, Time-Delays), Indicators, Motors, Relays, Switches, Timers

Local Sales Offices & Reps.

Cal	Los Angeles, C.E. Mello Co.	213-626-9159
Cal	Palo Alto, O'Donnell Assoc.	415-327-9260
Conn	Old Saybrook, M.L. Assoc.	203-388-9718
Ill	Chicago, J.C. Angel Co.	312-878-0653
Mass	Marlboro, M.L. Assoc.	617-485-6190
Mich	Novi, Miltimore Sls.	313-476-2446
Mo	Independence, Gribble Sls. Engr. Co.	816-796-4333
NJ	Nutley, Challenge Assoc.	201-667-3558
NJ	Pitman, Colrud Co.	609-589-5866
NY	Camillus	315-672-3988
NY	Old Saybrook, Challenge Assoc.	203-388-5562
NY	Pittsford	716-381-6714
NC	Charlotte, R.W. Chapman Co.	704-525-2421
NC	Raleigh, R.W. Chapman Co.	919-782-2624
Ore	Beaverton, David Fry Co.	503-643-5448
SC	Greenville, R.W. Chapman Co.	803-232-5391
Tex	Arlington, Ion Assoc.	817-461-9661

BRITISH AIRCRAFT CORP. (USA INC.), Intratec Div., 399 Jefferson Davis Hwy., Arlington, Va., 22202, Tel: 703-979-1400; Empl.: 100; Minimum order: $50

Customer service: G.J. McCallum

Products manufactured: Analyzers, Interferometer Systems, Kits, Breadboarding (For Engineers)

BROADVIEW CHEMICAL, 2910 S. 18th St., Broadview, Ill., 60153

BROMBERG ENGINEERING, 12 Simpson Rd., Wayland, Mass., 01778, Tel: 617-653-4285; Empl.: 6

For info on price: J. Swartz; Application info: N. S. Bromberg; Customer service: N. S. Bromberg; Delivery info: J. Swartz

Free literature available: Brochure describing OEM or custom dedicated instrumentation for clinical or pollution analysis employing fluoresence, scattering, polarization, optical density and electrochemistry. Using DAMS and D&S2AMS&I1.

Products manufactured: Amplifiers, Interferometer Systems, Lasers & Laser Systems, Meters, Services, Assembly, Production & Test, Spectrometers

BROOKHAVEN INSTRS. CORP., Box 3136, Austin, Tex., 78764, Tel: 512-442-1216; Empl.: 8

For info on price: E. J. Rogers; Delivery info: R. L. Davis

Free literature available: Brochures giving technical specs and descriptive info. on electronic integrators & sweep generators. Price lists.

Products manufactured: Generators, Integrators, Electronic, Services, Assembly, Production & Test

Local Sales Offices & Reps.

NY	Port Chester, Radiation Elctrns. Inc.	914-937-2300
Tenn	Knoxville, Pulcir Inc.	615-693-3461

BROOKS INSTR. DIV., Emerson Elec. Co., Hatfield, Pa., 19440, Tel: 215-368-2000; Empl.: 450

Customer service: N. Wilcox

Products manufactured: Alarms, Controls/Control Eqpt.

Local Sales Offices & Reps.

Ariz	Scottsdale, Brooks Instr. Div. Emerson Elec. Co.	602-947-8073
Cal	Stanton, Brooks Instr. Div. Emerson Elec. Co.	213-860-4460
Del	Wilmington, Brooks Instr. Div. Emerson Elec. Co.	215-724-7373
Ill	Westchester, Brooks Instr. Div. Emerson Elec. Co.	312-345-2740
NJ	Teaneck, Brooks Instr. Div. Emerson Elec. Co.	212-753-4628
Ohio	Cleveland, Brooks Instr. Div. Emerson Elec. Co.	216-884-7036
Pa	Hatfield, Brooks Instr. Div. Emerson Elec. Co.	215-247-2366
Tex	Houston, Brooks Instr. Div. Emerson Elec. Co.	713-784-4930

BROOKS CO. INC., WINFIELD, Conn. at Fowle St., Woburn, Mass., 01801, Tel: 617-933-5300

For info on price: Miss Salines; Application info: H. A. Perry, Jr.; Customer service: H. A. Perry, Jr.; Delivery info: Miss Salines

Free literature available: Form #52A-description of Tapfree and Alumtap Cutting Fluids.

Products manufactured: Lubricants

BSR (USA) LTD, Route 303, Blauvelt, NY, 10913

BUCHANAN CRIMP TOOL PRODS., Amerace Corp. Control Prods. Div., 1065 Floral Ave., Union, N.J., 07083, Tel: 201-289-2225; FSC No: 5120; QPL No: 22520; Empl.: 65; Minimum order: $50 .... p. 2•653

Customer service: J. Nosti

Free literature available: Catalog (T105) 32 page catalog describing full line of manual, pneumatically-operated and automatic feed crimping tools listing Mip-specs and contact types accommodated.

Products manufactured: Tools

Local Sales Offices & Reps.

Cal	Van Nuys	213-997-7243

BUCKBEE MEARS CO., 245 E. 6th St., St. Paul, Minn., 55101, Tel: 612-228-6371; Empl.: 1600

Products manufactured: Boards, Printed Circuit, Circuits, Flexible, Circuits, Printed, Multilayer, Laminations, Services, Assembly, Production & Test

Local Sales Offices & Reps.

Cal	Los Angeles	213-889-9962
Cal	San Jose	408-248-2750
Colo	Denver	303-237-3870
Ill	Elk Grove Village	312-439-6433
Minn	St. Paul	612-228-6371
NH	Nashua	603-883-0316
NJ	E. Windsor	609-443-3340
NY	Manlius	315-469-7394
Ohio	Sylvania	419-882-6918
Pa	Allentown	215-398-1511
Tex	Plano	214-423-3110

BUCKEYE STAMPING CO., 555 Marion Rd., Columbus, Ohio, 43207, Tel: 614-445-8433; Empl.: 75 p. 1•46-48; p. 2•1075

Customer service: J. Willcox

Free literature available: Instrument Knobs; Instrument Cases & Cabinets; Printed Circuit Board Guides & Racks.

Products manufactured: Cabinets & Accessories, Cases, Equipment, Instrument, Meter, Chassis, Circuit Board Mounting, Chassis, Metal, Guides, Circuit Board, Knobs, Racks, Stands, Instruments

Local Sales Offices & Reps.

Cal	Palo Alto, Engrg. Assocs.	415-326-7842
Cal	Pasadena, P. Nurches Co.	213-MU1-8957
Colo	Greeley, G. Moss Elctrns., Inc.	303-353-1452
Fla	St. Petersburg, S. Partak Inc.	813-393-5402
Ill	Chicago, W.J. Doyle Co.	312-BR4-6685
Mass	Belmont, Elctrn. Comps. & Svc.	617-484-8680
Mich	Lathrup Village, R.C. Nordstrom Co.	313-559-7373
Minn	Minneapolis, A.J. Warner Co.	612-729-7371
Mo	Raytown, Production Automation	816-737-0066
NY	Lynbrook, P. Saftler Assoc.	516-593-7880
Ohio	Columbus, Elctrns. Mktg.	614-299-4161
Pa	Paoli, T. Griffin Co.	215-647-1550
Tex	Houston, Southland Engrg. & Sls.	713-462-4077
Wash	Seattle, Underwood & Underwood	206-243-2133

BUD RADIO, INC., 4605 E. 355th St., Willoughby, Ohio, 44094, Tel: 216-946-3200, TWX: 810-427-2604; Empl.: 200 .... p. 1•54,55

Products manufactured: Air Cleaners & Filters (Shielded & Unshielded), Benches, Consoles, Stools, Tables, Blowers & Fans & Accessories, Boxes, Junction, Outlets & Wall Plates, Cabinets & Accessories, Cases, Equipment, Instrument, Meter, Chassis, Circuit Board Mounting, Chassis, Metal, Connector Boxes & Strips, Power Outlet, Drawers, Sliding, Frames, Cabinet & Rack, Handles For Cabinets, Circuit Boards, Racks, etc., Panels, Racks, Services, Assembly, Production & Test, Slides, Cabinet & Chassis

Local Sales Offices & Reps.

Ariz	Scottsdale, J. Berman Co.	602-994-8081
Cal	Inglewood, J. Berman Co.	213-649-6111
Cal	San Carlos, D.H. Ross Co.	415-591-4411
Colo	Denver, Lindberg Co.	303-758-9033
Fla	Orlando, Cartwright & Bean Co.	305-422-4531
Fla	Plantation, Cartwright & Beam Co.	305-791-3989
Ga	Atlanta, Cartwright & Bean Co.	404-255-5262
Ill	Chicago, GNB Assocs.	312-673-4050
Ind	Indianapolis, Southern Sls. Corp.	317-257-7575
Iowa	Cedar Rapids, Palatine Engrg. Sls.	319-365-8071
Kans	Andover, Palatine Engrg. Sls.	316-683-7512
Kans	Overland Park, Palatine Engrg. Sls.	913-262-5843
La	Chalmette, Cartwright & Bean Co.	504-279-4598
Mass	Needham, Mullin Tech. Sls.	617-444-4780
Mich	St. Clair Shores, J.M. Thorpe	313-779-6363
Minn	Minneapolis, C. Gibb Co.	612-377-1200
Miss	Jackson, Cartwright & Beam Co.	601-981-1368
Mo	St. Louis, Palatine Engrg. Sls.	314-426-7066
NJ	Cherry Hill, Trinkle Sls.	609-795-4200
NY	Rochester, Marsey Sls.	716-442-9700
NY	Rockville Centre, Willgold	516-764-4022
NC	Charlotte, Cartwright & Bean Co.	704-333-6457
NC	Raleigh, Cartwright & Bean Co.	919-832-7128
NM	Albuquerque, Lindberg Co.	505-345-2489
Ohio	Cleveland, Marlow Assocs.	216-932-0900
Ohio	Xenia, Marlow Assocs.	513-426-6270
Ore	Portland, Earl & Brown Co.	503-245-2283
Tenn	Knoxville, Cartwright & Bean Co.	615-693-7450
Tenn	Memphis, Cartwright & Bean Co.	901-276-4442
Tex	Dallas, Lund & Co.	214-358-4335
Utah	Salt Lake City, Lindberg Co.	801-364-6409
Wash	Seattle, Earl & Brown Co.	206-284-1121

BUDWIG MFG. CO., P.O. Box 97, Ramona, Calif., 92065, Tel: 714-789-0900; FSC No: 31827; Empl.: 50

Customer service: E. Creighton

Free literature available: Form 663-D Data-Straps, Grommets; Form 712-A Data Cabinet Feet; Form 906 Data Antenna Connectors.

Products manufactured: Bumpers, Clamps & Clips, Grommets

BULOVA WATCH CO., FREQ CONTROLS DIV., Elctrns. Div., 61-20 Woodside Ave., Woodside, N.Y., 11377, Tel: 212-335-6000; Minimum order: $100 p. 1•4,284-295,1124

For info on price: W. Carnes; Application info: M. Isola; Customer service: M. F. Casino; Delivery info: M. Isola

Products manufactured: Amplifiers, Analyzers, Bridges, Calibrators, Chargers, Battery, Chokes, Choppers, Chronometers, Cleaners, Ultrasonic, Clocks (All Types), Coders, Coils Including Assemblies & Forms, Comparators, Controls/Control Eqpt., Converters, Counters, Crystals, Decoders, Demodulators, Detectors, Dividers, Drivers, Chopper, Filter Synthesizers, Filters, Generators, Inverters, Keyers, Tone, Light Choppers, Meters, Modulators, All Kinds, Monitors, Networks, Oscillators, Power Supplies, Receivers, Records, Frequency Test, Regulators, Scanners, Servo Systems, Standards, Switches, Timers, Transducers, Tuning Forks

Local Sales Offices & Reps.

Ariz	Scottsdale, Carter Assocs.	602-947-4355
Cal	Menlo Park, Straube Assocs.	415-323-2476
Colo	Boulder, Straube Assocs.	303-443-8600
Conn	Suffield, Terrance P. Dunn Co.	203-668-0446
Fla	Clearwater, Purrett Assocs.	813-531-5513

Fla	Orlando, Perrott Assocs.	305-275-1132
Ill	Chicago, Techrep, Inc.	312-761-0548
Iowa	Cedar Rapids, J.R. Sls. Engrg. Inc.	319-377-8211
Kans	Prairie Village, Engrg. Svcs. Inc.	913-649-4000
Md	Baltimore, Callas Elctrns. Inc.	301-744-7711
Mass	Chelmsford, Underwood Sls.	617-256-8191
Minn	Minneapolis, Tornolson Assocs.	612-835-2414
Mo	St. Louis, Engrg. Svcs. Co.	314-997-1515
NJ	Englewood Cliffs, E. Glass Assocs.	201-592-0200
NY	Buffalo, H.C. Johnson Agencies	716-632-7880
NY	Fayetteville, H.C. Johnson Agencies	315-637-9383
NY	Guiderland, H.C. Johnson Agencies	518-456-9681
NY	Rochester, H.C. Johnson Agencies	716-482-3000
Ohio	Akron, Avoy Natalino Assocs.	216-725-6087
Ohio	Dayton, Avoy Natalino Assocs.	513-223-5002
Ore	Portland, J. J. Backer	503-297-3776
Pa	Glenshaw, H.C. Johnson Agencies	412-961-0414
Pa	Philadelphia, Eastern Comps.	215-927-6262
Tex	Dallas, United Comps.	214-324-1448
Wash	Seattle, J.J. Backer	206-285-1300
EXP:	New York, N.Y., C. Tunnant & Sons	212-679-1300
EXP:	New York, N.Y., Landseas Corp.	212-265-8323

BULOVA WATCH CO., SERVO PRODS. ELCTRNS. DIV., 61-20 Woodside Ave., Woodside, N.Y., 11377, Tel: 212-335-6000, TWX: 710-582-2637; Minimum order: $100 .... p. 1•1910-1913

Customer service: Ed Cohen

Products manufactured: Amplifiers, Controls/Control Eqpt., Servo Systems

BULOVA WATCH CO., Sys. & Instrs. Div., Green Acres Rd., W., Valley Stream, N.Y., 11582, Tel: 516-561-2600, TWX: 510-225-8409; Empl.: 750

Products manufactured: Switches, Testers, Timers

BULOVA WATCH CO., Timer Lab., Bulova Pk., Flushing, N.Y., 11370, Tel: 212-DE 5-6000, TWX: 212-672-0344; Minimum order: $25

Customer service: A. Craig

Free literature available: Descriptions of applications of precision D.C. clocks and timers in a variety of scientific projects.

Products manufactured: Clocks (All Types), Delays, Time (Excluding Delay Lines, Timers, Delay & Relays, Time-Delays), Indicators, Timers

BUNKER-RAMO CORP., Elctrn. Sys. Div., 31717 La Tienda Dr., Westlake Village, Cal, 91361, Tel: 213-889-2211, TWX: 910-494-1234

Products manufactured: Comm. Systems, Computers, Hydrophones & Accessories, Oceanographic Equip. (Electronic), Underwater Communication, Detection, Navigation, etc. Equipment

BUNTING, BRASS & BRONZE CO., Div. N.L. Inds., Inc., 715 Spencer St., Toledo, Ohio, 43609, Tel: 419-382-3451, Telex: 28-6413; Empl.: 450; Minimum order: $25

For info on price: J. J. Doherty ext 276; Application info: R. A. Peterson ext 224; Customer service: C. Sevrence ext 214; Delivery info: C. Sevrence ext 214

Free literature available: #72 catalog - Stock listing of cast bronze and powder metal oil-filled bearings. #5 catalog - Engineering data on powder metal.

Products manufactured: Bearings, Bushings, Glass, Plastic, Metal, Rubber, Etc.

Local Sales Offices & Reps.

Cal	Los Angeles	213-747-5566
Ga	Atlanta	404-876-6316
Ill	Elk Grove Village	312-593-2750
NJ	Robbinsville	609-587-5705

BURDETTE BUSS BARS, INC., 383 Kings Hwy., Cherry Hill, N.J., 08034, Tel: 609-931-1300; Empl.: 7; Minimum order: $50

For info on price: R. Kemper 609-931-1300; Application info: D. Kemper 609-931-1302

Products manufactured: Bus Bars & Systems, Connectors

Local Sales Offices & Reps.

Fla	Casselberry, Publicover Assocs.	305-834-5775
Md	Timonium, Technical Mktg. Co.	301-252-4780
Mass	Westboro, Technical Mktg. Co.	617-366-8460
NJ	Mt. Ephraim, Burdette Co.	609-931-1309

BUREAU ENGRAVING, INC., Ind'l. Div., 219 N. Second St., Minneapolis, Minn., 55401, Tel: 612-339-8001, TWX: 910-576-2733; Empl.: 550; Minimum order: $500

For info on price: J. Patterson; Application info: J. Patterson; Customer service: J. Patterson; Delivery info: B. Currie

Products manufactured: Boards, Printed Circuit, Circuits, Flexible, Circuits, Printed, Multilayer

BURGESS BATTERY, See Gould Inc., Portable Battery Div.

BURGESS SWITCH CO., 777 Warden Ave., Scarborough, Ont., Ont., Can., MIL 4C3, Tel: 416-751-8280; FSC No: 36497; Empl.: 1000; Minimum order: $25

For info on price: Sls. Order Off.; Application info: Tech. Sls. Off.; Customer service: Cust. Svc. Dept.; Delivery info: Exped. Dept.

Free literature available: Ultraminiature micro switches.

Products manufactured: Switches

Local Sales Offices & Reps.

Fla	Clearwater, Lynch Gentry Assoc.	813-443-2697
Ga	Atlanta, Murphy & Cota	404-875-2525
Ill	Des Plaines, Lincoln Hodges	312-297-3810
Mass	Waltham, R.J.C. Assocs.	617-899-5858
Mich	Bloomfield Hills, R. C. Dakin Co.	313-647-2262
Minn	St. Paul, Kenco Co.	612-645-7717
NJ	Clifton, Faber Assocs.	201-773-8900
NY	Buffalo, Niagara Elec.	716-886-4000
NY	Rochester, Niagara Elec.	716-271-1223
NY	Syracuse, Niagra Elec.	315-437-1656
Ohio	Cleveland, Anderson-Bolds	216-229-4700
Tex	Dallas, Wm. Reese Corp.	214-638-6575
Wisc	Waukesha, Lincoln Hodges Assocs.	414-542-3087

BURLING INSTR. CO., 16 River Rd., Box 298, Chatham, N.J., 07928, Tel: 201-635-9481; Empl.: 27; Minimum order: $10

For info on price: J. Price; Application info: T. Mick; Customer service: J. Price; Delivery info: I. Altman

Products manufactured: Controls/Control Eqpt., Monitors, Switches, Thermostats

Local Sales Offices & Reps.

Cal	Los Angeles, C. Meriam Co.	213-269-8271
Cal	Mountain View, Claypool Controls Co.	415-968-7488
Colo	Denver, Toncray Equip. Co.	303-CH4-1102
Conn	Bridgeport, M.A. Selmon Co.	203-366-3651
Fla	Cantonment, C.B. Metcalf Co.	904-476-7710
Fla	Jacksonville, Olen Sls. Corp.	904-744-3988
Fla	Miami, Henning Co.	305-NA4-5832
Ga	Atlanta, J.R. Stilwell Co.	404-237-9844
Haw	Honolulu, Berkley Engrg. & Equip. Co.	
Ill	Chicago, Kelburn Engrg. Co.	312-775-8383
La	New Orleans, Gilbert & Assocs.	504-UN6-7444
Md	Baltimore, G. Goodman Ind.	301-837-3210
Mich	Roseville, H.C. Engelman Co.	313-777-0750
Minn	Minneapolis, Industra Co.	612-929-6224
Mo	Florissant, H and R Sls. & Engrg. Co.	314-837-3966
Neb	Omaha, H.G. Klug Co.	402-553-1377
NJ	Springfield, RJM Sls.	201-467-1210
NJ	Westfield, Mechanical Specialties Co.	201-233-9188
NY	Rochester, H.C. Johnson Agencies	716-482-3000
NC	Charlotte, Brown & Morrison	704-ED3-0774
Ohio	Bay Village, C. H. Joy Co.	216-TR1-5900
Ohio	Cincinnati, BC Engrg. Co.	513-891-6122
Okla	Tulsa, Quigg Process Equip. Co.	918-587-0166
Pa	Broomall, J.C. Whiddett Co.	215-353-6343
Pa	Glenshaw, H.C. Johnson Agencies	412-961-0414
Tex	Arlington, Pan-Tech Engrg. Co.	817-261-4111
Tex	Houston, Pan-Tech Engrg. Co.	713-623-0640
Tex	Odessa, Barngo, Inc.	915-332-0293
Wash	Kirkland, Unit Process Co.	206-822-0241
EXP:	New Haven, Conn., Masten-Wright Corp.	203-288-1638
FOR:	Can., Thornhill, Ont., Baker Instrs. Ltd.	416-889-8642
FOR:	Can., Vancouver, B.C., J. Sherman Co.	604-254-3113

BURLINGTON OPERS. DIV., Electronized Chems. Corp., S. Bedford St., Burlington, Mass., 01803, Tel: 617-272-2850, TWX: 710-332-0502; FSC No: 24011; Empl.: 125; Minimum order: $25

Customer service: W.P. Broderick

Free literature available: Short Form Catalog contains synopsis of heat shrinkable tubings, tapes, and parts available from E.C.C. Gives data relating to electrical, mechanical and chemical properties of various heat shrinkable materials.

Products manufactured: Caps, Forms & Tapes, Heat Shrinkable, Heat Guns, Production, Laminates, Services, Assembly, Production & Test, Tapes, Electrical Insulation, Tubing

BURNDY CORPORATION, Richards Ave., Norwalk, Conn., 06852, Tel: 203-838-4444, TWX: 710-468-2546; Empl.: 3500

For info on price: S. Miller; Application info: J. F. Bradley; Customer service: S. Miller; Delivery info: S. Miller

Free literature available: HYLOK&T Connectors-Multi-pin, rectangular connectors, HYPOINT&T-Leadless IC receptacles, TRIMTRIO&T-Rectangular, OIKMATE&T & Round Connectors, Power & Coax Contacts, Large HYRING&T Assemblies-for termination of multi-conductor shielded cable, Smooth BANTAM&T Connectors, Solder BANTAM Connectors, Rack and Connector, Terminals & Spices, LG107-1, Printed Circuit Connectors Rack and Panel Connectors, Terminals & Splices, LG107-1, Printed Circuit Connectors

Products manufactured: Cable, Connectors, Contacts, Electrical, Holder & Carriers, Integrated Circuit Packaging Systems, Limiters, Machines/Machinery, Production, Sockets, Splicers, Coaxial Cable, Splices, wire (Including, Butt & Cap Types), Terminal Blocks, Boards & Strips, Terminals, Tools, Wire & Cable Ties, Wire Strippers

Local Sales Offices & Reps.

Ariz	Phoenix, Burndy Corp.	602-947-5715
Ark	Little Rock, C.H. Stout, Inc.	501-374-8201
Cal	El Segundo, Burndy Corp.	213-772-5401
Cal	San Diego, Burndy Corp.	714-278-7131
Cal	Santa Clara, Burndy Corp.	408-249-5353
Colo	Denver, Burndy Corp.	303-377-8859
Conn	Norwalk, Burndy Corp.	203-838-4444
Fla	Ft. Lauderdale, Burndy Corp.	305-685-6446
Fla	Winter Park, Burndy Corp.	305-851-7430
Ga	Atlanta, Burndy Corp.	404-292-1633
Ill	Schiller Park, Burndy Corp.	312-678-5211
La	New Orleans, C.H. Stout of LA, Inc.	504-486-3707
La	Shreveport, C.H. Stout of Shreveport, Inc.	318-425-5485
Md	Silver Spring, Bradley Electro Sls. Corp.	301-587-1886
Mass	Dedham, Burndy Corp.	617-326-6386
Mich	Troy, Burndy Corp.	313-557-2668
Minn	Bloomington, Burndy Corp.	612-835-2500
Miss	Jackson, C.H. Stout, of Miss. Inc.	601-354-4326
Md	St. Louis, Burndy Corp.	314-878-4294
Mo	Kansas City, Burndy Corp.	816-353-3131
NY	Pelham, Burndy Corp.	914-738-3200
NY	Rochester, Burndy Corp.	716-381-3792
NY	Syracuse, Burndy Corp.	315-422-3990
NC	Greensboro, Burndy Corp.	919-274-8441
Ohio	Cleveland, Burndy Corp.	216-749-2665
Ohio	Dayton, Burndy Corp.	513-222-7997
Ore	Portland, Burndy Corp.	503-244-8559
Pa	Philadelphia, Burndy Corp.	215-265-1615
Pa	Pittsburgh, Muller, Harper & Assoc.	412-931-6460
Tenn	Memphis, C.H. Stout of Tenn., Inc.	901-362-1616
Tex	Dallas, Burndy Corp.	214-231-1456
Tex	Houston, Burndy Corp.	214-231-1456
Va	Richmond, Bradley Electro Sls. Corp.	804-649-8787
Wash	Seattle, Burndy Corp.	206-624-5442
WVa	Charleston, Skaff Engrg. Co.	304-342-0131
EXP:	Norwalk, Conn., Burndy Corp.	203-838-4444

BURNS ENGRG., INC., 10201 Bren Rd. East, Minnetonka, Minn., 55343, Tel: 612-935-4400, Telex: 29-0184

Products manufactured: Probes, Thermocouples, Elements & Accessories, Thermometers, Resistance, Transducers

BURNS ENGRG., INC. cont'd

Advertisment

Platinum, Nickel & special RTD's. Interchangeability 0.1°F or 0.1% of temperature (Precision Series) or 3/4° for 1/2% of temperature (Relia Bulb Series). Also 1/4°F Interchangeability over any span of 75°F or less. Thermocouples and specialized electronics. STOCK DELIVERY ON SEVERAL MODELS

BURR-BROWN, 6730 S. Tucson Blvd., Tucson, Ariz., 85734, Tel: 602-294-1431, TWX: 910-952-1111; Empl.: 405

Products manufactured: Amplifiers, Capacitors, Fixed, Circuits, Hybrid, Thick Film, Circuits, Hybrid, Thin-Film, Comparators, Converters, Dividers, Filters, Generators, Integrated Circuit Devices, IC's, Active Filters, Multiplexers, Multipliers, Networks, Power Supplies, Voltage Sources

Local Sales Offices & Reps.

Ga	Atlanta, BCS Assocs.	404-874-9925
Ala	Huntsville, BCS Assocs.	205-881-6220
Ala	Mobile, BCS Assocs.	205-342-9670
Ariz	Tucson, Burr-Brown Research Corp.	602-294-1431
Cal	San Diego, Elctrn. Mrktg. Specialists	714-566-1000
Cal	San Jose, Burr-Brown Research Corp.	408-984-7700
Cal	Santa Ana, Burr-Brown Research Corp.	714-835-0712
Cal	Sherman Oaks, Elctrn. Mktg. Specialists	213-990-4244
Cal	Sunnyvale, Elctrn. Mrktg. Specialists	408-245-9291
Fla	Ft. Lauderdale, BCS Assocs.	305-735-7641
Fla	Orlando, BCS Assocs.	305-896-4881
Ill	Addison, Burr-Brown Research Corp.	312-832-6520
Md	Silver Spring, QED Elctrns.	301-588-8134
Mass	Wakefield, Meas. Equip. Co.	617-245-4870
Mich	Farmington, Sheridan Assocs.	313-477-3800
Minn	Minneapolis, ECR, Inc.	612-831-4547
Mo	Florissant, Sheridan Assocs.	314-837-5200
NJ	Camden, QED Elctrns., Inc.	215-925-8711
NY	Clinton, Advanced Comps. Corp.	315-853-6438
NY	Endicott, Advanced Comps. Corp.	607-785-3191
NY	Mt. Vernon, QED Elctrns., Inc.	914-664-0080
NY	Syracuse, Advanced Comps. Corp.	315-699-2671
NC	Greensboro, BCS Assocs.	919-273-1918
Ohio	Cincinnati, Sheridan Assocs.	513-761-5432
Ohio	Cleveland, Sheridan Assocs.	216-524-8120
Okla	Tulsa, Norvell Assocs.	918-663-1247
Pa	Pittsburgh, Sheridan Assocs.	412-244-1640
Tex	Dallas, Norvell Assocs.	214-350-6771
Tex	Houston, Norvell Assocs.	713-774-2568
Wash	Seattle, Hayes Tech.	206-763-2210
FOR:	Calgary, Alb.	403-261-0780
FOR:	Can., Longueuil, Que.	514-670-1212
FOR:	Can., Malton, Ont.	416-678-1500
FOR:	Can., Ottawa, Ont.	613-829-9651
FOR:	Can., Vancouver, B.C.	604-253-7136

BURROUGHS CORP., Electronic Components Div., Box 1226 - Mt. Bethel Rd., Plainfield, N.J., 07061, Tel: 201-757-3400, TWX: 710-997-9539; Empl.: 1100

For info on price: R. Pignatello 201-757-5000; Application info: G. Weber; Customer service: R. Pignatello; Delivery info: R. Pignatello

Products manufactured: Display Devices/Displays, Tubes

Local Sales Offices & Reps.

Cal	Palo Alto	415-321-5363
Cal	Santa Ana	714-835-7335
Ga	Atlanta	404-633-0606
Mass	Brockton	617-364-3220
Mich	Royal Oaks	313-545-3250
NY	Henrietta	716-544-8582
Ohio	Kettering	513-299-5174
Tex	Dallas	214-748-9863
Va	McLean	703-893-2950

BURROUGHS CORP., OEM Sales, 460 Sierra Madre Villa, Pasadena, Cal., 91109, Tel: 213-351-6551, TWX: 910-585-1835; Empl.: 50,000

Products manufactured: Comm. Systems, Computers, Encoders, Memory Systems, Modulator/Demodulators, Perforators, Printers, Punched Card Equipment, Readers, Recorders, Terminal Equipment, Digital, Terminals, Data Display (including Alphanumeric & Graphic)

Local Sales Offices & Reps.

Ala	Huntsville	205-539-4433
Ariz	Phoenix	602-264-1281
Ark	Little Rock	501-FR 2-4121
Cal	Los Angeles	213-483-4520
Cal	San Diego	714-560-7222
Cal	San Francisco	415-UN 3-4062
Colo	Denver	303-861-8222
Conn	Hartford	203-AD 3-9871
Del	Wilmington	302-478-4200
DC	Washington	202-833-3280
Fla	Jacksonville	904-EX8-1551
Fla	Orlando	305-628-0999
Ga	Atlanta	404-881-8888
Haw	Honolulu	808-949-4171
Idaho	Boise	208-343-4911
Ill	Chicago	312-WA2-7600
Ill	Springfield	217-528-3455
Ind	Indianapolis	317-925-9051
Iowa	Cedar Rapids	319-393-1812
Iowa	Sioux City	712-258-7552
Kans	Wichita	316-MU2-6536
Ky	Lexington	606-253-2626
La	Baton Rouge	504-926-0012
Me	Portland	207-SP 3-8119
Md	Baltimore	301-667-9700
Mass	Lexington	617-862-9810
Mich	Detroit	313-972-7300
Mich	Lansing	517-IV 5-9401
Minn	Minneapolis	612-870-1891
Miss	Jackson	601-956-5004
Mo	Kansas City	816-421-0202
Mo	St. Louis	314-534-7510
Neb	Omaha	402-344-4105
NH	Manchester	603-NA 7-7686
NJ	Paterson	201-967-0800
NJ	Trenton	609-883-5670
NM	Albuquerque	505-247-1594
NY	Buffalo	716-877-4774
NY	New York	212-972-3000
NY	Syracuse	315-463-8651
NY	W. Hempstead	516-483-6625
NC	Raleigh	919-876-6822
ND	Fargo	701-AD 2-7135
Ohio	Cincinatti	513-242-3790
Ohio	Cleveland	216-398-6700
Ohio	Columbus	614-224-7248
Okla	Oklahoma City	405-843-9437
Okla	Tulsa	918-LU 7-5138
Ore	Portland	503-639-9660
Pa	Philadelphia	215-LO 8-1400
Pa	Pittsburgh	412-343-3622
RI	E. Providence	401-GE 4-1811
SC	Columbia	803-772-8274
Tenn	Knoxville	615-588-7451
Tenn	Nashville	615-385-0082
Tex	Dallas	214-RI8-9861
Tex	Houston	713-688-6911
Utah	Salt Lake City	801-DA 8-8947
Vt	Burlington	802-864-6861
Va	Roanoke	703-DI 3-1537
Wash	Seattle	206-MA 3-1780
WVa	Wheeling	304-CE 2-0690
Wisc	Milwaukee	414-UP 3-8600

BURWEN LAB. INC., 209 Middlesex Tpke., Burlington, Mass., 01803, Tel: 617-273-1488; Empl.: 84

Customer service: R. Bollman

Free literature available: Specification sheets that cover bandwidths & applications on all Burwen dynamic noise filters, specs on modules, users list, application sheets.

Products manufactured: Amplifiers, Detectors, Filters, Networks

BUSSCO ENGRG., 119 Standard St., El Segundo, Cal., 90245, Tel: 213-322-6580, TWX: 910-348-6295; Empl.: 95; Minimum order: $50

For info on price: Sls Dept; Application info: Engrg Dept; Customer service: P. Wainscott; Delivery info: P. Wainscott

Free literature available: General Catalog

Products manufactured: Backpanel Interconnect Systems, Bus Bars & Systems, Terminals

Local Sales Offices & Reps.

Cal	San Carlos, Lodan, Inc.	415-592-4600
Cal	San Diego, AAA Sls.	714-565-0122
Colo	Denver, Todd Assoc., Inc.	303-761-7801
Conn	North Haven, Forsberg Sls.	203-239-5111
Fla	Eau Gallie, J. J. Smith Manufacturers Rep.	305-727-3163
Ill	Oak Park, M. Reith	312-383-5728
Mass	Brockton, Forsberg Sls.	617-522-6300
Mich	Grand Rapids, R. P. Urban & Assoc.	616-245-0511
Minn	St. Paul, Countryman & Assoc.	612-645-9151
NJ	So. Bound Brook, Jolt Elctrn. Sls.	201-469-2030
NY	Rochester, R. P. Kennedy Co.	716-271-6322
Pa	LaFayette Hill, M.C.D. Assoc.	215-828-0560
Tex	Dallas, E. B. Robertson, Inc.	214-942-2716
Tex	Houston, E. B. Robertson, Inc.	713-785-6800
Va	McLean, Carwithen Assoc.	301-589-9112
Wash	Bellevue, H. Paulman Sls.	206-455-3311

BUSSMANN MANUFACTURING, Div. McGraw-Edison Co., University at Jefferson, St. Louis, Mo., 63107, Tel: 314-421-1740; FSC No: 5920; QPL No: Multiple; Minimum order: $15 .... p. 1•1960-1965

For info on price: N. Schmitz; Application info: W. Curtis; Customer service: N. Schmitz; Delivery info: N. Schmitz

Free literature available: BUSS Form SFB - 28 page catalog featuring the complete line of Fuses, Fuseholders, Fuse Blocks and Accessories

Products manufactured: Clamps & Clips, Fuses, Indicators

Local Sales Offices & Reps.

Ala	Montgomery, A. Ashurst	205-328-9623
Cal	Los Angeles, L. Waggoner	213-263-7105
Cal	San Francisco, R. Madden	415-282-8220
Colo	Denver, L. Hall	303-322-2189
Conn	Cheshire, J. Miller	203-624-2440
Fla	Clearwater, W. Penhallegon	813-531-5112
Ga	Chamblee, L. Acker	404-457-1356
Ill	Northlake, J. Waters	312-562-3370
Ill	Peoria Heights, V. Saporita	~~309-685-9897~~
Ind	Carmel, J. Adams	317-637-9606
Iowa	Davenport, T. Bates	319-355-5400
Kans	Overland Park, B. Favaloro	816-EM3-3700
Ky	Louisville, M. Dickson	502-451-7652
La	New Orleans, A. Richard	504-488-5333
Md	Baltimore, J. Rambo	301-243-1717
Mass	Winchester, C. Dane	617-HA6-2122
Mich	Grand Rapids, R. Berry	616-949-4660
Mich	Southfield, T. Ewald	313-961-9405
Minn	Minnetonka, R. Norris	612-935-6280
Mo	St. Louis, P. Friemel	314-421-1740
Neb	Bellevue, B. Shriver	402-341-9224
NJ	Newark, A. Cox	201-484-3500
NY	Brewerton, P. Palys	315-422-1929
NY	Fairport, G. Goyette	716-377-7591
NY	New York, T. Lawless	212-267-1466
NC	Greensboro, K. Williams	919-299-3348
Ohio	Cincinnati, J. Wulfmeyer	513-241-1740
Ohio	Orient, J. Wise	614-237-9810
Ohio	Strongsville, G. Ockuly	216-561-4875
Ohio	Toledo, J. Atkins	419-241-1141
Okla	Oklahoma City, H. Gossage	405-751-4996
Okla	Tulsa, L. Welborn	918-742-5914
Ore	Lake Oswego, S. Dyrnes	503-234-0281
Pa	Newtown Square, A. Branning	215-KI6-0644
Pa	Pittsburgh, H. Slack	412-364-5230
Tenn	Memphis, R. Terry	901-397-2306
Tex	Dallas, J. Tubbesing	214-357-8357
Tex	Houston, E.H. McGowan	713-526-3101
Utah	Salt Lake City, O. Christiansen	801-363-4596
Va	Hayes, W. Kirkland	804-642-5550
Wash	Seattle, R. Shipek	206-RO3-1350
Wisc	Milwaukee, W. Burbach	414-964-3185

C & A PRODUCTS, INC., 37-12 58th St., Woodside, N.Y., 11377, Tel: 212-779-4303; Empl.: 37 ... p. 1•148-151

Customer service: R. M. Bogin

Free literature available: Synchro-to-Digital Converters, Angle Position Indicators, Synchro-to-Linear DC Converters, Multiplexed Synchro-to-Digital Converters, Digital-to-Sine-Cosine DC Converters, Digital-to-Synchro Converters, Synchro-to-Sine-Cosine DC Converters, Absolute Shaft Angle Encoders.

Products manufactured: Amplifiers, Controls/Control Eqpt., Converters, Demodulators, Detectors, Encoders, Indicators, Meters, Programmers, Repeaters, Servo, Resolvers, Synchro, Servo Systems, Standards, Switches, Synchro Transmitters, Solid-State, Testers, Transducers.

C-COR ELCTRNS., D., 60 Decibel Rd., State College, Pa., 16801, Tel: 814-238-2461, TWX: 510-691-1933; FSC No: 12775; Empl.: 150; Minimum order: $25

Customer service: G. H. Rachau

Free literature available: 1974-75 Industrial Short Form Catalog, Industrial Amplifier Catalog Data Sheets, Cable Television Systems and Products Catalog 1974-75, Cable Television Systems and Products Price List July 15, 1974

Products manufactured: Amplifiers, CATV Systems & Equipment, Converters, Mixers

Local Sales Offices & Reps.

Cal	Canoga Park, C-COR Elctrns., Western	213-887-0754
Cal	Los Altos, Astroel, Inc.	415-948-3636
DC	Wash., Eastern Instr.	301-839-3800
Va	Richmond, Eastern Instr., Inc.	703-644-6622
EXP:	NY, N.Y., S. Ginsbury	212-689-5212

C-F ELECTRONICS, INC., 14709 Keswick St., Van Nuys, Cal., 91405, Tel: 213-781-3849; FSC No: 5905; Empl.: 50; Minimum order: $15

For info on price: K. Landers; Application info: R.G. Jordan; Customer service: K. Landers; Delivery info: K. Landers

Free literature available: Catalog Free samples when ordered on company purchase order

Products manufactured: Networks, Resistors, Shunts, Meter

Local Sales Offices & Reps.

Ariz	Phoenix, Moltronics of Ariz.	602-272-7951
Ariz	Phoenix, MIRCO Electronics	602-944-2281
Ariz	Phoenix, Parts Electronics	602-258-6476
Cal	San Diego, Ohm Spun Electronics	714-277-6230
Cal	Santa Clara, Mauldin Co.	408-249-7660

C & K COMPONENTS, INC., 103 Morse St., Watertown, Mass., 02172, Tel: 617-926-0800, TWX: 710-327-0460; FSC No: 09353; Empl.: 190; Minimum order: $1 .... p. 1•1968,1969

For info on price: S. Trocki; Application info: J. Martinec; Customer service: N. Seldon; Delivery info: M. Kincaid

Products manufactured: Switch Hardware, Switches

Local Sales Offices & Reps.

Ala	Huntsville, Beacon Mfg.	205-881-5031
Ariz	Scottsdale, Engrg. Sls. Assoc.	602-945-5781
Cal	Los Altos, Ewing-Foley Inc.	415-941-4525
Cal	Los Angeles, Universal Comp. Co.	213-641-4255
Colo	Arvada, Arrowhead Sls. Corp.	303-423-5556
Ga	Atlanta, Beacon Mfg.	404-351-3654
Ill	Des Plaines, Control Sls.	312-296-5595
Minn	St. Louis Park S., Beta Engrg. Co.	612-925-4422
NJ	Cherry Hill, Quality Comps.	609-428-6266
NY	Elbridge, L-Tron Corp.	315-689-3787
NY	Mt. Vernon, D. Sonkin Assoc.	914-668-9809
Ohio	Cincinnati, F.E. Kahsar Sls.	513-471-9011
Ohio	Hudson, F.E. Kahsar Sls.	216-653-6808
Tex	Richardson, R.F. Kimball Co.	214-231-3447
Utah	Salt Lake City, Arrowhead Sls. Corp.	801-487-0036

Local Distributors

Ala	Huntsville, Cramer
Alas	Anchorage, Yukon Radio Supply
Ariz	Phoenix, Kierulff Elctrns.
Cal	Gardena, Santa Monica Bell
Cal	Glendale, RCA, Cramer
Cal	Los Angeles, Fisher Switches
Cal	Los Angeles, Kierluff Elctrns.
Cal	Menlo Park, Bell Inds.
Cal	Palo Alto, Kierluff Elctrns.
Cal	Redwood City, Cramer Elctrns.
Cal	San Diego, Kierluff Elctrns.
Cal	San Diego, R&C/Cramer
Cal	Santa Clara, Fisher Switches
Colo	Denver, Kierluff Elctrns.
Conn	Hamden, Wilshire Elctrns.
Fla	Miami, Electronics Equip.
Fla	Orlando, Hallmark Elctrns. Corp.
Fla	Orlando, Hammond Elctrns.
Fla	Palm Beach Gardens, Controlled Distr.
Ga	Atlanta, Cramer/Atlanta
Ill	Palatine, Cramer/Chicago
Ill	Rosemont, Advent Elctrns.
Ill	Westchester, L-Comp, Inc.
Ind	Ft. Wayne, Ft. Wayne Elctrns. Supply
Iowa	Cedar Rapids, Deeco, Inc.
Kans	Wichita, Radio Supply Elctrns.
Ky	Owensburg, Ohio Valley Sound
Md	Baltimore, Arrow Elctrns.
Mass	Burlington, Arrow Elctrns.
Mass	Dedham, Gerber Elctrns.
Mass	Needham, Schley/Kierluff
Mass	Newton, Cramer Elect.
Mass	Watertown, D.R.W. Elec. Corp.
Mich	Ann Arbor, Advent
Minn	St. Louis, Park Elctrns.
Mo	St. Louis, L-Comp, Inc.
Neb	Lincoln, Scott Elect. Supply Corp.
NJ	Moorestown, Arrow-Angus
NJ	Springfield, Route Elect.
NM	Albuquerque, Kierluff Elctrns.
NY	Albany, E. E. Taylor
NY	Bohemia, Car Lac Elctrns.
NY	Buffalo, Summit Distr.
NY	Hempstead, Elctrn. Equip.
NC	Raleigh, Pyttronics
Ohio	Dayton, Esco, Inc.
Okla	Oklahoma City, Hallmark Elctrns. Corp.
Pa	Huntington Valley, Hallmark Elctrns.
Pa	Montgomeryville, Pyttronics Inds.
Pa	Paoli, F.J.R./Kierluff-Phil.
Tex	Dallas, Hallmark Elctrns. Corp.
Tex	Houston, Altair Co.
Utah	Salt Lake City, Kimball Elctrns.
Va	Richmond, Meridian Elctrns.
Wash	Bellevue, Bell Inds.
Wash	Seattle, Kierluff Elctrns.
Wisc	Mequon, Taylor Elect. Co.
Wyo	Cheyenne, Houge Radio & Supply Co.

CABLE SYSTEMS & ASSEMBLY CO., INC., 210 Broadway, Everett, Mass., 02149, Tel: 617-387-7550; FSC No: 33426; Empl.: 65; Minimum order: $48

For info on price: T. Armelin; Application info: E. Vecchia; Customer service: T. Armelin; Delivery info: C. Ferrando

Products manufactured: Cable Assemblies & Harnesses, Cable, Cords, Services, Assembly, Production & Test

CABLEMASTER DIV., Accurate Elctrns. Corp., 7350 Atoll St., No. Hollywood, Cal., 91605, Tel: 213-875-0500

Products manufactured: Locators, Open-Short, Testers

Local Sales Offices & Reps.

Cal	San Jose, White & Co.	408-292-8229
Fla	Orlando, R. Attaway Co.	305-424-9983
Md	Lutherville-Timonium, Naudain Assocs.	301-252-5378
Mich	Detroit, Electro Enterprises, Inc.	313-886-2280
NJ	Ridgewood, Hansen Assocs.	201-652-7055
NC	Winston-Salem, Radco Co.	919-722-9671
Ohio	Cleveland, Electro Enterprises, Inc.	216-261-7670
Ohio	Dayton, Electro Enterprises, Inc.	513-426-6071
Pa	Phildelphia, Naudain Assocs.	215-564-3194
Pa	Pittsburgh, Electro Enterprises, Inc.	412-371-8497
Tex	Houston, Brice Co.	713-526-3197
Va	Lynchburg, Naudain Assocs.	703-846-8044
Wash	Seattle, Paratech	206-783-3900

CABLEWAVE SYSTEMS INC., 60 Dodge Ave., North Haven, Conn., 06473, Tel: 203-239-3311, TWX: 710-465-0244; Empl.: 135; Minimum order: $50

Customer service: S. Raucci, Jr.

Products manufactured: Antenna Feed Systems, Cable, Connector Adapters, Connectors, Dehydrators, Delay Lines, Kits, Cable-End Sealing, Plug Adapters, Socket Adapters, Splicers, Coaxial Cable, Tees, Waveguides & Adapters

Local Sales Offices & Reps.

Ala	Huntsville, Technology Mktg. Assocs.	205-883-7893
Ariz	Phoenix, Thorson Co.	602-956-5300
Cal	Alhambra, M. W. Riedel & Co.	213-283-7694
Cal	Redwood City, Woodworth Co.	415-365-0252
Fla	Ormond Beach, Technology Mktg. Assocs.	904-672-2314
Fla	Pompano Beach, Technology Mktg. Assocs.	305-942-0774
Ill	Park Ridge, RF Specialists	312-698-2044
Ind	Ft. Wayne, McDonald Sls. Co.	219-747-3650
Md	New Carrollton, W. A. Brown Equip-Comp, Inc.	301-577-4527
Mass	Haverhill, L-K Assocs.	617-373-1313
Mo	Kansas City, Forristal-Young Sls. Co.	816-358-6771
Mo	St. Louis, Forristal-Young Sls. Co.	314-645-2360
Neb	Omaha, Forristal-Young Sls. Co.	402-333-0800
NJ	Keasbey, Addem 2	516-567-5900
NY	Huntington Station, Addem 1	516-567-5900
NY	Syracuse, T2 Elctrns.	315-463-8592
NC	Winston-Salem, Burgin-Kreh Assocs., Inc.	919-768-4174
Pa	Fort Washington, Kirk-Sandell, Inc.	215-643-2100
Tex	Dallas, Hillman Entprs.	214-827-4790
Va	Alexandria, W. A. Brown Equip-Comp, Inc.	703-836-1800
Va	Lynchburg, Burgin-Kreh Assocs., Inc.	804-845-5600
Wash	Bellevue, Thorson Co.	206-455-9180
EXP:	Stamford, Conn., Dage Corp.	203-324-3123

CABTRON SYS., INC., 200 Anets Dr., Northbrook, Ill., 60062, Tel: 312-498-6090; Empl.: 30 .... p. 1•56,57

Free literature available: Short form catalog 801 metal cabinets for electronic equipment featuring the exclusive filtered base construction and all modular design.

Products manufactured: Benches, Consoles, Stools, Tables, Blowers & Fans & Accessories, Cabinets & Accessories, Carts & Dollies, Instrument & Equipment, Panels, Racks

Local Sales Offices & Reps.

Ariz	Scottsdale, Elctrn. Entpr., Inc.	602-946-9860
Cal	Santa Clara, Nova-Tronix	408-243-9530
Cal	Tustin, Spaulding Sls. Co.	714-832-1384
Colo	Golden, F. R. Campbell Assocs.	303-238-4174
Fla	Cocoa, Orbe, Inc.	305-452-9568
Fla	Fort Lauderdale, Orbe, Inc.	305-564-8571
Fla	St. Petersburg, Orbe, Inc.	813-894-0687
Ill	Northbrook, Cabtron Sys.	312-498-6090
Ind	Fort Wayne, S & S Elctrns.	219-743-4611
Md	Silver Spring, Ansell Engrg.	301-949-1655
Mass	Wakefield, Meas. Equip. Co.	617-245-4870
Mich	Farmington Hills, H. Lowell Co.	313-851-7474
Minn	St. Paul, Countryman Assocs.	612-645-9151
Mo	Raytown, Prod. Automation	816-737-0066
NM	Albuquerque, Elctrn. Entprs.	505-256-3561
NY	Port Washington, Paul D. Aaron	516-883-0600
NY	Syracuse, Tesco Assocs.	315-463-4566
NC	Kernersville, S. K. Wallace Assoc.	919-993-3993
Ohio	Cleveland, Geotronix Mktg. Assoc.	216-526-2535
Ohio	Columbus, Geotronix Mktg. Assoc.	614-457-8472
Pa	Feasterville, Professional Svc.	215-355-6244
Tex	Addison, Dunbar Assocs.	214-239-7151
Wash	Renton, S. Wilson Co.	206-226-0850

CADDEL-BURNS MFG. CO., INC., 40 E. 2nd St., Mineola, N. Y., 11501, Tel: 516-746-2310; Empl.: 30 p. 2•382-386

Products manufactured: Chokes, Coils Including Assemblies & Forms, Cores, Magnetic, Delay Lines, Filters, Shields, Transformers, Wire

Local Sales Offices & Reps.

Ohio	Dayton, C. V. Clark	513-294-7337

CADDELL COIL CORP., 35 Main St., Poultney, Vt., 05764, Tel: 802-287-4055; Empl.: 6; Minimum order: $10

For info on price: J. Caddell; Application info: J. Caddell; Customer service: R. Caddell; Delivery info: R. Caddell

Free literature available: Catalog, catalog supplement & price list. Lists stock coil products-toroids, chokes, variable coils, pot core transformers and coil parts. Gives specifications-inductance, Q, etc.

Products manufactured: Chokes, Coils Including Assemblies & Forms, Transformers

Local Sales Offices & Reps.

Fla	Sebastian, R.B. Caddell	609-492-2971
Mass	West Falmouth, D.P. MacDonald	617-548-7039

Advertisment

COIL WINDING JOB SHOP--RF coils, chokes, transformers. Coils to Print or Specification--toroids, printed circuit, pot core inductors, high current chokes, coils with ferrite or powdered iron, slug tuned, pi wound, single layer, random wound, encapsulation.

RF coils for communication, experimentation, avionics, radar, CATV, RF power, tests & measurement.

Send for catalog of stock coils.

CADDOCK ELECTRONICS, INC., 3127 Chicago Ave., Riverside, Cal., 92507, Tel: 714-683-5361, TWX: 910-332-6108; FSC No: 19647; Empl.: 80; Minimum order: $25 .... p. 1•884-887; p. 2•1428-1443

For info on price: F. Grimes; Application info: R. Caddock; Customer service: L. Johnson; Delivery info: F. Grimes

Free literature available: 1. Long-term stability data (40,000 hours) on Micronox high-performance resistors. 2. Test summary compiled from two years of Reliability Testing on Caddock Micronox film resistors.

Products manufactured: Dividers, Films, Networks, Packages, Integrated Circuit, Resistors

Local Sales Offices & Reps.

Ore	Portland, Almac/Stroum Elctrns.	503-292-3534
Tex	Houston, Unidyne, Inc.	713-782-0218
Wash	Seattle, Almac/Stroum Elctrns.	206-763-2300

Local Distributors

Tex	Houston, Lenert Co., 1420 Hutchins	713-225-1465

CADILLAC PLASTIC & CHEMICAL, Dayco Co., Box 810, Detroit, Mich., 48232, Tel: 313-869-9500; Empl.: 1000

For info on price: L. Lumberg; Application info: D. Meyer; Customer service: D. Meyer; Delivery info: D. Meyer

Free literature available: Cadillac Plastic Buyers Guide - the complete what, where and how of plastics for industry and home. Cadillac Plastic OSHA-Spec Safety Products Buyers Guide - complete Osha-Spec Safety Products line featuring brand name products in compliance with OSHA standards.

Products manufactured: Bearings, Bells, Buzzers, Gongs, Sirens & Aural Warning Devices, Bushings, Glass, Plastic, Metal, Rubber, Etc., Conductive Plastic Materials, Containers, Covers, Protective (Including Dust), Laminates, Materials, Self-Lubricating, Plastic Raw Materials, Liquids, Pellets, Powders, Resins, Rubber, Seals, Services, Assembly, Production & Test, Tapes, Electrical Insulation, Tapes, Films & Foils, Pressure Sensitive, Tubing

Local Sales Offices & Reps.

Ala	Birmingham	205-251-8951
Ala	Mobile	205-456-8481
Alas	Anchorage	907-337-2863
Ariz	Phoenix	602-264-0861
Cal	Anaheim	714-538-0021
Cal	North Hollywood	213-980-0840
Cal	So. San Francisco	415-761-0740
Colo	Denver	303-287-2506
Conn	Hartford	203-278-6900
Del	Wilmington	302-655-1027
DC	Washington	202-638-4552
Fla	Jacksonville	904-724-7274
Ga	Atlanta	404-351-9800
Ill	Chicago	312-243-2500
Ill	Rockford	815-874-9444
Ind	Indianapolis	317-639-5343
Ind	South Bend	219-272-1200
Iowa	Davenport	319-391-2224
Kans	Kansas City	913-888-5950
Ky	Louisville	502-448-6444
La	New Orleans	504-834-6222
Md	Baltimore	301-485-4200
Mass	Boston	617-666-8840
Mich	Detroit	313-869-9500
Mich	Flint	313-238-0411
Mich	Grand Rapids	616-452-6926
Mich	Kalamazoo	616-343-1341
Minn	Minneapolis	612-339-7941
Mo	St. Louis	314-991-1790
NH	Manchester	603-627-3583
NJ	Linden	201-862-8900
NJ	Pennsauken	609-662-4100
NM	Albuquerque	505-345-2516
NY	Albany	518-459-3377
NY	Buffalo	716-684-9200
NY	Long Island City	212-721-8484
NY	Rochester	716-235-2260
NC	Charlotte	704-523-7880
Ohio	Akron	216-644-7183
Ohio	Cincinnati	513-271-2780
Ohio	Cleveland	216-441-2200
Ohio	Columbus	614-228-6991
Ohio	Toledo	419-244-6757
Okla	Tulsa	918-836-6556
Pa	Philadelphia	215-925-3473
Pa	Pittsburgh	412-372-2202
RI	Warwick	401-738-6969
Tenn	Memphis	901-365-6600
Tex	Dallas	214-631-4460
Tex	Ft. Worth	817-332-4421
Tex	Houston	713-928-2581
Va	Richmond	804-276-2791
Wash	Seattle	206-682-7252
Wisc	Green Bay	414-435-8811
Wisc	Milwaukee	414-444-7650

CAHNMAN, HVGO N. ASSOCS., See Casso-Solar Inc.

CAI, DIV. BOURNS INC., 550 W. Northwest Hwy., Barrington, Ill., 60010, Tel: 312-381-2400, TWX: 910-651-1904; Empl.: 600; Minimum order: $100

For info on price: F. Consdorf x 406; Application info: K. Paap x 415; Customer service: G. Lohuis x 401; Delivery info: F. Consdorf x 406

Products manufactured: Cameras, Lenses, Optical & Camera

Local Sales Offices & Reps.

Cal	Los Angeles	213-670-4909
Va	Arlington	703-525-2590

CAIG LABS., INC., 455A Union Ave. Box 788), Westbury, N.Y., 11590, Tel: 516-334-1940; Empl.: 12; Minimum order: $10

Customer service: J. Howard

Free literature available: Bulletin C-200-Technical Facts about Cremoline Contact cleaner as applied to electronic and electrical metal contacts.

Products manufactured: Chamber, Environmental Test, Cleaners & Solvents, Coatings, Controls/Control Eqpt., Flux, Brazing & Soldering Materials, Heat Guns, Production, Lamps, Lubricants, Meters, Solder (All Types), Solder Pots & Baths, Soldering Accessories, Soldering Equipment

Local Sales Offices & Reps.

Cal	Northridge, P Dooley	213-360-2231
Fla	Winterhaven, S & S Sls. Reps.	813-293-7304
Ill	Palatine, J Clark	312-358-5095
Ohio	Canton, G. Melbourne	216-492-3333

Local Distributors

Ark	Little Rock, Carlton-Bates Co., 6821 Scott Hamilton Dr.	501-562-9100
Cal	Los Angeles, California Elec. Sply., 1911 Armacost W.	213-826-8333
Del	Wilmington, Wholesale Elctrn., 1402 Walnut St.	302-656-9988
Ill	Champaign, Klaus Radio Inc., 905 S. Neil St.	217-356-1896
Ill	Chicago, Complete Reading Elect., 100 So. Jefferson St.	
Ky	Louisville, Burks, P.I., 842 S. 7th	502-589-3960
La	Baton Rouge, R.P.S. Elctrns., Inc., 1732 Plank Rd.	504-344-3761
Md	Bethesda, Empire Elctrns., 4907 Rugby Ave.	301-OL6-3300
Md	Rockville, Capital Radio Wholesalers, 12270 Wilkins Ave.	301-881-2270
Mich	Grand Rapids, Stotts-Friedman, 2035 Eastern Ave., S.E.	616-241-6731
Mo	Kansas City, Walters Radio Supply Inc., 3635 Main St.	816-531-7015
NC	Fayetteville, Southeastern Radio, 325 Rowan St.	
Ohio	Cleveland, Complete Reading Elect., 13311 Enterprise Ave.	
Tex	El Paso, Midland Spec. Co., 2235 Wyoming Ave.	915-533-9555
Tex	Odessa, Midland Specialty Co., 2101 Andrew's Highway	915-337-7365
Va	Norfolk, Priest Elctrns., 6431 Tidewater Dr.	703-855-2021
Va	Norfolk, Radio Parts Dist. Co., 5652 E. Virginia Bch. Blvd.	703-855-8095

CAL-METEX CORP., 509 Hindry Ave., Inglewood, Cal., 90301, Tel: 213-641-8000, TWX: 910-328-6100; Empl.: 37

Products manufactured: Adhesives (All Types), Air Cleaners & Filters (Shielded & Unshielded), Bezels, Shielded & Unshielded, Braid, Cable, Conductive Plastic Materials, Contacts, Electrical, Containers, Gaskets, Shielding, R-F-Also See Shields, R-F, Honeycomb Sheets, Panels, etc., Rubber, Shields, Tubing, Wire, Wire Shielding

Local Sales Offices & Reps.

Ariz	Phoenix, Intermountain Engrg.	602-947-7379
Cal	Los Altos, Frauman Assoc.	415-941-0660
Cal	Los Angeles, Universal Comps.	213-474-1537
Colo	Denver, Walter Assoc.	303-777-5585
Wash	Seattle, Jon B. Jolly, Assoc.	206-938-4166
FOR:	Can., Vancouver, B.C., J.B. Jolly	206-938-4166

CAL-POWER CORP., 140 Kansas St., El Segundo, Calif., 90245, Tel: 213-772-2171, TWX: 910-348-6678; Empl.: 30

For info on price: L. Berggren; Application info: K. Richter

Products manufactured: Chargers, Battery, Controls/Control Eqpt., Converters, Eliminators, Battery, Inverters, Monitors, Power Supplies, Regulators

CAL-R, INC., P.O. Box 1397, Santa Monica, Cal., 90406, Tel: 213-451-9761, TWX: 910-343-6966; Empl.: 130

Products manufactured: Capacitors, Fixed, Resistors, Thermistors

Local Sales Offices & Reps.

Ariz	Phoenix, Toward Engrg. Assoc.	602-277-1453
Cal	Mountain View, Caltron/Pyle, Inc.	415-964-3244
Cal	San Diego, LoDan Inc.	714-279-6383
Colo	Boulder, Mile High Elctrns.	303-444-5615
Conn	Woodbridge, Electronic Mktg. Co.	203-397-1461
Fla	Tampa, F. C. Nickerson Co.	813-885-1416
Ill	Northbrook, Raines-Brin Assocs.	312-498-0890
Ind	Greenwood, Valentine Schillinger	317-888-2260
Ind	South Bend, Valentine Schillinger	219-291-6258
Md	Baltimore, Wafer Assocs.	301-744-1133
Minn	St. Louis Park, Beta Engrg. Co.	612-925-4422
Mo	Blue Springs, Cairns & Hayes Elec. Sls.	816-229-1404
Mo	St. Charles, Cairns & Hayes Elec. Sls.	314-946-6677
NY	Bay Shore, Brunetta Sls. Co.	516-586-1800
NY	Dewitt, Tri-Tech Elctrns.	315-446-2881
Ohio	Cleveland, Del Steffen & Assocs.	216-461-8333
Ohio	Dayton, Del Steffen & Assocs.	513-293-3145
Pa	Narberth, Electro-Comp Sls. Co.	215-664-3576
Tex	Dallas, Hillman Entprs.	214-827-4790
Wash	Bellevue, Ruggles Tech. Sls.	206-455-2778
EXP:	Cal., Santa Monica, Trans-World Trade	213-472-0444
FOR:	Can., Mississauga, Ont., Anbak Sls. Can., Ltd.	416-625-1061

CALEX MGF. CO., INC., 3305 Vincent Rd., Pleasant Hill, Calif., 94523, Tel: 415-932-3911; FSC No: 29988; Empl.: 30; Minimum order: $15 .... p. 1•240,1153

For info on price: A. Dallons; Application info: R. A. Belford; Customer service: T. Cate; Delivery info: A. Dallons

Free literature available: Product Catalog, Individual Data Sheets, Power Supply Brochure - 12 page brochure containing modular power supplies and mounting kits.

Products manufactured: Alarms, Amplifiers, Comparators, Current Sources, Delays, Time (Excluding Delay Lines, Timers, Delay & Relays, Time-Delays), Detectors, Filters, Magnetometers, Monitors, Multipliers, Power Supplies, Regulators, Relays, Timers, Voltage Sources

Local Sales Offices & Reps.

Cal	Mountain View, Gado Instr. Sls.	415-961-2222
Minn	Wayzata, Wm. A. Sternad	612-473-4700
Wash	Bellevue, Topp Engr. Sls. Co.	206-747-5401

Local Distributors

Cal	Santa Monica, Distr. Specialist, 1710 Santa Monica Blvd.	213-829-5401

CALICO DIV., California Instrus. Co., Div. Aiken Inds., Inc., 5150 Convoy St., San Diego, Cal., 92111, Tel: 714-279-8620; FSC No: 16067; Empl.: 80; Minimum order: $25

For info on price: W.W. Hanford; Application info: W.W. Hanford; Customer service: D. Chilcoat; Delivery info: W.W. Hanford

Free literature available: Cimron® Digital Multimeter Selection Guide Invertron® AC Power Source, Short Form Catalog

Products manufactured: Amplifiers, Converters, Counters, Meters, Oscilloscopes, Tape Recording Accessories

Local Sales Offices & Reps.

Ala	Huntsville, FM Assocs.	205-536-9990
Ariz	Scottsdale, Williams-Assocs., Inc.	602-947-4297
Cal	Los Altos, Jay Stone & Assoc.	415-948-4563
Cal	Los Angeles, QPL Inc.	213-682-3705
Cal	Los Angeles, T. Louis Sniter Co.	213-836-6170
Cal	San Diego, QPL Inc.	714-274-3722
Colo	Denver, Williams-Assocs., Inc.	303-373-4730
Fla	Orlando, FM Assocs.	305-851-5710
Fla	Tequesta, FM Assoc.	305-746-3128
Haw	Honolulu, Aloha Assocs.	808-941-1574
Ill	Chicago, SEA Inc.	312-282-6694
Ind	Carmel, SEA Inc.	317-846-2593
Kans	Overland Park, Palatine Engrg.	913-262-5643
Kans	Shawnee Mission, EIR Co.	913-362-0919
La	Baton Rouge, Systems Engrg. Sls. Co., Inc.	504-927-7574
Md	Silver Springs, Eastern Instr.	301-681-6500
Mass	Needham, Addelco Corp.	617-444-4754
Mich	Detroit, Group Ten	313-549-3910
Minn	Minneapolis, Waytek	612-933-2133
Mo	Hazelwood, EIR Co.	314-895-4100
Mo	St. Louis, Palatine Engrg.	314-426-7055

NM	Albuquerque, Williams-Assocs., Inc.	505-255-1638
NY	Great Neck, Eastern Instr. of N.Y.	516-466-9505
NY	North Syracuse, NACO Electronics	315-699-2651
NC	Greensboro, FM Assocs.	919-294-2754
Ohio	Cleveland, Group Ten	216-486-2800
Ohio	Dayton, Group Ten	513-277-6531
Pa	Philadelphia, Eastern Instr. of Phil.	215-927-7777
Tex	Houston, Systems Engrg. Sls. Co., Inc.	713-668-7840
Tex	Richardson, Systems Engrg. Sls. Co., Inc.	214-231-9364
Wash	Seattle, Datacom Assocs.	206-285-2525

CALIFORNIA AVIONICS LABS., INC., Box 701, Palo Alto, Calif., 94302, Tel: 415-328-7999; Empl.: 5; Minimum order: $10

Customer service: K. A. Hirschberg

Free literature available: Cable Catalog

Products manufactured: Cable Assemblies & Harnesses, Calibrators, Cords, Data Acquisition & Reduction Systems, Generators, Leads, Test & Adaptors

CALIFORNIA COMPUTER PRODS., 2411 W. La Palma Ave., Anaheim, Cal, 92801, Tel: 714-821-2011, TWX: 910-591-1154; Empl.: 4000

For info on price: Sls. Off.; Application info: J. L. Pyle; Delivery info: Sls. Off.

Free literature available: Literature on the following products: digital plotting equipment, disk and tape memory systems, COM systems, intelligent terminals, and our automated tape library.

Products manufactured: Computers, Digitizers, Pencil Follower (Inc. Coordinate & Graphic), Disc Packs, Magnetic, Drums Computer Memory, Memory Systems, Paper, Graphic Recording, Printers, Recorders

Local Sales Offices & Reps.

Ala	Huntsville	205-837-8540
Cal	El Segundo	714-523-7081
Cal	Newport Beach	714-833-0141
Cal	Sunnyvale	408-732-8421
Colo	Denver	303-433-7136
Conn	Meridian	203-634-3181
Fla	Maitland	305-645-1011
Fla	Orlando	305-851-1580
Ga	Atlanta	404-449-4610
Ill	Rosemont	312-693-6030
Kans	Shawnee Mission	913-362-0707
Md	Rockville	301-770-5274
Mass	Waltham	617-890-0484
Mich	Southfield	313-358-3130
Minn	Bloomington	612-888-0297
Minn	Minneapolis	612-888-0297
Mo	St. Louis	314-567-5215
NJ	Union	201-686-7100
NY	Fairport	716-223-2110
NY	Hicksville	516-938-7255
Ohio	Cleveland	216-243-7180
Ohio	Dayton	513-276-3915
Okla	Tulsa	918-742-8039
Ore	Beaverton	503-646-3942
Pa	Bala Cynwyd	215-667-1740
Pa	Pittsburgh	412-922-3430
Pa	Wayne	215-687-2910
Tex	Dallas	214-661-2326
Tex	Houston	713-781-6133
Utah	Salt Lake City	801-355-3459
Wash	Bellevue	206-747-9321
EXP:	Anaheim, Cal.	714-821-2011

CALIFORNIA INSTRS. CO., Div. Aiken Inds. Inc., 5150-Convoy St., San Diego, Cal., 92111, Tel: 714-279-8620, Telex: 695047; FSC No: 16067; Empl.: 80; Minimum order: $25 .... p. 1•626-629,1164,1165

For info on price: W. W. Hanford; Application info: W. W. Hanford; Customer service: D. Chilcoat; Delivery info: W. W. Hanford

Free literature available: Cimron® Digital Multimeter Selection Guide Invertron® AC Power Source Short Form Catalog

Products manufactured: Amplifiers, Converters, Counters, Generators, Isolators, Meters, Oscillators, Oscilloscopes, Power Supplies, Probes, Protectors, Regulators, Shifters, Suppressors, Tape Recording Accessories, Transformers, Voltage Sources

Local Sales Offices & Reps.

Ala	Huntsville, FM Assoc.	205-536-9990
Ariz	Scottsdale, Williams Assoc.	602-947-4297
Cal	Los Altos, Jay Stone & Assoc.	415-948-4563
Cal	Los Angeles, Basic Systems	800-252-9075
Colo	Denver, Williams Assoc.	303-373-4730
Fla	Orlando, FM Assoc.	305-851-5710
Fla	Tequesta, FM Assoc.	305-746-3128
Haw	Honolulu, Aloha Assoc.	808-941-1574
Ill	Chicago, Sea Inc.	312-282-6694
Ind	Carmel, Sea	317-846-2593
Kans	Shawnee Mission, EIR Co.	913-362-0919
Md	Silver Springs, Eastern Instrumentation	301-681-6500
Mass	Needham, Addelco Corp.	617-444-4754
Mich	Detroit, Group Ten	313-549-3910
Minn	Minneapolis, Waytek Inc.	612-933-2133
Mo	Hazelwood, EIR Co.	314-895-4100
NM	Albuquerque, Williams Assoc.	505-255-1638
NY	Great Neck, Eastern Instr. of N.Y.	516-466-9505
NY	North Syracuse, NACO Elctrns.	315-699-2651
NC	Greensboro, FM Assoc.	919-294-2754
Ohio	Cleveland, Group Ten	216-486-2800
Ohio	Dayton, Group Ten	513-277-6531
Pa	Philadelphia, Eastern Instr. of Phil.	215-927-7777
Tex	Houston, Systems Engrg. Sls. Co.	713-668-7840
Tex	Richardson, Systems Engrg. Sls. Co.	214-231-9364
Wash	Seattle, Datacom Assoc.	206-285-2525

CALIFORNIA MICROWAVE, INC., 455 W. Maude Ave., Sunnyvale, Cal., 94086, Tel: 408-732-4000, TWX: 910-339-9231; Empl.: 315

For info on price: Mktg. Dept.; Application info: Mktg. Dept.; Customer service: R. Parry; Delivery info: Contracts Dept.

Products manufactured: Circulators, Ferrite, Converters, Isolators, Multipliers, Oscillators, Testers

Local Sales Offices & Reps.

Cal	Los Angeles, Cain Technology	213-476-2251
Cal	Mountain View, D. Lay Assocs.	415-968-7500
Colo	Englewood, Cal. Microwave	303-770-8228
Ill	Park Ridge, R. F. Specialists	312-698-2044
Ind	Ft. Wayne, R. F. Specialists	219-485-8982
Md	Glen Burnie, Micro-Comp	301-761-4600
Mass	Lexington, Lancer Assocs.	617-861-1720
NY	Great Neck, Trionic Assocs.	516-466-2300
NY	Skaneateles, Robtron	315-685-5731
Pa	Ambler, W. M. Assocs.	215-643-4119
Tex	Arlington, N and W Sls.	817-461-4443
Va	Arlington, Cal. Microwave	703-841-1774

CALLINS CAPACITORS, Box C, Greenfield, Tenn., 38230, Tel: 901-235-2234, TWX: 810-590-3779; Empl.: 436; Minimum order: $100

For info on price: M. O'Hara; Application info: J. Stewart; Customer service: M. R. Maness; Delivery info: J. Hamilton

Products manufactured: Capacitors, Fixed

Local Sales Offices & Reps.

Ala	Huntsville, Comps. Sls. Corp.	205-883-7794
Ariz	Phoenix, Southwest e/m Engrg.	602-993-0250
Ariz	Phoenix, W. Bert Knight Co.	602-242-3057
Cal	Newport Beach, W.B. Knight Co.	714-833-8250
Cal	Redwood City, Parks & Pruitt Assocs.	415-364-1640
Conn	Meriden, Electro Prods. Sls.	203-235-4040
Conn	Waterbury, Selmark Assocs.	203-754-3060
Fla	Indialantic, Comps. Sls. Corp.	305-727-2681
Fla	N. Palm Beach, Callins Ind.	305-848-3466
Fla	Terra Ceia, Comps. Sls. Corp.	813-722-6376
Ind	Columbus, A. Bolenbaugh	812-372-8666
Md	Baltimore, Stitzer Assocs.	301-823-2600
Mass	Millis, Selmark Assocs.	617-376-2914
Mass	Waltham, Electro Prods. Sls.	617-899-1570
Mich	Jackson, Norwood Scroggs Co.	517-750-1170
Minn	Minneapolis, Comstrand	612-560-5300
Minn	Minneapolis, White Sls. Co.	612-929-4661
Mo	Hazelwood, Dy-Tronix	314-731-5799
Mo	Kansas City, Dy-Tronix	816-761-6543
NY	Camillus, C.L. Avery Assocs.	315-672-3988
NY	New York City, C.L. Avery Assocs.	212-823-5224
NY	Rye, C.L. Avery Assocs.	914-967-7610
NC	Raleigh, Comps. Sls. Corp.	919-832-1897
Okla	Broken Arrow, P. J. Scanlon Co.	918-251-1427
Okla	Tulsa, P.J. Scanlon Co.	918-663-1427
Pa	Paoli, Stitzer Assocs.	215-644-5500
Tex	Houston, P.J. Scanlon Co.	713-497-2302
Tex	Richardson, P.J. Scanlon Co.	214-231-4661
Wisc	Milwaukee, Gentron Corp.	414-351-1660

CALMARK CORP., 408 S. Gladys Ave., San Gabriel, Cal., 91776, Tel: 213-287-0451; FSC No: 52094; Empl.: 6; Minimum order: $10

For info on price: W, J. Jacobs; Application info: A. Weisman; Customer service: M. Kerby; Delivery info: M. Kerby

Free literature available: Technical Data and Pricing for PC Card Cages, Card Guides, Card Insertion and Extraction Devices.

Products manufactured: Chassis, Circuit Board Mounting, Chassis, Metal, Guides, Circuit Board, Pullers, Racks

Local Sales Offices & Reps.

Ala	Huntsville, Reynolds & Assocs.	205-536-1941
Ariz	Tempe, Delta Elctrn. Sls. Corp.	602-966-9903
Cal	Fremont, H. K. Foraker Co.	415-657-2213
Cal	San Gabriel, Calmark Corp.	213-287-0451
Colo	Denver, West/Mark Assocs.	303-433-7181
Fla	Satellite Beach, Reynolds & Assocs. Inc.	305-773-4700
Ga	Atlanta, Reynolds & Assocs. Inc.	404-252-5360
Ill	Arlington Hgts., Martec Assocs.	312-956-8090
Md	Towson, Kraft Electronic Sls.	301-828-5838
Mass	Westboro, Technical Mktg. Svcs. Co.	617-366-8462
Minn	Minneapolis, Components Group	612-824-4222
NJ	Medford, Component Consultants	609-654-2800
NY	Cooperstown, Fitzelle Assocs.	607-547-9333
NY	Northport, Production Sls. Assocs.	516-757-0336
Ohio	Cleveland, Components, Inc.	216-842-2737
Ohio	Hamilton, Components, Inc.	513-721-2997
Okla	Broken Arrow, P. J. Scanlon Co.	
Tex	Richardson, P. J. Scanlon Co.	214-231-4661

CALTRON INDUSTRIES, 2015 Second St., Berkeley, Cal., 94710, Tel: 415-548-1966; Empl.: 18

For info on price: S. Foster; Application info: J. Chourre; Customer service: S. Foster; Delivery info: S. Foster

Free literature available: Lab products catalog-wire, cable, tubing, & cable assemblies for laboratories. Manufacturing services data sheets-wire & cable harnessing, cable assemblies.

Products manufactured: Cable Assemblies & Harnesses, Cable

CALVERT ELCTRNS., INC., 220 E. 23rd St., New York, N.Y., 10010, Tel: 212-679-1340, TWX: 710-581-4086; Empl.: 50; Minimum order: $50

For info on price: J. McBride; Application info: I. Gips; Customer service: R. Borden; Delivery info: P. Karl

Products manufactured: Diodes, Integrated Circuit Devices, Transistor, Diode, Thyristor Heat Dissipators, Transistors, Tubes

Local Sales Offices & Reps.

Cal	San Jose, Calvert Elctrns.	408-265-0521
Fla	Clearwater, Brennan Assocs.	813-446-5006
Fla	Orlando, Brennan Assocs.	305-425-4382
Ill	Chicago, R. Olson Assts.	312-545-3237
Minn	Minneapolis, J.E.M. Anderson Co.	612-823-6459
Pa	Willow Grove, R. Lewis Sales	215-659-0704

CAMBRIDGE MEMORIES, INC., 12 Crosby Dr., Bedford, Mass., 01730, Tel: 617-271-6500, Telex: 92-3336; Empl.: 500

For info on price: W. R. Nimee 271-6502; Application info: W. R. Nimee 271-6502; Customer service: D. C. Turner 271-6505; Delivery info: D. C. Turner 271-6505

Products manufactured: Memory Systems

Local Sales Offices & Reps.

Ariz	Phoenix, Mountaintek	602-242-5551
Cal	Los Altos, Casey Assocs.	415-941-6892
Cal	Torrance, Mitronics Inds.	213-323-7934
Colo	Boulder, Mountaintek	303-444-1738
Colo	Littleton, Mountaintek	303-794-1779
Fla	Orlando, Technical Assocs.	305-894-7531
Ind	Columbus, Miltronics	812-376-6321
Kans	Shawnee Mission, Inland Assocs.	913-362-2366
Mass	Framingham, Victor Assocs.	617-237-4070
Mass	Waltham, Computer Mktg. Assoc.	617-890-1776
Mo	Glencoe, Inland Assocs.	314-938-4992
NM	Albuquerque, Mountaintek	505-268-0003
NY	Great Neck, Measurement Tech.	516-482-3500
Pa	Melrose Park, R. Meyers Assocs.	215-224-1663
SC	Spartanburg, Technical Assocs.	803-579-2904
Tex	Dallas, Remtek	214-369-8146
Tex	Houston, Remtek	713-664-2113
Utah	Salt Lake City, Mountaintek	801-278-6056
Va	Annandale, Roy Lankenau Assocs.	703-256-0800
Wash	Bellevue, L. B. Robbins Co.	206-455-1246

CAMBRIDGE THERMIONIC CORP., 455 Concord Ave., Cambridge, Mass., 02138, Tel: 617-491-5400, TWX: 710-320-6399; FSC No: 71279; Empl.: 614; Minimum order: $25

Directory of Local Distributors Starts on page 401

For info on price: R. M. Soule; Application info: W. Walkup; Customer service: R. M. Soule; Delivery info: Cust. Svc. Dept.

Products manufactured: Bars, Shorting, Boards, Plug-In, Boards, Printed Circuit, Boards, Programming, Capacitors, Fixed, Capacitors, Variable, Cards, Linear Function, Cards, Logic, Chokes, Clamps & Clips, Coils Including Assemblies & Forms, Connectors, Controls/Control Eqpt., Converters, Cooling/Heating Modules, Thermoelectric, Crystals, Delay Lines, Enclosures, Module, Plug-In, Eyelets, Filters, Integrated Circuit Devices, Jack Covers, Kits, Breadboarding (For Engineers), Kits, Terminal, Knobs, Machines/Machinery, Production, Modules, Logic, Encapsulated, Motors, Panels, Plug Adapters, Plug & Jack Sets, Posts, Power Supplies, Probes, Pullers, Racks, Shift Registers, Socket Adapters, Sockets, Spacers, Terminal Blocks, Boards & Strips, Terminals, Testers, Transformers

Local Sales Offices & Reps.

Cal	Belmont, Cambridge Thermionic	415-592-4524
Cal	Los Angeles, Cambridge Thermionic	213-776-0472
Colo	Denver, Zeus, Inc.	303-770-4400
Fla	Casselberry, Publicover Assocs.	305-834-5775
Ill	Chicago, Berndt Assocs., Inc.	312-283-0713
Ind	Ft. Wayne, Berndt Assocs., Inc.	317-844-0114
Kans	Overland Park, Ensco-Rep	913-381-7557
Mass	Cambridge, Cambridge Thermionic	617-491-5400
Mich	Dearborn, Pitcher-Poulin, Inc.	313-582-5450
Minn	St. Paul, Cahill Assocs.	612-646-7217
Mo	St. Louis, Ensco-Rep	314-567-3935
NM	Albuquerque, Zeus	505-256-9831
NC	Charlotte, Robert W. Chapman & Co.	704-525-2421
NC	Raleigh, Robert W. Chapman & Co.	919-782-2624
Ohio	Cleveland, K.W. Elctrn. Sls.	216-831-8292
Ohio	Dayton, K.W. Elctrn. Sls.	513-890-2150
Ore	Portland, J.J. Backer Co.	503-297-3776
Ore	Salem, J.J. Backer Co.	503-362-0717
Pa	Allison Park, K W Electronic Sls.	412-487-4300
Pa	Philadelphia, K.B. Erdman Co.	215-224-1833
SC	Greensboro, Robert W. Chapman & Co.	803-232-5391
Tex	Houston, R.F. Kimball	800-492-2805
Tex	Richardson, R.F. Kimball	214-231-3447
Utah	Salt Lake City, Zeus	801-486-2317
Wash	Seattle, J.J. Backer Co.	206-285-1300
Wisc	Brookfield, Berndt Assocs.	414-786-6950
FOR:	Can., Calgary, Alba., Smith-Paterson & Assoc.	
FOR:	Can., Dorval, Que., Cambridge Thermionic (Can.) Ltd.	514-636-9815
FOR:	Can., Vancouver, B.C., Smith-Paterson & Assoc.	604-681-0743
FOR:	Can., Winnipeg, Manitoba, Smith-Paterson & Assoc.	204-774-1855

Local Distributors

Ala	Huntsville, Cramer/E.W. Huntsville, 2310 B. Wallace A	205-539-5722
Ariz	Phoenix, Cramer/Arizona, 2816 N 16th St.	602-263-1112
Cal	Gardena, Bell Inds., 306 E. Alondra Blvd.	213-321-5802
Cal	Menlo Pk., Bell Inds., 1070 O'Brien Dr.	415-323-9431
Colo	Denver, Cramer/Denver, 5465 Evan Pl.	303-758-2100
Conn	Hamden, Wilshire Elctrns., 2554 State St.	203-281-1166
Fla	Hollywood, Cramer/E.W. Hollywood, 4035 N. 29th A.	305-923-8181
Ga	Atlanta, Cramer/E.W. Atlanta, 3923 Oakcliff Ind. C.	404-448-9050
Ill	Chicago, Newark Elctrns., 500 N. Pulaski Rd.	312-638-4411
Ill	Mt. Prospect, Cramer/Chicago, 1911 S. Busse R.	312-593-0230
Ind	Ft. Wayne, Fort Wayne Elec. Sup., 3606 Maumee Ave.	219-423-3422
Kans	Lenexa, Hall-Mark Elctrns., 9006 Rose Hill Rd.	913-888-4747
La	New Orleans, Southern Radio Sup., 1909 Tulane Ave.	504-524-2345
Md	Rockville, Cramer/E.W. Wash., Drawer 1648	301-948-0110
Mass	Boston, DeMambro, 1095 Commonwealth	617-787-1200
Mich	Wyoming, Newark Ind. Elect., 3645 Linden Ave. SE	616-241-6681
Minn	Edina, Cramer/Bonn, 7275 Bush Lake Rd.	612-941-4860
MO	Univ. City, Olive Ind. Elect., 6662 Olive Blvd.	314-863-7800
Neb	Lincoln, Scott Elctrn. Sup., 4040 Adams St.	402-434-8308
NJ	Camden, General Radio Supply, 600 Pen St.	609 964-8580
NJ	Rahway, Terminal Elctrns., 1463 Pinewood St.	201-381-5700
NM	Albuquerque, Cramer/New Mexico, 137 Vermont N.E.	505-265-5767
NY	Binghamton, Stack Indust. Elect., 45 Washington St.	607-723-6326
NY	Rochester, Cramer/Rochester, 3259 Winton Rd. S.	716-275-0300
NC	Winston-Salem, Cramer/E.W. W/Salem, 938 Burke St.	919-725-8711
Ohio	Dayton, Pioneer Standard Ele., 1900 Troy St.	513-236-9900
Okla	Tulsa, Hall-Mark Elctrns., 4846 S. 83rd E.	918-835-8458
Pa	Philadelphia, Philadelphia Elect., 1225 Vine St.	215-568-8288
Tex	Dallas, Cramer/Texas, 2970 Blystone La.	214-350-1355
Wash	Bellevue, Bell Inds., 1900 132nd N.E.	206-747-1515
Wisc	Milwaukee, Cramer/Wisconsin, 5626 N. 91st St.	414-462-8300

CAMCAR SCREW & MFG., 600 18th Ave., Rockford, Ill., 61101, Tel: 815-226-3600

Customer service: H. Kirrish 815-226-2400

Products manufactured: Fasteners

CAMUSAT GUEGUEN TELECOM. INT'L., 2 Windward Ave., White Plains, N.Y., 10605, Tel: 914-949-3719, TWX: 710-568-1305; Empl.: 230

Customer service: G. N. Snider

Products manufactured: Antenna Towers & Supports, Antennas, Comm. Systems

Advertisment

- Towers, Microwave, Radio, TV: Guyed and Self-Supporting
- Troposcatter Antennas 20' to 120' Lightweight, Patented Design
- Earth Station Antennas for Synchronous Satellities
- Passive Reflectors
- Portable Temporary Towers
- Civil Engineering, Erection, Installation Overseas
- Factories in Europe

CAMWIL INC., 835 Keeaumoku, Honolulu, Haw., 96814, Tel: 808-955-0766; Empl.: 12

Products manufactured: Labels, Temperature Indicating

CANNON, C.F. CO., Springwater, N.Y., 14560, Tel: 716-669-2550; Empl.: 25

Products manufactured: Handsets, Chestsets, Headphones, Headsets, Etc.

CANON U.S.A., INC., 10 Nevada Dr., Lake Success, N.Y., 11040, Tel: 516-488-6700, Telex: 96-1333; Empl.: 400 .... p. 1•942

Products manufactured: Amplifiers, Brushes & Brush Assemblies, Commutators, Controls/Control Eqpt., Heads, Recording Playback, Erase, Motors, Recorders, Scanners, Tachometers, Transports, card

CAPACITOR DIV. GENERAL INSTR. CORP., see General Instr. Corp., Semiconductor Prods. Grp. Capacitor Prods.

CAPLUGS DIV., Protective Enclosures Co., 2150 Elmwood Ave., Buffalo, N.Y., 14207, Tel: 716-876-9855, TWX: 716-858-1022; Empl.: 125

Products manufactured: Plug Buttons, Services, Assembly, Production & Test

CAPITOL MACHINE & SWITCH CO., Box 651, Danbury, Conn., 06810, Tel: 203-744-3300, TWX: 710-456-0365; Empl.: 125 .... p. 1•1970,1971

Products manufactured: Lights, Switches

Local Sales Offices & Reps.

Cal	Downey, Trimarco Inc.	213-861-8244
Cal	Los Altos, Frauman Assocs.	415-941-0660
Cal	San Diego, Tauber & Assocs. Inc.	714-274-7242
Colo	Denver, Franklin Sls. Co.	303-922-3623
Conn	N. Haven, Comp. Rep.	203-239-9762
Fla	Orlando, F. Fausett	305-894-6071
Ga	Smyrna, B-C Elctrns.	404-436-5169
Ill	Oak Pk., G. Petitt	312-261-0342
Kans	Shawnee, Lowell, Kangas & Assocs. Inc.	913-631-3515
Mass	Needham, Comp. Rep.	617-444-2484
Mich	Detroit, Heick & Ralph Assocs.	313-538-3350
Minn	So. Minneapolis, Bitronics Sls. Co.	612-835-7744
Mo	St. Louis, Lowell, Kangas & Assocs., Inc.	314-821-4050
NJ	Livingston, Varrelman-Gorman Co.	201-992-2505
Ohio	Chagrin Falls, E. Frost	216-247-7181
Pa	Philadelphia, J. Biernbaum	215-635-1030
Tex	Dallas, Blackburn Assoc.	214-692-8885
Va	Vinton, F. Fausett & Co.	703-890-1128
Wash	Seattle, John McClamrock Co.	206-244-9391
FOR:	Can., Montreal, Que., H.W. Brieger Sls. Co.	514-482-0722
FOR:	Can., Scarborough, Ont., J.R. Tilton, Ltd.	416-757-4171

CAPTOR CORP., 5040 S. County Rd. (25A), Tipp City, Ohio, 45371, Tel: 513-667-8484; Empl.: 48; Minimum order: $25

For info on price: O. Bruns; Application info: B. Jenks; Customer service: O. Bruns; Delivery info: B. Jenks

Products manufactured: Capacitors, Fixed, Filters

Local Sales Offices & Reps.

Fla	Satellite Beach, Reynolds & Assocs.	305-773-4700
Ill	Chicago, Croydon Elctrns., Inc.	312-237-4343
Ind	Fort Wayne, Croydon-Sarge	219-422-2311
Kans	Wichita, Avionics Engrg. Sls.	316-264-6201
Md	Wheaton, Magyar & Assocs.	301-871-8833
Mass	Framingham, L. Roffer Co.	617-877-4900
Pa	Philadelphia, Magyar & Assocs.	215-763-5044
Tex	Dallas, Blackburn & Assocs.	214-351-9991
EXP:	Smithtown, N.Y., C.P.S.	516-420-9559

CABTRON SYSTEMS, INC., 200 Anets Dr., Northbrook, Ill., 60062; Empl.: 35

Free literature available: Short form Catalog #801 metal cabinets for electronic equipment featuring the exclusive filtered base construction and all modular design.

Products manufactured: Cabinets & Accessories

Local Sales Offices & Reps.

Ariz	Scottsdale, Elctrn. Enterprise	
Cal	Santa Clara, Nova Tronix	408-243-9530
Cal	Tustin, Spaulding Sls. Co.	714-832-1384
Colo	Golden, F.R. Campbell	303-238-4174
Conn	Enfield, Measurement Equip.	203-745-9050
Ind	Fort Wayne, S & S Elctrns.	219-743-4611
Md	Silver Springs, Ansell Engrg.	301-949-1655
Mass	Wakefield, Measurement Equip.	617-245-4870
Mich	Farmington, H. Lowell Co.	
Minn	St. Paul, Countryman Assocs.	612-645-9151
Mo	Hazelwood, Production Automation Corp.	314-731-2331
Mo	Raytown, Production Automation Corp.	816-737-0066
NM	Albuquerque, Elctrn. Enterprise	505-256-3561
NY	Pt. Washington, P.D. Aaron Assocs.	516-883-0600
NY	Syracuse, Tesco Mktg. Resch.	315-463-4566
Ohio	Cleveland, Geotronix Mktg. Assoc.	216-526-2535
Pa	Feasterville, Professional Service Assoc.	215-355-6244
Tenn	Memphis, S.K. Wallace	901-682-2281
Tex	Addison, Dunbar Assoc.	214-239-7151
Wash	Renton, S. Wilson Co.	206-226-0650

CARBONE LORRAINE INDUSTRIES CORP., 400 Myrtle Ave., Boonton, N.J., 07005, Tel: 201-DE 4-0700; Empl.: 350

Products manufactured: Batteries, Brushes & Brush Assemblies, Bushings, Glass, Plastic, Metal, Rubber, Etc., Clamps & Clips, Contacts, Electrical, Fabrics, Conductive, Flashers, Fuses, Graphite Parts, Jigs And Fixtures, Chassis & Circuit Board, Limiters, Materials, Self-Lubricating, Resistors, Thermistors

Local Sales Offices & Reps.

Battery Prods.

La	Westwego, Automatic Power	504-347-2384
Pa	Philadelphia, ESB Inc.	215-342-8000
Tex	Houston, Automatic Power	713-228-9081
Tex	Houston, Tideland Signal Corp.	713-681-6101

Brush Prods.

Cal	San Francisco, Advance Carbon Prod.	415-431-4034
Colo	Arvada, R F S	303-423-1264
Conn	Newington, Interep Co.	203-666-4233
Fla	Boca Raton, J. Krupinski	305-395-5970

Fla	Delray Beach, J.W. Beaver	305-276-0111
Ill	Homewood, Carbone	312-798-7400
Ind	Highland, H A Smolen Co.	219-838-2700
Mich	Detroit, Winton Crawford Assocs.	
Mich	Owosso, Cortem Int. Div., Toledo Commutator Co.	517-725-8192
Minn	Minneapolis, W.B. Odegard	
Miss	Jackson, Lawrence & Co.	601-982-9513
NJ	E. Orange, David A. Rugg Co.	201-675-4822
NJ	Toms River, Beaver Co.	201-244-6467
NY	Syracuse, B. Fleckenstein	315-488-7883
Ohio	Copley, Norco	216-666-3774
Pa	Pittsburgh, Bowman & Co.	412-781-5949
Wisc	Milwaukee, F C du Bois & Assocs.	

Carbolube

Cal	San Francisco, Advance Carbon Prods.	415-431-4034
Conn	Newington, Interep Co.	203-666-4233
Fla	Boca Raton, J. Krupinski	305-395-5970
Fla	Delray Beach, J.W. Beaver	305-276-0111
Ill	Homewood, Carbone	312-SY8-7400
Ind	Highland, H.A. Smolen Co.	219-838-2700
Mich	Franklin, Schlee Sls. & Engrg. Co.	313-499-3430
Minn	Minneapolis, William Be Odegard	612-929-2226
Miss	Jackson, Lawrence Co.	601-982-9513
NJ	East Paterson, Bergen Ind. Supp.	201-796-2600
NJ	Toms River, Beaver Co.	201-244-6467
NY	Carle Place, Atomergic Chemetals Co.	212-786-0900
NY	Syracuse, B. Fleckenstein	315-488-7883
Ohio	Copley, Norco	216-666-3774
Pa	Pittsburgh, Bowman Co.	412-781-5949
Wisc	Oconomowoc, McNellis Representatives	414-567-9731
FOR:	Can., Valleyfield, P.Q., Cipel & Le Carbone	514-373-7337

Chemical Equip.

Cal	Glendale, Horrell Co.	213-245-6452
Cal	Pinole, Cutino Co.	415-223-5555
Fla	Hastings, Paul Sleeper Assoc.	904-328-5177
Ga	Atlanta, G.H. Crossley & Assocs.	404-261-4278
Ill	Homewood, J.J. Carey	312-798-7400
La	Gonzales, Wallace Co.	504-644-2861
Md	Millersville, PSI	301-987-1343
Mass	Cambridge, Mooney New England	617-864-5630
Mich	Galesburg, Hagadone Co.	616-665-4982
Mo	St. Louis, Technical Serv. Corp.	314-647-4252
NJ	Boonton, Carbone	201-334-0700
NJ	Little Falls, Mooney Bros. Co.	201-256-6200
NY	Batavia, F.J. Guppenberger	716-343-0115
NC	Charlotte, Carotek	704-847-4406
Ohio	Cincinnati, R.A. Mueller & Assocs.	513-242-2535
Okla	Tulsa, Laster/Castor Corp.	918-663-7365
Pa	McMurray, Kenneth R. Sears	412-941-8574
Pa	Philadelphia, M & S Seitz Co.	215-563-6136
Tenn	Chattanooga, David F. Moore & Assocs.	615-622-2123
Tex	Houston, Mercer Engineers	713-529-6121
Wisc	Milwaukee, A.E. Rasmussen Co.	414-342-2065
For:	Can., Valleyfield, P.Q., Cipel & Le Carbone Ltd.	514-373-7337

CARBORUNDUM CO., Graphite Prods. Div., Box 339, Niagara Falls, N.Y., 14302, Tel: 716-278-2731, Telex: 91 555; Empl.: 250 .... p. 1•2309-2315; p. 2•1445-1447

For info on price: D. L. Pietras 716-278-2521; Application info: H. R. Emes 716-278-2143; Customer service: N. L. Nadeau 716-278-2521; Delivery info: N. L. Nadeau 716-278-2521

Products manufactured: Abrasive Belts, Compounds, Cords, Powders, etc., Coatings, Dummy Loads, Heaters & Heating Elements, Insulators & Insulation, Materials, Self-Lubricating, Resistors, Suppressors, Terminals, Thermistors

Local Sales Offices & Reps.

Ala	Huntsville, Twentieth Century Mktg.	205-772-9237
Cal	El Segundo, Varigon Assocs.	213-679-0621
Cal	Palo Alto, O'Donnell Assocs. North	415-327-9260
Cal	San Diego, Varigon Assocs.	714-299-5413
Fla	Clearwater, WMM Assocs.	813-477-2533
Ill	Chicago, T.B. Hunter Assoc.	312-777-2500
Ind	Indianapolis, Electro-Rep	317-255-4147
Md	Westminster, FBD Sls.	301-876-2396
Mass	West Springfield, Carborundum	413-739-7361
Mich	Southfield, Rep Assocs.	313-354-9066
NY	Elmont, Crane & Egert Corp.	516-488-2100
NY	Niagara Falls, Carborundum	716-278-2521
NC	Cary, F.B.D. Sls.	919-467-7595
Ohio	Dayton, Sidnell Co.	513-433-7761
Pa	Ambler, Kirk-Sandell	215-643-2100
Tex	Houston, Vista Assocs.	713-661-0119
Tex	Richardson, Vista Assocs.	214-235-4547
Va	Portsmouth, F.B.D. Sls.	804-484-3162

CARCO ELCTRNS., 1180 O'Brien Dr., Menlo Park, Calif., 94025, Tel: 415-321-8174, Telex: 348482; Empl.: 41

For info on price: J.M. Carter; Application info: W.M. Spont; Customer service: J.M. Carter; Delivery info: W.M. Spont

Products manufactured: Actuators, Analyzers, Bearings, Bridges, Modulators, All Kinds, Simulators, Testers

CARDINAL CONTROL CO., 110 Kensington Rd., Kensington, Conn., 06037, Tel: 203-828-6379; Minimum order: $10

Customer service: E. P. Beatman

Free literature available: Relay Catalog - Standards and specials, coils, switches assemblies, Timer Catalog - Solid State standards and specials. Automac Literature-Press overload control. Accessories Literature-Sockets, brackets, clips.

Products manufactured: Coils Including Assemblies & Forms, Controls/Control Eqpt., Relays, Services, Assembly, Production & Test, Sockets, Switches, Timers

CARDION ELCTRNS., Unit General Signal Corp., Long Island Expwy., Woodbury, N.Y., 11797, Tel: 516-921-7300, TWX: 510-221-2179; FSC No: 12909; Empl.: 300

Customer service: J.F. Riley Ext. 211

Products manufactured: Comm. Systems, Control Systems, Air Traffic, Converters, Data Acquisition & Reduction Systems, Decoders, Display Devices/Displays, Monitors, Radar Systems, Receivers, Transmission Systems, Data

CARLINGSWITCH INC., 505 New Park Ave., W. Hartford, Conn., 06110, Tel: 203-233-5551, TWX: 710-425-0034; Empl.: 650; Minimum order: $25 p. 1•1972,1973

For info on price: B. Boucher; Application info: R. Smith; Customer service: M. Miller; Delivery info: M. Miller

Free literature available: Full Line - Cat G Short Form Distributing - Cat GS

Products manufactured: Switch Handle Boots, Switches

Local Sales Offices & Reps.

Cal	Van Nuys, Pacific Switch	213-873-4802
Conn	W. Hartford, Atlantic Switch	203-523-5259
Fla	Hialeah, Switch Controls	305-822-0892
Ill	Wheaton, Conectrix	312-653-1130
Tex	Dallas, Texaswitch	214-357-1768

CAROLINA MEDICAL ELCTRNS., INC., U.S. 52 Expwy., Box 307, King, N.C., 27021, Tel: 919-983-5132; Empl.: 26; Minimum order: $5

Customer service: C. R. Jones

Products manufactured: Meters, Recorders, Transducers

CARSON MFG. CO., 5451 N. Rural St., Indianapolis, Ind., 46220, Tel: 317-257-3191; Empl.: 125-150

Products manufactured: Controls/Control Eqpt., Switches, Transformers

CARTER MFG. CORP., Sugar Rd., Bolton, Ma., 01740, Tel: 617-779-5501; FSC No: 03929; Empl.: 25; Minimum order: $50 .... p. 2•1640,1641

Customer service: L. W. Tedstone

Free literature available: Data sheets illustrating a representative cross section of our product line. All or most of our products can be modified to meet customers specific requirements.

Products manufactured: Potentiometers, Switches

Local Sales Offices & Reps.

Cal	Millbrae, Polach & Bensinger Inc.	415-697-2525
Conn	Glastonbury, C.K. Barton Assocs.	203-633-9417
Ill	Chicago, Comms. Engrs.	312-761-0548
Mass	Auburndale, Charles K. Barton Assocs.	617-332-2021
NJ	Kinnelon, Ind'l. Science Supply Corp.	201-838-8746
NY	Great Neck, Ind'l. Science Supply Corp.	516-487-1174
Ohio	Dayton, Bek Assocs.	513-278-1343
Tex	Dallas, Southern Engrg. & Sls. Co.	214-748-5760

CARTER MOTOR CO., 2707 W. George St., Chicago, Ill., 60618, Tel: 312-588-7700; Minimum order: $5

Customer service: E. J. Mitchell

Products manufactured: Converters, Inverters, Motors, Tachometers

Local Sales Offices & Reps.

Cal	San Jose, J.T. McFarland Assocs.	408-268-2600
Cal	Sherman Oaks, R. Meussdorffer & Assocs.	213-788-0771
Colo	Englewood, H. Kaub & Co.	303-761-5881
Conn	Old Lyme, S. Armstrong	203-673-3692
Conn	Rocky Hill, Aid Engrg. Sls.	203-673-3692
Fla	Orlando, C. Ammerman	305-894-6071
Ga	Smyrna, B-C Elctrn. Sls.	404-436-5169
Ill	Oak Brook, A.G. Erickson & Assocs.	312-323-1367
Kans	Shawnee Mission, Double V Power Sls.	913-262-1345
La	New Orleans, J.B. Clements	504-282-2897
Md	Baltimore, B. Young	301-235-3726
Mass	Westborough, T. Sanden	617-890-8181
Mich	Ann Arbor, V. Miklas	313-769-5181
Mich	Marshall, R. Reed Inc.	616-781-7287
Minn	Minneapolis, A.J. Warner Co.	612-729-7371
NY	Buffalo, R.W. Mitscher Co.	716-633-7970
NY	Floral Park, Cushing Electro Sls.	516-775-7170
NC	Raleigh, J. Nagle	919-828-0575
Okla	Tulsa, R.D. Jay	918-939-5956
Pa	Philadelphia, Clisby & Assocs.	215-425-7724
Tex	Dallas, E.W. Haley	214-742-2515
Tex	Houston, M.F. Klicpera Co.	713-747-3868
Va	Troutville, R. Lawson	703-345-3283
Va	Virginia Beach, C. Bludau	804-481-7200
Wash	Seattle, R. Johnston Co.	206-524-5170
EXP:	Wheaton, Ill., CHS Int'l.	312-665-3402

CARTER SEMICONDUCTOR, 6901 Jericho Tpk., Syossett, N.Y., 11701, Tel: 516-598-0660, TWX: 510-224-6691

Products manufactured: Diodes, Rectifiers, Thyristors (Includes Silicon Controlled Rectifiers), Transistors

Local Sales Offices & Reps.

Ariz	Tempe, Saguaro Tech. Svc.	602-275-0431
Cal	Cupertino, Carter Semiconductor tor	408-245-7884
Cal	San Diego, Frugaletti Assoc.	714-272-6769
Ill	Northbrook, Jassen Assoc.	312-498-4260
Ind	Indianapolis, J. L. Weber Agcy.	317-255-4117
Iowa	Cedar Rapids, Engrg. Svc.	319-366-1591
Kans	Praire Village, Engrg. Svc.	913-649-4000
Md	Towson, C. H. Newson	
Mass	Lexington, Contact Sls.	
Mich	Detroit, S. Greiner	313-882-7570
Minn	St. Louis Pk., J. O'Brien	612-920-3643
Mo	St. Louis, Engrg. Svc.	314-726-2233
NJ	Stratford, A. E. Luba	609-784-5000
NY	Amityville, Carter Semiconductor	516-598-0660
NY	Northport, Halcon Assoc.	516-423-1818
Ohio	Dayton, E. M. A.	413-433-2800
Tex	Richardson, Thornton-Leepee Elctrn. Sls.	214-231-6891

CASTLE TV TUNER SERVICE, INC., 5710 N. Western Ave., Chicago, Ill., 60645, Tel: 312-561-6354; Empl.: 17

For info on price: A. Western 312-561-6354; Application info: C. Western 312-561-6355; Customer service: C. Western 312-561-6355; Delivery info: I. Stein 312-561-6354

Free literature available: TV receiver signal circuit analyzing instruments furnishing substitute signals for all signal stages of color or B & W TV receivers. TV field strength meters.

Products manufactured: CATV Systems & Equipment, Meters, Test Equipment, Testers

Local Sales Offices & Reps.

Cal	Los Angeles, Erlanger Sls. Co.	213-731-2238
Del	Newark, Di Vincent & Legato Assoc.	
Fla	Ft. Lauderdale, Unirep, Inc.	305-527-1558
Ill	Arlington Hts., P. Dombrow Co.	312-253-3326
Iowa	Des Moines, T. L. Dowell & Assoc.	515-225-1620
Kans	Overland Pk., T. L. Dowell & Assoc.	913-236-8200
Mass	Braintree, Rudolph Mac Inn's Assoc.	617-843-0908
Minn	Minneapolis, HMR Inc.	612-920-8200
Mo	St. Louis, T. L. Dowell & Assoc.	314-968-4234
NJ	Moorestown, Di Vincent & Legato	609-235-8299
NY	N. Bellmore, W. Keller & Assoc.	516-785-2826
Ohio	St. Mary's, Repp Co.	419-394-4724
Pa	Pittsburgh, Tanner Co.	412-561-4687
Tenn	Memphis, Ranger Elctrns. Co.	901-388-5410
Tex	Hurst, Ranger Elctrns. Co.	817-281-2736

CATON CONNECTOR CORP., 425 Northern Blvd., Great Neck, N.Y., 11021, Tel: 516-466-9288; FSC No: 52196; Empl.: 14; Minimum order: $50

For info on price: F. Tylinski 516-466-9288; Application info: L. Galambos 716-746-6817; Customer service: L. Tylinski 516-466-9288; Delivery info: L. Tylinski 516-466-9288

Free literature available: Brochure describes high voltage (over 1000 volts), corona free, connectors and cable assemblies, and cable assemblies, also pressurized and watertight. Typical applications are in radar systems, x-ray equipment, laser systems CRT displays, etc.

Products manufactured: Connectors

Local Sales Offices & Reps.

Cal	Garden Grove, Impact Elctrns.	213-431-3581
Cal	Los Altos, Parsons & Meister	415-941-4745
Ill	Hinsdale, H. Gray Assoc.	312-325-4810
NJ	Mt. Laurel, Naudain Assoc.	609-235-1801
NY	Great Neck, F. Tylinski Co.	516-466-9070
NY	Ithaca, B. Dean	607-272-2187
NC	Raleigh, B. Dean	919-782-9226
Ore	Forest Grove, B. Doran Sls.	503-357-3333

Advertisment

Designer and manufacturer of High Voltage Connectors and Cable Assemblies.
Our specialty is Corona Free and also Watertight Connectors.
These products find applications in copying machine, CRT terminals, ion implantation equipment, Laser equipment, Power supplies, radar X-ray equipment, Xenon flashers, nuclear equipment.
Connectors are single and/or multi-pin; Coaxial, Triaxial; Molded on types;
Quick disconnects or Field assembled. We invite your inquiries.
Write for literature

CBS LABORATORIES, High Ridge Rd., Stamford, Conn., 06905, Tel: 203-327-2000, TWX: 710-474-0694

Products manufactured: Amplifiers, Equalizers, Generators, Records, Frequency Test

Local Sales Offices & Reps.

Cal	LaCanada, CBS Laboratories	213-790-4393

CCS HATFIELD WIRE & CABLE GROUP, Continental Copper & Steel Industries, Inc., 12 Commerce Dr., Cranford, N.J., 07016, Tel: 201-272-3850; Empl.: 1036; Minimum order: $100

For info on price: G. Joyce; Application info: L. Kelly; Customer service: P. Sefranka; Delivery info: D. Christie

Products manufactured: Cable, Wire

Local Sales Offices & Reps.

Ariz	Phoenix, J. Smith Baker Agency	602-254-5189
Cal	Los Angeles, Agencies Co.	213-263-9561
Colo	Denver, Empire Elec. Sls.	303-744-1776
Ga	Atlanta, Hoppert & McCoy	404-875-5802
Ill	Chicago, J. Schonthal & Assoc.	312-828-0774
Ill	Melrose, CCS Hatfield Wire & Cable Grp.	312-379-4750
Iowa	Des Moines, Dick Bray Elec. Sls. Co.	515-225-2961
La	New Orleans, Redmann Sls. Co.	504-525-4103
Md	Baltimore, Bloom Assocs.	301-233-2222
Mass	Braintree, B.N. Yanow & Co.	617-848-7300
Mich	Detroit, Hoffman Bros.	313-873-7550
Minn	Mound, Jerry Finn & Assocs.	612-472-3562
Mo	St. Louis, CCS Hatfield Wire & Cable Grp.	314-434-1311
NJ	Cranford, CCS Hatfield Wire & Cable Grp.	201-272-3850
NJ	Linden, E.H. MacLeod & Assoc.	201-862-2233
NJ	Pennsauken, J.B. Currell Assoc.	609-663-0888
NM	Albuquerque, Hallek Sls. Co.	505-298-3114
NY	LeRoy, S & S Assocs.	716-967-6248
NC	Greensboro, Barber-Ayers & Assoc.	919-273-3628
Ohio	Cincinnati, A.L. Ehlers Co.	513-242-4200
Ohio	Cleveland, Pressler-Weissinger Co.	216-351-5841
Pa	Pittsburgh, L & R Elec. Corp.	412-781-4811
Tex	Dallas, Source, Inc.	214-747-3521
Tex	Houston, Brenner Elec. Sls.	713-225-0766
Utah	Price, Schroeder Bros. Co.	801-637-0522
Utah	Salt Lake City, Lyle W. Williams Co.	801-487-7621
Wash	Seattle, Shaffer & Nelson	206-523-0664
WVa	Wheeling, R.M. Wilson Co.	304-232-5860
Wisc	Butler, J.F. Nolan & Assoc.	414-781-1140

CEA, Div. Berkleonics, Inc., 1 Aerovista Pk., San Luis Obispo, Cal., 93401; Tel: 800-235-4150, 800-592-5910; Empl.: 30 .... p. 1•1125

Products manufactured: Chargers, Battery, Converters, Cords, Current Sources, Heat Exchangers & Systems, Inverters, Isolators, Power Supplies, References, D-C Voltage, Standards, Transformers, Transistor, Diode, Thyristor Heat Dissipators

Local Sales Offices & Reps.

Cal	San Luis Obispo, Johnson Assocs.	805-544-7770
Cal	Van Nuys, Tri-Tek	213-997-8340
Md	Betheseda, S & S Assocs.	301-654-1434
NM	Albuquerque, F. Hawken	505-292-2196
Pa	King of Prussia, S & S Assocs.	215-265-3450
Pa	Pittsburgh, R. F. Clark Co.	412-242-9500
Tex	Houston, Lear & Assocs.	713-649-7727
Tex	Richardson, Lear & Assoc.	214-231-5388
EXP:	Cal., L.A., Trans-World Tr.	213-472-0444

CELANESE CHEMICAL CO., 245 Park Ave., New York, N. Y., 10017

Products manufactured: Chemicals, Cleaners & Solvents

CELANESE PLASTICS, 550 Broad St., Newark, N.J., 07102

CELCO, Constantine Engrg. Labs., Co., 70 Constantine Dr., Mahwah, N.J., 07430, Tel: 201-327-1123, TWX: 710-988-1018; Empl.: 45 .... p. 1•630,631

For info on price: E. Ryder, 201-327-1123; Application info: M. J. Constantine, 714-986-9868

Free literature available: Product literature on: Deflection Yokes, Coils, Micropositioners, Large-Format and Micro- Scanners & Printers, CRT Displays, CRT Spot Analyzers, X-Y Deflection Amplifiers, Display Circuitry, Dual-Ramp Generators, 70mm Photo Recorders.

Products manufactured: Amplifiers, Analyzers, Cameras, Cards, Linear Function, Character Recognition Systems, Coils Including Assemblies & Forms, Comm. Systems, Data Acquisition & Reduction Systems, Display Devices/Displays, Generators, Integrated Circuit Devices, Intensifiers, Image, Microscopes, Mounts, Power Supplies, Printers, Radar Systems, Recorders, Regulators, Scanners, Services, Assembly, Production & Test, Shields, Yokes

Local Sales Offices & Reps.

Cal	Upland, Celco, Pacific	714-986-9868
Minn	Minneapolis, Loonam Assoc.	612-927-4055
Tex	Richardson, P.J. Scanlon	214-231-4661

CENTRAL PLASTICS DISTS., 2701 N. Pulaski Road, Chicago, Ill., 60639, Tel: 312-235-3300; Empl.: 32

For info on price: L. Longwell; Application info: H. Greenwald; Customer service: L. Longwell; Delivery info: T. Harris

Free literature available: Central Plastics General Catalog

Products manufactured: Insulators & Insulation, Nameplates, Plastic Raw Materials, Liquids, Pellets, Powders, Resins, Tubing

Local Sales Offices & Reps.

Ill	Rockford, Rockford Central Plastics	815-397-4455

CENTRALAB DISTRIBUTOR PRODS., N. 93 W 16112 Megal Dr., Menomonee Falls, Wisc., 53051, Tel: 414-228-2911, TWX: 910-260-3620

For info on price: C. Zickuhr; Application info: K. Youngbeck; Customer service: S. Wilkin; Delivery info: S. Wilkin

Refer to Centralab Elctrns. Div. for Sales Office Information.

CENTRALAB, Electrs. Div. - Globe Union, 5757 N. Green Bay Ave., Milwaukee, Wisc., 53201, Tel: 414-228-1200, TWX: 414-228-2315; Empl.: 5500

Products manufactured: Attenuators, Capacitors, Fixed, Capacitors, Variable, Circuits, Hybrid, Thick Film, Circuits, Printed, Multilayer, Cores, Ceramic, Dividers, Filters, Insulators & Insulation, Integrators, Electronic, Networks, Potentiometers, Resistors, Seals, Substrates, Switches, Tubing

Local Sales Offices & Reps.

Ariz	Phoenix, Clemick-Neenan & Assoc.	602-279-7649
Cal	Los Angeles, Clemick-Neenan & Assoc.	213-476-1272
Cal	Palo Alto, Brooks Technical Group	415-328-3232
Colo	Denver, Electro-Rep Inc.	303-744-2821
Fla	Orlando, Cartwright & Bean, Inc.	305-422-4531
Fla	Plantation, Cartwright & Bean, Inc.	305-791-3989
Ga	Atlanta, Cartwright & Bean, Inc.	404-255-5262
Haw	Honolulu, Dougherty Enterprises	
Ill	Des Plaines, Centralab	312-694-4870
Ind	Indianapolis, L.M. De Voe Co.	317-257-1227
Iowa	Cedar Rapids, J. Vrbik Co.	319-377-8244
Kans	Shawnee Mission, Lowell-Kangas & Assoc.	913-631-3515
La	Chalmette, Cartwright & Bean, Inc.	504-279-4598
Md	Pikesville, J. Bresson Assoc.	215-839-6770
Mass	Needham, Centralab	617-444-4847
Mich	Detroit, R.C. Merchant & Co.	313-535-6000
Mich	St. Joseph, R.C. Merchant & Co.	616-983-7378
Minn	Minneapolis, Centralab	612-831-5212
Miss	Jackson, Cartwright & Bean, Inc.	601-981-1368
Mo	St. Louis, Lowell-Kangas & Assoc.	314-821-4050
NJ	Clifton, Centralab	201-778-5900
NY	Albany, Reagan/Compar Albany	518-489-7408
NY	Endwell, Reagan/Compar Albany	607-723-8743
NY	Fairport, Reagan/Compar Albany	716-271-2230
NY	New Hartford, Reagan/Compar Albany	315-732-3775
NC	Charlotte, Cartwright & Bean, Inc.	704-333-6457
NC	Raleigh, Cartwright & Bean, Inc.	919-832-7128
Ohio	Cleveland, Imtech Inc.	216-826-3400
Ohio	Dayton, Imtech Inc.	513-885-4181
Ohio	Fairborn, R.G. Siff & Assoc.	513-252-7785
Ore	Portland, J.J. Backer Co.	503-297-3776
Ore	S. E. Salem, J. J. Backer Co.	503-362-0717
Pa	Narberth, J. Bresson Assoc.	215-839-6770
Pa	Pittsburgh, Imtech	412-247-1050
Tenn	Knoxville, Cartwright & Bean, Inc.	615-693-7450
Tenn	Memphis, Cartwright & Bean, Inc.	901-276-4442
Tex	Dallas, R.E. Nesbitt Co.	214-357-4601
Tex	El Paso, Centralab	915-779-3966
Tex	Houston, R.E. Nesbitt Co.	713-224-3633
Va	Lynchburg, J. Bresson Assoc.	215-839-6770
Wash	Seattle, J.J. Backer Co.	206-285-1300
Wisc	Milwaukee, Centralab	414-228-2122

CENTRALAB SEMICONDUCTOR, Globe-Union, 4501 Arden Dr., El Monte, Cal., 91734, Tel: 213-579-0700, TWX: 910-587-3429; Empl.: 300

Products manufactured: Amplifiers, Caps, Lenses, Indicator Light, Cells, Photoconductive, Photoemissive, Photovoltaic, Diodes, Lubricants, Punched Card Equipment, Racks

Local Sales Offices & Reps.

Ariz	Phoenix, Toward Engg.	602-955-3193
Cal	Los Altos, Recht	415-941-0336
Cal	Los Angeles, Clemick-Neenan	213-476-1272
Cal	Orange, Clemick-Neenan	714-998-2525
Colo	Denver, McLoud & Raymond	303-756-1589
Fla	Orlando, Cartwright & Bean	305-425-8284
Ga	Atlanta, Cartwright & Bean	404-237-2273
Ill	Des Plaines, Centralab	312-827-4487
Ind	Indpls., L.M. DeVoe	317-257-1227
Md	Baltimore, Component Sls.	301-484-3647
Mass	Burlington, Contact Sls.	617-273-1520
Mich	Southfield, REP Assocs.	313-354-9066
Minn	Minneapolis, Furber Sls.	612-861-1518
Mo	St. Louis, Coombs	314-542-3636
NJ	Clifton, Centralab	201-778-5900
NY	Rochester, W.H. Zimmerman	716-586-4450
NY	Syracuse, W.H. Zimmerman	315-474-4889
Ohio	Cleveland, Imtech	216-382-9090
Pa	Glenside, Elcom Inc.	215-885-1325
Tenn	Memphis, Cartwright & Bean	901-276-4442
Tex	Dallas, R.E. Nesbitt	214-357-4601
Tex	Houston, R. Nesbitt Co.	713-224-3633
Wash	Seattle, J. Backer Co.	206-285-1300
FOR:	Toronto 18, Ont Can., Wilson Entprs.	416-231-7536

CENTRE ENGRG., 307 Benner Pike, State College, Pa., 16801

CENTRON ENGRG., 24015 Garnier St., Torrance, Cal., 90510, Tel: 213-530-4410, Telex: 69-8223; Empl.: 20; Minimum order: $25

For info on price: G. McCray; Application info: G. McCray; Customer service: N. Levesque; Delivery info: Order Desk

Free literature available: Drafting Aids - complete line of printed circuit-artwork symbols, tapes, and donut pads. For making printed circuit master artworks. Available off the shelf. Available on request.

Products manufactured: Drafting Symbols, Dry Transfer, Pressure Sensitive, etc. (Including Lettering), Kits, Breadboarding (For Engineers), Kits, Printed Circuit, Tapes, Films & Foils, Pressure Sensitive

Local Sales Offices & Reps.

Ariz	Phoenix, W. Bert Knight Co.	602-242-6787
Ariz	Scottsdale, F. Board Assocs.	602-949-9561
Cal	Burlingame, W. J. Purdy Co.	415-347-7701
Cal	Newport Beach, W.B. Knight Co.	714-833-8350
Colo	Denver, W.J. Purdy Co.	303-777-1411
Fla	Orlando, Cartwright & Bean	305-422-4531
Ga	Atlanta, Cartwright & Bean	404-255-5262
Ill	Hinsdale, Hill-Gray Assoc.	312-325-4810
Ind	Mulberry, Maish Sls.	317-296-2322
Kans	Overland Pk., T.L. Dowell	913-236-8200
Mass	Babson Park, P.R. Sturgeon Co.	617-237-3506
Minn	Minneapolis, Dick Borrett Co.	612-929-0028
NJ	Teaneck, Fisher Elect. Assocs.	201-837-1200
NM	Albuquerque, C.T. Carlberg & Assocs.	505-265-1579
NY	Syracuse, Mar-Com Assocs.	315-437-2992
Ohio	St. Marys, T. Shelby & Co., Inc.	419-394-3377
Ore	Portland, Earl & Brown, Co.	206-284-1121
Tenn	Knoxville, Cartwright & Bean	615-693-7450
Tenn	Memphis, Cartwright & Bean	901-276-4442
Tex	Dallas, J.Y.Schoonmaker Co.	314-357-8481

CENTRONICS, Hudson, N.H., 03051, Tel: 603-883-0111, TWX: 710-228-6505; Empl.: 700; Minimum order: $50

Free literature available: On impact printers for EDP and communications applications. Specification data sheets.

Products manufactured: Printers, Teleprinters, Terminal Equipment, Digital

Local Sales Offices & Reps.

Cal	Santa Ana	714-979-6650
Ill	Rolling Meadows	312-398-4500
Mass	Burlington	617-272-8545
NH	Hudson	603-883-0111
NJ	Mt. Holly	609-234-6111
Ohio	Kettering	513-294-0070
Tex	Arlington	817-461-5711

CERAMASEAL, INC., Sub. Interpace Corp., Box 25, New Lebanon Center, N.Y., 12126, Tel: 518-794-7800, Telex: 14-5442; FSC No: 07601; Empl.: 60; Minimum order: $25

For info on price: G. D. Sawin; Application info: H. Jennings; Customer service: P. A. Beresford; Delivery info: P. A. Beresford

Free literature available: Literature On: High Alumina Ceramic & High Temp. Porcelain-Metal Sealed Bushings. High Vacuum: Flanges and Hardware, Coaxial Connectors and Cables, & Sapphire, Quartz and Glass Windows.

Mini-Vacuum, - Mini Thermocouple Vacuum, - Rotary Motion, & High Vacuum Feedthrus.

Products manufactured: Bushings, Glass, Plastic, Metal, Rubber, Etc., Connectors, Deposition Equipment, Vacuum & Accessories, Feedthrus & Seals, Environmental, Headers, Lead Assemblies & Receptacles, Seals, Services, Assembly, Production & Test, Terminals

Local Sales Offices & Reps.

Ariz	Wickenburg, H. A. Omley	602-684-7201
Ark	Little Rock, C.H. Stout, Inc.	501-374-8201
Cal	Atherton, Wadsworth-Pacific Mfg. Assoc.	415-321-3619
Cal	Pacific Palisades, Wadsworth-Pacific Mfg. Assoc.	213-454-4313
Colo	Denver, Continental Divide Prods.	303-420-0130
Ill	Mt. Prosepect, Automation Equip. Co.	312-398-7550
La	New Orleans, C.H. Stout of La., Inc.	504-482-3183
La	Shreveport, C.H. Stout of La., Inc.	318-425-5485
Md	Baltimore, R. A. Wafer Assoc.	301-744-1133
Mass	Boston, P-J Engrg. Sls. Co.	617-783-0510
Miss	Jackson, C.H. Stout of Miss., Inc.	601-354-4326
NY	Binghamton, Canavan-Scanlon Assoc.	607-724-7220
NY	Buffalo, Canavan-Scanlon Assoc.	716-839-3373
NY	Rochester, Canavan-Scanlon Assoc.	716-442-0720
NY	Syracuse, Canavan-Scanlon Assoc.	315-437-1271
NC	Charlotte, J. Rudisill Assoc.	704-377-6901
Ohio	Chagrin Falls, Bray Assocs.	216-247-4474
Pa	Pittsburgh, Muller-Harper & Assoc.	412-931-6460
Tenn	Knoxville, C.E. Fox	615-522-4404
Tenn	Memphis, C. H. Stout, Inc.	901-526-7601
Tex	Dallas, E.B. Robertson, Inc.	214-942-8486
Tex	Houston, E.B. Robertson, Inc.	713-785-6800
Tex	Lubbock, E.B. Robertson, Inc.	806-746-6527
Wash	Seattle, J. B. Jolly, Inc.	206-938-4166
FOR:	Can., Islington, Toronto, D.T. Shaw Co. Ltd.	416-231-2706
FOR:	Can., Montreal 379, D.T. Shaw Co. Ltd.	514-332-1163
FOR:	Can., Delta, British Columbia, Ocean Comps. Ltd.	604-521-3419

CERAMIC MAGNETICS, INC., 87 Fairfield Rd., Fairfield, N.J., 07006, Tel: 201-227-4222; Empl.: 25; Minimum order: $85

For info on price: A. G. Lang, Jr.; Application info: A. G. Lang, Jr.; Customer service: G. Schaller; Delivery info: G. Schaller

Free literature available: A catalog which presents all the technical data on the ferrites manufactured at this facility.

Products manufactured: Cores, Ceramic, Cores, Magnetic, Ferrite Material & Parts, Heads, Recording Playback, Erase, Magnets

Local Sales Offices & Reps.

Cal	Irvine, A. C. Allen	714-552-9428
Conn	North Haven, Northeast Reprs.	203-239-2507
Ill	Park Ridge, R. McIntosh	312-825-8070
Mass	Needham Heights, Northeast Reprs.	617-449-3034
Minn	St. Paul, Knox Assocs.	612-488-5402
NY	Buffalo, H. C. Johnson Agencies	716-632-7880
NY	Fayetteville, H. C. Johnson Agencies	315-637-9383
NY	Rochester, H. C. Johnson Agencies	716-482-3000
Pa	Glenshaw, H. C. Johnson Agencies	412-961-0414
Wash	Richland, H. Svobada	509-783-6523
Wash	Seattle, J. B. Jolly	206-938-4166
FOR:	Can., B.C., H. Bourgeois	604-521-3419

CERRO COMMUNICATION PRODUCTS, Box 2026, Anniston, Ala, 36201

CERRO WIRE & CABLE CO., Div. Cerro Corp., 285 Nicoll St., New Haven, Conn., 06504, Tel: 203-772-2250, TWX: 710-465-2149; Empl.: 500

Customer service: R.L. Belard Ext. 216

Products manufactured: Cable, Wire

Local Sales Offices & Reps.

Cal	Fremont	415-651-0460
Cal	Sherman Oaks	213-872-1610
Conn	Branford	203-488-1604
Ga	Norcross	404-449-1868
Ill	Bellwood	312-379-2265
Mo	Clayton	314-721-2498
Mo	Independence	816-358-9191
NJ	Avenel	201-381-2170
NJ	Cherry Hill	609-779-7667
Ohio	Rocky River	216-333-8640
Pa	Pittsburgh	412-343-5022
Tex	Dallas	214-233-2294
Tex	Houston	713-523-6843

CHADWICK-HELMUTH CO., INC., 111 E. Railroad Ave., Monrovia, Calif., 91016, Tel: 213-358-4567; Empl.: 20

Customer service: B. Minteer

Products manufactured: Controls/Control Eqpt., Lights, Testers

CHALCO ENGRG. CORP., 15126 S. Broadway, Gardena, Cal., 90248, Tel: 213-FA 1-0121, TWX: 910-346-7026; Empl.: 95; Minimum order: $25

Customer service: J. Cox

Products manufactured: Converters, Duplicators, Paper-Tape Preparation Systems, Perforators, Readers, Recorders

CHANNEL INDS., 839 Ward Dr., Santa Barbara, Cal., 93105, Tel: 805-967-0171; Empl.: 75

For info on price: R. F. Carlson; Application info: R. M. Callahan; Customer service: L. Barrett; Delivery info: R. M. Callahan

Products manufactured: Crystals, Hydrophones & Accessories, Oceanographic Equip. (Electronic), Transducers

Local Sales Offices & Reps.

Ohio	Newbury, Channel Prods., Inc.	216-564-2245

CHANNEL MASTER DIV. AVNET, Rte. 209, Ellenville, N.Y., 12428, Tel: 914-647-5000; Empl.: 1000

Products manufactured: Alarms, Amplifiers, Antenna Rotators, Antenna Towers & Supports, Antennas, Arresters, Electrical Surge, Lightning, Attenuators, Cable, CATV Systems & Equipment, Comm. Systems, Connectors, Converters, Couplers, Filters, Meters, Mixers, Mounts, Phonographs, Parts & Accessories, Receivers, Rivets, Rods, Ground, Tape Recording Accessories, Transformers, Tubes, Wire

CHANNELLOCK, INC., S. Main St., Meadville, Pa., 16335, Tel: 814-336-1175; Empl.: 500 .... p. 2•1693

Customer service: W. S. DeArment

Free literature available: Complete catalog illustrating the channellock line of mechanic's hand tools: pliers, hammers, screwdrivers, adjustable wrenches, aviation and metal cutting snips.

Products manufactured: Cutters, Wire, Hand Operated, Drivers, Nut, Heat Sinks, Soldering, Knives & Knife Sets, Pliers, Screwdrivers, Tools, Wire Strippers, Wrenches

Local Sales Offices & Reps.

Cal	Alhambra, J.J. Brown Co.	213-283-1322
Cal	S. San Francisco, J.J. Brown Co.	415-589-5775
Colo	Denver, Western Ind'l. Sls. & Svcs. Co.	303-758-3972
Fla	Ft. Lauderdale, G.A. Palmer	305-764-3487
Ga	Decatur, J.C. Lyle & Assocs.	404-378-5691
Ill	Chicago, Muzzy & Peters	312-287-1360
Ind	Jeffersonville, Wixson-Clinard Co.	812-283-0955
La	Mansfield, Lynn & Hemphill, Inc.	318-872-1108
Mass	Wellesley, T. Sawyer Sls. Co.	617-235-2667
Mich	Detroit, Wixson-Nehls Co.	313-871-8815
Minn	Minneapolis, R.L. Perrin & Assocs.	612-831-1211
Mo	Kansas City, D. Schmelzinger Co.	816-444-5330
Neb	Omaha, J. Pedersen	402-571-8604
NJ	Brickstown, A.P. Henricks Co., Inc.	201-892-2894
NJ	Summit, A.P. Henricks Co., Inc.	201-273-0555
NY	Brooklyn, A.P. Henricks Co., Inc.	212-680-0045
NY	Marcellus, A.P. Henricks Co., Inc.	315-673-1340
NY	Merrick, A.P. Henricks Co., Inc.	516-379-8507
NY	New York, A.P. Henricks Co., Inc.	212-732-9630
Ohio	Cleveland, H.W. Murray Co., Inc.	216-333-2977
Okla	Oklahoma City, Lynn & Hemphill, Inc.	405-524-9807
Pa	Glenolden, A.P. Henricks Co., Inc.	215-583-3921
Pa	Pittsburgh, E.D. McGinley	412-561-7979
Tex	Dallas, Lynn & Hemphill, Inc.	214-747-4745
Va	Richmond, D. Miller & Assocs.	703-353-5324
Wash	Port Orchard, R.G. Sullivan Co.	206-871-0872
EXP:	South Bend, Ind., United Export Corp.	219-232-8286

CHASSIS-TRAK, DIV., General Devices Co., Inc., 525 S. Webster Ave., Indianapolis, Ind., 46219, Tel: 317-359-5407, Telex: 27-2169; Empl.: 125; Minimum order: $50 .... p. 1•63-66

For info on price: S. Gray; Application info: R. D. Lambert; Customer service: R. L. Watson; Delivery info: S. Gray

Free literature available: Catalogs covering: Chassis-Trak solid bearing slides, Chassis-Trak bottom mount slides, Chassis-Trak linear ball-bearing slides, Chassis-Trak circulating ball bearing slides Chassis-Trak handles

Products manufactured: Handles For Cabinets, Circuit Boards, Racks, etc., Slides, Cabinet & Chassis

Local Sales Offices & Reps.

Ariz	Scottsdale, Schoeffler Assoc.	602-948-3470
Cal	Los Angeles, M. A. Stolaroff Co.	213-295-7781
Cal	Mtn. View, G. Woempner Co.	415-964-5454
Cal	San Diego, M. A. Stolaroff Co.	714-234-6905
Cal	Van Nuys, J. Thomas	213-782-3820
Colo	Sedalia, Jensen Reps.	303-688-4154
Conn	Cheshire, Coakley, Boyd & Abbett, Inc.	203-272-2261
Fla	North Miami, Winfield Elctrn. Sls.	305-945-6544
Fla	Tampa, Winfield Elctrn. Sls.	813-884-6500
Ill	Rolling Meadows, Lightner Assoc.	312-398-3000
Ind	Indianapolis, Mktg. Engineers, Inc.	317-546-1523
Ind	South Bend, Valentine & Schillinger	219-291-6258
Kans	Shawnee Mission, Lowell, Kangas & Assoc.	913-631-3515
Md	Bethesda, G. Rosen Assocs., Inc.	301-530-8448
Mass	Needham, Coakley, Boyd & Abbett, Inc.	617-444-5470

Mich	Brighton, Valentine & Schillinger	313-227-7863
Minn	St. Paul, Northport Engineering	612-698-3841
Mo	St. Louis, Lowell, Kangas & Assocs.	314-821-4050
NY	Fayetteville, H.G. Richter Inc.	315-637-6713
NY	Manhassett, Kalber & Mack	516-627-6620
NC	Paw Creek, Ward Tech. Sls. Co.	704-399-3481
Ohio	Cincinnati, Components, Inc.	513-721-2997
Ohio	Cleveland, Components, Inc.	216-842-2737
Tex	Dallas, R. Martin Assoc.	214-361-8584
Tex	Houston, R. Martin Assoc.	713-462-4077
Wash	Olympia, Bergford Assoc.	206-866-2001
EXP:	Indianapolis, General Devices Co.	317-359-5407

CHATHAM CONTROLS CORP., 33 River Rd., Chatham, N.J., 07928, Tel: 201-635-8892; FSC No: 04814; Empl.: 11; Minimum order: $10

For info on price: D. C. Perst; Application info: J. S. Ecklof; Delivery info: J. N. Ash

Free literature available: Miniature and sub-miniature hermetically sealed thermostats.

Products manufactured: Controls/Control Eqpt., Monitors, Switches, Thermostats

Local Sales Offices & Reps.

Cal	Pasadena, Components Corp.	213-681-7448
NJ	Fairlawn, PAR Assocs., Inc.	201-447-3722

CHATILLON JOHN & SONS, 83-30 Kew Gardens Rd., Kew Gardens, N.Y., 11415, Tel: 212-847-5000; Empl.: 135; Minimum order: $50

Customer service: R. H. Eklund

Products manufactured: Gages, Scales, Dial, Springs (All Types), Testers

CHATSWORTH DATA CORP., 9732 Cozycroft Ave., Chatsworth, Cal., 91311, Tel: 213-341-9200; Empl.: 45

For info on price: H. G. Boehm; Application info: R. Miller; Customer service: J. O'Neil

Free literature available: Cablemaster-A compact, versatile unit for rapid and efficient testing of electrical cable assemblies, harnesses, connectors, and bulk cable.

Products manufactured: Punched Card Equipment, Testers

CHEM AERO, INC., 231 E. Lomita Blvd., Wilmington, Cal., 90744, Tel: 213-775-2581, TWX: 910-345-6267; Empl.: 100; Minimum order: $1000

For info on price: D. Thomas; Application info: D. Thomas; Customer service: C. Hansen; Delivery info: D. Martin

Free literature available: Brochures detail bus bars, heatsinks, memory frames, multi-layer boards and assemblies, the rigid-to-flex technique, and bus bar design engineering.

Products manufactured: Boards, Printed Circuit, Bus Bars & Systems, Circuits, Flexible, Circuits, Printed, Multilayer, Heat Exchangers & Systems, Panels, Pins, Strips

Local Sales Offices & Reps.

Ariz	Scottsdale, Runyon Co.	602-959-6060
Cal	Anaheim, LoDan	213-924-1691
Cal	Mountain View, Melchior/Wesley	415-964-2321
Cal	San Diego, LoDan	714-279-6383
Fla	Clearwater, Reynolds & Assoc.	305-773-4700
Ga	Atlanta, Reynolds & Assoc.	
Mass	Waltham, United Engr. Sls.	617-890-6680
Mich	St. Clair Shores, J. M. Thorpe Co.	313-779-6363
Minn	Minneapolis, Technical Assoc.	612-929-6721
Mo	Florissant, H & R Sls. & Engrg.	314-921-6242
NJ	Livingston, Varrelman-Gorman	201-992-2505
Tex	Dallas, Precision Sls.	214-351-6964
Wash	Seattle, Todd-Brian Ind.	206-827-5811

CHEMCUT CORP., 500 Science Pk., State College, Pa., 16801, Tel: 814-238-0514, Telex: 842-555; Empl.: 186

For info on price: R. Lorah; Application info: J. Infield; Customer service: I. Hoy; Delivery info: R. Lorah

Free literature available: P.C. board and chemical machining process equipment...from printing and etching to regeneration and cleaning.

Products manufactured: Machines/Machinery, Production

Local Sales Offices & Reps.

Cal	Anaheim, Chemcut Corp., Western Dist. Office	714-630-1700

Local Distributors

Cal	Anaheim, Chemcut Corp. Western Dist. Off., Box 6376, 1509-A Kraemer Blvd.	714-630-1700
Fla	Maitland, Photo Chem. Sys., Box 1475	305-647-1593
Ga	Roswell, Photo Chem. Sys., 900 Sun Valley Rd.	404-993-1738
Ill	Chicago, John Plosflich & Assoc., 4106 N. Nashville Ave.	312-286-7676
Ill	Elk Grove Village, Chemcut-Central Dist. Off., 1210 Jarvis Ave.	312-956-6513
Ind	W. Lafayette, Bruce Johnson Co., 132 Tamiami Ct.	317-463-4616
Mass	Waltham, Etchomatic, Inc., Box 444, 151 Newton St.	617-893-2020
Minn	Minneapolis, T.K. Gray, Inc., St. Anthony Off. Pk.,2812 Anthony La., N.E.	612-781-4874
NY	East Meadow, Granirer Assoc., 1359 Oak La.	516-292-1627
NY	Skaneateles, Spar-Kleen Prod., Box 2, Fennell St.	315-685-5711
Ohio	Cleveland, L.W. Hodson Machinery Co., 9400 Midwest Ave.	216-587-4500
Okla	Tulsa, Lew Wenzel & Co., 520 S. Peoria Ave.	918-587-3371
Ore	Portland, Vandy Corp., Box 4383	503-297-1900
Tex	Dallas, Lew Wenzel & Co., 2850 Satsuma	214-243-1546
TEx	Houston, Lew Wenzel & Co., 1909 Scott St.	713-225-2147
Va	Alexandria, Chem. Etching Equip. & Supp. Co., 7629 Crawford Ct.	703-971-2646
Wash	Seattle, Vandy corp., Box 70651	206-789-3300

CHEMETRON CORP., Welding Prods., 111 E. Wacker St., Chicago, Ill., 60601, Tel: 312-565-5000

Free literature available: Instruction manual & catalog of our maintenance & repair alloys & fluxes.

Products manufactured: Alloys, Flux, Brazing & Soldering Materials, Solder (All Types), Soldering Accessories, Soldering Guns, Irons & Desoldering Tools, Torches, Soldering, Welding & Access., Welding Equipment & Access. (Excluding Equip. for Semiconductor Devices)

CHEMICAL ELECTRONIC ENG., Amboy Rd. Box 203, Matawan, N.J., 07747

CHEMICAL ETCHING EQUIP. & SUPPLY, 7629 Crawford Ct., Alexandria, Va., 22310, Tel: 703-971-2646; Empl.: 5; Minimum order: $25

Customer service: R. E. Hunt

Free literature available: Printed Circuit Processing Equipment

Products manufactured: Blowers & Fans & Accessories, Boards, Printed Circuit, Boards, Printed Wiring, Universal, Cameras, Comparators, Densitometers, Electronic, Drafting Machines, Drills & Accessories, Hand & Power, Electroplating Equipment & Supplies, Furnaces, Heaters & Heating Elements, Holders, Circuit Board (Production Type), Knives & Knife Sets, Lamps, Lenses, Optical & Camera, Lights, Machines/Machinery, Production, Microcircuit Production Equip., Power Supplies, Racks, Rectifiers, Solder (All Types), Solder Pots & Baths, Soldering Equipment, Testers

CHEMPLAST, INC., 31-150 Dey Rd., Wayne, N.J., 07470, Tel: 201-696-4700, TWX: 710-988-5834; Empl.: 200; Minimum order: $15

For info on price: H. Hill; Application info: L. Atkins; Customer service: L. Atkins; Delivery info: E. Walty

Products manufactured: Bushings, Glass, Plastic, Metal, Rubber, Etc., Caps, Forms & Tapes, Heat Shrinkable, Chemicals, Coatings, Cords, Heat Guns, Production, Insulators & Insulation, Lubricants, Materials, Self-Lubricating, Services, Assembly, Production & Test, Tapes, Electrical Insulation, Tapes, Films & Foils, Pressure Sensitive, Tubing, Wire

Local Sales Offices & Reps.

Ariz	Phoenix, A. W. Anderson	602-277-5911
Ark	Poyen, Component Parts	501-337-9580
Cal	Dana Point, J. Edwards	714-493-5046
Cal	Van Nuys, Chemplast-West	213-786-8866
Colo	Englewood, R-C Sls. Co.	303-789-0565
Conn	Branford, W.C. Thompson	203-488-8838
Fla	Vero Beach, J.D. Rule	305-589-5357
Ill	Rosemont, W. Cogger	312-671-0099
Kans	Wichita, Regal Plastic & Sup.	316-263-1211
Md	Pasadena, P.J. Simard	301-437-0855
Mass	Revere, J.G. Ferraro	617-289-6225
Minn	Minneapolis, Service Tool & Engr. Co.	612-941-7151
Mo	Kansas City, Regal Plastic & Sup. Co.	816-471-6390
Mo	St. Louis, J.A. Crowe	314-842-1353
Neb	Omaha, Regal Plastic & Sup. Co.	402-344-4446
NJ	Lincoln Park, E.R. Fischer	201-694-4763
NJ	Mount Holly, J.T. Anderson	609-267-6902
NY	New Hyde Park, J.J. Hagmaier	516-742-0524
Ohio	Kettering, D. McMullian	503-299-8063
Ohio	Olmsted Falls, B. Williams	216-886-1050
SC	Columbia, G.E. Younginer	803-772-6671
Tex	Dallas, Kolster	214-233-4158
Tex	Houston, J.V. Glaves	713-626-4131
Utah	Salt Lake City, Ward & Assoc.	801-487-0756
Wash	Seattle, D. Smith Sls. Co.	206-633-3160
EXP:	Wayne, N.J., H. Hamilton	201-696-4700

CHEMTRONICS, INC., 45 Hoffman Ave., Hauppauge, N.Y., 11787, Tel: 516-582-3322; Empl.: 23; Minimum order: $50

Customer service: R. G. Russell

Free literature available: Dealer Catalog available upon request. Provides complete information on each product that is currently being manufactured.

Products manufactured: Adhesives (All Types), Cleaners & Solvents, Coatings, Compounds, Encapsulating, Insulating, Molding, Potting, Coolants, Circuit & Components, Demagnetizers, Lubricants, Solder (All Types)

Local Sales Offices & Reps.

Cal	Burlingame, Wm. J. Purdy Co.	415-347-7701
Cal	West Covina, Dow Forth Assoc.	213-967-2893
Colo	Englewood, Electronix Spec. Co.	303-781-4409
Fla	Ft. Lauderdale, Jack Sproch Sls. Corp.	[redacted]
Ga	Norcross, B. Cooper Co.	404-448-5460
Ill	Chicago, Markal Sls. Corp.	312-282-5800
Ind	Indianapolis, New/Era Sls.	317-257-7333
Mass	N. Scituate, W.A. Hendrickson	617-545-0652
Minn	St. Paul, Carl-M Co.	612-699-8004
Mo	Raytown, Taraski Sls. Corp.	816-358-4590
NY	Grand Island, L.J. McTaggart Assoc.	716-773-9222
Ohio	St. Mary's, Repp Co.	419-394-4724
Pa	Pittsburgh, R. Tanner Co.	412-561-4687
Tex	Richardson, Willoughby-Fouler Co.	214-235-3664
Wash	Seattle, Fleehart & Sullivan	206-LA 2-1533
FOR:	Can., St. Laurent, Montreal, Paco Elctrns. Ltd.	514-748-6787

CHERRY ELECTRICAL PRODS. CORP., 3600 Sunset Ave., Waukegan, Ill., 60085, Tel: 312-689-7700, TWX: 910-235-1572; Empl.: 1050 .... p. 1•1974-1985

Free literature available: Catalog of Switches and Keyboards - 72 pages, Gas Discharge Displays - 6 pages, Keyboard Key Cap Work Book - 32 pages, Facilities Booklet (pocket) - 16 pages.

Products manufactured: Calculators, Electrical & Electronic, Delcalcomania, Display Devices/Displays, Keyboards, Alphanumeric & Decimal, Matrices, Computer, Programmers, Switches

Local Sales Offices & Reps.

Ala	Huntsville, Powertronics	205-852-6347
Cal	Palo Alto, Abbott Engrg.	415-327-0830
Cal	Torrance, O'Donnell Assocs.	213-323-9243
Colo	Arvada, Arrowhead Sls.	303-423-5556
Conn	Meriden, Electro-Prods. Sls.	203-235-4040
Fla	Ft. Lauderdale, CBC Elctrns.	305-484-7330
Ill	Waukegan, Cherry Electrical Prods.	312-689-7600
Ind	Fort Wayne, Menze Sls.	219-747-5616
Kans	Prairie Village, Thro Indl. Sls.	913-362-2533
Mass	Waltham, Electro-Prods. Sls.	617-899-1570
Mich	Novi, Miltimore Sls.	313-476-2446
Mich	Troy, McPahil Corp.	313-689-6444
Minn	St. Paul, Cahill Assoc.	612-646-7217
Mo	Florissant, Miller Assoc.	314-355-1642
NJ	Fort Lee, S. Justin Assoc.	201-947-4371
NJ	Pitman, Colrud Co.	609-589-5866
NM	Albuquerque, IMEC	505-883-9010
NY	Rochester, Andres Comp. Sls.	716-244-2445
NC	Thomasville, Oren Entprs., Inc.	919-476-6727
Ore	Portland, J.J. Backer Co.	503-297-3776
Tex	Dallas, Ion Assocs.	
Utah	Salt Lake City, Arrowhead Sls.	801-487-4716
Wash	Seattle, J.J. Backer Co.	206-285-1300
Wisc	Pewaukee, D. Herrick	414-691-2770
FOR;	Can., Oakville, Ont., H. Diamond Sls. Ltd.	416-844-6787

Local Distributors

Cal	Chattsworth, Westates Elec. Corp., 20151 Bahama St.	213-341-4411
Cal	Orange, Westates Elec. Corp., 948 Elm St.	714-532-6891
Cal	Sunnyvale, Westates Elec. Co., 255 N. Mathilda Ave.	408-733-8383
Tex	Richardson, Southwest Elec., 1100 Executive Dr.	214-234-3050

Tex	Stafford, Southwest Elec., 12725 Royal Dr.	713-494-6021

CHERRY RIVET & BOOTS NUT DIVS., Townsend Co., P.O. Box 2157, Santa Ana, Calif., 92707, Tel: 714-545-5511, TWX: 910-595-1500; Empl.: 817

Customer service: R. E. Herndon

Free literature available: Catalogs on Cherry MS Rivets, Cherrylock Rivets, Boots "Banc-Lok" Inserts, Boots Nuts.

Products manufactured: Bushings, Glass, Plastic, Metal, Rubber, Etc., Fasteners, Rivets

Local Sales Offices & Reps.

Ga	Atlanta, J.O. King	404-355-7660
Kans	Wichita, Std. Parts & Equip. Corp.	316-522-1516
Tex	Ft. Worth, Std. Parts & Equip. Corp.	817-336-2521

CHESTERFIELD PRODS. INC., 511A Victor St., Saddle Brook, N.J., 07662, Tel: 201-845-6886; Empl.: 27; Minimum order: $25 .... p. 1•548

For info on price: M. Silver; Application info: A. J. Spencer; Customer service: M. Silver; Delivery info: M. Silver

Products manufactured: Analyzers, Attenuators, Coils Including Assemblies & Forms, Delay Lines, Equalizers, Filters, Generators, Meters, Monitors

Local Sales Offices & Reps.

Ill	Chicago, K. W. Meyers Co.	312-774-6440
Ind	Indianapolis, K. W. Meyers Co.	317-243-6681
Md	Edgewater, Commart, Inc.	301-798-0607
Mass	Acton, E.E. Specialists, Inc.	617-259-9200
Minn	Minneapolis, K. W. Meyers Co.	612-920-7080
NJ	Saddle Brook, L&M Assocs.	201-843-8700
NY	Brentwood, L & M Assocs.	516-231-8363
NY	New York City, L & M Assocs.	212-675-7486
Pa	Andalusia, L & M Assocs.	215-639-3100
Tex	Dallas, Bradenco	214-358-3278
Tex	Houston, Bradenco	713-529-9881
Wisc	Milwaukee, K. W. Meyers Co.	414-482-1313

CHICAGO CONDENSER CORP, 3255 W. Armitage, Chicago, Ill., 60647, Tel: 312-227-7070; Empl.: 15; Minimum order: $25

For info on price: P. Phillips; Application info: K. Peter; Customer service: P. Phillips; Delivery info: P. Phillips

Products manufactured: Capacitors, Fixed, Power Supplies

Local Sales Offices & Reps.

Cal	Redwood City, Warren-Hickey Sls. Co.	415-368-3849

CHICAGO DYNAMIC INDUSTRIES, Precision Prods. Div., 1725 Diversey Blvd., Chicago, Ill., 60614, Tel: 312-935-4600; Empl.: 478

For info on price: J. M. Early; Application info: S. Heide; Customer service: J. M. Early; Delivery info: F. E. Kucera

Free literature available: Complete catalog or individual spec. sheets on thumbwheel, rotary, slide, and pushbutton switches; custom components; mechanical or pulse counters.

Products manufactured: Counters, Relays, Switches

Local Sales Offices & Reps.

Ala	Huntsville, Craft Assocs.	205-837-0221
Cal	Inglewood, Weightman & Assocs.	213-645-6060
Cal	Menlo Park, West Engrg. Sls.	415-325-2885
Colo	Denver, TESSCO	303-744-1119
Fla	Maitland, Craft Assocs.	305-645-2242
Ga	Atlanta, Craft Assocs.	404-252-5001
Ill	Rolling Meadows, Sumer, Inc.	312-394-4900
Ind	Fort Wayne, Temple Engrg.	219-744-4331
Md	Glen Arm, Hodgins Assocs.	301-592-7047
Mass	Norwood, JMG	617-762-5333
Mich	Detroit, L. H. Dickelman Co.	313-255-3300
Minn	Edina, M. Foster Co.	612-835-2252
Mo	Kansas City, Harris-Hanson Co.	816-HI4-9494
Mo	St. Louis, Harris-Hanson Co.	314-432-3611
NJ	Carlin, S.A.M. Assocs.	201-727-5335
NY	Jamaica, S.A.M. Assocs.	212-OL8-8881
NC	Greensboro, L & D, Inc.	919-292-3201
Ohio	Cleveland, L.H. Dickelman Co.	216-831-1039
Tex	Dallas, Glidden Electro Equip.	214-EM3-6539
Tex	Houston, Glidden Electro Equip.	713-681-1415
EXP:	Westbury, N.Y., Minthorne Int'l. Co.	516-334-3303

CHICAGO LOCK CO., 4275 W. Belmont Ave., Chicago, Ill., 60641, Tel: 312-282-7177, Telex: 25-4055; Empl.: 408 p. 1•1986,1987

Products manufactured: Switches

Local Sales Offices & Reps.

NY	New Rochelle	914-636-1311

CHICAGO MINIATURE LAMP/DRAKE, 4433 N Ravenswood Ave., Chicago, Ill., 60640, Tel: 312-784-1020, TWX: 910-221-5445; FSC No: 71744; Minimum order: $75

For info on price: C. Feeney 312-784-1020; Application info: M. Kaczmarek 312-867-7227; Customer service: C. Feeney; Delivery info: C. Feeney

Products manufactured: Caps, Lenses, Indicator Light, Diodes, Display Devices/Displays, Indicators, Lamps, Lights, Sockets

Local Sales Offices & Reps.

Ariz	Phoenix, Howe & Howe Sls., Inc.	602-264-7971
Cal	Mt. View, CMLW	415-967-2346
Cal	N. Hollywood, Chicago Miniature Lamp Co.	213-877-0158
Colo	Denver, Lindberg Co.	303-758-9033
Conn	Newtown, Gerber Sls. Corp.	203-426-3440
Fla	Hollywood, Component Engrg. Sls. Co.	305-922-5230
Ga	Atlanta, Winfield Southeast Co.	404-636-3023
Ill	Chicago, CMLW	312-784-1020
Ind	Indianapolis, Tech. Reprs.	317-849-6454
Iowa	Cedar Rapids, PMA Corp.	319-362-9177
Kans	Overland Park, PMA Corp.	913-381-0004
Kans	Wichita, PMA Corp.	316-264-2662
Mass	East Longmeadow, Gerber Sls. Corp.	413-525-3059
Mass	Waltham, Gerber Sls. Corp.	617-890-8040
Mich	Detroit, Rathsburg Assoc.	313-882-1717
Minn	Minneapolis, Nortec Sls.	612-835-7414
Mo	Hazelwood, PMA Corp.	314-731-4334
NJ	Cherry Hill, Trinkle Sls., Inc.	609-795-4200
NJ	Parsippany, TMA	201-227-4073
NM	Albuquerque, Lindberg Co.	505-345-2489
NY	N. Syracuse, L.D. Allen, Inc.	315-458-7470
NY	Port Washington, T.M.A.	516-883-2432
NY	Snyder, L.D. Allen, Inc.	716-839-3300
NC	Charlotte, Winfield Southeast Co.	404-636-3023
Ohio	St. Marys, T. Shelby & Co.	419-394-3377
Ore	Portland, J.J. Backer Co.	503-297-3776
Ore	Salem, J.J. Backer Co.	503-362-0717
Tenn	Hermitage, Winfield Southeast Co.	404-636-3023
Tex	Dallas, Techno Assocs.	214-357-9213
Utah	Salt Lake City, Lindberg Co.	801-364-6409
Wash	Seattle, J.J. Backer Co.	206-285-1300
EXP:	Chicago, Ill., Chicago Miniature	312-784-1020
FOR:	Can., Montreal, P.Q., General Instr. Can.	514-636-9454
FOR:	Can., Toronto, Ont., General Instr. Can.	416-763-4133

CHICAGO SWITCH, INC., 2035 W. Wabansia, Chicago, Ill., 60647, Tel: 312-489-5500; Empl.: 150; Minimum order: $25 .... p. 1•1988

For info on price: E. H. Petersen; Application info: E. H. Petersen; Customer service: M. Moore; Delivery info: M. Moore

Free literature available: GENERAL CATALOG - An attractive two color, 24 page catalog containing over 250 switches, many of which are in stock for immediate delivery. Included in this catalog are photos, dimensional line drawings, specifications, prices, and ordering information on our complete line of switches-including slide, snap action, rotary, pushbutton, rocker, paddle and leaf.

Products manufactured: Lights, Sockets, Switch Hardware, Switches

Local Sales Offices & Reps.

Ariz	Phoenix, Cleveland Entr.	602-996-6130
Cal	Burlingame, J. Logan & Assoc.	415-697-6100
Cal	San Gabriel, V. Gott & Assoc.	213-285-2148
Colo	Denver, Omega Ltd.	303-758-1508
Conn	Bethany, Reps. Corp.	203-393-0024
Fla	Casselberry, E.I.R.	305-830-9600
Ga	Atlanta, Winfield-Southeast Co.	404-636-3023
Ind	Indianapolis, Tech. Reps.	317-849-6454
Mass	Topsfield, Reps. Corp.	617-887-5050
Mich	Southfield, Kingsley Assoc.	313-424-8181
Minn	Minneapolis, Stack-Johnson, Inc.	612-925-2111
NJ	Mountain Lakes, Comps. Elctrns.	201-334-2921
NM	Albuquerque, Cleveland Entr.	505-345-2481
NY	Syracuse, Nycom, Inc.	315-437-8343
NC	Charlotte, Winfield-Southeast Co.	404-636-3023
Ohio	Beachwood, Elctrn. Salesmasters, Inc.	216-831-9555
Ore	Beaverton, N.R. Schultz Co.	503-643-1644
Pa	Glenside, Elcom, Inc.	215-885-1325
Tenn	Hermitage, Winfield-Southeast Co.	404-636-3023
Tex	Dallas, Erickson-Vilter Sls.	214-243-6611
Utah	Salt Lake City, Omega Ltd.	801-266-9617
Wash	Bellevue, N.R. Schultz Co.	206-454-5224

Local Distributors

Cal	Burlingame, Rose Elctrns., 846 N. Stanton Rd.	415-697-0224

CHOMERICS

CHOMERICS, INC., 77 Dragon Court, Woburn, Mass., 01801, Tel: 617-935-4850, TWX: 710-393-0173; Empl.: 90; Minimum order: $50

For info on price: P. A. Connolly; Application info: R. Stahl; Customer service: P. A. Connolly; Delivery info: D. Smith

Free literature available: Technical Bulletin 41-Describes CHO-THERM, a thermally conductive, electrically insulating silicone rubber for insulating power semiconductors. Bulletin 967-Describes standard QUICKEY keyboards, featuring low profile, tactile feel.

Products manufactured: Adhesives (All Types), Coatings, Compounds, Encapsulating, Insulating, Molding, Potting, Conductive Plastic Materials, Gaskets, Shielding, R-F-Also See Shields, R-F, Keyboards, Alphanumeric & Decimal, Pads, Transistor Mounting, Rubber, Shields, Switches, Transistor, Diode, Thyristor Heat Dissipators, Tubing

Local Sales Offices & Reps.

Component

Cal	Los Angeles, El-Com, Inc.	213-223-1351
Pa	Glenside, C.A. Briggs Co.	215-885-2244
Tex	Dallas, J. Clay Co.	214-350-1281

RFI Shielding

Cal	Irvine, Chomerics/Job-Ready	714-556-4170
Cal	Los Angeles, El-Com, Inc.	213-223-1351
Cal	San Carlos, Lo-Dan, Inc.	415-592-4600
Fla	Orlando, Data-Rep, Inc.	305-843-5224
Fla	Pompano Beach, Data-Rep, Inc.	305-781-9279
Ill	Skokie, Mar-Con Assoc.	312-675-6450
Md	Rockville, Mechtronics Sls., Inc.	301-340-2130
Minn	Minneapolis, Milt Westlund Assoc.	612-866-5002
Mo	St. Louis, Chomerics/Mid-America	314-434-3880
NY	Jamaica, S-J Assocs.	212-291-3232
NY	Manhasset, Win-Cor Elctrn. Sls.	516-627-9474
Okla	Tulsa, Blair Engrg.	918-633-9850
Ore	Portland, Houston Co.	503-235-4174
Pa	Philadelphia, Professional Svc. Assoc.	215-355-6244
Tex	Dallas, Blair Engrg.	214-352-8411
Tex	Dallas, K. A. Elctrn. Sls.	214-634-7870
Tex	Houston, Blair Engrg.	713-772-0677
Wash	Seattle, Houston	206-622-0750

Local Distributors

Cal	Los Angeles, El-Com, 5134 Valley Blvd.	213-223-1351

CHRISTIANSEN RADIO INC., 1950 San Remo, Laguna Beach, Cal., 92651, Tel: 714-497-1506; Empl.: 9

For info on price: J. Conroy; Application info: A. D. Christiansen; Customer service: J. Conroy; Delivery info: J. Conroy

Free literature available: Brochures: Mini-Mount Solid State Electronics Kits, Mini-Mounts DC/UHF Breadboarding, Electronics in Education, Instructor's Manual A Series.

Products manufactured: Benches, Consoles, Stools, Tables, Boards, Plug-In, Boards, Printed Circuit, Boards, Printed Wiring, Universal, Chassis, Circuit Board Mounting, Integrated Circuit Packaging Systems, Integrated Circuit Devices, Kits, Breadboarding (For Engineers), Kits, Power Supply, Kits, Printed Circuit, Kits, Test Equipment, Kits, Training Aid, Pads, Transistor Mounting, Soldering Accessories, Soldering Equipment, Strips, Terminal Blocks, Boards & Strips

Local Sales Offices & Reps.

Cal	Los Altos, Andot Tech. Sls. Co.	415-941-8858

CHRISTIE ELEC., 3404A W. 67th St., Los Angeles, Cal., 90043, Tel: 213-750-1151, TWX: 910-321-3867; FSC No: 02294; Empl.: 120; Minimum order: $1,095 p. 1•1180,1186

Customer service: H. Rudman

Free literature available: Bulletin AC-73 High-current DC power supplies; regulated and non-regulated; up to 1500 amps and 126 DC output volts.

Products manufactured: Chargers, Battery, Current Sources, Eliminators, Battery, Lamps, Lights, Power Supplies, Rectifiers, Sockets, Testers

Local Sales Offices & Reps.

Cal	Santa Clara, Thomas-Hartman Assoc.	408-247-1252
Fla	Orlando, Newco & Assocs.	305-293-7700
Md	Silver Spg., L. White	301-585-3141
NC	Winston-Salem, L. White & Co.	919-725-3612
Tex	Richardson, C. Tinch	214-231-1322
EXP:	Cal., L.A., Trans-World Trade	213-472-0444

CHRONETICS, INC., 500 Nuber Ave., Mt. Vernon, N.Y., 10550, Tel: 914-699-4400, TWX: 710-560-0014; Empl.: 55 p. 1•634; p. 2•1286

For info on price: Sls. Dept.; Application info: S. Gordon; Customer service: Sls. Dept.; Delivery info: Sls. Dept.

Free literature available: Complete and detailed literature on the following items: PG-10, PG-11A, PG-12, PG-13, PG-14B, PG-16, PG-32A, 1012.

Products manufactured: Amplifiers, Analyzers, Delay Lines, Generators

Local Sales Offices & Reps.

Ariz	Tempe, Trembly Assoc.	602-966-4428
Cal	Sherman Oaks, Windsor Dynamics	213-989-3631
Cal	Woodside, Windsor Dynamics	415-854-4870
Colo	Parker, Technology Mktg. Assoc.	303-841-3435
Conn	Hamden, Equip. Sls. Co., Inc.	203-248-5581
Fla	Clearwater, Brennan Assocs., Inc.	813-446-5006
Fla	Orlando, Brennan Assocs., Inc.	305-425-2161
Ill	Elk Grove Village, L.F. Green & Assocs.	312-593-0282
Ill	Mt. Prospect, Contemporary Science	312-255-3793
Ind	Indianapolis, L.F. Green & Assocs.	317-253-2087
Kans	Olathe, R. Rush Assocs.	913-782-1177
Md	Bethesda, Powell-Pendergraph, Inc.	301-656-4535
Mass	Chelmsford, Equip. Sls. Co., Inc.	617-256-8547
Minn	Minneapolis, L.F. Green & Assocs.	612-781-1611
Mo	St. Louis, R. Rush Assocs.	314-426-3656
NM	Albuquerque, Technology Mktg. Assoc.	505-298-4321
NY	Mt. Vernon, Q.E.D. Elctrns., Inc.	914-664-0080
Ohio	Dayton, Rixan Assocs.	513-278-4216
Ohio	Westerville, Contemporary Science, Inc.	216-292-7533
Pa	Abington, Powell-Pendergraph, Inc.	215-657-0300
Tex	Dallas, R. Martin Assocs, Inc.	214-358-3704
Tex	Houston, R. Martin Assocs., Inc.	713-462-4077
Va	Richmond, Powell-Pendergraph, Inc.	703-264-2341
Wash	Seattle, H. Levinson Co.	206-EA 3-5100

CHRONO-LOG CORP., 2 W. Park Rd., Havertown, Pa., 19083, Tel: 215-853-1130; Empl.: 15; Minimum order: $20 p. 1•152,153

For info on price: D. Biberman; Application info: D. Biberman; Customer service: A. Roy

Free literature available: Condensed Catalog - Digital Clocks, Calendars, Time Code Readers, Generators, Tape Search Systems. Series 70,000 Bulletin - versatile Digital Clocks. Series 9,000 Bulletin - low cost Time Code & Generator Readers.

Application Notes - individual bulletins of Chrono-log Digital Clocks and Time Code Equipment.

Products manufactured: Chronometers, Clocks (All Types), Controllers, Programmable, Converters, Counters, Generators, Receivers, Standards, Tape Search Equipment, Timers

Local Sales Offices & Reps.

Mass	Needham, J.J. Wild, Inc.	617-HI4-2366
Va	Arlington, H.J. Heffernan Co.	703-JA2-6666
FOR:	Can., Don Mills, Ont., York Instrs.	416-445-1255

HRONOMITE LABS, 21011 S. Ligueroa St., Carson, Cal., 90745

IMCO WIRE & CABLE, INC., 250 W. Crescent Ave., Allendale, N.J., 07401, Tel: 201-327-2522, Telex: 13-3443; Empl.: 58; Minimum order: $50 p. 2•1910,2023

Customer service: H. Singer

Products manufactured: Cable, Tubing, Wire

Local Sales Offices & Reps.

Cal	Chatsworth, Cal-Ward Sls. Co.	213-885-1771
Fla	Orlando, Royce Elctrn. Sls., Inc.	305-843-6030
Ill	Chicago, Kennedy Engrg.	312-631-8283
Ind	Ft. Wayne, Component/Insulation Corp.	219-485-7114
Kans	Shawnee Mission, K & M Sls.	913-262-1444
Mass	Weston, F.C. Talbot Co.	617-893-6877
Mich	Birmingham, Forand Sls. Co.	313-644-0087
Minn	Minneapolis, Paul Ericson & Assocs.	612-884-1969
NY	East Syracuse, Mac-Tron Sls. & Engrg. Co.	315-422-2425
Ohio	Cleveland, Component/Insulation Corp.	216-521-3570
Pa	Pittsburgh, J.W. Kight Co.	412-781-8303
Pa	Radnor, Cordray Sales Co.	215-687-1366
Tenn	Memphis, Wm. L. Porter Co.	901-386-7714
Tex	Dallas, R.E. Nesbitt Co.	214-357-4601
Wash	Kirkland, Lehr Assocs.	206-827-4581
FOR:	Can., Montreal, Que., Allied Elctrn. Sls.	514-488-5547

CINCH, See TRW Cinch

CINCINNATI ELCTRNS. CORP., 2630 Glendale Milford Rd., Cincinnati, Ohio, 45241, Tel: 513-563-6000, TWX: 810 464-8151; FSC No: 80045; Empl.: 900

Free literature available: Radio Sets, Receivers, Transceivers, Decoders, Demodulators, Antennas, Displays, Amplifiers, IR Receiving Sets and Detectors, Radar Sets.

Products manufactured: Amplifiers, Antennas, Boards, Printed Circuit, Circuits, Hybrid, Thick Film, Coders, Comm. Systems, Couplers, Decoders, Decommutators, Telemetering, Demodulators, Detectors, Mixer-Preamplifiers, Microwave, Modulator/Demodulators, Modulators, All Kinds, Multiplexers, Packages, Integrated Circuit, Radar Systems, Receivers; Scanners, Services, Assembly, Production & Test, Transceivers, Transmitters

CINCINNATI MILACRON, Molded Plastics Division, P.O. Box 246, Blanchester, Ohio, 45107, Tel: 513-783-2464, Telex: 214472; Empl.: 10000

Products manufactured: Laminates

Local Sales Offices & Reps.

Ala	Huntsville, Component Sls.	205-883-7794
Cal	Fremont, H.K. Foraker	415-657-2213
Cal	Sepulveda, R.L. Assocs.	213-782-7826
Colo	Boulder, Straube Assocs.	303-443-8600
DC	Bellevue, Ray Over Sls.	206-454-9187
Fla	Terra Ceia, Component Sls.	813-360-7460
Ill	Chicago, Electro-Comp. Sls., Inc.	312-763-3636
Ind	Ft. Wayne, P. Kilfoil	219-749-0113
Kans	Mission, Inland Assocs.	913-362-2366
Mich	Ferndale, Hilltronics, Inc.	313-398-5556
Minn	Minneapolis, M. Franklin	612-835-6422
Mo	Glencoe, Inland Assocs.	314-938-4992
NH	Spofford, Bahr Sls.	603-352-5444
NJ	Springfield, F. F. Sylvester Assoc.	201-376-3324
NM	Albuquerque, Straube Assocs.	505-294-1880
NY	Rochester, Landfear & Brophy	716-442-0430
NC	Raleigh, Component Sls. Corp.	919-832-1897
Ohio	Cincinnati, J.F. Kilfoil Co.	513-791-6150
Ohio	Grafton, A. Risser	216-458-5091
Pa	Fairview Village, R.H. Hilderbrand Co.	215-247-6225
Tex	Garland, G.V. Peck Co.	214-341-8311
Utah	Salt Lake City, Straube Assocs.	801-328-4513
FOR:	Can., Brock Elctrns. Ltd.	613-342-0152

CINCINNATI SUB-ZERO PRODUCTS, 2612 Gilbert Ave., Cincinnati, Ohio, 45206, Tel: 513-751-8810; Empl.: 40

For info on price: T. J. Frederick; Application info: T. J. Frederick; Customer service: R. E. Schroeder; Delivery info: T. E. Spicer

Products manufactured: Baths, Controlled Temperature (Air & Liquid), Chamber, Environmental Test, Testers

CIPHER DATA PRODUCTS, 7655 Convoy Ct., San Diego, Cal., 92111, Tel: 714-279-6550, TWX: 910-335-1257; Empl.: 132

Customer service: E. L. Phillips

Products manufactured: Computers, Converters, Data Acquisition & Reduction Systems, Recorders

Local Sales Offices & Reps.

Ala	Huntsville, FM Assocs.	205-536-9990
Ariz	Phoenix, Thorson Co.	602-956-5300
Cal	Los Angeles, Thorson Co.	213-937-0790
Cal	Mountain View, Thorson Co.	415-964-9300
Cal	San Diego, Mesa Elctrns.	714-278-8021
Colo	Boulder, Measurement Consultants	303-449-5294
Fla	Orlando, FM Assocs.	305-851-5710
Ill	Chicago, Data Elctrns.	312-283-0300
Ind	Columbus, Miltronics	812-376-6321
Mass	Wakefield, Instr. Dynamics	617-245-5100
Mich	Farmington, Anderson Elctrns.	313-476-9161
Minn	Minneapolis, Data Elctrns.	612-786-9666
NJ	Ramsey, Cipher East Regional Off.	201-825-0335
NM	Las Cruces, Measurement Consultants	505-526-2491
NY	East Setauket, K & J Assocs.	516-751-8686
NC	Greensboro, FM Assocs.	919-294-2754
Ohio	Dayton, E. V. Swede Swenson	513-425-2773
Pa	Pennsauken, Megargel/Himmelstein	609-662-3081
Tex	Houston, Comspec	713-461-4487
Tex	Richardson, Comspec	214-234-4137
Utah	Murray, Measurement Consit.	801-268-3181

CIR-Q-TÉL, INC., 10504 Wheatley St., Kensington, Md., 20795, Tel: 301-946-1800; Empl.: 20

Customer service: D. E. Claycomb

Free literature available: Mini Catalog - filters and other products.

Products manufactured: Attenuators, Circulators, Ferrite, Detectors, Filters, Isolators

CIRCON CORP., 749 Ward Drive, Santa Barbara, Cal., 93111, Tel: 805-967-0404; Empl.: 30; Minimum order: $15

Customer service: Sls. Order Desk

Free literature available: MicroVideo Systems; MicroTools; MicroHardware; MicroIndicators & Lamps, MicroLuminators and MicroMagnifiers.

Products manufactured: Cameras, Caps, Lenses, Indicator Light, Eyelets, Fasteners, Kits, Breadboarding (For Engineers), Kits, Terminal, Knives & Knife Sets, Lamps, Leads, Test & Adaptors, Lenses, Optical & Camera, Lights, Microcircuit Production Equip., Microscopes, Monitors, Probes, Recorders, Rivets, Sockets, Solder (All Types), Soldering Accessories, Soldering Equipment, Soldering Guns, Irons & Desoldering Tools, Television Systems & Equipment Closed-Circuit, Terminals, Testers, Tools, Tweezers, Hand & Vacuum

Local Sales Offices & Reps.

Ariz	Phoenix, Jensen Tools & Alloys	602-959-2210
Fla	Longwood, Lenz Engrg. Co.	305-831-9797
Fla	Miami, Elctrn. Equip.	305-871-3500
Ill	Chicago, Brooks Engrg. Co.	312-944-1227
Md	Rockville, Winston Sls. Co.	301-881-5780
Mass	Framingham, DLG Assocs.	
Mass	Sudbury, DLG Assocs.	617-877-7880
Mich	Detroit, Group Ten Tech. Sls. Corp.	313-549-3910
NJ	East Brunswick, Sigma Comms. Assocs.	201-238-3910
NM	Albuquerque	505-265-6775
NY	Binghamton, Stack Ind'l. Elctrns.	607-723-6326
NY	Hempstead, Davis Elctrns.	516-483-9200
NY	Merrick, Sigma Comms. Assocs.	516-623-7227
Ohio	Cleveland, Group Ten Tech. Sls. Corp.	216-486-2800
Ohio	Dayton, Group Ten Tech. Sls. Corp.	513-277-6531
Pa	Feasterville, H. Mann	215-355-7200
Pa	Plymouth Meeting, Techni-Tool	215-825-4990
Tex	Dallas, Southwestern Engrg. & Equip. Co.	214-826-6661
Tex	Spring, Southwestern Engrg. & Equip. Co.	713-353-4333
Wash	Seattle, Demarest Assocs.	206-523-0600

CIRCUIT ASSEMBLY CORP., 3169 Red Hill Ave., Costa Mesa, Ca., 92626, Tel: 714-540-5490, TWX: 910-595-1971; Empl.: 275

For info on price: T. Piatt; Application info: T. Piatt; Customer service: B. Payne; Delivery info: B. Payne

Products manufactured: Cable Assemblies & Harnesses, Cable, Connectors, Contacts, Electrical, Enclosures, Module, Plug-In, Jumpers, Pins, Plug Caps & Shells, Sockets, Wire

Local Sales Offices & Reps.

Ariz	Scottsdale, Barnhill Five	602-947-5745
Cal	Los Angeles, Product Supply Co.	213-659-1858
Cal	Santa Clara, Kelley Sales	408-249-0786
Colo	Denver, Barnhill Five	303-426-0222
Conn	Wallingford, Con Sales	203-269-7964
Fla	Fort Lauderdale, Tech-Rep Assocs.	305-782-0962
Fla	Indian Rocks Beach, Tech-Rep Assocs.	813-595-2834
Ill	Wilmette, Crest-Assocs.	312-256-5202
Mass	Waltham, Con Sales	617-890-0011
NJ	Westwood, R. C. Assocs.	201-664-1241
NM	Albuquerque, Barnhill Five	505-293-5956

Tex	Arlington, N. & W. Sales	817-461-4443
Wash	Bellevue, Hays Industrial	206-883-8888

CIRCUIT-STIK, INC., 24015 Garnier St., Torrance, Cal., 90510, Tel: 213-530-5530, Telex: 69-8223; FSC No: 06656; Empl.: 43; Minimum order: $25

For info on price: D. Harper; Application info: G. McCray; Customer service: D. Harper; Delivery info: Order Desk

Products manufactured: Boards, Printed Circuit, Connectors, Drafting Symbols, Dry Transfer, Pressure Sensitive, etc. (Including Lettering), Kits, Breadboarding (For Engineers), Kits, Printed Circuit, Racks, Socket Adapters, Sockets, Tapes, Films & Foils, Pressure Sensitive

Local Sales Offices & Reps.

Ariz	Phoenix, W. B. Knight Co.	602-242-6787
Ariz	Scottsdale, F. Board Assocs.	602-949-9561
Cal	Burlingame, W.J. Purdy Co.	415-347-7701
Cal	Newport Beach, W. B. Knight, Inc.	714-833-8250
Colo	Denver, W.J. Purdy Co.	303-777-1411
Fla	Orlando, Cartwright & Bean, Inc.	305-422-4531
Ga	Atlanta, Cartwright & Bean	404-255-5262
Ill	Hinsdale, Hill-Gray Assoc.	312-325-4810
Ind	Mulberry, Maish Sls.	317-296-2322
Kans	Overland Pk., T.L. Dowell	913-236-8200
Mass	Babson Park, P.R. Sturgeon Co.	617-237-3506
Minn	Minneapolis, D. Borrett Co.	612-929-0028
NJ	Teaneck, Fisher Elect. Assoc.	201-837-1200
NM	Albuquerque, C.T. Carlberg & Assocs.	505-265-1579
NY	Syracuse, Mar-Com Assocs.	315-437-2843
Ohio	St. Marys, Thomas Shelby & Co.	419-394-3377
Ore	Portland, Earl & Brown Co.	206-284-1121
Tenn	Knoxville, Cartwright & Bean	615-693-7450
Tenn	Memphis, Cartwright & Bean	901-276-4442
Tex	Dallas, J.Y. Schoonmaker Co.	214-357-8481

CIRCUIT STRUCTURES LAB., Div. Lincoln Instr. Co., Inc., 3200 N. San Fernando Blvd., Burbank, Calif., 91504, Tel: 213-849-6341; Empl.: 4

For info on price: G. Vogel; Application info: E.L. Deatrick; Customer service: G. Vogel; Delivery info: G. Vogel

Products manufactured: Chassis, Circuit Board Mounting, Chassis, Metal, Guides, Circuit Board, Kits, Breadboarding (For Engineers), Pads, Transistor Mounting

CIRCUIT TECHNOLOGY, 160 Smith St., Farmingdale, N.Y., 11735, Tel: 516-293-8686, TWX: 510-224-6555; Empl.: 280; Minimum order: $1000

For info on price: M. Spitz; Application info: B. Sabatini; Customer service: J. DiPietro; Delivery info: J. DiPietro

Free literature available: Facilities & Capabilities Brochure.

Products manufactured: Circuits, Hybrid, Thick Film, Converters, Drivers, Switch, Filters, Hybrid Voltage Regulators, Integrated Circuit Devices, IC's, Active Filters, Integrators, Electronic, Lamp Drivers, Networks

Local Sales Offices & Reps.

Cal	Manhattan Beach	213-374-7446

CIRTECH CORP., 3802 W. 95th St., Leawood, Kans., 66206, Tel: 913-649-2800, TWX: 910-749-6806

Products manufactured: Filters

Local Sales Offices & Reps.

Ariz	Phoenix, Runyon Co.	602-959-6060
Cal	Los Angeles, Westaironics, Inc.	213-466-6201
Fla	Clearwater, WMM Assoc., Inc.	813-446-0075
Mass	Braintree, Bordewieck Eng. Sales	617-843-0845
NY	Buffalo, Telesco Assoc., Inc.	716-834-1026
NY	New York, F & F Assoc.	516-ED 4-1160
Ohio	Dayton, Berberich & Assoc.	513-252-9981
Tex	Dallas, Tinch Sls. Co.	214-231-1322

CLAIREX ELCTRNS. INC., 560 S. 3rd Ave., Mt. Vernon, N.Y., 10550, Tel: 914-664-6602; Empl.: 120; Minimum order: $25 .... p. 1•1008,1009

For info on price: A. Rabidoux; Application info: S. Aconsky; Customer service: A. Rabidoux; Delivery info: A. Rabidoux

Free literature available: Photocell Design Manual, Photomud Catalog, Spec Sheets

Products manufactured: Cells, Photoconductive, Photoemissive, Photovoltaic, Detectors, Isolators, Transistors

Local Sales Offices & Reps.

Cal	Culver City, E.V. Roberts & Assoc.	213-870-9561
Cal	Palo Alto, E.V. Roberts & Assoc.	415-494-1671
Cal	San Diego, E.V. Roberts & Assoc.	714-565-4535
Colo	Eastlake, Jenson Reps.	303-688-4151
Fla	North Miami Beach, Irby & Connolly Inc.	305-949-5197
Fla	Orlando, Irby & Connolly Inc.	305-894-8471
Ga	Decatur, Electro Rep. Assoc. Inc.	
Ill	Chicago, L-Tec Inc.	312-286-1500
Md	Lutherville, Cunningham & Assoc.	301-296-4306
Mass	Norwell, Bordewieck Eng. Sls. Co.	617-659-4915
Mich.	Ferndale, Hilltronics Inc.	313-398-5556
Minn	Minneapolis, H.M.R. Inc.	612-920-8200
NJ	Fort Lee, Tecnimat	201-461-8686
NY	Cato, Clairex Elctrns.	315-626-6425
NY	Mt. Vernon, Clairex Elctrns.	914-664-6602
NY	Roslyn Heights, Livera Polk Assoc.	516-484-1276
NC	Charlotte, Electro Rep. Assoc.	704-527-2530
Ohio	Chardon, Clairex Elctrns.	216-285-3415
Pa	Media, W. Reeves Assoc.	215-566-6709
Tex	Dallas, J.B. Guenther Inc.	214-691-8500
Tex	Houston, J.B. Guenther Inc.	713-468-0232
Wash	Seattle, H. Levinson Co.	206-323-5100

Local Distributors

Ala	Birmingham, M-G Elctrns & Equip., Inc., 3112 6th Ave. S.	205-328-4525
Cal	Culver City, E.V. Roberts & Assocs., Inc., 9601 W. Jefferson Blvd.	213-870-9561
Cal	Garden Grove, Allied Elctrns. Corp., 12311 Ind'l. St.	714-894-7585
Cal	Palo Alto, E.V. Roberts & Assocs., Inc., 800 San Antonio Rd.	415-494-1671
Cal	San Diego, E.V. Roberts & Assocs., Inc., 8861 Balboa Ave., Suite E	714-565-4535
Fla	Orlando, Hammond Elctrns., Inc., 911 W. Central Blvd.	305-241-6601
Fla	Tampa, Lykes Elctrns. Corp., 5426 W. Crenshaw	813-886-6621
Ill	Elgin, Allied Elctrns. Corp., 1355 Sleepy Hollow Rd.	312-697-8200
Ind	Indianapolis, Graham Elctrns. Supp., Inc., 133 S. Pennsylvania St.	317-634-8486
Kans	Topeka, Acme Radio Supply, Box 437, 135 Kansas	913-235-1363
Ky	Louisville, P.I. Burks Co., 842 S. 7th St.	502-589-3960
La	New Orleans, Southern Radio Supply Co., 1901 Tulane Ave.	504-524-2343
Mass	Newton, Cramer Elctrns., Inc., 85 Wells Ave.	617-969-7700
Mass	Norwell, Bordewieck Sls. Co., 427 Washington St.	617-659-4915
Mich	Detroit, Michigan Lectrols Corp., 18315 W. 7 Mile Rd.	313-255-4250
Mich	Detroit, R.S. Elctrns., 12775 Lyndon Ave.	313-491-1000
Minn	Minneapolis, Stark Elctrns., 112 3rd. Ave. N.	612-294-1325
Mo	St. Louis, Van Sickle Radio Elctrns., 1915017 Washington Ave.	314-621-5000
NJ	Cherry Hill, D.F. Assocs., 135 Dumas Rd.	609-428-3455
NY	Buffalo, Summit Dists., 916 Main St.	716-884-3450
NY	Farmingdale, Arrow Elctrns., 900 Broad Hollow Rd.	516-694-6800
NY	New York, Blan Elctrns. Corp., 56 Warren St.	212-233-6288
NY	Rochester, Summit Elctrns. Rochester, 292 Commerce Dr.	716-334-8110
NC	Greensboro, Hammond Elctrns., Inc., 2923 Pacific Ave.	919-275-6391
NC	Raleigh, Southeastern Radio Supply Co., 414 Hillsborough St.	919-828-2311
NC	Winston-Salem, Kirkman Elctrns., Inc., 901 W. 2nd St.	919-724-0541
Ohio	Cincinnati, Hughes-Peters, Inc., 4865 Duck Creek Rd.	513-351-2000
Ohio	Columbus, Hughes-Peters, Inc., 418 E. 11th. Ave.	614-294-5351
Pa	Pittsburgh, R.P.C. Elctrns., 620 Alpha Dr.	412-782-3770
SC	Columbia, Dixie Radio Supply Co., 1900 Barnwell St.	803-253-5333
SC	Greenville, Hammond Elctrns., Inc., Box 2308	803-233-4121
Tenn	Memphis, Bluff City Dist. Co., 234 E. St.	901-276-4501
Tenn	Nashville, Electra Distr. Co., 1914 W. End Ave.	615-329-3971
Tex	Dallas, Wholesale Elctrn. Supply, Ross at Central	214-824-3001
Tex	Ft. Worth, Allied Elctrns., 401 E. 8th St.	817-336-5401
Tex	Ft. Worth, Wholesale Elctrn. Supply Co., 550 South Freeway	817-336-0461
Tex	Richardson, Altair Co., 406 N. Plano Rd.	214-231-5166
Wash	Seattle, Radar Elec. Co., 168 Western Ave. W.	206-282-2551
Wisc	Mequon, Taylor Elec. Co., 1000 W. Donges Bay Rd.	414-241-4321
Wisc	Milwaukee, Parts Mart Corp., 1314 N. 7th St.	414-276-4160
For:	Can., Willowdale, Ont., Electro-Sonic Ind'l. Sls. Ltd., 1100 Gordon Baker Rd.	416-494-1666

CLARE & CO., C.P., 3101 Pratt Blvd., Chicago, Ill., 60645, Tel: 312-262-7700, Telex: 25-3775; Empl.: 1500 p. 1•1596-1615

For info on price: R. E. Axthelm; Application info: T. Sipp; Customer service: T. Miller; Delivery info: T. Miller

Products manufactured: Relays, Sockets, Switches

Local Sales Offices & Reps.

Ala	Huntsville, C.P. Clare & Co.	205-534-5438
Ariz	Phoenix, Spectrum Assocs.	602-997-6324
Ark	Fort Smith, Electro-Related Prods.	501-783-7323
Cal	Mountain View, C.P. Clare & Co.	415-968-2831
Cal	Santa Ana, Spectrum Assocs.	714-835-4114
Colo	Denver, Electrodyne, Inc.	303-757-7679
Fla	Ft. Lauderdale, R.I. Smith Assocs.	305-772-5100
Ga	Atlanta, A. Brown Assocs.	404-457-6381
Ill	Chicago, C.P. Clare & Co.	312-262-7700
Ind	Fort Wayne, Baehr, Greenleaf & Assoc.	219-447-1608
Kans	Shawnee Mission, Lowell-Kangas & Assoc.	913-631-3515
La	Harvey, Electro-Related Prods.	504-368-7487
Md	Ellicott City, Doss Elctrns., Inc.	301-465-1336
Mass	Needham, C.P. Clare & Co.	617-449-4780
Mich	Southfield, C.P. Clare & Co.	313-356-3988
Minn	St. Paul, Repor, Inc.	612-645-8618
Mo	St. Louis, Lowell-Kangas & Assoc.	314-821-4050
NY	Great Neck, C.P. Clare & Co.	516-466-2100
NY	Syracuse, C.P. Clare & Co.	315-637-3939
NC	Charlotte, R.W. Chapman & Co.	704-525-2421
NC	Raleigh, R.W. Chapman & Co.	919-782-2624
Ohio	Cincinnati, Baehr, Greenleaf & Assoc.	513-891-3826
Ohio	Cleveland, Baehr, Greenleaf & Assoc.	216-221-9030
Ohio	Columbus, Baehr, Greenleaf & Assoc.	614-486-4046
Pa	Erie, Foster-McClinton Inc.	814-455-9111
Pa	Ft. Washington, C.P. Clare & Co.	215-643-5321
Pa	Pittsburgh, Foster-McClinton Inc.	412-941-4800
SC	Greenville, R.W. Chapman & Co.	803-232-5391
Tex	Dallas, R.E. Nesbitt Co.	214-357-4601
Tex	Houston, Gettys-Eads-Adair Inc.	713-781-3005
Utah	Salt Lake City, Electrodyne, Inc.	
Va	Richmond, Advance Control Equip.	804-270-7182
Wash	Bellevue, C.P. Clare & Co.	206-747-5600
WVa	Huntington, Foster-McClinton, Inc.	304-736-5161
Wisc	Wauwatosa, Larsen Assocs.	414-258-0529

Local Distributors

Ala	Birmingham, M. G. Elctrns. & Equip., 3112-6th Ave., S.	205-328-4525
Ala	Huntsville, Cramer/EW Inc., 2310 Bob Wallace Ave. S.W.	205-539-5722
Ala	Huntsville, Powell Elctrns., 803 Oster Dr.	205-539-2731
Ariz	Phoenix, Kierulff Elctrns., 2633 E. Buckeye Rd.	602-273-7331
Ark	Fort Smith, Wise Wholesale Elctrns., 1001 Towson Ave.	501-783-8925
Ark	Little Rock, Carlton-Bates Co., Scott Hamilton Dr. at 69th	501-562-9100
Cal	Los Angeles, Kierulff Elctrns. Corp., 2585 Commerce Way	213-685-5511
Cal	Los Angeles, Texas Instrs. Supply Co., 5200 W. 104th St.	213-776-4490
Cal	Menlo Park, Bell Inds, Elctrn. Dist. Div., 1070 O'Brien Dr.	415-323-9431
Cal	Palo Alto, Kierulff Elctrns., 3969 E. Bayshore Rd.	415-968-6292
Cal	San Diego, Kierulff Elctrns., 8797 Balboa Ave.	714-278-2112
Cal	Sun Valley, Richey Elctrns., 10871 La Tuna Canyon	213-983-0222
Cal	Sunnyvale, Texas Instrs. Supply 776 Palomar	408-732-5555
Colo	Denver, Kierulff Elctrns. Corp., 10890 E. 47th Ave.	303-343-7090
Colo	Denver, Texas Instrs. Supply Co., 2149 S. Holly St.	303-757-7671
Conn	North Haven, Cramer/Connecticut, 35 Dodge Ave.	203-239-5648

Fla	Hollywood, Cramer/EW Inc., 4035 N. 29th Ave.	305-923-8181
Fla	Miami Springs, Powell Elctrns., 1740 N.W. 69th Ave.	305-885-8761
Fla	Orlando, Cramer/EW Inc., 345 N. Graham Ave.	305-894-1511
Ga	Atlanta, Cramer/EW Atlanta, 3923 Oakcliff Industrial Ct.	404-448-9050
Ga	Atlanta, Specialty Distributing, 763 Juniper St., N.E.	404-873-2521
Ill	Arlington Heights, Texas Instrs. Supply Co., 2420 E. Oakton	312-593-7660
Ill	Mount Prospect, Cramer/Chicago, 1911 South Busse Rd.	312-593-8230
Ill	Palatine, Ohm/Elctrns., 649 Vermont Ave.	312-359-5500
Ill	Peoria, Klaus Radio & Elctrns., 8400 N. Pioneer Pkwy.	309-691-4840
Ind	Ft. Wayne, Ft. Wayne Elctrns. Supply, 3606 Maumee Ave.	219-423-3422
Ind	Indianapolis, Graham Elctrns. Supply, 133 S. Pennsylvania St.	317-634-8486
Kans	Wichita, Radio Supply Co., Inc., 115 Laura	316-267-5214
La	LaFayette, Ralph's of LaFayette, Box "R"	318-234-4507
Md	Beltsville, Treeko Sales, 10739 Tucker St.	301-937-8260
Md	Gaithersburg, Cramer/EW Washington, 16021 Industrial Dr.	301-948-0110
Md	Hanover, Cramer/EW Baltimore, 7235 Standard Dr.	301-796-5790
Md	Rockville, Pioneer/Washington Elctrns., 1037 Taft St.	301-424-3300
Mass	Cambridge, Wilshire Elctrns./New England, 205 Alewife Brook Pkwy.	617-491-3300
Mass	Newton Centre, Cramer Elctrns., 85 Wells Ave.	617-969-7700
Mich	Detroit, RS Elctrns., 12775 Lyndon Ave.	313-491-1000
Mich	Livonia, Cramer/Detroit, 13193 Wayne Rd.	313-425-7000
Minn	Edina, Cramer/Bonn, 7275 Bush Lake Rd.	612-835-7811
Minn	Edina, Texas Instrs. Supply Co., 7615 Metro Blvd., Suite 202	612-941-5020
Minn	Minneapolis, Control Design, 3433 E. 25th St.	612-721-1628
Mo	Kansas City, Walters Radio Supply, 3627-35 Main St.	816-531-7015
Mo	St. Louis, Olive Industrial Elctrns., 6662 Olive Blvd.	314-863-7800
Neb	Lincoln, Scott Electrn. Supply Corp., 4040 Adams St., Box 4467	402-434-8308
NJ	Cherry Hill, Cramer/Pennsylvania, No. 12 Springdale Rd.	215-923-5950
NJ	Clifton, Wilshire Elctrns./N.J., 312 Clifton Ave.	201-365-2600
NJ	Moonachie, Cramer/N.J., 1 Barrett Ave.	201-935-5600
NJ	Moorestown, Arrow/Angus, 126 Pleasant Valley Ave.	609-235-1900
NM	Albuquerque, Kierulff Elctrns. Corp., 2524 Baylor Dr. S.E.	505-247-1055
NY	Buffalo, Genesee Radio & Parts Co., 2550 Delaware Ave.	716-873-9661
NY	East Syracuse, Cramer/Syracuse, 6716 Joy Rd.	215-437-6671
NY	Endwell, Cramer/Binghamton, 3220 Watson Blvd.	607-754-6661
NY	Farmingdale, Wilshire Elctrns./L.I., 1855 New Hwy	516-293-5775
NY	Hauppauge, Cramer/L.I., 29 Oser Dr.	516-231-5600
NY	Johnson City, Wilshire Elctrns., 617 Main St.	607-797-1236
NY	Rochester, Cramer/Rochester, 3259 Winton Road So.	716-275-0300
NY	Rochester, Simcona Elctrns., 275 Mt. Read Blvd.	716-328-3230
NC	Raleigh, Cramer/EW Raleigh, 3901 Winton Rd.	919-876-2371
NC	Winston-Salem, Cramer/EW Inc., 938 Burke St.	919-725-8711
Ohio	Cincinnati, Cramer/Tri-States, 666 Redna Terr.	513-771-6441
Ohio	Cleveland, Cramer/Cleveland, 5835 Harper Rd.	216-248-8400
Ohio	Cleveland, Pioneer/Cleveland Elctrns., 4800 E. 131st St.	216-587-3600
Ohio	Dayton, Pioneer/Dayton Elctrns., 1900 Troy St.	513-236-9900
Okla	Tulsa, Texas Instrs. Supply, 12151 E. Skelly Dr.	918-437-4555
Pa	Allentown, Federated Elctrns., A Div. Federated Purchaser, 936 Union Blvd.	215-437-4431
Pa	Philadelphia, Powell Elctrns., S. Island Rd.	215-365-1900
Pa	Pittsburgh, Cameradio Co., 2801 Liberty Ave.	412-288-2600
SC	Columbia, Dixie Radio Supply, 1900 Barnwell St.	803-253-5333
Tenn	Nashville, Electra Distributing Co., 1914 West End Ave.	615-329-3971
Tex	Austin, Texas Instrs. Supply Co., 2601 N. Lamar	512-258-1636
Tex	Dallas, Cramer/Tex., 2970 Blystone La.	214-350-1355
Tex	Dallas, Texas Instrs. Supply Co., 6000 Denton Dr.	214-238-6853
Tex	Houston, Tex. Instrs. Supply, 3939 Ann Arbor Dr.	713-785-4800
Utah	Salt Lake City, Alta-Land Elctrns., 2280 S. Main St.	801-486-7227
Va	Richmond, Meridian Elctrns., 1001 W. Broad St.	804-355-0669
Wash	Seattle, Almac-Stroum Elctrns., 5811 Sixth Ave. S.	206-763-2300
Wash	Seattle, Kierulff Electronics, 5940 Sixth Ave. S.	206-763-1550
Wisc	Milwaukee, Marsh Elctrns., Inc., 6047 West Beloit Rd.	414-545-6500
Wisc	Oak Creek, Cramer/Wisc., 430 W. Rawson Ave.	414-764-1700

CLARE-PENDAR, Box 785, Post Falls, Idaho, 83854, Tel: 208-773-4541; Empl.: 500; Minimum order: $50

For info on price: T. Drahman; Application info: D. Dillard; Customer service: T. Drahman; Delivery info: T. Drahman

Free literature available: Switchlight Systems, S410 Monoform, S190 General Switchlight.

Products manufactured: Annunciators, Caps, Lenses, Indicator Light, Display Devices/Displays, Indicators, Keyboards, Alphanumeric & Decimal, Lenses, Readout & Display, Lenses, R-F, Lights, Sockets, Switchboards, Switches

Local Sales Offices & Reps.

Ala	Huntsville, C.P. Clare & Co.	205-534-5438
Ariz	Phoenix, Spectrum Assoc.	602-997-6324
Ark	Ft. Smith, J.R. Masterson	501-783-7323
Cal	Mt. View, C.P. Clare & Co.	415-968-2831
Cal	Santa Ana, Spectrum Assoc.	714-835-4114
Colo	Denver, Electrodyne	303-757-7679
Fla	Ft. Lauderdale, R.I. Smith Assoc.	305-772-5100
Fla	Largo, R.I. Smith Assoc.	813-585-2980
Ga	Atlanta, A. Brown & Assoc.	404-457-6381
Ill	Chicago, C.P. Clare & Co.	312-262-7700
Ind	Ft. Wayne, Baehr Greenleaf & Assoc.	219-447-1608
Kans	Shawnee Mission, Lowell-Kangas & Assoc.	913-631-3515
Md	Ellicott City, Doss Elctrns., Inc.	301-465-1336
Mass	Needham, C.P. Clare & Co.	617-449-4780
Mich	Southfield, C.P. Clare & Co.	313-356-3988
Minn	St. Paul, Repor, Inc.	612-645-8618
Mo	St. Louis, Lowell-Kangas & Assoc.	314-821-4050
NY	Fayetteville, C.P. Clare & Co.	315-637-3939
NY	Great Neck, C.P. Clare & Co.	516-466-2100
NY	Huntington, Caravan Sls. Corp.	516-692-2839
NC	Charlotte, R.W. Chapman & Co.	704-525-2421
NC	Raleigh, R.W. Chapman & Co.	919-782-2624
Ohio	Cincinnati, Baehr Greenleaf & Assoc.	513-891-3826
Ohio	Cleveland, Baehr Greenleaf & Assoc.	216-221-9030
Ohio	Columbus, Baehr Greenleaf & Assoc.	614-486-4046
Pa	Bridgeville, Foster-McClinton, Inc.	412-941-4800
Pa	Erie, Foster-McClinton, Inc.	814-455-9111
Pa	Ft. Washington, C.P. Clare & Co.	215-643-5321
SC	Greenville, R.W. Chapman & Co.	803-232-5391
Tex	Dallas, R.E. Nesbitt Co.	214-357-4601
Tex	Houston, Gettys-Eads-Adair, Inc.	713-781-3005
Va	Portsmouth, Advance Control Equip.	804-393-6642
Va	Richmond, Advance Control Equip.	804-264-2588
Wash	Bellevue, C.P. Clare & Co.	206-747-5600
WVa	Huntington, Foster-McClinton, Inc.	304-736-5161
Wisc	Wauwatosa, Larsen Assoc.	414-258-0529

CLARKE-HESS COMM., Resch. Corp., 43 W. 16th St., New York, N.Y., 10011, Tel: 212-255-2940; FSC No: 34423 .... p. 1•636,637

Customer service: M. Jacobs

Free literature available: Equivalent Series Resistance in Capacitors. Function Generator Synchronization Notes. Experiments with Function Generators and Multipliers

Products manufactured: Amplifiers, Generators, Memory Systems, Meters, Modulators, All Kinds, Multipliers, Oscillators, Test Equipment, Test Systems, Testers

Local Sales Offices & Reps.

Ill	Chicago, P. Lind Elctrns. Co.	312-774-1246
Ind	Indianapolis, P. Lind Elctrns. Co.	317-547-9178
Kans	Leawood, Leemark Engrs., Inc.	913-NI8-0124
Mass	Waltham, W. M. Hague Co.	617-899-5600
Minn	Circle Pines, P. Lind Elctrns. Co.	612-786-5770
Tex	Richardson, Spectra Sls.	214-234-3600
Va	Crossroads, Q.T. Elctrns. Sls. Co.	703-671-4357

CLAROSTAT MFG. CO., INC., Washington St., Dover, N.H., 03820, Tel: 603-742-1120, TWX: 510-297-4455; Empl.: 600 .... p. 2•1627

For info on price: D. Flanagan; Application info: J. McDevitt

Free literature available: 388/389 1/2" Square Modular Potentiometer, 73IA - 10 turn pot, 381 - Quiet-one 1 watt 5/8" Dia. Conducture plastic variable pot, 1975 - Distributor full line catalog, Engineering catalog.

Products manufactured: Attenuators, Decade Boxes, Dials, Potentiometers, Resistors, Rheostats, Switches

Local Sales Offices & Reps.

Ariz	Phoenix, J. Berman Co., Inc.	
Ark	Little Rock, J.Y. Schoonmaker Co.	501-375-2168
Cal	Inglewood, J. Berman Co.	213-776-1281
Cal	Menlo Park, Straube Assoc.	415-323-2476
Colo	Denver, Straube Assoc./Mtn. States	303-426-0890
Fla	Bradenton, Hutto-Hawkins-Peregoy Inc.	813-755-4015
Fla	Maitland, Hutto-Hawkins-Peregoy Inc.	305-831-2474
Fla	Pompano Beach, Hutto-Hawkins-Peregoy Inc.	305-943-9593
Ga	Atlanta, Millar Elctrs. Inc.	404-261-6160
Ill	Chicago, Clarostat Mfg. Co. Inc.	312-792-3898
Ind	Fort Wayne, Needler Sls. Co.	219-447-2123
Ind	Indianapolis, New/Era Sls. Inc.	317-257-7333
Iowa	Cedar Rapids, Palatine Eng. Sls. Inc.	319-365-8071
Kans	Andover, Palatine Eng. Sls. Inc.	316-683-7512
Kans	Overland Park, Palatine Eng. Sls. Inc.	913-262-5643
Md	Lutherville, L.D. Lowery Inc.	301-VA3-2172
Md	Silver Spring, Lowery Assoc.	301-HE9-3542
Mass	Concord, Clarostat Mfg. Co. Inc.	617-369-7933
Minn	Minneapolis, A.J. Warner Co.	612-729-7371
Mo	St. Louis, Palatine Eng. Sls. Inc.	314-426-7055
NM	Albuquerque, Straube Assoc./Mt. States	505-292-0295
NY	Manhasset, Win-Cor Elctr. Sls. Corp.	516-627-9474
NY	N. Syracuse, L.D. Allen Inc.	315-458-7470
NY	Snyder, L.D. Allen Inc.	716-839-3300
NC	Raleigh, Millar Elctrs. Inc.	919-787-9564
Ohio	Cleveland, K.W. Elctrs. Sls. Inc.	216-831-8292
Ohio	Dayton, K.W. Elctrs. Sls. Inc.	513-890-2150
Okla	Tulsa, J.Y. Schoonmaker Co.	918-936-1423
Ore	Portland, Almac/Stroum Elctrs.	503-292-3534
Pa	Allison Park, K.W. Elctrs. Sls. Inc.	412-487-4300
Pa	Broomall, L.D. Lowery Inc.	215-356-5300
Pa	Camp Hill, Beil & Whitaker Inc.	
Pa	Harrisburg, Beil & Whitaker Inc.	717-652-0184
Pa	Reading, Beil & Whitaker Inc.	215-779-2610
Tex	Dallas, J.Y. Schoonmaker Co. Inc.	214-357-8481
Tex	Houston, J.Y. Schoonmaker Co. Inc.	713-926-9510
Va	Charlottesville, L.D. Lowery Inc.	703-973-6672
Wash	Seattle, Almac/Stroum Co.	206-763-2300
EXP:	New York, N.Y., M. Simons & Sons Co. Inc.	212-227-5513
FOR:	Montreal, Quebec, Can., Superior Int'l.	514-683-6331

Local Distributors

Ariz	Phoenix, Sterling Elctrns., 201 E. University Dr.	602-258-4531
Cal	Irvine, Cramer/Los Angeles, 17201 Daimler	714-979-3000
Cal	Oakland, Brill Elctrns., 610 E. 10th St.	415-834-5888
Cal	Riverside, Elctrn. Supp., 2486 Third St.	714-787-9220
Cal	San Carlos, Sterling Elctrns., 1061 Ind. Rd.	415-592-2353
Cal	Sun Valley, Richey Elctrns., 10871 La Tuna Canyon Rd.	213-875-2862
Colo	Denver, Acacia Sls., 11111 W. 8th Ave., Unit B	303-232-2882

Colo Denver, Elctrn. Parts Co., 1212 S. Broadway 303-286-3755
Conn Fairfield, U-Tronics, 273 Linwood Ave. 203-255-4521
Conn North Haven, Cramer Elctrns., 35 Dodge Ave. 203-239-5641
Fla Miami, Elctrn. Equip., 2701 N.W. 42nd St. 305-635-0421
Fla Oakland Park, Peerless Radio of Fla., 1040 N.E. 43rd Ct. 305-566-5966
Ga Atlanta, Lykes Elctrns., 1135 Chattahoochee 404-355-2223
Ill Chicago, Newark Elctrns. Corp., 500 N. Pulaski Rd. 312-638-4411
Ill Elgin, Allied Radio Corp., 1355 Sleepy Hollow Rd. 312-697-8200
Ill Palatine, Ohm Elctrns., 649 Vermont Ave. 312-359-5500
Ind Indianapolis, Radisco, 814 N. Senate Ave. 317-637-5571
Iowa Cedar Rapids, Deeco, 2500 16th Ave., S.W. 319-365-7551
Kans Wichita, Radio Supp., 131 Laura 316-267-5216
Ky Louisville, P.I. Burks, 659 S. 9th St. 502-583-2871
La Lafayette, Ralph's of Lafayette, 3004 Cameron 318-369-9816
Md Baltimore, Radio Elec. Serv. Co., 1026 Cromwell Bridge Rd. 301-823-0070
Md Savage, Pyttronics, 8200 Wellmoor Ct. 301-792-7000
Mass Dedham, Gerber Radio, 852 Providence Hwy., Rte. #1 617-329-2400
Mass Newton, Cramer Elctrns., 85 Wells Ave. 617-969-7700
Mass Newton, Greene-Shaw Co., Inc., 70 Bridge St. 617-969-8900
Mass Watertown, Sterling Elctrns., 51 Spring St. 617-926-9720
Mich Ann Arbor, Wedemeyer Elctrn. Supp., 2280 S. Ind. Hwy. 315-665-8611
Mich Augusta, Great Lakes Elctrns., Div. Knappen Milling Co. 616-731-4156
Minn Minneapolis, Harry Stark Elctrns. Supp., 112 3rd Ave., N. 612-332-1325
NH Concord, Evans Radio, Box 893 603-224-9961
NJ Hanover, State Elctrns., 36 Route 10 201-887-2550
NY Farmingdale, Arrow Elctrns., 900 Broad Hollow Rd. 516-694-6800
NY Lynbrook, Peerless Radio, 19 Wilbur St. 516-593-2121
NY Rochester, Simcona Elctrns., 275 Mt. Read Blvd. 716-328-3230
NC Greensboro, Hammond Elctrns. of Carolina, 4923 Pacific Ave. 919-275-6391
NC Winston-Salem, Kirkman Elctrns., 901 W. 22nd St. 919-724-0541
Ohio Akron, Akron Elctrns., 107 S. Arlington St. 216-762-8818
Ohio Cleveland, Pioneer-Cleveland, 4800 E. 131st St. 216-587-3600
Ohio Columbus, Hughes-Peters, 481 E. 11th Ave. 614-294-5351
Ohio Dayton, Stotts Friedman Co., 108-112 N. Jefferson St. 513-224-1111
Okla Tulsa, Radio, Inc., 1000 S. Main St. 918-587-9123
Ore Portland, Almac/Stroum Elctrns., 8888 S.W. Canyon Rd. 503-292-3534
Pa Philadelphia, Almo Ind. Elctrns., Roosevelt Blvd., at Blue Grass Rd., N.E. Ind. Pk. 215-676-6000
Pa Philadelphia, Philadelphia Elctrns., 112 N. 12th St. 215-568-7400
Pa Pittsburgh, Cameradio, 2801 Liberty 412-288-2600
SC Columbia, Dixie Radio Supp., 1900 Barnwell St. 803-253-5333
Tenn Memphis, Bluff City Dist., 234 East St. 901-725-9500
Tenn Nashville, Electra Dist., 1914 West End Ave. 615-329-3971
Tex Ft. Worth, Allied Elctrns., 401 E. 8th St. 817-336-8366
Tex Ft. Worth, Sweico, 1512-18 E. Lancaster 817-335-6521
Tex Houston, Sterling Elctrns., 4201 S.W. Frwy. 713-623-6000
Va Charlottesville, Virginia Radio Supp., 717 Henry Ave. 804-296-4184
Wash Seattle, Almac/Stroum Elctrns., 5811 Sixth Ave., S. 206-763-2300
Wisc Milwaukee, Elctrnc. Expeditors, 6045 N. Greenbay Ave. 414-374-6666

CLARY CORP., Precision Instrs. Div., 320 W. Clary Ave., San Gabriel, Calif., 91776, Tel: 213-287-6111; Empl.: 50

Products manufactured: Gyros (All Types), Printers, Recorders, Terminal Equipment, Digital

CLAUSS CUTLERY CO., Box 667, Fremont, Ohio, 43420, Tel: 419-332-7344; Empl.: 175; Minimum order: $75

For info on price: L. Beal; Application info: J. Hart; Customer service: L. Beal; Delivery info: L. Beal

Free literature available: Pocket size catalog and price list

Products manufactured: Scissors, Tweezers, Hand & Vacuum, Wire Strippers

CLEAN ROOM PRODS., 56 W. Penataquit Ave., Bay Shore, N.Y., 11706, Tel: 516-968-8282; Empl.: 27; Minimum order: $15

For info on price: W. Duncan; Application info: W. Duncan; Customer service: C. Coppola; Delivery info: C. Coppola

Free literature available: General Catalog - Clean Room Ancillaries & Materials "Clean Rooms"

Products manufactured: Air Cleaners & Filters (Shielded & Unshielded), Benches, Consoles, Stools, Tables, Carts & Dollies, Instrument & Equipment, Cleaners & Solvents, Cleaners, Ultrasonic, Counters, Indicators, Lights, Machines/Machinery, Production, Ultraviolet Inspection Lighting

CLEMENS MFG. CO., 630 So. Berry Rd., St. Louis, Mo., 63122, Tel: 314-961-7228; Empl.: 3

Products manufactured: Generators

CLEVELAND CRYSTALS, INC., Box 17157, Euclid, Ohio, 44117, Tel: 216-486-6100; FSC No: 8K400; Empl.: 12; Minimum order: $50

Customer service: A. Carlson

Free literature available: Basic Data Sheets: Electro-optic crystals, piezoelectric II-DI crystals Lithium iodate, piezoelectric KBS (potassium peutaborate) infrared polarizer

Products manufactured: Crystal Blanks, Crystals, Modulators, All Kinds

CLEVELAND ELECTRONICS, INC., 14500 Darley Ave., Cleveland, Ohio, 44110, Tel: 216-249-3700, TWX: 810-421-8656; Empl.: 500

Customer service: J. Riffe

Products manufactured: Speakers, Yokes

CLEVELAND INSTITUTE OF ELCTRNS., 1776 E. 17th St., Cleveland, Ohio, 44164, Tel: 216-781-9400

Customer service: Registrar

Free literature available: CIE School Catalog: electronics homestudy courses-basic & advanced training information-benefits of CIE methods. FCC Booklet: answers popular questions about the various FCC licenses & permits- How to prepare for the government FCC exam.

Products manufactured: Technical Books

CLEVELAND MICA CO., 1360 Hird Ave., Lakewood, Ohio, 44107, Tel: 216-226-1360; Empl.: 50; Minimum order: $25

For info on price: W. D. Burton; Application info: W. D. Burton; Customer service: D. Brady; Delivery info: D. Brady

Free literature available: General information sheet on Mica.

Products manufactured: Bushings, Glass, Plastic, Metal, Rubber, Etc., Insulators & Insulation

Local Sales Offices & Reps.
Ill Northfield, Special Electric Co. 800-558-0640
NY New York, United Mineral & Chemical Corp. 212-966-4330
Ohio Cleveland, C.J. Voneman Co. 216-333-5500
Tex Frankston, Cline & Son, Inc. 214-876-2223

CLIFTON PRECISION, Litton Systems, Inc., Marple at Brdway., Clifton Hgts., Pa., 19018, Tel: 215-622-1000, TWX: 510-669-9782; FSC No: 86197; Empl.: 1000

Customer service: E. Demarco

Free literature available: Our general catalog is major source of information. Various products do appear in bulletin form as well; however, the data is always updated in the catalog, while bulletins become obsolete.

Products manufactured: Amplifiers, Controls/Control Eqpt., Converters, Encoders, Indicators, Motors, Repeaters, Servo, Resolvers, Synchro, Servo Systems, Synchros, Testers, Transducers

Local Sales Offices & Reps.
Ariz Phoenix, Clifton Precision 602-242-0910
Cal Norwalk, Comar Co. 213-921-8695
Cal Sunnyvale, Comar 408-245-3193
Fla Altamonte Springs, Clifton Precision 305-831-1441
Ill Elk Grove Village, Midwest Meridian 312-437-6531
Iowa Cedar Rapids, Midwest Meridian ... 319-365-6561
Mass W. Newton, Darbury Corp. 617-244-2053
Mich E. Grand Rapids, Midwest Meridian 616-949-7798
Mo Maryland Hgts., Midwest Meridian 314-878-4441
NY Greenlawn, Reflex Elctrn. 516-549-1888
Ohio Dayton, Midwest Meridian 513-276-4137
Tex Dallas, Midwest Meridian 214-251-3933

CLIMATRONICS CORP., 1324 Motor Pkwy., Hauppauge, N.Y., 11787, Tel: 516-234-2772; Empl.: 15

Customer service: T. Schreiber

Products manufactured: Bridges, Cable Assemblies & Harnesses, Choppers, Controls/Control Eqpt., Data Acquisition & Reduction Systems, Detectors, Indicators, Modulator/Demodulators, Modulators, All Kinds, Monitors, Probes

Local Sales Offices & Reps.
Mass Bedford, Ambientmetrics 617-274-6450

CLINTON ELCTRNS. CORP., 6701 Clinton Rd., Rockford, Ill., 61111, Tel: 815-633-1444, Telex: 257-484

For info on price: C. G. Phillipps; Application info: P. Knulty; Customer service: K. Pohl; Delivery info: K. Pohl

Free literature available: Free brochure describing products and capabilities.

Products manufactured: Tubes

CML-MACARR, INC., 167 National Rd., Edison, N.J., 08817, Tel: 201-287-2810, TWX: 710-998-0560; Empl.: 100 .... p. 1•1154-1161

Products manufactured: Amplifiers, Chargers, Battery, Controls/Control Eqpt., Converters, Discharge Systems, Energy, Generators, Inverters, Motor Electric Generator Sets, Motors, Oscillators, Power Supplies, Testers, Transformers, Underwater Communication, Detection, Navigation, etc. Equipment

Local Sales Offices & Reps.
Cal Costa Mesa, Meas. Assoc. 714-540-7160
Cal Sunnyvale, RDP Instrs. 408-735-9040
Fla Orlando, Datarep 305-843-5224
Fla Pompano Bch., Datarep 305-781-9279
Fla St. Petersburg, Datarep 813-345-8503
Ill Des Plaines, Marsland Assoc. 312-298-2620
Ill Elk Grove Village, L.F. Green & Assoc. 312-593-0282
Ind Indianapolis, L.F. Green 317-293-9827
Md Fulton, Gans-Fryling 301-837-6311
Mass Burlington, Tekdata 617-273-0198
Mich Detroit, H. Teplitz 313-537-9058
Minn Minneapolis, Marsland Assoc. 314-278-6949
Minn Mpls., L.F. Green 612-781-1611
Mo Florissant, Marsland Assocs. 816-765-0641
NJ Fort Lee, Tech. Mktg. Assocs. 201-224-6911
NY Fayetteville, M. P. Andrews 315-637-3144
Ohio Cleveland, H. Teplitz & Co. 216-371-2044
Ohio Dayton, H. Teplitz & Co. 315-277-6531
Pa Exton, Scientific Mktg. 215-363-7377
Tex Dallas, True Technology 214-691-7870
Va Arlington, Gans-Fryling 703-527-3262

CO-OPERATIVE INDS., INC., 100 Oakdale Rd., Chester, N.J., 07930, Tel: 201-879-5151, TWX: 510-235-1277; FSC No: 81482; Empl.: 250; Minimum order: $25

Customer service: C. Baletti

Free literature available: Waveguide Catalog; Plastic Conduit Catalog; Flex Metal Conduit/Hose Catalog; Gen'l Capability Brochure

Products manufactured: Bends & Twists, Microwave, Braid, Cable, Cable, Chokes, Conduit, Electrical, Connectors, Couplers, Ducts, Wiring, Flanges, Waveguide, Lead Assemblies & Receptacles, Shields, Tubes, Tubing, Waveguides & Adapters, Wire

COASTCOM, 2346 Stanwell Dr., Concord, Cal., 94520, Tel: 415-825-7500; Empl.: 25

Customer service: G.H. Vought

Free literature available: Data sheets describing the operation and listing specifications of our program audio transmission equipment and other specialized multiplex equipment.

Products manufactured: Comm. Systems, Filters, Multiplexers

Directory of Local Distributors Starts on page 401

Local Sales Offices & Reps.

Cal	Concord, Coastcom	415-825-7500
Cal	Santa Fe Springs, Kennedy Engrg. Co.	213-868-9965
Fla	Melbourne, Repcom, Inc.	305-254-1877
Md	Edgewater, Commart	301-261-4344
NJ	Totowa, H.M. Holzberg Assocs.	201-256-0455
Tex	El Paso, H. Markowitz Co.	915-584-1795

COAX DEVICES INC., Box 234-EEM, Chelsea, Mass., 02150, Tel: 617-884-6983; Empl.: 20

Products manufactured: Adapters, Waveguide, Attenuators, Cavities, Microwave, Detectors, Dividers, Dummy Loads, Duplexers, Microwave, Horns, Microwave, Junctions, Hybrid, Microwave, Line Strechers, Microwave, Mismatches, Microwave, Precision, Mixers, Mounts, Probes, Terminals, Waveguides & Adapters

COAXIAL DYNAMICS, INC., 13110 Enterprise, Cleveland, Ohio, 44135, Tel: 216-267-2233; Empl.: 28

Customer service: R. J. Scott

Free literature available: Catalog binder and specific flysheets on individual items: e.g. filters, watt meters, power sensors.

Products manufactured: Attenuators, Couplers, Detectors, Dummy Loads, Filters, Meters, Monitors, Probes, Strip-Line Components, Microwave, Switches, Terminals

Local Sales Offices & Reps.

Del	Newark, Tom Wright & Assoc.	301-398-3748
Ind	Ft. Wayne, Tx Sales Inc.	219-485-0805
Iowa	Cedar Rapids, S & O Sales	319-393-1845

COBEHN, INC., 226 Passaic Ave., Fairfield, N.J., 07006, Tel: 201-227-6675; Empl.: 5

For info on price: D. F. Cook; Application info: G. L. Henzel; Customer service: W. E. Bellars; Delivery info: D. F. Cook

Free literature available: High velocity spray equipment and fractionally distilled solvent for the critical cleaning of precision electronic, electro-mechanical and mechanical components.

Products manufactured: Cleaners & Solvents, Machines/Machinery, Production

Local Sales Offices & Reps.

Cal	Fullerton, John Broadbent, Jr.	714-879-4974
Cal	San Diego, J. C. Henberger Co.	714-223-7114
Ill	Des Plaines, Marsland Assocs., Inc.	312-298-2620
Ind	Indianapolis, Marsland Assocs., Inc.	317-924-3568
Md	Kensington, Aeron Assocs.	301-946-0070
Mass	Boston, R. E. Bailey	617-426-0846
Mich	Cedar, C & D Assocs.	616-334-3722
Minn	Minneapolis, Marsland Assocs., Inc.	612-545-4481
Mo	St. Peters, Marsland Assocs., Inc.	314-278-6949
NJ	Montclair, Ameresco, Inc.	201-746-5300
NY	Rochester, Rochester Ind'l. Supply Co.	716-325-2386
Pa	Reading, Chemtronics Div., Ind'l. Abrasives	215-779-3910
Tex	El Paso, Test Equip. Co.	915-755-9192
Utah	Bountiful, Bert Randall Assocs.	801-292-4965

COBER ELCTRNS., INC., 7 Gleason Ave., Stamford, Conn., 06902, Tel: 203-327-0003, TWX: 710-474-3371; FSC No: 28909; Empl.: 60; Minimum order: $50 p. 1•906,907

For info on price: B. Zarkower; Application info: B. Zarkower; Customer service: A. Fairman; Delivery info: A. Fairman

Products manufactured: Amplifiers, Dielectric Heating Equipment, Generators, Machines/Machinery, Production, Modulators, All Kinds, Networks, Power Supplies, Protectors, Radar Systems, Regulators, Relays, Testers, Transformers, Transmitters

Local Sales Offices & Reps.

Ariz	Phoenix, Zeus, Inc.	602-253-6104
Cal	Los Altos, J. Stone	415-948-4563
Cal	Woodland Hills, Interstate Mktg. Assocs.	213-883-7606
Colo	Denver, Zeus, Inc.	303-770-4400
DC	Wash, Eastern Instr.	301-681-6500
Fla	Palm Bay, SparTech Assocs.	305-727-8045
Ga	Smyrna, SparTech Assocs.	404-432-3644
Mass	Waban, Instrument Consits.	617-969-9881
Mass	Waltham, Meas. Consits.	617-890-4400
Mich	Detroit, Micro Sls.	313-482-1229
NM	Albuquerque, Zeus, Inc.	505-268-3941
NY	E. Syracuse, Ossmann Instr.	315-437-6666
NY	Great Neck, Eastern Instr.	516-466-9505
Ohio	Dayton, Micro Sls.	513-298-3033
Pa	Phila., Eastern Instr.	215-927-7777
Tex	Fort Worth, Carey, Wolf & Assoc.	817-738-1996
Utah	Salt Lake City, Zeus, Inc.	801-466-4924
FOR:	Calgary 21, Alberta, Can., Canadian Dynamics, Ltd.	403-269-2202
FOR:	Don Mills, Ont., Can., Componetics Limited	416-445-3230
FOR:	Donauworth, Germany, Telemeter Electronic Gmoh	
FOR:	Montreal, P.Q., Can., Componetics Limited	514-342-4117

CODEX CORP., 15 Riverdale Ave., Newton, Mass., 02195, Tel: 617-969-0600, Telex: 92-2443; Empl.: 459

For info on price: R. Lowry; Application info: R. Lowry; Customer service: B. Richner; Delivery info: J. Madison

Free literature available: High speed data processing equipment. Modems and multiplexers.

Products manufactured: Comm. Systems, Modulator/Demodulators, Terminal Equipment, Digital, Transmission Systems, Data

Local Sales Offices & Reps.

Cal	Los Angeles, P. Lindberg	213-552-2558
Cal	San Francisco, C. Rose	415-329-1700
Conn	New Haven, J. Blenner	203-488-8918
DC	Washington, G. Dickey	202-223-2990
Ga	Atlanta, L. Wallace	404-944-8233
Ill	Chicago, C. Cutsforth	312-992-1136
Mass	Boston, D. Kendrick	617-336-7495
Mass	Boston, S. Puchkoff	617-444-4060
NY	New York, D. Kirshy	201-779-6500
Ohio	Cleveland, J. Reid	216-886-3330
Tex	Dallas, G. Anderson	214-661-5235
FOR:	Can., Toronto, T.E. Field Assoc. Ltd.	416-292-1475

CODI CORPORATION, Pollitt Dr., Fair Lawn, N.J., 07410, Tel: 201-797-3900, TWX: 710-988-2241; FSC No: 16352; QPL No: 19500; Empl.: 73; Minimum order: $25

For info on price: J.S. LaBruna; Application info: W.C. Henderson; Customer service: P. Lydon; Delivery info: L. Dobson

Free literature available: Data sheets on the following products: Voltage Variable Capacitors; Zeners & Reference Diodes; High Voltage Rectifiers; Multijunction Diodes; Log Diodes; Chips; and White Noise Generator & Short Form catalog

Products manufactured: Bridges, Calibrators, Circuits, Integrated, Silicon Monolithic, Unpackaged Chips, Crystals, Diodes, Generators, Power Supplies, Rectifiers, References, D-C Voltage, Regulators, Standards, Suppressors

Local Sales Offices & Reps.

Ala	Huntsville, BJR Ind's.	205-881-3569
Ariz	Tempe, Gassner & Clark Co.	602-968-9037
Cal	Burlingame, Leddy	415-347-5247
Cal	Santa Ana, California Elctrn. Mktg.	714-835-2702
Colo	Littleton, B.B. Farquhar	303-795-1973
Fla	Ft. Lauderdale, CBC Elctrns., Inc.	305-484-7330
Ill	Franklin Pk., Dekotech, Inc.	312-455-5100
Ind	Fort Wayne, Delesa Sls. Co.	219-483-9537
Iowa	Cedar Rapids, S & O Sls. Co.	319-393-1845
Kans	Shawnee, J.F. Guernsey	913-631-2414
Md	Hyattsville, Eastern Components	301-577-2925
Mass	Norwood, J.M.G.	617-762-5333
Mich	Ferndale, SHALCO	313-547-4771
Mo	Shawnee, J.F. Guernsey	913-631-2414
NY	Williamsville, R.A. Murray Co.	716-632-6913
Ohio	Dayton, The Whelan Corp.	513-434-7551
Ore	Portland, C.K. Shanks & Assoc.	503-292-5656
Pa	Flourtown, Eastern Comps.	215-836-1616
Tex	Dallas, J. Clay Co.	214-350-1281
Wash	Seattle, C.K. Shanks & Assoc.	206-632-4290
EXP:	N.Y., N. Y., Singer Prods.	212-432-1400

COHU ELECTRONICS, INC., San Diego Div., Box 623, San Diego, Cal., 92112, Tel: 714-277-6700, TWX: 910-335-1244; Empl.: 210

For info on price: E. V. Dempsey; Application info: D. Frost; Customer service: C. Murray; Delivery info: Area Sls. Office

Free literature available: Closed-circuit television short form catalog; Broadcast television short form catalog

Products manufactured: Television Systems & Equipment Closed-Circuit

Local Sales Offices & Reps.

Ala	Huntsville, BCS Assocs.	205-881-6220
Ariz	Scottsdale, Perspective Measurements	602-947-3860
Cal	Cerritos, Cohu	213-926-7002
Cal	San Carlos, Cohu	415-592-7851
Cal	San Diego, Cohu	714-277-6700
Cal	San Diego, Perspective Measurements	714-278-8931
Colo	Denver, Cohu	303-573-8835
Fla	Orlando, BCS Assocs.	305-896-4881
Ill	Des Plaines, Cohu	312-824-4422
Md	Bethesda, Bartlett Assocs.	301-656-3061
Mass	Bedford, Cohu	617-275-0370
Neb	Lincoln, Cohu	402-467-2900
NJ	Florham Park, Cohu	201-377-6636
NC	Greensboro, BCS Assocs.	919-273-1918
Pa	Wayne, Bartlett Assocs.	215-688-7325
Tex	Arlington, Cohu	817-461-1707

COIL-CRAFT INC., 340 Bronxville Rd., Bronxville, N.Y., 10708, Tel: 914-337-4775; Empl.: 7; Minimum order: $15

For info on price: H. Julie; Application info: J. Julie; Customer service: J. Julie

Free literature available: Four page catalog listing technical information on tuneable, Hi Q inductors.

Products manufactured: Coils Including Assemblies & Forms, Couplers, Dividers, Filters, Transformers

Advertisment

Our line of turnable RF coils affords highest Q and stability in filter applications from audio thru VHF. Values of .027 to 100,000 uH spaced in a 10% series have overlapping tuning ranges. We also make wideband matching transformers, power splitter-combiners, Directional couplers, audio transformers, fixed and tunable filters. We will also design and fabricate any of the above items to your specific requirements.

COILCRAFT, 1102 Siler Lake Rd., Cary, Ill., 60013, Tel: 312-639-2361, TWX: 910-651-2251; Minimum order: $100

For info on price: R. G. Adams; Application info: J. Renskers; Customer service: R. G. Adams; Delivery info: D. Brodie

Products manufactured: Amplifiers, Chokes, Coils Including Assemblies & Forms, Filters, Heads, Recording Playback, Erase, Networks, Reactors, Transformers

COIL SPECIALTY CO., Box 120, Route 322, Boalsburg, Pa., 16827, Tel: 814-466-6244; Empl.: 25

Customer service: H. Hoffman

Free literature available: RF & IF coils and chokes manufactured to customers specifications.

Products manufactured: Chokes, Coils Including Assemblies & Forms, Filters, Resistors, Transformers

Advertisment

Coil Specialty Co. has facilities to manufacture small or large quantity requirements of IF and RF coils, chokes, transformers, hash filters, solenoid, special bobbin, reed switch or any other specialty windings to customer's specifications.

Quotations and sample requirements given immediate attention.

COIL WINDING EQUIP. CO., Railroad Plaza, Oyster Bay, N.Y., 11771, Tel: 516-922-5660; Empl.: 35; Minimum order: $10

For info on price: B. A. George; Application info: H. R. Snider; Customer service: G. Meier; Delivery info: B. A. George

Products manufactured: Machines/Machinery, Production

Local Sales Offices & Reps.

Ariz	Scottsdale, Elctrn. Entprs,	602-946-9860
NM	Albuquerque, Elctrn. Entprs.	505-256-3561
NM	Las Cruces, Elctrn. Entprs.	505-524-0126
NY	Oyster Bay, Coil Winding Equip. Co.	516-922-5660

COLE-FLEX CORP., 91 Cabot St., W. Babylon, N.Y., 11704, Tel: 516-249-6150

Products manufactured: Cable, Caps, Forms & Tapes, Heat Shrinkable, Cleaners & Solvents, Cords, Heat Guns, Production, Insulators & Insulation, Kits, Cable-End Sealing, Lubricants, Tapes, Electrical Insulation, Tapes, Films & Foils, Pressure Sensitive, Tubing

Local Sales Offices & Reps.

Cal	Glendale, Armstrong Sls. Co.	213-245-5344
Cal	Redwood City, Warren & Hickey Sls. Co.	415-368-3849
Colo	Colorado Springs, Norris & Co.	303-635-9319
Fla	Miami, World Wide Prods. Inc.	305-949-3457
Ga	Atlanta, Henry Phillips Co.	404-252-0720
Ill	Chicago, GNB Assoc.	312-673-4050
Ind	Indianapolis, Sukup & Cox	317-253-1215
Kans	Overland Park, Penzner-Mankus Assoc.	913-381-0004
La	Chalmette, Cartwright & Bean	504-279-4598
Mass	Lynn, Keene Sls. Co. Inc.	617-595-2300
Mich	Ferndale, Shalco Inc.	313-547-4771
Minn	Minneapolis, J.E.M. Anderson	612-823-6459
Miss	Jackson, Cartwright & Bean	601-354-1368
Mo	Hazelwood, Penzner-Mankus Assoc.	314-731-4334
NY	N. Syracuse, L.D. Allen Inc.	315-458-7470
NY	N.Y., I. Brown & Assoc.	212-493-1379
Ohio	Columbus, Weller Electronic Sls.	614-885-7819
Pa	Wynnewood, J. Stinson & Assoc.	215-896-7378
Tenn	Memphis, Cartwright & Bean	901-276-4442
Tex	Dallas, J. Collins Co.	214-341-7866
Wash	Seattle, W.K. Widdekind Co.	206-284-8020

COLE INSTRUMENT CORP., Div. F.H. Cole Enterprises, 2034 Placentia Ave., Costa Mesa, Cal., 92627, Tel: 714-642-8080; Empl.: 35

Customer service: P. Hunson

Products manufactured: Accelerometers, Controls/Control Eqpt., Drivers, Switch, Index Assemblies, Switch, Kits, Switch Assembling, Programmers, Shields, Switches, Testers

COLEMAN INSTR. DIV., 2000 York Road, Oak Brook, Ill., 60521, Tel: 312-887-0770; Empl.: 250; Minimum order: $25

For info on price: R. Glos; Application info: D. Smeaton; Delivery info: R. Glos

Products manufactured: Meters, Pumps, Vacuum, Recorders, Spectrometers

COLEMAN MICROWAVE CO., Box 59, Rte. 22, Lebanon, N.J., 08833, Tel: 201-534-2480; Empl.: 8

Customer service: K.R. Coleman

Free literature available: Microwave Filter Brochure which lists various types and frequencies of tunable bandpass filters. This brochure is representative of our product line but does not include other types of filters and wavemeters which Coleman Microwave Co. also manufactures.

Products manufactured: Cavities, Microwave, Diplexers, Antenna, Discriminators, Dummy Loads, Filters, Meters, Multiplexers, Preselector-Mixers, Preselectors, Terminals

Local Sales Offices & Reps.

Ala	Huntsville, Beacon	205-881-5031
Ariz	Tempe, Jarko Assocs.	602-966-3020
Fla	Maitland, Beacon	305-647-3498
Ga	Atlanta, Beacon	404-351-3654
Miss	Hernando, Beacon	601-368-9008
Okla	Norman, Data Marketing Assocs.	405-364-8320
Pa	Lafayette Hill, M. Lader Co.	215-825-3177
SC	Spartanburg, Beacon	803-582-4613
Tex	Houston, Data Marketing Assocs. Inc.	713-686-9627
Tex	San Antonio, Data Marketing Assocs.	512-828-0937
Va	Woodbridge, M. Lader Co.	703-494-3321

COLLINS RADIO CO., 160-180, Cedar Rapids, Iowa, 52406

COLLINS RADIO, Dallas, Tex., 75207, Tel: 214-690-5000, TWX: 910-867-4709; Empl.: 16000

Customer service: L. Marx 214-690-6020

Products manufactured: Amplifiers, Analyzers, Antennas, Cable Assemblies & Harnesses, Calibrators, CATV Systems & Equipment, Cavities, Microwave, Circuits, Cordwood, Circuits, Hybrid, Thin-Film, Circuits, Integrated, Silicon Monolithic, Unpackaged Chips, Circuits, Printed, Multilayer, Coils Including Assemblies & Forms, Comm. Systems, Comparators, Computers, Converters, Demodulators, Detectors, Dividers, Dummy Loads, Equalizers, Filters, Generators, Indicators, Integrators, Electronic, Leads, Test & Adaptors, Limiters, Memory Systems, Meters, Mixers, Modulators, All Kinds, Monitors, Mounts, Multipliers, Networks, Oscillators, Ovens, Preselectors, Punched Card Equipment, Racks, Radar Systems, Receivers, Regulators, Relays, RFI Measuring Equipment, Services, Assembly, Production & Test, Servo Systems, Shields, Shifters, Standards, Switches, Synthesizers, Tape Search Equipment, Television Systems & Equipment Closed-Circuit, Terminal Equipment, Digital, Terminals, Testers, Totalizers, Digital, Transformers, Transmission Systems, Data, Transmitters, Tuners, Underwater Communication, Detection, Navigation, etc. Equipment

Local Sales Offices & Reps.

Alas	Anchorage	904-337-2870
Ariz	Nogales	602-287-2101
Ariz	Sierra Vista	602-458-4491
Ark	Limestone	501-428-5257
Cal	La Habra	213-691-2304
Cal	Long Beach	213-593-8722
Cal	Los Angeles	213-647-5611
Cal	Palo Alto	415-493-9033
Cal	San Carlos	415-343-3224
Cal	San Mateo	415-342-2131
Cal	Saratoga	408-255-9399
Colo	Littleton	303-795-8784
Fla	Lighthouse Point	305-943-8371
Fla	Madeira Beach	813-391-8065
Fla	Miami Springs	305-888-0611
Fla	Tallahassee	904-877-2580
Ga	Atlanta	404-761-0607
Ga	Warner Robins	912-922-6616
Ill	Buffalo Grove	312-537-3760
Kans	Wichita	316-942-4201
La	Pineville	318-640-3412
Md	Bethesda	301-223-4222
Mass	Burlington	617-272-4050
Minn	Maple Plain	612-479-2633
Minn	Minneapolis	612-922-2876
Mo	Grandview	816-763-3928
Mo	Kansas City	816-942-4449
NJ	Red Bank	201-741-5379
NY	Guilderland Center	518-371-6610
NY	Lake Success	212-343-1600
NY	New York City	212-661-6530
Ohio	Cincinnati	513-825-3802
Ohio	Dayton	513-276-3931
Ohio	Galion	419-468-3964
Okla	Oklahoma City	405-632-6801
Okla	Tulsa	918-836-3751
Pa	Natboro	215-672-7797
SC	Rock Hill	803-366-7322
Tenn	Rockford	615-573-9717
Va	Arlington	703-524-9503
Wash	Seattle	206-725-1000

COLLINS RADIO GROUP, Comps. Mktg., 4311 Jamboree Blvd., Newport Beach, Calif., 92663, Tel: 714-833-4661, TWX: 910-595-1705; Empl.: 800

Products manufactured: Filters, Integrated Circuit Devices

Local Sales Offices & Reps.

Cal	Burlingame, J. Logan Assocs.	415-697-6377
Cal	Garden Grove, Impact Elctrns.	714-893-8551
Cal	San Jose, Collins Radio Grp.	415-961-1306
Fla	Orlando, Gentry Assocs.	305-894-4401
Ill	Buffalo Grove, Collins Radio Grp.	312-537-3760
Ind	Ft. Wayne, Bieberich, Inc.	219-432-2537
Ky	Lexington, Circuit Sls.	617-861-0567
Md	Bethesda, Collins Radio Grp.	202-223-4222
Mich	Warren, Dem Elctrns. Sls.	313-755-6660
Minn	Minneapolis, Merrill Franklin Co.	612-835-6422
Mo	St. Louis, Engineering Svcs. Co.	314-977-1515
NY	Plainview, E.R.A.	516-822-9890
NY	Syracuse, T&S2 Elctrns. Co.	315-463-8592
Ohio	Dayton, D. Steffen & Assocs.	513-293-3145
Tex	Dallas, Texas Microwave Elctrns.	
Wash	Seattle, R. Johnston Co.	206-524-5170

COLORADO CRYSTAL CORP., 2303 W. 8th St., Loveland, Colo., 80537, Tel: 303-667-9248

Customer service: E. Altick

Products manufactured: Crystals

COLORADO VIDEO, INC., Box 928, Boulder, Colo., 80302, Tel: 303-444-3972, TWX: 910-940-3248; Empl.: 19 p. 1•111-118

For info on price: G. Southworth; Application info: J. Sparks; Customer service: C. Elliott; Delivery info: C. Elliott

Products manufactured: Television Systems & Equipment Closed-Circuit, Test Equipment

Local Sales Offices & Reps.

Ala	Huntsville, BCS Assocs.	205-881-6220
Cal	San Diego, Perspective Meass.	714-278-8931
Cal	Westlake Village, LD Bevan Co.	213-889-3653
Colo	Littleton, Cropley, Inc.	303-794-4231
Fla	Orlando, BCS Assocs.	305-896-4881
NC	Greensboro, BCS Assocs.	919-273-1918
Pa	Exton, Scientific Mktg., Inc.	215-363-7377
Tex	Dallas, CVI Southwest Regional	214-233-5497
Va	Williamsburg, BCS Assocs.	703-877-4053

COLUMBIA COMPONENTS, Div. Computer Instrs., 60 Madison Ave., Hempstead, N.Y., 11550, Tel: 516-483-8200, TWX: 510-222-4189

Products manufactured: Circuits, Hybrid, Thick Film, Delay Lines, Modules, Logic, Encapsulated, Networks, Potentiometers

Local Sales Offices & Reps.

Ala	Huntsville, Int'l. Scien. Instr.	205-837-1601
Cal	Los Angeles, E. Landa	213-897-0770
Cal	Menlo Park, Frauman	415-322-8461
Cal	San Diego, B. Tauber & Assoc. Inc.	714-274-7242
Fla	Orlando, F. Baetzman	305-295-4817
Ill	Chicago, Lightner Assoc.	312-SP 4-1500
Md	Pimonium, Barn Hill & Assoc.	301-252-5610
Mo	Kansas City, Automatic General Elec.	816-333-8206
NJ	Cherry Hill, Jay Assocs.	609-662-0399
NJ	Morristown, D. Snyder	201-569-8800
NY	Huntington, Andrews & Andrews	516-692-8686
NY	Rochester, Semple	716-342-1413
Ohio	Fairborn, J. C. Hofstetter Co.	216-241-4880
Utah	Salt Lake City, Cannon Eng. & Sls.	206-454-2514
Va	Lynchburg, Glen White	703-846-4624

COLUMBIA ELECTRIC MFG. CO., 4519 Hamilton Ave. N.W., Cleveland, Ohio, 44114, Tel: 216-361-8060; Empl.: 60

Products manufactured: Alternators, Generators, Meters

COLUMBIA

ELECTRONIC CABLES

COLUMBIA ELCTRN. CABLES, 11 Cove St., New Bedford, Mass., 02744, Tel: 617-999-4455; Empl.: 2,500; Minimum order: $50 p. 2•1911

For info on price: L. Cohen; Application info: A. Souza; Customer service: N. Aronberg; Delivery info: A. Souza

Free literature available: Brochures on: Basket Merchandisers; Color Foam; Cross Reference Guide; Distributor Price Sheet; Dura-Color; Durafoam for Color TV; Shielded Permafoam TV Transmission; Super Duracolor; TV Cheater & Power Asst. Kit; and Various Ext. Cords.

Products manufactured: Braid, Cable, Cable Assemblies & Harnesses, Cable, Cords, Wire, Wire Shielding

Local Sales Offices & Reps.

Ala	Huntsville, Winfield Southeast Co.	205-533-3509
Ariz	Phoenix, J.R. Morgan Agency	602-252-3089
Cal	Gardena, Bidwell Sls. Assocs.	213-770-0300
Cal	San Francisco, Technical Sls. Assocs.	415-467-1434
Colo	Englewood, ESP Co.	303-781-4409
Fla	Miami, Winfield Electronic Sls.	305-945-6544
Ga	Atlanta, Winfield Southeast	404-636-3023
Haw	Honolulu, Gene Piety Factors	808-839-9059
Ill	Chicago, Bransky Sls.	312-433-2375
Ind	Indianapolis, Elctrn. Reps.	317-897-9326
Kans	Shawnee Mission, Lowell-Kangas & Assoc.	913-631-3515
La	New Orleans, Texport Co.	504-486-6073
Md	Silver Springs, Mid-Atlantic Sls. Co.	301-593-7749
Mass	Norwood, Rudolph & MacInnis Assoc.	617-769-5450
Mich	St. Clair Shores, J.M. Thorpe Co.	313-779-6363
Mich	St. Joseph, R. C. Merchant & Co.	616-983-7378
Minn	Minneapolis, H. M. R. Inc.	612-920-8200

Mo	St. Louis, Lowell-Kangas & Assoc.	314-821-4050
NY	N. Bellmore, L.W. Keller & Assoc.	516-785-2826
NY	Port Washington, T.M.A., Inc.	516-883-2432
NY	Rochester, J. Brown Elctrn. Sls.	716-266-2728
NY	Yonkers, J. Brown Elctrn. Sls.	914-779-7330
NC	Charlotte, Winfield /SE Co.	704-536-2757
Ohio	Columbiana, Nebco Assocs.	216-457-2333
Ohio	Richfield, Bear Mktg.	216-659-3131
Okla	Tulsa, The Texport Co.	918-939-1727
Ore	Salem, Pacnor Mktg.	503-363-6445
Pa	Philadelphia, S.K. MacDonald, Inc.	215-545-1205
Pa	Reading, Beil-Whitaker	215-779-2610
Tenn	Hermitage, Winfield Southeast Co.	615-889-5207
Tenn	Memphis, Texport Co.	901-683-0880
Tex	Houston, Texport Co.	713-464-2828
Tex	Richardson, Texport Co.	214-238-7117
Wash	Seattle, Pacnor Mktg. Co.	206-284-8020

COLUMBIA RESCH. LABS., Macdade Blvd. & Bullens La., Woodlyn, Pa., 19094, Tel: 215-532-9464, TWX: 510-669-3625; Empl.: 96

For info on price: J. Sarty; Application info: T. Carey; Customer service: R. R. Reymos; Delivery info: R. R. Reymos

Products manufactured: Accelerometers, Alarms, Amplifiers, Analyzers, Controls/Control Eqpt., Meters, Microphones, All Kinds, Recorders, Services, Assembly, Production & Test, Signal Conditioners & Equipment, Testers, Transducers, Transformers

Local Sales Offices & Reps.

Ariz	Phoenix, R. A. Mayes Co.	602-279-5243
Colo	Broomfield, R. A. Mayes Co.	303-466-6311
Ill	Des Plaines, Marsland Assocs., Inc.	312-298-2620
Ind	Indianapolis, Marsland Assocs., Inc.	317-924-3568
Mich	Detroit, Electro Sls. Assocs., Inc.	313-526-8800
Minn	Minneapolis, Marsland Assocs., Inc.	612-545-4481
Mo	Florrisant, Marsland Assocs., Inc.	314-278-6949
NM	Albuquerque, R. A. Mayes Co.	505-265-7989
NY	Mamaroneck, Cane Tech Sls., Inc.	914-698-4411
Ohio	Cleveland, Electro Sls. Assocs., Inc.	216-261-5440
Ohio	Dayton, Electro Sls. Assocs., Inc.	513-426-5551
Pa	Pittsburgh, Electro Sls. Assocs.	412-371-9449
Tex	Richardson, R. A. Mayes Co.	214-235-3043
Wash	Bellevue, Topp Engrg. Sls., Inc.	206-747-5401

COLUMBIA TECH, See Humiseal Div. and Industrial Mica Div.

COLUMBUS ELECTRIC MFG. CO., Box 289A Rt #2, Piney Flats, Tenn., 37686, Tel: 615-538-8191; Empl.: 160; Minimum order: $15

Customer service: L. Belt

Free literature available: Switch Catalogue, Control Catalogue

Products manufactured: Air Cleaners & Filters (Shielded & Unshielded), Controls/Control Eqpt., Switches

Local Sales Offices & Reps.

Cal	Los Angeles, F. Alleman	213-222-8128
Cal	Oakland, W. Nott	415-654-3747
Conn	Glaston Bury, Barton-Caron Assoc.	203-633-9417
Ill	Chicago, J. Angel Co.	312-878-0653
Mass	Auburndale, B. Caron	
NY	Henlett, E. Mann	516-569-5769
Ohio	Columbus, D. Davies	614-239-1158
Tex	Dallas, Blackburn Assoc.	214-351-9991

COM/TECH SYSTEMS INC., 15 William St., New York, N.Y., 10005, Tel: 212-425-0733; Empl.: 8; Minimum order: $100

For info on price: C. M. Mengani; Application info: S. Sharin; Customer service: C. M. Mengani; Delivery info: C. M. Mengani

Free literature available: Data sheet – Secre/Data scrambler AN-101 Scramblers for cash dispensers AN-102 Scramblers for multi-drop systems Secre/Data operating procedures

Products manufactured: Comm. Systems, Scramblers, Data

COMCO PLASTICS, INC., 98-36 C. Jamaica Ave., Richmond Hill, N.Y., 11418, Tel: 212-849-9000; Empl.: 125; Minimum order: $35

For info on price: J. Steele; Application info: J. Steele; Customer service: J. Steele; Delivery info: J. Schram

Products manufactured: Insulators & Insulation, Laminates, Services, Assembly, Production & Test, Terminal Blocks, Boards & Strips

Local Sales Offices & Reps.

Conn	Orange, Commercial Plastics & Supply Corp.	203-799-2351
Fla	Miami, Commercial Plastics & Supply Corp.	305-576-3333
Ga	Atlanta, Commercial Plastics & Supply Corp.	404-579-2600
Ill	Chicago, Commercial Plastics & Supply Corp.	312-277-4500
Md	Hyattsville, Commercial Plastics & Supply Corp.	301-864-6226
Mass	Somerville, Commercial Plastics & Supply Corp.	617-623-2100
Mich	Warren, Commercial Plastics & Supply Corp.	313-755-1700
NJ	Newark, Commercial Plastics & Supply Corp.	201-824-5400
NJ	Trenton, Commercial Plastics & Supply Corp.	609-883-5100
NY	New York, Commercial Plastics & Supply Corp.	212-477-5000
NC	Raleigh, Commercial Plastics & Supply Corp.	919-834-2511
Pa	Philadelphia, Commercial Plastics & Supply Corp.	215-331-8600
Tex	Dallas, Commercial Plastics & Supply Corp.	214-631-8170

COMMUNICATION ASSOCS., INC., 200 McKay Rd., Huntington Station, N.Y., 11746, Tel: 516-271-0800, TWX: 510-226-6998; Empl.: 150; Minimum order: $10

For info on price: G. W. Zachmann; Application info: G. W. Zachmann; Customer service: B. Hannon; Delivery info: B. Hannon

Free literature available: The "Mk II" brochure describes CAI's complete line of Marine SSB communications equipment and systems. The "Company Heard Around the World" brochure describes CAI facilities and outlines their HF/SSB communications products.

Products manufactured: Antennas, Receivers, Transceivers, Transmitters

COMMUNICATIONS EQUIPMENT CO., INC., 5134 East 65th Street, Indianapolis, Ind., 46220, Tel: 317-849-9240; Empl.: 23

For info on price: T. A. Garmhausen 616-334-3081; Application info: H. I. Morris 616-334-3081

Free literature available: Individual data sheets for each item. 3 ring binder covering all products.

Products manufactured: Amplifiers, Annunciators, Comm. Systems, Racks

COMMUNICATIONS TECHNOLOGY CORP., 2237 Colby Ave., Los Angeles, Cal., 90064, Tel: 213-478-5061, TWX: 910-342-6983; Empl.: 250; Minimum order: $15

For info on price: H. Reeves; Application info: D. deVilleneuve; Customer service: H. Reeves; Delivery info: H. Reeves

Free literature available: 1975 price book – reviews product application, kit contents, & gives resale prices.

Products manufactured: Caps, Connector, CATV Systems & Equipment, Clamps & Clips, Cleaners & Solvents, Coatings, Compounds, Encapsulating, Insulating, Molding, Potting, Cords, Covers, Protective (Including Dust), Fasteners, Insulators & Insulation, Kits, Cable-End Sealing, Kits, Terminal, Knives & Knife Sets, Locators, Open-Short, Services, Assembly, Production & Test, Splicers, Coaxial Cable, Splices, wire (Including, Butt & Cap Types), Testers, Tools, Tubing, Wrenches

COMMUNICATIONS TRANSISTOR CORP., 301 Industrial Way, San Carlos, Cal., 94070, Tel: 415-592-9390, TWX: 910-376-4893; FSC No: 50155; Empl.: 170; Minimum order: $50

For info on price: B. J. McDaniel; Application info: B. J. McDaniel; Customer service: S. Huebner; Delivery info: S. Huebner

Free literature available: Short Form Catalog.

Products manufactured: Transistors

Local Sales Offices & Reps.

Ariz	Scottsdale, DeAngelo, Rothman & Cheever	602-948-2240
Ariz	Scottsdale, Varian Assocs.	602-947-5461
Cal	Culver City, DeAngelo, Rothman & Co.	213-398-6239
Cal	Los Altos, Varian Assocs.	415-968-7630
Cal	San Diego, Trans Dynamics, Inc.	714-298-8215
Fla	Clearwater, Dyne-A-Mark Corp.	813-441-4702
Fla	Fort Lauderdale, Dyne-A-Mark Corp.	305-771-6501
Fla	Orlando, Dyne-A-Mark Corp.	305-299-6303
Ga	Atlanta, Varian Assocs.	404-252-0045
Ill	Park Ridge, RF Specialists	312-698-2044
Ind	Ft. Wayne, RF Specialists	219-485-8982
Iowa	Des Moines, Beams	515-282-0292
Kans	Shawnee Mission, Beams	913-341-7744
Md	Cheverly, Varian Assocs.	301-773-7010
Mass	Waltham, Com-Sale	617-890-0011
Minn	Minneapolis, Tech. Assocs.	612-929-6721
Mo	Creve Coeur, Beams	314-569-1060
NJ	Mt. Laurel, Varian Assocs.	609-235-6800
NJ	Springfield, Varian Assocs.	201-376-6600
NY	Dix Hill, K & J Engrg.	516-242-0888
NY	Huntington, CDB Entprs., Inc.	516-692-5200
NY	Syracuse, Varian Assocs.	315-437-2568
Ohio	Chagrin Falls, Crest Comp. Sls.	216-543-9808
Tex	Richardson, Varian Assocs.	214-235-2385
Wash	Tukwila, General Elctrns., Inc.	206-243-5141

COMPONENT RESCH., 1717 19th St., Santa Monica, Cal., 90404, Tel: 213-829-3615, TWX: 910-343-6864; FSC No: 12517; QPL No: Multiple; Empl.: 150; Minimum order: $20 .... p. 2•42

For info on price: S. Kellerman; Application info: D. Kellerman; Customer service: C. Davis; Delivery info: C. Davis

Products manufactured: Capacitors, Fixed

Local Sales Offices & Reps.

EXP:	Cal., Beverly Hills, M. Stewart & Co.	213-272-0103

COMPONENT SPECIALTIES, 9143 E. La Rosa Dr., Temple City, Cal., 91780, Tel: 213-283-0015; FSC No: 28984; Empl.: 45; Minimum order: $75

For info on price: Office; Application info: R. C. Johnston; Customer service: N. Laughlin; Delivery info: N. Laughlin

Free literature available: Our brochure shows the variety of magnetic components produced. All products are custom designed to fit customer specific requirements.

Products manufactured: Clutches, Coils Including Assemblies & Forms, Relays, Solenoids, Transformers

COMPONENTS CORP., 106 Main St., Denville, N.J., 07834, Tel: 201-627-0290; Empl.: 11

Customer service: W. Gordon

Free literature available: Digi-Klips® – Board to Board Interconnect System, describes Digi-Klip system and gives specifications; contact facts – application potential of Digi-Klips and associated items.

Products manufactured: Connectors, Converters, Power Supplies, Records, Frequency Test

Local Sales Offices & Reps.

Cal	Los Angeles, E. E. Strassner Co.	213-666-1511
Cal	San Carlos, LoDan	415-592-4600
Ga	Atlanta, Electro-Components	404-451-5489
Ill	Des Plaines, Coombs Assocs.	312-298-4830
Mass	Northboro, Henik Assoc.	617-891-5660
NJ	W. Trenton, W. Hartig	609-882-2433
Tex	Garland, G. V. Peck Co.	214-341-8311
FOR:	Can., Westmount, Montreal Que., W. F. Griffith	

COMPONENTS SPECIALTIES, INC., 393 So. FRanklin St., Hempstead, N.Y., 11550, Tel: 516-292-9500

For info on price: J. Berliant; Application info: S. Hulkower; Customer service: B. Zachman; Delivery info: B. Zachman

Products manufactured: Capacitors, Fixed, Coils Including Assemblies & Forms, Comm. Systems, Eliminators, Battery, Grilles, Jacks (All Types), Meters, Networks, Plug & Jack Sets, Potentiometers, Power Supplies, Probes, Speaker Systems, Speakers, Switch Handle Boots, Switches, Testers, Transformers

COMPONENTS SPECIALTIES, IN cont'd

Advertisment

SPECO - Complete line of automotive speakers. Auto grilles replacement speakers 1" - 15". The most complete line of miniature speakers in stock in the U.S. Miniature speakers made to your specifications. 25 to 70 volt line transformers. Miniature and sub-miniature jacks and plugs, volume controls, ear pieces and pillow speakers. A full line of electrolytic capacitors. Trumpets and intercoms.

COMPU-LITE CORP., 17795 Sky Park Cir. #C, Irvine, Cal., 92707, Tel: 714-546-9045; FSC No: 51420; Empl.: 50; Minimum order: $25

Customer service: S. Rasmussen

Free literature available: Product Summaries & Data Sheets with Engineering Specifications, Photos, Etc.

Products manufactured: Clamps & Clips, Indicators, Sockets, Switches

Local Sales Offices & Reps.

Ala	Huntsville, Repcom, Inc.	205-534-9959
Ariz	Phoenix, Gramer & Co.	602-279-1231
Cal	Los Angeles, Universal Components Co.	213-641-4255
Cal	San Carlos, Electronic Engineering Assoc. Ltd.	415-593-2189
Conn	Woodbridge, Electronic Marketing Co.	203-397-1461
Fla	Melbourne, Repcom Inc.	305-254-1877
Ga	Warner Robins, Repcom Inc.	912-923-1393
Ill	Oakbrook, Whitmore Associates Inc.	312-325-4727
Mich	Dearborn, Villani-Pitcher Inc.	313-271-4600
Minn	Bloomington, OEM Sales Co.	612-884-5930
NJ	Englewood Cliffs, Sprung/Nussbaum Inc.	201-947-6767
Pa	Jenkintown, Arnold Associates	215-887-7870
Wash	Bellevue, Pacific Consultants	206-454-2503
Exp:	Irvine, Cal., D. Rippin Ind'l. Exp. Mgr.	714-493-2589

COMPUMOD, INC., 306 River St., Haverhill, Mass., 01830, Tel: 617-373-9104, TWX: 710-347-0269

Products manufactured: Converters

Local Sales Offices & Reps.

Cal	Pasadena, A-F Sls. Engrg. Inc.	213-681-5631
Conn	West Hartford, Instrument Assocs	203-525-9367
Fla	Orlando, Brosey Enterprises	305-622-6045
Fla	Palm Beach Gardens, Brosey Enterprises	305-622-6045
Ill	Elk Grove, L.F. Green & Assocs.	312-593-0282
Ind	Indianapolis, L.F. Green & Assocs.	317-293-9827
Mass	Bedford, Instrument Assocs.	617-275-0700
Mich	Southfield, Data-Tron	313-354-6421
Minn	Fridley, L.F. Green & Assocs.	612-781-1611
NJ	Bogota, Neville & Vespo, Inc.	201-487-1507
NY	New Hartford, KLM Assocs.	315-735-8525
NY	North Syracuse, KLM Assocs.	315-458-6214
NY	Rochester, KLM Assocs.	716-442-0820
Ohio	Dayton, Data-Tron	513-223-8421
Ohio	Wickliffe, Data-Tron	216-585-8421
Okla	Tulsa, R. Matthews Elctrns.	918-936-2562
Pa	Media, W. Reeves Assocs.	215-566-6709
Tex	Dallas, R. Matthews Elctrns.	214-233-0363
Tex	Houston, R. Matthews Elctrns.	713-664-7131
Va	Fairfax, Nine Assocs.	703-273-1830
Wash	Seattle, J.B. Jolly Inc.	206-938-4166

COMPUTER AUTOMATION, INC., Ind. Prods. Div., 18651 Von Karman, Irvine, Cal., 92664, Tel: 714-833-8830, TWX: 910-595-1767; Empl.: 360

Customer service: A. Armoni

Products manufactured: Test Systems, Testers

Local Sales Offices & Reps.

Cal	Costa Mesa, Measurement Assocs.	714-540-7160
Colo	Denver, Computer Automation	303-466-1749
Ill	Chicago, Computer Automation	312-956-6400
Mass	Burlington, W.M. Hague Co.	617-899-5600
NJ	Ramsey, Computer Automation, Inc.	201-825-0990
Ohio	Cleveland, Computer Automation, Inc.	716-777-8700
Tex	Houston, Computer Automation	713-626-9430
Wash	Seattle, Computer Automation	206-455-9650

COMPUTER COMPS., 88-06 Van Wyck Expwy., Jamaica, N.Y., 11418, Tel: 212-AX 1-3500; Empl.: 45 p. 1•1616,1617

Products manufactured: Coils Including Assemblies & Forms, Relays, Sockets, Transformers

Local Sales Offices & Reps.

Cal	Santa Monica, Rep Assocs.	213-829-5401
Ill	Bellwood, Fiat Eng. Assocs.	312-547-6200
Mass	Billerica, Matrix Sls.	617-667-9268
NJ	Springfield, Svc. & Tech. Inc.	201-232-2666
NY	Commack, Svc. & Tech. Inc.	516-543-1061
NY	Rochester, L-Mar Assocs.	716-328-5240
Ohio	Chagrin Falls, Crest Component Sls.	216-543-9808
Pa	King of Prussia, White-Keystone Inc.	215-265-1817
Wash	Renton, Control Instr. Co.	206-226-7170
EXP:	N.Y., Baldwin, Milano Brothers	516-223-9000

COMPUTER CONVERSIONS CORP., 6 Dunton Ct., East Northport, N.Y., 11731, Tel: 516-261-3300; FSC No: 51086; Empl.: 100 p. 1•154,155

Customer service: S. J. Renard

Free literature available: Complete technical and applications on data on synchro/digital or DC, digital or DC/synchro, absolute encoders, angle indicators, rectangular to polar, modulators, demodulators, and multiplexed converters.

Products manufactured: Amplifiers, Calibrators, Comm. Systems, Controls/Control Eqpt., Converters, Counters, Demodulators, Encoders, Indicators, Meters, Modulator/Demodulators, Modulators, All Kinds, Resolvers, Synchro, Scalers, Binary, Decade, Standards, Synchro Transmitters, Solid-State, Synchros, Testers, Transducers

Local Sales Offices & Reps.

Cal	Burlingame, Leddy Assocs.	415-347-5247
Fla	Clearwater, Brennan Assocs.	813-446-5006
Ind	Carmel, Rich Elctrn. Mktg.	317-844-8462
Mass	Brookline, Technology Prods. Grp.	617-731-0858
NM	Albuquerque, F.Y. Gates Co.	505-298-1875
NY	Liverpool, R & D Assocs.	315-622-2350
Tex	Dallas, Jacobson Co.	214-363-7584
Va	Fairfax, Nine Assocs.	703-273-1803
Wash	Redmond, Desco, Northwest	206-455-9325

Advertisment

CCC manufactures a complete line of low cost, solid state, shaft and synchro to digital or DC ($295), and digital or DC to synchro converters for the military and commercial market. Other related products are rectangular to polar co-ordinate converters, digital phase meters ($295), digital angle indicators ($595), digital data converters, computer modulators and demodulators. Evaluation units supplied on request. Write for further information and free data conversion chart.

COMPUTER DEVICES CORP., 63 Austin Blvd., Commack, N.Y., 11725, Tel: 516-543-4220; Empl.: 50

Products manufactured: Coders, Decade Boxes, Delay Lines, Equalizers, Generators, Memories, Buffer, Memory Systems, Networks, Oscillators, Standards, Synthesizers

Local Sales Offices & Reps.

Cal	Arcadia, Mar-Land Entprs.	213-681-9440
Ill	Chicago, Kemp Sls. Co.	312-622-1121
Md	Baltimore, R.A. Wafer Assocs.	301-744-1133
NH	Windham, J.A. Justice Co.	603-434-4290
NJ	Cherry Hill, J.N. Barrett Assocs.	609-429-1551
NY	Tarrytown, Garrettson Co.	914-631-2650
NY	Utica, B.D. Hummel Co.	315-736-7821
Tex	Dallas, Bouco Sls. Assocs.	214-247-1749
EXP:	New Rochelle, N.Y., Montclair Elctrns.	914-576-1400

COMPUTER DEVICES OF CALIF., 11901 Burke St., Santa Fe Springs, Cal., 90670, Tel: 213-698-2595, Telex: 65-7478; FSC No: 32423; Empl.: 150 p. 1•940,941

For info on price: J. Rock; Application info: W. Diston; Customer service: J. Bazinet; Delivery info: J. Bazinet

Free literature available: Bulletin 6-72 - Large Angle Step Motors, 23 - Small Angle Stepping & Synchronous Motors 34H - 1.8° & 5° Stepping & Synchronous Motors, C&D - 1.8° 40 Steppers, 23F - 50 Steppers,
20 - PS & PE Value Line Steppers & Synchronous Motors, ESM - Electronics for Stepper Motors, PC-1 Rapid-Syn Drivers 484 - Rapid Syn Drivers
SFC - Short Form Catalog - Stepping Motor & Drivers.

Products manufactured: Controls/Control Eqpt., Motors

Local Sales Offices & Reps.

Cal	Redwood City, Archie Cardwell	415-364-7553
Cal	Santa Fe Springs, Computer Devices of Cal.	213-723-6593
Colo	Denver, Camel Elctrns.	303-757-6191
Conn	Old Saybrook, M.L. Assocs.	203-388-9718
Fla	Orlando, MacKay, Smith & Assocs.	305-277-1513
Ill	Barrington, G. A. Cridland Co.	312-381-7044
Mass	Marlboro, M.L. Assocs.	617-485-6190
Mich	Birmingham, J.C. Hofstetter Co.	313-643-7203
Minn	St. Paul, W.E. Taubert	612-636-6414
NH	East Derry, M.L. Assocs.	603-432-5838
NJ	Cherry Hill, R.E. Winter Assocs.	609-429-0696
NJ	Tenafly, ABC Elctrn. Sls. Co.	201-568-2354
NY	Cazenovia, A.E. Decew Agency	315-655-8602
NY	Sodus, A.E. Decew Agency	315-483-6561
NY	Williston Park, ABC Elctrn. Sls. Co.	516-747-6610
NC	Charlotte, MacKay, Smith, & Assocs.	704-527-0240
Ohio	Dayton, Electrical Sys. Co.	513-434-9822
Tex	Houston, Oeler & Menelaides	713-772-0730
Tex	Richardson, Oeler & Menelaides	214-234-6334
Wash	Bellevue, Ruggles Tech. Sls.	206-455-2778

COMPUTER INSTRS., 92 Madison Ave., Hempstead, N.Y., 11550, Tel; 516-483-8200, TWX: 510-222-4189; Empl.: 260 p. 1•2340; p. 2•1642,1643

Products manufactured: Circuits, Hybrid, Thick Film, Commutators, Controls/Control Eqpt., Delay Lines, Dividers, Films, Gages, Indicators, Meters, Modules, Logic, Encapsulated, Networks, Paper, Graphic Recording, Potentiometers, Recorders, Resistors, Switches, Testers, Transducers, Transmitters

Local Sales Offices & Reps.

Instrument & Controls

Ala	Huntsville, Int'l. Sci. Instr.	205-837-1601
Cal	Glendale, Meko Instr.	213-240-4664
Cal	Los Altos, Servo Data	415-964-1325
Colo	Denver, Technical Engrg. Sls.-Serv.	303-744-1119
Fla	Clearwater, Technical Comps. & Instr.	813-584-1122
Ill	Lansing, North Central Engrg.	312-474-3580
Kans	Andover, Palatine Engrg.	316-683-7512
Kans	Overland Pk., Palatine Engrg.	913-262-5643
Md	Greenbelt, J.E. Cuesta	301 552-1200
Mass	Norwell, Bordewieck Engrg. Sls. Co.	617-659-4915
Mich	Trenton, North Central Eng.	313-675-3157
Minn	Minneapolis, R.J. Sls.	612-922-1425
Mo	St. Louis, Palatine Engrg.	314-426-7055
NY	Westbury, Tech-Rep Engrg. Sls.	516-997-7946
Ohio	Dayton, J. Hofstetter	513-296-1010
Ohio	Medina, J. Hofstetter	216-241-4880
Okla	Tulsa, Pan Tech Engrg.	918-747-2494
Pa	Valley Forge, J.E. Cuesta & Co.	215-265-5800
Tex	Arlington, Pan Tech Engrg.	817-261-4111
Tex	Houston, Pan Tech Engrg.	713-623-0640
Wash	Seattle, Barrett Equip. Co.	206-522-8325

Potentiometer & Components

Ala	Huntsville, Int'l. Sci. Instrs.	205-837-1601
Ariz	Scottsdale, Carter Assoc.	602-947-4355
Cal	Los Altos, Servo-Data	415-964-1325
Cal	Los Angeles, E. Landa Co.	213-879-0770
Cal	San Diego, B. Tauber & Assoc.	714-274-7242
Colo	Denver, Camel Elctrns.	303-757-6191
Ill	Chicago, Berndt Assoc.	312-283-0713
Ind	Ft. Wayne, Temple Engrg.	219-744-4331
Iowa	Cedar Rapids, Palatine Engrg.	319-365-8071
Kans	Overland Pk., Palatine Engrg.	913-262-5643
Md	Baltimore, Callas Elctrns.	301-744-7711
Mass	Millis, Selmark Assocs.	617-376-2914
Mich	Birmingham, J. Hofstetter	313-642-0590
Minn	Mpls., R.J. Sls.	612-922-1425
Mo	St. Louis, Palatine Engrg.	314-426-7055
NH	Plaistow, Selmark Assocs.	617-375-0305
NJ	E. Orange, Masin-Esco	201-674-6505
NY	Jericho, Electro-Rep, Inc.	516-938-0540
NY	Massapequa Pk., Metro Tech.	516-798-1066
NY	Penfield, A & D Devices	716-586-8033
Ohio	Dayton, J. Hofstetter	513-298-0662
Ohio	Medina, J. Hofstetter	216-241-4880

Okla	Tulsa, Carter Assocs.	918-936-5100
Pa	Valley Forge, J. E. Cuesta	215-265-5800
Tex	Garland, Carter Assocs.	214-276-7151
Wash	Seattle, Gillett & Assocs.	206-284-3344

COMPUTER LABS, 1109 S. Chapman St., Greensboro, N.C., 27403, Tel: 919-292-6427, TWX: 510-922-7954; FSC No: 34031; Empl.: 40; Minimum order: $100

For info on price: D. W. Brockman; Application info: D. W. Brockman; Customer service: G. W. Perryman; Delivery info: D. W. Brockman

Free literature available: Individual data sheets, or catalog of data sheets. Also booklets containing reprints of articles and/or talks by engineers from company, useful as reference material.

Products manufactured: Amplifiers, Converters

Local Sales Offices & Reps.

Ariz	Phoenix, R.A. Mayes Co.	602-279-5243
Cal	No. Hollywood, Cardinal Assocs.	213-877-6641
Colo	Denver, R.A. Mayes Co.	303-444-0782
Conn	Hamden, J & J Assocs.	203-624-7800
Md	Laytonsville, G-T Assocs.	301-949-8060
Mass	Burlington, J & J Assocs.	617-272-2606
NJ	Fairfield, KLS Assocs.	201-227-2900
NM	Albuquerque, R.A. Mayes Co.	505-292-2330
NY	Penfield, A & D Devices	716-586-8033
Tex	Dallas, R.A. Mayes Co.	214-235-3043

COMPUTER OPERATIONS, 10774 Tucker St., Beltsville, Md., 20705, Tel: 301-937-5377; Empl.: 19

Products manufactured: Memory Systems

Local Sales Offices & Reps.

Colo	Boulder, Par Assocs.	303-499-4736
Haw	Honolulu, Aloha Assocs.	808-941-1574
Ind	Munster, Bexdata Ltd.	312-221-1411
Md	Rockville, MESA	301-881-8430
Mass	Wellesley, Northeast Data	617-237-1509
Minn	Edina, Bexdata Ltd.	612-941-2999
Mo	St. Louis, Bexdata Ltd.	314-872-3357
NJ	Cinnaminson, MESA	609-786-0284
Okla	Norman, Data Mktg.	405-364-8320
Tex	Houston, Data Mktg.	713-686-9627
Wash	Bellevue, Brennan Assoc.	206-454-9332

COMPUTER POWER, INC., 42 E. Park Avenue, Madison, NJ, 07940; Tel: 201-377-4003; Empl.: 50; Minimum order: $500

For info on price: R. Love; Application info: R. Love; Customer service: P. Ahlers; Delivery info: J. Moore

Free literature available: Interruptable and non-interruptable (UPS) power systems; General facilities brochure; modular power supply.

Products manufactured: Chokes, Computers, Converters, Inverters, Power Supplies, Reactors, Transformers

Advertisment

Small special purpose computers, all types of custom multiple output computer power supplies. Low cost, high efficiency, sine wave, regulated, interruptable, and non-interruptable (U.P.S.) AC power systems which include batteries, charger and inverter up to 15 KVA for many hours. Custom magnetics up to 100 KVA for all types of applications such as inverters converters, ferro regulators etc. We will assist in the design of the magnetic interface circuitry at no extra charge.

COMPUTER PRODUCTS, Box 23849, Ft. Lauderdale, Fla., 33307, Tel: 305-974-5500, TWX: 510-956-9895; Empl.: 150; Minimum order: $/50

For info on price: W. Ford; Application info: W. Ford; Customer service: R. Cheek; Delivery info: R. D'Allessandro

Free literature available: Power Supply Catalog - lists 61 models of encapsulated modular power supplies - from 3.6 to 26 volts, from 65MA to 2000 MA. RTP Device Specifications - describes CPI line of computer directed measurement & control equipment. RTP Pricing & Configuration Guide - provides model no.'s and pricing info on RTP line.

Products manufactured: Multiplexers, Power Supplies, Scanners

Local Sales Offices & Reps.

Ala	Huntsville, W.A. Brown Comps., Inc.	205-539-4411
Cal	North Hollywood, B.J. Wolfe Entps.	213-877-5518
Cal	Sunnyvale, RDP Instrs., Inc.	408-735-9040
Fla	Fort Lauderdale, W.A. Brown Comps., Inc.	305-776-4800
Fla	Orlando, W.A. Brown Comps., Inc.	305-425-5505
Ill	Chicago, Data Elctrns.	312-283-0300
Ind	Indianapolis, J. Holsapple & Assocs.	317-899-2890
Md	Ellicott, A/D Inc.	301-531-6700
Mass	Lynnfield, Andrews Airtronics., Inc.	617-245-5220
Minn	Minneapolis, Data Elctrns.	312-786-9666
NM	Albuquerque, Aztec Entprs.	505-255-2440
NY	Fayetteville, M.P. Andrews	315-637-9734
NY	Roslyn Heights, Travco Assocs.	516-621-3223
NC	Raleigh, W.A. Brown Comps.	919-876-9601
NC	Winston-Salem, W.A. Brown Comps., Inc.	919-725-5384
Ohio	Cincinnati, J.O. Olsen & Co.	513-922-2176
Ohio	Cleveland, J.O. Olsen & Co.	216-752-5444
Pa	Pittsburgh, J.O. Olsen & Co.	412-279-2550
Tex	Garland, G.V. Peck Co.	214-341-8311
Tex	Houston, G.V. Peck, Co.	713-664-1435
Wash	Bellevue, Brennan Assocs.	206-454-9332

COMPUTER TALK INC., Box 145, Idledale, Colo., 80453, Tel: 303-697-4315; Empl.: 20

Customer service: W. M. Barnes

Free literature available: Powerful - Fast - Automatic Computer; Billion Byte Disk Memories; Free - Floating Cursor Digitizers.

Products manufactured: Computers, Digitizers, Pencil Follower (Inc. Coordinate & Graphic), Memory Systems

COMPUTER TERMINAL SYS., 52 Newtown Plaza, Plainview, N.Y., 11803, Tel: 516-293-6611; FSC No: 33948; Empl.: 30; Minimum order: $25

For info on price: J. Gross; Application info: J. Gross; Customer service: E. Mermelstein; Delivery info: J. Gross

Free literature available: Line of versatile alphanumeric printers. Printing on impact paper, pressure sensitive labels, tickets, IBM cords, tags, sales slips, bank checks and plastic stock.

Products manufactured: Controls/Control Eqpt., Data Loggers, Printers, Teleprinters

Local Sales Offices & Reps.

Cal	Palo Alto, Gil Eakins	415-326-5317
Fla	Fort Lauderdale, Snow Co.	305-563-2448

COMSTRON SEG., 120-30 Jamaica Ave., Richmond Hill, N.Y., 11418, Tel: 212-441-3200, Telex: 146337; Empl.: 35 .... p. 1•544,545,638,639

Customer service: R. W. Tramposch

Free literature available: Brochure describing our Frequency Synthesizer

Products manufactured: Filters, Generators, Meters, Recorders, Synthesizers, Telephone Channel Test & Simulator Equipment, Testers

Local Sales Offices & Reps.

Ariz	Scottsdale, Measurement Consits.	602-994-9519
Cal	Inglewood, L & M Engrg.	213-674-6850
Cal	San Jose, L & M Engrg.	408-292-3220
Colo	Boulder, Measurement Consits.	303-449-5294
Conn	Hamden, J & J Assocs.	203-624-7800
Fla	Lighthouse Point, Saber Assocs.	305-943-3076
Fla	Longwood, Saber Assocs.	305-422-3686
Fla	St. Petersburg, Saber Assocs.	813-441-1301
Ga	Woodstock, Saber Assocs.	404-432-9625
Ill	Chicago, Electronic Instr. Assoc.	312-271-3774
Ind	Indianapolis, Electronic Instrs. Assoc.	317-257-7231
Kans	Wichita, Winco	316-684-8224
Md	Lanham, Brimberg Assocs.	301-552-2200
Mass	Burlington, J & J Assocs.	617-272-2606
Mich	Detroit, Comtel-Sterling Co.	313-255-1970
NJ	Hazlet, Mer Mon Elctrn. Instrum.	201-264-1851
NM	Las Cruces, Measurement Consits.	505-526-2491
NY	Plainview, Eastern Metro Assocs.	516-WE1-1414
NC	Raleigh, Saber Assocs.	919-834-3961
Ohio	Cleveland, Comtel-Sterling Co.	216-442-8080
Ohio	Detroit, Comtel-Sterling Co.	513-298-7573
Pa	Pittsburgh, Comtel-Sterling Co.	412-922-5720
Tex	Hurst, Anderson-Wylie Assocs.	817-268-2327
Utah	Murray, Measurement Consits.	801-268-3181

COMSTRON-SEG MULTIMETRICS, 120-30 Jamaica Ave., Richmond Hill, N.Y., 11418, Tel: 212-441-4240, Telex: 146337; Empl.: 35 .... p. 1•544,545,638,639

Customer service: R. W. Tramposch

Free literature available: Brochures describing our Models - Series AF-100, AF-200, AF-400.

Products manufactured: Analyzers, Filters, Generators, Meters, Recorders, Signal Conditioners & Equipment, Synthesizers, Telephone Channel Test & Simulator Equipment, Testers

Local Sales Offices & Reps.

Ala	Huntsville, Scientific Devices, SE, Inc.	205-536-1969
Ariz	Scottsdale, Measurement Consits.	602-994-9519
Cal	Mountain View, Gado Instr. Sls.	415-961-2222
Cal	Signal Hill, Saber Entprs.	213-595-5646
Colo	Boulder, Measurement Consits.	303-449-5294
Conn	Hamden, J & J Assocs.	203-624-7800
Fla	Lighthouse Point, Saber Assocs.	305-943-3076
Fla	Longwood, Saber Assocs.	305-422-3686
Fla	St. Petersburg, Saber Assocs.	813-441-1301
Ga	Woodstock, Saber Assocs.	404-432-9625
Ill	Chicago, Electronic Instrument Assocs., Inc.	312-271-3774
Ind	Indianapolis, Electronic Instrument Assocs., Inc.	317-257-7231
Mass	Burlington, J & J Assocs.	617-272-2606
Mich	Detroit, Comtel-Sterling Co.	313-255-1970
NJ	Hazlet, Mer-Mon Electronic Instrumentation	201-264-1851
NM	Las Cruces, Measurement Consits.	505-526-2491
NY	Plainview, Eastern Metro Assocs., Inc.	516-WE 1-1414
NC	Raleigh, Saber Assocs.	919-834-3961
Ohio	Cleveland, Comtel-Sterling Co.	216-442-8080
Ohio	Dayton, Comtel-Sterling Co.	513-298-7573
Pa	Mt. Penn, Mer-Mon Electronic Instrumentation	215-779-1640
Pa	Pittsburgh, Comtel-Sterling Co.	412-922-5720
Utah	Murray, Measurement Consits.	801-268-3181
Va	Annandale, J. Hopkins Assocs.	703-323-1641
FOR:	Can., Don Mills, Ont., Componetics, Ltd.	416-445-3230
FOR:	Can., Montreal, Que., Componetics, Ltd.	514-342-4117

CONAP, INC., 184 E. Union St., Allegany, N.Y., 14706, Tel: 716-372-9650, TWX: 510-245-2769; Empl.: 115

Products manufactured: Adhesives (All Types), Cleaners & Solvents, Coatings, Compounds, Encapsulating, Insulating, Molding, Potting, Conductive Plastic Materials, Insulators & Insulation, Plastic Raw Materials, Liquids, Pellets, Powders, Resins, Services, Assembly, Production & Test

Local Sales Offices & Reps.

Cal	Anaheim, Advance Electrical Sls.	714-870-0304
Cal	Belmont, Advance Electrical Sls.	415-592-4550
Ga	Macon, Stoneco Assocs.	912-745-4652
Ill	Wood Dale, Lucole Entprs.	312-595-7846
Ind	Indianapolis, Sheer Engrg.	317-852-8766
Mass	Marshfield, Conap, Inc.	617-837-1459
Minn	Burnsville, W.J. Koness	612-890-9159
Mo	St. Louis, Ensco-Rep Inc.	314-542-3935
NJ	Riverton, Given Assocs.	609-829-7249
NY	Allegany, Conap, Inc.	716-372-9650
NY	Bayside, Davis & Co.	212-229-7987
Pa	Meadville, Conap, Inc.	814-336-1996
SC	Myrtle Beach, J.D. Morrison Assocs.	803-448-2819
Tex	Garland, Cogburn & Assocs.	214-271-1147
Wash	Seattle, Advance Electrical Sls.	206-762-2262
Wisc	Brookfield, Techno-Ind'l. Sls. Co.	414-783-4385

CONCORD ELCTRNS., 37 Great Jones St., Dept. JE, New York, N.Y., 10012, Tel: 212-777-6571, TWX: 710-581-4930; Empl.: 150 .... p. 2•654,655

Products manufactured: Bushings, Glass, Plastic, Metal, Rubber, Etc., Connectors, Contacts, Electrical, Handles For Cabinets, Circuit Boards, Racks, etc., Insulators & Insulation, Jacks (All Types), Pins, Spacers, Terminals, Tools

Local Sales Offices & Reps.

Cal	Fremont, H. Foraker	415-657-2213
Mass	Woourn, Jalco Assocs.	617-227-1515
FOR:	Can., Downsview, Ont., Kaytronics Engrg.	416-638-5511
FOR:	Can., Montreal, Que., Kaytronics Engrg.	514-489-9335

CONDENSER PRODUCTS CORP., Box 997, Brooksville, Fla., 33512, Tel: 904-796-3562

Products manufactured: Capacitors, Fixed, Power Supplies

CONDOR PACIFIC INDS. CALIF., 8740 Remmet Ave., Canoga Park, Cal., 91304, Tel: 213-882-0550; Empl.: 20

Customer service: E. J. Smith

Products manufactured: Gyros (All Types)

CONFORMING MATRIX CORP., Box 5126, Pt. Pl. Sta., Toledo, Ohio, 43611, Tel: 419-729-3777; Empl.: 35; Minimum order: $15

Customer service: R. Sebetto

Products manufactured: Films

CONIC CORP., Terra Com Div., 9020 Balboa Ave., San Diego, Cal., 92123, Tel: 714-278-4100, TWX: 910-335-1183

Customer service: B. M. Jennings

Free literature available: Specification Sheet - Lists the product specification and discusses the Theory of Operation.

Products manufactured: Power Supplies, Receivers, Transmitters

CONNECTICUT HARD RUBBER CO., 407 East St., New Haven, Conn., 06509, Tel: 203-777-3631, TWX: 710-465-0264; Empl.: 80

Products manufactured: Gaskets, Shielding, R-F-Also See Shields, R-F, Rubber, Tapes, Electrical Insulation, Tapes, Films & Foils, Pressure Sensitive

CONNECTOR CORP., 6025 N. Keystone Ave., Chicago, Ill., 60646, Tel: 312-539-3108 .... p. 2•657-660

Products manufactured: Antennas, Backpanel Interconnect Systems, Cable Assemblies & Harnesses, Clamps & Clips, Connector Adapters, Connector Blocks, Mother Board, Connectors, Contacts, Electrical, Holders, Crystal, Jacks (All Types), Pins, Plug Adapters, Plug & Jack Sets, Plugs, Relays, Retainers, Services, Assembly, Production & Test, Socket Adapters, Sockets, Terminal Blocks, Boards & Strips, Terminals

Local Sales Offices & Reps.

Cal	Altadena, D. Wagner	213-681-4060
Ill	Chicago, Bauman Sls.	312-539-3108
Kans	Leawood, Vasen Sls. Co.	913-649-0679
Mass	Needham, Coakley Boyd & Abbett	617-444-5470
Mich	Jackson, E.H. Jordan	517-782-0694
Minn	Minneapolis, E. Mellus & Assoc. Inc.	612-854-4270
NY	Dewitt, A. Bowser	315-446-5920
NY	Synder, H.J. Sapecky	716-839-4170
NC	Raleigh, J. Nagle	919-782-0213
Tenn	Shelbyville, C. McLanahan	615-684-4544
Va	Virginia Beach, C. Bludau	703-464-0500

CONNECTICUT MICROWAVE CORP., Route 44, New Hartford, Conn., 06057, Tel: 203-693-4247; FSC No: 50974; Empl.: 16; Minimum order: $25

For info on price: S. T. Urbank; Application info: M. DePalo; Customer service: R. Poppe; Delivery info: S. T. Urbank

Free literature available: Brochure which includes outline dwgs & specifications of approx 50 models of directional couplers selected from approx 400 different units produced by this firm.

Products manufactured: Couplers, Dummy Loads

Local Sales Offices & Reps.

Pa	King of Prussia, J.T. Birkhead	215-688-4021
Va	Fairfax, Schibley Assocs.	703-591-3008

Advertisment

DIRECTIONAL COUPLERS, COAXIAL AND WAVEGUIDE, designed to produce DC or RF outputs sensitive to forward and reflected main line RF power. Your most exacting "SPECIAL" RF power measuring requirements can, in most cases, be satisfied by but a slight modification of one of our hundreds of standard models. Meet MIL Specs.

CONNECTOR INDS. OF AMERICA, 639 N. Wayne, Cincinnati, Ohio, 45215, Tel: 513-733-3680; FSC No: 32076; Empl.: 30

For info on price: K. C. Neal; Application info: F. S. Knolik; Customer service: K. C. Neal; Delivery info: K. C. Neal

Products manufactured: Connectors, Seals, Services, Assembly, Production & Test

Local Sales Offices & Reps.

Ariz	Phoenix, Southwest e/m Engrg., Inc.	602-944-1521
Conn	Branford, W. McCoy Co.	203-488-2012
Fla	Zephyrhills, Tool-Tronics	813-782-7177
Ill	Chicago, D. Dolin Sls. Co.	312-286-6200
Md	Baltimore, J.R. Daniel & Co.	301-825-3330
Mich	Birmingham, Forand Sls. Co.	313-644-0087
Mo	St. Louis, Boweng	314-429-7327
NJ	Newfoundland, T.A. Adamo Prod., Inc.	201-697-2450
NY	Syracuse, Canavan-Scanlon Assocs.	315-463-9161
Ohio	Cleveland, Component/Insulation Corp.	216-521-3570

CONNOR-WINFIELD CORP., 109 Turner Ct., W. Chicago, Ill., 60185, Tel: 312-231-5270; Empl.: 17 p. 1•296-299

Products manufactured: Alarms, Generators, Integrated Circuit Devices, Meters, Oscillators, Relays, Standards, Timers, Transformers

Local Sales Offices & Reps.

Cal	Encino, C.D.H. Assocs.	213-345-3111
Cal	Los Altos, Frauman Assocs.	415-941-0660

CONRAC CORP, See Cramer Div.

CONRAC CORP., Instrs/Controls Div., 1700 S. Mountain Ave., Duarte, Cal., 91010, Tel: 213-359-9141

Products manufactured: Accelerometers, Controls/Control Eqpt., Gyros (All Types), Indicators, Potentiometers, Switches, Transducers

CONRAC CORP., Machine Tool Div., 9200 Bolsa Ave., Westminister, Cal., 92683, Tel: 714-894-4711

Products manufactured: Controls/Control Eqpt., Cords, Machines/Machinery, Production

CONRAC CORP., New Jersey Div., Sherwood La., Fairfield, N.J., 07006, Tel: 201-226-7777

Products manufactured: Comm. Systems, Controls/Control Eqpt., Converters, Data Acquisition & Reduction Systems, Indicators

CONRAC DIV., Conrac Corp., 600 N. Rimsdale Ave., Covina, Calif., 91722, Tel: 213-966-3511

Products manufactured: CATV Systems & Equipment, Converters, Display Devices/Displays, Monitors, Mounts, Receivers

CONRAC CORP., Turner Div., 909 17th St. N.E., Cedar Rapids, Iowa, 52402

Products manufactured: Amplifiers, Machines/Machinery, Production, Microphones, All Kinds

CONSOLIDATED CONTROLS CORP., 12 Durant Ave., Bethel, Conn., 06801, Tel: 203-743-6721, TWX: 710-456-0446; FSC No: 02750; Empl.: 300; Minimum order: $25

Customer service: G. L. Garavel

Products manufactured: Actuators, Comparators, Controls/Control Eqpt., Converters, Couplings, Data Acquisition & Reduction Systems, Data Loggers, Gages, Indicators, Meters, Monitors, Multiplexers, Printers, Probes, Scanners, Switches, Transducers, Valves, Solenoid, Valves, Vacuum

Local Sales Offices & Reps.

Ariz	Scottsdale, OEM Specialties	602-948-3360
Cal	Redwood City, Marchi Assocs.	415-364-3411
Colo	Denver, D. E. Bond Assocs.	303-756-1234
Conn	Meriden, Abbott-Allison Inc.	203-237-9232
Fla	Satellite Beach, Reynolds & Assocs.	305-773-4700
Haw	Honolulu, Atecs Corp.	
Ill	La Grange, Olson Engrg. & Sls. Co.	312-482-3300
Mass	Boston, Abbott-Allison Inc.	617-245-0250
Mich	Southfield, Automatic Controls Co.	313-354-1190
Minn	Minneapolis, JD Co.	612-454-5552
Mo	St. Louis, Boweng Representatives	314-429-7327
NM	Albuquerque, Industrial Prods. Corp.	505-256-3561
NY	Massapequa, Clime Equip. Co.	516-798-5634
Ohio	Cleveland, Jay Industrial Sls. Co.	216-831-9393
Pa	Melrose Park, R. Meyers Assocs.	215-224-1663
Pa	Pittsburgh, Ener-Jet Inc.	412-682-0777
SC	Greenville, Egan Assocs.	803-288-4450
Tex	Houston, C. M. Asfahl Agency	713-523-3764
Utah	Salt Lake City, Specialty Sls. Co.	801-262-2979
Va	Annandale, R.W. Lankenau & Assocs.	703-256-0800
Wash	Bellevue, M. Poggi Co.	206-454-2026
EXP:	New York, N. Y., Technitron Inc.	212-758-2790

CONSOLIDATED REFINING CO, see CRM Div Consolidated Refining Co

CONSOLIDATED RESISTANCE CO. OF AMERICA, INC., 222 Lake Ave., Yonkers, N.Y., 10701, Tel: 914-YO3-5900 .... p. 2•1427

For info on price: J. J. Wilentchik; Application info: J. J. Wilentchik; Customer service: A. Powers; Delivery info: A. Powers

Products manufactured: Resistors

CONSOLIDATED WIRE & ASSOC. CORPS., 1635 S. Clinton St., Chicago, Ill., 60616, Tel: 312-421-4441; Empl.: 57; Minimum order: $100 p. 2•1929,1930,1933-1968

Customer service: T. A. Mann

Products manufactured: Braid, Cable, Cable, Cords, Leads, Test & Adaptors, Wire, Wire Shielding

Local Sales Offices & Reps.

Cal	Glendale, Armstrong Sls. Co.	213-245-5344
Colo	Arvada, Arrowhead Sls. Co.	303-423-5556
Conn	West Haven, Johnson Assocs.	203-932-0162
Fla	Hollywood, S.K. Wallace Assoc.	305-961-6640
Fla	Tampa, S.K. Wallace Assoc.	813-961-1037
Ga	Jonesboro, S.K. Wallace Assoc.	404-471-6297
Ill	Chicago, R.R. Hutmacher Assoc.	312-631-3248
Ind	Indianapolis, New/ERA Sls.	317-257-7333
Kans	Overland Park, Palatine Engrg. Sls.	913-262-5643
Md	Kensington, Forti-Austin Assoc.	301-949-1706
Mass	Wellesley Hills, Johnson Assoc.	617-235-3977
Mich	Detroit, Burcaw Co. & Assoc.	313-533-7700
Minn	Minneapolis, R.W. Marshall Co.	612-929-0457
Mo	St. Louis, Palatine Engrg. Sals.	314-426-7055
NJ	Willingboro, Forti-Austin Assoc.	609-871-9290
NY	Buffalo, Maury Farber & Assoc.	716-856-3543
NY	Flushing, Bettan Sls., Inc.	212-591-7600
NC	Kernersville, S.K. Wallace Assoc.	919-993-3993
Ohio	Cleveland, J.O. Olsen Co.	216-752-5444
Pa	Pittsburgh, J.O. Olsen Co.	412-279-2550
Tenn	Memphis, S.K. Wallace Assoc.	901-682-2281
Tex	Dallas, E.L. Wilks & Co.	214-242-5321
Utah	Salt Lake City, Arrowhead Sls.	801-487-3444
Wash	Seattle, Interface Ectrns.	206-285-3500
EXP:	Plainview, N.Y., Morhan Exporting	516-293-5582

CONSTANTA CO. OF CAN., 280 Regina Ave., Montreal, Can., Tel: 514-766-8569; Empl.: 33

Products manufactured: Capacitors, Fixed, Resistors

Local Sales Offices & Reps.

Cal	Bellflower, Royer Assocs.	213-867-3638
Cal	Walnut Creek, Murray Assocs.	415-937-7577
Md	Towson, W.M. Jones Co.	301-823-5721
Mass	Newton Upper Falls, Brookdale Elctrns. Engrg. Ltd.	617-244-6969
NY	Buffalo, J.M. Glass	716-856-9272
Ohio	Dayton, LI/Corp	513-434-6367

CONTINENTAL CONNECTOR CORP., 34-63 56th St., Woodside, N.Y., 11377, Tel: 212-899-4422, TWX: 710-582-2565; FSC No: 95238; Empl.: 550 ...p. 2•662-665

For info on price: H. Schade; Application info: O. Chernoff; Customer service: G. Palmquist

Free literature available: CONDENSED CATALOG - 8 different series listed and highlighted with pertinent specs for each group: PRINTED CIRCUIT CATALOG - 84-page manual with specifications, illustrations, descriptions and ordering information on receptacle type pc board connectors: MICROMINIATURE CONNECTOR CATALOG.

Products manufactured: Connectors, Sockets, Terminal Blocks, Boards & Strips

Local Sales Offices & Reps.

Cal	Encino, Continental Connector Corp.	213-986-6025
Cal	Los Altos, Continental Connector Corp.	415-948-0211
Cal	San Diego, Southwest Tech. Sls.	714-565-2295
Ill	Chicago, Continental Connector Corp.	312-282-1455
Mass	Chestnut Hill, M.M. Ross	617-469-0674
NY	Woodside, Continental Connector Corp.	212-899-4422
Pa	Warminster, Continental Connector Corp.	215-441-0195
Tex	Dallas, Continental Connector Corp.	214-620-1840

FOR:	Can., Scarborough, Al Attree	416-267-6567

Local Distributors

Cal	Chatsworth, Westates Elctrns., 20151 Bahama St.	213-341-4411
NY	W. Hempstead, March Elctrns., 600 Hempstead Tpke.	516-486-6511

CONTINENTAL RENTALS DIV., Continental Leasing, 175 Middlesex Tpke., Bedford, Mass., 01730, Tel: 617-275-0850

Products manufactured: Amplifiers, Analyzers, Bridges, Cameras, Counters, Filters, Generators, Meters, Monitors, Oscillators, Oscillographs, Direct Writing, Oscilloscope Plug-Ins, Oscilloscopes, Power Supplies, Recorders, RFI Measuring Equipment, Services, Assembly, Production & Test, Synthesizers, Test Equipment

Local Sales Offices & Reps.

Ariz	Mesa, Scientific Devices Albuq.	602-834-1682
Cal	Los Angeles, Continental Rentals	213-477-7521
Cal	Sunnyvale, Continetal Rentals	408-735-8300
Colo	Denver, Scientific Devices	303-573-9466
Conn	Hartford, Instrument Assocs.	203-525-9367
Ill	Des Plaines, Scientific Devices	312-297-5240
Ill	Elk Grove Village, Continental Rental Div	312-439-4700
Iowa	Cedar Rapids, Techn. Rep. Inc.	319-363-2489
Md	Ellicott City, Continental Rental Div.	301-465-7880
Mass	Bedford, Continental Rental Div.	617-275-0850
Mich	Detroit, Scientific Devices	313-851-5945
Minn	Minneapolis, Scientific-Devices	612-544-1616
Mo	Hazelwood, Technical Rep. Inc.	314-731-5200
Mo	Independence, Technical Rep. Inc.	816-356-3010
NJ	Metuchen, Continental Rental Div.	505-268-6729
NJ	Albuquerque, Scientific Devices-Albuq.	505-268-6729
Ohio	Cleveland, Scientific Devices	216-261-2000
Ohio	Dayton, Scientific Devices	513-298-9904
Tex	Dallas, Continental Rental Div.	214-357-1779
Tex	Houston, Scientific Devices	713-623-4250

CONTINENTAL SPECIALTIES, 44 Kendall Street, Box 1942, New Haven, Conn., 06509, Tel: 203-624-3103; Empl.: 15; Minimum order: $5 .... p. 2•348-351

For info on price: B. Bovee 203-624-3103; Application info: J. Pascoe 415-383-4207; Customer service: B. Bovee 203-624-3103; Delivery info: P. Contento 203-624-3103

Free literature available: Seasonal catalog describing breadboarding & circuit testing devices manufactured by Continental Specialties. Data sheets giving detailed description of Continental Specialties' Proto Board line and QT Socket line.

Products manufactured: Analyzers, Clamps & Clips, Connectors, Integrated Circuit Devices, Kits, Breadboarding (For Engineers), Kits, Training Aid, Sockets, Terminal Blocks, Boards & Strips, Testers

Local Sales Offices & Reps.

Cal	San Francisco, Continental Specialties	415-383-4207

CONTROL DATA CORP., 2815 El Segundo Blvd., Hawthorne, Cal., 90250

CONTROL DATA CORP., Printed Circuit Operation, 3965 Meadowbrook Rd., St. Louis Park, Minn, 55426

CONTROL DATA CORP., Connector Div., 31829 W. Tienda Dr., Westlake Village, Cal., 91361, Tel: 213-889-3535, TWX: 910-494-1224; Empl.: 180; Minimum order: $100

Customer service: T. Mueller

Products manufactured: Connector Blocks, Mother Board, Connectors, Contacts, Electrical

Local Sales Offices & Reps.

Cal	Glendale, Orion Sls.	213-240-3151
Cal	San Diego, Orion Sls.	714-566-0360
Cal	Santa Clara, Cindel Sls.	408-249-4424
Cal	Tustin, Orion Sls.	714-832-9687
Colo	Denver, Rope & Williamson	303-758-8507
Conn	Hartford, Cable Assocs.	203-525-5016
Fla	Ft. Lauderdale, Orbe Inc.	305-771-8915
Fla	St. Petersburg, Orbe Inc.	813-894-0687
Ill	Chicago, Such-Bohmer, Inc.	312-446-8934
Md	Stevenson, Tyler Griffin Co.	301-484-0251
Mass	Boston, Cable Assocs.	617-267-7322
Mich	Farmington, CMP	313-477-7700
Mo	St. Louis, Ensco-Rep	314-567-3935
NY	Mamaroneck, Cane Tech. Sls.	914-698-4411
NY	Rochester, T. Ferguson Sls.	716-482-7757
Ohio	Cleveland, CMP	216-333-5650
Pa	Pittsburgh, CMP	412-824-3760
Tex	Richardson, R.F. Kimball Co.	214-231-3447

CONTROL DATA CORP., Magnetic Components Div., 7801 Computer Ave., Minneapolis, Minn., 55435, Tel: 612-830-5800, TWX: 910-576-2978; Empl.: 500

Products manufactured: Motors, Power Supplies, Transformers

Local Sales Offices & Reps.

Ala	Huntsville, W.A. Brown Comps.	205-539-4411
Cal	Yorba Linda, E. Grabowski	714-528-5555
Colo	Denver, Williams-Assocs.	303-373-4730
Fla	Ft. Lauderdale, W.A. Brown Comps.	305-776-4800
Fla	Orlando, W.A. Brown Comps.	305-425-5505
La	Metairie, McKinney Sls. Co.	504-887-1723
Mass	Framingham, F.C. Hatch	617-879-3854
NM	Albuquerque, Williams-Assocs.	505-255-1638
NY	New York, J.D. Grey	914-255-0393
NC	Winston-Salem, W.A. Brown Comps.	919-725-5384
Ohio	Cleveland, Research Development Prod. Assocs.	216-526-5260
Ohio	Dayton, Research Development Prod. Assocs.	513-253-6175
Tex	Bellaire, McKinney Sls. Co.	713-774-3232
Tex	Dallas, McKinney Sls. Co.	214-631-9450
Va	Alexandria, W.A. Brown Equip-Comp	703-836-1800
Wash	Seattle, Avionics Liaison, Inc.	206-767-3870
Wisc	Racine, E. Wojcik	414-554-7167
EXP:	New York, N.Y., Lothar-Sanford Co.	212-757-3881

CONTROL DEVICES INC., 204 New Boston St., Woburn, Mass., 01801, Tel: 617-935-1105; Empl.: 54; Minimum order: $25

For info on price: J. F. Colligan; Application info: D. Gove; Customer service: A. Dean; Delivery info: G. Marino

Products manufactured: Keyboards, Alphanumeric & Decimal, Switches

Local Sales Offices & Reps.

Cal	Torrance, Mitronics Inds.	213-323-7934
Conn	Huntington, Comtronic Assoc. Inc.	203-929-4953
Fla	Clearwater, WMM Assoc.	813-726-8871
Ill	Chicago, Pivan Engng.	312-539-4838
NY	Garden City, Comtronic Assoc. Inc.	516-741-8966
NY	Ithaca, B. Dean Inc.	607-272-2187
Ohio	Cleveland, S. Sterling Co.	216-442-8080
Pa	Broomall, L.D. Lowery Inc.	215-356-5300
Tex	Dallas, EBR	214-942-2716

CONTROL ELCTRNS. CO., INC., 153 Florida St., Farmingdale, N.Y., 11735, Tel: 516-694-0125; Empl.: 50 p. 1•110,444

Customer service: H. Goldstein

Free literature available: Supplier of all types of delay line components, including variable magneto strictive, ultrasonic dispersive, lumped constant, etc. Full military and commercial lines.

Products manufactured: Amplifiers, Delay Lines, Delays, Time (Excluding Delay Lines, Timers, Delay & Relays, Time-Delays), Filters, Memory Systems, Meters, Synthesizers

Local Sales Offices & Reps.

Cal	Sherman Oaks, R.T. Assocs.	213-788-7588
Ill	Chicago, LGS Elctrn.	312-622-8183
Md	Ellicott City, VPI	301-465-4060
Mass	W. Medway, J. Gallagher	617-533-7292
Pa	Montgomery, VPI	215-474-3200
EXP:	Fla., Hallandale, Emec	305-925-6366

CONTROL EQUIP. CORP., 220 Tanner St., Lowell, Mass., 01851, Tel: 617-459-0573; Empl.: 10; Minimum order: $25

For info on price: G. Stephens; Application info: G. Stephens; Customer service: L. J. Pouliot; Delivery info: O. W. Ryden

Products manufactured: Cards, Logic, Comparators, Converters, Counters, Data Acquisition & Reduction Systems, Data Loggers, Generators, Integrators, Electronic, Multiplexers, Paper-Tape Preparation Systems, Punched Card Equipment, Recorders, Scanners, Switches, Testers, Totalizers, Digital, Translators, Data

CONTROL PRODUCTS CORP., 4431 W. Division St., Chicago, Ill., 60651, Tel: 312-235-1131; Empl.: 60

Free literature available: CPC manufactures thermocouples, sheated conductor, heaters, control panels and systems using electrical, electronic, pneumatic components custom built. We supply adjustable speed and frequency systems, using regadyne all AC control from 5 thru 1500 HP.

Products manufactured: Alarms, Cable Assemblies & Harnesses, Controls/Control Eqpt., Converters, Meters, Panels, Thermocouples, Elements & Accessories, Wire

Local Sales Offices & Reps.

Ariz	Mesa, D.C. Donath Co.	602-964-2782
Cal	Irvine, C. Oestreicher	714-673-1235
Mich	Detroit, K.V.A. Assocs.	313-892-6000
Mich	Grand Rapids, H.E. Frakie	616-949-4366
Minn	St. Paul, E. C. Stiedemann Co.	612-739-3775
Ohio	Cincinnati, A.H. Parker	513-563-1843
Pa	Bethayres, Control Instr. Sls. Co.	215-676-1808
Pa	Pittsburgh, Weiss Instr.	412-371-3020
Tex	El Paso, Progress Sls. Co.	915-566-2731
Tex	Houston, Houston Tech. Sls.	713-664-9891
Wash	Bellevue, Topp Engrg. Sls. Corp.	206-747-5401
Wisc	Milwaukee, E.C. Stiedemann Co.	414-332-1250

CONTROL PRODS., INC., E. Hanover, N.J., 07936, Tel: 201-887-9400; Empl.: 35; Minimum order: $10

For info on price: M. P. Deachuck; Application info: M. P. Deachuck; Customer service: C. Artho; Delivery info: C. Artho

Free literature available: Thermal Folder and 10 Data Sheets

Products manufactured: Switches

CONTROL SCIENCES, INC., 10315 Woodley Ave., Granada Hills, Cal., 91344, Tel: 213-342-3067; FSC No: 53317; Empl.: 8

For info on price: H. C. Ericsson; Application info: M. Bushell; Customer service: M. Bushell; Delivery info: H. C. Ericsson

Products manufactured: Converters, Demodulators, Indicators, Transformers

Local Sales Offices & Reps.

Ala	N. W. Huntsville, W. A. Brown Assoc.	205-539-4411
Cal	Van Nuys, Cardinal Assoc.	213-787-5511
Fla	Fort Lauderdale, W.A. Brown Assoc.	305-776-4800
Fla	Orlando, W.A. Brown Assoc.	305-425-5505
Ga	Tucker, W.A. Brown Assoc.	404-939-1674
La	Gretna, W.A. Brown Assoc.	504-366-5766
NY	Syracuse, Syracuse Tech. Reps.	315-488-0222
NC	Winston-Salem, W.A. Brown Assoc.	919-768-3600
Ohio	Cincinnati, G & H Sls. Co.	513-771-8231
Pa	Hatboro, DeShawn Assoc.	215-675-9111

CONTROL SWITCH, A Cutler Hammer Co., 1420 Delmar Dr., Folcroft, Pa., 19032, Tel: 215-586-7500, Telex: 83-4216; FSC No: 81640; Empl.: 250; Minimum order: $50

For info on price: F. Giasone; Application info: G. Maier; Customer service: J. Boyle; Delivery info: F. Giasone

Free literature available: Bulletins on: High reliability toggle, pushbutton, limit, lighted and special switches for direct PCB mounting for commercial, aircraft, industrial and military control applications

Products manufactured: Indicators, Lamps, Lights, Sockets, Switches

Local Sales Offices & Reps.

Cal	Menlo Park, Control Switch Inc.	415-854-1005
Cal	Sepulveda, R. L. Assocs.	213-782-7826
Fla	Lighthouse Point, Saber Assocs., Inc.	305-943-3076
Ga	Woodstock, Saber Assocs., Inc.	404-432-9625
Ill	Chicago, Carlson Elctrn. Sls. Co.	312-774-9022
Ind	Indianapolis, R. O. Whitesell & Assoc., Inc.	317-359-9283
Ky	Louisville, R. O. Whitesell & Assoc., Inc.	502-893-7303
Md	Lanham, Eastern Comps. Inc.	301-577-2925
Mass	Newton, Control Switch Inc.	617-244-7514
Mich	Grand Rapids, R. O. Whitesell & Assoc., Inc.	616-451-8901
Mich	Southfield, R. O. Whitesell & Assoc., Inc.	313-358-2020
Mich	St. Joseph, R. O. Whitesell & Assoc., Inc.	616-983-7337
Minn	Minneapolis, Control Switch Inc.	612-831-3560
Miss	Corinth, Rakes Engrg & Mktg. Corp.	601-287-5369
Mo	St. Louis, Carlson Elctrn. Sls. Co.	314-991-0262
NY	Oceanside, Bittan Assocs., Inc.	516-678-6222
NC	Smithfield, Byrd & Barbour Sls.	919-934-8136
Ohio	Cincinnati, R. O. Whitesell & Assoc., Inc.	513-521-2290
Ohio	Columbus, R. O. Whitesell & Assoc., Inc.	614-888-9396
Ohio	Dayton, R. O. Whitesell & Assoc., Inc.	513-298-9546

Ohio Lakewood, R. O. Whitesell & Assoc., Inc. 216-228-7525
Okla Tulsa, Control Switch Inc. 918-627-3312
Pa Paoli, Control Switch Inc. 215-878-0820
Pa Philadelphia, Eastern Comps., Inc. 215-836-1616
Pa Pittsburgh, R. O. Whitesell & Assoc., Inc. 412-344-7277
Tenn Bristol, Rakes Engrg. & Mktg. Corp. 615-968-4195
Tex Richardson, Thunderbird Tech. Sls. & Svcs., Inc. 214-690-0763
Wash Bellevue, Control Switch Inc. 206-747-5560
Wisc Wauwatosa, Carlson Elctrn. Sls. Co. 414-476-2790

Local Distributors
Cal Culver City, Western Electromotive Inc., 8467 Steller Dr. 213-870-7621
Fla Ft. Lauderdale, Peerless Radio Corp. of Fla. Inc., Box 23143 305-566-5966
Fla Miami, Electronic Equip. Co., 2701 NW 42nd Ave. 305-871-3500
Md Kensington, Marine Air Supply, 10233 Kensington Pkwy. 301-949-1353
Mass Boston, Sager Elec. Supply Co., 172 High St. 617-542-2281
NY Lynbrook, Peerless Radio Corp., 19 Wilbur St. 516-593-2121
Ohio Dayton, Related Components Inc., 1721 E. Third St. 513-253-6116
Tex Dallas, Texas Instr. Supply Co., 6000 Denton Dr. 214-238-6821

CONTROL SYSTEMS RESEARCH, INC., CSR Bldg., 632 Fort Duquesne Blvd., Pittsburgh, Pa., 15222, Tel: 412-566-1200, TWX: 710-664-4203; Empl.: 150

Free literature available: Systrol Catalog-Latest developments in digitally controlled drive systems with full wave 4 quadrant regenerative servo controllers. Acc-U-Lok Catalog-New electromechanical synchronizing mechanical isolated shafts.

Products manufactured: Amplifiers, Boards, Printed Circuit, Controls/Control Eqpt., Motors, Repeaters, Servo, Servo Systems

Local Sales Offices & Reps.
Cal Los Angeles, Halbar Assocs. 213-387-8283
Cal San Mateo, Halbar Assocs. 415-349-4700
Conn Middletown, CSR 203-346-6240
Ill Libertyville, CSR 312-367-0003
Mich W. Bloomfield, CSR 313-682-2717
NY E. Aurora, CSR 412-566-1200
NC Charlotte, J. Rudisill Assocs. 704-377-6901
Ohio Chagrin Falls, CSR 216-247-6021
Pa Malvern, Miller & Dietz Co. 215-647-7373
Pa Pittsburgh, CSR 412-566-1200
Pa Pittsburgh, R.F. Clark 412-242-9500
Tex Dallas, Dwayne Clement Assocs. 214-239-6105

CONTROL TECHNOLOGY CO., 41-16 29th St., L.I.C., N.Y., 11101, Tel: 212-EM 1-2133; Empl.: 35
p. 1•1914,1915

Products manufactured: Actuators, Amplifiers, Analyzers, Bridges, Comparators, Computers, Controls/Control Eqpt., Converters, Dampers, Servo, Data Acquisition & Reduction Systems, Demodulators, Detectors, Indicators, Integrated Circuit Devices, Integrators, Electronic, Modulator/Demodulators, Modulators, All Kinds, Monitors, Multipliers, Repeaters, Servo, Servo Systems, Simulators, Synchro Transmitters, Solid-State, Testers, Tracking Systems, Translators, Data

CONTROLCRAFT CORP., 213 Main St., West Chicago, Ill., 60185, Tel: 312-231-7511; Empl.: 35

Products manufactured: Controls/Control Eqpt., Counters, Drivers, Solenoid, Encoders, Generators, Indicators, Light Sources, Photoelectric, Modulators, All Kinds, Scalers, Binary, Decade, Scanners, Shift Registers, Switches, Tachometers, Timers, Totalizers, Digital, Transducers

Local Sales Offices & Reps.
Ark Little Rock, Electra-Tech Midsouth, Inc. 501-562-4090
Colo Denver, Tessco Co. 303-744-1119
Ind Indianapolis, National Engrg. Co. 317-251-1132
Mass Braintree, Bordewieck Engrg. Sls. Co. 617-843-0845
Minn Minneapolis, Bican Co. 612-827-4734
NY Syracuse, B. Fleckenstein 315-488-7883
Ohio Cleveland, Harvey Teplitz & Co. 216-371-2044
Ohio Dayton, Harvey Teplitz & Co. 513-277-6531
Ore Beaverton, D. Fry Co. 503-643-5448

CONTROL PRODUCTS DIV., Amerace Corp., 2330 Vauxhall Rd., Union, N.J., 07083, Tel: 201-964-4400, TWX: 710-985-4687; FSC No: 3L154; QPL No: 2270; Empl.: 275; Minimum order: $25

Customer service: G. Elwood

Free literature available: SR-3: Electropneumatic timers for industrial controls. SS-7: Solid-State timing relays. G-109: Terminal Blocks for design engineering freedom. CR-1: General Purpose and Magnetic Latch relays.

Products manufactured: Connectors, Controllers, Programmable, Controls/Control Eqpt., Motors, Programmers, Relays, Switches, Terminal Blocks, Boards & Strips, Timers

Local Sales Offices & Reps.
Agastat Control Prods.
Ala Birmingham, Control Prods. Div. 205-979-0511
Cal Foster City, Control Prods. Div. 415-349-3817
Cal San Diego, J. C. Henberger Co. 714-223-7114
Cal Santa Fe Springs, Control Prods. Div. 213-863-5753
Colo Denver, C. Beabout Co. 303-244-3151
Conn Prospect, P. Yoder 203-758-4221
Del Wilmington, Control Prods. Div. 302-475-2636
Ga Atlanta, Control Prods. Div. 404-261-1224
Haw Honolulu, H. C. Burgess 808-623-3118
Ill Elk Grove Village, Control Prods. Div. 312-437-8354
Kans Kansas City, G. H. Pearson 913-341-6210
Mass Boston, Control Prods. Div. 617-326-8686
Mich Southfield, Linder Assoc., Inc. 313-353-4334
Minn Minneapolis, Control Prods. Div. 612-560-5640
Mo Kirkwood, Control Prods. Div. 314-821-1909
Neb Omaha, B. Gurney & Assoc. 402-342-8445
NJ Union, Control Prods. Div. 201-355-7770
NY Buffalo, R. F. Lamb Co. 716-874-4900
NY Long Isl., Control Prods. Div. 516-627-8809
NY Rochester, T. Ferguson Sls. 716-482-7757
Ohio Cincinnati, Control Prods. Div. 513-729-2904
Ohio Solon, Control Prods Div. 219-692-2452
Pa Bridgeville, Foster-McClinton, Inc. 412-941-4800
Pa Erie, Foster-McClinton, Inc. 814-455-9111
SC Inman, J. Hile 803-578-6080
Tex Houston, Control Prods. Div. 713-666-8421
Tex Plano, Control Prods. Div. 214-423-4431
WVa Huntington, Foster-McClinton, Inc. 304-736-5161

Buchanan Terminal Blocks
Cal Los Angeles, Control Prods. Div. 213-863-5753
Cal Palo Alto, Control Prods. Div. 415-325-4486
Colo Denver, P. Douden Co. 303-744-1497
Conn Waterbury, Control Prods. Div. 203-758-4221
Fla Coral Springs, O. C. Puckett Co. 305-752-0648
Fla Jacksonville, O. C. Puckett Co., Inc. 904-724-3453
Fla Orlando, O. C. Puckett Co., Inc. 305-422-7197
Fla Temple Terr:, O. C. Puckett Co., Inc. 813-988-7077
Haw Honolulu, D. Schwab 808-537-1658
Ill Chicago, Control Prods. Div. 312-583-8131
Iowa Cedar Rapids, Bertsch Elec. Sls. Co. 319-366-7719
Mich Grand Rapids, Linder Assoc., Inc. ... 616-364-0748
Mich Lansing, Linder Assoc., Inc. 517-489-0292
Minn Minneapolis, Lee-Noonan Co. 612-920-7851
Mo Raytown, Arehart-Barnds Sls. Co. 816-356-3488
Neb Lincoln, E. Taber & Sons 402-423-4420
NJ New Brunswick, Control Prods. Div. 201-297-1511
NM Albuquerque, T. Deskin & Assoc. 505-242-3581
NY Buffalo, A. Schultz Co. 716-839-1010
Ohio Cleveland, V. O'Neill 216-331-4273
Ore Portland, M. Gerrard 503-224-0864
Pa Oreland, Cusick Elec. Sls. Co. 215-886-2100
Pa Pittsburgh, M. Smith & Assoc. 412-276-5363
Tex Dallas, Control Prods. Div. 214-423-4431
Wash Seattle, Tal Agencies, Inc. 206-624-3355

CONTROLS RESEARCH CORP., 2100 S. Fairview, Santa Ana, Cal., 92704, Tel: 714-549-2990, TWX: 910-595-1106

For info on price: D. P. Schulze; Application info: D. P. Schulze; Customer service: E. Whelin; Delivery info: E. Whelin

Free literature available: Data sheets on both reed and mechanical switch modules, also on stock keyboards using reeds, mechanical switches, and solid state switches (CRC C-SCAN).

Products manufactured: Keyboards, Alphanumeric & Decimal, Switches

Local Sales Offices & Reps.
Cal Encino, King-Way Assoc. 213-788-4124
Cal Los Altos, Ewing-Foley 415-941-4525
Fla Orlando, Gentry Assocs. 305-894-4401
Ill Downers Grove, Richmar Elctrns. Corp. 312-968-0118
Md Randallstown, J. M. Chavis Assoc. 301-484-6399
Mich Farmington Hills, W. R. Hummon & Assoc. 313-474-0661
Minn Minneapolis, Engineering Products Assoc. 612-925-1883
NH Nashua, Bell Controls 603-882-6984
NJ Ridgewood, Hansen Assoc. 212-947-0379
Ohio Medina, J. C. Hofstetter Co. 216-725-4477
Pa Horsham, CMS Mktg. 215-672-8300
Tex Garland, Carter Assocs. 214-276-7151
Wash Mercer Island, J. H. Andersen Assoc. 206-232-0484
FOR: Can., Downsview, Ont., Kaytronics Ltd. 416-638-5511
FOR: Can., Montreal, Que., Kaytronics Ltd. 514-487-3434

CONTROLTEK INC., 2235 N.W. Savier, Portland, Ore., 97210, Tel: 503-222-9381; Empl.: 4

Customer service: G. Fagg

Products manufactured: Chargers, Battery, Controls/Control Eqpt., Converters, Counters, Inverters, Power Supplies

Local Sales Offices & Reps.
EXP: Portland, Ore., Extech Ltd.

CONVERSION CHEM. CORP., 210 E. Main St., Rockville, Conn., 06066, Tel: 203-872-0541, TWX: 710-435-2336; Empl.: 43

Products manufactured: Chemicals, Cleaners & Solvents, Coatings, Etchants, Printed Circuit

Local Sales Offices & Reps.
Cal Montebello, Conversion Chemical 213-726-0825
Ill Chicago, Conversion Chemical Corp. 312-247-7117
Ill Lansing, G. A. Hobbs 312-474-5264
Mass Dudley, J. A. Cristina 617-943-3096
Mich Albion, L. Calicotte 517-629-3502
NY East Syracuse, K. R. MacDonald 315-463-0685
NC Charlotte, Conversion Chemical Corp. 704-394-1378
NC Statesville, B. G. Deal 704-872-3256
Ohio Sylvania, E. P. Agnew 419-882-1282
Ohio Toledo, Conversion Chemical Corp. 419-531-3703
EXP: Rockville, Conn., Kenvert International 203-875-8081

COOK ELEC. CO., 6201 Oakton St., Morton Grove, Ill., 60053, Tel: 312-967-6600, TWX: 910-223-3654; Empl.: 800; Minimum order: $50

For info on price: H. Thielsen; Application info: H. Wickstrom; Customer service: R. Tasson; Delivery info: R. Tasson

Free literature available: Catalog 701B Lists general line of field adjustable and factory calibrated pressure switches. Specials upon request.

Products manufactured: Controls/Control Eqpt., Relays, Switches

Local Sales Offices & Reps.
Cal El Segundo, Skytronics 213-772-3231
Cal Encino, V & L Assocs. 213-986-9703
Cal Los Altos, Frauman 415-941-0660
Ind Mishawaka, DeWald Fluid Power ... 219-255-4776
Iowa Cedar Rapids, Palatine Engrg. 319-365-8071
Kans Andover, Palatine Engrg. 316-683-7512
Kans Overland Pk., Palatine Engrg. 913-262-5643
Md Baltimore, Milan Assocs. 301-825-1120
Mich Fenton, Kundinger Fluid Power 313-629-2248
Mo St. Louis, Palatine Engrg. 314-426-7055
NY Binghamton, Canavan-Scanlon 607-724-7220
NY Rochester, Canavan-Scanlon 716-442-0720
NY Syracuse, Canavan-Scanlon 315-437-1271
Ohio Cleveland, D. Steffen 216-461-8333
Ohio Dayton, D. Steffen 513-293-3145
Pa Philadelphia, S.K. MacDonald 215-545-1205
Tex Dallas, Economy Gauge & Instr. Supply 214-243-8370
Wisc Appleton, Kundinger Fluid Power ... 414-739-7463
EXP: Ill., Chicago, E. Magnus 312-334-1503

COOPER GROUP, Weller Elctrns. Div., Box 728, Apex, N.C., 27502, Tel: 919-362-7511, Telex: 579497; Empl.: 350; Minimum order: $25

Customer service: G. Huegerich

Products manufactured: Soldering Equipment, Soldering Guns, Irons & Desoldering Tools

COORS PORCELAIN CO., 600 Ninth St., Golden, Colo., 80401, Tel: 303-279-6565; Empl.: 1600; Minimum order: $250

For info on price: D. Chandler; Application info: T. Glass; Customer service: T. Glass; Delivery info: T. Glass

Free literature available: 952 - alumina cermaic specification and application literature.

Products manufactured: Coatings, Packages, Integrated Circuit, Seals, Substrates, Tubing

Local Sales Offices & Reps.

Ariz	Phoenix, Hecht, Henschen & Assoc.	602-275-4411
Cal	Goleta, J.N. Paxson	805-968-3632
Cal	Newport Beach, S. Whisner	714-772-9500
Fla	Melbourne, Reynolds & Assoc.	305-727-3205
Ill	Chicago, A.S. Deter, Jr.	312-541-8010
Ind	Indianapolis, D.R. Reimer	317-783-2856
Kans	Kansas City, Mid-America Elctrns., Inc.	913-236-4800
Mich	Southfield, Eynon-Weyand Assoc.	313-354-3430
Minn	Minneapolis, D.G. Perry & Co.	612-920-3212
NJ	Hopatcong, R.P. Collins	201-526-9050
NY	Ithaca, B. Dean, Inc.	607-272-2187
NC	Winston-Salem, Dula Assoc.	919-768-7166
Pa	West Chester, R.L. White	215-692-2674
Tex	Hurst, H.L. Moschel	817-336-4721
Tex	Richardson, P.J. Scanlon Co.	214-231-4661

COPPERWELD BIMETALLICS, Div. Copperweld Corp., Glassport, PA, 15045, Tel: 412-664-7131, TWX: 710-794-4806

Customer service: W. G. Ross

Free literature available: Literature covers properties and characteristics of copperweld® (copper-clad steel) and Alumoweld® (aluminum-clad steel) wire and strand for use in electrical and mechanical applications.

Products manufactured: Antenna Towers & Supports, Cable, CATV Systems & Equipment, Clamps & Clips, Forms, Wire, Metals, Rods, Ground, Wire, Wire & Cable Ties

CORCOM, 2635 No. Kildare Ave., Chicago, Ill., 60639, Tel: 312-384-7400, TWX: 910-221-5308; FSC No: 05245; Empl.: 275 .... p. 1•546,547

Customer service: Reg. Sls. Mgr.

Products manufactured: Coils Including Assemblies & Forms, Comparators, Connector Boxes & Strips, Power Outlet, Connectors, Filters

Local Sales Offices & Reps.

Ariz	Scottsdale, Q.T. Wiles & Assoc.	602-948-5590
Cal	Los Angeles, Q.T. Wiles & Assoc.	213-649-1232
Cal	Menlo Park, Straube Assocs.	415-323-2476
Cal	San Diego, Q.T. Wiles & Assoc.	714-565-6893
Cal	Tustin, Q.T. Wiles & Assoc.	714-832-4952
Colo	Boulder, Straube Assocs.	303-426-0890
Conn	Milford, Conti-Younger	203-929-3294
Fla	Altamonte, W.M.M. Assocs.	305-831-4645
Fla	Clearwater, W.M.M. Assocs.	813-447-2533
Fla	Pompano, W.M.M. Associates	305-943-3091
Ga	Atlanta, G.S. O'Hara	404-237-0600
Ill	Downers Grove, Richmar Elctrns. Corp.	312-968-0118
Ind	Fort Wayne, Robert O. Whitesell & Assocs.	219-432-5591
Ind	Indianapolis, Robert O. Whitesell & Assocs.	317-359-9283
Ind	Kokomo, Robert O. Whitesell & Assocs.	317-452-6065
Iowa	Cedar Rapids, Palatine Eng. Sls.	319-365-8071
Kans	Andover, Palatine Eng. Sls.	316-683-7512
Kans	Overland Park, Palatine Eng. Sls.	913-262-6820
Ky	Louisville, Robert O. Whitesell & Assocs.	502-893-7303
Md	Baltimore, D.K. Jones & Assocs.	301-752-0577
Mass	Waltham, Conti-Younger Assocs.	617-890-4582
Mich	Grand Rapids, Robert O. Whitesell & Assocs.	616-451-8901
Mich	Southfield, Robert O. Whitesell & Assocs.	313-358-2020
Mich	St. Joseph, Robert O. Whitesell & Assocs.	616-983-7337
Minn	Edina, M. Foster Co.	612-835-2252
Mo	St. Louis, Palatine Eng. Sls.	314-426-7055
NM	Albuquerque, Straube Assocs.	505-292-0295
NY	Clinton, Advanced Comp. Corp.	315-853-6438
NY	Endicott, Advanced Comp. Corp.	607-785-3191
NY	Manhasset, Win-Cor Elctrn. Sls.	516-627-9474
NY	No. Syracuse, Advanced Comp. Corp.	315-699-2671
NY	Scottsville, Advanced Comp. Corp.	716-889-1429
Ohio	Cincinnati, Robert O. Whitesell & Assocs.	513-521-2290
Ohio	Cleveland, Robert O. Whitesell & Assocs.	216-228-7525
Ohio	Columbus, Robert O. Whitesell & Assocs.	614-888-9396
Ohio	Dayton, Robert O. whitesell & Assocs.	513-298-9546
Ore	Portland, Earl & Brown Co.	503-245-2283
Pa	Feasterville, Professional Service Assoc.	215-355-6244
Pa	Pittsburgh, Robert O. Whitesell & Assocs.	412-344-7277
Tex	Austin, K & H Sls.	512-836-2842
Tex	Plana, K & H Sls.	214-423-6520
Utah	Salt Lake City, Straube Assocs.	801-328-4513
Wash	Seattle, Earl & Brown Co.	206-284-1121
Wisc	Oak Creek, Richmar Elctrns. Corp.	414-475-0141
FOR:	Toronto, Ont., Can., Atlas Elctrns., Ltd.	416-781-6174

Local Distributors

Cal	Mt. View, Terminal Elctrns., 880 Maude Ave.	415-969-9240
Cal	South Gate, CEC/Moltronics, 5610 E. Imperial Hwy.	213-773-6521
Cal	Sunnyvale, Diplomat/Westland, 1118 Elko Dr.	408-734-1900
Colo	Denver, Elctrn. Parts, 1212 S. Bdwy.	303-744-1992
Fla	Orlando, Hammond Elctrns., 911 W. Central	305-849-6060
Ga	Atlanta, Lykes Elctrns., 1135 Chattahoochee Ave. N.W.	404-355-2223
Ill	Chicago, Newark Elctrns., 500 N. Pulaski	312-638-4411
Ill	Elgin, Allied Elctrns., 1355 Sleepy Hollow	312-697-8200
Ill	Palatine, Ohm Elctrns., 649 Palatine	312-359-5500
Md	Savage, Pyttronics Ind., 8220 Wellmore Ct.	301-792-7000
Mass	Dedham, Gerber Elctrns., 852 Providence	617-329-2400
Mo	Raytown, Advanced Elctrns., 9052 B50 Hwy	816-737-1443
NJ	Haddonfield, Mid Atlantic, 140 Haddon Ave.	609-428-8288
NY	Mt. Vernon, QAR Ind. Elctrn., 621 S. Columbus	914-699-2224
Tex	Richardson, Prime Distr., 777 S. Central Expwy.	214-231-0170
Utah	Salt Lake City, Diplomat/Alta Land, 2280 S. Main	801-486-7227
Wash	Seattle, Interface Elctrns., 300 2nd Ave. W.	206-285-3500

CORDOVER & CO., CARL, 3914 North 29th Ave., Hollywood, Fla., 33020, Tel: 305-921-6300; Empl.: 25; Minimum order: $25

For info on price: C. Cordover; Application info: J. Cordover; Customer service: D. Abbey; Delivery info: D. Abbey

Products manufactured: Alarms, Diodes, Kits, Printed Circuit, Modules, Logic, Encapsulated, Rectifiers, Transistor, Diode, Thyristor Heat Dissipators, Transistors

CORNELL-DUBILIER ELCTRNS., 2070 Maple, Des Plaines, Ill, 60018

CORNELL-DUBILIER ELECTRONICS, 150 Avenue "L", Newark, N.J., 07105, Tel: 201-589-7500; QPL No: Multiple; Empl.: 3000; Minimum order: $25

Customer service: H. Cerretti

Free literature available: Cornell - Dubilier Component Selector provides convenient identification of standardized products, applied by CDE Distributors, and guidance to selection of customized parts developed through engineering services.

Products manufactured: Antenna Rotators, Capacitors, Fixed, Filters, Relays, Vibrators

Local Sales Offices & Reps.

Ariz	Scottsdale	602-946-4437
Cal	Los Altos	415-941-3399
Cal	San Diego	714-565-9444
Cal	Venice	213-821-5001
Colo	Littleton	303-798-8955
Fla	Maitland	305-831-1242
Ga	Atlanta	404-261-6160
Ill	Des Plaines	312-299-7761
Ind	Indianapolis	317-545-6247
Iowa	Des Moines	515-276-6387
Mass	Norwood	617-762-5333
Mich	Detroit	313-882-1717
Minn	Minneapolis	612-546-5361
Mo	Liberty	816-781-2522
Mo	St. Louis	314-534-4611
NM	Albuquerque	505-265-6794
NY	Rochester	716-544-9580
NC	Raleigh	919-787-9564
Ohio	Cleveland	216-271-5429
Ohio	Dayton	513-298-7224
Ore	Portland	503-297-3777
Pa	Norristown	215-272-0118
Pa	Pittsburgh	412-563-0303
Tex	Dallas	214-357-4024
Wash	Seattle	206-285-1300
EXP:	Des Plaines, Ill.	312-299-8171
FOR:	Can., Lower Sackville, Halifax County, N.S.	902-865-8960
FOR:	Can., Montreal 379, Que.	514-331-2722
FOR:	Can., Scarborough 733, Ont.	416-755-9346
FOR:	Can., Vancouver 9, B.C.	604-980-4346

CORNING GLASS WORKS, Electronic Prod. Div., Houghton Pk., Bldg. A-2, Corning, N.Y., 14830, Tel: 607-974-8652, TWX: 510-252-1385; Minimum order: $45 p. 2•105,1449

Customer service: F. Quan 607-974-8679

Free literature available: Corning Electronics - Electronic Components Catalog #ECC-1

Products manufactured: Capacitors, Fixed, Delay Lines, Heaters & Heating Elements, Memory Systems, Resistors, Transducers

Local Sales Offices & Reps.

Cal	Orange, Corning Glass Works	714-541-5275
Cal	Sunnyvale, Corning Glass Works	408-732-5050
Colo	Denver, Corning Glass Works	303-758-9457
Ill	Chicago, Corning Glass Works	312-693-6830
Kans	Leawood, H.C. Heyde Co.	913-649-8628
Me	Kennebunk, Components, Inc.	207-282-5111
Mass	Littleton, Corning Glass Works	617-486-3125
NC	Raleigh, Corning Glass Works	919-876-1100
NC	Wilmington, Corning Glass Works	919-791-5040
Pa	Bradford, Corning Glass Works	814-362-5571
Pa	Broomall, L.D. Lowery Assocs.	215-356-5300
Pa	Pittsburgh, Covert & Newman Co.	412-563-0303
FOR:	Can., Toronto, Ont., Corning Glass Works of Canada	416-421-1500

Local Distributors

Ala	Huntsville, Cramer/EW Inc., 2310 Bob Wallace Ave., S.W.	205-539-5722
Ariz	Phoenix, Liberty Elctrns., 3130 N. 27th Ave.	602-257-1272
Cal	El Segundo, Liberty Elctrns. Inc., 124 Maryland St.	213-322-8100
Cal	Gardena, Bell Industries, 306 E. Alondra Blvd.	213-321-5802
Cal	Mountain View, Elmar Elctrns., 2288 Charleston Rd.	415-961-3611
Cal	San Diego, Liberty Elctrns., 8248 Mercury Ct.	714-565-9171
Colo	Commerce City, Elmar Elctrns., 6777 E. 50th Ave.	303-287-9611
Colo	Denver, Cramer Elctrns., 5465 E. Evans Pl.	303-758-2100
Conn	North Haven, Cramer Elctrns. Inc., 35 Dodge Ave.	203-239-5641
Fla	Hollywood, Cramer/EW Inc., 4035 N. 29th Ave.	305-923-8181
Fla	Hollywood, Hamilton/Avnet Elctrns., 4020 N. 29th Ave.	305-925-5401
Fla	Orlando, Cramer/EW Inc., 345 N. Graham Ave.	305-894-1511
Ill	Chicago, Bell Ind., 7701 N. Auston Ave.	312-282-5400
Ill	Elk Grove Village, Schweber Elctrns., 1380 Jarvis Ave.	312-593-2740
Ind	Indianapolis, Graham Elctrns. Supp., 133 S. Pennsylvania St.	317-634-8202
Kans	Lenexa, Hamilton Avnet Elctrns., 37 Lenexa Ind'l Center	913-888-8900
Md	Baltimore, Radio Elctrn. Svc. Co., 1026 Cromwell Bridge Rd.	301-823-0700
Md	Hyattsville, Milgray/Washington, Inc., 5405 Lafayette Pl.	301-864-1111
Md	Rockville, Cramer/EW, Inc., Box 1648	301-948-0110
Mass	Newton Centre, Cramer Elctrns., 85 Wells Ave.	617-969-7700
Mass	Watertown, Sterling Elctrns., 70 Summer St.	617-926-9720
Minn	St. Paul, Ragon Elctrns., 1136 W. Larpenteur Ave.	612-488-0201
NJ	Cherry Hill, Cramer/Penn, 12 Springdale Rd	609-424-5993
NJ	Somerset, Schweber Elctrns., 43 Belmont Dr.	201-469-6008
NM	Albuquerque, Cramer Elctrns., 137 Vermont N.E.	505-265-5767
NY	Freeport, Milgray Elctrns., 191 Hanse Ave.	516-546-6000

NY	Hauppauge, Cramer/Long Island, 29 Oser Ave.	516-231-5600
NY	Rochester, Cramer/Rochester, Inc., 3000 S. Winton Rd.	716-275-0300
NY	Syracuse, Cramer/Eastern, Inc., 6716 Joy Rd.	315-437-6671
NY	Westbury, Schweber Elctrns., Jericho Tnpk.	516-334-7474
NY	Woodbury, Harvey Elctrns., 60 Crossways Pk. W.	516-921-8700
NC	Raleigh, Resco, 701 Georgetown Rd.	919-832-2077
NC	Winston-Salem, Cramer/EW, Inc., 938 Burke St.	919-725-8711
Ohio	Cincinnati, Sheridan Assocs., Box 37826	513-761-5432
Ohio	Cleveland, Schweber Elctrns., 23880 Commerce Pk. Rd.	216-464-2970
Ohio	Columbus, Hughes-Peters, Inc., 481 E. 11th Ave.	614-294-5351
Pa	Philadelphia, Almo Elctrns., Roosevelt Blvd. at Blue Grass Rd.	215-676-6000
Tex	Dallas, Solid State Elctrns., 2643 Manana St., Box 20299	214-352-2601
Tex	Houston, Hamilton/Avnet Elctrns., 1216 W. Clay St.	713-526-4661
Utah	Salt Lake City, Cramer Elctrns., 391 West 2500 South	801-487-4131
Wash	Seattle, Liberty Elctrns./NW, 5305 Second Ave., S.	206-763-8200
For:	Can., Downsview, Ont., Cesco Elctrns., 24 Martin Ross Ave.	416-661-0220
For:	Can., Montreal, Cesco Elctrns., 4050 Jean-Talon St., W.	514-735-5511

CORNING GLASS WORKS, FLUIDIC PRODUCTS, Corning, N.Y., 14830, Tel: 607-974-8311, TWX: 510-252-1595; Empl.: 8000; Minimum order: $30

For info on price: S. Gunn 607-974-8467; Application info: L. Roueche 607-974-8674; Customer service: S. Gunn 607-974-8467; Delivery info: S. Gunn 607-974-8467

Free literature available: Complete technical information on fluidic elements, peripheral equipment, systems and circuits plus a wide variety of applications information.

Products manufactured: Air Cleaners & Filters (Shielded & Unshielded), Controls/Control Eqpt., Converters, Counters, Detectors, Kits, Breadboarding (For Engineers), Kits, Training Aid, Modules, Logic, Encapsulated, Shift Registers, Switches, Timers, Transducers

CORNING GLASS WORKS, Memory Prods Dept., 3900 Electronic Dr., Raleigh, N.C., 27602, Tel: 919-876-1100, TWX: 510-928-1840; Empl.: 25

For info on price: H. S. Craumer; Application info: H. S. Craumer; Customer service: W. L. Brown; Delivery info: W. L. Brown

Free literature available: MCA 5.02 - Glass Delay Lines for Video Processing, MCA 5.03 - Low Cost 1H Video Delay Line, MCA 5.04 - High Performance Video Delay Line; MAN 4 - Sharpening TV Pictures With Video Delay Lines; 1H & 2H - Video Delay Line Questionnaire For Custom Designed Video Delay Lines.

Products manufactured: Delay Lines

CORNING GLASS WORKS, Corning Scientific Instruments, Medfield, Mass., 02052, Tel: 617-359-2341; Empl.: 8000

Products manufactured: Meters, Recorders

CORNING GLASS WORKS, Tech. Prods. Div., Corning, N.Y., 14830, Tel: 607-974-9000, TWX: 510-252-1384; Empl.: 34,000

For info on price: J. R. Dalle Pezze 607-974-7237; Application info: N. S. Kenny 607-974-7562

Free literature available: Brochures: (1) VYCOR BRAND GLASSES (2) DATA SHEILD PRECISION TAPE REEL (3) MACHINABLE GLASS-CERAMIC (4) CERCOR GLASS-CERAMIC HEAT EXCHANGER CORES (5) FUSED SILICA (6) MODEL CH-40 RADIANT PANEL HEATERS (7) HEAT EXCHANGERS (8) PROPERTIES OF GLASSES AND GLASS-CERAMICS

Products manufactured: Antennas, Bushings, Glass, Plastic, Metal, Rubber, Etc., Coatings, Compounds, Encapsulating, Insulating, Molding, Potting, Heat Exchangers & Systems, Heaters & Heating Elements, Honeycomb Sheets, Panels, etc., Lenses, Optical & Camera, Quartz, Fused, Seals, Silica, Fused, Substrates, Tape Recording Accessories, Thermocouples, Elements & Accessories, Tubing

Local Sales Offices & Reps.

Cal	Orange, Corning Glass Works	714-541-5275
Cal	Palo Alto, Corning Glass Works	415-328-7400
Ill	Chicago, Corning Glass Works	312-337-6600
NY	New York City, Corning Glass Works	212-752-1100

CORNING GLASS WORKS, TELEVISION PRODS. DIV., Corning, N.Y., 14830, Tel: 607-974-8600, TWX: 510-252-1595; Empl.: 8000

Products manufactured: Bushings, Glass, Plastic, Metal, Rubber, Etc., Compounds, Encapsulating, Insulating, Molding, Potting, Fiber Optic Bundles, Indicators, Insulators & Insulation, Mounts, Quartz, Fused, Seals, Silica, Fused, Spacers, Substrates, Tubing, Waveguides & Adapters

CORTEC, INC., 890 Production Pl., Newport Beach, Cal., 92660, Tel: 714-642-1877; Empl.: 27; Minimum order: $15

Customer service: A. Herbert

Free literature available: Cortec manufactures powdered iron cores for R.F. applications.

Products manufactured: Bobbins, Winding, Coil & Transformer, Coils Including Assemblies & Forms, Cores, Magnetic

Local Sales Offices & Reps.

Cal	Orange, Sls & Mktg. Assoc.	714-997-5720
Cal	Santa Clara, Rodgers	408-984-8110
Minn	St. Paul, Knox Assoc.	612-488-5402
NJ	Old Bridge, S.E.A. Co.	201-679-8800
NY	Buffalo, J.R. Henderson	716-634-8650
NC	Charlotte, McLean Sls.	704-366-2675

COSAR CORP., 3121 Benton St., Garland, Tex., 75042, Tel: 214-276-9487, Telex: 730-764; Empl.: 50

For info on price: J. D. Peterson; Application info: J. D. Peterson; Customer service: B. Milner; Delivery info: B. Milner

Free literature available: Twenty-page ZESTRON Reed Relay Catalog has sections on dynamic characteristics, load considerations, contact protection and reliability as well as detailed product data.

Products manufactured: Densitometers, Electronic, Relays, Testers

Local Sales Offices & Reps.

Cal	Fullerton	714-992-4690
Conn	Greenwich	203-661-2325
Ill	Chicago	312-539-6181
Tex	Dallas	214-276-9487

COSMO ELEC. LTD., 2145 Marion Pl., Baldwin, N.Y,, 11510

COSMO PLASTICS CO., 3239 W. 14th St., Cleveland, Ohio, 44109, Tel: 216-861-5594, TWX: 810-421-8444; Empl.: 500

For info on price: D. Haft; Application info: R. G. Bumm; Customer service: D. Haft; Delivery info: D. Haft

Free literature available: Catalog/design manual covers bobbin-terminal assemblies, material specifications, terminal designs. Lists specifications of over 1000 transformer, pot core, reed relay, IF, rectangular, round bobbins.

Products manufactured: Bobbins, Winding, Coil & Transformer, Coils Including Assemblies & Forms

Local Sales Offices & Reps.

Ariz	Phoenix, Electrical Specialty Co.	602-275-5736
Cal	Los Angeles, Electrical Specialty Co.	213-724-9600
Cal	San Diego, Electrical Specialty Co.	714-239-1345
Cal	So. San Francisco, Electrical Specialty Co.	415-589-9611
Colo	Denver, Electrical Specialty Co.	303-321-0226
Conn	Guilford, R.H. Whitehead Jr. & Assocs.	203-453-3762
Ill	Chicago, A.J. Ellis Co.	312-262-2708
Ind	Fort Wayne, Blind & Assocs.	219-748-7705
Ind	Indianapolis, Blind & Assocs.	317-251-1249
Md	Timonium, Heller Sls. Co.	301-252-4780
Mass	Boston, Whitehead Assocs.	617-542-7676
Minn	Minneapolis, Ladky Assocs. of Minn.	612-884-2125
Mo	Webster Grove, Hippler Sls. Co.	314-961-8499
NJ	Morristown, Andrews & Andrews, Inc.	201-569-8800
NY	Huntington, Andrews & Andrews, Inc.	516-692-8686
NY	Rochester, P.J. Andres	716-271-2201
Ohio	North Olmsted, Plus Sls., Inc.	216-734-8989
Ore	Portland, Electrical Specialty Co.	503-227-3601
Pa	Ardmore, R.D. Freedman Assocs.	215-649-3679
Tenn	Knoxville, T.S. Stone Co.	615-546-9282
Utah	Salt Lake City, Electrical Specialty Co.	801-487-9805
Va	Roanoke, A.B. Kreger, Jr.	703-989-4738
Wash	Seattle, Electrical Specialty Co.	206-682-3434

COTO-COIL CO., 65 Pavilion Ave., Providence, R.I., 02905, Tel: 401-467-4777; Empl.: 110 .... p. 1•1618-1623

Products manufactured: Coils Including Assemblies & Forms, Relays, Switches

Local Sales Offices & Reps.

Cal	Palo Alto, Engrg. Assocs.	415-326-7842
Cal	Pasadena, P. Nurches Co.	213-681-8957
Conn	Plantsville, Parnetics Co.	203-628-9343
Ill	Lombard, Quadtron Assocs.	312-627-6800
NY	Brooklyn, Eastern Elctrn. Sls.	212-763-5180
Ohio	Cleveland, J. Olsen Co.	216-752-5444
Wash	Seattle, H. Levinson Co.	206-323-5100

COUCH S.H. DIV., ESB Inc., 36 River St., Boston, Mass., 02126, Tel: 617-298-4147; Empl.: 203

Products manufactured: Relays

Local Sales Offices & Reps.

Ariz	Scottsdale, Mercury Engrg. Sls.	602-945-1927
Cal	Burbank, TransDynamics, Inc.	213-849-6261
Cal	Palo Alto, Engrg. Assocs.	415-326-7842
Cal	San Diego, TransDynamics, Inc.	714-298-8215
Colo	Denver, I.W. Strong & Assocs.	303-292-6900
Conn	Madison, A&M Elctrn. Reps.	203-245-1031
Fla	Orlando, Buchanan & Abrams Assocs.	305-898-7444
Ill	Wheaton, H.J. Batha Co.	312-668-4740
Iowa	Cedar Rapids, Snider Sls. Co.	319-326-4410
Mass	Needham, A&M Elctrn. Reprs.	617-444-8170
Mich	Grand Rapids, Elko Sls. Corp.	616-959-1451
Mich	Grosse Pointe Woods, Elko Sls. Corp.	313-884-7893
Minn	Minneapolis, International Sls. Co.	612-831-8423
Mo	St. Louis, Pem Sls. Co.	314-427-7200
NY	Rochester, J.G. Welch	716-244-1100
NY	Syracuse, H.R. Murray, Inc.	315-446-5555
NC	Winston-Salem, Radco Co.	999-722-9671
Ohio	Cincinnati, Phister Equip. Co.	513-421-3850
Ohio	Cleveland, Greenleaf & Assocs.	216-333-5480
Ore	Portland, J.W. Eckersley Co.	503-246-3183
Pa	Philadelphia, Technicraft Co.	215-483-4700
Tex	Dallas, Hillman Entprs.	214-827-4790

COUNTERSCAN SYSTEMS, Box 536, Sutton, Neb., 68979, Tel: 402-773-3875; Empl.: 100

Customer service: Mktg. Mgr.

Free literature available: Literature describes multiplexing and interconnect systems including interface adjustments, matching, considerations. Describes sophiaticated data switching systems - State of the Art Equip.

Products manufactured: Controllers, Programmable, Counters, Data Acquisition & Reduction Systems, Multiplexers, Scanners, Switches

Advertisment

Manufacturer of sophisticated backplane and wiring harness test equipment. Uses a self contained microprocessor with an internal electrically reprogrammable LSI-MOS memory and all CMOS integrated circuit construction. Complete with printer, mating connectors - Capacities to 768 K points. Modest Cost. Call Collect for info.

COUNTIS INDS., Box 1444, San Luis Obispo, Cal., 93406, Tel: 805-544-1770; Empl.: 9

Products manufactured: Ferrite Material & Parts

COX & CO., INC., 215 Park Ave., S., New York, N.Y., 10003, Tel: 212-OR 4-4727, TWX: 710-581-2839; Empl.: 85

Products manufactured: Adhesives (All Types), Baths, Controlled Temperature (Air & Liquid), Bridges, Cable, Chamber, Environmental Test, Controls/Control Eqpt., Heaters & Heating Elements, Indicators, Laminates, Monitors, Ovens, Probes, Relays, Resistors, Standards, Switches, Thermistors, Thermostats, Transducers, Wire

Local Sales Offices & Reps.

Cal	Palos Verdes Penninsula, J. E. Scott	213-377-9761

NY	Syracuse, Lenard Co.	315-GR 9-9191
Vt	Vergennes, M. Benton	802-877-2656
Wash	Mukilteo, J. Ransom	206-775-5431

CPS INC., DISPLAY GRP., 722 E. Evelyn Ave., Sunnyvale, Cal., 94086, Tel: 408-738-0530, Telex: 357-450; FSC No: 31640; Empl.: 62; Minimum order: $25 ... p. 1•1162,1163

Customer service: J. Gwinner

Free literature available: Beam penetration CRT, Color Monitor Catalog.

Products manufactured: Monitors, Terminals, Data Display (including Alphanumeric & Graphic)

Local Sales Offices & Reps.

Cal	Los Angeles, Basic Systems	213-938-2833
Cal	Sunnyvale, AMASCO	408-733-8690
Fla	Melbourne, REPCOM	305-254-1877
Md	Baltimore, Scientific Devices	301-788-6611
Mass	Burlington, Tekdata	617-273-0198
Minn	Minneapolis, Jaynus	612-884-1700
NJ	Palisades Park, Scientific Devices-East	201-871-3916
Pa	Audubon, Holmes	215-666-0636
Tex	Dallas, Data Aids	214-620-1551
Va	Springfield, Scientific Devices-DC	703-451-6500
Wash	Seattle, Underwood/Jensen	206-575-0123

CPS INC. - POWER SUPPLY GRP., 722 E. Evelyn Ave., Sunnyvale, Cal., 94086, Tel: 408-738-0530, Telex: 357-450; FSC No: 31640; Empl.: 62; Minimum order: $25 ... p. 1•1162,1163

Customer service: J. Gwinner

Free literature available: High Voltage Power Supply Catalog to 50 kv DC.

Products manufactured: Connectors, Converters, Power Supplies, Probes

Local Sales Offices & Reps.

Cal	Los Angeles, Basic Systems	213-938-2833
Cal	Sunnyvale, AMASCO	408-733-8690
Fla	Melbourne, Repcom	305-254-1877
Ill	Northfield, Torkelson Associates	312-446-9085
Ind	Indianapolis, Torkelson Associates	317-244-7867
Md	Baltimore, Scientific Devices-DC	301-788-6611
Mass	Burlington, Tekdata Inc.	617-273-0198
Mich	Center Line, Dietrich	313-754-6450
Minn	Minneapolis, Torkelson Assocs.	612-835-2414
NJ	Palisades Park, Scientific Devices-East	201-871-3916
NY	N. Syracuse, NACO	315-699-2651
Ohio	Cleveland, Dietrich & Assocs.	216-781-1855
Pa	Audubon, Holmes Assocs.	215-666-0636
Pa	Pittsburgh, Dietrich & Assocs.	412-892-2992
Tex	Irving, Space Elctrns.	214-251-2266
Va	Springfield, Scientific Devices-DC	703-451-6500
Wash	Seattle, Underwood/Jensen	206-575-0123

CRAIG SYS. CORP., 360 Merrimack St., Lawrence, Mass., 01842, Tel: 617-688-6961, TWX: 710-342-0765; Empl.: 200

Customer service: R. Noebel

Free literature available: Our literature describes general purpose mobile shelters, transporters and some shelter accessories used to house communication, radar, teletype and other systems requiring mobility.

Products manufactured: Antenna Towers & Supports, Benches, Consoles, Stools, Tables, Cases, Equipment, Instrument, Meter, Cases, Transit, Containers, Frames, Cabinet & Rack, Kits, Shielding, Mounts, Racks, Services, Assembly, Production & Test

Local Sales Offices & Reps.

Cal	Fullerton, Craig Sys. Corp.	714-879-3180
Md	Rockville, W. F. Frank Assoc.	301-340-7717
Minn	St. Paul, Debeck Assoc.	612-690-1557
Pa	York, N. R. Osborne Assoc.	717-755-2114

CRAMER COIL, Box 32, Grafton, Wisc., 53024; Empl.: 35; Minimum order: $25

Customer service: R. Rubinstein 414-377-7040

Free literature available: R.F. Coils, power transformers, balun coils.

Products manufactured: Chokes, Coils Including Assemblies & Forms, Transformers

Local Sales Offices & Reps.

Ala	Huntsville, Component Mktg.	
Colo	Aurora, Robbins & Assoc.	
Ill	Park Ridge, Metcom Assoc.	
Ind	Greenwood, Valentine & Schillinger	
Ind	South Bend, Valentine & Schillinger	
Mass	Brookline, Technology Prods. Group	
Minn	Minneapolis, OEM Sls. Co.	
Neb	Lincoln, Mktg. Assoc.	
NJ	Teaneck, Abbott Gordon	
Pa	Erie, Tuznik Assoc.	
Wash	Seattle, F. Jackson C.	
FOR:	Can., Oakville, Ont., Danowski Sls. Ltd.	

CRAMER DIVISION, Conrac Corporation, Old Saybrook, Conn., 06475, Tel: 203-388-3574, Telex: 966-453; Empl.: 350 ... p. 1•143,943

Customer service: C. R. Gasparini

Products manufactured: Alarms, Monitors, Motors, Tape Recording Accessories, Tape Search Equipment, Tapes, Recording, Magnetic (All Types), Timers

Local Sales Offices & Reps.

Ala	Huntsville, Col-Ins-Co.	205-539-1771
Ariz	Phoenix, Spectrum Assocs.	602-997-6324
Cal	Palo Alto, Held & Mollard	415-965-9321
Cal	Santa Ana, Spectrum Assocs.	714-835-4114
Cal	Santa Fe Springs, Conrac Security Detection	213-945-2673
Colo	Denver, I.W. Strong & Assoc.	303-292-6900
Conn	Rocky Hill, Aid Engrg. Sls. Co.	203-673-3692
Fla	Orlando, Col-Ins-Co.	305-423-7615
Ga	Clarkston, Col-Ins-Co.	404-934-7280
Ill	Arlington Heights, Martec Assocs.	312-956-8090
Ind	Indianapolis, Sukup & Cox	317-253-1215
Md	Rockville, L.G. White & Co.	301-770-6556
Mass	Westboro, Aid Engrg. Sls. Co.	617-890-8181
Mich	Birmingham, J.C. Hofstetter Co.	313-643-7203
Minn	Minneapolis, Jos-Co. Sls. Engrg.	612-835-5858
Mo	St. Louis, H.J. Weisler & Assoc.	314-428-3934
NY	Elmsford, Cramer Div./Conrac Corp.	914-592-5500
NY	Rochester, Upstate Comp. Sls.	716-288-1080
NC	Raleigh, Col-Ins-Co.	919-834-6591
Ohio	Medina, J.C. Hofstetter Co.	216-241-4880
Pa	Broomall, J.C. Whiddett Co.	215-353-6343
Tex	Dallas, Glidden Electro Equip. Co.	214-363-6539
Wash	Mercer Island, J.H. Andersen Assocs.	206-232-0484

CRATEX RUBBERIZED ABRASIVES, 1600 Rollins Rd., Burlingame, Cal., 94010, Tel: 415-697-1600; Empl.: 19

Free literature available: Catalog/price list describing Cratex rubberized abrasive wheels, points, blocks, sticks, and cones for light deburring, smoothing, cleaning, and polishing.

Products manufactured: Abrasive Belts, Compounds, Cords, Powders, etc.

CREST INDUSTRIES, INC., Box 35, Northbrook, Ill., 60062, Tel: 312-272-2440; Empl.: 10; Minimum order: $35

Customer service: P. Taylor

Free literature available: Short form catalog available describing crest prewired power strips and A.C. distribution Panels. Full catalog & distributor or industrial price list available on request.

Products manufactured: Boxes, Junction, Outlets & Wall Plates

Local Sales Offices & Reps.

Ariz	Tempe, J.F. Hurlbut Co.	602-968-5962
Cal	Carson, Bidwell Sls. Assocs.	213-770-0300
Cal	Redwood City, Warren & Hickey Sls. Co.	415-368-3849
Colo	Golden, J.F. Hurlbut Co.	303-279-7138
Fla	St. Petersburg, C.M. Furman Co.	813-898-8864
La	New Orleans, IBL Engrg. Co.	504-895-4793
Md	Baltimore, B. White & Co., Inc.	301-484-5400
Minn	Minneapolis, A.S. Miller & Son	612-866-6677
NY	Buffalo, M. Farber Assocs., Inc.	716-856-3543
NY	Oceanside, Bittan Assocs., Inc.	516-678-6222
NC	Charlotte, C.M. Furman Co.	704-375-2332
Okla	Tulsa, IBL Engrg. Co.	918-936-6305
Tex	Dallas, IBL Engrg. & Sls., Inc.	214-363-2921
Tex	Houston, IBL Engrg. & Sls., Inc.	713-467-5115
Wisc	Milwaukee, W.M. Braun & Assts.	414-332-1040

Advertisment

Crest "Prewired" Power Strips and A. C. Distribution Panels are designed for quality installations featuring all UL approved components. Reduce Internal Wiring in your Rack Cabinet by installing a Crest Prewired Power Strip or Power Panel. Send for your free catalog.

CRESTRONICS INC., 23539 Crest Forest Dr., Box "S", Crestline, Cal., 92325, Tel: 714-338-1722; Empl.: 11

Products manufactured: Converters, Power Supplies

CRM DIV., See Consolidated Refining Co.

CROSS ELECTRONICS INC., 100 Commonwealth Dr., Warrendale, Pa., 15086, Tel: 412-776-1591; Empl.: 35

For info on price: F. C. Stebbins; Application info: T. S. Roman; Customer service: D. Heddaeus; Delivery info: R. Heddaeus

Free literature available: 1 SCR proportional power controllers 2 Temperature controllers 3 Static relays 4 signal conditioners 5 static contactors 6 magnetic amplifiers & reactors 7 systems 8 electronic assemblies 9 electrical assemblies 10 mechanical assemblies 11 wiring harnesses 12 parts & subassemblies

Products manufactured: Amplifiers, Cable Assemblies & Harnesses, Coils Including Assemblies & Forms, Controllers, Programmable, Controls/Control Eqpt., Current Sensors, Isolators, Power Supplies, Reactors, Regulators, Relays, Transformers

Local Sales Offices & Reps.

Ala	Huntsville, Newcomb Assocs.	205-852-0304
Fla	Winterpark, GPI Instrs.	305-831-6215
Md	Bethesda, S & S Assocs.	301-654-1434
Mo	St. Louis, Wm. Adler Assoc.	314-423-7200
NY	N. Syracuse, KLM Assocs.	315-458-6214
NY	New Hartford, KLM Assocs.	315-735-8525
NY	Rochester, KLM Assocs.	716-442-0820
NY	Roslyn Heights, TRAVCO Assoc.	516-621-3223
NC	Research Triangle Park, Newcomb Assocs.	919-467-6248
Pa	King of Prussia, S & S Assocs.	215-265-3450
Tex	Richardson, Concept Sls. Inc.	214-387-1434

CROVEN, LTD., 500 Beech St., Whitby, Ont., Can., Tel: 416-668-3324, TWX: 610-384-2750; QPL No: Multiple; Empl.: 250 ... p. 1•300,301

For info on price: R. A. McCormick; Application info: R. A. McCormick; Customer service: J. Bates; Delivery info: G. Rankine

Free literature available: Quartz, Crystal Catalogue

Products manufactured: Circuit Breakers, Crystal Blanks, Crystals, Filters, Oscillators

Local Sales Offices & Reps.

Cal	San Mateo, Melvin Sls. Co.	415-349-7444
Cal	Sepulveda, R.L. Assocs.	213-892-5386
Cal	Van Nuys, R.L. Assocs.	213-782-7826
Mass	Sherborn, Naton Assoc.	617-986-6417
FOR:	Can., Que., Montreal, Ben Manis Assocs.	514-336-4500

CROWN INTERNATIONAL, Box 1000, Elkhart, Ind., 46514, Tel: 219-294-5571, TWX: 810-294-2160; Empl.: 175 ... p. 1•14,15

Products manufactured: Amplifiers, Analyzers, Controls/Control Eqpt., Dials, Duplicators, Recorders

Local Sales Offices & Reps.

Conn	Woodbridge, Elctrn. Mktg.	203-397-1461
Ga	Atlanta, Fidelicom	404-458-3616
Ill	Chicago, P. Berndt Assocs.	312-283-0713
Md	Gaithersburg, Wright Co.	301-948-5151
Mich	Ferndale, Shalco	313-547-4771
Minn	St. Paul, Skor	612-645-6461
NJ	Parlin, JMR Sls., Inc.	201-727-5335
NY	E. Rochester, RJC Assoc.	716-385-2521
NY	Rochester, Ossmann	315-437-6666
Ohio	Dayton, Ashby Assocs.	513-252-5627

CRYDOM CONTROLS, Int'l. Rectifier, 1521 Grand Ave., El Segundo, Cal., 90245, Tel: 213-322-4987

For info on price: L. Bringle; Application info: J. Weiss; Customer service: L. Bringle; Delivery info: L. Bringle

Free literature available: Crydom photo-isolated solid-state power relays-contains technical info and application data for solid/state relays from 2.5A to 40A and voltages of 120, 240 and 480 V. AC.

Products manufactured: Relays

Local Sales Offices & Reps.

Ala	Birmingham, Com-Trol Corp.	205-823-0897
Ariz	Scottsdale, Williams-Assocs	602-947-4297
Cal	San Diego, Southwest Tech. Sls.	714-565-2295
Cal	Santa Clara, T. Hartman Assoc.	408-247-1252
Cal	Tustin, Morgan Johnson Co.	714-832-7282
Colo	Denver, Williams-Assocs.	303-373-4730
Conn	Ridgefield, W. Johnson Co.	203-438-3351
Fla	Ft. Lauderdale, N. Bredesen	305-566-3289
Kans	Overland Park, Dy-Tronix	816-761-6543

Kans	Wichita, Dy-Tronix	316-943-6221
Md	Rockville, Marktron Inc.	301-762-6210
Md	Timonium, Marktron Inc.	301-252-7111
Mass	Norwood, JMG, Inc.	617-762-5333
Mich	Bloomfield Hills, Roth Ind'l Sls.	313-626-3171
Minn	St. Paul, Repor	612-645-8618
Mo	Hazelwood, Dy-Tronix	314-731-5799
NJ	Ridgewood, Ballou Inc.	201-444-6990
NM	Albuquerque, Williams-Assocs.	505-255-1638
NY	Buffalo, R. W. Mitscher Co.	716-633-7970
NY	New York City, Ballou Inc.	212-964-4640
NC	Raleigh, R. W. Mitscher Co.	919-828-0575
Ohio	Aurora, EMA Inc	216-562-6104
Ohio	Centerville, EMA Inc.	513-433-2800
Okla	Tulsa, W. Pat Fralia Co.	918-663-8707
Ore	Beaverton, Vantage Corp.	503-644-6111
Pa	Bala Cynwyd, J. V. Calhoun Co.	215-839-3000
Pa	Erie, F. McClinton	814-455-9111
Pa	Pittsburgh, F. McClinton	412-561-4803
Pa	Scranton, J. V. Calhoun Co.	717-587-1164
Pa	York, J. V. Calhoun Co.	717-244-4597
Tenn	Shelbyville, R. W. Mitscher Co.	615-684-4544
Tex	Ft. Worth, W. Pat Fralia Co.	817-738-2394
Tex	Houston, W. Pat Fralia Co.	713-772-1572
Va	Charlottesville, Marktron Inc.	804-973-5874
Wash	Bellevue, Vantage Corp.	206-455-3460
WVa	Huntington, F. McClinton	304-736-5161
Wisc	Racine, KMG Sls Co.	414-639-9005

CRYSTAL NETWORK PRODS. CORP., 818 Parade St., Erie, Pa., 16503, Tel: 814-459-2351; Minimum order: $100

For info on price: R. H. Tuznik; Application info: J. T. Tuznik; Customer service: R. K. Tuznik; Delivery info: R. K. Tuznik

Products manufactured: Crystals, Discriminators, Filters, Oscillators

CRYSTAL TECHNOLOGY, 2510 Old Middlefield Way, Mountain View, Cal, 94043, Tel: 415-961-9311; Empl.: 30; Minimum order: $100

Customer service: R. L. Carlson

Free literature available: Growth and fabrication of single crystal oxides, including lithium niobate, lithium tantalate, tellurium dioxide, BSO, BGO, and GGG. Fabrication of transducers and surface acoustic wave delay lines.

Products manufactured: Crystals, Delay Lines, Modulators, All Kinds, Transducers

Local Sales Offices & Reps.

Ill	Chicago, Brooks Engrg. Co.	312-944-1227
Md	Silver Spring, Spectro Sys.	301-949-8261
Mass	Billerica, Drew Associates	617-667-6643
NJ	E Windsor, Cook & Weil, Inc.	609-448-7409
NY	New York, Cook & Weil	212-741-1053

CRYSTEK CRYSTALS
CORPORATION
A Whitehall Company

CRYSTEK CRYSTALS CORP., 1000 Crystal Dr., Ft. Myers, Fla., 33901, Tel: 813-936-2109; Empl.: 2500

For info on price: L. Stacey; Application info: J. Case; Customer service: A. Whidden; Delivery info: L. Stacey

Free literature available: New Quartz Crystal Catalog includes application notes, definitions, specification charts, graphs and ordering information.

Products manufactured: Crystal Blanks, Crystals

Local Sales Offices & Reps.

Ala	Birmingham, H. W. Phillips Co., Inc.	205-655-8415
Ark	Little Rock, Schoonmaker	501-375-2168
Cal	Los Angeles, Crystek Crystals Sls. Office	714-936-8055
Cal	San Francisco, J.E. Stricker Co.	415-342-1425
Colo	Denver, KC Marketeers	303-733-5561
DC	Washington, Sonny Simberkoff Assocs., Inc.	703-525-5898
Fla	Ft. Lauderdale, Sprock Sls., Inc.	305-587-3792
Fla	Sarasota, Sprock Sls.	
Ga	Atlanta, H. W. Phillips Co., Inc.	404-252-0720
Ill	Chicago, Cummings & Foley Sls., Co.	312-725-8110
Ind	Indianapolis, Shamrock Elctrn. Sls.	317-251-5527
Iowa	Des Moines, Kathrinus-Kelly & Co.	515-255-4584
Kans	Kansas City, Kathrinus-Kelly & Co.	913-722-0000
Mass	Boston, Data Memory Assocs.	617-868-3120
Mich	Detroit, RC Merchant & Co.	313-535-6000
Mich	St. Joseph, RC Merchant & Co.	616-983-7378
Minn	Minneapolis, Heimann Co.	612-861-6051
Mo	St. Louis, Kathrinus-Kelly & Co.	314-968-3800
NJ	South Orange, Sonny Simberkoff Assocs., Inc.	201-763-7900
NY	Buffalo, Sonny Simberkoff Assocs., Inc.	716-834-8119
NY	New York City, Sonny Simberkoff Assocs., Inc.	212-943-7023
NC	Burlington, Sonny Simberkoff Assocs., Inc.	919-584-6450
Ohio	Akron, Shamrock Elctrn. Sls.	216-666-1400
Ohio	Dayton, Shamrock Elctrn. Sls.	513-298-3052
Okla	Tulsa, Schoonmaker Co.	918-936-1423
Ore	Portland, EBCO	503-245-2283
Pa	Philadelphia, Sonny Simberkoff Assocs., Inc.	215-455-9579
Pa	Pittsburgh, Shamrock Elctrns. Sls.	
Tex	Dallas, Schoonmaker Co.	214-357-8481
Tex	Houston, Schoonmaker Co.	713-926-9510
Va	Arlington, Sonny Simberkoff Assocs., Inc.	703-525-5898
Wash	Seattle, EBCO	206-284-1121
FOR:	Can., Toronto Ont., Fanon Elctrns.	416-363-5011

CTS CORP., 905 N. West Blvd., Elkart, Ind., 46514, Tel: 219-293-7511, TWX: 810-294-2167; Empl.: 6100

Free literature available: New 12-page Short Form Catalog for Expanding CTS Industrial Distributor Product Line. The handsome two-color, 12-page catalog pictures and describes capabilities of: 53 types of CTS cermet, carbon, and wirewound trimmers and potentiometers.
36 choices of CTS 1-1/16" diameter Rotary Selector Switches and an additional 20 miniature 13/16" diameter Selector Switches. 101 values of six or 8 lead single-in-line resistor networks. 126 values of CTS 14 or 16 lead DIP resistor networks.
7 new DIP programmable switches. Distributor quantity prices are included for each product line. Write: J.C. Wells, Distributor Sales Manager, CTS Corporation, 905 North West Boulevard, Elkhart, Indiana 46514. Phone: (219) 293-7511.

Products manufactured: Circuits, Hybrid, Thick Film, Controllers, Programmable, Controls/Control Eqpt., Controls, Fader, Converters, Crystal Blanks, Crystals, Discriminators, Filters, Hybrid Voltage Regulators, Networks, Oscillators, Ovens, Potentiometers, Power Drivers, Hybrid (High Current, High Voltage), Resistors, Rheostats, Speaker Systems, Speakers, Standards, Switches

Local Sales Offices & Reps.

Ala	Huntsville, Interep Assocs.	205-881-3677
Ariz	Phoenix, Hecht, Henschen & Assocs.	602-275-4411
Cal	Burlingame, Logan & Assocs.	415-697-6100
Cal	South Pasadena, CTS Corp.	213-682-1137
Colo	Denver, Zeus, Inc.	303-770-4400
Conn	North Haven, Comp Rep Assocs.	203-239-9762
Fla	Cocoa, Orbe, Inc.	305-452-9568
Fla	Ft. Lauderdale, Orbe, Inc.	305-564-8571
Fla	St. Petersburg, Orbe, Inc.	813-894-0687
Ga	Atlanta, Interep Assocs.	404-394-7756
Ind	Elkhart, CTS Corp.	219-293-7511
Iowa	Marion, Thomas & Modrcin Assocs.	319-377-6261
Kans	Shawnee Mission Thomas & Modrcin Assocs.	913-432-2131
Md	Baltimore, Coulbourn DeGreif, Inc.	301-247-4646
Mass	Needham, Comp Rep Assocs.	617-444-2484
Mich	Grand Rapids, J.L. Montgomery, Inc.	616-774-9308
Mich	Southfield, J.L. Montgomery, Inc.	313-358-2616
Minn	Minneapolis, R.W. Marshall Co.	612-929-0457
Mo	Hazelwood, Thomas & Modrcin Assocs.	314-838-6448
NM	Albuquerque, Zeus, Inc.	505-256-9831
NY	Jamaica, S-J Sales Assocs.	212-291-3232
NY	Syracuse, Nycom, Inc.	315-437-8343
NC	Raleigh, Component Sls.	919-782-8433
Ohio	Cincinnati, Baehr, Greenleaf & Assocs.	513-891-3827
Ohio	Cleveland, Baehr, Greenleaf & Assocs.	216-221-9030
Ohio	Upper Arlington, Baehr, Greenleaf & Assocs.	614-486-4046
Okla	Oklahoma City, Parvin Sls. Co.	405-942-4581
Pa	Fort Washington, G.C.M. Inc.	215-646-7535
Pa	Pittsburgh, Covert & Newman Co.	412-563-0303
Tex	Addison, Parvin Sls. Co.	214-239-9148
Tex	Houston, Parvin Sls. Co.	713-721-1054
Utah	Salt Lake City, Zeus, Inc.	801-486-2317
Wash	Bellevue, SD-R2 Prods. & Sls.	206-747-9424
EXP:	Elkhart, Ind., CTS Corp.	219-293-7511
FOR:	Can., Streetsville, Ont., CTS of Canada, Ltd.	416-826-1141

CTS OF BERNE, 406 Parr Rd., Berne, Ind., 46711, Tel: 219-589-3111, TWX: 810-589-1580 ....p. 2•1421-1426

Customer service: J. Long

Products manufactured: Resistors
Refer to CTS Corp. for sales office information

CTS KNIGHTS, INC., 400 Reimann Ave., Sandwich, Ill., 60548, Tel: 815-786-8411 ....p. 1•303-311

Customer service: C. Mooibroek

Products manufactured: Crystal Blanks, Crystals, Discriminators, Filters, Oscillators, Ovens
Refer to CTS Corp. for sales office information

CTS MICROELECTRONICS, INC., 1201 Cumberland Ave., W. Lafayette, Ind., 47906, Tel: 317-563-2565, TWX: 810-342-1882 ....p. 1•888; p. 2•1622

Customer service: F. Leingang

Products manufactured: Circuits, Hybrid, Thick Film, Potentiometers, Power Drivers, Hybrid (High Current, High Voltage)
Refer to CTS Corp. for sales office information

CTS OF PADUCAH, INC., 1565 N. 8th St., Paducah, Ky., 42001, Tel: 502-442-1641, TWX: 510-546-1152; Empl.: 1000; Minimum order: $100

Customer service: G. Draffen

Free literature available: Catalog 50M-3-73 complete listing of all loudspeakers and do-it-yourself systems (complete with crossover networks) available for immediate shipment from CTS stock.

Products manufactured: Speaker Systems, Speakers

Local Sales Offices & Reps.

Ark	El Dorado, D. Ballew Sls.	501-863-8325
Cal	San Francisco, Meyer, Ross & Fleming	415-285-8880
Cal	Van Nuys, Markman Co.	213-787-6151
Colo	Denver, B & B Elctrn. Prods.	303-934-2123
Fla	Maitland, Hutto, Hawkins, Peregoy	305-831-2474
Ga	East Point, P. Hayden & Assocs.	404-766-0261
Ill	Oak Park, G. Petitt Co.	312-265-0342
Ky	Paducah, CTS of Paducah	502-442-1641
Md	Silver Springs, Mid Atlantic Sls.	301-593-7749
Mass	Boston, Anderson Sls. Assocs.	617-227-2980
Mich	Plymouth, J. Malcolm Flora	313-453-4296
Minn	Minneapolis, Heimann Co.	612-861-6051
Mo	St. Louis, Lowell-Kangas & Assocs.	314-821-4050
NJ	Caldwell, A. Cerf & Co.	201-226-2263
NY	Syracuse, W. Tauber Co.	315-446-7094
Ohio	Medina, T. Grant Assocs.	216-725-6528
Pa	Enon Valley, Nebco Assocs.	216-457-2333
Tex	Dallas, Collins Co.	214-341-7866
Wash	Bellevue, SDR&S2 Prods. & Sls.	206-747-9424
EXP:	Summit, N.J., N. Christensen Int'l. Mktg.	201-273-3833

CUBIC CORP., 9233 Balboa Ave., San Diego, Cal., 92123, Tel: 714-277-6780, TWX: 714-279-0267; Empl.: 2100

Customer service: T. Grady

Products manufactured: Antenna Feed Systems, Antennas, Boards, Programming, Comm. Systems, Data Acquisition & Reduction Systems, Interferometer Systems, Meters, Receivers, Simulators, Tracking Systems, Translators, Data, Transmission Systems, Data, Transmitters

CUNNINGHAM, Sub. Gleason Works, 10 Carriage St., Honeoye Falls, N.Y., 14472, Tel: 716-624-2000, TWX: 510-254-4202; Empl.: 108 ....p. 1•640,641,2012,2013

Customer service: G. Appleton

Free literature available: 8 page reprint for switching products line. Product wall chart for CCTV products line.

Products manufactured: Matrices, Computer, Monitors, Multiplexers, Scanners, Switches, Television Systems & Equipment Closed-Circuit

Local Sales Offices & Reps.

Cal	Pasadena, Luscombe Engrg. Pasadena	213-684-2000
Cal	San Mateo, Luscombe Engrg. San Francisco	415-342-7057
Colo	Parker, Technology Mktg. Assocs.	303-841-3435
Conn	Hamden, Instr. Conslts.	203-288-5246
Ill	Des Plaines, Cozzens & Cudahy	312-298-3600
Ind	Indianapolis, Cozzens & Cudahy	317-244-2456
Md	Bethesda, Bartlett	301-656-3061
Mass	Waban, Instrument Conslts., Inc.	617-969-9881
Minn	Minneapolis, Cozzens & Cudahy	612-884-4336

Mo	St. Louis, Cozzens & Cudahy	314-423-1234
NM	Albuquerque, Tech. Mktg. Assocs.	505-298-4321
NY	White Plains, Bartlett	914-949-6476
Pa	Wayne, Bartlett	215-688-7325
Tex	Houston, Scien. Sls.	713-666-5318
Tex	Richardson, Scien. Sls.	214-231-6541
Wash	Seattle, Delcom Sls. Co.	206-248-0090

CURTIS INDUSTRIES INC., 8000 West Tower Ave., Milwaukee, Wisc., 53223, Tel: 414-354-1500; Empl.: 160; Minimum order: $50 .... p. 2•666,667

For info on price: M. Schuman; Application info: R. Van der Elsen; Customer service: M. Schuman; Delivery info: M. Schuman

Free literature available: Terminal Block Catalog - Broad Range of Terminal Blocks for High Current, Control, and Electronic Applications. Relay Socket Catalog - Complete Line Covering Octul and Rectangular Base Relays.

Liquid Level Control Catalog - Complete Line Covering Sensitivity Ranges and Cost Ranges.

Products manufactured: Controls/Control Eqpt., Indicators, Sockets, Terminal Blocks, Boards & Strips, Timers

Local Sales Offices & Reps.

Ariz	Scottsdale, DeAngelo, Rothman, Cheever	602-948-2240
Cal	Los Altos, Ewing-Foley	415-941-4525
Cal	Santa Fe Springs, Sls. Engineers Ltd.	213-921-4337
Colo	Boulder, Comp. Prods. Sls.	303-444-2730
Fla	Lakeland, AA Electric Div. of AEC	813-682-6181
Ga	Atlanta, Holman-Lobsinger Co.	404-256-9120
Haw	Honolulu, Dougherty Entprs.	
Ill	Downers Grove, Richmar Elctrns. Corp.	312-968-0118
Ind	Indianapolis, Val-Skol Sls.	317-926-5063
La	New Orleans, W. Case & Assocs.	504-835-7713
Md	Woodbine, Naudain Assocs.	301-252-5378
Mass	Sturbridge, Electrical Apparatus Co.	617-347-7447
Mich	Farmington Hills, Electro-Matic	313-478-1182
Minn	St. Paul, Kenco Co.	612-645-7717
Mo	Hazelwood, Dy-Tronix	314-731-5799
Mo	Kansas City, Dy-Tronix	816-761-6543
NJ	Mount Laurel, Naudain Assocs.	609-235-1801
NY	Buffalo, Ossmann Comp. Sls.	716-832-4271
NY	Kingston, Ossmann Comp. Sls.	914-338-5505
NY	Rochester, Ossmann Comp. Sls.	716-442-3290
NY	Valley Cottage, LRC Assocs.	914-634-7973
NC	Winston-Salem, L.G. White & Co.	919-725-3612
Ohio	Cincinnati, Val-Skol Sls.	513-563-6790
Ohio	Cleveland, Val-Skol Sls.	216-526-2156
Ohio	Columbus, Val-Skol Sls.	614-291-4123
Okla	Tulsa, T.J. Ray Co.	918-627-1515
Pa	Philadelphia, Naudain Assocs.	215-564-3194
Pa	Pittsburgh, R.F. Clark Co.	412-242-9500
Tenn	Memphis, R.D. Thomas Co.	901-683-0341
Tex	Richardson, R.F. Kimball Co.	214-231-3447
Wash	Seattle, C.B. Parsons & Co.	206-762-7373
Wisc	Oak Creek, Richmar Elctrns.	414-475-0141
FOR:	Willowdale, Ont., Can., A.C. Simmonds & Sons, Ltd.	416-491-1010

Local Distributors

NY	Scarsdale, Logicomp Elctrns., Inc., 52 Lafayette Rd.	914-723-3334

CURTIS INSTRS., INC., 200 Kisco Ave., Mt. Kisco, N.Y., 10549, Tel: 914-666-2971, TWX: 710-571-2163; Empl.: 50; Minimum order: $40 .... p. 1•642,643

For info on price: R. MacDonald, 914-666-2971; Application info: E. Sands, 914-666-2971; Customer service: R. MacDonald, 914-666-2971

Free literature available: 2 booklets describing range of analog timers and counter and comparing them with digital types. 2 booklets describing Curtis line of integrating instruments featuring the unique infinite memory integrator.

Products manufactured: Counters, Indicators, Integrators, Electronic, Meters, Testers, Timers

Local Sales Offices & Reps.

Cal	Milbrae, Polach & Bensinger, Inc.	415-697-2525
Cal	Seal Beach, Texel Engrg.	213-596-9411
Colo	Boulder, R.G. Entprs.	303-447-9211
Ill	Elmhurst, Schuten Assocs.	312-833-0980
Ind	Ft. Wayne, McDonald Sls. Co.	219-743-4611
Mass	Brookline, Harman Assocs.	617-232-6687
Mo	St. Louis, Fixman Engrg.	314-725-5219
NM	Albuquerque, Goyne, Assocs. Inc.	505-265-6794
NY	Syracuse, Rep. Tech., Inc.	315-437-2845
NC	Winston-Salem, Radco Engrg.	919-722-9671
Pa	Media, W. Reeves Assocs., Inc.	215-LO 6-6709
Va	Arlington, Gans Fryling, Inc.	703-527-3262

Wash	Seattle, Blum & Assocs.	206-782-1600
Wisc	Milwaukee, Star Engrg. Co.	414-645-3680

CUSH CRAFT CORP., 621 Hayward St., Manchester, N.H., 03103, Tel: 627-7877; Empl.: 30; Minimum order: $50

For info on price: R. Cushman; Application info: R. Cushman; Customer service: J. C. Arsenault; Delivery info: J. C. Arsenault

Products manufactured: Antenna Feed Systems, Antennas, Arresters, Electrical Surge, Lightning

Local Sales Offices & Reps.

Alas	Anchorage, H. J. Lang & Assoc.	907-279-5741
Cal	Los Angeles, Wallace & Wallace	213-744-0401
Cal	San Francisco, Feathenstone Sls. Co.	415-467-3133
Colo	Aurora, AES Sls. Co.	303-366-0208
Fla	Hollywood, E. Healy	305-961-6640
Ga	Jonesboro, E. Clanton	404-471-6297
Kans	Shawnee Mission, Lowell Kangas & Assoc.	913-631-3515
Mo	St. Louis, Lowell Kangas-Assoc.	314-821-4050
NY	Farmingdale, Chester Drexler Co.	516-249-8206
NC	Kernersville, M. F. Motsinger Jr.	919-993-3993
Ohio	N. Jackson, Ohio Assocs.	216-538-3215
Ore	Portland, Jud LeBrun Co.	503-244-6805
Pa	Philadelphia, Herman Lewis Co.	215-567-5020
Tenn	Memphis, A. F. Howard	901-682-2281
Tex	Dallas, Collins Co.	214-341-7866
EXP:	Chicago, E. D. Magnus Assoc.	312-334-1503

CUSTOM CABLE CO., 3325 Royal Ave., Oceanside, N.Y., 11572, Tel: 516-536-0300; Empl.: 3

Customer service: J. Michelman

Products manufactured: Braid, Cable, Cable, Wire

CUSTOM COIL & TRANSFORMER CO., Box 2624, Zanesville, Ohio, 43701, Tel: 614-452-6973; Empl.: 75

For info on price: D. Young; Application info: D. Young; Customer service: D. Young; Delivery info: R. Tilton

Products manufactured: Chokes, Coils Including Assemblies & Forms, Transformers

CUSTOM CONNECTOR CORP., 1738 E. 30th St., Cleveland, Ohio, 44114, Tel: 216-241-1679; Empl.: 36; Minimum order: $25

For info on price: D. G. Harper; Application info: J. R. Crosby; Customer service: D. Jones; Delivery info: D. Jones

Free literature available: Relay Socket Catalog

Products manufactured: Sockets

Local Sales Offices & Reps.

Cal	Downey, Sierra-Pacific Engrg, Inc.	213-928-1815
Colo	Aurora, Comp. Specialties	303-341-0160
Ill	Chicago, Control Sls.	312-298-5595
Mass	Norwell, Bordewieck Engrg. Sls. Co.	617-659-4915
Mo	St. Louis, Control Design	314-426-3150
NJ	Edison, Burgoyne Elec. Sls.	201-225-0450
NJ	Mt. Laurel, J. G. Speck Assoc.	609-234-4957
NY	Baldwinsville, Scibetta Reps.	315-622-3993
NC	Charlotte, J. Rudisill Assoc.	704-377-6901
Pa	New Kennsington, J. G. Speck Assoc.	609-234-4957
Tex	Dallas, Carey & Assoc.	214-363-7813
Tex	Houston, Carey & Assoc.	713-460-1111
Wisc	Milwaukee, Control Sls.	414-354-6266

CUSTOM ELCTRNS., Browne St., Oneonta, N.Y., 13820, Tel: 607-432-3880, TWX: 510-241-8292; Empl.: 60 p. 2•102,103

For info on price: D. Hathaway; Application info: J. Ahearn; Customer service: S. Vance; Delivery info: T. Pizza

Free literature available: Company Brochure, Technitip Data Sheets-CMR, CER, CEM Type units & mica data

Products manufactured: Capacitors, Fixed, Networks

Local Sales Offices & Reps.

Cal	Los Angeles, M.A. Stolaroff Co.	213-295-7781
Cal	Santa Clara, Richards Ass.	408-246-5860
Ill	Chicago, Rozner Sales	312-283-0022
Mass	Stow, Musello Assocs.	617-369-5900
Minn	Minneapolis, Revere Assocs.	617-781-7700
Mo	Kansas City, K & M Sls. & Assocs.	
NY	New York, Martech Assocs.	516-627-1151
Tex	Dallas, Hillman Entprs.	214-827-4790
Wash	Seattle, Underwood Inc.	206-243-2133

CUSTOM POWER, INC., 740 W. Collins Ave., Orange, Cal., 92667, Tel: 714-639-2390; Empl.: 45; Minimum order: $25

For info on price: R. Williams; Application info: T. Mehl; Customer service: A. M. Parker; Delivery info: A. M. Parker

Free literature available: Custom Power Supplies; General Information, Pictures Units previously manufactured. Custom OEM/Standards; shows outline drawings, general specifications, pricing. Transformers; states we build custom transformers. Standard Off the shelf supplies; data sheet with pricing.

Products manufactured: Power Supplies, Transformers

CUSTOM SCIENTIFIC INSTRS., 13 Wing Dr., Box A, Whippany, N.J., 07981, Tel: 201-538-8500; Empl.: 25; Minimum order: $25

Customer service: H. J. Bultman Jr.

Free literature available: Catalog or individual brochures of instruments.

Products manufactured: Chamber, Environmental Test, Testers

CUTLER-HAMMER, INC., 4201 N. 27th St., Milwaukee, Wisc., 53216, Tel: 414-442-7800, TWX: 910-262-3089

Free literature available: Order Log: A complete catalog of Commercial and Military Switches and Relays. Industrial Control Catalog: A complete catalog of motor starters, relays, timers and accessory devices.

Products manufactured: Arresters, Electrical Surge, Lightning, Brakes, Bus Bars & Systems, Circuit Breakers, Clutches, Controls/Control Eqpt., Drivers, Solenoid, Lights, Panels, Relays, Switchboards, Switches, Timers

Local Sales Offices & Reps.

Ala	Birmingham	205-871-1166
Ala	Mobile	205-471-5852
Ariz	Phoenix	602-957-1430
Ark	Little Rock	501-375-8355
Cal	Anaheim	714-776-1910
Cal	Concord	415-682-8800
Cal	Menlo Park	415-854-1005
Cal	San Diego	714-298-5432
Colo	Colorado Springs	303-576-1453
Colo	Denver	303-934-5408
Conn	Hartford	203-563-0104
Fla	Jacksonville	904-725-2845
Fla	Tampa	813-839-5493
Ga	Atlanta	404-939-3023
Haw	Honolulu	808-531-0596
Ill	Broadview	312-379-7565
Ill	Peoria	309-685-4031
Ill	Rockford	815-398-6585
Ind	Indianapolis	317-546-4096
Ind	South Bend	219-256-1591
Iowa	Ankeny	515-964-0258
Iowa	Davenport	319-323-8057
Kans	Mission	913-236-6313
Kans	Wichita	316-263-5216
Ky	Louisville	502-458-2639
La	New Orleans	504-366-1616
La	Shreveport	318-869-3194
Md	Rockville	301-881-8450
Md	Towson	301-825-6041
Mass	Newton	617-244-7511
Mass	Worcester	616-853-5824
Mich	Bridgeport	517-777-0880
Mich	Grand Rapids	616-243-0152
Mich	Lansing	517-482-2553
Mich	Southfield	313-444-8700
Minn	Minneapolis	612-831-3560
Mo	Joplin	417-623-6007
Mo	St. Louis	314-429-7711
Neb	Omaha	402-391-5040
NH	Dover	603-742-1687
NJ	Trenton	215-878-0820
NJ	Union	201-687-4433
NM	Albuquerque	505-266-7955
NY	Melville	516-595-4424
NY	New York	212-687-0707
NY	Rochester	716-271-5460
NY	Syracuse	315-437-7201
NC	Charlotte	704-523-3056
NC	Greensboro	919-272-4567
Ohio	Cincinnati	513-825-5252
Ohio	Dayton	513-293-2117
Okla	Oklahoma City	405-848-4807
Okla	Tulsa	918-627-3312
Ore	Eugene	502-342-8261
Pa	Pittsburgh	412-922-2707
Pa	Wayne	215-878-0820
RI	E. Providence	401-434-8555
SC	Columbia	803-772-6531
SC	Greenville	803-232-4639
Tenn	Memphis	901-458-2631
Tenn	Nashville	615-292-5539

Tex	Dallas	214-631-3731
Tex	Houston	713-526-1205
Utah	Salt Lake City	801-487-1338
Va	Norfolk	703-499-0555
Va	Richmond	804-353-4413
Wash	Seattle	206-747-5560
Wash	Spokane	509-326-1610
WVa	Charleston	304-343-4141
Wisc	Milwaukee	414-354-6050

CUTLER-HAMMER SHALLCROSS, Preston St., Selma, N.C., 27576, Tel: 919-965-2341, TWX: 510-920-0740; FSC No: 54294; QPL No: 39007; Empl.: 477; Minimum order: $50

For info on price: J. E. Russell; Application info: C. M. Huber; Customer service: C. A. Johnson; Delivery info: C. A. Johnson

Free literature available: Stockister Stock List - Power wirewound resistors per Mil-R-39007 (RWR 80s, 81s, & 89S) stocked (1,000 ohmic values) in packages of 10 for fast delivery through Authorized Distributors.

Products manufactured: Bridges, Decade Boxes, Meters, Networks, Probes, Resistors, Switches, Testers

Local Sales Offices & Reps.

Ariz	Phoenix, G. R. McKnight Co.	415-325-2844
Cal	Hawthorne, WCV Co.	213-772-4479
Cal	San Carlos, Winco Sls.	415-365-6082
Colo	Denver, Camel Elctrns.	303-757-6192
Fla	Oviedo, Conley Assocs.	305-365-3284
Ill	Chicago, Berndt Assocs.	312-283-0713
Kans	Olathe, T.R.I.	913-782-1177
Md	Bethesda, Warren Mount Co.	301-657-9312
Mass	Allston, Vector Sls., Inc.	617-787-2790
Mich	Farmington Hills, H. Lowell Co.	313-581-7474
NY	Plainview, ERA, Inc.	516-822-9890
NY	Rochester, Ontec	716-464-8636
NC	Smithfield, Byrd & Barbour Sls.	919-934-8136
Ohio	Cincinnati, A.C. Wahl & Assocs.	513-821-3270
Tenn	Bristol, Remco Corp.	615-968-4195
Tex	Richardson, Zonk Engrg. Co.	214-238-7651
Wash	Seattle, Underwood & Underwood	206-243-2133

Local Distributors

Cal	Carson, Hi-Rel, 20507 S. Belshaw Ave.	213-537-6500
Cal	Hawthorne, Westec, 14125 Inglewood Ave.	213-772-4479
Cal	Sunnyvale, Diplomat/Westland, 1118 Elko Dr.	408-734-1900
Fla	Clearwater, Diplomat/Southland, 1771 N. Hercules Ave.	813-443-4514
Md	Bethesda, Wire Supply, 4924 St. Elmo Ave.	301-657-9333
Minn	Minneapolis, Diplomat/Electro Com, 3816 Chandler Dr.	612-788-8601
Mo	St. Louis, Diplomat/St. Louis, 2725 Mercantile Dr.	314-645-8550
NJ	Haddonfield, Mid-Atlantic, 140 Haddon Ave.	609-428-8288
NY	Farmingdale, Command Elctrns., 114 Allen Blvd.	516-293-1212
NY	Plainview, ACI, 28 South Mall	516-293-6630
NY	Vestal, Harvey Federal, E. Vestal Pkwy.	607-748-8211
Ohio	Dayton, Diplomat/Northland, 2452 Stanley Ave.	513-228-1080

CVC PRODUCTS, INC., 525 Lee Rd., Box 1886, Rochester, N.Y., 14603, Tel: 716-458-2550, Telex: 97-8269; Empl.: 160; Minimum order: $30

For info on price: E. Chamberlain; Application info: R. Weeks; Customer service: G. Sadler; Delivery info: E. Chamberlain

Free literature available: Gauge Control Catalog, Diffusion Pump Catalog, High Vacuum Distillation Catalog, Pump Fluid Catalog.

Products manufactured: Analyzers, Chamber, Environmental Test, Controllers, Programmable, Controls/Control Eqpt., Deposition Equipment, Vacuum & Accessories, Evaporation Equipment, Electron Beam, Furnaces, Gages, Lubricants, Microcircuit Production Equip., Power Supplies, Pumps, Vacuum, Services, Assembly, Production & Test, Testers, Valves, Vacuum

Local Sales Offices & Reps.

Cal	Hayward	415-785-4440
Cal	Van Nuys	213-787-6001
Ga	Atlanta	404-233-1171
Ill	Mt. Prospect	312-394-0840
Mass	Wellesley	617-235-8273
Mich	Southfield	313-352-6367
NJ	Union	201-376-4900
Ohio	Cincinnati	513-871-6558
Tex	Richardson	214-235-2378
FOR:	Can., St. Laurent, Montreal, Canadian Vacuum Equip. Co. Ltd.	514-332-1025

CW INDUSTRIES, 550 Davisville Rd., Warminster, Pa., 18974, Tel: 215-355-7080, TWX: 510-667-1875; Empl.: 500 .... p. 1•1967; p. 2•656

Customer service: H. Cohen

Products manufactured: Connectors, Potentiometers, Resistors, Switches

Local Sales Offices & Reps.

Cal	Redwood City, W. Hickey Sls.	415-368-3849
Cal	Van Nuys, Shephard Comps.	213-787-4610
Colo	Denver, L.G. Moss	303-985-9815
Colo	Greeley, G. Moss Elctrns.	303-353-1452
Ill	Chicago, G. Mcl Cole	312-774-3535
Ind	Indpls., Southern Sls.	317-257-7575
Md	Pikesville, J. Nichols	301-484-6376
Mass	Needham, A & M Elctrn. Reps.	617-444-8170
Mich	Detroit, Nicon Assocs.	313-341-7688
Minn	Minneapolis, E. Melius	612-854-4270
Miss	Meridian, Herron Assoc.	601-483-9306
Mo	St. Louis, E. Hill	314-621-1818
NJ	Oaklyn, A. Wetterhahn	609-858-3003
NM	Albuquerque, Staley Co.	505-294-2660
NY	Elmont, F.E. Schmitt	516-437-8150
NY	Hempstead, Kahgan Sls. Corp.	516-538-2300
NY	Syracuse, W.A. Franklin Sls. Corp.	315-474-2954
NY	Whitesboro, H. Lessman	315-736-5460
Ohio	Cincinnati, H. Behrends	513-351-4441
Ohio	Rocky River, G. Herrick	216-333-0333
Tex	Dallas, Vista Assocs.	214-235-4547
Va	Chesapeake, F.B.D. Sls.	703-484-3162
Wash	Seattle, Carlyle Tech.	206-622-4288
EXP:	N.Y., N.Y., Roburn Agencies	513-294-1648
FOR:	Can., Etobicoke, Ont., C. Pipe	416-622-3403

CYBEREX, INC., 7171 Industrial Park Blvd., Mentor, Ohio, 44060, Tel: 216-946-1783, Telex: 980644; Empl.: 60

Products manufactured: Chargers, Battery, Controls/Control Eqpt., Converters, Inverters, Power Supplies, Regulators, Transformers

Local Sales Offices & Reps.

Ala	Birmingham, Crim Sls. & Engrg. Co.	205-871-4084
Alas	Anchorage, J.P. Bagoy & Assocs.	907-274-8531
Cal	Fullerton, Western Automation/Power Sys.	714-879-0440
Cal	San Francisco, Artwel Elec., Inc.	415-467-1880
Colo	Denver, Electrical Agencies Co.	303-623-8246
Conn	Bolton, Metronics, Inc.	203-643-5358
Conn	Wilton, J.H. Burnett	203-762-8862
Fla	Brandon, J. Meeks & Assocs.	813-689-6137
Fla	Miami, A.C. Chaney & Assocs.	305-754-8857
Ga	Lilburn, R.W. Dollar	404-469-6861
Haw	Honolulu, Atlas Elec. Co.	808-571-906
Ill	Chicago, Gannon Elec.	312-774-2884
Ill	Chicago, W. Lamont Assocs.	312-777-8575
Ind	Indianapolis, R.M. Price	317-255-0665
Kans	Lenexa, Matney & Co.	913-888-6900
La	Metairie, General Power & Control	504-834-1345
Md	Pikesville, A.D. Wilson Assocs.	301-252-2231
Mass	Framingham, Total Power Corp.	617-237-2024
Mich	Southfield, Engel-Klaes Co.	313-355-1610
Minn	Minneapolis, A.M. Johnson Co.	612-927-8741
Mo	St. Louis, Karraker Co.	314-231-3666
Neb	Omaha, Electric Equip. Sls. Co.	402-556-4198
NM	Albuquerque, Bowden Engrg. & Sls.	505-268-7676
NY	Buffalo, Robinson Assocs.	716-886-7350
NY	Latham, Robinson Assocs.	518-785-5844
NY	New York City, NEPA, Inc.	212-867-0340
NY	Rochester, Robinson Assocs.	716-342-3130
NY	Syracuse, Robinson Assocs.	315-478-0241
NY	White Plaines, Shea Assocs.	914-949-2366
NC	Charlotte, Motion Technology, Inc.	704-525-9055
NC	Greensboro, R.W. Chapman & Co.	919-273-1809
NC	Raleigh, R.W. Chapman & Co.	919-782-2624
Ohio	Chagrin Falls, Drivex Corp.	216-247-6701
Ohio	Cincinnati, Alexander Equip. Co.	513-221-7520
Ohio	Cleveland, Collart Co.	216-333-5550
Ohio	Wadsworth, Ohio Industrial	216-334-2518
Okla	Tulsa, H. Furtney Co.	918-747-6490
Ore	Gresham, Artwel Electric/Structural Substations	503-665-5141
Pa	Concordville, Harris & Kenworthey, Inc.	215-459-5532
Pa	Philadelphia, Technicraft Co.	215-483-4700
Pa	Pittsburgh, Waggoner-Ver Hill Assocs.	412-241-5202
SC	Greenville, R.W. Chapman & Co.	803-232-5391
SC	W. Columbia, R.W. Chapman & Co.	803-796-9795
Tenn	Concord, R.W. Chapman & Co.	615-966-6120
Tex	Dallas, Carey & Assocs.	214-363-7813
Tex	Houston, Carey & Assocs.	713-460-1111
Va	Falls Church, Negley Assocs.	703-560-7920
WVa	Charleston, McJunkin Corp.	304-348-5211
Wisc	Cedarburg, W. Osbon Assocs.	414-377-2400

CYCLE-DYNE, INC., Sub. Axel Elctrns., Inc., 134-20 Jamaica Ave., Jamaica, N.Y., 11418, Tel: 212-AX 1-3907, TWX: 710-582-2618; Empl.: 50; Minimum order: $15

For info on price: A. H. Fisher; Application info: N. Gagliardi; Customer service: D. Drechsel; Delivery info: W. McCook

Free literature available: Induction and Dielectric Heating Equipment, accessories, heat exchangers, work coils, fixtures, spare parts and service in the field.

Products manufactured: Converters, Dielectric Heating Equipment, Generators, Heaters & Heating Elements, Machines/Machinery, Production, Soldering Equipment

CYCLO-TRONICS, INC., 3858 N. Cicero Ave., Chicago, Ill., 60641, Tel: 312-282-6141; Empl.: 10

Customer service: Dave Goldware

Products manufactured: Machines/Machinery, Production

Local Sales Offices & Reps.

EXP:	Burlington, Ont., Can., Arbell Equip. Ltd.	416-632-9494

CYCON CORP., 1080 E. Duane Ave., Sunnyvale, Cal., 94086, Tel: 408-732-8311, TWX: 910-339-9216; Empl.: 40

For info on price: D. Armanino; Application info: C. Cump; Customer service: D. Armanino; Delivery info: D. Armanino

Free literature available: Our literature contains specifications, pin outs, operational characteristics, and applications data for proprietary & second source A/D and D/A Converters.

Products manufactured: Amplifiers, Converters, Multiplexers, Multipliers

Local Sales Offices & Reps.

Ala	Huntsville, South Central Mkt.	205-852-4600
Ariz	Tempe, J. F. Hurlbut & Co.	602-968-5962
Cal	Los Angeles, Basic Sys. Co.	213-938-2833
Cal	San Carlos, Electronic Engrg. Assocs.	415-593-2189
Colo	Golden, J. F. Hurlbut & Co.	303-279-7138
Conn	Hamden, Instrument Consultants, Inc.	203-288-5246
Fla	Orlando, Truex Assocs.	305-859-2160
Ill	Des Plaines, Coombs Assocs.	312-298-4830
Mass	Waban, Instrument Consultants, Inc.	617-969-9881
Minn	Minneapolis, Arjay Sls.	612-925-1833
Mo	St. Louis, Beneke & McCaul	314-567-3657
NY	Syracuse, T Elctrns.	315-463-8592
Pa	Abington, Bach Stewart Assocs.	215-885-1550
Tex	Dallas, McCoy Assocs.	214-350-9931
Tex	Houston, Carter Assocs.	713-644-1307
Wash	Seattle, R. Drake & Assocs.	206-763-2755
Wisc	Greendale, Coombs Assocs.	414-421-2300

D-CEMCO, INC., 3200 N. San Fernando Blvd., Burbank, Calif., 91504, Tel: 213-849-6341; Empl.: 16; Minimum order: $20

For info on price: G. Vogel; Application info: E. L. Deatrick; Customer service: G. Vogel; Delivery info: D. Vogel

Products manufactured: Contacts, Electrical, Frames, Cabinet & Rack, Guides, Circuit Board, Handles For Cabinets, Circuit Boards, Racks, etc., Kits, Breadboarding (For Engineers), Pads, Transistor Mounting, Spacers, Terminal Blocks, Boards & Strips, Terminals

D & L SALES CO. INC., 296 Preakness Ave., Paterson, N.J., 07502, Tel: 201-684-8223, 684-8224; Empl.: 10; Minimum order: $25

For info on price: I. Delgado; Application info: N. Bafundo; Customer service: I. Delgado; Delivery info: I. Delgado

Products manufactured: Bobbins, Winding, Coil & Transformer, Coils Including Assemblies & Forms

DABURN ELECTRONICS & CABLE CORP., 2360 Hoffman, Bronx, N.Y., 10458, Tel: 212-295-0050, TWX: 710-593-4145; FSC No: 25706; Minimum order: $25 p. 2•1973-1992

For info on price: F. Martin; Application info: B. Danziger; Customer service: S. Goltz; Delivery info: M. Wieczorek

Free literature available: Full catalog of electronic wire, cable, tubing and sleeving, lacing cord and tape, fastening devices and hardware; includes teflon constructions, audio and communication cables, retractible cords; shrinkable PVC, polyolefin, teflon, kynar, neoprene, dual wall teflon tubing and shrinkable tape.

Products manufactured: Braid; Cable, Bushings, Glass, Plastic, Metal, Rubber, Etc., Cable, Caps, Forms & Tapes, Heat Shrinkable, Clamps & Clips, Connectors, Cords, Fasteners, Heat Guns, Production, Heat Sinks, Soldering, Insulators & Insulation, Jacks (All Types), Plugs, Posts, Switch Hardware, Switches, Terminal Blocks, Boards & Strips, Terminals, Tubing, Wire, Wire & Cable Ties, Wire Shielding

Local Sales Offices & Reps.

Ala	Gadsden, F.C. Nickerson Co.	205-547-7718
Cal	San Mateo, Carelli-EMA	415-341-6666
Conn	Waterbury, Anderson Sls. Co.	203-753-2487
Fla	Oldsmer, F.C. Nickerson Co.	813-855-4209
Fla	Seminola, F.C. Nickerson Co.	813-397-4843
Fla	Tampa, F.C. Nickerson Co.	813-885-1416
Haw	Honolulu, Hawaii Elctrn. Ser.	808-845-8207
Kans	Colwich, Dy-Tronix, Inc.	316-263-6590
Md	Baltimore, Dyna Rep Co.	301-256-8300
Mass	Boston, Anderson Sls. Co.	617-227-2980
Mo	Hazelwood, Dy-Tronix, Inc.	314-731-5799
Mo	Kansas City, Dy-Tronix, Inc.	816-761-6543
NJ	Haddonfield, Dyna Rep.	609-795-1700
NY	E. Syracuse, Honsinger Assoc.	315-463-5718
NY	Liverpool, Lewis-Dunnigan Co.	315-622-2133
NY	Plainview, R. Smith Assoc.	516-681-3155
NY	Spring Valley, R. Smith Assoc.	914-354-6067
NC	Franklin, F.C. Nickerson Co.	704-524-6363
Ohio	Cleveland, Ind'l. Sls. Assoc.	216-721-7500
Tex	Garland, G.V. Peck Co.	214-341-8311
Va	Alexandria, Dyna Rep.	703-354-1222
Va	Newport News, Dyna Rep.	804-874-7729

DACO INSTR. CO., 30 Stran Rd., Milford, Conn., 06460, Tel: 203-874-2515, TWX: 710-462-1049; Empl.: 40

Products manufactured: Dehumidifiers (For Equipment), Dehydrators, Display Devices/Displays, Indicators, Solenoids

DAICO INDUSTRIES INC., Box 5225, Compton, Cal., 90220, Tel: 213-631-1143, TWX: 910-346-6741; Empl.: 35; Minimum order: $50 .... p. 2•1281-1284

Customer service: P. Nooteboom

Free literature available: Cat & Chart, Low frequency (IF and RF) switches, programmable (multi-bit) attenuators and phase shifters. Combining elements include both solid state switches and RF relays.

Products manufactured: Antenna Switching Matrices, Attenuators, Couplers, Relays, Shifters, Switches

Local Sales Offices & Reps.

Ariz	Scottsdale, J. Smith & Assocs.	602-947-2495
Cal	Los Altos, Cain-White & Co.	415-948-6533
Colo	Boulder, J. Smith & Assocs.	303-442-7100
Colo	Littleton, J. Smith & Assocs.	303-794-8891
Fla	Palm Bay, Spartech Assocs.	305-727-8045
Ga	Smyrna, Spartech Assocs.	404-432-3644
Iowa	Cedar Rapids, Penzner-Mankus Assocs.	319-362-9177
Kans	Overland Park, Penzner-Mankus Assocs.	923-381-0004
Kans	Wichita, Penzner-Mankus Assocs.	316-264-2662
Mass	Cochituate, Micronic Assocs.	617-872-6561
Mo	Hazelwood, Penzner-Mankus Assocs.	314-731-4334
NM	Albuquerque, J. Smith & Assocs.	505-255-2111
NY	Huntington Station, Gray & Reed Assocs.	516-GE 3-3333
Pa	Newtown Square, SWR Assocs.	215-EL6-8550
Wash	Seattle, Datacom Assocs.	206-285-2525

DALE ELECTRONICS INC., Sub. Lionel Corp., Box 609, Columbus, Neb., 68601, Tel: 402-564-3131, TWX: 910-668-3605; Empl.: 2000; Minimum order: $35 p. 2•1452

Customer service: N. Newman

Free literature available: Dale Full Line Catalog 232 pages of detailed catalog information on all Dale propus lines. Wirewound-film resistors, resistor networks, trimmer pots, connectors, inductors, transformers and surge arresters.

Products manufactured: Arresters, Electrical Surge, Lightning, Attenuators, Chokes, Coils Including Assemblies & Forms, Connectors, Converters, Networks, Potentiometers, Relays, Resistors, Transformers

Local Sales Offices & Reps.

Ariz	Scottsdale, Williams Assocs.	602-947-4297
Cal	Los Alamitos, J.S. Heaton Co. South	213-598-6676
Cal	Redwood City, J.S. Heaton Co. North	415-369-4671
Cal	San Diego, J.S. Heaton Co. South	714-454-1456
Colo	Denver, Williams Assocs.	303-373-4730
Fla	Palm Beach Gardens, Graham Assocs.	305-622-4049
Ill	Chicago, D.J.M. Elctrn. Sls., Inc.	312-774-6525
Ind	Fort Wayne, Scott Elctrns., Inc.	219-743-1586
Ind	Indianapolis, Scott Elctrns., Inc.	317-897-9976
Ky	Louisville, Scott Elctrns., Inc.	502-583-3220
Md	Towson, R.L. Wilkinson, Inc.	301-377-7800
Mass	Wakefield, Kaelber & Mack, Inc.	617-245-9359
Mich	Detroit, Burcaw Co. & Assocs.	313-533-7700
Mich	Kentwood, Burcaw Co. & Assocs.	616-531-1000
Minn	Minneapolis, Merrill Franklin Co.	612-835-6422
NJ	Fairlawn, Kaelber & Mack, Inc.	201-797-7782
NM	Albuquerque, Williams Assocs.	505-255-1638
NY	Buffalo, M. Farber Assocs.	716-856-3543
NY	Manhasset, Kaelber & Mack, Inc.	516-627-6620
NC	Charlotte, J. Rudisill Assocs.	704-377-6901
Ohio	Cleveland, Scott Elctrns., Inc.	216-291-2600
Ohio	Columbus, Scott Elctrns., Inc.	614-236-8619
Ohio	Dayton, Scott Elctrns., Inc.	513-294-0539
Okla	Tulsa, E.F. Aymond Co.	918-936-2562
Ore	Beaverton, ES/Chase Co.	503-649-6177
Pa	Glenside, R. Wilkinson, Inc.	215-424-8400
Pa	Pittsburgh, Scott Elctrns., Inc.	412-781-3112
Tex	Dallas, E.F. Aymond Co.	214-826-7620
Tex	Houston, E. F. Aymond Co.	713-442-5791
Wash	Edmonds, ES/Chase Co.	206-774-3586
Wisc	Cambridge, D. J. M. Elctrns. Sls.	608-423-4190
FOR:	Canada, Scarborough, Ont., Dale Electronics, Canada, Ltd.	416-759-5631

Local Distributors

Ariz	Phoenix, Dalis Elctrn. Supply, 917 N. 7th St.	602-258-8151
Ariz	Phoenix, Hamilton/Avnet Corp., 2615 S. 21st St.	602-275-7851
Cal	Culver City, Avnet Corp., 10916 Washington Blvd.	213-559-4111
Cal	Mountain View, Hamilton/Avnet Corp., 575 E. Middlefield Rd.	415-961-7000
Cal	Mountain View, Shelley-Rodabaugh, 2444 Old Middlefield Way	415-969-1820
Cal	San Diego, Hamilton/Avnet Corp., 8917 Complex Dr.	714-279-1550
Cal	San Diego, Shanks & Wright, 2045 Kettner Blvd.	714-239-0176
Cal	San Diego, Shelley-Neumann, Inc., 3347 Industrial Ct.	714-459-3701
Cal	Santa Monica, F. Shelley Elctrns., 1040 Pico Blvd.	213-392-3913
Colo	Denver, Newark-Denver Elctrns., 2170 S. Grape St.	303-757-3351
Colo	Denver, Waco Elctrns., 4616 Ironton St.	303-371-4370
Conn	Stratford, Electro/Comp, 2415 Main St.	203-375-5811
Fla	Fort Lauderdale, Newark Elctrns., 1360 N.W. 65th Ave.	305-587-2372
Fla	Palm Beach Gardens, G.S. Marshall Co., 10385 Riverside Dr.	305-622-8490
Ga	Atlanta, Jackson Elctrns., 1135 Chattahoochee Ave., N.W.	404-355-2223
Ill	Chicago, Newark Elctrns., 500 N. Pulaski Rd.	312-638-4411
Ill	Elgin, Allied Elctrns., 1355 Sleepy Hollow Rd.	312-697-8200
Ill	Palatine, Ohm Elctrns., 649 Vermont Ave.	312-359-5500
Ill	Schiller Park, Hamilton/Avnet Elctrns., 3901 Pace Ct.	312-678-6310
Ill	Skokie, Bell Inds., 7701 N. Austin Ave.	312-282-5400
Ind	Evansville, Ohio Valley Sound, 20 E. Sycamore St.	812-425-6173
Ind	Ft. Wayne, Ft. Wayne Elctrns., 3606 Maumee Ave.	219-742-4346
Ind	Indianapolis, Graham Elec. Supply, 133 S. Pennsylvania St.	317-634-8202
Ind	South Bend, Radio Distributing Co., 1212 High St.	219-287-2911
Iowa	Cedar Rapids, Deeco, Inc., 2500 16th Ave., S.W.	319-365-7551
Kans	Wichita, Radio Supply Co., 115 Laura	316-267-5216
Ky	Lexington, Radio Elctrn. Equip Co., 480 Skain Ave.	606-255-6661
La	New Orleans, Southern Radio Supply Co., 1909 Tulane Ave.	504-524-2343
Md	Baltimore, Radio Elec. Svc. Co., 1026 Cromwell Bridge Rd.	301-823-0070
Mass	Watertown, Sterling Elctrns., 51 Spring St.	617-926-9720
Mass	West Newton, A.W. Mayer Co., 38 Border St.	617-965-1111
Mich	Ann Arbor, Wedemeyer Elctrn. Supply, 2280 S. Industrial Hwy.	313-665-8611
Mich	Detroit, R S Elctrns., 12775 Lyndon St.	313-491-1000
Mich	Grand Rapids, Stotts-Friedman, 2035 Eastern, S.E.	616-241-6731
Mich	Oak Park, Newark-Detroit Elctrns., 20700 Hubbell Ave.	313-548-0250
Mich	Wyoming, Newark Industrial Elec. Corp., 3645 Linden Ave., S.E.	616-241-6681
Minn	Minneapolis, Stark Elctrns., 112 3rd Ave., N.	612-332-1325
Minn	St. Paul, Gopher Elctrns. Co., 2520 W. Larpenteur	612-645-0241
Mo	Kansas City, Burnstein-Applebee Co., 3199 Mercier St.	816-561-5460
Mo	Kansas City, Radiolab, Inc., 3814 Main	816-561-9935
Mo	St. Charles, Lectronix, Inc., 306 McDonough St.	314-946-6424
NJ	Clifton, Wilshire Elctrns., 312 Clifton Ave.	201-365-2600
NJ	Kenilworth, Newark Elctrns. Ctr., 303 Monroe Ave.	201-272-8410
NJ	Rahway, Terminal Elctrns., Rahway Ind'l. Ctr., 1463 Pinewood St.	201-381-5700
NJ	Roselle, Garden State Ind'l. Elctrns., 407 Hope Ave.	201-241-9000
NJ	Springfield, Federated Purchaser, 155 U.S. Rte 22	201-376-8900
NJ	Springfield, Route Elctrns., Echo Plaza, U.S. Rte. 22	201-379-7710
NJ	Trenton, Allen & Hurley, 23 S. Warren St.	609-393-3300
NM	Albuquerque, Kierulff Elctrns. Co., 2524 Baylor Dr., S.E.	505-247-1058
NM	Albuquerque, Sterling Elctrns., 3530 Pan American Fwy., N.E.	505-345-6601
NY	Binghamton, Stack Ind'l. Elctrns., 45 Washington Ave.	607-723-6326
NY	Buffalo, Radio Equip. Corp., 196 Vulcan St.	716-874-2690
NY	Buffalo, Summit Dist., 916 Main	716-884-3450
NY	E. Farmingdale, Harrison Radio Corp., 20 Smith St.	516-293-7990
NY	Farmingdale, Arrow Elctrns., 900 Broad Hollow Rd.	516-694-6800
NY	Farmingdale, Hallmark Elctrns., 167 Marine St.	516-293-7500
NY	Johnson City, Wilshire Elctrns., 617 Main St.	607-797-1236
NY	Plainview, Fairmont Elctrns., 35 S. Service Rd.	516-694-6200
NY	Poughkeepsie, Higgins & Sheer, 123 Dutchess Turnpike	914-471-3510
NY	Rochester, Simcona Elctrns. Corp., 275 Mt. Read Blvd.	716-328-3230
NY	Rockville Centre, Midway Ind'l. Elctrns., 24 Maple Ave.	516-764-2400
NY	Rome, Rome Elctrns., 216 Erie Blvd. E.	315-337-5400
NY	Yorkville, Valley Ind'l. Elctrns., Commercial Dr.	315-736-3393
NC	Charlotte, Brownell-Electro, 5141 Belhaven Blvd.	704-394-4341
NC	Winston-Salem, Kirkman Elctrns., 901 W. Second St.	919-724-0541
Ohio	Cincinnati, Hughes-Peters, Inc., 4865 Duck Creek Rd.	513-351-2000
Ohio	Cleveland, Pioneer Standard Elctrns., 4800 E 131st St.	216-587-3600
Ohio	Cleveland, W.M. Pattison Supply Co., 4550 Willow Pkwy.	216-441-3000
Ohio	Cleveland, Winteradio Elctrns. Supply Corp., 1468 W. 25th St.	216-621-9383
Ohio	Columbus, Hughes-Peters, Inc., 481 E. 11th Ave.	614-294-5351
Ohio	Dayton, Nasco, Inc., 3201 Plainfield Rd.	
Ohio	Dayton, Pioneer/Dayton, 1900 Troy St.	513-236-9900
Ohio	Kettering, Plaintronics Co., Box 2265, 3100 Plainfield Rd.	513-253-9176
Ohio	Lima, Lima Radio, 150 W. Grand Ave.	419-228-1220
Okla	Tulsa, Oil Capitol Electrs., 708 S. Sheridan	918-836-2541
Okla	Tulsa, Radio, Inc., 1000 S. Main	918-587-9123

Ore	Portland, Almac/Stroum Electrs., Box 25444	503-292-3534
Pa	Philadelphia, Herbach & Rademan, 401 E. Erie Ave.	215-426-1700
Pa	Pittsburgh, Cameradio Co., 2801 Liberty Ave.	412-288-2600
Pa	Pittsburgh, RPC Electrs., 620 Alpha Dr.	412-782-3770
RI	Providence, W. Dandreta & Co., 28 Wolcott St.	401-861-2800
Tenn	Nashville, Electra Distributing Co., 1914 W. End Ave.	615-329-3971
Tex	Dallas, Sterling Elctrns., 2875 Merrell Rd. Box 20129	214-357-9131
Tex	El Paso, McNichols, Inc., 3012 E. Yandell Dr.	915-566-2936
Tex	Fort Worth, Textronics, Inc., 1108 E. Lancaster	817-335-8111
Tex	Houston, Lenert Co., Box 2184, 1420 Hutchins	713-225-1465
Tex	Houston, Sterling Electrns., Box 1229	713-623-6600
Va	Richmond, I.T.R., 1425 Blue Jay La.	804-288-7198
Wash	Bellevue, Hamilton/Avnet Corp., 13407 Northrup Way	206-624-5930
Wash	Seattle, Almac-Stroum Elctrns., 5811 Sixth Ave. S.	206-763-2300
Wash	Seattle, Radar Elec. Co., 168 Western Ave., W.	206-282-2511
WVa	Charleston, McJunkin Corp., Box 513	304-348-5211

DALE ELECTRONICS, INC., Box 74, Norfolk, Nebr., 68701, Tel: 402-371-0080, TWX: 910-623-0163; Minimum order: $35 .... p. 2•1452

Customer service: B. Means

Free literature available: Refer to Dale Electronics, Columbus Neb. for catalog information.

Products manufactured: Attenuators, Circuits, Hybrid, Thick Film, Filters, Networks, Resistors

Refer to Dale Electronics Columbus, Neb. for sales office and distributor information.

DALE ELCTRNS., INC., Yankton Div., E. Hwy. 50, Box 180, Yankton, S.D., 57078, Tel: 605-665-9301, TWX: 910-668-3605; Empl.: 250; Minimum order: $35 p. 2•1452

Customer service: John Elliot

Free literature available: Refer to Dale Electronics, Columbus Neb. for catalog information.

Products manufactured: Arresters, Electrical Surge, Lightning, Bobbins, Winding, Coil & Transformer, Chokes, Coils Including Assemblies & Forms, Connectors, Controls/Control Eqpt., Drives & Drive Mechanisms (Dial), Filters, Kits, Potentiometer, Rheostat, Motors, Potentiometers, Protectors, Relays, Spark Gaps, Suppressors, Transformers

Refer to Dale Elctrns., Columbus, Neb. for sales office and distributor information.

DALE ELCTRNS. CANADA, LTD., 18 Howden Rd., Scarborough, Ont., Can., Tel: 416-759-5631, TWX: 610-492-1381; Minimum order: $35 .... p. 2•1452

Customer service: K. Beeby

Free literature available: Refer to Dale Elctrns, Columbus, Neb. for catalog information.

Products manufactured: Resistors

Local Sales Offices & Reps.

FOR:	Can., Burnaby, B.C., ES/Chase Ltd.	604-298-4515
FOR:	Can., Dorval, Que., Avotroics Ltd.	514-631-9168
FOR:	Can., London, Ont., Welwyn Can. Ltd.	519-451-9490
FOR:	Can., Montreal, Que., Bach-Simpson Ltd.	514-731-9617
FOR:	Can., Willowdale, Ont., Avotroics Ltd.	416-493-9711

DAMON CORP., Elctrns. Div., 80 Wilson Way, Westwood, Mass., 02090, Tel: 617-449-0800, TWX: 710-348-6722; Empl.: 75; Minimum order: $50 p. 1•312,313

Customer service: Ed Doherty

Products manufactured: Delay Lines, Discriminators, Filters, Oscillators

Local Sales Offices & Reps.

Cal	No. Hollywood, Jewett Assocs.	213-789-8103
Cal	Palo Alto, Waldman Assocs.	415-961-4100
Del	Springfield, Scientific Devices	703-451-6500
Fla	Melbourne, Repcom, Inc.	305-254-1877
Ill	Northfield, Feller Assoc.	312-446-8065
Mass	Cambridge, Vector Sls.	617-491-5700
NJ	Cherry Hill, Stemler Assocs.	609-966-4070
NM	Albuquerque, ALS Elctrns.	505-298-2575
NY	Tuckahoe, Spectrum Sls.	914-793-1660
Tex	Addison, Southland Comp.	214-233-0603

DAN-L INC., 229 Laurel Rd., E. Northport, N.Y., 11731, Tel: 516-757-8000; FSC No: 28327; Empl.: 22; Minimum order: $25

For info on price: E. P. Huber; Application info: D. Eltermann; Customer service: J. Closky; Delivery info: E. P. Huber

Products manufactured: Sockets

DANA EXACT ELECTRONICS, INC., Box 160, 455 SE 2nd Ave., Hillsboro, Ore., 97123, Tel: 503-648-6661, TWX: 910-460-8811; Empl.: 60; Minimum order: $5 p. 1•644,645

Customer service: J. Foster

Free literature available: Dana exact Electronics, Inc. short form catalog listing function generators, waveform synthesizers and frequency synthesizers.

Products manufactured: Amplifiers, Generators, Synthesizers

Local Sales Offices & Reps.

Ala	Hunstville, BCS Assocs.	205-881-6220
Ariz	Scottsdale, PLS Assocs.	602-957-9110
Cal	Los Angeles, Basic Sys. Corp.	213-938-2833
Cal	Palo Alto, Coherent Mktg. Assocs.	415-327-2217
Colo	Denver, PLS Assocs.	303-771-0140
Fla	Orlando, BCS Assocs.	305-896-4881
Ill	Chicago, Pivan Engrg. Inc.	312-539-4838
Ind	Indianapolis, Pivan Engrg Inc.	317-253-1681
Kans	Shawnee Mission, Pivan Engrg. Inc.	913-722-1030
Md	Kensington, Electronic Mktg. Assocs.	301-744-7700
Mass	Waltham, Measurement Consits. Corp.	617-890-4400
Mich	Farmington, Carter, McCormic & Peirce, Inc.	313-477-7700
Minn	Minneapolis, Pivan Engrg. Inc.	612-537-4501
Mo	St. Louis, Pivan Engrg. Inc.	314-567-3636
NM	Albuquerque, PLS Assocs. Inc.	505-255-2330
NY	Great Neck, Measurement Tech. Inc.	516-482-3500
NY	Rochester, KLM Assocs. Inc.	315-735-8525
NC	Greensboro, BCS Assocs. Inc.	919-273-1918
Ohio	Cleveland, Carter, McCormic & Peirce, Inc.	216-333-5650
Ohio	Dayton, Carter, McCormic & Peirce, Inc.	513-278-5873
Okla	Tulsa, Palatine Sls. Inc.	918-622-0321
Ore	Portland, Hayes Technical	503-238-0001
Pa	King of Prussia, Electronic Mktg. Ass.-Carter, McCormic/P	412-472-4415
RI	Cumberland, Measurement Consultants Corp.	410-333-6000
Tex	Richardson, Palatine Sls. Inc.	214-231-9489
Wash	Seattle, Hayes Technical	206-763-2210
Wisc	Brookfield, Pivan Engrg. Inc.	414-786-1940
FOR:	Can., Downsville, Ont., Electronetic Sys. Ltd.	416-661-3673

DANA LABS., INC., 2401 Campus Dr., Irvine, Calif., 92664, Tel: 714-833-1234, TWX: 910-595-1136; FSC No: 21793; Empl.: 300

For info on price: C. Steinke; Application info: C. Steinke; Customer service: B. Bishop; Delivery info: C. Steinke

Free literature available: The package contains information on our digital voltmeters, electronic counters and frequency synthesizers, including our new model 2000 Danameter which is a hand-held digital voltmeter that runs on a 9 volt transistor battery. Each catalog includes general information on the product as well as specifications.

Products manufactured: Counters, Meters, Synthesizers

Local Sales Offices & Reps.

Ala	Huntsville, Gentry Assocs., Inc.	205-534-9771
Ariz	Phoenix, PLS	602-957-9110
Cal	Irvine, Dana Labs., Inc.	714-833-1234
Cal	La Jolla, Ward-Davis Assocs.	714-459-3351
Cal	Lawndale, Ward-Davis Assocs.	213-542-7740
Cal	Sunnyvale, Ward-Davis Assocs.	408-245-3700
Colo	Denver, PLS	303-771-0140
Conn	Hamden, P. Jenks Assocs.	203-281-0810
DC	Wheaton, Sonco, Inc.	301-942-9420
Fla	Orlando, Gentry Assocs., Inc.	305-894-4401
Ill	Chicago, Pivan Engrg. Co.	312-539-4838
Ind	Indianapolis, Pivan Engrg. Co.	317-253-1681
Kans	Shawnee Mission, Pivan Engrg. Co.	913-722-1030
Md	Wheaton, Sonco, Inc.	301-942-9420
Mass	Wakefield, P. Jenks Assocs.	617-246-1590
Mich	Farmington, Carter, McCormic & Peirce, Inc.	313-477-7700
Mich	Kalamazoo, Carter, McCormic & Peirce, Inc.	616-349-9666
Minn	Minneapolis, Pivan Engrg. Co.	612-537-4501
Mo	St. Louis, Pivan Engrg. Co.	314-567-3636
NJ	Ft. Lee, Tech. Mktg. Assocs.	201-224-6911
NM	Albuquerque, PLS	505-255-2330
NY	Rochester, Ossmann Instruments, Inc.	716-328-2230
NY	Syracuse, Ossmann Instruments, Inc.	315-437-6666
NY	Vestal, Ossmann Instruments, Inc.	607-785-9947
NC	Burlington, Gentry Assocs. Inc.	919-227-3639
Ohio	Cleveland, Carter, McCormic & Peirce, Inc.	216-333-5650
Ohio	Dayton, Carter, McCormic & Peirce, Inc.	513-278-5873
Okla	Norman, Data Mktg. Assocs.	405-364-8320
Pa	Blue Bell, Sonco, Inc.	215-542-1490
Pa	Pittsburgh, Carter, McCormic & Peirce, Inc.	412-824-3760
Tex	Dallas, Data Mktg. Assocs.	214-661-0300
Tex	Houston, Data Mktg. Assocs.	713-686-9627
Tex	San Antonio, Data Mktg. Assocs.	512-828-0937
Wash	Seattle, R. Drake Assocs., Inc.	206-763-2755
Wisc	Brookfield, Pivan Engrg. Co.	414-786-1940

DANIELS MFG. CORP., 2266 Franklin Rd., Bloomfield Hills, Mich., 48013, Tel: 313-338-9611; FSC No: 5120; QPL No: 22520; Empl.: 50; Minimum order: $25

For info on price: W. Daniels; Application info: H. Kemmer; Customer service: H. Kemmer; Delivery info: H. Kemmer

Free literature available: Catalogs describing crimping tools, contact insertion & removal tools and tool kits. Catalog also includes cross reference of tools and contact part numbers they will crimp.

Products manufactured: Tools

Local Sales Offices & Reps.

Ala	Madison, Southeastern Assocs.	205-772-9616
Cal	Bellflower, Daniels Mfg. Corp.	714-774-6872
Fla	Orlando, Balmar Ents.	305-851-4041
Md	Bethesda, Sparks & Co.	301-654-1094

DANTRONICS, INC., 3175 Hafner Ct., St. Paul, Minn, 55112, Tel: 612-484-2108; Empl.: 22

Free literature available: Dantec 100 Automatic Transistor tester, Dantec 200 medium power diode and SCR tester.

Products manufactured: Analyzers, Controls/Control Eqpt., Meters, Testers

Advertisment

TESTERS FOR TRANSISTORS, DIODES, SLR'S, FETS, TRIACS, POTS, ETC.
EITHER ON WAFER OR FINAL DEVICE
FOR HIGH SPEED HANDLERS OR MANUAL INSERTION.

D.A.T.A. INC., A Cordura Co., 32 Lincoln Ave., Orange, N.J., 07050, Tel; 201-673-8030, TWX: 710-994-5839; Empl.: 36; Minimum order: $9.75

For info on price: P. McGill; Application info: E. H. Marriott; Customer service: B. Ehrlich; Delivery info: P. McGill

Free literature available: Brochures and Price lists.

Products manufactured: Technical Books

DATA, INC., 130 S. Mason, Box 2074, Ft. Collins, Colo., 80521, Tel: 303-493-1222; Empl.: 3

Products manufactured: Amplifiers, Recorders

DATA-CONTROL SYSTEMS, Commerce Dr., Box 584, Danbury, Conn., 06810, Tel: 203-743-9241, TWX: 710-456-0376; FSC No: 08539; Empl.: 199; Minimum order: $50

Customer service: J. S. Lombardo

Free literature available: Application and Specification Information On Analog and Digital (PCM) Telemetry Systems.

Products manufactured: Amplifiers, Calibrators, Comm. Systems, Data Acquisition & Reduction Systems, Decommutators, Telemetering, Demodulators, Detectors, Discriminators, Filters, Generators, Modulator/Demodulators, Modulators, All Kinds, Oscillators, Signal Conditioners & Equipment, Testers, Transmission Systems, Data

Local Sales Offices & Reps.

Ala	Huntsville, Data-Control Sys.	205-536-0784
Ariz	Phoenix, BFA Corp.	602-946-4215
Cal	Westminister, Data-Control Sys.	714-894-4471
Colo	Denver, BFA Corp.	303-744-3301
Conn	Danbury, Data-Control Sys.	203-743-9241
Conn	Hamden, Pat Jenks Assoc.	203-281-0810
Fla	Orlando, Uni-Rep	305-295-4817
Md	Laytonville, G T Assocs.	301-949-8060
Mass	Natick, Rabal Assoc.	617-655-5909
NM	Albuquerque, BFA Corp.	505-292-1212
NM	Las Cruces, BFA Corp.	505-523-0601
NY	Melville, Astrorep	516-423-2266
Ore	Norman, Data-Mktg. Assoc.	405-364-8320
Pa	Huntingdon Valley, Rabal Assoc.	215-947-4825
Tex	Dallas, Data Mktg. Assoc.	214-358-4643
Tex	Houston, Data-Mktg. Assocs.	713-686-9627
Tex	San Antonio, Data Mktg. Assocs.	512-828-0937
Utah	Salt Lake City, BFA Corp.	801-466-6522

DATA DELAY DEVICES, 253 Crooks Ave., Clifton, N.J., 07011, Tel: 201-772-1106; Empl.: 10 ...... p. 1•445-451,552

Products manufactured: Coils Including Assemblies & Forms, Decade Boxes, Delay Lines, Equalizers, Filters, Networks, Oscillators, Synthesizers

Local Sales Offices & Reps.

Cal	Mountain View, Weseloh & Assocs.	415-961-0565
Cal	Santa Monica, Rep Assocs.	213-829-5401
Fla	Winter Haven, S & S Sls. Reps.	813-293-7304
Mass	Framingham, Victor Assocs.	617-879-5710
NY	Huntington, C. R. Mayer Co.	516-921-7876
Va	Alexandria, W. A. Brown Equip. Comp.	703-836-1800
Tex	Dallas, IBL Engrg. & Sls. Inc.	214-363-2921

Advertisment

We manufacture, Design, Develop:

- Electromagnetic Delay lines fixed; variable, lumped, distributed, electrically variable.
- Filters Passive & Active of all response types
- Inductors, Fixed, variable, toroids, electrically variable
- Oscillators, Low-Freq. modular
- Magnetostrictive Delay Lines

DATA DISC INC., 686 W. Maude Ave., Sunnyvale, Cal., 94086, Tel: 408-732-7330, TWX: 910-339-9244; Empl.: 281; Minimum order: $25

For info on price: Sls. Dept.; Application info: Mktg. Dept.; Customer service: W. Sattler; Delivery info: Mktg. Dept.

Products manufactured: Display Devices/Displays, Memory Systems, Recorders, Terminals, Data Display (including Alphanumeric & Graphic)

Local Sales Offices & Reps.

Cal	Topanga, Data Disc	213-883-8413
Colo	Denver, Grifco	303-722-4674
Fla	Melbourne, Data Disc	305-724-2108
Ill	Glenview, Data Disc	312-729-8030
Kans	Shawnee Mission, Inland Assocs.	913-362-2366
Md	Bethesda, Bartlett Assocs.	301-656-3061
Mass	Framingham, Bartlett Assocs.	617-879-7530
Mich	Center Line, Dietrich & Assocs.	313-754-6450
Minn	Hopkins, F. Peterson Co.	612-941-5400
Mo	Glencoe, Inland Assocs.	314-938-4992
NY	Elmsford, Data Disc	914-592-8658
NY	White Plains, Bartlett Assocs.	914-949-6476
NC	Charlotte, Electro-Rep Assocs.	704-527-2530
Ohio	Cleveland, Dietrich & Assocs.	216-781-1855
Ohio	Dayton, Dietrich & Assocs.	513-223-6042
Pa	Pittsburgh, Dietrich & Assocs.	412-892-2992
Pa	Wayne, Bartlett Assocs.	215-688-7325
Tex	Dallas, Thorson Co.	214-233-5744
Tex	Houston, Thorson Co.	713-771-3504

DATA DISPLAY PRODUCTS, 5428 W. 104th St., Los Angeles, Cal., 90045, Tel: 213-641-1232; FSC No: 15513; Empl.: 14; Minimum order: $15

For info on price: P. Lodhie; Application info: Q. Lodhie; Customer service: P. Lodhie; Delivery info: P. Lodhie

Products manufactured: Diodes, Lamp Drivers, Lamps, Lights, Sockets

Local Sales Offices & Reps.

Ariz	Scottsdale, G. R. McKnight Co.	602-949-0809
Cal	Menlo Park, G. R. McKnight Co.	415-325-2844
Cal	Sun Valley, Weightman & Assocs.	213-768-5750
Ill	Glendale Heights, Trend-Tronics	312-963-2210
Mass	Sturbridge, Branford Controls	617-347-7367
Minn	Minneapolis, R. W. Marshall Co.	612-929-0457
NJ	Fair Lawn, Geo. D. Harris Assoc.	201-796-5200
NM	Albuquerque, McKnight Co.	505-266-6423
Pa	Jenkintown, Arnold Assocs.	215-742-0600

DATA GENERAL CORP., Route 9, Southboro, Mass., 01772, Tel: 617-485-9100, TWX: 710-390-0309; Empl.: 3000

Products manufactured: Computers, Converters, Memory Systems, Printers, Readers, Terminals, Data Display (including Alphanumeric & Graphic)

Local Sales Offices & Reps.

Ariz	Scotsdale	602-994-0351
Cal	El Segundo	213-973-0401
Cal	Palo Alto	415-965-1010
Cal	Sacremento	916-441-0167
Cal	San Diego	714-276-8450
Cal	Santa Ana	714-558-9421
Cal	Santa Barbara	
Colo	Denver	303-758-5080
Conn	North Haven	203-239-4438
Fla	Ft. Lauderdale	305-771-0784
Fla	Orlando	305-851-8230
Fla	St. Petersburg	813-576-4157
Ga	Atlanta	404-325-3181
Ill	Schaumburg	312-885-0505
Ind	Indianapolis	317-248-8306
Ky	Louisville	502-456-1490
Mass	Waltham	617-891-7000
Mich	Southfield	313-357-0006
Minn	Minneapolis	612-854-7727
Mo	Clayton	314-726-0811
Mo	Kansas City	816-531-1326
NJ	Saddlebrook	201-843-0676
NM	Albuquerque	505-266-5951
NY	Buffalo	716-674-6200
NY	Commack	516-864-2700
NY	New York City	212-867-1010
NY	Rochester	716-385-2000
NY	Schenectady	518-377-1300
NY	Syracuse	315-455-1525
NC	Greensboro	919-275-8586
Ohio	Dayton	513-435-1932
Ohio	Euclid	216-289-2660
Okla	Tulsa	918-749-5763
Ore	Portland	503-297-1756
Pa	Blue Bell	215-643-5515
Pa	Pittsburgh	412-922-7584
Tex	Austin	512-451-7487
Tex	Dallas	214-233-4496
Tex	Houston	713-688-8641
Utah	Salt Lake City	801-484-5271
Va	Falls Church	703-893-0910
Wash	Renton	206-228-5890
Wisc	Milwaukee	

DATAGRAPHICS CORP., 8402 Speedway, San Antonio, Tex., 78230, Tel: 512-342-9486; Empl.: 26; Minimum order: $25

For info on price: S. Smith; Application info: S. Smith; Customer service: J. Kosek; Delivery info: S. Smith

Products manufactured: Converters, Data Acquisition & Reduction Systems, Data Loggers, Timers

Local Sales Offices & Reps.

Cal	Newport Beach, FLW, Inc.	714-540-4412
Cal	North Hollywood, FLW, Inc.	213-877-5518
Cal	San Diego, FLW, Inc.	714-277-0993
Conn	Hamden, Equipment Sls. Co.	203-248-5581
DC	Washington, Scientific Sys. Sls. Corp.	202-726-4161
Mass	Chelmsford, Equipment Sls. Co.	617-256-8547
Minn	Minneapolis, Kirkeby & Assoc.	612-377-3239
NM	Albuquerque, Moore-Eiler	505-344-8020
NY	Syosset, Scientific Sys. Sls.	516-921-3737
NC	Matthews, W.K. Hile Co.	704-847-9125
Ohio	Dayton, G.L. Ashby Assoc.	513-252-5627
Okla	Norman, Data Mktg. Assoc.	405-364-8320
Tex	Dallas, Data Mktg. Assoc.	214-358-4643
Tex	Houston, Data Mktg. Assoc.	713-686-9627
EXP:	San Antonio, Tex., Data Graphics Corp.	512-342-9486

DATA NUMERICS, 141-A Central Ave., Farmingdale, N.Y., 11735, Tel: 516-293-6600; Empl.: 40

Customer service: A. H. Battaglia

Free literature available: Act I - Automatic continuity tester Act II - Automatic continuity tester, high voltage version Data check 200S - Cable & continuity tester, solid state version Data check 200H - Cable & continuity tester, Hi-Pot model

Products manufactured: Cards, Linear Function, Cards, Logic, Computers, Services, Assembly, Production & Test, Terminal Blocks, Boards & Strips, Test Systems, Testers

Local Sales Offices & Reps.

Cal	Encino, World Enterprises	213-342-5473
Cal	San Diego, Tauber & Assoc	714-274-7242
Kan	Wichita, Winco, Inc.	316-684-8224
Md	Cockeysville, Advanced Tech. Sls	301-666-9026
Mass	Newton Centre, Daner Hayes	617-969-4650
Mich	Grand Rapids, R. P. Urban & Assoc.	616-245-0511
NY	Farmingdale, Haines Prod	516-420-1177
Pa	Erie, Tuznik Assoc.	814-459-1894
Wash	Seattle, Drake Assoc	206-763-2755

DATA PRECISION CORPORATION, Audubon Rd., Wakefield, Mass, 01880, Tel: 617-246-1600; Empl.: 100 p. 1•646,647

For info on price: R. Scheinfein; Application info: R. Scheinfein; Customer service: J. Muise; Delivery info: L. Beston

Free literature available: Catalogs of our 3 1/2, 4 1/2 & 5 1/2/digit digital multimeters, Catalog of our new 7 digit, 100 MHz frequency counter, Evaluating digital multimeters-guide to selecting the right meter for your appliation.

Products manufactured: Counters, Meters, Probes

Local Sales Offices & Reps.

Ala	Huntsville, Lee Assocs.	205-533-5896
Ariz	Scottsdale, Measurement Consits.	602-944-9519
Cal	Costa Mesa, Meas. Assocs.	714-540-7160
Cal	Sunnyvale, Amasco	408-733-8690
Colo	Boulder, Meas. Consits.	303-449-5294
Conn	E. Hartford, Tekdata, Inc.	203-525-7647
Fla	Ft. Lauderdale, Lee Assocs.	305-525-9796
Fla	Winterhaven, Lee Assocs.	813-294-5815
Ga	Atlanta, Lee Assocs.	404-457-7117
Haw	Kailua, Lanikai Elctrns.	808-262-6286
Ill	Elk Grove Village, L. F. Green Assoc.	312-593-0282
Ind	Indianapolis, L. F. Green Assoc.	317-293-9827
Md	Lanham, Brimberg Assoc.	301-552-2200
Mass	Burlington, Tekdata, Inc.	617-273-0198
Mich	Detroit, Micro Sls. Corp.	313-482-1229
Minn	Minneapolis, L. F. Green Assoc.	612-781-1611
Mo	Hazelwood, Production Automation Corp.	314-731-2331
Mo	Raytown, Production Automation Corp.	816-737-0066
NJ	Camden, QED Elctrns. Inc. of PA	215-925-8711
NJ	Union City, Meas. Tech. Inc.	201-863-5660
NM	Albuquerque, Meas. Consits.	505-265-6471
NM	Las Cruces, Meas. Consits.	505-526-2491
NY	DeWitt, DB Assocs.	315-446-0220
NY	Great Neck, Measurement Tech. Inc.	516-482-3500
NC	Raleigh, Lee Assocs.	919-787-5818
Ohio	Cleveland, Micro Sls. Corp.	216-725-4560
Ohio	Dayton, Micro Sls. Corp.	513-433-8171
Ore	Portland, Hayes Tech.	503-238-0001
Tex	Dallas, Comspec. Inc.	214-234-4137
Tex	Houston, Comspec. Inc.	713-461-4487
Utah	Murray, Meas. Consits.	801-268-3181
Wash	Seattle, Hayes Tech.	206-763-2210

DATAPRODUCTS CORP., 6219 DeSoto Ave., Woodland Hills, Cal., 91365, Tel: 213-887-8490; Empl.: 3500

Free literature available: OEM product catalog, Individual data sheets on all products.

Products manufactured: Comm. Systems, Computers

Local Sales Offices & Reps.

Cal	Newport Beach	714-752-7411
Cal	Sunnyvale	408-733-9890
Fla	Pompano Beach	305-942-2257
Md	Bethesda	301-652-8120
Mass	Framingham	617-620-1950
Mich	Southfield	313-355-0822
Minn	Minneapolis	612-835-2066
NJ	Cherry Hill	609-667-7555
Tex	Dallas	214-231-4771

DATA SPECIALTIES, 3455 Commercial Ave., North Brook, Ill., 60062, Tel: 312-564-1800; Empl.: 30; Minimum order: $25

Customer service: E. Kaplan

Products manufactured: Comm. Systems, Data Acquisition & Reduction Systems, Data Loggers, Paper-Tape Preparation Systems, Perforators, Readers, Receivers, Recorders, Tape Winders

Local Sales Offices & Reps.

Ariz	Phoenix, Mountaintek	602-242-5551
Cal	San Diego, Moxon	714-292-4820
Cal	Santa Clara, Moxon	408-249-2491
Colo	Boulder, Mountaintek	303-444-1783
Colo	Evergreen, Mountaintek	303-674-5255
Ind	Columbus, Miltronics	812-376-6321
Mass	Waltham, Digital Sls. Assoc.	617-899-4300
NM	Albuquerque, Mountaintek	505-268-0003
NY	Guilderland, Electro Modular Sys.	518-456-2665
NY	Roslyn Heights, Travco Assocs.	516-621-3223
Pa	Norristown, Denco	215-279-8146
RI	N. Scituate, Digital Sls. Assoc.	401-647-5075
Utah	Salt Lake City, Mountaintek	801-272-4611

DATA TECHNOLOGY, 2700 S. Fairview, Santa Ana, Cal., 92704, Tel: 714-546-7160, TWX: 910-595-1570; Empl.: 150; Minimum order: $25 .... p. 1•649-651,863

For info on price: S. Blakemore; Application info: W. Kennedy; Customer service: L. Lombard; Delivery info: S. Blakemore

Free literature available: Data sheets for: panel meters; multi meters; strip chart recorders.

Products manufactured: Backpanel Interconnect Systems, Converters, Meters, Recorders

Local Sales Offices & Reps.

Ariz	Phoenix, Trembly Assocs.	602-253-6104
Cal	Los Angeles, Basic Sys.	213-938-2833
Cal	Mountain View, Prod. Data of No. Calif.	415-941-4410
Cal	San Diego, Basic Sys.	714-279-9641
Colo	Broomfield, Figaro-Klebba Assocs.	303-466-8228
Fla	Orlando, E.G. Holmes	305-894-8901
Ga	Chamblee, E.G. Holmes	404-451-6161
Ill	Chicago, Sea Inc.	312-282-6694
Ind	Carmel, Sea Inc.	317-846-2593
Kans	Prairie Village, Engrg. Svcs.	913-649-4000
Md	Bel Air, Dyna Rep. Co.	703-354-1222
Mass	Braintree, Data Technology Corp.	617-843-0954
Mass	Waltham, McBar Assoc.	617-890-0233
Mich	Farmington Hills, H. Lowell Co.	313-851-7474
Minn	Minneapolis, Sea Inc.	612-425-4455
Mo	St. Louis, Engrg. Svcs.	314-997-1515
NJ	Bogota, Neville & Vespo	
NJ	Haddonfield, Dyna Rep.	609-795-1700
NY	New Hartford, KLM Assocs.	315-735-8525
NY	No. Syracuse, KLM Assocs.	315-458-6214
NY	Rochester, KLM Assocs.	716-442-0820
NY	Tuckahoe, Neville & Vespo	212-539-1515
Ohio	Cleveland, Data Equip. Sls. Co.	216-252-3151
Tex	Richardson, Lear Assocs.	214-231-5388
Utah	Salt Lake City, Figaro, Klebba Assoc.	303-455-8228
Va	Alexandria, Dyna Rep Co.	703-354-1222
Va	Virginia Beach, E.G. Holmes	804-481-6556
Wash	Seattle, H. Levinson Co.	206-323-5100
Wisc	Waukesha, Sea Inc.	414-547-6637
FOR:	Can., Downsview, Ont., Electronetic Sys.	416-636-3673
FOR:	Can., Montreal, Que., Electronetic Sys. Ltd.	514-343-4112
FOR:	Can., Ottawa, Ont., Electronetic Sys. Ltd.	613-733-3781
FOR:	Can., Vancourver, BC, Electronetic Sys. Ltd.	804-687-5696

DATA TECHNOLOGY INC., 65 Grove St., Watertown, Mass., 02172, Tel: 617-924-1773; Empl.: 42

Products manufactured: Computers, Controls/Control Eqpt., Converters, Counters, Digitizers, Pencil Follower (Inc. Coordinate & Graphic), Encoders, Indicators, Recorders

Local Sales Offices & Reps.

Cal	San Marino, Dale-Dahl Assoc.	213-682-3417
Cal	Walnut Creek, Dale-Dahl Assoc.	415-933-9595
Ill	Deerfield, Traco Eng. Co.	312-945-3520
Md	Gaithersburg, Wright Co.	202-296-0979
Mass	Framingham, Victor Assocs.	617-879-5710
Mich	Southfield, Sterling-Lowell Co.	313-352-8881
Mo	St. Louis, Coombs Assocs.	314-542-3399
NM	Albuquerque, W. Dolde Sls Co.	505-256-0307
NY	Albany, J.A. Reagan Co.	518-489-4777
NY	Mamoroneck, Neville & Vespo	212-539-1515
NY	New Hartford, J.A. Reagan Co.	315-732-3775
NY	Rochester, J.A. Reagan Co.	716-473-2115
Ohio	Cleveland, Geotronix Mktg. Assoc.	216-238-8520
Okla	Tulsa, J.W. Elder Co.	918-583-9149
Ore	Eugene, J. Tudor & Assocs.	503-344-9212
Ore	Portland, J. Tudor & Assocs.	503-288-5154
Pa	Exton, Scientific Mktg., Inc.	215-363-7377
Wash	Seattle, J. Tudor & Assocs.	206-682-7444
Wash	Spokane, J. Tudor & Assocs	509-327-3328

DATA TEST CORP., 2450 Whitman Rd., Concord, Cal., 94518, Tel: 415-689-3583, TWX: 910-481-9973; Minimum order: $25

Customer service: D. Greenwood

Free literature available: Family product guide.

Products manufactured: Analyzers, Test Systems, Testers

Local Sales Offices & Reps.

Ariz	Scottsdale, B F A Corp.	602-946-4215
Cal	Los Angeles, Burtis Instr. Sls.	213-887-1360
Cal	Oakland, Advanced Technology	415-452-1401
Colo	Denver, B F A Corp.	303-744-3301
Conn	Hamden, Equipment Sls. Co.	203-248-5581
Ill	Wheaton, Engrg. Prods. Assocs.	312-653-6826
Mass	Chelmsford, Equipment Sls. Co.	617-256-8547
Mich	Detroit, Electro Sls. Assocs.	313-526-8800
Minn	Minneapolis, Engrg. Prods. Assocs.	612-925-1883
NJ	Pennsauken, Megargel/Himmelstein Assoc.	609-662-3091
NM	Albuquerque, B F A Corp.	505-292-2323
NM	Las Cruces, B F A Corp.	505-523-0601
NY	Tuckahoe, Asco Elctrns.	914-779-8110
Ohio	Cleveland, Electro Sls. Assocs.	216-261-5440
Ohio	Dayton, Electro Sls. Assocs.	513-426-5551
Okla	Norman, Data Mktg. Assocs.	405-364-8320
Pa	Pittsburgh, Electro Sls. Assocs.	412-371-9449
Tex	Dallas, Data Mktg. Assocs.	214-661-0300
Tex	Houston, Data Mktg. Assocs.	713-686-9627
Utah	San Antonia, Data Mktg. Assocs.	512-828-0937

DATA TRANSLATION, 109 Concord St., Framingham, Mass., 01701, Tel: 617-879-3595, Telex: 948316; Empl.: 15; Minimum order: $38

Customer service: F. Molinari

Free literature available: DATAX Data Acquisition Module brochure; DATAX User Instruction Guide; Data Acquisition System articles; Point Plotting data sheets and application data; DC-DC Converter data sheets; Microcomputer and minicomputer interface guides.

Products manufactured: Amplifiers, Converters, Data Acquisition & Reduction Systems, Meters, Modules, Logic, Encapsulated

Local Sales Offices & Reps.

Ala	Huntsville, W.A. Brown Instrs., Inc.	205-539-4411
Ariz	Scottsdale, Barnhill Three	602-947-7841
Cal	Los Angeles, Basic Sys. Co.	213-938-2833
Cal	Mt. View, Product Data	415-941-4410
Colo	Denver, Barnhill Three	303-934-5505
Fla	Ft. Lauderdale, W.A. Brown Instrs.	305-776-4800
Fla	Ft. Walton Beach, W.A. Brown Instrs.	904-243-6424
Fla	Indialantic, W.A. Brown Instrs.	305-723-0766
Fla	Orlando, W.A. Brown Instrs.	305-425-5505
Ga	Atlanta, W.A. Brown Instrs.	404-939-1674
Kans	Prairie Village, Engineering Svcs. Co.	913-649-4000
La	Gretna, W.A. Brown Instrs.	504-366-5766
Md	Fulton, Gans-Fryling	301-953-3724
Mo	St. Louis, Engineering Svcs. Co.	314-997-1515
NM	Albuquerque, Barnhill Three	505-299-7658
NY	Rochester, Scientific Devices-New York	716-334-2445
NY	Tenafly, Budd-Tronics	201-569-2230
NC	Durham, W.A. Brown Instrs.	919-489-1546
Ohio	Wickliffe, Data-Tron	216-585-8421
Pa	Abington, Bach-Steward Assocs.	
Tenn	Knoxville, W.A. Brown Instrs.	615-584-2614
Tex	Houston, Barnhill Two	713-688-9971
Tex	Richardson, Barnhill Two	214-231-2573
Va	Arlington, Gans-Fryling	703-527-3262
Wash	Bellevue, Scientific Devices-Northwest	206-454-0900

DATACOM, INC., Box 278, Ft. Walton Beach, Fla., 32548, Tel: 904-244-6121, TWX: 510-730-7693; Empl.: 40; Minimum order: $25

For info on price: T. D. Jaye; Application info: T. D. Jaye; Customer service: A. J. Williams; Delivery info: L. L. Croxton

Products manufactured: Alarms, Data Acquisition & Reduction Systems, Memory Systems, Recorders

Local Sales Offices & Reps.

Ala	Huntsville, Currie, Peak, & Frazier, Inc.	205-536-5650
Fla	Orlando, Currie, Peak & Frazier, Inc.	305-855-0843
Md	Greenbelt, J.E. Cuesta & Co.	301-552-1200
Mich	Detroit, Electro Sls. Assocs.	313-526-8800
Mo	Hazelwood, Technical Reps.	314-731-5200
NC	Greensboro, Currie, Peak, & Frazier, Inc.	919-273-3040
Ohio	Dayton, Electro Sls. Assocs.	513-426-5551
Pa	Valley Forge, J.E. Cuesta & Co., Inc.	215-265-5800

DATADYNE CORP., Box 247, King of Prussia, Pa., 19406, Tel: 215-265-1793; FSC No: 53032; Empl.: 23; Minimum order: $25

For info on price: J. Riggs; Application info: J. P. Roding; Customer service: R. D. Currie; Delivery info: L. H. Biscombe

Free literature available: 1. Application Guide for high-speed digital printer mechanisms. 2. Service and Operating instructions for high-speed digital Printer including electronics & mechanics. 3. Low-speed printer specification 4. High-speed printer specification.

Products manufactured: Printers

DATAK CORP., 65 Seventy-First St., Guttenberg, N.J., 07093, Tel: 201-869-2200 .... p. 2•354,1079

For info on price: B, Postorino 201-869-2200; Application info: C. Pflueger 201-869-2203; Customer service: C. Pflueger 201-860-2203; Delivery info: F. Marascio 201-869-2200

Free literature available: Full Line catalog and price sheets; Reprint of article "Printed Circuit Applications of JotDraft Dry Transfers"; Reprint of article "Direct Etch Resist for Printed Circuits"; Printed Circuit Kits brochure.

Products manufactured: Capacitors, Fixed, Delcalcomania, Dials, Drafting Symbols, Dry Transfer, Pressure Sensitive, etc. (Including Lettering), Kits, Marking (Dial, Instrument, Equipment, etc.), Labels, Pressure-Sensitive, Adhesive, Nameplates, Scales, Dial

Local Sales Offices & Reps.

Ariz	Phoenix, H. Premil	602-939-6787
Cal	Millbrae, Polach & Bensinger	415-697-2525
Cal	West Covina, Don Forth Assocs.	213-962-1431
Colo	Denver, W.J. Purdy Co.	303-777-1411
Conn	Wallingfd., Adams-McGregor	203-269-0225
Fla	Ft. Lauderdale, Unirep, Inc.	901-683-7616
Ill	River Forest, Petitt Co.	312-369-9040
Md	Kensington, Forti-Austin	301-949-1707
Mass	Scituate, K. Walsh	617-545-2213
Minn	Minneapolis, Kodo Assoc.	612-881-1255
NJ	Caldwell, BCD Sls. Co.	201-226-2263
NJ	Willingboro, Forti-Austin Assocs.	609-871-9290
NM	Albuquerque, W.J. Purdy Co.	505-266-7959
NY	Middle Village, BCD Sls. Co.	212-894-1331
Ohio	Cleveland, C.H. Dolfuss, Jr. & Co.	PR 1-1270
Ohio	Dayton, C.H. Dolfus, Jr. & Co.	213-275-4831
Ore	Lake Oswego, McMillan Elctrns.	503-636-7954
Pa	Pittsburgh, G.S. Root & Co.	412-561-5707
RI	Lincoln, Adams-McGregor	401-726-1300
SC	Taylors, H.C. Norman	803-244-6254
Tenn	Memphis, H.C. Norman Sls. Co.	901-683-7616
Tex	Dallas, Loss & Stewart	214-691-6039

Local Distributors

Ala	Huntsville, Mock Elect. Inc., 2310 Memorial Pkwy.
Alas	Juneau, Juneau Elctrn., 241 S. Franklin
Ariz	Tempe, Circuit Special, 1110 N. Scottsdale Rd.
Cal	Palo Alto, Zack Elctrns., 654 High St.
Cal	San Francisco, Zack Elctrns., 1444 Market St.
Cal	W. Los Angeles, Cal. Elect. Supply, 1911 Armacost Ave.
Colo	Colorado Springs, Walker Elect., 2838 N. Prospect St.
Conn	Waterbury, Bond Radio Elect., 438 W. Main St.
Del	Wilmington, RESCO, 3601 Market St.
Fla	W. Palm Bch., Nurmi Elect., 1727 Donna Rd.
Ga	Atlanta, Lykes Elect. Sply., 1135 Chattahoochee Ave. N.W.
Haw	Honolulu, Precision Radio Ltd., 1160 S. King
Ill	Peoria, Klaus Radio & Elect., 8400 N. Pioneer Pkwy.
Ind	Indianapolis, Graham Elect., 133 Pennsylvania St.
Ky	Louisville, P.I. Burks Co., 842 So. 7th St.
La	N. Orleans, Radio Parts Inc., 1112 Magazine St.
Md	Baltimore, A S I Elect., 1728-30 Whitehead Rd.
Mass	Boston, Sager Elctrical Sply., 172 High St.
Mass	Dedham, Gerber Elect., 852 Providence Hwy.
Mich	Muskegan, Western Elect. Sply., 1781 Fifth St.
Minn	Minneapolis, Electronic Ctr., 107 Third Ave., N.
Mo	Kansas City, Burstein Applebee, 3199 Mercier
Mo	St. Louis, Gateway Elect., 8123-25 Page Blvd.
Neb	Lincoln, Scott Elect. Sply., 4040 Adams St.
Nev	Reno, Elect. Dist. Co., Box 2918
NH	Concord, Evans Radio Inc., Box 893
NJ	Spfld., Route Elect., Echo Plaza, Rt. 22

NM	Albuquerque, Elect. Parts, 222 Truman St. N.E.
NY	Buffalo, Summit Distributor, 916 Main St.
NY	L.I. City, H.L. Dalis, Inc., 35-35 24th St.
NY	Rochester, Rochester Radio Sply., 140 W. Main St.
NY	Syosset, Lafayette Radio, 111 Jericho Tpk.
NC	Raleigh, Southeastern Radio, 414 Hillsborough St.
Ohio	Akron, Akron Elect. Sply., 107 So. Arlington St.
Ohio	Columbus, Hughes-Peters, 481 E. 11th Ave.
Okla	Tulsa, Radio Inc., 1000 So. Main St.
Ore	Portland, Portland Radio Sply., 1234 S.W. Stark St.
Pa	Pittsburgh, R.P.C. Electronics, 620 Alpha Dr.
Pa	Reading, G. D. Barbey, 333 N. 4th St.
RI	Providence, W. Dandreta & Co., 28 Wolcott St.
SC	Columbia, Dixie Radio Sply., 1900 Barnwell St.
Tenn	Memphis, W & W Distributing, 641 Madison
Tex	El Paso, Midland Specialty Co., 2235 Wyoming Ave.
Utah	Provo, Central Stan Elect., Box N
Utah	Salt Lake City, Kimball Elect., 350 Pierpont Ave.
Va	Arlington, Arlington Elect. Who., 3636 Lee Hwy.
Wash	Seattle, Radar Elect. Co., 169 Western Ave. W.
Wisc	Milwaukee, Parts Mart Corp., 1314 N. Seventh St.

DATALOG DIV., LITTON SYS., 1770 Walt Whitman Rd., Melville, N. Y., 11746, Tel: 516-694-8326, TWX: 510-224-6477; Empl.: 110; Minimum order: $50

For info on price: Mktg. Dept. Ext. 151; Application info: Mktg. Dept. Ext. 151; Customer service: Prod. Svcs.-H. Israel Ext. 442; Delivery info: Mktg. Dept. Ext. 151

Free literature available: Brochures - Messagefax, Videofax, Pressfax, Weatherfax, Policefax, Photo Recorder, Printers - MC1000,MC2000, MC3000, MC3434, MC4600, MC8800, 1100 and MC5000

Products manufactured: Comm. Systems, Printers

Local Sales Offices & Reps.

Cal	Studio City	213-986-7350
NJ	Bayonne	201-823-2310
Okla	Tulsa	918-664-6170

DATAMETRICS INC., 340 Fordham Road, Wilmington, Mass., 01887, Tel: 617-658-5410; Empl.: 104; Minimum order: $50

For info on price: S. Lucke; Application info: H. Gray; Customer service: A. Crampton; Delivery info: K. McMillan

Free literature available: Programmable Controller Handbook; Pressure/Vacuum Measurement Handbook; Time Code Generator Catalog; Flow Measurement Catalog; Absolute Timing Distribution Handbook.

Products manufactured: Amplifiers, Bridges, Calibrators, Controllers, Programmable, Converters, Data Acquisition & Reduction Systems, Detectors, Encoders, Gages, Generators, Indicators, Meters, Monitors, Multiplexers, Standards, Switches, Tape Search Equipment, Thermometers, Resistance, Timers, Totalizers, Digital, Transducers

Local Sales Offices & Reps.

Ala	Huntsville, Lee Assocs. Inc.	205-533-5896
Cal	Campbell, Sedillo Co.	408-374-5220
Cal	Canoga Park, Boyle Assocs.	213-773-5982
Cal	Palo Alto, R. W. Thompson Assocs.	213-677-6105
Cal	Studio City, Pi Instruments	213-983-0151
Colo	Littleton, RADCO Elctrns.	303-794-4279
DC	Washington, Scientific Sys. Sls. Corp.	202-726-4161
Fla	Winter Haven, Lee Assocs.	813-294-5815
Ga	Atlanta, W. L. Schoonover	404-255-0761
Kans	Shawnee Mission, Pivan Eng.	913-722-1030
Md	Rockville, TE Corp.	301-340-0303
Mass	Burlington, Scientific Sys. Sls. Corp.	617-273-1660
Mass	Burlington, Tekdata	617-273-0198
Mass	Natick, Andruss-Peskin Corp.	617-653-3919
Mich	Detroit, S. Sterling Co.	313-255-1970
Mo	St. Louis, Pivan Eng.	314-542-3636
NM	Albuquerque, Klein Aerospace	505-344-8020
NY	Depew, Labtronics	716-685-4111
NY	Garden City, PM Elctrns.	
NY	Syosset, Scientific Sys. Sls. Corp.	516-921-3737
NY	Syracuse, Labtronics	315-454-9314
NC	Raleigh, Lee Assocs. Inc.	919-787-5818
NC	Winston-Salem, RADCO Co.	919-722-9671
Ohio	Dayton, E. V. Swenson	513-435-2772
Ohio	Dayton, S. Sterling	513-298-7573
Pa	Melrose Park, R. Meyers Assocs.	215-224-1663
Tex	Dallas, True Tech. Co.	214-691-7870
Tex	Houston, Leeco	713-649-7727
Tex	Richardson, Leeco	214-231-7696
Wash	Bellevue, Topp Engrg. Sls. Corp.	206-747-5401
Wash	Seattle, Showalter Judd	206-624-9020

DATAPROBE, INC., 290 Huyler St., So. Hackensack, N.J., 07606, Tel: 201-489-5588; Empl.: 10

Customer service: S. Weiss

Products manufactured: Comm. Systems, Controls/Control Eqpt., Display Devices/Displays, Generators, Multiplexers, Receivers, Testers, Transmitters

DATASCAN DIV., Anadex Instruments Inc., 7833 Haskell Ave., Van Nuys, Ca., 91406, Tel: 213-782-9527, TWX: 910-495-1762; Empl.: 95; Minimum order: $15

Customer service: Will Luff

Free literature available: Digital Panel Meter Catalog, I.C. Logic Card Handbook

Products manufactured: Cards, Logic, Comparators, Controls/Control Eqpt., Converters, Integrators, Electronic, Meters, Racks

Local Sales Offices & Reps.

Ala	Huntsville, Lee Assoc. Inc.	205-533-5896
Ariz	Tempe, PLS Assocs.	602-957-9110
Cal	Los Altos, Jay Stone & Assocs.	415-948-4563
Colo	Denver, PLS Assocs.	303-771-0140
Conn	W. Hartford, Instrument Assocs.	203-525-9367
Ill	Chicago, Pivan Engrg. Co.	312-539-4838
Ind	Indianapolis, Pivan Engrg. Co.	317-253-1681
Kans	Mission, Pivan Engrg. Co.	913-722-1030
Md	Wheaton, Sonco	301-942-9420
Mass	Bedford, Instrument Assocs.	617-275-0700
Mich	Farmington, Carter, McCormic & Peirce, Inc.	313-477-7700
Mich	Kalamazoo, Carter, McCormic & Peirce, Inc.	516-349-9666
Minn	Minneapolis, Pivan Engrg. Co.	612-537-4501
Mo	St. Louis, Pivan Engrg. Co.	314-567-3636
NJ	Ft. Lee, Tech. Mktg. Assoc.	201-224-6911
NM	Albuquerque, PLS Assocs.	505-255-2330
Ohio	Cleveland, Carter, McCormic & Peirce, Inc.	216-333-5650
Ohio	Dayton, Carter, McCormic & Peirce, Inc.	513-278-5873
Okla	Norman, Data Mktg. Assocs.	405-364-8320
Pa	Blue Bell, Sonco	215-CH2-8460
Pa	Pittsburgh, Carter, McCormic & Peirce, Inc.	412-824-3760
Tex	Dallas, Data Mktg. Assocs.	214-661-0300
Tex	Houston, Data Mktg. Assocs.	713-686-9627
Tex	San Antonio, Data Mktg. Assocs.	512-828-0937
Wash	Seattle, R. S. Drake Assocs.	206-763-2755
Wisc	Brookfield, Pivan Engrg. Co.	414-786-1940
FOR:	Can., Montreal, Que., Radionics Ltd.	514-735-4565

DATATRON, INC., Box 11427, Santa Ana, Cal., 92711, Tel: 714-540-9330, TWX: 910-595-1589; Empl.: 300

Products manufactured: Annunciators, Display Devices/Displays, Editing Equipment, Tape, Generators, Lights, Services, Assembly, Production & Test, Tape Search Equipment, Test Systems, Testers, Translators, Data

Local Sales Offices & Reps.

Ala	Huntsville, Currie Aerospace	205-536-5650
Cal	Anaheim, Broadcast Comms. Devices	714-528-9505
Cal	Ben Lomond, Broadcast Comms. Devices	408-336-5437
Cal	Los Angeles, Basic Sys.	213-938-2833
Cal	Mountain View, Prod. Data Co.	415-941-4410
Cal	San Diego, Mesa Elctrns.	714-278-8021
Colo	Englewood, Davis Assocs.	303-761-9228
Colo	Evergreen, Didier/Denver	303-674-6000
Fla	Lighthouse Point, Saber Assocs.	305-422-3686
Ga	Atlanta, Radford Assocs.	404-237-6097
Ill	Chicago, Megatek, Inc.	312-889-1277
Md	Gaithersburg, Data-Time	301-948-7666
Mass	North Billerica, Datatron East	617-667-5353
Mich	Detroit, WKM Assocs.	313-892-2500
Mich	Farmington Hills, M. Dyer	313-892-2500
Minn	Minneapolis, Megatek, Inc.	612-933-2133
Mo	Raytown, Production Automation	816-737-0066
NJ	Fairfield, KLS Assocs.	201-227-2900
NM	Albuquerque, Rustco Entprs.	505-296-6474
NY	Garden City, P.M. Elctrns.	516-248-4858
NY	Kings Park, KLS Assocs.	212-233-4849
Ohio	Cleveland, WKM Assocs.	216-267-0445
Ohio	Dayton, WKM Assocs.	513-434-7500
Okla	Norman, Data Mktg. Assocs.	405-364-8320
Tex	Dallas, Data Mktg. Assocs.	214-661-0300
Tex	Dallas, Martin, Zienkosky, Browne & Assoc.	214-233-5535
Tex	Houston, Data Mktg. Assocs.	713-686-9627
Tex	San Antonio, Data Mktg. Assocs.	512-828-0937
Wash	Seattle, Avionics Liaison	206-767-3870
FOR:	Can., Don Mills, Ont., Glentronix	416-444-8497
FOR:	Can., Montreal-Nord 462, Que., Auvinic	514-322-4564

DATAWEST CORP., 7333 E. Helm Dr., Scottsdale, Ariz., 85260, Tel: 602-948-3280; Empl.: 14; Minimum order: $150

Customer service: N. T. Holzer

Products manufactured: Controllers, Programmable, Converters

DATEL SYSTEMS INC., 1020 Turnpike St., Canton, Mass., 02021, Tel: 617-828-8000, TWX: 710-348-0135; Empl.: 215; Minimum order: $30

p. 1•156-161,241,648,1166,1167

For info on price: B. Aldsworth; Application info: B. Salow; Customer service: S. Jackson; Delivery info: S. Jackson

Free literature available: 70 Pg Engineering Product Handbook-General catalog of A/D & D/A converters, multiplexers, sample/holds, DPM's, power supplies; 20 pg Data Acquisition Brochure; 16 Pg Power Supply Catalog; 16 Pg Cassette Data Logger Brochure; 60 Individual Product Data Sheets.

Products manufactured: Amplifiers, Computers, Converters, Counters, Data Acquisition & Reduction Systems, Data Loggers, Filters, Integrated Circuit Devices, Meters, Multiplexers, Multipliers, Power Supplies, Printers, Recorders, Tapes, Recording, Magnetic (All Types), Timers, Totalizers, Digital

Local Sales Offices & Reps.

Ala	Huntsville, Int'l. Scientific Instrs.	205-837-1601
Ariz	Phoenix, Cleveland Ent.	602-996-6130
Cal	Los Angeles, Datel Sys.	213-933-7256
Cal	Santa Ana, Datel Sys., Inc.	714-835-2751
Cal	Sunnyvale, Datel Sys.	408-733-2424
Colo	Westminster, Harvey Data Sys., Inc.	303-427-5299
Fla	Lighthouse Point, Saber Assocs., Inc.	305-943-3076
Fla	Longwood, Saber Assocs., Inc.	305-422-3686
Fla	St. Petersburg, Saber Assocs., Inc.	813-441-1301
Haw	Honolulu, Hawaii Data Sys.	808-946-1533
Ill	Chicago, Carter Elctrns., Inc.	312-585-5485
Ind	Indianapolis, Carter Elctrns., Inc.	317-293-0696
Iowa	Marion, B. Rush Assocs.	319-377-6313
Kans	Olathe, Technical Reps.	913-782-1177
Mass	Canton, Datel Sys., Inc.	617-828-8000
Mich	Troy, G.R. Peters Assocs.	313-524-2920
Minn	Minneapolis, Carter Elctrns., Inc.	612-544-9393
Mo	Hazelwood, Technical Reps.	314-731-5200
NJ	Fort Lee, Tech Mktg. Assoc.	201-224-6911
NM	Albuquerque, Cleveland Ent.	505-345-2481
NY	Liverpool, R & D Assocs.	315-622-2350
Ohio	Cleveland, Instrumentation Sys.	216-486-0782
Ohio	Dayton, Instrumentation Sys.	513-294-2838
Pa	King of Prussia, Rivco	215-265-5211
Pa	Pittsburgh, Instrumentation Sys.	412-243-1111
Tex	Dallas, Evans-McDowell	214-238-7157
Tex	Houston, Evans-McDowell	713-783-2900
Va	Arlington, H.J. Heffernan Co.	703-522-6666
Wash	Seattle, Jon B. Jolly Inc.	206-938-4166
Wisc	Milwaukee, Carter Elctrns.	414-464-5555
EXP:	Montreal 12, Quebec, Can., Prelco Elctrns., Ltd.	514-389-8051
EXP:	Ottawa, Ontario, Can., Prelco Elctrns., Ltd.	613-237-6150
EXP:	Rexdale, Ontario, Can., Prelco Elctrns., Ltd.	416-678-0401

DATEX DIV., Conrac Corp., 1600 S. Mountain Ave., Duarte, Cal., 91010, Tel: 213-395-9141

Products manufactured: Comm. Systems, Controls/Control Eqpt., Converters, Indicators

DATRON SYSTEMS, 20716 Plummer St., Chatsworth, Cal., 91311, Tel: 213-882-9616, TWX: 910-494-2787; Empl.: 165; Minimum order: $100

For info on price: F. M. Amtsberg; Application info: N. Hannon; Customer service: F. M. Amtsberg; Delivery info: F. M. Amtsberg

Products manufactured: Amplifiers, Antenna Feed Systems, Antenna Rotators, Antennas, Computers, Controls/Control Eqpt., Data Acquisition & Reduction Systems, Detectors, Horns, Microwave, Indicators, Integrators, Electronic, Limit Stops, Mechanical, Mounts, Networks, Pedestals, Radar, Radar Systems, Servo Systems, Tracking Systems

Local Sales Offices & Reps.

Ala	Huntsville, P. T. Miller Assocs.	205-534-2652

Cal	Mountain View, Microwave Mktg. Assocs.	415-969-3355
Cal	Santa Barbara, Kannard Engrg., Inc.	805-682-1928
DC	Washington, ECM Assocs.	202-296-1337
Fla	Ft. Lauderdale, Snow Co.	305-563-2449
Mass	Needham Hgts., Reptron, Inc.	617-449-4142
Tex	Fort Worth, C. Wolf & Assocs.	817-738-1996

DATTILO
ENTERPRISES, INC.

DATTILO ENTERPRISES, INC., 9405 Doral Ct., Louisville, Ky., 40220, Tel: 502-426-1212; Empl.: 50

Customer service: D. P. Dattilo 502-491-6262

Free literature available: Available literature includes a short form brochure describing capabilities and services offered. Application notes (with photos) are included with specific details on cost reduction re-design.

Products manufactured: Cards, Linear Function, Cards, Logic, Services, Assembly, Production & Test

Local Sales Offices & Reps.

Ind	Indianapolis, Needler Sls. Co.	317-255-8056
Ky	Louisville, Custom Comp. Sls.	502-969-4473

Advertisment

Why do so many firms, both large and small, come to Dattilo Enterprises, Inc. for design, layout, and complete printed circuit assemblies. The answer is simple. We do more than anyone else in the industry to help you with your individual circuit needs. We provide weekly status reports to keep you up-to-date with your RFQ or Purchase order. We do not offer excuses, only fast, concise information or solutions. We have established our reputation on superior quality at reasonable prices. For complete printed circuit assemblies from design to finished product; remember our name. We would be pleased to add your company to our constantly growing list of satisfied customers. If the above sound to good to be true.......try us, you will be very pleasantly surprised.

DATUM, INC., 1363 State College Blvd., Anaheim, Calif., 92806, Tel: 714-533-6333, TWX: 910-592-1289; Empl.: 300

Products manufactured: Amplifiers, Analyzers, Clocks (All Types), Computers, Converters, Data Acquisition & Reduction Systems, Generators, Memory Systems, Multiplexers, Printers, Readers, Receivers, Recorders, Tape Recording Accessories, Tape Search Equipment, Terminal Equipment, Digital, Timers

Local Sales Offices & Reps.

Ala	Huntsville, Datum	205-881-7629
Ala	Huntsville, Lee Assocs.	205-533-5896
Ariz	Scottsdale, BFA of Arizona, Inc.	602-946-4215
Cal	Lawndale, Ward/Davis Assoc.	213-542-7740
Cal	San Diego, Datum, Inc.	714-453-1633
Cal	Sunnyvale, Ward/Davis Assoc.	408-245-3700
Colo	Denver, BFA of Arizona, Inc.	303-744-3301
Conn	Hamden, P. Jenks Assoc.	203-281-0810
Fla	Ft. Lauderdale, Lee Assocs.	305-525-9767
Fla	Longwood, Southern Data Assocs.	305-831-3311
Fla	Winterhaven, Lee Assocs.	813-294-5815
Ill	Hoffman Estates, Datum, Inc.	312-298-1244
Kans	Wichita, Winco, Inc.	316-684-8224
Md	Silver Spring, K-G Elctrns.	301-588-3000
Mass	Wakefield, P. Jenks Assoc.	617-246-1590
Mass	Waltham, Datum, Inc.	617-899-7474
Mich	Detroit, Electro Sls. Assoc.	313-526-8800
NM	Albuquerque, BFA of Arizona, Inc.	505-292-1212
NM	Las Cruces, BFA of Ariz., Inc.	505-523-0601
NY	Great Neck, Krasner Assocs.	516-487-0690
NY	Melville, Astrorep	516-423-2266
NC	Raleigh, Lee Assocs.	919-787-5818
Ohio	Aurora, EMA, Engrg. Mktg. Assoc.	216-562-6104
Ohio	Centerville, EMA, Inc.	513-433-2800
Ohio	Cleveland, Electro Sls. Assoc.	216-261-5440
Ohio	Dayton, Electro Sls. Assoc.	513-426-5551
Pa	Norristown, Denco, Data Engrg. Co.	215-279-8146
Pa	Pittsburgh, Electro Sls. Assoc.	412-371-9449
Tex	Arlington, J. T. Houston Assoc.	817-265-2931
Tex	Dallas, Data Aids Assoc.	214-620-1551
Tex	Dallas, Datum, Inc.	214-352-7411
Tex	Houston, Data Aids Assoc.	713-862-6685
Utah	Salt Lake City, BFA of Ariz.	801-466-6522
Wash	Seattle, Comptronics, Inc.	206-284-4842

DAVIDSON ELCTRN. DEV. CO., 2211 Peninsula Dr., Erie, Pa., 16506, Tel: 814-833-9818

Customer service: A. R. Davidson

Products manufactured: Bridges, Meters, Test Systems

Local Sales Offices & Reps.

Mich	Detroit, WKM Assocs.	313-892-2500
Ohio	Cleveland, W.K.M. Assocs.	216-267-0445
Ohio	Dayton, W.K.M. Assocs.	513-434-7500
Pa	Pittsburgh, W.K.M. Assocs.	412-892-2953

Advertisment

Davidson designs and builds to your requirements: automatic test equipment, data acquisition systems, automatic adjust equipment, and special devices for the electrical and electronic industry.

DAVIES MOLDING CO., HARRY, 4920 Bloomingdale Ave., W., Chicago, Ill., 60639, Tel: 312-622-8966; FSC No: 5355; Empl.: 170; Minimum order: $25

For info on price: L. A. Sera; Application info: L. A. Sera; Customer service: R. C. Appleby Jr.; Delivery info: R. C. Appleby Jr.

Free literature available: 24 page catalog of plastic knobs, handles, and cases available without tooling costs.

Products manufactured: Cabinets & Accessories, Cases, Equipment, Instrument, Meter, Dials, Handles For Cabinets, Circuit Boards, Racks, etc., Knobs

Local Sales Offices & Reps.

Cal	Belmont, Littrell Western Sls., Inc.	415-592-3346
Cal	Los Angeles, Littrell Western Sls., Inc.	213-261-0164
Conn	Meriden, P.R. Sturgeon Co.	203-237-1112
Fla	Fort Lauderdale, W. Chester Smith	305-564-1477
Ill	Chicago, R. W. Kruse Co.	312-736-9546
Ind	Clermont, L.T. Clower Co.	317-293-3598
Iowa	Cedar Rapids, Clancey Co.	319-365-7141
Iowa	Des Moines, Clancey Co.	515-278-1331
Mass	Babson Park, P.R. Sturgeon Co.	617-237-3506
Mich	Bloomfield Hills, Gitre Co.	313-645-1777
Mo	Kansas City, Clancey Co.	816-931-3090
Mo	St. Louis, Clancey Co.	314-432-3633
NY	Syosset, Rywel Sls.	516-364-0888
Ohio	Westlake, Foley & Beilstein Co.	216-871-8830
Pa	Erie, M.L. Crowell Co.	814-454-0250
Pa	Paoli, W.G. Walker	215-627-8146
Tenn	Memphis, L.E. Offutt Co.	901-789-1210
Tex	Dallas, Commercial Plastics & Supply Co.	214-631-8170
Wash	Seattle, Northwest Plastics Inds.	206-763-0441
•Wisc	Milwaukee, Clague Sls. Corp.	414-272-1951
FOR:	Can., Toronto, Atlas Elctrns., Ltd.	416-781-6174

DAVEN, See McGraw-Edison Co.

DAVIS ELEC. CO., Box 38, Cape Girardeau, Mo., 63701, Tel: 314-335-5547; Empl.: 54; Minimum order: $100

For info on price: B. D. Davis; Application info: T. Le Grand; Customer service: B. D. Davis; Delivery info: B. D. Davis

Products manufactured: Relays

Local Sales Offices & Reps.

Cal	Costa Mesa, George Mousel Co.	714-546-8990
Cal	Los Altos, Schwerin Assocs.	415-941-3737
Cal	Santa Barbara, Schwerin Assocs.	805-967-7317
Fla	Palm Beach Gardens, W. Reasor & Assocs.	305-622-4049
Fla	Tampa, W. Reasor & Assocs.	813-877-2886
Ill	Norridge, Gianaras Sls. Co.	213-SP4-4600
Mass	Scituate, Near, Inc.	617-545-6327
Mo	Kansas City, Automatic Gen. Elctrn. Sls., Co.	816-DE3-8206
Ohio	Cincinatti, Components Inc.	513-721-2997
Ohio	Cleveland, Components Inc.	216-VI2-2737
Pa	Radnor, W. Henry Cordray Sls. Co.	215-TR8-3737
Tex	Dallas, Stevens Sls. Co.	214-350-2476
Wisc	Cedarburg, TFL Assocs.	414-377-7030

DAVIS & CO., J.W., Box 35313, Dallas, Tex., 75235, Tel: 214-352-8405; Empl.: 42

For info on price: W. Hevron; Application info: W. N. Fangio; Customer service: S. DeHay; Delivery info: W. Hevron

Products manufactured: Amplifiers, Attenuators, Cabinets & Accessories, Knobs, Mixers, Speaker Systems, Speakers, Transformers

Local Sales Offices & Reps.

Ill	Chicago, B. Burns & Assocs.	312-775-1233
Kans	Overland Park, T. Dowell & Assocs.	913-236-8200
Tex	Dallas, Crockett Sls. Co.	214-748-8209

DE COURSEY ENGRG. LAB., 11828 W. Jefferson, Culver City, Cal., 90230, Tel: 213-EX7-9668; Empl.: 7

Customer service: L. W. Howard

Free literature available: "Active Filters by DeCoursey" "DeCoursey Model 110 Electronic Dividing Network."

Products manufactured: Chargers, Battery, Coils Including Assemblies & Forms, Filters, Inverters, Networks, Transformers

DEARBORN ELCTRNS. DIV., Sprague Elec. Co., Box 1076, Longwood, Fla., 32750, Tel: 305-838-3011; FSC No: 56289; Minimum order: $50

Customer service: J. D. Kowalsk 413-664-4411 Ext. 2495

Products manufactured: Capacitors, Fixed

Refer to Sprague Electric for Sales office information

DEARBORN WIRE & CABLE CO., 8299 Evenhouse Dr., Rosemont, Ill., 60018, Tel: 312-696-1000; Empl.: 58; Minimum order: $25 .... p. 2•1993

For info on price: K. Brcka; Application info: K. Brcka; Customer service: M. DePinto; Delivery info: J. Lebert

Products manufactured: Braid, Cable, Bus Bars & Systems, Cable Assemblies & Harnesses, Cable, Cable Retractors, Cords, Monitors, Shields, Tubing, Wire, Wire Shielding

Local Distributors

Cal	Burlingame, Rose Elctrns., 846 Stanton	415-697-0224
Cal	Garden, Allied Elctrns., 12821 Knotts Ave.	213-598-8671
Cal	Inglewood, Switch & Signal, 1009 W. Arbor	213-776-3550
Fla	Clearwater, Diplomat Southland, 1771 N. Hercules	813-443-4512
Fla	Miami, Electro-Standards Lab., 3560 N.W. 34th	305-633-6973
Ill	Chicago, Allied Elctrns., 2400 W. Washington	312-421-2400
Ill	Chicago, Merrill Elctrns., 3563 N. Milwaukee	312-386-2525
Ill	Chicago, Newark Elctrns., 500 N. Pulaski	312-638-4411
Ill	Elk Grove, Diplomat Lakeland Electrn., 2451 Brickvale	312-595-1000
Ind	Evansville, Hutch & Sons, 300 N. Main	812-425-7201
Ind	Fort Wayne, Fort Wayne Elctrns., 3606 Maumee Ave.	219-423-3422
Mich	Grand Rapids, Stotts-Friedman, 2035 Eastern Ave.	616-241-6731
Minn	Minneapolis, Electro-Com, 3816 Chandler Dr.	612-788-8601
Mo	St. Louis, Diplomat St. Louis, 2725 Mercantile	314-645-8550
NY	Rochester, Simcona Elctrncs., 275 Mt. Read Blvd.	716-328-3230
Tenn	Knoxville, Industrial Electric, Gov. J. Sevier	615-753-7135
Tex	Garland, Hisco, 3710 Marquis	214-272-5411
Tex	Houston, Altair Co., 9501 Baythorne	713-462-3029
Tex	Houston, Hisco, 1815 Dallas	713-228-6662
Tex	Richardson, Altair, Box 26	204-231-5166
Utah	Salt Lake, Diplomat Alta Elctrns., 2280 S. Main Str.	801-486-7227
Va	Portsmouth, Distributors Inc., 710-712 Country	703-399-2446
Va	Richmond, Avec Elctrns., 2002 Staples	703-359-6071
Wisc	Milwaukee, Electronic Expeditors, 6045 Green	414-228-8100

DECISION DATA COMPUTER CORP., 100 Witmar Rd., Horsham, Pa, 19044

DECITEK, Div. Jamesbury Corp., 250 Chandler St., Worcester, Mass., 01602, Tel: 617-798-8731; Empl.: 800

Free literature available: Bulletin D2 Decitek Punched Tape Readers

Products manufactured: Readers

Local Sales Offices & Reps.

Ala	Huntsville, Beacon Elctrns. Assocs.
Cal	Costa Mesa, Costello Little & Co.
Cal	Los Altos, Casey Assoc.
Conn	Southbury, J.J. Wild
Fla	Ft. Lauderdale, Beacon Elctrns. Assoc.
Fla	Maitland, Beacon Elctrns. Assoc..
Ga	Atlanta, Beacon Elctrns. Assoc.
Ill	Rolling Meadows, Lightner Assoc.
Kans	Shawnee Mission, Inland Assoc.
Mass	Needham, J.J. Wild
Mich	Southfield, Data-Tron
Minn	Minneapolis, Loonam Assoc.
Mo	Glen Cove, Inland Assoc.
NJ	Woodbridge, J.J. Wild
NY	Jericho, J.J. Wild
Ohio	Dayton, Data-tron
Ohio	Wickliffe, Data-tron
Pa	Monroeville, Data-tron
SC	Spartanburg, Beacon Elctrns. Assoc.

DEFIANCE CIRCUIT CORP., Sub. Hi-G, 12 Shepherd St., Lawrence, Mass., 01843, Tel: 617-688-1856, TWX: 710-342-1246; Empl.: 120; Minimum order: $100 p. 2•252,253

Customer service: Bill Imlach 617-688-1856

Products manufactured: Boards, Printed Circuit

Local Sales Offices & Reps.

Cal	Downey, Trimarco	213-861-8244
Conn	Middletown, John E. Boeing	203-632-1892
Ga	Marietta, K & E Assocs.	404-427-0241
Ill	Des Plaines, Coombs Assoc.	312-298-4830
Kans	Wichita, Buse Sls.	316-685-8036
Md	Timonium, Heller Sls.	301-252-4780
Mass	Lexington, John E. Boeing Co.	617-862-2500
Minn	Minneapolis, Nygaard Sls.	612-881-3727
Miss	Corinth, K & E Assoc.	601-287-5369
Mo	St. Charles, Buse Sls. Co.	314-946-6430
NY	Great Neck, Pacent-DiBlasi	516-482-4678
NY	Rochester, Tech-Mark	716-223-1252
Pa	Glenside, Elcom, Inc.	215-885-1325
Tex	Dallas, Blackburn Assoc.	214-351-9991
EXP:	Can.,Mississauga, Ont., Anbak Sales	416-625-1061

DEGUSSA INC., Metals Div., Two Pennsylvania Plaza, New York, N.Y., 10001, Tel: 212-563-7100, TWX: 710-581-6320; Empl.: 30; Minimum order: $25

Customer service: Metals Div.

Free literature available: Catalog 101 - Platinum resistance elements for temperature sensing, Catalog 102 - Resistance temperature detectors, WS-81 - Platinum resistance surface temperature sensor.

Products manufactured: Probes, Thermometers, Resistance, Transducers, Wire

DEL ELECTRONICS CORP., 250 E. Sandford Blvd., Mt. Vernon, N.Y., 10550, Tel: 914-699-2000, TWX: 710-562-0130; FSC No: 01378; Empl.: 100 p. 1•1168-1176; p. 2•120

For info on price: W. Young; Application info: B. Michalak; Customer service: T. Galgano; Delivery info: T. Galgano

Free literature available: Complete Catalogs Available

Products manufactured: Analyzers, Capacitors, Fixed, Capacitors, Variable, Chokes, Coils Including Assemblies & Forms, Connectors, Controls/Control Eqpt., Converters, Counters, Dividers, Indicators, Inverters, Modulators, All Kinds, Monitors, Multipliers, Networks, Oceanographic Equip. (Electronic), Power Supplies, Reactors, Regulators, Relays, Switches, Testers, Transducers, Transformers

Local Sales Offices & Reps.

Ala	Huntsville, Lee Assocs.	205-533-5896
Cal	Downey, Trimarco, Inc.	213-861-8244
Cal	Palo Alto, Brooks Techn. Group	415-328-3232
Cal	Pasadena, D Ellis Co.	213-681-9108
Cal	San Carlos, Winco Sls.	415-365-6082
Colo	Littleton, Radco Elctrns.	303-794-4279
Fla	Winter Haven, Lee Assocs.	813-294-5815
Fla	Winter Park, Young & Lawrence Assoc.	305-647-6929
Haw	Honolulu, Aloha Assocs.	808-941-1574
Ill	Elmhurst, Scott Assocs.	312-279-5681
Md	Ellicott City, Whitco	301-937-1122
Mass	Burlington, TriTek Inc.	617-272-4550
Mich	Dearborn, Pitcher-Poulin	313-582-5450
Mich	Lathrup Village, R.C. Nordstrom & Co.	313-559-7373
Minn	Mpls., Scott Elctrn. Sls.	612-929-2985
Mo	Springfield, Del-Tech Assocs.	417-881-3667
NJ	Nutley, I. Brill	201-667-0653
NM	Albuquerque, Trembly Assocs.	505-293-4444
NY	Commack, L.K. Haner Assocs.	516-864-2220
NC	Raleigh, Lee Assocs.	919-787-5818
Ohio	Cincinnati, F.J. Campisano	513-662-1616
Ohio	Fairborn, Tech. Assocs.	513-878-2484
Ore	Portland, J.E. Edstrom	503-775-8527
Pa	Ardmore, Martin Elec. Co.	215-649-6332
Tex	Richardson, Athans Sls. Co.	214-235-7859
FOR:	Can., Toronto, Ont., Datamex	416-787-1208
FOR:	Can., Ville La Salle, Que., Electrodesign	514-363-5120

DELBERT BLINN. CO., Box 2007, Pomona, Calif., 91766, Tel: 714-623-1257

Products manufactured: Bushings, Glass, Plastic, Metal, Rubber, Etc., Fasteners, Insulators & Insulation, Pads, Transistor Mounting, Services, Assembly, Production & Test, Sockets, Spacers, Transistor, Diode, Thyristor Heat Dissipators

DELCO ELECTRONICS DIV., General Motors Corp., 700 Firmin St., Kokomo, Ind., 46901, Tel: 317-457-8461, TWX: 810-269-1921; Empl.: 9500 p. 1•1838-1841

Free literature available: Short Form Catalogs, Data Sheets and Application Notes.

Products manufactured: Accelerometers, Alarms, Cards, Logic, Computers, Controls/Control Eqpt., Converters, Data Acquisition & Reduction Systems, Diodes, Gyros (All Types), Heat Sinks, Soldering, Inverters, Rectifiers, Suppressors, Transistor, Diode, Thyristor Heat Dissipators, Transistors

Local Sales Offices & Reps.

Cal	Goleta	805-968-1011
Cal	Van Nuys	213-988-7550
Ind	Kokomo	317-459-2175
NJ	Union	201-687-3770
Exp:	NY New York, Gen. Motors Overseas Opers, Power & Ind'l. Prods. Dept.	212-486-3723

Local Distributors

Ala	Birmingham, Forbes Distr. Co., 1416 Fourth Ave., S.	205-251-4104
Ala	Huntsville, Powell Elctrns., 803 Oster Dr.	205-539-2731
Ariz	Phoenix, Sterling Elctrns., 1930 N. 22nd Ave.	602-258-4531
Cal	Goleta, R.P.S. Elctrns., 350-E So. Kellogg Ave.	805-964-6823
Cal	Los Angeles, Kierulff Elctrns., 2585 Commerce Way	213-685-5511
Cal	Los Angeles, R.P.S. Elctrns., 1501 S. Hill St.	213-748-1271
Cal	Palo Alto, Kierulff Elctrns., 3969 E. Bayshore Rd.	415-968-6292
Cal	San Diego, Kierulff Elctrns., 8797 Balboa Ave.	714-278-2112
Cal	San Diego, R.P.S. Elctrns., 7889 Clairemont Mesa Blvd.	714-292-5611
Cal	Sunnyvale, Bell Inds., 1161 N. Fairoaks Ave.	408-734-8570
Colo	Denver, Kierulff Elctrns., 10890 E. 47th Ave.	303-371-6500
Conn	Norwalk, Harvey Elctrns., 112 Main St.	203-853-1515
Fla	Miami Springs, Powell Elctrns./Fla., 1744 N.W. 69th Ave.	305-592-3260
Fla	Orlando, Powell Elctrns./Fla., 2032 Palm Ridge Way	305-859-1450
Ill	Rosemont, Kierulff Elctrns., 9340 William St.	312-678-8560
Ill	Skokie, Bell Inds., 7701 N. Austin Ave.	312-282-5400
Ind	Indianapolis, Graham Elctrns. Supply, 133 So. Pennsylvania St.	317-634-8202
Md	Baltimore, Radio Elec. Serv. Co., 1026 Cromwell Bridge Rd.	301-823-0070
Mass	Billerica, Kierulff Elctrns.	617-935-5134
Mass	Newton, Greene-Shaw Co., Chapel Bridge Pk., 70 Bridge St.	617-969-8900
Mich	Farmington, Harvey-Michigan, 23461 Ind. Pk. Dr.	313-477-1650
Mich	Livonia, Pioneer/Mich.	313-525-1800
Minn	Minneapolis, Stark Elctrns. Supply Co., 112 3rd Ave., N.	612-332-1325
Mo	Kansas City, Walters Radio Supp., 2627-3635 Main St.	816-531-7015
Mo	St. Louis, LCOMP-St. Louis, 2605 S. Hanley Rd.	314-647-5505
NJ	Cinnaminson, Wilshire Elctrns./Philadelphia, 855 Ind. Hwy. - Unit 5	609-786-8990
NJ	Clifton, Wilshire Elctrns./N.J., 312 Clifton Ave.	201-365-2600
NM	Albuquerque, Sterling Elctrns., 3530 Pan American Fwy.	505-345-6601
NY	Binghamton, Harvey Elctrns., Box 1208	607-748-8211
NY	Buffalo, Summit Dist., 916 Main St.	716-884-3450
NY	Farmingdale, Wilshire Elctrns./L.I., 1855 New Highway	516-293-5775
NY	Woodbury, Harvey Elctrns., 60 Crossways Pk. W.	516-921-8700
Ohio	Cincinnati, United Radio, 7713 Reinhold Dr.	513-761-4030
Ohio	Cleveland, Pattison Supp. Co. Ind. Elctrns. Div., 4550 Willow Pkwy.	216-441-30000
Ohio	Dayton, Pioneer.Dayton, 1900 Troy St.	513-236-9900
Pa	Philadelphia, Almo Elctrns., Roosevelt Blvd. at Blue Grass Rd. Northeast Ind. Pk.	215-698-4000
Pa	Pittsburgh, Cameradio Elctrns., 2801 Liberty Ave.	412-288-2600
SC	Columbia, Dixie Radio Supp. Co., 1900 Barnwell St.	803-253-5333
Tex	Dallas, Sterling Elctrns., 2875 Merrell Rd.	214-263-1711
Tex	Fort Worth, Adleta Elctrns. Co., S. Expwy. at E. Vickery	817-336-7446
Tex	Garland, Kierulff Elctrns.	214-271-2471
Tex	Houston, Harrison Equip. Co., 1616 McGowen St.	713-224-9131
Wash	Seattle, Kierulff Elctrns., 5940 6th Ave. S.	206-763-1550
For:	Can., Scarborough, Ont., Lake Engrg. Co., Ltd., 123 Manville Rd.	416-751-5980

DELEVAN DIV., AMERICAN PREC. INDS., Clutch & Brake Prods., 270 Quaker Road, E. Aurora, N.Y., 14052, Tel: 716-652-3600, Telex: 91-293; Empl.: 350 p. 1•945

Customer service: J. Holmes

Free literature available: Hysteresis Clutches & Brakes, Model 20 Electro-Magnetic Clutches & Brakes, Precision Electro-Mechanical Clutches & Brakes

Products manufactured: Brakes, Clutches

Local Sales Offices & Reps.

Ariz	Phoenix, Southwest e/m Engrg., Inc.	602-993-0250
Cal	Los Altos, Servo-Data	415-964-1325
Cal	Los Angeles, L-Tronix Assocs.	213-256-2224
Colo	Denver, Walter Engrg. Assocs.	303-777-5585
Fla	Boca Raton, Conley & Assocs., Inc.	305-395-6108
Fla	Oviedo, Conley & Assocs., Inc.	305-365-3283
Fla	Tampa, Conley & Assocs., Inc.	813-933-3183
Ill	Hinsdale, Momak Sls.	312-654-4524
Kans	Leawood, H.C. Heyde Co.	913-649-8628
Md	Lutherville, J.A. Dougherty Sls. Co.	301-321-7890
Mass	Boston, P.J. Engrg. Sls. Co.	617-924-5950
Minn	Minneapolis, E.C. Elctrn. Sls.	612-831-0229
NJ	Parlin, Martech Assocs.	201-721-2200
NJ	Woodstown, Loman Co.	609-769-0055
NY	Manhassett, Martech Assocs.	516-627-1151
NY	Syracuse, M. C. Antil	315-437-4851
Tex	Dallas, Scott Tech. Sls. Co.	214-352-7698
EXP:	Montreal, Can., J.G. Weiss Co. Ltd.	514-489-6887
EXP:	North Vancouver, Can., J.G. Weiss Co. Ltd.	604-987-3833
EXP:	Rexdale, Ont., Can., J.G. Weiss Co. Ltd.	416-766-0843

DELEVAN DIV., COIL PRODS., American Precision Inds., 270 Quaker Rd., E. Aurora, N.Y., 14052, Tel: 716-652-3600, Telex: 91-293; FSC No: 99800; QPL No: Multiple; Empl.: 350; Minimum order: $40 p. 2•388

For info on price: F. E. Riehle; Application info: R. Schuler; Customer service: S. Kerling; Delivery info: S. Kerling

Products manufactured: Chokes, Coils Including Assemblies & Forms, Transformers

Local Sales Offices & Reps.

Ariz	Phoenix, Toward Engrg.	602-277-1453
Cal	Los Angeles, L-Tronix Assoc.	213-256-2224
Cal	Menlo Park, Long & Assoc.	415-327-1300
Colo	Denver, Walter-Engrg.	303-777-5585
Fla	Boca Raton, Conley & Assc.	305-395-6108
Fla	Oviedo, Conley & Assoc.	305-365-3283
Fla	Tampa, Conley & Assoc.	813-933-3183
Ill	Hinsdale, MO-MAK Sls.	312-654-4524
Ind	Ft. Wayne, W.W. Bieberich	219-432-2537
Iowa	Cedar Rapids, Lorenz Sls.	319-393-9125
Kans	Leawood, H.C. Heyde Co.	913-649-8628

Md Lutherville, J. Dougherty Sls. 301-321-7890
Mass Boston, P.J. Engrg. 617-924-5950
NJ Haddonfield, Thomas Assocs. 609-854-3011
NJ Parlin, Martech Assc. 201-721-2200
NY Endicott, Tech-Mark 607-748-7473
NY Fairport, Tech-Mark 716-223-1252
NY Manhasset, Martech Assc. 516-627-1151
Ohio Cleveland, C. Robinson 216-381-9049
Ohio Dayton, C. Robinson 513-275-2412
Okla Broken Arrow, P.J. Scanlon Co. 918-251-1427
Ore Portland, D.G. Weber Co. 503-234-0686
Tenn Shelbyville, R. Mitscher 615-684-4544
Tex Houston, P.J. Scanlon 713-466-6897
Tex Richardson, P. Scanlon 214-231-4661
Wash Seattle, D. G. Weber Co. 206-623-5990

Local Distributors
Cal Glendale, R. V. Weatherford, 6921 San Fernando Rd. 213-849-3451
Cal Mountain View, Elmar Elctrns., 2288 Charleston Rd. 415-961-3611
Cal Sunnyvale, Cramer/San Francisco, 720 Palomar Ave. 408-739-3011
Cal Woodland Hill, Rampart Comps., 21201 Oxnard St. 213-887-7260
Conn Fairfield, Utronics, 273 Linwood Ave. 203-255-4521
Fla Clearwater, Diplomat/Southland, 1771 No. Hercules Ave. 813-443-4514
Ind South Bend, Radio Distributing, 1212 High St. 219-287-2911
Md Savage, Pyttronics Ind., 8200 Wellmoor Ct. 301-792-7000
Mass Boston, P. J. Engrg. Supply, 360 N. Beacon St. 617-783-0510
NJ Pennsauken, Resco Elctrns., Airport Industrial Pk. 215-925-6900
NY Buffalo, Summit Distributors, 916 Main St. 716-884-3450
NY Farmingdale, Arrow Elctrns., 900 Broad Hollow Rd. 516-694-6800
NY Freeport, Milgray/New York, 191 Hanse Ave. 516-546-6000
NY Hauppauge, Rampart Components, Engineers Rd. 516-273-1111
Tex Dallas, Hall-Mark Elctrns., 9333 Forest La. 214-231-6111

DELAVAN ELECTRONICS, 14441 No. 73rd St., Scottsdale, Ariz., 85260, Tel: 602-948-6350; Empl.: 500; Minimum order: $10

Customer service: J. Frantz

Products manufactured: Controls/Control Eqpt., Indicators, Switches

DELTA-BENCO-CASCADE LTD., 124 Belfield Rd., Rexdale, Ont. Can. M9W 1G1, Tel: 416-241-2651; Empl.: 500

Customer service: J. Galco 716-874-6570

Free literature available: Complete catalog on cable television products.

Products manufactured: Amplifiers, Attenuators, Calibrators, CATV Systems & Equipment, Converters, Couplers, Filters, Meters, Monitors, Transformers, Transmitters

Local Sales Offices & Reps.
NY Buffalo, Delta-Benco-Cascade 716-874-6570
FOR: Can., Don Mills, Ont., Welsh Communications 416-445-5650

DELTA DESIGN, INC., 5725 Kearny Villa Road, San Diego, Cal, 92123, Tel: 714-292-5000, TWX: 910-335-1215; Empl.: 55; Minimum order: $50

Customer service: G. Whitlock

Free literature available: Literature on Environmental Temperature Chambers, Ambient and Environmental Semiconductor Handlers, DIP and TO-5 Carrier Loaders/Unloaders and Burn-In Systems.

Products manufactured: Chamber, Environmental Test, Controllers, Programmable, Controls/Control Eqpt., Machines/Machinery, Production, Monitors, Ovens, Testers

DELTA ELCTRN. CONTROL, 1701 Pomona St., Costa Mesa, Cal., 92627, Tel: 714-646-7776; FSC No: 33434; Empl.: 40; Minimum order: $25

For info on price: C. W. Jobbins; Application info: L. O. Hodges; Customer service: H. Bakowski; Delivery info: B. Selle

Free literature available: Catalog: Shows general line of products manufactured. Paper: "Power Amplifiers for Sonar Systems" by L.O. Hodges, C.W. Jobbins and Dr. L.R. Syelzle. This is a 20 page study of designed and applications of class B and class D amplifiers.

Products manufactured: Amplifiers, Controls/Control Eqpt., Converters, Inverters, Power Supplies, Tachometers, Transmitters

DELTA PRODUCTS, Box 1147, Grand Junction, Colo., 81501, Tel: 303-242-9000; Empl.: 140

Products manufactured: Alarms, Controls/Control Eqpt.

Local Sales Offices & Reps.
Ariz Phoenix, McSherry & Assocs. 602-265-2803
Cal Santa Rosa, Thomas 707-542-7380
Cal Van Nuys, A. Szerlip Sls. 213-782-1765
Colo Denver, McSherry & Assoc. 303-238-8361
Colo Grand Junction, Delta Prods., Inc. 303-242-9000
Fla Miami, Sochin Sls. 305-235-6048
Ga Doraville, R. Alan Dist. 404-458-3195
Haw Honolulu, A. Mosher 808-732-3636
Ind Indianapolis, Shamrock Elctrn. 317-251-5527
Md Severna Park, Hochrein & Assoc. 301-987-4003
Mass Northboro, W.B. Pray Sls. 617-393-3434
Mich Brighton, Lectro Sls. 313-532-5725
Minn Minneapolis, Heimann Co. 612-861-6051
Mo Independence, C.W. Dreese & Assoc. 816-461-7294
NY Utica, G.E. & C.F. Bates Assoc. 315-735-4389
Ohio Akron, Shamrock Elctrn. 216-666-1400
Tex Houston, Ranger Elctrns. 713-526-1044
Wash Chehalis, B.E. Barkis & Assoc. 204-339-8024
EXP: South Bend, Ind., Schwanke & Marshall Int., Inc. 219-232-5948

DELTEC CORP., 980 Buenos Ave., San Diego, Cal., 92110, Tel: 714-297-4466; Empl.: 50 .... p. 1•1181-1183

Customer service: R. D. Scott

Free literature available: Super-Isolation Transformers, 250VA to 500VA; A-C Line Conditioners, 1200VA to 5000VA; D-C to A-C Inverters, 300VA to 15KVA; Uninterruptible Power Systems, 700VA to 30KVA.

Products manufactured: Inverters, Isolators, Power Supplies, Protectors, Regulators, Suppressors, Transformers, Voltage Sources

Local Sales Offices & Reps.
Ala Huntsville, F-M Assocs. 205-536-9990
Ariz Phoenix, Zeus, Inc. 602-253-6104
Cal Pasadena, A-F Sales Engg. 213-681-5631
Colo Denver, Zeus, Inc. 303-770-4400
Fla Orlando, F-M Assocs. 305-851-5710
Fla Tequesta, F-M Assocs. 305-746-2996
Iowa Cedar Rapids, Technical Reps. 319-363-2489
Kans Kansas City, Technical Reps 913-782-1177
Md Silver Springs, Sel-Tronics 301-589-3391
Mass Waltham, McBar Assocs. 617-890-0233
Minn Minneapolis, Electro-Service Co. 612-827-2907
Mo Independence, Technical Reps. 816-737-1414
NJ Pennsauken, Megargel/Himmelstein Assoc. 609-662-2081
NJ Ridgwood, Hansen Assoc. 201-652-7055
NM Albuquerque, Zeus, Inc. 505-268-3941
NY Fairport, NACO Elctrns. Corp. 716-223-4490
NY North Syracuse, NACO Elctrns. Corp. 315-699-2651
NY Utica, NACO Elctrns. Corp. 315-732-1801
NC Greensboro, F-M Assocs. 919-294-2754
Tex Houston, Data Appls. Corp. 713-661-4501
Tex Richardson, Data Appls. Corp. 214-231-4846
Tex San Antonio, Data Appls. Corp. 512-732-7176
Utah Salt Lake City, Zeus, Inc. 801-466-4924
Wash Bellevue, TOPP Engrg. Sls. Corp. 206-747-5401

DELTROL CONTROLS, 2745 S. 19th St., Milwaukee, Wisc., 53215, Tel: 414-671-6800; Empl.: 300

Customer service: D. Uhen

Products manufactured: Bells, Buzzers, Gongs, Sirens & Aural Warning Devices, Relays, Solenoids, Timers

Local Sales Offices & Reps.
Cal Los Angeles, Cummings & Assoc. 213-340-6035
Cal Palos Verdes Estates, Deltrol Controls 213-377-4294
Cal San Francisco, Cummings & Assoc. 408-247-8656
Colo Denver, Parker-Webster 303-770-1972
Conn Thomaston, Nelson & Schoonmaker 203-283-5959
Fla North Miami, Winfield Electronic Sls. 305-945-6544
Ga Atlanta, Winfield Southeast Co. 404-636-3023
Haw Honolulu, Aloha Assocs. 808-941-1574
Ill Chicago, Deltrol Controls 312-547-0500
Ind Ft. Wayne, W. Bieberich Co. 219-432-2537
Ind New Albany, W. W. Bieberich 812-945-3187
Md Lutherville, Timonium, Naudain Assoc. 301-252-5378
Mich Rochester, Kent & Assoc. 313-651-1890
Minn St. Paul, Kenco Co. 612-645-7717
Mo Hazelwood, Dy-Tronix 314-731-5799
Mo Kansas City, Dy-Tronix 816-761-6543
NJ Mount Laurel, Naudain Assocs. 609-235-1801
NY Plainview, Deltrol Controls 516-931-3815
NY Rochester, Deltrol Controls 716-473-3340
NC Charlotte, Winfield Southeast Co. 704-536-2757
Ohio Dayton, Deltrol Controls 513-223-3502
Ohio Parma, Deltrol Controls 216-845-6727
Okla Tulsa, T. J. Ray Co. 918-627-1515
Pa Philadelphia, Naudain & Assoc. 609-235-1801
Tex Dallas, E. F. Aymond Co. 214-826-7620
Tex Houston, E. F. Aymond Co. 713-461-4487
Wash Seattle, Underwood & Underwood 206-243-2133
Wisc Wauwatosa, F.C. DuBois & Assoc. 414-774-3100
EXP: Can., Ontario, Islington, Power Service Products 416-239-2977

Local Distributors
Ala Birmingham, Forbes Distributing Co. 205-251-4104
Ala Decatur, Forbes Distributing Co. 205-353-4546
Ala Dothan, Hand Supply 205-792-3148
Ala Huntsville, Hall-Mark 205-539-0691
Alas Anchorage, Alaska Bussell Elec. Co. 907-279-2150
Ariz Phoenix, Service Supply Co. 602-264-6126
Ark Fort Smith, Carlton-Bates Co. 501-782-7258
Ark Little Rock, Carlton-Bates Co. 501-562-9100
Cal Los Angeles, Electric Switches 213-664-2125
Cal Los Angeles, Electro Components Distrs. 213-264-7100
Cal San Jose, Consolidated Parts 408-294-3202
Cal Westminster, B. A. S. E. Electronics 714-894-1303
Cal Woodland Hills, C & A Elctrns. 213-340-6022
Colo Denver, Fistell's Elctrns. Supply Co. 303-244-4691
Colo Denver, Intermark Elctrns. 303-936-8284
Colo Grand Junction, Radio & Elctrns. Supply Co. 303-243-3346
Conn New Haven, Hatry Elctrns. 203-787-5921
Conn Waterbury, Suburban Supply Co. 203-757-1251
Conn West Port, Hi-Rel Inds. 203-226-4731
Fla Miami, Electronic Equip. 305-871-3500
Fla Tampa, Leader Elctrns. Distrs. 813-835-1891
Fla Tampa, Lykes Elctrns Corp. 305-633-8535
Ga Chamblee, Lance Engrg. 404-458-6280
Haw Honolulu, V. Kim Elctrns. 808-533-7132
Ill Chicago, G. W. Berkheimer Co. 312-468-5454
Ill Chicago, Merrill Elctrns. Inc. 312-286-2525
Ill Chicago, Revere Elctrns. Supply 312-738-3636
Ill Elgin, Stolz-Wickes, Inc. 312-741-4506
Ill Elk Grove, Hall-Mark Elctrns. 312-437-8800
Ill Peoria, Warren Radio Co. 309-674-5998
Ill Rockford, J & M Elctrns., Inc. 815-963-6445
Ill Wheeling, G. W. Berkheimer Co. 312-537-9300
Ind Elkhart, Warren Radio Co. 219-523-2398
Ind Fort Wayne, Fort Wayne Elctrns. Supply 219-423-3422
Ind Fort Wayne, G. W. Berkheimer Co. 219-744-4156
Ind Fort Wayne, Warren Radio Co. 219-743-5344
Ind Gary, G. W. Berkheimer Co. 219-887-0141
Ind Indianapolis, G. W. Berkheimer Co. 317-787-2206
Ind Indianapolis, Graham Elctrns. 317-634-8486
Ind Indianapolis, Warren Radio Co. 317-634-5566
Ind South Bend, G. W. Berkheimer Co. 219-288-4741
Ind South Bend, Radio Distributing Co. 219-287-2911
Iowa Cedar Rapids, Iowa Radio Supply Co. 319-364-6154
Iowa Davenport, Warren Radio 319-323-8051
Iowa Dubuque, Miller Electric 319-588-1469
Iowa Marshalltown, Egelston Electric 515-752-4678
Iowa Waterloo, Farnsworth Electronics, Inc. 391-364-6154
Iowa West Des Moines, Ramco Co. 515-274-2548
Kans Great Bend, Cen-Kan Supply, Inc. 316-792-4362
Kans Lenexa, Hall-Mark Electronics 913-888-4747
Ky Ashland, Ashland Electric Co. 606-324-4107
Ky Louisville, Peerless Electronic Equipment Co. 502-637-7677
Ky Paducah, Warren Radio Co. 502-442-4367
La Amelia, Bayou Bouef Elec. 504-631-2853
Md Baltimore, Chesapeake Electronics 301-665-7595
Md Baltimore, Hall-Mark Electronics 301-265-8500
Md Baltimore, Temsco, Inc. 301-685-4523
Md Baltimore, United Electronics 301-732-5000
Mass Cambridge, Interstate Electronics Equip. 617-868-7440

Mass	Fitchburg, Gettens Electric Supply Co.	617-343-3711
Mass	Waltham, QPL Electronic Distributors, Inc.	617-891-0460
Mich	Alpena, P & B Supply Inc.	517-354-5025
Mich	Ann Arbor, Gulf Electronics	313-769-8650
Mich	Battle Creek, Warren Radio Co.	616-965-3338
Mich	Detroit, Michigan Lectrol Corp.	313-255-4250
Mich	Flint, Roth Electric Supply Co.	313-234-8661
Mich	Grand Rapids, Stotts Friedman Electronics Co.	616-241-6731
Mich	Grand Rapids, Warren Radio Co.	616-456-5385
Mich	Kalamazoo, Warren Radio Co.	616-381-4203
Mich	Marquette, Warren Radio Co.	517-723-5239
Mich	Owaso, N.R.W. Electronics Corp.	906-226-7578
Mich	Port Huron, Huron Electric Supply Co.	313-985-8183
Minn	Minneapolis, Control Design, Inc.	612-721-1629
Minn	Minneapolis, Hall-Mark Electronics	612-925-2944
Mo	Kansas City, Kornfeld Thorp Electric	816-221-4000
Mo	St. Louis, Briner Electric Co.	314-321-1185
Mo	St. Louis, Control Design	314-426-3150
Mo	St. Louis, Hall-Mark Electronics	314-521-3800
Mo	St. Louis, Van Sickle Radio Electronics	314-621-5000
NJ	Belleville, Beltronics Corp.	201-751-2250
NJ	Edison, William Electronics Supply	201-985-3700
NJ	Rahway, Terminal Electronics Corp.	201-381-5700
NJ	Union City, Nidisco, Inc.	201-863-2111
NM	Albuquerque, Electronic Parts Co.	505-293-6161
NY	Brooklyn, Brooklyn Electronics, Inc.	212-748-1300
NY	Buffalo, Buffalo Electric Co.	716-854-4420
NY	East Islip, East Islip Electrical Supply	516-581-7600
NY	Farmingdale, Hall-Mark	516-293-7500
NY	Hempstead, Davis Electronics	516-483-9200
NY	Hempstead, Electronic Equipment Co.	516-895-5757
NY	New Hyde Park, Motors & Armatures, Inc.	516-437-9100
NY	Rochester, Simcona Electronics Corp.	716-328-3230
NC	Durham, Vickers Electronics Supply Co.	919-688-6311
ND	Minot, John Iverson	701-838-5466
ND	Williston, John Iverson	701-572-5126
Ohio	Akron, Sun Radio Co.	216-434-2171
Ohio	Akron, Warren Radio Co.	216-434-6668
Ohio	Cincinnati, United Radio Inc.	513-761-4030
Ohio	Cleveland, Warren Radio Co.	216-888-5225
Ohio	Cleveland, Winter-radio Electronic Supply	216-621-9383
Ohio	Columbus, McJunkin Corp.	614-294-3711
Ohio	Toledo, Warren Radio Co.	419-248-3364
Ohio	Wickliffe, Gateway Megatech	216-944-8565
Okla	Oklahoma City, Miller Jackson Co.	405-235-8426
Okla	Oklahoma City, Trice Wholesale Electronics	405-524-4411
Okla	Tulsa, Hall-Mark Electronics	918-835-8458
Ore	Albany, Portland Electric & Plumbing	503-926-7755
Ore	Eugene, Portland Electric & Plumbing	503-342-2101
Ore	Eugene, Tillman & Booth Inc.	503-343-7701
Ore	Medford, Portland Electric & Plumbing	503-779-6311
Ore	Portland, Central Distributors	503-234-0711
Ore	Portland, Portland Electric & Plumbing Co.	503-226-2531
Pa	Erie, Mace Electronics	814-838-3511
Pa	McKeesport, Barno Radio Co.	412-751-5966
Pa	Philadelphia, Simco Electronics Inc.	215-229-1880
Pa	Trevose, Hall-Mark Electronics	215-355-7300
SC	Columbia, Dixie Radio Supply	803-253-5332
SC	West Columbia, Standard Distributors	803-796-0350
Tenn	Chattanooga, Curle Electronics	615-266-4728
Tenn	Dyersburg, Warren Radio Co.	901-285-3850
Tenn	Knoxville, Bondurant Bros.	615-573-9151
Tex	Austin, Hargus-Austin, Inc.	512-478-6618
Tex	Beaumont, Marine & Industrial Electric	713-835-2517
Tex	Corpus Christi, Nunn Electric Supply Co.	512-884-0341
Tex	Dallas, Buffalo Electric Co.	214-421-7671
Tex	Dallas, Hall-Mark Electronics	214-231-5101
Tex	El Paso, McNicol Inc.	915-566-2936
Tex	El Paso, Sunland Supply Co.	915-533-5901
Tex	Houston, Buffalo Electric Co.	713-228-4431
Tex	Houston, Hall-Mark Electronics	713-781-6100
Tex	Houston, Nunn Electric Supply Corp.	713-928-5511
Tex	Lubbock, R & R Electric Co.	806-765-7727
Tex	Odessa, Midland Specialty Co.	915-337-6365
Tex	Richardson, Amtex Electric	214-637-1310
Utah	Salt Lake City, Alta Electronics	801-486-7227
Utah	Salt Lake City, Control Equipment Co.	801-487-7741
Utah	Salt Lake City, W. H. Bintz	801-363-5821
Va	Arlington, Arlington Electronic Wholesalers, Inc.	202-524-6256
Va	Charlottesville, Piedmont Electric Supply Corp.	804-977-2990
Va	Richmond, Meridian Electronics	804-353-6648
Va	Staunton, Piedmont Electric Supply Corp.	703-885-5186
Va	Staunton, Southern Electric Corp.	703-886-6218
Wash	Seattle, Almac Stroum Electronics	206-763-2300
Wash	Seattle, Interface Electronics Corp.	206-285-3500
Wash	Seattle, Pepco	206-325-2435
Wisc	Madison, Satterfield Electronics	608-257-4801
Wisc	Mequon, Taylor Electric Co.	414-241-4321
Wisc	Milwaukee, Hall-Mark Electronics	414-476-1270
Wisc	Wausau, Electronics Inc.	715-845-4671
Wisc	Wausau, Forward Electronics, Inc.	715-845-4355
For:	Can., Ont., Islington, Power Service Prods.	416-239-2977

DELTRON, INC., Wissahickon Ave., N. Wales, Pa., 19454, Tel: 215-699-9261, TWX: 510-661-8061; Empl.: 75; Minimum order: $15

For info on price: P. M. Gerber; Application info: J. Phillips; Customer service: P. M. Gerber; Delivery info: J. Phillips

Free literature available: Deltron manufactures a complete line of highly regulated power supplies covering OEM applications as well as systems and laboratory requirements.

Products manufactured: Power Supplies

Local Sales Offices & Reps.

Ala	Huntsville, Incotech, Inc.	205-837-6061
Ariz	Phoenix, Arrowhead Sales Corp.	602-271-7148
Cal	Inglewood, L & M Engrg.	213-674-6850
Cal	Sunnyvale, AMASCO	408-733-8690
Colo	Arvada, Arrowhead Sls. Corp.	303-423-5556
Conn	Hamden, Pat Jenks Assocs.	203-281-0810
Fla	Orlando, Geartner Assocs.	305-299-1000
Ill	Chicago, Berndt Assocs.	312-283-0713
Ind	Carmel, Berndt Assocs.	317-844-0114
Md	Wheaton, Sonco	301-942-9420
Mass	Wakefield, Pat Jenks Assoc.	617-246-1590
Mich	Detroit, Micro Sls. Corp.	313-482-1229
Mo	St. Louis, Gordon Fixman	314-725-5219
NJ	Haddonfield, TAI Corp.	609-854-3011
NY	Baldwinsville, Scibetta Reps.	315-622-3993
NY	Tuckahoe, Spectrum Sls.	914-793-1660
Ohio	Centerville, Micro Sales Corp.	513-885-4171
Ohio	Cleveland, Micro Sls. Corp.	216-243-7430
Ore	Portland, McLaren, Inc.	503-297-2248
Tex	Garland, Gordon V. Peck Co.	214-341-8311
Tex	Houston, Gordon V. Peck Co.	713-664-1435
Utah	Salt Lake City, Arrowhead Sls.	801-487-4716
Wash	Bellevue, McLaren, Inc.	206-454-3400
Wisc	Brookfield, Berndt Assocs.	414-786-6950
FOR:	Can., Don Mills, Ont., Componetics Ltd.	416-445-3230
FOR:	Can., Montreal, Que., Componetics Ltd.	514-342-4117

DELTRONIC CRYSTAL INDS., INC., Box 323, Denville, N.J., 07834, Tel: 201-361-2222; Empl.: 5

Customer service: S. Samuelson

Free literature available: Product bulletins YIG-1 & GGG-1, data/spec sheets

Products manufactured: Crystals, Ferrite Material & Parts, Filters, Oscillators

DEMEK, INC., 4824 Rainbox Blvd., Shawnee-Mission, Kans., 66205, Tel: 913-384-0444; Empl.: 10

Products manufactured: Comm. Systems, Converters, Punched Card Equipment, Translators, Data, Transmission Systems, Data

DENISON, R.B., INC., 103 Broadway, Bedford, Ohio, 44146, Tel: 216-232-8200; Empl.: 40; Minimum order: $5

For info on price: J. Basar; Application info: F. Hardcastle; Customer service: J. Basar; Delivery info: J. Basar

Free literature available: Individual Bulletins are available for Type L, Type C, Type M, Type SG and Type P limit switches. Complete catalogs are not available. Reader must specify bulletin of interest.

Products manufactured: Switches

Local Sales Offices & Reps.

Ala	Birmingham, J. Spader Co.	205-879-1366
Ark	Fort Smith, J.R. Masterson	501-646-7756
Cal	Los Angeles, R.B. Clapp Co.	213-225-2395
Cal	San Francisco, Artwel Elec. Inc.	415-467-1880
Colo	Denver, TESSCO	303-744-1119
Conn	Hartford, R. Sawtell Assoc.	413-562-6627
Fla	Indian Rocks Beach, Kirk Sls. Co.	813-595-7353
Ga	Buford, R.L. Matus	404-945-2946
Ill	Chicago, G.H. Anderson	312-728-3827
Ind	Indianapolis, L.W. Loyen Co.	317-359-0311
Mass	Norwood, R.P. Hyland Co.	617-762-0345
Mass	Westfield, R. Sawtell Assoc.	413-562-6627
Mich	Farmington Hills, R. McBride Co.	313-474-2300
Minn	Minneapolis, W.A. Hallock Co.	612-920-6100
Mo	St. Louis, R. Greene Co.	816-333-7585
NY	Buffalo, A.C. Schultz Inc.	315-475-5263
NY	Flushing, Tri State Comps., Inc.	212-358-1010
NC	Charlotte, W.E. Cook & Assoc.	704-525-3384
Ohio	Cincinnati, Nelcor, Inc.	513-871-2816
Ohio	Cleveland, J.L. Finnicum & Assoc.	216-226-7076
Pa	Malvern, Miller & Dietz Co.	215-647-7373
Pa	Pittsburgh, R.F. Clark Co.	412-242-9500
Tex	Dallas, Stout Schmidt Co.	214-241-4435
Tex	Houston, Stout-Jennings-Schmidt	713-729-1994
Va	Richmond, Reynolds Cowardin Assoc.	703-266-3457
Wash	Seattle, H. Campbell Co.	206-634-1200

DENNISON MFG. CO., Marke9ting & Attaching Sys. Div., Framingham, Mass., 01701, Tel: 617-879-0511, Telex: 948-478; FSC No: 5975; QPL No: 2310; Empl.: 6000

Customer service: F. T. Wright

Free literature available: Product Bulletin #283 gives specifications and prices on heavy duty Bar-Lok&T cable ties. Bundle diameters 1/16" to 3". Unique manufacturing process lowers cost and reduces weight. Product Bulletin #295 gives specifications and prices on adjustable Secur-A-Tie® fasteners for lowest cost.

Light duty bundling, closing, tieing or harnessing diameters from 1/16" to 1 3/8".

Products manufactured: Clamps & Clips, Fasteners, Labels, Pressure-Sensitive, Adhesive, Machines/Machinery, Production, Nameplates, Wire & Cable Ties

Local Sales Offices & Reps.

Ala	Birmingham	205-251-9558
Ariz	Phoenix	602-264-2699
Cal	Burlingame	415-347-1487
Cal	Rosemead	213-283-0214
Colo	Denver	303-388-8187
Conn	Hamden	203-528-0625
Fla	Ft. Lauderdale	305-947-3531
Fla	Tampa	813-894-0681
Ga	Atlanta	404-355-7665
Ill	Des Plaines	312-298-8870
Ind	Indianapolis	317-243-3209
Iowa	Des Moines	515-278-4276
La	New Orleans	504-947-2197
Md	Riverdale	301-792-4474
Mass	Waltham	617-890-0027
Mich	Grand Rapids	616-455-1620
Mich	Southfield	313-354-6440
Minn	Minneapolis	612-544-7738
Mo	Independence	816-358-4488
Mo	St. Louis	314-352-4161
NY	Buffalo	716-875-3084
NY	Elnora	518-869-8406
NY	New York	212-489-9400
NY	Rochester	716-244-3250
NC	Gastonia	704-867-8315
NC	Greensboro	919-275-9915
NC	Raleigh	919-782-5969
Ohio	Cincinnati	513-621-0865
Ohio	Cleveland	216-888-0515
Ohio	Columbus	614-231-2944
Ore	Portland	503-226-3241
Pa	Pittsburgh	412-923-1620
Pa	Wayne	215-687-9110
SC	Spartanburg	803-585-7175
SC	Taylors	803-232-8033
Tenn	Nashville	615-256-8718
Tex	Dallas	214-826-3150
Tex	Houston	713-771-4940
Tex	San Antonio	512-828-6055
Va	Richmond	804-644-2841
Wash	Seattle	206-243-2740
Wisc	Wauwatosa	414-778-0560

DERINGER MFG. CO., 1250 Town Line Rd., Mundelein, Ill., 60060, Tel: 312-566-4100, TWX: 910-685-4321; Empl.: 220

Products manufactured: Contacts, Electrical

DESIGN AUTOMATION, INC., 809 Massachusetts Ave., Lexington, Mass., 02173, Tel: 617-862-8998; Empl.: 5

Customer service: N. Sokal

Free literature available: Check lists for design review of electronic and electromechanical equipment.

Products manufactured: Amplifiers, Computers, Converters, Data Acquisition & Reduction Systems, Inverters, Services, Assembly, Production & Test, Transformers, Transmitters

DESIGNATRONICS INC., 55 S. Denton Ave., New Hyde Park, NY, 11040

DESPATCH OVEN CO., P.O. Box 1320, Minneapolis, Minn., 55440, Tel: 612-331-1873; Empl.: 250

Products manufactured: Chamber, Environmental Test, Controls/Control Eqpt., Furnaces

DEST DATA CORP., 1285 Forgewood Ave., Sunnyvale, Cal., 94085, Tel: 408-734-1234; Empl.: 33; Minimum order: $50

For info on price: A. E. Kushnick; Application info: I. Mallender; Customer service: A. E. Kushnick; Delivery info: I. Mallender

Free literature available: DSD 120/240 - Document Scanners and Digitizers OCR/Comp - OCR Equipment

Products manufactured: Cameras, Comm. Systems, Compressors, Data, Converters, Data Compressors, Digital, Digitizers, Pencil Follower (Inc. Coordinate & Graphic), Expanders, Data, Interferometer Systems, Readers, Recorders, Scanners, Servo Systems, Transmission Systems, Data

DETORONICS CORP., 10660 E. Rush St., S. El Monte, Cal., 91733, Tel: 213-579-7130, TWX: 910-587-3436; FSC No: 29867; Empl.: 45

For info on price: R. Wilson; Application info: D. Duke; Customer service: D. Baroda; Delivery info: R. Wilson

Free literature available: Illustrative brochure depicting various hermetically sealed glass to metal connectors and headers. Technical catalogs sheets available on request.

Products manufactured: Connector Adapters, Connectors, Detectors, Feedthrus & Seals, Environmental, Headers, Holder & Carriers, Packages, Integrated Circuit, Resistors, Seals, Services, Assembly, Production & Test, Terminals

DEUTSCH CO., Elec. Components Div., Municipal Airport, Banning, Cal., 92220

DEUTSCH FASTENER CORP., 7001 W. Imperial Hwy., Los Angeles, Cal., 90045, Tel: 213-649-1400, TWX: 213-673-1000; Empl.: 100; Minimum order: $25

Customer service: E. Baumgarten

Free literature available: Folders describing specialized fastening devices such as captive screws as well as flare inserted nuts, press to open latches stress panel fasteners and related devices.

Products manufactured: Bushings, Glass, Plastic, Metal, Rubber, Etc., Fasteners, Handles For Cabinets, Circuit Boards, Racks, etc., Pins, Rivets

DEUTSCH RELAYS, INC., 65 Daly Rd., East Northport, N.Y., 11731, Tel: 516-864-6000, TWX: 510-226-0233; Empl.: 420

For info on price: S. Saccareccia; Application info: R. Robotti; Customer service: R. D'Ambrosio; Delivery info: R. D'Ambrosio

Free literature available: Short Form Relay Catalog - Describes the wide line of Electromechanical relays produced by Deutsch Relays. Time Controllers Catalogs - Describes the Time Dealy Relays available from Deutsch Relays.

Products manufactured: Relays

Local Sales Offices & Reps.

Cal	Burlingame, J. Logan & Assoc.	415-697-6100
Fla	Altamonte Springs, Semtronic Assocs.	305-931-8235
Ga	Atlanta, Grady Duckett	404-451-3529
Ill	Chicago, Berndt Assocs.	312-283-0713
Mass	Waltham, Rantek	617-890-5110
Ohio	Dayton, Electro-Com	513-898-5140
Pa	King of Prussia, Monteiro Assocs.	215-265-0634
Tex	Dallas, Allied Inc.	214-238-0408
Wash	Bellvue, Pacific NW Consult.	206-454-2503
FOR:	Can., Burlington, Ont., Neeco	416-632-1403
FOR:	Can., Toronto, Ont., Neeco	416-364-0443

DEVELCO, 530 Logue Ave., Mountain View, Cal., 94043, Tel: 408-969-1600, TWX: 910-379-6588; Empl.: 75; Minimum order: $25

For info on price: G. Patterson; Customer service: R. Rondoe

Free literature available: Product Brochures and Application Notes.

Products manufactured: Amplifiers, Display Devices/Displays, Isolators, Magnetometers, Standards, Testers

Local Sales Offices & Reps.

Md	Gaithersburg, Data Time, Inc.	301-948-7666

Advertisment

Develco manufactures a broad range of high-technology products which include: (1) Fluxgate magnetometers; (2) Superconducting magnetometers, gradiometers, shields and cryostats; (3) Fiber-Optic isolated data links; (4) Geophysical instrumentation; (5) LF/VLF time and frequency instruments; (6) 3-axis displays for signal analysis; and, (7) the Alma (see separate Alma listing) line of IC testers.

DIACON, 4812 G Kearny Mesa Rd., San Diego, Cal., 92111, Tel: 714-279-6992; Empl.: 225; Minimum order: $100

For info on price: D. Fleming; Application info: P. Scott; Customer service: B. Moran; Delivery info: D. Fleming

Free literature available: Packages - hermetic ceramic dips and flatpaks cerdip technology, low temp seal. Equipment - environment and ambient handlers for test equipment.

Products manufactured: Machines/Machinery, Production, Packages, Integrated Circuit

Local Sales Offices & Reps.

Mass	Fall River, Greenlees Assoc.	617-674-9858
NY	New York, Huth Sls.	212-984-1765
Tex	Richardson, Marston Co.	214-235-3577
Wash	Bellvue, SD-R&S2 Co.	206-747-9424

DI-ACRO, Div. Houdaille Inds., Inc., 316 8th Ave., Lake City, Minn., 55041, Tel: 612-345-4571; Empl.: 400; Minimum order: $20

For info on price: F. W. Coyle; Application info: R. Scroggins; Customer service: T. Kruempel; Delivery info: F. W. Coyle

Products manufactured: Machines/Machinery, Production, Punches, Chassis, Services, Assembly, Production & Test

DI/AN CONTROLS, INC., 944 Dorchester Ave., Boston, Mass., 02125, Tel: 617-288-7700, TWX: 710-333-1732; Empl.: 180; Minimum order: $25

For info on price: H. Smith; Application info: H. Smith; Customer service: E. Healey; Delivery info: H. Smith

Free literature available: Ticket Printers - describes functions and specifications, as well as applications for a variety of ticket, bag and label printers. Model 9030 teleprinter - describes features and characteristics of this wide carriage, 30 CPS impact teleprinter.

Products manufactured: Memory Systems, Printers, Teleprinters, Teletypewriters & Equipment, Terminal Equipment, Digital, Timers

DIALIGHT, 203 Harrison Pl., Brooklyn, N.Y., 11237, Tel: 212-497-7600, TWX: 710-584-5487; Empl.: 400

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For info on price: C. Dombroski; Application info: C. Dombroski; Customer service: H. Goodman; Delivery info: A. Romaine

Products manufactured: Diodes, Display Devices/Displays, Drivers & Decoders For Readouts, Flashers, Lamps, Lights, Sockets, Switches

Local Sales Offices & Reps.

Ariz	Phoenix, R. Stitzer Co.	602-944-6808
Cal	Oakland, Moulthrop Sls.	415-261-7676
Cal	Pico Rivera, Westrep	213-949-2551
Colo	Denver, R.G. Bowen Co.	303-722-4641
Fla	Orlando, Cartwright & Bean, Inc.	305-422-4531
Fla	Plantation, Cartwright & Bean, Inc.	305-791-3989
Ga	Atlanta, Cartwright & Bean, Inc.	404-255-5262
Ill	Hinsdale, Hill-Gray Assocs.	312-325-4810
Ind	Indianapolis, Southern Sls. Corp.	317-257-7575
Kans	Shawnee Mission, K & M Sls. Co.	913-262-1444
La	Chalmette, Cartwright & Bean, Inc.	504-279-4598
Mass	Needham, Mullin Tech. Sls.	617-444-4780
Mich	Ferndale, Hilltronics Inc.	313-398-5556
Minn	St. Paul, R.G. Ragon, Inc.	612-488-0201
Mo	St. Louis, K & M Sls. Co.	314-423-2420
NJ	Wayne, R. Horne Assocs.	201-835-7400
NY	No. Syracuse, Precision Sls.	315-458-2223
NC	Charlotte, Cartwright & Bean, Inc.	704-333-6457
Ohio	Cleveland, K.W. Elctrn. Sls.	216-831-8292
Ohio	Dayton, K.W. Elctrn. Sls.	513-890-2150
Ore	Portland, Almac/Stroum Elctrns.	503-292-3534
Pa	Allison Park, K.W. Elctrn. Sls.	412-487-4300
Pa	Broomall, L.D. Lowery, Inc.	215-528-5170
Tenn	Memphis, Cartwright & Bean, Inc.	901-276-4442
Tex	Houston, Tesco	713-464-2828
Tex	Richardson, Tesco	214-690-4004
Utah	Salt Lake City, R.G. Bowen Co.	801-363-8801
Wash	Seattle, Almac/Stroum Elctrns.	206-763-2300
EXP:	Brooklyn, N.Y., Dialight	212-497-7600

Local Distributors

Ariz	Phoenix, Moltronics of Ariz, 2746 W. Palm La.	602-272-7951
Cal	Chatsworth, Westates Elctrns., 20151 Bahama St.	213-341-4411
Cal	Culver City, Western Electromotive, 8467 Steller Dr.	213-870-7621
Cal	Inglewood, Newark Elctrns., 4747 W. Century Blvd.	213-678-0441
Cal	Sacramento, Sacramento Elctrns., 1219 S. St.	916-441-4821
Cal	Santa Clara, Fisher/Brownell, 3381 Edward Ave.	408-244-6182
Cal	Sun Valley, Richey Elctrns., Inc., 10871 La Tuna Canyon Rd.	213-875-2862
Cal	Sunnyvale, Bell Industries, 1161 No. Fair Oak	408-734-8570
Colo	Denver, Meter Master Instr., 1165 S. Cherokee St.	303-722-5766
Colo	Denver, Newark-Denver Elctrns., 2170 S. Grape St.	303-757-3351
Conn	Waterbury, Surburban Supply, 117 Benedict St.	203-757-1261
Fla	Orlando, Hammond Elctrns., 911 W. Central Blvd.	305-849-6060
Ga	Atlanta, Specialty Dist., 763 Juniper St., N.E.	404-873-2521
Ill	Chicago, Elctrn. Dists., Inc., 4900 No. Elston Ave.	312-283-4800
Ill	Chicago, Newark Elctrns., 500 No. Pulaski Rd.	312-638-4411
Ill	Elgin, Allied Elctrns., 1355 Sleepy Hollow Rd.	312-697-8200
Ill	Peoria, Klaus Radio & Elect., 8400 N. Pioneer Pkwy.	309-691-4840
Ind	Ft. Wayne, Fort Wayne Elctrn. Supply, 3606 E. Maumee St.	219-423-3422
Ind	Indianapolis, Graham Elctrn. Supply, 133 S. Pennsylvania St.	317-634-8202
Ind	Indianapolis, Ra-Dis-Co., 814 N. Senate Ave.	317-637-5571
Ind	South Bend, Radio Dist., 1212 High St.	219-287-2911
Ky	Louisville, P.I. Burks Co., 842 S. 7th St.	502-583-2871
La	Lafayette, Ralph's of Lafayette, 3004 Cameron St.	318-234-4507
La	New Orleans, Southern Radio Supply Co., 1909 Tulane Ave.	504-524-2343
Md	Baltimore, Radio Elec. Svc., 1026 Cromwell Bridge Rd.	301-823-0070
Md	Gaithersburg, Cramer/EW Wash., 16021 Industrial Dr.	301-948-0110
Md	Rockville, Capitol Radio Wholesalers, 12270 Wilkins Ave.	301-881-2270
Md	Rockville, Pioneer Washington Elect., 1037 Taft St.	301-424-3300
Mass	Boston, De Mambro Radio Supply Co., 1095 Commonwealth Ave.	617-787-1200
Mass	Boston, Sager Electrical Supply, 172 High St.	617-542-2281
Mass	Dedham, Gerber Elctrns., 852 Providence Hwy.	617-329-2400
Mass	Newton Centre, Cramer Elctrns., 85 Wells Ave.	617-969-7700
Mass	Springfield, T.F. Cushing, Inc., 1026 Bay St.	413-788-7341

Mass Wilbraham, Ind'l. Components, 2551 Boston Rd. 413-596-3854
Mich Ann Arbor, Wedemeyer Elctrn. Supply, 2280 S. Industrial Hwy. 313-665-8611
Mich Detroit, Newark-Detroit Elctrn. Supply, 20700 Hubbell Ave. 313-548-0250
Mich Wyoming, Newark Elctrn., 3645 Linden Ave. S.E. 616-241-6681
Minn St. Paul, Gopher Elctrns., 2520 W. Larpenteur Ave. 612-645-0241
Mo Kansas City, Walters Radio Supply, 3635 Main St. 816-531-7015
Mo No. Kansas City, LCOMP-Kansas City, 1520 Taney 816-221-2400
Mo St. Louis, LCOMP-St. Louis, 2605 So. Hanley 314-647-5505
Neb Lincoln, Scott Elctrn. Supply, 4040 Adams St. 402-434-8308
NJ Cherry Hill, Milgray/Delaware Valley, 1165 Marlkress Rd. 609-424-1300
NJ Hanover, State Elctrns., 36 Rt. 10 201-887-2550
NJ Kenilworth, Newark Elctrns., 303 Monroe Ave. 201-272-8410
NJ Pennsauken, Resco Elctrns., Airport & Central Hwys. 609-662-4000
NJ Rahway, Terminal Elctrns. Corp., Rahway Industrial Ctr., Pinewood St. 201-381-5700
NJ Springfield, Federated Elctrns., 155 U.S. Rt. 22 201-376-8900
NY Binghamton, Stack Industrial Elctrns., 45 Washington St. 607-723-6326
NY Buffalo, Summit Distributors, 916 Main St. 716-884-3450
NY E. Farmingdale, Harrison Radio, 20 Smith St. 516-293-7990
NY Elmsford, Ancar Electronics Supply, 1 Nepperhan Ave. 914-592-7100
NY Farmingdale, Arrow Elctrns., 900 Broad Hollow Rd. 516-694-6800
NY Long Island City, H.L. Dalis, 35-35 24th St. 212-361-1100
NY Lynbrook, Peerless Radio, 19 Wilbur St. 516-593-2121
NY Rochester, Summit Elctrns. of Rochester, 292 Commerce Dr. 716-334-8110
NY Rome, Rome Elctrns., 108 Spring St. 315-337-5400
NY Syosset, Milo Elctrns., 170 Eileen Way 516-364-1111
NY Woodbury, Harvey Radio, 60 Crossways Park W. 516-921-8700
NC Greensboro, Hammond Elctrns. of Carolina, 2923 Pacific Ave. 919-275-6391
NC Raleigh, Southeastern Radio Supply, 414 Hillsborough St. 919-828-2311
NC Winston-Salem, Cramer/EW, 938 Burke St. 919-725-8711
Ohio Akron, Akron Elctrn. Supply, 107-117 S. Arlington St. 216-762-8818
Ohio Akron, Sun Radio, 110 E. Market St. 216-434-2171
Ohio Cincinnati, Hughes-Peters, 4865 Duck Creek Rd. 513-351-2000
Ohio Cincinnati, Newark Cincinnati, 9799-G Princeton Rd. 513-874-5115
Ohio Cincinnati, United Radio, Summit Rd. & Reinhold Dr. 513-761-4030
Ohio Cleveland, Pioneer-Standard-Cleveland Div., 4800 E. 131 St. 216-587-3600
Ohio Columbus, Hughes-Peters, 481 E. 11th St. 614-294-5351
Ohio Dayton, Pioneer/Dayton Div., Pioneer-Standard Electr., 1900 Troy St. 513-236-9900
Ohio Dayton, Stotts-Friedman, 108 N. Jefferson St. 513-224-1111
Ohio Highland Hgts, RPC Elctrns., 749 Miner Rd. 216-461-4700
Ohio Lima, Lima Radio Parts, 150 W. Grand Ave. 419-228-1220
Ohio Solon, Radio & Elctrn. Parts (Repco), 6835 Cochran Rd. 216-248-8900
Okla Tulsa, Radio, Inc., 1000 S. Main St. 918-587-9124
Ore Portland, Almac/Stroum Elctrns., 4475 Scholls Ferry Rd. 503-292-3534
Pa Erie, Seaway Elec. Supply, 142 W. 12 St. 814-456-4228
Pa Montgomeryville, Pyttronic Industries, Montgomeryville Ind'l Pk. 215-242-6700
Pa Philadelphia, Almo Elctrns., Roosevelt Blvd. at Blue Grass Rd. 215-676-6000
Pa Philadelphia, Philadelphia Elctrns., 1225 Vine St. 215-568-8288
Pa Pittsburgh, Cameradio Elctrns., 2801 Liberty Ave. 412-288-2600
Pa Reading, G. D. Barbey Co., 333 No. 4th St. 215-376-7451
RI Providence, Wm. Dandreta & Co., 28 Wolcott St. 401-861-2800
SC Greenville, Hammond Elctrns. of Carolina, 100 Augusta St. 803-293-4121
Tenn Kingsport, Radio Elec. Supply, 961 E. Sullivan St. 615-247-8111
Tenn Nashville, Electra Distributing, 1914 West End Ave. 615-255-8444
Tex Dallas, Texas Instr. Supply, 6000 Denton Dr. 214-238-6811
Tex Ft. Worth, Allied Elctrns., 401 E. 8th St. 817-336-5401
Tex Garland, Newark Elctrns., 707 Easy St. 214-271-2511
Tex Houston, Harrison Equip. Co., 1616 McGowen 713-224-9131
Tex Houston, Lenert Co., 1420 Hutchins 713-225-1465
Tex Houston, Newark-Houston Elctrns. Corp., 6902 Harwin Dr. 713-782-4800
Utah Salt Lake City, Standard Supply Co., 225 E. 6th South 801-355-2971
Va Norfolk, Priest Elctrns., 6431 Tidewater Dr. 703-855-0141
Va Richmond, Meridian Elctrns., 1001 W. Broad St. 804-353-6648
Wash Seattle, Almac/Stroum Elctrns., 5811 Sixth Ave. So. 206-763-2300
Wisc Milwaukee, Elctrn. Expaditors, 6045 N. Green Bay Ave. 414-228-8100
Wisc Milwaukee, Parts Mart, 1314 N. 7th St. 414-276-4160
For: Can., Don Mills, Ont., Saynor Elctrns. Ltd., 99 Scarsdale Rd. 416-445-2347
For: Can., Downsview, Ont., Cesco Elctrns. Ltd., 24 Martin Ross Ave. 416-661-0220
For: Can., Montreal, Que., Cesco Elctrns., Ltd., 4050 Jean Talon St. W. 514-735-5511
For: Can., Montreal, Que., Payette Radio Ltd., 730 St. James St. W. 514-866-6681
For: Can., Ottawa, Ont., Wackid Radio TV Labs, Ltd., 312 Parkdale Ave. 613-728-1821
For: Can., Ottawa, Ont., Cesco Elctrns. Ltd., 1300 Carling Ave. 613-729-5118
For: Can., Toronto, Ont., Electro Sonic Supply Co., Ltd., 543 Yonge St. 416-924-0711
For: Can., Toronto, Ont., Zentronics, Ltd., 185 Bridgeland Ave. 416-525-1700
For: Can., Vancouver, B.C., L.A. Varah Ltd., 2077 Alberta St. 604-873-3211
For: Can., Winnipeg, Man., Cam Gard Supply, Ltd., 1777 Ellice Ave. 204-786-8401

DIAMONITE PRODUCTS DIV., Box 581, Shreve, Ohio, 44676, Tel: 216-567-2145; Empl.: 250

Customer service: P. Dunley

Free literature available: Diamonite Alumina Electronic Ceramics-Brochure

Products manufactured: Cores, Ceramic, Insulators & Insulation, Seals, Substrates, Tubing

Local Sales Offices & Reps.
Ala Huntsville, Techn. Sls. 205-881-1750
Cal Atherton, Wadsworth-Pacific Mfg. Assoc. 415-321-3619
Cal Pacific Palisades, Wadsworth-Pacific Mfg. Assoc. 213-454-4313
Conn Simsbury, C.M. Billard & Co. 203-658-7200
Fla Ft. Lauderdale, G.F. Bohman Assocs. 305-564-3081
Fla Orlando, G.F. Bohman Assocs. 305-855-0274
Ind Indianapolis, H.G. Lake Co. 317-783-7254
Mich Farmington, Scanlon-Cotter Co. 313-477-9080
Mo St. Louis, A.V. Doran Co. 314-725-3377
NJ Trenton, William S. Mills 609-882-4111
NY Liverpool, Wadsworth Mfg. Assocs. 315-652-6865
NY Manlius, Wadsworth Mfg. Assocs. 315-682-5705
NC Greensboro, Manufacturers Sls. Co. 919-274-2474
Ohio Dayton, H.G. Lake Co. 513-277-8181
Ohio Richmond Heights, H.G. Lake Co. 216-486-1477
Pa Philadelphia, K.B. Erdman Co. 215-224-1833
Tex Addison, Manufacturers Mktg. Svc. 214-661-5160
Tex Kemah, Manufacturers Mktg. Svc. 713-334-4717
Wisc Elm Grove, Gibbons & Hebbe 414-782-6900

DIA-NETICS INC., 18823 Napa St., Northridge, Cal., 91324, Tel: 213-886-2616; Empl.: 35 p. 2•422,423

For info on price: M. Easton; Application info: L. Fleury; Customer service: L. Fleury; Delivery info: E. Wilson

Products manufactured: Bobbins, Winding, Coil & Transformer, Coils Including Assemblies & Forms

DICEON ELECTRONICS, 18522 Von Karman Ave., Irvine, Cal., 92664, Tel: 714-833-0870, TWX: 910-595-1794

Customer service: Area Sls. Coordinator

Products manufactured: Circuits, Flexible, Circuits, Printed, Multilayer, Services, Assembly, Production & Test

Local Sales Offices & Reps.
Ala Huntsville, Electronic Mktg. Assocs. 205-837-6061
Ariz Phoenix, Markets West 602-279-2378
Cal Mt. View, West/Mark Assocs. 415-969-1700
Colo Denver, Rope & Williamson 303-758-8507
Ill Barrington, L. Bacher & Assocs. 312-381-6780
Mass Wakefield, Data Engrg. Svcs. 617-234-6666
Mich Southfield, Luebbe Sls. Co. 313-357-0355
Minn Anoka, K. Haugen & Assocs. 612-421-3395
NJ Livingston, Graydon-Sherman 201-994-9055
NY Fayetteville, Graydon-Sherman 315-637-9861
NC Cary, Electronic Mktg. Assocs. 919-722-5151
Ohio Cincinnati, Luebbe Sls. Co. 513-871-4211
Pa Delmont, Luebbe Sls. Co. 412-468-4019
Pa Yeadon, Graydon-Sherman 215-664-7316
SC Greenville, Electronic Mktg. Assocs. 803-244-8120
Tex Richardson, P. J. Scanlon Co. 214-231-4661

DICKSON ELECTRONICS, See Siemens Corp, Comps Div.

DIELECTRIC COMMS, Div. Sola Basic Inds., Raymond, Maine, 04071, Tel: 207-655-4555, TWX: 710-229-6890; FSC No: 08441; Empl.: 165

For info on price: P. Skahan; Application info: R. Tanczos; Customer service: P. Skahan; Delivery info: R. Tanczos

Products manufactured: Dehydrators, Dummy Loads, Meters

DIELECTRIC INSTR. CORP., 761 Franklin Ave., Pittsburgh, Pa., 15221, Tel: 412-731-6566; Empl.: 10

Customer service: W. M. Wyman

Products manufactured: Bridges, Meters, Services, Assembly, Production & Test, Testers, Timers

DIELECTRIC SCIENCES, 5 South Ave., Burlington, Mass, 01803, Tel: 617-272-8960; FSC No: 50509; Empl.: 6

Customer service: J. A. Goldlust

Products manufactured: Cable, Connectors, Lead Assemblies & Receptacles, Wire

Local Sales Offices & Reps.
Cal San Diego, Encom 714-299-1616
Cal San Francisco, Encom 415-969-0330

DIETZ DESIGN, INC., 100 Electronics Pkwy., Belton, Mo., 64012, Tel: 816-331-4911; Empl.: 50

For info on price: D. Liter; Application info: V. L. Zugenbuhler; Customer service: C. Gurnett

Free literature available: Catalog sheets on Descq Plug-in Assemblies, Company folder describing capabilities and showing pictures of products manufactured, and catalog sheet designated 2700 EEM File System showing telegraph tone channel band pass filters and there frequency.

Products manufactured: Chokes, Coils Including Assemblies & Forms, Delay Lines, Enclosures, Module, Plug-In, Filters, Networks, Reactors, Standards, Transformers

DIETZ, HENRY G. CO., INC., 14-26 28th Ave., Long Island City, N.Y., 11102, Tel: 212-RA 6-3347; Empl.: 20; Minimum order: $10

Customer service: H. G. Dietz

Free literature available: Catalog - Title: flow meters, low pressure switches and velocity actuated flow switches (contents: general description of products available).

Products manufactured: Controls/Control Eqpt., Switches

DIETZGEN CORP., 2425 N. Sheffield Ave., Chicago, Ill, 60613, Tel: 312-549-3300; Empl.: 200

Products manufactured: Drafting Machines, Readers

Local Sales Offices & Reps.
Cal Los Angeles 213-678-3761
Cal San Diego 714-234-8411
Cal San Francisco 408-984-2460
Colo Denver 303-399-2180
Conn North Brunswick 201-297-3500
DC Washington 202-223-8130
Fla Orlando 305-241-5671
Ga Atlanta 404-934-5240
Ill Chicago 312-549-3300

Ky	Louisville	502-584-2265
La	New Orleans	504-525-7121
Mass	Upper Newton Falls	617-965-4830
Mich	Birmingham	313-644-1900
Mo	Kansas City	816-471-3340
NJ	North Bruswick	201-297-3500
Ohio	Cincinnati	513-761-2724
Ohio	Cleveland	216-631-2660
Ohio	Columbus	614-224-5149
Okla	Oklahoma City	405-232-1147
Pa	Philadelphia	215-688-6400
Pa	Pittsburgh	412-563-6880
Tex	Arlington	214-263-3111
Wash	Seattle	206-623-1158
Wisc	Brookfield	414-671-1518
FOR:	Can., Weston, Ont., 416-749-2077	

DIGIAC CORP., 175 Engineers Rd., Smithtown, N.Y., 11787, Tel: 516-273-8600; Empl.: 50; Minimum order: $10

Customer service: G. Timmes

Free literature available: Apple Cat - Includes educational training products, in computer electronics, technology, electromechanical technology, mechanisms & linkages fluid power technology. Electrolab - Data sheets to include, introductory to electricity training systems, advanced electrical machines studies, electrical technology training systems and power supplies.

Products manufactured: Amplifiers, Benches, Consoles, Stools, Tables, Computers, Controls/Control Eqpt., Converters, Generators, Power Supplies, Recorders, Servo Systems

Local Sales Offices & Reps.

Ala	Birmingham, Technical Training Aids	205-822-1326
Ariz	Scottsdale, Peterson Assocs.	602-945-6605
Cal	Granada Hills, Tech. Education Svcs.	213-360-1061
Fla	Winter Pk., Tech. Training Aids	305-647-5373
Ill	Downers Grove, Aidex Corp.	312-963-4270
Iowa	Marion, Gib Klein Co.	319-393-4048
Md	Columbia, W.B. Cavanaugh Co.	301-730-6777
Mich	Plymouth, J. Close	313-453-7531
Minn	Eden Prairie, Lab Corp.	612-944-1807
NH	Windham, Helmar Assocs.	603-893-4586
NY	East Norwich, Tequipment	516-922-6590
NY	Pittsford, Vowell Assocs.	716-381-9280
NC	Sanford, A.B. Williams Jr. Assoc.	919-775-4164
Ohio	Toledo, Freeman Supply Co.	419-691-4624
Pa	Philadelphia, Delta Equip. Co.	215-236-6350
SD	Watertown, J.L.H. Assocs.	605-886-4667
Tex	Dallas, Tol-Mark Co.	214-341-6917
Tex	Temple, Digiac Corp.	817-778-5681
Wash	Edmonds, Tomahawic Corp.	206-776-4598
Wisc	Milwaukee, Lab Corp.	414-771-2946

DIGI-DATA CORP., 8580 Dorsey Rd., Jessup, Md., 20794, Tel: 301-498-0200, TWX: 710-867-9254; Empl.: 80; Minimum order: $20

For info on price: R. Arnold; Application info: R. Pedersen; Customer service: C. Guenther; Delivery info: R. Arnold

DIGILIN INC., 3521 W. Pacific Ave., Burbank, Cal., 91505, Tel: 213-846-1800, TWX: 910-498-2758; Empl.: 50; Minimum order: $25

For info on price: E. B. Hibbs Jr.; Application info: J. Masatsugu; Customer service: M. Lessard; Delivery info: M. Jones

Free literature available: Literature describes performance specifications for Digilins' Broad Line of Digital Panel Meters, Thermocouple indicators, and process control meters.

Products manufactured: Comparators, Counters, Meters

Local Sales Offices & Reps.

Ala	Huntsville, Int'l. Scien.	205-837-1601
Cal	Burbank, DeAngelo, Rothman & Co.	213-398-6239
Cal	Mountain View, Tech-Ser, Inc.	415-969-9020
Cal	San Diego, DeAngelo, Rothman & Co.	714-560-5707
Fla	Orlando, Turex Assocs.	305-859-2160
Ill	Chicago, Midwest Elctrn. Sls.	312-626-0030
Md	Rockville, Marktron	301-762-6210
Mich	Clawson, Instr. Specialties	313-435-3311
Mich	Royal Oak, Group Ten	313-549-3910
Minn	Minneapolis, E.C. Elctrns.	612-831-0229
Mo	Kansas City, Harris Hanson Co.	816-444-9494
Mo	St. Louis, Harris Hanson Co.	314-432-3611
NJ	Stirling Heights, N.B.S. Assocs.	201-464-8500
NM	Albuquerque, Intermountain Engrg.	505-883-9010
NY	E. Syracuse, Ossmann Instrs.	315-437-6666
NY	Rochester, Ossmann Instrs.	716-328-2230
NY	Vestal, Ossmann Instrs.	607-785-9947
Ohio	Cleveland, Group Ten	216-486-2800
Ohio	Dayton, Group Ten	513-277-6531
Ore	Portland, Hayes Tech.	503-232-5343
Pa	Glenside, Elcom, Inc.	215-885-1325
Wash	Seattle, Hayes Tech.	206-763-2210
EXP:	Medway, Mass., Surel Int'l.	617-533-2041

DIGITAL COMPUTER CONTROLS, INC., 12 Industrial Rd., Fairfield, N.J., 07006; Empl.: 25; Minimum order: $50

For info on price: B. R. Erickson; Application info: P. Goodman; Customer service: J. Laidlaw; Delivery info: V. Choffo

Free literature available: Minicomputers and associated equipment including discs, printers, card readers, tape drives, communications. Electronic cash registers.

Products manufactured: Computers

Local Sales Offices & Reps.

Ariz	Phoenix, Mountaintek	602-242-5551
Cal	Cupertino, Digital Computer Controls	408-255-6690
Cal	Irvine, Digital Computer Controls	714-556-2760
Colo	Boulder, Mountaintek	303-444-1738
Colo	Evergreen, Mountaintek	303-674-5255
Conn	Danbury, Digital Computer Controls	203-792-1230
Fla	Altamonte Springs, Digital Computer Controls	305-862-6699
Kans	Shawnee Mission, Inland Assocs.	913-362-2366
Md	Silver Spring, Digital Computer Controls	301-587-5871
Mass	Wakefield, Digital Computer Controls	617-245-6240
Mich	Southfield, Digital Computer Controls	313-559-4633
Minn	Minneapolis, Carter Elctrns.	612-544-9393
Mo	Glencoe, Inland Assocs.	314-938-4992
NJ	Fairfield, Digital Computer Controls	201-575-0146
NM	Albuquerque, Mountaintek	505-268-0003
Ohio	Columbus, Meas. Instrs., Inc.	614-488-9753
Tex	Dallas, Remtek	214-369-8146
Tex	Houston, Remtek	713-664-2113
Utah	Salt Lake City, Mountaintek	801-272-4611
Wash	Seattle, Rush S. Drake Assocs.	206-763-2755
EXP:	N.J., Fairfield, Digital Computer Controls Inc.	201-575-9100
FOR:	Can., St. Laurent, Mont., Que., Digital Computer Controls	514-748-9694

DIGITAL DEV. CORP., 5575 Kearny Villa Rd., San Diego, Calif., 92123, Tel: 714-278-9920; Empl.: 375; Minimum order: $50

For info on price: M. Mougel; Application info: M. Mougel; Customer service: T. Rodstrum; Delivery info: D. Kinzel

Products manufactured: Memory Systems

Local Sales Offices & Reps.

Cal	Sunnyvale, Digital Dev. Corp.	408-733-5622
Fla	Orlando, W.A. Brown Instr., Inc.	305-425-5505
Mass	Boston, Digital Dev. Corp.	617-965-6099
Pa	Philadelphia, Digital Dev. Corp.	609-227-4617
Tex	Richardson, Digital Dev. Corp.	214-235-3488
Wash	Seattle, Showalter-Judd, Inc.	206-762-2310

DICEON ELECTRONICS, 18522 Von Karman Ave., Irvine, Cal., 92664, Tel: 714-833-0870, TWX: 910-595-1794; Empl.: 225

Products manufactured: Services, Assembly, Production & Test

Local Sales Offices & Reps.

Ariz	Phoenix, Markets West	602-279-2378
Cal	Mt. View, West/Mark Assocs.	415-969-1700
Colo	Denver, Rope & Williamson	303-758-8507
Ill	Barrington, L. Bacher & Assocs.	
Mass	Westboro, Tech. Mktg. Svcs.	617-366-8462
Minn	Anoka, K. Haugen & Assocs.	612-421-3395
NJ	Livingston, Graydon-Sherman	201-994-9055
Ohio	Cincinnati, Luebbe Sls. Co.	513-871-4211
SC	Greenvile, Elctrn. Mktg. Assocs.	803-244-8120
Tex	Richardson, P.J. Scanlon Co.	214-231-4661

DIGITAL EQUIPMENT CORP., 146 Main St., Maynard, Mass., 01754, Tel: 617-897-5111; Empl.: 19000

Products manufactured: Comm. , Systems, Computers, Controllers, Programmable, Converters, Data Acquisition & Reduction Systems, Data Compressors, Digital, Data Loggers, Disc Packs, Magnetic, Memories, Buffer, Memory Systems, Multiplexers, Paper-Tape Preparation Systems, Printers, Punched Card Equipment, Readers, Recorders, Terminal Equipment, Digital, Terminals, Data Display (including Alphanumeric & Graphic), Test Systems

Local Sales Offices & Reps.

Ala	Huntsville	205-881-7730
Ariz	Phoenix	602-267-1364
Ariz	Tucson	602-795-5840
Cal	Los Angeles	213-479-3791
Cal	Mountainview	415-964-6200
Cal	Oakland	415-635-3000
Cal	San Diego	714-280-7880
Cal	Santa Ana	714-979-2460
Cal	Sunnyvale	408-735-9200
Colo	Englewood	303-770-6150
Conn	Fairfield	203-255-5991
Conn	Meriden	203-237-8441
Fla	Fort Lauderdale	305-739-0530
Fla	Orlando	305-851-4450
Ga	Atlanta	404-451-7411
Haw	Kailua, Oahu	808-261-3182
Ill	Rolling Meadows	312-640-5500
Ind	Indianapolis	317-248-9461
Iowa	Bettendorf	319-359-7581
Ky	Louisville	502-458-9561
La	Metairie	504-837-0257
Md	Lanham	301-459-7900
Mass	Maynard	617-897-5111
Mass	Waltham	617-890-0330
Mass	Westfield	413-568-9511
Mich	Farmington Hills	313-478-3000
Minn	Minneapolis	612-854-6562
Mo	Independence	816-252-2300
Mo	St. Louis	314-872-8540
NH	Manchester	603-668-5507
NJ	Fairfield	201-227-9280
NJ	Metuchen	201-549-4100
NJ	Princeton	609-452-2940
NM	Albuquerque	505-296-5411
NY	Albany	518-869-8461
NY	Huntington Station	516-694-4131
NY	New York	212-582-1300
NY	Rochester	716-461-1700
NY	Syracuse	315-437-1593
NC	Durham	919-489-3347
Ohio	Cleveland	216-289-9000
Ohio	Columbus	614-868-1900
Ohio	Dayton	513-294-3323
Ohio	Sylvania	419-882-0511
Ohio	Worthington	614-888-9572
Okla	Tulsa	918-749-4476
Ore	Portland	503-297-3761
Pa	Blue Bell	215-825-4200
Pa	Monroeville	412-243-9404
Tenn	Knoxville	615-588-6571
Tenn	Nashville	615-244-0130
Tex	Austin	512-454-3660
Tex	Dallas	214-620-2051
Tex	Houston	713-777-3471
Utah	Salt Lake City	801-487-4669
Va	Richmond	804-282-3157
Wash	Bellevue	206-641-0070
Wisc	Milwaukee	414-784-1311

DIGITAL EQUIPMENT CORP., Comps. Grp., One Iron Way, Marlborough, Mass., 01752

DIGITAL GEN'L. CORP., Univ. Cir. Resch. Ctr., 11000 Cedar Ave., Cleveland, Ohio, 44106, Tel: 216-721-0440; Empl.: 15

Customer service: W. Rittman

Free literature available: DC IV Diagnostic Computer Test System - Computer controlled; functional test system for testing digital and hybrid logic cards. ELF - Portable test system for testing digital logic cards.

Products manufactured: Test Systems, Testers

Local Sales Offices & Reps.

Ariz	Scottsdale, C.T. Fink & Assocs.	602-947-7981
Cal	North Hollywood, Crown Elctrns.	213-877-3550
Ill	Park Ridge, West-Tronics	312-696-3115
Mass	Framingham, Victor Assocs.	617-879-5710
Mich	Royal Oak, Meas. Instrs.	313-352-2144
Minn	Minneapolis, Bitronics Sls. Co.	
NJ	Livingston, Graydon-Sherman	201-994-9055
NY	Baldwinsville, Scibetta Reps.	315-622-3993
Ohio	Cleveland, Meas. Instrs.	216-333-6611
Ohio	Columbus, Meas. Instrs.	614-488-9753
Ohio	Dayton, Meas. Instrs.	513-252-8132
Pa	Monroeville, Meas. Instrs.	412-366-1906
Tex	Richardson, C. Tinch Sls. Co.	214-231-1322
Tex	Richardson, C. Tinch Sls. Co.	214-231-1322

DIGITAL SCIENTIFIC, 11455 Sorrento Valley Rd, San Diego, Cal., 92121, Tel: 714-453-6050, TWX: 910-322-1136

For info on price: P. H. Rosa; Application info: J. J. Gormley; Customer service: R. W. Sykes; Delivery info: J. J. Gormley

Free literature available: Sales/Technical Brochures - Meta 4® Computer Emulators.

Directory of Local Distributors Starts on page 401

Products manufactured: Computers

Local Sales Offices & Reps.

Cal	Los Angeles	213-640-1360
DC	Washington	703-620-3458
Ill	Chicago	312-449-5155
Mich	Detroit	313-642-7448
NY	New York	212-943-8777
Tex	Dallas	214-239-0170

DIGITECH DATA INDS., INC., 66 Grove St., Ridgefield, Conn., 06877, Tel: 203-438-3731; Empl.: 100

Products manufactured: Amplifiers, Analyzers, Comm. Systems, Generators, Kits, Test Equipment, Meters, Oscillators, Relays, Synthesizers, Test Equipment, Testers

DIGITECH DATA INDS., INC., 66 Grove St., Box 547, Ridgefield, Conn., 06877, Tel: 203-438-3731, Telex: 969-623; Empl.: 60; Minimum order: $25

For info on price: D. Doherty; Application info: W. C. Andrews; Customer service: D. Doherty; Delivery info: D. Doherty

Free literature available: Short form catalog, data sheets defining our telecommunications test equipment.

Products manufactured: Amplifiers, Analyzers, Generators, Meters, Oscillators, Relays, Terminals, Data Display (including Alphanumeric & Graphic), Testers

DIGITRAN CO., 855 So. Arroyo Pkwy., Pasadena, Cal., 91105, Tel: 213-449-3110, TWX: 910-588-3794

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Products manufactured: Decade Boxes, Dividers, Keyboards, Alphanumeric & Decimal, Switches

Local Sales Offices & Reps.

Ala	Huntsville, Beacon Elctrns. Assoc.	205-881-5031
Ariz	Phoenix, Howe & Howe Sls., Inc.	602-264-7971
Cal	Los Altos, Shannon Assoc.	415-941-2217
Cal	San Diego, Celtec Co. Inc.	714-279-7961
Colo	Englewood, Todd Assoc.	303-761-7801
Fla	Mitland, Beacon Elctrns. Assoc.	305-647-3498
Fla	Palm Beach Gardens, Beacon Elctrns. Assoc.	305-622-2770
Ga	Atlanta, Beacon Elctrns. Assoc.	404-351-3654
Ill	Chicago, Scientific Sls. Corp.	312-775-7594
Ind	Ft. Wayne, R.O. Whitesell & Assoc.	219-432-5591
Ind	Indianapolis, R.O. Whitesell & Assoc.	317-359-9283
Ind	Kokomo, R.O. Whitesell & Assocs.	317-452-6065
Iowa	Des Moines, Beams	515-282-0292
Kans	Overland Park, Beams	913-341-7744
Ky	Louisville, R.O. Whitesell & Assoc.	502-893-7303
Md	Rockville, Marktron, Inc.	301-762-6210
Md	Silver Springs, Mil, Inc.	301-585-6141
Md	Timonium, Marktron, Inc.	301-252-7111
Mich	Grand Rapids, Robert O. Whitesell & Assoc.	616-451-8901
Mich	South Field, Robert O. Whitesell & Assoc.	313-358-2020
Mich	St. Joseph, Robert O. Whitesell & Assoc.	616-983-7337
Minn	Bloomington, Scientific Sls. Corp.	612-881-3300
Mo	St. Louis, Beams	314-781-6855
NJ	Cherry Hill, N. Kronstadt Assoc.	609-662-2958
NJ	Dumont, Dom Ciccone	201-273-6140
NJ	Haddonfield, Sunday-O'Brien	609-249-4013
NM	Albuquerque, Data Handling Co.	505-268-4364
NY	Buffalo, Telesco Assoc.	716-834-1026
NY	Canandaigua, Telesco Assoc.	716-872-6417
NY	Coram, B. O'Brien	201-273-6140
NY	Liverpool, Telesco Assoc.	315-451-4925
NY	Rochester, Telesco Assoc.	716-271-3780
Ohio	Cincinnati, R.O. Whitesell & Assoc.	513-521-2290
Ohio	Columbus, R.O. Whitesell & Assoc.	614-888-9396
Ohio	Dayton, Mil, Inc.	513-268-8771
Ohio	Lakewood, R.O. Whitesell & Assoc.	216-228-7525
Ore	Beaverton, Arnescon Assoc.	503-643-5754
Pa	Pittsburgh, Robert O. Whitesell & Assoc.	412-344-7277
SC	Spartanburg, Beacon Elctrns. Assoc.	803-582-4613
Tex	Dallas, Allied Comps., Inc.	214-238-0408
Tex	Houston, Allied Comps., Inc.	713-691-3961
Va	Charlottesville, Marktron, Inc.	703-973-5874
Wash	Seattle, Arneson Assoc.	206-762-7664
FOR:	Can. Malton, Ontario, Deskin Sls., Inc.	416-677-5517
FOR:	Can. Montreal, Que., Deskin Sls., Inc.	514-384-1420
FOR:	Can., Vancouver, B.C., Deskin Sls., Inc.	604-324-6331

Local Distributors

Ala	Huntsville, Powell Electrs./Huntsville, 803 Oster Dr.	205-539-2731
Cal	Los Angeles, El-Com, Inc., 5134 Valley Blvd.	213-223-1351
Cal	Mt. View, Powell Electrns., Inc., 411 Fairchild Dr.	415-964-0820
Conn	Hamden, Impact Sls. Inc., 60 Connolly Pkwy.	203-281-1331
Fla	Coral Springs, Controlled Distrs., Inc., 7857 W. Sample Rd.	305-752-4950
Fla	Miami Springs, Powell Electr./Fla., Box 514	305-592-3260
Fla	Orlando, Powell Elctrns./Fla., 2049 W. Central Blvd.	305-859-1450
Ill	Mt. Prospect, Magnuson Elctrns., 2420 Oakton St.	312-956-0700
Ind	Indianapolis, Pioneer Standard, 6408 Castle Pl.	317-849-7300
Md	Bettsville, Powell Electr./Wash., 10728 Hanna St.	301-937-4030
Mass	Waltham, Impact Sls. Co., 223 Crescent St.	617-893-2850
Mich	Romulus, Pioneer Standard, 6337 N. Beverly Plaza	313-729-8500
Minn	St. Paul, Magnuson Elec., Inc., 1246 W. 7th St.	612-227-8495
NY	Buffalo, Ossmann Comp. Sls. Corp., 395 Cleveland Dr.	716-832-4271
NY	Kingston, Ossmann Comp. Sls. Corp., 411 Washington Ave.	914-338-5505
NY	Lynbrook, Peerless Radio Corp., 19 Wilbur St.	516-593-2121
NY	Rochester, Ossmann Comp. Sls., 280 Metro Park	716-442-3290
NY	Syracuse, Ossmann Comp. Sls. Corp., 132 Pickard Bldg.	315-454-4477
NY	Vestal, Ossmann Comp. Sls. Corp., 1911 Vestal Pkwy. E.	607-785-9949
Ohio	Cleveland, Pioneer Standard, 4800 E. 131st St.	216-587-3600
Ohio	Columbus, Electronics Mktg. Corp., 1150 W. Third Ave.	614-200-4161
Ohio	Dayton, Pioneer Standard, 1900 Troy St.	513-236-9900
Pa	Philadelphia, Powell Electr./Philadelphia, S. Island Rd., Box 8765	215-365-1900
Pa	Pittsburgh, Pioneer Standard, 560 Alpha Dr.	412-782-2300
Tex	Dallas, Powell Elctrns./Dallas, 2860 Walnut Hill Dr.	214-350-4186
Tex	Dallas, Solid State Electrs. Co. of Tex., 2643 Manana	214-352-2601
Tex	Houston, Solid State Elctrns. Co. of Texas, Box 36849	713-785-5436

DIGITRONICS CORP., 1 Albertson Ave., Albertson, N.Y., 11507, Tel: 516-484-1000, TWX: 510-223-0607

Products manufactured: Comm. Systems, Converters, Integrated Circuit Packaging Systems, Perforators, Printers, Readers, Recorders, Transmission Systems, Data

DILECTRON, Div. Bestran Corp., 2669 S. Myrtle Ave., Monrovia, Cal., 91016, Tel: 213-446-6195, TWX: 910-582-3210; Empl.: 400

Customer service: R.J. Ruby

Free literature available: Catalog - Complete line of disc and monolithic ceramic capacitors

Products manufactured: Capacitors, Fixed

Local Sales Offices & Reps.

Ariz	Phoenix, W. Bert Knight Co.	602-242-3057
Cal	Newport Beach, W. Bert Knight Co.	714-833-8250
Cal	Redwood City, Logan Sls.	415-369-6726
Colo	Denver, Piper-Goyne	303-934-6971
Conn	Vernon, G.M. Assocs.	203-646-4443
Fla	Indian Rocks Beach, Tech-Rep Assocs.	813-595-2834
Ga	Marietta, K&E Assocs.	404-427-0241
Ill	Chicago, Schumacher Elec. Co.	312-384-6060
Ind	Indianapolis, Scott Elctrns.	317-897-9976
Ky	Louisville, Scott Elctrns	502-583-3220
Mass	Framingham, G.M. Assocs.	617-872-4871
Mich	Plymouth, Scott Elctrns.	313-357-2088
Mo	Kansas City, R.R. Burton Co.	816-444-8300
NJ	Marlton, Krouse Assocs.	609-424-3543
NM	Albuquerque, Piper-Goyne	505-265-6794
NY	Fulton, C.D. Truax	315-592-7184
NY	Valley Cottage, LRC Assocs.	914-634-7973
Ohio	Cleveland, Scott Elctrns.	216-291-2600
Pa	Ardmore, Wm. K. Metz	215-649-3966
Tex	Richardson, Semiconductor Sls. Assocs.	214-231-6181
Wash	Seattle, Ray Johnston	206-524-5170
FOR:	Can., Markham, Ont., Elctrn. Components Intl.	416-499-5681

DILLON, W.C. & CO., 14620-EP Keswick St., Van Nuys 340, Calif., 91407, Tel: 213-786-8812, Telex: 65-1449; Empl.: 80; Minimum order: $15

For info on price: R. Magio; Application info: R. Magio; Customer service: J. W. Dillon; Delivery info: E. Webber

Products manufactured: Cells, Load, Controls/Control Eqpt., Gages, Indicators, Limit Stops, Mechanical, Power Supplies, Scales, Dial, Services, Assembly, Production & Test, Switches, Testers, Transducers

Local Sales Offices & Reps.

Fla	Ft. Lauderdale, R. Jacobs	305-523-8694
Haw	Mililani, H.C. Burgess & Assocs.	808-623-3118
Ill	Chicago, Service Assoc.	312-568-4545
Md	Baltimore, Jobe & Co.	301-235-3503
Mass	Hathorne, Danvers, Osgood Engrg.	617-933-4744
Mich	Detroit, Basic Serv. Corp.	313-837-8820
NY	Amityville, Long Island, Testing Machines Inc.	516-598-1400
Ohio	Brecksville, M.A. Blankenburg Co.	216-526-1100
Pa	Newtown Square, C.W. Middlestead Co.	215-528-5092
Tex	Dallas, Dillon Equip. Co.	214-824-2511
Wisc	Milwaukee, C. V. Kray Co.	414-352-5194

DIMCO-GRAY COMPANY, 207 E. Sixth St., Dayton, Ohio, 45402, Tel: 513-224-1913; Empl.: 130

For info on price: R. Cramer; Application info: R. Cramer; Customer service: B. Chaney; Delivery info: R. Cramer

Free literature available: DIMCO-GRAY stock molded plastic knobs and handles, snapslide fasteners, and GraLab darkroom, sports, photographic and industrial timers.

Products manufactured: Fasteners, Knobs, Timers

Local Sales Offices & Reps.

Cal	Downey, Corbett-Smith	213-927-2677
Conn	Torrington, Manu-Rep	203-643-4485
Fla	Eustis, R.K. Welter	215-657-0100
Ga	Atlanta, Electro-Mech Sls. Engr. Co.	404-256-4414
Ill	Des Plaines, L. Hodges & Assocs.	312-297-3810
Mich	Birmingham, Barribeau-Simmons Co.	313-646-7800
Minn	Minneapolis, Christian-Richards Co.	612-929-7574
Mo	Kansas City, Automatic General Elctrn. Sls.	816-333-8206
NJ	Forked River, Feralite Metals Corp.	609-693-8575
NY	Rochester, W. Stevenson	716-271-2200
NC	Raleigh, Electro-Mech Sls. Engr. Co.	919-782-6452
Ohio	Lyndhurst, A.C. Wahl & Assocs.	216-461-4930
Pa	Willow Grove, Techparts	215-659-6900
Tex	Hurst, Edmar Tech. Sls. Co.	817-282-5561
Wash	Seattle, National Co.	206-623-7060
Wisc	Waukesha, Lincoln Hodges & Assocs.	414-542-3087
FOR:	Can., Toronto, Ont., Precision Express Supply Ltd.	416-481-5211

DIMENSIONAL SYSTEMS, INC., 31 Hartwell Ave., Lexington, Mass., 02173, Tel: 617-862-2700; Empl.: 25

For info on price: M. N. Barry; Application info: J. Novosielski; Customer service: M. Wiener; Delivery info: M. N. Barry

Free literature available: DMS-15 Datafile 1510 Add-on core memory for PDP-15 computer DMS-9 Datafile 910 Add-on core memory for PDP-9 computer, DMS-10 Brochure Add-on core/semiconductor memory for PDP-10 computer, Datadraft Brochure Automated engineering drafting system.

Products manufactured: Drafting Machines, Memory Systems

DIPLOHMATIC DIV., Harry Levinson Co., 1211 E. Denny Way, Seattle, Wash., 98122, Tel: 206-323-5100, TWX: 910-444-2154; Empl.: 4; Minimum order: $15

Customer service: H. Levinson

Products manufactured: Potentiometers, Resistors

DISC ROTASWITCH®
Shaft Encoder

DISC INSTRUMENTS, INC., 102 E. Baker St., Costa Mesa, Ca., 92626, Tel: 714-979-5300, TWX: 910-595-1987; Empl.: 60; Minimum order: $20

For info on price: E. L. McElroy Ext. 32; Application info: B. Wiles Ext. 45; Customer service: L. Hulburt Ext. 53; Delivery info: B. Treadway Ext. 52

Free literature available: Packages upon request for all Disc Instruments' standard products, describing both electrical and mechanical specifications of individual units.

Products manufactured: Cards, Logic, Controls/Control Eqpt., Counters, Couplings, Encoders, Generators, Indicators, Integrators, Mechanical & Electro-Mechanical, Power Supplies, Switches, Tachometers, Transducers

Local Sales Offices & Reps.

Cal	Mt. View, TRI REP	415-965-1822
Cal	Studio City, Pi Instr.	213-995-0077
Fla	Satellite Beach, Reynolds & Assocs.	305-773-4700
Mass	Lexington, SIR Assocs.	617-862-1812
Mich	Farmington, Carter, McCormic & Peirce, Inc.	313-477-7700
Minn	Minneapolis, Waytek, Inc.	612-933-2133
Mo	Raytown, Production Automation	816-737-0066
NY	Buffalo, Good Components Corp.	716-634-4400
NY	White Plains, Swedelco, Inc.	914-946-1122
Ore	Beaverton, Fry Controls, Inc.	503-643-5448
Pa	Glenside, C. A. Briggs Co.	215-885-2244

DISPLAY DEVICES, Box 667, Encinitas, Cal., 92024, Tel: 714-753-0113; FSC No: 26107; Minimum order: $25 p. 2•1142,1143

For info on price: C. Homer; Application info: C. Ross; Customer service: C. Homer; Delivery info: C. Homer

Free literature available: Component catalog - all components we sell; backlighted panel drawings - typical applications; LED panels.

Products manufactured: Caps, Lenses, Indicator Light, Display Devices/Displays, Labels, Pressure-Sensitive, Adhesive, Lamp Adapters, Lamps, Lenses, Readout & Display, Lights, Sockets

Local Sales Offices & Reps.

Ariz	Phoenix, Thorson Co.	602-956-5300
Cal	Santa Clara, Nova-Tronix	408-243-9530
Cal	Torrance, James W. Johnson	213-371-8580
Fla	Miami, Ludlum Assocs. Co.	305-592-6523
Fla	Orlando, Ludlum Assocs. Co.	305-894-7761
Ill	Bellwood, Fiat Engrg. Assocs.	312-547-6200
Ind	Ft. Wayne, Advanced Comp. Sls.	219-432-2546
Ind	Indianapolis, Advanced Comp. Sls.	317-545-6441
Md	Towson, Kraft Elctrn. Sls., Inc.	301-828-5838
Mich	Plymouth, Romarc	313-455-0300
Minn	St. Paul, Northport Engrg.	612-698-3841
NH	Nashua, Bell Controls	603-882-6984
NJ	Wayne, G T Assoc.	201-694-6040
NY	North Salem, Lodol-Bell Controls	203-438-7808
NC	Winston-Salem, Dula Assocs.	919-768-7166
Ohio	Chagrin Falls, Crest Comp. Sls.	216-543-9808
Pa	Newton Square, Holdsworth & Co., Inc.	215-356-8550
Tex	Dallas, Thorson Co.	214-233-5744
Tex	Houston, Thorson Co.	713-771-3504
Wash	Renton, Control Inst. Co.	206-226-7170

DIT-MCO INT'L., 5612 Brighton Terr., Kansas City, Mo., 64130, Tel: 816-444-9700; Empl.: 160; Minimum order: $25 p. 1•6660

For info on price: B. A. Claxton; Application info: B. A. Claxton; Customer service: J. Herbert; Delivery info: B. A. Claxton

Products manufactured: Test Systems, Testers

Local Sales Offices & Reps.

Cal	Corona, G. Coulter	213-772-4386
Cal	Los Angeles, A. Holtz	213-772-4386
Fla	Cocoa Beach, P. File	305-295-9780
Mass	Beverly, J. Coogan	617-734-5400
Mo	Kansas City, P. Tobin	816-363-6288
NY	N.Y., J. Fitzsimmons	212-682-5844

DIVA, INC., 607 Industrial Way West, Eatontown, N.J., 07724, Tel: 201-544-9000, TWX: 710-722-6645; Empl.: 80; Minimum order: $one

For info on price: R. Maly; Application info: R. Maly; Customer service: S. Trudo; Delivery info: R. Maly

Free literature available: General Disc Drive Description and Controllers. Product Description and General Specs of Computrollers. Floppy Disc Systems. Magnetic Tape Systems. Cartridge Disc Systems. Controllers & Multiwire, Design & Production.

Products manufactured: Circuits, Printed, Multilayer, Memory Systems

Local Sales Offices & Reps.

Ariz	Phoenix, Thorson Co.	602-956-5300
Mass	Bedford, E. H. Gittines	617-275-1436
FOR:	Can., Ottawa, Ont., Gil York	613-225-8789

DIVERSIFIED ELECTRONICS CO., 720 E. Evelyn St., Sunnyvale, Cal., 94086, Tel: 408-738-3911; Empl.: 8

Customer service: Order desk

Products manufactured: Calculators, Electrical & Electronic, Computers

DIVERSIFIED ELECTRONICS INC., Box 6231, Sta. B, Evansville, Ind., 47712, Tel: 812-426-2806; Empl.: 35 p. 1•1624-1627

Customer service: C. L. Smith

Free literature available: Phase Monitor Catalog - contains specifications, applications and operational description. Current Monitor Catalog - contains specifications, applications and operational description. Air Conditioning/Refrigeration Controls Catalog - contains specifications, applications, check-out procedure and installation procedures.

Products manufactured: Controls/Control Eqpt., Monitors, Protectors, Relays, Sockets, Timers

Local Sales Offices & Reps.

Cal	L.A., Cutlass Elctrns.	213-324-7360
Conn	Meriden, Abbott-Allison Co.	203-237-9232
Fla	Ft. Lauderdale, Armor Investment Corp.	305-733-7767
Ill	Chicago, Lincoln Hodges Assoc.	312-297-3810
Ind	Ft. Wayne, McDonald Sls. Co.	219-747-3650
NC	Charlotte, L.P. Spoon Co.	704-372-3290
Tex	Ft. Worth, C. Yarborough Co.	817-451-8000
Wisc	Janesville, National Sls. Off.	608-752-1402
Wisc	Milwaukee, Automation Prods. Co.	414-425-2250
FOR:	Can., Quebec, Electrodesign, Ltd.	514-363-5120

Local Distributors

Cal	Cathedral City, Consolidated Electrical Distr., 33-660 Cathedral Canyon Dr.	714-328-1131
Cal	San Francisco, E.B. Ward & Co., 337 Roebling Rd.	415-873-1660
Del	Wilmington, Wilmington Supply, 2000 Maryland Ave.	302-656-4421
Fla	Miami, ACR Supply Inc., Box 1	305-576-1120
Ind	Indianapolis, Ra-Dis-Co, 814 Senate Ave.	317-637-5571
Ky	Louisville, E & H Electric Supply, Box 1022	502-587-0991
Md	Rockville, Boland Trane Service Ag., 12320 Parklawn Dr.	301-881-8600
Mich	Detroit, Cochrane Supply & Eng., 19300 Beech Daly Rd.	313-255-4050
Neb	Seward, Lee's Refrigeration Co., 734 Seward	402-643-3344
Nev	Las Vegas, Desert York Co., Box 14606	702-384-3980
NJ	Fairlawn, Relay Specialties, 13-00 Plaza Rd.	201-797-3313
NY	Maspeth, Power Cooling, 59-55 60th St.	212-894-8003
Ohio	Columbus, Columbus Temperature Controls, 100 East Swan St.	614-221-7133
Tex	Ft. Worth, Air Tec Supply, Box 8446	817-732-3447
Utah	Salt Lake, Distributors Inc., 234 West 13th South	

DIXON AUTOMATION, 23915 Garnier, Torrance, Cal., 90509

Free literature available: Chip Assembly Robot: Automatically Places & Solderdips Chip Capacitors, IC's and Resistors onto Substrates.

Products manufactured: Machines/Machinery, Production

Local Sales Offices & Reps.

Ariz	Phoenix, K. Jahn Co.	602-956-9060
Cal	Inglewood, Weightman Assoc.	213-645-6060
Cal	Menlo Park, West Engineering Sls.	415-325-2885

DIXON CORP., Metacom Ave., Bristol, R.I., 02809, Tel: 401-253-2000; Empl.: 210; Minimum order: $25

For info on price: J. G. Holloway; Application info: W. A. Tucker; Customer service: F. Rounds; Delivery info: G. Beauchaine

Products manufactured: Bearings, Bushings, Glass, Plastic, Metal, Rubber, Etc., Compounds, Encapsulating, Insulating, Molding, Potting, Conductive Plastic Materials, Films, Grommets, Insulators & Insulation, Laminates, Materials, Self-Lubricating, Tapes, Electrical Insulation, Terminals

Local Sales Offices & Reps.

Ala	Birmingham, Moodie & Assoc.	205-823-0815
Cal	Glendale, Lockwood Assocs.	213-247-3330
Cal	Palo Alto, Lockwood Assoc.	415-328-3999
Conn	Plainville, N. F. Mooers	203-747-3042
Fla	Coral Spgs., D. H. Bond	305-752-0344
Ill	Arlington, A. H. Walkie	312-394-8313
Ind	Indianapolis, Hoster & Sieloff	317-844-9921
Mich	Dearborn, Firth Assoc.	313-565-0615
Minn	Minnapolis, Swenson Ind. Sls.	612-544-7789
Mo	Florissant, H & R Sls. & Engrg.	314-921-6242
NY	Commack, P. Hoade	516-543-9308
NY	Penfield, CHP Sls. Corp.	716-381-2800
NC	Sanford, C.G. Simpson	919-776-8025
Ohio	N. Olmstead, G. E. Blaney	216-777-4322
Pa	Aston, J. F. Walls	215-622-2300
Tex	Dallas, Benson Engrg. Co.	214-352-7541
Utah	Salt Lake City, B. S. Anderson	801-486-6401
Wisc	Milwaukee, Fisher-Barton	414-258-1022

DIXSON, INC., Box 1449, Grand Junction, Colo., 81501, Tel: 303-242-8863, TWX: 910-929-6991; Empl.: 460

Customer service: K. Rogers

Products manufactured: Meters

Local Sales Offices & Reps.

Ariz	Phoenix, Kay Entprs.	602-242-6787
Ark	Ft. Smith, Electro-Related Products	501-783-7323
Cal	Long Beach, Emerson Kirk Engrg.	213-439-9559
Colo	Littleton, Simpson Assocs., Inc.	303-794-8381
Fla	North Miami, Winfield Elctrn. Sls. Co.	305-945-6544
Ill	Des Plaines, E. Flaxman Co.	312-298-8580
Kans	Olathe, BC Elctrn. Sls., Inc.	913-782-6696
Mich	Benton Harbor, Hampton, Askin & Assocs., Inc.	616-925-0341
Mo	Hazelwood, BC Electronic Sls., Inc.	314-731-1255
NJ	Oaklyn, A. Wetterhahn Co.	609-858-3003
NY	Mount Vernon, D. Sonkin Assocs.	914-668-9809
NY	Syracuse, Nycom, Inc.	315-437-8343
Ohio	Cleveland, J.O. Olsen Co.	216-752-5444
Tex	Dallas, United Comps.	214-324-1448
Utah	Salt Lake City, Simpson Assocs., Inc.	801-486-3731
Wash	Bellevue, SD-R2	206-747-9424

DOERR ELECTRIC CORP., 1201 Doerr Way, Cedarburg, Wisc., 53012, Tel: 414-377-0500

Products manufactured: Motors

DOLAN-JENNER INDS., INC., 10 Ingalls Ct., Melrose, Mass., 02176, Tel: 617-662-8200; Empl.: 60; Minimum order: $15

For info on price: F. Laudin; Application info: F. Pettis; Customer service: J. Prior; Delivery info: F. Laudin

Free literature available: Bulletin 738-Glass Fiber Optics-Custom Designed, 818-Industrial Heavy Duty-Fiber Optics, 728-Plastic Fiber Optics, 737-Glass Fiber Optics, 739-Technical Data-Fiber Optics, 746-Registration Controls

Products manufactured: Controls/Control Eqpt., Counters, Detectors, Fiber Optic Bundles, Indicators, Lights, Scanners, Switches, Transducers

DOLPH, JOHN C. CO., New Rd., Monmouth Junction, N.J., 08852, Tel: 201-DA 9-2333

Products manufactured: Adhesives (All Types), Chemicals, Cleaners & Solvents, Coatings, Compounds, Encapsulating, Insulating, Molding, Potting, Insulators & Insulation, Plastic Raw Materials, Liquids, Pellets, Powders, Resins

DORAN MFG. CO., 1033 Bader St., Cincinnati, Ohio, 45225, Tel: 513-681-5424; Empl.: 25; Minimum order: $100

For info on price: R. Demar; Application info: R. Demar; Customer service: D. A. Griffin; Delivery info: D. A. Griffin

Free literature available: Send for free disigners' guide and catalog from Doran Mfg. Co. , booklet includes material and terminal tab selection guide for your custom terminal board.

Products manufactured: Connectors, Terminal Blocks, Boards & Strips, Terminals

DORIC SCI. CORP., 3883 Ruffin Rd., San Diego, Calif., 92123, Tel: 714-565-4415, Telex: 69-5001; Empl.: 105; Minimum order: $25

For info on price: F. Schulte; Application info: A. Frowiss; Customer service: G. Roberts; Delivery info: S. Shelquist

Free literature available: This new 4-page brochure provides a quick look at the highlight features of digital instruments for physical measurements. A wide range of products, from single point indicators to multipoint data loggers, are listed and described.

Products manufactured: Alarms, Amplifiers, Bridges, Calibrators, Comparators, Converters, Data Acquisition & Reduction Systems, Data Loggers, Indicators, Meters, Monitors, Multiplexers, Potentiometers, Power Supplies, Signal Conditioners & Equipment, Standards

Local Sales Offices & Reps.

Cal	Los Altos, J. Stone & Assocs.	415-948-4563
Cal	Los Angeles, Basic Sys.	213-938-2833
Cal	San Diego, Mesa Elctrns.	714-278-8021
Colo	Littleton, Radco Elctrns.	303-794-4279
Conn	Hamden, Applied Measurements	203-288-5288
DC	Washington, Powell-Pendergraph	301-656-4535
Ill	Chicago, Doric Scientific Corp.	312-397-8545
Ill	Chicago, SEA, Inc.	312-282-6694
Ind	Carmel, SEA, Inc.	317-846-2593
Kans	Prairie Village, Engineering Svcs. Co.	913-649-4000
La	Baton Rouge, Sesco	504-272-3730
Mass	West Acton, Applied Measurements, Inc.	617-263-2766
Mich	Farmington, Anderson Elctrns.	313-476-9161
Minn	Minneapolis, SEA, Inc.	612-425-4455
Mo	St. Louis, Engineering Svcs. Co.	314-997-1515
NJ	Fairfield, KLS Assocs., Inc.	201-227-2900
NM	Albuquerque, Rustco Entprs.	505-296-6474
NY	Fairport, Naco Elctrns. Corp.	716-244-4720
NY	N. Syracuse, Naco Elctrns. Corp.	315-699-2651
NY	Utica, Naco Elctrns. Corp.	315-732-1801
NC	Charlotte, Doric Scientific Corp.	704-536-8096
Ohio	Cleveland, Instrumentation Sys., Inc.	216-486-0782
Ohio	Dayton, Instrumentation Sys., Inc.	513-294-2838
Pa	Abington, Bach-Stewart Assocs.	215-885-1550
Pa	Pittsburgh, Instrumentation Sys., Inc.	412-243-1111
Pa	Warrington, Doric Scientific Corp.	215-343-3215
Tex	Houston, Sesco	713-668-7840
Tex	Richardson, Sesco	214-231-9364
Va	Richmond, Powell-Pendergraph, Inc.	804-264-2341
Wash	Seattle, Seatronics, Inc.	206-767-4330
Wisc	Waukesha, SEA, Inc.	414-547-6637

DORMEYER INDUSTRIES, 3418 N. Milwaukee, Chicago, Ill., 60641, Tel: 312-283-4000; Empl.: 650

Customer service: Sls. Coordinators

Free literature available: Engineering workbook for use in specifying linear solenoids as relates to work force required in application.

Products manufactured: Chargers, Battery, Coils Including Assemblies & Forms, Power Supplies, Solenoids, Transformers

DOUGLAS ELECTRONICS, 718 Marina Blvd., San Leandro, Cal., 94577, Tel: 415-483-8770; Empl.: 20; Minimum order: $10

For jnfo on price: L. Powell; Application info: C. Pennebaker; Customer service: N. Cain; Delivery info: L. Powell

Free literature available: 1. Catalog of Circuit Buaro Components 2. Mini Computer products

Products manufactured: Boards, Plug-In, Boards, Printed Circuit, Boards, Printed Wiring, Universal, Chassis, Circuit Board Mounting, Connector Blocks, Mother Board, Connectors, Integrated Circuit Devices, Printers, Racks, Terminal Equipment, Digital, Terminals, Data Display (including Alphanumeric & Graphic)

DOUGLAS-WORKMAN ELCTRNS CORP., 4300 Peters Rd., Ft. Lauderdale, Fla., 33317, Tel: 305-791-9390

Customer service: D. Workman; Delivery info: H. Biesemeyer

Free literature available: Form D100-B Description of exact replacement television knobs, available to Electronic Parts Distributors.

Products manufactured: Knobs

DOUGLAS RANDALL DIV., Walter Kidde, 6 Pawcatuck Ave., Pawcatuck, Conn., 02891, Tel: 203-599-1750; Empl.: 125
p. 1•549,1629-1638; p. 2•1734

For info on price: J. Barber; Application info: E. J. Goehring; Customer service: J. Barber; Delivery info: J. Barber

Free literature available: Reed Relay Catalogs-complete description & details of standard products. Solid State Relays-complete details on twenty standard models. Modular Tone Controls-technical data on oscillators and fritch including application notes.

Products manufactured: Coders, Coils Including Assemblies & Forms, Controls/Control Eqpt., Decoders, Detectors, Encoders, Monitors, Oscillators, Regulators, Relays, Switches, Transformers

Local Sales Offices & Reps.

Ala	Huntsville, Leigh Sls., Inc.	205-852-3270
Cal	Los Altos, Parsons & Meister	415-941-4745
Cal	Los Angeles, Sodaro Assocs.	213-478-7733
Cal	San Diego, Qualtronix	714-560-8955
Conn	Ridgefield, JMG, Inc.	617-762-5333
Fla	Maitland, Ellis Assoc.	305-645-1101
Ill	Chicago, R. Cahill, Inc.	312-287-7292
Mass	Norwood, JMG, Inc.	617-762-5333
Minn	St. Paul, Cahill	612-646-7217
Mo	Kansas City, R.R. Burton Sls. Co.	816-444-8300
Mo	Maryland Hgts., Delltron Co.	314-434-3804
NY	Great Neck, F. Tylinski Co.	516-466-9070
NY	Rochester, H.R. Murray, Inc.	716-244-1100
NY	Syracuse, H.R. Murray Inc.	315-446-5555
NC	Knightdale, Leigh Sales	919-266-0105
Ohio	Berea, Geotronix Mktg. Assoc.	216-243-8520
Ohio	Columbus, Geotronix Mktg. Assoc.	614-457-8472
Pa	Glenside, Elcom, Inc.	215-885-1325
Tex	Dallas, BESCO	214-376-1929
Va	Reston, Boyle Assocs.	703-620-9558
Wash	Seattle, Carlyle Tech. Sls.	206-622-4288

Local Distributors

Mass	W. Newton, A. Mayer Co., Inc., 38 Border St.	617-965-1111

DOW CHEMICAL CO., Box 2020, Midland, Mich., 48640, Tel: 517-636-1000, TWX: 810-266-9490; Empl.: 52000

Products manufactured: Chemicals, Cleaners & Solvents, Coatings, Compounds, Encapsulating, Insulating, Molding, Potting, Coolants, Circuit & Components, Etchants, Printed Circuit, Insulators & Insulation, Metal Oxides, Metals, Plastic Raw Materials, Liquids, Pellets, Powders, Resins, Services, Assembly, Production & Test, Sound Absorbing Materials, Tubing

Local Sales Offices & Reps.

Cal	Pasadena	213-577-1515
Cal	Walnut Creek	415-933-3100
Conn	Stamford	203-359-3300
Ga	Atlanta	404-394-4141
Ill	Des Plaines	312-297-1000
Ind	Indianapolis	317-926-3441
Kans	Shawnee Mission	913-362-2100
La	Baton Rouge	504-937-2222
Mass	Wellesley	617-237-2070
Mich	Grand Rapids	616-949-9000
Mich	Southfield	313-358-1300
Minn	Minneapolis	612-835-4200
Mo	St. Louis	314-726-5000
NJ	Moorestown	609-234-0400
NJ	Saddle Brook	201-845-5000
NY	New York	212-757-8300
NY	Williamsville	716-631-5540
NC	Charlotte	704-525-9030
Ohio	Cincinnati	513-793-6200
Ohio	Cleveland	216-861-5825
Pa	Pittsburgh	412-281-3030
Tenn	Memphis	901-767-5000
Tex	Dallas	214-742-8691
Tex	Houston	713-626-3170
Wash	Bellevue	206-455-2144

DOW CORNING, Savage Rd. Bldg., Midland, Mich., 48640, Tel: 517-636-8000, TWX: 810-266-9006

Products manufactured: Coatings, Compounds, Encapsulating, Insulating, Molding, Potting, Coolants, Circuit & Components, Crystals, Insulators & Insulation, Lubricants, Plastic Raw Materials, Liquids, Pellets, Powders, Resins, Rubber

Local Sales Offices & Reps.

Cal	Los Angeles	213-289-5186
Cal	Palo Alto	415-964-7744
Ga	Atlanta	404-934-6595
Ill	Chicago	312-671-3100
Mass	Boston	617-965-1010
Mich	Farmington	313-474-4000
NJ	Englewood Cliffs	201-567-4960
NC	Greensboro	919-275-9706
Ohio	Cleveland	216-464-2330
Tex	Dallas	214-661-0702

DRACON INDUSTRIES, 9541 Mason Ave., Chatsworth, Cal., 91311, Tel: 213-882-8595; Empl.: 150; Minimum order: $10

For info on price: J. Mason; Application info: A. Polzer; Customer service: B. Witt; Delivery info: B. Witt

Products manufactured: Amplifiers, Baffles, Speaker, Cable, Generators, Power Supplies, Racks, Speaker Systems, Speakers, Tools

DRAKE MFG. CO., Sub. Gen. Instr. Corp., 4626 N. Olcott Ave., Harwood Heights, Ill., 60656, Tel: 312-867-7227, TWX: 910-221-0236; Empl.: 150

Products manufactured: Bezels, Shielded & Unshielded, Diodes, Holders, Circuit Board (Production Type), Lamps, Lights, Sockets

Local Sales Offices & Reps.

Ariz	Phoenix, Howe & Howe Sls.	602-264-7971
Cal	Mountainview, R.T. Pross	415-967-2346
Cal	N. Hollywood, Chicago Miniature/Drake	213-877-0158
Colo	Denver, Lindberg Co.	303-758-9033
Conn	Newton, Gerber Sls.	203-426-3440
Fla	Hollywood, Component Eng. Sls.	305-922-5230
Ga	Atlanta, Winfield Southeast Co.	404-636-2023
Ill	Chicago, Chicago Miniature Lamp Works	312-784-1020
Ind	Indianapolis, Technical Reps.	317-849-6454
Kans	Overland Park, Penzer-Mankus Assoc.	913-381-0004
Mass	Needham, Chicago Miniature/Drake	617-449-4730
Mass	Waltham, Gerber Sls.	617-890-8040
Mich	Detroit, Rathsburg Assoc.	313-882-1717
Minn	Minneapolis, Nortec Sls.	612-835-7414
NJ	Cherry Hill, Trinkle Sls.	609-795-4200
NY	North Syracuse, L.D. Allen	315-458-7470
NY	Port Washington, TMA	516-883-2432
Ohio	St. Mary's, T. Shelby & Co.	419-394-3377
Tex	Dallas, Techno Assocs.	214-357-9213
Wash	Seattle, J.J. Backer Co.	206-285-1300
EXP:	Chicago, Ill., E.D. Magnus & Assoc.	312-334-1503

DRAKE CO., R.L., 540 Richard St., Miamisburg, Ohio, 45342, Tel: 513-866-2421, Telex: 288-017

For info on price: J. H. Brunzo; Application info: J. H. Brunzo; Customer service: W. F. Frost; Delivery info: J. H. Brunzo

Free literature available: Technical brochures on any R.L. Drake Co. product upon request.

Products manufactured: Amplifiers, Couplers, Filters, Meters, Receivers, Transceivers, Transmitters

DRANETZ

DRANETZ ENGRG. LABS., 2385 S Clinton Ave., So. Plainfield, N.J., 07080, Tel: 201-755-7080, TWX: 710-997-9553; FSC No: 23207; Empl.: 50; Minimum order: $25 p. 1•652-657

Customer service: L. Banas

Free literature available: Description, specifications and application information for time/phase/impedance/energy and line disturbances are described instruments to measure, analyze and record AC volts/amps/frequency/ time/phase/impedance/energy and line disturbances are described in individual and general catalogs and application notes.

Products manufactured: Amplifiers, Analyzers, Bridges, Calibrators, Coders, Comm. Systems, Comparators, Controllers, Programmable, Controls/Control Eqpt., Converters, Counters, Current Sensors, Data Acquisition & Reduction Systems, Detectors, Equalizers, Filters, Generators, Indicators, Insertion Loss Measurement Systems, Meters, Monitors, Networks, Oceanographic Equip. (Electronic), Shifters, Signal Conditioners & Equipment, Standards, Telephone Channel Test & Simulator Equipment, Test Equipment, Testers, Timers, Totalizers, Digital, Transformers, Underwater Communication, Detection, Navigation, etc. Equipment

Local Sales Offices & Reps.

Cal	Los Angeles, E. Mintz	213-645-2066
Cal	Palo Alto, Coherent Mktg. Assoc.	415-327-2217
Cal	San Diego, E. Mintz	213-645-2066
Colo	Denver, Hamilton Assocs.	303-629-0901
Conn	Hamden, Scientific Devices-Conn.	203-248-9361
Fla	Orlando, Datarep, Inc.	305-843-5224
Fla	Pompano Beach, Datarep, Inc.	305-781-9279
Fla	St. Petersburg, Datarep, Inc.	813-345-8503
Haw	Honolulu, Aloha Assocs.	808-941-1574
Ill	Elk Grove Village, L. F. Green & Assocs.	312-593-0282
Ind	Indianapolis, L. F. Green & Assocs.	317-293-9827
Md	Rockville, Mesa	301-881-8430
Mass	Waltham, Scientific Devices-New England	617-894-5637
Mich	Royal Oak, Group Ten	313-549-3910
Minn	Minneapolis, L. F. Green & Assoc.	612-781-1611
Mo	St. Louis, Delltron Co.	314-869-4779
NJ	Cinnaminson, Mesa	609-786-0284
NJ	Fairfield, KLS Assocs.	201-227-2900
NY	Rochester, Scientific Devices	716-334-2445
NC	Charlotte, Ranson, Wallace & Baesel, Inc.	704-334-4244
Ohio	Cleveland, Group Ten	216-486-2800
Ohio	Dayton, Group Ten	513-293-7061
Ore	Portland, Topp Eng. Sls.	503-644-3020
Tex	Austin, Martin, Zienkosky, Browne & Assocs.	512-454-4371
Tex	Dallas, Martin, Zienkosky, Browne & Asso.	214-233-5535
Tex	Houston, Martin, Zienkowsky, Browne & Asso.	713-523-7333
Wash	Bellevue, Topp Engrg. Sls.	206-747-5400
WVa	W. Virginia, Group Ten	513-293-7061
FOR:	Can., Ottawa, Ont., Kenwood Controls	613-722-8233
FOR:	Can., St. Catherines, Ont., Kenwood Controls	416-682-3286
FOR:	E. Can., Montreal, Que., Kenwood Controls	514-738-4969
FOR:	W. Can., Vancouver, B.C., Canadian Dynamics	604-325-3201

DRESSEN-BARNES ELCTRNS., 250 N. Vinedo Ave., Pasadena, Cal., 91107, Tel: 213-681-0643, TWX: 910-588-3780; FSC No: 94412; Empl.: 85; Minimum order: $25

For info on price: M. Foes 213-795-7731; Application info: A. Washnesky 213-795-7731; Customer service: M. Foes 213-795-7731; Delivery info: M. Foes 213-795-7731

Products manufactured: Converters, Power Supplies, Regulators, Transformers

Local Sales Offices & Reps.

Ala	Huntsville, Young & Lawrence Assoc.	205-539-6575
Cal	Mountain View, Tech-Ser.	415-969-9020
Cal	Pasadena, Dressen-Barnes	213-795-7731
Fla	Ft. Lauderdale, Young & Lawrence Assoc.	305-563-6717
Fla	St. Petersburg, Young & Lawrence Assoc.	813-894-0026
Fla	Winter Park, Young & Lawrence Assoc.	305-647-6929
Md	Simpsonville, Seirec Assoc.	301-596-5520
Mass	Needham, A. & M. Elec. Reps.	617-444-8170
Mich	Detroit, Hocker Assocs.	313-431-1403
NY	Elmira, A & D Dev.	607-733-0405
NY	Hartsdale, Comp. Sls.	914-725-1050
NY	Rochester, A & D Devices	716-586-8033
NY	Verona, A & D Devices	315-337-7321
Ohio	Dayton, Hocker Assocs.	513-298-8638
Tex	Plano, Zeus Eng.	214-423-2027
Wash	Seattle, Avionics-Liaison	206-767-3870

DUKANE CORP., 2900 Dukane Dr., St. Charles, Ill., 60174

Products manufactured: Amplifiers, Analyzers, Baffles, Speaker, Clocks (All Types), Comm. Systems, Detectors, Generators, Grilles, Microphone Accessories (Including Stands, Holders, Booms), Microphones, All Kinds, Mixers, Phonographs, Parts & Accessories, Public Address Systems, Speaker Systems, Speakers, Transducers, Tuners, Underwater Communication, Detection, Navigation, etc. Equipment, Welding Equipment & Access. (Excluding Equip. for Semiconductor Devices)

DULLRON CO., INC., 425 N. Findlay St., Dayton, Ohio, 45401, Tel: 513-226-4000; Empl.: 2100

For info on price: J. A. Welch 513-226-4056; Application info: R. J. Hinman 513-226-4249; Customer service: J. R. Adcock 513-226-4117; Delivery info: R. J. Hinman 513-226-4249

Free literature available: Complete and descriptive literature on Durcon laboratory sinks and tops made from corrosion resistant Durcon® epoxy resin.

Products manufactured: Benches, Consoles, Stools, Tables

Local Sales Offices & Reps.

Ala	Birmingham, Clary & Assocs.	205-251-2085
Ariz	Phoenix, Tyson-Feist Assocs.	602-277-4427
Ariz	Tucson, Tyson-Feist Assocs.	602-296-0349
Ark	N. Little Rock, C.A. Riner Co.	501-372-4156
Cal	Los Angeles, Scanlan & Lucas	213-266-2020
Cal	San Francisco, Specification Products	415-981-1154
Colo	Denver, Parker/Shyne Assocs.	303-893-5149
Conn	Windsor, R. Yost Assocs.	203-527-4101
Fla	Jacksonville, Trippe & Black Assocs.	904-737-7022
Fla	Miami, N. Ascher & Assocs.	305-371-3195
Fla	Orlando, Tripp & Black Assocs.	305-841-4995
Fla	Tampa, P. Pullara & Assocs.	813-872-5657
Ga	Atlanta, Clary & Assocs.	404-873-1861
Haw	Honolulu, B. Watanabe	808-845-0939
Ill	Broadview, W.R. Wallin Assocs.	312-379-2626
Ind	Indianapolis, Aspinall & Assocs.	317-926-3421
Iowa	Des Moines, M.B. Townsend Co.	515-279-1641
La	Alexandria, W.H. Grant, Jr.	318-443-4084
La	New Orleans, Grant & Assocs.	504-525-4207
Md	Bethesda, Steck Sls. Co.	301-657-2442
Md	Severna Park, Donnelly & Burns Assocs.	301-647-4100
Mich	Detroit, R.L. Deppman Co.	313-872-6304
Mich	Grand Rapids, J.R. Thomas & Assocs.	616-454-2500
Minn	Minneapolis, H.E. Agness Co.	612-339-4696
Mo	Kansas City, Hebenstreit Co.	816-561-4661
Mo	St. Louis, Brodz Sls & Engineer Co.	314-426-0335
Mont	Great Falls, D.E. Weidner Co.	406-453-2727
Neb	Omaha, Shiner Sls. Co.	402-493-6625
NJ	Waldwick, Salsbury Sls. Co.	201-652-2666
NM	Albuquerque, Mohon Sls. Co.	505-344-3449
NY	Buffalo, E.C. Oldach	716-634-0024
NY	Long Island City, Salsbury Sls. Co.	212-786-8260
NY	Syracuse, J.A. Walsh	315-474-1089
NC	Charlotte, Smith & Stevenson	704-525-3388
Ohio	Cleveland, BWA Co.	216-781-4040
Ohio	Hilliard, BWA Co.	614-876-2477
Ohio	Norwood, BWA Co.	513-631-3330
Ohio	Toledo, BWA Co.	419-472-6531
Okla	Broken Arrow, Brazeal & Dilbeck	918-251-1509
Okla	Oklahoma City, Brazeal & Dilbeck	405-232-2940
Ore	Portland, G.J. Scott Co.	503-228-8643
Pa	Philadelphia, R. Burns Assocs.	215-925-7255
Pa	Pittsburgh, R.J. Fitzgerald Assocs.	412-486-8900
Tenn	Knoxville, Corrigan Co.	615-584-8335
Tenn	Memphis, Corrigan Co.	901-274-5712
Tex	Dallas, Dillard Assocs.	214-748-7708
Tex	Houston, H.F. Wood & Assocs.	713-686-8441
Utah	Salt Lake City, Richards & Hansen	801-487-1355
Va	Richmond, Otto Sls. Co.	804-288-5648
Wash	Bellevue, J. Wm. Jones Sls. Agency	206-747-4447
Wash	Spokane, D.E. Weidner Co.	509-535-4632
Wisc	Wauwatosa, T. Tiernan & Assocs.	414-453-8838
FOR:	Can., Vancouver, B.C., Scott-Peterson Agencies, Ltd.	604-685-7304

DUMONT ELECTRON TUBES & DEVICES CORP., 750 Bloomfield Ave., Clifton, N.J., 07015, Tel: 201-773-2000, TWX: 710-989-7149

Products manufactured: Cells, Photoconductive, Photoemissive, Photovoltaic, Counters, Detectors, Diodes, Mounts, Photomultiplier Tube Housings, Tubes

DUMONT OSCILLOSCOPE LABS., INC., 40 Fairfield Pl., W. Caldwell, N.J., 07006, Tel: 201-575-8666, TWX: 710-734-4308; Empl.: 125; Minimum order: $25

Products manufactured: Cameras, Oscilloscope Plug-Ins, Oscilloscopes, Probes

DUNCAN ELECTRONICS, INC., 2865 Fairview Rd., Costa Mesa, Cal., 92626, Tel: 714-545-8261, TWX: 910-595-1128; FSC No: 5905; Empl.: 170; Minimum order: $25 .... p. 1•2024,2025; p. 2•1654,1655

For info on price: R. L. Rissler; Application info: R. L. Rissler; Customer service: R. Macke; Delivery info: R. Macke

Products manufactured: Attenuators, Controls, Fader, Dials, Potentiometers, Switches

Local Sales Offices & Reps.

Ariz	Phoenix, Southwest e/m Engrg., Inc.	602-993-0250
Cal	Costa Mesa, Duncan Elctrns., Inc.	714-545-8261
Cal	El Monte, Telemart Co.	213-444-7666
Cal	Mountain View, Caltron/Pyle	415-964-3244
Colo	Denver, Zeus, Inc,	303-771-6200
Conn	Newtown, Gerber Sls. Corp.	203-426-3440
Fla	Ft. Lauderdale, Orbe, Inc.	305-564-8571
Fla	St. Petersburg, Orbe, Inc.	813-894-0687
Ga	Atlanta, G. Duckett Sls. Co.	404-451-3529
Ill	Mt. Prospect, Delta Tech. Sls.	312-437-9412
Ind	Greenwood, Valentine & Schillinger	317-888-2260
Ind	South Bend, Valentine & Schillinger	219-291-6258
Kans	Shawnee Mission, Florence & Meyer	913-722-5210
Kans	Wichita, Florence & Meyer	316-838-7226
Md	Rockville, Marktron, Inc.	301-762-6210
Md	Timonium, Marktron, Inc.	301-252-7111
Mass	East Longmeadow, Gerber Sls. Corp.	413-525-3059
Mass	Waltham, Gerber Sls. Corp.	617-890-8040
Mich	Grosse Pointe Park, Greiner Assocs.	313-499-0188
Minn	Minneapolis, J.J. Exon Co.	612-566-5340
Mo	St. Charles, Florence & Meyer	314-723-8566
NM	Albuquerque, Zeus, Inc.	505-256-9831
NY	Copiague, Sencor, Inc.	516-842-7676
NY	De Ruyter, R.P. Kennedy Co.	315-682-2920
NY	Rochester, R.P. Kennedy Co.	716-271-6322
Ohio	Dayton, Rockford Controls Ohio, Inc.	513-898-5452
Ohio	Euclid, Rockford Controls Ohio, Inc.	216-731-5250
Okla	Tulsa, Kemp Engrg. Co.	918-299-2636
Ore	Portland, C. K. Shanks & Assoc.	503-292-5656
Pa	Monroeville, Rockford Controls Ohio, Inc.	412-373-2531
Pa	Philadelphia, Sencor, Inc.	215-698-9660
Tex	Addison, Kemp Engrg. Co.	214-661-0400
Tex	Houston, Kemp Engrg. Co.	713-688-1431
Utah	Salt Lake City, Zeus, Inc.	801-486-2317
Va	Charlottesville, Marktron, Inc.	703-973-5874
Wash	Seattle, C. K. Shanks & Assoc.	206-632-4290

Local Distributors

Cal	San Carlos, Sterling Elctrns., 1061 Industrial Rd.	415-592-2353
Cal	Sun Valley, Richey Elctrns., 10871 La Tuna Canyon Rd.	213-875-2862
Colo	Denver, Ind. Elctrns., Box 22457	303-771-2636
Fla	Tampa, Lykes Elctrns., 1800 N.W. 23rd	305-633-8536
Ill	Elgin, Allied Elctrns., 1355 Sleepy Hollow	312-697-8200
Ill	Westmont, Bodelle Co., 47 Chestnut La.	312-323-9670
Mich	Ann Arbor, Advent Elctrns., 254 S. Wagner Rd.	313-769-8650
Minn	Minneapolis, Stark Elctrns., 112-3rd Ave. N.	612-332-1325
NJ	Clifton, Parts Masters, 411 Main Ave.	201-777-7706
NJ	Perth Amboy, Sterling Elctrns., 774 Pfieffer Blvd.	201-442-8000
NM	Albuquerque, Ind. Elctrns., 310 Val Verde S.E.	505-266-8721
NY	NYC, Martin Audio, 320 W. 46th	212-265-6470
Ohio	Akron, Akron Elctrns., 107 S. Arlington	216-762-8818
Pa	Erie, Mace Elctrns., 2631 W. 8th	814-838-3544
Tex	Stafford, Southwest Elctrns., 12725 Royal Dr.	713-494-6021
Wash	Seattle, Radar Electric, 168 Western Ave. W.	206-282-2511

DUNEGAN/ENDEVCO, Rancho Viejo Rd., San Juan Capistrano, Cal., 92675, Tel: 714-831-9131, TWX: 910-596-1415; Empl.: 30

Customer service: B. Sonnenberg

Products manufactured: Detectors

Local Sales Offices & Reps.

Ala	Huntsville, Craft Assocs.	205-837-0221
Cal	Palo Alto, Dunegan/Endevco	415-969-3212
Cal	Rowland Heights, Dunegan/Endevco	714-493-8181
Cal	San Juan Capistrano, Dunegan/Endevco	714-493-8181
Cal	Santa Clara, Johnson Assocs.	408-984-4626
Fla	Maitland, Craft Assocs.	305-645-2242
Ga	Atlanta, Craft Assocs.	404-393-0400
Ill	Chicago, Rhodes Engineering Co.	312-478-0161
Ill	Crystal Lake, Dunegan/Endevco	815-459-7226

Directory of Local Distributors Starts on page 401

Md.	Towson, Dunegan/Endevco	301-752-0688
Mass	Bedford, Dunegan/Endevco	617-969-8063
NJ	Haddonfield, Dunegan/Endevco	609-428-5285
Ohio	Brecksville, RDP Assocs.	216-526-5260
Ohio	Dayton, RDP Assocs.	513-253-6175
FOR:	Can., Scarborough, Ont., J. DeGroot Assocs.	416-264-2991

DUNTON, M.W. CO., 350 Kinsley Ave., Providence, R.I., 02903, Tel: 401-331-3600; Empl.: 14; Minimum order: $8

Products manufactured: Flux, Brazing & Soldering Materials, Solder (All Types)

Local Sales Offices & Reps.

Ariz	Phoenix, Nibco of Phoenix	602-272-6853
Cal	Los Angeles, Naaklyell/Rollins & Assoc.	213-588-9166
Colo	Denver, Nibco of Denver	303-936-2328
DC	Wash, Barnett & Benner	301-864-5640
Fla	Pinellas Park, Distributor Sls. of Fla.	813-527-6651
Ga	Atlanta, Cochran & Co.	404-351-7767
Ill	Addison, Preferred Dist.	312-543-4660
Ind	Indianapolis, C.T. Voyles Co.	317-359-0698
Iowa	Des Moines, Mack McClain Corp.	515-288-0184
Md	Baltimore, R.B. Fulton Co.	301-467-0750
Mass	Reading, F. Banester	617-944-3776
Mich	Birmingham, Marshall Durston Co.	313-646-6144
Minn	Minneapolis, Nibco Midwest	612-544-3377
Mo	St. Louis, Nibco of St. Louis	314-647-2141
NJ	Woodbury, C.W. Cope Assoc.	609-845-0573
NY	Mineola, W.G. Roller	516-746-4486
NY	Rochester, Kolstad Assoc.	716-288-2086
NC	Greensboro, J.M. Pleasants Co.	919-288-1707
Ohio	Worthington, Shreiner Wright	614-846-1700
Tenn	Memphis, Cochran-Prather	901-274-4018
Tex	Dallas, H.F. Wood & Assoc.	214-631-4470
Va	Richmond, Taylor, Lipscomb & Appel	804-648-4431
Wash	Seattle, Baxter-Rutherford	206-623-1954

DUPONT INDUSTRIAL FIBERS, Center Rd. Bldg., Wilmington, Del, 19898

DURA PLASTICS N.Y., INC., 49 Richmondville Ave., Westport, Conn., 06880, Tel: 203-227-9588; Empl.: 90; Minimum order: $100

For info on price: J. F. Layman; Application info: J. Layman; Customer service: C. Halas; Delivery info: C. Halas

Free literature available: Catalog - Custom fabrication and vacuum forming of thermoplastics.

Products manufactured: Bezels, Shielded & Unshielded, Boxes, Junction, Outlets & Wall Plates, Bushings, Glass, Plastic, Metal, Rubber, Etc., Cabinets & Accessories, Cases, Equipment, Instrument, Meter, Dials, Plastic Raw Materials, Liquids, Pellets, Powders, Resins, Services, Assembly, Production & Test

Local Sales Offices & Reps.

Ill	Downers Grove, Jon Wright Distr. Co.
NY	N.Y. C., Dura Plastics of N.Y.

DURABLE INTERNATIONAL, INC., 3-01 27th Ave., Long Island City, NY, 11102, Tel: 212-726-1200

DURAKOOL, 1010 N. Main St., Elkhart, Ind., 46514, Tel: 219-264-1116, Telex: 25-8482; Empl.: 120; Minimum order: $25 .... p. 1•1639-1643

For info on price: N. Thorn; Application info: B. Brewers; Customer service: B. Brewers; Delivery info: D. Severs

Products manufactured: Relays, Switches

Local Sales Offices & Reps.

Cal	Los Angeles, Hundley Co.	213-240-3600
Cal	Los Gatos, Ind'l Mktg Assoc.	408-358-1734
Ga	Atlanta, Austin Brown Assocs	404-457-6381
Ill	Chicago, Kelburn Engrg Co.	312-775-8383
Ind	Indianapolis, Kelburn Engrg Co.	317-257-9874
Iowa	Davenport, Volco Co.	319-326-5233
Iowa	Des Moines, Volco Co.	515-283-1650
La	Metairie, Carey & Assocs	504-737-7614
Md	Cockeysville, N. H. Yates & Co.	301-667-6300
Mass	Waltham, DeVeer Sales Engrg Co.	617-899-5900
Mich	Farmington, Carter, McCormic & Peirce	313-477-7700
Minn	Minneapolis, Volco Co.	612-336-1746
Mo	Kansas City, R. Greene Co.	816-333-7585
Mo	St. Louis, R. Greene Co.	314-644-2666
Neb	Omaha, Volco Co.	402-346-2203
NY	Wantagh, DONY Tech. Sls.	516-826-5550
NC	Matthews, Carolina Tech. Reps.	704-847-4494
Ohio	Akron, Sords Elec	216-644-7074
Ohio	Cincinnati, Sords Elec	513-272-3351
Ohio	Cleveland, Sords Elec	216-229-4700
Ohio	Worthington, Sords Elec	614-885-3933
Ore	Portland, Branom Instr. Co.	503-285-9861
Pa	Pittsburgh, Carter, McCormic & Pierce	412-824-3760
Pa	Willow Grove, Techparts	215-659-6900
Tenn	Nashville, Austin Brown Assocs	615-256-3003
Tex	Dallas, Carey & Assocs	214-363-7813
Tex	Houston, Carey & Assoc	713-460-1111
Utah	Salt Lake City, Thermalink Intermountain	801-466-8601
Va	Richmond, Virginia Tech. Assocs.	804-266-9654
Wash	Seattle, Branom Instr. Co.	206-762-6050
Wisc	Milwaukee, Kelburn Engrg Co.	414-545-2122
FOR:	Can., Ancienne Lorette, Que., Davis Controls	418-524-1823
FOR:	Can., Edmonton So., Alb, Davis Controls	403-439-5644
FOR:	Can., Halifax S.NS, Davis Controls	902-429-3877
FOR:	Can., Hamilton, Que., Davis Controls	416-522-2551
FOR:	Can., Islington, Ont., Davis Controls	416-233-3211
FOR:	Can., London, Ont., Davis Controls	519-432-9341
FOR:	Can., Montreal, Que., Davis Controls	514-481-7765
FOR:	Can., Ottowa, Ont., Davis Controls	613-237-6361
FOR:	Can., Richmond, BC, Davis Controls	604-685-1942
FOR:	Can., Winnipeg, Manitoba, Davis Controls	204-589-6625

Local Distributors

Pa	Narberth, Power Modules, Box 465	215-839-1331

DURANT DIGITAL INSTRUMENTS, Cutler Hammer Co., 901 S. 12th St., Watertown, Wisc., 53094, Tel: 414-261-4070, TWX: 910-260-3713; Minimum order: $25

Customer service: E. J. Parulski

Products manufactured: Controls/Control Eqpt., Counters, Machines/Machinery, Production, Switches

Local Sales Offices & Reps.

Ala	Birmingham, Spader & Assocs.	205-879-1366
Cal	Los Angeles, Durant Digital Instrs.-Cutler Hammer Co.	213-876-4000
Cal	Menlo Park, Durant Digital Instrs.-Cutler-Hammer Co.	415-854-2178
Colo	Denver, Durant Digital Instrs.-Cutler Hammer	303-922-3458
Conn	Stamford, Durant Digital Instrs.-Cutler Hammer Co.	203-327-1750
Fla	Clearwater, H.R. Gross & Co.	813-446-6649
Ill	Chicago, Durant Digital Instrs.-Cutler-Hammer Co.	312-237-1222
Kans	Mission, Durant Digital Instrs.-Cutler-Hammer Co.	913-262-2199
Md	Baltimore, Durant Digital Instrs.-Cutler Hammer Co.	301-825-6626
Mass	Wakefield, Durant Digital Instrs.-Cutler Hammer Co.	617-246-0024
Mich	Detroit, Durant Digital Instrs.-Cutler Hammer Co.	313-535-3630
Minn	Minneapolis, Durant Digital Instrs.-Cutler Hammer	612-835-5534
Mo	St. Louis, Durant Digital Instrs.-Cutler Hammer	314-423-3431
NY	Rochester, Durant Digital Instrs.-Cutler Hammer	716-328-5700
NC	Charlotte, Durant Digital Instrs.-Cutler Hammer	704-525-3149
Ohio	Cincinnati, Durant Digital Instrs.-Cutler Hammer	513-531-5073
Ohio	Cleveland, Durant Digital Instrs.-Cutler Hammer	216-464-8787
Ore	Portland, Durant Digital Instrs.-Cutler Hammer	503-297-4374
Pa	Paoli, Durant Digital Instrs.-Cutler Hammer	215-688-5055
Tex	Houston, Durant Digital Instrs.-Cutler Hammer	713-528-4183
Wash	Bellevue, Durant Digital Instrs.-Cutler Hammer	206-747-2001

DURGIN & BROWN, INC., 80 Allen Rd., Burlington, Vt., 05401, Tel: 802-863-6873; Empl.: 26; Minimum order: $10

For info on price: R. Martineau; Application info: R. Haskins; Customer service: R. Haskins; Delivery info: B. Hutchins

Free literature available: Digital systems products catalog. Complete catalog of counters, timers and controllers for production and process control.

Products manufactured: Counters, Display Devices/Displays, Indicators, Process Control Systems, Timers

Local Sales Offices & Reps.

Ariz	Phoenix, RDX Corp.	602-267-8162
Cal	Pasadena, RDX Corp.	213-681-3451
Cal	San Diego, RDX Corp.	714-278-6863
Cal	Sunnyvale, RDX Corp.	408-734-4500
Conn	Enfield, Measurement Equip. Co.	
Ind	Indianapolis, National Engrg. Co.	317-251-1132
Mass	Wakefield, Measurement Equip. Co.	617-245-4870
NY	Sodus, AED Agency	315-483-6561
Pa	Abington, Industrial Mktg. Specialist	215-659-0444
Tex	Dallas, Glidden Electro Equip. Co.	214-363-6539
Wash	Bellevue, Hickey Engineering Sales	206-454-0480

DUTREX INDS., INC., 150 Fifth Ave., New York, N.Y., 10011, Tel: 212-989-5000, TWX: 710-581-6234; Empl.: 20

For info on price: H. H. Friedman; Application info: H. H. Friedman; Customer service: P. Ortiz; Delivery info: P. Ortiz

Products manufactured: Diodes, Tubes

DYNACO INC., Box 88 Coles Rd., Blackwood, N.J., 08012, Tel: 609-228-3200, Telex: 831-493; Empl.: 100; Minimum order: $500

For info on price: V. Kaplan; Application info: W. Phillips; Customer service: V. Kaplan; Delivery info: V. Kaplan

Products manufactured: Amplifiers, Speaker Systems, Transformers, Tuners

DYNACOR, Div. Vectrol, Inc., 1010 Westmore Ave., Rockville, Md., 20850, Tel: 301-424-6900; Empl.: 48; Minimum order: $25

For info on price: R. Mitchell; Application info: R. Vollmer; Customer service: K. Berger; Delivery info: K. Berger

Free literature available: Miniature tape wound bobbin cores

Products manufactured: Cores, Magnetic

DYNAGE, INC., 1331 Blue Hills Ave., Bloomfield, Conn., 06002, Tel: 203-243-0315, TWX: 710-425-6063; Empl.: 60; Minimum order: $25 .... p. 1•1178,1179

For info on price: J. A. Pfingsten; Application info: J. A. Pfingsten; Customer service: L. Fedora; Delivery info: L. Fedora

Free literature available: Catalog 73-1 - Power Supplies.

Products manufactured: Cards, Logic, Controllers, Programmable, Controls/Control Eqpt., Power Supplies, References, D-C Voltage

Local Sales Offices & Reps.

Cal	Palo Alto, Engrg. Assocs.	415-494-7842
Cal	San Gabriel, Van Gott & Assoc.	213-285-2148
Fla	Casselberry, EIR, Inc.	305-830-9600
Ill	Northfield, H. Sam Tollaksen Co.	312-441-6644
Minn	St. Paul, Countryman Assocs.	612-645-9151
NM	Albuquerque, Trembly Assocs.	505-293-4444
NY	Jericho, HRC Comp-Tech.	516-822-5550
NY	Rochester, R.P. Kennedy Co.	716-271-6322
Ohio	Dayton, Midwest Mktg. Assoc.	513-433-2511
Pa	Paoli, Stitzer Assocs.	216-644-5500
Tenn	Bristol, Rakes Engrg. & Mktg. Corp.	615-968-4195

Local Distributors

Cal	Santa Monica, Distr. Specialist, 1710 Santa Monica Blvd.	213-829-5401
Pa	Trappe, Empire Intl., 106 W. 7th Ave.	215-489-6061

DYNAIR ELCTRNS. INC., 6360 Federal Blvd., San Diego, Calif., 92114, Tel: 714-582-9211, TWX: 910-335-2040; FSC No: 11650; Empl.: 150; Minimum order: $20

For info on price: M. Hughes Ext. 69; Application info: D. A. Keller Ext. 61; Customer service: E. Jett Ext. 26; Delivery info: M. Hughes Ext. 69

Products manufactured: Amplifiers, CATV Systems & Equipment, Demodulators, Direction Finders, Modulators, All Kinds, Power Supplies, Switches, Television Systems & Equipment Closed-Circuit, Transponders

Local Sales Offices & Reps.

DC	Washington, L. Darrigo	703-471-4078

DYNALAB CORP., 7808 Gloria Ave., Van Nuys, Cal., 91406, Tel: 213-781-3151; Empl.: 8

Products manufactured: Amplifiers, Analyzers, Antenna Feed Systems, Cavities, Microwave, Comm. Systems, Comparators, Converters, Couplers, Demodulators, Diplexers, Antenna, Discriminators, Duplexers, Microwave, Filters, Generators, Inverters, Limiters, Microphones, All Kinds, Mixer-Preamplifiers, Microwave, Modulators, All Kinds, Multipliers, Networks, Oscillators, Power Supplies, Prescalers, Preselectors, Probes, Receivers, Scramblers, Data, Shifters, Strip-Line Components, Microwave, Timers, Transceivers, Transformers, Transmitters, Transponders

DYNALOY, INC., 7 Great Meadow La., Hanover, N.J., 07936, Tel: 201-887-9270; FSC No: 27908; Empl.: 19; Minimum order: $10

For info on price: M. Bell; Application info: A. Ringel; Customer service: N. Gallop; Delivery info: M. Bell

Free literature available: Remove-A-Pads-New fast dissolving CFX1 type-under 15 seconds in chlorinated or fluorinated solvents: AWE Type under 1 minute in water-Decap & Uresolve - For dissolving most epoxies, RTV silicones, urethanes over 14 different selective solvents for failure analysis; Chemical deflashing; salvage, Conductive coatings & epoxy silver solders - air dry, silver & gold filled; unique one component silver epoxy for die attach.

Products manufactured: Adhesives (All Types), Chemicals, Cleaners & Solvents, Coatings, Conductive Plastic Materials, Pads, Transistor Mounting, Plastic Raw Materials, Liquids, Pellets, Powders, Resins, Spacers

Local Sales Offices & Reps.

Ariz	Scottsdale, E. J. Foley & Assocs.	602-945-2665
Cal	Westminster, Contronic Devices	714-897-2266
Ind	Noblesville, G. Cardoza	317-773-6985
Minn	Minneapolis, International Sales	612-831-8423
Tex	Dallas, M. Daggett, Jr. & Assoc.	214-368-0135

DYNAMAGNETIC ENGRG, INC., 620 E. Dyer Rd., Santa Ana, Cal., 92705, Tel: 714-540-2081; FSC No: 52635; Empl.: 7; Minimum order: $10

Customer service: L. J. Zynda

Free literature available: A four page brochure with drawings showing numerous packaging configurations, terminals, mounting means, performance ratings, and sizes. Various applicable mil-specs. are listed.

Products manufactured: Capacitors, Fixed, Filters, Suppressors

DYNAMIC COMMUNICATIONS, INC., 948 Ave.E, P.O. Box 10116, Riviera Beach, Fla., 33404, Tel: 305-844-1323; Empl.: 30

For info on price: R.E. Beja; Application info: J. Penny; Customer service: T. Gault; Delivery info: R.E. Beja

Free literature available: Short form catalog which gives a complete description of each product manufactured. Individual data sheets for technical info on each product.

Products manufactured: Amplifiers, Comm. Systems, Meters, Probes, Transponders

Local Sales Offices & Reps.

Cal	Anaheim, Gillingham Assocs.	714-280-6050
Cal	Oakland, Sinclair Elctrn. Assoc.	415-451-1835
Fla	Terra Ceia, Communications Supp. Corp.	813-360-7460
Ga	Altanta, J.E. Joyner Assoc.	404-691-1776
Mass	Newton, Techmar	617-444-8130
Minn	Minneapolis, C.K. Melby Co.	612-884-7688
Mont	Billings, Duane E. Parker & Assoc.	406-245-6349
NY	Greenvale, Bertram D. Aaron & Co.	516-621-0630
NY	Syracuse, Tesco Mktg. Assoc.	315-463-4566
Tex	Richardson, Horizon Engrg. Sls.	214-238-9121
Va	Arlington, Magnum Systems & Comm.	703-524-0884
Wash	Seattle, Robert R. Slater Co.	206-622-3860
Wisc	Brookfield, Steffen Sls. Co.	414-781-7591
EXP:	Chicago, Ill, E.D. Magnus & Assoc.	312-334-1503

DYNAMIC CONTROLS CORP., 8 Nutmeg Rd., S. Windsor, Conn., 06074, Tel: 203-289-6807, TWX: 710-425-1994; FSC No: 07148; Empl.: 200; Minimum order: $35

For info on price: R. Kowalski ext. 68; Application info: R. Kowalski ext. 68; Customer service: R. Kowalski ext. 68; Delivery info: J. Dutton ext. 30

Products manufactured: Controls/Control Eqpt., Detectors, Flashers, Monitors, Power Supplies, Switches, Timers

Local Sales Offices & Reps.

Cal	Los Angeles, Ledbetter Assocs.	213-454-2421
Tex	Arlington Hgts., Aero Sls Co.	817-732-6907

DYNAMIC INSTR. CORP., 933 L.I. Motor Pkwy., Hauppauge, N.Y., 11787, Tel: 516-234-2900, TWX: 510-227-9884; Empl.: 720 .... p. 1•1177; p. 2•1735

Products manufactured: Chargers, Battery, Coils Including Assemblies & Forms, Converters, Eliminators, Battery, Inverters, Isolators, Plug Adapters, Power Drivers, Hybrid (High Current, High Voltage), Power Supplies, Regulators, Transformers

Local Sales Offices & Reps.

Cal	Burlingame, J. Logan & Assoc.	415-697-6100
Cal	Monrovia, Electro-Mechanical Instr.	213-358-1881
Colo	Arvada, Arrowhead Sls. Corp.	303-423-5556
Conn	Bloomfield, Zaslow Sls. Co.	203-242-7781
Fla	Maitland, Hutto, Hawkins, Peregoy, Inc.	305-831-2474
Ga	Atlanta, Millar Elctrns. Inc.	404-261-6160
Ill	Oakbrook, Whitmore Assoc. Inc.	312-325-4727
Mass	Lowell, Zaslow Sls. Corp.	617-458-8452
Minn	St. paul, H.A. Cullen Assoc.	612-646-7371
NY	Plainview, Preisick Assoc.	516-681-8444
NY	Syracuse, Naylor Elec. Co.	315-GR2-9183
NC	Raleigh, Millar Elctrns. Inc.	919-787-9564
Ohio	Englewood, Ad-El-Tek Co.	513-836-2741
Pa	Devon, Kiley Elec. Co.	215-687-9340
Tex	Dallas, E.B. Robertson Inc.	214-942-2716
Utah	Salt Lake City, Arrowhead Sls. Corp.	801-487-3444
EXP:	Downsview Ont., Can., Zaslow-Can.	416-249-1954

DYNAMIC MEASUREMENTS CORP., 6 Lowell Ave., Winchester, Mass., 01890, Tel: 617-729-7870, TWX: 710-348-6596; Empl.: 60

Customer service: R. Palmer

Free literature available: Complete specifications and applications data covering a broad range of convertor and operational amplifier products.

Products manufactured: Amplifiers, Comparators, Converters, Power Supplies

Local Sales Offices & Reps.

Ala	Huntsville, Beacon Sls.	205-881-5031
Ariz	Scottsdale, De Angelo, Rothman & Cheever	602-948-2240
Cal	Santa Clara, Mauldin Co.	408-249-7660
Cal	Santa Monica, Rep Assocs.	213-829-5401
Colo	Englewood, Klein Aerospace	303-781-4967
Conn	North Haven, Kitchen & Kutchen	203-239-0212
Fla	Ft. Lauderdale, Beacon Elec. Assoc.	305-776-6074
Fla	Maitland, Beacon Elec. Assoc.	305-647-3498
Ga	Atlanta, Beacon Elec. Assoc.	404-351-3654
Md	Simpsonville, A/O Elctrns.	301-997-8033
Mass	Lexington, Kitchen & Kutchen	617-862-8230
Mich	Detroit, Burcaw Assoc.	313-533-7700
Mich	Kentwood, Burcaw Assoc.	616-531-1000
Miss	Hernando, Beacon Elec. Assoc.	601-368-9008
Mo	St. Louis, Ozark Elec. Mktg.	314-423-7200
NJ	Wallington, Comp-Tech Sls.	201-935-5454
NY	Ithaca, B. Dean Inc.	607-272-2187
Ohio	Cleveland, Marlow Assoc.	216-932-0900
Ohio	Xenia, Marlow Assoc.	513-426-6270
Pa	Horsham, CMS Mktg.	215-672-8300
SC	Spartanburg, Beacon Sls.	803-582-4613
Tex	Dallas, Bouco Sls. Assocs.	214-247-6708
Tex	Houston, Bouco Sls. Assocs.	713-661-9640
Wash	Renton, Control Instrument	206-226-7170
EXP:	N.C. Greensboro, Beacon Elec. Assoc.	919-674-9432
FOR:	Can., Toronto, Ont., Norgay Enterprises	416-233-2930

DYNAMIC SYSTEM ELCTRNS., 35 Anacapa St., Santa Barbara, Cal., 93101, Tel: 805-963-3479 p. 1•604,605

Products manufactured: Converters, Data Acquisition & Reduction Systems, Data Loggers, Multiplexers

DYNAMICS ELCTRN. PRODS., INC., 12117 E. Slauson Ave., Santa Fe Springs, Cal., 90670, Tel: 213-723-6395; FSC No: 51209; Empl.: 35 .... p. 1•5

For info on price: A. L. White; Application info: J. Stephenson; Customer service: D. Cantrell; Delivery info: D. Cantell

Free literature available: Current and Voltage Excitation of Resistance Bridges Grounding and Shielding Practices for Instrumentation Systems.

Products manufactured: Amplifiers, Filters, Meters, Power Supplies, Signal Conditioners & Equipment

Local Sales Offices & Reps.

Ala	Huntsville, Currie Peak & Frazier, Inc.	205-536-5650
Ariz	Scottsdale, J. Smith & Assocs.	602-947-2495
Cal	Palo Alto, Egbert Engrg. Assocs.	415-326-1387
Cal	Santa Fe Springs, Dynamics Elctrn. Prods., Inc.	213-945-2493
Colo	Littleton, J. Smith & Assocs.	303-794-8891
Conn	Hamden, P. Jenks Assocs.	203-281-0810
Fla	Orlando, Currie Peak & Frazier, Inc.	305-855-0843
Ill	Chicago, Pivan Engrg. Co.	312-539-4838
Ill	Skokie, Pivan Engrg. Co.	312-679-7870
Ind	Indianapolis, Pivan Engrg. Co.	317-253-1681
Kans	Shawnee Mission, Pivan Engrg. Co.	913-722-1030
Md	Fulton, Gans-Fryling, Inc.	301-837-6311
Mass	Wakefield, P. Jenks Assocs.	617-246-1590
Mich	Detroit, S. Sterling Co.	313-255-1970
Minn	Minneapolis, Pivan Engrg. Co.	612-537-4501
Mo	St. Louis, Pivan Engrg. Co.	314-567-3636
NJ	Cherry Hill, Williams Assocs.	609-424-4110
NM	Albuquerque, J. Smith & Assocs.	505-255-2111
NY	Kings Park, KLS Assocs., Inc.	516-724-1325
NY	Penfield, A & D Devices, Inc.	716-586-8033
NC	Greensboro, Currie Peak & Frazier, Inc.	919-273-3040
Ohio	Cleveland, S. Sterling Co.	216-442-8080
Ohio	Dayton, S. Sterling Co.	513-298-7573
Pa	Pittsburgh, S. Sterling Co.	412-922-5720
Tex	Houston, C.M. Asfahl, Inc.	713-523-3764
Va	Arlington, Gans-Fryling, Inc.	703-527-3262
Wash	Seattle, Comptronics	206-284-4842
Wisc	Brookfield, Pivan Engrg. Co.	414-786-1940

DYNAMOD, Power Prods Corp., Box 152, Little Ferry, N.J., 07643, Tel: 201-440-9112; Empl.: 80

Products manufactured: Power Supplies

DYNAPAR CORP., 1675 Delany Rd., Gurnee, Ill., 60031, Tel: 312-662-2666, TWX: 910-235-1865; Empl.: 120; Minimum order: $30

Customer service: R. R. Brooks Ext. 41

Free literature available: Industrial Digital Equipment (Bulletin 100) The publication describes and illustrates digital measurement and control components and provides abbreviated specifications. On systems, application descriptions are provided.

Products manufactured: Computers, Controls/Control Eqpt., Counters, Data Acquisition & Reduction Systems, Encoders, Indicators, Timers, Totalizers, Digital, Transducers

Local Sales Offices & Reps.

NJ	Westfield, Dynapar Corp.	201-654-3111
Ohio	Willowick, Dynapar Corp.	216-944-9616

DYNASCAN CORP., 1801 W. Belle Plaine Ave., Chicago, Ill., 60613, Tel: 312-327-7270; Empl.: 250 p. 1•608-611

Products manufactured: Comm. Systems, Counters, Generators, Meters, Oscilloscopes, Power Supplies, Probes, Testers, Transceivers

Local Sales Offices & Reps.

Ala	Birmingham, Maitland K. Smith, Inc.	205-967-3080
Cal	Redwood City, Sinai-Johnson, Inc.	415-365-6263
Cal	Van Nuys, Mike Roth Sls. of Cal.	213-989-3738
Colo	Denver, K-C Mkts., Inc.	303-733-5561
Fla	Ft. Lauderdale, Sproch Sls., Inc.	305-587-3792
Fla	Sarasota, Sproch Sls., Inc.	813-924-7768
Ga	Marietta, Maitland K. Smith, Inc.	404-971-2831
Ill	Centralia, R. Dunn	618-533-1775
Ill	Mt. Prospect, Q & B, Inc.	312-392-1200
La	New Orleans, Texport Co.	504-486-6073
Mich	Detroit, Burcaw Co. & Assoc.	313-533-7700
Minn	Minneapolis, Kodo Assoc.	612-881-1255
Mo	Crestwood, Nevco, Inc.	314-843-7406
Mo	Kansas City, Nevco, Inc.	816-421-1751
NY	Ballston Lake, G. Dworkin	518-877-8586
NY	Grand Island, McTaggart Assoc.	716-773-9222
NY	North Bellmore, L.W. Keller Assoc.	516-785-2826
NC	Charlotte, Maitland K. Smith, Inc.	704-372-1026
Ohio	Conneaut, T. Clements, Reg. S. Mgr.	216-593-1646
Ohio	Novelty, D. Kocher, District S. Mgr.	216-338-3964
Okla	Tulsa, Texport Co.	918-939-1727

Pa	Jenkinton, J. Spangler	215-884-2787
RI	Glouster, A. Previte	401-949-0534
Tenn	Memphis, Texport Co.	901-683-0880
Tex	Houston, Texport Co.	713-464-2828
Wash	Seattle, Fleeheart & Sullivan	206-522-1533
EXP:	Plainview, N.Y., Empire Exporters	516-293-5582
EXP:	Toronto, Canada, Atlas Elctrns., Inc.	416-781-6174

DYNATECH CORP., 1225 E. Wakenham Ave., Santa Ana, Cal., 92702, Tel: 714-558-8755, TWX: 910-595-1951; Empl.: 100; Minimum order: $35

Customer service: E. Krause

Products manufactured: Backpanel Interconnect Systems, Connector Blocks, Mother Board, Connectors, Panels, Sockets

Local Sales Offices & Reps.

Ala	Huntsville, Technology Mktg. Assoc.	205-883-7893
Ariz	Phoenix, Hecht, Henschen & Assoc.	602-275-4411
Cal	Los Altos, Frauman Assoc.	415-941-0660
Cal	Santa Ana, Dynatech Corp.	714-558-8755
Colo	Denver, Rope & Williamson	303-758-8507
Fla	Winter Park, C.B.C. Elctrns.	305-644-2277
Ill	Evanston, Rendell Sls. Co.	312-866-8060
Ind	Indianapolis, J.D. Mktg.	317-849-9832
Mass	Westboro, Technical Mktg. Svc.	617-366-8462
Mich	Warren, DEM Elctrn. Sls.	313-755-6660
Minn	Bloomington, S. Clothier Co.	612-888-4666
Mo	St. Charles, Buckman & Assoc.	314-724-6690
NY	Spring Valley, R. Smith Assoc.	914-354-6067
NY	Syracuse, D. Dwyre	315-472-8282
NC	Winston-Salem, Burgin-Kreh & Assoc.	919-768-4174
Ohio	Canton, CSA Equip. Sls. Co.	216-456-1359
Pa	Ft. Washington, Kirk-Sandell	215-643-2100
Tex	Richardson, Zonk Engrg. Co.	214-238-7651
Va	Charlottesville, K.-Sandell	703-977-2033
Wash	Bellevue, Vantage Corp.	206-455-3460

Local Distributors

Cal	Mountain View, Abacus Elctrns., 1065 Terra Bella Ave.	416-961-1500
Cal	Orange, R.C. Elctrns., 17885 Skypark Cir.	714-549-9822
Cal	Woodland Hills, Elcon, 6325 DeSoto, Bldg. E	213-884-4852
NY	Farmingdale, Broadline Elec. Dist., 119 Marine St.	516-420-8320
NY	New York, Hofor Ind'l Svcs., Inc., 342 Madison Ave.	212-682-3092
Tex	Addison, Computer Comp Corp., 732 Wiley Post Rd.	214-239-0271
Wash	Seattle, Intermark Elctrns., 621 S. Michigan	206-767-3160

DYNATRON CO., Box 48822, Los Angeles, Cal., 90048, Tel: 213-933-4413; Empl.: 3; Minimum order: $25

Customer service: M. S. Robbins

Free literature available: Description of the color bar T.V. subcarrier frequency comparator system using the DyCo Model 175 and a color T.V. set for calibration against network rubidiums.

Products manufactured: Comparators, Connector Adapters, Television Systems & Equipment Closed-Circuit

DYNISCO, 20 S. West Pk., Westwood, Mass., 02090, Tel: 617-326-8210, Telex: 092-4347; Empl.: 78; Minimum order: $50

For info on price: R. J. Van Hooft; Application info: R. J. Van Hooft; Customer service: L. Shovelton; Delivery info: L. Shovelton

Products manufactured: Controls/Control Eqpt., Gages, Power Supplies, Transducers

Local Sales Offices & Reps.

Cal	Long Beach, E. Kirk Engrg. Co.	213-439-9559
Cal	San Francisco, Automated Process Controls	415-467-6162
Conn	Newtown, D. Hayes Inc.	203-426-9094
Fla	Ft. Lauderdale, Beacon Elctrn. Assocs. Inc.	305-776-6074
Ga	Atlanta, Beacon Elctrn. Assocs. Inc.	404-351-3654
Ill	Chicago, Thermo/Cense Inc.	312-792-2760
Mass	Newton Centre, D. Hayes Inc.	617-969-4650
Minn	Minneapolis, Automated Controls Inc.	612-377-7727
Mo	St. Louis, Ozark Elctrn. Mktg.	314-423-7200
NJ	Englewood, Tridon Sls. Co.	201-569-8011
NY	Rochester, D. Hayes Inc.	
Ohio	Cincinnati, Schlemmer Assocs.	513-522-8340
Ohio	Cleveland, Orr Assocs.	216-885-1324
Pa	Jenkintown, PDC Corp.	215-887-9610
SC	Spartanburg, Beacon Elctrn. Assocs. Inc.	803-582-4613
Tex	Arlington, D. Dawson Co.	817-265-6426
Utah	Salt Lake City, Applied Engrg. Prods. Co.	801-582-4942
Va	Falls Church, Beacon North Inc.	703-534-1673

DYTRO CORP., 63 Tec St., Hicksville, N.Y., 11801, Tel: 516-822-2130, TWX: 710-593-4135; Empl.: 15; Minimum order: $100

Products manufactured: Comparators, Converters, Data Acquisition & Reduction Systems, Data Loggers, Demagnetizers, Meters, Printers, Testers

Local Sales Offices & Reps.

Cal	North Hollywood, Crown Elctrns.	213-877-3550
Mass	Waltham, Instrumentation Controls & Measts.	617-891-8059
Tex	Houston, Leeco Inc.	713-487-1402

DYTRONICS CO., INC., 4800 Evanswood Dr., Columbus, Ohio, 43229, Tel: 614-885-3303; Empl.: 25

p. 1•658,659

Products manufactured: Filters, Generators, Meters, Shifters, Standards, Testers, Transducers

Local Sales Offices & Reps.

Ala	Huntsville, Beacon Elctrn. Assoc.	205-881-5031
Cal	San Mateo, Dayton Assocs.	415-347-9419
Colo	Wheatridge, Technology Mktg. Assoc.	303-423-6106
Fla	Ft. Lauderdale, Beacon Elctrn. Assoc.	
Ill	Des Plaines, Marsland Assocs.	312-775-1309
Mass	Acton, Applied Meas.	617-263-2766
Minn	Minneapolis, Marsland Assoc.	612-545-4481
Tex	Dallas, Airep Elctrns.	214-363-5291
Va	Arlington, Gans-Fryling, Inc.	703-527-3262
Wash	Seattle, J.B. Jolly, Inc.	206-938-4166
EXP:	New York, N.Y., Joseph Plasencia, Inc.	212-867-8084

DYTRONICS DIV., GTI Corp., Box 217, Leesburg, Ind., 46538, Tel: 219-453-3261, Telex: 023-2653; Empl.: 150

For info on price: S. E. Edwards; Application info: R. L. Gerber; Customer service: N. L. Banghart; Delivery info: N. L. Banghart

Products manufactured: Boards, Printed Circuit, Circuits, Flexible

Local Sales Offices & Reps.

Ark	Hot Springs, Meredith Young Assoc.	501-262-1365
Cal	Santa Ana, Calif Elctrn Mktg.	714-835-2702
Fla	Orlando, Geartner Assoc.	305-299-1000
Ill	Chicago, Midwest Elctrn. Sls.	312-626-0030
Ind	Indianapolis, Electro-Reps	317-255-4147
Kans	Mission, Mid-Amer. Elctrn. Mktg.	913-236-4800
Mass	Attleboro, E. J. Hughes Assoc.	617-226-0050
Mich	Rochester, Kent & Assocs.	313-651-1890
Minn	St. Paul, Kenco Co.	612-645-7717
Miss	Jackson, Meredith Young Assoc.	601-366-8185
NJ	Parsippany, Total Mktg. Approach	201-227-4073
NY	East Aurora, E. E. Harries & Co.	716-652-1221
NY	Fayetteville, E. E. Harries & Co.	315-637-9871
Ohio	Chagrin Falls, Alexander Indl. Sls.	216-247-4133
Pa	Ardmore, R. D. Freedman Assoc.	215-649-3679

DZUS FASTENER CO., INC., 425 Union Blvd., West Islip, N.Y., 11795, Tel: 516-669-0494; Empl.: 100

Products manufactured: Fasteners

Local Sales Offices & Reps.

Cal	Anaheim, Dzus Fastener Co.	714-635-0830

E-H RESCH. LABS., INC., Dept. A., 515 11th St., Oakland, Cal., 94604, Tel: 415-834-3030, TWX: 910-366-7258; Empl.: 175

Products manufactured: Amplifiers, Attenuators, Calibrators, Comparators, Converters, Current Sources, Generators, Integrators, Electronic, Meters, Oscilloscopes, Probes, Recorders, Testers, Transformers

Local Sales Offices & Reps.

Ala	Huntsville, BCS Assocs.	205-881-6220
Ariz	Phoenix, Zeus, Inc.	602-253-6104
Cal	Lawndale, Ward/Davis Assocs.	213-542-7740
Colo	Denver, Zeus, Inc.	303-770-4400
Conn	W. Hartford, Instr. Dynamics	203-233-5503
Fla	Orlando, BCS Assocs.	305-843-1510
Ill	Chicago, Cozzens & Cudahy, Inc.	312-298-3600
Md	Baltimore, E-H Research Labs.	301-532-7400
Mass	Wakefield, Instr. Dynamics	617-245-5100
Minn	Mpls., Cozzens & Cudahy, Inc.	612-884-4336
Mo	St. Louis, Cozzens & Cudahy, Inc.	314-423-1234
NJ	Haddonfield, Dyna Rep. Co.	609-795-1700
NJ	Union, SBM Reps.	201-687-8737
NM	Albuquerque, Zeus, Inc.	505-268-3941
NY	Pleasantville, SBM Reps.	914-769-1811
NY	Rochester, SBM Reps.	716-381-8330
NC	Greensboro, BCS Assocs.	919-273-1918
Ohio	Centerville, Micro Sls.	513-885-4171
Ohio	Medina, Micro Sls. Corp.	216-221-5505
Ore	Portland, McLaren, Inc.	503-297-2248
Tex	Dallas, Data Mktg.	214-661-0300
Tex	Houston, Data Mktg.	713-686-9627
Wash	Bellevue, McLaren, Inc.	206-454-3400

E & L INSTRUMENTS, INC., 61 First St., Derby, Conn., 06418, Tel: 203-735-8774, Telex: 963536; Empl.: 25

For info on price: G. LaRatta; Application info: R. Vuillequez; Customer service: D. Tomalis; Delivery info: D. Tomalis

Free literature available: 1) Circuit Design Line-catalogue on range of breadboarding instruments & accessories, 2) Innovator Series Brochure-programmed/teacher's manual, 3) Adam Brochure-Modular-breadboarding instrument, 4) Elite Brochure-range of design requirements from incoming inspection thru research lab.

Products manufactured: Analyzers, Boards, Plug-In, Boards, Printed Wiring, Universal, Boards, Programming, Cards, Linear Function, Cards, Logic, Chassis, Circuit Board Mounting, Clamps & Clips, Generators, Integrated Circuit Devices, Jumpers, Kits, Breadboarding (For Engineers), Kits, Marking (Dial, Instrument, Equipment, etc.), Kits, Power Supply, Kits, Programming Board, Kits, Test Equipment, Kits, Training Aid, Power Supplies, Probes, Sockets, Terminal Blocks, Boards & Strips, Terminals, Testers

Local Sales Offices & Reps.

Cal	Mountain View, IFM Co.	415-961-2828
Cal	Palos Verdes, Edwards Assocs.	213-377-0975
Colo	Denver, R. Bowen Assoc.	303-722-4641
Conn	Woodbridge, Electronic Mktg. Co.	203-397-1461
Fla	Orlando, Nine Assocs.	305-628-1124
Ill	Arlington Heights, Martec Assocs.	312-956-8090
Mo	Kansas City, T. Dowell Co.	913-236-8200
NJ	Springfield, Shortess-Rawson & Assocs.	201-467-8585
NY	N. Syracuse, Naco Elctrns.	315-699-2651
Ohio	Dayton, Rixan Assocs.	513-222-0011
Pa	Valley Forge, J. E. Cuesta & Co.	215-265-5800
Tex	Richardson, Tesco, Inc.	214-690-4004
Va	Fairfax, Nine Assocs.	703-273-1803
Wash	Seattle, J. Jolly, Inc.	206-938-4166
FOR:	Can., Vancouver, BC, RAE Industrial Electronics Ltd.	604-687-2621
FOR:	Can., Edmonton, Alb., Cardinal Ind'l. Elctrns. Ltd.	403-455-4122
FOR:	Can., Winnipeg, Man., J. Fortin Co.	204-774-6286

E & M LABORATORIES, INC., 5388 Sterling Ctr. Dr., Westlake Village, Cal., 91361, Tel: 213-889-1470, TWX: 910-494-1953; FSC No: 14135; Empl.: 75

For info on price: G. M. Underberger; Application info: C. C. Carnegie; Customer service: M. McGinniss; Delivery info: W. Reed

Products manufactured: Amplifiers, Circulators, Ferrite, Drivers, Switch, Isolators, Strip-Line Components, Microwave, Switches

Local Sales Offices & Reps.

Ariz	Phoenix, Thorson Co.	602-956-5300
Cal	Cupertino, Data Elec. Sls	408-255-2084
Cal	Los Angeles, McDougall/McLaughlin Co.	213-477-8556
Colo	Parker, TMA, Inc.	303-841-3435
Fla	Lighthouse Point, Saber Assocs., Inc.	305-943-3076
Ga	Woodstock, Saber Assocs	404-432-9625
Ill	Park Ridge, RF Specialists	312-698-2044
Ind	Ft. Wayne, TX Sls	219-489-4447
Mass	Stoneham, REPCO	617-438-3113
NJ	Haworth, Central Assocs., Inc.	201-568-0808
NJ	Pennsauken, Megargel/Himmelstein Assoc.	609-662-3081
NM	Albuquerque, TMA, Inc.	505-298-4321
NY	No. Syracuse, Naco Elctrns.	315-699-2651
NY	Plainview, Central Assocs., Inc.	516-433-0808
NY	Rochester, NACO Elctrns.	716-244-4720
NY	Utica, Naco Elctrns. Corp.	315-733-1801
NC	Raleigh, Candor Co.	919-876-4999
Ohio	Shaker Hts, Tex. Sls	216-561-1900
SC	Myrtle Beach, Candor Co., Inc.	803-448-5213
Tenn	Chattanooga, Candor Co., Inc.	615-894-7454
Tex	Dallas Airep Elctrns.	214-827-2120
Utah	Salt Lake City, Monarch Dist. & Representing	
Wash	Seattle, Datacom Assoc.	206-285-2525

FOR:	Can., Vancouver, Mitec Elctrns Ltd.	604-988-7317
FOR:	Can., Quebec, Mitec Elctrns Ltd.	514-334-9140

E-SYSTEMS INC., Garland Div., Box 6118, Dallas, Tex., 75222, Tel: 214-272-0515, TWX: 910-860-5187; Empl.: 1700

Products manufactured: Antenna Feed Systems, Antennas, Comm. Systems, Data Acquisition & Reduction Systems, Display Devices/Displays, Receivers

Local Sales Offices & Reps.

Fla	Fort Walton Beach	904-243-0127
Mass	Lexington	617-861-9050
NJ	W. Long Branch	201-222-0565
NY	Rome	315-336-1911
Ohio	Dayton	513-254-8464
Va	Arlington	703-524-2310
Va	Hampton	703-838-2010

E-SYSTEMS, INC., Memcor Div., 1320 Flaxmill Rd., Huntington, Ind., 46750, Tel: 219-356-4300, TWX: 810-333-1530; Empl.: 1100; Minimum order: $50 p. 2•1484-1491,1656-1665

For info on price: B. Broom; Application info: J. Fredricks; Customer service: B. Broom; Delivery info: J. Fredricks

Products manufactured: Bushings, Glass, Plastic, Metal, Rubber, Etc., Clamps & Clips, Dials, Fasteners, Kits, Potentiometer, Rheostat, Knobs, Locks, Dial & Shaft, Resistors, Rheostats

Local Sales Offices & Reps.

Ala.	Huntsville, Murcota Inc.	205-539-8476
Cal	Culver City, De Angelo, Rothman & Co.	213-398-6239
Cal	San Carlos, D.H. Ross Co.	415-591-4411
Colo	Denver, Gossard & Assoc.	303-985-0602
Fla	Boca Raton, R.K. Welter Co.	305-391-9067
Ga	Atlanta, Murcota Corp.	404-875-2525
Ill	Chicago, D. Dolin Sls. Co.	312-286-6200
Ind	Ft. Wayne, M & N Prods. Co.	219-747-2461
Iowa	Marion, Thomas & Modrcin Assocs.	319-377-6261
Kans	Shawnee Mission, Thomas & Modrcin Assocs.	913-432-2131
Md	Baltimore, D.H. Brothers Co.	301-764-7189
Mass	Boston, Anderson Sales Assoc.	617-227-2980
Mich	St. Clair Shores, J.M. Thorpe Co.	313-779-6363
Minn	St. Paul, H.A. Cullen, Assoc.	612-646-7371
Mo	Hazelwood, Thomas & Modrcin Assocs.	314-895-4700
NJ	East Orange, Masin Esco Inc.	201-674-6505
NY	E. Syracuse, Honsinger Mktg. Assocs.	315-463-5718
NY	Syosset, Masin Esco Inc.	516-364-0310
NC	Burlington, Murcota Corp.	919-585-1577
NC	Winston Salem, Murcota Corp.	919-723-1001
Ohio	Cleveland, Glover Sls. Co.	216-842-4520
Pa	Newtown Square, G.M. Conneen	215-353-2241
Tex	Dallas, Southwest Electronic Ind.	214-233-9816
Tex	Houston, Southwest Electronic Ind.	713-729-1670
Wash	Seattle, R.K. Squibb Inc.	206-632-2450

E-T-A PRODS. CO. AMERICA, 7400 N. Croname Rd., Chicago, Ill., 60648, Tel: 312-647-8303, Telex: 253780; Empl.: 13; Minimum order: $20

For info on price: D. Schneider 312-647-8303; Application info: W. Gillich 312-647-8306; Delivery info: D. Schneider 312-647-8303

Free literature available: Condensed Catalog; individual catalog sheets; bulletin 402, thermal magnetic circuit breaker.

Products manufactured: Circuit Breakers, Relays

Local Sales Offices & Reps.

Cal	Santa Fe Springs, Sierra-Pacific Eng.	213-921-9634
Cal	Walnut Creek, P.W. Jasin Co.	415-935-6339
Colo	Denver, Vinson Assocs.	303-757-5151
Conn	Meriden, Eagle Assocs.	203-235-9036
Fla	Orlando, Buchanan & Abrams Assoc.	305-898-7444
Ill	Chicago, Midwest Elctrn. Sls.	312-777-9700
Ind	Indianapolis, Garstang Engrg.	317-632-9903
Iowa	Cedar Rapids, Midwest Elctrn. Sls.	319-362-4410
Kans	Wichita, Dy-Tronix Inc.	316-943-6221
La	New Orleans, M.F. Klicpera Co.	504-282-2897
Mich	Lathrup Village, R.C. Nordstrom & Co.	313-559-7373
Minn	Minneapolis, Wenco Sls.	612-866-3639
Mo	Hazelwood, Dy-Tronix Inc.	314-731-5799
Mo	Kansas City, Dy-Tronix	816-761-6543
NJ	Fort Lee, S. Justin Assoc.	201-947-4371
NY	Buffalo, Harries & Kershaw Co.	716-652-1221
NY	Rochester, Harries & Kershaw Co.	716-671-6365
NY	Syracuse, Harries & Kershaw Co.	315-637-9871
Ohio	Cincinnati, J.O. Olsen Co.	513-922-2176
Ohio	Cleveland, J.O. Olsen Co.	216-752-5444
Okla	Tulsa, M.F. Klicpera Co.	918-939-5956
Pa	Pittsburgh, J.O. Olsen Co.	412-279-2550
Pa	Willow Grove, Techparts	215-659-6900
Tenn	Nashville, Stark & Assocs.	615-352-4276
Tex	Dallas, M.F. Klicpera	214-742-2515
Tex	Houston, M.F. Klicpera	713-747-3868
Wash	Kirkland, W.J. Stulgis Co.	206-822-3867
Wisc	Waukesha, J.C. Morkin Sls. Eng.	414-542-5129

E-TRONICS, 16774 Schoenborn, Sepulveda, Cal., 91343, Tel: 213-892-7279; Empl.: 28

Products manufactured: Cabinets & Accessories, Carts & Dollies, Instrument & Equipment, Cases, Equipment, Instrument, Meter, Chassis, Circuit Board Mounting, Chokes, Coils Including Assemblies & Forms, Converters, Inverters, Power Supplies, Transformers

EV-GAME INC., Box 711, Freeport, N.Y., 11520, Tel: 516-378-0440, Telex: 96-1304; Empl.: 60; Minimum order: $20

Customer service: Sales Dept.

Products manufactured: Cable, Connector Adapters, Connectors, Cords, Crystals, Jack Adapters (All Types), Microphones, All Kinds, Motors, Phonographs, Parts & Accessories, Plug Adapters, Plug & Jack Sets, Tape Recording Accessories

Local Sales Offices & Reps.

Ariz	Phoenix, B & G Sls. Co.	602-266-5624
Ark	El Dorado, D. Bellew Sls. Co.	501-863-8325
Cal	San Francisco, Technical Sls.	415-467-1434
Cal	W. Covina, D. Forth Assocs.	213-967-2893
Colo	Colorado Springs, Norris & Co.	303-635-9319
Fla	Ormand Beach, J. F. Thompson Co.	904-677-2298
Ga	Atlanta, H. W. Phillips Co.	404-237-7564
Ill	Skokie, M. Bermann Sls. Co.	312-675-3740
Ind	Indianapolis, Mid-Central Sls.	317-283-1727
Ky	Ferncreek, Mid-Central Sls.	502-239-5614
La	Kenner, D. Bellew Sls. Co.	504-729-4550
Md	Baltimore, E-K-P Assocs.	301-788-6498
Mich	Detroit, Riley & Petchell Sls.	313-535-7000
Minn	Minneapolis, Kodo Assocs.	612-881-1255
Mo	Raytown, Midwest Mktg.	816-358-6638
NJ	Englewood, J. J. Bressler	201-569-7600
NY	Liverpool, Lewis-Dunnigan Co.	315-622-2133
NY	New York, J. J. Bressler	212-564-4105
NC	Burlington, E. P. Ester Co.	919-226-5942
Ohio	Cleveland, H. Miller Sls. Co.	216-321-3900
Pa	Easton, E-K-P Assocs.	215-258-6477
Tenn	Memphis, L. Jones	901-683-7616
Tex	Irving, Antle-Smith Sls. Co.	214-259-8707
Wash	Seattle, W. R. Lanphear Sls. Co.	206-633-4900

E-Z-HOOK, Div. of Tektest, Inc., Box 450, Arcadia, Cal., 91006, Tel: 213-446-6175, TWX: 910-582-1614 ... p. 2•671

Products manufactured: Cable Assemblies & Harnesses, Clamps & Clips, Connectors, Cords, Jumpers, Kits, Breadboarding (For Engineers), Kits, Test Equipment, Leads, Test & Adaptors, Probes, Testers

EAGLE MAGNETICS CO., Box 24283, 7421 Crawfordsville Rd., Indianapolis, Ind., 46224, Tel: 317-297-1030; Empl.: 11 ... p. 2•1216,1217

For info on price: R. Jackson; Application info: J. L. Coddington; Customer service: R. Jackson; Delivery info: R. Jackson

Free literature available: Transformer Brochure-Design & Application, Testing, Cathode-Ray-Tube Brochure-Design & Application, Testing, Magnetic Shielding Materials Brochure-Design & Application, Testing

Products manufactured: Foil, Shields

EAGLE-PICHER INDS., Commercial Prods, Dept., Box 130, Seneca, Mo., 64865, Tel: 417-776-2258; Empl.: 100 p. 1•1208

Customer service: H.M. York

Free literature available: Battery Application Manual.

Products manufactured: Batteries

Local Sales Offices & Reps.

Ariz	Phoenix, Spectrum Assocs.	602-997-6324
Cal	Palo Alto, Abbott Engrg. Co.	415-327-0830
Cal	Santa Ana, Spectrum Assocs.	714-835-4114
Conn	Bloomfield, Zaslow Sls. Co.	203-242-7781
Fla	Maitland, Ellis Assocs.	305-645-1101
Ill	Oak Brook, Whitmore Assocs.	312-325-4727
Mass	Northboro, Zaslow Sls. Co.	617-393-8150
Minn	Minneapolis, Jaynus Assocs.	612-884-1700
NY	Plainview, Preisick Assocs.	516-681-8444
NY	Syracuse, Naylor Elec. Co.	315-656-2251
NC	Greensboro, L & D	919-292-3201
Ohio	Dayton, Ad-El-Tek/El Compo	513-836-2741
Tex	Dallas, E. B. Robertson	214-942-2716

EAGLE-PICHER INDUSTRIES, INC., Elctrns. Div., Box 47, Joplin, Mo., 64801, Tel: 417-623-8000, TWX: 910-774-4508; Empl.: 700; Minimum order: $100

Customer service: P. E. Grayson Ext: 448

Free literature available: Special purpose batteries for military and aerospace applications.

Products manufactured: Batteries, Boards, Printed Circuit, Braid, Cable, Cable, Chargers, Battery, Crystals, Metals, Services, Assembly, Production & Test

EAGLE SIGNAL, Mfg. Div. Gulf & Western Inds., Box 3585, Davenport, Iowa, 52808, Tel: 319-326-8111; Empl.: 800

For info on price: D. J. Morse 312-326-8125; Application info: J. C. Schwartz 312-326-8143; Customer service: E. P. Doak 312-326-8127; Delivery info: E. P. Doak 312-326-8127

Free literature available: An industrial control selection guide describing everything from control relays to programmable control systems including time, count and temperature controls; control sensors; prices; sales offices.

Products manufactured: Controllers, Programmable, Controls/Control Eqpt., Counters, Indicators, Light Sources, Photoelectric, Programmers, Relays, Sensors, Light, Switches, Timers, Totalizers, Digital

Local Sales Offices & Reps.

Ala	Birmingham, McConnell Sls. & Engrg. Corp.	205-871-3501
Ariz	Phoenix, Bews & Wallace Co., Inc.	602-275-4496
Ariz	Tucson, Bews & Wallace Co., Inc.	602-297-4001
Cal	Burlingame, Campbell & George Co.	415-697-2965
Cal	Los Angeles, Hundley Co.	213-240-3600
Colo	Denver, Empire Electrical Sls. Co.	303-744-1776
Fla	Ft. Lauderdale, Ward Engrg. Co.	305-564-4883
Fla	Jacksonville, Ward Engrg. Co.	904-388-7656
Fla	Orlando, Ward Engrg. Co.	305-851-0725
Ga	Atlanta, B. Fancher & Assocs.	404-448-7078
Idaho	Twin Falls, C.W. Silver Inc.	208-733-0460
Ill	Chicago, Kelburn Engrg. Co.	312-775-8383
Ill	Moline, J. Otis & Assocs.	309-762-9311
Ind	Indianapolis, Kelburn Engrg. Co.	317-257-9874
La	Baton Rouge, Thompson Equip. Co.	504-355-6663
La	New Orleans, Thompson Equip. Co.	504-833-6381
Md	Glen Burnie, E.J. Varholy & Sons Inc.	301-760-3344
Mass	Norwood, Gibson Engrg. Co.	617-769-3600
Mich	Detroit, R.D. Ernest Assocs.	313-861-7311
Mich	Spring Lake, Mackinaw Engrg. Co.	616-842-9170
Minn	Minneapolis, W. Hallock Co.	612-920-6100
Mo	Kansas City, R. Greene Co.	816-333-7585
Mo	St. Louis, R. Greene Co.	314-644-2666
NJ	Hackensack, C.H. Ribble Co.	201-342-2602
NY	Buffalo, Munhall Co.	716-856-1212
NC	Charlotte, B. Fancher & Assocs.	704-376-1753
Ohio	Cleveland, J.L. Finnicum & Assocs.	216-226-7076
Ohio	Dayton, Thal-Mor Assocs.	513-298-9939
Okla	Oklahoma City, L. Elliott Co.	405-842-7885
Okla	Tulsa, L. Elliott Co.	918-743-7794
Ore	Portland, Branom Instr. Co.	503-285-9861
Pa	Havertown, W. F. Keegan & Co.	215-528-6640
Pa	Monroeville, H. A. Deevers & Co.	412-372-4000
Tenn	Knoxville, J. R. Stephenson Agency	615-588-7474
Tex	Addison, L. Elliott Co.	214-239-8533
Tex	Missouri City, L. Elliott Co.	713-499-1571
Utah	Salt Lake City, C. W. Silver Inc.	801-355-5377
Wash	Seattle, Branom Instr. Co.	206-762-6050
WVa	Charleston, Skaff Engrg. Co.	304-342-0131
Wisc	Milwaukee, Kelburn Engrg. Co.	414-545-2122
EXP:	Davenport, Iowa, (Eagle Signal - J. Duda)	319-326-8146

EAI, See Electronic Assocs.

EASTERN AIR DEVICES MOTOR DIV., Electro Audio Dynamics, Inc., 385 Central Ave., Dover, N.H., 03820, Tel: 603-742-3330, TWX: 510-297-4454; Empl.: 325

Products manufactured: Alternators, Blowers & Fans & Accessories, Controls/Control Eqpt., Gearheads & Speed Reducers, Motors, Reducers, Tachometers

Local Sales Offices & Reps.

Ala	Huntsville, International Scientific	205-837-1601
Ariz	Tempe, Gassner & Clark	602-945-7979
Cal	Los Altos, Servo Data	415-964-1325
Cal	Los Angeles, Universal Comps.	213-641-4255
Fla	Orlando, Perrott Assoc.	305-275-1132
Ill	Westchester, Gassner & Clark	312-345-4245
Mich	Detroit, A. Blumenberg Assoc.	313-557-1934
Minn	St. Paul, R. G. Ragon	612-488-0201
NJ	Ridgefield, Haber-Ramp Corp.	201-945-5250
NY	No. Syracuse, L. D. Allen	315-458-7470
NY	Rochester, H. C. Johnson Agencies	716-482-3000
Ohio	Dayton, Midwest Mktg Assoc.	513-433-2511
Pa	Newtown Square, Hagy Assoc.	215-459-0504
Tex	Houston, Carey Assoc.	713-460-1111
FOR:	Can., Montreal, Que., Componetics, Ltd.	514-342-4117

EASTERN DELTA CORP., 29-09 S. Broadway, Fair Lawn, N.J., 07410, Tel: 201-797-4200; Empl.: 31; Minimum order: $25

For info on price: S. Carlson; Application info: I. Green; Customer service: I. Green; Delivery info: F. McKenzie

Products manufactured: Arresters, Electrical Surge, Lightning, Chargers, Battery, Chokes, Demagnetizers, Diodes, Eliminators, Battery, Limiters, Protectors, Rectifiers, Services, Assembly, Production & Test, Suppressors, Transformers, X-Ray Inspection Equipment

Local Sales Offices & Reps.

NJ	Fair Lawn, Eastern Delta Corp.	201-797-4200

EASTMAN CHEM. PRODS., Sub. Eastman Kodak Co., Kingsport, Tenn., 37662, Tel: 800-251-0351, TWX: 810-574-5174; Empl.: 1000

Customer service: Info. Svcs.

Free literature available: Pub. No. PA-14 Describes bonding strength and fast setting properties of Eastman 910® brand of cyanoacrylate adhesives. Pub. No. PO-12 General information on Tenite® Pollyallomer in wire coatings and other applications.

Products manufactured: Adhesives (All Types), Cleaners & Solvents, Coatings, Compounds, Encapsulating, Insulating, Molding, Potting, Plastic Raw Materials, Liquids, Pellets, Powders, Resins

Local Sales Offices & Reps.

Conn	Hartford
Del	Newark
Fla	Tampa
Ga	Atlanta
Ga	Dalton
Ill	Chicago
Ky	Louisville
La	New Oreans
Mass	Boston
Mich	Detroit
Minn	Minneapolis
Mo	Kansas City
Mo	St. Louis
NJ	Millburn
NY	Buffalo
NY	New York City
NC	Charlotte
NC	Greensboro
NC	Raleigh
Ohio	Akron
Ohio	Cincinnati
Ohio	Cleveland
Ohio	Columbus
Ohio	Toledo
Okla	Tulsa
Pa	Bethlehem
Pa	Philadelphia
Pa	Pittsburgh
SC	Greenville
Tenn	Memphis
Tex	Dallas
Tex	Houston

EASTMAN KODAK, Bus. Sys. Mkt. Div., 343 State St., Rochester, NY, 14608

EASY-UP INC., Racine, Wisc., 53401, Tel: 414-633-6389; Empl.: 12

For info on price: T. I. Le Clear; Application info: T. I. Le Clear; Customer service: T. I. Le Clear; Delivery info: Main

Free literature available: Brochures-All products described.

Products manufactured: Benches, Consoles, Stools, Tables, Carts & Dollies, Instrument & Equipment, Mounts

Local Sales Offices & Reps.

Ga	Smyrna, B-C Elctrn. Sls.	404-436-5169
Ill	Skokie, M. Bermann Sls. Co.	312-675-3740
Ind	Fort Wayne, N. Hoemig Sls. Co.	219-747-0826
Mass	Needham, Coakley, Boyd & Abbett	617-444-5470
Mich	Detroit, R. Milsk Co.	313-342-6660
Minn	Minneapolis, R. Ripley & Assocs.	612-881-8282
Mo	St. Louis, Kathrinus-Helly-Boswell Co.	314-962-5627
NY	Yonkers, J. Mesnick Elctrn. Sls.	914-961-6619

EATON CORP., Ind'l. Drives Div., 9919 Clinton Rd., Cleveland, Ohio, 44111; Empl.: 1640

Products manufactured: Brakes, Controls/Control Eqpt., Gearheads & Speed Reducers, Gears & Gear Mechanisms (Precision), Motors, Reducers

Local Sales Offices & Reps.

Cal	Los Angeles	213-724-4320
Cal	San Francisco	415-588-4307
Colo	Denver	303-623-7011
Conn	Stratford	203-375-5207
Fla	Jacksonville	904-786-3254
Ga	Atlanta	404-448-6600
Ill	Elk Grove Village	312-439-6200
Iowa	Des Moines	515-278-4540
La	Metairie	504-888-9811
Md	Timonium	
Mass	Westboro	617-235-1624
Mich	Grand Rapids	616-245-8748
Mich	Southfield	313-345-5085
Minn	Minneapolis	612-835-5110
Mo	Maplewood	314-645-4732
NJ	Cherry Hill	215-563-1446
NJ	Fairfield	201-227-4111
NY	Buffalo	716-836-0850
NY	Syracuse	315-463-8202
NC	Charlotte	704-375-5659
Ohio	Cincinnati	513-874-4800
Ohio	Cleveland	216-523-5304
Okla	Tulsa	918-587-7917
Pa	Pittsburgh	412-341-6565
Tenn	Memphis	901-272-1374
Tex	Dallas	214-522-6191
Tex	Fort Worth	817-332-5351
Tex	Houston	713-623-0797
Tex	Odessa	915-366-4951
Wash	Seattle	206-624-7292
Wisc	Milwaukee	414-462-3800

EATON CORPORATION, Engineered Fasteners Division, Box 6688, Cleveland, Ohio, 44101, Tel: 216-523-5363, TWX: 810-421-8678; Empl.: 1300; Minimum order: $100

For info on price: W. J. Febel 216-523-5325; Application info: W. J. Febel 216-523-5325; Customer service: W. H. Gibbons 216-523-5705; Delivery info: W. A. Sutton 216-523-5771

Free literature available: Bulletin 383 - high carbon spring steel fasteners, heat treated. Used throughout automotive, appliance, radio-tv industries. Also complete line of plastics fasteners. Exotic & precious metal stampings, precision, miniature & sub-miniatures for electro-mechanical components.
Catalog 034-100 - Full Line of Cold Headed Nut-Bolt-Washer Assemblies & Specialties, Railroad Washers.

Products manufactured: Clamps & Clips, Connectors, Contacts, Electrical, Fasteners, Forms, Wire, Grommets, Rings, Retaining, Rivets, Springs (All Types), Strain Reliefs, Cable & Wire, Terminals, Wire

Local Sales Offices & Reps.

Cal	Santa Ana	714-542-7295
Ill	Oak Park	312-589-0300
Mich	Southfield	313-354-2810
Minn	Richfield	612-866-3696
Mo	St. Louis	314-725-1182
NJ	Kenilworth	201-272-8780
NY	Rochester	716-654-9690
Ohio	Cincinnati	513-771-9303
Ohio	Cleveland	216-523-5363
Tenn	Chattanooga	615-892-8452
Va	Roanoke	703-343-3678

EBY CO., HUGH H., 4701 Germantown, Philadelphia, Pa., 19144, Tel: 215-842-3000, TWX: 710-670-0452; FSC No: 72825; Empl.: 150; Minimum order: $200

For info on price: W. Telmosse; Application info: M. Sterling; Customer service: M. Costello; Delivery info: M. Costello

Products manufactured: Clamps & Clips, Connectors, Jacks (All Types), Plugs, Posts, Services, Assembly, Production & Test, Sockets

Local Sales Offices & Reps.

Cal	Norwalk, Zoolialian Inc.	213-921-9791
Ill	Des Plaines, E. Flaxman Co.	312-298-8580
Ill	Streamwood, Al Holte & Assoc.	312-837-4066
Md	Baltimore, Component Sls.	301-484-3647
Mass	Framingham, G. Rosen Co.	617-879-5505
Mich	Southfield, Baer Ents.	313-357-3330
Minn	Hopkins, Grayden & Flemmer	612-941-1120
Mo	Hazelwood, Technical Representatives	314-731-5200
NY	Huntington, Caravan Sls. Corp.	516-421-1391
NY	Jamaica, S-J Sls. Assoc.	212-291-3232
NY	Larchmont, Hingston Walsh Assoc.	914-834-5781
NY	Liverpool, B.C.S. Assocs.	315-458-4774
NY	New York, Eltron Export Corp.	212-944-7635
Ohio	Cleveland, Components, Inc.	216-842-2737
Pa	Glenside, Griffin Co.	215-646-8383
FOR:	Can., Quebec, Electrodesign Ltd.	514-363-5120

Local Distributors

Cal	Los Angeles, Dyna Service Co., 1020 S. Atlantic Blvd.	213-268-8531
Ill	Des Plaines, Edmar Elctrns., 1305 Rand Rd.	312-298-8580
NY	Buffalo, Summit Dists., 916 Main St.	716-884-3450
NY	Jamaica, Eby Sls. Co., 148-05 Archer Ave.	212-291-3232

ECC CORP., Box 669, Euless, Tex., 76039; Empl.: 927

Products manufactured: Controls/Control Eqpt., Regulators, Relays, Switches, Thyristors (Includes Silicon Controlled Rectifiers), Timers

Local Sales Offices & Reps.

Ala	Huntsville, Interep Assocs.	205-881-3677
Ariz	Scottsdale, F. Board Assocs.	602-949-9561
Cal	Palo Alto, O'Donnell Assocs.	415-327-9260
Cal	Torrance, O'Donnell Assocs.	213-323-9243
Colo	Arvada, Arrowhead Sls.	303-423-5556
Fla	Clearwater, Perrott Assocs.	813-531-5513
Fla	Orlando, Perrott Assocs.	305-275-1132
Ill	Elk Grove Village, John G. Twist Co.	312-593-0200
Ind	Fort Wayne, R.O. Whitesell & Assocs.	219-432-5591
Ind	Indianapolis, R.O. Whitesell & Assocs.	317-359-9283
Ind	Kokomo, R.O. Whitesell & Assocs.	317-453-6868
Iowa	Cedar Rapids, John G. Twist Co.	319-393-8703
Ky	Louisville, R.O. Whitesell & Assocs.	502-893-7303
Mass	Lexington, KCA Comps., Inc.	
Mich	Grand Rapids, R.O. Whitesell & Assocs.	616-451-8901
Mich	Southfield, R.O. Whitesell & Assocs.	313-358-2020
Mich	St. Joseph, R.O. Whitesell & Assocs.	616-983-7337
Minn	Minneapolis, Elec. Comp. Sls.	612-933-2594
Mo	Hazelwood, Centech Sls.	314-731-4220
Mo	Raytown, Centech Sls.	816-358-8100
NM	Albuquerque, A.Q. Elctrns.	505-255-8701
NY	Binghamton, Elcom Sls., Inc.	607-723-9270
NY	Rochester, Elcom Sls., Inc.	716-385-1400
NY	Whitesboro, Elcom Sls., Inc.	315-732-6445
NC	Charlotte, R.W. Chapman	704-525-2421
NC	Raleigh, R.W. Chapman & Co.	919-782-2624
Ohio	Cincinnati, R.O. Whitesell & Assocs.	513-521-2290
Ohio	Columbus, R.O. Whitesell & Assocs.	614-888-9396
Ohio	Dayton, R.O. Whitesell & Assocs.	513-298-9546
Ohio	Lakewood, R.O. Whitesell & Assocs.	216-228-7522
Pa	Bala Cynwyd, M. Friedman Assocs.	215-839-3450
Pa	Pittsburgh, R.O. Whitesell & Assocs.	412-242-0100
SC	Greenville, R.W. Chapman & Co.	803-232-5391
Tenn	Bristol, Remco	615-968-4195
Tex	Dallas, Component Specialties, Inc.	214-357-4576
Tex	Houston, Component Specialties, Inc.	713-771-7237
Tex	Richardson, Oeler & Menelaides	214-234-6334
Utah	Salt Lake City, Arrowhead Sls.	801-487-3444

Wash	Bellevue, Vantage Corp.	206-455-3460
Wisc	Oak Creek, Erdman Sls. Co.	414-761-2120
Wisc	Waukesha, John G. Twist Co.	414-786-6330
FOR:	Downsview, Ont., Can., Cantronics Ltd.	416-661-2494
FOR:	Montreal, Quebec, Can., Cantronics Ltd.	514-733-0749

ECHO SCIENCE CORP., 485 E. Middlefield Rd., Mountain View, Cal., 94040, Tel: 415-961-7145, TWX: 910-379-6499; Empl.: 180

Customer service: R. R. Watson

Free literature available: Video Discassette Recorder, Video Tape Recorder, military and commercial, military-ruggedized. Video Disc Recorder - VDR 300, 310 & 315 & VDR-1R, Video Tape Recorder - WRR-411, WR-200 series Longitudinal Recorder, Transient Free Recorder.

Products manufactured: Memory Systems, Recorders

Local Sales Offices & Reps.

Cal	San Diego, Tauber & Assoc.	714-274-7242
Md	Laytonsville, G-T Assocs.	301-949-8060
NY	Huntington, Data Logic Sls.	516-421-1644
Tex	Dallas, Martin, Zienkasky, Browne & Assoc.	214-233-5535

ECONOMY FUSE DIV., Federal Pacific Elec. Co., 2070 Maple St., Des Plaines, Ill., 60016, Tel: 312-299-2211

Products manufactured: Fuses

ECP CORP., 4726 Superior Ave., Cleveland, Ohio, 44113

ECTRON CORP., 8159 Engineer Rd., San Diego, Cal., 92111, Tel: 714-278-0600, TWX: 910-335-1259; Empl.: 30
p. 1•7,162

Customer service: J. W. JaQuay

Free literature available: Differential DC Amplifiers and Signal Conditioners, Wide Band Differential DC Amplifiers, 500 Series DC Amplifiers, Industrial DC Amplifiers Multipurpose Signal Conditioners, Thermocouple Simulator/Calibrator

Products manufactured: Amplifiers, Calibrators, Data Acquisition & Reduction Systems, Data Loggers, Signal Conditioners & Equipment, Standards, Thermocouples, Elements & Accessories

Local Sales Offices & Reps.

Ala	Huntsville, Incotech, Inc.	205-837-6061
Cal	Encino, Sci Devices	213-986-9933
Cal	Los Alamitos, Sci. Devices	213-598-7678
Cal	Mtn. View, Sci. Devices	415-964-4230
Cal	San Diego, Scientific Devices	714-279-6642
Colo	Littleton, Aztec Enter.	303-795-0250
Conn	E. Hartford, Tekdata	203-525-7647
Fla	Orlando, Datarep	305-843-5224
Fla	Pompano Beach, Datarep	305-781-9279
Ill	Chicago, S.E.A. Inc.	312-282-6694
Ind	Carmel, S.E.A. Inc.	317-846-2593
Md	Perry Hall, Dyna Rep. Co.	301-256-8300
Mass	Burlington, Tekdata	617-273-0198
Mich	Royal Oak, Satullo	313-549-3910
Minn	Minneapolis, S.E.A. Inc.	612-425-4455
NJ	Haddonfield, Dyna Rep Co.	609-795-1700
NM	Albuquerque, Aztec Entprs.	505-255-2440
NY	Fayetteville, Doolittle Elctrns. Corp.	315-637-3222
NY	Great Neck, Eastern Instrumentation	516-466-9505
NC	Winston-Salem, Radco Co.	919-722-9671
Ohio	Cleveland, Instrumentation Sys. Inc.	216-486-0782
Ohio	Dayton, Instrumentation Sys. Inc.	513-294-2838
Pa	Pittsburgh, Instrumentation Sys.	412-243-1111
Va	Alexandria, Dyna Rep.	703-354-1222
Wash	Seattle, R.S. Drake Assocs.	206-763-2755
Wisc	Waukesha, S.E.A. Inc.	414-547-6637
FOR:	Can., Scarborough, Ont., J. DeGrott	416-264-2991

EDAL INDS., INC., 4 Short Beach Rd., E. Haven, Conn., 06512, Tel: 203-467-2591; Empl.: 200; Minimum order: $50

For info on price: E. Pagano; Application info: E. Pagano; Customer service: D. Vagnini; Delivery info: D. Vagnini

Products manufactured: Arresters, Electrical Surge, Lightning, Bridges, Diodes, Limiters, Rectifiers, Spacers, Suppressors, Terminals

Local Sales Offices & Reps.

Ala	Huntsville, Component Sls.	205-883-7794
Cal	Los Altos, Schwerin Assoc.	415-941-3737
Cal	Los Angeles, Current Product Sls.	714-633-7414
Conn	Madison, A&M	203-245-1031
Fla	Terra Ceia, Component	813-722-6376
Ill	Chicago, Brock & Cushman	312-622-4110
Mass	Needham, A&M Sls.	617-444-8170
Mich	Ferndale, Hilltronics	313-398-5556
Minn	Minneapolis, Furber Sls.	612-861-1518
Mo	Blue Springs, Chesco	816-229-1404
Mo	St. Charles, Chesco	314-946-6677
NJ	Nutley, I. Brill	201-667-0653
NY	Brooklyn, Eastern	212-763-5180
NY	Buffalo, H.C. Johnson	716-632-7880
NY	Rochester, H.C. Johnson	716-482-3000
Ohio	Cleveland, Brauer	216-943-0601
Ohio	Vandalia, Brauer & Assoc.	513-898-1224
Pa	Pittsburg, Brauer	412-921-3213
Pa	Radnor, Cordray Sls.	215-878-3737
RI	Needham, A & M	617-444-8170
Va	Reston, Boyle Assoc.	703-620-9558
Wisc	West Allis, Brock & Cushman	414-933-3374

E.D.I. INC., Box 66, Cairo, Ill., 62914, Tel: 618-734-1694; Empl.: 3

Customer service: E. Badran

Products manufactured: Boards, Printed Circuit

EDISON ELECTRONICS DIV., See McGraw-Edison Co.

EDISON, INSTR. DIV., McGraw Edison Co., 2 Babcock Pl., W. Orange, N.J., 07051, Tel: 201-736-1000, TWX: 710-994-5810; Empl.: 450

Products manufactured: Alarms, Controls/Control Eqpt., Detectors, Gages, Indicators, Meters, Monitors, Probes, Pyrometers, Recorders, Relays, Switches, Transducers

EDMAC ASSOCIATES INC., 333 W. Commercial St., East Rochester, N.Y., 14445, Tel: 716-385-1440; Empl.: 70

Products manufactured: Counters, Data Acquisition & Reduction Systems, Data Loggers, Filters, Recorders, Services, Assembly, Production & Test, Testers, Underwater Communication, Detection, Navigation, etc. Equipment

EDMUND SCIENTIFIC CO., 555 Edscorp Bldg., Barrington, N.J., 08007, Tel: 609-547-3488, Telex: 831-564; Empl.: 175; Minimum order: $5

For info on price: B. McKelevy; Application info: B. McKelevy; Customer service: D. Blackburn; Delivery info: D. Blackburn

Free literature available: Catalog 752 - More than 4,500 unusual bargains for hobbyists, schools & industry. Bulletin 9903 "Tips & Things For Beating the Energy Crisis". Consumer benefits from energy conservation. Includes solar energy devices, alternate energy devices, heat pipes.

Products manufactured: Adhesives (All Types), Alarms, Analyzers, Batteries, Calculators, Electrical & Electronic, Cameras, Cells, Photoconductive, Photoemissive, Photovoltaic, Chargers, Battery, Chemicals, Cleaners, Ultrasonic, Demagnetizers, Fiber Optic Bundles, Lamps, Lasers & Laser Systems, Lenses, Optical & Camera, Lenses, Readout & Display, Lights, Magnets, Magnifying Glasses, Inspection, Meters, Microscopes, Pyrometers, Radiometers

EDO WESTERN CORP., 2645 S. 300 West, Salt Lake City, Utah, 84115, Tel: 801-486-7481; Empl.: 225

Free literature available: Data sheets on each product and brochures on systems in the areas of oceanographic instrumentation, closed circuit TV systems for airborne and underwater applications, transducers and hydrophones, and piezoceramic crystals.

Products manufactured: Amplifiers, Cases, Equipment, Instrument, Meter, Coders, Crystals, Hydrophones & Accessories, Indicators, Monitors, Oceanographic Equip. (Electronic), Receivers, Recorders, Television Systems & Equipment Closed-Circuit, Transducers, Underwater Communication, Detection, Navigation, etc. Equipment

Local Sales Offices & Reps.

Ala	Huntsville, Kemp Instr.	205-837-4304
Ariz	Scottsdale, J. Smith & Assocs.	602-947-2495
Cal	Laguna Beach, J. M. Elgar	714-494-3965
Colo	Boulder, J. Smith & Assocs.	303-442-7100
Conn	West Hartford, Instrument Assocs.	203-525-9367
Md	Rockville, E. J. Winston	301-881-5780
Md	Silver Spring, L. G. White & Co.	301-685-1780
Mass	Bedford, Instrument Assocs.	617-275-0700
NM	Albuquerque, J. Smith & Assocs.	505-255-2111
NY	College Point, Edo Int'l.	212-445-6000
Ohio	Risingsun, Mecom	419-457-3231
Okla	Tulsa, Kemp Engrg. Co.	918-299-2636
Tex	Addison, Kemp Engrg. Co.	214-661-0400
Tex	Houston, Kemp Engrg. Co.	713-688-1431
Tex	Stafford, Electrosystems Engrg.	713-721-0126
Wash	Seattle, Coccolith & Co.	206-525-8952
FOR:	Can., Delta, B.C., Band Elctrns.	604-581-9104

EDSYN, INC., 15958 Arminta St., Van Nuys, Cal., 91406, Tel: 213-873-5115, Telex: 65-1469; Empl.: 25
p. 2•1694,1695

Products manufactured: Meters, Soldering Accessories, Soldering Equipment, Soldering Guns, Irons & Desoldering Tools

Local Distributors

Ariz	Phoenix, Jensen Tools & Alloys, 4117 N. 44 th St.
Cal	El Monte, Marshall Inds., 9674 Telstar Ave.
Cal	El Segundo, Alpha Comps., 115 Eucalyptus Dr.
Cal	El Segundo, Wassco, 410 Douglas St.
Cal	Glendale, MacDonald Co., 213 S. Brand Blvd.
Cal	Los Angeles, Garrett Corp., 6015 E. Randolph St.
Cal	San Jose, J. Elctrn. Tool Co., 1918 Story Rd.
Cal	Santa Clara, Com Kyl, 2368 Walsh Ave.
Cal	Torrance, Erem Corp., 3740 Skypark Dr.
Ill	Chicago, EMF Co., 6135 W. Belmont
Minn	Minneapolis, H. Stark's Inc., 112 3rd Ave. N.
NJ	Saddlebrook, Tool-Tronics, 114 Route 46
Pa	Huntingdon Valley, H. Mann Inc., 3983 Mann Rd.
Tex	Fort Worth, Tandy Corp., 2615 W. 7th St.
Wash	Seattle, Seattle Tool Supply, 1161 Eleventh St.

EDWARDS HIGH VACUUM, 3279 Grand Isl. Blvd., Grand Island, N.Y., 14072, Tel: 716-773-7552, Telex: 91-536; Empl.: 40; Minimum order: $10

For info on price: R. Niccola; Application info: H. Stry; Customer service: R. Niccola; Delivery info: R. Niccola

Products manufactured: Chamber, Environmental Test, Couplings, Deposition Equipment, Vacuum & Accessories, Detectors, Evaporation Equipment, Electron Beam, Feedthrus & Seals, Environmental, Gages, Lubricants, Pumps, Vacuum, Switches, Valves, Solenoid, Valves, Vacuum

Local Sales Offices & Reps.

Cal	El Segundo, Edwards High Vacuum, Inc.	213-322-7699
Colo	Denver, Continental Divide Prods., Inc.	303-420-0130
Fla	Orlando, Physimetrics, Inc.	305-894-8081
Ga	Atlanta, Physimetrics, Inc.	404-261-8720
Ill	Oak Lawn, Edwards High Vacuum, Inc.	312-423-0443
Mass	So. Weymouth, Edwards High Vacuum, Inc.	617-337-8931
Mich	Dearborn, Anger Assocs.	313-584-9853
NJ	Sussex, Edwards High Vacuum, Inc.	201-835-3925
NM	Albuquerque, Southwestern Engrg. & Equip. Co.	505-265-6775
NY	Grand Island, Edwards High Vacuum, Inc.	716-773-7552
Tex	Dallas, Southwestern Engrg. & Equip. Co.	214-826-6661
Tex	Houston, Southwestern Engrg. & Equip. Co.	713-353-4333

EECO, 1441 E. Chestnut Ave., Santa Ana, Cal., 92701, Tel: 714-835-6000, TWX: 910-595-1550; Empl.: 642
p. 1•2030-2033

Free literature available: EECO Switch Catalog, EECO Electronic Packaging Products Catalog #1002, EECO Guide to Punched Tape Readers/Perforators #630.

Products manufactured: Boards, Plug-In, Boards, Printed Circuit, Boards, Printed Wiring, Universal, Cards, Logic, Chassis, Circuit Board Mounting, Dividers, Editing Equipment, Tape, Modules, Logic, Encapsulated, Packages, Integrated Circuit, Paper-Tape Preparation Systems, Perforators, Readers, Services, Assembly, Production & Test, Switch Hardware, Switches, Tape Search Equipment

Local Sales Offices & Reps.

Ala	Huntsville, Col-Ins-Co	205-539-1771
Cal	Los Altos, Recht Assocs.	415-941-0336
Cal	San Diego, Mesa Engr. & Sls. Assoc.	714-278-8021
Conn	Farmington, R. Perron & Co.	203-673-4825
Conn	Trumbull, R. Perron & Co.	203-268-9631
Fla	Orlando, Col-Ins-Co	305-423-7615
Ga	Clarkston, Col-Ins-Co	404-938-7280
Ill	Northfield, Torkelson Assocs.	312-446-9085
Ind	Indianapolis, Torkelson Assocs.	317-244-7867
Iowa	Cedar Rapids, Palatine Sls.	319-365-8071
Kans	Andover, Palatine Sls., Inc.	316-683-7512
Kans	Overland Park, Palatine Sls., Inc.	913-262-5643
Md	Kensington, EMA (Elctrn. Mktg. Assts.)	301-881-5300
Mass	Norwood, R. Perron & Co.	617-762-8114
Mich	Farmington Hills, H. Lowell Co.	313-851-7474

Minn Minneapolis, Torkelson Assocs. 612-835-2414
Mo St. Louis, Palatine Sls., Inc. 314-426-7055
NH Dover, R. Perron Co., Inc. 603-742-2321
NJ Ft. Lee, Tecnimat 201-461-8686
NY Fairport, NACO Electronics Corp. ... 716-244-4720
NY No. Syracuse, NACO Electronics Corp. 315-699-2651
NY Utica, NACO Electronics Corp. 315-732-1801
NC Raleigh, Col-Ins-Co 919-834-6591
Ohio Aurora, EMA, Inc. 216-562-6104
Ohio Centerville, EMA, Inc. (Engr. Mktg. Assts.) 513-433-2800
Okla Tulsa, Palatine Sls., Inc. 918-622-0321
Pa King of Prussia, EMA (Elctrn. Mktg. Assts.) 215-265-1600
Pa Philadelphia, EMA, Inc. 215-248-5050
Tex Austin, Palatine Sls., Inc. 512-451-7463
Tex Houston, Palatine Sls., Inc. 713-783-1492
Tex Richardson, Palatine Sls., Inc. 214-231-9489
Wash Seattle, B. Hirsh Co. 206-783-3423

Local Distributors
Ala Huntsville, Hall-Mark Elect. Corp., 4739 Commercial Dr. 205-837-8700
Ariz Tempe, G.S. Marshall Co., 835 W. 22nd St. 602-968-6181
Cal Costa Mesa, Schweber Elctrns., 3000 Red Hill Ave. 714-556-3880
Cal El Monte, G.S. Marshall Co., 9674 Telstar Ave. 213-686-0141
Cal Irvine, G.S. Marshall Co., 17975 Sky Park Blvd. 714-556-6400
Cal San Diego, G.S. Marshall Co., 8057 Raytheon Rd. 714-278-6350
Cal Sunnyvale, G.S. Marshall Co., 788 Palomar 408-732-1100
Colo Arvada, G.S. Marshall Co., 5633 Kendall Ct. 303-423-9670
Conn Danbury, Schweber Elctrns., Finance Dr. Commerce Indust. Pk. 203-792-5000
Conn N. Branford, G.S. Marshall Co., 200 Shaw Rd. 203-484-0488
Fla Hollywood, Schweber Elctrns., 2830 N. 28th Terrace 305-927-0511
Fla Orlando, Hall-Mark Elctrns., 7233 Lake Ellenor Dr., Box 13950 305-885-4020
Fla Palm Beach Gardens, G.S. Marshall Co., 10384 Riverside Dr. 305-622-8490
Ga Atlanta, Schweber Elctrns., 4126 Pleasantdale Rd. 404-449-9170
Ill Des Plaines, G.S. Marshall, 300 East Touhy Ave. 312-298-3700
Ill Elk Grove Village, Schweber Electronics, 1380 Jarvis Ave. 312-593-2740
Ill Elk Grove Village, Hall-Mark Elctrns., 180 Crossen Ave. 312-437-8800
Iowa Cedar Rapids, Schweber Elctrns., 302 Executive Plaza 319-393-9125
Kans Lenexa, Hall-Mark Elect. Corp., 9006 Rosehill Rd. 913-888-4747
Md Baltimore, Hall-Mark Elect. Corp., 6660 Security Blvd. 301-265-8500
Md Rockville, Schweber Elctrns., 5640 Fisher La., Twinbrook Pkwy. 301-881-2970
Mass Newton Highland, G.S. Marshall, 88 Needham St. 617-965-5115
Mass Waltham, Schweber Elctrns., 213 Third Ave. 617-890-8484
Mich Troy, Schweber Elctrns., 86 Executive Dr. 313-583-9242
Minn Bloomington, Hall-Mark Elect. Corp., 9201 Penn Ave. So. 612-884-9056
Minn Edina, Schweber Elctrns., 7015 Washington Av. S. 612-941-5280
Mo Earth City, Hall-Mark Elect. Corp., 13789 Rider Trails 314-291-5350
NJ Somerset, Schweber Elctrns., 43 Belmont Dr. 201-469-6008
NY Farmingdale, G.S. Marshall Co., 230 Sherwood Ave. 516-293-4141
NY Farmingdale, Hall-Mark Elctrns., 167 Marine St. 516-293-7500
NY Rochester, Schweber Elctrns., 2 Town Line Circle 716-461-4000
NY Westbury, Schweber Elctrns., Jericho Turnpike 516-334-7474
NC Raleigh, Hall-Mark Elctrns., 3000 Industrial Dr. 919-832-4465
NC Raleigh, Schweber Elctrns., 10 Sunnybrook Rd. 919-832-8881
Ohio Beachwood, Schweber Elctrns., 23880 Commerce Pk. Rd. 216-464-2970
Ohio Dayton, G.S. Marshall Co., 6388 No.Dixie Dr. 513-898-1105
Okla Tulsa, Hall-Mark Elect. Corp., 4846 S. 83rd E. Ave. 918-835-8458
Pa Trevose, Hall-Mark Elect. Corp., Box 125 215-355-7300
Tex Austin, Schweber Elctrns., 2628 Longhorn Blvd. 512-837-2890
Tex Dallas, G.S. Marshall Co., 14205 Proton Rd. 214-233-5200
Tex Dallas, Hall-Mark Elctrns., 9333 Forest La. 214-231-5101
Tex Dallas, Schweber Elctrns., 14177 Proton Rd. 214-661-5010
Tex Houston, Hall-Mark Elctrns., 8000 Westglen 713-781-6100
Tex Houston, Schweber Elctrns., 7420 Harwin Rd. 713-784-3600
Wash Bellevue, G.S. Marshall Co., 1801 130th Ave. N.E. 206-883-1084
Wisc Milwaukee, Hall-Mark Elect. Corp., 11925 W. Ripley Ave. 414-476-1270

EEMCO DIV., Datron Sys., 4585 Electronics Pl., Los Angeles, Cal., 90039, Tel: 213-247-7060, TWX: 910-497-2269; Empl.: 200

Products manufactured: Actuators, Cabinets & Accessories, Controls/Control Eqpt., Gears & Gear Mechanisms (Precision), Motor & Generator Armatures, Rotors, Stators, Motor Electric Generator Sets, Motors, Valves, Solenoid

Local Sales Offices & Reps.
Cal Encino, El Tec 213-981-9881
Cal Palo Alto, Mauldin Co. 415-326-5291
Colo Golden, J. T. Hurlbet Co. 303-279-7138
Conn Hamden, Northeast Eng.
Conn Huntington, G.T.C.Assocs. 203-929-0981
Fla Hialeah, Shaw Engrg. & Sls. 305-888-0835
Fla Orlando, Dost Assoc. 305-295-4440
Ga Atlanta, Brown Assoc.
Ill Chicago, J Golten Co. 312-725-7870
Mass Danvers, Northeast Eng. 617-774-3010
Mass So. Natick, Wm. Beaver 617-655-1529
Mass Westford, G. T. C. Assocs. 617-459-6782
Minn St. Paul, Vikeland Sls. 612-645-4647
NY Manhasset, Northeast Eng.
NY Plainview, L.I., R Smith Assocs. 516-822-6140
NY Rochester, L. G. Marchese Assoc. .. 716-342-7664
NY Spring Valley, R Smith Assocs. 914-352-1067
Ohio Cleveland, Geotronix 216-238-8520
Ore Portland, J. J. Backer Co. 503-297-3776
Pa Devon, B & A Assocs. 215-688-5173
Wash Kirkland, R. Chase 206-454-2514
Wash Seattle, J. J. Backer Co. 206-285-1300

EFRATOM CALIFORNIA, INC., 3303 Harbor Blvd., Costa Mesa, Cal., 92626, Tel: 714-556-1620, Telex: 685-635; Empl.: 18

Customer service: H. Badura

Free literature available: Data Sheets and General Brochure describing our products, technical articles on Rubidium Frequency Standards.

Products manufactured: Receivers, Standards

Local Sales Offices & Reps.
Mass Reading, Geder-Rotondi 617-944-3105

E G & G INC., Georgetown, Mass, 01833

EG & G, INC., 35 Congress St., Salem, Mass., 01970, Tel: 617-745-3200, TWX: 710-347-6741

Products manufactured: Detectors, Diodes, Lamps, Lights, Meters, Monitors, Power Supplies, Probes, Protectors, Radiometers, Spark Gaps, Transformers, Tubes

EG&G, INC., Bedford Div., 35 Congress St., Salem, Mass., 01970, Tel: 617-745-3200, TWX: 710-347-6741; Empl.: 310

Products manufactured: Alarms, Comm. Systems, Data Compressors, Digital, Flashers, Lamps, Lights, Magnifying Glasses, Inspection, Power Supplies, Recorders, Scanners, Transmitters

EG&G, INC., Electro-Optics Div., 35 Congress St., Salem, Mass., 01790, Tel: 617-745-3200, TWX: 710-347-6741; FSC No: 25506; Empl.: 400; Minimum order: $50 ...... p. 1•1011-1013

For info on price: J. McClafferty; Application info: G. Riley; Customer service: J. McClafferty; Delivery info: J. McClafferty

Free literature available: Photodiode Catalog; Light Measurement Instrument Catalog; Flashtube, Transformer, High Energy Switch Catalog; Strobe and Sensitometer Catalog

Products manufactured: Amplifiers, Arresters, Electrical Surge, Lightning, Cells, Photoconductive, Photoemissive, Photovoltaic, Densitometers, Electronic, Detectors, Diodes, Generators, Lamps, Lights, Meters, Monitors, Power Supplies, Protectors, Radiometers, Spark Gaps, Switches, Transformers, Tubes

Local Sales Offices & Reps.
Cal Los Angeles, EG&G, Inc. 213-484-8780
Md Riverdale, EG&G, Inc. 301-779-4272
Mass Salem, E G & G Inc., Electro-Optics Div. 617-745-3200
EXP: Can., Waterloo, Ont. N2J-4C3, Optikon Corp., Ltd. 519-743-8571

E.I. DUPONT DE NEMOURS & CO., 1007 Market St., Wilmington, Del., 19898, Tel: 302-774-2421; Empl.: 110000

Products manufactured: Abrasive Belts, Compounds, Cords, Powders, etc., Adhesives (All Types), Analyzers, Chemicals, Cleaners & Solvents, Cleaners, Ultrasonic, Coatings, Compounds, Encapsulating, Insulating, Molding, Potting, Coolants, Circuit & Components, Detectors, Electroplating Equipment & Supplies, Etchants, Printed Circuit, Fiber Optic Bundles, Films, Flux, Brazing & Soldering Materials, Heat Exchangers & Systems, Indicators, Inks For Thick Film Microcircuits, Insulators & Insulation, Laminates, Lubricants, Materials, Self-Lubricating, Metals, Meters, Paints, Plastic Raw Materials, Liquids, Pellets, Powders, Resins, Refrigerants, Spray, Services, Assembly, Production & Test, Solder (All Types), Sound Absorbing Materials, Spectrometers, Tapes, Recording, Magnetic (All Types)

Local Sales Offices & Reps.
Cal Los Angeles 213-843-1038
DC Washington 202-DU7-0416
Del Wilmington 302-774-2421
Ill Chicago 312-222-5050
Md Baltimore 301-PL2-2506
NY New York 212-971-4771
Pa Philadelphia 215-WA3-2493
Tex Houston 713-467-4449

EICO ELECTRONIC INSTR. CO., 283 Malta St., Brooklyn, NY, 11207

EIMAC, Div. Varian Assocs., 301 Industrial Way, San Carlos, Calif., 94070, Tel: 415-592-1221, TWX: 910-376-4893

Products manufactured: Amplifiers, Diodes, Filters, Headers, Heat Exchangers & Systems, Lamps, Lights, Modulators, All Kinds, Power Supplies, Seals, Sockets, Switches, Tubes

Local Sales Offices & Reps.
Ariz Scottsdale, Varian Assocs., Eimac Div. 602-947-5461
Cal Los Altos, Varian Assocs., Eimac Div. 415-968-7630
Cal Santa Monica, Varian Assocs., Eimac Div. 213-828-5588
Fla Clearwater, Varian Assocs., Eimac Div. 813-446-8513
Fla Lighthouse Point, Varian Assocs., Eimac Div. 305-943-9495
Ga Atlanta, Varian Assocs., Eimac Div. 404-252-0045
Ill Park Ridge, Varian Assocs., Eimac Div. 312-825-6686
Md Cheverly, Varian Assocs., Eimac Div. 301-773-7010
Mass Waltham, Varian Assocs., Eimac Div. 617-890-4560
NJ Cherry Hill, Varian Assocs., Eimac Div. 609-426-6800
NJ Springfield, Varian Assocs., Eimac Div. 201-376-6600
NM Albuquerque, Varian Assocs., Eimac Div. 505-345-3827
NY Syracuse, Varian Assocs., Eimac Div. 315-437-2568
Ohio Dayton, Varian Assocs., Eimac Div. 513-298-7318
Tex Richardson, Varian Assocs., Eimac Div. 214-235-2385

EIP, INCORPORATED, 3230 Scott Blvd., Santa Clara, Cal., 95051, Tel: 408-244-7975, TWX: 910-338-0155; Empl.: 70

Customer service: R. Bush

Free literature available: Literature describing automatic microwave frequency counters and their capabilities-20 Hz to 20 Ghz.

Products manufactured: Counters

Local Sales Offices & Reps.

Ariz	Phoenix, Zeus, Inc.	602-253-6140
Cal	La Jolla, Ward/Davis Assocs.	714-459-3351
Cal	Lawndale, Ward/Davis Assocs.	213-542-7740
Cal	Sunnyvale, Ward/Davis Assocs.	408-245-3700
Colo	Denver, Zeus, Inc.	303-770-4400
Fla	Orlando, Gentry Assocs.	305-894-4401
Ill	Chicago, Pivan Engrg. Co.	312-539-4838
Ind	Indianapolis, Pivan Engrg. Co.	317-253-1681
Kans	Shawnee Mission, EIR Co.	913-362-0909
Md	Wheaton, Sonco Inc.	301-942-9420
Mass	Waltham, Meas. Conslts. Corp.	617-890-4400
Mich	Detroit, Group Ten	313-549-3910
Minn	Minneapolis, Pivan Engrg. Co.	612-537-4501
Mo	Hazelwood, EIR Co.	314-895-4100
NJ	Fort Lee, Tech. Mktg. Assocs.	201-224-6911
NM	Albuquerque, Zeus, Inc.	505-268-3941
NY	East Syracuse, Ossmann Instrs., Inc.	315-437-6666
NY	Rochester, Ossmann Instrs., Inc.	716-328-2230
NY	Vestal, Ossmann Instrs., Inc.	607-785-9947
NC	Burlington, Gentry Assocs., Inc.	919-227-3639
Ohio	Cleveland	216-486-2800
Ohio	Dayton	513-277-6531
Okla	Norman, Data Mktg. Assocs., Inc.	405-364-8320
Pa	Blue Bell, Sonco Inc.	215-524-1490
Tex	Dallas, Data Mktg. Assocs., Inc.	214-358-4643
Tex	Houston, Data Mktg. Assocs.	713-686-9627
Tex	San Antonio, Data Mktg. Assocs.	512-828-0937
Utah	Salt Lake City, Zeus, Inc.	801-466-4924
Wash	Seattle, Arva-Hudson	206-622-0177
Wisc	Brookfield, Pivan Engrg. Co.	414-786-1940

EL-RAD MFG. CO., 4300 N. California, Chicago, Ill, 60618, Tel: 312-478-7300, TWX: 910-221-0104; FSC No: 11253; Empl.: 300 .... p. 2•1773,1774

Customer service: J. Clark

Products manufactured: Antennas, Coils Including Assemblies & Forms, Delay Lines, Filters, Networks, Transformers

Local Sales Offices & Reps.

Cal	San Marino, Van Gott Assoc.	213-282-1125
Fla	Melbourne, Hanson Assocs.	305-727-7474
Ill	Palatine, Butor Sls. Co.	312-358-2988
Md	Glen Burnie, Faion Lott & Co.	301-744-4611
Mich	Jackson, E.H. Jordan & Assocs.	517-782-0694
Minn	Minneapolis, Elctrn. Innovators Inc.	612-884-7471
NY	Rochester, Elcom Sls.	716-385-1400

ELASCO, Div. Buchbinder Corp., 5 Northwood Rd., Bloomfield, Conn, 06002, Tel: 203-242-0708; Empl.: 50

For info on price: S. Buchbinder; Application info: R. Wolff; Customer service: J. Lovinger; Delivery info: W. Grenen

Products manufactured: Converters, Power Supplies

Local Sales Offices & Reps.

Cal	Santa Clara, Cummings & Assoc.	408-247-8656
Cal	Woodland Hills, Cummings & Assoc.	213-340-6035
Conn	Bloomfield	203-242-0708
Mich	Plymouth, Romarc	313-455-0300
NY	Mamaroneck, Cane Technical	917-698-4411
Pa	King of Prussia, Riuco	215-265-5211

Local Distributors

Mass	Dedham, Gerber Elctrns., 825 Providence Hwy.	617-329-2400

ELCO, Maryland Rd. & Computer Ave., Willow Grove, Pa., 19090, Tel: 215-659-7000, TWX: 510-665-5573; Empl.: 825

Products manufactured: Bus Bars & Systems, Chassis, Circuit Board Mounting, Connectors, Contacts, Electrical, Flashers, Guides, Circuit Board, Machines/Machinery, Production, Plugs, Posts, Racks, Sockets, Terminals, Tools

Local Sales Offices & Reps.

Ala	Huntsville, EMA	205-837-6061
Ariz	Phoenix, Ralph Stitzer Co.	602-944-6808
Cal	El Segundo, Elco Pacific	213-675-3311
Cal	Oakland, Moulthrop Sls.	415-261-7676
Cal	San Diego, Celtec Co.	714-279-7961
Colo	Denver, Parker, Webster Co.	303-770-1972
Conn	Cheshire, Scientific Comps.	203-272-2160
Fla	Ft. Lauderdale, R. I. Smith Assocs.	305-772-5100
Ill	Chicago, Carlson Elctrn. Sls. Co.	312-774-4812
Ind	Ft. Wayne, Baehr, Greenleaf & Assocs.	219-483-6864
Md	Rockville, Marktron Inc.	301-762-6210
Md	Timonium, Marktron Inc.	301-252-7111
Mass	Wilburn, Belmac Corp.	617-935-6810
Mich	Farmington, Sheridan Assocs.	313-476-2446
Minn	St. Paul, Cahill	612-646-7217
Mo	Crestwood, Nevco Inc.	
Mo	Kansas City, Nevco Inc.	816-421-1751
NY	Binghamton, Canavan-Scanlon Assocs.	607-724-7220
NY	Buffalo, Canavan-Scanlon Assocs.	716-839-3373
NY	Jericho, Electro Rep.	516-938-0540
NY	Rochester, Canavan-Scanlon Assocs.	716-442-0720
NY	Syracuse, Canavan-Scanlon Assocs.	315-437-1271
NC	Winston-Salem, EMA	919-722-5151
Ohio	Cincinnati, Baehr-Greenleaf	513-891-3826
Ohio	Columbus, Baehr, Greenleaf & Assocs.	614-486-4046
Ohio	Lakewood, Baehr-Greenleaf	216-221-9030
Okla	Tulsa, H. Daly	918-627-4159
Ore	Portland, Almac/Stroum	503-292-3534
Pa	Pittsburgh, Covert & Newman Co.	412-563-0303
Pa	Willow Grove, Elco Corp.	215-659-7000
SC	Greenville, EMA	803-268-1125
Tex	Houston, Aid Elctrns.	713-777-3882
Tex	Irving, Aid Elctrns.	214-259-4761
Utah	Salt Lake City, Parker Webster Co.	801-486-3737
Wash	Seattle, Almac/Stroum	206-763-2300
Wisc	Milwaukee, Carlson Elctrn. Sls.	414-476-2790

ELCO PACIFIC, 2200 Park Pl., El Segundo, Cal., 90245, Tel: 213-675-3311, TWX: 910-325-6602

ELCOM INDUSTRIES, INC., 10277 Bach Blvd., St. Louis, Mo., 63132, Tel: 314-429-3100; Empl.: 20

Customer service: T. C. Noel, Jr.

Products manufactured: Comm. Systems, Punched Card Equipment, Readers

ELCOM SYSTEMS, INC., 127F Brook Ave., Deer Pk., N.Y., 11729, Tel: 516-667-5800; Empl.: 6

Customer service: L. Pollachek

Free literature available: Catalog #731 - complete product line

Products manufactured: Attenuators, Converters, Couplers, Mixers, Terminals, Transformers

ELCOR PRODS. NEOTEC ELCTRNS. INC., Box 986, 2431 Linden La., Silver Spring, Md., 20910, Tel: 301-589-6614; Empl.: 100

For info on price: C. Guinnee; Application info: K. V. Bargen; Customer service: C. Guinnee; Delivery info: C. Guinnee

Free literature available: ELCOR Product Catalog Including: Isolated, Transformers 4025W, Power Transformers 40 to 6000VA, Power Supplies 3% to .002% Reg., Signal Conditioners, Integrators, Electronic, Prices and Application Info.

Products manufactured: Integrators, Electronic, Meters, Power Supplies, References, D-C Voltage, Regulators, Signal Conditioners & Equipment, Transformers

Local Sales Offices & Reps.

Ariz	Scottsdale, Elctrn. Ent.	602-946-9860
Cal	Arcadia, William H. H. Co.	213-447-6166
Cal	San Mateo, J.E. Lape Co.	415-345-3021
Ill	Addison, R.E. Stemm, Inc.	312-279-2440
Ill	Rockford, Rockford Reps.	815-964-5806
Md	Silver Springs, ML Council Assoc.	301-587-1755
Mass	Lexington, Zieco, Inc.	617-861-8300
NJ	Hillsdale, B. Cameron Assoc.	201-461-2595
NM	Albuquerque, Elctrn. Enterprises	505-256-3561
NM	Las Cruces, Elctrn. Enterprises	505-524-0126
NY	Guilderland, Electro Modular Sys.	518-456-2665
Okla	Oklahoma City, J. R. Lukeman & Assoc.	405-848-4791
Pa	King of Prussia, Letronix	215-265-1020
EXP:	N.Y., N.Y., Henley & Co.	212-986-5544

ELDEC CORP., Box 100, 16700 13th Ave. W., Lynnwood, Wash., 98036, Tel: 206-743-1313, TWX: 910-449-2855; Empl.: 600; Minimum order: $25 .... p. 1•1193-1196

For info on price: W. W. Arnold; Application info: R. B. Banks; Customer service: R. Keating; Delivery info: B. A. Stone

Products manufactured: Chargers, Battery, Converters, Power Supplies

Local Sales Offices & Reps.

Ala	Huntsville, Astro-Tec.	205-881-1861
Cal	Northridge, Tauber & Assocs.	213-368-4011
Cal	Torrance, ELDEC	213-532-8732
Conn	Madison, A & M Elctrn. Reps.	203-245-1031
Ga	Atlanta, Astro-Tec	404-237-0943
Ill	Chicago, Pivan Engrg. Co.	312-539-4838
Ind	Indianapolis, Pivan Engrg. Co.	317-253-1681
Kans	Wichita, D & O Engrg. Co.	316-264-7358
La	New Orleans, Astro-Tec	504-581-2099
Mass	Needham, A & M Elctrn. Reps.	617-444-8170
Mass	Stoneham, Robertson Elctrn. Prods. Co.	617-438-3113
Mich	Royal Oak, Group Ten	313-549-3910
Minn	Minneapolis, Pivan Engrg. Co.	612-537-4501
Mo	Bridgeton, D & O Engrg. Co.	314-731-3800
NJ	Dover, R.L. Diamond Inc.	
NY	Bayside, R.L. Diamond, Inc.	212-423-7330
NY	Binghamton, Labtronics, Inc.	607-748-0509
NY	Depew, Labtronics, Inc.	716-685-4111
NY	Syracuse, Labtronics, Inc.	315-454-9314
NY	Ulster Park, Labtronics, Inc.	518-372-6649
Ohio	Cleveland, Group Ten	216-486-2800
Ohio	Dayton, Group Ten	513-277-6531
Tex	Arlington, D & O Engrg. Co., Inc.	817-261-2300
Tex	Bedford, Astro Tec	817-267-1361
Va	Arlington, Astro Tec	703-979-2498
Wisc	Brookfield, Pivan Engrg. Co.	414-786-1940
FOR:	Can., Toronto, Ont., Patlon Aircraft & Ind. Ltd.	416-239-7389

ELDEN MFG. CO., 2712 N. Elston Ave., Chicago, Ill., 60647; Empl.: 12

Products manufactured: Counters, Machines/Machinery, Production, Motors

ELDORADO INSTRUMENT CO., 2151 Arnold Industrial Hwy., Concord, Cal., 94520, Tel: 415-686-4200; Empl.: 20

Products manufactured: Counters, Generators, Meters, Timers, Totalizers, Digital

Local Sales Offices & Reps.

Cal	Cupertino, T. Louis Snitzer Co.	408-257-8333
Cal	Del Mar, Snitzer	714-454-2191
Cal	Los Angeles, Snitzer	213-836-6170
Colo	Littleton, Aztec Entprs.	303-795-0250
Fla	Orlando, E. Holmes	305-894-8901
Ga	Chamblee, E. Holmes	404-451-6161
Ill	Chicago, Carter Elctrns.	312-585-5485
Ind	Indpls., Carter Elctrns.	317-293-0696
Kans	Leawood, Leemark Engrs.	913-648-0124
Md	Lanham, Brimberg Assocs., Inc.	301-552-2200
Mass	Burlington, J & J Assocs.	617-272-2606
Mich	Farmington, Anderson Elctrns.	313-476-9161
Minn	Mpls., Carter Elctrns.	612-544-9393
Mo	Hazelwood, Carter Elctrns.	314-731-2237
NJ	Fairfield, KLS Assocs.	201-227-2900
NM	Albuquerque, Aztec Entprs.	505-255-2440
NY	N. Syracuse, NACO Elctrns.	315-699-2651
NY	NY, KLS Assocs.	212-233-4849
Pa	Ambler, W M Assocs.	215-643-4119
Tex	Austin, Crockett Southwest Co.	512-476-6801
Tex	Dallas, Crockett Southwest Co.	214-637-6120
Va	Virginia Bch., E.G. Holmes	703-340-6556
Wash	Bellevue, Brennan	206-454-9332
Wisc	Milwaukee, Carter Elctrns.	414-464-5555

ELEC-TROL, INC., 26477 N. Golden Valley Rd., Saugus, Cal., 91350, Tel: 805-252-8330, TWX: 910-336-1556; FSC No: 51636; Empl.: 300; Minimum order: $25 p. 1•1644-1647

For info on price: M. Wainess; Application info: M. Wainess; Customer service: N. Koon; Delivery info: N. Koon

Products manufactured: Relays

Local Sales Offices & Reps.

Ala	Huntsville, Beacon Elctrn. Assocs.	205-881-5031
Ariz	Phoenix, Southwest Engrg, Inc.	602-993-0250
Cal	Mt. View, Gene C. Woempner Co.	415-964-5454
Cal	Pico Rivera, Westrep	213-949-2551
Cal	San Diego, Westrep	714-276-0751
Colo	Denver, Zeus, Inc.	303-770-4400
Conn	Orange, NPM Assocs.	203-878-4066
Fla	Ft. Lauderdale, Beacon Elctrn. Assocs.	305-776-6074
Fla	Maitland, Beacon Elctrn. Assocs.	305-647-3498
Ga	Atlanta, Beacon Elctrn. Assocs.	404-351-3654
Ill	Des Plaines, Lincoln, Hodges & Assocs.	312-297-3810
Mass	Franklin, NPM Assocs.	617-528-5013
Mich	Detroit, Nicon Assocs.	313-341-7688
Mich	St. Joseph, Nicon Assocs.	616-983-4989
Minn	Minneapolis, R-J, Inc.	612-922-1425
Mo	Blue Springs, Chesco	816-229-1404
Mo	St. Charles, Chesco	314-946-6677
NM	Albuquerque, Zeus, Inc.	505-256-9831
NY	Jericho, HRC Comp-Tech, Inc.	516-822-5550
NY	New Hartford, KLM Assocs.	315-735-8525
NY	North Syracuse, KLM Assocs.	315-458-6214
NY	Rochester, KLM Assocs.	716-442-0820

Ohio	Cincinnati, G & H Sls. Co.	513-771-8231
Ohio	Grove City, G & H Sls. Co.	614-878-1128
Pa	Birchrunville, Jadelectronic Associates, Inc.	215-647-5151
SC	Spartanburg, Beacon Elctrn. Assocs.	803-582-4613
Tex	Dallas, Allied Comps., Inc.	214-238-0408
Tex	Houston, Allied Comps., Inc.	713-691-3961
Utah	Salt Lake City, Zeus, Inc.	801-486-2317
Wash	Bellevue, R. Over Sls.	206-454-4551
Wisc	Waukesha, Lincoln, Hodges & Assocs.	414-542-3087

Local Distributors

Cal	Sunnyvale, Acacia Sls., 384 San Aleso St.	408-735-0100
Cal	Van Nuys, Patane Avionics, 5937 Kester Ave.	213-988-4455
Colo	Lakewood, Acacia Sls., 11111 W. 8th Ave.	303-232-2882
Fla	Margate, C.D.I., 2922 N. State Rd. Suite 105	305-971-4950
Ill	Elk Grove Village, Diplomat/Lakeland, 2451 Brickvale Dr.	312-595-1000
Tex	Dallas, Solid State Elctrns. Co. of Tex, 2643 Manana	214-352-2601
Tex	Houston, Solid State Elctrns. Co. of Tex, 6400 Westpark Dr., Suite 480	713-785-5436

ELECTRA/MIDLAND CORP., Box 760, Mineral Wells, Tex., 76067, Tel: 817-325-7871, TWX: 910-890-5855

Products manufactured: Circuits, Hybrid, Thick Film, Resistors

(Refer to Electra/Midland Corp., Midland Div., for sales office information.)

ELECTRAC, INC., 1614 Orangethrope Way, Anaheim, Calif., 92801, Tel: 714-879-6021; Empl.: 40

Customer service: L. Katz

Products manufactured: Analyzers, Comm. Systems, Converters, Demodulators, Detectors, Filters, Indicators, Multipliers, Receivers, Tracking Systems

ELECTRIC INDICATOR CO., INC., 272 Main Avenue, Norwalk, Conn., 06851, Tel: 203-847-5861, Telex: 96-5945; Empl.: 102

For info on price: W. L. Sly; Application info: W. L. Sly; Customer service: F. J. Drake; Delivery info: F. J. Drake

Free literature available: Catalogs on AC & DC generators; AC & DC commutator motors; AC induction & AC torque motors; AC hysteresis & salient pole synchronous motors; AC self-synchronous motors; AC induction & synchronous gear motors; and stepping motors.

Products manufactured: Alternators, Converters, Generators, Motor Electric Generator Sets, Motors, Resolvers, Synchro, Synchros, Tachometers, Transformers

ELECTRIC MACHINERY MFG. CO., 800 Central Ave., Minneapolis, Minn., 55413, Tel: 612-378-0500, TWX: 612-321-1390; Empl.: 1600

For info on price: C. M. Burns Ext. 548; Application info: C. M. Burns Ext. 548; Customer service: K. B. Green Ext. 613

Products manufactured: Controls/Control Eqpt., Converters, Motor Electric Generator Sets, Motors

Local Sales Offices & Reps.

Ala	Birmingham	205-822-4474
Ariz	Phoenix	602-244-0331
Cal	Los Angeles	213-685-6444
Cal	San Francisco	415-392-8296
Colo	Denver	303-388-6322
Conn	Rocky Hill	203-563-9338
Fla	Tampa	813-872-7859
Ga	Atlanta	404-458-7971
Ill	Barrington	312-381-8091
Ill	Oak Brook	312-325-9620
Ind	Indianapolis	317-546-4053
Kans	Prairie Village	913-362-8540
La	Gretna	504-362-1074
Mass	Waltham	617-890-3792
Mich	Farmington	313-477-3774
Mich	Grand Rapids	616-459-8156
Minn	Minneapolis	612-831-2111
Mo	St. Louis	314-872-7300
Mont	Butte	406-792-5447
NM	Albuquerque	505-344-3288
NY	Buffalo	716-839-0851
NY	New York	212-697-0955
NC	Charlotte	704-332-6191
Ohio	Cincinnati	513-791-0480
Ohio	Cleveland	216-885-1254
Okla	Tulsa	918-743-9851
Ore	Portland	503-223-7349
Pa	Broomall	215-353-5040
Pa	Pittsburgh	412-563-7603
Pa	York	717-854-0217
Tenn	Knoxville	615-522-0165
Tenn	Memphis	901-767-3555
Tex	Dallas	214-748-6691
Tex	Houston	713-526-3283
Utah	Salt Lake City	801-487-5621
Va	Richmond	703-784-5293
Va	Vienna	703-790-5790
Wash	Bellevue	206-455-3655
Wash	Spokane	509-535-2931
Wisc	Milwaukee	414-332-5140
FOR:	Can., Calgary, Alberta	403-265-4854
FOR:	Can., North Vancouver, B.C.	604-985-7451
FOR:	Can., Scarborough, Ont.	416-449-3200
FOR:	Can., Winnipeg, Manitoba	204-338-5404

FIRING CIRCUITS, see Marathon Elec.

ELECTRIC SOLDERING IRON CO., Box 247, Deep River, Conn., 06417

ELECTRIC TACHOMETER CORP., 68th & Upland Sts., Philadelphia, Pa., 19142, Tel: 215-SA6-7723, Telex: 831-475; FSC No: 20049; Empl.: 50; Minimum order: $15

For info on price: W.F. Porter; Application info: F.M. Porter; Customer service: W.F. Porter; Delivery info: W.F. Porter

Free literature available: Bulletin 740, Describes Tetco Model 120 Indicating Tachometers and drive components. Dial and digital types, portable, explosion-proof, watertight. Photos and technical data given.

Products manufactured: Counters, Indicators, Recorders, Tachometers

Local Sales Offices & Reps.

Ala	Huntsville, VESCO	205-881-8830
Cal	Berkeley, P. Rosen Co.	415-526-8286
Cal	Reseda, T.R. Slocum, Jr.	213-789-3355
Fla	Cocoa Beach, VESCO	305-784-0784
Haw	Honolulu, Berkley Engrg. & Equip. Co.	808-538-1921
Ill	Hinsdale, Johnson Engrg. & Sls. Co.	312-325-2272
Ind	Mishawaka, Law Instr. Co.	219-256-1110
Mass	Lexington, W.R. Hatfield Assoc.	617-861-0201
Mich	Lake Orion, Service Instr. Sls.	313-391-2266
Minn	St. Paul, Nelson Engineered Sls.	612-631-0646
Mo	St. Louis, C.O. Leaver Co.	314-968-1500
NJ	Fair Lawn, Bixon Assocs.	201-797-5356
NJ	Haddonfield, C.G. Thomson	609-429-5233
NY	Rochester, Holter Assocs.	716-381-7988
NY	Valley Stream, Idalee Elctrns. Corp.	516-825-8955
NC	Greensboro, Associated Agents	919-292-6508
Ohio	Cincinnati, Kammerer Sls. Co.	513-321-1916
Ohio	Cleveland, Fred R. Sharp Co.	216-464-3820
Pa	Ligonier, J.K. Woodwell, Jr.	412-238-2748
Tenn	Memphis, Engineered Instrs.	901-743-3402
Tex	Stafford, Jordan Equip. Co.	713-GY8-6212
FOR:	Can., Edmonton, Alb., Instr. Serv. Labs.	465-0327
FOR:	Can., St. Lambert, Que., Lasanne Serv. Ltd.	514-672-6430
FOR:	Can., Vancouver, B.C., Instr. Serv. Labs.	604-876-3361

ELECTRICAL INSTR. SVC., INC., 25 Dock St., Mt. Vernon, N.Y., 10550, Tel: 914-699-9717; QPL No: 16034A; Empl.: 35; Minimum order: $25

For info on price: R. Ngelia; Application info: M. Kane; Customer service: G. D. Frank; Delivery info: R. Neglia

Products manufactured: Baths, Controlled Temperature (Air & Liquid), Batteries, Bridges, Calibrators, Comparators, Decade Boxes, Detectors, Dividers, Indicators, Meters, Multipliers, Potentiometers, Regulators, Services, Assembly, Production & Test, Shunts, Meter, Standards, Testers, Transformers

Local Sales Offices & Reps.

Ala	Huntsville, J. L. Highsmith Co.	205-881-3294
Ariz	Scottsdale, William Assocs.	602-947-4297
Colo	Denver, Williams Assocs.	303-343-4730
DC	Washington, Whitcomb Assocs.	202-737-0763
Fla	Orlando, J. L. Highsmith Co.	305-293-5202
Ill	Skokie, Saffro & Assocs.	312-588-0905
Kans	Shawnee Mission, Pivan Engrg. Co.	913-722-1030
Md	Baltimore, Whitcomb Assocs.	301-889-1245
Mass	Waltham, Measurement Consultants Corp.	617-890-4400
Mich	Detroit, S. Sterling Co.	313-255-1970
Minn	Minneapolis, The Heimann Co.	612-861-6051
Mo	St. Louis, Pivan Engrg. Co.	314-567-3636
NM	Albuquerque, Williams Assocs.	505-255-1638
NY	Buffalo, R. F. Lamb Co.	716-874-4900
NY	Rochester, R. F. Lamb Co.	716-544-5580
NY	Schenectady, R. F. Lamb Co.	518-393-4844
NY	Syracuse, R. F. Lamb Co.	315-454-2469
NC	Charlotte, J. L. Highsmith Co.	704-333-7743
Ohio	Cleveland, S. Sterling Co.	216-442-8080
Ohio	Dayton, Comtel-Sterling Co.	513-298-7573
Okla	Norman, Data Mktg. Assocs.	405-364-8320
Pa	Jenkintown, A M T	215-L19-2080
Pa	Pittsburgh, S. Sterling Co.	412-922-5720
Tex	Dallas, Data Mktg. Assocs.	214-661-0300
Tex	Houston, Data Mktg. Assocs., Inc.	713-686-9627
Tex	San Antonio, Data Mktg. Assocs.	512-828-0937
Va	Richmond, J. L. Highsmith Co.	804-272-5888
Wash	Seattle, R. S. Drake Assocs., Inc.	206-725-2700

ELECTRICAL PLASTICS CORP., 500 Long Branch Ave., Long Branch, N.J., 07740, Tel: 201-870-9500; Empl.: 60; Minimum order: $35

For info on price: L. Classen; Application info: R. Brockner; Customer service: L. Classen; Delivery info: R. Kluge

Free literature available: EPC Stock Coil Forms and Bobbins Catalog #710 contains description of over 378 standard products including material selection guide, MIL specs and dimensions.

Products manufactured: Bobbins, Winding, Coil & Transformer, Cores, Magnetic, Cups, Encapsulation, Services, Assembly, Production & Test, Terminal Blocks, Boards & Strips

Local Sales Offices & Reps.

Cal	Los Angeles, E.A. Wilcox	213-723-6436
Cal	San Francisco, E.A. Wilcox	415-871-5350
Fla	Orlando, Buchannan & Abrams	305-898-7444
Ill	Chicago, J. Golten Co.	312-725-7870
Mass	Framingham, G & M Assoc.	617-872-4871
Mich	Dearborn, Villani-Pitcher	313-271-4600
Minn	St. Paul, Knox Assocs.	612-488-5402
NJ	Livingston, H. Thaw Sls. Co.	201-992-2711
NM	Albuquerque, A.Q. Elctrns.	505-255-8701
NY	Rochester, Schmitz Brothers	716-546-7628
Pa	Elkins Park, EMESCO Assoc.	215-224-3102
Pa	Haverford, D Humes Sls.	215-489-4163
Tex	Houston, Hisco	713-228-6662
Wash	Seattle, Powel & Assoc.	206-623-7060

ELECTRICAL STANDARDS DIV., E.S.R.S., Inc., 13418 Wyandotte St., N. Hollywood, Cal., 91605, Tel: 213-765-4224; Empl.: 6

For info on price: R. Stromquist; Application info: R. Wangerin; Customer service: R. Stromquist; Delivery info: E. Barnhart

Products manufactured: Dividers, Meters

Local Sales Offices & Reps.

Ariz	Scottsdale, Biedler & Assocs.	602-945-7821
Conn	Durham, Marr Elec. Co.	203-349-9691
Fla	Melbourne, Repcom Inc.	305-254-1877
NJ	Morris Plains, K. Garrison Assocs.	201-539-3142
Va	Annandale, J. Hopkins Assocs.	703-323-1641

Advertisment

Manufacturers of Taut Band design high voltage Electrostatic Voltmeters and Precision High Voltage Dividers with accuracies to the "State of the Art". Custom design dividers and instrumentation for unique application to customer specifications. Maintain standards directly traceable to the National Bureau of Standards.

ELECTRICAL TESTING LABS., INC., 2 East End Ave., New York, N.Y., 10021, Tel: 212-288-2600, TWX: 710-581-2440; Empl.: 141

Customer service: D. S. Schrum

Free literature available: CATALOG BROCHURE 200 list - lists services and facilities. Available on letterhead requests.

Products manufactured: Services, Assembly, Production & Test

Local Sales Offices & Reps.

Ga	Chamblee, ETL Georgia Div.	404-458-7763
Ind	Elkhart, Gold Seal Div. of ETL	219-294-1332
NY	Elmhurst, KAL Div. of ETL	212-446-1550

ELECTRO CORP., 1845 57th St., Sarasota, Fla., 33580, Tel: 813-355-8411, Telex: 52-683; FSC No: 81692; Empl.: 120; Minimum order: $50

For info on price: R. Snite; Application info: R. Hollenbeck; Customer service: R. Snite; Delivery info: R. Snite

Free literature available: Magnetic Sensors - catalog contains engineering & specification data on non-contact speed sensors. Proximity Switches - catalog describes inductive proximity sensors & controls for industrial applications. Tachometers - catalog lists speed monitoring & control components & systems.

Products manufactured: Controls/Control Eqpt., Converters, Indicators, Switches, Tachometers, Transducers

Local Sales Offices & Reps.

Ariz	Phoenix, Mesa Engrg. & Sls. Assocs.	602-943-9213
Cal	Emeryville, Milligan-Spika	415-658-9044
Cal	Los Angeles, Basic Sys.	213-938-2833
Cal	Menlo Park, Long Assocs.	910-373-1170
Cal	San Diego, Mesa Elctrns.	714-278-8021
Cal	Santa Ana, Electramation	714-541-8142
Colo	Denver, Bond Assocs.	303-756-1234
Conn	Cheshire, Coakley, Boyd & Abbett	203-272-2261
Fla	Orlando, Datarep	305-843-5224
Fla	Pompano BH., Datarep	305-781-9279
Fla	St. Petersburg, Datarep	813-345-8503
Ill	Addison, Electro Corp.	312-543-5288
Ill	Chicago, Electro	312-543-5288
Ill	La Grange, Olson Engrg. & Sls. Corp.	312-482-3300
Ind	Anderson, F. R. Sharp Co.	317-644-1690
Iowa	Cedar Rapids, Technical Reps.	319-363-2489
Mass	Needham, Coakley, Boyd & Abbett	617-444-5470
Mich	Birmingham, Electro-Mation Assocs.	313-564-6517
Minn	Minneapolis, Arjay Sls., Inc.	612-925-1833
Mo	Independence, Technical Reps.	816-737-1414
NY	E. Syracuse, Ossman Instrs., Inc.	315-437-6666
NY	Rochester, Ossman Instrs., Inc.	716-328-2230
NY	Vestal, Ossman Instrs., Inc.	607-785-9947
NY	White Plains, Swedelco, Inc.	914-946-1122
NC	Charlotte, Systems Service Corp.	704-377-3407
Ohio	Cleveland, F.R. Sharp Co.	216-464-3820
Ohio	Dayton, F.R. Sharp Co.	513-298-0011
Ore	Portland, Tekelectric Control Co.	503-246-5451
Pa	Erie, Ecco Elctrn. Sls. Co.	814-455-8110
Pa	Glenside, C.A. Briggs	215-885-2244
Tex	Houston, Whitson Engrg. Co.	713-645-1801
Tex	Plano, Whitson Engrg. Co.	214-423-5255
Wash	Seattle, Tekelectric Control Co.	206-283-7100

ELECTRO-CRAFT CORP., 1600 2nd St. South, Hopkins, Minn., 55343, Tel: 612-935-8226, TWX: 910-576-3132; Empl.: 300; Minimum order: $25
p. 1•946-949

For info on price: Sls. Dept.; Application info: K. P. Willasch; Customer service: D. Woodash; Delivery info: Sls. Dept.

Products manufactured: Amplifiers, Controls/Control Eqpt., Motor Electric Generator Sets, Motors, Servo Systems, Tachometers

Local Sales Offices & Reps.

Ariz	Scottsdale, Oem Specialties	602-948-3360
Cal	Los Angeles, Electrocraft Corp.	213-889-3631
Colo	Denver, Electro-Craft Corp.	303-750-4040
Fla	Altamonte Springs, WMM Assocs.	305-831-4645
Fla	Clearwater, WMM Assocs.	813-726-8871
Fla	Pompano Beach, WMM Assocs.	305-943-3091
Ga	Lilburn, Motion Technology Inc.	404-233-4368
Ill	Chicago, Electro-Craft Corp.	312-298-0687
Mass	Boston, Electro-Craft Corp.	617-226-0206
Minn	Minneapolis, Electro-Craft Corp.	612-935-8226
NJ	Williamstown, Electro-Craft Corp.	609-728-2450
NY	Melville, Electro-Craft Corp.	516-293-2188
NY	Rochester, Ferguson Sls. Co.	716-482-7757
NC	Charlotte, Motion Technology Inc.	704-525-9855
Ohio	Cleveland, A.H. Baier Co.	216-461-6161
Ohio	Dayton, A.H. Baier Co.	513-276-4128
Ore	Portland, Todd-Brian Inds.	503-297-3862
Tex	Dallas, Electro-Craft Corp.	214-241-0680
Wash	Seattle, Todd-Brian Inds.	206-827-5811
FOR:	Can., Montreal, Que., Electrodesign Ltd.	514-363-5120
FOR:	Can., Toronto, Ont., Electrodesign Ltd.	416-787-0991
FOR:	Can., Vanier, Ont., Electrodesign Ltd.	613-745-0541
FOR:	Can., Winnipeg, Man., Electrodesign Ltd.	204-338-5050

ELECTRO-DEVICES, INC., 4-6 Godwin Ave., Paterson, N.J., 07509, Tel: 201-274-8989; Empl.: 12

For info on price: O. E. Carlson; Application info: O. E. Carlson; Customer service: E. A. Fix; Delivery info: E. A. Fix

Products manufactured: Controls/Control Eqpt., Indicators

ELECTRO IMPULSE, Box 870, Red Bank, N.J., 07701, Tel: 201-741-0404; Empl.: 50; Minimum order: $25
p. 1•492,662-666

Customer service: M. Rubin

Free literature available: Conversion Factors-Engineer's Handbook, Gen Catalog 800, Intro to cooling units-tech data on cooling systems for electronics.

Products manufactured: Air Conditioners (For Equipment), Attenuators, Bridges, Calorimeters, Microwave, Couplers, Dummy Loads, Heat Exchangers & Systems, Meters, Monitors, Resistors, Terminals, Transformers, Waveguides & Adapters

Local Sales Offices & Reps.

Cal	Hawthorne, Barnard & Assocs.	213-973-5050
Fla	Orlando, Gra-Mar, Inc.	305-894-3351
Md	Ellicott City, VPI, Inc.	301-465-4060
Mass	Reading, Geder-Rotondi Assocs.	617-944-3105
NY	Bridgeport, Lightstone Corp.	315-699-5747
NY	Greenvale, B.D. Aaron & Co.	516-621-0630
Pa	Montgomeryville, VPI, Inc.	215-474-3200
Tex	Richardson, Spectra Sls. Corp.	214-234-3600
EXP:	Teaneck, N.J., Sylvan Ginsbury Ltd.	201-837-1100

ELECTRO LIFE, INC., 603 Maple La., Geneva, Ill., 60134, Tel: 312-232-0010; Empl.: 5

Customer service: J. B. White

Free literature available: Catalog sheets describing our highway traffic beacons, strobe lights for fire and security alarm systems, emergency vehicle, and warning lights for projecting loads on trucks.

Products manufactured: Lights

ELECTRO MATS. CORP. AMER., 605 Center Ave., Mamaroneck, N.Y., 10543, Tel: 914-698-8434, TWX: 710-566-1128; Minimum order: $50

For info on price: D. Davis; Application info: T. McCurdy; Customer service: T. McCurdy; Delivery info: Stock

Products manufactured: Adhesives (All Types), Coatings, Conductive Plastic Materials, Paints, Resistors, Solder (All Types), Thermistors

Local Sales Offices & Reps.

Cal	Livermore, EMCA	415-447-8300
Fla	Longwood, Lenz Engrg. Co.	305-831-9797
Mass	Newton, Normell Assocs.	617-969-5478
Minn	Minneapolis, D.G. Perry & Co.	
NY	Buffalo, Watmet	716-285-3595
Tex	Richardson, Mero Corp.	214-234-3365

ELECTRO-MECH COMPONENTS, 1826 N. Floradale Ave., So. El Monte, Cal., 91733, Tel: 213-442-7180; FSC No: 07150; Empl.: 75; Minimum order: $25
p. 1•2026,2027

For info on price: M. Ambrose; Application info: M. Peretik; Customer service: M. Ambrose; Delivery info: M. Ambrose

Products manufactured: Caps, Lenses, Indicator Light, Dials, Index Assemblies, Switch, Indicators, Keyboards, Alphanumeric & Decimal, Lamps, Lights, Switches

Local Sales Offices & Reps.

Ariz	Phoenix, GND Sales Co.	602-971-9758
Cal	Los Angeles, Rep Assocs.	213-829-5401
Cal	Palo Alto, Engrg. Assocs.	415-326-7842
Colo	Denver, Franklin Sls. Co.	303-922-3623
Conn	Milford, Todino Engrg.	203-TR4-6643
Fla	Casselberry, Publicover Assocs.	305-834-5775
Ill	Chicago, DJM Elctrn. Sls.	312-774-6525
Ind	Fort Wayne, Scott Elctrns., Inc.	219-743-1586
Ind	Indianapolis, Scott Elctrns., Inc.	317-897-9976
Ky	Louisville, Scott Elctrns., Inc.	502-683-3220
Md	Rockville, Quality Comps., Inc.	301-933-1623
Mass	Needham Heights, Todino Engrg. Sls.	617-444-7925
Mich	Plymouth, Scott Elctrns., Inc.	313-455-2440
Minn	Minneapolis, R.W. Marshall Co.	612-929-0457
NJ	Cherry Hill, Quality Comps.	609-428-6266
NY	Scarsdale, Bassin Tech. Sls. Co.	914-SC3-3334
Ohio	Cleveland, Scott Elctrns., Inc.	216-291-2600
Ohio	Dayton, Scott Elctrns., Inc.	513-294-0539
Pa	Pittsburgh, Scott Elctrns., Inc.	412-781-3112
Tex	Dallas, McCoy Assosc.	214-350-9931
Tex	Houston, Ev. Smith Sls. Co.	713-649-5756

Advertisment

IMMEDIATE DELIVERY
ELECTRO-MECH
COMPONENTS, INC.
East Coast Stocking Distributor
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Phone - 914-SC3-3334
Off the shelf delivery of
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INC. switches & indicators. Fast
custom engraving service for lenses.
Incandescent & neon lamps.

ELECTRO-MECHANICAL INSTR. DIV., See Sheller-Globe Corp. Electro-Mechanical Instr. Div.

ELECTRO-MECHANICS CO., Box 1546, Austin, Tex., 78767, Tel: 512-451-8273; Empl.: 14

Customer service: R. L. Waters

Products manufactured: Analyzers, Antennas, Calibrators, Ferrite Material & Parts, Filters, Horns, Microwave, Magnetometers, RFI Measuring Equipment

Local Sales Offices & Reps.

Cal	Yorba Linda, Del Black Assocs.	714-524-0141
Md	Silver Spring, Gawler-Knoop Co.	301-589-4406
NY	Guilderland, Electro-Modular Sys. Inc.	518-456-2665
Tex	El Paso, Comms., Data & Control Sys.	915-584-1795
EXP:	New York, N.Y., Ad. Auriema, Inc.	212-466-2500

ELECTRO-MECHANISMS, INC., 1163 W. Fourth St., Azusa, Cal., 91702, Tel: 213-334-4927, TWX: 910-584-4855; Empl.: 25

Products manufactured: Solenoids, Switches

Local Sales Offices & Reps.

Ariz	Scottsdale, R. Thomas Co.	602-994-0401
Cal	Redwood City, Warren & Hickey Sls.	415-368-3849
Cal	San Diego, Van Gott & Assoc.	714-272-8452
Cal	San Gabriel, Van Gott & Assoc.	213-285-2148
Colo	Denver, Cristee-Meade Co.	303-753-9471
Conn	Old Saybrook, M. L. Assoc.	203-388-9718
Ill	Mt. Prospect, Magnuson Assoc.	312-956-0700
Md	Bethesda, Warren Mount Co.	301-657-9312
Mass	Marlboro, M. L. Assoc.	617-485-6190
Mich	Detroit, Group Ten	313-549-3910
Minn	St. Paul, Magnuson Assoc.	612-227-8495
NH	East Derry, M. L. Assoc.	603-432-5838
NJ	Berkeley Heights, R. P. Luce & Co.	201-464-6440
NY	Buffalo, Good Components	716-634-4400
NY	New Hyde Pk., R. P. Luce & Co.	516-437-4550
NC	Gastonia, Warren Mount Co.	704-867-2101
Ohio	Cleveland, Group Ten	216-486-2800
Ohio	Dayton, Group Ten	513-277-6531
Pa	Philadelphia, R. P. Luce & Co.	215-884-8365
Tex	Addison, R. Thomas Co.	214-233-8235
Wash	Bellevue, Ray Over Sls.	206-454-9187
FOR:	Can., Scarborough, Ont., Lake Engrg.	416-751-5980
FOR:	Can., St. Laurent, Que., Lake Engrg.	

ELECTRO-METRICS, Div. Penril Corp., 100 Church St., Amsterdam, N.Y., 12010, Tel: 518-843-2600; FSC No: 8A831; Empl.: 52; Minimum order: $25

For info on price: F.B. Powell; Application info: W.S. Lambdin; Customer service: R. Lyons; Delivery info: F. Powell

Products manufactured: Analyzers, Filters, Meters, Probes, Receivers

Local Sales Offices & Reps.

Ala	Huntsville, E.G. Holmes & Assoc.	
Cal	Yorba Linda, D. Black Assoc.	714-524-0141
Colo	Evergreen, Moutaintek, Inc.	303-674-5255
Fla	Orlando, E.G. Holmes & Assoc.	305-894-8901
Ga	Chamblee, E.G. Holmes & Assoc.	404-451-6161
Ill	Chicago, K.W. Meyers Co.	312-774-6440
Ind	Indianapolis, K.W. Meyers Co.	317-243-6681
Kans	Overland Park, Ensco-Rep Inc.	913-381-7557
Md	Silvers Spring, Gawler-Knoop Co.	301-589-4406
Minn	Minneapolis, K.W. Meyers Co.	612-920-7080
Mo	St. Louis, Ensco-Rep, Inc.	314-567-3935

NJ	E. Orange, Friedman Associates	201-673-2500
NM	Albuquerque, Mountaintek Inc.	505-268-0003
NY	Guilderland, Electro-Modular Sys.	518-456-2665
Ohio	Dayton, G.L. Ashby Assocs.	513-252-5627
Tex	Richardson, Scientific Devices	214-231-8016
Utah	Salt Lake City, Mountaintek Inc.	801-278-6056
Va	Virginia Beach, E.G. Holmes & Assoc.	801-481-6556
Wash	Seattle, G.M. Gillett & Assocs.	206-284-3344
EXP:	Amsterdam, NY, Electro-Metrics	518-843-2600
FOR:	Can., Burnaby, B.C., Megatronix Ltd.	604-526-3312
FOR:	Can., Montreal, Que., Megatronix, Ltd.	514-488-0404
FOR:	Can., Ottawa, Ont., Megatronix, Ltd.	613-729-4004
FOR:	Can., Weston, Ont., Megatronix, Ltd.	416-742-8015

ELECTRO-MODULE, INC., 2655 Metropolitan Place, Pomona, Cal., 91767, Tel: 714-593-3565, Telex: 670339; FSC No: 34217; Empl.: 150; Minimum order: $35

Customer service: D. Glynn

Products manufactured: Current Sensors, Delays, Time (Excluding Delay Lines, Timers, Delay & Relays, Time-Delays), Detectors, Flashers, Inverters, Power Supplies, Regulators, Relays, Switches, Timers

Local Sales Offices & Reps.

Ind	Indianapolis, Rockford Controls	513-898-5452
Mass	Lexington, M.R.I.	617-861-6270
NY	Commack, Lawrence K. Haner, Assoc.	516-864-2220
Ohio	Dayton, Rockford Controls-Ohio	513-898-5452
Tex	Dallas, EBR	214-942-2716

ELECTRO MOTIVE CORP., Div. of International Electronics Corp., 316 S. Service Road, Melville, New York, 11746, Tel: 516-694-7700, TWX: 510-224-6427; Empl.: 2100 .... p. 2•194,195

For info on price: Sls. Dept.; Application info: Engrg. Dept.; Customer service: Sls. Dept.; Delivery info: Sls. Dept.

Free literature available: Complete catalog all products. Covers dipped, molded high reliability mica; polyester film, mylar, ceramic, paper, polypropylene capacitors; variable compression trimmers, padders; metal clad devices; electrolytics, tantalums.

Products manufactured: Capacitors, Fixed, Capacitors, Variable, Diodes, Tubes

Local Sales Offices & Reps.

Ala	Huntsville, 20th Century Mktg.	205-772-9237
Ariz	Tempe, Argus Sls.	602-967-8709
Cal	Los Altos, Collins & Hyde	415-941-3355
Cal	Los Angeles, Collins & Hyde	213-666-4238
Colo	Denver, Walter Eng.	303-777-5585
Conn	Milford, Conti-Younger Assocs.	203-929-3294
Fla	Oviedo, Conley Assocs.	305-365-3283
Ill	Chicago, Electro Motive	312-237-4454
Ill	Streamwood, A. Holte & Assoc.	312-837-4066
Ind	Indianapolis, Electro Motive	317-545-4432
Kans	Prairie Village, Engrg. Svcs.	913-649-4000
Ky	Owensboro, Great Southern Elctrns.	502-685-4781
Mass	Waltham, Conti-Younger Assocs.	617-890-4582
Minn	St. Louis Park, Beta Engrg. Corp.	612-925-4422
Mo	St. Louis, Engineering Svcs. Co.	314-997-1515
NJ	Harrington Park, Metro Tech. Sls.	201-768-8495
NY	Endicott, Advanced Comps. Corp.	607-785-3191
NY	Jericho, Metro Tech. Sls.	516-935-3330
NY	North Syracuse, Advanced Comps. Corp.	315-699-2671
Ohio	Cincinnati, R. Makin Assoc.	513-232-5588
Pa	Ardmore, W.K. Metz	215-649-3966
Tex	Dallas, United Comps.	214-324-1448
Wash	Seattle, R. Thorp Co.	206-763-1236
FOR:	Can., Ont., Anbak Sls.	416-625-1061
FOR:	Can., Que., Anbak Sls.	514-636-8514

ELECTRO-NUMERICS CORP., 67 East Evelyn Ave., Mountain View, Cal., 94040, Tel: 415-965-8500; Empl.: 70

Products manufactured: Cells, Load, Converters, Counters, Indicators, Meters, Printers, Totalizers, Digital, Transducers

Local Sales Offices & Reps.

Ariz	Scottsdale, O.E.M. Specialties	602-948-3360
Cal	Belmont, Richards Assocs.	408-246-5860
Cal	So. Pasadena, Cameron G. Pierce Assocs.	213-682-1166
Colo	Denver, Omega Ltd.	303-758-1508
Conn	Hamden, Applied Meas., Inc.	203-288-5288
Ill	Chicago, Lighiner Assocs. Inc.	312-774-1500
Mass	Acton, Applied Meas., Inc.	617-263-2766
Mich	Farmington, Carter, McCormic & Peirce, Inc.	313-477-7700
NJ	Camden, QED Elctrns., Inc.	215-925-8711
NJ	Fort Lee, Tecnimat	201-461-8686
NY	Liverpool, Rayelco Elctrns., Inc.	315-652-5272
Ohio	Cleveland, Carter, McCormic & Peirce	216-333-5650
Ohio	Dayton, Carter, McCormic & Peirce	513-278-5873
Ore	Portland, Brett & Assocs., Inc.	503-232-4184
Pa	Pittsburg, Carter, McCormic & Peirce	412-824-3760
Tex	Dallas, R. T. Martin Assoc.	214-358-3704
Tex	Houston, R. T. Martin Assoc.	713-462-4077
Wash	Seattle, Brett & Assoc.	
EXP:	Palo Alto, Cal., Western Int'l. Trade Co.	415-321-1240

ELECTRO-OPTICAL INDS., INC., 839 Ward Dr., Santa Barbara, Cal., 93111, Tel: 805-964-6701; Empl.: 40

Customer service: A.J. Cussen

Free literature available: "Radiometric Properties of Isothermal, Diffuse Wall Cavity Sources" Description: Total radiant power emission from various diffuse wall cavity sources is calculated without approximation. Results applied to the practical problems of cavity design and analysis.

Products manufactured: Amplifiers, Analyzers, Calibrators, Choppers, Filters, Generators, Heat Exchangers & Systems, Integrators, Electronic, Light Choppers, Modulators, All Kinds, Monitors, Oscilloscopes, Power Supplies, Pyrometers, Radiometers, Slide Rules (Circuitry Computing), Standards

ELECTRO-PACIFIC, INC., 5782 Thornwood Dr., Goleta, Calif., 93017, Tel: 805-964-4878; Empl.: 41; Minimum order: $25

For info on price: J.R. Lindbery; Application info: J.R. Lindbery; Customer service: J.R. Lindbery; Delivery info: P. Williams

Free literature available: Data sheets EPI Models 1-249 & 1-250 Laser power supplies for 12UDC battery operation for portable laser equip. such as surveying equip, levels etc.

Products manufactured: Amplifiers, Coils Including Assemblies & Forms, Controls/Control Eqpt., Converters, Generators, Inverters, Power Supplies, Reactors, Transformers

Local Sales Offices & Reps.

Cal	Los Angeles, Halbar Assocs.	213-387-8283
Cal	San Mateo, Halbar Assocs.	415-349-4700

ELECTRO PACKAGING, INC., 176 Walker St., Lowell, Mass., 01854, Tel: 459-3731, Telex: 94-7490; Empl.: 350 p. 2•672-675

Customer service: B. Rio

Free literature available: Data Sheets Cross Reference lists on Competitive products.

Products manufactured: Boards, Plug-In, Boards, Printed Circuit

Local Sales Offices & Reps.

Ala	Huntsville, Technology Mktg. Assocs.	205-883-7893
Ariz	Scottsdale, S.C. Blaker Co.	602-948-3061
Colo	Englewood, Holland Co.	303-789-4149
Conn	Meriden, Com-Sl.	203-634-0179
Fla	Ormond Beach, Technology Mktg. Assocs.	904-672-2314
Fla	Pompano Beach, Technology Mktg. Assocs.	305-942-0774
Ill	Northbrook, R.T. Howlett & Assocs.	312-498-5444
Mass	Waltham, Com-SL	617-890-0011
NJ	North Caldwell, Masin-Esco	201-226-2550
NY	Schenectady, N. Alexander & Assocs.	518-377-0581
NY	Syosset, Masin-Esco	516-364-0310
Pa	Newton Square, Danton Assocs.	215-353-0500
Tex	Houston, Cunningham Co.	713-461-4197
Tex	Richardson, Cunningham Co.	214-231-2686
FOR:	Can.Dollard Des Ormeaux, Que., Empro Sls. Co.	514-683-3455

ELECTRO RENT, 1699 Elmhurst Rd., Elk Grove Village, Ill., 60007, Tel: 312-956-8380, TWX: 910-222-1847; Empl.: 75; Minimum order: $50

For info on price: T. WAllace; Application info: J. Frey; Customer service: J. Frey; Delivery info: T. Wallace

Free literature available: Catalog and equipment rental brochure.

Products manufactured: Services, Assembly, Production & Test

Local Sales Offices & Reps.

Cal	Burbank	213-843-3131
Cal	Mountain View	415-964-5500
Cal	Santa Ana	714-979-5620
Md	Rockville	301-881-8180
Mich	Detroit	313-891-8410
NJ	Plainfield	201-561-6466
Tex	Dallas	214-691-6086

ELECTRO-RACK PRODUCTS CO., 1742 So. Clementine St., Anaheim, Cal., 92802, Tel: 714-776-5420; Empl.: 25

Products manufactured: Cabinets & Accessories, Cases, Equipment, Instrument, Meter, Chassis, Metal

ELECTRO-SCIENCE LABS., 1601 Sherman Ave., Pennsauken, N. J., 08110, Tel: 609-663-7777, Telex: 83-4788; Empl.: 70

For info on price: C. M. Schreiber; Application info: A. Rose; Customer service: A. Gelb

Free literature available: Short form catalog of thick film and optoelectronic materials data sheets on individual products thick film resistors for high yield processing.

Products manufactured: Adhesives (All Types), Boards, Printed Circuit, Capacitors, Fixed, Circuits, Hybrid, Thick Film, Coatings, Compounds, Encapsulating, Insulating, Molding, Potting, Films, Inks For Thick Film Microcircuits, Insulators & Insulation, Kits, Printed Circuit, Metals, Paints, Potentiometers, Resistors, Rubber, Seals, Services, Assembly, Production & Test, Solder (All Types), Substrates

Local Sales Offices & Reps.

Ariz	Phoenix, Shefler-Kahn Co.	602-258-7893
Cal	Burlingame, Hybrid Elctrns.	415-347-8217
Cal	Hacienda Heights, Electro-Science Labs.	213-330-5592
Cal	Sunnyvale, Electro-Science Labs.	408-732-5161
Colo	Denver, W. J. Purdy Co.	303-777-1411
Fla	Sarasota, W. J. Irvine Co.	813-955-9656
Kans	Shawnee Mission, Mid-America Elctrns. Mktg.	913-236-4800
Mass	Framingham, Microdon	617-879-3800
Minn	Minneapolis, C. E. Bohlig Co.	612-922-7011
NJ	Nutley, D/R Assocs.	201-667-5900
NM	Albuquerque, Shefler-Kahn Co.	505-265-7077
NY	Rochester, D/R Elctrns.	716-442-6980
Ohio	Dayton, Sidnell Co.	513-885-4161
Tex	Austin, Crockett Southwest Corp.	512-476-6801
Tex	Dallas, Crockett Southwest Corp.	214-251-1776
FOR:	Can., Rosemere, Que., D/R Elctrns., Ltd.	

ELECTRO SCI. INDS., 13902 N.W. Science Pk. Dr., Portland, Ore., 97229, Tel: 503-646-4141, Telex: 36-0273; FSC No: 11837; Empl.: 297; Minimum order: $25

For info on price: S. Gressel; Application info: J. Currier; Customer service: S. Gressel; Delivery info: S. Gressel

Free literature available: ESI Condensed Catalog; ESI Model 1234 IC (Linear) Tester Brochure; ESI Model 1248 IC (Digital) Tester Brochure; ESI System 25 Resistance Trimming Laser System Brochure

Products manufactured: Bridges, Calibrators, Capacitors, Fixed, Clamps & Clips, Comparators, Decade Boxes, Detectors, Dividers, Indicators, Leads, Test & Adaptors, Meters, Microcircuit Production Equip., Networks, Potentiometers, Resistors, Standards, Testers, Transformers

Local Sales Offices & Reps.

Ala	Huntsville, Gentry Assocs. Inc.	205-534-9771
Cal	Orange, Bill Lyon	714-633-4704
Cal	Palo Alto, T. White	415-327-1571
Conn	Seymour, B. Fobes	203-888-3258
Fla	Orlando, Gentry Assocs. Inc.	205-534-9771
Ill	Rosemont, Electro Sci. Ind.	312-696-4322
Mass	Waltham, D. Erickson	617-899-6633
NJ	Bergenfield, Electro Sci. Inds.	201-385-9493
NY	Camillus, Eric Hill	315-672-5498
NC	Burlington, Gentry Assocs. Inc.	919-227-3639
Ohio	Cleveland, Instr. Sys.	216-486-0782
Ohio	Dayton, Instr. Sys.	513-293-8095
Pa	Pittsburgh, Instrumentation Sys. Inc.	412-243-1111
Tex	Austin, Crockett Engrg.	512-476-6801
Tex	Dallas, Crockett Engrg. Co.	214-637-6120

ELECTRO STYLUS, 31 Cheyenne Blvd., Colorado Springs, Colo., 80906, Tel: 303-633-5969; Empl.: 10

Customer service: M. L. Murray

Products manufactured: Nameplates

ELECTRO SWITCH CORP., King Ave., Weymouth, Mass., 02188, Tel: 617-335-5200, TWX: 710-388-0377; Empl.: 200 .... p. 1•2028,2029

Products manufactured: Switches

Local Sales Offices & Reps.

Ariz	Scottsdale, OEM Specialties	602-948-3360
Cal	Oakland, W. Nott & Co.	415-654-3747
Cal	Pico Rivera, Westrep	213-949-2551
Cal	San Diego, Westrep	714-279-9412
Colo	Denver, Vinson Assocs.	303-757-5151
Fla	Boca Raton, Floritronics Inc.	305-368-0325
Fla	Winter Park, Floritronics, Inc.	305-886-4818
Ga	Atlanta, Holman-Lobsinger Co.	404-256-9120
Ill	Elk Grove Village, Electro Switch Corp.	312-593-2225
Md	Woodbine, Naudain Assocs.	301-252-5378
Mich	Ferndale, Hilltronics, Inc.	313-398-5556
Minn	St. Paul, Kenco Co.	612-645-7717
Mo	No. Kansas City, H.J. Weisler & Assoc., Inc.	816-421-1679
Mo	St. Louis, H. J. Weisler & Assoc.	314-428-3934
NJ	Mt. Laurel, Naudain Assocs.	609-235-1801
NY	Melville, Electro Switch Corp.	516-249-3770
NY	Rochester, T. Ferguson Sls., Inc.	716-482-7757
NC	Winston-Salem, L.G. White Southern, Inc.	919-725-3612
Ohio	Columbus, Rockford Controls	614-231-5890
Ohio	Dayton, Rockford Controls Ohio	513-278-7362
Ohio	Euclid, Rockford Controls Ohio	216-731-5250
Pa	Pittsburgh, R. F. Clark	412-242-9500
Tex	Bellaire, Brice Co.	713-666-1788
Tex	Dallas, Brice Co.	214-233-9808
Wash	Seattle, C.B. Parsons & Co.	206-762-7373
Wisc	Wauwatosa, Larsen Assoc.	414-258-0529
EXP:	Canada, Don Mills, Ont., G.M. Fraser Ltd.	416-449-6600
EXP:	Conn. Litchfield, Norcon Div. Intrade Inc.	203-567-5865

ELECTRO-TECHNIQUES, INC., 215 Via Del Norte, Oceanside, Cal., 92054, Tel: 714-757-7770, Telex: 697-932; Empl.: 38; Minimum order: $50

For info on price: G. S. Tice; Application info: B. H. Tice

Free literature available: Short form catalog #5 = Lists all standard potentiometers built by electro-techniques; Short Form catalog #6 = Gives specs on all variations Series 850, 3/4" long multiturn, includihg switch-pot variations; Data sheet - Model 850 - 7/8" diameter, 3/4" long multi-turn.

Products manufactured: Potentiometers

Local Sales Offices & Reps.

Ariz	Scottsdale, Piper-Goyne	602-946-4437
Cal	Burlingame, Jack Logan & Assocs.	415-697-6100
Cal	Los Angeles, M.W. Riedel & Co.	213-283-7694
Colo	Littleton, Piper-Goyne	303-798-8955
Conn	Madison, A & M Elec. Reps.	203-421-4242
Fla	Palm Beach Gardens, Brosey Enterprises	305-622-6045
Ill	Glenview, Crimson Engrg.	312-724-1780
Kans	Wichita, E. Carbiener Assoc.	316-682-5782
Mich	Livonia, Rep-Tron	313-525-2700
NM	Albuquerque, Piper-Goyne	505-265-6794
NY	Conklin, Ramcom	607-775-0641
NY	New York, Addem Group	516-567-5900
Ore	Portland, J. W. Eckersley Co.	503-246-3183
Pa	Philadelphia, W. F. Assocs.	215-224-4120
Tex	Richardson, Spectra Sls. Co.	214-234-3600

ELECTRO-VOICE, INC., Sub. Gulton Inds., Inc., 600 Cecil St., Buchanan, Mich., 49107, Tel: 616-695-6831, TWX: 810-270-3135; Empl.: 1,000

Customer service: Sales Dept.

Free literature available: Complete catalog on microphones and loudspeakers for broadcast, recording, sound reinforcement, communications, and home entertainment.

Products manufactured: Attenuators, Filters, Handsets, Chestsets, Headphones, Headsets, Etc., Microphone Accessories (Including Stands, Holders, Booms), Microphones, All Kinds, Networks, Speaker Systems, Speakers, Tape Recording Accessories, Transducers, Transformers

Local Sales Offices & Reps.

Ala	Birmingham, M. K. Smith, Inc.	205-967-3080
Alas	Anchorage, H. J. Lang & Assocs.	907-279-5741
Ariz	Phoenix, J. R. Morgan Agency	602-252-3089
Ark	El Dorado, Dick Bellew Sls., Inc.	501-863-8325
Cal	Hollywood, J. Carter Assocs.	213-980-3450
Cal	San Francisco, Meyer, Ross & Fleming, Inc.	415-285-8880
Colo	Denver, Lindberg Co.	303-758-9033
Fla	Fort Lauderdale, Sproch Sls., Inc.	305-587-3792
Fla	Sarasota, Sproch Sls., Inc.	813-924-7768
Ga	Tucker, M. K. Smith, Inc.	404-938-7161
Haw	Honolulu, Dougherty Entprs. Co.	808-847-4144
Ill	Lincolnwood, Wm. M. Linz Assocs.	312-677-2000
Ind	Mulberry, Maish Sls.	317-296-2322
Kans	Olathe, B. C. Elctrn. Sls., Inc.	913-782-6696
La	Kenner, Dick Bellew Sls., Inc.	504-729-4550
Md	Baltimore, D. H. Brothers Co.	301-764-7189
Mass	Wellesley Hills, M. Scott Co.	617-235-0102
Mich	Detroit, Riley & Petchell Sls. Inc.	313-535-7000
Minn	St. Paul, SKOR	612-645-6461
Miss	Michigan City, J. Fisher Sls.	601-224-6470
Mo	Raytown, Midwest Mktg. Co.	816-358-6638
Mo	St. Louis, Midwest Mktg. Co.	314-894-1388
NJ	Ridgefield, Bi-State Marketers, Inc.	201-943-5888
NY	Buffalo, Waxman-Currant Sls., Inc.	716-873-0442
NC	Charlotte, M. K. Smith, Inc.	704-372-1026
Ohio	Columbia Station, C. L. Pugh & Assocs.	216-235-6028
Ohio	Columbus, C. L. Pugh & Assocs.	614-486-9678
Pa	Newtown Square, G. M. Conneen Co.	215-353-2241
Pa	Pittsburgh, C. L. Pugh & Assocs.	412-531-2731
Tenn	Memphis, Dick Bellew Sls., Inc.	901-365-9437
Tex	Dallas, Collins Co.	214-341-7866
Utah	Salt Lake City, Lindberg Co.	801-364-6409
Wash	Edmond, Gemini Elctrns., Inc.	206-775-1229
Exp:	Chicago, Ill., Magnus Inter-America	312-334-1503
Exp:	Roslyn, N.Y., Telesco Int'l. Corp.	516-484-4920
FOR:	Can., Gananoque, Ont., E.V. of Canada, Ltd.	613-382-2141
FOR:	Can., Mississauga, Ont., Thorvin Elctrns., Inc.	416-274-1573
FOR:	Can., Montreal, H2W2J1, Audesco Elctrns., Ltd.	514-288-4122
FOR:	Can., Vancouver, B.C., Electro-Tec Marketers	604-736-6377

ELECTROCOM INDS., 1105 N. Ironwood Dr., S. Bend, Ind., 46615, Tel: 219-232-2743; FSC No: 27114; Minimum order: $15

Customer service: B. Jaffe

Products manufactured: Amplifiers, Chokes, Coils Including Assemblies & Forms, Comm. Systems, Converters, Filters, Keyers, Tone, Networks, Reactors, Receivers, Services, Assembly, Production & Test, Teletypewriters & Equipment, Terminal Equipment, Digital, Transformers

ELECTROCUBE INC., 1710 So. Del Mar Ave., San Gabriel, Cal., 91776, Tel: 213-573-3300, TWX: 910-589-1609; Empl.: 125 p. 1•553; p. 2•121-125,1736,1737

Products manufactured: Capacitors, Fixed, Chokes, Coils Including Assemblies & Forms, Filters, Networks, Reactors, Resistors, Transformers

Local Sales Offices & Reps.

Ariz	Phoenix, Delta Elctrns. Sls. Corp.	602-966-9903
Cal	Los Angeles, Ed Landa Co.	213-879-0770
Cal	Mountain View, West/Mark Assocs.	415-969-1700
Colo	Denver, West/Mark Assocs.	303-433-7181
Fla	Coca, Orbe Inc.	305-452-9568
Fla	Ft. Lauderdale, Orbe, Inc.	305-564-857
Fla	Winter Park, CBC, Inc.	904-383-6498
Ill	Downers Grove, Richmar Elctrn. Sls.	312-968-0118
Md	Stevenson, T. Griffin Co.	301-484-0251
Mass	Reading, C. Godfrey Co.	617-944-2230
Mich	Grosse Pointe Park, S. Greiner Assocs.	313-499-0188
Minn	Minneapolis, Electro-Serv Co.	612-827-2907
Mo	Hazelwood, Centech Sls.	314-731-4220
Mo	Raytown, Centech Sls.	816-358-8100
NM	Albuquerque, IMEC	505-883-9010
NY	Floral Park, MOS Assocs.	516-694-5923
NY	Rochester, Gislason Sls.	716-454-4741
Ohio	Cleveland, K.W. Elctrn. Sls.	216-831-8292
Ohio	Dayton, K.W. Elctrn. Sls.	513-890-2150
Pa	Paoli, T. Griffin Co.	215-647-1550
Pa	Waterford, K.W. Elctrn. Sls.	814-796-6714
Tex	Dallas, W. Reese Assocs.	214-638-6575
Tex	Houston, W. Reese Assocs.	713-621-3134
Wash	Bellevue, J. Findley Co.	206-454-5200
Wash	Seattle, H. Levinson Co.	206-323-5100
Wisc	Oak Creek, Richmar Elctrn. Sls.	414-475-0141
EXP:	N.Y., N.Y., C. Tennant, Sons & Co.	212-679-1300

Local Distributors

Cal	Carson, Hi-Rel Dist. Sls., 20507 S. Belshaw	213-537-6500
Cal	Sunnyvale, Acacia Sls., 384 San Aleso	408-735-0100
Ohio	Englewood, Argent Inds., 477 E. Wenger Rd.	513-836-8633
Ohio	Solon, REPCO, Inc., 6855 Cochran Rd.	216-248-8900
Pa	Erie, Erie Corp. Contractors, 1938 Buffalo Rd.	814-452-3762
Pa	Pittsburgh, Cameradio, 2801 Liberty Ave.	412-288-2600
Tex	Richardson, Altair Co., 405 N. Pland Rd.	214-231-5166

ELECTRODYNE CORP., 7315 Greenbush Ave., No. Hollywood, Cal., 91605

ELECTRON, INC., 12655 Coit Rd., Bratenahl, Ohio, 44108, Tel: 216-681-4700, Telex: 980240; Empl.: 85

For info on price: J. M..Wexler; Application info: F. P. Zaffarano; Customer service: R. C. Dederson

Products manufactured: Controls/Control Eqpt., Data Acquisition & Reduction Systems, Data Compressors, Digital, Drums Computer Memory, Readers, Recorders, Test Systems, Testers

ELECTRON-MACHINE CORP., Box M, Umatilla, Fla., 32784, Tel: 904-669-3101, Telex: 56-4300; Empl.: 55

Customer service: J. Gatch

Free literature available: Milmaster, Controller, Capacitance Monitor, X-Ray Gage, Refractometer

Products manufactured: Controls/Control Eqpt.

Local Sales Offices & Reps.

Ala	Anniston, Shelton Ind. Equip.	205-237-1749
Colo	Denver, Equipment Specialties Co.	303-433-3371
Del	Newark, Brennan-Davis Instr. Sls. Co.	302-731-5000
Ill	Chicago, Memeco, Inc.	312-774-0919
Mass	Acton, Six States Engrg.	617-263-8989
Mich	Birmingham, Brooks Equip. Co.	313-645-0950
Minn	Wayzata, Wm. A. Sternad, Consulting Engr.	612-473-4700
Mo	St. Louis, E.B. Miller Co.	314-966-8250
NJ	Haddonfield, Brennan-Davis Instr. Sls. Co.	609-429-7687
NJ	Kenilworth, Wolock & Lott	201-241-4333
NY	North Syracuse, V. Luven Company	315-458-8195
NC	Charlotte, MacGuire & Crawford Instr. Co.	704-366-3454
Ohio	Cincinnati, Surkamp & Rowe	513-891-1838
Ohio	Cleveland, Thorrat & Hanmer	216-333-5950
Okla	Tulsa, Telstar Instr. Corp.	918-628-1011
Ore	Portland, R.E. Donelson Co.	503-654-3137
Pa	Pittsburgh, Bollinger & Richards	412-561-2340
Tex	Bellaire, Cactus Engrg. Co.	713-665-2723
Vt	Springfield, Six States Engrg.	802-885-5253
Va	Richmond, Mickle-Milnor Engrg. Co.	804-266-8741
FOR:	Can., Montreal, Que., Industrial Projects, Ltd.	514-489-5769
FOR:	Can., Toronto, Ont., Industrial Projects, Ltd.	416-368-1923

ELECTRONAUTICS, Dept. Dielectric Comm., Newtown Rd., Littleton, Mass., 01460, Tel: 617-486-3578, TWX: 710-347-0650; Empl.: 155; Minimum order: $10

For info on price: N. J. Diehm; Application info: N. J. Diehm; Customer service: B. Lurvey; Delivery info: B. Lurvey

Products manufactured: Attenuators, Dummy Loads, Loads, Electronic Variable

Advertisment

Designing, Engineering & Manufacturing Loads from Waveguide Sizes WR28 thru WR650 *Low Power Terminations, Tongue Loads, Step Loads Cone Loads

*Hi Pow Dummy Loads from 40 watts to 8000 watts avg. power

*Special Configurations, Stripline Load Elements Attenuators Bushings, Damping Rings

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Write for new catalog and price lists

ELECTRONIC APPLICATIONS CO., 2213 Edwards Ave., So. El Monte, Cal., 91733, Tel: 213-442-3212; Empl.: 75 .... p. 1•1648-1659

For info on price: G. T. Stockton; Application info: A. Churik; Customer service: A. Churik; Delivery info: A. Churik

Free literature available: Catalogs

Products manufactured: Relays

Local Sales Offices & Reps.

Ala	Huntsville, Repcom	205-534-9959
Ariz	Phoenix, McKnight	602-257-8037
Cal	Los Angeles, El-Com Inc.	213-223-1351
Cal	Menlo Park, McKnight	415-325-2844
Colo	Sedalia, Jensen Reps.	303-688-4154
Conn	Trumbull, TX Sales	203-261-2088
Fla	Ft. Lauderdale, Repcom Inc.	305-564-1929
Fla	Jacksonville, Repcom Inc.	904-773-8381
Fla	Melbourne, Repcom Inc.	305-254-1877
Fla	Miami Springs, Repcom	305-887-8723
Fla	Orlando, Repcom	305-894-7217
Fla	Seminole, Repcom, Inc.	813-393-0584
Ga	Marietta, Repcom, Inc.	404-971-2831
Ga	Warner Robins, Repcom	912-923-1393
Ill	Chicago, Midwest Elctrn. Sls.	312-777-9700
Ind	Indianapolis, Midwest Elec.	317-926-3736
Iowa	Cedar Rapids, Midwest Elec.	319-362-4410
Md	Baltimore, M/E Assoc.	301-825-1130
Md	Towoon, Holden Engineering Sls. Co.	301-823-3763
Mass	Randolph, Tx Sls.	617-986-6080
Minn	Bloomington, Ladky Assoc.	612-884-2125
NJ	Little Falls, Carbone Assoc.	201-256-9191
NM	Albuquerque, McKnight	505-266-6423
Pa	Elkins Pk., Arnold Assoc., Inc.	
Pa	Erie, Ecco Elctrn. Sls.	814-455-8110
Pa	Jenkintown, Arnold Assoc.	215-887-7870
Tex	Dallas, E-Tron Sls.	214-348-4749
Tex	Dallas, Kentron Engrg.	214-352-7535
Wash	Seattle, Underwood	206-243-2133
Wisc	Waukesha, Midwest Elec.	414-542-5129
For:	Can., Toronto, Ont.	416-294-6797

ELECTRONIC ARRAYS, 550 Middlefield Rd., Mountain View, Cal., 94043, Tel: 415-964-4321, TWX: 910-379-6985; Empl.: 798

For info on price: B. Cushman; Application info: L. Hester; Customer service: H. Day

Free literature available: Short form catalog.

Products manufactured: Integrated Circuit Devices

Local Sales Offices & Reps.

Ala	Huntsville, Col-Ins Co.	205-539-1771
Ariz	Phoenix, Dorton Entprs.	602-263-0414
Cal	Huntington Beach, EA Western Region	714-968-3775
Cal	Los Angeles, Black, Ekizian & Strong	213-870-9191
Cal	Mt. View, Caltron/Pyle	408-964-3244
Cal	San Diego, Bestronics	714-278-2150
Colo	Denver, Thorson Co.	303-759-0809
Conn	Meriden, COM-SALE	203-634-0179
Conn	Wallingford, COM-SALE	203-269-7964
Fla	Largo, Col-Ins Co.	813-343-0978
Fla	Orlando, Col-Ins Co.	305-423-7615
Ga	Clarkston, Col-Ins Co.	404-934-7280
Ind	Indianapolis, Ihrig Assoc.	317-783-7630
Mass	Waltham, Com-Sale	617-890-0011
Mich	Grand Rapids, Elko Sls. Corp.	616-949-1451
Mich	Grosse Pointe Woods, Elko Sls. Corp.	313-884-1955
Minn	Minneapolis, Electronic Innovators	612-884-7471
NJ	Cherry Hill, EA Eastern Region	609-795-5066
NM	Albuquerque, Thorson Co.	505-265-5655
NY	Elmont, Crane & Egert Corp.	516-488-2100
NC	Raleigh, Col-Ins Co.	919-834-6591
Ohio	Brecksville, A. Nace Co.	216-526-4323
Ohio	Englewood, A. Nace Co.	513-836-7548
Ore	Beaverton, N.R. Schultz Co.	503-643-1644
Pa	Pittsburgh, A. Nace Co.	412-922-7225
Pa	Willow Grove, Harry Nash Assocs.	215-657-2213
Tex	Dallas, Thorson Co.	214-233-5744
Tex	Houston, Thorson Co.	713-771-3504
Va	Reston, Boyle Assocs.	703-620-9558
Wash	Bellevue, N.R. Schultz Co.	206-454-0300

ELECTRONIC COIL CORP., 347 New Britain Ave., Plainville, Conn., 06062, Tel: 203-747-1213; Empl.: 75; Minimum order: $50

For info on price: R. Gorski 203-747-1213; Application info: R. Gorski 203-747-1213; Customer service: D. Bray 203-747-1222; Delivery info: D. Bray 203-747-1222

Free literature available: Wire Stripping Ultra-fine Teflon & PV wires to AWG # 36 Stranded 7/44 with final O.D. of .010", Electric Coils for relays, timing motors, solenoids, clocks, voice systems, memory drum systems, telephone systems etc.

Products manufactured: Coils Including Assemblies & Forms, Lead Assemblies & Receptacles, Services, Assembly, Production & Test

ELCTRN. COMM., INC., Sub. NCR, 1501 72nd St., N., St. Petersburg, Fla., 33733, Tel: 813-381-2000, TWX: 810-850-4127; Empl.: 1500

Products manufactured: Amplifiers, Antennas, Circuits, Hybrid, Thin-Film, Comm. Systems, Data Acquisition & Reduction Systems, Keyboards, Alphanumeric & Decimal, Modulators, All Kinds, Multiplexers, Receivers, Transmitters

Local Sales Offices & Reps.

Cal	Van Nuys	213-896-9963
Mass	Lexington	617-861-1063
Va	Arlington	703-525-7070

ELCTRN. CONCEPTS, INC., Box 627, Eatontown, N.J., 07724, Tel: 201-542-7880, TWX: 710-722-6691; Empl.: 80

Customer service: A. J. Muscillo

Products manufactured: Capacitors, Fixed, Films

Local Sales Offices & Reps.

Cal	Los Angeles, Corcoran Assocs.	213-823-2425
Cal	Menlo Park, G.R. McKnight Co.	415-325-2844
Fla	Maitland, Hutto-Hawkins-Peregoy	305-831-2474
Ill	Park Ridge, Metcom Assocs.	312-696-1490
Mass	Waltham, Impact Sls. Co.	617-893-2850
Minn	Minneapolis, Revere Assocs.	612-781-2615
NJ	Irvington, Murray Gallagher	201-399-4350
NJ	Neptune, Com-Tek Elctrns.	201-477-6992
NY	Conklin, Comerota Assocs.	607-775-0641
NY	New Rochelle, Display Comps. Sls.	914-636-2969
Ohio	Mentor, Bishop Co.	216-255-6969
Tex	Seabrook, Stolle-Hamilton Co.	713-334-1909
Va	Reston, Boyle Assocs.	703-620-9558
Wash	Seattle, Underwood & Underwood	206-243-2133

ELECTRONIC CONTROL SYSTEMS, INC., Box 1232, Fairmont, W. Va., 26554, Tel: 304-363-8690; Empl.: 112; Minimum order: $50

Customer service: J. P. O'Leary

Products manufactured: Alarms, Cabinets & Accessories, Controllers, Programmable, Controls/Control Eqpt., Indicators, Meters, Monitors, Panels, Potentiometers, Switches, Thyristors (Includes Silicon Controlled Rectifiers)

Local Sales Offices & Reps.

Cal	La Mirada, F.C. Collins Co.	213-941-8515
Cal	Sunnyvale, Wilson, Leonik & Co.	408-732-9050
Del	Claymont, Elctrn. Control Sys.	302-405-8050
Mass	Northboro, Elctrn. Control Sys.	617-366-4940
NJ	Hackensack, C.H. Ribble Co.	201-342-2602
NJ	Moorestown, J. Speck Assocs.	609-234-4957
Ohio	Cleveland, Elctrn. Control Sys.	216-235-2992
Pa	Warminster, Elctrn. Control Sys.	215-674-4777
Pa	White Oak, Elctrn. Control Sys.	412-672-8500
SC	Taylors, Elctrn. Control Sys.	803-244-6147
Wisc	Brookfield, S.F. Boyd Co.	414-781-7170

ELECTRONIC COUNTERS & CONTROLS INC., 1500 McCormick Blvd., Mundelein, Ill., 60060, Tel: 312-362-8910; Empl.: 90

For info on price: F. A. Balmes; Application info: J. L. Mosak; Customer service: P. Sulek; Delivery info: P. Sulek

Free literature available: Digital, preset counters, uni or bi-directional standard or custom sequential controls digital tachometers, ratio indicators, draw-speed indicators proximity & photoelectric switches shaft encoders.

Products manufactured: Cards, Logic, Comparators, Controllers, Programmable, Controls/Control Eqpt., Counters, Encoders, Indicators, Meters, Modules, Logic, Encapsulated, Monitors, Printers, Process Control Systems, Programmers, Sensors, Light, Switches, Tachometers, Timers

Local Sales Offices & Reps.

Ala	Birmingham, Com-Trol	205-823-0897
Alas	Anchorage, J.A. Tudor & Assocs.	907-274-6350
Cal	Marina Del Rey, Components West Sls.	213-821-6522
Colo	Boulder, R. Hendrickson	303-499-5603
Conn	Rocky Hill, Aid Engrg. Sls. Co.	203-673-3692
Ga	Atlanta, Hal Homer Assocs.	404-255-8669
Ill	Deerfield, Traco Eng. Co.	312-945-3520
Iowa	Sioux City, Lakeland Eng. Equip.	712-252-3611
Mass	Westboro, Aid Engrg. Sls. Co.	617-890-8181
Mich	Kalamazoo, E.B. Dewey Co.	616-344-6163
Mich	Troy, Control Sls. Assoc.	313-391-3235
Minn	St. Paul, Power/Mation Div.	612-645-0781
Mo	St. Louis, Tines Ind'l. Sls.	314-638-2936
NJ	Kenilworth, Wolock & Lott	201-241-4333
NY	Henrietta, Rush Instrs.	716-334-0452
NC	Charlotte, Amtek	704-596-6898
Ohio	Cincinnati, Drivex Corp.	513-742-2000
Ohio	Dayton, Albrecht Assocs.	513-236-9333
Ohio	Euclid, Control Dynamics Corp.	216-692-2818
Ohio	Toledo, P. Girkins	419-241-2101
Ore	Eugene, J.A. Tudor & Assoc.	503-686-1252
Ore	Portland, J.A. Tudor & Assocs.	503-288-5154
Pa	King of Prussia, Reinbrecht Assocs.	215-265-6180
Pa	Pittsburgh, Weiss Instrs.	412-371-3020
Tex	Bellaire, Brice Co.	713-666-1788
Tex	Dallas, Brice Co.	214-233-9808
Va	Richmond, S.D. Harmon & Co.	804-285-3168
Wash	Seattle, J.A. Tudor & Assocs.	206-682-7444
Wash	Spokane, J.A. Tudor & Assoc.	509-327-3328

ELECTRONIC COUNTERS, INC., 240 Humphrey St., Englewood, N.J., 07631, Tel: 201-567-5300; Empl.: 30

Customer service: L. Sonders

Free literature available: Technical Data Sheets for our line of Pulse Generators.

Products manufactured: Generators

Local Sales Offices & Reps.

Colo	Loveland, Kelley Entprs.	303-667-1376
DC	Washington, Eastern Instru.	301-839-3800
NY	Fayetteville, M. P. Andrews, Inc.	315-637-3144
NY	Great Neck, E. I. Inc.	516-466-9505
Pa	Philadelphia, Eastern Instru.	215-927-7777
Tex	Dallas, Airep Elctrn.	214-363-5291
Va	Richmond, Eastern Instru.	703-644-6622

ELECTRONIC DEV. CORP., 11 Hamlin St., Boston, Mass., 02127, Tel: 617-268-9696; FSC No: 12619; Minimum order: $15 .... p. 1•670-672

Customer service: R. Ross

Free literature available: Complete catalog containing full engineering specifications, applications, block diagrams and prices.

Products manufactured: Calibrators, Converters, Current Sources, Indicators, Meters, Power Supplies, References, D-C Voltage, Standards, Testers, Voltage Sources

Local Sales Offices & Reps.

Ala	Huntsville, Lee Assocs.	205-881-8008
Ariz	Phoenix, R.A. Mayes Co.	602-279-5243
Cal	Burbank, Basic Systems	213-938-2833
Cal	Los Altos, Wright Engrg.	415-941-4405
Colo	Boulder, R.A. Mayes Co.	303-444-0782
Conn	E. Hartford, Tekdata, Inc.	203-525-7647
Fla	Ft. Lauderdale, Lee Assocs.	305-525-9767
Fla	Winterhaven, Lee Assocs.	813-294-5815
Ill	Des Plaines, Marsland Assocs.	312-298-2620
Ind	Indpls., Marsland Assocs.	317-924-3568
Md	Bethesda, Powell-Pendergraph Inc.	301-656-4535
Mass	Boston, Electronic Dev. Corp.	617-268-9696
Mich	Ferndale, Tiby Co.	313-547-3550
Minn	Mpls., Marsland Assocs.	612-545-4481
Mo	Florrissant, Marsland Assocs.	314-278-6949
NM	Albuquerque, R.A. Mayes Co.	505-292-2330
NY	E. Syracuse, Ossmann Instrs., Inc.	315-437-6666
NY	Great Neck, Powell-Pendergraph, Inc.	914-761-7792
NY	Rochester, Ossmann Instrs.	716-328-2230
NY	Vestal, Ossmann Instrs.	607-785-9947
NC	Raleigh, Lee Assocs.	919-787-5818
Ohio	Cleveland, Tiby	216-371-5335
Ohio	Dayton, Tiby Co.	513-277-3822
Pa	Abington, Powell-Pendergraph, Inc.	215-657-0330
Tex	Dallas, R.A. Mayes Co.	214-235-3043
Tex	El Paso, R.A. Mayes Co.	Enterprise 750
Tex	Houston, R.A. Mayes Co.	713-466-8325
Utah	Salt Lake City, R.A. Mayes Co.	801-292-6781
Va	Richmond, Powell-Pendergraph, Inc.	703-264-2341
Wash	Bellevue, Topp Engrg.	206-747-5400
FOR:	Can., Mississauga, Ont., Webster Instr.	416-275-2270
FOR:	Can., Point Claire, Que., Webster Instr.	514-695-9787

ELCTRN. DEVICES, 21 Gray Oaks Ave., Yonkers, N.Y., 10710, Tel: 914-965-4400, TWX: 710-560-0021; Empl.: 200; Minimum order: $50

For info on price: D. Dean; Application info: J. D. Weiner; Customer service: M. Goldstein; Delivery info: D. Dean

Products manufactured: Bridges, Diodes, Multipliers, Rectifiers

Local Sales Offices & Reps.

Ariz	Scottsdale, Mercury Engrg. Sls.	602-945-1927

Cal	Conoja Park, Blazer Wolf	213-888-7432
Cal	Sunnyvale, RDX	408-734-4500
Colo	Denver, Walter Engrg.	303-777-5585
Fla	Light House Point, Saber Assoc.	305-943-3076
Fla	Orlando, Saber Assoc.	305-422-3686
Fla	St. Petersburg, Saber Assoc.	813-441-1301
Ga	Woodstock, Saber Assoc.	404-926-7660
Ill	Chicago, Berndt Assocs.	312-283-0713
Ill	Chicago, Rozner Sls.	312-283-0022
Kans	Overland Pk., Penzner-Mankus	913-DU 1-0004
Ky	Liberty, Depco	513-621-0162
Mass	Waltham, Betronic Assocs.	617-894-8400
Mich	Southfield, Rep Inc.	313-354-9066
Minn	St. Paul, Cahill Assocs.	612-739-8445
Mo	Hazelwood, Penzner-Mankus	314-731-4334
NY	Rochester, Electra Sls.	716-436-4030
NY	Syracuse, Electra Sls.	315-455-5783
NC	Raleigh-Durham, Saber Assoc.	919-787-9675
Ohio	Cleveland, Depco	216-289-8188
Ohio	Wadsworth, Depco	216-336-2600
Tex	Dallas, Dunbar Assocs.	214-239-7151
Wash	Seattle, F. Jackson & Co.	206-782-2211
EXP:	N.Y., Yonkers, Elctrn. Devices, N.Y.	~~914-965-4400~~
FOR:	Can., Montreal, Allied Elctrns.	514-488-5547

ELECTRONIC ENCLOSURES, Div. Wyle Labs, 225 South Aviation Blvd., El Segundo, Cal., 90245, Tel: 213-679-0181; Empl.: 150; Minimum order: $25

For info on price: A. Blinder; Application info: H. Sorey; Customer service: J. Gordon; Delivery info: D. Marlow

Products manufactured: Blowers & Fans & Accessories, Cabinets & Accessories, Carts & Dollies, Instrument & Equipment, Cases, Equipment, Instrument, Meter, Racks, Services, Assembly, Production & Test

Local Sales Offices & Reps.

Cal	El Segundo, Elctrn. Enclosures	213-679-0181
Cal	San Jose, B. Belt	408-226-2611
Conn	Milford, Todino Engrg.	203-874-6643
Md	Rockville, Marktron	301-762-6210
Md	Timonium, Marktron, Inc.	301-252-7111
Mass	Needham, Todino Engrg.	617-444-7925
NJ	Pennsauken, Elctrn. Enclosures, Inc.	~~609-665-6810~~
NJ	Rockaway, D. Despins Elctrn. Enclosures	201-627-4276

ELECTRONIC ENGRG. CO. OF CAL., See EECO Elctrn. Engrg. Co. of Cal.

ELCTRN. ENTERPRISES, 65 7th Ave., Newark, N.J., 07104, Tel: 201-485-8500; FSC No: 97130; Empl.: 100; Minimum order: $25

For info on price: R. Dubin; Application info: H. C. Grunwald; Customer service: J. Torlucci; Delivery info: J. Torlucci

Products manufactured: Diodes, Heaters & Heating Elements, Modulators, All Kinds, Tubes

Local Sales Offices & Reps.

EXP:	N.Y., Westbury, Minthorne Int'l.	516-334-3303
FOR:	Can., Montreal, Que., Future Elctrns. Corp.	514-481-7701

ELECTRONIC HARDWARE CORP., Div. Hi-Tech Industries, Inc., 180-08 Liberty Ave., Jamaica, N.Y., 11433, Tel: 212-291-2710; Empl.: 100 .... p. 2•1081,1082

For info on price: H. Goodman; Application info: H. Goodman; Customer service: J. Quick; Delivery info: J. Quick

Free literature available: Catalog #MS70 - MS91528 Knobs, #68 - Knobs, #CS-1 - Knobs, #71 - Knobs.

Products manufactured: Dials, Handles For Cabinets, Circuit Boards, Racks, etc., Knobs

Local Sales Offices & Reps.

Cal	Los Altos, Schwerin Assoc.	415-941-3737
Cal	Orange, Current Prods. Sls.	714-633-7414
Colo	Denver, Electronic Sls.	303-771-6300
Fla	Miami Beach, Geartner Assoc.	305-861-3661
Fla	Orlando, Geartner Assoc.	305-299-1000
Ill	Chicago, Allen Woods & Assoc.	312-283-7400
Kans	Overland Park, Penzner-Mankus Assoc.	913-381-0004
Md	Pikesville, A. Wetterhahn Co.	301-484-6376
Mass	Waltham, Impact Sls. Co.	617-893-2850
Minn	Minneapolis, Betronics Sls. Co.	612-866-3035
NJ	Oaklyn, A. Wetterhahn Co.	609-858-3003
NJ	River Edge, Meg Sls.	201-265-9887
NY	Buffalo, Telesco Assoc.	716-834-1026
Ohio	Cincinnati, F.E. Kahsar Sls.	513-471-9011
Ohio	Hudson, F.E. Kahsar Sls.	216-653-6808
Pa	Philadelphia, A. Wetterhahn Co.	215-627-1535
Tex	Garland, G.V. Peck Co.	214-341-8311
Tex	Houston, G.V. Peck Co.	713-664-1435
Wash	Mercer Island, J.H. Andersen Assoc.	206-232-0484

ELCTRN. INSTR. & SPECIALTY, 42 Pleasant St., Stoneham, Mass., 02180, Tel: 617-438-5300; Empl.: 65; Minimum order: $25 .... p. 1•1660-1667

For info on price: W. K. Crawford; Application info: R. A. Painter; Customer service: W. K. Crawford; Delivery info: E. K. Rodham

Free literature available: Eight page catalog of wide spectrum of Reed Relays and data sheets on AC Solid State Relays.

Products manufactured: Converters, Relays

Local Sales Offices & Reps.

Cal	San Jose, Grosken Inc.	408-293-3108
Md	Woodbine, Naudain Assocs.	301-442-2270
Mass	Stoneham, Electronic Instr. & Specialty Corp.	617-438-5300
Mich	Birmingham, Forand Sls. Co.	313-644-0087
NJ	Mount Laurel, Naudain Assocs.	215-564-3194
NJ	Nutley, I. Brill	201-667-0653
Ohio	Cleveland, Buckeye Comps.	216-292-2889
Ohio	Dayton, Buckeye Comps.	513-278-4279
Tex	Houston, Texas Special Elctrn. Comps.	713-666-5871

Local Distributors

NJ	Clifton, Parts Masters, 411 Main Ave.	201-777-7706

ELECTRONIC MEASUREMENTS, 405 Essex Rd., Neptune, N.J., 07753, Tel: 201-922-9300, Telex: 132-424; Empl.: 70 .... p. 1•1187-1192

Products manufactured: Power Supplies

ELECTRONIC MEMORIES & MAGNETICS CORP., 12621 Chadron Ave., Hawthorne, Cal., 90250, Tel: 213-644-9881, TWX: 910-325-6213; Empl.: 7300

Products manufactured: Cores, Magnetic, Disc Packs, Magnetic, Integrated Circuit Devices, Memory Systems

Local Sales Offices & Reps.

Cal	Burlingame, EMM Corp.	415-692-4250
Cal	Los Angeles, EMM Corp.	213-477-3911
Colo	Littleton, Cropley Inc.	303-794-4231
Conn	Rocky Hill, EMM Corp.	203-529-7775
Fla	Ft. Lauderdale, Modemsplus, Inc.	305-587-3849
Ga	Atlanta, Modemsplus, Inc.	404-633-1212
Ill	Des Plaines, EMM Corp.	312-297-3110
Mass	Lexington, EMM Corp.	617-861-9650
Mich	Southfield, EMM Corp.	313-352-1040
Minn	Minneapolis, Datasery	612-546-4422
Mo	Clatton, EMM Corp.	314-863-0015
Neb	Omaha, Dataserv	402-551-4882
NJ	Saddle Brook, EMM Corp.	201-845-0450
NC	Charlotte, Modemsplus, Inc.	704-364-5158
Ohio	Cleveland, EMM Corp.	216-884-1980
Pa	Abington, EMM Corp.	215-887-4940
Pa	Pittsburgh, EMM Corp.	412-921-1221
Tenn	Nashville, Modemsplus, Inc.	615-868-1004
Tex	Dallas, EMM Corp.	214-243-2374
Tex	Houston, EMM Corp.	713-626-3592
Tex	McDade, EMM Corp.	918-366-8491
Utah	Salt Lake City, Cropley, Inc.	801-355-8321
Va	Annandale, EMM Corp.	703-941-2100
Wash	Seattle, EMM Corp.	206-623-1477

ELECTRONIC MODULES, INC., 2500 E. Foothill Blvd., Pasadena, Cal., 91107, Tel: 213-795-4231; Empl.: 15

Products manufactured: Amplifiers, Power Supplies, Regulators, Relays, Signal Conditioners & Equipment

ELCTRN. MOLDING CORP., 88 Mill St., Woonsocket, R.I., 02895, Tel: 401-769-3800, TWX: 710-387-1350; FSC No: 17117; Empl.: 100; Minimum order: $25 p. 2•676-679

For info on price: I. Dulude 401-769-3800; Application info: E. Boonstra 401-769-3800; Customer service: J. Bourassa 401-769-3800; Delivery info: I. Dulude 401-769-3800

Products manufactured: Backpanel Interconnect Systems, Boards, Printed Circuit, Boards, Printed Wiring, Universal, Bushings, Glass, Plastic, Metal, Rubber, Etc., Chassis, Circuit Board Mounting, Clamps & Clips, Coils Including Assemblies & Forms, Connectors, Contacts, Electrical, Cords, Enclosures, Module, Plug-In, Fasteners, Feedthrus & Seals, Environmental, Handles For Cabinets, Circuit Boards, Racks, etc., Holders, Crystal, Integrated Circuit Packaging Systems, Jacks (All Types), Jumpers, Lamp Adapters, Packages, Integrated Circuit, Pads, Transistor Mounting, Panels, Pins, Plug Adapters, Posts, Probes, Racks, Services, Assembly, Production & Test, Socket Adapters, Sockets, Spacers, Terminal Blocks, Boards & Strips, Terminals, Tools

Local Sales Offices & Reps.

Cal	San Diego, Qualtronics	714-560-8955
Cal	San Jose, K. Yerama	408-251-6900
NY	Plainview, B. Yellin	516-433-7669

ELECTRONIC NAVIGATION INDS., INC., 3000 Winton Rd. S., Rochester, N.Y., 14623, Tel: 716-473-6900, Telex: 97-8283; Empl.: 50 ......p. 1•674-676

For info on price: L. M. Salmen; Application info: L. M. Salmen; Customer service: L. M. Salmen; Delivery info: C. Cipro

Free literature available: We have an ENI catalog describing our complete line of Solid State, Broadband, Power Amplifiers & Power Multicouplers. Also includes technical data and design information on our RF Power Amplifiers and their application.

Products manufactured: Amplifiers, Attenuators, Generators, Meters, Oscillators, Transformers

Local Sales Offices & Reps.

Ala	Huntsville, Scientific Devices	205-536-1969
Ariz	Scottsdale, Williams Assocs.	602-947-4297
Cal	Los Angeles, McDougall/McLaughlin Co.	213-477-8556
Cal	Portola Valley, Kipp Assocs.	415-851-0123
Colo	Denver, Williams Assocs.	303-373-4730
Fla	Ft. Lauderdale, Scientific Devices	305-721-4260
Fla	Orlando, Scientific Devices	305-841-8180
Ill	Chicago, Carter Elctrns.	312-585-5485
Ind	Indianapolis, Carter Elctrns.	317-293-0696
Kans	Overland Park, Carter Elctrns.	913-649-6996
Md	Silver Springs, Gawler Knoop Co.	301-589-4406
Mass	South Chelmsford, Independent Mktg. Reps.	617-256-8251
Mich	Ferndale, Tiby Co.	313-547-3550
Minn	Minneapolis, Carter Elctrns.	612-544-9393
Mo	Hazelwood, Carter Elctrns.	314-731-2237
NM	Albuquerque, Williams Assocs.	505-255-1638
NY	Greenvale, B.D. Aaron & Co.	516-621-0630
NY	Rochester, Elctrn. Navigation Ind's.	716-473-6900
NC	Burlington, Scientific Devices	919-228-6279
Ohio	Cleveland, Tiby Co.	216-371-5335
Ohio	Dayton, Tiby Co.	513-277-3822
Okla	Norman, Data Mktg. Assocs.	405-364-8320
Pa	Newtown Square, SWR Assocs.	215-356-8550
Tex	Austin, Data Mktg. Assocs.	512-451-5174
Tex	Dallas, Data Mktg. Assocs.	214-661-0300
Tex	Houston, Data Mktg. Assocs.	713-686-9627
Tex	San Antonio, Data Mktg. Assoc.	512-828-0937
Wash	Seattle, Underwood, Jensen & Assoc.	206-575-0123
Wisc	Milwaukee, Carter Elctrns.	414-464-5555

ELCTRN. PRECISION COMPS. CORP., 11 W. Sandford Blvd., Mt. Vernon, N.Y., 10550, Tel: 914-664-2333; Empl.: 8; Minimum order: $25

For info on price: Patrica; Application info: D. Edwards; Customer service: Patrica; Delivery info: L. Brown

Free literature available: Literature on precision power resistors.

Products manufactured: Networks, Resistors, Shunts, Meter

Local Sales Offices & Reps.

NJ	Nutley, I. Brill	201-667-0653

ELECTRONIC RESEARCH CO., Div. Textron Inc., Box 913, Shawnee Mission, Kans., 66201, Tel: 913-631-6700, TWX: 910-749-6477; Empl.: 520; Minimum order: $35 .... p. 1•317,677-684

For info on price: B. Cook Ext. 46; Application info: B. Cook Ext. 46; Customer service: C. Hammond Ext. 62; Delivery info: B. Cook Ext. 46

Free literature available: Digital Instrument Product Index - Contains Abbreviated Specs, Prices, Options for 13 series of digital panel instruments including voltmeters, clocks, counters, timers, comparators, and stopwatches. Data Sheets - Complete Specs, Prices, Options on all instruments. Frequency Product Literature - Data Sheets, Design Sheets.

Products manufactured: Clocks (All Types), Comparators, Counters, Crystals, Current Sensors, Filters, Indicators, Meters, Oscillators, Preselectors, Synthesizers, Timers, Totalizers, Digital

Local Sales Offices & Reps.

Digital instrument

Ala	Huntsville, Vesco	205-881-8830
Cal	Cupertino, T. L. Snitzer Co.	408-257-8333
Cal	Del Mar, T. L. Snitzer Co.	714-454-2191
Cal	Los Angeles, T. L. Snitzer Co.	213-836-6170
Colo	Littleton, Aztec Entrprs.	303-795-0250
Conn	Newton, Daner-Hayes, Inc.	
Fla	Orlando, Datarep, Inc.	305-843-5224
Fla	Pompano Beach, Datarep, Inc.	305-781-9279
Ind	Indianapolis, Couchman-Conant	317-849-9890
Kans	Baxter Springs, Production Automation Corp.	
Md	Rockville, Farrell Assoc.	301-424-9460
Mass	Newton Center, Daner-Hayes, Inc.	617-969-4650
Mass	Stoneham, Ken Corp.	617-438-5464
Mich	Royal Oak, Dave Ray & Assocs.	313-576-4705
Minn	Minneapolis, Production Automation Corp.	612-866-5700
Mo	Hazelwood, Production Automation Corp.	314-731-2331
Mo	Raytown, Production Automation Corp.	816-737-0066
NM	Albuquerque, J.S. Heaton Co.	505-293-3900
NY	Elbridge, L-Tron Corp.	315-689-3787
NY	Great Neck, Meas. Technology Inc.	516-482-3500
NY	Scottsville, L-Tron	716-436-4410
NY	Tonawanda, L-Tron	716-691-8887
NC	Winston Salem, Radco Co.	919-722-9671
Ohio	Aurora, EMA, Inc.	216-562-6104
Ohio	Centerville, EMA, Inc.	513-433-2800
Pa	Audubon, Daner-Hayes, Inc.	215-666-5005
Wash	Rush, S. Drake Assocs.	206-763-2755

Frequency product

Cal	Redwood City, J. S. Heaton Co.	415-369-4671
Colo	Denver, J. S. Heaton Co.	303-758-5130
Conn	New Canaan, S. Pierce Inc.	203-966-4630
Fla	Clearwater, Dyne-A-Mark Corp.	813-446-3229
Fla	Ft. Lauderdale, Dyne-A-Mark Corp.	305-771-6501
Fla	Orlando, Dyne-A-Mark Corp.	305-299-6303
Ill	Oak Brook, Whitmore Assocs.	312-325-4727
Ky	Ft. Mitchell, G. W. Thelen Co.	606-341-8181
Md	Silver Spring, Spectro Sys.	301-949-8261
Mass	Norwood, S. Pierce, Inc.	617-762-3164
Minn	Minneapolis, Nortec Sls. Inc.	612-835-7414
Mo	Hazelwood, Cen-Tech Sls.	314-731-4220
Mo	Raytown, Cen-Tech Sls.	816-358-8100
Mo	Springfield, Osbern Sls. Co.	417-887-1773
NJ	Riverdale, Comp Tech Sls.	201-935-5454
NM	Albuquerque, J. S. Heaton Co.	505-293-3900
NY	New Hyde Park, Comp-Tech Sls.	516-593-2628
Pa	Wyndmoor, Spectro Sys. Corp.	215-836-1545
Wash	Seattle, Blum & Assocs.	206-285-2590

ELCTRN. SEALS, 13766 Saticoy St., Van Nuys, Cal., 91402, Tel: 213-873-4982; FSC No: 12349; Empl.: 25; Minimum order: $75

Customer service: H. Adelman

Products manufactured: Connectors, Seals, Services, Assembly, Production & Test

ELECTRONIC SPECIALTY DIV., Datron Systems Inc., 18900 N.E. Sandy Blvd., Portland, Ore., 97220, Tel: 503-665-0121, TWX: 910-469-8782; QPL No: M5757; Minimum order: $35

For info on price: B. Sites; Application info: B. Hartman; Customer service: N. Pelham; Delivery info: N. Pelham

Products manufactured: Relays

Local Sales Offices & Reps.

Ala	Madison, B-C Elctrn. Sls.	205-837-5778
Ariz	Scottsdale, Goodreau Assocs.	602-994-9909
Cal	Los Angles, KCE Corp.	213-649-2622
Cal	Mountain View, Westrep	415-968-5800
Cal	Pico Rivera, Westrep	213-949-2551
Cal	San Diego, Westrep	714-276-0751
Colo	Denver, Cristee-Meade	303-753-9471
Conn	North Haven, Forsberg Sls.	203-239-5111
Fla	Seminole, Spartak Inc.	813-393-5402
Ga	, B-C Elctrn. Sls.	404-436-5169
Ill	Hinsdale, J.D. Allyn Co.	312-325-0495
Ind	Indianapolis, Berberich Assocs.	317-788-9221
Kans	Prairie Village, Engrg. Svc. Co.	913-649-4000
Md	Luthersville, L.D. Lowery	301-296-0379
Mass	Brockton Mass, Forsberg Sls.	617-522-6300
Mich	Walled Lake, Berberich Assoc.	313-624-2211
Minn	St. Paul, Countryman Assoc. Co.	612-645-9151
Mo	St. Louis, Engrg. Svcs. Co.	314-997-1515
NY	Smithtown, T.X. Sls.	516-979-8750
NY	Syracuse, C.W. Floring & Assoc.	315-478-2149
Ohio	Dayton, Berberich Assoc. Inc.	513-433-0342
Pa	Broomall, L.D. Lowery	215-356-5300
Pa	Harrisburg, L.D. Lowery	
Tex	Addison, R.R. Thomas Co.	214-233-8235
Va	Charlottesville, L.D. Lowery	804-973-6672
Va	Vinton, B-C Elctrn. Sls.	703-890-1128
Wash	Seattle, H.S. Thorpe	206-784-3333

ELECTRONIC SUPPORT SYSTEMS, 122 W. St. Charles Rd., Villa Park, Ill., 60181, Tel: 312-833-8277; Empl.: 20

Products manufactured: Boards, Printed Circuit

ELECTRONIC SYSTEMS & PROGRAMMING INC., 3355 W. El Segundo Blvd., Hawthorne, Cal., 90250, Tel: 213-973-0262; Empl.: 46; Minimum order: $25

For info on price: R. Potampa; Application info: K. F. Zimmermann; Customer service: H. F. Gainey; Delivery info: L. E. Oliver

Products manufactured: Jigs And Fixtures, Chassis & Circuit Board, Test Systems, Testers

Local Sales Offices & Reps.

Cal	Los Angeles, Burtis Instrumentation	213-887-1360
Tex	Houston, Ammon & Rizos	214-233-5591

ELECTRONIC TRANSFORMER CORP., 460 Totowa Ave., Paterson, N.J., 07509, Tel: 201-279-4445; FSC No: 72149; Empl.: 65

For info on price: M. Gorman; Application info: E. Bulwin; Customer service: A. Cezar; Delivery info: M. Haras

Products manufactured: Chokes, Coils Including Assemblies & Forms, Filters, Networks, Reactors, Transformers

Local Sales Offices & Reps.

NY	Bellmore, J. Anapol	516-826-2310
NY	Syracuse, Lenard Co.	315-479-9191
Ohio	Dayton, S. Tetelbaum	513-276-5808

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ELECTRONIC TRANSISTORS, 153-13 Northern Blvd., Flushing, N.Y., 11354, Tel: 212-539-6700, Telex: 960173; FSC No: 12045; Empl.: 45; Minimum order: $5

For info on price: M. Byrnes; Application info: M. Byrnes; Customer service: M. Byrnes; Delivery info: M. Lipton

Products manufactured: Diodes, Rectifiers, Thyristors (Includes Silicon Controlled Rectifiers), Transistors

Local Sales Offices & Reps.

Ill	Chicago, Weisz Assocs.	312-637-9117
Ohio	Dayton, L.S. Fedotin	513-275-9345
Ohio	St. Marys, Repp Co.	419-394-4724
EXP:	Westbury, N.Y., Minthorne Int. Co.	516-334-3303

ELECTRONICS ONE INC., 2166 Faulkner Rd. NE, Atlanta, Ga., 30324, Tel: 404-321-4960; Empl.: 7

Customer service: B.A. Bond Jr.

Products manufactured: Circuits, Printed, Multilayer, Services, Assembly, Production & Test, Testers, Timers

ELECTRONS CO., Unit of General Signal Corp., 65 Passaic Ave., Fairfield, N.J., 07006, Tel: 201-227-3830; FSC No: 80098; Empl.: 100

For info on price: D. J. Hall; Application info: E. Burns; Customer service: H. Benevento; Delivery info: N. Benevento

Free literature available: Industrial power tubes, Equipment Ground Fault Sensors; Telecommunications Surge Arrestors; Fire and Security Systems Thermal and Ionization detectors.

Products manufactured: Arresters, Electrical Surge, Lightning, Protectors, Spark Gaps, Tubes

Local Sales Offices & Reps.

Ala	Birmingham, Whitman Assoc.	205-252-3079
Cal	El Monte, Randolph Ind., Inc.	213-443-1701
Cal	San Francisco, Artwel Elec., Inc.	415-467-1880
Colo	Denver, Gaer Sls.	307-777-3740
Fla	Coconut Grove, Whitman Assoc.	305-856-6749
Fla	Gulf Breeze, Whitman Assoc.	904-932-5670
Fla	Jacksonville, Whitman Assoc.	904-354-5985
Fla	Tampa, Whitman Assoc.	813-877-6091
Ga	Atlanta, Whitman Assocs.	404-521-0977
Ill	Chicago, Weldy-Lamont Assoc., Inc.	312-777-8575
La	New Orleans, Rapco Assoc.	504-283-7321
Mass	Watertown, Northeast Mfrs. Assocs.	617-325-3252
Mich	Royal Oak, Continental Products Co.	313-546-4520
Miss	Jackson, Rapco Assoc.	601-969-3221
Mont	Missoula, Pacific Western Agencies	406-543-5296
NJ	Old Bridge, R. W. Duffy & Assocs.	201-251-6200
NY	Old Bridge, R. W. Duffy & Assoc.	201-251-6200
NY	Rochester, Canavan-Scanlon Assoc.	716-442-0720
NC	Charlotte, Norman Tindel Co.	704-334-4776
Ore	Portland, Pacific Western Agencies	503-228-7261
Pa	Pittsburgh, Brown Elec. Equip. Co.	412-563-4444
SC	Columbia, George W. Greene Agency	803-252-3032
Tenn	Knoxville, Whitman Assoc.	615-687-3578
Tex	Houston, J Edwards Co.	713-223-4731
Va	Richmond, Whitman Assoc.	703-266-3185
Va	Roanoke, Whitman Assoc.	703-774-6029
Va	Va. Beach, Whitman Assoc.	703-428-8717
Wash	Seattle, Pacific Western Agencies	206-623-3483
Wash	Spokane, Pacific Western Agencies	509-FA 6-4242
FOR:	Can., Streetsville, Ont., L & H Ents.	416-826-3828

ELECTROSTATICS INC., 7718 Clairemont Mesa Blvd., San Diego, Cal., 92111, Tel: 714-279-1414; FSC No: 34538; Empl.: 15; Minimum order: $30 ... p. 1•1184,1185

For info on price: Robert D. McCartney; Application info: Robert D. McCartney; Customer service: Edwin T. Foster; Delivery info; Edwin T. Foster

Free literature available: A catalog of low priced DC power supplies featuring single, dual, and triple models from 3 to 50 volts and 0.35 to 15A.

Products manufactured: Power Supplies

ELECTROTEC INC., 2837 Ladybird La., Dallas, Tex., 75220, Tel: 214-358-4221, TWX: 910-861-4123; Empl.: 32; Minimum order: $50

For info on price: W. Cloyd 214-358-4221; Application info: W. Cloyd 214-358-4221; Delivery info: D. Venable 214-358-4223

Free literature available: Microwave Integrated Circuit design parameters & assembly techniques for MIC users. Resistor Design design parameters for thin film resistor designers.

Products manufactured: Chemicals, Networks, Resistors

Local Sales Offices & Reps.

Cal	Burbank, Wright Engrg.	213-843-7240
Cal	Los Altos, Stout-Loeswick Inc.	415-948-3265
Mass	Lowell, Russell Engrg.	617-458-7146
Minn	Anoka, Magner & Assocs.	612-427-5550
NY	Bridgeport, Lightstone Corp.	315-699-5747
NY	Plainview, ERA	516-822-9890
Wisc	Milwaukee, MW Enterprises	414-352-9150

ELECTROVERT, 86 Hartford Ave., Mt. Vernon, N.Y., 10553, Tel: 914-664-6090, Telex: 1-37483; Empl.: 65; Minimum order: $50

Customer service: M. Lanoy

Free literature available: Wire cable harnesses, markers & accessories. Terminal blocks, strips & specialty types. Automatic soldering, fusing & tinning systems.

Products manufactured: Baths, Controlled Temperature (Air & Liquid), Boards, Programming, Cable Assemblies & Harnesses, Clamps & Clips, Cleaners, Ultrasonic, Ducts, Wiring, Fasteners, Grommets, Holders, Circuit Board (Production Type), Machines/Machinery, Production, Solder Pots & Baths, Soldering Equipment, Strips, Terminal Blocks, Boards & Strips, Testers, Tubing, Wire & Cable Ties, Wire Markers

Local Sales Offices & Reps.

Ala	Huntsville, BJR Research Reps	205-881-1841
Ariz	Phoenix, Kay Ent.	602-242-6787
Ariz	Phoenix, Southwest Engrg.	602-933-0250
Cal	Burbank, Electrovert, Inc.	213-849-7833
Cal	Encino, CDH	213-345-3111
Cal	Glendale, Tooltronics, Inc.	213-240-4000
Cal	La Mirada, Dennis Don & Assoc.	714-523-5622
Cal	Santa Clara, Tooltronics	415-241-4000
Cal	Saratoga, Enterprise Engrg. Reps	408-255-7272
Colo	Boulder, Mile High Elctrns.	303-444-5615
Colo	Denver, B. T. Clark Inc.	303-936-4844
Fla	Clearwater, H. R. Gross & Co.	813-446-6649
Fla	Maitland, Rowe Engrg. Sls.	305-834-2700
Ga	Atlanta, Electrovert	404-451-9366
Ill	Chicago, Cumming & Foley Sls. Co.	312-725-8110
Ill	Chicago, EMF Co.	312-889-8323
Ill	Northlake, Electrovert, Inc.	312-562-1700
Ind	Carmel, Central States Machinery Co.	317-844-0178
Ind	Indianapolis, Dick Bennet Sls.	317-786-0196
Ind	Indianapolis, Marketing Engrgs.	317-546-1523
Kans	Prairie Village, Engrg. Serv. Co.	913-649-4000
Md	Silver Springs, ARA Elctrns.	301-565-2444
Mass	Newtonville, Edcom, Inc.	617-969-9710
Mass	Norwood, JMG, Inc.	617-762-5333
Mich	Grosse Point Park, J. L. Miner Assoc.	313-886-5878
Mich	Southfield, M. A. Percival Co.	313-356-5710
Minn	Minneapolis, Servco	612-941-7151
Minn	St. Paul, Countryman Assoc. Co.	612-645-9151
Mo	Raytown, Marty Taraski	816-358-4590
Mo	St. Louis, Engrg. Svc. Co.	314-997-1515
NJ	Hohokus, H. M. Linter & Son	201-445-2905
NJ	Livingston, Argo Engrg. Co.	201-992-4367
NY	Guiderland, Solder Pot	518-355-1829
NY	Plainview, R. Smith Assoc.	516-681-3155
NY	Rochester, L-Mar Assocs.	716-328-5240
Ohio	Cincinnati, Luebbe Sls. Co.	513-871-4211
Ohio	Cincinnati, Nelcor	513-871-2816
Ohio	Cleveland, J. B. Clough Co.	216-431-2700
Ohio	Cleveland, K. R. Dodge	216-461-6482
Ore	Portland, Vandy Corp.	503-297-1900
Pa	Enon Valley, NEBco Assoc.	412-457-2333
Pa	Glenside, ARA Elctrns. Inc.	215-887-5250
Pa	Narberth, S. A. Jeffries, Inc.	215-664-8500
Pa	Reading, Beil & Whitaker	215-779-2610
Tenn	Memphis, Strickland Assoc.	901-332-6578
Tex	Dallas, J. Tuite Co.	214-381-2103
Tex	Irving, Electrovert, Inc.	214-255-1516
Tex	Irving, Tooltronics	214-251-2239
Tex	Richardson, P. J. Scanlon Co.	214-231-4661
Wash	Seattle, Electrical Agents NW Inc.	206-762-3314
Wash	Seattle, Vandy Corp.	206-789-3300
FOR:	Can., Montreal, Electrovert, Mfg.	514-488-2521

ELEXON POWER SYS., Div. Elpac Inc., 3131 S. Standard Ave., Santa Ana, Cal., 92705, Tel: 714-979-4440; Empl.: 180

Products manufactured: Power Supplies

Local Sales Offices & Reps.

Ala	Huntsville, BJR Mftg. Reps.	205-881-3569
Ariz	Phoenix, J.S. Heaton Co., Inc.	602-264-7887
Cal	Redwood City, J.S. Heaton Co., Inc.	415-369-4671
Colo	Denver, J.S. Heaton Co., Inc.	303-758-5130
Fla	Ft. Lauderdale, CBC Elctrns.	305-484-7330
Fla	Melbourne, Reynolds & Assoc. Inc.	305-727-3205
Fla	St. Petersburg, Orbe, Inc.	813-894-0687
Ill	Chicago, Balhorn & Welch	312-889-5011
Ill	Oak Park, E. Schmeichel Co.	312-378-2070
Ind	Indianapolis, France Entprs.	317-894-0593
Iowa	Cedar Rapids, J. Vrbik Co.	319-377-8244
Kans	Shawnee Mission, K & M Sls Co.	913-262-1444
Md	Baltimore, Component Sls., Inc.	301-484-3647
Mass	Needham, Coakley, Boyd & Abbett	617-444-5470
Mass	Needham Heights, Todino Eng. Sls., Inc.	617-444-7925
Mich	Dearborn, Villani-Pitcher, Inc.	313-271-4600
Minn	St. Paul, L. Cahill & Assoc. Inc.	612-646-7217
NJ	Mt. Laurel, Naudian Assoc.	215-564-3194
NM	Albuquerque, J. S. Heaton Co.	505-293-3900
NY	New York, P. Saftler Assoc., Inc.	16-593-7880
NC	Raleigh, Component Sls., Inc.	919-782-8433
Ohio	Cincinnati, F. J. Campisano Co.	513-662-1616
Ohio	Medina, J.C. Hoffstetter Co.	216-241-4880
Okla	Tulsa, H. J. Daly Co.	918-627-4159
Pa	Doylestown, T.O.E. Sls. Inc.	215-348-2212
Tex	Dallas, Hillman Entprs.	214-827-4790
Wash	Bellevue, Testco	206-454-7422
FOR:	Can., Downsview, Ont., Cantronics Ltd.	416-661-2494

ELFAB CORP., 762 Wiley Post Rd., Addison, Tex., 75001, Tel: 214-233-3033, TWX: 910-860-5460; Empl.: 150; Minimum order: $50 .... p. 2•680,681

For info on price: B. Treece; Application info: J. Scaminaci, Jr.; Customer service: B. Treece; Delivery info: B. Treece

Free literature available: Literature on: Printed circuit connector backpanel assemblies.

Products manufactured: Backpanel Interconnect Systems, Boards, Printed Circuit, Connectors, Terminals

Local Sales Offices & Reps.

Ariz	Tempe, Delta Elctrns.	602-966-9903
Cal	Freemont, H.K. Foraker	415-657-2213
Cal	Woodland Hills, Elfab Corp.	213-883-7606
Colo	Boulder, Component Prods.	303-444-2730
Fla	Orlando, Geartner Assocs.	305-299-1000
Ill	Glendale Hgts., Trend-Tronics	312-963-2210
Kans	Prairie Village, R. S. Sls., Inc.	913-381-8812
Md	Rockville, Mechtronics Sls.	301-340-2130
Mich	Dearborn Hts., Ankofski Sls. Co.	313-565-6330
Minn	Minneapolis, Components Group	612-824-4222
NJ	Paramus, Win Cor Elctrn. Sls.	201-967-0242
NY	Cooperstown, A. Fitzelle Assocs.	607-547-9333
NY	Manhasset, Win-Cor Elctrn. Sls.	516-627-9474
Ohio	Dayton, Myers Assocs.	513-435-1309
Okla	Oklahoma City, Ammon & Rizos Co.	405-373-2748
Pa	Philadelphia, R.P. Luce & Co.	215-884-8365
Tex	Dallas, Ammon & Rizos Co.	214-233-5591
Tex	Houston, Ammon & Rizos Co.	713-781-6240
Wash	Tukwila, General Elctrns, Inc.	206-243-5141
FOR:	Can., Ottawa, OnT., Orion Electrns.	613-521-2739

ELGAR CORPORATION, 8225 Mercury Ct., San Diego, Cal., 92111, Tel: 714-565-1155, TWX: 910-335-1246; FSC No: 25965; Empl.: 85; Minimum order: $25 .... p. 1•1197-1199

For info on price: W. E. Foy Ext. 19; Application info: W. E. Foy Ext. 19; Customer service: Samuel A. Lewis, Ext. 41; Delivery info: W. E. Foy, Ext. 19

Free literature available: General Catalog (describes AC Power Sources & AC Line Conditioners), UPS Brochure (describes UPS models through 15 KVA), Inverter Data Sheets.

Products manufactured: Amplifiers, Converters, Inverters, Isolators, Oscillators, Power Supplies, Regulators, Suppressors, Testers

Local Sales Offices & Reps.

Ala	Huntsville, BCS Assocs.	205-881-6220
Ariz	Scottsdale, Barnhill Three, Inc.	602-947-7841
Cal	La Jolla, Ward/Davis Assocs.	714-459-3351
Cal	Lawndale, Ward/Davis Assocs.	213-452-7740
Cal	Sunnyvale, Ward/Davis Assocs.	408-245-3700
Colo	Denver, Barnhill Three, Inc.	303-750-1222
Conn	Hamden, P. Jenks Assocs.	203-281-0810
Conn	New Canaan, McLellan Assocs.	203-966-2580
Fla	Orlando, BCS Assocs.	305-896-4881
Ill	Des Plaines, Cozzens & Cudahy, Inc.	312-298-3600
Ind	Indianapolis, Cozzens & Cudahy, Inc.	317-244-2456
Md	Kensington, Electronic Mktg. Assocs.	301-881-5300
Mass	Holbrook, McLellan Assocs.	617-767-4771
Mass	Wakefield, P. Jenks Assocs.	617-246-1590
Mich	Detroit, WKM Assocs.	313-892-2500
Minn	Minneapolis, Cozzens & Cudahy, Inc.	612-884-4336
Mo	Edmundson, Cozzens & Cudahy, Inc.	314-423-1234
Mo	Kansas City, Cozzens & Cudahy, Inc.	816-454-5836
NM	Albuquerque, Barnhill Three, Inc.	505-299-7658
NY	Great Neck, Measurement Tech. Inc.	516-482-3500
NY	Pleasantville, SBM Representatives	914-769-1811
NY	Rochester, SBM Representatives	716-266-1400
NC	Greensboro, BCS Assocs.	919-273-1918
Ohio	Cleveland, WKM Assocs.	216-267-0445
Ohio	Dayton, WKM Assocs.	513-434-7500
Pa	King of Prussia, Electronic Mktg. Assocs.	215-265-1600
Pa	Pittsburgh, WKM Assocs.	412-892-2953
Tex	Houston, Barnhill Two, Inc.	713-688-9971
Tex	Richardson, Barnhill Two, Inc.	214-231-2573
Wash	Seattle, SJI Corp.	206-624-9020
EXP:	San Diego, Cal., Elgar Intern'l. Corp.	714-565-1155

ELGENCO, INC., 1550 Euclid, Santa Monica, Cal., 90404, Tel: 213-451-1635; FSC No: 15455; Minimum order: $10 .... p. 1•685-690

Customer service: D. Cusworth

Products manufactured: Analyzers, Cards, Linear Function, Generators, Power Supplies

Local Sales Offices & Reps.

Cal	Sherman Oaks, Windsor Dynamics, Inc.	213-989-3631
Cal	Woodside, Windsor Dynamics, Inc.	415-854-4870
Conn	Glastonbury, Instrs. Reps.	203-633-0777
Mass	Lexington, Instr. Reps., Inc.	617-861-8620
NM	Albuquerque, Technology Mktg. Assoc.	505-298-4321
NY	Great Neck, Harvey J. Krasner Assoc.	516-487-0690
Pa	Newtown Square, Holdsworth & Co.	215-EL6-8550

ELGIN ELCTRNS., INC., Sub. Basic, Inc., Walnut St., Waterford, PA., 16441, Tel: 814-796-2601, TWX: 510-699-6659; Empl.: 600; Minimum order: $50

For info on price: G. Egelston; Application info: J. Seppala; Customer service: R. Borgia; Delivery info: R. Borgia

Products manufactured: Boards, Printed Circuit, Chargers, Battery, Eliminators, Battery, Generators, Power Supplies, Services, Assembly, Production & Test, Terminal Blocks, Boards & Strips

Local Sales Offices & Reps.

Ala	Huntsville, 20th Century Mktg., Inc.	205-772-9237
Cal	Los Alamitos, Anderson Assoc.	213-596-2313
Cal	Mountain View, Microwave Mktg. Assoc.	415-969-3355
Conn	Wilton, Elgin Electronics	203-762-7012
Fla	Eau Gallie, W. Bitter	305-254-3674
Haw	Honolulu, Communicators Inc.	
Ill	Woodridge, Elgin Electronics	312-964-4474
Mass	Concord, Elgin Electronics	617-369-3051
Mich	Rochester, K. Mor Assoc.	313-651-1890
Mont	Lakeside, W.J. McDougall	
PA	Waterford, Elgin Electronics	814-796-2601
Tex	Dallas, Utility Mktg. & Devel.	214-661-3284
Va	Fairfax, Tom Davis Mkts.	703-591-7390
Wash	Seattle, Del Com Sls. Co.	206-248-0900
EXP:	Can., Scarborough, Ont., R-O-R Assoc., Ltd.	416-291-7121

ELIN DIV., California Instrs. Co., Div. of Aiken Ind., 5150 Convoy St., San Diego, Cal., 92111, Tel: 714-279-8620; FSC No: 16067; Empl.: 80; Minimum order: $25

For info on price: W. W. Hanford; Application info: W. W. Hanford; Customer service: D. Chilcoat; Delivery info: W. W. Hanford

Free literature available: Cimron® Digital Multimeter Selection Guide Invertron® AC power source short form catalog.

Products manufactured: Amplifiers, Converters, Generators, Isolators, Power Supplies, Protectors, Regulators, Suppressors, Transformers

Local Sales Offices & Reps.

Ala	Huntsville, FM Assocs.	205-536-9990
Ariz	Scottsdale, Williams Associates, Inc.	602-947-4297
Cal	Cupertino, T. Louis Snitzer Co.	408-257-8333
Cal	Los Angeles, T. Louis Snitzer Co.	213-836-6170
Colo	Denver, Williams Associates, Inc.	303-373-4730
Fla	Orlando, FM Assoc.	305-851-5710
Fla	Tequesta, FM Assoc.	305-746-3128
Haw	Honolulu, Aloha Associates	808-941-1574
Ill	Chicago, Sea	312-282-6694
Ind	Carmel, Sea	317-846-2593
Iowa	Cedar Rapids, Palatine Engrg. Sls. Co.	319-365-8071
Kans	Andover, Palatine Engrg. Sls. Co.	316-683-7512
Kans	Overland Pk., Palatine Engrg. Sls. Co.	913-262-5643
La	Baton Rouge, SESCO	504-927-7574
Mass	Needham, Addelco Corp.	617-444-4754
Mich	Detroit, Group Ten	313-549-3910
Minn	Minneapolis, Waytek	612-933-2133
Mo	St. Louis, Palatine Engrg. Sls. Co.	314-426-7055
NM	Albuquerque, Williams Associates, Inc.	505-255-1638
NY	Great Neck, Eastern Instr. of N.Y.	516-466-9505
NY	North Syracuse, NACO Elctrns.	315-699-2651
NC	Greensboro, FM Assoc.	919-294-2754

Ohio	Cleveland, Group Ten	216-486-2800
Ohio	Dayton, Group Ten	513-277-6531
Pa	Philadelphia, Eastern Instr. of Phil.	215-927-7777
Tex	Houston, SESCO	713-668-7840
Tex	Richardson, SESCO	214-231-9364
Wash	Seattle, Data Com Assoc.	206-285-2525

ELMA ENGINEERING, 1066 E. Meadow Circle, Palo Alto, Cal., 94303, Tel: 415-494-7303, Telex: 345-560; Empl.: 50; Minimum order: $25

For info on price: J. E. Frederick; Application info: K. W. Widl; Customer service: W. Bougher; Delivery info: G. Albert

Products manufactured: Analyzers, Chokes, Coils Including Assemblies & Forms, Controls/Control Eqpt., Heaters & Heating Elements, Magnets, Power Supplies, Reactors, Transformers

Local Sales Offices & Reps.

Ariz	Phoenix, Montgomery Bros.	602-253-3431
Cal	Laguna Beach, Marchi-Barus Assocs.	714-497-1815
Cal	Redwood City, Marchi Assocs.	415-364-3411
Colo	Denver, Montgomery Bros.	303-759-2749
Conn	Woodstock, Godfrey & Assocs.	203-928-0332
Minn	Minneapolis, I. T. Dahl Co.	612-926-4823
NJ	Paterson, Long, Poveromo & Assocs.	201-785-2492
NY	Rochester, H.C. Johnson Agencies	716-482-3000
Ohio	Cleveland, Allied Ents.	216-234-3838
Pa	St. Davids, R. Schadler Co.	215-687-5650
Tenn	Memphis, Engineered Instrs.	901-324-3871
Tex	Arlington, Davis-Dawson Co.	817-265-6426
Utah	Salt Lake City, Montgomery Bros.	801-363-3555

ELMAG CORP., 54 Clark St., Newark, N.J., 07104, Tel: 201-481-1600; FSC No: 23160; Empl.: 25; Minimum order: $50

For info on price: I. Black; Application info: F. Senft; Customer service: I. Black; Delivery info: I. Black

Products manufactured: Capacitors, Fixed, Filters

Local Sales Offices & Reps.

NJ	Hillsdale, Martin Klein Assoc.	201-664-8711
NY	E. Rockaway, Wm. Bellenkes Assoc.	516-887-1443
Ohio	Dayton, Irving Atkind Assoc.	513-837-4750
Pa	Narbeth, Samuel A. Jeffries	215-664-8500

EL-MENCO-, See Electro Motive Corp.

ELMWOOD SENSORS, INC., 1655 Elmwood Ave., Cranston, RI, 02907, Tel: 401-781-6500, TWX: 710-381-6413; Empl.: 400; Minimum order: $100
p. 1•1682,2308

For info on price: S. Hecht; Application info: S. Hecht; Customer service: A. Emerson; Delivery info: A. Emerson

Products manufactured: Controls/Control Eqpt., Relays, Switches, Thermometers, Resistance

Local Sales Offices & Reps.

Ala	Decatur, Tenn. Tech. Sls.	205-350-0630
Ark	Hot Springs, M. Young Assocs.	501-262-1365
Cal	Palo Alto, O'Donnell	415-327-3583
Cal	Torrance, O'Donnell	213-323-9243
Colo	Denver, P.A. Douden Co.	303-744-1497
Conn	Cheshire, G. Forman Co.	203-272-8509
Fla	Maitland, D & E Assocs.	305-644-3039
Ga	Marietta, K & E Asso.	404-427-0241
Ill	Hoffman Estates, Tech. Reps.	312-882-1414
Ind	Marion, O. Bromberg	317-664-5384
Iowa	Cedar Rapids, J.G. Twist Co.	310-393-8703
Ky	Louisville, O. Bromberg	502-245-8916
Mich	Farmington, Davis & Martensen	313-474-8300
Minn	Mpls., C. Listug Sls.	612-537-6740
Mo	St. Louis, E.J. Hill Co.	314-621-1818
NH	Durham, G. Forman	603-868-2282
NJ	Pitman, Colrud Co.	609-589-5866
NY	Binghamton, Canavan-Scanlon	607-724-7220
NY	Buffalo, Canavan-Scanlon	716-839-3373
NY	Larchmont, G.M. Moch Co.	914-834-3530
NY	Latham, L-Tron Corp.	518-785-5032
NY	Rochester, Canavan-Scanlon	716-442-0720
NY	Syracuse, Canavan-Scanlon	315-437-1271
Ohio	Cincinnati, O. Bromberg	513-771-9333
Ohio	Cleveland, Allied Entprs.	216-234-3838
Pa	Pittsburg, Allied Entprs.	216-234-3838
RI	Edgewood, G.H. Forman	401-781-1230
Tex	Fort Worth, T.J. Small Co.	817-332-6352
Va	Lynchburg, Royelec Sls. Assocs.	703-846-7117
Wash	Federal Way, Temco Northwest	206-838-0588
Wisc	Milwaukee, R. Zingler	414-964-8120

ELPA MARKETING IND., Thorens & Atlantic Ave., Garden City Park, NY, 11040, Tel: 516-746-3002

ELPOWER CORP., 2117 S. Anne St., Santa Ana, Cal., 92704, Tel: 714-540-6155, TWX: 910-595-1934; Empl.: 129

Customer service: J. Dunn

Free literature available: Complete catalogue with price sheet, discharge curves, other application data.

Products manufactured: Batteries, Chargers, Battery

Local Sales Offices & Reps.

Cal	Inglewood, Ungar Sls. Assocs.	213-678-5371
Cal	Oakland, Moulthrop Sls., Inc.	415-261-7676
Colo	Denver, K.C. Mkts.	303-733-5561
Fla	Orlando, Cartwright & Bean Inc.	305-896-2031
Fla	Plantation, Cartwright & Bean Inc.	305-791-3989
Ga	Atlanta, Cartwright & Bean Inc.	404-237-2273
Ill	Chicago, G. McL. Cole Co.	312-774-3535
La	Chalmette, Cartwright & Bean Inc.	504-279-4598
Mass	Newtonville, C. Segel Co.	617-969-6900
Mich	St. Clair Shores, J. Thorpe Co.	313-779-6363
Minn	Minneapolis, Heimann Co.	612-861-6051
Miss	Jackson, Cartwright & Bean Inc.	601-354-1368
Mo	Kansas, KSW Assocs.	816-363-5651
NJ	Cherry Hill, Trinkle Sls., Inc.	609-667-3500
NJ	East Orange, Masin-Esco, Inc.	201-674-6505
NY	Syosset, Masin-Esco, Inc.	516-364-0310
NY	Syracuse, Mar-Com Assocs.	315-437-2843
NC	Charlotte, Cartwright & Bean Inc.	704-333-6457
NC	Raleigh, Cartwright & Bean Inc.	919-832-7128
Ohio	Columbus, McFadden Sls., Inc.	614-221-3363
Tenn	Knoxville, Cartwright & Bean Inc.	615-693-7450
Tenn	Memphis, Cartwright & Bean Inc.	901-276-4442
Tex	Dallas, J.Y. Schoonmaker Co.	214-357-8481
Wash	Seattle, R. Johnston Co.	206-524-5170

ELSYTEC, INC., 212 Michael Dr., Syosset, N.Y., 11791, Tel: 516-364-0560; Empl.: 25

Products manufactured: Analyzers

ELTEC INSTRUMENTS INC., Central Ind'l. Pk., Daytona Beach, Fla., 32014, Tel: 904-252-0411

For info on price: M. A. Cleaver; Application info: F. H. Oettel; Customer service: M. A. Cleaver; Delivery info: M. A. Cleaver

Products manufactured: Feedthrus & Seals, Environmental, Impedance Converters, Microwave, Meters, Resistors

ECM MOTOR CO., 1301 E. Tower Rd., Schaumburg, Ill., 60172, Tel: 312-885-4000; Empl.: 250

Customer service: E. Spence

Free literature available: Gear motor brochure providing mechanical & electrical specifications for unidirectional & reversible AC & DC motors, plus information sheets on universal & synchronous motors.

Products manufactured: Motors

Local Sales Offices & Reps.

Ark	Little Rock, Ind'l. Sls. Co.	501-562-5852
Cal	Los Angeles, Halbar Assocs.	213-387-8283
Cal	San Mateo, Halbar Assocs.	415-349-4700
Conn	Thomaston, NBC	203-283-5959
Fla	Maitland, Hutto, Hawkins, Peregoy, Inc.	305-831-2474
Fla	Pompano Beach, Hutto, Hawkins, Peregoy, Inc.	305-943-9593
Ill	Chicago, M. Gottlieb Assoc.	312-775-1151
Ind	Ft. Wayne, J & B Engrg. Sls. Co.	219-483-2813
Ind	Indianapolis, M. Gottlieb Assoc.	317-846-5788
Ky	Nicholasville, W.H. Mathews	606-885-5047
La	New Orleans, Warriner Controls	504-861-4571
Md	Silver Spring, H.R. Sieber Co.	301-589-9110
Mass	Auburn, NBS	617-757-3131
Mich	Detroit, Nicon Assoc.	313-341-7688
Minn	Minneapolis, Applied Sls. Engrg.	612-544-3308
Mo	Kansas City, L.T. Silver	816-531-1144
Mo	St. Louis, Wells-White Co.	314-726-2511
NJ	Fort Lee, Sydney-Justin Assocs.	201-947-4371
NY	Rochester, Electra Sls. Corp.	716-436-4030
NY	Syracuse, Electra Sls. Corp.	315-455-5783
Ohio	Cincinnati, J. O. Olsen Co.	513-922-2176
Ohio	Cleveland, J. O. Olsen Co.	216-752-5444
Okla	Tulsa, T.J. Ray Co.	918-627-1515
Pa	Broomall, J. C. Whiddett Co.	215-353-6343
Pa	Pittsburgh, J.O. Olsen Co.	412-279-2550
Tenn	Bristol, Remco	615-968-4195
Tex	Dallas, Titan Reps Inc.	214-661-5350
Wash	Bellevue, Hays Indl. Sls.	206-883-8888
Wisc	Wauwatosa, Larsen Assocs.	414-258-0529

EMCO HIGH VOLTAGE, 2444 Old Middlefield Way, Mt. View, Cal., 94086, Tel: 415-969-3056; Empl.: 10; Minimum order: $100

Customer service: W. F. Doherty

Free literature available: General Catalog

Products manufactured: Converters, Power Supplies

EMCON DIV., Illinois Tool Works Inc., 11620 Sorrento Valley :Rd., Box 85142, San Diego, Cal., 92138, Tel: 714-459-4355, TWX: 910-322-1130

Products manufactured: Capacitors, Fixed

Local Sales Offices & Reps.

Cal	Irvine, Emcon Regional Office	714-833-9286
Cal	Mt. View, G.C. Woempner Co.	415-964-5454
Cal	San Diego, Emcon Home Office	714-459-4355
Colo	Denver, Camel Elctrns.	303-757-6191
Fla	Altomonte Springs, WMM Assocs.	305-831-4645
Fla	Clearwater, WMM Assocs.	813-447-2533
Fla	Pompano Beach, WMM Assocs.	305-943-3091
Ill	Chicago, Emcon Regional Office	312-282-7383
Ind	Indianapolis, Emcon Regional Office	317-255-9658
Mass	Burlington, Emcon Regional Office	617-273-0365
Mich	Benton Harbor, R.C. Nordstrom Co.	616-857-4653
Mich	Lathrup Village, R.C. Nordstrom Co.	313-559-7373
Minn	St. Paul, Murnco	612-484-8200
NY	Elmont, F.E. Schmitt Co.	516-437-8150
NY	Liverpool, L-Mar Assocs.	315-457-2329
NY	Rochester, L-Mar Assocs.	716-328-5240
NY	Vestal, L-Mar Assocs.	607-729-6339
Ohio	Columbus, Rockford Controls	614-231-5890
Ohio	Dayton, Rockford Controls	513-278-7362
Ohio	Euclid, Rockford Controls	216-731-5250
Pa	Erie, Ecco Elctrns.	814-455-8110
Tenn	Memphis, Emcon Regional Office	901-386-7252
Tex	Houston, R.F. Kimball Co.	800-294-2805
Tex	Richardson, R.F. Kimball Co.	214-231-3447
Utah	Salt Lake City, Camel Elctrns.	801-355-6181
Wash	Seattle, Nemco	
EXP:	Chicago, Ill., Illinois Tool Works Inc.	312-693-3040
FOR:	Can., Montreal, Que., H.W. Brieger Sls.	514-482-0722

Local Distributors

Cal	Los Angeles, RPS Elctrns., 1501 S. Hill St.	213-748-1271
Cal	Sunnyvale, Acacia Sls., 384 San Aleso Ave.	408-735-0100
NY	Elmont, F. E. Schmitt Co., 311 Meacham Ave.	516-437-8150

EMERGENCY BEACON CORP., 15 River Street, New Rochelle, N.Y., 10801, Tel: 914-235-9400; Empl.: 56

For info on price: J. DeLorenzo; Application info: R. Scappatura; Customer service: R. Scappatura; Delivery info: J. DeLorenzo

Products manufactured: Alarms, Amplifiers, Antennas, Comm. Systems, Filters, Handsets, Chestsets, Headphones, Headsets, Etc., Meters, Receivers, Transmitters

EMERSON & CUMING, INC., Dielectric Mat'ls. Div., 869 Washington St., Canton, Mass., 02021, Tel: 617-828-3300, TWX: 710-348-1324; Empl.: 252

For info on price: E. DiCastro; Application info: R. Wittemaur; Customer service: R. Wittemaur; Delivery info: E. DiCastro

Free literature available: Stycast Brochure - casting resins; Eccobond Brochure - adhesives; Eccocoat Brochure - coatings; Eccosil Brochure - silicones; Eccofoam Brochure - dielectric foams; Eccomold Brochure - transfer molding epoxies;

Eccosorb Brochure - microwave absorbers; Eccoshield Brochure - microwave r.f. shielding; Eccospheres Brochure - hollow glass spheres.

Products manufactured: Adhesives (All Types), Coatings, Compounds, Encapsulating, Insulating, Molding, Potting, Conductive Plastic Materials, Containers, Gaskets, Shielding, R-F-Also See Shields, R-F, Interferometer Systems, Kits, Shielding, Loads, Electronic Variable, Rubber, Seals, Shields, Tubing

Local Sales Offices & Reps.

Cal	Gardena, Emerson & Cuming, Inc.	213-321-6650
Fla	Cocoa Beach, DBM Research Corp.	305-783-2438
Ill	Northbrook, Emerson & Cuming, Inc.	312-272-6700
Md	Silver Spring, Emerson & Cuming, Inc.	301-949-2777
NY	Kings Park, Emerson & Cuming, Inc.	516-724-5216

Pa	Philadelphia, Emerson & Cuming, Inc.	215-848-2040
Tex	Richardson, Emerson & Cuming, Inc.	214-235-7394
Wash	Seattle, Minor B. Brown & Assoc.	206-932-5855

EMERSON, INDUSTRIAL CONTROLS DIV., 3300 Standard St., Santa Ana, Cal., 92702, Tel: 714-545-5581; Empl.: 400

For info on price: L. J. Boutin; Application info: L. J. Boutin; Customer service: H. Greene; Delivery info: H. Greene

Products manufactured: Controls/Control Eqpt., Power Supplies, Recorders

EMI GENCOM INC., 80 Express St., Plainview, N.Y., 11803, Tel: 516-433-5900, TWX: 510-221-1889; Empl.: 13

Customer service: L. M. Lieberman

Free literature available: General catalog with supplement and revised data sheets. Also, new accessories catalog and reprints of published technical papers, on request.

Products manufactured: Cells, Photoconductive, Photoemissive, Photovoltaic, Detectors, Diodes, Dividers, Gages, Generators, Meters, Photomultiplier Tube Housings, Power Supplies, Sensors, Light, Tubes

Local Sales Offices & Reps.

Ariz	Scottsdale, PLS Assocs.	602-957-9110
Cal	N. Hollywood, O'Halloran Assocs.	213-877-0173
Cal	Palo Alto, O'Halloran Assocs.	415-326-1493
Colo	Denver, PLS Assocs.	303-771-0140
Fla	Orange Park, Pulcir	904-264-7615
Ill	Chicago, Carter Elctrns.	312-585-5485
Ill	Chicago, Pivan Engrg.	312-539-4838
Ind	Indianapolis, Carter Elctrns.	317-293-0696
Kans	Shawnee, Pivan Engrg.	913-722-1030
Mass	Needham, Addelco Corp.	617-444-4754
Mich	Farmington, Carter, McCormic & Peirce	313-477-7700
Mich	Kalamazoo, Carter, McCormic & Peirce	616-349-9686
Minn	Minneapolis, Carter Elctrns.	612-544-9393
Mo	St. Louis, Pivan Engrg.	314-567-3636
NJ	East Orange, Friedman Assocs.	201-673-2500
NM	Albuquerque, PLS Assocs.	505-255-2330
NY	Fayetteville, M.P. Andrews	315-637-3144
Ohio	Cleveland, Carter, McCormic & Peirce	216-333-5650
Ohio	Dayton, Carter, McCormic & Peirce	513-278-5873
Ore	Beaverton, N.R. Schultz Co.	503-643-1644
Pa	Elkins Park, Snow Assocs.	215-379-4700
Pa	Pittsburgh, Carter, McCormic & Peirce	412-824-3760
Tenn	Knoxville, Pulcir	615-693-3641
Tex	Dallas, Southwestern Eng. & Equip. Co.	214-826-6661
Tex	Houston, Southwestern Eng. & Equip. Co.	713-353-4333
Wash	Bellevue, N.R. Schultz Co.	206-454-0300
Wisc	Milwaukee, Carter Elctrns.	414-464-5555

EMPORIUM SPECIALTIES CO., INC., Box 65, Austin, Pa., 16720, Tel: 814-647-8661; Empl.: 150

For info on price: W. G. Munsell; Application info: D. English; Customer service: T. Lepold; Delivery info: W. G. Munsell

Products manufactured: Bearings, Bushings, Glass, Plastic, Metal, Rubber, Etc., Cams, Connectors, Forms, Wire, Services, Assembly, Production & Test, Terminals, Tools, Wrenches

Local Sales Offices & Reps.

Ariz	Scottsdale, C.T. Fink & Assocs.	602-947-7981
Cal	Burbank, H.N. Petersen Sls. Co.	213-848-7091
Cal	Lynwood, D. West & Assocs.	213-636-6124
Cal	Oakland, MHR Sls. Agency	415-569-1564
Conn	Woodbury, Hart, Nininger & Campbell	203-263-4321
Fla	Lighthouse Point, E. Whalen	305-781-6996
Ill	Chicago, K.D. Engle Co.	312-539-1820
Ind	Indianapolis, T. Tuohy	317-356-3001
Md	Ellicott City, Special Prods.	301-465-5922
Mass	Gloucester, P. Hart	617-281-0679
Mich	St. Claire Shores, L. Donlon	313-775-6496
Minn	Anoka, Magner & Assocs.	612-427-5550
NJ	Montvale, H. Herzing	201-573-0967
NJ	Riverton, Given Assocs.	609-829-7249
NY	New York, A. Oppenheim	212-683-1093
NY	Roslyn Heights, R. Binder	516-621-8279
NY	Tonawanda, N.A. Throm & Assocs.	716-693-4468
NC	Charlotte, S.M. Clarke	704-376-8262
Ohio	Chagrin Falls, Bray Assocs.	216-247-4474
Ohio	Cleveland, G.F. Sindelar Co.	216-333-9945
Tex	Richardson, C.J. Garvey Co.	214-234-3371
Wisc	Wauwatosa, C. Garny	414-475-9290

EMPRO MFG. CO., INC., Box 26064, 10920 E. 59th St., Indianapolis, Ind., 46226, Tel: 317-823-4478; Empl.: 25; Minimum order: $10 .... p. 1•692,693

Free literature available: CATALOG 72 Full line catalog of Empro standard model DC ammeter shunts. Includes photographs and drawings of ten types, with dimensions of 177 different models. Six pages. BULLETIN 72A One page bulletin on the Empro DC ammeter shunt Model LAB for laboratory use.
BULLETIN CM One page Empro bulletin showing examples of custom made DC ammeter shunts.

Products manufactured: Shunts, Meter

Local Sales Offices & Reps.

Ga	Atlanta, Brownell Electro Inc.	404-762-5181
Ill	Chicago, A & M Inst. Inc.	312-774-3500
Ill	LaGrange, Penn Engrg.	312-352-1037
Mass	Burlington, Mancib Co.	617-272-9450
NY	Flushing, D.F. Tobias & Co.	212-545-9191
Ohio	Cleveland, Weschler Elec. Corp.	216-251-4609
Pa	Philadelphia, Sunshine Scientific Inst.	215-673-5600

EMR TELEMETRY, Weston Instrument Co., Box 3041, Sarasota, Fla., 33578, Tel: 813-371-0811, TWX: 810-864-0406; Empl.: 525; Minimum order: $25

Free literature available: Condensed catalog plus individual spec. sheets for any product listed therein.

Products manufactured: Analyzers, Calibrators, Comm. Systems, Converters, Decommutators, Telemetering, Discriminators, Filters, Multiplexers, Oscillators, Transmitters

Local Sales Offices & Reps.

Cal	Cupertino, EMR-Telemetry	408-257-1813
Cal	Lancaster, EMR-Telemetry	805-948-7614
Cal	Playa Del Rey, EMR-Telemetry	213-821-8084
Fla	Sarasota, EMR-Telemetry	813-371-0811
Ill	Chicago, Carter Elctrns., Inc.	312-585-5485
Ind	Indianapolis, Carter Elctrns., Inc.	317-293-0696
Kans	Overland Park, Carter Elctrns., Inc.	913-649-6996
Md	Rockville, Farrell Assocs.	301-424-9460
Md	Silver Spring, EMR-Telemetry	301-588-8200
Mass	Waltham, EMR-Telemetry	617-890-1183
Mich	Southfield, EMR-Telemetry	313-559-2580
Minn	Minneapolis, Carter Elctrns., Inc.	612-544-9393
Mo	Hazelwood, Carter Elctrns., Inc.	314-731-2237
Tex	El Paso, EMR-Telemetry	915-542-0966
Wash	Seattle, EMR-Telemetry	206-243-4330
Wisc	Milwaukee, Carter Elctrns., Inc.	414-464-5555

ENCOM PRODS. CO., INC., Lower Hopewell Rd., Oxford, Pa., 19363, Tel: 215-932-9265; Empl.: 10

Customer service: R. P. Mallalieu

Free literature available: Data sheets describing the various intercom/paging phones manufactured by ENCOM. Data sheet describing the ENCOM Model ETA-25 Power Amplifier for voice paging applications.

Products manufactured: Amplifiers, Comm. Systems, Public Address Systems

Local Sales Offices & Reps.

Pa	Pittsburgh, Control Assembly Co.	

Local Distributors

Ala	Birmingham, Sound Engrg. Svc., 2317-2nd Ave. S.	205-322-4408
Alas	Anchorage, Electronics Alaska, 507 E. Northern Lights	907-272-5447
Ariz	Phoenix, Comm. Consultants, 4111 E. McDowell	602-267-1411
Cal	Los Angeles, General Intercom, 1849 Arlington	213-731-6336
Cal	Oakland, Comm. Svc. Co., 600-16th St.	415-893-6970
Cal	San Dimas, Pacific Intercom, 730 E. Foothill	213-963-1225
Del	Wilmington, Megonigal Elex., 304 N. Maryland	302-652-3178
Fla	Hollywood, Comm. Svc. Co., 1932 Tyler	305-961-1157
Fla	Orlando, Dictograph/N. Fla., 1537 Smith	305-841-1360
Ga	Atlanta, JWM Corp./Comm. Div., 1141 Spring, NW	404-875-8175
Ill	Chicago, G & O Industries, 5752 N. Calif.	312-334-2294
Ill	Chicago, Industrial Comms., 5843 W. Div.	312-626-7500
Ill	Chicago, Modern Comms. Inc., 8333 Niles Ctr.	312-677-0700
Ill	Springfield, Elec. Specialty Co., 135 N. Illinois	217-787-0800
Ill	Elkhart, Penwood Sls. Corp., 115 N. Main St.	219-293-3615
Iowa	Des Moines, Temputer, Inc., 3833 E. 27th	515-265-1586
Kans	Kansas City, A. A. Richards Co., 1206 State Ave.	913-321-3977
Md	Ellicott City, B. F. Whitten Co., 3702 St. Johns La.	301-465-0797
Mass	Canton, Mass. Tel. Co., 11 Beaumont St.	617-828-8400
Mich	Detroit, Stanley's Comms., 13507 Keystone	313-366-6344
Minn	Minneapolis, Interior Comms., 7705 Morgan Ave. S.	612-866-4001
Mo	St. Louis, St. Louis Comms., 7811 Carondelet	314-726-2218
NJ	Beverly, Dynasonic Inc., 429 Cooper St.	609-386-6900
NJ	Bloomfield, Bingham Comms., 69 E. Passaic	201-748-3575
NJ	Elizabeth, Tel-A-Tune Music, 422 Trinity Pl.	201-965-1144
NJ	Mahwah, N. A. Philips, 91 McKee Dr.	201-529-3800
NY	Batavia, Demerly Comms., 104 Cedar St.	716-343-4946
NY	Buffalo, Hunter & Bell Inc., 858 Main St.	716-882-2210
NY	Marcellus, Div. Concepts, 3929 New Seneca	315-673-2088
NY	Woodside, Imperial Elex., 33-44; 61st St.	212-458-7275
NC	Winston-Salem, Long Engrg. Co., 961 Burke St.	919-725-2306
Ohio	Akron, Elec. Engrg. Co., 362 W. Bowery	216-762-9771
Ohio	Cleveland, Warwick Comms., 3125 Detroit	216-621-7127
Okla	Lawton, Automatic Music, 425 Ave. F	405-355-4926
Pa	Allentown, Daveland Co., 407 Linden St.	215-439-8701
Pa	Pittsburgh, Gray Sound, 10 California	412-761-6130
RI	Providence, Gertz Inc., 166 Broadway	401-421-5881
Tenn	Chattanooga, Sound Engrg. Co., 1209 S. Watkins	615-624-3381
Tex	Corpus Christi, Sound Distributors, 515 S. Water St.	512-882-2282
Va	Richmond, Cottrell Elex., 408 E. Main	703-648-8338
Wash	Seattle, Electronic Aids, 2642-42nd Ave. SW	206-937-3399
WVa	Wheeling, H. Black Co., 123 N. 23rd St.	304-277-1651
Wisc	Wauwatosa, Krueger Elex. Inc., 9021 Jack. Park	414-453-0650

ENCODER DIVISION, Litton Sys. Inc., 20745 Nordhoff St., Chatsworth, Cal., 91311, Tel: 213-341-6161, TWX: 910-494-1229; Empl.: 175

Products manufactured: Encoders

ENDEVCO, Div. Becton, Dickinson & Co., 30700 Rancho Viejo Rd., San Jaun Capistrano, Cal., 92675, Tel: 714-493-8181, TWX: 910-588-3272; FSC No: 95411; Empl.: 400; Minimum order: $25

Customer service: J. Wilson

Products manufactured: Accelerometers, Amplifiers, Analyzers, Calibrators, Detectors, Filters, Meters, Power Supplies, Recorders, Signal Conditioners & Equipment, Test Equipment, Testers, Transducers

Local Sales Offices & Reps.

Cal	Palo Alto, Endevco	415-969-3212
Fla	Palm Beach Gardens, Endevco	305-622-2122
Ill	Crystal Lake, Endevco	815-459-7226
Md	Towson, Endevco	301-752-0688
Mass	Bedford, Endevco	617-969-8063
Mich	Southfield, Endevco	313-557-6675
NJ	Haddonfield, Endevco	609-428-5285
Ohio	Akron, Endevco	216-929-3811

ENDICOTT COIL CO., 24 Charlotte St., Binghamton, N.Y., 13905, Tel: 607-797-1263; Empl.: 110
p. 1•1206; p. 2•396

For info on price: R. Beebe; Application info: R. Beebe; Customer service: R. Beebe; Delivery info: C. Biviano

Free literature available: E700 Power supply Bulletin & Specifications (DC to DC for glow discharge displays); E8600 Clicker for Audible Feedback of Completed Information Input; Linear Solenoid Data Sheet; E305 Vibrator for Shaking or Moving Small Parts; E29 & E30 Buzzers (AC only).

Products manufactured: Bells, Buzzers, Gongs, Sirens & Aural Warning Devices, Bobbins, Winding, Coil & Transformer, Coils Including Assemblies & Forms, Converters, Data Compressors, Digital, Inverters, Power Supplies, Services, Assembly, Production & Test, Solenoids, Valves, Solenoid, Vibrators

Local Sales Offices & Reps.

Cal	Palo Alto, Testco Inc.	415-326-5320
Cal	Panarama City, Testco Inc.	213-988-2671
Fla	Orlando, M.G. Assoc.	305-841-8793
Ill	Crystal Lake, Dessco	815-459-8688
Md	Timonium, Heller Assoc.	301-252-4780
Mass	Lexington, Sir Assoc.	617-862-1812
Mich	Detroit, Blumenberg Assoc.	313-557-1934
NY	Endicott, Tech-Mark Inc.	607-748-7473
NY	Williamsville, H. C. Johnson	716-632-7880
Ohio	Dayton, Dynel Co.	513-434-6467
Pa	Ardmore, Freedman Assoc.	215-649-3679
Tex	Richardson, Palatine Inc.	214-231-9489
Wash	Bellevue, Testco	206-454-7422
WVa	Glenshaw, H.C. Johnson	412-961-0414

ENERGY CONVERSION DEVICES, 1675 W. Maple Rd., Troy, Mich., 48084

ENERGY ELCTRN. PRODUCTS CORP., 6060 Manchester Ave., Los Angeles, Cal., 90045, Tel: 213-670-7880, TWX: 910-325-6161; Empl.: 17

Products manufactured: Integrated Circuit Devices, Transistors

ENERGY TECHNOLOGY CORP., See TOR Corp.

ENGDAHL ENTERPRISES, 2850 Monterey Ave., Costa Mesa, Cal., 92626, Tel: 714-540-0398; Empl.: 5

Customer service: P. D. Engdahl

Free literature available: Peak Shock Recorder describes a response spectrum recorder. Peak Shock Annunciator describes a response spectrum annunciator. Talk to Seismological Society of America describing a response spectrum recorder and annunciator.

Products manufactured: Accelerometers, Alarms, Annunciators, Data Acquisition & Reduction Systems, Meters, Recorders, Transducers

ENGELHARD MINERALS & CHEM., Engelhard Inds. Div., 430 Mountain Ave., Murray Hill, N.J., 07974, Tel: 201-464-7000

Customer service: A. Nabor Ext. 478

Free literature available: Literature on: Brazing alloys & flux for joining metals, Precious metal refining, Thick & thin films & powders, Clad metals, Modulus alloy, Contact assemblies, Plating solutions.

Products manufactured: Alloys, Brushes & Brush Assemblies, Chemicals, Circuits, Hybrid, Thick Film, Contact Strips, Finger, Contacts, Electrical, Films, Flux, Brazing & Soldering Materials, Fuses, Inks For Thick Film Microcircuits, Laminates, Metal Compounds, Foils, Powders, Sheet, Stock, Metals, Paints, Preforms, Precious Metal, Resistors, Rivets, Slip-Rings & Assemblies, Solder (All Types), Springs (All Types), Thermocouples, Elements & Accessories, Wire

Local Sales Offices & Reps.

Ala	Birmingham	205-871-3202
Cal	E. Palo Alto	415-968-2613
Cal	Los Angeles	213-724-1800
Ill	Skokie	312-673-1900
Mich	Southfield	313-557-1424
Tex	Dallas	214-350-4106
FOR:	Can., Toronto, Ont.	416-362-3211

ENGELMANN MICROWAVE, Skyline Dr., Montville, N.J., 07045, Tel: 201-334-5700, TWX: 710 987-8344; Empl.: 100; Minimum order: $15

For info on price: C. Schraufnagl; Application info: H. F. Bailey; Customer service: E. Wiest; Delivery info: E. Wiest

Products manufactured: Attenuators, Comparators, Couplers, Detectors, Discriminators, Dividers, Filters, Junctions, Hybrid, Microwave, Limiters, Mixers, Modulators, All Kinds, Switches, Terminals

Local Sales Offices & Reps.

Cal	Inglewood, L & M Engrg., Inc.	213-674-6850
Cal	Santa Clara, L & M Engrg. Inc.	408-243-2891
Conn	Stamford, Dage Corp.	203-324-3125
Fla	Fort Lauderdale, Snow Co.	305-563-2448
Ga	Smyrna, SparTech Assocs.	404-432-3644
Ill	Highland Park, Feller Assocs.	312-433-3651
Ind	Rochester, Feller Assocs.	219-223-2377
Md	Columbia, Neal Deoul Assocs.	301-997-4353
Mass	Lowell, Russell Engrg.	617-458-5146
NY	Bridgeport, Lightstone Corp.	315-699-5747
NY	Huntington, CDB Enterprises, Inc.	516-692-5200
Pa	Lafayette Hill, M. Lader Co.	215-825-3177
Wash	Bellevue, Ray Over Sls.	206-454-4551

ENGINEERED COMPONENTS CO., 3580 Sacramento Dr., San Luis Obispo, Cal., 93401, Tel: 805-544-3800; FSC No: 32440; Empl.: 75

For info on price: M. Clarke; Application info: B. Rorick

Free literature available: Insulator Catalog - over 100 component mounting insulators. Encapsulation Shell Catalog - more than 2,000 sizes in Round, Oblong, Square, and Module Configurations. Delay Line Brochures - description of Delay Lines. Capacitor Brochures - capacitors available TTLDM, ECLDM Brochures

Products manufactured: Capacitors, Fixed, Delay Lines, Filters, Generators, Networks, Oscillators

Local Sales Offices & Reps.

Ariz	Phoenix, Gramer Co.	602-279-1231
Cal	Downey, Groh Assocs.	213-923-0963
Cal	Palo Alto, R. W. Thompson Assocs.	
Cal	San Diego, Daniels & Doty Sls. Co.	714-560-6266
Colo	Boulder, R. G. Ents.	303-447-9211
Iowa	Des Moines, Beams	515-282-0292
Kans	Shawnee Mission, Beams	913-341-7744
Md	Hyattsville, Eastern Components	301-557-2925
Mass	Woburn, Jalco Assocs.	617-227-1515
Minn	Hopkins, Fred Peterson Co.	612-941-5400
Mo	Creve Couer, Beams	314-569-1060
NY	Brentwood, Cir-Tech Assocs.	516-231-4440
NY	De Ruyter, R. A. Murray Co.	315-852-9981
NY	Rochester, R. A. Murray Co.	716-467-4538
Ohio	Cleveland, Electro-Com	216-886-2404
Ohio	Dayton, Electro-Com	513-276-3993
Pa	Flourtown, Eastern Components	215-836-1616
Pa	York, Eastern Components	714-764-3114
Tex	Houston, Aid Electrns.	713-777-3882
Tex	Irving, Aid Elctrns.	214-259-4761
Wash	Kirkland, Freed Assocs.	206-822-8100

ENM, 5350 Northwest Hwy., Chicago, Ill., 60630, Tel: 312-775-8400; Empl.: 140

Products manufactured: Counters, Timers

ENTERPRISE DEVELOPMENT CORP, 5127 E. 65th St., Indianapolis, Ind., 46220, Tel: 317-251-1231; Empl.: 10; Minimum order: $5

For info on price: L. Kopernak; Application info: R. Kopernak; Customer service: L. Kopernak; Delivery info: A. Kopernak

Products manufactured: Soldering Accessories, Soldering Equipment, Soldering Guns, Irons & Desoldering Tools

Local Sales Offices & Reps.

Cal	Redwood City, Sinai-Johnson, Inc.	415-365-6263
Cal	Van Nuys, Oberman-Renner Sls.	213-997-1124
Fla	Ormond Beach, J.F. Thompson Co.	904-677-2298
Ga	Tucker, Elrep Sls. Co.	404-938-7108
Ill	Skokie, M. Berman Sls.	312-679-2293
Ind	Indianapolis, Elctrn. Rep., Inc.	317-897-9326
Mass	Northboro, W.B. Pray Sls.	617-393-3434
Mich	Livonia, F. Peters & Assocs.	313-425-0086
Minn	Minneapolis, D. Borrett Co.	612-929-0028
Mo	Ballwin, R.J. Throckmorton Sls. Co.	314-227-7222
NY	Camillus, Callahan-Ferguson Co.	315-487-3870
Ohio	St. Mary's, T. Shelby & Co.	419-394-3377
Pa	Philadelphia, S.K. Macdonald, Inc.	315-545-1205
Tex	Richardson, Campion Sls. Co.	214-238-8145
Wash	Seattle, Larrabee & Assocs.	206-623-2521

ENVIRONMENTAL COMMUNICATIONS INC., 3150 Pullman St., Costa Mesa, Cal., 92627, Tel: 714-557-7800, TWX: 910-595-1781

Free literature available: Facility brochure-custom hybrid micro circuits.

Products manufactured: Alarms, Amplifiers, Attenuators, CATV Systems & Equipment, Circuits, Hybrid, Thin-Film, Comm. Systems, Comparators, Controls/Control Eqpt., Converters, Couplers, Current Sensors, Decoders, Demodulators, Detectors, Diodes, Discriminators, Display Devices/Displays, Dividers, Drivers, Switch, Drivers & Decoders For Readouts, Electronic Switches (Oscilloscope), Encoders, Films, Filters, Flashers, Generators, Hybrid Voltage Regulators, Integrated Circuit Devices, Integrators, Electronic, Lamp Drivers, Limiters, Microcircuit Production Equip., Mixer-Preamplifiers, Microwave, Mixers, Modulator/Demodulators, Modulators, All Kinds, Modules, Logic, Encapsulated, Monitors, Multiplexers, Multipliers, Networks, Oscillators, Preselector-Mixers, Receivers, Rectifiers, References, D-C Voltage, Regulators, Resistors, Restorers, Pulse Form, Services, Assembly, Production & Test, Shifters, Signal Conditioners & Equipment, Strip-Line Components, Microwave, Substrates, Timers, Transmitters

ENVIRONMENTAL CONTAINER SYS., INC., 3560 Rogue River Hwy., Box 188, Grants Pass, Ore., 97526, Tel: 503-479-5388; FSC No: 24995; Empl.: 100; Minimum order: $50 .... p. 1•60,61

For info on price: J. Innes; Application info: D. Becklin; Customer service: B. Jaeger; Delivery info: Mktg./Scheduling

Free literature available: 1. "Standard Case Catalog": Lists Approx. 1200 standard case sizes and styles available from stock tooling. Includes hardware, colors, and ordering information. 80 pages 2. "Instrumentation Operating Cases": Transportable shock mounted, rack-mount, operating enclosures. Sizes from 5 1/4" to 47 3/8" rack height. Accessory drawers and design options are described. 20 pages
3. "Tape Reel Cases": Fiberglass cases for 8 1/2" & 11" diameter tape reel. Case sizes for 2 reels, 4 reels & 6 reels. Waterproof and/or magnetically shielded. 2 pages 4. "Excalibur": Cloth laminated, fiberglass cases for camera equipment, electronic equipment, sporting rifles and shotguns, 4 pages

Products manufactured: Cabinets & Accessories, Cases, Equipment, Instrument, Meter, Cases, Transit, Containers, Drawers, Sliding

Local Sales Offices & Reps.

Cal	Newport Beach, W. Burkhart	714-673-0681
Cal	Sebastopal, R. Connick	415-494-3661
Fla	Orlando, Gra-Mar, Inc.	305-894-3351
NM	Albuquerque, R.A. Mayes Co.	505-293-8010
Tex	Dallas, E.A. Robertson, Inc.	214-942-2716

ENVIRONMENTAL RESEARCH GRP., 313 N. First St., Ann Arbor, Mich., 48103, Tel: 313-662-3104

Customer service: F. Hammer

Free literature available: Eight-page brochure discusses ERG's problem-solving capabilities in Chemical Analysis, Toxicology, and Radiation Studies, Air Pollution and Industrial Health Analysis.

Products manufactured: Services, Assembly, Production & Test

EPIC, INC., 150 Nassau St., New York, N.Y., 10038, Tel: 212-349-2470; Empl.: 8; Minimum order: $10

For info on price: P. Letica; Application info: P. Letica; Customer service: M. Couteau; Delivery info: F. Harding

Free literature available: Hand Vibrograph, Infrared Pyrometer Kustotherm, Electrical Clip-on AC Meters, Resistance Bridges, Capacitance Bridges, Standard Compressed Gas Capacitors, Micro-Optical Pyrometer

Products manufactured: Bridges, Capacitors, Fixed, Indicators, Lamps, Meters, Pyrometers, Recorders, Testers

EPOXY TECHNOLOGY, 65 Grove St., Watertown, Mass., 02172, Tel: 617-926-0136; FSC No: 33246; Empl.: 6

For info on price: J. Toppi; Application info: F. Kulesza; Customer service: A. Delmarsh; Delivery info: J. Toppi

Free literature available: Literature for The Microelectronic Industry Include Our Conductive Silver and Gold Epoxies for Chip Attachment as well as Non-Conductive Epoxies. Literature on our New Insulating Epoxy for Lid Sealing.

Products manufactured: Adhesives (All Types), Coatings, Compounds, Encapsulating, Insulating, Molding, Potting, Conductive Plastic Materials, Inks For Thick Film Microcircuits

Local Sales Offices & Reps.

Cal	Pacific Palisades, Wadsworth-Pacific Mfg. Assoc. Inc.	213-454-4313
Fla	Longwood, Lenz Engrg. Co.	305-831-9797
Ill	Lake Villa, R.W. Venn Co.	312-395-5353
Mass	Newton, Normell Assocs.	617-969-5478
Mich	New Baltimore, Tech-Tron Engrg.	313-725-4600
NJ	Califon, C.W. Price Co.	201-638-6850
NY	Liverpool, Wadsworth Mfg. Assoc. Inc.	315-652-6865
Tex	Richardson, Oeler & Menelaides, Inc.	214-234-6334
Utah	Salt Lake City, Specialty Sls. Co.	801-262-2979
Wash	Seattle	206-938-4166
EXP:	Plainville, Mass., Teknis	617-695-3591

EPOXYCAST ELECTRONIC CASE CO., 222 Lake Ave., Yonkers, N.Y., 10701, Tel: 914-YO3-5900

For info on price: J. J. Wilentchik; Application info: J. J. Wilentchik; Customer service: A. Powers; Delivery info: A. Powers

Products manufactured: Cups, Encapsulation, Enclosures, Module, Plug-In

EPSCO, INC., 920 Westwood Dr., Addison, Ill., 60101, Tel: 312-543-0410; FSC No: 53003; Empl.: 9; Minimum order: $10 .... p. 1•1200,1201

Customer service: J. W. Storch

Products manufactured: Inverters, Power Supplies

Local Sales Offices & Reps.

Ohio	Cleveland, Fred Sharp Co.	216-464-3820

Local Distributors

Ala	Birmingham, Forbes Dist. Co., 1416 4 Ave. S.	205-251-4104
Ariz	Phoenix, R.V. Weatherford Co., 1917 No. 25th Dr.	602-272-7144
Ark	Little Rock, Carlton-Bates Co., Scott Ham. at 69th	501-562-9100
Cal	Garden Grove, Allied Elctrns., 12311 Ind. St.	213-598-6605
Cal	Glendale, Western Elctrn. Supply, 229 S. Orange St.	213-246-4861
Colo	Denver, R. V. Weatherford Co., 3905 So. Mariposa	303-761-5432
Conn	New London, Aikins Elctrn. Supply, 531 Broad St.	203-442-4406
Del	Wilmington, Almo Elctrn. Corp., 1122 French St.	302-656-9467
DC	College Park, Allied Elctrns., 4911 Niagara Rd.	301-345-4600
Fla	Tampa, Lykes Elctrns., Box 24047	813-886-6621
Ga	Atlanta, Spec. Distr. Co., 763 Juniper St. N.E.	404-873-2521
Haw	Honolulu, Honolulu Elctrn., 819 Keeaumoku	949-5564
Idaho	Twin Fall, Central Elctrn., 125 Second St. W.	
Ill	Chicago, Allied Elctrn., 2400 W. Washington Blvd.	312-421-2400
Ill	Chicago, Newark Elctrns., 500 N. Pulaski	312-638-4411
Ind	Indianapolis, Graham Elctrns. Supply, 133 S. Pa. St.	317-634-8202
Iowa	Cedar Rapids, Deeco, Inc., 2500 16th Ave., S.W.	319-365-7551
Kans	Topeka, Interstate Elctrn. Supply, 2500 S. Kan. Ave.	913-235-2396
Ky	Lexington, Radio-Elctrn. Equip., 480 Skain Ave.	606-255-6661
La	New Orleans, Southern Radio Supply, 1909 Tulane Ave.	504-524-2324
Me	Portland, Holmes Distr., 510 Cumberland	207-774-5901
Md	College Park, Allied Elctrn., 4911 Niagara Rd.	301-345-4600
Mass	Braintree, Allied Elctrn., 1 Century Cir.	617-848-4150
Mich	Ann Arbor, Wedemeyer Elctrn. Supply Co., 2280 S. Ind. Hwy.	
Minn	Duluth, Northwest Radio of Duluth, 123 E. First St.	218-727-1565
Miss	Jackson, Ellington Elctrn. Supply, 1425 Terry Rd.	601-355-0561
Mo	Kansas City, Walters Radio Sup., 3627-35 Main St.	816-531-7015
Mont	Billings, Elctrn. Supply Co., 250 11 St. W.	406-252-2197
Neb	Lincoln, Scott Elctrn. Supply Co., 4040 Adams St.	402-434-8308
Me	Portland, Holmes Distr., 510 Cumberland	207-774-5901
Nev	Las Vegas, Indl. Elctrns., 300 W. Utah	702-384-2151
NH	Concord, Evans Radio & Elctrns., Box 893	603-224-9961
NJ	Kenolworth, Newark Elctrns., 303 Monroe Ave.	201-272-8410
NJ	Rahway, Quad Parts Distr., 1561 Main St.	201-381-5400
NM	Albuqerque, R. V. Weatherford Co., 6101 Marble Ave., N.E.	505-265-5671
NY	Buffalo, Summitt Distr., 916 Main	716-884-3450
NY	New York, Newark Elctrns., 3000 S. Winton Rd.	716-473-6600
NC	Raleigh, Southeastern Supply, 414 Hillsborough	919-828-2313
ND	Minot, J-I Co., Inc., 330 N. Bdwy.	701-838-5466
Ohio	Cleveland, RPC Elctrn. of Ohio, 749 Miner Rd.	216-461-4700
Okla	Oklahoma City, Trice Wholesale Elctrns., 4701 N. Stiles	405-232-2291
Ore	Portland, United Radio Supply, 123 N.E. 7th Ave.	503-233-5346
Pa	Philadelphia, Almo Elctrn., 9815 Roosevelt	215-676-6000
RI	Providence, W. Candreta & Co., 28 Wolcott St.	401-861-2100
SC	Columbia, Dixie Radio Supply, 1900 Barnwell St.	803-253-5333
SD	Mitchell, Elctrn. Supply Co., 119 E. 1st Ave.	605-996-4300
Tenn	Kingsport, Radio Supply Co., 961 E. Sullivan	615-247-8111
Tex	Ft. Worth, Allied Elctrns., 401 E. 8th St.	817-336-5401
Utah	Provo, Central Utah Elctrns., 735 S. State St.	801-373-7522
Vt	White River Jct., Elctrn. Supply, S. Main	802-295-3536
Va	Richmond, AVEC Elctrn. Corp., 2002 Staples Mill	
Wash	Seattle, Western Elctrns. Co., 717 Dexter Ave., N.	206-284-0200
Wash	Seattle, Western Elctrn. Co., 717 Dexter Ave. N.	206-284-0200
WVa	Charleston, McJunkin Corp., 1400 Hansford St.	304-348-4919
Wisc	Milwaukee, Elctrn. Expeditors, 6045 N. Gr. Bay	414-228-8100
Wyo	Casper, Fleming Supply Co., 332 East A St.	

EPSCO, INC., 411 Providence Hwy., Westwood, Mass., 02090, Tel: 617-329-1500, TWX: 710-348-0484; FSC No: 99380; Empl.: 150; Minimum order: $25

Customer service: H. Clark

Free literature available: Data sheets/brochures with detailed specifications of data conversion systems; ECM, radar, TACAN, altimeter, IFF simulators; high power microwave signal sources and cavity oscillators.

Products manufactured: Converters, Data Acquisition & Reduction Systems, Radar Systems, Receivers, Synthesizers, Test Systems, Transponders

Local Sales Offices & Reps.

Ariz	Tempe, PLS Assocs.	612-957-9110
Cal	Anaheim, Blair Assocs.	714-635-1350
Cal	San Jose, MCH Assocs.	408-246-7330
Colo	Denver, PLS Assocs.	303-771-0140
Fla	Fort Lauderdale, Snow Co.	305-563-2448
Fla	Hallandale, Emec, Inc.	305-925-6366
Ill	Northfield, Feller Assocs.	312-446-8065
Mass	Waban, Bawer Assocs.	617-244-6572
NJ	Hayworth, Central Assocs.	201-568-0808
NM	Albuquerque, PLS Assocs.	505-255-2330
NY	Plainview, Central Assocs.	516-433-0808
NY	Syracuse, Syracuse Tech. Reps.	315-488-0222
Tex	Fort Worth, C. Wolf & Assocs.	817-738-1996
Tex	Houston, C. Wolf & Assocs.	714-721-2442
Va	Annandale, J. Hopkins Assocs.	703-323-1641
Wash	Seattle, Datacom Assocs.	206-285-2525

EQUIPTO, Aurora Equipment Co., 225 So. Highland Ave., Aurora, Ill., 60507, Tel: 312-859-1000; Empl.: 300

Products manufactured: Benches, Consoles, Stools, Tables, Cabinets & Accessories, Carts & Dollies, Instrument & Equipment, Drawers, Sliding, Racks

EQUIPTO ENCLOSURE SYSTEMS, Div/Equipto Elec. Corp., 435 Woodlawn Ave., Aurora, Ill., 60507, Tel: 312-897-4691; FSC No: Multiple; Empl.: 40 ....p. 1•58,59

Customer service: C. W. Peterson

Free literature available: Complete catalog containing technical and ordering information as well as price books Includes rack cabinets, consoles, accessories, blowers and fans.

Products manufactured: Blowers & Fans & Accessories, Cabinets & Accessories, Racks

Local Sales Offices & Reps.

Ala	Huntsville, J.L. Highsmith & Co.	205-881-3294
Ariz	Scottsdale, BFA Corp.	602-946-4215
Cal	Menlo Park, Long & Assocs.	415-327-1300
Cal	Santa Fe Springs, Sls. Engrs. Limited	213-921-4337
Colo	Denver, BFA Corp.	303-744-3301
Conn	Glastonbury, Edcom, Inc.	203-633-1380
Fla	Hollywood, W.B. Wimberly Co.	305-961-6962
Fla	Orlando, W.B. Wimberly Co.	305-423-2514
Ill	Palatine, J. Clark Co.	312-358-5095
Mass	Newtonville, Edcom, Inc.	617-969-9710
Mich	Royal Oak, Group Ten	313-549-3910
Minn	St. Paul, H.A. Cullen & Assocs.	612-646-7371
Mo	Blue Springs, Cairns & Hayes Elctrn. Sls. Co.	816-229-1404
Mo	St. Charles, Cairns & Hayes Elctrn. Sls. Co.	314-946-6677
NM	Albuquerque, BFA Corp.	505-296-8303
NM	Las Cruces, BFA Corp.	505-523-0601
NY	Port Chester, Radiation Elctrns., Inc.	914-937-2300
NY	Syracuse, Labtronics, Inc.	315-454-9314
NC	Charlotte, J.L. Highsmith & Co.	704-333-7743
Ohio	Cleveland, Group Ten	216-486-2800
Ohio	Dayton, Group Ten	513-277-6531
Pa	Valley Forge, J.E. Cuesta & Co.	215-265-5800
Tex	Dallas, M. Kruvand Co.	214-827-8043
Tex	Houston, M. Kruvand Co.	713-661-3007
Utah	Salt Lake City, BFA Corp.	801-466-6522
Va	Richmond, J.L. Highsmith & Co.	804-272-5888
Va	Springfield, Scientific Devices/E-Tech	703-451-6500
Wash	Seattle, Seatronics	206-767-4330

ERA ACOUSTICS, 311 E. Park St., Moonachie, N.J., 07074, Tel: 201-641-3650, TWX: 710-990-5064; Empl.: 100; Minimum order: $25

Customer service: J. Grieg

Free literature available: Poly-planar speaker product line, Poly-planar speaker application data.

Products manufactured: Speaker Systems, Speakers

ERA TRANSPAC CORPORATION

ERA TRANSPAC CORP., Sub. Electronic Research Assocs., 311B E. Park St., Dept. 1202, Moonachie, N.J., 07074, Tel: (201) 641-3650, TWX: 710-990-5064 p. 1•1202-1205

Products manufactured: Inverters, Power Supplies, Regulators

Local Sales Offices & Reps.

Ariz	Scottsdale, DeAngelo, Rothman & Cheever	602-948-2240
Cal	Culver City, DeAngelo, Rothman & Co.	213-398-6239
Fla	Melbourne, Repcom	305-254-1877
Ill	Park Ridge, R.F. Specialists	312-698-2044
Md	Baltimore, Stemler Assocs.	
Mass	Canton, New England Elctrn. Sls. Co.	617-828-4835
NY	Fayetteville, M.P. Andrews Co.	315-637-3144
NY	Plainview, R.H. Smith Assocs.	516-681-3155
NY	Spring Valley, R. Smith Assocs.	914-354-6067
Ohio	Cincinnati, R. Makin Assocs.	513-232-5588
Tex	Dallas, E.B. Robertson	

ERASER CO., Box 1342, Syracuse, N.Y., 13201, Tel: 315-454-3237; Empl.: 25; Minimum order: $10

Customer service: J. Nett

Free literature available: Full Line Catalog

Products manufactured: Brushes & Brush Assemblies, Burnishers, Contact, Chemicals, Cleaners & Solvents, Heat Guns, Production, Holders, Circuit Board (Production Type), Machines/Machinery, Production, Wire Strippers, Wire Twisters

Local Sales Offices & Reps.

Ark	Hot Springs, Meredith Young Assoc.	501-262-1365
Fla	Orlando, W.A. Brown Comps.	305-425-5505
Ill	Chicago, EMF Co., Inc.	312-889-8323
Mass	Stoneham, Production Devices Corp.	617-438-2772
Minn	Minneapolis, Prod. Auto Corp.	612-866-5700
NY	Guilderland, The Solder Pot	518-355-1829
NC	Raleigh, W. A. Brown Comps.	919-876-9601
Ohio	Strongsville, Jim Finnegan & Co.	216-826-1033
Pa	Ft. Washington, Kirk-Sandell Inc.	215-643-2100
Tex	Richardson, Prod. Auto. Corp.	214-234-4002
Wash	Kingston, F. A. Haight Co.	206-297-3212
Wisc	Milwaukee, Wakefield-Krauthoff Co.	414-871-3381
EXP:	N.Y., New York, American Trading Co., Inc.	212-943-5100

FOR:	Can., Montreal, Que., A D Tool Corp.	514-482-2548

Local Distributors

Ala	Huntsville, W. A. Brown Comp., 1314 Buford St. NW	205-539-4411
Cal	El Monte, C. Michael, 9674 Telstar Ave.	213-686-0141
Cal	El Segundo, Wassco, 410 S. Douglas St.	213-640-1060
Fla	Clearwater, Prod. Cupboardi, 2060 Palmeto St.	813-447-2581
Ga	Atlanta, Elect. Insulating Supp., 1255 Collier Rd.	404-355-1651
Ill	Chicago, EMF Co., 6135 W. Belmont	312-889-8323
Minn	Minneapolis, Prod. Auto. Corp., 7726 Morgan Ave. S.	612-866-5700
Miss	Jackson, O. Van Horn Co., 451 No. Gallatin St.	601-354-4321
NY	Guilderland, Solder Pot, Box 14	518-355-1829
NY	Syracuse, Jet Elctrn., Box 109 Oliva Dr.	315-454-3237
NC	Raleigh, W. A. Brown Co., 7204 Bolero Cir.	919-876-9601
Pa	Huntingdon Valley, H. Mann Inc., 3983 Mann Rd.	215-355-7200
Tex	Richardson, Prod. Auto. Corp., 777 S. Central Exp.	214-234-4002

ERC, See Electronic Research Co.

ERIE FREQUENCY CONTROL, Div. Erie Technological Prods., 453 Lincoln St., Carlisle, Pa., 17013, Tel: 717-249-2232, Telex: 84-2328; Minimum order: $25

Products manufactured: Crystals, Filters, Oscillators, Ovens

Local Sales Offices & Reps.

Cal	Palo Alto	415-327-1520
Cal	Santa Ana	714-835-4822
Fla	Maitland	305-644-0954
Ill	Des Plaines	312-297-5560
Ind	Fort Wayne	219-484-1528
Mass	Wakefield	617-245-7880
NJ	Pennsauken	609-655-4787
NC	Greensboro	919-299-1905
EXP:	Pa.	814-453-5611

ERIE TECHNOLOGICAL PRODUCTS, 644 W. 12 St., Erie, Pa., 16512, Tel: 814-453-5611, TWX: 510-696-6607; FSC No: Multiple; QPL No: Multiple; Empl.: 2300; Minimum order: $50
p. 1•314,315,556,1207,1837; p. 2•127-129

For info on price: R. F. Smith; Application info: P. M. Miller; Customer service: R. L. Whitney; Delivery info: R. L. Whitney

Products manufactured: Capacitors, Fixed, Capacitors, Variable, Crystals, Filters, Oscillators, Ovens, Power Supplies, Rectifiers, Sockets

Local Sales Offices & Reps.

Cal	Palo Alto, Erie Technological Prods., Inc.	415-327-1520
Cal	Santa Ana, Erie Technological Prods., Inc.	714-835-4822
Fla	Maitland, Erie Technological Prods., Inc.	305-644-0954
Ill	Des Plaines, Erie Technological Prods., Inc.	312-297-5560
Ind	Fort Wayne, Erie Technological Prods., Inc.	219-484-1528
Mass	Wakefield, Erie Technological Prods., Inc.	617-245-7880
Mo	North Kansas City, LCOMP, Inc./Kansas City	816-221-2400
NJ	Pennsauken, Erie Technological Prods., Inc.	609-665-4787
NC	Greensboro, Erie Technological Prods., Inc.	919-299-1905
Pa	Erie, Erie Technological Prods., Inc.	814-453-5611
EXP:	Erie, Pa., Erie Technological Prods. Export Sls.	814-453-5611
FOR:	Can., Trenton, Ont., Erie Technological Prod. of Can. Ltd.	613-392-2581

ERIKSON SPECIALIZED TOOL CO., Box 424, Pico-Rivera, Cal., 90660, Tel: 213-699-3719; Empl.: 4; Minimum order: $10

Customer service: J. R. Erikson

Products manufactured: Pliers, Screwdrivers, Soldering Accessories, Tools, Wrenches

ESC ELCTRNS. CORP., 534 Bergen Blvd., Palisades Pk., N.J., 07650, Tel: 201-947-0400, TWX: 710-991-9780; Empl.: 120 .... p. 1•452,453,550,551

For info on price: B. Carr; Application info: R. Peressini; Customer service: B. Carr; Delivery info: B. Carr

Free literature available: 1. Delay Line Brochure LC Delay Line information. 2. LC Filters Brochure-LC Filters of printed circuit board mounting types and discussions of ESC Telephone Line Simulators and Equalizers and other LC Filters 3. Wide Band Video Transformers Bulletin.

Products manufactured: Coils Including Assemblies & Forms, Delay Lines, Equalizers, Filters, Networks, Synthesizers, Telephone Channel Test & Simulator Equipment, Transformers

Local Sales Offices & Reps.

Ariz	Scottsdale, Carter Assocs.	602-947-4355
Cal	Chatsworth, Westaironics Inc.	213-882-8977
Cal	Los Alamitos, Westaironics Inc.	213-431-1101
Cal	Los Altos, P M Sls.	415-941-4444
Cal	Marina Del Ray, Westaironics Inc.	213-821-7958
Fla	Cocoa Beach, Barrett Assocs.	305-784-2758
Fla	Maitland, Barrett Assocs.	305-678-0172
Fla	Melbourne, Barrett Assocs.	305-727-2491
Fla	N. Miami, Barrett Assocs.	305-681-4957
Fla	St. Petersburg, Barrett Assocs.	813-345-3585
Ill	Chicago, Carlson Elctrns. Sls. Co.	312-774-9022
Md	Glen Burnie, New Era Sls.	301-768-6666
Mass	Waltham, Betronic Assocs.	617-894-8400
Mich	Mt. Clemens, Compass Assocs.	313-468-8830
Minn	Minneapolis, J. J. Exon Inc.	612-566-5340
Mo	St. Louis, Carlson Elctrn. Sls. Co.	314-991-0262
NJ	Clifton, A. Clarfield Assocs.	212-757-6454
NY	Buffalo, Telesco Assocs.	716-834-1026
NY	Rochester, Telesco Assocs.	716-271-3780
NC	Charlotte, J. Rudisill Assoc. Inc.	704-377-6901
Ohio	Dayton, Compass Assocs.	513-252-9939
Pa	Philadelphia, Mid-Eastern Assocs.	215-842-2810
Tex	Dallas, Mark Kruvand & Assoc.	214-827-8043
Tex	Houston, Mark Kruvand & Assoc.	713-661-3007
FOR:	Can., Downsview, Ont., Zaslow Sls. Co.	416-727-1211

ESCO PRODUCTS, Oak Ridge Rd., Oak Ridge, NJ, 07438, Tel: 201-697-3700; Empl.: 35

Products manufactured: Coatings, Lenses, Optical & Camera, Lenses, Readout & Display, Microscopes, Quartz, Fused, Silica, Fused, Tubing

ESICO, INC., Box 247, Deep River, Conn., 06417, Tel: 203-526-5361; Empl.: 40; Minimum order: $15

For info on price: R. Lee; Application info: G. E. Westerlund; Customer service: R. Lee; Delivery info: R. Lee

Products manufactured: Solder Pots & Baths, Soldering Accessories, Soldering Equipment, Soldering Guns, Irons & Desoldering Tools

Local Sales Offices & Reps.

Colo	Lakewood, Pathway, Inc.	303-232-7730
Ga	Atlanta, Electr-Mech Sls. Engrg. Co.	404-393-0444
Ill	Chicago, H. Halinton Engrg. Assoc.	312-763-2131
Ohio	Dayton, AMES Corp.	513-435-9730
Tex	Dallas, Production Eng. Sls. Inc.	214-369-3181

ESNA DIV., Amerace Corp., 2330 Vauxhall Rd., Union, N.J., 07083, Tel: 201-686-6000, TWX: 710-985-4677; Empl.: 1100; Minimum order: $50

For info on price: Sls. Dept.; Application info: G. Dietrich; Customer service: Sls. Dept.; Delivery info: Sls. Dept.

Free literature available: General product bulletin No. 7014 visually identifies and describes the three major cana lines of self-locking fasteners and lists nation-wide sales offices.

Products manufactured: Fasteners, Pins

Local Sales Offices & Reps.

Cal	San Francisco	415-349-6011
Cal	Van Nuys	213-873-7420
Ill	Chicago	312-777-2929
Ind	Indianapolis	317-253-6526
Mass	Boston	617-545-3424
Mich	Southfield	313-646-6700
Minn	Minneapolis	612-835-4599
Mo	Kansas City	816-333-8394
Mo	St. Louis	314-968-1336
NJ	Union	201-686-6000
NY	Rochester	716-473-5088
Ohio	Cincinnati	513-825-8135
Ohio	Dayton	513-298-2346
Ohio	Strongsville	216-238-3351
Pa	Ardmore	215-642-8667
Tex	Dallas	214-231-2391
Wisc	Milwaukee	414-786-4456
FOR:	Can., Dorval, Que., Esna Ltd.	514-631-9013
FOR:	Can., Markham, Ont.	416-499-1221

ESSEX INTERNATIONAL, INC., Essex Controls Div., 445 Park Ave., Sycamore, Ill., 60178, Tel: 815-895-4501, TWX: 910-639-0611

Customer service: L. Bassill

Products manufactured: Cable, Cords, Wire

Local Sales Offices & Reps.

Cal	Anaheim, Essex Int'l., Inc.	213-625-7516
Colo	Denver, Essex Int'l., Inc.	303-399-0521
Ky	Georgetown, Essex Int'l., Inc.	502-863-3321
Mich	Berrien Springs, Essex Int'l., Inc.	616-473-4811
Minn	Minneapolis, Essex Int'l., Inc.	612-331-6370
Mo	St. Louis, Essex Int'l., Inc.	314-382-9000
Ohio	Dayton, Essex Int'l., Inc.	513-277-8964
Pa	Philadelphia, Essex Int'l., Inc.	215-236-7100
SC	Bennettsville, Essex Int'l., Inc.	803-479-6211
Tenn	Nashville, Essex Intl.	615-794-8451
Tex	Dallas, Essex Intl.	214-369-6541

ESSEX INTERNATIONAL CORP., 1601 Wall St., Ft. Wayne, Ind, 46802

ESSEX CONTROLS DIV., Essex International, Inc., 131 Godfrey St., Logansport, Ind., 46947, Tel: 219-753-7521, TWX: 810-295-0699; Minimum order: $25
p. 1•1668-1681

Customer service: A. M. Maloy

Free literature available: Distributor Catalog SC-7 Covering General Purpose Relays, Power Relays & Contactors, Miniature Sensitive Relays, Solenoids, Time Delays-Complete Engineering Data Dimensions & Prices.

Products manufactured: Relays, Switches

Local Sales Offices & Reps.

Cal	Anaheim, Essex Int'l., Controls Div.	213-625-7516
Cal	Burlingame, Leddy Assocs.	415-347-5247
Colo	Denver, R.G. Bowen Co.	303-722-4641
Conn	Madison, A & M Elctrn. Reps., Inc.	203-245-1031
Fla	Clearwater, Reynolds & Assocs.	813-726-2373
Fla	Ft. Lauderdale, Reynolds & Assocs.	305-581-6611
Fla	Hollywood, Reynolds & Assocs.	305-987-6720
Fla	Palm Beach Gardens, Reynolds & Assocs.	305-622-6850
Fla	Satellite Beach, Reynolds & Assocs.	305-773-4700
Fla	St. Petersburg, Reynolds & Assocs.	813-360-1484
Ga	Atlanta, Reynolds & Assocs.	404-252-5360
Ill	Chicago, Essex Intern'l. Inc. Controls Div.	312-478-9151
Ind	Greenwood, Valentine & Schillinger & Assoc.	317-888-2260
Ind	Logansport, Essex Intern'l. Inc. Controls Div.	219-753-7521
Ind	South Bend, Valentine & Schillinger & Assoc.	219-291-6258
Iowa	Cedar Rapids, Palatine Sls., Inc.	319-365-8071
Kans	Andover, Palatine Sls., Inc.	316-683-7512
Kans	Overland Park, Palatine Sls. Inc.	913-262-6820
Md	Baltimore, W.S. Warrington & Assocs.	301-823-8759
Mass	Needham, A & M Elctrn. Reps.	617-444-8170
Mich	Berrien Springs, Essex Intern'l., Inc. Controls Div.	616-473-4811
Minn	Minneapolis, Essex Intern'l., Inc. Controls Div.	612-331-6370
Mo	St. Louis, Palatine Sls., Inc.	314-426-7055
NJ	South Hackensack, Essex Internt'l., Inc. Controls Div.	201-641-4407
NY	Dewitt, Essex Intern'tl., Inc. Controls Div.	315-446-0800
NC	Charlotte, Reynolds & Assocs.	704-527-2536
Ohio	Centerville, C.H. Dolfuss, Jr. & Co.	513-433-6776
Ohio	Rocky River, C.H. Dolfuss Jr. & Co.	216-333-7504
Okla	Tulsa, Palatine Sales	918-622-0321
Ore	Portland, C. K. Shanks & Assoc.	503-292-5656
Pa	Blue Bell, Essex Intern'tl., Inc. Controls Div.	215-542-8476
Tex	Austin, Palatine Sls.	512-451-7463
Tex	Houston, Palatine Sls.	713-777-4477
Tex	Richardson, Palatine Sls.	214-231-9489
Wash	Seattle, C. K. Shanks & Assoc.	206-632-4290

Local Distributors

Ala	Huntsville, Powell Elctrns., Inc., 803 Oster Dr.	205-539-2731
Ariz	Tucson, Inland Elctrn. Supply, 715 E. Bdwy.	602-624-4402
Ark	Fort Smith, Carlton-Bates Co., 302 North 6th St.	501-782-7258

Ark	Jonesboro, Bluff City Distributing Co., 324 Huntington	501-932-7811
Ark	Little Rock, Carlton-Bates Co., 69th & Scott Hamilton Dr.	501-562-9100
Cal	Burbank, Terminal Elctrns. Corp., 2402 W. Olive	213-843-1221
Cal	Fresno, Dunlap Elctrns., 1750 E. McKinley Ave.	209-268-6111
Cal	Hayward, Dunlap Elctrns., 25354 Cypress Ave.	415-352-1933
Cal	Mountain View, Terminal-Hudson Elctrns., Inc., 880 Maude Ave.	415-969-9240
Cal	Redwood City, Electrical Sls. Prods., 465 Convention Way	415-364-2621
Cal	San Leandro, Electro Comps. Dist., 1939 Republic Ave.	415-352-5210
Cal	Santa Clara, Fisher Switches, Inc., 3381 Edward Ave.	408-244-6182
Colo	Denver, Dixon Elec. Supply, Inc., 4880 E. Pacific Pl.	303-757-7453
Colo	Denver, Newark/Denver Elctrns., 2170 S. Grape St.	303-757-3351
Conn	Hamden, Wilshire Elctrns./Conn., 2554 State St.	203-281-1166
Fla	Daytona Beach, Hammond Elctrns., Inc., 719 N. Ridgewood Ave.	904-253-0531
Fla	Fort Myers, Hammond Elctrns., Inc., 2563- 4th St.	813-334-2277
Fla	Jacksonville, Hammond Elctrns., Inc., 250 East First St.	904-356-4851
Fla	Lakeland, Hammond Elctrns., Inc., 930 East Oak St.	813-686-4145
Fla	Miami, Electro-Standards Labs., Inc., 3560 N. W. 34th St.	305-633-6973
Fla	Miami, Electronic Equip. Co., 2701 N.W. 42nd Ave.	305-871-3500
Fla	Orlando, Hammond Elctrns., Inc., 911 West Central Blvd.	305-849-6060
Fla	Tampa, Hammond Elctrns., Inc., 1516 Cypress St.	813-253-0104
Ga	Atlanta, Specialty Distributing Co., 763 Juniper St. N.E.	404-873-2521
Ill	Chicago, Newark Elctrns., 500 North Pulaski Rd.	312-638-4411
Ill	Elgin, Allied Elctrns., 1355 Sleepy Hollow Rd.	312-697-8200
Ill	Peoria, Klaus Radio, Inc., 8400 N. Pioneer Pkwy.	309-691-4840
Ind	Evansville, Hutch & Son, Inc., 300 N. Main St.	812-425-7201
Ind	Fort Wayne, Fort Wayne Elctrns. Supply, Inc., 3606 E. Maumee Ave.	219-423-3422
Ind	Indianapolis, Graham Elctrns. Supply, Inc., 133 S. Pennsylvania St.	317-634-8486
Iowa	Cedar Rapids, Deeco, Inc., 2500-16th Ave. S.W.	319-365-7551
Kans	Wichita, Radio Supply Co., 115 Laura	316-267-5216
La	Metairie, Industrial Distributors, Inc., 710 Papworth Ave.	504-835-7281
Md	Baltimore, A S I Elctrns., 1728 - 30 Whitehead Rd., Meadows Industrial Pk.	301-265-5100
Md	Beltsville, Powell Elctrns., Inc., 10728 Hanna St.	301-474-1030
Md	Gaithersburg, Pioneer/Wash., 9100 Gaither Rd.	301-948-0710
Mass	Dedham, Gerber Elctrns. & Radio Supply Co., 852 Providence Hwy. (U.S. Rt. 1)	617-329-2400
Mich	Detroit, RS Elctrns., 12775 Lyndon Ave.	313-491-1012
Mich	Grand Rapids, Stotts-Friedman, 2035 Eastern Ave., S.E.	616-241-6731
Minn	St. Paul, Gopher Elctrns. Co., 2520 W. Larpenteur	612-645-0241
Miss	Columbus, Bluff City Distributing Co., 116 S. 22nd St.	601-328-6212
Miss	Greenville, Bluff City Distributing Co., Box 5606	601-334-4412
Miss	Tupelo, Bluff City Distributing Co., 210 South Glaster	601-842-6832
Mo	Kansas City, Burstein-Applebee, 3199 Mercier St.	816-531-5614
Mo	North Kansas City, LCOMP, 1520 Taney St.	816-221-2400
Mo	St. Louis, Interstate Ind'l. Elctrns., 4445 Gustine Ave.	314-481-6110
Mo	St. Louis, Olive Ind'l. Elctrns., 6662 Olive Blvd.	314-863-7800
NJ	Fairlawn, Relay Specialties, Inc., 1300 Plaza Rd.	201-797-3313
NJ	South Plainfield, Brownell-Electro, 500 Hadley Rd.	201-753-4600
NY	Buffalo, Summit Distributors, Inc., 916 Main St.	716-884-3450
NY	Farmingdale, Arrow Elctrns., Inc., 900 Broad Hollow Rd. (Rt. 110)	516-694-6800
NY	New York, Brownell-Electro, 85 Tenth Ave.	212-924-6000
NY	Rochester, Summit Elctrns., 292 Commerce Dr.	716-334-8110
NC	Charlotte, Dixie Radio Supply Co., 2220 South Tryon St.	704-377-5413
Ohio	Cincinnati, Hughes-Peters, Inc., 4865 Duck Creek Rd.	513-351-2000
Ohio	Cleveland, Pioneer-Standard Elctrns., Inc., 4800 E. 131st St.	216-587-3600
Ohio	Columbus, Hughes-Peters, Inc., 481 East 11th Ave.	614-294-5351
Ohio	Dayton, J. A. Becker Co., 1341 East Fourth St.	513-226-1341
Ohio	Mansfield, Hoover Instr. Service, Inc., 401 North Home Rd.	419-529-3583
Okla	Tulsa, Oil Capitol Elctrns. Corp., 708 South Sheridan, Box GG - Admiral Station	918-836-2541
Ore	Portland, EOFF Elec. Co., 509 N.W. 10th Ave.	503-222-9411
Pa	Philadelphia, Powell Elctrns., Inc., S. Island Road & Enterprise Ave.	215-365-1900
Pa	Pittsburgh, RPC Elctrns., 620 Alpha Dr.	412-782-3770
Pa	Reading, G. D. Barbey Co., 333 N. 4th St.	215-376-7451
SC	Columbia, Dixie Radio Supply Co., 1900 Barnwell St.	803-253-5333
Tenn	Memphis, Bluff City Distributing Co., 234 East St.	901-725-9500
Tenn	Nashville, Electra Distributing Co., 1914 West End Ave.	615-329-3971
Tex	Dallas, Texas Instr. Supply Co., 6000 Denton Dr.	214-238-2011
Tex	Denison, Denison Radio Supply, 426 West Woodard St.	214-465-2336
Tex	Ft. Worth, Allied Elctrns., 401 East 8th St.	817-336-5401
Tex	Houston, Solid State Elctrns. Co. of Texas, 6400 Westpark Dr.	713-785-5205
Tex	Houston, Texas Instrs. Supply Co., 3939 Ann Arbor Dr.	713-785-4800
Va	Charlottesville, Piedmont Elec. Supply Corp., 1150 Rose Hill Dr.	703-296-6167
Wash	Seattle, Sterling Elctrns., 5608 6th Avenue So.	206-762-9100
Wisc	Milwaukee, Marsh Elctrns., Inc., 6047 W. Beloit Rd.	414-545-6500
Wisc	Milwaukee, Parts Mart Corp., 1314 N. 7th St.	414-276-4160
Exp:	New York, N.Y., Roburn Agencies, Inc., 349 West 14th St.	212-989-5939

ESSEX WIRE, 6235 S. Harlem Ave., Chicago, Ill., 60638

ESTERLINE ANGUS, 1201 Main St., Indianapolis, Ind., 46224, Tel: 317-244-7611; FSC No: 72264; Empl.: 300; Minimum order: $20 ... p. 1•864-867

For info on price: M. Vian; Application info: M. Vian; Customer service: B. Kiser; Delivery info: M. Vian

Free literature available: Keyboard programmable data acquisition systems, ammeters, voltmeters, milliammeters, inkless multipoint, PIP, XY and impact chart recorders. Also: event, frequency and temperature recorders; Servo recorders.

Products manufactured: Amplifiers, Cleaners, Ultrasonic, Data Acquisition & Reduction Systems, Data Loggers, Indicators, Integrators, Electronic, Meters, Monitors, Recorders, Tachometers, Transformers

Local Sales Offices & Reps.

Ala	Birmingham, Spader & Assocs.	205-879-1366
Ariz	Scottsdale, BFA Corp. of Ariz.	602-946-4215
Ark	Little Rock, Electra-Tech Midsouth, Inc.	501-562-4090
Cal	City of Industry, Esterline Angus Branch Off.	213-330-1621
Cal	Hayward, Esterline Angus Branch Off.	415-785-8232
Colo	Denver, Cliff Beabout Co.	303-831-7259
Fla	Orlando, Datarep, Inc.	305-843-5224
Fla	Pompano Beach, Datarep, Inc.	305-781-9279
Ga	Decatur, Spader & Assocs.	404-296-3024
Haw	Honolulu, Berkley Engrg. & Equip. Co.	808-538-1921
Ill	Elmhurst, Esterline Angus Branch Off.	312-833-4410
Ind	Indianapolis, C.D. Arnold Co.	317-546-4053
Iowa	Cedar Rapids, H.E. Ferris Co.	319-362-9156
Iowa	Des Moines, H.E. Ferris Co.	515-255-5008
La	New Orleans, Mid-South Sls. Co.	504-822-3030
Mass	Holliston, Esterline Angus Branch Off.	617-235-5343
Mich	Marquette, NWR Elctrns. Corp.	906-228-9660
Mich	Troy, G. R. Peters Assocs.	313-524-2920
Minn	Minneapolis, Electrical Jobbers Equip. Inc.	612-721-4815
Minn	Virginia, NWR Elctrns. Corp.	218-741-5080
Mo	Crestwood, C.B. Fall Co.	314-968-3850
Mo	Kansas City, C.B. Fall Co.	816-942-3912
NJ	Lodi, Esterline Angus Branch Off.	201-471-0084
NM	Albuquerque, BFA Corporation	505-292-1212
NM	Las Cruces, BFA Corporation	505-523-0601
NY	Buffalo, Robt F. Lamb Co.	716-874-4900
NY	Rochester, Robt F. Lamb Co.	716-544-5580
NY	Schenectady, Robt F. Lamb Co.	518-393-4844
NY	Syracuse, Robt F. Lamb Co.	315-454-2469
NC	Charlotte, Ranson, Wallace & Baesel, Inc.	704-334-4244
Ohio	Cincinnati, Beedle Equip. Co.	513-793-0140
Ohio	Cleveland, M.A. Blankenburg & Co.	216-251-7010
Okla	Oklahoma City, Kennedy Engrg. Co.	405-524-6048
Okla	Tulsa, Kennedy Engrg. Co.	918-835-9975
Ore	Portland, McLaren, Inc.	503-297-2248
Pa	Oreland, Esterline Angus Branch Off.	215-887-2268
Pa	Pittsburgh, Bollinger & Richards	412-561-2340
Tenn	Knoxville, G.W. Massey Co.	615-577-9553
Tex	Borger, Kennedy Engrg. Co.	806-273-2871
Tex	Dallas, Data Aids Assocs.	214-620-1551
Tex	Houston, Data Aids Assocs.	713-862-6685
Utah	Salt Lake City, Instrumentation Sls.	801-272-3793
Va	Fairfax, Hildenbrand Co.	703-280-2330
Wash	Bellevue, McLaren, Inc.	206-454-3400
WVa	Charleston, Vynock Engrg. Co.	304-722-4221
Wisc	Milwaukee, T.R. Bickler Assocs.	414-453-3772

Local Distributors

Ala	Birmingham, MG Elect. & Equip., 3112 Sixth Ave., S.	205-328-4525
Cal	Burlingame, Metric Resources, 822 Airport Blvd.	415-347-3067
Cal	City of Industry, Hamilton Instrumentation Inc., 137 A N. Puente Ave.	213-330-3380
Ill	Niles, Cole-Parmer Instr. Co., 7425 N. Oak Park Ave.	312-647-0272
La	New Orleans, New Orleans Instr. Works, 3821 Magazine St.	504-897-0561
Md	Timonium, E.I.L. Instrmts., 1830 York Rd.	301-252-1260
Mich	TroyG. R. Peters Assoc., 1944 Crooks Rd.	313-524-2920
Neb	Omaha, Schneider Elect., 1102-08 Farnham	402-346-5550
NJ	Park Ridge, Gibbs & Stone, 116 Glendale Rd.	201-391-1255
NY	Buffalo, KOM Lamb, 1865 Kenmore Ave.	716-874-3530
Ohio	Cleveland, Marlin Mfg., 12404 Triskett Rd.	216-941-6200
Pa	Philadelphia, Aquatronics, 4th & Cumberland	215-739-0695
Tex	Fort Worth, Allied Elctrns., 401 E. 8th St.	817-336-5401
Wash	Seattle, Eicher-Richards, 2727 N.E. Blakely	206-523-7888
Wisc	Milwaukee, Taylor Elec., Drawer 11	414-241-4321

ESTES ENGRG. CO., 930 Marine Dr., Port Angeles, Wash., 98362, Tel: 206-457-0904; FSC No: 22590; Empl.: 28

Customer service: S. E. Estes

Free literature available: Ignition shielding specifications & appplication listings for automotive engines (for use by 2-way radio communications systems).

Products manufactured: Braid, Cable, Cable, Capacitors, Fixed, Containers, Filters, Jumpers, Kits, Shielding, Lead Assemblies & Receptacles, Resistors, Services, Assembly, Production & Test, Shields, Suppressors, Wire, Wire Shielding

ETC TERMINAL PRODUCTS, Unit of ITT Cannon Elec., 29000 Aurora Rd., Solon, Ohio, 44139, Tel: 216-248-8800; Empl.: 380; Minimum order: $50 p. 2•695-706

Customer service: D. Dunn

Free literature available: OEM-6T - Electric Terminals & Splices for the OEM, PDQ-1 - Quick Connect Terminals AMC-5 - Terminals & Splices, PIG-4 - Electrical Pigtails, lamp socket assemblies & connectors, TB-2 - Terminal Blocks, Open & Closed Backs, CT-3 - Crimping Tools.

Products manufactured: Connectors, Cutters, Wire, Hand Operated, Splices, wire (Including, Butt & Cap Types), Strips, Terminal Blocks, Boards & Strips, Terminals, Tools, Wire & Cable Ties

Local Sales Offices & Reps.

Ala	Huntsville, ITT Cannon Elec.	205-881-6653
Ariz	Phoenix, ITT Cannon Elec.	602-273-0755
Cal	Los Altos, Recht Assocs.	415-941-0336

Directory of Local Distributors Starts on page 401

Cal	San Carlos, LoDan, Inc.	415-592-4600
Cal	San Marcos, ITT Cannon Elec.	714-743-4554
Cal	Santa Ana, ETC Terminal Products	714-557-4700
Colo	Denver, Camel Elctrns., Inc.	303-757-6191
Colo	Englewood, ITT Cannon Elec.	303-770-1631
Conn	Tolland, ITT Cannon Elec.	203-872-2119
Fla	Deerfield Beach, Brandel-Stephens & Co.	305-427-8558
Fla	Orlando, Brandel-Stephens & Co.	305-425-3202
Ga	Atlanta, Brandel-Stephens & Co.	404-261-7579
Ill	Des Plaines, ITT Cannon Elec.	312-297-3150
Ind	Muncie, ITT Cannon Elec.	317-257-7879
Kans	Leawood, Thunderbird Tech. Sls. & Svcs.	913-642-7220
Kans	Wichita, Thunderbird Tech. Sls. & Svcs.	316-684-3941
Mass	Swampscott, ITT Cannon Elec.	617-729-8950
Mich	Detroit, ITT Cannon Elec.	313-543-0360
Minn	Minneapolis, ITT Cannon Elec.	612-854-1973
Mo	St. Louis, Thunderbird Tech. Sls. & Svcs.	314-567-6488
NY	Dewitt, Tri Tech Elctrns.	315-446-2881
NY	E. Rochester, Tri Tech Elctrns.	716-381-2722
NY	Elmsford, ITT Cannon Elec.	
NY	Larchmont, Tri Tech Elctrns.	914-834-4423
Ohio	Bedford, ITT Cannon Elec.	216-248-8800
Ohio	Kettering, ITT Cannon Elec.	513-434-8181
Pa	Feasterville, Professional Svc. Assocs.	215-355-6244
Pa	Fort Washington, ETC Terminal Products	215-646-2801
Tex	Dallas, ITT Cannon Elec.	214-661-0302
Tex	Houston, ITT Cannon Elec.	713-721-3999
Tex	Irving, Aid Elctrns., Inc.	214-259-4761
Va	Alexandria, ITT Cannon Elec.	703-370-5733
Va	Roanoke, ITT Cannon Elec.	703-362-0749
Wash	Bellevue, ITT Cannon Elec.	206-454-3903
Wisc	Milwaukee, DeVos-Prinz Sls. Corp.	414-272-0356
EXP:	Santa Ana, Cal., ETC Terminal Products	714-557-4700
FOR:	Can., Montreal, Que., ITT Cannon Elec. Can.	514-336-7660
FOR:	Can., North Vancouver, B.C., Arwin Tech. Sls.	604-980-4346
FOR:	Can., Whitby, Ont., ITT Cannon Elec. Can.	416-668-8881

ETCHIT, INC., 643 13th Ave. S., Hopkins, Minn., 55343, Tel: 612-935-5507; Empl.: 20; Minimum order: $40

For info on price: F. Bergland; Application info: R. H. Dunn; Customer service: F. Bergland; Delivery info: R. H. Dunn

Free literature available: Brochure

Products manufactured: Services, Assembly, Production & Test

Local Sales Offices & Reps.

Ind	Columbus, Ritter	812-372-1534
NJ	Caldwell, A.M. Bakken	201-349-4655
Tex	Houston, Manco Metals	713-864-8084

EUBANKS ENGRG., 225 W. Duarte Rd., Monrovia, Calif., 91016, Tel: 213-358-4531, Telex: 675403; Empl.: 75; Minimum order: $25

For info on price: J. Reed; Application info: J. Reed; Customer service: J. Menart; Delivery info: S. Kirkland

Free literature available: Quick-Reference Catalogue; Eubanks; Automatic Wire Strippers.

Products manufactured: Machines/Machinery, Production, Wire Strippers

Local Sales Offices & Reps.

Ala	Huntsville, Powertronics, Inc.	205-852-6347
Cal	Glendale, Tool Tronics, Inc.	
Cal	Mountain View, Charles Morse	415-968-7722
Cal	Pasadena, O.E.M. Sls. Co.	213-796-9937
Cal	Santa Clara, Tool Tronics, Inc.	408-241-4000
Colo	Boulder, Mile High Elctrns.	303-444-5615
Conn	Bridgeport, Technical Instrs., Inc.	203-368-4582
Fla	Titusville, Powertronics, Inc.	305-267-5699
Ill	Lake Forest, Marsland Distributing Corp.	312-295-1616
Md	Silver Springs, Ara Elctrns. Inc.	301-565-2584
Mass	Wilmington, Technical Instrs., Inc.	617-944-3930
Mich	Detroit, Electro Entprs., Inc.	313-521-1500*2
Minn	Minneapolis, Production Automation Corp.	612-866-5700
Mo	Hazelwood, Production Automation Corp.	314-731-2331
Mo	Raytown, Production Automation Corp.	816-737-0066
NJ	Livingston, Argo Engrg. Co.	201-992-4367
NY	Spring Valley, Salit Assocs.	914-352-4443
NY	Syracuse, Maloney Sls. Co.	315-488-3440
NC	Raleigh, Powertronics, Inc.	919-787-9090
NC	Thomasville, Powertronics, Inc.	919-476-6727
Ohio	Cleveland, Electro Entprs., Inc.	216-261-7670
Ohio	Dayton, Electro Entprs., Inc.	513-426-6071
Ore	Portland, Vandy, Inc.	503-292-8633
Pa	Glenside, Ara Elctrns. Inc.	215-887-5250
Pa	Pittsburgh, Electro Entprs., Inc.	412-371-8497
Tex	Dallas, Sivright Co.	214-357-6681
Wash	Seattle, Vandy, Inc.	206-789-3300
FOR:	Can., Thornhill, Ontario, Robert Neill Co.	416-889-9971

EVANS ASSOCS., Box 5055, Berkeley, Cal., 94705, Tel: 415-848-6839

Customer service: Sls. Dept.

Products manufactured: Amplifiers

Local Sales Offices & Reps.

Va	Annandale, J. Hopkins Assoc.	703-323-1641

EVANS CORP., GEORGE 121 37th St., Moline, Ill., 61265, Tel: 309-762-9456; Empl.: 180 .... p. 1•493

Products manufactured: Air Cleaners & Filters (Shielded & Unshielded)

EVAPORATED COATINGS, INC., 798 Welsh Rd., Huntingdon Valley, Pa., 19006, Tel: 215-WI 7-1465; Empl.: 17; Minimum order: $30

For info on price: R. W. Schaffer; Application info: C. H. Barto

Free literature available: General litereature as well as data sheets on several specialized coatings such as RFI shielding anti-static films, reflecting and low reflecting coatings.

Products manufactured: Coatings, Filters, Lenses, R-F, Services, Assembly, Production & Test, Shields

EVERETT/CHARLES, INC., 2806 Metropolitan Pl., Pomona, Cal., 91767, Tel: 714-593-2541; Empl.: 90

Application info: J. Ireland; Customer service: W. Frey

Products manufactured: Cable Assemblies & Harnesses, Cable Fault Locators, Probes, Testers, Valves, Solenoid, Valves, Vacuum

Local Sales Offices & Reps.

Cal	Pleasanton, Everett/Charles	415-462-4772
Fla	Winter Park, Everett/Charles	305-671-1246
Ill	Aurora, Everett/Charles, Inc.	312-859-2636
Ill	Chicago, K.W. Meyers	312-774-6440
NH	Merrimack, Everett/Charles	603-424-4466
Tex	Dallas, Bradenco	214-358-3278

EWALD INSTRS. CORP., Rte. 7R, Kent, Conn., 06757, Tel: 203-927-3278

Customer service: Sls. Dept.

Free literature available: S5 - welding eq't for small parts; HWT hand welding tools; DB die bonders; SS shielding strippers.

Products manufactured: Machines/Machinery, Production, Soldering Equipment, Welding Equipment & Access. (Excluding Equip. for Semiconductor Devices), Wire Strippers

EWC, INC., 725 Federal Ave., Kenilworth, N.J., 07033, Tel: 201-245-3200, TWX: 710 996 5993; FSC No: 15387; Empl.: 90

For info on price: C. G. Hiotis; Application info: S. Plepis; Customer service: W. J. Cyrana; Delivery info: W. J. Cyrana

Free literature available: Audio, Power and Inverter Transformers for Military and Commercial Applications.

Products manufactured: Amplifiers, Chokes, Coils Including Assemblies & Forms, Converters, Filters, Power Supplies, Transducers, Transformers

Local Sales Offices & Reps.

Cal	Santa Clara, Cummings & Assocs.	408-247-8656
Cal	Woodland Hills, Cummings & Assocs.	213-340-6035
Conn	Marion, Sands S Company, Inc.	203-628-4363
Fla	Orlando, Duay Enterprises	305-277-3296
Fla	Palm Beach Gardens, Bill Brozey	305-622-6045
NY	Fairport, D. Kirby Co.	
NC	Swansboro, William Eschwei	919-326-5740
Ohio	Vandalia, W. Williams	513-898-1224
Ohio	Wickliffe, Walter J. Brauer & Assocs.	216-943-0601
Pa	Pittsburgh, Hal B. Allison	412-921-3213

EXACT ELECTRONICS, Box 160, Hillsboro, Ore., 97123, Tel: 503-648-6661, TWX: 910-460-1188; Empl.: 60; Minimum order: $5

Customer service: P. V. Pryor

Free literature available: SHORT FORM CATALOG describes and illustrates 31 different items including function generators, phase generators, frequency synthesizers, and complex waveform synthesizers. The catalog also contains a model capability cross-reference chart and prices.

Products manufactured: Amplifiers, Generators, Synthesizers

Local Sales Offices & Reps.

Ala	Huntsville, BCS Assocs.	205-881-6220
Ariz	Tempe, PLS Assocs.	602-957-9110
Cal	Culver City, Feeger, Lucas, Wolfe	213-559-7220
Cal	Los Altos, J. Stone & Assocs.	415-948-4563
Cal	Los Angeles, Basic Systems	213-938-2833
Cal	Palo Alto, Coherent Mktg. Assoc.	415-327-2217
Cal	San Diego, Feeger, Lucas, Wolfe, Inc.	714-277-0993
Colo	Denver, PLS Assocs.	303-771-0140
Fla	Orlando, BCS Assocs.	305-896-4881
Ill	Chicago, Pivan Engrg., Inc.	312-539-4838
Ind	Indianapolis, Pivan Engrg., Inc.	317-253-1681
Kans	Shawnee Mission, Pivan Engrg., Inc.	913-722-1030
Md	Kensington, Electronic Mktg. Assocs., Inc.	301-744-7700
Mass	Waltham, Measurement Consultants Corp.	617-890-4400
Mich	Farmington, Carter, McCormic & Peirce, Inc.	313-477-7700
Mich	Kalamazoo, Carter, McCormic & Peirce, Inc.	616-349-9669
Minn	Minneapolis, Pivan Engrg., Inc.	612-537-4501
Mo	St. Louis, Pivan Engrg., Inc.	314-567-3636
NM	Albuquerque, PLS Assocs.	505-255-2330
NY	Great Neck, Measurement Tech., Inc.	516-482-3500
NC	Greensboro, BCS Assocs.	919-273-1918
Ohio	Cleveland, Carter, McCormic & Peirce, Inc.	216-333-5650
Ohio	Dayton, Carter, McCormic & Peirce, Inc.	513-278-5873
Okla	Tulsa, Palatine Sls., Inc.	918-622-0321
Pa	King of Prussia, Electronic Mktg. Assoc.	215-248-5050
Pa	Pittsburgh, Carter, McCormic & Peirce, Inc.	412-824-3760
RI	Cumberland, Measurement Consultants Corp.	410-333-6000
Tex	Austin, Palatine Sls., Inc.	512-451-7463
Tex	Houston, Palatine Sls., Inc.	713-777-4477
Tex	Richardson, Palatine Sls., Inc.	214-231-9489
Wash	Seattle, Hayes Tech.	206-763-2210
Wisc	Brookfield, Pivan Engrg., Inc.	414-786-1940
FOR:	Can., Downsview, Ont., Electronetic Systems	416-661-3673
FOR:	Can., Montreal, Que., Electronetic Systems	514-342-4112
FOR:	Can., Ottawa, Ont., Electronetic Systems	613-733-3781
FOR:	Can., Vancouver, B.C., Electronetic Systems	604-687-5696

EXAR, 750 Palomar Ave., Sunnyvale, Cal., 94086, Tel: 408-733-7700, TWX: 910-339-9233; Empl.: 50

Customer service: K. Davis

Products manufactured: Integrated Circuit Devices, Transistors

Local Sales Offices & Reps.

Ariz	Scottsdale, Barnhill Five	602-947-5745
Cal	Culver City, DeAngelo, Rothman & Co.	213-398-6239
Cal	Redwood City, Logan Sls.	415-369-6726
Cal	San Diego, DeAngelo, Rothman & Co.	714-560-5707
Cal	Santa Ana, DeAngelo, Rothman & Co.	714-549-8092
Cal	Sunnyvale, Exar Integrated Sys.	408-733-7700
Colo	Denver, Barnhill Five	303-426-0222
Conn	Wallingford, Com-Sale	203-269-7964
Fla	Miami, Reptronics	305-251-5478
Fla	St. Petersburg, Reptronics	813-522-8220
Ga	Atlanta, Electro-Mech	404-393-0444
Ill	Chicago, M&S Sls.	312-992-1053
Kans	Wichita, Dy-Tronix	316-943-6221
Md	Baltimore, Component Sls.	301-484-3647
Md	Severna Park, Exar Integrated Sys.	301-647-6775
Mass	Waltham, Com-Sale	617-890-0011
Mich	Warren, DEM Elctrn. Sls.	313-755-6660
Minn	Minneapolis, Electronic Innovators	612-884-7471
Minn	St. Petersburg, Reptronics	813-522-8220
Mo	Hazelwood, Dy-Tronix	314-731-5799
Mo	Kansas City, Dy-Tronix	816-761-6543
NY	Buffalo, J. McDonough Assoc.	716-839-2044
NY	Manlius, J. McDonough Assoc.	
NY	Rochester, J. McDonough Assoc.	716-889-1919

NY	Williston Park, ABC Elctrn. Sls.	516-747-6610
NC	Raleigh, Component Sls.	919-782-8433
Ohio	Columbus, McFadden Sls.	614-221-3363
Pa	Willow Grove, H. Nash Assoc.	215-657-2213
Tenn	Nashville, Electro-Mech	615-883-1490
Wash	Bellevue, SD-R2 Products & Sls.	206-747-9424
FOR:	Can., Dollard Des Ormeaux, Que., R.F.Q. Ltd.	
FOR:	Can., Downsview Ont., R. Ohm Elctrns. Can.	416-661-2084
FOR:	Can., Mississauga, Ont., R.F.Q. Ltd.	416-625-8874

EXCEL PRODUCTS CO., INC., 700 Joyce Kilmer Ave., New Brunswick, N.J., 08903, Tel: 201-249-6600; Empl.: 360; Minimum order: $25

For info on price: L. Eige Ext. 212; Customer service: R. Louth Ext. 221; Delivery info: R. Louth Ext. 221

Free literature available: Contained in Excel Literature Along With Complete, Illustrated Descriptions of Products are the 'Products' Outstanding Features, Drawings, and Specs of All Items and Material Used In Their Manufacture.

Products manufactured: Boards, Plug-In, Boards, Printed Circuit, Boards, Printed Wiring, Universal, Boards, Programming, Cabinets & Accessories, Cams, Cards, Logic, Chassis, Circuit Board Mounting, Connector Adapters, Connector Blocks, Mother Board, Connector Boxes & Strips, Power Outlet, Connectors, Contact Strips, Finger, Contacts, Electrical, Guides, Circuit Board, Holder & Carriers, Holders, Circuit Board (Production Type), Integrated Circuit Packaging Systems, Racks, Screens, Printed Circuit, Services, Assembly, Production & Test, Sockets, Solder (All Types), Splicers, Coaxial Cable, Splices, wire (Including, Butt & Cap Types), Terminal Blocks, Boards & Strips, Terminals

EXCEL SPECIALTY CORP., 6335 N. Broadway, Chicago, Ill., 60660, Tel: 312-262-4781; Empl.: 25

For info on price: M. Bank; Application info: M. Bank; Customer service: M. H. Gawron; Delivery info: B. King

Products manufactured: Cords, Jumpers, Lead Assemblies & Receptacles, Leads, Test & Adaptors, Services, Assembly, Production & Test

EXCELLON AUTOMATION, Div. Excellon Inds., 23915 Garnier St., Torrance, Cal., 90509

EXCELLON INDUSTRIES, 9522 W. Jefferson, Culver City, Cal., 94525

EXECUTONE, PRINTACT RELAY DIV., 29-10 Thomson Ave., Long Island City, N.Y., 11101, Tel: 212-EX2-4800, TWX: 710-582-2610; Empl.: 500; Minimum order: $25 .... p. 1•1683

For info on price: J. A. Richards; Application info: R. Terry; Customer service: R. Terry; Delivery info: R. Terry

Free literature available: PR-100 Catalog describes PC board relay which plugs directly into board without sockets or soldering. PR-102A - Relay BCD decoder with memory, PR-262D Technical note on P-C board preparation to accomodate the printout relay.

Products manufactured: Drivers & Decoders For Readouts, Relays

Local Sales Offices & Reps.

Cal	Orange, Sls. & Mktg. Assoc.	714-997-5720
Cal	San Francisco, R.R. Slater	415-392-9154
Cal	Tarzana, R. Capell Co.	213-987-2233
Colo	Colorado Springs, Elctrns. Mfg. Consult.	303-244-3217
DC	Wash, H. Wise Co.	202-363-9417
Fla	Palm Beach Gardens, Graham Assocs.	305-622-4049
Ill	Chicago, Allen Wood & Assocs.	312-283-7400
Ind	Indianapolis, Marketing Engineers	317-546-1523
Mass	Wakefield, Measurement Equip. Co.	617-245-4870
Mich	Dearborn Hgts., Ankofski Assocs.	313-565-6330
Minn	Anoka, K. Haugen & Assocs.	612-421-3395
NM	Albuquerque, IMEC	505-883-9010
NY	Jamaica, S. A. M. Assoc.	212-658-8881
Ohio	Englewood, Ad-El-Tek	513-836-2741
Pa	Philadelphia, H.A. Goodman	215-247-7116
Tex	Dallas, Caton Sls. Co.	214-661-5792
Wash	Seattle, R.R. Slater	206-622-3860

EXETRON CORP., 2390 Walsh St., Santa Clara, Cal., 95050, Tel: 408-247-7660, Telex: 357424; Empl.: 215; Minimum order: $25

For info on price: B. Dresser; Application info: D. Apte; Customer service: S. Koch; Delivery info: S. Koch

Products manufactured: Circuits, Integrated, Silicon Monolithic, Unpackaged Chips, Circuits, Printed, Multilayer, Integrated Circuit Devices, Semiconductor Wafer Fabrication, Services, Assembly, Production & Test

Local Sales Offices & Reps.

Ariz	Tempe, Delta Elctrn. Sls.	602-966-9903
Cal	Mountain View, Nor-Cal	451-961-8121
Cal	San Diego, J.T.L. Assoc.	714-277-8044
Cal	Woodland Hills, Elctrn. Comp. Mktg.	213-340-1745
Colo	Denver, Straube Assoc.	303-426-0890
Fla	Casselberry, E.I.R.	305-830-6900
Ill	Palatine, Choisser & Clanfield Elctrn. Sls.	312-358-6900
Mass	Burlington, Contact Sls.	617-273-1520
Mich	Grosse Pointe Woods, Elko Sls.	313-884-1955
Mo	St. Louis, Beneke & McCaul	314-434-6242
NJ	Cherry Hill, Barrett Assoc.	609-429-1551
NJ	Irvington, M.G.I.	201-399-4350
Ohio	Cleveland, D. Steffen & Assoc.	216-461-8333
Tenn	Bristol, Rakes Engrg. & Mktg.	615-968-4195
Tex	Dallas, Merino Sls.	214-239-9719
Wash	Bellevue, Western Tech. Sls.	206-641-3900
Wisc	Elm Grove, Choisser & Clanfield Elctrn. Sls.	414-476-0484

EXIDE POWER SYS. DIV., ESB, Inc., Box 5723, Philadelphia, Pa., 19120, Tel: 215-FI2-8000, TWX: 215-725-7397; Empl.: 2200

Products manufactured: Batteries, Oceanographic Equip. (Electronic), Power Supplies, Switches, Testers

Local Sales Offices & Reps.

Ala	Birmingham	205-879-5321
Ariz	Phoenix	602-279-6680
Cal	San Francisco	415-589-9005
Cal	San Francisco	415-761-1080
Cal	Santa Fe Springs	213-698-9981
Colo	Denver	303-623-7793
Conn	Hamden	203-288-6389
Del	Wilmington	302-994-1970
DC	Wash	202-362-5700
Fla	Jacksonville	904-356-7506
Fla	Miami	305-885-5709
Fla	Tampa	813-248-2173
Ga	Atlanta	404-351-2722
Haw	Honolulu	808-847-0623
Ill	Benton	618-439-6194
Ill	Countryside	312-352-3665
Ill	Peoria	309-685-7684
Ind	Fort Wayne	219-743-0020
Ind	Indianapolis	317-787-3434
Ind	South Bend	219-233-7823
Ky	Louisville	502-585-4500
La	Metairie	504-837-3504
Md	Towson	301-825-2611
Mass	Medford	617-395-7979
Mass	Springfield	413-785-1034
Mich	Dearborn	313-581-0400
Mich	E. Grand Rapids	616-456-7487
Mich	Flint	313-238-6811
Minn	Roseville	612-631-2150
Mo	Kansas City	816-842-7274
Mo	St. Louis	314-773-1644
Neb	Omaha	402-342-6528
NJ	Newark	201-642-0005
NY	Albany	518-869-6907
NY	Buffalo	716-854-1278
NY	East Syracuse	315-437-8481
NY	Rochester	716-865-3800
NY	Woodside	212-457-4700
NC	Charlotte	704-375-7966
NC	Greensboro	919-274-2222
Ohio	Cincinnati	513-851-3838
Ohio	Cleveland	216-241-6231
Ohio	Columbus	614-846-0224
Okla	Tulsa	918-932-2878
Ore	Portland	503-284-6710
Pa	Bethel Park	412-833-6500
Pa	King of Prussia	215-265-6060
Tenn	Chattanooga	615-267-5850
Tenn	Memphis	901-327-6236
Tenn	Nashville	615-262-9285
Tex	Dallas	214-243-5531
Tex	Houston	713-524-2033
Utah	Salt Lake City	801-359-5766
Va	Ashland	804-798-4511
Va	Roanoke	703-342-0763
Wash	Seattle	206-623-1377
WVa	Bluefield	304-327-5859
WVa	Charleston	304-346-5363
Wisc	New Berlin	414-544-5428

F-DYNE ELCTRNS., 449 Howard Ave., Bridgeport, Conn., 06605, Tel: 203-367-6431; Empl.: 310; Minimum order: $15 .... p. 2•130-133

For info on price: M. Koenigsberg; Application info: A. Horne; Customer service: M. Koenigsberg; Delivery info: R. Furst

Products manufactured: Capacitors, Fixed, Capacitors, Variable, Filters, Networks

Local Sales Offices & Reps.

Ala	Huntsville, Beacon Elctrns.	205-881-5031
Cal	Fremont, Spence Assocs.	415-656-9506
Cal	Van Nuys, Myco Sls.	213-988-2288
Colo	Denver, Walter Engrg.	303-777-5585
Conn	Wethersfield, Con/Pak	203-563-4784
Del	Wilmington, Dyna-Rep.	301-256-8300
Fla	Ft. Lauderdale, Beacon Elctrns.	305-622-2770
Fla	Maitland, Beacon Elctrns.	305-647-3498
Ga	Atlanta, Beacon Elctrns.	404-351-3654
Ill	Elk Grove Village, Loren Green Assocs.	312-593-0282
Ind	Indianapolis, Loren Green Assoc.	317-293-9827
Kans	Shawnee, J. Guernsey Co.	913-631-2414
Mass	Needham, Com/Pak	617-444-1259
Mich	St. Clair Shores, J. M. Thorpe Co.	313-779-6363
Minn	Minneapolis, Loren Green Assoc.	612-781-1611
NJ	Haddonfield, Dyna-Rep.	609-795-1700
NY	Hempstead, Kahgan Sls.	516-538-2300
NY	Syracuse, Naylor Elec.	315-472-9183
NC	Greensboro, L & D, Inc.	919-292-3201
Ohio	Cleveland, Orr Assoc.	216-885-1324
Tex	Dallas, Cunningham Co.	214-231-2686
Tex	Houston, Cunningham Co.	713-461-4197
Va	Alexandria, Dyna-Rep.	703-354-1222
Va	Newport News, Dyna-Rep.	804-874-7729
FOR:	Can., Don Mills, Ont., B. D. Vallillee Elctrns.	416-447-8482

FABRI-TEK, INC., 5901 S County Rd. #18, Minneapolis, Minn., 55436, Tel: 612-935-8811, TWX: 910-576-2913

Products manufactured: Memory Systems

FABRI-TEK, INC., Computer Systems Div., 5901 S. County Rd. 18, Minneapolis, Minn., 55436, Tel: 612-935-8811, TWX: 910-576-2913; FSC No: 21542; Empl.: 2322; Minimum order: $75

For info on price: J. Erickson; Application info: J. Erickson; Customer service: G. Nelson; Delivery info: G. Nelson

Free literature available: Data sheets on all products – lists features & specifications Data sheets & reference manual on MP12 digital computer – contains all info. on operation & descriptions of standard MP12 software.

Products manufactured: Cores, Magnetic, Memories, Buffer, Memory Systems

Local Sales Offices & Reps.

Cal	Long Beach	213-420-2493
Cal	San Jose	408-246-8391
Colo	Denver	303-753-0631
Fla	Orlando	305-857-1050
Ill	Elk Grove Village	312-437-4116
Mass	Auburndale	617-969-5077
Mich	Northville	313-348-2161
NJ	Union	201-964-4770
Tex	Dallas	214-661-3155

FABRICAST, INC., 2517 Seaman Ave., So. El Monte, Cal., 91733, Tel: 213-443-3247; FSC No: 13345; Empl.: 8; Minimum order: $25 .... p. 1•950-955

Customer service: T. Elam

Free literature available: Catalogue

Products manufactured: Brushes & Brush Assemblies, Motor & Generator Armatures, Rotors, Stators, Slip-Rings & Assemblies

FACIT-ADDO, INC., 501 Winsor Dr., Secaucus, N.J., 07094, Tel: 201-866-5111, TWX: 710-992-8927; Empl.: 125

Customer service: O. Bjerkmann

Products manufactured: Calculators, Electrical & Electronic, Display Devices/Displays, Perforators, Printers, Readers, Recorders, Typewriters, Input-Output (All Types)

Local Sales Offices & Reps.

Cal	Los Altos, Cain-White, Co.	
Cal	Los Angeles, Facit-Addo, Inc.	213-385-4161
Cal	Sherman Oaks, Elctrn. Mktg. Specialists	213-990-4244
Colo	Denver, Rocky Mountain Office Machines	303-238-1381
Colo	Evergreen, Mountaintek	303-674-5255

Directory of Local Distributors Starts on page 401

Fla	Orlando, Gra-Mar, Inc.	305-894-3351
Ill	Chicago, Data Elctrns. Co.	312-283-0300
Md	Wheaton, K-G Elctrns.	301-946-4055
Mass	Wakefield, Instr. Dynamics	617-245-5100
Mo	Florissant, Midwest Mktg. Assocs.	314-831-0342
NY	Elmont, Crane & Egert	516-448-2100
NY	Penfield, A & D Devices	716-586-8033
Ohio	Wickliffe, Data-tron	216-585-8421
Pa	King of Prussia, Riv-Co.	215-265-5211
Tex	Fort Worth, Carey Wolf & Assocs.	817-738-1996
Wash	Seattle, Showalter-Judd, Inc.	206-762-2310

FAIR-RITE PRODS. CORP., Wallkill, N.Y., 12589, Tel: 914-895-2055, TWX: 510-249-4819; Empl.: 210

p. 2•1215

For info on price: B. Tolen; Application info: W. Martin; Customer service: B. Tolen; Delivery info: B. Tolen

Free literature available: Catalog of Fair-Rite® Cores, Application Note: Use of Ferrites For Wide Band Transformers, Application Note: DC to AC Inverter Design, Fair-Rite® Shield Beads

Products manufactured: Cores, Magnetic, Ferrite Material & Parts, Shielding Beads, Ferrite

Local Sales Offices & Reps.

Cal	City of Industry, Micrometals	213-968-4718
Colo	Denver, Electronic Sales, Inc.	303-771-6300
Conn	W Hartford, R. S. Pettigrew & Assoc.	203-233-8533
Fla	Maitland, Barrett Assocs.	305-678-0172
Ill	Palestine, Fair-Rite Prod.	618-586-2556
Mass	W. Newton, R.S. Pettigrew & Co.	617-969-5770
Ohio	Cincinnati, F. J. Campisano & Assoc.	513-662-1616
Pa	Philadelphia, Mid-Eastern Assoc.	215-842-2810
Tex	Dallas, Stasco	214-239-5054
Va	Roanoke, A. B. Kreger & Co.	703-989-4738
Wash	Seattle, J. Bergford & Assoc.	206-866-0201

FAIRCHILD SEMICONDUCTOR, 464 Ellis St., Mountain View, Cal., 94040, Tel: 415-962-5011

Products manufactured: Amplifiers, Circuits, Hybrid, Thin-Film, Circuits, Integrated, Silicon Monolithic, Unpackaged Chips, Diodes, Display Devices/Displays, Integrated Circuit Devices, Lamp Drivers, Lamps, Memory Systems, Microwave Integrated Circuits (MIC's), Multiplexers, Multipliers, Rectifiers, Regulators, Sensors, Light, Shift Registers, Switches, Transducers, Transistors

Local Sales Offices & Reps.

Ala	Huntsville	205-883-7020
Ariz	Phoenix	602-264-4948
Cal	Los Angeles	213-466-8393
Cal	San Diego	714-279-6021
Cal	Santa Ana	714-558-1881
Cal	Santa Clara	408-244-1400
Colo	Lakewood	303-234-9292
Conn	Stamford	203-348-7701
Fla	Altamonte Springs	305-834-7000
Fla	Ft. Lauderdale	305-566-7414
Fla	Largo	813-585-3892
Ill	Schiller Park	312-671-4660
Ind	Fort Wayne	219-483-6453
Ind	Indianapolis	312-849-5412
Kans	Mission	913-432-7878
Md	Bladensburg	301-779-0954
Mass	Wellesley Hills	617-237-3400
Mich	Westland	313-425-3250
Minn	Edina	612-835-3322
NJ	Wayne	201-696-7070
NM	Albuquerque	505-265-5601
NY	Endwell	607-754-1094
NY	Melville	516-293-2900
NY	Poughkeepsie	914-452-4200
NY	Rochester	716-385-1130
NY	Syracuse	315-471-3391
NC	Raleigh	919-781-1000
Ohio	Dayton	513-278-8278
Ohio	Highland Hgts.	216-461-8288
Okla	Tulsa	918-663-7131
Pa	Fort Washington	215-886-6623
Tex	Dallas	214-234-3391
Tex	Houston	713-771-3547
Wash	Bellevue	206-454-4946
Wisc	Milwaukee	414-282-5260
FOR:	Can., Mississauga, Ont.	416-625-7070

FAIRCHILD SOUND EQUIP., Sub. Robins Inds., 75 Austin Blvd., Commack, N.Y., 11725, Tel: 516-543-5200; Empl.: 35; Minimum order: $25

Customer service: R. Belmont

Free literature available: Engineering data sheets covering our broad line of solid state audio components, including amplifiers, compressors, mixing consoles and specialized audio control devices.

Products manufactured: Amplifiers, Attenuators, Equalizers, Generators, Mixers, Monitors, Oscillators, Power Supplies, Public Address Systems

Local Sales Offices & Reps.

Ala	Birmingham, Adams & Assocs., Inc.	205-822-8109
Cal	Oakland, Hank Gabriel	415-465-5361
Colo	Westminster, Electro-Tek Sls., Inc.	303-255-4566
Fla	Tampa, Repelect	813-227-5051
Ga	Decatur, Adams & Assocs., Inc.	404-981-2207
Haw	Honolulu, Gene Piety Factors, Inc.	808-839-9059
Ill	Chicago, Gordon Duvall Co.	312-763-6785
Iowa	Des Moines, KSW Assocs.	515-279-9235
Mich	Southfield, Robert Milsk Co.	313-354-3310
Mo	Kansas City, KSW Assocs.	816-363-5651
Neb	Omaha, KSW Assocs.	
NJ	Cherry Hill, Landy Assocs.	609-424-4660
NY	Phelps, LSM Assocs.	315-548-4891
NY	Port Washington, Joseph Assocs.	516-883-1829
NC	Greensboro, Adams & Assocs., Inc.	919-272-6838
Ohio	Columbus, Mandabach Assocs.	614-235-0265
Tex	Houston, Wyborny Sls. Co.	713-772-0961
EXP:	N.Y., Roslyn, Telesco Internat'l Corp.	516-484-4920

FAIRCHILD SPACE & DEFENSE SYS. DIV., Fairchild Camera & Instr., 300 Robbins La., Syosset, N.Y., 11791, Tel: 516-931-4500, TWX: 510-221-1836; Empl.: 800

Products manufactured: Cameras, Comm. Systems, Computers, Converters, Data Acquisition & Reduction Systems, Lenses, Optical & Camera, Services, Assembly, Production & Test, Standards, Television Systems & Equipment Closed-Circuit

FAIRCHILD SYS. TECHNOLOGY, 1725 Technology Dr., San Jose, Cal., 95110, Tel: 408-998-0123, TWX: 910-338-0558; Empl.: 600

For info on price: L. Thompson; Application info: J. Campbell; Customer service: V. Klein; Delivery info: B. Davi

Free literature available: Catalogs: Qualifier 901 - Digital IC benchtop tester; Sentry 610 – Computer controlled 10 MHz LSI, memory tester; Sentry 1200 – Computer controlled memory and microprocessor tester.

Products manufactured: Testers

Local Sales Offices & Reps.

Ariz	Tempe, FST	602-966-7297
Cal	Los Angeles, Fairchild Sys. Tech.	213-678-3166
Cal	Sunnyvale, Fairchild Sys. Tech.	408-998-0123
Fla	Altamonte Springs, Fairchild Sys. Tech.	305-834-7070
Ill	Chicago, Fairchild Sys. Tech.	312-671-4480
Mass	Wellesley, FST	617-237-4787
Minn	Minneapolis, Fairchild Sys. Tech.	612-835-3322
NJ	Cherry Hill, FST	602-242-3100
NJ	Wayne, FST	201-696-7070

FALSTROM CO., 174 Falstrom Ct., Passaic, N.J., 07055, Tel: 201-777-0013; Empl.: 250

Customer service: R. E. Hill

Free literature available: Falstrom Metal Fabricated Products- shows variety of weldments, enclosures, chassis, racks, made for dozens of industries.

Products manufactured: Cabinets & Accessories, Cases, Equipment, Instrument, Meter, Chassis, Metal, Frames, Cabinet & Rack, Racks, Services, Assembly, Production & Test, Welding Equipment & Access. (Excluding Equip. for Semiconductor Devices)

FANON/COURIER CORP., SUBS., Resdel Engineering, 990 S. Fair Oaks, Pasadena, Cal., 91105, Tel: 213-799-9164

For info on price: M. Trotiner; Application info: M. Trotiner; Customer service: R. Dashner

Free literature available: Fanon short form catalog with complete product line of sound and communications products. Individual Courier data sheets on citizen band radios and monitor scanners.

Products manufactured: Amplifiers, Antennas, Baffles, Speaker, Comm. Systems, Drivers, Speaker, Handsets, Chestsets, Headphones, Headsets, Etc., Microphones, All Kinds, Public Address Systems, Receivers, Speaker Systems, Speakers, Transmitters

Local Sales Offices & Reps.

Cal	Burlingame, Elvey Proctor Co.	415-347-2994
Cal	Sunnyvale, Elvey Proctor Co.	
Cal	Van Nuys, C.H. Mitchell Co.	213-994-9466
Colo	Littleton, Kenealey Assocs.	303-771-8140
Conn	Wallingford, Adam-McGregor	203-269-5816
Ga	Savannah, L. Sherman Assocs.	912-925-3660
Ill	Skokie, M. Bermann Sls.	312-675-3740
Ind	Indianapolis, Dewey Powers Sls.	317-846-0790
Kans	Shawnee Mission, M. Bettis Co.	913-362-0772
Kans	Wichita, M. Bettis Co.	316-685-7441
Mass	Scituate, Adams-McGregor	617-545-2213
Minn	St. Paul, Carl-M Co.	612-699-8004
Mo	St. Louis, M. Bettis Co.	314-429-2099
NJ	Fair Lawn, Moses & Kline	201-791-8538
NY	Ballston Spa, Al Toupkin Sls.	518-587-3956
NY	Kenmore, Al Toupkin Sls.	716-873-8839
NY	Merrick, Moses & Kline	516-378-1804
NY	North Pelham, Moses & Kline	914-738-1163
Ohio	Youngstown, Repcom	216-788-9693
Ore	Portland, Ron Meritt Co.	503-292-8762
Pa	Willowgrove, R. Lewis Sls.	215-659-0704
RI	Lincoln, Adams-McGregor	401-726-1300
Tex	Dallas, Loss Co.	214-691-6039
Utah	Murray, Kenealey Assocs.	801-268-3111
Va	Falls Church, R. Lewis Sales	703-534-7732
Wash	Seattle, Ron Merritt Co.	206-682-7337
Ariz	Phoenix, Sal Bova Sls. Co.	602-266-1137
Cal	Foster City, Olson Sls. Co.	415-573-1600
Cal	Los Angeles, L.J. Ross Sls.	213-476-1601
Cal	No. Hollywood, M. Stobin Co.	213-983-1555
Cal	San Diego, Doyle & Assocs.	714-461-1926
Col.o	Englewood, H.P. Mktg.	303-770-1158
Conn	Waterbury, Anderson Sls. Assocs.	203-753-2487
Fla	Atlantic Beach, Global Military Sls.	904-246-1400
Fla	North Miami, Winfield Elctrn. Sls.	305-945-6544
Fla	Tampa, Winfield Elctrn Sls.	813-884-6500
Ga	Norcross, D. Cooper Co.	404-448-5460
Ill	Chicago, Markal Sls. Co.	312-282-5800
Ill	Evanston, David-Martin Corp.	312-273-2600
Ind	Indianapolis, Shamrock Elctrn. Sls.	317-547-0080
Mass	Boston, Anderson Sls. Assocs.	617-227-2980
Minn	St. Paul, Carl-M Co.	612-699-8004
Mo	Raytown, Midwest Mktg.	816-358-6638
Mo	St. Louis, Midwest Mktg.	314-894-1388
NJ	Fair Lawn, Moses & Kline	201-791-8538
NJ	South Orange, S. Simberkoff Sls. Assocs.	201-763-7900
NY	Lockport, S. Simberkoff Sls. Assocs.	716-434-4426
NY	Merrick, Moses & Kline	516-378-1804
NY	North Pelham, Moses & Kline	914-738-1163
NY	North Syracuse, S. Simberkoff Sls. Assocs.	315-458-5469
Ohio	Akron, Shamrock Elctrn. Sls.	216-666-3796
Ohio	Beachwood, Kam Mktg.	216-464-7717
Pa	Cambridge Springs, Shamrock Elctrn. Sls.	814-398-8348
Pa	Philadelphia, S. Simberkoff Sls. Assocs.	215-743-2512
Tex	Dallas, Maynard-Gunn Sls.	214-528-9090
Tex	Dallas, Ram Mktg.	214-744-4881
Tex	El Paso, Sal Bova Sls.	915-591-6242
Tex	Houston, Maynard-Gunn Sls.	713-497-0544
Utah	Salt Lake City, H & P Mktg. of Colo.	801-466-6105
Va	Arlington, Howard Golenpaul & Assocs.	703-525-5898
Wash	Seattle, W.R. Lanphear & Co.	206-633-4900
Wisc	Colgate, Markal Sls. Co.	414-628-2801
EXP:	N.Y., New York, Roburn Agencies	212-989-5939

FANSTEEL INC., One Tantalum Pl., N Chicago, Ill., 60064, Tel: 312-689-4900, TWX: 910-235-1577; Empl.: 3000

Products manufactured: Contacts, Electrical, Diodes, Foil, Heat Sinks, Soldering, Metal Compounds, Foils, Powders, Sheet, Stock, Metals, Seals, Services, Assembly, Production & Test, Transistor, Diode, Thyristor Heat Dissipators, Wire

FARATRON CORP., 280 Green St., S. Hackensack, N.J., 07606, Tel: 201-488-1440, TWX: 710-990-5022; Empl.: 60

For info on price: A. Sanford; Application info: H. Aufiero; Customer service: B. Crawford; Delivery info: B. Crawford

Frèe literature available: Product sheets on our Present Standard Line of Power Supplies listing description, specifications, available options and pricing. Greibach product literature analoge instruments.

Products manufactured: Meters, Power Supplies

Local Sales Offices & Reps.

Cal	Torrance, Mitronics Ind.
Conn	Manchester, Addelco Corp.
Mass	Needham, Addelco Corp.
NY	Elbridge, L-Tron Corp.
NY	Great Neck, EAC Assocs.
NY	Syracuse, Nycom Corp.
Pa	Doylestown, Camco
Pa	Pittsburgh, Automated Equip. & Engrg.
Tex	Dallas, Thorson Co.
Tex	Houston, Thorson Co.

Advertisment

SINGLE AND MULTIPLE OUTPUT POWER SUPPLIES DESIGNED ESPECIALLY FOR THE OEM MARKET AND COVERING A WIDE RANGE OF REQUIREMENTS. ULTIMATE IN RELIABILITY AND RUGGEDNESS WITH UNIQUE SELF COOLING DESIGN.
FARATRON STOCKS AN EXTENSIVE STANDARD LINE TO SATISFY YOUR IMMEDIATE NEEDS AND SPECIFICATIONS. IMFORMATIVE LITERATURE AVAILABLE ON REQUEST.

FARIA METER CORP., 19 Faria Lane, Uncasville, Conn., 06382, Tel: 203-848-9271; Empl.: 150 ...... p. 1•694

For info on price: J. C. Halbrooks; Application info: J. C. Halbrooks; Customer service: K. Willey; Delivery info: K. Willey

Free literature available: Catalog sheet on each type of product manufactured. Gives technical data, physical dimensions and options available.

Products manufactured: Meters, Switches, Tachometers

FARINON ELECTRIC, 935 Washington St., San Carlos, Calif., 94070, Tel: 415-593-8491, Telex: 34-8491; Empl.: 1000; Minimum order: $25

Customer service: K. O'Neil

Products manufactured: Amplifiers, Comm. Systems, Receivers, Transmitters

Local Sales Offices & Reps.

Cal	San Carlos	415-593-8491
Ga	Atlanta	404-451-1982
NJ	Somerville	201-526-2669
Tex	Houston	713-688-5569
FOR:	Can., Calgary, Alberta	
FOR:	Can., Dorval, Que.	514-636-0974
FOR:	Can., Edmonton, Alberta	403-422-0566

FARRAND CONTROLS, INC., 99 Wall St., Valhalla, N.Y., 10595, Tel: 914-RO 1-2600; Empl.: 75

For info on price: G. A. Quinn; Application info: W. Grace; Customer service: R. McCusker

Free literature available: Farrand Integrated Circuit Digital Readout Brochure, Farrand Step-by-Step Way to Grinder Automation

Products manufactured: Amplifiers, Controls/Control Eqpt., Couplings, Indicators, Recorders, Resolvers, Synchro, Servo Systems

Local Sales Offices & Reps.

Cal	Gardena, Meas. Dev.	213-321-2504
Cal	Hayward, Harron-Rickard Dist.	415-786-1300
Conn	No. Haven, Machining Sys. Inc.	203-288-7433
Ga	Atlanta, Scott Mach. Tool Co.	404-522-8311
Haw	Honolulu, H. S. Gray Co., Ltd.	808-839-2747
Ill	Elmhurst, Federal-Bryant Mach.	312-833-4800
La	Shreveport, Richards Mach. & Sup.	314-567-3131
Mass	E. Boston, Wigglesworth Mach.	617-567-7210
Mich	Troy, Applied Mfg. Sys.	313-689-8600
Mo	Springfield, Crossland Mach. Co.	
Neb	Omaha, Crossland Mach. Co.	402-571-2288
NJ	Morristown, Leon Assocs.	201-540-0209
NY	Pittsford, R/F Allen Mach.	716-385-2730
Ohio	Cincinnati, Tech. Equip. S.	513-771-3630
Ore	Portland, Star Machinery	503-226-3011
Pa	Media, G.S. Maier Co.	215-565-2010
SC	Mt. Pleasant, Smith-Courtney Co.	802-884-5689
Tex	Dallas, C. J. Harter & Son Mach.	214-FL7-1501
Va	Richmond, Smith-Courtney Co.	804-232-4581

FEDERAL PACKAGE CORP.; 34016 Nevada Ave. N., Minneapolis, Minn., 55427

FEDERAL SCIENTIFIC CORP., See Nicolet Scientific Corp.

FEEDBACK, INC., 438 Springfield Ave., Berkeley Hghts., N.J., 07922, Tel: 201-464-5181; Empl.: 5

Customer service: M. A. Hewett

Free literature available: Electronic Test Equipment Catalog - Gives detailed specifications of products we offer. Includes application notes & explains principles of operation.

Products manufactured: Analyzers, Demodulators, Generators, Meters, Modulators, All Kinds

Local Sales Offices & Reps.

Fla	Lighthouse Point	305-946-0381
Ind	Indianapolis	317-926-6327

FENWAL ELCTRNS., 63 Fountain St., Framingham, Mass., 01701, Tel: 617-872-8841, TWX: 710-346-0678; Empl.: 250 ...... p. 1•2316

For info on price: W. M. Minnucci; Application info: W. M. Minnucci; Customer service: N. Brien; Delivery info: W. M. Minnucci

Free literature available: ISO- - CURVE & UNI-CURVE, RT, curve-matched interchangeable thermistors (L-2A & L-6A), thermistor capsule course cL-3A); E-I, curve-matched thermistors (L-7); hi-temp thermistors (L-8), thermistor housing manual (L-5A); thermistor manual

Products manufactured: Mounts, Probes, Resistors, Slide Rules (Circuitry Computing), Thermistors, Transducers

Local Sales Offices & Reps.

Ala	Huntsville, Col Ins Co.	205-539-1771
Ariz	Phoenix, Dorton Enterprises, Inc.	602-263-0414
Cal	Los Angeles, E. Landa Co.	213-879-0770
Cal	Menlo Park, G.R. McKnight Co.	415-325-2844
Colo	Denver, Zeus, Inc.	303-770-4400
Conn	Suffield, Andrews Airtronics, Inc.	203-668-0446
Fla	Orlando, Col Ins Co.	305-423-7615
Ill	Chicago, Midwest Elctrn. Sls.	312-777-9700
Ind	Indianapolis, Midwest Elctrn. Sls.	317-926-3736
Iowa	Marion, Thomas & Modrcin Assocs.	319-377-6261
Kans	Shawnee Mission, Thomas & Modrcin Assocs.	913-432-2131
Md	Baltimore, B. White & Co.	301-484-5400
Mass	Lynfield, Andrews Airtronics, Inc.	617-245-5220
Mich	Ferndale, Hilltronics, Inc.	313-398-5556
Minn	St. Paul, Northport Engr., Inc.	612-698-3841
Mo	Hazelwood, Thomas & Modrcin Assocs.	314-895-4700
NM	Alburquerque, Zeus, Inc.	505-256-9831
NY	De Ruyter, R.P. Kennedy Co.	315-682-2920
NY	Huntington, CDB Enterprises, Inc.	516-692-5200
NY	Red Hook, R.P. Kennedy Co.	914-876-2700
NY	Rochester, R.P. Kennedy Co.	716-271-6322
NC	Raleigh, Col Ins Co.	919-834-6591
Ohio	Cleveland, A.H. Baier Co. & Assocs.	216-461-6161
Ohio	Dayton, A.H. Baier Co. & Assocs.	513-276-4128
Okla	Tulsa, W.P. Fralia Co.	918-663-8707
Ore	Beaverton, Arneson Assocs.	503-643-5754
Pa	Ardmore, W.K. Metz, Inc.	215-649-3966
Pa	Pittsburgh, Covert & Newman Co.	412-563-0303
Tex	Fort Worth, W.P. Fralia Co.	817-738-2394
Tex	Houston, W.P. Fralia Co.	713-772-1572
Utah	Salt Lake City, Zeus, Inc.	801-486-2317
Wash	Seattle, Arneson Assocs., Inc.	206-762-7664
Wisc	Waukesha, Midwest Elctrn. Sls.	414-542-5129
EXP:	Framingham, Mass., Fenwal Electronics	617-872-8841

Local Distributors

Ala	Huntsville, Thermal Corp., Box 5327	205-837-1122
Cal	Burlingame, Rose Elctrn. Distributing Co., 846 Stanton Rd.	415-697-0224
Cal	Los Angeles, Mil-Comm Distrs., 1616 Cotner Ave.	213-478-0525
Colo	Aurora, Jet Elctrns. Supply Co., 1455 Florence St.	303-364-7000
Colo	Denver, Indl. Elctrns. Corp., Box 22457	303-771-2636
Colo	Denver, Newark-Denver Elctrn. Supply, 2170 S. Grape St.	303-757-3351
Ill	Chicago, Newark Elctrns. Corp., 500 N. Pulaski Rd.	312-638-4411
Ill	Elgin, Allied Elctrns., 1355 Sleepy Hollow Rd.	312-697-8200
Ind	Indianapolis, Graham Elctrn Supply, 133 South Pennsylvania St.	317-634-8486
Mass	Boston, DeMambro Elctrns., 1095 Commonwealth Ave.	617-787-1200
Mass	Newton, A. W. Mayer Co., 38 Border St.	617-965-1111
Minn	Minneapolis, Harry Stark, Inc., 112 Third Ave. N.	612-332-1325
Mo	Kansas City, Burstein-Applebee Co., 3199 Mercier St.	816-531-5614
Mo	St. Louis, Olive Indl. Elec., 6662 Olive St. Rd.	314-863-4051
NH	Manchester, DeMambro Elctrns., 1308 Elm St.	516-433-1700
NM	Albuquerque, Industrial Elctrns., 310 Valverde S.E.	505-256-9831
NY	Buffalo, Summit Distributors, 916 Main St.	716-884-3450
NY	Rochester, Summit Elctrns. of Rochester, 292 Commerce Dr.	716-334-8110
NC	Winston-Salem, Kirkman Elctrns., Inc., 901 W. Second St.	919-724-0541
Ohio	Cincinnati, United Radio, Summit Road & Rheinhold Dr.	513-761-4030
Okla	Tulsa, Radio, Inc., 1000 S. Main St.	918-587-9123
Pa	Philadelphia, Philadelphia Elctrns., 112 N. 12th St.	215-568-7444
RI	Providence, Wm. Dandreta & Co., 28 Wolcott St.	401-861-2800
Tex	Fort Worth, Patco Supply, 6100 Camp Bowie Blvd.	817-738-2394
Utah	Salt Lake City, Standard Supply Co., 225 E. 6th So.	801-355-2971
For:	Can., Edmonton, Alb., Cardinal Indl. Elctrns. Ltd., 14804-119th Ave.	403-455-4122
For:	Can., Montreal West, Que., S. C. Hooker (Cda) Ltd., 144 Ronald Dr.	514-487-5151
For:	Can., Montreal, Que., D. Randall Div. of Neeco Inds. Ltd.	Zenith39420
For:	Can., Rexdale, Ont., D. Randall-Div. of Neeco Inds. Ltd., 80 Galaxy Blvd.	416-678-2890
For:	Can., Vancouver 2, BC, RAE Indl. Elctrns. Ltd., 1629 Main St.	604-687-2621

FENWAL, INC., Div. W. Kidde & Co., Inc., Main St., Ashland, Mass., 01721, Tel: 617-881-2000, TWX: 617-881-1609; FSC No: 73168; Empl.: 700; Minimum order: $25

For info on price: J. W. Rice; Application info: J. W. Rice; Customer service: E. Murphy; Delivery info: J. W. Rice

Products manufactured: Adhesives (All Types), Alarms, Comparators, Controls/Control Eqpt., Monitors, Probes, Pyrometers, Switches, Thermistors, Thermocouples, Elements & Accessories, Thermostats, Transducers

Local Sales Offices & Reps.

Cal	Oakland, Belilove Co., Engrs.	415-658-9011
Cal	Sherman Oaks, Pacific Thermal Sls., Inc.	213-986-6036
Colo	Denver, E & M Sls., Inc.	303-244-4291
Conn	Middletown, Dittman & Greer, Inc.	203-347-4655
Fla	Miami, Ludlum Assocs. Co.	305-592-6523
Ga	Atlanta, Applebee-Church, Inc.	404-451-2747
Ill	River Forest, F. I. Tourtelot Co.	312-771-6300
Ind	Indianapolis, Couchman-Conant, Inc.	317-849-9890
Iowa	Davenport, Volco Co.	319-326-5233
La	Baton Rouge, Ross & Pethtel, Inc.	504-293-0520
Md	Ellicott City, McCourt Co., Inc.	301-465-4515
Mich	Warren, Smith Instrument & Equip. Co.	313-755-3110
Minn	Minneapolis, Volco Co.	612-336-6831
Mo	Kansas City, R. Greene Co.	816-333-7585
Mo	St. Louis, R. Greene Co.	314-644-2668
NJ	Clifton, R.L. Faber & Assocs., Inc.	201-773-8900
NY	Buffalo, R. F. Lamb Co., Inc.	716-874-4900
NY	New York, R.L. Faber & Assocs., Inc.	212-947-4100
NC	Matthews, W.K. Hile Co., Inc.	704-847-9125
Ohio	Cincinnati, Arnold & Assocs.	513-851-7200
Ohio	Cleveland, Anderson-Bolds, Inc.	216-229-4700
Okla	Tulsa, Driscoll Automatic Control Co.	918-747-6625
Pa	Narberth, C. B. Ives & Co., Inc.	215-839-6850
Pa	Pittsburgh, Gilson Engrg. Sls.	412-931-6114
Tenn	Memphis, R. M. Jordan & Assocs.	901-452-7441
Tex	Dallas, D. Shuhert Co., Inc.	214-239-0185
Tex	Houston, Southwestern Controls	713-666-2801
Wash	Seattle, Seatronics, Inc.	206-767-4330
Wisc	Milwaukee, G. Hatch Co., Inc.	414-671-6550

FERRA FLUX CORP., 1801 Newport Circle, Santa Ana, Cal., 92705, Tel: 714-979-0225; Empl.: 50

Customer service: J. Erdag

Free literature available: Data sheets are available on both Audio, Digital and Instrumentation Head Assemblies and on Memory Drum Systems.

Products manufactured: Drums Computer Memory, Heads, Recording Playback, Erase, Memory Systems

FERRANTI ELEC., East Bethpage Rd., Plainview, N.Y., 11803, Tel: 516-293-8383; Empl.: 15

For info on price: M. Canellos; Application info: S. J. Gladys; Customer service: S. J. Gladys; Delivery info: G. Glavin

Products manufactured: Display Devices/Displays, Erasers, Magnetic Tape (Bulk), Meters, Shields, Transistors, Tubes, Yokes

FERRANTI-PACKARD, LTD. ELEC. DIV., 121 Industry St., Toronto, Can.M6M 4M3, Tel: 416-762-3661, Telex: 06-22007; Empl.: 140; Minimum order: $75

For info on price: D. W. Smart; Application info: D. W. Smart; Customer service: J. D. Greenwood; Delivery info: B. Ashton

Free literature available: Brochures on: Electromagnetic display systems and components. Fully automatic or semi-automatic sortation control systems.

Products manufactured: Controls/Control Eqpt., Display Devices/Displays, Indicators

FERRODYNE CORP., 4240 Glencoe Ave., Venice, Calif., 90291, Tel: 213-821-7933, TWX: 910-588-3780; Empl.: 80; Minimum order: $25

For info on price: R. Warmington; Application info: H. Kumano; Customer service: R. Warmington; Delivery info: R. Warmington

Products manufactured: Chokes, Coils Including Assemblies & Forms, Reactors, Transformers

Local Sales Offices & Reps.

Cal	Pasadena, Dressen-Barnes	213-795-7731
Md	Simpsonville, Seltec Assoc.	301-596-5520
Mass	Needham, A & M Elec. Reps.	617-444-8170
NY	Elmira, A & D Devices	607-733-0405
NY	Hartsdale, Comp. Sls.	914-725-1050
NY	Rochester, A & D Devices	716-586-8033
NY	Verona, A & D Devices	315-337-7321
Tex	Plano, Zeus Eng.	214-423-7027
Wash	Seattle, Avionics-Liaison	206-767-3870

FERRONICS, INC., 60 N. Lincoln Rd., East Rochester, N.Y., 14445, Tel: 716-377-6820; Empl.: 60; Minimum order: $20

For info on price: M. J. Breiland; Application info: W. Lee Vroom; Customer service: E. Kolls; Delivery info: E. Kolls

Free literature available: Ferronics "Short Form" Catalog, Data Materials Div. Bulletin 501, Ferrite Beads, Bulletin 203, Wide Band Ferrite Cores, Bulletin 401

Products manufactured: Cores, Magnetic, Ferrite Material & Parts, Heads, Recording Playback, Erase, Kits, Shielding, Magnets, Shielding Beads, Ferrite

Local Sales Offices & Reps.

Ala	Huntsville, Comp. Sls.	
Ariz	Phoenix, J.A. Swanson Assocs.	602-949-1536
Cal	Santa Clara, Rodgers Assocs.	408-984-8110
Cal	Seal Beach, TEXEL,	213-596-9411
Fla	Tera Ceia, Comp. Sls.	813-894-4366
Ill	Chicago, Kennedy Engrg.	312-631-8283
Ind	Fort Wayne, Component Insulation Corp.	219-485-7114
Md	Baltimore, Bernard White	301-484-5400
Mass	Newton Lower Falls, New England Comp. Sls.	617-969-9523
Mich	Birmingham, Comp. Insulation	313-644-0087
Minn	Minnetonka, P.J. Codute Co.	612-933-2281
NJ	Ft. Lee, B. Cameron	201-461-2595
NY	Syracuse, N. J. Matchuk	315-488-3251
NC	Charlotte, McLean Sls. Co.	704-366-2675
Ohio	Cleveland, Comp. Insulation	216-521-3570
Ore	Portland, D. G. Weber	503-234-7671
Pa	Ardmore, Wm. K. Metz, Inc.	215-649-3966
Tex	Dallas, Gordon V. Peck Co.	214-341-8311
Wash	Seattle, D. G. Weber	
WVa	Spokane, D. G. Weber	

FERRO-TECH CORP., 6 Northwood Rd., Bloomfield, Conn., 06002, Tel: 203-242-0708; Empl.: 12; Minimum order: $100

For info on price: S. Buchbinder; Application info: R. Wolff; Customer service: J. Zavac; Delivery info: J. Zavac

Products manufactured: Transformers

FERROTRAN ELCTRN., 683 Broadway, New York, N.Y., 10012, Tel: 212-AL4-5810

p. 1•1209-1213; p. 2•1751

Customer service: E. Abbot

Free literature available: Company Catalog

Products manufactured: Power Supplies, Transformers

FERROXCUBE CORP., Mt. Marion Rd., Box 359, Saugerties, N.Y., 12477, Tel: 914-246-2811, TWX: 510-247-5410; Empl.: 300; Minimum order: $100

p. 2•1218-1225

For info on price: G. Ljutic; Application info: J. VanderPoec; Customer service: G. Ljutic; Delivery info: G. Ljutic

Products manufactured: Bobbins, Winding, Coil & Transformer, Chokes, Cores, Magnetic, Ferrite Material & Parts, Magnets, Memories, Buffer, Memory Systems, Shielding Beads, Ferrite, Suppressors

Local Sales Offices & Reps.

Ala	Huntsville, NAPECC	205-534-7351
Cal	North Hollywood, NAPECC	213-762-2118
Cal	San Diego, NAPECC	714-453-5440
Cal	Santa Clara, NAPECC	408-249-1134
Colo	Denver, NAPECC	303-922-8434
Conn	Shelton, Comark Assoc.	203-929-4884
Fla	Fort Lauderdale, NAPECC	305-772-2840
Ill	Elk Grove Village, NAPECC	312-593-8220
Ind	Indianapolis, NAPECC	317-257-6547
Kans	Olathe, B. C. Electronics Sls.	913-782-6696
Mass	Waltham, NAPECC	617-899-7100
Mich	Southfield, NAPECC	313-357-4288
Minn	Minneapolis, Siedare Assoc.	612-533-2294
Mo	St. Louis, B.C. Electronic Sls.	314-731-1255
NJ	Rochelle Park, NAPECC	201-843-4810
NY	Endicott, Tech-Mark Inc.	607-748-7473
NY	Fairport, Tech-Mark Inc.	716-223-1252
NY	Hempstead, Kahgan Sls. Co.	516-538-2300
NY	Hicksville, NAPECC	516-931-6200
NY	Liverpool, Tech-Mark Inc.	315-652-6229
NY	Pleasant Valley, Tech Mark, Inc.	914-635-3436
NC	Raleigh, Candor Co.	919-787-2652
Pa	King of Prussia, NAPECC	215-265-4240
SC	Myrtle Beach, Candor Co.	803-448-5213
Tex	Dallas, NAPECC	214-691-2141
Va	Richmond, NAPECC	804-282-6515
Wash	Bellevue, Ferroxcube Corp.	206-746-3600

Local Distributors

Cal	San Diego, NAPECC, 11568 Sorrento Valley Rd.	714-453-5440
Ill	Elk Grove Village, NAPECC, 175 Scott St.	312-593-8220
Mass	Waltham, NAPECC, 1393 Main St.	617-899-7103
NY	Hempstead, Kahgan Sales, 556 Peninsula Blvd.	516-538-2300
NY	Woodstock, Elna Ferrite, Box 395	914-246-5861
Pa	Flourtown, Eastern Comps., 1407 Bethlehem Pk.	215-836-1616

FERWALT INC. W. H., Hwy. 95 & Webb Rd., Lapwai, Idaho, 83540, Tel: 208-843-2281; Empl.: 15

p. 1•318,319

For info on price: R. J. Brant; Application info: R. J. Brant; Customer service: R. J. Brant; Delivery info: S. Pinson

Free literature available: Crystal oscillator catalog sheets, Temperature compensated crystal oscillator catalog sheets, Voltage controlled crystal and non-crystal catalog sheets, LC & RC oscillator catalog sheets, Oven regulated oscillator specifications

Products manufactured: Clocks (All Types), Oscillators, Standards, Timers

Local Sales Offices & Reps.

Pa	Philadelphia, W.F. Assocs.	215-CA4-4120
Wash	Seattle, IMI Corp.	206-244-8233

FIBERFIL DIV. DART IND., 1701 N. Heidelbach, Evansville, Ind., 47717, Tel: 812-424-3831, TWX: 810-353-0506

For info on price: Cust. Svc.; Application info: W. Lachowecki; Customer service: J. Kissinger; Delivery info: Cust. Svc.

Free literature available: 36 page engineering manual with charts and physical property comparison, test and application data.

Products manufactured: Plastic Raw Materials, Liquids, Pellets, Powders, Resins

Local Sales Offices & Reps.

Cal	Encino	213-783-3235
Ga	Atlanta	404-525-7184
Ill	Chicago	312-332-6242
Mass	Boston	617-742-1049
Mich	Detroit	313-961-9696
Minn	Minneapolis	612-335-0186
NY	New York	212-765-3690
Ohio	Cincinnati	513-721-3810
Ohio	Cleveland	216-771-7107
Okla	Oklahoma City	405-235-2001
Pa	Philadelphia	215-567-2450

FIBRA-SONICS ,INC., 4626 N. Lamon Ave., Chicago, Ill., 60630, Tel: 312-286-7377; Empl.: 20; Minimum order: $25

For info on price: A. R. Watson; Application info: A. R. Watson; Customer service: J. Kirchschlager; Delivery info: J. Kirchschlager

Free literature available: "Facts About Ultrasonic Soldering".

Products manufactured: Generators, Soldering Equipment

Local Sales Offices & Reps.

Cal	Gardena, Instrument Labs	213-770-0650
Colo	Denver, Electronic Sls.	303-771-6300
Ga	Atlanta, D. G. Machnery & Gage Co.	404-633-6201
Mass	Boston, P.J. Engrg. Sls. Co.	617-783-0510
Mich	Dearborn, Pitcher-Poulin	313-582-5420
Minn	Minneapolis, E. J. Doyle Co.	612-827-5847
NY	Great Neck, F. Tylinski Co.	516-466-9070
NY	Scaneateles, Tech-Sonics Assocs.	315-685-6144
Ohio	Dayton, Rixan Assocs.	513-222-0011
Ore	Portland, Vandy	503-297-1900
Pa	Paoli, Stitzer Assocs.	215-644-5500
Tex	Dallas, Teamwork Inc.	214-243-5881

FIDELITY CHEM. PRODS. CORP., 472 Frelinqhuysen Ave., Newark, N.J., 07114, Tel: 201-242-4110; Empl.: 10; Minimum order: $20

For info on price: S. Siegel; Application info: M. Bick; Customer service: S. Siegel; Delivery info: S. Siegel

Products manufactured: Chemicals, Cleaners & Solvents, Cleaners, Ultrasonic, Coatings, Electroplating Equipment & Supplies

FIFTH DIMENSION, Box 483, Princeton, N.J., 08540, Tel: 609-924-5990, TWX: 510-685-9294; Empl.: 100; Minimum order: $45

For info on price: W. Kinney 669-452-1200; Application info: W. Kinney 669-452-1200; Customer service: A. Dubs 669-452-1200; Delivery info: A. Dubs 669-452-1200

Free literature available: Applications Booklet & Catalog on Mercury Film Switching describes methods of using non position sensitive mercury relays and switches. Test Data provided.

Products manufactured: Comm. Systems, Converters, Data Acquisition & Reduction Systems, Relays, Scanners, Signal Conditioners & Equipment, Switches

Local Sales Offices & Reps.

Ariz	Phoenix, Portis & Assocs.	602-947-4379
Cal	Encino, Porter Co.	213-788-2350
Cal	Menlo Pk., G.R. McKnight Co.	415-325-2844
Colo	Denver, A-G Elctrns.	303-759-4790
Fla	Orlando, Gra-Mar	305-841-2330
Mass	Burlington, Tritek Inc.	617-272-4550
Mich	Detroit, Nicon Assocs.	313-341-7688
Minn	Minneapolis, G.E. Arneson & Co.	612-920-2086
Mo	Kansas City, Harris Hanson Co.	816-444-9494
Mo	St. Louis, Harris-Hanson Co.	314-432-3611
NY	Staten Island, F.T. Battista Co.	212-979-4020
Pa	Berwyn, Tucker Assocs.	215-644-0142
Va	Alexandria, Vanguard Engrg. Sls.	703-768-1660
Wash	Seattle, H. Levinson Co.	206-323-5100

FIGARO ENGRG. INC., 3-7-3 Higashitoyonaka, Toyonaka City, Osaka, Japan, Tel: 06-849-2156; Empl.: 64; Minimum order: $32

Customer service: K. Tsukada

Free literature available: Catalog: TGS High Sensitive Gas-Electric Transducer for Combustible gases.

Products manufactured: Detectors

FILM CAPACITORS, INC., 100 8th St., Passaic, N.J., 07055, Tel: 201-779-2240; Minimum order: $25

For info on price: S. Lipmsn; Application info: S. Saposnik; Customer service: Margaret; Delivery info: Margaret

Free literature available: 1 - Application Chart 2 - High Voltage Capacitors 3 - High Voltage AC Capacitors 4 - Metallized Mylar High Voltage Capacitors 5 - Metallized Capacitors, (Mylar) 6 - Polystyrene Capacitors Hermetic Mylar Capacitors

8 - Teflon capacitors 9 - Polycarbonate capacitors 10 - Polypropylene capacitors

Products manufactured: Capacitors, Fixed, Capacitors, Variable

Local Sales Offices & Reps.

Ala	Gadsden, F. C.. Nickerson & Co.	205-547-7718
Cal	Mountain View, G. C. Woempner Co.	415-964-5454
Cal	Santa Monica, Rep Associates	213-829-5401
Fla	Oldsmar, F. C. Nickerson Co.	813-855-4209
Ga	Decatur, F.C. Nickerson Co.	404-321-4678
Ill	Chicago, Berndt Assocs.	312-283-0713
Md	Lutherville, Cunningham & Assocs.	301-296-4306
Mass	Chelmsford, Northeast Comps.	603-668-1372
Mich	Warren, DEM Elctrn. Labs	313-755-6660
NJ	Leonia, Kohl-Camber	201-944-6488
NY	Pittsford, D Hurley Sls.	716-586-6159
NC	Kannapolis, F. C. Nickerson & Co.	704-932-6772
Ohio	Akron, Augey Natalino Assoc.	216-725-6087
Tex	Dallas, G. Weinreich & Assocs.	214-DA 1-2800
Wash	Seattle, R Johnston Co.	206-524-5170

FILM MICROELECTRONICS, INC., 17 A St., Burlington, Mass, 01803, Tel: 617-272-5650; Empl.: 75; Minimum order: $10

For info on price: M. Lioz; Application info: M. Lioz; Customer service: M. Lioz; Delivery info: J. Gordon

Free literature available: Literature is available on our chip resistors chemical etchants, metallized substrates, pin diode drivers and hybrid circuit capabilities.

Products manufactured: Circuits, Hybrid, Thin-Film, Resistors, Substrates

FILTECH CORP., 10103 W. Pacific, Franklin Park, Ill., 60131, Tel: 312-678-8900, TWX: 910-227-4637; Empl.: 75

Customer service: J. A. Victor

Free literature available: Brochures: Quartz crystal filters, LC filters and monolithic crystal filters

Products manufactured: Filters

FILTRON COMPANY, INC., 200 Shames Drive, Westbury, N.Y., 11590, Tel: 516-997-3500; FSC No: 51932; Empl.: 50; Minimum order: $100

For info on price: E. Greenwood 516-997-3500; Application info: E. Greenwood 516-997-3500; Customer service: G. Barry516-997-3500; Delivery info: G. Barry 516-997-3500

Products manufactured: Capacitors, Fixed, Coils Including Assemblies & Forms, Delay Lines, Films, Filters

Local Sales Offices & Reps.

Ariz	Scottsdale, Inter-Mountain Engrg.	602-947-7379
Cal	Culver City, DeAngelo, Rothman	213-398-6239
Cal	Mt. View, Nor-CalAssoc.	415-961-8121
DC	Wash, Arco	202-393-5991
Mass	Newton Upper Falls, Brookdale Elec.	617-244-6969
Mich	Farmington, Carter, McCormick & Peirce	313-477-7700
NJ	Huntingdon Valley, ABC Sls.	215-464-2275
NJ	Tenafly, Garrettson Co.	201-568-2354
NM	Albuquerque, IMEC	505-883-9010
NY	Williston Pk., Garrettson Co., Inc.	516-747-6610
Tex	Dallas, Texas Microwave	214-231-5381
FOR:	Can., Ottawa, Ont., Aircraft Appliances & Equip., Ltd.	613-233-1852

FINNEY CO., 34 W. Interstate St., Bedford, Ohio, 44014, Tel: 216-232-6161; Empl.: 200; Minimum order: $25

For info on price: R. O. Phillips; Application info: R. O. Phillips; Customer service: R. O. Phillips; Delivery info: N. Harris

Products manufactured: Amplifiers, Antenna Feed Systems, Antenna Rotators, Antennas, Arresters, Electrical Surge, Lightning, Attenuators, Cable, Connectors, Converters, Couplers, Dividers, Filters, Meters, Mounts, Probes, Splicers, Coaxial Cable, Tools, Transformers

Local Sales Offices & Reps.

Cal	Fullerton, H. Hawthorne	714-528-4551
Colo	Colorado Springs, Norris & Co.	303-635-9319
Fla	Maitland, Hutto-Hawkins-Peregoy	305-831-2474
Fla	Pompano Beach, Hutto-Hawkins-Peregoy	305-943-9593
Ga	Atlanta, Millar Electronics	404-261-6160
Ill	Chicago, Markal Sls.	312-282-5800
Ind	Indianapolis, Elctrn. Representatives, Inc.	317-897-9326
Kans	Shawnee Mission, Lowell, Kangas & Assocs.	913-631-3515
Md	Baltimore, E.K.P. Assocs.	301-944-6677
Md	Baltimore, E.K.P. Assocs.	301-788-6498
Mass	W. Springfield, L.B. Cole & Co.	413-781-3040
Mass	Wellesley Hills, L.B. Cole & Co.	617-237-1260
Miss	Clinton, J. Fisher Sls. Co.	601-924-7348
Miss	Michigan City, J. Fisher Sls. Co.	601-224-6470
Mo	St. Louis, Lowell, Kangas & Assocs.	314-821-4050
NJ	Edison, L.W. Keller & Assocs.	201-287-5476
NJ	Moorestown, Victor Piper	609-235-8006
NY	North Bellmore, L.W. Keller & Assocs.	516-785-2826
NY	North Syracuse, L.D. Allen, Inc.	315-458-7470
NY	Snyder, L.D. Allen	716-839-3300
NC	Raleigh, Millar Electronics	919-787-9564
Ohio	Westlake, T.G. Corpus	216-871-8832
Pa	Easton, E.K.P. Assocs.	215-258-6477
Tex	Ft. Worth, L. Smith	817-332-1909
Wash	Seattle, D. Miller Sls.	206-784-6800
Wisc	Colgate, Markal Sls.	414-628-2801

FIRING CIRCUITS INC., Muller Ave./Box 2007, Norwalk, Conn., 06852, Tel: 203-846-1633; Empl.: 110

Products manufactured: Controls/Control Eqpt., Power Supplies

FISHER SCI. CO., 711 Forbes Ave., Pittsburgh, Pa., 15219, Tel: 412-562-8300; Empl.: 2500

For info on price: W. Lorenz; Application info: K. Doverspike

Products manufactured: Analyzers, Baths, Controlled Temperature (Air & Liquid), Benches, Consoles, Stools, Tables, Cabinets & Accessories

Local Sales Offices & Reps.

Cal	Santa Clara	408-249-0660
Fla	Orlando	305-857-3600
Ga	Atlanta	404-261-4120
Ill	Chicago	312-379-9300
Md	Silver Spring	301-587-7000
Mass	Medford	617-391-6110
Mich	Livonia	313-261-3320
Mo	St. Louis	314-991-2400
NJ	Springfield	201-379-1400
NY	Rochester	716-464-8900
NC	Raleigh	919-876-2351
Ohio	Cincinnati	513-793-5100
Ohio	Cleveland	216-292-7900
Pa	King of Prussia	215-265-0300
Pa	Pittsburgh	412-781-3400
Tex	Houston	713-521-9351

FITCHBURG COATED PRODUCTS, Div. Litton Inds., P. O. Box 1106, Scranton, Pa., 18501, Tel: 717-347-2035; Empl.: 250

Customer service: R. Malloy

Free literature available: A free technical manual on the "Dry Electro-sensitive Recording Process" on request.

Products manufactured: Paper, Graphic Recording, Tapes, Films & Foils, Pressure Sensitive

FJW INDUSTRIES, 215 E. Prospect Ave., Mt. Prospect, Ill., 60056

FLEXPRINT DIV, Sanders Assocs., Inc., Grenier Field, Manchester, N H, 03060, Tel: 603-669-4615, TWX: 710-220-1845; Empl.: 700

Products manufactured: Boards, Printed Circuit, Circuits, Flexible, Circuits, Printed, Multilayer

FLIGHT SYS., INC., Box 25, Mechanicsburg, Pa., 17055, Tel: 717-697-0333; Empl.: 30

Products manufactured: Controls/Control Eqpt.

Local Sales Offices & Reps.

Pa	Paoli, T. Griffin Co.	215-647-1550

FLITE-TRONICS CO., INC., 3314 Burton Ave., Burbank, Cal., 91504, Tel: 213-849-1483; Empl.: 50 p. 1•1214,1215

Customer service: W. V. Viscarra

Products manufactured: Inverters, Power Supplies

FLUKE MFG. CO., INC. JOHN, Box 7428, Seattle, Wash., 98133, Tel: 206-774-2211, TWX: 910-449-2850; FSC No: 89536 .... p. 1•695

For info on price: J. Welte 206-774-2481; Application info: D. Buell 206-774-2473; Customer service: T. Brumfield 206-774-2323; Delivery info: J. Welte 206-774-2481

Free literature available: 1974-75 Test and Measurement Instruments Catalog general catalog covering all Fluke products. Digital Multimeter Brochure - One or more brochures covering latest digital voltmeter products in Fluke line. Automatic Calibration Systems Brochure - Covers Fluke's terminal/10 line of automatic calibration systems.

Products manufactured: Amplifiers, Attenuators, Bridges, Calibrators, Comparators, Converters, Counters, Dividers, Generators, Meters, Power Supplies, Printers, Probes, Receivers, Services, Assembly, Production & Test, Standards, Synthesizers, Test Systems

Local Sales Offices & Reps.

Ala	Huntsville, BCS Assocs.	205-881-6220
Alas	Anchorage, Harry Lang Assocs.	907-279-5741
Ariz	Scottsdale, Barnhill Assoc. Inc.	602-947-7841
Cal	Burbank, Instr. Specialists Inc.	213-849-7181
Cal	San Diego, Instr. Specialists Inc.	714-752-6200
Cal	Santa Clara, Instr. Specialists Inc.	408-244-1505
Colo	Denver, Barnhill Assoc.	303-750-1222
Conn	Glastonbury, Instr. Reps. Inc.	203-633-0777
Fla	Orlando, BCS Assoc. Inc.	305-896-4881
Ga	Atlanta, BCS Assoc., Inc.	804-321-0980
Haw	Honolulu, Ind'l. Elctrns., Inc.	808-533-6095
Ill	Des Plaines, Cozzens & Cudahy, Inc.	312-298-3600
Ind	Indianapolis, Cozzens & Cudahy, Inc.	317-244-2456
Ky	Louisville, BCS Assocs.	502-935-9634
Md	Kensington, Elctrn. Mktg. Assoc.	301-881-5300
Mass	Lexington, Instr. Reps. Inc.	617-861-8620
Mich	Detroit, WKM Assoc.	313-892-2500
Minn	Minneapolis, Cozzens & Cudahy, Inc.	612-884-4336
Mo	St. Louis, Cozzens & Cudahy, Inc.	314-423-1234
Mo.	Kansas City, Cozzens & Cudahy, Inc.	816-454-5836
NJ	Union, SBM Reps., Inc.	201-687-8737
NM	Albuquerque, Barnhill Assoc.	505-299-7658
NY	Pleasantville, SBM Reps., Inc.	914-769-1811
NY	Rochester, SBM Reps., Inc.	716-266-1400
NC	Greensboro, BCS Assoc.	919-273-1918
Ohio	Cleveland, WKM Assoc.	216-267-0445
Ohio	Dayton, WKM Assoc.	513-434-7500
Ore	Beaverton, Showalter Instrs.	503-646-3004
Pa	King of Prussia, Elctrn. Mktg. Assoc.	215-248-5050
Pa	Pittsburgh, WKM Assoc.	412-892-2953
Tex	Houston, Barnhill Assoc.	713-688-9971
Tex	Richardson, Barnhill Assoc.	214-231-2573
Va	Williamsburg, BCS Assoc.	804-877-4053
Wash	Seattle, Showalter Instrs.	206-455-4922

FLUKE TRENDAR CORP., 500 Clyde Ave., Mountain View, Cal., 94043, Tel: 415-965-0350, TWX: 910-379-6573; Empl.: 40

Customer service: N.P. Lyons

Free literature available: TESTCLIP sales brochure and How to Use Manual, T1000, T1010, and T2000 sales brochures, Questions and Answers, and Preparing to Test Manuals.

Products manufactured: Analyzers, Comparators, Probes, Test Systems, Testers

Local Sales Offices & Reps.

Ala	Huntsville, BCS Assocs.	205-881-6220
Alas	Anchorage, H. J. Lang & Assocs.	907-279-5741
Ariz	Scottsdale, Barnhill Three, Inc.	602-947-7841
Cal	Burbank, Instr, Specialists, Inc.	213-849-7181
Cal	Glendale, Instr. Specialists, Inc.	213-243-9404
Cal	San Diego, Instr. Specialists, Inc.	714-565-2555
Cal	Santa Clara, Instr. Specialists, Inc.	408-244-1505
Colo	Denver, Barnhill Three, Inc.	303-934-5505
Conn	Glastonbury, Instr. Reps.	203-633-0777
Fla	Orlando, BCS Assocs.	305-896-4881
Ill	Des Plaines, Cozzens & Cudahy, Inc.	312-298-3600
Ind	Indianapolis, Cozzens & Cudahy, Inc.	317-244-2456
Md	Kensington, Elctrn. Mktg. Assocs.	301-881-5300
Mass	Lexington, Instr. Reps.	617-861-8620
Mich	Detroit, W K M Assocs.	313-892-2500
Minn	Minneapolis, Cozzens & Cudhay, Inc.	612-884-4336
Mo	St. Louis, Cozzens & Cudhay, Inc.	314-423-1234
NJ	Union, S B M Reps., Inc.	201-687-8737
NM	Albuquerque, Barnhill Three, Inc.	505-299-7658
NY	Pleasantville, S B M Reps., Inc.	914-769-1811
NY	Rochester, S B M Reps., Inc.	716-266-1400
NC	Greensboro, BCS Assocs.	919-273-1918
Ohio	Cleveland, W K M Assocs.	216-267-0445
Ohio	Dayton, W K M Assocs.	513-434-7500
Ore	Beaverton, Showalter-Judd, Inc.	503-646-3004

Pa	King of Prussia, Elctrn. Mktg. Assocs.	215-265-1600
Pa	Pittsburgh, WKM Assocs.	412-892-2953
Tex	Houston, Barnhill Two, Inc.	713-621-0040
Tex	Richardson, Barnhill Two, Inc.	214-231-2573
Wash	Bell, Showalter-Judd, Inc.	206-455-4922

FMC CORP., Organic Chems. Div., 633 Third Ave., New York, N.Y., 10017, Tel: 212-MU 7-7400; Empl.: 300

Products manufactured: Plastic Raw Materials, Liquids, Pellets, Powders, Resins

FMC CORPORATION, Semiconductor Products Operation, 264 Lexington, Homer City, Pa., 15748, Tel: 412-479-8011, TWX: 510-468-9220

Customer service: H. D. Wood

Free literature available: Syntron Silicon Rectifiers - #310O72; Syntron Selenium Surge Suppressors - #301172; Silicon Controlled Rectifier Data - #323173; Syntron Selenium Rectifiers - #300D71; A complete line of Syntron Selenium, Silicon, and Silicon Controlled Power Rectifiers.

Products manufactured: Diodes, Rectifiers, Suppressors, Thyristors (Includes Silicon Controlled Rectifiers)

Local Sales Offices & Reps.

Ariz	Scottsdale, Fryco, Engrg. Reps.	602-945-3281
Cal	Los Angeles, C. E. Holmes Co.	213-256-2255
Colo	Denver, Gossard & Assocs.	303-985-0602
Fla	N. Miami Beach, L. Haas Co., Inc.	305-949-9143
Ill	Hinsdale, FMC Corp. Material Handling Equip. Div.	312-325-3250
Ind	Montgomery, Seawood	513-793-6702
Md	Baltimore, Callas Elctrns.	301-744-7711
Mass	Needham, Garrettson Co.	617-449-2640
Mich	Detroit, L.H. Dickelman	313-255-3300
Minn	St. Paul, Northport Engrg.	612-698-3841
Mo	St. Louis, H.J. Weisler & Assocs.	314-428-3934
NJ	Hasbrouck Heights, FMC Corp. Material Handling Equip. Div.	201-288-1845
NY	Penfield, J. Lazor Assocs.	716-385-3300
NC	Charlotte, J. Rudisill Assocs.	704-377-6901
Ohio	Brecksville, A. Nace Co.	216-526-4323
Pa	Media, W. Reeves Assocs.	215-566-6709
Tex	Richardson, Palatine Sls.	214-231-9489
Wash	Olympia, Bergford & Assocs.	206-866-2001
Wisc	Milwaukee, Syntron Semiconductor Sls.	414-273-6773

FOGG SYSTEM CO., 2101 So. Leyden, Box 22226, Denver, Col., 80222, Tel: 303-758-2979; Empl.: 7

Customer service: H. Fogg

Products manufactured: Amplifiers, Bridges, Calibrators, Filters, Integrators, Electronic

FORK STANDARDS, INC., 211 Main St., West Chicago, Ill., 60185, Tel: 312-231-3511; Empl.: 27 p. 1•320,321

Customer service: A. E. Toht

Free literature available: Catalog 72C and Mailer - contains broad looks at fork standards product line of tuning fork and crystal oscillators. Specialized units such as oven controlled crystal oscillators and oscillators with output regulation are included.

Products manufactured: Calibrators, Coders, Decoders, Generators, Modulator/Demodulators, Modules, Logic, Encapsulated, Oceanographic Equip. (Electronic), Oscillators, Power Supplies, Relays, Standards, Tuning Forks

Local Sales Offices & Reps.

Ala	Huntsville, Reynolds & Assoc.	205-536-1941
Cal	Sherman Oaks, Windsor Dynamics	213-989-3631
Cal	Woodside, Windsor Dynamics	415-854-4870
Fla	Satellite Beach, Reynolds & Assoc.	305-773-4700
Ga	Atlanta, Reynolds & Assoc.	404-252-5360
Mass	Salem, Forbes Engrg.	617-744-1693
NC	Greensboro, Reynolds & Assoc.	919-275-3725
Ohio	Cleveland, Harvey Teplitz & Co.	216-371-2044
Ohio	Dayton, Harvey Teplitz & Co.	513-277-6531
Pa	Paoli, Tyler Griffin Co.	215-647-1550
EXP:	Westbury, N.Y., Minthorne Intl. Co.	516-334-3303

FORM-IT PRODUCTS INC., 1621 W Walnut St., Chicago, Ill, 60612, Tel: 312-421-7337; Empl.: 21; Minimum order: $10

Customer service: R. St. John

Free literature available: A catalog of our products and an inquiry sheet.

Products manufactured: Bobbins, Winding, Coil & Transformer, Coils Including Assemblies & Forms, Insulators & Insulation, Services, Assembly, Production & Test

FORMICA METAL PRODS. CO., INC., Corporation Way, Dept. M, Medford, Mass., 02155, Tel: 617-395-5656; Empl.: 35 p. 1•62,1540

Products manufactured: Benches, Consoles, Stools, Tables, Cabinets & Accessories, Cases, Equipment, Instrument, Meter, Racks

FORMULATED RESINS INC., Box 508, Greenville, R.I., 02828, Tel: 401-949-2060; Empl.: 15

For info on price: J. Leone; Application info: N. G. Harrington; Customer service: H. R. Oldham; Delivery info: C. Ridge

Free literature available: Dielectric Materials Selector Chart, News Release.

Products manufactured: Adhesives (All Types), Chemicals, Cleaners & Solvents, Coatings, Compounds, Encapsulating, Insulating, Molding, Potting, Conductive Plastic Materials, Insulators & Insulation, Lubricants, Plastic Raw Materials, Liquids, Pellets, Powders, Resins, Rubber

FOSTER TRANSFORMER CO., 3820 Colerain Ave., Cincinnati, Ohio, 45223, Tel: 513-681-2420, TWX: 810-461-2584; Empl.: 250; Minimum order: $2000

Customer service: A. W. Reynolds

Products manufactured: Transformers

Local Sales Offices & Reps.

Cal	Encino, V & L Assocs.	213-986-9703
Cal	San Carlos, Component Assocs.	415-591-9656
Cal	Santa Clara, Nova-Tronix Elctrn. Sls.	408-243-9530
Colo	Wheatridge, Waugaman Assocs. Inc.	303-423-1020
Fla	Melbourne, Hanson Assocs.	305-727-7474
Ill	Evanston, W.F. Swinke & Assocs.	312-869-3577
Ky	Ft. Mitchell, G. Thelen Co.	606-341-8181
Md	Towson, Kraft Elctrn. Sls.	301-828-5838
Mass	Brockton, Forsberg Sls.	207-522-6302
Mich	Farmington, Davis-Martensen Co.	313-474-8300
Minn	Minneapolis, R.W. Marshall Co.	612-929-0457
NJ	Ho-Ho-Kus, Alto Assoc.	201-447-1770
NJ	Moorestown, Maple Assocs.	609-234-0382
NY	Brooklyn, Alto Elctrns.	212-253-3904
NY	Pittsford, D. Hurley Sls.	716-586-6159
NC	Charlotte, B. Jackson Co.	704-366-6678
Ohio	Cleveland, Martin-Rettger	216-791-8787
Pa	Pittsburgh, R.F. Clark Co.	412-242-9500
Tex	Dallas, Tesco	214-631-6270
Wisc	Milwaukee, W.M. Braun & Assoc.	414-332-1040

FOUR-PHASE SYSTEMS, 19333 Vallco Pkwy., Cupertino, Cal, 95014, Tel: 408-255-0900, TWX: 910-338-0250

Products manufactured: Computers, Data Loggers, Display Devices/Displays, Recorders, Terminal Equipment, Digital, Terminals, Data Display (including Alphanumeric & Graphic)

Local Sales Offices & Reps.

Cal	Los Angeles	213-640-1438
Cal	San Francisco	415-692-4360
Conn	Hartford	203-549-0054
Conn	Stamford	203-357-1860
DC	Washington	202-785-9222
Fla	Miami	305-592-3620
Ga	Atlanta	404-351-0070
Ill	Chicago	312-694-3250
Ind	Indianapolis	317-923-1341
Kans	Kansas City	913-384-0080
Mass	Boston	617-245-9600
Mich	Detroit	313-557-8844
Minn	Minneapolis	612-854-4461
Mo	St. Louis	314-862-3030
NJ	Rochelle Park	201-845-0252
NY	New York	212-575-5656
Ohio	Cincinnati	513-771-0670
Ohio	Cleveland	216-661-0720
Ohio	Columbus	614-459-0414
Pa	Philadelphia	609-234-0200
Tex	Dallas	214-634-2240

FOURJAY INDUSTRIES, Box 1465 Northridge Br., Dayton, Ohio, 45414, Tel: 513-278-9417

Products manufactured: Baffles, Speaker, Grilles, Speakers

FOXBORO CO., 38 Neponset Avenue, Foxboro, Mass., 02035, Tel: 617-543-8750, Telex: 927-602; Empl.: 8500; Minimum order: $25

Free literature available: Brochures for different types of products, e.g., temperature, flow level, pH etc., and indicators, recorders or controllers, pneumatic and electronic. A general catalog for large users.

Products manufactured: Alarms, Amplifiers, Cabinets & Accessories, Cases, Equipment, Instrument, Meter, Computers, Controllers, Programmable, Controls/Control Eqpt., Converters, Counters, Current Sources, Dividers, Gages, Indicators, Integrators, Electronic, Meters, Monitors, Paper, Graphic Recording, Probes, Programmers, Receivers, Recorders, Services, Assembly, Production & Test, Signal Conditioners & Equipment, Thermocouples, Elements & Accessories, Totalizers, Digital, Transducers, Valves, Solenoid, Valves, Vacuum

Local Sales Offices & Reps.

Ala	Birmingham	205-871-0319
Ala	Mobile	205-471-4487
Cal	El Monte	213-443-4191
Cal	San Leandro	415-357-7520
Cal	Valencia	805-259-8080
Colo	Denver	303-757-6105
Conn	West Hartford	203-236-6121
Fla	Jacksonville	904-398-1545
Ga	Chamblee	404-458-2381
Haw	Honolulu	808-538-1921
Ill	Lansing	312-474-8822
Ill	Mt. Prospect	312-625-8430
Kans	Mission	913-262-1262
Kans	Wichita	316-682-9061
La	Baton Rouge	504-937-3955
La	Metairie	504-887-9450
La	Shreveport	318-865-6522
Me	Augusta	207-622-0601
Md	Baltimore	301-377-9000
Mass	Walpole	617-762-9350
Mich	Farmington Hills	313-851-8900
Minn	Minneapolis	612-835-2191
Mo	St. Louis	314-567-4377
NJ	Springfield	201-379-4000
NY	East Greenbush	518-477-9397
NY	New York	212-532-4682
NY	Rochester	716-244-4590
NY	Tonawanda	716-693-8455
NC	Charlotte	704-535-1111
Ohio	Cincinnati	513-851-1220
Ohio	Middleberg Hts.	216-842-9300
Okla	Tulsa	918-743-4096
Ore	Portland	503-282-4545
Pa	Media	215-565-4100
Pa	Pittsburgh	412-922-3000
SC	Greenville	803-233-4184
Tenn	Knoxville	615-588-9601
Tenn	Memphis	901-452-4427
Tex	Amarillo	806-374-8823
Tex	Beaumont	713-832-9949
Tex	Corpus Christi	512-854-4856
Tex	Dallas	214-238-8207
Tex	Houston	713-783-5400
Tex	Odessa	915-333-2791
Utah	Salt Lake City	801-486-0133
Va	Richmond	804-359-2479
Wash	Seattle	206-633-3660
WVa	South Charleston	304-744-5321
Wisc	Appleton	414-739-1153
FOR:	Can., Calgary 2, Alberta, Foxboro Co., Ltd.	403-264-0891
FOR:	Can., Edmonton, Alberta, Foxboro Co., Ltd.	403-469-2374
FOR:	Can., La Salle 650, Quebec, Foxboro Co., Ltd.	514-366-4210
FOR:	Can., Mississauga, Ontario, Foxboro Co., Ltd.	416-625-4111
FOR:	Can., Moncton, New Brunswick, Foxboro Co., Ltd.	506-855-5174
FOR:	Can., Montreal 201, Quebec, Foxboro Co., Ltd.	514-761-4534
FOR:	Can., Vancouver 6, British Columbia, Foxboro Co., Ltd.	604-291-7248
FOR:	Can., Winnipeg 21, Manitoba, Foxboro Co., Ltd.	204-775-1577

FRAZIER, INC., 1930 Valley View La., Dallas, Tex., 75234, Tel: 214-241-3441; Empl.: 30

Products manufactured: Amplifiers, Baffles, Speaker, Drivers, Speaker, Equalizers, Filters, Mixers, Networks, Speaker Systems, Speakers, Transformers

Local Sales Offices & Reps.

Cal	Los Angeles, Pacific Audio Sls. Inc.	213-747-7314
Cal	San Francisco, Equinox Sls. Co.	415-468-3000
Colo	Arvada, CB Elctrn. Mktg.	303-422-0561
Conn	W. Hartford, Robert Smith Co.	203-523-0512
Ga	Atlanta, Secom	404-261-8935

Haw	Honolulu, J.C. Elctrns.	808-537-6787
Ill	Chicago, R.R. Hutmacher Assoc.	312-631-3248
Mich	Ferndale, Shalco Inc.	313-547-4771
Minn	Moorhead, Northland Assocs.	218-233-4616
NJ	Greenbrook, Idiser Co.	201-968-0344
Ohio	Dayton, N. Browning Co. Ltd.	513-298-5973
Tex	Dallas, B. Amos & Assocs.	214-741-3674
Wash	Seattle, D. Smith Sls. Co.	206-633-3160

FREDERICK ELECTRONICS CORP., Hayward Rd. P.O. Box 502, Frederick, Md., 21701, Tel: 301-662-5901, Telex: 893438; Empl.: 215; Minimum order: $25

For info on price: B. Fogle; Application info: E. Russell; Customer service: B. Payton; Delivery info: D. Baker

Free literature available: Data brochures on all products; complete catalog of all products.

Products manufactured: Comm. Systems, Converters, Generators, Keyers, Tone, Memory Systems, Modulator/Demodulators, Oscillators, Receivers, Synthesizers

Local Sales Offices & Reps.

Cal	Santa Clara, Plantronics	408-249-1160
Cal	Valencia, Plantronics	805-255-7997
Conn	Trumbull, Plantronics	203-261-5642
Fla	Brandon, Plantronics	813-689-0220
Ill	Chicago, Plantronics	312-991-1120
Md	Bethesda, Warner Assocs.	202-469-8904
Mo	Ballwin, Plantronics	314-391-0209
NY	New York, Frederick Elctrns. Corp.	212-422-2449
Ohio	Cincinnati, Plantronics	513-232-7870
Pa	Shippensburg, Plantronics	717-532-4425
Tex	Dallas, Plantronics	214-341-9500
Wash	Seattle, Plantronics	206-624-8861
FOR:	Can., Montreal, Fred. Elctrns.	541-871-9652

FREDERICKS CO., Televac Div., Philmont & Anne Sts., Huntington Valley, Pa., 19006, Tel: 215-947-2500; Empl.: 75; Minimum order: $15

For info on price: J. Boericke; Application info: P. McReynolds; Customer service: H. Q. Simons; Delivery info: H. Q. Simons

Products manufactured: Gages, Seals, Services, Assembly, Production & Test, Switches, Thermocouples, Elements & Accessories, Timers

FREED TRANSFORMER CO., INC., 1718 Weirfield St., Brooklyn, N.Y., 11227; Empl.: 200
p. 1•716,717; p. 2•1738-1747

Products manufactured: Amplifiers, Bridges, Capacitors, Fixed, Chokes, Coils Including Assemblies & Forms, Compounds, Encapsulating, Insulating, Molding, Potting, Converters, Current Sources, Decade Boxes, Filters, Indicators, Inverters, Meters, Power Supplies, Reactors, Regulators, Testers, Transformers, Voltage Sources

FREQUENCY DEVICES, INC., 25 Locust St., Haverhill, Mass., 01830, Tel: 617-374-0761, TWX: 710-347-0314; Empl.: 25 .... p. 1•554,555

Customer service: S. M. Ruscio

Free literature available: Data Sheets 300 Series Voltage Tuneable Filters, 700 Series Fixed Frequency Filters, 730-760 Series Tuneable Filters, 744 Series Programable Filters, 400 Series Quadrature Oscillators, 440 Series Tuneable Oscillators, 450 Series Amplitude Regulated Oscillators, 510 Series Tone Encoders, 540-550 Series Tone Decoders, Application Briefs # 1-30.

Products manufactured: Decoders, Encoders, Filters, Generators, Oscillators, Power Supplies, Testers

Local Sales Offices & Reps.

Ala	Huntsville, Tech. Sls.	205-881-1750
Cal	Mountain View, Tech-Ser	415-969-9020
Cal	Woodland Hills, Elctrn. Comp. Mktg.	213-340-1745
Colo	Englewood, Klein Aerospace Assocs.	303-781-4967
Fla	Clearwater, Brennan Assocs.	813-446-2670
Ill	Northfield, Torkelson Assoc.	612-835-2414
Ind	Indianapolis, Torkelson Assocs.	317-244-7867
Kans	Shawnee Mission, Tech. Sls. Assocs.	913-888-3330
Md	Silver Spring, Rep-Tron, Inc.	301-593-4844
Mich	Detroit, Electro Sls. Assocs.	313-526-8800
Minn	Minneapolis, Torkelson Assocs.	612-835-2414
Mo	Ferguson, Technical Sls.	314-725-5361
NJ	Fort Lee, Tecnimat	201-461-8686
NM	Albuquerque, Klein Aerospace Assocs.	505-344-8020
NY	Guilderland, Electro-Moduler Sys.	516-456-2665
Ohio	Cleveland, Electro Sls. Assocs.	216-261-5440
Pa	Pittsburg, Electro Sls. Assocs.	412-371-9449
Pa	Willow Grove, H. Nash Assocs.	215-657-2213
Tex	Richardson, Scientific Sls. Co.	214-231-6541
Wash	Seattle, Avionics Liaison, Inc.	206-767-3870

FREQUENCY ELCTRNS., 3 Delaware Dr., New Hyde Pk., N.Y., 11040, Tel: 516-328-0100, TWX: 510-223-0418; Empl.: 185 .... p. 1•323-326

Products manufactured: Amplifiers, Calibrators, Clocks (All Types), Comparators, Connectors, Controls/Control Eqpt., Converters, Detectors, Discriminators, Dividers, Filters, Generators, Meters, Microwave Integrated Circuits (MIC's), Multipliers, Oscillators, Ovens, Receivers, Standards, Switches, Synthesizers

Local Sales Offices & Reps.

Ala	Huntsville, Int'l. Scien.	205-837-1601
Cal	Sherman Oaks, Windsor Dynamics	213-989-3631
Cal	Woodside, Windsor Dynamics	415-854-4870
Fla	Orlando, Truex Assoc.	305-859-2160
Ill	Chicago, Pivan Engrg.	312-539-4838
Md	Rockville, Marktron Inc.	301-762-6210
Mass	Reading, Kanan Assocs.	617-944-8484
Mich	Ferndale, Tiby Co.	313-547-3550
Mo	St. Louis, Pivan Engrg.	314-567-3636
NJ	Englewood, Scien. Devices-East	201-871-3916
NY	Rochester, Ossmann Comps.	716-442-3290
NC	Winston Salem, Int'l. Scien.	919-722-1783
Ohio	Cleveland, Tiby Co.	216-371-5335
Pa	Glenside, Elcom Inc.	215-885-1325
Tex	Houston, R. Martin Assocs.	713-462-4077
Va	Charlottesville, Marktron, Inc.	703-973-5874
Wash	Renton, S. Wilson Co.	206-226-0650
EXP:	New York City, N.Y., Henley Elctrns.	212-986-5544

FREQUENCY ENGRG. LABS., Div. Harvard Inds., Inc., Box 527, Farmingdale, N.J., 07727, Tel: 201-938-9221, TWX: 201-938-2456; Empl.: 620; Minimum order: $125

Customer service: R. Peterson

Free literature available: Passive microwave components, sub-assemblies & instruments, including fixed & variable filters, phase shifters, high power filter-combiners, wavemeters, cavities, multiplexers, frequency synchronizers & phase noise analyzers.

Products manufactured: Amplifiers, Analyzers, Antennas, Calibrators, Cavities, Microwave, Comm. Systems, Comparators, Converters, Filters, Junctions, Hybrid, Microwave, Meters, Mixers, Monitors, Multipliers, Preselector-Mixers, Preselectors, Radar Systems, Receivers, Shifters, Synchronizers, Klystron & BWO, Synthesizers, Testers, Tuners

Local Sales Offices & Reps.

Cal	Sherman Oaks, Windsor Dynamics	213-989-3631
Cal	Woodside, Windsor Dynamics	415-854-4870
Md	Glen Burnie, Micro-Comp	301-761-4600
NY	Tuckahoe, ASCO Elctrns.	914-779-8110
Tex	Ft. Worth, C. Wolf Co.	817-738-1996
Tex	Houston, C. Wolf Co.	713-721-2442
Tex	Universal City, C. Wolf	512-658-6672

FREQUENCY WEST, INC., 3140 Alfred St., Santa Clara, Cal., 95050, Tel: 408-249-2850, TWX: 910-338-0163; FSC No: 8F150; Empl.: 60; Minimum order: $50

Free literature available: Complete specifications for fundamental oscillators, microwave sources and synthesizers. Linear transistorized power amplifiers specifications are included. Application notes on phase-locked signal source design and phase-locked oscillator tune-up procedure.

Products manufactured: Amplifiers, Generators, Oscillators

Local Sales Offices & Reps.

Ala	Huntsville, FM Assocs.	205-536-9990
Ariz	Phoenix, Thorson Co.	602-956-5300
Cal	Los Angeles, Thorson Co.	213-937-0790
Cal	Palo Alto, Waldman Assocs.	415-961-4100
Colo	Denver, Thorson Co.	303-759-0809
Fla	Orlando, Currie, Peak & Frazier	305-855-0843
Ill	Chicago, Tech. Sls.	312-237-7210
Ind	Ft. Wayne, TX Sls.	219-489-4447
Kans	Shawnee, J. F. Guernsey Co.	913-631-2414
Md	Ellicott City, VPI	301-465-4060
Mass	Needham Hts., REPTRON	617-449-4141
Mo	St. Louis, HITT Assocs.	314-426-2322
NM	Albuquerque, Thorson Co.	505-265-5655
NY	N. Syracuse, NACO ELCTRNS.	315-699-2651
NY	Tuckahoe, Spectrum Sls.	914-793-1660
NC	Greensboro, FM Assocs.	919-294-2754
Ohio	Shaker Heights, TX Sls.	216-561-1900
Pa	Montgomeryville, VPI Assocs.	215-474-3200
Tex	Dallas, Thorson Co.	214-233-5744
Wash	Bellevue, Thorson Co.	206-455-9180

FREUDENBERG, INC. B., 50 Rockefeller Plaza, New York, N.Y., 10020, Tel: 212-757-9130; Empl.: 8

Customer service: W. J. Leonhardt

Products manufactured: Bridges, Machines/Machinery, Production, Testers, Welding Equipment & Access. (Excluding Equip. for Semiconductor Devices)

FRIEND'S MFG., Rd. 5, Box 74, Williamstown, N.J., 08094, Tel: 609-629-7919; Empl.: 2; Minimum order: $32

Customer service: H. Friend

Products manufactured: Cleaners & Solvents

FUJITSU LTD., 2-chone 6-1, Marunochi, Chiyoda-ku, Japan, 100, Tel: 03-216-3211; Empl.: 32380

FUJI ELECTROCHEMICAL CO., Hamagomu Bld. 5 36-11 Shinbashi, Minato-ku, Tokyo, Japan; Empl.: 3000

Products manufactured: Circuits, Hybrid, Thick Film, Circuits, Hybrid, Thin-Film, Circuits, Integrated, Silicon Monolithic, Unpackaged Chips, Circulators, Ferrite, Coils Including Assemblies & Forms, Converters, Cores, Magnetic, Delay Lines, Delays, Time (Excluding Delay Lines, Timers, Delay & Relays, Time-Delays), Heads, Recording Playback, Erase, Inverters, Isolators, Memory Systems, Microwave Integrated Circuits (MIC's), Power Supplies, Transformers

FUNCTION MODULES, INC., Box 856, 711 W. 17th St., Costa Mesa, Cal., 92627, Tel: 714-645-6001, TWX: 910-596-1384; FSC No: 52467; Empl.: 50; Minimum order: $25

For info on price: S. Banis; Application info: S. Osgood; Customer service: S. Banis; Delivery info: S. Banis

Products manufactured: Amplifiers, Converters, Dividers, Multiplexers, Multipliers, Power Supplies

Local Sales Offices & Reps.

Ariz	Phoenix, Mesa Engrg. & Sls. Assocs.	602-224-1995
Cal	Pasadena, A-F Sales	213-681-5631
Cal	San Diego, Mesa Engrg.	714-278-8021
Cal	Sunnyvale, RDP Instr., Inc.	408-735-9040
Colo	Denver, Lindberg Co.	303-758-9033
Fla	Altamonte Springs, Wmm Assocs. Inc.	305-831-4645
Fla	Clearwater, Wmm Assocs. Inc.	813-726-8871
Fla	Pompano Beach, Wmm Assocs. Inc.	305-943-3091
Ill	Hinsdale, Momak Sls.	312-654-4524
Iowa	Cedar Rapids, Palatine Engrg. Sls.	319-365-8071
Kans	Andover, Palatine Engrg. Sls.	316-683-7512
Kans	Overland Park, Palatine Engrg. Sls.	913-262-5643
Md	Baltimore, J.R. Daniel & Co.	301-825-3330
Mass	Needham, Massa & Maquire	617-329-0354
Mich	Farmington, Rep-Tron	313-478-1024
Minn	Minneapolis, Nortec Inc.	612-920-9526
Mo	St. Louis, Palatine Engrg. Sls.	314-426-7055
NM	Albuquerque, Lindberg Co.	505-345-2489
NY	Kingston, Ossmann Component Sales	914-338-5505
NY	Manhasset, Win-Cor Elctrn. Sls.	516-627-9474
NY	Rochester, Ossmann Component Sales	716-442-3290
NY	Syracuse, Ossmann Component Sales	315-454-4477
NY	Vestal, Ossmán Component Sales	607-785-9949
NC	Greensboro, J.R. Daniel & Co.	919-294-1065
Ohio	Dayton, Neal Bear Corp.	513-299-3566
Ohio	West Richfield, Bear Mktg.	216-659-3331
Ore	Portland, Western Tech. Sls.	503-297-1711
Pa	Ambler, Wm Assocs.	215-643-4119
Pa	Delmont, T.F. Laslo & Assocs.	412-468-5045
Tex	Dallas, Comspec, Inc.	214-234-4137
Tex	Houston, Comspec, Inc.	713-461-4487
Tex	Houston, Palatine Engrg. Sls.	713-747-6537
Tex	Richardson, Palatine Engrg. Sls.	214-231-9489
Utah	Salt Lake City, Lindberg Co.	801-364-6409
Wash	Bellevue, Western Tech. Sls.	206-454-3906

FURNAS ELEC. CO., 1197 McKee St., Batavia, Ill., 60510, Tel: 312-879-3410; Empl.: 1100; Minimum order: $10

For info on price: Sls. Dept.; Application info: Appl. Eng.; Customer service: J. B. Blass; Delivery info: Sls. Dept.

Products manufactured: Controls/Control Eqpt., Nameplates, Relays, Switches, Timers

Local Sales Offices & Reps.

Ark	Little Rock, Ransom Sls. Co.	501-225-7332
Cal	Los Angeles, Calhoun & Poxon Co.	213-225-2328
Cal	Sacramento, R.G. Mitchell Co.	916-444-3789
Cal	San Francisco, Furnas Elec. Co.	415-692-5656
Colo	Lakewood, Western Reps.	303-986-6025
Conn	North Haven, Furnas Elec. Co.	203-239-7185
Fla	Jupiter, J.C. Turner Assoc.	305-746-1487
Fla	Miami, J.C. Turner Assoc.	305-625-6556
Fla	Orlando, J.C. Turner Assoc.	305-859-4705
Ga	Atlanta, A. Brown Assoc.	404-457-6381
Ill	Chicago, Furnas Elec. Co.	312-521-7450
Ind	Fort Wayne, Neal Eng. Co.	219-484-5090
Ind	Indianapolis, Neal Eng. Co.	317-849-4201
Iowa	Davenport, R.L. Wildauer Co.	319-355-3121
Kans	Kansas City, R.E. Gooley	913-831-0200
Ky	Louisville, Neal Engr. Co.	502-267-8337
La	New Orleans, MacKenroth-Robbins & Assocs.	504-524-7662
Md	Baltimore, McCourt Co.	301-465-4515
Mass	Boston, Electrical Comp.	617-655-2225
Mass	Longmeadow, Electrical Comp.	617-655-2225
Mich	Detroit, W.C. Fay & Assoc.	313-851-4750
Mich	Grand Rapids, J.M. Perry Co.	616-949-0271
Minn	Minneapolis, H. Mercer Co.	612-933-7111
Miss	Jackson, MacKenroth-Robbins & Assoc.	601-355-3946
Mo	St. Louis, Kattelmann & Co.	314-434-6875
Neb	Omaha, Orlin I. Wahl	402-451-4276
NJ	Fairfield, Furnas Elec. Co.	201-227-5122
NM	Albuquerque, Elec. Locator & Sls. Co.	505-867-5340
NY	Buffalo, H.H. Cardozo	716-834-3377
NY	New York City, Furnas Elec. Co.	212-285-9732
NY	Rochester, F. Serr	716-586-6226
NY	Syracuse, R.H. Nichols	315-437-2813
NC	Charlotte, R.W. Chapman & Co.	704-525-2421
NC	Greensboro, R.W. Chapman & Co.	919-275-6323
NC	Raleigh, R.W. Chapman & Co.	919-782-2624
Ohio	Akron, R.R. Smith	216-334-2518
Ohio	Cincinnati, Fallon & Sterling Assoc.	513-232-7733
Ohio	Cleveland, M.M. Haley Co.	216-238-3650
Ohio	Dayton, W. Hammer & Assoc.	513-294-4531
Ohio	Toledo, M.M. Haley Co.	419-536-2849
Okla	Tulsa, Industrial Sls. & Engr. Co.	918-743-3610
Ore	Portland, Donal Co.	503-246-3131
Pa	Erie, Foster-McClinton Inc.	814-455-9111
Pa	Philadelphia, H.B. Stallings & Assoc.	215-566-4100
Pa	Pittsburgh, Foster-McClinton Inc.	412-561-4803
SC	Greenville, R.W. Chapman & Co.	803-232-5391
SC	W. Columbia, R.W. Chapman & Co.	803-796-9796
Tenn	Memphis, Ransom Sls. Co.	901-332-0036
Tenn	Nashville, A. Brown Assoc.	615-256-3003
Tex	Dallas, Titan Reps Inc.	214-661-5350
Tex	Houston, Beeco Corp.	713-661-3192
Tex	San Antonio, Dudley Co.	512-337-4804
Utah	Salt Lake City, Electrical Sls. Co.	801-486-1367
Va	Richmond, Marchant Electrical Sls. Co.	804-262-7333
Wash	Seattle, M. Richards Co.	206-323-2127
Wash	Spokane, Electro-Power Corp.	509-535-2931
WVa	Huntington, Foster-McClinton Inc.	304-736-5161
Wisc	Appelton, H. Mercer Co.	414-739-6223
Wisc	Milwaukee, H. Mercer Co.	414-786-6431
FOR:	Can., Calgary, Alb., Elec. Contr. Mach. Ltd.	403-244-0771
FOR:	Can., Halifax, NS, MarLite Co. Ltd.	902-429-5200
FOR:	Can., Moncton, NB, Marlite Co., Ltd.	506-382-8469
FOR:	Can., Montreal, Que, PD Assoc.	514-695-6369
FOR:	Can., St. Johns, New Found, Marlite Co. Ltd.	709-726-4500
FOR:	Can., Toronto, Ont., Furnas Elec. Can. Ltd.	416-759-6743
FOR:	Can., Vancouver, BC, Cansco Agencies Ltd.	604-291-7251
FOR:	Can., Winnipeg, Manitoba, Smith-Paterson & Assoc.	204-774-1855

FUSION SYSTEMS CORP., 11810 Parklawn Dr., Rockville, Md., 20852, Tel: 301-881-5934; Empl.: 19

Customer service: M. Greenblatt

Free literature available: An electrodeless high intensity ultraviolet lamp system with instant on-off, 3000 hour bulb lifetime, low heat, high curing speed. Non mercury bulbs available.

Products manufactured: Lamps

FUSITE DIV./EMERSON ELEC., 6000 Fernview Ave., Cincinnati, Ohio, 45212, Tel: 513-731-2020, TWX: 810-461-2810; Minimum order: $75

For info on price: J. Marsh; Application info: J. Bentley; Customer service: W. Grothaus; Delivery info: J. Marsh

Free literature available: Bulletin 421: Overview of products & specs.

Products manufactured: Connectors, Feedthrus & Seals, Environmental, Seals, Services, Assembly, Production & Test, Terminals, Wire

Local Sales Offices & Reps.

Conn	Old Saybrook, E.J. Hughes Assoc.	203-399-9100
Mass	Attleboro, E.J. Hughes Assoc.	617-226-0050
Mass	Beverly, E.J. Hughes Assoc.	617-927-7171

GABRIEL ELCTRNS. INC., Box 626, Scarborough Ind'l. Pk., Scarborough, Me., 04074, Tel: 207-883-5161; Empl.: 80; Minimum order: $35

For info on price: D. B. Crisman; Application info: D. B. Crisman; Customer service: M. Curry; Delivery info: M. Curry

Free literature available: Short form catalog on request. Information on standard parabolic antennas, high performance antennas (including ultra type) and horn reflectors. Details on mounts, elliptical waveguide, networks, circular waveguide, radomes and pressurizer.

Products manufactured: Antenna Feed Systems, Antennas, Couplers, Dehydrators, Flanges, Waveguide, Horns, Microwave, Mounts, Waveguides & Adapters

GAERTNER SCIENTIFIC CORP., 1261 Wrightwood Ave., Chicago, Ill., 60614, Tel: 312-281-5335; Empl.: 80; Minimum order: $15

For info on price: R. Kutko; Application info: E. G. Watson; Customer service: K. Kutko; Delivery info: J. Stozek

Products manufactured: Densitometers, Electronic, Gages, Interferometer Systems, Lamps, Lenses, Optical & Camera, Microscopes, Testers

GAGNE ASSOCS., INC., 1080 Chenago St., Dept. 3EE-27, Binghamton, N.Y., 13901, Tel: 607-723-9556; Empl.: 45; Minimum order: $10

For info on price: S. Morrisey; Application info: W. W. Schoch; Customer service: J. Edwards; Delivery info: S. Morrisey

Free literature available: Literature on: 1- "Shield-Stripp", "P-F" Dust Bellows2- "Porta-Flex", 3- "Sensiflex", 4- "Porta-Flex".

Products manufactured: Controls/Control Eqpt., Covers, Protective (Including Dust), Machines/Machinery, Production, Switches, Wire Strippers, X-Ray Inspection Equipment

GALILEO ELECTRO-OPTICS CORP., Galileo Pk., Sturbridge, Mass., 01518, Tel: 617-347-9191, TWX: 710-347-1190; Empl.: 200

For info on price: J. M. O'Neil; Application info: L. Owen; Customer service: J. M. O'Neil; Delivery info: J. M. O'Neil

Products manufactured: Comm. Systems, Converters, Detectors, Fiber Optic Bundles, Intensifiers, Image, Power Supplies, Substrates, Transmission Systems, Data, Tubes

Local Sales Offices & Reps.

Cal	El Segundo, Griot Assocs., Inc.	213-322-8383
Cal	Los Altos, Griot Assocs., Inc.	415-941-2533
Colo	Arvada, Cleveland Entrprs., Inc.	303-423-3707
Conn	Sherman, R. P. Mahan Co.	203-355-0231
Fla	Winter Park, McMahan Assocs.	305-645-0463
Ill	Chicago, Brooks Engrg. Co.	312-944-1227
Md	Beltsville, Kelly Scientific Instr.	301-937-4350
Mass	Wellesley, R. P. Mahan Co. (Fiber optics)	617-237-1040
Mich	Farmington, Sheridan Assocs., Inc.	313-477-3800
Minn	St. Paul, Northport Engrg., Inc.	612-698-3841
Mo	Florissant, Sheridan Assocs., Inc.	314-837-5200
NJ	Tenafly, Budd-Tronics (Fiber Optics)	201-569-2230
NM	Albuquerque, Cleveland Entprs., Inc.	505-345-2481
NY	Rochester, Irondequoit Inds.	716-544-6257
Ohio	Cincinnati, Sheridan Assocs., Inc.	513-761-5432
Ore	Beaverton, ES/Chase Co.	503-649-6177
Pa	Pittsburgh, Sheridan Assocs., Inc.	412-244-1640
Tex	Garland, R. S. Marston Co.	214-235-3577
Wash	Edmonds, ES/Chase Co.	206-774-3586
EXP:	Plainville, Mass., Teknis, Inc.	617-695-3591

GAMBLE, CHARLES T. INDS., New Jersey Ave. & Fairview St., Riverside, N.J., 08075, Tel: 609-461-1900, TWX: 510-682-3243; Empl.: 150; Minimum order: $25 p. 2•1492-1495

Customer service: E.P. McCabe

Free literature available: Precision Resistor Catalogue; Power "Vitreous Enamel" Wirewound Resistos; Precision Power Wirewounds; Resistor Engineering Data Book.

Products manufactured: Dividers, Networks, Resistors

Local Sales Offices & Reps.

Cal	Menlo Park, G.R. McKnight Co.	415-325-2844
Cal	San Diego, Miracle Assoc.	714-276-8619
Fla	Ft. Lauderdale, G. Bohman Assoc.	
Fla	Orlando, G. Bohman Assoc.	305-855-0274
Ill	Glenview, Crimson Eng.	312-724-1780
NY	Hempstead, Kahgan Sls. Corp.	516-538-2300
NY	Liverpool, WEI Inc.	315-652-8111
Pa	Erie, ECCO Elctrn. Sls.	814-452-3762
Tex	Richardson, Vista Assoc.	214-235-4547

GAMMA SCIENTIFIC INC., 3777 Ruffin Rd., San Diego, Cal., 92123, Tel: 714-279-8034, Telex: 697938; Empl.: 50; Minimum order: $25

For info on price: P. Householder; Application info: G. Unangst; Customer service: G. Unangst; Delivery info: P. Householder

Products manufactured: Densitometers, Electronic, Detectors, Lamps, Meters, Microscopes, Monitors, Photomultiplier Tube Housings, Radiometers, Recorders, Tubes

Local Sales Offices & Reps.

Ariz	Phoenix, Griot Assocs.	602-275-4991
Cal	El Segundo, Griot Assocs.	213-322-8383
Cal	Los Altos, Griot Assocs.	415-941-2533
Cal	Tustin, Griot Assocs.	714-838-2330
Fla	Winter Park, McMahan Assocs.	305-645-0463
Ill	Chicago, Brooks Engrg.	312-944-1227
Md	Kensington, C.W. Hench Assocs.	301-946-7822
Mass	Sudbury, DLG Assocs.	617-877-7880
Pa	Elkins Park, Snow Assocs.	215-379-4700
Tex	Plano, Optical Services Co.	214-442-2011
Wash	Bellevue, Griot Assocs.	206-454-8592

GAP INSTR. CORP., 110 Marcus Blvd., Hauppauge, N.Y., 11787, Tel: 516-273-0909, TWX: 510-227-6237; FSC No: 00607; Empl.: 50; Minimum order: $100

Customer service: W. P. Soboleski

Free literature available: Short Form Catalog Demonstrating Full Capability And/Or Individual Technical Data Sheets on Certain Equipments With Technical Specifications.

Products manufactured: Actuators, Amplifiers, Comparators, Computers, Controls/Control Eqpt., Converters, Display Devices/Displays, Indicators, Motors, Multipliers, Power Supplies, Repeaters, Servo, Servo Systems, Simulators

Local Sales Offices & Reps.

Cal	Long Beach, Maintronics Div. of Pac Ord	213-426-9486
Cal	Monrovia, E. M. I.	213-358-1881
Fla	Orlando, Brennan Assocs.	305-425-4382
Md	Simpsonville, A/O Elctrns.	301-531-6700
Mass	Attleboro, Elctrn. Sls. of New England	617-222-4078
Minn	Anoka, A & R Assocs.	612-421-0751
EXP:	N.Y.C., N.Y., Frathom Co., Div. of Henley Overseas Sls.	212-687-9390

GAR ENTERPRISES, 2031 N. Lincoln Ave., Pasadena, Cal., 91103, Tel: 213-798-0785; Empl.: 25

Customer service: G. Sugimoto

Products manufactured: Regulators, Testers

GARDINER SOLDER CO., Div. of Gardiner Metal Co., 4820 S. Campbell Ave., Chicago, Ill, 60632

GARDNER-DENVER, Grand Haven Div., 1333 Fulton St., Grand Haven, Mich., 49417, Tel: 616-842-0200, Telex: 22-8457; Empl.: 5000 ....p. 1•1541; p. 2•1697

Customer service: W. H. Christiansen

Free literature available: Bulletin 14-1, Portable Wire-Wrap® Tools - A complete line of portable air, electric, battery powered and manual tools for making solder- less wrapped electrical connections.

Products manufactured: Backpanel Interconnect Systems, Cutters, Wire, Hand Operated, Machines/Machinery, Production, Pumps, Vacuum, Screwdrivers, Tools, Wire Strippers, Wire Twisters, Wrenches

Local Sales Offices & Reps.

Ala	Birmingham, Gardner-Denver Co.	205-871-3543
Ariz	Phoenix, Gardner-Denver Co.	602-272-0451
Cal	Bakersfield, Gardner-Denver Co.	805-327-5713
Cal	San Diego, San Diego Egpt. & Supply	714-278-6000
Cal	San Francisco, Gardner-Denver Co.	415-589-3305
Cal	Whittier, Gardner-Denver Co.	213-692-1258
Colo	Denver, Gardner-Denver Co.	303-399-1321
Colo	Grand Junction, Gardner-Denver Co.	303-242-4157
Conn	Bloomfield, Gardner-Denver Co.	203-243-0311
Fla	Hialeah, Pan American Equip. Co.	305-691-4631
Ga	Atlanta, Gardner-Denver Co.	404-938-6633
Idaho	Wallace, Gardner-Denver Co.	208-752-6291
Ill	Broadview, Gardner-Denver Co.	312-681-2210
Ill	Quincy, Gardner-Denver Co.	217-223-8282
Ind	Indianapolis, Gardner-Denver Co.	317-634-2167
Kans	Shawnee Mission, Gardner-Denver Co.	913-888-1040
Ky	Louisville, Gardner-Denver Co.	502-363-2679
La	Lafayette, Gardner-Denver Co.	318-232-3190
La	New Orleans, Gardner-Denver Co.	504-347-1451
La	Shreveport, Gardner-Denver Co.	318-424-4446
Md	Ellicott City, Gardner-Denver Co.	301-465-1155
Mass	Hopkinton, Gardner-Denver Co.	617-435-6311
Mich	Livonia, Gardner-Denver Co.	313-525-9110
Minn	Duluth, Gardner-Denver Co.	218-729-9290
Minn	Minneapolis, Gardner-Denver Co.	612-888-4647
Mo	Bridgeton, Gardner-Denver Co.	314-291-2800
NJ	Mahwah, Gardner-Denver Co.	201-529-4760
NY	Buffalo, Gardner-Denver Co.	716-836-8300
NY	Rochester, Gardner-Denver Co.	716-254-1260
NC	Charlotte, Gardner-Denver Co.	704-366-8532
Ohio	Cleveland, Gardner-Denver Co.	216-524-1856
Ohio	Springdale, Gardner-Denver Co.	513-671-7270
Okla	Oklahoma City, Gardner-Denver Co.	405-677-5737
Okla	Tulsa, Gardner-Denver Co.	918-622-2800
Pa	Horsham, Gardner-Denver Co.	215-672-3003
Pa	Pittsburgh, Gardner-Denver Co.	412-923-1511
Tenn	Knoxville, Gardner-Denver Co.	615-523-6195
Tex	Corpus Christi, Gardner-Denver Co.	512-882-6155
Tex	Dallas, Gardner-Denver Co.	214-233-0100
Tex	Houston, Gardner-Denver Co.	713-626-2220
Tex	Odessa, Gardner-Denver Co.	915-563-1350
Utah	Salt Lake City, Gardner-Denver Co.	801-466-8610
Wash	Seattle, Gardner-Denver Co.	206-624-1115
Wisc	Milwaukee, Gardner-Denver Co.	414-774-2210
Wyo	Casper, Gardner-Denver Co.	307-235-5794
EXP:	Dallas, Tex., Gardner-Denver Int'l.	214-634-8491

GARDNER-DENVER CO., Box 47114, Dallas, Tex, 75247

GARY MFG., INC., 1010 Jersey Ave., New Brunswick, N.J., 08902, Tel: 201-545-2424; Empl.: 250

Products manufactured: Boards, Plug-In, Boards, Printed Wiring, Universal, Connectors, Contacts, Electrical, Integrated Circuit Packaging Systems, Packages, Integrated Circuit, Pins, Racks, Services, Assembly, Production & Test, Socket Adapters, Sockets, Terminals

Local Sales Offices & Reps.

Ariz	Phoenix, Mirco Elctrns.	602-944-2281
Cal	Mountainview, Westmark Assocs.	415-969-1700
Cal	Santa Ana, Spectrum Assocs.	714-835-4114
Colo	Denver, Westmark Assocs.	303-433-7181
Conn	Stratford, G. Rosen Co.	203-375-5456
Fla	Pompano Beach, V. G. Sls.	305-941-5544
Ill	Downers Grove, Richmar Elctrns.	312-968-0118
Ind	Indianapolis, J. Ihrig	317-783-7630
Iowa	Des Moines, BEAMS	515-282-0292
Kans	Overland Park, BEAMS	913-341-7744
Md	Baltimore, J. R. Daniels & Co.	301-825-3330
Mass	Framingham, G. Rosen Co.	617-879-5505
Mich	Detroit, Nicon Assocs.	313-341-7688
Mo	Creve Couer, BEAMS	314-569-1060
NJ	Cherry Hill, J. N. Barrett Assocs.,	609-429-1551
NY	Mount Vernon, Friedman Smith Elec. Sls.	914-664-4800
NY	Syracuse, I. A. Hotze	315-479-6641
NC	Greensboro, J. R. Daniels & Co.	919-294-1965
Ohio	Medina, J. C. Hofstetter	216-725-4477
Tex	Dallas, R. Matthews Co.	214-233-0363
Wash	Kirkland, Freed Assocs.	206-822-8100

GATES ELCTRN. CO., 526 Van Nest Ave., Bronx, N.Y., 10460 .... p. 1•1216-1221

Products manufactured: Chargers, Battery, Eliminators, Battery, Power Supplies

GATES ENERGY PRODS., INC., 1050 S. Broadway, Denver, Colo., 80217, Tel: 303-744-4806, TWX: 910-931-2658; Empl.: 100

Products manufactured: Batteries, Power Supplies

Local Sales Offices & Reps.

Ariz	Scottsdale, FRYCO, Inc.	602-945-3281
Cal	Los Angeles, M. Geery	213-641-2325
Colo	Denver, Gates Energy Prods., Inc.	303-744-4806
Fla	Hollywood, Reynolds & Assocs.	305-987-6720
Fla	Melbourne, Reynolds & Assocs.	305-727-3205
Ga	Atlanta, Reynolds & Assocs.	404-252-5360
Minn	Minneapolis, HMR, Inc.	612-920-8200
Mo	Kansas City, H. Hanson Co.	816-444-9494
Mo	St. Louis, H. Hanson Co.	314-432-3611
Okla	Tulsa, Ammon & Rizos	918-633-8518
Ore	Portland, Almac Stroum Elect.	503-292-3534
Tex	Dallas, Ammon & Rizos	214-233-5591
Tex	Houston, Ammon & Rizos	713-729-1233
Wash	Seattle, Almac Stroum Elec.	206-763-2300

GATES, GEO. W. & CO., INC., Hempstead Tpke. & Lucille Ave., Franklin Sq., N.Y., 11010, Tel: 212-347-0787; Empl.: 8

Customer service: T. E. Schulz, Sr.

Products manufactured: Chemicals, Lamps, Lights, Power Supplies, Ultraviolet Inspection Lighting

G B INSTRUMENTS INC., 2030 Coolidge St., Hollywood, Fla., 33020, Tel: 305-920-0225, TWX: 510-954-9813; FSC No: 31601; Minimum order: $50

For info on price: B. Weiss; Application info: B. Weiss; Customer service: R. Richard; Delivery info: B. Weiss

Free literature available: X-Y Recorder Specs; Polar to cartesian converters (coordinate converters); Buffers; Meteorological transmission system; commercial computer systems.

Products manufactured: Computers, Converters, Multiplexers, Process Control Systems, Receivers, Recorders, Services, Assembly, Production & Test, Transmission Systems, Data

Local Sales Offices & Reps.

NM	Las Cruces, BFA Assoc.	505-523-0601

GBC - CLOSED CIRCUIT TV, 74 Fifth Ave., New York, N.Y., 10011; Empl.: 85; Minimum order: $10

For info on price: B. Clarke; Application info: S. Lefkowitz; Customer service: M. Dunn; Delivery info: Z. Richards

Free literature available: List Price Catalog; Executive Guide to CCTV; Distributor Price Schedule.

Products manufactured: Alarms, Amplifiers, Cable, CATV Systems & Equipment, Lenses, Optical & Camera, Monitors, Oceanographic Equip. (Electronic), Racks, Recorders, Tapes, Recording, Magnetic (All Types), Television Systems & Equipment Closed-Circuit, Tubes

Local Sales Offices & Reps.

Cal	Oakland, F.W. Moulthrop & Assoc.	415-261-7676
DC	Wash., GBC/CCTV Wash. Corp.	202-785-8182
Ill.	Chicago, GBC/CCTV Ill. Corp.	312-956-1286
Ind	Indianapolis, GBC/CCTV Ind. Corp.	317-257-1337
Mass	Boston, GBC/CCTV New England Corp.	617-261-2360
Mich	Detroit, GBC/CCTV Mich. Corp.	313-398-1630
Mo	St. Louis, GBC/CCTV Mo. Corp.	314-994-3211
NY	Buffalo, Waxman-Currant Sls.	716-873-0442
EXP:	New York, N.Y., GBC Export Corp.	212-989-4433

GC ELECTRONICS, Div. Hydrometals, 400 So. Wyman St., Rockford, Ill., 61101, Tel: 815-968-9661; Empl.: 550 p. 2•341,1696

Customer service: R. Keas

Free literature available: GC Electronics Catalog-tools, chemicals, service aids. Walsco Catalog-tape-phono drives & belts. Telco Catalog-antennas & installation accessories. Audiotex Catalog-home entertainment accessories. Calectro Handbook experimenter hobbyist items. Electrocraft Switch Catalog-switches & accessories. CB Catalog-CB & ham accessories.

Products manufactured: Adhesives (All Types), Alarms, Amplifiers, Antenna Rotators, Antenna Towers & Supports, Antennas, Arresters, Electrical Surge, Lightning, Bells, Buzzers, Gongs, Sirens & Aural Warning Devices, Benches, Consoles, Stools, Tables, Boards, Printed Circuit, Burnishers, Contact, Bus Bars & Systems, Cable Assemblies & Harnesses, Cable, Cans, Capacitor, Relay, Semiconductor, Transformer, etc, Capacitors, Fixed, Capacitors, Variable, Chargers, Battery, Chemicals, Chokes, Circuit Breakers, Circuits, Integrated, Silicon Monolithic, Unpackaged Chips, Clamps & Clips, Cleaners & Solvents, Coatings, Coils Including Assemblies & Forms, Compounds, Encapsulating, Insulating, Molding, Potting, Connector Adapters, Connectors, Cords, Couplers, Cutters, Wire, Hand Operated, Demagnetizers, Diodes, Display Devices/Displays, Drafting Symbols, Dry Transfer, Pressure Sensitive, etc. (Including Lettering), Drivers, Nut, Dummy Loads, Eliminators, Battery, Etchants, Printed Circuit, Fasteners, Filters, Flux, Brazing & Soldering Materials, Fuses, Grilles, Grommets, Heat Sinks, Soldering, Integrated Circuit Devices, Inverters, Jack Adapters (All Types), Jacks (All Types), Jumpers, Kits, Breadboarding (For Engineers), Kits, Printed Circuit, Knobs, Lamps, Leads, Test & Adaptors, Lubricants, Meters, Microphone Accessories (Including Stands, Holders, Booms), Microphones, All Kinds, Mounts, Phonographs, Parts & Accessories, Pickups, Telephone (For Recording), Pin Straighteners, Tube, Pliers, Plug & Jack Sets, Posts, Potentiometers, Power Supplies, Probes, Punches, Chassis, Rectifiers, Relays, Resistors, Rheostats, Rings, Retaining, Rods, Ground, Seizers, Semiconductor Wafer Fabrication, Sockets, Solder (All Types), Soldering Accessories, Soldering Guns, Irons & Desoldering Tools, Spacers, Speaker Systems, Speakers, Splicing Equipment, Magnetic Tape, Springs (All Types), Strain Reliefs, Cable & Wire, Suppressors, Switches, Tape Recording Accessories, Tape Winders, Terminals, Thermistors, Tools, Transducers, Transformers, Tubing, Tweezers, Hand & Vacuum, Wire, Wire & Cable Ties, Wire Strippers

GCA/DAVID W. MANN, 174 Middlesex Tpke., Burlington, Mass., 01803, Tel: 617-272-5600, Telex: 94-9352; Minimum order: $25

Customer service: A. C. Tobey

Products manufactured: Data Acquisition & Reduction Systems, Data Loggers, Encoders, Machines/Machinery, Production, Microcircuit Production Equip.

GCA/PRECISION SCIENTIFIC, 3737 W. Cortland St., Chicago, Ill., 60647, Tel: 312-227-2660, TWX: 910-221-3122; Empl.: 325; Minimum order: $10

For info on price: D. Bloss Ext. 322; Application info: R. DeSilvia Ext.353; Customer service: D. Bloss Ext. 322; Delivery info: D. Bloss Ext.322

Free literature available: Thelco Bulletin (320A) covers varied line of ovens, incubators, dryers, vacuum ovens, low temperature incubators, CO&I2 incubators, and similar constant temperature cabinets for research and production control.

Products manufactured: Baths, Controlled Temperature (Air & Liquid), Chamber, Environmental Test, Controls/Control Eqpt., Dehydrators, Gages, Ovens, Pumps, Vacuum, Refrigerators, Environmental Test, Timers, Vibrators

Local Sales Offices & Reps.

Cal	Los Angeles	213-283-7815
Cal	San Francisco	415-391-1883
Del	Wilmington	302-995-1753
Ga	Marietta	404-432-8737
Mass	Boston	617-227-1515
NJ	Milford	201-686-9392
NY	Buffalo	716-856-4141
NC	Charlotte	704-332-4850
Ohio	Columbus	614-457-1807

GCA/SUNNYVALE DIV., 1050 Kifer Rd., Sunnyvale, Cal., 94086

GEMS SENSORS DIV., Delaval, Spring La., Farmington, Conn., 06032, Tel: 203-677-1311; Empl.: 160

For info on price: M. Wright; Application info: M. Wright; Customer service: R. Thibodeau; Delivery info: M. Wright

Free literature available: Complete technical information is supplied relative to level switches, flow switches, solid state relays and continuous readout-tank level indicating systems. Comprehensive educational material is also offered on the subject of "Intrinsic Safety".

Products manufactured: Controls/Control Eqpt., Indicators, Relays, Switches

Local Sales Offices & Reps.

Ala	Homewood, Activation	205-871-0353
Ala	Mobile, Activation	
Alas	Anchorage, C. V. Reser Co.	907-279-3911
Ariz	Phoenix, Bews & Wallace	602-275-4496
Ariz	Tucson, Bews & Wallace	602-795-4837
Cal	Burlingame, Delaval	415-342-3350
Cal	Downey, Delaval	213-923-7281
Colo	Arvada, Petromotive Co.	303-422-0990
Conn	Wethersfield, Delaval	203-563-3737
Fla	Tampa, State Instrs.	813-251-3991
Ga	Atlanta, Activation of Georgia	404-755-6691
Haw	Honolulu, Berkley Eng. & Equip. Co.	808-538-1921
Ill	Moline, R. R. Floody Co.	309-755-2483
Ill	Rockford, R. R. Floody Co.	815-399-1931
Ill	Westchester, Delaval	312-681-4806
Kans	Kansas City, E. A. Akin Engrg. Co.	913-831-3733
La	Metairie, Aries Marine & Ind. Sls.	504-889-0520
Md	St. Michael's, Ray Cantwell	301-745-9010
Mich	Madison Hts., Delaval	313-585-8200
Mich	Royal Oak, R. H. Jackson Co.	313-542-5059
Minn	Minneapolis, W. F. Hartfiel Co.	612-929-1631
Mo	St. Louis, Neff Power	314-647-3002
NM	Albuquerque, Lietz Equip. Co.	505-266-5821
NY	Manhasset, Northeast Engrg.	516-365-9633
NY	Rochester, Delaval	716-328-4760
NC	Charlotte, R. W. Chapman & Co.	704-525-2421
Ohio	Cincinnati, Gallagher Co.	513-761-1288
Ohio	Cleveland, Delaval	216-333-1805
OKla	Tulsa, Tulsa Gauge & Instr.	918-622-5061
Pa	Horsham, Delaval	215-674-1697
Pa	Pittsburgh, Delaval	412-343-5666
SC	Greenville, R. W. Chapman Co.	803-233-0053
Tenn	Antioch, Activation	615-889-6524
Tenn	Knoxville, Activation of Georgia	615-584-2771
Tenn	Memphis, Centro	901-526-0518
Tex	Dallas, Delaval	214-638-1712
Tex	Houston, Delaval	713-697-2897
Wash	Seattle, Fairman B. Lee Co.	206-244-7262
Wisc	Milwaukee, Delaval	414-342-1500

GENERAL AUTOMATIC CORP., 235 W. First St., Bayonne, N.J., 07002, Tel: 201-437-7500

Products manufactured: Relays, Switches

GENERAL AUTOMATION, 1055 South East St., Box 4883, Anaheim, Cal., 92803, Tel: 714-778-4800, TWX: 910-591-1695; Empl.: 1430; Minimum order: $50

Application info: D. Stoner Ext. 240; Customer service: J. Appel Ext. 515

Free literature available: Wide range of data sheets and technical brochures that describe all standard minicomputer products and systems presently available; two comprehensive texts on how to select both minicomputers and microprocessors for specific applications.

Products manufactured: Comm. Systems, Compressors, Data, Computers, Controls/Control Eqpt., Data Acquisition & Reduction Systems, Data Compressors, Digital, Data Loggers, Process Control Systems

Local Sales Offices & Reps.

Ala	Huntsville	205-833-9620
Ariz	Tempe	602-967-7885
Cal	Sunnyvale	408-734-4840
Colo	Denver	303-758-7323
Conn	Stanford	203-327-6000
Fla	Altamonte Springs	305-831-5603
Ga	Atlanta	404-261-6203
Ill	Des Plaines	312-298-1830
Ill	Rockford	815-962-8000
Ind	Indianapolis	317-248-0377
La	Metairie	504-837-7071
Md	Silver Springs	301-587-7090
Mass	Waltham	617-899-8600
Mich	Farmington Hills	313-478-2640
Minn	Minneapolis	612-331-9060
Mo	St. Louis	314-997-1830
NJ	Cherry Hill	609-655-5112
NJ	Livingston	201-994-2750
NY	New York	212-682-7015
NY	Rochester	716-442-0780
NC	Greensboro	919-274-3134
Ohio	Cincinnati	513-563-0860
Ohio	Dayton	513-253-2195
Ohio	Rocky River	216-333-3544
Pa	Pittsburgh	412-922-3331
Tex	Dallas	214-661-5370
Tex	Houston	713-464-2815
Wash	Bellevue	206-747-0720
Wisc	Brown Deer	414-355-1220

GENERAL CONTROL CO., 1196 Soldiers Field Rd, Boston, Mass., 02134, Tel: 617-782-7440; Empl.: 25; Minimum order: $10

Customer service: M. Stone

Products manufactured: Switches

Local Sales Offices & Reps.

Mass	Boston, EACO Engrg. Corp.	617-782-7440

GENERAL DEVICES, INC., P.O. Box 253, Princeton, N.J., 08540, Tel: 609-924-2500, Telex: 84-6473; FSC No: 05285; Empl.: 32; Minimum order: $50

For info on price: M. Medvin; Application info: M. Kirzecky; Customer service: M. Medvin; Delivery info: M. Medvin

Products manufactured: Amplifiers, Brushes & Brush Assemblies, Calibrators, Comm. Systems, Commutators, Controls/Control Eqpt., Converters, Data Acquisition & Reduction Systems, Data Loggers, Multiplexers, Oscillators, Scanners, Signal Conditioners & Equipment, Slip-Rings & Assemblies, Switches

Local Sales Offices & Reps.

Ala	Huntsville, Reynolds & Assoc.	205-536-1941
Conn	New Canaan, Nerem, Inc.	203-966-2580
Fla	Ft. Lauderdale, Reynolds & Assoc.	305-581-6611
Fla	Satellite Beach, Reynolds & Assoc.	305-773-4700
Fla	St. Petersburg, Reynolds & Assoc.	813-360-1484
Ga	Atlanta, Reynolds & Assoc.	404-252-5360
Mass	Wakefield, Nerem, Inc.	617-245-4426
NJ	Mountainside, Service & Technology Inc.	201-232-2666
NY	Farmingdale, Service & Technology Inc.	516-694-7330
NY	Pompey, S. F. Foster Co., Inc.	315-677-3333
NY	Webster, S.F. Foster Co.	716-872-5220
NC	Greensboro, Reynolds & Assoc.	919-275-3725
Wash	Seattle, Comptronics	206-284-4842
EXP:	Bala Cynwyd, Tech Impex, Inc.	215-667-3155

GENERAL DEVICES CO., INC., 525 S. Webster Ave., Indianapolis, Ind., 46219, Tel: 317-359-5407, Telex: 27-2169; Empl.: 125; Minimum order: $50 ..... p. 1•63-70

For info on price: S. Gray; Application info: R. D. Lambert; Customer service: R. L. Watson; Delivery info: S. Gray

Free literature available: Complete Catalog covering: chassis-trak solid-bearing, bottom mount and ball-bearing slides; chassis-trak handles; vent-rak cabinets, consoles, instrument cases, chassis and accessories; poxylube dry-film lubricants.

Products manufactured: Benches, Consoles, Stools, Tables, Cabinets & Accessories, Cable Retractors, Cases, Equipment, Instrument, Meter, Chassis, Metal, Containers, Drawers, Sliding, Handles For Cabinets, Circuit Boards, Racks, etc., Lubricants, Racks, Slides, Cabinet & Chassis

Local Sales Offices & Reps.

Ariz	Scottsdale, F. Schoeffler Assocs.	602-959-3011
Cal	Los Angeles, M.A. Stolaroff Co. Inc.	213-295-7781
Cal	Mountain View, G. Woempner Co.	415-964-5454
Cal	San Diego, M.A. Stolaroff Co., Inc.	714-234-6905
Cal	Van Nuys, J.R. Thomas	213-782-3820
Colo	Sedalia, Jensen Representatives	303-688-4154
Conn	Cheshire, Coakley, Boyd & Abbett, Inc.	203-272-2261
Fla	North Miami, Winfield Elctrn. Sales	305-945-6544
Fla	Tampa, Winfield Elctrn. Sales	813-884-6500
Ill	Rolling-Meadows, Lightner Assocs.	312-398-3000
Ind	Indianapolis, General Devices Co.	317-359-5407
Ind	Indianapolis, Mktg. Engrs., Inc.	317-546-1523
Ind	South Bend, Valentine Schillinger & Assocs.	219-291-6258
Kans	Shawnee Mission, Lowell & Kangas Assocs.	913-631-3515
Md	Bethesda, G. Rosen & Assocs.	301-530-8448
Mass	Needham, Coakley, Boyd & Abbett, Inc.	617-444-5470
Minn	St. Paul, Northport Engrg., Inc.	612-698-3841
Mo	St. Louis, Lowell & Kangas Assocs.	314-821-4050
NY	Fayettville, H.G. Richter, Inc.	315-637-6713
NY	Manhasset, Kaebler & Mack	516-627-6620
NC	Paw Creek, Ward Techn. Sls. Co.	704-399-3481
Ohio	Cleveland, Components, Inc.	216-842-2737
Ohio	Hamilton, Components, Inc.	513-721-2997
Tex	Dallas, R. Martin Assocs.	214-361-8584
Tex	Houston, R. Martin Assocs.	713-462-4077
Wash	Olympia, Bergford & Assocs.	206-866-2001
EXP:	Indianapolis, Ind., General Devices Co.	317-359-5407

GENERAL ELECTRIC, Battery Prods. Sect., Box 114, Gainesville, Fla., 32602, Tel: 904-462-3911; Empl.: 71500

Products manufactured: Batteries

GENERAL ELEC. CO., Communication Systems Div., Box 4197, Lynchburg, Va., 24502, Tel: 804-846-7311; Empl.: 4000

Customer service: R. A. Page

Products manufactured: Bridges, Comm. Systems, Controls/Control Eqpt., Printers, Terminal Equipment, Digital, Transceivers

GENERAL ELEC. CO., Elctrn. Comps. Sls. Dept., Sect. 998-2, 1 River Rd., Schenectady, N.Y., 12345
p. 1•958,959,1684,1685; p. 2•134-137,1698,1699

Products manufactured: Amplifiers, Arresters, Electrical Surge, Lightning, Cameras, Capacitors, Fixed, Cells, Photoconductive, Photoemissive, Photovoltaic, Chargers, Battery, Circuit Breakers, Clamps & Clips, Controls/Control Eqpt., Converters, Diodes, Display Devices/Displays, Encoders, Generators, Indicators, Intensifiers, Image, Isolators, Lamps, Lights, Meters, Mixer-Preamplifiers, Microwave, Mixers, Motor Electric Generator Sets, Motors, Oscillators, Power Supplies, Pyrometers, Reactors, Recorders, Rectifiers, Regulators, Relays, Seals, Shunts, Meter, Soldering Accessories, Soldering Equipment, Soldering Guns, Irons & Desoldering Tools, Solenoids, Spark Gaps, Substrates, Suppressors, Switches, Tachometers, Technical Books, Terminal Blocks, Boards & Strips, Thyristors (Includes Silicon Controlled Rectifiers), Timers, Transformers, Transistor, Diode, Thyristor Heat Dissipators, Transistors, Tubes

Local Sales Offices & Reps.

Ala	Huntsville	205-883-3151
Ariz	Phoenix	602-264-1751
Cal	Los Angeles	213-479-7763
Cal	Palo Alto	415-493-2600
Cal	San Diego	714-236-1266
Colo	Denver	303-388-5771
Conn	Bridgeport	203-334-1012
Fla	No. Palm Beach	305-844-5202
Ill	Chicago	312-777-1600
Ind	Fort Wayne	219-482-4557
Iowa	Cedar Rapids	319-364-9149
Mass	Wellesley	617-237-2050
Mich	Southfield	313-355-3552
Minn	Minneapolis	612-835-2550
Mo	Kansas City	816-221-4033
Mo	St. Louis	314-429-6941
NJ	Clifton	201-472-8100
NY	Albany	518-458-7755
NY	Great Neck	516-466-8800
NY	Rochester	716-461-5400
NY	Syracuse	315-456-3108
NC	Greensboro	919-273-6981
Ohio	Cleveland	216-266-2900
Ohio	Dayton	513-298-0311
Okla	Oklahoma City	405-943-9015
Pa	Erie	814-455-5466
Pa	Pittsburgh	412-921-9917
Pa	Wayne	215-962-1500
Tex	Dallas	214-661-8582
Tex	Houston	713-783-8170
Va	Falls Church	703-790-1700
Va	Waynesboro	703-943-1151
Wash	Seattle	206-575-2866
Wisc	Milwaukee	414-271-5000

GENERAL ELECTRIC, Ind'l Heating Business Dept, 1 Progress Rd, Shelbyville, Ind., 46176, Tel: 317-398-4411

Free literature available: GEP 1005 Electric heaters & components such as tubular, strip, cartridge and immersion heaters. Als duct, air and flanged and circulation heaters. GEP 1545 Soldering irons (electric) including ratings from 12 watts to 1250 watts-and-temperature controlled soldering irons.

Products manufactured: Heaters & Heating Elements, Soldering Equipment

Local Sales Offices & Reps.

Cal	Burlingame	415-697-6500
Cal	Los Angeles	213-589-6321
Cal	San Diego	714-224-1212
Colo	Denver	303-759-2749
Conn	Hamden	203-281-1795
Conn	Woodstock	203-928-0332
Fla	Miami	305-592-6523
Fla	Orlando	305-894-7761
Ill	Glen Ellyn	312-858-6320
Ind	Shelbyville	317-398-4411
La	Baton Rouge	504-275-5480
La	Lake Charles	318-439-8173
La	Monroe	318-323-3671
La	New Orleans	504-737-4181
Mich	Detroit	313-835-5100
Minn	Minneapolis	612-789-2535
Miss	Pascagoula	601-475-1248
Mo	Kansas City	816-561-4050
Mo	St. Louis	314-993-5810
Neb	Omaha	402-342-7044
NJ	Caldwell	201-228-2220
NY	Buffalo	716-634-9873
NC	Charlotte	704-523-2122
Ohio	Cincinnati	513-574-0800
Ohio	Hudson	216-467-3377
Ore	Portland	503-223-4197
Pa	Pittsburgh	412-795-4130
Pa	St. Davids	215-687-5650
Tenn	Chattanooga	615-821-0235
Tex	Dallas	214-826-6350
Utah	Salt Lake City	801-363-3555
Va	Richmond	804-359-6051
Wash	Seattle	206-762-4100
FOR:	Can., Toronto, Ont.	614-534-6511

GENERAL ELECTRIC CO., Instrument Prods. Dept., 40 Federal St., West Lynn, Mass., 01905, Tel: 617-594-7049; Empl.: 800; Minimum order: $100

For info on price: L. Atkins 617-594-7274; Application info: B. Kieser 617-594-7273; Customer service: L. Atkins; Delivery info: B. Kieser

Free literature available: GEP-307 Panel Meters Catalog; GEP-302 Switchboard Instruments Catalog; GEA-8619A Recorder Bulletin; GEA-9798 Transducer Bulletin; GEA-9729 Halogen Leak Detector Bulletin. The Ferret&T

Products manufactured: Controls/Control Eqpt., Current Sensors, Indicators, Meters, Probes, Recorders, Relays, Scales, Dial, Shunts, Meter, Thermometers, Resistance, Transducers

Refer to GE Electrn. Comps. Sls. Dept. for sales office information

GENERAL ELEC., Insulating Matl's., 1 Campbell Rd., Schenectady, N.Y., 12306, Tel: 518-374-2211, TWX: 518-556-2290; Empl.: 500

For info on price: R. J. Wachalec Ext. 55249; Application info: H. C. Lauroesch Ext. 55239; Customer service: A. R. Lacasse Ext. 54773; Delivery info: A. R. Lacasse Ext. 54773

Products manufactured: Adhesives (All Types), Compounds, Encapsulating, Insulating, Molding, Potting, Films, Paints, Tapes, Electrical Insulation

GENERAL ELEC. CO., Laminated & Insulating Matls. Bus. Dep., Coshocton, Ohio, 43812, Tel: 614-622-5310, TWX: 810-255-2921; Empl.: 1100; Minimum order: $50

For info on price: Sls. Off.; Application info: H. A. Schudel; Customer service: F. B. Simmons; Delivery info: F. B. Simmons

Free literature available: Industrial Laminates Brochure IL-401 Grades and Properties of Industrial Laminates.

Products manufactured: Laminates

Local Sales Offices & Reps.

Cal	Burlingame, Insulectro	415-692-2010
Cal	El Segundo, Insulectro	213-640-1470
Fla	Tampa, General Elec. Co.	813-251-1033
Ill	Elk Grove Village, Gen. Elec. Co.	312-439-9080
Ind	Indianapolis, General Elec. Co.	317-253-7592
Mass	Wellesley Hills, General Elec. Co.	617-235-9290
NY	Liverpool, General Elec. Co.	315-456-2144
NC	Greensboro, General Elec. Co.	919-288-0153
Ohio	Elyria, General Elec. Co.	216-322-3749
Pa	King of Prussia, General Elec. Co.	215-962-3685
Tex	Dallas, Bunker Inds.	214-630-1600

GENERAL ELEC. LAMP GLASS, See General Elec. Lamp Parts & Equip. Sales Oper.

GENERAL ELECTRIC CO., Battery Business Dept., Box 861, Gainesville, Fla., 32602, Tel: 904-377-6960

Products manufactured: Batteries, Chargers, Battery

Refer to Gen. Elec. Elctrn. Comps. Sls. Dept. for sales office information.

GENERAL ELECTRIC CO., Lamp Parts & Equip. Sls. Oper., 21800 Tungsten Rd., Cleveland, Ohio, 44117, Tel: 216-266-2451

Free literature available: Literature and technical data on lamps leads, bases, chemicals, tungsten, molybdenum, glass and fused quartz.

Products manufactured: Headers, Metal Compounds, Foils, Powders, Sheet, Stock, Metals, Quartz, Fused, Shields, Silica, Fused, Tubes, Tubing, Wire

Local Sales Offices & Reps.

Cal	Los Angeles	213-723-2541
Cal	San Jose	408-298-4126
Mass	Newton Upper Falls	617-332-6200
Mo	Lee's Summit	816-524-5300
NJ	West Orange	201-736-5305
Ohio	Cleveland	216-266-3788
Pa	Pittsburgh	412-531-5700

GENERAL ELECTRIC CO., Miniature Lamp Dept., Nela Park, Clevland, Ohio, 44112, Tel: 216-266-2121

p. 2•1144,1145

Products manufactured: Lamps, Lights

Local Sales Offices & Reps.

Alas	Achorange	907-333-7835
Cal	Los Angeles	213-723-2541
Cal	Oakland	415-569-3422
Cal	Portola Valley	415-854-4010
Colo	Denver	303-388-4611
Fla	Miami	305-693-3811
Ga	Atlanta	404-875-0921
Haw	Honolulu	808-537-3280
Ill	Chicago	312-332-4712
Ind	Indianapolis	317-547-5511
La	New Orleans	504-835-6421
Md	Baltimore	301-242-5700
Mass	Newton Upper Falls	617-332-6200
Mich	Detroit	313-883-0200
Minn	Minneapolis	612-331-4050
Mo	North Kansas City	816-471-0123
Mo	St. Louis	314-429-6930
NJ	Newark	201-622-8000
NY	New York	212-750-2000
NY	Rochester	716-461-5900
NY	Utica	315-733-0922
NC	Charlotte	704-376-6585
Ohio	Cincinnati	513-559-3607
Ohio	Cleveland	216-266-4337
Ohio	Columbus	614-294-4115
Okla	Oklahoma City	405-842-4028
Ore	Portland	503-221-5120
Pa	King of Prussia	215-688-5900
Pa	Pittsburgh	412-471-9050
Tenn	Memphis	901-948-2642
Tex	Dallas	214-358-5321
Tex	Houston	713-644-3264
Va	Richmond	703-355-3289
Wisc	Milwaukee	414-462-3860

GENERAL ELEC., Noryl Prods. Sect., Noryl Ave., Selkirk, N.Y., 12158, Tel: 518-439-9371

Free literature available: Noryl Engineering Plastics-describes property profiles and application areas of the three standard, four glass reinfored, one platable and three extrudable grades of Noryl thermoplastic resin. Processing, design and comparative data are described in depth.

Products manufactured: Plastic Raw Materials, Liquids, Pellets, Powders, Resins

Local Sales Offices & Reps.

Cal	Industry	213-965-4973
Cal	Oakland	415-535-2015
Ga	Atlanta	404-897-6245
Ill	Oakbrook	312-325-8090
Ind	Indianapolis	317-923-7221
Kans	Shawnee Mission	913-432-5851
Ky	Louisville	502-452-3701
Md	Baltimore	301-296-1010
Mass	Pittsfield	413-494-1110
Mass	Wellesley Hills	617-237-9125
Mich	Southfield	313-355-4460
Minn	Minneapolis	612-926-3111
Mo	St. Louis	314-429-7002
NJ	Cranford	201-276-8472
NY	East Rochester	716-381-8500
Ohio	Cleveland	216-523-6336
Ohio	Dayton	513-298-0311
Tex	Dallas	214-233-5683
FOR:	Can., Toronto 4 ,Ont.	416-534-6511

GENERAL ELEC., Plastics, 1 Plastic Ave., Pittsfield, Mass., 01201

Customer service: Sls. Off.

Free literature available: 1. General GE Plastics Brochure - CDP-74; 2. Lexan - CDC-570; 3. Noryl - CDX-80 -
4. Valov - VAL-5A; 5. Gen. Product Brochure 474; 6. Engineering Structual Foam - SFR-1

Products manufactured: Plastic Raw Materials, Liquids, Pellets, Powders, Resins

Local Sales Offices & Reps.

Cal	City of Industry	213-965-4973
Ga	Atlanta	404-897-6245
Ill	Oakbrook	312-325-8090
Ind	Indianapolis	317-923-7221
Kans	Shawnee Mission	913-432-5851
Ky	Louisville	502-454-5458
Md	Baltimore	301-944-7676
Mass	Pittsfield	413-494-1110
Mass	Wellesley Hills	617-237-9125
Mich	Southfield	313-355-4400
Minn	Minneapolis	612-835-3111
Mo	St. Louis	314-429-7002
NJ	Cranford	201-276-8472
NY	East Rochester	716-381-8500
Ohio	Cleveland	216-523-6336
Ohio	Dayton	513-298-0311
Tex	Dallas	214-233-5683

GENERAL ELEC., Semiconductor Prods., Electronics Pk., Box 1122, Syracuse, NY, 13201, Tel: 315-456-2798, TWX: 710-541-0498; Empl.: 400000

Free literature available: Short Form Catalog 451.119

Products manufactured: Cells, Photoconductive, Photoemissive, Photovoltaic, Diodes, Isolators, Rectifiers, Relays, Resistors, Thyristors (Includes Silicon Controlled Rectifiers), Transistor, Diode, Thyristor Heat Dissipators, Transistors

Refer to Gen. Elec. Elctrn. Comps Dept. for Sales office information

Local Distributors

Ala	Birmingham, Forbes Dist Co., 1416 Fourth Ave.	205-251-4107
Ala	Huntsville, Cramer Elctrns. Inc., 2310 Bob Wallace Ave.	205-539-5722
Ala	Huntsville, Hamilton Electro Corp., 805 Oster Dr. N.W.	205-533-1170
Ariz	Phoenix, Hamilton Electro Corp., 2615 So. 21st St.	602-275-7851
Ariz	Phoenix, Kierulff Elctrns. Inc., 2633 E. Buckeye Rd.	602-273-7331
Ark	Little Rock, Carlton-Bates Co., 6821 Scott Hamilton Dr.	501-562-9100
Cal	Culver City, Hamilton Electro Corp., 10912 W. Washington Blvd.	213-870-7171
Cal	El Monte, G. S. Marshall Co., 9674 Telstar Ave.	213-686-0141
Cal	Irvine, Cramer Elctrns. Inc., 17201 Daimler St.	213-771-8300
Cal	Los Angeles, Kierulff Elctrns. Inc., 2585 Commerce Way	213-685-5511
Cal	Mountain View, Elmar Elctrns., 2288 Charleston Rd.	415-961-3611
Cal	Mountain View, Hamilton/Avnet, 575 E. Middlefield Rd.	415-961-7000
Cal	Oakland, Brill Elctrns., 610 E. 10th St.	442-834-5888
Cal	Palo Alto, Kierulff Elctrns. Inc., 3969 E Bayshore Rd.	415-968-6292
Cal	Riverside, Electronic Supply, 2486 Third St	714-626-6796
Cal	San Diego, Hamilton Electro Corp., 8917 Complex Dr.	714-279-2421
Cal	San Diego, Kierulff Elctrns., Inc., 8797 Balboa	714-278-2112
Cal	Sunnyvale, Cramer Elctrns., 695 Veterans Blvd.	408-739-3011
Colo	Denver, Electronics Parts Co., 1212 So. Broadway	303-744-1992
Colo	Denver, Hamilton Electro Corp., 5921 N. Broadway	303-534-1212
Conn	Danbury, Schweber Elctrns., Finance Dr., Commerce Ind. Pk.	203-792-3500
Conn	Georgetown, Hamilton Elctro Corp., 643 Danbury Rd.	203-762-0361
Conn	No. Haven, Cramer Elctrns. Inc., 35 Dodge Ave.	203-239-5641
Conn	Waterbury, Bond Radio Supp, 639 WMain St.	203-757-0546
Fla	Hollywood, Cramer Elctrns. Inc., 4035 N. 29th Ave.	305-923-8181
Fla	Hollywood, Hamilton Electro Corp., 4020 N. 29th Ave.	305-925-5401
Fla	Hollywood, Schweber Elctrns., 2830 N. 28th Terrace	305-927-0511

Directory of Local Distributors Starts on page 401

Fla	Orlando, Cramer Elctrns. Inc., Box 20214	305-894-1511
Fla	Orlando, Hammond Elctrns. Inc., 911 W. Central Ave.	305-241-6601
Ga	Atlanta, Cramer Elctrns. Inc., 3923 Oakliff Ind. Ct.	404-448-9050
Ga	Atlanta, Lykes Elctrns., 1135 Chattahoochee Ave. NW	404-355-2223
Ga	Atlanta, Schweber Elctrns., 4126 Pleasantdale Rd.	404-449-9170
Ga	Norcross, Hamilton Electro, 6700-1-85 Suite 2B	404-448-0800
Ill	Chicago, Elctrn. Distrs. Co., 4900 N. Elston Ave.	312-283-4800
Ill	Chicago, Newark Elctrns Corp., 500 N. Pulaski Rd.	312-638-4411
Ill	Chicago, Semiconductor Specs Inc., Ohare Int. Airport Box 66125	
Ill	Elk Grove, Schweber Elctrns., 1380 Jarvis	412-593-2740
Ill	Mount Prospect, Cramer Elctrns., 1911 S. Busse Rd	312-593-8230
Ill	Schiller Park, Hamilton/Avnet Elctrn., 3901 No. 25th Ave.	312-678-6310
Ind	Castleton, Pioneer Standard, 82nd Street	317-849-7300
Ind	Evansville, Hutch & Son Inc., 300 N. Main	812-425-7201
Ind	Ft. Wayne, Ft. Wayne Elctrns. Supp, 3606 Maumee Ave.	219-423-3422
Ind	Indianapolis, Graham Elctrns. Supp, 133 S. Pennsylvania St.	317-634-8202
Ind	Indianapolis, Semiconductor Spec. Inc., 1885 Banner Ave.	317-243-8271
Iowa	Cedar Rapids, DEECO Inc., 2500 16th Avenue SW	319-365-7551
Kans	Lenexa, Hamilton Electro Corp., 37 Lenexa Ind. Center 9900 Pflumm Rd.	913-888-8900
Ky	Louisville, Burks P I Co., 842 S 7th St.	502-589-3960
La	New Orleans, Lykes Elctrns. Corp. Epcor Div., 3308 Orleans Ave.	504-486-7441
Md	Baltimore, Cramer/Baltimore Inc., 922-24 W Patasco Ave.	301-796-5790
Md	Gaithersburg, Cramer-Washington Inc., 16021 Ind Dr.	301-948-0110
Md	Hanover, Hamilton Electro Corp., 7255 Standard Dr.	301-796-5000
Md	Rockville, Pioneer-Washington Elctrns. Inc., 1037 Taft St.	301-424-3300
Md	Rockville, Schweber Elctrns., 6540 Fisher La.	301-881-2970
Mass	Burlington, Hamilton Electro Corp., 185 Cambridge St.	617-273-2120
Mass	Dedham, Gerber Elctrns., 852 Providence Hwy. Rte. 1	617-329-2400
Mass	Newton, Cramer Elctrns. Inc., 85 Wells Ave.	617-969-7700
Mass	Springfield, T.F. Cushing Inc., 1026 Bay St.	413-788-7341
Mass	Waltham, Schweber Elctrns., 213 3rd Ave.	617-890-8484
Mich	Detroit, RS Elctrns., 12775 Lyndon	313-491-1000
Mich	Detroit, Semiconductor Specs., 25127 W. Six Mile Rd.	313-255-0300
Mich	Grand Rapids, Newark Industrial, 2114 S. Division	616-331-6350
Mich	Livonia, Hamilton Elctrns., 12870 Farmington Rd.	313-522-4700
Mich	Troy, Schweber Elctrns., 86 Executive Dr.	313-583-9242
Minn	Edina, Cramer Elctrns. Inc. Cramer/Bonn Div., 7275 Bush Lake Rd.	612-835-7811
Minn	Mineapolis, Semiconductor Specs. Inc., 8030 Cedar Ave. S.	612-854-8841
Minn	St. Paul, Gopher Elctrns., 2520 W. Carpenteur Ave.	612-645-0889
Miss	Jackson, Ellington Elctrns. Sply Co., 1425 Terry Rd	601-355-0561
Mo	Hazelwood, Hamilton Electro Corp., 364 Brookes La.	314-731-1144
Mo	Joplin, Norman Elctrns. Supp., 402 Wall St.	417-624-0368
Mo	North Kansas City, L-Comp-Kansas City Inc., 1520 Tany St.	816-221-2400
Mo	University City, Olive Ind. Elctrns., 6662 Olive St. Rd.	314-873-7800
Neb	Lincoln, Scott Elctrns., 4040 Adams St.	402-464-8308
Neb	Omaha, Radio Equip. Co., 625 N. 18th St.	402-341-7700
NJ	Camden, General Radio Supp., 600 Penn St.	609-964-8560
NJ	Cedar Grove, Hamilton Electro Corp., 218 Little Falls Rd.	201-239-0800
NJ	Cherry Hill, Cramer Elctrns. Inc., 7300 Rte. 130 N.	609-424-5993
NJ	Moonachie, Cramer Elctrns. Inc., 1 Barrett Ave.	201-935-5600
NJ	Mt. Laurel, Hamilton Electro. Corp., E. Gate Ind. Pk.	609-234-2123
NJ	Somerset, Schweber Elctrns., 43 Belmont Dr.	201-469-6008
NM	Albuquerque, Cramer Elctrns. Inc., 137 Vermont NE	505-265-5767
NM	Albuquerque, Hamilton Electro Corp., 2450 Baylor Drive SE	505-765-1500
NM	Albuquerque, Kierulff Elctrns. Inc., 2524 Baylor Dr. SE	505-247-1055
NY	Cheetowaga, Standard Elctrns. Inc., 3523 Union Rd.	716-685-4220
NY	E. Syracuse, Cramer Elctrns. Inc., 6716 Joy Rd.	315-437-6671
NY	E. Syracuse, Hamilton Electro Corp., 6500 Joy Rd.	315-437-2642
NY	Endwell, Cramer Elctrns. Inc., 3220 Watson Blvd.	607-754-6661
NY	Farmingdale, Arrow Elctrns. Inc., 900 Broad Hollow Rd.	516-694-6800
NY	Hauppauge, Cramer Elctrns. Inc., 29 Oser Ave.	516-231-5600
NY	Rochester, Cramer Elctrns. Inc., 3000 S. Winton Rd.	716-275-0330
NY	Rochester, Hamilton Electro. Corp., 167 Clay Rd.	716-442-7820
NY	Rochester, Rochester Radio Supp., 140 W. Main St.	716-454-7800
NY	Rochester, Schweber Elctrns., 999 Buffalo Rd.	716-328-4180
NY	Rome, Rome Elctrns., 108 Spring St.	315-476-2033
NY	Westbury, Hamilton Electro. Corp., 70 State St.	516-333-5800
NY	Westbury, Schweber Elctrns., Jericho Tnpk.	516-334-7474
NC	Charlotte, Dixie Radio Supply, 2220 S. Tryon St.	704-377-5413
NC	Raleigh, Southeastern Radio Supp., 414 Hillsboro St.	919-828-2311
NC	Winston-Salem, Cramer Elctrns., 938 Burke St.	919-725-8711
Ohio	Akron, Sun Radio, 110 East Market St.	216-434-2171
Ohio	Beachwood, Schweber Elctrns., 23880 Commerce Pk. Rd.	216-464-2970
Ohio	Cincinatti, Hughes Peters Inc., 4865 Duck Creek Rd.	513-351-2000
Ohio	Cleveland, Pioneer Standard Elctrns. Inc., 4800 E. 131 St.	216-587-3600
Ohio	Columbus, Elctrns. Marketing Corp., 1150 W. 3rd Ave.	614-299-4161
Ohio	Columbus, Hughes Peters Inc., 481 E. 11th Ave.	614-294-5351
Ohio	Dayton, Pioneer Standard Elctrns. Inc., 1900 Troy St.	513-236-9900
Ohio	Toledo, Warren Radio Co., 1002 Adams St.	419-248-3364
Ohio	Warren, Rem Elctrns. Supp., 264 W. Market St.	216-399-2777
Okla	Tulsa, Oil Capitol Elctrns. Corp., 708 S. Sheridan	918-836-2541
Pa	Allentown, Resco of Lehigh Valley, 425 Hanover St.	215-435-6743
Pa	Philadelphia, Almo Elctrns. Corp., Roosevelt of Bluegrass	215-676-6000
Pa	Pittsburgh, RPC Elctrns., 620 Alpha Dr.	412-782-3770
Pa	Pittsburgh, Semiconductor Specs. Inc., 538 Alpha Dr.	412-781-8120
Pa	York, Rosen Elctrns., 215 S. George St.	717-843-3875
RI	Warwick, Edwards Co. WH, 55 Electronics Dr.	617-329-2400
SC	Columbia, Dixie Radio Supp., 1900 Barnwell St.	803-253-5333
SC	Greenville, Dixie Radio Supp., 500 Pendleton St.	803-253-5357
Tenn	Chattanooga, Harpe Elctrns., 1845 Central Ave.	615-267-2381
Tenn	Kingsport, Radio Electric Supp., 961 E. Sullivan St.	615-247-8111
Tenn	Knoxville, Ind. Elctrns. Inc., Box 9125	615-573-7135
Tenn	Memphis, Bluff City Dist., 234 East St.	901-725-9500
Tenn	Nashville, Electra Distr., 1914 W. End Ave.	615-329-3971
Tex	Dallas, Cramer Elctrns. Inc., 2970 Blystone	214-661-9300
Tex	Dallas, Hamilton/Avnet Elctrns., 4445 Sigma Rd.	214-661-8661
Tex	Dallas, Norvell Elctrns. Inc., 10210 Monroe	214-350-6771
Tex	Dallas, Sterling Elctrns. Inc., 2875 Merrell Rd.	214-357-9131
Tex	Houston, Hamilton Electro. Corp., 1216 West Clay	713-526-4661
Tex	Houston, Sterling Elctrns. Inc., 4201 SW Freeway	713-627-9800
Utah	Salt Lake City, Ballard Supp., 44 E. Sixth South St.	801-394-5544
Utah	Salt Lake City, Hamilton Electro Corp., 647 W. Billinis Rd.	801-262-8451
Utah	Salt Lake City, Newark Elctrns. Inc., 259 Crossroads Sq.	801-486-1048
Va	Charlottesville, Virginia Radio Supp., 715 Henry St.	804-828-2311
Va	Roanoke, Peoples Radio TV Supp., 1015 Moorman Rd.	703-342-8933
Wash	Bellevue, Hamilton Electro Corp., 13407 Northrop Way	206-746-8750
Wash	Seattle, Almac/Stroum Elctrns., 5811 6th Ave. S.	206-763-2300
Wash	Tacoma, C&G Elctrns., 2502 Jefferson Ave.	206-272-3185
WVa	Charleston, Charleston Electrical Div., 1400 Hamsford Street	304-348-5211
Wisc	Milwaukee, Electronics Expeditors, 6045 N. Greenbay Ave.	414-228-8100
Wisc	West Allis, Marsh Radio Inc., 6047 W. Beloit Rd.	414-545-6500

GENERAL ELEC. CO., Silicone Prods. Dept., Waterford, N.Y., 12188, Tel: 518-237-3330; Empl.: 1300; Minimum order: $200

For info on price: H. Laumeister; Application info: R. Mahar; Customer service: W. Schultz; Delivery info: W. Schultz

Free literature available: Technical Data Book S-35 describes the many uses of RTV silicone rubber adhesive/sealants. Contains a selector guide giving uses and properties; application procedures and curing agent selection sections also included.

Products manufactured: Adhesives (All Types), Coatings, Compounds, Encapsulating, Insulating, Molding, Potting, Coolants, Circuit & Components, Insulators & Insulation, Lubricants, Rubber, Seals

Local Sales Offices & Reps.

Cal	City of Industry	213-965-3301
Cal	Oakland	415-535-2014
Fla	Orlando	305-855-5904
Ga	Atlanta	404-897-6280
Ill	Oak Brook	312-654-4570
Ind	Indianapolis	317-923-7221
Kans	Shawnee Mission	816-842-9745
Md	Gaitherburg	301-948-7170
Mass	Framingham	617-879-2985
Mich	Southfield	313-355-4400
Minn	Minneapolis	612-926-00266
Mo	St. Louis	314-429-6941
NJ	Cranford	201-276-5110
NY	Schenectady	518-346-2059
NY	Waterford	518-237-3330
NC	Greensboro	919-288-7906
Ohio	Dayton	513-298-0311
Ohio	Parma Heights	216-842-6776
Pa	Media	215-LO6-3841
Pa	W. Mifflin	412-466-6700
SC	Greenville	803-288-4453
Tenn	Memphis	901-774-3481
Tex	Dallas	214-EM9-2357
Tex	Houston	713-688-2593
Wash	Seattle	206-575-2920
EXP:	Export Operations, Waterford, N.Y.	518-237-3330

GENERAL ELEC., Valley Forge Space Tech. Ctr., Box 8555, Phila., Pa., 19101, Tel: 215-962-5474, TWX: 510-660-2034; Empl.: 2100

For info on price: T. Hontz 215-962-1033; Application info: T. Hontz 215-962-1033; Customer service: M. D. Fasano 215-962-3987; Delivery info: M. D. Fasano 215-962-3987

Products manufactured: Circuits, Hybrid, Thick Film, Services, Assembly, Production & Test

GENERAL ELEC., Wire & Cable, 1285 Boston Ave., Bridgeport, Conn., 06602, Tel: 203-334-1012, Telex: 964209

Free literature available: WC-3311 & WC-3119 wires and cables.

Products manufactured: Cable, Wire

Local Sales Offices & Reps.

Cal	Los Angeles	213-572-5330
Cal	Oakland	415-638-0725
Conn	Meriden	203-235-3264
Fla	Jacksonville	904-396-3896
Ga	Atlanta	404-633-4522
Ill	Chicago	312-496-3232
Ind	Indianapolis	317-923-7221

Ky Louisville 502-452-3191
La New Orleans 504-486-7267
Md Baltimore 301-944-7676
Mass Boston 617-969-8200
Mich Detroit 313-355-4400
Mich Grand Rapids 616-451-2094
Minn Minneapolis 612-544-6699
Mo Kansas City 816-842-9745
Mo St. Louis 314-342-7794
NY Albany 518-458-7243
NY New York 212-683-6104
NY Syracuse 315-456-7568
NC Charlotte 704-372-8541
NC Greensboro 919-288-0153
Ohio Cincinnati 513-871-6300
Ohio Cleveland 216-267-6300
Ore Portland 503-221-5023
Pa Philadelphia 215-289-6310
Pa Pittsburgh 412-921-5150
Tenn Nashville 615-329-3535
Tex Dallas 214-350-4609
Tex Houston 713-675-6681
Utah Salt Lake City 801-364-1894
Wash Seattle 206-575-2940
Wisc Milwaukee 414-271-5000

GENERAL-ELECTRO MECHANICAL, 787 Hertel Ave., Buffalo, N.Y., 14207, Tel: 716-876-9685; Empl.: 121; Minimum order: $25 .... p. 1•956,957

Customer service: D. Stuhlmiller

Products manufactured: Brakes, Clutches

GENERAL ELECTRODYNAMICS CORP., 4430 Forest La., Garland, Tex., 75040, Tel: 214-276-1161, TWX: 910-860-5193; Empl.: 113

For info on price: T. Anderson Ext. 264; Application info: E. Olszewski Ext. 289; Customer service: J. Cox Ext. 272; Delivery info: T. Anderson Ext. 264

Free literature available: GEC will send out any of the enclosed brochures free when they are requested.

Products manufactured: Boards, Printed Circuit, Cable, CATV Systems & Equipment, Converters, Lenses, Optical & Camera, Monitors, Television Systems & Equipment Closed-Circuit, Tubes, X-Ray Inspection Equipment

GEN'L. ENVIRONMENTS CORP., Chicago Labs. Div., 7845 Nagle Ave., Morton Grove, Ill., 60053, Tel: 312-966-0770; Empl.: 12

Customer service: B. F. Loveless

Free literature available: Facility Books Upon Request

Products manufactured: Services, Assembly, Production & Test

Local Sales Offices & Reps.
Va Springfield, General Environments Corp. 703-354-2000

GENERAL ILLUMINATION, INC., 2958 North Cleveland Ave., Roseville, Minn., 55113, Tel: 612-633-1388; FSC No: 18788; Empl.: 20; Minimum order: $25

Customer service: D. Van Loh

Free literature available: Catalog, Product Information Sheets on new products.

Products manufactured: Diodes, Lamps, Lights, Pins, Sockets

Local Sales Offices & Reps.
Ariz Scottsdale, DeAngelo, Rothman & Cheever 602-948-2240
Cal Culver City, National Electro Sls. Co. 213-391-6294
Conn Woodbridge, Elctrn. Mktg. Co. 203-397-1461
Md Baltimore, Stitzer Assocs. 301-823-2600
NY Buffalo, Telesco Assocs. 716-834-1026
NY New York, F. Tylinski Co. 516-466-9070
NY Rochester, Telesco Assocs. 716-271-3780
NY Utica, Telesco Assocs. 315-733-3183
Ohio Cleveland, Goory Sls. Co. 216-331-2055
Ohio Dayton, Goory Sls. Co. 513-294-3747
Ore Portland, Earl & Brown Co., Inc. 503-292-9145
Pa Paoli, Stitzer Associates 215-644-5500
Wash Seattle, Earl & Brown Co. 206-284-1121

GENERAL INSTR. CORP., AUTOMATIC MFG. DIV., Box 517, Chicopee, Mass., 01021, Tel: 413-594-4781, TWX: 710-353-6854; Empl.: 84

For info on price: A. A. Adessa; Application info: V. Friberg; Customer service: C. A. MacMaster; Delivery info: H. Moffatt

Products manufactured: Coils Including Assemblies & Forms, Filters, Transformers

Local Sales Offices & Reps.
Ala Huntsville, 20th Century Mktg. Inc.
Cal Placentia, Starr Sls. Co.
Conn Newtown, Gerber Sls. Corp.
Fla Hollywood, Component Engrg. Sls. Co.
Ill Chicago, General Instr. Corp.
Ind Indianapolis, Morris, Cunningham & Assocs.
Mass Waltham, Gerber Sls. Corp.
Minn St. Paul, R. G. Ragon, Inc.
NY Buffalo, J. McDonough Assocs.
NY DeWitt, R. H. Hovey
NY Manlius, Quality Comps., Inc.
Ohio Cincinnati, G & H Sls. Co.
Pa Glenside, C. A. Beeson
Tex Dallas, Dunbar Assocs.

GENERAL INSTR. CORP., SEMICONDUCTOR PRODS GRP., Capacitor Prods., 600 W. John St., Hicksville, N.Y., 11802, Tel: 516-733-3000, TWX: 510-221-1866; Empl.: 1200; Minimum order: $50 p. 2•169

Customer service: M. Hollander

Products manufactured: Capacitors, Fixed

Local Sales Offices & Reps.
Ariz Scottsdale, Mercury Eng. Sls. 602-275-8579
Cal Los Angeles, Clemick Neenan 213-476-1272
Cal Palo Alto, Brooks Tech. Grp. 415-328-3232
Colo Denver, Zeus/Elcom 303-771-6200
Fla Hollywood, Component Engrng. 305-922-8917
Ga Atlanta, Cartwright & Bean 404-255-5262
Ind Indianapolis, Needler Sls. 317-255-8056
Md Towson, J. Bresson Assoc. 301-484-4457
Mich Detroit, A. Blumenberg 313-557-1934
Minn Minneapolis, NORTEC Sls. 612-835-7414
Miss Jackson, Cartwright & Bean 601-981-1368
NJ Leonia, Kohl-Camber 201-944-6488
NM Albuquerque, Zeus, Inc. 505-256-9831
NY Buffalo, R.W. Mitscher 716-633-7970
NY New York, Kohl-Camber 212-369-4222
NC Charlotte, Cartwright & Bean 704-333-6457
Ohio Cincinnati, Giesting Assocs. 513-931-0812
Pa Narberth, J. Bresson Assoc. 215-839-6770
Tenn Memphis, Cartwright & Bean 901-276-4442
Tex Dallas, J. B. Guenther 214-691-8500
Utah Salt Lake City, Zeus, Inc. 801-486-2317
Va Lynchburg, J. Bresson Assoc. 804-237-1304
Wash Redmond, Desco N.W. 203-455-9325

Local Distributors
Ala Huntsville, Hallmark Elctrns. Corp., 2010 Bob Wallace Ave. 205-837-8700
Ariz Phoenix, Kierulff Elctrns., 2633 E. Buckeye Rd. 602-968-6292
Ariz Phoenix, Mirco Elctrns., 2005 W. Peoria Ave. 602-944-2281
Ariz Phoenix, Sterling Elctrns., 1930 No. 22nd Ave. 602-258-4536
Cal Carson, Hi-Rel Distrs., 20507 S. Belshaw 213-537-6500
Cal Chatsworth, Westates Elctrns. Corp., 20151 Bahama St. 213-241-4411
Cal Glendale, R. V. Weatherford Co., 6921 San Fernando Rd. 213-849-3451
Cal Melo Park, Bell Inds., 1070 O'Brien Dr. 415-323-9431
Cal San Diego, Sterling Elctrns., 7405 Convoy Ct. 714-565-2441
Cal Sun Valley, Sterling Elctrns., 11614 Pendleton St. 213-767-5030
Cal Sunnyvale, Diplomat/Westland, 1118 Elko Dr. 408-734-1900
Cal Woodland Hills, Jaco Elctrns., 21201 Oxnard St. 213-887-6400
Colo Denver, Ind'l. Elctrns. 303-770-4400
Conn Fairfield, U-tronics, Inc., 273 Linwood Ave. 203-255-2451
Conn Hamden, Wilshire Elctrns., 2554 State St. 203-281-1166
Conn Norwalk, Harvey/Conn., 112 Main St. 203-853-1515
DC Washington, Pyttronics Inds., Inc. 301-953-3000
Fla Orlando, Hallmark Elctrns. Corp., 7233 Lake Elenor Dr. 305-855-4020
Ill Elk Grove, Diplomat/Lakeland, 2451 Brickvale Dr. 312-595-1000
Ill Palatine, Ohm/Elctrns., 649 Vermont 312-359-5500
Ill Skokie, Bell Ind's., 7701 N. Austin Ave. 312-282-5400
Iowa Cedar Rapids, Deeco, Inc., 2500 16th Ave. S.W. 319-365-7551
Kans Kansas City, Hallmark Elctrns. Corp., 9006 Rosehill Rd. 913-888-4747
Md Baltimore, A. S. I. Elctrns., 1728 Whitehead Rd. 301-265-5100
Md Baltimore, Hallmark Elctrns. Corp., 6660 Security Blvd. 301-265-8500
Md Gaithersburg, Kierulff Elctrns., 16021 Ind'l. Dr. 301-948-0250
Md Hyattsville, Milgray Elctrns., 5405 Lafayette Pl. 301-864-1111
Mass Lynn, Land Elctrns., 9R Franklin St. 617-592-2220
Mass Newton, Greene-Shaw Co., 70 Bridge St. 617-969-8900
Mass Waltham, QPL Elctrn. Dist., 75 N. Beacon St. 617-891-0460
Mass Watertown, Sterling Elctrns., 51 Spring St. 617-926-9720
Mich Farmington, Diplomat/Northland ... 313-477-3200
Mich Farmington, Harvey/Mich., 23461 Ind'l Park Dr. 313-477-1650
Minn Edina, Harvey/Minnesota, 6969 Washington Ave. So. 612-941-6060
Minn Minneapolis, Electro-Com Corp., 3816 Chandler Dr. 612-788-8601
Minn Minneapolis, Industrial Comps. 612-831-2666
NJ Bergenfield, Tech. Elctrn. Dist. 201-384-3643
NJ Cherry Hill, Milgray/Delaware, 1165 Marlkress Rd. 609-424-1300
NJ Clifton, Wilshire Elctrns., 312 Clifton Ave. 201-365-2600
NJ Iselin, Brothers Elctrns. 201-388-7676
NJ Parsippany, Tonar Elctrns., 1220 US Hwy 46 201-335-9400
NJ Perth Amboy, Sterling Elctrns., 774 Pfeiffer Blvd. 201-442-8000
NJ Rahway, Terminal Elctrns. Corp., 1463 Pinewood St. 201-381-5700
NJ Trenton, Allen & Hurley Co., 23 S. Warren St. 609-393-3300
NM Albuquerque, Industrial Elctrns., 310 Vale Verde S.E. 505-266-8721
NM Albuquerque, Sterling Elctrns. 505-247-2486
NY Binghamton, Harvey/Federal Elctrns., Box 1208 607-748-8211
NY Buffalo, Summit Elctrns., 916 Main St. 716-884-3450
NY Farmingdale, Arrow Elctrns., 900 Broadhollow Rd. 516-694-6800
NY Farmingdale, Bart Elctrns., 195 Central Ave. 516-293-3144
NY Farmingdale, Command Elctrns. Corp. 516-293-1212
NY Farmingdale, Hallmark Elctrns. Corp., 167 Marine St. 516-293-7500
NY Farmingdale, Pride Elctrns. 516-293-4020
NY Farmingdale, Wilshire Elctrns., 1855 New Hwy. Unit B 516-293-5775
NY Freeport, Mil Spec Wire & Cable Corp. 516-546-5454
NY Freeport, Milgray Elctrns., 191 Hanse Ave. 516-546-6000
NY Hauppauge, Jaco Elctrns., 195 Engineers Rd. 516-273-5500
NY Johnson City, Wilshire Elctrns., 617 Main St., Westover Plaza 607-791-1236
NY Mount Vernon, QAR Industrial Elctrn. Sls., 621 S. Columbus Ave. 914-694-2224
NY Ontario Center, Kehoe Comp Sls. ... 315-524-2491
NY Plainview, Fairmont Elctrn. Sls. Corp., 35 S. Service Rd. 516-694-8200
NY Rochester, Simcona Elctrns. Corp., 275 Mt. Road Blvd. 716-328-3230
NY Rochester, Summit Elctrns., 292 Commerce Dr. 716-334-8110
NY West Babylon, Delmar Elctrns., 101 Eads St. 516-420-1234
NY Woodbury, Diplomat Elctrns. 516-921-9373
NC Raleigh, Pyttronics Inds., 4509 Creedmoor Rd. 919-782-6370
Ohio Cleveland, Milgray Elctrns., 1821 E. 40th St. 216-481-8800
Pa Harrisburg, Pyttronics Inds., 2325 No. 7th St. 717-233-6591
Pa Huntingdon Valley, Hallmark Elctrn. Corp., 458 Pike Rd. 215-355-2335
Pa Huntingdon Valley, Shap Elctrns., 421 Pike Rd. 215-698-9550
Pa Montgomeryville, Pyttronics Inds., Stump Rd., Box 433 215-242-6700
Pa Philadelphia, Philadelphia Elctrns., 1225 Vine St. 215-568-7444
Pa Pittsburgh, Pyttronics Inds. 412-276-6722
Tex Dallas, Hallmark Elctrns. Corp., 9333 Forrest La. 214-231-5101
Tex Dallas, K.A. Elctrns. 214-634-7870
Tex Ft. Worth, Textronics Co. 817-731-8701
Tex Houston, Sterling Elctrns., 4201 S.W. Freeway 713-623-6600
Tex Richardson, Altair Co., 405 N. Plano Rd. 214-263-8783
Tex San Antonio, Sterling Elctrns. 512-735-9173
Utah Salt Lake City, Cramer Elctrns., 391 W. 2500 South 801-487-4131
Wash Bellevue, Bell Inds., 12410 S.E. 32nd 206-747-1515

Wash	Seattle, Sterling Elctrns., 5608 6th Ave. So.	206-762-9100
Wash	Seattle, Zepher Elctrns.	206-242-2517
For:	Can., Montreal, Electronic Wholesalers Co., Ltd.	514-769-8861
For:	Can., Ottowa, Wackid Radio	613-728-1821
For:	Can., Scarborough, Carsten Elctrns., Ltd., 52 Howden Rd.	416-951-2371
For:	Can., Toronto, Electrosonic Ind'l. Sls., Ltd., 543 Yonge St.	416-924-9301

GENERAL INSTRUMENT CORP., 600 W. John St., Hicksville, NY, 11802, Tel: 516-733-3333

GENERAL INSTR. CORP., Entertainment Elctrns. Prods. Grp., F.W. Sickles Div., 165 Front St., Chicopee, Mass., 01013, Tel: 413-594-4781, TWX: 710-353-1301; Empl.: 800

Products manufactured: Transformers, Yokes

GENERAL INSTR. CORP., Microelectronics Div., 600 W. John St., Hicksville, N.Y., 11802, Tel: 516-733-3107, TWX: 510-221-1866

GENERAL INSTRUMENT CORP., Hybrid Div., 600 W. John St., Hicksville, N.Y., 11802, Tel: 516-733-3000

Products manufactured: Amplifiers, Choppers, Circuits, Hybrid, Thick Film, Circuits, Hybrid, Thin-Film, Circuits, Integrated, Silicon Monolithic, Unpackaged Chips, Converters, Drivers, Switch, Drivers & Decoders For Readouts, Filters, Generators, Hybrid Voltage Regulators, Integrated Circuit Packaging Systems, Integrated Circuit Devices, IC's, Active Filters, Integrators, Electronic, Lamp Drivers, Memory Systems, Modulator/Demodulators, Multiplexers, Multipliers, Networks, Power Supplies, Regulators, Relays

Refer to General Instr. Corp. Semiconductor Comps. Div for sales office information

GENERAL INSTR. CORP., Microelectronics Div., 600 W. John St., Hicksville, N.Y., 11802, Tel: 516-733-3107, TWX: 510-221-1866

Products manufactured: Circuits, Hybrid, Thick Film, Integrated Circuit Devices

Refer to Geneneal Instr. Semiconductor Comps. Div. for sls. off. Information

GENERAL INSTRUMENTS CORP., Semiconductor Comps. Div., 600 W. John St., Hicksville, N.Y., 11802, Tel: 516-733-3333, TWX: 510-221-1866; Empl.: 2000 p. 1•1844

Customer service: A. Abeles

Free literature available: General Catalog (36 pages) lists lead-mounted rectifiers, bridges, multipliers and other high-voltage rectifiers. Also lists Mosfets. Bridge Reference Guide-cross index showing comparison between GI's and competitors' bridges.
Silicon Rectifier cross reference guide. Lists over 1000 JEDEC and competitors' lead-mounted rectifiers replaceable with reduced number of GI units.

Products manufactured: Amplifiers, Circuits, Hybrid, Thick Film, Circuits, Hybrid, Thin-Film, Circuits, Integrated, Silicon Monolithic, Unpackaged Chips, Comparators, Converters, Current Sources, Decoders, Decommutators, Telemetering, Detectors, Diodes, Drivers, Solenoid, Drivers & Decoders For Readouts, Equalizers, Filters, Hybrid Voltage Regulators, Integrated Circuit Packaging Systems, Integrated Circuit Devices, IC's, Active Filters, Integrators, Electronic, Inverters, Memory Systems, Mixers, Modulators, All Kinds, Modules, Logic, Encapsulated, Monitors, Multiplexers, Multipliers, Oscillators, Power Drivers, Hybrid (High Current, High Voltage), Power Supplies, Rectifiers, References, D-C Voltage, Regulators, Relays, Shifters, Switches, Synchro Transmitters, Solid-State, Timers, Transistors

Local Sales Offices & Reps.

Ala	Huntsville, 20th Century Mktg.	205-772-9237
Ariz	Scottsdale, Mercury Engrg. Sls., Inc.	602-275-8579
Cal	El Segundo, Varigon Assocs.	213-679-0621
Cal	Los Altos, P.M. Sls., Inc.	415-941-4444
Cal	San Diego, Varigon Assocs.	714-290-5413
Colo	Wheatridge, Waugaman Assoc.	303-423-1020
Conn	Stratford, G. Rosen	203-375-5456
Fla	Hollywood, Comp. Engrg. Sls. Co.	305-922-8917
Ill	Park Ridge, Metcom	312-696-1490
Ind	Greenwood, V.S. & Assocs.	317-888-2260
Ind	Southbend, V.S. & Assocs.	219-291-6258
Iowa	Cedar Rapids, J.R. Sls.	319-377-8211
Kans	Wichita, Dy-Tronix	316-943-6221
Md	Baltimore, Comp. Sls.	301-484-3647
Mass	Framingham, G. Rosen	617-879-5505
Mich	Kentwood, Burcaw Co. & Assoc.	616-531-1000
Minn	Hopkins, Grayden & Flemmer	612-941-1120
Mo	Hazelwood, Dy Tronix	314-731-5799
Mo	Kansas City, Dy Tronix	816-761-6543
NJ	Teaneck, R.T. Reid	201-692-0200
NY	Manlius, Quality Comps.	315-682-8885
NY	Snyder, Quality Comps.	716-839-4170
NC	Raleigh, Comp. Sls., Inc.	919-782-8433
Ohio	Cincinnati, G & H Sls. Co.	513-771-8231
Ohio	Grove City, G & H Sls. Co.	614-878-1128
Okla	Oklahoma City, Ammon & Rizos	405-373-2748
Ore	Portland, J.J. Backer Co.	503-297-3776
Pa	Narberth, J. Bresson Assocs.	215-839-6770
Tex	Dallas, Ammon & Rizos Co.	214-233-5591
Tex	Houston, Ammon & Rizos	713-781-6240
Wash	Seattle, J.J. Backer Co.	206-285-1300
FOR:	Can., Montreal, Que., General Instr. of Canada	514-636-9454
FOR:	Can., Toronto, Ont., General Instr. of Canada	416-763-4133

Local Distributors

Ala	Huntsville, Cramer Elctrns., 2005 Bob Wallace S.W.	205-539-5722
Ariz	Phoenix, Mirco Elctrn. Dist., 2104 W. Peoria Ave.	602-944-2281
Cal	Newport Beach, Semicomp Sls., 4100 Birch St.	714-833-3070
Cal	San Diego, Intermark Elctrns., 7354 Convoy St.	714-279-5200
Cal	Santa Ana, Intermark Elctrns., 2920 W. Warner	714-540-1322
Cal	Sunnyvale, Intermark Elctrns., 1020 Stewart Dr.	408-738-1111
Cal	Woodland Hills, Semiconductor Concepts, 21201 Oxnard St.	213-884-4560
Colo	Denver, Intermark Elctrns., 2600 W. Second Ave.	303-936-8284
Conn	Norwalk, Harvey Conn, 112 Main St.	203-853-1515
Fla	Hollywood, Cramer Elctrns., 4035 N. 29th Ave., Box WW	305-923-8181
Fla	Orlando, Cramer Elctrns., 345 Graham Ave., Box 20214	305-894-1511
Ill	Broadview, LCOMP-Chicago Inc., 2030 W. 16th St.	312-569-2340
Ill	Chicago, Newark Elctrns., 500 N. Pulaski Rd.	312-638-4411
Ill	Elmhurst, Semiconductor Specialists, 195 Spangler Ave., Elmhurst Industrial Pk.	312-279-1000
Ill	Rosemont, Advent Elctrns., Inc., 7110 N. Lyndon St.	312-298-4210
Ind	Indianapolis, Semiconductor Specialists, Box 41645, Weir Cook Airport	317-243-8271
Iowa	Cedar Rapids, Deeco, Inc., 2500 16th Ave., S.W.	319-365-7551
Kans	Lenexa, Hall-Mark Elctrns., 9006 Rosehill Rd.	913-888-4747
Md	Gaithersburgh, Cramer Elctrns., 16021 Industrial Rd.	301-948-0110
Md	Savage, Pyttronic Inds., 8220 Wellmoor Ct.	301-792-7000
Mass	Newton, Greene-Shaw Co., 70 Bridge St.	617-969-8900
Mich	Farmington, Semiconductor Specialists, 33505 State	313-255-0300
Mich	Grand Rapids, Stotts Friedman Co., 2035 Eastern Ave., S.E.	616-241-6731
Minn	Minneapolis, Bergquist Co., 4350 W. 78th St.	612-835-2322
Minn	Minneapolis, Hall-Mark Elctrns., 9201 Penn Ave. S.	612-884-9056
Minn	Minneapolis, Semiconductor Specialists, 8030 Cedar Ave., S.	612-854-8841
Minn	St. Louis Park, Park Elctrns., 2206 Edgewood Ave.	612-925-3118
Mo	North Kansas City, LCOMP-Kansas City, 1520 Taney St.	816-221-2400
Mo	St. Louis, LCOMP-St. Louis, 2605 S. Hanley Rd.	314-647-5505
Mo	St. Louis, Semiconductor Specialists, 10062 Natural Bridge	314-428-6100
Neb	Lincoln, Scott Elec. Supply, 4040 Adams St.	402-464-8308
NJ	Linden, Kevtron, 1306 E. Elizabeth Ave.	201-925-5000
NM	Albuquerque, Century Elctrns., 121 Elizabeth N.E.	505-292-2700
NY	Buffalo, Summit Distrs., 916 Main St.	716-884-3450
NY	Commack, Connecting Comps., 61 Mall Dr.	516-543-8300
NY	Elmsford, Zeus Comps., 175 Clear Brook Rd.	914-592-4120
NY	Farmingdale, Bart Elctrns., 195 Q. Central Ave.	516-293-3144
NY	Forest Hills, Nasco, 99-08 Metropolitan Ave.	212-793-6500
NY	Hauppauge, Semiconductor Concepts, 195 Engineers Rd.	516-273-1234
NY	Johnson City, Wilshire Elctrns., 617 Main St.	607-797-1236
NY	New Hyde Park, Lafayette, 1327 Second Ave.	516-488-6600
NC	Raleigh, Pyttronic Inds., 4509 Creedmoor Rd.	919-782-6370
NC	Winston-Salem, Cramer Elctrns., 938 Burke St.	919-725-8711
Ohio	Cincinnati, Newark Elctrns., 9799G Princeton Rd.	513-874-5115
Ohio	Dayton, Semiconductor Specialists, 4500 Wadsworth Rd.	513-278-9455
Ohio	Dayton, Stotts-Friedman Co., 108-112 N. Jefferson St.	513-224-1111
Ohio	Solon, Repco, 6835 Cochran Rd.	216-248-8900
Pa	Erie, Erie Corporate, 1938 Buffalo Rd.	814-455-8110
Pa	Harrisburg, Pyttronic Inds., 2525 N. 7th St.	717-233-6591
Pa	Huntingdon Valley, Hallmark, 458 Pike Rd.	215-355-7300
Pa	Montgomeryville, Pyttronic Inds., 2 Stump Rd.	215-643-2850
Pa	Philadelphia, Philadelphia Elctrns., 112 N. 12th St.	215-568-7400
Pa	Pittsburgh, Semiconductor Specialists, 538 Alpha Dr.	412-781-8120
Tex	Dallas, Component Specialties, 2560 Electronics La.	214-357-4576
Tex	Dallas, K.A. Elctrns. Sls., 1220 Majesty	214-634-7870
Tex	Dallas, Semiconductor Specialists, Suite 112, 9990 Monroe Dr.	214-358-5211
Tex	Houston, Component Specialties, Suite 202, 7313 Ashcroft	713-771-7237
Tex	Houston, Lenert Co., 1420 Hutchins St.	713-225-1465
Utah	Salt Lake City, Alta Elctrns., 2280 S. Main St.	801-486-7227
Utah	Salt Lake City, Intermark Elctrns., 63 E. Stratford Ave.	801-486-3411
Wash	Seattle, Intermark Elctrns., 621 S. Michigan	206-767-3160
Wisc	Mequon, Taylor Elec., 1000 W. Donges Bay Rd.	414-241-4321

GENERAL MAGNETIC CO., 10001 Erwin Ave., Detroit, Mich., 48234, Tel: 313-921-7558; Empl.: 130; Minimum order: $500

For info on price: R. H. Campbell; Application info: C. Hohmann; Customer service: R. Miller; Delivery info: R. H. Campbell

Free literature available: We have a catalog listing the various sizes we mfg.

Products manufactured: Magnets

Local Sales Offices & Reps.

Cal	Los Angeles, G.B. Leland	213-851-5821
Ill	Chicago, H.J. Corey & Assoc.	312-539-6310
Ill	Chicago, R.T. Thompson	312-359-0159
Mass	Beverly, Gysan Assoc.	617-774-2012
NY	Wellsville, Walpole Assoc.	716-593-1941
Ohio	Euclid, Rockford Controls	216-731-5250

GENERAL MAGNETICS, 135 Bloomfield Ave., Bloomfield, N.J., 07003, Tel: 201-743-2700; FSC No: 99165; Empl.: 60 p. 1•242-251

Free literature available: Data sheets on various products detailing capabilities, specifications, size, weight and in most cases a photograph

Products manufactured: Amplifiers, Coils Including Assemblies & Forms, Computers, Converters, Demodulators, Detectors, Dividers, Generators, Modulator/Demodulators, Modulators, All Kinds, Multipliers, Oscillators, Regulators, Switches, Transformers

Local Sales Offices & Reps.

Cal	Lynwood, Dick West & Assoc.	213-636-6124

GENERAL MFG. CO., 724 Ruberta Ave., Glendale, Calif., 91201, Tel: 213-243-2069; FSC No: 10454; Minimum order: $20

For info on price: E. Galle; Application info: E. Galle; Customer service: V. Galle

Free literature available: Catalog

Products manufactured: Eyelets, Spacers, Terminals

Local Sales Offices & Reps.

Ill	Chicago, G.F. Sls. Co.	312-545-5562

GENERAL MICROWAVE CORP., 155 Marine St., Farmingdale, NY, 11735, Tel: 516-MY4-3600, TWX: 510-224-6406; FSC No: 11332; Empl.: 120; Minimum order: $25 .... p. 1•718

Customer service: Sls. Dept.

Free literature available: Switch brochure; Attenuator brochure; power meter brochure; radiation hazard monitor brochure

Products manufactured: Amplifiers, Analyzers, Attenuators, Bolometers, Bridges, Calorimeters, Microwave, Cameras, CATV Systems & Equipment, Comparators, Converters, Detectors, Dividers, Electronic Switches (Oscilloscope), Generators, Insertion Loss Measurement Systems, Junctions, Hybrid, Microwave, Limiters, Meters, Modulator/Demodulators, Modulators, All Kinds, Monitors, Mounts, Probes, Shifters, Slotted Lines, Microwave, Switches, Testers, Thermistors, Tubes, Tuners

Local Sales Offices & Reps.

Ga	Woodstock, Saber Assocs.	404-432-9625
Ill	Mt. Prospect, Cain & Co.	312-253-3578
Kans	Andover, Palatine Sls., Inc.	316-683-7512
Kans	Overland Park, Palatine Sls., Inc.	913-262-5643
Md	Bethesda, S & S Assocs., Inc.	301-654-1434
Mass	Stoneham, REPCO	617-438-3113
Mo	St. Louis, Palatine Sls., Inc.	314-426-7055
NJ	West Orange, EF Technical Sls., Inc.	201-731-7203
NY	Huntington, EF Technical Sls., Inc.	516-368-5841
NY	Liverpool, R & D Assocs., Inc.	315-622-2350
NC	Raleigh, Saber Assocs.	919-834-3961
Ohio	Lancaster, Cain & Co.	614-654-4800
Pa	King of Prussia, S & S Assocs., Inc.	215-265-3450
Tex	Dallas, Cain & Co.	214-233-6809
FOR:	Can., Montreal H3P 1Y9 Quebec, Canadian Marconi Co.	514-343-3695
FOR:	Can., Ottawa K1P 5L6, Canadian Marconi Co.	613-235-5121

GENERAL MONITORS, INC., 3019 Enterprise St., Costa Mesa, Calif., 92626, Tel: 714-540-4895, Telex: 678-372; Empl.: 90

Products manufactured: Detectors

Local Sales Offices & Reps.

Ala	Huntsville, Instruments & Computer Tech., Inc.	205-837-6060
Alas	Anchorage, Alaska Controls, Inc.	907-272-3629
Ariz	Phoenix, R. A. Mayes Co.	602-279-5243
Cal	Costa Mesa, Technical Prods.	714-646-8585
Cal	Sacramento, E. Freitag	916-489-8831
Colo	Broomfield, R. A. Mayes Co.	303-466-6311
Ga	Atlanta, Measure-Trol Co.	404-255-7249
Ill	Chicago, Nomad Engrg.	312-764-0403
Iowa	Des Moines, Deco Engrg. Prods., Inc.	515-288-5721
La	Baton Rouge, C. Doyle Co.	504-921-5386
Mass	Randolph, Power Specialties	617-963-8910
Mich	Royal Oak, The Satullo Co.	313-549-3910
Minn	Minneapolis, E.R. Berg & Assoc.	612-890-1221
Mo	St. Louis, Fisk Process Equip.	314-426-1410
Neb	Omaha, Deco Engrg. Prods., Inc.	402-341-4836
NJ	East Orange, Industrial Flow Control, Inc.	201-672-5220
NM	Albuquerque, R. A. Mayes Co.	505-265-7989
NY	Elbridge, L-Tron Corp.	315-689-3787
NC	Charlotte, A. D. Penn Co.	704-847-4426
Ohio	Cincinnati, Surkamp & Rowe	513-891-1838
Ohio	Cleveland, Loesch Assocs., Inc.	216-241-4581
Okla	Tulsa, J. Schoeffler Co.	918-742-5331
Ore	Portland, Set-Point Control Inc.	503-233-5108
Pa	Philadelphia, Y. Wayne Miller, Inc.	215-247-9602
Tex	Houston, Groth Equip. Corp.	713-675-6151
Va	Richmond, Virginia Tech Assocs.	703-266-9654
Wash	Bellevue, Set-Point Control Inc.	206-454-0155
WVa	So. Charleston, Allied Controls Co.	304-768-7313

GENERAL RADIO CO., 300 Baker Ave., Concord, Mass., 01742, Tel: 617-369-8770, TWX: 710-347-1051; FSC No: 24655; Minimum order: $25 ......p. 2•1748-1750

Customer service: R. W. Ingram Ext. 134

Products manufactured: Accelerometers, Amplifiers, Analyzers, Attenuators, Bridges, Cable, Calibrators, Capacitors, Fixed, Capacitors, Variable, CATV Systems & Equipment, Comparators, Connector Adapters, Connectors, Controls/Control Eqpt., Cords, Counters, Couplers, Data Acquisition & Reduction Systems, Decade Boxes, Detectors, Dividers, Filters, Generators, Indicators, Insertion Loss Measurement Systems, Jacks (All Types), Lamps, Leads, Test & Adaptors, Lights, Line Strechers, Microwave, Meters, Microphone Accessories (Including Stands, Holders, Booms), Microphones, All Kinds, Mixers, Oscillators, Paper, Graphic Recording, Plug Adapters, Plug & Jack Sets, Plugs, Posts, Potentiometers, Printers, Probes, Recorders, Regulators, Resistors, RFI Measuring Equipment, Scanners, Signal Conditioners & Equipment, Slotted Lines, Microwave, Smith Chart Impedance Plotters, Automatic, Sockets, Standards, Synthesizers, Tachometers, Tees, Terminals, Test Equipment, Test Systems, Testers, Transducers, Transformers, Tubes

Local Sales Offices & Reps.

Cal	Irvine	714-540-9830
Cal	Palo Alto	415-948-8233
Ga	Atlanta	404-394-5380
Ill	Chicago	312-992-0800
Md	Gaithersburg	301-948-7071
Mass	Bolton	617-646-0550
NJ	Saddle Brook	212-964-2722
Ohio	Dayton	513-294-1500
Tex	Richardson	214-234-3357

GENERAL RAND CORP., 100 Menlo Park, Edison, N.J., 08817, Tel: 201-548-1591; Empl.: 12; Minimum order: $15

For info on price: C. Morton; Application info: F. Weber; Customer service: O. Yovanovits; Delivery info: O. Yovanovits

Products manufactured: Amplifiers, Bridges, Calibrators, Meters, Printers, Pumps, Vacuum, Recorders, Standards

GENERAL RELAY CORP., 20 Mercer St., Dover, N.J., 07801, Tel: 201-361-1400, TWX: 710-987-7929; Empl.: 90

Products manufactured: Relays, Solenoids

GENERAL RESISTANCE, INC., 75 Haven Ave., Mt. Vernon, N.Y., 10553, Tel: 914-699-8010, TWX: 710-562-0199; Empl.: 50; Minimum order: $50

For info on price: L. Batard; Application info: J. Jamieson; Customer service: L. Batard; Delivery info: L. Batard

Free literature available: Econistor brochure, Sequaristor brochure, Miniohm brochure, Instrument Catalogue Digest-440-3

Products manufactured: Attenuators, Bridges, Calibrators, Converters, Current Sources, Decade Boxes, Demodulators, Dividers, Filters, Networks, Power Supplies, References, D-C Voltage, Resistors, Standards, Testers

Local Sales Offices & Reps.

Ala	Huntsville, Kemp Instrs., Inc.	205-837-4304
Ariz	Phoenix, Zeus, Inc.	602-253-6104
Cal	El Monte, Telemart	
Cal	Los Altos, J. Stone & Assoc.	415-948-4563
Cal	South Pasadena, QPL, Inc.	213-682-3706
Colo	Denver, Zeus, Inc.	303-770-4400
Conn	Meriden, P.R. Sturgeon Co.	203-237-1112
Fla	Casselberry, EIR, Inc.	305-830-9600
Fla	Orlando, R.J. Cheney & Assoc.	305-894-7371
Ga	Atlanta, Grady Duckett Sls. Co.	404-451-3529
Ill	Chicago, Brock & Cushman	312-622-4110
Ill	Wheaton, Engrg. Prods. Assoc.	312-653-6826
La	Baton Rouge, SESCO Corp.	504-927-7574
Mass	Babson Park, P.R. Sturgeon Co.	617-237-3506
Mass	Framingham, J.M. Lancaster Co.	617-873-8893
Mich	Farmington, Anderson Elctrns.	313-476-9161
Mich	Farmington, R. Hummon Assoc.	313-474-0661
Minn	Minneapolis, Engrg. Prods. Assoc.	612-925-1883
NM	Albuquerque, Zeus, Inc.	505-268-3941
NY	Syracuse, Nycom, Inc.	315-437-8343
NC	Charlotte, G. Duckett Sls. Co.	404-451-3529
NC	Matthews, W.K. Hile & Assoc.	704-847-3125
Ohio	Dayton, Rixan Assocs.	513-278-4216
Pa	Delmont, T.F. Laslo & Assoc.	412-468-5045
Pa	Media, W. Reeves Assoc.	215-566-6709
Tex	Houston, SESCO Corp.	713-668-7840
Tex	Richardson, SESCO Corp.	214-231-9364
Utah	Salt Lake City, Zeus, Inc.	801-466-4924
Va	Falls Church, Beacon North, Inc.	703-534-1673
Wash	Seattle, Seatronics, Inc.	206-767-4330
EXP:	Mt. Vernon, N.Y., General Resistance, Inc.	914-699-8010

Local Distributors

Ill	Dayton, Rixan Assoc., 5062 Wadsworth	513-278-4216

GENERAL SCANNING, 80 Coolidge Hill Rd., Watertown, Mass., 02172, Tel: 617-924-1010; Empl.: 60

Customer service: R. L. Hubbell

Free literature available: OEM recorder modules for instrumentation optical scanning components & systems.

Products manufactured: Actuators, Controls/Control Eqpt., Light Choppers, Motors, Recorders, Scanners

GENERAL SEMICONDUCTOR INDUSTRIES, INC., 2001 W. 10 Pl., Box 3078, Tempe, Ariz., 85281, Tel: 602-968-3101, TWX: 910-950-1942; FSC No: 24444; QPL No: 19500; Empl.: 175; Minimum order: $100

For info on price: E. Stumbaugh Ext. 18; Application info: D.W. Hutchins Ext. 21; Delivery info: E. Stumbaugh Ext. 18

Free literature available: TransZorb - Silicone transient voltage suppressors; Transistors - NPN silicon power switch; Zeners - Regulator and reference diodes.

Products manufactured: Arresters, Electrical Surge, Lightning, Diodes, Filters, Limiters, Protectors, Regulators, Suppressors, Transistors

Local Sales Offices & Reps.

Ariz	Tempe, Argus Sls.	602-967-8709
Cal	San Carlos, Kottmeier Assocs.	415-592-8333
Cal	Woodland Hills, Electronic Comp. Mktg.	213-340-1745
Colo	Denver, Camel Electronics	303-757-6191
Conn	Milford, Sales Engrg. Co.	203-877-2001
Conn	New Fairfield, Sales Engrg. Co.	203-746-9516
Fla	Orlando, Buchanan & Abrams Assocs.	305-898-7444
Ill	Chicago, Balhorn & Welch, Inc.	312-889-5011
Iowa	Cedar Rapids, Snider Sls. Co.	319-362-4410
Kans	Shawnee Mission, Technical Sls. Assoc.	913-888-3330
Md	Baltimore, Stemler Assocs., Inc.	301-944-8262
Mass	Andover, Sales Engrg. Co.	617-470-0800
Mich	Southfield, Representatives Elctrn. Prods., Inc.	313-354-9066
Minn	Minneapolis, Professional Sls. Ind.	612-835-1777
Mo	Ferguson, Technical Sls. Assocs.	314-725-5361
NJ	Barrington, Stemler Assocs.	215-644-3477
NJ	Cherry Hill, Stemler Assocs.	609-966-4070
NM	Albuquerque, EMI	505-292-2700
NY	Endicott, Advanced Comps. Corp.	914-471-1623
NY	Hempstead, Kahgan Sls. Corp.	516-538-2300
NY	N. Syracuse, Advanced Comps. Corp.	315-853-6438
NY	Scottsville, Advanced Comps. Corp.	716-889-1429
Ohio	Columbus, McFadden Sls. Co.	614-221-3363
Tex	Houston, Oeler & Menelaides	713-772-0730
Tex	Richardson, Oeler & Menelaides	214-234-6334
Va	Alexandria, Stemler Assocs.	703-548-7818
Wash	Redmond, Desco-Northwest	206-455-9325

GENERAL TV NETWORK, 520 W. Eight Mile Rd., Ferndale, Mich., 48220, Tel: 313-548-2500; Empl.: 25

Products manufactured: Television Systems & Equipment Closed-Circuit

GENERAL TIME CORP., Industrial Controls Div., 135 S Main St., Thomaston, Conn., 06787, Tel: 203-283-5881; Empl.: 350

Products manufactured: Brakes, Clutches, Controls/Control Eqpt., Delays, Time (Excluding Delay Lines, Timers, Delay & Relays, Time-Delays), Indicators, Motors, Relays, Timers

Local Sales Offices & Reps.

Cal	Pasadena, C.A. Williams	213-793-1161
Cal	San Francisco, C. Myers	415-825-4770
Colo	Denver, R.L. Palmer Co.	303-771-6827
Conn	Thomaston, P. Allison	203-283-5881
Ga	Atlanta, Motion Technology	404-233-4368
Ill	Des Plaines, T. Sauer	312-296-7751
Kans	Shawnee Mission, E.L. Martin Co.	913-648-4746
Mass	Boston, T. Weafer	617-762-1466
Minn	Mpls, General Time	612-333-2815
Mo	St. Louis, Automation Components	314-872-7111
NY	New York City, General Time	201-289-5959
NY	Rochester, R. King	716-546-4766
NC	Charlotte, Motion Technology	704-525-9855
Ohio	Cincinnati, W. Tomlinson	513-421-3366
Ohio	Cleveland, A.F. Blaine	216-752-2083
Ore	Portland, C. Myers	415-825-4770

Pa	Philadelphia, General Time	215-696-3443
Tex	Dallas, Titan Reps.	214-661-5350
Wisc	Milwaukee, W. Ferguson	414-353-5422
FOR:	Can., Peterborough, Ont., Gen'l Time Can.	

GENERAL VALVE CORP., 110 Rte. 10 Box 222, E. Hanover, N.J., 07936, Tel: 201-887-9460, Telex: 136411

Customer service: G. E. Toohey

Products manufactured: Connectors, Controls/Control Eqpt., Valves, Solenoid, Valves, Vacuum

Local Sales Offiçes & Reps.

Cal	Los Angeles, Fluid Tech Sls. So.	714-530-8111
Cal	San Francisco, Valin Corp.	408-734-2590
Mo	St. Louis, Hitt Assocs.	314-HA 6-2322
NJ	East Hanover, General Valve Corp.	201-887-9460
NY	Rochester, Lloyd Hart Assocs.	716-244-3253
Ohio	Cincinnati, W. Watkins Assocs.	513-891-0313
Wisc	Elm Grove, Fluid Power Consultants	414-782-5508

GENISCO TECH. CORP., Special Products Div., 18435 Susana Rd., Compton, Cal., 90221, Tel: 213-537-4750, TWX: 910-346-6773; Empl.: 350; Minimum order: $100

Customer service: K. Williamson

Free literature available: Instrumentation magnetic tape-Model 10-286; Model 10-276 Instrumentation Recorder high environment airborne or-tape recorders preliminary product bulletin digital magnetic tape cartridge.

Products manufactured: Recorders

Local Sales Offices & Reps.

Ala	Huntsville, Kemp Instrs.	205-837-4304
Ariz	Phoenix, Thorson Co.	602-956-5300
Cal	Encino, Scientific Devices	213-872-1951
Cal	Los Alamitos, Scientific Devices	
Cal	Mountain View, Scientific Devices	415-964-4230
Cal	San Diego, Scientific Devices	714-279-6642
Colo	Denver, C.W. Fowler Co.	303-744-9595
DC	Wash, Mr. R. Kent White	301-839-5858
Ill	Chicago, Carter Elctrns.	312-585-5485
Ind	Indianapolis, Carter Elctrns.	317-293-0696
Kans	Overland Park, Carter Elctrns.	913-649-6996
Md	Baltimore, Scientific Devices	301-788-6611
Mass	Newton Centre, Daner-Hayes	617-969-4650
Mich	Detroit, Electro Sls. Assoc.	313-526-8800
Minn	Minneapolis, Carter Elctrns.	612-544-9393
Mo	Hazelwood, Carter Elctrns.	314-731-2237
NM	Albuquerque, Thorson Co.	505-265-5657
Ohio	Cleveland, Electro Sls. Assoc.	216-261-5440
Ohio	Dayton, Electro Sls. Assoc.	513-426-5551
Pa	Bethayres, Control Instrs. Sls. Co.	215-676-1808
Pa	Pittsburgh, Electro Sls. Assoc.	412-371-9449
Tex	Dallas, Thorson Co.	214-233-5744
Tex	Houston, Thorson Co.	713-771-3504
Va	Norfolk, Scientific Devices	804-499-8133
Va	Springfield, Scientific Devices	703-451-6500
Wash	Seattle, R.S. Drake Assoc.	206-763-2755
Wisc	Milwaukee, Carter Elctrns.	414-464-5555

GENISCO TECHNOLOGY CORP., Eldema Div., 18435 Susana Rd., Compton, Cal., 90221, Tel: 213-537-4750, TWX: 910-346-6773; Empl.: 350; Minimum order: $50

Customer service: R. L. Chase

Free literature available: Eldema Condensed General Catalog +GTC-E200C; Eldema C-Series Solder-Pin Lamps #C500; Eldema C-Lites, D-Holders #CD 100 C; Sockets/Mountings for Led Lamps #Q 200A.

Products manufactured: Caps, Lenses, Indicator Light, Diodes, Display Devices/Displays, Lamps, Sockets, Switches

Local Sales Offices & Reps.

Ariz	Tempe, W. Bert Knight Co.	602-946-1088
Ark	El Dorado, D. Bellew Sls. Inc.	501-863-8325
Cal	Los Altos, E. Foley, Inc.	415-941-4525
Cal	Newport Beach, W.B. Knight Co.	714-833-8250
Colo	Denver, W.J. Purdy Co.	303-777-1411
Conn	Meriden, P.R. Sturgeon Co.	203-237-1112
Wash	D.C., S.K. MacDonald	202-265-3938
Fla	Miami Beach, Geartner Assocs.	305-861-3661
Fla	Orlando, Geartner Assocs.	305-299-1000
Ill	Wilmette, Crest Assocs.	312-256-5202
Ind	Indianapolis, Mktg. Engrs. Inc.	317-546-1523
Iowa	Cedar Rapids, Palatine Sls. Inc.	319-365-8071
Kans	Andover, Palatine Sls. Inc.	316-683-7512
Kans	Overland Park, Palatine Sls. Inc.	913-262-5643
La	Kenner, D. Bellew Sls. Inc.	504-729-4550
Md	Baltimore, S.K. MacDonald Inc.	301-254-3380
Mass	Babson Park, P.R. Sturgeon Co.	617-237-3506
Minn	Minneapolis, F.B. Hill Co.	612-941-5270
Mo	St. Louis, Palatine Sls. Inc.	314-426-7055
NJ	Englewood Cliffs, Sprung-Nussbaum Inc.	201-947-6767
NM	Albuquerque, C.T. Carlberg & Assocs.	505-265-1579
NY	Buffalo, R.W. Mitscher Co.	716-633-7970
NY	E. Aurora, Harries & Kershaw	716-652-1221
NC	Raleigh, R.W. Mitscher Co.	919-828-0575
Ohio	Columbus, T. Mulligan & Assocs.	614-457-2242
Pa	Philadelphia, S.K. MacDonald Inc.	215-545-1205
Pa	Pittsburg, S.K. MacDonald Inc.	412-366-2643
Tenn	Memphis, D. Bellew Sls. Inc.	901-365-9437
Tenn	Shelbyville, R.W. Mitscher Co.	615-684-4544
Tex	Dallas, R.E. Nesbitt Co.	214-357-4601
Tex	Houston, R.E. Nesbitt Co.	713-224-3633
Va	Virginia Beach, R.W. Mitscher Co.	804-464-0500
Wash	Seattle, Underwood & Underwood Inc.	206-243-3133

Local Distributors

Ark	Little Rk., Carlton-Bates, Box 3155	501-375-5375
Cal	Burlingame, Rose Elctrns., 846 Stanton Rd.	415-697-0224
Cal	Hollywood, Yale Radio, 6662 Sunset Blvd.	213-465-3186
Cal	Inglewood, Cal. Switch & Signal, 1009 Arbor Vitae	213-776-3550
Cal	Los Angeles, Cal. Elect. Supply, 1911 Armacost	213-879-0760
Cal	Los Angeles, Radio Prod. Sls., 1501 So. Hill	213-748-1271
Cal	Mt. View, Ratel Elctrns., 815 Maude Ave.	415-965-2010
Cal	Oakland, Brill Elctrns., 610 E. 10th St.	415-834-5888
Cal	Palo Alto, Zack Elctrns., 654 High St.	415-326-5432
Cal	Riverside, MacRudie Group, 3627 Merrill Ave.	714-683-7711
Cal	San Diego, Radio Prod. Sls., 7889 Claremont Mesa	
Cal	San Francisco, Zack Elctrns., 1444 Market St.	415-626-1444
Colo	Denver, Electronic Parts, 1277 Broadway	303-266-3755
Colo	Lakewood, Acacia Sls., 1111 W. 8th Ave.	303-232-2832
Conn	Hartford, R & S Elctrns., 95 Leggett St.	203-528-6581
Fla	Miami, Elect. Equip., 2701 N.W. 42nd Ave.	305-635-0421
Fla	Pensacola, Grice Elctrns., Box 1911	904-434-4281
Ind	Indianapolis, Graham Elctrns., 133 S. Penn St.	317-635-5453
Iowa	Cedar Rap., Iowa Radio Supply, 710 Centerpoint Rd.	319-364-6154
Kans	Wichita, Radio Supply Co., 115 Laura St.	316-267-5214
La	Baton Rouge, Ralphs, 1732 Plank Rd	504-344-3761
La	Lafayette, Ralphs, Drawer R	318-234-4507
La	New Orleans, Radio Parts, 1112 Magazine St.	504-581-5959
La	Shreveport, Industrial Elctrns., Box 4067	615-573-7135
Md	Baltimore, ASI, 1728 Whitehead Ave.	301-265-5100
Md	Bethesda, Empire Elctrns., 4907 Rugby Ave.	301-656-3300
Md	Rockville, Pioneer/Wash., 1037 Taft St.	301-427-3300
Md	Savage, Pyttronics, 8220 Wellmore Rd	301-792-7000
Mass	Lynn, Land Elctrns., 9 Rear Franklin St.	617-592-2220
Mass	Newton, Greene Shaw, 70 Bridge St.	617-969-8900
Mass	W. Newton, A.W. Mayer, 38 Border St.	617-267-5530
Mich	Muskegon, Fitzpatrick Elect., 444 Irwin Ave.	616-722-6621
Mich	Wyoming, Newark Ind. Elect., 3645 Linden S.E.	616-241-6681
Minn	Minneapolis, Electronics Center, 107 3rd Ave.	612-338-5881
Mo	St. Louis, Olive Ind. Elect., 6662 Olive St.	314-863-7800
NJ	Camden, General Radio Supply, 600 Penn St.,	609-964-8560
NJ	Cinnaminson, Wilshire Elctrns., 8555 Indl. Hwy.	609-788-8990
NJ	Little Falls, Ind'l. Prods., Cardinal Dr.	201-785-1830
NY	Babylon, Delmar Elctrns., 101 Eads St.	516-420-1234
NY	Buffalo, Summit Distrs., 916 Main St.	716-884-3450
NY	Carle Place, Electronic Precepts, 288 Westbury Ave.	516-997-5380
NY	Mt. Vernon, QAR Elctrns., 621 S. Columbus	914-699-2224
NY	Plainview, ACI, 28 S. Mall St.	516-293-6630
NY	Rochester, Rochester Radio, 140 W. Main St.	716-454-7800
NY	Rochester, Summit Dist., 292 Commerce	716-334-8810
NY	Rome, Rome Elctrns., 108 Spring St.	315-337-5400
Ohio	Columbus, Hughes-Peters, 481 E. 11th Ave.	614-294-5351
Okla	Oklahoma City, Trice Whsle Elctrns., 4701 N. Stiles	405-524-4415
Pa	Allentown, A.A. Peters, 404 Union Blvd.	215-434-5237
Pa	Allentown, Valley Elctrns., 101 N. 7th St.	215-435-9696
Pa	Altoona, Allegheny, 1720 Union Ave.	814-946-0871
Pa	Erie, J.V. Duncomke, 721 Parade St.	
Pa	Harrisburg, Pyttronics, Box 1967	717-233-6591
Pa	McKeesport, Barno Radio, 5403 W. Smithfield St.	412-751-5966
RI	Warwick, W.H. Edwards, 55 Electronic	401-781-8000
SC	Colombia, Dixie Radio, Box 408	
Tex	Dallas, Whsle. Elect. Supply, Ross at Central	214-824-3001
Tex	El Paso, Midland Specialty, 2235 Wyoming Ave.	915-533-9555
Tex	Houston, Kent Elctrns., 5626 Bonhomme	713-783-9805
Tex	Houston, Solid State Elect., 6400 Westpark	713-785-5436
Utah	Salt Lake, Kimball Elctrns., 360 Pierpont Ave.	801-328-2075
Va	Arlington, Arlington Elctrns., 3636 Lee Hwy	703-524-2412
Va	Charlottesville, Virginia Radio, 715 Henry St.	804-296-4186
Wash	Seattle, Interface, 300 2nd Ave.	206-285-3500
Wash	Seattle, Sterling Elect., 5608 6th St.	206-762-9100

GENISCO TECHNOLOGY CORP., Filter Div., 18435 Susana Rd., Compton, Cal., 90221, Tel: 213-537-4750, TWX: 910-346-6773; Empl.: 350; Minimum order: $100

For info on price: D. Pizzo; Application info: C. Kelley; Customer service: C. Kelley; Delivery info: C. Kelley

Free literature available: EMI/RFI Mini Filters; Shielden Enclosure and Ground Support Equipment Radio Interference Filters; R.F.I. Filters R.F. Filtered Power Line Assemblies

Products manufactured: Amplifiers, Capacitors, Fixed, Coils Including Assemblies & Forms, Filters, Transformers

Local Sales Offices & Reps.

Cal	Los Altos, Ewing-Foley, Inc.	415-941-4525
Cal	San Diego, F. Nagel Co.	714-298-4850
Md	Severna Park, D. Hughes	301-647-6327
Minn	St. Paul, Countryman Assocs.	612-645-9151

GENISCO TECH. CORP., Genistron Div., 18435 Susana Rd., Compton, Cal., 90221, Tel: 213-537-4750, TWX: 910-346-6773; Empl.: 350; Minimum order: $400

Customer service: D. Pizzo

Free literature available: EMI/RFI Mini-Filters #F102; Shielded Enclosure and , - etc. #103C; RFI Filters #F101C; Current Probes #F150; Genistron RFI/EMI Analysis , - etc.

Products manufactured: Bobbins, Winding, Coil & Transformer, Coils Including Assemblies & Forms, Current Sensors, Filters, Networks, Probes, Reactors, Relays, Services, Assembly, Production & Test, Suppressors, Switches

Local Sales Offices & Reps.

Cal	Los Altos, Ewing-Foley	415-941-4525
Cal	San Diego, F. Nagel	714-298-4850
Colo	Denver, I. Strong	303-292-6900
Md	Severna Pk., D. Hughes	301-647-6327
Minn	St. Paul, Countryman	612-645-9151

GENISCO TECH. CORP., Tape Div., 18435 Susana Rd., Compton, Cal., 90221, Tel: 213-537-4750, TWX: 910-347-6773; Empl.: 450; Minimum order: $100

For info on price: K. Williamson; Application info: L. Turner; Customer service: L. Turner; Delivery info: L. Turner

Free literature available: Model 10-286 Brochure and specifications Model 10-276 Brochure and specifications Model ECR-10 Brochure and specifications Models 10-110 and 10-236 Brochure and specifications Model AU/ASH-27 Brochure

Products manufactured: Recorders, Tape Recording Accessories

Local Sales Offices & Reps.

Ala	Huntsville, Kemp Instrs.	205-837-4304
Ariz	Phoenix, Thorson Co.	602-956-5300
Cal	Encino, Scientific Devices	213-872-1951
Cal	Los Alamitos, Scientific Devices	213-598-7678
Cal	Mt. View, Scientific Devices	415-964-4230
Cal	San Diego, Scientific Devices	714-279-6642
Colo	Denver, C. Fowler	303-744-9595
Conn	Newtown, Daner-Hayes	203-426-9094
Fla	Orlando, Scientific Devices	305-424-7932
Ill	Chicago, Carter Elctrns.	312-585-5485
Ind	Indianapolis, Carter Elctrns.	317-293-0696
Kans	Overland Park, Carter Elctrns.	913-649-6996
Md	Baltimore, Scientific Devices	301-788-6611
Mass	Newton Centre, Daner-Hayes	617-969-4650
Mich	Detroit, Electro-Sls. Assoc.	313-526-8800
Minn	Minneapolis, Carter Elctrns.	612-544-9393
Mo	Hazelwood, Carter Elctrns.	314-731-2237
NM	Albuquerque, Thorson Co.	505-265-5657
NY	Rochester, Daner-Hayes	716-467-5100
Ohio	Cleveland, Electro-Sls. Assoc.	216-261-5440
Ohio	Dayton, Electro Sls. Assoc.	513-426-5551
Pa	Bethayres, Control Instr. Sls. Co.	215-676-1808
Pa	Pittsburgh, Electro Sls. Assoc.	412-371-9449
Tex	Dallas, Thorson Co.	214-233-5744
Tex	Houston, Thorson Co.	713-771-3504
Va	Norfolk, Scientific Devices	804-499-8133
Va	Springfield, Scientific Devices	703-451-6500
Wash	Seattle, R. S. Drake Assoc.	206-763-2755
Wisc	Milwaukee, Carter Elctrns.	414-464-5555

GENISCO TECH. CORP., Rotating Test Div., 18435 Susana Rd., Compton, Cal., 90221, Tel: 213-537-4750, TWX: 910-346-6773; Empl.: 350; Minimum order: $100

Customer service: F. Schodlbauer

Free literature available: Series 1100 Rate of Turn Table No. 1-RT; Genisco Centrifuge Model 1068; Genisco Rate Tables; Centrifuge Composite Catalog.

Products manufactured: Calibrators, Simulators

Local Sales Offices & Reps.

Ala	Huntsville, Scientific Devices	205-536-1969
Ariz	Phoenix, Thorson Co.	602-956-5300
Cal	Carson, Abco Co.	213-537-5152
Colo	Denver, C.W. Fowler Co.	303-744-9595
Conn	Newtown, Daner-Hayes	203-426-9044
Fla	Fort Lauderdale, Scientific Devices	305-721-4260
Fla	Orlando, Scientific Devices	305-424-7932
Ind	Indianapolis, M & L Assocs.	317-545-0643
Iowa	Cedar Rapids, Palatine Engrg.	319-365-8071
Kans	Andover, Palatine Engrg.	316-683-7512
Kans	Overland Park, Palatine Engrg.	913-262-5643
Mass	Newton Center, Daner-Hayes	617-969-4650
Mich	Plymouth, Meas. Instr., Inc.	313-352-2144
Minn	Eden Prairie, F. Peterson Co.	612-941-5400
Mo	St. Louis, Palatine Engrg.	314-426-7055
NM	Albuquerque, Thorson Co.	505-265-5655
NC	Burlington, Scientific Devices	919-228-6279
Ohio	Cincinnati, Meas. Instr., Inc.	513-531-2729
Ohio	Cleveland, Meas. Instr., Inc.	216-333-6611
Okla	Tulsa, Palatine Engrg.	918-622-0321
Ore	Portland, McLaren, Inc.	503-297-2248
Pa	Bethayres, Control Instr. Sls.	215-676-1808
Pa	Monroeville, Meas. Instr., Inc.	412-366-1906
Tex	Houston, Palatine Engrg.	713-777-4477
Tex	Richardson, Palatine Engrg.	214-231-9489
Wash	Bellevue, McLaren, Inc.	206-454-3400

GENISCO TECH. CORP., TRANSDUCERS, 18435 Susana Rd., Compton, Cal., 90221, Tel: 213-537-4750, TWX: 910-346-6773; Empl.: 350; Minimum order: $100

Customer service: R. DeSomer

Free literature available: Acceleration Switches and Accelerometers Selector Guide #200; Genisco/Data Sensors Pressure Transducers and Readouts Selector Guide #400.

Products manufactured: Accelerometers, Amplifiers, Transducers

Local Sales Offices & Reps.

Ala	Huntsville, Incotech	205-837-6061
Cal	Long Beach, Saber Entprs.	213-595-5646
Colo	Denver, C.W. Fowler	303-744-9595
Conn	Marion, Sands Co.	203-628-4363
Fla	Ft. Lauderdale, Scientific Devices	305-721-4260
Fla	Orlando, Scientific Devices	305-424-7932
Ill	Skokie, Mauer Co.	312-677-4771
Ind	Indianapolis, M & L Assocs.	317-545-0643
Iowa	Cedar Rapids, Palatine Engrg.	319-365-8071
Kans	Andover, Palatine Engrg.	316-683-7512
Kans	Overland Park, Palatine Engrg.	913-262-5643
Md	Baltimore, Scientific Devices	301-788-6611
Mich	Royal Oak, Meas. Instr.	313-352-2144
Minn	Hopkins, F. Peterson	612-941-5400
Mo	St. Louis, Palatine Engrg.	314-426-7055
NC	Burlington, Scientific Devices	919-228-6279
Ohio	Cincinnati, Meas. Instr., Inc.	513-531-2729
Ohio	Cleveland, Meas. Instr., Inc.	216-333-6611
Okla	Tulsa, Palatine Engrg.	918-622-0321
Pa	Bethayres, Control Instr. Sls.	215-676-1808
Pa	Monroeville, Meas. Instr., Inc.	412-366-1906
Tex	Houston, Palatine Engrg.	713-777-4477
Tex	Richardson, Palatine Engrg.	214-231-9489
Va	Norfolk, Scientific Devices	804-499-8133
Va	Springfield, Scientific Devices	703-451-6500
Wash	Seattle, R.S. Drake	206-763-2755

GENTRON CORP., 6667 N. Sydney Pl., Milwaukee, Wisc., 53209, Tel: 414-351-1660; Empl.: 10; Minimum order: $100

Customer service: Factory

Free literature available: Micro Power Circuits, SCR Bridge Rectifiers & Assemblies, Motor Controls, Hybrid Circuits, Resistor Networks, Oscillators, Relays Solid State & Thermal.

Products manufactured: Bridges, Circuits, Hybrid, Thick Film, Circuits, Hybrid, Thin-Film, Controls/Control Eqpt., Flashers, Motors, Networks, Oscillators, Relays, Resistors, Suppressors, Switches, Thyristors (Includes Silicon Controlled Rectifiers)

GEORGE INSTRUMENT CO., GIC Thermodynamics Div., 4949 Delemere, Royal Oak, Mich., 48073, Tel: 313-576-4700, Telex: 23-5714; Empl.: 10; Minimum order: $25

For info on price: F. Leslie; Application info: F. Leslie; Customer service: J. Smith; Delivery info: J. Smith

Free literature available: GIC Thermodynamics Master Catalog (42 pages) showing all material required for sensing, reading, & controlling temperature (#GIC-574-5/M) GIC Thermodynamics Short
Form Catalog (12 pages) showing most commonly used thermocouples and accessories. (#GIC-774-50/M)

Products manufactured: Connectors, Plug & Jack Sets, Probes, Thermocouples, Elements & Accessories, Wire

Local Sales Offices & Reps.

Ala	Huntsville, 20th Century Mktg.	205-772-9237
Conn	Durham, Marr Elec. Co.	203-349-9691
Ill	Northfield, Ensign Co.	312-446-7147
La	Baton Rouge, Ross & Pethtel	504-293-0520
Mich	Royal Oak, D. Ray & Assocs.	313-576-4705
Minn	Minneapolis, Control Assemblies	612-544-3364
NJ	Clifton, Long, Poveromo & Assocs.	201-785-2492
NJ	W. Patterson, Long, Poveromo & Assocs.	201-785-2492
NY	Brooklyn, Long, Poveromo & Assocs.	212-449-5281
NY	Buffalo, Trott Elctrns.	716-876-0880
Ohio	Cleveland, Scott Elctrns.	216-291-2600
Pa	Media, W. Reeves Assocs.	215-566-6709
Tex	Houston, Gaumer Co.	713-686-3483
Wisc	Milwaukee, C.D. Controls Div. of Gordon Hatch	414-671-6550

GEORATOR CORPORATION, Box 70, Manassas, Va., 22110, Tel: 703-368-2101; Minimum order: $25

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For info on price: C. E. Trefzger; Application info: J. Rahaw; Customer service: S. Vick; Delivery info: S. Vick

Free literature available: Data Sheets, Summary Data Sheet, Converters, 60 to 60 Hz Line Isolator Motor Generators, Permanent Magnet Alternators, Complete Box Catalog: Describes Full line of, 50, 60, 120, 180, 360, 420, 840 Hz Outputs.

Products manufactured: Alternators, Converters, Generators, Isolators, Motor & Generator Armatures, Rotors, Stators, Motor Electric Generator Sets, Power Supplies, Regulators, Stabilizers, Line Impedance, Tachometers

GEORATOR CORPORATION cont'd

Advertisment

Georator Corporation

Manufacturer of NOBRUSH Permanent Magnet Generators, frequency Converters, Alternators, Isolator-Stabilizer Motor Generators, and seperate rotors and stators. In frequencies of 25, 50, 60, 120, 180, 360, 400, 420, 800 and 840 Hz. In ratings from O.5 KVA to 25 KVA.

GEOTECH, See Teledyne Geotech.

GERBER SCIENTIFIC INSTR. CO., Box 305, Hartford, Conn., 06601, Tel: 203-644-1551, TWX: 710-427-2218; Empl.: 350

Products manufactured: Digitizers, Pencil Follower (Inc. Coordinate & Graphic), Drafting Machines, Recorders, Simulators

Local Sales Offices & Reps.

Cal	Encino
Fla	Jacksonville
Ill	Skokie
Mich	Lathrup Village
NJ	Paramus
Tex	Arlington
Va	Arlington

GERMANIUM POWER DEVICES, Box 65, Shawsheen Village Sta., Andover, Mass., 01810, Tel: 617-475-5982, Telex: 94-7150; Empl.: 42; Minimum order: $100

For info on price: L. LeBow; Application info: D. Frost; Customer service: L. LeBow; Delivery info: L. LeBow

Free literature available: Short form catalogue Listing complex Germanium power devices

Products manufactured: Transistors

Local Sales Offices & Reps.

Ariz	Scottsdale, Piper-Goyne, Inc.	602-946-4437
Cal	Canoga Park, TKO Elctrns.	213-883-3822
Cal	Mt. View, Nor-Cal Assocs.	415-961-8121
Cal	San Diego, Col-Rob Elctrns.	714-565-6814
Colo	Littleton, Piper-Goyne, Inc.	303-798-8955
Colo	Wheatridge, Waugaman Assocs.	303-423-1020
Fla	North Miami, Winfield Elctrn. Sls. Co.	305-945-6544
Ga	Atlanta, Winfield Southeast Co.	404-636-3023
Ill	Addison, H. Grubb & Co.	312-543-8525
Iowa	Cedar Rapids, F. Snyder	
Kans	Shawnee Mission, Florence & Meyer	913-722-5210
Kans	Wichita, Florence & Meyer	316-838-7226
Minn	Hopkins, Grayden & Flemmer, Inc.	612-941-1120
Mo	St. Charles, Florence & Meyer	314-724-6690
NJ	Cherry Hill, Danco Elctrn. Sls. Corp.	710-896-2218
NM	Albuquerque, Piper-Goyne, Inc.	505-265-6794
NY	Larchmont, Hindston Walsh Assoc.	914-834-5781
NY	Syracuse, Nycom, Inc.	315-437-8343
Ohio	Cleveland, KW Elctrns.	216-831-8292
Ohio	Dayton, KW Elctrns.	513-890-2150
Okla	Broken Arrow, P. J. Scanlon Co.	918-251-5728
Ore	Portland, C. K. Shanks & Assoc.	503-292-5656
Pa	Allsion Park, KW Elctrns.	412-487-4300
Tex	Houston, P. J. Scanlon Co.	
Tex	Richardson, P. J. Scanlon Co.	214-231-4661
Wash	Seattle, C. K. Shanks & Assoc.	206-632-4290
Wisc	Milwaukee, H. Grubb & Co.	414-545-7810
FOR:	Can., Scarborough, Ont., International Rectifier Canada, Ltd.	416-755-7793

GHZ DEVICES, INC., 16 Maple Road, So. Chelmsford, Mass., 01824, Tel: 617-256-8101, TWX: 710-343-0404; Empl.: 66; Minimum order: $25

For info on price: R. Tremblay; Application info: C. Newton; Customer service: C. Elliason; Delivery info: C. Elliason

Free literature available: GHZ devices offers 2 short form catalogs; to cover complete microwave diode product line and the GHZ line of microwave control devices.

Products manufactured: Attenuators, Diodes, Limiters, Modulators, All Kinds, Shifters, Switches

Local Sales Offices & Reps.

Ala	Huntsville, F.M. Assocs., Ltd.	205-536-9990
Ariz	Scottsdale, Piper Goyne	602-946-4437
Cal	Los Angeles, Thorson Co.	213-937-0790

Cal	Palo Alto, Waldman Assocs.	415-961-4100
Cal	San Diego, Thorson Co.	714-298-8385
Cal	Tustin, Thorson Co.	714-544-5121
Colo	Denver, Thorson Co.	303-355-3521
Fla	Orlando, Currie, Peak & Frazier Inc.	305-855-0843
Fla	Orlando, F.M. Assocs., Ltd.	305-851-5716
Ill	Chicago, Techrep, Inc.	312-761-0548
Ind	Ft. Wayne, TX Sls. Inc.	219-485-0805
Ind	Indianapolis, TX Sls. Inc.	317-253-1966
Kans	Shawnee, F. Guernsey Co.	913-631-2414
Md	Ellicott City, Applied Engrg. Consits.	301-465-1272
Mass	Needham Hts., O'Sullivan & Murphy at Reptron	617-449-4141
NY	Tuckahoe, Spectrum Sls. Inc.	914-793-1660
NC	Greensboro, F.M. Assocs. Ltd.	919-294-2754
Ohio	Dayton, K.W. Elctrn. Sls., Inc.	513-890-2150
Ohio	Shaker Heights, TX Sls., Inc.	216-561-1900
Tex	Dallas, Thorson Co.	214-233-5744
Tex	Houston, Thorson Co.	713-771-3504
Wash	Seattle, Thorson Co.	206-632-0710
FOR:	Can. Villa LaSalle 650, Que., Electrodesign, Ltd.	514-363-5120
FOR:	Can., Toronto, Ont., Electrodesign, Ltd.	416-787-0991
FOR:	Can., Vanier, Ont., Electrodesign, Ltd.	613-745-0541

GIBSON/EGAN CO., 21 Flower St., Arcadia, Calif., 91006, Tel: 213-446-5259; Empl.: 40; Minimum order: $15

For info on price: D. Clark; Application info: K. Kanberra; Customer service: G. Egan; Delivery info: G. Egan

Free literature available: Timing Belt Pulleys - stock list of thermoplastic pulleys; IC Carriers - wide assortment of IC carriers for flatpack, to's, and dip devices; Dip Stirips - description of various sizes of dual in line sockets; P.C. Card Guides - instant pc card rack for holding p.c. cards.

Products manufactured: Cups, Encapsulation, Gears & Gear Mechanisms (Precision), Guides, Circuit Board, Holder & Carriers, Holders, Circuit Board (Production Type), Pullers, Racks, Retainers, Sockets

Local Sales Offices & Reps.

Cal	San Jose, Smolen Assocs.	408-252-7358
Pa	Devon, B & A Assocs.	215-688-5173
Tex	Dallas, Scott Tech. Sls. Co.	214-352-7698

GILWAY SALES COMPANY, 29B Cummings Pk., Woburn, Mass., 01801, Tel: 617-935-4442; Empl.: 3; Minimum order: $25

For info on price: B. Murphy; Application info: G. Wade; Customer service: D. Volner; Delivery info: G. Wade

Free literature available: Catalog #152 list our complete line of T-3/4, T-1, and T-4 precision wound filament lamps. Filaments are straight, rugged, and centered. Lamps offer lens end and special bases.

Products manufactured: Lamps

GLASTIC CORP., 4321 Glenridge Rd., Cleveland, Ohio, 44121, Tel: 216-486-0100, TWX: 810-421-8827; Empl.: 375; Minimum order: $50

Customer service: Cust. Svc. Dept.

Free literature available: Laminate Catalog; Insulator and Channel Catalog; Pultruded Rod Catalog.

Products manufactured: Compounds, Encapsulating, Insulating, Molding, Potting, Laminates

GLATZER INDUSTRY CORP., 286 Huguenot St., New Rochelle, NY, 10801, Tel: 914-576-2700

GLENAIR, INC., 1211 Air Way, Glendale, Cal., 91201, Tel: 213-247-6000, TWX: 910-497-2066; FSC No: 06324; Empl.: 325

Customer service: R. Platz

Products manufactured: Braid, Cable, Cable Assemblies & Harnesses, Cable, Caps, Connector, Connector Adapters, Connectors, Testers, Tools

Local Sales Offices & Reps.

Ala	Huntsville, Brandel-Stephens Co.	205-883-0445
Ariz	Scottsdale, Runyon Co.	602-959-6060
Cal	Downey, Buffa Co.	213-923-4618
Cal	Glendale, Electro-Mech Prods.	213-848-0922
Cal	San Diego, Earle Assocs.	714-278-5441
Cal	Santa Clara, Nova-Tronix Elec. Sls.	408-243-9530
Colo	Englewood, Todd Assocs.	303-761-7801
Conn	Branford, W. McCoy Co.	203-488-2012
Fla	Orlando, Brandel-Stephens Co.	305-425-3202
Ga	Atlanta, Brandel-Stephens Co.	404-261-7579
Haw	Honolulu, Aloha Assocs.	808-941-1574
Ill	Chicago, Marsten Sls. Co.	312-775-6611
Ind	Greenwood, Valentine-Schillinger Assoc.	317-888-2260
Ind	South Bend, Valentine-Schillinger Assoc.	219-291-6258
Md	Silver Spring, Carwithen Assocs.	301-589-9112
Mich	Plymouth, Romarc	313-455-0300
Minn	Minneapolis, Nygaard Sls.	612-881-3727
Mo	Kansas City, Harris-Hanson Co.	816-444-9494
Mo	St. Louis, Harris-Hanson Co.	314-432-3611
NJ	Haddonfield, T. Mills Co.	609-429-1005
NJ	Wayne, GT Assocs.	201-694-6040
NM	Scottsdale, Goodreau Assocs.	602-994-9909
NY	Buffalo, Telesco Assocs.	716-834-1026
NY	Levittown, GT Assoc.	516-731-3449
NY	Liverpool, Telesco Assocs.	716-872-6417
NY	Rochester, Telesco Assocs.	716-271-3780
Ohio	Cleveland, D. Steffen & Assocs.	216-461-8333
Ohio	Dayton, A.D. Dircksen & Assoc.	513-256-0351
Ohio	Dayton, D. Steffen & Assocs.	513-293-3145
Tex	Houston, AID Elctrns.	713-777-3882
Tex	Irving, AID Electronics, Inc.	214-259-4761
Wash	Redmond, Barrett Sls. Northwest Ltd.	206-885-6991

GLENMARC MFG. INC., 330 Melvin Dr., Northbrook, Ill., 60062, Tel: 312-272-9030; Empl.: 10

Customer service: D. Greenwood

Free literature available: Portionator brochure - epoxy metering & dispensing equip.

Products manufactured: Solder (All Types)

GLENTEK, INC., 1557 7th St., Santa Monica, Calif., 90401, Tel: 213-451-4511; FSC No: 26415; Empl.: 15

Customer service: R. C. Vasak

Products manufactured: Actuators, Amplifiers, Controls/Control Eqpt., Converters, Demodulators, Modulators, All Kinds, Multipliers, Power Supplies

GLIDDON METALS, Glidden-Durkee Div. SCM Corp., 900 Union Commerce Bldg., Cleveland, Ohio, 44115, Tel: 216-771-5121; Minimum order: $30

For info on price: J. F. Jasper 216-771-5121; Application info: H. D. Ambs 814-535-2571; Customer service: H. D. Ambs 814-535-2571; Delivery info: J. F. Jasper 216-771-5121

Products manufactured: Alloys, Metal Compounds, Foils, Powders, Sheet, Stock, Metal Oxides, Metals

GLOBE PLASTICS, 1342 S. Signal Dr., Pomona, Cal., 91766, Tel: 714-NA3-2747; Empl.: 15; Minimum order: $10

Products manufactured: Clamps & Clips, Cups, Encapsulation, Fasteners, Handles For Cabinets, Circuit Boards, Racks, etc., Kits, Marking (Dial, Instrument, Equipment, etc.), Pads, Transistor Mounting, Services, Assembly, Production & Test

Local Sales Offices & Reps.

Ill	Chicago, H. Halinton Engrg. Assocs., Inc.	312-763-2131
NY	Brooklyn, Verter Sls.	212-HI 4-3880

Advertisment

Injection & Transfer Molding - Custom Molding
Complete Mold-Making Facilities
Quality Control/Mil Q9858
Mfg. Code No. 21071
Specialize in transistor pads, washers, header boards, frames, funnels, clips. Send for complete brochure. Let us quote on your plastic part requirements.

GLOBE UNION, INC., Globe Battery Div., 5757 N. Green Bay Ave., Milwaukee, Wisc., 53201, Tel: 414-228-1200, TWX: 910-262-3084; Empl.: 9957

For info on price: T. Ruhlmann 414-228-2396; Application info: D. Scarvaci 414-228-2394; Customer service: T. Ruhlmann 414-228-2396; Delivery info: T. Ruhlmann 414-228-2396

Products manufactured: Batteries, Chargers, Battery

Local Distributors

Ariz	Phoenix, Micro-Components, Box 15268 Arcadia Sta.	602-955-3193
Cal	Los Angeles, Mil-Com Dist., 1609 Pontius Ave.	213-477-2068
Cal	Los Angeles, Radio Prod Sls Inc., 1501 S. Hill St.	213-748-1271
Cal	Mountain View, Abacus Elctrns., 1065 Terra Bella Ave.	415-961-1500
Cal	Mountain View, Energy Sls., 2271 Nora Dr.	415-969-0800
Fla	Miami, Pro Can Inc., 2013 N.E. 160th St.	305-945-4253
Ill	Skokie, Bell Ind., 7701 N. Austin Ave.	312-965-7500
Ind	Indianapolis, Ra-Dis-Co., 814 N. Senate Ave.	317-637-5571
Iowa	Mason City, Alexander Dist., Box 381	
Mass	Burlington, Arrow Elctrn., 15"A" St.	617-273-0100
Minn	Bloomington, Arrow Elctrns. Inc., 9700 Newton Ave. S.	612-888-5522
Mo	Kansas City, Burnstein-Applebee Co., 3199 Mercier	816-531-5614
Mo	St. Louis, Olive Ind. Elctrns., 6662 Olive Blvd.	314-863-7800
NJ	Hanover, State Elctrns. Parts Corp., 36 Route 10	201-887-2550
NY	Plainview, Fairmont Elec. Sls. Corp., 35 S. Service Rd.	516-694-8200
NY	Syracuse, Stewart N. Smith, 325 E. Water St.	315-422-0323
Pa	Hatboro, Henwarr Inc., 218 Tanner Ave.	215-675-4104
Tex	Dallas, Mauratron Inc., 13333 Central Expwy	
Tex	Dallas, Solid State Elec. Co. of Tex., 2643 Manana Dr.	214-352-2601
Tex	Houston, Lenert Co., 420 Hutchins Dr.	713-225-1465
Tex	San Antonio, Sherman Elec. Supp., 702 San Pedro Ave.	512-226-0247
Va	Arlington, Perrott Engrg. Labs, 1020 N. Fillmore	703-528-5861
Wash	Seattle, James J. Backer Co., 221 W. Galer St.	206-285-1300

GLOWLITE CORP., Sub. ELT, Inc., Pauls Valley, Okla., 73075, Tel: 405-238-5541, TWX: 910-830-6590; Empl.: 300; Minimum order: $35

For info on price: J. Phillips; Application info: J. Phillips; Customer service: J. Abney; Delivery info: J. Abney

Free literature available: ELT, Inc. Glow Lite Div. Catalog informative description of neon lamp characteristics and terms, as well as a convenient, compact list of glow-lite products.

Products manufactured: Lamps, Lights

Local Sales Offices & Reps.

Ill	Chicago, ELT, Inc.	312-441-6650

GLUCO, INC., Box 336, Monroeville, Pa., 15146, Tel: 412-327-7575; FSC No: 83508; Empl.: 20

Customer service: Wm. Gluck

Free literature available: Molding presses for encapsulation of electronic components. Automatic assembly machines.

Products manufactured: Machines/Machinery, Production

GOE ENGRG. CO., Box 3485, City of Industry, Calif., 91746, Tel: 213-330-7401; FSC No: 00866; Empl.: 40; Minimum order: $15

Customer service: G. H. Reynolds

Products manufactured: Handles For Cabinets, Circuit Boards, Racks, etc., Terminals

Local Sales Offices & Reps.

Cal	Palo Alto, W. W. Tompkins & Co.	415-DA6-7940
Colo	Denver, T. Crump Co.	303-426-1443
Ill	Chicago, Ellinger Sls. Corp.	312-763-1570
NJ	S. Orange, S. Simberkoff Assocs.	201-763-7900
Tex	Arlington, D/FW Sls. Co.	817-461-0681

GEO SPACE, See Trak Systems

GOODRICH CHEM. CO., B.F., 6100 Oak Tree Blvd., Cleveland, Ohio, 44131, Tel: 216-524-0200

Customer service: D. G. Kuharik

Products manufactured: Compounds, Encapsulating, Insulating, Molding, Potting, Plastic Raw Materials, Liquids, Pellets, Powders, Resins

Local Sales Offices & Reps.

Cal	Los Angeles	213-386-7436
Ga	Atlanta	404-355-2555
Ill	Oak Brook	312-654-4700
Mass	Wellesley Hills	617-235-8700

Mich	Southfield	313-357-3939
Mo	Kansas City	816-353-6440
NJ	Englewood Cliffs	201-461-5100
Pa	Fort Washington	215-643-6805
FOR:	Can., Kitchener, Ont.	519-742-3641

GOODRICH DIV., Conrac Corp., 3560 Chicago Dr., Hudsonville, Mich., 49426, Tel: 616-669-1000

Products manufactured: Machines/Machinery, Production

GOODYEAR AEROSPACE CORP., 1210 Massillon Road, Akron, Ohio, 44315, Tel: 216-794-3631, TWX: 810-431-2080; Empl.: 4000

Products manufactured: Computers

Local Sales Offices & Reps.

Cal	Los Angeles, Goodyear Tire & Rubber Co.	213-776-5577
DC	Washington, Goodyear Tire & Rubber Co.	202-331-9500
Fla	Ft. Walton Beach, Goodyear Tire & Rubber Co.	904-242-4231
Fla	Orlando, Goodyear Tire & Rubber Co.	305-894-2751
Mo	St. Louis, Goodyear Tire & Rubber Co.	314-731-1986
NY	Rome, Goodyear Tire & Rubber Co.	315-336-7020
Ohio	Dayton, Goodyear Aerospace Corp.	513-224-8301

GORDON, CLAUD S. CO., Sub. Pneumo Corp., 5710 Kenosha St., Richmond, Ill., 60071, Tel: 815-678-2211, Telex: 72-2427; Empl.: 200

Products manufactured: Cable, Connectors, Controls/Control Eqpt., Crayons, Coatings, Pellets, etc., Temperature Indicating, Furnaces, Labels, Temperature Indicating, Monitors, Probes, Pyrometers, Thermocouples, Elements & Accessories, Thermometers, Resistance, Wire

Local Sales Offices & Reps.

Cal	San Carlos, C. S. Gordon Co.	415-591-7070
Cal	Torrance, C. S. Gordon Co.	213-775-8688
Colo	Denver, J.M.C. Instr.	303-744-7035
Conn	Manchester, C. S. Gordon Co.	203-633-6887
Fla	Boca Raton, L. E. Rogers Co.	305-395-7922
Fla	Ruskin, L. E. Rogers Co.	813-645-1453
Ga	Atlanta, R. Freeman Assocs.	404-261-9065
Ind	Indianapolis, C. S. Gordon Co.	317-547-1057
Kans	Wichita, B. J. Alberts Co.	316-263-4941
La	Baton Rouge, Hahn Sls. Co.	504-356-2596
Mich	Milford, C.S. Gordon Co.	313-872-1837
NJ	Scotch Plaines, Buck Sls.	201-322-8747
NM	Farmington, J. Neff Co.	505-325-6449
NY	Buffalo, G. E. Bowker	716-876-8387
NC	Charlotte, A. D. Penn Co.	704-847-4426
Ohio	Cleveland, C. S. Gordon Co.	216-321-7777
Pa	Norristown, C. S. Gordon Co.	215-546-7255
Pa	West Mifflin, C. S. Gordon Co.	412-371-2600
Tex	Houston, C. S. Gordon Co.	713-224-2964
Utah	Salt Lake City, Wiscomb-Weidner Co.	801-328-3205
Va	Richmond, D.W. Larcen & Co., Inc.	804-288-4061
Wash	Seattle, Eustis Co., Inc.	206-623-7060
Wisc	Milwaukee, C. S. Gordon Co.	414-645-2380
EXP:	Westbury, N.Y., C. S. Gordon Export Dept.	516-334-3303

GORDON ENGINEERING CORP., Del Mar Dr., Brookfield, Conn., 06804, Tel: 203-775-1895; Empl.: 12

Customer service: L. Najman 203-775-0990

Products manufactured: Controls/Control Eqpt., Indicators, Switches

Local Sales Offices & Reps.

Ala	Huntsville, B J R Reps.	205-881-3569
Cal	San Francisco, Steven Engrg.	415-626-7979
Cal	Whittier, Marcott Ind.	213-723-0866
Colo	Denver, H. Kaub & Co.	303-399-1520
Conn	Ridgefield, Technical Mgr. Co.	203-438-2740
Ind	Wabash, Richard Scales Assocs.	219-563-4886
Mich	Troy, Morco Corp.	313-585-3910
Mo	St. Louis, Best Equip. Co.	314-991-3434
NY	White Plains, Swedelco, Inc.	914-946-1122
NC	Charlotte, Power Components	704-537-8099
Ohio	Cincinnati, H. C. Jahn	513-521-0172
Ohio	Twinsburg, J. Hubbard & Assoc.	
Pa	Hershey, Niets Assocs.	717-533-3679
Wash	Airway Hgts., Calvert Controls Inc.	
Wisc	Milwaukee, Star Engrg. Sls.	414-543-3469
FOR:	Can., North Vancouver, B.C., Southwell Controls, Ltd.	604-930-3688
FOR:	Can., Windsor, Ont., Canadian Border City	

GORDOS CORP., 250 Glenwood Ave., Bloomfield, N.J., 07003, Tel: 201-743-6800, Telex: 13-8209; Empl.: 600 p. 1•1700-1706,2053-2057

Products manufactured: Relays, Switches

Local Sales Offices & Reps.

Cal	Palo Alto, Engrg. Assocs.	415-326-7842
Colo	Wheatridge, Waugaman Assocs.	303-423-1020
Conn	Cheshire, R.F. Duffy Assocs.	203-272-7789
Fla	Maitland, Barrett Assocs.	305-678-0172
Ga	Atlanta, Millar Elctrns., Inc.	
Mass	Braintree, R.F. Duffy Assocs.	617-335-7724
Mass	Detroit, L.H. Dickelman Co.	313-255-3300
Minn	St. Paul, Kenco Co.	
NJ	Cherry Hill, Gordon Co.	609-667-6644
NJ	Mountainside, Henry G. Richter Inc.	
NM	Albuquerque, Waugaman Assocs., Inc.	
NY	Fayettville, Henry G. Richter Inc.	
NC	Raleigh, Millar Elctrns., Inc.	
Ohio	Cleveland, A.H. Baier Co. & Assoc.	216-461-6161
Ohio	Dayton, A.H. Baier Co. & Assoc.	513-276-4128
Tex	Richardson, Zonk Engrg.	214-238-7651
Wash	Seattle, H. Levinson Co.	206-323-5100

GORDOS/GRISBY-BARTON, 3800 Industrial Dr., Rolling Meadows, Ill., 60008, Tel: 312-392-5900, TWX: 910-687-3789; Empl.: 150 p. 1•1700-1706

For info on price: Sls. Dept.; Application info: Tech. Sls. Dept.; Customer service: Cust. Sus. Dept.; Delivery info: Cust. Svs. Dept.

Free literature available: Technical data sheets for dip reed relays, molded reed relays, Hybrid relays, solid state relays.

Products manufactured: Controls/Control Eqpt., Relays

Local Sales Offices & Reps.

Cal	Pasadena, Luscombe Eng.	213-684-2000
Cal	San Mateo, Luscombe Eng.	415-342-7057
Colo	Denver, Goyne Assoc.	303-722-4674
Fla	Ft. Lauderdale, Orbe, Inc.	305-771-8915
Fla	St. Petersburg, Orbe, Inc.	813-894-0687
Mass	Andover, R. Purinton, Inc.	617-475-7055
Minn	St. Paul, Kenco Co.	612-645-7717
NJ	Mountainside, H.G. Richter Co.	201-233-4615
NM	Albuquerque, Goyne Assoc., Inc.	505-265-6794
NY	Fayetteville, H.G. Richter Co.	315-637-6713
NY	Mountainside, H.G. Richter Co.	212-962-5820
Ohio	Chagrin Falls, Pine Sls. & Eng. Co.	216-247-6198
Ore	Beaverton, N.R. Schultz Co.	503-643-1644
Tex	Garland, Whiteside Sls.	214-231-9771
Wash	Bellevue, N.R. Schultz Co.	206-454-0300

Local Distributors

Cal	Inglewood, Newark Elctrns., 4747 W. Century	213-678-0441
Cal	Inglewood, Time Elec-West, 900 W. Olive St.	213-649-6900
Colo	Denver, Newark Electronics, 2170 S. Grape St.	303-757-3351
Conn	Westport, Newark Elctrns., 25 Sylvan Rd.	203-226-6921
DC	Washington, Newark Elctrns., 10440 Baltimore Rd.	301-937-5085
Fla	Ft. Lauderdale, Newark Elctrns., 1360 N.W. 65th St.	305-587-2372
Ill	Chicago, Newark Elctrns., 500 N. Pulaski Rd.	313-638-4411
Iowa	Cedar Rapids, Newark Elctrns., 1019 First Ave. SW	319-362-1171
Mass	Boston, Time Elctrns.-N.E., Woburn	617-935-8080
Mich	Detroit, Newark Elctrns., 20700 Hubbell	313-548-0250
Minn	Minneapolis, Control Design, 3433 E. 25th St.	612-721-1628
NJ	Kenilworth, Newark Elctrns., 303 Monroe Ave.	201-272-8410
NJ	Pennsauken, Resco, Apt. Hwy & Cen. Hwy	609 662-4000
NY	Plainview, Newark Elctrns., 80 Express St.	516-822-5000
NY	Rochester, Newark Elctrns., 3000 S. Winston Rd.	716-743-6600
NC	Greensboro, Hammond Elctrns., 2923 Pacific Ave.	919-275-6391
Ohio	Cleveland, Spec. Comp. Sls. Co., 23366 Commercial Pk. Rd.	216-464-0405
Pa	Philadelphia, Resco	215-925-6900
Tex	Dallas, Newark Elctrns., Box 38299	214-271-2511
Utah	Salt Lake, Newark Electronics, 2540 S. 300 W.	801-486-1048
Wisc	Milwaukee, Newark Elctrns., 3695 N. 126 St.	414-781-2450

GORMAN-REDLICH MFG. CO., 6 Curtis St., Athens, Ohio, 45701, Tel: 614-593-3150; Empl.: 4; Minimum order: $50

Customer service: J. T. Gorman

Products manufactured: Oscillators

Advertisment

Manufacturers of broad band crystal oscillators modules (± 5 PPM) over the temp. range -10°C to +60°C. Products cover 9 MHZ to 100 MHZ with bandwidths of 15% to 50%. Applications: Frequency source for counters, communication, navigation transmitters and receivers. Input 10V to 30V at 10MA to 50MA, output up to 10 VRMS. Freq. set to within 1 PPM with trimmer capacitor.

GOTHAM AUDIO CORP., 741 Washington St., New York, N.Y., 10014, Tel: 212-741-7411; Empl.: 14

For info on price: E. Passin; Application info: S. Temmer; Customer service: P. Golstein; Delivery info: P. Golstein

Products manufactured: Attenuators, Cable, Equalizers, Meters, Microphones, All Kinds, Mixers, Phonographs, Parts & Accessories, Recorders, Timers, Transformers

Local Sales Offices & Reps.

Cal	Hollywood, Gotham Audio Corp.	213-874-4444

GOULD INC., Allied Control Div., 100 Relay Rd., Plantsville, Conn., 06479, Tel: 203-628-9654, TWX: 710-473-0079; Empl.: 450 p. 1•1686

Customer service: R. E. Delaney

Free literature available: Relays & Sockets Catalog, Solenoid Valves Catalog

Products manufactured: Controls/Control Eqpt., Process Control Systems, Relays, Sockets, Timers, Valves, Solenoid

Local Sales Offices & Reps.

Ariz	Tempe, Delta Elctrns. Sls.	602-966-9903
Cal	Los Angeles, El-Com Sls.	213-223-2435
Cal	Menlo Park, Straube Assocs.	415-323-2476
Colo	Denver, Elctrn. Sls.	303-771-6300
Fla	Orlando, Geartner Assocs.	305-299-1000
Ga	Atlanta, O'Hara Assocs.	404-237-0600
Ill	Chicago, D. Dolin Sls.	312-286-6200
Kans	Olathe, Bob Rush Assocs.	913-782-1177
Md	Baltimore, J.R. Daniel & Co.	301-825-3330
Mass	Millis, Selmark Assocs.	617-376-2914
Mich	Dearborn; VPI, Inc.	313-271-4600
Minn	Minneapolis, Industrial Comps.	612-831-4547
NJ	Cherry Hill, J.N. Barrett Assoc.	215-627-0149
NJ	Pompton Lakes, R. Horne Assocs.	201-835-7400
NY	E. Syracuse, Honsinger Mktg. Assoc.	315-463-5718
NC	Burlington, P.J. Nahser Co.	919-226-8053
Ohio	Aurora, E.M.A., Inc.	216-562-6104
Ohio	Centerville, E.M.A., Inc.	513-433-2800
Okla	Oklahoma City, Ammon & Rizos Co.	405-373-2748
Pa	Pittsburgh, G.S. Root Co.	412-561-4125
Tex	Dallas, Ammon & Rizos Co.	214-233-5591
Tex	Houston, Ammon & Rizos Co.	713-729-1233
Wash	Seattle, F. Jackson Co.	206-782-2211
FOR:	Can., Montreal, Que., H.W. Brieger Sls.	514-482-0722

Local Distributors

Ala	Huntsville, Cramer/EW, 2310 Bob Wallace Ave.	205-539-5722
Ariz	Phoenix, Cramer/Ariz., 2816 N. 16th St.	602-263-1112
Cal	Los Angeles, El-Com, Inc., 5134 Valley Blvd.	213-223-1351
Cal	Sunnyvale, Cramer/San Francisco, 720 Palomar Ave.	408-739-3011
Colo	Denver, Newark-Denver Elect., 2170 S. Grape St.	303-757-3351
Conn	Waterbury, Bond Radio, 439 W. Main St.	203-757-0546
Fla	Ft. Lauderdale, Peerless Radio, 1040 N.E. 43rd St.	305-566-5966
Ga	Atlanta, Lykes Elctrns., 1135 Chattahoochee	404-355-2223
Ill	Chicago, Newark Elctrns., 500 N. Pulaski	312-638-4411
Ind	Indianapolis, Graham Elctrn., 133 S. Pennsylvania	317-634-8486
Kans	Wichita, Radio Supply, 115 Laura	316-267-5214

Md	Baltimore, Allied Control Sls. Corp., 1404 Bare Hills A	301-828-6416
Mass	Newton, Cramer Elctrns., 85 Wells Ave.	617-969-7700
Mich	Oak Park, Newark Detroit Elect., 20700 Hubbell Ave.	313-548-0250
Minn	Minneapolis, Industrial Comps., 5280 W. 74th St.	612-831-2666
Mo	Kansas City, LCOMP-Kansas City, 1520 Taney St.	816-221-2400
NJ	Moonachie, Cramer/N.J., 1 Barrett Ave.	201-935-5600
NJ	Wayne, Gordon/Horne, 2282 Hamburg Tpke.	201-835-7400
NM	Albuquerque, Cramer/N.M., 137 Vermont N. E.	505-265-5767
NY	Hauppauge, Cramer, 29 Oser Ave.	516-231-5600
NY	Rome, Rome Elctrn., 108 Spring St.	315-337-5400
NC	Winston-Salem, Kirkman Elect., 901 W. 2nd St.	919-724-0541
Ohio	Akron, Akron Elctrns., 107 S. Arlington St.	216-762-8818
Okla	Tulsa, Cramer/Tulsa, 6336 E. 13 St.	918-836-3371
Ore	Portland, Eoff Elctrns., 509 N. W. Tenth Ave.	503-222-9411
Pa	Philadelphia, Philadelphia Elctrns., 1225 Vine St.	215-568-8288
Tenn	Nashville, Electra Distributing, 1914 West End Ave.	615-329-3971
Tex	Dallas, Sterling Elctrns., 2875 Merrell Rd.	214-357-9131
Utah	Salt Lake City, Alta-Land Elctrns., 2280 S. Main St.	801-486-7227
Va	Arlington, Republic Elctrns., 3004 Lee Hwy.	703-528-3973
Wash	Seattle, Western Elctrns., 717 Dexter Ave. N.	206-284-0200
Wisc	Milwaukee, Cramer/Wisc., 5626 N. 91st St.	414-462-8300

GOULD, INC., Portable Battery Div., 931 Vandalia, St. Paul, Minn., 55114, Tel: 612-452-1500; Minimum order: $150

Customer service: Zigmund

Free literature available: Complete line of seal-nickel cadnium and gilled electrolyte lead oxide rechangeable batteries.

Products manufactured: Batteries

Local Sales Offices & Reps.

Cal	Fountain Valley	714-531-1793
Cal	San Jose	408-238-3620
Ill	Rosemont	312-671-0671
Md	Towson	301-296-0825
Mass	Maynard	617-369-5651
Mass	Quincy	617-773-7980
Minn	St. Paul	612-452-1500
NY	Brooklyn	212-332-8641
Ohio	Cleveland	216-861-1877
Pa	Philadelphia	215-831-9520
Wisc	Schofield	715-359-3531

GOULD, INC., Instr. Sys. Div., 3631 Perkins, Cleveland, Ohio, 44114, Tel: 216-361-3315 .... p. 1•2341

Products manufactured: Amplifiers, Analyzers, Bridges, Data Acquisition & Reduction Systems, Data Loggers, Detectors, Display Devices/Displays, Indicators, Integrators, Electronic, Memory Systems, Monitors, Multiplexers, Oscillographs, Direct Writing, Oscilloscopes, Paper, Graphic Recording, Printers, Recorders, Signal Conditioners & Equipment, Terminals, Data Display (including Alphanumeric & Graphic), Transducers

Local Sales Offices & Reps.

Ala	Huntsville, W.A. Brown Instr., Inc.	205-539-4411
Cal	Burlingame, Gould Inc., Instr. Sys. Inc.	415-697-9345
Cal	Los Angeles, Gould Inc., Instr. Sys. Div.	213-685-7476
Colo	Denver, Gould Inc., Instr. Sys. Div.	303-758-4922
Conn	Stratford, Gould Inc., Instr. Sys. Div.	203-377-1332
Fla	Ft. Lauderdale, W.A. Brown Instrs.	305-776-4800
Fla	Ft. Walton Beach, W.A. Brown Instrs.	904-243-6424
Fla	Orlando, W.A. Brown Instrs.	305-425-5505
Ga	Atlanta, W.A. Brown Instrs.	404-939-1674
Ill	Rosemont, Gould Inc., Instr. Sys. Div.	312-671-5620
La	Gretna, W.A. Brown Instrs.	504-366-5766
Md	Lanham, Gould Inc., Instr. Sys. Div.	301-459-7350
Mass	Burlington, Gould Inc., Instr. Sys. Div.	617-272-0750
Mich	Southfield, Gould Inc., Instr. Sys. Div.	313-356-6600
Minn	Minneapolis, Gould Inc., Instr. Sys. Div.	612-546-7336
Mo	St. Louis, Gould Inc., Instr. Sys. Div.	314-878-6110
NJ	Fairfield, KLS Assocs., Inc.	212-233-4849
NJ	Saddle Brook, Gould Inc., Instr. Sys. Div.	201-845-0220
NY	East Rochester, Gould Inc., Instr. Sys. Div.	716-381-4095
NY	Schenectady, Gould Inc., Instr. Sys. Div.	518-370-1404
NC	Research Triangle Park, W.A. Brown Instrs.	919-489-1546
Ohio	Cleveland, Gould Inc., Instr. Sys. Div.	216-481-7221
Ohio	Dayton, Gould Inc., Instr. Sys. Div.	513-433-9586
Pa	Bala Cynwyd, Gould Inc., Instr. Sys. Div.	215-839-7066
Pa	Pittsburgh, Gould Inc., Instr. Sys. Div.	412-931-3660
Tenn	Knoxville, W. A. Brown Instrs.	615-584-2614
Tex	Dallas, Gould Inc., Instr. Sys. Div.	214-241-5131
Tex	Houston, Gould Inc., Instr. Sys. Div.	713-644-3671
Va	Richmond, Gould Inc., Instr. Sys. Div.	604-288-2858
Wash	Renton, Gould Inc., Instr. Sys. Div.	206-271-1100
FOR:	Can., Calgary, Alberta, Allan Crawford Assocs., Ltd.	403-276-9658
FOR:	Can., Dartmouth, Nova Scotia, Allan Crawford Assocs., Ltd.	902-469-7865
FOR:	Can., Montreal, Que., Allan Crawford Assocs. Ltd.	514-670-1212
FOR:	Can., Ottawa, Ont., Allan Crawford Assocs., Ltd.	613-829-9651
FOR:	Can., Toronto, Ont., Allan Crawford Assocs. Ltd.	416-678-1500
FOR:	Can., Vancouver, B.C., Allan Crawford Assocs., Ltd.	604-980-4831

GOULD INC., Ind'l. Battery Div., 467 Calhoun St., Trenton, N.J., 08607, Tel: 609-392-3111, TWX: 510-681-8489

Products manufactured: Batteries, Chargers, Battery, Eliminators, Battery, Inverters, Rectifiers, Transformers

GOW-MAC INSTR. CO., 100 Kings Rd., Madison, N.J., 07940, Tel: 201-377-3450, Telex: 136-331; Empl.: 45

Customer service: R. J. Mathieu

Products manufactured: Analyzers, Detectors, Probes

GOWANDA ELECTRONICS CORP., 179 Broadway Rd., Gowanda, N.Y., 14070, Tel: 716-532-2236, TWX: 710-529-1211; FSC No: 24226; QPL No: 15305D; Minimum order: $20

For info on price: G. Drake; Application info: K. Strohmeyer; Customer service: D. McLaughlin; Delivery info: D. McLaughlin

Products manufactured: Chokes, Coils Including Assemblies & Forms, Transformers

Local Sales Offices & Reps.

Cal	Redwood City, Parks & Pruitt Assocs.	315-364-1640
Cal	Van Nuys, W.J. Barron Co.	213-780-0509
Colo	Golden, J.F. Hurlbut Co.	303-279-7138
Conn	Stamford, R.B. Scanlon Co.	203-325-2718
Ill	Chicago, W.F. Hamilton Co.	312-545-7576
Iowa	Cedar Rapids, Snider Sls. Co.	319-362-4410
Mass	Reading, Lincoln Assocs.	617-944-9020
Minn	Minneapolis, Saturn Co.	612-881-0091
Mo	St. Louis, Beneke & McCaul	314-434-6242
NJ	Medford, Mech Elec Sls. Co.	609-654-8209
NY	Syracuse, Naylor Elec. Co.	315-472-9138
NC	Greensboro, L & D	919-292-3201
Ohio	Cleveland, Geotronix Mktg. Assocs.	216-238-8520
Tex	Dallas, R. E. Nesbitt Co.	214-357-4601
Wash	Olympia, Bergford and Assocs.	206-943-6664

GRADO LABS., INC., 4614 Seventh Ave., Brooklyn, N.Y., 11220, Tel: 212-435-5340

For info on price: R. Krieger; Application info: J. Chaipis; Customer service: M. Wildes; Delivery info: R. Krieger

Free literature available: Brochures Grado FT Series CD-4 Pickups in three categories: Professional Series, Flux-Bridger Series & Super Flux-Bridger Series. All contain "diamond" needles in either spherical elliptical or twin-tip.

Products manufactured: Transducers

Local Sales Offices & Reps.

Cal	San Francisco, Meyer, Ross & Fleming	415-285-8880
Cal	Van Nuys, Markman Co.	213-787-6151
Fla	Miami, World Wide Prods., Inc.	305-754-5475
Ga	Atlanta, Igou-Turner & Assocs.	404-451-7616
Ill	Chicago, T. Pappas & Assocs.	312-685-2338
Mass	Waltham, F. Barmakian	617-894-4849
Minn	Willmar, More Sls., Inc.	612-235-0034
Neb	Omaha, Tobias Co.	402-342-4028
NY	New York City, Somerset Assocs. Inc.	212-929-1824
Ohio	Cleveland, Schroeder Sls. Co.	216-268-3636
Pa	Willow Grove, Estersohn Assocs.	215-657-1414
Tex	Irving, Dobbs-Stanford Corp.	214-252-5502
Wash	Bellevue, Pacific Northwest Marketing	206-455-2300

GRALEX INDS., Div. Gen. Microwave, 155 Marine St., Farmingdale, N.Y., 11735, Tel: 516-694-3600, TWX: 510-224-6406; FSC No: 11332; Empl.: 25; Minimum order: $25 .... p. 1•718,719

For info on price: H. Steinberg 516-694-3607; Application info: H. Steinberg 516-694-3607; Customer service: D. Yulke 516-694-3600; Delivery info: H. Steinberg 516-694-3607

Free literature available: Data Sheets and Application Notes available for Series 36, Series 37, Series 45 Digital Panel Meters.

Products manufactured: Counters, Meters

Local Sales Offices & Reps.

Cal	Burlingame, Leddy Assoc.	415-347-5247
Cal	El Monte, Telemart Co.	213-444-7666
Colo	Littleton, Barron Farquhar Co.	303-794-3918
Conn	E. Hartford, Tekdata	203-525-7647
DC	Washington, H. Wise Co.	202-363-9417
Haw	Honolulu, Aloha Assocs.	
Ill	Lombard, Quadtron Assoc. Inc.	312-627-6800
Ky	Louisville, Scott Elctrns.	502-583-3220
Mass	Burlington, Tekdata	617-273-0198
Mass	Newton Centre, Daner-Hayes, Inc.	
Mich	Plymouth, Scott Elctrns.	313-455-2440
Minn	Minneapolis, L.F. Green & Assoc.	612-781-1611
Mo	Kansas City, R.R. Burton Sls. Co.	816-444-8300
NJ	Hackensack, C.R. Mayer Assoc.	201-487-3113
NY	Huntington, C.R. Mayer Assoc.	516-921-7876
NY	Rochester, H.C. Johnson Agencies	716-482-3000
Ohio	Cleveland, Scott Elctrns. Inc.	216-291-2600
Pa	Audubon, Daner-Hayes	215-666-5005
Pa	Pittsburgh, Scott Elctrns.	412-781-3112
Tex	Dallas, Cain & Co.	214-233-6809

GRAND TRANSFORMERS, Box 188, Grand Haven, Mich., 49417, Tel: 616-842-5430; Empl.: 175; Minimum order: $30

For info on price: G. G. Anderson; Application info: K. Williams; Customer service: F. Beradis; Delivery info: F. Beradis

Products manufactured: Services, Assembly, Production & Test, Transformers

Local Sales Offices & Reps.

Cal	San Gabriel, Van Gott & Assocs.	
Fla	Orlando, Buchanan & Abrams Assocs.	
Ill	Streamwood, A Holte & Assocs.	312-837-4066
Mass	Newtonville, C. Segel Co.	617-969-6900
Mich	Grand Rapids, R. Van Riper Sls.	616-452-0464
NY	Floral Park, MOS Assocs.	516-694-5923
Ohio	Cleveland, D. Steffen & Assocs.	216-261-5055
Pa	Ardmore, Rothenheber & Wurts, Inc.	215-642-6911
Tex	Dallas, W.T. Blackburn Assocs.	214-351-9991

GRANT HARDWARE CO., Div. Buildex Inc., 525 High St., W. Nyack, N.Y., 10994, Tel: 914-EL8-4400, TWX: 914-358-3541; FSC No: 83508; Empl.: 300

Customer service: J. Bross 914-429-5367

Free literature available: An illustrated 28 page handbook: "Slides, What They Are. When They Are Used. Where They Are Used" explains factors related to the selection and use of industrial slides.

Products manufactured: Cabinets & Accessories, Cable Retractors, Mounts, Slides, Cabinet & Chassis

Local Sales Offices & Reps.

Ariz	Phoenix, G.R. McKnight Co.	602-949-0809
Cal	Menlo Park, The McKnight Co.	415-325-2844

Cal	So El Monte, Grant Hardware Co.	213-686-2110
Colo	Denver, R.G. Bowen Co. Inc.	303-722-4641
Fla	Orlando, B. Wimberly Co.	305-423-2514
Ill	Des Plaines, Lincoln, Hodges & Associates	312-297-3810
Kans	Overland Park, J. Singer	913-381-3684
Mass	Lexington, E.F. Del Fino Co.	
Mich	Farmington, Carter, McCormic & Peirce	313-477-7700
Minn	St. Paul, R. G. Ragon, Inc.	612-488-0201
NJ	Mountain Lakes, Components For Elctrns.	201-334-2921
NJ	Ridgefield, M - D Industries	201-941-3113
NY	Liverpool, Vertex Corp.	315-622-3060
NY	Syracuse, Vertex Corp.	315-458-2223
NC	Charlotte, Bill Henry Associates	704-375-8958
Ohio	Cincinnati, Tri State Mktg. Inc.	513-761-7993
Ohio	Cleveland, Carter McCormic & Peirce	216-333-5650
Pa	Pittsburgh, Carter McCormic & Peirce	412-824-3760
Tex	Dallas, Blackburn Associates	214-FL 1-9991
Wash	Bellevue, Rowe NorthwesT	

GRAPHIC CONTROLS CORP., Recording Chart Div., 189 Van Rensselaer St., Buffalo, N.Y., 14210, Tel: 716-853-7500; Empl.: 390

Products manufactured: Paper, Graphic Recording

Local Sales Offices & Reps.

Cal	Canoga Park	213-347-8621
Cal	Santa Clara	408-241-9960
Colo	Lakewood	303-238-5239
Conn	Windsor	203-688-8501
Ga	Atlanta	404-451-4738
Ill	Barrington	312-381-6540
La	Metairie	504-885-1226
Mass	Farmington	313-851-6340
Minn	Minneapolis	612-335-2341
Ohio	Cincinnati	513-522-5476
Ohio	Cleveland	216-241-2217
Okla	Tulsa	918-936-5246
Pa	Philadelphia	215-436-6100
Tex	Houston	713-781-9870
Wash	Bellevue	206-455-1755

GRAPHIC SYSTEMS, 925 Danville Rd., DL-10, Yanceyville, N.C., 27379

GRAPHITE METALLIZING CORP., 1036 Nepperhan Ave., Yonkers, N.Y., 10702, Tel: 914-968-8400, Telex: 13-1571; Empl.: 165 .... p. 1•960,961

Products manufactured: Bearings, Brushes & Brush Assemblies, Bushings, Glass, Plastic, Metal, Rubber, Etc., Clutches, Contacts, Electrical, Graphalloy Products, Graphite Parts, Joints, Rotary, Microwave, Posts, Slip-Rings & Assemblies

GRAYHILL INC., 569 Hillgrove Ave., LaGrange, Ill., 60525, Tel: 312-354-1040, TWX: 910-683-1850; FSC No: 5930; Empl.: 250; Minimum order: $25
p. 1•1696-1698,2034-2052; p. 2•1261,2021

Free literature available: G-374-General Catalog-Switches, Relays, Wire Ties, Termination Hardware, #238-Rocker DIP Switches, #231-Solid State Relays, #228-Wire Ties & Cable Clamps.

Products manufactured: Clamps & Clips, Fasteners, Insulators & Insulation, Kits, Switch Assembling, Lights, Posts, Relays, Services, Assembly, Production & Test, Sockets, Switch Hardware, Switches, Terminals, Wire & Cable Ties

Local Sales Offices & Reps.

Ala	Huntsville, Rep, Inc.	205-881-9270
Cal	Garden Grove, Impact Elctrns.	213-431-3581
Cal	Los Altos, Nickerson-Gray Assoc.	415-941-5777
Colo	Denver, Lindberg Co.	303-758-9033
Fla	Orlando, Geartner Assoc.	305-299-1000
Ga	Atlanta, Rep, Inc.	404-938-4358
Ill	Hinsdale, Hill-Gray Assoc.	312-325-4810
Ind	Ft. Wayne, Menze Sls.	219-747-5616
Iowa	Cedar Rapids, Reid Assoc.	319-362-6302
Kans	Overland Park, Penzner-Mankus Assoc.	913-DU1-0004
Md	Woodbine, Naudain Assoc.	301-252-5378
Mass	Wellesley Hills, M. Scott Co.	617-235-0102
Mich	Troy, C.B. Jensen & Assoc.	313-643-0506
Minn	St. Paul, Northport Engrg. Inc.	612-698-3841
Mo	Hazelwood, Penzner-Mankus Assoc.	314-731-4334
NJ	Mount Laurel, Naudain Assoc.	215-564-3194
NM	Albuquerque, Lindberg Co.	505-345-2489
NY	Great Neck, F. Tylinski Co.	516-466-9070
NY	Ithaca, B. Dean Inc.	607-272-2187
NC	Charlotte, R.W. Chapman & Co.	704-525-2421
Ohio	Cleveland, A.H. Baier Co. & Assoc.	216-461-6161
Ohio	Dayton, A.H. Baier Co. & Assoc.	513-276-4128
Okla	Tulsa, W.P. Fralia Co.	918-663-8707
Pa	Pittsburgh, Covert & Newman Co.	412-563-0303
SC	Greenville, R.W. Chapman & Co.	803-232-5391
Tex	Ft. Worth, W.P. Fralia Co.	817-738-2394
Tex	Houston, W.P. Fralia Co.	713-772-1572
Utah	Salt Lake City, Lindberg Co.	801-364-6409
Wash	Seattle, Seatronics, Inc.	206-767-4330

GREAT WESTERN AVIATION, Box 20396, Denver, Colo., 80220, Tel: 303-355-4468; Empl.: 2

Customer service: T. O. Markel

Products manufactured: Antennas, Cable Assemblies & Harnesses, Cable, Connectors, Couplers, Lights, Transformers, Tubes

Local Sales Offices & Reps.

Cal	San Rafael, Levin-Schwartz	415-454-1940
Cal	Van Nuys, Szerlip Sls. Co.	213-782-1765
Colo	Denver, C. B. Elctrn. Mktg.	303-422-0561
Fla	Margate, Florida Elctrn. Sls.	305-972-0800
Ga	Norcross, Dean Cooper Sls. Co.	404-448-5460
Ill	Chicago, Q & B Inc.	312-725-4999
Iowa	Atlantic, Kimian Sls. Co.	712-243-1626
Mass	Northboro, W.B. Pray Sls.	617-393-3434
Mich	Grand Rapids, L. Drieborg	616-953-1242
Minn	Minneapolis, J. E. M. Anderson	612-823-6459
Mo	Independence, Kimian Sls.	816-796-4026
NJ	Moorestown, DiVincent & Legato	609-235-8299
NY	Jericho, Gim Sls. Corp.	516-433-4080
Ohio	Columbus, Mandabach & Assoc.	614-235-0265
Pa	Pittsburgh, Mandabach & Assoc.	412-279-2264
Tex	Houston, M. R. Summers Assoc.	713-524-7800

GREENLEE TOOL CO., 2136-12th St., Rockford, Ill., 61101, Tel: 815-963-4881

Products manufactured: Punches, Chassis

Local Sales Offices & Reps.

Cal	Monterey Park	213-268-9307
Ga	Atlanta	404-448-6121
NY	Long Island City	212-392-3414
Wisc	Milwaukee	414-481-5768
EXP:	Coral Gables, Fla.	305-443-7922

GREENRAY INDS., INC., 840 W. Church Rd., Mechanicsburg, Pa., 17055, Tel: 717-766-0223, TWX: 510-650-4939; Empl.: 60 .... p. 1•327

Products manufactured: Amplifiers, Clocks (All Types), Converters, Filters, Generators, Impedance Converters, Microwave, Multipliers, Oscillators, Standards, Transmitters

Local Sales Offices & Reps.

Ala	Huntsville, Beacon Electronics Associates, Inc.	205-881-5031
Ariz	Tempe, Sedco Sales	602-968-7791
Cal	Burlingame, Westronics Assoc.	415-342-1425
Cal	Los Angeles, Cain Technology	213-476-2251
Colo	Boulder, H. Bass Assocs.	303-499-7509
DC	Washington, Hayden Assocs.	202-296-6059
Fla	Fort Lauderdale, Beacon Elctrns.	305-776-6074
Ga	Atlanta, Beacon Elctrns.	404-351-3654
Ill	Mt. Prospect, Cain & Co.	312-253-3578
Mass	Reading, Geder-Rotondi Assoc.	617-944-3105
Mich	Grand Rapids, Thies & Assocs.	616-245-0319
Mo	Florissant, KM & B Tech. Sls.	314-831-0015
NM	Albuquerque, Trembly Assocs.	505-293-4444
NY	Huntington, Andrews & Andrews, Inc.	516-692-8686
Ohio	Dayton, F. Ohmer Assoc.	513-434-1454
Okla	Tulsa, J.A. Green Co.	918-742-4657
Pa	Ambler, Wm. Assocs.	215-643-4119
SC	Spartanburg, Beacon Elctrns. Assocs.	803-582-4613
Tex	Dallas, J.A. Green Co.	214-631-7450
Tex	Houston, J.A. Green Co.	713-526-2959
Wash	Redmond, Barrett Sls. Northwest, Ltd.	206-885-6991
EXP:	Lemoyne, Pa., Elctrns. Int'l.	717-737-8858
FOR:	Can., St. Laurent, Que., Rutherford Agencies	514-744-4121

GREGG ELECTRIC INC., Electronics Div., 608 W. Emporia, Ontario, Cal., 91761, Tel: 714-983-1794; Empl.: 5

Customer service: R. Fehlman

Free literature available: Illustrated Bulletins Describing our low cost line of Integrated Circuit Digital Clocks, Calendars, Timing Instruments, and their Accessories.

Products manufactured: Chronometers, Clocks (All Types), Counters, Timers

GREGG ELECTRIC INC. cont'd

Advertisment

Manufacturers of low cost integrated circuit digital electronic clocks, calendars, and timing instruments. Options include xtal time base, BCD or ASCII outputs, battery back-up, relay contact outputs, etc. We will customize to your requirements. Contact our factory for quotations and further information.

GRIES REPRODUCER CO., Div. Coats & Clark Inc., 162 Beechwood Ave., New Rochelle, N.Y., 10801, Tel: 914-633-8600, TWX: 914-235-2188; Empl.: 600

For info on price: S. R. Dube; Application info: S. R. Dube; Customer service: J. Gadin; Delivery info: J. Gadin

Products manufactured: Bobbins, Winding, Coil & Transformer, Bushings, Glass, Plastic, Metal, Rubber, Etc., Clamps & Clips, Coils Including Assemblies & Forms, Fasteners, Rivets, Services, Assembly, Production & Test, Slides, Cabinet & Chassis, Tubing

GRISBY-BARTON, INC., See Gordos/Grisby-Barton

GRM CORP., Box 337, Medford, N.J., 08055, Tel: 609-267-7950; Empl.: 100; Minimum order: $25
p. 1•120,121

Customer service: T. A. McGarrity

Products manufactured: Alarms, Amplifiers, Attenuators, Chargers, Battery, Coders, Comm. Systems, Control Systems, Air Traffic, Controls/Control Eqpt., Couplers, Dummy Loads, Generators, Magnetizers, Monitors, Networks, Panels, Power Supplies, Services, Assembly, Production & Test

GROOV-PIN CORP., 1125 Hendricks Causeway, Ridgefield, N.J., 07657, Tel: 201-945-6780, TWX: 710-992-8963; FSC No: 73957; Empl.: 100; Minimum order: $25

For info on price: R. F. Reis; Application info: J. Pagliuca; Customer service: R. F. Reis

Free literature available: "Design Tips for Togetherness" 26-page brochure illustrates how Groov-Pin® press fit fasteners, Tap-Lok® self-tapping, self-locking inserts, and grooved Drive Studs are used in a variety of applications.

Products manufactured: Bushings, Glass, Plastic, Metal, Rubber, Etc., Fasteners, Pins

Local Sales Offices & Reps.

Ariz	Phoenix, Kennedy Sls.	602-275-7501
Cal	Hayward, D. Lewis Assocs.	415-785-9650
Cal	Woodland Hills, R.R. Sweet & Son	213-883-8651
Colo	Englewood, Todd Assocs.	303-761-7801
Conn	Stratford, P.E. Wolfe & Assocs.	203-377-4343
Fla	Orlando, A-Gen-Teers Entprs.	305-293-6269
Ga	Atlanta, R.R. Miller	404-993-2150
Ill	Wheaton, W.L. Barth, Jr.	312-653-4970
Iowa	Bettendorf, R.L. Burchett	319-355-6332
Mass	Southboro, T.P. Wolfe	617-481-1769
Mich	Detroit, H.B. Schweppe	313-872-8149
Minn	Minneapolis, Nelson & Son	612-920-3414
Miss	Jackson, Lawrence & Co.	601-982-9513
Mo	St. Louis, Smith-Bollinger & Co.	314-351-1177
NY	Oakdale, R.V. Davison	516-589-6388
NY	Rochester, Select Comps.	716-381-2620
NC	High Point, L.J. Mortimer & Assocs.	919-882-9015
Ohio	Dayton, Stork-Kelch & Assocs.	513-222-3232
Pa	Paoli, A. Buchanan	215-696-8323
SC	Columbia, L.J. Mortimer & Assocs.	803-254-2228
Tex	Dallas, Tech Sls. Co.	214-631-8820
Va	Roanoke, A.B. Kreger	703-989-4738
Wash	Seattle, F.W. Aurich & Co.	206-284-5561

GTE AUTOMATIC ELECTRIC INC., 400 N. Wolf Rd., Northlake, Ill., 60164, Tel: 312-562-7100, TWX: 910-226-1975; FSC No: Multiple; Empl.: 12,000; Minimum order: $50

Customer service: J. D. Ashby

Free literature available: "Selection Guide to AE Relays and Switches"(C-4071) A convenient aid to specifying the correct types and sizes of components, plus a considerable amount of reference data.

Products manufactured: Cable, Comm. Systems, Connector Blocks, Mother Board, Dials, Encoders, Handsets, Chestsets, Headphones, Headsets, Etc., Keyboards, Alphanumeric & Decimal, Receivers, Relays, Switches, Terminal Blocks, Boards & Strips

Local Sales Offices & Reps.

Cal	Burlingame	415-697-6400
Cal	North Hollywood	213-766-5203
Cal	San Diego	714-283-2095
Conn	Stamford	203-329-0981
Ga	Atlanta	404-261-7441
Mass	Newton	617-965-3770
Mich	Detroit	313-538-6040
Minn	Minneapolis	612-835-4222
Mo	Kansas City	816-241-4760
NY	Albany	518-438-3511
Ohio	Cleveland	216-267-6288
Ohio	Dayton	513-299-6481
Pa	Haverford	215-525-7575
Va	Falls Church	703-533-0636

GTE LENKURT INC., 1105 County Rd., San Carlos, Calif., 94070, Tel: 415-591-8461, TWX: 910-376-4396; Empl.: 4000

Products manufactured: Alarms, Antenna Feed Systems, Comm. Systems, Cords, Demodulators, Equalizers, Modulator/Demodulators, Modulators, All Kinds, Multiplexers, Receivers, Testers, Transmission Systems, Data, Transmitters

Local Sales Offices & Reps.

Ga	Atlanta	404-261-8282
Ill	Arlington Hgts.	312-398-6700
Tex	Dallas	214-363-0286
Va	Falls Church	703-533-3344

GTE SYLVANIA, INC., W.M. Chace Co., 1600 Beard Ave., Detroit, Mich., 48209, Tel: 313-842-7400; Empl.: 260

Products manufactured: Bi-Metals, Thermostatic

GTE SYLVANIA, INC., Chem. & Metallurgical Div., Towanda, Pa., 18848, Tel: 717-265-2121; Empl.: 1400

Products manufactured: Alloys, Crystals, Metal Oxides, Metals, Wire

Local Sales Offices & Reps.

Cal	Burlingame	415-697-3500
Conn	Hartford	203-246-0608
Ill	Melrose Park	312-345-0100
Mass	Danvers	617-777-1900
Mich	Dearborn	313-582-8754
NJ	Teterboro	201-288-9484
NY	Camillus	315-672-3111
NC	Charlotte	704-334-4671
Ohio	Dayton	513-223-6227
Pa	Philadelphia	215-477-5000
Pa	Pittsburgh	412-531-4975
Tex	Dallas	214-239-8171

GTE SYLVANIA, Circuit Module Oper., Elctrn. Comps. Grp., Box 360, Muncy, Pa., 17756, Tel: 717-546-3191; Empl.: 463

Products manufactured: Boards, Printed Circuit, Cards, Linear Function, Cards, Logic, Circuits, Printed, Multilayer, Modules, Logic, Encapsulated, Services, Assembly, Production & Test

GTE SYLVANIA INC., Consumer Prods. - Lighting Prods., 100 Endicott St., Danvers, Mass., 01923, Tel: 617-777-1900; Empl.: 8200

Products manufactured: Lamps

Local Sales Offices & Reps.

Cal	Burlingame	415-697-3500
Cal	Los Angeles	213-726-1666
Colo	Denver	303-399-1760
Conn	Hartford	203-249-7611
Fla	Orlando	305-859-6220
Ga	Atlanta	404-762-1781
Ill	Chicago	312-345-0100
Kans	Kansas City	913-371-3773
La	New Orleans	504-733-6970
Mich	Dearborn	313-582-8754
Mich	Southfield	313-559-5872
Minn	Minneapolis	612-331-9363
Mo	St. Louis	314-664-8975
NJ	Teterboro	201-288-9484
NY	Buffalo	716-668-0500
NY	New York City	212-486-3995
NC	Charlotte	704-334-4671
Ohio	Cincinnati	513-793-6440
Ohio	Cleveland	216-267-6800
Pa	Philadelphia	215-477-5000
Pa	Pittsburgh	412-781-4533
Tex	Dallas	214-239-8171
Tex	Houston	713-869-8671
Va	Springfield	703-354-3100
Wash	Seattle	206-763-2660

GTE SYLVANIA INC., Wilbur B. Driver Sub., 1875 McCarter Hwy., Newark, N.J., 07104, Tel: 201-481-3110; Empl.: 749

Products manufactured: Alloys, Cable, Foil, Metals, Substrates, Wire

Local Sales Offices & Reps.

Cal	Los Angeles	213-478-4021
Conn	West Hartford	203-233-4047
Ill	Melrose Park	312-344-4155
NJ	Teterboro	201-288-9484
NC	Charlotte	704-375-8568
SC	Orangeburg	803-534-6910

GTE SYLVANIA INC., Electrical Equip. Grp., 100 First Ave., Waltham, Mass., 02154, Tel: 617-890-9200; Empl.: 3600

Products manufactured: Boxes, Junction, Outlets & Wall Plates, Bus Bars & Systems, Circuit Breakers, Controls/Control Eqpt., Limit Stops, Mechanical, Motors, Relays, Switchboards, Switches, Transformers

Local Sales Offices & Reps.

Clark Control		
Ala	Birmingham	205-879-3457
Cal	Los Angeles	213-685-6770
Cal	San Francisco	415-479-7770
Ga	Atlanta	404-261-5970
Ga	Atlanta	404-762-1781
Ill	Chicago	312-767-5123
Ill	Elk Grove Village	312-439-8748
Ind	Gary	219-887-5645
Mass	Waltham	617-890-9200
Mich	Detroit	313-255-0660
Mich	Flint	313-688-2270
Minn	Minneapolis	612-331-9363
Mo	St. Louis	314-872-8240
NJ	Union	201-686-9000
NY	Buffalo	716-668-0500
NY	Syracuse	315-437-1431
Ohio	Akron	216-923-5274
Ohio	Cincinnati	513-272-0633
Ohio	Cleveland	216-851-2200
Ohio	Cleveland	216-851-2000
Ohio	Columbus	614-888-3428
Ohio	Youngstown	216-757-1516
Pa	Philadelphia	215-649-6511
Pa	Pittsburgh	412-341-5777
Tex	Houston	713-869-8671
Va	Hampton	804-838-8080
Va	Hampton	804-838-8080
Wisc	Milwaukee	
Union Insulating Co.		
Ga	Decatur	404-389-4761
Md	Reisterstown	301-833-1662
Minn	Hastings	612-437-5763
Tenn	Nashville	615-242-3942
WVa	Davis	304-866-4166
WVa	Parkersburg	304-422-4571
Zinsco Electrical Prods.		
Ariz	Phoenix	602-277-2649
Cal	Fresno	209-266-6669
Cal	Los Angeles	213-625-8971
Cal	Sacramento	916-452-7621
Cal	San Diego	714-283-6361
Cal	San Leandro	415-352-3450
Colo	Denver	303-892-9468
Fla	Orlando	305-859-6220
Fla	Pompano Beach	305-946-0772
Ga	Atlanta	404-762-1781
Md	Columbia	301-465-5878
Mo	Creve Coeur	314-872-8240
Mo	St. Louis	314-289-9500
Ore	Portland	503-222-1063
Pa	Folcroft	215-532-9300
Tenn	Memphis	901-276-5536
Tenn	Nashville	615-255-8084

GTE SYLVANIA INC., Elctrn. Comps. Grp., 100 First Ave., Waltham, Mass., 02154, Tel: 617-890-9200; Empl.: 4726

Products manufactured: Boards, Printed Circuit, CATV Systems & Equipment, Circuits, Printed, Multilayer, Test Equipment, Tubes, Yokes

Local Sales Offices & Reps.

Cal	Burlingame	415-697-3500
Cal	Los Angeles	213-726-1666
Ga	Atlanta	404-762-1781
Ill	Melrose Park	312-345-0100
Mass	Danvers	617-777-1900
NJ	Teterboro	201-288-9484
Ohio	Cleveland	216-267-6800
Tex	Dallas	214-239-8171

GTE SYLVANIA INC., Elctrn. Sys. Gp., 1800 N. Kent St., Washington, D.C., 22209, Tel: 703-841-9020; Empl.: 4200

Products manufactured: Alarms, Amplifiers, Analyzers, Antenna Feed Systems, Antenna Rotators, Antenna Switching Matrices, Antennas, Coders, Comm. Systems, Computers, Control Systems, Air Traffic, Couplers, Data Acquisition & Reduction Systems, Decoders, Detectors, Display Devices/Displays, Horns, Microwave, Lasers & Laser Systems, Modulator/Demodulators, Modulators, All Kinds, Radar Systems, Receivers, Simulators, Switchboards, Switches, Terminal Equipment, Digital, Terminals, Data Display (including Alphanumeric & Graphic), Tracking Systems, Transceivers, Transmission Systems, Data, Transmitters, Underwater Communication, Detection, Navigation, etc. Equipment

GTE SYLVANIA INC., Elctrn. Tube Div., Seneca Falls, N.Y., 13148, Tel: 315-568-5881; Empl.: 1092

Products manufactured: CATV Systems & Equipment, Testers, Tubes

Local Sales Offices & Reps.

Cal	Burlingame	415-697-3500
Cal	Los Angeles	213-726-1666
Ga	Atlanta	404-762-1781
Ill	Melrose Park	312-345-0100
Mass	Danvers	617-777-1900
NJ	Teterboro	201-288-9484
Ohio	Cleveland	216-267-6800
Tex	Dallas	214-239-8171

GTE SYLVANIA INC., Gibson Electric Subsidiary, Delmont, Pa., 15626, Tel: 412-468-4121; Empl.: 250

Products manufactured: Contacts, Electrical

Local Sales Offices & Reps.

NC	Charlotte	704-334-8940
Pa	Philadelphia	215-477-5000
FOR:	Can., Toronto, Ont.	416-364-5660

GTE SYLVANIA INC., Lighting Prods. Grp., Danvers, Mass., 01923, Tel: 617-777-1900; Empl.: 8200

Products manufactured: Caps, Lenses, Indicator Light, Circuit Breakers, Coils Including Assemblies & Forms, Deposition Equipment, Vacuum & Accessories, Flashers, Lamp Adapters, Lamps, Lights, Regulators, Relays, Sockets, Switches, Ultraviolet Inspection Lighting

Local Sales Offices & Reps.

Cal	Burlingame	415-697-3500
Cal	Los Angeles	213-726-1666
Colo	Denver	303-399-1760
Conn	Hartford	203-249-7611
Fla	Orlando	305-859-6220
Ga	Atlanta	404-762-1781
Ill	Chicago, (Melrose Park)	312-345-0100
Kans	Kansas City	913-371-3773
La	New Orleans	504-733-6970
Mich	Dearborn	313-582-8754
Mich	Southfield	313-559-5872
Minn	Minneapolis	612-331-9363
Mo	St. Louis	314-664-8975
NJ	Teterboro	201-288-9484
NY	Buffalo	716-675-0500
NY	New York	212-244-8820
NC	Charlotte	704-334-4671
Ohio	Cincinnati	513-793-6440
Ohio	Cleveland	216-267-6800
Pa	Philadelphia	215-477-5000
Pa	Pittsburgh	412-781-4533
Tex	Dallas	214-239-8171
Tex	Houston	713-869-8671
Va	Springfield	703-354-3100
Wash	Seattle	206-763-2660

GTE SYLVANIA INC., Miniature Lamp Div., 528 Elm St., Kearny, N.J., 07032, Tel: 201-997-1850

Products manufactured: Lamps

Local Sales Offices & Reps.

Cal	No. Hollywood, Bassett & Moore, Inc.
Colo	Arvada, Arrowhead Sls. Corp.
Conn	Waterbury, Coakley, Boyd, & Abbett, Inc.
Fla	Bradenton, Hutto, Hawkins, Peregoy, Inc.
Fla	Maitland, Hutto, Hawkins, Peregoy, Inc.
Fla	Pompano Beach, Hutto, Hawkins, Peregoy, Inc.
Ga	Atlanta, Millar Elctrns., Inc.
Ill	Oak Park, G. E. Finnegan
Ind	Indianapolis, R. O. Whitesell & Assoc.
Ind	Indianapolis, Southern Sls. Corp.
Iowa	Atlantic, Kimian Sls., Inc.
Mass	Needham, Coakley, Boyd, & Abbett, Inc.
Mich	Grand Rapids, R. O. Whitesell & Assoc.
Mich	Southfield, R. O. Whitesell & Assoc.
Mich	St. Joseph, R. O. Whitesell & Assoc.

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Minn	Minneapolis, Stoss Assocs.	
Mo	Independence, Kimian Sls., Inc.	
Mo	Maryland Hgts., Kimian Sls., Inc.	
NJ	Long Valley, P. A. Sweeney	
NY	Camillus, Callahan & Ferguson Co.	
NY	Rochester, Fowler Beach Corp.	
NY	Tuckahoe, LCA Sls., Co.	
NC	Raleigh, Millar Elctrns., Inc.	
Ohio	Cincinnati, R. O. Whitesell & Assoc.	
Ohio	Columbus, R. O. Whitesell & Assoc.	
Ohio	Dayton, R. O. Whitesell & Assoc.	
Ohio	Lakewood, R. O. Whitesell & Assoc.	
Pa	Glenside, Shelmar Elctrns. Corp.	
Pa	Pittsburgh, R. O. Whitesell & Assoc.	
Tenn	Bristol, R. O. Whitesell & Assoc.	
Tex	Dallas, Dunbar Assocs.	
Utah	Salt Lake City, Arrowhead Sls. Corp.	
Wash	Seattle, Blum & Assoc.	
Wisc	Milwaukee, F. C. DuBois & Assoc.	
FOR:	Can., Mississauga, Ont. L4T 1G3, Munro Elctrn. Comps.	

GTE SYLVANIA INC., Miniature Lighting Prods., W. Main St., Hillsboro, N.H., 03244, Tel: 603-464-5533, TWX: 710-366-0387; Empl.: 700 .... p. 2•1147

Products manufactured: Caps, Lenses, Indicator Light, Lamps, Lights, Sockets

Local Sales Offices & Reps.

Cal	Los Altos, W.W. Posey Co.	415-948-7771
Cal	N. Hollywood, Bassett & Moore	213-766-2117
Colo	Arvada, Arrowhead Sls.	303-423-5556
Conn	Cheshire, Coakley, Boyd & Abbett	203-272-2262
Fla	Maitland, Hutto, Hawkins, Peregoy	305-831-2474
Fla	Pompano Beach, Hutto, Hawkins, Peregoy	305-943-9593
Ga	Atlanta, GTE Sylvania	404-762-1781
Ill	Oak Park, G. E. Finnegan	312-383-9098
Ind	Indianapolis, Southern Sls.	317-257-7575
Iowa	Atlantic, Kimian Sls.	712-243-1626
Mass	Needham, Coakley, Boyd & Abbett	617-444-5470
Mich	Grand Rapids, R.O. Whitesell & Assoc.	616-451-8901
Mich	Southfield, R.O. Whitesell & Assoc.	313-358-2020
Mich	St. Joseph, R.O. Whitesell & Assoc.	616-983-7337
Minn	Minneapolis, Stoss Assocs.	612-925-2757
Mo	Independence, Kimian Sls.	816-796-4026
Mo	Maryland Heights, Kimian Sls.	314-739-1655
NJ	Kearny, GTE Sylvania	201-997-1850
NY	Rochester, Fowler Beach Corp.	716-586-0468
NC	Raleigh, Millar Elctrns.	919-787-9564
Ohio	Cincinnati, R.O. Whitesell & Assoc.	513-521-2290
Ohio	Columbus, R. O. Whitesell	614-888-9396
Ohio	Dayton, R.O. Whitesell & Assoc.	513-298-9546
Ohio	Lakewood, R.O. Whitesell & Assoc.	216-228-7525
Pa	Glenside, Shelmar Elctrns.	215-885-0800
Pa	Pittsburgh, R.O. Whitesell & Assoc.	412-344-7277
Tenn	Memphis, Cartwright & Bean	901-276-4442
Tex	Dallas, Dunbar Assoc.	214-239-7151
Utah	Salt Lake City, Arrowhead Sls.	801-487-3444
Wash	Seattle, Blum & Assocs.	206-285-2590
Wisc	Milwaukee, F.C. Du Bois & Assoc.	414-774-3100

GTE SYLVANIA INC, Parts Div., 816 Lexington Ave., Warren, Pa, 16365

GTE SYLVANIA, INC., Western Gold & Platinum Sub., 555 Harbor Blvd., Belmont, Cal., 94002, Tel: 415-593-3121; Empl.: 320

Products manufactured: Flux, Brazing & Soldering Materials, Insulators & Insulation, Metals, Tubing, Wire

Local Sales Offices & Reps.

Cal	Torrance, Western Gold & Platinum Co.	213-375-6191
Ill	Lake Zurich, Western Gold & Platinum Co.	312-438-4488
Mass	Salem, Western Gold & Platinum Co.	617-745-1826
Minn	Minneapolis, Western Gold & Platinum Co.	612-920-3288
Pa	Drexel Hill, Western Gold & Platinum Co.	201-483-7467

GTI CORPORATION, 480 Manor Oak Two, 1910 Cochran Rd., Pittsburgh, Pa., 15220, Tel: 412-343-4070, Telex: 866-483; Empl.: 800

Products manufactured: Boards, Printed Circuit, Bus Bars & Systems, Caps, Connector, Caps, Lenses, Indicator Light, Circuits, Flexible, Covers, Protective (Including Dust), Eyelets, Feedthrus & Seals, Environmental, Forms, Wire, Headers, Holder & Carriers, Lenses, Readout & Display, Machines/Machinery, Production, Pins, Seals, Services, Assembly, Production & Test, Tubing

Local Sales Offices & Reps.

Cal	Santa Clara	408-244-2938
NJ	Red Bank	201-842-6682
Ohio	Centerville	513-433-7913

GTJ/TENSOR ELECTRONICS, 11558 Sorrento Valley Rd., San Diego, Cal., 92121, Tel: 714-453-7262, Telex: 69-5056; Empl.: 55

For info on price: W. Devine; Application info: J. Sayre; Customer service: D. Spurrier; Delivery info: D. Spurrier

Products manufactured: Capacitors, Fixed

Local Sales Offices & Reps.

Ala	Birmingham, Electro-Rep Assocs.	205-822-4484
Ala	Huntsville, Electro-Rep Assocs.	205-881-8315
Ariz	Scottsdale, BFA Corp. of Ariz.	602-946-4215
Cal	Downey, Trimarco, Inc.	213-861-8244
Cal	Redwood City, Parks & Pruitt Assocs.	415-364-1640
Conn	Brookfield, E. J. Hughes Assocs.	203-775-4541
Conn	Old Saybrook, E. J. Hughes Assocs.	203-339-7636
Fla	Clearwater, CBC Elctrns.	813-447-3375
Fla	Ft. Lauderdale, CBC Elctrns.	305-484-7330
Fla	Winter Park, CBC Elctrns.	305-644-2277
Ga	Decatur, Electro-Rep Assocs.	404-365-6349
Ill	Des Plaines, Butor Sls. Co.	312-298-0555
Ind	Indianapolis, Technical Representatives, Inc.	317-849-6454
Kans	Shawnee Mission, Mid-America Elctrn. Mktg. Inc.	913-236-4800
Md	Lutherville, Cunningham & Assocs.	301-296-4306
Mass	Attleboro, E. J. Hughes & Assocs.	617-226-0050
Mass	Beverly, E. J. Hughes & Assocs.	617-927-7171
Mich	Rochester, Kent Assocs.	313-651-1890
Minn	Minneapolis, D. G. Perry & Co.	612-920-3212
NJ	Clifton, A. Clarfield	212-757-6454
NJ	Haddonfield, Keefe Elctrn. Sls. Co.	609-429-4650
NY	Syracuse, T-Squared-L Elctrns.	315-463-8592
NC	Charlotte, Electro-Rep Assocs.	704-527-2530
NC	Raleigh, Electro-Rep Assocs.	919-828-8133
Ohio	Dayton, Sidnell Co.	513-433-7761
Tex	Richardson, Campion Sls. Co.	214-238-8145
Wash	Seattle, R. K. Squibb, Inc.	206-632-2450

GUARDIAN CALIFORNIA, 4030 W. Spencer St., Torrance, Cal., 90503, Tel: 213-772-8511, TWX: 910-344-7381; Empl.: 48

Products manufactured: Alarms, Coils Including Assemblies & Forms, Controls/Control Eqpt., Converters, Delays, Time (Excluding Delay Lines, Timers, Delay & Relays, Time-Delays), Detectors, Drivers, Solenoid, Flashers, Relays, Timers

Local Sales Offices & Reps.

Ala	Birmingham, Immco Inc.	205-879-0739
Cal	Palo Alto, O'Donnell Assocs.	415-327-9260
Cal	Torrance, O'Donnell Assocs.	213-323-9243
Colo	Denver, Arrowhead Sls.	303-222-5645
Fla	Winter Park, Floritronics	305-424-5070
Ga	Marietta, Immco Inc.	404-435-0079
Haw	Honolulu, G Piety Factors	808-841-0185
Ill	Chicago, Guardian Elec. Mfg.	312-243-1100
Ind	Fort Wayne, Needler Sls.	219-447-2123
Md	Ellicott City, Mc Court Co.	301-465-4515
Mass	Concord, Sales Engrg. Co.	617-369-3943
Mich	Westland, Miltimore Sls.	313-349-5820
Mo	Kansas City, H.J. Weisler & Assocs.	
Mo	St. Louis, H.J. Weisler & Assocs.	
NM	Albuquerque, Arrowhead Sls.	505-247-0287
NY	Massapequa, Coughlin Assocs.	516-799-7743
NY	Rochester, Elcom Sales	716-385-1400
Ohio	Miamisburg, W. C. Schmidt	513-866-3640
Ohio	Richmond Heights, W. A. Rowell, Jr.	216-291-0647
Pa	Delmont, T.F. Laslo & Assocs.	
Pa	Doylestown, T.O.E. Sls.	215-348-5333
Tex	Dallas, W Reese Assocs.	214-638-6575
Utah	Salt Lake City, Arrowhead Sls.	801-487-3444
Wash	Seattle, R. K. Squibb	206-632-2450
FOR:	Can., Williowdale, Ont., A.C. Simmonds & Sons	

GUARDIAN ELECTRIC CO. OF CAL., 4030 W. Spencer St., Torrance, Cal., 90503, Tel: 213-542-8651; Empl.: 50

Products manufactured: Cards, Linear Function, Controls/Control Eqpt., Counters, Current Sensors, Drivers, Solenoid, Insertion Loss Measurement Systems, Monitors, Relays, Timers

Refer to Guardian Elec. Co. for Sales Offices

GUARDIAN ELECTRIC CO., 1550 W. Carroll Ave., Chicago, Ill., 60607

Products manufactured: Relays, Sockets, Solenoids, Switches, Timers

Local Sales Offices & Reps.

Cal	Palo Alto, O'Donnell Assocs.	415-327-9260
Cal	Torrance, O'Donnell Assocs.	213-323-9243
Colo	Arvada, Arrowhead Sls. Corp.	303-423-5556
Fla	Winter Park, Floritronics	305-886-4818
Ga	Atlanta, Electro-Mech. Eng. Sls.	404-256-4414
Haw	Honolulu, G. Piety Factors Inc.	808-841-0185
Ill	Chicago, F. Nitti	312-243-1100
Ind	Ft. Wayne, Needler Sls. Co.	219-447-2123
Ind	Indianapolis, Needler Sls. Co.	317-255-8056
Mass	West Concord, Sls. Eng. Co.	617-369-3943
Mich	Novi, Miltimore Sls.	313-476-2446
Minn	St. Paul, R.A. Karr	612-335-8552
Mo	Kansas City, H.J. Weisler & Assoc.	816-421-1679
Mo	St. Louis, H.J. Weisler & Assoc.	314-428-3934
NY	Binghamton, Elcom Sls.	607-723-9270
NY	Massapequa, Coughlan Assocs.	516-799-7743
NY	Rochester, Elcom Sls.	716-385-1400
NY	Whitesboro, Electro-Mech Sls. Eng. Co.	919-782-6452
Ohio	Cleveland, Depco	216-289-8188
Ohio	Miamisburg, W. Schmidt	513-298-4451
Pa	Doylestown, T.O.E. Sls. Inc.	215-348-2212
Tex	Dallas, Wm. Reese Assoc.	214-638-6575
Utah	Salt Lake City, Arrowhead Sls. Corp.	801-485-3362
Wash	Seattle, R.K. Squibb, Inc.	206-632-2450

GUDEBROD BROS. SILK CO., INC., Electronics Div., 12 South 12th St., Philadelphia, Pa., 19107, Tel: 215-WA2-1122

Products manufactured: Cords, Pads, Transistor Mounting, Retainers

Local Sales Offices & Reps.

Cal	Burbank	213-848-3962
Ill	Chicago	312-DE7-3025
Mass	Boston	617-HA6-5347
NY	New York	212-LA4-5858
NC	Charlotte	704-333-9591

GUDEMAN CORP., 340 W. Huron St., Chicago, Ill., 60610, Tel: 312-337-7400, TWX: 910-221-3863; Empl.: 180; Minimum order: $30 .... p. 2•138

For info on price: P. LoVecchio; Application info: T. Banach; Customer service: E. Kacheris; Delivery info: E. Kacher15

Products manufactured: Capacitors, Fixed, Filters

Local Sales Offices & Reps.

Ariz	Scottsdale, Piper-Goyne Co.	602-946-4437
Cal	Monrovia, Caltronic Sls.	213-359-2626
Cal	Mt. View, Melchior Assocs.	415-964-2321
Colo	Denver, Walker Assocs.	303-623-8713
Fla	Ft. Lauderdale, R.I. Smith Assocs.	305-772-5100
Ill	Hinsdale, Momak Sls.	312-654-4524
Ind	Ft. Wayne, R. G. Frederick	219-745-2461
Ind	Indianapolis, Electro Reps	
Mass	Chelmsford, Underwood Sls.	617-256-8191
Minn	St. Paul, Cullen & Assocs.	612-646-7371
Mo	Kansas City, R.R. Burton Sls.	816-644-8300
NJ	Englewood Cliffs, E. Glass Assocs.	201-592-0200
NY	Liverpool, George Corp.	315-652-8317
NY	Rochester, J. Semple Co.	716-342-1413
NC	Winston-Salem, C. Dula Assocs.	919-768-7166
Ohio	Cincinnati, A.C. Wahl Assocs.	513-821-3270
Ohio	Fairborn, R.G. Siff	513-252-7785
Pa	King of Prussia, Monteiro Assocs.	215-265-0634
Tex	Dallas, Evans & McDowell	214-238-7157
Wash	Olympia, Bergford Assocs.	206-866-2001

GUILDLINE INSTRS., INC., 1997 Palmer Ave., Larchmont, N.Y., 10538, Tel: 914-834-8100; Empl.: 85; Minimum order: $25

For info on price: V. Stein; Application info: E. Nemeroff; Customer service: V. Stein; Delivery info: B. Wright

Free literature available: Condensed Catalog - detailing precision electrical measuring instruments for temperature and voltage calibration.

Directory of Local Distributors Starts on page 401

Products manufactured: Amplifiers, Baths, Controlled Temperature (Air & Liquid), Batteries, Bridges, Calibrators, Chamber, Environmental Test, Choppers, Comparators, Controls/Control Eqpt., Dividers, Indicators, Meters, Oceanographic Equip. (Electronic), Potentiometers, Resistors, Standards, Testers, Transformers

GULTON INDS., INC., Elctrn. Comps. Div., Metuchen, N.J., 08840, Tel: 201-548-2800, TWX: 710-998-0592; Empl.: 125; Minimum order: $35

For info on price: V. Braza; Application info: E. Price; Customer service: V. Braza; Delivery info: V. Braza

Free literature available: Thermistor Catalog; EMI Filter Catalog; Piezoelectric Catalog; Thermal Printhead Catalog & Application Data.

Products manufactured: Circuits, Hybrid, Thick Film, Filters, Printers, Probes, Thermistors, Transducers

Local Sales Offices & Reps.

Cal	Los Angeles, Cal. Cem, Inc.	714-835-2702
Cal	Los Angeles, California-Caltronic Sales	213-359-2626
Cal	Monrovia, California-Caltronic Sales	213-359-2626
Cal	Mountain View, Tri-Rep	415-965-1822
Cal	San Diego, California - Cem, Inc.	714-835-2702
Cal	Santa Ana, California - Cem, Inc.	714-835-2702
Colo	Denver, Comtech	303-756-6815
Fla	Palm Beach Gardens, Florida-Service Representative Assoc.	305-622-4049
Ill	Westchester, Wasson-Gallagher	312-261-7517
Iowa	Cedar Rapids, J.R. Sls. Engrg.	319-377-8211
Md	Hyattsville, Eastern Components	301-577-2925
Mass	Chelmsford, Underwood Sls.	617-256-8191
Mich	Grand Rapids, Elko Sls.	616-949-1451
Minn	St. Paul, H.A. Cullen	612-646-7371
NJ	Oakland, W. E. Venator Assoc.	201-337-5387
NM	Albuquerque, Elctrn. Mktg.	505-265-7837
NY	Rochester, J.L. Semple	716-342-1413
NC	Winston-Salem, Dula Assocs.	919-768-7166
Ohio	Cincinnati, A.C. Wahl	513-821-3270
Ohio	Fairborn, R.G. Siff & Assocs.	513-252-7785
Ohio	Lyndhurst, A.C. Wahl	513-821-3270
Okla	Tulsa, Allied Comps.	918-939-2848
Tex	Dallas, Allied Comps.	214-238-0408

GULTON INDS., Connector Div., 6400 Roland St., Buena Park, Cal., 90621, Tel: 714-523-3480, TWX: 910-596-1489; Empl.: 90

Customer service: Sales Dept.

Products manufactured: Braid, Cable, Cable Assemblies & Harnesses, Cable, Connectors, Detectors, Feedthrus & Seals, Environmental, Headers, Lead Assemblies & Receptacles, Plugs, Seals, Services, Assembly, Production & Test, Terminals, Thermocouples, Elements & Accessories, Wire

Local Sales Offices & Reps.

Ariz	Scottsdale, Pete Murphy Assocs.	602-946-2457
Cal	Los Altos, P M Sls.	408-255-1771
Conn	W. Simsbury, Anchor Engrg.	203-658-6261
Md	Ellicott City, J. Winkler & Assocs.	301-465-8630
Mass	Wellesley Hills, Anchor Engrg.	671-235-6330
Minn	Minneapolis, Milt Westland Assocs.	612-884-4567
NM	Albuquerque, C. T. Carlberg Assocs.	505-265-1579
NY	Massapequa, Coughlin Assocs.	516-799-7743
Ohio	Dayton, A. D. Dircksen & Assocs.	513-256-0351
Tex	Irvine, Gordon V. Peck Co.	713-664-1435

GULTON INDS., INC., Measurement & Control Systems Div., Gulton Ind'l. Pk., E. Greenwich, R.I., 02818, Tel: 401-884-6800, TWX: 710-387-1500; Minimum order: $25 .... p. 1•868,869

Free literature available: Condensed Catalog of Instrumentation. Shows complete product line of Technirite analog and event recorders, Gulton printers, recorder building blocks, Rustrack miniature recorders, West controllers and Thermocouples.

Products manufactured: Amplifiers, Controls/Control Eqpt., Oscillographs, Direct Writing, Printers, Pyrometers, Recorders, Thermocouples, Elements & Accessories

Local Sales Offices & Reps.

Ala	Huntsville, Beacon Elctrns. Assoc.	205-881-5031
Ariz	Scottsdale, Williams Assoc.	602-947-4297
Cal	Costa Mesa, Gulton M.C.S. Div.	714-646-4424
Cal	Palo Alto, E.V. Roberts & Assoc.	415-494-1671
Cal	San Diego, Lodan	714-279-6383
Colo	Denver, Williams Assoc. Inc.	303-373-4730
Conn	Glastonbury, Instr. Reps. Inc.	203-633-0777
Fla	Fort Lauderdale, Beacon Elctrn. Assoc.	305-622-2770
Fla	Jacksonville Beach, Lewis M. Crowe Co.	904-249-8888
Fla	Maitland, Beacon Elctrns. Assoc.	305-622-2770
Fla	Orlando, W.A. Brown Comp. Inc.	305-425-5505
Fla	St. Petersburg, Lewis M. Crowe Co.	813-894-0249
Ga	Atlanta, Beacon Elctrn. Assoc.	404-351-3654
Haw	Honolulu, Yett Co. Inc.	808-847-2521
Ill	Chicago, Pivan Engrg. Co.	312-539-4838
Ind	Ft. Wayne, Scott Elctrns.	219-743-1586
Ind	Hammond, B & B Instrs.	312-731-0878
Ind	Indianapolis, Pivan Engrg.	317-253-1681
Iowa	Des Moines, Harry E. Ferris Co.	515-255-5008
Kans	Olathe, Tech Reps	913-782-1177
La	New Orleans, Gilbert & Assocs.	504-866-7444
Md	Glen Burnie, Faber-Renoff	301-768-4554
Md	New Carrollton, W.A. Brown Equip. Comp. Inc.	301-577-4527
Mass	Lexington, Instr. Reps. Inc.	617-861-8620
Mass	Norwood, Gibson Engrg. Co.	617-769-3600
Mich	Detroit, S. Sterling Co.	313-255-1970
Mich	Farmington, Applied Instrs. Co.	313-476-9060
Minn	Minneapolis, Heimann Co.	612-861-6051
Minn	Minneapolis, Automated Controls,	612-377-7727
Mo	Hazelwood, Tech. Reps. Inc.	314-731-5200
Mo	Kansas City, Boschert Equip. Co.	816-561-4050
Mo	University City, E. Mooney Co.	314-725-8875
Ohio	Cincinnati, Scott Elctrns.	513-791-2513
Mo	Kansas City, Boschert Equip. Co.	861-561-4050
NJ	Metuchen, Gulton M.C.S. Div.	201-548-2800
NJ	Newark, Norman Bragar Co.	201-344-1100
NM	Albuquerque, Williams Assoc. Inc.	505-255-1638
NY	Buffalo, Niagara Elec. Sls. Co.	716-886-4000
NY	E. Syracuse, Niagara Elec. Sls. Co.	315-437-1656
NY	Rochester, Niagara Elec. Sls. Co.	716-271-1223
NY	Syracuse, Labtronics Inc.	315-454-9314
NC	Charlotte, James L. Highsmith & Co.	704-333-7743
NC	Raleigh, W. A. Brown Comp.,	919-876-9601
NC	Winston-Salem, W.A. Brown Comp. Inc.	919-725-5384
Ohio	Cincinnati, Schlemmer Assocs.	513-522-8340
Ohio	Cleveland, Comtel-Sterling Co.	216-442-8080
Ohio	Columbus, Scott Elctrns.	614-236-8619
Ohio	Dayton, Comtel-Sterling Co.	513-298-7573
Okla	Tulsa, Kemp Engrg.	918-299-2636
Ore	Portland, Branom Instr. Co.	503-285-9861
Pa	King of Prussia, Applied Controls	215-265-3832
Pa	Murrysville, Bock Engring. Co.	412-327-3700
Pa	Pittsburgh, Comtel Sterling	412-922-5720
SC	Spartanburg, Beacon Elctrn. Assoc.	803-582-4613
Tenn	Memphis, Gilber & Assocs.	901-767-7894
Tex	Addison, Kemp. Engrg. Co.	214-661-0400
Tex	Arlington, Pan Tech. Engrg. Co.	817-261-4111
Tex	Houston, Kemp Engrg. Co.	713-688-1431
Va	Alexandria, W.A. Brown Equip. Comp. Inc.	703-836-1800
Va	Richmond, James L. Highsmith & Co.	804-272-5888
Wash	Seattle, Arva-Hudson	206-622-0177
Wisc	Brookfield, Pivan Engrg. Co.	414-786-1940
Wisc	Menomonee Falls, Fritz Engrg. Sls. Co.	414-251-6590

Local Distributors

Alas	Anchorage, Denali Services Co., POB 4895	907-277-5594
Ariz	Phoenix, Metermaster, 2633 E. Backeye Rd.	602-273-7331
Ariz	Phoenix, R.V. Weatherford, 1917 N. 25th Dr.	602-272-7144
Ark	El Dorado, Indl. Elctrns. Supp., 413 W. Main St.	501-862-4901
Ark	Little Rock, Carlont-Bates Co., 6821 Scott Hamilton Dr.	501-375-2383
Cal	Culver City, E.V. Roberts, 9601 W. Jefferson Blvd.	213-870-9561
Cal	Gardena, Instr. Labs, 1323 W. 130th St.	213-770-0650
Cal	Glendale, R. V. Weatherford Co., 6921 San Fernando Rd.	213-849-3451
Cal	Inglewood, Newark Elctrns. Corp., 4747 W. Century Blvd.	213-678-0441
Cal	Los Angeles, Fisher/Brownell, 13936 S. Broadway	213-532-2170
Cal	Los Angeles, Metermaster, 5646 Jillson St.	213-685-4340
Cal	Palo Alto, Metermaster, 3969 E. Bayshore Rd.	415-968-0313
Cal	Palo Alto, R.V. Weatherford Co., 3240 Hillview Rd.	415-321-5373
Cal	San Diego, R.V. Weatherford Co., 7872 Raytheon Rd.	714-278-7400
Cal	Santa Clara, Fisher/Brownell, 3381 Edward Ave.	408-244-6182
Colo	Denver, Newark Elctrns. Corp., 2170 S. Grape St.	303-757-3351
Colo	Denver, Waco, 4616 Ironton St.	303-371-4370
Conn	Middletown, Mancib Co., POB 781	203-347-5629
Fla	Lakeland, A.A. Elctrns. Div. of Auto. Engrg. Co., 2112 S. Combee Rd.	813-682-6181
Fla	Orlando, Brownell Electro., 307 27th St.	305-843-6770
Ga	Atlanta, Brownell Electro, 3020 Commerce Way	404-762-5181
Haw	Honolulu, Yett Co., 429 Waiakamilo Rd.	808-847-2521
Ill	Chicago, Allied Elctrns., 2400 W. Washington Blvd.	312-421-2400
Ill	Chicago, Newark Elctrns. Corp., 550 N. Pulaski Rd.	312-638-4411
Ill	Elk Grove Village, Metermaster, 121 Gordon St.	312-593-8650
Ill	Oak Park, Pacific Indicator Co., 6603 W. North Ave.	312-383-0220
Ill	Worth, Premium Instrs. Co., 5821 W. 117th Pl.	312-371-0500
Ind	Chesterton, Instr. Sys., POB 13	219-926-3078
Ind	Ft. Wayne, Ft. Wayne Elctrns. Supp., 3606 Maumee Ave.	219-742-4346
Ind	Indianapolis, Pioneer/Indiana, 6408 Castleplace Dr.	317-849-7300
Ind	South Bend, Radio Dist. Co., 1212 High St.	219-288-4666
Iowa	Ames, Skarshaug Engrg. & Testing Lab, 4803 W. Lincoln Way	515-292-1422
Kans	Wichita, Main Elctrns., 225 Ida St.	316-267-3581
La	Lafayette, Ralph's, 3004 Cameron St.	318-234-4507
La	Shreveport, Analytical Logging, 1610 Well Island Rd.	318-424-8126
La	Shreveport, Indl. Elctrn. Supp., 2424 Greenwood Rd.	318-222-9459
Md	Elkridge, Sunshine Scientific Instrs., 5800 Main St.	301-796-5600
Mass	Burlington, Mancib Co., Middlesex Tnpk. at A St.	617-272-9450
Mass	Norwood, Timer Srv., 90 Broadway	617-769-3600
Ill	Worth, Premium Instrs. Co., 5821 W. 117th Pl.	312-371-0500
Minn	Minneapolis, Instr. Control Co., 2401 E. Franklin Ave.	612-336-7744
Minn	Virginia, NWR Elctrns., POB 118	218-741-5080
Miss	Jackson, Ellington Elctrns. Supp., 1425 Terry Rd.	601-335-0561
Mo	St. Louis, Indl. Srvc. Labs, 4354 Olive St.	314-535-5760
Mo	St. Louis, Olive Indl. Elctrns., 6662 Olive Blvd.	314-863-7800
NJ	Newark, Norman Brager Prods Co., 350 Lafayette St.	201-344-1101
NJ	Princeton, Science Assocs., 230 Nassau St.	609-924-4470
NM	Albuquerque, WACO, 420 Washington SE	505-255-1638
NY	Albany, Edwain E. Taylor Co., 465 Central Ave.	518-489-5600
NY	Buffalo, Summit Distrs., 916 Main St.	716-884-3450
NY	Long Island City, Metermod ilstr. Corp., 48-15 31st Ave.	212-726-4850
NC	Charlotte, Brownell Electro, 5141 Bellhaven Blvd.	704-393-4341
NC	Charlotte, Sys. Svc. Corp., POB 17525	704-377-3407
NC	Matthews, W.K. Hile, POB 1015	704-847-9125
NC	Winston-Salem, Kirkman Elctrns., Drawer K Salem Sta.	919-724-0541
Ohio	Cincinnati, Hughes Peters, 4865 Duck Creek Rd.	513-351-2000
Ohio	Cleveland, Pioneer Standard Elctrns., Pioneer Elect-Instrs. Lab., 4800 E. 131 St.	216-587-3600
Ohio	Columbus, Hughes Peters, 481 E. 11th Ave.	614-294-5351
Ohio	Dayton, Pioneer/Dayton, Div. of Pioneer-Standard Elctrns., 1900 Troy St.	513-224-0971
Okla	Tulsa, Oil Capitol Elctrns. Corp., Admiral Sta. Box GG	918-836-2451
Pa	Philadelphia, Sunshine Scientific Instrs., 1810 Grant Ave.	215-673-5600
Pa	Pittsburgh, Air Serco, 3875 Bigelow Blvd.	412-621-6980
Pa	Pittsburgh, Cameradio, 2810 Liberty Ave.	412-288-2600
Pa	Pittsburgh, T.F. Campbell Co., 1521 Saw Mill Run Blvd.	412-881-8006
Tenn	Memphis, Bluff City Distr. Co., 234 East St.	901-725-9500

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Tenn Memphis, Brownell Electro., 217 Cumberland St. 901-452-2181
Tenn Nashville, Brownell Electro, 1050 Acorn Dr. 615-889-8230
Tex Beaumont, Ralph Indl. Elctrns., 1203 Broadway 713-833-9443
Tex Dallas, Dallas Instrs., 10205 Plano Rd. 214-341-0504
Tex Dallas, Economy Gauge, Div. of McGatlin, 11035 Harry Hines Blvd. 214-358-5381
Tex Houston, American Analog, 11207 Sagehaven Dr. 713-481-6520
Tex Houston, Van London Co., 2422 Robin Hood 713-526-1567
Tex Stafford, Southwest Elctrns., 12725 Royal Dr. 713-494-6021
Utah Salt Lake City, Control Equip. Co., 2255 S. 2nd W. 801-487-7741
Va Richmond, Meridan Elctrs., Div. of Sterling Elec., 1001 W. Broad St. 804-355-6521
Wash Seattle, Arva-Hudson, 1320 Prospect St. 206-622-0177
WVa Charleston, Williams & Co., 1010 F. St. 304-744-5365
Wisc Cedarburg, Automation Engrg. Co., 1200 Highway 143, ... 414-377-7500
Wisc Milwaukee, Electro-Mechano Co., 241 Erie St. 414-272-4050

GULTON INDS., INC., Servonic/Instrumentation Div., 1644 Whittier Ave., Costa Mesa, Cal., 92627, Tel: 714-642-2400, TWX: 910-596-1352; Empl.: 225; Minimum order: $50

For info on price: J. W. Strosnider; Application info: J. C. Pennock; Customer service: L. McKnight; Delivery info: Contracts

Free literature available: Will be supplied on request for any specific product.

Products manufactured: Accelerometers, Amplifiers, Gages, Microphones, All Kinds, Switches, Thermocouples, Elements & Accessories, Transducers

Local Sales Offices & Reps.
Cal Burlingame, Banner Aircraft Int'l. 415-697-8310
Cal Los Altos, Jay Stone & Assocs. 415-948-4563
Cal Los Angeles, Thorson Co.
Cal Mission Viejo, Miracle & Assocs. 714-586-5510
Cal San Diego, Miracle & Assocs. 714-276-8619
Colo Littleton, Pond Assocs., Inc. 303-798-2904
Conn No. Haven, Kitchen & Kutchin, Inc. 203-239-0212
Fla Clearwater, Reynolds & Assocs. 813-726-2373
Fla Ft. Lauderdale, Reynolds & Assocs. 305-581-6611
Fla Hollywood, Reynolds & Assocs. 305-987-6720
Fla Palm Beach Gardens, Reynolds & Assocs. 305-622-6850
Fla Satellite, Reynolds & Assocs. 305-773-4700
Fla St. Petersburg, Reynolds & Assocs. 813-360-1484
Ga Atlanta, Reynolds & Assocs. 404-252-5360
Ill La Grange, Olson Engrg. & Sls. 312-482-3300
Ind Anderson, Olson Engrg. & Sls. Corp. 317-644-1690
Kans Leawood, Thunderbird Tech. Sls. & Svcs. 913-642-7220
Kans Wichita, Thunderbird Tech. Sls. & Svcs. 316-684-3941
Md Baltimore, Stemler Assocs., Inc. 301-944-8262
Mass Lexington, Kitchen & Kutchin, Inc. 617-862-8230
Mich Detroit, K.V.A. Assocs. 313-892-6000
Minn Minneapolis, Westlund Assocs. 612-886-5002
Mo St. Louis, Thunderbird Tech Sls. & Svcs. 314-567-6488
NJ Cherry Hill, Stemler Assocs. 609-966-4070
NJ Laurel Springs, Stemler Assocs. 215-644-3477
NJ Springfield, SM Service & Tech., Inc. 201-232-2666
NY Chappaqua, R. M. Glueck & Assoc. 914-238-3233
NC Charlotte, Reynolds & Assocs.
Ohio Cleveland, Instrumentation Sys. 216-486-0782
Ohio Dayton, Instrumentation Sys. Inc. 513-294-2838
Pa Pittsburgh, Instrumentation Sys., Inc. 412-243-1111
Tex Garland, Gordon V. Peck Co. 214-341-8311
Tex Houston, Gordon V. Peck Co. 713-664-1435
Utah Salt Lake City, Applied Engrg. Prods. Co. 801-582-4942
Va Alexandria, Stemler Assocs. 703-548-7818
Wash Bellevue, Thorson Co. 206-455-9880
Wisc Milwaukee, Olson Engrg. & Sls. Corp. 414-873-7330

GULTON INDS., Piezo Prods. Div., Box 4300, Fullerton, Cal., 92634, Tel: 714-871-2150, TWX: 910-592-1247; Empl.: 100; Minimum order: $150

For info on price: H. Kelly; Application info: C. Edmiston; Customer service: C. Edmiston; Delivery info: R. Johnson

Free literature available: Gulton Glennite Piezoceramics catalog, H-700, contains the specifications of our materials, describes some standard shapes and sizes and provides basic engineering application notes.

Products manufactured: Ceramic Resonators, Crystals, Transducers

G.V. CONTROLS, INC., 80 Okner Parkway, Livingston, N.J., 07039

H-B INSTR. CO., 4315 N. American St., Phila., Pa., 19140, Tel: 215-329-9125; Empl.: 45; Minimum order: $20

For info on price: E. D. Hiergesell; Application info: C. G. Roveran; Customer service: C. G. Roveran; Delivery info: F. J. Freitag

Free literature available: The new H-B Relay/Thermostat Catalog features precision thermostats, solid state relays, and mercury plunger relays with capacaties up through 100 amps for all applications.

Products manufactured: Controls/Control Eqpt., Indicators, Meters, Relays, Services, Assembly, Production & Test, Standards, Switches, Thermostats

HACKENSACK CABLE CORP., 3275 Sunset Blvd., West Columbia, S.C., 29169, Tel: 803-796-3070; Empl.: 115; Minimum order: $25

Customer service: J. Floyd

Free literature available: Cable Catalog - wire ropes and cables made of stainless steel, galvanized steel, bronze, monel bare and coated with nylon and vinyl.

Products manufactured: Cords, Wire

Local Sales Offices & Reps.
Cal Long Beach, Hackensack Cable Corp. 213-424-1659
Fla Miami, J.M. Keely Sls. 305-634-8526
NJ South Hackensack, Hackensack Cable Corp. 201-487-1036
Ohio North Olmsted, Hackensack Cable Corp. 216-734-6190
Tex Houston, R.D. Chapman 713-681-6221

HACKER INSTRS., INC., Box 646, Fairfield, N.J., 07006, Tel: 201-226-8450; Empl.: 10; Minimum order: $5

For info on price: K. S. Lanye; Application info: I. E. Hills; Customer service: I. E. Hills; Delivery info: K. S. Lanye

Products manufactured: Meters, Microscopes, Testers

HADLEY COMPONENTS DIV., GTI Corp., R.D. #2, Box 77, Hadley, Pa., 16130, Tel: 412-253-3161, Telex: 914-545

Customer service: R. C. Kaufman

Free literature available: Brochure outlining Hadley Components capabilities and current product lines.

Products manufactured: Capacitor, Hardware, Forms, Wire, Lead Assemblies & Receptacles, Resistor, Hardware, Services, Assembly, Production & Test, Wire

Local Sales Offices & Reps.
Ala Huntsville, 20th Century Mktg. 205-772-9237
Ariz Tempe, Gassner & Clark Co. 602-968-9037
Cal Canoga Park, California Elctrn. Mktg. 213-884-7867
Cal San Mateo, California Elctrn. Mktg. 415-574-1113
Cal Santa Ana, California Elctrn. Mktg. 714-835-2702
Cal Santa Clara, GTI Corp. 408-244-2938
Colo Boulder, Mile High Elctrns. 303-444-5615
Conn Brookfield, E.J. Hughes Assocs. 203-775-4541
Conn Old Saybrook, E.J. Hughes Assocs. 203-399-7636
Fla Longwood, Lenz Engrg. 305-831-9797
Ill Westchester, Gassner & Clark Co. 312-345-4245
Ind Indianapolis, Electronic Sls. & Engrg. Co. 317-849-4260
Mass Attleboro, E.J. Hughes Assocs. 617-226-0050
Mass Beverly, E.J. Hughes Assocs. 617-927-7171
Mich Southfield, Eynon-Weyand Assocs. 313-354-3430
Minn Minneapolis, D.G. Perry & Co. 612-920-3212
NJ Brielle, Semi-Mat Co. 201-528-7439
NJ Shrewsbury, GTI Corp. 201-842-6682
NY Skaneatelis, MCK Assocs. 315-685-7122
NC Charlotte, B. Henry Assocs. 704-375-8958
Ohio Dayton, Sidnell Co. 513-885-4161
Ohio Mentor, Bishop Co. 216-255-6969
Tex Richardson, R.S. Marston Co. 214-235-3577

HALEX, INC., Box 2940, Torrance, Cal., 90509, Tel: 213-772-4461; Minimum order: $1000

For info on price: M. J. Bergquist Ext. 26; Application info: Y. Tonai Ext. 34; Customer service: R. C. Sivas Ext. 28; Delivery info: R. C. Sivas Ext. 28

Products manufactured: Amplifiers, Circuits, Hybrid, Thin-Film, Networks, Resistors

Local Sales Offices & Reps.
Ariz Phoenix, W. W. Posey Co. 602-949-9395
Cal Los Altos, W. W. Posey Co. 415-948-7771
Colo Eastlake, Jensen Reps. 303-452-1609
Fla Atamonte Springs, WMM Assocs. 305-831-4645
Fla Clearwater, WMM Assocs. 813-726-8871
Fla Pompano Beach, WMM Assocs. 305-943-3091
Ill Northbrook, Raines-Brin Assocs. 312-498-0890
Mass Norwood, R. Perron & Co. 617-762-8114
Minn Hopkins, Grayden & Flemmer 612-941-1120
Mo Grand View, Beneke & McCaul 816-765-2998
NJ Cranford, Idalee Elctrn. Corp.
NY Hyde Park, R.P. Kennedy Co., Inc. 914-229-2269
NY Rochester, R. P. Kennedy Co. 716-271-6322
NY Valley Stream, Idalee Elctrn. Corp. 516-825-8955
Wash Seattle, Underwood & Underwood 206-243-2133

HALMAR ELECTRONICS, INC., 1544 W. Mound St., Columbus, Ohio, 43223, Tel: 614-276-0131, TWX: 810-482-1654; Empl.: 70; Minimum order: $20

For info on price: Sls. Dept.; Application info: Sls. Dept.; Customer service: T. Koerber; Delivery info: Sls. Dept.

Products manufactured: Controls/Control Eqpt., Current Sensors, Integrators, Electronic, Meters, Monitors, Power Supplies, Regulators, Relays, Switches, Totalizers, Digital, Transducers, Transformers

HAMAMATSU CORP., 120 Wood Ave., Middlesex, N. J., 08846, Tel: 201-469-6640, Telex: 83-3403; Empl.: 450
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Customer service: R. Eno

Products manufactured: Amplifiers, Cameras, Cells, Photoconductive, Photoemissive, Photovoltaic, Detectors, Diodes, Lamps, Light Sources, Photoelectric, Lights, Photomultiplier Tube Housings, Power Supplies, Television Systems & Equipment Closed-Circuit, Tubes

Local Sales Offices & Reps.
Cal Burlingame, California Eastern Labs 415-342-7744

HAMAMATSU TV CO., LTD., 1126 Ichino-Cho, Hamamatsu City, Shizuoka Pref., Japan, Tel: 0534-34-3311; Empl.: 530

For info on price: R. Eno 201-469-6640; Application info: R. Eno 201-469-6640; Customer service: C. Simola 201-469-6641; Delivery info: C. Simola 201-469-6641

Products manufactured: Analyzers, Bolometers, Cameras, Cells, Photoconductive, Photoemissive, Photovoltaic, Coils Including Assemblies & Forms, Detectors, Diodes, Lamps, Light Sources, Photoelectric, Monitors, Photomultiplier Tube Housings, Power Supplies, Sensors, Light, Shields, Television Systems & Equipment Closed-Circuit, Tracking Systems, Tubes

Local Sales Offices & Reps.
NJ Middlesex, Hamamatsu Corp. 201-469-6640

HAMILTON STANDARD, Div. United Aircraft Corp., Windsor Locks, Conn., 06096, Tel: 203-623-1621, TWX: 710-420-0584

HAMILTON TECHNOLOGY, INC., a Sub. of HMW Industries Inc., Box 1609, Lancaster, Pa., 17604, Tel: 717-299-2581; Empl.: 1000

For info on price: S. L. Snyder; Application info: S. L. Snyder; Customer service: T. Murray; Delivery info: S. L. Snyder

Free literature available: Ultra-Thin metal strip and foil; Precision parts and assembly. New faciliities brochure provides complete properties of proprietary metals, commercial alloys, pure metals, precisin piece-parts and assembly.

Products manufactured: Alternators, Foil, Gears & Gear Mechanisms (Precision), Heads, Recording Playback, Erase, Laminations, Magnets, Metal Compounds, Foils, Powders, Sheet, Stock, Services, Assembly, Production & Test, Wire

Local Sales Offices & Reps.

Cal	Costa Mesa, Hamilton Tech., Inc.	714-546-0780
Cal	Los Angeles, E. A. Wilcox Co.	213-723-6436
Colo	Denver, Electro-Rep, Inc.	303-744-2655
Conn	W. Hartford, R. S. Pettigrew & Co.	203-233-8533
Ill	Chicago, Electro-Comp Sls., Inc.	312-763-3636
Mass	W. Newton, R. S. Pettigrew & Co.	617-969-5770
Minn	Navarre, MagCo, Inc.	612-471-8538
Mo	St. Louis, Holtgrieve & Co.	314-725-6602
NJ	Asbury Park, Lancaster Ind'l. Sls., Inc.	201-988-5401
NM	Albuquerque, Electro-Rep, Inc.	505-256-1749
Ohio	Grafton, A. W. Risser Co.	216-458-5091
Pa	Lancaster, Lancaster Ind'l. Sls., Inc.	717-397-2942
Wash	Seattle, E. A. Wilcox Co.	206-243-5450

HAMLIN INC., Lake & Grove Sts., Lake Mills, Wisc., 53551, Tel: 414-648-2361, TWX: 910-260-3740; Empl.: 800; Minimum order: $100

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For info on price: Cust. Serv. Desk; Customer service: Cust. Svc. Desk; Delivery info: Cust Svc Desk

Free literature available: Free descriptive literature with application help and specifications covering: Reed switches, dry and mercury-wetted; Sensors, temperature and proximity; Relays, opto-isolated solid state and hybrid; Liquid displays, dynamic scattering and field effect, for watches, clocks and instrumentation.

Products manufactured: Display Devices/Displays, Relays, Switches, Transducers

Local Sales Offices & Reps.

Ariz	Phoenix, Zeus, Inc.	602-258-7519
Cal	El Toro, Electronic Component Mktg.	714-830-3939
Cal	Palo Alto, Testco Inc.	415-494-2011
Cal	Pico Rivera, Westrep	213-949-2551
Cal	San Diego, Elctrn. Comp.	714-273-1346
Cal	Woodland Hills, Elctrn. Comps. Mktg.	213-340-1745
Colo	Denver, Zeus, Inc.	303-770-4400
Conn	Berlin, White Sls. Co.	203-224-0423
Fla	Hollywood, Wallace Elctrn. Sls.	305-961-6640
Fla	Tampa, Wallace Elctrn. Sls.	813-961-1037
Ga	Jonesboro, Wallace Elctrn. Sls.	404-471-6297
Ill	Des Plaines, Lincoln, Hodges	312-297-3810
Ill	Palatine, CC Elctrns. Sls.	312-358-8900
Ind	Indianpolis, R.H. Newsom Assoc.	317-849-4442
Iowa	Marion, Thomas & Modrcin	319-377-6261
Kans	Shawnee Mission, Thomas & Modrcin	913-432-2131
Md	Woodbine, Naudain Assoc.	301-422-2270
Mass	Needham, White Sls. Co.	617-444-3676
Mich	Dearborn, V.P.I. Inc.	313-271-4600
Minn	Minneapolis, R-J, Inc.	612-922-1425
Mo	Hazelwood, Thomas & Modrcin	314-895-4700
NJ	Mount Laurel, Naudain Assoc.	609-235-1801
NM	Albuquerque, Zeus, Inc.	505-256-9831
NY	DeRuyter, R.P. Kennedy Co., Inc.	315-662-3996
NY	Manhasset, Win-Cor Elctrn.	516-627-9474
NY	Red Hook, R.P. Kennedy Co., Inc.	914-876-2700
NY	Rochester, R. Kennedy	716-271-6322
NC	Greensboro, Wallace Elctrn. Sls.	919-292-0487
NC	Kernersville, Wallace Elctrn. Sls.	919-993-3993
Ohio	Cincinnati, G & H Sales Co.	513-771-8231
Ohio	Grove City, G & H Sales Co.	614-878-1128
Tenn	Memphis, Wallace Elctrn. Sls.	901-682-2281
Tex	Dallas, Allied Comp., Inc.	214-238-0408
Tex	Houston, Allied Comp., Inc.	713-691-3961
Utah	Salt Lake City, Zeus, Inc.	801-486-2317
Wash	Bellevue, Testco, Inc.	206-454-7422
Wisc	Waukesha, Lincoln Hodges	414-542-3087

Local Distributors

Ala	Huntsville, Mock Elctrns., 2310 Memorial Pkwy. S.	205-539-2401
Cal	Palo Alto, Testco, 941 Charleston Rd.	415-326-5320
Cal	Van Nuys, Patane Avionics, 5937 Kester Ave.	213-988-4455
Colo	Denver, Ind. Elctrns., Box 22457	303-771-2636
Conn	New Haven, Hatry Ectrns., 610 Blvd.	203-787-5921
Fla	Miami, ESL, 3560 N.W., 34th St.	305-633-6975
Ga	Augusta, Dixie Radio Supp., 1234 Gordon Pk. Rd.	404-722-2055
Ill	Chicago, Newark Elctrns., 500 N. Pulaski Rd.	312-638-4411
Ill	Westmont, Bodelle Co., 47 Chestnut La.	312-323-9670
Ind	Indianapolis, Graham Elctrns., 133 S. Pennsylvania	317-634-8486
Md	Gaithersburg, Pioneer/Washington, 9100 Gaither Rd.	301-948-0710
Mass	Dedham, Gerber Elctrns., 852 Providence Hwy.	617-329-2400
Mich	Ann Arbor, Wedemeyer Elctrn. Supp., 2280 S. Ind. Hwy.	313-665-8611
Mich	Farmington, Harvey-Michigan, Inc., 23461 Ind. Pk. Dr.	313-477-1650
Minn	Edina, Harvey-Minnesota, Inc., 6969 Washington Ave. S.	612-941-6060
Miss	Pascegoula, May Elctrns., 2514 Market St.	601-762-1900
NJ	Pennsauken, Resco Elctrns., Airport Indl. Pk.	609-662-4000
NM	Buffalo, Summit Dist., 916 Main St.	716-884-3450
NY	Farmingdale, Norelcom Elctrns., 200 Allen Blvd.	516-249-7245
NY	Lynbrook, Peerless Radio Corp., 19 Wilbur St.	516-593-2121
NC	Greensboro, Hammond Elctrns., 2923 Pacific Ave.	919-275-6391
NC	Winston-Salem, Kirkman Elctrns., Drawer "K" Salem Sta.	919-724-0541
Ohio	Solon, Repco, 6835 Cochran Rd.	216-248-8900
Okla	Tulsa, Radio, Inc., 1000 S. Main St.	918-587-9124
Pa	Pittsburgh, RPC Elctrns., 620 Alpha Dr.	412-782-3770
RI	Providence, Wm. Dandreta & Co., 38 Wolcott St.	401-861-2800
SC	Columbia, Dixie Radio Supp. Co., 1900 Barnwell	803-253-5333
Tenn	Fort Worth, Allied Elctrns., 401 E. 8th St.	817-336-5401
Tex	Dallas, KA Elctrn. Sls., 1220 Majesty Dr.	214-634-7870
Va	Richmond, Meridian Elctrns., 1001 W. Broad St.	
Wash	Seattle, Radar Elec. Co., 168 Western Ave. W.	206-282-2511

HANDY & HARMAN, 850 Third Ave., New York, N.Y., 10022, Tel: 212-752-3400; Empl.: 800

Customer service: T. M. Hansen

Free literature available: Bulletin 202A: 12 page booklet on alloys and fluxes. Advantages of silver alloy brazing; "The Logic of Precious Metal Cladding." How to gain properties of a precious metal while conserving use of costly material explained.

Products manufactured: Alloys, Flux, Brazing & Soldering Materials, Metal Compounds, Foils, Powders, Sheet, Stock, Metal Oxides, Metals, Preforms, Precious Metal, Wire

Local Sales Offices & Reps.

Cal	El Monte	213-283-8181
Ill	Elk Grove Village	312-437-3883
Mass	Attleboro	617-226-1000
Mich	Southfield	313-356-5390
NY	New York	212-752-3400
Ohio	Cleveland	216-333-2166
Tex	Dallas	214-351-5890

HANKSCRAFT CO., Motor Div., PO Box 120, Reedsburg, Wisc., 53959, Tel: 608-524-4341; Empl.: 400

Customer service: E. F. Gesteland

Free literature available: Catalog Sheet - Series 3440 D.C. Gearhead Motor - Gives demensions, characteristics and voltages and speeds available.

Products manufactured: Motors

Local Sales Offices & Reps.

Cal	Mountain View, Caltron-Pyle	415-964-3244
Cal	Westminster, Electric Motor Specialists	213-564-7323
Ga	Atlanta, V. Avis McCorvey Co.	404-636-2502
Ill	Libertyville, Matthews-Midwest Co.	312-362-8200
Ind	Indianapolis, W.F. Sondermann	317-849-2769
Md	Bethesda, Mount & Co.	301-530-9303
Mass	Salem, Forbes Engrg.	617-744-1693
Mich	Jackson, N. Scroggs Co.	517-782-5211
Minn	St. Paul, W.E. Taubert	612-776-1285
NJ	Mahwah, Kent Assocs.	201-327-7878
NY	Skaneateles, Henkell Mktg. Co.	315-685-6945
Ohio	Fairborn, Technical Assocs.	513-878-2484
Tex	Bellaire, Dynamic Comp. Sls., Inc.	713-668-7729
Wash	Seattle, R.K. Squibb, Inc.	206-632-2450

HANSEN MFG. CO., Div. P.R. Mallory & Co. Inc., Box 23, Princeton, Ind., 47670, Tel: 812-385-3415; Empl.: 350

Products manufactured: Motors, Slip-Rings & Assemblies

Local Sales Offices & Reps.

Cal	Fremont, H.K.F. Inc.	415-863-2200
Cal	Sherman Oaks, R.S. Hopkins Co.	213-788-5501
Conn	Essex, Winslow Elec. Co.	203-767-8229
Ill	River Forest, Fromm Co.	312-771-6000
Mich	Grand Rapids, J. Orr Assocs.	616-534-4029
NJ	Teaneck, H. Rude Assocs.	201-836-6778
NY	Rochester, H.C. Johnson Agency, Inc.	716-482-3000
Pa	Devon, Kiley Elec. Co.	215-687-9340
Tex	Dallas, Carey & Assocs.	214-363-7813
Tex	Houston, Carey & Assocs.	713-460-1111
Wash	Vancouver, H.K.F. Inc.	503-228-1683

HAPCO, Box 1205, Boulder, Colo., 80302, Tel: 303-447-0441; Empl.: 4

For info on price: P. Wojtisek; Application info: P. Wojtisek; Customer service: J. Snyder; Delivery info: P. Wojtisek

Products manufactured: Drafting Machines, Drafting Symbols, Dry Transfer, Pressure Sensitive, etc. (Including Lettering), Drills & Accessories, Hand & Power, Eyelets, Templates, Printed Circuit Design

HARBISON IND'L. PRODS., INC., 7205 Hibbs La., Levittown, Pa., 19057, Tel: 215-943-9000; Empl.: 115

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Products manufactured: Bobbins, Winding, Coil & Transformer, Coils Including Assemblies & Forms, Services, Assembly, Production & Test

Local Sales Offices & Reps.

Tex	Richardson, Corwin Assocs.	214-424-8333

HARDMAN INC., Belleville, N.J., 07109, Tel: 201-751-3000; Empl.: 85; Minimum order: $25

Customer service: T. M. Stefanelli

Free literature available: Double/Bubble: 2-part epoxy adhesive job-sized packet DPR Compounds: Pourable elastomers for mold-making Epoweld: Two-part, non-sag epoxy adhesive

Products manufactured: Adhesives (All Types), Chemicals, Cleaners & Solvents, Coatings, Compounds, Encapsulating, Insulating, Molding, Potting, Insulators & Insulation, Kits, Cable-End Sealing, Meters, Plastic Raw Materials, Liquids, Pellets, Powders, Resins, Rubber, Seals, Services, Assembly, Production & Test

Local Sales Offices & Reps.

Cal	Los Altos, Astroel, Inc.	415-948-3636
Conn	Hartford, C. Segal Co.	203-236-2027
Fla	Maitland, D & E Assocs.	305-644-3039
Ill	Chicago, Techrep Inc.	312-761-0548
Mass	Newtonville, C. Segal Co.	617-969-6900
Mich	Ferndale, Tiby Co.	313-547-3550
NJ	Flemington, Eric Sheard	201-782-6492
NJ	Old Bridge, Seaco	201-679-8800
NY	Copake Falls, A.L. Perkins Co.	518-329-1428
NY	New York City, Henley & Co.	212-986-5544
Ohio	Cleveland, Tiby Co.	216-371-5335
Ohio	Dayton, Tiby Co.	513-277-3822
SC	Myrtle Beach, Candor Co.	803-448-8361
Tex	Dallas, Apogee Engrg. Svcs.	214-352-2083
Wash	Seattle, Atlas Packing & Rubber Co.	206-623-4697
Wash	Seattle, Houston Co.	206-622-0750
FOR:	Can., Toronto, Ont., Ware Chemical of Can. Ltd.	416-233-1234

HAROWE SERVO CONTROLS, 48 Westtown Rd., W. Chester, Pa., 19380, Tel: 215-692-2700, TWX: 510-663-0335; Empl.: 350; Minimum order: $100

For info on price: B. Schmitt; Application info: H. Smith; Customer service: B. Schmitt; Delivery info: B. Schmitt

Free literature available: Precision synchrus, resolvers, brushless synchros, stepper motors and controllers, motor generators, integrating tuchometers, precision speed reducers and counters for Servo Systems and Components.

Products manufactured: Controls/Control Eqpt., Encoders, Motors, Resolvers, Synchro, Synchros, Tachometers

Local Sales Offices & Reps.

Ariz	Scottsdale, Fred Schoeffler Assoc. Inc.	602-948-3470
Cal	Hollywood, Westaironics	213-466-6201
Colo	Denver, Franklin Sls.	303-922-3623
Conn	Bloomfield, Zaslow Sls.	203-242-7781
Fla	Ormond Beach, Technology Mktg. Assoc.	904-672-2314
Ill	Chicago, Carlson Elctrn.	312-SP 4-4812
Ind	Ft. Wayne, McDonald Sls.	219-745-9214
Mass	Lowell, Zaslow Sls. Co.	617-458-8452

Minn	Minneapolis, Nortec Sls. Inc.	612-926-2855
Mo	St. Louis, Carlson Elctrn. Sls.	314-991-0262
NJ	Fairfield, R.C. Assocs.	201-664-1241
NY	Jericho, Electro Rep.	516-938-0540
Ohio	Cleveland, Rockford Controls	216-731-5250
Ohio	Dayton, Rockford Controls	513-274-1931
Tex	Addison, Parvin Sls. Co.	214-239-9148
Tex	Dallas, Kukla Elctrns.	214-661-3257
FOR:	Can., Pierrefonds, Que., Avotronics Ltd.	514-626-6511
FOR:	Can., Willowdale, Ont., Avotronics Ltd.	416-491-7941

HARREL, INC., 16 Fitch St., E. Norwalk, Conn., 06855, Tel: 203-866-2573

Customer service: W.J. Becker

Free literature available: General bulletin-single sheet summary of available products.

Products manufactured: Alarms, Bridges, Controllers, Programmable, Controls/Control Eqpt., Counters, Data Acquisition & Reduction Systems, Data Loggers, Dials, Gages, Meters, Monitors, Probes, Process Control Systems, Programmers, Pyrometers, Recorders, Standards, Thermistors, Timers, Transducers

Local Sales Offices & Reps.

Ala	Birmingham, McConnel Sls.	205-871-3501
Cal	Sherman Oaks, Windsor Dynamics, Inc.	213-989-3631
Cal	Walnut Creek, Viking Instr.	415-933-1221
Colo	Denver, Electro-Rep.	303-744-2821
Fla	Hialeah, Shaw Engrg. & Sls.	
Ill	Glen Ellyn	312-668-6622
Ky	Williamstown, C. Burnitt Agency	606-823-6451
Mo	Hazelwood, Carter Elctrns.	314-731-2237
NM	Albuquerque, Electro-Rep.	505-256-1749
NY	Cazenovia, P.M. Decew, Inc.	315-065-8602
NC	Matthews, Datatech	704-847-4464
Ohio	Willoughby	216-942-0920
Tex	Houston, Hatfield & Co.	713-468-1703

HARRINGTON & KING & PERFRTNG CO., 5655 Fillmore St., Chicago, Ill., 60644

HARRIS
COMMUNICATIONS AND INFORMATION HANDLING

HARRIS CORP., Computer Systems Div., 1200 Gateway Dr., Fort Lauderdale, Fla., 33309, Tel: 305-974-1700, TWX: 510-956-3096; FSC No: 29436; Empl.: 600

For info on price: A. S. Walder; Application info: J. D. Jones; Customer service: R. S. Patten; Delivery info: P. Stratford

Free literature available: Slash 4 Computer Systems; Slash 5 Computer Systems; DC-38-D Memory Systems; Vulcan (Virtual Core Manager) Operating Systems; Slash 4VMS (Virtual Memory Systems) Computer; Slash 4 Real Time Computer System; Disc Monitor System (DMS) Operating System.

Products manufactured: Computers, Memory Systems

Local Sales Offices & Reps.

Cal	Newport Beach	714-752-0910
Cal	Santa Clara	408-984-2811
Ill	Oak Brook	312-323-3437
Md	Rockville	301-762-5600
Mass	Waltham	617-890-5410
Mo	St. Louis	314-961-9927
NY	Huntington	516-549-8787
Ohio	Cleveland	216-461-1510
Pa	King of Prussia	215-337-2180
Tex	Dallas	214-243-3478

HARRIS SEMICONDUCTOR, Box 883, Melbourne, Fla., 32901, Tel: 305-727-5430, TWX: 510-959-6259; Empl.: 1265; Minimum order: $250

For info on price: Cust. Svcs.; Application info: E. Fernandez 305-727-5824; Customer service: B. DeGiovanni 305-727-5412; Delivery info: Cust. Svcs.

Products manufactured: Integrated Circuit Devices

Local Sales Offices & Reps.

Ariz	Scottsdale, Harris Semiconductor	602-946-3556
Cal	Long Beach, Harris Semiconductor	213-426-7687
Cal	Palo Alto, Harris Semiconductor	415-964-6443
Cal	San Diego, Celtec	714-279-7961
Colo	Denver, Checkmate Sls. Inc.	303-771-4920
DC	Washington, Harris Semiconductor	202-337-3170
Ill	Schaumburg, Harris Semiconductor	312-894-8824
Kans	Olathe, B. Rush Assocs.	913-782-1177
Md	Randallstown, Beacon North, Inc.	301-922-1248
Mass	Boston, Harris Semiconductor	617-237-5430
Minn	Deep Haven, Harris Semiconductor	612-473-4936
NY	Melville, Harris Semiconductor	516-249-4500
NC	Raleigh, R.W. Mitscher	919-828-0575
Ohio	Dayton, Harris Semiconductor	513-226-0636
Ore	Beaverton, N.R. Schultz Co.	503-643-1644
Pa	Philadelphia, Harris Semiconductor	215-687-6680
Tenn	Shelbyville, R.W. Mitscher	615-684-4544
Tex	Richardson, Harris Semiconductor	214-231-9031
Utah	Salt Lake City, Checkmate Sls., Inc.	801-268-3533
Va	Falls Church, Beacon North, Inc.	703-534-1673
Va	Troutville, R. W. Mitscher Co.	703-345-3283
Va	Virginia Beach, R. W. Mitscher Co.	804-481-7200
Wash	Bellevue, N.R. Schultz Co.	206-454-0300
FOR:	Can., Mississauga, Ont., Munro Electric Component, Ltd.	416-676-1042

Local Distributors

Ala	Huntsville, Hamilton/Avnet, 805 Oster Dr. NW	205-533-1170
Ariz	Phoenix, Hamilton/Avnet, 2615 S 21st St.	602-275-7851
Ariz	Phoenix, Liberty Elctrns., 3130 N 27th Ave.	602-257-1272
Ariz	Phoenix, R.V. Weatherford, 1917 N 25th Dr.	602-272-7144
Cal	Anaheim, R.V. Weatherford, 1550 Babbit Ave.	714-633-9633
Cal	Culver City, Avnet Electro Sls., 10916 W Washington Blvd.	213-558-2345
Cal	Culver City, Hamilton Electro Sls., 10912 W Washington Blvd.	213-558-2121
Cal	El Segundo, Liberty Elctrns., 124 Maryland St.	213-322-8100
Cal	Glendale, R.V. Weatherford, 6921 San Fernando Rd.	213-849-3451
Cal	Mountain View, Elmar Elctrns., 2288 Charleston Rd.	415-961-3611
Cal	Mountain View, Hamilton/Avnet, 340 E. Middlefield Rd.	415-961-7000
Cal	Palo Alto, R.V. Weatherford, 3240 Hillview Ave.	415-493-5373
Cal	Pomona, R.V. Weatherford, 1095 E Third St.	714-623-1261
Cal	San Diego, Hamilton/Avnet, 8917 Complex Dr.	714-279-2421
Cal	San Diego, Liberty Elec., 8248 Mercury Ct.	714-565-9171
Cal	San Diego, R.V. Weatherford, 7872 Raytheon Rd.	714-278-7400
Colo	Denver, Elmar Electronics, 6777 E 50th Ave.	303-287-9611
Colo	Denver, Hamilton/Avnet, 5921 N Broadway	303-534-1212
Colo	Englewood, R.V. Weatherford, 3905 S Mariposa	303-761-5432
Conn	Danbury, Schweber, Commerce Industrial Park	800-645-7381
Conn	Georgetown, Hamilton/Avnet, 643 Danbury Rd.	203-762-0361
Conn	Norwalk, Harvey Elctrns., 112 Main St.	203-853-1515
Fla	Hollywood, Hamilton/Avnet, 4020 N 29th Ave.	305-925-5401
Fla	Hollywood, Schweber, 2830 N 28th Terr.	305-927-0511
Ga	Norcross, Hamilton/Avnet, 6700 I-85, Suite 2B	404-448-0800
Ill	Elk Grove, Schweber, 1380 Jarvis Ave.	312-593-2740
Ill	Schiller Park, Hamilton/Avnet, 3901 N 25th Ave.	312-678-6310
Kans	Lenexa, Hamilton/Avnet, 37 Lenexa Indl. Ctr.	913-888-8900
Md	Hanover, Hamilton/Avnet, 7255 Standard Dr.	301-796-5000
Md	Rockville, Schweber, 5640 Fisher La.	301-881-2970
Mass	Burlington, Hamilton/Avnet, 185 Cambridge St.	617-273-2120
Mass	Lexington, Harvey, 44 Hartwell Ave.	617-861-9200
Mass	Waltham, Schweber, 213 3rd Ave.	617-890-8484
Mich	Livonia, Hamilton/Avnet, 12870 Farmington Rd.	313-522-4700
Mich	Troy, Schweber, 86 Executive Dr.	313-583-9242
Minn	Edina, Hamilton/Avnet, 7683 Washington Ave. S.	612-941-3801
Minn	Edina, Schweber, 7015 Washington Ave. S.	612-941-5280
Mo	Hazelwood, Hamilton/Avnet, 392 Brookes Dr.	314-731-1144
NJ	Cedar Grove, Hamilton/Avnet, 218 Little Falls Rd.	201-239-0800
NJ	Mt. Laurel, Hamilton/Avnet, 113 Gaither Dr. E. Gate Indust. Pk.	609-234-2133
NJ	Somerset, Schweber, 43 Belmont Dr.	201-469-6008
NM	Albuquerque, Hamilton/Avnet, 2450 Baylor Dr. S.E.	505-765-1500
NM	Albuquerque, R.V. Weatherford, 6101 Marble N.E. Marberry Plaza #11	505-265-5671
NY	E. Syracuse, Hamilton/Avnet, 6500 Joy Rd.	315-437-2642
NY	Rochester, Hamilton/Avnet, 167 Clay Rd.	716-442-7820
NY	Rochester, Schweber, 2 Townline Cr.	716-461-4000
NY	Westbury, Hamilton/Avnet, 70 State St.	516-333-5800
NY	Westbury Schweber, Jericho Tpk.	516-334-7474
NY	Woodbury, Harvey, 60 Crossways Pk. W.	516-921-8700
Ohio	Beachwood, Schweber, 23880 Commerce Pk. Rd.	216-464-2970
Ohio	Cleveland, Hamilton/Avnet, 761 Beta Dr.	216-461-1400
Ohio	Dayton, Hamilton/Avnet, 118 Westpark Rd.	513-433-0610
Tex	Dallas, Hamilton/Avnet, 4445 Sigma Rd.	214-661-8661
Tex	Dallas, R.V. Weatherford, 10836 Grissom La.	214-243-1571
Tex	Houston, Hamilton/Avnet, 1216 W. Clay	713-526-4661
Tex	Houston, R.V. Weatherford, 3500 WTC Jester Blvd.	713-688-7406
Utah	Salt Lake City, Hamilton/Avnet, 647 W. Billinis Rd.	801-262-8451
Wash	Bellevue, Hamilton/Avnet, 13407 Northrup Way	206-746-8750
Wash	Seattle, Liberty Elctrns., 5305 Second Ave. S.	206-763-8200
Wash	Seattle, R.V. Weatherford, 541 Industrial Dr.	206-243-6340
For:	Can., Mississauga, Ont., Hamilton/Avnet	416-677-7432
For:	Can., Montreal, Que.	514-331-6443
For:	Can., Ottawa, Ont., Hamilton/Avnet	613-725-3071

HARSHAW CHEMICAL CO., Div./Kewanee Oil Co., 1945 E. 97th St., Cleveland, Ohio, 44106, Tel: 216-248-7400, TWX: 216-248-7400

Customer service: R. Eaton

Free literature available: Data sheets describing complete line of synthetic optical crystals, IR and UV detectors, nuclear instrument modules, radiation detectors and dosimetry materials and systems.

Products manufactured: Amplifiers, Analyzers, Counters, Crystal Blanks, Crystals, Detectors, Generators, Lenses, Optical & Camera, Modules, Logic, Encapsulated, Scalers, Binary, Decade, Timers

Local Sales Offices & Reps.

Cal	Los Angeles, C. D. Wright Optical Products	714-838-6340
Cal	Los Angeles, V. Overby	714-838-6340
Cal	San Francisco, R. Lowe	415-968-2171
DC	Washington, W. Todd Nuclear Products	703-356-9570
Ga	Atlanta, A. Barber	404-255-4616
Ill	Chicago, N. Pawluk	312-325-4179
Mass	Norwood, K. Babeux	617-769-5065
NJ	Ramsey, M. Aguinas	201-327-8850
Ohio	Cleveland, T. Stack Nuclear Prods.	216-248-7400
Ohio	Solon, R. Kasulones Optical Prods.	216-248-7400
Tex	Houston, J. Owens	713-522-8377
Wash	Seattle, Showalter Instruments	206-624-9020

HARTMAN ELECTRICAL MFG., Div. A-T-O Inc., 175 N. Diamont St., Mansfield, Ohio, 44902, Tel: 419-524-1411, TWX: 810-448-2814

For info on price: D. Vogel; Application info: G. Danas; Customer service: G. Beck; Delivery info: G. Beck

Products manufactured: Actuators, Controls/Control Eqpt., Monitors, Motors, Relays, Solenoids, Switches, Timers

Local Sales Offices & Reps.

Ariz	Phoenix, Airsupply Co.	606-267-3916
Cal	Dublin, Airsupply Co.	415-829-0870

Directory of Local Distributors Starts on page 401

Cal	San Diego, Airsupply Co.	714-298-1121
Cal	San Monica, Airsupply Co.	213-829-1781
Ga	Marietta, Airsupply Co.	404-422-8242
Ill	Berkeley, Airsupply Co.	312-544-7400
Ind	Indianapolis, Airsupply Co.	317-248-8391
Kans	Wichita, Airsupply Co.	316-683-7518
Mass	Boston, Airsupply Co.	617-232-5020
Minn	Bloomington, Airsupply Co.	612-884-8950
Mo	Bridgeton, Airsupply Co.	314-731-3011
NY	Clinton, Airsupply Co.	315-735-8341
NY	Huntington Station, Airsupply Co.	516-249-1410
Ohio	Columbus, Airsupply Co.	614-861-1129
Ohio	Dayton, Airsupply Co.	513-224-0728
Pa	Valley Forge, Airsupply Co.	215-933-8924
Tex	Fort Worth, Airsupply Co.	817-355-4541
Va	Arlington, Airsupply Co.	703-525-1191
Wash	Bellevue, Airsupply Co.	206-454-7922
EXP:	Rye, N.Y., American Avitron	914-937-5300

HARWIL CO., 903 Colorado Ave., Santa Monica, Calif., 90401, Tel: 213-394-4710; Empl.: 5; Minimum order: $5

Customer service: H. Hutchinson

Free literature available: 1) Coolant fluid flow switches for the electronic industry. Interlock & monitor coolant flow to ensure against very expensive overheating & failure. 2) Component Lead Bender - Eliminates trial and error lead bending. Fast, exact, thumbwheel adjusted spacing between beads.

Products manufactured: Controls/Control Eqpt., Machines/Machinery, Production, Switches, Tools

HATHAWAY INDUSTRIES INC., 11616 51st St., Tulsa, Okla., 74145, Tel: 918-663-0110, TWX: 910-845-2129; Empl.: 450; Minimum order: $25

Customer service: F. D. Leynaert

Free literature available: Brochures on: terminal blocks- mosaic displays - PMDC motors.

Products manufactured: Amplifiers, Connectors, Meters, Motors, Oscillographs, Direct Writing, Paper, Graphic Recording, Recorders, Signal Conditioners & Equipment, Strips, Tachometers, Terminal Blocks, Boards & Strips, Terminals

Local Sales Offices & Reps.

Terminals

Ariz	Phoenix, Airsupply Co.	602-267-3916
Cal	Dublin, Airsupply Co.	910-343-6861
Cal	Santa Monica, Airsupply Co.	213-670-6722
Ga	Marietta, Airsupply Co.	404-422-8242
Ill	Berkeley, Airsupply Co.	312-544-7400
Ind	Indianapolis, Airsupply Co.	317-248-8391
Kans	Wichita, Airsupply Co.	316-683-7518
Mass	Boston, Airsupply Co.	617-232-5020
Minn	Bloomington, Airsupply Co.	612-884-8950
Mo	Bridgeton, Airsupply Co.	314-731-3011
NY	Clintcn, Airsupply Co.	315-735-8341
NY	Huntington, Airsupply Co.	516-249-1410
Ohio	Columbus, Airsupply Co.	614-861-1129
Ohio	Dayton, Airsupply Co.	513-224-0728
Pa	Valley Forge, Airsupply Co.	215-933-8924
Tex	Fort Worth, Airsupply Co.	817-335-4541
Va	Arlington, Airsupply Co.	703-525-1191
Wash	Bellevue, Airsupply Co.	206-454-7922

Motors

Ariz	Phoenix, Airsupply Co.	602-267-3916
Cal	Dublin, Airsupply Co.	415-829-0870
Cal	Santa Monica, Airsupply Co.	213-670-6722
Fla	Orlando, Von Kamecke Assoc.	305-843-5294
Ga	Marietta, Airsupply Co.	404-422-8242
Ill	Berkeley, Airsupply Co.	312-544-7400
Ind	Indianapolis, Airsupply Co.	317-248-8391
Kans	Wichita, Airsupply Co.	316-683-7518
Mass	Boston, Airsupply Co.	617-232-5020
Minn	Bloomington, Airsupply Co.	612-884-8950
Mo	Bridgeton, Airsupply Co.	314-731-3011
NY	Clinton, Airsupply Co.	315-735-8341
NY	Huntington Sta., Airsupply Co.	516-249-1410
Ohio	Columbus, Airsupply Co.	614-861-1129
Ohio	Dayton, Airsupply Co.	513-224-0728
Pa	Valley Forge, Airsupply Co.	215-933-8924
Tex	Fort Worth, Airsupply Co.	817-335-4541
Va	Arlington, Airsupply Co.	703-525-1191
Wash	Bellevue, Airsupply Co.	206-454-7922
FOR:	Can., Rexdale, Ont., Frank Eakin Ltd.	416-245-3600

HATHAWAY INSTRUMENTS, INC., 5250 E. Evans Ave., Denver, Colo., 80222, Tel: 303-756-8301, TWX: 910-931-0568; Empl.: 150

For info on price: Sls. Dept.; Application info: L. G. Zacherl; Customer service: L. E. Carter; Delivery info: E. E. Poe

Free literature available: Power System Instrumentation, full line catalog

Products manufactured: Alarms, Annunciators, Comm. Systems, Data Loggers, Generators, Meters, Oscillographs, Direct Writing, Receivers, Recorders, Standards, Transmission Systems, Data, Transmitters

Local Sales Offices & Reps.

Cal	El Monte, Randolph Inds.	213-283-7901
Ga	Atlanta, M.J. Fein & Co.	404-938-0190
Ill	Wilmette, M.J. Fein & Co.	312-256-5828
Mass	Holliston, M.J. Fein & Co.	617-236-2546
NJ	Livingston, M.J. Fein & Co.	201-994-3575
NY	Scarsdale, M.J. Fein & Co.	914-472-1100
Wash	Seattle, Sperry Co.	206-932-1101

HAWKEYE INSTRUS., INC., 3545 Third Ave., Marion, Iowa, 52302, Tel: 319-377-8241; Empl.: 18; Minimum order: $25

Customer service: D. Meuler

Free literature available: Model 1800 bridge conditioner/amplifier bulletin; System 1830 dynamic recording system bulletin; System 910, digital data acquisition system bulletin; Frictional Strain Gage Bulletin; Concrete Strain Gage Bulletin.

Products manufactured: Amplifiers, Bridges, Data Acquisition & Reduction Systems, Data Loggers, Indicators, Meters, Oscillographs, Direct Writing, Power Supplies, Signal Conditioners & Equipment, Transducers

HAYDON SWITCH & INSTR., INC., 1500 Meriden Rd., Waterbury, Conn., 06705, Tel: 203-756-7441, TWX: 710-477-2580; FSC No: 02005; QPL No: Multiple; Empl.: 96

Free literature available: CAT72-2 - Resilient & Hermetically Sealed Basic Switches & Switch Assemblies. CAT306A - Digital Timers, Stop Clocks, Pulse Counters. CAT102A - Big Inch, Open Frame & Brushless DC Crystal Chronetic Controlled Motors.

Products manufactured: Clocks (All Types), Counters, Indicators, Meters, Motors, Process Control Systems, Relays, Switches, Timers

Local Sales Offices & Reps.

Ala	Huntsville, Incotech, Inc.	205-837-6061
Cal	Los Angeles, Fetty/Schoenduve, Inc.	213-651-4050
Cal	Palo Alto, Fetty/Schoenduve, Inc.	415-321-7041
Colo	Denver, A. G. Electronics	303-722-5814
Fla	Fern Park, M.G. Assocs.	305-841-8793
Ill	Des Plaines, Coombs Assoc.	312-298-4830
Ind	Fort Wayne, Coombs Assoc.	219-743-4611
Md	Baltimore, R.P. Luce & Co.	301-752-8200
Minn	Minneapolis, Revere Assocs.	612-781-2615
Mo	Kansas City, Automatic General Elctrn. Sls. Co.	816-333-8206
Mo	St. Louis, Coombs Assoc.	314-567-3657
NY	Mineola, Transaero, Inc.	516-248-0400
NY	Syracuse, J. V. Costello	315-472-0322
Ohio	Cleveland, A. H. Baier Co.	216-461-6161
Ohio	Dayton, A. H. Baier Co.	513-276-4128
Pa	Philadelphia, R.P. Luce & Co.	215-884-8365
Wash	Bellevue, Willis Sls. Co.	206-454-3029
Wisc	Greendale, Coombs Assocs.	414-421-2300
EXP:	N.Y., Mineola, Transaero	516-248-0400

HBS EQUIPMENT DIV., 3543 East 16th St., Los Angeles, Calif., 90023, Tel: 213-262-1151

HEADWAY RESEARCH, INC., 3713 Forest La., Garland, Tex., 75042, Tel: 214-272-5431

Customer service: Sls. Dept.

Free literature available: Catalog - Complete information on Photo Resist Spinners and Wafer Cleaner/Dryers.

Products manufactured: Machines/Machinery, Production, Microcircuit Production Equip.

Local Sales Offices & Reps.

Cal	Santa Ana, Nelson Engrg.	714-545-2550
Cal	Sunnyvale, Wilson Entprs.	408-732-9050

HEATH CO., Dept. 180, Benton Harbor, Mich., 49022, Tel: 616-983-3961; Empl.: 1500 ......p. 1•720,721,874,1232

For info on price: Cust Relations; Application info: Tech Correspondence; Customer service: Cust Svc Dept

Free literature available: 1975 Heathkit Catalog Describes over 350 easy-to-assemble electronic kits including color TVs, audio equipment, ham radio gear, test instruments, marine electronics and many more. Heath/Schlumberger Assembled Instruments Catalog Describes a complete line of laboratory and test instruments for research and educational applications.

Products manufactured: Air Cleaners & Filters (Shielded & Unshielded), Alarms, Amplifiers, Analyzers, Antenna Rotators, Antennas, Bells, Buzzers, Gongs, Sirens & Aural Warning Devices, Bridges, Cable, Calculators, Electrical & Electronic, Calibrators, Cleaners, Ultrasonic, Comm. Systems, Counters, Couplers, Decade Boxes, Dummy Loads, Electronic Switches (Oscilloscope), Eliminators, Battery, Generators, Inverters, Kits, Power Supply, Kits, Test Equipment, Meters, Microphones, All Kinds, Monitors, Oscilloscopes, Power Supplies, Probes, Receivers, Recorders, References, D-C Voltage, Soldering Guns, Irons & Desoldering Tools, Speaker Systems, Speakers, Technical Books, Test Equipment, Testers, Timers, Tools, Tracers, Curve, Transceivers, Tuners

Local Sales Offices & Reps.

Ariz	Phoenix, Heathkit Elctrn. Center	602-279-6247
Cal	Anaheim, Heathkit Elctrn. Center	714-776-9420
Cal	El Cerrito, Heathkit Elctrn. Center	415-236-8870
Cal	La Mesa, Heathkit Elctrn. Center	714-461-0110
Cal	Los Angeles, Heathkit Elctrn. Center	213-749-0261
Cal	Pomona, Heathkit Elctrn. Center	714-623-3543
Cal	Redwood City, Heathkit Elctrn. Center	415-365-8155
Cal	Woodland Hills, Heathkit Elctrn. Center	213-883-0531
Colo	Denver, Heathkit Elctrn. Center	303-422-3408
Conn	Avon, Heathkit Elctrn. Center	203-678-0323
Fla	Hialeah, Heathkit Elctrn. Center	305-823-2280
Fla	Tampa, Heathkit Elctrn. Center	813-884-3102
Ga	Atlanta, Heathkit Elctrn. Center	404-252-4341
Ill	Chicago, Heathkit Elctrn. Center	312-583-3920
Ill	Downers Grove, Heathkit Elctrn. Center	312-852-1304
Ind	Indianapolis, Heathkit Elctrn. Center	317-257-4321
Kans	Mission, Heathkit Elctrn. Center	913-362-4486
Ky	Louisville, Heathkit Elctrn. Center	502-245-7811
La	Kenner, Heathkit Elctrn. Center	504-722-6321
Md	Baltimore, Heathkit Elctrn. Center	301-881-4448
Md	Rockville, Heathkit Elctrn. Center	301-881-5420
Mass	Wellesley, Heathkit Elctrn. Center	617-237-1510
Mich	Detroit, Heathkit Elctrn. Center	313-535-6480
Mich	E. Detroit, Heathkit Elctrn. Center	313-772-0416
Minn	Hopkins, Heathkit Elctrn. Center	612-938-6371
Mo	St. Louis, Heathkit Elctrn. Center	314-291-1850
Neb	Omaha, Heathkit Elctrn. Center	402-391-2071
NJ	Fair Lawn, Heathkit Elctrn. Center	201-791-6935
NY	Amherst, Heathkit Elctrn. Center	716-835-3090
NY	Jericho, Heathkit Elctrn. Center	516-334-8181
NY	New York, Heathkit Elctrn. Center	212-765-4590
NY	No. White Plaines, Heathkit Elctrn. Center	914-761-7690
NY	Rochester, Heathkit Elctrn. Center	716-227-4750
Ohio	Cleveland, Heathkit Elctrn. Center	216-886-2590
Ohio	Columbus, Heathkit Elctrn. Center	614-475-7200
Ohio	Toledo, Heathkit Elctrn. Ctr.	419-537-1887
Ohio	Woodlawn, Heathkit Elctrn. Center	513-771-8850
Pa	Frazer, Heathkit Elctrn. Center	215-647-5555
Pa	Philadelphia, Heathkit Elctrn. Center	215-288-0180
Pa	Pittsburgh, Heathkit Elctrn. Center	412-824-3564
RI	Warwick, Heathkit Elctrn. Center	401-738-5150
Tex	Dallas, Heathkit Elctrn. Center	214-826-4053
Tex	Houston, Heathkit Elctrn. Center	713-623-2090
Va	Norfolk, Heathkit Elctrn. Ctr.	804-460-0997
Wash	Seattle, Heathkit Elctrn. Center	206-682-2172
Wisc	Milwaukee, Heathkit Elctrn. Center	414-873-8250

HECON CORP., 31 Park Rd., New Shrewsbury, N.J., 07724, Tel: 201-542-9200; Empl.: 200; Minimum order: $20

For info on price: W. Goodman Ext. 263; Application info: J. Becker Ext. 233; Customer service: G. Leininger Ext. 283

Free literature available: Catalogs: Electromechanical totalizing & controlling counters, Digital tape & ticket printers, print decades & printing mechanisms, Pneumatic/fluidic counters. Brochures: Digital cassette recorder reproducers, Electronic industrial controllers (counters). Application Notes: Electromechanical counters.

Products manufactured: Counters, Printers, Recorders, Totalizers, Digital

Local Sales Offices & Reps.

Cal	Marina Del Rey, Hecon Western Corp.	213-823-5386
Cal	Mountain View, Hecon Western Corp., Recording Instrs. Div.	415-961-6015
Conn	Stratford, Hecon Corp.	203-375-2836
Fla	Bradenton, Hutto-Hawkins-Peregoy, Inc.	813-755-4015
Fla	Maitland, Hutto-Hawkins-Peregoy, Inc.	305-831-2474
Fla	Pompano Beach, Hutto-Hawkins-Peregoy, Inc.	305-943-9593
Ill	Hanover Park, Hecon Corp.	312-289-2859
Kans	Prairie Village, Engrg. Svcs. Co.	913-649-4000
Mass	Boston, Hecon Corp.	617-262-5043
Minn	St. Paul, Howard A. Cullen & Assoc.	612-646-7371
Mo	St. Louis, Engrg. Svcs. Co.	314-997-1515
NJ	Laurel Springs, Hecon Corp.	609-784-2334
NJ	Wayne, Hecon Corp.	201-839-5454
Ohio	Port Clinton, Hecon Corp.	419-734-4556
Okla	Tulsa, Hecon Corp.	918-627-2774
Ore	Beaverton, Fry Controls, Inc.	503-643-5448
EXP:	Can., Rexdale, Ont., Hecon of Can., Ltd.	416-678-2441

Local Distributors

Cal	Burlingame, Control Devices Pacific, Box 1584, Station A, 400 Burlingame Ave.	415-343-2773
Cal	Los Angeles, California Wholesale Elec. Co., Box 3581 Terminal Annex	213-723-6711
Cal	Los Angeles, Pacific Elctrnc. Sls., 1628 Silverlake Blvd.	213-663-8060
Cal	San Francisco, Master Distrs., 364 Eleventh St.	415-626-0807
Cal	Santa Monica, Master Distrs., 1553 17th St.	213-395-2637
Conn	Middletown, Mancib Co., Randolph & Coe Rds.	203-346-6646
Conn	Stratford, State Elctrns. Parts Corp., 1269 Barnum Ave.	203-375-5961
Fla	Miami, Electro Standards Labs, 3560 N.W. 34th St.	305-633-6973
Ill	Addison, Lectron Controls Co., 524 S. Westgate St., Unit-C	312-543-8460
Ill	Chicago, D. Johns, Inc., 1320 West Lake St.	312-666-2210
Ill	Elgin, Allied Elctrns. Corp., 1355 Sleepy Hollow Rd.	312-697-8200
Ill	Mount Prospect, Automation Equip. Co., 1301 Greenwood Ave.	312-398-7550
Ill	Park Ridge, Automation Comp Sls., 1731 Evergreen La.	312-823-8075
Ind	Indianapolis, Graham Elctrns. Sup., 133 S. Pennsylvania	317-634-8202
Kans	Prairie Village, Parker & Foster, Inc., 7930 State Line	913-381-9330
Ky	Louisville, D. Johns of Kentucky, 1835 Cargo Ct.	502-491-3495
La	Kenner, Automation Specialists, 1939 3rd St. Box 790	504-721-3497
Md	Baltimore, E.I.L. Instrs., 1830 York Rd.	301-252-1260
Mass	Burlington, Mancib Co., "A" Street & Middlesex Turnpike	617-272-9450
Mass	Worcester, F. X. Bonneau Assocs., Box 163, West Side Station, #8 Suburban Rd.	617-754-7655
Mich	Detroit, E & E Engrg., Inc., 11941 Harper Ave.	313-371-2000
Minn	St. Paul, Power/Mation Div., 1441 Iglehart Ave.	612-645-0781
Minn	St. Paul, United Elec. Corp., 512 Sibley St.	612-333-1111
Mo	University City, E. W. Mooney Co., 7505 Delmar Blvd.	314-725-8875
NJ	Hanover, State Elctrns. Parts Corp., 36 Route 10	201-887-2550
NJ	Piscataway, Fromm Electric Supply Co., 50 Seeley Ave.	201-981-0400
NY	Albany, Edwin E. Taylor Co., 465 Central Ave.	518-489-5601
NY	Buffalo, KOM Lamb, Inc., 1865 Kenmore Ave.	716-874-3530
NY	Scarsdale, Logicomp Elctrns., 52 Fayette Rd.	914-723-3334
NC	Winston-Salem, Kirkman Elctrns., 901 W. 2nd St., Drawer K Salem Sta.	919-724-0541
Ohio	Cincinnati, United Radio, Inc., Summit Road & Reinhold Dr.	513-761-4030
Ohio	Dayton, Summit Inds., Inc., 4545 Gateway Circle	513-434-8192
Ohio	Highland Heights, R/D Elctrns. Div., Radio Distr. Co., 653 Alpha Dr. #67	216-461-9090
Ohio	Richfield, Capwell Distrs., 3031 Cleveland-Massillon Rd.	216-659-4158
Ohio	Toledo, Toldedo Ind'l. Repair Svc., 2388 Airport Hwy.	419-382-2261
Ohio	Warren, Rem Electronics Supply Co., 525 S. Park Ave.	216-399-2777
Okla	Tulsa, Radio, Inc., 1000 S. Main St.	918-587-9123
Ore	Portland, Platt Electric Supply, 1305 N.W. Davis Box 3167	503-228-6121
Pa	Philadelphia, Royal Electric Supply Co., 3233 Hunting Park Ave.	
Pa	Philadelphia, Royal Electric Supply Co., 3300 W. Clearfield St.	215-221-1200
Pa	Reading, Barbey Elctrns., G. D. Barbey Co., 333 N. Fourth St.	215-376-6116
Pa	Wilkinsburg, Fuller Instr. Svc., Inc., 1125 North Ave.	412-241-6789
SC	Greenville, Barker Controls, Box 3884 Park Pl.	803-244-6495
Tex	Beaumont, Ralph's Ind'l. Elctrns., Box 3631, 1293 Broadway	713-833-9443
Tex	Dallas, Dallas Instrs., 10205 Plano Rd.	214-341-0504
Tex	Dallas, Wholesale Elctrn. Co., 2809 Ross Ave.	214-824-3001
Tex	Houston, Ralph's Ind'l. Elctrns., 4400 Wayside Dr., Suite 102	713-641-0267
Tex	Houston, T & J Instrs., 6316 Alder	713-666-2308
Tex	Odessa, Automation Engrg., A Div. Kobe, Inc., 2310 Steven Rd.	915-363-7391
Va	Alexandria, E.I.L. Instrs., 5390 Cherokee Ave.	703-354-4330
Va	Richmond, Avec Elctrns. Corp., 2002 Staples Mill Rd.	804-359-6071
Wash	Seattle, Platt Elec. Supply, 2767 6th St. So.	206-624-4083
Wisc	Cedarburg, Automation Engrg. Co., Box 322, 1220 Hwy. 143	414-377-7500

Advertisment

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HEEGER INC., 720 Ceres Ave., Los Angeles, Cal., 90021, Tel: 213-627-9310

Products manufactured: Boxes, Junction, Outlets & Wall Plates, Cabinets & Accessories, Cans, Capacitor, Relay, Semiconductor, Transformer, etc, Cases, Equipment, Instrument, Meter, Chassis, Metal, Cleaners & Solvents, Containers, Coolants, Circuit & Components, Flux, Brazing & Soldering Materials, Grilles, Handles For Cabinets, Circuit Boards, Racks, etc., Panels, Racks, Refrigerants, Spray

Local Sales Offices & Reps.

Ala	Birmingham, J.F. Russel Co.	
Ariz	Phoenix, B.G. Sls. Co.	602-266-5624
Cal	Burlingame, Carelli EMA	415-697-8862
Colo	Aurora, A.E.S.	303-366-0208
Fla	Ft. Lauderdale, Unirep	
Ill	Skokie, M. Fields Co.	312-OR4-3018
Ind	Mulberry, Maish Sls.	
Mass	Farmingham, Northeastern Rep	617-877-4850
Mich	Bloomfield Hills, S.F. McMedhan	313-852-4308
Minn	Minneapolis, A.J. Warner	
Mo	St. Louis, K. Kelly & Co.	
NY	Camillus, W.M. Ferguson	
NY	Yonkers, J. Bron Elctrn.	914-779-7330
NC	Charlotte, De Witt-Austin Co.	704-366-4643
Ohio	Columbus, J.A. Mandabach	614-235-0265
Ore	Portland, J.W. Eckersley	503-246-3183
Pa	Holland, Parnell Sls. Co.	215-355-9330
Tex	Houston, B. Wylds Co.	

HEI, INC., Jonathan Ind'l. Ctr., Chaska, Minn., 55318, Tel: 612-448-3510, TWX: 910-578-0832; Empl.: 175

Products manufactured: Alarms, Circuits, Hybrid, Thick Film, Controls/Control Eqpt., Counters, Detectors, Diodes, Encoders, Kits, Training Aid, Punched Card Equipment, Readers, Transistors

Local Sales Offices & Reps.

Cal	Burlingame, Leddy Assocs.	415-347-5247
Cal	Carmichael, Leddy Assocs.	916-944-1694
Cal	Torrance, O'Donnell Assocs.	213-323-9243
Fla	Clearwater, WMM Assocs.	813-726-8871
Ill	Chicago, G. MCL Cole Co.	312-774-3535
Md	Baltimore, Stitzer Assocs.	301-823-2600
Mass	West Concord, Sls. Engrg.	617-369-3943
Mich	Novi, Miltimore Sls.	313-476-2446
Mo	Florissant, Miller Assocs.	314-355-1642
NJ	Dover, Diamond Inc.	201-366-7518
NY	Bayside, Diamond Inc.	212-423-7330
NY	Fairport, Franklin Sls.	716-377-6584
NY	Syracuse, Franklin Sls.	315-472-5273
NY	Whitesboro, Franklin Sls.	315-736-5460
Ohio	Cleveland, A.H. Baier Co.	216-461-6161
Ohio	Dayton, A.H. Baier Co.	513-276-4128
Pa	Paoli, Stitzer Assocs.	215-644-5500
Tex	Dallas, W. Reese Assocs.	214-638-6575
Tex	Houston, W. Reese Assocs.	713-621-3134
Wash	Bellevue, Hays Ind'l.	206-455-3908
Wisc	Milwaukee, G. Mcl. Cole Co.	414-545-6083

HEINEMANN ELEC. CO., 2636 Brunswick Pike, Trenton, N.J., 08602, Tel: 609-882-4800; FSC No: 74193; Empl.: 624; Minimum order: $35 .... p. 1•1730,2061

For info on price: D. Vertuca Ext. 272; Application info: C. Littlewood Ext. 274; Customer service: R. Warner Ext. 270; Delivery info: G. Rosinski Ext. 265

Free literature available: Bulletin 303 Short Form Catalog

Products manufactured: Circuit Breakers, Motors, Protectors, Relays

Local Sales Offices & Reps.

Ala	Birmingham, J. Spader Co.	205-879-1366
Ariz	Phoenix, Martin & Assocs.	602-277-5421
Cal	Burlingame, Campbell & George	415-697-2965
Cal	Encino, Porter Co.	213-788-2350
Colo	Denver, P.A. Douden	303-744-1497
Fla	Boca Raton, Conley & Assoc. Inc.	305-305-6108
Fla	Oviedo, Conley & Assocs., Inc.	305-365-3283
Fla	Tampa, Conley	813 933-3183
Ga	Decatur, Spader & Associates	404-296-3024
Ill	Chicago, D. Dolin Sls.	312-286-6200
Ind	Marion, O. Bromberg	317-664-5384
Ky	Louisville, O. Bromberg	502-245-8916
Md	Ellicott City, McCourt	301-465-4515
Mass	Sturbridge, Branford Controls Co.	617-347-7367
Mich	Detroit, L. H. Dickelman Co.	313-255-3300
Minn	Minneapolis, H. Smith	612-881-3620
Mo	St. Louis, Hill & Co.	314-621-1818
NJ	Ridgewood, Ballou, Inc.	201-444-6990
NJ	Trenton, Kriegner Sls.	609-882-6330
NY	Binghamton, Canavan Scanlon	607-724-7220
NY	Rochester, Canavan-Scanlon	716-442-0720
NY	Syracuse, Canavan-Scanlon	315-437-1271
NC	Charlotte, J. Rudisill Assocs., Inc.	704-377-6901
Ohio	Cincinnati, O. Bromberg	513-771-9333
Ohio	Cleveland, Brown Elect. Prod.	216-861-0114
Okla	Tulsa, Comps. Inc.	918-583-9149
Pa	Pittsburgh, Brown Elec. Equip.	412-563-4444
Tex	Dallas, Glidden Electro Equip.	214-363-6539
Tex	Houston, Glidden Electro Equip.	713-681-1415
Wash	Mercer Island, J. Andersen	206-232-0484
Wisc	Milwaukee, Control Sales	414-964-3322

HEITZ, INC., KARL, 979 Third Ave., New York, N.Y., 10022, Tel: 212-421-5220

Customer service: M. Schlapfer

Free literature available: Pricelists and brochures on all our products.

Products manufactured: Cameras, Controls/Control Eqpt., Lenses, Optical & Camera, Magnifying Glasses, Inspection, Recorders

HELI-COIL PRODS., Div. Mite Corp., Shelter Rock La., Danbury, Conn., 06810, Tel: 203-743-7651, TWX: 710-456-0336; FSC No: 01556; Empl.: 300; Minimum order: $15

For info on price: D. Lxall; Application info: A. Mussnug; Customer service: D. Lxall; Delivery info: D. Lxall

Products manufactured: Fasteners

Local Sales Offices & Reps.

Cal	El Monte, Western Regional Office	213-579-0181
Ga	Atlanta, J. O. King, Inc.	404-355-7660
Ill	Downers Grove, S. W. Anderson Co.	312-964-2600
Mich	Detroit, A. A. Geisler Co.	313-255-1450
Tex	Arlington, Burgess Power Equip.	817-261-8241
EXP:	New York, N.Y., Resources & Facilities	212-687-4741

HELICAL PRODS. CO., INC., Box 2296, Santa Maria, Cal., 93454, Tel: 805-925-8651; FSC No: 13201; Empl.: 15

For info on price: D. Merrell; Application info: G. Boehm; Customer service: D. Merrell

Free literature available: Question and answers about flexible shaft couplings – the who, what and how of flexible couplings and how we approach the solution. MC series – motor couplings "A" series – aluminum commercial couplings Precision & instrument – precise and under Mil Spec.

Products manufactured: Couplings, Springs (All Types)

Local Sales Offices & Reps.

Conn	Bloomfield, Zaslow Sls. Co.	203-242-7781
Conn	Milford, Zaslow Sls. Co.	203-878-1094
Ill	Chicago, Engineered Sls.	312-867-8434
Md	Baltimore, R. P. Luce Co.	301-752-8200
Mass	Lowell, Zaslow Sls. Co.	617-458-8452
Mass	Northboro, Zaslow Sls. Co.	617-393-8150
Minn	St. Paul, W. Taubert	612-636-6414
NJ	Berkeley Hts., R. P. Luce & Co.	201-464-6440
NY	DeRuyter, R. P. Kennedy Co.	315-682-2920
NY	New Hook, R. P. Kennedy Co.	914-758-8229
NY	New Hyde Park, R. P. Luce & Co.	516-437-4550
NY	Rochester, R. P. Kennedy Co.	716-271-6322
Ohio	Fairburn, Tech. Assocs.	513-878-2484
Pa	Philadelphia, R. P. Luce & Co.	215-884-8365

HELIX SPRING CORP., 35-10 10th St., Long Island City, N.Y., 11106, Tel: 212-YE2-0303; Empl.: 25; Minimum order: $50

Customer service: J. Freudenberger

Products manufactured: Coils Including Assemblies & Forms, Forms, Wire, Springs (All Types)

HELM INSTR. CO., 4511 South Ave., Toledo, Ohio, 43615, Tel: 419-531-0146; Empl.: 14

Products manufactured: Accelerometers, Alarms, Amplifiers, Analyzers, Calibrators, Cells, Load, Controls/Control Eqpt., Counters, Indicators, Monitors, Testers, Transducers

Local Sales Offices & Reps.

Ark	Little Rock, M. Robinson Co.	501-666-2170
Cal	La Jolla, R.S. Purinton	714-459-9185
Ill	Lagrange, Olson Eng.	312-482-3300
Ind	Fort Wayne, G.A. Stacy & Asc.	219-483-8331
Mo	St. Louis, Woodsons Machinery Co.	314-822-8836
NJ	Wyckoff, Vard-Smith Assocs.	
Pa	Oreland, N.H. Rogers & Co.	
Pa	Pittsburgh, WKM Asc. Inc.	412-892-2953
Tex	Houston, Mepco	713-941-6969

HENES MFG. CO., 4301 E. Madison St., Phoenix, Ariz., 85034, Tel: 602-275-4126; Empl.: 25

Products manufactured: Heat Guns, Production, Tools, Torches, Soldering, Welding & Access., Welding Equipment & Access. (Excluding Equip. for Semiconductor Devices)

Local Sales Offices & Reps.

Ariz	Scottsdale, Allen Assocs.	602-994-1305
Cal	Costa Mesa, Scrantom Engrg. Inc.	714-979-6373
Cal	Los Altos, C.D. Buerki Co.	415-941-3343
Conn	Bridgeport, Tech. Instrs., Inc.	203-368-4582
Ill	Roselle, Automated Process, Inc.	312-885-1095
Ind	Cumberland, Automated Process, Inc.	317-251-0708
Mass	Wilmington, Tech. Insts., Inc.	617-944-3930
Minn	Minneapolis, Automated Process, Inc.	612-545-4481
Mo	Hazelwood, Production Automation Corp.	314-731-2331
Mo	Raytown, Production Automation Corp.	816-737-0066
NJ	Saddle Brook, L & M Assocs.	201-843-8700
NY	Brentwood, L & M Assocs.	516-231-8363
NY	New York, L & M Assocs.	212-675-7486
NC	Raleigh, F.G. Speidel	919-787-4521
Ohio	Dayton, H. Noyes & Assocs.	513-274-2871
Ore	Yamhill, Walsh-Ehlers, Inc.	503-662-3207
Pa	Andalusia, L & M Assocs.	215-639-3100
Tex	Dallas, R.W. Mureen Co.	214-369-7561
Wash	Bellevue, Walsh-Ehlers, Inc.	206-454-2211
Wisc	Milwaukee, Automated Process, Inc.	414-354-4370
EXP:	New York, N.Y., E.D. Allmendinger, Inc.	212-269-0090

HENSCHEL CORP., 14 Cedar St., Amesbury, Mass., 01913, Tel: 617-388-1103, Telex: 94-7444; FSC No: 28199; QPL No: Multiple; Empl.: 120; Minimum order: $35

For info on price: F. L. Clark; Application info: F. L. Clark; Customer service: W. A. Ross; Delivery info: W. A. Ross

Free literature available: Catalog sheets enclosed are used to respond to technical inquiries.

Products manufactured: Alarms, Amplifiers, Annunciators, Bells, Buzzers, Gongs, Sirens & Aural Warning Devices, Comm. Systems, Data Loggers, Indicators, Synchros

Local Sales Offices & Reps.

Cal	Los Angeles, Allied Ind.	213-685-4460
Cal	San Francisco, Dahl Beck Elc. Co.	415-392-5214
La	New Orleans, Carstone Corp.	504-525-2231
NJ	Jersey City, Henschel Corp.	201-434-1113
NJ	Morristown, C. Gilfillan	609-235-3376
Ohio	Cleveland, Electro-Marine Corp.	216-631-3082
Wash	Bellevue, Ralston Cunningham Assocs.	206-455-0316
Wisc	Superior, Benson Elec. Co.	715-394-5548
FOR:	Can., Montreal, J.E. Fouchaux (Can) Ltd.	514-844-7569

HERALD ELECTRONICS, 6611 N. Lincoln Ave., Chicago, Ill., 60645, Tel: 312-675-1100; Empl.: 13

For info on price: H. Katz; Customer service: C. Ward

Products manufactured: Amplifiers, Cable, Meters, Microphone Accessories (Including Stands, Holders, Booms), Microphones, All Kinds, Mixers, Phonographs, Parts & Accessories, Speaker Systems, Speakers, Transformers

Local Sales Offices & Reps.

Cal	Foster City, Olson Sls.	415-573-1600
Fla	Pembroke Pines, Joe Wanger Sls.	305-987-8766
Ga	Norcross, Dean Cooper Co.	404-448-5460
Ind	Indianapolis, Ronald Munn Co.	317-897-9326
Mich	Detroit, Markal Sls.	312-282-5800
NY	Middle Village, BCD Sls.	212-894-1331
Ohio	Medina, Tom Grant & Assoc.	216-725-6528
Tex	Houston, Buck Rogers Co.	713-626-5370
EXP:	Chicago, Ill., Magnos & Assoc.	312-334-1503

HERMES ELECTRONICS LTD., Suite 315, 2020 F. Street N.W., Washington, D.C., 20006

HERMETIC SEAL CORP., 4232 Temple City Blvd., Rosemead, Cal., 91770, Tel: 213-283-0411, TWX: 910-587-3352; Empl.: 100

Products manufactured: Connectors, Feedthrus & Seals, Environmental, Headers, Lead Assemblies & Receptacles, Packages, Integrated Circuit, Seals, Services, Assembly, Production & Test, Terminals

HERTZ FILTER, 3 Aerial Way, Syosset, N.Y., 11791, Tel: 516-822-4770; Empl.: 22 .... p. 1•562,563

For info on price: B. Dworkin; Application info: R. Friedman; Delivery info: B. Dworkin

Products manufactured: Filters

HEWLETT PACKARD, 974 E. Arques Ave., Sunnyvale, Cal, 94086

HEWLETT-PACKARD CO., 1501 Page Mill Rd., Palo Alto, Cal., 94304, Tel: 415-493-1501, TWX: 910-373-1267; Empl.: 28000

Products manufactured: Amplifiers, Analyzers, Arresters, Electrical Surge, Lightning, Attenuators, Bolometers, Bridges, Cabinets & Accessories, Cable Fault Locators, Calculators, Electrical & Electronic, Calibrators, Cameras, Carriages, Probe, Carts & Dollies, Instrument & Equipment, Cases, Equipment, Instrument, Meter, Circuits, Hybrid, Thin-Film, Clamps & Clips, Comparators, Computers, Controls/Control Eqpt., Converters, Counters, Couplers, Current Sources, Data Acquisition & Reduction Systems, Data Loggers, Delay Lines, Detectors, Digitizers, Pencil Follower (Inc. Coordinate & Graphic), Diodes, Display Devices/Displays, Drivers & Decoders For Readouts, Gages, Generators, Holders, Crystal, Insertion Loss Measurement Systems, Integrators, Electronic, Interferometer Systems, Isolators, Kits, Training Aid, Lamps, Leads, Test & Adaptors, Lights, Locators, Open-Short, Memory Systems, Meters, Mounts, Oscillators, Oscillographs, Direct Writing, Oscilloscope Plug-Ins, Oscilloscopes, Paper, Graphic Recording, Power Supplies, Printers, Probes, Punched Card Equipment, Racks, Readers, Receivers, Recorders, RFI Measuring Equipment, Services, Assembly, Production & Test, Shifters, Signal Averagers, Signal Conditioners & Equipment, Slotted Lines, Microwave, Smith Chart Impedance Plotters, Automatic, Spectrometers, Standards, Switches, Synthesizers, Tape Recording Accessories, Tape Winders, Tees, Telephone Channel Test & Simulator Equipment, Teleprinters, Teletypewriters & Equipment, Terminals, Test Equipment, Test Systems, Testers, Thermometers, Resistance, Timers, Totalizers, Digital, Tracers, Curve, Transducers, Transistors, Viewing Hoods, Cathode Ray Tube, Waveguides & Adapters, X-Ray Inspection Equipment

Local Sales Offices & Reps.

Ala	Huntsville	205-881-4591
Ariz	Phoenix	602-244-1361
Ariz	Tucson	602-889-4661
Cal	Fullerton	714-870-1000
Cal	Los Angeles	213-776-7500
Cal	North Hollywood	213-877-1282
Cal	Sacramento	916-482-1463
Cal	San Diego	714-279-3200
Cal	Santa Clara	408-249-7000
Colo	Englewood	303-771-3455
Conn	New Haven	203-389-6551
Fla	Ft. Lauderdale	305-731-2020
Fla	Orlando	305-859-2900
Ga	Atlanta	404-434-4000
Haw	Honolulu	808-955-4455
Ill	Skokie	312-677-0400
Ind	Indianapolis	317-546-4891
Iowa	Iowa City	319-338-9466
La	Kenner	504-721-6201
Md	Baltimore	301-944-5400
Md	Rockville	301-948-6370
Mass	Lexington	617-861-8960
Mich	Farmington	313-476-6400
Minn	St. Paul	612-645-9461
Mo	Kansas City	816-763-8000
Mo	Maryland Hghts.	314-567-1455
NJ	Cherry Hill	609-667-4000
NJ	Paramus	201-265-5000
NM	Albuquerque	505-265-3713
NM	Las Cruces	505-526-2485
NY	Albany	518-458-1550
NY	Endicott	607-754-0050
NY	New York	201-265-5000
NY	Poughkeepsie	914-454-7330
NY	Rochester	716-473-9500
NY	Syracuse	315-454-2486
NY	Woodbury	516-921-0300
NC	High Point	919-885-8101
Ohio	Cleveland	216-243-7300
Ohio	Columbus	614-436-1041
Ohio	Dayton	513-859-8202
Okla	Oklahoma City	405-721-0200
Ore	Tualatin	503-620-3350
Pa	King of Prussia	215-265-7000
Pa	Pittsburgh	412-782-0400
SC	Columbia	803-782-6493
Tex	Houston	713-781-6000
Tex	Richardson	214-231-6101
Tex	San Antonio	512-434-8241
Utah	Salt Lake City	801-487-0715
Va	Richmond	803-285-3431
Wash	Bellevue	206-454-3971
Wisc	Milwaukee	414-541-0550
FOR:	Can., Calgary, Alb.	403-287-1672
FOR:	Can., Dartmouth, N.S.	902-459-7820
FOR:	Can., Edmonton, Alb.	403-452-3670
FOR:	Can., Mississauga, Ont.	416-678-9430
FOR:	Can., Ottawa, Ont.	613-255-6530
FOR:	Can., Pointe Claire, Que.	514-697-4232

FOR:	Can., St-Foy, Que.	418-688-8710
FOR:	Can., Vancouver, B.C.	604-254-0531
FOR:	Can., Winnipeg, Man.	204-786-7581

HEWLETT PACKARD, 5301 Stevens Creek Blvd, Santa Clara, Cal., 95050

HEWLETT-PACKARD CO., Calculator Prods. Div., Box 301, Loveland, Colo., 80537, Tel: 303-667-5000, TWX: 910-930-9020

Free literature available: "HP Calculator-Aided Design: Computing Power For Engineers In Electronics" provides an overview of HP calculators in such design areas as: Analog Networks, Logic Designs, Microwave circuits, and Transformer design.

Products manufactured: Calculators, Electrical & Electronic, Computers

Local Sales Offices & Reps.

Ala	Huntsville	205-881-4591
Ariz	Phoenix	602-244-1361
Ariz	Tucson	602-889-4661
Cal	Fullerton	714-870-1000
Cal	Los Angeles	213-776-7500
Cal	North Hollywood	213-877-1282
Cal	Palo Alto	415-327-6500
Cal	Sacramento	916-482-1463
Cal	San Diego	714-279-3200
Conn	New Haven	203-389-6551
Fla	Ft. Lauderdale	305-731-2020
Fla	Orlando	305-859-2900
Ga	Atlanta	404-436-6181
Haw	Honolulu	808-955-4455
Ill	Skokie	312-677-0400
Ind	Indianapolis	317-546-4891
La	Kenner	504-721-6201
Md	Baltimore	301-944-5400
Md	Rockville	301-948-6370
Mass	Lexington	617-861-8960
Mich	Farmington	313-476-6400
Minn	St. Paul	612-645-9461
Mo	Kansas City	816-763-8000
Mo	Maryland Heights	314-567-1455
Nev	Las Vegas	702-382-5777
NJ	Englewood	303-771-3455
NJ	Paramus	201-265-5000
NM	Albuquerque	505-265-3713
NM	Las Cruces	505-526-2485
NY	Albany	518-458-1550
NY	Endicott	607-754-0050
NY	Poughkeepsie	914-454-7330
NY	Rochester	716-473-9500
NY	Syracuse	315-454-2486
NY	Woodbury	516-921-0300
NC	High Point	919-885-8101
Ohio	Cleveland	216-243-7300
Ohio	Columbus	614-846-1300
Ohio	Dayton	513-859-8202
Okla	Oklahoma City	405-721-0200
Ore	Tualatin	503-620-3350
Pa	East Providence	401-434-5535
Pa	King of Prussia	215-265-7000
Tenn	Memphis	901-274-7472
Tex	Houston	713-781-6000
Tex	Richardson	214-231-6101
Tex	San Antonio	512-434-4171
Utah	Salt Lake City	801-487-0715
Va	Richmond	804-285-3431
Wash	Bellevue	206-454-3971
WVa	Charleston	304-345-1640
Wisc	Milwaukee	414-541-0550

HEWLETT-PACKARD CORP., Colorado Springs Div., 1900 Garden of the Gods Rd., Colorado Springs, Colo., 80907

Products manufactured: Analyzers, Cameras, Display Devices/Displays, Generators, Oscilloscope Plug-Ins, Oscilloscopes, Probes, Pulsers, Logic Test, Testers

H-PACKARD, 19310 Pruneridge Ave., Cupertino, Cal., 95014

HEWLETT-PACKARD, HPA Div., 640 Page Mill Rd., Palo Alto, Cal., 94304, Tel: 415-493-1212, TWX: 910-373-1247 ......p. 1•1014,1015; p. 2•1150-1153

Customer service: G.Spear

Products manufactured: Diodes, Display Devices/Displays, Isolators, Lamps, Lights

Refer to Hewlett-Packard Co., Palo Alto, Cal. for sales office information.

Local Distributors

Ala	Huntsville, Hall-Mark Electronics, 4739 Commercial Dr.	205-837-8700
Ariz	Phoenix, Liberty Electronics, 3130 N. 27th Ave.	602-257-1272
Cal	Costa Mesa, Schweber Electronics, 3000 Redhill Ave.	714-556-3880
Cal	El Segundo, Liberty Electronics, 124 Maryland St.	213-322-8100
Cal	Mt. View, Elmar Electronics, 2288 Charleston Rd.	415-961-3611
Cal	San Diego, Liberty Electronics, 8248 Mercury Ct.	714-565-9171
Colo	Denver, Elmar Electronics, 6777 E. 50th Ave.	303-287-9611
Conn	Danbury, Schweber Electronics, Finance Dr., Commerce Ind'l Park	203-792-3500
Conn	Hamden, Wilshire Electronics, 2554 State St.	203-281-1166
Fla	Ft. Lauderdale, Hall-Mark Electronics, 1302 W. McNab Rd.	305-971-9280
Fla	Hollywood, Schweber Electronics, 2830 No. 29th Terrace	305-927-0511
Fla	Orlando, Hall-Mark Electronics, 7233 Lake Ellenor Dr.	305-855-4020
Ga	Atlanta, Schweber Electronics, 4126 Pleasantdale Rd.	404-449-9170
Ill	Elk Grove Village, Hall-Mark Electronics, 180 Crossen	312-437-8800
Ill	Elk Grove Village, Schweber Electronics, 1380 Jarvis Ave.	312-593-2740
Iowa	Cedar Rapids, Hall-Mark Electronics, Executive Plaza, Suite 401, First Ave., S.E.	319-393-3556
Iowa	Cedar Rapids, Schweber Electronics, 4403 - 1st Ave., SE, Suite 302	319-393-0100
Kans	Lenexa, Hall-Mark Electronics, 9006 Rosehill Rd.	913-888-4747
Md	Rockville, Schweber Electronics, 5640 Fisher La.	301-881-3300
Mass	Burlington, Wilshire Electronics, One Wilshire Rd.	617-272-8200
Mass	Waltham, Schweber Electronics, 213 Third Ave.	617-890-8484
Mich	Troy, Schweber Electronics, 86 Executive Dr.	313-583-9242
Minn	Edina, Schweber Electronics, 7015 Washington Ave., So.	612-941-5280
Minn	Bloomington, Hall-Mark Electronics, 9201 Penn Avenue, So., Suite 10	612-884-9056
Mo	Earth City, Hall-Mark Electronics, 13789 Rider Trail	314-291-5350
NJ	Clifton, Wilshire Electronics, 312 Clifton Ave.	201-365-2600
NJ	Somerset, Schweber Electronics, 43 Belmont Dr.	201-469-6008
NY	Farmingdale, Wilshire Electronics, 1855 New Hwy. (Unit B)	516-293-5775
NY	Johnson City, Wilshire Electronics, 617 Main St.	607-797-1236
NY	Rochester, Schweber Electronics, 2 Townline Circle	716-461-4000
NY	Westbury, Schweber Electronics, Jericho Tpke.	516-334-7474
NC	Raleigh, Hall-Mark Electronics, 3000 Industrial Dr.	919-832-4465
Ohio	Beachwood, Schweber Electronics, 23880 Commerce Pk. Rd.	216-464-2970
Okla	Tulsa, Hall-Mark Electronics, 4846 So. 83rd E. Ave.	918-835-8458
Pa	Huntingdon Valley, Hall-Mark Electronics, 458 Pike Rd.	215-355-7300
Tex	Austin, Hall-Mark Electronics, 3100-A Ind'l Terrace	512-837-2814
Tex	Austin, Schweber Electronics, 2628 Longhorn Blvd.	512-837-2890
Tex	Dallas, Hall-Mark Electronics, 9333 Forest La.	214-231-5101
Tex	Dallas, Schweber Electronics, 14177 Proton Rd.	214-661-5010
Tex	Houston, Hall-Mark Electronics, 8000 Westglen, Box 36739	713-781-6100
Tex	Houston, Schweber Electronics, 7420 Harwin Dr.	713-784-3600
Wash	Seattle, Liberty Electronics, 5305 Second Ave. So.	206-763-8200
Wisc	West Allis, Hall-Mark Electronics, 237 S. Curtis	414-476-1270

HEWLETT-PACKARD, Green Pond Rd., Rockaway, N.J., 07204

HEWLETT PACKARD CORP., Microwave, Santa Rosa Div., 3273 Airway Dr., Santa Rosa, Cal., 95401

HEWLETT-PACKARD, San Diego Div., 16399 W. Bernardo Dr., San Diego, Cal., 92127, Tel: 714-487-4100

Free literature available: Recording instruments, including strip chart, x-y oscillographic, graphic, and magnetic tape recorders.

Products manufactured: Oscillographs, Direct Writing, Recorders

Refer to Hewlett-Packard, Palo Alto, Cal. for sales office information.

HEXACON ELEC. CO., 621 W. Clay Ave., Roselle Park, N.J., 07204, Tel: 201-CH5-6200; Empl.: 150 p. 2•1700-1705

Products manufactured: Controls/Control Eqpt., Solder Pots & Baths, Soldering Accessories, Soldering Equipment, Soldering Guns, Irons & Desoldering Tools

Local Sales Offices & Reps.

Ariz	Tucson, Ross Ribaudo	602-299-1425
Cal	Burlingame, Dillon Stevens	415-697-3022
Cal	L.A., Dillon Stevens Co.	213-747-9221
Conn	Woodstock, HDQ & HV Neff	203-974-1281
Fla	Merritt Island, J.A. Kennedy Co.	305-452-9821
Ga	Morrow, R. Hartmann	404-366-5799
Ill	Chicago, EMF Co.	312-889-8323
Kans	Kansas City, L.E. Bruns	913-287-5242
Md	Phoenix, REBCO Sls.	301-592-8907
NJ	Edgewater Park, REBCO Sls.	609-386-7116
NY	New Hartford, V. Clair	315-735-8122
NY	New York, W.D. Blood & Co.	212-344-0210
NY	New York City, Dunn & Bryan	212-964-8091
Ohio	Strongville, J. Finnegan & Co.	216-826-1033
Ore	Milwaukie, Northcoast Mfrs. Agency Inc.	503-659-3811
SC	Greenville, J.B. Jackson	803-244-2508
Tenn	Memphis, H. Carson	901-398-6194
Tex	Richardson, P.J. Scanlon	214-AD 1-4661
Wash	Seattle, Northcoast Mfrs. Agency, Inc.	206-284-5024
Wisc	Milwaukee, Process Tech	414-464-6620-6621
EXP:	Hato Rey, P.R., M. Anderson	809-722-1654
FOR:	Can., Montreal, W. P. Q. Adtool	514-482-2548

HEYMAN MFG. CO., N. Michigan Ave., Kenilworth, N.J., 07033, Tel: 201-245-2345, TWX: 710-996-5986; Empl.: 86; Minimum order: $20

For info on price: R. Zednick; Application info: R. Zednick; Customer service: R. Zednick; Delivery info: M. Lauxman

Free literature available: Catalog 175 20 pages describing strain relief bushings, insulating bushings, hole plugs, cable clamps, wire ties. Provides dimensions and application data.

Products manufactured: Bushings, Glass, Plastic, Metal, Rubber, Etc., Clamps & Clips, Grommets, Plug Buttons, Strain Reliefs, Cable & Wire, Terminals, Wire & Cable Ties

Local Sales Offices & Reps.

Wisc Waukesha, Heyman Mfg. Co.

HGA ELCTRNS., INC., 519 S. Fifth Ave., Mt. Vernon, N.Y., 10550, Tel: 914-664-5393; Empl.: 3

For info on price: L. Grossman; Application info: E. Valentine; Customer service: L. Grossman; Delivery info: L. Grossman

Products manufactured: Amplifiers, Chargers, Battery, Clocks (All Types)

H H CONTROLS CO., INC., 16 Frost St., Arlington, Mass., 02174, Tel: 617-646-2626; Empl.: 22

For info on price: W. Edins; Application info: W. Edins; Customer service: D. H. Smith; Delivery info: G. Davis

Products manufactured: Encoders, Indicators, Servo Systems, Transducers

Local Sales Offices & Reps.

Cal	Montebello, TUCUL Engrg. Co.	213-728-7397
Ill	Park Ridge, Electrical Materials & Equip.	312-696-1540
Mass	Stoneham, K & D Elctrns.	617-438-3002
Ohio	Cleveland, Adcon Engrg. Co.	216-238-3916
Ore	Portland, A.L. Polich	503-246-5451
Tex	Houston, C. Butt Co.	713-526-3101
Va	Roanoke, Johnson Custom Controls	703-774-5550

HI-G INC., Spring St. & Rte. 75, Windsor Locks, Conn., 06096, Tel: 203-623-2481, TWX: 710-420-0592; FSC No: 02289; QPL No: M5757; Empl.: 490; Minimum order: $75 ...... p. 1•1714-1729

Customer service: Sls. Dept

Free literature available: 16 page Relay Catalog Including M5757 QPL Cross Reference 20 page Timing & Sensing Catalog with full Details of Time Functions.

Products manufactured: Comparators, Relays, Timers, Transducers

Local Sales Offices & Reps.

Ala	Huntsville, L & D, Inc.	205-837-8480
Ariz	Scottsdale, Fryco	602-945-3281
Cal	Mountain View, G.C. Woempner Co.	415-964-5454
Cal	Woodland Hills, Interstate Mktg. Assoc.	213-883-7606
Colo	Denver, Omega Ltd.	303-758-1508
Conn	Fairfield, C. Weber	259-5386
Fla	Boca Raton, Conley & Assocs.	305-395-6108
Fla	Coral Springs, Shaw Engrg. & Sls.	305-752-7596
Fla	Oviedo, Conley & Assocs.	305-365-3283
Fla	Tampa, Conley & Assocs.	813-933-3183
Ill	Chicago, Engineered Sls. Co.	312-867-8434
Ind	Ft. Wayne, Given Corp.	219-432-5585
Kans	Overland Park, Reese & Assocs.	913-648-7748
Md	Baltimore, Bernard White & Co.	301-484-5400
Mass	Lexington, J.E. Boeing Co.	617-862-2500
Mich	Farmington, Davis & Martensen	313-474-8300
Mich	Grand Rapids, Elko Sls.	616-949-1451
Mich	Grosse Pointe Woods, Elko Sls.	313-884-1950
Minn	St. Paul, R.G. Ragon, Inc.	612-488-0201
Mo	St. Charles, Buse Sls. Co.	314-723-1122
NY	Binghamton, Canavan-Scanlon Assoc.	607-724-7220
NY	Jericho, HRC Comp-Tech, Inc.	516-822-5550
NY	Rochester, Canavan-Scanlon Assoc.	716-442-0720
NY	Syracuse, Canavan-Scanlon Assoc.	315-437-1271
NC	Greensboro, L & D, Inc.	919-292-3201
Ohio	Cincinnati, Components, Inc.	513-721-2997
Ohio	Cleveland, Components, Inc.	216-842-2737
Ohio	Dayton, P.E. Montplaisir	513-434-4316
Pa	Ardmore, Rothenheber & Wurts, Inc.	215-649-6300
Tex	Dallas, United Comps.	214-324-1448
Utah	Salt Lake City, Omega Ltd.	801-266-9617
Wash	Bellevue, Ruggles Tech. Sls.	206-455-2778
FOR:	Can., Cooksville, Ont., Anbak Sls. Can., Ltd.	416-625-1061
FOR:	Can., Dorval 780, Que., Anbak Sls. Can., Ltd.	514-636-8514

Local Distributors

Cal	Burbank, Terminal Elctrns. Corp., 2402 W. Olive	213-843-1221
Cal	Chatsworth, Westates Elctrns. Corp., 20151 Bahama St.	213-341-4411
Cal	Los Angeles, Radio Prod. Sls., 1501 S. Hill St.	213-748-1271
Cal	Mt. View, Terminal Elctrns. Corp., 880 Maude Ave.	415-969-9240
Cal	San Diego, Radio Prod. Sls., 7889 Clairmont Mesa Blvd.	714-292-5611
Cal	Sunnyvale, Bell Inds., 1161 N. Fairoaks Ave.	408-734-8570
Fla	Orlando, Hallmark Elctrns. Corp., 7233 Lake Ellenor Dr.	305-855-4020
Ill	Westmont, Bodelle Co., 47 Chestnut La.	312-323-9670
Ind	Indianapolis, Graham Elctrns. Sup., 133 S. Pennsylvania St.	317-634-8486
Md	Rockville, Wilshire Elctrns., 1037 Taft St.	301-340-7900
Md	Savage, Pyttronic Inds., Baltimore/Wash. Distr. Ctr., 8220 Wellmoor Ct.	301-792-7000
Mass	Lexington, Harvey/ R & D Elctrns., 44 Hartwell Ave.	617-861-9200
Minn	St. Paul, Ragon Elctrns., 1136 W. Larpenteut Ave.	612-488-0201
Mo	St. Charles, Lectronix, 306 Mc Donough St., Box 188	314-723-1122
NY	Binghamton, Harvey/Federal Elctrns., Box 1208 Vestal Pkwy E.	607-748-8211
NY	Hauppauge, Time Elctrn. Sls., 70 Marcus Blvd.	516-273-0100
NY	Woodbury, Harvey Radio Co., 60 Crossways Park W.	516-921-8700
NC	Raleigh, Pyttronics Inds., 4509 Creedmor Rd., Suite 110	919-782-6370
Ohio	Cleveland, Arrow Elctrns., 23945 Mercantile Rd.	216-464-2000
Ohio	Dayton, Arrow Elctrns., 3100 Plainfield Rd.	513-253-9176
Okla	Oklahoma City, Electro-Enterprises Inc., 6725 N. Miramar	405-478-1752
Pa	Harrisburg, Pyttronic Inds., 2525 N. Seventh St.	717-233-6591
Pa	Montgomeryville, Pyttronic Inds., Stump Rd.	215-643-2850
Tex	Dallas, Hallmark Elctrns. Corp., 9333 Forest La.	214-231-5101
For:	Can., Mississauga, Ont., Specialty Elctrns., Ltd., 2776 Slough St.	416-678-2104
For:	Can., Montreal, Que., Specialty Elctrns., Ltd., 1415 Pitfield Blvd.	514-336-4500

HEWLETT-PACKARD CO., Data Systems Div., 11000 Wolfe Rd., Cupertino, Cal., 95014, Tel: 408-257-7000, TWX: 910-338-0221

Products manufactured: Computers, Converters, Memory Systems, Printers, Readers, Teleprinters, Transmission Systems, Data

Refer to Hewlett Packard, Palo Alto, Cal. for sales office information

HICKOK ELECTRICAL INSTR., 10514 DuPont Ave., Cleveland, Ohio, 44108, Tel: 216-541-8060, TWX: 810-421-8286 .... p. 1•163,728

Products manufactured: Counters, Generators, Indicators, Meters, Oscilloscopes, Probes, Punched Card Equipment, Readers, Relays, Testers, Wire Nuts

Local Sales Offices & Reps.

Ala	Huntsville, W.A. Brown	205-539-4411
Ariz	Scottsdale, BFA	602-946-4215
Cal	Culver City, FLW	213-559-7200
Cal	Newport Beach, FLW	213-877-0663
Cal	Palo Alto, Coherent Mktg.	415-327-2217
Cal	San Diego, FLW	714-277-0993
Colo	Denver, BFA Corp.	303-477-6570
Conn	Hamden, J & J Assoc.	203-624-7800
DC	Wash, Powell-Pendergraph	301-656-4535
Fla	Orlando, W.A. Brown	305-425-5505
Ga	Atlanta, W.A. Brown	404-939-1674
Haw	Honolulu, Precision Radio Ltd.	808-537-5291
Ill	Chicago, Midwest Elect. Sls.	312-626-0030
Ind	Indianapolis, Midwest Elect. Sls.	317-926-3736
Iowa	Cedar Rapids, Midwest Elect. Sls.	319-362-4410
La	Gretna, W.A. Brown	504-366-5766
Mass	Burlington, J & J Assoc	617-272-2606
Mich	Royal Oak, Group Ten	313-549-3910
Mo	St. Louis, Adelphi	314-821-1232
NJ	Plainfield, S. Glassman Assoc.	201-561-3866
NM	Albuquerque, BFA Corp.	505-296-8303
NM	Las Cruces, BFA Corp.	505-523-0601
NY	Binghamton, Labtronics	607-748-0509
NY	Depew, Labtronics	716-685-4111
NY	Glen Cove, S. Glassman Assoc.	516-676-1039
NY	Schenectady, Labtronics	518-372-6649
NY	Syracuse, Labtronics	315-454-9314
NC	Durham, W.A. Brown	919-489-1546
Ohio	Cleveland, Group Ten	216-486-2800
Ohio	Dayton, Group Ten	513-277-6531
Pa	Abington, Powell-Pendergraph	215-657-0330
Tex	Austin, Martin, Zienkosky, Browne	512-454-4371
Tex	Dallas, Martin, Zienkosky, Browne	214-233-5535
Tex	Houston, Martin, Zienkosky, Browne	713-523-7333
Va	Richmond, Powell-Pendergraph	703-264-2341
Wash	Seattle, Datacom Assocs.	206-285-2525
Wisc	Waukesha, Midwest Elect. Sls.	414-542-5129

HIGH SPEED HAMMER CO., INC., 313 Norton St., Rochester, N.Y., 14621, Tel: 716-CO 6-6740; Empl.: 25; Minimum order: $4

Customer service: D. W. Marcellus

Free literature available: Precision Drilling Machines; Riveting Machines; Staking Machines; Wire Stripping Machines; Automated Assembly Machines; Optical Screwdrivers.

Products manufactured: Drills & Accessories, Hand & Power, Wire Strippers

Local Sales Offices & Reps.

NY	New Hyde Park, P. Casale	516-437-7876

HIGH VACUUM EQUIP. CORP., 2 Churchill Rd., Hingham, Mass., 02043, Tel: 617-749-9000, TWX: 710-348-0160; Empl.: 27; Minimum order: $20

For info on price: Sls. Dept.; Application info: J.R. Lombardo J. A. F. Trueman; Customer service: M. Danser; Delivery info: M. Danser

Free literature available: Capabilities Data Sheets , custom designed & mfg. systems & components (vacuum)

Products manufactured: Chamber, Environmental Test, Deposition Equipment, Vacuum & Accessories, Feedthrus & Seals, Environmental, Furnaces, Gages, Ovens, Valves, Vacuum

Local Sales Offices & Reps.

Ala	, Newco & Assocs.	305-293-7700
Ariz	Phoenix, R.A. Mayes Co.	602-279-5243
Colo	Boulder, R.A. Mayes Co.	303-444-0782
Fla	Orlando, Newco & Assocs.	305-293-7700
Haw	Honolulu, The H. S. Gray Co., Ltd.	
Md	Bethesda, Bartlett Assocs., Inc.	301-656-3061
Mass	Hingham, HVEC	617-749-9000
NY	White Plains, Bartlett Assocs., Inc.	914-949-6476
Pa	Wayne, Bartlett Assocs., Inc.	215-688-7325
Tex	Houston, R.A. Mayes Co.	713-461-5385
Tex	Richardson, R.A. Mayes Co.	214-235-3043

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HIGHTEMP RESINS, INC., 225 Greenwich Ave., Stamford, Conn., 06902, Tel: 203-357-7401; Empl.: 5; Minimum order: $25

For info on price: H. Grisar; Application info: H. Isbenjian; Customer service: H. Isbenjian; Delivery info: H. Grisar

Products manufactured: Adhesives (All Types), Cleaners & Solvents, Coatings, Compounds, Encapsulating, Insulating, Molding, Potting, Plastic Raw Materials, Liquids, Pellets, Powders, Resins, Services, Assembly, Production & Test

HILLS-MCCANNA CO., 400 Maple Ave., Carpentersville, Ill., 60110, Tel: 312-426-4851, Telex: 722442; Empl.: 700; Minimum order: $25

For info on price: R. W. Hank; Application info: R. Glanz; Customer service: R. W. Hank; Delivery info: R. W. Hank

Free literature available: Bulletin A3 - shows complete line of electric or pneumatic actuators and controls, Bulletin E261 - details servo amplifier interface unit between actuator and process sensor.
Bulletin E262 - details complete data on Posi-meter®, a position indicating meter.

Products manufactured: Actuators, Controls/Control Eqpt., Valves, Vacuum

Local Sales Offices & Reps.

Cal	San Francisco, Hills-McCanna Co.	415-981-3829
Cal	Santa Fe Springs, Hills-McCanna Co.	213-864-3758
Colo	Denver, Collison Bros.	303-733-3791
Ga	Atlanta, Hills-McCanna Co.	404-448-7173
Ill	Hinsdale, Hills-McCanna Co.	312-325-5640
Mich	Madison Heights, Bradbury-Kenrick Assoc.	313-564-5410
Mo	St. Louis, Corva Corp.	314-878-4100
NJ	Edison, Hills-McCanna Co.	201-494-9400
Ohio	Cleveland, Hills-McCanna Co.	216-433-4520
Okla	Tulsa, C.J. Co.	918-627-8162
Pa	Pittsburgh, D.D. Foster Co.	412-281-0864
Tex	Houston, Hills-McCanna Co.	713-688-5747

HILTON INDUSTRIES INC., 190 Maple St., Glen Falls, N.Y., 12801; Empl.: 120

Customer service: M. E. Mesirov 518-793-3473

Free literature available: Manufacturers of sub-miniature wet slug tantalum capacitors and radial plus axial leaded solid state Tamta:l, capacitors.

Products manufactured: Capacitors, Fixed, Welding Equipment & Access. (Excluding Equip. for Semiconductor Devices)

Local Sales Offices & Reps.

Ariz	Phoenix, G. R. McKnight Co.	602-257-8037
Cal	Los Angeles, Corcoran Assocs.	213-823-2425
Cal	Menlo Park, G. R. McKnight Co.	415-325-2844
Cal	Westminster, Corcoran Assocs.	714-893-4670
Conn	Madison, A & M Elctrn. Reps.	203-421-4242
Fla	Orlando, Buchanan & Abrams Assocs.	305-898-7444
Ill	Streamwood, Al Holte & Assocs.	312-837-4066
Mass	Needham, A & M Elctrn. Reps.	617-444-8170
Minn	Minneapolis, Al Holte & Assocs.	612-926-1523
NJ	Springfield, Service and Technology	201-232-2666
NJ	W. Trenton, Kriegner Sls. Co.	609-882-6330
NM	Albuquerque, G. R. McKnight Co.	505-266-6423
NY	Farmingdale, Service and Technology	516-694-2626
NY	Syracuse, Murcan Sls.	315-474-4889
Ohio	Columbus, Rockford Controls Ohio	614-231-5890
Ohio	Dayton, Rockford Controls Ohio	513-278-7362
Ohio	Euclid, Rockford Controls Ohio	216-731-5250
Ore	Portland, J.J. Backer Co.	503-297-3776
Tex	Richardson, Unidyne	214-234-3050
Tex	Stafford, Unidyne	613-494-6027
Va	Alexandria, Potomac Elctrns.	703-836-1630
Wash	Seattle, J.J. Backer Co.	206-285-1300

FOR: Can., Port Credit, Ont., Baknor Industries Ltd. 416-274-1591

S. HIMMELSTEIN & CO., 2500 Estes Ave., Elk Grove Village, Ill., 60007, Tel: 312-439-8181; Empl.: 40; Minimum order: $25

For info on price: J. Hall; Application info: J. Hall; Customer service: R. Kuenstler; Delivery info: R. Kuenstler

Free literature available: Literature on: MCRT Torquemeters & Rotary Transformers, TVS Torque Verification System, Torque-Rite Air Tool Torque Control & Verification System, Precision Load Cell Specifications.
Battery Operated, Digital Transducer Readout, Digital Torque Display, & Precision Pressure Transducer Specifications.

Products manufactured: Amplifiers, Cells, Load, Controls/Control Eqpt., Indicators, Signal Conditioners & Equipment, Testers, Transducers, Transformers

Local Sales Offices & Reps.

Mass	Needham, Addelco Corp.	617-444-4754
Mich	Livonia, S. Himmelstein & Co.	313-427-2066
NJ	Cherry Hill, Markey Instrumentation	609-667-3809
NY	Eldridge, L-Tron Corp.	315-689-3787
NY	Latham, L-Tron Corp.	518-785-5032
NY	Rochester, L-Tron Corp.	716-436-4410
Wash	Bellevue, Topp Engrg. Sls. Corp.	206-747-5401

HIPOTRONICS, INC., Brewster, N.Y., 10509, Tel: 914-279-8091, TWX: 710-574-2420; Empl.: 155; Minimum order: $50 .... p. 1•722,723,1230,1231

For info on price: J. Robertson; Application info: J. Robertson; Customer service: L. Lambert; Delivery info: W. N. Boyer

Products manufactured: Cable Fault Locators, Capacitors, Fixed, Detectors, Dividers, Locators, Open-Short, Meters, Power Supplies, Probes, Reactors, Regulators, Services, Assembly, Production & Test, Shields, Test Systems, Testers, Transformers, Voltage Sources

Local Sales Offices & Reps.

Cal	Concord, J. Marinan	415-686-4382
Cal	Pasadena, RDX Corp.	213-681-3452
Cal	San Diego, RDX Corp.	714-278-6863
Cal	Sunnyvale, RDX Corp.	408-734-4500
Colo	Littleton, Aztec Entprs.	303-798-4573
Ga	Atlanta, J.P. Smith	404-233-1009
Haw	Honolulu, Aloha Assocs.	941-1574
Ill	Decatur, J. Connelly	217-865-2188
Ind	Ossian, V. Schumacher	219-622-4346
Mass	Bellingham, J. Kirkup	617-966-2121
NJ	Rivervale, J. Lebert	201-391-9400
NM	Albuquerque, Aztec Entprs.	505-255-2440
NY	Cazenovia, Peter De Cew Agency	315-HT 3-3261
Pa	Downingtown, Kenn Ebert-Hipotronics, Inc.	215-269-5898
Tex	Fort Worth, D. Wells	817-244-2204
Wash	Seattle, RDX Corp.	206-682-6750

HISONIC, INC., 249 N. Troost, Olathe, Kan., 66061, Tel: 913-782-0012; FSC No: 11402; Empl.: 80; Minimum order: $35 .... p. 1•564,565,1233; p. 2•1755

For info on price: W. S. Bonebright; Application info: D. H. Hersh; Customer service: W. S. Bonebright; Delivery info: W. S. Bonebright

Free literature available: Brochure-Facilities information and general product line description.

Products manufactured: Chokes, Coils Including Assemblies & Forms, Converters, Delay Lines, Discriminators, Equalizers, Filters, Inverters, Networks, Reactors, Transformers

Local Sales Offices & Reps.

Ariz	Scottsdale, Piper-Goyne	602-946-4437
Cal	Mountain View, Caltron/Pyle	415-964-3244
Cal	No. Hollywood, Crown Elctrns.	213-877-3550
Colo	Littleton, Piper-Goyne	303-798-8955
Kans	Shawnee, J.F. Guernsey Co.	913-631-2414
NJ	Haddonfield, Gray Assocs.	609-429-5300
NY	Conklin, Ramcom, Inc.	607-775-0641
NY	E. Rockaway, W. Bellenkes Assocs.	516-599-8260
Tex	Irving, AID Elctrns., Inc.	214-259-4761

HISONIC, INC. cont'd

Advertisment

Hisonic has an established reputation of unexcelled competence in the design and quality manufacture of complex filter network as well as specialized inductors and transformers. Our staff is experienced and equipped to apply unique modern synthesis techniques to your requirements. Do not accept an answer of "impossible" unless you have consulted Hisonic.

HI-TEK CORP., 3115 W. Warner, Santa Ana, Cal., 92704, Tel: 714-540-3520, TWX: 910-595-1758; Empl.: 150

For info on price: D. Dickerman; Application info: S. Laxineta; Customer service: R. Williams; Delivery info: R. Williams

Products manufactured: Keyboards, Alphanumeric & Decimal, Switches

H.J.J. CO., Box 905, Los Gatos, Cal., 95030, Tel: 408-356-4040; Empl.: 4

Customer service: D. P. Cavallaro

Free literature available: Brochure On Screwholding Drivers.

Products manufactured: Screwdrivers

Local Sales Offices & Reps.

Cal	San Mateo, J. Hand	415-341-5516
Pa	Pittsburgh, A. Kostman	412-823-3430

HM ELECTRONICS, INC., 6151 Fairmount Ave., San Diego, Cal., 92120, Tel: 714-280-6050; Empl.: 12

For info on price: G. Johnson; Application info: H. Miyahira; Customer service: B. Tateyama; Delivery info: B. Tateyama

Products manufactured: Amplifiers, Oscillators, Oscilloscopes, Receivers, Synthesizers, Transceivers, Transmitters

Local Sales Offices & Reps.

Cal	Los Angeles, RF Assocs.	213-478-1586
Cal	Palo Alto, Coherent Mktg. Assocs.	415-327-2217
Minn	Minneapolis, Scientific Devices	612-544-3725
NC	Greensboro, FM Assocs.	919-294-2754

HOAGLAND INSTR., Box 550, Dayton, N.J., 08810, Tel: 201-329-4681, TWX: 710-480-5674; Empl.: 30 .. p. 1•1731

Products manufactured: Controls/Control Eqpt., Delays, Time (Excluding Delay Lines, Timers, Delay & Relays, Time-Delays), Flashers, Relays, Services, Assembly, Production & Test, Switches, Timers

Local Sales Offices & Reps.

Mich	Detroit, L. H. Dickelman Co.	313-255-3300
Minn	St. Paul, Howard A. Cullen & Assocs.	612-646-7371
NJ	Cranford, Martech Assocs.	201-272-5510
NY	Manhasset, Martech Assocs.	516-627-1151
NC	Charlotte, F. Nickerson	919-527-4911
Ohio	Cincinnati, L.H. Dickelman Co.	513-671-6176
Ohio	Cleveland, L.H. Dickelman Co.	216-292-5643
Ore	Portland, Carmody Co., Inc.	206-682-2330
Wash	Seattle, Carmody	206-682-2330

HOBBS, Div. of Steward Warner, Ash at Yale Blvd., Springfield, Ill, 62705, Tel: 217-525-0330

HOBSON BROS., INC., 4940 W. Lawrence Ave., Chicago, Ill., 60630, Tel: 312-283-3600; Empl.: 90

For info on price: H.L. Behm; Application info: W.J. Leitmann; Customer service: H.L. Behm; Delivery info: J. Whalen

Products manufactured: Clamps & Clips, Connectors, Services, Assembly, Production & Test, Transistor, Diode, Thyristor Heat Dissipators

Local Sales Offices & Reps.

Ind	Indianapolis, Specialty Mfrs.	317-635-2723
NY	Buffalo, R. W. Mitscher Co.	716-633-7970
Va	Virginia Beach, R. W. Mitscher Co.	804-481-7200

HOFFMAN ENGINEERING CO.; Div. Federal Cartridge Corp., 9th & Tyler Sts., Anoka, Minn., 55303, Tel: 612-421-2240, TWX: 910-578-2211

For info on price: H. Maenke; Application info: R. Burley; Customer service: P. Pipenhagen; Delivery info: P. Pipenhagen

Products manufactured: Boxes, Junction, Outlets & Wall Plates, Cabinets & Accessories, Ducts, Wiring

Local Sales Offices & Reps.

Ala	Birmingham, C.W. Ashby Co.	205-879-1651
Ariz	Scottsdale, N.F. Ross	602-945-7262
Cal	Los Angeles, W.J. Trenbeth Engrg. Co.	213-645-4377
Cal	Walnut Creek, W.A. Borden Co.	415-937-5196
Colo	Denver, Gaer Sls.	303-777-3740
Conn	West Hartford, L. Bell	203-236-0395
Fla	Longwood, Shannon Assocs.	305-831-2245
Fla	St. Petersburg, Shannon Assocs.	813-822-3146
Ga	Atlanta, Holman-Lobsinger Co.	404-256-9120
Haw	Honolulu, Specialty Prods. Co.	808-531-0596
Ill	Chicago, KGA Engrg. Co.	312-889-2060
Ind	Indianapolis, Lester Sls. Co.	317-783-9251
Ky	Louisville, R & R Inc.	502-893-2571
La	Metairie, Schell-Ranna Co.	504-837-7837
Md	Baltimore, O.T. Hall & Son	301-467-5359
Mass	Framingham, H. Standish	617-879-1220
Mich	Farmington, W.L. Trombley & Son	313-477-5800
Mich	Grand Rapids, J.M. Perry Co.	616-949-0271
Minn	Minneapolis, R.D. Schwen Engrg. Inc.	612-854-4304
Mo	Kirkwood, Martin Electrical Sls. Inc.	314-966-8659
Mo	Raytown, Arehart-Barnds Sls. Co.	816-356-3488
Neb	Omaha, Electrical Prods. Co.	402-393-7350
NJ	Edison, Burgoyne Elec. Sls. Inc.	201-225-0450
NJ	Morristown, W.J. Waldron Assocs.	201-538-5607
NY	Camillus, J.C. Fox & T.R. Fox	315-488-0200
NC	Charlotte, R.W. Chapman & Co.	704-525-2421
NC	Raleigh, R.W. Chapman & Co.	919-782-2624
Ohio	Cleveland, M.M. Haley Co.	216-238-3650
Ohio	Dayton, W.W. Baerbalck & Assocs.	513-278-4217
Ohio	Jenks, W.G. Parker Co.	918-299-5449
Ore	Beaverton, D. Fry Co.	503-643-5448
Pa	Oreland, Cusick Electrical Sls. Inc.	215-886-2100
Pa	Pittsburgh, M.F. Smith & Assocs.	412-276-5363
SC	Greenville, R.W. Chapman & Co.	803-232-5391
SC	West Columbia, R.W. Chapman & Co.	803-256-2984
Tex	Dallas, Electrical Agencies Co.	214-747-0108
Tex	Houston, J. Edwards Co.	713-223-4731
Utah	Salt Lake City, J.H. Jones Co.	801-485-9372
Va	Richmond, J.H. Thrower	804-794-6819
Wash	Seattle, Muth-Richards Co.	206-323-2127
Wisc	Milwaukee, KGA Engrg. Co.	414-354-5900

HOFFMAN INDUSTRIAL PRODS., 170 Allen Blvd., Farmingdale, N.Y., 11735, Tel: 516-293-5244; Empl.: 30

Products manufactured: Connectors, Splices, wire (Including, Butt & Cap Types), Terminals, Tools, Wire & Cable Ties, Wire Strippers

Local Sales Offices & Reps.

DC	Washington, Selinger Assoc.	202-529-2044
Fla	Brandon, R. Herig	813-689-1573
Fla	Winter Park, Steele Tech. Sls.	305-644-6641
Ga	Atlanta, C. Roach	404-261-7184
Ill	Chicago, A. J. Ellis Co.	312-262-2708
Ill	Glynn Ellen, Anderson Elec.	
Ill	Oak Park, J. La Van	800-645-2014
Ind	Indianapolis, OEM Sls. Co.	317-545-1267
Kans	Wichita, B. Penn	316-682-9433
La	New Orleans, G. Bondurant Co.	504-833-6347
Mass	Springfield, W. Smith	800-645-2014
Mich	Detroit, Hoffman Bros.	313-873-7550
Mich	Lansing, Mktg. Professionals	517-484-0828
Minn	Mound, Moeller Sls.	612-472-1526
Mo	Chesterfield, H. Allensworth	314-469-3281
Mo	Fenton, R. Uthoff	314-343-4059
Mo	St. Louis, Midwestern Sls. Co.	314-961-0766
NJ	East Brunswick, I. Weschler	201-257-3951
NY	Farmingdale, Haines Products	516-420-1177
NY	Flushing, J. V. Marcus	212-463-0754
NY	Merrick, D. Obstgarten	212-682-0276
NY	New Rochelle, C. Erickson	914-636-8477
NC	Charlotte, J. Fairbanks	704-537-2753
NC	Statesville, J. Fowler	704-872-5117
Ohio	Chagrin Falls, American Traders	216-543-8155
Ohio	Shaker Heights, Martin-Rettger	216-283-5600
Pa	Cornwells Heights, D. Glick	215-757-9046
Pa	Phoenixville, J. Ludwick	800-645-2014
Pa	Pittsburgh, Karthauser Co.	412-931-5252
Tenn	Memphis, Hicks Sls. Agency	901-396-5725
Tenn	Memphis, S. F. Hiller	901-525-8463
Tex	Dallas, J. E. Bill Morton	214-341-1414
Tex	Garland, D. Reed	800-645-2014
Tex	Houston, C & C Sls. Co.	713-465-6856
Tex	Houston, D. Schick	800-645-2014
Wisc	Waukesha, J. C. Morkin	414-542-5129

P. R. HOFFMAN CO., Div. of Aiken Inds., Inc., 321 Cherry St., Carlisle, Pa., 17013, Tel: 717-243-2011; Empl.: 275

Customer service: J. W. Mountz

Free literature available: Literature on Cultured Quartz crystals, Literature on precision gringing, polishing, and measurement equipment and accessories for the processing of quartz, semiconductor, and optical materials.

Products manufactured: Abrasive Belts, Compounds, Cords, Powders, etc., Crystal Blanks, Crystals, Machines/Machinery, Production

HOLLINGSWORTH SOLDERLESS TERMINAL, Box 430, Phoenixville, Pa., 19460, Tel: 215-933-8947; Empl.: 300

Products manufactured: Connectors, Kits, Terminal, Machines/Machinery, Production, Terminals, Tools

HOLLIS ENGRG., INC., Charron Ave., Box 1189, Nashua, N.H., 03060, Tel: 603-889-1121, TWX: 710-228-1881; Empl.: 105

For info on price: R. T. Kosten; Application info: R. T. Kosten; Customer service: T. Diggins; Delivery info: R. T. Kosten

Free literature available: Hollis catalog 174 provides brief descriptions of the Hollis line of assembly, soldering, cleaning, lead-cutting and lead stabilizing systems.

Products manufactured: Air Cleaners & Filters (Shielded & Unshielded), Cleaners & Solvents, Machines/Machinery, Production, Solder Pots & Baths, Soldering Equipment, Soldering Guns, Irons & Desoldering Tools

Local Sales Offices & Reps.

Ariz	Phoenix, L. C. Palmer	602-955-9390
Cal	Mountain View, Morse Assocs.	415-968-7722
Colo	Denver, West/Mark Assoc.	303-433-7181
Fla	Ft. Lauderdale, B. Melvin Prods. Equip.	305-566-8195
Ga	Atlanta, DG Machinery & Gage Co.	404-633-6201
Ill	Chicago, Solid State Elctrns.	312-889-8033
Md	Baltimore, D.K. Jones & Assocs.	301-752-0577
Mass	Hudson, E.P.E. Corp.	617-562-9123
Minn	Minneapolis, M. Westlund Assoc.	612-866-5002
NJ	Princeton, Krone & Rubin Assoc.	609-924-0200
NY	Webster, Krone & Rubin Assoc.	716-671-6709
Ohio	Dayton, A.M.E.S. Corp.	513-435-9730
Pa	Norristown, Glove Engrg. Co.	215-275-9875
Tex	Austin, Crockett Engrg.	512-451-8269
Tex	Dallas, Crockett Engrg.	214-251-1776
Wash	Seattle, R. Johnston Co.	206-524-5170

HAMMOND MANUFACTURING COMPANY (U.S.) INC., 1051 Clinton St., Buffalo, N.Y., 14240, Tel: 716-852-0010; Empl.: 600

For info on price: L. Sillery 519-822-2960; Application info: B. Reardon; Customer service: R. Hammond

Free literature available: Catalogue 84: Electronic Transformers and Housings; Catalogue 75: Electrical Transformers and Housings.

Products manufactured: Boxes, Junction, Outlets & Wall Plates, Cabinets & Accessories, Chassis, Metal, Transformers

HONEYWELL, Aerospace & Def., Honeywell Plaza, Minneapolis, Minn., 55408, Tel: 612-870-5200, TWX: 910-576-2692

Products manufactured: Accelerometers, Alarms, Batteries, Computers, Controls/Control Eqpt., Cores, Ceramic, Crystals, Detectors, Direction Finders, Display Devices/Displays, Gyros (All Types), Hydrophones & Accessories, Indicators, Lasers & Laser Systems, Magnetometers, Memory Systems, Modulator/Demodulators, Oceanographic Equip. (Electronic), Power Supplies, Radar Systems, Radiometers, Scanners, Services, Assembly, Production & Test, Substrates, Tracking Systems, Transducers

Local Sales Offices & Reps.

Cal	Fullerton	714-870-0120
Cal	Los Angeles	213-670-7500
Cal	San Diego	714-565-6000
Cal	Sherman Oaks	213-986-6310
Cal	Sunnyvale	408-732-0120
Fla	Orlando	305-894-3131
Fla	Shalimar	904-651-0310
Ga	Atlanta	404-321-2028
Iowa	Davenport	319-355-6456
Mass	Boston	617-782-3100
Mo	Creve Coeur	314-991-4100
NJ	Westfield	201-233-9200
NY	Elmsford	914-592-3200
NY	Liverpool	315-451-4000
NY	Plainview	516-931-1500
Ohio	Dayton	513-461-4480
Pa	Bala Cynwyd	215-835-2500
Tex	Dallas	214-661-5459
Tex	Houston	713-333-3622
Va	Arlington	703-524-8200
Wash	Mercer Island	206-232-5030

HONEYWELL INFORMATION SYSTEMS, 60 Walnut St., Wellsley, Mass., 02181, Tel: 617-237-4100

Customer service: Prod. Mktg.

Products manufactured: Comm. Systems, Computers, Data Acquisition & Reduction Systems, Printers, Terminals, Data Display (including Alphanumeric & Graphic)

HONEYWELL INC., Commercial Div., 200 Bond St., Wabash, Ind., 46992, Tel: 219-563-2161, TWX: 810-290-2725; Empl.: 350

Products manufactured: Cabinets & Accessories, Cases, Equipment, Instrument, Meter, Racks

Local Sales Offices & Reps.

Colo	Denver, E. W. Johnson Co.	303-985-4810
Fla	Maitland, Beacon Elctrns.	305-647-3498
Fla	Palm Beach Gardens, Beacon Elctrns.	305-622-2770
Ga	Atlanta, Beacon Elctrns.	404-351-3654
Ind	Ft. Wayne, R. O. Whitesell & Assoc.	219-432-5591
Ind	Indianapolis, R. O. Whitesell & Assoc.	317-359-9283
Ky	Louisville, R. O. Whitesell & Assoc.	502-893-7303
Md	Lanham, Eastern Compts.	301-794-8610
Mass	Burlington, Schaal Assocs.	617-272-7940
Mich	Grand Rapids, R. O. Whitesell & Assoc.	616-451-8901
Mich	Southfield, R. O. Whitesell & Assoc.	313-358-2020
Mich	St. Joseph, R. O. Whitesell & Assoc.	616-983-7337
Minn	St. Paul, Northport Engrg.	612-698-3841
Ohio	Dayton, R. O. Whitesell & Assoc.	513-298-9546
Pa	Flowertown, Eastern Comps.	215-836-1616
Pa	Pittsburgh, R. O. Whitesell & Assoc.	412-242-0100
SC	Spartanburg, Beacon Elctrns.	803-582-4613
Tex	Dallas, Blair Engrg. Sls.	214-352-8411
Tex	Houston, Blair Engrg.	713-772-0677

HONEYWELL INFORMATION SYSTEMS, 200 Smith St. MS061, Waltham, Mass., 02154, Tel: 617-237-4100; Empl.: 40000

Products manufactured: Comm. Systems, Computers, Disc Packs, Magnetic, Drums Computer Memory, Printers, Terminals, Data Display (including Alphanumeric & Graphic)

Local Sales Offices & Reps.

Ala	Birmingham	205-323-2431
Ala	Mobile	205-479-8572
Ala	Montgomery	205-262-1127
Ariz	Phoenix	602-263-2240
Ark	Little Rock	501-376-2620
Cal	Fresno	209-486-4780
Cal	Long Beach	213-435-6578
Cal	Los Angeles	213-625-1271
Cal	Oakland	415-839-1300
Cal	Sacramento	916-927-2221
Cal	San Diego	714-565-6000
Cal	San Francisco	415-957-2500
Cal	Sunnyvale	408-732-0120
Colo	Englewood	303-771-2340
Conn	Westport	203-226-1051
Fla	Jacksonville	904-396-6971
Fla	Miami	305-592-5293
Fla	Orlando	305-894-3131
Fla	Tampa	813-870-0200
Ga	Atlanta	404-321-3321
Ga	Columbus	404-322-1625
Ga	Savannah	912-234-2283
Haw	Honolulu	808-537-5514
Ill	Chicago	312-454-1300
Ill	Chicago	312-671-1800
Ill	Lansing	312-568-4200
Ill	Oakbrook	312-325-7950
Ill	Peoria	309-692-0610
Ill	Rockford	815-965-3757
Ill	Springfield	217-529-0100
Ind	Evansville	812-477-9255
Ind	Fort Wayne	219-482-4567
Ind	Indianapolis	317-243-0831
Ind	Mishawaka (So. Bend)	219-259-8561
Iowa	Cedar Rapids	319-393-9200
Iowa	Des Moines	515-288-3601
Kans	Wichita	316-686-2348
Ky	Louisville	502-456-1220
La	Baton Rouge	504-348-0075
La	Bettendorf	319-355-6456
La	New Orleans	504-833-7241
La	Shreveport	318-425-4288
Me	Augusta	207-622-4701
Me	Portland	207-774-5811
Md	Lutherville	301-828-0900
Mass	Burlington	617-272-8115
Mass	Springfield	413-781-0132
Mass	Waltham	617-890-0400
Mass	Worcester	617-799-4132
Mich	Detroit	313-424-3500
Mich	Grand Rapids	616-451-0621
Mich	Lansing	517-694-3361
Minn	Edina	612-830-3500
Miss	Jackson	601-982-2090
Mo	Creve Coeur	314-991-4100
Mo	Kansas City	816-358-4200
Neb	Omaha	402-393-8300
NH	Manchester	603-625-9772
NJ	Mountainside	201-233-9200
NM	Albuquerque	505-345-1656
NY	Albany	518-456-7000
NY	Amherst	716-835-2770
NY	Elmsford	914-592-3200
NY	Manhasset	516-869-8200
NY	N.Y.	212-557-1200
NY	New York	212-555-1271
NY	Rochester	716-461-1600
NY	Syracuse	315-451-4000
NC	Charlotte	704-364-4770
NC	Charlotte	704-525-4485
NC	Greensboro	919-272-2162
NC	Raleigh	919-787-0170
Ohio	Akron	216-733-2244
Ohio	Cincinnati	513-771-8730
Ohio	Cleveland	276-881-0300
Ohio	Columbus	614-486-5971
Ohio	Dayton	513-461-4480
Ohio	Lima	419-222-5010
Ohio	Toledo	419-473-9721
Okla	Oklahoma City	405-947-1516
Okla	Tulsa	918-437-5934
Ore	Portland	503-233-8581
Ore	Salem	503-585-7197
Pa	Allentown	215-434-4244
Pa	Bala Cynwyd	215-835-2500
Pa	Harrisburg	717-564-8000
Pa	Pittsburgh	412-922-4422
RI	Providence	401-438-6000
SC	Charleston	803-722-8381
SC	Columbia	803-779-3240
SC	Greenville	803-232-3854
Tenn	Chattanooga	615-892-4242
Tenn	Johnson City	615-929-2195
Tenn	Knoxville	615-525-7396
Tenn	Memphis	901-396-6222
Tenn	Nashville	615-385-3400
Tex	Dallas	214-634-8880
Tex	Ft. Worth	817-336-5479
Tex	Houston	713-785-3200
Tex	San Antonio	512-341-4691
Utah	Salt Lake City	801-487-0681
Va	McLean	703-790-3000
Va	Norfolk	804-497-1067
Va	Richmond	804-285-8211
Va	Roanoke	703-344-3218
Wash	Mercer Island	206-232-5030
Wash	Tacoma	206-475-5393
WVa	Charleston	304-744-5341
Wisc	Appleton	414-733-4491
Wisc	Madison	608-238-9344
Wisc	Milwaukee	414-771-6300
FOR:	Can., Willowdale, Ont.	416-491-0660

HONEYWELL, Process Control Div./Ft. Wash., 1100 Virginia Dr., Ft. Washington, Pa., 19034, Tel: 215-643-1300, TWX: 510-661-0328

Products manufactured: Actuators, Alarms, Amplifiers, Computers, Connectors, Controls/Control Eqpt., Data Acquisition & Reduction Systems, Detectors, Gages, Indicators, Meters, Motors, Mounts, Panels, Paper, Graphic Recording, Plug & Jack Sets, Potentiometers, Probes, Pyrometers, Racks, Recorders, Regulators, Relays, Switches, Thermistors, Thermocouples, Elements & Accessories, Transducers, Transmission Systems, Data, Transmitters, Valves, Solenoid, Wire

Local Sales Offices & Reps.

Ala	Birmingham	205-323-2431
Alas	Anchorage	907-344-0522
Ariz	Phoenix	602-263-2222
Ark	Little Rock	501-372-0166
Cal	Los Angeles	213-724-3500
Cal	San Francisco	415-826-9100
Colo	Englewood	303-771-2340
Conn	Hartford	203-549-3800
Fla	Orlando	305-894-3131

Ga	Atlanta	404-875-9561
Ill	Chicago	312-478-9266
Ill	Lansing	312-474-9300
Ind	Indianapolis	317-243-0831
Iowa	Davenport	319-355-6456
Kans	Wichita	316-522-3431
Ky	Louisville	502-459-5970
La	Baton Rouge	504-924-4236
Me	Portland	207-773-4751
Md	Lutherville	301-828-0900
Mass	Boston	617-787-5305
Mich	Farmington Hills	313-478-1300
Mich	Grand Rapids	616-451-0621
Minn	Minneapolis	612-835-5400
Miss	Jackson	601-366-6461
Mo	St. Louis	314-647-6100
Mont	Billings	406-252-5646
Neb	Omaha	402-393-8300
NJ	Westfield	201-233-9200
NM	Albuquerque	505-345-1656
NY	Long Island City	212-392-4300
NY	Syracuse (Liverpool)	315-451-4000
NC	Charlotte	704-364-4770
ND	Fargo	701-235-4221
Ohio	Cleveland	216-881-0300
Okla	Oklahoma City	405-848-2811
Ore	Portland	503-235-8411
Pa	Philadelphia	215-226-2400
SC	Columbia	803-779-3240
Tenn	Memphis	901-458-8511
Tex	Houston	713-785-3200
Utah	Salt Lake City	801-487-0681
Va	Richmond	804-285-8211
Wash	Seattle	206-232-5030
WVa	Charleston	304-744-5341
Wisc	Milwaukee	414-771-6300

HONEYWELL MICRO SWITCH DIV., See Micro Switch, Div. Honeywell

HONEYWELL, Residential Div., 2701 4th Ave., S., Mpls., Minn., 55408, Tel: 612-332-5222

Products manufactured: Air Cleaners & Filters (Shielded & Unshielded), Controls/Control Eqpt., Detectors, Indicators, Relays, Switches, Thermostats, Transducers, Valves, Solenoid

Local Sales Offices & Reps.

Cal	Los Angeles	213-724-3500
Cal	San Francisco	415-826-9100
Colo	Englewood	303-771-2340
Ga	Atlanta	404-875-9561
Ill	Chicago	312-478-9266
Ill	Lansing	312-474-9300
Ind	Indianapolis	317-243-0831
Iowa	Des Moines	515-288-3601
Mass	Boston	617-787-5300
Mich	Southfield	313-352-1900
Minn	Edina	612-941-5430
Mo	Kansas City	816-358-4200
Mo	St. Louis	314-647-6100
NJ	Westfield	201-233-9200
NY	Long Island City	212-392-4300
NY	Syracuse	315-437-8493
NC	Charlotte	704-364-4770
Ohio	Cleveland	216-881-0300
Ohio	Columbus	614-486-5971
Pa	Blue Bell	215-643-5990
Pa	Pittsburgh	412-922-4422
Tenn	Nashville	615-297-0992
Tex	Dallas	214-363-5441
Va	McLean	703-893-4660
Wash	Mercer Island	206-232-5030
Wisc	Milwaukee	414-771-6300

HONEYWELL, INC., Test Instrs. Div., 4800 E. Dry Creek Rd., Box 5227, Denver, Colo., 80217, Tel: 303-771-4700; Empl.: 750 .... p. 1•724,725

Products manufactured: Amplifiers, Analyzers, Data Acquisition & Reduction Systems, Memory Systems, Oscillographs, Direct Writing, Power Supplies, Recorders, Signal Conditioners & Equipment

Local Sales Offices & Reps.

Cal	Los Angeles	213-724-3500
Cal	Sunnyvale	408-998-3131
Colo	Denver	303-771-2340
Fla	Orlando	305-894-3131
Ga	Atlanta	404-321-2524
Haw	Honolulu	808-841-6644
Ill	Lansing	312-474-9300
Ill	Skokie	312-674-9770
Md	Lutherville	301-828-0900
Mass	Bedford	617-275-2630
Mich	Southfield	313-478-1600
Minn	Minneapolis	612-830-3500
Mo	Creve Coeur	314-991-4100
NJ	Westfield	201-233-9200
NM	Albuquerque	505-345-1656
NC	Greensboro	919-292-1556
Ohio	Cleveland	216-881-0300
Ohio	Dayton	513-461-4480
Pa	Bala Cynwyd	215-835-2500
Pa	Pittsburgh	412-922-4422
Tex	Dallas	214-661-5459
Wash	Mercer Island	206-232-5030

HOPE ELCTRNS., Box 773, Clifton, N.J., 07013, Tel: 201-777-3522; Empl.: 20; Minimum order: $25 p. 1•1234; p. 2•1287

Customer service: Randolph Mossige

Products manufactured: Amplifiers, Attenuators, Controls/Control Eqpt., Detectors, Filters, Generators, Oscillators, Ovens, Power Supplies, Relays

Local Distributors

NJ	Clifton, Parts Masters, 411 Main Ave.	201-777-7706

HOPKINS ENGRG., 12900 Foothill Blvd., San Fernando, Cal., 91342, Tel: 213-361-8691, TWX: 910-496-1531; Empl.: 65 .... p. 1•566,567

Products manufactured: Filters, Services, Assembly, Production & Test, Suppressors

Local Sales Offices & Reps.

Ariz	Scottsdale, Runyon Co.	602-959-6060
Cal	Glendale, G R U Assocs.	213-245-5586
Cal	San Carlos, Kottmeier Assocs., Inc.	415-592-8333
Colo	Wheatridge, Waugaman Assocs., Inc.	303-423-1020
Conn	Glastonbury, Barton-Caron Assocs.	203-633-9417
Kans	Olathe, B. Rush Assocs.	913-782-1177
Md	Lanham, Eastern Comps.	301-794-8610
Mass	Auburndale, Barton-Caron Assocs.	617-332-2021
Mich	Jackson, Norwood Scroggs Co.	517-750-1170
Minn	St. Paul, H. Cullen & Assoc.	612-646-7371
NJ	Wayne, Unicomp	201-696-2888
NY	Syracuse, H. R. Murray, Inc.	315-446-5555
Ohio	Dayton, Berberich Assocs., Inc.	513-252-9981
Pa	Flourtown, Eastern Comps.	215-836-1616
Tex	Dallas, Stevens Sls.	214-350-2476
Wash	Seattle, Blum & Assoc.	206-782-1600

HORIZONS INTERNATIONAL, INC., 716 Willow Rd., Menlo Park, Cal., 94025, Tel: 415-328-1111, TWX: 910-373-1170; Empl.: 150; Minimum order: $25 p. 1•962,963

For info on price: S. Robinson; Application info: C. Long; Customer service: J. Raynal; Delivery info: E. Warren

Free literature available: General Brochure Super "26" Information Sheet Super "32" Information Sheet Fan Information Sheet/Fan Price Sheet Computer Run Out On All Motors On Request

Products manufactured: Blowers & Fans & Accessories, Motors, Servo Systems, Tachometers

Local Sales Offices & Reps.

Ariz	Scottsdale, Williams & Assocs.	602-947-4297
Cal	Menlo Park, Long & Assocs.	415-327-1300
Cal	Sherman Oaks, R. Meussdorfer & Assocs.	213-788-0771
Colo	Denver, Williams & Assocs.	303-373-4730
Conn	Milford, Todino Engrg. Sls.	203-874-6643
Fla	Ft. Lauderdale, Orbe, Inc.	305-564-8571
Ill	Chicago, Engineered Sls. Co.	312-867-8434
Md	Baltimore, R.L. Wilkinson	301-377-7800
Mass	Needham Heights, Todino Engrg. Sls.	617-444-7925
Mich	St. Claire Shores, J. M. Thorpe	313-779-6363
Mo	Kansas City, Harris-Hanson Co.	816-444-9494
Mo	St. Louis, Harris-Hanson Co.	314-432-3611
NJ	Ridgefield, Haber-Ramp Corp.	201-945-5250
NM	Albuquerque, Williams & Assocs.	505-255-1638
NY	Buffalo, H.C. Johnson Agencies	716-632-7880
NY	Fayetteville, H.C. Johnson Agencies	315-637-9383
NY	Rochester, H.C. Johnson Agencies	716-482-3000
Ohio	Chagrin Falls, Drivex Corp.	216-247-6701
Pa	Glenside, R.L. Wilkinson	215-424-8400
Tenn	Bristol, R. Rakes	615-968-4195
Tex	Dallas, M. Kruvand Co.	214-827-8043
Tex	Houston, M. Kruvand Co.	
Wash	Seattle, Seatronics	206-767-4330
FOR:	Can., Rexdale, Ont. M9W 5A3, Eakin Ltd.	416-245-3600

HOSKINS MFG. CO., 4445 Lawton Ave., Detroit, Mich., 48208, Tel: 313-895-2860, TWX: 810-221-1409; Empl.: 400

Customer service: Sls. Serv. Sec.

Free literature available: Catalogs available include nickel-chromium resistance alloys, Iron-chromium-aluminum resistance alloys, Hoskins; chromel-alumel* thermocouple alloys, and high temperature tungsten-rhenium thermocouple alloys. *Chromel-Alumel are registered trademarks.

Products manufactured: Magnets, Wire

Local Sales Offices & Reps.

Cal	Los Angeles, Hoskins Mfg. Co.	213-685-5550
Conn	Stamford, Hoskins Mfg. Co.	203-348-4442
Ill	Chicago, Hoskins Mfg. Co.	312-724-6880
Mich	Detroit, Hoskins Mfg. Co.	313-895-2860
Ohio	Cleveland, Hoskins Mfg. Co.	216-371-9529

HOTPACK CORP., 5148 Cottman Ave., Phila., Pa., 19135, Tel: 215-333-1700, TWX: 710-670-1694; Empl.: 130

Customer service: Sales Office

Free literature available: Short form catalog shows Hotpack's line of water jacketed incubators, fraction collector bio-refrigerators, portable refrigerated bath/circulators, steady state test chambers. The 8-page brochure also describes and illustrates the company's full line of equipment.

Products manufactured: Baths, Controlled Temperature (Air & Liquid), Chamber, Environmental Test, Controls/Control Eqpt., Dehumidifiers (For Equipment), Furnaces, Ovens

Local Sales Offices & Reps.

NY	New York, Hotpack Corp.	212-247-5554

Local Distributors

Cal	Los Altos, Herb Waldeck Assoc., 12054 Brookmill Rd.	415-964-4699
Cal	Reseda, Bob Milner & Assoc., 7219 Canby Ave.	213-877-1444
Colo	Denver, PLS Assoc., Inc., 7418 E. Princeton Ave.	303-771-0141
Fla	Ft. Lauderdale, Hays Enterprises, 2120 N.E. 45th St.	305-772-4982
Ga	Atlanta, J. L. Morris Assoc., 3224 Peachtree Rd.	404-233-5118
Ill	Chicago, A. Stanley Co., 6059 N. Albany Ave.	312-973-7376
Iowa	Des Moines, H. E. Ferris Co., 4005 Plainview Dr.	515-255-5008
Md	Rockville, Guerra Technical Sls., Box 286	301-929-1444
Minn	Minneapolis, Gibbco Scientific Co., 1311 W. 25th St.	612-377-1200
Mo	St. Louis, Herdlein Scientific, 2050 Woodson Rd.	314-423-4834
NJ	Cherry Hill, F. Lucchesi, 224 Heritage Rd.	609-428-3537
NY	New York, G. Kobin, Box 776, Nad Sq. Sta.	212-247-5554
NY	No. Tonowanda, Harvey Instr., 1121 Oliver St.	716-694-9500
NC	Raleigh, G. W. Mitchell, Box 25129	919-833-8655
Ohio	Cincinnati, Witt Sales Co., Box 37294	513-761-5602
Pa	Pittsburgh, Giangarlo Scientific, 3237 Dawson St.	412-687-6415
Tenn	Germantown, John Sellers, 3267 Hiclory Creek	901-362-8651
Tex	Dallas, Southwestern Engrg. & Equip., 6260 E. Mockingbird La.	214-826-6661

HOUSTON INSTRUMENT, Div. Bausch & Lomb, 8500 Cameron Rd., Austin, Tex., 78753, Tel: 512-837-2820, TWX: 910-881-5782; Empl.: 10,000 .... p. 1•870-873

For info on price: J. Bell; Application info: W. Kriger; Customer service: R. Stevens; Delivery info: S. Haskell

Products manufactured: Recorders

Local Sales Offices & Reps.

Ala	Huntsville, J.L. Highsmith & Co.	205-881-3294
Ariz	Phoenix, Moxon, Inc.	602-273-7363
Cal	Culver City, Feeger Lucas Wolfe	213-559-7200
Cal	Long Beach, CTI Data Sys.	213-426-7375
Cal	San Mateo, Dayton Assocs.	415-347-9419
Colo	Englewood, Davis Assocs.	303-761-9228
Colo	Littleton, Aztec Entprs.	303-795-0250
Fla	Orlando, J.L. Highsmith & Co.	305-293-5202
Haw	Honolulu, Aloha Assocs.	808-941-1574
Ill	Downers Grove, Data Dev.	312-887-8480
Mass	Framingham, J.M. Lancaster Co.	617-873-8893
Mich	Detroit, Ridgway East, Inc.	313-538-3940

Directory of Local Distributors Starts on page 401

Minn	Minneapolis, Instrumentation Svcs., Inc.	612-544-8916
Mo	Hazelwood, Technical Reps.	314-731-5200
NJ	Palisades Park, Scientific Dev.-East	201-871-3916
NJ	Woodbrige, J.J. Wild, Inc.	201-636-7780
NM	Albuquerque, Aztec Entprs.	505-255-2440
NY	Fayetteville, Doolittle Elctrns.	315-637-3222
NY	Jericho, J.J. Wild, Inc.	516-935-6600
NC	Charlotte, J.L. Highsmith & Co.	704-333-7743
Ohio	Chagrin Falls, Ridgway East, Inc.	216-247-4845
Ohio	Loveland, Ridgway East, Inc.	513-683-4350
Pa	King of Prussia, S & S Assocs.	215-265-3450
Tex	Houston, Comspec, Inc.	713-461-4487
Tex	Richardson, Comspec, Inc.	214-234-4137
Va	Fairfax, Nine Assocs.	703-273-1803
Va	Richmond, J.L. Highsmith & Co.	703-272-5888
Wash	Bellevue, Showalter Instrs.	206-455-4922
Wisc	Hales Corners, Arthur Engrg. Sls. Co.	414-425-5919

HOWARD INDUSTRIES, Div. of MSL, Box 287, Milford, Ill., 60953; Empl.: 500

Products manufactured: Blowers & Fans & Accessories, Motor & Generator Armatures, Rotors, Stators, Motors

Local Sales Offices & Reps.

Cal	Los Angeles, Techrep Assocs.	213-641-5830
Cal	Santa Clara, Richards & Assocs.	408-246-5860
Colo	Denver, Williams & Assocs.	303-373-4730
Conn	Torrington, Motoreps of New England	203-482-3193
Ga	Atlanta, W.E. Moran, Inc.	404-451-3000
Ill	Chicago, K.M.G. Sls. Co.	312-437-5815
Minn	Minnetonka, T.H. Ayre Assocs.	612-474-4125
Mo	St. Ann, Lawton Sls. Co.	314-725-1330
NJ	Red Bank, Motoreps of New York	201-741-3356
Ohio	Dayton, Electrical Sys. Co.	513-434-9822
Tex	Dallas, Evans & McDowell Assocs.	214-238-7157
Wash	Bellevue, Pacific Conslts.	206-454-2503
Wisc	Racine, K.M.G. Sls. Co.	414-639-9005

HOWE RICHARDSON SCALE CO., 680 Van Houten Ave., Clifton, N.J., 07015, Tel: 201-GR1-3400; Empl.: 1150

Free literature available: Catalog – showing full line of industrial weighing equipment including bench, floor scales, truck and track scales, automatic packaging equipment.

Products manufactured: Scales, Dial

Local Sales Offices & Reps.

Ala	Birmingham	205-595-0587
Cal	Anaheim	714-630-6230
Cal	Hayward	415-782-5040
Colo	Denver	303-934-5616
Conn	Hartford	203-246-8576
Fla	Tampa	813-877-3082
Ga	Atlanta	404-355-2464
Ill	Broadview	312-345-7605
Iowa	Des Moines	515-244-2231
La	Jefferson	504-834-0082
Md	Baltimore	301-282-2600
Mass	Avon	617-588-3770
Mich	Troy	313-585-7070
Minn	Minneapolis	612-925-2995
Mo	Kansas City	816-221-0437
Mo	Maryland Heights	314-432-8300
Neb	Omaha	402-333-8754
NJ	Fairfield	201-227-1030
NY	Albany	518-459-2410
NY	Buffalo	716-684-5700
NY	Richmond Hill	212-847-7995
NC	Charlotte	704-394-1392
Ohio	Cincinnati	513-271-6640
Ohio	Cleveland	216-781-7300
Ore	Portland	503-224-3147
Pa	Philadelphia	215-744-6200
Pa	Pittsburgh	412-782-0611
Tenn	Memphis	901-743-3133
Tex	Garland	214-341-1727
Tex	Houston	713-782-1315
Va	Richmond	703-644-8774
Wash	Seattle	206-624-8646
Wash	Spokane	509-535-4295
Wisc	Milwaukee	414-453-1111

HOWELL INST. INC., 3479 W. Vickery Blvd., Ft. Worth, Tex., 76107, Tel: 817-336-7411; FSC No: 98869; Empl.: 150

Free literature available: Catalogs in the following categories: digital indicators, data acquisition systems, totalizers and batch counters, and turbine engine monitoring and test equipment.

Products manufactured: Analyzers, Controls/Control Eqpt., Counters, Data Acquisition & Reduction Systems, Data Loggers, Indicators, Meters, Monitors, Recorders, Tachometers

HOYT ELEC. INSTR. WORKS, Burton-Rogers Co., Sls. Div., 556 Trapelo Rd., Belmont, Mass., 02179, Tel: 800-225-1375; Empl.: 200 .... p. 1•726,727

Customer service: W. Burton 800-225-1375

Products manufactured: Meters

Local Sales Offices & Reps.

Cal	Hollywood, Duncan Engrg. Sls. Co.	213-462-5880
Colo	Denver, J. Dolliver	303-377-4740
Fla	St. Petersburg, W. Palmer Lanagan	813-822-1192
Ill	Chicago, Ringland M. Krueger Co.	312-282-8444
Ind	Fort Wayne, Val-Skol Sls.	219-742-9122
Ind	Indianapolis, Val-Skol Sls.	317-926-5063
Md	Baltimore, R.L. Wilkinson, Inc.	301-377-7800
Mass	Belmont, Burton-Rogers Co.	617-489-1520
Minn	Minneapolis, R.J. Siedare & Assoc.	612-533-2294
Mo	St. Louis, Ensco-Rep Inc.	314-542-3935
NJ	West Caldwell, Peterson-Rudnick Assocs.	201-226-4363
NY	Bronx, Peterson-Rudnick Assocs.	212-671-1923
NY	Rochester, Up State Comps.	716-288-5670
NC	Charlotte, K-I Assocs.	704-523-0324
Ohio	Cincinnati, Val-Skol Sls.	513-563-6790
Ohio	Cleveland, Val-Skol Sls.	216-229-2822
Pa	Glenside, R.L. Wilkinson	215-424-8400
Tex	Dallas, Stevens Sls.	214-350-2476
Wash	Bellevue, Elden Bowden Co.	206-822-5608
EXP:	Belmont, Burton-Rogers Co.	617-489-1520

Local Distributors

Ariz	Phoenix, Metermaster, Inc., 2633 E. Buckeye Rd.	602-273-7331
Cal	Los Angeles, Metermaster/LA, 5646 Jillson St.	213-685-4340
Cal	Palo Alto, Metermaster, Inc., 3995 Bayshore Rd.	415-968-0313
NJ	Little Falls, Hosica Labs, 715 Main St.	201-256-7724
Tex	Garland, Metermaster, 2809 National Dr.	214-271-2471

H.P.M. DIV., Koehring Co., Marion Rd., Mt. Gilead, Ohio, 43338, Tel: 419-946-0222; Empl.: 1200

Products manufactured: Machines/Machinery, Production

HRB-SINGER, INC., Science Park, Box 60, State College, Pa., 16801, Tel: 814-238-4311, TWX: 510-691-2610; Empl.: 575

Free literature available: Electromagnetic surveillance systems, interactive processing, environmental & behavioral sciences, airborne infrared surveillance systems & services.

Products manufactured: Amplifiers, Antennas, Converters, Couplers, Demodulators, Display Devices/Displays, Dividers, Duplexers, Microwave, Filters, Integrated Circuit Devices, Microwave Integrated Circuits (MIC's), Mixers, Multipliers, Oscillators, Receivers, Services, Assembly, Production & Test, Strip-Line Components, Microwave, Synthesizers, Tuners

Local Sales Offices & Reps.

DC	Wash, K.E. O'Neil	202-223-4100
FOR:	Can., Ottawa, Ont., J.R. Douglas	613-235-2812

HUGHES AIRCRAFT CO, Aerospace Grps., Centinela Ave & Teale St, Culver City, Cal., 90230

Products manufactured: Antenna Feed Systems, Antennas, Attenuators, Boards, Plug-In, Boards, Printed Circuit, Boards, Printed Wiring, Universal, Boards, Programming, Cable Assemblies & Harnesses, Cable, Capacitors, Fixed, Cavities, Microwave, Circuits, Hybrid, Thick Film, Circuits, Hybrid, Thin-Film, Circuits, Integrated, Silicon Monolithic, Unpackaged Chips, Circuits, Printed, Multilayer, Circulators, Ferrite, Coatings, Coils Including Assemblies & Forms, Comm. Systems, Computers, Containers, Controllers, Programmable, Control Systems, Air Traffic, Controls/Control Eqpt., Converters, Couplers, Data Acquisition & Reduction Systems, Data Compressors, Digital, Decoders, Delay Lines, Demodulators, Detectors, Diplexers, Antenna, Direction Finders, Discriminators, Display Devices/Displays, Dividers, Drums Computer Memory, Duplexers, Microwave, Ferrite Material & Parts, Filters, Generators, Honeycomb Sheets, Panels, etc., Horns, Microwave, Impedance Converters, Microwave, Indicators, Integrated Circuit Packaging Systems, Integrated Circuit Devices, Intensifiers, Image, Inverters, Isolators, Junctions, Hybrid, Microwave, Laminates, Lasers & Laser Systems, Limiters, Lubricants, Masers, Materials, Self-Lubricating, Memory Systems, Mixers, Modulator/Demodulators, Modules, Logic, Encapsulated, Monitors, Mounts, Multiplexers, Multipliers, Networks, Packages, Integrated Circuit, Paints, Pedestals, Radar, Power Supplies, Radar Systems, Receivers, Recorders, Relays, Resistors, Scramblers, Data, Screens, Printed Circuit, Sensors, Light, Services, Assembly, Production & Test, Shifters, Shutters, Microwave, Signal Conditioners & Equipment, Simulators, Sliding Loads, Microwave, Slotted Lines, Microwave, Strip-Line Components, Microwave, Terminal Blocks, Boards & Strips, Terminal Equipment, Digital, Terminals, Terminals, Data Display (including Alphanumeric & Graphic), Test Systems, Tracking Systems, Transceivers, Transformers, Translators, Data, Transmission Systems, Data, Transmitters, Transponders, Waveguides & Adapters

HUGHES AIRCRAFT CO., Communication Prods. Dept., Microelectronic Prods. Div., 500 Superior Ave., Newport Beach, Cal., 92663, Tel: 714-548-0671, TWX: 910-596-1374 .... p. 1•361

Products manufactured: Crystals, Discriminators, Filters

Local Sales Offices & Reps.

Ala	Gadsden, F.C. Nickerson Co.	205-547-7718
Ariz	Phoenix, Toward Engrg. Assocs.	602-277-1453
Cal	Mountain View, Caltron Pyle	415-964-3244
Cal	Newport Beach, Hughes Aircraft Co.	714-548-0671
Cal	Van Nuys, Wes-K Assocs.	213-989-3070
Colo	Denver, Electronic Sls.	303-771-6300
Conn	No. Haven, Kitchen & Kutchin	203-239-0212
Fla	Oldsmar, F.C. Nickerson Co.	813-855-4209
Fla	Tampa, F.C. Nickerson Co.	813-885-1416
Ga	Decatur, F.C. Nickerson Co.	404-321-4678
Ill	Des Plaines, Coombs Assocs.	312-298-4830
Md	Baltimore, R.L. Wilkinson, Inc.	301-377-7800
Mass	Lexington, Kitchen & Kutchin	617-862-8230
Minn	Minneapolis, Stach-Johnson, Inc.	612-925-2111
Mo	St. Louis, Beneke & McCaul, Inc.	314-567-3399
NY	Dewitt, Tri-Tech Elctrns.	315-446-2881
NY	East Rochester, Tri Tech Elctrns.	716-381-2722
NY	Great Neck, Cooper-Simon & Co.	516-487-1142
NY	Larchmont, Tri Tech Elctrns.	914-834-4423
NC	Kannapolis, F.C. Nickerson	704-932-6772
Ohio	Dayton, R.G. Sidnell Co.	513-885-4161
Ore	Beaverton, N.R. Schultz Co.	503-643-1644
Pa	Narbeth, Electro-Comp Sls.	215-664-3576
Tex	Dallas, R. Mathews Elctrns.	214-233-0363
Tex	Houston, R. Matthews Elctrns.	713-664-7131
Wash	Bellevue, N.R. Schultz Co.	206-454-0300
Wisc	Greendale, Coombs Assocs.	414-421-2300
EXP:	Newport Beach, Cal., Hughes Aircraft Co.	714-548-0671

HUGHES AIRCRAFT CO., CONNECTING DEVICES, 17150 Von Karman Ave., Irvine, Cal., 92705, Tel: 714-549-5701 .... p. 2•888,2022

Products manufactured: Cable Assemblies & Harnesses, Cable, Circuits, Flexible, Connectors, Contacts, Electrical, Tools

Local Sales Offices & Reps.

Cal	Newport Bch., W. E. S. T., Inc.	714-540-9040
Ill	Park Ridge, Probe Elctrns	312-696-2828
Kans	Overland Pk, Ensco-Rep	913-381-7557
Md	Towson, Kraft Elctrns. Sls.	301-828-5838
Mass	Stoneham, REPCO, Inc.	617-438-3113

Mich	Southfield, Luebbe Sls.	313-357-0355
Minn	Mpls., Siedare Assocs.	612-533-2294
Mo	St. Louis, Ensco-Rep.	314-567-3935
NJ	Newfoundland, Adamo Prod. Dvl.	201-697-2450
NY	Syracuse, T-Squared Elctrns. Co.	315-463-8592
Ohio	Cincinnati, Luebbe Sls.	513-871-4211
Ohio	Cleveland, Luebbe Sls.	216-333-0425
Ohio	Dayton, Luebbe Sls.	513 294-0426
Pa	Delmont, Luebbe Sls. Co.	412-468-4019
Tex	Irving, Space Elctrns.	214-251-2261
EXP:	Los Angeles, Cal,, Hughes Int'l	213-534-2121

HUGHES AIRCRAFT CO., Electron Dynamics Div., 3100 W. Lomita Blvd., Torrance, Cal., 90509, Tel: 213-534-2121, TWX: 910-347-6238; Empl.: 1200

Products manufactured: Amplifiers, Bends & Twists, Microwave, Detectors, Diodes, Generators, Heat Exchangers & Systems, Heaters & Heating Elements, Isolators, Lasers & Laser Systems, Mixer-Preamplifiers, Microwave, Mixers, Modulators, All Kinds, Power Supplies, Tubes

Local Sales Offices & Reps.

Ariz	Phoenix, Griot Assocs.	602-275-4991
Ariz	Scottsdale, Fryco	602-945-3281
Cal	Anaheim, Blair Assocs.	714-635-1350
Cal	El Segundo, Griot Assocs.	213-322-8383
Cal	Los Altos, Griot Assocs.	415-941-2533
Cal	San Jose, MCH Assocs.	408-246-7330
Cal	Tustin, Griot Assocs.	714-838-2330
Colo	Denver, Grifco	303-722-4674
Fla	Orlando, E. G. Holmes & Assocs.	305-894-8901
Ga	Chamblee, E. G. Holmes & Assocs.	404-451-6161
Ill	Chicago, Brooks Engrg. Co.	312-944-1227
Ill	Northfield, Feller Assocs.	312-446-8065
Ind	Rochester, Feller Assocs.	219-223-2377
Md	Wheaton, Sonco	301-942-9420
Mass	Chelmsford, Independent Mktg. Reps.	617-256-8251
Mich	Southfield, Air Design	313-353-3440
NH	Nashua, Independent Mktg. Reps.	603-888-3630
NJ	E. Orange, Friedman Assocs.	201-673-2500
NM	Albuquerque, Fry-Gates Co.	505-298-1875
NY	Fayetteville, Graydon-Sherman	315-637-9861
NY	Pittsford, Graydon-Sherman	716-381-8838
NY	Tuckahoe, Asco Elctrns.	914-779-8110
Pa	Blue Bell, Sonco	215-542-1490
Pa	Lafayette Hill, M. Lader Co.	215-825-3177
Tex	Houston, Barnhill Two	713-688-9971
Tex	Richardson, Barnhill Two	214-231-2573
Utah	Salt Lake City, Grifco	
Va	Virginia Beach, E. G. Holmes & Assocs.	804-481-6556
Wash	Bellevue, Griot Assocs.	206-454-8592
Wash	Seattle, Datacom Assocs.	206-285-2525
FOR:	Can., Manotick, Ont., Giga-Tron Assocs.	613-692-4829

HUGHES AIRCRAFT CO, Ground Sys. Grp., 1901 Malvern St., Box 3310, Fullerton, Cal., 92634, Tel: 714-871-3232; Empl.: 5000

Products manufactured: Antenna Feed Systems, Antenna Rotators, Antenna Switching Matrices, Antenna Towers & Supports, Antennas, Boards, Printed Circuit, Boards, Programming, Cabinets & Accessories, Circuits, Printed, Multilayer, Circulators, Ferrite, Comm. Systems, Computers, Control Systems, Air Traffic, Converters, Data Acquisition & Reduction Systems, Data Compressors, Digital, Decoders, Decommutators, Telemetering, Delay Lines, Demodulators, Digitizers, Pencil Follower (Inc. Coordinate & Graphic), Diodes, Display Devices/Displays, Drums Computer Memory, Duplexers, Microwave, Integrators, Electronic, Intensifiers, Image, Isolators, Junctions, Hybrid, Microwave, Masers, Modulator/Demodulators, Modulators, All Kinds, Modules, Logic, Encapsulated, Multiplexers, Multipliers, Networks, Oceanographic Equip. (Electronic), Oscillators, Pedestals, Radar, Power Supplies, Radar Systems, Receivers, Recorders, Services, Assembly, Production & Test, Shift Registers, Shifters, Shutters, Microwave, Signal Conditioners & Equipment, Simulators, Slotted Lines, Microwave, Strip-Line Components, Microwave, Technical Books, Terminal Blocks, Boards & Strips, Terminal Equipment, Digital, Terminals, Terminals, Data Display (including Alphanumeric & Graphic), Test Systems, Tracking Systems, Transistor, Diode, Thyristor Heat Dissipators, Transmitters, Transponders, Underwater Communication, Detection, Navigation, etc. Equipment, Waveguides & Adapters

HUGHES AIRCRAFT CO., Hybrid Microelectronic Circuits Dept., Microelectronic Prods. Div., 500 Superior Ave., (E 4/5), Newport Bch., Cal., 92663, Tel: 714-548-0671, TWX: 910-596-1374 ....p. 1•889

Products manufactured: Circuits, Hybrid, Thick Film, Circuits, Hybrid, Thin-Film

Refer to Communications Prods Dept., Microelectronic Products Div. for sales office information.

HUGHES AIRCRAFT CO., Image Devices Ind'l. Prods. Div., 6855 El Camino Real, Carlsbad, Cal., 92008, Tel: 714-729-9191, TWX: 910-322-1393; Empl.: 500

Products manufactured: Converters, Intensifiers, Image, Terminals, Data Display (including Alphanumeric & Graphic), Tubes

HUGHES AIRCRAFT CO., Ind'l. Prods. Div. Display Sys., 2020 Oceanside Blvd., Oceanside, Calif., 92054, Tel: 714-757-1200, TWX: 910-322-1380

Products manufactured: Converters, Terminal Equipment, Digital

HUGHES AIRCRAFT CO., Ind'l. Prods. Div. FACT Sys., Box 92904, Los Angeles, Cal., 90009, Tel: 213-670-9040, TWX: 213-653-582

Products manufactured: Testers

Local Sales Offices & Reps.

Ill	Park Ridge, Hughes Aircraft Co.	312-823-5126
Tex	Dallas, Bradenco	214-358-3278

Advertisment

FACT System offers a total systems approach to wiring verification by providing high speed random access circuit analyzers with a total complement of optional accessories. Includes rapid access fixturing, such as, LIFT (Low Insertion Force Technique), QUIC (Quick Universal Interface Connector), FACT-AID (Automatic Interconnection Devices) and Spring Probe Fixtures to meet the specific needs of each individual customer.

HUGHES AIRCRAFT CO., Ind'l. Prods. Div./Ind'l. Auto, 2020 Oceanside Blvd., Oceanside, Cal., 92054, Tel: 714-757-1200, TWX: 910-322-1380; Empl.: 600

Products manufactured: Controls/Control Eqpt., Indicators, Machines/Machinery, Production, Simulators, Testers

HUGHES AIRCRAFT CO., Ind'l. Prods. Div., Prod. Equip. Dept., 2020 Oceanside Blvd., Oceanside, Cal., 92054; Tel: 714-729-9191, TWX: 910-322-1380; Empl.: 500; Minimum order: $15

For info on price: C. A. Rollins Ext. 258; Application info: C. A. Rollins Ext. 258; Customer service: C. A. Rollins Ext. 258; Delivery info: J. C. Brown Ext. 265

Products manufactured: Alarms, Comm. Systems, Comparators, Controllers, Programmable, Controls/Control Eqpt., Converters, Indicators, Machines/Machinery, Production, Microcircuit Production Equip., Power Supplies, Process Control Systems, Simulators, Soldering Equipment, Terminal Equipment, Digital, Test Systems, Testers, Tubes, Welding Equipment & Access. (Excluding Equip. for Semiconductor Devices)

Local Sales Offices & Reps.

Ariz	Scottsdale, Allen Assocs.	602-994-1305
Cal	Los Altos, C. D. Buerki Co.	415-941-3343
Cal	Los Angeles, International Sls.	213-670-1515
Fla	Clearwater, MacGregor Assocs.	813-446-7310
Fla	Coral Springs, MacGregor Assocs.	305-752-1924
Ga	Lilburn, MacGregor Assocs.	404-921-1300
Ill	Chicago, J. C. Angel Co.	312-878-0653
Kans	Kansas City, Ransom Assocs.	913-299-2789
Md	Baltimore, A. L. Myers Co.	301-426-5583
Mass	Acton, E. E. Specialists	617-259-9200
NJ	Saddle Brook, L & M Assocs.	201-843-8700
NY	Brentwood, L & M Assocs.	516-231-8363
NY	New York, L & M Assocs.	212-675-7486
NY	Penfield, Upstate Tech. Equip.	716-381-0930
NY	Solvay, Upstate Tech. Equip.	315-488-3101
NC	Charlotte, MacGregor Assocs.	704-375-1562
Ohio	Dayton, R. G. Sidnell & Co.	
Pa	Andalusia, L & M Assocs.	215-639-3100
Tex	Dallas, Bradenco	214-358-3278
Wash	Seattle, Penryn Sls. & Engrg.	206-634-0240

FOR:	Can., Manotick, Ont., Giga-Tron Assoc.	613-692-4829

HUGHES AIRCRAFT CO., MOS Dept. (E 3/5) Microelectronic Prods. Div., 500 Superior Ave., Newport Beach, Cal., 92663, Tel: 714-548-0671, TWX: 910-596-1374 ....p. 1•889

Products manufactured: Integrated Circuit Devices

Refer to Communications Prods Dept., Microelectronic Products Div. for sales office information.

HUGHEY & PHILLIPS, INC., 3050 N. California St., Burbank, Cal., 91505, Tel: 213-849-1104, TWX: 910-498-2252; FSC No: 94295; Empl.: 38; Minimum order: $15

For info on price: C. E. Stephens; Application info: C. E. Stephens; Customer service: C. L. Phillis; Delivery info: C. L. Phillis

Products manufactured: Controls/Control Eqpt., Flashers, Transformers

HULL CORP., Davisville Rd., Hatboro, Pa., 19040, Tel: 215-672-7800, TWX: 510-665-6822; Empl.: 275

Customer service: S. H. Bauer

Free literature available: Brochures describing presses and molds for encapsulating electrical and electronic components by transfer molding in thermosetting resins.

Products manufactured: Chamber, Environmental Test, Furnaces, Machines/Machinery, Production, Microcircuit Production Equip., Ovens, Pumps, Vacuum

Local Sales Offices & Reps.

Cal	Burlingame	415-692-4477
Ill	Elmhurst	312-279-8900
NC	Brevard	704-883-3061
Ohio	Cleveland	216-228-1318
Pa	Hatboro	215-672-7800
Tex	Dallas	

HUMISEAL DIV., Columbia Tech. Dept. 77, 26-60 Bklyn-Queens Expwy., Woodside, N.Y., 11377, Tel: 212-932-0800; QPL No: 46058; Empl.: 150; Minimum order: $20 ....p. 2•338,339,1270,1271

For info on price: Sls. Dept.; Application info: J. Waryold; Customer service: Sls. Dept.; Delivery info: Sls. Dept.

Free literature available: HumiSeal Protective Coating, How To Select a Conformal Coating for P.C. Boards, Materials, Methods & Equipment for Cleaning Assemblies, Causes & Prevention of Blisters

Products manufactured: Coatings, Insulators & Insulation

Local Sales Offices & Reps.

Cal	Alhambra, M.W. Riedel Co.	213-283-7694
Cal	Mountain View, Weseloh & Assocs.	415-961-0565
Fla	Maitland, Barrett Assocs.	305-678-0172
Ill	Northbrook, R. T. Howlett & Assoc.	312-498-5444
Mass	Waltham, Betronic Assocs.	617-894-8400
NJ	Livingston, H. Thaw Sls.	201-992-2711
NY	Rochester, Gislason Sls.	716-454-4741
Ohio	Cleveland, Marlow Assocs.	216-932-0900
Tex	Dallas, R. D. Spooner	214-357-6636
Wash	Kirkland, R.R. Chase & Assoc.	206-454-2514
FOR:	Can., Montreal, Que., D/R Elctrns.	514-622-7381

HUMPHREY, INC., 9212 Balboa Ave., San Diego, Calif., 92123, Tel: 714-565-6631, TWX: 910-335-2001; Empl.: 96

Customer service: H. H. Kries

Free literature available: Brochures on: Rate transducers, solid state, electro-fluidic; single and three-axis models.

Products manufactured: Accelerometers, Blowers & Fans & Accessories, Gyros (All Types), Indicators, Potentiometers, Switches, Transducers

Local Sales Offices & Reps.

Cal	Burbank, TransDynamics	213-849-6262
Cal	San Diego, TransDynamics	714-298-8215
Conn	Bloomfield, Zaslow Sls. Co.	203-242-7781
Conn	Milford, Zaslow Sls. Co.	203-878-1094
Fla	Orlando, Gra-Mar, Inc.	305-894-3351
Kans	Wichita, Humphrey, Inc.	316-685-7563
Mass	Lowell, Zaslow Sls. Co.	617-458-8452
Mass	Northboro, Zaslow Sls. Co.	617-393-8150
Mich	Farmington, Carter, McCormick & Peirce	313-477-7700
NY	Holbrook, Aviatech Int'l.	516-981-9300

Ohio	Cleveland, Carter, McCormick & Peirce	216-333-5650
Ohio	Dayton, Carter, McCormick & Peirce	513-278-5873
Pa	Philadelphia, Humphrey, Inc., Eastern Div.	215-542-9150
Pa	Pittsburgh, Carter, McCormick & Peirce	412-824-3760
Tex	Dallas, W.N. Rider Co.	214-357-2246
Wash	Seattle, TransDynamics	206-782-0064

Advertisment

Humphrey, Inc. designs and manufactures electro-mechanical and inertial reference instruments, including electro-fluidic angular rate sensors, gyroscopes (free, rate, directional, vertical); all-electric attitude and directional gyros and repeaters for general aviation and avionics OEMs; bore hole survey systems for offshore and inland drilling; angular and rectilinear displacement transducers; accelerometers and acceleration switches; planar accelerometers (Accelograph); pendulums; inertial reference systems for automotive, aircraft, and oceanographic performance testing. Proven and qualified as required for military and industrial applications.

HUNTER TOOLS, See Marshall Inds.

HURST MFG. CORP., Box 326, Princeton, Ind., 47670, Tel: 812-385-2564, TWX: 810-350-2341; Empl.: 140

Customer service: M. Meuser

Free literature available: General catalog No. 700

Products manufactured: Motors

Local Sales Offices & Reps.

Ariz	Phoenix, Shefler-Kahn Co.	602-258-7893
Cal	Los Angeles, Minarik Electric Co.	213-485-1391
Cal	Menlo Park, Long & Assoc.	415-327-1300
Colo	Denver, Shefler-Kahn Co.	303-232-0873
Fla	Orlando, Cartwright & Bean, Inc.	305-422-4531
Fla	Plantation, Cartwright & Bean, Inc.	305-791-3989
Ga	Atlanta, Cartwright & Bean, Inc.	404-237-2273
Ill	Chicago, D. Dolin Co.	312-286-6200
Ind	Princeton, W.S. Burton	812-385-2564
La	Chalmette, Cartwright & Bean, Inc.	504-279-4598
Md	Glen Arm, Hodgins Assoc.	301-592-7047
Mass	Millis, Selmark Assoc.	617-376-2914
Mich	Grand Rapids, R. Van Riper Sls.	616-452-0464
Minn	Minneapolis, White Sls. Co.	312-929-4661
Miss	Jackson, Cartwright & Bean, Inc.	601-354-1368
NH	Plaistow, Selmark Assoc.	617-375-0305
NJ	Little Falls, D. Carbone	201-256-9191
NM	Albuquerque, Shefler-Kahn Co., Inc.	505-265-7077
NY	Newburgh, W. H. Zimmerman Co.	914-562-7330
NY	Rochester, W.H. Zimmerman Co.	716-586-4450
NY	Syracuse, W.H. Zimmerman Co.	15-474-4889
NC	Charlotte, Cartwright & Bean, Inc.	704-333-6457
NC	Raleigh, Cartwright & Bean, Inc.	919-832-7128
Ohio	Chagrin Falls, Kilroy Sls. Co.	216-247-8997
Pa	Pittsburgh, G.S. Root Co.	412-561-4125
Tenn	Knoxville, Cartwright & Bean, Inc.	615-693-7450
Tenn	Memphis, Cartwright & Bean, Inc.	901-276-4442
Tex	Dallas, John B. Guenther, Inc.	214-691-8500
Tex	Houston, John B. Guenther, Inc.	713-468-0232
Wash	Kingston, F.H. Haight Co.	206-297-3212
EXP:	Westbury, New York, Minthorne International	516-334-3303

HUTCHINSON INDUSTRIAL CORP., 44 W. Highland Park, Hutchinson, Minn., 55350, Tel: 612-879-2371; Empl.: 115 .... p. 1•1542,1543

Customer service: J. Green

Free literature available: Brochure and Data Sheets

Products manufactured: Boards, Printed Circuit, Circuits, Flexible, Circuits, Printed, Multilayer, Cores, Magnetic, Delay Lines, Dials, Encoders, Heaters & Heating Elements, Light Choppers, Plates, Core Loading (Memory), Scales, Dial, Services, Assembly, Production & Test, Thermometers, Resistance, Transducers

Local Sales Offices & Reps.

Cal	Santa Clara, King Assocs.	408-249-1022

HUTSON INDUSTRIES, 2019 W. Valley View, Dallas, Tex., 75234, Tel: 214-241-3511, TWX: 910-860-5537; Empl.: 200

Local Sales Offices & Reps.

Ariz	Scottsdale, Gassner & Clark	602-945-7979
Cal	Arcadia, Orion Sls.	213-355-6638
Cal	Northridge, Orion Sls.	213-886-4761
Cal	Tustin, Orion Sls.	714-832-9687
Colo	Denver, Electrodyne	303-757-7679
Conn	New Haven, Gerber Sls.	203-777-6279
Fla	Belleair Beach, Consultants for Industry	813-595-1486
Ga	Kennesaw, K&E Assocs.	404-974-4264
Ill	Chicago, L-TEC, Inc.	312-286-1500
Ind	Greenwood, Valentine/Schillinger & Assoc.	317-888-2260
Ind	South Bend, Valentine/Schillinger & Assoc.	219-291-6258
Md	Baltimore, Stemler Assoc.	301-944-8262
Mass	East Longmeadow, Gerber Sls.	413-525-3059
Mass	Waltham, Gerber Sls.	617-890-8040
Mich	Grosse Point Park, S. Greiner Assoc.	313-499-0188
Minn	Minneapolis, Bitronics Sls.	612-866-3035
Mo	Grandview, Beneke & McCaul, Inc.	816-765-2998
Mo	St. Louis, Beneke & McCaul, Inc.	314-231-1677
NJ	Cherry Hill, Stemler Assoc.	609-966-4070
NJ	Nutley, Falk-Baker Assoc.	201-661-2430
NJ	Turnersville, Stemler Assoc.	215-644-3477
NY	No. Syracuse, Advanced Comps.	315-699-2671
Ohio	Dayton, Midwest Mktg. Assoc.	513-433-2511
Ore	Beaverton, N.R. Schultz Co.	503-646-1345
Tex	Garland, Whiteside Sls. Co.	214-231-9771
Tex	Houston, Whiteside Sls.	713-498-2551
Va	Alexandria, Stemler Assoc.	703-548-7818
Wash	Bellevue, N.R. Schultz Co.	206-454-0300

HY-CAL ENGINEERING, 12105 Los Nietos Rd., Santa Fe Springs, Cal, 90607, Tel: 213-698-7785; Empl.: 50

Customer service: A. E. Bowman, Mktg Mgr

Free literature available: Bulletin A-104 describes resistance temperature sensors, indicating systems, reference temperature systems, thermocouples, calorimeters, radiometers, pyrheliometers. Includes data on equations for thermocouples, resistance temperature detectors, and heat flux instrumentation.

Products manufactured: Amplifiers, Bridges, Controls/Control Eqpt., Detectors, Indicators, Meters, Monitors, Networks, Probes, Radiometers, Scanners, Standards, Thermocouples, Elements & Accessories, Transducers, Transmission Systems, Data

HY-GAIN ELECTRONICS CORP., 8601 N.E. Highway 6, Lincoln, Neb., 68507, Tel: 402-464-9151, Telex: 48-6424; Empl.: 540; Minimum order: $50

For info on price: K. Simmons Ext. 222; Application info: K. Simmons Ext. 222; Customer service: J. Magnuson Ext. 260; Delivery info: C. Hoppe Ext. 270

Products manufactured: Antenna Rotators, Antenna Switching Matrices, Antenna Towers & Supports, Antennas, Arresters, Electrical Surge, Lightning, CATV Systems & Equipment, Coils Including Assemblies & Forms, Comm. Systems, Dummy Loads, Mounts, Receivers, Transceivers, Transmitters

Local Sales Offices & Reps.

Cal	Van Nuys, Hy-Gain Elctrns. Corp.	213-785-4532
Colo	Denver, G. Moss Elctrns., Inc.	303-985-8815
Fla	Miami, B-C Elctrn. Sls., Inc.	305-894-6071
Ga	Smyrna, B-C Elctrn. Sls., Inc.	404-436-5169
Ind	Indianapolis, Mid-Central Sls.	317-283-1727
Kans	Overland Park, H. Curry	913-888-6484
Md	Olney, A B & T Sls. Corp.	301-924-4976
Mass	Wellesley, Johnson Assocs.	617-235-3977
Mich	Ferndale, Shalco, Inc.	313-547-4771
Miss	Michigan City, J. Fisher Sls. Co.	601-224-6470
NJ	Fair Lawn, Moses & Kline	201-791-8538
NY	Rochester, Johnson Assocs.	716-473-6030
NY	Schenectady, Johnson Assocs.	518-393-3939
Ohio	Cleveland, H. Miller Sls. Co.	216-321-3900
Pa	King of Prussia, A B & T Sls. Corp.	215-265-1028
Tex	Dallas, Loss & Stewart Assocs.	214-691-6039
Va	Vinton, B-C Elctrn. Sls., Inc.	703-890-1128
Wash	Seattle, W.R. Lanphear Co.	206-633-4900
Wisc	Brookfield, Steffen Sls. Co.	414-781-7596
EXP:	Peterborough, Ont., Can., Lectron Radio Sls.	705-745-3231

HYCOMP INC., Box 250, Maynard, Mass., 01754, Tel: 617-897-4578; Empl.: 54

For info on price: N. S. Palazzini; Application info: J. J. Madden; Customer service: N. D. Oelschlegel; Delivery info: N. D. Oelschlegel

Products manufactured: Circuits, Hybrid, Thin-Film, Converters, Films, Networks, Resistors

Local Sales Offices & Reps.

Cal	Pasadena, Mar-Land Entprs..	213-681-9440
Md	Ellicott City, J. Winkler Assoc.	301-465-8630
Mass	Billerica, Matrix Sls.	617-667-9268
Mass	Burlington, Contact Sls.	617-273-1520
NJ	Ridgefield, Haber-Ramp Corp.	201-945-5250
NY	Rochester, W.H. Zimmerman, Inc.	716-586-4450
NY	Syracuse, W.H. Zimmerman, Inc.	315-474-4889

HYBREX, 6730 S. Tucson Blvd., Tucson, Ariz., 85734

Customer service: Sls. Dept. 602-294-1431

Products manufactured: Capacitors, Fixed, Resistors

Local Sales Offices & Reps.

Ala	Huntsville, W.A. Brown Comps., Inc.	205-539-4411
Ariz	Tempe, J.F. Hurlbut Co.	602-968-5962
Cal	Glendale, Orion Sls.	213-240-3151
Cal	Palo Alto, Andot Tech Sls.	415-941-8858
Cal	San Diego, Orion Sls.	714-566-0360
Cal	Tustin, Orion Sls.	714-832-9687
Colo	Golden, J.F. Hurlbut Co.	303-279-7138
Conn	Guilford, Whitehead Assocs.	203-453-3762
Fla	Ft. Lauderdale, W.A. Brown Comps.	305-564-8000
Fla	Orlando, W.A. Brown Comps.	305-425-5505
Mass	Boston, Whitehead Assocs.	617-542-7676
Mich	Farmington, Sheridan Assocs.	313-477-3800
Mo	Florissant, Sheridan Assocs.	314-837-5200
NJ	Union, J. Onore	201-355-0474
NY	Clinton, Advanced Comps.	315-853-6438
NY	Endicott, Advanced Comps.	607-785-3191
NY	Mt. Vernon, QED Elctrns.	914-664-0080
NY	North Syracuse, Advanced Comps.	315-699-2671
NY	Scottsville, Advanced Comps.	716-889-1429
NC	Winston-Salem, W.A. Brown Comps., Inc.	919-725-5384
Ohio	Cincinnati, Sheridan Assocs.	513-761-5432
Ohio	Cleveland, Sheridan Assocs.	216-524-8120
Ohio	Dayton, Sheridan Assocs.	513-277-8911
Pa	Pittsburgh, Sheridan Assocs.	412-244-1640

HYBRID SYSTEMS CORP., 87 Second Ave., Burlington NW Ind'l. Pk., Burlington, Mass., 01803, Tel: 617-272-1522, TWX: 710-332-7584; Empl.: 250
p. 1•164-170,890; p. 2•1496,1497

For info on price: R. Cummings; Application info: W. Miller; Customer service: R. Cummings; Delivery info: R. Cummings

Free literature available: Data Conversion Module Catalog; Chip Resistor Catalog; Deltaverta Catalog

Products manufactured: Amplifiers, Cards, Linear Function, Circuits, Hybrid, Thick Film, Circuits, Hybrid, Thin-Film, Converters, Data Acquisition & Reduction Systems, Detectors, Dividers, Drivers, Switch, Enclosures, Module, Plug-In, Generators, Integrated Circuit Packaging Systems, Integrated Circuit Devices, IC's, Active Filters, Lamp Drivers, Modulator/Demodulators, Multiplexers, Multipliers, Networks, Power Supplies, Resistors, Signal Conditioners & Equipment, Transistors

Local Sales Offices & Reps.

Ariz	Phoenix, R.A. Mayes Co.	602-279-5243
Cal	Los Altos, Hoeke-Reeser Assocs.	415-941-4080
Cal	Los Angeles, Cain Technology	213-476-2251
Cal	Norwalk, Bertrand-Zoolalian	213-921-9791
Cal	Orange, Cain Technology	714-997-7311
Colo	Boulder, R.A. Mayes Co.	303-444-0782
Conn	Washington Depot, Kanan Assocs.	203-868-0513
Fla	Ormond Beach, Technology Mktg. Assocs.	904-672-2314
Fla	Pompano Beach, Technology Mktg. Assocs.	305-942-0774
Ill	Hinsdale, Momak Sales	312-654-4524
Md	Randallstown, Beacon North Inc.	301-922-1248
Mass	Holbrook, McLellan Assocs.	617-767-4771
Mass	Reading, Kanan Assocs.	617-944-8484
Mich	Birmingham, J.C. Hofstetter Co.	313-643-7203
NJ	Haddonfield, Thomas Assocs.	609-854-3011
NM	Albuquerque, R.A. Mayes Co.	505-292-2330
NY	Buffalo, H.C. Johnson Agencies	716-632-7880
NY	Fayetteville, H.C. Johnson Agencies	315-637-9383

NY	Rochester, H.C. Johnson Agencies	716-482-3000
NY	Tuckahoe, Spectrum Sls.	914-793-1660
NC	Winston-Salem, RADCO Co.	919-722-9671
Ohio	Dayton, J.C. Hofstetter Co.	513-296-1010
Ohio	Medina, J.C. Hofstetter Co.	216-241-4880
Ore	Portland, Jas. J. Backer	503-297-3776
Pa	Glenshaw, H.C. Johnson Agencies	412-961-0414
Tex	Houston, R.A. Mayes Co.	713-461-5385
Tex	Richardson, R.A. Mayes Co.	214-235-3043
Utah	Centerville, R.A. Mayes Co.	801-292-6781
Va	Falls Church, Beacon Inc.	703-534-1673
Wash	Seattle, Jas. J. Backer	206-285-1300

HYCOM, 16841 Armstrong Ave., Irvine, Cal., 92705

HYKON MFG. CO., 163 E. State St., Box 923, Alliance, Ohio, 44601, Tel: 216-821-2320

Customer service: A. Duchon

Free literature available: A 10 page catalog featuring payout & take up wire and cable reels. Wire and cable length measuring meters. Portable live extention cord reels.

Products manufactured: Machines/Machinery, Production, Reels, Cord & Cable

HYPERTRONICS CORP., 154 Great Rd., Stow, Mass., 01775, Tel: 617-897-3236, Telex: 94-8338; FSC No: 50541; Empl.: 16; Minimum order: $25

For info on price: J. Kelley; Application info: D. Downey; Customer service: J. Kelley; Delivery info: J. Kelley

Free literature available: General Brochure (6 pages) - sampling of product line. Printed Circuit Connectors (24 pages) - K series, Modular Connectors (16 pages) - L series, Circular Connectors (Avail. Feb. 75) - C & D series.

Products manufactured: Connector Adapters, Connector Blocks, Mother Board, Connectors, Jacks (All Types), Plug & Jack Sets, Plugs, Sockets

Local Sales Offices & Reps.

Cal	Belmont, Ciance Assocs.	415-593-2000
Cal	N. Hollywood, Jewett Co.	213-789-8103
Conn	Bethany, Representatives Corp.	203-393-0024
DC	Wash, Tyler Griffin Co.	EN1-4821
Fla	Orlando, Gra-Mar, Inc.	305-894-3351
Ill	Oak Park, Joe Popp Sls. Co.	312-626-3711
Md	Baltimore, Tyler Griffin Co.	EN9-4821
Mass	Topsfield, Representatives Corp.	617-887-5050
Minn	Minneapolis, Electronic Innovators	612-884-7471
NJ	Fairlawn, C.R. Mayer Co.	201-791-8989
NY	Huntington, C.R. Mayer Co.	516-421-4322
Ohio	Medina, McShane, Inc.	216-725-4568
Pa	Paoli, Tyler Griffin Co.	215-647-1550

HYTRONICS CORP., 6231 72nd Ave. N., Pinellas Park, Fla., 33565, Tel: 813-546-2421; FSC No: 29525; Empl.: 50; Minimum order: $35

For info on price: G. J. Wilson; Application info: C. Clark; Customer service: P. Hall; Delivery info: M. Petruzzi

Free literature available: Hytronics literature illustrates the broad category of small coils and transformers that are custom-made to the design requirements of their customers.

Products manufactured: Chokes, Coils Including Assemblies & Forms, Transformers

Local Sales Offices & Reps.

Ariz	Scottsdale, J. B. Hower & Co.	602-948-0430
Cal	Mountain View, Weseloh & Assocs.	415-961-0565
Cal	Santa Ana, Cal. Elctrns. Mktg.	714-835-2702
Colo	Denver, Omega Ltd.	303-758-1508
Fla	Madeira Beach, Harvey Pipe	813-391-3057
Mass	Canton, New England Elctrn. Sls. Corp.	617-828-4835
Mich	Grosse Pointe Park, Greiner Assocs.	313-499-0188
Minn	Minneapolis, Scott Elctrns.	612-929-2985
Ohio	Dayton, F. L. Ohmer	513-434-1454
Pa	Furlong, Avenir	215-348-8290
Tex	Richardson, Vista Engrg.	214-235-4547

I-T-E ELECTRICAL COMPONENTS GRP., 123 Smith St., E. Farmingdale, N.Y., 11735, Tel: 516-694-5400; Empl.: 400

For info on price: M. Robinson; Application info: T. Mooney; Customer service: M. Robinson; Delivery info: M. Robinson

Free literature available: EF 274 - EFCOR Products Catalog; CF 19 - Electrical Connector & Components Catalog; LT 42 - Industrial Electrical Fittings Bulletin; Shawmut Fuse Catalog & Applications Brochure.

Products manufactured: Conduit, Electrical, Connectors, Fuses, Splices, wire (Including, Butt & Cap Types), Strain Reliefs, Cable & Wire, Terminals, Tools, Wire & Cable Ties, Wire Nuts

Local Sales Offices & Reps.

Ala	Birmingham, W. F. Bishop Co.	205-822-4524
Alas	Anchorage, Rostel Corp.	
Ariz	Phoenix, T. Geiss & Assoc.	602-252-7694
Ark	Little Rock, Percy Williams & Co.	501-663-8069
Cal	Los Angeles, I-T-E Electrical Comps.	213-266-3364
Cal	Sacramento, I-T-E Electrical Comps.	916-371-6953
Colo	Denver, Stemco Sls. Co.	303-355-3573
DC	Washington, D.T. Ewing Assoc.	202-292-4777
Fla	Tampa, I-T-E Electrical Comps.	813-621-4773
Ga	Atlanta, W. F. Bishop Co.	404-522-8124
Ill	Bellwood, I-T-E Electrical Comps.	312-547-5900
Ind	Indianapolis, Pfeiffer-Boyle Sls. Co.	317-255-2553
Iowa	Cedar Rapids, A. Sell & Assoc.	319-393-4225
Kans	Kansas City, D. Hatfield Sls. Co.	913-281-0533
Ky	Louisville, Pfeiffer-Boyle Sls. Co.	502-896-9876
La	Metairie, I-T-E Electrical Comps.	504-455-2350
Md	Baltimore, D.T. Ewing Assoc.	301-823-2306
Mass	Braintree, B.N. Yanow & Co.	617-848-7300
Mich	Detroit, Popkin Bros.	313-832-1700
Minn	Minneapolis, Lawless Electrical Sls.	612-925-3663
Mo	St. Louis, Cooper Elec. Sls.	314-638-3434
NY	Brooklyn, B. Cooper, Inc.	212-383-1900
NY	Jamaica, Warshaw Elec. Co.	212-525-8150
NY	Syracuse, Elec. Sls. Agents, Inc.	315-437-1676
NC	Charlotte, E.F. Lombardi Co.	704-334-1637
Ohio	Cleveland, J. Natt & Assoc.	216-526-4200
Ore	Portland, Carlson, Ziegler & Assoc.	503-227-1181
Pa	Philadelphia, I-T-E Electrical Comps. Grp.	215-426-1500
Pa	Pittsburgh, I-T-E Electrical Comps. Grp.	412-922-5114
Tenn	Nashville, Matthews & Park, Inc.	615-242-3309
Tex	Dallas, I-T-E Electrical Comps. Grp.	214-638-8550
Utah	Salt Lake City, L. Vordos Agency	801-521-2111
Wash	Seattle, Valliant Sales Corp.	206-762-8780
Wisc	Milwaukee, Lawless Elect. Sls.	414-352-4850

ICI/MIDWEC, See Midwec Div. Independent Cable.

ICO/RALLY CORP., 2575 E. Bayshore Rd., Palo Alto, Cal., 94303, Tel: 415-324-0970, Telex: 348-335; FSC No: 51705; Empl.: 25; Minimum order: $25

For info on price: J. Triplett; Application info: W. H. Clark, Sls. Admin.; Customer service: J. Triplett; Delivery info: J. Triplett

Free literature available: 1974 Catalog "Wiring Accessories & Plastic Insulation Materials" Indexed by product - Heat Shrinkable Tubing, Wire Harnessing Devices, Sleeving & Tubing and Solderless Terminals..Catalog #0874-MC

Products manufactured: Bushings, Glass, Plastic, Metal, Rubber, Etc., Cable Assemblies & Harnesses, Clamps & Clips, Connectors, Cords, Grommets, Heat Guns, Production, Insulators & Insulation, Spacers, Strain Reliefs, Cable & Wire, Tapes, Electrical Insulation, Terminals, Tools, Tubing, Wire & Cable Ties

Local Sales Offices & Reps.

Cal	Palo Alto	415-324-0970
NJ	Deptford	609-228-4600

ICON CORP., Sub. of U.S.M. Corp., 156 Sixth St., Cambridge, Mass., 02142, Tel: 617-868-5400, TWX: 710-321-1883; Empl.: 100; Minimum order: $25

For info on price: L. Smith; Application info: D. Jackson; Customer service: L. Smith; Delivery info: L. Smith

Free literature available: 1) Stepping Motor Technical Manual - Application guide, for design engineers, in the use of stepping motor positioning systems. 2) 1 Con Numerical Controls - Application guide, for design engineers, in the selection automatic digital positioning systems.

Products manufactured: Actuators, Controls/Control Eqpt., Motors

Local Sales Offices & Reps.

Cal	Los Angeles, Icon Corp.	714-556-7711
Cal	San Francisco, McFarland Assoc.	408-286-9333
Fla	Orlando, McMahon Assoc.	305-645-0463
Ill	Chicago, Icon Corp.	312-259-3778
Mich	Detroit, Xanthus	313-391-3235
Minn	Minneapolis, Applied Sls. Engrg.	612-544-3308
NY	North Port, Icon	516-271-1110
NY	Rochester, H. C. Johnson Agencies	716-482-3000
Ohio	Cincinnati, J. Murray Assoc.	513-662-1616
Ohio	Cleveland, Del Steffen Assoc.	216-461-8333

ICORE INT'L., INC., 180 N. Wolfe Rd., Sunnyvale, Cal., 94086, Tel: 408-732-5400, TWX: 910-339-9269; Minimum order: $125

Customer service: T. Green

Free literature available: Icore Conflex Systems - Harness Systems EMC Shielding - EMI Capabilities Thermoplastics Brochure - Plastic's Capabilities Conflex Wire - General Wire Data Elcon Universal Power Disconnects - General Brochure

Products manufactured: Backpanel Interconnect Systems, Braid, Cable, Cable Assemblies & Harnesses, Cable, Coils Including Assemblies & Forms, Conduit, Electrical, Connectors, Services, Assembly, Production & Test, Shields, Tubing, Wire, Wire Shielding

Local Sales Offices & Reps.

Ala	Huntsville, E. Finn	205-859-1750
Ariz	Scottsdale, Mercury Engrg. Sls.	602-275-8579
Cal	Sunnyvale, J. Marquez	408-732-5400
Fla	Casselberry, Publicover Assocs.	305-834-5775
Ill	Chicago, Drager Co.	312-478-5022
Iowa	Cedar Rapids, Palatine	
Kans	Wichita, Dytronix	316-943-6221
Md	Towson, Kraft Elctrn. Sls.	301-828-5836
Mass	Reading, Champagne Assocs.	617-944-3011
Mich	Southfield, Luebbe Sls. Co.	313-357-0355
Mo	Hazelwood, Dy-tronix	314-731-5799
NY	Commack, PMR	516-543-8300
NY	Fayetteville, F. Darcy Assocs.	315-637-6587
NY	Williston Park, ABC Elctrns. Sls. Co.	516-747-6610
Ohio	Cincinnati, Luebbe Sls. Co.	513-871-4211
Pa	Delmont, Luebbe Sls. Co.	412-468-4019
Pa	Huntingdon Valley, ABC Elctrn. Sls. Co.	215-464-2275
Tex	Richardson, Barry Sls.	214-234-0255
Wash	Seattle, Norwest Co.	206-282-3707

IDEAL INDUSTRIES INC., 4450 Becker Pl., Sycamore, Ill., 60178, Tel: 815-895-5181, TWX: 910-639-0613; Empl.: 650

For info on price: K. Doubler; Application info: N. R. Griffin; Customer service: D. Woodin; Delivery info: D. Woodin

Products manufactured: Blowers & Fans & Accessories, Caps, Connector, Clamps & Clips, Connectors, Cutters, Wire, Hand Operated, Demagnetizers, Soldering Equipment, Splices, wire (Including, Butt & Cap Types), Terminals, Testers, Tools, Wire & Cable Ties, Wire Markers, Wire Nuts, Wire Strippers

Local Sales Offices & Reps.

Ala	Birmingham, Ideal Industries, Inc.	205-822-4782
Ala	Mobile, Zeller & Constantine Inc.	205-471-1724
Ariz	Phoenix, Maddox Sls. Co.	602-274-3807
Cal	Los Angeles, Ideal Electrical Ind. Inc.	213-269-2141
Cal	Pico Rivera, Maddox Sls. Co.	213-949-5433
Cal	San Francisco, Maddox Sls. Co.	415-431-2953
Colo	Denver, E-O Sls. Co.	303-744-7031
Conn	Avon, Electrical Agencies, Inc.	203-673-9296
Conn	West Haven, Electrical Agencies, Inc.	203-WE3-2985
Fla	Miami, Curly Gross & Assoc.	305-666-7778
Fla	Temple Terrace, Ideal Ind. Inc.	813-872-2651
Ga	Atlanta, Ideal Industries Inc.	404-351-4256
Haw	Honolulu, H.H. Sawyer Co.	808-847-1411
Ill	Chicago, Ideal Industries Inc.	312-775-4343
Ill	Peoria, Ideal Industries Inc.	309-265-9631
Ind	Ft. Wayne, Ideal Industries Inc.	219-485-3625
Ind	Indianapolis, Ideal Industries Inc.	317-881-9994
Iowa	Cedar Rapids, F.C. Clatterbaugh Co.	319-364-5557
Iowa	Des Moines, F.C. Clatterbaugh Co.	515-282-3213
Kans	Leawood, Walker-Loudermilk Co.	913-648-7223
Kans	Prairie Village, Walker-Loudermilk Co.	918-362-4889
La	Metairie, Zeller & Constantine, Inc.	504-889-1995
Me	S. Berwick, Electrical Agencies, Inc.	207-384-5321
Md	Baltimore, O.T. Hall & Son Inc.	301-467-5359
Mass.	Boston, Electrical Agencies Inc.	617-268-9300
Mich	Birmingham, Ideal Industries Inc.	313-341-6426
Mich	Royal Oak, Associated Elec. Sls. Co.	313-541-0248

Mich	Southfield, Associated Elec. Sls. Co.	313-354-1177
Mich	Troy, Associated Elec. Sls. Co.	313-646-0745
Minn	Minneapolis, Elstad Sls. Co.	612-533-3033
Miss	Jackson, Zeller & Constantine, Inc.	601-982-2745
Mo	Webster Groves, Ideal Industries, Inc.	314-968-1832
Neb	Lincoln, F.C. Clatterbaugh Co.	402-489-5912
Neb	Omaha, F.C. Clatterbaugh Co.	402-391-2905
NJ	Beverly, Ideal Industries Inc.	609-871-6735
NJ	Hackensack, Ideal Industries Inc.	201-342-5813
NJ	Linden, Ideal Industries Inc.	201-925-0575
NM	Albuquerque, Maddox Sls. Co.	505-298-2422
NY	Canandaiqua, Ideal Industries Inc.	315-394-3411
NY	East Williston, Ideal Industries Inc.	516-741-5989
NY	Elnora, Ideal Industries Inc.	518-371-5129
NY	Oceanside, Ideal Industries Inc.	516-764-6118
NC	Charlotte, Ideal Industries Inc.	704-536-5794
NC	Greensboro, Ideal Industries Inc.	919-288-7121
Ohio	Cincinnati, Ideal Industries Inc.	513-471-0446
Ohio	Cleveland, Ideal Industries Inc.	216-831-1600
Okla	Oklahoma City, Hamco Sls.	405-946-6503
Okla	Tulsa, Hamco Sls.	918-627-2262
Ore	Portland, Northwest Agencies Inc.	503-227-5004
Pa	Philadelphia, Ideal Industries Inc.	215-VI4-6300
Pa	Pittsburgh, Ideal Industries Inc.	412-561-8335
SC	Columbia, Ideal Industries Inc.	803-722-1629
Tenn	Memphis, Ideal Industries Inc.	901-323-9162
Tenn	Nashville, Ideal Industries Inc.	615-356-2511
Tex	Dallas, Galvin Sls. Co.	214-692-1557
Tex	Houston, Galvin Sls. Co.	713-774-1141
Utah	Murray, Wright, Williams & Roup, Inc.	801-262-6132
Utah	Salt Lake City, Wright, Williams & Roup. Inc.	801-487-7821
Va	Richmond, Ideal Industries Inc.	804-262-5311
Wash	Kent, Northwest Agencies Inc.	206-UL2-8198
Wash	Seattle, Northwest Agencies Inc.	206-MA3-8882
Wisc	Pewaukee, Ideal Industries Inc.	414-464-3230

IDEAL PRECISION METER CO., 214 Franklin St., Brooklyn, N. Y., 11222, Tel: 212-383-6904; FSC No: 6625; QPL No: 10304-41; Empl.: 150; Minimum order: $50

Customer service: R. Friedman

Free literature available: Commercial Panel Meters, Military Ruggedized Meters & Instruments, Avionic Mechanisms and Instruments

Products manufactured: Indicators, Meters

Local Sales Offices & Reps.

Cal	San Francisco, Artwel Electric Inc.	415-467-1880
Cal	Van Nuys, Cardinal Assoc. Inc.	213-787-5511
Conn	Bloomfield, Zaslow Sls. Co.	203-242-7781
Ill	Chicago, Ropek-Cahill Inc.	312-287-7292
Iowa	Cedar Rapids, H. R. Brown Sls. Co.	319-366-0635
Md	Baltimore, M E & Assoc. Inc.	301-825-1130
Mich	Benton Harbor, Mc Nabb & Sasoc.	616-925-2166
Minn	Minneapolis, Furber Sls.	612-861-1518
NJ	Cherry Hill, M E & Assoc.	609-667-6110
NY	Liverpool, L.P. Garner	315-451-1323
Ohio	Cincinnati, F. E. Kahsar Sls.	216-653-6808
Tex	Dallas, Blackburn Assocs.	214-FL1-9991
Wash	Seattle, Seatronics, Inc.	206-767-4330
FOR:	Can. Scarborough, Ontario, Lake Engineering Co. Ltd.	416-751-5980

IEC CORPORATION, 3100 Longhorn Blvd., Austin, Tex, 78758, Tel: 512-836-0547; Empl.: 35

Customer service: J. B. McQueen

Free literature available: Catalog #2 (Illustrates our standard stocked slip ring assemblies, complete with descriptions and dimensions)

Products manufactured: Slip-Rings & Assemblies

IEC ELECTRONICS CORP., 319 E. Chestnut St., E. Rochester, N.Y., 14445, Tel: 716-586-7850; Empl.: 190

For info on price: R. Vogler; Application info: R. Vogler; Customer service: R. Vogler; Delivery info: L. Scheafer

Free literature available: Data Sheets and Accessories brochure describing the communications equipment line manufactured and marketed by IEC electronics. Equipment is VHF and UHF ultra high bands.

Products manufactured: Comm. Systems, Receivers, Services, Assembly, Production & Test, Transmitters

Local Sales Offices & Reps.

NY	Syracuse, C.W. Floring & Assoc. Inc.	315-478-2149
NY	Syracuse, Canavan-Scanlon	315-437-1271

IEE/SCHADOW, INC., 8081 Wallace Rd., Eden Prairie, Minn., 55343, Tel: 612-944-1820, Telex: 29-0556; Empl.: 75; Minimum order: $25 ... p. 1•2066-2073

For info on price: C. Pilon; Application info: H. Sinn; Customer service: L. Hanna; Delivery info: H. Sinn

Free literature available: Switch selection guide, incorporating our basic modular push button switches as well as our unique line of mechanical reflecting indicator buttons. Special sheets are also enclosed for customer convenience.

Products manufactured: Caps, Lenses, Indicator Light, Display Devices/Displays, Indicators, Lamps, Sockets, Switches

Local Sales Offices & Reps.

Ala	Huntsville, Beacon	205-881-5031
Ariz	Phoenix, GND Sls. Co.	602-971-9758
Cal	Los Angeles, M.A. Stolaroff Co.	213-295-7781
Cal	Mt. View, Weseloh & Assocs.	415-961-0565
Cal	San Diego, M.A. Stolaroff Co.	714-234-6905
Conn	Farmington, R. Perron & Co.	203-673-4825
Conn	Trumbull, R. Perron & Co.	203-268-9631
Fla	Ft. Lauderdale, Beacon	305-776-6074
Fla	Maitland, Beacon	305-647-3498
Ga	Atlanta, Beacon	404-351-3654
Ill	Chicago, ILIS, Inc.	312-631-1124
Ind.	Carmel, Giesting & Assocs.	317-844-8171
Md	Randallstown, Beacon	301-922-1248
Mass	Norwood, R. Perron & Co.	617-762-8114
Mich	Benton Harbor, R. C. Nordstrom	616-857-4653
Mich	Lathrop Village, R.C. Nordstrom Co.	313-559-7373
Minn	Minneapolis, Elctrn. Innovators, Inc.	612-884-7471
Mo	Kansas City, Nevco	816-421-1751
Mo	St. Louis, Nevco	314-843-7406
NH	Dover, R. Perron & Co.	603-742-2321
NY	Buffalo, R.W. Mitscher Co.	716-633-7970
NY	Manlius, R.W. Mitscher Co.	315-637-3777
NY	Pittsfield, R.W. Mitscher Co.	716-381-9115
NY	Valley Cottage, LRC Assocs.	914-634-7973
NY	W. Hurley, R.W. Mitscher Co.	914-679-6151
NC	Greensboro, Beacon	
Ohio	Cincinnati, Giesting & Assocs.	513-931-0812
Ohio	Dayton, Giesting & Assocs.	513-293-4044
Ore	Portland, C. K. Shanks & Assocs.	503-292-5656
SC	Spartanburg, Beacon	803-582-4613
Va	Falls Church, Beacon	703-534-1673
Wash	Seattle, C. K. Shanks & Assocs.	206-632-4290

Local Distributors

Cal	Inglewood, Time Elctrns. Wese, 900 W. Olive St.	213-649-6900
Cal	Mt. View, Target Elctrns., Box 4189	415-961-0565
NJ	Little Falls, IPC, Box 204	201-785-1830
NY	Hempstead, Elctrn. Equip. Co., 741 Peninsula Blvd.	516-538-5510
Wash	Seattle, Zepher Elctrn. Sls. Corp., 647 Industry Dr.	206-242-2517

IFE DIV., Plastic Mold & Eng. Co., 66 Taylor Dr., Rumford, R.I., 02916, Tel: 401-438-3315; Empl.: 175

For info on price: D. G. Barrett; Application info: J. J. Doherty; Customer service: D. Andrews; Delivery info: D. Andrews

Free literature available: Complete brochure describing wire-wrap packaging panels, plug in cards, card cages and racks, DIP sockets, off-the shelf racks and drawers.

Products manufactured: Boards, Plug-In, Boards, Printed Wiring, Universal, Boards, Programming, Chassis, Circuit Board Mounting, Chassis, Metal, Connectors, Integrated Circuit Packaging Systems, Racks, Services, Assembly, Production & Test, Socket Adapters, Sockets, Terminals

Local Sales Offices & Reps.

Cal	Santa Clara, Ruby Sls. Co.	408-739-5333
Conn	Cheshire, Lane Assocs.	203-272-6081
Fla	MelBourne, REPCOM	305-254-1877
Ill	Chicago, Gassner & Clark Co.	312-764-6121
Ind	Fort Wayne, Gassner & Clark Co.	219-456-1675
Mass	Waltham, Digital Sls. Assoc.	617-899-4300
Mich	Grand Rapids, R.P. Urban & Assocs.	616-245-0511
Minn	Eden Prairie, F. Peterson Co.	612-941-5400
NJ	Flanders, Spectrum Sls.	201-584-8944
NJ	Mt. Ephraim, Burdette Co.	609-931-1300
NY	Fairport, TAC Assocs.	716-377-1742
NY	Tuckahoe, Spectrum Sls., Inc.	914-793-1660
Ore	Hillsboro, Elmer Panko Co.	503-222-9595
Tex	Richardson, ZONK Engrg. Co.	214-238-7651
Va	Reston, Boyle Assocs.	703-620-9558
Wisc	Wauwatosa, Larsen Assocs.	414-258-0529

ILC DATA DEVICE CORP., Airport Int'l. Plaza, Bohemia, N.Y., 11716, Tel: 516-567-5600, TWX: 510-228-7324; FSC No: 19645; Empl.: 320; Minimum order: $100 ... p. 1•171

For info on price: F. Johnson; Application info: J. Sheahan; Customer service: G. Cregan; Delivery info: F. Johnson

Free literature available: Short Form Brochure - Brief description of most products produced. Hybrid Technology Brochure - Description of hybrid capabilities.

Products manufactured: Amplifiers, Cards, Linear Function, Circuits, Hybrid, Thick Film, Circuits, Hybrid, Thin-Film, Comparators, Computers, Converters, Drivers & Decoders For Readouts, Filters, Generators, Indicators, Integrated Circuit Devices, IC's, Active Filters, Lamp Drivers, Modules, Logic, Encapsulated, Multiplexers, Networks, Relays, Signal Conditioners & Equipment, Synchro Transmitters, Solid-State, Testers

Local Sales Offices & Reps.

Ala	Huntsville, Rep Inc.	205-881-9270
Ariz	Scottsdale, OEM Specialties	602-948-3360
Cal	Culver City, DeAngelo, Rothman & Co.	213-398-6239
Cal	Long Beach, Data Device	213-597-5744
Cal	Palo Alto, Coherent Mrktg. Assocs.	415-327-2217
Cal	San Diego, DeAngelo, Rothman & Co.	714-560-4707
Cal	Santa Ana, DeAngelo, Rothman & Co.	714-549-8092
Colo	Boulder, Herb Bass Assocs.	303-499-7509
Conn	Glastonbury, Instrt. Reps.	203-633-0777
Fla	Casselberry, EIR, Inc.	305-830-9600
Ill	Des Plaines, Cozzens/Cudahy Inc.	312-298-3600
Ind	Indianapolis, Cozzens/Cudahy Inc.	317-244-2456
Md	Bethesda, Powell Pendergraph	301-656-4535
Md	Reistertown, Powell-Pendergraph	
Mass	Lexington, Instrt. Reps.	617-861-8620
Minn	Mpls., Cozzens/Cudahy Inc.	612-884-4336
Mo	Kansas City, Cozzens/Cudahy	816-454-5836
Mo	St. Louis, Cozzens/Cudahy Inc.	314-423-1234
NM	Albuquerque, Trembly Assocs.	505-293-4444
NY	Great Neck, Meas. Technology, Inc.	516-482-3500
NY	Syracuse, Nycom, Inc.	315-437-8343
Ohio	Dayton, McShane	513-433-8173
Ohio	Medina, McShane	216-725-4568
Ore	Beaverton, Arneson Assoc.	503-643-5743
Pa	Abington, Powell-Pendergraph	215-657-0330
Tex	Austin, MZB Co.	512-454-4371
Tex	Dallas, MZB Co.	214-235-5535
Tex	Houston, MZB Co.	713-523-7333
Va	Falls Church, Data Device	703-536-2212
Va	Richmond, Powell-Pendergraph Inc.	804-264-2341
Wash	Seattle, Arneson Assocs.	206-762-7664
For:	Can., Hamilton, Ont., Kenwood Controls & Equip.	416-544-0596
For:	Can., Montreal, Que., Kenwood Controls & Equip.	514-738-4969
For:	Can., Ottawa, Ont., Kenwood Controls & Equip.	613-722-8233

ILLINOIS CAPACITOR SLS. CO., 6284 W. Oakton, Morton Grove, Ill., 60053, Tel: 312-967-6270, Telex: 72-4361; Empl.: 10 ... p. 2•191

Products manufactured: Capacitors, Fixed

Local Sales Offices & Reps.

Cal	Mountain View, Weseloh & Assocs.	415 961-0565
Cal	Orange, Sales & Mktg. Assocs.	714-997-5720
Cal	Van Nuys, Myco Sls.	213-988-2827
Colo	Denver, Nelson Co.	303-573-1516
DC	Wash, H. Wise & Co.	202-363-9417
Fla	Lake Park, Graham Assocs.	305-622-4049
Ga	Marietta, K & E Assocs.	404-427-0241
Ill	Morton Grove, T-Squared Assocs.	312-965-1515
Ind	Carmel, Rich Elctrn. Mktg.	317-844-8462
Iowa	Des Moines, Kathrinus-Kelly & Co.	
Kans	Shawnee Mission, Kathrinus-Kelly & Co.	913-722-0000
Mass	Brookline, Technology Prods. Grp.	617-731-0858
Mich	Warren, Dem Elctrns. Sls.	313-755-6660
Minn	Minneapolis, Thomas Mktg.	612-823-4880
Miss	Corinth, K & E Assocs.	601-287-5369
NJ	Randolph, MOS Assocs.	201-361-5773

NY	DeRuyter, R. A. Murray Co.	
NY	Fairport, R. A. Murray Co.	716-254-2070
NY	Floral Park, MOS Assocs.	516-694-5923
NY	Rochester, R. A. Murray Co.	716-467-4538
Ohio	Cleveland, Depco	216-289-8188
Ore	Forest Grove, Bern Doran Sls.	503-357-3333
Pa	King of Prussia, Monteiro Assocs.	215-265-0634
Pa	Newtown Square, Danton Assocs.	215-353-0500
Tex	Dallas, J. Clay Co.	214-350-1281
Wisc	Oak Creek, Erdman Sls. Co.	414-643-0506

Local Distributors

Cal	Mountain View, Weseloh Distrs., Box 4189	415-961-0565
Wisc	Oak Creek, Badger Capacitor Sales, 6312 S. 27th St.	414-761-2120

ILLUMINATED PRODUCTS INC., 207 S. Helena St., Box 4011, Anaheim, Cal., 92803, Tel: 714-535-6037, TWX: 910-591-1185; FSC No: 87034; QPL No: Multiple; Empl.: 150; Minimum order: $50
p. 1•2062-2065; p. 2•1154-1158

Customer service: B. Selvey

Free literature available: SL-72A Catalog - Illuminated pushbutton switches and indicators, SC/973 Catalog - Miniature and Subminiature lamps

Products manufactured: Caps, Lenses, Indicator Light, Diodes, Lamps, Lights, Switches

Local Sales Offices & Reps.

Lamps

Ariz	Tempe, Argus Sls.	602-967-8709
Cal	Inglewood, Oak Inds.	213-678-4108
Cal	Los Altos, Oak Inds.	415-941-1237
Colo	Denver, I.W. Strong & Assocs.	303-292-6900
Conn	Old Greenwich, Hoffman Engrg.	203-637-1719
Fla	Orlando, Oak Inds.	305-671-4111
Ill	Chicago, Engineered Sls.	312-867-8434
Kans	Wichita, Dy-Tronix	316-943-6221
La	Metaire, McKinney Sls.	504-887-1723
Md	Baltimore, Callas Elctrns.	301-744-7711
Mass	Reading, Oak Industries Inc.	617-944-0094
Mich	Farmington Hills, H. Lowell Co.	313-851-7474
Minn	Minneapolis, G. E. Arnerson & Co.	612-835-2177
Mo	Hazelwood, Dy-Tronix	314-731-5799
Mo	Kansas City, Dy-Tronix	816-761-6543
NJ	Haddonfield, Gray Assocs.	609-429-5300
NY	Rochester, Irondequoit Ind.	716-544-6257
NC	Raleigh, Oak Industries Inc.	919-876-7591
Ohio	Cincinnati, Oak Industries Inc.	513-851-4411
Okla	Tulsa, McKinney Sls.	918-742-6791
Ore	Beaverton, Arneson Assocs.	503-643-5754
Tex	Bellaire, McKinney Sls.	713-655-3653
Tex	Dallas, McKinney Sales Co.	214-631-9450
Wash	Seattle, Arneson Assocs.	206-762-7664
EXP:	Cal., Anaheim, Illuminated Prods. Inc.	714-535-6037

Switches & Indicators

Ariz	Tempe, Argus Sales	602-967-8709
Cal	Inglewood, Oak Inds.	213-678-4108
Cal	Los Altos, Oak Inds.	415-941-1237
Colo	Denver, I.W. Strong & Assoc.	303-292-6900
Fla	Orlando, Oak Inds.	305-671-4111
Ill	Northfield, Torkelson Assoc.	312-446-9085
Kans	Wichita, Dy-Tronix	316-943-6221
La	Metaire, McKinney Sls.	504-887-1723
Md	Rockville, Marktron	301-762-6210
Md	Timonium, Markton	301-252-7111
Mass	Reading, Oak Inds.	617-944-0094
Mich	Farmington Hills, H. Lowell Co.	313-851-7474
Minn	Minneapolis, Torkelson Assoc.	612-835-2414
Mo	Hazelwood, Dy-Tronix Inc.	314-731-5799
Mo	Kansas City, Dy-Tronix, Inc.	816-761-6543
NJ	Bergenfield, H. Gray Assocs.	201-384-3643
NJ	Haddonfield, Gray Assocs.	609-429-5300
NY	Rochester, Irondequoit Ind.	716-544-6257
NC	Raleigh, Oak Inds.	919-876-7591
Ohio	Cincinnati, Oak Inds.	513-851-4411
Okla	Tulsa, McKinney Sales	918-742-6791
Ore	Portland, Oak Inds.	503-292-0878
Tex	Dallas, McKinney Sales	214-631-9450
Tex	Houston, McKinney Sls.	713-665-3653

Local Distributors

Ala	Huntsville, Hall-Mark Elect., 4739 Commercial	205-837-8700
Ariz	Tempe, G. S. Marshall Co., 835 W. 22nd St.	602-968-6181
Cal	El Monte, G. S. Marshall Co., 9674 Telstar Ave.	213-686-1500
Cal	Irvine, G. S. Marshall Co., 17975 Sky Park Blvd.	714-664-2125
Cal	San Diego, G. S. Marshall Co., 8057 Raytheon Rd., Suite 1	714-278-8350
Cal	Sunnyvale, G. S. Marshall Co., 788 Palomar	408-732-1100
Colo	Arvada, G. S. Marshall Co., 5633 Kendall Ct.	303-423-9670
Conn	Hamden, Wilshire Elctrns./Conn., 2554 State St.	203-281-1166
Conn	North Branford, G.S. Marshall Co., 200 Shaw Rd.	203-484-0488
Fla	Ft. Lauderdale, Hall-Mark Elctrns., 1302 West McNab	305-971-9280
Fla	Orlando, Hall-Mark Elctrns., Box 13950	
Fla	Palm Beach Gardens, G. S. Marshall Co., 10384 Riverside Dr.	305-622-8490
Ga	Lawrenceville, Hall-Mark Elctrns., Rte. #1, Cedar Dr.	800-633-2918
Ill	Des Plaines, G. S. Marshall Co., 300 E. Touhy Ave.	312-298-3700
Ill	Elk Grove Village, Hall-Mark Elctrns., 180 Crossen Ave.	312-437-8800
Ill	Rosemont, Advent Elctrns., 7110 Lyndon St.	312-298-4210
Kans	Lenexa, Hall-Mark Elctrns., 9006 Rosehill Rd.	913-888-4747
Kans	Wichita, Hall-Mark Elctrns., 7327 E. Indianapolis	
Md	Baltimore, Hall-Mark Elctrns., 6660 Security Blvd.	301-265-8500
Mass	Burlington, Wilshire Elctrns./N.E., One Wilshire Rd.	617-272-8200
Mass	Newton Highlands, G. S. Marshall Co., 88 Needham St.	617-965-5115
Mich	Ann Arbor, Advent Elctrns., 254 S. Wagner Rd.	313-769-8650
Minn	Bloomington, Hall-Mark Elctrns., 9201 Penn Ave. So., Suite 10	612-884-9056
Minn	Minneapolis, G. S. Marshall Co., 4900 Viking Drive, Rm. 114	612-831-4904
Minn	Minneapolis, Industrial Comps., Inc., 5280 W. 74th St.	612-831-2666
Mo	St. Louis, Hall-Mark Elctrns. Corp., 6100 Madison Ave.	314-521-3800
Mo	St. Louis, Olive Industrial Elctrns., 6662 Olive Blvd.	314-863-7800
NJ	Cinnaminson, Wilshire Elctrns., 855 Industral Hwy.	215-627-1920
NJ	Clifton, Wilshire Elctrns., 312 Clifton Ave.	201-365-2600
NY	Farmingdale, G. S. Marshall Co., 230 Sherwood Ave.	516-293-4141
NY	Farmingdale, Hall-Mark Elctrns. Corp., 167 Marine St.	516-293-7500
NY	Farmingdale, Wilshire Elctrns./L.I., 1855 New Highway, Unite B	516-293-5775
NY	Johnson City, Wilshire Elctrns./N.Y. State, 617 Main St., (Westover Plaza)	607-797-1236
NC	Raleigh, Hall-Mark Elctrns., 300 Industrial Dr.	919-832-4465
Ohio	Dayton, G. S. Marshall Co., 6388 N. Dixie Dr.	513-898-1100
Ohio	Dayton, Hall-Mark Elctrns., 2775 Shelburen La.	513-294-0437
Ohio	Wickliffe, Gateway Megatech, Inc., 30214 Lakeland Blvd.	216-944-8565
Okla	Tulsa, Hall-Mark Elctrns., 4846 S. E. 83rd Ave.	918-835-8458
Pa	Huntingdon Valley, Hall-Mark Elctrns., 458 Pike Rd.	215-355-7300
Tex	Austin, Hall-Mark Elctrns., 3100-A Industrial Terrace	512-837-2814
Tex	Dallas, G. S. Marshall Co., 14205 Proton	214-233-5200
Tex	Dallas, Hall-Mark Elctrns. Corp., 9333 Forest La.	214-231-6111
Tex	Dallas, Sterling Elctrns., 2875 Merrell Rd.	214-357-9131
Tex	El Paso, Hall-Mark Elctrns., 2211 E. Missouri St.	
Tex	Houston, Hall-Mark Elctrns. Corp., Box 42190	713-781-6100
Wash	Bellevue, G. S. Marshall, 1801 130th Ave. N.E.	206-883-1084
Wisc	Mequon, Taylor Elec. Co., 1000 W. Donges Bay Rd.	414-241-4321
Wisc	Milwaukee, Hall-Mark Elctrns. Corp., 11925 W. Ripley Ave.	414-476-1270

ILLUMINATION INDUSTRIES, 825 E. Evelyn Ave., Sunnyvale, Cal., 94086, Tel: 408-738-2744; Empl.: 165; Minimum order: $25

Customer service: Customer Service 408-245-4111 Ext. 74-79

Free literature available: Mercury and Xenon Lamps, Medium Pressure Ultra Violet Curing Lamps and Systems, Capillary Lamps. Power Supplies and Lamp Housings. Exposure Equipment.

Products manufactured: Lamps, Lights, Power Supplies, Semiconductor Wafer Fabrication, Sockets

Local Sales Offices & Reps.

Ariz	Scottsdale, Allen Assocs.	602-994-1305
Cal	Mountain View, R. Muenzer	415-964-0390
Cal	Torrance, Mitronics Industries	213-323-7934
Colo	Denver, Camel Elect.	303-757-6191
Fla	Ft. Lauderdale, Semquip	305-772-3002
Kans	Shawnee Mission, Mid America Mktg.	913-236-4800
NH	Amherst, Martek Inds.	617-245-0940
NJ	Nutley, D/R Assocs.	201-667-5900
NM	Albuquerque, Thorson Co.	505-265-5655
Tex	Dallas, Airep Elctrns.	214-363-5291
Wash	Tukwila, General Elctrns.	206-243-5141

I M C MAGNETICS, Eastern Div., 570 Main St., Westbury, N.Y., 11590, Tel: 516-334-7070, TWX: 510-222-4469; Empl.: 175; Minimum order: $50
p. 1•494-497,964,965

Customer service: G. Egan

Free literature available: The Motor Catalog-EMistr, The Fan Catalog-EF1, Centrigugal Blowers Catalog-EB1, Vaneaxial Catalog- EV1R, Brushless DC Motor Broadside-Edcor-1

Products manufactured: Actuators, Alternators, Blowers & Fans & Accessories, Controls/Control Eqpt., Encoders, Gearheads & Speed Reducers, Gears & Gear Mechanisms (Precision), Motor & Generator Armatures, Rotors, Stators, Motors, Tachometers

Local Sales Offices & Reps.

Cal	Los Altos, Recht Assocs.	415-941-0336
Cal	Los Angeles, Elcom Sls. Co.	213-223-1351
Colo	Denver, Linberg Co.	303-758-9033
Conn	Newtown, Gerber Sls. Co.	203-426-3440
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Ill	Chicago, Berndt Assocs.	312-283-0713
Ind	Ft. Wayne, Waid & Assocs.	219-422-4344
Md	Baltimore, D.K. Jones & Assoc.	301-752-0577
Mass	E. Longmeadow, Gerber Sls. Co.	413-525-3059
Mass	Waltham, Gerber Sls. Co.	617-090-8040
Mich	Dearborn, V.P.I., Inc.	313-271-4600
Minn	Minneapolis, Stack Johnson	612-925-2111
Mo	Kansas City, Harris-Hanson Co.	816-444-9494
Mo	St. Louis, Harris-Hanson Co.	314-432-3611
NJ	Haddonfield, Mesa Tech. Assoc.	609-429-9531
NY	Great Neck, Trionics Assocs.	516-466-2300
NY	Rochester, Fowler-Beach Corp.	716-586-0468
Ohio	Dayton, BEK Assocs.	513-278-1343
Ore	Portland, Brett-Ross	503-232-4184
Tex	Dallas, Electra III Co.	214-243-5969
Utah	Salt Lake City, Lindberg Co.	801-364-6409
Wash	Seattle, Brett-Ross	206-935-8054
FOR:	Can., Montreal, Que., Vitel Elctrns.	514-331-7393

IMC MAGNETICS CORP., New Hampshire Div., Rte. 16B, Rochester, N.H., 03867, Tel: 603-332-5300, TWX: 510-297-4466; Empl.: 200 p. 1•496,497

Customer service: F. C. Taylor

Free literature available: AIRMOVERS CATALOGUE

Products manufactured: Blowers & Fans & Accessories

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Colo	Denver, Lindberg Co.	303-758-9033
Conn	Newtown, Gerber Sls. Co.	203-426-3440
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Ill	Rolling Meadows, Sumer Inc.	312-394-4900
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Mass	Waltham, Gerber Sls. Co.	617-890-8040
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Mo	Kansas City, Harris-Hanson Co.	816-444-9494
Mo	St. Louis, Harris-Hanson Co.	314-432-3611
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NY	Rochester, Fowler-Beach	716-586-0468
Ohio	Dayton, Bek Assocs.	513-278-1343
Ore	Portland, Brett Assoc.	503-232-4184
Pa	Pittsburgh, G.S. Root & Co.	412-561-4125
Tex	Dallas, Electra III	214-243-5969
Utah	Salt Lake City, Lindberg Co.	801-364-6409
Wash	Seattle, Brett Assoc.	206-935-8054
For:	Can., Montreal, Que., Vitel Elctrns.	514-331-6393
For:	Can., Toronto, Ont., Vitel Elctrns.	416-622-6300

IMC MAGNETICS CORP., Western Div., 6058 Walker Ave., Maywood, Cal., 90270, Tel: 213-583-4785, TWX: 910-321-3089; FSC No: 99743; Empl.: 110

Customer service: M. Kloetzel

Free literature available: Stepper Motor Catalog and Application Notes; Solenoid Selector; Synchro Data Sheets; Flag Indicator Data Sheets; Remote Indicator Data Sheets.

Products manufactured: Actuators, Controls/Control Eqpt., Indicators, Motors, Resolvers, Synchro, Solenoids, Synchros

Local Sales Offices & Reps.

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Cal	Los Angeles, El Com Sls.	213-223-1351
Colo	Denver, Lindberg Co.	303-758-9033
Conn	New Haven, Gerber Sls.	203-777-6279
Fla	Orlando, Duay Entprs.	305-277-3296
Ill	Chicago, Electro-Tech Mktg. Assoc.	312-588-4535
Mass	Waltham, Gerber Sls.	617-891-8040
Minn	Minneapolis, Stack-Johnson	612-925-2111
Mo	Kansas City, Harris-Hanson	816-444-9494
Mo	St. Louis, Harris-Hanson	314-962-0111
NJ	Haddonfield, Mesa Tech. Assoc.	609-429-9531
NY	E. Aurora, Harries & Kershaw	716-652-1221
NY	Great Neck, Trionic Assocs.	516-466-2300
Ohio	Dayton, Bek Assocs.	513-278-6851
Ore	Portland, Brett Assoc.	503-232-4184
Tex	Dallas, M. Kruvand Co. Inc.	214-827-8043
Utah	Salt Lake City, Lindberg Co.	801-364-6409
Wash	Seattle, Brett Assoc.	514-681-1400

INCOR INSTRUMENTATION, INC., 144 Lamar St., West Babylon, N.Y., 11704, Tel: 516-643-70703rum132; FSC No: 23132; Empl.: 25

Products manufactured: Amplifiers, Attenuators, Converters, Data Acquisition & Reduction Systems, Filters, Integrators, Electronic, Inverters, Isolators, Oscillographs, Direct Writing, Power Supplies, Racks, Recorders, Signal Conditioners & Equipment, Thermocouples, Elements & Accessories, Voltage Sources

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Conn	Newton, Daner-Hayes	203-426-9094
DC	Washington, Powell Pendergraph	301-656-4535
Ill	Des Plaines, Marsland Assocs.	312-775-1309
Ind	Indianapolis, Marsland Assoc.	317-924-3568
Mass	Newton Centre, Daner-Hayes	617-969-4650
Mich	Ann Arbor, H. C. Heym, Assoc.	313-971-6552
Mich	Saginaw, H. C. Heym, Assoc.	517-792-7928
Minn	Minneapolis, Marsland Assoc.	612-545-4481
MO	Kansas City, Marsland Assoc.	816-765-0641
NJ	Boonton, Eastern Metro Assoc.	201-335-7633
NY	Plainview, Eastern Metro Assoc.	516-931-1414
NY	Rochester, Daner-Hayes	315-986-3548
Ohio	Cleveland, Geotronix Mktg. Assoc.	216-526-2535
Ohio	Columbus, Geotronix Mktg. Assoc.	614-457-8472
PA	Audobon, Daner-Hayes	215-666-5005
PA	Glenshaw, Wainwright Tech.	412-487-3358
VA	Richmond, Powell-Pendergraph	804-264-2341
Wash	Seattle, Avionics Liaison	206-767-3870

INDIANA GEN'L. DIV., Electro-Mechanical Prods., 517 W. Walnut St., Oglesby, Ill., 61348, Tel: 815-883-8453, TWX: 910-642-2370; Empl.: 1,200

Products manufactured: Motors, Tachometers

INDIANA GENERAL, Elctrn. Prods., Crows Mill Rd., Keasbey, N.J., 08832, Tel: 201-826-5100, TWX: 710-998-0877; Empl.: 1,200

For info on price: H. Landsberger; Application info: M. Distefano; Customer service: H. Landsberger; Delivery info: M. Maurath

Free literature available: Ferramic Components - ferrites and associated hardware, Inverter-Rated Ferramics - inverter transformer design info with nomographs for core and wire selection, Broad Band-Rated Ferramics (16,000 perm) - with guaranteed electrical specifications, Attenuator-Rated Ferramics - for impedance modulus and DB charts for bead selection, Pulse-Rated Toroids with guaranteed electrical characteristics

Products manufactured: Cores, Magnetic, Ferrite Material & Parts

INDIANA GENERAL/DIV. EMM CORP., Magnet Prods., 405 Elm St., Valparaiso, Ind., 46383, Tel: 219-462-3131, TWX: 910-690-4891; Empl.: 1200

Products manufactured: Magnetizers, Magnets

Local Sales Offices & Reps.

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Ill	Villa Park	312-833-5698
Mass	Hingham	617-749-2003
NJ	Haddonfield	609-428-2706
NJ	Hillsdale	201-666-8668
Ohio	Cleveland	216-289-4600

INDIVIDUALIZED INSTRUCT. INC., Div. Economy Co., 1901 N. Walnut, Oklahoma City, Okla., 73105, Tel: 405-528-8444; Empl.: 250

Customer service: A. Kuebler

Free literature available: Phi-Deck Brochure; Phi-Deck Application Notes; Phi-Deck Price Schedule & Demonstrator Offer.

Products manufactured: Tape Recording Accessories

Local Sales Offices & Reps.

Cal	Culver City, Feeger Lucas Wolfe, Inc.	213-559-7200
Cal	Sunnyvale, AMASCO	408-733-8690
Colo	Littleton, Radco Elctrns.	303-794-4279
Ill	Chicago, J. Golten Co.	312-725-7570
Ohio	Akron, Shamrock Elctrn. Sls., Inc.	216-666-3796
Tex	Addison, Kemp Engrg. Co.	214-661-0400
Va	Arlington, Gans-Fryling, Inc.	703-527-3262

INDUSTRIAL CONDENSER CORP., 3243 N. California Ave., Chicago, Ill., 60618, Tel: 312-463-2200; FSC No: 74861; Empl.: 200; Minimum order: $25

For info on price: J. Ostrowski; Application info: M. Forester; Customer service: M. Forester; Delivery info: J. Ostrowski

Free literature available: Capacitor Catalogs-1180-B Oil Filled; 1117-D Stabelex; 1134-A G & H Type Oil Filled; 1195-A Silverfilm; 1212-A Synthar; 1255-A Viscofilm; 1273-B Miniature Metalized; 1291 Metalized Polycarbonate; 1298 Metalized Polyester

Products manufactured: Capacitors, Fixed

Local Sales Offices & Reps.

Cal	Los Angeles, W.S. Harmon Co.	213-937-1460
Conn	Farmington, R. Perron & Co.	203-673-4825
Conn	Trumbull, R. Perron & Co.	203-268-9631
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INDUSTRIAL CONTROL CO., Central Ave. at Pinelawn, Farmingdale, N.Y., 11735, Tel: 516-694-3000; Empl.: 20 .... p. 1•1916,1917

For info on price: G. Attura; Application info: G. Attura; Customer service: E. Kiritsis; Delivery info: E. Kiritsis

Products manufactured: Actuators, Amplifiers, Analyzers, Coils Including Assemblies & Forms, Computers, Controllers, Programmable, Controls/Control Eqpt., Converters, Dampers, Servo, Demodulators, Detectors, Generators, Indicators, Integrators, Mechanical & Electro-Mechanical, Reactors, Repeaters, Servo, Servo Systems, Testers

INDUSTRIAL DEVICES, Edgewater, N.J., 07020, Tel: 201-224-4700, Telex: 12-7459; Empl.: 200; Minimum order: $50 .... p. 2•1168-1171

For info on price: M. Diceglie; Application info: M. Diceglie; Customer service: M. Diceglie; Delivery info: E. Rupert

Free literature available: Form FDC - Pilot and indicator lights and accessories available off-the-shelf. Form PLF - Pilot Light Selection Guide covering unit-construction lights. Form QCA - Covering replaceable lamp incandescent pilot lights. Form MCG - Covering bi-pin cartridge lights. Form MSF - Covering T-2 Slide Base Lamps, Sockets, Pilot Light Assemblies.

Products manufactured: Caps, Lenses, Indicator Light, Clamps & Clips, Diodes, Knobs, Lamp Drivers, Lamps, Lenses, Readout & Display, Lights, Sockets, Testers

Local Sales Offices & Reps.

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Ariz	Phoenix, Shepherd Comps.	602-934-0425
Cal	Los Altos, Frauman Assocs	415-941-0660
Cal	Van Nuys, Shepherd Comps.	213-787-4610
Colo	Denver, Connors Inc.	303-934-5829
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Fla	St. Petersburg, Comps. Sls.	813-894-4366
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Kans	Overland Pk., Fixman Eng.	913-648-7748
Kans	Wichita, G. Fixman Engrg. Co.	316-MU 2-9433
Md	Baltimore, ME & Assocs.	301-825-1130
Mass	Newton Upper Falls, Anchor Engrg.	617-964-6205
Mich	Oak Pk., W. Spenser	313-398-8005
Minn	Wayzata, G.A. Kelly	612-473-0251
Mo	St. Louis, Fixman Engrg.	314-PA 5-5219
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NY	Albany, Niagara Electric Sls.	518-869-0130
NY	Buffalo, Niagara Elec. Sls.	716-886-4000
NY	E. Syracuse, Niagara Electric Sls.	315-437-1656
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NY	Rochester, Niagara Elec. Sls. Co.	716-BR 1-1223
NC	Raleigh, Comps Sls. Corp.	919-832-1897
Tenn	Chattanooga, Ind'l. Hardgoods Co.	615-267-0907
Tex	Dallas, Blackburn Assocs.	214-692-8885
Wash	Seattle, Fleehart & Sullivan	206-522-1533
EXP:	NJ Ft. Lee, J.A. Gross	201-944-3609
FOR:	Can., Windsor, Ont., W. Spenser Co.	519-969-1332

Local Distributors

Ala	Huntsville, Cramer EW/Huntsville, Inc., 2310 Bob Wallace Ave. S.W.	205-539-5722
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Ariz	Tucson, Inland Elctrn. Supply, 715 E. Broadway	602-624-4402
Cal	Buena Park, Dow Radio Inc., 6001 Beach Blvd.	714-521-1906
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Cal	Fullerton, Orvac Elctrns., 1645 E. Orangethorpe Ave.	714-871-1020
Cal	Irvine, Cramer/Los Angeles, 17201 Daimler St.	714-979-3000
Cal	Los Angeles, Electric Switches, Box 3085, Term. Annex	213-664-1141
Cal	Oxnard, Dow Radio Inc., 921 S. Oxnard Blvd.	805-486-6353
Cal	Palo Alto, Zack Elctrns., 654 High St.	415-326-5432
Cal	Pasadena, Dow Radio Inc., 1759 E. Colorado Blvd.	213-681-3416337667J0730/A3/
Cal	Pasadena, Empire Elctrns., 37 E. Union	213-681-2711
Cal	San Diego, Cramer/San Diego, 8975 Complex Dr.	714-565-1881
Cal	San Diego, Shanks & Wright, 2045 Kettner Blvd.	714-239-0176
Cal	San Francisco, Zack Elctrns., 1444 Market St.	415-626-1444
Cal	San Jose, Quement Elctrns., 1000 S. Bascom Ave.	408-294-0464
Cal	Sunnyvale, Cramer/San Francisco, 720 Palomar Ave.	408-739-3011
Cal	W. Los Angeles, California Elctrn. Supply, 1911 Armacost Ave.	213-477-8561
Colo	Colorado Springs, D. Walker Elctrns., 9 E. Vermijo Ave.	
Colo	Denver, Cramer/Denver, 5465 E. Evans Pl. at Hudson	303-758-2100
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Colo	Pueblo, D. Walker Elctrns., 100 N. Victoria Ave.	
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Conn	Waterbury, Bond Radio Elctrns., 439 W. Main St.	203-735-1184
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Fla	Miami, ESL Elctrn. Dist. Div., 3560 N.W. 34th St.	
Fla	Orlando, Cramer EW/Orlando, 345 N. Graham Ave. Box 20214	305-894-1511
Ga	Atlanta, Cramer/Atlanta, 3923 Oakcliff Ind'l. Ct.	404-448-9050
Ga	Augusta, Dixie Radio Supply Co., 1234 Gordon Park Rd.	404-722-2055
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Ill	Chicago, Electro-Kinetics, 4114 N. Nashville Ave.	312-286-4200
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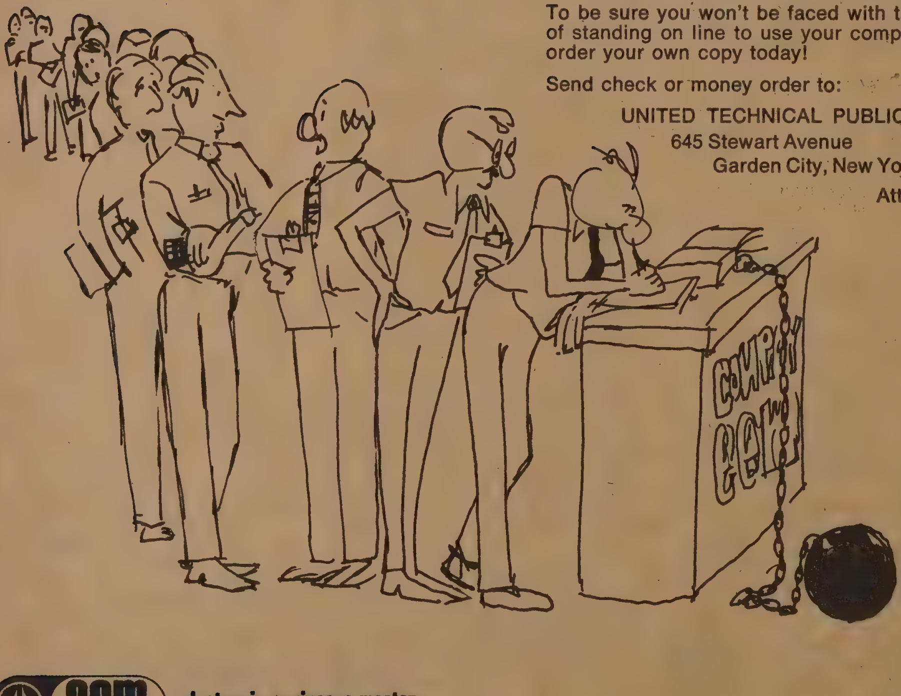

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For info on price: B. Weir Ext. 341; Application info: P. McEvoy Ext. 273; Customer service: B. Brandt Ext. 287; Delivery info: J. Ritacco Ext. 278

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Cal	Van Nuys, IEE Factory Sls.	213-787-0311
Colo	Denver, Checkmate	303-771-4920
Conn	North Haven, Kitchen & Kutchin	203-239-0212
DC	Wash., L. L. Paxson, Sys. Support	202-544-4257
Fla	Clearwater, Reynolds & Assocs., Inc.	813-726-2373
Fla	Fort Lauderdale, Reynolds & Assocs., Inc.	305-581-6611
Fla	Hollywood, Reynolds & Assocs., Inc.	305-987-6720
Fla	Palm Beach, Reynolds & Assocs., Inc.	305-622-6850
Fla	Satellite Beach, Reynolds & Assocs.	305-773-4700
Ga	Atlanta, Reynolds & Assoc.	404-252-5360
Ill	Highland Park, Bransky Sls.	312-433-2375
Ind	Carmel, Rich Elctrn. Mktg.	317-844-8462
Kans	Overland Park, Ensco/Rep.	913-381-7557
Md	Rockville, Marktron	301-762-6210
Md	Timonium, Marktron	301-825-8222
Mass	Lexington, Kitchen & Kutchin	617-862-8230
Mich	Detroit, L. H. Dickelman	313-255-3300
Mo	St. Louis, Ensco/Rep.	314-567-3935
NJ	Haddonfield, TAI Sales	215-627-6615
NM	Albuquerque, Data Handling	505-268-4364
NY	Albany, Reagan/Compar Albany Inc.	518-489-7408
NY	Endwell, Reagan/Compar Albany Inc.	607-732-8743
NY	Fairport, Reagan/Compar Albany Inc.	716-271-2230
NY	New Hartford, Reagan/Compar Albany	315-732-3775
NY	Plainview, E.R.A.	516-522-9890
NC	Charlotte, Reynolds & Assocs.	704-527-2536
Ohio	Cleveland, Geotronix Mktg. Assocs.	216-526-2535
Ohio	Columbus, Geotronix Mktg. Assocs.	614-457-8472
Pa	Philadelphia, Tai Sales	215-627-6613
Pa	Pittsburgh, Russell F. Clark	412-242-9500
Tex	Dallas, E. B. Robertson, Inc.	214-942-2716
Utah	Salt Lake City, Checkmate Sls.	801-268-3533
Va	Charlottesville, Marktron, Inc.	301-762-6210
Wash	Mercer Island, J. H. Anderson Assocs.	206-232-0484
For:	Can., Delta, B.C. V4C 3T3, Kaytronics West	
For:	Can., Downsview, Kaytronics, Ltd.	416-638-5511
For:	Can., Montreal, Kaytronics, Ltd.	514-487-3434

INDUSTRIAL ELCTRN. ENGRS. cont'd

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INDUSTRIAL ELECTRONIC HARDWARE, 109 Prince St., New York, N.Y., 10012, Tel: 212-677-1881, TWX: 710-581-4338; Empl.: 350; Minimum order: $50

For info on price: L. Roberts; Application info: W. Kirschner; Customer service: L. Roberts; Delivery info: J. Schmidt

Free literature available: 1974/5 issue of connector catalog including PC types, rack & panel, IC receptacles, display connectors, transistor & power transistor sockets, CRT assemblies.

Products manufactured: Connector Adapters, Connector Blocks, Mother Board, Connector Boxes & Strips, Power Outlet, Connectors, Contacts, Electrical, Sockets, Terminal Blocks, Boards & Strips

Local Sales Offices & Reps.

Ala	Huntsville, Beacon Elctrns.	205-881-5031
Ariz	Scottsdale, J. Berman Co.	602-994-8081
Cal	Santa Clara, Nova-Tronix	408-243-9530
Conn	Milford, Conti-Younger Assocs.	203-929-3294
Fla	Ft. Lauderdale, Beacon Elctrns.	305-776-6074
Fla	Maitland, Beacon Elctrns.	305-647-3498
Ga	Atlanta, Beacon Elctrns.	404-351-3654
Ill	Chicago, B. Burns & Assocs.	312-775-1233
Ill	Chicago, M. Gottlieb Assocs.	312-775-1151
Ind	Indianapolis, Lat-Tronics	312-846-5788
Iowa	Cedar Rapids, Reid Assocs.	319-362-6302
Kans	Leawood, Vasen Sls. Corp.	913-649-0679
Md	Westminster, F.B.D. Sls. Corp.	301-876-2398
Mass	Waltham, Conti-Younger Assocs.	617-890-4582
Mich	St. Clare Shores, J.M. Thorpe Co.	313-779-6363
Minn	Anoka, K. Haugen Assocs.	612-421-3359
NJ	Haworth, Kay Sls.	201-384-3261
NY	Buffalo, W.A. Franklin Sls.	716-223-5102
NY	Syracuse, W.A. Franklin Sls.	315-472-5273
NY	Whitesboro, W.A. Franklin Sls.	315-736-5460
Ohio	Cleveland, Marlow Assoc.	216-932-0900
Ore	Portland, C.K. Shanks Assoc.	503-292-5656
Pa	Bala Cynwyd, M. Friedman Assoc.	215-839-3450
Tex	Dallas, E.B.R. Inc.	214-942-2716
Va	Portsmouth, F.B.D. Sls.	804-484-3162
Wash	Seattle, C.K. Shanks	206-632-4290
FOR:	Can., Mississauga, Ont., Specialty Elec. Ltd.	416-678-2104
FOR:	Can., Montreal, Que., Specialty Elec. Ltd.	514-336-4500

INDUSTRIAL MICA DIV., Columbia Tech. Corp., 223 S. Van Brunt St., Englewood, N.J., 07631, Tel: 201-568-7200; Empl.: 150 p. 1•1268,1269

Customer service: J. Maione

Products manufactured: Insulators & Insulation, Pads, Transistor Mounting, Spacers

INDUSTRIAL PRODUCTS DIV., Int'l Laser Systems, Inc., 2111 W. Central Blvd., Orlando, Fla., 32805, Tel: 305-843-4731, TWX: 810-850-0195; Empl.: 9

Customer service: D. O. Tate

Free literature available: Industrial Optical Data Communications Systems - both analog and digital GaAs laser transmitters and receivers

Products manufactured: Comm. Systems, Detectors, Lasers & Laser Systems, Modulator/Demodulators, Transmission Systems, Data

INDUSTRIAL TEST EQUIP., 21 Yennicock Ave., Port Washington, N.Y., 11050, Tel: 516-883-1700; FSC No: 90074; Minimum order: $10 p. 1•729,1235

Customer service: M. Schreibman

Free literature available: Catalog No. PH-71 - 4 page catalog describing line of phase meters and vector voltmeters. Catalog No. 969 - 8 page catalog describing line of AC power converters. Brochures - describing line of impedence comparators.

Products manufactured: Amplifiers, Bridges, Calibrators, Comparators, Converters, Detectors, Generators, Inverters, Meters, Modulators, All Kinds, Multipliers, Oscillators, Power Supplies, Regulators, Shifters, Standards, Testers

Local Sales Offices & Reps.

Ala	Huntsville, Intern'l. Scientific Instru.	205-837-1601
Ariz	Phoenix, Luscombe Engrg., Co.	602-274-8128
Cal	Pasadena, Luscombe Engrg., Co.	213-684-2000
Conn	Hartford, MRI	203-527-1245
Ill	Chicago, Midwest Elctrn.	312-626-0030
Ind	Indianapolis, Midwest Elctrn. Sls.	317-926-3736
Mass	Lexington, MRI	617-861-6270
NY	Great Neck, Industron Assocs., Inc.	516-HU 7-2620
NC	Winston Salem, Int'l. Sci. Instrs.	919-722-1783
Ohio	Dayton, Gemini Inc.	513-890-5394
Wisc	Waukesha, Midwest Elctrn. Sls.	414-542-5129
EXP:	N.Y., N.Y., Ad. Auriema	212-466-2500
FOR:	Can., Ont., Giga-Tron Assoc.	613-692-4829

INDUSTRIAL TIMER CORP., Unit of Esterline Corp., U.S. Hwy 287, Parsippany, N.J., 07054, Tel: 201-887-2200; Empl.: 175; Minimum order: $10

For info on price: F. Bailey; Application info: F. Bailey; Customer service: S. Stewart; Delivery info: S. Stewart

Free literature available: Timing control condensed catalog Direct Reading Tape Programmers & Control Systems catalog.

Products manufactured: Programmers, Timers

Local Sales Offices & Reps.

Ark	El Dorado, D. Bellew Sls. Co.	501-863-8325
Cal	Oakland, Sierra-Pacific Engrg.	415-635-6909
Cal	Santa Fe Springs, Sierra-Pacific Engrg.	213-921-9634
Fla	Orlando, Buchanan & Abrams Assocs.	305-423-8995
Ill	Hinsdale, Hill-Gray Assocs.	312-325-4810
Ind	Indianapolis, Val-Skol Sls.	317-926-5063
La	Kenner, D. Bellew Sls.	504-729-4550
Mass	Waltham, RJC Assocs.	617-899-5858
NJ	Leonia, Associated Controls & Equip.	201-944-9218
NY	Rochester, Ontec	716-464-8636
NC	Charlotte, Barker Instr. & Mach. Co.	704-334-1222
Ohio	Cincinnati, Val-Skol Sls.	513-563-6790
Ore	Forest Grove, Bern Doran Sls.	503-357-3333
Pa	Abington, Ind'l. Mktg. Specialists	215-659-0444
SC	Greenville, Barker Instr. & Mach. Co.	803-235-5022
Tex	Dallas, Lund & Co.	214-358-4335
EXP:	Bloomfield, New Jersey, Buck International, Inc.	201-743-8110

INERTIAL MOTORS CORP., 280 N. Broad St., Doylestown, Pa., 18901, Tel: 215-345-1010; Empl.: 41

For info on price: E. S. Mihalko; Application info: T. D. Schmalbruch; Customer service: L. Rouleau; Delivery info: L. Rouleau

Free literature available: Position control catalogue describing the performance characteristics of low inertia shell motors, and application formulas.

Products manufactured: Motors

Local Sales Offices & Reps.

Cal	Santa Fe Springs, Sales Engineers Ltd.	213-921-4337
Conn	E. Hartford, Meas. Equip. Co.	203-745-9050
Fla	Pompano Beach, G. Morris	305-943-8715
Ill	Chicago, Engineered Sls. Co.	312-867-8434
Mass	Wakefield, Meas. Equip. Co.	617-245-4870
NJ	Camden, J.E.D. Elctrns.	601-357-7389
NY	Mt. Vernon, Q.E.D. Elctrns.	914-664-0080
NY	Pittsford, Magna Sls. Corp.	716-586-8748

INFO-LITE CORP., 46-10 104 St., Corona, N.Y., 11368, Tel: 212-476-1287; Empl.: 13 p. 1•2076; p. 2•1159

Products manufactured: Annunciators, Boards, Plug-In, Boards, Programming, Connectors, Controllers, Programmable, Cords, Counters, Display Devices/Displays, Flashers, Kits, Programming Board, Lamps, Lights, Matrices, Computer, Panels, Power Supplies, Process Control Systems, Programmers, Sockets, Switchboards, Switches

Local Sales Offices & Reps.

Ala	Huntsville, Repcom	205-534-9959
Cal	Redwood City, Caltronic Assocs.	415-365-2545
Fla	Melbourne, Repcom	305-254-1877
Ga	Marietta, Repcom	404-971-2831
Mass	Needham, A & M Elctrn. Reps.	617-444-8170
Mich	Southfield, H. Lowell Co.	313-851-7474
Minn	St. Paul, Kenco Co.	612-645-7717

NJ	Long Valley, Rovine Assocs.	201-876-4140
NY	Syracuse, Lenard Co.	315-479-9191
Tex	Dallas, Glidden Electro Equip.	214-363-6539
Tex	Houston, Glidden Electro Equip.	713-681-1415

INFODEX, INC., 7 Cherry Ave., Waterbury, Conn., 06702, Tel: 203-757-9291; FSC No: 09087; Empl.: 25
p. 1•730-733

Customer service: E. H. Ulm

Free literature available: Phosphor Selection Guide-describes briefly the most popular phosphors in general purpose monitors &discusses suitability.

Products manufactured: Amplifiers, Display Devices/Displays, Monitors, Oscilloscopes, Scanners, Tapes, Recording, Magnetic (All Types), Tubes

Local Sales Offices & Reps.

Cal	Pasadena, A-F Sales Engrg.	213-681-5631
Cal	Sunnyvale, Amasco	408-733-8690
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NJ	Tenafly, Budd-Tronics, Inc.	201-569-2230
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Tex	Dallas, Mft. Mktg. Svc. Corp.	214-357-6893
Tex	Houston, Mft. Mktg. Svc. Corp.	713-645-3581

INFORMATION DISPLAYS, INC., 333 N. Bedford Rd., Mt. Kisco, N.Y., 10549, Tel: 914-241-1000, TWX: 710-571-2179; Empl.: 19

For info on price: C. Machover; Application info: C. Machover; Customer service: F. Lombardi; Delivery info: C. Machover

Products manufactured: Amplifiers, Converters, Display Devices/Displays, Drafting Machines, Generators, Recorders, Terminal Equipment, Digital

Local Sales Offices & Reps.

Ariz	Scottsdale, Williams-Assocs.	602-947-4297
Ariz	Tempe, Williams-Assocs.	602-838-2631
Cal	Mission Hills, J. Long	213-365-9754
Colo	Denver, Williams-Assocs.	303-373-4730
Colo	Lakewood, Williams-Assocs.	303-233-9067
Colo	Littleton, Williams-Assocs.	303-798-6738
Md	Baltimore, S & S Assocs.	301-661-8979
Md	Bethesda, S & S Assocs.	301-654-1434
Mass	Chelmsford, S & S Elctrns.	617-256-8731
Mich	Southfield, Data-Tron	313-354-6421
Mich	St. Clair Shores, Data-Tron	313-776-3685
Minn	Minneapolis, DeBeck Assocs.	612-822-4265
Minn	St. Paul, DeBeck Assocs.	612-690-1557
Mo	Ballwin, Automated Graphics	314-391-0461
Mo	St. Louis, Automated Graphics	314-535-2978
NM	Albuquerque, Williams-Assocs.	505-255-1638
Ohio	Dayton, Data-Tron	513-223-8421
Ohio	Wickliffe, Data-Tron	216-858-8421
Okla	Norman, Data Mktg. Assocs.	405-364-8320
Pa	King of Prussia, S & S Assocs.	215-265-3450
Pa	Monroeville, Data-Tron	412-243-8421
Pa	Swarthmore, S & S Assocs.	215-328-0580
Tex	Dallas, Data Mktg. Assocs.	214-661-0300
Tex	Houston, Data Mktg. Assocs.	713-686-9627
Tex	Richardson, Data Mktg. Assocs.	214-231-6932
Tex	San Antonio, Data Mktg. Assocs.	512-828-0937
Va	Catlett, S & S Assocs.	703-347-7304
FOR:	Can., Montreal, Que., Datanetics Ltd.	514-342-4210

INFORMATION HANDLING SERVICES, 5500 S. Valentia Way, Englewood, Colo., 80110, Tel: 303-771-2600; Empl.: 350

For info on price: Mktg. Dept.; Application info: Mktg. Dept.; Customer service: Cust. Svc.; Delivery info: Cust. Svc.

Free literature available: "Brochures" of general nature for specific applications/markets "Teck Data Sheets" detailing each of our 25 services.

Products manufactured: Technical Books

INFORMATION TERMINALS, 323 Soquel Way, Sunnyvale, Cal., 94086, Tel: 408-245-4400, TWX: 910-339-9381; Empl.: 250; Minimum order: $50

For info on price: J. E. Neal; Application info: S. Ferketich; Customer service: C. Hentis; Delivery info: S. Rawlings

Products manufactured: Disc Packs, Magnetic, Tapes, Recording, Magnetic (All Types), Testers

Local Sales Offices & Reps.

Cal	Newport Beach, N. D. Roche	
Conn	Newton, Gerber Sls. Corp.	203-426-3440
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Mass	Waltham, Gerber Sls. Corp.	617-890-8040
Pa	East Pittsburgh, W. Pogachnick	412-563-6655
FOR:	Can., DASCO Data Prods., Ltd.	416-677-9373

Local Distributors

Cal	Los Altos, Systems Mktg. Conslts., Box 1376	415-941-7122
Cal	Los Angeles, Consolidated Trading Company, 12609 Venice Blvd.	213-397-6231
Cal	Los Angeles, FSI, 7407 Melrose Ave.	213-651-4411
Cal	San Carlos, Herrmann & Assocs., 727 Industrial Rd.	415-592-2757
Cal	San Francisco, Kanematsu-Gosho (U.S.A.) Inc., 425 California Street, 4th Floor	415-788-3800
Cal	San Gabriel, Data Accessory Co., 313 W. Valley Blvd.	213-283-7616
Cal	Santa Clara, Logic Sys., 3520 Victor Ave.	408-244-2412
Colo	Denver, Tab Prods. of Colo., 1390 W. Evans	303-922-8355
Conn	Hamden, Wilshire Elctrns./Conn., 2554 State St.	203-281-1166
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Fla	Tampa, Lykes Elctrns. Corp., 5426 W. Crenshaw	813-886-6621
Ga	Atlanta, Hackett Corp., 1311 Logan Circle, N.W.	404-351-2364
Ga	Atlanta, Lykes Elctrns. Corp., Jackson Div.	404-355-2223
Haw	Honolulu, Hole Enterprises, 1451 S. King St.	808-946-3185
Ill	Chicago, Hackett Corp., 2100 W. Fullerton Ave.	312-227-7714
Ill	Downers Grove, Remote Computing Supplies, 3415 Hickory	312-964-7800
Ill	Northfield, American Data Processing Supplies, 229 Northfield Rd.	206-623-2413
Md	Baltimore, R. L. Wilkinson, 707 Stevenson La.	301-377-7800
MD	Baltimore, Data Processor Supplies, 4319 Harford Rd.	301-254-4321
Mass	Chelmsford, Scopus Corp., 286 Chelmsford St.	617-454-4267
Mass	East Longmeadow, Gerber Sls. Corp., 44 Baldwin St.	413-525-3059
Mass	W. Newton, A. W. Mayer Co., 38 Border St.	617-965-1111
Mass	Waltham, Gerber Sls. Corp., 176 Second Ave.	617-890-8040
Mich	Howell, Hackett Corp., 1800 S. Burkhart Rd.	517-546-6530
Mich	West Bloomfield, Robert Fairbank Assocs., 6118 Palomino Ct.	313-851-9546
Mo	Kansas City, Alexander Elctrns., 1820 Wyandotte St.	816-474-6656
Neb	Lincoln, Data Source Business Forms, Box 5573	402-464-0432
NH	Portsmouth, Morley Co., 909 Islington St.	603-436-5430
NJ	Bergenfield, Technical Electrn. Distrs., 20 Foster St.	201-384-3643
NJ	Ho-Ho-Kus, Progressive Sys., 212 First St.	201-652-0909
NY	New York, Super Business Machines, 19 Rector St.	212-943-4130
NY	Rochester, Elcom Sls., Box 9112	716-385-1400
NC	Greensboro, Carolina Ribbon & Carbon Sls., 400 Prescott St.	919-274-2468
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Ohio	Cincinnati, Sheridan Assocs., Box 37826	513-761-5432
Ohio	Cleveland, Hackett Corp., 6530 Juniata Ave.	216-391-2700
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SC	Charleston, Wholesale Radio Supply Co., 515 E. Bay St.	803-722-2634
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Tex	Houston, Kent Computer, 9219 Katy Frwy.	713-467-0077
Wash	Seattle, Almac/Stroum Elctrns., 5811 Sixth Ave. S.	206-763-2300
Wash	Seattle, Data Card, 3625 Interlake Ave. N.	206-633-4346
Exp:	New York, NY, B. Freudenberg, 50 Rockefeller Plaza	212-757-9130
For:	Bromma, Sweden, Esselte System AB, Box 140	Stockholm 25-27-80
For:	Can., Don Mills, Ont., DKW Computer Prods. & Svcs., 801 Yorkmills Rd.	416-447-0301
For:	Can., Rexdale, Ont., DASCO Data Prods., Ltd., 421 Carlingview Dr.	416-677-9373
For:	England, London W. 13, BFI Elctrns. Ltd., Sinclair House, The Avenue	01-998-2113
For:	Finland, Helsinki, KONTVA, Runeberginkatu 56	90-440371
For:	France, Paris, BFI Electronique S.A.R.L., 52, Avenue de New York	KLE 6969
For:	Germany, Frankfurt am Main, BFI Elektronik, GmbH, 26-28 Hainerweg	617099
For:	Israel, Tel Aviv, TALVITON Elctrns. Ltd., 9, Biltmor St.	444572
For:	Italy, Milano, BFI Elettronica SPA, Via Massena, 18	316716
For:	Japan, Tokyo, Kanematsu-Gosho Ltd., 2-5 Takaracho, 2-Chome, Chuo-Ku	03-562-8111
For:	Puerto Rico, Santurce, Info-Teknica, Inc., Box 6823	809-722-4339

INFORMATION TRANSFER INDUSTRIAL, INC., Box 357, Holcomb, N.Y., 14469, Tel: 315-657-7074; Empl.: 10

For info on price: J. E. Wiseman; Application info: M. P. Tubinis; Customer service: J. E. Wiseman; Delivery info: J. E. Wiseman

Free literature available: Bulletin OLR-001 Magnetic Latching Relays; Bulletin 7100 Scanners and AccessorieS.

Products manufactured: Data Acquisition & Reduction Systems, Data Loggers, Filters, Relays, Scanners, Switches

Local Sales Offices & Reps.

Conn	Madison, A & M Elctrn. Reps.	203-245-1031
Md	Greenbelt, Riffe Assocs.	301-474-8600
Mass	Needham, A & M Elctrn. Reps.	617-444-8170
NJ	Ridgewood, Ballou Inc.	212-964-464
NY	Buffalo, R. F. Lamb Co.	716-874-4900
NY	Rochester, R. F. Lamb Co.	716-544-5580
NY	Schenectady, R. F. Lamb Co.	518-393-4844
NY	Syracuse, R. F. Lamb Co.	315-454-2469
Pa	Norristown, Glove Engrg. Co.	215-275-9875
Tex	Dallas, V. J. Sykes Assocs.	214-243-2221
EXP:	NY, Schenectady, EMB Tech. Corp.	518-372-5841

Advertisment

- Multipole Latching Reed Relays
- Reed Switching Matrices
- Scanners With Controls
- Scanners for Computer Control
- Data Acquisition Systems
- True RMS Voltmeters & Ammeters
- Thermistor Temperature Indicators
- Thermocouple Data Systems
- LC & Quartz Crystal Filters
- Catalogs Available

INFRARED INDUSTRIES, INC., 62 Fourth Ave., Waltham, Mass., 02154, Tel: 617-890-5400, TWX: 710-324-1199

Customer service: J. W. Meehan

Free literature available: Optical Filter, Designers Guide and Catalog Interference Filters from the Ultraviolet to the Infrared are fully described with tips to the designer. Detector Specification Sheets, complete description of Silicon, Lead Sulfide, Lead Selenide, and Indium Antinonide Photodetectors.

Products manufactured: Cells, Photoconductive, Photoemissive, Photovoltaic, Detectors, Diodes, Light Choppers

Local Sales Offices & Reps.

Cal	Santa Barbara	805-684-4181

INGERSOLL PRODS., Div. Borg-Warner Corp., 1000 W. 120th St., Chicago, Ill., 60643, Tel: 312-264-7800, TWX: 910-221-5081; Empl.: 750; Minimum order: $15
p. 1•72,73

Customer service: EmCor Sales

Products manufactured: Cabinets & Accessories, Cases, Equipment, Instrument, Meter, Drawers, Sliding, Frames, Cabinet & Rack, Panels, Racks, Slides, Cabinet & Chassis

Local Sales Offices & Reps.

Ala	Huntsville, W.A. Brown Instrs.	205-539-4411
Cal	Cupertino, T. Louis Snitzer Co.	408-257-8333
Cal	Del Mar, T. Louis Snitzer Co.	714-454-2191
Cal	Los Angeles, T. Louis Snitzer Co.	213-836-6170
Colo	Denver, Rope & Williamson	303-758-8507

Conn	Bridgeport, Tech. Instrs.	203-368-4582
Fla	Fort Lauderdale, W.A. Brown Instrs.	305-776-4800
Fla	Fort Walton Beach, W. A. Brown Instrs.	904-243-6424
Fla	Indialantic, W. A. Brown Instrs.	305-723-0766
Fla	Orlando, W.A. Brown Instrs.	305-425-5505
Ga	Atlanta, W.A. Brown Instrs.	404-939-1674
Ill	Des Plaines, Marsland Assocs.	312-775-1309
Ind	Indianapolis, Marsland Assocs.	317-924-3568
La	Gretna, W.A. Brown Instrs.	504-366-5766
Mass	Wilmington, Technical Instrs.	617-944-3930
Mich	Detroit, Comtel-Sterling Co.	313-255-1970
Minn	Minneapolis, Marsland Assocs.	612-545-4481
Mo	Kansas City, Harris-Hanson Co.	816-444-9494
Mo	St. Louis, Harris-Hanson Co.	314-432-3611
NJ	Fort Lee, K.E. Hughes Co.	201-944-1600
NJ	Haddonfield, Dyna Rep. Co.	215-627-2212
NY	Albany, Reagan Compar Albany Co.	518-489-4777
NY	Endwell, Reagan Compar Albany Co.	607-723-9661
NY	Fairport, Reagan Compar Albany Co.	716-721-2230
NY	New Hartford, Reagan Compar Albany Co.	315-732-3775
NY	New York, K. E. Hughes Co.	212-695-0082
NC	Research Triangle Park, W.A. Brown Instrs.	919-489-1546
Ohio	Cleveland, Comtel-Sterling Co.	216-442-8080
Ohio	Dayton, Comtel-Sterling Co.	513-298-7573
Ore	Beaverton, N.R. Schultz	503-643-1644
Pa	Pittsburgh, Comtel-Sterling Co.	412-922-5720
Tenn	Knoxville, W. A. Brown Instrs.	615-584-2614
Tex	Dallas, J.A. Green Co.	214-631-7450
Tex	Houston, J.A. Green Co.	713-526-2959
Va	Alexandria, Dyna Rep. Co.	703-354-1222
Va	Newport News, Dyna Rep. Co.	804-874-7729
Wash	Bellevue, N.R. Schultz Co.	206-454-0300
FOR:	Can., Downsview, Ont., Tracan Elctrns.	416-628-0052
FOR:	Can., Montreal, Que., Tracan Elctrns.	514-341-4163
FOR:	Can., Ottawa, Ont., Tracan Elctrns.	613-820-0269
FOR:	Can., West Vancouver, B.C., Tracan Electronics Western	604-926-3411

INGRAHAM DIV., McGraw Edison Co., 210 Redstone Hill Rd., Bristol, Conn., 06010, Tel: 203-582-6321, TWX: 710-454-1024; Empl.: 250

Customer service: W. A. Hinman

Products manufactured: Motors, Solenoids, Timers

INLAND ELCTRN. PRODS. CORP., 35 E. Glenarm, Pasadena, Cal., 91105, Tel: 213-682-1521; FSC No: 14953; Empl.: 10; Minimum order: $25

For info on price: A. Raines; Application info: William August; Customer service: A. Raines; Delivery info: D. Umland

Free literature available: Bulletin 201B - TR Series Transistor Radiators

Products manufactured: Transistor, Diode, Thyristor Heat Dissipators

INLAND MFG. CO., 1108 Jackson St., Omaha, Neb., 68102, Tel: 402-342-1108; Empl.: 175

Customer service: T. R. Gomez

Free literature available: 24-page brochure describing Inland Glass Bead cleaning systems for removing solder from transistors, etc.

Products manufactured: Cabinets & Accessories, Machines/Machinery, Production

INLAND MOTOR DIV. KOLLMORGAN, 501 First St., Rockford, Va., 24141, Tel: 703-639-3973, TWX: 710-875-3740; FSC No: 11384; Empl.: 472; Minimum order: $25 .... p. 1•966-969

For info on price: B. Webb; Application info: C. Hayes; Customer service: J. Davis; Delivery info: J. Davis

Products manufactured: Actuators, Amplifiers, Controls/Control Eqpt., Motor Electric Generator Sets, Motors, Tachometers

Local Sales Offices & Reps.

Ariz	Phoenix, Thorson Co.	602-956-0800
Cal	Los Angeles, Thorson Co.	213-937-0790
Cal	Palo Alto, Thorson Co.	415-321-2414
Cal	San Diego, Thorson Co.	714-298-8385
Cal	Tustin, Thorson Co.	714-544-5121
Colo	Denver, Thorson Co.	303-355-3521
Conn	Guilford, R H Whitehead Jr. Assoc.	203-453-3762
Fla	Ormond Beach, Technology Mktg. Assoc.	904-672-2314
Ill	Chicago, Carlson Elctrn. Sls.	312-774-4812
Md	Silver Spring, Rep-Tron	301-593-4844
Mass	Boston, R H Whitehead Jr. Assoc.	617-542-7676
Mich	Bloomfield Hills, Roth Industrial Sls.	313-626-3171
Minn	Hopkins, Fred Peterson Co.	612-941-5400
Mo	St. Louis, Carlson Elctn. Sls.	314-991-0262
NJ	Haddonfield, Thomas Assocs. (TAI)	609-854-3011
NM	Albuquerque, Thorson Co.	505-265-5655
NY	New York, Bradley Assoc.	212-549-8500
NY	Penfield, A & D Devices	716-586-8033
NC	Winston-Salem, Burgin-Kreh Assoc.	919-768-4174
Ohio	Chagrin Falls, Jerry Kilroy Corp.	216-247-8997
Tex	Dallas, Thorson Co.	214-233-5744
Va	Lynchburg, Brugin-Kreh Assoc.	703-845-5600
Wash	Bellevue, Thorson Co.	206-455-9180

INNOVATION INDUSTRIES INC., 5012 S. Main St., Roswell, N.M., 88201, Tel: 505-622-4072; Empl.: 10; Minimum order: $25

For info on price: R. Primm; Application info: J. Copeland

Free literature available: Complete Catalog

Products manufactured: Alarms, Controls/Control Eqpt., Counters, Scanners

Local Sales Offices & Reps.

Cal	San Rafael, H. Wells Assocs.	415-454-5730
Cal	Santa Ana, H. Wells Assocs.	714-547-4455

INRECO, 8940 Ellis Ave., Los Angeles, Cal., 90034, Tel: 213-870-6664; Empl.: 30; Minimum order: $25

For info on price: H. S. Potter; Application info: H. S. Potter; Customer service: J. A. Wasson; Delivery info: J. A. Wasson

Free literature available: General catalog describing environmental simulation equipment including temperature, humidity, vibration & altitude chambers, along with temperature & humidity conditioning units.

Products manufactured: Chamber, Environmental Test, Refrigerators, Environmental Test

INSELEK, Dept. 6 University Park, 743 Alexander Rd., Princeton, N.J., 08540, Tel: 609-452-2222

INSTANT INSTRUMENTS INC., 306 River St., Haverhill, Mass., 01830, Tel: 617-373-9260; Empl.: 14; Minimum order: $25

For info on price: J. Bonfiglio; Application info: J. Bonfiglio; Customer service: N. Blye; Delivery info: N. Blye

Free literature available: Literature on low cost laboratory & modular regulated power supplies, keyboard, sloped & vertical panel enclosures, and instant breadboarding systems.

Products manufactured: Boards, Printed Circuit, Cabinets & Accessories, Cases, Equipment, Instrument, Meter, Chassis, Circuit Board Mounting, Chassis, Metal, Converters, Diodes, Display Devices/Displays, Kits, Breadboarding (For Engineers), Kits, Power Supply, Kits, Printed Circuit, Power Supplies

Local Sales Offices & Reps.

Cal	Pasadena, Advanced Techniques	213-681-1093
Mass	Andover, Mech-Tron Co.	617-475-3531
NJ	Hazlet, MerMon Elctrn. Instrumentation	201-264-1851
Pa	Hatboro, MerMon Elctrn. Instrumentation	215-672-5565
FOR:	Can., Toronto, Ont., Canadian Instr.	416-769-1512

Advertisment

INSTANT INSTRUMENTS INC.
manufactures:
INSTRUMENT CASES
• Keyboard, Sloped & Vertical panel
Low cost off-the-shelf brushed alum.
• MINI-LAB POWER SUPPLIES
Logic & Linear outputs, variable & preset from 50 to 1000 mA
• MODULAR POWER SUPPLIES
single & dual from 25 to 3000 mA
• INSTANT BREADBOARD new method to mount.

INSTRU-LEC CORP., 520 Homestead Ave., Mt. Vernon, N.Y., 10550, Tel: 914-668-3754; FSC No: 13782; Empl.: 45; Minimum order: $20

For info on price: R. Hobert; Application info: R. Hobert; Customer service: N. L. Eckles; Delivery info: N. L. Eckles

Free literature available: Gear and Differential Brochures illustrating the various types of precision instrument components manufactured on premises.

Products manufactured: Bushings, Glass, Plastic, Metal, Rubber, Etc., Couplings, Gears & Gear Mechanisms (Precision), Reducers

INSTRUMENTS COMPONENTS CO., 7239 Industrial Park Blvd., Montor, Ohio, 44060, Tel: 951-3030; Empl.: 15

Customer service: J. Wereb

Free literature available: Constant Current Power Supplies - Applications & Specifications.

Products manufactured: Controls/Control Eqpt., Converters, Power Supplies

INSTRUMENT RESEARCH CO., Box 231, Lincoln, Mass., 01773, Tel: 617-897-7647; Empl.: 6

Customer service: E. Withey

Products manufactured: Amplifiers, Generators, Modulators, All Kinds, Power Supplies

Local Sales Offices & Reps.

Cal	Los Angeles, Sodaro Co.	213-876-6001
Colo	Evergreen, Fahnestock Assoc.	303-674-5255
NM	Albuquerque, Mountaintek	505-268-0003
EXP:	Fla., Hallandale, EMEC	305-925-6366

INSTRUMENT SPECIALTIES, 276 Bergen Blvd., Little Falls, N.J., 07424, Tel: 201-256-3500, TWX: 710-988-5732; Empl.: 170 .... p. 2•1226,1229

Free literature available: Catalog 14C Precision Springs, RF1-EM1 Shielding, Contact Strips and Rings, All From Beryllium Copper.

Products manufactured: Contact Strips, Finger, Contacts, Electrical, Gaskets, Shielding, R-F-Also See Shields, R-F, Shields, Springs (All Types)

Local Sales Offices & Reps.

Ariz	Phoenix, O'Donnel Assoc.	602-993-9740
Cal	Palo Alto, O'Donnell Assocs.	415-327-9260
Cal	Torrance, O'Donnell Assocs.	213-323-9243
Ill	Arlington Heights, Instrument Specialties Co.	312-392-0292
NC	Charlotte, McLean Sls. Co.	704-366-2675
Ohio	Cincinnati, J.G. McLaughlin & Assoc.	513-561-2285
Tex	Irving, Lee Sls. Co.	214-363-3831

INSTR. & CONTROL SYS., INC., 129 W. Laura, Addison, Ill., 60101, Tel: 312-543-6200; Empl.: 35

Customer service: H. Washington

Free literature available: Sheets on all Industrial Control Components and Electro-Pac UPS Systems and Inverters.

Products manufactured: Controls/Control Eqpt., Current Sensors, Electroplating Equipment & Supplies, Inverters, Motors, Power Supplies, Process Control Systems, Relays, Timers

Local Sales Offices & Reps.

Cal	Sunnyvale, RDP Instrs.	408-735-9040
Cal	Woodland Hills, Cummings & Co.	213-340-6035
Fla	Orlando, McKay, Smith & Assoc.	305-277-1513
Fla	Satellite Beach, Reynolds & Assoc.	305-773-4700
Ill	Lombard, Quadtron Assoc.	312-627-6800
Ill	Northfield, Sam Tallaksen Co.	312-441-6644
Ind	Indianapolis, Garstang Engrg. Co.	317-632-9903
Ind	Indianapolis, J. Mahaney	317-925-2090
Md	Rockville, Marktron, Inc.	301-762-6210
Mass	Needham Heights, Geo. Danek & Co.	617-444-8838
Mich	Saginaw, R. Von Berg	517-799-0873
Mich	Southfield, Static Controls	313-358-1460
Minn	Minneapolis, HMR	612-920-8200
Mo	Kansas City, Harris-Hanson Co.	816-HI4-9494
Mo	St. Louis, Harris-Hanson Co.	314-432-3611
NJ	East Orange, Friedman & Assoc.	201-673-2500
NJ	Old Bridge, Ross Co.	212-824-5424
NY	Utica, KLM Assoc.	315-735-8525
NC	Charlotte, McKay, Smith & Assoc.	704-527-0240
Ohio	Chagun Falls, Pine Sls. & Engrg.	216-247-6198
Tex	Dallas, G. Weinreigh & Assoc.	214-321-2800
Tex	Dallas, Glidden Electro Equip. Co.	214-363-6539
Tex	Houston, Glidden Electro Equip. Co.	713-681-1415
Utah	Salt Lake City, Stuart & Co.	801-466-8603
Va	Charlottesville, Marktron, Inc.	804-973-5874

INSTRUMENTATION ENGRG., 769A Susquehanna Ave., Franklin Lakes, N.J., 07417, Tel: 201-891-9300; Empl.: 197

For info on price: J. Gregory; Application info: T. Aufieri; Customer service: F. Borkowski; Delivery info: J. Gregory

Free literature available: The SYSTEM 390 Computerized Test Systems Catalog describes performance capabilities of delivered configurations satisfying analog/digital/hybrid requirements in production, service repair, and refurbishment environments.

Products manufactured: Test Systems, Testers

Local Sales Offices & Reps.

Cal	El Segundo, Instrumentation Engrg.	213-973-6611
Ill	Chicago, Solid State Elctrns. of Ill.	312-889-8033
Mass	Waltham, McBar Assocs.	617-890-0233
NJ	Palisades Park, Scientific Devices - East	201-871-3916
NY	Rochester, Ossman Instrs.	716-328-2230
NC	Charlotte, J. L. Highsmith Co.	704-333-7743
Pa	Glenside, ARA Elctrns.	215-887-5250
Tex	Arlington, CTR, Inc.	817-277-6001
Va	Springfield, Instrumentation Engrg.	703-451-1422

INSTRUMENTATION TECH. CORP., 18811 Napa St., Northridge, Cal., 91324, Tel: 213-886-2034; FSC No: 34090; Empl.: 30

For info on price: J. Ahlstron; Application info: J. Ahlstrn; Customer service: J. Ahlstron; Delivery info: D. Benson

Products manufactured: Calibrators, Comm. Systems, Comparators, Computers, Controls/Control Eqpt., Converters, Data Acquisition & Reduction Systems, Data Loggers, Generators, Multiplexers, Simulators, Terminal Equipment, Digital, Verification Systems, Tape

INSTRUMENTS FOR INDUSTRY, INC., 151 Toledo St., Farmingdale, N.Y., 11735, Tel: 516-694-1414; Empl.: 25 .... p. 1•734,735

Products manufactured: Amplifiers, Antennas, Generators, Meters

Local Sales Offices & Reps.

Cal	Yorbalinda, Del Black Assocs.	714-524-0141
Colo	Evergreen, Mountaintek, Inc.	303-674-5255
Kans	Shawnee Mission, EIR Co.	913-362-0919
Mich	Detroit, Harvey Teplitz & Co.	313-537-9058
Mo	Leasburg, EIR Co.	314-245-6477
NJ	No. Plainfield, Brady Co.	201-753-7988
NM	Albuquerque, Mountaintek Inc.	505-268-0003
NY	Guilderland, Electro Modular Sys.	518-456-2665
Ohio	Cleveland, Harvey Teplitz & Co.	216-371-2044
Ohio	Dayton, Harvey Teplitz & Co.	513-277-6531
EXP:	Hollandale, Fla., Emec Inc.	305-925-6366
FOR:	Can., Mississauga, Ont., D.R. Beattie Ltd.	416-274-3000
FOR:	Can., Port Credit, Ont., D.R. Beattie Ltd.	416-278-7401
FOR:	Can., St. Eustache, Que., D.R. Beattie Ltd.	514-473-5744

INSTRUMENTS, INC., 3432 Midway Dr., San Diego, Cal., 92110, Tel: 714-223-7156; Empl.: 22

Customer service: D. C. Kalbfell

Products manufactured: Amplifiers

Local Sales Offices & Reps.

Wash	Seattle, Datacom Assocs.	206-285-2525

INTECH, INC., 1220 Coleman Ave., Santa Clara, Cal., 95050, Tel: 408-244-0500, TWX: 910-338-0254; FSC No: 33967; Empl.: 165

For info on price: M. Schall; Application info: R. L. Burkett; Customer service: M. Schall; Delivery info: M. Schall

Free literature available: Short Form Catalog (Modular Products) or individual data sheets Individual data sheets (Communications products)

Products manufactured: Amplifiers, Cards, Linear Function, Comm. Systems, Commutators, Converters, Integrated Circuit Devices, Modules, Logic, Encapsulated

Local Sales Offices & Reps.

Ariz	Scottsdale, Barnhill Five, Inc.	602-947-7841
06/		
Fla	Clearwater, Brennan Assocs	813-446-5006
Ill	Elk Grove Village, L.F. Green & Assocs.	312-593-0282
Ind	Indianapolis, L.F. Green & Assocs.	317-293-9827
Md	Fulton, Gans-Fryling, Inc.	301-953-3724
Mass	Peabody, Intech Inc.	617-535-3058
Mich	Detroit, WKM Assocs.	313-892-2500
Minn	Minneapolis, L.F. Green & Assocs.	612-781-1611
Mo	St. Louis, Beneke & McCaul	314-567-3399
NJ	Clifton, Compar N.Y.	201-546-3660
Ohio	Dayton, WKM Assocs.	513-434-7500
Tex	Houston, Semiconductor Sls. Assocs.	713-461-4197
Tex	Richardson, Semiconductor Sls. Assocs.	214-231-6181
Va	Arlington, Gans-Fryling, Inc.	703-527-3262
Wash	Bellevue, NEMCO	206-747-6863
EXP:	New York, N.Y., Multiparts Corp.	212-944-4370

INTEGRATED CIRCUITS, INC., 13256 Northrup Way, Bellevue, Wash., 98005, Tel: 206-747-8556, TWX: 910-443-2302; Empl.: 45 .... p. 1•891,1236

Customer service: G. H. Kestner

Free literature available: Hybrid Capabilities Brochure - describing facilities, equipment and general specifications. Product Data Sheets on DC-DC Converters. Product Data Sheets on Filters.

Products manufactured: Amplifiers, Circuits, Hybrid, Thick Film, Converters, Filters, Hybrid Voltage Regulators, Power Supplies, Signal Conditioners & Equipment

Local Sales Offices & Reps.

Ala	Huntsville, Technical Sls.	205-881-1750
Cal	El Toro, Electronic Component Mktg.	714-830-3939
Cal	Menlo Park, Straube Assocs.	415-323-2476
Cal	San Diego, Electronic Component Mktg.	714-295-6122
Cal	San Diego, Tech-Ser Inc.	714-222-1121
Cal	Woodland Hills, Electronic Component Mktg.	213-340-1745
Colo	Denver, Straube Assocs./Mtn. States	303-426-0890
Ind	Fort Wayne, W. W. Bieberich	219-432-2537
Mich	Detroit, R.P. Urban & Assocs.	313-535-2355
Mich	Grand Rapids, R.P. Urban & Assocs.	616-245-0511
NM	Albuquerque, Straube Assoc./Mtn. States	505-294-1880
Pa	King of Prussia, Shibley Assocs.	215-688-4021
Utah	Salt Lake City, Straube Assoc./Mtn. States	801-328-4513
Va	Fairfax, Shibley Assocs.	703-591-3008
Wash	Seattle, Integrated Circuits	206-747-8556

Advertisment

CUSTOM HYBRID MICROCIRCUITS Broad capability in military and commercial application. Specialists in custom design services and rapid response to customer needs.
DC-DC CONVERTERS High efficiency, low cost converters with input voltages in the range of 5V to 50V and any output voltages from 5V to 21 V. Standard models available.
ACTIVE FILTERS Total capability in custom and standard hybrid filters.

INTERGRATED MICROSYSTEMS INC., 1215 Terra Bella Ave., Mountain View, Cal., 94043, Tel: 415-965-3900; Empl.: 75

For info on price: A. Nusbaum; Application info: A. Nusbaum; Customer service: J. Laurence

Products manufactured: Cards, Linear Function, Cards, Logic, Circuits, Hybrid, Thick Film, Filters, Integrated Circuit Devices, IC's, Active Filters, Resistors

Local Sales Offices & Reps.

Ariz	Phoenix, Bestronics	602-248-7020
Cal	Los Angeles, Black, Ekizian, Strong Inc.	213-870-9191
Cal	Mountain View, Melchoir/Wesley Assoc.	415-964-2321
Cal	San Diego, Bestronics	714-278-2150
Ill	Park Ridge, R.F. Specialists	312-698-2044
Ind	Indianapolis, R.F. Specialists	
Mass	Billerica, Matrix Sls.	617-667-9268
Mich	Birmingham, J.C. Hofstetter Co.	313-643-7203
Mich	Grand Rapids, J.C. Hofstetter Co.	616-942-0650
Minn	Minneapolis, Elctrn. Innovators, Inc.	612-884-7471
NY	Camillus, ONTEC	315-488-2203
NY	Fayetteville, ONTEC	315-446-2580
NY	Grand Island, ONTEC	716-773-9319
NY	Northport, F. F. Marin Co.	516-261-5585
NY	Rochester, ONTEC	716-464-8636
Ohio	Dayton, J.C. Hofstetter Co.	513-296-1010
Ohio	Medina, J.C. Hofstetter Co.	216-241-4880
Tex	Houston, Semiconductor Sls. Assoc.	713-461-4197
Tex	Richardson, Semiconductor Sls. Assoc.	214-231-6181
Wash	Tukwila, General Elctrns. Inc.	206-243-5141

INTEGRATED PHOTOMATRIX, 1101 Bristol Rd., Mountainside, N.J., 07092, Tel: 201-233-7200; Empl.: 60

Products manufactured: Cameras, Cells, Photoconductive, Photoemissive, Photovoltaic, Circuits, Hybrid, Thick Film, Diodes, Integrated Circuit Devices, Switches

Local Sales Offices & Reps.

Cal	Pasadena, A F Sales Engrg.	213-681-5631
Cal	San Diego, Tauber & Assocs.	714-274-7242
Cal	Sunnyvale, Dynetics International	408-257-7778
Ill	Hinsdale, Hill-Gray Assocs.	312-325-4810
Mass	Amesbury, ATM World Trade	603-394-7874
Minn	Minneapolis, International Sls. Co.	612-831-8423
Mo	Kansas City, R. R. Burton Sls. Co.	816-471-2850
NH	So. Hampton, ATM World Trade	603-394-7874
NY	New York City, ATM World Trade	212-687-5244
Ohio	Cleveland, Ad-El-Tek	216-252-0488
Ohio	Englewood, Ad-El-Tek	513-836-2741
Tex	Plano, Whitson Engrg. Co.	214-423-5255
Wash	Seattle, J. B. Jolly Co.	206-938-4166

INTEL CORP., 3065 Bowers Ave., Santa Clara, Cal., 95051, Tel: 408-246-7501, TWX: 910-338-0026; Empl.: 2000

Products manufactured: Computers, Integrated Circuit Devices, Memory Systems

Local Sales Offices & Reps.

Cal	Irvine, Intel Corp.	714-838-1126
Mass	Lexington, Intel Corp.	617-861-1136
Minn	Bloomington, Intel Corp.	612-835-6722
Pa	Bala Cynwyd, Intel Corp.	215-664-6636

INTER-COMPUTER ELECTRONICS,, Div. American Electronics Laboratories, Inc., Box 507, Lansdale, Pa., 19446, Tel: 215-855-0922, TWX: 510-661-4976; Empl.: 1228; Minimum order: $25 .... p. 1•172,173

Customer service: H. W. Anderson

Free literature available: Literature covering A/D converters, D/A converters, Sample and Hold modules and Pulse and Transient Recorders.

Products manufactured: Amplifiers, Analyzers, Converters, Data Acquisition & Reduction Systems, Data Loggers, Decoders, Encoders, Generators, Multiplexers, Process Control Systems, Recorders

Local Sales Offices & Reps.

Ariz	Phoenix, Shefler-Kahn Co.	602-258-7893
Cal	Mountain View, IFM	415-961-2828
Cal	San Pedro, IFM	213-547-0829
Colo	Denver, Shefler-Kahn Co.	303-831-9087
Fla	Satellite Beach, Reynolds & Assocs.	305-773-4700
Mass	Burlington, Scientific Sys. Sls. Corp.	617-273-1660
Mich	Detroit, Comtel-Sterling Co.	313-255-1970
Minn	Minneapolis, SEA, Inc.	612-425-4455
Mo	St. Louis, Kemco, Inc.	
NM	Albuquerque, Shefler-Kahn Co.	505-265-7077
NY	Syosett, Scientific Sys. Sls. Corp.	516-921-3737
Ohio	Cleveland, Comtel-Sterling Co.	216-442-8080
Ohio	Dayton, Comtel-Sterling Co.	513-298-7573
Pa	Pittsburgh, Comtel-Sterling Co.	412-922-5720
Tex	Houston, Kemco Inc.	713-467-1061
Tex	Irving, Kemco Inc.	214-255-0537
Wash	Seattle, R. S. Drake Assocs.	206-RO 3-2755
Wisc	Waukesha, SEA, Inc.	414-547-6637
FOR:	Can., Ottawa, Ont., Louis Albert Assoc., Inc.	610-562-8918

INTER-MARKET, INC., 1946 Lehigh Ave., Glenview, Ill., 60025, Tel: 312-729-5330, TWX: 910-651-1997; Empl.: 10; Minimum order: $15 .... p. 2•1173

For info on price: R. M. Scott; Application info: K. Freed; Customer service: R. M. Scott; Delivery info: R. M. Scott

Free literature available: Subminiature miniature, bi-pin/neon/green neon lamps; indicator lights - incandescent and neon; Thumbwheel switches; lighted displays; industrial C.C.T.V.

Products manufactured: Display Devices/Displays, Lamps, Lights, Sockets, Switches, Television Systems & Equipment Closed-Circuit

Local Sales Offices & Reps.

Ariz	Phoenix, Spectrum Assoc.	602-997-6324
Cal	San Carlos, Kottmeir Assoc.	415-592-8333
Cal	Santa Ana, Spectrum Assoc.	714-835-4114
Conn	Berlin, White Sls.	203-224-0423
Ill	Downers Grove, Richmar Elctrns	312-968-0118
Md	Glen Wood, Naudain Assoc.	301-442-2270
Mass	Needham, White Sls.	617-444-3676
Mich	Birmingham, J.C. Hofstetter Co.	313-643-7203
Mich	Grand Rapids, J.C. Hofstetter Co.	616-942-0650
Minn	St. Paul, Kenco Co.	612-645-7717
NJ	Harrington Pk., Metro Tech. Sls.	201-768-8495
NJ	Mt. Laurel, Naudain Assoc.	609-235-1801
NY	Jericho, Metro Tech. Sls.	516-935-3330
Ohio	Dayton, J.C. Hofstetter Co.	513-296-1010
Ohio	Medina, J.C. Hofstetter Co.	216-725-4477
Tex	Dallas, Erickson-Ulter Sls	214-243-6611
Wash	Seattle, C.K. Shanks & Assoc.	206-632-4290
Wisc	Oak Creek, Richmar Elctrns.	414-475-0141
FOR:	Can., Montreal, Que., Braydon Electro Ltd.	514-341-3330

INTER-TECH. GRP., INC., Box 23, Irvington-on-Hudson, N.Y., 10533, Tel: 914-LY 1-8822, TWX: 710-564-0802; Empl.: 8 p. 1•19,2356,2357; p. 2•1230

Products manufactured: Alloys, Bi-Metals, Thermostatic, Capacitors, Fixed, Cores, Magnetic, Foil, Heads, Recording Playback, Erase, Laminations, Shields, Tubes

Local Sales Offices & Reps.

Ariz	Phoenix, Palmer Assoc.	602-996-9077
Cal	San Carlos, Winco Sls.	415-365-6082
Cal	San Gabriel, R. G. Moye	213-283-1669
Colo	Denver, Palmer Assocs.	303-255-9961
Fla	Maitland, H. Sarkis	305-647-3671
Fla	Melbourne, Repcom	305-254-1877
Ill	Chicago, J. Golton Co.	312-725-7870
Md	Timonium, Heller	301-252-4780
Mass	Newton, Normell Assocs.	617-969-5478
Minn	Minneapolis, Int'l. Sls.	612-831-8423
NY	Lynbrook, H.B. Heft	516-LY 9-3351
NY	Syracuse, Naylor Elec.	315-GR 2-9183
Ohio	Dayton, BEK Assocs., Inc.	513-278-1343
Pa	Ardmore, Freedman Assoc.	215-649-3679
Tex	Dallas, J. Clay Co.	214-350-1281
Wash	Seattle, H. Levinson	206-323-5100

INTERDATA, 2 Crescent Pl., Oceanport, N.J., 07757, Tel: 201-229-4040, TWX: 710-722-65312; Empl.: 1100

For info on price: D. Von Donop; Application info: J. Gould; Customer service: J. Rechner; Delivery info: D. Von Donop

Products manufactured: Comm. Systems, Computers, Recorders

Local Sales Offices & Reps.

Ariz	Phoenix	602-968-2477
Cal	Los Angeles	213-640-0451
Cal	San Diego	714-565-0602
Cal	San Francisco	415-969-1180
Colo	Denver	303-758-0474
DC	Washington	703-525-4806
Fla	Orlando	305-851-6962
Ill	Chicago	312-437-5120
Mass	Boston	617-890-0557
Mich	Detroit	313-356-5515
Mo	Kansas City, 913-384-1606	
Ohio	Dayton	513-434-4193
Pa	Philadelphia	215-436-5579
Tex	Dallas	214-238-9656
Tex	Houston	713-783-3060
Wash	Bellevue	206-455-0680
Wash	Seattle	206-455-0680
FOR:	Can., Toronto	416-677-8990

INTERDESIGN INC., 1255 Reamwood Ave., Sunnyvale, Cal., 94086, Tel: 408-734-8666, TWX: 910-339-9374; Empl.: 50; Minimum order: $10

Customer service: G. Kurtz

Free literature available: Monochip Brochure; Technical Monochip Journal-quarterly (1 through 6); Pulse Generator Brochure-Model 1101; Thermocouple amplifier Data Sheet-Model 1201.

Products manufactured: Amplifiers, Circuits, Integrated, Silicon Monolithic, Unpackaged Chips, Generators, Indicators, Integrated Circuit Devices

INTERDYNE

INTERDYNE, Intercette Div., 14761 Califa St., Van Nuys, Cal., 91401, Tel: 213-787-6800, TWX: 910-495-1754; FSC No: 31598; Empl.: 80; Minimum order: $25

For info on price: W. Geist; Application info: R. Lewis

Free literature available: Digital Cassette Tape Drives, D.C. servo capstan drive system, ANSY ECMA compatible with cast frame. Interfaced cassette systems with RS 232 and machine interfaces, 1,2, or 3 drives.

Products manufactured: Boards, Plug-In, Boards, Printed Circuit, Cable, Connectors

Local Sales Offices & Reps.

Ariz	Phoenix, Vari-Tron Sls.	602-997-0774
Cal	La Jolla, REP Sls.	714-454-1500
Cal	Los Altos, Parsons & Meister	415-941-4745
Colo	Boulder, Component Prod. Sls.	303-444-2730
Ill	Chicago, J.C. Angel & Co.	312-878-0653
Ind	Ft. Wayne, Temple Engrg.	219-743-0362
Md	Baltimore, B. White & Assocs.	301-484-5400
Mass	Stoneham, REPCO	617-438-3113
Minn	Minneapolis, Stoss Assocs.	612-925-2757
NJ	Wayne, K & J Assocs.	201-694-3334
NY	E. Setauket, K & J Assocs.	516-751-8686
NY	Rochester, R.P. Kennedy Co.	716-271-6322
Ohio	Wickliffe, W.J. Brauer	216-943-0601
Pa	King of Prussia, Monteiro Assocs.	215-265-0634
Tex	Richardson, P.J. Scanlon Co.	214-231-4661
Wash	Bellevue, Ruggles Tech. Sls.	206-455-2778

INTERELECTRONICS CORP., 550 U.S. Rte. 303, Congers, N.Y., 10920, Tel: 914-EL8-8000 p. 1•1237

Products manufactured: Capacitors, Fixed, Capacitors, Variable, Converters, Cords, Intensifiers, Image, Inverters, Power Supplies, Thermistors

INTERFACE, INC., 7401 Butherus Dr., Scottsdale, Ariz., 85260, Tel: 602-948-5555; FSC No: 32311; Empl.: 35; Minimum order: $50

For info on price: T. Johnson; Application info: T. Johnson; Customer service: B. P. Moran; Delivery info: B. P. Moran

Free literature available: Catalog 300-A offers concise Models & specification chart & price list. Data sheets for Low Range Minibeam & Sealed Super-Mini give same for new products. Ranges from 5 lbs to 200,000 lbs are included in the literature describing Interface load cells.

Products manufactured: Cells, Load, Transducers

Local Sales Offices & Reps.

Ala	Huntsville, Col-Ins-Co.	205-539-1771
Ariz	Scottsdale, Electronic Entprs.	602-946-9860
Cal	Long Beach, Saber Ent.	213-595-5646
Cal	Mountain View, Gado Instr. Sls.	415-933-5566
Conn	Hamden, Northeast Engrg.	203-248-4481
Fla	Largo, Col-Ins-Co.	813-343-0978
Fla	Orlando, Col-Ins-Co.	305-423-7615
Ga	Clarkston, Col-Ins-Co.	404-934-7280
Ill	Des Plaines, Marsland Assoc.	312-298-2620
Ind	Indianapolis, Marsland Assoc.	317-924-3568
Md	Randlestown, Beacon North	703-534-1868
Mass	Danvers, Northeast Engrg.	617-774-3010
Mich	Farmington, Anderson Electrns.	313-476-9161
Minn	Minneapolis, Marsland Assoc.	612-545-4481
Mo	Florissant, Marsland Assoc.	314-278-6949
NM	Albuquerque, Electronic Entprs.	505-256-3561
NY	Elbridge, L-Tron	315-689-3787
NY	Manhasset, Northeast Engineer	516-365-9633
NC	Raleigh, Col-Ins-Co.	919-834-6591
Ohio	Cleveland, Instrumentation Systems	216-486-0782
Ohio	Dayton, Instrumentation Systems	513-294-2838
Ore	Portland, McLaren	503-297-2248
Pa	Jenkintown, PDC Corp.	215-887-9610
Pa	Pittsburgh, Instrumentation Syst.	412-243-1111
Tex	Fort Worth, Carey Wolf & Assoc.	817-738-1996
Tex	Houston, Carey Wolf & Assoc.	713-721-2442
Va	Falls Church, Beacon North	703-534-1868
Wash	Bellevue, McLaren	206-454-3400

INTERFACE ENGINEERING INC., 386 Lindelof Ave., Stoughton, Mass., 02072, Tel: 617-344-7383; FSC No: 14352; Empl.: 18 p. 1•174,175

For info on price: T. Scanlon; Application info: T. Scanlon; Customer service: J. Judd; Delivery info: J. Judd

Free literature available: "Angle Translators"-Summary of digital and analog angle translation modules and their key performance characteristics. The modules encompass all functions required in the developement of medium to high performance control systems.

Products manufactured: Alarms, Amplifiers, Bridges, Comm. Systems, Comparators, Computers, Controls/Control Eqpt., Converters, Data Acquisition & Reduction Systems, Decommutators, Telemetering, Indicators, Monitors, Multiplexers, Signal Conditioners & Equipment, Simulators, Synchro Transmitters, Solid-State, Testers

Local Sales Offices & Reps.

Ariz	Phoenix, RDX Corp.
Cal	Pasadena, RDX Corp.
Cal	San Diego, RDX Corp.
Cal	Sunnyvale, RDX Corp.
Va	Arlington, Gans-Fryling

Advertisment

INTERFACE ENGINEERING manufactures analog, synchro, and digital code converters, analog and digital function generators, digital-angle operators, coordinate converters, digital couplers, and accessory power supplies and displays for the measurement, control, simulation, and display of shaft position.

INTERFACE TECHNOLOGY INC., 10500 Kahlmeyer Dr., St. Louis, Mo., 63132, Tel: 314-426-6880; Empl.: 30; Minimum order: $75

For info on price: M. E. Smith; Application info: M. E. Smith; Customer service: K. Zienta; Delivery info: K. Zienta

Free literature available: Touch-Tone User's Guide. This small booklet describes the touch-tone transmission technique and the terminal products available from Interface Technology, Inc. to support this growing application area.

Products manufactured: Display Devices/Displays, Encoders, Keyers, Tone, Keyboards, Alphanumeric & Decimal, Terminals, Data Display (including Alphanumeric & Graphic), Typewriters, Input-Output (All Types)

Local Sales Offices & Reps.

NY	Great Neck, H. J. Krasner & Assocs.	516-487-0690
Ohio	Akron, System Mktg. Corp.	216-666-5411

INTERLOK, 770 Airport Blvd., Burlingame, Cal., 94010, Tel: 415-347-7701; Empl.: 30; Minimum order: $50 p. 1•74-77; p. 2•1084-1086

For info on price: R. Vorce 348-5625; Application info: R. Vorce 348-5625; Customer service: A. Fluter 347-7701; Delivery info: R. Vorce 348-5625

Free literature available: Short From Product Catalog Model 12 Card Frame Model 15 Card Frams Model 30 Enclosures Model 34 Consoles Model 36 Enclosures Model 1500 Cabinets Model 1520 Cabinets The Collet Knob Catalog

Products manufactured: Cabinets & Accessories, Cases, Equipment, Instrument, Meter, Chassis, Circuit Board Mounting, Knobs, Racks

Local Sales Offices & Reps.

Ariz	Phoenix, Bestronics	602-248-7020
Ark	Little Rock, J.Y. Schoonmaker Co.	501-375-2168
Cal	Burlingame, W.J. Purdy Co.	415-347-7701
Cal	Los Angeles, Black, Ekizan, Strong, Inc.	213-870-9191
Cal	San Diego, Bestronics	714-278-2150
Colo	Denver, W.J. Purdy Co.	303-777-1411
Conn	Meriden, P.R. Sturgeon Co.	203-237-1112
Ill	Hinsdale, Hill-Gray Assoc.	312-325-4810
Ind	Indiaanapolis, Sukup & Cox	317-253-5501
Mass	Babson Park, P.R. Sturgeon Co.	617-237-3506
Mich	Ferndale, Hilltronics, Inc.	313-398-5556
Minn	Minneapolis, HMR	612-920-8200
NJ	Bergenfield, Harold Gray Assocs.	201-384-3643
NM	Albuquerque, W.J. Purdy Co.	505-266-7959
NY	Syracuse, Mar-Com Assocs.	315-437-2843
Okla	Tulsa, J.Y. Schoonmaker Co.	918-936-1423
Pa	Enon Valley, Nebco Assoc.	216-457-2333
Pa	Havertown, Liberi Sls.	215-789-8150
Tex	Dallas, J.Y. Schoonmaker Co.	214-357-8481
Tex	Houston, J.Y. Schoonmaker Co.	713-926-9510
FOR:	Can., Willowdale, Ont., A.C. Simmonds & Sons	416-491-1010

INTERMATIC, INC., Intermatic Plaza, Spring Grove, Ill., 60081, Tel: 815-675-2321, Telex: 25-265; Empl.: 700; Minimum order: $50

For info on price: J. Sechrist; Application info: J. Sechrist; Customer service: A. Dunn; Delivery info: A. Dunn

Products manufactured: Cells, Photoconductive, Photoemissive, Photovoltaic, Timers

Local Sales Offices & Reps.

Ariz	Phoenix, T. Geis & Assocs.	602-252-7694
Cal	Los Angeles, Intermatic, Inc.	213-627-1506
Cal	San Francisco, Keeler, White Co.	415-431-2900
Colo	Denver, E.O. Sales	303-744-7081
Fla	Coral Gables, J.H. Akerman	305-667-3864
Ga	Atlanta, C. Powell, Inc.	404-875-0755
Haw	Honolulu, H.H. Sawyer Co.	808-847-1411
Ind	Indianapolis, C.K. Warble Assocs.	317-632-1465
Iowa	Cedar Rapids, A. Sell & Assocs.	319-393-4225
Kans	Shawnee Mission, Stover & Assocs.	913-649-6600
Ky	Covington, Hackman Electrical Sls.	606-291-3800
La	New Orleans, W. Case & Assocs.	504-835-7713
Mass	Woburn, Yusen Assocs.	617-935-8500
Mich	Southfield, Linder Assocs.	313-353-4334
Minn	Golden Valley, Elstad Sales Co.	612-533-3033
Mo	Kirkwood, Martin Electrical Sls.	314-966-8659
Neb	Omaha, Midwest Equip. Co.	402-734-1020
NJ	Rahway, Nash & Cornell	201-381-2400
NM	Albuquerque, T. Deskin & Assocs.	505-242-3581
NY	New Hartford, F.W. Laver & Son	315-724-2304
NC	Charlotte, E.F. Lombardi	704-334-1637
Ohio	Bedford Heights, Riffle & Assocs.	216-439-5500
Okla	Jenks, W.G. Parker	918-299-5449
Ore	Portland, M.H. Gerrard	503-224-0864
Pa	Philadelphia, W.C. Welde & Sons	215-243-1120
Pa	Pittsburgh, H.W. Groetzinger Co.	412-322-6280
Tex	Dallas, T.C. Kissel Co.	214-742-2349
Tex	Houston, Kopinitz Co.	713-692-0022
Utah	Salt Lake City, J.R. Christensen & Assocs.	801-486-0031
Wash	Seattle, Tal Agencies	206-624-3355
Wisc	Wauwatosa, G.R. Adams & Assocs.	414-453-7130

INTERNATIONAL COMMUNICATIONS, A Milgo Co., 8600 NW 41st St., Miami, Fla., 33166, Tel: 305-592-7654, TWX: 810-848-6588; Empl.: 1400

Free literature available: Data communications products catalog.

Products manufactured: Comm. Systems, Modulator/Demodulators, Terminals, Data Display (including Alphanumeric & Graphic), Testers

Local Sales Offices & Reps.

Cal	Los Angeles, Intl. Comm. Corp.	213-641-3961
Cal	Oakland, Persons & Assocs.	415-569-6461
Cal	Sunnyvale, CSS Telecommunications Specialists	408-739-8366
Cal	Torrance, CSS Telecommunications Specialists	213-372-9360
Colo	Littleton, Cropley, Inc.	303-794-4231
Conn	Westport, T.H. Maguire & Assocs.	203-227-1976
DC	Washington, Intl. Comm. Corp.	202-296-4940
Fla	Ft. Lauderdale, Modemsplus	305-587-3849
Fla	Tampa, Modemsplus	813-223-7932
Ga	Atlanta, Intl. Comm. Corp.	404-996-6327
Ill	Alton, Information Prods.	314-355-4340
Ill	Chicago, HH Sls.	312-337-4478
Kan	Prairie Village, Giddings Co.	913-831-0727
Ky	Louisville, Data Processing Sciences	502-459-1206
Md	Silver Springs, Computer Complements Inc.	301-593-1559
Mass	Danvers, John Melanson & Assocs.	617-774-1220
Mich	Southfield, Data Processing Sciences	313-557-3164
Minn	Minneapolis, Delta Comms. Sys.	612-884-0202
Mo	Independence, Information Prods, Inc.	816-252-3700
NY	Great Neck, Harvey J. Krasner Assocs. Inc.	516-487-0690
NY	Herkimer, Gall & Annese Assocs.	315-458-7189
NY	Massapequa, L.E. Walz & Assocs.	516-798-3119
NY	New York, Int'l. Comm. Corp.	212-687-5040
Ohio	Cincinnati, Data Processing Sciences Corp.	513-961-0776
Ohio	Cleveland, Data Processing Sciences Corp.	216-886-2090
Ohio	Toledo, Data Processing Sciences Corp.	419-472-0111
Ohio	Vendalia, Data Processing Sciences Corp.	513-275-6781
Ohio	Worthington, Data Processing Sciences Corp.	614-224-4081
Ore	Beaverton, SJI	503-646-3004
Pa	Bala-Cynwyd, Applied Energy Systems Inc.	215-667-1010
Tenn	Nashville, Modemsplus, Inc.	615-868-1004
Tex	Richardson, Computer Mktg. Corp.	214-231-1426
Wash	Seattle, SJI Inc.	206-624-9020
Wisc	Milwaukee, Delta Commus. Sys.	414-774-1989
FOR:	Can., Montreal 252, Que., Electronetic Supt. Ltd.	514-342-4112
FOR:	Downsview, Ont., Can., Electronetic Supt. Ltd.	416-661-3673
FOR:	Ottawa 8, Ont., Can., Electronetic Supt. Ltd.	613-733-3781
FOR:	Vancouver, B.C., Can., Western Electronetic Supt. Ltd.	604-687-5696

INTERNATIONAL COMPS CORP., 105 Maxess Rd, Melville, N.Y., 11746, Tel: 516-293-1500, TWX: 510-224-6409; Empl.: 100; Minimum order: $50 p. 2•192,193

For info on price: M. Karasik; Application info: I. Greenburg; Customer service: R. Schuster; Delivery info: R. Rubenstein

Free literature available: Aluminum Electrolytic Capacitors; Tantalum Capacitors; Film Capacitors; Metallized Film Capacitors; Ceramic Disc Capacitors; Carbon Film Resistors; Carbon Composition Resistors.

Products manufactured: Capacitors, Fixed, Diodes, Meters, Potentiometers, Resistors, Tubes

Advertisment

INTEROHM RESISTORS - including carbon composition, and carbon film. INTERCAP CAPACITORS - miniature electrolytics, dipped tantalums, and miniature film. INTERNATIONAL SERVICEMASTER & 10M RECEIVING TUBES - all domestic & foreign types. ALL PRODUCTS ARE STOCKED IN DEPTH. LARGE QUANTITIES OF STANDARD VALUES AVAILABLE.

INTERN'L. COMPUTER PRODS., INC., 2925 Merrell Rd., Dallas, Tex., 75229, Tel: 214-350-6951; Empl.: 102

Customer service: G. Rocky

Free literature available: A 16 page brochure on the most versatile digital cassette family with descriptions, specifications and photographs.

Products manufactured: Recorders, Tape Recording Accessories, Tapes, Recording, Magnetic (All Types)

Local Sales Offices & Reps.

Ariz	Phoenix, Southwest Peripherals	602-995-1508
Cal	Sherman Oaks, Electronic Mktg Specialists	213-990-4244
Conn	Stamford, ICP East Coast Regional Off.	203-327-6263
Fla	Orlando, Technical Assocs.	305-894-7531
Minn	Minneapolis, Loonam Assocs.	612-831-1616
FOR:	Can., Ottawa, Ont., L. Albert Assocs.	613-737-5941

INTERNATIONAL CRYSTAL MFG., 10 N. Lee St., Oklahoma City, Okla., 73102, Tel: 405-CE 6-3741, TWX: 910-831-3177 p. 1•362-366,738

Products manufactured: Crystal Blanks, Crystals, Oscillators

INTERNATIONAL DATA SCIENCES, 100 Nashua St., Providence, R.I., 02904, Tel: 401-274-5100, TWX: 710-381-0285; Empl.: 35

Customer service: Sls. Dept.

Free literature available: Specification sheets describing various products. Short form catalog and technical article reprints also available. Telephone line matrix switches and special systems quoted on request.

Products manufactured: Cable Assemblies & Harnesses, Generators, Panels, Printers, Testers

Local Sales Offices & Reps.

Ala	Huntsville, FM Assocs.	205-536-9990
Alas	Anchorage, Consolidated Comm.	907-272-3591
Ariz	Scottsdale, Barnhill Three	602-947-7841
Cal	N. Hollywood, O'Halloran Assoc.	213-877-0173
Colo	Denver, Barnhill Three	303-934-5505
Conn	Wallingford, Instrument Assoc.	203-525-9367
Ill	Elk Grove Village, L.F. Green & Assoc.	312-593-0282
Ind	Indianapolis, L.F. Green Assoc.	317-293-9827
Kans	Shawnee Mission, Inland Assoc.	913-362-2366
Md	Gaithersburg, Wright Co.	301-948-5151
Mass	Bedford, Instr. Assoc.	617-275-0700
Minn	Minneapolis, L.F. Green & Assoc.	612-781-1611
Mo	Glencoe, Inland Assocs.	314-938-4992
NJ	Pennsauken, Megargel/Himmelstein Assoc.	609-622-3081
NJ	Ridgewood, Instrumentation Sls. Co.	201-445-5210
NM	Albuquerque, Barnhill Three	505-299-7658
NY	E. Syracuse, Ossmann Instr.	315-437-6666
NC	Greensboro, FM Assocs.	919-294-2754
Ohio	Dayton, Ashby Assocs.	513-252-5627
RI	Providence, Int. Data Sciences	401-274-5100
Tex	Richardson, Barnhill Two	214-231-2573
Wash	Seattle, Delcom Sls. Co.	206-248-0090

INTERNATIONAL ELECTRO EXCH. CORP., See IEE/Schadow, Inc.

INTERNATIONAL ELECTRO-MAGNETICS, Eric Dr. & Cornell Ave., Palatine, Ill., 60067, Tel: 312-358-4622; Empl.: 30 p. 1•16,17

Products manufactured: Cameras, Controls/Control Eqpt., Heads, Recording Playback, Erase, Mounts, Recorders, Tape Recording Accessories, Transducers

INT'L. ELCTRN. RESCH., 135 W. Magnolia Blvd., Burbank, Cal., 91508, Tel: 213-849-2481, TWX: 910-498-2206; FSC No: 98978; Empl.: 110; Minimum order: $25

Customer service: Order Desk

Free literature available: Product Technical Bulletins (individual) Short Form Catalog 1974/1975 General Catalog 1974/1975 22 Pg. Article "Semiconductor Thermal Mgmt." 17 Pg. Article "U.S. Navy SHP - Standard Packaging".

Products manufactured: Boards, Printed Circuit, Chassis, Circuit Board Mounting, Circuits, Printed, Multilayer, Coatings, Guides, Circuit Board, Heat Exchangers & Systems, Metal Oxides, Racks, Retainers, Shields, Transistor, Diode, Thyristor Heat Dissipators

Local Sales Offices & Reps.

Ala	Huntsville, Murcota Corp.	205-539-8476
Ariz	Phoenix, Piper Sales Co.	602-946-4436
Cal	Burlingame, J. Logan	415-697-6100
Cal	Los Angeles, Ed Landa Co.	213-879-0770
Colo	Denver, Vinson Assocs.	303-757-5151
Conn	Canaan, Hathaway Elctrns.	800-225-1293
Fla	Clearwater, Lynch-Gentry Assocs.	813-443-2697
Ill	Mt. Prospect, Magnuson	312-956-0700
Kans	Leawood, Thunderbird Tech.	913-642-7220
Kans	Wichita, Thunderbird Tech. Sls.	316-684-3941
Mass	Lexington, Hathaway Elct.	617-861-7010
Mich	Utica, N. Case Assocs.	313-781-3900
Minn	St. Paul, Magnuson	612-227-8495
Mo	St. Louis, Thunderbird Tech.	314-567-6488
NJ	Clifton, Compar N.Y.	201-546-3660
NY	Buffalo, Ossmann Component Sls. Corp.	716-832-4271
NY	Kingston, Ossmann Component Sls. Corp.	914-338-5505
NY	Rochester, Ossmann Component Sls. Corp.	716-442-3290
NY	Syracuse, Ossmann Component Sls. Corp.	315-454-4477
NY	Vestal, Ossmann Component Sls. Corp.	607-785-9949
NC	Winston-Salem, Murcota Corp.	919-723-1001
Ohio	Centerville, N. Case Assocs.	513-435-1301
Ohio	Rocky River, N. Case Assocs.	216-333-4120
Pa	Philadelphia, Kenneth B. Erdman Co.	215-224-1833
Pa	Pittsburgh, R. F. Clark Co.	412-242-9502
Tex	Dallas, Blair Engrg.	214-352-8411
Wash	Seattle, F. Jackson Co.	206-782-2211
FOR:	Can., Burlington, Ont., White Radio	416-634-1845
FOR:	Can., Montreal, Que., White Radio	514-482-8091

INTERNATIONAL ELECTRONICS CORP., I.E.C./El-Menco Capacitors, 316 S. Service Rd., Melville, N.Y., 11746, Tel: 516-694-7700, TWX: 510-224-6427; Empl.: 3000 p. 2•194,195

Products manufactured: Capacitors, Fixed, Capacitors, Variable, Diodes, Tubes

Local Sales Offices & Reps.

Conn	Milford, Conti-Younger	203-929-3294
Ill	Chicago, S. DiMarco	312-237-4454

Ill	Des Plaines, E. Flaxman Co.	312-298-8580
Mass	Waltham, Conti-Younger Assocs.	617-890-4582
Minn	St. Louis Park, Beta Engrg.	612-925-4422
NJ	Harrington Park, Metro Tech. Sls.	201-768-8495
NY	Endicott, Advanced Comps.	607-785-3191
NY	Jericho, Metro Tech. Sls.	516-935-3330
NY	No. Syracuse, Advanced Comps.	315-699-2671
Pa	Ardmore, W.K. Metz	215-MI9-3966
Tex	Dallas, United Comps.	214-324-1448
Wash	Seattle, R. Thorp Co.	206-763-1236

INTERNATIONAL IDENTIFICATIONS, 1917 Green Spring Dr., Timonium, Md., 21903, Tel: 301-252-1768; Empl.: 15

Customer service: W. B. Yahn

Products manufactured: Braid, Cable, Cable Assemblies & Harnesses, Cable, Kits, Marking (Dial, Instrument, Equipment, etc.), Lead Assemblies & Receptacles, Leads, Test & Adaptors, Machines/Machinery, Production, Services, Assembly, Production & Test, Strips, Tubing, Wire, Wire Shielding

Advertisment

Flat woven cable, harness and cable assembly, wire and cable markers, lead assembly braided cable, hot stamping, cutting and stripping wire, back panel wiring, circumferential color coding of wire. Engineering and design assistance on all phases of interconnections and wire and cable marking.

INTERNATIONAL IMPORTERS, 2244 S. Western Ave., Chicago, Ill., 60608, Tel: 312-847-6363, TWX: 910-221-1394; Empl.: 35

Customer service: B.A. Moll Ext. 226

Products manufactured: Capacitors, Fixed, Diodes, Jacks (All Types), Microphones, All Kinds, Resistors, Speakers, Transistors, Tubes

Local Sales Offices & Reps.

Ala	Huntsville, 20th Century Mktg.	205-772-9237
Cal	Marina Del Ray, Intervend	213-821-7936
Colo	Denver, Franklin Sls.	303-922-3623
Ill	Chicago, Minitron	312-774-6815
Ind	Indianapolis, W. Deem & Assoc.	317-844-2993
Iowa	Des Moines, Beams	515-282-0292
Kans	Shawnee Mission, Beams	913-888-6110
Mass	Waltham, MSN Assoc. Inc.	617-893-6211
Mich	Ferndale, Shalco	313-547-4771
Minn	St. Paul, D. Countryman & Assoc.	612-645-9151
Mo	St. Louis, Beams	314-781-6855
NY	NYC, C. Avery & Assoc.	212-823-5224
NY	Rye, C. Avery & Assoc.	914-967-7610
Pa	Philadelphia, Danton Assoc.	215-353-0500
Tex	Dallas, Techno Assoc.	214-357-9213

INT'L. INSTRS., Div. Sigma Instrs., 88 Marsh Hill Rd., Orange, Conn., 06477, Tel: 203-795-4711, TWX: 710-465-2897; Empl.: 275; Minimum order: $50

For info on price: J. Connolly; Application info: J. Connolly; Customer service: M. Schultz; Delivery info: M. Schultz

Free literature available: Catalog - individual data sheets

Products manufactured: Alarms, Controls/Control Eqpt., Indicators, Meters, Monitors, Relays

Local Sales Offices & Reps.

Ala	Huntsville, Brandel-Stephens & Co. Inc.	205-883-0445
Ariz	Phoenix, J. S. Heaton Co.	602-264-7887
Cal	Burlingame, Engineering Rep. Co.	415-692-2581
Cal	Los Angeles, Barnard & Assocs.	213-973-5050
Cal	San Diego, Engineering Rep. Co.	714-565-6366
Colo	Englewood, Tech Sls.	303-789-2864
Fla	Orlando, Brandel-Stephens & Co.	305-425-3202
Ga	Atlanta, Brandel-Stephens & Co.	404-261-7579
Ill	Westchester, Gassner & Clark Co.	312-345-4245
Kans	Shawnee Mission, Technical Sls. Assoc.	913-888-3330
La	Harahan, Williams Equipment Co.	504-737-4082
Md	Baltimore, J.R. Daniel & Co.	301-825-3330
Mass	Needham Heights, Northeast Reps.	617-449-3093
Mich	Detroit, Stress Analysis Services	313-535-1120
Minn	Minneapolis, Pilot Industrial Controls	612-941-7400
Mo	Ferguson, Technical Sls. Assocs.	314-725-5361
NJ	Stirling, NBS Assocs.	201-464-8500
NY	Buffalo, H.C. Johnson Agencies	716-632-7880
NY	Fayetteville, H.C. Johnson Agencies	315-637-9383
NY	Rochester, H.C. Johnson Agencies	716-482-3000
NC	Charlotte, D.G.W., Inc.	704-334-7090
NC	Winston Salem, D.G.W., Inc.	919-768-7166
Ohio	Medina, Stress Analysis Services	216-725-7733
Okla	Tulsa, Telstar Instrument Corp.	918-628-1011
Pa	Glenshaw, H.C. Johnson Agencies	412-961-0414
Pa	Paoli, Stitzer Assocs.	215-644-5500
Tex	Dallas, J. B. Guenther, Inc.	214-691-8500
Tex	Houston, Instrumatics, Inc.	713-225-6626
Wash	Bellevue, General Elctrns., Inc.	106-885-4148

Local Distributors

Ariz	Phoenix, Metermaster, 2633 E. Buckeye Rd.	602-273-7331
Cal	Los Angeles, Metermaster, 5646 Jillson St.	213-685-4340
Cal	Palo Alto, Metermaster, 3995 E. Bayshore	415-968-0313
Colo	Denver, Metermaster Instr. Corp., 1165 So. Cherokee	303-722-5766
Conn	Middletown, Mancib Co., Box 467	203-346-6646
Fla	Ft. Lauderdale, A & M Instrs., 4257 N.E. 6th Ave.	305-565-2579
Ill	Chicago, E.I.L. Instrs., 221 W. 79th St.	312-874-8070
La	New Orleans, Ind. Instr. Works, 3305 Tchoupitoulas	504-895-5621
Md	Timonium, E.I.L. Instrs., 1830 York Rd.	301-252-1260
Mass	Burlington, Mancib Co., Middlesex Tpke.	617-272-9450
Mich	Royal Oak, Stillings Instr., 4850 Leafdale Rd.	313-549-6030
Minn	Minneapolis, Control Assemblies Co., 5735 Lindsey St.	612-544-3364
NY	Buffalo, Trott Elctrns., 932 Hertel Ave.	716-876-0880
NY	Rockville Center, A & M Instrs., 5 Nassau St.	516-678-6960
Ohio	Cleveland, Weschler Electric., 4250 W. 130th St.	216-251-4609
Pa	Pittsburgh, Cameradio Co., 2801 Liberty Ave.	412-288-2600
RI	E. Greenwich, E.I.L. Instrs., 99 French Town Rd.	401-885-1773
Tex	Houston, Meters & Instr., 6502 Gulf Frwy.	713-644-1631
Wash	Seattle, Eicher Richards, 2727 N.E. Blakeley	206-523-7888

INTERNATIONAL NICKEL CO., Huntington Alloy Prods. Div., Huntington, W.Va., 25720

INTERNATIONAL POWER MACHINES CORP., 3328 Executive Blvd., Box 724, Mesquite, Tex., 75149, Tel: 214-288-7501, Telex: 73-0992; Empl.: 140

For info on price: F. Perkins; Application info: F. Perkins; Customer service: J. Herr; Delivery info: L. Parks

Products manufactured: Converters, Inverters, Power Supplies

Local Sales Offices & Reps.

Ark	North Little Rock, Kennedy Engrg. Co.	501-753-6306
Cal	, Emeryville	Independent Engrg., Inc.
Cal	San Diego, Independent Engrg.	714-995-5959
Colo	Denver, Benchmark Sys., Inc.	303-399-1062
DC	Washington, Instrucom, Inc.	202-223-1759
Fla	Orlando, R.J.C. Assocs.	305-894-7371
Ga	Atlanta, Forward Prods. Co.	404-255-1016
Haw	Honolulu, Island Rep., Inc.	808-531-4011
Ill	Schaumburg, Tech-Sys.	312-894-0015
NJ	Upper Montclair, D. Cunningham	201-783-4647
NY	Rochester, PCI Assocs.	716-334-6793
Ohio	Cleveland, P.E. Lax Co.	216-226-8815
Okla	Oklahoma City, Kennedy Engrg. Co.	405-524-6048
Okla	Tulsa, Kennedy Engrg. Co.	918-835-9975
Ore	Portland, Ingalls Engrg. Co.	503-232-7487
Pa	Croydon, J. LeSaint	215-788-8212
Pa	Pittsburgh, P.E. Lax Co.	412-833-5477
Tex	Houston, L.P. Spencer & Assocs.	713-337-2751
Utah	Salt Lake City, Benchmark Sys.	801-487-4955
Va	Danville, Instrucom, Inc.	804-799-1661

INTERNATIONAL POWER MACHIN cont'd

Advertisment

Manufacturer of 'Computer Grade' Uninterruptible Power Systems (UPS) providing 50 Hz, 60 Hz, & 415 Hz power in the range from 10 KVA to 300 KVA. Equipment is compatible with IBM system/370 computers.

INT'L. PRODS. INC., Box 405, Atchison, Kans., 66002, Tel: 913-EM 7-1934; Empl.: 3; Minimum order: $25

For info on price: L. Poos; Application info: T. Moorhead; Customer service: L. Poos; Delivery info: L. Poos

Products manufactured: Lamp Adapters, Lamps, Lights

Local Sales Offices & Reps.

Ariz	Phoenix, Toward Engrg. Assocs.	602-955-3193
Cal	Mountain View, Connolly & Co.	415-967-6988
Cal	Van Nuys, C.H. Mitchell Co.	213-994-9466
Colo	Greeley, Moss Elctrns.	303-353-1452
Fla	Melbourne, REPCOM Inc.	305-254-1877
Mass	Belmont, Elctrn. Comps. & Svc.	617-484-8680
Mich	Jackson, Norwood Scroggs Co.	517-782-5211
NJ	West Caldwell, Peterson-Rudnick Assocs.	201-CA6-4363
NY	Rochester, Ossmann Comp. Sls. Corp.	716-442-3290
NC	Charlotte, Power Engrg. Co.	704-537-8099
Ohio	Cleveland, Brownie & Assocs.	216-795-7472
Ore	Portland, J. E. Edstrom	503-775-8527
Tex	Houston, M. R. Summers Assocs.	713-524-7800
Wash	Seattle, W.J. Stulgis	206-AT2-7870

INTERNATIONAL RECTIFIER CORP., Semiconductor Div., 233 Kansas St., El Segundo, Cal., 90245, Tel: 213-678-6281, TWX: 910-348-6291; Empl.: 1200

p. 1•1842,1843

For info on price: F. Angier; Application info: B. Bixby; Customer service: F. Angier; Delivery info: F. Angier

Free literature available: A complete selection of cross references to IR product lines. Also an increasing number of application notes. Write for index.

Products manufactured: Arresters, Electrical Surge, Lightning, Bridges, Cells, Photoconductive, Photoemissive, Photovoltaic, Chargers, Battery, Circuits, Hybrid, Thick Film, Controls/Control Eqpt., Converters, Diodes, Eliminators, Battery, Fuses, Heat Exchangers & Systems, Inverters, Power Drivers, Hybrid (High Current, High Voltage), Power Supplies, Protectors, Readers, Rectifiers, References, D-C Voltage, Regulators, Relays, Sensors, Light, Suppressors, Switches, Thyristors (Includes Silicon Controlled Rectifiers), Transistors, Tubes

Local Sales Offices & Reps.

Alas	Anchorage, H.J. Lang & Assoc.	907-279-5741
Ariz	Phoenix, Shefler-Kahn Co.	602-258-7893
Cal	El Segundo, Int'l. Rectifier	213-678-2181
Cal	San Diego, Harvey King	714-276-7541
Cal	San Francisco, Thomas-Hartman Assocs.	415-969-0660
Cal	Santa Clara, Thomas-Hartman Assocs.	408-247-1252
Colo	Denver, Parker-Webster	303-770-1972
DC	Washington, Int'l. Rectifier	301-821-0292
Fla	Ft. Lauderdale, Dyne-A-Mark Corp.	305-771-6501
Ill	Des Plaines, Int'l. Rectifier	312-299-7181
Iowa	Cedar Rapids, Seltec Sls. Corp.	319-362-8155
Md	Baltimore, Int'l. Rectifier	301-821-0292
Mass	Lexington, Int'l. Rectifier	617-861-1820
Mich	Livonia, Int'l. Rectifier	313-477-3131
Minn	Minneapolis, Int'l. Rectifier	612-920-1200
Mo	Hazelwood, Int'l. Rectifier	314-895-3400
NJ	Palisades Park, Int'l. Rectifier	201-943-4554
NM	Albuquerque, Shefler-Kahn Co.	505-265-7077
NY	Buffalo, R.W. Mitscher Co.	716-633-7970
NY	New York, Int'l. Rectifier	212-565-0882
NC	Charlotte, Int'l. Rectifier	704-372-9190
Ohio	Cleveland, Int'l. Rectifier	216-261-2135
Ohio	Kettering, Int'l. Rectifier	513-299-2635
Okla	Tulsa, W. Pat Fralia Co.	918-663-8707
Pa	Abington, Int'l. Rectifier	215-886-0130
Tenn	Shelbyville, R.W. Mitscher Co.	615-684-4549
Tex	Fort Worth, W. Pat Fralia Co.	817-738-2394
Tex	Houston, W. Pat Fralia Co.	713-772-1572
Wash	Bellevue, Vantage Corp.	206-455-3460
Wisc	Brookfield, Int'l. Rectifier	414-784-2480
FOR:	Can., Dorval, Que., Int'l. Rectifier Can. Ltd.	514-631-4969

FOR: Can., Scarborough, Ont., Int'l. Rectifier Can. Ltd. 416-755-7793

Local Distributors

Ala Huntsville, Hall-Mark Elctrns., 4739 Commercial Dr. 205-837-8700
Ala Huntsville, Powell/Gulf Elctrns., 803 Aster Dr. 205-539-2731
Ariz Phoenix, Kierulff Elctrns., 2633 E. Buckeye Rd. 602-273-7331
Cal Costa Mesa, Schweber Elctrns., 3000 Red Hill Ave. 714-556-3880
Cal Inglewood, Newark Elctrns., 4747 Century Blvd. 213-678-0441
Cal Los Angeles, Kierulff Elctrns., 2585 Commerce Way 213-685-5511
Cal Los Angeles, RPS Elctrns., 1501 S. Hill St. 213-748-1271
Cal Mountain View, Abacus, 1065 Terra Bella Ave. 415-961-1500
Cal Oakland, Brill Elctrns., 610 E. 10th St. 415-834-5888
Cal Palo Alto, Kierulff Elctrns., 3969 E. Bayshore Rd. 415-968-6292
Cal San Diego, Intermark Elctrns., 7354 Convoy Court 714-279-5200
Cal San Diego, Kierulff Elctrns., 8797 Balboa Ave. 714-278-2112
Cal San Diego, Liberty Elctrns., 8248 Mercury Ct. 714-565-9171
Cal Santa Ana, Intermark Elctrns., 2920 W. Warner 714-540-1322
Cal Sunnyvale, Intermark Elctrns, 1020 Stewart Dr. 408-738-1111
Colo Denver, Intermark Elctrns., 2600 W. Second Ave. 303-936-8284
Colo Denver, Kierulff Elctrns., 10890 E. 47th Ave. 303-371-6500
Conn Danbury, Schweber Elctrns., Finance Dr., Commerce Ind'l. Pk. 203-792-3500
Fla Ft. Lauderdale, Hall-Mark Elctrns., 1302 W. McNab 305-971-9280
Fla Hollywood, Schweber Elctrns., 284 N. 28th Terrace 305-927-0511
Fla Miami, Powell Elctrns., 1740 N.W. 69th Ave. 305-887-8761
Fla Orlando, Hall-Mark Elctrns., 7233 Lake Ellenor Dr. 305-855-4020
Fla Orlando, Powell Elctrns., 2032 Tomridge Way 305-859-1450
Ga Atlanta, Schweber Elctrns., 4126 Pleasantdale Rd. 404-449-9170
Ill Chicago, Allied Elctrns., 2400 W. Lake St. 312-829-9100
Ill Chicago, Newark Elctrns., 500 N. Pulaski Rd. 312-638-4411
Ill Elk Grove Village, Hall-Mark Elctrns., 180 Crossen St. 312-437-8800
Ill Elk Grove Village, Schweber Elctrns., 1380 Jarvis Ave. 312-593-2740
Ill Skokie, Bell Inds., 7701 North Austin Ave. 312-965-7500
Ind Fort Wayne, Fort Wayne Elctrns., 3606 Maumee Ave. 219-423-3422
Ind Indianapolis, Graham Elctrns., 133 S. Pennsylvania 317-634-8202
Iowa Cedar Rapids, Schweber Elctrns., Executive Plaza, Suite 302, 4403 First Ave., S.E. 319-319-366-0774
Kans Lenexa, Hall-Mark Elctrns., 9006 Rosehill Rd. 913-888-4747
Md Baltimore, Hall-Mark Elctrns., 6660 Security Blvd. 301-265-8500
Md Gaithersburg, Kierulff Elctrns., 16021 Industrial Dr. 301-948-0250
Md Rockville, Schweber Elctrns., 5640 Fisher Ave. 301-881-2970
Mass Waltham, Schweber Elctrns., 213 Third Ave. 617-890-8484
Mass Watertown, Sterling Elctrns., 51 Spring St. 167-926-9720
Mich Troy, Schweber Elctrns., 86 Executive Dr. 313-583-9242
Minn Edina, Schweber Elctrns., 7015 Washington Ave. 612-941-5280
Minn Minneapolis, Hall-Mark Elctrns., 4555 West 77th St. 612-925-2944
Minn Minneapolis, Stark Elctrns., 112 Third Ave. N. 612-333-3361
Mo Earth City, Hall-Mark Elctrns., 13789 Rider Trail 314-291-5350
Mo Saint Louis, Olive Ind'l. Elctrns., 6662 Olive Blvd. 314-863-7800
NJ Clifton, Wilshire Elctrns./N.J., 312 Clifton Ave. 201-365-2600
NJ Somerset, Schweber Elctrns., 43 Bellmont Dr. 201-469-6008
NY Buffalo, Summit Distrs., 916 Main St. 716-884-3450
NY Farmingdale, Arrow Elctrns., 900 Broadhollow Rd., Route 110 516-694-6800
NY Farmingdale, Hall-Mark Elctrns., 167 Marine St. 516-293-7500
NY Freeport, Milgray/N.Y., 191 Hanse Ave. 516-546-6000
NY Hicksville, L.I., Kierulff Elctrns., 49 Bethpage Rd. 516-433-5530
NY Rochester, Rochester Radio Supply, 140 W. Main St. 716-454-6300
NY Rochester, Schweber Elctrns., 2 Town Line Cir. 716-328-4180
NY Westbury, Schweber Elctrns., Jericho Turnpike 516-334-7474
NC Raleigh, Hall-Mark Elctrns., 3000 Industrial Dr. 919-832-4465
NC Raleigh, Schweber Elctrns., 10 Sunnybrook Rd. 919-832-8881
Ohio Beachwood, Schweber Elctrns., 23880 Commerce Park Rd. 216-464-2970
Ohio Cleveland, Arrow Elctrns., 23500 Mercantile Rd. 216-464-2000
Ohio Dayton, Esco Elctrns., 221 Crane St. 513-226-1133
Okla Tulsa, Hall-Mark Elctrns., 4846 S. 83rd E. Ave. 918-835-8458
Okla Tulsa, T.I. Supply, Box T, Admiral Station 918-437-4555
Ore Portland, United Radio Supply, 123 N.E. 7th 503-233-7151
Pa Erie, Mace Elctrns., 2631 W. 8th St. 814-838-3511
Pa Huntington Valley, Hall-Mark Elctrns., 458 Pike Rd. 215-355-7300
Pa Philadelphia, Almo Elctrns., Roosevelt Blvd. at Blue Grass Rd. 215-676-6000
Pa Philadelphia, Powell Elctrns., South Island Rd. 215-365-1900
Pa Pittsburgh, Cameradio Co., 2801 Liberty Ave. 412-288-2606
Tenn Knoxville, Industrial Elctrns., Box 9120 615-573-7135
Tex Austin, Schweber Elctrns., 2628 Longhorn Blvd. 512-837-2890
Tex Dallas, Hall-Mark Elctrns., 9333 Forest 214-231-6111
Tex Dallas, Kierulff Elctrns., 2750 Northaven 214-243-4521
Tex Dallas, Schweber Elctrns., 14177 Proton Rd. 214-233-5866
Tex Dallas, T.I. Supply, 6000 Denton Dr. 214-238-6974
Tex Houston, Hall-Mark Elctrns., 8000 West Glen 713-781-6100
Tex Houston, Harrison Equip., 1616 McGowen 713-224-9131
Tex Houston, Schweber Elctrns., 7420 Harwin Dr. 713-784-3600
Tex Houston, T.I. Supply, 3939 Ann Arbor Dr. 713-785-4800
Utah Salt Lake City, Intermark Elctrns., 63 E. Stratford 801-486-3411
Wash Seattle, Almac-Stroum Elec., 5811 6th Ave. S. 206-763-2300
Wash Seattle, Intermark Elctrns., 621 S. Michigan St. 206-767-3160
WVa Charleston, McJunkin Corp., 312 Mac Corkle Ave., S.E. 304-348-4930
wisc Milwaukee, Marsh Elctrns., 6047 W. Beloit Rd. 414-545-6500
Wisc Milwaukee, Hall-Mark Elctrns., 11925 W. Ripley Ave. 414-476-1270

INTERNATIONAL SENSOR SYSTEMS, INC., Aurora Industrial Pk., Box 345, Aurora, Neb., 68818, Tel: 402-694-6111; Empl.: 18; Minimum order: $100

Customer service: Sls. Dept.

Free literature available: Facilities and Capabilities brochure, Descriptions of facilities with photographs and a flow chart of typical Hybrid thick film system.

Products manufactured: Circuits, Hybrid, Thick Film, Networks, Resistor, Hardware

Local Sales Offices & Reps.

Cal Millbrae, Ashby Assocs. of N. Cal. 415-692-4442
Cal Studio City, Shortronics 213-789-0418
Kans Mission, Mid America Elctrns. 913-236-4800
NY Endicott, Tech-Mark Inc. 607-748-7473
Ohio Dayton, Ashby Assocs. 513-252-5627

INTERSIL, INC., 10900 N. Tantau Ave., Cupertino, Cal., 95014, Tel: 408-996-5000, TWX: 910-338-0228; FSC No: 32293; Empl.: 750; Minimum order: $50

Customer service: Customer Service 408-996-5257

Free literature available: Information on Low Power CMOS Monolithic Watch and Clock circuits. Devices Available for both Analog and Digital Application.

Products manufactured: Amplifiers, Circuits, Integrated, Silicon Monolithic, Unpackaged Chips, Integrated Circuit Devices, Transistors

Local Sales Offices & Reps.

Ariz Phoenix, Shefler-Kahn Co. 602-258-7893
Cal Carson, Intersil Inc. 213-532-3544
Cal Cupertino, Intersil, Inc. 408-257-5450
Cal San Diego, Intersil Inc. 714-278-6053
Colo Littleton, Simpson Assocs. 303-794-8381
Fla Casselberry, E.I.R. Inc. 305-830-9600
Ill Franklin Park, Dekotech, Inc. 312-455-5100
Ill Palos Heights, Intersil, Inc. 312-371-1440
Ind Ft. Wayne, Delesa Sls. 219-483-9537
Ind Indianapolis, Delesa Sls. 317-257-4683
Iowa Cedar Rapids, Elctrn. Sls. 319-364-4342
Kans Shawnee, J.F. Guernsey 913-631-2414
Md Glen Bernie, New Era Sls. Inc. 301-761-0085
Mass Burlington, Intersil, Inc. 617-273-2055
Mich Grand Rapids, J.L. Montgomery Assoc., Ltd. 616-774-9308
Mich Southfield, J.L. Montgomery Assoc. Ltd. 313-358-2616
Minn Minneapolis, Intersil, Inc. 612-925-1844
Mo St. Louis, Ensco-Rep Sls. 314-567-3935
NJ Cherry Hill, Barrett Assocs. 609-429-1551
NJ Englewood Cliffs, Intersil, Inc. 201-567-5585
NJ Irvington, MGI 201-399-4350
NM Albuquerque, Shefler-Kahn Co. 505-265-7077
NY Ithaca, Bob Dean, Inc. 607-272-2187
NY Syracuse, Intersil, Inc. 315-463-3368
Ohio Cleveland, K.W. Elctrns. Sls. 216-831-8292
Ohio Dayton, K.W. Elctrns. Sls. 513-890-2150
Ore Beaverton, ES/Chase Co. 503-649-6177
Pa Allison Park, K.W. Elctrns. Sls. 412-487-4300
Tex Dallas, Intersil Inc. 214-233-0611
Tex Houston, Vista Engr. Assocs. 713-661-0119
Tex Richardson, Vista Engr. Assocs. 214-235-4547
Utah Salt Lake City, Simpson Assocs. 801-486-3731
Va Falls Church, Beacon North, Inc. 703-534-1673
Wash Edmonds, ES/Chase Co. 206-774-3586

INTERSTATE ELECTRONICS, Box 1117, Anaheim, Cal., 92803, Tel: 714-772-2811, TWX: 910-591-1197; Empl.: 1000 p. 1•736,737

Customer service: J. Norburg

Free literature available: Interstate Shortform Catalog, 20 MHz Pulse Generators and 3MHz, 11MHz, and 20 MHz function generators Pulse Generator Catalog, 8-page catalog illustrates how applications requirements are matched with series 20 Performance Capabilities.

Products manufactured: Generators

Local Sales Offices & Reps.

Ariz Scottsdale, Meas. Consits. 602-994-9519
Cal Costa Mesa, Meas. Assocs. 714-540-7160
Cal Palo Alto, General Radio Co. 415-948-8233
Colo Boulder, Meas. Consits. 303-449-5294
Conn Hamden, J & J Assoc. 203-624-7800
Ga Atlanta, General Radio Co. 404-394-5380
Ill Elk Grove Village, L.F. Green & Assocs. 312-593-0282
Ind Indianapolis, L.F. Green & Assocs. 317-293-9827
Kans Olathe, Tech. Reps. Inc. 913-782-1177
Md Silver Spring, Sel-Tronics, Inc. 301-589-3391
Mass Burlington, J & J Assocs. 617-272-2606
Mich Royal Oak, Group 10 313-549-3910
Minn Minneapolis, L.F. Green Assocs. 612-781-1681
Mo Hazelwood, Tech. Reps., Inc. 314-731-5200
NJ Fairfield, KLS Assocs., Inc. 201-227-2900
NM Albuquerque, Meas. Consits. 505-265-6471
NM Las Cruces, Meas. Consits. 505-526-2491
NY Syracuse, Labtronics, Inc. 315-454-9314
Ohio Cleveland, Group Ten 216-486-2800
Ohio Dayton, Group 10 513-277-6531
Pa Melrose Park, R. Meyers Assoc. 215-224-1663
Tex Houston, Scientific Sls. Co. 713-666-5318
Tex Richardson, Scientific Sls. Co. 214-231-6541
Utah Murray, Meas. Consits. 801-268-3181

INTERSWITCH, 770 Airport Blvd., Burlingame, Cal., 94010, Tel: 415-347-8217, TWX: 910-374-2353; Empl.: 30; Minimum order: $50 p. 1•2074,2075

Free literature available: Brochures On: Thumbwheel Switches Program Matrix Boards Program Data Modules

Products manufactured: Boards, Programming, Connectors, Matrices, Computer, Modules, Logic, Encapsulated, Pins, Readers, Switches

Local Sales Offices & Reps.

Ariz Phoenix, Bestronics 602-248-7020

Ark	Little Rock, J.Y. Schoonmaker	501-375-2188
Cal	Burlingame, W.J. Purdy Co.	415-347-7701
Cal	Los Angeles, Black Ekizian Strong, Inc.	213-870-9191
Cal	San Diego, Bestronics	714-278-2150
Colo	Denver, W.J. Purdy Co.	303-777-1411
Conn	Meriden, P.R. Sturgeon Co.	203-237-1112
Fla	Orlando, Cartwright & Bean	305-422-4531
Fla	Plantation, Cartwright & Bean	305-791-3989
Ga	Atlanta, Cartwright & Bean	404-255-5262
Ill	Hinsdale, Hill-Gray	312-325-4810
Ind	Indianapolis, Sukup & Cox	317-253-5501
Mass	Babson Park, P. Sturgeon Co.	617-237-3506
Mich	Ferndale, Hilltronics Inc.	313-398-5556
Minn	Minneapolis, HMR, Inc.	612-920-8200
Miss	Jackson, Cartwright & Bean	601-981-1368
NJ	Bergenfield, H. Gray Assoc.	201-384-3643
NM	Albuquerque, W. J. Purdy Co.	505-266-7959
NY	Syracuse, Mar-Com Assocs.	315-437-2843
NC	Charlotte, Cartwright & Bean	704-333-6457
NC	Raleigh, Cartwright & Bean Co.	919-832-7128
Ohio	Dayton, Bear Mktg.	513-299-3566
Ohio	Richfield, Bear Mktg.	216-659-3131
Okla	Tulsa, J.Y. Schoonmaker Co.	918-936-1423
Pa	Enon Valley, NEBCO Assoc.	216-457-2333
Pa	Havertown, Liberi Sls.	215-789-8150
Tenn	Knoxville, Cartwright & Bean	615-693-7450
Tenn	Memphis, Cartwright & Bean	901-276-4442
Tex	Dallas, J. Schoonmaker	214-357-8481
Tex	Houston, J.Y. Schoonmaker	713-926-9510
FOR:	Can., Willowdale, Ont., A. C. Simmonds & Sons	416-491-1010

INTRONICS INC., 57 Chapel St., Newton, Mass., 02158, Tel: 617-332-7350, TWX: 710-335-6835; Empl.: 50

Products manufactured: Amplifiers, Circuits, Hybrid, Thick Film, Circuits, Hybrid, Thin-Film, Converters, Demodulators, Dividers, Integrated Circuit Devices, Multipliers, Power Supplies, Yokes

Local Sales Offices & Reps.

Cal	Chatsworth, Boyle Assocs.	213-861-9223
Cal	San Carlos, Courier Data	213-277-8884
Conn	Hamden, Scientific Devs.-Conn., Inc.	203-248-9361
Fla	Clearwater, Southeastern Comp. Sls.	703-522-6666
Mich	Dearborn Heights, Mitronics Sls. Co.	313-565-6330
Mo	St. Louis, Ensco-Rep., Inc.	314-567-3935
NJ	Fort Lee, Tecnimat	201-461-8686
NY	Rochester, Scientific Devs.-N.Y. Inc.	716-334-2445
Ohio	Wickliffe, Walter J. Brauer & Assocs.	216-943-0601
Pa	Berwyn, Tucker Assocs.	215-644-0142
Tex	Richardson, Scientific Sls. Co.	214-231-6541
Va	Arlington, H.J. Hefferman Co.	703-522-6666

INVINCIBLE GEAR CO., 14938 Telegraph Rd., Detroit, Mich., 48239, Tel: 313-533-7524; Empl.: 25

Customer service: L. J. Smith

Free literature available: Description of gear types & size capacity & explanation of method employed for producing precision gears.

Products manufactured: Gears & Gear Mechanisms (Precision)

IPT CORP., 1140 W. Evelyn Ave., Sunnyvale, Cal., 94086, Tel: 408-732-7550, TWX: 910-379-6472; Empl.: 35

Products manufactured: Machines/Machinery, Production, Microcircuit Production Equip., Testers

Local Sales Offices & Reps.

Colo	Boulder, Mile High Elctrns.	303-444-5615
Fla	Pompano Beach, Semquip	305-772-3002
Ill	Chicago, L.F. Green & Assocs.	312-593-0282
Ind	Indianapolis, L.F. Green Assocs.	317-293-9827
Md	Gaithersburg, Wright Co.	301-948-5151
Minn	Minneapolis, L.F. Green & Assocs.	612-781-1611
NJ	Wayne, K & J Assocs.	201-694-3334
NY	E. Setauket, K & J Assocs.	516-751-8686
NY	Rochester, K & J Assocs.	716-334-9487

IRCON INC., 7555 N. Linder Ave, Skokie, Ill., 60076, Tel: 312-967-5151, Telex: 72-4412; Empl.: 60

Products manufactured: Bridges, Controls/Control Eqpt., Indicators, Meters, Pyrometers

Local Sales Offices & Reps.

Ala	Birmingham, Spader & Assoc.	205-879-1366
Ariz	Scottsdale, J.T. Aldrich Co.	602-945-8598
Ark	Little Rock, Electra-Tech Midsouth	501-562-4090
Cal	Costa Mesa, Robinson Tech. Assoc.	714-557-1622
Cal	San Diego, R. Brainard Co.	714-274-1333
Cal	San Mateo, Ircon, Inc.	415-348-0122
Colo	Lakewood, Intermountain Instrs.	303-237-0444
Ga	Woodstock, Spader & Assoc.	404-428-0366
Ill	Libertyville, J. Miller Co.	312-362-0038
Ind	Indianapolis, Electro Engrg. & Sls.	317-547-5273
La	New Orleans, Mid-South Sls.	504-822-3030
La	Shreveport, JDJ Sls.	318-865-2393
Mass	Framingham, J.M. Lancaster Co.	617-873-8893
Mass	Pittsfield, Ircon, Inc.	413-445-4016
Mich	Berkley, G. Peters Assoc.	313-564-6325
Minn	Minneapolis, Arjay Sls.	612-925-1833
Mo	St. Louis, Arentsen Elctrns.	314-434-3605
NJ	Palisades Park, Scientific Devices-East	201-871-3916
NY	Baldwinsville, Alpha Co.	315-622-3993
NY	Williamsville, Alpha Co.	716-633-1342
NC	Matthews, Datatech, Inc.	704-847-4464
Ohio	Cincinnati, Schlemmer Assoc.	513-522-8340
Ohio	Grafton, A. Risser Co.	216-458-5091
Okla	Tulsa, P. King	918-836-2501
Pa	King of Prussia, Reinbrecht Assoc.	215-265-6180
Pa	Pittsburgh, Weiss Instrs.	412-371-3020
Tex	Houston, JD Inds.	713-468-8087
Wash	Bellevue, Kakar Corp.	206-454-1318
Wisc	Milwaukee, T.R. Bickler	414-453-3772

IRD MECHANALYSIS, INC., 6150 Huntley Rd., Columbus, Ohio, 43229, Tel: 614-885-5376, Telex: 24-5318; Empl.: 250

Customer service: E. Raub

Products manufactured: Accelerometers, Analyzers, Calibrators, Meters, Services, Assembly, Production & Test, Shields, Testers, Transducers

Local Sales Offices & Reps.

Cal	Industry	213-968-3219
Cal	Lafayette	415-781-5529
Conn	Fairfield	203-255-0893
Ga	Atlanta	404-237-4875
Ill	Chicago	312-726-2969
La	Baton Rouge	504-272-0355
Mich	Farmington	313-477-2066
Mo	St. Louis	314-644-4691
NJ	Springfield	201-379-1132
NY	New York City	212-687-6754
NY	Williamsville	716-632-6699
Pa	Rosemont	215-477-0922
Pa	Verona	412-795-1606
Tex	Houston	713-645-1846
Tex	Richardson	214-352-8312
FOR:	Can., Calgary, Alberta	403-264-2568
FOR:	Can., Montreal, Que.	514-697-9992
FOR:	Can., Stoney Creek, Ontario	416-662-7577

IRISH MAGNETIC RECORDING TAPE, 270-78 Newtown Rd., Plainview, N.Y., 11803, Tel: 516-293-5582, Telex: 96-7880; Empl.: 17; Minimum order: $50

Customer service: G. Krug

Products manufactured: Tapes, Recording, Magnetic (All Types)

Local Sales Offices & Reps.

Cal	San Francisco, Meyer, Ross & Fleming	415-285-8880
Cal	Van Nuys, Mike Roth Sls. of Cal.	213-989-3738
Colo	Aurora, A-E-S	303-366-0208
Fla	Longwood, Riddle-Williams Sls. & Mktg. Co.	305-862-8722
Ga	Jonesboro, Stanley K. Wallace Assoc.	407-471-6297
Ill	La Grange, Ed Severson & Assoc.	312-246-4883
Ind	Indianapolis, C. Scheffler	317-253-6337
La	Metairie, Jack F. McKinney Sls. Co.	504-887-1723
Mass	N. Scituate, W. A. Hendrickson Co.	617-545-0652
Mich	Southfield, Robert Milsk Co.	313-354-3310
Minn	St. Paul, Skor	612-645-6461
NY	Flushing, Bettan Sls.	212-591-7600
NY	Liverpool, Lewis & Dunnigan Co.	315-622-2133
Ohio	Cleveland, Spectra Sls. Co.	216-561-8900
Okla	Tulsa, Jack F. McKinney Sls. Co.	918-742-6791
Tex	Dallas, Jack F. McKinney Sls. Co.	214-631-9450
EXP:	Plainview, N.Y., Morhan Exporting Corp.	516-293-5582

ISC MAGNETICS DIV., Instr. Sys. Corp., 35 S. Service Rd., Plainview, N.Y., 11803, Tel: 516-293-0115, TWX: 510-226-6983; Empl.: 6 .... p. 1•252

Customer service: M. Schwartz

Products manufactured: Calibrators, Dividers, Generators, Indicators, Magnetizers, Magnetometers, Magnetoresistors, Hall, Magnets, Meters, Monitors, Multipliers, Probes, Resistors, Switches, Thermistors, Transducers

TELEPHONICS, DIV, Instr. Sys. Corp., 770 Park Ave., Huntington, N.Y., 11743, Tel: 516-549-6000, TWX: 510-226-6983; Empl.: 525

For info on price: C. Hamilton 516-549-6240; Application info: C. Hamilton 516-549-6240; Customer service: T. Reith 516-549-6038; Delivery info: T. Reith 516-549-6038

Products manufactured: Comm. Systems, Handsets, Chestsets, Headphones, Headsets, Etc., Microphones, All Kinds

ISOCHEM RESINS CO., 99 Cook St., Lincoln, R.I., 02865

Products manufactured: Adhesives (All Types), Chemicals, Cleaners & Solvents, Cleaners, Ultrasonic, Coatings, Compounds, Encapsulating, Insulating, Molding, Potting, Insulators & Insulation, Materials, Self-Lubricating, Paints, Plastic Raw Materials, Liquids, Pellets, Powders, Resins

ITE IMPERIAL, Rte. 309, Norristown Rd., Springhouse, Pa., 19477

ITEK CORP. MEAS. SYS. DIV., Christina St., Newton, Mass., 02161, Tel: 617-969-7300, TWX: 710-335-6783; Empl.: 100; Minimum order: $100

Customer service: L. J. Kelly

Products manufactured: Counters, Encoders, Indicators

Local Sales Offices & Reps.

Cal	Los Altos, Wright Engrg.	415-941-4405
Cal	Los Angeles, Measurement Sys. Div.	213-641-8251
Fla	Orlando, Measurement Sys. Div.	305-896-1455
Ill	Des Plaines, Marsland Assocs. Inc.	312-298-2620
Ind	Indianapolis, Marsland Assocs. Inc.	317-924-3568
Mich	Detroit, Electro Sls. Assocs.	313-521-1500
Minn	Minneapolis, Marsland Assocs. Inc.	612-545-4481
Mo	Florissant, Marsland Assocs. Inc.	314-278-6949
NJ	Union, Measurement Sys. Div.	201-964-3000
Ohio	Cleveland, Electro Sls. Assocs. Inc.	216-261-7670
Pa	Pittsburgh, Electro Sls. Assocs. Inc.	412-371-8497
Tex	Grand Prairie, Telemetry Sls. Corp.	214-262-2649

ITHACO, INC., 735 W. Clinton St., Ithaca, N.Y., 14850, Tel: 607-272-7640, TWX: 510-255-9307; Empl.: 120; Minimum order: $200 .... p. 1•8,9,568,739

For info on price: M. Jolly; Application info: J. Hanson; Customer service: T. Hoff; Delivery info: M. Jolly

Free literature available: Preamp Specification Brochures: Discussion of Amplifier Noise, Filters Discussion of Filters and Noise, Model 3170 Applications Information, 430/450 Amplifiers Plus Discussion of Noise Application Notes:

Heterodyning Lock-In Amplifier Variable Electronic Filters Use of Filters to Measure Noise

Products manufactured: Amplifiers, Attenuators, Choppers, Data Acquisition & Reduction Systems, Filters, Hydrophones & Accessories, Light Choppers, Meters, Oceanographic Equip. (Electronic), Signal Conditioners & Equipment

Local Sales Offices & Reps.

Ala	Huntsville, W.A. Brown Instr., Inc.	205-539-4411
Cal	Cupertino, T. Louis Snitzer Co.	408-257-8333
Cal	Del Mar, T. Louis Snitzer Co.	714-454-2191
Cal	Los Angeles, T. Louis Snitzer Co.	213-836-6170
Conn	Easton, Jarrold Corp.	203-255-4133
Fla	Fort Lauderdale, W.A. Brown Instrs., Inc.	305-776-4800
Fla	Orlando, W.A. Brown Instrs., Inc.	305-425-5505
Ga	Atlanta, W.A. Brown Instrs., Inc.	404-939-1674
Ill	Skokie, Mauer Co.	312-677-4771
La	Gretna, W.A. Brown Instrs., Inc.	504-366-5766
Mass	Waltham, Jarrold Corp.	617-891-8045
Mich	Royal Oak, Meas. Instrs., Inc.	313-352-2144
Minn	Minneapolis, Heimann Co.	612-861-6051
NM	Albuquerque, Grady Moore Assocs.	505-292-3322
NY	Northport, Lindgren Assocs.	516-261-7937
NC	Research Triangle Park, W.A. Brown Instrs., Inc.	919-489-1546
Ohio	Columbus, Measurement Instrs., Inc.	614-488-9751
Tenn	Knoxville, W.A. Brown Instr.	615-584-2614
Tex	Dallas, Southwestern Eng. & Equip. Co.	214-692-8097

Va	Norfolk, Scientific Devices-D.C., Inc.	804-499-8133
Va	Springfield, Scientific Devices-D.C., Inc.	703-451-6500
Wash	Bellevue, Scientific Devices-N.W.	206-454-0900

ITI ELECTRONICS, INC., 369 Lexington Ave., Clifton, N.J., 07015, Tel: 201-546-3900; Empl.: 50; Minimum order: $10

For info on price: E. G. Nichols; Application info: E. G. Nichols; Customer service: M. DeBliek; Delivery info: M. DeBliek

Products manufactured: Amplifiers, Attenuators, Bridges, Cable Assemblies & Harnesses, Coils Including Assemblies & Forms, Comm. Systems, Converters, Detectors, Equalizers, Filters, Panels, Power Supplies, Services, Assembly, Production & Test, Transformers

C. ITOH ELECTRONICS, INC., 280 Park Ave., New York, N.Y., 10017, Tel: 212-953-5452; Empl.: 100; Minimum order: $100 .... p. 1•176

Customer service: H. Weck

Free literature available: We have digital printers, alpha numeric, segment impact types.

Products manufactured: Printers

Local Sales Offices & Reps.

Ala	Huntsville, Technical Assocs.	205-881-8494
Ariz	Scottsdale, BFA Corp.	602-946-4215
Cal	Marina Del Rey, Delta Mutual Sls.	213-823-0643
Colo	Denver, BFA Corp.	303-744-3301
Fla	Orlando, Technical Assocs.	305-894-7531
Ill	Des Plaines, Coombs Assocs.	312-298-4830
Iowa	Cedar Rapids, Tech. Reps.	319-363-2489
Kans	Olathe, Tech. Reps.	913-782-1177
La	Shreveport, IBL Engrg. & Sls.	
Mass	Chelmsford, S & S elctrns.	617-256-8731
Minn	Hopkins, Grayden & Flemmer	612-941-1120
Mo	Hazelwood, Technical Reps.	314-731-5200
NM	Las Cruces, BFA Corp.	505-523-0601
NY	Mamaroneck, Cane Tech. Sls.	914-698-4411
NY	Rochester, L-Mar Assocs.	716-328-5240
Ohio	Cleveland, Components Inc.	216-842-2737
Okla	Oklahoma City, IBL Engrg. & Sls.	405-843-9434
Pa	Norristown, Data Engrg. Co.	215-279-8146
SC	Spartanburg, Technical Assocs.	803-579-2904
Tex	Dallas, IBL Engrg. & Sls.	214-363-2921
Utah	Salt Lake City, BFA Corp.	801-466-6522
Wash	Seattle, R. S. Drake Assocs.	206-763-2755

Local Distributors

Cal	Burlingame, Itoronics Lab, 381 Beach Rd.

ITT CANNON ELECTRIC, 666 E. Dyer Rd., Santa Ana, Cal., 92702, Tel: 714-557-4700, TWX: 910-595-1131; FSC No: 71468; QPL No: Multiple; Empl.: 1700; Minimum order: $50 .... p. 2•687-693

Customer service: J. Tison

Free literature available: Connector Selection Guide.

Products manufactured: Cable Assemblies & Harnesses, Cable, CATV Systems & Equipment, Connectors, Sockets, Tools, Wire Strippers

Local Sales Offices & Reps.

Ala	Huntsville, Brandel-Stephens & Co.	205-883-0445
Ariz	Phoenix, ITT Cannon Elec.	602-273-0755
Cal	Los Altos, Recht Assocs.	415-941-0336
Cal	San Marcos, ITT Cannon Elec.	714-743-4554
Cal	Santa Ana, ITT Cannon Elec.	714-557-4700
Colo	Englewood, ITT Cannon Elec.	303-770-1631
Conn	Tolland, ITT Cannon Elec.	203-872-2119
Fla	Deerfield Beach, Brandel-Stephens & Co.	305-427-8558
Fla	Orlando, Brandel-Stephens & Co.	305-425-3202
Ga	Atlanta, Brandel-Stephens & Co.	404-261-7579
Ill	Des Plaines, ITT Cannon Elec.	312-297-3150
Ind	Muncie, ITT Cannon Elec.	317-257-7879
Kans	Leawood, Thunderbird Tech. Sls. & Svcs., Inc.	913-642-7220
Kans	Wichita, Thunderbird Tech. Sls. & Svcs.	316-684-3941
Mass	Swampscott, ITT Cannon Elec.	617-729-8950
Mich	Detroit, ITT Cannon Elec.	313-534-0360
Minn	Minneapolis, ITT Cannon Elec.	612-854-1973
Mo	St. Louis, Thunderbird Tech. Sls. & Svcs., Inc.	314-567-6488
NY	Dewitt, Tri-Tech Elctrns., Inc.	315-446-2881
NY	E. Rochester, Tri Tech Elctrns.	716-381-2722
NY	Elmsford, ITT Cannon Elec.	
NY	Larchmont, Tri Tech Elctrns.	914-834-4423
Ohio	Bedford, ITT Cannon Elec.	216-248-8800
Ohio	Kettering, ITT Cannon Elec.	513-434-8181
Pa	Feasterville, Professional Svc. Assocs.	215-355-6244
Pa	Fort Washington, ITT Cannon Elec.	215-646-2801
Tex	Dallas, ITT Cannon Elec.	214-661-0302
Tex	Houston, ITT Cannon Elec.	713-721-3999
Va	Alexandria, ITT Cannon Elec.	703-370-5733
Va	Roanoke, ITT Cannon Elec.	703-362-0749
Wash	Bellevue, ITT Cannon Elec.	206-454-3903
EXP:	Santa Ana, Cal., ITT Cannon Elec.	714-557-4700
FOR:	Can., Montreal, Que., ITT Cannon Elec. Can.	514-336-7660
FOR:	Can., North Vancouver, B.C., Arwin Tech. Sls.	604-980-4346
FOR:	Can., Whitby, Ont., ITT Cannon Elec.	416-668-8881

ITT COMPS. GRP., Electro Mechanical Comps., 1551 Osgood St., N. Andover, Mass., 01845, Tel: 617-688-1881

Products manufactured: Motors, Relays, Switches

Local Sales Offices & Reps.

Ala	Huntsville, Rep., Inc.	205-881-9270
Cal	Mountain View, Nor-Cal	415-961-8121
Colo	Lakewood, Tri-Tronix	303-237-0774
Conn	Hamden, Impact Sales	203-281-1331
Fla	Indian Rock Beach, Tech-Rep Assocs.	813-595-2834
Ga	Tucker, Rep. Inc.	404-938-4358
Ill	Hinsdale, Hill-Gray Assocs.	312-325-4810
Iowa	Cedar Rapids, Reid Assocs.	319-362-6302
Kans	Wichita, M.E. Bettis Co.	316-685-7441
Mass	Waltham, Impact Sales	617-893-2850
Mich	Warren, DEM Elctrns.	313-755-6660
Minn	Minneapolis, S® Comps. Sls.	612-544-3022
NM	Albuquerque, Tri-Tronix	505-265-0172
NY	Syracuse, NYCOM	315-437-8343
NY	Valley Cottage, LRC Assocs.	914-634-7973
NC	Raleigh, Candor Co.	919-876-4999
Ohio	Cincinnati, Giesting Assocs.	513-931-0812
SC	Myrtle Beach, Candor Co.	803-448-8361
Tenn	Chattanooga, Candor Co.	615-894-7454
Tex	Dallas, W. Reese Assocs.	214-638-6575
Va	Lynchburg, Candor Co.	804-846-6579
Wash	Bellevue, Vantage Corp.	206-455-3460

ITT ELECTRON TUBE, Box 100, Easton, Pa., 18042, Tel: 215-252-7331; Empl.: 550; Minimum order: $50

Customer service: W. Jakimer

Products manufactured: Lamps, Tubes

Local Sales Offices & Reps.

Cal	Los Angeles	213-367-5988
Ill	Chicago	312-782-4359
Md	Baltimore	301-467-5733
Mass	Waltham	617-893-5579
NJ	Nutley	201-284-2762

ITT GENERAL CONTROLS, 801 Allen Ave., Glendale, Cal., 91201, Tel: 213-842-6131, TWX: 910-498-2225; Empl.: 1892

For info on price: Prod. Mgr.; Application info: Application Engineer; Customer service: S. Garner; Delivery info: S. Garner

Free literature available: All products are supported by Technical Data sheet and catalog.

Products manufactured: Controls/Control Eqpt., Counters, Printers, Valves, Solenoid

Local Sales Offices & Reps.

Cal	Burlingame	415-342-8391
Cal	Glendale	213-842-6131
Colo	Denver	303-572-8494
Ga	Atlanta	404-451-5895
Ill	Des Plaines	312-299-2237
Kans	Shawnee Mission	913-631-1188
Mich	Birmingham	313-642-1847
Minn	Minneapolis	612-929-6772
Mo	Manchester	314-391-8456
NJ	Teaneck	201-836-2444
NC	Charlotte	704-334-6511
Ohio	Dayton	513-298-8771
Ohio	Fairview Park	216-333-2306
Ohio	Troy	513-335-3583
Okla	Tulsa	918-627-9145
Pa	Folcroft	215-534-2800
RI	Warwick	401-739-6336
Tenn	Hendersonville	615-824-6838
Tex	Dallas	214-358-2555
Tex	Houston	713-666-4261

ITT GILFILLAN DIV. OF ITT, 7821 Orion Ave., Van Nuys, Calif., 91409, Tel: 213-988-2600, TWX: 910-495-1787; FSC No: 24930; Empl.: 1500; Minimum order: $100

Customer service: F. J. Brennan

Free literature available: The near and far reaches of space - ITT Gilfillan capabilities brochure, Quadradar - the world's most versatile air traffic control radar, Series 32 - the world's most advanced family of 3D surveillance radars.

Products manufactured: Antennas, Radar Systems, Receivers

ITT HARPER, 8200 Lehigh Ave., Morton Grove, ILL., 60053, Tel: 312-966-6000; Empl.: 875; Minimum order: $20

Customer service: R. Gilbert

Free literature available: Bulletin # 114 - Checklist of stock corrosion resistant fasteners.

Products manufactured: Fasteners, Rivets

Local Sales Offices & Reps.

Ala	Birmingham	205-324-5678
Cal	Berkeley	415-357-2655
Cal	Monterey Park	213-268-1345
Colo	Denver	303-433-7397
Fla	Hialeah	305-887-8151
Ga	Atlanta	404-355-0330
Ill	Elk Grove Village	312-595-7220
Ind	Indianapolis	317-244-7888
La	New Orleans	504-246-0000
Md	Baltimore	301-866-1600
Mass	Winchester	617-729-8700
Mich	Troy	313-585-7510
Mo	St. louis	314-781-9906
NY	Castleton-on-Hudson	518-732-7711
NY	Mt. Vernon	914-664-7555
NY	Rochester	813-877-9193
NC	Charlotte	704-376-1854
Ohio	Cincinnati	513-733-4411
Ohio	Cleveland	216-781-4411
Pa	Philadelphia	215-329-8900
Pa	Pittsburgh	412-242-8901
Tex	Dallas	214-241-2353
Tex	Houston	713-223-4204
Wash	Seattle	206-783-9200
Wisc	Milwaukee	414-272-3565

ITT-HIGBIE MFG. CO., Wagner Rd., Rochester, Mich., 48063, Tel: 313-651-5300, TWX: 810-232-1592; Empl.: 1500

Customer service: D. J. Campbell

Products manufactured: Tubing

Local Sales Offices & Reps.

Cal	Los Angeles, E.J. Brookes Co.	213-723-8431
Ill	Lombard, A.G. Pinder	312-627-4678
Mich	Rochester, ITT Higbie Mftg. Co.	313-651-5300
Mich	Tecumseh, M.G. Coulter	313-423-4300
NJ	Rumson, Phillips Tube Co.	201-842-5168
Tenn	Hermitage, Cap-I-Tol Sls.	615-254-8295
Tex	Dallas, W.P. Schoenfield	214-352-6200

ITT HOLUB INDUSTRIES, 413 West Elm, Sycamore, Ill., 60178, Tel: 815-895-6501; Empl.: 110; Minimum order: $50

For info on price: J. W. Hope; Application info: T. McNieve; Customer service: T. McNieve; Delivery info: R. Parsons

Free literature available: OSHA - 972 - Product des. by family.

Products manufactured: Clamps & Clips, Connectors, Cutters, Wire, Hand Operated, Meters, Wire & Cable Ties, Wire Nuts, Wire Strippers, Wrenches

ITT INDUSTRIAL & AUTOMATION SYSTEMS, 41225 Plymouth Rd., Plymouth, Mich., 48170, Tel: 313-427-9300, Telex: 23-5816; Empl.: 200

For info on price: G. McAlpine; Application info: W. Ferris; Customer service: M. Wylie; Delivery info: G. McAlpine

Free literature available: Soldering Systems: Brochure describes system modules and applications of typical systems.

Products manufactured: Detectors, Soldering Equipment

Local Sales Offices & Reps.

Ala	Birmingham, E. Pickett Co.	205-879-4726
Ariz	Phoenix, Bews & Wallace Co.	602-275-4496
Cal	Alhambra, H.E. Wales & Assocs.	213-576-0953
Cal	San Francisco, Process Equip. Co.	415-397-1496
Colo	Englewood, G.M. Wallace & Assocs.	303-771-5960
Conn	Bloomfield, Wetzel Tool Corp.	203-242-8535
Fla	Orlando, B. Woodruff, Inc.	305-424-2771
Ga	Atlanta, Crigler Engrg.	404-351-3733
Ill	Chicago, Mills-Winfield Engrg. Sls.	312-648-1373

Ind	Kokomo & Indianapolis, Stout, Loman & Thompson	317-459-8236
Ky	Louisville, Miller-Harrington Ind'l. Sls.	502-893-5859
La	New Orleans, Betz Engrg. Sls. Co.	504-486-5452
Mass	Boston, Harris & Underhill	617-426-3544
Mich	Farmington, Garrett-Burgess	313-477-7440
Mich	Lansing, A.D. Schneider & Co.	517-482-1337
Minn	Minneapolis, Mills-Winfield	612-920-1199
Minn	Minneapolis, W.H. Schulz Co.	612-544-0133
Mo	St. Louis, Ind'l. Process Equip.	314-534-3100
Mo	St. Louis, Process & Chemical Equip. Co.	314-771-4741
NJ	Mountain Lakes, Dearie & Farrell Co.	201-334-4848
NY	Rochester, Brook-Anco Corp.	716-271-4100
NC	Charlotte, F. D. Hurka Co.	704-366-0209
NC	High Point, Hersey-Thomas	919-882-1132
Ohio	Cuyahoga Falls, W.T. Kendall Co.	216-928-3636
Ohio	Dayton, Production Engrg. Sls.	513-278-4741
Okla	Oklahoma City, Southwestern Gage & Sls.	405-787-1734
Ore	Portland, N. Rupp Co.	503-228-4311
Pa	Bethel Park, D.A. Roberts & Sons	412-561-6404
Pa	Newtown Squares, Holco, Inc.	215-353-2060
SC	Greenville, Hersey-Thomas	803-232-5261
Tenn	Memphis, M-P Sls. Co.	901-274-6933
Tex	Dallas, Southwestern Gage & Sls.	214-358-5151
Tex	Houston, Southwestern Gage & Sls.	713-523-4606
Utah	Salt Lake City, Pelton Equip. Co.	801-484-3522
Va	Alexandria, Chemical Etching Equip. & Supply	703-971-2646
Wash	Bellevue, H.F. Soderling	206-885-2535
Wisc	Elm Grove, Mills-Winfield Engrg. Sls.	414-782-5372

ITT JENNINGS, INSTRUS. & SYSTEMS, Div. Int'l. Telephone & Telegraph Corp., 970 Mc Laughlin Ave., San Jose, Cal., 95116, Tel: 408-292-4025, TWX: 910-338-0159 ... p. 1•740,741

Products manufactured: Dividers, Meters, Power Supplies, Probes, Testers

Local Sales Offices & Reps.

Ala	Huntsville, Lee Assocs., Inc.	205-533-5896
Ariz	Scottsdale, BFA Corp.	602-946-4215
Cal	Calabasas, Shovlowsky	213-348-3402
Cal	Palo Alto, Held & Mollard	415-965-9321
Colo	Denver, BFA Corp.	303-744-3301
Conn	Hartford, Newmar Assocs.	203-523-0402
Fla	Winterhaven, Lee Assocs.	813-294-5815
Ga	Chamblee, Lee Assoc.	404-457-7117
Ill	Northbrook, Electronic Instrument Assocs.	312-498-4500
Ind	Indianapolis, Electronic Instrument Assocs.	317-257-7231
Mass	Lynnfield, Newmar Assocs.	617-245-7960
Mo	St. Louis, Scherrer Inst.	314-644-5362
NM	Albuquerque, BFA Corp.	505-296-8303
NM	Las Cruces, BFA Corp.	505-523-0601
NY	Binghamton, Ossman Instrs.	607-785-9947
NY	East Syracuse, Ossman Instr.	315-437-6666
NY	Great Neck, Eastern Instrumentation	516-466-9505
NY	Rochester, Ossman Instr.	716-328-2230
NC	Raleigh, Lee Assocs.	919-787-5818
Ohio	Dayton, Whelan Corp.	513-434-7551
Okla	Norman, Data Mktg. Assocs., Inc.	405-364-8320
Tex	Dallas, Data Mktg. Assocs.	214-661-0300
Tex	Houston, Data Mktg. Assocs.	713-686-9627
Tex	San Antonio, Data Mktg. Assocs.	512-828-0937
Wash	Bellevue, Conrard-Carlson	206-455-1336
EXP:	Downsview, Ontario, Can., Meter Master	416-661-3190

ITT JENNINGS, Monrovia Plant, 1960 Walker Ave., Monrovia, Cal., 91016, Tel: 213-359-8281, TWX: 910-585-1830; Empl.: 160

Products manufactured: Capacitors, Fixed, Capacitors, Variable, Films, Filters, Foil, Forms, Wire

Local Sales Offices & Reps.

Ariz	Scottsdale, R. R. Thomas Co.	602-994-0401
Cal	Los Altos, Horne Associates	415-948-5823
Cal	Monrovia, ITT Jennings Monrovia Plant	213-357-1185
Cal	San Diego, Bestronics, Inc.	714-278-2150
Fla	Palm Beach Gardens, Beacon Assoc.	305-622-2770
Ga	Atlanta, Beacon Assoc.	404-351-3654
Ill	Elmhurst, Schuten Assoc.	312-833-0980
Ind	Ft. Wayne, Delesa	219-483-7486
Iowa	Cedar Rapids, Reid Assoc.	319-362-6302
Md	Timonium, Marktron Inc.	301-762-6210
Mass	Lexington, Kitchen & Kutchin	617-862-8230
Minn	St. Paul, R. G. Ragon Inc.	612-488-0201
NJ	Dunellen, ITT Jennings	201-968-6556
NJ	Tenafly, ABC Elctrn. Sls.	201-568-2354
NY	New Rochelle, Montclair Electronics	914-576-1400
NY	Syracuse, Nycom	315-437-8343
NY	Williston Park, ABC Elctrn. Sls.	516-747-6610
Ohio	Dayton, Whelan Corp.	513-434-7551
Pa	Bethayres, ABL Electronic Sales Co.	215-464-2275
SC	Spartanburg, Beacon Assoc.	803-576-7462
Tex	Dallas, R. R. Thomas Co.	214-363-8591
Wash	Bellevue, Ray Over Sls.	206-454-4551

ITT JENNINGS, VACUUM ELCTRN. PRODS., Div. Int'l. Telephone & Telegraph Corp., 970 McLaughlin Ave., San Jose, Cal., 95116, Tel: 408-292-4025, TWX: 910-338-0159; Empl.: 350

p. 1•1733-1738,2077-2079; p. 2•198-200

Products manufactured: Capacitors, Fixed, Capacitors, Variable, Relays, Services, Assembly, Production & Test, Switches

Local Sales Offices & Reps.

Ala	Huntsville, Brandel-Stephens	205-883-0445
Ariz	Scottsdale, BFA Corp.	602-946-4215
Cal	Palo Alto, Engineering Assocs.	415-494-7842
Colo	Denver, BFA Corp.	303-744-3301
Fla	Deerfield Beach, Brandel-Stephens	305-427-8558
Fla	Orlando, Brandel-Stephens	305-425-3202
Ga	Atlanta, Brandel-Stephens	404-261-7579
Ill	Chicago, Berndt Assocs.	312-283-0713
Kans	Shawnee Mission, Lowell-Kangas & Assoc.	913-631-3515
Md	Rockville, Marktron, Inc.	301-762-6210
Md	Timonium, Marktron, Inc.	301-252-7111
Mich	Troy, Peters Assoc.	313-524-2920
Mo	St. Louis, Lowell-Kangas & Assoc.	314-821-4050
NJ	Tenafly, ABC Elctrns. Sls.	201-568-2354
NM	Albuquerque, BFA Corp.	505-292-1212
NM	Las Cruces, BFA Corp.	505-523-0601
NY	N. Tarrytown, ABC Elctrn. Sls.	914-631-2650
NY	Syracuse, Nycom Inc.	315-437-8343
NY	Williston Pk., ABC Elctrn. Sls.	516-747-6610
Ohio	Dayton, Whelan Corp.	513-434-7551
Pa	Huntington Valley, ABC Elctrn. Sls.	215-464-2275
Tex	Richardson, P.J. Scanlon	214-231-4661
Va	Charlottesville, Marktron	301-762-6210

ITT MACKAY MARINE, 2912 Wake Forest Rd., Raleigh, N.C., 27611, Tel: 919-828-4441; Empl.: 525

Products manufactured: Alarms, Amplifiers, Antennas, Comm. Systems, Direction Finders, Generators, Indicators, Inverters, Radar Systems, Receivers, Synthesizers, Teleprinters, Teletypewriters & Equipment, Transceivers, Transmitters, Underwater Communication, Detection, Navigation, etc. Equipment

Local Sales Offices & Reps.

La	Metairie	504-887-4200
NJ	Elizabeth	201-527-0300
Wash	Seattle	206-283-4204

Advertisment

ITT Mackay Marine designs and manufactures a complete line of communications and navigational equipment systems, includes Synthesized Receivers (15 kHz to 30 MHz), Synthesized Transmitters 2-30 MHz Solid State Transmitters and Receivers, Auto alarms, Keyers, Radio Direction Finders, Lorans, Omega Receivers, Antenna systems and Survival equipment.

ITT POMONA ELECTRONICS DIV., 1500 E. 9th St., Box 2767, Pomona, Cal., 91766, Tel: 714-623-3463, TWX: 910-581-3822; FSC No: 05276; Empl.: 100; Minimum order: $25 ... p. 2•727-787

For info on price: Sls. Dept.; Application info: J. J. Musarra; Customer service: Sls. Dept.; Delivery info: Sls. Dept.

Free literature available: Electronic Test Accessory Catalog

Products manufactured: Bars, Shorting, Boards, Printed Circuit, Cable Assemblies & Harnesses, Clamps & Clips, Connector Adapters, Connectors, Containers, Cords, Enclosures, Module, Plug-In, Jack Adapters (All Types), Jacks (All Types), Jumpers, Leads, Test & Adaptors, Meters, Plug Adapters, Plug & Jack Sets, Posts, Probes, Sockets, Terminals

Local Sales Offices & Reps.

Ala	Madison, South Eastern Assoc.	205-722-9616
Ariz	Phoenix, H.A. Moore Sls. Co.	602-274-4558
Ariz	Scottsdale, DeAngelo, Rothman & Cheever, Inc.	602-947-6626
Cal	Beverly Hills, Intercontinental Aviation	213-274-7578
Cal	Culver City, DeAngelo,Rothman	213-398-6239
Cal	La Selva Bch., Belchamber & French	408-722-0444
Cal	Palo Alto, Engineering Assoc.	415-494-7842
Cal	Pasadena, P. Nurches	213-681-8957
Colo	Aurora, AES, Inc.	303-EM 6-0208
Fla	No. Miami, L. Haas	305-949-9143
Ill	Lincolnwood, W.M. Linz	312-677-2000
Ind	Indianapolis, Blind & Assoc., Inc.	317-251-1249
Mass	Sharon, A Appell Assoc.	617-SU 4-3439
Mich	Kentwood, C. Geer	616-534-9449
Minn	Mpls., Northern States	612-888-3300
Mo	Crestwood, NEVCO	314-843-7406
Mo	Kansas City, NEVCO, Inc.	816-421-1751
NY	Long Island City, Tobias	212-545-9191
Ohio	Cleveland, P. Lohse	216-381-4424
Pa	Philadelphia, D.S. Linz	215-ES 9-0734
SC	Greenville, H. C. Norman	803-244-6254
Tex	Dallas, Techno Assocs.	214-FL 7-9213
Wash	Seattle, R.K. Squibb	206-632-2450
FOR:	Can., Whitby, Ont., ITT Cannon Electric	416-668-8881

ITT SEMICONDUCTOR, 3301 Electronics Way, West Palm Beach, Fla., 33407, Tel: 305-842-2411, TWX: 510-952-7605; Empl.: 1350

Products manufactured: Amplifiers, Capacitors, Fixed, Circuits, Integrated, Silicon Monolithic, Unpackaged Chips, Converters, Counters, Diodes, Dividers, Drivers & Decoders For Readouts, Integrated Circuit Devices, Multiplexers, Rectifiers, Semiconductor Wafer Fabrication, Shift Registers, Timers, Transistors

Local Sales Offices & Reps.

Ala	Huntsville, Rep, Inc.	205-881-9270
Ariz	Tempe, ITT Semiconductors	602-277-8166
Cal	Inglewood, ITT Semiconductors	213-649-4644
Cal	Mountain View, Nor-Cal Assocs.	415-961-8121
Cal	Palo Alto, ITT Semiconductors	415-961-5265
Cal	San Diego, JTL Assocs.	714-277-8044
Cal	Woodland Hills, Interstate Mktg.	213-883-7606
Colo	Denver, Checkmate Sls.	303-771-4920
Fla	Palm Beach Gardens, Trainor Sls.	305-622-1383
Fla	West Palm Beach, ITT Semiconductors	305-842-2411
Ill	Chicago, ITT Semiconductors	312-693-7070
Ill	Rolling Meadows, Sumer, Inc.	312-394-4900
Iowa	Cedar Rapids, S & O Sls. Co.	319-393-1845
Md	Baltimore, Coulbourn-DeGreif, Inc.	301-247-4646
Mass	Lexington, ITT Semiconductors	617-861-0880
Mich	Farmington, ITT Semiconductors	313-477-6060
Mich	Livonia, Rep-Tron	313-261-7446
Minn	Minneapolis, ITT Semiconductors	612-920-2943
Mo	Grandview, Beneke & McCaul, Inc.	816-765-2998
NY	Fayetteville, ITT Semiconductors	315-445-0560
NY	Huntington, Caravan Sls.	516-692-2839
NY	Jericho, ITT Semiconductors	516-938-1191
NY	Syracuse, Precision Power	315-477-3200
NY	Valley Cottage, LRC Assocs.	914-634-7973
Ohio	Cincinnati, Giesting Assocs.	513-931-0812
Pa	Wayne, ITT Semiconductors	215-688-6990
Tex	Dallas, ITT Semiconductors	214-242-8164
Wash	Tukwila, General Elctrns.	206-243-5141
EXP:	Mississauga, Ont., Can., ITT Semiconductors	416-625-9022
EXP:	Montreal, Que., Can., Vitel Elctrns.	514-331-7393

ITT SEMICONDUCTORS-CAPACITORS, 1551 Osgood St., No. Andover, Mass., 01845, Tel: 617-688-1881, TWX: 710-344-0718; Empl.: 30

Products manufactured: Capacitors, Fixed, Motors, Rectifiers, Relays, Sockets, Switches

Local Sales Offices & Reps.

Ala	Huntsville, Rep Inc.	205-881-9270
Ariz	Scottsdale, R.R. Thomas Co.	602-994-0401
Cal	Mt. View, Nor Cal Assoc.	415-961-8121

Cal	San Jose, ITT	408-247-6400
Colo	Lakewood, Tri Tronix	303-237-0774
Conn	Hamden, Impact Sls.	
Fla	Indian Rocks Beach, Tech. Rep.	813-595-2834
Iowa	Cedar Rapids, Reid & Assoc.	319-362-6302
Mass	Waltham, Impact Sls.	617-893-2850
Mich	Warren, DEM Elct. Sls.	313-755-6660
Minn	Minneapolis, S & R Comp. Sls.	612-544-3022
NM	Albuquerque, Tri-Tronix	505-265-0172
NY	Syracuse, Nycom Inc.	315-437-8343
NY	Valley Cottage, LRC Assocs.	914-634-7973
NC	Raleigh, Candor Co.	919-787-2652
Ohio	Cincinatti, Giesting Assocs.	513-931-0812
SC	Myrtle Beach, Candor Co.	803-448-5213
Tenn	Chattanooga, Candor Co.	615-894-7454
Tex	Dallas, R.R. Thomas Co.	214-363-8591
Va	Lynchburg, Candor Co.	703-846-6579
Wash	Bellevue, Vantage Corp.	206-455-3460

ITT SEMICONDUCTORS DISCRETE DEVICES, 500 Broadway, Lawrence, Mass., 01841

ITT SEMICONDUCTORS PASSIVE COMPONENTS, 1551 Osgood St., No. Andover, Mass., 01845

ITT SEMICONDUCTORS RECTIFIERS, 1551 Osgood St., No. Andover, Mass., 01845

ITT TELECOMMUNICATIONS, Apparatus Dept., Fulton Dr., Corinth, Miss., 38834, Tel: 601-287-3771, TWX: 510-984-0211; Empl.: 1100

Application info: M. Ayrer; Customer service: J. Livingston; Delivery info: J. Livingston

Products manufactured: Comm. Systems, Dials

ITT THERMOTECH, Div. Int'l. Telephone & Telegraph Corp., 1202 S. 5th St., Hopkins, Minn., 55343, Tel: 612-938-7671; Empl.: 515 .... p. 2•1231-1233

Products manufactured: Bobbins, Winding, Coil & Transformer, Coils Including Assemblies & Forms, Covers, Protective (Including Dust), Keyboards, Alphanumeric & Decimal, Services, Assembly, Production & Test, Terminals

Local Sales Offices & Reps.

Ariz	Phoenix, Toward Engrg. Assoc., Inc.	602-277-1453
Cal	Belmont, C. Crisler	415-591-5363
Cal	Glendale, Secana Co.	213-240-7570
Colo	Denver, T. Mc Sherry	303-238-8361
Conn	W. Hartford, D. Kelley	203-233-0870
Conn	West Simsburg, R. Russ	203-658-6261
Fla	St. Petersburg, Florida Div.	813-347-2191
Ill	Chicago, J. Robinson	312-777-6200
Ill	Norridge, B. Reynolds	312-824-4129
Ind	Ft. Wayne, R. McCampbell	219-747-9697
Iowa	Des Moines, F. F. Wilcox	515-255-8416
Kans	Mission, Inland Assocs.	913-362-2366
Ky	Mt. Sterling, M.F. Eubanks	606-498-5955
Mass	Newton Upper Falls, Anchor Engrg.	617-964-6205
Mich	Detroit, G. Hall	313-864-1368
Mich	Farmington, L. George	313-477-5833
Minn	Minneapolis, W. J. Houlihan	612-544-3023
Mo	Glenco, R.L. Omer	314-938-4992
Mo	St. Louis, E. Monnig	314-991-2512
NJ	Union, Plastech	201-687-4810
NY	Fairport, P. B. Schumacher	716-223-2488
NY	Manhasset, Kaelber & Mack	516-627-6620
NC	Charlotte, Spartan Assoc.	704-523-8419
NC	Greensboro, Mfrs. Sls.	919-274-2474
Ohio	Cleveland, G. Richards	216-221-3634
Okla	Tulsa, T. J. Ray Co.	918-627-1515
Ore	Portland, C. E. Riggs	503-226-3286
Pa	Ardmore, Midlantic Plastic Sls.	215-649-2436
Tex	Dallas, Ammon & Rizos	214-233-5591
Tex	Houston, G. Knower	713-781-6240
Wash	Seattle, J. Perkins	206-623-5707
Wisc	Menomonee, D. Jensen	414-251-9230

J-B-T INSTRS., INC., Box 1818, New Haven, Conn., 06508, Tel: 203-772-2220, TWX: 710-465-3165; Empl.: 300 .... p. 1•742-745,2080-2087

Free literature available: TS-7-various types of MIL and commercial toggle switches. MT-40-types of sub-miniature toggle, rocker and paddle lever switches. 1172A-frequency and elapsed time meters, 12, 14 and 20 position rotary switches and other J-B-T products.

Products manufactured: Indicators, Meters, Switches

Local Sales Offices & Reps.

Cal	Inglewood, J. Berman Co.	213-678-1281
Cal	La Mesa, J. Berman Co.	714-583-6457
Cal	Oakland, Moulthrop Sls.	415-261-7676
Colo	Denver, Nelson Co.	303-573-1516
Conn	Wallingford, Adams-McGregor, Inc.	203-269-5816
Fla	Maitland, Hutto-Hawkins-Peregoy	305-831-2474
Fla	Pompano Beach, Hutto-Hawkins-Peregoy	305-943-9593
Ga	Atlanta, Millar Elctrns.	404-261-6160
Ill	Oak Park, G. Petitt Co.	312-369-8940
Ind	Fort Wayne, W.W. Bieberich	219-432-2537
Kans	Overland Park, T.L. Dowell & Assocs.	913-236-8200
Md	Reisterstown, Massey Assocs.	301-833-2039
Mass	Scituate, Adams-McGregor, Inc.	617-542-3773
Mich	St. Clair Shores, J.M. Thorpe Co.	313-779-6363
Minn	Minneapolis, Heimann Co.	612-861-6051
NY	Long Island City, D.F. Tobias & Co.	212-545-9191
NY	Syracuse, H.R. Murray, Inc.	315-446-5555
NC	Raleigh, Millar Elctrns., Inc.	919-787-9564
Ohio	Dayton, C.H. Dolfuss, Jr. & Co.	513-275-4831
Ohio	Rocky River, C.H. Dolfuss, Jr. & Co.	216-333-7504
Pa	Media, Snyder & Massey Assocs.	215-566-5400
Pa	Pittsburgh, G.S. Root & Co.	412-561-4125
RI	Lincoln, Adams-McGregor, Inc.	401-726-1300
Tex	Dallas, Lund & Co.	214-358-4335
Wash	Seattle, J.J. Backer Co.	206-285-1300

JACKSON BROS., (LONDON) LTD., 258 Bway., New York, N.Y., 10007, Tel: 212-WO 2-5485; Minimum order: $10 .... p. 2•196,197

Customer service: Swedgal Elctrns.

Products manufactured: Capacitors, Fixed, Capacitors, Variable, Couplings, Dials, Drives & Drive Mechanisms (Dial), Encoders, Gears & Gear Mechanisms (Precision), Locks, Dial & Shaft, Terminal Blocks, Boards & Strips, Terminals, Transducers

Local Sales Offices & Reps.

Cal	Encino, V & L Assocs., Inc.	213-986-9703
Ill	Westchester, W.G. Brouillette	312-345-6500

JAESIC INDUSTRIES CO., 29830 Beck, Wixom, Mich., 48096, Tel: 313-624-6411; Empl.: 18; Minimum order: $250

For info on price: J. J. Tomecek; Application info: K. J. Sekenske; Customer service: J. W. Tomecek; Delivery info: F. Tomecek

Free literature available: Brochures

Products manufactured: Amplifiers, Cards, Linear Function, Cards, Logic, Chargers, Battery, Coders, Controls/Control Eqpt., Converters, Generators

Local Sales Offices & Reps.

Fla	Hollywood, R. L. Tomecek Co.	305-752-0226
Ill	Lombard, A. Bolin	312-627-6802
Mich	Ann Arbor, Lama Enterprises	313-761-4323
Mich	Detroit, Professional Med. Dist.	313-624-6413

JAIDINGER MFG. CO., INC., 1921 W. Hubbard St., Chicago, Ill., 60622, Tel: 312-421-1090; Empl.: 35; Minimum order: $10

Customer service: F. M. Smith

Free literature available: Brochure RS-65 describes and illustrates typical relays and switches we can produce, to customer's specifications, from modular components.

Products manufactured: Relays, Switches

JAMESBURY CORP., 640 Lincoln St., Worcester, Mass., 01605, Tel: 617-852-0200, TWX: 710-340-1268; Empl.: 800

Free literature available: Bulletin #233 Ball Valves for Vacuum Service 247 Butterfly Valves for Vacuum Service 213 Style B 3-piece Valves P137 Wafer-Sphere Butterfly Valves 251 Pneumatic piston actuators 252 Quadra-Powr spring-diaphragm actuators 215 Clincher Ball Valves

Products manufactured: Actuators, Valves, Vacuum

Local Sales Offices & Reps.

Ala	Pleasant Grove, Jamesbury Corp.	205-787-1429
Cal	Mill Valley, Jamesbury Corp.	415-982-0606
Cal	Westlake Village, Jamesbury Corp.	213-264-7508
Fla	Jacksonville, Jamesbury Corp.	904-768-0411
Ill	Prestbury, Jamesbury Corp.	312-858-1060
La	Baton Rouge, Jamesbury Corp.	504-344-1933
Mich	Milford, Jamesbury Corp.	313-547-5070
Mo	Kansas City, Jamesbury Corp.	816-531-2700
NY	New York, Jamesbury Corp.	212-964-8852
NY	Pittsford, Jamesbury Corp.	716-381-2282
NC	Charlotte, Jamesbury Corp.	704-376-6393
Ohio	Chagrin Falls, Jamesbury Corp.	216-543-4202
Ohio	Dayton, Jamesbury Corp.	513-579-[illegible]47
Pa	Newtown Square, Jamesbury Corp.	215-353-4670
Pa	Pittsburgh, Jamesbury Corp.	412-341-3338
Tex	Houston, Jamesbury Corp.	713-622-1671
Tex	Irving, Jamesbury Corp.	214-259-8460
Wash	Mercer Island, Jamesbury Corp.	206-682-6997
EXP:	Tenn., Murfreesboro, Jamesbury Corp.	615-256-0643
FOR:	Can., Ottawa 15, Ont., Jamesbury Canada Ltd.	613-746-2211

JAN HARDWARE MFG. CO., 47-27 36th St., Long Island City, N.Y., 11101, Tel: 212-361-0800; FSC No: 99813; QPL No: 3926; Empl.: 60; Minimum order: $25 p. 2•1088-1103

For info on price: I. Wasserman; Application info: R. Oddo; Customer service: J. RAy; Delivery info: L. Marra

Free literature available: Catalog including products listed in EEM.

Products manufactured: Alarms, Bezels, Shielded & Unshielded, Brakes, Bumpers, Bushings, Glass, Plastic, Metal, Rubber, Etc., Cabinets & Accessories, Chassis, Metal, Clutches, Controls/Control Eqpt., Cords, Counters, Couplings, Dials, Display Devices/Displays, Drives & Drive Mechanisms (Dial), Encoders, Escutcheons, Foil, Gearheads & Speed Reducers, Gears & Gear Mechanisms (Precision), Handles For Cabinets, Circuit Boards, Racks, etc., Heat Exchangers & Systems, Heat Sinks, Soldering, Jack Covers, Jacks (All Types), Jigs And Fixtures, Chassis & Circuit Board, Knobs, Limit Stops, Mechanical, Locks, Dial & Shaft, Mounts, Panels, Plug & Jack Sets, Pointers, Dial, Potentiometers, Racks, Reducers, Scales, Dial, Shafts & Adapters, Shields, Sockets, Spacers, Terminal Blocks, Boards & Strips, Terminals, Testers

Local Sales Offices & Reps.

Cal	Carte Madera, P. O'Neal Assoc.	415-924-1691
Cal	Los Angeles, J.C. Simon Co.	213-939-2366
Fla	Clearwater, CBC Elctrns.	813-447-3375
Fla	Ft. Lauderdale, CBC Elctrns.	305-484-7330
Fla	Winter Park, CBC Elctrns.	305-644-2277
Ga	Avondale Estates, Candor Co.	404-458-6713
Haw	Honolulu, Aloha Assoc.	808-922-3810
Ill	Chicago, Croydon Elect.	312-237-4343
Ind	Huntington, Croydon Elect.	219-422-2311
Md	Woodbine, Naudain Assoc.	301-442-2270
Mass	Newton Lower Falls, New England Comp. Sls.	617-969-9523
Mo	Crestwood, Nevco	314-843-7406
Mo	Kansas City, Nevco	816-421-1751
NJ	Bergenfield, H. Gray Assoc.	201-384-3643
NY	Rochester, Lloyd Hart Assoc.	716-244-3253
NC	Raleigh, Candor Co.	919-876-4999
Ohio	Cleveland, Goory Sls.	216-331-2055
Ohio	Dayton, Goory Sls.	513-294-3747
Pa	Mount Laurel, Naudain Assoc.	215-564-3194
SC	Myrtle Beach, Candor Co.	803-448-8361
Tenn	Chattanooga, Candor Co.	615-894-7454
Tex	Dallas, Loss & Stewart Assoc.	214-691-6039
Va	Lynchburg, Candor Co.	804-846-6579
EXP:	Can., Scarborough, Ont., Banke Elctrns., Ltd.	416-291-7529

JANCO CORP., Box 3038-Glenoaks Sta., Burbank, Cal., 91504, Tel: 213-845-7473, TWX: 910-498-2701; FSC No: 91812; Empl.: 150 .... p. 1•2088-2091

For info on price: S. Kay, Jr.; Application info: L. Smart

Products manufactured: Bus Bars & Systems, Jumpers, Shunts, Meter, Switches, Timers

Local Sales Offices & Reps.

Ala	Knoxville, J.R. Stephenson Agency	615-588-7474
Ariz	Scottsdale, J.B. Hower & Co.	602-948-0430
Ark	Dallas, M. Kruvand Co.	214-827-8043
Cal	Menlo Park, McKnight Co.	415-325-2844
Colo	Denver, Brown Tech., Inc.	303-233-0863
Conn	Glastonbury, Barton-Caron Assocs.	203-633-0417
Fla	Orlando, MacKay, Smith & Assocs.	305-277-1513
Ga	Atlanta, N.D. Russell	404-256-2918
Ill	Chicago, Engineered Sls. Co.	312-867-8434
Kans	Wichita, T-Bird Tech. Sls. & Svc.	316-684-2941
Md	Silver Spring, H.R. Sieber Co.	301-589-9110
Mass	Auburndale, Barton-Caron Assocs.	617-332-0342
Minn	Minneapolis, Electro-Serv Co.	612-827-2907
Mo	St. Louis, T-Bird Sls. & Svc.	314-567-6488
NJ	Cherry Hill, Quality Comps. Co.	609-428-6266
NY	Albertson, C.F. Ward	516-742-5561

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NC	Charlotte, MacKay, Smith & Assoc.	704-527-0240
Ohio	Cleveland, Comps., Inc.	216-842-2737
Tenn	Knoxville, J.R. Stephenson Agency	615-588-7474
Tex	Dallas, Mark Kruvand Co.	214-827-8043
Wash	Seattle, Norwest Co.	206-282-3707

JANEL, INC., 1320 Valley Rd., Stirling, N.J., 07980, Tel: 201-647-5600; Empl.: 16

For info on price: M. Marcasciano; Application info: B. Huriock; Customer service: D. Stelle; Delivery info: C. Giacomo

Products manufactured: Cleaners, Ultrasonic, Gages, Heat Sinks, Soldering, Knives & Knife Sets, Lamps, Pliers, Screwdrivers, Soldering Accessories, Soldering Equipment, Tools, Tweezers, Hand & Vacuum, Wire Twisters, Wrenches

JAPANESE PRODS. CORP., 7 Westchester Plaza, Elmsford, N.Y., 10523, Tel: 914-592-8880; Empl.: 6

For info on price: S. Lane; Application info: S. Lane; Customer service: E. W. Brown; Delivery info: E. W. Brown

Products manufactured: Motors, Testers

JAVELIN DIV., Apollo Lasers, Inc., 6357 Arizonia Circle, Los Angeles, Cal., 90045, Tel: 213-641-4490, Telex: 69-8204; Empl.: 65

For info on price: T. Miller; Application info: T. Miller; Customer service: M. Rice; Delivery info: R. Perry

Free literature available: Javelin Catalog - literature on CCTV security equipment: cameras, monitors VTR's, video signal equipment, housings, pan/tilts, scanners, switchers, night vision equipment.

Products manufactured: Amplifiers, Lasers & Laser Systems, Lenses, Optical & Camera, Monitors, Recorders, Tapes, Recording, Magnetic (All Types), Television Systems & Equipment Closed-Circuit

Local Sales Offices & Reps.

Cal	Los Angeles, R. S. Milecki	213-641-4490
Colo	Aurora, A. E. S.	303-366-0208
Fla	Port Charlotte, W. F. Hemminger	813-625-6050
Ga	Atlanta, C. Harrison Assocs.	404-633-3230
Ill	Chicago, Ellinger Sls. Corp.	312-763-1570
Ind	Indianapolis, C. Scheffler Co.	317-253-6337
Mass	Newton Upper Falls, M. P. Video	617-965-5405
Minn	Minneapolis, Kodo Assoc.	612-881-1255
Mo	Kansas City, Nevco	816-421-1751
NY	Binghamton, Rayber Sls. Co.	607-724-1734
NY	Port Chester, Reich & Bernstein	914-939-5408
Ohio	Cleveland, Imtech Equip. Div.	216-825-3400
Pa	Newton Square, G. M. Coneen Co.	215-353-2241
Tex	Dallas, B. S. Amos & Assoc.	214-823-7820
Va	Anandale, Javelin Electrns.	703-978-7558
Wash	Seattle, Pacnor Mktg.	206-284-8020

JAVEX ELCTRNS., 9509 Oak Glen Rd., Cherry Valley, Cal., 92223, Tel: 714-845-3986; Empl.: 60

Customer service: C. J. Reimuller

Products manufactured: Attenuators, Boxes, Junction, Outlets & Wall Plates, Caps, Connector, Connectors, Couplers, Jacks (All Types), Plug Adapters, Plug & Jack Sets, Plug Caps & Shells, Plugs, Potentiometers, Sockets, Splicers, Coaxial Cable, Switches, Terminals

JAY-EL PRODS., 1859 W. 169th St., Gardena, Calif., 90247, Tel: 213-321-3260, TWX: 910-346-7633; FSC No: 08719; QPL No: Multiple; Empl.: 65; Minimum order: $25

For info on price: K. Woods; Application info: L. Miller; Customer service: K. Woods; Delivery info: K. Woods

Free literature available: Basic concepts of our switches and indicators plus ordering information and general outline dimensions.

Products manufactured: Delays, Time (Excluding Delay Lines, Timers, Delay & Relays, Time-Delays), Indicators, Relays, Switches

Local Sales Offices & Reps.

Cal	Gardena, Jay-El Prods., Inc.	213-323-7130
Cal	Santa Clara, Nova Tronix, Representative	408-243-9530
Mass	Chelmsford, North East Components	603-668-1372
Pa	Lafayette Hill, R. Tschopp (Direct Sls.)	215-825-3666
Tex	Dallas, Allied Comp.	214-238-0408
Wash	Seattle, Norwest Co.	206-AT 2-3707

JB ELCTRN, TRANSFORMERS, INC., 2300 W. Armitage Ave., Chicago, Ill, 60647, Tel: 312-342-0080, TWX: 910-221-1283; Empl.: 150

Products manufactured: Coils Including Assemblies & Forms, Transformers

JDN ELECTRONICS, INC., 239 Morristown Rd., Gillette, N.J., 07933, Tel: 201-647-2400; Empl.: 5; Minimum order: $15

For info on price: M. Fussell; Application info: D. Bock; Customer service: D. Bock

Free literature available: JDN-Series A .1000DX .250 Long, JDN Series B .1250DX .335 Long, JDN Series C .1570DX.450 Long, JDN Series D .1570DX .415 Long, Data sheets describe components and list mechanical and electrical parameters for each series.

Products manufactured: Chokes, Coils Including Assemblies & Forms

Local Sales Offices & Reps.

Ala	Huntsville, Incotech	205-837-6061
Cal	Sunnyvale, Amasco	408-733-8690
Ill	Chicago, Chant-Aslan Assocs.	312-235-8443
Mass	Waltham, Betronic Assocs.	617-894-8400
NJ	Kenilworth, Ventronics	201-272-9262
Ohio	Chagrin Falls, Pine Sls. & Engrg. Co.	216-247-6198
Va	Fairfax, Schibley Assocs.	703-591-3008
Wash	Seattle, W. Spaulding Co.	206-282-9173

JEFFERSON ELEC., Div. Litton Inds., 840 S. 25th Ave., Bellwood, Ill., 60104, Tel: 312-626-7700; Empl.: 1200

Customer service: J. Mocko

Free literature available: Published as application guides, Jefferson Electric's comprehensive product catalogs offer the latest electrical data for transformers, ballasts and lighting equipment.

Products manufactured: Transformers

Local Sales Offices & Reps.

Ariz	Scottsdale, J. Bennan Sls. Co.	602-945-2394
Ark	Little Rock, Southland Sls. Inc.	501-753-4013
Cal	Los Angeles, J.G. Pomeroy Co.	213-263-9381
Cal	San Francisco, Black & Egbert	415-282-0840
Colo	Denver, E-O Sls. Co.	303-744-7081
Fla	Orlando, O.C. Puckett Co.	305-422-7197
Fla	Temple Terrace, O.C. Puckett Co.	813-988-7077
Ga	Atlanta, Chastain-Powell, Inc.	404-875-0755
Haw	Honolulu, R.J. Austin & Assoc.	808-395-4011
Ill	Westchester, EMC, Electrical Mktg. Corp.	312-681-1180
Ind	Indianapolis, C. Warblee & Assoc.	317-632-1465
Kans	Kansas City, D. Hatfield Sls. Co.	913-281-0533
Ky	Covington, Hackman Electrical Sls.	606-291-3800
La	New Orleans, Corrigan Mktg. Agency	504-865-7301
Mass	Canton, North Coast Sls. Co.	617-828-4006
Mich	Dearborn, Electrical Materials	313-541-1650
Mo	St. Louis, Electrical Mktg. Inc.	314-726-2920
Neb	Omaha, W.J. Fritsch, Electric Equip. Sls. Co.	402-556-4988
NY	Hartford, F.W. Laver & Son	315-724-2304
NY	Jamaica, Warshaw Electric Co.	212-525-8150
NC	Charlotte, W.H. Lassiter, Sls. Co.	704-523-2736
Ohio	Bedford Heights, Riffle & Assoc.	216-439-5500
Pa	Philadelphia, Electrical Sls. Assoc.	609-541-7452
Pa	Pittsburgh, Squire & Main Assoc.	412-364-3700
Tenn	Memphis, Southland Sls. Agents	901-525-0142
Tenn	Nashville, Southland Sls. Agents	615-889-4738
Tex	Dallas, Rich Co.	214-742-1758
Tex	Houston, McIver & Slavin Co.	713-861-3888
Utah	Salt Lake City, J.D. Stephens Co.	801-355-3540
Wash	Seattle, Bangs Assoc.	206-762-0262
Wisc	Milwaukee, J. F. Nolan & Assoc.	414-781-1140

JENSEN SOUND LABS., Div. Pemcor, Inc., 4310 Trans World Rd., Schiller Park, Ill., 60176, Tel: 312-671-5680, TWX: 910-227-3728; Empl.: 42; Minimum order: $100

For info on price: R. Gold; Application info: R. Engelmann; Customer service: R. Gold; Delivery info: R. Gold

Free literature available: New 4/Color Catalogs, for high fidelity speaker systems and automotive speaker systems.

Products manufactured: Speaker Systems, Speakers

Local Sales Offices & Reps.

Ariz	Phoenix, Sal Bova Sls.	602-266-1137
Cal	Culver City, Marshank Sls.	213-559-2591
Cal	Redwood City, Sinai-Johnson, Inc.	415-365-6263
Colo	Aurora, Scowcroft & Assoc.	303-755-2422
Ga	Atlanta, B. M. Tyler & Assoc.	404-634-6121
Haw	Honolulu, G. Piety Factors	808-839-9059
Ill	LaGrange, E.N. Seversen & Assoc.	312-352-2055
Ind	Carmel, Alpha Sls. Corp.	317-846-7735
Kans	Overland Park, Nackman-Brod-Vann & Co.	913-381-6560
Md	Silver Springs, M.F. Taylor	301-589-4002
Mass	Norwood, Market Reps., Inc.	617-762-0155
Mich	Lake Orion, T.A. Firaneck Sls.	313-391-1177
Minn	Minneapolis, G & C Assocs.	612-927-5633
Mo	St. Louis, Nackman-Brod-Vann & Co.	314-991-2424
Neb	Omaha, Nackman-Brod-Vann	402-333-4346
NY	Phelps, LSM Assocs.	315-548-4891
NY	Yonkers, Adelman-Pinz Sls. Corp.	914-423-4747
Ohio	Cleveland, MS Sls. Corp.	216-382-2060
Okla	Oklahoma City, T. Wachendorfer Assoc.	405-721-9170
Ore	Portland, Fleehart & Sullivan	503-297-1033
Tex	Houston, T. Wachendorfer Assoc.	713-465-3092
Wash	Seattle, Fleehart & Sullivan	206-522-1533
EXP:	Chicago, Ill., J. D. Marshall Int'l.	312-583-6060

JENSEN TOOLS & ALLOYS, 4117 N. 44th St., Phoenix, Ariz., 85018, Tel: 602-959-2210, TWX: 910-950-1154; Empl.: 35

Customer service: J. Hogg

Products manufactured: Drills & Accessories, Hand & Power, Heat Guns, Production, Heat Sinks, Soldering, Knives & Knife Sets, Pliers, Screwdrivers, Solder (All Types), Soldering Accessories, Soldering Equipment, Soldering Guns, Irons & Desoldering Tools, Tools, Torches, Soldering, Welding & Access., Wire Strippers, Wrenches

JERMYN, 712 Montgomery St., San Francisco, Cal., 94111, Tel: 415-362-7431; Empl.: 6

Customer service: G. Hall

Free literature available: 80 page full color catalog and complete price list including sockets logic checkers, heat sinks, heat pipes, heat transfer isolators, transistor and I. C. spacers, cooling modules and D. I. L. headers for discrete construction of small plug in units.

Products manufactured: Cable, Clamps & Clips, Coatings, Connectors, Cooling/Heating Modules, Thermoelectric, Heaters & Heating Elements, Kits, Breadboarding (For Engineers), Ovens, Pads, Transistor Mounting, Probes, Retainers, Sockets, Testers, Wire

Local Sales Offices & Reps.

Ariz	Tempe, J. F. Hurlbut Co.	602-968-5962
Cal	Garden Grove, Impact Elctrns.	213-431-3581
Colo	Denver, Cristee-Meade Co.	303-753-9471
Fla	Casselberry, E. I. R.	305-830-9600
Ill	Northbrook, R. T. Howlett	312-498-5444
Mass	Waltham, Impact Sls.	617-893-2850
NY	Huntington Station, Addem Group	516-567-5900
Pa	Birchrunville, Jadelectronics Assoc.	215-647-5151
Wash	Seattle, Fleehart & Sullivan	206-522-1533

JEROME INDUSTRIES CORP., 391 Lakeside Ave., Orange, N.J., 07050, Tel: 201-678-9595; Empl.: 75

For info on price: J. Digirolamo; Application info: J. Digirolamo; Customer service: C. Montagna; Delivery info: J. D. Trollo

Free literature available: Catalogue-shows plug-in adaptors and complete product line. Flyer-shows transformers manufactured.

Products manufactured: Chargers, Battery, Motors, Plug Adapters, Potentiometers, Power Supplies, Transformers

Local Sales Offices & Reps.

Cal	Santa Monica, REP Assocs.	213-829-5401
Fla	Oldsmar, L.A. Assocs.	813-855-4209
Ill	Downers Grove, Ed Joyner & Co.	312-968-8383
Md	Glen Arm, Hodgins Assoc.	301-592-7047
Mass	Framingham, Gerald Rosen Co.	617-879-5505
Mo	St. Louis, Gordon Fixman Engrg. Co.	314-725-5219
NY	Floral Park, M.O.S. Assoc.	516-694-5923
NY	Pompey, Stuart Foster Co.	315-677-3333
Tenn	Bristol, Rakes Engrg. & Mktg. Corp.	615-968-4195
Tex	Dallas, Precision Sls.	214-351-6964
Wash	Bellevue, Vantage Corp.	206-455-3460

JERROLD ELECTRONICS CORP., Distributor Sales Div., 200 Witmer Rd., Horsham, Pa., 19044, Tel: 215-674-4800, TWX: 510-665-6880

Products manufactured: Amplifiers, Antenna Feed Systems, Antennas, Attenuators, Bridges, Cable, CATV Systems & Equipment, Comparators, Converters, Couplers, Demodulators, Detectors, Filters, Generators, Insertion Loss Measurement Systems, Jacks (All Types), Meters, Modulators, All Kinds, Mounts, Networks, Switches, Television Systems & Equipment Closed-Circuit, Terminals, Test Equipment, Testers, Transformers

Local Sales Offices & Reps.

Cal	Redwood City, R. Snider	415-365-5050
Ga	Atlanta, O. Cavendish	404-432-3102
Mo	No. Kansas City, W. Woody	816-842-1555

JERSEY SPECIALTY CO., Box 248, Burgess Pl., Wayne, N.J., 07470, Tel: 201-694-6200; Empl.: 40; Minimum order: $50

Customer service: R. D. Foster

Free literature available: Catalog and Wire Sample Board.

Products manufactured: Cable, Wire

Local Sales Offices & Reps.

Cal	Los Angeles, Erlanger Sls. Co.	213-731-2238
Del	Newark, F. S. Carmine Co.	302-738-5966
Fla	Miami, Raulson & Co.	305-226-6013
Ga	Atlanta, H. W. Phillips Co.	404-237-7564
Ill	Chicago, Lassers & Co.	312-539-0170
Ind	Indianapolis, D. Powers Sls., Inc.	317-846-0790
Mass	Lynn, Keene Sls. Co.	617-595-2300
Mich	Brighton, Lectro Sls. Co.	313-632-7941
Minn	St. Louis Park, Smith Sls. Co.	613-377-3187
Mo	Raytown, M. Taraski Sls. Co.	816-358-1442
NJ	Teaneck, Fisher Elctrn. Assocs.	201-837-1200
NY	Liverpool, Lewis-Dunnigan Co.	315-622-2133
NC	Charlotte, D. Austin Co.	704-366-4643
Ohio	Medina, T. Grant Assocs.	216-692-3050
Ore	Portland, R. M. Minthorne	503-246-4556
Tex	Dallas, Crockett Sls. Co.	214-748-8209
EXP:	New York, N.Y., Roburn Agencies	212-989-5939

JETTRON PRODS., 58 Rte. 10, Box 7, Hanover, N.J., 07936, Tel: 201-887-0571; FSC No: 04435; Empl.: 30; Minimum order: $20

For info on price: R. Jannacelli; Application info: E. Dietz; Customer service: J.M. Schill; Delivery info: D. Lanata

Free literature available: Magnetron Connectors, 50 Types Plus Input Terminal Outlines; Molded H.V. Cabel Assembly Outlines And Anode Terminal Types; Magnetron Connectors, 5 Types, Magnetron Tube Type Listing; Jettron Thermal Time Delay Relays, 45 P/N's.

Products manufactured: Cable Assemblies & Harnesses, Caps, Connector, Clamps & Clips, Connector Adapters, Connectors, Holder & Carriers, Holders, Crystal, Jigs And Fixtures, Chassis & Circuit Board, Lead Assemblies & Receptacles, Relays, Retainers, Services, Assembly, Production & Test, Sockets, Strips, Testers

Local Sales Offices & Reps.

Cal	El Monte, Western Controls	213-443-9376
Ill	Chicago, William F. Hamilton Co.	312-545-7676
Mass	Natick, Wayland Engrg. Sls.	617-655-6080
NY	New York, Eltron Export Co.	212-944-7635
FOR:	Can., Willowdale, Ont., Avotronics Ltd.	

JEWELL ELECTRICAL INSTRUMENTS, INC., Grenier Field, Manchester, N.H., 03105, Tel: 603-669-6400; Empl.: 500

Products manufactured: Controls/Control Eqpt., Indicators, Meters

Local Sales Offices & Reps.

Ariz	Scottsdale, E.V. Roberts & Assocs.	205-881-1213
Ark	Magnolia, J.Y. Schoonmaker Co.	501-234-3778
Cal	Culver City, E.V. Roberts & Assocs.	213-870-9561
Colo	Denver, R.G. Bowen Co.	303-722-4641
Conn	New Haven, Gerber Sls. Corp.	203-777-6279
Fla	Orlando, Cartwright & Bean Inc.	305-422-4531
Fla	Plantation, Cartwright & Bean Inc.	305-791-3989
Ga	Atlanta, Cartwright & Bean, Inc.	404-237-2273
Ill	Barrington, F.J. Peck Co.	312-381-3388
Ind	Indianapolis, L.M. DeVoe Co.	317-257-1227
Kans	Shawnee Mission, Kathrinus, Kelly & Co.	913-722-0000
La	Chalmette, Cartwright & Bean, Inc.	504-279-4598
Mass	East Longmeadow, Gerber Sls. Corp.	413-525-3059
Mass	Waltham, Gerber Sls. Corp.	617-890-8040
Mich	Dearborn, Villani-Pitcher	313-271-4600
Minn	Edina, M. Foster Co.	612-941-7600
Mo	St. Louis, Kathrinus & Kelly	314-968-3800
NJ	Cherry Hill, Trinkle Sls., Inc.	609-667-3500
NM	Albuquerque, C.T. Carlberg & Assocs.	505-265-1579
NY	Garden City, Comtronics Assocs.	516-741-8966
NY	N. Syracuse, L.D. Allen, Inc.	315-458-7470
NC	Charlotte, Cartwright & Bean, Inc.	704-333-6457
Ohio	Beachwood, Elctrns. Salesmaster, Inc.	216-831-2900
Okla	Tulsa, J.Y. Schoonmaker	501-234-3778
Tenn	Memphis, Cartwright & Bean, Inc.	901-276-4442
Tex	Dallas, J.Y. Schoonmaker Co.	214-357-8481
Tex	Houston, J.Y. Schoonmaker Co.	713-926-9510
Utah	Salt Lake City, R.G. Bowen Co.	801-364-4632
Wash	Seattle, F. Jackson Co.	206-363-3931

JFD ELECTRONICS COMPONENTS CORP., 15th Ave. at 62nd St., Bklyn., N.Y., 11219, Tel: 212-331-1000, TWX: 710-584-2462; Empl.: 325; Minimum order: $50

For info on price: L. Semmel; Application info: F Caserta; Customer service: M. Miller; Delivery info: M. Miller

Free literature available: Microceram Porcelain Ceramic Multilayer Capacitors; Piston · Timmer Capacitors; Air Variable Capacitors; Subminiature Ceramic Disc Capacitors; Fixed and Variable Metalized Indicators, LC tuners; Modutrim Microminiature Ceramic Variable Capacitors.

Products manufactured: Capacitors, Fixed, Capacitors, Variable, Coils Including Assemblies & Forms

Local Sales Offices & Reps.

Ala	Huntsville, 20th Century Mktg.	205-772-9237
Ariz	Tempe, Argus Sls.	602-967-8709
Cal	Los Altos, Recht Assocs.	415-941-0336
Cal	Van Nuys, MCA So. Cal.	213-785-0487
Colo	Denver, Omega Ltd.	303-758-1508
Fla	Altamonte Springs, SemTronic Assocs.	305-831-8233
Fla	Ft. Lauderdale, SemTronic Assocs.	305-771-0010
Ga	Atlanta, G. Duckett Sls. Co.	404-451-3529
Ill	Chicago, MCA Chicago	312-992-2090
Ill	Hinsdale, Momak Sls.	312-654-4524
Ind	Indianapolis, Electro-Reps Inc.	317-255-4147
Kans	Prairie Village, Engrg. Svcs. Co.	914-649-4000
Md	Elicott City, Doss Elctrns.	301-465-1336
Mass	Framingham, MCA Boston	617-872-4843
Mich	Southfield, Luebbe Sls. Co.	313-357-0355
Minn	St. Louis Park, Beta Engrg. Corp.	612-925-4422
Mo	St. Louis, Engrg. Svcs. Co.	314-997-1515
NY	Jericho, HRC Comp-Tech, Inc.	516-822-5550
NY	New Hartford, MCA Upstate N.Y.	315-732-3507
NC	Charlotte, L.P. Spoon, Inc.	704-372-3290
Ohio	Cincinnati, Luebbe Sls.	513-871-4211
Ohio	Cleveland, Luebbe Sls.	216-333-0425
Ohio	Dayton, Luebbe Sls.	513-294-0426
Pa	King of Prussia, Monteiro Assocs., Inc.	215-265-0634
Tex	Dallas, United Comps.	214-861-4306
Wash	Seattle, H. Levinson Co.	206-EA 3-5100
Wisc	Milwaukee, Star Engrg. Sls.	414-543-3469
FOR:	Can., Toronto, Ont., Kaytronics Ltd.	416-638-5511
FOR:	Can., Montreal, Quebec, Kaytronics Ltd.	514-487-3434
FOR:	Can., Vancouver, B.C., Harry Levinson	206-EA 3-5100

J.D.N. ELECTRONICS INC., Box 156, 239 Morristown Rd., Gillette, N.J., 07933, Tel: 201-647-2400; Empl.: 5; Minimum order: $15

For info on price: M. Fussell; Application info: D. Bock; Customer service: D. Bock; Delivery info: M. Fussell

Free literature available: JDN Series A - 0.10 uh to 1000 uh shielded inductor, JDN Series B - 0.10 uh to 10000 uh shielded inductor, JDN Series C - 0.10 uh to 100000 uh shielded inductor, JDN Series D - 0.10 uh to 100000 uh shielded inductor, Mechanical dimensions on products plus, complete listing of electrical parameters and, applicable Mil specifications.

Products manufactured: Chokes, Coils Including Assemblies & Forms

Local Sales Offices & Reps.

Ala	Huntsville, Incotech Inc.	205-837-6061
Cal	Sunnyvale, Amasco	408-733-8690
Ill	Chicago, Chant-Aslan Association	312-235-8443
Mass	Waltham, Betronic Assocs.	617-894-8400
NJ	Kenilworth, Ventronics, Inc.	201-272-9262
Ohio	Chagrin Falls, Pine Sls. & Engrg. Co.	216-247-6198
Pa	King of Prussia, Schibley Assocs.	
Va	Fairfax, Schibley Assocs.	703-591-3008
Wash	Seattle, Walt Spaulding Co.	206-282-9173

JPI, INC., 1507 San Vicente Blvd., Santa Monica, Cal., 90402, Tel: 213-395-2018; Empl.: 3

Customer service: S. Kondo

Products manufactured: Boards, Printed Circuit, Boards, Printed Wiring, Universal, Coils Including Assemblies & Forms, Counters, Heads, Recording Playback, Erase, Indicators, Inverters, Lamps, Meters, Power Supplies, Readers, Speaker Systems, Tachometers, Testers

JOHANSON MFG. CORP., Box 329, Boonton, N.J., 07005, Tel: 201-334-2676, TWX: 710-987-8367; Empl.: 160; Minimum order: $35 .... p. 2•204

Customer service: P. Smeeton

Products manufactured: Capacitors, Fixed, Capacitors, Variable, Tuners

Local Sales Offices & Reps.

Ariz	Scottsdale, Q.T. Wiles & Assocs.	602-948-5590
Cal	Menlo Pk., Straube Assocs.	415-323-2476
Cal	Studio City, Shortronics, Inc.	213-789-0418
Colo	Denver, Straube Assoc.-Mountain States, Inc.	303-426-0890
Conn	Meriden, J. Murphy Assocs.	203-269-1812
Fla	Clearwater, Perrott Assocs.	813-726-1549
Fla	Orlando, Perrott Assocs., Inc.	305-275-1132
Ill	Rolling Meadows, Sumer, Inc.	312-394-4900
Ind	Greenwood, Valentine & Schillinger	317-888-2260
Ind	South Bend, Valentine & Schillinger	219-291-6258
Md	Silver Springs, Rep-Tron, Inc.	301-593-4844
Mass	Seekonk, J. Murphy Assocs.	617-761-7153
Minn	Minneapolis, Stoss Assocs.	612-925-2757
NM	Albuquerque, Straube Assoc.-Mountain States, Inc.	505-292-0295
NY	Fayetteville, Graydon-Sherman	315-637-9861
NY	Mt. Vernon, Friedman-Smith Elctrn. Sls.	914-644-4866
Ohio	Cleveland, Electro-Com	216-886-2404
Ohio	Dayton, Electro-Com	513-276-3993
Pa	Feasterville, Professional Svc. Assocs.	215-355-6244
Tex	Ft. Worth, W. Pat Fralia Co.	214-264-3491
Utah	Salt Lake City, Straube Assoc.-Mountain States, Inc.	801-328-4513
Wash	Seattle, R. Johnston Co.	206-524-5170

Local Distributors

Cal	Oxnard, JACO Elctrns., Willard Hills Rd.	213-887-6400
Cal	Sunnyvale, Diplomat/Westland, 1118 Elko Dr.	408-734-1900
Fla	Orlando, Pelcor Co., 1607 Forsyth Rd.	305-275-1132
Ill	Chicago, Newark Elctrns., 500 N. Pulaski	312-638-4411
Md	Baltimore, Radio Elec. Ser., 1026 Cromwell Bridge Rd.	301-823-0700
Mass	Medford, Blake Assocs., 74 Lawrence Rd.	617-391-7890
NY	Hauppauge, JACO Elect., 195 Engineer Rd.	516-273-5500
Pa	Philadelphia, Philadelphia El., 112 N. 12th St.	215-568-8288
Tex	Ft. Worth, PATCO Co., 6100 Camp Bowie Blvd.	214-264-3491

JOHANSON/MONOLITHIC DIELECTRICS DIV., Box 6456, Burbank, Cal., 91505, Tel: 213-848-4465, TWX: 910-498-2735; Empl.: 75; Minimum order: $25 p. 2•205

Customer service: H. Huber

Products manufactured: Capacitors, Fixed

Local Sales Offices & Reps.

Ariz	Scottsdale, Q.T. Wiles	602-948-5590
Cal	Menlo Park, Straube Assocs.	415-323-2476
Cal	Sherman Oaks, J.B. Microelctrns.	213-789-0418
Colo	Boulder, Straube/Mountain States, Inc.	303-443-8600
Conn	Durham, J. W. Murphy Assocs.	203-269-1812
Fla	Orlando, Pelcor	305-275-1132
Ill	, Sumer Inc.	312-394-4900
Ind	South Bend, Valentine & Schillinger	219-291-6258
Md	Silver Springs, Rep-Tron, Inc.	301-593-4844
Mass	Seekonk, J. W. Murphy Assoc.	617-761-7153
Minn	Minneapolis, Stoss Assocs.	612-925-2757
NJ	Mt. Vernon, Friedman-Smith Elect. Sls.	914-664-4866

NY	Fayetteville, Graydon-Sherman, Inc.	315-637-9861
Ohio	Cleveland, Electro-Com	216-886-2404
Okla	Tulsa, W. P. Fralia Co., Inc.	918-663-8707
Pa	Philadelphia, Professional Service Assoc.	215-722-8222
Pa	Pittsburgh, Electro-Com	216-886-2404
Tex	Fort Worth, W. Pat Fralia Co.	214-264-3491
Wash	Seattle, R. Johnson Co.	206-524-5170
FOR:	Can., Que., Braydon Electro, Ltd.	514-341-3330

JOHNATHAN MFG., 1101 South Acacia Ave., Fullerton, Calif.

JOHNSON CO., E.F., 299 10th Ave., Waseca, Minn., 56093, Tel: 507-835-2050; Empl.: 1400
p. 2•201-203,707-712

For info on price: Mktg.; Application info: Mktg.; Customer service: Cust. Svc. Dept.; Delivery info: Mktg.

Free literature available: Capacitors Catalog, JCM Miniature Coaxial Connectors Catalog, Electrical Hardware Catalog.

Products manufactured: Capacitors, Variable, Comm. Systems, Connectors, Jacks (All Types), Plugs, Posts, Terminals, Transceivers, Transmitters

Local Sales Offices & Reps.

Ariz	Phoenix, Clemick-Neenan & Assoc.	602-254-2327
Cal	Los Angeles, Clemick-Neenan & Assocs.	213-476-1272
Cal	Redwood City, Logan Sls. Co.	415-369-6726
Colo	Denver, McLoud & Raymond Co.	303-756-1589
Conn	Meriden, P.R. Sturgeon Co.	203-237-1112
Fla	Bradenton, Hutto-Hawkins-Peregoy, Inc.	813-755-4015
Fla	Maitland, Hutto-Hawkins-Peregoy, Inc.	305-831-2474
Fla	Pompany Beach, Hutto-Hawkins-Peregoy, Inc.	305-943-9593
Ga	Atlanta, Millar Elctrns. Inc.	404-261-6160
Ill	Chicago, Ellinger Sls. Corp.	312-763-1570
Iowa	Cedar Rapids, J. Vrbik Co.	319-377-8244
Kans	Overland Park, T.L. Dowell & Assocs.	913-238-8200
La	Chalmette, McFadden Sls. Inc.	614-221-3363
Md	Baltimore, J. Bresson Assocs.	215-839-6770
Mass	Babson Park, P.R. Sturgeon Co.	617-237-3506
Minn	Minneapolis, S. Clothier Co.	612-888-4666
Miss	Jackson, Cartwright & Bean	504-354-1368
Mo	Shrewsbury, T.L. Dowell & Assocs.	314-647-7067
NJ	Palisades Park, E.F. Johnson Co.	201-461-6463
NY	Elmont, F.E. Schmitt Co.	516-437-8150
NY	Syracuse, Mor-Com Assocs.	315-437-2843
NC	Raleigh, Millar Elctrns., Inc.	404-261-6160
Ohio	Columbus, McFadden Sls., Inc.	614-221-3363
Ore	Portland, J.J. Backer Co.	503-297-3776
Ore	Salem, J.J. Backer Co.	503-362-0717
Pa	Narberth, J. Bresson Assocs.	215-839-6770
Pa	Pittsburgh, Covert & Newman Co.	412-563-0303
Tenn	Memphis, Cartwright & Bean Inc.	901-276-4442
Tex	Dallas, R.E. Nesbitt Co.	214-357-4601
Tex	Houston, R.E. Nesbitt Co.	713-224-3633
Va	Lynchberg, J. Bresson Assocs.	215-839-6770
Wash	Seattle, J.J. Backer Co.	206-285-1300
EXP:	New York, Roburn Agencies	212-989-5939
FOR:	Can., Calgary, Alb., A.C. Simmonds & Sons	403-242-3207
FOR:	Can., Montreal, Que., A.C. Simmonds & Sons	514-352-5250
FOR:	Can., Smith Falls, Ont., A.C. Simmonds & Sons	613-283-2727
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FOR:	Can., Willowdale, Ont., A.C. Simmonds & Sons	416-491-1010
FOR:	Can., Winnipeg, Man., A.C. Simmonds & Sons	204-489-2086

Local Distributors

Ala	Huntsville, Mock Elctrns., 2310 Memorial Pkwy.	205-539-2401
Ariz	Phoenix, Dalis Radio & TV Supply, 917 North 7th St.	
Ariz	Phoenix, Sterling Elctrns., 2001 East University	602-258-4531
Ariz	Tucson, Inland Elctrns. Supply, 715 E. Broadway	602-624-4402
Cal	Irvine, Terminal Elctrns., 1791 Reynolds Ave.	714-549-8611
Cal	Los Angeles, California Elctrns. Supply, 1911 Armacost Ave.	213-826-8333
Cal	Los Angeles, Henry Radio, 11240 Olympic Blvd.	213-272-1440
Cal	Los Angeles, RPS Elctrns., 1501 S. Hill St.	213-748-1271
Cal	Mt. View, Elmar Elctrns., 2288 Charleston Rd.	415-961-3611
Cal	Oakland, Brill Elctrns., 610 E. 10th	415-834-5888
Cal	Palo Alto, 415-326-5432, 654 High St.	415-3256-5432
Cal	Riverside, Electronic Supply, 2486 3rd St.	714-787-9220
Cal	San Diego, Mock III Sls., 5150 Convoy St.	714-560-0515
Cal	San Diego, Shank & Wright, 2045 Kettner Blvd.	714-239-0176
Cal	San Diego, Sterling Elctrns., 6158 Mission Gorge Rd.	714-283-6575
Cal	San Francisco, Zack Elctrns., 1444 Market St.	415-626-1444
Cal	San Jose, Quement Elctrns., 1000 So. Bascom Ave.	408-998-5900
Cal	Santa Barbara, Channel Radio Supply Co., 18 E. Ortega St.	805-965-8551
Cal	Woodland Hills, Jaco Elctrns., 21201 Oxnard	213-887-6400
Colo	Denver, Electronic Parts, 1212 So. Bdwy.	303-744-1992
Colo	Denver, Elmar Elctrns., 5701 E. Evans Ave.	303-758-5711
Colo	Denver, Newark/Denver, 2170 S. Grape St.	303-757-3351
Colo	Lakewood, Acacia Sls., 11111 W. 8th Ave., Unit B	303-232-2882
Fla	Miami, Electronic Equip., 2701 N.W. 42nd Ave.	305-871-3500
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Fla	Tampa, Lykes Elctrns., Box 24047	
Ga	Atlanta, Ack Radio Supply, 554 Deering N.W.	404-351-6340
Ga	Atlanta, Lykes Elctrns. Corp., 1135 Chattahoochee Ave.	404-355-2223
Ill	Chicago, Allied Elctrns., 2400 W. Lake St.	312-421-2400
Ill	Chicago, Electronic Distributing, 4900 N. Elston Ave.	312-283-4800
Ill	Chicago, Newark Elctrns., 500 N. Pulaski Rd.	312-638-4411
Ill	Geneva, Melvin Elctrns., 825 W. State St.	312-232-8050
Ill	Palatine, OHM/Elect., 649 Vermont Ave.	312-359-5500
Ill	Peoria, Klaus Radio & Elec. Co., 8400 N. Pioneer Parkway	309-691-4840
Ind	Fort Wayne, Ft. Wayne Elctrn. Supply, 3606 Maumee Ave.	219-423-3422
Ind	Indianapolis, Graham Elctrns., 133 S. Pennsylvania St.	317-634-8486
Ind	Indianapolis, RaDisCo, Inc., 814 N. Senate Ave.	317-637-5571
Ind	South Bend, Radio Distributing, 1212 High St.	219-288-4666
Iowa	Cedar Rapids, DEECO, Inc., 2500 16th Ave., S.W.	319-365-7551
Kans	Wichita, Interstate Elctrns. Supply, 1330 E. 1st St.	
Kans	Wichita, Radio Supply Co., 115 Laura	
Ky	Louisville, Burks, P.I., 842 S. 7th	502-589-3960
La	New Orleans, Southern Radio Supply, 1909 Tulane Ave.	504-524-2343
Md	Baltimore, Radio Elec. Svc., 1026 Cromwell Bridge Rd.	301-823-0070
Md	Bethesda, Empire Elctrn. Supply, 4907 Rugby Ave.	301-656-3300
Md	Rockville, Capitol Radio Wholesalers, 12270 Wilkins Ave.	301-881-2270
Mass	Boston, Demambro Elctrns., 1095 Commonwealth Ave.	617-787-1200
Mass	Boston, Sager Electrical Supply, 172 High St.	617-542-2281
Mass	Cambridge, Wilshire Elctrns./New Eng., 205 Alewife Brook Pkwy	617-491-3300
Mass	Dedham, Gerber Elctrns., 852 Providence Hwy.	617-329-2400
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Mass	W. Newton, A. W. Mayer, 38 Border St.	617-965-1111
Mass	Watertown, Sterling Elctrns., 51 Spring St.	
Mich	Ann Arbor, Wedemeyer Elctrn. Supply, 2280 S. Industrial Hwy.	313-665-8611
Mich	Detroit, R. S. Elctrns., 12775 Lyndon	313-491-1000
Minn	Minneapolis, Electronic Center, 127 3rd Ave., N.	612-338-5881
Minn	Minneapolis, Newark-Minneapolis Elects. Corp., 336 Hoover St., N.E.	612-331-6350
Minn	Minneapolis, Stark Elctrns., 112 3rd Ave. N.	612-332-1325
Minn	St. Paul, Gopher Elctrns., 2520 W. Larpenteur Ave.	612-645-0889
Mo	Kansas City, Burstein Applebee Co., 3199 Mercier St.	816-531-5614
Mo	Kansas City, Walters Radio Supply, 3635 Main St.	816-531-7015
Mo	St. Louis, Olive Indl. Elctrns., 6662 Olive Blvd.	314-863-7800
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NJ	Camden, General Radio Supply, 600 Penn St.	609-964-6560
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NJ	Hanover, State Elctrn. Parts, 36 Rt. #10	201-887-2550
NJ	Little Falls, IPC Corp., Cardinal Dr.	201-785-1830
NJ	Pennsauken, Radio Elec. Svc., Airport Industrial Pk.	609-662-4000
NJ	Rahway, Terminal Elects. Corp., Pinewood St.	201-381-5700
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NJ	Springfield, Route Elctrns., U.S. Rt. #22	
NM	Albuquerque, Electronic Parts Co., 2620 Rhode Island St., N.E.	505-293-6161
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NY	Buffalo, Standard Elect., 3519 Union Rd.	716-685-4220
NY	Buffalo, Summit Distrs., 916 Main St.	716-884-3450
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NY	Farmingdale, Broadline Elctrns. Distributors, 119 Marine St.	516-420-8320
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NC	Winston-Salem, Kirkman Elctrns., 901 W. 2nd St.	919-724-0541
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Okla	Portland, United Radio Supply, 123 N.E. 7th Ave.	503-233-7151
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Okla	Tulsa, Radio, Inc., 1000 S. Main St.	918-587-9123
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Pa Philadelphia, Philadelphia Elctrns., 112 N. 12th St. 215-568-8288
Pa Pittsburgh, Cameradio Co., 2801 Liberty Ave. 412-288-2600
Pa Pittsburgh, RPC Elctrns., 620 Alpha Dr. 412-782-3770
RI Providence, Dandretta, Wm., Co., 28 Wolcott St. 401-861-2800
Tenn Knoxville, Industrial Elctrns., Gov. John Sevier Hwy.
Tenn Nashville, Electra Distributing Co., 1914 West End Ave. 615-329-3971
Tex Dallas, All State Elctrns., 516 S. Good-Latimer
Tex Dallas, Sterling Elctrns., 2875 Merrell Rd.
Tex Dallas, Wholesale Elctrns. Supply, 2809 Ross Ave. 214-824-3001
Tex Ft. Worth, Allied Elctrns., 401 East 8th St. 817-336-5401
Tex Ft. Worth, Swieco, Inc., 1512 E. Lancaster 817-335-6521
Tex Garland, Newark Dallas, 707 Easy St. 214-271-2511
Tex Houston, Geophysical Supply Co., 1500 Crawford St. 713-224-0621
Tex Houston, Harrison Equip., 1616 McGowen 713-224-9131
Tex Houston, Wofford Elctrns. Co., 7537 Edna St. 713-644-1838
Utah Salt Lake City, Kimball Elctrns., 350 Pierpont Ave. 801-328-2075
Utah Salt Lake City, Standard Supply Co., 225 E. 6th St. 801-355-2971
Va Charlottesville, Virginia Radio Supply, 715 Henry Ave. 703-296-4184
Va Roanoke, Peoples Radio & TV, 1015 Moorman Rd., N.W. 703-342-8933
Wash Seattle, ALMAC/Stroum Elctrns., 5811 6th Ave. S. 206-763-2300
Wash Seattle, Interface Elctrns. Corp., 300 2nd Ave. W. 206-285-3500
Wash Seattle, Radar Elec. Co., 168 Western Ave. W. 206-282-2511
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Wisc Madison, Satterfield Elctrns., 1900 S. Park St. 608-257-4801
Wisc Milwaukee, Electronic Expeditors, 6045 N. Green Bay Ave.
Wisc Milwaukee, Parts Mart, Inc., 1314 N. 7th St. 414-276-4160
Wisc West Allis, Marsh Radio Supply, 6047 W. Beloit Rd. 414-545-6500
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For: Can., South Burnaby, B.C., A.C. Simmonds & Sons, Ltd., 7010 Sussex Ave. 604-434-9002
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For: Can., Winnipeg, Manitoba, A.C. Simmonds & Sons, Ltd., 109 Ruby St. 204-489-2086

JOLO INDUSTRIES, INC., 11861 Cardinal Circle, Garden Grove, Cal., 92643, Tel: 714-636-4940; Empl.: 10; Minimum order: $15

For info on price: T. Giampiccolo; Delivery info: J. Bavol

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Md Riverdale, Riggs Assocs. 301-927-3380
Mass Brookline, Harman Assocs. 617-232-6687
NJ Riverton, Given Assocs. 609-829-7249
NY Manhasset, Everett Mktg. Corp. 516-627-7750
NY Vestal, Systems Hardware Reps. 607-729-6339
Ohio Cleveland, Geotronix Mktg. Assocs. 216-526-2535
Ohio Columbus, Geotronix Mktg. Assocs. 614-457-8472
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For info on price: M. Zyzyzk; Application info: J. Roman; Customer service: S. J. McKinnon

Products manufactured: Brushes & Brush Assemblies, Burnishers, Contact, Calibrators, Cases, Equipment, Instrument, Meter, Cleaners & Solvents, Connectors, Drivers, Nut, Gages, Heat Guns, Production, Heat Sinks, Soldering, Holder & Carriers, Holders, Circuit Board (Production Type), Kits, Breadboarding (For Engineers), Kits, Switch Assembling, Kits, Test Equipment, Leads, Test & Adaptors, Lubricants, Meters, Microscopes, Pliers, Probes, Pullers, Scissors, Screwdrivers, Scribers, Seizers, Services, Assembly, Production & Test, Soldering Accessories, Soldering Guns, Irons & Desoldering Tools, Splicers, Coaxial Cable, Splices, wire (Including, Butt & Cap Types), Testers, Tools, Torches, Soldering, Welding & Access., Tweezers, Hand & Vacuum, Wire, Wire Strippers, Wire Twisters, Wrenches

Local Distributors
Cal Garden Grove, Allied Elctrns., 12311 Industry St. 213-598-6605
Cal Inglewood, Newark Elctrns., 4747 W. Century Blvd. 213-678-0441
Colo Englewood, National Camera, 2000 W. Union Ave. 303-789-1893
Fla Miami, Electro-Standards Labs., 35-60 NW 34th St. 305-633-6975
Ill Chicago, Newark Elctrns., 500 N. Pulaski Rd. 312-638-4411
Ill Elgin, Allied Elctrns., 1355 Sleepy Hollow Rd. 312-697-8200
La Lafayette, Ralph's of Lafayette, 3004 Cameron St. 318-234-4507
NY Mount Vernon, Elctrn. Tool, 15 Bertel Ave. 914-664-0088
NY New York, Graybar Elec., 420 Lexington Ave. 212-532-4000
Okla Tulsa, S & S Radio Sup., 537 S. Kenosha 918-582-8242
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Customer service: E. W. Reed

Products manufactured: Bushings, Glass, Plastic, Metal, Rubber, Etc., Contacts, Electrical, Jacks (All Types), Terminals

Local Sales Offices & Reps.
Tex Dallas, Packard Assocs. 214-357-5713
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Tex Paris, Amrad Corp. 214-785-4544
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JORDAN CONTROLS, 5607 W. Douglas Ave., Milwaukee, Wisc., 53218, Tel: 414-461-9200; Empl.: 55-60; Minimum order: $25

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Conn Simsbury, Canner Assocs. 203-658-5074
Ga Atlanta, F.B. Culwell & Assocs. 404-939-1660
Ill Chicago, Clarkson Engrg. Co. 312-286-2314
Ind Indianapolis, Garstang Engrg. Co. .. 317-632-9903
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NY New York, N. Brager Co. Inc. 212-697-1050
NC Charlotte, Beck Sls. & Engrg. Co. 704-366-5366
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Pa Erie, Foster-McClinton Inc. 814-453-5786
Pa Pittsburgh, Foster-McClinton Inc. ... 412-561-4803
Tex Dallas, Peso-Production Engrg. 214-369-3181
Va Roanoke, Johnson Custom Control 703-774-5550
Wash Bellevue, Southwell Controls Ltd. ... 206-454-1140
WVa Huntington, Foster-McClinton Inc. 304-736-5161
EXP: New Haven, Conn., Master-Wright 203-288-1638

JORDAN ELECTRIC CO., 14707 Keswick St., Van Nuys, Cal., 91405, Tel: 213-781-3849; FSC No: 5905; Empl.: 50; Minimum order: $25

For info on price: K. Landers; Application info: R. Jordan; Customer service: K. Landers

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Products manufactured: Resistors, Shunts, Meter

Local Sales Offices & Reps.
Ariz Phoenix, Micro Elctrns. Dist. 602-944-2281
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Ariz Phoenix, Parts Elctrns. 601-258-6476
Cal San Diego, Ohm Spun Elctrns. 714-277-6230
Cal Santa Clara, Mauldin Co. 408-249-7660

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Products manufactured: Arresters, Electrical Surge, Lightning, Counters, Limiters, Protectors, Spark Gaps, Suppressors

JSH ELECTRONICS, INC., 8549 Higuera St., Culver City, Cal., 90230, Tel: 213-559-6900, TWX: 910-340-6356; FSC No: 2B436; Empl.: 127; Minimum order: $25

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JUDSON RESCH. & MFG. CO., Conshohocken, Pa., 19428, Tel: 215-828-3011; Empl.: 30; Minimum order: $20

Customer service: R. Gibson 215-828-0433

Products manufactured: Detectors

JUDD WIRE DIV., Electronized Chems. Corp., S Bedford St., Burlington, Mass., 01803, Tel: 413-863-4357, TWX: 510-290-2147; Empl.: 70

Customer service: M. Walker

Products manufactured: Cable, Wire

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Md	Baltimore, Burgin-Kreh Assoc.	710-862-1450
Mass	Marlborough, O.K. Engrg.	617-481-6400
Mich	Sturgis, Kesler Assoc.	616-651-7619
Minn	Edina, W.L. Ruth & Assoc.	612-941-6350
NJ	Hackensack, TRAK Sls.	201-487-5075
NY	Syracuse, D. Dwyre	315-472-8282
Ohio	Dayton, Whelan Corp.	513-434-7551
Pa	Haddonfield, Mesa Tech. Assoc.	609-429-9531
Tex	Dallas, Stevens Sls. Co.	214-350-2476
Va	Lynchburg, Burgin-Kreh Assoc.	804-845-5600
Wash	Olympia, Bergford Assoc.	206-866-2001

JULIE RESEARCH LAB., 211 West 61st St., New York, N.Y., 10023, Tel: 212-245-2727; Empl.: 40; Minimum order: $50

For info on price: Sls. Dept.; Application info: Sls. Dept./Engrg.; Customer service: Prod. Dept.; Delivery info: Sls. Dept.

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Local Sales Offices & Reps.

Cal	Pasadena, Luscombe Engineer	213-684-2000
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Mass	E. Pepperill, Leger Labs.	617-433-6940
Tex	San Antonio, Teletronics Labs., Inc.	512-735-6179

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K-W ENGINEERING WORKS, N50 W16328 Pin Oak Ct., Menomonee Falls, Wisc., 53051, Tel: 414-781-8616; Empl.: 37

Customer service: H. Kaetel

Products manufactured: Antennas, Coils Including Assemblies & Forms, Mounts

KAHGAN ELECTRONICS CORP., 556 Peninsula Blvd., Hempstead, NY, 11550, Tel: 516-538-2300; Empl.: 12

For info on price: B. Stapler; Application info: B. Stapler; Customer service: B. Quisenberry; Delivery info: B. Quisenberry

Free literature available: Mica capacitors, low cost and subminiature. Low cost, low voltage, standardized ceramic capacitors; Aluminum Electrolytic Capacitors-Single Ended (Radial Leads); Solid, Dipped Tantalum Capacitors-Single Ended (Radial Leads); Metal Oxide Film Resistors (1/2 to 5 watts)-Flame-proof Coating.

Products manufactured: Capacitors, Fixed, Resistors

Local Sales Offices & Reps.

Ariz	Phoenix, G. R. McKnight Co.	602-257-8037
Cal	City of Industry, Micrometals	213-968-4718
Cal	Menlo Park, G. R. McKnight Co.	415-325-2844
Conn	West Simsbury, Anchor Engrg. Corp.	203-658-6261
Fla	Altamonte Springs, Semtronics Assocs.	305-831-8233
Fla	Ft. Lauderdale, Semtronics Assocs.	305-771-0010
Ill	Des Plaines, E. Flaxman Co.	312-298-8580
Kans	Shawnee, J. F. Guernsey Co.	913-631-2414
Mass	Wellesley Hills, Anchor Engrg. Corp	617-235-6330
Mich	Detroit, Nicon Assocs.	313-341-7688
Minn	Minneapolis, Thomas Mktg.	612-823-4880
NM	Albuquerque, G. R. McKnight Co.	505-266-6423
Pa	Reading, Beil-Whitaker	215-779-2610
Tex	Addison, Southland Comps.	214-231-2008
Va	Alexandria, Potomac Elctrns.	703-836-1630
Wash	Redmond, Desco Northwest	206-455-9325

KAHLE ENGRG. CO., 3344 Hudson Ave., Union City, N.J., 07087, Tel: 201-867-6500; Empl.: 50

For info on price: C. A. Napor; Application info: C. A. Napor; Customer service: E. Stiefel; Delivery info: C. A. Napor

Free literature available: Our literature covers CRT production; mercury switch manufacture; lamps and component manufacture; hermetically sealed capacitors, diodes; exhaust machines; capacitor testing; brazing, soldering and welding systems.

Products manufactured: Cams, Furnaces, Machines/Machinery, Production, Ovens, Soldering Accessories, Soldering Equipment, Testers

Advertisment

KAHLE Automatic Production Machines and Machine Systems are custom engineered for precision, high speed processing or assembling of lamps, tubes, semi-conductors, diodes, transistors, electrical subassemblies, switches, vacuum bottles, etc. Hermetic seal and exhaust machines include those for most vacuum and gasfilled devices; two or three piece lead-and-cap, lead-slug butt welding by resistance or capacitor discharge welding machines with 100-200 per minute capacity; cat-whisker or current carrying element welding. Glass machinery of all types.

KALART VICTOR CORP., Hultenius St., Plainville, Conn., 06062, Tel: 203-747-1663

For info on price: H. Nettleton; Application info: H. Nettelton; Customer service: J. J. Costag; Delivery info: J. J. Costag

Free literature available: Form #TB55-TeleBeam II new solid state large screen television projector.

Products manufactured: CATV Systems & Equipment

KAMAN SCIENCES CORP., 1500 Garden of the Gods Rd., Colorado Springs, Colo., 80907, Tel: 303-599-1500; Empl.: 450; Minimum order: $50

For info on price: G. Cooper 303-599-1891; Application info: S. Smith 303-599-1892; Customer service: H. Ramey 303-599-1864; Delivery info: G. Cooper 303-599-1891

Products manufactured: Accelerometers, Cable, Transducers

Local Sales Offices & Reps.

Cal	Temple City, Kaman Sciences	213-579-4867
Conn	Simsbury, Kaman Sciences	203-821-6989
Pa	Bethayres, Control Instr. Sls. Co.	215-676-1808

KANDU CORPORATION, 5635 Kendall Ct., Arvada, Colo., 80002, Tel: 303-421-8031; Empl.: 19; Minimum order: $5

Customer service: K. Norris

Free literature available: E-3 Lists prototype P.C. supplies and accessories Etching and plating supplies. 4C Describes custom metal products

Products manufactured: Chemicals, Cleaners & Solvents, Drills & Accessories, Hand & Power, Electroplating Equipment & Supplies, Etchants, Printed Circuit, Kits, Printed Circuit, Laminates, Nameplates, Services, Assembly, Production & Test, Templates, Printed Circuit Design

KAPPA NETWORKS, 165 Roosevelt Ave., Carteret, N.J., 07008, Tel: 800-631-5653; Empl.: 40 .... p. 1•461-464

Products manufactured: Coils Including Assemblies & Forms, Delay Lines, Equalizers, Synthesizers, Transformers

Local Sales Offices & Reps.

Ariz	Scottsdale, R.R. Thomas Co.	602-994-0401
Cal	Alhambra, M.W. Ridel Co.	213-283-7694
Ill	Chicago, Electro Tech. Assoc.	
Mass	Burlington, Burlington Sls.	617-272-7655
Minn	Minneapolis, Heimann Co.	612-861-6051
NJ	Carteret, Kappa Networks	201-541-1600
NJ	Cherry Hill, Benco Sales	609-779-9282
NY	Roslyn Heights, Livera-Polk Assoc.	516-484-1276
Ohio	Cincinnati, Tri State Mktg.	513-761-7993
Tex	Dallas, R.R. Thomas Co.	214-363-8591
Utah	Salt Lake City, Monarch Distributing & Representing	801-266-9617
Wash	Seattle, Delcom Sls. Co.	206-248-0090

KAPPA SCIENTIFIC CORP., Box 30585, Santa Barbara, Cal., 93105, Tel: 805-967-2396; Empl.: 4

Customer service: F. R. Marshall

Free literature available: Send for: Data sheets describing Kerr cells for Photography. Q-switching and light modulation, also High Voltage Pulse Generators, with nanosecond speed and very low jitter.

Products manufactured: Generators, Modulator/Demodulators, Networks

Advertisment

Kerr cells featuring picosecond response and apertures to 25mm for photography, Q-switching, and light modulation. Specialists in fast, high amplitude pulse generators with outputs to 30 Kilovolts or more, subnanosecond speed and very low jitter. Applications to electro optical modulators, spark gap triggering, laser excitation. Custom requirements are invited.

KATES SCIENTIFIC INSTRS., INC., 23 Converse Ave., Newton, Mass., 02158, Tel: 617-527-2711; Empl.: 18

For info on price: M. Kates; Application info: M. Kates; Customer service: D. Kates

Products manufactured: Braid, Cable, Cards, Logic, Circuits, Hybrid, Thick Film, Circuits, Hybrid, Thin-Film, Coils Including Assemblies & Forms, Controls/Control Eqpt., Integrated Circuit Packaging Systems, Modules, Logic, Encapsulated, Services, Assembly, Production & Test, Wire

KATO ENGINEERING CO., 1415 1st Ave., Mankato, Minn., 56001, Tel: 507-387-4011; Empl.: 450

For info on price: M. C. Madsen; Application info: F. Batemon; Customer service: J. Findblom; Delivery info: G. Cliff

Free literature available: Numerous brochures describing KATO generators, motors, power conversion motor - generator sets and complete engine-generator control systems are available from KATO Engineering Company.

Products manufactured: Controls/Control Eqpt., Generators, Motor & Generator Armatures, Rotors, Stators, Motor Electric Generator Sets, Motors, Power Supplies, Regulators, Transformers

Local Sales Offices & Reps.

Cal	San Rafael, H. Wells Assocs.	415-454-5730
Conn	Trumble, Roswell Engrg.	203-268-4382
Ill	Deerfield, Electrocon Inc.	312-948-0320
La	Metarie, General Power & Control Corp.	504-834-1345
Minn	St. Paul, DeBeck Assocs.	612-690-1557
NH	Ashland, Roswell Engrg.	603-968-7022
NY	Seaford, Greer Tech. Sls., Inc.	516-785-6919
Ore	Portland, W. Haynes Assoc.	503-236-2744
Tex	Dallas, General Power Equip. Co.	214-368-4655
Tex	Houston, General Power Equip. Co.	713-524-1895
Va	Virginia Beach, R.H. Graham	804-425-1388
FOR:	Can., Chomeday, Laval, Que., T. G. McDougall	514-332-0712
FOR:	Can., North Vancouver, B.C., C. L. Thompson, Ltd.	604-987-9388

FOR:	Can., Winnipeg, Man., C. L. Thompson, Ltd.	204-783-0848

KAWECKI BERYICO INDS., INC., 220 East 42nd St., New York, NY, 10017, Tel: 212-682-7143, TWX: 710-581-5199; Empl.: 1925

For info on price: R. McLaughlin Ext. 217; Application info: C. B. Harlan; Customer service: R. McLaughlin; Delivery info: R. McLaughlin

Products manufactured: Alloys, Cores, Ceramic, Eyelets, Foil, Jigs And Fixtures, Chassis & Circuit Board, Metal Compounds, Foils, Powders, Sheet, Stock, Metal Oxides, Metals, Pliers, Screwdrivers, Services, Assembly, Production & Test, Tools, Tubing, Wrenches

Local Sales Offices & Reps.

Cal	Long Beach, Kawecki Berylco Ind., Inc.	213-595-4525
Cal	Palo Alto, Kawecki Berylco Ind., Inc.	415-323-9625
Conn	Thomaston, Eyelets for Industry, Inc.	203-283-8213
Conn	Thomaston, Summit Finishing Div.	
Ga	Atlanta, Kawecki Berylco Inds., Inc.	404-458-7824
Ill	Des Plaines, Kawecki Berylco Inds., Inc.	312-824-6133
Mass	Boston, Metalonics Div.	617-268-4450
Mass	Waltham, Kawecki Berylco Inds., Inc.	617-890-8270
Mich	Dearborn, Kawecki Berylco Inds., Inc.	313-292-0300
NJ	Palisades Park, Duramic Prods.	201-947-8313
NY	New York, Kawecki Berylco Inds., Inc.	212-697-4360
Ohio	Cleveland, Kawecki Berylco Inds., Inc.	216-464-8860
Ohio	Dayton, Kawecki Berylco Inds., Inc.	513-298-1433
Ore	Springfield, National Metallurgical Div.	503-746-7670
Pa	Reading, Kawecki Berylco Inds., Inc.	215-929-0781
Pa	Revere, Penn Rare Metals Div.	215-847-5121
Wash	Wenatchee, Wenatchee Works	509-663-2165

KAY ELEMETRICS CORP., 12 Maple Ave., Pine Brook, N.J., 07058, Tel: 201-227-2000, TWX: 710-734-4347; Empl.: 86 .... p. 1•746-749

Customer service: J. Connors

Free literature available: GENERAL R.F. TEST EQUIPMENT equipment for tests in the audio thru microwave range. PRECISION, STEPPED ATTENUATOR attenuators for the Audio thru Microwave frequency ranges. CATV TEST EQUIPMENT-Video thru UHF Test equipment for CATV.

Products manufactured: Amplifiers, Analyzers, Attenuators, Bridges, CATV Systems & Equipment, Detectors, Electronic Switches (Oscilloscope), Generators, Insertion Loss Measurement Systems, Meters, Switches, Testers

Local Sales Offices & Reps.

Ariz	Scottsdale, Barnhill Assocs.	602-947-7841
Cal	Canoga Park, Kay Elemetrics Corp.	213-883-4610
Colo	Denver, Barnhill Assocs.	303-934-5505
Conn	Hamden, J & J Assocs.	203-624-7800
Ill	Northfield, Feller Assocs.	312-446-8065
Mass	Burlington, J & J Assocs.	617-272-2606
NM	Albuquerque, Barnhill Assocs.	505-299-7658
Tex	Houston, Barnhill Assocs.	713-688-9971
Tex	Richardson, Barnhill Assocs.	214-231-2573

KD COMPONENTS, INC., 3016 S. Orange Ave., Santa Ana, Cal., 92707, Tel: 714-545-7108; Minimum order: $25

Customer service: M. Day

Free literature available: Technical and ordering information on single layer and multilayer ceramic capacitors for 125°C and 200°C temperatures. Voltage ranges from 25 to 15000.

Products manufactured: Capacitors, Fixed

Local Distributors

Tex	Houston, Lenert Co., 1420 Hutchins	713-225-1465

KEDMAN CO., Box 267, Salt Lake City, Utah, 84110

KEITHLEY INSTRUMENTS INC., 28775 Aurora Rd., Cleveland, Ohio, 44139, Tel: 216-248-0400; Empl.: 200; Minimum order: $15

For info on price: V. Disantis Ext. 261; Application info: C. Garfinkel Ext. 286; Customer service: V. Disantis Ext. 261; Delivery info: V. Disantis Ext. 261

Free literature available: Full-Line Catalog (All products except below), Keithley Engineering Notes (Models 164, 165, 168, 171, 180, 190, 227, 244), Product Information Bulletins (Models 103A, 160, 160B, 163, 167, 225, 427, 616, 616/6169, 840, 26000, 35020, 35050)

Products manufactured: Amplifiers, Bridges, Calibrators, Detectors, Indicators, Meters, Monitors, Power Supplies, Testers, Voltage Sources

Local Sales Offices & Reps.

Cal	Cupertino, T.L. Snitzer Co.	408-257-8333
Cal	Del Mar, T.L. Snitzer Co.	714-454-2191
Cal	Los Angeles, T.L. Snitzer Co.	213-836-6170
Colo	Littleton, Aztec Entprs., Inc.	303-795-0250
Ill	Chicago, Carter Elctrns., Inc.	312-585-5485
Ind	Indianapolis, Carter Elctrns., Inc.	317-293-0696
Minn	Minneapolis, Carter Elctrns., Inc.	612-544-9393
Mo	Hazelwood, Tech. Reps., Inc.	314-731-5200
Mo	Independence, Tech. Reps., Inc.	816-737-1414
NJ	Flemington, Keithley Instrs., Inc.	201-782-5555
NM	Albuquerque, Aztec Entprs., Inc.	505-255-2440
Ore	Portland, McLaren, Inc.	503-297-2248
Tex	Austin, Palatine Sls.	512-451-7463
Tex	Houston, Palatine Sls.	713-777-4477
Tex	Richardson, Palatine Sls., Inc.	214-231-9489
Tex	Tulsa, Palatine Sls.	918-622-0321
Wash	Bellevue, McLaren, Inc.	206-454-3400
Wisc	Milwaukee, Carter Elctrns., Inc.	414-464-5555
EXP:	Cleveland, Ohio, Keithley Int'l. Sls. Corp.	216-248-0400

KELK, GEORGE LTD., 48 Lesmill Rd., Don Mills, Ont., Canada, Tel: 416-445-5850; Empl.: 60; Minimum order: $10

For info on price: P. R. Wharton; Application info: C. H. Draper; Customer service: J. Mitchell; Delivery info: J. Mitchell

Products manufactured: Amplifiers, Cells, Load, Dividers, Inverters, Regulators, Tachometers

KELTEC FLORIDA, A Division of Aiken Industries, Inc., Box 1348, Fort Walton Beach, Fla., 32548, Tel: 904-651-1210, TWX: 510-730-7775; FSC No: 09062; Empl.: 197; Minimum order: $100

Customer service: Mktg. Dept.

Products manufactured: Amplifiers, Power Supplies

Local Sales Offices & Reps.

Ala	Huntsville, Gentry Assocs.	205-534-9771
Ariz	Tempe, PLS Assocs.	602-957-9110
Cal	Los Altos, Stout-Loeswick	415-948-3265
Cal	Los Angeles, Cain Technology	213-476-2251
Colo	Denver, PLS Assocs.	303-771-0140
Fla	Orlando, Gentry Assocs.	305-894-4401
Ill	Park Ridge, RF Specialists	312-698-2044
Ind	Fort Wayne, RF Specialists	219-485-8982
Iowa	Cedar Rapids, Palatine Sls.	319-365-8071
Kans	Overland Park, Palatine Sls.	913-262-5643
Md	Ellicott City, VPI	301-465-4060
Mass	Needham Heights, Reptron	617-449-4141
Mich	Detroit, Micro Sls. Corp.	313-482-1229
Mo	St. Louis, Palatine Sls.	314-426-7055
NJ	Rockaway Borough, Gray & Reed Assocs.	201-625-0223
NM	Albuquerque, PLS Assocs.	505-255-2330
NY	Huntington Station, Gray & Reed Assocs.	516-433-3333
NY	Syracuse, Labtronics	315-454-9314
NC	Burlington, Gentry Assocs.	919-227-3639
Ohio	Dayton, Micro Sls. Corp.	513-885-4171
Pa	Montgomerysville, VPI	215-474-3200
Tex	Richardson, Lear Assoc.	214-231-5388
Utah	Salt Lake City, PLS Assocs.	801-272-3681
Va	Merrifield, VPI	703-573-7837
Wash	Seattle, Delcom Sls. Co.	206-248-0090

KELTRON, 223 Crescent St., Waltham, Mass., 02154, Tel: 617-894-0525; Empl.: 100

Products manufactured: Counters, Drivers & Decoders For Readouts, Power Supplies, Printers, Timers

Local Sales Offices & Reps.

Cal	Mountain View, Tri-Rep	415-965-1882
Cal	Santa Fe Springs, Sls. Engrs., Ltd.	213-921-4337
Fla	Orlando, Gra-Mar, Inc.	305-894-3351
Ill	Chicago, Scientific Sls.	312-775-7594
Ind	Indianapolis, Scientific Sls.	317-253-4606
Mich	Detroit, Ridgway-East	313-538-3940
Minn	Bloomington, Scientific Sls.	612-881-3300
NJ	Harrington Park, Metro Tech. Sls.	201-768-8495
NY	Jericho, Metro Tech. Sls.	516-935-3330
Ohio	Chagrin Falls, Ridgway-East	216-247-4845
Ohio	Loveland, Ridgway-East	513-683-4350
Pa	Abington, Bach-Stewart	215-885-1550
Wash	Bellevue, A. Smith Co.	206-746-6670

KELVIN, 5919 Noble Avenue, Van Nuys, Cal., 91411, Tel: 213-782-6662, Telex: 651417; FSC No: 07088; Empl.: 250; Minimum order: $35

Customer service: Sls. Dept.

Products manufactured: Networks, Resistors

Local Sales Offices & Reps.

Ariz	Scottsdale, Piper-Goyne	602-946-4437
Cal	Mountain View, G.C. Woempner Co.	415-964-5454
Cal	San Diego, Harvey King	714-276-7541
Colo	Boulder, R-G Entprs.	303-447-9211
Conn	Milford, Todino Engrg. Sls.	203-874-6643
Fla	Fort Lauderdale, Orbe	305-564-8571
Ga	Smyrna, B-C Elctrns.	404-436-5169
Ill	Des Plaines, Coombs Assoc.	312-298-4830
Iowa	Des Moines, Beams	515-282-0292
Kans	Overland Park, Beams	913-341-7744
Md	Baltimore, Callas Elctrns.	301-744-7711
Mass	Needham Hgts., Todino Engrg.	617-444-7925
Mich	Grosse Pointe Park, S. Greiner	313-499-0188
Minn	St. Paul, Cahill Assocs.	612-646-7217
Mo	Creve Couer, Beams	314-569-1060
NJ	Haddonfield, Gray Assoc.	609-429-5300
NM	Albuquerque, Piper-Goyne	505-265-6794
NY	Great Neck, Trionic	516-466-2300
NY	Pompey, S.F. Foster	315-677-3333
NY	Webster, S.F. Foster	716-872-5220
Ohio	Akron, Augnat Assoc.	216-725-6087
Ohio	Dayton, Augnat Assoc.	513-223-5002
Pa	Pittsburgh, Augnat Assoc.	412-281-8283
Tex	Dallas, Reese Assoc.	214-638-6575
Wash	Seattle, H. Levinson	206-323-5100

KEMLITE LABS., INC., 1819 W. Grand Ave., Chicago, Ill., 60622, Tel: 312-829-6050; Empl.: 65; Minimum order: $10

For info on price: P. Hamlin; Application info: H. W. Klauer; Customer service: J. Daniels, Jr.; Delivery info: J. Daniels, Jr.

Free literature available: Brochure Lists Many Of Our Standard Photographic Flashtubes and Reflector Flashtubes.

Products manufactured: Lamps

KEMTRON ELECTRON PRODS., INC., 14 Prince Pl., Newburyport, Mass., 01950, Tel: 617-462-4464

Products manufactured: Diodes

KENCO ALLOY & CHEMICAL CO., INC., 418 W. Belden Ave., Addison, Ill., 60101, Tel: 312-543-6060; Empl.: 12

For info on price: M. Bush; Application info: K. Barry; Customer service: E. Wolfgram; Delivery info: T. Whalen

Free literature available: General Catalog of solders, fluxes, cleaners, coatings & PCB processing chemicals.

Products manufactured: Chemicals, Cleaners & Solvents, Coatings, Flux, Brazing & Soldering Materials, Solder (All Types), Soldering Accessories

Local Sales Offices & Reps.

Ariz	Phoenix, K. Jahn Co.	602-956-9060
Cal	Mountain View, Morse Assocs.	415-968-7722
Fla	Largo, Doug Shower Assocs.	813-446-6505
Mass	Hudson, E.P.E. Corp.	617-562-9123
Minn	St. Paul, Nordic Elctrns.	612-226-2210
Mo	Springfield, Del-Tech Assocs.	417-881-3667
NJ	Princeton, Krone & Rubin Assocs.	609-924-0200
NY	Webster, Krone & Rubin Assocs.	716-671-6709
Ohio	Dayton, Buckeye Comps.	513-278-4279
Tex	Dallas, Atlan Inds.	214-243-6216
Wash	Seattle, F. Jackson Co.	206-782-2211
EXP:	Ill., Addison, Kenco Alloy & Chemical Co.	312-543-6060

KENTON ENGRG. CORP., 8232 Christiana Ave., Skokie, Ill., 60076, Tel: 312-677-8280; FSC No: 18308; Empl.: 18

For info on price: A. R. Friesel; Application info: R. E. Zenner; Customer service: E. A. Roberts

Products manufactured: Memory Systems, Meters, Tape Recording Accessories

KENTUCKY ELECTRONICS, INC., 1204 Industrial Dr., Box 507, Owensboro, Ky., 42301, Tel: 502-684-0431; Empl.: 300; Minimum order: $100

For info on price: R. Soblosky; Application info: E. E. Yorns; Customer service: T. Payne; Delivery info: T. Payne

Free literature available: Facilities Brochure - Outlines general capabilities.

Products manufactured: Cans, Capacitor, Relay, Semiconductor, Transformer, etc, Caps, Connector, Clamps & Clips, Connectors, Eyelets, Fasteners, Forms, Wire, Pins, Services, Assembly, Production & Test, Wire

Local Sales Offices & Reps.

Ariz	Phoenix, Southwest Engrg.	602-993-0250
Cal	Atherton, Wadsworth-Pacific Mfg. Assocs.	415-321-3619
Cal	Pacific Palisades, Wadsworth-Pacific Mfg. Assocs.	213-454-4313
Conn	Madison, A & M Electronic Reps.	203-245-1031
Ill	Park Ridge, R. McIntosh	312-825-8070
Mass	Needham, A & M Electronic Reps.	617-444-8170
NJ	Haddenfield, Keefe Electronic Sls.	609-429-4650
NY	Williamsville, Henderson Assocs.	716-634-8650
Tex	Dallas, Waddle Sls. Co.	214-638-2860

Advertisment

Deep-drawn and stamped metal parts, wire forms, and fine wire. KE specializes in close-tolerance, precision parts and close-tolerance, critical-surface wire. Main plant has low-tonnage presses (to 35-ton) and low-to-medium tonnage eyelet machines (to No. 20).. Subsidiary does contract tool and die work and medium-tonnage stamping (to 100-ton). Custom assembly services available at both plants.

KEPCO, INC., 131-38 Sanford Ave., Flushing, N.Y., 11352, Tel: 212-461-7000, TWX: 710-582-2631; Empl.: 200 .... p. 1•1239-1301

For info on price: C. Parrish; Application info: P. Birman; Customer service: E. Becker; Delivery info: B. Ruppert

Free literature available: "Using Operational Power Supplies" "Kepco power supply catalog & handbook" Kepco international catalog (in French & German)

Products manufactured: Generators, Power Supplies, Regulators

Local Sales Offices & Reps.

Ala	Huntsville, J.L. Highsmith Co.	205-881-3294
Ariz	Tempe, J.F. Hurlbut Co.	602-968-5962
Cal	Los Angeles, Windsor Dynamics	213-989-3631
Cal	S. Francisco, Windsor Dynamics	415-854-4870
Colo	Denver, J.F. Hurlbut Co.	303-279-7796
Conn	Farmington, R. Perron Co.	203-673-4825
Conn	Trumball, R. Perron Co.	203-268-9631
Fla	Orlando, J.L. Highsmith Co.	305-293-5202
Ill	Chicago, Midwest Elctrn. Sls.	312-777-9700
Iowa	Cedar Rapids, Midwest Elctrn. Sls.	319-362-4410
Kans	Shawnee Mission, K. Kelly & Co.	913-722-0000
Md	Baltimore, Eastern Instrumentation	301-744-3675
Md	Silver Spring, Eastern Instrumentation	301-681-6500
Mass	Boston, R. Perron Co.	617-762-8114
Mich	Detroit, Carter McCormick & Peirce Inc.	313-477-7700
Minn	Minneapolis, E.C. Elctrn. Sls.	612-927-7777
Mo	St. Louis, Kathrinus, Kelly & Co.	314-968-3800
NH	Dover, R. Perron & Co.	603-742-2321
NM	Albuquerque, Technology Mktg. Assoc.	505-298-4321
NY	New York, Eastern Instrumentation	516-466-9505
NY	Rochester, NACO Elctrns. Corp.	716-223-1156
NY	Syracuse, Naco Elctrns. Corp.	315-699-2651
NY	Utica, NACO Elctrns. Corp.	315-732-1801
NC	Charlotte, J.L. Highsmith Co.	704-333-7743
Ohio	Cleveland, Carter McCormick & Peirce Inc.	216-333-5650
Ohio	Dayton, Carter McCormick & Peirce Inc.	513-278-5873
Pa	Philadelphia, Eastern Instrumentation	215-927-7777
Pa	Pittsburgh, Carter McCormick & Peirce	412-472-4415
Tex	Dallas, Airep Elctrns. Inc.	214-827-2120
Va	Norfolk, Eastern Instrumentation	804-497-0001
Va	Richmond, J.L. Highsmith Co.	703-272-5888
Wash	Seattle, H. Levinson Co.	206-323-5100
Wisc	Milwaukee, Midwest Elctrn. Sls.	414-542-5129
For:	Can., Halifax, N.S., Radionics Ltd.	902-455-0670
For:	Can., Montreal, Que., Radionics Ltd.	514-735-4565
For:	Can., Ottawa, Ont., Radionics Ltd.	613-521-8251
For:	Can., Vancouver, B. C., Radionics Ltd.	604-732-7317
For:	Can., Winnipeg, Radionics Ltd.	204-475-1732
For:	Can.,Toronto, Ont., Radionics	416-638-0218

KERTRON, INC., 7516 Central Ind'l. Dr., Riviera Beach, Fla., 33404, Tel: 305-848-9606, TWX: 510-952-7611; Empl.: 160

Products manufactured: Transistors

Local Sales Offices & Reps.

Ariz	Tempe, Sedco Inc.	602-950-1149
Cal	Palos Verdes Peninsular, B. Gray & Assocs.	213-373-1820
Cal	Redwood City, Parks & Pruitt	415-364-1640
Colo	Denver, Camel Elctrns.	303-757-6192
Ill	Chicago, Derndt Assoc.	312-283-0713
Kans	Overland Park, Palatine Engrg. Sls.	913-262-5643
Md	Silver Spring, Rep-Tron	301-593-4844
Mass	Framingham, G. Rosen Co.	617-879-5505
Mich	Southfield, Reps. Elctrn. Prods.	313-354-9066
Mo	St. Louis, Engrg. Svcs.	314-997-1515
NY	East Rockaway, W. Bellenkes & Assoc.	516-887-1443
Ohio	Cincinnati, Giesting Assocs.	513-931-0812
Okla	Tulsa, Palatine Engrg. Sls.	918-622-0321
Pa	Ambler, WM Assocs.	215-643-4119
Tenn	Bristol, Rakes Engrg. & Mktg. Co.	615-968-4195
Tex	Richardson, Palatine Engrg. Sls.	214-231-9489

KESSLER-ELLIS PRODS., 120 1st Ave., Atlantic Highlands, N.J., 07716, Tel: 201-291-0500, Telex: 13-2496; FSC No: 28222; Empl.: 30; Minimum order: $15 .... p. 1•254-259

For info on price: L. Glecson; Application info: R. Laird; Customer service: L. Glecson; Delivery info: L. Glecson

Free literature available: Bulletin #1200 General Catalog, Bulletin #12 ER type of counters, Bulletin #20 Elapsed time indicators, Bulletin #21 Electronic line-both totalizing & predetermining, Bulletin #14 Pneumatic Predetermining & Totalizing counters.

Products manufactured: Controls/Control Eqpt., Counters, Indicators, Switches, Timers, Totalizers, Digital

Local Sales Offices & Reps.

Ala	Atlanta, Electro Mech. Inc.	404-393-0444
Ariz	Phoenix, Palmer Assocs.	602-996-9077
Cal	San Gabriel, Van Gott Assocs.	213-285-2148
Colo	Denver, Palmer Assocs.	303-255-9961
Fla	Clearwater, WMM Assoc.	813-447-2533
Ill	Des Plaines, Lincoln Hodges	312-297-3810
Ind	Indianapolis, F. Sedlack	317-545-1141
Md	Silver Springs, H.R. Siebar	301-589-9110
Mass	Woburn, Gilway Sls. Co.	617-935-4442
Mich	Dearborn, Pitcher-Paulin	313-582-5450
Minn	Minneapolis, R.J. Sls.	612-922-1425
NJ	Atlantic Highlands, R. L. Dalton	201-291-0500
NY	Rochester, L. Marchese	716-544-4300
Ohio	Cleveland, E. Bock & Assocs.	216-331-5212
Pa	Media, W. Reeves	215-566-6709
Tex	Houston, W. Carey Assocs.	713-460-1111
Wash	Seattle, C. Parsons	206-762-7373
Wisc	Waukesha, Rockwell, Brown, Lincoln, Hodges	414-542-3087

KESTER SOLDER DIV., Litton Systems Inc., 4201 Wrightwood Ave., Chicago, Ill., 60639, Tel: 312-235-1600; Empl.: 350

Customer service: B. Mullins

Free literature available: Distributor Catalog; OEM Catalog.

Products manufactured: Cleaners & Solvents, Flux, Brazing & Soldering Materials, Solder (All Types), Soldering Equipment

Local Sales Offices & Reps.

Cal	Anaheim	714-871-0280
NJ	Newark	201-589-0246

KEUFFEL & ESSER CO., 20 Whippany Rd., Morristown, N.J., 07960, Tel: 201-285-5181; Empl.: 2200

For info on price: J. Montesi 201-285-5358; Application info: R. Wayne 201-285-5181; Customer service: J. Montesi 201-285-5358

Products manufactured: Cleaners, Ultrasonic, Drafting Machines, Drafting Symbols, Dry Transfer, Pressure Sensitive, etc. (Including Lettering), Films, Paper, Graphic Recording

Local Sales Offices & Reps.

Alas	Anchorage	907-277-2506
Cal	Los Angeles	213-747-7601
Cal	S. San Francisco	415-873-6850
Colo	Denver	303-733-2451
Fla	Jacksonville	904-398-6471
Fla	Orlando	305-423-1641
Ga	Norcross	404-448-6352
Ill	Northbrook	312-564-0880
Kans	Wichita	316-265-8505
Md	Baltimore	301-727-5290
Mich	Troy	313-549-9100
Mo	Kansas City	816-842-9077
Mo	St. Louis	314-773-8500
NJ	Teterboro	201-288-3900
NJ	Trenton	609-882-8000
NY	E. Syracuse	315-437-1417
NY	Long Island City	212-361-2190
NY	New York	212-687-6510
Ohio	Cleveland	216-241-7807
Ohio	Cuyahoga Falls	216-929-8371
Ohio	Toledo	419-475-3427
Pa	Ft. Washington	215-643-2570
Tex	Dallas	214-742-8084
Tex	Houston	713-227-6231
Tex	San Antonio	512-223-3811
Va	Arlington	703-524-9000
Va	Norfolk	703-625-2591
Wash	Seattle	206-623-5535
Wisc	Milwaukee	414-444-1890
FOR:	Can., Montreal 376, P.Q.	514-735-4171
FOR:	Can., Ottawa 13, Ont.	613-725-2048
FOR:	Can., Ste. Foy, Que.	418-688-9049
FOR:	Scarborough, Ont.	416-751-5600

KEWAUNEE SCIEN. EQUIP. CORP., 4012 Logan St., Adrian, Mich., 49221, Tel: 313-263-5731; Empl.: 750

For info on price: C. A. Schindler; Application info. D. Richards; Customer service: J. McElfresh; Delivery info: J. McElresh

Products manufactured: Benches, Consoles, Stools, Tables, Blowers & Fans & Accessories, Chamber, Environmental Test

KEY TRONIC CORP., Bldg. 14, Spokane Ind'l. Pk., Spokane, Wash., 99216, Tel: 509-928-8000, TWX: 510-773-1885; Empl.: 350

Customer service: Mktg. Dept.

Products manufactured: Encoders, Keyboards, Alphanumeric & Decimal, Kits, Switch Assembling, Lights, Switchboards, Switches

KEYSTONE CARBON CO., Thermistor Div., St. Marys, Pa., 15857, Tel: 814-781-1591; Empl.: 1100 p. 1•2317,2318

Products manufactured: Bearings, Brushes & Brush Assemblies, Controls/Control Eqpt., Indicators, Limiters, Monitors, Networks, Probes, Resistors, Thermistors

Local Sales Offices & Reps.

Cal	San Carlos, Electro Pacific	415-593-1334
Cal	San Gabriel, Van Gott & Assoc.	213-285-2148
Fla	Orlando, Cartwright & Bean	305-422-4531
Fla	Plantation, Cartwright & Bean	305-791-3989
Ga	Atlanta, Cartwright & Bean	404-255-5262
Ill	Elk Grove Village, Knoblock & Assoc.	312-593-5940
Ind	Fort Wayne, R.O. Whitesell & Assoc.	219-432-5591
Ind	Indianapolis, R.O. Whitesell & Assoc.	317-359-9283
Ind	Kokomo, R.O. Whitesell & Assoc.	317-452-6065
Ky	Louisville, R.O. Whitesell & Assoc.	502-893-7303
La	Chalmette, Cartwright & Bean	504-279-4598
Md	Baltimore, Coulbourn DeGreif	301-247-4646
Mass	Reading, C.E. Godfrey Co.	617-944-2230
Mich	Grand Rapids, J.L. Montogomery Co.	616-774-9308
Mich	Southfield, J.L. Montgomery Assoc.	313-358-2616
Minn	Minneapolis, Stoss Assocs.	612-925-2757
Miss	Jackson, Cartwright & Bean	601-981-1368
NJ	Ridgefield, Haber-Ramp Corp.	201-945-5250
NY	Pompey, S.F. Foster Co.	315-677-3333
NY	Webster, S.F. Foster Co.	716-265-2072
NC	Charlotte, Cartwright & Bean	704-333-6457
NC	Raleigh, Cartwright & Bean	919-832-7128
Ohio	Cincinnati, R.O. Whitesell & Assoc.	513-521-2290
Ohio	Columbus, R.O. Whitesell & Assoc.	614-888-9396

Ohio	Dayton, R.O. Whitesell & Assoc.	513-298-9546
Ohio	Lakewood, R.O. Whitesell & Assoc.	216-228-7525
Pa	Fort Washington, GCM, Inc.	215-646-7535
Pa	Pittsburgh, R.O. Whitesell & Assoc.	412-344-7277
Tenn	Knoxville, Cartwright & Bean	615-693-7450
Tenn	Memphis, Cartwright & Bean	901-276-4442
EXP:	Westbury, N.Y., Minthorne Int'l.	516-334-3303
For:	Can., Markham, Ont., Tel-Mar Elctrn. Sls., Ltd.	416-887-5612

KEYSTONE ELCTRNS. CORP., 49 Bleeker St., New York, N.Y., 10012, Tel: 212-475-4600; FSC No: 91833; Empl.: 50; Minimum order: $20 .... p. 2•713-715

For info on price: B. Luque; Application info: A. Arrons; Customer service: D. Rosenberg; Delivery info: L. Schwaid

Free literature available: Standardized Electronic Components catalog includes: Battery Holders and Connectors, Clips, Terminal Boards, Perforated Boards, Plug-In Housings, Spacers and Standoffs, Transistor Sockets and Associated Hardware.

Products manufactured: Boards, Plug-In, Boards, Printed Circuit, Bushings, Glass, Plastic, Metal, Rubber, Etc., Cabinets & Accessories, Cans, Capacitor, Relay, Semiconductor, Transformer, etc, Cases, Equipment, Instrument, Meter, Clamps & Clips, Connectors, Contact Strips, Finger, Contacts, Electrical, Containers, Couplings, Cups, Encapsulation, Enclosures, Module, Plug-In, Eyelets, Fasteners, Headers, Holders, Crystal, Insulators & Insulation, Jack Covers, Jacks (All Types), Jumpers, Kits, Breadboarding (For Engineers), Kits, Printed Circuit, Kits, Terminal, Kits, Test Equipment, Laminates, Locks, Dial & Shaft, Pads, Transistor Mounting, Pins, Plug Adapters, Plug & Jack Sets, Plugs, Probes, Retainers, Services, Assembly, Production & Test, Sockets, Spacers, Terminal Blocks, Boards & Strips, Terminals, Tools

Local Sales Offices & Reps.

Cal	Culver City, H. Feldman Co.	213-870-5973
Cal	Daly City, R. Del Bucchia Assocs.	415-756-1664
Colo	Arvada, Arrowhead Sls.	801-487-3444
Fla	N. Miami, Len Hass Co.	305-949-9143
Ill	Chicago, Memac Sls.	312-545-1033
Kans	Overland Park, Penzner Assocs.	913-381-0004
Md	Lutherville, Cunningham & Assocs.	301-296-4306
Mass	Waltham, Conti-Younger Assocs.	617-890-4582
NJ	Moorestown, L.E. Brown Assocs.	609-234-0382
NJ	Murray Hill, Cambridge-Allen Assocs.	201-464-7987
NJ	Riveredge, Cambridge Assocs.	201-MU2-5844
NY	Fayetteville, Martin P. Andrews Inc.	315-637-3144
NC	Charlotte, Maitland K. Smith	704-372-1026
Ohio	Cleveland, Del Steffen & Assocs.	216-461-8333
Tex	Dallas, Texas Sls.	
Tex	Garland, Texas Sales Co.	214-270-5451
Wash	Seattle, R. K. Squibb, Inc.	206-632-2450

K.G.S. ELCTRNS., 2029 N. Lincoln Ave., Pasadena, Cal., 91103, Tel: 213-798-0786; Empl.: 25
p. 1•1238,1752; p. 2•1752-1754

Customer service: G. Sugimoto

Products manufactured: Amplifiers, Chargers, Battery, Chokes, Coils Including Assemblies & Forms, Controls/Control Eqpt., Inverters, Power Supplies, Transformers

KIDDE, WALTER & CO., Belleville Div., 675 Main St., Belleville, N.J., 07109, Tel: 201-759-5000, TWX: 710-995-4925; Empl.: 1266; Minimum order: $100

Customer service: Sales Off.

Free literature available: Kidde's Fire & Intrusion Alarm Systems & Components brochure illustrates and describes intrusion systems and components and fire alarm systems and components.

Products manufactured: Alarms, Bells, Buzzers, Gongs, Sirens & Aural Warning Devices, Transducers

Local Sales Offices & Reps.

Cal	San Francisco	415-863-6858
Cal	Signal Hill	213-595-5488
Ga	Atlanta	404-451-6122
Ill	LaGrange	312-352-1910
Md	Baltimore	301-247-4545
NJ	Totowa	201-785-4224
Tex	Irving	214-259-3756
Wash	Seattle	206-283-1616
FOR:	Can., Pointe Claire, Quebec, Walter Kidde & Co. of Can., Ltd.	514-695-8230

KILOVAC CORP., Box 4422, Santa Barbara, Cal., 93103, Tel: 805-684-4560, TWX: 910-336-1141; FSC No: 18741; Empl.: 100; Minimum order: $50 .... p. 1•1740-1748

For info on price: J. L. Dysart; Application info: R. Maseda; Customer service: M. Casten; Delivery info: M. Casten

Free literature available: Kilovac Vacuum Relays - General Catalogue - 18 pages, Kilovac Vacuum Relays - 4 page summary, Dow-Key Coaxial Relays - 12 page General Catalog, 1 Page Dow-Key Summary and Prices.

Products manufactured: Antenna Switching Matrices, Attenuators, Coils Including Assemblies & Forms, Relays, Switches

Local Sales Offices & Reps.

Ariz	Tempe, Gassner & Clark (Arizona)	602-968-9037
Cal	Los Angeles, Rep. Assocs.	213-829-5401
Cal	San Carlos, Electro Pacific	415-593-1334
Conn	Washington Depot, Kanan Assocs.	203-868-0513
Fla	Madeira Beach	813-391-3057
Ill	Westchester, Gassner & Clark	312-345-4245
Iowa	Cedar Rapids, H.R.Brown Sls. Co.	319-366-0635
Kans	Leawood, Vasen Sls.	913-649-0679
Kans	Shawnee Mission, M. Bettis	913-362-0772
Kans	Wichita, M.E. Bettis Co.	316-685-7441
Md	Baltimore, Burgin-Kreh	301-788-5200
Mass	Reading, Kanan Assocs.	617-944-8484
Minn	St. Paul, De Beck	612-690-1557
Mo	St. Louis, M. Bettis	314-429-2099
NJ	Riverton, Given	609-829-7249
NM	Albuquerque, Data Handling	505-268-4364
NY	Buffalo, Lamb	716-874-4900
NY	Great Neck, Trionic	516-466-2300
NY	Rochester, Lamb	716-544-5580
NY	Schenectady, Lamb	518-393-4844
NY	Syracuse, Lamb	315-454-2469
NC	Charlotte, DGW, Inc.	704-334-7090
NC	Winston-Salem, DGW, Inc.	919-768-7166
Ohio	Cleveland, Components	216-842-2737
Ohio	Hamilton, Components	513-721-2997
Okla	Tulsa, Norvell Assocs., Inc.	918-663-1247
Tex	Dallas, Norvell Assocs.	214-350-6771
Tex	Houston, Norvell	713-774-2568
Va	Lynchburg, Burgin-Kreh	804-845-5600

KILOVOLT CORP., 238 High St., Hackensack, N.J., 07602, Tel: 201-488-7373; Empl.: 22; Minimum order: $25 .... p. 1•1302-1305

For info on price: S. Rothman; Application info: W. Haschec; Customer service: E. Brown; Delivery info: A. Baratta

Free literature available: General Catalog-High voltage power supplies & insulator testers

Products manufactured: Capacitors, Fixed, Connectors, Diodes, Dividers, Electrodes, High-Voltage, Meters, Power Supplies, Probes, Relays, Resistors, Spark Gaps, Switches, Testers, Transformers

Local Sales Offices & Reps.

Cal	Sherman Oaks, Windsor Dynamics, Inc.	213-989-3631
Cal	Woodside, Windsor Dynamics	415-854-4870
Conn	Meriden, Abbott-Allison Co., Inc.	203-237-9232
Ill	Chicago, P. Lind Elctrns. Co.	312-774-1246
Mich	Farmington, Carter, McCormic & Peirce	313-477-7700
Mich	Kalamazoo, Carter, McCormic & Peirce	616-349-9666
Minn	Circle Pines, Lind Elctrns.	612-786-5770
Ohio	Cleveland, Carter McCormic & Peirce	216-333-5650
Ohio	Dayton, Carter, McCormic & Peirce	513-278-5873
Pa	Pittsburgh, Carter, McCormic & Peirce	412-824-3760
Tex	Dallas, J.A. Green Co.	214-631-7450
Tex	Houston, J.A. Green Co.	713-526-2959

KINEMETRICS, INC., 336 Agostino Rd., San Gabriel, Cal., 91776, Tel: 213-287-9731; Empl.: 44

For info on price: H. T. Halverson; Application info: H. T. Halverson; Customer service: K. L. Benuska; Delivery info: H. T. Halverson

Free literature available: 1. "Kinemetrics Short Form Catalog" , Gives technical descriptions for Kinemetrics instruments for gephysics, seismology, and structural dynamics. 2. "Specific Products Division Short Form Catalog" , Gives technical descriptions for Specific Products standard time and frequency receivers.

Products manufactured: Accelerometers, Antennas, Comparators, Data Acquisition & Reduction Systems, Receivers, Recorders, Services, Assembly, Production & Test, Signal Conditioners & Equipment, Testers, Transducers

Local Sales Offices & Reps.

NJ	Berkeley Heights, Kinemetrics, Inc.	201-464-3933
FOR:	Can., Toronto 269, Ont., B. H. McGregor	416-699-5521

KINETIC SYSTEMS CORP., Maryknoll Dr., Lockport, Ill., 60411, Tel: 815-838-0005; Empl.: 32

For info on price: Laurie; Application info: L. A. Klaisner; Customer service: W. C. Martin; Delivery info: Laurie

Free literature available: KineticSystems' catalog describes a complete line of computer interface modules manufactured to the CAMAC standard. Application information and an introduction to the standard is included.

Products manufactured: Converters, Counters, Data Acquisition & Reduction Systems, Process Control Systems, Scalers, Binary, Decade, Terminals, Data Display (including Alphanumeric & Graphic)

Local Sales Offices & Reps.

Cal	LaCanada, Spectrum Sciences	213-790-1181
Mass	Burlington, Scientific Sys. Sls. Corp.	617-273-1660
Wash	Seattle, Spectrum Sciences	206-624-2373

KINETIC TECH., INC., 3393 De La Cruz Blvd., Santa Clara, Cal., 95050, Tel: 408-296-9305, TWX: 910-338-0122; Empl.: 13

For info on price: G. Williams; Application info: G. Williams; Customer service: S. Odell; Delivery info: S. Odell

Free literature available: Standard Product Brochure; Special Product Brochure; Touch Tone Receiver System Description data sheet; C-Message Filters Specifications Brochure; Standard Product Data Sheets; Application Notes.

Products manufactured: Amplifiers, Analyzers, Filter Synthesizers, Filters

Local Sales Offices & Reps.

Cal	Altadena, Trimarco, Inc.	213-681-7760
Cal	San Francisco, F. Glynn Mktg. Research	415-563-3982
Colo	Denver, Omega Ltd.	303-758-1508
Md	Baltimore, Compar Chesapeake	301-484-5400
Mich	Utica, Norm Case Assoc.	313-781-3900
Minn	Minneapolis, Electro-Serv.	612-827-2907
Ohio	Dayton, Norm Case Assocs.	513-435-1301
Ohio	Fairview Park, Norm Case Assocs.	216-333-4120
Pa	Ambler, Wyncote Instr. Co.	215-643-2440
Tex	Richardson, Campion Sls.	214-238-8145

KINETRON CORP., 1416 Roller Rd, Asbury Park, N.J., 07712, Tel: 201-776-9595; Empl.: 12; Minimum order: $25

Customer service: V. H. Triwedi

Free literature available: General catalog-All types of custom sheet metal fabrication including cans, covers, chassis, brackets etc. Also stock drawn & fabricated cans & covers, weld studs & inserts. Brochure-Stock Transformer Mounting Brackets.

Products manufactured: Cabinets & Accessories, Cans, Capacitor, Relay, Semiconductor, Transformer, etc, Cases, Equipment, Instrument, Meter, Chassis, Metal, Containers, Fasteners, Services, Assembly, Production & Test, Shields

KING-SEELEY THERMOS CO., Box 423, Kendallville, Ind., 46755, Tel: 219-347-1000; Empl.: 450

Products manufactured: Controls/Control Eqpt., Relays, Thermostats

KINGS ELECTRONICS, 40 Mabledale Rd., Tuckahoe, N.Y., 10707, Tel: 914-793-5000, TWX: 710-562-0110; FSC No: 91836; Empl.: 360; Minimum order: $25

For info on price: E. Corcorin; Application info: F. Pack; Customer service: Sls. Dept; Delivery info: Sls. Dept.

Free literature available: Catalogs for all types of coaxial connectors and flat cable connectors.

Products manufactured: Attenuators, Cable Assemblies & Harnesses, Connectors, Relays, Switches, Terminals

Local Sales Offices & Reps.

Ala	Huntsville, Interep Assocs.	205-881-3677
Alas	Anchorage, H. Lang Assocs.	907-279-5741

Cal	Daly City, R. Del Bucchia & Assoc.	415-756-1664
Cal	Westminster, A. A. Dowers Co.	714-894-1123
Colo	Denver, Camel Elctrns.	303-757-6191
Fla	St. Petersburg, Kirkwood Assocs.	
Ill	Chicago, D. Dolin Sls. Co.	312-286-6200
Iowa	Marion, Thomas & Modrcin Assocs.	319-377-6261
Md	Lutherville, Dougherty Sls. Co.	301-823-0431
Mass	Wellesley Hills, M. Scott Co.	617-235-0102
Mo	St. Louis, Boweng Co.	314-429-7327
NJ	Haddonfield, Gray Assocs.	609-429-5300
NY	E. Syracuse, Fountain, Young & Co.	315-437-7733
NY	Massapequa, Coughlin Assocs.	516-799-7743
Ohio	Dayton, F. L. Ohmer & Assoc.	513-434-1454
Tex	Dallas, Bradenco	214-358-3278
Wash	Seattle, R. K. Squibb	206-632-2450
FOR:	Can., Malton, S. C. Hooker Ltd.	
FOR:	Can., Montreal W., Que., Kings Canada	514-487-5151

KINGSLEY MACH. CO., Aero-Space Div., 850 Cahuenga Blvd. - EEM, Hollywood, Calif., 90038, Tel: 213-469-7243

Customer service: J. M. Butler

Products manufactured: Machines/Machinery, Production

KINSEKISHA LAB. LTD., 23-17 2-chome Miyasaka, Setagaya-ku Tokyo, Japan, Tel: 429-2111, Telex: J24-22659; Empl.: 735

Products manufactured: Counters, Crystal Blanks, Crystals, Delay Lines, Delays, Time (Excluding Delay Lines, Timers, Delay & Relays, Time-Delays), Oscillators, Thermostats

KISTLER INSTR. CO., see Sunstrand Data Control, Inc.

KLEIN, MATHIAS & SONS, INC., 7200 McCormick Rd., Chicago, Ill., 60645, Tel: 312-588-6820, Telex: 72-4431

For info on price: R. Franklin; Application info: M. Kelly; Customer service: R. Franklin; Delivery info: R. Franklin

Free literature available: Catalog 117 - General Tool & Safety, 117 PTG - Pocket Version of Catalog 117, KT2 - Envelope Size Tool Guide, CW1 - Construction Workers Bulletin, Consumer Price List, RM Bulletin - Roll N Measure Bulletin.

Products manufactured: Cases, Equipment, Instrument, Meter, Clamps & Clips, Cutters, Wire, Hand Operated, Drills & Accessories, Hand & Power, Drivers, Nut, Knives & Knife Sets, Scissors, Screwdrivers, Tools, Wire Strippers, Wrenches

KLIPSCH & ASSOCS. INC., Box 688, Hope, Ark, 71801, Tel: 501-777-6751; Empl.: 43

For info on price: B. Moers; Application info: Eng. Dept.; Customer service: B. Moers; Delivery info: L. McClellan

Free literature available: Catalog, price list, dealer list, Pocket Size Mailers, Spec Sheets.

Products manufactured: Speaker Systems

Local Sales Offices & Reps.

Ariz	Phoenix, R. Fissell Co.	602-264-4031
Cal	Burbank, Mike Ross & Assoc.	213-842-2104
Cal	Palo Alto, J. Thornton Co.	415-327-8960
Colo	Denver, Justiss, Wilson, & Co.	303-934-3741
Fla	Tampa, Repelect	813-227-5051
Md	Gaithersburg, Electronic Marketers	301-948-5623
Mass	Holliston, W. H. Bell	617-429-2424
Mich	Livonia, F. Peters & Assoc.	313-425-0086
Mo	Springfield, J. C. Fricks	417-831-3674
NY	Gloversville, D. Croucher	212-799-7118
NY	New York, RMS Marketing	212-799-7118
Wash	Seattle, R. Johnston Co.	206-524-5171

KNOL ENTERPRISE, 200 Suburban Rd., San Luis Obispo, Cal., 93401, Tel: 805-544-4881; Empl.: 4

Customer service: P. Knol

Products manufactured: Attenuators, Circuits, Printed, Multilayer, Timers

KNOWLES ELCTRNS., INC., 3100 N. Mannheim Rd., Franklin Park, Ill., 60131, Tel: 312-455-3600, Telex: 72-8397

Free literature available: Sub-miniature microphones, receivers, and speakers.

Products manufactured: Annunciators, Microphones, All Kinds, Transducers

KOLLSMAN INSTR. CO., 575 Underhill Blvd., Syosset, N.Y., 11791, Tel: 516-921-4300, TWX: 510-221-2191; Empl.: 1600

Products manufactured: Display Devices/Displays, Gages, Indicators, Lenses, Optical & Camera, Lenses, Readout & Display, Motors, Pyrometers, Scanners, Servo Systems, Tachometers, Tracking Systems, Transducers, Underwater Communication, Detection, Navigation, etc. Equipment

Local Sales Offices & Reps.

Cal	Long Beach	213-595-5441
DC	Arlington	703-979-1200
Tex	Dallas	214-350-1396

KOOLTRONICS INC., Box 504, Princeton, N.J., 08540, Tel: 609-799-1466, Telex: 843345; Empl.: 100

For info on price: R. Armbruster; Application info: W. G. Stewart; Customer service: R. Armbruster; Delivery info: C. Weil

Products manufactured: Air Conditioners (For Equipment), Blowers & Fans & Accessories, Heat Exchangers & Systems

Local Sales Offices & Reps.

Ala	Huntsville, Beacon Elctrns	205-881-5031
Ariz	Tempe, Jarko Assocs.	602-966-3020
Cal	Canoga Pk., Ebert Entprs.	213-887-7578
Cal	San Mateo, Halbar Assoc.	
Colo	Denver, McLoud & Raymond	303-756-1589
Fla	Maitland, Beacon Elctrns	305-647-3498
Ga	Atlanta, Beacon Elctrns	404-351-2654
Ill	Palatine, J. Clark Co.	312-358-5095
Kan	Shawnee Mission, Inland Assoc.	913-362-2366
Md	Randallstown, Beacon North Inc.	301-922-1248
Minn	Minneapolis, C. R. Gibb Co.	612-377-1200
Mo	Glencoe, Inland Assoc.	314-938-4992
NY	Syracuse, Naylor Elec. Co.	315-472-9183
Ohio	Sylvania, Deo-Volente & Assoc.	419-882-2830
Pa	Bala Cynwyd, Elec-Tech Inc.	215-687-5305
SC	Spartanburg, Beacon Elctrns	803-582-4613
Tex	Dallas, Blackburn Assoc.	214-351-9991
Va	Falls Church, Beacon North Inc.	703-534-1673

KORRY MFG. CO., 223 8th Ave. N., Seattle, Wash., 98109, Tel: 206-624-4066, TWX: 910-444-2295; Empl.: 156; Minimum order: $30

Customer service: J. A. Hevly

Free literature available: Short Form Catalog; Facilities Brochure; Brochure Catalog.

Products manufactured: Diodes, Display Devices/Displays, Indicators, Lights, Sockets, Switches

Local Sales Offices & Reps.

Ala	Huntsville, Craft Assoc. Co.	205-837-0221
Cal	Mountain View, Westrep	415-968-5800
Cal	Pico Rivera, Westrep	213-949-2551
Cal	San Diego, Westrep	714-276-0751
Conn	New Canaan, S. Pierce, Inc.	203-966-4639
Fla	Maitland, Craft Assoc. Co.	305-645-2242
Ga	Atlanta, Craft Assoc. Co.	404-393-0400
Haw	Pico Rivera, Westrep	213-949-2551
Ill	Chicago, Engineered Sls. Co.	312-867-8434
Ind	Fort Wayne, McDonald Sls. Co.	219-747-3650
Kans	Overland Park, Ensco-Rep	913-381-7557
Md	Glen Arm, Hodgins Assoc.	301-592-7047
Mass	Norwood, S. Pierce, Inc.	617-762-3164
Mo	St. Louis, Ensco-Rep	314-542-3935
NY	New Rochelle, Display Comps. Sls. Co.	914-636-4664
Ohio	Dayton, Whelan Corp.	513-434-7551
Tex	Fort Worth, W.P. Fralia Co.	817-738-2394

K R ELECTRONICS, INC., 91 Avenel St., Avenel, N.J., 07001, Tel: 201-636-1900

Products manufactured: Filters

KRATOS, 403 S. Raymond Ave., Bin 45, Pasadena, Cal, 91109, Tel: 213-449-3090, TWX: 910-588-3288; FSC No: 34830; Empl.: 340; Minimum order: $50 p. 1•177,253,750,751

For info on price: F. LaChapelle; Application info: D. Risk; Customer service: F. LaChapelle; Delivery info: F. LaChapelle

Free literature available: Catalog - Switchboard Instruments, Catalog - Panel Meters, Catalog - Pressure Gauges, Catalog - Aircraft Instruments, Brochures - Computer Graphics, Brochures - Batching/Weighing

Products manufactured: Alarms, Comparators, Controllers, Programmable, Controls/Control Eqpt., Converters, Current Sensors, Detectors, Display Devices/Displays, Gages, Indicators, Meters, Monitors, Process Control Systems, Relays, Switches, Terminals, Data Display (including Alphanumeric & Graphic), Timers, Transducers, Transmitters

Local Sales Offices & Reps.

Cal	San Carlos, Electro-Pacific	415-593-1334
Conn	Bethel, Kratos Eastern Sls. Off.	203-792-9302
Fla	Miami, Ludlum Assoc.	305-592-6523
Fla	Orlando, Ludlum Assoc.	305-894-7761
Ga	Atlanta, Electro-Mech Sls. Engrg. Co.	404-256-4414
Ill	Addison, R. Edward Stemm, Inc.	312-279-2440
Md	Glen Arm, Hodgins Assocs.	301-592-7047
Mass	Peabody, JSR Assocs.	617-532-0348
Minn	St. Paul, Cullen & Assocs.	612-646-7371
Mo	St. Louis, PEM Sales Co.	314-427-7200
NY	Great Neck, F. Tylinski Co.	516-466-9070
NY	N. Massapequa, C. B. Hopkins Co.	516-796-0066
NY	Syracuse, Labtronics, Inc.	315-454-9314
Ohio	Cleveland, Imtech Corp.	216-826-3400
Okla	Tulsa, Knight Engineering Company, Inc.	918-749-7785
Tex	Hurst, Kratos Dallas Sls. Off.	817-268-4165
Wash	Bellevue, Doland Co.	206-454-4952
Wisc	West Allis, Electric Power & Light Equipment Co.	414-258-8488

KRECKMAN, HERB CO., Cresco, Pa., 18326, Tel: 717-595-2212; Empl.: 4

Customer service: H. Kreckman

Free literature available: Catalog - Showing Communications Antennas in various forms from 25 to 470 MHZ.

Products manufactured: Antennas

KRIS INC., 1026 S. Washington, Cedarburg, Wisc., 53012, Tel: 414-377-5700, Telex: 2-6886

Products manufactured: Amplifiers, Comm. Systems

Local Sales Offices & Reps.

Cal	Glendale, Richard Armstrong Sls.	213-245-5344
Ga	East Point, Paul Hayden Assoc.	404-766-0261
Mass	Boston, Sam Adelman Assocs.	617-443-9260
Minn	Burnsville, Chip Carlson Sls.	612-890-7893
Pa	Pittsburg, Don Small Assoc.	412-561-6432
Utah	Murray, Kennealey Assocs.	801-268-3111
Wash	Seattle, DMS/VANTAGE	206-784-6800

KRL ELECTRONICS, 28 Bridge St., Manchester, N.H., 03101, Tel: 603-668-3210; Empl.: 25 .... p. 2•1498,1499

Products manufactured: Networks, Resistors, Thermistors, Thermometers, Resistance, Thermostats

Local Sales Offices & Reps.

Cal	Mt. View, Shaw-Tech, Inc.	415-961-4775
Colo	Denver, Omega Ltd.	303-758-1508
Ill	Palatine, C & C Elctrn. Sls.	312-358-8900
Ind	Indianapolis, Sheridan Assocs.	317-547-7777
Kans	Overland Park, Sheridan Assocs.	913-383-1636
Mass	Burlington, Contact Sls.	617-273-1520
Mich	Farmington, Sheridan Assocs.	313-477-3800
Mo	Florissant, Sheridan Assocs.	314-837-5200
NY	Port Washington, R.E. Breuer Co.	516-883-7810
NC	Raleigh, Candor Co., Inc.	919-876-4999
Ohio	Beachwood, Sheridan Assocs.	216-831-0130
Ohio	Cincinnati, Sheridan Assocs.	513-761-5432
Ohio	Dayton, Sheridan Assocs.	513-277-8911
Okla	Tulsa, Norvell Assocs.	918-663-1247
Pa	Pittsburgh, Sheridan Assocs.	412-244-1640
SC	Myrtle Beach, Candor Co., Inc.	803-448-8361
Tenn	Chattanooga, Candor Company, Inc.	615-894-7454
Tex	Dallas, Norvell Assocs.	214-350-6771
Tex	Houston, Norvell Assocs.	713-774-2568
Va	Lynchburg, Candor Company, Inc.	804-846-6579
Wash	Bellevue, J. Wandell Co.	206-454-4648

Local Distributors

SC	Myrtle Bch., Candor Co., Box 2220	803-448-5213
Tex	Dallas, Norvell Assocs., 10210 Monroe Dr.	214-350-6771
Tex	Houston, Norvell Assocs., 6640 Hillcroft Ave.	713-774-2568
Tex	Tulsa, Norvell Assocs., 3340 Memorial Blvd.	918-663-1247
Wash	Seattle, Earl & Brown Co., Box 9285	206-284-1121

KROHN-HITE CORP., 580 Massachusetts Ave., Cambridge, Mass., 02139, Tel: 617-580-1660, TWX: 710-320-6583; Empl.: 120; Minimum order: $10 p. 1•569,753-755

For info on price: E. C. Lutfy; Application info: S. L. Guinta; Customer service: E. C. Lutfy; Delivery info: E. C. Lutfy

Products manufactured: Amplifiers, Filters, Generators, Meters

Local Sales Offices & Reps.

Ala	Huntsville, Gentry Assocs.	205-534-9771
Ariz	Scottsdale, Barnhill Three Inc.	602-947-7841
Cal	Inglewood, L&M South., Inc.	213-674-6850
Cal	San Jose, L&M Engrg., Inc.	408-292-3220
Colo	Denver, Barnhill Three, Inc.	303-750-1222
Conn	Glastonbury, Instrument Reps., Inc.	203-633-0777
Fla	Orlando, Gentry Assocs.	305-894-4401
Haw	Honolulu, Aloha Assocs.	808-941-1574
Ill	Des Plaines, Cozzens & Cudahy Inc.	312-298-3600
Ind	Indianapolis, Cozzens & Cudahy Inc.	317-244-2456
Mass	Lexington, Instrument Reps., Inc.	617-861-8620
Mich	Detroit, Electro Sls. Assocs.	313-526-8800
Mo	St. Louis, Cozzens & Cudahy Inc.	314-423-1234
NJ	Haddonfield, Dyna Rep Co.	609-795-1700
NM	Albuquerque, Barnhill Three, Inc.	505-299-7658
NY	Elmont, Crane & Egert Corp.	516-488-2100
NY	Syracuse, Ossman Instr.	315-437-6666
NC	Burlington, Gentry Assocs.	919-227-3639
Ohio	Cleveland, Electro Sls. Assocs.	216-261-5440
Pa	Pittsburgh, Electro Sls. Assocs.	412-371-9449
Tex	Houston, Barnhill Two Inc.	713-688-9971
Tex	Richardson, Barnhill Two Inc.	214-231-2573
Va	Alexandria, Dyna Rep Co.	703-354-1222
Wash	Bellevue, Showalter Instruments, Inc.	206-624-4035

KRYLON, Div. Borden, Box 390, Norristown, Pa., 19404, Tel: 215-279-1950, TWX: 510-660-0335; Empl.: 200

Customer service: B. Adams

Products manufactured: Cleaners & Solvents, Coatings

Local Sales Offices & Reps.

Ala	Atlanta, Cartwright & Bean	404-255-5262
Cal	Los Angeles, G.B. White & Assoc.	213-749-4168
Cal	Millbrae, G.B. White & Assoc.	415-EM 6-8234
Colo	Denver, Western Indus. Sls. & Svcs.	303-758-3972
Ill	Chicago, Q & B Inc.	312-725-4999
Ind	, Mktg. Engineers	317-545-1523
Kans	Shawnee Mission, Thomas & Modrcin Assoc.	913-HE 2-2131
Mass	Ellingwood	617-423-4075
Mich	Detroit, Riley & Petchell Sls.	313-838-9100
Minn	Minneapolis, Godden-Olson	612-927-4434
NY	New York, Newhope Corp.	212-LE 2-7372
NY	Syracuse, Paston-Hunter Co.	315-437-2992
Ohio	Cleveland, J. O. Olsen Co.	216-752-5444
Pa	Philadelphia, K. B. Erdman	215-CA 4-1833
Tenn	Memphis, Cartwright & Bean	901-276-4442
Tex	Dallas, H. Frazier	214-824-0117
Tex	Houston, H. Frazier	713-461-2866
Wash	Seattle, R. Merritt Co.	206-682-7337

KRYSTINEL CORP., Fox Island Rd., Port Chester, N. Y., 10573, Tel: 914-937-5252, TWX: 914-937-5370; Empl.: 135 p. 2•1234,1235

Customer service: S. Snead

Free literature available: Complete catalog: Lists Ferrite, Slugs, Coil Forms, Insert Tuning Cores, Threaded Cores, Cap Cores, Balun Cores, Bobbins, Toroids, Washers, Shield Beads, Sleeves.

Products manufactured: Bobbins, Winding, Coil & Transformer, Coils Including Assemblies & Forms, Cores, Magnetic, Ferrite Material & Parts, Shields

Local Sales Offices & Reps.

Cal	LaHabra, Magnetic Materials	213-694-2063
Cal	Los Altos, Horne Assocs.	415-948-0788
Colo	Golden, B. Callister & Assocs.	303-761-0992
Fla	Orlando, Geartner Assocs.	305-299-1000
Ill	Chicago, C & A Assocs.	312-235-8443
Mo	Blue Springs, Cairns & Hayes Elctrns. Sls. Co.	816-229-1404
Mo	St. Charles, Cairns & Hayes Elctrns. Sls. Co.	314-946-6617
NJ	Kenilworth, Ventronics Inc.	201-272-9262
NJ	South Orange, S. Simberkoff Assocs.	201-763-7900
NY	Buffalo, J. R. Henderson & Assocs.	716-634-8650
Tex	Houston, Cunningham Co.	713-461-4197
Wash	Bellevue, Rep. Tronix	206-454-5190

KULITE SEMICONDUCTOR PROD., 1030 Hoyt Ave., Ridgefield, N.J., 07657, Tel: 201-945-3000, Telex: 135458; Empl.: 140; Minimum order: $25

Customer service: J. W. G. Budd

Free literature available: Literature describing complete line of products including semiconductor strain gages, pressure transducers, accelerometers, load cells, and temperature sensors.

Products manufactured: Accelerometers, Amplifiers, Cells, Load, Gages, Microphones, All Kinds, Transducers, Transmitters

Local Sales Offices & Reps.

Ala	Huntsville, Col-Ins-Co.	205-539-1771
Cal	Hollywood, B. J. Wolfe Entprs.	213-877-5518
Cal	Walnut Crk., Dale-Dahl Assocs.	415-933-9595
Colo	Littleton, Aztec Entprs	303-795-0250
Conn	Hamden, Northeast Engrg.	203-248-4481
Fla	Orlando, Col-Ins-Co.	305-423-7615
Ga	Clarkston, Col-Ins-Co.	404-934-7280
Ill	Northfield, Torkelson Assocs.	312-446-9085
Ind	Indianapolis, Torkelson Assocs.	317-244-7867
Md	Kensington, Kinney Tech Prod	301-727-2122
Mass	Danvers, Northeast Engrg	617-774-3010
Mich	Detroit, WKM Assoc.	313-892-2500
Minn	Minneapolis, Torkelson Assocs.	612-835-2414
Mo	St. Louis, Ozark Elctrn Mktg	314-423-7200
NM	Albuquerque, Aztec Entprs	505-255-2440
NY	Manhasset, Northeast Engrg	516-365-9633
NY	Melville, Astrorep Inc.	516-423-2266
NC	Raleigh, Col-Ins-Co.	919-834-6591
Ohio	Cleveland, WKM Assocs.	216-267-0445
Ore	Portland, Brett-Ross	503-232-4184
Pa	Jenkintown, PDC Corp.	215-887-9610
Tex	Arlington, Pan/Tech Engrg	817-261-4111
Wash	Seattle, Brett-Ross	206-935-8054

KULKA ELEC. CORP., 520 S. Fulton Ave., Mt. Vernon, N.Y., 10551, Tel: 914-664-4024, TWX: 710-562-0104; Empl.: 500

Customer service: P. Lauria

Free literature available: 17B Catalog - Terminal Boards & Toggle Switches Individual Catalog Sheets - Spec Sheets: Standards Printed Circuit Mount Insulated Feed-Thru Marker & Insulated Strips Military Kliptites Pressure-Contact Stud & Turret Snapblocks Wire Wrap Thermoplastic Printed Circuit Mount Thermoplastic Insulated Feed-Thru Thermoplastic High Barrier

Products manufactured: Connectors, Sockets, Strips, Terminal Blocks, Boards & Strips, Terminals

Local Sales Offices & Reps.

Ariz	Phoenix, Shefler-Kahn Co.	602-258-7893
Cal	Los Angeles, E E Strassner	213-666-1511
Cal	Redwood City, Warren-Hickey Sls.	415-368-3849
Colo	Denver, Koether-Cox	303-733-5561
Conn	Cheshire, Coakley, Boyd & Abbett	203-272-2261
Fla	North Miami, Winfield Elctrns. Sls.	305-945-6544
Ga	Atlanta, Winfield Southeast	404-636-3023
Ill	Chicago, Hanke Co.	312-593-8500
Ind	Fort Wayne, New Era Sls	219-743-5371
Kan	Shawnee Mission, Lowell-Kangas & Assocs.	913-631-3515
La	Metairie, J. F. McKinney Sls.	504-887-1723
Md	Bromall, L.D. Lowery	215-356-5300
Mass	Needham, Coakley, Boyd & Abbett	617-444-5470
Mich	Ferndale, Shalco	313-547-4771
Mo	St. Louis, Lowell-Kangas & Assocs.	314-821-4050
NJ	South Orange, Simberkoff Sls.	201-763-7900
NM	Albuquerque, Shefler-Kahn	505-265-7077
NY	Buffalo, Telesco Assocs.	716-834-1026
NY	New York, Simberkoff Sls.	212-943-7023
NY	Rochester, Telesco Assocs.	716-271-3780
NY	Utica, Telesco Assocs.	315-733-3183
Ohio	Dayton, Neal Bear	513-299-3566
Ohio	Richfield, Bear Mktg	216-659-3131
Okla	Tulsa, J. F. McKinney Sls.	918-742-6791
Ore	Portland, Earl & Brown	503-245-2283
Pa	Broomall, L.D. Lowery	215-356-5300
Pa	Pittsburgh, Trymac Co.	412-823-8400
Tex	Bellaire, J. F. McKinney Sls.	713-774-3232
Tex	Dallas, J. F. McKinney Sls.	214-631-9450
Wash	Seattle, Earl & Brown	206-274-1121
FOR:	Can., Ajax, Ont., Munro Elctrn. Comps.	416-676-1042

KURZ-KASCH, INC., Electronics Div., 2876 Culver Ave., Dayton, Ohio, 45429, Tel: 513-296-0330; Empl.: 70

Customer service: J. Keller

Free literature available: Kurz-Kasch will supply upon request catalogs or data sheets of any product shown in EEM. All literature is self-descriptive.

Local Sales Offices & Reps.

Cal	Los Angeles, W.S. Harmon Co.	213-937-1460
Colo	Denver, Walter Engineering	303-777-5585
Conn	Wallingford, Adams-McGregor, Inc.	203-269-5816
Ill	Libertyville, R. Klipp Assoc.	312-362-4676
Iowa	Des Moines, KSW Associates	515-279-9235
Mass	Scituate, Adams-McGregor, Inc.	617-545-2213
Mich	Farmington, Carter, McCormic & Peirce	313-477-7700
Minn	St. Paul, Skor	612-645-6461
Mo	Kansas City, KSW Assocs.	816-358-5240
Mo	St. Louis, KSW Associates	
NY	Great Neck, F. Tylinski Co.	516-466-9070
NY	Rochester, Marsey Sls., Inc.	716-442-9700
NC	Charlotte, M. F. Taylor Co.	704-537-4878
Ohio	Cleveland, Carter, McCormic & Pierce	
Ohio	Dayton, Carter, McCormic & Pierce	512-278-5873
Ore	Portland, D.G. Weber Co.	503-234-7671
RI	Lincoln, Adams-McGregor, Inc.	401-726-1300
Tex	Dallas, G. V. Peck Co.	214-328-3511
Tex	Houston, The Gordon V. Peck Co.	713-664-1435
EXP:	New York, N.Y., Singer Products Co.	

KURZ-KASCH, INC., Knob Div., 711 Hunter Rd., Wilmington, Ohio, 45177, Tel: 513-382-0966 ... p. 2•1104

Customer service: A.L. King

Free literature available: Kurz-Kasch will supply upon request catalogs or data sheets of any product shown in EEM. All literature is self-descriptive.

Products manufactured: Knobs, Services, Assembly, Production & Test

Refer to Kurz-Kasch Electronics Div. for sales office information.

KYROS CORP., Box 406, Madison, Wisc., 53701, Tel: 608-238-3587; Empl.: 4

Customer service: R. Cox

Products manufactured: Tape Search Equipment

L & L SPECIAL FURNACE CO., 166 Conchester Rd., Twin Oaks, Pa., 19016, Tel: 215-HU5-6334; Empl.: 32

Customer service: G. Lewicki

Free literature available: Econo Master Furnaces. Unique new Modular furnaces. Available with tubes, conveyor belts, alloy muffles, recirculation. Temperatures to 2350°F. Dyna-Trol Furnaces. Unique box furnaces for temperatures to 2300°F. Available with fans, various controls. Elements located on multi-walls.

Products manufactured: Furnaces

L & R MFG., 577 Elm St., Kearny, N.J., 07032

LABELON CORP., 10 Chapin St., Canandaigua, N.Y., 14424, Tel: 315-394-6220, TWX: 510-254-7147; Empl.: 160

Customer service: H. J. Kratoville

Products manufactured: Labels, Pressure-Sensitive, Adhesive, Tapes, Films & Foils, Pressure Sensitive

Local Sales Offices & Reps.

Cal	Los Angeles, R. L. Smith Co.	213-746-1710
Ill	Chicago, P. Coridon & Assoc.	312-286-5144
NY	New York, Labelon Corp.	212-947-4049

LABORATORY DATA CONTROL, Div. M. Roy Corp., Box 10235, Riviera Beach, Fla., 33404, Tel: 305-844-5241; Empl.: 52

For info on price: J. Wagner; Delivery info: J. Wagner

Products manufactured: Integrators, Electronic, Paper, Graphic Recording, Recorders

Local Sales Offices & Reps.

Ala	Huntsville, Newcomb, Assoc.	205-852-0304
Del	Newark, Benchmark	302-366-8797
Ill	Joliet, Utopia Instr.	815-727-5431
Iowa	Ames, Midwest Instr.	515-292-5413
Mass	Boston, Richman Assoc.	
Mass	Holliston, Richman Assoc.	617-879-5011
Minn	Minneapolis, Midwest Inst.	612-333-0319
Mo	St. Louis, Gateway Scientific	314-725-3464
NJ	South Amboy, Laboratory Data Control	201-721-9331
NM	Albuquerque, Air Row Inc.	505-268-1733
NC	Raleigh, Newcomb Assoc.	919-893-5721
Tex	Houston, Antek Instr.	713-691-2265
Wash	Seattle, VWR Scientific	206-682-3460

LAKE CHEMICAL CO., 250 N. Washtenaw Ave., Chicago, Ill., 60612, Tel: 312-826-1700; Empl.: 65

Free literature available: #74-0 Catalog, Covering Our Full Line of Fluxes and Sealants.

Products manufactured: Flux, Brazing & Soldering Materials

LAKESHORE ELECTRIC CORP., 205 Willis, Bedford, Ohio, 44146, Tel: 216-232-0200, Telex: 980-253; Empl.: 40

Products manufactured: Cabinets & Accessories, Chargers, Battery, Controls/Control Eqpt., Panels, Switchboards, Switches

Local Sales Offices & Reps.

Cal	Redondo Beach, Control Switches, Inc.	213-772-1582
Cal	San Francisco, Artwel Elec., Inc.	415-467-1880
Colo	Commerce City, Elec. Power Equip. Co.	303-288-0753
Fla	Jacksonville, R.J. Hines	904-641-9503
Fla	Miami, A.C. Chaney & Assoc.	305-633-1651
Ga	Atlanta, R.W. Allen	404-725-5561
Haw	Honolulu, Pacific Energy Equip.	808-373-1039
Ill	Chicago, Weldy-Lamont Assoc.	312-777-8575
Iowa	Des Moines, I.L. Davidson Co.	515-288-0958
Md	Lutherville, M.P. West, Inc.	301-252-7080
Mass	Sharon, Adcour	617-784-3996
Mich	Detroit, Webco, Inc.	313-862-4673
Minn	Minneapolis, Pinkney & Assocs.	612-786-9270
Mont	Billings, Holeman GM Diesel, Inc.	406-252-4191
NY	Buffalo, H.C. Zang	716-877-3677
NY	Greenvale, O. Smith-Johannsen & Co.	516-484-5630
NC	Charlotte, C. Alley Assocs.	704-523-1532
Ohio	Cincinnati, Alexander Equip. Co.	513-221-7520
Ohio	Shaker Heights, R.F. Reske & Assoc.	216-932-5293
Pa	Croyden, R. Cunningham & Assoc.	215-677-8559
Pa	Pittsburgh, Waggoner-Ver Hill Assoc.	412-241-5203
Tenn	Knoxville, Tubbs Agency	615-577-0689
Tenn	Memphis, Underwood Sls. Co.	901-527-0333
Tex	Garland, Stout-Jennings-Schmidt Co.	214-272-5585
Tex	Houston, Stout-Jennings-Schmidt Co.	713-729-1994
Va	Richmond, T.L. Haynes & Co.	804-285-9326
Wisc	Cedarburg, Weldy-Osbon Assoc.	414-377-2400
FOR:	Can., Montreal 460, Que., Sytrolec Controls, Ltd.	514-324-8991

LA MARCHE MFG. CO., 106 Bradrock Drive, Des Plaines, Ill., 60018, Tel: 312-299-1188, Telex: 282-524; QPL No: 15736; Empl.: 225 .... p. 1•1308,1309

Customer service: A. Rotschild

Free literature available: Complete float battery charger and D.C. to A.C. Inverter catalog.

Products manufactured: Chargers, Battery, Converters, Eliminators, Battery, Inverters, Power Supplies, Relays

Local Sales Offices & Reps.

Alas	Anchorage, J.P. Bagoy	907-274-8531
Ariz	Phoenix, W.C. Osborn	602-279-5556
Ark	El Dorado, L. Byrne	501-UN3-9435
Cal	El Cerrito, B. Saletta	415-236-9191
Cal	Encino, D. Meyers	213-981-6552
Colo	Denver, W. Pape	303-455-3643
Fla	Jupiter, J. Marsh	305-746-4911
Ga	Atlanta, J. H. Chambers	404-875-8086
Ill	Deerfield, T. Waters	312-948-0320
Ind	Ft. Wayne, J. McDonald	219-747-3650
Iowa	Eldridge, L. Garrett	319-391-5211
La	New Orleans, H. Chambers	504-525-6677
Md	Annapolis, P. Martini	301-267-7462
Mass	Sharon, R. Jacobs	617-784-3996
Mich	Detroit, B. Schafer	313-862-4673
Mich	Grand Rapids, J. Perry	616-949-0271
Minn	Minneapolis, W. Ruva	612-721-7444
Mo	Kansas City, H. Burton	816-531-1077
Mo	St. Louis, R. Link	314-966-3506
Mont	Billings, D. Parker	406-245-6349
NJ	Collingswood, C.W. Wright	609-858-4887
NY	Syracuse, A. Komar	315-437-2845
NY	Uniondale, A. Crowe	516-485-2622
NC	Charlotte, H.E. Gray Jr.	704-375-3249
Ohio	Columbus, A. Ulrich	614-253-2705
Okla	Tulsa, L.W. Hubbell	918-RI3-9851
Ore	Portland, W. Haynes	503-236-2744
Tenn	Jackson, D. Hallman	901-423-1366
Tex	Dallas, D. Cooper	214-271-5494
Tex	Houston, E. Meyer	713-928-3181
Tex	Odessa, B. McEntyre	915-332-1429
FOR:	Can., Springhill Nova Scotia, D. Surrette	902-597-3767
FOR:	Can., Vancouver B.C., Simson-Maxwell Co.	604-736-5431
FOR:	Can., Ville St. Laurent Que., D. Surrette	514-336-4192

LAMBDA ELCTRNS., 515 Brd. Hollow Rd., Melville, N.Y., 11746, Tel: 516-694-4200, TWX: 510-224-6484; Empl.: 500 .... p. 1•1310,1311,1846

Products manufactured: Chokes, Circuits, Hybrid, Thick Film, Hybrid Voltage Regulators, Limiters, Locks, Dial & Shaft, Meters, Power Supplies, Protectors, Racks, Reels, Cord & Cable, Regulators, Slides, Cabinet & Chassis, Transformers

Local Sales Offices & Reps.

Ariz	Phoenix	602-996-1010
Cal	No. Hollywood	213-875-2744
Cal	Sunnyvale	408-738-2541
Fla	Altamonte Springs	305-831-8010
Ill	Arlington Heights	312-593-2550
Md	Baltimore	301-465-1133
Mass	Lexington	617-861-8585
Minn	Minneapolis	612-935-6194
NJ	Cherry Hill	609-424-2170
NY	Melville	516-694-4200
NY	Poughkeepsie	914-297-4800
NY	Rochester	716-454-6770
Ohio	Cleveland	216-585-7808
Pa	Norristown	215-279-5644
Tex	Dallas	214-341-5130
Tex	Houston	713-464-6554
Va	McLean	703-356-0141
EXP:	N.Y., Melville	516-694-4200
FOR:	Can., Pointe Claire, Que.	514-697-6520
FOR:	Can., Toronto, Ont.	416-486-0794

LAMINATED FABRICATORS, 1145 San Mateo Ave., San Bruno, Calif., 94066, Tel: 415-583-5092; Minimum order: $5

Customer service: H. L. Jacobs

Products manufactured: Bushings, Glass, Plastic, Metal, Rubber, Etc., Insulators & Insulation, Laminates, Nameplates, Services, Assembly, Production & Test, Terminal Blocks, Boards & Strips

LAMPS, INC., see Illuminated Products, Inc.

LANGEVIN, 2030 Placentia Ave., Costa Mesa, Cal., 92627, Tel: 714-642-8083; FSC No: 11135; Empl.: 12

Customer service: P. Hanson

Products manufactured: Programmers, Switches

LANSDALE TRANSISTOR & ELCTRNS., Bldg. 4, Shetland Ind'l. Pk., Andover, Mass., 01810, Tel: 617-933-3500; Empl.: 10

Products manufactured: Integrated Circuit Devices

LAPP INSULATOR DIV., INTERPACE CORP., Radio Specialties, 350 Sumner St., LeRoy, N.Y., 14482, Tel: 716-967-6221, TWX: 716-967-2511; Empl.: 1310

For info on price: S. P. Lapp, Ext. 403; Application info: G. Bolin, Ext. 409; Customer service: R. Bullock, Ext. 244

Free literature available: Catalog No. 590 contains description, ratings and specifications on antenna tower insulators, standoff insulators, entrance insulaton and special radio insulators.

Products manufactured: Bushings, Glass, Plastic, Metal, Rubber, Etc., Capacitors, Fixed, Capacitors, Variable, Insulators & Insulation, Seals

Local Sales Offices & Reps.

Ala	Birmingham, C.W. Ashby Co.	205-879-1651
Ark	Little Rock, C. H. Stout	501-372-2555
Fla	Jacksonville, Belcher & Assocs.	904-724-7811
Ga	Atlanta, E. A. Thornwell	404-351-6535
Kans	Kansas City, Power Equip. Sls.	913-384-3898
Ky	Lexington, Dyer-Pederson Agency	606-266-7412
La	Shreveport, C. H. Stout	318-221-5555
Md	Annapolis, Rumsey Elec. Co.	301-268-9644
Miss	Jackson, C. H. Stout of Miss.	601-354-4326
NC	Charlotte, J. Rudisill Assocs.	704-377-6901
Okla	Tulsa, C. B. Anderson Elec. Co.	918-836-4661
Pa	Pittsburgh, Muller, Harper & Assocs.	412-931-6460
Tenn	Memphis, C. H. Stout of Tenn	901-362-1616
Tex	Dallas, E. B. Robertson	214-942-2711
Va	Richmond, Rumsey Elec. Co.	804-335-4379

LARSON AERO DEV., Box 135, Concord, Calif., 94522, Tel: 415-228-7870; Empl.: 15

Products manufactured: Accelerometers, Gyros (All Types), Indicators, Meters, Potentiometers, Recorders, Relays, Testers, Transducers

Local Sales Offices & Reps.

Fla	Maitland, D & E Assoc.	305-644-3039
Mich	Detroit (Ferndale), TIBY Co.	313-547-3550
Ohio	Cleveland, TIBY Co.	216-371-5335
Ohio	Dayton, TIBY Co.	513-277-3822

LARSON INSTR. CO., INC., Greenbush Rd., Orangeburg, N.Y., 10962, Tel: 914-359-3800; Empl.: 14 p. 1•756,757

Products manufactured: Amplifiers, Bridges, Controls/Control Eqpt., Meters, Probes, Pyrometers, Recorders, Relays, Shunts, Meter, Transducers, Transformers

Local Sales Offices & Reps.

Cal	Los Angeles, L-Tronix Assoc.	213-256-2224
Cal	Palo Alto, Mauldin Co.	415-326-5291
Ind	Richmond, Kennedy Sls.	317-966-1933
Pa	Ingomar, R. W. Moulton Assocs.	412-366-3333
Wash	Seattle, Instr. Engrg.	206-682-1123
FOR:	Can., Montreal, Que., Brian Engrg.	514-735-1671

LASER INC., Laser Lane, Box 537, Sturbridge, Mass., 01566, Tel: 617-347-7314; Empl.: 12

For info on price: A.D. Battista; Application info: W.H. Shiner; Customer service: W.H. Shiner; Delivery info: A.D. Battista

Free literature available: Complete catalog of our products. This 24 page catalog contains 8 pages of general information and many descriptions, with photos, of industrial welding & drilling with laser equipment.

Products manufactured: Fiber Optic Bundles, Lasers & Laser Systems, Lenses, Optical & Camera, Machines/Machinery, Production, Microscopes, Monitors, Power Supplies, Services, Assembly, Production & Test, Television Systems & Equipment Closed-Circuit, Welding Equipment & Access. (Excluding Equip. for Semiconductor Devices)

Local Sales Offices & Reps.

Cal	Sherman Oaks, Windsor Dynamics	213-989-3631
Cal	Woodside, Windsor Dynamics	415-854-4870
Fla	Satellite Beach, Reynolds & Assocs.	305-773-4700
Ill	Chicago, Victor Welding	
Ind	Indianapolis, Tech Sls. & Mktg.	317-356-3658
Md	Silver Spring, Spectroscopy Sys.	301-949-8261
Mass	Waltham, Betronic Assocs.	617-894-8400
NY	Mineola, J.B. Lilly Co.	516-746-2226
NY	Syracuse, Labtronics	315-454-9314
Ohio	Dayton, H. Teplitz & Co.	513-277-6531
Pa	Wyndmoor, Spectroscopy Sys.	215-836-1545
Tex	Houston, Optics & Elctrns.	713-666-8622
Wisc	Milwaukee, Bentley Welding Supply Co.	414-476-1222
EXP:	Weston, Mass., Maridyne Int'l Corp.	617-899-3510

LASER SYSTEMS CORP., 117 N. First St., Ann Arbor, Mich., 48108, Tel: 313-761-7150; Empl.: 6

Customer service: R. E. Miller

Products manufactured: Alarms

LASER TECHNOLOGY, INC., 10624 Ventura Blvd., N. Hollywood, Calif., 91604, Tel: 213-763-7091; Empl.: 24

Customer service: H. B. McLaughlin

Products manufactured: Honeycomb Sheets, Panels, etc., Scribers, Semiconductor Wafer Fabrication

LATTIN RADIO LABS., 1431 Sweeney, Box 44, Owensboro, Ky., 42301, Tel: 502-683-2868; Empl.: 3; Minimum order: $55

Customer service: W. J. Lattin

Products manufactured: Coils Including Assemblies & Forms

LDJ ELECTRONICS, 1064 Naughton Ave., Troy, Mich., 48084, Tel: 313-689-3623; Empl.: 12

For info on price: I. Bergel; Application info: L. Jackson; Customer service: I. Bergel; Delivery info: L. Jackson

Products manufactured: Analyzers, Calibrators, Coils Including Assemblies & Forms, Generators, Indicators, Integrators, Electronic, Magnetizers, Magnetometers, Magnetoresistors, Hall, Magnets, Meters, Probes, Testers, Transducers

LDJ ELECTRONICS cont'd

Advertisment

LDJ magnetizing and magnetic test equipment is designed for the production and quality control testing of magnetic materials and assemblies. Standard products include: magnetizers, demagnetizers, calibrators, gaussmeters, fluxmeters, coercimeters, and BH Meters, including tooling and fixtures to be used with the above. Features include digital readouts, hard-copy print-outs, automation and measurements that can be obtained with the push of a single button, and special designs for customers' particular application.

LEACH CORP., 5915 Avalon Blvd, Los Angeles, Cal., 90003, Tel: 213-232-8221, TWX: 910-321-2303; FSC No: 5945; QPL No: 6106; Empl.: 500; Minimum order: $100
p. 1•1749-1755

For info on price: J. Weaver; Application info: E. Combs; Customer service: J. Weaver; Delivery info: J. Weaver

Free literature available: 8 page short form catalog covering all product lines, plus various technical reprints. 12 part "How-To-Pick-A-Relay" advertising insert series.

Products manufactured: Circuits, Hybrid, Thick Film, Controls/Control Eqpt., Monitors, Relays, Sockets, Switches, Timers

Local Sales Offices & Reps.

Ala	Huntsville, Craft Assocs.	205-837-0221
Cal	San Mateo, Halbar Assocs.	415-349-4700
Colo	Denver, Brown Technical	303-233-0863
Conn	Trumbull, Blake Assocs.	617-391-7890
Fla	Maitland, Craft Assocs.	305-645-2242
Ga	Atlanta, Craft Assocs.	404-393-0400
Md	Rockville, Markton, Inc.	301-762-6210
Mass	Medford, Blake Assocs.	617-391-7890
Mo	Ferguson, Leach Corp.	314-524-2880
NJ	Fort Lee, Leach Corp.	201-461-6550
NY	Fayetteville, Graydon-Sherman	315-637-9861
NY	Pittsford, Graydon-Sherman	315-637-9861
Ohio	Dayton, Leach Corp.	513-434-8151
Pa	Feasterville, PSA, Inc.	215-355-6244
Tex	Dallas, Caton Sales	214-661-5792
Va	Charlottesville, Marktron, Inc.	301-762-6210
Wash	Bellevue, Leach Corp.	206-822-9247

Local Distributors

Cal	El Segundo, Liberty Elctrns., 124 Maryland St.	213-322-8100
Cal	Inglewood, Time Elctrns. West, 900 W. Olive St.	213-649-6900
Ga	Atlanta, Electro Air Corp., 2270 Marietta Blvd.	404-351-3545
Mass	Woburn, Time Elctrns./New England, 116 Cummings Pk.	617-935-8080
NY	Hauppauge, Time Elctrns. Sls., 70 Marcus Blvd.	516-273-0100
Pa	Clifton Hgts., Time/Mid-Atlantic, 359 E. Madison Ave.	215-622-2500
Tex	Dallas, Assocd. Aircraft Supply, 5021 W. Jefferson Blvd.	214-331-4381
Wash	Seattle, Liberty Elctrns./Northwest, 5305 2nd Ave. S.	206-763-8200

LEADER INSTRUMENTS CORP., 151 Dupont St, Plainview, N.Y., 11803, Tel: 516-822-9300; Empl.: 15; Minimum order: $50

For info on price: S. Eisonborg; Application info: P. Redko; Customer service: M. Ambrico; Delivery info: D. Myers

Free literature available: 1) Complete full line catalog describing entire line of equipment-specifications applications and pricing; 2) full line short form catalog essentially same as above, but in condensed form.

Products manufactured: Calibrators, Generators, Meters, Oscilloscope Plug-Ins, Oscilloscopes, Power Supplies, Probes

LEAR SIEGLER, INC., 3171 S. Bundy Dr., Santa Monica, Calif., 90406, Tel: 213-391-7211, TWX: 910-343-6463; Empl.: 21000

Customer service: G. A. Moak

Products manufactured: Actuators, Air Conditioners (For Equipment), Amplifiers, Analyzers, Bearings, Bins, Part Storage, Brakes, Bus Bars & Systems, Bushings, Glass, Plastic, Metal, Rubber, Etc., Cabinets & Accessories, Chargers, Battery, Clutches, Comm. Systems, Controls/Control Eqpt., Couplings, Dehumidifiers (For Equipment), Dehydrators, Drills & Accessories, Hand & Power, Encoders, Equalizers, Gears & Gear Mechanisms (Precision), Generators, Grilles, Gyros (All Types), Indicators, Knobs, Motor Electric Generator Sets, Motors, Oceanographic Equip. (Electronic), Power Supplies, Public Address Systems, Pumps, Vacuum, Regulators, Relays, Repeaters, Servo, Services, Assembly, Production & Test, Servo Systems, Speaker Systems, Speakers, Switches, Telephone Channel Test & Simulator Equipment, Television Systems & Equipment Closed-Circuit, Terminal Equipment, Digital, Terminals, Data Display (including Alphanumeric & Graphic), Testers, Transducers, Transmission Systems, Data, Tubing, Underwater Communication, Detection, Navigation, etc. Equipment

Local Sales Offices & Reps.

Cal	Anaheim, Lear Siegler, Inc., Elctrn. Instr. Div.	714-774-1010
Cal	Burbank, Lear Siegler, Inc., Bogen Div.	213-843-3111
Colo	Englewood, LSI Evironmental Technology Div.	303-770-3300
Mass	Burlington, LSI Instrument Div.	617-273-0058
Mich	Grand Rapids, LSI Instrument Div.	616-241-7000
Mich	Southfield, Acts Computing Corp.	313-557-6800
NJ	Paramus, LSI Bogen Div.	201-343-5700
NY	Rye, American Avitron, Inc.	914-937-5300
Ohio	Maple Heights, LSI Power Equip. Div.	216-662-1000
Okla	Oklahoma City, LSI Telecomms.	405-525-2171
Tex	Dallas, LSI Power Equip. Div.	214-247-1212
Va	Arlington, Div. Sls. Off.	703-521-1010
Wash	Seattle, LSI Instr. Div.	206-725-6077
EXP:	Rye, New York, American Avitron, Inc.	914-937-5300

LEAR SIEGLER, Elctrn. Instr. Div., 714 N. Brookhurst St., Anaheim, Cal., 92803, Tel: 714-774-1010, TWX: 910-591-1157; Empl.: 600; Minimum order: $50
p. 2•716,717

Free literature available: Pin Bar Product Brochure-Giving performance, mechanical and plating specifications for the entire line of solderless bus bars including two free sample bars.

Products manufactured: Bus Bars & Systems

Local Sales Offices & Reps.

Cal	San Francisco, Shannon Assoc.	415-941-2217
Colo	Denver, Moss Elec.	303-353-1452
Ga	Atlanta, Grady Duckett	404-451-3529
Ill	Chicago, Mauer Co.	312-677-4771
Mass	Boston, ABC Elec.	617-542-9162
Mich	Detroit, Hummon Assoc.	313-474-0661
Minn	Minneapolis, Macnamara Assoc.	612-472-4919
NJ	Haddonfield, Mid-Atlantic Elec.	609-428-8288
NJ	Tenafly, ABC Elec.	201-568-2354
NM	Albuquerque, Moss Elec.	505-821-6101
NY	Tarrytown, ABC Elec.	914-631-2650
NY	Williston Park, ABC Elec.	516-747-6610
NC	Charlotte, Grady Duckett	404-451-3529
Ohio	Cleveland, Geotronix	216-526-2535
Ohio	Columbus, Geotronix	614-457-8472
FOR:	Can., Toronto, Ont., LSI/AA&E	416-459-0920

Local Distributors

Cal	Los Altos, Shannon Assocs., One First St.	415-941-2217
Colo	Greeley, G. Moss Elect., Drawer "J"	303-353-1452
Ga	Atlanta, Grady Duckett Sls., Box 29067	404-451-3529
Ill	Skokie, Mauer Co., Suite 29, 9701 Kenton	312-677-4771
Mass	Needham, ABC Elctrn. Sls., 50 Kearney Rd.	617-449-2640
Mich	Farmington Hills, W.R. Hummon & Assoc., 23414 Industrial Pk.	313-474-0661
Minn	Mound, Macnamara Assoc., Box 38	612-472-4919
NJ	Haddonfield, Mid Atlantic Corp., 140 Haddon Ave.	609-428-8288
NJ	Tenafly, ABC Elect. Sls., 121 Oak St.	201-568-2354
NM	Albuquerque, G. Moss Elect., Box 708	505-821-6101
NY	N. Tarrytown, ABC Elect. Sls., 2 Willard Ave.	914-631-2650
NY	Williston Pk., ABC Elect. Sls., 99 Hillside Ave.	516-747-6610
Ohio	Cleveland, Geotronix Mktg., Box 41068	216-526-2535
Ohio	Columbus, Geotronix Mktg., Box 20313	614-457-8472

LEAR SIEGLER, INC., Transportation Support Div., 11135 Condor Avenue, Fountain Valley, Cal., 92708, Tel: 714-546-3060, Telex: 678454; Empl.: 200

Products manufactured: Air Conditioners (For Equipment)

LEAR SIEGLER, INC., Romec Div., 241 S. Abbe Rd., Elyria, Ohio, 44035, Tel: 216-323-3211, TWX: 216-322-7265; Empl.: 230

For info on price: Mktg. Dept.; Application info: Engrg. Dept.; Customer service: Svc. Dept.; Delivery info: Mktg. Dept.

Products manufactured: Controls/Control Eqpt., Couplings, Dehumidifiers (For Equipment), Dehydrators, Heat Exchangers & Systems, Motors, Pumps, Vacuum, Services, Assembly, Production & Test, Switches, Valves, Vacuum

Local Sales Offices & Reps.

Cal	Los Angeles
Cal	Santa Monica
Ga	Atlanta
Ga	Marietta
Mass	Waltham
NJ	Palisades Park
Tex	Dallas
Tex	Fort Worth
Exp.	Rye N.Y., American Avitron
FOR:	Can., Rexdale, Ont., A.A.E. Aerospace Prods.

LEBOW ASSOCIATES, INC., 1728 Maplelawn Rd., Troy, Mich., 48084, Tel: 313-643-0220, TWX: 810-232-4818; Empl.: 80; Minimum order: $20

For info on price: R. Haggerson; Application info: R. Phillips; Customer service: R. Martin; Delivery info: P. Rice

Products manufactured: Amplifiers, Cells, Load, Indicators, Slip-Rings & Assemblies, Testers, Transducers

Local Sales Offices & Reps.

Ala	Huntsville, Vaughn Electrosources	205-881-8830
Ariz	Phoenix, RDX Corp.	602-267-8162
Cal	Pasadena, RDX Corp.	213-681-3451
Cal	San Diego, RDX Corp.	714-278-6863
Cal	Sunnyvale, RDX Corp.	408-734-4500
Colo	Denver, PLS Assocs.	303-771-0140
Conn	W. Hartford, Instrument Assocs.	203-525-9367
Fla	Cocoa Beach, Vaughn Electrosources	303-784-0784
Ill	Chicago, Pivan Engrg.	312-539-4838
Ind	Indianapolis, Pivan Engrg.	317-253-1681
Kans	Mission, Pivan Engrg.	913-722-1030
Mass	Bedford, Instrument Assocs.	617-275-0700
Mich	Detroit, S. Sterling Co.	313-255-1970
Minn	Minneapolis, Pivan Engrg.	612-537-4501
Mo	St. Louis, Pivan Engrg.	314-567-3636
NJ	Bogota, Neville & Vespo Inc.	201-487-1505
NM	Albuquerque, PLS Assocs.	505-355-0120
NY	Williamsville, Maxwell Bennett Co.	716-634-2107
Ohio	Cleveland, S. Sterling	216-442-8080
Ohio	Dayton, S. Sterling	513-298-7573
Ore	Portland, ARVA, Inc.	503-292-8762
Pa	Pittsburgh, S. Sterling	412-922-5720
Tex	Dallas, Tech. Prods.	214-357-9603
Tex	Houston, Tech. Prods.	713-777-7360
Wash	Seattle, ARVA, Inc.	206-622-0177
Wisc	Brookfield, Pivan Engrg.	414-786-1940

LECTROETCH, 14925 Elderwood Ave., E. Cleveland, Ohio, 44112, Tel: 216-451-8080/; Empl.: 20; Minimum order: $7

For info on price: E. A Badt; Application info: E. A. Badt; Customer service: J.F. Zemter; Delivery info: J.F. Zemter

Free literature available: Electrochemical marking manual complete catalog of all products illustrated price list.

Products manufactured: Kits, Marking (Dial, Instrument, Equipment, etc.), Machines/Machinery, Production

Local Sales Offices & Reps.

Ala	Birmingham, Porter Landrum Assoc.	205-967-2095
Cal	El Segundo, Applied Prods. Co.	213-678-6441
Conn	So. Glastonbury, E.D. Geiger	203-633-7646
Fla	Boca Raton, Aeromark Corp.	305-395-3320
Ill	Chicago, W.C. Kamin Co.	312-371-2870

Mass	Belmont, A.D. Geiger Co.	617-489-3322
Mich	Grosse Ile, C.H. Webster	313-676-6510
Mo	Kansas City, Liepsner & Co.	816-421-2511
Mo	St. Louis, Wagner Engraving Co.	314-535-3393
NY	Rochester, R.A. Haehl	716-467-6074
Ohio	Mayfield Heights, J.G. Seifert	216-442-0380
Pa	Feasterville, J.C. Moore	215-357-6086
Pa	Pittsburgh, E.A. McKinney	412-281-3138

LECTROHM DIV. OF CAPCO, INC., Box 1028, Grand Junction, Colo., 81501, Tel: 303-243-8480, TWX: 910-896-4346; Empl.: 200; Minimum order: $35

For info on price: M. Klinect; Application info: J. Younker

Products manufactured: Resistors

Local Sales Offices & Reps.

Cal	Encino, V & L Assocs.	213-986-9703
Cal	Los Altos, Frauman Assocs.	415-941-0660
Colo	Littleton, Goyne Assocs.	303-298-8955
Ill	Chicago, Rinaldi Sls. Co.	312-763-4848
Kans	Prairie Village, Engrg. Svs. Co.	913-649-4000
Mass	Babson Park, P.R. Sturgeon Co.	617-237-3506
Minn	St. Paul, Countryman Assocs.	612-645-1951
Mo	St. Louis, Engrg. Svs. Co.	314-997-1515
NM	Albuquerque, Goyne Assocs.	505-265-6794
NY	Buffalo, R.W. Mitscher Co.	716-633-7970
NY	Manlius, R.W. Mitscher Co.	315-637-3777
NC	Raleigh, R. W. Mitscher Co.	919-828-0575
Ohio	Cleveland, D. Steffen & Assocs.	216-461-8333
Ohio	Dayton, D. Steffen & Assocs.	513-293-3145
Pa	Birchrunville, Jadelectronic	215-647-5151
Tenn	Shelbyville, R. W. Mitscher Co.	615-684-4544
Va	Virginia Beach, R. W. Mitscher Co.	804-481-7200
Wisc	Milwaukee, Star Engrg.	414-543-3469

LECTRO MAGNETICS, INC., 6056 W. Jefferson Blvd., Los Angeles, Cal., 90016, Tel: 213-870-9383; FSC No: 29098; Empl.: 45; Minimum order: $25

For info on price: F.J. Nichols; Application info: J.C. Senn; Customer service: F.J. Nichols; Delivery info: G. Muir

Free literature available: Catalogs: RF Shielded Rooms: Prefabricated & all welded types 2. RFI/EMC Power Line Filters per MIL-STD-220A & MIL-F-15733

Products manufactured: Capacitors, Fixed, Chamber, Environmental Test, Chokes, Containers, Filters, Honeycomb Sheets, Panels, etc., Kits, Shielding, Shields

Local Sales Offices & Reps.

Ala	Huntsville, J.L. Highsmith & Co.	205-881-3294
Ariz	Phoenix, J.S. Heaton Co.	602-264-7887
Cal	Los Altos, Frauman Assoc.	415-941-0660
Cal	Santa Monica, McDonald Assoc.	213-393-7195
Colo	Denver, Scientific Devices, S.W.	303-573-9466
Fla	Orlando, J.L. Highsmith & Co.	305-293-5202
Ill	Belleville, E.E. Pauley Co.	618-233-3524
Ill	Chicago, Tollaksen & Assoc.	312-441-6644
Md	Wheaton, Magyar & Assoc.	301-871-8833
Mass	Waltham, Meas. Conslts. Corp.	617-890-4400
NM	Albuquerque, Scientific Devices, S.W.	505-268-6729
NY	East Syracuse, Ossmann Instrs.	315-437-6666
NC	Charlotte, J.L. Highsmith & Co.	704-333-7743
Ohio	Dayton, Ashby Assoc.	513-252-5627
Pa	Philadelphia, Magyar & Assoc.	215-763-5044
Tex	Dallas, Scientific Devices, S.W.	214-231-8106
Tex	Houston, Scientific Devices, S.W.	713-623-4250
Tex	San Antonio, Scientific Devices, S.W.	512-694-6251
Wash	Seattle, Rush S. Drake Assoc.	206-763-2755
FOR:	Can., Mississauga, Ont., RFQ LTD.	

Advertisment

LectroMagnetics(LMI) is a leading supplier in all types of shielded enclosures of the modular and all welded types. Complete turn key facilities are designed and installed by licensed engineers and contractors.

LMI's Filter Division manufactures a wide range of RFI/EMI power line Filters to Government, U/L, FCC and to customer specifications.

LECTROTECH, INC., 5810 N. Western Ave., Chicago, Ill., 60659, Tel: 312-769-6262

Products manufactured: Generators, Oscilloscopes, Power Supplies, Probes, Test Equipment, Testers

Local Sales Offices & Reps.

Ariz	Phoenix, P.Z. Ray Assocs.	602-942-2502
Cal	Culver City, H. Feldman Co.	213-397-4471
Cal	San Francisco, Tech. Sls. Assocs.	415-467-1434
Fla	Ormond Beach, J.F. Thompson Co.	904-677-2298
Ga	Atlanta, Murphy & Cota	404-875-2525
Ill	Skokie, M. Berman Sls.	312-OR5-3740
Kans	Shawnee Mission, Maury Bettis Co.	913-362-0772
Md	Silver Springs, Mid-Atlantic Sls.	215-657-2815
Mich	Detroit, R. Milsk Co.	313-354-3310
Minn	St. Paul, C.M. Sales Co.	612-699-8004
NY	East Northport, F. Tabman Sls	212-263-4646
NY	Syracuse, W. Tauber Co.	315-446-7094
Ohio	Cleveland, H. Miller Sls.	216-321-3900
Tex	Dallas, Loss & Stewart Assocs.	214-691-6039
Wash	Seattle, D.G. Weber Co.	503-254-0686
EXP:	Westbury, N. Y., Minthorne Intl Co.	516-334-3303

LEDEX INC., 123 Webster St., Dayton, Ohio, 45402, Tel: 513-224-9891, TWX: 810-459-1646; FSC No: 81840; Empl.: 515; Minimum order: $25
p. 1•262,263,970,1756-1759,2092-2096

Customer service: Cust. Svc. Supv.

Free literature available: Solenoids, switches, stepping motors and interface circuits are shown in the General Catalog, A-9500. Detailed catalogs on each product are also available upon request.

Products manufactured: Actuators, Comm. Systems, Controls/Control Eqpt., Lamps, Lights, Motors, Rectifiers, Relays, Solenoids, Suppressors, Switches, Timers

Local Sales Offices & Reps.

Ariz	Scottsdale, B-5 Inc.	602-947-5745
Cal	Palo Alto, Testco	415-326-5320
Cal	Woodland Hills, Interstate Mktg. Assocs.	213-883-7606
Colo	Denver, B-5 Inc.	303-426-0222
Conn	Trumbull, SIR Assocs.	203-268-2560
Fla	Hollywood, W.B. Wimberly Co.	305-961-6962
Fla	Orlando, W.B. Wimberly Co.	305-423-2514
Ill	La Grange Park, Bierhaus Sls., Inc.	312-354-5100
Kans	Leawood, Thunderbird Tech. Sls. & Svcs.	913-642-7220
Kans	Wichita, Thunderbird Tech. Sls. & Services	316-684-3941
Mass	Lexington, SIR Assocs.	617-862-1812
Mich	Benton Harbor, R.C. Nordstrom & Co.	616-857-4653
Mich	Lathrup Village, R.C. Nordstrom & Co.	313-559-7373
Minn	Minnetonka, T.H. Ayre Assocs.	612-474-4125
Mo	St. Louis, Thunderbird Tech. Sls. & Svcs.	314-567-6488
NY	Liverpool, L.P. Garner Assocs.	315-451-1323
NY	Oceanside, Bittan Assocs.	516-678-6222
NC	Raleigh, A.B. Andrews & Co.	919-833-5565
Ohio	Dayton, Dynel Co.	513-434-6467
Pa	Philadelphia, V.S. Malta	215-836-5122
Pa	Pittsburgh, R.F. Clark Co.	412-242-9500
Tex	Richardson, Thunderbird Tech. Sls. & Svcs. Inc.	214-690-0763
Wash	Bellevue, Testco	206-454-7422
Wisc	Milwaukee, Bierhaus Sls. Inc.	414-332-0900

LEECRAFT MFG. CO., INC., 21-16 44th Rd., Long Island City, N.Y., 11101, Tel: 212-392-8800; Empl.: 250
p. 2•1182,1183

Customer service: T. Marine

Free literature available: Specification Sheets: 1) Solid State L-E-D Indicators, 2) Lampholder (subminiature) 3) Trim-Line Indicator Lights, 4) Tineon Pilot Lights Product Lighting Guide No.1-73 4 Pages, Product Lighting Guide No.1-70-C 12 Pages; Indicator Lights, Product Lighting Guide No. LG-970/1 20 Pages; Lampholders, Indicator Lights, Electrical Assemblies.

Products manufactured: Diodes, Lamps, Lights, Services, Assembly, Production & Test, Sockets, Switches

Local Sales Offices & Reps.

Ala	Huntsville, Murcota	205-536-9121
Ark	Hot Springs, Meridith Young & Assocs.	501-262-1365
Cal	Chatsworth, Hansen	213-882-8181
Colo	Arvada, Arrowhead Sls. Co.	303-423-5556
Conn	Bloomfield, Zaslow Sls.	203-242-7781
Fla	No. Miami, Winfield Elctrns.	305-945-6544
Ga	Atlanta, Murcota	919-723-1001
Ill	Hinsdale, Hill & Gray	312-325-4810
Ind	Indianapolis, Southern Sls.	317-257-7575
Iowa	Des Moines, K-S-W	515-279-9235
Ky	Louisville, Southern Sls. Co.	919-723-1001
Md	Lutherville, L. Lowery	301-823-2172
Mass	Lowell, Zaslow Sls.	617-458-8452
Mich	Troy, C. Jensen	313-643-0506
Minn	St. Paul, R. Ragon	612-488-0201
Miss	Jackson, Meredith Young Assoc.	601-366-8185
Mo	Kansas City, K-S-W	816-358-5240
Mo	St. Louis, K-S-W	314-781-6111
NJ	Parlin, Cooper Simon & Co. Inc.	516-487-1142
NY	Cazenvia, B. H. Tollefson Assoc., Inc.	716-271-4141
NY	Great Neck, C. Simon & Co.	516-487-1142
NC	Winston Salem, Murcota	919-723-1001
Ohio	Cleveland, Anderson-Bolds	216-229-4700
Okla	Tulsa, Erickson-Vilter Sls.	214-243-6611
Ore	Portland, A. Stroum	503-292-3534
Pa	Broomall, L. D. Lowery	215-356-5300
Pa	Pittsburgh, R. W. Moulton Assoc.	412-366-3333
Tenn	Chattanooga, Knox Talley	615-266-3611
Tex	Dallas, Erickson-Vilter Sls.	214-243-6611
Utah	Salt Lake City, Arrowhead Sls.	801-487-3444
Va	Charlottesville, L.D. Lowery Inc.	804-973-6672
Wash	Seattle, Almac Stroum	206-763-2300
EXP:	Long Island City, NY, Leecraft Int'l. Corp.	212-392-8800
FOR:	Can., Richmond, Ontario, Leecraft Industries, Ltd.	
FOR:	Can., Scarborough, Ont., Lake Engrg.	416-751-5980

Local Distributors

Cal	Culver City, Western Electromotive, 8467 Steller Dr.	213-870-7621
Cal	El Monte, Kimball Stark, 3035 N. Tyler Ave.	213-283-7979
Cal	Garden Grove, Allied Elctrns, 12311 Industry St.	714-894-7581
Cal	Inglewood, Newark Electronics, 4747 W. Century Blvd.	213-678-0441
Cal	Los Angeles, Fisher/Brownell, 13936 S. Broadway	213-532-2170
Cal	Sacramento, Sacramento Elctrns.	916-441-4821
Cal	Santa Clara, Fisher/Brownell, 3381 Edward Ave.	408-244-6182
Colo	Denver, Newark Denver Supplyy, 2170 S. Grape St.	303-757-3351
Conn	WWaterbury, Suburban Supply Corp., 117 Benedict St.	203-757-1251
Fla	Orlando, E. W. Cramer, 345 N. Graham Ave.	305-894-1511
Fla	Orlando, Hammond Elctrns., 911 W. Central AVe.	305-241-6601
Ill	Chicago, Newark Elctrns. Corp., 500 N. Pulaski Rd.	312-638-4411
Ill	Elgin, Allied Elctrns. Corp., 1355 Sleepy Hollow	312-421-2400
Ill	Peoria, Klaus Radio, 8400 N. Pioneer Pkwy.	309-691-4840
Ill	Western Springs, Industribution Inc., Box 228	312-325-0296
Ind	Evansville, Hutch & Son, Inc., 300 N. Main St.	812-425-7155
Ind	Indianapolis, Ra-Dis-Co., 814 N. Senate Ave.	317-637-5571
Ind.	Indianapolis, Graham Elctrns. Supply, 133 S. Pennsylvania St.	317-634-8486
Ky	Louisville, P. I. Burks Co., 659 S. Ninth St.	502-583-2871
La	New Orleans, Southern Radio Supply Co., 1909 Tulane Ave.	504-524-2345
Md	Baltimore, Radio Elec. Sve. Co., 1026 Cromwell Bridge Rd.	301-823-0071
Md	Rockville, Capitol Radio Wholesalers, 12270 Wilkens Ave.	301-881-2270
Md	Rockville, Cramer E. W. Inc., 16021 Industrial Dr.	301-948-0110
Mass	Boston, Sager Electrical Supply, 172 High St.	617-542-2281
Mass	Newton, Cramer Elctrns, Inc., 85 Wells Ave.	617-969-7700
Mich	Ann Arbor, Wedemeyer Elec. Supply, 2280 S. Industrial Hwy.	313-665-8611
Mich	Detroit, Newark Elctrns. Corp., 20700 Hubbell Ave.	313-548-0250
Mich	Detroit, RS Elctrns., 12775 Lyndon Ave.	616-241-3483
Mich	Wyoming, Newark Ind. Elect., 3645 Linden Ave. S. E.	616-241-6681
Minn	St. Paul, Gopher Elctrns., 2520 W. Larpenteur Ave.	612-645-0241
Mo	St. Louis, LCOMP St. Louis, Inc., 2605 S. Hanley Rd.	314-647-5505
NJ	Cherry Hill, Milgray/Delaware Valley, 1165 Marlkress Rd.	609-424-1300
NJ	Hanover, State Elctrns., Inc., 36 Route # 10	201-887-2550
NJ	Kenilworth, Newark Elctrns., 303 Monroe Ave.	201-272-8410
NJ	Pennsauken, Resco Elctrns, Airport Industrial Pk.	609-662-4000

NJ	Springfield, Federated Purchasers, Inc., 155 U.S. Route #22	201-376-8900
NY	Binghamton, Stack Indl. Elctrns., 10 Susquehanna St.	607-723-6326
NY	Buffalo, Summit Distrs., 916 Main St.	716-884-3450
NY	Elmsford, Ancar/Elctrns., One Nepperhan Ave.	914-592-7100
NY	Farmingdale, Arrow Elctrns., 900 Broadhollow Rd.	516-694-6800
NY	Rochester, Summit Distrs., Inc., 292 Commerce Dr.	716-334-8110
NC	Greensboro, Hammond Elctrns., 2923 Pacific Ave.	919-275-6319
Ohio	Akron, Sun Radio Co., 110 E. Market St.	216-434-2171
Ohio	Cincinnati, Hughes Peters, Inc., 4865 Duck Creek Rd.	513-351-2000
Ohio	Cincinnati, Newark Elctrns., 9799G Princeton Rd.	513-874-5115
Ohio	Cleveland, Pioneer Standard Elect., 4800 E. 131 St.	216-587-3600
Ohio	Dayton, Pioneer Standard, 314 Leo St.	513-224-0871
Ohio	Dayton, S. Friedman, 108-112 N. Jefferson	513-224-1111
Ore	Portland, Almas Almac Stroum Elctrns., Box 25444, 4475 S. W. Scholls Ferry Rd.	503-292-3534
Pa	Philadelphia, Almo Indl., Elctrns., Roosevelt Blvd. & Blue Grass Rd.	215-676-6000
Pa	Philadelphia, Herbach Rademan, Inc., 401 E. Erie Ave.	215-426-1700
Pa	Philadelphia, Philadelphia Elctrns., Inc., 112 N. 12th St.	215-568-7400
Pa	Pittsburgh, Cameradio, Inc., 2801 Liberty Ave.	412-288-2988
Pa	Reading, G. D. Barbey Co., 333 N. 4th St.	215-376-7451
RI	Providence, W. Dandretta & Co., 28 Wolcott St.	401-861-2800
Tenn	Kingsport, Radio Elec. Supply Corp., 961 E. Sullivan St.	615-247-8111
Tenn	Nashville, Electra Distributing Corp., 1914 West End Ave.	615-329-3971
Tex	Fort Worth, Allied Elctrns., 401 E. 8th St.	817-336-5401
Tex	Garland, Newark Elctrns., 707 Easy St.	214-271-2511
Va	Richmond, Sterling/Meridian Elctrns., 1001 W. Broad St.	804-353-0040
Wash	Seattle, Almac Stroum Elctrns., 5811 6th Ave., S.	206-763-2300
Wisc	Milwaukee, Parts Mart Corp., 1314 N. 7th St.	414-276-4160
Exp:	Can., Richmond Hills, Ont., Leecraft Inds. Ltd., 382 Enford Rd.	416-889-2744
Exp:	Long Island City, N.Y., Leecraft Int. Corp., 21-16 44th Rd.	212-392-8800
For:	Can., Don Mills, Ont., Saynor Elctrns., Ltd., 99 Scarsdale Rd.	416-445-2340
For:	Can., Montreal, Que., Payette Radio, 730 St. James St..	514-878-4771
For:	Can., Montreal, Que., Cesco Elctrns., Ltd., 4050 Jean Talon St.	514-735-5511
For:	Can., Toronto, Ont., Electro Sonic, Inc., 543 Yonge St.	416-494-1555
For:	Can., Toronto, Ont., Zentronics, Ltd., 185 Bridgeland Ave.	416-789-5111
For:	Can., Vancouver, B.C., L. A. Varah, Ltd., 1250 W. 6th St.	604-873-3211
For:	Can., Winnipeg, Man., Cam Gard Supply Co., Ltd., 1777 Ellis Ave.	204-786-8401

LEEDS & NORTHRUP CO., Sumneytown Pike, North Wales, Pa., 19454, Tel: 215-643-2000; Empl.: 4800

Products manufactured: Amplifiers, Analyzers, Baths, Controlled Temperature (Air & Liquid), Bridges, Calibrators, Capacitors, Fixed, Capacitors, Variable, Clocks (All Types), Comm. Systems, Comparators, Computers, Controllers, Programmable, Controls/Control Eqpt., Converters, Current Sensors, Data Acquisition & Reduction Systems, Data Loggers, Decade Boxes, Display Devices/Displays, Dividers, Drives & Drive Mechanisms (Dial), Furnaces, Indicators, Integrated Circuit Devices, Meters, Monitors, Paper, Graphic Recording, Potentiometers, Power Supplies, Printers, Probes, Pyrometers, Recorders, References, D-C Voltage, Scanners, Services, Assembly, Production & Test, Standards, Switches, Testers, Thermocouples, Elements & Accessories, Thermometers, Resistance, Totalizers, Digital, Transducers, Transmission Systems, Data, Transmitters, Voltage Sources, Wire

Local Sales Offices & Reps.

Ala	Birmingham	205-870-5310
Ala	Mobile	205-342-8929
Ariz	Phoenix	602-966-3870
Cal	Anaheim	714-635-6040
Cal	San Mateo	415-349-6656
Colo	Denver	303-759-2701
Conn	West Hartford	203-232-4474
Del	Wilmington	302-478-6970
DC	Washington	301-621-1353
Fla	Miami	305-428-2861
Fla	Orlando	305-851-3911
Ga	Atlanta	404-938-8946
Ill	Chicago	312-775-4141
Ill	Lansing	312-474-7070
Ind	Indianapolis	317-545-4364
Iowa	Davenport	319-355-6481
Kans	Mission	913-432-3727
Ky	Louisville	502-426-2985
La	Baton Rouge	504-921-5487
La	Shreveport	318-861-1861
Md	Baltimore	301-465-9494
Mass	Boston	617-326-8816
Mich	Detroit	313-398-3035
Mich	Grand Rapids	616-458-3691
Minn	Minneapolis	612-835-7722
Mo	Kansas City	913-432-3727
Mo	St. Louis	314-726-0853
Neb	Omaha	402-895-0886
NJ	Union	201-686-5200
NY	Albany	518-785-1354
NY	Buffalo	716-836-5900
NY	New York	212-687-4133
NY	Rochester	716-235-1700
NY	Syracuse	315-446-8446
NC	Winston-Salem	919-723-1087
Ohio	Akron	216-253-9086
Ohio	Canton	216-492-7400
Ohio	Cincinnati	513-791-2274
Ohio	Cleveland	216-291-2100
Ohio	Columbus	614-891-1615
Ohio	Toledo	419-531-4489
Okla	Tulsa	918-622-4515
Ore	Portland	503-292-8945
Pa	Allentown	215-434-4417
Pa	Erie	814-838-7708
Pa	Harrisburg	717-737-8628
Pa	Philadelphia	215-646-5500
Pa	Pittsburgh	412-561-7808
Pa	Sharon	412-346-3585
SC	Columbia	803-256-1495
Tenn	Knoxville	615-693-1838
Tenn	Memphis	901-365-9026
Tex	Beaumont	713-838-6848
Tex	Dallas	214-234-3363
Tex	Houston	713-784-2720
Utah	Salt Lake City	801-266-6931
Va	Richmond	804-272-7573
Va	Roanoke	703-345-9532
Wash	Seattle	206-455-4450
WVa	Charleston	304-342-6678
Wisc	Milwaukee	414-774-6000

LEEPOXY PLASTICS, 3324 Ferguson Rd., Ft. Wayne, Ind., 46809, Tel: 219-747-7411; Empl.: 15

Customer service: S. H. Christie

Free literature available: Selector Guide - Adhesives

Products manufactured: Adhesives (All Types), Compounds, Encapsulating, Insulating, Molding, Potting

Local Distributors

Cal Paramount, J. S. Switzer, 15116 Downey Ave. 213-634-6363

LEHIGHTON ELECTRONICS, INC., RD1 4Mi. West on Rt. 443, Lehighton, Pa, 18235, Tel: 717-386-4156; Empl.: 40; Minimum order: $25

For info on price: L.Miller; Application info: A. R. Blew; Customer service: L. Miller; Delivery info: L. Miller

Free literature available: IC & transistor carrier board-device trays, digital controller P.C. Boards, control panels, electronic ass'ys to equip., switchgear, elevated temp. aging rack (diodes) ambient transistor aging rack.

Products manufactured: Alarms, Boards, Plug-In, Boards, Printed Circuit, Boards, Printed Wiring, Universal, Boards, Programming, Cable Assemblies & Harnesses, Cards, Linear Function, Cards, Logic, Controllers, Programmable, Kits, Printed Circuit, Power Supplies, Services, Assembly, Production & Test, Testers, Timers

Local Sales Offices & Reps.

DC	Washington, Arco Engrg. Inc.	202-393-5991
NJ	Haddonfield, Sunday-O-Brien	609-429-4013

LEHIGHTON ELECTRONICS, INC cont'd

Advertisment

Let Lehighton Electronics, Inc. be your one stop high quality fast delivery source for artwork, printed circuit boards and assemblies, special and catalog test, production and automation equipment and switchgear. Please send your specifications and drawings for fast competitive pricing.

LEICO INDS., INC., 250 West 57th St., New York, N.Y., 10019, Tel: 212-765-5290; Minimum order: $30

For info on price: L. L. Eisenmann; Application info: L. L. Eisenmann; Customer service: E. Buchsbaum; Delivery info: P. Kasner

Products manufactured: Alloys, Connectors, Crystals, Diodes, Metal Compounds, Foils, Powders, Sheet, Stock, Metal Oxides, Metals, Plug Adapters, Plug & Jack Sets, Thermocouples, Elements & Accessories, Tubing, Wire

LEKTRA LABS., INC., 129-07 18th Ave., College Point, N.Y., 11356, Tel: 212-939-7171; Empl.: 60

For info on price: F. L. Chilton; Application info: C. Sershen; Customer service: C. Shershen; Delivery info: L. Nappi

Products manufactured: Controls/Control Eqpt., Switches, Timers

LEMO U.S.A. INC.

LEMO USA, 2015 Second St., Berkeley, Cal., 94710, Tel: 415-548-1966, Telex: 33-5393

For info on price: D. Winocour; Application info: B. Wersen; Customer service: D. Winocour; Delivery info: D. Winocour

Products manufactured: Connector Adapters, Connectors

Local Sales Offices & Reps.

Cal	Berkeley, Caltron Industries	415-548-1966
Cal	Los Angeles, Ezra Mintz Assocs.	213-645-2066
Ill	Parkridge, Central States Assocs.	312-692-2101
Mass	Lexington, Zieco	617-861-8300

Advertisment

Quick Connect/Dis-connect cylindrical connectors for round cables. Coaxial, multi-contact, and high voltage types. All metal shells are satin-chrome plated and complement other high quality front panel components.

LENK MFG. CO., INC., See Wall-Lenk Mfg. Co.

LENOX-FUGLE ELCTRNS., INC., 100 Sylvania Pl., S. Plainfield, N.J., 07080, Tel: 201-756-1164; Empl.: 18

Products manufactured: Coils Including Assemblies & Forms

LENOX INSTR. CO., 121 E. Luray St., Philadelphia, Pa., 19120, Tel: 215-DA 4-4543; Empl.: 40

Products manufactured: Fiber Optic Bundles, Lenses, Optical & Camera, Lenses, Readout & Display, Microscopes, Television Systems & Equipment Closed-Circuit

LENZ ELECTRIC MFG. CO., 1751 N. Western Ave., Chicago, Ill., 60647, Tel: 312-276-4454

Products manufactured: Cable, Wire, Wire Shielding

LEPEL HIGH FREQUENCY LABS., 59-21 Queens-Midtown Expwy., Maspeth, N.Y., 11378, Tel: 212-HA 6-4580; Empl.: 200; Minimum order: $25

For info on price: J. Chiuffi; Application info: P. Capolongo; Customer service: R. Rosenberg; Delivery info: J. Chiuffi

Products manufactured: Heaters & Heating Elements, Machines/Machinery, Production

Local Sales Offices & Reps.

Ala South Birmingham, Dilcher Engrg. Co. 205-252-3300

Ariz	Scottsdale, Mercury Engrg. Sls., Inc.	602-945-1927
Cal	Irvine, Lepel High Frequency Labs., Inc.	714-540-1650
Conn	Simsbury, T. V. Evans	203-658-5579
Fla	St. Petersburg, Dilcher Engrg. Co.	813-343-1041
Ga	Atlanta, Dilcher Engrg. Co.	404-261-1678
Ill	Chicago, Lepel High Frequency Labs., Inc.	312-637-7244
Mass	Wakefield, Eastern Appliance Co.	617-245-8530
Mich	Mount Clemens, E. L. Kemper & Assocs.	313-468-9797
Minn	Minneapolis, C. W. Stone Co.	612-FE 9-0611
Mo	St. Louis, Brandwine Equip. Co.	314-993-5810
NC	Charlotte, Dilcher Engrg. Co.	704-364-9272
Ohio	North Canton, H. D. Denton	216-499-3091
Pa	Havertown, E. G. Murphy	215-446-4414
Tenn	Chattanooga, Young Equip. Sls.	615-265-3862
Tex	Houston, Selle Alloys & Equip. Co.	713-524-3013
Wash	Seattle, Eustis Co., Inc.	206-623-7060

LEVITON MFG. CO., INC., 59-25 Little Neck Pkwy., Little Neck, N.Y., 11362, Tel: 212-229-4040, TWX: 710-582-2632

Products manufactured: Bells, Buzzers, Gongs, Sirens & Aural Warning Devices, Boxes, Junction, Outlets & Wall Plates, Cable, Caps, Connector, Clamps & Clips, Controls/Control Eqpt., Cords, Fuses, Lamp Adapters, Plug Caps & Shells, Plugs, Socket Adapters, Sockets, Switch Mounting Plates, Switches, Wire

LFE CONTROL SYSTEM INDUSTRIES, 2920 Sand Ysidro Way, Santa Clara, Cal., 95051, Tel: 408-732-9400, TWX: 910-339-9282; Empl.: 100

For info on price: D. G. Ridgeway 408-732-9400; Application info: D. J. Gaushell 408-732-9400; Customer service: W. J. Robertson 408-732-9591; Delivery info: D. G. Ridgeway 408-732-9400

Free literature available: Modscan Systems-Modular computer-driven data acquisition & control systems 2. Series 400 Trend Displays. Supplies simultaneous viewing of any two process variables. CSI 7000 Remote Terminal-Supplies remote acquisition of data and transmission to a central Minicomputer.

Products manufactured: Data Acquisition & Reduction Systems, Multiplexers, Terminals, Data Display (including Alphanumeric & Graphic)

Local Sales Offices & Reps.

Cal	Santa Clara	408-732-9400
Ill	Arlington Heights	312-956-0930
Tex	Houston	713-661-5390

LFE CORPORATION, Process Control Div., 1601 Trapelo Rd., Waltham, Mass., 02154, Tel: 617-890-2000, TWX: 710-324-0681; Empl.: 490

For info on price: R. Gubisch; Application info: R. Gubisch; Customer service: J. Incatasciato; Delivery info: G. Holderer

Free literature available: New catalog describes (API) analog panel meters, meter-relays, digital panel meters, temperature indicators, temperature controllers, and other display and control instruments.

Products manufactured: Comparators, Controls/Control Eqpt., Counters, Detectors, Dials, Display Devices/Displays, Meters, Monitors, Pyrometers, Recorders, Relays, Semiconductor Wafer Fabrication, Thermocouples, Elements & Accessories, Transducers

Local Sales Offices & Reps.

Ala	Huntsville, 20th Century Mktg.	205-772-9237
Ariz	Phoenix, Zeus Inc./Elcom Div.	602-253-6104
Cal	Irvine, LFE Corp./Process Control Div.	714-979-8472
Cal	Santa Clara, LFE Corp./Process Control Div.	408-732-9611
Colo	Denver, Zeus Inc./Elcom Div.	303-770-4400
Fla	Boca Raton, Conley Assocs.	305-395-6108
Fla	Oviedo, Conley Assocs.	305-365-3283
Fla	Tampa, Conley Assocs.	813-933-3183
Ga	Douglasville, 20th Century Mktg.	404-942-6483
Ill	Arlington Heights, LFE Corp./Process Control Div.	312-593-5551
Kans	Prairie Village, LFE Corp./Process Control Div.	913-649-0121
Mass	Waltham, LFE Corp./Process Control Div.	617-890-2000
Mich	Royal Oak, George Instr. Co.	303-576-4700
Minn	Minneapolis, CMI	612-757-5090
NJ	Oakland, LFE Corp./Process Control Div.	201-337-6163
NM	Albuquerque, Zeus Inc./Elcom Div.	505-268-3941
NY	New Hartford, KLM Assocs.	315-735-8525
NY	North Syracuse, KLM Assocs.	315-458-6214
NY	Rochester, KLM Assocs.	716-442-0820
Ohio	Chesterland, LFE Corp./Process Control Div.	216-423-3131
Ohio	Dayton, LFE Corp./Process Control Div.	513-434-8873
Pa	Newtown Square, LFE Corp./Process Control Div.	215-353-0772
Tex	Houston, Carey-Wolf & Assocs.	713-721-2442
Utah	Salt Lake City, Zeus Inc./Elcom Div.	801-486-2317
Wash	Seattle, Comptronics	206-284-4842

LH RESEARCH, INC., 2052 S. Grand Ave., Santa Ana, Cal., 92705, Tel: 714-546-5279; Empl.: 100 p. 1•1306,1307

For info on price: J. C. Graham; Application info: J. C. Graham; Customer service: L. Reeve; Delivery info: L. Reeve

Products manufactured: Power Supplies

Local Sales Offices & Reps.

Ariz	Scottsdale, DeAngelo, Rothman & Cheever	602-948-2240
Cal	Los Altos, Parsons & Meister	415-941-4745
Cal	Pasadena, A-F Sls. Engrg.	213-795-7081
Fla	Winter Park, Young & Lawrence Assoc.	305-647-6929
Md	Laytonsville, G-T Assocs.	301-949-8060
Minn	Minneapolis, Electro-Serv.	612-827-2907
NH	Nashua, Bell Controls	603-882-6984
NY	Endicott, Tech-Mark Assoc.	607-748-7473
NY	Great Neck, Tronic Assoc.	516-466-2300
Ohio	Cleveland, Goetronix Mktg. Assocs.	216-526-2535
Pa	Ambler, Denco-Data Engrg.	215-542-9876
Tex	Irving, Space Elctrns.	214-251-2261
Wash	Seattle, C.K. Shank & Assocs.	206-632-4290

LIBBEY OWENS-FORD CO., Liberty Mirror Div., 811 Madison Ave., Toledo, Ohio, 43695, Tel: 419-247-4797

For info on price: Ms M. Gillespie 412-224-1800; Application info: D. W. Barkley 412-224-1800; Customer service: D. R. Grove 419-247-4797; Delivery info: T. Conroy 412-224-1800

Products manufactured: Coatings

Local Sales Offices & Reps.

Cal	Los Angeles	213-388-0641
Ill	Chicago	312-236-2490
NJ	Fort Lee	201-947-8000
Ohio	Cincinnati	513-563-8920
Ohio	Toledo	419-247-4797
Tex	Dallas	214-521-3782

LIBERTY CONTROLS, INC., 500 Brookforest Ave., Shorewood, Ill., 60431, Tel: 815-725-2241; Empl.: 60; Minimum order: $50 p. 1•1765

For info on price: R. J. Rudisill; Application info: R. J. Rudisill; Customer service: R. A. Bauer; Delivery info: R. A. Bauer

Products manufactured: Coils Including Assemblies & Forms, Panels, Racks, Relays, Solenoids

Local Sales Offices & Reps.

Cal	Santa Monica, REP Assoc.	213-829-5401
Fla	Sarasota, R.F. Carlson	813-388-3086
Ill	Chicago, Schuten Assoc.	312-833-0980
Mass	Braintree, Systems Comps.	617-275-2890
Mich	Grand Rapids, R. P. Urban & Assocs.	616-245-0511
Minn	St. Paul, Countryman Assocs.	612-645-9151
Mo	St. Louis, R. Carlson	314-961-4485
NJ	Fort Lee, Necco	201-461-2789
NY	Buffalo, Niagara Elec. Sls.	716-886-4000
NY	Rochester, Niagara Elec.	716-271-1223
Ohio	Cleveland, E. Bock	216-331-5212
Pa	Bryn Mawr, Vantage Sls.	215-525-0304
Tex	Dallas, D. Shuhart Co.	214-239-0185

LICON DIV., Illinois Tool Works, 6615 W. Irving Park Rd., Chicago, Ill., 60634, Tel: 312-282-4040, TWX: 910-221-0275; Empl.: 450; Minimum order: $50

For info on price: R. Schmidt; Application info: R. Schmidt; Customer service: A. Strassenberg; Delivery info: A. Strassenberg

Free literature available: Designers Keyboard Brochure with designers work sheet, A colorful 24-page lighted switch guide, and a general 40 page condensed catalog covering all Licon products.

Products manufactured: Caps, Lenses, Indicator Light, Controls/Control Eqpt., Diodes, Keyboards, Alphanumeric & Decimal, Lamps, Switches

Local Sales Offices & Reps.

Cal	Los Angeles, Licon	213-723-1181
Cal	Menlo Pk., McKnight Co.	415-325-2844
Colo	Lakewood, Licon	303-232-9588
Conn	Meriden, R. Stornello	203-237-6361
Fla	Clearwater, Perrott Assoc.	813-726-1549
Fla	Orlando, Perrott Assoc.	305-275-1132
Ga	Atlanta, Electro Mech.	404-393-0444
Kans	Overland Pk., Penzner-Mankus	913-381-0004
Kans	Wichita, Penzner-Mankus	316-264-2662
Md	Baltimore, Coulbourn DeGreif Inc.	301-247-4646
Mass	Burlington, J. Griffin	617-273-0365
Mich	Birmingham, Licon	313-642-9876
Minn	Minneapolis, Comstrand Inc.	612-560-5300
Mo	Hazelwood, Penzner-Mankus	314-731-4334
Neb	Lincoln, Mktg. Assoc.	402-464-5244
NJ	Haddonfield, TAI Corp.	609-854-3011
NY	Buffalo, Telesco Assoc.	716-834-1026
NY	Massapequa, J.F. Coughlin	516-799-7743
NY	Rochester, Telesco Assoc.	716-271-3780
NY	Utica, Telesco Assoc.	315-733-3183
NC	Raleigh, Electro Mech.	919-782-6452
Ohio	Columbus, Rockford Controls	614-231-5890
Ohio	Dayton, Rockford Controls	513-278-7362
Ohio	Euclid, Rockford Controls	216-731-5250
Pa	Monroeville, Rockford Controls	412-373-2531
Tex	Dallas, Evans-McDowell	214-238-7157
Tex	Houston, Evans-McDowell	713-783-2900
Wash	Bellevue, Barrett Sls.	206-885-6991
FOR:	Can., Don Mills, Ont., Illinois Tools	

LINDEN LABS., INC., Box 920, State College, Pa., 16801, Tel: 814-355-5491; FSC No: 20872; Empl.: 50; Minimum order: $50

For info on price: D. A. Beisswanger; Application info: P. A. Rishel; Customer service: D. A. Beisswanger; Delivery info: D. A. Beisswanger

Free literature available: Technical data on complete line of piezoelectric materials and transducers. Short form catalog.

Products manufactured: Ceramic Resonators, Crystals, Detectors, Hydrophones & Accessories, Microphones, All Kinds, Transducers

LINE ELECTRIC CO. UNIT ESTERLINE CORP., U.S. Hwy. 287, Parsippany, N.J., 07054, Tel: 201-887-8200; Empl.: 175; Minimum order: $5

For info on price: I. Kasper; Application info: C. Stewart; Customer service: I. Kasper; Delivery info: I. Kasper

Free literature available: Line Relay Catalog

Products manufactured: Bells, Buzzers, Gongs, Sirens & Aural Warning Devices, Relays, Switches

Local Sales Offices & Reps.

Ala	Huntsville, Murcota Corp.	205-539-8476
Cal	Oakland, Sierra-Pacific Engrg., Inc.	415-635-6909
Cal	Santa Fe Springs, Sierra Pacific Engrg.	213-921-9634
Conn	Berlin, White Sls. Co.	203-224-0423
Fla	Clearwater, Lynch Gentry Assocs.	813-443-2697
Ind	Indianapolis, Val-Skol Sls., Inc.	317-926-5063
Mass	Needham, White Sls. Co.	617-444-3676
NJ	Leonia, Associated Controls & Equip.	201-944-9218
NY	Rochester, ONTEC	716-464-8636
NC	Winston-Salem, Murcota Corp.	919-723-1001
Ore	Forest Grove, Bern Doran Sls.	503-357-3333
Pa	Abington, Industrial Mktg. Specialists	215-659-0444
Tex	Dallas, Techno Assocs.	214-357-9213
EXP:	Bloomfield, N.J., Buck International Co.	201-743-8110

LINEAC CORP., 222 Lake Ave., Yonkers, N.Y., 10701, Tel: 914-YO3-5900 p. 2•2097

For info on price: J. Wilentchik; Application info: J. Wilentchik; Customer service: A. Powers; Delivery info: A. Powers

Free literature available: Bulletin #P502 – Program Dip Switches From 1 to 32 positions; single or multi throw; 1 to 8 poles; Mount on Board, Panel or in standard DIP receptacles.

Products manufactured: Switches

LINEAR INSTRS. CORP., 17282 Eastman St., Irvine, Cal., 92705, Tel: 714-546-6776, Telex: 68-5613; Empl.: 50; Minimum order: $25

For info on price: J. Mixon; Application info: J. Mixon; Customer service: C. Hamilton; Delivery info: N. Lorance

Free literature available: Laboratory Recorders; Log/Linear Recorders; Integrating Recorders; Recorder Buyer's Guide.

Products manufactured: Amplifiers, Paper, Graphic Recording, Recorders

LINEAR NETWORKS CO., Box 775, Westminster, Cal., 92683, Tel: 213-430-9342; FSC No: 5915; Empl.: 7

Customer service: J. L. Hogin

Products manufactured: Filters

LINEAR SYSTEMS, INC., 220 Airport Blvd., Watsonville, Cal., 95076, Tel: 408-722-4177, TWX: 910-330-6371; Empl.: 70

For info on price: P. F. Zimmer; Application info: P. F. Zimmer; Customer service: J. L. Peloso; Delivery info: J. L. Peloso

Free literature available: Full line catalogue 16 page, full color Product data sheets by model Misc. product information fliers and brochures

Products manufactured: Comm. Systems, Microphones, All Kinds, Power Supplies, Receivers, Transceivers, Transmitters

Local Sales Offices & Reps.

Cal	Culver City, W. Alderson Co.	213-870-9286
Cal	S. Lake Tahoe, L & H Mktg. Co.	916-544-5053
Cal	San Jose, L & H Mktg. Co.	408-268-8629
Colo	Arvada, CB Elctrn. Mktg.	303-422-0561
Conn	Hartford, S. Cohn Assocs.	203-522-0596
Fla	Orlando, Cartwright & Bean	305-422-4531
Fla	Plantation, Cartwright & Bean	305-791-3989
Ga	Norcross, D. Cooper Co.	404-448-5460
Ill	Chicago, R.R. Hutmacher Assocs.	312-631-3248
Ind	Fort Wayne, New/Era Sls.	219-423-1164
Ind	Indianapolis, New/Era Sls.	317-257-7333
Iowa	Atlantic, Kimian Sls.	712-243-1626
Md	Baltimore, Par-Nell Sls.	301-655-2944
Mich	Oak Park, Wolverine Elctrn. Sls.	313-547-4089
Minn	Minneapolis, Jensen & Olsen Sls.	612-941-7181
Mo	Independence, Kimian Sls.	816-796-4026
Mo	Maryland Heights, Kimian Sls.	314-739-1655
NY	North Syracuse, L.D. Allen	315-458-7470
NY	Valley Cottage, S. Cohn Assocs.	914-268-9216
Ohio	Cleveland, Eastern Regional Sls Off.	216-235-6865
Ohio	Dayton, Bear Mktg.	513-299-3566
Ohio	Richfield, Bear Mktg.	216-659-3131
Ore	Portland, Earl & Brown Co.	503-245-2283
Pa	Enon Valley, NEBco Assocs.	216-457-2333
Pa	Holland, Par-Nell Sls.	215-355-9330
Tex	Dallas, Collins Co.	214-341-7866
Wash	Seattle, Earl & Brown Co.	206-284-1121
WVa	Princeton, NEBCO Assocs.	
FOR:	Can., Montreal, Que., E S Gould Mktg	514-342-4441

LINEMASTER SWITCH CORP., Box 52, Woodstock, Conn., 06281, Tel: 203-974-1000; FSC No: 97918; Empl.: 100; Minimum order: $10/

For info on price: Sls. Dept.; Application info: A. Munroe; Customer service: Sls. Dept.; Delivery info: Sls. Dept.

Free literature available: Catalog 74 (16 pages) Electric foot switches, anti-trip controls, foot operated Air Valves, special OEM foot controls, stock and custom cordsets OTS Reprint 1975 edition. Over 150 standard foot control in 17 basic families, with brief description including operation, circuitry and electrical ratings.

Products manufactured: Cable Assemblies & Harnesses, Cable, Switches

Local Sales Offices & Reps.

Ill	Addison, Line Master Switch Corp.	312-543-4550

LION PRECISION CORP, 60 Bridge St., Newton, Mass., 02195, Tel: 617-969-4710; FSC No: 25404; Empl.: 30; Minimum order: $20

For info on price: P. S. Vail; Application info: L. Michelson; Customer service: A. Pearle; Delivery info: J. Carsow

Free literature available: Literature contains specifications, features, applications, drawings, photos, etc. of spring, displacement, bow, diameter, thickness, tension, force, semiconductor thickness, ribbon, caliper, taper, pressure, flow, emissivity and reflectivity gages.

Products manufactured: Analyzers, Controls/Control Eqpt., Detectors, Gages, Indicators, Meters, Process Control Systems, Transducers

LIPPS, INC., 1630 Euclid St., Santa Monica, Cal., 90404, Tel: 213-393-0449; Empl.: 100 .... p. 1•20-23

Products manufactured: Heads, Recording Playback, Erase

Local Sales Offices & Reps.

Ala	Huntsville, Kemp Instrs. Inc.	205-837-4304
Conn	Guilford, Whitehead Assocs.	203-453-3762
Mass	Boston, Whitehead Assocs.	617-542-7676
Mo	St. Louis, Kemp Engr. Corp.	314-821-0587
Okla	Tulsa, Kemp Engrg. Corp.	918-299-2636
Tex	Dallas, Kemp Engrg. Corp.	214-661-0400

LISK, G.W. CO., 2 South St., Clifton Springs, N.Y., 14432, Tel: 315-462-2611, Telex: 97-8395; Empl.: 125; Minimum order: $30

For info on price: R. A. Nelson; Application info: M. D. Walborn; Customer service: A. Landschoot; Delivery info: A. Landschoot

Free literature available: Cat 8 Special Design to Order Military-Aerospace Linear DC Solenoid; Cat 9 Standard Industrial Linear DC Solenoids; Standard Industrial Rotary Solenoids (DC).

Products manufactured: Actuators, Air Cleaners & Filters (Shielded & Unshielded), Coils Including Assemblies & Forms, Solenoids

Local Sales Offices & Reps.

Ariz	Phoenix, Palmer Assocs.	602-996-9077
Cal	Whittier, J.J. Crowley	213-943-4115
Colo	Denver, Palmer Assocs.	303-255-9961
Ga	Roswell, Wyco	404-428-2576
Ill	Chicago, K-W Assocs.	312-792-2618
Md	Baltimore, W.V. Fox Assocs.	301-323-9544
Mich	Farmington Hills, W.R. Hummon & Assocs.	313-474-0661
Minn	Minneapolis, Murphy Assocs.	612-884-9701
Ohio	Cincinnati, Tri-State Mktg.	513-761-7993
Okla	Tulsa, Blair Engrg.	918-663-9850
Tex	Dallas, Blair Engrg.	214-352-8411
Tex	Houston, Blair Engrg.	713-667-9864
Wisc	Wauwatosa, Larsen Assocs.	414-258-0529
FOR:	Can., Stoney Creek, Ont., Simmonds Aerocessories of Can. Ltd.	416-664-6203

LITHIC SYSTEMS, INC., Box 478, Saratoga, Cal., 95070, Tel: 408-867-5600; FSC No: 51083; Empl.: 6; Minimum order: $25

Customer service: R. A. Hirschfeld

Free literature available: Short-Form Brochure "Integrated Circuits for the Communications Industry".

Products manufactured: Amplifiers, Circuits, Integrated, Silicon Monolithic, Unpackaged Chips, Detectors, Dividers, Flashers, Integrated Circuit Devices, IC's, Active Filters, Lamp Drivers, Mixers, Modulators, All Kinds, Semiconductor Wafer Fabrication

Local Sales Offices & Reps.

Cal	Mt. View, Norcal Assocs.	415-961-8121
Cal	Tustin, Orion Sls.	714-832-9687
Ill	Rolling Meadows, Lightner Assocs.	312-398-3000

LITRONIX, 19000 Homestead Rd., Cupertino, Cal., 95014, Tel: 408-257-7910, TWX: 910-338-0022; FSC No: 50579; Empl.: 5000; Minimum order: $150 p. 2•1174-1179

For info on price: D. Fraser; Application info: D. Fraser; Customer service: L. Golden; Delivery info: L. Golden

Free literature available: Our line short form catalog lists all standard products: Led Lamps, Opto Isolators, Photo Transistors, Numeric Displays, Alpha Numeric Displays.

Products manufactured: Calculators, Electrical & Electronic, Crystals, Diodes, Display Devices/Displays, Integrated Circuit Devices, Isolators, Lamps, Lights, Sensors, Light, Timers, Transistors

Local Sales Offices & Reps.

Ala	Huntsville, Rep. Inc.	205-881-9270
Ariz	Scottsdale, Q.T. Wiles & Assoc.	602-947-5791
Cal	Los Angeles, Q.T. Wiles & Assoc.	213-478-0183
Cal	Mountain View, Trident Assoc.	415-967-7031
Cal	Tustin, Q. T. Wiles	714-832-4952
Colo	Denver, Parker-Webster Co.	303-770-1972
Conn	Meriden, New England Tech. Sls.	203-634-0298
Fla	Altamonte Springs, Semtronics Assoc.	305-831-8233
Fla	Ft. Lauderdale, Semtronics Assoc. Inc.	305-771-0010
Fla	Plantation, Cartwright & Bean	305-791-3989
Ga	Atlanta, Cartwright & Bean	404-255-5262
Ga	Tucker, Rep Inc.	404-938-4358
Ill	Elk Grove Village, J. G. Twist Co.	312-593-0200
Ind	Fort Wayne, R.O. Whitesell	219-432-5591
Ind	Indianapolis, R.O. Whitesell	317-359-9283
Ind	Kokomo, R.O. Whitesell	317-452-6065
Iowa	Cedar Rapids, J. G. Twist Co.	319-393-8703
Kans	Prairie Village, J. G. Twist Co.	913-236-4646
Kans	Wichita, J. G. Twist Co.	316-686-6685
Ky	Louisville, R.O. Whitesell	502-893-7303
Md	Baltimore, Component Sls.	301-484-3647
Mass	Burlington, New England Tech. Sls.	617-272-0434
Mich	Grand Rapids, R.O. Whitesell	616-451-8901
Mich	Southfield, R.O. Whitesell	313-358-2020
Mich	St. Joseph, R.O. Whitesell	616-983-7337
Minn	Edina, M. Foster Tech. Sls.	612-835-2252
Mo	St. Louis, J. G. Twist Co.	314-432-2830
NM	Albuquerque, Tri-Tronix Inc.	505-265-8409
NY	DeWitt, Tritech	315-446-2881
NY	E. Rochester, Tritech	716-381-2722
NY	Larchmont, Tritech	914-834-4423
NY	Manhasset, Win-Cor	516-627-9474
NC	Raleigh, Component Sls.	919-782-8433
Ohio	Cincinnati, R.O. Whitesell	513-521-2290
Ohio	Cleveland, R.O. Whitesell	216-228-7525
Ohio	Columbus, R.O. Whitesell	614-888-9396
Ohio	Dayton, R.O. Whitesell	513-298-9546
Pa	Ft. Washington, G.C.M.	215-646-7535
Pa	Pittsburgh, R.O. Whitesell	412-344-7277
Tex	Houston, Semi Conductor Sls.	713-464-4197
Tex	Richardson, Semi Conductor Sls.	214-231-6181
Utah	Salt Lake City, Parker-Webster	801-486-3737
Wash	Bellevue, Tri-Tronix	206-454-0940
Wisc	Wauwatosa, J. G. Twist Co.	414-475-7755
For:	Can., Montreal, Que., Vitel Elctrns.	514-331-7393
For:	Can., Toronto, Ont., Vitel Elctrns.	416-622-6300

Local Distributors

Ala	Huntsville, Hamilton-Avnet	205-533-1170
Ariz	Phoenix, Hamilton-Avnet, 2615 So. 21st St.	602-275-7851
Ariz	Phoenix, Moltronics, Inc., 2746 W. Palm La.	602-272-7951
Ariz	Phoenix, R.V. Weatherford, 1917 N. 25th Dr.	602-272-7144
Cal	Anaheim, R.V. Weatherford, 1550 Babbitt Ave.	714-633-9633
Cal	Culver City, Hamilton Electro Sls., 10912 W. Washington Blvd.	213-558-2121
Cal	Glendale, R.V. Weatherford, 6921 San Fernando Rd.	213-849-3451
Cal	Mt. View, Hamilton-Avnet, 575 E. Middlefield Rd.	415-961-7000
Cal	Palo Alto, R.V. Weatherford, 3240 Hillview Ave.	415-493-5373
Cal	Pamona, R.V. Weatherford, 1095 E. 3rd St.	714-623-1261
Cal	San Diego, Hamilton-Avnet, 8917 Complex Dr.	714-279-2421
Cal	San Diego, Moltronics, Inc.	714-278-5020
Cal	San Diego, R.V. Weatherford, 7872 Raytheon Rd.	714-278-7400
Cal	Southgate, Moltronics, Inc., 5610 E. Imperial Hwy.	213-773-6521
Colo	Denver, Hamilton-Avnet, 5921 N. Broadway	303-534-1212
Colo	Englewood, R.V. Weatherford, 3905 S. Mariposa	303-761-5432
Conn	Georgetown, Hamilton-Avnet, 643 Danbury Rd.	203-762-0361
Conn	Hamden, Arrow Elctrns., 295 Treadwell	203-248-3801
Fla	Hollywood, Hamilton-Avnet, 4020 N. 29th Ave.	305-925-5401
Ga	Norcross, Hamilton-Avnet, 6700 I-85, Suite 2B	404-448-0800
Ill	Rosemont, Advent Elctrns., 7110-16 N. Lyndon St.	312-298-4210
Ill	Schiller Park, Hamilton-Avnet, 3901 N. 25th Ave.	312-678-6310
Ind	Indianapolis, Pioneer-Standard, 6408 Castle Place Dr.	317-849-7300
Kans	Lenexa, Hamilton-Avnet, 37 Lenexa Industrial Ctr.	913-888-8900
Md	Gaithersburg, Pioneer-Wash. Elctrns., 9100 Gaither Rd.	301-948-0710
Md	Hanover, Hamilton-Avnet, 7255 Standard Dr.	301-796-5000
Mass	Burlington, Hamilton-Avnet, 185 Cambridge St.	617-273-2120
Mass	Dedham, Gerber Elctrns., 852 Providence Hwy.	617-329-2400
Mich	Livonia, Hamilton-Avnet, 12870 Farmington Rd.	313-522-4700
Mich	Livonia, Pioneer-Mich.	313-525-1800
Minn	Minneapolis, Hamilton-Avnet, 7683 Washington Ave.	612-941-3801
Mo	Hazlewood, Hamilton-Avnet, 364 Brookes La.	314-731-1144

Directory of Local Distributors Starts on page 401

NJ	Cedar Grove, Hamilton-Avnet, 218 Little Falls Rd.	201-239-0800
NJ	Moorestown, Arrow Elctrns., Pleasant Valley Ave.	609-235-1900
NJ	Mt. Laurel, Hamilton-Avnet, 113 Gaither Dr., E. Gate Ind'l. Pk.	609-234-2133
NM	Albuquerque, Century Elctrns., 129 Vermont St., N.E.	505-292-2700
NM	Albuquerque, Hamilton-Avnet, 2450 Baylor Dr., S.E.	505-765-1500
NM	Albuquerque, R.V. Weatherford, 6101 Marble Ave., N.E.	505-265-5671
NY	Buffalo, Summit Distrs., 916 Main St.	716-884-3450
NY	E. Syracuse, Hamilton-Avnet, 6500 Joy Rd.	315-437-2642
NY	Farmingdale, Arrow Elctrns., 900 Broad Hollow Rd.	516-694-6800
NY	Freeport, Milgray Elctrns., 191 Hanse Ave.	516-546-6000
NY	Hauppauge, Semiconductor Concepts, 175 Engineers Rd.	516-273-1234
NY	Rochester, Hamilton-Avnet	716-442-7820
NY	Rochester, Summit Distrs., 292 Commerce Dr.	716-334-8110
NY	Westbury, Hamilton-Avnet, 70 State St.	516-333-5800
NC	Greensboro, Pioneer-STD Elctrns., 2906 Baltic Ave.	919-273-4441
NC	Winston-Salem, Kirkman Elctrns., 910 W. Second St.	919-724-0541
Ohio	Cleveland, Hamilton-Avnet, 761 Beta Dr.	216-461-1400
Ohio	Cleveland, Pioneer-Standard, 4800 E. 131st St.	216-587-3600
Ohio	Dayton, Arrow elctrns., 3100 Plainfield Rd.	513-253-9176
Ohio	Dayton, Hamilton-Avnet, 118 Westpark Rd.	513-433-0610
Ohio	Dayton, Pioneer-Standard, 1900 Troy St.	513-236-9900
Pa	Pittsburgh, Pioneer-Standard, 560 Alpha Dr.	412-782-2300
Tex	Dallas, Component Specialties	214-357-4576
Tex	Dallas, Hamilton-Avnet, 4445 Sigma Rd.	214-661-8661
Tex	Dallas, R.V. Weatherford, 10836 Grissom La.	214-243-1571
Tex	Houston, Component Specialties, 7313 Ashcroft	713-771-7237
Tex	Houston, Hamilton-Avnet, 1216 W. Clay St.	713-526-4661
Tex	Houston, R.V. Weatherford, 3500 W. T.C. Jester Blvd.	713-688-7406
Utah	Salt Lake City, Hamilton-Avnet, 647 W. Billins Rd.	801-262-8451
Wash	Bellevue, Hamilton-Avnet, 13407 Northrup Way	206-746-8750
Wash	Seattle, R.V. Weatherford, 541 Industry Dr.	206-243-6340
For:	Can., Mississauga, Tor., Hamilton-Avnet, 6291-19 Dorman Rd.	416-677-7432
For:	Can., Montreal, Que., Hamilton-Avnet, 935 Montee de Liesse St. Laurant	514-331-6443
For:	Can., Montreal, Que., Prelco Elctrns., 480 Port Royal St. W.	514-389-8051
For:	Can., Montreal, Que., Future Elctrns., 5647 Ferrier St.	514-735-5775
For:	Can., Ottawa, Ont., Prelco Elctrns. Ltd.	613-237-6150
For:	Can., Ottawa, Ont., Future Elctrns.	613-232-7757
For:	Can., Vancouver, B.C., L.A. Varah's Ltd., 2077 Alberta St.	604-873-3211
For:	Can., Willowdale, Ont., Electro Sonic, 1100 Gordon Baker Rd.	416-494-1666

LITTELFUSE, INC., 800 E. Northwest Hwy., Des Plaines, Ill., 60016, Tel: 312-824-1188
p. 1•2098,2099; p. 2•1180,1181

Customer service: B, Cotter

Free literature available: Catalog #18: Technical information on fuses, fuseholders, clips and blocks, circuit breakers. Littelites Product Guide: Guide to selecting correct indicator lights; cartridge lamps; subminiature, miniature lampholders; snap-mount plastic lites.

Products manufactured: Circuit Breakers, Clamps & Clips, Fuses, Lights, Panels, Relays, Sockets, Switches

Local Sales Offices & Reps.

Ala	Gadsden, F.C. Nickerson Co.	205-547-7718
Ariz	Phoenix, H. Moore Sls. Co.	602-257-8007
Cal	Burlingame, W.J. Purdy Co.	415-347-7701
Cal	Inglewood, J. Berman Co.	213-766-1281
Colo	Denver, McLoud & Raymond Co.	303-756-1589
Conn	West Hartford, C. Segel Co.	203-236-2027
Fla	Oldsmar, F.C. Nickerson Co.	813-855-4209
Ga	Atlanta, F.C. Nickerson Co.	404-321-4678
Ill	Arlington Heights, C.P. Dombrow Co.	312-253-3326
Ind	Indianapolis, L.M. DeVoe Co.	317-257-1227
Iowa	West Des Moines, T.L. Dowell & Assocs.	515-225-1620
Kans	Overland Park, T.L. Dowell & Assocs.	913-236-8200
Md	Silver Spring, Ansell Engrg. Co.	301-949-1655
Mass	Newtonville, C. Segel Co.	617-969-6900
Mich	Detroit, R.C. Merchant & Co.	313-535-6000
Minn	Edina, M. Foster Tech. Sls.	612-835-2252
Mo	St. Louis, T.L. Dowell & Assocs.	314-968-4234
NJ	Englewood, Bressler & Baum Assocs.	201-569-7600
NJ	N. Caldwell, Masin Esco., Inc.	201-226-2550
NM	Albuquerque, W.J. Purdy Co.	505-266-7959
NY	Buffalo, R.W. Mitscher	716-633-7970
NY	Syosset, Masin Esco, Inc.	516-364-0310
NC	Kannapolis, F.C. Nickerson Co.	704-932-6772
Ohio	Richfield, Bear Mktg.	216-659-3131
Ore	Portland, J.V. Belusko Co.	503-222-4279
Pa	Enon Valley, Nebco Assocs.	216-457-2333
Pa	Narbeth, S.A. Jeffries, Inc.	215-664-8500
Pa	Reading, Beil & Whitaker	215-779-2610
Tenn	Memphis, A. Engelman	901-458-6263
Tex	Dallas, Lund & Co.	214-358-4335
Va	Virginia Beach, R.W. Mitscher Co.	804-481-7200
Wash	Seattle, Earl & Brown Co.	206-284-1121
Exp:	Chicago, Ill.	312-824-1188
FOR:	Can., Willowdale, Ont., A.C. Simmonds & Sons, Ltd.	416-491-1010

LITTON ABS/OEM PRODS DIV., 34 Maple Ave., Pine Brook, N.J., 07058

LITTON INDS., Electron Tube Div., 960 Industrial Rd., San Carlos, Calif., 94070, Tel: 415-591-8411, TWX: 910-376-4900; FSC No: 80080; Empl.: 950

Customer service: E. D. Taylor

Free literature available: Product Summary , This brochure describes most of the unclassified microwave tubes, solid-state microwave devices, and cathode ray tubes available from Litton Industries Electron Tube Division.

Products manufactured: Amplifiers, Coils Including Assemblies & Forms, Couplers, Diodes, Generators, Intensifiers, Image, Modulators, All Kinds, Oscillators, Power Supplies, Shields, Tubes

Local Sales Offices & Reps.

DC	Washington	202-554-2570
Ga	Warner Robins	912-923-3397
NJ	West Long Branch	201-542-7101
Ohio	Dayton	513-258-1243
Pa	Williamsport	717-326-3561
Tex	Dallas	214-369-2184

LITTON SYSTEMS, INC., Potentiometer Div., 226 E. Third St., Mt. Vernon, N.Y., 10550, Tel: 914-664-7733, TWX: 710-562-0129; QPL No: Multiple; Empl.: 300

For info on price: E. Cubbin

Free literature available: Precision potentiometer catalog illustrating complete line of conductive plastic, wire wond and slidewire single and multiturn potentiometer elements, wipers and speed controls.

Products manufactured: Alarms, Brushes & Brush Assemblies, Controls/Control Eqpt., Dividers, Generators, Potentiometers, Resistors, Testers, Transducers

Local Sales Offices & Reps.

Ala	Huntsville, Technology Instr. Assocs.	205-883-7893
Cal	Norwalk, Comar Co.	213-921-8695
Cal	Sunnyvale, Comar Co.	408-245-3193
Fla	Ormand Beach, Technology Mktg. Assocs.	904-672-2314
Fla	Pompano Beach, Technology Mktg. Assocs.	305-942-0774
Ill	Chicago, Ropek-Cahill	312-287-7292
Iowa	Cedar Rapids, Midwest Meridian Corp.	319-365-6561
Md	Baltimore, R.A. Wafer Assocs.	301-744-1133
Mass	Allson, Vector Sls.	617-787-2790
Mich	Lakeview, Midwest Meridian Corp.	517-352-7775
Mo	St. Louis, B & H Assocs.	314-427-7200
Mo	St. Louis, Mid West Meridian Corp.	314-878-4441
NY	New York, Trionic Assocs., Inc.	516-466-2300
NY	Syracuse, C. W. Floring Assocs.	315-478-2149
Ohio	Dayton, Rixan Assocs., Inc.	513-278-4216
Pa	Newton Square, Quarracino & Hunter	215-353-4300
Tex	Saginaw, Midwest Meridian Corp.	214-251-3933
FOR:	Can., Ottawa, Wilson Entprs.	613-224-9878
FOR:	Can., Toronto, Wilson Entprs.	416-766-0510

LITTON SYS., INC., Guidance & Control Sys. Div., 5500 Canoga Ave., Woodland Hills, Calif., 91346; Empl.: 3000

Products manufactured: Computers, Memory Systems

LIVERMORE DATA SYSTEMS, INC., 2050 Research Dr., Livermore, Cal., 94550, Tel: 415-447-2252, TWX: 910-386-8343; Empl.: 110; Minimum order: $15

For info on price: J. G. Nugen; Application info: J. G. Nugen; Customer service: J. E. Bannister; Delivery info: B. H. Shore

Products manufactured: Comm. Systems, Couplers, Modulator/Demodulators, Multiplexers

Local Sales Offices & Reps.

Ariz	Phoenix, Thorson Co.	602-956-0653
Cal	Palo Alto, Digicom	415-327-9081
Colo	Denver, Thorson Co.	303-759-0809
Ill	Des Plains, Cozzens & Cudahy	312-298-3600
Ind	Indianapolis, Cozzens & Cudahy	317-244-2456
Mass	Framingham, Victor Assoc.	617-879-5710
Mich	Southfield, Nation Wide Communications	
Minn	Minneapolis, Cozzens & Cudahy	612-884-4336
Mo	Kansas City, Cozzens & Cudahy	816-454-5836
Mo	St. Louis, Cozzens & Cudahy	314-423-1234
NY	Roslyn Hts., Travco Assoc.	516-621-3223
Ore	Beaverton, Tarbell Communications	503-643-1631
Ore	Lake Oswego, Cartel	503-636-5226
Va	Fairfax, Nine Assocs.	703-273-1803
FOR:	Can., Thornhill, Manitoba, Harding Corp.	416-881-0707

LMB HEEGER, INC., 729 Ceres Ave., Los Angeles, Cal., 90021, Tel: 213-627-9310; Empl.: 11

For info on price: O. Heeger 213-627-9319; Application info: O. Heeger 213-627-9319; Customer service: R. Heeger 213-627-9310; Delivery info: R. Heeger 213-627-9310

Products manufactured: Boxes, Junction, Outlets & Wall Plates, Cabinets & Accessories, Cases, Equipment, Instrument, Meter, Chassis, Circuit Board Mounting, Chassis, Metal, Cleaners & Solvents, Coolants, Circuit & Components, Enclosures, Module, Plug-In, Flux, Brazing & Soldering Materials, Panels

Local Sales Offices & Reps.

Ala	Birmingham, J. F. Russell Sls.	
Ariz	Phoenix, B.G. Sls.	602-266-5624
Cal	Burlingame, Carelli-EMA	415-697-8862
Cal	Los Angeles, Heeger	213-627-9319
Colo	Aurora, A.E.S. Inc.	303-366-0208
Fla	Fort Lauderdale, Unirep Inc.	305-527-1556
Ill	Skokie, Mort Fields Co.	312-OR4-3018
Ind	Mulberry, Marsh Sls.	
Mass	Framingham Center, Northeastern Rep.	617-877-4850
Mich	Bloomfield Hills, S.F. McMechan	313-852-4308
Minn	Minneapolis, A.J. Warner Co.	612-729-7371
Mo	St. Louis, Kathrinus-Kelly & Co.	
NY	Yonkers, J. Brown Ele. Reps.	914-779-7330
Ohio	Columbus, J.A. Mandabach	614-235-0265
Ore	Portland, J.W. Eckersley	503-246-3183
Pa	Holland, Parnell-Sls. Co.	215-355-9330
Tex	Houston, W. Wylds	713-467-0072

LOCKHEED AIRCRAFT SVC., Ont. Intl. Airport, P.O. Box 33, Ont., Cal., 91761, Tel: 714-984-1234, TWX: 714-556-9517

Products manufactured: Antennas, Converters, Data Acquisition & Reduction Systems, Decommutators, Telemetering, Racks, Recorders, Services, Assembly, Production & Test

LOCKHEED ELCTRNS. CO., Rte. #22, Watchung, N.J., 07060, Tel: 201-757-1600, TWX: 710-997-9541; Empl.: 1600

Products manufactured: Boards, Printed Circuit, Circuits, Flexible, Circuits, Printed, Multilayer, Computers, Control Systems, Air Traffic, Cores, Ceramic, Cores, Magnetic, Memory Systems, Radar Systems, Recorders, Services, Assembly, Production & Test, Technical Books, Underwater Communication, Detection, Navigation, etc. Equipment

Local Sales Offices & Reps.

Cal	Cupertino, Lockheed Elctrn. Co.	408-257-3357
Cal	Downey, Lockheed Elctrn. Co.	213-869-1187
Ga	Atlanta, Lockheed Elctrns. Co.	404-266-0730
Ill	Elmhurst, Lockheed Elctrns. Co.	312-833-4600

Mass	Lexington, Lockheed Elctrns. Co.	617-861-1880
Mich	Southfield, Lockheed Elctrns. Co.	313-557-5037
Minn	Bloomington, Lockheed Elctrns. Co.	612-888-6080
NJ	Fort Lee, Lockheed Elctrns. Co.	201-947-8107
Pa	West Conshohocken, Lockheed Elctrns. Co.	215-825-2880
Tex	Richardson, Lockheed Elctrns. Co.	214-231-6163
Va	Arlington, Lockheed Elctrns. Co.	703-525-3600

LOGICPULSE, 18758 Bryant St., Northridge, Cal., 91324, Tel: 213-993-0225; Empl.: 3

Customer service: W.W. Fisher

Free literature available: Bulletin/Specification

Products manufactured: Generators

LOGIMETRICS INC., 121-03 Dupont Street, Plainview, NY, 11803, Tel: 516-681-4700, TWX: 510-221-1833; FSC No: 6625; Empl.: 35; Minimum order: $50 p. 1•758,759,909

For info on price: M. H. Feigenbaum; Application info: M. H. Feigenbaum; Customer service: M. H. Feigenbaum; Delivery info: B. Divack

Products manufactured: Amplifiers, Generators, Power Supplies, Synthesizers

Local Sales Offices & Reps.

Ala	Huntsville, Scientific Devices S.E.	205-536-1969
Ariz	Phoenix, R.L. Davis Co.	602-955-2266
Cal	Los Angeles, L & M Engrg	213-674-6850
Cal	Palo Alto, R.F. Assocs.	415-327-5531
Colo	Denver, Scientific Devices Intermountain	303-573-9466
Conn	Hamden, Instrument Consultants, Inc.	203-288-5246
Fla	Ft. Lauderdale, Scientific Devices S.E.	305-721-4260
Fla	Orlando, Scientific Devices S.E.	305-841-8180
Ill	Northfield, Torkelson Assocs.	312-446-9085
Ind	Indianapolis, Torkelson Assocs.	317-244-7867
Kans	Shawnee Mission, Pivan Engrg., Inc.	913-722-1030
Md	Lanham, Brimberg Assocs.	301-552-2200
Mass	Waban, Instrument Consultants, Inc.	617-969-9881
Mich	Detroit, S. Sterling	313-255-1970
Minn	Minneapolis, Torkelson Assocs.	612-835-2414
Mo	St. Louis, Pivan Engrg., Inc.	314-567-3636
NJ	Hazlet, Mer Mon Elctrn. Instrumentation	201-264-1851
NM	Albuquerque, I.M.E.C.	505-883-9010
NY	Binghamton, Labtronics, Inc.	607-748-0509
NY	Jericho, Dal-Tech Devices, Inc.	516-433-7448
NY	Syracuse, Labtronics, Inc.	315-454-9314
NY	Ulster Park, Labtronics, Inc.	518-372-6649
NC	Burlington, Scientific Devices S.E.	919-228-6279
ND	Minneapolis, Torkelson Assocs.	612-835-2414
Ohio	Cleveland, S. Sterling	216-442-8080
Ohio	Dayton, S. Sterling Co.	513-298-7573
Tex	Houston, Scientific Devices S.W.	713-623-4250
Tex	Richardson, Scientific Devices S.W.	214-231-8106
Wash	Bellevue, Brennan Assocs.	206-454-9332

LOGITEK, INC., 42 Central Dr., Farmingdale, N.Y., 11735, Tel: 516-694-3080; Empl.: 25

Products manufactured: Controls/Control Eqpt., Detectors, Flashers, Monitors, Relays, Timers

Local Sales Offices & Reps.

Cal	Palo Alto, Adtek Assocs.	415-323-5414
Cal	Sun Valley, Weightman & Assocs.	213-768-5750
Fla	Orlando, Dost Assocs.	305-831-1118
Iowa	Cedar Rapids, Palatine Engrg. Sls., Inc.	319-365-8071
Kans	Andover, Palatine Engrg. Sls., Inc.	316-683-7512
Kans	Overland Park, Palatine Engrg. Sls., Inc.	913-262-5643
Md	Baltimore, Coulbourn DeGreif, Inc.	301-247-4646
Mass	Needham Heights, Northeast Reps., Inc.	617-449-3034
Mo	St. Louis, Palatine Engrg. Sls., Inc.	314-426-7055
NJ	Clifton, Compar Corp.	201-546-3660
Ohio	Cleveland, Ad-El-Tek Co.	216-252-0488
Ohio	Englewood, Ad-El-Tek Co.	513-836-2741
Okla	Tulsa, Palatine Engrg. Sls., Inc.	918-622-0321
Pa	Philadelphia, Technicraft Co.	215-IV 3-4700
Tex	Houston, Palatine Engrg. Sls., Inc.	713-777-4477
Tex	Richardson, Palatine Engrg. Sls., Inc.	214-231-9489

LONDON CHEMICAL CO., 240 Foster Ave., Bensenville, Ill., 60106; Empl.: 25

Products manufactured: Chemicals, Cleaners & Solvents, Cleaners, Ultrasonic, Coatings, Flux, Brazing & Soldering Materials, Machines/Machinery, Production

Local Sales Offices & Reps.

Cal	Burbank, London Chemical West, Inc.	213-846-8666
Fla	Miami, Norm Black, Assoc.	305-651-4132
Md	Baltimore, D.K. Jones	301-752-0577
Mass	Waltham, Etchomatic, Inc.	617-893-2020
Minn	Minn., Servco, Inc.	612-941-7151
NY	Skaneateles, Spar-Kleen Prods.	315-685-5711
Ohio	Cleveland, Hodson Co.	216-587-4500
Pa	Montgomeryville, Buerger Co.	215-699-7591
Tex	Dallas, Steven-Daniels Corp.	214-241-2333
EXP:	Rensenville, Ill., London Chemical Co. Inc. International Dept.	312-287-9477

LONDON CO., 811 Sharon Dr., Westlake, Ohio, 44145, Tel: 216-871-8900; Empl.: 35 p. 1•760-765

For info on price: R. Specht; Application info: J. Bush; Customer service: R. Specht; Delivery info: R. Specht

Free literature available: Test equipment for the audio, mid frequency and component market.

Products manufactured: Analyzers, Bridges, Generators, Meters, Switches, Testers

Local Sales Offices & Reps.

Cal	Burbank, Wright Engrg.	213-843-7240
Cal	Los Altos, Wright Engrg.	415-941-4405
Conn	Glastonbury, Instr. Reps., Inc.	203-633-0777
Ill	Chicago, Bernot Assoc.	312-283-0713
Mass	Lexington, Instr. Reps., Inc.	617-861-8620
Mich	Royal Oak, Group Ten	313-549-3910
Ohio	Cleveland, Group Ten	216-486-2800
Ohio	Dayton, Satullo Co.	513-277-6531
Pa	Audubon, Holmes Assoc.	215-666-0636

LORANGER MFG. CORP., Box 948, Warren, Pa., 16365, Tel: 814-723-2250; Empl.: 350; Minimum order: $50

For info on price: R. Ehrman; Application info: A. Loranger Jr.; Customer service: P. Seber; Delivery info: R. Ehrman

Free literature available: Literature on: The LMC #2910-300-4050 tool.

Products manufactured: Sockets

Local Sales Offices & Reps.

Ariz	Scottsdale, C.T. Fink & Assocs.	602-992-9884
Cal	Los Angeles, Elmo Engrg. Assocs.	213-461-4871
Cal	Sunnyvale, B. Oppenheim, Inc.	408-733-9000
Conn	New Haven, McBar Assocs.	203-865-4376
Fla	Longwood, Lenz Engrg. Co.	305-831-9797
Ill	Northfield, Torkelson Assocs.	312-446-9085
Ind	Indianapolis, Torkelson Assocs.	317-244-7867
Mass	Waltham, McBar Assoc.	617-890-0233
Minn	Minneapolis, Torkelson Assocs.	612-835-2414
NJ	Flanders, D. Zingone	201-584-7845
NY	Rochester, Upstate Comp. Sls.	716-288-1080
Tex	Richardson, C.J. Garvey Co.	214-234-3371
Wash	Seattle, H.S. Thorpe Co.	206-784-3333
FOR:	Can., Toronto, Ont., C. Edwards	416-921-6986

LORCH ELCTRNS. CORP., 105 Cedar La., Englewood, N.J., 07631, Tel: 201-569-8282, TWX: 710-991-9718

For info on price: A. E. Steinhauer; Application info: J. Lorch; Customer service: A. Remes; Delivery info: A. Remes

Products manufactured: Amplifiers, Antenna Feed Systems, Attenuators, Cavities, Microwave, Comparators, Converters, Couplers, Demodulators, Detectors, Dividers, Duplexers, Microwave, Filters, Impedance Converters, Microwave, Junctions, Hybrid, Microwave, Line Strechers, Microwave, Mixer-Preamplifiers, Microwave, Mixers, Modulators, All Kinds, Multipliers, Preselector-Mixers, Receivers, Shifters, Strip-Line Components, Microwave, Switches, Transformers

Local Sales Offices & Reps.

Ala	Huntsville, Scientific Devices S.E.	205-536-1969
Ariz	Phoenix, Williams Assocs.	602-947-4297
Cal	Inglewood, L & M Engrg South	213-674-6850
Cal	San Jose, L & M Engrg. Inc.	408-292-3220
Colo	Denver, Williams Assocs.	303-373-4730
Fla	Fort Lauderdale, Scientific Devices-Southeast	305-721-4260
Fla	Orlando, Scientific Devices S.E.	305-841-8180
Fla	St. Petersburg, Scientific Devices-Southeast	813-576-5194
Ill	Chicago, Pivan Engrg., Inc.	312-539-4838
Ind	Indianapolis, Pivan Engrg., Inc.	317-253-1681
Kans	Shawnee Mission, Pivan Engrg., Inc.	913-722-1030
Md	Silver Spring, Eastern Instrumentation	301-744-3675
Mass	Reading, Geder-Rotondi Assocs.	617-944-3105
Mich	Detroit, Comtel-Sterling Co.	313-255-1970
Minn	Minneapolis, Pivan Engrg., Inc.	612-537-4501
Mo	St. Louis, Pivan Engrg., Inc.	314-567-3636
NJ	W. Orange, R. Felsenheld, Jr.	201-731-7203
NM	Albuquerque, Williams Assocs.	505-255-1638
NY	Liverpool, R & D Assocs.	315-622-2350
Ohio	Cleveland, Comtel-Sterling Co.	216-442-8080
Ohio	Dayton, Comtel-Sterling	513-298-7573
Pa	Jenkintown, AMT	215-549-2080
Pa	Pittsburgh, Comtel-Sterling Co.	412-922-5720
Tex	Houston, Scientific Devices S.W.	713-623-4250
Tex	Richardson, Scientific Devices S.W.	214-231-8106
Tex	San Antonio, Ashcraft	512-824-7267
Va	Suffolk, Eastern Instrumentation	804-497-0001
Wash	Seattle, G.M. Gillett & Assocs.	206-284-3344
Wisc	Brookfield, Pivan Engrg., Inc.	414-786-1940
EXP:	New York, N.Y., Ad. Auriema, Inc.	212-466-2500
FOR:	Can., Ottawa K1G 3N4, Ont., L. Albert Assocs.	613-737-5941

LORCH DEVICES INC., 105 Cedar Lane, Englewood, N.J., 07631, Tel: 201-569-8282, TWX: 710-991-9718

For info on price: J. Lorch; Application info: A. E. Steinhauer; Customer service: A. Remes; Delivery info: A. Remes

Products manufactured: Amplifiers, Antenna Feed Systems, Attenuators, Cavities, Microwave, Circuits, Printed, Multilayer, Comparators, Converters, Couplers, Delay Lines, Demodulators, Detectors, Diplexers, Antenna, Dividers, Drivers, Switch, Dummy Loads, Duplexers, Microwave, Filters, Generators, Impedance Converters, Microwave, Isolators, Junctions, Hybrid, Microwave, Line Strechers, Microwave, Mismatches, Microwave, Precision, Mixer-Preamplifiers, Microwave, Mixers, Modulators, All Kinds, Monitors, Multipliers, Preselector-Mixers, Preselectors, Receivers, Shifters, Strip-Line Components, Microwave, Switches, Transformers

Local Sales Offices & Reps.

Ala	Huntsville, Scientific Devices	205-536-1969
Ariz	Phoenix, Williams Assocs.	602-947-4297
Cal	Canoga Pk., Microwave Mktg.	213-883-6181
Colo	Denver, Williams Assoc.	303-373-4730
Fla	Fort Lauderdale, Scientific Devices - Southeast	305-721-4260
Fla	Orlando, Scientific Devices - Southeast	305-843-1826
Fla	St. Petersburg, Scientific Devices-Southeast	813-576-5194
Ill	Chicago, Pivan Eng., Inc.	312-539-4838
Ind	Indianapolis, Pivan Engrg.	317-253-1681
Kan	Shawnee Mission, Pivan Engg	913-722-1030
Md	Silver Spring, Eastern Instrumentation	301-744-3675
Mass	Andover, Bee Assoc.	617-475-2124
Mich	Detroit, Comtel-Sterling Co.	313-255-1970
Minn	Minneapolis, Pivan Engg	612-537-4501
Mo	St. Louis, Pivan Engg	314-567-3636
NJ	West Orange, R. Felsenheld, Jr.	201-731-7203
NM	Albuquerque, Williams-Assocs.	505-255-1638
NY	Utica, B.D. Hummel Co.	315-736-7821
Ohio	Cleveland, Comtel-Sterling Co.	216-442-8080
Ohio	Dayton, Comtel-Sterling	513-298-7573
Pa	Jenkintown, AMT	215-549-2080
Pa	Pittsburgh, Comtel-Sterling Co.	412-922-5720
Tex	Houston, Scientific Devices-SW	713-623-4250
Tex	Richardson, Scientific Devices-SW	214-231-8106
Tex	San Antonio, Scientific Devices-SW	512-736-3164
Va	Suffolk, Eastern Instrumentation	804-497-0001
Wash	Seattle, G. M. Gillett & Assocs.	206-284-3344
Wisc	Brookfield, Pivan Engg	414-786-1940
EXP:	New York, N.Y., Ad. Auriema Inc.	212-466-2500
FOR:	Can., Ottawa, Ont., L. Albert Assocs.	613-737-5941

LPS RESEARCH LABS, 2050 Cotner Ave., Los Angeles, Cal., 90025, Tel: 213-478-0095, TWX: 910-342-7557/; Empl.: 61; Minimum order: $250

For info on price: L. Erdman; Application info: B. Einson; Customer service: L. Erdman; Delivery info: R. Dube

Free literature available: Catalogs explain what the product is and how to use it. Explains testimonials!

Products manufactured: Cleaners & Solvents, Cleaners, Ultrasonic, Coatings, Lubricants

Local Sales Offices & Reps.

Cal	San Franicisco, D. C. Dostal	415-584-2159
Fla	Miami, M. Kelly	305-253-1294
Ga	Stone Mountain, E. R. Eigen	404-469-2698
Ill	Hanover Park, J. A. McArdle	312-685-7612
Ill	Woodridge, R. Parker	312-685-7612
Mass	Walpole, A. Hession	617-668-0218
Minn	Edina, R. D. O'Bryan	612-993-0344
NJ	Barnegat, J. L. Markley	201-544-1170
Ohio	Vermillion, J. Lacinak	215-234-7400
Tex	Arlington, A. V. Heavin	817-265-9067
Va	Midlothian, F. T. Mayo	804-355-3392
Wash	Bellevue, D. Pearce	206-682-6860

LRC INC., 101 Digital Dr., Hudson, N.H., 03051, Tel: 603-883-9351, TWX: 710-228-1377; Empl.: 50; Minimum order: $20

For info on price: J. Susi; Application info: F. Solla; Customer service: R. Woodman; Delivery info: J. Susi

Free literature available: Solid State Switch Drivers, Resistor Ladder Networks, Chip Resistors, Custom Hybrid Ckts. Metallized Substrates

Products manufactured: Attenuators, Circuits, Hybrid, Thin-Film, Converters, Drivers, Switch, Networks, Resistors, Switches

Local Sales Offices & Reps.

Ariz	Phoenix, Thorson Co.	602-956-5300
Cal	San Diego, KCE Corp.	714-278-7640
Cal	San Francisco, Jack Logan & Assoc.	415-697-6100
Cal	Tustin, Thorson Co.	714-455-5121
Colo	Denver, Thorson Co.	303-355-3521
Conn	Hamden, Impact Sls.	203-281-1331
Fla	Orlando, Gra-Mar Inc.	305-894-3351
Ill	Palatine, CC Electronics	312-358-8900
Mass	Waltham, Impact Sls.	617-893-2850
Mich	Detroit, R.C. Merchant & Co.	313-535-6000
NH	Hudson, LRC Inc.	603-883-9351
NJ	Clifton, Compar Inc.	201-546-3660
NM	Albuquerque, IMEC	505-344-2212
NY	Rochester, Schomburg & Burke Grp.	716-244-0920
Ohio	Dayton, Berberich Assoc.	513-433-0342
Pa	Jenkintown, AMT	215-549-2080
Va	Baileys Crossroads, QT Elctrn. Sls.	703-671-4357
Wash	Seattle, Thorson Co.	206-632-0710
FOR:	Can., Don Mills, Ont., J-Tronics	416-429-6324

LSI COMPUTER SYSTEMS, INC., 22 Cain Dr., Plainview, N.Y., 11803, Tel: 516-293-3850; Empl.: 20; Minimum order: $50

Free literature available: Capabilities Brochure; D Series Dividers; Red Series Dividers; C1200 Clock Circuit.

Products manufactured: Clocks (All Types), Converters, Dividers, Integrated Circuit Devices, Memory Systems, Multiplexers, Packages, Integrated Circuit, Scalers, Binary, Decade, Services, Assembly, Production & Test

LUFT INSTRS., INC., Old Winter St., Lincoln, Mass., 01773, Tel: 617-259-9215; Empl.: 25; Minimum order: $100

Customer service: L. Luff

Products manufactured: Alarms, Comparators, Controllers, Programmable, Controls/Control Eqpt., Electroplating Equipment & Supplies, Servo Systems, Testers

GULTON INDUSTRIES, Luminator Div., 1200 E. Dallas N. Pkwy., Plano, Tex, 75074, Tel: 214-424-6511, Telex: 073-2373; Empl.: 300; Minimum order: $25

For info on price: R. P. Winks; Application info: R. P. Winks; Customer service: J. Pavlik; Delivery info: J. Pavlik

Products manufactured: Inverters, Sockets, Switches

Local Sales Offices & Reps.

Cal	Pacific Palisades, Ledbetter Assocs.	213-454-2421
Ill	Chicago, Terhune-Van Effen	312-346-0053
Md	Wheaton, W. Jordan Co.	202-949-1962
Mass	Boston, Sands-Barnard Assocs.	617-631-7533
Tex	Dallas, Blair Engrg. Sls. Co.	214-352-8411
Wash	Kirkland, R.R. Chase & Assocs.	206-454-2514

LUNDY ELCTRNS. & SYS., INC., Robert La., Glen Head, N.Y., 11545, Tel: 516-671-9000, TWX: 510-223-0605; Empl.: 707

For info on price: J. Guy; Application info: B. Stein; Customer service: D. Casadonte; Delivery info: D. Casadonte

Products manufactured: Actuators, Cable, Character Recognition Systems, Converters, Display Devices/Displays, Filters, Gaskets, Shielding, R-F-Also See Shields, R-F, Motors, Printers, Punched Card Equipment, Readers, Scanners, Shields, Testers, Transceivers, Transmitters

Local Sales Offices & Reps.

Cal	Los Angeles	213-487-4040
Colo	Boulder,	303-443-2606
Fla	Pompano Beach	305-943-1500
Ga	Atlanta	404-458-7339
Ill	Chicago	312-726-3103
Mass	Ipswich	617-356-5761
NJ	Moorestown	201-434-1533
NC	Charlotte	704-394-1161
Tex	Houston	713-521-0818
Va	Annandale	703-941-1900

LUXO LAMP CORP., Monument Park, Port Chester, N.Y., 10573, Tel: 914-937-4433, Telex: 137-336; Empl.: 100

Customer service: R. Newton

Free literature available: Price lists; Brochures; Flyers.

Products manufactured: Lamps, Magnifying Glasses, Inspection

Local Sales Offices & Reps.

Cal	Corte Madera, E. Myer	415-924-4680
Cal	Hollywood, J. Barnett	213-462-4576
Conn	Norwalk, N. Tarrant	203-866-2420
Fla	Port Charlotte, W. Hemminger Co.	813-625-6050
Ga	Atlanta, Dotson & Co.	404-325-9173
Ill	Evanston, J.S. Sprenger	312-475-0848
Md	Baltimore, H. Abrams	301-486-3040
Mich	Plymouth, W. Ryan	313-779-5760
Minn	St. Louis Park, J. Lee Co.	612-920-1525
Mo	Kansas City, Nevco	816-421-1751
NY	Port Chester, Luxo Lamp Corp.	914-937-4433
NY	Whitesboro, A. Coletti	315-736-6989
NC	Charlotte, Coleman Co.	704-525-2046
Ore	Portland, T.E. Ferris	503-646-8659
Tex	Conroe, T. O'Neill	713-273-1215

LVC INDS. INC., Co-Ord Switch Bloc-Lite Divs., 135-25 37th Ave., Flushing, N.Y., 11354, Tel: 212-939-9777; FSC No: 32759; Empl.: 29; Minimum order: $25

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For info on price: L. Cartelli; Application info: J. Muller; Customer service: N. Pennetti; Delivery info: T. Rade

Products manufactured: Annunciators, Antenna Switching Matrices, Boards, Plug-In, Boards, Programming, Caps, Lenses, Indicator Light, Connectors, Controls/Control Eqpt., Cords, Counters, Display Devices/Displays, Dividers, Generators, Kits, Breadboarding (For Engineers), Kits, Programming Board, Lamp Adapters, Lamps, Lights, Matrices, Computer, Monitors, Panels, Pins, Receivers, Services, Assembly, Production & Test, Sockets, Switchboards, Switches, Timers

Local Sales Offices & Reps.

Cal	Los Angeles, Dyna Sls. Co.	213-268-1175
Colo	Denver, Franklin Sls. Co.	303-922-3623
Kans	Prairie Village, Engrg. Svcs. Co.	913-649-4000
Mo	St. Louis, Engrg. Svcs. Co.	314-997-1515
NJ	Springfield, Service & Technology	201-232-2666
NY	Farmingdale, Service & Technology	516-694-7330
Pa	Phila., V.S. Malta	215-836-5122
Wash	Seattle, W. Spaulding Co.	206-282-9173

LYON METAL PRODUCTS, INC., 47 Railroad Ave., Aurora, Ill., 60507, Tel: 312-892-8941; Empl.: 1200

For info on price: J. Jurgelonis; Application info: M. Miller; Customer service: S. Thompson; Delivery info G. Anderson

Free literature available: Catalog 100-B – illustrates and describes the entire Lyon steel equipment line Catalog 200-A – pictures and descriptions of Lyon office furniture.

Products manufactured: Benches, Consoles, Stools, Tables, Cabinets & Accessories, Carts & Dollies, Instrument & Equipment, Racks

Local Sales Offices & Reps.

Cal	Los Angeles	213-330-2261
Cal	San Francisco	415-347-7067
DC	Washington	703-683-2755
Ga	Atlanta	404-237-9205
Ill	Chicago	312-263-4255
Mass	Boston	617-825-0100
Mich	Detroit	313-352-5860
Minn	Minneapolis	612-927-5695
Mo	Kansas City	816-363-6801
NY	New York City	212-695-5441
NY	Syracuse	315-478-0947
NC	Charlotte	704-527-0410
Ohio	Cincinnati	513-221-4688
Ohio	Cleveland	216-241-3535
Pa	Philadelphia	215-687-6232
Pa	Pittsburgh	412-344-5577
Tenn	Memphis	901-682-9664
Tex	Dallas	214-691-7341

3M CO., See Listing Under Letter "T"

M-TRON INDUSTRIES, Box 630, 100 Douglas St., Yankton, S.D., 57078, Tel: 605-665-9321, TWX: 910-668-3603; Empl.: 500; Minimum order: $15

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Customer service: Sales Dept.

Free literature available: A guide and catalogue to specify M-Tron crystals.

Products manufactured: Crystal Blanks, Crystals, Holders, Crystal

Local Sales Offices & Reps.

Cal	Los Alamitos, Anderson Assocs.	213-596-2313
Cal	Los Angeles, Wallace & Wallace	213-747-0401
Cal	Redwood City, Logan Sls.	415-369-6726
Cal	San Diego, Celtec Co.	714-279-7961
Colo	Denver, McLoud & Raymond	303-756-1589
Conn	Meridan, P.R. Sturgeon Co.	203-237-1112
Fla	Indian Rocks Beach, Tech-Rep Assocs.	813-595-2834
Fla	Maitland, Hutto-Hawkins-Peregoy	305-831-2474
Fla	Pompano Beach, Hutto-Hawkins-Peregoy	305-943-9593
Fla	Tampa, Hutto-Hawkins-Peregoy	813-837-2512
Ga	Atlanta, Millar Elctrns.	404-261-6160
Ill	Chicago, Ellinger Sls. Corp.	312-763-1570
Ind	Fort Wayne, Given Corp.	219-432-5585
Ind	Indianpolis, Kingston Sharkey & Assoc.	317-353-9406
Iowa	W. Des Moines, T.L. Dowell & Assoc.	515-255-6583
Kans	Overland Park, T.L. Dowell & Assoc.	913-649-6069
La	Chalmette, Cartwright & Bean	504-279-4598
Md	Silver Spring, Mid-Atlantic Sls.	301-593-7749
Mass	Babson Park, P.R. Sturgeon Co.	617-237-3506
Mass	Lexington, J.E. Boeing Co.	
Mich	Benton Harbor, McNabb & Assoc.	616-925-2166
Miss	Jackson, Cartwright & Bean	601-981-1368
Mo	Shrewsbury, T.L. Dowell & Assoc.	314-647-7067
NY	Elmont, F.E. Schmitt Co.	516-437-8150
NY	Huntington Station, Addem I	516-567-5900
NC	Raleigh, Millar Elctrns., Inc.	919-787-9564
Ohio	Columbus, Weller Elctrnc. Sls.	614-885-7819
Ohio	Dayton, BEK Assoc.	513-278-1343
Ore	Salem, M.K. Widdekind Co.	503-363-6445
Pa	Glenside, Elcom, Inc.	215-885-1325
Pa	Laverock, M. Weinberg Assoc.	215-549-1122
Tenn	Memphis, Cartwright & Bean	901-276-4442
Tex	Dallas, R.E. Nesbitt Co.	214-357-4601
Tex	Houston, R.E. Nesbitt Co.	713-224-3633
Wash	Seattle, M. Stobin Co.	206-772-2121
Wash	Seattle, Pacnor Mktg.	206-284-8020

MAC PANEL CO., Box 5027, 215 Church Ave., High Pt., N.C., 27262, Tel: 919-882-8138; Empl.: 20

Products manufactured: Boards, Plug-In, Boards, Programming, Connectors, Cords, Matrices, Computer, Panels, Services, Assembly, Production & Test, Tape Recording Accessories, Tapes, Recording, Magnetic (All Types), Tools

Local Sales Offices & Reps.

Ala	Huntsville, Reynolds & Assocs., Inc.	205-536-1941
Ariz	Phoenix, Zeus, Inc.	602-258-7519
Cal	Los Altos, Casey Associates	415-941-6892
Cal	Los Angeles, Costello, Little & Co.	213-870-5951
Colo	Denver, Zeus, Inc.	303-771-6200
Fla	Bradenton, Reynolds & Assocs., Inc.	813-778-5219
Fla	Ft. Lauderdale, Reynolds & Assoc., Inc.	305-581-6611
Fla	Melbourne, Reynolds & Assocs., Inc.	305-727-3205
Ga	Atlanta, Reynolds & Assocs., Inc.	404-252-5360
Ill	Chicago, Megatek, Inc.	312-889-1277
Md	Rockville, J.J. Wild	301-424-8490
Mass	Needham, J.J. Wild, Inc.	617-444-2366
Mich	Detroit, B. Hocker & Assocs.	313-531-1403
Minn	St. Paul, Bonament Heyda Co.	612-484-8531
NJ	Mendham, J.J. Wild	201-543-4782
NM	Albuquerque, Zeus, Inc.	505-256-9831

NY	Hastings on Hudson, J.J. Wild, Inc.	914-963-3803
NY	Jericho, J.J. Wild, Inc.	516-935-6600
NC	High Point, Mac Panel Co.	919-882-8138
Ohio	Cleveland Heights, B Nocker & Assocs.	216-932-0984
Ohio	Dayton, B. Hocker & Assocs.	513-298-8638
Ore	Portland, J J Backer Co.	503-297-3776
Pa	Southampton, J.J. Wild, Inc.	215-357-6645
Tex	Dallas, K.O. Brown & Co.	214-357-3996
Utah	Salt Lake City, Zeus, Inc.	801-486-2317
Wash	Seattle, J.J. Backer Co.	206-285-1300

MACDONALD & CO., 213 S. Brand Blvd., Glendale, Calif., 91204, Tel: 213-241-1101, TWX: 910-497-4782; Empl.: 18

Customer service: D. W. MacDonald

Free literature available: Production tools for electronic assembly

Products manufactured: Adhesives (All Types), Chemicals, Clamps & Clips, Cleaners, Ultrasonic, Coatings, Compounds, Encapsulating, Insulating, Molding, Potting, Drivers, Nut, Heat Guns, Production, Heat Sinks, Soldering, Holders, Circuit Board (Production Type), Jigs And Fixtures, Chassis & Circuit Board, Knives & Knife Sets, Lamps, Lubricants, Pliers, Scissors, Screwdrivers, Solder (All Types), Solder Pots & Baths, Soldering Accessories, Soldering Equipment, Soldering Guns, Irons & Desoldering Tools, Testers, Tools, Tweezers, Hand & Vacuum, Wire Twisters, Wrenches

Local Sales Offices & Reps.

Cal	Sunnyvale, Wyman Engrg. Sls.	408-735-0598
Colo	Denver, Soldering Supply Specialists	303-455-0104
Ill	Chicago, EMF Co.	312-889-8323
Ind	Indianapolis, Blind & Assoc.	317-251-1249
Md	Baltimore, D. K. Jones & Assoc.	301-752-0577
Mich	Grand Rapids, C. A. Geer Co.	616-534-9449
Minn	St. Paul, Ragon Elctrns.	612-488-0201
Mo	Kansas City, Burke Sls. Co.	816-842-5511
NJ	Haddonfield, Mills Equip. Co.	609-429-1005
NY	New York, Van Valkenburg Assoc.	212-254-3722
NC	Winston-Salem, Kirkman Elctrns.	
Ohio	Cleveland, P. Lohse Co.	216-381-4424
FOR:	Can., Brossard, P.Q., Gammon Ind'l	819-861-6177
FOR:	Can., Vancouver 2, B.C., RAE Industrial Electronics	

MACHINE COMPONENTS CORP., 70 Newtown Rd., Plainview, N.Y., 11803, Tel: 516-694-7222; FSC No: 15531; Empl.: 20

For info on price: D. L. Dubov; Application info: D. L. Dubov; Customer service: R. Kanter; Delivery info: R. Kanter

Free literature available: Catalog #18 - Describes standard stock clutches brakes, couplings - torques to 20 in. lb. Catalog #19 - Intermittent motion devices, electromechanical. Catalog #20 - X and XY axis joy stick toggle switches

Products manufactured: Brakes, Clutches, Counters, Couplings, Drives & Drive Mechanisms (Dial), Electronic Switches (Oscilloscope), Gears & Gear Mechanisms (Precision), Index Assemblies, Switch, Shafts & Adapters, Switches

Local Sales Offices & Reps.

Cal	San Jose, McFarland Assoc.	408-286-9333
Ind	Indianapolis, Pacer Sls. & Eng'g Co.	317-849-1481
Mass	Woburn, Stockwell Technical Sls. Co.	617-935-5770
Wash	Mercer Island, J. H. Andersen Assoc.	206-232-0484

MACRODATA, 6203 Variel Avenue, Woodland Hills, Cal., 91364, Tel: 213-887-5550; Empl.: 125

Products manufactured: Semiconductor Wafer Fabrication, Testers

MACRODYNE INC., 1900 Maxon Rd., Box 1079, Schenectady, N.Y., 12301, Tel: 518-372-5619; Empl.: 16; Minimum order: $25

Customer service: D.J. Antos

Free literature available: ERDAC III Brochure 2 MACHINE MINDER Transducer Brochure-monitoring the power spectrum to control process variables. 3 Laser Dopler Velocimeter Brochure-precise, non-contact measurement techniques for high speed fluid flow applications in wind tunnel & turbine research.

Products manufactured: Analyzers, Converters, Counters, Current Sensors, Data Acquisition & Reduction Systems, Lasers & Laser Systems, Memories, Buffer, Memory Systems, Meters, Oscilloscopes, Process Control Systems, Recorders, Services, Assembly, Production & Test, Testers, Transducers

MADISON LABORATORIES, Box 608, Madison, Conn, 06443, Tel: 203-245-4280; Empl.: 8; Minimum order: $15

For info on price: M.S. MacDonald; Application info: D. H. MacDonald; Customer service: D.H. MacDonald; Delivery info: M. S. MacDonald

Free literature available: Product Reference Guide - small brochure listing our level switches and solid state controls

Products manufactured: Controls/Control Eqpt., Relays, Switches

Local Sales Offices & Reps.

Cal	Glendale, James L. McCoy Co.	213-246-2134
NY	New York City, Mc Intosh EquiP. Corp.	212-349-3288
Pa	Philadelphia, Technicraft Co.	215-182-2323
Tenn	Memphis, Engineered Instr	901-743-3402

MAG-CON, INC., 85-2nd Ave. S.E., New Brighton, Minn., 55112, Tel: 612-633-8820, TWX: 910-576-3116; Empl.: 150; Minimum order: $15

Customer service: M. Lorge 612-633-5892

Free literature available: Bulletins on: Temp. monitoring equipment; Resistance temp. detectors for above; Resistance sensing power relays; Rotary speed sensors & monitors; Portable, hand-held temp. meter; Facilities & service related to manufacture of custom magnetics.

Products manufactured: Alarms, Amplifiers, Chargers, Battery, Chokes, Coils Including Assemblies & Forms, Controls/Control Eqpt., Current Sensors, Demagnetizers, Detectors, Eliminators, Battery, Inverters, Magnetizers, Meters, Monitors, Power Supplies, Probes, Reactors, Regulators, Relays, Services, Assembly, Production & Test, Switches, Tachometers, Transducers, Transformers

Local Sales Offices & Reps.

Ariz	Tucson, Gar Kachel Co.	602-795-5202
Cal	Altadena, D. Murray Entprs.	213-681-5031
Cal	San Francisco, Tech. Sls. Dev. Co.	415-346-1655
Fla	Orlando, Fluid Scientific, Inc.	305-851-5310
Md	Wheaton, Magyar & Assocs.	301-871-8833
Mass	Allston, Magyar & Assocs.	617-566-9759
NJ	Middlesex, Magyar & Associates	201-752-4848
Ohio	Brecksville, A. Nace Co.	216-526-4323
Pa	Philadelphia, Magyar & Assocs.	215-763-5044
Pa	Pittsburgh, A. Nace Co.	412-922-7225
Tex	Houston, R & K Engrg. & Sls., Inc.	713-465-8367
Wisc	Cedarburg, T.F.L. Assocs.	414-377-7030

MAGIC DOT, 3361 Republic Ave., Minneapolis, Minn., 55426, Tel: 612-925-4410, TWX: 910-576-3477; Empl.: 18

Products manufactured: Keyboards, Alphanumeric & Decimal, Switches

Local Sales Offices & Reps.

Ala	Huntsville, Murcota	205-539-8476
Ariz	Phoenix, Thorson Co..	602-956-5300
Cal	Burlingame, Brooks Tech. Group	415-374-5411
Cal	Downey, Trimarco	213-861-8244
Cal	San Diego, W. Hadden Assocs.	714-565-9444
Colo	Denver, Thorson Co.	303-355-3521
Conn	Hamden, Kanan Assocs.	203-288-9276
Fla	Clearwater, Lynch-Gentry	813-443-2697
Fla	Winter Park, Lynch-Gentry	305-671-7649
Ill	Chicago, Croydon Elctrn. Inc.	312-781-3900
Ind	Fort Wayne, S & S Elctrns. Inc.	219-743-4611
Iowa	Cedar Rapids, Technical Reps. Inc.	319-363-2489
Md	Baltimore, Compar Chesapeake, Inc.	301-484-5400
Mass	Reading, Kanan Assocs.	617-944-8484
Mich	Utica, N. Case Assocs.	313-781-3900
Minn	Minneapolis, C. Bohlig Co..	612-922-7011
Mo	Hazelwood, Technical Reps.	314-731-5200
Mo	Independence, Technical Reps.	816-737-1414
NJ	Clifton, Compar N. Y., Inc.	201-546-3660
NJ	Haddonfield, S. O'Brien	609-429-1526
NY	Albany, Compar Albany	518-489-7408
NY	Endwell, Compar Albany	607-723-8743
NY	Fairport, Compar Albany	716-271-2230
NY	Liverpool, Compar Albany	315-471-3356
NC	Winston-Salem, Murcotta	919-723-1002
Ohio	Centerville, N. Case Assocs.	513-435-1301
Ohio	Fairview Park, N. Case Assocs.	216-333-4120
Tex	Dallas, Allied Comps.	214-238-0408
Tex	Houston, Allied Comps.	713-782-5406
Wash	Bellevue, SDR2 Prods. & Sls.	206-747-9424

MAGITRAN CO., 311 E. ?ark St., Moonachie, N.J., 07074, Tel: 201-641-3650, TWX: 710-990-5064; Empl.: 100; Minimum order: $25

For info on price: J. Grieg; Application info: J. Crompton

Free literature available: Poly-Planar Speaker Products, Poly-Planar Speaker Application Data

Products manufactured: Speaker Systems, Speakers

Local Sales Offices & Reps.

Ala	Birmingham, Maitland Smith	205-967-3080
Cal	No. Hollywood, M. Stobin Co.	213-983-1555
Cal	San Mateo, Olson Sls.	415-347-7071
Conn	Waterbury, J. Sequenzia	203-753-2487
Fla	Miami, Raulson & Co.	305-264-6003
Ga	Marietta, Maitland Smith	404-971-2831
Ill	Chicago, Lassers & Co.	312-539-0170
Kans	Prairie Village, N. Spencer Assoc.	913-432-3700
Ky	Campbellsville, R. B. Herron Assoc.	502-465-5631
Md	Kensington, Forti-Austin Assoc.	301-949-1706
Mo	St. Louis, N. Spencer Assoc.	314-994-1916
Neb	Omaha, N. Spencer Assoc.	402-393-6574
NJ	Englewood, J. Bressler Co.	201-569-7600
NJ	Willingboro, Forti-Austin Assoc.	609-871-9290
NY	New York, J. Bressler Co.	212-564-4105
NY	Yonkers, J. Brown Sls.	914-779-7330
NC	Charlotte, Maitland Smith	704-372-1026
Ohio	Dayton, S. McWilliams	513-277-9245
Pa	Meadville, D. Hilliard Assoc.	814-336-3443
Tex	Houston, Ranger Elctrns.	713-626-1432
Wash	Seattle, K. Bolster Sls.	206-772-2121
Exp.	N.Y., N.Y., Auriema Inc.	212-466-2500

MAGNECRAFT ELEC. CO., 5575 N. Lynch Ave., Chicago, Ill., 60630, Tel: 312-282-5500, TWX: 910-221-5221; Empl.: 400; Minimum order: $50

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For info on price: D. Didricksen; Application info: W. Greenwood; Customer service: W. Greenwood; Delivery info: D. Nordquist

Free literature available: Over 1060 stock relays for custom application. This 36 page, 2 color catalog includes photos, prices, ordering information, drawings, and specifications.

Products manufactured: Relays, Sockets

Local Sales Offices & Reps.

Ala	Huntsville, BJR Research & Mfg.	205-881-3569
Ariz	Phoenix, Gramer & Co.	602-279-1231
Cal	Los Angeles, Universal Comp. Corp.	213-641-4255
Cal	San Carlos, Kottmeier Assoc.	415-592-8333
Colo	Denver, Camel Elctrn. Inc.	303-757-6191
Conn	Farmington, R. Perron & Co.	203-673-4825
Conn	Trumbull, R. Perron & Co.	203-268-9631
Fla	Altamonte Springs, WMM Assocs.	305-831-4645
Fla	Clearwater, WMM Assoc.	813-447-2538
Fla	Pompano Beach, WMM Assoc.	305-943-3091
Ga	Duluth, BJR Research & Mfg	404-476-1453
Ill	Hinsdale, Momak Sls.	312-654-4524
Ind	Ft. Wayne, Menze Sls. Inc.	219-747-5616
Mass	Norwood, R. Perron & Co.	617-762-8114
Mich	Detroit, R.P. Urban & Assoc.	313-535-2355
Mich	Grand Rapids, R.P. Urban & Assoc.	616-245-0511
Minn	Minneapolis, S. Johnson Inc.	612-925-2111
Mo	Kansas City, K & M Sales	816-471-1355
Mo	St. Louis, K & M Sales	314-423-2420
NH	Dover, R. Perron & Co.	603-742-2321
NJ	South Orange, S. Simberkoff & Assoc.	201-763-7900
NY	New York, S. Simberkoff & Assoc.	212-943-7023
NY	Syracuse, W. A. Franklin Sls	315-472-5273
NC	Burlington, S. Simberkoff & Assoc.	919-584-6450
Ohio	Cleveland, Weschler Electric Corp.	216-251-4609
Ohio	Dayton, Weschler Electric Corp.	513-274-6972
Okla	Tulsa, H.J. Daly Co.	918-627-4159
Ore	Portland, Earl & Brown Co.	503-245-2283
Pa	Bristol, S. Simberkoff & Assoc.	215-785-1132
Tex	Dallas, Evans-McDowell Assocs.	214-238-7157
Tex	Dallas, McKinney Sls.	214-631-9450
Wash	Seattle, Earl & Brown Co.	206-284-1121
Exp:	Chicago, Ill., Magnecraft Int'l.	312-282-5500
For:	Can., EtoBicoke, Ont., C.A. Pipe & Assocs.	416-622-3403
For:	Can., Montreal, Que., Vitel Elctrns.	514-331-7393

Local Distributors
Ala Andalusia, Wholesale Elctrn Supply Co., Box 1437 205-222-5100
Ala Birmingham, M G. Elctrn & Equip Co., 3112 6th Ave. S. 205-328-4525
Ala Huntsville, Hall-Mark Elctrns, Box 1133 205-539-0691
Ariz Phoenix, Dalis Elctrns Supply Inc., 917 N. 7th St. 602-258-8151
Ariz Phoenix, Kierulff Elctrns, 2633 E. Buckeye Rd 602-273-7331
Ariz Phoenix, Parts Elctrns., 1310 7th St. 602-258-6476
Cal Burlingame, Rose Elctrns, 846 Stanton Rd. 415-697-0224
Cal Emeryville, B & B Distributors, 1400 62nd St. 415-843-3254
Cal Garden Grove, Allied Elctrns of Cal. Inc., 12821 Knott Ave. 714-894-7581
Cal Hollywood, Hollywood Radio & Elctrns, 5250 Hollywood Blvd. 213-466-3181
Cal Inglewood, Newark Elctrns, 4747 W. Century Blvd. 213-678-0441
Cal Los Angeles, Kierulff Elctrns, 2585 Commerce Way 213-685-5511
Cal Palo Alto, Kierulff Elctrns, 3969 E. Bayshore Rd. 415-968-6292
Cal Sacramento, Sacramento Elec., 1219 South St. 916-441-4821
Cal San Diego, Kierulff Elctrns, 8797 Balboa 714-278-2112
Cal Sun Valley, Q.C. Components, Inc., 8913 Lankershim Blvd. 213-768-6111
Cal Sunnyvale, Bell Industries, 1161 N. Fairoaks, Box 8050 408-734-8570
Colo Aurora, Jet Elctrns, 1447 Florence St. 303-364-1000
Colo Denver, Fistells Elctrns Supply Co., 1001 Bannock 303-244-4691
Conn East Hartford, R & S Electronics, 95 Leggett St. 203-528-6581
Conn Stratford, State Elctrns Parts Corp., 1269 Barnum Ave. 203-375-5961
Fla Miami, Electronic Equip Co., Inc., 2701 N.W. 42nd Ave. 305-871-3500
Fla Orlando, Hall-Mark Elctrns, 7233 Lake Ellenor Dr. 305-855-4020
Fla Tampa, Lykes Elctrns, 5426 W. Crenshaw, P.O. Box 24047 813-886-6621
Ga Atlanta, Ack Radio Supply Co., 554 Deering Rd., N.W. 404-351-6340
Ga Chamblee, Lance Engrg Inc., 2080 Peachtree Ind. Ct. 404-458-6286
Haw Honolulu, Electrical Equip. Co., 656 Queen St. 808-533-3884
Ill Alton, Ebinger Radio Inc., 1155 Broadway, Rear Ct. 217-462-9783
Ill Chicago, Allied Elctrns Corp., 2400 W. Washington Blvd. 312-421-2400
Ill Chicago, Newark Elctrns Corp., 500 N. Pulaski Rd. 312-638-4411
Ill Decatur, York Radio & TV Corp., 590 N. Broadway 217-423-3484
Ill Elk Grove Village, Hall-Mark Elctrns, 180 Crossen Ave. 312-437-8800
Ill Mt. Prospect, Cramer Electrns, 1911 Busse Rd. 312-593-8230
Ill Peoria, Klaus Radio & Elec. Co., 8400 N. Pioneer Pkwy. 309-691-4840
Ind Evansville, Hutch & Son, 300 N. Main St. 812-425-7201
Ind Fort Wayne, Fort Wayne Elctrns, 3606 E. Maumee Ave. 219-423-3422
Ind Indianapolis, Graham Elctrns Supply, Inc., 133 S. Pennsylvania St. 317-634-8202
Iowa Cedar Rapids, Deeco Inc., 2500 16th Ave. S.W. 319-365-7551
Iowa Cedar Rapids, Iowa Radio Supply Co., 719 Center Pt. Rd. N.E. 319-364-6154
Kan Lenexa, Hall-Mark Elctrns, 9006 Rosehill Rd. 913-888-4747
Kan Wichita, Radio Supply Co., 115 Laura 316-267-5216
La Baton Rouge, Davis Wholesale Elctrn Supply Co., 3575 Choctaw Dr. 504-357-6427
La LaFayette, Ralph's of LaFayette, Inc., 3004 Cameron St. 318-234-4507
La New Orleans, Lykes Elctrns, 3308 Orleans Ave. 504-486-7441
Md Baltimore, Hall-Mark Elctrns, 6660 Security Blvd. 301-285-8500
Md Baltimore, Radio Electric Service Co. of Baltimore, Inc., 1026 Cromwell Bridge Rd. 301-823-0070
Md Rockville, Pioneer Washington Elctrns, 1037 Taft St. 301-424-3300
Mass Boston, DeMambro Elctrns, 1095 Commonwealth Ave. 617-7876-1200
Mass Needham Hts., Kierulff Elctrns, 14 Charles St. 617-449-3600
Mass Newton, Cramer Elctrns, Inc., 85 Wells Ave. 617-969-7700
Mass Woburn, Newark Elctrns, 13A Wheeling Ave. 617-935-8350
Mich Ann Arbor, Wedemeyer Electric Supply Co., 2280 S. Industrial Hwy. 313-665-8611
Mich Romulus, Pioneer/Mich, 6337 N. Beverly Plaza 313-729-8500
Minn Minneapolis, Hall-Mark Elctrns, 4555 W. 77th St. 612-925-2944
Mo St. Louis, Hall-Mark Elctrns, 6100 Madison Ave. 314-521-3800
Mo St. Louis, Olive Ind. Elctrns, Inc., 6662 Olive Blvd. 314-863-7800
Mo St. Louis, Vansickle Radio Elec., 1915-17 Washington 314-621-5000
Mont Billings, Electronic Supply, 250 Eleventh St. 406-252-2197
Neb Lincoln, Scott Elctrn Supply Corp, 4040 Adams St. 402-434-8308
NJ Rutherford, Kierluff Elctrns, 5 Industrial Dr. 201-935-2120
NM Albuquerque, Kierulff Elctrns, 2524 Baylor Dr. S.E. 505-247-1055
NY Albany, E.E. Taylor Co., 465 Central Ave. 518-438-4461
NY Buffalo, Standard Elctrns, Inc., 3519 Union Rd. 716-685-4220
NY Buffalo, Summit Distributors, 916 Main St. 716-884-3450
NY E. Farmingdale, Harrison Elctrns Corp., 20 Smith St. 516-293-7990
NY Farmingdale, Hall-Mark Elctrns, 167 Marine St. 516-293-7500
NY Lynbrook, Peerless Radio Corp., 19 Wilbur St. 516-593-2121
NY Mt. Vernon, QAR Industrial Elctrns Sls, Inc., 621 S. Columbus Ave. 914-699-2224
NY Rochester, Rochester Radio Supply Co., 140 W. Main St. 716-454-6300
NY Rochester, Simcona Elctrns Corp., 275 Mt. Read Blvd. 716-328-3230
NY Syosset, Lafayette Radio, 111 Jericho Tpk 516-921-7700
NC Concord, MacVictor Elctrn Supply, Box 3236, Hwy. 29 + Florence Ave. 704-786-4175
NC Gastonia, United Electronic Supply Co. of Gastonia, Inc., 805 W. Airline Ave. 704-867-4401
NC Raleigh, Hall-Mark Elctrns, 3000 Industrial Dr. 919-832-4465
NC Winston-Salem, Kirkman Elctrns, Inc., 901 W. 2nd St. 919-724-0541
Ohio Cleveland, W. Pattison Supply Co. 4550 Willow Pkwy., (Cuyahoga Heights) 216-441-3000
Ohio Columbus, Hughes-Peters Inc., 481 E. 11th Ave. 614-294-5351
Ohio Dayton, ESCO Inc., Crane St. 513-224-9192
Okla Oklahoma City, Electronic Supply Co., 212 N.W. 10th St. 405-232-5215
Okla Tulsa, Hall-Mark Elctrns, 4846 S. 83rd E. Ave. 918-835-8458
Okla Tulsa, S & S Radio Supply, 537 S. Kenosha 918-582-8242
Ore Portland, Almac/Stroum, 8888 S.W. Canyon Rd. 503-292-3534
Ore Portland, North Coast Electric Co., 625 N.W. Evertt St. 503-228-5111
Pa Huntingdon Valley, Hall-Mark Elctrns, Box 125 215-355-7300
Pa Philadelphia, Simco Elctrns, Inc., 3907-11 N. Broad St. 215-229-1880
Pa Pittsburgh, Cameradio Co., 2801 Liberty Ave. 412-288-2600
RI Providence, W. Dandreta & Co., 28 Wolcott St. 401-861-2800
RI Warwick, W.H. Edwards, Inc., 55 Electronic Dr. 401-781-8000
SC Charleston, Wholesale Radio Supply Co. 515 E. Bay St. 803-722-2634
SC Greenville, Sawyer Elctrns, 1210 Poinsett Hwy 803-235-0438
Tenn Chattanooga, Curle Elctrns, 1813 S. Market St. 615-266-4728
Tenn Kingsport, Radio Electric Supply Co., 961 E. Sullivan St. Box 827 615-247-8111
Tenn Nashville, Electra Distributing Co., 1914 W. End Ave. 615-329-3971
Tex Dallas, Hall-Mark Elctrns, 9333 Forest La. 214-231-6111
Tex Fort Worth, Allied Elctrns, 401 E. 8th St. 817-336-5401
Tex Garland, Newark Elctrns, 707 Easy St. 214-271-2511
Tex Houston, Altair Co., 9501 Baythorne Dr. 713-462-3029
Tex Houston, Hall-Mark Elctrns, Box 42190 713-781-6100
Tex Houston, Newark Elctrns, 6902 Harwin Dr. 713-782-4800
Tex Odessa, Automation Eng. Suc., Inc., 2310 Steven Rd. 915-362-7391
Tex Richardson, Altair Co., Box 26, 405 N. Plano Rd. 214-231-5166
Tex Stafford, Southwest Elctrns, Inc., 12725 Royal Dr., Box 848 713-494-6021
Tex Waco, Hargis Co., 1205 Washington Ave. 817-754-5667
Utah Salt Lake City, Stuart Electric Supply Co., 2999 S. 300 West 801-466-8605
Utah Salt Lake City, W.H. Bintz, 433 W. 3rd South 801-363-5821
Va Arlington, Arlington Elctrns Wholesalers, Inc., 3636 Lee Hwy. 703-524-2412
Va Richmond, Meridian Electric, 1001 W. Broad St. 703-355-6521
Wash Seattle, Almac/Stroum Elctrns, 5811 Sixth Ave. S. 206-763-2300
Wash Tacoma, Consolidated Electrical Distributors (Love Electric Co.), 1914 Market St. 206-383-5961
Wisc Appleton, Electronic Expeditors, 1037 W. Wisconsin Ave. 414-731-4187
Wisc Mequon, Taylor Electric Co., 1000 W. Donges Bay Rd. 414-241-4321
Wisc Milwaukee, Hall-Mark Elctrns, 11925 W. Ripley Ave. 414-476-1270

MAGNET WIRE INC., 25 Walker St., New York, NY, 10013, Tel: 212-226-0900; Empl.: 6; Minimum order: $15

Customer service: J. Wasserman

Products manufactured: Cable

MAGNETEC CORP., A Hi-G Subsidiary, 96 Granby St., Bloomfield, Conn., 06002, Tel: 203-243-8941, TWX: 710-420-0592; Empl.: 55 .... p. 1•1708-1713

Products manufactured: Solenoids

Local Sales Offices & Reps.
Ala Huntsville, Interep Assoc. 205-881-3677
Ariz Scottsdale, Fryco 602-945-3281
Cal Mountain View, G. C. Woempner Co. 415-964-5454
Cal Woodland Hills, Interstate Mktg. Assoc. 213-883-7606
Colo Denver, Omega Ltd. 303-758-1508
Conn Fairfield, C. Weber 203-259-5386
Fla Coral Springs, Shaw Engrg. & Sls. 305-752-7596
Ga Atlanta, Interep Assocs. 404-394-7756
Ill Chicago, Engineered Sls. Co. 312-867-8434
Ind Ft. Wayne, Given Corp. 219-432-5585
Kans Overland Park, Reese & Assocs. 913-648-7748
Kans Wichita, Buse Sls. Co. 316-685-8036
Mass Lexington, J. E. Boeing Co. 617-862-2500
Mich Grand Rapids, Representatives Elctrn. Prod. 616-942-1320
Mich Southfield, Representatives Elctrn. Prod. 313-354-9066
Minn St. Paul, R. G. Ragon, Inc. 612-488-0201
Mo St. Charles, Buse Sls. Co. 314-946-6430
NY Binghamton, Canavan-Scanlon Assoc. 607-724-7220
NY Jericho, HRC Comp-Tech, Inc. 516-822-5550
NY Rochester, Canavan-Scanlon Assoc. 716-442-0720
NY Syracuse, Canavan-Scanlon Assoc. 315-437-1271
Ohio Cincinnati, Components, Inc. 513-721-2997
Ohio Cleveland, Components, Inc. 216-842-2737
Ohio Dayton, P. E. Montplaisir 513-434-4316
Pa Ardmore, Rothenheber & Wurts, Inc. 215-649-6300
Tex Dallas, United Comps. 214-324-1448
Utah St. Lake City, Omega Ltd. 801-266-9617
Wash Bellevue, Ruggles Tech. Sls. 206-455-2778
FOR: Can., Dorval, Que., Anbak Sls. Can., Ltd. 514-636-8514
FOR: Can., Mississauga, Ont., Anbak Sls. Can., Ltd. 416-625-1061

MAGNETIC CIRCUIT ELEMENTS, 2455A Garden Rd., Monterey, Cal., 93940, Tel: 408-373-0456, TWX: 910-360-7088; FSC No: 09349; Empl.: 24; Minimum order: $15

For info on price: K. Dethlefsen; Application info: J. Conklin; Customer service: K. Dethlefsen; Delivery info: K. Dethlefsen

Free literature available: Complete catalogue of standard parts.

Products manufactured: Chokes, Coils Including Assemblies & Forms, Converters, Inverters, Transformers

Advertisment

MCE offers an extensive line of standard inductors and transformers with package options. These include 60 and 400 Hz transformers, lamination type or toroidal chokes, and precision inductors. Miniature high frequency, high temperature and high voltage units for power supplies are our specialty. Complete catalogue including engineering data and prices on request.

MAGNETIC METALS CO., Hayes Ave. at 21st St., Camden, N.J., 08105, Tel: 609-964-7842, TWX: 710-891-7054; Empl.: 500; Minimum order: $35

For info on price: J. Roche; Application info: G. B. Finke; Customer service: R. L. Breen; Delivery info: R. L. Breen

Free literature available: Transformer lamination catalog; cut core catalog; tape core design manual; ferrite core catalog.

Products manufactured: Cores, Magnetic, Foil, Laminations, Motor & Generator Armatures, Rotors, Stators, Testers

Local Sales Offices & Reps.

Cal	Westminster, Magnetic Metals Co.	714-892-6627
Ill	Chicago, Magnetic Metals Co.	312-437-7440
Minn	Minneapolis, D. G. Perry & Co.	612-920-3212
NC	Bethania, Candor Co.	919-924-1480
EXP:	Philadelphia, Pa., Ballagh & Thrall, Inc.	215-564-4020

MAGNETIC TECHNOLOGY, Vernitron Corp., 21001 Kittridge St., Canoga Pk., Cal., 91303, Tel: 213-887-7700, TWX: 910-494-1217; Empl.: 125 p. 1•971-974

Products manufactured: Actuators, Motors, Tachometers

Local Sales Offices & Reps.

Cal	Los Altos, Servo Data	415-964-1325
Cal	Los Angeles, Halbar	213-387-8283
Conn	Hartford, Aid Engrg. Sls. Co.	203-673-3692
Fla	Cocoa, Orbe Inc.	305-452-9568
Fla	St. Petersburg, Orbe	813-894-0687
Ill	Chicago, Engr. Sls.	312-867-8434
Md	Baltimore, Wilkinson Inc.	301-377-7800
Mass	Westboro, Aid Engrg. Sls. Co.	617-890-8181
Mich	Detroit, A. Blumenberg Assoc.	313-557-1934
Minn	Minneapolis, Revere Assoc.	612-781-2615
Mo	Florissant, Sheridan Assoc.	314-837-5200
NJ	Harrington Pk., Metro Tech.	201-768-8495
NY	Jericho, Metro Tech.	516-935-3330
NY	Pittsford, Magna Sales Corp.	716-586-8748
Ohio	Beachwood, Sheridan Assoc.	216-831-0130
Ohio	Cincinnati, Sheridan Assocs.	513-761-5432
Ohio	Dayton, Sheridan Assoc.	513-277-8911
Pa	Glenside, R.L. Wilkinson, Inc.	215-424-8400
Pa	Pittsburgh, Sheridan Assoc.	412-244-1640

MAGNETICO, INC., 182 Morris Ave., Holtsville, N.Y., 11742, Tel: 516-654-1166; Empl.: 45 .... p. 2•1770

For info on price: H. Eicher; Application info: Ch. Engr.; Customer service: T. Sullivan

Products manufactured: Amplifiers, Bobbins, Winding, Coil & Transformer, Chokes, Coils Including Assemblies & Forms, Converters, Decade Boxes, Filters, Inverters, Networks, Power Supplies, Regulators, Transformers

Local Sales Offices & Reps.

Mass Brookline, Technology Prods. Group

MAGNETICO, INC. cont'd

Advertisment

Magnetico Manufactures a complete line of laminated and toroidal transformers. A complete line of precision Scott "T" and reference transformers for use in solid state synchro to digital and digital to synchro converters. Other standard products include power transformers, inductors, inverter transformers, DC to DC converter transformers, ratio transformers, pulse, wide band and hybrid transformers.

MAGNETICS, Div/Spang Industries, Inc., Box 391, Butler, Pa., 16001, Tel: 412-285-4711, TWX: 710-373-3821; Empl.: 650

For info on price: E. J. McClellan; Application info: R. G. Noah; Customer service: E. J. McClellan; Delivery info: E. J. McClellan

Products manufactured: Alloys, Cores, Magnetic, Ferrite Material & Parts, Foil, Laminations, Metal Compounds, Foils, Powders, Sheet, Stock, Seals, Shields, Wire

Local Sales Offices & Reps.

Cal	S. El Monte, J. A. McMillin	213-686-0920
Cal	San Jose, L. J. Anglin	408-253-0591
Colo	Arvada, B. P. Brenner	303-420-3927
Fla	St. Petersburg, D.A. King	813-896-4420
Ill	Chicago, H.G. Pretat	312-255-6011
Mass	South Deerfield, B.E. Gray	413-665-2225
Minn	Hopkins, F. Peterson Co.	612-941-5400
NY	Rochester, Fowler-Beach Corp.	716-586-0468
NC	Greensboro, E.A. Siebenaler	919-288-0053
Ohio	Findlay, H.A. Beck	419-424-0592
Pa	Doylestown, F.A. Sank	215-794-7312
RI	Westerly, T. G. Fitch	401-322-8844
Tex	Garland, F.H. Hall	214-272-5697
EXP:	New York, N.Y., B. Freudenberg, Inc.	212-757-9130
FOR:	Can., Agincourt, Ont., F. P. Taylor, Ltd.	416-291-6538

MAGNETICS, DIV. OF SPANG INDUSTRIES, INC., Ind'l. Control Div., Sandy Lake, Pa., 16145, Tel: 412-376-7515, TWX: 510-461-3334; Empl.: 150

Application info: S. Barretta; Delivery info: L. Hughes

Products manufactured: Amplifiers, Controls/Control Eqpt., Power Supplies, Reactors, Regulators, Transformers

MAGNOS, INCORPORATED, Old School House Rd., Harvard, Mass., 01451, Tel: 617-456-8880; Empl.: 4

For info on price: S. Cohen 617-484-8680; Application info: S. Cohen 617-484-8680; Customer service: A. H. Fredrick 617-456-8880; Delivery info: A. H. Fredrick 617-456-8880

Free literature available: GAUSSMETERS - Solid State Hall effect magnetic field snrength meters; HALL PROBES - Transverse, Axial and special probes; FLUXMETERS - Discrete scale and digital scale instruments for general purpose or laboratory measurement. Electrical output on all models; SPECIAL COILS - For determination of intrinsic or extrinsic material properties. Field generating coils, Helmholtz or simple solenoids; MATERIAL TEST SYSTEMS - Hysteresigraphs for BH loop tracing of hard and soft materials. Thin film BH loopers; QUALITY CONTROL EQUIPMENT - Coercivity and Remanence systems for hard or soft materials. Production oriented with digital readout and printout optior; DEMAGNETIZERS and MAGNETIZERS - Tool and material demagnetizers and electro-magnetic magnet chargers.

Products manufactured: Coils Including Assemblies & Forms, Demagnetizers, Indicators, Magnetizers, Magnets, Meters, Power Supplies, Testers

Local Sales Offices & Reps.

Cal	San Carlos, Electronic Engrg Assocs.	415-593-2189
Mass	Belmont, Electronic Comps. & Svcs.	617-484-8680

MAGNOS, INCORPORATED cont'd

Advertisment

Specialists in instrumentation for; Magnetic Measurement, Magnetic Material Tests, Quality Control Systems. Manufacturer of Fluxmeters, Hall Gaussmeters, Coercivity Meters, Electromagnets and associated Power Supplies. Solenoids, Helmholtz Coils and Material Test Coil Sets to specifications.

MAGNUM ELEC. CORP., Drawer 247, 6385 Dixie Hwy., Erie, Mich., 48133, Tel: 313-848-2555; Empl.: 75; Minimum order: $25

For info on price: A. Gonzales; Application info: F. Wojcik; Customer service: A. Gonzales; Delivery info: A. Gonzales

Free literature available: Magstrip catalog - barrier strips - how to order - suggested applications - options optional hardware, quick connects, marking, mounts, colors, jumpers, screws, new products

Products manufactured; Connectors, Terminal Blocks, Boards & Strips, Terminals

Local Sales Offices & Reps.

Cal	Fremont, H.K. Foraker Co.	415-657-2213
Cal	Lynwood, D. West & Assocs.	213-636-6124
Conn	East Haven, Eagle Assocs.	203-235-9036
Fla	Ft. Lauderdale, R.I. Smith Assocs.	305-772-5100
Fla	Largo, R.I. Smith Assocs.	813-585-2980
Ill	Des Plaines, Control Sls.	312-296-5595
Ind	Ft. Wayne, Baehr, Greenleaf & Assocs.	219-447-1608
Mich	Utica, E.H. Hufferd Co.	313-731-6003
Minn	Minneapolis, E. Melius Assocs.	612-854-4270
NJ	Haddonfield, TAI Corp.	215-627-6615
NY	Great Neck, Frank Tylinski Co.	516-466-9070
NY	Rochester, E.J. Schomburg Co.	716-244-0920
Ohio	Cincinnati, Baehr, Greenleaf & Assocs.	513-891-3826
Ohio	Cleveland, Baehr, Greenleaf & Assocs.	216-221-9030
Ohio	Columbus, Baehr, Greenleaf & Assocs.	614-486-4046
Tenn	Greenvale, ACM Southeast	615-639-9141
Wisc	Milwaukee, Control Sls.	414-964-3322

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Local Distributors

Cal	Fremont, Terminal Sales, 40970 Fremont	415-656-7722
Minn	Minneapolis, Control Design, 3433 E. 25th St.	612-721-1629

MAGNUSONIC DEVICES, INC., 290 Duffy Ave., Hicksville, N.Y., 11801, Tel: 516-938-4700, TWX: 510-221-1850; Empl.: 200

For info on price: K. A. Both; Application info: A. Garamy; Customer service: K. A. Both; Delivery info: K. A. Both

Free literature available: 7 and 9 track IBM compatible heand (all speeds), flying heads, floppy disc and cassette/cartridge heads.

Products manufactured: Heads, Recording Playback, Erase

Local Sales Offices & Reps.

Cal	Covina, DCM Assocs.	213-331-7114
Mass	Burlington, New England Tech. Sls. Co.	617-272-0434
Tex	Dallas, Evans & McDowell Assocs.	214-238-7157

MAIN ELECTRNS., INC., 225 Ida, Wichita, Kan., 67211, Tel: 316-267-3581; Empl.: 10

Products manufactured: Dials, Services, Assembly, Production & Test

Local Sales Offices & Reps.

Kans	Shawnee Mission, Main Elctrns.	913-362-2121

MAJOR DATA CORP., 1796 Monrovia Ave., Costa Mesa, Cal., 92627, Tel: 714-646-2455; Empl.: 10

Customer service: B. Sears

Products manufactured: Annunciators, Computers, Display Devices/Displays, Tubes

Local Sales Offices & Reps.

Cal	Montebello, Tucul Engrg. Co.	213-728-7397
Cal	Santa Anna, Shelly Assocs.	714-540-9330
D.C.	Wash, Arco Engrg.	202-393-5991

Ill	Chicago, Engineered Sls. Co.	312-867-8434
La	New Orleans, I B L Engrg. & Sls., Inc.	504-895-4793
Mass	Newton Upper Falls, Brookdale/Elctrns. Engrg.	617-244-6969
NJ	Haddonfield, Gray Assocs.	609-429-5300
NY	Fayetteville, M. P. Andrews, Inc.	315-637-5291
NY	Scarsdale, Bassin Tech. Sls. Co.	914-723-3334
Ohio	Dayton, Ashby Assocs., Inc.	513-252-5627
Tex	Dallas, I B L Engrg. & Sls., Inc.	214-363-2921
Tex	Houston, I B L Engrg. & Sls., Inc.	713-781-5171
FOR:	Can., Montreal, Que., Electrodesign, Ltd.	514-363-5120

MALCO, A MICRODOT CO., 5150 W. Roosevelt Rd., Chicago, Ill., 60650, Tel: 312-287-6700, TWX: 910-221-1296; Empl.: 400

Free literature available: Coaxial Connectors- Catalog #100-1 Multi-Pin Connectors- Catalog #200-1 Rack & Panel Connectors- Catalog #300-1 Wire Terminals- Catalog #400-1 Printed Circuit Terminals- Catalog #500-1 Back Plane Assemblies- Catalog #600-1 Cardedge Connectors- Catalog #700-1
Electronic Hardware- Catalog #800-1 Wire and Cable- Catalog #900-1

Products manufactured: Cable Assemblies & Harnesses, Cable, Connector Adapters, Connectors, Contacts, Electrical, Cords, Machines/Machinery, Production, Sockets, Terminal Blocks, Boards & Strips, Terminals

MALLINCKRODT, INC., 2nd & Mallinckrodt Sts., St. Louis, Mo., 63147, Tel: 314-731-4141, TWX: 910-761-0443; Empl.: 2500; Minimum order: $100

For info on price: C. S. Kettler; Application info: C. S. Kettler; Customer service: B. D. Williams; Delivery info: B. D. Williams

Free literature available: Product brochure including specifications on Transist AK® line of electronic grade chemicals.

Products manufactured: Chemicals, Cleaners & Solvents, Metal Oxides

P.R. MALLORY & CO., 3029 East Washington St., Indianapolis, Ind., 46201; Empl.: 7500

Local Sales Offices & Reps.

Cal	Los Angeles	213-921-7939
Cal	San Francisco	415-348-2081
Fla	Orlando	305-855-6353
Ill	Chicago	312-775-9455
Mass	Watertown	617-924-2214
Mich	Detroit	313-645-1490
NJ	Cinnaminson	609-829-7902
NJ	Hillsdale	201-666-3600
Ohio	Dayton	513-299-5505

MALLORY BATTERY, P.R. Mallory, S. Broadway, Tarrytown, N.Y., 10591, Tel: 914-591-7000

Products manufactured: Batteries

(Refer to Mallory, P.R. & Co. Inc. for sales office information.)

MALLORY CAPACITOR CO., Div. P.R. Mallory, 3029 E. Washington, Box 372, Indianapolis, Ind., 46201, Tel: 317-636-5353 .... p. 1•26,27; p. 2•206-209

Products manufactured: Alarms, Capacitors, Fixed

Local Sales Offices & Reps.

Ala	Huntsville, P.R. Mallory	205-539-1751
Ariz	Scottsdale, P.R. Mallory	602-947-0241
Cal	Los Angeles, P.R. Mallory	714-523-7992
Cal	San Francisco, P.R. Mallory	415-348-2081
Colo	Denver, P.R. Mallory	303-758-7788
Fla	Orlando, P.R. Mallory	305-855-6353
Ill	Chicago, P.R. Mallory	312-775-9455
Ind	Indianapolis, P.R. Mallory	317-636-5353
Mass	Boston, P.R. Mallory	617-924-2214
Minn	Minneapolis, P.R. Mallory	612-944-2870
Mo	St. Louis, P.R. Mallory	314-727-8695
NJ	Hillsdale, P.R. Mallory	201-666-3600
NY	Plandome, Fred Spellman Co.	516-627-3399
NY	Rochester, P.R. Mallory	716-647-3410
NC	Statesville, P.R. Mallory	704-872-0586
Ohio	Dayton, P.R. Mallory	513-299-5505
Ore	Portland, Earl & Brown Co.	503-292-9145
Pa	Philadelphia, P.R. Mallory	215-844-8891
Tex	Dallas, P.R. Mallory	214-324-2448
Wash	Seattle, Earl & Brown Co.	206-284-1121

MALLORY CONTROLS, P.R. Mallory, Box 327, Frankfort, Ind., 46041, Tel: 317-654-5501, TWX: 317-634-4214

Products manufactured: Plug & Jack Sets, Potentiometers, Resistors, Switches

(Refer to Mallory, P.R. & Co. Inc. for sales office information.)

MALLORY DISTRIBUTOR PRODS. CO., P.R. Mallory & Co., Box 1558, Indianapolis, Ind., 46201

MALLORY TIMERS, P.R. Mallory, 3029 E. Washington St., Indpls., Ind., 46201, Tel: 317-636-5353, TWX: 317-634-4214; Empl.: 2,000

Products manufactured: Bells, Buzzers, Gongs, Sirens & Aural Warning Devices, Indicators, Motors, Timers

(Refer to Mallory, P.R. & Co. Inc. for sales office information.)

MANGER ELEC. CO., INC., W. Henry St., Stamford, Conn., 06902, Tel: 203-348-7761; Minimum order: $50

For info on price: J. A. Markus; Application info: J. V. Judge; Customer service: J. V. Judge; Delivery info: B. Lusita

Free literature available: Summary sheet giving history of our company; catalog which details the scope of wire processing at Manger.

Products manufactured: Braid, Cable, Cable Assemblies & Harnesses, Cords, Jumpers, Labels, Pressure-Sensitive, Adhesive, Lead Assemblies & Receptacles, Services, Assembly, Production & Test, Terminals, Wire & Cable Ties, Wire Markers, Wire Shielding

Local Sales Offices & Reps.

Cal	Palos Verdes Estates, Sid Schulman & Assoc.	213-373-6564
Md	Baltimore, Fian Lott Co.	301-744-4611
Mich	Rochester, Keu-Mor Assoc.	313-651-1890

MANHATTAN ELEC. CABLE CORP., 1 Station Plaza, Rye, N.Y., 10580, Tel: 212-875-7130, Telex: 12-6141; Empl.: 75; Minimum order: $50

For info on price: F. Mindek; Application info: T. Blick; Customer service: K. Berg.

Free literature available: Electronic wire & cable catalog containing complete data & information on the wide range of electronic & electrical types of wire & cable marketed by Manhattan Cable

Products manufactured: Braid, Cable, Cable, Cords, Wire

Local Sales Offices & Reps.

Cal	Burlingame, Manhattan Elec. Cable	415-697-7016
Cal	Los Angeles, Bassett & Moore Inc.	213-766-2117
Cal	San Francisco, Logan Sales Co.	415-369-6726
Colo	Denver, K.C. Marketeres Inc.	303-733-5561
Ga	Atlanta, Hollingsworth & Still Inc.	404-394-3270
Ill	Chicago, Manhattan Elec. Cable	312-344-5040
Ill	Melrose Park, Manhattan Elec. Cable	312-344-5040
Mass	Boston, Keene Sales Co. Inc.	617-595-2300
Mich	Detroit, Shalco Inc.	313-547-4771
Mo	St. Louis, Midwestern-Manhattan Elec. Cable	314-865-5050
NY	Brooklyn, Manhattan Elec. Cable	212-875-7130
NY	Camillus, Callahan-Ferguson Co.	315-487-3870
NY	New York, Bressler & Baum Assoc.	212-564-4105
NY	Rye, Manhattan Elec. Cable	914-967-4080
Ohio	Cleveland, Electronic Sales Masters	216-831-9555
Ohio	Independence, Manhattan Elec. Cable	216-749-7500
Pa	Philadelphia, Stinson Assoc. Inc.	215-896-7378
Tex	Dallas, Lund & Co. Inc.	214-358-4335
Tex	Houston, Texas-Manhattan Elect. Insulated Cable	713-227-5228
Wash	Seattle, R.K. Squibb Inc.	206-ME2-2450

MANN, HENRY INC., Mann Rd., Box 496, Huntingdon Valley, Pa., 19006, Tel: 215-355-7200, TWX: 800-523-1960; Empl.: 50; Minimum order: $20

For info on price: B. Schick; Application info: J. Massi; Customer service: L. Suder; Delivery info: L. Suder

Free literature available: Literature on all Printed Circuit Board processing equipment, component lead forming, cut and layover tools, holding fixtures, assembly tools and equipment, etc.

Products manufactured: Adhesives (All Types), Benches, Consoles, Stools, Tables, Cabinets & Accessories, Calculators, Electrical & Electronic, Carts & Dollies, Instrument & Equipment, Chemicals, Cleaners & Solvents, Cleaners, Ultrasonic, Coatings, Containers, Cords, Cutters, Wire, Hand Operated, Demagnetizers, Drills & Accessories, Hand & Power, Drivers, Nut, Heat Guns, Production, Heat Sinks, Soldering, Holders, Circuit Board (Production Type), Jigs And Fixtures, Chassis & Circuit Board, Kits, Connector, Knives & Knife Sets, Lamps, Machines/Machinery, Production, Magnifying Glasses, Inspection, Meters, Pads, Transistor Mounting, Pliers, Pumps, Vacuum, Racks, Scissors, Screwdrivers, Scribers, Seizers, Solder (All Types), Solder Pots & Baths, Soldering Accessories, Soldering Equipment, Soldering Guns, Irons & Desoldering Tools, Testers, Tools, Torches, Soldering, Welding & Access., Tweezers, Hand & Vacuum, Wire Strippers, Wire Twisters, Wrenches

MARATHON BATTERY CO., c/o Marathon Manufacturing Co., 1900 Marathon Bldg., 600 Jefferson Box 61589, Houston, Tex., 77002, Tel: 817-776-0650, TWX: 910-894-5203; Empl.: 400; Minimum order: $1000

Customer service: R. Tarpey

Products manufactured: Batteries, Chargers, Battery, Eliminators, Battery, Motor Electric Generator Sets, Motors

Local Sales Offices & Reps.

Cal	San Carlos, R. DelBucchia & Assoc.	415-756-1664
Cal	Westminster, A.A. Dowers, Inc.	213-596-4485
Colo	Denver, Brown Tech.	303-233-0863
Fla	Winter Pk., Young & Lawrence	305-647-6929
Ill	Chicago, Gassner & Clark Co.	312-345-4245
Ind	Indianapolis, Southern Sls.	317-257-7575
Iowa	Hiawatha, Gassner & Clark Co.	319-393-5763
Mich	Farmington Hills, H. Lowell Co.	313-851-7474
Minn	St. Paul, Howard Cullen Assocs.	612-646-7371
NM	Albuquerque, Bowden Assoc.	505-268-7676
NY	Buffalo, R. Mitscher	716-633-7970
Ohio	Cleveland, Components, Inc.	216-842-2737
Pa	Phila., C. Newson	215-248-3377
Wash	Seattle, R. Squibb	206-632-2450
Wisc	Oak Creek, Erdman Sls.	414-761-2120

MARCONI INSTRS., Div. Marconi Elctrns. Inc., 100 Stonehurst Ct., Northvale, N.J., 07647, Tel: 201-767-7250, TWX: 710-991-9752; Empl.: 19
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Products manufactured: Analyzers, Attenuators, Bridges, Counters, Filters, Generators, Meters, Monitors, Oscillators, Receivers, Telephone Channel Test & Simulator Equipment, Television Systems & Equipment Closed-Circuit, Test Equipment, Testers

Local Sales Offices & Reps.

Ala	Huntsville, Lee	205-533-5896
Ariz	Phoenix, Moxon Elctrns.	602-273-7363
Cal	Irvine, Moxon Elctrns.	714-556-6500
Cal	San Diego, Moxon Elctrns.	714-292-4820
Cal	Santa Clara, Moxon Elct.	408-249-2491
Colo	Denver, PLS Assoc.	303-771-0140
Fla	Winter Haven, Lee Assocs.	813-294-5815
Ga	Chamblee, Lee Assocs., Inc.	404-457-7117
Ill	Chicago, K.W. Meyers	312-774-6440
Ind	Indpls., K. Meyers	317-243-6681
Md	Bethesda, S & S	301-654-1434
Mass	Stoneham, Ken Corp.	617-438-5464
Minn	Mpls., K.W. Meyers	612-920-7080
Mo	Raytown, P. A. C.	816-737-0066
NJ	Saddle Brook, L & M Assocs.	201-843-8700
NM	Albuquerque, PLS Assoc.	505-255-2330
NY	Brentwood, L & M Assocs.	516-231-8363
NY	Fayetteville, Savage Sales Co.	315-682-2131
NY	New York City, L & M Assocs.	212-675-7486
NC	Raleigh, Lee Assocs., Inc.	919-787-5818
Ohio	Waldo, Ohio Instr.	614-726-4242
Pa	Andalusia, L & M	215-639-3100
Tex	Dallas, Bradenco	214-358-3278
Utah	Salt Lake City, PLS Assoc.	801-272-3681
Wash	Seattle, R.S. Drake Assoc.	206-763-2755

MARK EYELET & STAMPING, 185 Wakelee Rd., Wolcott, Conn., 06716, Tel: 203-756-8847; Empl.: 50

For info on price: G. Hunting; Delivery info: C. Rinaldi

Products manufactured: Connectors, Eyelets, Fasteners, Grommets, Rivets, Terminals

Local Sales Offices & Reps.

Cal	Glendale, Bruce Entprs.	213-245-6538
Ill	Chicago, Weber Assocs.	312-943-5225
Iowa	Cedar Rapids, Snider Sls.	
Mich	Detroit, W. L. Crawford	313-836-8121
Minn	St. Paul, C. Vandervort	612-489-5222

Pa	Wayne, Miller & Smith Co.	215-687-0750
Tex	Richardson, P.J. Scanlon Co.	214-231-4661

MARK SPECIALTIES, 1780 Monrovia, Costa Mesa, Cal., 92627, Tel: 714-642-7757; Empl.: 4; Minimum order: $25

Customer service: R. Hackstock

Products manufactured: Bobbins, Winding, Coil & Transformer, Coils Including Assemblies & Forms, Solenoids

MARKAL CO., 250 N. Washtenaw Ave., Chicago, Ill., 60612, Tel: 312-826-1700; Empl.: 65; Minimum order: $25

For info on price: J. Laicour; Application info: D. Lytton; Customer service: E. G. Carlsen; Delivery info: M. Kaplan

Free literature available: We have Markal Paint Eight Page Catalog, Ball Paint Marker Catalog & Protective Coating Catalog

Products manufactured: Coatings, Crayons, Coatings, Pellets, etc., Temperature Indicating

MARKEL, L. FRANK & SONS, School La., Norristown, Pa., 19404, Tel: 215-272-8960, TWX: 510-660-0190; FSC No: 03890; Empl.: 395; Minimum order: $25

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For info on price: J. F. Carpenter, Jr.; Customer service: E. Pascal; Delivery info: H. Doerner

Products manufactured: Cable, Tapes, Electrical Insulation, Tubing, Wire

Local Sales Offices & Reps.

Ariz	Pheonix, K. Jahn Co.	602-956-9060
Ark	Hot Springs, Meredith Young Assocs.	501-262-1365
Cal	L.A., National Wire & Cable	213-225-5611
Cal	Los Angeles, C.D. LaMoree	213-225-5631
Cal	Torrance, Insulation Supply	213-320-9400
Colo	Denver, Ward Elec. Supply	303-222-3541
Conn	Sherman, R.P. Mahan Co.	203-355-0231
Fla	Clearwater, WMM Assocs.	813-447-2533
Ill	Chicago, J. Glenn	312-847-6400
Kans	Overland Park, Mathews & Co.	913-642-9063
Mass	Wellesley, R. Mahan	617-237-1040
Mich	Farmington, L. George Agency	313-474-1505
Minn	Eden Prairie, F. Peterson	612-941-5400
Mo	Webster Groves, Hippler	314-961-8499
NJ	Colonia, H.B. Heft Assocs.	201-381-5389
NY	Lynbrook, H.B. Heft	516-599-3351
NY	Rochester, Gislason	716-454-4741
NC	Charlotte, H.T. Altman Co.	704-399-8926
Ohio	Chagrin Falls, Electrolock	216-543-5125
Okla	Oklahoma City, J. Cole	405-235-2447
Ore	Portland, C. Riggs	503-226-3286
Pa	Munhall, PEI Sls. Corp.	412-462-6300
Pa	Phila., C. Newson	215-248-3377
Tenn	Chattanooga, Jackson	615-267-4260
Tex	Tyler, Cline & Son, Inc.	214-595-1038
Wash	Seattle, C. Riggs	206-623-5707
Wisc	Elm Grove, J.J. Glenn & Co.	414-352-7262
FOR:	Can., Burlington, Ont., Neeco Inds.	416-632-1403

MARKEM CORP., 1000 Congress St., Keene, NH, 03431, Tel: 603-352-1130, TWX: 710-366-1800; Empl.: 775

Customer service: T. Pallarino

Free literature available: Capabilities Brochure describing in-plant marking systems available for Electronics Industry - component marking, pressure sensitive labels including rating plate labels.

Products manufactured: Labels, Pressure-Sensitive, Adhesive, Machines/Machinery, Production, Nameplates, Wire Markers

Local Sales Offices & Reps.

Cal	Industry, Markem Corp.	213-965-3345
Ill	Elk Grove Village, Markem Corp.	312-625-2866
Mo	St. Louis, Mft. Supplies Co.	314-231-7886
NH	Keene, Markem Corp.	603-352-1130
NJ	Springfield, Markem Corp.	201-467-0870
NC	Charlotte, Markem Corp.	704-525-1445
Ohio	Cincinnati, L. G. Freeman Co.	513-721-1080
Ohio	Medina, Markem Corp.	216-238-5125
Tex	Richardson, Markem Corp.	214-231-8297

MARLIN MANUFACTURING CORP., 12404 Triskett Rd., Cleveland, Ohio, 44111, Tel: 216-941-6200; Empl.: 55; Minimum order: $25

For info on price: P. Hruby; Application info: D. Park; Customer service: P. Hruby; Delivery info: P. Hruby

Products manufactured: Connectors, Panels, Plug Adapters, Plug & Jack Sets, Probes, Thermocouples, Elements & Accessories, Wire

Local Sales Offices & Reps.

Mass	Norwell, Bordewieck Engrg. & Sls.	617-659-4915
NY	Troy, HJM Sls. Co.	518-283-5599
NC	Charlotte, Sloan Assocs.	704-523-2133
Ohio	Cincinnati, Seawood Sls. Co.	513-793-6702
Pa	Broomall, AM Tech. Sls. Co.	215-356-0574
Pa	Pittsburgh, AM Tech. Sls. Co.	412-885-3363
Tenn	Chattanooga, Coleman Assocs.	615-821-0235
Va	Richmond, Sloan Assocs.	804-359-6051

MARLOW INDUSTRIES, INC., 3640 A Marquis Dr., Garland, Tex., 75402, Tel: 214-494-2521, TWX: 910-860-5161; Empl.: 10; Minimum order: $50

Customer service: R. L. Smythe

Products manufactured: Baths, Controlled Temperature (Air & Liquid), Controls/Control Eqpt., Cooling/Heating Modules, Thermoelectric, Feedthrus & Seals, Environmental, Photomultiplier Tube Housings, Substrates

Local Sales Offices & Reps.

Ariz	Phoenix, Griot Assocs.	602-275-4991
Cal	El Segundo, Griot Assocs.	213-322-8383
Cal	Los Altos, Griot Assocs.	415-941-2533
Cal	Tustin, Griot Assocs.	714-838-2330
Tex	Dallas, W.P. Fralia Co.	214-264-3491
Tex	Houston, W.P. Fralia Co.	713-772-1572
Wash	Bellevue, Griot Assocs.	206-454-8592

MAROTTA SCI. CONTROLS, INC., Boonton Ave., Boonton, N.J., 07005, Tel: 201-334-7800, TWX: 710-987-8358; FSC No: 99657; Empl.: 165; Minimum order: $30

For info on price: P. Johnson; Application info: T. Havness; Customer service: T. Rogers; Delivery info: B. Stritch

Products manufactured: Controllers, Programmable, Controls/Control Eqpt., Valves, Solenoid

Local Sales Offices & Reps.

Ala	Huntsville, General Hydraulics Corp.	205-536-6341
Cal	Tustin, Marotta Scientific Controls	714-544-2160

HUNTER TOOLS, Marshall Industries, 9674 Telstar Ave., El Monte, Calif, 91731, Tel: 213-686-0141, TWX: 910-587-1565; Empl.: 75

For info on price: J. Spiri; Application info: J. Spiri; Customer service: D. Hunter; Delivery info: D. Hunter

Products manufactured: Drivers, Nut, Heat Sinks, Soldering, Pliers, Pullers, Screwdrivers, Soldering Accessories, Soldering Guns, Irons & Desoldering Tools, Testers, Tools, Transistor, Diode, Thyristor Heat Dissipators, Wrenches

Local Sales Offices & Reps.

Cal	Los Angeles, Gignac, Oldfield & Weaver	213-747-9544
Cal	San Francisco, Meyer, Ross & Fleming	415-285-8880
Colo	Arvada, Arrowhead Sls. Corp.	303-423-5556
Fla	Ft. Lauderdale, Unirep Inc.	
Ga	Atlanta, Murphy & Cota	404-875-2525
Ill	Chicago, J. J. McBride Sls., Inc.	312-775-1080
Ind	Indianapolis, Elctrn. Reps.	317-897-9326
Kans	Leawood, J. D. How Assoc.	913-649-0542
Md	Phoenix, Rebco Sls.	301-592-8907
Mass	Lynn, J. Grant	617-595-6411
Mich	Detroit, Burcaw Co. & Assoc.	313-533-7700
Minn	Minneapolis, Jensen & Olsen Sls.	612-941-7181
Mo	Liberty, Lectro-Reps.	816-781-2522
NY	Elmhurst, Wilson Assoc.	212-899-0929
NY	Rochester, Marsey Sls.	716-442-9700
Ohio	Cincinnati, Paten Sls. Co.	513-574-0813
Ohio	St. Marys, Shelby & Co.	419-394-3377
Ore	Portland, J. V. Belusko Co.	503-222-4279
Pa	Willow Grove, Dick Lewis	215-659-0704
Tex	Dallas, Techno Assoc.	214-357-9213
Utah	Salt Lake City, Arrowhead Sls. Corp.	801-487-3444
Va	Richmond, Taylor Bros., Inc.	804-644-2391

MARSHALL INDUSTRIES, Kinatechnic Sys., 9674 Telstar Ave., El Monte, Cal., 91731, Tel: 213-686-0141, TWX: 910-587-1565; Empl.: 500

For info on price: R. Frost; Application info: R. Merrill; Customer service: R. Frost; Delivery info: R. Frost

Free literature available: Complete 94 page catalog covering all aspects of facilities layout, assembly station specifications, industrial seating and material handling.

Products manufactured: Benches, Consoles, Stools, Tables, Cleaners, Ultrasonic, Machines/Machinery, Production

Local Sales Offices & Reps.

Ariz	Tempe	602-968-6181
Cal	Sunnyvale	408-739-8720
Colo	Arvada	303-423-9670
Conn	N. Branford	203-288-9241
Fla	Palm Beach Gardens	305-622-8590
Ill	Des Plaines	312-298-0440
Mass	Newton Highland	617-965-5310
NY	Farmingdale	516-293-4120
Ohio	Dayton	513-898-1100
Tex	Dallas	214-233-7650
Wash	Bellevue	206-883-1084

MARSTAN RESISTOR, Balco Elctrns., Inc., 307 Washington St., Orange, N.J., 07050, Tel: 201-677-1200, TWX: 710-994-5812; FSC No: 5905; QPL No: Multiple; Empl.: 50; Minimum order: $50

For info on price: R. W. Hagerty; Application info: R. W. Hagerty; Customer service: L. James; Delivery info: R. W. Hagerty

Free literature available: Precision wirewound resistors.

Products manufactured: Dividers, Networks, Resistors

Local Sales Offices & Reps.

Ariz	Scottsdale, F. Schoeffler Assocs.	
Cal	Culver City, Sodaro Co.	213-870-6001
Conn	Meriden, Abbott-Allison	203-237-9232
Ill	Northbrook, R.T. Howlett & Assocs.	312-498-5444
Kans	Overland Park, B. Rush Assocs.	913-831-4259
Mich	Northbrook, R.T. Howlett & Assocs.	312-498-5444
NJ	Harrington Pk, Metro Tech Sls.	201-768-8495
NY	Jericho, Metro Tech Sls.	516-935-3330
Wash	Seattle, J. B. Jolly	206-938-4166
Wisc	Milwaukee, Gentron Co.	414-543-8110
EXP:	New York, N.Y., Multiparts Corp.	212-944-4372
EXP:	Westbury, N.Y., Minthorne International Inc.	516-334-3303
FOR:	Can., Montreal, Quebec, Electrodesign, Ltd.	514-389-5914
FOR:	Can., Ottowa, Ont., Electrodesign, Ltd.	613-745-0541
FOR:	Can., Quebec, Electrodesign	514-363-5120
FOR:	Can., Toronto, Ont., Electrodesign	416-787-0991

MASTECH, INC., 478 E. Brighton Ave., Syracuse, N.Y., 13210, Tel: 315-478-3133, TWX: 710-541-1546; Empl.: 20; Minimum order: $100

Customer service: R. F. Merrithew

Free literature available: 2610-202-216, Semiconductor Device Test Sets, (Short Form Catalog)

Products manufactured: Testers

Local Sales Offices & Reps.

Cal	Los Angeles, Dyna Sls. Co.	213-268-1175
Mass	Chelmsford, Equipment Sls. Co.	617-256-8547
Wash	Bellevue, Scientific Devices - Northwest	206-454-0900

MASTER APPLIANCE CORP., 2420 18th St., Racine, Wisc., 53403, Tel: 414-633-7791; Empl.: 80

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Customer service: S. Radwill

Free literature available: Full Line Catalog & Price List Single Page Full Line Sheet Master-Mite Page Parts Price Lists Air Cleaner Catalog Pages

Products manufactured: Air Cleaners & Filters (Shielded & Unshielded), Blowers & Fans & Accessories, Heat Guns, Production, Tools, Torches, Soldering, Welding & Access., Welding Equipment & Access. (Excluding Equip. for Semiconductor Devices)

Local Sales Offices & Reps.

NJ	Cherry Hill, M/E & Assocs.	609-667-6110
NY	Great Neck, Harris & Aldrich Sls. Inc.	516-466-4122
EXP:	Mt. Prospect, Ill., Master Appliance Corp.-Overseas Div.	312-358-8677

MASTER ELCTRN. CONTROLS, 1553 17th St., Santa Monica, Cal., 90404, Tel: 213-393-3177; Empl.: 27; Minimum order: $15

For info on price: K.A. Holladay; Application info: I. Nizam; Customer service: D. Colmenero; Delivery info: K.A. Holladay

Products manufactured: Controls/Control Eqpt., Relays, Sockets, Timers

Local Sales Offices & Reps.

Cal	Los Angeles, Master Distributors	213-395-2637
Cal	San Francisco, Master Dist.	415-626-0807
Ill	Park Ridge, G. E. Collins Sls.	312-823-8075

NY	Scarsdale, Bassin Tech. Sls. Co.	914-SC 3-3334
Ohio	Columbus, Ind'l. Comp. Sls.	614-486-3045

MASTER SPECIALTIES CO., 1640 Monrovia St., Costa Mesa, Cal., 92627, Tel: 714-642-2427; Empl.: 350

Products manufactured: Display Devices/Displays, Lamps, Lights, Switches

Local Sales Offices & Reps.

Cal	Costa Mesa	714-642-2427
Cal	Mountain View	415-961-3640
Cal	San Diego	714-279-4812
Colo	Denver	303-758-7741
Fla	Titusville	305-269-3040
Ga	Morrow	404-363-9947
Ill	Schiller Park	312-671-4586
Mass	Lynn	617-599-0566
Minn	St. Paul	612-854-7535
NJ	Barrington	609-546-9044
NY	Avon	716-342-3630
NY	Valley Stream	516-561-2334
Ohio	Wickliffe	216-946-5552
Tex	Dallas	214-357-9459
Wash	Bellevue	206-746-4440

MASTERITE CORPORATION, 2841 Lomita Blvd., Torrance, Cal., 90505, Tel: 213-775-3471, TWX: 910-347-6237; FSC No: 05041; Empl.: 380; Minimum order: $50

For info on price: C. J. Huebert; Application info: C. J. Huebert; Customer service: R. C. Reese; Delivery info: R. C. Reese

Free literature available: Masterite brochures include P.C.B. Connectors which are available in several sizes with a choice of contact centers; .050, .100, .125, .156 Also available are brochures "Plates and Connecting Devices for Wire Wrap" and "Flexible Interconnects"

Products manufactured: Boards, Printed Wiring, Universal, Boards, Programming, Cable Assemblies & Harnesses, Cable, Connectors

Local Sales Offices & Reps.

Ariz	Phoenix, S.O. Rush	602-959-3594
Cal	Mountain View, West/Mark Assoc.	415-969-1700
Colo	Denver, West/Mark Assoc.	303-433-7181
Fla	St. Petersburg, Russell Assoc.	813-526-2939
Ga	Atlanta, Russell Assoc.	404-255-8422
Ill	Wood Dale, L. Bacher Assoc.	312-766-1922
Kans	Overland Park, Penzner-Mankus Assoc.	913-381-0004
Mass	Waltham, UNESCO	617-890-6680
Mich	Grand Rapids, R.P. Urban Assoc.	616-245-0511
Minn	St. Paul, Countryman Assoc.	612-645-9151
Mo	Hazelwood, Penzner-Mankus Assoc.	314-731-4334
NJ	Livingston, Varrelman-Gorman Co.	201-992-2505
NM	Albuquerque, Thorson Co.	505-265-5655
NY	Camillus, Varrelman-Gorman Co.	315-458-4774
NY	Centerport, Varrelman-Gorman Co.	212-463-5000
Ohio	Tipp City, Tech. Comps.	513-667-1216
Okla	Broken Arrow, P.J. Scanlon Co.	918-251-1427
Pa	Newtown Square, Hagy Assoc.	215-459-0504
Tex	Richardson, P.J. Scanlon Co.	214-231-4661

MATERIALS FOR ELCTRNS., INC., 149-32 132nd St., Jamaica, N.Y., 11430, Tel: 212-322-9400

Products manufactured: Antennas, Capacitors, Fixed, Coatings, Metals, Seals, Thermocouples, Elements & Accessories

MATERIALS RESCH. CORP., Route 303, Orangeburg, N.Y., 10962, Tel: 914-359-4200, TWX: 710-576-2656; Empl.: 300

Products manufactured: Alloys, Chamber, Environmental Test, Coatings, Crystals, Deposition Equipment, Vacuum & Accessories, Detectors, Evaporation Equipment, Electron Beam, Feedthrus & Seals, Environmental, Forms, Wire, Furnaces, Gages, Materials, Self-Lubricating, Metal Compounds, Foils, Powders, Sheet, Stock, Metal Oxides, Metals, Microcircuit Production Equip., Networks, Ovens, Pumps, Vacuum, Quartz, Fused, Scribers, Semiconductor Wafer Fabrication, Services, Assembly, Production & Test, Substrates, Valves, Vacuum, Wire

Local Sales Offices & Reps.

Ariz	Tempe, Materials Research Corp.	602-949-5662
Cal	Mountain View, Materials Research Corp.	415-964-7272
Mass	Allston, J. W. Fox	617-429-1300
Mo	Maryland Heights, J. True	314-739-3326
Tex	Dallas, S. Smith	214-235-9008
Tex	Richardson, Materials Research Corp.	214-235-9008

MATHESON GAS PRODUCTS, Box 85, East Rutherford, N.J., 07073, Tel: 201-933-2400, TWX: 710-989-0173; Empl.: 500; Minimum order: $10

Customer service: T. Swanson 415-793-2559

Free literature available: Matheson General Gas Catalog: Separate section devoted to electronic gases and gas mixtures for use in the semiconductor industry. Equipment section for high purity regulators and handling equipment.

Products manufactured: Chemicals, Controls/Control Eqpt., Couplings, Dials, Gages, Regulators, Technical Books, Testers, Valves, Vacuum

Local Sales Offices & Reps.

Cal	Cucamonga	714-987-4611
Cal	Newark	415-793-2559
Fla	Morrow	404-478-7274
Ill	Joliet	815-727-4848
Mass	Gloucester	617-283-7700
Tex	La Porte	713-471-2544
FOR:	Can., Edmonton, Alberta	403-476-6214
FOR:	Can., Whitby, Ontario	416-668-3397

MATRIX CORP., 520 N. 11th Ave., Beech Grove, Ind., 46107, Tel: 317-786-4601; Empl.: 10 .... p. 1•178,266

Customer service: K. D. Bantlett

Products manufactured: Boards, Programming, Controllers, Programmable, Controls/Control Eqpt., Process Control Systems, Programmers, Scanners, Timers

Local Sales Offices & Reps.

Ill	Chicago, SEA Inc.	312-282-6694
Ind	Carmel, Sea Inc.	317-846-2593
Minn	Mpls., SEA Inc.	612-425-4455
Tex	Dallas, Sys. Engrg. Sls.	214-231-9364
Tex	Houston, System Engrg.	713-668-7840
Wisc	Waukesha, SEA Inc.	414-547-6637

MATRIX ENGINEERING CORP., 17000 S. Western Ave. 19, Gardena, Cal., 90247, Tel: 213-770-0521; Empl.: 9; Minimum order: $10

Customer service: G. Austin

Free literature available: MATRIX ENGINEERING CORPORATION presents work positioners and fixtures for: Assembly, Inspection, Testing, Servicing.

Products manufactured: Benches, Consoles, Stools, Tables, Holders, Circuit Board (Production Type), Jigs And Fixtures, Chassis & Circuit Board, Panels, Pullers, Racks, Services, Assembly, Production & Test, Soldering Accessories, Soldering Equipment, Tools

Local Sales Offices & Reps.

Ariz	Phoenix, Davis Co.	602-955-2266
Cal	Anaheim, Production Sys. Inc.	714-533-1120
Cal	Ontario, West Coast Ents.	714-903-3914
Cal	San Jose, Hefte Industries	408-264-8319
Colo	Denver, Soldering Supply Specialists	303-455-1352
Ill	Chicago, EMF Co. Inc.	312-889-8323
Mass	Burlington, Contact East Inc.	617-272-5051
Ore	Portland, Murphy Ind. Supply Co.	503-226-6081
Pa	Feasterville, H. Mann Inc.	215-355-7200
Tex	Dallas, Atlan Inds.	214-243-6216
Utah	Salt Lake City, Technical Devices Co.	801-277-1029
FOR:	Can., Burlington, Ont., Arbell Equipment Ltd.	416-632-9494

Local Distributors

Ala	Huntsville, Mock Ents., 2310 Memorial Pkwy	205-539-2401
Cal	Anaheim, Production Sys., 2021 Via Burton	213-533-1120
Cal	Inglewood, N66 Inc., 3819 W. Imperial Hwy	213-671-5455
Ill	Chicago, E.M.F. Co., 6135 W. Belmont	312-889-8323
Mass	Burlington, Contact East, 7 Cypress Dr.	617-272-5051
Ore	Portland, Murphy Indus. Supply, 3057 N.W. Yeon Ave.	503-226-6081
Pa	Huntingdon Val., Henry Mann, Box 496, Mann Rd.	215-355-7200
Pa	Plymouth Meeting, Techni-Tool, Apollo Rd.	215-825-4990

MATRIX SYSTEMS CORP., 9411 Lurline Ave., Chatsworth, Cal., 91311, Tel: 213-882-2008; Empl.: 10 p. 1•1800-1802

Customer service: J. Singleton

Products manufactured: Attenuators, Converters, Modules, Logic, Encapsulated, Relays, Scanners, Switches

Local Sales Offices & Reps.

Cal	Los Angeles, Dynasales Co.	213-268-1175
Cal	Mountain View, IFM, Inc.	415-961-2828
Conn	Hamden, Instrument Consultants, Inc.	203-288-5246
Fla	Satellite Beach, Reynolds & Assocs.	305-727-3205
Ga	Atlanta, Reynolds & Assocs.	404-252-5360
Ill	Chicago, Pivan Engrg., Inc.	312-539-4838
Ind	Indianapolis, Pivan Engrg., Inc.	317-253-1681
Kans	Shawnee Mission, Pivan Engrg.	913-722-1030
Mass	Waban, Instrument Consultants, Inc.	617-969-9881
Mich	Detroit, Comtel-Sterling Assocs.	313-255-1970
Minn	Minneapolis, Pivan Engrg., Inc.	612-537-4501
Mo	St. Louis, Pivan Engrg., Inc.	314-542-3636
NY	Cortland, RJC Assocs.	607-753-3909
NY	Scarsdale, Bassin Tech. Sls. Co.	914-723-3334
Ohio	Cleveland, Comtel-Sterling Assocs.	216-442-8080
Ohio	Dayton, Comtel-Sterling Assocs.	513-298-7573
Okla	Tulsa, Carter Assocs.	918-749-3311
Pa	Pittsburgh, Comtel-Sterling Assocs.	412-922-5720
Tex	Garland, Carter Assocs.	214-276-7151
Tex	Houston, Carter Assocs.	713-644-1307
Va	Fairfax, Schibley Assocs.	703-591-3008
Wisc	Brookfield, Pivan Engrg., Inc.	414-786-1940
Exp:	NY, NY, May Lee Inds.	212-532-9200
FOR:	Downsview, Ontario, Can., Can-Tech Elctrns. Co.	416-661-9797

MATTHEWS & CO., JAS. H., Marking Systems Div., 6619 Penn. Ave., Pittsburgh, Pa., 15206, Tel: 412-362-6500, Telex: 86-6215; Empl.: 250; Minimum order: $15

Customer service: J. R. Ash

Products manufactured: Kits, Marking (Dial, Instrument, Equipment, etc.), Machines/Machinery, Production, Nameplates, Wire Markers

Local Sales Offices & Reps.

Cal	Bell Gardens, J.E. Hinshaw	213-927-3495
Cal	San Francisco, T.E. Graves	415-474-8300
Ga	Atlanta, C.W. Powell	404-233-8426
Ill	Chicago, S.C. Gurtner	312-263-6573
NJ	Clifton, S. Zeeble	201-643-4377
NY	Buffalo, J.V. Mason	716-856-7812
Ohio	Cincinnati, H.C. Bathe	513-631-0133
Ohio	Cleveland, G.H. Shumaker	216-696-6676
Pa	Philadelphia, S. Zeeble	215-563-2243
Pa	Pittsburgh, J. R. Ash	412-362-6500
Pa	Pittsburgh, R.F. Abbs	412-362-6500
Tenn	Memphis, J.J. Ford	901-525-0316
Tex	Dallas, L.S. Maguire	214-742-1760
Wash	Seattle, L.E. Kasper	206-624-0265
EXP:	Pittsburgh, Pa., C.A. Prezikowski	412-362-6500

MAURATRON, INC., 2741 Satsuma, Dallas, Tex., 75229, Tel: 214-243-3329; Empl.: 7; Minimum order: $10 .... p. 1•1312,1313

For info on price: A. Deasey; Application info: J. E. Sykes; Customer service: A. Deasey; Delivery info: C. Hunter

Products manufactured: Batteries, Blowers & Fans & Accessories, Chargers, Battery, Diodes, Power Supplies, Resistors, Retainers, Timers, Transistor, Diode, Thyristor Heat Dissipators, Tubing

Local Sales Offices & Reps.

Cal	San Diego, Tauber & Assocs.	714-274-7242
Md	Lutherville, Cunningham & Assoc.	301-296-4306
Mass	Northboro, Henik Assocs.	617-891-5660
Tex	Dallas, V.J. Sykes Assocs.	214-243-2221

Local Distributors

Cal	W. Los Angeles, Mil-Comm Distributor, 1616 Cotner	213-478-0525

MAUREY INSTRUMENT CORP., 555 W. 60th St., Chicago, Ill., 60629, Tel: 312-581-4555; FSC No: 03942; Empl.: 75; Minimum order: $25

For info on price: E. Maurey; Application info: E. Maurey; Customer service: T. Podge; Delivery info: T. Podge

Free literature available: Literature is available describing full lines of single turn and linear motion wirewound and conductive plastic potentiometers as well as wirewound trimmers.

Products manufactured: Potentiometers, Resistors, Slip-Rings & Assemblies, Switches

Local Sales Offices & Reps.

Ariz	Tempe, Whitronics, Inc.	602-966-4417

Fla	, Shaw Engrg. & Sls.	305-752-7596
Ill	Glenview, Crimson Engrg. Co.	312-724-1780
NM	Albuquerque, A.L.S. Elctrns.	505-294-8555
NY	Jamestown, W.R. Arnold, Inc.	716-664-5402
Wisc	Glenview, Crimson Engrg. Co.	312-724-1780

MAURY MICROWAVE CORP., 8610 Helms Ave., Cucamonga, Calif., 91730, Tel: 714-987-4715; FSC No: 13047; Empl.: 26; Minimum order: $40

For info on price: S. Shirley Ext. 31; Application info: B. Wambach Ext. 26; Customer service: A. Lopez Ext. 20; Delivery info: A. Lopez Ext. 20

Free literature available: A short form catalog and one page product summary of Maury Microwave's product line of precision coaxial, waveguide and microwave instrumentation is available.

Products manufactured: Adapters, Waveguide, Antenna Feed Systems, Antennas, Attenuators, Bends & Twists, Microwave, Bolometers, Calibrators, Cavities, Microwave, Comparators, Connector Adapters, Connectors, Couplers, Delay Lines, Detectors, Dividers, Dummy Loads, Filters, Flanges, Waveguide, Holders, Crystal, Horns, Microwave, Insertion Loss Measurement Systems, Junctions, Hybrid, Microwave, Line Strechers, Microwave, Meters, Mismatches, Microwave, Precision, Monitors, Mounts, Oscillators, Preselectors, Probes, Receivers, Services, Assembly, Production & Test, Shifters, Sliding Loads, Microwave, Slotted Lines, Microwave, Standards, Suppressors, Switches, Tees, Terminals, Tubing, Tuners, Waveguides & Adapters

Local Sales Offices & Reps.

Ariz	Tempe, Jarko Assoc.	602-966-3020
Cal	Cupertino, Dura Elctrn. Sls.	408-255-2084
Colo	Parker, TMA, Inc.	303-841-3435
Fla	Satellite Beach, Reynolds Assoc.	305-773-4700
Ga	Atlanta, Reynolds Assoc.	404-252-5360
Md	Greenbelt, Riffe Assoc., Inc.	301-474-8600
Mass	Lexington, Zieco, Inc.	617-861-8300
NJ	Moorestown, Stern Assocs., Inc.	609-234-0661
NM	Albuquerque, TMA, Inc.	505-298-4321
NY	East Rockaway, Long Island, W. Bellenkes Assoc. Inc.	516-887-1443
Ohio	Dayton, F. L. Ohmer & Assoc.	513-434-1454

MAXI-SWITCH CO., 9697 East River Road, Minneapolis, Minn., 55433, Tel: 612-755-7660; Empl.: 100 .... p. 1•2262-2265

Products manufactured: Keyboards, Alphanumeric & Decimal, Relays, Switches

Local Sales Offices & Reps.

Ala	Huntsville, Young & Lawrence	205-539-6575
Ariz	Scottsdale, Williams Assocs.	602-947-4297
Cal	Canoga Park, R. Kruse	213-341-3020
Colo	Denver, Williams Assocs.	303-373-4730
Fla	Ft. Lauderdale, Young & Lawrence	305-563-6717
Fla	St. Petersburg, Young & Lawrence	813-894-0026
Fla	Winter Park, Young & Lawrence	305-647-6929
Ill	Crystal Lake, Mesa Inc.	312-639-3359
Md	Towson, H. White Co.	609-667-3202
Mass	Chelmsford, M. Flynn	617-256-6229
Mich	Grand Rapids, R.P. Urban & Assocs.	616-245-0511
Minn	St. Paul, Quantum Sls.	612-831-8583
NJ	Cherry Hill, H. White Co.	609-428-4544
NJ	East Orange, D. A. Rugg Co.	201-675-4822
NM	Albuqurque, Williams Assocs.	505-255-1638
NY	Penfield, J.E. Blair	716-586-1419
NC	Raleigh, Candor	919-828-5716
Ohio	Cincinnati, Tri-State Mktg.	513-761-7993
SC	Myrtle Beach, Candor Co.	803-448-5213
Tex	Dallas, J. A. Green Co.	214-631-7450
Tex	Houston, J. A. Green Co.	713-526-2959
Va	Lynchburg, Candor	703-846-6579

MAXWELL LABS., INC., 9244 Balboa Ave., San Diego, Calif., 92123, Tel: 714-279-5100, TWX: 910-335-2063; Empl.: 300

For info on price: Sls. Dept.; Application info: Sls. Dept.; Customer service: V. Tallarida; Delivery info: V. Tallarida

Free literature available: Capacitors 303R/401R/760 (Haefely); Generators 513; Switches 807/808/812; Questionnaires: capacitors/switches/power supplies/; Reprints; Magneform 1201R; Magneform machines 1202; Application 1501 & 1502A.

Products manufactured: Capacitors, Fixed, Diodes, Discharge Systems, Energy, Generators, Lasers & Laser Systems, Modulators, All Kinds, Networks, Power Supplies, Spark Gaps, Switches, Transformers

Local Sales Offices & Reps.

Cal	Los Angeles, Halbar Assoc.	213-387-8283
Ill	Chicago, Berndt Assoc.	312-283-0713

MBC ENGINEERING INC., 2501 Walsh Ave., Santa Clara, Cal., 95050, Tel: 408-244-9242; Empl.: 25; Minimum order: $100

For info on price: D. Munson; Application info: D. Munson; Customer service: L. Romelfanger; Delivery info: L. Romelfanger

Free literature available: Brochure describing facility and equipment.

Products manufactured: Circuits, Printed, Multilayer

MCCOY ELECTRONICS, Sub Oak Inds. Inc., Chestnut & Watts, Mount Holly Springs, Pa., 17065, Tel: 717-486-3411, TWX: 510-650-3548; Empl.: 457 p. 1•367-381

Products manufactured: Crystal Blanks, Crystals, Filters, Oscillators

Local Sales Offices & Reps.

Ariz	Tempe, Argus Sls.	602-967-8709
Cal	Inglewood, D. Foyer-McCoy Elctrns. Co.	213-678-4108
Cal	Los Altos, OAK Inds. Inc.	415-941-1237
Colo	Denver, I.W. Strong & Assocs.	303-292-6900
Fla	Altamonte Springs, Oak Inds., Inc.	305-735-4495
Ill.	Chicago, Brock & Cushman	312-622-4110
Ind	Fort Wayne, Menze Sls.	219-747-5616
Iowa	Cedar Rapids, Lorenz Sls.	319-393-9125
Md	Silver Springs, Eastern Instrumentation	301-681-6500
Mass	Norwood, JMG, Inc.	617-762-5333
Mich	Jackson, Norwood Scroggs Co.	517-750-1170
Minn	Edina, Wagner Conslts. Corp.	612-941-6310
Mo	Kansas City, Automatic Gen. Elctrn. Sls.	816-333-8206
NJ	Clifton, Albert Clarfield	212-757-6454
NJ	Haddonfield, Gray Assocs.	609-429-5300
NY	Pompey, S.F. Foster Co.	315-677-3333
NY	Webster, S.F. Foster Co.	716-872-5220
NC	Raleigh, OAK Inds. Inc.	919-876-7591
Ohio	Cincinnati, OAK Inds. Inc.	513-851-4411
Ore	Salem, Pacnor Mktg., Inc.	503-636-6445
Tex	Richardson, R.F. Kimball Co.	214-231-3447
Wash.	Seattle, Pacnor Mktg.	206-284-8020
EXP:	Teaneck, N.J., Sylvan Ginsbury Ltd.	201-837-1100

MCFADDEN ELCTRNS. CO., 8953 S. Atlantic Blvd., South Gate, Calif., 90281, Tel: 213-564-5958; FSC No: 25750; Empl.: 11

For info on price: B. W. McFadden; Application info: B. W. McFadden; Customer service: S. McFadden; Delivery info: B. W. McFadden

Free literature available: Cockpit Simulation Control Loaders and Instruments Catalog, Low Torque Dynamometers, DC Power Amplifiers, Motion Simulation Tables.

Products manufactured: Amplifiers, Controls/Control Eqpt., Servo Systems, Simulators, Testers

Local Sales Offices & Reps.

Ala	Huntsville, Incotec	205-837-6061
Ind	Indianapolis, Tri-State Tech. Sls.	317-924-3568
Mass	Salem, Forbes Engrg.	617-744-1693
FOR:	Can., Ville LaSalle, Que., Electrodesign Ltd.	514-363-5120

MCG ELECTRONICS INC., 279 Skidmore Rd., Deer Park, N.Y., 11729

Products manufactured: Arresters, Electrical Surge, Lightning, Protectors, Suppressors

Local Sales Offices & Reps.

Cal	Los Angeles, Dyna Sls.	213-268-1175
Fla	Maitland, Beacon	305-647-3498
Ga	Atlanta, Beacon	404-351-3654
Mass	Framingham, Victor Assoc.	617-879-5710
Mich	Utica, N. Case Assoc.	313-731-6003
NJ	Mt. Vernon, Sonkin Assocs.	914-668-9809
NY	Conklin, Ramcom	716-632-6913
Pa	Newtown Square, Holdsworth & Co.	
Va	Falls Church, D. Snow-Beacon	703-534-1673
Wisc	Germantown, Germantown	414-255-2120

MCGILL MFG. CO. INC., Electrical Div., 909 Lafayette St., Valparaiso, Ind., 46383, Tel: 219-464-4911, TWX: 910-690-4892; Empl.: 395

Customer service: P. Bain VP Sls. Ext. 376

Free literature available: Catalog #89 illustrates and describes McGill precision switches including snap action, (standard, miniature and sub-miniature), toggle, rocker, push button types and specials. 1 to 20 Amp.

Products manufactured: Switches

Local Sales Offices & Reps.

Ark	Hot Springs, M. Young Assocs.	501-262-1365
Cal	Los Angeles, Clemick-Neenan & Assocs.	213-476-1272
Cal	San Francisco, Maddox Sls. Co.	415-431-2953
Fla	Orlando, Geartner Assocs.	305-299-1000
Ill	, R. J. Eckert	312-297-3233
Ind	Arcadia, D. Rickards	317-253-8689
Ind	Dyer, A. Knezevich	312-297-3233
Mass	Norwood, R. Perron & Co.	617-762-8114
Mich	Benton Harbor, Ken-Mor Assocs.	616-927-3134
Minn	Minneapolis, Elec. Comp. Sls.	612-933-2594
Mo	St. Louis, Larco Sls., Inc.	314-863-1242
NJ	Mount Laurel, Naudain Assocs.	609-235-1801
NY	Baldwin, C. Glianna	516-378-2700
NY	Pompey, S.F. Foster Co.	315-677-3333
Ohio	Cleveland, G. Stofer & Bro. Co.	216-333-0733
Ohio	Tipp City, W. Lenz	513-277-5509
SC	Columbia, H. Heaton	803-779-4016
Tex	Dallas, Raley Sls. Co.	214-368-1783
Tex	Houston, Carey & Assocs.	713-460-1111
Wash	Seattle, Stroheker, Inc.	206-623-0357

MCGRAW-EDISON CO., Edison Electronics Div., Grenier Field, Manchester, N.H., 03103, Tel: 603-669-0940, TWX: 710-220-1747; Empl.: 450 .. p. 1•661

For info on price: W. Manson; Application info: D. Cox; Customer service: D. Cox; Delivery info: D. Cox

Products manufactured: Attenuators, Cable, Calibrators, CATV Systems & Equipment, Coils Including Assemblies & Forms, Connectors, Delay Lines, Detectors, Gages, Generators, Indicators, Meters, Monitors, Networks, Oscillators, Resistors, Switches, Telephone Channel Test & Simulator Equipment, Terminals, Testers, Transducers, Transformers, Transmitters

Local Sales Offices & Reps.

Ala	Huntsville, P.J. Nahser	205-881-5590
Ariz	Scottsdale, Williams Assocs.	602-947-4297
Cal	Encino, Eltec Sys.	213-981-9881
Colo	Denver, Williams-Assocs.	303-343-2911
Conn	Wallingford, Adams-McGregor, Inc.	203-269-5816
Fla	Lighthouse Point, Saber Assocs.	305-943-3076
Fla	Longwood, Saber Assocs.	305-422-3686
Fla	St. Petersburg, Saber Assocs.	813-441-1301
Ga	Kenneshaw, P.J. Nahser	404-422-8053
Ga	Woodstock, Saber	404-432-9625
Idaho	Bois, Tarbell Comms.	208-343-0285
Ill	Chicago, Midwest Elctrns. Sls.	12-777-9700
Ind	Indianapolis, Midwest Elctrns. Sls.	312-926-3736
Iowa	Cedar Rapids, S & O Sls.	319-393-1845
Kans	Swanee Mission, Tech. Sls. Assocs.	913-888-3330
Md	Silver Spring, Gawler Knoop Co.	301-598-4406
Mass	Scituate, Adams-McGregor, Inc.	617-545-2213
Mich	Ferndale, Tiby Co.	313-547-3550
Mo	Ferguson, Tech. Sls.	314-725-5361
NJ	Boonton, Eastern Metro Assocs.	201-335-7881
NM	Alberquerque, Williams Assocs.	505-255-1638
NY	Guilderland, Electro-Modular Sys. Inc.	518-456-2665
NY	Plainview, Eastern Metro Assocs.	516-931-1414
NC	Burlington, P. J. Nahser Co. Inc.	919-226-8053
NC	Raleigh, Saber Assocs.	919-834-3961
Ohio	Cleveland, Tiby Co.	216-371-5335
Ohio	Dayton, Tiby Co.	513-277-3822
Ore	Beaverton, Tarbell Comms.	503-643-1631
RI	Lincoln, Adams-McGregor	401-726-1300
Tex	Dallas, Diversity Comms. Co.	713-772-0730
Wash	Bellevue, Tarbell Comms.	206-454-9716
Wisc	Waukesha, Midwest elctrns. Sls.	414-542-5129

MCKAY DYMEK CO., 675 N. Park Ave., Box 2100, Pomona, Cal., 91766, Tel: 800-854-7769, TWX: 800-472-7782; Empl.: 15; Minimum order: $155

For info on price: L. Engard 714-623-1581; Application info: L. Engard 714-623-1581; Customer service: F. Coker 714-623-1581; Delivery info: L. Engard 714-623-1581

Free literature available: #1 - Sheet on Shielded Ferrite Rod Antenna for AM broadcast band 540 - 1600 khz. #2 - Sheet on Hi Fi AM Tuner as used in broadcast Stations all over the U.S.A.

Products manufactured: Antennas, Receivers

MCKEE-PEDERSEN INSTRS., P.O. Box 322, Danville, Calif., 94526, Tel: 415-937-3630; Empl.: 8

Customer service: R. G. McKee

Free literature available: An 8-page brochure describes all the MP-System electronic modules and housings. A 4-page brochure describes MPI graphic recorders. A 4-page brochure describes electro-optical instruments.

Products manufactured: Amplifiers, Bridges, Current Sources, Meters, Potentiometers, Power Supplies, Recorders, Voltage Sources

MCL, INC., 10 North Beach Ave., LaGrange, Ill., 60525, Tel: 312-354-4350, TWX: 910-683-1899; Empl.: 80 p. 1•910-915,917-925

Products manufactured: Amplifiers, Cavities, Microwave, Filters, Generators, Modulators, All Kinds, Multipliers, Oscillators, Preselectors, Transmitters

Local Sales Offices & Reps.

Cal	Cupertino, Allis Assocs.	408-379-2883
Cal	Orange, Pacific Microwave, Inc.	714-633-7991
Fla	Orlando, Gra-Mar, Inc.	305-894-3351
Haw	Honolulu, Aloha Assocs.	808-941-1574
Ill	Mt. Prospect, Cain & Co.	312-253-3578
Md	Baltimore, Stemler Assocs.	310-944-8262
Mass	Reading, Geder-Rotondi Assocs.	617-944-3105
NM	Albuquerque, J. Smith & Assocs.	505-255-2111
NY	Plainview, Eastern Metro Assocs.	516-931-1414
Ohio	Dayton, Cain & Co.	513-254-6521
Ohio	Reynoldsburg, Cain & Co.	614-861-2119
Tex	Dallas, Texas Avionics Co.	214-363-6324
Va	Alexandria, Stemler Assocs.	703-548-7818

MCLEAN ENGRG. LABS., 70 Washington Rd., Princeton Jctn., N.J., 08550, Tel: 609-799-0100; Empl.: 74; Minimum order: $25 p. 1•499-503,975

For info on price: P. Blakely; Application info: P. M. Stewart; Customer service: P. Blakely; Delivery info: P. Blakely

Products manufactured: Air Cleaners & Filters (Shielded & Unshielded), Blowers & Fans & Accessories, Controls/Control Eqpt., Gaskets, Shielding, R-F-Also See Shields, R-F, Grilles, Heat Exchangers & Systems, Honeycomb Sheets, Panels, etc., Motors, Shields

Local Sales Offices & Reps.

Ala	Huntsville, W. Brown	205-539-4411
Ariz	Phoenix, PLS Assocs.	602-957-9110
Cal	Cupertino, T. Snitzer	408-257-8333
Cal	Del Mar, T. Snitzer	714-454-2191
Cal	L.A., T. Snitzer	213-836-6170
Colo	Denver, PLS Assoc.	303-771-0140
Conn	Bridgeport, Technical Instrs.	203-FO 8-4582
Fla	Ft. Lauderdale, W. Brown	305-776-4800
Fla	Orlando, W. Brown	305-425-5505
Ga	Tucker, W. Brown	404-939-1674
Ill	Elmhurst, Scott Assocs.	312-279-5681
Kans	Kansas City, Harris-Hanson	816-HI 4-9494
La	Gretna, W.A. Brown Inst. Co.	504-366-5766
Mass	Wilmington, Tech. Instrs.	617-944-3930
Mich	St. Clair Shores, J. Thorpe	313-779-6363
Minn	Mpls., Scott Elctrn.	612-929-2985
Mo	St. Louis, Harris-Hanson	314-432-3611
NJ	Ft. Lee, K. Hughes	201-944-1600
NM	Albuquerque, PLS Assocs.	505-255-2330
NY	Albany, J. Reagan	518-489-4777
NY	New Hartford, J. Reagan	315-732-3775
NY	Rochester, J. Reagan	716-473-2115
NC	Winston-Salem, W. Brown	919-768-3600
Ohio	Cleveland, Marlow Assocs.	216-932-0900
Tex	Dallas, J.A. Green Co.	214-ME 1-7450
Tex	Houston, J.A. Green Co.	713-JA 6-2959
Va	Alexandria, Dyna Rep. Co.	703-354-1222
FOR:	Can., Montreal, Que., Brian Engrg.	514-735-1671
FOR:	Can., Rexdale, Ont., Brian Engrg.	416-248-0226

MEASUREMENT SYS., INC., 523 West Ave., Norwalk, Conn., 06850, Tel: 203-838-5561; Empl.: 14

For info on price: F. J. Stevens; Application info: M. H. Mehr; Customer service: F. J. Stevens; Delivery info: F. J. Stevens

Free literature available: C-3 "Tracking control products for the Human Operator" 8 page condensed catalog providing brief description of over 40 products. G174 "Control Grips". 8 page brochure describing standard products and custom configurations providing an almost limitless number of control options.

Products manufactured: Bridges, Controls/Control Eqpt., Converters, Switches, Tracking Systems, Transducers

Local Sales Offices & Reps.

Cal	Encino, Kingway & Assocs.	213-788-4124
Cal	Fullerton, Kingway & Assocs.	213-788-4124
Iowa	Cedar Rapids, S & O Sls. Inc.	319-393-1845
Mass	Burlington, Tekdata Inc.	617-273-0198
Pa	Melrose Park, R. Meyers Assocs.	215-224-1663
Tex	Richardson, P.J. Scanlon Co.	214-231-4661

MECHANICAL ENGRAVING CO., INC., 10 Van Cortlandt Ave., E., Bronx, N.Y., 10468, Tel: 212-LU 4-8600; FSC No: 99040; Empl.: 35; Minimum order: $15

For info on price: B.W. Mandel; Customer service: J.T. Mandel; Delivery info: J.T. Mandel

Products manufactured: Cams, Chassis, Metal, Dials, Indicators, Nameplates, Panels, Scales, Dial, Services, Assembly, Production & Test, Strips, Terminal Blocks, Boards & Strips

MECHANICAL ENTERPRISES, 601 Dale Dr., Silver Spring, Md., 20910, Tel: 703-321-8282, TWX: 710-832-0942

For info on price: R. H. Twyford; Application info: R. H. Twyford; Customer service: G. Russell; Delivery info: G. Russell

Free literature available: Keyboard designer's kit including deta on all mercutron and gold v-bar switches, keytops, and keyboard accessories.

Products manufactured: Keyboards, Alphanumeric & Decimal, Switch Hardware, Switches

Local Sales Offices & Reps.

Ala	Huntsville, Beacon Reps	205-881-5031
Ariz	Phoenix, KCE Corp.	602-955-5250
Cal	Burlingame, J. Logan & Assoc.	415-697-6100
Cal	Los Angeles, KCE Corp.	213-649-2622
Colo	Denver, Franklin Sls. Co.	303-922-3623
Fla	Palm Beach Gardens, Beacon Reps	305-622-2770
Ga	Atlanta, Beacon Reps	404-351-3654
Ill	Des Plaines, Coombs Assocs.	312-298-4830
Ind	Fort Wayne, Coombs Assocs.	219-747-0402
Md	Glen Arm, Hodgins Assocs.	301-592-7047
Mass	Lexington, Circuit Sls. Co.	617-861-0567
Mich	Jackson, Norwood Scroggs	517-750-1170
Mo	St. Louis, Beneke & McCaul, Inc.	314-567-3399
NY	Mt. Vernon, D. Sonkin Assocs.	914-668-9809
NY	Rochester, L. Hart	716-244-3253
Ohio	Dayton, Bear Mktg.	513-299-3566
SC	Spartanburg, Beacon Reps	803-582-4613
Tex	Dallas, I.B.L. Engrg. & Sls.	214-363-2921
Wisc	Greendale, Coombs Assoc.	414-421-2300

MECHANICAL ENTERPRISES, INC., 8000 Forbes Pl., Springfield, Va., 22151, Tel: 703-321-8282, TWX: 710-832-0942; Empl.: 25

For info on price: R. Twyford; Application info: R. Twyford; Customer service: G. Russell; Delivery info: G. Russell

Free literature available: Complete catalog & list containing specifications on 3 basic keyboard switches, including lighted and alternate action, 6 varieties of doubleshot molded keytops & 44 small deyboard arrays.

Products manufactured: Keyboards, Alphanumeric & Decimal, Switches

Local Sales Offices & Reps.

Ala	Huntsville, Beacon Elctrns	205-881-5031
Ariz	Phoenix, KCE Corp.	602-258-7519
Cal	Burlingame, J. Logan	415-697-6100
Cal	Los Angeles, KCE Corp.	213-649-2622
Cal	San Diego, KCE Corp.	714-278-7640
Colo	Denver, Franklin Sls.	303-922-3623
Fla	Ft. Lauderdale, Beacon Electrns.	305-776-6074
Fla	Maitland, Beacon Elctrns	305-647-3498
Ga	Atlanta, Beacon Elctrns	404-351-3654
Ill	Chicago, Coombs Assoc. Inc.	312-298-4830
Ind	Fort Wayne, Coombs Assocs., Inc.	219-747-0402
Md	Glen Arm, Hodgins Assocs.	301-592-7047
Mass	Lexington, Circuit Sls. Co.	617-861-0567
Mich	Jackson, Norwood Scroggs & Co.	517-750-1170
Miss	Hernando, Beacon Elctrns.	601-368-9008
Mo	St. Louis, Beneke & McCaul	314-434-6242
NY	Mt. Vernon, D. Sonkin Assocs.	914-668-9809
NY	Rochester, Lloyd Hart	716-244-3253
NC	Greensboro, Beacon Elctrns.	919-674-9432
Ohio	Dayton, Neal Bear Corporation	513-299-3566
Ohio	Richfield, Neal Bear Corporation	216-659-3131
SC	Spartanburg, Beacon Elctrns.	803-576-4613
Tex	Dallas, IBL Engrg. & Sls.	214-363-2921
Wisc	Greendale, Coombs Assocs.	414-421-2300

MECHANICAL PROD., Div. Aiken Ind., 1824 River St., Jackson, Mich., 49204, Tel: 517-782-0391, TWX: 810-253-0827; Empl.: 200; Minimum order: $50

Customer service: R. Reed

Products manufactured: Circuit Breakers

Local Sales Offices & Reps.

Cal	Panorama City, Mechanical Prods.	213-781-8966

MEGATEK CORP., 1055 Shafter St., San Diego, Cal., 92106, Tel: 714-224-2721; Empl.: 25; Minimum order: $25

For info on price: C. Foley; Application info: W. Foley; Customer service: W. Foley; Delivery info: C. Foley

Free literature available: "7 Economical ways to solve your computer graphics problems:" A collection of data sheets and application notes on inexpensive approaches to computer graphics.

Products manufactured: Display Devices/Displays

Local Sales Offices & Reps.

Ala	Birmingham, Technical Assocs.	205-854-0616
Ariz	Phoenix, Data Sys. Mktg.	602-277-4732
Cal	La Mesa, Data Sys. Mktg.	714-447-5411
Cal	Newport Beach, Data Sys. Mktg.	714-540-2312
Cal	Poway, Data Sys. Mktg.	714-486-2172
Cal	San Francisco, Data Sys. Mktg.	415-391-1111
Colo	Littleton, Data Sys. Mktg.	303-795-1960
Fla	Orlando, Technical Assocs.	305-894-7531
Haw	Honolulu, Aloha Assocs.	808-941-1574
Kans	Prairie Village, Engineering Svcs. Co.	913-649-4000
Mass	Cambridge, Techexport	617-661-9424
Mich	Centerline, Dietrich & Assocs.	313-754-6450
Mo	St. Louis, Engineering Svcs.	314-997-1515
NJ	Tenafly, Budd-Tronics	201-569-2230
Ohio	Cleveland, Dietrich & Assocs.	216-781-1855
Ohio	Dayton, Dietrich & Assocs.	513-223-6042
Pa	Pittsburgh, Dietrich & Assocs.	412-892-2992
SC	Spartanburg, Technical Assocs.	803-579-2904
Utah	Bountiful, Data Sys. Mktg.	801-295-3457
Wash	Bellvue, Data Sys. Mktg.	206-455-2999
FOR:	Can., Rexdale, Ont., Ahearn & Soper, Ltd.	416-247-7141

MEGAVOLT, INC., Sub. Julie Research Labs., 211 W. 61st St., New York, N.Y., 10023, Tel: 212-245-2727; Empl.: 8

Customer service: H. Tekel

Free literature available: Manufacture of high voltage power supplies, insulation testers, and dividers.

Products manufactured: Cable, Dividers, Drivers, Nut, Meters, Modulators, All Kinds, Power Supplies, Regulators, Relays, Spark Gaps, Standards, Switches, Testers, Transformers

Advertisment

Specialists in the design, manufacture and testing of High Voltage Power Supplies and insulation testers.

Custom units at standard prices are our specialty.

Voltage rating range from 1 KV to 1000 KV and powers up to 1 Megawatt. Our dividers have accuracies to 0.001% and are certified traceable to N B S.

Contact Harry Tekel for immediate quotations. 212-245-2727

MEGURO ELECTRONIC INSTR. CO., 5-1 2-Chome Chu-Cho Meguro-ku, Tokyo, Japan, Tel: Tokyo 715-1211, TWX: 2468208 MEGURO J; Empl.: 230

Products manufactured: Calibrators, Generators, Meters, Oscillators, Oscilloscopes

MEKO INSTRUMENT CO., 1311 Air Way, Glendale, Cal., 91201, Tel: 213-240-4664; Empl.: 10

Customer service: M. F. Gonsalues

Free literature available: Electrical and mechanical specification catalogue.

Products manufactured: Counters, Meters, Relays

Local Sales Offices & Reps.

Cal	Encino, Porter Co.	213-788-2350
Cal	Mountain View, Weseloh & Assoc.	415-961-0565
Cal	Palos Verdes Peninsula, R. Carretta Co.	213-375-6648
Colo	Denver, Parker-Webster Co.	303-770-1972
Fla	Orlando, Geartner Assocs.	813-393-2974
Ga	Marietta, K & E Assocs.	404-427-0241
Haw	Honolulu, Aloha Assocs.	808-941-1574
Md	New Carrollton, W. A. Brown	703-836-1800
Mass	Millis, Selmark Assoc. Inc.	617-376-2914
NJ	Fort Lee, B. Cameron Assocs.	201-461-2595
NY	Burnt Hills, K. D. Corsetti	518-399-9200
Ohio	Cleveland, E. E. Bock & Assocs.	216-331-5212
Ohio	Dayton, BEK Assocs.	513-278-1343
Tex	Garland, G. V. Peck Co.	214-341-8311
Tex	Houston, G. V. Peck Co.	713-664-1435
Va	Alexandria, W. A. Brown	703-836-1800

Directory of Local Distributors Starts on page 401

Wash	Seattle, W. Spaulding Co.	206-282-9173
WVa	Charleston, W. A. Brown	304-342-2700
FOR:	Can., H8R 3H9, Quebec, Electrodesign Ltd.	514-363-5120

MELCOR-MATERIALS ELCTRN. PRODS., 990 Spruce St., Trenton, N.J., 08638, Tel: 609-393-4178, Telex: 84-3314; FSC No: 32333; Empl.: 36; Minimum order: $25

Customer service: M. A. Levine

Free literature available: 1. General catalog containing specifications, ratings and prices of all standard single stage heat pumps 2. Folder containing specifications and ratings of frigichip miniaturized heat pumps.

Products manufactured: Cooling/Heating Modules, Thermoelectric

Local Sales Offices & Reps.

Ill	Skokie, Spartan Engrg. Co.	312-674-2950

Advertisment

Creators of the Solderable Ceramic Thermoelectric Cooling Module and the "Frigichip" Miniaturized Module. Applications in Electro-optical Systems (Infrared Detectors, Photomultiplier Tube Housings), Medical and Biomedical Apparatus and Instruments, Institutional Refrigeration, etc. Highest reliability and efficiency. Modules and Assemblies supplied in OEM quantities and prices.

MELOY LABORATORIES INC., Instrus. & Sys. Div., 6715 Electronic Dr., Springfield, Va., 22151, Tel: 703-354-2600, Telex: 899-440; Empl.: 475; Minimum order: $10

Customer service: Mktg. Ext. 311-313

Products manufactured: Alarms, Analyzers, Calibrators, Controls/Control Eqpt., Converters, Counters, Generators, Multipliers, Oscillators, Sensors, Light, Standards, Timers, Tuning Forks

Local Sales Offices & Reps.

Cal	Los Altos, Collins & Hyde	415-941-3355
Mass	Hingham, Meloy Labs Inc.	617-749-4842
Mo	Kansas City, Nevco, Inc.	816-421-1751
NC	Wake Forest, Meloy Labs	919-556-1345

MELTRONICS INC., Route #3 Box 225, Leeds, Ala., 35094, Tel: 205-699-2186; Empl.: 20

Customer service: J. Miele

Products manufactured: Actuators, Antenna Rotators, Brakes, Clutches, Controls/Control Eqpt., Gears & Gear Mechanisms (Precision), Motors, Reducers, Solenoids

MEMCOR DIV. E-SYSTEMS, See E-Systems, Memcor Div.

MEMODYNE CORP., 369 Elliot St., Newton Upper Falls, Ma., 02164, Tel: 617-527-6600, Telex: 922537; Empl.: 14; Minimum order: $25

For info on price: K. Corbett; Application info: J. Pastoriza; Customer service: M. Furey; Delivery info: K. Corbett

Free literature available: Incremental Recorder Handbook; Data Sheets on all products; Short Form Catalog.

Products manufactured: Data Loggers, Recorders, Terminal Equipment, Digital

Local Sales Offices & Reps.

Ala	Huntsville, Currie, Peak & Frazier	205-536-5650
Ariz	Glendale, ED Assocs.	602-247-5818
Cal	Los Altos, H-R Assocs.	415-941-4080
Cal	Los Angeles, Cain Technology	213-476-2251
Colo	Westminster, Harvey Data Sys.	303-427-5299
Fla	Orlando, Currie, Peak & Frazier	305-855-0843
Haw	Honolulu, Hawaii Data Sys.	808-946-1533
Ill	Chicago, Elctrn. Instr. Assoc.	312-271-3774
Ind	Indianapolis, Elctrn. Instr. Assoc.	317-257-7231
Mass	Holbrook, McLellan Assocs.	617-767-4771
Mich	Detroit, Electro Sls. Assocs.	313-526-8800
NJ	Wayne, G. & A. Sls.	201-256-8500
NM	Albuquerque, J & D Assocs.	505-255-2377
NY	Binghamton, Labtronics	607-748-0509
NY	Depew, Labtronics	716-685-4111
NY	Syracuse, Labtronics	315-454-9314
NY	Ulster Park, Labtronics	914-471-2806
NC	Greensboro, Currie, Peak & Frazier	919-273-3040
Ohio	Cleveland, Electro Sls. Assoc.	216-261-5440
Ohio	Dayton, Electro Sls. Assoc.	513-426-5551
Pa	Ambler, Wyncote Instrumentation	215-643-2440
Pa	Pittsburgh, Electro Sls. Assoc.	412-371-9449
Tex	Dallas, Bouco Sls. Assocs.	214-247-6708
Tex	Houston, Bouco Sls. Assocs.	713-661-9640
Va	Arlington, H. J. Heffernan Co.	703-522-6666
Wash	Seattle, Datacom Assocs.	206-285-2525
EXP:	Can., Laval, Que., Harvard Elctrn. Sls. Co.	514-681-1400

MEMOREX CORP., San Thomas at Central Expwy., Santa Clara, Cal., 95052, Tel: 408-987-1000; Empl.: 5300

Customer service: J. Pingree 408-987-3578

Free literature available: Brochures on: Computer peripheral equipment and media, audio/video tape for consumer & professional use, and word processing supplies.

Products manufactured: Comm. Systems, Disc Packs, Magnetic, Tapes, Recording, Magnetic (All Types)

Local Sales Offices & Reps.

Ala	Birmingham	205-870-4240
Cal	Los Angeles	213-380-4790
Colo	Denver	303-399-1943
Conn	Hartford	203-568-1370
Ga	Atlanta	404-321-0200
Ill	Oak Brook	312-325-8420
Mass	Waltham	617-890-0700
Mich	Southfield	313-354-0240
Minn	Minneapolis	612-835-6635
Mo	St. Louis	314-725-9687
NY	Buffalo	716-631-5410
NY	Long Island	212-541-7780
Ohio	Cincinnati	513-721-7120
Ore	Portland	503-228-9341
Pa	Bala Cynwyd	215-835-2190
Tex	Dallas	214-233-1031
Va	Richmond	804-288-3116
Wash	McLean	703-821-3300

MEPCO/ELECTRA, SUBSTRATE DIV., 10439 Roselle St., San Diego, Cal., 92121, Tel: 714-453-4733, TWX: 910-322-1134; Empl.: 50

Products manufactured: Substrates

Local Sales Offices & Reps.

Ala	Huntsville	205-534-7351
Cal	Los Angeles, N.A.P. Elctrn. Comps.	213-762-2118
Cal	North Hollywood	213-762-2118
Cal	San Diego	714-453-9250
Cal	Santa Clara, N.A.P. Elctrn. Comps.	408-249-1134
Colo	Denver	303-922-8434
Conn	Shelton, Comark Assoc.	203-929-4884
Fla	Fort Lauderdale	305-772-2840
Fla	Winter Park	305-678-2522
Ill	Elk Grove Village	312-593-8220
Ind	Indianapolis	317-257-6547
Kans	Olatha, BC Elctrns.	913-782-6696
Mass	Waltham	617-899-7100
Mich	Southfield	313-357-4288
Minn	Minneapolis, Siedare Assoc., Inc.	612-533-2294
Mo	Hazelwood, BC Elctrns.	314-731-1255
NJ	Montvale	201-391-3511
NY	Endicott, Tech-Mark, Inc.	607-748-7473
NY	Fairport, Tech-Mark, Inc.	716-223-1252
NY	Hempstead, Kahgan Sls. Corp.	516-538-2300
NY	Hicksville	516-931-6200
NY	Liverpool, Tech-Mark, Inc.	315-652-6229
NC	Raleigh, Candor Co., Inc.	919-787-2652
Pa	King of Prussia	215-265-4240
SC	Myrtle Beach, Candor Co., Inc.	803-448-5213
Tex	Dallas, N.A.P. Elctrn. Comps.	214-691-2141
Va	Richmond	703-282-6515
Wash	Bellevue, Western Tech. Sls.	206-454-3906

MEPCO/ELECTRA, INC., Columbia Rd., Morristown, N.J., 07960, Tel: 201-539-2000, TWX: 710-986-7473

Free literature available: MEPCO/ELECTRA PRODUCT GUIDE - illustrates and briefly describes our entire product line which includes: capacitors, electrolytic; film; ceramic and trimmers. Fixed Resistors, carbon film; metal film. Variable Resistors, cermet; carbon; wirewound.

Products manufactured: Capacitors, Fixed, Capacitors, Variable, Circuits, Hybrid, Thick Film, Cores, Ceramic, Networks, Potentiometers, Resistors, Substrates, Thermistors

Local Sales Offices & Reps.

Ala	Huntsville, North American Philips Elctrn. Comp. Corp.	205-534-7351
Ariz	Phoenix, N.A.P.E.C.C.	602-279-9588
Cal	North Hollywood, N.A.P.E.C.C.	213-762-2118
Cal	San Diego, N.A.P.E.C.C.	714-453-5440
Cal	Santa Clara, N.A.P.E.C.C.	408-249-1134
Colo	Denver, N.A.P.E.C.C.	303-922-8434
Conn	Shelton, Comark Assocs.	203-929-4884
Fla	Fort Lauderdale, N.A.P.E.C.C.	305-772-2840
Ill	Elk Grove Village, N.A.P.E.C.C.	312-593-8220
Ind	Indianapolis, N.A.P.E.C.C.	317-257-6547
Kans	Olathe, BC Elctrn. Sls.	913-782-6696
Mass	Waltham, N.A.P.E.C.C.	617-899-7100
Mich	Southfield, N.A.P.E.C.C.	313-357-4288
Minn	Minneapolis, Siedare Assocs.	612-533-2294
Mo	Hazelwood, BC Elctrn. Sls.	314-731-1255
NY	Endicott, Tech-Mark, Inc.	607-748-7473
NY	Fairport, Tech-Mark, Inc.	716-223-1252
NY	Hicksville, N.A.P.E.C.C.	516-931-6200
NY	Liverpool, Tech-Mark, Inc.	315-652-6229
NC	Raleigh, Candor Co.	919-787-2652
Ohio	Dayton, N.A.P.E.C.C.	513-278-7351
Pa	King of Prussia, N.A.P.E.C.C.	215-265-4240
SC	Myrtle Beach, Candor Co.	803-448-5213
Tenn	Chattanooga, Candor Co.	615-894-7454
Tex	Dallas, N.A.P.E.C.C.	214-691-2141
Va	Lynchburg, Candor Co.	804-846-6579
Va	Richmond, N.A.P.E.C.C.	804-282-6515
Wash	Bellevue, N.A.P.E.C.C.	206-746-3600

MERCER CONTROLS CORP., 96 Mercer St., New York, N.Y., 10012, Tel: 212-966-5815, Telex: 14-1484; Empl.: 15; Minimum order: $20

For info on price: D. Shaw; Application info: D. Shaw; Customer service: B. Kulack; Delivery info: Stock

Free literature available: Variable speed controls for permanent split capacitor, single phase AC induction motors to 1/4 HP. Speed range 20:1. Regulation - 1% load, 1% line.

Products manufactured: Controls/Control Eqpt.

Local Sales Offices & Reps.

Conn	Torrington, Motoreps of New England	203-482-3193
Ill	River Forest, Allen/Sizer Assoc.	312-366-3324
Mich	Detroit, C.H. Alexander Assocs.	313-535-4714
Minn	Minnetonka, T. H. Ayres Assoc. Inc.	612-474-4125
Miss	St. Louis, Delltron Co.	314-434-3804
NJ	Red Bank, Motoreps of New York	201-741-3356
NY	New York, Mercer Controls	212-966-5815
Ohio	Dayton, Electrical Syst. Co.	513-434-9822
Tex	Houston, Southland Engrg. & Sls.	713-782-4575
Va	Bellevue, Pacific Consultants	206-454-2503
Wisc	Wauwatosa, Larson Assocs.	414-258-0529

MERCURY ELECTRONICS CORP., 339 E Cottage Place, York, Pa., 17403, Tel: 717-854-9557; Empl.: 35

Customer service: C. R. Bruns 717-854-9557

Free literature available: Brochure

Products manufactured: Cable Assemblies & Harnesses

Local Sales Offices & Reps.

Pa	West Chester, S. E. Balint	

MERET INC., 1815 24th St., Santa Monica, Cal., 90404, Tel: 213-828-7496, Telex: 65-2468; Empl.: 12; Minimum order: $50

For info on price: M. B. Prince; Application info: D. B. Medued; Customer service: M. B. Prince; Delivery info: M. B. Prince

Free literature available: Hybrid Optoelectronic Modules - includes light sources with driving circuitry, defector packages with amplifiers, and total systems including fiber optic cables.

Products manufactured: Amplifiers, Circuits, Hybrid, Thin-Film, Comm. Systems, Detectors, Diodes, Lasers & Laser Systems, Sensors, Light, Transceivers, Transmission Systems, Data

MERIAM INC., Box 2134, Hammond, Ind., 46323, Tel: 219-980-1909, Telex: 72-5449; Empl.: 4; Minimum order: $100

For info on price: A. Jones 219-980-1909; Application info: E. Cronch 219-980-1909; Customer service: Miss Marlini; Delivery info: Miss Marlini 219-980-3566

Products manufactured: Punched Card Equipment

MERIX CHEM. CO., 2234 East 75th St., Chicago, Ill., 60649, Tel: 312-221-8242; Empl.: 15; Minimum order: $25

For info on price: J. Parus; Application info: E. O. Sonneman; Customer service: R. Newman; Delivery info: R. Newman

Products manufactured: Cleaners & Solvents, Coatings, Conductive Plastic Materials, Fabrics, Conductive, Lubricants, Phonographs, Parts & Accessories, Plastic Raw Materials, Liquids, Pellets, Powders, Resins

MERRIMAC INDS., INC., 41 Fairfield Pl., West Caldwell, N.J., 07006, Tel: 201-228-3890, TWX: 710-734-4314; Empl.: 110

Customer service: F. J. Weber

Products manufactured: Attenuators, Circulators, Ferrite, Comparators, Couplers, Dividers, Isolators, Junctions, Hybrid, Microwave, Limiters, Mismatches, Microwave, Precision, Mixer-Preamplifiers, Microwave, Mixers, Modulators, All Kinds, Networks, Shifters, Strip-Line Components, Microwave, Terminals

Local Sales Offices & Reps.

Ala	Huntsville, Beacon Elctrns.	205-881-5031
Cal	Orange, J.E. Hachten Co.	714-998-6020
Cal	Palo Alto, J.E. Hachten Co.	415-326-1252
Colo	Boulder, Herb Bass Assoc.	303-499-7509
Va	Alexandria, Vanguard Engrg.	703-768-1660
Wash	Seattle, Jon B. Jolly	206-938-4166

MERRIMACK MAGNETICS, 361 Aiken St., Lowell, Mass., 01850, Tel: 617-458-1487; Empl.: 200

Customer service: R. Ross

Products manufactured: Transformers

Local Sales Offices & Reps.

Ariz	Phoenix, J. S. Heaton Co.	602-264-7887
Cal	Menlo Pk., J.S. Heaton Co., Inc.	415-369-4671
Conn	No. Haven, Comp. Rep.	203-239-9762
FOR:	Can., Cooksville, Ont., Anbak Sls., Ltd.	416-625-1061

MET-L-WOOD CORP., 6755 65th St., Chicago, Ill., 60638, Tel: 312-585-7575, Telex: 25-6106; Empl.: 110

For info on price: C. B. Correnti; Application info: C. B. Correnti; Customer service: V. Lutze; Delivery info: V. Lutze

Free literature available: General Brochure - general product info; Bulletin 661 - Cabinetry panels.

Products manufactured: Cabinets & Accessories, Honeycomb Sheets, Panels, etc., Laminates

Local Sales Offices & Reps.

Cal	San Jose, H.J. Carlson	408-226-9049
Fla	Largo, Dow Assocs.	813-595-9195
Ill	Chicago, R.R. Clemens	312-585-7575
Ill	Chicago, T.J. Neirinckx	312-585-7575
NJ	No. Haledon, J.P. Gagliano	201-427-5133
Ohio	Columbus, G.V. Pagorek	614-891-6856
Pa	Media, V.J. Higgins	215-566-9188

METAL BELLOWS CORP., 1075 Providence Hwy., Sharon, Mass., 02067, Tel: 617-668-3050; Empl.: 300

For info on price: S. Jackson; Application info: S. Jackson; Customer service: E. Mendeloff; Delivery info: S. Jackson

Products manufactured: Actuators, Braid, Cable, Couplings, Feedthrus & Seals, Environmental, Pumps, Vacuum, Seals, Shields

Local Sales Offices & Reps.

Cal	Chatsworth, Metal Bellows Co.	213-341-4900
Mo	Hazelwood, Strother & Assoc.	314-521-5100
NJ	Colt's Neck, J. L. Reddan	201-462-4624
Ohio	Port Clinton, W. C. Johnson	419-625-0943
Tex	Duncanville, J. Stephens	214-298-6994
FOR:	Can., Burnaby, B.C., Philip French Sls.	604-437-0312
FOR:	Can., Mississauga, Ont., Philip French Sls.	416-678-9261
FOR:	Can., Dorval 760, Que., Philip French Sls. Ltd.	514-636-1484

METALIZED CERAMICS, Huntington Industrial Pk., Providence, R.I., 02907, Tel: 401-943-2200; Empl.: 600

For info on price: J. T. Feeley; Application info: F. C. Rydwansky, Jr.; Customer service: R. Halpert; Delivery info: J. T. Feeley

Free literature available: Tech Data Sheets - Packages; Tech Data Sheets - Microwave & Opto Diode Housings; Design Guidelines - Multilayer Ceramics; Design Guidelines - Screened Dielectrics; Hybrid Package Design & Applications.

Products manufactured: Packages, Integrated Circuit, Services, Assembly, Production & Test, Substrates

Local Sales Offices & Reps.

Cal	Cupertino, Metalized Ceramics Corp.	408-996-1350
Tex	Richardson, Metalized Ceramics Corp.	214-238-0505

METALPHOTO CORP., 18531 South Miles Rd., Cleveland, Ohio, 44128, Tel: 216-475-0555; Empl.: 50

Customer service: M. Hizak

Free literature available: Metalphoto&R products, processes and applications.

Products manufactured: Labels, Pressure-Sensitive, Adhesive, Machines/Machinery, Production, Nameplates

METAVAC, INC., 45-68 162nd St., Flushing, N.Y., 11358, Tel: 212-HI5-0400; Empl.: 40; Minimum order: $100

Customer service: S.D. Feiman

Free literature available: O-1 list capabilities to supply thin film coatings and components for optical applications. E-1 catalog list resistors, attenuators and conductive coatings.

Products manufactured: Attenuators, Coatings, Films, Filters, Lenses, Optical & Camera, Lenses, Readout & Display, Resistors, Services, Assembly, Production & Test, Strip-Line Components, Microwave, Terminals

METEX CORP., 970 New Durham Rd., Edison, N.J., 08817, Tel: 201-287-0800, TWX: 710-998-0578; Empl.: 240

Products manufactured: Adhesives (All Types), Air Cleaners & Filters (Shielded & Unshielded), Bezels, Shielded & Unshielded, Braid, Cable, Coatings, Conductive Plastic Materials, Contact Strips, Finger, Contacts, Electrical, Gaskets, Shielding, R-F-Also See Shields, R-F, Honeycomb Sheets, Panels, etc., Kits, Shielding, Rubber, Shields, Wire, Wire Shielding

Local Sales Offices & Reps.

Ariz	Scottsdale, Inter-Mountain Engrg.	602-947-7379
Cal	Los Altos, Frauman Assocs.	415-941-0660
Cal	Los Angeles, Universal Comps.	213-641-4225
Colo	Denver, Walter Engrg.	303-777-5585
Conn	, Conners & Mann	617-769-2570
Fla	, Semtronic Assoc. Inc.	305-831-8233
Ga	Smyrna, B.C. Elctrn. Sls. Co.	404-436-5169
Ill	Chicago, R.M. Krueger Co.	312-282-8444
Mass	Westwood, Connors & Mann	617-769-2570
Minn	St. Paul, R.G. Ragon, Inc.	612-488-0201
Mo	St. Charles, Cairns & Hayes Elctrn. Sls.	314-946-6677
NY	Great Neck, Trionic Assocs.	212-762-4320
NY	Syracuse, C.W. Floring & Assocs.	315-478-2149
Ohio	Dayton, Jay Engrg. Co.	513-253-2151
Pa	Media, Snyder & Massey Assocs.	215-566-5400
Tex	Richardson, P.J. Scanlon Co.	214-231-4661
Va	Fairfax, Snyder & Massey Assocs.	703-273-1413
Wash	Seattle, Jon B. Jolly, Inc.	206-938-4166

METHODE ELCTRNS., INC., 7447 W. Wilson Ave., Chicago, Ill., 60656, Tel: 312-867-9600, TWX: 910-221-2468; Empl.: 900

For info on price: D. Mason; Application info: J. Klimek; Customer service: I. Lubor; Delivery info: I. Lubor

Products manufactured: Backpanel Interconnect Systems, Bars, Shorting, Boards, Plug-In, Boards, Printed Circuit, Boards, Printed Wiring, Universal, Bus Bars & Systems, Cable Assemblies & Harnesses, Cable, Chemicals, Circuits, Flexible, Circuits, Printed, Multilayer, Connector Blocks, Mother Board, Connectors, Contact Strips, Finger, Contacts, Electrical, Guides, Circuit Board, Headers, Inks For Thick Film Microcircuits, Jack Adapters (All Types), Jacks (All Types), Panels, Plugs, Services, Assembly, Production & Test, Shields, Socket Adapters, Sockets, Switches, Terminal Blocks, Boards & Strips, Terminals

Local Sales Offices & Reps.

Ariz	Scottsdale, F. Board Assocs.	602-994-9388
Cal	Burlingame, W. J. Purdy Co.	415-347-7701
Cal	El Segundo, Varigon Assocs.	213-679-0621
Fla	Winter Pk., Young & Lawrence	305-647-6929
Ill	Chicago, J. Howe	312-867-9600
Ind	Indianapolis, Schroeder & Loomis	317-251-4571
Ky	Fort Mitchell, G. W. Thelen Co.	606-341-8181
Mass	Needham, Massa & Maguire	617-329-0354
Mich	Dearborn, VPI	313-271-4600
Minn	St. Paul, R. G. Ragon	612-488-0201
Mo	Hazelwood, Dy-Tronix	314-731-5799
NJ	Haddonfield, T. A. I.	609-854-3011
NJ	Mountain Lakes, Components for Elctrns.	201-334-2921
NY	Pompey, S. F. Foster Co.	315-677-3333
SC	Myrtle Beach, Candor Co.	803-448-5213
Tex	Dallas, McKinney Sls. Co.	214-631-9450
Wash	Bellevue, Ray Over Sls. Co.	206-454-9187

METHODS RESEARCH CORP., 34 Asbury Ave., Farmingdale, N.J., 07727

METRA INSTRUMENTS, INC., 1161 San Antonio Rd., Mt. View, Cal., 94043, Tel: 415-961-7249; Empl.: 22

For info on price: F. Fitting; Application info: F. Fitting; Customer service: D. Marquez; Delivery info: P. Andrews

Products manufactured: Alarms, Annunciators, Data Acquisition & Reduction Systems, Display Devices/Displays, Monitors, Multiplexers, Printers, Scanners

Local Sales Offices & Reps.

Cal	San Francisco, Technical Sls. Dev.	415-346-1655
Cal	Sante Fe Springs, D.A. Matthews/Assocs.	213-693-5432
Fla	Port St. Lucie, Techl. Svcs. Assocs.	305-334-5266
Ill	Chicago, Liz Indl. Sls. Co.	312-943-5122
Md	Fulton, Gans-Fryling	301-837-6311
Mass	Newton Centre, Daner-Hayes	617-969-4650
Mass	Peabody, JSR Assocs.	617-532-0348
Mich	Detroit, Electro Sls. Assocs.	313-526-8800
NJ	S. Orange, Daner-Hayes	201-763-1771
NY	Port Washington, Daner-Hayes	516-883-4576
NY	Rochester, Daner-Hayes	716-467-5100
NC	Matthews, W.K. Hile Co.	704-847-9125
Ohio	Cincinnati, A. Parker, Jr.	513-563-1843
Ohio	Cleveland, Electro Sls. Assocs.	216-261-5440
Okla	Tulsa, Pan Tech. Engrg. Co.	918-747-2494
Ore	Portland, Brett Assocs.	503-232-4184
Pa	Audubon, Daner-Hayes	215-666-5755
Pa	Pittsburgh, Electro Sls. Assocs.	412-371-9449
Tenn	Knoxville, W.K. Hile	615-690-1061
Tex	Arlington, Pan Tech Engrg.	817-261-4111
Tex	Houston, Pan Tech Engrg.	713-623-0640
Va	Arlington, Gans-Fryling	703-527-3262
Wash	Seattle, Brett Assocs.	206-935-8054
FOR:	Can., Calgary, Alberta, Cantech Controls, Ltd.	403-252-8151
FOR:	Can., Edmonton, Alberta, Cantech Controls, Ltd.	403-425-9810
FOR:	Can., Halifax, Nova Scotia, Cantech Controls, Ltd.	902-429-9103
FOR:	Can., St. Laurent, Que., Cantech Controls, Ltd.	514-636-8364
FOR:	Can., Vancouver, B. C., Cantech Controls, Ltd.	604-736-2851
FOR:	Can., Scarborough, Ont., Cantech Controls, Ltd.	416-438-6907

METRIC ENGRG., Div. Oven Ind's., Box 290, Mechanicsburg, Pa., 17055, Tel: 717-766-0741; Empl.: 30; Minimum order: $20

For info on price: T. M. Nolan; Application info: R. E. Eckert; Customer service: T. M. Nolan; Delivery info: T. M. Nolan

Products manufactured: Regulators

Local Sales Offices & Reps.

Ala	Huntsville, Reynolds & Assocs.	205-536-1941
Ariz	Scottsdale, S.C. Blaker Co.	602-948-3061
Cal	Encino, El-Tec, Inc.	213-981-9881
Cal	San Carlos, Westronics Assoc.	415-592-1417
Fla	Melbourne, Reynolds & Assoc.	305-727-3205
Ga	Atlanta, Reynolds & Assocs.	404-252-5360
Ill	Skokie, Saffro & Assocs.	312-588-0905
La	Baton Rouge, Covington Instr. Co.	504-924-1784
Mass	Reading, Geder & Rotundi	617-944-3105
Minn	Minneapolis, C. E. Bohlig Co.	612-922-7011
Mo	St. Peters, K.M. & B. Tech. Sls.	314-278-3159
NY	Huntington, Andrews & Andrews, Inc.	516-692-8686
NY	Syracuse, Mike Antil	315-463-0266
NC	Greensboro, Reynolds & Assocs.	919-275-3725
Ohio	Medina, McShane	216-725-4568
Pa	Ambler, W&M Assocs.	215-643-4119
Tex	Dallas, Bouco Sales Assocs.	214-247-6708
Va	Falls Church, Beacon Elctrn. Assoc.	703-534-1673
EXP:	Lemoyne, Pa., Elctrn. International	717-737-8858
FOR:	Can., Ajax, Ont., R. D. Assocs.	416-294-6796

METRIC SYSTEMS CORP., 736 N. Beal St., Ft. Walton Beach, Fla., 32548, Tel: 904-242-2111; Empl.: 135; Minimum order: $50

For info on price: Mktg. Dept.; Application info: Mr. Henne; Customer service: D. Evans

Products manufactured: Analyzers, Annunciators, Antenna Towers & Supports, Boards, Printed Circuit, Calibrators, Cards, Linear Function, Cards, Logic, Comm. Systems, Computers, Converters, Data Acquisition & Reduction Systems, Flashers, Generators, Indicators, Monitors, Receivers, Recorders, Simulators, Tape Search Equipment, Terminal Equipment, Digital, Timers, Tracking Systems, Translators, Data

Local Sales Offices & Reps.

Fla	Orlando, Datarep Inc.	305-843-5224

METRIX INSTRUMENT CO., Box 36501, Houston, Tex., 77036, Tel: 713-668-2386; Empl.: 26

Customer service: H. W. Kinne

Free literature available: 1975 Vibration Catalog – Vibration Inst'n. Bulletin DW-103 – DATAWATCH® Alarm Monitors and Signal Transmitters.

Products manufactured: Accelerometers, Alarms, Amplifiers, Analyzers, Converters, Indicators, Meters, Monitors, Switches, Testers, Transducers

Local Sales Offices & Reps.

Ala	Birmingham, Lewis M. Crowe Co	205-629-5475
Ariz	Phoenix, Roy E. Coulson Co.	602-947-8331
Cal	Encino, Arens Inds.	212-986-5560
Cal	San Francisco, Technical Sls. Div.	415-346-1655
Conn	Newton, Daner-Hayes	203-426-9094
DC	Washington, Wright Co	202-296-0979
Fla	St. Petersburg, Lewis M. Crowe Co	813-894-0249
Ill	Chicago, Martec Assocs.	312-956-8090
La	Baton Rouge, Carter Elctrns.	504-272-3175
Md	Gaithersburg, Wright Co	202-296-0979
Mass	Newton Centre, Daner-Hayes	617-969-4650
Mich	Detroit, Basic Service Corp.	313-837-8820
NJ	Englewood, Tridon Sls. Co.	201-569-8011
NY	NYC, Tridon Sls Co	201-569-8011
Ohio	Englewood, Gemini, Inc.	513-890-5394
Ohio	N. Canton, M. S. Jacobs	216-494-5480
Okla	Tulsa, Quigg Equip.	918-587-0166
Pa	Philadelphia, Control Equip.	215-676-1460
Pa	Pittsburgh, M.S. Jacobs & Assoc.	412-923-2090
Tenn	Knoxville, Lewis M. Crowe Co	615-693-4226
Tex	Lubbock, Killian Inds.	806-792-8768
WVa	Charleston, M. S. Jacobs & Assoc.	304-343-8905

METROLOGIC INSTRUMENTS, INC., 143 Harding Ave., Bellmawr, N.J., 08030, Tel: 609-933-0100; Empl.: 51

For info on price: S. Decicco; Application info: G. Punis; Delivery info: S. Decicco

Free literature available: Catalog describes the company's line of HE-NE lasers, education laboratories, holography systems, optical benches and accessories.

Products manufactured: Lasers & Laser Systems, Meters, Monitors, Power Supplies, Radiometers, Substrates, Tubes

METROPOLITAN CIRCUITS INC., 1261 Logan, Costa Mesa, Cal, 92626, Tel: 714-549-2204; Empl.: 400

Customer service: R. Florez

Products manufactured: Boards, Printed Circuit, Circuits, Printed, Multilayer

METROPOLITAN WIRE CORP., Industrial Div., Washington & George, Wilkes-Barre, Pa., 18705, Tel: 717-825-2741

Customer service: Cust. Svc.

Free literature available: 1M175 Applications brochure - Super Erecta shelf mobile & stationary materials handling equipment PCB-773 Data Sheet - printed circuit board baskets MC-873 Data Sheet - meter carriers.

Products manufactured: Carts & Dollies, Instrument & Equipment, Containers, Holder & Carriers, Holders, Circuit Board (Production Type), Racks

METROSONICS, INC., Box 18090, Rochester, N.Y., 14618, Tel: 716-442-0760; Empl.: 20

Free literature available: db-201 General Purpose Sound Level Meters db-400 Sound Level Recorders db-501 Octane Band Analyzers db-600 Sound Level Analyzers

Products manufactured: Analyzers, Calibrators, Meters, Microphones, All Kinds, Recorders

Local Sales Offices & Reps.

Ala	Huntsville, BCS Assocs.	205-881-6220
Conn	Hamden, Northeast Engr.	203-248-4481
Fla	Orlando, BCS Assocs.	305-896-4881
Ind	Indianapolis, Tri-State Tech. Sls.	317-924-3568
Mass	Danvers, Northeast Engrg.	617-774-3010
Mich	Detroit, Electro Sls. Assocs.	313-526-8800
Mo	St. Louis, Adelphi Inc.	314-821-1232
NY	Dewitt, db Assocs.	315-446-0220
NC	Greensboro, BCS Assocs.	919-273-1918
Ohio	Cleveland, Electro Sls. Assocs.	216-261-5440
Ohio	Dayton, Electrosales Assocs.	513-426-5551
Pa	King of Prussia, Valley Instr.	215-265-1020
Pa	Pittsburgh, Electro Sls. Assocs.	412-371-9449

METROSONICS, INC. cont'd

Advertisment

Specialists in sound measurement instrumentation. Designers and manufacturers of acoustical equipment including miniature general purpose sound level meters and sophisticated recording and analysis products. Complete system design capability for industrial and environmental applications including interfacing transducers, computers, etc.

MEYERCORD CO., 365 E. North Ave., Carol Stream, Wheaton, Ill., 60187, Tel: 312-682-6200, Telex: 72-2449; Empl.: 683; Minimum order: $25

For info on price: A.M. Batchen 312-682-6226; Application info: R.A. Jando 312-682-6228; Customer service: R.G. Kline 312-682-6351; Delivery info: E. Prochaska 312-682-6316

Products manufactured: Delcalcomania, Labels, Pressure-Sensitive, Adhesive, Nameplates

Local Sales Offices & Reps.

Cal	Fremont	415-794-6522
Cal	Los Angeles	213-723-8661
Ga	Atlanta	404-237-3422
Kans	Leawood	913-648-3480
Mass	Fayville	617-879-0447
Mich	Detroit	313-538-5819
Mich	Grand Rapids	616-451-3773
Minn	Brooklyn Center	612-566-3380
Mo	St. Louis	314-965-0857
NY	Mamaroneck	914-698-0710
Ohio	Chesterland	216-729-4644
Ore	Portland	503-244-3144
Pa	Abington	215-885-2820
Tex	Houston	713-528-0962
Tex	Winnsboro	214-342-6307
Wisc	Milwaukee	414-272-8294

MFE CORPORATION, Keewaydin Dr., Salem, N.H., 03079, Tel: 603-893-1921, TWX: 710-366-1887; Empl.: 224 .... p. 1•179-181,876-879,1016

Products manufactured: Heads, Recording Playback, Erase, Monitors, Motors, Paper, Graphic Recording, Printers, Recorders, Scanners, Tapes, Recording, Magnetic (All Types)

Local Sales Offices & Reps.

Ala	Huntsville, Lee Assocs.	205-533-5896
Ariz	Phoenix, Moxon Elctrns.	602-273-7363
Cal	Goleta, Thorson Co.	805-964-8751
Cal	Irvine, Moxon Elctrns.	714-556-6500
Cal	Los Angeles, Thorson Co.	213-937-0790
Cal	Mt. View, Thorson Co.	415-964-9300
Cal	San Diego, Mokon Elctrns.	714-292-4820
Cal	Santa Clara, Moxon Elctrns.	408-249-2491
Cal	Tustin, Thorson Co.	714-544-5121
Colo	Denver, Thorson Co.	303-759-0809
Fla	Ft. Lauderdale, Lee Assocs.	305-525-9767
Fla	Winter Haven, Lee Assocs.	813-294-5815
Ga	Chamblee, Lee Assocs.	404-457-7117
Haw	Honolulu, Industrial Elctrns., Inc.	808-533-6095
Ill	Elk Grove Village, L.F. Green Assocs.	312-593-0282
Ind	Indianapolis, L.F. Green Assocs.	317-293-9827
Md	Anapolis, Bartek	301-261-2987
Md	Silver Spring, Gawler Knoop Co.	301-589-4406
Mass	Natick, Andruss-Peskin Co.	617-653-3919
Mich	Royal Oak, Group Ten	313-549-3910
Minn	Minneapolis, L.F. Green & Assocs.	612-781-1611
NJ	Kinnelon, Science Supply Corp.	201-838-8746
NJ	N. Plainfield, Brady Co.	201-753-7988
NM	Albuquerque, Shefler-Kahn Co.	505-265-7077
NY	Buffalo, H.C. Johnson Agencies, Inc.	716-632-7880
NY	Fayettvile, H.C. Johnson Agencies, Inc.	315-637-9383
NY	Great Neck, Science Supply Corp.	516-487-1173
NY	Rochester, H.C. Johnson Agencies, Inc.	716-482-3000
NC	Raleigh, Lee Assocs.	919-787-5818
Ohio	Cleveland, Group Ten	216-486-2800
Ohio	Dayton, Group Ten	513-277-6531
Pa	Glenshaw, H.C. Johnson Agencies, Inc.	412-961-0414
Pa	Philadelphia, V.S. Malta Co.	215-836-5122
Tex	Dallas, Thorson Co.	214-233-5744
Tex	Houston, Thorson Co.	713-771-3504
Va	Norfolk, Scientific Devices/E-Tech	804-499-8133
Wash	Bellevue, Thorson Co.	206-455-9180

MF ELECTRONICS CORP., 118 E. 25th St., New York, N.Y., 10010, Tel: 212-674-5360, TWX: 710-581-4109 p. 1•384-387

Products manufactured: Oscillators

Local Sales Offices & Reps.

Cal	North Hollywood, B.J. Wolfe Entprs.	213-877-5518
Conn	Meriden, Abbott-Allison Co.	203-237-9232
NY	Huntington, C.R. Mayer Co.	516-921-7876

M.I.A.L. U.S.A., INC., 165 Franklin Ave., Nutley, N.J., 07110, Tel: 201-667-1600, TWX: 710-989-1443; Empl.: 10; Minimum order: $35

For info on price: J. W. Yuhas; Application info: J. W. Yuhas; Customer service: R. Birtwistle; Delivery info: R. Birtwistle

Free literature available: MIAL U.S.A. offers Ceramic disc capacitors, all styles of Polystyrene capacitors both general purpose and professional, solid Tantalum capacitors (dipped style) and Metal Film resistors.

Products manufactured: Capacitors, Fixed, Resistors

Local Sales Offices & Reps.

Cal	Walnut Creek, MacPherson Sls.	415-937-1482
Cal	Woodland Hills, Interstate Mktg. Assocs.	213-883-7606
Colo	Golden, J.F. Hurlbut	303-279-7138
Ill	Rolling Meadows, Lightner	312-398-3000
Mich	Detroit, R.S. Lohmann Co.	313-474-6144
Minn	Minneapolis, C.R. Gibb Co.	612-377-1200
NJ	Nutley, Falk-Baker Assocs.	201-661-2431
NY	Pompey, S.F. Foster	315-667-3333
NC	Raleigh, A.B. Andrews & Co.	919-833-5565
Pa	Oreland, Brown-Oberlies	215-887-1325
Tex	Addison, Parvin Sls. Co.	214-239-9148

MI2 DATA SYSTEMS INC., Design Elements Div., 930 Kinnear Rd., Columbus, Ohio, 43212, Tel: 614-481-8881; Empl.: 110

For info on price: G. Gerhard; Application info: G. Gerhard; Customer service: D. Buelow; Delivery info: G. Gerhard

Free literature available: Product Data Sheets on acoustic couplers, direct access data sets, and other data transmission equipment cover features and specifications of each device. Product catalog giving a capsule review of all MI2 data systems products.

Products manufactured: Comm. Systems, Converters, Couplers, Data Compressors, Digital, Modulator/Demodulators, Multiplexers, Printers, Recorders, Teleprinters, Terminal Equipment, Digital, Terminals, Data Display (including Alphanumeric & Graphic)

Local Sales Offices & Reps.

Ga	Atlanta, R. Geiger	404-455-1830
Ohio	Cincinnati, L. Sherman	513-531-2729
Pa	Berwyn, L. Phelan	215-647-0797

MICA CORPORATION, 10900 Washington Blvd., Culver City, Calif., 90230, Tel: 213-559-4223, TWX: 910-340-6365; FSC No: 06216; QPL No: Multiple; Empl.: 300; Minimum order: $100

For info on price: W. Kennedy; Application info: P. Benke; Customer service: G. Rogers; Delivery info: G. Rogers

Free literature available: Epoxy Glass and Polyimide Glass Laminates, Ohmega Resistor-Conductor Laminate, Conductor Metalized Substrates for Hybrid Circuitry, Micapak Lamination Service, Hybrid Circuitry and Thin Copper Claddings.

Products manufactured: Circuits, Hybrid, Thick Film, Circuits, Hybrid, Thin-Film, Circuits, Printed, Multilayer, Laminates

Local Sales Offices & Reps.

Cal	Mountain View, West Mark Assocs.	415-969-1700
Fla	Orlando, R. F. Carlson Co.	305-422-3996
Md	Lutherville, Nationwide Circuit Prods.	301-296-0009
NH	Amherst, Nationwide Circuit Prods.	603-889-2122
NJ	Cedar Grove, Nationwide Circuit Prods.	201-857-1333
NY	Utica, Nationwide Circuit Prods.	315-735-7686
Tex	Dallas, Stevens Sls.	214-350-2476
Wash	Seattle, R Johnston Co.	206-524-5170

MICHIGAN MAGNETICS, 203 W. Third St., Vermontville, Mich, 49096, Tel: 517-726-0590; Empl.: 95; Minimum order: $15

For info on price: B. L. Killinger; Application info: M. Fox; Customer service: B. Killinger; Delivery info: B. Killinger

Products manufactured: Heads, Recording Playback, Erase

Local Sales Offices & Reps.

Cal	Burlingame, J. Logan Assoc.	415-697-6100
Cal	Los Angeles, C. L. Repp Co.	213-820-1715
Conn	Kensington, N. Stachelek	203-223-6423
Ill	Chicago, J. Twist	
Minn	St. Paul, Countryman	612-645-9151
NY	Great Neck, R. Breuer	516-466-3030
EXP:	New York, Singer Products	212-432-1400

MICONICS INDUSTRIES INC., 135 Ailene Way, Syosset, N.Y., 11701

MICRITE METAL MFG., INC., 21531 Strathern St., Canoga Park, Cal., 91304, Tel: 213-348-1610; Empl.: 16 p. 2•1236-1239

Products manufactured: Boxes, Junction, Outlets & Wall Plates, Cabinets & Accessories, Cans, Capacitor, Relay, Semiconductor, Transformer, etc, Cases, Equipment, Instrument, Meter, Chassis, Metal, Containers, Cups, Encapsulation, Horns, Microwave, Metal Oxides, Services, Assembly, Production & Test, Shields

Local Sales Offices & Reps.

Ariz	Phoenix, Dorton Entprs.	602-263-0414
Cal	Fountain Valley, Stangenberg & Assoc.	714-968-5049
Cal	Santa Clara, King & Assocs.	408-240-1022
Ill	Parkridge, Central States Assocs.	312-692-2101
Mass	Woburn, Jalco Assocs.	617-227-1515
Mo	Kansas City, Burke Sls. Co.	816-842-5511

MICRO-CIRCUITS CO., INC., Dept EEM I, New Buffalo, Mich., 49117, Tel: 616-469-2727 ..... p. 2•342,343

Free literature available: Catalog-Descriptions of our line of electrically conductive coatings. Ten basic ways to use electrically conductive coatings.

Products manufactured: Coatings, Inks For Thick Film Microcircuits, Paints, Shields

MICRO COMPONENTS CORP., 99 Bald Hill Rd., Cranston, RI, 02920, Tel: 401-737-3200, TWX: 710-381-1757; Empl.: 120

Customer service: E. Rasmanis

Products manufactured: Alarms, Amplifiers, Choppers, Circuits, Integrated, Silicon Monolithic, Unpackaged Chips, Converters, Diodes, Integrated Circuit Devices, Semiconductor Wafer Fabrication, Transistors

Local Sales Offices & Reps.

Cal	San Jose, Allgood-North	408-288-6731
Colo	Denver, Omega Ltd.	303-758-1508
Ill	Chicago, M & S Sls. Co.	312-992-1053
Mass	Westboro, Tech. Mktg. Serv. Co.	617-366-8462
Minn	Minneapolis, Siedare Assocs.	910-576-3171
Mo	Webster Groves, Boyce Assocs.	341-961-8235
NY	Plainview, Erde Assocs.	516-822-5357
Ohio	Cincinnati, R. Makin Assocs.	513-232-5588
Wash	Seattle, Blair-Hirsh Co.	206-783-3423

MICRO DEVICES CORP., Box 501 - Far Hill Sta., Dayton, Ohio, 45419; Empl.: 450

Products manufactured: Circuit Breakers, Controls/Control Eqpt., Current Sensors, Fuses, Indicators, Limiters, Monitors, Protectors, Thermocouples, Elements & Accessories, Thermostats

Local Sales Offices & Reps.

Ala	Decatur, Tenn-Tech Sls.	205-350-0630
Cal	Fremont, Hartfield, Kennan & Freytag	415-863-2200
Cal	Los Angeles, Hartfield, Kennan & Freytag	213-225-1318
Colo	Denver, Thorson Co.	303-759-0809
Conn	Madison, L.J. Carr, Inc.	203-245-4890
Fla	Maitland, D & E Assocs.	305-644-3039
Ill	Arlington Heights, W.J. Davis	312-545-0166
Ind	Marion, O.H. Bromberg & Assocs.	317-664-5384
Ky	Louisville, O.H. Bromberg & Assocs.	502-245-8916
Mich	Rochester, R. Shurte	313-375-0888
Minn	Minneapolis, C. Listug	612-537-6740
Mo	Raytown, G.F. Beckett & Co.	816-358-0404
Mo	Saint Louis, Thunderbird	314-567-6488
NJ	Denville, Grimm, Siegel Assocs.	201-877-2154
NY	Binghamton, Elcom Sls.	607-723-9270
NY	East Northport, Grimm, Siegel Assocs.	516-757-7642
NY	Plainview, Grimm, Siegel Assocs.	516-938-9721
NY	Rochester, Elcom Sls.	716-385-1400
NY	Whitesboro, Elcom Sls.	315-732-6445
NC	Charlotte, R.W. Chapman & Co.	704-525-2421
NC	Raleigh, R.W. Chapman & Co.	919-782-2624
Ohio	Cincinnati, O.H. Bromberg & Assocs.	513-381-5728
Ohio	Cleveland, Allied Entprs.	216-234-3838
Ohio	Dayton, O.H. Bromberg & Assocs.	513-434-8788
Pa	Devon, Kiley Elec. Co.	215-687-9340
SC	Greenville, R.W. Chapman & Co.	803-232-5391
Tex	Fort Worth, T.J. Small Co.	817-332-6353
Wash	Vancouver, Hartfield, Kennan & Freytag	503-228-1683
Wisc	Milwaukee, R.C. Zingler Co.	414-964-8120

MICRO INSTRUMENT CO., Marine & Power Instr. Div., Box 1565, Escondido, Cal., 92025, Tel: 714-746-2010, TWX: 910-322-1156; Empl.: 20; Minimum order: $10

Customer service: C. L. Marks

Free literature available: "M.I.C. Live Wires" - new power monitoring techniques and applications. Distributed to qualified power engineers. "M.I.C. Navigation News" - information on the latest changes in the Omega system and new navigation products.

Products manufactured: Alarms, Detectors, Meters, Monitors, Oscillographs, Direct Writing, Oscilloscope Plug-Ins, Probes, Recorders, Testers

Local Sales Offices & Reps.

Ala	Birmingham, Spader & Assocs.	205-879-1366
Cal	Emeryville, Independent Engrg. Assoc.	415-658-4476
Cal	Santa Fe Springs, Underground Svc. & Supply Co.	213-941-7833
Colo	Denver, Utility Prods., Inc.	303-758-3103
Conn	East Hartford, Tekdata, Inc.	203-525-7647
Fla	Orlando, Datarep, Inc.	305-843-5224
Ga	Decatur, Spader & Assocs.	404-296-3024
Ill	Chicago, Electronic Instr. Assocs.	312-271-3774
Ind	Indianapolis, M & L Assocs.	317-546-1155
Md	Silver Springs, Rep-Tron, Inc.	301-593-4844
Mass	Burlington, Tekdata, Inc.	617-273-0198
Mich	Detroit, Electro Entprs. Inc.	313-521-1500
NJ	Cherry Hill, L. H. Walke Co.	609-424-3766
NJ	East Orange, Friedman Assocs.	201-673-2500
Ohio	Dayton, Electro Entprs., Inc.	513-420-6071
Ore	Portland, Arnett Sls.	503-292-9746
Pa	Pittsburgh, Electro Entprs., Inc.	412-371-8497

MICRO LINE DIV. BAUSCH & LOMB, 2 Girts Rd., Jamestown, N.Y., 14701, Tel: 716-488-1958, Telex: 91-547; Empl.: 50

Products manufactured: Coatings, Counters, Disc Packs, Magnetic, Encoders, Services, Assembly, Production & Test

MICRO MASK, INC., 716 N. Pastoria Ave., Sunnyvale, Cal., 94086

MICRO-MEASUREMENTS DIV., Vishay Intertechnology, Inc., Box 306, Romulus, Mich., 48174, Tel: 313-941-3900, Telex: 23-0328; Empl.: 235

For info on price: G. J. Guminski; Application info: L. B. Sayles; Customer service: G. J. Guminski; Delivery info: G. J. Guminski

Free literature available: Short Form Catalog 95 describes M-M Strain Gages, Temperature Sensors, Fatigue Life Gages, Crack Propagation Gages, Manganin Gages, Bondable Resistors, and related accessories (adhesives, protective coatings, wires, solders, surface preparation supplies, installation tools, etc.)

Products manufactured: Gages, Transducers

Local Sales Offices & Reps.

Cal	Santa Clara, Johnson Assoc.	408-984-4626
Cal	Wilmington, Premtronics Inc.	213-830-5871
Colo	Denver, Davis Assoc.	303-744-6644
Ga	Atlanta, Craft Assocs.	404-393-0400
Ill	Glen Ellyn, G.B. Hall Co.	312-858-1700
Mass	Natick, Andruss-Peskin Corp.	617-653-3919
NM	Albuquerque, Rustco Entrps.	505-296-6474
Ohio	Medina, Stress Analysis Svcs.	216-725-7733
Pa	Chadds Ford, Stress & Test Sls.	215-793-1008
Pa	Frazer, Measurement Sls.	215-644-7142
Tex	Dallas, Tech. Prods.	214-357-9603
Wash	Seattle, Brett Assocs.	206-935-8054

MICRO-MO ELECTRONICS INC., 3691 Lee Rd., Cleveland, Ohio, 44120, Tel: 216-921-1131, Telex: 98-0650; Empl.: 50

For info on price: S. Frakes 216-921-1131; Application info: J. W. Linko 617-453-1719; Customer service: S. Frakes 216-921-1131; Delivery info: S. Frakes 216-921-1131

Free literature available: Short form catalog - Contains all electrical, thermal, and mechanical specifications.

Products manufactured: Amplifiers, Controls/Control Eqpt., Gearheads & Speed Reducers, Gears & Gear Mechanisms (Precision), Motors, Tachometers

MICRO NETWORKS, 324 Clark St., Worcester, Mass., 01606, Tel: 617-852-5400, TWX: 710-340-0067; Empl.: 160

For info on price: B. Smith; Application info: D. Pouliot; Customer service: A. Peterson; Delivery info: D. Pouliot

Free literature available: Short Form Catalog - data sheets application notes

Products manufactured: Amplifiers, Circuits, Hybrid, Thin-Film, Converters, Data Acquisition & Reduction Systems, Hybrid Voltage Regulators, Integrated Circuit Devices

Local Sales Offices & Reps.

Ariz	Tempe, Argus Sls.	602-967-8709
Cal	Burlingame, Leddy Assocs.	415-347-5247
Cal	Santa Ana, Calif. Elctrns. Mktg., Inc.	714-835-2702
Fla	Winter Park, Young & Lawrence Assoc.	305-647-6929
Haw	Honolulu, Aloha Assocs.	808-941-1575
Ill	Chicago, Communication Engrs.	312-761-0548
Mass	Lexington, J.E. Boeing, Inc.	617-862-2500
Mich	Detroit, Rathsburg Assoc., Inc.	313-882-1717
Minn	St. Louis Park, Beta Engrg. Corp.	612-925-4422
Mo	St. Louis, Beneke & McCaul, Inc.	314-434-6242
NY	Jamaica, S-J Sales Assoc.	212-291-3232
NY	Syracuse, Nycom, Inc.	315-437-8343
Ohio	Dayton, Midwest Mktg. Assoc.	513-433-2511
Pa	Berwyn, Tucker Assoc.	215-644-0142
Tex	Dallas, J. Clay Co.	214-350-1281
Wash	Seattle, J.B. Jolly, Inc.	206-938-4166

MICRO-NOW INSTR. CO., 6104 N. Pulaski Rd., Chicago, Ill., 60646, Tel: 312-478-1151; Empl.: 15; Minimum order: $25

For info on price: G. Zielinski; Application info: R. Houget; Customer service: G. Zielinski

Free literature available: Catalog of products, and current engineering bulletins.

Products manufactured: Amplifiers, Generators, Mixers, Multipliers, Power Supplies, Receivers, Spectrometers, Synchronizers, Klystron & BWO

Local Sales Offices & Reps.

Cal	Los Angeles, Mc Dougall/Mc Laughlin Co.	213-477-8556
Colo	Boulder, H. Bass Assocs.	303-499-7509
NJ	Westfield, Gray & Reed	201-AD3-6116
NM	Albuquerque, IMEC	505-344-2212
NY	Huntington Station, Gray & Reed Assocs.	516-GE3-3333
Tex	Dallas, Texas Avionics Co.	214-368-3566

MICRO-OHM CORP., Box 287, South Laguna, Cal., 92677, Tel: 213-442-3310; FSC No: 20940; Empl.: 109; Minimum order: $25

Customer service: C. A. Schwab

Free literature available: Quality Precision - Precision Wirewound, Commercial Power, Film and Carbon Film Resistors.

Products manufactured: Resistors

Local Sales Offices & Reps.

Ariz	Scottsdale, Gassner & Clarke	602-945-7979
Cal	Orange, Sls. & Mktg. Assocs.	714-997-5720
Cal	Redwood City, Siani Johnson, Inc.	415-365-6263
Cal	San Diego, B. Tauber	714-274-7242
Colo	Denver, Electrodyne	303-757-7679

MICRO POWER SYSTEMS INC., 3100 Alfred St., Santa Clara, Cal., 95050

MICRO SWITCH, Div. Honeywell Inc., 11 W. Spring St., Freeport, Ill., 61032, Tel: 815-232-1122, TWX: 910-642-0922; Empl.: 3000 ..... p. 1•2101

Free literature available: Catalogs 50, 51, 52 - Switches, Various Types, Catalog NTC - "No Touch" Photoelectric controls and proximity controls. Product Brochure SN - solid state pushbutton switches. Product Brochure SD - Solid state keyboards. DC Motors Brochure - Low inertia high performance DC motors with fast acceleration and deceleration.

Products manufactured: Alarms, Caps, Lenses, Indicator Light, Controls/Control Eqpt., Indicators, Keyboards, Alphanumeric & Decimal, Light Sources, Photoelectric, Motors, Relays, Switch Handle Boots, Switches

Local Sales Offices & Reps.

Cal	Los Angeles	213-723-6611
Cal	San Jose	408-732-0120
Colo	Englewood	303-771-2340
Conn	Hartford	203-549-3800
Ga	Atlanta	404-321-2565
Ill	Skokie	312-478-9266
Iowa	Davenport	319-355-6456
Mass	Bedford	617-275-2440
Mich	Southfield	313-424-3569
Minn	Minneapolis	612-835-5400
Mo	Creve Coeur	314-991-4100
NJ	Westfield	201-233-9200
NY	Elmsford	914-592-3200
NY	Rochester	716-461-1600
NY	Syracuse (Liverpool)	315-451-4000
Ohio	Cleveland	216-881-0300
Ohio	Dayton	513-461-4480
Pa	Blue Bell, Merion-Towle House	215-643-5820
Tenn	Memphis	901-396-6222
Tex	Dallas	214-661-5459
Va	McLean	703-790-3525
Wash	Mercer Island	206-233-2010
Wisc	Milwaukee	414-771-6300

MICRO SYSTEMS, INC., 2106 W. Peoria, Phoenix, Ariz., 85029, Tel: 602-997-5931; Empl.: 30

Customer service: Sls. Dept.

Free literature available: Brochure (20-page) describing Micro 500-series logic-circuit testers; Booklet containing technical reprints and descriptions of company products and services.

Products manufactured: Analyzers, Test Systems, Testers

MICRO SYSTEMS INT'L., Box 3529, Sta. C, Ottowa, Can.

MICRO-TEL CORP., 6310 Blair Hill La., Baltimore, Md., 21209, Tel: 301-823-6227; Empl.: 50

Customer service: Sls. Dept.

Free literature available: Data Sheets containing technical specifications on all products manufactured.

Products manufactured: Calibrators, Comm. Systems, Converters, Counters, Generators, Receivers, Testers

Local Sales Offices & Reps.

Ala	Huntsville, Gentry Assocs.	205-534-9771
Ariz	Scottsdale, J. Smith & Assocs.	602-947-2495
Cal	Cupertino, T. Louis Snitzer Co.	408-257-8333
Cal	Los Angeles, T. Louis Snitzer Co.	213-836-6170
Colo	Boulder, J. Smith & Assoc.	602-947-2495
Fla	Orlando, Gentry Assocs.	305-894-4401
NJ	Hazlet, Mer Mon	201-264-1851
NM	Albuquerque, J. Smith & Assocs.	505-255-2111
NY	Huntington, N. Ellen	516-368-5841
NC	Burlington, Gentry Assocs.	919-227-3639

MICRODATA CORP., 17481 Red Hill Ave., Irvine, Cal., 92705, Tel: 714-540-6730, TWX: 910-595-1764; Empl.: 375

Products manufactured: Comm. Systems, Computers, Memory Systems

Local Sales Offices & Reps.

Cal	Los Angeles, Microdata Corp.	213-596-5404
Cal	San Jose, Microdata Corp.	408-225-3235
Ill	Deerfield, Microdata Corp.	312-948-9440
Md	Rockville, Microdata	301-881-6282
Mass	Foxboro, Microdata	617-543-6306
Mich	Farmington, Microdata Corp.	313-477-8686
NY	Hauppauge, Microdata Corp.	516-724-4807
Pa	King of Prussia, Microdata	215-337-1839
Tex	Dallas, Microdata Corp.	214-239-8186

MICRODOT, See Ailtech, Western Opers.

MICRODYNAMICS, 9855 Dupree, So. El Monte, Cal., 91733, Tel: 213-579-1166; Empl.: 40

Customer service: J. Foster

Free literature available: Automated Omega Probe Station Probe Card Manufacturing Station Fixed Array Probe Card for testing & laser trimming Multiprobe cards - IC/TF Movable Magnetic Probe Card

Products manufactured: Calculators, Electrical & Electronic, Clocks (All Types), Probes, Services, Assembly, Production & Test

Local Sales Offices & Reps.

Cal	Mountain View, Karl Suss KG	415-961-1720
Cal	Santa Ana, Schlines-Richardson	714-832-1949
Fla	Sarasota, W. J. Irvine Co.	813-955-9656
Kans	Prairie Village, Dougherty & Assocs.	913-649-3515
Mass	Needham Heights, COM/PAK	617-444-1259
Minn	St. Paul, MURNCO	612-484-8200
Mo	St. Louis, J. E. Metz Co.	314-993-1979
NJ	Sparta, Production Technology	201-729-7159
NY	Niagara Falls, Watmet	716-285-3595
Ohio	Dayton, Sidnell Co.	513-885-4161
Tex	Dallas, Crockett Southwest Co.	214-251-1776
Wisc	Milwaukee, Process Technology	414-464-6620

MICROFLECT CO., 3575 25th S.E., Salem, Ore., 97302, Tel: 503-363-9267, TWX: 510-599-0107; Empl.: 85

For info on price: G. Kreitzberg; Application info: J. Kreitzberg; Customer service: R. Kreitzberg; Delivery info: R. Kreitzberg

Products manufactured: Antenna Towers & Supports, Mounts

MICROLAB/FXR, 10 Microlab Rd., Livingston, N.J., 07039, Tel: 201-992-7700, TWX: 710-994-4850; FSC No: 00929; Empl.: 185; Minimum order: $25

Customer service: M. J. DiPrimo

Products manufactured: Adapters, Waveguide, Amplifiers, Antennas, Attenuators, Bends & Twists, Microwave, Bolometers, Calorimeters, Microwave, Cavities, Microwave, Chokes, Circulators, Ferrite, Connector Adapters, Converters, Couplers, Detectors, Diodes, Dividers, Dummy Loads, Filters, Flanges, Waveguide, Horns, Microwave, Isolators, Joints, Rotary, Microwave, Junctions, Hybrid, Microwave, Kits, Test Equipment, Kits, Training Aid, Limiters, Line Strechers, Microwave, Meters, Mismatches, Microwave, Precision, Mixer-Preamplifiers, Microwave, Mixers, Modulators, All Kinds, Monitors, Mounts, Multipliers, Preselector-Mixers, Preselectors, Probes, Receivers, Shifters, Sliding Loads, Microwave, Slotted Lines, Microwave, Standards, Strip-Line Components, Microwave, Switches, Tees, Terminals, Testers, Transmitters, Tuners, Waveguides & Adapters

Local Sales Offices & Reps.

Cal	Los Angeles, McDougall/McLaughlin Co.	213-477-8556
Cal	San Jose, M.C.H. Assoc.	408-246-7330
Fla	Clearwater, R.F. Brennan, Inc.	813-446-5006
Ill	Park Ridge, R.F. Specialists, Inc.	312-698-2045
Ind	Indianapolis, R.F. Specialists, Inc.	317-783-7630
Md	Ellicott City, V P I Inc.	301-465-4060
Mass	Stoneham, Robertson Elctrn. Prods. Co.	617-438-3113
NY	Great Neck, Robert L. Diamond, Inc.	516-482-8387
NC	Winston-Salem, The Candor Co., Inc.	919-924-1480
Pa	Montgomeryville, V P I, Inc.	215-474-3200
Wash	Seattle, Datacom Assocs.	206-329-2989

MICROMETALS, 228 N. Sunset, City of Industry, Cal., 91744, Tel: 213-968-4718, TWX: 910-584-1878; FSC No: 12856; Empl.: 30; Minimum order: $20

For info on price: K. Baker; Application info: J. Cox; Customer service: L. Raymond; Delivery info: L. Raymond

Free literature available: Complete catalog of Iron Powder Cores Q. Curves for Iron Powder Toroidal Cores

Local Sales Offices & Reps.

Cal	Santa Clara, King Assocs.	408-249-1022
Fla	Dunedin, W. J. Irvine Co.	813-733-5382
Mass	Wellesley Hills, Anchor Engrg.	617-235-6330
Minn	Hopkins, F. Peterson Co.	612-941-5400
NY	Hempstead, Kahgan Sls.	516-538-2300
NY	Rochester, L. Hart Assocs.	716-244-3253

MICRON INDUSTRIES CORP., Constant Voltage Div., 1830 N. 32nd Ave., Stone Park, Ill., 60165, Tel: 312-345-0788; Empl.: 54; Minimum order: $25

For info on price: J. Topel; Application info: D. Davenport; Customer service: J. Topel; Delivery info: J. Topel

Free literature available: Impervitran Bulletin showing line of standard machine tool transformers and molded transformers. OEM Bulletin showing OEM capabilities for regulated DC power supplies and AC voltage regulators.

Products manufactured: Power Supplies, Regulators, Transformers

MICROPAC INDUSTRIES, INC., 905 E. Walnut St., Garland, Tex., 75040, Tel: 214-272-3571, TWX: 910-860-5186; Empl.: 200

Products manufactured: Circuits, Hybrid, Thick Film, Hybrid Voltage Regulators

Local Sales Offices & Reps.

Ala	Huntsville, Burgin-Kreh	205-883-7893
Ariz	Tempe, Argus Sls.	602-948-1499
Cal	Los Altos, Cain, White & Co.	415-948-6533
Fla	Orlando, G. F. Bohman	305-855-0274
Ill	Des Plaines, Coombs Assoc.	312-298-4830
Md	Baltimore, Burgin-Kreh Assoc.	301-788-5200
Mich	Southfield, Reps. Assoc.	313-354-9066
Minn	Minneapolis, Bitronics Sls. Co.	612-835-7744
NJ	Ridgewood, Instrumentation Sls. Co.	201-445-5210
NY	Syracuse, T2 Elctrns.	315-463-8592
NC	Winston Salem, Burgin Kreh	919-768-4174
Ohio	Cleveland, D. Steffen & Assoc.	216-461-8333
Ohio	Dayton, D. Steffen & Assoc.	513-293-3146
Ore	Beaverton, ES/Chase Co.	503-649-6177
Va	Lynchburg, Burgin-Kreh Assoc.	703-845-5600
Wash	Edmonds, ES/Chase Co.	206-774-3586
Wisc	Greendale, Coombs Assoc.	414-421-2300

MICROPHASE CORP., 35 River Rd., Cos Cob, Conn., 06807, Tel: 203-661-6200, TWX: 710-579-2926; Empl.: 105

Customer service: R. J. Crocco

Free literature available: Catalog Pages On: LTM series low-pass filters, HI series interdigital band-pass filters, CDL series limiter detectors, contiguous band multiplexers, detector mounts, amplifers, detectorvideo log amps, detecting multi-plexers, mixers, front ends & receivers.

Products manufactured: Amplifiers, Cavities, Microwave, Converters, Couplers, Detectors, Diodes, Dividers, Duplexers, Microwave, Filters, Holders, Crystal, Junctions, Hybrid, Microwave, Limiters, Mixer-Preamplifiers, Microwave, Mixers, Modulators, All Kinds, Modules, Logic, Encapsulated, Monitors, Mounts, Multiplexers, Oscillators, Preselector-Mixers, Preselectors, Receivers, Switches, Tuners

Local Sales Offices & Reps.

Mo	Glen Burnie, R. L. Engrg.	301-760-5533
NY	Syracuse, Ossmann Instruments Inc.	315-437-6666

MICROSONICS, INC., Div. Sangamo Elec. Co., 60 Winter St., Weymouth, Mass., 02188, Tel: 617-337-4200, TWX: 710-388-6833; Empl.: 125; Minimum order: $100

Customer service: J. Klayman

Products manufactured: Amplifiers, Delay Lines, Filters, Memory Systems, Oscillators

Local Sales Offices & Reps.

Cal	Los Angeles, Tauber Assocs.	213-368-4011
Cal	San Carlos, Kottmeier Assocs.	415-592-8333
Cal	San Diego, Tauber Assocs.	714-274-7242
Fla	Ormond Beach, Technology Mktg. Assoc.	904-672-2314
Fla	Pompano Bch., Technology Mktg. Assoc.	305-942-0774
Ind	Ft. Wayne, G & D Electrn. Sls., Inc.	219-432-5585
Md	Baltimore, Burgin-Kreh Assocs.	301-788-5200
Mass	Weymouth, Reptron	617-449-4141
NJ	Cherry Hill, Danco	609-424-5590
NY	Rochester, Ontec	716-464-8636
NC	Winston-Salem, Burgin-Kreh Assoc.	919-768-4174
Ohio	Cleveland, Whelan Corp.	216-692-1266
Ohio	Dayton, Whelan Corp.	513-434-7551
Pa	Fairview Vill., Danco	215-627-2218
Tex	Richardson, Lear Assocs.	214-231-5388
Va	Lynchburg, Burgin-Kreh	703-845-5600

MICROTRAN CO., INC., 145 E. Mineola Ave., Valley Stream, N.Y., 11580, Tel: 516-561-6050, TWX: 510-225-8412; FSC No: 50; Empl.: 100; Minimum order: $50 .... p. 2•1757-1769

For info on price: B. Tanner; Application info: W. Benscher; Customer service: B. Tanner; Delivery info: B. Ciancia

Free literature available: Transformer Catalog: Highlights new P.C. Powers, Telephone Coupling, Studio-Broadcast, DC-DC Converter - F237: P.C. Power Supply Xfmrs. for +5V & ±15V supplies - F158: Lists schematics and components for DC-DC Converters - F243: Magnetically Shielded Studio-Grade Mike Input Xfmrs. F185: Magnetically Shielded Low-Level Chopper Input Xfmrs. - Nomograph: Transistor Xfmr. Load Impedances determination - F139: Professional Bulk Tape Erasers, Demagnetizers, Audio Accessories.

Products manufactured: Chokes, Coils Including Assemblies & Forms, Controls/Control Eqpt., Converters, Decade Boxes, Demagnetizers, Demodulators, Editing Equipment, Tape, Eliminators, Battery, Erasers, Magnetic Tape (Bulk), Filters, Hybrid Voltage Regulators, Inverters, Kits, Power Supply, Microphone Accessories (Including Stands, Holders, Booms), Networks, Pickups, Telephone (For Recording), Power Supplies, Reactors, Regulators, Transducers, Transformers

Local Sales Offices & Reps.

Ala	Gadsden, F. Nickerson	205-547-7718
Ariz	Scottsdale, F. Schoeffler	602-959-3011
Cal	Los Altos, Westec Elctrns.	415-948-8880
Cal	Norwalk, Bertrand-Zoolalian	213-921-9791
Cal	San Diego, Bertrand-Zoolalian	714-560-5832
Colo	Denver, Gossard & Assocs.	303-985-0602
Fla	Miami Beach, Geartner Assocs.	305-861-3661
Fla	Orlando, Geartner Assocs.	305-299-1000
Ga	Decatur, F. Nickerson	404-321-4678
Ill	Highland Park, Bransky Sls. Co.	312-433-2375
Kans	Shawnee, J. Guernsey Co.	913-631-2414
Md	Baltimore, J. R. Daniel	301-825-3330
Mass	Wakefield, Meas. Equip. Co.	617-245-4870
NJ	Englewood Cliffs, E. Glass Assocs.	212-586-8440
NC	Kannapolis, F. Nickerson Co.	704-932-6772
Ohio	Cincinnati, J. Olsen	513-922-2176
Ohio	Cleveland, J.O. Olsen	216-752-5444
Pa	Jenkintown, Arnold Assocs.	215-887-7870
Pa	Pittsburgh, J.O. Olsen Co.	412-279-2550
Tex	Grand Prairie, Howell Sls., Inc.	214-AN2-5153
Wash	Seattle, Westec Elctrns., Inc.	206-CH3-7070
EXP:	N.Y., Valley Stream, Microtran Co.	516-561-6050

Local Distributors

Ala	Birmingham, MG Elctrns. & Equip., 3112 6th Ave. S.	205-328-4525
Ariz	Phoenix, Moltronics, Inc., 2746 W. Palm La.	910-951-1512
Cal	San Diego, Moltronics, Inc., 7960 Convoy Ct.	714-278-5020
Cal	Santa Clara, Moltronics, Inc., 337 Matthew St.	408-244-7600
Cal	South Gate, Moltronics, Inc., 5610 E. Imperial Hwy.	213-773-6521
Colo	Denver, Electronic Parts Co., 1212 S. Broadway	303-744-1992
Conn	Hamden, Arrow Elctrns., 295 Treadwell St.	203-248-3801
Fla	Orlando, Hall-Mark Elctrns., 7233 Lake Ellenor Dr.	810-850-0183
Ga	Atlanta, Lykes Elctrns. Corp., 1135 Chattahoochee	810-751-3501
Ill	Chicago, Newark Elctrns., 500 N. Pulaski Rd.	910-221-0268
Ind	Indianapolis, Graham Elctrns., 133 S. Penn St.	317-634-8486
Iowa	Cedar Rapids, Deeco, Inc., 2500 16th Ave. S.W.	319-365-7551
Kans	Wichita, Radio Supply Co., 115 Laura St.	316-267-5216
Md	Savage, Pyyttronic Inds., Inc., 8200 Wellmoor Ct.	301-792-7000
Mass	Waltham, QPL Elctrn. Distr., Inc., 47 Calvary St.	617-891-0460
Mich	Oak Park, Newark-Detroit, 20700 Hubbell Ave.	313-548-0250
Minn	Minneapolis, Newark Elctrns., 336 Hoover St. N.E.	612-331-6350
Mo	Berkeley, Hall-Mark Elctrns., 6100 Madison Ave.	910-760-1630
NJ	Moorestown, Arrow/Angus, Pleasant Valley Ave.	710-897-0829
NJ	Springfield, Federated Purchaser, Inc., 155 U.S. Rte. 22	201-376-8900
NM	Albuquerque, Electronics Parts Co., 2620 Rhode Island N.E.	505-293-6161
NY	Binghamton, Federal Elctrns., Box 1208	510-252-0893
NY	Buffalo, Summit Distrs., Inc., 916 Main St.	710-522-1692
NY	Farmingdale, Arrow Elctrns., 900 Broad Hollow Rd.	516-694-6800
NC	Raleigh, Hall-Mark Elctrns., 3000 Industrial Dr.	510-928-1831
Ohio	Cleveland, Pattison Supply Co., 4550 Willow Pkwy.	216-441-3000
Pa	McKeesport, Barno Radio Co., 5403 W. Smithfield St.	412-751-5971
Tenn	Nashville, Electra Distributing Co., 1914 W. End Ave.	615-255-8444
Tex	Dallas, Hall-Mark Elctrns., 9333 Forest La.	910-867-4721
Tex	Houston, Lenert Co., 1420 Hutchins	713-225-1465
Wash	Seattle, Sterling Elctrns., 5608 6th Ave. S.	206-762-9100

MICROWAVE ASSOCS., Northwest Industrial Pk., Burlington, Mass., 01803, Tel: 617-272-3000, TWX: 710-332-6789

Products manufactured: Adapters, Waveguide, Alarms, Amplifiers, Analyzers, Attenuators, Bends & Twists, Microwave, CATV Systems & Equipment, Cavities, Microwave, Chokes, Circulators, Ferrite, Comm. Systems, Couplers, Detectors, Diodes, Dividers, Duplexers, Microwave, Filters, Integrated Circuit Packaging Systems, Interferometer Systems, Isolators, Limiters, Microwave Integrated Circuits (MIC's), Mixer-Preamplifiers, Microwave, Mixers, Modulators, All Kinds, Mounts, Multipliers, Receivers, Shifters, Shutters, Microwave, Strip-Line Components, Microwave, Switches, Tees, Terminals, Transmitters, Tubes, Waveguides & Adapters

Local Sales Offices & Reps.

Ala	Huntsville, Tech. Mktg. Assocs.	205-883-7893
Ariz	Scottsdale, Microwave Assocs.	602-947-5431
Cal	Long Beach, Microwave Assocs.	213-426-9531
Cal	Sunnyvale, Microwave Assocs.	408-733-0330
Fla	Ormond Beach, Tech. Mktg. Assocs.	904-672-2314
Fla	Pompano Beach, Tech. Mktg. Assocs.	305-942-0774
Fla	Seminole, Tech. Mktg. Assocs.	813-393-3214
Ill	Franklin Park, Dekotech, Inc.	312-455-5100
Ind	Fort Wayne, Delesa Sls.	219-483-9537
Ind	Indianapolis, Delesa Sls.	317-257-4683
Iowa	Cedar Rapids, Seltec Sls. Corp.	319-362-8155
Md	Baltimore, Burgin-Kreh Assocs.	301-788-5200
Mass	Burlington, Burlington Sls., Inc.	617-272-7655
Mich	Ann Arbor, IM Tech, Inc.	313-663-0230
NY	Great Neck, ERA, Inc.	516-482-9320
NY	Syracuse, T2 Elctrns.	315-463-8592
NC	Winston-Salem, Burgin-Kreh Assocs.	919-768-4174
Ohio	Cleveland, IM Tech, Inc.	216-826-3400
Ohio	Dayton, IM Tech, Inc.	513-837-5610
Pa	Fort Washington, G.C.M., Inc.	215-646-7535
Tex	Richardson, Microwave Assocs.	214-234-2463

MICROWAVE DEVELOPMENT LABS., INC., 87 Cresent Rd., Needham Hgts., Mass., 02194, Tel: 617-449-0700, TWX: 710-325-1739; Empl.: 180; Minimum order: $25

For info on price: R. Tucker; Application info: R. Tucker; Customer service: W. Berry; Delivery info: M. Hale

Free literature available: Three ring binder with individual catalogs & data sheets- Individual bulletins & catalogs can be mailed separately for many of our products.

Products manufactured: Adapters, Waveguide, Attenuators, Bends & Twists, Microwave, Cavities, Microwave, Chokes, Couplers, Detectors, Dividers, Dummy Loads, Duplexers, Microwave, Filters, Flanges, Waveguide, Generators, Holders, Crystal, Horns, Microwave, Impedance Converters, Microwave, Joints, Rotary, Microwave, Junctions, Hybrid, Microwave, Mixers, Seals, Shifters, Shutters, Microwave, Switches, Tees, Terminals, Tubing, Waveguides & Adapters

Local Sales Offices & Reps.

Cal	Orange, J. E. Hachten Co.	714-998-6020
Cal	Palo Alto, J. E. Hachten Co.	415-326-1252
Fla	Orlando, Hi Co Assocs., Inc.	305-273-0571
Md	Lanham, Brimberg Assoc.	301-552-2200
Mass	Wayland, Wayland Engrg. Sls.	617-655-6080
NY	DeWitt (Syracuse), D.B. Assocs., Inc.	315-446-0220
NY	Great Neck, Trionic Assocs., Inc.	516-466-2300
Pa	Lafayette Hill, M. Lader Co.	215-825-3177
Tex	Dallas, Texas Microwave	214-231-5381
Wash	Seattle, Jon B. Jolly	206-938-4166
EXP:	Stamford, Conn., Dage Corp.	203-324-3123
FOR:	Can., Don Mills, Ontario, Tacan Assocs., Inc.	416-445-7490

MICROWAVE DIODE CORP., 13 Pleasant St., Colebrook, N.H., 03576, Tel: 603-237-4822; Empl.: 15; Minimum order: $35

For info on price: D. E. Shea; Application info: D. E. Shea; Customer service: G. P. Jacques; Delivery info: D. Hamel

Free literature available: Catalog and Specification Sheets

Products manufactured: Converters

Local Sales Offices & Reps.

Cal	Santa Ana, Rical Assocs.	714-557-6543
Md	Towson, L. H. Kolman & Co.	301-752-8756
Mass	Waltham, Betronic Assocs.	617-894-8400

MICROWAVE POWER DEVICES, Adams Ct., Plainview, N.Y., 11803, Tel: 516-433-1400, TWX: 510-221-1862; Empl.: 53

Customer service: R. J. Sheloff

Free literature available: Solid state CW power amplifiers, solid state linear amplifiers, low noise solid state amplifiers, solid state IF amplifiers, solid state AM Modulators, solid state pulse amplifiers, and lab amplifiers.

Products manufactured: Amplifiers, Converters, Modulators, All Kinds, Transmitters

Local Sales Offices & Reps.

Ala	Huntsville, Gentry Assocs.	204-534-9771
Ariz	Phoenix, R. A. Mayes Co.	602-279-5243
Cal	Inglewood, L & M Engrg. S.	213-674-6850
Cal	San Jose, L & M Engrg.	408-292-3220
Colo	Boulder, R.A. Mayes Co.	303-444-0782
Fla	Orlando, Gentry Assocs.	305-894-4401
Fla	St. Petersburg, Gentry Assocs.	813-867-7820
Ill	Mt. Prospect, Cain & Co.	312-253-3578
Kans	Prairie Village, Engrg. Servs. Co.	913-649-4000
Md	Silver Springs, Eastern Instrumentation Corp.	301-681-6500
Mass	Needham, Addelco Corp.	617-444-4754
Mo	St. Louis, Engrg. Serv. Co.	314-997-1515
NJ	Palisades Park, Scientific Devices - East	201-871-3916
NM	Albuquerque, R.A. Mayes Co.	505-292-2330
NY	N. Syracuse, Naco Elctrns. Corp.	315-699-2651
NY	Rochester, Naco Elctrns. Corp.	716-244-4720
NC	Burlington, Gentry Assocs.	919-227-3639
Ohio	Dayton, Cain & Co.	513-253-8144
Ohio	Lancaster, Cain & Co.	614-654-4800
Pa	Philadelphia, Eastern Instrumentation of Philadelphia	215-927-7777
Tex	Houston, R.A. Mayes Co.	713-461-5385
Tex	Richardson, R.A. Mayes Co.	214-235-3043
Utah	Centerville, R.A. Mayes Co.	801-292-6781
EXP:	Fla., Hallandale, Emec Inc.	305-925-6366
FOR:	Can., Montreal, Que., Electrodesign Ltd.	514-363-5120
FOR:	Can., Toronto, Ont., Electrodesign Ltd.	416-787-0991
FOR:	Can., Vanier, Ottawa, Electrodesign Ltd.	613-745-0541
FOR:	Can., Winnipeg, Manitoba, Electrodesign Ltd.	204-338-5050

MICROWAVE SEMICONDUCTOR CORP., 100 School House Rd., Somerset, N.J., 08873, Tel: 201-469-3311, TWX: 710-480-4730; Empl.: 190

Products manufactured: Amplifiers, Generators, Transistors

MICROWAVE PRODS., INC., 9533 Irondale Ave., Chatsworth, Cal., 91311, Tel: 213-882-3434; Empl.: 70

For info on price: C. T. Troesken; Application info: W. Perry; Customer service: W. Perry; Delivery info: C. T. Troesken

Products manufactured: Antennas, Circulators, Ferrite, Couplers, Filters, Isolators, Mixers, Strip-Line Components, Microwave

MICROWAVE/SYS., INC., 1 Adler Dr., E. Syracuse, N.Y., 13057, Tel: 315-437-9951, TWX: 710-541-0406; Empl.: 50

Customer service: D. L. Bush

Products manufactured: Amplifiers, Analyzers, Calibrators, Couplers, Detectors, Discriminators, Dividers, Generators, Meters, Mixers, Monitors, Radar Systems, Receivers, Synchronizers, Klystron & BWO

Local Sales Offices & Reps.

Cal	Anaheim, Blair Assocs.	714-635-1350
Cal	Portola Valley, Kipp Assocs.	415-851-0123
Colo	Denver, PLS Assocs.	303-771-0110
DC	Washington, SONCO	301-942-9420
Fla	Orlando, E.G. Holmes & Assocs.	305-894-8901
Ga	Chamblee, E.G. Holmes & Assocs.	404-451-6161
Ill	Chicago, Pivan Eng.	312-539-4838
Kans	Shawnee Mission, Pivan Eng.	913-722-1030
Mass	Waltham, Meas. Conslts. Corp.	617-890-4400
Mich	Detroit, S. Sterling Co.	313-255-1970
Mo	St. Louis, Pivan Eng.	314-567-3636
NJ	Englewood, Scientific Devices E.	201-871-3916
NM	Albuquerque, PLS Assocs.	505-255-2330
NY	Syracuse, Ossmann Instrs.	315-437-6666
Ohio	Cleveland, S. Sterling Co.	216-442-8080
Ohio	Dayton, S. Sterling Co.	513-298-7573
Pa	Blue Bell, SONCO	215-242-8460
Pa	Pittsburgh, S. Sterling Co.	412-922-5726
Tex	Richardson, Lear Assocs.	214-231-5388

Wash	Bellevue, Scientific Devices N.W.	206-454-0900

MID-EASTERN INDS., Div. of Eanco, Inc., 660 Jerusalem Rd., Scotch Plains, N.J., 07076, Tel: 201-233-5900, TWX: 510-665-6752; FSC No: 06179; Empl.: 30; Minimum order: $25 .... p. 1•1315-1318

For info on price: D. R. Ellenback; Application info: R. Hauseur or D. Ellenback; Customer service: R. Daisey; Delivery info: M. Fullman

Free literature available: Catalog arranged so that you can quickly find the power supply that has the features and voltage current output you want.

Products manufactured: Chargers, Battery, Converters, Eliminators, Battery, Inverters, Power Supplies, Regulators

Local Sales Offices & Reps.

Cal	Los Angeles, Dyna Sls.	213-268-1175
Colo	Denver, D. E. Bond Assocs.	203-756-1234
Conn	Guilford, R. H. Sturdy Co.	203-966-2580
Conn	New Canaan, R. H. Sturdy Co.	203-966-2580
Fla	Alamonte Spg., WMM Assocs.	305-862-4700
Fla	Clearwater, WMM Assocs., Inc.	813-446-0075
Fla	No. Palm Beach, WMM Assoc. Inc.	305-848-9042
Fla	Pompano Bch., WMM Assocs., Inc.	305-943-3091
Ill	Evanston, Mauer & Co.	312-869-1644
Ill	Skokie, Mauer & Co.	312-677-4771
Ind	Indianapolis, Mauer & Co.	317-547-3259
Iowa	Ft. Dodge, Heimann	515-576-2374
Md	Baltimore, J. R. Daniel & Co.	301-825-3330
Mass	Wellesley Hls., R. Sturdy	617-235-2330
Mich	Brighton, Dietrich & Assoc.	313-961-4540
Mich	Centerlaine, Dietrich & Assoc.	313-754-6450
Minn	Mpls., Heimann Co.	612-861-6051
NJ	Hazlet, Mer Mon Elec. Inst.	201-264-1851
NJ	Susssex, Eanco	201-875-3860
NM	Albuquerque, D. E. Bond Assoc.	505-296-9111
NY	Huntington, C.R. Mayer Co.	516-WA 1-7876
Ohio	Cleveland, Dietrich & Assoc.	216-781-1855
Ohio	Dayton, Dietrich & Assoc.	513-223-6042
Pa	Mt. Penn, Mer Mon Elctrn. Instrumentation	215-779-1640
Pa	Pittsburgh, Dietrich & Assoc.	412-892-2992
Pa	Willow Grove, J. R. Daniel Co.	215-674-3880
Wash	Seattle, Eicher-Richards Co.	206-LA 3-7888

MID-WEST METAL PRODS., INC., 456 E. Donovan Rd., Kansas City, Kans., 66115, Tel: 913-342-8171; Empl.: 200

Products manufactured: Benches, Consoles, Stools, Tables, Boards, Plug-In, Boards, Printed Circuit, Boards, Printed Wiring, Universal, Cabinets & Accessories, Cable Assemblies & Harnesses, Carts & Dollies, Instrument & Equipment, Cases, Equipment, Instrument, Meter, Chassis, Circuit Board Mounting, Chassis, Metal, Circuits, Flexible, Frames, Cabinet & Rack, Jack Covers, Jigs And Fixtures, Chassis & Circuit Board, Panels, Racks, Services, Assembly, Production & Test

MIDGET LOUVER CO., 800 Main Ave., Norwalk, Conn., 06852, Tel: 203-866-2342; Empl.: 10

Free literature available: Circular 10-A and price list; also additional stuffers.

Products manufactured: Air Cleaners & Filters (Shielded & Unshielded), Cabinets & Accessories

MIDLAND INTERNATIONAL CORP., 1909 Vernon St., No. Kansas City, Mo., 64116, Tel: 816-474-5080, Telex: 42-6344; Empl.: 200; Minimum order: $1000

For info on price: J. Hart; Application info: D. Saxon; Customer service: J. Hart; Delivery info: J. Hart

Products manufactured: Antennas, Batteries, Comm. Systems, Converters, Crystals, Cutters, Wire, Hand Operated, Filters, Flashlights & Lanterns, Meters, Microphones, All Kinds, Pickups, Telephone (For Recording), Power Supplies, Public Address Systems, Receivers, Recorders, Speaker Systems, Speakers, Testers, Transceivers

Local Sales Offices & Reps.

Ala	Birmingham, Adams & Assocs.	205-822-8109
Alas	Anchorage, C. E. Garrett	907-279-7585
Ark	El Dorado, D. Bellew Sls.	501-863-8325
Cal	Emoryville, Assc. Rep & Whse.	415-653-3838
Cal	Torrance, Barston & Doran	213-325-4140
Colo	Englewood, E.S.P. Co.	303-781-4409
Ind	Indianapolis, Kingston - Sharkey Assocs.	317-353-9406
Iowa	Des Moines, Beams	515-282-0292
La	Kenner, D. Bellen Sls.	504-729-4550
Md	Seabrook, Taylor Mktg.	301-864-4011
Mass	Lynne, Keene Sls. Co.	617-595-2300
Mich	Brighton, Leetro Sls. Co.	313-632-7941
Minn	Minneapolis, H.M.R.	612-920-8200
NJ	Teaneck, S. Axelrod Assocs.	201-836-6661
NY	Syracuse, W. Tauber Co.	315-446-7094
NC	Greensboro, Adams & Assocs.	919-272-6838
Ohio	Columbus Station, C.L. Pugh & Assocs.	216-235-6028
Pa	Laverock, M. Weinberg Assocs.	215-549-1122
Tenn	Memphis, G. Vanable	901-365-9437
Tex	Dallas, Roman Sls. Co.	214-358-2152
Wash	Seattle, James J. Backer Co.	206-285-1300
EXP:	Mo Kansas City, R. B. Thetford	816-842-0511

MIDWEC DIV., Independent Cable, Box 417 G, Scottsbluff, Neb., 69361, Tel: 308-632-4127, TWX: 910-627-0061; Empl.: 300; Minimum order: $50 p. 2•187-190

For info on price: D. Williamson; Application info: J. Tierney; Customer service: J. Tierney; Delivery info: D. Williamson

Products manufactured: Capacitors, Fixed

Local Sales Offices & Reps.

Ariz	Phoenix, Toward Engr. Assoc.	602-955-3193
Cal	Long Beach, Emerson Kirk Engr.	213-439-9559
Cal	Mountain View, Caltron/Pyle Inc.	415-964-3244
Colo	Denver, Checkmate Sls.	303-771-4920
Conn	Washington Depot, Kanan Assocs.	203-868-0513
Ga	Atlanta, G. Duckett Sls.	404-451-3529
Ill	Northbrook, Raines Brin Assoc.	312-498-0890
Md	Baltimore, Kaufholz Assoc.	301-488-6561
Mass	Reading, Kanan Assocs.	617-944-8484
Mich	Plymouth, Romarc	313-455-0300
Minn	St. Paul, Knox Assoc.	612-488-5402
Neb	Lincoln, Mktg. Assoc.	402-464-5244
NY	Port Washington, P.D. Aaron	516-883-0600
NY	Syracuse, L.D. Allen Inc.	315-458-7470
NC	Charlotte, G. Duckett Sls.	404-451-3529
Ohio	Cincinnati, J. Olsen Co.	513-922-2176
Ohio	Cleveland, J. Olson Co.	216-752-5444
Ore	Portland, C.K. Shanks Assoc.	503-292-5656
Pa	Newton Square, Kaufholz Assoc.	215-356-5000
Pa	Pittsburgh, J. Olsen Co.	412-279-2550
Tex	Dallas, United Comps.	214-324-1448
FOR:	Can., Montreal, Que., Vitel Elctrns.	514-331-7393
FOR:	Can., Toronto, Ont., Vitel Elctrns.	416-622-6300

Local Distributors

Cal	Belmont, Eric Electronics, 111 Glenn Way	415-593-8284
Mass	Newton, Greene-Shaw, 70 Bridge St.	617-969-8900
NY	Buffalo, Summit Dr.	
NY	Port Washington, Connector Concepts, Box 511	516-883-0600
Ohio	Cleveland, Gateway, 30214 Lakeland Blvd.	216-944-8565
Pa	Huntington Valley, Hallmark, 458 Pike Rd.	215-355-7300

MIDWEST ELECTRONIC INDUSTRIES, 4945 W. Belmont Ave., Chicago, Ill., 60641, Tel: 312-626-0030, TWX: 910-221-5247; Empl.: 64

For info on price: E. Taylor; Application info: E. Chapman; Customer service: C. Sweeney; Delivery info: K. Kramer

Products manufactured: Amplifiers, Microphones, All Kinds, Speakers

Local Sales Offices & Reps.

Ind	Indianapolis	317-426-3736
Iowa	Cedar Rapids	319-362-4410
Wisc	Waukesha	414-542-5129

MIIDA ELECTRNS., 14 Henderson Dr., W. Caldwell, NJ, 07006

MIKRON INSTR. CO., Box 211, Ridgewood, N.J., 07451, Tel: 201-891-7330; Empl.: 15

For info on price: J. E. Galbraith; Application info: J. E. Galbraith; Customer service: K. B. Davis; Delivery info: K. B. Davis

Free literature available: Sales brochures for each model.

Products manufactured: Bolometers, Controls/Control Eqpt., Detectors, Pyrometers, Radiometers

Local Sales Offices & Reps.

Ariz	Tempe, Lietz Equip. Co.	602-968-4991
Cal	Gardena, Instr. Lab.	213-770-0650
Cal	Palo Alto, Instr. Lab.	415-328-1040
Colo	Denver, TESSCO	303-744-1119
Conn	Westport, A. J. Abrams Co.	203-226-3010
Fla	Winter Haven, Engineered Equip. Co.	813-294-6520
Haw	Mililani Town, H. C. Burgess & Assocs.	808-623-3118
Ill	Westchester, Murphy & Dickey	312-344-5660
Iowa	Cedar Rapids, H. E. Ferris	319-362-9156
Iowa	Des Moines, H. E. Ferris	515-255-5008
La	Baton Rouge, Alford, Woods & Childs	504-275-5480
Mass	Lowell, Moisan Assocs.	617-452-5003
Mich	Dearborn, Ind. Temperature Control	313-278-2210
Mich	Grand Rapids, Ind. Temp. Control	616-538-3488
Minn	Minneapolis, G. J. Winikates & Co.	612-546-5770
Mo	St. Louis, EV Miller Co.	314-821-2610
NJ	Brielle, H. W. Good Co.	201-528-5251
NJ	Riverdale, B. Most Assocs.	201-839-4333
NM	Albuquerque, Lietz Equip. Co.	505-266-5821
NY	E. Rochester, Thermal Systems	716-377-1970
NY	N. Syracuse, Thermal Systems	315-458-5202
NY	Orchard Park, Thermal Systems	716-662-5560
NC	Charlotte, J. L. Highsmith & Co.	704-333-7743
Ohio	Brecksville, D & B Engrg. Sls.	216-526-6320
Ohio	Cincinnati, G. H. Drysdale & Assocs.	513-752-2069
Okla	Tulsa, Wallace Equip. Co.	918-747-6749
Ore	Portland, Branom Instr. Co.	503-285-9861
Pa	Bridgeville, Instr. Servs.	412-221-3600
Tenn	Oak Ridge, Tech. Equip. Supp.	615-483-4285
Tex	Houston, Alford, Woods & Childs	713-488-2730
Va	Richmond, Advance Control Equip.	804-270-7182
Wash	Seattle, Branom Instr. Co.	206-762-6050
WVa	St. Albans, Instr. Servs.	304-722-2953
Wisc	Menomonee Falls, Fritz Engrg. Sls. Co.	414-251-6590
FOR:	Calgary, 27, Alberta, Can., Lee Instr. & Supp.	403-252-4222
FOR:	Downs View, Ont., Can., Tubefit Ltd.	416-743-1661
FOR:	Lachine, Que., Can., Instro-Test Ltd.	514-637-1231
FOR:	Sarnia, Ont., Can., Tubefit Ltd.	519-344-5271
FOR:	Vancouver 9, B.C., Can., Branom Instr. Co.	604-736-7794

MIL ELECTRONICS, 176 Walker St., Lowell, Mass., 01854, Tel: 617-453-4142, Telex: 94-7490; Empl.: 35 p. 1•1319-1324

For info on price: B. W. Eldridge; Application info: B. W. Eldridge; Customer service: M. Gaudette; Delivery info: M. Gaudette

Free literature available: Catalog 7406-dc-dc encapsulated power converters. Catalog 735-ac-dc encapsulated power supplies.

Products manufactured: Converters, Power Supplies

Local Sales Offices & Reps.

Ala	Huntsville, Scientific Dev.	205-536-1969
Ala	Huntsville, Scientific Dev SE	
Ariz	Tempe, Hall Co.	303-789-4149
Cal	Lynwood, Dick West & Assocs.	213-636-6124
Cal	San Carlos, Winco Sls.	415-365-6082
Colo	Englewood, Hall Co.	303-789-4149
Conn	North Haven, Northeast Reps.	203-239-2507
Fla	Fort Lauderdale, Scientific Devs S.E.	
Fla	Orlando, Scientific Dev - Southeast	305-841-8180
Ill	Wilmette, Crest Assocs.	312-256-5205
Ind	Indianapolis, Crest Assocs.	
Mass	Medway, Surel Int'l.	617-533-2041
Mass	Needham, Northeast Reps.	617-449-3034
Mass	Needham Heights, Northeast Reps.	
Mich	Bloomfield Hills, Ellinger Sls.-Mich.	313-642-0203
Minn	Minneapolis, R-J Inc.	612-922-1425
NJ	Marmora, Holdsworth & Co.	
NY	Schenectady, N. W. Alexander & Assocs.	518-377-0581
NY	Tuckahoe, Spectrum Sls.	914-793-1660
NC	Burlington, Scientific Devs., S.E.	
Ohio	Chagrin Falls, Crest Comp Sls.	216-543-9808
Pa	Newton Square, Holdsworth & Co.	215-356-8550
Tex	Dallas, Precision Sls.	214-351-6964
Va	Annandale, J. Hopkins Assocs.	703-280-2086
Wash	Bellevue, A. Smith Co.	
FOR:	Can., Don Mills, Ont., G. M. Fraser Ltd.	

MIL SPEC WIRE & CABLE CORP., 404 N. Main St., Freeport, N.Y., 11520, Tel: 516-546-5454

Products manufactured: Cable, Cable Retractors, Tubing, Wire, Wire Shielding

MILERTRONICS, 525-A Airport Rd., Greenville, S.C., 29607, Tel: 803-242-9232; Empl.: 8

For info on price: G. G. Miler, Jr.; Application info: M. D. Webb; Customer service: P. G. Arms; Delivery info: M. D. Webb

Free literature available: Application Notes 101 READ ONLY MEMORIES and 201 DESIGN AND PROGRAMMING OF PROGRAMMABLE ROM MEMORY BOARDS. Brochures: ROM Programmers. DM-2000 Diode Matrix Programmer (Universal).

Products manufactured: Boards, Programming, Integrated Circuit Devices, Programmers

Local Sales Offices & Reps.

Ala	Huntsville, F.M. Assocs.	205-536-9990
Conn	Ellington, Daner-Hayes	203-875-5157
Fla	Orlando, F. M. Assocs.	305-851-5710
Ga	Atlanta, F. M. Assocs.	305-851-5710
Mass	Newton Centre, Daner-Hayes	617-969-4650
NJ	Port Washington, Daner-Hayes	516-883-4576
NC	Greensboro, F. M. Assocs.	919-294-2754
Pa	Erie, Ecco Elctrn. Sls.	814-452-3762
Va	Fairfax, Nine Assocs.	703-273-1803

Advertisment

MilerTronics div. of George Miler Inc. designs and manufactures IC test equipment. Product line includes ROM programmers and accessories and diode matrix programmers. The MilerTronics ROM programmers include a remote socket. These programmers will operate fully automatically using the MilerTronics duplicator or tape cassette accessories and can be interfaced with computers. MilerTronics also designs and builds custom microprocessor systems.

MILGO ELECTRONIC CORP., 8600 N.W. 41st Street, Miami, Fla., 33166, Tel: 305-592-8600, TWX: 810-848-6588; Empl.: 1485

Products manufactured: Comm. Systems, Modulator/Demodulators, Terminals, Data Display (including Alphanumeric & Graphic), Testers

MILLEN MFG. CO. INC., JAMES, 150 Exchange St., Malden, Mass., 02148, Tel: 617-324-4108; FSC No: 76487; Empl.: 500; Minimum order: $25
p. 2•1240-1253

For info on price: A. B. Caputo; Application info: O. I. Haszard; Customer service: A. B. Caputo; Delivery info: A. B. Caputo

Free literature available: General Catalog- 12 pages. Condensed Listing; Price List- 2 pages - Items in General Catalog; Shaft Hardware Bulletin- 8 pages. Dials-Couplings-Drives-Shaft Hardware; Oscilloscope/Magnetic Shield Bulletin- 24 pages; Selecting Magnetic Materials; Use of Magnetic Foil.

Products manufactured: Amplifiers, Antenna Feed Systems, Bezels, Shielded & Unshielded, Boards, Plug-In, Bridges, Capacitors, Variable, Caps, Connector, Chamber, Environmental Test, Chokes, Clamps & Clips, Coatings, Coils Including Assemblies & Forms, Connectors, Containers, Counters, Couplers, Couplings, Delay Lines, Detectors, Dials, Discriminators, Display Devices/Displays, Drives & Drive Mechanisms (Dial), Jacks (All Types), Knobs, Locks, Dial & Shaft, Meters, Modulators, All Kinds, Monitors, Networks, Oscilloscope Plug-Ins, Oscilloscopes, Plug & Jack Sets, Plugs, Pointers, Dial, Posts, Power Supplies, Probes, RFI Measuring Equipment, Scales, Dial, Shields, Shifters, Sockets, Standards, Switches, Terminal Blocks, Boards & Strips, Terminals, Transformers

Local Sales Offices & Reps.

Cal	Los Angeles, W.S. Harmon Co.	213-937-1460
Cal	Millbrae, Polach & Bensinger, Inc.	415-697-2525
Cal	Pasadena, D. Ellis Co.	213-681-9108
Conn	Newtown, Gerber Sls. Corp.	203-426-3440
Ill	Streamwood, Al Holte & Assoc.	312-837-4066
Mass	Waltham, Gerber Sls. Corp.	617-890-8040
NY	Great Neck, J. DiBlasi Assoc.	516-482-4040
NY	Pittsford, D. Hurley Sls., Inc.	716-586-6159
Pa	Havertown, Liberi Sls.	215-789-8150
Tex	Richardson, Air Quip Sls. Co.	214-234-3285
EXP:	Lakehurst, N.J., Tech. Equip. Co.	201-349-1716

Local Distributors

Cal	Palo Alto, Zack Elctrns., 654 High St.	415-326-5432
Fla	Miami, Elctrn. Equip. Co., 2701 N.W. 42nd Ave.	305-871-3500

MILLER, J.W. CO., See Bell Inds.

MILLER, L.C. CO., 717 Monterey Pass Rd., Monterey Park, Calif., 91754, Tel: 213-268-3611; Empl.: 49

Customer service: R. D. Kelly

Products manufactured: Heaters & Heating Elements, Soldering Accessories, Soldering Equipment

MILLER, SANFORD CORP., See Sanford-Miller Corp.

MILLER-STEPHENSON CHEM. CO., INC., Box 628, Danbury, Conn., 06810, Tel: 203-743-4447; Empl.: 500

For info on price: F. H. Bodnar; Application info: J. R. Laverdure; Customer service: F. H. Bodnar; Delivery info: F. H. Bodnar

Products manufactured: Adhesives (All Types), Chemicals, Cleaners & Solvents, Coatings, Compounds, Encapsulating, Insulating, Molding, Potting, Coolants, Circuit & Components, Lubricants

Local Sales Offices & Reps.

Ariz	Phoenix, H.C. Torrey Assoc.	602-944-0352
Cal	Los Angeles, Miller-Stephenson Chem.	213-624-3887
Colo	Denver, Ind. Hardware Co.	303-426-1443
Fla	Merritt Isle, J. A. Kennedy	305-452-9821
Ill	Chicago, Miller-Stephenson Chem.	312-761-4272
FOR:	Can., Toronto, Miller-Stephenson Chem.	416-364-0111

Local Distributors

For:	Fr., Montgeron, POLYTRONIX S.A.	903-22-50
For:	G. B., Scotland, D. Fraser & Co.	Uddingston 3476
For:	Ger., Hamburg, Detakta	0411/513051
For:	It., Milano, Aldo Garzanti S.A.S.	654-621
For:	Lebanon, Beirut, Freon® Products Middle East	20845LE
For:	Neth., Amsterdam, G. L. Loos & Co's.	020-822851
For:	Spain, Valencia, JASO	23 70 90
For:	Swit., Basle, Matera AG Basle	061 06 30

Advertisment

Aerosol Products for electronics, computers/communications/maintenance

MS-122 Fluorocarbon Release Agent
MS-150 En-Rust Rust Inhibitor
MS-160 Freon T-P 35 Solvent
MS-166 En-Stat Static Eliminator
MS-170 1,1,1-Trichloroethane
MS-180 Freon TF Solvent
MS-185 Freon TA Solvent
MS-190/MS-190HD Flux Removers
MS-200 Magnetic Tape Head Cleaner
MS-220 Aero-Duster
MS-226 Cobra Extension Brush Kit
MS-230 Contact Re-Nu
MS-238 "Clean 'n Lube" Contact Cleaner
MS-240 Quik-Freeze
MS-260 Cleaner Plastic/Glass/Metal
MS-400 Strippable Masking Film
MS-450 Protective Varnish
MS-111 Epoxy Stripper, Resins, Curing Agents

MILLER, W. A. CO., Mingo Loop, Oquossoc, Me., 04964, Tel: 207-864-3344; Empl.: 32

Customer service: R. Wentzell

Free literature available: Upon request literature with approximate pricing describing our custom-built Ruggedized Formica Cases, cabinets, and enclosures

Products manufactured: Cabinets & Accessories, Cases, Equipment, Instrument, Meter

MILLS RESISTOR CO., 10810 Kaylor St., Los Alamitos, Cal., 90720, Tel: 213-598-2454; FSC No: 34238; Empl.: 22

For info on price: M. Gough; Application info: T. Mills; Customer service: T. Mills; Delivery info: M. Gough

Free literature available: General Catalog; Metric Catalog; Precision Power Resistor Release; Miniature (MR 510) Resistor Page; Dual Miniature Resistor Specification.

Products manufactured: Networks, Resistors

Local Sales Offices & Reps.

Cal	Clairemont, Nelgo Assocs.	714-621-1224
Cal	Los Altos, Frauman Assocs.	415-941-0660
Fla	Belleair Beach, Consultants for Industry	813-595-1486
Ind	Carmel, Rich Elctrns. Mktg.	317-844-8462
Mo	Kansas City, Nevco	816-421-1751
NY	Valley Stream, Levison Sls. Co.	516-561-9696
Tex	Houston, Ev Smith Sls.	713-649-5756
Va	Lynchburg, J. A. Griffin	804-384-5236
Wash	Bellevue, Rowe/Northwest	206-455-2686

MILWAUKEE RESISTOR CORP., 700 W. Virginia St., Milwaukee, Wisc., 53204, Tel: 414-271-9900; FSC No: 82807; QPL No: 15109; Empl.: 90; Minimum order: $25
p. 2•1500,1501

For info on price: C. Gormanson; Application info: R. Amacher; Customer service: C. Gormanson; Delivery info: C. Gormanson

Free literature available: Product Bulletins Covering Our Line of Wire-Wound Power Resistors in the Range of 3-2000 Watts, and Grid Resistors 2000 Watts and Above.

Products manufactured: Alarms, Resistor, Hardware, Resistors

Local Sales Offices & Reps.

Ala	Gadsden, F.C. Nickerson Co.	205-547-7718
Cal	Mountain View, Wes-K Assocs.	415-964-5454
Cal	San Diego, Wes-K Assocs.	714-276-7541
Cal	Van Nuys, Wes-K Assocs.	213-989-3070
Colo	Denver, Nelson Co.	303-733-5528
Conn	West Haven, Johnson Assocs.	203-932-0162
Fla	Oldsmar, F.C. Nickerson Co.	813-855-4209
Fla	Tampa, F.C. Nickerson Co.	813-885-1416
Ga	Atlanta, F.C. Nickerson Co.	404-321-4678
Ill	Evanston, W.F. Swinke & Assocs.	312-248-4343
Ind	Ft. Wayne, W.W. Bieberich	219-432-2537
Ind	New Albany, W.W. Bieberich	812-945-3187
Iowa	Cedar Rapids, Technical Reps.	319-363-2409
Kans	Olathe, Technical Reps.	913-782-1177
Mass	Wellesley, Johnson Assocs.	617-235-3977
Minn	Minneapolis, C.R. Gibb Co.	612-377-1200
Mo	Maryland Heights, Kattelmann & Co.	314-434-6875
NH	E. Wakefield, Johnson Assoc.	603-522-8512
NJ	Haddonfield, Braddock Assocs.	609-429-0087
NY	Forest Hills, Miller Co.	212-263-4446
NY	Rochester, Gislason Sls.	716-454-4741
NC	Kannapolis, F.C. Nickerson Co.	704-932-6772
Ohio	Cincinnati, Val-Skol Sls.	513-563-6790
Ore	Portland, R.M. Minthorne Co.	503-246-4556
Tex	Dallas, R.E. Nesbitt Co.	214-357-4601
Tex	Houston, R.E. Nesbitt Co.	713-224-3633
Exp:	Teaneck, N.J., S. Ginsbury, Ltd.	201-837-1100
EXP:	Downsview, Ont., Can., F. Eakin Ltd.	416-638-0451

MINCO PRODUCTS INC., 7300 Commerce Lane, Minneapolis, Minn., 55432, Tel: 612-786-3121, TWX: 910-576-2848; Empl.: 200; Minimum order: $20

Customer service: L. Hanson

Free literature available: 1) Bulletin TS-100 - Temperature sensors for general purpose, industrial, and laboratory applications. 2) Bulletin HE-100 - Heating elements and assemblies. Thin flexible patch, strip and spot heaters.

Products manufactured: Circuits, Flexible, Heaters & Heating Elements, Thermocouples, Elements & Accessories, Thermometers, Resistance

Local Sales Offices & Reps.

Ala	Huntsville, Technical Sls.	205-881-1750
Cal	Los Gatos, Industrial Mktg. Assocs.	408-358-1734
Cal	South Pasadena, Pentagon Co.	213-799-7141
Ill	Chicago, Thermo/Cense	312-792-2760
Md	Wheaton, Magyar & Assocs.	301-871-8833
Mass	Allston, Magyar & Assocs.	617-566-9759
NJ	Livingston, A.A. Budde & Assoc.	201-994-1210
NJ	Middlesex, Magyar & Assocs.	201-752-4848
Ohio	Brecksville, A. Nace Co.	216-526-4323
Ore	Portland, McLaren, Inc.	503-297-2248
Pa	Philadelphia, Magyar & Assocs.	215-763-5044
Tex	Richardson, Air Quip Sls. Co.	214-234-3285
Wash	Bellevue, McLaren, Inc.	206-454-3400
WVa	Charleston, Skaff Engrg. Co.	304-342-0131

MINE SAFETY APPLIANCES CO., 400 Penn Center Blvd., Pittsburgh, Pa, 15235, Tel: 412-241-5900, TWX: 710-797-3895; Empl.: 2000; Minimum order: $10

Free literature available: Data Sheets on all products including Description, Application, Specifications and ordering information

Products manufactured: Air Cleaners & Filters (Shielded & Unshielded), Alarms, Analyzers, Batteries, Blowers & Fans & Accessories, Calibrators, Chargers, Battery, Coatings, Comm. Systems, Counters, Detectors, Meters

Local Sales Offices & Reps.

Ala	Birmingham	205-592-2077
Ariz	Tucson	602-623-1814
Cal	Los Angeles	213-875-2905
Cal	San Diego	714-Ze 2-5720
Cal	San Francisco	415-871-6700
Conn	Bridgeport	203-335-9639
DC	Washington	202-621-1221
Ill	Chicago	312-921-7474
Ind	Indianapolis	317-547-4407
Kans	Lenexa	913-888-2628
La	New Orleans	504-486-5368
Md	Baltimore	301-828-6363
Mass	Boston	617-364-2828
Mich	Detroit	313-272-7717
Mo	St. Louis	314-533-2550
NJ	Mountainside	201-232-3490
NY	New York	212-697-1350
NY	Tonawanda	716-694-2737
Ohio	Cleveland	216-461-6300
Ore	Portland	503-Co 9922
Pa	Philadelphia	215-622-2121
Pa	Pittsburgh	412-241-6332
RI	Esmond	401-231-6900
Tex	Dallas	214-631-2670
Tex	Houston	713-785-4040
Utah	Salt Lake City	801-355-7517
Wash	Seattle	206-763-9666
WVa	Bluefield	304-327-5171

MINELCO, DIV. GENERAL TIME CORP., 135 S. Main St., Thomaston, Conn., 06787, Tel: 203-283-8261, TWX: 710-475-1091; FSC No: 07479; Empl.: 66

For info on price: M. Tanski Ext. 270; Application info: W. Gillis; Customer service: M. Tanski; Delivery info: M. Tanski

Free literature available: Short Form Catalog (SFC-1) includes brief description of all products on four pages. Data sheets on each product also available.

Products manufactured: Indicators, Potentiometers, Switches

Local Sales Offices & Reps.

Ariz	Phoenix, Thorson Co.	602-956-5300
Cal	Alhambra, M.W. Riedel & Co.	213-283-7694
Cal	Daly City, R Del Bucchia & Assoc.	415-756-1664
Ga	Atlanta, Beacon Elec. Assoc.	404-351-3654
Ill	Wilmette, Crest Assoc.	312-256-5202
Iowa	Cedar Rapids, Jr Sls. Eng.	319-377-8211
Kans	Overland Park, Penzner-Mankus Assoc.	913-381-0004
Mass	Waltham, Conti-Younger Assoc.	617-890-4582
Mich	Oak Park, Willard Spenser Co.	313-398-8005
Minn	St. Paul, Northport Eng.	612-698-3841
NY	Huntington Station, Addem Group	516-567-5900
NY	Syracuse, Rep Tech	315-437-2845
Ohio	Cleveland, Geotronix Mktg. Assoc.	216-243-8520
Tex	Dallas, Bradenco Corp.	214-358-3278
Wash	Seattle, RK Squibb	206-632-2450
EXP:	Huntington Station, N.Y., Airsupply Intl.	212-291-8885

MINI-CIRCUITS LAB., Div. Scientific Comps. Corp., 2913 Quentin Rd., Brooklyn, N.Y., 11229, Tel: 212-252-5252; Empl.: 15 .... p. 2•1291

Products manufactured: Attenuators, Detectors, Dividers, Indicators, Mixers, Modulators, All Kinds, Multipliers, Transformers

Local Sales Offices & Reps.

Cal	Los Altos, Cain-White & CO.	415-948-6533
Cal	N. Hollywood, Crown Elctrns.	213-877-3550
Ill	Mount Prospect, Cain & Co.	312-253-3578
Mass	So. Chelmsford, IMR	617-256-8251
NY	East Rockaway, W Bellenkes Assoc.	516-LY 9-8260
Ohio	Dayton, Cain & Co.	219-482-4411
Ohio	Reynoldsburg, Cain & Co.	614-861-2119
Pa	Lafayette Hill, M. Lader & Co.	215-825-3177
Tex	Dallas, Cain & Co.	214-233-6809
Va	Woodbridge, M. Lader & Co.	703-494-4731

MINI-SYSTEMS, INC., 20 David Rd., North Attleboro, Mass., 02761, Tel: 617-695-0206, TWX: 710-348-0564; FSC No: 50316; Empl.: 58; Minimum order: $10 p. 2•1502,1503

For info on price: D. Rice; Application info: P. Boivin; Customer service: G. Robertson; Delivery info: J. Sweeney

Free literature available: Precision Thick Film Chip Resistors (MIL-Spec. Hi Rel applications); Miniature Single, Dual, Triple Op Amps; FET Input Op Amps; Chip Attenuators; Hybrid Jumpers and padders.

Products manufactured: Amplifiers, Attenuators, Capacitors, Fixed, Circuits, Hybrid, Thick Film, Circuits, Hybrid, Thin-Film, Diodes, Jumpers, Packages, Integrated Circuit, Pads, Transistor Mounting, Resistors, Seals, Services, Assembly, Production & Test

Local Sales Offices & Reps.

Ariz	Phoenix, J.S. Heaton Co.	602-264-7887
Colo	Denver, J.S. Heaton Co.	303-758-5130

MINNEAPOLIS SPEAKER CO., 3806 Grand Ave. S., Minneapolis, Minn., 55409, Tel: 612-825-1010; Minimum order: $10

Customer service: Sls. Off.

Free literature available: Form C74 Full Line Descriptive Catalog; Form MB474 Mini-Speaker Brochure; Form 671 Descriptive Brochure Describing Loudspeaker Construction, "All About Speakers".

Products manufactured: Speaker Systems, Speakers

Local Sales Offices & Reps.

Ala	Birmingham, J.F. Russell Sls. Co.	205-822-2196
Cal	Gardena, Bidwell Sls. Assocs.	213-770-0300
Cal	Oakland, Sinclair Elctrns. Assoc.	415-451-7485
Fla	Pembroke Pines, J. Wanger Sls. Co.	305-987-8766
Ill	Chicago, T. Pappas & Assoc.	312-685-2338
Iowa	Marion, Thomas & Modrcin Assoc.	319-377-6261
Kans	Shawnee Mission, Thomas & Modrcin Assoc.	913-432-2131
Md	Baltimore, Par-Nell Sls. Co.	301-655-2944
Mass	Bedford, Chamberlin & Murray	617-274-0044
Mich	Bloomfield Hills, Central Elctrns. Sls. Co.	313-852-4308
Mo	Hazelwood, Thomas & Modrcin Assoc.	314-838-6446
NY	Roslyn Heights, S.I.R. Sls., Inc.	516-621-7485
NY	Syracuse, Wm. Tauber Co.	315-446-7094
Ohio	Cincinnati, J.O. Olsen Co.	513-825-0678
Ohio	Cleveland, J.O. Olsen Co.	216-752-5444
Ore	Portland, J. LeBrun Co.	503-244-6805
Pa	Holland, Par-Nell Sls. Co.	215-355-9330
Pa	Pittsburgh, J.O. Olsen Co.	412-341-8391
SC	Greenville, H.C. Norman Sls. Co.	802-244-6254
Tex	Dallas, Techno Assocs.	214-357-9213

MINNESOTA RUBBER CO., 3630 Wooddale Ave., Minneapolis, Minn., 55416, Tel: 612-929-6781; Empl.: 800; Minimum order: $10

Customer service: R. K. Mattocks

Products manufactured: Feedthrus & Seals, Environmental, Rubber, Seals, Services, Assembly, Production & Test

MITEG INC., 100 Ricefield La., Hauppauge, N.Y., 11787, Tel: 516-543-8873, TWX: 510-226-3781; Empl.: 25

For info on price: A. Kiiss; Application info: A. Kiiss; Customer service: A. Faverio; Delivery info: A. Faverio

Products manufactured: Amplifiers, Converters, Mixer-Preamplifiers, Microwave, Mixers, Multipliers, Oscillators

Local Sales Offices & Reps.

Ariz	Scottsdale, Fryco Inc.	602-945-3281
Cal	Mountain View, Microwave Mktg. Assocs.	415-969-3355
Cal	North Hollywood, Crown Elctrns.	213-877-3550
Fla	Orlando, Gra-Mar	
Mass	Natick, Spectrum Energy	617-237-4030
Minn	Minneapolis, Saturn Co.	
NJ	Haworth, Central Assocs.	201-568-0808
NJ	Moorestown, N. Stern	609-234-0661
NY	Plainview, Central Assocs.	516-433-0808
Ohio	Dayton, Ashby Assocs.	513-252-5627
Va	Alexandria, Dyna Rep Co.	703-354-1222
FOR:	Can., Don Mills, Ont., B. D. Vallillee Elctrns Ltd.	416-447-8482

MITSUBISHI INT'L CORP., MGA Div., 7045 N. Ridgeway Ave., Lincolnwood, Ill., 60645

MKC ELECTRONICS, 454 E. Donovan Rd., Kansas City, Kans., 66115, Tel: 913-371-1351; Empl.: 26

Customer service: V. M. Mathews

Products manufactured: Controls/Control Eqpt., Counters, Drivers, Solenoid, Relays, Timers

MKS INSTRS., INC., 25 Adams Street, Burlington, Mass., 01803, Tel: 617-272-9255; Empl.: 50; Minimum order: $25

Customer service: E. Mortberg

Products manufactured: Controls/Control Eqpt., Detectors, Gages, Transducers

M M ELCTRN. ENCLOSURES, 111 Bloomingdale Rd., Hicksville, N.Y., 11801, Tel: 516-935-9400, TWX: 510-221-1857

Products manufactured: Cases, Equipment, Instrument, Meter, Cases, Transit, Containers

Local Sales Offices & Reps.

Ala	Huntsville, BJR Inds.	205-881-3569
Ariz	Scottsdale, Vinson	602-947-7371
Cal	Los Angeles, Daton Engrg. Co.	213-479-4211
Cal	Santa Clara, Vico Sls. Co.	408-298-5944
Colo	Denver, Vinson Assocs.	303-757-5151
Conn	Kensington, N.S. Stachalek	203-VA 8-4587
Fla	Indian Rocks Bch., Tech. Rep.	813-595-2834
Fla	Melbourne, Tech. Rep. Assocs.	305-723-9140
Ga	Jonesboro, Tech. Rep. Assocs.	404-753-0111
Ill	Northfield, Adcon Assocs.	312-446-6486
Kans	Mission, Tech. Sls. Assocs.	913-831-2888
Mass	W. Acton, K.B. Reidy	617-CO 3-7146
Mich	Farmington, Carter, McCormic & Peirce, Inc.	313-477-7700
Minn	Mpls., Hasse & Assocs.	612-588-0551
Mo	St. Louis, Tech-Sls.	314-725-5361
NJ	Haddonfield, M & S Assocs.	609-HA 9-7055
NJ	Raritan, J & L Assocs.	201-722-0682
NM	Albuquerque, Vinson Assocs.	505-298-7442
NY	Utica, R. J. Davis Assoc.	315-724-5773
Ohio	Cleveland, Carter, McCormic & Peirce	216-333-5650
Ohio	Dayton, Carter, McCormic & Peirce	513-278-5873
Pa	Pittsburgh, Carter, McCormic & Peirce, Inc.	412-824-3760
Tex	Dallas, Blair Engrg. Sls.	214-352-8411

MOBAY CHEM. CORPORATION, Pittsburgh, Pa., 15205, Tel: 412-923-2700

Products manufactured: Coatings, Insulators & Insulation, Plastic Raw Materials, Liquids, Pellets, Powders, Resins

MOBIL ELECTRONICS, INC., Box 1132, Anderson, Ind., 46015, Tel: 317-642-7976; Empl.: 6-9; Minimum order: $10

For info on price: H. P. Hart; Application info: J. M. Hart; Customer service: H. Z. Hart; Delivery info: H. Z. Hart

Free literature available: on all products

Products manufactured: Amplifiers, Baffles, Speaker, Boards, Printed Circuit, Boxes, Junction, Outlets & Wall Plates, Cabinets & Accessories, Carts & Dollies, Instrument & Equipment, Cases, Equipment, Instrument, Meter, Chassis, Circuit Board Mounting, Chassis, Metal, Comm. Systems, Converters, Couplers, Decoders, Encoders, Generators, Grilles, Handles For Cabinets, Circuit Boards, Racks, etc., Meters, Panels, Racks, Receivers, Services, Assembly, Production & Test, Speaker Systems, Switches, Transceivers, Transmitters

MOBIL-TRONICS, Box 1022, Tustin, Cal., 92680, Tel: 714-832-6744; Empl.: 2

Customer service: B. Somodi

Free literature available: Mobil-Tronics' catalog presents over 100 instrument and utility carts, scope carts, stainless steel carts, lab carts, and test equipment carts for use in all industries.

Products manufactured: Carts & Dollies, Instrument & Equipment

MODPAK, 31 A Green St., Waltham, Mass., 02154, Tel: 617-891-7048, TWX: 710-324-6484; Empl.: 4

For info on price: C. Lindbohm; Application info: A. Cerullo; Customer service: A. Cerullo; Delivery info: C. Lindbohm

Free literature available: Literature & information describing MODPAK'S electronic packaging devices and MODPAK'S new circuit boxes and prototype engineering kit

Products manufactured: Boxes, Junction, Outlets & Wall Plates, Cabinets & Accessories, Cases, Equipment, Instrument, Meter, Chassis, Circuit Board Mounting, Connectors, Containers, Frames, Cabinet & Rack, Holders, Circuit Board (Production Type), Integrated Circuit Packaging Systems, Kits, Breadboarding (For Engineers), Kits, Shielding, Kits, Test Equipment, Packages, Integrated Circuit, Racks, Services, Assembly, Production & Test, Shields, Strip-Line Components, Microwave

Local Sales Offices & Reps.

Ala	Huntsville, Reynolds & Assocs.	205-536-1941
Ariz	Phoenix, Thorson Co.	602-956-5300
Cal	Burbank, Wright Omnia	213-843-7240
Cal	Los Altos, Wright Eng.	415-941-4405
Cal	San Diego, Wright Omnia	213-843-7240
Colo	Denver, Thorson Co.	303-355-3521
Fla	Palm Beach, Reynolds & Assoc.	305-622-4336
Fla	Satellite Beach, Reynolds & Assoc.	305-773-4700
Ga	Atlanta, Reynolds & Assoc.	404-252-5360
Mass	Waltham, Russell Engrg. Sls.	617-458-7146
NY	Buffalo, Harries & Kershaw	716-652-1221
NY	Mt. Vernon, Friedman-Smith	914-664-4866
NY	Rochester, Harries & Kershaw	716-671-6365
NY	Syracuse, Harries & Kershaw	315-637-9871
Pa	Plymouth Meeting, Ron-Mar Co.	215-825-2841
Tex	Dallas, Stevens Sls.	214-350-2476
Va	Alexandria, Vanguard	703-768-1660

MODULAR AUDIO PRODUCTS, INC., 1385 Lakeland Ave., Bohemia, N.Y., 11716, Tel: 516-567-9620; FSC No: 52202; Empl.: 5; Minimum order: $35

For info on price: J. Brick; Application info: M. Gittleman; Customer service: K. Zajick; Delivery info: K. Zajick

Free literature available: Audio Products Catalog - Complete line of amplifier and special effects devices for audio console and system construction.

Products manufactured: Amplifiers, Integrated Circuit Devices, Power Supplies

Local Sales Offices & Reps.

Ill	Hinsdale, J. D. Allyn Co.	312-325-0495
Ohio	Dayton, Rixan Assoc.	513-278-4216
EXP:	Cal., San Diego, Total Electronics Int'l.	714-224-3291

MODULAR DEVICES, INC., 1385 Lakeland Ave., Airport International Plaza, Bohemia, N. Y., 11716, Tel: 516-567-9620; FSC No: 52202; Empl.: 20; Minimum order: $35

For info on price: J. Brick; Application info: M. Gittleman; Customer service: J. Brick; Delivery info: K. Zajick

Free literature available: SP-100 servo amplifier condensed catalog SP-200 operational amplifier catalog

Products manufactured: Amplifiers, Equalizers, Integrated Circuit Devices, Inverters

Local Sales Offices & Reps.

Cal	San Diego, Total Elctrns. Int'l.	714-224-3291
Ill	Hinsdale, J.D. Allyn Co.	312-325-0495
Ohio	Dayton, Rixan Assocs.	513-278-4216

Advertisement

Off the shelf and custom designed amplifiers, specializing in AC servo amplifiers and related modules: DC operational amplifiers and power amplifiers; professional quality audio amplifiers and special effects devices; military quality intercom equipment. If you have an amplifier requirement, check with MDI first! We probably have it on the shelf now, and if not, we're still able to reduce your engineering costs in designing it.

MODULAR POWER, 7364 Convoy Ct., San Diego, Cal., 92111, Tel: 714-279-1641; Empl.: 20

Products manufactured: Converters, Power Supplies

Local Sales Offices & Reps.

Ala	Huntsville, FM Assocs., Ltd.	205-536-9990
Ariz	Phoenix, Mesa Engrg.	602-943-9213
Cal	Costa Mesa, Robinson Tech. Assocs.	714-557-1622
Cal	San Diego, Mesa Engrg.	714-278-8021
Cal	San Jose, MCH Assocs.	408-246-7330
Cal	Westlake Village, Edwards Assocs.	213-889-1057
Colo	Littleton, Eissler Sls. & Service	303-794-1779
Conn	Newton, C. Lueders & Co.	203-426-3339
Fla	Orlando, FM Assocs., Ltd.	305-851-5710
Fla	Tequesta, FM Assocs., Ltd.	305-746-3126
Ill	Palantine, C & C Elctrn. Sls.	312-358-8900
Kans	Shawnee Mission, Tech. Sls. Assocs.	913-888-3330
Mass	Needham, C.J. Lueders	617-449-0345
Minn	Minneapolis, Bitronics Sls. Co.	612-866-3035
Mo	Ferguson, Tech. Sls. Assocs.	910-761-0565
NJ	Moorestown, Comp. Conslts.	609-234-3666
NJ	Palisades Park, Scientific Devices-East	201-871-3916
NM	Albuquerque, Elctrn. Entprs.	505-256-3561
NM	Las Cruces, Elctrn. Entprs.	505-524-0126
NC	Greensboro, FM Assocs., Ltd.	919-294-2754
Ohio	Worthington, Ohio Instr. Co.	614-885-0743
Tex	Dallas, REMTEK	214-369-8146
Tex	Houston, Remtek	713-664-2113
Wash	Seattle, Blum & Assocs.	206-782-1600

MODUTEC, INC., 18 Marshall St., Norwalk, Conn., 06854, Tel: 203-853-3636, TWX: 710-468-2039; Empl.: 300 p. 1•773-779,2319

For info on price: R. A. Eck; Application info: L. A. Velez; Customer service: W. J. Beke; Delivery info: B. Kunkel

Free literature available: Catalog #622 - Panel Meters, Control Meter Catalog #CM-1011, Pyrometer Catalog #PYR-1104

Products manufactured: Indicators, Meters, Pyrometers, Thermocouples, Elements & Accessories

Local Sales Offices & Reps.

Ala	Huntsville, Beacon Elctrns. Assocs.	205-881-5031
Cal	Los Gatos, Luscombe Engrg. Co.	408-354-6496
Cal	Pasadena, Luscombe Engrg. Co.	213-684-2000
Colo	Arvada, Arrowhead Sls. Co.	303-423-5556
Fla	Fort Lauderdale, Beacon Electronic Assoc.	305-776-6074
Fla	Maitland, Beacon Elctrn. Assocs.	305-647-3498
Ga	Atlanta, Beacon Elctrn. Assocs.	404-351-3654
Ill	Wilmette, Crest Assocs.	312-256-5202
Ind	Indianapolis, Crest Assocs.	317-844-2800
Kans	Prairie Village, Engrg. Service Co.	913-649-4000
Md	Randallstown, Beacon Elec. Inc.	301-922-1248
Mass	Canton, New England Electronic Sls. Corp.	617-828-4835
Mich	Farmington, Carter, McCormic & Peirce, Inc.	313-477-7700
Minn	Minneapolis, R.J. Inc.	612-922-1425
Mo	St. Louis, Engrg. Svcs. Co.	314-997-1515
NJ	Englewood Cliffs, Sprung/Nussbaum, Inc.	201-947-6767
NJ	Marmora, Holdsworth & Co.	609-398-4340
NM	Albuquerque, Aztec Enterprises, Inc.	505-255-2440
NY	DeRuyter, R.P. Kennedy Co.	315-682-2299
NY	Red Hook, R.P. Kennedy Co.	914-876-2700
NY	Rochester, R.P. Kennedy Co.	716-271-6322
Ohio	Cleveland, Carter, McCormic & Peirce	216-333-5650
Ohio	Dayton, Carter, McCormic & Peirce	513-278-5873
Pa	Monroeville, Carter, McCormic & Peirce	412-372-4415
Pa	Newtown Square, Holdsworth & Co.-SWR	215-356-8550
SC	Spartanburg, Beacon Elctrn. Assocs.	803-582-4613
Tex	Houston, Scientific Sls. Co.	713-666-5318
Tex	Richardson, Scientific Sls. Co.	214-231-6541
Utah	Salt Lake City, Arrowhead Sls. Co.	801-487-4716
Va	Falls Church, Beacon Elctrns.	703-534-1673
Wash	Seattle, R.K. Squibb, Inc.	206-632-2450
EXP:	New York, Frathom Co.	212-687-9390
FOR:	Can., Burlington, Ont., Motion Control Devices	416-637-9369

MOHAWK DATA SCIENCES CORP., Corporate Headquarters, Utica, N.Y., 13503, Tel: 315-792-2002; Empl.: 5000

Customer service: S. J. Keane, V.P. Direct Sls 315-792-2022

Free literature available: Card equip. Tape equip.

Products manufactured: Perforators, Printers, Punched Card Equipment, Readers, Recorders, Transmission Systems, Data

Local Sales Offices & Reps.

Cal	Anaheim	714-772-0803
Cal	San Mateo	415-573-6400
Fla	Orlando	305-841-3091
Mass	Waltham	617-890-5870
Mich	Southfield	313-352-9160
Pa	King of Prussia	215-337-1910

MOHAWK OEM SALES, 1008 West 8th Ave., King of Prussia, Pa., 19406, Tel: 215-337-1910, Telex: 84-6453; Empl.: 5400; Minimum order: $100

For info on price: F. Graziano 315-792-2183; Application info: J. Rodenhausen 215-337-1910; Customer service: C. Randall 315-792-2234; Delivery info: F. Graziano 315-792-2183

Free literature available: 34-page catalog describing and picturing complete MDS OEM product line: printers tape drives, card readers, disk drives, keyboards, and paper tape equipment.

Products manufactured: Comm. Systems, Computers, Controllers, Programmable, Converters, Data Loggers, Encoders, Keyboards, Alphanumeric & Decimal, Modulator/Demodulators, Perforators, Printers, Punched Card Equipment, Readers, Recorders, Teleprinters, Terminal Equipment, Digital, Translators, Data, Transmission Systems, Data

Local Sales Offices & Reps.

Cal	Anaheim	714-772-0803
Cal	Los Angeles	213-933-5571
Cal	San Mateo	415-573-6400
Fla	Orlando	305-841-3091
Ill	Oak Brook	312-654-8630
Ind	Indianapolis	317-243-7547
Mass	Waltham	617-890-5870
Mich	Southfield	313-352-9160
Mo	Clayton	314-727-0175
NY	Liverpool	315-457-3248
NY	Utica	315-792-2022
Ohio	Independence	216-398-4700
Pa	Wayne	215-687-8452
Tenn	Nashville	615-383-1393
Tex	Houston	713-681-6601
Va	Richmond	804-359-9283
Wisc	Wauwatosa	414-771-7830
EXP:	Utica, N.Y.	315-792-2045

MOLDING TECHNOLOGY INC., Ivyland, Pa., 18974, Tel: 215-355-3110; Empl.: 80

Customer service: D. C. Campbell

Free literature available: Four page brochure from Molding Technology Incorporated, Ivyland, Pa. 18974, describing their "Total Concept Service" for Molds, Trim and Forming Systems used by the Electronics and Electrical Industries.

Products manufactured: Services, Assembly, Production & Test

Local Sales Offices & Reps.

Cal	Alta Loma, Metro-Line Western	714-987-4112
Cal	Westminster, Metro-Line Western	714-839-8880
Fla	Ft. Lauderdale, E & E Engrg. Svc.	305-791-0754
NY	Niagara Falls, Waters Metal Prods. Ltd.	716-285-3595
NC	Charlotte, E & E Engrg. Svc.	704-333-9790

MOLDTRONICS, INC., 707 Roger St., Downers Grove, Ill., 60515, Tel: 312-968-7000; Empl.: 170; Minimum order: $25

For info on price: B. Qualizza; Application info: J. Collins; Customer service: B. Qualizza; Delivery info: B. Qualizza

Free literature available: PLASTIC MODULE CASES - DIP HEADERS - COIL FORMS/24 page illustrated brochure describing an assortment of miniature plastic cases for potting electronic components, many with metal inserts.

Products manufactured: Bobbins, Winding, Coil & Transformer, Bushings, Glass, Plastic, Metal, Rubber, Etc., Cups, Encapsulation, Headers, Lenses, Readout & Display, Pads, Transistor Mounting, Services, Assembly, Production & Test, Sockets

Local Sales Offices & Reps.

Ariz	Phoenix, Thorson Co.	602-956-5300
Cal	Canoga Park, Snavely Assocs.	213-348-5258
Cal	San Diego, Miracle & Assocs.	714-276-8819
Cal	San Jose, United Sls. Co.	408-379-0800
Colo	Denver, Thorson Co.	303-759-0809
Fla	Orlando, Hi-Co Assocs.	305-273-0571
Ga	Atlanta, Davidson Co.	404-993-4570
Ill	Hinsdale, Hill-Gray Assocs.	312-325-4810
Ind	Indianapolis, Stoltenberg Sls. Co.	317-547-1169
Iowa	Marion, Thomas & Modrcin Assocs.	319-377-6261
Kan	Shawnee Mission, Thomas & Modrcin Assocs.	913-432-2131
Md	Woodbine, Naudain Assocs.	301-252-5378

Directory of Local Distributors Starts on page 401

Mass	Wellesley Hills, Michael Scott Co.	617-235-0102
Minn	St. Paul, Northport Engrg.	612-698-3841
Mo	Hazelwood, Thomas & Modrcin Assocs.	314-895-4700
NJ	Mount Laurel, Naudain Assocs.	609-235-1801
NY	Rochester, Fowler Beach Corp.	716-586-0468
Ohio	Dayton, Harry G. Lake Co.	513-277-8181
SC	Columbia, Davidson Co.	803-788-3538
Tenn	Nashville, Davidson Co.	615-356-2905
Tex	Garland, Gordon V. Peck Co.	214-341-8311
Wash	Bellevue, Henry Paulman Sls.	206-455-3311

MOLECU-WIRE CORP., P.O. Box 495, Farmingdale, N.J., 07727, Tel: 201-922-9400, TWX: 710-723-6943; Empl.: 150

Products manufactured: Wire

Local Sales Offices & Reps.

Cal	La Canada, R. D. Dahl Co.	213-790-6111
Ill	Chicago, Kennedy Engrg.	312-631-8283
Minn	Wayzata, Schlenker & Assoc.	612-473-5417
Mo	St. Louis, Renner & Co.	314-434-3623
NJ	N. Plainfield, Tri-J Corp.	201-469-9300
Ohio	Cleveland, Qualiform Insul.	216-671-8300
Ohio	Oregon, Meej Sls.	419-698-1026
Pa	Pittsburgh, Patterson Elec. Co.	412-244-1818
Wash	Seattle, Comptronics	206-284-4842

MOLEX INC., 2222 Wellington Ct., Lisle, Ill., 60532, Tel: 312-969-4550 .... p. 2•1068,1069

Customer service: Cust. Svc.

Free literature available: M-100 Catalog (General Product Catalog) M-200 Catalog - specific terminal and connector housing information. M-300 Catalog - switch product catalog. M-400 Catalog - printed circuit board interconnection systems and devices.

Products manufactured: Connector Blocks, Mother Board, Connectors, Contacts, Electrical, Sockets, Switches, Terminals, Tools

Local Sales Offices & Reps.

Cal	Encino, R.H. McDonald & Assocs.	213-986-5832
Cal	Mt. View, Cindel Sls.	415-965-2630
Colo	Denver, Thorson Co.	303-759-0809
Fla	Altamonte Springs, WMM Assocs.	305-831-5067
Fla	Clearwater, WMM Assocs.	813-447-2533
Fla	Pompano Beach, WMM Assocs.	305-943-3091
Ill	Crystal Lake, E.S. Healy & Assocs.	815-459-4386
Ind	Crawfordsville, D. Miller & Assocs.	317-362-6348
Kans	Overland Park, Palatine Engrg. Sls.	913-262-5643
Mass	Andover, Sales Engrg. Co.	617-470-0800
Mich	Benton Harbor, Hampton Askin & Assocs.	616-925-0341
Mich	Southfield, D.D. Douglas & Assocs.	313-352-7180
Minn	Minneapolis, C. Diehl	612-854-4448
Mo	St. Louis, P. Still & Assocs.	314-993-2077
NM	Albuquerque, Cleveland Ents.	505-345-2481
NY	Lynbrook, P. Saftler & Assocs.	516-593-7880
NY	Rochester, L-Mar Assocs.	716-328-5240
Ohio	Mansfield, R. Meckling Assocs.	419-526-1250
Pa	Pittsburgh, Sheridan Assocs.	412-244-1640
Tenn	Chattanooga, Peirson, Deakins & McGinness	615-821-4501
Tex	Richardson, Palatine Sls. Inc.	214-231-9489
Va	Lynchburg, Barnhill & Assocs.	804-846-4624
Wash	Bellevue, H. Paulman Sls.	206-455-3311

MOLEX PRODUCTS, INC., 5224 Katrine, Downers Grove, Ill., 60515, Tel: 312-969-4550, TWX: 910-695-3229

Customer service: Cust. Svc. Personnel

Free literature available: M100 Catalog - General Product Line; M200 Catalog - Connectors and Terminals, M300 Catalog - Molex Switches, M400 Catalog - Printed Circuit Interconnections.

Products manufactured: Connector Blocks, Mother Board, Connectors, Machines/Machinery, Production, Sockets, Switches, Terminal Blocks, Boards & Strips, Terminals, Tools

Local Sales Offices & Reps.

Cal	Encino, R. H. McDonald & Assocs.	213-986-5832
Cal	Mountain View, Cindel Sales, Inc.	415-965-2630
Colo	Denver, Thorson Co.	303-759-0809
Fla	Clearwater, WMM Assocs.	813-447-2533
Ill	Crystal Lake, E.S. Healy & Assocs.	815-459-4386
Ind	Crawfordsville, Dale A. Miller & Assocs.	317-362-6348
Kans	Overland Park, Palatine Engrg. Sls.	913-262-5643
Mass	Andover, Sls. Engrg. Co.	617-470-0800
Mich	Benton Harbor, Hampton, Askin & Assocs.	616-925-0341
Mich	Southfield, D.D. Douglass & Assocs.	313-352-7180
Minn	Bloomington, Chuck Diehl	612-854-4448
Mo	St. Louis, Palmer Still & Assocs.	314-993-2077
NJ	Riverton, Valley Sls.	609-829-2892
NM	Albuquerque, Cleveland Enterprises, Inc.	505-345-2481
NY	Lynbrook, P. Saftler & Assocs.	516-593-7880
NY	Rochester, L-Mar Assocs.	716-328-5240
Ohio	Mansfield, Ralph Meckling & Assocs.	419-526-1250
Pa	Pittsburgh, Sheridan Assocs., Inc.	412-244-1640
Tenn	Chattanooga, Peirson, Deakins & McGinness	615-821-4501
Tex	Richardson, Palatine Sls., Inc.	214-231-9489
Va	Lynchburg, Barnhill & Assocs.	804-846-4624

MOLON MOTORS & COIL CORP., 3737 Industrial Ave., Rolling Meadows, Ill., 60008, Tel: 312-259-3750; Empl.: 300

Customer service: L. Breden 312-259-8700

Free literature available: 1. Brochure describing Molon's product line of custom designed open frame motors and gear motors. 2. Literature describing Molon's permanent magnet synchronous motors and 7-1/2° stepper motors.

Products manufactured: Blowers & Fans & Accessories, Motors, Pumps, Vacuum

Local Sales Offices & Reps.

Cal	Sunnyvale, RDX Corp.	408-734-4500
Cal	Woodland Hills, G.M. Stevenson	213-348-5506
Colo	Denver, Parker Webster	303-770-1972
Conn	Bloomfield, Zaslow Sls. Co.	203-242-7781
Minn	St. Paul, Dale Merrick Co.	612-636-0444
NJ	Cranford, Hy Rel Assocs.	201-276-5677
NY	Buffalo, R.W. Mitscher Co.	716-633-7970
Ohio	Cleveland, E.B. Kaercher	216-TE1-8098
Pa	Cornwall Hghts., W.D. Staats	215-ME9-5231
Tex	Dallas, W. Reese Assoc.	214-638-6575

MONA INDS., INC., Box 397, River Street Station, Paterson, N.J., 07524, Tel: 201-274-8220; Empl.: 60

Products manufactured: Chemicals, Cleaners & Solvents

MONITOR LABS, INC., 4202 Sorrento Vly. Blvd., San Diego, Cal., 92121, Tel: 714-453-6260, TWX: 910-337-1278; Empl.: 75; Minimum order: $25

For info on price: Prod. Line Mgr.; Application info: Prod. Line Mgr.; Customer service: Cust. Svc. Mgr.; Delivery info: Prod. Line Mgr.

Products manufactured: Analyzers, Clocks (All Types), Data Acquisition & Reduction Systems, Data Loggers, Scanners, Switches

Local Sales Offices & Reps.

Ala	Huntsville, F.M. Assocs.	205-536-9990
Ariz	Scottsdale, Measurement Conslts.	602-994-9519
Cal	Lawndale, Ward/Davis Assocs.	213-542-7740
Cal	San Diego, Ward/Davis Assocs.	714-459-3351
Cal	Sunnyvale, Ward/Davis Assocs.	408-245-3700
Colo	Boulder, Measurement Conslts.	303-449-5294
Fla	Orlando, F.M. Assocs.	305-851-5710
Fla	Tequesta, F.M. Assocs.	305-746-3126
Ill	Chicago, Dalec	312-283-0300
Ind	Indianapolis, Dalec	317-784-6360
Md	Rockville, MESA, Inc.	301-881-8430
Mass	Nonatum, ETA Assocs.	617-527-4544
Mich	Southfield, Data-Tron	313-354-6421
Minn	Minneapolis, Dalec	612-786-9666
Mo	Hazelwood, Technical Reps.	314-731-5200
NJ	Union, SBM Assocs.	201-687-8737
NM	Albuquerque, Measurement Conslts.	505-265-6471
NY	Pleasantville, SBM Assocs.	914-769-1811
NY	Rochester, SBM Assocs.	716-266-1400
NC	Greensboro, F.M. Assocs.	919-294-2754
Ohio	Dayton, Data-Tron	513-223-8421
Ohio	Wickliffe, Data-Tron	216-585-8421
Pa	Pittsburgh, K.J. Lesker Co.	412-892-2996
Tex	Houston, Harvey Assoc.	713-464-7641
Tex	San Antonio, Data Applications Corp.	512-732-7176
Wash	Seattle, Showalter/Instruments	206-455-4922
FOR:	Can., Calgary, Alb., Canadian Dynamics	403-269-2202
FOR:	Can., Downsview, Ont., Datamex, Ltd.	416-661-1404
FOR:	Can., Montreal, Datamex, Ltd.	514-731-9328
FOR:	Can., Ottawa, Ont., Datamex, Ltd.	613-825-4255
FOR:	Can., Vanvouver, B.C., Canadian Dynamics	604-325-3201

MONITOR PRODS., Box 1966, 3018 San Luis Rey Rd., Oceanside, Cal., 92054, Tel: 714-433-4510, TWX: 910-322-1381; Empl.: 60; Minimum order: $50 p. 1•388-397

Customer service: Sls. Order Desk

Free literature available: Oven Oscillator Data Sheet, General Catalog, 74 EEM Reprint, Digital Oscillators & Logic Clocks, TCXO's, Filters, Crystals, Comml, Crystals, Military

Products manufactured: Clocks (All Types), Crystals, Filters, Integrated Circuit Devices, Oscillators, Ovens, Standards, Terminal Equipment, Digital

Local Sales Offices & Reps.

Cal	W. Covina, Groh Assocs.	213-923-0963
Colo	Denver, Electrodyne, Inc.	303-757-7679
Fla	Ft. Lauderdale, Tech. Rep. Assocs.	305-792-0962
Fla	Indian Rock Bch., Tech. Rep. Assocs., Inc.	813-595-2834
Iowa	Cedar Rapids, H. R. Brown Assoc.	319-366-0635
NY	Great Neck, Trionic Assoc.	516-466-2300
Ohio	Dayton, Berberich Assocs.	513-252-9981
Tex	Dallas, Tesco	214-358-3521

MONOLITHIC MEMORIES INC., 1165 E. Arques Ave., Sunnyvale, Cal., 94086

MONROE, THE CALCULATOR CO., Div. Litton Inds., 550 Central Ave., Orange, N.J., 07050, Tel: 201-673-6600, TWX: 710-994-5840; Empl.: 3000; Minimum order: $50

Products manufactured: Analyzers, Calculators, Electrical & Electronic, Comm. Systems, Computers, Data Acquisition & Reduction Systems, Integrated Circuit Devices, Recorders, Terminal Equipment, Digital, Transmission Systems, Data

MONSANTO, Box 8, St. Peters, Mo., 63376, Tel: 314-272-6281, TWX: 910-760-1591; Empl.: 1000

Products manufactured: Crystals

Local Sales Offices & Reps.

Cal	Santa Clara, Monsanto Co.	408-243-0414
Mass	Westwood, Monsanto Co.	617-329-2530
Mo	St. Peters, Monsanto Co.	314-272-6281
Tex	Garland, Monsanto Co.	214-272-6974

MONSANTO-ELCTRN. SPEC. PRODS., 3400 Hillview Ave., Palo Alto, Cal., 94304, Tel: 415-493-3300, TWX: 910-373-1767; Empl.: 500; Minimum order: $250

For info on price: W. Reed; Application info: Mr. Bottini; Customer service: F. August; Delivery info: F. August

Free literature available: Short form catalog of optoelectronic devices

Products manufactured: Cells, Photoconductive, Photoemissive, Photovoltaic, Detectors, Diodes, Display Devices/Displays, Isolators, Lamps, Lights, Relays, Switches

MONTEVIDEO TECHNOLOGY INC., 4716 Wilford Way, Edina, Minn., 55435, Tel: 612-920-1050; Empl.: 160; Minimum order: $50

For info on price: W.L. Nees; Application info: W.L. Nees; Customer service: W.C. Knutsen; Delivery info: W.C. Knutsen

Free literature available: Catalog Describing Aircraft Grade Servo Motors, Motor Tachometers, Digital Indicators and Related Mechanisms That Are Used In Military & Commercial Aircraft and Other Airborne Equipment. The Product Line Had Its Origin In 1962 And Has Been Marketed Under Trade Names "Cedar Engineering", "Cedar" and "Cedar Avionics."

Products manufactured: Coils Including Assemblies & Forms, Controls/Control Eqpt., Counters, Display Devices/Displays, Gearheads & Speed Reducers, Gears & Gear Mechanisms (Precision), Generators, Indicators, Motors, Tachometers, Transducers

MOODY TOOLS, INC., 42 - 46 Dudley St., Providence, R.I., 02905, Tel: 401-421-5032; Empl.: 11; Minimum order: $60

Customer service: J. H. Moody

Free literature available: Catalog of present line, a sheet announcing 41 New Tools plus distributor and dealer price lists.

Products manufactured: Drills & Accessories, Hand & Power, Drivers, Nut, Magnets, Screwdrivers, Scribers, Tools, Wrenches

Local Sales Offices & Reps.

Cal	Long Beach, L. P. Feeley & Assocs.	213-595-5421
Cal	San Carlos, A. Williams	415-591-7043
Colo	Denver, J. Connors	303-934-5829
Fla	Riviera Beach, C.M. Allen	305-844-2593
Ga	Atlanta, R.B. Allen	404-255-8267
Ill	Chicago, Witz-Knight, Inc.	312-685-3181
Kans	Overland Park, D.H. Donegan	913-384-0460
NY	Manlius, W. Ferguson	315-682-9301
NY	New York, A. Mizner Assocs., Inc.	212-683-4948
NC	Charlotte, T.T. Patterson	704-366-4174
Ore	Portland, R. Minthorne Co.	503-246-4556
Pa	King of Prussia, L. Spangenberg	215-265-2130
Pa	Pittsburgh, A. Kostman	412-421-9204
RI	East Providence, G. Goddard Assocs.	401-434-3824
Tenn	Nashville, M.M. Hnatio	615-834-4225

MOREY CORP., 2659 Wisconsin Ave., Downers Grove, Ill., 60515, Tel: 312-964-2300; FSC No: 04377; Empl.: 150; Minimum order: $25

For info on price: E. J. Cunningham; Application info: E. J. Hollowed; Customer service: E. J. Cunningham; Delivery info: R. R. Morey

Free literature available: Product & general facility brochure.

Products manufactured: Cable Assemblies & Harnesses, Cable Retractors, Capacitors, Fixed, Capacitors, Variable, Chokes, Coils Including Assemblies & Forms, Comm. Systems, Cords, Couplers, Filters, Jack Covers, Lead Assemblies & Receptacles, Oscillators, Reels, Cord & Cable, Screens, Printed Circuit, Terminal Blocks, Boards & Strips, Transformers

MORIRICA ELCTRNS., LTD., 205 Tozuka-machi, Tozuka-ku, Yokohama, Japan, Tel: 045-881-2331; Empl.: 350

Products manufactured: Cells, Photoconductive, Photoemissive, Photovoltaic

Local Sales Offices & Reps.

Ill	Skokie, Solar Systems Inc.

MORRIS, J.I. CO., 372 Elm St., Southbridge, Mass., 01550, Tel: 617-764-4394; Empl.: 45

For info on price: J. B. Dirlam; Application info: J. B. Dirlam; Customer service: T. Holden; Delivery info: T. Holden

Products manufactured: Fasteners

MOS TECHNOLOGY, INC., Valley Forge Corp. Ctr., 950 Rittenhouse Rd., Norristown, Pa., 19401, Tel: 215-666-7950, TWX: 510-660-4033; Empl.: 350; Minimum order: $250

Customer service: J. C. Hertsch

Free literature available: Mos LSI, application notes and specifications/data sheets available on complete product line.

Products manufactured: Encoders, Integrated Circuit Devices, Shift Registers

MOSTEK CORP., 1215 W. Crosby Rd., Carrollton, Tex., 75006, Tel: 214-242-0444; Empl.: 1800

For info on price: J. Garrett Ext. 357; Application info: K. Daugherty Ext. 432; Customer service: C. Crutcher Ext. 359; Delivery info: J. Tadlock Ext. 359

Free literature available: Literature on complete line of RAMs, ROMs, shift registers, timing and display circuits, calculator circuits, CMOS, and special products.

Products manufactured: Integrated Circuit Devices

Local Sales Offices & Reps.

Ala	Huntsville, Component Mktg.	205-881-5333
Ariz	Phoenix, Howe & Howe Sls.	602-264-7971
Cal	Fountain Valley, Mostek Corp.	714-554-1611
Cal	Los Altos, Mostek Corp.	415-941-3030
Cal	Redwood City, J. Heaton Co.	415-369-4671
Cal	San Diego, H. King	714-276-7541
Cal	Santa Ana, Rical Assoc.	714-557-6543
Colo	Wheatridge, Waugaman Assocs.	303-423-1020
Fla	Clearwater, CBC	813-447-3375
Fla	Coral Springs, Mostek Corp.	305-752-8140
Fla	Ft. Lauderdale, CBC	305-484-7330
Fla	Winter Park, CBC	305-644-2277
Ill	Elk Grove Village, J. G. Twist Co.	312-593-0200
Ill	Wheaton, Mostek	312-682-9505
Ind	Fort Wayne, R. O. Whitesell & Assocs.	219-432-5591
Ind	Indianapolis, R. O. Whitesell & Assocs.	317-359-9283
Ind	Kokomo, R. O. Whitesell & Assocs.	317-452-6065
Kans	Prairie Village, J. G. Twist Co.	913-236-4646
Ky	Louisville, R. O. Whitesell & Assocs.	502-893-7303
Md	Baltimore, J. R. Daniel & Co.	301-825-3330
Mass	Burlington, New England Tech. Sls.	617-272-0434
Mass	Waltham, Mostek Corp.	617-899-9107
Mich	Grosse Point Park, Greiner Assocs.	313-499-0188
Minn	Minneapolis, HMR	612-920-8200
Mo	St. Louis, J. G. Twist Co.	314-432-2830
NJ	East Hanover, HLM Assocs.	201-386-0794
NY	Liverpool, J. Semple Assocs.	315-458-4775
NY	Northport, HLM Assocs.	516-757-1606
NY	Rochester, J. Semple Assocs.	716-544-8582
NC	Greensboro, J. R. Daniel & Co.	919-885-4634
NC	Raleigh, A. B. Andrews Co.	919-833-5565
Ohio	Brecksville, Mostek Corp.	216-526-6747
Ohio	Cincinnati, R. O. Whitesell & Assocs.	513-521-2290
Ohio	Cleveland, R. O. Whitesell & Assocs.	216-228-7525
Ohio	Columbus, R. O. Whitesell & Assocs.	614-888-9396
Ohio	Dayton, R. O. Whitesell & Assocs.	513-298-9546
Okla	Tulsa, W. Pat Fralia Co.	918-663-8707
Pa	Ft. Washington, Mostek Corp.	215-628-9050
Pa	Horsham, CMS Mktg.	215-672-8300
Pa	Pittsburgh, R. O. Whitesell & Assocs.	412-344-7277
Tex	Ft. Worth, W. Pat Fralia Co.	817-738-2394
Tex	Houston, W. Pat Fralia Co.	713-772-1572
Wash	Seattle, General Elctrns.	206-243-5141
Wisc	Wauwatosa, J. G. Twist Co.	414-475-7755
FOR:	Can., Downsview 475, Ont., Cantronics Ltd.	416-661-2494
FOR:	Can., Montreal, Que., Cantronics Ltd.	514-341-5207

MOTOROLA COMMS. DIV., Parts Dept., 1313 E. Algonquin Rd., Schaumburg, Ill., 60172, Tel: 312-397-3500, TWX: 910-693-1592

Customer service: J. Willson 312-397-1000 Ex. 3204

Products manufactured: Antenna Towers & Supports, Antennas, Arresters, Electrical Surge, Lightning, Attenuators, Batteries, Benches, Consoles, Stools, Tables, Cabinets & Accessories, Cable, Calibrators, Capacitors, Fixed, Capacitors, Variable, Carts & Dollies, Instrument & Equipment, Cases, Equipment, Instrument, Meter, Chargers, Battery, Comm. Systems, Comparators, Connectors, Counters, Cutters, Wire, Hand Operated, Diodes, Dummy Loads, Eliminators, Battery, Filters, Fuses, Generators, Handsets, Chestsets, Headphones, Headsets, Etc., Heat Sinks, Soldering, Inverters, Kits, Marking (Dial, Instrument, Equipment, etc.), Lamps, Meters, Microphones, All Kinds, Monitors, Oscillators, Pliers, Plug Buttons, Potentiometers, Power Supplies, Probes, Public Address Systems, Receivers, Resistors, Soldering Accessories, Soldering Equipment, Soldering Guns, Irons & Desoldering Tools, Speakers, Synthesizers, Tubes, Wire

Local Sales Offices & Reps.

Cal	El Segundo	213-644-1101
Cal	Foster City	415-349-3111
Ga	Forest Park	404-762-6183
NJ	Glen Rock	201-447-4000
Ohio	Parma	216-267-2210
Tex	Dallas	214-241-2151

MOTOROLA INC., Component Prods. Dept., 2553 N. Edgington, Franklin Park, Ill., 60131, Tel: 312-451-1000, TWX: 910-227-0799 .... p. 1•398

Customer service: C. Chopp

Free literature available: K1100A - Crystal Clock Oscillator, K1114A - K1115A - K1116A Economy Class Crystal Clock Oscillator, K1117A - K1123A Clock Generator for INTEL 8080 Microprocessor, K1112A - K1122A - Clock Generator for Motorola M6800 Microprocessor, Preliminary Data Sheets

Products manufactured: Integrated Circuit Devices, Oscillators

Local Sales Offices & Reps.

Ala	Huntsville, Barnhill Assocs.	205-883-9394
Ariz	Scottsdale, F. Board Assocs.	602-994-9388
Cal	Inglewood, J. Berman Co.	213-776-1281
Cal	San Carlos, Kottmeier Assocs.	415-592-8333
Fla	Altamonte Springs, Semtronic Assocs.	305-831-8233
Fla	Fort Lauderdale, Semtronic Assocs.	305-771-0010
Ill	Franklin Park, Component Prods. Dept. Motorola Inc.	312-451-1000
Ill	Skokie, Mar-Con Assocs.	312-675-6450
Ind	Indianapolis, Sheridan Assocs.	317-547-7777
Md	Timonium, Barnhill Assocs.	301-252-5610
Mass	Natick, Wayland Engrg. Sls.	617-655-6080
Mich	Farmington, Sheridan Assocs.	313-477-3800
Mo	Florissant, Sheridan Assocs.	314-837-5200
NJ	Keasby, Addem 3	516-567-5900
NY	Buffalo, Ossmann Comp. Sls.	716-832-4271
NY	Deer Park, Addem 12	516-567-5900
NY	Huntington Station, Addem 1	516-567-5900
NY	Kingston, Ossmann Comp. Sls.	914-338-5505
NY	Massapequa Park, Addem 4	516-567-5900
NY	Rochester, Ossmann Comp. Sls.	716-442-3290
NY	Syracuse, Ossmann Comp. Sls.	315-454-4477
NY	Vestal, Ossmann Comp. Sls.	607-785-9949
NC	Raleigh, Barnhill Assocs.	919-876-5617
Ohio	Beachwood, Sheridan Assocs.	216-831-0130
Ohio	Cincinnati, Sheridan Assocs.	513-761-5432
Ohio	Dayton, Sheridan Assocs.	513-277-8911
Okla	Tulsa, H.J. Daly Co.	918-627-4159
Ore	Portland, Almac/Stroum Electronics	503-292-3534
Pa	Bala Cynwyd, Vantage Sls. Co.	215-667-0990
Pa	Pittsburgh, Sheridan Assocs.	412-242-1640
Tenn	Johnson City, Barnhill Assocs.	615-928-0184
Tex	Dallas, R.M. Electronics	214-233-0363
Tex	Houston, R.M. Electronics	713-664-7131
Va	Lynchburg, Barnhill Assocs.	804-846-4624
Wash	Seattle, Almac/Stroum Electronics	206-763-2300

MOTOROLA SEMICONDUCTOR PRODS., Tech. Info. Ctr. T902, 5005 E. McDowell Rd., Phoenix, Ariz., 85008, Tel: 602-244-3464, TWX: 910-951-1334; Empl.: 10000

Products manufactured: Capacitors, Fixed, Circuits, Integrated, Silicon Monolithic, Unpackaged Chips, Controls/Control Eqpt., Diodes, Integrated Circuit Devices, Isolators, Multipliers, Rectifiers, References, D-C Voltage, Regulators, Resistors, Suppressors, Technical Books, Thyristors (Includes Silicon Controlled Rectifiers), Transistors

Local Sales Offices & Reps.

Ala	Huntsville	205-533-1650
Ariz	Phoenix	602-244-6364
Cal	Encino	213-986-6850
Cal	Menlo Park	415-854-1910
Cal	San Diego	714-560-4644
Cal	Santa Ana	714-558-2601
Colo	Denver	303-770-2122
Conn	Hamden	203-281-0771
Fla	Maitland	305-644-3422
Fla	Palm Beach Gardens	305-622-2700
Fla	Pompano Beach	305-782-4464
Fla	St. Petersburg	813-576-6030
Ga	Atlanta	404-255-2043
Ill	Chicago	312-992-2320
Ill	Schiller Park	312-678-7205
Ind	Ft. Wayne	219-485-1691
Ind	Indianapolis	317-849-7060
Iowa	Cedar Rapids	319-393-8632
Kans	Mission	913-384-3050
Md	Hyattsville	301-779-1100
Mass	Lexington	617-861-1350
Mich	Garden City	313-261-6200
Mich	Saugatuck	616-857-2159
Minn	Minneapolis	612-545-0251
Mo	St. Louis	314-872-7681
NJ	Cherry Hill	609-665-3783
NJ	River Edge	201-488-1200
NM	Albuquerque	505-266-5763
NY	Fishkill	914-896-8970
NY	Hauppauge	516-231-9000
NY	Rochester	716-381-7220
NY	Syracuse	315-454-9373
NC	Raleigh	919-782-7604
Ohio	Cleveland	216 461-3160
Ohio	Dayton	513-294-2231
Ohio	Worthington	614-846-9460
Okla	Tulsa	918-664-5227
Ore	Portland	503-297-2235
Pa	Ft. Washington	215-643-4500
SC	Columbia	803-788-0585
Tex	Dallas	214-661-9829
Tex	Houston	713-688-4583
Wash	Bellevue	206-455-3700
Wisc	Wauwatosa	414-476-5554

Local Distributors

Ala	Huntsville, Hall-Mark Elctrns.	205-539-0691
Ariz	Phoenix, Hamilton/Avnet Elctrns.	602-275-7851
Ariz	Phoenix, Liberty Elctrns./Arizona	602-257-1272
Cal	El Segundo, Liberty Elctrns. Corp.	213-322-8100
Cal	Irvine, Cramer/Los Angeles	213-771-8300

Directory of Local Distributors Starts on page 401

Cal	Los Angeles, Hamilton Electro Sls.	213-870-7171
Cal	Mountain View, Elmar Elctrns.	415-961-3611
Cal	Mountain View, Hamilton/Avnet Elctrns.	415-961-7000
Cal	San Diego, Hamilton/Avnet Elctrns.	714-279-2421
Cal	San Diego, Liberty Elctrns./San Diego	714-565-9171
Cal	Sunnyvale, Cramer/San Francisco	408-739-3011
Colo	Commerce City, Elmar Elctrns.	303-287-9611
Colo	Denver, Hamilton/Avnet Elctrns.	303-534-1212
Conn	Danbury, Schweber Elctrns.	203-792-3500
Conn	North Haven, Cramer Elctrns.	203-239-5641
Fla	Hollywood, Cramer Elctrns.	305-923-8181
Fla	Hollywood, Hamilton/Avnet	305-925-5401
Fla	Hollywood, Schweber Elctrns.	305-927-0511
Fla	Orlando, Cramer Elctrns.	305-894-1511
Ga	Norcross, Hamilton/Avnet Elctrns.	404-448-0800
Ill	Chicago, Newark Elctrns. Corp.	312-638-4411
Ill	Chicago, Semiconductor Specialists	312-279-1000
Ill	Schiller Park, Hamilton/Avnet Elctrns.	312-678-6310
Ind	Indianapolis, Graham Elctrns. Supply	317-634-8202
Kans	Lenexa, Hamilton/Avnet Elctrns.	913-888-8900
Md	Rockville, Cramer Elctrns.	301-948-0110
Md	Rockville, Pioneer/Washington Elctrns.	301-424-3300
Md	Rockville, Schweber Elctrns.	301-881-2970
Md	Savage, Pyttronic Inds.	301-792-7000
Mass	Burlington, Hamilton/Avnet Elctrns.	617-273-2120
Mass	Lexington, Harvey Elctrns.	617-861-9200
Mass	Newton Centre, Cramer Elctrns.	617-969-7700
Mich	Detroit, RS Elctrns.	313-491-1012
Mich	Livonia, Hamilton/Avnet Elctrns.	313-522-4700
Minn	Edina, Cramer/Minneapolis	612-835-7811
Minn	Edina, Hamilton/Avnet Elctrns.	612-941-3801
Mo	Hazelwood, Hamilton/Avnet Elctrns.	314-731-1144
NJ	Cedar Grove, Hamilton/Avnet Elctrns.	201-239-0800
NJ	Moorestown, Arrow Elctrns.	609-235-1900
NJ	Mt. Laurel, Hamilton/Avnet Elctrns.	609-234-2133
NJ	Pennsauken, Radio Elect. Svc. Co.	609-662-4000
NJ	Somerset, Schweber Elctrns.	201-469-6008
NM	Albuquerque, Hamilton/Avnet Elctrns.	505-765-1500
NY	East Syracuse, Cramer/Syracuse	315-437-6671
NY	Hauppague, Cramer Elctrns.	516-231-5600
NY	Rochester, Cramer Elctrns.	716-275-0300
NY	Westbury, Schweber Elctrns.	516-334-7474
NY	Woodbury, Harvey Elctrns.	516-921-8700
NC	Winston-Salem, Cramer Elctrns.	919-725-8711
Ohio	Cleveland, Pioneer-Standard Elctrns.	216-587-3600
Ohio	Dayton, Hamilton/Avnet Elctrns.	513-433-0610
Ohio	Dayton, Pioneer/Dayton	513-236-9900
Ohio	Solon, Cramer/Cleveland	216-248-8400
Pa	Pittsburgh, Cameradio	412-288-2600
SC	Columbia, Dixie Radio Supply Co.	803-253-5333
Tex	Dallas, Hall-Mark Elctrns.	214-231-6111
Tex	Dallas, Hamilton/Avnet Elctrns.	214-661-8661
Tex	Dallas, Sterling Elctrns.	214-357-9131
Tex	El Paso, Midland Specialty Co.	915-533-9555
Tex	Houston, Hamilton/Avnet Elctrns.,	713-526-4661
Tex	Houston, Sterling Elctrns.	713-623-6600
Utah	Salt Lake City, Cramer Elctrns.	801-487-4131
Wash	Bellevue, Hamilton/Avnet Elctrns.	206-746-6720
Wash	Seattle, Liberty Elctrns.	206-763-8200
For:	Can., London, Ont., CM Peterson Co.	519-434-3204
For:	Can., Mississauga, Ont., Hamilton/Avnet	416-677-7432
For:	Can., Montreal, P.Q., Electronic Wholesalers Co.	514-769-8851
For:	Can., Montreal, P.Q., Hamilton/Avnet	514-735-6393
For:	Can., Ottawa, Ont., Electronic Wholesalers Co.	613-237-4703
For:	Can., Ottawa, Ont., Hamilton/Avnet	613-725-3071
For:	Can., Toronto, Ont., Zentronics, Ltd.	416-787-1271
For:	Can., Vancouver, B.C., L. A. Varah	604-873-3211
For:	Can., Vancouver, B.C., Bowtek Elec. Co.	604-736-7677
For:	Can., Winnipeg, Man., Jang Elctrns.	204-786-7521

MPB CORP., Precision Park, Keene, N.H., 03431, Tel: 603-352-0310, TWX: 710-366-1801; Empl.: 1600

Products manufactured: Bearings, Bushings, Glass, Plastic, Metal, Rubber, Etc.

Local Sales Offices & Reps.

Cal	Glendale	213-245-6413
Conn	Milford	203-877-3208
Ill	Rolling Meadows	312-259-7800

MOXON INC., 2222 Michelson Dr., Irvine, Cal., 92664, Tel: 714-833-2000, TWX: 910-596-1362; FSC No: 22623; Empl.: 85; Minimum order: $50 .... p. 1•752,2343

Free literature available: Sales brochures describing in detail Timing Systems, Digital Data Generators, LVDT and Torque Transducers, Power Supplies, Signal Conditioning Equipment and CATV Equipment. Products produced to Mil and Commerical Specifications.

Products manufactured: Amplifiers, Calibrators, CATV Systems & Equipment, Converters, Encoders, Gages, Generators, Indicators, Power Supplies, Signal Conditioners & Equipment, Television Systems & Equipment Closed-Circuit, Testers, Transducers

Local Sales Offices & Reps.

Ala	Huntsville, Int'l. Scientific Instrs.	205-837-1601
Ariz	Phoenix, Moxon Elctrns.	602-945-3737
Cal	Irvine, Moxon Elctrns.	714-556-6500
Cal	San Diego, Moxon Elctrns.	714-292-4820
Cal	Santa Clara, Moxon Elctrns.	408-249-2491
Fla	Orlando, Truex Assocs.	305-859-2160
Md	Rockville, Farrell Assocs.	301-424-9460
Mass	Stoneham, Ken Corp.	617-438-5464
Mich	Farmington, Carter McCormic & Peirce	313-477-7700
Mich	Kalamazoo, Carter McCormic & Peirce	616-349-9666
NJ	Union, S B M Reps Inc.	201-687-8737
NY	Pleasantville, S B M Reps. Inc.	914-769-1811
NY	Rochester, S B M Reps. Inc.	716-266-1400
NC	Winston Salem, Int'l. Scientific Instrs.	919-722-1783
Ohio	Cleveland, Carter McCormick & Peirce	216-333-5650
Ohio	Dayton, Carter McCormic & Peirce	513-278-5873
Pa	Pittsburgh, Carter McCormick & Peirce	412-824-3760
Tex	Dallas, Martin, Zienkosky, Browne & Assocs.	214-233-5535
Tex	Houston, Martin, Zienkosky, Browne & Assocs.	713-523-7333
Wash	Seattle, R. Drake Assocs.	206-763-2755

MPC PRODS. CORP., 4200 W. Victoria Ave., Chicago, Ill., 60646, Tel: 312-583-5100, TWX: 910-221-2576; FSC No: 019710; Empl.: 115

Customer service: Sls. Dept.

Products manufactured: Actuators, Amplifiers, Controls/Control Eqpt., Drives & Drive Mechanisms (Dial), Gearheads & Speed Reducers, Gears & Gear Mechanisms (Precision), Motors, Potentiometers, Servo Systems, Tachometers

MRC ALARM SYSTEMS & DEVICES CO., 700 W. Virginia St., Milwaukee, Wisc., 53204, Tel: 414-271-4343 .... p. 1•1017

Products manufactured: Alarms

Local Sales Offices & Reps.

Cal	Pinole, Bryce Bogue	415-758-1010
Cal	Westlake Village, K. Jensen	213-889-1606
Ga	Chamblee, R. J. Shafer	404-458-7483
Haw	Honolulu, J. J. Harding Co., Ltd.	808-841-0941
Pa	Bala-Cynwyd, M. Friedman Assocs.	215-839-3450
Wash	Seattle, D. Smith Sls. Co.	206-633-3160
FOR:	Can., Kitchener, Ont., Poetker Comms., Ltd.	519-576-1010

MU-DEL ELCTRNS., 2426 Linden La., Silver Spring, Md., 20910, Tel: 301-587-6087; Empl.: 14; Minimum order: $50

For info on price: I. Kuzminsky; Application info: I. Kuzminsky; Customer service: I. Kuzminsky; Delivery info: H. E. Blum

Free literature available: Catalog Sheets

Products manufactured: Amplifiers, Attenuators, Comm. Systems, Converters, Couplers, Diplexers, Antenna, Dividers, Filters, Mixer-Preamplifiers, Microwave, Mixers, Multiplexers, Multipliers, Networks, Oscillators, Preselectors, Receivers

Local Sales Offices & Reps.

Ala	Huntsville, Anderson Assocs.	205-881-6770
Fla	Orlando, Unirep	305-295-4817
Md	Greenbelt, Riffe Assocs.	301-474-8600
Mass	Reading, L. DeBrigard	617-944-5661
NM	Albuquerque, Moore-Eiler Assocs.	505-292-3322
NY	Greenvale, B. D. Aaron & Co.	516-621-0630
Pa	Huntington Valley, Rabal Assocs.	215-947-4825
Tex	Arlington, J. T. Houston Assoc.	817-265-2931

MUELLER ELECTRIC CO., 1589 H East 31st St., Cleveland, Ohio, 44114, Tel: 216-771-5225; FSC No: 5999; Empl.: 156; Minimum order: $3 .... p. 2•718,719

Customer service: Sls. Dept.

Free literature available: 8-page general catalog G1 illustrates and describes complete line of electric test and battery clips and clip insulators.

Products manufactured: Cable, Clamps & Clips, Insulators & Insulation

Local Sales Offices & Reps.

Ariz	Phoenix, Maddox Sls. Co.	602-274-3807
Cal	Pico Rivera, Maddox Sls. Co.	213-949-5433
Cal	San Francisco, Maddox Sls. Co.	415-431-2953
Colo	Denver, L B Putnam Co.	303-825-5066
Fla	Orlando, Cartwright & Bean	305-422-4531
Fla	Plantation, Cartwright & Bean	305-791-3989
Ga	Atlanta, Cartwright & Bean	404-255-5262
Ill	Libertyville, R. Klipp Assocs.	312-362-4676
Ind	Indianapolis, Sukup & Cox Inc.	317-253-5501
Kans	Shawnee Mission, K & M Sls. Co.	913-262-1444
La	Chalmette, Cartwright & Bean	504-279-4598
Md	Baltimore, E-K-P Assocs.	301-788-6498
Mass	Lynn, Keene Sls. Co.	617-595-2300
Mich	Ferndale, Hilltronics Inc.	313-398-5556
Minn	Minneapolis, A.S. Miller & Sons	612-727-1952
NY	Buffalo, R W Mitscher Co.	716-663-7970
NY	Port Washington, Joseph Assocs.	516-883-7770
NC	Cary, Cartwright & Bean	919-832-7128
NC	Charlotte, Cartwright & Bean	704-537-7965
NC	Raleigh, Cartwright & Bean	919-832-7128
Ohio	Columbus, Mandabach & Assoc.	614-235-0265
Ore	Portland, Richard Legg Co.	503-292-8824
Pa	Easton, E-K-P Assocs.	215-258-6477
Tenn	Knoxville, Cartwright & Bean	615-693-7450
Tenn	Memphis, Cartwright & Bean	901-276-4442
Tex	Waco, Sanders-Willis Co.	817-776-1742
Utah	Salt Lake City, L B Putnam Co.	801-277-0375
EXP:	Can., Toronto, Downsview, W H Cooper & Co.	416-630-3900

MULTI-ELMAC CO., 22700 Heslip Dr., Novi, Mich., 48050, Tel: 313-349-3990; Empl.: 150

For info on price: T. Alsheskie, X44; Application info: R. DeVoll, X43; Customer service: T. Alsheskie, X44; Delivery info: T. Alsheskie, X44

Products manufactured: Controls/Control Eqpt., Receivers, Transmitters

Local Sales Offices & Reps.

Cal	Orange, Multi-Elmac Co.	714-997-1251
Colo	Denver, Howard Sls.	303-936-0134
Mich	Linden, R. Zerull	313-735-7497
Mo	Marshall, T.J. McCune	816-886-5308
Pa	Morrisville, E.F. Weiss	215-295-8254
Tex	Rockwall, Southwestern Sls. Co.	214-722-6515

MULTICORE SOLDERS, Div. Avnet, Long Island Expwy., Westbury, N.Y., 11590, Tel: 516-334-7450, TWX: 510-222-2219; Empl.: 1000

Products manufactured: Cleaners & Solvents, Coatings, Flux, Brazing & Soldering Materials, Kits, Test Equipment, Solder (All Types), Testers

Local Sales Offices & Reps.

Mo	Kansas City, Forristal-Young Sls. Co.	316-358-6771

MULTIMETRICS, See Comstron-Seg Multimetrics

MUPAC CORP., 646 Summer St., Brockton, Mass., 02402, Tel: 617-588-6110, TWX: 710-345-0194; Empl.: 70; Minimum order: $35

For info on price: E. Olson; Application info: B. Leary; Customer service: E. Olson; Delivery info: E. Olson

Free literature available: Sixteen page catalog listing hardware in a wirewrap* mode to package micro electronic systems.

Products manufactured: Boards, Plug-In, Boards, Printed Wiring, Universal, Cable, Chassis, Circuit Board Mounting, Chassis, Metal, Connectors, Drawers, Sliding, Jack Covers, Jumpers, Panels, Racks, Sockets, Terminals, Tools

Local Sales Offices & Reps.

Cal	Anaheim, Lodan, Inc.	213-924-1691
Cal	San Carlos, Lodan, Inc.	415-592-4600
Colo	Littleton, Eissler Sls. & Svcs.	303-794-1779

Conn	North Haven, Forsberg Sls.	203-239-5111
Fla	Lighthouse Point, Saber Assocs.	305-943-3076
Fla	Orlando, Saber Assocs.	305-422-3686
Ga	Woodstock, Saber Assocs.	404-432-9625
Ill	Morton Grove, T-Squared Assocs.	312-965-1515
Md	Silver Springs, Rep-Tron, Inc.	301-593-4844
Mass	Brockton, Forsberg Sls.	617-522-6300
Minn	Minneapolis, C.E. Bohlig Co.	612-922-7011
Mo	Blue Springs, Chesco	816-229-1404
Mo	St. Charles, Chesco	314-946-6677
NJ	Flanders, K & R Engrg Sls Co.	201-584-5235
NY	Bayside, K & R Engrg Sls Co.	212-225-8879
NY	Syracuse, Marcom Assocs.	315-437-2845
Ohio	Chagrin Falls, Midwest Mktg. Assocs.	216-247-6655
Ohio	Dayton, Midwest Mktg. Assocs.	513-433-2511
Pa	Harleysville, T. Jackson Assocs.	215-643-5560
Tex	Dallas, EBR, Inc.	214-942-2716

MURA CORP., 50 S. Service Rd., Jericho, N.Y., 11753, Tel: 516-334-2700; Empl.: 25

For info on price: J. Gaffney; Application info: B. Lipsky; Customer service: B. Lipsky; Delivery info: B. Lipsky

Products manufactured: Display Devices/Displays, Indicators, Lamps, Lights, Meters, Microphones, All Kinds, Probes, Rectifiers

MURATA CORPORATION OF AMERICA, 2 Westchester Plaza, Elmsford, N.Y., 10523, Tel: 914-592-9180, Telex: 13-7332; Empl.: 12

Customer service: Cust. Svc.

Products manufactured: Filters, Heaters & Heating Elements, Resistors, Thermistors, Transducers, Tuning Forks

Refer to Murata Corp. of America, Capacitor Div. for sales office information.

MURATA CORP. OF AMERICA, Capacitor Div., Rockmart Ind'l. Pk., Rockmart, Ga., 30153, Tel: 404-684-7143, Telex: 54-2999 .... p. 2•211

Customer service: G. Beylouny

Products manufactured: Capacitors, Fixed

Local Sales Offices & Reps.

Ala	Huntsville, 20TH Century Mktg.	205-772-9237
Ariz	Tempe, Argus Sls.	602-967-8709
Cal	Inglewood, J. Berman	213-649-6111
Cal	Mountain View, Cindel	415-965-2630
Cal	Van Nuys, MCA Southern California	213-785-0487
Colo	Denver, Omega, Ltd.	303-758-1508
Fla	Fort Lauderdale, Semtronic Assocs.	305-771-0010
Ga	Atlanta, Grady Duckett Sls. Co.	404-451-3529
Ill	Hinsdale, Momak Sls.	312-654-4524
Ind	Indianapolis, Electro-Reps	317-255-4147
Kans	Prairie Village, Engrg. Svcs. Co.	914-649-4000
Md	Ellicott City, Doss Elctrns.	301-465-1336
Mass	Framingham, MCA Boston	617-872-4843
Mich	Southfield, Luebbe Sls. Co.	313-357-0355
Minn	St. Louis Park, Beta Engrg.	612-925-4422
Mo	St. Louis, Engrg. Svcs. Co.	314-997-1515
NY	Jericho, HRC Comp-Tech	516-822-5550
NY	New Hartford, MCA Upper N.Y. State	315-732-3507
Ohio	Cincinnati, Luebbe Sls. Co.	513-871-4211
Ohio	Cleveland, Luebbe Sls. Co.	216-333-0425
Pa	Philadelphia, S.K. MacDonald	215-545-1205
Tex	Dallas, Blackburn Assocs.	214-692-8885
Wash	Seattle, Harry Levinson Co.	206-EA3-5100

MURATA MFG. CO. LTD., Nagaoka-Shi, Kyoto, Japan, Tel: 075-921-9111; Empl.: 1800

Products manufactured: Amplifiers, Capacitors, Fixed, Capacitors, Variable, Chamber, Environmental Test, Circuits, Hybrid, Thick Film, Coatings, Coders, Cores, Magnetic, Ferrite Material & Parts, Filters, Heaters & Heating Elements, Insulators & Insulation, Magnets, Networks, Oscillators, Ovens, Paints, Potentiometers, Resistors, Spark Gaps, Switches, Thermistors, Transducers, Tubes, Tuning Forks

Local Sales Offices & Reps.

Ga	Rockmart, Murata Corp. of America	404-684-7143
NY	Elmsford, Murata Corp. of America	914-592-9180

MYLEE DIGITAL SCIENCES, 155 Weldon Pkwy., Maryland Heights, Mo., 63043, Tel: 314-567-3420; Empl.: 80

For info on price: C. Bogner; Application info: G. Graves; Customer service: J. Acup; Delivery info: G. Graves

Free literature available: IMS - General product features; A-L6 - Small systems; A-18 - General system; Plan 3 - Multistore.

Products manufactured: Comm. Systems, Computers

Local Sales Offices & Reps.

Ala	Birmingham, Automation Inc.	205-595-7787
Alas	Anchorage, Alaska Digital	907-272-4414
Cal	Los Angeles, Franklen Computer Sys.	213-483-4711
Cal	Mountain View, Mylee Digital Sciences	415-965-2227
Cal	San Diego, Saber Sys.	714-296-2162
Colo	Denver, Total Business Sys.	303-333-4256
Fla	Longboat Key, Inventrol Sys., Inc.	813-383-1424
Ga	Atlanta, H & B Office Machines	404-872-4236
Haw	Honolulu, Automated Data Sys.	808-536-8556
Ill	Northfield, Mylee Digital Sciences	312-446-3002
Ind	Indianapolis, Indianapolis Office Machines	317-353-9336
Iowa	West Des Moines, Electronic Business Sys., Inc.	515-225-2489
Kans	Kansas City, Midwest Data Sys.	816-363-0470
Ky	Louisville, Accounting Machines Sls. & Service	502-583-4417
La	Metairie, Delta Business Machines, Inc.	504-368-3402
Md	Towlson, Natl. Business & Security Sys.	301-296-0600
Mass	Boston, Systems Automation, Inc.	617-246-1620
Mich	Ann Arbor, Data Machines Corp.	313-761-0450
Minn	Minneapolis, Information Products, Inc.	612-721-6391
Miss	Clinton, Regional Sls. Corp.	601-924-5696
NJ	Cinnaminson, Mylee Digital Sciences	
NY	Rochester, Business Machines of NYS	716-271-2010
NC	Charlotte, Auto Data Corp.	704-366-5721
Ohio	Northfield, B. Prescott	216-467-4727
Ore	Portland, Abbott & Lind	503-282-3245
Pa	Horsham, Mylee Digital Sciences	215-674-4517
Tenn	Memphis, Automation Inc.	901-396-7248
Tex	Dallas, Selectronic Business Mach.	214-363-2531
Utah	Salt Lake City, Herrscher & Co.	801-363-4551
Va	Richmond, American Business Mach.	804-499-9856
Wash	Spokane, Murphy's Business Equip.	509-325-2551

NAMCO CONTROLS, Acme-Cleveland Co., 170 E. 131st St., Cleveland, Ohio, 44108, Tel: 216-268-4200; Empl.: 220; Minimum order: $17

For info on price: Mrs. Cerino; Application info: R. H. Kantner; Customer service: R. Passow; Delivery info: W. Kocianic

Free literature available: "Namco" and "Snap-Lock" Limit Switches miniature to hazardous locations; Proximity Switches - "rf" and magnetic sensing; Pushbutton Control Stations - butt & reed type contacts; Solid State Relays; Reed Switches; Solenoids - miniature to heavy-duty & Coils for A.C.-D.C. applications.

Products manufactured: Coils Including Assemblies & Forms, Controls/Control Eqpt., Drivers, Solenoid, Modules, Logic, Encapsulated, Solenoids, Switches

Local Sales Offices & Reps.

Cal	Thousands Oaks	805-495-47070
Fla	Pompano Beach	305-942-9880
Ga	Marietta	404-427-0241
Ill	Chicago	312-427-0496
La	Kenner	504-722-6363
Mass	Danvers	617-777-0450
Mich	Detroit	313-851-6614
Mo	Kansas City	816-781-3770
Mo	St. Louis	314-965-5880
NJ	Montclair	201-744-6222
NC	Charlotte	704-392-2155
Ohio	Cincinnati	513-271-1530
Ohio	Cleveland	216-942-1496
Ohio	Jefferson	216-576-4074
Ohio	Tiffin	419-447-1291
Ore	Portland	503-760-3400
Pa	Willow Grove	215-659-6900
Tex	Dallas	214-363-8900
Tex	Houston	713-464-4662
Wisc	Walworth	414-275-2771
FOR:	Can., North Burnaby, B.C.	604-291-2361
FOR:	Can., Toronto	416-787-0687

NANO PULSE INDUSTRIES, INC., 249-D E. Emerson Ave., Orange, Cal., 92665, Tel: 714-998-2360, TWX: 910-593-1617; Empl.: 165; Minimum order: $1 p. 2•1773,1774

For info on price: J. Rogers; Application info: B. Grissom; Customer service: J. Rogers; Delivery info: J. Ito

Free literature available: Pulse Transformer Brochure, Memory Design Info Reprints.

Products manufactured: Coils Including Assemblies & Forms, Transformers

Local Sales Offices & Reps.

Ariz	Phoenix, Dorton Ent.	602-263-0414
Cal	San Gabriel, Van Gott & Assocs.	213-285-2148
Cal	Santa Barbara, Astralonics	805-498-2183
Fla	Maitland, Ellis & Assoc.	305-645-1101
Ill	Chicago, El-Rad Mfg. Co.	312-478-7300
Mass	Burlington, J & J Assocs.	617-272-2606
Minn	Minneapolis, Elctrn. Innovators	612-884-7471
NC	Greensboro, L & D Inc.	919-292-3201
Tex	Dallas, Merino Sls. Co.	214-239-9719

NARDA MICROWAVE CORP., Plainview, N.Y., 11803, Tel: 516-433-9000, TWX: 510-221-1867; FSC No: 99899; Empl.: 335; Minimum order: $30

For info on price: R. Nopper Ext. 720; Application info: J. J. Lautermilch Ext. 723; Customer service: D. Marlowe Ext. 227; Delivery info: R. Nopper Ext. 720

Free literature available: Technical notes on microwave measurements, complete catalog of products, various short form catalogs on directional couplers, coaxial attenuators and terminations - technical note on broadband swept oscillators and signal generators.

Products manufactured: Adapters, Waveguide, Amplifiers, Analyzers, Antennas, Attenuators, Bends & Twists, Microwave, Bolometers, Bridges, Cable, Calibrators, Calorimeters, Microwave, Comm. Systems, Comparators, Connector Adapters, Connectors, Converters, Couplers, Demodulators, Detectors, Diplexers, Antenna, Discriminators, Dividers, Drivers, Switch, Dummy Loads, Duplexers, Microwave, Filters, Flanges, Waveguide, Generators, Horns, Microwave, Insertion Loss Measurement Systems, Junctions, Hybrid, Microwave, Line Strechers, Microwave, Meters, Microwave Integrated Circuits (MIC's), Mixers, Modulators, All Kinds, Monitors, Mounts, Oscillators, Probes, Receivers, Semiconductor Wafer Fabrication, Shifters, Slotted Lines, Microwave, Strip-Line Components, Microwave, Suppressors, Switches, Terminals, Thermistors, Transmitters, Tuners, Waveguides & Adapters

Local Sales Offices & Reps.

Ariz	Scottsdale, BFA Corp.	602-946-4215
Cal	Menlo Pk., Straube Assocs.	415-323-2476
Cal	Woodland Hills, Interstate Mktg. Assocs.	213-883-7606
Fla	Orlando, E.G. Holmes & Assocs.	305-894-8901
Ga	Chamblee, E.G. Holmes & Assocs.	404-451-6161
Ill	Chicago, Scientific Sls. Co.	312-775-7594
Ind	Indianapolis, Scientific Sls. Co.	317-253-4606
Kans	Shawnee Mission, EIR Co.	913-362-0919
Md	Kensington, Elctrn. Mktg. Assocs.	301-881-5300
Mass	Burlington, Tritek, Inc.	617-272-4550
Mich	Detroit, Micro Sls. Corp.	313-482-1229
Minn	Bloomington, Scientific Sls. Co.	612-881-3300
Mo	Hazelwood, EIR Co.	314-895-4100
NJ	Pennsauken, Megargel/Himmelstein Assoc.	215-629-1072
NJ	Westfield, Gray & Reed Assoc., Inc.	201-233-6116
NM	Albuquerque, Inter-Mountain Engrg. Co.	505-883-9010
NY	E. Syracuse, Ossmann Instrs., Inc.	315-437-6666
NY	Huntington Sta., Gray & Reed Assoc.	516-433-3333
NY	Rochester, Ossmann Instrs.	716-328-2230
NY	Vestal, Ossmann Instrs., Inc.	607-785-9947
Ohio	Cleveland, Micro Sls. Corp.	216-243-7430
Ohio	Dayton, Micro Sls. Corp.	513-298-3033
Okla	Norman, Data Mktg. Assocs.	405-364-8320
Tex	Dallas, Data Mktg. Assocs.	214-661-0300
Tex	Houston, Data Mktg. Assocs.	713-686-9627
Tex	San Antonio, Data Mktg. Assocs.	512-828-0937
Va	Virginia Beach, E.G. Holmes & Assocs.	804-481-6556
Wash	Seattle, Showalter-Judd, Inc.	206-624-9020
FOR:	Can., Downsview, Ont., Electronetic Sys., Ltd.	416-661-3673
FOR:	Can., Montreal, Que., Electronetic Sys., Ltd.	514-342-4112
FOR:	Can., Ottawa, Ont., Electronetic Sys., Ltd.	613-733-3781

NATIONWIDE ELCTRN. SYS., See NES

NATEL ENGINEERING CO., 8954 Mason Ave., Canoga Park, Cal., 91306, Tel: 213-882-9620, TWX: 910-494-1959; Empl.: 35 .... p. 1•184-187

Products manufactured: Amplifiers, Converters, Data Acquisition & Reduction Systems, Demodulators, Detectors, Indicators, Modulator/Demodulators, Signal Conditioners & Equipment, Synchro Transmitters, Solid-State

NATIONAL BERYLLIA CORP., Greenwood Ave, Haskell, N.J., 07420, Tel: 201-839-1600, TWX: 710-988-5363; Empl.: 300

Products manufactured: Alloys, Circuits, Printed, Multilayer, Coatings, Compounds, Encapsulating, Insulating, Molding, Potting, Cores, Ceramic, Couplers, Crystals, Graphite Parts, Headers, Insulators & Insulation, Integrated Circuit Packaging Systems, Packages, Integrated Circuit, Pads, Transistor Mounting, Seals, Semiconductor Wafer Fabrication, Services, Assembly, Production & Test, Substrates, Thermocouples, Elements & Accessories, Transistor, Diode, Thyristor Heat Dissipators, Tubing

NATIONAL CAMERA INC., 2000 W. Union Ave., Englewood, Colo., 80110, Tel: 303-789-1893; Empl.: 56; Minimum order: $5

For info on price: E. Kuhlman; Application info: E. Kuhlman; Customer service: H. Love; Delivery info: E. Kuhlman

Free literature available: FLASHER catalog of unique or hard-to-find tools, test instruments, technical supplies. Instruction manuals and specifications for photographic equipment test instruments. Sample copy of magazine for photo equipment technicians. Sheet describing technical literature on photographic equipment.

Products manufactured: Batteries, Cabinets & Accessories, Calculators, Electrical & Electronic, Cleaners & Solvents, Cleaners, Ultrasonic, Drills & Accessories, Hand & Power, Gages, Magnifying Glasses, Inspection, Meters, Microscopes, Pliers, Rings, Retaining, Rivets, Screwdrivers, Services, Assembly, Production & Test, Solder (All Types), Soldering Accessories, Soldering Guns, Irons & Desoldering Tools, Tachometers, Testers, Tools, Torches, Soldering, Welding & Access., Tweezers, Hand & Vacuum, Wire Strippers, Wire Twisters

NAT'L CERAMIC CO., 500 Southard St., Trenton, N.J., 08602, Tel: 609-394-5373; Empl.: 50; Minimum order: $33

For info on price: E. A. Domber; Application info: J. M. Welke; Customer service: E. A. Domber; Delivery info: A. B. Hunt

Free literature available: Ceramic insulators and/or metal part assemblies using ceramic insulators. All insulators JAN-I-8, MIL-I-10-A and MIL-I-23264

Products manufactured: Insulators & Insulation, Tubing

Local Sales Offices & Reps.

Iowa	Cedar Rapids, J. R. Sls. Engr.	319-377-8211
NY	Liverpool, Wadsworth Mfg. Assocs.	315-652-6865

NATIONAL CONNECTOR, Div of Fabri Tek, Inc., 9210 Science Center Dr., Minneapolis, Minn., 55428, Tel: 612-533-3533, TWX: 910-576-2717; Empl.: 250

Customer service: P. Van Wyngeeren

Free literature available: Connector Design Guide - Plate & Molded Types Telephone Connectors Printed Circuit Board Headers High Reliability PC Connectors

Products manufactured: Connector Adapters, Connectors, Contact Strips, Finger, Contacts, Electrical, Sockets, Terminals

Local Sales Offices & Reps.

Ala	Huntsville, 20th Century Mktg.	205-772-2194
Ariz	Phoenix, M R Engrg. Sls. Co.	602-959-5150
Cal	Burlingame, Jack Logan & Assocs.	415-697-6100
Cal	Escondido, Cirolia Elctrn. Sls.	714-743-3015
Cal	Woodland Hills, Elcon Elctrns.	213-884-4852
Conn	North Haven, Kitchen & Kutchin	203-239-0212
Fla	Indialantic, J. Talbot	305-724-2386
Fla	Lighthouse Point, Saber Assocs.	305-943-3076
Fla	Longwood, D. Mitro	305-422-3686
Ill	Oak Brook, Whitmore & Assoc.	312-325-4727
Ind	Fort Wayne, Delesa Sls.	219-483-9537
Ind	Indianapolis, F. Thomas	317-257-4683
Md	Baltimore, Burgin-Kreh Assocs.	301-788-5200
Mass	Lexington, Kitchen & Kutchin	617-862-8230
Mass	N. Andover, R. Hicks	617-686-6975
Mass	Westwood, B. Reinherz	617-762-9272
Minn	Minneapolis, S & R Sls	612-544-3022
Mo	Kansas City, Thro Ind. Sls. Co.	913-362-2533
NJ	Springfield, F.F. Sylvester Assoc.	201-944-6964
NY	Fayetteville, Martin P. Andrews	315-637-3144
NC	Winston-Salem, L. G. White Southern	919-725-3612
Ohio	Richfield, Bear Mktg.	216-659-3131
Pa	Narberth, Jerry Bresson Assocs.	215-839-8770
Tex	Richardson, Concept Sls.	214-387-1434
Va	Lynchburg, Burgin-Kreh Assocs.	804-845-5600
FOR:	Can., Thornhill, Ont., Elctrns. Components Int.	416-889-0212

NATIONAL ELECTRONIC SUPPLY, INC., 7231-B Garden Grove Blvd., Garden Grove, Cal., 92641, Tel: 213-430-7525, TWX: 910-596-1316; Empl.: 32; Minimum order: $10

Customer service: M. Hartstein

Free literature available: Capacitor catalog and mil-spec capacitor directory. Complete pricing and manfacturer's information displayed in easy-to-understand language.

Products manufactured: Capacitor, Hardware, Capacitors, Fixed

Local Sales Offices & Reps.

Minn	Minneapolis, Components Group	612-824-4222

NATIONAL ELECTRONICS, Varian Div., Box 269, Geneva, Ill., 60134, Tel: 312-232-4300, TWX: 910-237-1685; Empl.: 400

Products manufactured: Display Devices/Displays, Drivers & Decoders For Readouts, Integrators, Electronic, Semiconductor Wafer Fabrication, Tubes

Local Sales Offices & Reps.

Cal	Los Altos	415-968-7633
Ill	Geneva	312-232-4300

NATIONAL SEMICONDUCTOR CORP., 2900 Semiconductor Dr., Santa Clara, Cal., 95051, Tel: 408-732-5000, TWX: 910-339-9240; Empl.: 15000

Customer service: R. Weaver

Products manufactured: Amplifiers, Calculators, Electrical & Electronic, Circuits, Hybrid, Thick Film, Circuits, Hybrid, Thin-Film, Circuits, Integrated, Silicon Monolithic, Unpackaged Chips, Clocks (All Types), Comparators, Computers, Controllers, Programmable, Converters, Counters, Data Acquisition & Reduction Systems, Decoders, Diodes, Display Devices/Displays, Drivers, Solenoid, Drivers & Decoders For Readouts, Encoders, Integrated Circuit Devices, Isolators, Keyboards, Alphanumeric & Decimal, Lamp Drivers, Memories, Buffer, Memory Systems, Modulator/Demodulators, Modulators, All Kinds, Multiplexers, Multipliers, Power Supplies, References, D-C Voltage, Regulators, Shift Registers, Timers, Transducers, Transistors

Local Sales Offices & Reps.

Ala	Huntsville, Inter Rep. Assocs., Inc.	205-881-3677
Ala	Huntsville, National Semiconductor	205-881-0622
Ariz	Scottsdale, Fred Board Assocs.	602-994-9388
Ariz	Scottsdale, National Semiconductor	602-945-8473
Cal	Buena Park, P. H. Wastal & Assoc.	714-826-7434
Cal	Mountain View, National Semiconductor	415-961-4740
Cal	Palo Alto, Quad Rep, Inc.	415-964-3532
Cal	San Diego, S.R. Electronics	714-565-8411
Cal	San Leandro, Quad Rep, Inc.	415-352-5942
Cal	Sherman Oaks, National Semiconductor	213-783-8272
Cal	Tustin, National Semiconductor	714-832-8113
Colo	Denver, Electrodyne Inc.	303-757-7679
Conn	Danbury, National Semiconductor	203-744-2350
Conn	Westport, National Semiconductor	203-226-6833
Conn	Westport, P.A.L. Comps. Inc.	203-226-6835
Fla	Clearwater, Dyne A Mark	813-441-4702
Fla	Ft. Lauderdale, Dyne A Mark	305-771-6501
Fla	Miami, National Semiconductor	305-446-8309
Fla	Orlando, Dyne A Mark	305-299-6303
Ga	Atlanta, Inter Rep. Assoc.	404-394-7756
Ill	Chicago, Gassner & Clark Co.	312-764-6121
Ill	Mt. Prospect, Delta Tech. Sls.	312-437-9412
Ill	Mt. Prospect, National Semiconductor	312-394-2030
Ind	Ft. Wayne, Advanced Comp. Sls.	219-432-2546
Ind	Indianapolis, Advanced Comp. Sls.	317-545-6441
Ind	Indianapolis, National Semiconductor	317-255-5822
Iowa	Cedar Rapids, Gassner & Clark Co.	319-393-5763
Md	Glen Burnie, Micro Comp. Inc.	301-761-4600
Md	Glen Burnie, National Semiconductor	301-760-5220
Mass	Lexington, KCA Components	617-861-9024
Mass	Lexington, National Semiconductor	617-861-6090
Mich	Farmington, National Semiconductor	313-477-0400
Mich	Grand Rapids, Representative Elctrn. Prod.	616-942-1320
Mich	Southfield, Representative Elctrn. Prod.	313-354-9066
Minn	Minneapolis, National Semiconductor	612-888-3060
Minn	Minneapolis, Stan Clothier Co.	612-888-4666
Mo	Hazelwood, Cen Tech	314-731-4220
Mo	Raytown, Cen Tech	816-358-8100
NJ	Cranford, National Semiconductor	201-272-3344
NJ	Englewood Cliffs, National Semiconductor	201-461-5959
NJ	Englewood Cliffs, P.A.L. Comps. Inc.	201-461-3410
NJ	Haddonfield, Thomas Assocs. Inc.	609-854-3011
NM	Albuquerque, A.O. Elctrns.	505-255-8701
NY	Greenvale, P.A.L. Comps. Inc.	516-484-4900
NY	Rochester, Electra Sls. Corp.	716-436-4030
NY	Syracuse, Electra Sls. Corp.	315-455-5783
NY	Syracuse, National Semiconductor	315-455-5858
NC	Raleigh, Inter Rep. Assoc.	919-781-2370
Ohio	Chagrin Falls, Micro Tec.	216-247-5481
Ohio	Dayton, National Semiconductor	513-434-0097
Okla	Tulsa, Carter Assocs. Inc.	918-749-3311
Ore	Beaverton, Vantage Corp.	503-644-6111
Tex	Dallas, National Semiconductor	214-233-6801
Tex	El Paso, Carter Assocs.	915-533-2681
Tex	Garland, Carter Assocs.	214-276-7151
Tex	Houston, Carter Assocs.	713-621-6930
Wash	Bellevue, National Semiconductor	206-454-4600
Wash	Bellevue, Vantage Corp.	206-455-3460
FOR:	Can., Downsview, National Semiconductor	416-630-5751
FOR:	Can., Montreal, Weber Electronic Ltd.	514-738-9415

Local Distributors

Ala	Huntsville, Hall-Mark Elctrns., 2010 Bob Wallace Ave., S.W.	205-539-0691
Ala	Huntsville, Hamilton/Avnet Elctrns., 805 Oster Drive N.W.	205-533-1170
Ariz	Phoenix, Hamilton/Avnet Elctrns., 2615 S. 21st St.	602-269-1391
Ariz	Phoenix, Liberty Elctrns., 3130 North 27th Ave.	602-257-1272
Ark	Little Rock, Carlton Bates, Scott Hamilton at 69th St.	501-562-9100
Cal	Culver City, Avnet Elctrns., 10916 Washington Blvd.	213-558-2345
Cal	Culver City, Hamilton Electro Sales, 10912 W. Washington Blvd.	213-558-2121
Cal	El Segundo, Liberty Elctrns., 124 Maryland St.	213-322-8100
Cal	Mountain View, Elmar Elctrns., 2288 Charleston Rd.	415-961-3611
Cal	Mountain View, Hamilton/Avnet Elctrns., 340 Middlefield Rd.	415-961-7000
Cal	San Diego, Hamilton/Avnet Elctrns., 8917 Complex Dr.	715-279-2421
Cal	San Diego, Liberty Electronics/San Diego, 8248 Mercury Ct.	714-565-9171
Cal	Sunnyvale, Bell Inds., 1161 N. Fairoaks	408-734-8570
Colo	Commerce City, Elmar Elctrns./Denver, 6777 East 50th Ave.	303-287-9611
Colo	Denver, Hamilton/Avnet Elctrns., 5921 North Bdwy	303-534-1212
Conn	Georgetown, Hamilton/Avnet Elctrns., 643 Danbury Rd.	203-762-0361
Conn	Hamden, Wilshire Elctrns./Conn., 2554 State St.	203-281-1166
Conn	Norwalk, Harvey/Elctrns., 112 Main St.	203-853-1515
Fla	Hollywood, Hamilton/Avnet Elctrns., 4020 North 29th Ave.	305-925-5401
Fla	Miami, Powell Elctrns. Corp., Box 514	305-592-3260
Fla	Orlando, Hall-Mark Elctrns., 7233 Lake Ellenor Dr.	305-855-4020
Fla	Orlando, Hammond Elctrns., Inc., 911 West Central Blvd.	305-241-6601
Ga	Norcross, Hamilton/Avnet Elctrns., 6700 1-85 Access Rd.	404-448-0800

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Ill	Elk Grove Village, Hall-Mark Elctrns. Corp., 180 Crossen Ave.	312-437-8800
Ill	Rosemont, Advent Elctrns., 7110 Lyndon Ave.	312-298-4210
Ill	Rosemont, Kierulff Elctrns., 9340 William St.	312-678-8560
Ill	Schiller Park, Hamilton/Avnet Elctrns., 3901 North 25th Ave.	312-678-6310
Ind	Indianapolis, Harvey-Indiana, Inc., 8557 Zionsville Rd.	317-297-4910
Ind	Indianapolis, Pioneer Indiana Elctrns., Inc., 6408 Castleplace Dr.	317-849-7300
Iowa	Cedar Rapids, Advent Elctrns., 1834 Blairs Ferry Rd., N.E.	319-393-8811
Kans	Lenexa, Hall-Mark Elctrns. Corp., 9000 Rosehill Rd.	913-888-4747
Kans	Lenexa, Hamilton/Avnet Elctrns., 37 Lenexa Industrial Center	913-888-8900
Md	Gaithersburg, Kierulff Elctrns., 16021 Industrial Dr.	301-948-0250
Md	Gaithersburg, Pioneer Washington Elctrns., 9100 Gaither Rd.	301-948-0710
Md	Hanover, Hamilton/Avnet Elctrns., 7255 Standard Dr.	301-796-5000
Mass	Burlington, Hamilton/Avnet Elctrns., 185 Cambridge	617-273-2120
Mass	Burlington, Wilshire Elctrns., One Wilshire Rd.	617-272-8200
Mass	Lexington, Harvey-Elctrns., 44 Hartwell	617-861-9200
Mass	Needham Heights, Kierulff Elctrns, 14 Charles St.	617-449-3600
Mich	Farmington, Harvey Michigan Inc., 23461 Industrial Parkway Dr.	313-477-1650
Mich	Kentwood, Harvey Michigan Inc., 4860 South Division Rd.	
Mich	Livonia, Hamilton/Avnet Elctrns., 12670 Farmington Rd.	313-522-4700
Mich	Livonia, Pioneer/Michigan, 13485 Stamford	313-525-1800
Minn	Bloomington, Hall-Mark Elctrns., 9201 Penn Ave. So., Suite 10	612-884-9056
Minn	Edina, Hamilton/Avnet Elctrns., 7683 Washington Ave. So.	612-941-3801
Mo	Earth City, Hall-Mark Elctrns. Corp., 13789 Rider Trail	314-291-5350
Mo	Hazelwood, Hamilton/Avnet Elctrns., 382 Brooks La.	314-731-1144
NJ	Cedar Grove, Hamilton/Avnet Elctrns., 218 Little Falls Rd.	201-239-0800
NJ	Cinnaminson, Wilshire Elctrns., 855 Industrial Highway	609-786-8990
NJ	Mount Laurel, Hamilton/Avnet Elctrns., 113 Gaither Dr., East Gate Industrial Pk.	609-234-2133
NJ	Rutherford, Kierulff Elctrns., Industrial Dr.	201-935-2120
NM	Albuquerque, Century Elctrns., Inc., 129 Vermont Avenue, N.E.	505-265-7839
NM	Albuquerque, Hamilton/Avnet Elctrns., 2450 Baylor Dr. S.E.	505-765-1500
NY	Binghamton, Harvey/Federal Elctrns., Box 1208	607-748-8211
NY	Buffalo, Summit Dist., 916 Main St.	716-884-3450
NY	East Syracuse, Hamilton/Avnet Elctrns., 6500 Joy Road	315-437-2642
NY	Hauppauge, Semiconductor Concepts, 195 Engineers Road	516-273-1234
NY	Rochester, Hamilton/Avnet Elctrns., 167 Clay Rd.	716-442-7820
NY	Rochester, Summit Elctrns. of Rochester Inc., 292 Commerce Dr.	716-334-8110
NY	Westbury, Hamilton/Avnet Elctrns., 70 State Street	516-333-5800
NY	Woodbury, Harvey Elctrns., 60 Cross Ways Park West	516-921-8700
NC	Greensboro, Hammond Elctrns. of Carolina, Inc., 2923 Pacific Ave.	919-275-6391
NC	Greensboro, Pioneer/Carolina Elctrns., 2906 Baltic Avenue	919-273-4441
NC	Raleigh, Hall-Mark Elctrns., 3000 Industrial Dr.	919-832-4465
Ohio	Cleveland, Hamilton/Avnet Elctrns., 761 Beta Dr., Suite E	216-461-1400
Ohio	Cleveland, Pioneer Standard, 4800 East 131 St.	216-587-3600
Ohio	Dayton, Hamilton/Avnet Elctrns., 118 Westpark Rd.	513-433-4055
Ohio	Dayton, Pioneer Standard, 1900 Troy St.	513-236-9900
Okla	Oklahoma City, Radio, Inc., 903 North Hudson	405-CE5-1561
Okla	Tulsa, Hall-Mark Electronics Corp., 4846 South 83rd East Ave.	913-835-8458
Okla	Tulsa, Radio Inc., Ind'l. Elctrns., 1000 South Main	918-587-9124
Ore	Portland, Almac/Stroum Elctrns., 4475 School Ferry Rd.	503-292-3534
Pa	Erie, Mace Elctrns., 2631 West 8th St.	814-838-3511
Pa	Huntington Valley, Hall-Mark Elctrns. Corp., 458 Pike Rd., Pike Ind'l. Pk.	215-355-7300
Pa	Pittsburgh, Cameradio, 2801 Liberty Ave.	412-288-2600
Pa	Pittsburgh, Pioneer/Pittsburgh, 560 Alpha Dr.	412-782-2300
SC	Greenville, Hammond Elctrns. of Carolina, 100 Augusta Street	803-233-4121
Tex	Austin, Hall-Mark Elctrns. Corp., 3100-A Industrial Terr.	512-837-2814
Tex	Dallas, Hall-Mark Elctrns. Corp., 9333 Forest La.	214-231-6111
Tex	Dallas, Hamilton/Avnet Elctrns., 4445 Sigma Rd.	214-661-8661
Tex	Houston, Hall-Mark Elctrns. Corp., 8000 Westglen	713-781-6100
Tex	Houston, Hamilton/Avnet Elctrns., 1216 West Clay	713-526-4661
Utah	Salt Lake City, Century Elctrns., Inc., 2150 South 300 W, Suite 1-J	801-466-6000
Utah	Salt Lake City, Hamilton/Avnet Elctrns., 647 Billinis Road W.	801-262-8451
Wash	Bellevue, Hamilton/Avnet Elctrns., 13407 Northrup Way	206-746-8750
Wash	Seattle, Almac/Stroum Elctrns., 5811 Sixth Ave., So.	206-763-2300
Wash	Seattle, Liberty Elctrns. Northwest, 5305 - 2nd Ave., S.	206-RO3-8200
Wisc	Milwaukee, Taylor Electric Co., Drawer 11N	414-241-4321
For:	Can., Downsview, Ont., Semad Elctrns., Ltd., 1111 Finch Ave. W.	416-635-9880
For:	Can., Mississauga, Ont., Hamilton/Avnet Elctrns., Ltd., 6291 - 19 Dorman Rd.	416-677-7432
For:	Can., Montreal 12, Que., Preico Elctrns., Ltd., 480 Port Royal St., W.	514-389-8051
For:	Can., Ottawa, Ont., Hamilton/Avnet Elctrns., 880 Lady Ellen Pl.	613-725-3071
For:	Can., St. Laurent, Que., Hamilton/Avnet Elctrns., Ltd., 2670 Paulus	514-331-6443
For:	Can., Vancouver 15, B.C., Intek Elctrns. Ltd., 7212 Main St.	604-324-6831
For:	Can., Willowdale, Ont., Electro Sonic Ind'l Sls., 100 Gordan Baker Rd.	416-494-1666

NATIONAL SEMICONDUCTORS, 331 Cornelia St., Plattsburgh, N.Y., 12901, Tel: 518-561-3160, TWX: 610-421-3362; Empl.: 150; Minimum order: $25 p. 1•1018,1019

Customer service: Duncan F. Clifton 518-561-3170

Free literature available: Literature On: CdS, CdSe and Si Photo detectors, optocouplers, phototransistors. Light emitting diodes.

Products manufactured: Cells, Photoconductive, Photoemissive, Photovoltaic, Diodes, Isolators, Transistors

Local Sales Offices & Reps.

Ala	Huntsville, BJR Research	205-881-3569
Ariz	Phoenix, KCE Corp.	
Cal	Los Altos, Shannon Assoces.	415-941-2217
Cal	Varigon, El Segundo	213-679-0621
Conn	Farmington, Keyco Assocs.	203-677-1771
Fla	Ft. Lauderdale, Tech-Rep Assocs.	305-792-0962
Fla	Indian Rocks Beach, Tech-Rep Assocs.	813-595-2834
Ill	Glenview, Nero Elctrn.	312-729-5075
Kans	Shawnee Mission, Florence & Meyer Inc.	913-722-5210
Mass	Needham, Keyco Assocs.	617-449-2600
Mich	Farmington, Davis-Martensen Co.	313-474-8300
Minn	St. Paul, Northport Engrg.	612-698-3841
NJ	Nutley, D/R Assoc. of N.J.	201-667-5900
NY	Huntington, Andrews & Andrews, Inc.	516-692-8686
NY	Rochester, D/R Elctrns.	716-442-6980
NC	Greensboro, L & D Inc.	919-292-3201
Ohio	Cleveland, D. Steffen	216-461-8333
Ohio	Columbus, T. Mulligan & Assocs.	614-457-2242
Ohio	Dayton, D. Steffen	513-293-3145
Ore	Beaverton, Arneson Assocs.	503-643-5754
Pa	Phila., H.A. Goodman	215-247-7116
Tex	Dallas, J. Clay Co.	214-350-1281
Wash	Seattle, Arneson Assocs.	206-762-7664
FOR:	Rosemere, Que., Can., D/R Elctrn. Ltd.	514-622-7381

NATIONAL SONICS, Div. Envirotech Corp., 120 Milbar Blvd., Farmingdale, N.Y., 11735, Tel: 516-694-5110, Telex: 14-4545; Empl.: 65

Customer service: J. Kristoffersen

Free literature available: Dry Product Control - Control dry product in bins, silos etc. Conveyor line counting and sorting. Liquid Level Control - Level control of any kind of liquid. Interface detection of two liquids. Sladge Density Control - Monitoring and controlling density of municipal and industrial sladges and slurries

Products manufactured: Controls/Control Eqpt., Indicators, Switches, Transducers

NAT'L-STANDARD CO., Niles, Mich., 49120, Tel: 616-683-8100, TWX: 810-270-3153; Empl.: 1000

Customer service: J. L. Dayton

Products manufactured: Wire

NATIONAL TEL-TRONICS, Div. Electro Audio Dynamics, Inc., State Road Hill, Meadville, Pa., 16335, Tel: 814-724-6440, Telex: 91-4405; Empl.: 200; Minimum order: $35 p. 2•720-723

For info on price: M. Keller; Customer service: J. George; Delivery info: S. Rynd

Free literature available: Product Catalogs

Products manufactured: Cable Assemblies & Harnesses, Cable, Circuits, Printed, Multilayer, Clamps & Clips, Connectors, Insulators & Insulation, Jack Adapters (All Types), Jacks (All Types), Leads, Test & Adaptors, Panels, Plug Adapters, Plug & Jack Sets, Plugs, Posts, Probes, Terminal Blocks, Boards & Strips, Terminals, Tools

Local Sales Offices & Reps.

Ala	Huntsville, J. Eberle & Assocs.	205-881-8315
Cal	Burlinghame, Carelli-EMA	415-697-6286
Cal	Van Nuys, Shepherd Comps.	213-787-4610
Fla	Ft. Lauderdale, Sproch Sls., Inc.	305-587-3792
Ill	Chicago, Rozner Sls. Co.	312-283-0022
Ind	Indianapolis, Tech. Reps. Inc.	317-849-6454
Mass	Framingham, G-M Assocs.	617-872-0333
Minn	Minneapolis, Heimann Co.	612-861-6051
Mo	St. Louis, J. J. Mueller	314-353-3656
NJ	Marlton, N. Krouse Assoc.	609-424-3543
NJ	Nutley, Falk-Baker Assoc.	201-661-2436
NY	Pompey, S.F. Foster Co.	315-677-3333
Ohio	Chagrin Falls, D.C. Prior Co.	216-247-7999
Ohio	Cincinnati, R. Makin Assocs.	513-232-5588
Pa	Philadelphia, R. Cooper Sls.	215-624-5486
Tex	Dallas, Allied Comps.	214-348-6660
Wash	Seattle, Pacnor Mktg., Inc.	206-284-8020
EXP:	Plainview, N.Y., Empire Exporters Inc.	516-293-5582
FOR:	Can., Hamilton, Ont., Cartwright Southall Assoc.	416-528-0294

Local Distributors

Ariz	Phoenix, Parts Elctrns., 1310 North 7th	602-258-6476
Cal	N. Redondo Beach, Mark Elec., 2315 1/2 Artesia Blvd.	213-772-2141
Cal	San Jose, Peninsula Elec., 980 S. First St.	408-294-3594
Colo	Denver, Electronic Parts, 1277 Broadway	303-893-3050
Conn	Bridgeport, Hatry Elctrns., 2465 Main St.	203-335-3124
Conn	Hartford, Hatry Electronics, 500 Ledyard St.	203-527-1881
Fla	Tampa, Lykes Elctrns., 121 S. Ashley	813-229-1885
Md	Bethesda, Empire Elec. Supply, 4907 Rugby Ave.	301-656-3300
Mass	Lynn, Land Elctrns., 9 Franklin St.	617-592-2220
NY	N.Y. City, Center Ind. Elec., 15 East 16th St.	212-989-6363
NY	Rochester, Simcona Elec., Box 1903	716-328-3230
Okla	Tulsa, Radio, Inc., 1000 S. Main St.	
Pa	Harrisburg, Pyttronics Ind., 2525 N. 7th St.	717-233-6591
Tenn	Nashville, Electra Dist., 19-14 W. End	615-255-8444
Tex	Ft. Worth, Swieco, Inc., 1512-18 E. Lancaster	817-335-6521

NATIONAL WIRE & CABLE CORP., Dept EEM, Service Div., 136 San Fernando Rd., Los Angeles, Cal., 90031, Tel: 213-225-5611, TWX: 910-321-4155; FSC No: 04569; Empl.: 114; Minimum order: $50 p. 2•2028-2047

For info on price: H.F. Korte; Application info: F. Motley; Customer service: J.B. Wiley; Delivery info: H.F. Korte

Free literature available: Complete catalog.

Products manufactured: Cable Assemblies & Harnesses, Cable, Services, Assembly, Production & Test, Shields, Tubing, Wire

Local Sales Offices & Reps.

Ariz	Phoenix, K. Jahn Co.	602-956-9060

Directory of Local Distributors Starts on page 401

Ark	Fort Smith, Electro-Related Products	501-783-7323
Cal	La Jolla, Rep. Sls. Co.	714-454-1500
Cal	Los Angeles, National Wire & Cable Corp.	213-225-5611
Cal	San Mateo, National Wire & Cable Corp.	415-344-3066
Colo	Arvada, Arrowhead Sls. Co.	03-423-5556
Conn	Wethersfield, Com/Pak Ltd., Inc.	203-583-4784
Fla	Maitland, J.W. Barrett Assocs.	305-678-0172
Fla	North Miami, J.W. Barrett Assocs.	305-681-4957
Fla	Orlando, National Wire & Cable Corp.	305-898-3801
Ill	Northfield, H.S. Tollaksen Co.	312-441-6644
Md	Glen Burnie, Faion Lott Co.	301-744-4611
Mass	Needham Heights, Com/Pak Ltd.	617-444-1259
Mich	Southfield, Luebbe Sls. Co.	313-357-0355
Minn	Minneapolis, Tech. Assocs.	612-929-6721
Mo	Hazelwood, Production Automation	314-731-2331
Mo	Raytown, Production Automation	816-737-0066
NY	Huntington, National Wire & Cable Corp., Int'l.	516-757-6549
NY	Ontario Center, Kehoe Comp. Sls.	315-524-2491
NC	Charlotte, J. Rudisill Assocs.	704-377-6901
Ohio	Cincinnati, Luebbe Sls. Co.	513-871-4211
Ohio	Cleveland, Luebbe Sls. Co.	216-333-0425
Ohio	Dayton, Luebbe Sls. Co.	513-294-0426
Pa	Delmont, Luebbe Sls. Co.	412-468-4019
Pa	Wynnewood, H.J. Fairbanks Co.	215-642-5816
Tex	Fort Worth, J.H. Gibbs Assocs.	817-237-1455
Utah	Salt Lake City, Arrowhead Sls. Co.	801-487-4716
Wash	Olympia, Bergford Assocs.	206-866-2001
FOR:	Can., Downsview, Ontario, Cantronics, Ltd.	412-661-2494

NAUGLER ENGRG., INC., Off Dunham Rd., Beverly, Mass., 01915, Tel: 617-922-5634; FSC No: 05222; Empl.: 5; Minimum order: $8

For info on price: C. A. Osborn; Application info: C. A. Osborn; Customer service: C. A. Osborn; Delivery info: T. Johnson

Free literature available: Catalog #700 Describes line of flexible couplings with unique leaf design for shafts up to 1/2" dia. with both set screw and clamp type hubs available.

Products manufactured: Couplings

NCI, INC., 5900 Australian Ave., W. Palm Beach, Fla., 33407, Tel: 305-842-3201, TWX: 510-952-7618; FSC No: 26769; Empl.: 460; Minimum order: $100

Customer service: C. C. Johnson

Free literature available: NCI tantalum capacitor catalog listing each product and specification thereof as manufactured by NCI.

Products manufactured: Capacitors, Fixed

Local Sales Offices & Reps.

Ala	Huntsville, 20th Century Mktg.	205-772-9237
Ariz	Tempe, Sedco Sls	602-968-7791
Cal	Los Alamitos, J.S. Heaton Co.	213-598-6676
Cal	Mountain View, Caltron-Pyle	415-964-3244
Cal	San Diego, J.S. Heaton Co.	714-452-1456
Colo	Denver, J.S. Heaton Co.	303-758-5130
Fla	Fort Lauderdale, CBC	305-484-7330
Fla	Winter Park, CBC, Inc.	305-644-2277
Ill	Chicago, Brock & Cushman, Inc.	312-622-4110
Iowa	Cedar Rapids, J. Vrbik Co.	319-377-8244
Kans	Shawnee Mission, K & M Sls & Assocs.	913-262-1444
Mass	Burlington, New England Tech. Sls.	617-272-0434
Mich	Detroit, R.C. Merchant & Co.	313-535-6000
Minn	St. Paul, R.G. Ragon, Inc.	612-488-0201
NJ	Englewood Cliffs, E. Glass Assocs.	212-586-8440
NY	Ontario Center, Kehoe Comps.	315-524-2491
Ohio	Medina, J.C. Hofstetter	216-241-4880
Pa	Fort Washington, GCM Assocs.	215-646-7535
Tex	Garland, Carter Assocs.	214-276-7151
Va	Lynchburg, Barnhill & Assocs.	804-846-4624
Wash	Seattle, Blum & Assocs.	206-782-1600
EXP:	Montreal, Que., Can., Cantronics, Ltd.	514-733-0749

NCR, S. Main & K Sts., Dayton, Ohio, 45409

NCR MICROELECTRONICS DIV., 8181 Byers Rd., Miamisburg, Ohio, 45342

NEC, see Nippon Electric

NEC AMERICA INC., See Nippon Elec./NEC America

NEC AMERICA, INC., 277 Park Ave., New York, N.Y., 10017, Tel: 212-758-1666, TWX: 710-581-3376; Empl.: 200 .... p. 1•2261; p. 2•1184

Products manufactured: Capacitors, Fixed, Diodes, Display Devices/Displays, Fiber Optic Bundles, Integrated Circuit Devices, Lasers & Laser Systems, Potentiometers, Relays, Switches, Thyristors (Includes Silicon Controlled Rectifiers), Transistors, Tubes

Local Sales Offices & Reps.

Cal	Los Angeles	213-973-2071
Del	Newark	302-738-0150
Ill	Chicago	312-828-9494
Va	Falls Church	703-560-2010

Local Distributors

Cal	Burlingame, California Eastern Lab., 1 Edwards Ct.	415-342-7744
Cal	Canoga Park, Nucleonic Prods. Co., 6660 Tarlel Ave.	213-887-1010
Mich	Farmington, Harvey Michigan, 23461 Industrial Pk. Dr.	313-477-1650
Minn	Minneapolis, World Products, 5100 Edina Industrial Blvd., Box 35263	612-835-2117

NEC MICROSYSTEMS, Div. of North Electric Co., 1150 NW 70th St., Ft. Lauderdale, Fla., 33309, Tel: 305-974-5400, TWX: 510-956-9897; Empl.: 75; Minimum order: $50 .... p. 1•892

For info on price: L. Brande; Application info: E. Lane; Customer service: L. Brande; Delivery info: L. Brande

Free literature available: Capabilities brochure - custom hybrid microcircuits

Products manufactured: Circuits, Hybrid, Thick Film, Drivers & Decoders For Readouts, Filters, Hybrid Voltage Regulators, Integrated Circuit Devices, IC's, Active Filters

Local Sales Offices & Reps.

Cal	Laguna Beach, W.D. Bird	714-494-5800
Cal	Los Altos, W. W. Posey Co.	415-948-7771
Conn	North Haven, Kitchen & Kutchin	203-239-0212
Ill	Northfield, Such & Assocs.	312-446-8934
Md	Silver Spring, Spectro Sys.	301-494-8261
Mass	Lexington, Kitchen & Kutchin	617-862-8230
Mich	Ferndale, Shalco	313-547-4771
Mo	Grandview, Beneke & McCaul	816-765-2998
Mo	St. Louis, Beneke & McCaul	314-434-6242
NJ	E. Hanover, HLM Assoc.	201-386-0794
NY	Northport, HLM Assoc.	516-423-1818
NY	Syracuse, Lenard Co.	315-479-9191
Ohio	Chagrin Falls, Midwest Mktg. Assoc.	216-247-6655
Ohio	Dayton, Midwest Mktg. Assoc.	513-433-2511
Pa	Wyndmoor, Spectro Sys	215-836-1545
Tex	Garland, R. Forsyth	214-243-0140

NEFF INSTRUMENT CORP., 1088 E. Hamilton Rd., Duarte, Cal., 91010, Tel: 213-357-2281, TWX: 910-585-1833; Empl.: 55; Minimum order: $10

Customer service: Sls. Dept.

Free literature available: Amplifiers: Instrumentation Amplifier products and accessories, , System 620: amplifier-per-channel data acquisition system. Input Connection Practices for Differential Amplifiers: discussion of correct input techniques necessary to achieve high accuracy performance of Instrumentation amplifiers.

Products manufactured: Amplifiers, Data Acquisition & Reduction Systems, Data Compressors, Digital, Multiplexers

Local Sales Offices & Reps.

Ala	Huntsville, BCS Assocs.	205-881-6220
Ariz	Phoenix, Zeus, Inc.	602-253-6104
Cal	Glendale, Instrument Specialists, Inc.	213-849-7181
Cal	San Diego, Instrument Specialists, Inc.	714-565-2555
Cal	Santa Clara, Instrument Specialists, Inc.	408-244-1505
Colo	Englewood, Zeus, Inc.	303-770-4400
Conn	Glastonbury, Instrument Reps., Inc.	203-633-0777
Fla	Orlando, BCS Assocs.	305-896-4881
Ill	Chicago, Carter Elctrns., Inc.	312-585-5485
Ind	Indianapolis, Carter Elctrns., Inc.	317-293-0696
Iowa	Cedar Rapids, Technical Reps., Inc.	319-363-2489
Mass	Lexington, Instrument Reps., Inc.	617-861-8620
Mich	Detroit, Electro Sls. Assocs.	313-526-8800
Minn	Minneapolis, Carter Elctrns., Inc.	612-544-9393
Mo	Hazelwood, Technical Reps., Inc.	314-731-5200
Mo	Independence, Technical Reps., Inc.	816-737-1414
NJ	Union, SBM Reps., Inc.	201-687-8737
NM	Albuquerque, Zeus, Inc.	505-268-3941
NY	Pleasantville, SBM Reps., Inc.	914-769-1811
NY	Rochester, SBM Reps., Inc.	716-266-1400
NC	Greensboro, BCS Assocs.	919-273-1918
Ohio	Cleveland, Electro Sls. Assocs.	216-261-5440
Ohio	Dayton, Electro Sls. Assocs.	513-426-5551
Ore	Beaverton, Showalter Instr.	503-646-3004
Pa	Jenkintown, PDC Corp.	215-887-9610
Pa	Pittsburgh, Electro Sls. Assocs.	412-371-9449
Tex	Houston, Barnhill Two, Inc.	713-621-0040
Tex	Richardson, Barnhill Two, Inc.	214-231-2573
Utah	Salt Lake City, Zeus Inc.	801-486-3217
Wash	Seattle, Showalter Instr.	206-624-7020
Wisc	Milwaukee, Carter Elctrns., Inc.	414-464-5555
FOR:	Can., Calgary, Alb., A. Crawford Assocs. Ltd.	403-261-0780
FOR:	Can., Longuevil, Que., A. Crawford Assocs. Ltd.	514-670-1212
FOR:	Can., Mississauga, Ont., A. Crawford Assoc., Ltd.	416-678-1500
FOR:	Can., North Vancouver, A. Crawford Assocs. Ltd.	604-980-4831
FOR:	Can., Ottawa, Ont., A. Crawford Assocs. Ltd.	613-829-9651

NELSON ROSS ELCTRNS., 5 Delaware, Lake Success, N.Y., 11040, Tel: 516-328-1100, TWX: 510-223-0414; FSC No: 82199; Empl.: 150; Minimum order: $25 .... p. 1•784,785

For info on price: E. F. Feldman; Application info: E. F. Feldman; Customer service: V. Roebeck; Delivery info: E. F. Feldman

Free literature available: Spectrum Analyzer Catalog 0.5Hz - 25 MHz, Plug-In Spectrum Analyzers 0.5 Hz - 25 MHz, Synchro Sweep Generators 10 Hz - 500 kHz, Communications Spectrum Analyzers 10 Hz to 400 MHz, Microwave Spectrum Analyzers 10 MHz - 6.5 GHz, Low Frequency Spectrum Analyzers 0.5 Hz - 25 MHz, Broad Band Spectrum Analyzers 100 Hz - 25 MHz, RF - VHF - TV Spectrum Analyzers 1 to 300 MHz

Products manufactured: Analyzers, Detectors, Generators, Monitors, Receivers

Local Sales Offices & Reps.

Ala	Huntsville, J. L. Highsmith	205-881-3294
Alas	Anchorage, Arva-Hudson, Inc.	907-272-5231
Ariz	Scottsdale, BFA Corp. of Ariz.	602-946-4215
Cal	Cupertino, T. Snitzer	408-257-8333
Cal	Del Mar, T. Snitzer	714-454-2191
Cal	Los Angeles, T. Snitzer	213-836-6170
Colo	Boulder, H. Bass Assocs.	303-499-7509
Conn	Hamden, P. Jenks Assocs.	203-281-0810
Fla	Orlando, J. Highsmith	305-293-5202
Ill	Elk Grove Village, L. Green	312-593-0282
Ind	Indianapolis, L. Green	317-293-9827
Kans	Prairie Vlg., Engrg. Svcs.	913-649-4000
Md	Bethesda, S & S Assocs.	301-654-1434
Mass	Wakefield, P. Jenks Assocs.	617-246-1590
Mich	Detroit, Group Ten, Inc.	313-549-3910
Minn	Mpls., L. Green	612-781-1611
Mo	St. Louis, Engrg. Svcs.	314-997-1515
NM	Albuquerque, IMEC	505-883-9010
NY	Great Neck, Meas. Tech.	516-482-3500
NY	Liverpool, R & D Assocs.	315-622-2350
NC	Charlotte, J. Highsmith	704-333-7743
Ohio	Cleveland, Group Ten	216-486-2800
Ohio	Dayton, Group Ten	513-277-6531
Ohio	Lake Oswego, Arva-Hudson, Inc.	503-227-4916
Pa	Philadelphia, Eastern Instrumentation of Phila.	215-927-7777
Tex	Richardson, Lear Assoc.	214-231-5388
Tex	San Antonio, Data Appls. Corp.	512-732-7176
Wash	Seattle, Arva-Hudson, Inc.	206-622-0177
For:	Can., Downsview, Ont., Electronetic Sys., Ltd.	416-661-3673
For:	Can., Montreal, Que., Electronetic Sys., Ltd.	514-342-4112
For:	Can., Ottawa, Ont., Electronetic Sys. Ltd.	613-733-3781
For:	Can., Vancouver, B.C., Electronetic Sys. Ltd.	604-687-5686

NELSON STUD WELDING TRW INC., 28th & Toledo Ave., Lorain, Ohio, 44035, Tel: 216-245-6931; Empl.: 500

For info on price: R. Pomeroy; Application info: J. Jenkins; Customer service: J. Kilbride; Delivery info: V. Hug

Free literature available: Metalworking Brochure - Booklet detailing stud welding in metalworking industry.

Products manufactured: Fasteners, Welding Equipment & Access. (Excluding Equip. for Semiconductor Devices)

Local Sales Offices & Reps.

Ala	Birmingham	205-871-8109
Colo	Denver	303-744-3495
Conn	Hartford	203-236-5218

Fla	Jacksonville	904-786-6734
Ga	Atlanta	404-261-3479
Ind	Ft. Wayne	219-484-5356
Iowa	Davenport	319-323-2139
Kans	Overland Park	913-381-3060
La	Metairie	504-737-1082
Md	Rockville	301-762-9511
Md	Towson	301-821-6862
Mass	Needham Heights	617-449-0131
Mich	Grand Rapids	616-455-9020
Mich	Southfield	313-357-3700
Minn	Minneapolis	612-884-4108
Mo	St. Louis	314-567-5320
Neb	Omaha	402-341-5272
NJ	Palisades Park	201-947-2291
NY	New York	212-565-1585
NY	Tonawanda	715-694-6535
NC	Winston-Salem	919-724-2262
Ohio	Cincinnati	513-771-1581
Ohio	Cleveland	216-524-5470
Ohio	Columbus	614-258-6705
Okla	Tulsa	918-627-3487
Ore	Portland	503-281-7693
Pa	Pittsburgh	412-922-2515
Pa	York	717-843-5585
SC	Columbia	803-798-0415
Tenn	Memphis	901-452-6770
Tenn	Nashville	615-256-1739
Tex	Dallas	214-358-1588
Tex	Houston	713-524-7429
Utah	Salt Lake City	801-322-4122
Va	Richmond	804-233-5520
Wisc	Milwaukee	414-351-0705
FOR:	Can., Calgary 24, Alberta	403-287-1243
FOR:	Can., Dorval 730, Quebec	514-636-8170

NERA, INC., 133 The Great Rd., Bedford, Mass., 01730, Tel: 617-275-2500; Empl.: 20; Minimum order: $25

Customer service: D. Kuyamjian

Free literature available: Brochures Data Sheets application notes describing applications Water Quality System Brochure: describing system for automatic water quality data acquisition Model 4 Series Specifications - Interface specifications for environmental data acquisition system Application Note: Data display formats Environmental data reduction system

Products manufactured: Comm. Systems, Data Acquisition & Reduction Systems, Data Loggers

Local Sales Offices & Reps.

Cal	Port Hueneme, Whitney Assocs.	805-488-4434
Cal	San Diego, Whitney Assocs.	714-453-1181
Fla	Sarasota, Continental Shelf Assocs.	813-349-7182
La	Gretna, Continental Shelf Assocs.	504-340-3502
Md	Fulton, Gans - Fryling, Inc.	301-837-6311
Mass	Cohassett, E-M Assocs.	617-383-6133
NC	Charlotte, S. J. Perkinson Co.	704-366-1892
Va	Arlington, Gans - Fryling, Inc.	703-527-3262
Wash	Edmunds, Ocean Research Instrs.	206-774-6824

NES, INC., 1536 Brandy Pkwy., Streamwood, Ill., 60103, Tel: 312-289-8820; Empl.: 145 .... p. 1•182,183

For info on price: R. Lounsbury; Application info: R. Lounsbury; Customer service: C. Manning; Delivery info: R. Casperson

Free literature available: CATALOGS & DATA SHEETS ON: DIGITAL PANEL METERS DATA LOGGING, ACQUISITION, & REDUCTION SYSTEM CIRCUIT CARDS COMMUNICATION EQUIPMENT DIGITAL CLOCKS APPLICATION NOTE INDEX

Products manufactured: Accelerometers, Alarms, Amplifiers, Analyzers, Bi-Metals, Thermostatic, Boards, Plug-In, Boards, Printed Circuit, Boards, Printed Wiring, Universal, Boards, Programming, Bolometers, Bridges, Cabinets & Accessories, Calculators, Electrical & Electronic, Calibrators, Cameras, Cards, Linear Function, Cards, Logic, Cells, Load, Chamber, Environmental Test, Chassis, Circuit Board Mounting, Clocks (All Types), Coders, Comm. Systems, Comparators, Compressors, Data, Computers, Controls/Control Eqpt., Converters, Counters, Couplers, Current Sensors, Data Acquisition & Reduction Systems, Data Compressors, Digital, Data Loggers, Decoders, Decommutators, Telemetering, Deposition Equipment, Vacuum & Accessories, Detectors, Display Devices/Displays, Drivers & Decoders For Readouts, Duplicators, Enclosures, Module, Plug-In, Encoders, Expanders, Data, Filters, Gages, Generators, Indicators, Integrators, Electronic, Kits, Breadboarding (For Engineers), Magnetometers, Magnetoresistors, Hall, Memories, Buffer, Memory Systems, Meters, Modulator/Demodulators, Modules, Logic, Encapsulated, Monitors, Motors, Multiplexers, Multipliers, Oceanographic Equip. (Electronic), Oscillators, Paper-Tape Preparation Systems, Perforators, Pickups, Telephone (For Recording), Potentiometers, Power Supplies, Prescalers, Preselectors, Printers, Process Control Systems, Programmers, Pulsers, Logic Test, Pyrometers, Racks, Readers, Receivers, Recorders, Relays, Scanners, Scramblers, Data, Sensors, Light, Services, Assembly, Production & Test, Shunts, Meter, Signal Conditioners & Equipment, Switches, Tachometers, Teleprinters, Teletypewriters & Equipment, Terminal Equipment, Digital, Test Systems, Testers, Thermistors, Thermocouples, Elements & Accessories, Thermometers, Resistance, Thermostats, Timers, Totalizers, Digital, Tracking Systems, Transducers, Translators, Data, Transmission Systems, Data, Transmitters, Transponders, Typewriters, Input-Output (All Types), Underwater Communication, Detection, Navigation, etc. Equipment, Verification Systems, Tape

Local Sales Offices & Reps.

Fla	St. Petersburg, Comtech Assocs.	813-527-3281
Md	Bethesda, S & S Assocs.	301-654-1434
Mass	Waltham, McBar Assocs.	617-890-0233
Minn	Minneapolis, R-J Inc.	612-922-1425
NY	DeWitt, DB Assocs.	315-446-0220
NY	Great Neck, Industron Assoc.	516-487-2620
Pa	King of Prussia, S & S Assocs.	215-265-3450

NESHAMINY TRANSFORMER, Div. Neshaminy Elctrn., Edison-Furlong Rd., Furlong, Pa., 18925, Tel: 215-794-7411; Empl.: 130; Minimum order: $150 p. 2•1775;1776

For info on price: F. Klein; Application info: W. Smith; Customer service: F. Klein; Delivery info: F. Klein

Products manufactured: Chokes, Coils Including Assemblies & Forms, Converters, Filters, Power Supplies, Transformers

Local Sales Offices & Reps.

Cal	Altadena, D. Wagner Assoc.	213-MU 1-4060
Fla	Maitland, Peregoy, Inc.	305-831-2474
Ill	Chicago, Ever-Flo Sls. Corp.	312-775-1418
NH	Nashua, Bell Controls	603-882-6984
NJ	Haddonfield, Thomas	609-UL 4-3011
NY	Rockville Centre, Magneco Inds.	516-764-4000
NY	Syracuse, W. Zimmerman	315-GR 4-4889
Pa	Philadelphia, Thomas Assocs.	215-627-6615

NESOR ALLOY CORP., 666 Passaic Ave., W. Caldwell, N.J., 07006, Tel: 201-575-0400; Empl.: 230; Minimum order: $100

For info on price: M. Feldman; Customer service: B. Rosen; Delivery info: M. Jacobsen

Products manufactured: Wire

NEUSES, INC. P.K., 1401 Rohlwing Rd., Rolling Meadows, Ill., 60008, Tel: 312-253-6555; Empl.: 8

Customer service: V. Pelletier

Free literature available: Literature on all items listed in EEM.

Products manufactured: Burnishers, Contact, Gages, Kits, Marking (Dial, Instrument, Equipment, etc.), Screwdrivers, Services, Assembly, Production & Test, Testers, Tools, Wrenches

NEW ENGLAND INSTR., 14 Kendal Lane, Natick, Mass., 01760, Tel: 617-873-9711, TWX: 710-346-0398; Empl.: 250; Minimum order: $25 .... p. 2•1666-1671

For info. on price: E. Burroughs; Application info: D. Hoos; Customer service: E. Burroughs; Delivery info: E. Burroughs

Free literature available: 12-page Condensed Catalog of Precision Potentiometers Featuring Single-Turn & Linear Motion Models in Wirewound, Conductive Plastic, Conductive Plastic Film, & Hybrid Designs.

Products manufactured: Potentiometers, Resistors, Rheostats, Switches

Local Sales Offices & Reps.

Ariz	Scottsdale, E.J. Foley & Assoc.	602-945-2665
Cal	Palo Alto, O'Donnell Assocs.	415-327-9260
Cal	Torrance, O'Donnell Assocs.	213-323-9243
Colo	Denver, Electrodyne	303-757-7679
Conn	Wethersfield, Underwood Sls.	203-563-3046
Fla	Fort Lauderdale, R.I. Smith Assocs.	305-772-5100
Ga	Atlanta, Electro-Mech Sls. Eng. Co.	404-256-4414
Ill	Oak Park, J. Popp Sls. Co.	312-626-3711
Kans	Overland Park, Penzner-Mankus Assoc.	913-381-0004
Kans	Wichita, Penzner-Mankus Assoc.	316-264-2662
Md	Silver Spring, Rep-Tron, Inc.	301-593-4844
Mass	Chelmsford, Underwood Sls.	617-256-8191
Mich	Farmington, W.R. Hummon & Assoc.	313-474-0661
Minn	Minneapolis, R.W. Marshall Co.	612-929-0457
Mo	Hazelwood, Penzner-Mankus Assoc.	314-731-4334
NJ	Newfoundland, T.A. Adamo Prod. Dev. Inc.	201-697-2450
NY	Kingspark, T.A. Adamo Prod. Dev. Inc.	603-474-9112
NY	New Hartford, KLM Assocs.	315-735-8525
NY	No. Syracuse, KLM Assocs.	315-458-6214
NY	Rochester, KLM Assocs.	716-442-0820
NC	Raleigh, Electro-Mech Sls. Eng. Co.	919-782-6452
Ohio	Cincinnati, Tri-State Mktg.	513-761-7993
Pa	King of Prussia, Monteiro Assocs.	215-265-0634
Tex	Dallas, Evans & McDowell Assoc.	214-238-7157
Wash	Renton, S. Wilson Co.	206-226-0650

NEW ERA PRODS., 4480 Broadview Rd., Cleveland, Ohio, 44109, Tel: 216-351-1097; Empl.: 25; Minimum order: $5

Customer service: M. Zehner

Products manufactured: Alarms, Calibrators, Inverters, Leads, Test & Adaptors, Lighting Equipment, Emergency, Reels, Cord & Cable, Services, Assembly, Production & Test, Tachometers, Test Equipment, Testers

NEW HAMPSHIRE BALL BEARINGS, INC., Peterborough, N.H., 03458, Tel: 603-924-3311, TWX: 710-364-1805; Empl.: 750; Minimum order: $200

For info on price: Sls. Dept.; Application info: Engrg. Dept.; Customer service: Sls. Dept.; Delivery info: Sls. Dept.

Free literature available: Miniature and Instrument Bearings, Precision Bearing Assemblies, Precision Steel Balls, Rod End and Spherical Bearings.

Products manufactured: Bearings

Local Sales Offices & Reps.

Cal	Los Angeles	213-776-5330
Ill	Des Plaines	312-827-6646
NY	Plainview	516-938-2011
Tex	Dallas	817-268-3141
Tex	Ft. Worth	817-284-1451

Local Distributors

Cal	Los Angeles, Jamaica Bearings, 8621 Bellanca Ave.	213-649-0480
Fla	Miami, Florida Bearings, 3164 N. Miami Ave.	305-573-8424
Ga	Atlanta, Dixie Bearings, 276 Memorial Dr.	404-522-7620
Iowa	Cedar Rapids, Iowa Midland Supply, 708 Third St. SE	319-366-3555
Minn	Minneapolis, Arrowhead Bearings, 1609 Hennepin Ave.	612-335-1111
Mo	Kansas City, Bearing Distrs., 1919 Baltimore St.	816-471-0666
NY	Jamaica, Jamaica Bearings, 138-72 Queens Blvd.	212-526-1350
Okla	Tulsa, Allied Brg. Supply, Box 3263	918-583-0164
Pa	Pittsburg, Bearings, Inc., 5536 Baum Blvd.	
Tex	Dallas, Bearing Chain & Supply, 1630 Prudential Dr.	214-631-8310
Wash	Bellevue, J. E. Phillips Co., Box 764	206-747-6538

NEWMAN CORP., M. M., Marblehead, Mass., 01945, Tel: 617-631-7100; Empl.: 8; Minimum order: $10

For info on price: F. McCarron; Application info: P. Cohen; Customer service: F. McCarron; Delivery info: P. Cohen

Free literature available: Descriptive Bulletin on Spiral Wrap Tubing; Descriptive Bulletin on Antex Solder Irons.

Products manufactured: Caps, Forms & Tapes, Heat Shrinkable, Cords, Heat Guns, Production, Insulators & Insulation, Kits, Cable-End Sealing, Soldering Guns, Irons & Desoldering Tools, Spacers, Strain Reliefs, Cable & Wire, Tubing, Wire Markers

NEW-TRONICS CORP., 15800 Commerce Park Dr., Brookpark, Ohio, 44142, Tel: 216-267-3150; Empl.: 200; Minimum order: $100

For info on price: P. Fritz; Application info: W. C. McNeil; Customer service: R. Chakerian; Delivery info: P. Fritz

Free literature available: Citizens-band and monitor antenna catalog, UHF amateur antennas & accessories, VHF amateur antennas & accessories

Products manufactured: Antennas, Cable

Local Sales Offices & Reps.

Cal	Foster City, Olson Sls.	415-573-1600
Cal	Woodland Hills, Chick Ryel & Co.	213-883-8118
Colo	Colorado Springs, Norris & Co.	303-635-9319
Colo	Denver, Norris & Co.	303-988-6430
Fla	Pembroke Pines, J. Wanger Sls.	305-987-8766
Ga	Atlanta, Murphy & Cota Co.	404-875-2525
Ill	Skokie, M. Bermann Sls.	312-675-3740
Ind	Indianapolis, Sukup & Cox Inc.	317-253-1215
Iowa	West Des Moines, Irvine Assocs.	515-225-7900
Mich	Bloomfield Hills, S. McMechan	313-852-4308
Mo	Liberty, Lectro Reps	816-781-2522
NY	Flushing, Bettan Sls. Inc.	212-591-7600
NC	Burlington, Murphy & Cota Co.	919-584-1577
Ohio	Brookpark, W. J. Corrigan	216-267-3150
Ohio	Twinsburg, F. Ohman Inc.	216-425-7445
Pa	Levittown, Sher Sls. Inc.	215-946-6200
Tex	Dallas, I. Harrison	214-239-2479
Wash	Seattle, Fleehart & Sullivan Inc.	206-522-1533
EXP:	New York, N.Y., Roburn Agencies Inc.	212-989-5939
FOR:	Can., Dorval, Que., Superior Int'l. Elctrns.	514-683-6331

N.Y. TESTING LABS., INC., 81 Urban Ave., Westbury, N.Y., 11590, Tel: 516-334-7770, TWX: 212-297-1449; Empl.: 50; Minimum order: $50

Customer service: J. Gaspari

Products manufactured: Furnaces, Gages, Ovens, Services, Assembly, Production & Test, Testers

NEWCOMB AUDIO PRODUCTS CO., 12881 Bradley Ave., Sylmar, Cal., 91342, Tel: 213-367-1921

Products manufactured: Amplifiers, Phonographs, Parts & Accessories, Public Address Systems, Receivers, Recorders

Local Sales Offices & Reps.

Ala	Birmingham, M.F. Taylor Co.	205-853-3673
Cal	Burlingame, W.J. Purdy Co.	415-347-7701
Colo	Colorado Springs, Norris & Co.	303-635-9319
Fla	Winter Haven, M.F. Taylor Co.	813-294-2941
Iowa	Des Moines, K.S.W. Assocs.	515-279-9235
La	New Orleans, Crockett Sls. Co.	504-486-4590
Md	Silver Spring, M.F. Taylor Co.	301-589-4002
Mass	Belmont, A. Reinherz	617-484-7784
Mich	Ferndale, Shalco, Inc.	313-547-4771
Minn	Minneapolis, Jensen-Olsen Sls.	612-941-7181
Mo	Kansas City, K.S.W. Assocs.	816-363-5651
NJ	Teaneck, Fisher Elctrns. Assocs.	201-836-6661
NY	Grand Island, L.J. McTaggart	716-773-9222
NC	Charlotte, M.F. Taylor	704-537-4878
Ohio	Mansfield, K. White	419-756-3363
Pa	Pittsburgh, M.F. Taylor	412-823-8400
Tenn	Memphis, Crockett Sls. Co.	901-388-5410
Tex	Dallas, Crockett Sls. Co.	214-748-8209
Wash	Seattle, Vantage Corp.	206-784-6800

NEWPORT LABS., INC., 630 E. Young St., Santa Ana, Cal., 92705, Tel: 714-540-4914, TWX: 910-595-1787; Empl.: 175; Minimum order: $25

Free literature available: Sales catalog includes information on complete line of panel mounted digital instrumentation for voltage, current, frequency, time and temperature.

Products manufactured: Amplifiers, Comparators, Converters, Counters, Data Loggers, Indicators, Meters, Tachometers, Thermometers, Resistance, Timers, Totalizers, Digital

Local Sales Offices & Reps.

Ala	Huntsville, W.A. Brown	205-539-4411
Ariz	Scottsdale, Measurement Conslts.	602-994-9519
Cal	Pasadena, A&F Sls.	213-681-5631
Cal	Sunnyvale, RPD Instrs.	408-735-9040
Colo	Boulder, Meas. Conslts.	303-449-5294
Conn	Hartford, Victor Assocs.	203-246-5643
Fla	Ft. Lauderdale, W.A. Brown	305-776-4800
Fla	Orlando, W.A. Brown	305-425-5505
Ga	Atlanta, W.A. Brown	404-939-1674
Ill	Chicago, Data Elctrns.	312-283-0300
Ind	Indianapolis, Data Elctrns.	317-784-6360
La	Gretna, W.A. Brown	504-366-5766
Md	Rockville, Mesa, Inc.	301-881-8430
Mass	Framingham, Victor Assocs.	617-879-5710
Mich	Southfield, Data-Tron	313-354-6421
Minn	Minneapolis, Data Elctrns.	612-786-9666
Mo	Crestwood, C.B. Fall	314-968-3850
Mo	Kansas City, C.B. Fall	816-942-3912
NJ	Pennsauken, Megargel & Himmelstein	609-662-3081
NM	Albuquerque, Meas. Conslts.	505-265-6471
NY	Buffalo, R.F. Lamb	716-874-4900
NY	Elmont, Crane & Egert	516-488-2100
NY	Rochester, R.F. Lamb	716-544-5580
NC	Research Triangle Park, W.A. Brown	919-489-1546
Ohio	Dayton, Data-Tron	513-223-8421
Ohio	Wickliffe, Data-Tron	216-585-8421
Tex	Dallas, Martin, Zienkowsky, Browne, & Assoc.	214-233-5535
Tex	Houston, Martin, Zienkowsky, Browne, & Assoc.	713-523-7333
Utah	Murray, Meas. Conslts.	801-268-3181
Wash	Seattle, Underwood, Jensen & Assoc.	206-575-0123

NEY, CO, J.W., Maplewood Ave., Bloomfield, Conn., 06002

NH RESEARCH, INC., 1510 S. Lyon St., Santa Ana, Calif., 92705, Tel: 714-835-1616, Telex: 67-8377; FSC No: 24862; Empl.: 20; Minimum order: $50

Customer service: N. Paik

Free literature available: Short-form catalog or specific data sheets of the NH Research product line.

Products manufactured: Amplifiers, Analyzers, Calibrators, Controls/Control Eqpt., Converters, Current Sensors, Current Sources, Dividers, Filters, Generators, Isolators, Meters, Monitors, Oscillators, Power Supplies, Regulators, Shifters, Stabilizers, Line Impedance, Standards, Synthesizers, Testers

Local Sales Offices & Reps.

Ala	Huntsville, Gentry Assocs.	205-534-9771
Ariz	Scottsdale, Measurement Conslts. Ltd.	602-948-8410
Cal	Santa Ana, Schlines-Richardson	714-832-1949
Colo	Boulder, Measurement Conslts. Ltd.	303-449-5294
Fla	Gulfport, Greenstein Assocs.	813-381-6490
Ill	Chicago, Pat Lind Elctrns. Co.	312-774-1246
Ind	Indianapolis, Pat Lind Elctrns. Co.	317-547-9178
Mass	Waltham, W.M. Hague Co.	617-899-5600
Mich	Detroit, Electro Sales Assocs.	313-526-8800
Minn	Circle Pines, Pat Lind Elctrns. Co.	612-786-5770
NJ	Haddonfield, Dyna Rep Co.	609-795-1700
NJ	Ridgewood, Hansen Assocs.	201-652-7055
NM	Albuquerque, Measurement Conslts., Ltd.	505-265-6471
NY	Huntington, Hansen Assocs.	212-947-0379
NC	Burlington, Gentry Assocs.	919-227-3639
Ohio	Cleveland, Electro Sales Assocs.	216-261-5440
Ohio	Dayton, Electro Sales Assocs.	513-426-5551
Pa	Pittsburgh, Electro Sales Assocs.	412-371-9449
Tex	El Paso, LH Industries	915-544-5124
Utah	Murray, Measurement Conslts. Ltd.	801-268-3181
Va	Alexandria, Dyna Rep Co.	703-354-1222
Wash	Bellevue, Showalter Instr.	206-624-9020
FOR:	Can., Mississauga, Ont., Allan Crawford Assocs.	416-678-1500

NICHICON AMERICA CORP., 6435 N. Proesel Ave., Chicago, Ill., 60645, Tel: 312-679-6530

Products manufactured: Capacitors, Fixed

NICOLET INSTRUMENTS CORP., 5225 Verona Rd., Madison, Wisc., 53711, Tel: 608-271-3333, TWX: 910-286-1713; Empl.: 201 ..... p. 1•780,781

Customer service: B. Hervey

Free literature available: 1090 Brochure. A description of the operation and display capability of the Digital Oscilloscope. Specifications of the mainframe and various plug-ins are included.

Products manufactured: Oscilloscopes

Local Sales Offices & Reps.

Cal	Encino, Scientific Devices	213-872-1951
Cal	Los Alamitos, Scientific Devices	213-598-7678
Cal	Mountainview, Scientific Devices	415-964-4230
Cal	San Diego, Scientific Devices	714-279-6642
Colo	Littleton, Nicolet Instr.	303-798-3561
Ga	Decatur, Nicolet Instr.	404-243-1219
Ill	Des Plaines, Scientific Devices-Midwest	312-297-5240
Kans	Lenexa, Scientific Devices-Midwest	913-631-3818
La	Baton Rouge, Systems Engrg. Sls. Co.	504-272-3730
Md	Silver Spring, Sel-Tronics, Inc.	301-589-3391
Mass	Auburndale, Nicolet Instr.	617-969-7420
Minn	Minneapolis, Scientific Devices-Midwest	612-544-1616
Mo	St. Louis, Scientific Devices-Midwest	314-842-2535
NJ	Fairfield, KLS Assocs., Inc.	201-227-2900
NY	Liverpool, Rayelco Elctrns., Inc.	315-652-5272
Ohio	Cleveland, Data Equip. Sls. Co.	216-252-3151
Pa	Melrose Park, R. Meyers Assocs.	215-224-1663
Tex	Houston, Systems Engrg. Sls. Co.	713-668-7840
Tex	Richardson, Systems Engrg. Sls. Co.	214-231-9364
Wash	Bellevue, Scientific Devices-Northwest	206-454-0900
For:	Can., Mississauga, Ont., Allan Crawford Assocs.	416-678-1500

NICOLET SCIENTIFIC CORP., 245 Livingston St., Northvale, N.J., 07647, Tel: 201-767-7100, TWX: 710-991-9619; Empl.: 85; Minimum order: $50

For info on price: R. S. Rothschild; Application info: R. S. Rothschild; Customer service: A. Pini; Delivery info: R. S. Rothschild

Products manufactured: Analyzers

Local Sales Offices & Reps.

Cal	Irvine, Nicolet Scientific	714-549-1199
Colo	Littleton, Nicolet Instrument	303-798-3561
Ga	Decatur, Nicolet Instrument	404-243-1219
Ill	Palatine, Nicolet Scientific	312-358-6520
Mass	Auburndale, Nicolet Instrument	617-969-7420
NJ	Medford, Nicolet Scientific	215-467-7070
NY	Liverpool, Rayelco Elctrns.	315-652-5272
Ohio	Dayton, LI/CORP	513-434-6367
Pa	West Chester, Nicolet Scientific	301-942-2020
Tex	Plano, Nicolet Instrument	214-424-8611
Wash	Bellevue, Scientific Devices/Northwest	206-454-0900

NIHON DEMPA KOGYO CO., LTD., 1-21-2 Nishihara, Shibuya-Ku, Tokyo, Japan, Tel: 03-460-2111; Empl.: 800

Products manufactured: Crystal Blanks, Filters, Oscillators

NIPPERT CO., 825 Pittsburgh Dr., Delaware, Ohio, 43015, Tel: 614-363-1981; Empl.: 350; Minimum order: $100

For info on price: D. E. Breese; Application info: D. E. Breese; Customer service: D. Heinlein; Delivery info: D. Heinlein

Free literature available: Bulletin N-101: Cold-Formed Components, Bulletin N-102: Cold-Formed Heat Sinks with Integral Weld Rings, Bulletin N-104: Custom Drawn Shapes.

Products manufactured: Commutators, Crystals, Headers, Services, Assembly, Production & Test, Slip-Rings & Assemblies

NIPPON-DENSAN CORP., 1821 University Ave., St. Paul, Minn., 55104

NITRON DIV., McDonnell Douglas Corp., 10420 Bubb Rd., Cupertino, Cal., 95014

NJE CORP., Box 50, Culver Rd., Dayton, N.J., 08810, Tel: 201-329-4616, TWX: 710-480-5674; Empl.: 125

p. 1•1326-1331

Products manufactured: Power Supplies

Local Sales Offices & Reps.

Ala	Huntsville, Col-Ins-Co.	205-539-1771
Ariz	Phoenix, BFA Corp.	
Cal	Sherman Oak, Electronic Mktg. Specialists	213-990-4244
Cal	Sunnyvale, Electronic Mktg. Specialists	408-245-9291
Colo	Denver, BFA Corp.	303-744-3301
Conn	Hamden, Instrument Consultants	203-288-5246

Fla	Orlando, Col-Ins-Co.	305-423-7615
Ind	Ft. Wayne, R.O. Whitesell & Assocs.	219-432-5591
Ind	Indianapolis, R.O. Whitesell & Assocs.	317-359-9283
Ind	Kokomo, R.O. Whitesell & Assocs.	317-452-6065
Iowa	Marion, B. Rush Assoc.	319-377-0551
Kans	Olathe, B. Rush Assoc.	913-782-1177
Md	Silver Spring, Reptron Inc.	301-593-4844
Mass	Waban, Instr. Consultants	617-969-9881
Mo	St. Louis, B. Rush Assoc.	314-426-3656
NM	Albuquerque, BFA Corp.	505-292-1212
NM	Las Cruces, BFA Corp.	505-523-0601
NY	Manhasset, Win-Cor Elctrn. Sls. Corp.	516-627-9474
NY	Pittsford, T-Squared Elctrns. Co.	716-381-2551
NY	Syracuse, T-Squared Elctrns. Co.	315-463-8592
NC	Raleigh, Col-Ins-Co.	919-834-6591
Okla	Tulsa, Kemp Engrg.	918-299-2636
Pa	Pennsauken, Megargel-Himmelstein Assoc.	215-629-1072
Tex	Addison, Kemp Engrg.	214-661-0400
Tex	Houston, Kemp Engrg.	713-688-1431
Wash	Bellevue, Brennan Assoc.	206-454-9332

NL INDS., INC., Elctrns. Dept., Box 726-1981 Port City Blvd., Muskegon, Mich., 49445, Tel: 616-777-2602, TWX: 510-394-4130; Empl.: 60 .... p. 1•2320-2323

Products manufactured: Arresters, Electrical Surge, Lightning, Current Sensors, Discharge Systems, Energy, Fuses, Heaters & Heating Elements, Indicators, Limiters, Meters, Ovens, Probes, Protectors, Regulators, Resistors, Suppressors, Switches, Thermistors, Thermometers, Resistance, Transducers

Local Sales Offices & Reps.

Ala	Huntsville, Murphy & Cota	205-529-8476
Cal	Inglewood, Tracker	213-645-6060
Cal	Palo Alto, Testco	415-326-5320
Colo	Wheat Ridge, RMS Sls.	303-423-6693
Ill	Chicago, D. Dolin Sls. Co.	312-286-6200
Ind	Greenwood, V. Schillinger & Assocs.	317-888-2260
Ind	South Bend, V. Schillinger & Assocs.	219-291-6258
Md	Baltimore, R. A. Wafer Assocs.	301-744-1133
Mass	Newton, Normell Assocs.	617-969-5478
Mich	Detroit, Burcaw Co. & Assocs.	313-533-7700
Minn	St. Paul, R.G. Ragon, Inc.	612-488-0201
Mo	Kansas City, Nevco, Inc.	816-421-1751
NJ	Fairlawn, G. Harris & Assocs.	201-796-5200
NJ	Haddonfield, Thomas Assocs., Inc.	609-854-3011
NY	Syracuse, W.A. Franklin Sls. Corp.	315-474-2954
NY	Whitesboro, W.A. Franklin Sls. Corp.	315-736-5460
NC	Winston-Salem, Murphy & Cota	919-723-1001
Ohio	Cleveland, Jay Engrg. Co.	216-252-0486
Ohio	Dayton, Jay Engrg. Co.	513-253-2151
Okla	Tulsa, Norvell Assocs., Inc.	918-663-1247
Tex	Dallas, Norvell Assocs., Inc.	214-350-6771
Tex	Houston, Norvell Assocs.	713-774-2568
Wash	Seattle, D. Smith Sls. Co.	206-633-3160

NL INDUSTRIES, INC., Metal Div., 111 Broadway, New York, N.Y., 10006, Tel: 212-732-9400

Products manufactured: Flux, Brazing & Soldering Materials, Metal Compounds, Foils, Powders, Sheet, Stock, Metals, Solder (All Types), Tubing

N L INDS., INC., Paint Div., 111 Broadway, New York, N.Y., 10006, Tel: 212-732-9400

Products manufactured: Coatings, Paints

N L INDS., INC., Steel Package Div., 15th & State Sts., Granite City, Ill., 62040, Tel: 618-451-9760

Products manufactured: Containers

NOBEX

components

NOBEX DIV., Griffith Plastics Corp., 1027 California Dr., Box 4365, Burlingame, Cal., 94010, Tel: 415-342-8170, TWX: 910-374-2840; FSC No: 32767; Empl.: 35; Minimum order: $10

For info on price: P. Long; Application info: J. A. Griffith; Customer service: P. Meyers; Delivery info: P. Long

Free literature available: Instrument Knob Catalog #300, Clear Dial Skirted Knob Catalog #361, DIGIBEZEL Catalog #351, Instrument Case Catalog #371, Binding Post Catalog #381.

Products manufactured: Bezels, Shielded & Unshielded, Caps, Lenses, Indicator Light, Cases, Equipment, Instrument, Meter, Dials, Knobs, Lenses, Readout & Display, Meters, Posts, Testers

Local Sales Offices & Reps.

Cal	Burlingame, J. Logan & Assocs.	415-697-6100
Cal	Inglewood, V & L Assocs.	213-671-7688
Fla	Delray Beach, F. A. Cullman Co.	305-276-5071
Ill	Chicago, Comm. Engrs.	312-761-0548
Ind	Ft. Wayne, McDonald Sls. Co.	219-745-9214
La	Metairie, McKinney Sls. Co.	504-887-1723
Md	Baltimore, M/E Assocs.	301-825-1130
Mass	N. Scituate, W.A. Hendrickson Co.	617-545-0652
Minn	Minneapolis, Wenco Sls.	612-866-3639
NJ	Cherry Hill, M/E Assocs.	609-667-6110
NY	Bayside, W. Jay Assocs.	212-762-4238
Okla	Tulsa, McKinney Sls. Co.	918-742-6791
Tex	Bellaire, McKinney Sls. Co.	713-665-3653
Tex	Dallas, McKinney Sls. Co.	214-631-9450
Va	Richmond, M/E Assocs.	703-266-3457
Wash	Seattle, C.K. Shanks & Assoc.	206-632-4290

Local Distributors

Cal	Burlingame, Rose Elctrns., Inc., 846 Stanton Rd.	415-697-0224
Cal	Los Angeles, Electric Switches, Inc., 2478 Fletcher Dr.	213-664-1141
Mass	Newton, Greene-Shaw Co., 70 Bridge St.	617-969-8900
NY	Bohemia, Car-Lac Elctrns., 75 Orville Dr.	516-567-4200
NY	Buffalo, Summit Distributors, 916 Main St.	716-884-3450
Okla	Tulsa, Oil Capitol Elctrns., 708 S. Sheridan	918-836-2541
Tex	Dallas, K-A Electronic Sls., 1220 Majesty	214-634-7870
Wisc	Mequon, Taylor Electric Co., 1000 W. Dones Bay	414-241-4321

SELF-ORGANIZING SYS., See Cosar Corp.

NON LINEAR FILTERS, Box 338, Trumbull, Conn., 06611, Tel: 203-268-6309; Empl.: 12

Free literature available: IPI low pass and IPVC-1 voltage controlled (over a 500:1 frequency range) low pass non-linear filters.

Products manufactured: Amplifiers, Filters, IC's, Active Filters

NON-LINEAR SYS., INC., Box N, Del Mar, Cal., 92014, Tel: 714-755-1134, TWX: 910-322-1132; Empl.: 76

For info on price: H. P. Heisig; Application info: P. Akin

Products manufactured: Clocks (All Types), Comparators, Controllers, Programmable, Controls/Control Eqpt., Converters, Counters, Data Acquisition & Reduction Systems, Data Compressors, Digital, Data Loggers, Detectors, Gages, Generators, Meters, Monitors, Multiplexers, Printers, Recorders, Scanners, Signal Conditioners & Equipment, Test Systems, Testers, Totalizers, Digital

NORELCOM ELECTRONICS, 200 Allen Blvd., Farmingdale, N.Y., 11735, Tel: 516-249-7262, TWX: 510-224-6519; Empl.: 40; Minimum order: $10

For info on price: A. Baldon; Application info: A. Rogers; Customer service: L. Frodell; Delivery info: L. Frodell

Free literature available: Electronic Hardware Catalog #173A; GE RTV Silicone Catalog; Raychem Heat Shrinkable Tubing Catalog; Thermalloy Heat Sink & Mfg. Pad Catalog.

Products manufactured: Cable, Capacitors, Fixed, Chokes, Coils Including Assemblies & Forms, Compounds, Encapsulating, Insulating, Molding, Potting, Connectors, Cords, Diodes, Fuses, Insulators & Insulation, Knobs, Lamps, Lubricants, Pads, Transistor Mounting, Rectifiers, Rubber, Tapes, Electrical Insulation, Tapes, Films & Foils, Pressure Sensitive, Transistor, Diode, Thyristor Heat Dissipators, Transistors, Tubing, Wire, Wire & Cable Ties

Local Sales Offices & Reps.

NJ	Livingston, H. Thaw Sls. Co.	

NORPLEX DIV., Universal Oil Products, Norplex Dr., LaCrosse, Wisc., 54601, Tel: 608-784-6070, Telex: 29-3422; Empl.: 850

Products manufactured: Laminates

Local Sales Offices & Reps.

Ariz	Phoenix, Karl Jahn Co.	602-956-9060
Cal	Alhambra, Ralph Little & Assocs.	213-282-2114
Cal	Santa Clara, Ralph Little & Assocs.	408-247-7750
Colo	Sedalia, Jensen Reps. Co.	303-466-6061
Conn	West Hartford, R.S. Pettigrew & Co.	203-233-8533
Fla	Largo, Almac Assocs.	813-581-0444
Ga	Tucker, Cartier & Wilson Co.	404-939-2547
Ill	Wheaton, Norplex Div, UOP	312-653-1283
Ind	Indianapolis, Norplex Division, UOP	317-788-1998
Iowa	Cedar Rapids, J. Vrbik Co.	319-377-8244
Mass	West Newton, R.S. Pettigrew & Co.	617-969-5770
Mich	Detroit, Hohlfeldt Engrg., Inc.	313-839-4592
Minn	Minneapolis, Norplex Div., UOP	612-835-5530
Mo	St. Louis, Phelan-Tramelli Sls. Agency	314-727-3400
NJ	Union, Plastech, Inc.	201-687-4810
NY	East Rochester, J.N. Powderly Co.	716-381-2540
Ohio	Cleveland, R.A. Paisley	216-333-0569
Ohio	Dayton, Wm. S. McClellan Assocs.	513-299-5161
Okla	Tulsa, T.J. Ray Co.	918-627-1515
Pa	Ardmore, Midlantic Plastics Sls. Co.	215-649-2436
Tex	Arlington, N & W Sls., Inc.	817-461-4443
Wash	Olympia, Bergford & Assocs.	206-866-2001
Wisc	Menomonee Falls, Ind'l Sls. Tech., Inc.	414-781-7232
FOR:	Can., Agincourt, Ont., J. Best	416-690-3254

NORSAL INDUSTRIES, INC., 34 Grand Blvd., Brentwood, N.Y., 11717, Tel: 516-231-4040, TWX: 510-227-9865; FSC No: 19136; Empl.: 15; Minimum order: $25

For info on price: C. Feldman; Application info: N. Spector; Customer service: C. Feldman; Delivery info: R. Feldman

Products manufactured: Adapters, Waveguide, Attenuators, Boards, Programming, Cavities, Microwave, Circuits, Hybrid, Thick Film, Circuits, Hybrid, Thin-Film, Circuits, Printed, Multilayer, Circulators, Ferrite, Connectors, Couplers, Demodulators, Detectors, Dividers, Dummy Loads, Duplexers, Microwave, Films, Filters, Isolators, Junctions, Hybrid, Microwave, Limiters, Line Strechers, Microwave, Mismatches, Microwave, Precision, Mixers, Modulators, All Kinds, Monitors, Multiplexers, Probes, Resistors, Shifters, Strip-Line Components, Microwave, Switches, Tees

Local Sales Offices & Reps.

Cal	Los Angeles, E. Mintz Assoc.	213-645-2066
Cal	Mt. View, Don Lay Assoc.	415-968-7500
Fla	Clearwater, Brennan Assoc.	813-446-5006
Ill	Chicago, Communication Engineers	312-761-0548
Mo	Kansas City, R. R. Burton Sls.	816-444-8300
Mo	Maryland Hgts., Delltron Co.	314-434-3804
NY	Melville, Astrorep	516-423-2266
Ohio	Dayton, F. L. Ohmer, Assoc.	513-434-1454
Pa	Lafeyette Hill, M. Lader Co.	215-825-3177
Tex	Addison, RMC & Assoc.	214-363-0166
Wisc	Milwaukee, Star Engrg.	414-543-3469

NORTH AMERICAN PHILIPS CONTROLS CORP., Cheshire Industrial Park Box E, Cheshire, Conn., 06410, Tel: 203-272-0301, TWX: 710-455-4048; Empl.: 650

For info on price: L. Connor; Application info: F. Vitone; Customer service: R. Wozniak; Delivery info: R. Wosniak

Free literature available: 4-page "Permanent Magnet Synchronous Motor Selection Guide" lists in chart form comparative electrical, physical and operating characteristics of 13 models of synchronous motors.

Products manufactured: Controls/Control Eqpt., Counters, Detectors, Display Devices/Displays, Flashers, Indicators, Motors, Relays, Switches, Timers, Totalizers, Digital

Local Sales Offices & Reps.

Ala	Huntsville, W.A. Brown Components	205-539-4411
Cal	North Hollywood, No. Amer. Philips Controls	213-877-0536
Cal	Palo Alto, Harris Engrg.	415-328-3370
Colo	Littleton, Simpson Assocs.	303-794-8381
Fla	Ft. Lauderdale, W.A. Brown Comps.	305-776-4800
Fla	Orlando, W.A. Brown Comps.	305-425-5505
Ill	Rolling Meadows, Sumer	312-394-4900
Ind	Ft. Wayne, Temple Engrg.	219-744-4331
Kans	Wichita, Dy-Tronix, Inc.	316-943-6221
Md	Lutherville, L.D. Lowery	301-823-2172

Mass	Braintree, No. Amer. Philips Controls	617-648-2576
Mich	Dearborn Heights, Temple Engrg.	313-565-6330
Minn	Mpls, Nortec Sls.	612-835-7414
Mo	Hazelwood, Dy-Tronix Inc.	314-731-5799
Mo	Kansas City, Dy-Tronix Inc.	816-761-6543
NJ	Livingston, A.A. Budde	201-994-1210
NJ	Union City, Malin Assocs. Co.	201-348-3770
NY	Rochester, Woodams-Montbach	716-544-8721
NC	Raleigh, W.A. Brown Comps.	919-876-9601
NC	Winston-Salem, W.A. Brown Comps.	919-725-5384
Ohio	Cleveland, C. Robinson Co.	216-381-9049
Ohio	Dayton, C. Robinson Co.	513-275-2412
Pa	Broomall, L.D. Lowery	215-528-5170
Tex	Dallas, R. Kimball Co.	214-231-3447
Utah	Salt Lake City, Simpson Assocs., Inc.	801-486-3731
Va	Charlottesville, L.D. Lowery	703-973-6672
Wash	Bellevue, W.M. Buehler Co.	206-455-5512
FOR:	Can., Toronto, Ont., Philips Elctrns. Inds., Ltd.	416-425-5161

Local Distributors

Cal	Sun Valley, Sterling Elctrns., 11614 Pendleton St.	213-767-5030
Fla	Ft. Lauderdale, Peerless Radio Corp., 1040 N.E. 43rd Ct.	305-566-5966
Pa	Horsham, Pioneer/Pennsylvania, 205 Witmer Rd.	215-674-5710
Tex	Houston, Altair Co., 9501 Baythorne Dr.	713-462-3029
Tex	Richardson, Altair Co., 405 N. Plano Rd.	214-231-5166

NORTH AMERICAN PHILIPS CONTROLS, Husky Park, Frederick, Md., 21701, Tel: 301-663-5141, TWX: 710-862-0901; Empl.: 310; Minimum order: $40

For info on price: B. L. Reeder; Application info: G. Borke; Customer service: P. Longo; Delivery info: M. Gieroux

Free literature available: 4-page guide to general purpose relays, displayed are operating, electrical and mechanical characteristics as well as dimensional data.

Products manufactured: Relays, Solenoids, Switches

Local Sales Offices & Reps.

Ala	Huntsville, W. Brown	205-539-4411
Cal	No. Hollywood, North Amer. Philips Controls Corp.	213-877-0536
Cal	Palo Alto, Harris Engrg.	415-328-3370
Colo	Denver, Williams-Assocs.	303-343-2911
Conn	Cheshire, North Amer. Philips Controls Corp.	203-272-0301
Fla	Ft. Lauderdale, W. Brown	305-776-4800
Fla	Orlando, W. Brown	305-425-5505
Ill	Rolling Meadows	312-394-4900
Ind	Ft. Wayne, Temple Engrg.	219-744-4331
Kans	Wichita, Dy-Tronix, Inc.	316-943-6221
Md	Towson, J-H Elctrn. Sls. Co.	301-825-4440
Mass	Braintree, North Amer. Philips Controls Corp.	617-848-2576
Mich	Dearborn Heights, Temple Engineering	313-565-6330
Minn	Mpls., Nortec Sls.	612-920-9526
Mo	Hazelwood, Dy-Tronix	314-731-4677
Mo	Kansas City, Dy-Tronix	816-761-6543
NJ	Dumont, Wilson Assoc.	201-385-7447
NM	Albuquerque, Williams Assocs.	505-255-1638
NY	New York, Wilson Assoc.	212-889-0929
NY	Rochester, Woodams-Montbach	716-544-8721
NC	Raleigh, W.A. Brown	919-876-9601
NC	Winston-Salem, W. Brown	919-725-5384
Ohio	Cleveland, C. Robinson	216-381-9049
Ohio	Dayton, C. Robinson	513-275-2412
Pa	Fort Washington, G. C. M. Assocs.	215-646-7535
Tex	Richardson, R.F. Kimball Inc.	214-231-3447
Wash	Bellevue, W.M. Buehler Co.	206-455-5512
EXP:	NY, N.Y., Frathom Co.	212-687-9390
FOR:	Can., Toronto, Ont., Pye-Tmc	416-249-7044

Local Distributors

Cal	Sun Valley, Sterling Elctrns., 11614 Pendleton St.	213-767-5030
Fla	Ft. Lauderdale, Peerless Radio Corp., 1040 NE 43rd Ct.	305-566-5966
Pa	Horsham, Pioneer/Penn., 205 Witmer Rd.	215-674-5710
Tex	Houston, Altair Co., 9501 Baythorne Dr.	713-462-3029
Tex	Richardson, Altair Co., 405 N. Plano Rd.	214-231-5166

NORTH AMERICAN PRINTED CIRCUIT DIV., Tyco Labs., Inc., Box 145, Stafford, Conn., 06075, Tel: 203-684-2703; Empl.: 140

Products manufactured: Boards, Printed Circuit, Circuits, Printed, Multilayer

NORTH ATLANTIC INDS., 200 Terminal Dr., Plainview, N.Y., 11803, Tel: 516-681-8600, TWX: 510-221-1879; FSC No: 07342; Empl.: 175; Minimum order: $25 p. 1•188,772

For info on price: P. G. Wittenberg; Application info: P. G. Wittenberg; Customer service: W. Cullum; Delivery info: B. Carolyn

Free literature available: Condensed catalog, individual data sheets & application notes on AC instrumentation & resover/synchro/digital conversion

Products manufactured: Analyzers, Bridges, Calibrators, Comparators, Converters, Decade Boxes, Demodulators, Detectors, Dividers, Indicators, Meters, Repeaters, Servo, Resolvers, Synchro, Servo Systems, Shifters, Simulators, Standards, Synchro Transmitters, Solid-State, Testers, Transformers

Local Sales Offices & Reps.

Ala	Huntsville, BCS Assocs.	205-881-6220
Ala	Mobile, BCS Assoc.	205-666-2796
Cal	Encino, Scientific Devices	213-872-1951
Cal	Los Alamitos, Scientific Devices	213-598-7678
Cal	Mountain View, Scientific Devices-CA	415-964-4230
Cal	North Hollywood, Elect. Standards Repair Svc.	213-765-4224
Cal	North Hollywood, North Atlantic Dist. Off.	213-982-0442
Cal	San Diego, Scientific Devices-CA	714-279-6642
Conn	Hamden, J & J Assocs.	203-624-7800
Fla	Orlando, BCS Assocs.	305-896-4881
Ga	Decatur, BCS Assocs.	404-321-0980
Ill	Chicago, P. Lind	312-774-1246
Ind	Indianapolis, P.Lind	317-547-9178
Iowa	Cedar Rapids, Tech Reps	319-363-2489
Ky	Valley Station, BCS Assoc.	502-935-9634
Md	Lanham, Brimberg Sls. Co.	301-552-2200
Mass	Burlington, J & J Assocs.	617-272-2606
Mich	Troy, G. R. Peters Assocs.	313-524-2920
Minn	Circle Pines, P. Lind	612-786-5770
Mo	Hazelwood, Tech. Reps.	314-731-5200
Mo	Independence, Tech Reps.	816-737-1414
NC	Greensboro, BCS Assocs.	919-273-1918
Ohio	Cleveland, Dynatron	216-835-2270
Pa	Exton, Scientific Mktg.	215-363-7377
Tex	El Paso, System Design Conslts.	915-544-5124
Tex	Houston, Scien. Sls.	713-666-5318
Tex	Richardson, Sci. Sls.	214-231-6541
Va	Williamsburg, BCS Assocs.	703-245-1786
Wash	Bellevue, Sci. Devices N.W.	206-454-0900
EXP:	N.Y., Plainview, North Atlantic	516-681-8600

Advertisment

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If you are using ILC/DDC or Analog Devices, North Atlantic Industries has the second source and also state-of-the-art S/D-D/S.

Test Equipment
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NORTH ELECTRIC CO., Electronics Div., Portland Way N., Galion, Ohio, 44833, Tel: 419-468-8100, TWX: 810-248-2907; Empl.: 1000

Free literature available: "NEC TODAY" Brochure - Overview of all of North's divisions with descriptions of each division's product line. "QUALITY ENGINEERED POWER SUPPLIES" Brochure - Photos & descriptions of the facilities and product capabilities of North's Electronetics Division, including ordering information for power supplies.

Products manufactured: Chargers, Battery, Chokes, Coils Including Assemblies & Forms, Converters, Inverters, Power Supplies, Switches, Transformers

Local Sales Offices & Reps.

Cal	Laguna Beach, North Elec. Co.	714-494-5800
Ill	Des Plaines, Marsland Assoc.	312-775-1309
NJ	Cherry Hill, Benco Sls.	609-779-9282
NJ	Fair Lawn, Bixon Assoc.	201-797-5356
NJ	Livingston, G & A Elctrns., Inc.	201-992-3087
Ohio	Canton, CSA Equip. Sls.	216-456-1359
Va	Oakton, Product Management Corp.	703-385-9306

NORTH HILLS ELCTRNS., Alexander Pl., Glen Cove, N.Y., 11542, Tel: 516-671-5700; FSC No: 98821; Empl.: 45; Minimum order: $25 p. 1•189,264,265,1332,1333; p. 2•399,1388,1771

Free literature available: Summary Product Sheets on All Products.

Products manufactured: Alarms, Boards, Programming, Calibrators, Coils Including Assemblies & Forms, Comm. Systems, Comparators, Converters, Couplers, Current Sources, Display Devices/Displays, Dividers, Integrators, Electronic, Power Supplies, References, D-C Voltage, Scanners, Switches, Transducers, Transformers, Transmission Systems, Data, Voltage Sources

Local Sales Offices & Reps.

Ala	Huntsville, Scientific Devices-Southeast	205-536-1969
Cal	Los Angeles, Sodaro Co.	213-478-7733
Fla	Ft. Lauderdale, Scientific Southeast	305-721-4260
Fla	Orlando, Scientific Devices-Southeast	305-841-8180
Fla	St. Petersburg, Scientific Devices-Southeast	813-521-1720
Minn	Minneapolis, Heimann Co., Inc.	612-861-6051
NY	Great Neck, Industron Assocs., Inc.	516-487-2620
NC	Burlington, Scientific Devices-Southeast	919-228-6279

NORTHEAST SCIENTIFIC CORP., 30 Wetherbee St., Acton, Mass., 01720, Tel: 617-263-2711; Empl.: 10; Minimum order: $100

Customer service: C. Moritz

Free literature available: Catalog

Products manufactured: Power Supplies

Local Sales Offices & Reps.

Cal	Santa Clara, Ray Marg	408-248-5199
DC	Washington, Whitcomb Assocs.	202-737-0763
Ill	Des Plaines, Marsland Assocs., Inc.	312-775-1309
Ind	Indianapolis, Marsland Assocs., Inc.	317-924-3568
Md	Baltimore, Whitcomb Assocs.	301-889-1245
Minn	Minneapolis, Marsland Assocs.	612-545-4481
Mo	St. Peters, Marsland Assocs.	314-278-6949
NH	Salem, Bilowich Enterprises	603-898-5408
Pa	Audubon, Holmes Assocs.	215-666-0636

NORTHERN ENGINEERING LABS., 357 Beloit St., Burlington, Wisc., 53105, Tel: 414-763-3591; FSC No: 00815; Empl.: 200; Minimum order: $25 .... p. 1•399

Customer service: D. Griebel

Free literature available: Twenty page technical brochure on frequency control devices (catalog #373) and pamphlet on "Writing Crystal Specifications."

Products manufactured: Crystal Blanks, Crystals, Oscillators, Ovens

Local Sales Offices & Reps.

Cal	Palo Alto, R.W. Thompson Assocs.	415-494-7516
Cal	Pasadena, P. Nurches Co.	213-796-5844
Colo	Aurora, Robbins & Assocs.	303-399-6618
Ill	Oak Park, E. Schmeichel Co.	312-524-0307
Kans	Olathe, Tech. Reps. Inc.	913-782-1177
Mass	Needham, Hatch Assocs.	617-444-3310
Minn	Chanhassen, Barnes Sls Assocs.	612-474-2907
NJ	Bergenfield, H. Gray Assocs.	201-384-3643
NY	Syracuse, Nayor Elctrns. Co.	315-656-2251
Ohio	Wickliffe, W.J. Brauer & Assocs.	216-943-0601
Tex	Addison, Southland Comps., Inc.	214-233-0603

NORTHFIELD PRECISION INSTR. CORP., 4400 Austin Blvd., Island Park, N.Y., 11558, Tel: 516-431-1112; FSC No: 12639

Customer service: M. Farber

Products manufactured: Clutches, Couplings

NORTON ASSOCS., INC., 10 Di Tomas Ct., Copiague, N.Y., 11726, Tel: 516-842-4666; FSC No: 08739

Customer service: R. Norton

Free literature available: Specification sheets on Norton magnetic heads for tape & film.

Products manufactured: Heads, Recording Playback, Erase

NORTRONICS CO., INC., 8101 Tenth Ave., N., Minneapolis, Minn., 55427, Tel: 612-545-0401; Empl.: 600; Minimum order: $35

For info on price: E. Bedell; Application info: J. Dundovic; Customer service: P. Lund; Delivery info: P. Lund

Free literature available: Design digest for audio recording; design digest for mini-digital recording design digest for digital recording; recorder care maintenance manual; nortronics head replacement guide; application oriented literature & catalogues for the user.

Products manufactured: Demagnetizers, Editing Equipment, Tape, Erasers, Magnetic Tape (Bulk), Heads, Recording Playback, Erase, Tape Recording Accessories

NOTHELFER WINDING LABS, See NWL Transformer

NOVA ELECTRIC MFG. CO., 263 Hillside Ave., Nutley, N.J., 07110, Tel: 201-661-3434; Empl.: 50 p. 1•1334-1337

Products manufactured: Converters, Inverters, Power Supplies, Regulators

Local Sales Offices & Reps.

Cal	Los Angeles, Basic Sys.	213-938-2833
Cal	Mountain View, Gado Instr.	415-961-2222
Colo	Boulder, A.L.S. Elctrns.	303-447-2436
Conn	Hamden, Victor Assoc.	203-646-6448
Fla	Maitland, Rowe Engrg. Sls.	305-834-2700
Ill	Chicago, Ampol Svcs. & Engrg.	312-545-4600
Ind	Carmel, Rich Elctrn. Mktg.	317-844-8462
Md	Bethesda, Powell-Pendergraph	301-656-4535
Mass	Framingham, Victor Assoc.	617-879-5710
Mich	Farmington, Anderson Elctrns.	313-476-9161
Minn	Minneapolis, R-J Inc.	612-922-1425
NM	Albuquerque, A.L.S. Elctrns.	505-294-8555
NY	Elmont, Crane & Egert Corp.	516-488-2100
NY	Fayetteville, M.P. Andrews Mfrs. Rep.	315-637-5291
NC	Charlotte, J. Rudisill Assoc.	704-377-6901
Ohio	Aurora, EMA Inc.	216-562-8516
Ohio	Centerville, EMA Inc.	513-433-2800
Ore	Portland, Richard Legg Co.	503-792-8824
Pa	Philadelphia, Powell-Pendergraph	215-657-0330
Pa	Pittsburgh, Wainwright Tech. Sls.	412-487-5055
Tex	Dallas, R. Martin Assoc	214-358-3704
Tex	Houston, R. Martin Assoc.	713-462-4077
Va	Richmond, Powell-Pendergraph	804-264-2341
EXP:	N.Y., N.Y., Henley & Co.	212-986-5544
FOR:	Can., Calgary, Alberta, Canadian Dynamics	403-243-2018
FOR:	Can., Lachine, Que., Electrodesign Ltd	514-363-5120
FOR:	Can., Toronto, Ont., Electrodesign Ltd	416-787-0991
FOR:	Can., Vancouver, B.C., Canadian Dynamics	604-325-3201
FOR:	Can., Vanier, Ont., Electrodesign Ltd,	613-745-0541

NSI, INSTRUMENT DIV., 2613 Industrial La., Garland, Tex., 75041, Tel: 214-278-3545; Empl.: 38; Minimum order: $25

Customer service: D. Hoppens

Free literature available: Solid State Cooling: Guide to Solid State Cooling: photos, performance curves, size and application data

Products manufactured: Controls/Control Eqpt., Cooling/Heating Modules, Thermoelectric, Power Supplies

Advertisment

Standard and custom solid state thermoelectric coolers and associated temperature controls/power supplies. Specialists in coolers for industrial use and high reliability space or military applications. Temperatures to -110°C. Capabilities include complete thermal systems design and fabrication including heat exchangers, fans, and vacuum chambers.

N.T-T/PEERLESS, 40 Jytek Dr., Leominister, Mass., 01453, Tel: 617-537-6001, TWX: 710-347-0326; Minimum order: $25

Customer service: W. E. Schwartz

Products manufactured: Cable Assemblies & Harnesses, Cable, Clamps & Clips, Cleaners, Ultrasonic, Connectors, Cords, Insulators & Insulation, Jack Adapters (All Types), Jacks (All Types), Lead Assemblies & Receptacles, Microphone Accessories (Including Stands, Holders, Booms), Networks, Plug Adapters, Plug & Jack Sets, Posts, Probes, Sockets, Spacers, Speaker Systems, Speakers, Terminal Blocks, Boards & Strips, Terminals, Tools

Local Sales Offices & Reps.

Cal	Burlingame, Carelli-EMA	415-697-6286
Cal	Van Nuys, Markman Co.	213-787-6151
Fla	Fort Lauderdale, Sproch Sls.	305-587-3792
Ga	Atlanta, Hollingsworth & Still	404-394-3270
Ill	Hoffman Estates, G. Sangwin Co.	312-884-0186
Mass	Wellesley, L. Cole	617-237-1260
Mich	Milford, Polyphase Sls.	313-685-3003
Minn	Minneapolis, Heimann Co.	612-861-6051
NY	New York, Newhope Co.	212-532-7372
NY	Rochester, Marsey Sls.	716-442-9700
Ohio	Columbus, Mandabach & Assoc.	614-235-0265
Ore	Salem, Pacnor Mktg.	503-363-6445
Pa	Willow Grove, R. Lewis Sls.	215-659-0704
Tex	Dallas, Berthold Sls.	214-526-8329
Wash	Seattle, Pacnor Mktg.	206-284-8020
Wisc	Brookfield, G. Sangwin Co.	414-782-3240

NU-CONCEPT COMPUTER SYSTEMS, INC., Route 309 and Advance Lane, Colmar, Pa., 18915, Tel: 215-822-8400

For info on price: T. Dvorak; Application info: J. Moretz; Customer service: T. Dvorak; Delivery info: T. Dvorak

Free literature available: Dy-Nos-Stick Digital Test Probe Brochure - Specifications & description, Digital Diagnostics leaflet - Digital trouble-shooting requisites, PAK-X-TRAC brochure - Specifications & description

Products manufactured: Probes, Soldering Guns, Irons & Desoldering Tools

NU-METRICS, RD 1 Box 489, Vanderbilt, Pa., 15486, Tel: 412-628-0400; Empl.: 23

For info on price: R. T. Semsey; Application info: R. T. Semsey; Customer service: J. D. Bowman; Delivery info: J. D. Bowman

Products manufactured: Counters

NUCLEAR MEAS. CORP., 2460 N. Arlington Ave., Indianapolis, Ind., 46218, Tel: 317-546-2415, TWX: 810-341-3137; Empl.: 46; Minimum order: $10

For info on price: L. G. Vaughn; Application info: L. G. Vaughn; Customer service: M. Hansen; Delivery info: M. Hansen

Free literature available: Bulletin AM-4 Continuous Air Monitors - Nuclear Bulletin GA-2T0-Gamma Alarms-Nuclear Bulletin PC-4-Laboratory Counting System1-Nuclear

Products manufactured: Detectors, Scalers, Binary, Decade

Local Sales Offices & Reps.

Cal	Menlo Park, Robt. W. Healy Co.	415-828-6044
Colo	Denver, T. Buirley	303-841-2754
DC	Washington, Hildenbrand Co., Inc.	703-280-2330
Fla	Jacksonville, Pulcir, Inc.	904-743-5700
Ill	Chicago, Memeco, Inc.	312-774-0919
Mass	Marblehead, Nucleonic Div. M.M. Newman Corp.	617-631-7100
NY	Syosset, Scientific Sys. Sls. Corp.	516-921-3737
NC	Charlotte, MacGuire & Crawford, Inc.	704-366-3454
Pa	Pittsburgh, Scientific-Pittsburgh	412-655-2800
Tex	Houston, R. Martin Assocs.	713-462-4077
Wash	Bellevue, Showalter Elctrns.	206-455-4922

NUCLEAR RESCH. CORP., Street Rd. & 2nd St. Pike, Southampton, Pa., 18966, Tel: 215-357-5015; FSC No: 96696; Empl.: 25

For info on price: E. M. Pollock; Application info: A. J. Cassell; Customer service: A. J. Cassell; Delivery info: A. J. Cassell

Products manufactured: Amplifiers, Controls/Control Eqpt., Counters, Gages, Indicators, Meters, Scalers, Binary, Decade, Test Equipment, X-Ray Inspection Equipment

NUCLEONIC PRODS., Box 1454, 6660 Variel Ave., Canoga Pk., Cal., 91303, Tel: 213-887-1010, TWX: 910-494-1954; Empl.: 101; Minimum order: $35

For info on price: H. Nierenberg; Application info: H. Nierenberg; Customer service: A. Blakemore; Delivery info: A. Blakemore

Products manufactured: Capacitors, Fixed, Crystals, Diodes, Integrated Circuit Devices, Inverters, Magnets, Metals, Power Supplies, Rectifiers, Transistors

NUCLEUS CORP., 25131 Dequindre, Madison Hgts., Mich., 48071, Tel: 313-399-3610; Empl.: 37

For info on price: L. Zeleney; Application info: L. Zeleney; Customer service: L. Adami; Delivery info: L. Adami

Free literature available: Fifth wheel instrumentation; vehicle performance test electronics.

Products manufactured: Boards, Printed Circuit, Controls/Control Eqpt., Converters, Counters, Decoders, Dials, Display Devices/Displays, Indicators, Integrated Circuit Packaging Systems, Kits, Power Supply, Kits, Test Equipment, Machines/Machinery, Production, Meters, Packages, Integrated Circuit, Screens, Printed Circuit, Services, Assembly, Production & Test, Solder (All Types), Stands, Instruments, Test Systems

NUCOR CORP., Power Supply Div., 2 Richwood Pl., Denville, N.J., 07834, Tel: 201-627-4200, TWX: 710-987-8487; Empl.: 115

Products manufactured: Chamber, Environmental Test, Meters, Power Supplies

Local Sales Offices & Reps.

Cal	Long Beach, Cairns Engrg. Sls.	213-432-7444
Fla	Clearwater, Brennan Assocs.	305-466-5006
Ill	Chicago, Electro-Tech Mktg. Assoc.	312-588-4535
Iowa	Cedar Rapids, Palatine Sales	319-365-8071
Kans	Overland Park, Palatine Sls.	913-262-5643
Md	Timonium, DeShawn Assocs.	301-252-4878
Mass	Burlington, R.J. Sickles Assoc.	617-272-7285
Mich	Warren, DEM Elctrn. Sls.	313-755-6660
Mo	St. Louis, Palatine Sls.	314-426-7055
NY	Cortland, R.J.C. Associates	607-753-3909
NY	Huntington Station, Addem Group	516-567-5900
Okla	Tulsa, Vista Engrg.	918-627-7557
Tex	Richardson, Vista Engrg.	214-235-4547

NURAD, INC., 2165 Druid Pk. Dr., Baltimore, Md., 21211, Tel: 301-462-1700; Empl.: 40

Free literature available: "Airborne ECM Horn Antennas" A brochure on the use of airborne horn antennas for Electronic Warfare. Omni Directional Quad Polarized antenna system for remote TV broadcasts.

Products manufactured: Antenna Feed Systems, Antennas, Attenuators, CATV Systems & Equipment, Honeycomb Sheets, Panels, etc., Horns, Microwave, Mounts, Switches, Waveguides & Adapters

NUSONICS, INC., Box 248, Paramus, N.J., 07652, Tel: 201-265-2400; Empl.: 30

Products manufactured: Analyzers, Meters, Oceanographic Equip. (Electronic)

NVF CO., Box 68, Yorklyn, Del., 19736, Tel: 302-239-5281; Empl.: 1500

Products manufactured: Cases, Equipment, Instrument, Meter, Containers, Insulators & Insulation, Laminates, Services, Assembly, Production & Test, Tubing

NWL TRANSFORMERS, Nothelfer Winding Labs., Box 455, Trenton, N.J., 08603, Tel: 609-298-7300; Empl.: 100; Minimum order: $100 ..... p. 1•1325; p. 2•1325,1772

For info on price: R. Graham; Application info: D. Singh; Customer service: C. Zigrand; Delivery info: C. Wszolek

Free literature available: Our transformer reactor information booklet describes NWL deisgn and manufacture of custom electrical equipment. It is directed to those with special design requirements not met by standard "off the shelf" catalog units. The following information is available in this literature: transformer, reactor, power supply and application information.

Products manufactured: Chokes, Coils Including Assemblies & Forms, Controls/Control Eqpt., Filters, Power Supplies, Reactors, Transformers

Local Sales Offices & Reps.

Mass	Randolph, Naton Assoc	617-986-6417
NY	Elmira Hgts., REECO	607-733-1387
Tex	Dallas, Titan Reps	214-357-8266

NYE, WILLIAM F., INC., P.O. Box G-927, New Bedford, Mass., 02742, Tel: 617-996-6721; Empl.: 10; Minimum order: $6

Customer service: G. B. Mock

Free literature available: Summary catalog on synthetic lubricants for wide temperatures, high lubricity, chemical resistance, oil creep control, motion damping, plastic and elastomer compatibility and electric contacts.

Products manufactured: Lubricants

NYTRONICS COMPS. GROUP INC., Sub Nytronics, Orange St., Darlington, S.C., 29532, Tel: 803-393-5421; FSC No: 83125; Empl.: 500; Minimum order: $50 p. 2•212-229,400-421,1504-1507

For info on price: M. W. Windham Ext. 320; Application info: W. Early Ext. 325; Customer service: M. Parnell Ext. 217; Delivery info: M. Parnell Ext. 217

Products manufactured: Capacitors, Fixed, Coils Including Assemblies & Forms, Delay Lines, Resistors

Local Sales Offices & Reps.

Ala	Huntsville, W.A. Brown Inc.	205-539-4411
Ariz	Phoenix, Clemick & Neenan & Assocs.	602-279-7649
Cal	Los Altos, W.W. Posey	415-948-7771
Cal	Los Angeles, Clemick & Neenan & Assoc.	213-476-1272
Colo	Denver, P. Webster	303-770-1972
Fla	Fort Lauderdale, W.A. Brown Comp. Inc.	305-776-4800
Fla	Orlando, W.A. Brown Comp. Inc.	305-425-5505
Ga	Atlanta, W.A. Brown Comp. Inc.	404-457-4069
Ill	Chicago, Balhorn & Welch Inc.	312-889-5011
Ind	Indianapolis, Southern Sls. Corp.	317-257-7575
Md	Bethesda, Warren Mount Comp.	301-657-9312
Mass	Bedford, F.R. Lesser	617-275-7558
Mich	Ann Arbor, H.C. Heym Assoc.	313-971-6552
Mich	Saginaw, H.C. Neym Assoc.	517-799-0873
Minn	Edina, Wagner Conslts.	612-941-6310
NY	Fairport, W.A. Franklin Sls. Corp.	716-377-6584
NY	Syracuse, W.A. Franklin Sls. Corp.	315-472-5273
NY	Valley Cottage, LRC Assocs.	914-634-7973
NY	Whitesboro, W.A. Franklin Sls. Corp.	315-736-5460
NC	Gastonia, W.A. Brown Comp. Inc.	704-867-2101
NC	Winston Salem, W.A. Brown Comp. Inc.	919-725-5384
Ohio	Cleveland, Imtech Inc.	216-826-3400
Ohio	Dayton, Imtech Inc.	
Okla	Tulsa, Palatine Sls., Inc.	918-622-0321
Pa	Narbeth, J. Bresson Assoc.	215-839-6770
Pa	Pittsburgh, Imtech, Inc.	
Tex	Austin, Palatine Sls., Inc.	512-451-7463
Tex	Houston, Palatine Sls., Inc.	713-777-4477
Tex	Richardson, Palatine Sls., Inc.	214-231-9489
Utah	Salt Lake City, P. Webster	
Wash	Seattle, Seatronics, Inc.	206-767-4330

Local Distributors

Ala	Huntsville, Cramer Elect., 2310 Bob Wallace Ave. S.W.	205-539-5722
Cal	Carson, Hi Rel, 20507 S. Belshaw Ave.	213-537-6500
Cal	Sunnyvale, Bell Industries, Box 8050	408-734-8570
Colo	Denver, Newark Elec., 2170 S. Grape St.	303-757-3351
DC	Beltsville, Newark Elec., 10440 Baltimore	301-937-5085
Fla	Ft. Lauderdale, Newark Elect., 1360 N.W. 65th Ave.	305-587-2372
Ga	Atlanta, Cramer Elect., 3923 Oak Cliff	404-448-9050
Ill	Chicago, Newark Elect., 500 N. Pulaski Rd.	312-638-4411
Ind	Ft. Wayne, Ft. Wayne Elect., 3606 E. Maumee	219-742-4346
Iowa	Cedar Rapids, Newark Elect., 1019 First Ave. S.W.	312-362-1171
Md	Baltimore, Radio Elect., 1026 Cromwell Bridge Rd.	301-823-0070
Mass	Newton, Cramer Elect., 85 Wells Ave.	617-969-7700
Minn	Minneapolis, Newark Elect., 2028 E. 46th St.	216-361-4700
NJ	Kenilworth, Newark Elect., 303 Monroe Ave.	201-272-8410
NJ	Rahway, Terminal Elect., 1463 Pinewood St.	201-381-5700
NY	Hauppauge, Jaco Elect., 195 Engineers Rd.	516-273-5981
NY	Plainview, ACI Elect., 28 South Mall St.	516-293-6630
NC	Winston Salem, Cramer Elect., 938 Burke St.	919-725-8711
Ohio	Cleveland, Newark Elect., 2028 E. 46th St.	216-361-4700
Pa	Philadelphia, Philadelphia, 1225 Vine St.	215-568-8288
Tex	Dallas, Wholesale Elect., Ross at Central	214-824-3001
Utah	Salt Lake City, Newark Elect., 2540 S. 300 W.	801-486-1048
Wash	Bellevue, Bell Industries, 12410 S.E. 32nd St.	206-747-1515
Wisc	Brookfield, Newark Elect., 3695 No. 126th St.	414-781-2450

OAK INDS. INC., Switch Div., Dept. EL, Crystal Lake, Ill., 60014, Tel: 815-459-5000, TWX: 910-634-3353; FSC No: 76854; QPL No: 3786; Empl.: 2000; Minimum order: $100

Customer service: Mktg. Dept.

Products manufactured: Controls/Control Eqpt., Relays, Solenoids, Switches

Local Sales Offices & Reps.

Ariz	Phoenix, Shefler-kahn	602-258-7893
Cal	Inglewood, J. Kent	213-678-4108
Cal	Los Altos, D. Jacoby	415-941-1237
Colo	Denver, I.W. Strong	303-292-6900
Fla	Orlando, Dan Green	305-671-4111
Haw	Honolulu, Pegart Int'l. Hawaii	808-839-6574
Ill	Crystal Lake, Oak Inds. Inc.	815-459-5000
La	Metairie, J. McKinney Sls.	504-887-1723
Mass	Reading, R. Kolarik	617-944-0094
Mich	St. Joseph, J. Carlson	616-983-3032
Minn	Edina, Wagner Conslts. Corp.	612-941-6310
Mo	Raytown, Centech Corp.	816-358-8100
NJ	Haddonfield, Gray Assocs.	609-429-5300
NJ	Mountainside, H. Richter	201-233-4615
NJ	Nutley, Falk-Baker Assoc.	201-661-2430
NM	Albuquerque, Shefler-Kahn Co.	505-265-7077
NY	Fayetteville, H. G. Richter, Inc.	315-637-6713
NY	New York, H. G. Richter, Inc.	212-962-5820
NC	Raleigh, R. Burns	919-876-7591
Ohio	Cincinnati, C. Preston	513-851-4411
Okla	Tulsa, J.F. McKinney Sls. Co.	918-742-6791
Ore	Portland, B. Bartos	503-292-0878
Tex	Dallas, J. McKinney Sls.	214-631-9450
Tex	Houston, J.F. McKinney Sls. Co.	713-774-3232
EXP:	Ill., Crystal Lake, Oak Industries Inc.	815-459-5000
FOR:	Can., Aurora, Ont., Harper-Oak, Ltd.	416-727-3191

Local Distributors

Ala	Huntsville, Hall Mark Elctrns., 4739 Commercial Dr.	205-837-8700
Ariz	Phoenix, Parts Elect. of Ariz., 1310 N. 7th St.	602-258-6476
Ariz	Tempe, G.S. Marshall Co., 835 W. 22nd St.	602-968-6181
Cal	El Monte, G.S. Marshall Co., 9674 Telstar Ave.	213-686-1500
Cal	Irvine, G.S. Marshall Co., 17975 Sky Park Blvd.	714-556-6400
Cal	San Diego, G.S. Marshall Co., 8057 Raytheon Rd.	714-278-6350
Cal	Sunnyvale, G.S. Marshall Co., 788 Palomar Ave.	408-732-1100
Colo	Arvada, G.S. Marshall Co., 5633 Kendall Ct.	303-423-9670
Conn	No. Branford, G.S. Marshall Co., 200 Shaw Rd.	203-484-0480
Fla	Ft. Lauderdale, Hall Mark Elctrns., 1302 W. McNab	305-971-9280
Fla	Orlando, Hall Mark Elctrns., 7233 Lake Ellenor Dr.	305-855-4020
Fla	Palm Beach Gardens, G.S. Marshall Co., 10384 Riverside Dr.	305-622-8490
Ill	Chicago, Newark Elctrns., 500 N. Pulaski Rd.	312-638-4411
Ill	Des Plaines, Edmar Elctrns., 1275 Rand Rd.	312-298-8580
Ill	Des Plaines, G.S. Marshall Co., 300 E. Touhy Ave.	312-298-3700
Ill	Elk Grove Village, Hall Mark Elctrns., 180 Crossen Ave.	312-437-8800
Ill	Peoria, Klaus Radio, 8400 N. Pioneer Pkwy.	309-691-4840
ILL	Palatine, Ohm/Elctrns., 649 Vermont Ave.	312-359-5500
Ind	Indianapolis, Graham Elctrns., 133 S. Pa.	317-634-8486
Kans	Lenexa, Hall Mark Elctrns., 9006 Rosehill Rd.	913-888-4747
Md	Baltimore, Hall Mark Elctrns., 6660 Security Blvd.	301-265-8500
Md	Hyattsville, Milgray/Washington, 5405 Lafayette Pl.	301-864-1111
Mass	N. Wilbraham, Industrial Comps., 2551 Boston Rd.	413-596-3854
Mass	Newton Highland, G.S. Marshall Co., 88 Needham St.	617-965-5115
Mass	Watertown, DRW Elctrns., 600 Pleasant St.	617-923-1900
Minn	Bloomington, Hall Mark Elctrns., 9201 Penn Ave. S., Ste. 10	612-884-9056
Minn	Minneapolis, Industrial Comps., 5280 W. 74th St.	612-831-2666
Mo	Earth City, Hall Mark Elctrns., 13789 Rider Trail	314-291-5350
NJ	Springfield, Federated Purchaser, 155 U.S. Rte. 22	201-376-8900
NY	Binghamton, Harvey/Federal Elctrns., Box 1208 Vestal Pkwy.	607-748-8211
NY	Farmingdale, DRW Elctrns., 100 Milbar Blvd.	516-249-2660
NY	Farmingdale, G.S. Marshall Co., 230 Sherwood Ave.	516-293-4141
NY	Farmingdale, Hall Mark Elctrns., 167 Marine St.	516-293-7500
NC	Raleigh, Hall Mark Elctrns., 3000 Industrial Dr.	919-832-4465
Ohio	Dayton, G.S. Marshall Co., 6388 N. Dixie Dr.	513-898-1105
Ohio	Medina, DRW Elctrns., 7409 Spencer Lake Rd.	216-225-0020
Okla	Tulsa, Hall Mark Elctrns., 4846 S. 83rd East Ave.	918-835-8458
Okla	Tulsa, S & S Radio Suppply, 537 S. Kenosha	918-582-8242
Pa	Huntingdon Valley, Hall Mark Elctrns., 458 Pike Rd.	215-355-7300
Pa	Philadelphia, Herbach & Rademan, 401 E. Erie Ave.	215-426-1700
Tex	Austin, Hall Mark Elctrns., 3100-A Industrial Terr.	512-837-2814
Tex	Dallas, G.S. Marshall Co., 14205 Proton	214-233-5200
Tex	Dallas, Hall Mark Elctrns., 9333 Forest La.	214-231-6111
Tex	Dallas, Solid State Elect. Co. of Tex., 2643 Manana	214-352-2601
Tex	Houston, Hall Mark Elctrns., 8000 Westglen	713-781-6100
Tex	Houston, Solid State Elect. Co. of Tex., 6400 Westpark Dr., Ste. 295	713-785-5205
Tex.	El Paso, Hall Mark Elctrns., 2211 E. Missouri St.	915-545-1763
Wash	Bellevue, G.S. Marshall Co., 1801 130th Ave., N.E.	206-883-1084
Wash	Seattle, Radar Electric Co., 168 Western Ave., W.	206-282-2511
Wisc	Milwaukee, Hall Mark Elctrns., 11925 W. Ripley Ave.	414-476-1270

OAKTRON INDS., INC., Monroe, Wisconsin, 53566, Tel: 608-325-2121; Empl.: 250 p. 1•26,27

For info on price: J. Disch; Application info: J. Disch; Customer service: J. Disch; Delivery info: M. West

Free literature available: C-75 Home & Industry Catalog; A-75 Automotive Catalog Sound Engineering Data Sheets

Products manufactured: Alarms, Baffles, Speaker, Controls, Fader, Drivers, Speaker, Grilles, Speaker Systems, Speakers, Transducers, Transformers, Underwater Communication, Detection, Navigation, etc. Equipment

Local Sales Offices & Reps.

Ariz	Phoenix, R. Fissell Co.	602-264-4031
Cal	Los Altos, Ewing-Foley, Inc.	415-941-4525
Cal	No. Hollywood, J. Carter Assoc.	213-980-3450
Colo	Arvada, C B Elctrn. Mktg.	303-422-0561
DC	Washington, Lienau Assoc.	301-770-6800
Fla	No. Miami, Winfield Elect. Sls.	305-945-6544
Fla	Tampa, Winfield Elect. Sales	813-884-6500
Ga	Atlanta, Millar Elect.	404-261-6160
Ill	Chicago, Markal Sls.	312-282-5800
Ind	Indianpolis, Shamrock Elect.	317-547-0080
Md	Rockville, Lienau Assoc.	301-770-6800
Mass	Braintree, Rudolph & MacInnis	617-843-0908
Mass	Norwood, Rudolph & MacInnes	617-769-5450
Mich	Ferndale, Shalco Inc.	313-547-4771
Minn	St. Paul, Carl-M Co.	612-699-8004
Mo	Kansas City, Nevco, Inc.	816-421-1751
Mo	St. Louis, Nevco, Inc.	314-843-7406
NY	Rochester, J. Brown Elect. Sls.	716-266-2728
NY	Yonkers, J. Brown Elect. Sls.	914-779-7330
NC	Raleigh, Millar Elect.	919-787-9564
Ohio	Akron, Shamrock Elect.	216-666-3796
Ohio	Dayton, Shamrock Elect.	513-298-3052
Ore	Salem, Pacnor Mktg.	503-363-6445
Pa	Philadelphia, Lienau Assoc.	215-464-9444
Pa	Pittsburgh, Tanner Co.	412-561-4687
Tenn	Memphis, Al. Engleman Co.	901-458-6263
Tex	Irving, Antle Smith Sls.	214-259-8707
Wash	Seattle, Pacnor Mktg.	206-284-8020
EXP:	Chicago, Ill., E.D. Magnus Assoc.	312-334-1503

Directory of Local Distributors Starts on page 401

OAL ASSOCS., INC., Box 788, Westbury, N.Y., 11590, Tel: 516-334-1940; Empl.: 10

Customer service: O. Lohkemper

Free literature available: Bulletin 1R-100D - Infra Red Radiation Heating

Products manufactured: Chamber, Environmental Test, Controls/Control Eqpt., Furnaces, Heaters & Heating Elements, Lamps, Lights, Soldering Equipment

Local Sales Offices & Reps.

Cal	Northridge, Pat Dooley Co.	213-360-2231
Fla	Winter Haven, S & S Sls. Reps.	813-293-7304
Ill	Palatine, Jos. Clark Co.	312-358-5095
Mass	Chelmsford, Equipment Sls. Co.	617-256-8547
Mich	Southfield, S.L. Sellers & Assocs.	313-444-1070

M. P. ODELL CO., 26612 Center Ridge Rd., Cleveland, Ohio, 44145, Tel: 216-871-8000; Empl.: 7; Minimum order: $5

For info on price: N. Odell; Application info: M. P. Odell; Customer service: M. S. Harmon; Delivery info: N. Odell

Products manufactured: Cleaners & Solvents, Machines/Machinery, Production, Ovens

OGALLALA ELCTRNS., Div. Arnold Engrg. Co., Box 59, Ogallala, Neb., 69153, Tel: 308-284-4093; Empl.: 30; Minimum order: $25

Customer service: H. L. Harrington

Free literature available: "Electromagnet Brochure" A 12 page illustrated "Quick Facts" booklet looks at special purpose electromagnets, permanent-magnet assemblies and related magnetic products for high precision applications.

Products manufactured: Coils Including Assemblies & Forms, Magnets

Local Sales Offices & Reps.

Mass	Belmont, Electronic Comps. & Srvcs.	617-484-8680

OHIO CARBON CO., 12508 Berea Rd., Cleveland, Ohio, 44111, Tel: 216-252-6100; FSC No: 76868; Minimum order: $250

For info on price: D. Marquard; Application info: J. Kupets; Customer service: D. Marquard; Delivery info: D. Marquard

Free literature available: Brush Grade Selector Form 1250, Karak Brochure carbon-graphite applications, material specifications.

Products manufactured: Bearings, Brushes & Brush Assemblies, Bushings, Glass, Plastic, Metal, Rubber, Etc., Contacts, Electrical, Graphite Parts, Materials, Graphite, Materials, Self-Lubricating, Resistors

Local Sales Offices & Reps.

Cal	Los Angeles, Marwood Ltd.	213-628-3241
Cal	San Francisco, Marwood Ltd.	415-431-7893
Ga	Atlanta, W. Gilbert	404-255-8152
Ill	Arlington Hgts., Eschner & Keranen	312-259-8184
Ill	Chicago, M. Smith	312-787-3371
Kans	Shawnee Mission, K&M Sls.	913-262-1444
Mass	Sharon, Adcour Engrg. Reps.	617-784-3996
Mich	Bay City, Allsopp Assoc.	517-684-6120
Mo	St. Louis, K&M Sls.	314-423-2420
NJ	Andover, W. Proshek	201-347-6205
Ohio	Cleveland, Greenleaf Assoc.	216-333-5480
Ore	Portland, Marwood Ltd.	503-223-5130
Pa	Sewickley, R. Clark	412-923-1980
Wash	Seattle, Marwood Ltd.	206-623-4747

OHIO SEMITRONICS, INC., 1205 Chesapeake Ave., Columbus, Ohio, 43212, Tel: 614-486-9561; FSC No: 12066; Empl.: 30 .... p. 1•782,783,1848,1849,2344-2346

For info on price: A. Leatherman; Application info: A. Leatherman; Customer service: J. Gillard

Free literature available: HE7-2A, Halltron Hall Effect Probes; CT4-1, Current Transducers DC to KHz; HE-7-4, Wideband Current XDCRS AC to MHz; HE-7-6, Watt Transducers; HE-7-10, Watt Meter; WH74-1, Watt Hour Meter; HE7-3A, Hall Multipliers; ME8-2, Magnetic Antenna.

Products manufactured: Controls/Control Eqpt., Cooling/Heating Modules, Thermoelectric, Crystals, Current Sensors, Detectors, Generators, Integrators, Electronic, Meters, Monitors, Multipliers, Probes, Signal Conditioners & Equipment, Transducers

OHMITE MFG. CO., 3601 W. Howard St., Skokie, Ill., 60076, Tel: 312-675-2600, TWX: 910-223-0805
p. 1•1799,2266; p. 2•1508-1515,1673-1675,1777

Products manufactured: Attenuators, Chokes, Coils Including Assemblies & Forms, Controls/Control Eqpt., Decade Boxes, Dividers, Dummy Loads, Potentiometers, Regulators, Relays, Resistors, Rheostats, Switches, Timers, Transformers

Local Sales Offices & Reps.

Alas	Anchorage, H.J. Lang & Assocs.	907-279-5741
Ariz	Phoenix, Darci Sales	602-948-2240
Cal	Garden Grove, Impact Elctrns., Inc.	213-431-3581
Cal	Palo Alto, Ohmite Mfg. Co.	415-494-6953
Colo	Denver, I.W. Strong & Assocs.	303-292-6900
Conn	Waterbury, Coakley, Boyd & Abbett, Inc.	203-756-8766
Fla	Orlando, Cartwright & Bean	305-896-2031
Iowa	W. Des Moines, T.L. Dowell & Assocs.	515-225-1620
Kans	Kansas City, T.L. Dowell & Assocs.	913-649-6069
La	Chalmette, Cartwright & Bean	504-279-4598
Mass	Needham, Coakley, Boyd & Abbett, Inc.	617-444-5470
Mich	Birmingham, Ohmite Mfg. Co.	313-642-6040
Minn	St. Paul, Cahill Assocs.	612-646-7217
Mo	St. Louis, T.L. Dowell & Assocs.	314-647-7067
NJ	Pennsauken, Ohmite Mfg. Co.	609-663-1703
NY	Buffalo, Telesco Assocs.	716-834-1026
NY	Great Neck, L.I., Cooper-Simon & Co.	516-487-1142
NC	Charlotte, Polytec Svs.	704-332-6191
Ohio	Birmingham, Ohmite Mfg. Co.	216-261-6000
Ohio	Dayton, Ohmite Mfg. Co.	513-277-6543
Tenn	Memphis, Cartwright & Bean	901-276-4442
Tex	Dallas, Erickson & Vilter Sls.	214-243-6611
Wash	Western Tech. Sls., Western Tech. Sls.	206-641-3900
EXP:	Canada, Ontario, A.C. Simmonds & Sons Ltd.	416-491-1010

O. K. MACHINE & TOOL CORP., 3455 Conner St., Bronx, N.Y., 10475, Tel: 212-994-6600, Telex: 12-5091; Empl.: 100; Minimum order: $25

For info on price: J. Camen; Application info: J. Camen; Customer service: J. Camen; Delivery info: G. Polanco

Free literature available: Catalog 36A includes technology of wire-wrapping, tool specifications, terminal spacing charts, illustrations and charts for bits and sleeves. Aimed at telecommunications and electronics fields.

Products manufactured: Connectors, Cutters, Wire, Hand Operated, Machines/Machinery, Production, Pliers, Soldering Guns, Irons & Desoldering Tools, Terminals, Tools, Wire Strippers

OKONITE CO., Box 340, Ramsey, N.J., 07446, Tel: 201-825-0300; Empl.: 1800

For info on price: H. A. Penhale; Application info: J. R. Hogan; Customer service: H. N. Bush; Delivery info: H. N. Bush

Products manufactured: Cable, Tapes, Electrical Insulation, Tubing, Wire

Local Sales Offices & Reps.

Ala	Birmingham	205-592-8968
Cal	Los Angeles	213-685-7610
Cal	S. San Francisco	415-589-2362
Colo	Denver	303-759-2776/7
Fla	Jacksonville	904-721-2800
GA	Smyrna	404-434-3388
Ill	LaGrange	312-352-7200
La	New Orleans	504-944-0259
Mass	Hingham	617-749-3374/5
Mich	Royal Oak	313-588-3525
Minn	Minneapolis	612-888-7925
Mo	Frontenac	314-997-2320
Mo	Kansas City	816-471-6991
NJ	Cherry Hill	215-567-5739
NY	Syracuse	315-479-8313
NC	Charlotte	704-535-6535
Ohio	Cincinnati	513-761-1333
Ohio	Cleveland	216-661-2550
Okla	Tulsa	918-743-2543
Ore	Portland	503-228-3172
Pa	Pittsburgh	412-344-8181
Tex	Dallas	214-243-3318
Tex	Houston	713-691-3716
Utah	Salt Lake City	801-484-7642
Va	Vienna	703-938-4770
Wisc	Milwaukee	414-476-4550

OLYMPUS CORP. AMERICA, Two Nevada Dr., New Hyde Park, N.Y., 11040, Tel: 516-488-3880; Empl.: 120

For info on price: J. Jurek; Application info: W. J. Seidl; Customer service: R. Kester; Delivery info: R. Kester

Products manufactured: Fiber Optic Bundles, Lenses, Optical & Camera, Microscopes

OMEGA ENGRG., INC., Box 4047, Stamford, Conn., 06907, Tel: 203-359-1660; Empl.: 75; Minimum order: $10 .... p. 1•2324-2327

For info on price: M. Cardillo; Application info: D. Babbitt; Customer service: S. Bartosik; Delivery info: M. Cardillo

Free literature available: 1975 Omega Temperature Measurement Handbook, Bulletin A 674 - Color Coded Thermocouple Connectors & Jack Panels, Bulletin C 765 - Thermocouple Readout Meters, Bulletin 474 - Melting Point Standards

Products manufactured: Amplifiers, Bolometers, Bridges, Connectors, Controls/Control Eqpt., Crayons, Coatings, Pellets, etc., Temperature Indicating, Current Sensors, Detectors, Indicators, Labels, Temperature Indicating, Meters, Mounts, Panels, Potentiometers, Probes, Pyrometers, Switches, Thermistors, Thermocouples, Elements & Accessories, Thermometers, Resistance, Transducers, Tubing, Wire

OMNETICS
INCORPORATED

OMNETICS, INC., Box 113, Syracuse, N.Y., 13211, Tel: 315-699-5262; FSC No: 52516; Empl.: 65; Minimum order: $25

Customer service: J. F. Cleary

Free literature available: Specification sheets on all products. Price lists on all products. Complete binder catalog upon request. Short form catalog mailer. Application notes.

Products manufactured: Controls/Control Eqpt., Timers

Local Sales Offices & Reps.

Ark	Fort Smith, Electro-Related Products	501-646-7756
Cal	La Habra, Nolan Assocs.	213-694-2145
Cal	Oakland, Powermatics	415-635-6826
Colo	Denver, TESSCO	303-744-1119
Conn	Trumbill, SIR Assocs.	203-268-2560
Fla	North Miami, L. Haas Co.	305-949-9143
Ill	Des Plaines, Control Sls.	312-774-1674
Kans	Shawnee Mission, Technical Sls. Assocs.	913-888-3330
La	Metairie, Electro Related Products	504-888-2908
Mass	Lexington, SIR Assocs.	617-862-1812
Mich	Troy, Control Sls. Assocs.	313-391-3236
Mo	St. Louis, Technical Sls. Assocs.	314-725-5361
NJ	Pitman, Colrud Co.	609-589-5866
NJ	Ridgewood, BAllou	212-964-4640
NM	Albuquerque, TESSCO	505-298-2415
NY	Skaneatles, MCK Assocs.	315-685-7122
NY	Syracuse, Omnetics, Inc.	315-699-5262
NC	Charlotte, W. E. MacDonald Co.	704-372-7012
Ohio	Cleveland, E. E. Bock & Assocs.	216-331-5212
Ohio	Dayton, W. Hammer & Assocs.	513-294-4531
Ore	Beaverton, D. Fry Co.	504-643-5448
Pa	Erie, ECCO Elctrn. Sls.	814-455-8110
Tex	Houston, M. R. Summers Assocs.	713-524-7800
Va	Richmond, Marchant-Field Sls. Co.	804-262-7333
Va	Vienna, W. E. MacDonald Co.	703-938-4242
Wash	Seattle, D. Fry Co.	503-643-2391
WVa	Charleston, W. E. MacDonald Co.	304-342-8557
Wisc	Cedarburg, TFL Assocs.	414-377-7030

Local Distributors

Ark	Crossett, Lanius Elctrns., 118 Main St.	501-364-3015
Ark	Ft. Smith, Wise Whsl. Elec., 1001 Towson Ave.	501-783-8925
Cal	El Segundo, Alpha Components Corp., 115 Eucalyptus Dr.	213-322-7780
Cal	Redwood City, Electrical Sls. Prod., 465 Convention Way	415-364-2621
Colo	Denver, TESSCO, 1340 S. Sherman	303-744-1119
Fla	Miami, Electro-Standards Labs, 3560 NW 34th St.	305-633-6975
Fla	Tampa, Leader Elec. Dist., 3411 S. Dale Mabry	813-835-1891
Ill	Chicago, Fluid-Tek, 6348 S. Central	312-582-2872
Ill	Franklin Park, Lumenite Elec. Co., 2331 N. 17th Ave.	312-455-1450

Mass	Cambridge, H. Young Jr., 45 Landsdowne St.	617-547-3873
Mass	West Springfield, Control Eng'g Inc., 1702 Riverdale St.	413-739-5134
NJ	Fairlawn, Relay Specialties, 1300 Plaza Rd.	201-797-3313
NY	Rochester, K.M.V.G., 315 Mt. Read Blvd.	716-328-2800
NY	Rochester, Simcona Elec. Corp., 275 Mt. Read Blvd.	716-328-3230
NY	Woodside, Switches Unlimited, 49-11 43rd Ave.	212-651-0945
Ohio	Columbus, Columbus Elec. Works, 767-783 N. 4th St.	614-294-4651
Ohio	Dayton, Duellman Elec., 131 Wayne Ave.	513-461-5010
Ore	Portland, Platt Elec. Supply, 1305 NW Davis	503-228-6121
Pa	Braddock, M. Leff Radio Parts, 225 Braddock Ave.	412-271-2800
Pa	Erie, Erie Corporate Cont., 1938 Buffalo Rd.	814-455-8110
Wash	Seattle, Radar Elec. Co., 168 Western Ave. W.	206-282-2511
Wisc	Mequon, Taylor Elec. Co., 1000 W. Donges Bay Rd.	414-241-4321

Advertisment

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Plain, quiet, priced to save you money. All Solid State Circuitry gives you silently smooth system operation, superior performance and dependability. Example: The NEW M-Liners are 100% solid state, are high-temp. compression molded to withstand extreme environmental abuses, and are available in AC or DC from 24 to 240 volts. Time delays start at 0.6 second and can be had out to 8 minutes in fixed times or in adjustable ranges by adding a potentiometer control. A single mounting screw and some Quick-Connects make M-Liners easy to use. Cost is easy too.

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- Rating: 1 ampere steady state (10 amps inrush)
- Low cost

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OMNI SPECTRA, 24600 Hallwood Ct., Farmington, Mich., 48024, Tel: 312-477-1234; Empl.: 250
p. 2•724,725

Products manufactured: Attenuators, Connector Adapters, Connectors, Couplers, Detectors, Dividers, Integrated Circuit Packaging Systems, Line Strechers, Microwave, Microwave Integrated Circuits (MIC's), Sockets, Tees, Tools, Tuners

Local Sales Offices & Reps.

Ala	Huntsville, Gentry Assocs.	205-536-5306
Ariz	Phoenix, Zeus, Inc.	602-253-6104
Cal	Culver City, DeAngelo, Rothman & Co.	213-398-6239
Cal	Los Altos, Cain-White & Co.	415-948-6533
Cal	San Carlos, LoDan, Inc.	415-592-4600
Colo	Denver, Zeus, Inc.	303-770-4400
Fla	Orlando, Gentry Assocs.	305-894-4401
Ill	Chicago, Gassner & Clark Co.	312-345-4245
Iowa	Hiawatha, Gassner & Clark Co.	319-393-5763
Md	Randallstown, C.L. Malinow & Co., Inc.	301-922-2092
Mass	Brockton, Forsberg sls.	617-522-6300
Minn	Minneapolis, C.E. Bohlig Co.	612-922-7011
NM	Albuquerque, Zeus, Inc.	505-268-3941
NY	Bayside, R. Diamond Inc.	212-423-7330
NY	Fayetteville, Graydon-Sherman, Inc.	315-637-9861
NC	Burlington, Gentry Assocs.	919-227-3630
Ohio	Cincinnati, Comps., Inc.	513-721-2997
Ohio	Cleveland, Comps., Inc.	216-842-2737
Pa	Media, Snyder & Massey Assocs.	215-566-5400
Tex	Dallas, Texas Microwave	214-231-5381
Utah	Salt Lake City, Zeus, Inc.	801-466-4924
Wash	Seattle, H. Levinson Co.	206-323-5100

OMNI-SPECTRA, Arizona Div., 1040 W. Alameda Dr., Tempe, Ariz., 85282, Tel: 602-966-1471, TWX: 910-950-1296; Empl.: 165

Customer service: F. S. Parin

Free literature available: Voltage controlled and mechanically tuned oscillators for ECM, radar and communication applications. Low noise, broad band and minimum post tuning drift characterize voltage controlled oscillators.

Products manufactured: Alarms, Detectors, Oscillators

Local Sales Offices & Reps.

Cal	Van Nuys, C.W. Swift & Assocs.	213-989-1133
Md	Randallstown, C.L. Malinow & Co.	301-922-2092
Mass	Medford, Blake Assocs., Inc.	617-391-7890
NY	Fayetteville, Graydon-Sherman, Inc.	315-637-9861
Tex	Dallas, Texas Microwave Elctrn.	214-358-1172

OMNITEC CORPORATION, 2405 S. 20th St., Phoenix, Ariz., 85034, Tel: 602-258-8246, TWX: 910-951-4247; FSC No: 09736; Empl.: 50

For info on price: F. Willes; Application info: F. Willes; Customer service: J. Ingram; Delivery info: J. Ingram

Products manufactured: Couplers, Modulator/Demodulators, Printers, Telephone Channel Test & Simulator Equipment, Teletypewriters & Equipment, Terminal Equipment, Digital

Local Sales Offices & Reps.

Ala	Huntsville, W. A. Brown Instr.	205-539-4411
Ariz	Scottsdale, BFA Corp.	602-946-4215
Cal	Sherman Oaks, Elctrn. Mktg. Spec.	213-990-4244
Cal	Sunnyvale, Elctrn. Mktg. Spec.	408-245-9291
Colo	Denver, BFA Corp.	303-744-3301
Conn	Hamden, J & J Assocs.	617-272-2606
Fla	Ft. Lauderdale, W. A. Brown Instr.	305-776-4800
Fla	Indialantic, W. A. Brown Instr.	305-723-0766
Fla	Orlando, W. A. Brown Instr.	305-425-5505
Ga	Atlanta, W. A. Brown Instr.	404-939-1674
Ill	Des Plaines, Lincoln, Hodges & Assoc.	312-297-3810
La	Gretna, W. A. Brown Instr.	504-366-5766
Md	Bethesda, S & S Assocs.	301-654-1434
Mass	Burlington, J & J Assocs.	617-272-2606
NJ	Ft. Lee, Tech. Mktg. Assoc.	201-224-6911
NM	Albuquerque, BFA Corp.	505-292-1212
NM	Las Cruces, BFA Corp.	505-523-0601
NY	E. Syracuse, Ossmann Instrs.	315-437-6666
NY	Rochester, Ossmann Instrs.	716-328-2230
NY	Vestal, Ossmann Instrs.	607-785-9947
NY	Wappingers Falls, Ossmann Instrs.	914-297-7777
NC	Durham, W. A. Brown Instr.	919-489-1546
Okla	Norman, Data Mktg. Assocs.	405-364-8320
Pa	King of Prussia, S & S Assocs.	215-265-3450
Tenn	Knoxville, W. A. Brown Instr.	615-584-2614
Tex	Dallas, Data Mktg. Assocs.	214-661-0300
Tex	Houston, Data Mktg. Assocs.	713-686-9627
Tex	San Antonio, Data Mktg. Assocs.	512-828-0937
Utah	Salt Lake City, BFA Corp.	801-466-6522
Wisc	Waukesa, Lincoln, Hodges & Assoc.	414-542-3087

OMTRONICS MFTG., INC., 2406 Leavenworth, Omaha, Neb., 68105, Tel: 402-348-9500, TWX: 910-622-8220; Empl.: 125; Minimum order: $10
p. 2•1516-1525

For info on price: B. Matejka; Application info: J. Matejka, Sr.; Delivery info: B. Matejka

Products manufactured: Resistors

Local Sales Offices & Reps.

Ariz	Phoenix, Dorton Entprs., Inc.	602-263-0414
Cal	Redwood City, Woodworth Co.	415-365-0252
Cal	Santa Ana, RMS Assocs.	714-556-4155
Colo	Arvada, Arrowhead Sls.	303-423-5556
Ill	LaGrange Park, Bierhaus Sls.	312-354-5100
Iowa	Cedar Rapids, J. Vrbik Co.	319-377-8244
Kans	Overland Park, Penzner Assocs.	913-381-0004
Kans	Wichita, Penzner-Mankus Assocs.	316-264-2662
Md	Towson, Habco Elctrns., Inc.	301-825-9637
Mass	Canton, New England Elctrn. Sls.	617-828-4835
Minn	Minneapolis, Hasse & Assocs.	612-535-2671
Mo	Hazelwood, J.C. Mankus Assocs.	314-731-4334
NJ	Kenilworth, Ventronics, Inc.	201-272-9262
NY	Rochester, L.G. Marchese Assocs.	716-544-4300
Ohio	Cincinnati, Comps., Inc.	513-863-0526
Ohio	Cleveland, Comps., Inc.	216-842-2737
Tex	Forth Worth, W. Pat Fralia Co.	817-738-2394
Utah	Salt Lake City, Arrowhead Sls.	801-485-3362
Wash	Seattle, Carlyle Tech. Sls.	206-622-4288
EXP:	Stamford, Ct., Dage Corp.	203-324-3123

Local Distributors

Ala	Birmingham, ACK Radio Supply, 3101 4th Ave. So.	205-322-0588
Ariz	Phoenix, Mirco Elctrnc., 2005 W. Peoria Ave.	602-944-2281
Cal	Chatsworth, Westates Elctrns., 20151 Bahama St.	213-341-4411
Cal	Costa Mesa, Comps. Center, 1240 Logan Ave.	714-979-0433
Colo	Denver, Elctrn. Parts, 1212 So. Bdwy.	303-744-1992
Fla	Miami, Elctrn. Equip., 2201 N.W. 42nd Ave.	305-871-3500
Ill	Rosemont, Advent Elctrns., 7110 No. Lyndon	312-297-6200
Mass	Newton, Greene-Shaw Co., 70 Bridge St.	617-969-8900
Mo	St. Louis, L/Comp St. Louis, 2605 So. Hanley Rd.	314-647-5505
Neb	Omaha, Radio Equip., 625 No. 18th St.	402-341-7700
NY	Farmingdale, Arrow Elctrns., 900 Broadhollow Rd.	516-694-6800
Ohio	Cleveland, Hamilton Avnet, 26111 Brush Ave.	216-289-0550
Okla	Tulsa, Hall Mark Elctrns., 4846 So. 83 Ave. E.	918-835-8458
Pa	Huntingdon Valley, Hall Mark Elctrns., 458 Pike Rd.	215-355-7300
SC	Greenville, Hammond Elctrns., 100 Augusta St.	803-233-4121
Tex	Houston, Hall Mark Elctrns., 8000 Westglen	713-781-6100
Wash	Seattle, R. E. Priebe Co., 2211 Fifth Ave.	206-682-8242

ON-GUARD CORP. OF AMERICA, 350 Gotham Pkwy., Carlstadt, NJ, 07072, Tel: 201-939-5822, TWX: 710-989-0282; Minimum order: $50

Free literature available: Catalog #972-Alarms and Accessories Catalog #727-Home Security Systems and back up Catalog Sheet #2016-alarms & forged wheel locks Catalog Sheet #2017-Smoke & heat detectors Catalog Sheet #2018-splash guards

Products manufactured: Alarms, Bells, Buzzers, Gongs, Sirens & Aural Warning Devices, Switches, Thermostats, Wire

Local Sales Offices & Reps.

Ala	Birmingham, Morris F. Taylor Co.	205-853-3181
Cal	Emeryville, Assoc. Rep. Warehouse C.	415-653-3838
Cal	Van Nuys, Art Szerlip Sls.	213-782-1765
Colo	Englewood, ESP Co.	303-781-4409
Fla	Miami, Seaman Sls. Inc.	305-271-5728
Ga	Decatur, Morris F. Taylor Co.	404-243-8591
Ill	Chicago, D. Dolinn Sls. Co.	312-286-6200
Iowa	Des Moines, B.E.A.M.S.	515-282-0292
Kans	Shawnee, B.E.A.M.S.	913-341-7744
Md	Silver Spring, Morris F. Taylor Co.	301-589-4002
MD	Silver Spring, Morris F. Taylor Co.	301-946-3569
Mass	Northboro, W. B. Pray Sls.	617-393-3434
Mich	Ferndale, Irving J. Flanders Assoc.	313-545-4633
Minn	St. Louis Park, Smith Sls. Co.	612-377-3187
Mo	Creve Couer, B.E.A.M.S.	314-569-1060
NY	Roslyn Heights, Sir Sls.	516-621-7485
NY	State Grand Island, McTaggert Assoc.	716-634-2030
NC	Charlotte, Morris F. Taylor Co.	704-523-7932
Ohio	Akron, Shamrock Elctrn. Sls.	216-666-3796
Ohio	Cincinnati, Kirschner Sls.	513-891-5602
Pa	Philadelphia, Morris F. Taylor Co.	215-698-9757
Pa	Pittsburgh, Morris F. Taylor Co.	412-823-8337
Tex	Houston, Sidney Katzoff Assoc.	713-666-1636
EXP:	NY Westbury, Minthorne International	516-334-3303

ONAN DIV-ONAN CORP., 1400 73rd Ave. N.E., Minneapolis, Minn., 55432, Tel: 612-786-6322

Customer service: R.L. Westrum

Free literature available: Standby Folder (F-322-D) "A Guide to the Selection & Installation of Onan Standby Electric Generating Systems".

Products manufactured: Annunciators, Chargers, Battery, Generators, Power Supplies

ONEIDA ELECTRONICS MFG., 843 N. Cottage St., Meadville, Pa., 16335, Tel: 814-336-2125; Empl.: 25; Minimum order: $25

Customer service: D. L. Smith

Free literature available: Complete Oneida Electronic Mfg., Inc. Product-Parts Catalog available upon request.

Products manufactured: Adhesives (All Types), Clamps & Clips, Lamps, Resistors, Sockets

Local Sales Offices & Reps.

Cal	Los Altos, W.W. Poseys Co.	415-948-7771
Cal	Sacramento, W.W. Posey Co.	916-428-5768
Cal	Van Nuys, A. Szerlip Sls. Co.	213-782-1765
Colo	Westminister, Electro-Tex Sls.	303-255-4566
Fla	Ormond Beach, J. F. Thompson Sls. Co.	904-677-2298
Haw	Mililani, C&L Distrs.	808-949-1087
Ill	Chicago, Lassers & Co.	312-539-0170
Kans	Shawnee Mission, K&M Sls. Co.	913-262-1444
Md	Silver Springs, Mid-Atlantic Sls. Co.	301-593-7749
Mass	North Boro, W.B. Pray Sls. Co.	617-393-3434
Mich	Milford, Polyphase Sls. Co.	313-685-3003
Minn	St. Louis Park, Smith Sls. Co.	612-377-3187
NJ	Princeton, S. Enright Sls. Co.	
NY	Yonkers, J. Brown Sls. Co.	914-779-7330
NC	Charlotte, M.K. Smith	704-372-1026
Ohio	Akron, Shamrock Elctrn. Sls.	216-666-3796
Pa	Bethlehem, L.T. Benner	215-865-3014
Pa	Pittsburgh, Tanner Co.	412-561-4687
Tex	Hurst, Ranger Elctrns. Co.	817-281-2736
Wash	Seattle, Fleehart & Sullivan	206-522-1533
EXP:	Chicago, Ill., E.D. Magnus & Assocs.	312-334-1502

OPAD ELEC. CO., INC., 43-12 Walker St., New York, N.Y., 10013, Tel: 212-WO 6-0380; FSC No: 94940

For info on price: H. L. Opad; Customer service: G. Cohen

Products manufactured: Chargers, Battery, Controls/Control Eqpt., Detectors, Electroplating Equipment & Supplies, Eliminators, Battery, Kits, Power Supply, Machines/Machinery, Production, Monitors, Power Supplies, Rectifiers, Regulators, Testers

OPAMP LABS, INC., 1033 N. Sycamore Ave, Los Angeles, Cal., 90038, Tel: 213-934-3566; FSC No: 24699; Empl.: 18 .... p. 1•10,11

Customer service: B. J. Losmandy

Free literature available: Free 30 page Catalog and Audio Applications. Contains Audio Consoles (Kits and Wired), Amplifiers-Mic. Eq. ACN. Line. Tape. Disc. Power. Oscillators-Audio, Tape Bias., Power Supplies.

Products manufactured: Amplifiers, Integrated Circuit Devices, Power Supplies

OPCOA, INC., 330 Talmadge Rd., Edison, N.J., 08817, Tel: 201-287-0355, TWX: 710-998-0555; Empl.: 150

Products manufactured: Display Devices/Displays, Indicators, Lights

Local Sales Offices & Reps.

Ariz	Scottsdale, Carter Assocs.	602-947-4355
Cal	Menlo Park, Straube Assocs., Inc.	415-323-2476
Cal	Woodland Hills, Interstate Mktg. Assoc.	213-883-7606
Colo	Englewood, W. J. Purdy Co.	303-770-5311
Conn	North Haven, Comp. Rep. Assocs., Inc.	203-239-9762
Fla	Bradenton, Reynolds & Assocs.	813-778-5219
Ga	Atlanta, Reynolds & Assocs.	404-422-2114
Ill	Chicago, Delta Tech. Sls.	312-693-3380
Ind	Greenwood, Valentine-Schillinger	317-888-2260
Md	Elkridge, J. Bresson Assocs.	301-796-5220
Mass	Needham, Comp. Rep. Assocs., Inc.	617-444-2484
Mich	Southfield, R. O. Whitesell & Assocs.	313-358-2020
Minn	Hopkins, Grayden & Flemmer	612-941-1120
Mo	Hazelwood, Technical Reps, Inc.	314-524-6900
Mo	Peculiar, Technical Reps, Inc.	816-331-7744
NM	Albuquerque, Straube Assocs., Inc.	505-294-1880
NY	Dewitt, Bowser & Sapecky Assocs.	315-446-5920
NY	Jamaica, S-J Sls.	212-291-3232
Ohio	Cincinnati, G & H Sales Co.	513-771-8231
Ore	Beaverton, N. R. Schultz Co.	503-646-1345
Pa	Narberth, J. Bresson Assocs.	215-839-6770
Tex	Ft. Worth, W. P. Fralia Co.	817-738-2394
Tex	Houston, W. P. Fralia Co.	713-772-1572
Va	Lynchburg, J. Bresson Assocs.	215-839-6770
Wash	Bellevue, N. R. Schultz Co.	206-GL 4-0300
EXP:	Edison, N. J., Opcoa, Inc.	201-287-0355

OPT INDS. INC., Data Products Div., 300 Red School Lane, Phillipsburg, N.J., 08865, Tel: 201-454-2600; Empl.: 160; Minimum order: $500

For info on price: J. Smith; Application info: B. Slack; Customer service: P. Jones; Delivery info: P. Jones

Products manufactured: Chokes, Coils Including Assemblies & Forms, Equalizers, Filters, Modulator/Demodulators, Networks, Power Supplies, Transformers

Local Sales Offices & Reps.

Cal	Encino, El/Tec	
Fla	St. Petersburg, Kirkwood Assoc.	
Ill	Chicago, Croyden Elctrns.	
Md	Bethesda, Warren Mount Assoc.	
Mass	Needham Heights, Com/Pak	
NJ	Union, J. Onore	
NY	Hempstead, Kahgan Sls.	
NY	Syracuse, Franklin Sls.	

OPTEL CORP., Box 2215, Princeton, N.J., 08540

OPTICAL ELECTRONICS, INC., Box 11140, Tucson, Ariz., 85734, Tel: 602-624-8358, TWX: 910-952-1283; FSC No: 5962; Empl.: 26; Minimum order: $15

For info on price: Mrs. Mac; Application info: R. Gerdes; Customer service: S. E. Day; Delivery info: Mrs. Mac

Free literature available: Analog modules including operational amplifiers and analog function modules.

Products manufactured: Amplifiers, Circuits, Hybrid, Thick Film, Comparators, Converters, Dividers, Filters, Generators, Integrated Circuit Devices, Integrators, Electronic, Multipliers, Oscillators, Power Supplies, Timers

Local Sales Offices & Reps.

Ariz	Tempe, J.F. Hurlbut Co.	602-968-5962
Colo	Golden, J.F. Hurlbut Co.	303-279-7796
Pa	Abington, Bach-Stewart Assocs.	215-885-1550
Tex	Richardson, Applied Science Accounts	214-231-6958
Va	Annandale, J. Hopkins Assocs.	703-323-1641

OPTICS INTERNATIONAL, Box 101, Tenafly, N.J., 07670, Tel: 201-567-4799; Empl.: 10; Minimum order: $50

For info on price: R. J. Schmitt; Application info: R. Cole; Customer service: J. Johnson; Delivery info: M. Ryan

Free literature available: Custom optics brewster angle prisms, corner cube reflectors, plane and spherical mirrors, polarizing prisms, retardation plates, narrow band interference filters, neutral density filters, front surface mirrors, high precision optical coatings.

Products manufactured: Coatings, Crystals, Filters, Lenses, Optical & Camera, Quartz, Fused, Silica, Fused

OPTIMA ENCLOSURES, Div. Scientific Atlanta, 2166 Mountain Ind'l Blvd., Tucker, Ga., 30084, Tel: 404-939-6340, TWX: 810-766-3967; Empl.: 70; Minimum order: $50 .... p. 1•78,79

For info on price: B. Holman; Application info: R. Dawsey; Customer service: B. Holman; Delivery info: B. Holman

Free literature available: Short form Catalog Describes general line of products with photos and brief technical descriptions.

Products manufactured: Benches, Consoles, Stools, Tables, Blowers & Fans & Accessories, Cabinets & Accessories, Carts & Dollies, Instrument & Equipment, Cases, Equipment, Instrument, Meter, Chassis, Metal, Drawers, Sliding, Frames, Cabinet & Rack, Grilles, Handles For Cabinets, Circuit Boards, Racks, etc., Racks, Slides, Cabinet & Chassis

Local Sales Offices & Reps.

Ala	Huntsville, Gentry Assocs.	205-536-5306
Ariz	Scottsdale, Barnhill Five	602-947-5745
Cal	Los Altos, Frauman Assocs.	415-941-0660
Cal	Palos Verdes, Edwards Assocs.	213-377-0975
Colo	Denver, Barnhill Five	303-426-0222
Fla	Orlando, Gentry Assocs.	305-894-4401
Fla	St. Petersburg, Genrty Assocs.	813-867-7820
Ga	Tucker, Scien.-Atlanta	404-939-6340
Ill	Des Plaines, Cozzens & Cudahy	312-298-3600
Ind	Indianapolis, Cozzens & Cudahy	317-244-2456
Md	Bladensburg, Scien.-Atlanta	301-779-1515
Mass	Lexington, Zieco	617-861-8300
Mich	Grand Rapids, Representatives Elec. Prod	616-942-1320
Mich	Southfield, Representative Elec. Prod.	313-354-9066
Minn	Minneapolis, Cozzens and Cudahy, Inc.	612-884-4336
Mo	St. Louis, Cozzens & Cudahy	314-423-1234
NJ	Leonia, Scien.-Atlanta	201-461-3650
NC	Burlington, Gentry Assocs.	919-227-3639
Ohio	Cleveland, C.A. Robinson Co.	216-381-9049
Ohio	Dayton, C.A. Robinson Co.	513-275-2412
Tex	Ft. Worth, Carey-Wolf	817-738-1996
Tex	Garland, Carey-Wolf	214-494-1212
Tex	Houston, Carey-Wolf	713-721-2442
Wash	Seattle, S.J.I. Corp.	206-624-9020

OPTIMATION, INC., Sub. Julie Research Labs., Inc., 9259 Independence Ave., Chatsworth, Cal., 91311, Tel: 213-882-6490, TWX: 910-494-1219; Empl.: 26

Products manufactured: Amplifiers, Calibrators, Current Sources, Display Devices/Displays, Generators, Oscillators, Standards, Testers, Voltage Sources

Local Sales Offices & Reps.

Ala	Huntsville, BCS Assocs., Inc.	205-881-6220
Cal	Newport Beach, Feeger, Lucas, Wolfe, Inc.	714-540-4412
Cal	North Hollywood, Feeger, Lucas, Wolfe, Inc.	213-877-5518
Cal	Palo Alto, Coherent Mktg.	415-327-2217
Cal	San Diego, Feeger, Lucas, Wolfe, Inc.	714-277-0993
Conn	Hamden, Applied Measurements, Inc.	203-288-5288
Fla	Orlando, BCS Assocs., Inc.	305-896-4881
Ga	Atlanta, BCS Assocs., Inc.	404-874-9925
Ill	Chicago, Pivan Engrg. Co.	312-539-4838
Ind	Indianapolis, Pivan Engrg. Co.	317-253-1681
Md	Beltsville, R. Davies Assocs.	301-937-2215
Mass	West Acton, Applied Measurements, Inc.	617-263-2766
Mich	Detroit, S. Sterling Co.	313-255-1970
Minn	Minneapolis, Pivan Engrg. Co.	612-537-4501
Mo	Hazelwood, Technical Representatives, Inc.	314-731-5200
Mo	Peculiar, Technical Representatives, Inc.	816-737-1414
NY	Mount Vernon, Q.E.D. Elctrns., Inc.	914-664-0080
NY	Rochester, SBM Reps., Inc.	716-266-1400
NC	Greensboro, BCS Assocs., Inc.	919-273-1918
Ohio	Cleveland, S. Sterling Co.	216-442-8080
Ohio	Dayton, S. Sterling Co.	513-298-7573
Pa	Melrose Park, R. Meyers Assoc.	215-224-1663
Pa	Pittsburgh, S. Sterling Co.	412-922-5720
Wash	Bellevue, Scientific Devices-Northwest	206-454-0900
Wisc	Brookfield, Pivan Engrg. Co.	414-786-1940

OPTIMAX, INC., Box 105, Advance Lane, Colmar, Pa., 18975, Tel: 215-822-1311, TWX: 510-661-7370; Empl.: 30; Minimum order: $50

For info on price: R. Barry; Application info: D. Gardner; Customer service: R. West; Delivery info: R. Barry

Free literature available: Optimax catalog

Products manufactured: Amplifiers

Local Sales Offices & Reps.

Cal	Los Altos, Hoeke and Reeser Assoc.	415-941-4080
Cal	Los Angeles, McDougall/McLaughlin	213-477-8556
Fla	Palm Bay, Spar Tech Assocs.	305-727-8045
Ga	Smyrna, Spar Tech Assocs.	404-432-3644
Ill	Park Ridge, RF Specialists	312-698-2044
Ind	Ft. Wayne, RF Specialists	219-485-8982
Md	Silver Spring, Spectroscopy Sys.	301-949-8261
Mass	Lexington, Lancer Assocs.	617-861-1720
Mich	Warren, DEM Elctrn. Sls.	313-755-6660
Mo	St. Louis, Boweng Reps	314-429-7327
NJ	Palisades Park, Scientific Devices	201-945-3962
NY	E. Syracuse, Ossmann Instrs.	315-437-6666
Pa	Wyndmoor, Spectroscopy Sys.	VE6-1545
Tex	Dallas, Texas Microwave/Elec.	214-231-7281

OPTIMIZED DEVICES INC., 220 Marble Ave., Pleasantville, N.Y., 10570, Tel: 914-769-6100; Empl.: 22

For info on price: A. Zuch; Application info: A. Zuch; Customer service: J. ODonnel; Delivery info: J. Murtha

Free literature available: Model 6000 Computer Operated Test System, Model Computer Operated Screwdriver, Series 19 Capacitor Test Bridges, Model 3000 Automatic Relay Test System, Model CH-1 Component Handler, Model 1900 Capacitance Test System.

Products manufactured: Analyzers, Bridges, Generators, Screwdrivers, Test Systems, Testers

Local Sales Offices & Reps.

Cal	Los Angeles, DynaSales Co.	
NM	Albuquerque, Electronic Enterprises	
NM	Las Cruces, Elctrn. Enterprises	

NY	New York City, Hy Lewis Assoc.	
Wash	Seattle, Datacom Assocs.	

Advertisment

Automatic and computer operated testing systems for circuits, boards and components. Specialists in custom designs and unusual applications. Call us for a free price estimate and proposal.

OPTO-METRIC TOOLS, Sub/E. Leitz, Link Crescent, Rockleigh, N.J., 07647, Tel: 201-767-1320; Empl.: 200

Products manufactured: Comparators, Fiber Optic Bundles, Gages, Interferometer Systems, Lamps, Lenses, Optical & Camera, Magnifying Glasses, Inspection, Microscopes, Simulators, Television Systems & Equipment Closed-Circuit, Testers

Local Sales Offices & Reps.

Cal	Burlingame, E. Leitz, Inc.	415-697-9182

OPTRON, INC., 1201 Tappon Cir., Carrollton, Tex., 75006, Tel: 214-242-6571, TWX: 910-860-5958; FSC No: 32694; Empl.: 230; Minimum order: $25

For info on price: Mktg.; Application info: Mktg.; Customer service: Cust. Svc.; Delivery info: Cust. Svc.

Free literature available: Shortform Catalog-Individual Data Sheets

Products manufactured: Cells, Photoconductive, Photoemissive, Photovoltaic, Detectors, Diodes, Encoders, Isolators, Lamps, Light Sources, Photoelectric, Lights, Punched Card Equipment, Readers, Sensors, Light, Transistors

Local Sales Offices & Reps.

Ala	Huntsville, Murcota Corp.	205-539-8376
Ariz	Phoenix, T. Goodreau & Assocs.	602-243-5141
Cal	Glendale, Orion Sls.	213-240-3151
Cal	San Carlos, Kottmeier Assocs.	415-592-8333
Cal	San Diego, Orion Sls.	714-299-8322
Cal	Tustin, Orion Sls.	714-832-9687
Colo	Wheat Ridge, Waugaman Assocs.	303-423-1020
Fla	Clearwater, Lynch-Gentry Assocs.	813-443-2697
Ill	Chicago, Carlson Elctrn. Sls.	312-774-9022
Md	Baltimore, Stemlen Assocs.	301-944-8262
Mass	Haverhill, L-K Assocs.	617-373-1313
Mass	Sudbury, Heinecke Corp.	617-443-3200
Mich	Detroit, R.P. Urban Assocs.	313-535-2355
Mich	Grand Rapids, R.P. Urban Assocs.	616-245-0511
Minn	Minneapolis, ECR, Inc.	612-831-4547
Mo	St. Louis, Carlson Elctrn. Sls.	314-991-0262
NJ	Cherry Hill, Stemlen Assocs.	609-966-4070
NJ	Fort Lee, Necco	201-461-2789
NJ	Freehold, Necco	201-462-1361
NJ	Laurel Springs, Stemlen Assocs.	215-644-3477
NM	Albuquerque, Electronic Mktg., Inc.	505-265-7837
NY	Endicot, Advanced Comps. Corp.	607-785-3191
NY	N. Syracuse, Advanced Comps. Corp.	315-699-2671
NY	Scottsville, Advanced Comps. Corp.	716-889-1429
NC	Winston Salem, Murcota Corp.	919-723-1001
Ohio	Cleveland, D. Steffen & Assocs.	216-461-8333
Ohio	Dayton, D. Steffen & Assocs.	513-293-3145
Tex	Dallas, M. Kruvand Co.	214-827-8043
Tex	Houston, M. Kruvand Co.	713-661-3007
Va	Alexandria, Stemlen Assocs.	703-548-7818
Va	Reston, Boyle Assocs.	703-620-9558
Wash	Tukwila, General Elctrns., Inc.	206-243-5141
Wisc	Wauwatosa, Carlson Elctrn. Sls.	414-476-2790

Local Distributors

Cal	Sunnyvale, Diplomat/Westland, 1118 Elko Dr.	408-734-1900
Ill	Westmont, Bodelle Co., 47 Chestnut La.	312-323-9670
Tex	Dallas, Component Specialties, 2560 Electronic Ln.	214-357-4576
Tex	Houston, Component Specialties, 7313 Ashcroft	713-771-7237
Utah	Salt Lake City, Diplomat/Altaland, 2280 S. Main St.	801-486-7227

ORBIT INDS., Div. Countis Inds., Box 1444, San Luis Obispo, Calif., 93401, Tel: 805-544-1770; Empl.: 10

Products manufactured: Tools, Tweezers, Hand & Vacuum

ORBIT INSTR. CORP., 131 Eileen Way, Syosset, N.Y., 11791, Tel: 516-WA 1-6310, TWX: 510-221-2122; FSC No: 11263; Empl.: 65

For info on price: P. Sherman; Application info: M. Gersten; Customer service: P. Sherman; Delivery info: P. Sherman

Products manufactured: Amplifiers, Analyzers, Brakes, Clutches, Controls/Control Eqpt., Counters, Gears & Gear Mechanisms (Precision), Indicators, Reducers, Repeaters, Servo, Servo Systems, Switches, Tracking Systems, Transducers

Local Sales Offices & Reps.

Cal	San Diego, W. Gorman Co.	714-222-9424
Tex	Dallas, R. O. Spooner Co.	214-357-6636

ORIEL CORP. OF AMERICA, 15 Market St., Stamford, Conn., 06902, Tel: 203-357-1600, TWX: 710-474-3563; Empl.: 49; Minimum order: $50

Customer service: A. Smith

Free literature available: Instruments and components for UV, visible and IR research including optical bench and table equipment, lasers and accessories, light sources and monochromators, light detection equipment, optical filters and optical components.

Products manufactured: Coatings, Converters, Filters, Lamps, Lasers & Laser Systems, Lenses, Optical & Camera, Lights, Machines/Machinery, Production, Power Supplies, Radiometers, Services, Assembly, Production & Test, Ultraviolet Inspection Lighting

Local Sales Offices & Reps.

Cal	Newport Beach	714-546-5871

ORMOND INC., 11969 E. Rivera Rd., Santa Fe Springs, Cal., 90670, Tel: 213-698-0641, TWX: 910-586-1635; Empl.: 40; Minimum order: $85

Customer service: A. Denny Ext. 26

Free literature available: Literature on: load cells, digital displays, digital printers, aircraft weighing systems, & scales.

Products manufactured: Cells, Load

OSBORNE TRANSFORMER CORP., 3834 Mitchell Jen Ave., Detroit, Mich., 48207, Tel: 313-579-0700; Empl.: 30

Products manufactured: Coils Including Assemblies & Forms, Reactors, Transformers

OSHINO ELECTRIC LAMP WORKS, LTD, 2-5-2, Minami-Shinagawa, Shinagawa-ku, Tokyo, Japan, Tel: 03-471-8548; Empl.: 250

Products manufactured: Diodes, Lamps, Sockets, Switches

Local Sales Offices & Reps.

Cal	Costa Mesa, WAMCO Tech. Sls., Inc.	714-833-9361
Ill	Chicago, Cimco Int'l. Inc.	312-782-5621

OSTBY & BARTON CO., Box 6267, Providence, R.I., 02904, Tel: 401-739-7310; Empl.: 175; Minimum order: $25

For info on price: G. J. Cavanaugh; Application info: E. Jackson; Customer service: R. L. Porter; Delivery info: J. Burns

Free literature available: Spring-loaded test probes; custom designed & manufactured test fixtures; wire wrapping equipment.

Products manufactured: Brushes & Brush Assemblies, Contacts, Electrical, Probes, Testers, Tools

Local Sales Offices & Reps.

Ill	Glen Ellyn, H.F. Wilson Engrg. Co.	312-469-8473
Nev	Reno, Standard Pneumatic Motor Co.	702-329-6311
RI	Warwick, Market Development	401-739-7610

OTTO ENGRG., INC., Otto Controls Div., 36 Main St., Carpentersville, Ill., 60110, Tel: 312-428-7171; FSC No: 21649; Empl.: 42; Minimum order: $15 ... p. 1•1545,2267

For info on price: R. E. Sparks; Application info: R. E. Sparks; Customer service: J. Graves; Delivery info: J. Graves

Products manufactured: Switches

Local Sales Offices & Reps.

Cal	Alhambra, M.W. Riedel & Co.	213-283-7694
Cal	Redwood City, Woodworth Co.	415-365-0252
Ill	Glen Ellyn, Rockford Controls Co.	312-469-6016
Mass	Chelmsford, Northeast Comps.	617-256-8758
Mo	Kansas City, Harris-Hanson Co.	816-444-9494
Mo	St. Louis, Harris-Hanson Co.	314-432-3611
NY	Great Neck, F. Tylinski Co.	516-466-9070
Ohio	Cleveland, A.H. Baier Co.	216-461-6161
Ohio	Dayton, A.H. Baier Co.	513-276-4128
Wash	Bellevue, J. Findlay Co.	206-454-5200

OVEN INDUSTRIES, INC., Box 229, Silver Spring Indl. Pk., Mechanicsburg, Pa., 17055, Tel: 717-766-0721; Empl.: 30; Minimum order: $20

For info on price: T. M. Nolan; Application info: R. E. Eckert; Customer service: T. M. Nolan; Delivery info: T. M. Nolan

Products manufactured: Controls/Control Eqpt., Heaters & Heating Elements, Ovens, Regulators, Standards

Local Sales Offices & Reps.

Ala	Huntsville, Reynolds & Assocs.	205-536-1941
Ariz	Scottsdale, S.C. Blaker Co.	602-948-3061
Cal	Encino, El-Tec, Inc.	213-981-9881
Cal	San Carlos, Westronics Assoc.	415-592-1417
Fla	Melbourne, Reynolds & Assoc.	305-727-3205
Ga	Atlanta, Reynolds & Assocs.	404-252-5360
Ill	Skokie, Saffro & Assocs.	312-588-0905
La	Baton Rouge, Covington Instr. Co.	504-924-1784
Mass	Reading, Geder & Rotundi Assocs.	617-944-3105
Minn	Minneapolis, C.E. Bohlig Co.	612-922-7011
Mo	St. Peters, K.M. & B. Tech. Sls.	314-278-3159
NY	Huntington, Andrews & Andrews	516-692-8686
NY	Syracuse, Mike Antil	315-463-0266
NC	Greensboro, Reynolds & Assocs.	919-275-3725
Ohio	Medina, McShane, Inc.	216-725-4568
Pa	Ambler, W & M Assocs.	215-643-4119
Tex	Dallas, Bouco Sls. Assocs.	214-247-6708
Va	Falls Church, Beacon Elctrn. Assoc.	703-534-1673
EXP:	Ajax, Ont., Can., R.D. Assocs.	416-294-6796
EXP:	Pa., Lemoyne, Elctrns. Int'l.	717-737-8858

OVENAIRE, Div. Walter Kidde & Co., 706 Forrest St., Charlottesville, Va., 22901, Tel: 804-977-8050, TWX: 510-587-5461; Empl.: 125 ... p. 1•400-403

Customer service: Norman Broadbent

Free literature available: Ovens-16 page catalog illustrating crystal ovens and component ovens, propertional control and thermostat control. Oscillators-4-page short form catalog illustrating packaged high stability crystal oscillators

Products manufactured: Oscillators, Ovens, Standards

Local Sales Offices & Reps.

Ala	Huntsville, L & D, Inc.	205-881-7760
Ariz	Phoenix, J. S. Heaton Co. Inc.	602-264-7887
Ark	El Dorado, D. Bellew Sls.	501-863-8325
Cal	San Mateo, Melvin Sl.	415-349-7445
Cal	Van Nuys, R.L. Assocs.	213-780-1666
Fla	Maitland, Ellis & Assocs.	305-645-1101
Ill	Chicago, TX Sls., Inc.	312-455-6199
Ind	Fort Wayne, TX Sls., Inc.	219-489-4447
Ind	Indpls., TX Sls., Inc.	317-253-1966
La	Kenner, D. Bellew Sls.	504-729-4550
Md	Luthersville, L. E. Brown Assoc.	301-296-4306
Mass	Randolph, Naton Assocs., Inc.	617-986-6417
Minn	St. Paul, Countryman	612-645-9151
Mo	Blue Springs, Chesco	816-229-1404
Mo	St. Charles, Chesco	314-946-6677
NJ	Moorestown, L. E. Brown Assoc.	609-234-0382
NY	Buffalo, Quality Comps.	716-839-4170
NY	Smithtown, TX Sls., Inc.	516-979-8750
NC	Greensboro, L & D, Inc.	919-292-3201
Ohio	Cleveland, TX Sls., Inc.	216-561-1900
Tenn	Memphis, D. Bellew Sls.	901-365-9437
Tex	Dallas, Stevens Sls.	214-350-2476
Wash	Seattle, Carlyle Tech. Sls.	206-622-4288

OVERLY-HAUTZ CO., 8617 Clinton Rd., Cleveland, Ohio, 44144, Tel: 216-281-1500; Empl.: 100; Minimum order: $25

Customer service: P. Siliko

Free literature available: MB-400 Motor Base Brochure, Shorewall Brochure, Facilities Brochure.

Products manufactured: Cabinets & Accessories, Cases, Equipment, Instrument, Meter, Chassis, Circuit Board Mounting, Chassis, Metal, Enclosures, Module, Plug-In, Frames, Cabinet & Rack, Racks, Services, Assembly, Production & Test, Stands, Instruments

OWATONNA TOOL CO., 395 Eisenhower Dr., Owatonna, Minn., 55060, Tel: 507-451-5310; Empl.: 1035

For info on price: L. Wavrin Ext. 225; Customer service: T. Nutting Ext. 409

Free literature available: Catalog No. G-71, includes complete OTC line of maintenance tools and equipment; Catalog No. H-72, power work holding systems.

Products manufactured: Couplings, Gages, Testers, Wrenches

Local Sales Offices & Reps.

Ala	Birmingham, J.R. Kuehn	205-853-0980
Cal	Arcadia, R. Long	213-447-0081
Cal	La Habra, R. Fitzgerald	213-697-8626
Cal	San Jose, G. Packer	408-378-1853
Cal	Santa Ana, G. Weers	213-283-2933
Colo	Aurora, K. Buerk	303-751-9369
Conn	Killingworth, W. Buckingham	203-663-2271
Fla	Tampa, L. Rickett, Jr.	813-884-1046
Ga	Riverdale, C. Crews	404-471-8046
Idaho	Pocatello, W. Noesen	208-232-2045
Ill	Chicago, G.J. Reilly	312-274-6993
Ind	Lebanon, T. Payne	317-482-1376
Iowa	Des Moines, D. Vandermeulin	515-276-2290
Iowa	Des Moines, M. Seskis	515-265-0843
Md	Derwood, G. Miller, Jr.	301-948-2892
Mass	Concord, B. L. Boyd	617-369-5938
Mich	Madison Heights, R. Lock	313-645-2120
Mich	Troy, D.V. Johnson	313-689-5413
Minn	Minneapolis, C. Johnson	612-888-4957
Mo	Florissant, P. Stumpe	314-741-4444
NJ	Convent Station, C. Knill	201-538-3846
NJ	Middletown, D.A. Peterson	201-671-4395
NJ	Parlin, J. Stowers	201-727-6020
NJ	Willingboro, C.V. Bareikis	609-871-0399
NY	Rochester, J. Jenkinson	716-385-3217
NC	Charlotte, R.J. Ludes, Sr.	704-366-4963
Ohio	Columbus, J. Moeller	614-885-1478
Ohio	Conneaut, D. Dye	216-593-1226
Ohio	Lakewood, D. Brown	216-228-9563
Ohio	Westlake, D.O. Schneider	216-871-8820
Ore	Tigard, J. Davenport	503-639-6644
Tenn	Memphis, R. Ludes	901-396-7469
Tex	Euless, L. Johnson	817-267-4828
Tex	Houston, W. Parker	713-468-6157
Tex	Richardson, J.W. Cissne	214-235-6127
Wisc	Kenosha, E.T. Beckman	414-654-1778

OWENS-ILLINOIS, INC., Box 1035, Toledo, Ohio, 43666, Tel: 419-242-6543, TWX: 810-442-1812; Empl.: 56000

OXFORD INSTR. CORP., Box 1829, 48 Maryland Ave., Annapolis, Md., 21404, Tel: 301-268-2350; Empl.: 3

Customer service: J. E. Templeton

Products manufactured: Controls/Control Eqpt., Generators, Indicators, Magnets, Recorders

OXFORD SPEAKER CO., 4647 W. 47th St., Chicago, Ill., 60632, Tel: 312-585-4491, TWX: 910-221-5029; Empl.: 300

Products manufactured: Speaker Systems, Speakers

Local Sales Offices & Reps.

Ala	Gadsden, F.C. Nickerson	205-547-7718
Alas	Anchorage, R. Merritt Co.	
Ariz	Culver City, H. Feldman Co.	213-870-5973
Cal	Culver City, H. Feldman Co.	213-870-5973
Cal	San Francisco, Tech. Sls. Assoc.	414-467-1434
Colo	Denver, Nelson Co.	303-733-5528
Fla	Ormond Beach, J.F. Thompson	904-677-2298
Ga	Decatur, F.C. Nickerson	404-631-4481
Ill	Chicago, G. MCL Cole Co.	312-774-3535
Ind	Indianapolis, D. Powers Sls. Inc.	317-846-0790
Mass	N. Scituate, W.A. Hendrickson Co.	617-545-0652
Mich	Oak Park, J. Shay Assocs.	313-546-0194
Minn	Minneapolis, J.E.M. Anderson	
Mo	Kansas City, Forristal-Young Sls. Co.	816-358-6771
Neb	Omaha, Forristal-Young Sls. Co.	402-333-0800
NY	Liverpool, Lewis & Dunnigan Co.	315-622-2133
NY	Tuckahoe, L-C-A Sls. Co.	
NC	Kannapolis	
Ohio	Columbus, Mandabach & Assocs.	614-235-0265
Ore	Portland, R. Merritt Co.	
Pa	Philadelphia, L-C-A Sls. Co.	215-GR7-3298
Tex	Dallas, Wyborny Sls. Co.	
Wash	Seattle, R. Merritt Co.	206-682-7337
Wisc	Milwaukee, G. MCL Cole Co.	414-545-6083
EXP:	New York, N.Y., Roburn Agencies, Inc.	219-989-5939

PACE INC., 9337 Fraser Ave., Silver Spring, Md., 20910, Tel: 301-587-1696, Telex: 89-8476; Empl.: 35; Minimum order: $40

For info on price: R. Deblinger; Application info: R. Deblinger; Customer service: R. Deblinger; Delivery info: Sls. Off.

Free literature available: PACE Catalog - Detailed descriptions of PACE Equipment and Services; PACE All Products Flyer - "Yours" Brief desc. of PACE Products; PACE Desoldering for any Budget - Ped-A-Vac descriptive brochure.

Products manufactured: Soldering Guns, Irons & Desoldering Tools

Local Sales Offices & Reps.

Ala	Madison, South Eastern Assoc.	205-772-9616
Ariz	Phoenix, Tooltronics	602-257-0768
Cal	Glendale, Tooltronics	213-240-4000
Cal	Santa Clara, Tooltronics	408-241-4000
Colo	Lakewood, Pathway	303-232-7730
Fla	Miami, N. Black Assoc.	305-651-4132
Haw	Honolulu, Pacific Instrumentation	808-373-1287
Ill	Mt. Prospect, E.T. Champion & Assoc.	312-593-1150
Kans	Baxter Springs, Production Automation Corp.	316-856-3600
Md	Baltimore, A.L. Myers Co.	301-426-5583
Mass	Woburn, MacHugh Assoc.	617-935-4650
Minn	Minneapolis, Production Automation Corp.	612-866-5700
Mo	Raytown, Production Automation Corp.	816-737-0066
Ohio	Cleveland, Data Equip. Sls.	216-252-3151
Okla	Tulsa, Production Automation Corp.	918-932-1051
Tex	Richardson, Production Automation Corp.	214-234-4002
Wash	Bellevue, Doland Co.	206-454-4952

PACE WIRE & CABLE CORP., 3590 Oceanside Rd., Oceanside, N.Y., 11572, Tel: 516-678-2275; Empl.: 35

Products manufactured: Braid, Cable, Cable, Wire

PACIFIC COMMUNICATIONS, 2126 So. Lyon St., Santa Ana, Cal., 92705, Tel: 714-546-0147; Empl.: 26

For info on price: G. Grunewald; Application info: G. Gruenwald; Customer service: G. Gruenwald; Delivery info: J. Day

Products manufactured: Comm. Systems, Receivers, Transmitters

PACIFIC ELECTRICORD CO., 747 W. Redondo Beach Blvd., Box 10, Gardena, Cal., 90247, Tel: 213-532-6600, TWX: 910-346-7619; Empl.: 350; Minimum order: $250

For info on price: P. Liput; Customer service: A. McLeod; Delivery info: A. McLeod

Free literature available: Catalog #1073 describes stock and custom power supply cords and cord sets.

Products manufactured: Braid, Cable, Cable, Cords, Plug Caps & Shells, Plugs, Switches, Wire

PACIFIC TECHNOLOGY, 235 Airport Way, Renton, Wash., 98055, Tel: 206-623-9080; Empl.: 60

Customer service: L. C. Rama

Products manufactured: Controls/Control Eqpt., Memory Systems, Monitors, Shift Registers

Local Sales Offices & Reps.

Ala	Huntsville, Vesco	205-881-8830
Ariz	Scottsdale, Utility Prods.	602-947-9326
Cal	El Monte, Randolph Industries, Inc.	213-283-7901
Cal	Palo Alto, Coherent Mktg. Assocs.	415-327-2217
Colo	Englewood, Utility Prods., Inc.	303-771-9080
Conn	Glastonbury, Instrument Reps., Inc.	203-633-0777
Ill	Chicago, Scientific Sls. Corp.	312-775-7594
Ind	Indianapolis, Scientific Sls. Corp.	317-253-4606
Md	Baltimore, Elctrn. Mktg. Assoc.	301-744-7700
Mass	Lexington, Instrument Reps., Inc.	617-861-8620
Minn	Bloomington, Scientific Sls. Corp.	612-881-3300
Mo	St. Louis, Floyd Gilliam Assoc.	314-961-5555
NY	Buffalo, Robinson Assoc.	716-886-7350
NC	Charlotte, J. Rudisill Assocs., Inc.	704-377-6901
Ohio	Cleveland, Peter Lax Co.	216-226-8815
Okla	Tulsa, Telstar Instrument Corp.	918-628-1011
Pa	Pittsburgh, Peter Lax Co.	412-833-5477
Tex	Houston, W. W. Scherwitz Co.	713-527-8866
Wash	Bellevue, Topp Engrg. Sls.	206-747-5400
FOR:	Can., Toronto, Ont., Nortech Control Equip. Co.	416-622-7820
FOR:	Can., Montreal 355, Quebec, Associated Instrumentation & Controls	514-384-7211
FOR:	Can., Vancouver, British Columbia, T. W. MacKay & Son, Ltd.	604-731-6561

PACKAGED RESINS DIV., Bacon Inds., Inc., 192 Pleasant St., Watertown, Mass., 02172, Tel: 617-926-2550; Empl.: 18; Minimum order: $25

For info on price: Order Desk; Application info: T. Willett; Customer service: T. Willett

Products manufactured: Adhesives (All Types), Coatings, Compounds, Encapsulating, Insulating, Molding, Potting, Conductive Plastic Materials, Plastic Raw Materials, Liquids, Pellets, Powders, Resins

PAGEANT/M.A. MILLER CO., 605 Northern Blvd., Chinchilla, Pa., 18501, Tel: 717-587-4771; Empl.: 14; Minimum order: $25

For info on price: R. Gardner; Application info: A. Wormser; Customer service: R. Gardner; Delivery info: Stock

Products manufactured: Bearings, Phonographs, Parts & Accessories

Local Sales Offices & Reps.

Ark	Jonesboro, B. McCaughan Sls.	402-346-5330
Cal	San Rafael, Sid Levin Sls.	415-454-1940
Cal	Van Nuys, A. Szerlip Sls. Co.	213-782-1765
Fla	Longwood, Williams Sls. & Mktg.	305-862-8722
Ga	Atlanta, Murphy & Cota	404-875-2525
Ill	Skokie, 2M Sls. Co.	312-674-3018
Md	Baltimore, Associated Sls. Reps.	301-661-2888
Mich	Lake Orion, T. Firaneck Sls.	313-391-1177
Minn	Minneapolis, H.M.R.	612-920-8200
Neb	Omaha, Mag Co. Sls.	402-346-5330
NY	Camillus, Callahan-Ferguson Co.	315-487-3870
NY	Wantagh, Audio Plus	516-781-2223
Ohio	Akron, Audio Mktg. Assocs.	216-864-8988
Ore	Portland, J. V. Be Lusko Co.	503-222-4279
Pa	Elkins Pk., I. Perlman Co.	
Tenn	Knoxville, R. K. Swan & Assocs.	615-523-7482
Tex	Dallas, Poole Inds.	214-742-7541
Tex	Houston, Ranger Elctrns. Co.	713-529-2811

PAKTRON DIV., Illinois Tool Works, Inc., 900 Follin Lane, S.E., Vienna, Va., 22180, Tel: 703-281-2810, TWX: 710-833-0682; FSC No: 19396; Minimum order: $1000

For info on price: C. Miller; Application info: K. Christensen; Customer service: C. Miller; Delivery info: C. Miller

Free literature available: Standard Catalog; Micromatic Catalog; Filmatic Catalog; Application Note Series; Facilities Brochure.

Products manufactured: Capacitors, Fixed

Local Sales Offices & Reps.

Cal	Mountain View, G. Woempner Co.	415-964-5454
Cal	Newport Beach, Paktron Regional Sls. Off.	714-833-9286
Cal	San Diego, Emcon	714-459-4355
Colo	Denver, Camel Elctrns., Inc.	303-757-6191
Fla	Altamonte Springs, W M M Assocs.	305-831-4645
Fla	Clearwater, W M M Assocs.	813-447-2533
Fla	Pompano, W M M Assocs.	305-943-3091
Ill	Chicago, Elctrn. Div., Illinois Tool Works, Inc.	312-693-3040
Ind	Indianapolis, Paktron Regional Sls. Off.	317-255-9658
Mass	Burlington, Paktron Regional Sls. Off.	617-273-0365
Mich	Benton Harbor, R.C. Nordstrom & Co.	616-857-4653
Mich	Lathrup Village, R.C. Nordstrom & Co.	313-559-7373
Minn	St. Paul, Murnco	612-484-8200
Mo	North Kansas City, H. J. Weisler & Assocs.	816-421-1679
Mo	St. Louis, H. J. Weisler & Assocs.	314-HA 8-3934
NY	Elmont, F.E. Schmitt Co.	516-437-8150
NY	New York, Landseas Corp.	212-265-8323
NY	Rochester, L-Mar Assocs.	716-328-5240
NY	Vestal, L-Mar Assocs.	607-729-6339
NC	Smithfield, Byrd & Barbour Sls.	919-934-8136
Ohio	Columbus, Rockford Controls, Inc.	614-231-5890
Ohio	Dayton, Rockford Controls, Inc.	513-278-7362
Ohio	Euclid, Rockford Controls, Inc.	216-731-5250
Pa	Erie, ECCO Electronic Sls.	814-452-3762
Tenn	Memphis, Paktron Regional Sls. Off.	901-386-7252
Tex	Houston, R.F. Kimball & Co.	800-294-2805
Tex	Richardson, R.F. Kimball & Co.	214-231-3447
Wash	Seattle, Nemco	206-322-6200
FOR:	Can., Toronto 20, Ont., P. J. Heenan Ltd.	416-223-3619

Local Distributors

Ala	Huntsville, Hall-Mark, 4739 Commercial Dr.	205-837-8700
Cal	Goleta, Radio Prod. Sls., 350 E. South Kellog	805-964-6823

Directory of Local Distributors Starts on page 401

Cal	Los Angeles, Radio Product Sls., 1501 S. Hill St.	213-748-1271
Cal	San Diego, Radio Prod. Sls., 7889 Clairemont Mesa Blvd.	714-292-5611
Conn	Stratford, Stepco, 1269 Barnum Ave.	203-375-5961
Fla	Ft. Lauderdale, Hall-Mark, 1302 West McNab Rd.	305-971-9280
Fla	Orlando, 7233 Lake Ellenor Dr.,	305-855-4020
Ga	Lawrenceville, Hall-Mark, Route 1	404-963-9728
Ill	Skokie, Bell Inds., 7701 N. Austin Ave.	312-965-7500
Ind	Ft. Wayne, Harvey-Ind., 2226 Abbey Dr.	800-382-4517
Ind	Indianapolis, Harvey-Indiana, 8505 Zionsville Rd.	317-297-4910
Mich	Farmington, Harvey-Mich, 23461 Industrial Pk. Rd.	313-477-1650
Mich	Kentwood, Harvey-Mich, 4860 S. Div.	616-531-9300
Minn	Edina, Harvey-Minn, 6969 Washington Ave. S.	612-941-6060
NJ	Hanover, State Elctrns., 36 Route 10	201-887-2550
NM	Albuquerque, Century Elec., 121 Elizabeth N.E.	505-292-2700
NY	Farmingdale, Iris Elctrns., 91 Milbar Blvd.	516-420-8400
NY	Rochester, Simcona Elec., 275 Mt. Read Blvd.	716-328-3230
NC	Raleigh, Hall•Mark, 3000 Ind'l. Dr.	919-832-4465
Ohio	Dayton, Sunray Elec., 3191 Plainfield Rd.	513-253-4114
Pa	Erie, Erie Corporate Cont., 1938 Buffalo Rd.	814-455-8110
Tex	Dallas, Component Specialties, 2560 Elctrns. La.	214-357-4576
Tex	Houston, Component Specialties, 7315 Ashcroft	713-771-7237
Utah	Salt Lake City, Century Elec., 2150 South 300 W.	801-466-6000
Utah	Salt Lake City, W.H. Bintz, 433 West Third So.	801-363-5821

PALL CORP., 30 Sea Cliff Ave., Glen Cove, N.Y., 11542, Tel: 516-671-4000, TWX: 510-223-0606; Empl.: 1300

Products manufactured: Air Cleaners & Filters (Shielded & Unshielded), Dehumidifiers (For Equipment), Filters, Switches

Local Sales Offices & Reps.

Cal	Pasadena	213-684-2131
NJ	, Pall Trincor Corp.	201-245-8400

PALL TRINITY MICRO CORP., Rte. 281, Cortland, N.Y., 13045, Tel: 607-756-7535, TWX: 510-252-0791; Empl.: 300; Minimum order: $25

For info on price: D. J. Taylor; Application info: D. J. Taylor; Customer service: D. J. Taylor; Delivery info: R. Chierchio

Products manufactured: Air Cleaners & Filters (Shielded & Unshielded), Dehumidifiers (For Equipment), Dehydrators, Filters

Local Sales Offices & Reps.

Ala	Birmingham, Brownlee-Morrow Engrg.	205-967-2873
Ala	Mobile, F. A. Thomas Co.	205-471-1593
Ala	Pelham, G. S. Edwards Co.	205-663-0707
Cal	S. El Monte, Pall Western Corp.	213-686-2786
Cal	Sunnyvale, Mensco	408-739-8690
Colo	Denver, Ross Equip. Co.	303-759-4215
Conn	Hamden, Pond Tech. Sls.	203-288-6278
Fla	Tampa, J. M. Clontz Assocs.	813-935-1988
Ga	Atlanta, Thomas Engrg. Co.	404-261-5070
Haw	Honolulu, Berkley Engrg.	808-538-1921
Ill	Villa Park, Enpro Inc.	312-279-2525
Iowa	Clinton, H. G. Klug Co.	319-243-3642
Ky	Paducah, LECO Inc.	502-554-9653
La	Baton Rouge, AWC Inc.	504-275-5480
Mass	North Reading, J. R. Chisholm Corp.	617-664-5711
Mich	Kalamazoo, Hose & Seals Inc.	616-375-1290
Mich	Trenton, North Central Engrg.	313-675-3157
Minn	Minneapolis, Industra Co.	612-929-6224
Mo	Kansas City, Condit Co.	816-561-4660
Mo	St. Louis, Durkin Equip. Co.	314-542-1444
Mo	St. Louis, Process & Chemical Equip.	314-771-3741
Neb	Omaha, H. G. Klug Co.	402-553-1377
NJ	Vauxhall, Pall Trincor Corp.	201-245-8400
NY	Cortland, E.P.S. Corp.	607-753-9308
NY	Malone, Bentek Inc.	518-483-4654
NY	New York City, Pall Trincor Corp.	212-269-4779
Ohio	Cleveland, Lester Johnson Co.	216-751-7040
Okla	Tulsa, Condit Co.	918-743-6651
Ore	Portland, Set Point Control	503-288-8868
Pa	Pittsburgh, Biltmore Products Co.	412-563-0808
SC	Greenville, Abernathy-Thomas Engrg.	803-288-2833
Tenn	Kingsport, Abernathy-Thomas Engrg.	615-245-6151
Tenn	Memphis, LECO Inc.	901-754-4800
Tex	El Paso, Engineered Equip.	915-533-4221
Tex	Houston, AWC Inc.	713-488-2730
Utah	Salt Lake City, T. R. Brown & Assoc.	801-486-7241
Va	Richmond, Dynamation Inc.	804-649-7666
Wash	Bellevue, Set Point Control	206-454-0155
Wisc	Milwaukee, Chipley & Zeman Inc.	414-228-1300
FOR:	Can., Montreal, Que., Pall Canada Ltd.	514-735-5311

PALOMAR ENGRS., Box 455, Escondido, Cal., 92025, Tel: 714-747-3343; Empl.: 6

Customer service: J. Althouse

Free literature available: A brochure for each of our seven products on request.

Products manufactured: Bridges, Decoders, Generators, Keyers, Tone, Modulators, All Kinds, Standards, Transformers

PAMOTOR, INC., 770 Airport Blvd., Burlingame, Cal., 94010, Tel: 415-347-1203, TWX: 910-374-2353; Empl.: 30 p. 1•504-507

Free literature available: Brochures: "Fans Blowers & Accessories" & "Pentaflow Premium Fans"

Products manufactured: Blowers & Fans & Accessories

Local Sales Offices & Reps.

Ariz	Phoenix, Bestronics	602-248-7020
Ark	Little Rock, J.Y. Schoonmaker Co.	501-375-2168
Cal	Burlingame, W. J. Purdy Co.	415-347-7701
Cal	Los Angeles, Black, Ekizian, Strong, Inc.	213-870-9191
Cal	San Diego, Bestronics	714-278-2150
Colo	Denver, W. J. Purdy Co.	303-777-1411
Conn	Meriden, P. R. Sturgeon	203-237-1112
Fla	Orlando, Cartwright & Bean	305-422-4531
Fla	Plantation, Cartwright & Bean, Inc.	305-791-3989
Ga	Atlanta, Cartwright & Bean	404-255-5262
Ill	Hinsdale, Hill-Gray	312-325-4810
Ind	Indianapolis, Sukup & Cox	317-253-5501
Mass	Babson Park, P. R. Sturgeon Co.	617-237-3506
Mich	Ferndale, Hilltronics, Inc.	313-398-5556
Minn	Edina, M. Foster	612-835-2252
Miss	Jackson, Cartwright & Bean	601-981-1368
NJ	Bergenfield, H. Gray Assoc.	201-384-3643
NM	Albuquerque, W. J. Purdy Co.	505-266-7959
NY	Syracuse, Mar-Com Assocs.	315-437-2843
NC	Charlotte, Cartwright & Bean	704-333-6457
NC	Raleigh, Cartwright & Bean Co.	919-832-7128
Ohio	Dayton, Bear Mktg.	513-299-3566
Ohio	Richfield, Bear Mktg.	216-659-3131
Okla	Tulsa, J.Y. Schoonmaker Co.	918-936-1423
Pa	Enon Valley, Nebco Assoc.	216-457-2333
Pa	Havertown, Liberi Sls.	215-789-8150
Tenn	Knoxville, Cartwright & Bean	615-693-7450
Tenn	Memphis, Cartwright & Bean	901-276-4422
Tex	Dallas, J. Schoonmaker Co.	214-357-8481
Tex	Houston, J.Y. Schoonmaker Co.	713-926-9510
FOR:	Can., Willowdale, Ont., A. C. Simmonds & Sons	416-491-1010

PAN-L-FAST, 13205 Sherman Way, N. Hollywood, Cal., 91605, Tel: 213-875-0831; Empl.: 5

Products manufactured: Fasteners

PANAMETRICS INC., 221 Cresent St., Waltham, Mass., 02154, Tel: 617-899-2719, Telex: 92-3406; Empl.: 60; Minimum order: $25

For info on price: D. F. Garland; Application info: K. A. Fowler; Customer service: D. F. Garland; Delivery info: D. F. Garland

Products manufactured: Amplifiers, Analyzers, Generators, Indicators, Testers, Timers, Transducers, X-Ray Inspection Equipment

Local Sales Offices & Reps.

Cal	Downey, Uresco Co.	213-773-3828
Conn	Gailes Ferry, NDT Engrg.	203-464-7636
Mich	Chelsea, Michigan Nondestructive Gage Co.	313-994-5117
Pa	Downingtown, Testech	215-269-2705
Pa	Pittsburgh, American NDT	412-536-2345
Tex	Dallas, NDE-Aids	214-363-3217

PANASONIC, IND'L. ELCTRN. COMPS., Matsushita Elec. Corp. Amer., 200 Park Ave., New York, N.Y., 10017, Tel: 212-973-8427

Products manufactured: Capacitors, Fixed, Capacitors, Variable, Circuits, Hybrid, Thick Film, Circuits, Hybrid, Thin-Film, Controls/Control Eqpt., Delay Lines, Diodes, Display Devices/Displays, Drivers, Speaker, Films, Filters, Foil, Handsets, Chestsets, Headphones, Headsets, Etc., Heads, Recording Playback, Erase, Integrated Circuit Devices, Isolators, Limiters, Microphones, All Kinds, Networks, Oscillators, Phonographs, Parts & Accessories, Potentiometers, Power Supplies, Protectors, Rectifiers, Relays, Resistors, Speaker Systems, Speakers, Substrates, Switches, Thermistors, Thyristors (Includes Silicon Controlled Rectifiers), Transducers, Transformers, Transistors, Tubes, Tuners, Yokes

Local Sales Offices & Reps.

Ala	Huntsville, Rep, Inc.	205-881-9270
Cal	Los Angeles, Elctrns. for Industry	213-641-3277
Cal	San Jose, Allgood-North	408-288-6731
Colo	Arvada, Arrowhead Sls. Corp.	303-423-5556
Fla	Casselberry, EIR, Inc.	305-830-9600
Fla	Palm Beach, EIR, Inc.	305-585-6689
Ga	Atlanta, Rep, Inc.	404-876-1591
Ill	Chicago, Brock & Cushman	312-622-4110
Ill	Franklin Park, Matsushita Elec. Corp. Amer. Elctrn. Comps. Dept.	312-455-3105
Iowa	Des Moines, B.E.A.M.S., Inc.	515-282-0292
Kans	Shawnee Mission, B.E.A.M.S., Inc.	913-888-6110
Mass	Cambridge, Vector Sls., Inc.	617-491-5700
Mich	Detroit, NICON Assocs.	313-341-7688
Mich	Farmington, Panasonic Distr. Ctr. Automotive Comps.	313-477-1107
Minn	St. Paul, Skor	612-645-6461
Mo	St. Louis, B.E.A.M.S., Inc.	314-781-6855
NJ	River Edge, Meg Elctrn. Sls.	201-265-9887
NY	Buffalo, Kehoe Comp. Sls.	716-856-9272
NY	Ontario Center, Kehoe Comp. Sls.	315-524-2491
NC	Charlotte, Anthom, Inc.	704-527-1515
Ohio	Columbus, T. Mulligan & Assocs.	614-457-2242
Ore	Portland, Almac/Stroum Elctrns.	503-292-3534
Pa	King of Prussia, Monteiro Associates, Inc.	215-265-0634
Tex	Addison, Dunbar Assocs.	214-239-7151
Utah	Salt Lake City, Arrowhead Sls. Corp.	801-485-3362
Va	Fairfax, T. Davis Marketers	703-591-7390
Wash	Seattle, Almac/Stroum Elctrns.	206-763-2300
EXP:	Toronto 150, Ont., Can., Canadian Gen. Elec.	416-537-4481

PANASONIC SPD DIV., OEM Ind'l. Battery Dept., Box 3980, Grand Central Sta., New York, N.Y., 10017, Tel: 212-973-8054

Customer service: K. Love

Free literature available: General Battery Catalog Ni-Cad Battery Catalog sealed lead acid (gel cells) Lithium batteries Silicone Photo Detectors Panaquick battery chargers.

Products manufactured: Batteries, Cells, Photoconductive, Photoemissive, Photovoltaic, Chargers, Battery, Meters

PANDUIT CORP., 17301 Ridgeland Ave., Tinley Park, Ill., 60477, Tel: 312-532-1800, Telex: 25-4560; QPL No: 06383 p. 2•2048-2051

For info on price: B. Kenny; Application info: B. Kenny; Customer service: H. Kunce; Delivery info: H. Kunce

Free literature available: Bulletin CC-2, an eight page condensed catalog covering the complete line of Panduit® wiring components. It contains concise data to aid in selection of component to meet the application.

Products manufactured: Clamps & Clips, Connectors, Cutters, Wire, Hand Operated, Ducts, Wiring, Fasteners, Kits, Terminal, Splices, wire (Including, Butt & Cap Types), Strain Reliefs, Cable & Wire, Strips, Terminals, Tools, Tubing, Wire, Wire & Cable Ties, Wire Markers, Wire Nuts, Wire Strippers

Local Sales Offices & Reps.

Ala	Birmingham, James E. Heusser Agency	205-836-3896
Alas	Anchorage, H.J. Lang & Assocs.	907-279-5741
Ariz	Phoenix, Panduit Corp.	602-252-4515
Ark	Little Rock, Byron Carson Co.	501-568-3342
Cal	Los Altos, Ewing-Foley, Inc.	415-941-4525
Cal	San Diego, Panduit Corp.	714-270-2827
Cal	Westminster, Panduit Corp.	714-554-2300
Colo	Denver, Panduit Corp.	303-756-7747
Conn	Glastonbury, Barton-Caron Assocs.	203-633-9417
Fla	Boca Raton, Floritronics	305-368-0325
Fla	Winter Park, Floritronics	305-886-4818

Ga	Atlanta, Panduit Corp.	404-252-6483
Haw	Honolulu, A. J. Vivas Co.	808-946-6233
Ill	Tinley Park, Panduit Corp.	312-532-1800
Ind	Fort Wayne, Val-Skol Sls., Inc.	219-742-9122
Ind	Indianapolis, Val-Skol Sls., Inc.	317-926-5063
Iowa	Marion, Thomas & Modrcin Assoc.	319-377-6261
Kans	Shawnee Mission, Thomas & Modrcin Assoc.	913-432-2131
Ky	Jeffersontown, A.L. Pickens Co.	502-491-4215
La	Gretna, Panduit	504-366-1022
Md	Rockville, L.G. White & Co.	301-792-0660
Mass	Auburndale, Barton-Caron Assocs.	617-332-2021
Mich	Flint, Panduit Corp.	313-233-0501
Mich	Jenison, Panduit Corp.	616-942-0420
Mich	Southfield, Panduit Corp.	313-354-1830
Minn	Minneapolis, Electric Comp. Sls.	612-933-2594
Mo	Hazelwood, Thomas & Modrcin Assoc.	314-895-4700
NJ	Leonia, Panduit Corp.	201-461-7790
NY	Albany, Panduit Corp.	518-869-6913
NY	Kenmore, Panduit Corp.	716-834-8119
NY	Rochester, Panduit Corp.	716-244-9480
NY	Syracuse, Panduit Corp.	315-476-6161
NC	Winston-Salem, L.G. White Southern, Inc.	919-725-3612
Ohio	Cincinnati, Val-Skol Sls., Inc.	513-563-6790
Ohio	Cleveland, Val-Skol Sls., Inc.	216-526-2156
Ohio	Columbus, Val-Skol Sls., Inc.	614-291-4123
Okla	Oklahoma City, Panduit Corp.	405-848-6916
Ore	Portland, Panduit Corp.	503-248-1971
Pa	King of Prussia, L.G. White-Keystone, Inc.	215-265-1817
Pa	Pittsburgh, Myles F. Smith & Assoc.	412-276-5363
Tenn	Cookeville, A.L. Pickens Co.	615-528-1047
Tenn	Memphis, Byron Carson Co.	901-396-4553
Tex	Dallas, Panduit Corp.	214-638-7280
Tex	Houston, Panduit Corp.	713-784-1680
Wash	Bellevue, Panduit Corp.	206-454-7267
Wisc	Appleton, H. Mercer Co.	414-739-6223
Wisc	Brookfield, H. Mercer Co.	414-786-6431

PANEL CONTROLS CORP., 1000 Mt. Elliott Ave., Detroit, Mich., 48207, Tel: 313-568-2400; Empl.: 22

Customer service: P. Van Osdol

Products manufactured: Cases, Equipment, Instrument, Meter, Containers, Racks

Local Sales Offices & Reps.

Ala	Chattanooga, Jackson & Assocs.	615-267-4260
Ariz	Phoenix, Davia Pkg. Supplies	602-942-5484
Cal	Westminster, Contronic Devices	714-897-2266
Ill	Glenview, F.W. Castle Co.	312-724-3075
Mass	Burlington, Contract East	617-272-5051
Mich	Dearborn, F.B. Wright Co.	313-843-8250
Minn	Anoka, A. & R. Assocs.	612-421-0751
Mo	Maryland Heights, Allied Assocs.	314-291-1120
NJ	Mountain Lakes, J.P. Dearie Co.	201-334-4848
NC	Durham, R.H. Davis Co.	919-596-8472
Ohio	Dayton, Dynel Co.	513-434-6467
Ore	Portland, Commercial Products Co.	503-286-4040
Tex	Dallas, W.W. Cannon Co.	214-357-2846
Utah	Salt Lake City, American Handling & Packaging	801-487-4673
Wash	Seattle, Commercial Products Co.	206-767-5313

PANELGRAPHIC CORP., Box 254, Caldwell, N.J., 07006, Tel: 201-227-1500, TWX: 710-734-4367; Empl.: 100; Minimum order: $95

For info on price: D. Appel; Application info: E. Greason; Customer service: W. Perra; Delivery info: W. Perra

Products manufactured: Cabinets & Accessories, Dials, Display Devices/Displays, Filters, Nameplates, Scales, Dial, Services, Assembly, Production & Test

Local Sales Offices & Reps.

Ala	Huntsville, W.A. Brown Comps.	205-539-4411
Ariz	Phoenix, C. P. McKight Co.	602-257-8037
Cal	Canoga Park, M.J. Murphy	213-341-1472
Cal	Menlo Park, G.R. McKnight	415-325-2844
Colo	Denver, Goyne Assoc.	303-798-8955
Fla	Ft. Lauderdale, W. A. Brown Comps.	305-776-4800
Fla	Orlando, W.A. Brown Comps.	305-425-5505
Ill	Elmhurst, Panelgraphic	312-834-4849
Ill	Rolling Meadows, Sumer, Inc.	312-394-4900
Mass	Lexington, Measurements Equip.	617-245-4870
Mich	Southfield, J. L. Montgomery Assoc.	313-358-2616
Minn	Minneapolis, TWC Sales	612-636-1770
NJ	Mt. Lakes, Comp. for Electronics	201-334-2921
NM	Albuquerque, G. R. McKnight	505-266-6423
NY	Rochester, L. Hart	716-244-3253
NC	Raleigh, W. A. Brown	919-725-5384
NC	Winston Salem, W.A. Brown Comp.	919-725-5384
Ohio	Cincinnati, Components	513-721-2997
Ohio	Cleveland, Components Inc.	216-842-2737
Pa	Media, Snyder & Massey	215-566-5400
Tex	Dallas, McCoy Assoc.	214-350-9931
Tex	Houston, McCoy	713-649-5756
Va	Fairfax, Snyder & Massey	703-273-1413
Wash	Bellevue, Hickey Eng. Sales	206-454-0460

PANELOC CORP., Front & Main Sts., Collinsville, Conn., 06022, Tel: 203-693-8363; FSC No: 23893; Empl.: 24; Minimum order: $25

For info on price: B. Ehrhardt; Application info: G. M. Williams, Jr.; Customer service: B. Ehrhardt; Delivery info: B. Ehrhardt

Free literature available: Quick Operating Fasteners Self locking fasteners

Products manufactured: Fasteners

PAR-METAL PRODS. DIV., Eon Corp., 1260 Atlantic Ave., Brooklyn, N.Y., 11216, Tel: 212-772-5800; Empl.: 75; Minimum order: $50

For info on price: H. L. Miller; Application info: H. L. Miller; Customer service: W. Jones; Delivery info: W. Jones

Products manufactured: Benches, Consoles, Stools, Tables, Cabinets & Accessories, Chassis, Circuit Board Mounting, Panels, Racks, Slides, Cabinet & Chassis

Local Sales Offices & Reps.

Ill	Skokie, Saffro & Assoc.	312-588-0905
Md	Baltimore, ME & Assoc.	301-825-1130
Mass	Lynfield, New Mar Assoc.	617-245-7960
NY	New York, Miller Co.	212-263-4446
Tex	Dallas, Techno Assoc.	214-357-9213

Local Distributors

	Rockville, Capital Radio, 12270 Wilkins Ave.	301-881-2270
Cal	Oakland, Brill Ectrns., 610 E. 10th St.	834-5888
Md	Bethesda, Empire Ectrn. Sup., 4907 Rugby Ave.	301-OL6-3300
NJ	Greenbrook, Greenbrook Elec., 269 U.S. Hwy. 22	201-968-3500
NJ	Hanover, State Ectrns., 36 Rte. 10	201-887-2550
NY	Buffalo, Summit Dist., 916 Main St.	716-884-3450
NY	L.I.C., H.L. Dalis, 35-35 24th St.	212-361-1100
Tex	Houston, Geophysical Sup. Co., 1500 Crawford	713-224-0621

PARA-KOTE, INC., Box 516, Marshall, Minn., 56258, Tel: 507-532-3789, TWX: 910-565-1330; Empl.: 35 p. 2•1773,1774

Products manufactured: Coatings, Services, Assembly, Production & Test, Transformers

PARABAM, INC., 3017 E. Las Hermanas St., Compton, Cal., 90221, Tel: 213-537-1771; Empl.: 22; Minimum order: $25

Customer service: J. N. Day

Free literature available: Custom manufacturing of fiberglass products; prototype production or quantity production; Astrodome and Observatory Shelters; Containers; Auto Bodies; Panels; Trailer Structures; Hoods; Concrete Forms; Custom Molded Shapes and Fiberglass Tooling.

Products manufactured: Containers, Services, Assembly, Production & Test, Servo Systems, Tracking Systems

PARAMETRIC INDS., INC., 742 Main St., Winchester, Mass., 01890, Tel: 617-729-7333; FSC No: 21455; Empl.: 50; Minimum order: $25

For info on price: J. D. Haskins; Application info: G. R. Sotiropoulos; Delivery info: J. D. Haskins

Products manufactured: Detectors, Diodes, Oscillators

Local Sales Offices & Reps.

Cal	Campbell, Allis Assocs.	408-379-2883
Colo	Boulder, H. Bass Assocs.	303-449-7509
Kans	Wichita, E. Carbiener Assocs.	316-682-5782
NJ	Leonia, Sprung/Nussbaum	201-947-6767
Pa	Glenside, Lewis Slubin & Co.	215-886-9291
Tex	Dallas, Stevens Sls. Co.	214-350-2476
Wash	Seattle, Datacom Assocs.	206-285-2525

PARAMOUNT INDUSTRIES, INC., 1430 Progress Rd., Ft. Wayne, Ind., 46808, Tel: 219-484-4111; Empl.: 44

Free literature available: Arbor list of square, rectangular and round sizes available.

Products manufactured: Tubing

Local Sales Offices & Reps.

FOR:	Can., Scarborough, Ont., Lake Engrg. Co. Ltd.	416-751-5980

PARAPLEGICS MFG., 304 N. York Rd., Bensenville, Ill., 60106, Tel: 312-625-7740; Empl.: 65; Minimum order: $25

For info on price: V. Caricato; Customer service: V. Caricato; Delivery info: I. Pryble

Free literature available: Job Shop - Sub-Contract of electro-mechanical & electronics assembly - cable & harness fabrication - circuit board assembly (wave & hand solder), wire wrapping, control panel asbly. Encapsulation of components & circuit boards coaxial cable assembly.

Products manufactured: Cable Assemblies & Harnesses, Cards, Linear Function, Cards, Logic, Services, Assembly, Production & Test

PASO SOUND PRODUCTS INC., 251 Park Ave. S., New York, N.Y., 10010, Tel: 212-254-2282; Empl.: 50; Minimum order: $25

For info on price: S. Goldberl; Application info: P. Mastrangelo; Customer service: A. Sgueglia; Delivery info: A. Sgueglia

Free literature available: Three Catalogs: General Line #33, Intercommunication Equipment #66, and Packaged Sound Systems #55 With Application Data 47, 48, 50, 51, 53, 54.

Products manufactured: Amplifiers, Comm. Systems, Horns, Microwave, Microphones, All Kinds, Mixers, Speaker Systems, Speakers, Transformers

Local Sales Offices & Reps.

Fla	North Miami Beach, L. Haas Co.	305-949-9143
Ga	East Point, P. Hayden Assocs.	404-766-0261
Ill	La Grange, E. N. Seversen & Assocs.	312-352-2055
Ind	Indianapolis, C. Scheffler Co.	317-253-6337
Mich	Brighton, Lectro Sls. Co.	313-632-7941
Minn	Minneapolis, A. J. Warner Co.	612-729-7371
Mo	Raytown, M. Taraski Sls. Co.	816-358-1442
NY	Jericho, Gim Sls. Corp.	516-433-4080
NY	Yonkers, J. Brown Electronic Sls. Reps.	914-779-7330
Ohio	Medina, J. H. Podolny Co.	216-725-8814
Tex	Houston, B. Rogers & Co.	713-626-5370
FOR:	Can., St. Laurent, Montreal, Que., PACO Electronics Ltd.	514-748-6787

PASTERNACK ENTERPRISES, 8538 Hamilton Ave., Huntington Beach, Cal., 92646, Tel: 714-536-7511; FSC No: 7F118; Empl.: 7; Minimum order: $35

Customer service: M. Pasternack

Free literature available: Data Sheet Package Describing All Products

Products manufactured: Amplifiers, Cable, Connectors, Demodulators

Local Sales Offices & Reps.

Cal	Los Angeles, RF Assocs.	213-478-1586
Cal	Palo Alto, RF Assocs.	415-327-5531
Colo	Boulder, A.L.S. Elctrns.	303-447-2436
Mass	Andover, Bee Assocs.	617-475-2124
Mich	Detroit, Comtel-Sterling Co.	313-255-1970
NM	Albuquerque, A.L.S. Elctrns.	505-294-8555
NY	Huntington Station, Gray & Reed Assocs.	516-GE3-3333
NY	Syracuse, Syracuse Tech. Reps.	315-488-0222
Ohio	Cleveland, Comtel Sterling Co.	216-442-8080
Pa	Newton Square, SWR Assocs.	215-356-8550
Tex	Dallas, Southern Engrg. Co.	214-357-0669
Va	Bailey's Crossroads, Q.T. Elctrns. Sls.	703-671-4357
EXP:	Stamford, Conn., J.P. Int'l. Corp.	203-348-2691

PAYNE ENGRG. CO., Box 70, Scott Depot, W. Va., 25560, Tel: 304-755-4353, Telex: 88-5452; Empl.: 16; Minimum order: $10

For info on price: F. M. Griffin; Application info: F. M. Griffin; Customer service: I. Endicott; Delivery info: L. McElwee

Products manufactured: Controls/Control Eqpt., Fuses, Inverters, Limiters, Power Supplies, Rectifiers, Relays, Switches

Local Sales Offices & Reps.

Cal	Santa Fe Springs, Sierra-Pacific Eng.
Conn	Ridgefield, Himes Co.
Ga	Atlanta, H. Homer & Assoc.
Ill	Chicago, Ash Equip. Co.
Mass	Worcester, F. X. Bonneau Assoc.
Mich	St. Clair Shores, T. E. Redmond
Minn	St. Paul, Power/Mation Div.
Mo	St. Louis, Tines Ind. Sls.
NJ	Kenilworth, Wolock & Lott

NY	Oriskany, Knightsbridge Ind.	
NY	White Plains, Swedelco	
Ohio	Cincinnati, J. W. Murray & Assoc.	
Ohio	Cleveland, Collart Co.	
Okla	Tulsa, Components	
Pa	Frazer, Engineered Specialty Prods.	
Pa	Pittsburgh, Process Engrg. Co.	
Tex	Houston, Cordel Corp.	
Va	Richmond, Frazier & Co.	
Wisc	Oconomowoc, Power/Mation Division	
FOR:	Can., Toronto, Sigma Instrs. Can. Ltd.	

PCA ELCTRNS., INC., 16799 Schoenborn St., Sepulveda, Cal., 91343, Tel: 213-892-0761, TWX: 910-496-1525; Empl.: 35; Minimum order: $25

For info on price: Sls. Desk; Application info: Engrg. Dept.; Customer service: Sls. Desk; Delivery info: Sls. Desk

Products manufactured: Delay Lines, Transformers

Local Sales Offices & Reps.

Ariz	Phoenix, Toward Engrg. Assocs., Inc.	602-277-1453
Cal	Mountain View, Caltron/Pyle	415-964-3244
Cal	San Diego, J.T.L. Assocs.	714-277-8044
Fla	Altamonte Springs, WMM Assocs.	305-831-4645
Fla	Clearwater, WMM Assocs.	813-447-2533
Fla	Pompano Beach, WMM Assocs.	305-943-3091
Ill	Westchester, W. G. Brouillette & Assocs., Inc.	312-345-6500
Iowa	Marion, Thomas & Modrcin Assocs., Inc.	319-377-6261
Kans	Shawnee Mission, Thomas & Modrcin Assocs., Inc.	913-432-2131
Md	Baltimore, R. P. Luce & Co., Inc.	301-752-8200
Mass	Stoneham, REPCO	617-438-3113
Minn	Hopkins, Grayden & Flemmer	612-941-1120
Mo	Hazelwood, Thomas & Modrcin Assocs., Inc.	314-838-6446
NJ	Berkeley Heights, R. P. Luce & Co., Inc.	201-464-6440
NY	Fayetteville, H. C. Johnson Agencies	315-637-9383
NY	Guilderland, H. C. Johnson Agencies	518-465-9681
NY	New Hyde Park, R. P. Luce & Co., Inc.	516-437-4550
NY	Rochester, H. C. Johnson Agencies, Inc.	716-482-3000
Ohio	Cleveland, Weschler Elec. Co.	216-251-4609
Ohio	Dayton, Weschler Elec. Corp.	513-274-6972
Pa	Glenshaw, H. C. Johnson Agencies	412-961-0414
Pa	Philadelphia, R. P. Luce & Co., Inc.	215-884-8365
Tex	Dallas, Blackburn Assocs.	214-351-9992

PCB PIEZOTRONICS, INC., 5800 Transit Rd., Depew, N.Y., 14043, Tel: 716-684-0001, TWX: 710-263-1371; Empl.: 35

Products manufactured: Accelerometers, Amplifiers, Analyzers, Cells, Load, Signal Conditioners & Equipment, Transducers

Local Sales Offices & Reps.

Cal	Long Beach, Saber Entprs.	213-595-5646
Cal	Santa Clara, Richards Assocs.	408-246-5860
Conn	Hamden, Northeast Engrg., Inc.	203-248-4481
Fla	Orlando, Physimetrics, Inc.	305-894-8081
Ga	Atlanta, Physimetrics, Inc.	404-261-8720
Ill	Northfield, Torkelson Assocs.	312-446-9085
Ind	Indianapolis, Torkelson Assocs.	317-244-7867
Md	Fulton, Gans-Fryling, Inc.	301-837-6311
Mass	Danvers, Northeast Engrg., Inc.	617-774-3010
Mich	Farmington, Carter, McCormic & Peirce, Inc.	313-477-7700
Mich	Kalamazoo, Carter, McCormic & Pierce, Inc.	
Minn	Minneapolis, Torkelson Assocs.	612-835-2414
Mo	St. Louis, Adelphi, Inc.	314-821-1232
NM	Albuquerque, Rustco Entprs.	505-296-6474
NY	Liverpool, Rayelco Elctrns., Inc.	315-652-5272
NY	Manhasset, Northeast Engrg., Inc.	516-365-9633
Ohio	Cleveland, Carter, McCormic & Peirce, Inc.	216-333-5650
Ohio	Dayton, Carter, McCormic & Peirce, Inc.	513-278-5873
Ore	Portland, Brett Assocs.	503-232-4184
Pa	Jenkintown, AMT	215-549-2080
Pa	Pittsburgh, Carter, McCormic & Peirce, Inc.	412-824-3760
Tex	Dallas, Tech. Prods., Inc.	214-357-9603
Va	Arlington, Gans-Fryling, Inc.	703-527-3262
Wash	Seattle, Brett Assocs.	206-935-8054

PCS., INC., 5467 Hill 23 Dr., Flint, Mich., 48507, Tel: 313-744-0225; TWX: 810-235-8667; Empl.: 90; Minimum order: $25

For info on price: A. D. Harmala; Application info: A. D. Harmala; Customer service: T. Wadsworth; Delivery info: A. D. Harmala

Free literature available: Micropac 80 - stand alone microcomputer development system. Has a full line of digital, analog & communications I/O. Micropac OEM - microcomputer system tailored to the OEM's application. Micropac RT - remote I/O for computers using a microcomputer at the process interface.

Products manufactured: Computers, Controllers, Programmable, Controls/Control Eqpt., Converters, Counters, Multiplexers

Local Sales Offices & Reps.

Cal	Culver City, Feeger Lucas & Wolfe	213-559-7200
Cal	Fullerton, PCS	714-992-4311
Cal	Los Altos, J. Stone & Assocs.	415-948-4563
Cal	Newport Beach, Feeger Lucas & Wolfe	
Cal	San Diego, Feeger Lucas & Wolfe	714-277-0993
Conn	Glastonbury, Lincoln Tech. Sls.	203-633-1380
Ill	Chicago, Solid State Elctrns. Ill.	312-889-8033
Kans	Shawnee Mission, Inland Assocs.	913-362-2366
Md	Bethesda, S & S Assocs.	301-654-1434
Mass	Reading, Lincoln Tech. Sls.	617-944-9594
Mich	Grand Rapids, Reps. Elctrns. Prods.	616-942-1320
Mich	Southfield, Reps. Elctrns. Prods.	313-354-9066
Minn	St. Paul, Cullen & Assocs.	612-646-7371
Mo	Glencoe, Inland Assocs.	314-938-4992
NJ	Bricktown, PCS	201-477-8080
NY	Mamaroneck, Cane Tech. Sls.	914-698-4411
Ohio	Cleveland, Instrumentation Sys.	216-486-0782
Ohio	Dayton, Instrumentation Sys.	513-294-2838
Pa	King of Prussia, S & S Assocs.	215-265-3450
Pa	Pittsburgh, Instrumentation Sys.	412-243-1111
Tex	Dallas, Evans & Mc Dowell Assocs.	214-238-7157
Tex	Houston, Evans & Mc Dowell Assocs.	713-772-1257
Wash	Bellevue, Topp Engrg. Sls. Corp.	206-747-5400
Wisc	Wauwatosa, Larsen Assocs.	414-258-0529

PEARCE-SIMPSON, INC., Div/Gladding Corp., 4701 N.W. 77th Ave., Miami, Fla., 33166, Tel: 305-592-5550; Empl.: 200

For info on price: D. Henry; Application info: D. Henry; Customer service: M. Goldblatt; Delivery info: P. Zazzali

Products manufactured: Antennas, Comm. Systems, Direction Finders, Receivers, Transceivers

PEARSON ELCTRNS. INC., 4007 Transport St., Palo Alto, Cal., 94303, Tel: 415-326-7285; FSC No: 05280; Empl.: 20; Minimum order: $236

For info on price: C.Porter; Application info: D. Everton; Customer service: C. Porter; Delivery info: C. Porter

Products manufactured: Current Sensors, Dividers, Transformers

PECO CORP., 450-9 Landress Ave., Milpitas, Cal., 95035, Tel: 408-262-4050, Telex: 346-347; Empl.: 70; Minimum order: $10

For info on price: R. Jensen; Application info: J. Bellamy; Customer service: J. Bellamy

Free literature available: Catalogs upon request.

Products manufactured: Cards, Logic, Controls/Control Eqpt., Counters, Delays, Time (Excluding Delay Lines, Timers, Delay & Relays, Time-Delays), Detectors, Modules, Logic, Encapsulated, Monitors, Racks, Relays, Switches, Transducers

Local Sales Offices & Reps.

Cal	Huntington Beach, W. Spell	714-963-6444
Cal	Milpitas, A. Khan	408-262-4050
Ga	Atlanta, J. Luttrell & Assocs.	404-237-4551
Ill	Chicago, F. M. Smith	312-763-3656
Mass	Cochituate, W. F. Humphrey Co.	617-653-7918
Mo	Creve Coeur, Williams Equipment Co.	314-997-1030
NJ	Bogota, Neville & Vespo	201-487-1505
NJ	Mine Hill, T. Regenczuk	201-366-5977
NJ	Willingboro, J. D. Miller	609-877-2031
NY	Rochester, H. M. Cross & Sons	716-442-6200
Ohio	Toledo, P. Hensing	419-478-4506
Tex	Dallas, Production Engrg. Sls. Org.	214-369-3181

PEERLESS RADIO CORP., 19 Wilbur St., Lynbrook, N.Y., 11563, Tel: 516-593-2121, TWX: 510-225-8422; Empl.: 40; Minimum order: $10

For info on price: Sls. Dept.; Application info: Sls. Dept.; Customer service: T. Corozzo; Delivery info: P. Hartill

Free literature available: Literature is available for all custom switch products Toggle, Pushbutton, Indicators, Manual Control, Reed, Magnetic etc.

Products manufactured: Services, Assembly, Production & Test

Local Sales Offices & Reps.

Fla	Oakland Park	305-566-5966

PENN AIRBORNE PRODS., Industrial Hwy., Southampton, Pa., 18966, Tel: 215-355-3400; FSC No: 25805; Empl.: 33; Minimum order: $25

Customer service: F. Pipito

Free literature available: Bulletin 201 Potentiometers-Portable; Bulletin 301 Bridges-Portable.

Products manufactured: Bridges, Indicators, Meters, Modules, Logic, Encapsulated, Potentiometers, Resistors, Standards, Testers

Local Sales Offices & Reps.

Cal	Palo Alto, Mauldin Co.	415-326-5291
Haw	Honolulu, Atecs Corp.	808-841-6694
Iowa	Des Moines, H.E. Ferris	515-255-1757
Mich	Royal Oak, Stillings Instr. Sys.	313-549-6030
Neb	Omaha, Interstate Ind'l. Inst.	402-331-3535
Ohio	Dublin, Analytco	614-889-1224
Ohio	W. Carrollton, Analytco	513-434-8940
Pa	Downingtown, Reinbrecht	215-265-6180
Pa	Pittsburgh, W. Wells	412-833-1632
Tex	Houston, Wilson-Mohr Inc.	713-781-2768
Va	Richmond, Instrument Technical Representatives	703-288-7198

PENN ENGRG. & MFG. CORP., Doylestown, Pa., 18901, Tel: 215-766-8853, TWX: 510-665-9338; FSC No: 46384; Empl.: 130; Minimum order: $10

For info on price: Sls. Dept.; Application info: J. Guba; Customer service: J. Guba; Delivery info: Sls. Dept.

Products manufactured: Fasteners, Machines/Machinery, Production, Terminals

PENN FIBRE & SPECIALTY, 2020 E. Westmoreland St., Phila., Pa., 19134, Tel: 215-RE 9-4862; Empl.: 40; Minimum order: $15

For info on price: W. H. Frey; Application info: W. K. Davis; Customer service: R. Wagner; Delivery info: E. Timms

Free literature available: Comparative Sample Chart of plastics and non-metallics showing typical properties and costs of materials most commonly used for electrical insulation in fabricated parts.

Products manufactured: Bushings, Glass, Plastic, Metal, Rubber, Etc., Fasteners, Gaskets, Shielding, R-F-Also See Shields, R-F, Insulators & Insulation, Laminates, Tubing, Wire Markers

Local Sales Offices & Reps.

Ill	Chicago, B. Finder & Assocs. Inc.	312-262-2020

PENN KEYSTONE CORP., Division St., Ansonia, Conn., 06401, Tel: 203-734-3301, Telex: 96-3554; FSC No: 03034; Empl.: 65; Minimum order: $25

For info on price: E. M. Parker; Application info: John Babina; Customer service: John Babina; Delivery info: E. M. Parker

Free literature available: Peaklite Indicator Lights - Series 7500 etal. An illustrated bulletin with fly sheets, describing a unique family of products for front-of-panel and rear-of-panel lighting. Message display is emphasized.

Products manufactured: Annunciators, Caps, Lenses, Indicator Light, Display Devices/Displays, Indicators, Lamps, Lights

Local Sales Offices & Reps.

Cal	Huntington Beach, ASC Sls. Co.	714-847-7515
Ind	Fort Wayne, Ryan Sls. Co., Inc.	219-483-9567
NJ	Pitman, Colrud Co.	609-589-5866
NY	Rochester, L. Hart Assoc., Inc.	716-244-3253
Ohio	Cincinnati, Tri-State Mktg., Inc.	513-761-7993
Tex	Arlington, Ion Associates, Inc.	817-461-9661

PENNTUBE PLASTICS, Madison Ave. & Holly St., Clifton Heights, Pa., 19018, Tel: 215-622-2300; Empl.: 145

Products manufactured: Tubing

Local Sales Offices & Reps.

Cal	Burlingame, Quintec Inds.	415-692-2010
Cal	El Segundo, Quintec Inds.	231-640-1400
Cal	San Diego, Quintec Inds.	714-276-6604
Colo	Denver, Industrial Elctrns., Inc.	303-771-2636

Conn	Woodbury, Hart, Nininger & Campbell Assocs.	203-263-4321
Fla	Largo, Almac Assocs.	813-581-0444
Ga	Atlanta, D. Wix	404-361-2550
Ill	Arlington Hgts., A. H. Walkie	312-394-8313
Ind	Indianapolis, Hoster & Sieloff Assocs.	317-844-9921
Kans	Overland Park, Ensco-Rep, Inc.	913-381-7557
Mich	Birmingham, Carmco, Inc.	313-642-2068
Minn	Minneapolis, D. A. Schultz Co.	612-FE9-7701
Mo	St. Louis, Ensco-Rep, Inc.	314-567-3935
NY	Mineola, R. A. Colucci Co.	516-746-0397
NY	Rochester, Potter Assocs.	716-288-3750
NC	Sanford, G. Simpson	919-776-3701
Ohio	North Olmsted, G. Blaney	216-777-4322
Pa	Aston, J. F. Walls	215-459-8377
Tex	Richardson, C. J. Garvey Co.	214-234-3371
Wash	Kirkland, Lehr Assocs.	206-827-4581
FOR:	Can., Montreal, Que., A. Gilchrist, Ltd.	514-735-3603
FOR:	Can., Rexdale, Ont., A. Gilchrist Ltd.	416-749-8755

PENTRONIX, 1735 Cicotte, Lincoln Park, Mich., 48146, Tel: 313-388-3100, Telex: 23-0398; Empl.: 12; Minimum order: $25

For info on price: A. Bazner; Application info: J. Schultz; Customer service: F. Wheeler; Delivery info: A. Bazner

Free literature available: Multipak Powder Compacting Press Brochure featuring three mode presses and anvil type presses.

Products manufactured: Machines/Machinery, Production

PERFECT GEAR & INSTR. DIV., Div. Designatronics, 18141 Napa, Northridge, Calif., 91324, Tel: 213-885-1781, TWX: 910-493-1241

Customer service: A. Cazier

Products manufactured: Brakes, Clutches, Couplings, Dials, Drives & Drive Mechanisms (Dial), Encoders, Gears & Gear Mechanisms (Precision), Limit Stops, Mechanical, Servo Systems

PERFECTION MICA CO., Magnetic Shield Div., 740 Thomas Dr., Bensenville, Ill., 60106, Tel: 312-766-7800, TWX: 910-256-4815; Empl.: 43 ....p. 2•1255-1257,2055

Products manufactured: Cable, Chamber, Environmental Test, Containers, Indicators, Insulators & Insulation, Kits, Shielding, Photomultiplier Tube Housings, Shields, Wire, Wire Shielding

Local Sales Offices & Reps.

Ala	Huntsville, Murcota Corp.	205-539-8476
Cal	San Carlos, Kottmeier Assoc.	415-592-8333
Cal	Woodland Hills, Cal-Ward Sls. Co.	213-833-2202
Colo	Denver, E. Johnson	303-985-4810
Conn	Wethersfield, Com/Pak	203-563-4784
Fla	Clearwater, L. Gentry Assoc.	813-443-2697
Ill	Hinsdale, Momak Sls.	312-654-4524
Kans	Shawnee Mission, Midwestern Sls. Co.	913-648-6414
Md	Bethesda, Mount & Co.	301-530-0012
Mass	Needham Heights, Com/Pak	617-444-1259
Minn	Minneapolis, E. Melius & Assoc.	612-854-4270
Mo	St. Louis, Midwestern Sls. Co.	314-961-6880
NJ	Moorestown, Electrical Comps., Inc.	609-235-3012
NJ	Mountain Lakes, Comps. for Elctrns.	201-334-2921
NM	Albuquerque, IMEC	505-883-9010
NY	Buffalo, Telesco Assoc.	716-834-1026
NY	Rochester, Telesco Assoc.	716-271-3780
NY	Utica, Telesco Assoc.	
NC	Winston-Salem, Murcota Corp.	919-723-1001
Ohio	Dayton, F. Ohmer Assoc.	513-434-1454
Tex	Richardson, Air Quip Sls. Co.	214-234-3285
Utah	Salt Lake City, P. Bowthorpe Agency	801-521-9677
Wash	Seattle, J.B. Jolly	206-938-4166

PERKIN-ELMER CORP., Elctrn. Prods. Dept., Main Ave., Norwalk, Conn., 06856, Tel: 203-762-4786, TWX: 710-468-3213; Empl.: 40

For info on price: J. Sonntag 203-762-6574; Application info: W. Woschetzky 203-762-6574; Delivery info: J. Sonntag 203-762-6574

Free literature available: Short form catalog of Vernistat (A. C. Potentiometer) Function Generator, Transformer and Digital Converter Product Lines

Products manufactured: Converters, Generators, Potentiometers, Transformers

Local Sales Offices & Reps.

Ariz	Scottsdale, Mercury Engrg. Co.	602-945-1927
Cal	San Diego, Qualtronics Corp.	714-224-6555
Colo	Denver, Electrodyne Inc.	303-757-7679
Fla	Ft. Lauderdale, Snow Co.	305-563-2448
Ind	Greenwood, Valentine-Schillinger & Assoc.	317-888-2260
Ind	South Bend, Valentine-Schillinger & Assoc.	219-291-6258
Kans	Overland Park, ENSCO-Rep. Inc.	913-381-7557
Md	Temple Hills, Wyncote Instrumentation Co.	301-423-8523
Mich	Grand Rapids, Thies & Assocs.	616-457-2052
Minn	Eden Prairie, F. Peterson Co.	612-941-5400
Mo	St. Louis, ENSCO-Rep Inc	314-567-3935
NY	Syracuse, C.W. Floring & Assoc.	315-478-2149
Pa	Ambler, Wyncote Instrumentation Co.	215-643-2440
Tex	Dallas, Southern Engrg. Co.	214-357-0669
Wash	Bellevue, Conrard-Carlson Engrg. Co.	206-455-1336

PERKIN-ELMER CORP., Instr. Div., Main Ave., Norwalk, Conn., 06856, Tel: 203-762-1000, TWX: 710-468-3213; Empl.: 7300

Products manufactured: Amplifiers, Converters, Generators, Lenses, Optical & Camera, Potentiometers, Transformers

PERKIN-ELMER ULTEK INC., Box 10920, Palo Alto, Cal., 94303, Tel: 415-967-2100, TWX: 910-379-6442; Empl.: 180

Customer service: J. A. Leever Ext. 282

Free literature available: High vacuum equipment and Randex sputtering deposition equipment

Products manufactured: Chamber, Environmental Test, Deposition Equipment, Vacuum & Accessories, Detectors, Evaporation Equipment, Electron Beam, Feedthrus & Seals, Environmental, Furnaces, Gages, Ovens, Pumps, Vacuum, Services, Assembly, Production & Test, Valves, Vacuum

Local Sales Offices & Reps.

Cal	Huntington Beach, Perkin-Elmer Ultek	714-968-1030
Cal	San Jose, Perkin-Elmer Ultek	408-292-7044
Ill	Wilmette, Perkin-Elmer Ultek	312-256-2688
Md	Gaithersburg, Perkin-Elmer Ultek	301-926-3200
Mass	Stoneham, H. W. Gath Assoc.	617-438-5428
NJ	Mountainside, Perkin-Elmer Ultek	201-232-1750
Ohio	N. Olmsted, Perkin-Elmer Ultek	216-331-4798
Tex	Richardson, Yardrough Southwest	214-690-0800

PERMA POWER DIV., Chamberlain Mfg. Corp., 845 Larch Ave, Elmhurst, Ill., 60126, Tel: 312-279-3600; Empl.: 1500

For info on price: N. Ackerman; Customer service: E. Michna; Delivery info: M. Shatz

Free literature available: Radio Control Catalog, describes available systems; Ampli-Vox Sound Systems Catalog, public address systems; Ladder Catalog, aluminum ladders; Perma Power Complete Line catalog, product groups.

Products manufactured: Amplifiers, Controls/Control Eqpt., Public Address Systems, Regulators, Speaker Systems, Speakers, Transformers

Local Sales Offices & Reps.

Ark	El Dorado, D. Bellew Sls.
Cal	San Francisco, Technical Sls. Assocs.
Cal	Van Nuys, Oberman-Renner Sls. Co.
Colo	Aurora, A. E. S.
Conn	West Hartford, R. Smith Co.
Ill	Lincolnwood, W. Linz & Assoc.
Ind	Ft. Wayne, N. Hoemig Sls. Co.
Mich	Plymouth, J. Malcolm Flora
Minn	St. Paul, W. Engelbretson Co.
Mo	Jefferson City, C. A. Vignola Assoc.
NJ	Cherry Hill, Trinkle Sls.
NY	Manhassat, Landau & Mack
NY	Phelps, L. S. M. Assocs.
NC	Greensboro, Adams & Assocs.
Ohio	Columbus, J. W. Lehner Co.
Tex	Dallas, Berthold Sls. Co.
Wash	Seattle, Fleehart & Sullivan

PERMAG CORP., 88-06 Van Wyck Expwy., Jamaica, N.Y., 11418, Tel: 212-657-1818; Empl.: 50

Customer service: C. Hemming

Free literature available: Literature on Magnetic Assemblies, Ferramics, ALNICO and Ceramics, Berlox and Heat Sinks.

Products manufactured: Cores, Ceramic, Cores, Magnetic, Demagnetizers, Ferrite Material & Parts, Magnetizers, Magnets

Local Sales Offices & Reps.

Cal	Los Angeles, Permag Pacific Corp.	213-776-5656
Cal	Menlo Park, Permag Sierra Corp.	415-369-0303
Ga	Atlanta, Permag Dixie Corp.	404-351-0994
Ill	Elk Grove Village, Permag Central Corp.	312-956-1140
Mass	Billerica, Permag Northeast Corp.	617-273-2890
Ohio	Toledo, Permag Magnetics Corp.	419-385-4621
Tex	Dallas, Permag Southwest Corp.	214-748-6909

PERMALUSTER, INC., 1844 N. Keystone St., Burbank, Calif., 91504, Tel: 213-849-4543; Empl.: 9

For info on price: H. D. Walker; Application info: H. D. Walker; Customer service: J. Ross

Free literature available: Technical catalog describing Permaluster process, properties of thin film insulation, thermal and mechanical properties, working techniques and applications.

Products manufactured: Coatings, Coils Including Assemblies & Forms, Films, Shields, Wire

PERMANENT MAGNET CO., 4437 Bragdon St., Indianapolis, Ind., 46226, Tel: 317-547-1336; Empl.: 150; Minimum order: $35

Customer service: J. M. Amigh

Products manufactured: Magnets

Local Sales Offices & Reps.

Cal	Pasadena, T.W. Yeakle	213-684-2275
Ill	Hillside, L.M. Holt, Permanent Magnet Co.	312-449-7660
Ind	Indianapolis, Hoster & Sieloff Assocs.	317-884-9921
Mass	Wakefield, Denning Assocs.	617-334-4099
Minn	Minneapolis, Peterson Entprs.	612-784-6628
NY	Manhasset, Kaelber & Mack, Inc.	516-627-6620

PERRY AMPLIFIER, 138 Fuller St., Brookline, Mass., 02146, Tel: 617-734-0844; Empl.: 18

For info on price: H. Rodman; Application info: G. Perry; Customer service: H. Rodman; Delivery info: P. Turcotte

Free literature available: Amplifier Catalog

Products manufactured: Amplifiers, Power Supplies

Advertisment

Ultra low noise (IDB typical) transistor amplifiers for use with infrared detectors and electrical transducers; voltage mode, current mode and automatic bias control. Standard models are available to match all infrared detectors and transducers produced in the U.S. and Europe. Multi-Element amplifier arrays are available in all operating modes with hybrid modules containing up to 100 signal channels.

Standard secondary function amplifiers such as; logarythmic, AGC, video, RF, etc., are also available from stock.

PERTEC, Peripheral Equip. Div., 9600 Irondale Ave., Chatsworth, Cal., 91311, Tel: 213-882-0030, TWX: 910-494-2093; Empl.: 523

For info on price: R. Gabai Ext. 485; Application info: R. Gabai Ext. 485; Customer service: J. Zedalis Ext. 561; Delivery info: L. Hemmerich Ext. 564

Free literature available: Data Sheets and Brochures Describing Technical Specifications, Applications, and Interface Requirements for Tape Transports, Disk Drives for Minicomputer Peripherals.

Products manufactured: Memory Systems, Terminal Equipment, Digital, Terminals, Data Display (including Alphanumeric & Graphic)

Local Sales Offices & Reps.

Ala	Birmingham, T.A. Instrs.	205-881-8494
Ariz	Scottsdale, BFA Corp.	602-946-4215
Cal	Encino, Pertec PED	213-996-1333
Cal	Los Altos, Pertec PED	415-964-9966
Cal	Santa Ana, Pertec PED	714-542-2348
Colo	Denver, BFA Corp.	303-744-3301
Conn	Stamford, Pertec PED	203-327-2260
Fla	Orlando, T.A. Instrs.	305-894-7531
Ill	Rosemont, Pertec PED	312-696-2460

Kans	Shawnee Mission, EIR Co.	913-362-0919
Mass	Waltham, Pertec PED	617-890-6230
Minn	Minnetonka, Pertec PED	612-933-1030
Mo	Hazelwood, EIR Co.	314-895-4100
NM	Albuquerque, BFA Corp.	505-296-8303
NM	Las Cruces, BFA of Arizona	505-523-0601
Ohio	Vandalia, Pertec PED	513-898-3150
Pa	Malvern, Pertec PED	915-644-4910
SC	Spartanburg, T.A. Instrs.	803-579-2904
Tex	Dallas, Pertec PED	214-692-0052
Tex	Dallas, Remtek	214-369-8146
Tex	Houston, Remtek	713-664-2113
Utah	Salt Lake City, BFA Corp.	801-466-6522
Wash	Seattle, Rush Drake Assocs.	206-763-2755

PERTEC CORP., 101 Continental Blvd., Ste. 435, El Segundo, Cal., 90245, Tel: 213-640-1540, TWX: 910-494-2093; Empl.: 1000

For info on price: W. T. Chambers 882-0030; Application info: J. Lembas 882-0030; Customer service: J. Zedalis 882-0030; Delivery info: T. Boren 882-0030

Free literature available: Sales Brochures/Data Sheets on the Following: (1) Tape Drives T5000 Series; T6000 Series; T7000 Series; T8000A Series; T9000 Series, (2) Memory Drives D3000 Series Disk, (3) FD400 Flexible Disk, (4) 7100 CRT Terminal.

Products manufactured: Drives & Drive Mechanisms (Dial), Terminals, Data Display (including Alphanumeric & Graphic), Transports, Tape (all kinds)

Local Sales Offices & Reps.

Ariz	Scottsdale, BFA Corp.	602-946-4215
Cal	Encino, Pertec	213-996-1333
Cal	Los Altos, Pertec	415-964-9966
Cal	Santa Ana, Pertec	714-542-2348
Colo	Denver, BFA Corp.	303-744-3301
Conn	Stamford, Pertec	203-327-2260
Fla	Orlando, T. A. Instrs.	305-894-7531
Ill	Rosemont, Pertec	312-696-2460
Kans	Mission, E.I.R. Co.	
Kans	Shawnee, E.I.R. Co.	913-362-0919
Mass	Waltham, Pertec	617-890-6230
Minn	Minnetonka, Pertec	612-933-1030
Mo	Hazelwood, E.I.R. Co.	314-895-4100
NM	Albuquerque, BFA Corp.	505-296-8303
Ohio	Vandalia, Pertec	513-898-3150
Pa	Malvern, Pertec	215-644-4910
SC	Spartanburg, T. A. Instrs.	803-579-2904
Tex	Dallas, Pertec	214-387-2817
Tex	Dallas, Remtex	214-387-2817
Tex	Houston, Remtek	713-664-2113
Utah	Salt Lake City, BFA Corp.	801-466-6522
Wash	Seattle, Rush Drake Assoc.	206-763-2755

PESCHEL INSTRS., INC., 1412 Viscaya Pkwy., Cape Coral, Fla., 33904, Tel: 813-542-3164; FSC No: 92656; Empl.: 13; Minimum order: $15

For info on price: M. S. Mailly; Application info: F. Peschel; Customer service: W. J. Strobel; Delivery info: M. S. Mailly

Free literature available: Peschel Instruments' 25 page catalog of high voltage power supplies and test equipment, provides full specifications and prices on their line of standard units.

Products manufactured: Cable Fault Locators, Chokes, Converters, Current Sources, Detectors, Power Supplies, Probes, Reactors, Testers, Transformers

Local Sales Offices & Reps.

Fla	Orlando, Boynton & Assocs.	305-423-0555
Mass	Boston, Sandman Elec. Co.	617-442-7600
NC	Charlotte, R.W. Chapman & Co.	704-525-2421
SC	West Columbia, R.W. Chapman & Co.	803-796-9796
Tenn	Concord, R.W. Chapman & Co.	615-966-6120

Advertisment

We manufacture a broad line of high voltage test equipment, power supplies and magnetic components as a standard line and built to order. Our 28 yrs. in business covers broad experience in DC-DC to 500 watts and 100KV; Regulated power supplies to 100KV at 0.01%; transformers and AC test sets to 300KV RMS & DC units to 400KV. Specials built to order.

PFC MANUFACTURING DIV., Community Dr., Great Neck, N.Y., 11022, Tel: 516-487-0500, TWX: 510-223-0888

PHAOSTRON INSTRUMENT, 151 Pasadena Ave., So. Pasadena, Cal., 91030, Tel: 213-255-1471, TWX: 910-321-4134; FSC No: 77221; Empl.: 250; Minimum order: $50

For info on price: B. Alexander; Application info: B. Alexander; Customer service: B. Alexander; Delivery info: b. Cox

Free literature available: Panel Meters (Anaolog) and Avionic Mechanisms.

Products manufactured: Meters

Local Sales Offices & Reps.

Ariz	Phoenix, Southwest Engrg.	602-993-0250
Cal	Redwood City, Parks & Pruitt	415-364-1640
Cal	So. Pasadena, Phaostron	213-255-1471
Colo	Denver, Omega Ltd.	303-758-1508
Conn	Thomaston, N. Bennett Assoc.	203-283-5959
Ill	Hinsdale, Hill-Gray Assocs.	312-325-4810
Iowa	Cedar Rapids, J. R. Sales Co.	319-377-8211
Kans	Overland Park, Penzner Mankus Assoc.	913-381-0004
Mass	Auburn, N. Bennett Assoc.	617-757-3131
Mich	Detroit, Burcaw Co.	313-533-7700
Minn	Minneapolis, L. F. Green Assoc.	612-781-1611
Mo	Hazelwood, Penzner Mankus Assoc.	314-731-4334
NJ	Haddonfield, Thomas Assocs.	609-854-3011
NY	Great Neck, Trionic Assocs.	516-466-2300
NY	Syracuse, Lenard Co.	315-479-9191
Ohio	Cleveland, H. Baier Corp.	216-461-6161
RI	Thomaston, N. Bennett Assoc.	203-283-5959
Tex	Dallas, McCoy Assocs.	214-350-9931
Tex	Houston, E. Smith Sls. Co.	713-649-5756
Utah	Salt Lake City, Omega Ltd.	801-266-9617

PHILADELPHIA QUARTZ CO., Box 840, Valley Forge, Pa., 19482, Tel: 215-687-8400, TWX: 510-668-3432; Empl.: 600

Customer service: R. Attig

Free literature available: (PQ Bulletin #18-25) Describes the functions of and techniques for using QUSO microfine silica suspensions for polishing silicon wafers.

Products manufactured: Adhesives (All Types), Cleaners & Solvents, Metal Oxides, Semiconductor Wafer Fabrication

PHILAMON, INC., 33 Dubon Ct., Farmingdale, N.Y., 11735, Tel: 516-249-2700, TWX: 510-224-6512; Empl.: 27

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Products manufactured: Choppers, Filters, Light Choppers, Oscillators, Tuning Forks

PHILIPS ELMET CORP., 1560 Lisbon Rd., Lewiston, Me., 04240, Tel: 207-784-3591; Empl.: 200; Minimum order: $100

Customer service: R. J. Boutin

Products manufactured: Contacts, Electrical, Metal Compounds, Foils, Powders, Sheet, Stock, Metals, Wire

Local Sales Offices & Reps.

NJ	Ramsey, R. A. Vachon	201-825-4070

PHILIPS TEST & MEASURING INSTRS., INC., 400 Crossways Pk. Dr., Woodbury, N.Y., 11797, Tel: 516-921-8880, TWX: 510-221-2120; Empl.: 25; Minimum order: $10

For info on price: E. Chwalisz; Application info: S. Rauch; Customer service: E. Chwalisz; Delivery info: E. Chwalisz

Products manufactured: Analyzers, Cameras, Counters, Generators, Kits, Training Aid, Meters, Oscilloscopes, Printers, Probes, Receivers, Recorders, Scanners

Local Sales Offices & Reps.

Ala	Huntsville, Lee Assocs.	205-533-5896
Ariz	Phoenix, Cleveland Ent.	602-996-6130
Cal	N. Hollywood, Philips Test & Measuring Inst.	213-762-2997
Cal	Santa Clara, Philips Test & Measuring Instrs.	408-243-7363
Colo	Arvada, Cleveland Entprs., Inc.	303-423-3707
Conn	Hartford, Victor Assocs.	203-246-5643
Del	Delaware, Wright Co.	301-948-5151
DC	Washington, D.C., Wright Co.	301-948-5151
Fla	Ft. Lauderdale, Lee Assocs.	305-525-9796
Fla	Winterhaven, Lee Assocs.	813-294-5815
Haw	Honolulu, J.B. Jolly, Inc.	206-938-4166
Ill	Northfield, Torkelson Assocs.	312-446-9085
Ind	Indianapolis, Torkelson Assocs.	317-244-7867
Iowa	Cedar Rapids, Palatine Sls.	319-365-8071
Kans	Andover, Palatine Sls.	316-683-7512
Kans	Overland Park, Palatine Sls.	913-262-5643
Md	Gathersburg, Wright Co.	301-948-5151
Mass	Framingham, Victor Assocs.	617-879-5710
Mich	Centerline, Dietrich & Assocs.	313-754-6450
Minn	Minneapolis, Torkelson Assocs.	612-835-2414
Mo	St. Louis, Palatine Sls.	314-426-7055
NJ	Willingboro, Philips Test & Measuring Instr.	609-877-2293
NM	Albuquerque, Cleveland Entprs., Inc.	505-345-2481
NY	Syracuse, Tesco Mktg. Assocs.	315-463-4566
NY	Woodbury, Philips Test & Measuring, Inst.	516-921-8880
NC	Raleigh, Lee Associates, Inc.	919-787-5818
Ohio	Cleveland, Dietrich & Assocs.	216-781-1855
Ohio	Dayton, Dietrich & Assocs.	513-223-6042
Okla	Tulsa, Palatine Sls., Inc.	918-622-0321
Pa	Philadelphia, Philips Test & Measuring Inst.	215-677-5770
Pa	Pittsburgh, Dietrich & Assocs.	412-892-2992
Tex	Austin, Palatine Sls., Inc.	512-451-7463
Tex	Houston, Palatine Sls., Inc.	713-777-4477
Tex	Richardson, Palatine Sls., Inc.	214-231-9489
Va	Virginia, Wright Co.	301-948-5151
Wash	Richland, Jon B. Jolly	509-783-6523
Wash	Seattle, J.B. Jolly, Inc.	206-938-4166

PHILLIPS MFG. CO., National Ultrasonic Div., 7334 N. Clark St., Chicago, Ill., 60626, Tel: 312-338-6200, Telex: 25-4507; Empl.: 75

Products manufactured: Cabinets & Accessories, Chamber, Environmental Test, Cleaners & Solvents, Cleaners, Ultrasonic, Generators, Machines/Machinery, Production, Racks, Transducers

Local Sales Offices & Reps.

Ariz	Phoenix, Arizona Abrasive & Supply Co.	602-244-9357
Cal	Pico Rivera, Acto-Kleen Co.	213-723-8505
Cal	San Mateo, Batina Machinery Co.	415-342-9554
Colo	Englewood, Todd Assocs.	303-761-7801
Conn	Ansonia, Foy Electro Chemical Co.	203-735-3331
Fla	Clearwater, Datco Inc.	813-531-4255
Haw	EWA Beach, Panther Chemical Co.	
Ill	Chicago, A. Wudi	312-338-6200
Ill	Chicago, W. Blomberg	312-338-6200
Ill	Rockford, R.R. Floody Co.	815-399-1931
La	New Orleans, Hester Engrg. Co.	504-866-2998
Md	Baltimore, W.L. Lawrence	301-235-4161
Mich	Detroit, J. Matteson	313-341-4030
Mich	Kalamazoo, L. Riege	616-342-6437
Minn	Minneapolis, Minnesota Ind'l. Tool Co.	612-333-8281
Mo	Kansas City, Ellfeldt Machinery Co.	816-842-5494
NJ	Teaneck, J. Dempsey	212-685-9137
NM	Albuquerque, R. Berg & Sons	505-299-8173
NY	Great Neck, W & A Holland, Inc.	516-487-8877
NY	New York, R. Balton	212-685-9137
NY	Skaneateles, R.M. Krause	315-685-5196
NY	Stow, K. Merrill	716-789-2645
NC	Charlotte, J. & P. Assocs.	704-525-5331
Ohio	Cincinnati, B. Bruns & Assoc.	513-931-4425
Ohio	Toledo, R. Deckelman	419-243-7161
Pa	Lancaster, Lightner Ind'l. Finishings	717-393-5541
Pa	Pittsburgh, L. Nourie, Inc.	412-561-1628
RI	North Scituate, R. Poyton	401-521-3522
Tex	Arlington, JMC Sls. Co.	817-261-1621
Wash	Seattle, Process Systems, Inc.	206-246-0224
WVa	Charleston, Preiser Scientific	304-343-5515
Wisc	Milwaukee, Industrial Abrasives Co.	414-383-5700

PHILMORE MFG. CO. INC., 40 Inip Dr., Inwood, N.Y., 11696, Tel: 516-239-6161; Empl.: 25; Minimum order: $25

For info on price: M. Greenker; Application info: E.M. Rothenstein; Customer service: M. Greenker; Delivery info: I. Koff

Free literature available: Philmore Master Catalog #745 Philmore Industrial Catalog #M16 Philmore Consumer Mini-Catalog #100

Products manufactured: Amplifiers, Cable, Capacitors, Fixed, Capacitors, Variable, Clamps & Clips, Connectors, Cords, Grilles, Jacks (All Types), Knobs, Leads, Test & Adaptors, Lights, Meters, Microphone Accessories (Including Stands, Holders, Booms), Microphones, All Kinds, Mixers, Networks, Pickups, Telephone (For Recording), Plug Adapters, Plug & Jack Sets, Posts, Potentiometers, Power Supplies, Sockets, Soldering Guns, Irons & Desoldering Tools, Speakers, Switches, Testers, Tools, Transformers

PHIPPS & BIRD, P.O. Box 2V, Richmond, Va., 23205

PHOENIX DATA INC., 3384 W. Osborn Rd., Phoenix, Ariz., 85017, Tel: 602-278-8528, TWX: 910-951-1364; Empl.: 57 .... p. 1•190-193

Customer service: R. D. Brunnemer

Products manufactured: Amplifiers, Comm. Systems, Commutators, Converters, Data Acquisition & Reduction Systems, Data Loggers, Meters, Multiplexers

Local Sales Offices & Reps.

Ariz	Tempe, J. Cain Assocs.	602-838-3404
Cal	Burbank, EM Southwest	213-846-9373
Cal	San Diego, Dorado Sls.	714-487-1974
Cal	Sunnyvale, RDP Instrs., Inc.	408-735-9040
Fla	Orlando, Datarep	305-843-5224
Haw	Honolulu, Aloha Assocs.	808-941-1574
Ill	Chicago, Electronic Instrs. Assocs.	312-271-3774
Ind	Indianapolis, Electronic Instrs. Assocs.	317-257-7231
Kans	Shawnee Mission, Inland Assocs.	913-362-2366
Md	Ellicott City, Whitco	301-366-1216
Mass	Norwood, Forster Assocs.	617-543-5041
Mo	Glencoe, Inland Assocs.	314-938-4992
NJ	Fort Lee, Tecnimat	201-461-8686
NJ	Pennsauken, Megargel/Himmelstein	215-629-1072
NY	Schenectady, Alexander Assocs.	518-377-0581
Tex	Richardson, Barry Sls.	214-234-0255
Wash	Bellevue, Topp Engrg. Sls. Corp.	206-747-5401

PHOENIX TRANSFORMER CO., 1818 E. Madison, Phoenix, Ariz., 85034, Tel: 602-254-9747, TWX: 910-951-0631; Empl.: 50

Products manufactured: Chokes, Coils Including Assemblies & Forms, Filters, Regulators, Transformers

Advertisment

A complete facility for engineering and production of military and industrial transformers designed for your exact application. Stock and facility for volume production. We specialize in constant voltage units. Call or write for prompt quotations.

PHOENIX WIRE, INC., 100 Teflon Ave., S. Hero, Vt., 05486, Tel: 802-372-4561; Empl.: 25

Customer service: A. Legge

Free literature available: Folder describing specail subminiature & microminiature hook-up wires & cables especially valuable in miniaturization applications.

Products manufactured: Cable, Services, Assembly, Production & Test, Tubing, Wire

Advertisment

Micro-Miniature High-Reliability Wires. Phoenix Wire specializes in the custom application of Teflon to fine wires. Guages 14 to 60 of any composition can be insulated with less than .000025 to over .006 inches of Teflon. Custom cut & strip service for all types of insulated wires also available. Call us for all types of Teflon Hook-up Wires-Teflon Tubing, and Teflon Magnet Wire.

PHONE-AID CO., Sub. of Wells-Gardner Elctrns., 2701 N. Kildare, Chicago, Ill., 60639, Tel: 312-252-4610; Empl.: 25; Minimum order: $100

For info on price: J. Remec; Application info: Dr. Matthew; Customer service: J. Remec; Delivery info: Dr. Matthew

Products manufactured: Cable, Comm. Systems

PHOTO CHEMICAL PRODS. CAL., 1715 Berkeley, Santa Monica, Cal., 90404, Tel: 213-828-9561; Empl.: 60

For info on price: J. T. Cain; Application info: J. T. Cain; Customer service: R. Taylor; Delivery info: S. Jocsing

Products manufactured: Cabinets & Accessories, Caps, Lenses, Indicator Light, Coatings, Delcalcomania, Dials, Display Devices/Displays, Escutcheons, Kits, Marking (Dial, Instrument, Equipment, etc.), Labels, Pressure-Sensitive, Adhesive, Laminates, Lenses, Readout & Display, Lights, Nameplates, Scales, Dial, Services, Assembly, Production & Test

Local Sales Offices & Reps.

Ariz	Tempe, N. A. Page	602-838-1128
Cal	Burlingame, W. J. Purdy Co.	415-347-7701
Colo	Denver, W. J. Purdy Co.	303-777-1411
Ill	La Grange, Bierhaus Sls.	312-345-5100
Md	Bethesda, W. Mount Co.	301-657-9312
Mass	Needham, W. Mahoney	617-444-3372
Mich	Lathrup Village, R. C. Nordstrom & Co.	313-333-4417
Minn	Minnetonka, T. H. Ayre Assocs.	612-474-4125
Mo	Kansas City, L. F. Florence Co.	816-561-7222
NJ	Nutley, Falk-Baker Assocs.	201-661-2430
NM	Albuquerque, W. J. Purdy Co.	505-266-7959
NY	N. Syracuse, H. R. Murray	315-446-5555
Ohio	Dayton, Dynel Co.	513-789-8150
Pa	Haverton, Liberi Sls.	215-789-8150
Tex	Dallas, W. Reese Assocs.	214-638-6575
Wisc	Milwaukee, Bierhaus Sls.	414-332-0900

PHOTO RESEARCH CORP., Division Kollmorgen Corp., 3000 N. Hollywood Way, Burbank, Cal., 91505, Tel: 213-849-6017; Empl.: 40; Minimum order: $10

Customer service: F. Grover

Free literature available: A wide variety of product bulletins describing complete photometer/radiometer light measuring instrumentation line. Also technical reprints on many of the products.

Products manufactured: Light Sources, Photoelectric, Meters, Radiometers, Test Equipment

Local Sales Offices & Reps.

Ala	Huntsville, Beacon Elctrns	205-881-5031
Cal	N. Hollywood, O'Halloran Assoc.	213-877-0173
Cal	Palo Alto, O'Halloran Assoc.	415-326-1493
Cal	San Diego, O'Halloran Assoc.	714-224-2824
Fla	Ft. Lauderdale, Beacon Elctrns	305-776-6074
Fla	Maitland, Beacon Elctrns	305-647-3498
Ga	Atlanta, Beacon Elctrns	404-351-3654
Haw	Honolulu, Pacific Instrumentation	808-373-1287
Ill	Hoffman Estate, Mist Engrg	312-885-3432
Md	Silver Spring, Spectroscopy Sys.	301-949-8261
Mass	Billierica, Drew Assocs.	617-667-6643
Mo	St. Louis, G. Fixman Engrg. Co.	314-725-5219
NJ	East Orange, Friedman Assocs.	201-673-2500
NM	Albuquerque, Southwestern Engrg. & Equip.	505-265-6775
NC	Greensboro, Beacon Elctrns	
Ohio	Rising Sun, Mecom, Inc.	419-457-3231
SC	Spartanburg, Beacon Elctrns	803-582-4613
Tex	Dallas, Southwestern Engrg. & Equip. Co.	214-826-6661
Tex	Houston, Southwestern Engrg. & Equip. Co.	713-353-4333
Wash	Bellevue, C.W. Fowler Co.	206-454-8600

PHOTOBELL CO., INC., 12M East 22nd St., New York, N.Y., 10010, Tel: 212-674-2121; Empl.: 30; Minimum order: $10

Customer service: A. Edelman

Free literature available: Photoheads and Prices, Bulletin RP, Reflex photohead applications RPX, 115V Reflex photorelays, RPXLA, Drop through count sensors, CPDTR1 Photoelectric burglar alarms, BP Safety light curtain for machy SAO, Conveyorized Inspections 3535IT
Daylight control of lamps, etc. Capacitance proximity uses, RCA

Products manufactured: Alarms, Character Recognition Systems, Controls/Control Eqpt., Counters, Detectors, Indicators, Services, Assembly, Production & Test, Switches

Advertisment

Photoelectric and capacitive devices, methods, ideas for machines, instruments, production lines; to trigger, control, sort, alarm, count, inspect, reject, measure, sense. Low prices, custom designs for infrared and visible light projectors, receivers, reflex photoheads, solid-state logic circuits to fit need. Intrusion alarms, smoke sensors, safety guards.

PHOTOCIRCUITS DIV., KOLLMORGEN CORP., 31 Sea Cliff Ave., Glen Cove, N.Y., 11542, Tel: 516-448-1000, TWX: 516-671-3155; Empl.: 850

Customer service: J. Tabak

Products manufactured: Boards, Printed Circuit, Chemicals, Circuits, Printed, Multilayer, Coatings, Motors

PHOTOMATION, INC., Box 460, Mountain View, Cal., 94041, Tel: 415-967-8992; Empl.: 12; Minimum order: $10

For info on price: S. Pedersen; Application info: R. Heinsoth

Free literature available: Catalog #731 Photoelectric Controls as used in automation.

Products manufactured: Controls/Control Eqpt., Counters, Scanners

Local Sales Offices & Reps.

Cal	Millbrae, Call Assoc.
Fla	Orlando, B. Woodruff, Inc.
Haw	Honolulu, Amfac Distribution Co.
Ill	Glen Ellyn, Control Dynamics
Ind	Indianapolis, Sukup & Cox, Inc.
Kans	Kansas City, Process Svce. & Equip. Co.
Mass	Sturbridge, Electrical Apparatus Co.
Mich	Detroit, R.D. Ernest & Assoc.
Minn	Minneapolis, Pilot Industries Corp.
Mo	St. Louis, Schwaig Engrg. Co.
NY	Brooklyn, Eastern Elctrn. Sls.
NY	Syracuse, Thomas J. McGough
Ohio	Cincinnati, Jeffrey Equip Co.
Ohio	Cleveland, Adcon Eng. Co.
Ore	Portland, Dynatech
Pa	Narberth, Clayton A. Denault
Tenn	Chattanooga, C.H. Cloer & Assoc.
Tex	Houston, Electrical Instr & Meter Co.
Utah	Salt Lake City, E. C. Coffin Co.
Va	Richmond, Martin's Control & Equip. Co.
Wash	Airway Heights, Calvert Controls
Wash	Medical Lake, Calvert Controls Inc.
Wash	Seattle, C. Stebbins
WVa	Charleston, Engrg. Prods. Co.
Wisc	Milwaukee, G.H. Fredericks & Co.

PHOTRON INSTRUMENT CO., 6516 Detroit Ave., Cleveland, Ohio, 44102, Tel: 216-281-7020; Empl.: 10

Products manufactured: Meters, Oscillographs, Direct Writing, Recorders

Advertisment

GALVANOMETERS: Low cost, for OEM applications; miniaturized and conventional types. A wide range of coil impedance and torque is offered and may be tailored to customer requirement. Frequency response available from d.c. to 75 Hz. Suitable for solid state or high resistance circuitry. OSCILLOGRAPHS: Custom engineered for OEM, complete or subassemblies.

PHYSICAL DATA, INC., 5160 N. Lagoon Ave., Portland, Ore., 97217, Tel: 503-283-5116; Empl.: 12; Minimum order: $25

For info on price: B. Gibbons; Application info: G. Caspell; Customer service: B. Gibbons; Delivery info: B. Gibbons

Products manufactured: Analyzers, Recorders

Local Sales Offices & Reps.

Ala	Huntsville, Lee Assocs.	205-533-5896
Ariz	Scottsdale, Measurement Consultants	602-944-9519
Cal	Inglewood, C. Fowler Co.	213-678-5211
Cal	Menlo Park, C. Fowler Co.	415-322-5374
Colo	Boulder, Measurement Consultants	303-449-5294
Conn	Hamden, Equipment Sls.	203-248-5581
Fla	Miami, Lee Assocs.	305-525-9796
Fla	Winter Haven, Lee Assocs.	813-294-5815
Ga	Chamblee, Lee Assocs.	404-457-7117
Ill	Chicago, Carter Elctrns.	312-585-5485
Ind	Indianapolis, C. Elctrns.	317-293-0696
Kans	Overland Park, Carter Elctrns.	913-649-6996
Md	Rockville, Farrell Assocs.	301-424-9460
Mass	Chelmsford, Equipment Sls.	617-256-8547
Mich	Detroit, Comtel-Sterling	313-255-1970
Minn	Minneapolis, Carter Elctrns.	612-544-9393
Mo	Hazelwood, Carter Elctrns.	314-731-2237
NM	Albuquerque, Measurement Consultants	505-265-6471

NY Williamsville, M. Bennett Assocs. ...716-634-2107
NC Raleigh, Lee Assocs. 919-787-5818
Ohio Cleveland, Comtel-Sterling 216-442-8080
Ohio Dayton, Comtel-Sterling 513-298-7573
Pa Pittsburgh, Comtel-Sterling 412-922-5720
Utah Murray, Measurement Consultants
801-268-3181
Wash Bellevue, C. Fowler Co. 206-454-8600
Wisc Milwaukee, Carter Elctrns. 414-464-5555

PHYSICAL ELECTRONICS LABS., 1185 O'Brien Dr., Menlo Park, Cal., 94025, Tel: 415-323-9092; Empl.: 25

Customer service: R. A. Craig

Products manufactured: Discriminators, Filters, Generators, Limiters, Oscillators, Tuners

Local Sales Offices & Reps.
Cal Los Altos, Cain-White Co. 415-948-6533
Cal Los Angeles, Cain Tech. Inc. 213-476-2251
Fla Clearwater, Brennan Assocs., Inc.
813-446-5006
Ill Mt. Prospect, R. Forlaw dba Cain & Co.
312-253-3578
Md Lanham, Brimberg Assocs., Inc. 301-552-2200
Mass Reading, Geder-Rotundi Assocs. 617-944-3105
NJ Livingston, G & A Sls. 201-992-3087
NY North Syracuse, NACO Elctrns. Corp.
315-699-2651
Ohio Dayton, J. Tennison dba Cain & Co.
513-254-6521
Ohio Reynoldsburg, R. Hansel, dba Cain & Co.
614-861-2119
Tex Dallas, Cain & Co. 214-233-6809
Wash Seattle, Datacom Assocs. 206-325-5193

PHYSICAL ELECTRONICS INDUSTRIES, 6509 Flying Cloud Dr., Eden Prairie, Minn., 55343, Tel: 612-941-5540, Telex: 29-0407; Empl.: 90

For info on price: M. Gorder; Application info: M. Gorder; Customer service: L. Yarger; Delivery info: M. Gorder

Free literature available: Auger Electron Spectrometers; Thin Film Analyzer for an elemental analysis of thin films; Scanning Auger Microprobe for comprehensive surface elemental analysis; Condensed product catalogue; ESCA/Auger Electron Spectrometer for surface elemental analysis with ESCA or Auger Electron Spectroscopy.

Products manufactured: Spectrometers

Local Sales Offices & Reps.
Cal San Jose 408-247-7767
Ill Park Ridge 312-297-7730
Mass North Attleboro 617-695-7504
NJ Springfield 201-376-3650
Tex Richardson 214-231-8661

PIC DESIGN DIVISION, Benrus Corp., Box 335, Benrus Ctr., Ridgefield, Conn., 06877, Tel: 203-431-1500, TWX: 710-467-0666; Empl.: 150; Minimum order: $10

For info on price: Sls. Dept. 203-431-1500; Application info: E. Hansen 203-431-1517; Customer service: J. Able 203-431-1506; Delivery info: Expediting Dept. 203-431-1521

Free literature available: PIC Catalog #37 explicitly defines over 35,000 precision mechanical components and assemblies supplied from stock.

Products manufactured: Bearings, Brakes, Cams, Clutches, Counters, Couplings, Dials, Drives & Drive Mechanisms (Dial), Fasteners, Gearheads & Speed Reducers, Gears & Gear Mechanisms (Precision), Handles For Cabinets, Circuit Boards, Racks, etc., Jigs And Fixtures, Chassis & Circuit Board, Kits, Breadboarding (For Engineers), Kits, Training Aid, Knobs, Limit Stops, Mechanical, Locks, Dial & Shaft, Nameplates, Pins, Pointers, Dial, Potentiometers, Power Supplies, Reducers, Rings, Retaining, Spacers, Springs (All Types)

Local Sales Offices & Reps.
Ill Chicago, F. Tye Sls. Co. 312-283-1227
Ind Fort Wayne, Hoemig Sls. Co. 219-483-6913
Ohio Cleveland, J. O. Olsen Co. 216-752-5444
Pa Philadelphia, K. B. Erdman Co. 215-224-1833
Tex Dallas, Robco Inc. 214-631-7191

PICKERING & CO., Meas. & Controls Div., 101 Sunnyside Blvd., Plainview, N.Y., 11803, Tel: 516-681-0200; Empl.: 300

For info on price: A. Eidmann; Application info: R. P. Zupa; Customer service: A. Eidmann; Delivery info: A. Eidmann

Products manufactured: Indicators, Transducers

Local Sales Offices & Reps.
Cal Los Angeles, Fetty/Schoenduve, Inc.
213-651-4050
Colo Denver, Walter Engrg. Assoc. 303-777-5585
Ill Lombard, Quadtron Assoc. Inc. 312-627-6800
Mass Norwell, Bordewieck Engrg. Sls. Co.
617-659-4915
Mich Ferndale, Tiby Co. 313-547-3550
NJ North Caldwell, Masin, Esco, Inc. ... 201-226-2550
NY Liverpool, Rayelco Elect. Inc. 315-652-5272
NY Syosset, Masin Esco, Inc. 516-364-0310
Ohio Cleveland, Tiby Co. 216-371-5335
Pa Bethayres, Control Instr. Sls. Co.
215-OR 6-1808
Tex Dallas, G. Weinreich & Assoc. 214-321-2800
Wash Seattle, G. M. Gillett 206-284-5324

PICO CRIMPING TOOLS CO., 9832 Jersey Ave., Santa Fe Springs, Calif., 90670, Tel: 213-723-2150; Empl.: 12

Products manufactured: Tools

PICO ELCTRNS. INC., 50 S. Macquesten Pkwy., Mount Vernon, N.Y., 10551, Tel: 914-699-5514 ... p. 2•1778-1783

Customer service: J. Sweeney

Free literature available: Catalog 2002, Ultra-Miniature Transformers

Products manufactured: Chokes, Coils Including Assemblies & Forms, Reactors, Transformers

Local Sales Offices & Reps.
Ariz Scottsdale, Piper-Goyne 602-946-4437
Cal Orange, Sls. & Mktg. Assocs. 714-997-5720
Cal Santa Clara, Fisher Assocs. 408-733-7350
Colo Littleton, Piper-Goyne 303-798-8955
Conn Waterbury, Selmark Assocs. 203-754-3060
Ga Atlanta, Grady Duckett Sls. Co. 404-451-3529
Mass Millis, Selmark Assocs. Inc. 617-376-2914
Minn Minneapolis, F. B. Hill & Co. 612-941-5270
Mo St. Charles, Buckman & Assocs. 314-724-6690
NH Plaistow, Selmark Associates Inc.
603-382-4796
NM Albuquerque, Piper-Goyne 505-294-1436
Ohio Dayton, BEK Assocs. Inc. 513-278-1343
Tex Houston, Vista Engrg. 713-661-0119
Tex Richardson, Vista Engrg. 214-235-4547
Wash Seattle, W. Spaulding Co. 206-282-9173

PICONICS INC., Cummings Rd., Tyngsboro, Mass., 01879, Tel: 617-649-7501, TWX: 710-347-6663; Empl.: 48

Products manufactured: Coils Including Assemblies & Forms, Transformers

Local Sales Offices & Reps.
Cal No. Hollywood, Jewett Co. 213-789-8103
Cal Palo Alto, J/M Assocs. 415-327-1261
Fla Longwood, Lenz Engrg. 305-831-9797
Mass Wayland, Wayland Engrg. Sls. Co.
617-655-6080
Mo Kansas City, Harris-Hanson Co. 816-444-9494
Mo St. Louis, Harris-Hanson Co. 314-432-3611
NY Huntington, Regulus Ind'l. Sls. Co.
516-271-7966
NY Utica, Micro Comp. Sls. 315-733-2460
Pa Lansdowne, W. F. Satterthwaite & Co.
215-623-5100
Tex Addison, Southland Comps. 214-233-0603
EXP: Huntington, N.Y., Regulus Ind'l. Sls. Co.
516-271-7966
FOR: Can., Waters Metal Prods. 716-285-3595

PIEZO CRYSTAL CO., 100 "K" St., Carlisle, Pa., 17013, Tel: 717-249-2151; Empl.: 250

Customer service: S. Stone

Free literature available: General product catalog giving major performance characterisitcs and popular closure configurations.

Products manufactured: Crystal Blanks, Crystals, Discriminators, Filters

PIEZO TECHNOLOGY INC., Box 7877, 2400 Diversified Way, Orlando, Fla., 32804, Tel: 305-425-1574, TWX: 810-850-4136; FSC No: 25120; Empl.: 320 ... p. 1•406,407

For info on price: H. C. Schinaman; Application info: H. C. Schinaman; Customer service: D. Worrell; Delivery info: D. Worrell

Free literature available: Data Sheets: Stock Monolithic Crystal Filters, 5 to 180 MHz, Reprint: "Communications Systems Benefit from Monolithic Crystal Filters"

Products manufactured: Crystals, Filters

Local Sales Offices & Reps.
Cal San Mateo, Melvin Sls. Co. 415-349-7444
Cal Van Nuys, R.L. Assocs. 213-780-1666
Colo Denver, Walter Engrg. Assoc. 303-777-5585
Fla Maitland, Ellis & Assocs. 305-645-1101
Ill Chicago, T.B. Hunter Assocs. 312-777-2500
Ind Greenwood, V. Schillinger & Assocs.
317-888-2260
Md Baltimore, C.O. Emrich 301-747-8348
Mass Randolph, TX Sls., Inc. 617-986-6080
Mich Brighton, V. Schillinger & Assocs.
Minn St. Paul, Barnes Sls. Assocs. 612-474-2907
NJ Haddonfield, Mesa Tech. Assocs. 609-429-9531
NY Buffalo, Quality Comps., Inc. 716-839-2044
NY Smithtown, TX Sls. Inc. 516-979-8750
NC Greensboro, L&D, Inc. 919-292-3201
Tex Dallas, Stevens Sls. 214-350-2476

PIHER INT'L. CORP., 1239 Rand Rd., Des Plaines, Ill., 60016, Tel: 312-297-1560, Telex: 28-2514; Empl.: 3000

Products manufactured: Potentiometers, Resistors

Local Sales Offices & Reps.
Ala Huntsville, 20th Century Mktg. 205-772-9237
Cal Pico Rivera, Westrep 213-949-2251
Ill Mt. Prospect, Delta Tech. Sls. 312-437-9412
Kans Shawnee Mission, Admack Sls. 913-432-5550
Minn St. Louis Park, Beta Engrg. 612-925-4422
Mo Kansas City, T. Mac Collough 816-561-5758
NJ Cherry Hill, Trinkle Sls.
NM Albuquerque, Cleveland Entprs. 505-345-2481
NY Garden City, Comtronic Assoc.
NY Rochester, Ossmann Component Sls. Corp.
716-442-3290
Ohio Cincinnati, Sheridan Assoc. 513-761-5432
Tex Dallas, Norvell Assocs. 214-350-6771
Wash Seattle, C.K. Shanks & Assoc. 206-632-4290
FOR: Can., Downsview, Ont., Weber Elctrns.
416-638-1322

PINLITES, See Refac/Pinlites

PIONEER ELEC. & RESCH. CO., 743 Circle Dr., Forest Park, Ill., 60130, Tel: 312-771-8242

Customer service: J. W. Bullock

Products manufactured: Lights, Tachometers

PIONEER INSTRUMENTATION, 4800 E. 131st St., Cleveland, Ohio, 44105, Tel: 216-587-3600; Empl.: 10

Customer service: L. Sullin

Products manufactured: Calibrators, Comparators, Meters, Standards

Local Sales Offices & Reps.
Ill Chicago, Pen-Vel Assocs. 312-248-4343
NY Mamaroneck, Cane Tech. Sls. 914-698-4411
Ohio Cleveland, Pioneer/Instrumentation
216-587-3600
Pa Media, W. Reeves Assocs. 215-566-6709

PIONEER MAGNETICS, 1745 Berkeley St., Santa Monica, Cal., 90404, Tel: 213-829-3305, TWX: 910-343-6249; FSC No: 08676

For info on price: A. Hagiwara; Application info: G. Held; Customer service: G. Held; Delivery info: A. Hagiqara

Products manufactured: Converters, Current Sensors, Power Supplies, Testers, Wire Strippers

PITTMAN CORP., Sellersville, Pa., 18960, Tel: 215-257-5117, TWX: 510-661-5086; Empl.: 92; Minimum order: $40 ......p. 1•976,977

For info on price: C. Pittman; Application info: C. Pittman; Customer service: C. Pittman; Delivery info: J. Parker

Free literature available: Data sheets descriptive of miniature low voltage; DC servo motors, gearmotors, and motor-tachometers commercial.

Products manufactured: Motors, Tachometers

Local Sales Offices & Reps.
Ariz Scottsdale, Williams-Assocs. 602-947-4297
Cal Los Angeles, Halbar Assocs. 213-387-8283
Cal San Mateo, Halbar Assocs. 415-349-4700
Colo Denver, Williams-Assocs. 303-373-4730
Fla Ft. Lauderdale, Tropi-Tec Co. 305-523-4988
Ill Chicago, K-W Assocs. 312-792-2618
Ind Fort Wayne, Neal Engrg. Co. 219-484-5090
Ind Indianapolis, Neal Engrg. Company
317-849-4201
Mass Salem, Forbes Engrg. 617-744-1693
Mich Birmingham, J.C. Hofstetter Co. 313-643-7203
Mich Grand Rapids, J. C. Hofstetter Co.
616-942-0650
Mo St. Louis, Gordon Fixman Engrg. 314-725-5219
NJ Summit, R.A. Potter Assocs. 201-277-0220
NM Albuquerque, Williams-Assocs. 505-255-1638
NY Buffalo, Application Specialists 716-834-3377
NY East Syracuse, Application Specialists
315-437-2813
NY Rochester, Application Specialists
716-586-6226
NC Charlotte, Electro-Rep Assocs., Inc.
704-527-2530
Ohio Dayton, J.C. Hofstetter Co. 513-296-1010

Ohio	Medina, J.C. Hofstetter Co.	216-241-4880
Okla	Tulsa, Blair Engrg. Sls. Co.	918-663-9850
Ore	Portland, Donal Co.	503-246-3131
Tex	Dallas, Blair Engrg. Sls. Co.	214-352-8411
Tex	Houston, Blair Engrg. Sls. Co.	713-667-9864

PLASTIC CAPACITORS, INC., 2620 N. Clybourn Ave., Chicago, Ill., 60614, Tel: 312-348-3735, TWX: 910-221-1354; FSC No: 99120; Empl.: 125

For info on price: D. Powalish; Application info: Sls. Dept.; Customer service: S. Ludwig; Delivery info: S. Ludwig

Free literature available: Engineering oriented booklet of conversion factors and electronic formulae. Ideal for use with a pocket calculator. Booklet will fit in most calculator pouches.

Products manufactured: Capacitors, Fixed, Capacitors, Variable, Networks, Power Supplies

Local Sales Offices & Reps.

Ala	Huntsville, B.J.R., Inc.	205-881-3569
Cal	Los Altos, Parsons & Meister, Inc.	415-941-4745
Cal	Los Angeles, E.E. Strassner Co.	213-666-1511
Conn	Meriden, Eagle Assocs.	203-235-9036
Ill	Chicago, Carlson Elctrn. Sls. Co.	312-774-4812
Ind	Fort Wayne, W.W. Bieberich, Inc.	219-432-2537
Ind	New Albany, W.W. Bieberich, Inc.	812-945-3187
Kans	Shawnee Mission, Carlson Elctrn. Sls. Co.	913-432-2144
Md	Hyattsville, Eastern Comps.	301-577-2925
Mass	Boston, Eagle Assocs.	617-444-3446
Minn	Minneapolis, J. J. Exon Co.	612-566-5340
Mo	St. Louis, Carlson Elctrn. Sls. Co.	314-991-0262
NJ	Springfield, F.F. Sylvester Assoc.	201-376-3324
NY	Baldwinsville, E. Scovel Co.	315-652-9798
NY	Rushville, E. Scovel Co.	315-584-6522
Ohio	Cleveland, Electro-Com	216-886-2404
Ohio	Dayton, Electro-Com	513-276-3993
Pa	Flourtown, Eastern Comps., Inc.	215-836-1616
Pa	York, Eastern Comps., Inc.	717-764-3114
Tex	Dallas, Packard Assocs.	214-357-5713
Wisc	Milwaukee, Carlson Elctrn. Sls. Co.	414-476-2790
EXP:	New York, N.Y., B. Freudenberg	212-757-9130

PLASTICS ENGRG. CO., 3518 Lakeshore Rd., Sheboygan, Wisc., 53081, Tel: 414-458-2121, TWX: 910-264-3873; Empl.: 475

For info on price: L. L. Korb Ext. 323; Application info: L. L. Korb Ext. 323; Customer service: J. D. Ellis Ext. 331; Delivery info: J. Potochnik Ext. 244

Free literature available: Brochure "PLENCO" Gives descriptions, applications, typical values for PLENCO molding compounds (phenolics; melamine-phenolics and alkyds) and PLENCO phenolic resins. Also describes molding processes and PLENCO facilities.

Products manufactured: Compounds; Encapsulating, Insulating, Molding, Potting, Plastic Raw Materials, Liquids, Pellets, Powders, Resins

Local Sales Offices & Reps.

Ill	Arlington Heights, H. Sanders	312-437-6930
Ill	La Grange Park, O. B. Buss	311-354-4285
Ill	Schaumburg, J. Wood	312-894-7038
Mich	Marshall, B. L. Young	616-781-5415
Mo	Manchester, K. A. Pickell	314-527-0476
NJ	North Plainfield, S. C. Dusza	201-757-2059
Ohio	Grafton, E. D. Larrick	216-458-4570
Pa	Doylestown, R. P. Draper	215-348-3666
Pa	Erie, N. B. Duffett	814-833-4386
Wisc	Plymouth, R. T. Johnson	414-892-8556
Wisc	Sheboygan, F. Shaw	414-452-7849

PLATT LUGGAGE, 2301 S. Prairie, Chicago, Ill., 60616, Tel: 312-225-6670; Empl.: 75

For info on price: M. Platt; Application info: M. Platt; Customer service: J. Persons; Delivery info: J. Persons

Free literature available: 4-page product sheet and pricing on complete line of tool cases for servicemen and technicians.

Products manufactured: Cases, Equipment, Instrument, Meter

P. L. C. ELECTRONICS INC., 39-50 Crescent St., Long Island City, NY, 11101, Tel: 212-937-2605; Empl.: 25; Minimum order: $10

For info on price: Sls. Dept.; Customer service: Svc. Dept.

Free literature available: Full description 32 page catalog details 17 different professional security systems that are prepackaged for distributor sales to electronic technicians and service dealers.

Products manufactured: Alarms, Bells, Buzzers, Gongs, Sirens & Aural Warning Devices

Local Sales Offices & Reps.

Ala	Mobile, Hollingsworth & Still	205-478-8108
Colo	Denver, R. Bowen & Assocs.	303-744-2501
Fla	Orlando, Hollingsworth & Still	904-669-4738
Ga	Atlanta, Hollingsworth & Still	404-394-3270
Ill	Chicago, Cumming & Foley Sls. Co.	312-725-8110
Ind	Indianapolis, Charles Scheffler Co.	317-253-6337
Iowa	Des Moines, B.E.A.M.S.	515-282-0292
Kans	Lenexa, B.E.A.M.S.	913-888-6110
La	Monroe, Dixie Elctrn. Assocs.	318-387-8893
Mich	Lake Orion, Ted Firaneck Sls.	313-391-1177
Minn	Minneapolis, Dick Borrett Co.	612-929-0028
Mo	Creve Cover, B.E.A.M.S.	314-569-1060
NC	Charlotte, Hollingsworth & Still	704-536-7047
Ohio	Medina, T. Grant Assocs.	216-725-6528
Ore	Salem, Pacnor Mktg.	503-363-6445
Pa	Newtown Square, G. M. Conneen Co.	215-353-2241
Tenn	Gallatin, Dixie Elctrn. Assocs.	615-452-1744
Tex	Dallas, R. E. Nesbitt Co.	214-357-4601
Wash	Seattle, Pacnor Mktg.	206-284-8020

PLESSEY INC., Materials Div., 320 Long Island Expwy. S., Melville, N.Y., 11746, Tel: 516-694-7900, TWX: 510-224-6411; Empl.: 700

Free literature available: Five facility brochures as follows: Plessey Melville, Plessey EMD, Plessey Frenchtown, Plessey Montvale, Plessey Micro Science, Each describes products and capabilities.
Plus, Plessey Materials borchure which gives brief overview of products and capabilities of entire Division.

Products manufactured: Alloys, Contact Strips, Finger, Contacts, Electrical, Films, Inks For Thick Film Microcircuits, Laminates, Laminations, Metal Oxides, Metals, Motors, Pads, Transistor Mounting, Paints, Preforms, Precious Metal, Rivets, Seals, Services, Assembly, Production & Test, Solder (All Types), Substrates, Thermistors, Wire

Local Sales Offices & Reps.

Ariz	Mesa, Plessey Inc.	602-969-7281
Cal	Los Angeles, Plessey Inc.	213-390-7844
Cal	Mt. View, Plessey Inc.	415-965-1400
Cal	San Diego, Plessey Inc.	714-560-8433
Colo	Boulder, Mile High Elctrns.	303-444-5615
Ill	Schiller Park, Plessey Inc.	312-671-2686
Md	Rockville, Plessey Inc.	301-340-3220
Mass	Reading, Plessey Inc.	617-944-7000
NJ	Bernardsville, Plessey Inc.	201-766-2200
NY	Melville, Plessey Inc.	516-694-7900
Ohio	Akron, Plessey Inc.	216-644-7643
Tex	Dallas, Plessey Inc.	214-235-2307

PLESSEY CERAMIC DIV., Plessey N.J. Inc., 8th & Harrison Sts., Frenchtown, N.J., 08825, Tel: 201-996-2121, TWX: 510-235-3399; Empl.: 198

For info on price: W. Weaver; Application info: B. Spillman

Products manufactured: Alloys, Circuits, Hybrid, Thick Film, Coils Including Assemblies & Forms, Cores, Ceramic, Networks, Packages, Integrated Circuit, Seals, Spacers, Transistor, Diode, Thyristor Heat Dissipators, Tubes, Tubing

Local Sales Offices & Reps.

Ariz	Mesa, Plesasey Materials	602-969-7281
Cal	Los Angeles, Plessey Materials	213-390-7844
Cal	Mountain View, Plessey Materials	415-965-1400
Cla	San Diego, Plessey Materials	714-560-8433
Colo	Boulder, Mile High Electronics	303-444-5615
Ill	Schiller Park, Plessey Materials	312-671-2686
Md	Rockville, Plessey Materials	301-340-3220
Mass	Reading, Plessey Materials	617-944-7000
NJ	Bernardsville, Plessey Materials	201-766-2200
NY	Melville, Plessey Materials	516-694-7900
Ohio	Akron, Plessey Materials	216-644-7643
Tex	Dallas, Plessey Materials	214-235-2307

PLESSEY ELECTRO-PRODUCTS, 3860 Centinela Ave., Los Angeles, Cal., 90066, Tel: 213-390-3585, TWX: 910-343-6483; Minimum order: $25 .... p. 1•267

For info on price: P. H. Dalton; Application info: R. Coulter; Customer service: P. Dalton; Delivery info: P. Dalton

Free literature available: Bulletin 500 Applications brochure

Products manufactured: Indicators, Integrators, Electronic, Timers

PLESSEY ENVIROMENTAL SYS., 3939 Ruffin Rd., San Diego, Cal., 92123, Tel: 714-278-6500, Telex: 695053; Empl.: 75

For info on price: S. Liflander; Application info: G. N. Clausen; Customer service: J. Delozier; Delivery info: S. Liflander

Free literature available: A product catalog that describes and illustrates the instruments and equipment manufactured by the company.

Products manufactured: Baths, Controlled Temperature (Air & Liquid), Counters, Data Loggers, Dummy Loads, Gages, Indicators, Oceanographic Equip. (Electronic), Recorders, Transducers, Underwater Communication, Detection, Navigation, etc. Equipment

Local Sales Offices & Reps.

Md	Rockville, C. Blakely	301-946-0082

PLESSEY SEMICONDUCTORS, 1674 McGaw Ave., Santa Ana, Cal., 92705, Tel: 714-540-9979, TWX: 910-595-1930; FSC No: 52648; Empl.: 9

For info on price: D. Clark X35; Application info: W. B. Boris X49; Customer service: D. Chant X27; Delivery info: D. Clark X35

Free literature available: Applications; data sheets; short form catalog; price list; data book

Products manufactured: Amplifiers, Cells, Photoconductive, Photoemissive, Photovoltaic, Circuits, Integrated, Silicon Monolithic, Unpackaged Chips, Counters, Demodulators, Detectors, Diodes, Dividers, Drivers, Switch, Generators, Integrated Circuit Devices, Microwave Integrated Circuits (MIC's), Mixers, Modulators, All Kinds, Transistors

Local Sales Offices & Reps.

Ariz	Phoenix, Thorson Co.	602-956-5300
Cal	Los Altos, Hoeke-Reeser Assocs.	415-941-4080
Cal	Los Angeles, Thorson Co.	213-937-0790
Cal	San Diego, Thorson Co.	714-298-8385
Cal	Tustin, Thorson Co.	714-544-5121
Colo	N. Denver, West/Mark Assoc.	303-433-7181
Fla	St. Petersburg, Kirkwood Assocs.	813-894-8240
Ill	Park Ridge, R F Specialists	312-698-2044
Ind	Fort Wayne, R. F. Specialists	219-485-8982
Kans	Prairie Village, Engr. Services Co.	913-649-4000
Mass	Wayland, Wayland Engrg. Sls.	617-655-6080
Mo	St. Louis, Engr. Services Co.	314-997-1515
NM	Albuquerque, Thorson Co.	505-265-5655
NY	Plainview, B. Erde	516-822-5357
Ohio	Cincinnati, Luebbe Sls Co.	513-871-4211
Pa	Easton, Mid Eastern Assocs.	215-253-3100
Pa	Philadelphia, Mid Eastern Assocs.	215-842-2810
Tex	Dallas, Thorson Co.	602-956-5300
Tex	Houston, Thorson Co.	713-771-3504
Wash	Olympia, Bergford & Assoc.	206-866-2001

PLEXUS, INC., 7345 E. Evans Rd., Scottsdale, Ariz., 85260

P M C ELECTRONICS CO., INC., 1120 Industrial Hwy., Southampton, Pa, 18966, Tel: 215-322-2925; Empl.: 100; Minimum order: $100

For info on price: J. Horan; Application info: J. Becker; Customer service: B. Petherbridge; Delivery info: B. Petherbridge

Products manufactured: Boards, Printed Circuit, Boards, Printed Wiring, Universal, Services, Assembly, Production & Test

Local Sales Offices & Reps.

Fla	Orlando, Gra-Mar	305-894-3351
NJ	Haddon Field, Mesa Tech. Assocs.	609-Ha 9-9531
NY	Port Washington, Total Mktg. Action	516-883-2432
NY	Syracuse, D. H. Dwyer	315-472-8282

POLARAD ELCTRN. INSTRS., 5 Delaware Dr., Lake Success, N.Y., 11040, Tel: 516-328-1100, TWX: 510-223-0414; FSC No: 82199; Empl.: 150; Minimum order: $25 .... p. 1•784,785

For info on price: E. F. Feldman; Application info: E. F. Feldman; Customer service: S. Lim; Delivery info: E. F. Feldman

Free literature available: Polarad Microwave Instrumentation Catalog, Microwave Signal Generators & Sources 800 MHz - 21 GHz, Microwave Receivers & Field Intensity Meters 1-21 GHz, Microwave Antennas, Retrofit Data for older Polarad Signal Generators & Sources Application Data re Microwave Signal Generators

Products manufactured: Analyzers, Antennas, Generators, Meters, Modulators, All Kinds, Monitors, Multipliers, Oscillators, Receivers, Synchronizers, Klystron & BWO, Testers

Local Sales Offices & Reps.

Alas	Anchorage, Arva-Hudson, Inc.	907-272-5231
Ariz	Scottsdale, BFA Corp. of Ariz.	602-946-4215
Cal	Cupertino, T. Snitzer	408-257-8333
Cal	Del Mar, T. Snitzer	714-454-2191
Cal	Los Angeles, T. Snitzer	213-836-6170
Colo	Boulder, H. Bass Assocs.	303-499-7509
Conn	Hamden, P. Jenks Assocs.	203-281-0810
Fla	Orlando, J. Highsmith	305-293-5202
Ill	Elk Grove Village, L. Green	312-593-0282
Ind	Indpls., L. Green	317-293-9827
Kans	Prairie Vlg., Engrg. Svcs.	913-649-4000
Md	Lanham, Brimberg Assocs., Inc.	301-552-2200
Md	Silver Spring, Eastern Instrumentation Corp.	301-681-6500
Mass	Wakefield, P. Jenks Assoc.	617-246-1590
Mich	Detroit, Group Ten, Inc.	313-549-3910
Minn	Mpls., L. F. Green	612-781-1611
Mo	St. Louis, Engrg. Svcs.	314-997-1515
NM	Albuquerque, IMEC	505-883-9010
NY	Great Neck, Meas. Tech.	516-482-3500
NY	Liverpool, R&D Assocs.	315-622-2350
Ohio	Cleveland, Group Ten, Inc.	216-486-2800
Ohio	Dayton, Group Ten, Inc.	513-277-6531
Ore	Lake Oswego, Arva-Hudson, Inc.	503-227-4916
Pa	Phila., East Instrumentation Phila. Inc.	215-927-7777
Tex	Richardson, Lear Assoc.	214-231-5388
Tex	San Antonio, Data Applications	512-732-7176
Wash	Seattle, Arva-Hudson, Inc.	206-622-0177
FOR:	Can., Downsview, Ont., Electronetic Sys. Ltd.	416-661-3673
FOR:	Can., Montreal, Que., Electronetic Sys. Ltd.	514-342-4112
FOR:	Can., Ottawa, Ont., Electronetic Sys. Ltd.	613-733-3781
FOR:	Vancouver, B.C., Electronetic Sys. Ltd.	604-687-5696

POLYFLON CORP., 35 River St., New Rochelle, N.Y., 10801, Tel: 914-636-7222, TWX: 710-563-0619; Empl.: 60; Minimum order: $25

For info on price: R. McLaughlin; Application info: P. Russo; Customer service: R. McLaughlin; Delivery info: R. McLaughlin

Free literature available: Products & Services-Condensed catalogue; Individual Data Sheets: fixed RF capacitors, trimmer capacitors, microwave components, UHF cavities, DC Blocking Capacitors, Mylar Capacitors.

Products manufactured: Antennas, Boards, Printed Circuit, Capacitors, Fixed, Capacitors, Variable, Filters, Foil, Laminates, Seals, Services, Assembly, Production & Test, Shields, Slotted Lines, Microwave, Tees, Terminal Blocks, Boards & Strips, Terminals, Waveguides & Adapters

Local Sales Offices & Reps.

Fla	Lighthouse Point, Ed Whalen Assocs.	305-781-6996
Ill	Arlington Heights, Bunting & Assocs.	312-392-3370
EXP:	New Rochelle, N.Y., Polyflon Corp.	914-636-7222

POLYPHASE INSTR. CO., 126 E. Fourth St., Bridgeport, Pa., 19405, Tel: 215-279-4660; Empl.: 150

For info on price: R. H. Simmons; Application info: R. H. Simmons; Customer service: R. H. Simmons; Delivery info: P. Benedetti

Products manufactured: Amplifiers, Chokes, Coils Including Assemblies & Forms, Controls/Control Eqpt., Converters, Equalizers, Filters, Networks, Panels, Reactors, Transformers

Local Sales Offices & Reps.

DC	Wash, Arco Eng. Co.	202-393-5991
Fla	Seminole, Massey Assoc.	813-393-3206
Ill	Chicago, Berndt Assoc.	312-283-4900
Ind	Carmel, J. Riley	317-844-0114
Mass	Raddolph, Naton Assoc.	617-986-6417
NJ	Plainfield, Glassman Assoc.	201-561-3866
NY	Glen Cove, Glassman Assoc.	516-676-1039
NY	Utica, B. D. Hummel Co.	315-736-7821
Pa	Ft. Washington, GCM Assoc.	215-646-7535

PORTER, H.K., INC., 74 Foley St., Somerville, Mass., 02143, Tel: 617-776-8200, Telex: 92-1420; Empl.: 250

Customer service: A. L. Holmes

Free literature available: Hand & Power Operated Cutters A200B

Products manufactured: Cutters, Wire, Hand Operated, Drivers, Nut, Jacks (All Types), Tools

PORTESCAP US, 730 Fifth Ave., New York, N.Y., 10019

POSITRONIC INDS., 1906 S. Stewart, Springfield, Mo., 65804, Tel: 417-883-3434, Telex: 43-6445; Empl.: 90
p. 2•788,789

For info on price: M. Dock; Application info: J. Gentry; Customer service: W. Gilbert; Delivery info: W. Gilbert

Products manufactured: Connectors, Contacts, Electrical, Fasteners, Handles For Cabinets, Circuit Boards, Racks, etc., Pins, Sockets, Spacers, Terminals, Tools

Local Sales Offices & Reps.

Ariz	Scottsdale, Schoeffler Assoc.	602-948-3470
Cal	Canoga Park, Balzer-Wolf Assocs.	213-888-7432
Cal	Mountain View, G. Woempner	415-964-5454
Colo	Littleton, Lange Sls.	303-798-1397
Conn	Fairfield, Schumacher & Yarrington	203-259-0772
Fla	Ft. Lauderdale, CBC Electronics	305-484-7330
Ga	Norcross, Comptron	404-921-6929
Ill	Des Plaines, Control Sls.	312-296-5595
Kans	Shawnee Mission, Florence & Meyer	913-722-5210
Kans	Wichita, M. Meyer	316-838-7226
Mich	Dearborn Hts., Ankofski Assoc.	313-565-6330
Minn	Minneapolis, Components Group	612-824-4222
Mo	Springfield, Positronic Inds.	417-883-3434
Mo	St. Charles, Buckman Assocs.	314-724-6690
NJ	Moorestown, Comp. Consits.	609-234-3666
NY	Cooperstown, Fitzelle Assoc.	607-547-9333
NY	Farmingdale, Haines Products	516-420-1177
Ohio	Dayton, Myers Assocs.	513-435-1309
RI	Rhode Island, Schumacher & Yarrington	401-884-5671
Tex	Richardson, Zonk Engrg. Co.	214-238-7651

Local Distributors

Cal	Gardena, Bell Inds., 306 E. Alondra	213-321-5802
Cal	Inglewood, Times West, 900 W. Olive	213-673-5900
Cal	Sunnyvale, Acacia Sls., 384 San Aeso	408-735-0100
Colo	Denver, Acacia Sls., 758 S. Jason	303-232-2882
Mass	Waltham, Impact Elctrns., 223 Crescent St.	617-893-2850
Tex	Dallas, Computor Comps., 732 Wiley Post Rd.	214-239-0271

POTTER & BRUMFIELD, Div of AMF, 1200 E. Broadway, Princeton, Ind., 47671, Tel: 812-385-5251, TWX: 810-350-2343; Empl.: 3500 ....p. 1•1803

Free literature available: Catalog 100 lists over 1000 standard relays, stocked and sold by leading electronic parts distributors. Models include electromechanical, dry reed, mercury-wetted, hybird, solid state and time delay relays.

Products manufactured: Bells, Buzzers, Gongs, Sirens & Aural Warning Devices, Circuit Breakers, Covers, Protective (Including Dust), Relays, Sockets, Switches, Timers

Local Sales Offices & Reps.

Ariz	Phoenix, Howe & Howe Sls.	602-264-7971
Cal	Los Altos, E. Recht Assocs.	415-941-0336
Cal	Los Angeles, Black, Ekizian & Strong, Inc.	213-870-9191
Cal	San Diego, Bestronics	714-278-2150
Cal	San Juan Capistrano, Potter & Brumfield	714-493-4503
Colo	Littleton, Simpson Assocs.	303-794-8381
Conn	Canaan, Hathaway Elctrncs., Inc.	800-225-1293
Fla	N. Miami Beach, Irby & Connolly, Inc.	305-949-5197
Fla	Orlando, Irby & Connolly, Inc.	305-894-8471
Ga	Atlanta, Cartwright & Bean, Inc.	404-255-5262
Ill	Chicago, Balhorn & Welch, Inc.	312-889-5011
Ill	LaGrange Park, Bierhaus Sls., Inc.	312-354-5100
Ind	Fort Wayne, R.O. Whitesell & Assocs.	219-432-5591
Ind	Indianapolis, R.O. Whitesell & Associates, Inc.	317-359-9283
Ind	Kokomo, R.O. Whitesell & Assocs.	317-452-6065
Kans	Overland Park, P-M-A Corp.	913-381-0004
Kans	Wichita, P-M-A Corp.	316-264-2662
Ky	Louisville, R.O. Whitesell & Assocs.	502-893-7303
La	Chalmette, Cartwright & Bean, Inc.	504-279-4598
Md	Glen Burnie, Micro-Comp, Inc.	301-761-4600
Mass	Braintree, Potter & Brumfield	617-848-6550
Mass	Lexington, Hathaway Elctrns., Inc.	617-861-7010
Mich	Ferndale, Hilltronics, Inc.	313-398-5556
Mich	St. Joseph, R.O. Whitesell & Assocs.	616-983-7337
Minn	Edina, M. Foster Co.	612-835-2252
Miss	Jackson, Cartwright & Bean, Inc.	601-981-1368
Mo	Hazelwood, P-M-A Corp.	314-731-4334
NJ	Cherry Hill, J. McCoy, Inc.	609-428-3444
NM	Albuquerque, C.T. Carlberg & Assocs.	505-265-1579
NY	Buffalo, Ossmann Comp. Sls. Corp.	716-832-4271
NY	Garden City, Comtronic Assocs.	516-741-8966
NY	Kingston, Ossmann Comp. Sls. Corp.	914-338-5505
NY	Rochester, Ossmann Comp. Sls. Corp.	716-442-3290
NY	Syracuse, Ossmann Component Sales Corp.	315-454-4477
NY	Vestal, Ossmann Component Sales Corp.	607-785-9949
NC	Charlotte, Cartwright & Bean, Inc.	704-333-6457
NC	Raleigh, Cartwright & Bean, Inc.	919-832-7128
Ohio	Cincinnati, R.O. Whitesell & Assocs.	513-521-2290
Ohio	Cleveland, Scott Elctrns., Inc.	216-291-2600
Ohio	Columbus, Scott Electronics, Inc.	614-236-8619
Ohio	Dayton, R.O. Whitsell & Associates, Inc.	513-298-9546
Okla	Tulsa, Comps., Inc.	918-583-9149
Pa	Camp Hill, Beil & Whitaker, Inc.	717-233-1254
Pa	Harrisburg, Beil & Whitaker, Inc.	717-652-0184
Pa	Orefield, Beil & Whitaker, Inc.	215-395-0150
Pa	Philadelphia, Jack McCoy, Inc.	215-922-7333
Pa	Pittsburg, Scott Electronics, Inc.	412-781-3112
Pa	Reading, Beil & Whitaker, Inc.	215-779-2610
Tenn	Knoxville, Cartwright & Bean, Inc.	615-693-7450
Tenn	Memphis, Cartwright & Bean, Inc.	901-276-4442
Tex	Dallas, J.B. Guenther, Inc.	214-691-8500
Tex	Houston, J.B. Guenther, Inc.	713-468-0232
Utah	Salt Lake City, Simpson Assocs.	801-486-3731
Wash	Seattle, R. Johnston Co.	206-524-5170
Wisc	Milwaukee, E.A. Dickinson & Assocs.	414-264-1080

POTTER CO., Box 337 North Hwy 51, Wesson, Miss., 39191, Tel: 601-643-2216, TWX: 510-981-4072; FSC No: 13050; Empl.: 200; Minimum order: $25
p. 1•570,571; p. 2•230,231

For info on price: W. Murray; Application info: H. Mutz; Customer service: W. Murray; Delivery info: W. Murray

Free literature available: UL Recognized EMI Filters, High Voltage Bluseal Film Capacitors, Maxi-Brute Low Pass EMI Filters, Bluseal Film Capacitors

Products manufactured: Capacitors, Fixed, Chokes, Filters

Local Sales Offices & Reps.

Ariz	Phoenix, Chaparral	602-996-9648
Cal	Los Angeles, Products Supply Co.	213-659-1858
Cal	Malibu, Potter Co.	213-457-7835
Cal	Redwood City, Parks & Pruitt Assoc.	415-364-1640
Cal	Woodland Hills, Interstate Mktg. Assocs.	213-883-7606
Colo	Denver, Omega Limited	303-758-1508
Fla	Ft. Lauderdale, G.F. Bohman Assocs.	305-564-3081
Fla	Orlando, G.F. Bohman Assocs.	305-855-0274
Ill	Park Ridge, R.F. Specialists	312-698-2044
Ind	Ft. Wayne, R.F. Specialists	219-485-8982
Mass	Pittsfield, Potter Co.	413-499-2677
Mich	Grand Rapids, Thies & Assocs.	616-245-0319
Minn	Minneapolis, Stack-Johnson	612-925-2111
Miss	Wesson, Potter Co.	601-643-2216
NJ	Haddonfield, Gray Assocs.	609-429-5300
NY	Binghamton, El-Com Sls., Inc.	607-723-9270
NY	Mineola, R.A. Colucci Co.	516-746-0397
NY	Rochester, El-Com Sls., Inc.	716-385-1400
NY	Whitesboro, El-Com Sls., Inc.	315-736-2421
NC	Charlotte, R.W. Chapman & Co.	704-525-2421
Ohio	Brecksville, A. Nace Co.	216-526-4323
Ohio	St. Marys, Potter Co.	513-278-5030
Okla	Tulsa, W. Pat Fralia Co.	918-663-8707
Pa	Pittsburgh, Allen Nace Co.	412-922-7225
Tex	Fort Worth, W.P. Fralia Co.	214-264-3491
Tex	Houston, W.P. Fralia Co.	817-738-2394
Utah	Salt Lake City, Omega Limited	801-226-9617
Wash	Kirkland, Lehr Assocs.	206-827-4581
FOR:	Can., Toronto, Ont., Connector Sts. Ltd.	610-492-1398

POTTER INSTR. CO., 532 Broad Hollow Rd., Melville, N.Y., 11746, Tel: 516-694-9000, TWX: 510-224-6486; Empl.: 1500

Products manufactured: Comm. Systems, Computers, Data Acquisition & Reduction Systems, Heads, Recording Playback, Erase, Memory Systems, Perforators, Printers, Readers, Recorders, Tape Recording Accessories, Terminal Equipment, Digital, Transmission Systems, Data

POWER CONTROL CORP., Box 11432, Pittsburgh, Pa., 15238, Tel: 412-782-3120; Empl.: 65; Minimum order: $15

For info on price: W. J. Happel; Application info: W. J. Happel; Delivery info: H. Baird

Products manufactured: Amplifiers, Boards, Printed Circuit, Chargers, Battery, Controls/Control Eqpt., Converters, Inverters, Monitors, Power Supplies, Relays, Testers, Thyristors (Includes Silicon Controlled Rectifiers)

Local Sales Offices & Reps.

Mass	Boston, Eaco Engrg. Corp.	617-782-7440
Mich	Saginaw, Von Berg & Assocs.	517-799-0873
NJ	Plainfield, Brady Co.	201-753-7988
NY	Rochester, H.C. Johnson Agency	716-482-3000
Ohio	Cleveland, Whitehill Industrial	216-464-0298
Pa	Philadelphia, Rothenheber & Wurts	215-649-6300

POWER CONVERSION INC., 70 MacQuesten Pkwy. S., Mt. Vernon, N.Y., 10550, Tel: 914-699-7333; Empl.: 60; Minimum order: $50

Customer service: S. Chodosh

Free literature available: A brochure presenting voltage - time characteristics at room temperature and -20°F of Eternacell® Lithium organic electrolyte batteries ranging in capacity from 0.5 to 10 ampere-hours.

Products manufactured: Batteries

POWER DESIGNS, INC., 1700 Shames Dr., Westbury, N.Y., 11590, Tel: 516-333-6200, TWX: 510-222-6561; Empl.: 200 .... p. 1•1418-1425

For info on price: R. Roth; Application info: M. Waimberg; Customer service: M. Conklin; Delivery info: R. Roth

Free literature available: General Catalogue; Data sheet on stock models; stock models; instruction manual excerpts on non-standard & custom models including outline dwgs; short form catalogues.

Products manufactured: Calibrators, CATV Systems & Equipment, Chargers, Battery, Converters, Current Sources, Dividers, Eliminators, Battery, Loads, Electronic Variable, Power Supplies, References, D-C Voltage, Regulators, Stabilizers, Line Impedance, Transformers, Voltage Sources

Local Sales Offices & Reps.

Ariz	Phoenix, Zeus Inc. (Hytronic Meas.)	602-253-6104
Cal	North Hollywood, O'Halloran Assocs.	213-877-0173
Cal	Palo Alto, O'Halloran Assocs.	415-326-1493
Cal	San Diego, O'Halloran Assocs.	714-224-2824
Colo	Denver, Zeus Inc. (Hytronic Meas.)	303-770-4400
Fla	Casselberry, EIR, Inc.	305-830-9600
Ill	Elk Grove Village, L.F. Green & Assocs.	312-593-0282
Ind	Indianapolis, L.F. Green & Assocs.	317-293-9827
Mass	Waltham, Mc Bar Assocs.	617-890-0233
Mich	Detroit, H. Teplitz & Co.	313-537-9058
Minn	Minneapolis, L.F. Green & Assocs.	612-781-1611
Nev	Clark County, Zeus Inc. (Hytronic Meas.)	602-253-6104
NM	Albuquerque, Zeus, Inc.	505-268-3941
NY	East Syracuse, Ossmann Instrs.	315-437-6666
NY	Mt. Vernon, OED Elctrns.	914-664-0080
NY	Rochester, Ossmann Instrs.	716-328-2230
NY	Vestal, Ossmann Instrs.	607-785-9947
Ohio	Cleveland, H. Teplitz & Co.	216-371-2044
Ohio	Dayton, H. Teplitz & Co.	513-277-6531
Pa	Abington, Powell-Pendergraph	215-657-0330
Utah	Salt Lake City, Zeus, Inc.	801-466-4924
Va	Richmond, Powell-Pendergraph	703-264-2341
Wash	Bellvue, Topp Engrg.	206-747-5401
FOR:	Can., Montreal, Que., Datamex	514-731-9328

POWER, INC., Marketing Div., 12809 Eagle Ridge Dr., Burnsville, Minn., 55378, Tel: 612-890-1360; Empl.: 500; Minimum order: $15 .... p. 1•1339,1340

Customer service: D. Carlson

Free literature available: Custom Battery Packs with Chargers

Products manufactured: Batteries, Chargers, Battery

POWER INSTRS., INC., 7352 N. Lawndale Ave., Skokie, Ill., 60076; Empl.: 20; Minimum order: $20

For info on price: N. Cohen 312-676-2300; Application info: R. H. Redfield 312-676-2301; Customer service: R. Lee 312-274-9110; Delivery info: N. Cohen 312-676-2300

Products manufactured: Controls/Control Eqpt., Converters, Counters, Indicators, Light Sources, Photoelectric, Lights, Tachometers, Testers

Local Sales Offices & Reps.

Ala	Huntsville, Vaughn Electrosources Co.	205-881-8830
Cal	Santa Monica, Davidson Assocs.	213-829-1731
Fla	Cocoa Beach, Vaughn Electrosources Co.	305-784-0784
Kans	Lenexa, S. Sterling Co.	913-888-2995
Mich	Detroit, S. Sterling Co.	313-255-1970
Mo	St. Louis, S. Sterling	314-567-3636
Tex	Dallas, Teamwork, Inc.	214-243-5881
Wisc	Milwaukee, W. Klinger & Son	414-351-1775

PMC

POWER/MATE CORP., 514 S. River St., Hackensack, N.J., 07601, Tel: 201-343-6294, TWX: 710-990-5023; Empl.: 280 .... p. 1•1341

For info on price: R. Allison; Application info: D. Skulnik; Customer service: D. West; Delivery info: M. Hochaupt

Products manufactured: Converters, Power Supplies

Local Sales Offices & Reps.

Ariz	Phoenix, Thorson Co.	602-956-5300
Cal	Los Angeles, Thorson Co.	213-937-0790
Cal	Mountain View, Thorson Co.	415-964-9300
Cal	San Diego, Thorson Co.	714-298-8385
Cal	Tustin, Thorson Co.	714-544-5121
Colo	Denver, Thorson Co.	303-759-0809
Conn	Hartford, Victor Assocs.	203-246-5643
Fla	Ft. Lauderdale, W. A. Brown Instr.	305-776-4500
Fla	Orlando, W. A. Brown Instr.	305-425-5505
Ga	Atlanta, W. A. Brown Instr.	404-939-1674
Ill	Chicago, K.W. Meyers Co.	312-774-6440
Ind	Indianapolis, K.W. Meyers Co.	317-243-6681
Md	Rockville, Marktron	301-762-6210
Md	Timonium, Marktron	301-252-7111
Mass	Framingham, Victor Assocs.	617-879-5710
Mich	Detroit, R.P. Urban & Assocs.	313-535-2355
Mich	Grand Rapids, R.P. Urban & Assocs.	616-245-0511
Minn	Minneapolis, K.W. Meyers Co.	612-920-7080
Mo	Grandview, Beneke & McCaul	816-765-2998
Mo	St. Louis, Beneke & McCaul	314-567-3399
NJ	Hackensack, PMC	201-343-6294
NM	Albuquerque, Rustco	505-296-6474
NY	Elmont, Crane & Egert Corp.	516-488-2100
Ohio	Aurora, EMA Inc.	216-562-6104
Ohio	Centerville, EMA Inc.	513-433-2800
Pa	Philadelphia, QED Elctrns.	215-925-8711
Tex	Dallas, R. Martin Assoc.	214-361-8584
Tex	Houston, R. Martin Assoc.	713-462-4077
Vt	Burlington, Victor Assoc.	802-862-2172
Wash	Seattle, Thorson Co.	206-455-9180
EXP:	Hackensack, N.J., Power/Mate	201-343-6294
FOR:	Can: Mississauga, Ont., Webster Instrs.	416-275-2270

POWER MONOLITHICS INC., 121 International Dr., Corpus Christi, Tex., 78410, Tel: 512-883-6251; Minimum order: $75 .... p. 1•1845

For info on price: R. Whalen; Application info: L. Ferguson; Customer service: R. Whalen; Delivery info: R. Whalen

Free literature available: Power Hybrid Voltage Regulators 4 and 14 terminal 3.3A & 5A Pos or Neg Regulators 5 and 9 terminal 10A & 15A Pos & Neg Regulators 20 and 25 Amp Pos Regulators

Products manufactured: Hybrid Voltage Regulators, Integrated Circuit Devices, Transistors

Local Distributors

Cal	Burlingame, Logan Assocs., 844 Stanton Rd.	415-697-6100
Cal	Los Angeles, Black, C. Kizian & Strong, 1728 So. La., Cienega Blvd.	213-870-9191
Fla	Clearwater, Lynch-Gentry, 1932 Drew St.	813-443-2697
Ill	Rolling Meadows, Sumer Inc., 5050 Newport Dr.	312-394-4900
Mass	Lexington, Kitchen & Kutchin, Inc., 177 Bedford St.	617-862-8230
Minn	Minneapolis, Nortec Sls., 4530 W. 77th Ave.	612-835-7414
NJ	Haddonfield, Sunday & Obrien, 15 Potter St.	609-429-4013
NY	Hempstead, Kahgan Sales Corp., 556 Peninsula Blvd.	516-538-2300
NY	Rochester, Ossman Comp. Sls., 280 Metro Park	716-442-3290
NC	Winston-Salem, Murcota, Inc., 1106 Burke St.	919-723-1001
Ohio	Cincinnati, Sheridan Assocs., Box 37826	513-761-5432

POWER ONE, 531 Dawson Dr., Camarillo, Cal., 93010, Tel: 805-484-2806, TWX: 910-336-1297; Empl.: 35 p. 1•1414-1417

For info on price: D. Weisse; Application info: L. Wallace; Customer service: L. Wallace; Delivery info: D. Weisse

Free literature available: 16 page catalog listing 52 models of open frame power supplies from 5 to 200 VDC at 15 to 300 watts. Manual of each power supply.

Products manufactured: Power Supplies

Local Sales Offices & Reps.

Cal	San Diego, Col-Rob Elect.	714-565-6814
Cal	Santa Clara, Richards Assocs.	408-246-5860
Cal	Woodland Hills, Burtis Instrs.	213-887-1360
Fla	Miami, Reptronics, Inc.	305-251-5478
Fla	St. Petersburg, Reptronics, Inc.	813-522-8220
Ill	Wheaton, Engineering Products Assoc.	312-665-0061
Ind	Indianapolis, Holsapple Assocs.	317-899-2890
Mass	Waltham, Digital Sls. Assoc.	617-899-4300
Minn	Minneapolis, Engrg. Prods. Assoc.	612-925-1883
NJ	Madison, Livera-Polk Assoc.	201-377-3220
NY	Burnt Hills, Mktg. Rep.	518-399-9200
NY	Roslyn Heights, Livera-Polk Assoc.	516-484-1276
Pa	Norristown, Denco-Data Engrg.	215-279-8146
RI	N. Scituate, Digital Sls. Assoc.	401-647-2675
Tex	Dallas, Reese Assoc.	214-638-6575
Tex	Houston, Reese Assoc.	713-621-3134
Wash	Richland, J. B. Jolly	509-783-6523
Wash	Seattle, J. B. Jolly	206-938-4166
FOR:	Can. Weston, Ont., Duncan Instrs. LTD	416-742-4448

Local Distributors

Cal	Santa Clara, Richards Assocs., 1659 Scott Blvd.	408-246-5860
Cal	Woodland Hills, Burtis Power Dist., 6324 Variel Ave.	213-887-1360
Ind	Indianapolis, Holsapple & Assocs., 8640 E. Washington	317-899-2890
Mass	Waltham, Digital Sls. Assoc., 9 Spring St.	617-899-4300
NY	Roslyn Hts., Livera-Polk Assoc., 275 Warner Ave.	201-377-3220
Tex	Dallas, W. Reese Assocs., 3131 Stemmons Frwy.	214-638-6575
Tex	Houston, W. Reese Assocs, 4151 Southwest Frwy.	713-621-3134
For:	Can., Weston, Ont. M9L 1Y4, Duncan Instr. Ltd., 65 Millwick Dr., Unit 6	416-742-4448

POWER PAC, INC., 18 Marshall St., South Norwalk, Conn., 06854, Tel: 203-866-4484; FSC No: 53998; Empl.: 45; Minimum order: $25

For info on price: C. Mittel; Application info: W. Anderes; Customer service: C. Mittel; Delivery info: C. Bubba

Free literature available: Econopac, Power Card, Modules, Dual Output Modules System Pac

Products manufactured: Power Supplies

Local Sales Offices & Reps.

Ariz	Phoenix, RDX Corp	602-267-8162
Cal	Pasadena, RDX Corp.	213-681-3451
Cal	Sunnyvale, RDX Corp.	408-734-4500
Fla	Orlando, Fausett of Fla.	305-894-6071
Ill	Wilmette, Crest Assocs.	312-286-5202
Ind	Indianapolis, Crest Assocs.	317-844-2800
Md	New Carrolton, W. A. Brown-Equip. Co.	301-577-4527
Mass	Burlington, TEKDATA	617-273-0198
Mich	Farmington Hills, Lowell Co.	313-851-7474
NY	Mt. Vernon, D. Sonkin Assocs.	914-668-9809
Pa	Jenkintown, AMT	215-549-2080
Va	Alexandria, W. A. Brown-Equip. Co.	703-836-1800
WVa	Charleston, W. A. Brown-Equip. Co.	304-342-2700

POWER-PACK, INC., 1 St. John St., Dover, NH, 03820, Tel: 603-749-2929

POWER PHYSICS CORP., Box 626, Eatontown, N.J., 07724, Tel: 201-542-1393, TWX: 710-722-6646; Empl.: 110; Minimum order: $25

For info on price: C. Dee; Application info: M. Baker; Customer service: C. Dee; Delivery info: C. Dee

Free literature available: General catalog

Products manufactured: Circuits, Hybrid, Thick Film, Diodes, Hybrid Voltage Regulators, Rectifiers, Transistors

Local Sales Offices & Reps.

Ala	Huntsville, Incotech	205-837-6061
Ariz	Phoenix, Shefler-Kahn Co.	602-258-7894
Cal	Los Alamitos, J. S. Heaton Co.	714-821-9600
Cal	Menlo Park, J. S. Heaton Co.	415-369-4671
Cal	San Diego, Cel-Tec	714-279-7961
Colo	Denver, Shefler-Kahn Co.	303-831-9087
Conn	North Haven, Kitchen & Kutchen	203-239-0212
Fla	Clearwater, Bohman Assocs.	813-442-5606
Fla	Ft. Lauderdale, Bohman Assocs.	
Fla	Orlando, Bohman Assocs.	305-855-0274
Ga	Atlanta, EMA	919-722-5151
Ill	Chicago, Lightner Assocs.	312-774-1500
Md	Towson, Habco Elec.	301-825-9637
Mass	Lexington, Kitchen & Kutchen	617-862-8230
Mich	Lathrup, R.C. Nordstron & Co.	313-444-4417
Minn	Minneapolis, Technical Assocs. Inc.	612-929-6721
NY	, LRC Assoc.	914-634-7973
NY	, MCK Assoc.	315-685-7122
NC	Winston-Salem, Elctrn. Mktg. Assoc., Inc.	919-722-5151
Ohio	Columbus, T. Mulligan & Assoc.	614-457-2242
Ore	Portland, Underwood & Underwood	503-245-2342
Pa	King of Prussia, Monteiro Assocs.	215-265-0634
Tex	Dallas, Merino Sls. Co.	214-239-9719
Va	Lynchburg, Habco Elec.	804-384-5236
Wash	Seattle, Underwood & Underwood	206-243-2133

POWER-SONIC CORP., Box 5242, 3106 Spring St., Redwood City, Cal., 94063, Tel: 415-364-5001; Empl.: 4

For info on price: B. A. Ender; Application info: G. C. Clum; Customer service: B. Ender; Delivery info: G. C. Clum

Free literature available: Specification sheet listing all models, voltage, capacity, dimensions, discharge characteristics, terminal configuration, as well as general characteristics of power-sonic batteries. Technical brochure: characteristics, curves, application notes, charging.

Products manufactured: Batteries, Chargers, Battery

Local Sales Offices & Reps.

Cal	Marina Del Rey, Intervend Inds., Ltd.	213-821-7936
Cal	San Diego, Qualtronics	714-560-8955
Ill	Chicago, Ropek-Cahill	312-287-7292
Mass	Reading, Kanan Assocs.	617-944-8484
Mich	Orchard Lake, Ellinger Sls.	313-626-1170
Minn	Minneapolis, Jos-Co Sls. Engrg.	612-927-5858
NY	Wantagh, Dony Tech Sls.	516-826-5550

Advertisment

We specialize exclusively in gelled electrolyte lead-acid batteries and chargers. Our batteries are sealed, maintenance free, may be discharged and charged in any position. Cycle or standby (float) applications.

Full product line– 6, 12, 18 volts; capacities ranging from 1 to 15 ampere-hours. Minimum lead time.

POWER SYSTEMS & CONTROLS, INC., 3206 Lanvale Ave., Richmond, Va., 23230, Tel: 804-355-2803; Empl.: 40

For info on price: R. A. Amos; Application info: C. Gregory; Customer service: A. Moore; Delivery info: S. Frazier

Free literature available: 1) Series 700C Uninterruptible Computer Power Supply, 40KW through 720KW 2) Model 1200 Voltage Band Monitor, 3) Series RF Computer Power Filter

Products manufactured: Monitors, Motor Electric Generator Sets, Power Supplies

Local Sales Offices & Reps.

Cal	LaCrescenta, Power Systems & Controls	213-248-9018
Iowa	Des Moines, Beckley Electric Co.	515-288-3201
Mass	Framingham, C. Pappas Assocs.	617-877-2984
Mo	Florissant, C. Mark Corp.	314-921-4444
NJ	Old Bridge, Media Prods.	201-257-8076
NY	Great Neck, H.J. Krasner Assocs.	516-487-0690
Ohio	Cincinnati, Data Processing Sciences Corp.	513-961-0776
Okla	Tulsa, Data Processing Svcs.	918-582-2114
Tex	Richardson, Computer Mktg. Corp.	214-231-1426

POWER TECHNOLOGY, INC., Box 4403, 7925 Mablewave Cutoff, Little Rock, Ark., 72204, Tel: 501-568-1995; Empl.: 17 .... p. 1•119,1338

Customer service: T. H. Burgess

Free literature available: Power Supply Catalogs; IL & ILC Series laser Diode Pulsers; DC Motor Speed Controls; 117 or 230 V AC to 12V DC Converter.

Products manufactured: Comm. Systems, Controls/Control Eqpt., Converters, Lasers & Laser Systems, Power Supplies

POWER WAVES INC., Box 1353, Asbury Park, N.J., 07712, Tel: 201-774-8322; Empl.: 6; Minimum order: $100

Customer service: I. Ulman

Products manufactured: Counters, Dielectric Heating Equipment, Filters, Furnaces, Meters

Local Sales Offices & Reps.

Cal	San Francisco, Microwave of Cal.	415-467-1071
NJ	Middletown, Juno-Mutz	201-774-8322

POWERCUBE CORP., 214 Calvary St., Waltham, Mass., 02154, Tel: 617-891-1830, TWX: 710-324-0300; FSC No: 31557; Empl.: 70

For info on price: Sls. Department; Application info: J. Prestidge; Customer service: L. Sampson; Delivery info: L. Sampson

Products manufactured: Converters, Inverters, Power Supplies

Local Sales Offices & Reps.

Cal	Palo Alto, Brooks Tech. Grp.	415-328-3232
Cal	Woodland Hills, Interstate Mktg.	213-883-7606
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Conn	East Hartford, Tekdata	203-525-7647
Fla	Boca Raton, Conley & Assocs.	305-395-6108
Fla	Oviedo, Conley & Assocs.	305-365-3283
Fla	Tampa, Conley & Assocs.	813-933-8183
Ill	Park Ridge, R F Specialists	312-698-2044
Ind	Fort Wayne, R F Specialists	219-485-8982
Iowa	Cedar Rapids, Technical Reps.	319-363-2489
Kans	Olathe, Technical Reps.	913-782-1177
Md	Baltimore, J. R. Daniel & Co.	301-825-3330
Mass	Burlington, Tekdata	617-273-0198
Minn	Minneapolis, Bitronics Sls. Co.	612-835-7744
Mo	Hazelwood, Technical Reps.	314-731-5200
NJ	Clifton, Compar New York	201-546-3660
NY	Albany, Reagan/Compar Albany	518-489-7408
NY	Endwell, Reagan/Compar Albany	607-723-8743
NY	Fairport, Reagan/Compar Albany	716-271-2230
NY	New Hartford, Reagan/Compar Albany	315-732-3775
Ohio	Milford, Knight Tech. Sls.	513-248-0193
Ore	Portland, Almac/Stroum Elctrns.	503-292-3534
Tenn	Bristol, Remco	615-968-4195
Tex	Dallas, Electra III Co.	214-243-5969
Utah	Salt Lake City, Simpson Assocs.	801-486-3731
Wash	Seattle, Almac/Stroum Elctrns.	206-763-2300
FOR:	Can., Toronto, Ont., Norgay Entprs.	416-233-2930

POWERTEC, INC., 9168 DeSoto Ave., Chatsworth, Cal., 91311, Tel: 213-882-0004, TWX: 910-494-2092; Empl.: 300 .... p. 1•1426,1427

For info on price: J. Poturny; Application info: S. Cole; Customer service: B. Turkish; Delivery info: M. Watson

Free literature available: OEM D.C. Power Supplies, Sub-Modular D.C. Power Supplies, High Frequency Switching Power Supplies, D.C. Power Supplies Short Form Catalog.

Products manufactured: Inverters, Power Supplies

Local Sales Offices & Reps.

Ariz	Scottsdale, J. Smith Assocs.	602-947-2495
Cal	Los Altos, Powertec, Inc.	415-941-6200
Colo	Boulder, J. Smith Assocs.	303-442-7100
Fla	Orlando, Powertec, Inc.	305-277-2458
Ill	Chicago, D. Dolin Sls.	312-286-6200
Iowa	Cedar Rapids, Comstrand	319-363-7495
Kans	Overland Pk., Sheridan Assoc.	913-383-1636
Md	Silver Spring, QED Elctrns. Inc.	301-588-8134
Mich	Farmington, Sheridan Assocs.	313-477-3800
Minn	Minneapolis, Comstrand Inc.	612-560-5300
Mo	Florissant, Sheridan Assocs.	314-837-5200
NH	Goffstown, Powertec, Inc.	603-497-4004
NJ	Tenafly, ABC/Garrettson Sls.	201-568-2354
NM	Albuquerque, J. Smith Assocs.	505-255-2111
NY	Melville, Powertec	516-549-0790
NY	Tarrytown, ABC/Garrettson Sls.	914-631-2650
NY	Williston Park, ABC/Electronic Sls.	516-747-6610
Ohio	Cincinnati, Sheridan Assocs.	513-761-5432
Ohio	Cleveland, Sheridan Assocs.	216-831-0130
Pa	Bethayers, ABC/Electronic Sls.	215-464-2275
Pa	Pittsburg, Sheridan Assocs.	412-244-1640
Tex	Dallas, Powertec	214-387-0529
Wash	Bellevue, A. Smith Co.	206-746-6770
FOR:	Can., Montreal, Que., John Weiss Co., Ltd.	514-489-6887

POWERTECH, INC., 9 Baker Ct., Clifton, N.J., 07011, Tel: 201-478-6205; FSC No: 32953; Empl.: 25

Customer service: A. M. Polner

Free literature available: POWER TRANSISTORS...Wall Chart describes a complete range of High-Current High-Voltage Silicon Power Transistors. Major specifications of each type are included for device selection. Each chart includes a postage-paid reply card enabling you to receive a complete catalogue with detailed specifications and price lists.

Products manufactured: Transistors

PPM, INC., 32 West Monroe St., Bedford, Ohio, 44146, Tel: 216-232-1880; Empl.: 10 .... p. 1•201,786

Free literature available: Thermal Digital Printers, Data Loggers & Strain, Gage Conditioners Described in Series of PPM Data Sheets

Products manufactured: Alarms, Amplifiers, Bridges, Calibrators, Clocks (All Types), Data Acquisition & Reduction Systems, Data Loggers, Generators, Indicators, Monitors, Power Supplies, Printers, Recorders, Scanners, Signal Conditioners & Equipment, Standards, Thermocouples, Elements & Accessories

Local Sales Offices & Reps.

Ariz	Glendale, Ed. Assocs.	602-247-5818
Cal	Long Beach, Saber Entprs.	213-595-5646
Colo	Westminister, Harvey Data Sys.	303-427-5299
Conn	Hamden, J. & J. Assocs.	203-624-7800
Md	Rockville, E. Winston & Co.	301-881-5780
Mass	Burlington, J & J Assocs.	617-272-2606
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NM	Albuquerque, J & D Assocs.	505-255-2377
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NY	Westbury, OAL Assocs.	516-334-1940
NC	Charlotte, Bimco	704-366-5092
Ohio	Cleveland, Tiby Co.	216-371-5335
Ohio	Dayton, Tiby Co.	513-277-3822

PRACTICAL AUTOMATION, INC., Trap Falls Rd., Shelton, Conn., 06484, Tel: 203-929-5381; Empl.: 150; Minimum order: $15

For info on price: R. Banzaca X29; Application info: E. Bokina X27; Customer service: J. Ives X31; Delivery info: B. Tobin X30

Free literature available: Digital printers, numeric and alphanumeric for data and terminal applications. Printing digital voltmeters and thermometers pulse printers & counters.

Products manufactured: Counters, Meters, Printers, Recorders

Local Sales Offices & Reps.

Cal	Montebello, Tucul Engrg.	213-728-7397
Cal	San Carlos, Electro Pacific	415-593-1334
Colo	Denver, Tessco	303-744-1119
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Md	Towson, Kraft Elctrn. Sls.	301-828-5838
Mass	Needham, J. J. Wild	617-444-2366
Mich	Grand Rapids, R. P. Urban & Assocs.	616-245-0511
Minn	Mpls., Wenco Sls.	612-866-3639
NJ	Woodbridge, J. J. Wild	201-636-7780
NY	Jericho, J. J. Wild	516-935-6600
NY	New Hartford, KLM Assocs.	315-735-8525
NY	Rochester, KLM Assocs.	716-442-0821
NY	Syracuse, KLM Assocs.	315-458-2199
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Pa	Newtown Sq., Holdsworth	215-356-8550
Tex	Dallas, Glidden Engrg. & Elctrn. Eqpt.	214-363-6539
Tex	Houston, Glidden Engrg. & Elctrn. Eqpt.	713-681-1415
Wash	Seattle, R. Johnston Co.	206-524-5170

PRD ELCTRNS., INC., Sub. of Harris Corp., 6801 Jericho Tpke., Syosset, N.Y., 11791, Tel: 516-334-7810, TWX: 510-222-4494; FSC No: 77327; Empl.: 1450; Minimum order: $25

For info on price: C. Calabrese; Application info: R. A. Lebowitz; Customer service: D. Palmer; Delivery info: R. Lebowitz

Free literature available: Application Note #22. Vector Voltmeter Measurement Techniques; Quick Guide to the RF and Microwave Instruments and Components from PRD Electronics, Inc.; VAST Operational.

Products manufactured: Adapters, Waveguide, Amplifiers, Analyzers, Attenuators, Bolometers, Bridges, Calibrators, Calorimeters, Microwave, Carriages, Probe, CATV Systems & Equipment, Cavities, Microwave, Couplers, Detectors, Dividers, Generators, Isolators, Kits, Training Aid, Meters, Mismatches, Microwave, Precision, Mixers, Monitors, Mounts, Multipliers, Oscillators, Power Supplies, Probes, Receivers, Slotted Lines, Microwave, Switches, Synthesizers, Terminals, Test Systems, Testers, Thermistors, Tuners, Waveguides & Adapters

Local Sales Offices & Reps.

Ala	Huntsville, Gentry Assocs.	205-534-9771
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Colo	Littletown, Aztec Entprs.	303-795-0250
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NM	Albuquerque, Aztec Entprs.	505-255-2440
NY	Plainview, Eastern-Metro Assoc.	516-931-1414
NC	Burlington, Gentry Assocs.	19-227-3639
Ohio	Cleveland, S. Sterling Co.	216-442-8080
Ohio	Dayton, PRD c/o Marcus/Gordon	513-256-9984
Ohio	Dayton, S. Sterling Co.	513-298-7573
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Tex	Richardson, Data Appls. Corp.	214-231-4846
Tex	San Antonio, Data Applications Corp.	512-732-7176
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Wisc	Brookfield, Pivan Engrg.	414-786-1940

PRECISION DIPBRAZE/TOR., see Energy Technology Corp.

PRECISION DYNAMICS CORP., Elctrns. Div., 3031 Thornton, Burbank, Cal., 91504, Tel: 213-845-7606, Telex: 65-1386; Empl.: 60; Minimum order: $100

For info on price: S. Charles; Application info: A. Schimmelman; Customer service: S. Charles; Delivery info: S. Charles

Free literature available: Catalogs with application's information and pricing data on request. These include information on standard PDC modules as well as PDC dual-in-line sockets.

Products manufactured: Converters, Counters, Display Devices/Displays, Drivers & Decoders For Readouts, Integrated Circuit Devices, Lamps, Sockets, Timers, Totalizers, Digital

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When your lead time is short, our off-the-shelf PDC series display modules can save you time and money on moderate volume or prototype applications. We have modules in a wide range of digit sizes. They include LED, incandescent and seven-segment numeric as well as dot-matrix alphanumeric. They're prewired for BCD logic and are ready to mount to your panel with just two screws. Ask for our catalog.

PRECISION ELECTRONICS, INC., 0101 King Ave., Franklin Park, Ill, 60131, Tel: 312-678-5350; Empl.: 75

For info on price: W. Stow; Application info: A. A. Hart; Customer service: J.. Nielsen; Delivery info: C. R. Franzen

Free literature available: Cat. # 1274 P.A.- Sound; Cat 2972-5034 Hi-Fi; Cat 2272-600 Hi-Fi; "G" Series Booklet-Commercial Sound.

Products manufactured: Amplifiers, Attenuators, Microphone Accessories (Including Stands, Holders, Booms), Receivers, Speaker Systems, Speakers, Tuners

Local Sales Offices & Reps.

Ala	Birmingham, M. K. Smith	205-967-3080
Cal	Los Angeles, E. E. Strassner Co.	213-666-1511
Cal	San Francisco, Meyer, Ross & Fleming	415-285-8880
DC	Washington, H. Wise & Co.	202-363-9417
Ga	Mariette, M. K. Smith	404-971-2831
Haw	Honolulu, Gene Piety Factors	
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La	Metairie, J. F. McKinney Sls.	504-887-1723
Minn	Minneapolis, J. E. Anderson	612-823-6459
NH	Londonderry, Associated Sys.	603-434-0731
NC	Charlotte, M. K. Smith	704-372-1026
Ohio	Columbus, Weller Elctrns. Sls.	614-885-7819
Okla	Tulsa, J. F. McKinney Sls.	918-742-6791
Tex	Dallas, J. F. McKinney Sls.	214-631-9450
EXP:	Plainview, N.Y., Morhan Exporting Corp.	516-293-5582
FOR:	Can., Dorval 740 Quebec, Superior Intl. Elctrns.	

PRECISION ELEC. CO., Federal Rd., Kezar Falls, Me., 04047, Tel: 207-625-3243, TWX: 710-990-7506; Empl.: 25

For info on price: R. Magline 201-666-3200; Application info: R. A. Kidder 207-625-3243; Customer service: R. O'Neill 207-625-3243; Delivery info: S. Aspinall 207-625-3243

Free literature available: Full Line Catalog; Mini Catalog; Soldering Iron Tip Brochure.

Products manufactured: Solder Pots & Baths, Soldering Accessories, Soldering Equipment, Soldering Guns, Irons & Desoldering Tools, Tweezers, Hand & Vacuum

Local Sales Offices & Reps.

Cal	El Monte, Federated Sls. Co.	213-283-8374
Cal	Mill Valley, Roy Cohen Sls. Co.	415-383-3555
Ill	Westchester, W. Gallagher Inc.	312-344-0690
La	New Orleans, Crockett Sls. Co.	504-486-4590
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NY	Liverpool (Rochester), W. T. Elliott	315-652-3690
NY	New York (Jackson Hts.), C. Landis Sls. Co.	212-458-7900
Ohio	Columbus, Mandabach Assocs.	614-235-0265
Ohio	Dayton, Carter McCormic & Pierce	513-278-5873
Pa	Aston, E-K-P Assocs.	215-459-4517
Pa	Easton, E-K-P Assocs.	215-691-5250
Pa	Pittsburgh, Mandabach Assocs.	412-279-2264
Tenn	Memphis, Crockett Sls. Co.	901-388-5410
Tex	Dallas, Crockett Sls. Co.	214-748-8209
Wash	Seattle, Don Smith Sls. Co.	206-633-3160
EXP:	Westwood, N.J., Lonor Sls. Intern'l. Ltd.	201-666-3200

PRECISION LAMP, INC., 950 N. Rengstorff Ave., Mountain View, Cal., 94043, Tel: 415-965-1333, Telex: 348498; Empl.: 25; Minimum order: $25

For info on price: M. Lawrence; Application info: G. Verwer; Customer service: M. Lawrence; Delivery info: M. Lawrence

Products manufactured: Lamps, Lights

Local Sales Offices & Reps.

Ariz	Phoenix, Controlyne, Inc.	602-254-9565
Cal	Anaheim, LoDan, Inc.	714-956-1560
Cal	Menlo Park, Straube Assocs.	415-323-2476
Colo	Denver, Straube Assocs.	303-426-0890
Conn	North Haven, Comp Rep Dists.	203-239-9762
Fla	Miami, Winfield Elctrn. Sls. Co.	305-945-6544
Ill	Chicago, G. McL. Cole Co.	312-774-3535
Ind	Fort Wayne, W.W. Bieberich Co.	219-432-2537
Ind	New Albany, W.W. Bieberich Co.	812-945-3187
Iowa	Des Moines, KSW Assocs.	513-279-9235
Md	Baltimore, Kaufholz Assocs.	301-488-6561
Mass	Needham, Comp. Rep. Distrs.	617-444-2484
Mich	Grand Rapids, J.L. Montgomery Assocs.	616-774-9308
Mich	Southfield, J.L. Montgomery Assocs.	313-358-2616
Minn	Minneapolis, R-J Inc.	612-922-1425
Mo	Kansas City, KSW Assocs.	816-358-5240
Mo	St. Louis, KSW Assocs.	314-781-6111
NJ	Upper Montclair, Controlyne, Inc.	201-746-8900
NM	Albuquerque, Straube Assocs.	505-292-0295
NY	Massapequa, R.D. McGrath	516-798-0400
Ohio	Cleveland, Goory Sales Co.	216-331-2055
Pa	Newtown Square, Kaufholz Assocs.	215-356-5000
Tex	Dallas, Scott Tech. Sls.	214-352-7698
Utah	Salt Lake City, Straube Assocs.	801-328-4513
Wash	Bellevue, W.M. Buehler Co.	206-455-5512
Wisc	Milwaukee, G. McL. Cole Co.	414-545-6083

PRECISION MECHANISMS CORP., 44 Brooklyn Ave., Westbury, N.Y., 11590, Tel: 516-ED 3-5955; FSC No: 08127; Empl.: 24 .... p. 1•1200,1919

For info on price: M. Gagnon; Application info: L. N. Canick; Customer service: M. Kornhauser; Delivery info: M. Gagnon

Free literature available: Bulletins 102, 103, 104, 106, 108, 109, 110 Designer's manual for assembly large variety geared mechanisms from stocked components. Self contained infinitely adjustable cam switches, limit stops. Slip clutches and antibacklash gears. Bulletin III tape perforator.

Products manufactured: Actuators, Clutches, Controls/Control Eqpt., Couplings, Drives & Drive Mechanisms (Dial), Gears & Gear Mechanisms (Precision), Indicators, Kits, Breadboarding (For Engineers), Limit Stops, Mechanical, Perforators, Reducers, Servo Systems, Switches, Timers

Local Sales Offices & Reps.

Cal	Cupertino, Eakins ASSOC.	408-255-6494
NY	Rochester, A & D Devices	716-586-8033

PRECISION METAL PRODS. CO., 41 Elm St., Stoneham, Mass., 02180, Tel: 617-438-3650, TWX: 710-393-0113; FSC No: 86577; Empl.: 54; Minimum order: $10

For info on price: R. A. Waite; Application info: C. F. Gerry; Customer service: R. D. Weadick; Delivery info: R. D. Weadick

Free literature available: PRESSERTS-CAPTIVE HARDWARE: 24-page catalog describing inserts and studs for thin metal and thread strength. No special tools required. TERMINALS-MINI-PINS: Complete 40-page booklet desciribing contact pins and soldering terminals for printed circuits and module applications.

Products manufactured: Fasteners, Pins, Spacers, Terminal Blocks, Boards & Strips, Terminals

Local Sales Offices & Reps.

Ariz	Phoenix, J. Osborn Assocs.	602-996-1291
Cal	Corte Madera, P. Oneal & Assocs.	415-924-1691
Cal	Garden Grove, Impact Elctrns., Inc.	213-431-3581
Colo	Denver, McLoud & Raymond Co.	303-756-1589
Fla	Winter Park, Steele Tech. Sls.	305-644-6641
Ga	Atlanta, Mr. G. O'Hara	404-237-0600
Ill	Chicago, Rusz Sls. Co.	312-631-7322
Ind	Fort Wayne, New/Era Sls., Inc.	219-432-1164
Ind	Indianapolis, New/Era Sls., Inc.	317-257-7333
Md	Baltimore, M/E Assocs.	301-825-1130
Mass	Andover, Sls. Engrg. Co.	617-470-0800
Mich	Lathrup Village, R.C. Nordstrom & Co.	313-559-7373
Minn	Hopkins, F. Peterson Co.	612-941-5400
NJ	Cherry Hill, M/E & Assocs.	609-667-6110
NY	Mount Vernon, Zauderer Assocs., Ins.	914-664-7385
NY	Syracuse, C.W. Floring & Assocs.	315-478-2149
Ohio	Cleveland, Electro-Com	216-886-2404
Ohio	Dayton, Electro-Com	513-276-3993

Tex Arlington, Chaparral Inds. 817-265-2418
Wash Kirkland, W.J. Stulgis Co. 204-822-3867
FOR: Can., Ville St. Laurent, P.Q., A. Deskin Sls. Corp. 514-331-2860

PRECISION MONOLITHICS INC., 1500 Space Dr., Santa Clara, Cal., 95050, Tel: 408-246-9222, TWX: 910-338-0528; Empl.: 250 .... p. 1•893

Products manufactured: Amplifiers, Converters, Drivers & Decoders For Readouts, Integrated Circuit Devices, Transistors

Local Sales Offices & Reps.
Ala Huntsville, W.A. Brown Comps. 205-539-4411
Ariz Tempe, Argus Sales, Inc. 602-967-8709
Cal El Toro, Elctrn. Comp. Mktg. 714-830-3939
Cal Newport Beach, R. Debowey 714-752-1760
Cal San Diego, Elctrn. Comp. Mktg. 714-295-6122
Cal Woodland Hills, Elctrn. Comp. Mktg. 213-340-1745
Colo Englewood, Checkmate Sls. 303-771-4920
Conn Wallingford, Com-Sale 203-269-7964
Fla Ft. Lauderdale, W.A. Brown Comps. 305-776-4800
Fla Orlando, W.A. Brown Comps. 305-425-5505
Ga Atlanta, W.A. Brown Comps. 404-457-4069
Ill Arlington Heights, J. Kennaugh 312-437-6697
Ill Chicago, G. McL. Cole Co. 312-774-3535
Ind Indianapolis, Jerry Ihrig Assoc., Inc. 317-783-7630
Md Baltimore, Stemler Assocs. 301-944-8262
Mass Waltham, Com-Sale 617-890-0011
Mich Detroit, A. Blumenberg Assocs. 313-557-1934
Minn St. Paul, Cahill Assocs. 612-646-7217
Mo Hazelwood, Dytronix, Inc. 314-731-5799
Mo Kansas City, Dytronix, Inc. 816-761-6543
NJ Cherry Hill, Stemler Assocs. 609-966-4070
NJ Keasbey, Addem II 516-567-5900
NJ Laurel Springs, Stemler Assocs. 215-644-3477
NM Albuquerque, Thorson Co. 505-265-5655
NY Huntington Station, Addem 516-567-5900
NY Rochester, Ontec Assocs. 716-464-8636
NY Smithtown, Sales Office (Mr. Mike Neidich) 516-785-3331
NC Raleigh, W.A. Brown Comps. 919-876-9061
NC Winston-Salem, W.A. Brown Comps. 919-725-5384
Ohio Cleveland, D. Steffen & Assocs. 216-461-8333
Ore Portland, SJI, Corp.
Tex Houston, Oeler & Menelaides, Inc. 713-772-0730
Tex Richardson, Oeler & Menelaides, Inc. 214-234-6334
Utah Salt Lake City, Checkmate Sales 801-268-3533
Va Alexandria, Stemler Assocs. 703-548-7818
Wash Seattle, Showalter-Judd, Inc. 206-624-9020
Wisc Milwaukee, G. McL. Cole Co. 414-545-6083

PRECISION PAPER TUBE CO., 1049 S. Noel Ave., Wheeling, Ill., 60090, Tel: 312-537-4250; Empl.: 185; Minimum order: $35

Customer service: D. Speer

Products manufactured: Bobbins, Winding, Coil & Transformer, Bumpers, Bushings, Glass, Plastic, Metal, Rubber, Etc., Caps, Forms & Tapes, Heat Shrinkable, Caps, Lenses, Indicator Light, Coils Including Assemblies & Forms, Connectors, Containers, Covers, Protective (Including Dust), Cups, Encapsulation, Grommets, Insulators & Insulation, Laminates, Machines/Machinery, Production, Shafts & Adapters, Shields, Spacers, Tubing

Local Sales Offices & Reps.
Ariz Phoenix, Tanler & Co. 602-279-1252
Cal Los Angeles, C.E. Riggs, Inc./C.D. Lamoree Co. 213-225-5631
Conn West Hartford, R.S. Pettigrew & Co. 203-233-8533
Mich Grand Junction, Goodell Sls. Co. 616-434-6757
Mo St. Louis, Tanler & Co. 314-645-0590
NJ Rocky Hill, Krone & Rubin Assoc. ... 609-924-0200.
NY Webster, J. Giovenco 716-671-6709
Ohio Cincinnati, I.W. Grothouse Assoc. 513-385-6562
Ohio Westlake, Buckeye Bobbin & Mfg. Div. 216-871-9020
Ore Portland, C.E. Riggs Inc./C.D. Lamorree Co. 503-226-3286
Wash Seattle, C.E. Riggs Inc./C.D. Lamorree Co. 206-623-5707
EXP: Can., Mississauga, Ont., Anbak Sls., Can., Ltd. 416-625-1061

PRECISION RESISTOR CO., INC., 109 U.S. Hwy. 22, Hillside, N.J., 07205, Tel: 201-926-3036; FSC No: 48615; Empl.: 40; Minimum order: $25

For info on price: W. F. Kirgan; Application info: R. L. Wright; Customer service: W. F. Kirgan; Delivery info: W. F. Kirgan

Products manufactured: Resistors, Shunts, Meter, Standards

PRECISION STANDARDS CORP., 1701 Reynolds, Santa Ana, Cal., 92705, Tel: 714-546-0431, 800-854-3253, TWX: 800-854-3253; Empl.: 25; Minimum order: $25

For info on price: M. Hill; Application info: S. Eitel; Customer service: T. Smith; Delivery info: M. Hill

Products manufactured: Bridges, Calibrators, Meters, Standards, Testers

Local Sales Offices & Reps.
FOR: Can., Montreal, Que., Electro-design 514-363-5120
FOR: Can., Toronto, Ont., Electro-design 416-787-0991
FOR: Can., Vanier-Ottowa, Ont., Electro-design 613-745-0541

PRECISION TIMER CO., 13 Westbrook Ind'l. Park, Westbrook, Conn., 06498, Tel: 203-399-6253; Empl.: 25 p. 1•268,269

Products manufactured: Clocks (All Types), Controllers, Programmable, Controls/Control Eqpt., Converters, Counters, Data Acquisition & Reduction Systems, Data Loggers, Delays, Time (Excluding Delay Lines, Timers, Delay & Relays, Time-Delays), Display Devices/Displays, Dividers, Electroplating Equipment & Supplies, Encoders, Flashers, Generators, Indicators, Integrated Circuit Devices, Meters, Motors, Power Drivers, Hybrid (High Current, High Voltage), Process Control Systems, Programmers, Recorders, Relays, Services, Assembly, Production & Test, Standards, Switches, Testers, Timers, Totalizers, Digital, Transmitters, Welding Equipment & Access. (Excluding Equip. for Semiconductor Devices)

Local Sales Offices & Reps.
Conn Westbrook, Precision Timer Co. 203-399-6253
Ill Lombard, Quadtron Assocs. 312-627-6800
Mass Millis, Selmark Assoc. 617-376-2914
NH Plaiston, Selmark Assocs., Inc. 603-382-4796

PRECISION TUBE, Church Rd. & Wissahickon, No. Wales, Pa., 19454, Tel: 215-699-5801, Telex: 84-6439; FSC No: 82413; Empl.: 170; Minimum order: $25

For info on price: M. F. Balch; Application info: A. J. West; Customer service: B. Dudinetz; Delivery info: B. Dudinetz

Free literature available: Catalog;Semi-rigid coaxial cable, cable assemblies, and delay lines made to customer's exact specifications.

Products manufactured: Cable, Delay Lines

Local Sales Offices & Reps.
Ariz Scottsdale, Carter Assocs. 602-947-4355
Cal Mt. View, Walter Assoc., Inc. 415-965-4131
Cal Santa Ana, RMS Assocs. 714-556-4155
Fla Melbourne, Hanson Assocs. 305-727-7474
Ga Alpharetta, K. Ekmark 404-475-4872
Ill Crystal Lake, MESA, Inc. 312-639-3359
Ind Indianapolis, Sukup & Cox, Inc. 317-253-1215
Iowa Cedar Rapids, Snider Sls. Co. 319-362-4410
Mass Burlington, Tri Tek, Inc. 617-272-4550
Minn St. Louis Park, Xylem Co. 612-920-9626
Mo St. Charles, Buse Sls. Co. 314-946-6430
NJ Haddonfield, Sunday-O'Brien 609-429-4013
NY Huntington, CDB Enterprises, Inc. .. 516-692-5200
NY Utica, B. D. Hummel Co. 315-736-7821
NC Charlotte, McLean Sls. Co. 704-366-2675
Tex Richardson, Lawrence Sls. 214-235-5504
Va Fairfax, Schibley Assocs. 703-591-3008
Wash Seattle, Blum & Assocs. 206-285-2590

PREFORMED LINE PRODUCTS CO., Box 91129, Cleveland, Ohio, 44101, Tel: 216-461-5200; Empl.: 450; Minimum order: $50

Customer service: W. J. Voelker

Products manufactured: Connectors, Services, Assembly, Production & Test, Spacers, Splices, wire (Including, Butt & Cap Types), Wire & Cable Ties

Local Sales Offices & Reps.
Ala Birmingham, Belcher & Assocs. 205-322-1733
Ala Birmingham, Glenn, Hirhman & Mills 205-591-6520
Ark Little Rock, C.H. Stout, Inc. 501-374-8201
Ark Rogers, Preformed Line Prods. Co. 501-636-7600
Cal Palo Alto, Preformed Line Prods. Co. 415-493-0170
Cal San Francisco, K.M. Ryals Co. 415-495-7090
Cal Woodland Hills, Smith Co. Div. 213-887-8600
Colo Denver, Peterson Co. 303-388-6322
Colo Littleton, R.J. Hodona 303-798-6729
Fla Jacksonville, Belcher & Assocs. 904-724-7811
Fla Long Wood, Belcher & Assocs. 305-830-7327
Fla Miami, Belcher & Assocs. 305-371-1700
Fla St. Petersburg, Belcher & Assocs. 813-822-3531
Ga Atlanta, Belcher & Assocs. 404-255-5481
Ga Decature, Glenn, Huhman & Mills, Inc. 404-284-4431
Ga Tucker, Preformed Line Prods. Co. 404-938-6820
Haw Honolulu, J.W. Smith 808-988-3079
Ill Schiller Park, JSG Elec. Co. 312-678-5990
Ind Indianapolis, Cory, Crum & English, Inc. 317-545-8593
Iowa Cedar Rapids, F.C. Clatterbaugh Co. 319-364-5557
Iowa Des Moines, F.C. Clatterbaugh Co. 515-282-3213
Ky Bowling Green, Dyer-Pederson Agency 502-842-9346
Ky Lexington, Dyer-Pederson Agency 606-266-7412
Ky Morganfield, Dyer-Pederson Agency 502-389-1744
La Baton Rouge, C.H. Stout of La. Inc. 504-927-8097
La New Orleans, C.H. Stout of La. Inc. 504-486-3707
La Shreveport, C.H. Stout of Shreveport, Inc. 318-425-5485
Md Annapolis, P.J. Martini & Assocs. ... 301-267-7462
Md Reistertown, Electrical Distributors Co. 301-833-4604
Mass Framingham, E.L. Flowers & Sons 617-879-4250
Mich Dearborn, G.R. Horne & Co. 313-561-1360
Mich Jackson, G.R. Horne & Co. 517-536-4387
Minn Faribualt, Dale E. Putrah & Assoc. ... 507-334-4431
Minn Minneapolis, Bergstrom-Verbarg Co. 612-FE9-0028
Miss Jackson, C.H. Stout of MS, Inc. 601-354-4326
Mo Kansas City, Cleaves-Bessmer, Inc. 816-353-6011
Mo St. Louis, Ken Way Co. 314-961-3062
Neb Lincoln, F.C. Clatterbaugh Co. 402-489-5912
Neb Omaha, Preformed Line Prods. 402-391-6570
NM Albuquerque, McKinley Sls. Co. 505-294-7349
NY Eastchester, M.N. Snyder & Sons, Inc. 914-337-6000
NY Horseheads, Canavan-Scanlon Assoc. 607-739-0810
NY Rochester, Canavan-Scanlon Assoc. 716-442-0720
NY Syracuse, Canavan-Scanlon Assoc. 315-437-1271
Ohio Vermilion, R.S. Howley Co. 216-967-7000
Okla Oklahoma City, C.B. Anderson Elec. Co. 405-751-2771
Okla Tulsa, C.B. Anderson Elec. Co. 918-TE6-4661
Ore Portland, Shaffer & Nelson, Inc. 503-234-7437
Pa Conshohocken, Electrical Distributions Co. 215-825-1305
Pa Pittsburgh, Burns Elec. Co. 412-823-5874
SC Columbia, Engr. Sls. Co. of Carculina, Inc. 803-253-4004
Tenn Memphis, C.H. Slout of TN, Inc. 901-362-1616
Tenn Nashville, J.S. Baron Assocs. 615-883-4748
Tex Dallas, E.B. Robertson, Inc. 214-942-2711
Tex Houston, E.B. Robertson, Inc. 713-785-6800
Tex Lubbock, E.B. Robertson, Inc. 806-746-6527
Tex Rio Hondo, B.J. Kohler Assocs. 512-226-5184
Tex San Antonio, E.B. Robertson, Inc. ... 512-824-0597
Utah Salt Lake City, Shaffer & Nelson, Inc. 206-523-0664
Wash Seattle, Shaffer & Nelson, Inc. 206-523-0664
Wash Spokane, Shaffer & Nelson, Inc. 509-624-1339

PREMAX PRODS. DIV., Chisholm-Ryder Co., Highland & College Aves., Niagara Falls, N.Y., 14305, Tel: 716-285-9186; FSC No: 74183; Empl.: 350; Minimum order: $15

For info on price: M. A. Finley; Application info: J. Maglio; Customer service: M. A. Finley; Delivery info: M. A. Finley

Products manufactured: Antennas, Mounts, Rods, Ground

Local Sales Offices & Reps.
Ariz Phoenix, Shefler-Kahn Co. 602-258-7893
Cal Culver City, DeAngelo, Rotham & Co. 213-398-6239
Cal La Selva Beach, Belchamber & French 408-722-0444
Colo Denver, G. Moss Elctrns., Inc. 303-985-8815
Colo Greeley, G. Moss Elctrns., Inc. 303-353-1452

DC	Washington, S.K. Macdonald, Inc.	202-265-3938
Kans	Shawnee Mission, K & M Sls. Co.	913-262-2444
La	La Combe, Scott Ormsby & Assocs.	504-882-7248
Md	Baltimore, S.K. Macdonald, Inc.	302-254-3380
Mass	Northboro, W.B. Pray Sls., Inc.	617-393-3434
NY	Rockville Centre, L.I., Willgold Elctrn. Sls. Corp.	516-764-4022
Ohio	Cincinnati, J.O. Olsen Co.	513-825-0678
Ohio	Cleveland, J.O. Olsen Co.	216-752-5444
Ore	Portland, R.M. Minthrone Co.	503-246-4556
Pa	Philadelphia, S.K. Macdonald, Inc.	215-545-1205
Pa	Pittsburgh, S.K. Macdonald, Inc.	412-366-2643
Tex	Carrollton, E. L. Wilks Co.	214-242-5321
EXP:	New York City, N.Y., M. Simons & Son Co.	212-227-5513

PREMIER METAL PRODS. CO., Div. Sunshine Mining Co., 337 Manida St., Bronx, N.Y., 10474, Tel: 212-991-6600; Empl.: 70; Minimum order: $25

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Free literature available: Cabinets and Enclosures Catalog: 16 pages in full color (Trimline Series); 30 pages Illustrated General Lines and Accessories; 24 pages of technical drawings.

Products manufactured: Blowers & Fans & Accessories, Cabinets & Accessories, Cases, Equipment, Instrument, Meter, Chassis, Metal, Drawers, Sliding, Frames, Cabinet & Rack, Grilles, Guides, Circuit Board, Handles For Cabinets, Circuit Boards, Racks, etc., Panels, Racks, Slides, Cabinet & Chassis

Local Sales Offices & Reps.

Ala	Birmingham, Adams & Assocs.	205-822-8109
Ariz	Scottsdale, G. DARCI	602-948-2240
Cal	Culver City, DeAngelo, Rothman & Co.	213-398-6239
Cal	Menlo Park, G.R. McKnight Co.	415-325-2844
Conn	Meriden, Eagle Assocs.	203-467-6542
Fla	Orlando, Adams & Assocs.	305-894-7185
Ga	Decatur, Adams & Assocs.	404-981-2207
Ill	Chicago, Ellinger Sls.	312-763-1570
Md	Towson, Habco Elctrns.	301-825-9637
Mass	Needham, Eagle Assocs.	617-444-3446
Minn	Minneapolis, J.E.M. Anderson Co.	612-823-6459
Mo	Kansas City, R.R. Burton Sls. Co.	816-444-8300
Mo	St. Louis, Delltron Co.	314-869-1351
NY	Liverpool, Lewis-Dunnigan Co.	315-622-2133
NY	Mt. Vernon, Sonkin Assocs.	914-668-9809
NY	New Hyde Park, Harris & Aldrich Sls.	516-488-2622
NC	Greenboro, Adams & Assocs.	919-272-6838
Ohio	Cleveland, ImTech Inc.	216-826-3400
Pa	Easton, E-K-P Assocs.	215-258-6477
Pa	Philadelphia, Eastern Instrumentation	215-927-7777
Tenn	Knoxville, Adams & Assocs.	615-577-4241
Tex	Garland, G.V. Peck	214-341-8311
Tex	Houston, G.V. Peck	713-MO4-1435
EXP:	Hallandale, Fla., Emec, Inc.	305-925-6366

Local Distributors

Ala	Opelika, Southern Elctrns., 309 S. 10th St.	205-745-6478
Cal	Burlingame, Rose Elec. Distrs., 846 Stanton Rd.	415-697-0224
Cal	San Jose, Quement Elctrns., Box 6000, 1000 S. Bascom Ave.	408-998-5900
Conn	Bridgeport, Westconn Elctrns. Inc., 195 Colorado Ave.	203-367-7747
Conn	E. Hartford, R & S Elctrn. Dist., 95 Leggett St.	203-528-9901
Conn	Waterbury, Bond Radio Elec. Co., 439 W. Main St.	203-757-0546
Fla	Miami, Electronic Equip. Co., 2701 N.W. 42nd Ave.	305-871-3500
Ind	Ft. Wayne, Ft. Wayne Ele. Supply, 3606 E. Maumee Ave.	219-423-3422
Ind	Indianapolis, Graham Elctrns., 133 S. Pennsylvania St.	317-634-8486
La	Lafayette, Ralph's Elctrns., 1732 Plank Rd.	504-344-3761
Md	Bethesda, Empire Elctrn. Supply, 4907 Rugby Ave.	301-OL-6-3300
Mass	Boston, Sager Elctrn. Corp., 172 High St.	617-542-2281
Mass	Newton, Greene Shaw Co., Chapel Bridge Pk., 70 Bridge St.	617-WO-9-8900
Mich	Ann Arbor, Purchase Radio Supply, 327 E. Hoover Ave.	313-668-8696
NJ	Edison, William Elctrns., 1863 Woodbridge Ave.	201-985-3700
NJ	Hanover, State Elctrns. Pts., 36 Route #10	201-887-2550
NJ	Springfield, Federated Purchasers, 155 U.S. Rte. #22	212-DI-9-3050
NJ	Springfield, Route Elctrns., Echo Plaza Rte. 22	201-467-0166
NJ	Union City, Nidisco Inc., 2812 Kennedy Blvd.	201-863-2111
NY	Albany, E. E. Taylor Co., 465 Central Ave.	518-438-4461
NY	Buffalo, Summit Distrs., 916 Main St.	716-884-3450
NY	Elmsford, Ancar Elctrns. Supply, One Nepperhan Ave.	914-LY-2-7100
NY	Farmingdale, Arrow Elctrns. Inc., 900 Broad Hollow Rd.	212-995-2100
NY	Farmingdale, Broadline Elec. Dist., 119 Marine St.	516-420-8320
NY	Hempstead, Electronics Equip. Co., 741 Peninsula Blvd.	212-895-5757
NY	L.I.C., H.L. Dalis, Inc., 35-35 24th St.	212-361-1100
NY	Lynbrook, Peerless Radio Dist. Corp., 19 Wilbur St.	212-523-3456
NY	New York, Martin Audio Corp., 320 W. 46 St.	212-541-5900
NY	Poughkeepsie, Chief Elctrns., 14 N. Bridge St.	914-471-1300
NY	Rochester, Summit Distrs., 292 Commerce Dr.	716-334-8110
NY	Rockville Ctr., Midway Indl., 24 Maple Ave.	516-764-2400
NY	Syosset, Lafayette Radio Corp., 111 Jericho Tpke.	516-921-7700
NY	White Plains, Westchester Elctrns., 602-610 Mamaroneck Ave.	914-965-1063
NY	Woodbury, Harvey Radio Corp., 60 Crossways Pk. W.	516-895-9260
Ohio	Dayton, ESCO Inc., 221 Crane St.	513-226-1133
Pa	Allentown, A. A. Peters, 404 Union Blvd.	215-434-5237
Pa	Altoona, Allegheny Elctrns., 800 Chestnut Ave.	814-946-0871
Pa	Philadelphia, Herbach & Rademan, 401 E. Erie Ave.	215-426-1700
Pa	Philadelphia, Philadelphia Elctrns., 112 N. 12th St.	215-568-7400
Pa	Philadelphia, Simco Inc., 3907-11 N. Broad St.	215-BA9-1880
Pa	Reading, Barbey Elctrns., Inc., 333 N. 4th St.	215-376-6116
Pa	West Chester, West Chester Elec. Supply, 716 E. Market St.	215-696-7500
RI	Providence, Wm. Dandreta Co., 28 Wolcott St.	401-861-2800
RI	Warwick, W.H. Edwards Inc., 55 Electric Dr.	401-781-8000
Tex	Dallas, All State O.E.M. Div., Summer Elec., Co., 510 S. Good Latimer Expwy.	214-651-0242
Tex	Ft. Worth, Swieco Inc., 1512-18 E. Lancaster	817-335-6521
Tex	Houston, Lenert Co., 1420 Hutchins	713-225-1465
Va	Arlington, Arlington Elctrns., 3636 Lee Hwy.	703-524-2412
Wash	Seattle, Radar Elec. Co., 168 Western Ave. W.	206-282-2511

PREMIER MICROWAVE, 35 New Broad St., Port Chester, N.Y., 10573, Tel: 914-939-8900; FSC No: 15870; Empl.: 60; Minimum order: $100

Customer service: J. Simmonds

Free literature available: Brochures illustrating "Rotary Joints," "MICROWAVE FILTERS" "MICROWAVE FRONT ENDS" and "MICROWAVE FERRITE DEVICES."

Products manufactured: Adapters, Waveguide, Amplifiers, Antenna Feed Systems, Antennas, Attenuators, Bends & Twists, Microwave, Cavities, Microwave, Chokes, Circulators, Ferrite, Converters, Couplers, Couplings, Delay Lines, Detectors, Discriminators, Dividers, Dummy Loads, Duplexers, Microwave, Filters, Flanges, Waveguide, Gaskets, Shielding, R-F-Also See Shields, R-F, Generators, Horns, Microwave, Impedance Converters, Microwave, Isolators, Joints, Rotary, Microwave, Junctions, Hybrid, Microwave, Line Strechers, Microwave, Meters, Mismatches, Microwave, Precision, Mixers, Modulators, All Kinds, Mounts, Networks, Preselector-Mixers, Preselectors, Probes, Receivers, Shifters, Shutters, Microwave, Slotted Lines, Microwave, Strip-Line Components, Microwave, Switches, Tees, Terminals, Transformers, Transmitters, Tubing, Tuners, Waveguides & Adapters

Local Sales Offices & Reps.

Ariz	Scottsdale, O.E.M. Specialties	602-948-3360
Cal	No. Hollywood, Crown Elctrn.	213-877-3550
Cal	San Mateo, Melvin Sls. Co.	415-349-7444
Fla	Orlando, BC Elctrns. Sls. Corp.	305-894-6071
Ga	Smyrna, BC Elctrnc. Sls. Corp.	404-436-5169
La	Metairie, J. F. McKinney Sls. Co.	504-887-1723
Md	Catonsville, Callas Elctrns. Dist.	301-744-7711
Mass	Natick, Gerald Rosen Co.	617-879-5505
Mo	St. Louis, G Fixman Engrg.	314-725-5219
NY	Huntington, C.D.B. Entprs.	516-692-5220
Ohio	Dayton, BEK Assocs.	513-278-1343
Okla	Tulsa, J. F. McKinney Sls.	918-742-6791
Tex	Bellaire, J. F. McKinney Sls. Co.	713-665-3653
Tex	Dallas, J. F. McKinney Sls.	214-631-9450
Va	Vinton, BC Elctrnc. Sls. Corp.	703-890-1128
EXP:	Cal., No. Hollywood, Air Frame Mfg. & Supply	213-765-2600
EXP:	New York, N.Y., Singer World Prods. Inc.	212-432-1400
FOR:	Can., Ville Lasalle 650, Que., Electrodesign Ltd.	514-363-5120

PRESS-ON PRODS., 39 Factory Rd., Addison, Ill., 60101, Tel: 312-543-9466; Empl.: 40

For info on price: T. Cummins; Application info: T. Cummins; Customer service: J. Tonne; Delivery info: J. Tonne

Free literature available: Catalog with samples attached of various Type gasketing tapes (pressure sensitive adhesive backed).

Products manufactured: Services, Assembly, Production & Test, Tapes, Electrical Insulation, Tapes, Films & Foils, Pressure Sensitive

PRESIN CO., INC., Trap Falls Rd., Shelton, Conn., 06484, Tel: 203-929-5381; Empl.: 150

Customer service: Sls. Desk

Products manufactured: Capacitors, Fixed, Controls/Control Eqpt., Counters, Networks, Printers, Protectors, Recorders, Suppressors, Timers, Totalizers, Digital

Local Sales Offices & Reps.

Cal	Montebello, Tucul Engrg.	213-728-7397
Cal	San Carlos, Electro Pacific	415-593-1334
Colo	Denver, Tessco	303-744-1119
Fla	Hialeah, Shaw Engrg. & Sls.	305-822-6141
Ill	Arlington Heights, Martec Assocs.	312-956-8090
Md	Towson, Kraft Elctrn.	301-828-5838
Mich	Detroit, R.P. Urban & Associates	313-535-2355
Mich	Grand Rapids, R.P. Urban & Associates	616-245-0511
Minn	Mpls., Wenco Sls.	612-866-3639
NJ	Ridgewood, Ballou, Inc.	201-444-6990
NY	New Hartford, KLM Associates Inc.	315-735-8525
NY	Rochester, KLM Associates Inc.	716-442-0821
NY	Syracuse, KLM Associates Inc.	315-458-2199
NC	McLeansville, Ron Ingle Assoc.	919-697-0787
Ohio	Chagrin Falls, J. Kilroy	216-247-8997
Pa	Newtown Sq., Holdsworth	215-356-8550
Tex	Dallas, Glidden Engrg. & Elctrn. Equip. Corp.	214-363-6539
Tex	Houston, Glidden Engrg. & Elctrn. Equip. Corp.	713-681-1415
Wash	Seattle, R. Johnston Co.	206-524-5170

PRESTOLITE WIRE DIVISION, An Eltra Co., Box 649, Port Huron, Mich., Tel: 313-985-6131

Products manufactured: Cable, Wire

PRESTON SCIENTIFIC INC., 805 E. Cerritos Ave., Anaheim, Cal., 92805, Tel: 714-776-6400, Telex: 66-5432; Empl.: 85; Minimum order: $25

p. 1•12,13,194-199

For info on price: N. Hummel, 714-776-6400; Application info: N. Hummel, 714-776-6400; Customer service: C. Currier, 714-776-6400; Delivery info: M. Montooth, 714-776-6403

Free literature available: Amplifier (DC) Technical Data Sheets: 8300XWB Series, XWBRC Series, Amplifier User Survey Report, Balanced Precision-Technical Discussion of CMV/CMRR, Bias Current Drift, 10 New Options Brochure. A/D Conversion Technical Data Sheets: GMAD1, 2 & 3 ADC Systems, GMAD-01 Ultra East (1 to 10 MHz) ADC, GMAD4 ADC Systems, Data Acquisition Systems & Components.

Products manufactured: Amplifiers, Converters, Data Acquisition & Reduction Systems, Multiplexers

Local Sales Offices & Reps.

Ala	Huntsville, Int'l. Scientific Instrs.	205-837-1601
Ariz	Scottsdale, Williams Assocs.	602-947-4297
Cal	Anaheim, Preston-Ana	714-776-6400
Cal	San Jose, MCH Assocs.	408-246-7330
Colo	Denver, Williams Assocs.	303-373-4730

Conn	Avon, Inst. Dynamics Inc.	203-678-1088
Fla	Orlando, Truex Assocs.	305-859-2160
Ind	Indianapolis, Holsapple & Assocs.	317-899-2890
Kans	Shawnee Mission, Techn. Sls. Assocs.	913-888-3330
Md	Greenbelt, Riffe Assocs.	301-474-8600
Mass	Wakefield, Instr. Dynamics Inc.	617-245-5100
Mich	Royal Oak, Hocker Assocs.	313-549-3910
Mo	Ferguson, Techn. Sls. Assocs.	314-725-5361
NM	Albuquerque, Williams Assocs.	505-255-1638
NY	Pittsford, Ossmann Instruments	716-385-2770
NY	Westbury, Tech-Rep Engrg. Sls.	516-997-7946
NC	Winston-Salem, Radco	919-722-9671
Ohio	Dayton, Hocker Assocs.	513-298-8638
Ohio	N. Olmsted, Hocker Assocs.	216-734-4433
Pa	Jenkintown, Stein Instrumentation Corp.	215-885-2370
Tex	Dallas, R. Martin Assocs.	214-361-8584
Tex	Houston, R. Martin Assocs.	713-462-4077
Wash	Bellevue, Brennan Assocs.	206-454-9332

PRIME COMPUTER INC., 145 Pennsylvania Ave., Framingham, Mass., 01701

PRIMO COMPANY LTD., 25-1, 6-Chome, Mure, Mitakashi, Tokyo, Japan, Tel: 0422-43-3121, Telex: 2822-326J; Empl.: 400 .... p. 1•30

Products manufactured: Comm. Systems, Microphone Accessories (Including Stands, Holders, Booms), Microphones, All Kinds

Local Sales Offices & Reps.

Ill	Chicago, Primo Microphone Inc.	312-595-1022

PRIMO MICROPHONE INC., 2468 Delta La., Elk Grove Village, Ill., 60007, Tel: 312-595-1022, Telex: 28-3474; Empl.: 6

Products manufactured: Handsets, Chestsets, Headphones, Headsets, Etc., Meters, Microphone Accessories (Including Stands, Holders, Booms), Microphones, All Kinds, Mixers, Transformers

Local Sales Offices & Reps.

Ind	Fort Wayne, Morris-Cunningham Assoc.	219-485-3612
Ind.	Indianapolis, Morris-Cunningham Assoc.	317-255-2548
Tex	Addison, Parvin Sls.	214-661-5374
Tex	Houston, Parvin Sls.	713-784-9900

PRINCETON APPLIED RESCH. CORP., Box 2565, Princeton, N.J., 08540, Tel: 609-452-2111, Telex: 84-3409; Empl.: 225; Minimum order: $50

For info on price: S. Elkins; Application info: S. Letzter; Customer service: S. Elkins; Delivery info: S. Elkins

Free literature available: Photon Counting Catalog #T-335, contains complete specifications on Princeton Applied Research Corporation ratemeters, digital counters, amplifier discriminators, quantum photometers and photon counting accessories. Signal Averager Catalog #T-220B, contains complete specifications of our MOdel 162 Dual Channel Boxcar, Model 160 Single Channel Boxcar, Model TDH-9 100 Point Averager and Model CW-1 Single Channel Boxcar. Preamplifier specifications and accessories as well as several application summaries are included.

Lock-In Amplifiers Catalog #T218B contains complete specifications of all Princeton Applied Research Lock-ins, light choppers, ratiometers, low noise preamplifiers and current sensitive preamps. This Lock-In catalog also contains short section on How Lock-ins work, where to use them, how to choose one, a section on noise and 9 typical applications. Optical Multichannel Analyzer Catalog #T-336 describes Princeton Applied Research's 500 channel OMA. Complete specs on our Model 1205B Detector assembly.

Model 1205D Intensified Detector Head and Model 1205E IR Enhanced Vidicon Detector Head. Cooled Detector Heads are also described as well as several application summaries.

Products manufactured: Amplifiers, Analyzers, Cases, Equipment, Instrument, Meter, Controls/Control Eqpt., Converters, Data Acquisition & Reduction Systems, Detectors, Indicators, Integrators, Electronic, Magnetometers, Meters, Monitors, Multipliers, Signal Averagers, Signal Conditioners & Equipment, Transducers, Transformers

Local Sales Offices & Reps.

Cal	Anaheim, Princeton Applied Resch. Corp.	714-635-6710
Cal	Burlingame, Princeton Applied Resch. Corp.	415-347-0786
Colo	Denver, GRIFCO	303-722-4674
Fla	Orlando, E. G. Holmes & Assoc.	305-894-8901
Ga	Chamblee, H.G. Holmes & Assoc.	404-451-6161
Ill	Deerfield, Princeton Applied Resrch. Corp.	312-498-5858
Kans	Shawnee Mission, EIR Co.	913-362-0919
Md	Rockville, Princeton Applied Resch. Corp.	301-881-3120
Mass	Bedford, Princeton Applied Resch. Corp.	617-275-2100
Mo	Hazelwood, EIR Co.	314-895-4100
NM	Albuquerque, Fry Gates Co.	505-298-1875
Ohio	Cleveland, Princeton Applied Resrch. Corp.	216-333-1244
Tex	Dallas, Southwestern Engrg. & Equip. Co.	214-826-6661
Tex	Houston, Southwestern Engrg. & Equip. Co.	713-623-2580
Va	Virginia Beach, E.G. Holmes & Assoc.	804-481-6556
FOR:	Can., Longueuil, Quebec, Allan Crawford Assoc.	514-670-1212
FOR:	Can., Mississauga, Ont., Allan Crawford Assoc.	416-678-1500
FOR:	Can., Ottawa, Ont., Allan Crawford Assoc.	613-829-9651
FOR:	Can., Vancouver, B.C., Allan Crawford Assoc.	604-253-7136

PRINCETON ELCTRN. PRODS., Box 101, New Brunswick, N.J., 08902, Tel: 201-297-4448; Empl.: 70

For info on price: W. M. Herbener; Application info: R. Lenskold; Customer service: R. Lenskold; Delivery info: R. Lenskold

Products manufactured: Comm. Systems, Converters, Counters, Delays, Time (Excluding Delay Lines, Timers, Delay & Relays, Time-Delays), Detectors, Display Devices/Displays, Integrators, Electronic, Memories, Buffer, Scanners, Terminal Equipment, Digital, Terminals, Data Display (including Alphanumeric & Graphic), Tubes

Local Sales Offices & Reps.

Ariz	Phoenix, Moxon Elctrns.	602-273-7363
Cal	Irvine, Moxox Elctrns.	714-556-6500
Cal	San Diego, Maxon Elctrns.	714-292-4820
Cal	Sunnyvale, Moxox Elctrns.	408-249-2491
DC	Washington, QED Elctrns.	301-588-8134
Ind	Fort Wayne, R.O. Whitesell & Assoc.	219-432-5591
Ind	Indianapolis, R. O. Whitesell & Assoc.	317-359-9283
Ky	Louisville, R. O. Whitesell & Assoc.	502-893-7303
Md	Rockville, Wiltronix	301-460-1454
Mass	Cambridge, Media Systems	617-876-0164
Mich	Farmington, George Tallman	313-557-0974
Mich	Southfield, R. O. Whitesell & Assoc.	313-358-2020
Mich	St. Joseph, R. O. Whitesell & Assoc.	616-983-7337
Ohio	Columbus, R. O. Whitesell & Assoc.	614-888-9396
Ohio	Lakewood, R. O. Whitesell & Assoc.	216-228-7525
Okla	Norman, Data Marketing Assoc. Inc.	405-364-8320
Pa	Norristown, Data Engrg. Co.	215-272-1444
Pa	Pittsburg, R. O. Whitesell & Assoc.	412-344-7277
Tex	Dallas, Data Marketing Assoc. Inc.	214-661-0300
Tex	Houston, Data Marketing Assoc. Inc.	713-686-9627

PRINTACT RELAY DIV., Executone Inc., Box 1430EM, Long Island City, N.Y., 11101, Tel: 212-EX2-4800; Empl.: 500 .... p. 1•1683

Products manufactured: Relays

Local Sales Offices & Reps.

Cal	Orange, Sales & Mktg. Assoc.	714-997-5720
Cal	San Francisco, R. Slater	415-392-9154
Cal	Tarzana, R. Capell Co.	213-987-2233
Colo	Colorado Springs, E.M.C./P. Hale	303-244-3217
DC	Washington, H. Wise	202-363-9417
Ill	Chicago, A. Woods & Assoc.	312-283-7400
Ind	Indianapolis, Marketing Engineers	317-546-1523
Mass	Wakefield, Measurement Equip. Co.	617-245-4870
Mich	Dearborn Hgts., Ankofski Assoc.	313-565-6330
Minn	Anoka, K. Haugen & Assoc.	612-421-3395
Mo	Grandview, K-MAR Engrg. & Sls.	816-763-3466
NM	Albuquerque, IMEC	505-883-9010
NY	Jamaica, S.A.M. Assocs.	212-658-8881
Ohio	Englewood, AD-EL-TEK	513-836-2741
Pa	Phila., H. Goodman	215-CH 7-7116
Wash	Seattle, R. R. Slater	206-622-3860
FOR:	Can., Toronto, Ont., ANRO Electronic Ltd.	416-661-2607

PROCESS & INSTRS. CORP., 1943 Broadway, Brooklyn, N.Y., 11207, Tel: 212-452-8380; Empl.: 28

For info on price: E. Greenspan; Application info: J. Greenspan

Free literature available: Our firm designs and manufactures scientific instruments as per enclosed circular.

Products manufactured: Services, Assembly, Production & Test

PRODUCTION DEVICES, 7857 Raytheon Rd., San Diego, Cal, 92111, Tel: 714-278-1141

Customer service: D. Press

Free literature available: Brochures on all products-8 1/2 x 11.

Products manufactured: Generators, Machines/Machinery, Production, Probes, Testers

Local Sales Offices & Reps.

Ala	Huntsville, Elmar Assocs.	205-881-0274
Ariz	Phonenix, B. G. Sls. Co.	602-266-7252
Cal	Encino, Wayne Dinsmore	213-622-2849
Cal	San Francisco, Technical Sls. Assocs.	415-467-1434
Cal	Simi, Wayne Dinsmore	805-527-1097
Colo	Colorado Springs, Norris & Co.	303-635-9319
Colo	Denver, Norris & Co.	303-988-6430
Ga	Atlantic, Elmar Assocs.	404-261-4345
Ill	Chicago, Markal Sls. Corp.	312-282-5800
Ind	Indianapolis, Mid-Central Sls. Co.	317-283-1727
Ky	Louisville, Mid-Cental Sls. Co.	502-239-5614
Md	Silver Springs, Sherr Assocs.	301-593-2477
Mass	Lynn, Keene Sls. Co.	617-595-2300
Minn	Minneapolis, John E. M. Anderson Co.	612-823-6459
Mo	St. Louis, Baumhauer & Assocs.	314-843-4123
NY	Massapequa Park, Brown Elctrn. Sls.	914-779-7330
NY	Rochester, Brown Elctrn. Sls.	716-266-2728
NY	Yonkers, Brown Elctrn. Sls.	914-779-7330
NC	Burlington, E. P. Ester Co.	919-584-1568
Ohio	Cleveland, H. Miller Sls. Co.	216-321-3900
Ohio	Jamestown, Hank Miller Sls.	513-675-2059
Ore	Portland, R. M. Minthorne Co.	503-246-4556
Pa	Pittsburg, H. Miller Sls.	412-782-1882
Tex	Dallas, Berthold Sls. Co.	214-526-8329

PRODUCTS FOR RESEARCH, INC., 78 Holten St., Danvers, Mass., 01923, Tel: 617-774-3250, Telex: 94-0287; Empl.: 26

Customer service: H. Martin

Free literature available: Catalogue No. 103 gives complete performance and general spec's. on our entire line of photomultiplier housing and support equipment.

Products manufactured: Chamber, Environmental Test, Oceanographic Equip. (Electronic), Photomultiplier Tube Housings, Power Supplies

Local Sales Offices & Reps.

Cal	North Hollywood, O'Halloran Assocs.	213-877-0173
Cal	Palo Alto, O'Halloran Assocs.	415-326-1493
Cal	San Diego, O'Halloran Assocs..	714-224-2824
Ill	Aurora, Dwight Smith & Assoc.	312-896-0828
Md	Wheaton, Applied Science Mktg.	301-933-2566
NM	Albuquerque, Thorson Co.	505-265-5655
Va	Vienna, Applied Science Mktg.	703-281-3638

PROGRAM DATA CO., 739 E. 223 St., Carson, Cal., 90745, Tel: 213-830-3016; Empl.: 20; Minimum order: $25

For info on price: R. Russo 213-830-3016; Application info: R. Russo 213-830-3016; Customer service: R. Russo 213-830-3016; Delivery info: J. Hatfield 213-830-3049

Free literature available: Probing Fixtures, PC Board Test, Probe Contacts, Pneumatic Connectors, Probe Heads, Boards, Programming.

Products manufactured: Boards, Programming, Connectors, Jigs And Fixturas, Chassis & Circuit Board, Probes, Test Systems, Testers

PROGRAMMED POWER, INC., 141 Jefferson Dr., Menlo Park, Cal., 94025, Tel: 415-323-8454, Telex: 34-8323; Empl.: 15; Minimum order: $20

For info on price: N. Funnell; Application info: R. L. Cooper; Customer service: N. Funnell; Delivery info: N. Funnell

Free literature available: Data sheets and pricing information on our complete family of power line disturbance monitors and frequency converters, including article reprints of interest.

Products manufactured: Converters, Detectors, Inverters, Monitors, Power Supplies, Recorders

Local Sales Offices & Reps.

Ariz	Phoenix, R. A. Mayes Co.	602-279-5243
Cal	Oakland, Advanced Technology	415-452-1401
Cal	Van Nuys, Gordon-Elliot	213-873-6862
Colo	Boulder, R. A. Mayes Co.	303-444-0782
Conn	Hamden, P. Jenks Assocs.	203-281-0810
Fla	Orlando, E. G. Holmes & Assocs.	305-894-8901
Ga	Chamblee, E. G. Holmes & Assocs.	404-451-6161
Haw	Honolulu, Aloha Assocs.	808-941-1574
Ill	Glen Ellyn, J.T. Becker Assocs.	312-858-1911
Ind	Indianapolis, Holsapple Assocs.	317-899-2890
Kans	Olathe, Technical Reps.	913-782-1177
Md	Silver Spring, Tri-Tech Engrg.	301-585-8280
Mass	Wakefield, P. Jenks Assocs.	617-246-1590
Mich	Detroit, Group Ten	313-549-3910
Minn	Minneapolis, Waytek	612-933-2133
Mo	Hazelwood, Technical Reps.	314-731-5200
NM	Albuquerque, R.A. Mayes Co.	505-292-2330
NY	DeWitt, db Assocs.	315-446-0220
NY	Great Neck, Meas. Technology Inc.	516-482-3500
Ohio	Cleveland, Group Ten	216-486-2800
Ohio	Dayton, Group Ten	513-277-6531
Pa	Norristown, Data Engrg. Co.	215-279-8146
Tex	Houston, R.A. Mayes Co.	713-461-5385
Tex	Richardson, R.A. Mayes Co.	214-235-3043
Utah	Centerville, R.A. Mayes Co.	801-292-6781
Wash	Seattle, Dayne Hansen & Assocs.	206-248-1884

PROJECTS UNLIMITED, INC., 3680 Wyse Rd., Dayton, Ohio, 45414, Tel: 513-890-1918, TWX: 810-450-2523; Empl.: 49; Minimum order: $15
p. 1•270,271

For info on price: D. L. Wyse; Application info: G. Stephens; Customer service: D. L. Wyse; Delivery info: C. Chambers

Products manufactured: Alarms, Amplifiers, Bells, Buzzers, Gongs, Sirens & Aural Warning Devices, Connectors, Flashers, Generators, Networks, Posts, Probes, Relays, Services, Assembly, Production & Test, Testers

Local Sales Offices & Reps.

Ariz	Scottsdale, Williams Assocs.	602-947-4297
Cal	Anaheim, L & M Sls.	714-774-0492
Cal	Menlo Park, Long & Assocs.	415-327-1300
Colo	Denver, Williams Assocs.	303-373-4730
Ill	Addison, R. Stemm, Inc.	312-279-2440
Ind	Fort Wayne, R.O. Whitesell	219-432-5591
Ind	Indianapolis, R.O. Whitesell Co.	317-359-9283
Ind	Kokomo, R.O. Whitesell Co.	317-452-6065
Iowa	Cedar Rapids, Palatine Sls. Co.	319-365-8071
Kans	Andover, Palatine Sls. Co.	316-683-7512
Kans	Overland Park, Palatine Sls. Co.	913-262-5643
Ky	Louisville, R.O. Whitesell	502-893-7303
Mass	Sharon, Adcour	617-784-3396
Mich	Grand Rapids, R.O. Whitesell Co.	616-451-8901
Mich	Southfield, R.O. Whitesell Co.	313-358-2020
Mich	St. Joseph, R.O. Whitesell Co.	616-983-7337
Mo	St. Louis, Palatine Sls. Co.	314-426-7055
NM	Albuquerque, Williams Assoc.	505-255-1638
NY	Glen Head, J.A. Keeneth Co.	516-676-1355
Ohio	Cincinnati, R.O. Whitesell & Assocs.	513-521-2290
Ohio	Cleveland, R.O. Whitesell	216-228-7525
Ohio	Columbus, R.O. Whitesell & Assocs.	
Ohio	Dayton, R.O. Whitesell	513-298-9546
Okla	Tulsa, Palatine Sls. Co.	918-622-0321
Pa	Concordville, J. Hanlon Jr.	215-459-4276
Pa	Pittsburgh, R.O. Whitesell	412-244-7277
Tenn	Bristol, Rakes Engrg. & Mktg. Corp.	615-968-4195
Tex	Austin, Palatine Sls. Co.	512-451-7463
Tex	Dallas, Palatine Sls. Co.	214-231-9489
Tex	Houston, Palatine Sls. Co.	713-777-4477
Wash	Seattle, F. Jackson Co.	206-782-2211

PRO-LOG CORP., 825 Airport Rd., Monterey, Cal., 93940

PROMEMCO, INC., 181 Bridge Rd., Hauppauge, N.Y., 11787, Tel: 516-582-9388; Empl.: 22
p. 1•1847; p. 2•1784

Products manufactured: Amplifiers, Capacitors, Fixed, Computers, Converters, Drivers & Decoders For Readouts, Integrated Circuit Devices, Kits, Breadboarding (For Engineers), Memory Systems, Services, Assembly, Production & Test, Transformers, Transistors

Local Sales Offices & Reps.

NJ	Tenafly, ABC Elctrn. Sls. Co.	201-568-2354
NY	Tarrytown, ABC Elctrn. Sls. Co.	914-631-2650
NY	Williston Park, ABC Elctrn. Sls. Co.	516-747-6610
Pa	Bethayres, ABC Elctrn. Sls. Co.	215-464-2275

PROTECTOWIRE CO., Hanover, Mass., 02339, Tel: 617-826-2626; Empl.: 17; Minimum order: $15

For info on price: C. J. Lane; Application info: J. T. King; Customer service: C. M. Sullivan; Delivery info: C. J. Lane

Free literature available: Brochures describe-protectowire's line of UL and FM approved fire detection products and alarm systems. Featuring unique line type heat sensitive cables for fire detection in a wide variety of applications.

Products manufactured: Alarms, Annunciators, Bells, Buzzers, Gongs, Sirens & Aural Warning Devices, Cable, Cable Fault Locators

PROTO MATIC CO., 11699 Chesterdale Rd., Cincinnati, Ohio, 45246, Tel: 513-771-1780; Empl.: 30; Minimum order: $25

For info on price: R. Carver; Application info: R. Carver; Customer service: V. Dahl; Delivery info: V. Dahl

Free literature available: Facilities Brochure - Describes electronic mfg. service capability. Stepping Motor Controller Brochure - Describes controller used for cross-slide compensation and diamond trueing on centerless grinders. May be used whenever precision motion control is required.

Products manufactured: Cards, Logic, Controls/Control Eqpt., Deposition Equipment, Vacuum & Accessories, Integrated Circuit Devices, Services, Assembly, Production & Test, Testers

PSC TECHNOLOGY INC., 1200 Grand Central Ave., Glendale, Cal., 91201, Tel: 213-245-8424; Empl.: 65; Minimum order: $25

For info on price: D. E. Stults; Application info: R. Christopherson; Customer service: S. Hatounian; Delivery info: D. E. Stults

Free literature available: Gamma 70 - 70 mm data recording and/or oscilloscope camera. UV-3850 - High speed lead pattern printer for IC's. Contact prints onto Super 8mm, 35 mm, 32mm, 70mm copper coated polyimide base film.

Products manufactured: Cameras, Machines/Machinery, Production

PSG INDUSTRIES INC., 1225 Tunnel Road, Perkasie, Pa., 18944, Tel: 212-257-3621; Empl.: 74; Minimum order: $50

For info on price: R. Whitekettle; Application info: R. Whitekettle; Customer service: L. Solliday; Delivery info: Cust. Svc.

Free literature available: HY-Switch Thermostat - High accurancy, low cost Thermostats, Sub Miniature Thermostats - High accuracy ultra-small Thermostats (.625" long X .093" wide) SSTC Series Solid State Thermostats - High accuracy Thermostats that will handle load to 5 amps.

Products manufactured: Alarms, Bi-Metals, Thermostatic, Controls/Control Eqpt., Relays, Services, Assembly, Production & Test, Sockets, Switches, Thermistors, Thermocouples, Elements & Accessories, Thermometers, Resistance, Thermostats

PTS ELECTRONICS INC., Box 272, Bloomington, Ind, 47401, Tel: 812-824-9331; Empl.: 170

Customer service: J. D. Craig

Products manufactured: Cleaners & Solvents, Services, Assembly, Production & Test, Testers, Tools, Tuners

Local Sales Offices & Reps.

Ala	Birmingham	205-323-2657
Cal	Sacramento	916-482-6220
Cal	San Diego	714-280-7070
Colo	Arvada	303-423-7080
Fla	Jacksonville	904-389-9952
Fla	Miami	305-685-9811
Ind	Bloomington	812-824-9331
Kans	Kansas City	913-831-1222
La	Metairi	504-885-2349
Md	Silver Spring	301-565-0025
Mass	Springfield	413-734-2737
Mich	Detroit	313-862-1783
Minn	Minneapolis	612-824-2333
Mo	St. Louis	314-428-1299
NJ	E. Paterson	201-791-6380
NY	Buffalo	716-891-4935
NC	Charlotte	704-332-8007
Ohio	Cincinnati	513-821-2298
Ohio	Cleveland	216-845-4480
Okla	Oklahoma City	405-947-2013
Ore	Portland	503-282-9636
Pa	Philadelphia	215-724-0999
Pa	Pittsburgh	412-761-7648
Tenn	Memphis	901-365-1918
Tex	Houston	713-644-6795
Tex	Longview	214-753-4334

PULSE ENGRG., INC., Box 12235, San Diego, Cal, 92112, Tel: 714-279-5900, TWX: 910-335-1527; Empl.: 300; Minimum order: $250

For info on price: J. Collins; Application info: B. McColey; Customer service: J. Collins; Delivery info: J. Collins

Products manufactured: Circuits, Hybrid, Thick Film, Coils Including Assemblies & Forms, Delay Lines, Networks, Reactors, Resistors, Transformers

Local Sales Offices & Reps.

Cal	San Diego	714-279-5900
Cal	Santa Clara	408-248-6040
Cal	Studio City	213-872-0735
Fla	Boca Raton	305-391-3803
Ill	Chicago	312-992-3720
Mass	Waltham	617-894-0950
Pa	Abington	215-887-4343

PULSE TECHNIQUES, INC., 1411 Palisade Ave., Teaneck, N.J., 07666, Tel: 201-837-2575

Customer service: E. R. Shenk

Free literature available: Catalog describing audio program equalizers & program and sound effects filters.

Products manufactured: Amplifiers, Equalizers, Filters

PURE CARBON CO., INC., 441 Hall Ave., St. Marys, Pa., 15857; Empl.: 750

Products manufactured: Bearings, Brushes & Brush Assemblies, Bushings, Glass, Plastic, Metal, Rubber, Etc., Graphalloy Products, Graphite Parts, Materials, Self-Lubricating

Local Sales Offices & Reps.

Cal	LaCanada, Pure Carbon Co.	213-790-1830
Conn	Bristol, Pure Carbon Co.	203-247-5019
Ga	Marietta, Pure Carbon Co.	404-436-9067
Ill	East Peoria, Pure Carbon Co.	309-699-1935
Ill	Park Ridge, Pure Carbon Co.	312-825-7686
Ind	Hammond, W.C. Boldt	219-931-7091
Mich	Plymouth, Pure Carbon Co.	313-453-7310
NJ	Carlstadt, Hoyt Sls. Co.	201-935-0044
NY	Camillus, Pure Carbon Co.	315-487-1439
Ohio	Centerville, Pure Carbon Co.	513-433-1314
Ohio	Chagrin Falls, Pure Carbon Co.	216-338-3900
Tex	Fort Worth, R.E. Porter	817-281-1415
Wash	Seattle, Pure Carbon Co.	206-542-1844
Wisc	Lake Mills, Pure Carbon Co.	414-648-8205

PYLON CO., INC., 51 Newcomb St., Attleboro, Mass., 02703, Tel: 617-222-3726; Empl.: 30; Minimum order: $25

Free literature available: Pogo® Catalog 102 Contains various types of spring-loaded test probes for making temporary electrical connection for the purpose of testing. For testing p.c. boards, back-planes, microcircuits, etc.

Products manufactured: Bushings, Glass, Plastic, Metal, Rubber, Etc., Clamps & Clips, Connectors, Contacts, Electrical, Eyelets, Fasteners, Holder & Carriers, Jigs And Fixtures, Chassis & Circuit Board, Leads, Test & Adaptors, Pins, Probes, Rivets, Sockets, Terminals, Testers

Local Sales Offices & Reps.

Cal	Fremont, Hartfield, Kennan & Freytag Co.	415-863-2200
Cal	Los Angeles, Hartfield, Kennan & Freytag Co.	213-225-1318
ILL	Elk Grove Village, Somers-Reagan	312-593-2713
Mass	Plainville, Teknis	617-695-3591
NJ	Summit, R. Potter	201-277-0220
Pa	Lafayette Hill, MCD Assocs.	215-828-0560
Tex	Dallas, Sivright Co.	214-357-6681
VA	Lynchburg, Royelec Sls. Assocs.	703-846-7117
Wash	Vancouver, Hartfield, Kennan & Freytag Co.	503-228-1683
FOR:	Can., Scarborough 707, Ont., Finnan Engineered Prod. Co.	416-438-6070

PYROFERRIC - N. Y., INC., Bronx Blvd. at 216th St., Bronx, N.Y., 10467, Tel: 212-654-3930; Empl.: 35

Customer service: J. A. Roberts

Free literature available: Data Packet

Products manufactured: Bobbins, Winding, Coil & Transformer, Coils Including Assemblies & Forms, Cores, Magnetic

Local Sales Offices & Reps.

Cal	Los Angeles, Yarbrough Sls. Co.	213-254-5101

PYROFILM RESISTOR CO., INC., 60 S. Jefferson Rd., Whippany, N.J., 07981, Tel: 201-887-8100, TWX: 710-726-8220; Empl.: 200 .... p. 2•1526-1528

Products manufactured: Attenuators, Dividers, Networks, Resistors, Terminals

Local Sales Offices & Reps.

Ala	Huntsville, Holcombe Sls. Agency, Inc.	205-534-1035
Cal	Los Angeles, E. Landa Co.	213-879-0770
Cal	Mountain View, Don Lay Assocs.	415-968-7500
Cal	San Carlos, Winco	415-365-6082
Colo	Denver, R. Smith Assoc.	303-399-1132
Fla	Orlando, Irby & Connoly, Inc.	305-894-8471
Ga	Atlanta, Holcombe Sls. Agency, Inc.	404-233-2837
Ill	Chicago, Berndt Assocs.	312-283-0713
Ind	Carmel, Berndt Assocs.	317-844-0114
Md	Columbia, Neal Deoul Assocs.	301-997-4353
Mass	Lowell, Russell Engrg. Svc. Co.	617-458-7146
Mich	Royal Oak, Satullo Co.	313-549-3910
Minn	St. Paul, Northport Engineering	612-698-3841
NJ	Madison, Livera-Polk Assocs.	201-377-3220
NM	Albuquerque, IMEC	505-344-2212
NY	Camillus, Ontec	315-487-0596
NY	Fayetteville, Ontec	315-446-2587
NY	Grand Island, Ontec	716-773-9319
NY	Huntington, CDB Entprs.	516-692-5200
NY	Rochester, Ontec	716-464-8636
NY	Roslyn Heights, Livera-Polk Assocs.	516-484-1276
NC	Burlington, P.J. Nahser, Co.	919-226-8053
Ohio	Cleveland, Satullo Co.	216-486-2800
Ohio	Dayton, Satullo Co.	513-277-6531
Tex	Dallas, Hillman Enterprises	214-827-4790
Wash	Bellevue, Ray Over Sls.	206-454-4551
EXP:	Stamford, Conn., Dage Corp.	203-324-3123

Local Distributors

Cal	Los Angeles, Mil-Comm, 1618 Cotner Ave.	213-879-0770
NY	Yonkers, Legri S. Resistor, 389-393 Riverdale Ave.	914-969-6000
Tex	Houston, Lenert Co., Box 2184, 1420 Hutchins	713-225-1465

Q-TECH CORP., 11529 W. Pico Blvd., Los Angeles, Cal., 90064, Tel: 213-473-1105 .... p. 1•408,409

Products manufactured: Crystals, Filters, Oscillators

Local Sales Offices & Reps.

Cal	San Diego, Tauber Assocs.	714-274-7242
Ind	Auburn, D. Flanagan	219-925-1757
Md	College Park, J & B Elctrns.	301-864-4011
Mass	Burlington, Burlington Sls., Inc.	617-272-7655
NY	New York, AstroRep Inc.	516-423-2266
NY	Rochester, R.P. Kennedy Co.	716-271-6322
Tex	Houston, TCI Elctrns.	713-774-5019
Wash	Seattle, W. Spaulding Co.	206-282-9173

QANTEX, the peripherals division of North Atlantic Inds., 200 Terminal Dr., Plainview, N.Y., 11803, Tel: 516-681-8350, TWX: 510-221-1879; Empl.: 175; Minimum order: $25

For info on price: L. Malmed; Application info: L. Malmed; Customer service: L. Malmed; Delivery info: B. Carolyn

Free literature available: Catalogs, interface manuals, & application notes on digital tape drives & tape storage systems.

Local Sales Offices & Reps.

Cal	Burbank, E-M Southwest	213-845-4400
Cal	San Leandro, IMS Assocs.	415-483-2093
Colo	Littleton, Cropley Inc.	303-794-4231
Ill	Chicago, Data Elctrns. Co.	312-283-0300
Ind	Indianapolis, Data Elctrns. Co.	317-784-6360
Mass	Wellesley Hills, Datamart	617-235-5520
Minn	Minneapolis, Data Elctrns. Co.	612-786-9666
Tex	Dallas, Evans-McDowell	214-238-7157
Tex	Houston, Evans-McDowell	713-772-1257
Utah	Salt Lake City, Cropley Inc.	801-355-8321
Wash	Bellevue, Scientific Devices NW	206-454-0900

QTRON CORP., 1320 E. St. Gertrude Pl., Santa Ana, Cal., 92705, Tel: 714-556-1184; FSC No: 75-2848591; Empl.: 20; Minimum order: $25

For info on price: W. Sliff; Application info: C. Knox; Customer service: D. Franck; Delivery info: D. Franck

Free literature available: Upon Request A 12 Page Catalog On Reed Relays Including Price Sheets and Valuable Engineering Information

Products manufactured: Coils Including Assemblies & Forms, Relays

Local Sales Offices & Reps.

Cal	Los Angeles, Dorr Wagner Assoc.	213-681-4060
Colo	Denver, Comtech	303-756-6815
Ill	Arlington Heights, Hagan Sls.	312-394-0617
Ind	Indianapolis, Marketing Engineers	317-546-1523
Ky	Liberty, Depco	513-621-0162
Minn	Minneapolis, Components Group	612-824-4222
NY	Commack, L.K. Haner	516-864-2220
Ohio	Cleveland, Depco	216-289-8188
Ore	Portland, Wes-Tek	503-297-1711
Tex	Houston, E. Smith Sls.	713-649-5756
Wash	Bellevue, Wes-Tek	206-641-3900

Q.V.S., INC., 20 North 15th St., East Orange, N.J., 07017, Tel: 201-673-3996; FSC No: 89820; Empl.: 45

Customer service: F. D. Fogle

Products manufactured: Meters, Relays, Services, Assembly, Production & Test, Testers

QUADRASTAT CONTROLS CORP., 4429 San Fernando Rd., Glendale, Cal., 91204, Tel: 213-245-1098, TWX: 910-497-4783; Empl.: 15; Minimum order: $25

For info on price: A. Chadney; Application info: P. D. Adams; Customer service: A. Chadney; Delivery info: A. Chadney

Free literature available: Brochures show the complete "QUADCO" line of self-locking and gate-type Control Heads, as used by Heavy Equipment OEM's to mechanically control a power source.

Products manufactured: Controls/Control Eqpt.

QUALCO, One First St., Los Altos, Cal., 94022, Tel: 415-964-7666; Empl.: 11 .... p. 2•790,791

Customer service: J. C. Meyer

Products manufactured: Machines/Machinery, Production, Microcircuit Production Equip., Socket Adapters, Sockets, Testers

QUAM-NICHOLS CO., 234 E. Marquette Rd., Chicago, Ill., 60637, Tel: 312-488-5800; Empl.: 200; Minimum order: $15

For info on price: G. Johns; Application info: W. G. Little; Customer service: G. Johns; Delivery info: G. Johns

Free literature available: Catalog #74 – General line loudspeakers

Products manufactured: Speakers

Local Sales Offices & Reps.

Cal	Inglewood, Ungar Sls. Assocs.	213-649-6238
Cal	Oakland, Moulthrop Sls.	415-261-7676
Fla	Orlando, Cartwright & Bean	305-422-4531
Ga	Atlanta, Cartwright & Bean	404-255-5262
Ill	Chicago, R. R. Hutmacher Assoc.	312-631-3248
Ind	Indianapolis, R. Milsk Co.	317-546-5468
Kans	Overland Park, T. L. Dowell	913-236-8200
Mass	Needham, Coakley, Boyd & Abbett	617-444-5470
Mich	Southfield, R. Milsk Co.	313-354-3310
Minn	Edina, M. Foster Co.	612-835-2252
NJ	Cherry Hill, Trinkle Sls	609-795-4200
NY	Camillus, Callahan-Ferguson	315-487-3870
NY	Flushing, Bettan Sls	212-591-7600
Ohio	Beachwood, Electronic Salesmasters	216-831-9555
Ore	Portland, J. V. BeLusko Co.	503-222-4279
Tenn	Memphis, Cartwright & Bean	901-276-4442
Tex	Dallas, El Wilco Inc.	214-242-5329

QUAN-TECH, Div. Scientific-Atlanta, Inc., Randolph Park W., Rte. #10, Randolph Township, N.J., 07801, Tel: 201-361-3100, TWX: 710-987-7946; Empl.: 50; Minimum order: $25 .... p. 1•787-790

Customer service: G. M. Carney

Free literature available: Wave & Spectrum Catalog-Product Data Sheets plus some technical literature. Noise File-Product data sheets plus technical literature. Application note on flutter measurement in magnetic tape recorders. Data sheets on all instruments in our product line.

Products manufactured: Amplifiers, Analyzers, Filters, Generators, Meters, Standards, Test Equipment, Testers, Tracking Systems

Local Sales Offices & Reps.

Ala	Huntsville, J. L. Highsmith & Co.	205-881-3284
Cal	Palo Alto, Coherent Mktg. Assoc.	415-327-2217
Cal	Pasadena, A-F Sls. Engrg.	213-681-5631
Colo	Golden, J. Hurlbut	303-279-7138
Fla	Orlando, J. L. Highsmith & Co.	305-293-5202
Ill	Chicago, K. Meyers	312-774-6440
Ind	Indianapolis, K. Meyers	317-243-6681
Mass	Stoneham, Ken Corp.	617-438-5464
Minn	Mpls., K. Meyers	612-920-7080
NY	Liverpool, Rayelco	315-652-5272
NY	Plainview, Eastern Metro Assocs.	516-931-1414
NC	Charlotte, J. L. Highsmith & Co.	704-333-7743
Ohio	Dayton, Micro Sls. Corp.	513-433-8171
Tex	Dallas, Airep Elctrns.	214-827-2120
Wash	Seattle, Datacom Assocs.	206-285-2525
EXP:	NJ, Teaneck, Sylvan Ginsbury	201-837-1100
FOR:	Can., Calgary, Alberta, Can. Marconi	403-243-7751
FOR:	Can., Don Mills, Ont., Can. Marconi	416-445-9900
FOR:	Can., Edmonton, Alberta, Can. Marconi	403-429-3387
FOR:	Can., Halifax, N.S., Can. Marconi	902-454-8321
FOR:	Can., Montreal, Que., Can. Marconi	514-341-7630
FOR:	Can., Ottawa, Ont., Can. Marconi	613-232-1672
FOR:	Can., St. John's, N.F., Canadian Marconi	709-726-2422
FOR:	Can., Vancouver, B. C., Can. Marconi	604-291-2331
FOR:	Can., Winnipeg, Man., Can. Marconi	204-775-0348

QUANTALOG, INC., 42 Enterprise Drive, Ann Arbor, Mich, 48103, Tel: 313-769-4936; Empl.: 16

For info on price: J. Dute; Application info: J. Dute; Customer service: E. Therkelsen; Delivery info: J. Dute

Free literature available: Transient Recorders: Model 1720 QuantaLatch featuring 1k memory; 50k samples/sec 4000 Series QuantaLatch with 4k memory, 10&6 samples/sec. Remote Data Acquisition & Logging: Model 1740 System featuring central control and recording station plus one or more 16-channel data stations.

Products manufactured: Data Acquisition & Reduction Systems, Data Loggers, Recorders

Local Sales Offices & Reps.

Alas	Anchorage, H. J. Lang & Assocs.	907-279-5741
Cal	North Hollywood, O'Halloran Assocs.	213-877-0173
Cal	Palo Alto, O'Halloran Assoc.	415-326-1493
Cal	San Diego, O'Halloran Assocs.	714-224-2824
Fla	Clearwater, Reynolds & Assocs.	813-726-2373
Fla	Ft. Lauderdale, Reynolds & Assocs.	305-581-6611
Fla	Hollywood, Reynolds & Assocs.	305-987-6720
Fla	Palm Beach, Reynolds & Assocs.	305-622-6850
Fla	Satellite Beach, Reynolds & Assocs.	305-773-4700
Fla	St. Petersburg, Reynolds & Assocs.	813-360-1484
Ga	Atlanta, Reynolds & Assocs.	404-252-5360
Ill	Northbrook, Electronic Instr. Assocs.	312-498-4500
Ind	Indianapolis, Electronic Instr. Assocs.	317-257-7231
Md	Silver Springs, Eastern Instrumentation	301-681-6500
Mich	Farmington, Anderson Elctrns.	313-476-9161
NY	Great Neck, Eastern Instrumentation	516-466-4500
NY	Syracuse, Tesco Mktg Assocs.	315-463-4566
NC	Raleigh, Eastern Instrumentation	919-876-7600
Ohio	Dayton, Hocker Assocs.	513-298-8638
Ohio	North Olmsted, Hocker Assocs.	216-734-4433
Pa	Abington, Bach-Stewart Assocs.	215-885-1550
Tex	Houston, Scientific Sls. Co.	713-666-5318
Tex	Richardson, Scientific Sls. Co.	214-231-6541
Wash	Bellevue, Brennan Assocs.	206-454-9332

QUANTRAD CORPORATION, 139 Illinois St., El Segundo, Cal., 90245, Tel: 213-535-0854, TWX: 910-348-6676; Empl.: 40; Minimum order: $25

For info on price: H. Long 213-322-2086; Application info: R. Fox 213-322-2086; Customer service: H. Holdaway 213-322-2460; Delivery info: C. Strope 213-322-1452

Free literature available: Brochures on: Laser resistor trimmers, pulsed Argon, Krypton, Xenon and Ion Lasers, Image Converter Cameras, Photodiodes, Electro Optical Systems and Long Coherence Holographic Systems.

Products manufactured: Cameras, Cells, Photoconductive, Photoemissive, Photovoltaic, Delays, Time (Excluding Delay Lines, Timers, Delay & Relays, Time-Delays), Generators, Intensifiers, Image, Lasers & Laser Systems, Lights, Microcircuit Production Equip., Monitors, Perforators

Local Sales Offices & Reps.

DC	Washington, Scientific Sys. Sls. Corp.	202-726-4161
Fla	Winter Haven, S & S Sls. Reps.	813-293-7304
Mass	Burlington, Scientific Sys. Sls. Corp.	617-273-1660
NM	Albuquerque, Trembly Assocs.	505-293-4444
NY	Syosset, Scientific Sys. Sls. Corp.	516-921-3737

QUANTROL ELECT. INC., 1820 Mills Ave., El Paso, Tex., 79901, Tel: 915-532-4651; Empl.: 20; Minimum order: $20

For info on price: E. K. Chamberlin; Application info: R. R. Chamberlin; Customer service: E. K. Chamberlin; Delivery info: M. J. Jaurez

Free literature available: Electrical and physical specifications on available photoconductors and opto isolators.

Products manufactured: Cells, Photoconductive, Photoemissive, Photovoltaic, Diodes, Sensors, Light

Local Sales Offices & Reps.

Fla	Melbourne, Reynolds & Assocs.	305-727-3205
Minn	Minneapolis, Heimann Co.	612-861-6051
Ohio	Cincinnati, Sheridan Assocs.	513-761-5432

QUANTRONIX CORP., 225 Engineers Rd., Smithtown, N.Y., 11787, Tel: 516-273-6900, Telex: 96-7782; Empl.: 70; Minimum order: $25

For info on price: P. Risucci; Application info: R. J. Bruno; Customer service: S. Taylor

Free literature available: Laserscribe® functional specifications for wafer scribing; Series 114 Nd:Yag laser systems; Series 300 Acousto Optic Devices; Series 500 energy/power measuring instruments; Series 700 Laser Micromachining Systems.

Products manufactured: Lasers & Laser Systems, Machines/Machinery, Production, Modulator/Demodulators, Monitors, Scribers, Semiconductor Wafer Fabrication

Local Sales Offices & Reps.

Ariz	Phoenix, Trembly Assocs.	
Cal	Palo Alto, Quantronix Corp.	415-327-6381
Colo	Broomfield, Figaro, Klebba Assocs.	
Fla	Ft. Lauderdale, Semquip	
NM	Albuquerque, Trembly Assocs.	
Tex	Dallas, Quantronix	

QUARTZITE PROCESSING, INC., 6 Holyoke St., Malden, Mass., 02148, Tel: 617-322-1380; Empl.: 11

For info on price: J. H. Westerman 617-322-1380; Customer service: P. S. Yanofsky 617-322-1380; Delivery info: P. S. Yanofsky 617-322-1380

Free literature available: Man Made Materials Which Require Diamond Tooling

Products manufactured: Cores, Ceramic, Ferrite Material & Parts, Insulators & Insulation, Quartz, Fused, Services, Assembly, Production & Test, Tubing

QUIETROLE CO., 395 St. John, Spartenburg, S.C., 29302, Tel: 803-583-1451; Minimum order: $5

Customer service: R. O. Monk

Products manufactured: Cleaners & Solvents, Lubricants

Local Sales Offices & Reps.

Mo	St. Louis, B & C Sls. Co.	
Ohio	Euclid, W. Peters Co.	216-261-2330
Tex	Dallas, E.L. Wilks Co.	214-242-5321
FOR:	Can., Downsview, Ont., L. Finkler Ltd.	

R-COLUMBIA PRODUCTS, INC., 2008 St. John's Ave., Highland Park, Ill., 60035, Tel: 312-432-7915; Empl.: 6

Products manufactured: Cleaners & Solvents, Comm. Systems, Handsets, Chestsets, Headphones, Headsets, Etc., Magnets, Microphone Accessories (Including Stands, Holders, Booms), Microphones, All Kinds

RAACO CORP., 372 Ely Ave., So. Norwalk, Conn, 06854

RADATRON CORP., 2424 Niagara Falls Blvd., N. Tonawanda, NY, 14120, Tel: 716-731-4171; Empl.: 85

For info on price: J. Howells; Application info: J. Howells; Customer service: L. Pauly; Delivery info: L. Pauly

Products manufactured: Antennas, Lamps, Lights, Power Supplies, Receivers

Local Sales Offices & Reps.

Cal	San Rafael, E. W. Brandt Co.	415-454-0840
Cal	W. Covina, Don Forth	213-967-2893
Ga	Savannah, Len Sherman Assoc.	912-925-3660
Ill	Skokie, Mike Bermann Sls.	312-675-3740
Ind	Indianapolis, Dewey Power Sls.	317-846-0790
Md	Olney, A B & T Sls.	301-924-4976
Mich	Grand Rapids, Cecil Geer Co.	616-534-9449
Minn	Burnsville, C. Carlson	612-890-7893
Mo	Raytown, Marty Taraski Sls.	816-358-1442
NY	Farmingdale, Chester Drexler Sls.	516-249-8206
NC	Charlotte, Electro Rep Assoc.	704-527-2530
Ohio	Columbus, J. Lehner	614-268-5260
Tenn	Memphis, L. Jones	901-683-7616
Tex	Dallas, Collins Co.	214-341-7866
Wash	Seattle, DMS/Vantage	206-784-6800

RADIAL CONTROLS, 2555 E. 55th Place, Indianapolis, Ind., 46220, Tel: 317-255-2796; Empl.: 25; Minimum order: $10

Customer service: R. Newsom

Free literature available: 16 page catalog on plastic knobs, 4 page catalog on aluminum knobs.

Products manufactured: Knobs

RADIATION DEVICES CO., Box 8450, Baltimore, Md., 21234, Tel: 301-665-2764; Empl.: 6; Minimum order: $5

Customer service: F. M. Rybak

Free literature available: Broad line of RF and microwave amplifiers, multicouplers, filters described in data sheets and application notes. Receivers for ATC, ELT and monitoring featuring battery operation.

Products manufactured: Amplifiers, Antennas, Bridges, Calibrators, Couplers, Demodulators, Detectors, Dividers, Dummy Loads, Filters, Limiters, Meters, Modulator/Demodulators, Receivers, Terminals

Local Sales Offices & Reps.

Ariz	Phoenix, Kay Ents.	602-242-6787
Cal	Encino, CDH Assocs.	213-345-3111
Cal	Yucca Valley, CDH Assocs.	213-345-3111
Colo	Lakewood, Harvey Data Sys.	303-427-5299
Fla	Orlando, Gra-Mar	305-894-3351
NM	Albuquerque, J & D Assocs.	505-255-2377

RADIATION DYNAMICS, INC., 1800 Shames Dr., Westbury, N.Y., 11590, Tel: 516-334-3990; Empl.: 180

For info on price: R. L. Malnati; Application info: J. H. Bly; Customer service: R. G. Burgess

Products manufactured: X-Ray Inspection Equipment

RADIO DEVELOPMENT LAB., 121 Brook Ave, Deer Park, NY, 11729, Tel: 516-242-0999; Empl.: 6; Minimum order: $10

For info on price: F. Goldstein; Application info: S. Russo; Customer service: S. Russo; Delivery info: S. Russo

Free literature available: Data Sheets, New Product releases.

Products manufactured: Amplifiers, Converters, Filters, Integrated Circuit Devices, Preselector-Mixers, Receivers

RADIO MATERIALS CO., Div. P.R. Mallory, 4242 W. Bryn Mawr Ave., Chicago, Ill., 60646, Tel: 312-478-3600, TWX: 910-221-2915; FSC No: 91418; Empl.: 500; Minimum order: $25

For info on price: J. Kirschner; Application info: J. Kirschner; Customer service: B. Merritt; Delivery info: Sls.Svc.

Free literature available: 28 Page General Catalog; Ceramic Resonator application notes describing typical applications and characteristics.

Products manufactured: Capacitors, Fixed, Ceramic Resonators, Circuits, Hybrid, Thick Film, Crystals, Spark Gaps, Substrates

Local Sales Offices & Reps.

Ariz	Phoenix, R. Stitzer	602-944-6808
Cal	Burlingame, RMC Div. of P.R. Mallory	415-348-2081
Cal	La Mirada, RMC Div. of P.R. Mallory	213-921-7939
Conn	Meriden, Eagle Assocs.	203-235-9036
Ill	Chicago, RMC Div. of P.R. Mallory	312-478-3600
Mass	Needham, Eagle Assocs.	617-444-3446
NY	Plandome, F. Spellman Co.	516-627-3399
NY	Syracuse, N.J. Matchuk Co.	315-488-3251
Ore	Portland, Earl & Brown Co.	503-245-2283
Pa	Philadelphia, R. Cooper	215-624-5486
Wash	Seattle, Earl & Brown Co.	206-284-1121
EXP:	Indianapolis, Ind., Mallory Int'l. Co.	317-636-5353
EXP:	Toronto, Ontario, Canada, P.J. Heenan Ltd.	416-223-3619

RADIO SWITCH, State Hwy. 79, Marlboro, N.J., 07746, Tel: 201-462-6100; Minimum order: $15

Customer service: W. Schwarz

Products manufactured: Switches

RAGEN DATA SYSTEMS, INC., 125 Schmitt Blvd., Farmingdale, N.Y., 11735, Tel: 516-293-1333, TWX: 510-224-6405; Empl.: 52

Products manufactured: Amplifiers, Controllers, Programmable, Controls/Control Eqpt., Converters, Counters, Dials, Indicators, Power Supplies, Servo Systems, Timers

Local Sales Offices & Reps.

Cal	Los Angeles, Western Aircraft, Inc.	213-477-1548
Cal	San Diego, Temp Tech	714-560-0545
Iowa	Cedar Rapids, Palatine	319-365-8071
Kans	Andover, Palatine	316-683-7512
Mass	Stoneham, Data Engrg. Svcs.	617-245-6666
Minn	Minneapolis, Bitronics Sls. Co.	612-866-3035
Mo	St. Louis, Palatine	314-426-7055
NY	Great Neck, EAC Assocs.	516-466-9798
Tex	Dallas, Barry Sls. Co.	214-234-0255
Va	Alexandria, Vanguard Engrg.	703-768-1660
Wash	, Thorson Co.	206-455-9180

RAGEN PRECISION INDS., INC., 9 Porete Ave., N. Arlington, N.J., 07032; Empl.: 250

Products manufactured: Boards, Printed Circuit, Circuits, Printed, Multilayer, Display Devices/Displays, Integrated Circuit Devices, Lamps, Machines/Machinery, Production, Memory Systems, Soldering Equipment

RAGEN SEMICONDUCTOR, 50 S. Jefferson Rd., Whippany, N.J., 07981

RAILWAY COMM., Rycom Instrs., 9351 E. 59th St., Raytown, Mo., 64133, Tel: 816-353-2100; Empl.: 37; Minimum order: $10

For info on price: E. E. Tuel; Application info: E. E. Tuel; Customer service: G. Craven; Delivery info: H. D. Aggeler

Free literature available: "T" Carrier Test Equipment; Buried Cable Fault Locators; Levelmeters/Voltmeters.

Products manufactured: Analyzers, Counters, Locators, Open-Short, Meters, Receivers, Testers, Totalizers, Digital

Local Sales Offices & Reps.

Cal	Oakland, Dolphin Engrg. Co.	415-451-8262
Cal	Santa Fe Springs, Kennedy Engrg. Co.	213-868-9965
Colo	Denver, Claredon Co.	303-238-4462
DC	Washington, InstruCom	202-223-1759
Fla	St. Petersburg, Comtech Assocs.	813-527-3281
Ill	Schaumburg, Kay Sls.	312-397-1215
Kans	Prairie Village, Giddings Co.	913-831-0727
MO	Cameron, Communication Sys. Assocs.	816-632-7616
Tex	Richardson, Horizon Engrg. Sls. Co.	214-238-9121
Wash	Seattle, Reeves Supp. Co.	206-789-1234
FOR:	Can., Toronto, Ont., Tele-Radio Sys. Ltd.	416-661-3221

RAM CHEMS., Div. Whittaker Corp., 210 E. Alondra Blvd., Gardena, Calif., 90248, Tel: 213-FA 1-0710; Empl.: 65; Minimum order: $25

For info on price: D. Saylor; Application info: M. E. Gould; Customer service: D. Saylor; Delivery info: D. Saylor

Products manufactured: Chemicals, Cleaners & Solvents, Coatings, Compounds, Encapsulating, Insulating, Molding, Potting, Lubricants, Plastic Raw Materials, Liquids, Pellets, Powders, Resins, Rubber

RAMSEY ENGINEERING, 1853 W. County Rd. C, St. Paul, Minn., 55113, Tel: 612-633-5150, Telex: 29-7001; Empl.: 160; Minimum order: $25

Customer service: J. Miller

Free literature available: RH-202: Manually operated integrated circuit handler, RH-903: Automatic three (3) category sort integrated circuit handler., RH-905: Automatic five (5) category sort integrated circuit handler. RS-5618: Automatic integrated circuit lead straightener.

Products manufactured: Machines/Machinery, Production

Local Sales Offices & Reps.

Ala	Huntsville, Scientific Devices-Southeast	205-232-8317
Cal	Encino, Scientific Devices-California	213-872-1951
Cal	Los Alamitos, Scientific Devices-California	213-598-7678
Cal	Mountain View, Scientific Devices-California	415-964-4230
Cal	San Diego, Scientific Devices-California	714-279-6642
Conn	Hamden, Scientific Devices-Connecticut	203-248-9361
Fla	Ft. Lauderdale, Scientific Devices-Southeast	305-721-4260
Fla	Orlando, Scientific Devices-Southeast	305-424-7932
Fla	St. Petersburgh, Scientific Devices-Southeast	813-521-1720
Ill	Desplaines, Scientific Devices-Midwest	312-297-5230
Ind	Indianapolis, Scientific Devices-Midwest	317-783-2111
Kans	Lenexa, Scientific Devices-Midwest	913-631-3818
Mass	Waltham, Scientific Devices-New England	617-894-5637
Mich	Milford, Scientific Devices-Midwest	313-363-2282
Minn	Minneapolis, Scientific Devices-Midwest	612-544-1616
Mo	St. Louis, Scientific Devices-Midwest	314-842-2535
NJ	Palisades Park, Scientific Devices-East	201-871-3916
NY	Rochester, Scientific Devices-New York	716-334-2445
NC	Burlington, Scientific Devices-Southeast	919-584-8311
Ohio	Cleveland, Scientific Devices-Midwest	216-261-2000
Ohio	Dayton, Scientific Devices-Midwest	513-298-9904
Okla	Norman, Data Mktg. Assoc.	405-364-8320
Tex	Dallas, Data Mktg. Assoc.	214-661-0300
Tex	Houston, Data Mktg. Assoc.	713-686-9627
Tex	San Antonio, Data Mktg. Assoc.	512-828-0937
Va	Norfolk, Scientific Devices-E/Tech	703-499-8133
Va	Springfield, Scientific Devices-E/Tech	703-451-6500
Wash	Seattle, Avionics Liaison	206-767-3870

RAMTEK CORP., 292 Commercial St., Sunnyvale, Cal., 94086, Tel: 408-735-8400, TWX: 910-339-9379; Empl.: 130

For info on price: C. W. Nordby Ext. 280; Application info: G. S. Brink Ext. 205; Customer service: H. P. Kulp Ext. 270; Delivery info: A. A. Middlebrook Ext. 215

Free literature available: GX-100 brochure and FS-2000 brochure. Describes the features and functions of the GX-100 and FS-2000 series of raster scan graphic displays.

Products manufactured: Terminals, Data Display (including Alphanumeric & Graphic)

Local Sales Offices & Reps.

Ala	Huntsville, W. A. Brown Instrs.	205-539-4411
Ariz	Phoenix, Data Systems Mktg.	602-277-4732
Cal	Newport Beach, Data Systems Mktg.	714-540-2312
Colo	Littleton, Data Systems Mktg.	303-795-1960
Fla	Orlando, W. A. Brown Instrs.	305-425-5505
Ga	Atlanta, W. A. Brown Instrs.	404-939-1674
Ind	Munster, Bexdata, Ltd.	312-221-1411
La	Gretna, W. A. Brown Instrs.	504-368-5766
Md	Beltsville, Ron Davies Assocs.	301-937-2215
Mass	Chelmsford, S & S Elctrns.	617-256-8731
Mich	Southfield, Tallman Assocs.	313-557-0974
Minn	Edina, Bexdata Ltd.	612-835-5220
NJ	Ridgewood, Hansen Assocs.	201-652-7055
NM	Albuquerque, Data Systems Mktg.	505-299-6027
NY	Syracuse, Naco Elctrns.	315-699-2651
NC	Research Tri. Park, W. A. Brown Instrs.	919-489-1546
Pa	Bryn Mawr, Hopkins Assocs.	215-527-2252
Pa	Pittsburgh, Compu Graph	412-366-5056
Tex	Dallas, Remtek	214-369-8146
Tex	Houston, Remtek	713-664-2113
Utah	Bountiful, Data Systems Mktg.	801-295-3457
Wash	Bellevue, Data Systems Mktg.	206-454-1676

RANDOLPH PRODS. CO., 12th St., Carlstadt, N.J., 07072, Tel: 201-438-3700; Empl.: 60

Customer service: H. Randalph

Products manufactured: Adhesives (All Types), Cleaners & Solvents, Coatings, Paints

RANTEC DIV., Emerson Elec. Co., 24003 Ventura Blvd., Calabasas, Calif., 91302, Tel: 213-347-5446, TWX: 910-494-1218; Empl.: 265; Minimum order: $100

Customer service: V. S. Kerness Ext. 254

Free literature available: Catalogs on: antennas; Cassegrain Feeds/Flat Plate Arrays/ TACAN – Electronic Instrumentation; Time/Group Test Sets Anechoic Systems; Absorber-Turnkey Chambers Power Supplies; MIL SPECD, Modular.

Products manufactured: Analyzers, Antenna Feed Systems, Antennas, Chamber, Environmental Test, Converters, Generators, Modulators, All Kinds, Power Supplies, Testers, Timers, Tracking Systems

RATELCO, INC., 610 Pontius Ave. N., Dept. EEM, Seattle, Wash., 98109, Tel: 206-624-7770; Empl.: 50; Minimum order: $5

For info on price: N. Kun; Application info: B. Lince; Customer service: D. Terpstra; Delivery info: N. Kun

Products manufactured: Amplifiers, Antennas, Chargers, Battery, Comm. Systems, Converters, Eliminators, Battery, Inverters, Panels, Power Supplies, Racks, Regulators, Testers, Timers, Transformers

Local Sales Offices & Reps.

Ariz	Scottsdale, Weldy Assocs., Inc.	602-947-1263
Ark	Little Rock, M. Robinson Co., Inc.	501-663-1830
Cal	Los Angeles, Matzinger Assocs.	213-624-8001
Cal	Redwood City, Howe-Stephens Co.	415-366-9592
Colo	Denver, Hamilton Assocs., Inc.	303-770-2345
Ga	Atlanta, A. P. Beamish	404-252-5567
Haw	Kailua, R. A. Kemp Co.	808-839-5593
Ill	Chicago, Electrical Materials & Equip. Co.	312-696-1540
La	Metairie, J. J. Aertker Jr. Co.	504-888-0677
Mass	Framingham, E. L. Flowers & Sons	617-879-4250
Minn	Minneapolis, Klass Co., Inc.	612-338-8427
Mo	St. Louis, Petefish Engrg. Co.	314-821-0587
NM	Albuquerque, Bryant Co.	505-296-5158
NY	Bay Shore, F. E. Klaus	516-665-3504
NY	Massapequa, Crest Assocs.	516-799-8053
Pa	Ingomar, R. W. Moulton & Assocs.	412-366-3333
Pa	Radnor, J. Claflin Co.	215-MU8-1990
Tenn	Chattanooga, J.R. Murray Co.	615-267-3889

Advertisment

Designers and manufacturers of Constant Voltage Battery Chargers and Eliminators, Ringing Generators, Dry CEMF Cells, DC-DC Converters, DC-AC Inverters, Communications Power Distribution Boards, Uninterruptible Power Systems (U.P.S.), AC-DC Test Bench Power Supply Units (Battery Eliminators), Alternator Power Converters, Mobile 2-Way Truck Intercoms.

RAULAND, Div. Zenith Radio Corp., 2407 W. North Ave., Melrose Pk., Ill., 60160, Tel: 312-345-4700

Customer service: Sls. Dept.

Products manufactured: Tubes

RAWAY BEARING CORP., 8 Melnick Rd., Monsey, N.Y., 10952, Tel: 914-352-4944; FSC No: 3110; Empl.: 5

For info on price: A. Baskin; Delivery info: H. Grossman

Free literature available: Catalogue

Products manufactured: Bearings

RAY-O-VAC DIV., ESB Inc., 101 E. Washington Ave., Madison, Wisc., 53703, Tel: 608-252-7400; Empl.: 2931; Minimum order: $100

For info on price: H. Coakley 608-252-7483; Application info: D. Wilberg 608-252-7725; Customer service: E. Peterson 608-252-7722; Delivery info: E. Peterson 608-252-7722

Products manufactured: Batteries, Flashlights & Lanterns

Local Sales Offices & Reps.

Cal	North Hollywood, Bassett & Moore	213-877-7129
Cal	Oakland, Moulthrop Sls.	415-261-7676
Cal	Placentia, Bassett & Moore	213-877-7129
Colo	Denver, W. J. Purdy Co.	303-777-1411
Fla	Orlando, Cartwright & Bean	305-422-4531
Fla	Plantation, Cartwright & Bean	305-791-3989
Ga	Atlanta, Cartwright & Bean	404-255-5262
Ill	Chicago, G. Mcl. Cole Co.	312-774-3535
Ind	Indianapolis, Sukup & Cox	317-253-1215
Mass	Needham, Mullin Tech. Sls.	617-444-4780
Mich	Detroit, R.C. Merchant Co.	313-535-6000
Mich	St. Joseph, R.C. Merchant Co.	616-983-7378
Minn	Minneapolis, Jensen-Olsen Sls.	612-941-7181
Mo	Kansas City, Forristal-Young Sls.	816-358-6771
Mo	St. Louis, Forristal-Young Sls.	314-645-2360
Neb	Omaha, Forristal-Young Sls.	402-333-0800
NJ	Cherry Hill, Trinkle Sls.	609-795-4200
NJ	Teaneck, Fisher Elctrn. Assocs.	201-837-1200
NM	Albuquerque, W. J. Purdy Co.	505-266-7959
NY	Camillus, Trademark Elctrns.	315-487-3870
NY	Port Washington, Fisher Elctrn. Assocs.	516-883-0600
NC	Charlotte, Cartwright & Bean	704-333-6457
NC	Raleigh, Cartwright & Bean	919-832-7128
Ohio	Dayton, Bear Mktg.	513-299-3566
Ohio	Richfield, Bear Mktg.	216-659-3131
Tenn	Memphis, Cartwright & Bean	901-276-4442
Tex	Dallas, Tesco/Texport	214-690-4004
Wash	Seattle, Fleehart & Sullivan	206-522-1533
Wisc	Milwaukee, G. McL. Cole	414-545-6083

RAYCHEM CORP., 300 Constitution Dr., Menlo Park, Cal., 94025, Tel: 415-329-3333, TWX: 910-373-1728; Empl.: 3160

Products manufactured: Cable, Caps, Forms & Tapes, Heat Shrinkable, Cups, Encapsulation, Insulators & Insulation, Solder Pots & Baths, Terminals, Tubing, Wire, Wire Markers

Local Sales Offices & Reps.

Cal	Irvine, Raychem Corp.	714-833-3630
Cal	San Diego, Raychem Corp.	714-280-5990
Cal	Sherman Oaks, Raychem Corp.	213-788-9872
Colo	Denver, Raychem Corp.	303-758-1936
Conn	Norwalk, Raychem Corp.	203-853-2700
Fla	Orlando, Raychem Corp.	305-855-4214
Ga	Atlanta, Raychem Corp.	404-261-3657
Ill	Des Plaines, Raychem Corp.	312-298-1100
Kans	Overland Park, Raychem Corp.	913-649-6930
Md	Bethesda, Raychem Corp.	301-652-9057
Mass	Hingham, Raychem Corp.	617-749-6850
Minn	Minneapolis, Raychem Corp.	612-529-9114
Mo	Berkeley, Raychem Corp.	314-521-5111
NJ	Bloomfield, Raychem Corp.	201-744-6261
NJ	Maple Shade, Raychem Corp.	609-667-4280
NY	Dix Hills, Raychem Corp.	516-864-4400
Ohio	Cleveland, Raychem Corp.	216-692-2141
Ohio	Warren, Raychem Corp.	216-856-4979
Pa	Johnstown, Raychem Corp.	814-255-1142
Pa	West Chester, Raychem Corp.	215-692-8660
Tenn	Knoxville, Raychem Corp.	615-667-3027
Tex	Dallas, Raychem Corp.	214-350-8871
Wash	Bellevue, Raychem Corp.	206-455-0903
EXP:	Dorval 760, Quebec Can., Raychem Canada Ltd.	514-636-1680
EXP:	Toranto l9, Ont, Can., Raychem Canada Ltd.	416-789-7425

RAYMOND ENGRG. INC., 217 Smith St., Middletown, Conn., 06457, Tel: 203-347-5611, TWX: 710-428-7944; FSC No: 92059; Empl.: 625

Customer service: J. S. Hinchliffe 203-632-1000

Free literature available: Raycorder Digital Cassette Recorder; Magnetic Tape Memory, Model 6401; Military Magnetic Tape Products; Positive Torque Control With Power-Dyne

Products manufactured: Accelerometers, Actuators, Fuses, Memory Systems, Recorders, Switches, Timers, Wrenches

RAYTEK, INC., 1277 Terra Bella Ave., Mountain View, Cal., 94043, Tel: 415-961-1650, Telex: 348351; Empl.: 35; Minimum order: $50

Customer service: M. R. Wank

Free literature available: Description and application of portable and fixed IR thermometers for non-contact temperature measurement and control.

Products manufactured: Bolometers, Probes, Pyrometers, Radiometers, Transducers

Local Sales Offices & Reps.

Cal	Los Angeles, McCamey-Jones, Inc.	213-263-9812
Cal	San Francisco, Priz Co.	415-326-9333
Fla	Clearwater, J. Barber Co.	813-442-8713
Ga	Jonesboro, W.L. Anderson Co.	404-478-9648
Ill	Park Ridge, L.R. Fitz Co.	312-631-5488
Ind	Indianapolis, Couchman-Conant, Inc.	317-849-9890
La	Baton Rouge, R.S. & P. Sls.	504-937-4828
Mass	Acton, Abbott Assocs.	617-263-5047
Mich	Orchard Lake, W.C. Fay Co.	313-851-4750

Minn	Minneapolis, Bican Co.	612-827-4734
Mo	St. Louis, R. Greene Co.	314-644-2666
Neb	Omaha, H.G. Klug Co.	402-553-1377
NJ	Fair Lawn, Par Assocs.	201-447-3722
NM	Albuquerque, A.L.S. Elctrns.	505-298-2575
NC	Charlotte, Sloan Assocs.	704-523-2122
Ohio	Cincinnati, A.H. Parker, Jr.	513-563-1843
Ore	Portland, McLaren, Inc.	503-297-2248
Pa	Mt. Lebanon, Advance Instrs., Inc.	412-341-3252
Pa	Wayne, R. Schadler Co.	215-687-0969
Tenn	Chattanooga, Coleman Assocs.	615-821-0235
Tex	Dallas, Dixon Engrg.	214-321-0240
Tex	Houston, Dixon Engrg.	713-644-8052
Va	Richmond, Sloan Assocs.	804-359-6051
Wash	Bellevue, McLaren, Inc.	206-454-3400
Wisc	Brookfield, S.F. Boyd Co.	414-781-7170

RAYTHEON CO., Distributor Prods. Oper., Fourth Ave., Burlington, Mass., 01803, Tel: 617-272-6400, TWX: 710-332-7641 .... p. 1•2283-2285; p. 2•1105-1113

For info on price: B. Knight; Application info: J. Hickey; Customer service: B. Knight; Delivery info: B. Knight

Products manufactured: Cells, Photoconductive, Photoemissive, Photovoltaic, Isolators, Jacks (All Types), Knobs, Lights, Locks, Dial & Shaft, Posts, Switches, Tubes

Local Sales Offices & Reps.

Cal	El Monte, Cook Entprs.	213-686-2120
Cal	Oakland, Moulthrop Sls.	415-261-7676
Colo	Denver, Connors, Inc.	303-934-5829
Fla	N. Miami, L. Haas Co.	305-949-9143
Ga	Atlanta, Hollingsworth & Still	404-394-3270
Haw	Honolulu, G. Piety Factors	
Ill	Chicago, GNB Assocs.	312-673-4050
Ind	Indianapolis, Cardinal Sls. Co.	317-253-1513
Minn	Edina, Mel Foster Co.	612-835-2252
Mo	Kansas City, Forristal & Young Sls.	816-358-6771
Mo	St. Louis, Forristal & Young Sls.	314-645-2360
Neb	Omaha, Forristal & Young Sls.	402-333-0800
NJ	Cherry Hill, Trinkle Sls.	609-795-4200
NJ	Teaneck, Fisher Elctrn. Assoc.	201-837-1200
NY	Rochester, Marsey Sls. Co.	716-442-9700
Ohio	Beachwood, Electronic Salesmasters	216-831-9555
Ohio	Cleveland, Imtech	216-826-3400
Ohio	Dayton, Imtech	513-837-5610
Ore	Portland, D.G. Weber Co.	503-234-0686
Tenn	Memphis, Crockett Sls. Co.	901-388-5410
Tex	Dallas, Crockett Sls. Co.	214-748-8209

RAYTHEON CO., Indl. Comps. Oper., 465 Centre St., Quincy, Mass., 02169, Tel: 617-479-5300, TWX: 710-337-6879

Customer service: R. Punchard

Products manufactured: Cells, Photoconductive, Photoemissive, Photovoltaic, Circuits, Hybrid, Thick Film, Hybrid Voltage Regulators, Isolators, Knobs, Modules, Logic, Encapsulated, Regulators, Tubes

Local Sales Offices & Reps.

Cal	Los Angeles	213-641-3103
Cal	Mountain View	415-964-4754
Fla	Longwood	305-830-6670
Ill	Elmhurst	312-833-6760
Mass	Waltham	617-899-8080
NY	Great Neck	516-482-8480
NY	Rome	315-337-2500
Ohio	Dayton	513-254-3571
Tex	Dallas	214-233-2939
Va	Arlington	703-979-6100
EXP:	Lexington, Mass.	617-862-6600
FOR:	Can., Waterloo, Ont.	519-745-6831

RAYTHEON CO., Spec. Microwave & Device Oper., 130 Second Ave., Waltham, Mass., 02154, Tel: 617-890-8080, TWX: 710-324-6568

Customer service: D. Bauks

Products manufactured: Lasers & Laser Systems, Welding Equipment & Access. (Excluding Equip. for Semiconductor Devices)

RAYTHEON CO., Microwave & Power Tube Div., 190 Willow St., Waltham, Mass, 02154

RAYTHEON SEMICONDUCTOR, 350 Ellis St., Mountain View, Cal., 94042, Tel: 415-968-9211, TWX: 910-379-6481; FSC No: 07933; Empl.: 950; Minimum order: $500

Customer service: B. O'Connell Ext 280

Products manufactured: Integrated Circuit Devices, Transistors

Local Sales Offices & Reps.

Ariz	Phoenix, Chaparral	602-996-9648
Ariz	Scottsdale, Raytheon Semiconductor	602-947-6621
Cal	Irvine, Raytheon Semiconductor	714-833-9042
Cal	Mountain View, Raytheon Semiconductor	415-964-4754
Cal	San Diego, Daniels & Doty Sls. Co.	714-560-6266
Colo	Boulder, Straube Assoc.	303-443-8600
Colo	Denver, Straube Assocs.	303-426-0890
Fla	Clearwater, Perrott Assocs.	813-726-1549
Fla	Fort Lauderdale, Raytheon Semiconductor	305-792-8400
Fla	Orlando, Perrott Assocs.	305-275-1132
Ill	Chicago, Carlson Elctrn. Sls.	312-774-9022
Ill	Des Plaines, Raytheon Semiconductor	312-297-5540
Kans	Shawnee Mission, Carlson Elctrn. Sls.	913-432-2144
Md	Glen Burnie, Raytheon Semiconductor	301-760-3917
Mass	Burlington, Raytheon Semiconductor	617-272-8500
Mich	Birmingham, J. C. Hofstetter Co.	313-643-7203
Mich	Grand Rapids, J. C. Hofstetter Co.	616-942-0650
Minn	Minneapolis, Raytheon Semiconductor	612-920-8710
Minn	New Brighton, Raytheon Semiconductor	612-636-7696
Mo	St. Louis, Carlson Elctrn.	314-991-0262
NJ	Englewood, Raytheon Semiconductor	201-567-4911
NJ	Pennsauken, Raytheon Semiconductor	609-663-4066
NM	Albuquerque, Straube Assoc.	505-294-1800
NY	Melville, Raytheon Semiconductor	516-420-0700
Ohio	Dayton, J. C. Hofstetter Co.	513-296-1010
Ohio	Medina, J. C. Hofstetter co.	216-241-4880
Ore	Beaverton, E. S. Chase Co.	503-649-6177
Tex	Dallas, Mark Kruvand Co.	214-827-8043
Tex	Houston, Mark Kruvand Co.	713-661-3007
Utah	Salt Lake City, Straube Assocs.	801-328-4513
Wash	Edmonds, E. S. Chase Co.	206-774-3586
Wisc	Milwaukee, Carlson Elctrn. Sls.	414-476-2790
Wisc	Wauwatosa, Carlson Elctrns.	414-476-2790
EXP:	Lexington, Mass., Raytheon Overseas Ltd.	617-862-6600
FOR:	Can., Scarborough, Ont., Lake Engrg. Co.	416-751-5980
FOR:	Can., St. Laurent 381, Que., Lake Engrg. Co.	514-747-2441

RBM CONTROLS, See Essex Controls Div.

RCA CORP., Commercial Communications Systems Div., Front & Cooper, Camden, N.J., 08102, Tel: 609-963-8000, TWX: 710-892-0905

Customer service: G. M. Lewis

Free literature available: Broadcast Audio Equipment, Catalòg AU.742000 TR-600 advanced technology quadraplex VTR, catalog TA.3400 TKP-45A portable broadcast/teleproduction camera, catalog CA.1410

Products manufactured: Amplifiers, Erasers, Magnetic Tape (Bulk), Microphones, All Kinds, Recorders, Television Systems & Equipment Closed-Circuit

Local Sales Offices & Reps.

Ala	Birmingham, RCA Broadcast Sys.	205-871-1155
Cal	Hollywood, RCA Broadcast Sys.	213-461-9171
Cal	San Francisco, RCA Broadcast Sys.	415-343-2741
Colo	Denver, RCA Broadcast Sys.	303-433-8484
DC	Washington, RCA Broadcast Sys.	703-558-4212
Fla	Jacksonville, RCA Broadcast Sys.	904-398-4588
Fla	West Palm Beach, RCA Broadcast Sys.	305-622-1100
Ga	Atlanta, RCA Broadcast Sys.	404-634-6131
Ill	Chicago, RCA Broadcast Sys.	312-782-0700
Ind	Indianapolis, RCA Broadcast Sys.	317-546-4001
Kans	Kansas City: Overland Park, RCA Broadcast Sys.	913-642-3185
Mass	Boston: Wellesley, RCA Broadcast Sys.	617-237-6050
Mich	Detroit: Southfield, RCA Broadcast Sys.	313-357-0080
Minn	Minneapolis, RCA Broadcast Sys.	612-920-6395
Mo	St. Louis, RCA Broadcast Sys.	314-862-3660
NJ	Camden, RCA Broadcast Sys.	609-963-8000
NY	New York, RCA Broadcast Sys.	212-586-3000
NC	Charlotte, RCA Broadcast Sys.	704-366-0626
Ohio	Cincinnati, RCA Broadcast Sys.	513-825-1550
Pa	McMurray, RCA Broadcast Sys.	412-941-5570
Tex	Austin, RCA Broadcast Sys.	512-345-2224
Tex	Dallas, RCA Broadcast Sys.	214-638-6200
Wash	Seattle, RCA Broadcast Sys.	206-285-2375

RCA ELECTRONIC COMPS., 415 S. Fifth St., Harrison, N.J., 07029, Tel: 201-485-3900

Customer service: R. B. Means 201-485-3900

Products manufactured: Amplifiers, Batteries, Capacitors, Fixed, Chargers, Battery, Decade Boxes, Diodes, Display Devices/Displays, Gages, Generators, Isolators, Lasers & Laser Systems, Leads, Test & Adaptors, Meters, Oscilloscopes, Power Supplies, Probes, Resistors, Sockets, Tape Recording Accessories, Tapes, Recording, Magnetic (All Types), Television Systems & Equipment Closed-Circuit, Transformers, Transmitters, Tubes

Local Sales Offices & Reps.

Cal	Hollywood	213-461-9171
Cal	Los Altos	415-948-8961
Fla	Riviera Beach	305-842-0141
Ga	Atlanta	404-634-6131
Ill	Des Plaines	312-827-0033
Ind	Ft. Wayne	219-432-9461
Ind	Indianapolis	317-546-4001
Kans	Overland Park	913-642-7656
Mass	Needham Heights	617-444-7200
NJ	Cherry Hill	609-424-4773
NJ	Edison	201-485-3900
NY	Syracuse	315-474-8221
Pa	Lancaster	717-397-7661
Va	Arlington	703-558-4286

RCA, IND'L. TUBE DIV., New Holland Ave., Lancaster, Pa., 17604, Tel: 717-397-7661

Free literature available: Literature on tubes and devices for broadcasting, communications, microwaves, electro optics, image projection, radiation detection, and image display.

Products manufactured: Diodes, Lasers & Laser Systems, Oscillators, Television Systems & Equipment Closed-Circuit, Tubes

Local Sales Offices & Reps.

Cal	Hollywood	213-461-9171
Cal	Los Altos	415-948-8996
Fla	Riviera Beach	305-842-0141
Ill	Des Plaines	312-827-0033
Kans	Overland Park	913-642-7656
Mass	Needham	617-444-7200
NJ	Cherry Hill	609-424-4773
NJ	Edison	201-485-3900
NY	Syracuse	315-474-8221
Va	Arlington	703-558-4286

RCA PARTS & ACCESSORIES, 2000 Clements Bridge Rd., Deptford, N.J., 08096, Tel: 609-963-8000

Products manufactured: Amplifiers, Antennas, Cleaners & Solvents, Couplers, Resistors

RCA SERVICE CO., Div. RCA Corp., Govt. Svcs. 202-1, Camden, N.J., 08101, Tel: 609-779-5176, TWX: 710-892-0905; Empl.: 6000

Customer service: J. J. Connors

Products manufactured: Services, Assembly, Production & Test

Local Sales Offices & Reps.

Colo	Colorado Springs	303-475-8810
Fla	Indiatlantic	305-727-7120
Va	Arlington	703-558-4441

RCA SOLID STATE DIV., Route 202, Somerville, N.J., 08876, Tel: 201-722-3200, TWX: 710-480-9333; Minimum order: $100

Customer service: P. R. Thomas X5177

Products manufactured: Amplifiers, Circuits, Integrated, Silicon Monolithic, Unpackaged Chips, Diodes, Display Devices/Displays, Drivers & Decoders For Readouts, Integrated Circuit Devices, Rectifiers, Thyristors (Includes Silicon Controlled Rectifiers), Transistors

Local Sales Offices & Reps.

Ala	Huntsville	205-881-4100
Ariz	Scottsdale	602-947-7235
Cal	Hollywood	213-461-9171
Cal	Los Altos	415-948-8996
Cal	San Diego	714-279-0420
Cal	Tustin	714-832-5302
Colo	Denver	303-433-8841
Conn	Stamford	203-329-2041
Fla	Riviera Beach	305-842-1577
Ga	Atlanta	404-634-6131
Ill	Des Plaines	312-827-0033
Ind	Fort Wayne	219-432-9461
Ind	Indianapolis	317-546-4001
Kans	Overland Park	913-642-7656

Mass	Needham Heights	617-444-7200
Mich	Birmingham	313-644-1151
Minn	Minneapolis	612-929-0676
NJ	Cherry Hill	609-424-3650
NJ	Edison	201-485-3900
NY	Huntington Station	516-293-0180
NY	Syracuse	315-474-8221
Ohio	Pepper Pike	216-831-0030
Tex	Dallas	214-638-6200
Va	Arlington	703-558-4161
Wash	Bellevue	206-747-8534

RCA SOLID STATE DIV., COS/MOS IC Mktg., Rte. 202, Somerville, N. J., 08876, Tel: 201-722-3200, TWX: 710-480-9333; Minimum order: $100

For info on price: Mktg.; Application info: Engineering HOT LINE; Customer service: P. R. Thomas; Delivery info: Mktg.

Free literature available: COS/MOS product brochure, COS-278C

Products manufactured: Integrated Circuit Devices
See RCA Solid State Div. for Sls. Reps.

RCA SOLID STATE DIV., Linear Integrated Circuits, Rte. 202, Somerville, N. J., 08876, Tel: 201-722-3200, TWX: 710-480-9333; Minimum order: $100

For info on price: G. M. O'Neal; Application info: M. V. Hoover; Customer service: P. R. Thomas; Delivery info: G. M. O'Neal

Free literature available: Linear Integrated Circuits catalog, 6D6-8Z0F

Products manufactured: Amplifiers, Circuits, Integrated, Silicon Monolithic, Unpackaged Chips, Integrated Circuit Devices
See RCA Solid State Div. for Sls. Reps.

RCA SOLID STATE DIV., Liquid Crystal Products, Route 202, Somerville, N.J., 08876, Tel: 201-722-3200, TWX: 710-480-9333

For info on price: P.L. Farina, Ext. 5401; Application info: G.J. Granieri, Ext. 5408; Delivery info: P.L. Farina, Ext. 5401

Products manufactured: Display Devices/Displays

RCA SOLID STATE DIV., Micro Processors, Route 202, Somerville, N.J., 08876, Tel: 201-722-3200, TWX: 710-480-9333

For info on price: V. E. Hills, Ext. 2072; Application info: V. E. Hills, Ext. 2072; Customer service: P. R. Thomas, Ext. 5177; Delivery info: V. E. Hills, Ext. 2072

Products manufactured: Integrated Circuit Devices

RCA SOLID STATE DIV., MOS IC Products, Route 202, Somerville, N.J., 08876

For info on price: M. Ciampaglia, Ext. 2158; Application info: T. G. Athanas, Ext. 3741; Customer service: P. R. Thomas, Ext. 5177; Delivery info: M. Ciampaglia, Ext. 2158

Products manufactured: Integrated Circuit Devices, Metal Oxides

RCA SOLID STATE DIV., RF & Microwave Devices, Rte. 202, Somerville, N. J., 08876, Tel: 201-722-3200, TWX: 710-480-9333; Minimum order: $100

For info on price: F. J. Rohr X3435; Application info: B. Maximow X2465; Customer service: P. R. Thomas X5177; Delivery info: F. J. Rohr X3435

Products manufactured: Transistors
See RCA Solid State Div. for Sls. Reps

RCA SOLID STATE DIV., Thyristors & Rectifiers, Rte. 202, Somerville, N.J., 08876, Tel: 201-722-3200, TWX: 710-480-9333; Minimum order: $100

For info on price: L. H. Gibbons; Application info: T. C. McNulty; Customer service: P. R. Thomas; Delivery info: L. H. Gibbons

Free literature available: Thyristors/Rectifiers catalog, THC-500D

Products manufactured: Diodes, Rectifiers, Thyristors (Includes Silicon Controlled Rectifiers)
See RCA Solid State Div. for Sls. Reps.

RCA SOLID STATE DIV., Transistors, Rte. 202, Somerville, N.J., 08876, Tel: 201-722-3200, TWX: 710-480-9333; Minimum order: $100

For info on price: Power Mktg. Mgr.; Application info: D. E. Burke; Customer service: P. R. Thomas; Delivery info: Power Mktg. Mgr.

Free literature available: Power Transistor Directory, PTD-187D

Products manufactured: Transistors
See RCA Solid State Div. for Sls. Reps.

RCA SERVICE CO., Tech. Prods. Svc. Div. RCA Corp., Bldg. 204-2, Cherry Hill, Camden, N.J., 08101, Tel: 609-779-4129, TWX: 710-892-0905; Empl.: 6000

For info on price: B. L. Grossman; Application info: V. A. Littlefield; Customer service: B. L. Grossman; Delivery info: V. A. Littlefield

Free literature available: 33ASR Teletype equipped for Alternate TWX/Dataphone use; 38ASR Teletype used for Dataphone; Extel with standard print, 5 and 8 level.

Products manufactured: Comm. Systems, Radar Systems, Receivers, Teleprinters, Teletypewriters & Equipment, Television Systems & Equipment Closed-Circuit, Transmission Systems, Data

Local Sales Offices & Reps.

Cal	Montebello, RCA Service Co.	213-685-3069
Ga	Atlanta, RCA Service Co.	404-355-6110
Ill	Skokie, RCA Service Co.	312-965-7550
NJ	Jersey City, RCA Service Co.	201-451-2222
Ohio	Strongsville, RCA Service Co.	216-238-9555
Pa	Philadelphia, RCA Service Co.	215-467-3300
Tex	Dallas, RCA Service Co.	214-631-8770

RCL ELECTRONICS DIV., AMF Inc., 700 S. 21st St., Irvington, N.J., 07111, Tel: 201-374-3311, TWX: 710-999-5511; Empl.: 750
p. 1•454-460,2286-2295; p. 2•1530-1542

Customer service: C. Smith 603-627-3831

Free literature available: Resistor Engineering Handbook. Precision/Power Wire Wound Resistors. Switch Engineering Handbook. Complete information on miniature rotary switches. Delay Line Engineering Handbook. Electromagnetic Delay Lines Including Complete Information on DIP Configurations.

Products manufactured: Delay Lines, Networks, Resistors, Switches

Local Sales Offices & Reps.

Ala	Huntsville, Interep	205-881-3677
Ariz	Mesa, Toribre Ent.	602-832-1134
Cal	(No.) Los Altos, Held & Mollard, Inc.	415-941-6041
Cal	So. Woodland Hills, Interstate Mktg.	213-883-7606
Colo	Wheatridge, Waugaman	303-423-1020
Conn	No. Haven, Kitchen & Kutchin	203-239-0212
Fla	Altamonte Springs, Semtronic Assoc.	305-831-8233
Fla	St. Petersburg, Semtronic Assoc.	813-867-6835
Ga	Marietta, K&E Assoc.	404-427-0241
Ill	Chicago, Gassner & Clark	312-764-6121
Ind	Indianapolis, L. DeVoe	317-257-1227
Iowa	Cedar Rapids, Palatine Sls.	319-365-8071
Kans	Andover, Palatine Sls.	316-683-7512
Kans	Overland Park, Palatine Sls.	913-262-5643
Md	Baltimore, Burgin-Kreh	301-788-5200
Mass	Lexington, Kitchen & Kutchin	617-862-8230
Mich	Farmington, Davis-Martenson	313-474-8300
Minn	Minnetonka, T. Ayre	612-474-4125
Mo	St. Louis, Palatine Sls.	314-426-7055
NJ	(So.) Haddonfield, T.A.I.	609-854-3011
NJ	Irvington, MGI	201-399-4350
NY	Rochester, W. Zimmerman	716-586-4450
NY	Syracuse, W.H. Zimmerman	315-474-4889
NC	Winston Salem, Burgen-Kreh	919-768-4174
Ohio	Cleveland, KW Elctrn. Sls.	216-831-8292
Ohio	Dayton, KW Elctrn. Sls.	513-890-2150
Okla	Oklahoma City, Ammon & Rizos	405-947-1051
Ore	Portland, Almac/Stroum	503-292-3534
Pa	Waterford, KW Elctrn. Sls.	412-487-4300
Tex	Dallas, Ammon & Rizos	214-233-5591
Tex	Houston, Ammon & Rizos	713-729-1233
Va	Lynchburg, Burgin-Kreh	703-845-5600
Wash	Seattle, Almac/Stroum	206-763-2300
FOR:	Alaska, Almac Stroum	206-232-8228
FOR:	Can., Brit. Ca., Almac/Stroum (Portland)	503-292-3534
FOR:	Can., Malton, Ont., S. Hooker	416-677-3554
FOR:	Can., Montreal, Que., S. Hooker	514-487-5151

Local Distributors

Cal	Sunnyvale, Bell Ind., 1161 N. Fairoaks Ave.	408-734-8570
Cal	Woodland Hills, Rampart Components, 21201 Oxnard St.	213-887-7260
Colo	Lakewood, Acacia Sls., 11111 W. 8th Ave.	303-232-2882
Ill	Elk Grove Village, GBL, 75 Gaylord St.	312-569-2730
Ill	Rosemont, Advent Elctrns., 7110 N. Lycon Ave.	312-298-4210
Iowa	Cedar Rapids, Advent Elctrns., 1834 Blairs Ferry Rd. N.E.	319-393-8811
Md	Baltimore, Arrow Elctrns., 4801 Benson Ave.	301-247-5200
Md	Baltimore, Radio Elec., 1026 Cromwell Bridge Rd.	301-823-0070
Mass	Burlington, Arrow Elctrns., 15 A St.	617-273-0100
NY	Hauppauge, Rampart Components, 195 Engineers Rd.	516-273-1111
NY	Rochester, Simcona, 275 Mt. Read Blvd.	716-328-3230
Ohio	Solon, Repco, 6835 Cochran Rd.	216-248-8900
Pa	Erie, Erie Corp. Contractor, 1938 Buffalo Rd.	814-455-8110
Pa	Philadelphia, Almo, Roosevelt Blvd. at Blue Grass Rd.	215-676-6000
Utah	Salt Lake City, Diplomat/Alta, 2280 S. Main St.	801-486-7220
Vt	Richmond, Hooker Vt., Bridge St.	514-487-5151
Wash	Seattle, Almas Stroum/Seattle, 5811 6th Ave. S.	206-763-2300
Wisc	Mequon, Taylor Elec. Co., 1000 W. Donges Bay Rd.	414-241-4321

RDI/REED DEVICES, INC., 21 W. 183 Hill Ave., Glen Ellyn, Ill., 60137, Tel: 312-858-2050, Telex: 72-1527; FSC No: 53337; Minimum order: $50 ... p. 2•792-795

For info on price: B. Wolber; Application info: H. Roeser; Customer service: B. Wolber; Delivery info: B. Wolber

Free literature available: Cat. #100: Complete description of 43 Snaptrack T.M. relay & timer sockets, edge connector assemblys, Power Supplies for IC's; Bulletin 102: 4 sizes Snaptrack TM channel for mounting pcb's;
Bulletin 103: Molded octal socket assembly for single or gang mounting. Cat. #200: Barrier Terminal Strips for PCB's. 3 sizes, 6 styles including right angle mount.

Products manufactured: Boards, Printed Wiring, Universal, Connectors, Power Supplies, Sockets, Switches, Terminal Blocks, Boards & Strips, Terminals

Local Sales Offices & Reps.

Ariz	Phoenix, G. R. McKnight Co.	602-257-8037
Ark	Eldorado, D. Bellew Sls.	501-863-8325
Cal	Menlo Park, G. R. McKnight Co.	415-325-2844
Cal	Woodland Hills, Cummings & Assocs.	213-340-6035
Colo	Denver, Mundix Co.	303-893-2390
Fla	Miami, S.K. Wallace Assoc.	305-961-6640
Fla	Tampa, S. K. Wallace Assoc.	813-961-1037
Ga	Atlanta, A. Brown Assoc.	404-457-6381
Ill	Glen Ellyn, Rockford Controls	312-469-6016
Kans	Wichita, Avionics	316-264-6201
La	Kenner, D. Bellew Sls.	504-729-4550
Mass	Waltham, Betronic Assocs.	617-894-8400
Mich	Brighton, H. H. Barnum Co.	313-229-2961
Mich	Lowell, H. H. Barnum Co.	616-451-0980
Minn	Minneapolis, HMR	612-920-8200
Mo	Florissant, Miller Assocs.	314-355-1642
NY	Buffalo, H.C. Johnson Ags.	716-632-7880
NY	Fayetteville, H.C. Johnson Ags.	315-637-9383
NY	Great Neck, Cooper-Simon & Co., Inc.	516-487-1142
NY	Rochester, H.C. Johnson Ags.	716-482-3000
NC	Greensboro, S. K. Wallace Assoc.	919-292-0487
Ohio	Columbus, Rockford Controls Ohio	614-231-5890
Ohio	Dayton, Rockford Controls Ohio	513-898-5452
Ohio	Euclid, Rockford Controls Ohio	216-731-5250
Pa	Elkins Park, K. B. Erdman Co.	215-224-1833
Tenn	Memphis, D. Bellew Sls.	901-365-9437
Tenn	Nashville, A. Brown Assoc.	615-256-3003
Tex	Dallas, R.E. Nesbitt Co.	214-357-4601
Tex	Houston, R.E. Nesbitt Co.	713-224-3633
Utah	Salt Lake City, Control Agency, Inc.	801-466-8601
Wash	Seattle, R. Johnston & Co.	206-524-5170

Local Distributors

Ark	Little Rock, Carlton-Bates Co., 6821 Scott Hamilton	501-562-9100
Cal	Burlingame, Rose Elex, 846 Stanton Rd.	415-697-0224
Cal	Los Angeles, Electro Comps., 122 So. Misson	213-264-7100
Colo	Aurora, Component Specialties, 3178 Noma St.	303-341-0160
Conn	Hartford, Hartford Elec. Supp., Box 748	203-233-3694
Fla	Miami, Electro Standard Labs, 3560 Northwest 34 St.	305-633-6973
Ga	Atlanta, Electrical Control Prods., 3762 N.W. Freeway Access	404-455-1216
Haw	Honolulu, Electrical Equip., 656 S. Queen St.	808-533-3884
Ill	Arlington Hts., S & R Corp., 2420 E. Oakton	312-593-2545

Ill	Chicago, Newark Elex., 500 N. Pulaski	312-638-4411
Ill	Moline, Jim Otis & Assoc., 4520 River Dr.	309-762-9311
Ind	Indianapolis, Ra-Dis-Co, 814 N. Senate	317-637-5571
Kans	Wichita, Interstate Elec. Supply, 1330 E. 1st St.	316-264-6316
Ky	Louisville, P.I. Burks Co., 842 S. 7th St.	502-589-3960
La	New Orleans, Southern Radio, 1909 Tulane	504-524-2343
Mass	Cambridge, Apollo Elex., 101 Binney St.	617-868-3120
Mich	Detroit, La Salle Elec. Supply, 470 Brainard	313-831-0470
Minn	Minneapolis, Control Design, 3433 E. 25th	612-721-1629
Mo	St. Louis, LComp, 2605 S. Hanley	314-647-5505
Neb	Lincoln, Scott Elex., 4040 Adams	402-434-8308
NJ	Jersey City, Cuny & Guerber, 3468 Kennedy	201-653-0222
NJ	So. Plainfield, Brownell Electro., 500 Hadley	201-753-4600
NY	Buffalo, Summit, 916 Main St.	716-884-3450
NY	Lynbrook, Peerless Radio, 19 Wilbur St.	516-593-2121
NC	Winston-Salem, Kirkman Elec., Drawer K	919-724-0541
Ohio	Dayton, ESCO Inc., 221 Crane	513-224-9192
Okla	Tulsa, Radio Inc., 1000 S. Main	918-587-9123
Ore	Eugene, Vitus Elec., 140 E. 5th Ave.	503-345-4377
Pa	Philadelphia, Philadelphia Elex., 112 N. 12th St.	215-568-7400
SC	Greenville, Black Elec., 203 Westfield	803-233-4142
Tenn	Memphis, Brownell Electro, 3053 Tranquility	901-332-9254
Tex	Stafford, Southwest Elex., 12725 Royal Dr.	713-494-6021
Utah	Salt Lake City, Standard Supply, 225 E. 6th South	801-355-2971
Va	Lynchburg, Midstate Elec., 1217 Church	804-846-6555
Wash	Seattle, Radar Elec., 168 Western	206-282-2511
Wisc	Milwaukee, Marsh Elex., 6047 W. Beloit	414-545-6500

RE-EL CIRCUITS, INC., 520 Victor Street, Saddle Brook, N.J., 07662, Tel: 201-843-3738; Empl.: 15 p. 1•123,204

Products manufactured: Alarms, Amplifiers, Annunciators, Attenuators, Boards, Printed Circuit, Chassis, Circuit Board Mounting, Comm. Systems, Controls/Control Eqpt., Converters, Decoders, Encoders, Modulator/Demodulators, Multiplexers, Receivers, Switches, Terminal Equipment, Digital, Terminals, Data Display (including Alphanumeric & Graphic), Testers, Transmitters

Local Sales Offices & Reps.

Mass	Needham, White Sls. Co.	617-444-3676
NY	E. Northport, Jarms Assoc.	516-368-4096
NY	Fayetteville, M. P. Andrews Mfrs. Rep.	315-637-5291

RECORDER SYS DIV., See Gulton Inds, Meas. & Control Sys. Div.

RECOTON CORP., 46-23 Crane St., Long Island City, N.Y., 11101, Tel: 212-392-6442

For info on price: P. Wish; Application info: P. Wish; Customer service: R. Diaz; Delivery info: R. Diaz

Free literature available: 3 complete product catalogs for audio, diamond needle and record, tape and music accessory products.

Products manufactured: Cable, Connector Adapters, Demagnetizers, Microphones, All Kinds, Phonographs, Parts & Accessories, Tape Recording Accessories

Local Sales Offices & Reps.

Ala	Birmingham, Morris Taylor Co.	205-853-3181
Ariz	Phoenix, SWM Sls. Corp.	602-258-6868
Cal	Culver City, Marshank Sls. Corp.	213-559-2591
Cal	Walnut Creek, Mac Pherson Sls. Co.	415-937-1482
Colo	Aurora, SPS Assocs.	303-341-1776
Fla	Casselberry, Morris Taylor Co.	305-838-0821
Haw	Mililani, C & L Dists.	808-623-2762
Ill	Chicago, W. Doyle Co.	312-274-6685
Kans	Leawood, W. Menezes & Assocs.	913-649-2680
La	Metairie, Tape City U.S.A.	504-888-2505
Md	Silver Spring, Morris Taylor Co.	301-946-3569
Mass	Lynn, Keene Sls. Co.	617-595-2300
Mich	Southfield, Aztec Sls. Corp.	313-642-0777
Minn	Maple Grove, R. C. Sls. Co.	612-425-5543
NJ	Lake Pine, Morris Taylor	609-983-1712
NM	Albuquerque, SWM Sls. Corp.	505-296-2620
NY	New York, Newhope Corp.	212-532-7372
NY	Yonkers, J. Brown Electr. Sls. Reps.	914-779-7330
NC	Charlotte, Morris Taylor Co.	704-523-7932
Ohio	Cleveland, M.S. Sls. Co.	216-382-2060
Pa	Philadelphia, Morris Taylor Co.	215-698-9757
Tex	Houston, Spivey-LeBoeuf Assocs.	713-649-1221
Utah	Salt Lake City, SPS Assocs.	801-485-1294
Wash	Yakima, Barnsley-Weis Assocs.	509-453-5537

RECTIFIER COMPONENTS CORP., 1112 Lousons Rd., Union, N.J., 07083, Tel: 201-687-5410; Empl.: 75; Minimum order: $50 p. 1•1850,1851

For info on price: D. L. Mohn; Application info: D. L. Mohn; Customer service: J. Hambor; Delivery info: B. Murphy

Products manufactured: Bridges, Diodes, Multipliers, Rectifiers

Local Sales Offices & Reps.

Ill	Chicago, M & S Sls. Co.	312-992-1053
Md	Towson, Habco Elctrns.	301-825-9637
Mass	Needham Hts., Todino Engrg. Sls. Co.	617-444-7925
Mich	Detroit, A. Blumenberg Assoc.	313-557-1934
NY	Glen Cove, S. Glassman Assocs.	516-676-1039
Pa	Willow Grove, H. Nash Assocs.	215-657-2213
Wash	Seattle, Underwood & Underwood	206-243-2133
FOR:	Can., Hamilton, Ont., Cartwright-Southall Assocs., Inc.	416-528-0294

RED POINT CORP., 105 W. Spazier, Burbank, Calif., 91503, Tel: 213-842-4895; Empl.: 12; Minimum order: $15

Customer service: R. P. Craig

Free literature available: Bulletins 9-70 and 10-67

Products manufactured: Chamber, Environmental Test, Machines/Machinery, Production, Ovens, Pumps, Vacuum

REDACTRON CORP., 100 Parkway Dr. S., Hauppauge, N.Y., 11787, Tel: 516-543-8700; Empl.: 475

Customer service: T. Reantillo

Free literature available: Description & Interface Information on: Magnetic Tape Cassette Transport, Magnetic Card Transport, Cartridge Transport, 1,000 Line Resolution CRT Monitor.

Products manufactured: Monitors, Recorders

Local Sales Offices & Reps.

Cal	Cupertino, Eakins Assocs.	408-255-6494
Cal	Palo Alto, Eakins Assocs. Inc.	415-328-7871
Cal	Pasadena, Advanced Techniques	213-681-1093
Colo	Englewood, Davis Assocs.	303-761-9228
Conn	Hartford, Newmar Assocs.	203-523-0402
Fla	Orlando, Gra-Mar Inc.	305-894-3351
Kans	Shawnee Mission, IBL Engrg. & Sls., Inc.	913-262-1374
Md	Silver Springs, QED Elctrns.	301-588-8134
Mass	Lynnfield, Newmar Assocs.	617-245-7960
Mich	Detroit, Hocker Assocs.	313-531-1403
NM	Albuquerque, Trembly Assocs.	505-293-4444
NY	Mamaroneck, Cane Tech. Sls., Inc.	914-698-4411
Ohio	Cleveland, Hocker Assocs.	216-734-4433
Ohio	Dayton, Hocker Assocs.	513-298-8638
Ohio	N. Olmstead, Hocker Assocs.	216-734-4433
Okla	Oklahoma City, IBL Engrg. & Sls., Inc.	405-843-9434
Pa	King of Prussia, White-Keystone, Inc.	215-265-1817
Tex	Bellair, IBL Engrg. & Sls.	713-661-2511
Tex	Dallas, IBL Engrg. & Sls., Inc.	214-EM3-2921
Tex	Houston, IBL Engrg. & Sls., Inc.	713-781-5171
Wash	Bellevue, Conrad-Carlson Assocs.	206-455-1336

REDINGTON COUNTERS, INC., 130 Addison Rd., Windsor, Conn., 06095, Tel: 203-688-6207

Customer service: T. Nelson

Free literature available: RCI Full Catalog RCI #35, RCI Condensed Catalog RCI #36, RCI Model 300 Blue Line Electrical Counters RCI #38, RCI Model 500 Predeterming Counters RCI #39

Products manufactured: Controls/Control Eqpt., Counters

Local Sales Offices & Reps.

Ala	Birmingham, McConnell Sls. & Engrg. Corp.	205-871-3501
Ark	Fort Smith, Electro-Related Prods.	501-783-7323
Cal	Los Angeles, R.B. Clapp Co. Inc.	213-225-2395
Cal	San Francisco, Automated Process Controls Co.	415-467-6162
Colo	Loveland, Kelley Entprs.	303-667-1376
Fla	Winter Park, Steele Tech. Sls.	305-644-6641
Ga	Atlanta, B. Fancher Assocs.	404-448-7078
Ind	Ft. Wayne, Neal Engrg. Co.	219-484-5090
Ind	Indianapolis, Neal Engrg. Co.	317-849-4201
Ky	Louisville, Neal Engrg. Co.	502-267-8337
Mass	Wellesley, Staley-Dautel Assocs.	617-235-1643
Mich	Detroit, Basic Service Corp.	313-837-8820
Minn	St. Paul, J.D. Co.	612-454-5552
NY	Buffalo, Good Comps. Corp.	716-634-4400
NY	Manhasset, R. Fara Assocs.	516-627-1151
NC	Matthews, W.K. Hile Co.	704-847-9125
Ohio	Cleveland, Jay Industrial Sls. Co.	216-831-9393
Ohio	Dayton, Neal Engrg.	513-299-6448
Okla	Tulsa, Summit Sls. Inc.	918-743-7794
Ore	Wilsonville, J.L. Kearns Co.	503-236-1165
Pa	Pittsburgh, R.W. Moulton & Assocs.	412-366-3333
Tenn	Knoxville, W.K. Hile Co.	615-588-1061
Tex	Addison, L. Elliott Co.	214-239-8533
Tex	Missouri City, L. Elliott Co.	713-499-1571
Va	Chester, W. K. Hile Co.	804-271-0014
EXP:	Cheshire, Conn., Techmark Corp.	203-272-7131
FOR:	Can., Markham, Ont., Scott Controls	416-499-0932

REED SWITCH DEV. CO., 34 Lincoln Ave., Greenwich, Conn., 06830, Tel: 203-661-9410; Empl.: 2; Minimum order: $10

Customer service: J. S. Hammond

Products manufactured: Controls/Control Eqpt., Magnets, Switches

REEVE ELECTRONICS, INC., 601 EEM W. Lake St., Chicago, Ill., 60606, Tel: 312-726-9755; Empl.: 40

Products manufactured: Adapters, Waveguide, Attenuators, Bends & Twists, Microwave, Calorimeters, Microwave, Cavities, Microwave, Chokes, Controls/Control Eqpt., Couplers, Dielectric Heating Equipment, Dividers, Dummy Loads, Generators, Heaters & Heating Elements, Junctions, Hybrid, Microwave, Loads, Electronic Variable, Machines/Machinery, Production, Meters, Oscillators, Shifters, Soldering Equipment, Switches, Tees, Waveguides & Adapters

Local Sales Offices & Reps.

Ala	Huntsville, Powertronics, Inc.	205-852-6347
Ariz	Phoenix, Montgomery Bros.	602-253-3431
Cal	Burlingame, Montgomery Bros.	415-697-6500
Colo	Denver, Montgomery Bros.	303-759-2749
Fla	Titusville, Powertronics, Inc.	305-267-5699
Ill	St. Charles, R.B. Engrg. Co.	312-584-8245
Kans	Baxter Springs, Production Automation Corp.	316-856-3600
Md	Silver Spring, ARA Elctrns.	301-565-2584
Mass	Wilmington, Technical Instrs.	617-944-3930
Mich	Troy, C. H. Armstrong Co.	313-524-1414
Minn	Minneapolis, Production Automation Corp.	612-866-5700
Mo	Hazelwood, Production Automation Corp.	314-731-2331
Mo	Raytown, Production Automation Corp.	816-737-0066
NC	Raleigh, Powertronics, Inc.	919-787-9090
NC	Thomasville, Powertronics, Inc.	919-476-6727
Okla	Tulsa, Production Automation Corp.	918-932-1051
Ore	Portland, Montgomery Bros.	503-223-4197
Tex	Richardson, Production Automation Corp.	214-234-4002
Utah	Salt Lake City, Montgomery Bros., Inc.	801-363-3555
Wash	Seattle, Montgomery Bros.	206-762-4100
Wisc	Milwaukee, W. M. Braun & Assoc.	414-332-1040
FOR:	Can., Thornhill, Ont., R. Neill Co.	416-889-9971

REEVES-HOFFMAN DIV., Dynamics Corp. of Amer., 400 W. North St., Carlisle, Pa., 17013, Tel: 717-243-5929, TWX: 510-650-3510; Empl.: 718; Minimum order: $25 p. 1•410,411

For info on price: D. Kingery; Application info: D. Kingery; Customer service: R. Stone; Delivery info: R. Stone

Products manufactured: Crystal Blanks, Crystals, Filters, Holders, Crystal, Mounts, Oscillators

Local Sales Offices & Reps.

Cal	Hollywood, Westaironics	714-831-2369
Cal	Marino Del Rey	213-821-7950
Cal	Santa Clara, L & M Assocs.	408-243-2891
Ill	Deerfield, Hutchinson Assocs.	312-945-6882
Iowa	Cedar Rapids, Seltec Sls.	319-362-8155

Md	Baltimore, R. F. Assocs.	301-465-5944
Mass	Wakefield, H. Jappe Co.	617-245-9359
Mich	Farmington, W. R. Hummon & Assoc.	313-474-0661
Mo	St. Louis, Engrg. Svcs. Co.	
NJ	Ridgefield, G. M. Moch Co.	
NY	E Aurora, E.A. Kershaw & Co.	716-652-1221
NY	Larchmont, G.M. Moch Co.	914-834-3530
Ohio	Cincinnati, Tri-State Mktg.	513-761-7993
Pa	Philadelphia, C.H. Newson & Assoc.	215-248-3377
SC	Myrtle Beach, Candor Co.	803-448-5213
Tex	Richardson, Semi Conductor Sls.	214-231-6181

REFAC ELCTRNS./PINLITES, 1275 Bloomfield Ave., Fairfield, N.J., 07006, Tel: 201-575-8820, TWX: 710-734-4348; Empl.: 50 .... p. 2•1185

Products manufactured: Converters, Counters, Display Devices/Displays, Drivers & Decoders For Readouts, Enclosures, Module, Plug-In, Lamps, Terminal Equipment, Digital, Totalizers, Digital, Tubes

Local Sales Offices & Reps.

Ala	Huntsville, Elmar Assocs.	
Ariz	Scottsdale, E. J. Foley & Assocs.	602-945-2665
Cal	Burlingame, J. Logan & Assocs.	415-697-6100
Cal	Pasadena, Components Corp.	213-681-7448
Colo	Denver, I. W. Strong & Assoc.	303-292-6900
Conn	Stratford, G. Rosen Co.	203-375-5456
Fla	Pompano Beach, Technology Mktg. Assocs.	305-942-0774
Ga	Atlanta, Elmar Assocs.	404-938-2821
Ill	Westchester, Gassner & Clark Co.	312-345-4245
Md	Towson, L. H. Kolman & Co.	301-752-8756
Mass	Framingham, G. Rosen Co.	617-879-5505
Mich	Grand Rapids, Representatives Elctrn. Prod.	616-942-1320
Minn	St. Paul, Northport Eng., Inc.	612-698-3841
Mo	Kansas City, L. F. Florence Co.	816-561-7222
NY	New York, Contact Refac Elctrns.	201-575-8820
NC	Raleigh, Elmar Assocs.	919-787-2841
Ohio	Dayton, J. C. Hofstetter Co.	513-298-0662
Tex	Dallas, Glidden Electro Equip. Co.	214-363-6539
Wash	Seattle, R. Johnston Co.	206-524-5171
Exp:	New York, N.Y., Refac Export Corp.	212-687-4741
For:	Can., Pointe Claire, Que., Avotronics, Ltd.	514-697-2135
For:	Can., Willowdale, Ont., Avotronics, Ltd.	416-499-3164

REFAC ELCTRNS/WILD ROVER, 1275 Bloomfield Ave., Fairfield, N.J., 07006, Tel: 201-227-9195, TWX: 710-991-9615; Empl.: 50 .... p. 1•2268

Products manufactured: Keyboards, Alphanumeric & Decimal, Switches

Local Sales Offices & Reps.

Ala	Huntsville, Elmar Assocs.	
Ariz	Scottsdale, E. J. Foley & Assocs.	602-945-2665
Cal	Los Gatos, Luscombe Engrg. Co.	408-354-6496
Cal	Pasadena, Luscombe Engrg. Co.	213-684-2000
Colo	Denver, I.W. Strong & Assocs.	303-292-6900
Conn	Stratford, G. Rosen Co.	203-375-5456
Fla	Pompano Beach, Technology Mktg. Assocs.	305-942-0774
Ga	Atlanta, Elmar Assocs.	404-938-2821
Ill	Chicago, Carlson Elctrn. Sls.	312-774-4812
Md	Towson, L.H. Kolman & Co.	301-752-8756
Mass	Framingham, G. Rosen Co.	617-879-5505
Mich	Grand Rapids, Representatives Elctrn. Prod.	616-942-1320
Minn	St. Paul, Northport Engrg.	612-698-3841
Mo	Kansas City, L.F. Florence Co.	816-561-7222
NC	Raleigh, Elmar Assocs.	919-787-2841
Ohio	Dayton, J.C. Hofstetter Co.	513-298-0662
Tex	Dallas, Glidden Electro Equip. Co.	214-363-6539
Wash	Seattle, R. Johnston Co.	206-524-5171
Wisc	Milwaukee, Carlson Elctrn. Sls. Co.	414-476-2790
Exp:	New York, NY, Refac Export Corp.	
For:	Can., Pointe Claire, Que., Avotronics, Ltd.	514-697-2135
For:	Can., Willowdale, Ont., Avotronics, Ltd.	416-499-3164

REGENCY ELECTRONICS, INC., 7707 Records St., Indianapolis, Ind., 46226, Tel: 317-547-3581; Empl.: 450

For info on price: W. Ayres; Application info: W. Ayres; Customer service: A. Culpepper

Free literature available: Catalogues for: Comm. Systems, FM; Comm. Systems, Radiotelephone: Counters, frequency; Crystals, Quartz; Receivers, Monitoring, Communications; Transmitters, Tone; Comm. Systems, Carrier Current; Comm. Systems, Frequency Shift; Comm, Systems, Selective Paging; Crystals, Frequency Control; Receivers, Fixed Frequency; Receivers, Tone; Transmitters, UHF/VHF.

Products manufactured: Attenuators, Comm. Systems, Counters, Crystals, Receivers, Transmitters

Local Sales Offices & Reps.

Ariz	Phoenix, L. McMillan	602-949-9437
Cal	Foster City, Olson Sls.	415-573-1600
Cal	Orange, I. Greene	714-637-1356
Cal	Woodland Hills, C. Ryel Co.	213-883-8118
Fla	Miami, L.P. Hench Co.	305-251-4343
Ga	Atlanta, B. Bowlin	404-948-6604
Iowa	Des Moines, J.D. Irvine Assoc.	515-225-7900
Md	Timonium, Tesco, Inc.	301-252-5610
Mass	Cohasset, Montague Assocs., Inc.	617-383-0634
Mich	Southfield, R. Milsk Co.	313-354-3310
NY	Buffalo, M. Farber, Assoc.	716-856-3543
NY	Long Island, Willgold Sls. Corp.	516-764-4022
Ohio	Canton, L. Pilcher	216-494-2148
Okla	Tulsa, B. Favors	918-936-9291
Ore	Portland, J. LeBrun Co.	503-244-6805

REGDON CORP., 3715 Grand Blvd., Brookfield, Ill, 60513, Tel: 312-485-5152; FSC No: 27190; Empl.: 50; Minimum order: $15 .... p. 1•1804,1805

For info on price: D. Siemeck; Application info: N. Krasowsky; Customer service: D. Siemeck; Delivery info: D. Siemeck

Products manufactured: Coils Including Assemblies & Forms, Solenoids

Local Sales Offices & Reps.

Ariz	Phoenix, Spectrum & Assoc.	602-997-6324
Cal	San Francisco, Shonin, Inc.	415-467-8701
Cal	Santa Ana, Spectrum & Assoc.	714-835-4114
Conn	Madison, United Components	203-562-4002
Ga	Atlanta, Mr. George O'hara	404-237-0600
Ill	Downers Grove, Richmar Elect. Corp.	312-968-0118
Mich	Walled Lake, T. Mulligan & Assoc.	313-624-0174
Minn	Minneapolis, R.J. Inc.	612-922-1425
NY	New York, LRC Assocs.	
NY	Pittsford, NoCo Inc.	716-461-4750
NY	Valley Cottage, LRC Assocs.	914-634-7973
Ohio	Columbus, T. Mulligan & Assoc.	614-457-2242
Pa	Birchrunville, Jadelectronics	215-647-5151
RI	Saunderstown, United Components	617-226-0556
Tex	Dallas, W. Reese & Assoc.	214-638-6575
Tex	Houston, W. Reese & Assoc.	713-621-3134

REGMO DATA CORP., 6992 Oxford St., Minneapolis, Minn., 55426, Tel: 612-925-3800; Minimum order: $25 p. 1•272; p. 2•344

For info on price: R. Otterlei; Application info: R. M. Plaisted; Delivery info: R. Otterlei

Products manufactured: Cleaners & Solvents, Coatings, Process Control Systems, Switches, Timers

REI SALES CO., 120 Cambridge St., Burlington, Mass., 01803, Tel: 617-273-2777 .... p. 1•796,797

Products manufactured: Computers, Meters, Oscillators, Oscilloscopes, Recorders

REICH ASSOCIATES INC., PO Box 73, Plano, Tex, 75074, Tel: 214-424-7904; Empl.: 10; Minimum order: $25

Customer service: E. Reich

Free literature available: Application notes on nitrogen and dye lasers and information on families of high voltage power supplies.

Products manufactured: Converters, Detectors, Lasers & Laser Systems, Power Supplies

Local Sales Offices & Reps.

Ga	Atlanta, Physimetrics	404-261-8720
NM	Albuquerque, Southwestern Eng. & Eqp. Co.	505-265-6775
NY	Mineola, J. B. Lilly Co.	516-746-2226
Tex	Dallas, Southwestern Eng. & Eqp.	214-826-6661
Tex	Houston, TCI Elctrns.	713-774-5019

RELAY SERVICE CO., 1310 N. Pulaski Rd., Chicago, Ill., 60651, Tel: 312-AL 2-2700; Empl.: 40; Minimum order: $7

For info on price: C. H. Badger; Application info: F. Vivacue

Products manufactured: Bells, Buzzers, Gongs, Sirens & Aural Warning Devices, Coils Including Assemblies & Forms, Relays, Switches

Local Sales Offices & Reps.

Kans	Mission, Midland Sls. Engrg. Assocs.	913-CO2-6565
Mich	Farmington, Lloyd George Assocs.	313-474-1505
NJ	Cranford, Hy-Rel Assocs.	201-276-2677

RELAY SPECIALTIES INC., 1300 Plaza Rd., Fair Lawn, N.J., 07410, Tel: 201-797-3313; Empl.: 57; Minimum order: $15

For info on price: B. Albanese; Application info: S. Gershberg; Customer service: B. Sauer; Delivery info: J. Abrams

Free literature available: Catalog on electronic control components. Relays-Timers-Counters-Switches-Sockets-Temperature controls-Photo Electric Controls-Buzzers and cabinets.

Products manufactured: Bells, Buzzers, Gongs, Sirens & Aural Warning Devices, Counters, Relays, Switches, Timers

RELCO PRODS., 5594 E. Jefferson Ave., Denver, Colo., 80237, Tel: 303-756-1143; FSC No: 14454; Empl.: 7; Minimum order: $50

Customer service: R. Ruehle

Products manufactured: Meters, Probes, Thermometers, Resistance, Transducers

RELIABILITY INC., 5325 Glenmont, Dept. A, Houston, Tex., 77036, Tel: 713-666-3261, TWX: 910-881-1739 p. 1•1428,1429

Customer service: B. Miller

Free literature available: Catalog which describes all products completely.

Products manufactured: Chamber, Environmental Test, Ovens, Power Supplies

Local Sales Offices & Reps.

Ala	Huntsville, EMA, Inc.	405-837-6061
Ariz	Scottsdale, Electronic Entrps.	602-946-9860
Cal	Glendale, Orion Sales	213-240-3151
Cal	San Diego, Orion Sales	714-566-0095
Cal	Sunnyvale, Amasco	408-733-8690
Cal	Tustin, Orion Sales	714-832-9687
Conn	Washington Depot, Kanan Assoc.	203-868-0513
Ind	Indianapolis, Sheridan Sales	317-547-7777
Mass	Reading, Kanan Assoc.	617-944-8484
Mass	Waltham, W. M. Hague Co.	617-899-5600
Mich	Farmington, Sheridan Sales	313-477-3800
Mo	Florrisant, Sheridan Sales	314-837-5200
NJ	Berkely Heights, AMC	201-464-5100
NM	Albuquerque, Electronic Entprs.	505-256-3561
NM	Albuquerque, Piper-Goyne Inc.	505-294-1436
NY	Syracuse, T-Squared Elctrns.	315-463-8592
NC	Winston Salem, EMA, Inc.	919-722-5151
Ohio	Beachwood, Sheridan Sales	216-831-0130
Ohio	Dayton, Sheridan Sales	513-277-8911
Ohio	Reading, Sheridan Sales	513-761-5432
Pa	Pittsburgh, Sheridan Sales	412-244-1640
SC	Greenville, EMA, Inc.	803-268-1125
Tex	Richardson, Semiconductor Sls. Assoc.	214-231-6181
Wash	Tukwila, General Elctrns.	206-243-5141
Wash	Vancouver, General Elctrns.	206-693-0025

Local Distributors

Cal	El Segundo, Tex. Instr. Sup. Co., 831 Douglas St.	213-776-4490
Cal	Los Angeles, Tex. Instr. Supp. Co.	213-776-4490
Cal	Sunnyvale, Tex. Instr. Sup. Co., 776 Palomer	408-732-5555
Colo	Denver, Tex. Instr. Supp. Co., 9725 E. Hampden	303-751-1780
Colo	Denver, Tex. Instr. Supp. Co.	203-757-7671
Ill	Arlington Hts., Tex. Instr. Supp. Co., 2420 E. Oakton Rd.	312-593-7660
Mass	Waltham, Tex. Instr. Supp. Co., 404 Toten Pond Rd.	617-890-0510
Minn	Edina, Tex. Instr. Supp. Co., 7615 Metro Blvd.	612-835-5353
NJ	Clark, Tex. Instr. Supp. Co., 301 Central Ave.	201-382-6400
NM	Albuquerque, Goyne Assocs.	505-265-6794
NY	Huntington Sta., Tex. Instr. Supp. Co., 2 Huntington Quadrangle	516-293-2660
NY	Syracuse, T Squared Elctrns.	315-463-8592
Ohio	Cincinnati, Sheridan Sls.	513-761-5432
Okla	Tulsa, Tex. Instr. Supp. Co., Box Drawer T	918-437-4555
SC	Greenville, Egan Assocs.	803-228-4450

Tex	Austin, Tex. Instr. Supp. Co.	512-258-1636
Tex	Dallas, Tex. Instr. Supp. Co., 6000 Denton	214-238-6821
Tex	Houston, Tex. Instr. Supp. Co., 3939 Ann Arbor	713-785-4800
Tex	Richardson, Semiconductor Sls. Assocs.	214-231-6181
Va	Arlington, Tex. Instr. Supp. Co., 1500 Wilson Blvd.	703-524-5885
Wash	Bellevue, SD.R2 Prods. & Sls.	207-747-9424

RELIANCE ELECTRIC CO., 24701 Euclid Ave., Cleveland, Ohio, 44117, Tel: 216-266-7000; Empl.: 20000

Products manufactured: Analyzers, Boards, Printed Circuit, Boards, Printed Wiring, Universal, Controls/Control Eqpt., Gearheads & Speed Reducers, Indicators, Inverters, Meters, Motor & Generator Armatures, Rotors, Stators, Motor Electric Generator Sets, Motors, Racks, Reducers, Relays, Services, Assembly, Production & Test

RENBRANDT, INC., 6 Parmelee St., Boston, Mass., 02118, Tel: 617-445-8910; Empl.: 25

Products manufactured: Couplings

RENCO CORP., 26 Coromar Dr., Goleta, Cal., 93017, Tel: 805-968-1525; Empl.: 75 .... p. 1•202,203

Products manufactured: Encoders, Tachometers

Local Sales Offices & Reps.

Cal	Santa Fe Springs, Sales Engrs. Ltd.	213-921-4337
Fla	Orlando, MacKay, Smith & Assocs.	305-277-1513
Ill	Chicago, Electro Tech. Mktg.	312-588-4535
Iowa	Cedar Rapids, Palatine Sls.	319-385-8071
Kans	Andover, Palatine Sls.	316-683-7512
Kans	Overland Park, Palatine Sls.	913-262-5643
Mass	Andover, Mech-Tron Co.	617-475-3531
Mich	Detroit, Ridgway East	313-538-3940
Mo	St. Louis, Palatine Sls.	314-428-7055
NY	Roslyn Heights, Travco Assocs.	516-621-3223
NC	Charlotte, MacKay, Smith & Assocs.	704-527-0240
Ohio	Chagrin Falls, Ridgway East	216-247-4845
Ohio	Loveland, Ridgway East	513-683-4350
Okla	Tulsa, Palatine Sls.	918-622-0321
Tex	Austin, Palatine Sls.	512-451-7463
Tex	Richardson, Palatine Sls.	214-231-9489
Wash	Seattle, Thorson Co.	206-632-0710

RENTAL ELECTRONICS, 99 Hartwell Ave., Lexington, Mass., 02173, Tel: 617-862-6905, Telex: 92-3494; Empl.: 70 .... p. 1•792-795

Free literature available: INSTRUMENT RENTAL CATALOG - Complete listing and description of rental equipment. Includes the advantages of renting equipment; information on rental, rental/purchase and leasing services available; and prices.

TEST EQUIPMENT CATALOG - Complete listing and description of slightly used electronic test equipment available for sale. Discount prices included.

Products manufactured: Amplifiers, Analyzers, Attenuators, Bridges, Calculators, Electrical & Electronic, Calibrators, Cameras, Chamber, Environmental Test, Computers, Converters, Counters, Couplers, Decade Boxes, Detectors, Filters, Generators, Inverters, Meters, Oscillators, Oscillographs, Direct Writing, Oscilloscope Plug-Ins, Oscilloscopes, Power Supplies, Recorders, Resistors, RFI Measuring Equipment, Scanners, Services, Assembly, Production & Test, Shifters, Standards, Synthesizers, Testers, Tracers, Curve, Voltage Sources, Waveguides & Adapters

Local Sales Offices & Reps.

Ala	Huntsville, General Radio Corp.	205-883-7538
Ariz	Scottsdale, BFA Corp.	602-946-4215
Cal	Anaheim, Rental Elctrns., Inc.	714-879-0561
Cal	Lawndale, Ward/Davis Assoc.	213-542-7740
Cal	Mountain View, Rental Elctrns., Inc.	415-968-8845
Cal	Sunnyvale, Ward/Davis Assoc.	408-245-3700
Colo	Denver, BFA Corp.	303-744-3301
Conn	Glastonbury, Instr. Rep.	203-633-0777
Fla	Ft. Lauderdale, Rental Elctrns., Inc.	305-771-3500
Fla	Lighthouse Pt., Saber Assoc.	305-943-3076
Ga	Atlanta, General Radio Corp.	404-457-2485
Ill	Des Plaines, Cozzens & Cudahy	312-298-3600
Ill	Des Plaines, Rental Elctrns., Inc.	312-827-6670
Ind	Indianapolis, Cozzens & Cudahy	317-244-2456
Md	Gaithersburg, Rental Elctrns., Inc.	301-948-0620
Mass	Burlington, Rental Elctrns., Inc.	617-273-2770
Mass	Burlington, REI Sls.	617-273-2777
Mass	Lexington, Instr. Rep.	617-861-8620
Mich	Detroit, S. Sterling	313-255-1970
Minn	Minneapolis, Cozzens & Cudahy	612-844-4336
Mo	Edmondson, Cozzens & Cudahy	314-423-1234
NJ	Oakland, Rental Elctrns., Inc.	201-337-3757
NM	Las Cruces, BFA Corp.	505-523-0601
NY	E. Syracuse, Ossman Instrs.	315-437-6666
NY	Great Neck, Eastern Instr.	516-466-9505
NC	Winston-Salem, General Radio	
Ohio	Cleveland, S. Sterling	216-422-8080
Okla	Norman, Data Mktg.	405-364-8320
Pa	Pittsburgh, S. Sterling	412-922-5720
Tex	Dallas, Rental Elctrns., Inc.	214-661-8082
Tex	Houston, Data Mktg. Assoc.	713-686-9627
Va	Alexandria, Dyna Rep Co.	703-354-1222
Wash	Seattle, R.S. Drake Assoc.	206-763-2755
FOR:	Can., Rexdale, Ont., Rental Elctrns., Inc.	416-677-7513

REO INDS, INC., 633 3rd St., N.W., Massillon, Ohio, 44646, Tel: 216-833-9951; Empl.: 150

Customer service: T. J. Albert

Free literature available: Brochure describes product applications and services available.

Products manufactured: Cabinets & Accessories

REPCO INC., Special Product Dept., Box 7065, Orlando, Fla., 32804, Tel: 305-843-8484, TWX: 810-850-0120; Empl.: 350

For info on price: J. Dirmann 305-843-8498; Application info: B. Schermerhorn 305-843-8498; Customer service: W. Nelson 305-843-8484; Delivery info: B. Schermerhorn 305-843-8498

Free literature available: Brochures, R.F. links, 10-8 hand held portable radio, 10-2 hand held portable radio, m/p mobile portable radio.

Products manufactured: Comm. Systems, Receivers, Recorders, Transceivers, Transmitters

Local Sales Offices & Reps.

Advertisment

VHF/UHF portable hand-held transceivers, mobile/portable radios-low and high band. RF communications links. Transmitters and receiver units. Power outputs from .5 to 50 watts. Solid state throughout. Modular plug-in-block circuits, small size, FCC type accepted easy maintenance, high reliability.

REPUBLIC ELCTRNS. CORP., 176 E. 7th St., Paterson, NJ, 07524, Tel: 201-279-0300, TWX: 710-988-5908; Empl.: 125; Minimum order: $15 .... p. 2•232,233

For info on price: G. Wolter; Application info: G. Wolter; Customer service: C. Taylor; Delivery info: C. Taylor

Free literature available: Bulletin KI describes a complete line of subminiature general purpose and temperature compensating ceramic capacitors. Included are tight tolerance NPO units.

Products manufactured: Capacitors, Fixed

Local Sales Offices & Reps.

Ariz	Phoenix, MR Sales	602-959-5150
Cal	Los Angeles, Corcoran Assoc.	213-823-2425
Cal	Ramona, Advanced Tech. Sls.	714-789-1676
Fla	Miami Beach, Geartner	305-861-3661
Fla	Orlando, Geartner	305-299-1000
Ill	Chicago, Ropek & Cahill	312-287-7292
Iowa	Cedar Rapids, J.R. Sales Engrg.	319-377-8211
Kans	Overland Park, Reese Assoc.	913-648-7748
Md	Bethesda, W. Mount Co.	301-657-9312
Mass	Allston, Vector Sls.	617-787-2790
Minn	Hopkins, Grayden & Flemmer	612-941-1120
NJ	Paterson, Mucon Corp.	201-279-0300
NJ	Wallington, Comp-Tech Sls.	201-935-5454
NY	Liverpool, J.L. Semple Assoc.	315-458-4775
NY	New Hyde Park, Comp-Tech. Sls.	516-593-2628
NY	Rochester, J.L.Semple Assoc.	716-342-1413
NC	Charlotte, J. Rudisill Assocs.	704-377-6901
Ohio	Columbus, T. Mulligan & Assoc.	614-457-2242
Okla	Tulsa, H.J. Daly Co.	918-627-4159
Pa	Ardmore, Rothenheber & Wurts	215-649-6300
Wash	Seattle, Blum & Assoc.	206-285-2590

REQUIRED PRODUCTS, Box 3083, Stanford, Cal., 94305, Tel: 408-738-4329; Empl.: 4; Minimum order: $25

Customer service: C. E. Merkel

Free literature available: Data sheets

Products manufactured: Amplifiers, Power Supplies

RESDEL CORP., Bldg. #22-County Airport, Rio Grande, N.J., 08242, Tel: 609-886-1111; Empl.: 12; Minimum order: $35

For info on price: W. O. Taylor; Application info: W. A. Taylor; Customer service: W. O. Taylor; Delivery info: W. O. Taylor

Products manufactured: Bobbins, Winding, Coil & Transformer, Bushings, Glass, Plastic, Metal, Rubber, Etc., Coils Including Assemblies & Forms, Cups, Encapsulation, Spacers, Tubing

Advertisment

Centrifugally cast epoxy tubing, with or without fillers, for electrical and mechanical applications. Cast in lengths of 57 inches with no taper inside or outside. Some of the present applications are encapsulating and potting forms, stand-offs, connecting links, spacers, insulators, bolt and cooling holes in castings.

RESDEL ENGRG. CORP., 300 E. Live Oak Ave., Arcadia, Cal., 91006, Tel: 213-684-2600, TWX: 910-582-3219; Empl.: 170

Customer service: R. Bennett 213-445-5955 Ext. 302

Products manufactured: Amplifiers, Comm. Systems, Couplers, Receivers, Recorders, Synthesizers, Transmission Systems, Data, Transmitters

RESEARCH DEVICES, 616 Springfield Ave., Berkeley Heights, N.J., 07922, Tel: 201-464-0668; Empl.: 6

For info on price: B. G. Cohen; Customer service: M. W. Focht; Delivery info: V. R. Saba

Free literature available: 1-Data Sheets on Infrared Microscopes; 2-Application notes on uses of IR Microscopy in solid state device manufacture.

Products manufactured: Cameras, Machines/Machinery, Production, Microscopes, Semiconductor Wafer Fabrication

Advertisment

Research Devices Model D infrared microscope. Direct observation and photography of defects in integrated circuits, transistors, LED's and other solid state devices. Problems such as faulty metallizations, internal precipitates, die attach and bonding nonuniformities, may be detected on slices and chips. Call for applications information, or for a free demonstration.

RESEARCH, INC., Box 24064, Minneapolis, Minn., 55424, Tel: 612-941-3300, TWX: 612-292-4066; Empl.: 160

For info on price: H. Atkins; Application info: G. Gauvin; Customer service: W. Baer; Delivery info: H. Atkins

Free literature available: INFRARED RADIANT HEATING: Basic radiant heating and control concepts, including focussed and area heating pattersn. PYROMATION HEATING SYSTEMS: A series of short application articles concerning infrared process heating in the electronics industry.

Products manufactured: Chamber, Environmental Test, Computers, Controls/Control Eqpt., Power Supplies, Programmers, Transducers

RESEARCH INSTRUMENT CO., 643 Stewart Ave., Garden City, N. Y., 11530, Tel: 516-248-1001; Empl.: 12; Minimum order: $25

Customer service: M. Stoll

Free literature available: "The Pluses of Hermetic Sealing", "Universal Multi-Station GRADIENT Flat Pack Sealer", "Pressurized Sealer", "Crystal Grower", "Boat Puller", "CCTV Microscope", "Solvent Lap"

Products manufactured: Controls/Control Eqpt., Furnaces, Machines/Machinery, Production, Meters, Microcircuit Production Equip., Microscopes, Ovens, Seals, Semiconductor Wafer Fabrication, Services, Assembly, Production & Test, Soldering Equipment, Television Systems & Equipment Closed-Circuit, Test Equipment

Local Sales Offices & Reps.

Cal	Santa Barbara, F. Pennucci	805-967-4116
NY	Ossining, Int'l. Scientific Sls.	914-762-0685
NY	Rochester, Upstate Tech. Equip.	716-377-6058
NY	Solvay, Upstate Tech. Equip.	315-458-5573
Tex	Houston, R.L. Stoll Assocs.	713-772-8282

RESEARCH PRODS. CORP., 1015 E Washington Ave., Madison, Wisc, 53701, Tel: 608-257-8801

Customer service: T. Alery

Free literature available: Aluminum, washable air filters.

Products manufactured: Air Cleaners & Filters (Shielded & Unshielded), Filters

RESISTANCE PRODS., 914 S. 13th St., Harrisburg, Pa., 17104, Tel: 717-236-5081, TWX: 510-650-4920; Empl.: 87

Products manufactured: Networks, Resistors

Local Sales Offices & Reps.

Ariz	Scottsdale, Fred Board Assocs.	602-944-9388
Cal	Mountain View, G.C. Woempner	415-964-5454
Cal	San Marino, Van Gott & Assoc.	213-285-2148
Colo	Denver, Walter Engrg. Assoc.	303-777-5585
Fla	Winter Park, Steele Technical Sls.	305-644-6641
Ga	Atlanta, G.S. O'Hara	404-237-0600
Ill	Bellwood, Fiat Engrg. Assoc.	312-547-6200
Ind	So Bend, Valentine-Schillinger Co.	219-291-6258
Kans	Leawood, Vasen Sls. Co.	913-649-0679
Mass	Canton, New England Elec. Sls. Co.	617-828-4835
Minn	St. Paul, Furber Sales	612-861-1518
Mo	St. Louis, Vasen Sls. Co.	314-725-5219
NY	Floral Park, Mos Assocs.	516-694-5923
NY	Syracuse, C. W. Floring & Assoc., Inc.	315-478-2149
Ohio	Cleveland, D. Steffen Assocs.	216-461-8333
Ohio	Dayton, Del Steffen Assoc.	513-293-3145
Pa	Flourtown, Avenir	215-348-8290
Tex	Addison, MMS Comps.	214-661-5160
Wash	Seattle, D. Smith Sls. Co.	206-633-3160
EXP:	N.Y., Westbury, Minthorne Int'l. Co., Inc.	516-334-3303
FOR:	Can., Ottawa, Ont., Wilson Ent.	416-224-9878
FOR:	Can., Toronto, Ont., Wilson Enterprises	416-766-0510

RESISTORS, INC., 5226 W. 26th St., Chicago, Ill., 60650, Tel: 312-BI2-1540; Empl.: 50 ....p. 2•1544,1545

Products manufactured: Resistors

Local Sales Offices & Reps.

Cal	Los Angeles, W.S. Harmon Co.	213-937-1460
Cal	Palo Alto, W.W. Tompkins & Co.	415-326-7940
Ill	Chicago, L-Tec, Inc.	312-286-1500
Iowa	Cedar Rapids, J.R. Sls. Engrg.	319-377-8211
Mass	Needham, White Sls. Co.	617-444-3676
Mich	Lathrup Village, R.C. Nordstrom & Co.	313-353-0210
NJ	Moorestown, A.A. Foley Assocs.	609-235-2390
NY	New York City, Symon Assocs.	212-757-3638
Ohio	Wickliffe, W.J. Brauer & Assocs.	216-943-0601
Pa	Pittsburgh, W.J. Brauer & Assocs.	412-921-3213
Tex	Garland, Whiteside Sls. Co.	214-231-9771
Wisc	Milwaukee, Honkamp Sls. Co.	414-463-2530

MOXON, INC., see SRC Div. Moxon, Inc.

REYNOLDS INDS., INC., Box 1170, Marina Del Rey, Cal., 90291, Tel: 213-823-5491; FSC No: 99747; Empl.: 150; Minimum order: $50

For info on price: J. Korbel; Application info: R. Craig; Customer service: J. Korbel; Delivery info: J. Korbel

Products manufactured: Connector Adapters, Connectors, Lead Assemblies & Receptacles, Services, Assembly, Production & Test

Local Sales Offices & Reps.

Mass	Stow, Musello Assocs.	617-369-5900
NJ	Moorestown, Reynolds Inds.	609-234-0613
Tex	Irvine, A.I.D. Elctrns.	214-259-4761
Wash	Seattle, S. Wilson Co.	206-226-0650

REYNOLDS METALS CO., Box 27003, Richmond, VA., 23261, Tel: 804-282-2311, TWX: 710-956-0112

Products manufactured: Alloys, Bus Bars & Systems, Cable, Foil, Metal Compounds, Foils, Powders, Sheet, Stock, Metals, Tubing, Wire

Local Sales Offices & Reps.

Ala	Birmingham	205-592-4994
Ariz	Phoenix	602-272-7961
Ark	Little Rock	501-374-6472
Cal	Los Angeles	213-937-3680
Cal	San Francisco	415-692-3011
Colo	Denver	303-756-1591
Conn	Hartford	203-278-1760
DC	Washington	202-833-3760
Fla	Coral Gables	305-666-1866
Fla	Tampa	813-877-8057
Ga	Atlanta	404-393-1000
Ill	Galesburg	309-342-6204
Ill	Park Ridge	312-696-1400
Ind	Fort Wayne	219-637-5177
Ind	Indianapolis	317-247-6246
Kans	Kansas City	913-262-2121
Kans	Wichita	316-265-7245
Ky	Louisville	502-897-7101
La	New Orleans	504-833-3713
Md	Towson	301-823-4141
Mass	Chestnut Hill	617-734-3770
Mich	Detroit	313-354-4111
Mich	Grand Rapids	616-241-4677
Minn	Minneapolis	612-927-4424
Mo	St. Louis	314-726-5700
NJ	South Plainfield	201-561-0500
NY	New York	212-355-7700
NY	Buffalo	716-877-2565
NY	Rochester	716-271-5060
NY	Syracuse	315-437-2947
NC	Charlotte	704-536-0494
Ohio	Cincinnati	513-771-8640
Ohio	Cleveland	216-845-5000
Ohio	Columbus	614-228-2092
Ohio	Toledo	419-729-1681
Ohio	Youngstown	216-757-3163
Ore	Portland	503-666-3841
Pa	Bala-Cynwyd	215-839-4820
Pa	Pittsburgh	412-563-0030
Tenn	Memphis	901-396-3435
Tenn	Nashville	615-254-7597
Tex	Dallas	214-661-1120
Tex	Houston	713-622-7810
Utah	Salt Lake City	801-328-8138
Wash	Seattle	206-623-2503
Wisc	Milwaukee	414-475-1051

RF INTERONICS, 100 Pine Air Dr., Bay Shore, N.Y., 11706, Tel: 516-231-6400, TWX: 510-227-6233; FSC No: 13619; QPL No: 15733; Empl.: 150; Minimum order: $25 .... p. 1•572,573

For info on price: Sls. Dept.; Application info: Engrg. Dept.; Customer service: Sls. Dept.; Delivery info: Sls. Dept.

Free literature available: Filter catalog

Products manufactured: Attenuators, Capacitors, Fixed, Coils Including Assemblies & Forms, Filters

Local Sales Offices & Reps.

Ariz	Scottsdale, Williams-Assocs.	602-947-4297
Cal	Alhambra, M.W. Riedel Co.	213-283-7694
Cal	San Jose, United Sales Co.	408-379-0800
Colo	Denver, Williams-Assocs.	303-373-4730
Fla	Ft. Lauderdale, Tech-Rep Assocs	305-792-0962
Fla	Indian Rocks Beach, Tech-Rep Assocs	813-595-2834
Ill	Oak Park, J. Popp Sls.	312-626-3711
Kans	Overland park, Ensco-Rep. Inc.	913-381-7557
Md	Bethesda, Mechtronics Sls.	301-340-2130
Mass	Wakefield, Meas. Equip. Co.	617-245-4870
Mich	Detroit, A. Blumenberg Assocs.	313-557-1934
Minn	Minnetonka, P.J. Codute & Co.	612-933-2281
Mo	St. Louis, Ensco-Rep Inc.	314-542-3935
NJ	Cherry Hill, H.J. White Co.	609-428-4544
NM	Albuquerque, Williams-Assocs.	505-255-1638
NY	Fairport, W.A. Franklin Sls.	716-377-6584
NY	Great Neck, Trionic Assocs.	516-466-2300
NY	Syracuse, W.A. Franklin Sls.	315-474-5273
NY	Whitesboro, W.A. Franklin Sls.	315-736-5460
Ohio	Cincinnati, Tri-State Mktg	513-761-7993
Tex	Richardson, Campion Sales	214-238-8135
EXP:	New York, N.Y., Ad. Auriema, Inc.	212-466-2516
FOR:	Can., Don Mills, Ont., Bruce Vallillee Elec	416-447-8482

R F D, INC., 5024 Nassau St., Tampa, Fla., 33607, Tel: 813-872-1502; FSC No: 21992; Empl.: 32; Minimum order: $50

For info on price: S. Bailey; Application info: C. Beaty; Customer service: T. Facer; Delivery info: T. Facer

Free literature available: Microwave products catalog.

Products manufactured: Amplifiers, Oscillators, Preselector-Mixers, Preselectors, Receivers, Transmitters

Local Sales Offices & Reps.

Cal	Los Altos, Stout/Loeswick Assoc.	415-948-3265
Cal	Woodland Hills, Interstate Mktg. Assoc.	213-883-7606
Colo	Boulder, H. Bass Assoc.	303-499-7509
Fla	Clearwater, Southeastern Comp. Sls.	813-531-8324
Ill	Chicago, RF Specialists	312-698-2044
Md	Baltimore, Applied Engrg. Conslts.	301-465-1272
Mass	Burlington, Tritek, Inc.	617-272-4550
NJ	Clemerton, Applied Engrg. Conslts.	609-783-5121
NJ	Westfield, Gray & Reed Assoc.	201-233-6116
NY	Huntington Station, Gray & Reed Assoc.	516-433-3333

RFL INDS., Comms. Div., Powerville Rd., Boonton, N.J., 07005, Tel: 201-334-3100, TWX: 710-987-8352; Empl.: 250; Minimum order: $10 .... p. 1•122

For info on price: W. Estler Ext. 213; Application info: R. Gilman Ext. 276; Customer service: W. Fettes Ext.246; Delivery info: W. Estler Ext. 213

Free literature available: Voice Frequency Carrier Equipment may be used for transmission of data signals derived from nearly any source. Typical are telemetry, supervisory control, telegraph and data applications.

Products manufactured: Amplifiers, Bridges, Coders, Comm. Systems, Converters, Data Acquisition & Reduction Systems, Equalizers, Limiters, Modulator/Demodulators, Multipliers, Networks, Oscillators, Receivers, Transducers, Transformers, Transmission Systems, Data, Transmitters

Local Sales Offices & Reps.

Alas	Anchorage, H Lang & Assoc.	907-279-5741
Ariz	Phoenix, Portis & Assocs.	602-947-4379
Cal	Los Gatos, Luscombe Engrg. Co.	408-354-6496
Cal	Pasadena, Luscombe Engrg. Co.	213-684-2000
Colo	Lakewood, Claredon Co.	303-238-4462
DC	Wash, Instrucom, Inc.	202-223-1759
Fla	St. Petersburg, Comtech Assoc. Inc.	813-527-3281
Haw	Honolulu, Aloha Assoc.	808-941-1574
Idaho	Boise, Tarbell Communications	208-343-0285
Ill	Schaumburg, Kay Sls.	312-397-1215
La	New Orleans, Mid South Sls.	504-822-3030
Minn	Minneapolis, R.W. Marshall Co.	612-929-0457
Mo	Cameron, Comm. Systems	816-632-7616
NH	Nashua, Bell Controls	603-882-6984
Ohio	Columbus, RFL Industries	614-888-7255
Ore	Portland, Tarbell Com.	503-643-1631
Tex	Houston, Control Interface, Inc.	713-464-6571
Tex	Richardson, Horizon Engrg. Sls. Co.	214-238-9121
Utah	Salt Lake City, Cannon Engrg. & Sls. Co.	801-328-9404
Wash	Bellevue, Tarbell Communications	206-454-9716

RFL INDS., Instr. Div., Powerville Rd., Boonton, N.J., 07005, Tel: 201-334-3100, TWX: 710-987-8352; Empl.: 250; Minimum order: $10 .... p. 1•791

For info on price: F. Price Ext. 202; Application info: R. Schmehl Ext. 235; Customer service: W. Fettes Est. 246; Delivery info: F. Price Ext. 202

Free literature available: How to Magnetize, Measure and Stabilize Permanent Magnets, describes, Magnetic Instrumentation ranging from simplified operator controlled apparatus to complete automated processing systems.

Products manufactured: Analyzers, Calibrators, Demagnetizers, Dividers, Indicators, Magnetizers, Magnetometers, Magnets, Meters, Power Supplies, Probes, Standards, Testers, Transducers

Local Sales Offices & Reps.

Ala	Huntsville, Lee Assocs.	205-533-5896
Ariz	Scottsdale, Williams Assocs.	602-947-4297
Cal	Glendale, IFM Inc.	213-246-7261
Cal	Mountain View, IFM, Inc.	415-961-2828
Colo	Denver, Williams Assocs.	303-373-4730
Conn	Middletown, The Mancib Co.	203-347-5629
Fla	Ft. Lauderdale, Lee Assocs.	305-525-9767
Fla	Winter Haven, Lee Assocs.	813-294-5815
Haw	Honolulu, Aloha Assocs.	808-941-1574
Idaho	Boise, Tarbell Comm., Inc.	208-343-0285
Ill	Des Plaines, Marsland	312-298-2620
Ind	Indpls, Marsland	317-924-3568
Mass	Burlington, Mancib Co.	617-272-9450

Mich	Farmington, Carter, McCormic & Pierce, Inc.	313-477-7700
Minn	Mpls, Marsland Assocs., Inc.	612-545-4481
Mo	Kansas City, Marsland	314-278-6949
NJ	Haddonfield, Dyna Rep Co.	609-795-1700
NM	Albuquerque, Williams Assocs.	505-255-1638
NY	Elbridge, L-Tron Corp.	315-689-3787
NY	Latham, L-Tron Corp.	518-785-5023
NY	Tonawanda, L-Tron	716-691-8887
NC	Raleigh, Lee Assocs.	919-787-5818
Ohio	Cleveland, Carter, McCormic & Pierce	216-333-5650
Ohio	Dayton, Carter, McCormic & Pierce	513-278-5873
Ore	Beaverton, Tarbell Comm., Inc.	503-643-1631
Pa	Monroeville, Carter, McCormic & Pierce	412-372-4415
Tex	Houston, Scientific Sls.	713-666-5318
Tex	Richardson, Scientific Sls. Co.	214-231-6541
Va	Alexandria, Dyna Rep. Tech. Svcs.	703-354-1222

RFL INDS., Thermocontrol Div., Boonton, N.J., 07005, Tel: 201-334-3100, TWX: 710-987-8352; Empl.: 250; Minimum order: $10 .... p. 1•2328,2329

For info on price: B. Kendall Ext. 237; Application info: J. Simon Ext. 282; Customer service: W. Fettes Ext. 246; Delivery info: B. Kendall Ext. 237

Free literature available: A Guide for selection and installation of RFL Electronic controllers, where precise process temperature control is required for industrial applications.

Products manufactured: Controls/Control Eqpt., Meters, Monitors, Mounts, Probes, Thermistors, Transducers

Local Sales Offices & Reps.

Ala	Huntsville, W.A. Brown Comps., Inc.	205-539-4411
Ariz	Scottsdale, Williams	602-947-4297
Cal	Glendale, IFM Inc.	213-246-7261
Cal	Mountain View, IFM, Inc.	415-961-2828
Colo	Denver, Williams Assocs.	303-373-4730
Conn	Wallingford, Adams-McGregor	203-269-5816
Fla	Ft. Lauderdale, W.A. Brown Comps.	305-776-4800
Fla	Orlando, W.A. Brown Comps., Inc.	305-425-5505
Ga	Atlanta, W.A. Brown Comps.	404-457-4069
Haw	Honolulu, Aloha Assocs.	808-941-1574
Idaho	Boise, Tarbell Comms., Inc.	208-343-0285
Ill	Palatine, J.E. Zenner Assoc.	312-358-6520
Md	Kensington, Elctrn. Mktg. Assoc. Inc.	301-881-5300
Mass	Scituate, Adams-McGregor	617-545-2213
Mich	Farmington, Carter, McCormic & Peirce	313-477-7700
Minn	Minneapolis, Waytek Co.	612-933-2133
NJ	Boonton, RFL Inds., Inc.	201-334-3100
NJ	Union, Garwood Assocs.	201-964-8366
NM	Albuquerque, Williams	505-255-1638
NY	Elbridge, L-Tron Corp.	315-689-3787
NY	Latham, L-Tron Corp.	518-785-5032
NY	Tonawanda, L-Tron	716-691-8887
NC	Raleigh, W.A. Brown Comps.	919-876-9601
NC	Winston-Salem, W.A. Brown Comps., Inc.	919-725-5384
Ohio	Cleveland, Carter, McCormic & Peirce	216-333-5650
Ohio	Dayton, Carter, McCormic & Peirce	513-278-5873
Ore	Beaverton, Tarbell Comms. Inc.	503-643-1631
Pa	King of Prussia, Elctrn. Mktg. Assoc.	215-265-1600
Pa	Monroeville, Carter, McCormic & Peirce	412-372-4415
RI	Lincoln, Adams-McGregor	401-726-1300
Tex	Dallas, McGatlin Instr. Co.	214-243-6061
Wash	Bellevue, Tarbell Comms.	206-454-9716

Local Distributors

Ala	Mobile, Brownell Electro, 3450 Armour Dr.	205-479-5405
Cal	Burlingame, Rose Elctrns., 846 Stanton Rd.	415-697-0224
Cal	Los Angeles, Fisher-Brownell, 13936 S. Broadway	213-532-2170
Cal	Mt. View, IFM, Inc., 80 W. El Camino Real	415-961-2828
Cal	San Pedro, IFM, Inc., 1300 S. Beacon St.	213-547-0829
Cal	Santa Clara, Fisher-Brownell, 3381 Edward Ave.	408-244-6182
Conn	Waterbury, Suburban Supply, 117 Benedict St.	203-757-1251
Fla	Orlando, Brownell Electro, 307 27th St.	305-843-6770
Ga	Atlanta, Brownell Electro, 3026 Commerce	404-762-5181
Ind	Indianapolis, Rockwell Engrg., 2121 E. 45th St.	417-251-9453
Mass	Boston, Sager Electrical, 172 High St.	617-542-2281
Mass	Burlington, Instrs./Div of Mancib, A Street	617-272-9450
Mass	Cambridge, Brownell Electro, 271 Vassar St.	617-864-7500
Mich	Farmington, C,M,&P Distrs., 23995 Freeway Pk.	313-477-7700
Minn	Minneapolis, Waytek, Inc., 5656 Lincoln Dr.	612-933-2133
NJ	S. Plainfield, Brownell Electro, 500 Hadley Rd.	201-753-4600
NJ	Springfield, Federated Purchaser, 155 Rte. 22	201-376-8900
NY	Buffalo, Trott Elctrns., 932 Hertel Ave.	716-876-0880
NY	New York, Brownell Electro, 85 10th Ave.	212-924-6000
NC	Charlotte, Brownell Electro, 5141 Belhaven	704-394-4341
Pa	Philadelphia, Brownell Electro, 10980 Dutton	215-632-3030
Tenn	Memphis, Brownell Electro, 3053 Tranquillity	901-332-9254
Tenn	Nashville, Brownell Electro, 1050 Acorn Dr.	615-889-8230

RG ENTERPRISES INC., Box 667, Scottsdale, Ariz., 85252, Tel: 602-948-9888; Empl.: 2

Customer service: R. C. Granite

Free literature available: A data sheet describing spec's, usage & pricing on a line tools for manual lead forming. Five models are available from 1/8W to 2W.

Products manufactured: Machines/Machinery, Production

Local Distributors

Cal	El Monte, Marshall Industries, 9674 Telstar Ave.	213-686-0141
Cal	El Segundo, Wassco, 410 S. Douglas St.	213-772-8171
Cal	Glendale, Macdonald & Co., 213 S. Brand Blvd.	213-241-1101
Cal	Los Angeles, Engineering & Elctrn. Devices, Inc., 1024 N. McCadden Pl.	213-463-4175
Cal	Torrance, Unitool Div. of Erem Corp., 3740 Skypark Dr.	213-772-0751
Conn	Madison, A & M Electronic Rep's, Aileen Dr.	202-245-1031
Ind	Huntington, Triad-Utrad, 305 N. Briant St.	
Pa	Huntingdon Valley, H. Mann, Inc., 3983 Mann Rd.	215-355-7200
Tex	Dallas, Specialized Prods. Co., 2324 Short Crest Dr.	214-358-4663
Wyo	Cheyenne, Houge Radio & Supply Co., 1102 Logan Ave.	307-632-6474

RHG ELCTRNS. LAB., 161 E. Ind. Ct., Deer Park, N.Y., 11729, Tel: 516-242-1100, TWX: 510-227-6083; Empl.: 65 p. 2•1389

Customer service: S. Wolin

Products manufactured: Amplifiers, Comm. Systems, Converters, Couplers, Demodulators, Discriminators, Dividers, Integrated Circuit Devices, Microwave Integrated Circuits (MIC's), Mixer-Preamplifiers, Microwave, Mixers, Modulators, All Kinds, Preselector-Mixers, Receivers, Transmission Systems, Data, Transmitters, Tuners

Local Sales Offices & Reps.

Ala	Huntsville, Gentry Assocs.	205-534-9771
Ariz	Phoenix, Thorson Co.	602-956-5300
Cal	Los Altos, Cain-White & Co.	415-948-6533
Cal	Los Angeles, Thorson Co.	213-937-0790
Cal	San Diego, Thorson Co.	714-298-8385
Cal	Tustin, Thorson Co.	714-544-5121
Fla	Orlando, Gentry Assocs.	305-894-4401
Md	Annapolis, Hayden Assocs.	202-296-6059
Mass	Reading, Geder-Rotundi Assocs.	617-944-3105
NJ	W. Orange, E F Tech. Sls.	201-731-7203
NM	Albuquerque, IMEC Co.	505-883-9010
NY	Huntington, E F Tech. Sls.	516-368-5841
NY	N. Syracuse, KLM Assocs.	315-458-6214
NY	New Hartford, KLM Assocs.	315-736-5466
NY	Rochester, KLM Assocs.	716-442-0820
NC	Burlington, Gentry Assocs.	919-227-3639
Pa	Lafayette Hill, M. Lader	215-825-3177
Tex	Dallas, Cain & Co., Inc.	214-233-6809
Wash	Seattle, Thorson Co.	206-632-0710

RHOMBUS INDS., INC., 22119 Vermont Ave., Torrance, Cal., 90502, Tel: 213-325-7440, TWX: 910-349-7512; Empl.: 30

Products manufactured: Delay Lines

Local Sales Offices & Reps.

Ariz	Scottsdale, S. C. Blaker Co.	602-948-3061
Mass	Waltham, Impact Sls. Co.	617-893-2850
Minn	Minneapolis, Merrill Franklin Co.	612-835-6422
Tex	Irving, Space Elctrns.	214-251-2266
EXP:	Cal, Los Angeles, Product Supply Co.	213-659-1858

RICHARD-LEE CO., Box 724, New Providence, N.J., 07974, Tel: 201-665-1333; Empl.: 6

Customer service: H. Kundrat

Products manufactured: Amplifiers, Comparators, Controls/Control Eqpt., Converters, Counters, Integrators, Electronic, Meters, Monitors, Oscillators, Tachometers, Totalizers, Digital, Transducers

RICHLOK CORP., 5825 N. Tripp Ave., Chicago, Ill., 60646

RIESTER & THESMACHER CO., 6880 Lake Abrams Dr., Cleveland, Ohio, 44130, Tel: 216-243-5550; Empl.: 80

Customer service: T. D. Burt

Free literature available: Descriptive Brochure, Facilities List

Products manufactured: Cabinets & Accessories, Carts & Dollies, Instrument & Equipment, Cases, Equipment, Instrument, Meter, Chassis, Circuit Board Mounting, Chassis, Metal, Frames, Cabinet & Rack, Racks, Services, Assembly, Production & Test

RJL ELCTRNS., INC., Street Rd. at 2nd St. Pike, Southampton, Pa., 18966, Tel: 215-EL 5-1361; Empl.: 25

For info on price: D. G. Shylan; Application info: J. R. Brochon; Customer service: D. G. Shylan; Delivery info: D. G. Shylan

Products manufactured: Amplifiers, Chargers, Battery, Controls/Control Eqpt., Gages, Meters, Recorders, Test Equipment, Testers

RIPLEY CO., INC., 1 Factory St., Middletown, Conn., 06457, Tel: 203-346-6677; Empl.: 120; Minimum order: $10

Customer service: R. S. Clark

Free literature available: Blower catalolg showing line of small blowers for electronic cooling. Timer catalog showing timers for many types of application. Cable preparation tools - CATV & Coaxial.

Products manufactured: Blowers & Fans & Accessories, Controls/Control Eqpt., Services, Assembly, Production & Test, Timers

Local Sales Offices & Reps.

Ariz	Scottsdale, S.C. Blaker Co.	602-948-3061
Cal	Downey, Sierra Pacific Engrg. Co.	
Cal	Mountain View, Connolly & Co.	415-967-6988
Conn	Cheshire, Techmark Corp.	203-272-7131
Fla	Hialeah, Shaw Engrg. & Sls.	305-822-6141
Ill	Elmhurst, Schuten Assocs.	312-833-0980
Ill	Park Ridge, G. Collins Sls. Co.	312-823-8075
Kans	Shawnee Mission, M.E. Bettis Co.	913-362-0772
Mass	Wellesley Hills, M. Scott Co.	617-235-0102
Minn	New Brighton, T W C Sls. Co.	612-636-1770
NY	Great Neck, F. Tylinski Co.	516-466-9070
NY	Rochester, Application Specialists, Inc.	716-586-8226
NY	Skaneateles, Henkell Mktg. Co.	315-685-6945
Ohio	Cincinnati, G & H Sls. Co.	513-771-8231
Ohio	Cleveland, Scott Electronics, Inc.	216-291-2600
Tex	Dallas, E.F. Aymond Co.	214-826-7620
Tex	Dallas, J.C. Sauls Co.	214-742-9419

RISK INDS, INC., GEORGE, GRI Plaza, Kimball, Neb., 69145, Tel: 308-235-4645, TWX: 910-620-9040; Empl.: 80; Minimum order: $15

For info on price: T. Onigkeit; Application info: R. Nickels; Customer service: T. Onigkeit; Delivery info: T. Onigkeit

Free literature available: Bulletin No. S-12 - Pushbutton Switch Catalog, Bulletin No. KB-10 - Keyboard Catalog, Bulletin No. BA-1 - Burglar Alarm Catalog

Products manufactured: Keyboards, Alphanumeric & Decimal, Switches

Local Sales Offices & Reps.

Ariz	Phoenix, MR Engrg. Sls. Co.	602-959-5150
Cal	Redwood City, Woodworth Co.	415-365-0252
Cal	Van Nuys, C.T.S. Sls.	213-786-4661
Ind	Greenwood, Valentine & Schillinger	317-888-2260
Ind	South Bend, Valentine & Schillinger	219-291-6258
Iowa	Cedar Rapids, VRBIK Co.	319-377-8244

Directory of Local Distributors Starts on page 401

Mich	Ferndale, Shalco, Inc.	313-547-4771
Minn	Minneapolis, Merrill Franklin Co.	612-835-6422
Mo	Florissant, Nevco	314-843-7406
Mo	Kansas City, Nevco Inc.	816-421-1751
Mo	St. Louis, Nevco	314-843-7406
NJ	Springfield, Shortess, Rawson & Assocs.	201-467-8585
NY	Syracuse, I. A. Hotze Co.	315-479-6641
Ohio	Cleveland, Del Steffen & Assocs.	216-461-8333
Ohio	Dayton, Del Steffin & Assocs.	513-293-3145
Pa	Paoli, Tyler Griffin	215-647-1550
Tex	Dallas, McCoy Assocs.	214-350-9931
Tex	Houston, E. V. Smith Sls.	713-649-5756
Tex	Houston, McCoy Assocs.	
EXP:	Laguna Niguel, Cal., Ind. Export Management	714-493-2589
EXP:	Philadelphia, Pa., ALM Elctrns. Inds., Ltd.	215-877-3105

R L C ELCTRNS., INC., 83 Radio Cir., Mt. Kisco, N.Y., 10549, Tel: 914-241-1334; FSC No: 12598; Empl.: 45

Customer service: Sls. Dept.

Free literature available: Catalog describes in 80 pages all information concerning switches, filters, attenuators, terminations, detectors, line stretchers, etc.

Products manufactured: Adapters, Waveguide, Attenuators, Couplers, Detectors, Dividers, Dummy Loads, Filters, Junctions, Hybrid, Microwave, Line Strechers, Microwave, Mixers, Switches, Terminals, Tuners, Waveguides & Adapters

Local Sales Offices & Reps.

Cal	Cupertino, Dura Elctrn. Sls.	408-255-2084
Cal	Los Angeles, Thorson Co.	213-937-0790
Mass	S. Chelmsford, I M R	617-256-8251
Mo	St. Peters, Marsland Assoc.	314-278-6949
NY	Plainview, Central Assoc.	516-433-0808
Pa	Elkins Park, Snow Assocs.	215-379-4700
Tex	Dallas, Texas Microwave	214-231-5381
Va	Woodbridge, M. Lader Company	703-494-4731
EXP:	Yonkers, New York, R. I. Mendels Co.	914-965-4210

RO ASSOCS., INC., 3705 Haven Ave., Menlo Park, Cal., 94025, Tel: 415-322-5321, TWX: 910-378-5929; Empl.: 60
p. 1•1430,1431

For info on price: F. Kamp; Application info: F. Kamp; Customer service: S. Vavro; Delivery info: S. Vavro

Free literature available: Catalog-Complete technical description of standard products plus article "The Principles and Facts About Switching Power Supplies".

Products manufactured: Converters, Power Supplies

Local Sales Offices & Reps.

Ala	Huntsville, Lee Assocs.	205-533-5896
Cal	Los Angeles, Halbar Assocs.	213-387-8283
Cal	Santa Clara, Richards Assocs.	408-246-5860
Colo	Boulder, H. Bass Assocs.	303-499-7509
Fla	Miami, Lee Assocs.	305-525-9767
Fla	Winter Haven, Lee Assocs.	813-294-5815
Ill	Rolling Meadows, Lightner Assocs.	312-398-3000
Md	Fulton, Gans-Fryling Inc.	301-837-6311
Mass	Lynnfield, Research Instrs.	617-245-9530
Mass	Newton, Techmar Inc.	617-444-8130
Mich	, Holsapple & Assoc.	317-899-2890
Minn	Minneapolis, Data Electronics Co.	612-786-9666
NJ	Ft. Lee, Technimat	201-461-8686
NM	Albuquerque, Fry-Gates Co.	505-298-1875
NY	Ithaca, B. Dean Inc.	607-272-2187
NC	Raleigh, Lee Assocs.	919-787-5818
Tex	Dallas, McCoy Assoc. Co.	214-350-9931
Tex	Houston, Ev Smith Sls. Co.	713-649-5756
Va	Arlington, Gans-Fryling Inc.	703-527-3262
FOR:	Can., Toronto, Ont., B.H. Mc Gregor	416-699-5521

ROBERTSHAW CONTROLS CO., Box 449, Columbus, Ohio, 43216, Tel: 614-875-2351, TWX: 810-335-2560; Empl.: 500; Minimum order: $25

For info on price: J. Putsock; Application info: R. A. Heber; Customer service: J. Putsock; Delivery info: R. A. Heber

Free literature available: General Catalog D-73, Robertshaw "Command Series" Oil-Tight Pushbutton Switches - Switch and Component Ordering Information.

Products manufactured: Switches

Local Sales Offices & Reps.

Ga	Atlanta, B. Fancher & Assoc.	404-448-7078
Minn	Minneapolis, Stack-Johnson, Inc.	612-925-2111
NY	Rochester, Upstate Comp. Sls.	716-288-1080
NC	Charlotte, B. Fancher & Assocs.	704-376-1753
Va	Richmond, Advance Control Equip. Co.	703-288-0124

ROBERTSHAW CONTROLS CO., Ind'l. Instr. Div., 1701 Byrd Ave., Box 26544, Richmond, Va., 23261, Tel: 804-282-9561, TWX: 710-956-0121; Minimum order: $20

Customer service: L. E. Huff

Products manufactured: Computers, Controls/Control Eqpt., Gages, Indicators, Integrators, Electronic, Meters, Monitors, Recorders, Switches, Transducers, Transmitters

Local Sales Offices & Reps.

Ala	Birmingham, J.W. Eshelman	205-879-3462
Ariz	Phoenix, Special Sys. Co.	602-964-5807
Cal	Anaheim, Robertshaw Controls	213-860-2491
Cal	San Diego, G. L. Parkhurst Co.	714-232-0721
Cal	So. San Francisco, Robertshaw Controls	415-871-7767
Cal	Taft, Oilfield Controls, Inc.	805-763-1561
Colo	Denver, Peterson Co.	303-388-6322
Conn	Hamden, Pond Tech.	203-288-6278
DC	Washington, Caton, Waller & Assocs., Inc.	301-269-0304
Fla	Lakeland, Curry Controls	813-646-4832
Ga	Atlanta, L. Rawson Co.	404-228-2351
Haw	Kailau, Oahu, CBC, Inc.	808-262-6561
Ill	Elk Grove Village, Robertshaw	312-437-6060
Ind	Indianapolis, Electro Engrg. & Sls., Inc.	317-547-5273
Iowa	Clinton, H. G. Klug, Inc.	319-243-3642
Ky	Louisville, Control Prods. Co.	502-367-6421
La	Baton Rouge, Allen Assocs.	504-926-4687
La	New Orleans, Turner & Co.	504-834-3848
La	Shreveport, Deeco Co.	318-742-0856
Md	Baltimore, Reco Inc.	301-647-0926
Mass	Boston, Stickney Engrg. Assoc.	617-449-3733
Mich	Detroit, G. R. Peters Assoc.	313-546-1166
Mich	Portage, G. R. Peters Assoc.	616-327-8390
Minn	Minneapolis, Northwest Power Equip.	612-646-7904
Mo	Kansas City, Power Specialties	816-531-6550
Mo	St. Louis, C. F. Gast Co.	314-993-2870
Mont	Billings, Industrial Sys.	406-252-6671
Neb	Omaha, H. G. Klug Co.	402-553-1377
NJ	Beverly, T. R. Van Ornam Co.	609-387-1964
NJ	Morrestown, D. J. Hettich	609-235-3411
NY	Albany, S. F. Sheldon Co.	518-684-2356
NY	Buffalo, Nickles Engrg. Co.	716-773-5399
NY	Liverpool, Nickles Engrg. Co.	315-457-8224
NY	New York, Buck Sls.	201-322-8747
NY	Rensselaer, Ashley Equip. Co.	518-436-9151
NY	Rochester, Nickles Engrg. Co.	716-586-4988
NC	Charlotte, G. M. Johnston	704-364-0722
NC	Charlotte, Robertshaw Controls	704-376-7495
Ohio	Cincinnati, Rawdon Myers, Inc.	513-791-4224
Ohio	Cleveland, E. J. Hodan & Assoc.	216-331-9344
Okla	Tulsa, Myers-Aubrey Co.	918-622-3500
Ore	Portland, Arthur Forsythe	503-297-3121
Pa	Ft. Washington, Robertshaw Controls	215-646-8031
Pa	Pittsburgh, Gilson Engr.	412-931-6114
SC	Greenville, Robertshaw Controls Co.	803-233-2787
Tenn	Knoxville, Robertshaw Controls	615-546-0550
Tenn	Memphis, Huckabee Industrial Sls., Inc.	901-388-4110
Tex	Corpus Christi, Duke - Lane Co.	512-888-5222
Tex	Dallas, Controls Intl. Co.	214-233-9397
Tex	Houston, Robertshaw Controls	713-498-0500
Tex	Odessa, The Barnco Co.	915-332-0293
Utah	Salt Lake City, Peterson Co.	801-487-5621
Wash	Richmond, Advance Control Equip. Co.	703-288-0124
Wash	Seattle, A. Forsyth Co.	206-283-5716
Wash	Spokane, A. Forsyth	509-326-2700
Wisc	Milwaukee, Allen Engrg.	414-353-5070
Wisc	Milwaukee, Robertshaw Controls	414-464-6446
Wyo	Casper, Moltec	307-234-5309
EXP:	Richmond, Va., Robertshaw Controls Intl. Mktg.	804-282-9561
FOR:	Can., Ontario, Robertshaw Controls	416-255-3451

ROBICON CORP., Plus Ind'l. Pk., Pittsburgh, Pa., 15239, Tel: 412-327-7000, Telex: 812-441; Empl.: 175; Minimum order: $50

For info on price: R. Sheppard; Application info: G. Lacki; Customer service: D. Lorenzi; Delivery info: S. Lagerbauer

Products manufactured: Controls/Control Eqpt.

Local Sales Offices & Reps.

Ala	Decatur, Pace	205-353-8067
Cal	Costa Mesa, Robinson Tech. Assocs.	714-557-1622
Cal	San Francisco, Automated Process Controls Co.	415-467-6162
Ga	Atlanta, Pace	404-458-7225
Ill	Park Ridge, Thermo/Cense	312-792-2760
Kans	Shawnee Mission, W. Hickman Co.	913-362-8066
Mass	Framingham, J.M. Lancaster Co.	617-873-8893
Mich	Southfield, Harris-Blancett & Assoc.	313-352-9505
Mo	St. Louis, F. Gilliam Assoc.	314-961-5555
Neb	Omaha, W. Hickman Co.	402-895-0262
NJ	S. Orange, Smith Co.	201-763-1770
NY	Buffalo, Robinson Assocs.	716-886-7350
NY	Latham, Robinson Assocs.	518-785-5844
NY	Rochester, Robinson Assocs.	716-342-3130
NY	Syracuse, Robinson Assocs.	315-478-0241
NC	Charlotte, R. Chapman Co.	704-525-2421
NC	Raleigh, R. Chapman Co.	919-782-2624
Ohio	Cincinnati, Cetco	513-671-6871
Ohio	Cleveland, A.W. Risser Co.	216-458-5091
Ohio	Toledo, Cubbedge Controls	419-535-5530
Okla	Tulsa, Terry Co.	918-743-3249
Pa	King of Prussia, Reinbrecht Assoc.	215-265-6180
Pa	Pittsburgh, Weiss Instrs.	412-371-3020
Tex	Houston, R & K Engineering	713-465-8367
Wash	Bellevue, A. Smith Co.	206-746-6770
WVa	Charleston, Hedrick Engineering	304-925-7655

Advertisment

SCR thyristor power control and conversion equipment. Robicon supplies standard SCR devices and custom packaged systems in fields of temperature control for process and comfort industries; speed/position control for motor drives to 2000 HP, both unidirectional and static reversing; and materials melting systems to 10,000 KVA.

ROBINSON-NUGENT, INC., 802 East 8th St., New Albany, Ind., 47150, Tel: 812-945-0211, TWX: 810-540-4082; Empl.: 250; Minimum order: $100

For info on price: S. M. Shine; Application info: M. Amster; Customer service: L. Winn; Delivery info: B. Hubler

Products manufactured: Boards, Plug-In, Chassis, Metal, Connectors, Integrated Circuit Packaging Systems, Plugs, Services, Assembly, Production & Test, Socket Adapters, Sockets, Terminals, Tools

Local Sales Offices & Reps.

Ariz	Phoenix, GND Sls.	602-971-9758
Cal	El Monte, Cook Ent.	213-686-2120
Cal	Redwood City, Logan Sls. Co.	415-369-6726
Cal	San Diego, Celtec Co.	714-279-7961
Colo	Englewood, W.J. Purdy Co.	303-777-1411
Fla	Oviedo, Conley & Assoc.	305-365-3283
Ill	Park Ridge, Metcom Assoc.	312-696-1490
Ind	Indianapolis, Technical Reps.	317-546-4967
Ky	Mt. Sterling, M.F. Eubank Sls. Co.	606-498-5955
Mass	Clinton, F.J. Coleman Co.	617-894-1855
Mich	Sturgis, Kesler & Assoc.	616-651-7619
Minn	Minneapolis, Stan Clothier Co.	612-888-4666
NM	Albuquerque, W.J. Purdy Co.	505-266-7959
NY	Huntington, C.R. Mayer Co.	516-921-7876
NY	Syracuse, Canavan-Scanlon Assoc.	315-437-1271
Ohio	Cincinnati, Tri-State Mktg.	513-761-7993
Ore	Portland, J.V. BeLusko Co.	503-222-4279
Pa	Broomall, L.D. Lowery, Inc.	215-356-5300
SC	Greenville, Elect. Mktg. Assoc.	803-268-1125
Tex	Irving, Space Elect. Corp.	214-251-2261

Local Distributors

Ala	Birmingham, M-G Elctrns., 3112 6th Ave.	205-328-4525
Ariz	Phoenix, Moltronics, 3617 N. 35th Ave.	602-272-7951
Cal	Los Angeles, RPS, 1501 S. Hill	213-748-1271
Cal	Riverside, Elec. Supp., 2486 3rd St.	714-787-9220
Cal	Sunnyvale, Intermark Elec., 1020 Stewart Dr.	408-738-1111
Colo	Denver, Intermark, 2600 W. 2nd Ave.	303-936-8284
Fla	Orlando, Hammond Elec., 911 W. Central Blvd.	305-849-6060
Ill	Westmont, Bodelle Co., 47 Chestnut	312-323-9670
Ind	Indianapolis, Harvey-Ind., 8505 Zionsville	317-297-4910
Ky	Louisville, Peerless Elec., 1815 S. 7th	502-636-3336

Md	Baltimore, Radio Elec. Svc., 1026 Cromwell Bridge Rd.	301-823-0070
Mass	Burlington, B & W Assoc., "B" St.	617-272-4420
Mich	Farmington, Harvey-Michigan, 23461 Ind. Pk. Dr.	313-477-1650
Minn	Minneapolis, Electro-Com, 3816 Chandler	612-788-8601
Mo	St. Louis, L-Comp St. Louis, 2605 S. Hanley	314-647-5505
Neb	Lincoln, Scott Elec., 4040 Adams St.	402-464-8308
NY	Bohemia, Carlac, 75 Orville Dr.	516-567-4200
NY	Buffalo, Summit Dist., 916 Main St.	716-884-3450
NC	Greensboro, Hammond Elec., 838 Huffman St.	919-275-6391
Ohio	Dayton, Esco, 221 Crane St.	513-226-1133
Pa	Philadelphia, Almo, Roosevelt Blvd. & Blue Grass Rd.	215-676-6000
SC	Greenville, Hammond Elec., 100 Augusta St.	803-233-4121
Tex	Dallas, Component Spec., 2560 Elec. La.	214-357-4576
Tex	Houston, Geophysical Supp., Box 52230	713-224-0621
Va	Charlottesville, Virginia Radio, 715 Henry Ave.	804-296-4184
Wash	Seattle, Radar Elec. Co., 168 Western Ave.	206-282-2511

ROBISON ELCTRNS., 3580 Sacramento Dr., San Luis Obispo, Cal., 93401, Tel: 805-544-8000; Empl.: 70

Products manufactured: Cups, Encapsulation, Pads, Transistor Mounting

Local Sales Offices & Reps.

Ariz	Phoenix, Gramer & Co.	602-279-1231
Cal	Downey, Groh Assocs.	213-923-0963
Cal	Palo Alto, R.W. Thompson Assocs.	
Cal	San Diego, Daniels & Doty Sls.	714-560-6266
Colo	Boulder, R.G. Enterprises	303-447-9211
Iowa	Des Moines, Beams, Inc.	515-282-0290
Kans	Shawnee Mission, Beams Inc.	913-341-7744
Md	Hyattsville, Eastern Comps.	301-557-2925
Mass	Woburn, Jalco Assocs.	617-227-1515
Minn	Hopkins, F. Peterson Co.	612-941-5400
Mo	Creve Coeur, Beams, Inc.	314-569-1060
NY	Brentwood, Cir-Tech Assocs.	516-231-4440
NY	De Ruyter, R.A. Murray Co.	315-852-9981
NY	Rochester, R.A. Murray Co.	716-467-4538
Ohio	Cleveland, Electro-Com	216-886-2404
Ohio	Dayton, Electro-Com	513-276-3993
Pa	Flourtown, Eastern Comps.	215-836-1616
Pa	York, Eastern Comps.	714-764-3114
Tex	Houston, Aid Elctrns.	713-777-3882
Tex	Irvine, Aid Elctrns.	214-259-4761
Wash	Kirkland, Freed Assocs.	206-822-8100

ROCKLAND INSULATED WIRE & CABLE, 87 Broadway, Haverstraw, N.Y., 10927, Tel: 914-429-3103; FSC No: 12111; Minimum order: $25

Free literature available: Catalog #471 contains a listing of miniature and sub-miniature PVC insulated wires & cables indicating items available from stock & special order.

Products manufactured: Cable, Wire

ROCKLAND SYS. CORP., 230 W. Nyack Rd., W. Nyack, N.Y., 10994, Tel: 914-623-6666, TWX: 710-575-2631; Empl.: 55; Minimum order: $50

p. 1•416,574,798,799

For info on price: D. Kohn; Application info: D. Kohn; Customer service: J. P. Marcella; Delivery info: J. P. Marcella

Free literature available: 1974 Short Form Catalog, Technical Data Sheets, Application Bulletins, Electronic Products Reprint "Frequency Synthesizers". 1973 IEEE Intercon Technical Papers "New Developments in Signal Generators".

Products manufactured: Analyzers, Equalizers, Filter Synthesizers, Filters, Generators, Signal Conditioners & Equipment, Synthesizers

Local Sales Offices & Reps.

Ala	Huntsville, Lee Assocs., Inc.	205-533-5896
Ariz	Phoenix, Cleveland Entprs.	602-996-8130
Cal	Mountain View, IFM	415-961-2828
Cal	San Pedro, IFM	213-547-0829
Colo	Arvada, Cleveland Entprs.	303-423-3707
Conn	Hamden, Instrument Consultants	203-288-5246
Fla	Ft. Lauderdale, Lee Assocs.	305-525-9796
Fla	Winter Haven, Lee Assocs., Inc.	813-294-5815
Ill	Chicago, Carter Elctrns.	312-585-5485
Ind	Indianapolis, Carter Elctrns.	317-293-0696
Kans	Overland Park, Carter Elctrns.	913-649-6996
Md	Rockville, Mesa, Inc.	301-881-8430
Mass	Newton, Instrument Consits.	617-969-9881
Mich	Detroit, LI/Corp.	513-434-6367
Minn	Minneapolis, Carter Elctrns.	612-544-9393
Mo	Hazelwood, Carter Elctrns.	314-731-2237
NJ	Riverton, Mesa	609-786-0284
NM	Albuquerque, Cleveland Enterprises	505-345-2481
NY	Port Chester, Radiation Electronics	914-937-2300
NY	Rochester, Scientific Devices	716-334-2445
NC	Raleigh, Lee Assocs., Inc.	919-787-5818
Okla	Norman, Data Mktg. Assocs.	405-364-8320
Tex	Dallas, Data Mktg. Assoc.	214-661-0300
Tex	Houston, Data Mktg.	713-686-9627
Tex	San Antonio, Data Mktg. Assocs.	512-828-0937
Wash	Seattle, Delcom Sls. Co.	206-248-0090
Wisc	Milwaukee, Carter Elctrns.	414-464-5555
FOR:	Can., Downsview 463, Ont., Radionics Ltd.	416-638-0218
FOR:	Can., Montreal 376, Que., Radionics Ltd.	514-735-4565
FOR:	Can., Ottawa, Ont., Radionics Ltd.	613-521-8251
FOR:	Can., Vancouver, B.C., Radionics Ltd.	604-732-7317
FOR:	Can., Winnipeg, Man.	204-475-1732

ROCKWELL INT'L., Microelectronics Device Div., Box 3669, 3430 Miraloma Ave., Anaheim, Cal., 92803, Tel: 714-632-3729, TWX: 910-591-1179; FSC No: 34576

For info on price: W. A. Treleaven 714-632-3698; Application info: J. E. Bass 714-632-3860; Customer service: R. F. Voigt 714-632-3729; Delivery info: C. D. Bopf 714-632-0624

Free literature available: Product Descriptions & Application Notes.

Products manufactured: Integrated Circuit Devices, Modulator/Demodulators

Local Sales Offices & Reps.

NY	Smithtown	516-979-0183

RODAN IND'S., 2905 Blue Star St., Anaheim, Ca., 92806, Tel: 714-630-0081, TWX; 910-591-1684; FSC No: 15454; Empl.: 48; Minimum order: $15

For info on price: R. W. Dankert; Application info: A. Storamski; Customer service: J. H. Burns; Delivery info: J. H. Burns

Free literature available: Thermistor Manual enclosed

Products manufactured: Networks, Probes, Resistors, Thermistors, Transducers

Local Sales Offices & Reps.

Ariz	Scottsdale, De Angelo, Rothman & Cheever	602-948-2240
Cal	Los Altos, Stout-Loeswick	415-948-3265
Fla	Boca Raton, Southeastern Component Sls.	305-391-9067
Fla	Clearwater, Southeastern Component Sls.	813-531-8324
Ill	Chicago, J. Popp Sls. Co.	312-626-3711
Ind	Ft. Wayne, Menze Sls. Co.	219-747-5616
Iowa	Cedar Rapids, Snider Sls.	319-362-4410
Kans	Leawood, H.C. Heyde Co.	913-649-8628
Md	Baltimore, Burgin-Kreh Assoc.	301-788-5200
Mass	Andover, Sales Engrg.	617-470-0800
Mich	Troy, C. B. Jensen Assocs.	313-643-0506
Minn	Minneapolis, E.C. Elctrn. Sls.	612-831-0229
NY	Great Neck, F. Tylinski Co.	516-466-9070
NC	Winston-Salem, Burgin-Kreh Assoc.	919-768-4174
Pa	Ardmore, R. Freedman Assoc.	215-649-3679
Tex	Addison, Southland Components	214-233-0603
Va	Lynchburg, Burgin-Kreh Assoc.	703-845-5600
Wash	Seattle, R.K. Squibb Co.	206-632-2450
EXP:	New York City, N.Y., Singer Prod. Inc.	212-432-1400

RODELCO, 356A Commack Rd., Deer Park, N.Y., 11729, Tel: 516-643-5110; Empl.: 9; Minimum order: $500

Customer service: A. Dahiher

Products manufactured: Amplifiers, Transmitters

ROGAN CORP., 3455 Woodhead Dr., Northbrook, Ill., 60062, Tel: 312-498-2300, TWX: 910-686-0008

Products manufactured: Dials, Knobs

Local Sales Offices & Reps.

Cal	Palo Alto, O'Donnell Assocs.	415-327-9260
Cal	Torrance, O'Donnell Assocs.	213-323-9243
Colo	Arvada, Arrowhead Sls.	303-423-5556
Conn	North Haven, Comp Rep Assocs.	203-239-9762
Haw	Hanalei, TJR Sls. Co.	
Mass	Needham, Comp Rep Assocs.	617-444-2484
Mich	Grand Rapids, Montgomery Assocs.	616-774-9308
Mich	Southfield, Montgomery Assocs.	313-358-2616
Minn	Minneapolis, R.W. Marshall Co.	612-929-0457
NJ	Pitman, Colrud Co.	609-589-5866
Ohio	Dayton, J.C. Hofstetter Co.	513-298-0662
Ohio	Medina, J.C. Hofstetter Co.	216-241-4880
Tex	Dallas, W. Reese Assocs.	214-638-6575
Tex	Houston, W. Reese Assocs.	713-621-3134
Utah	Salt Lake City, Arrowhead Sls.	801-487-3444
Va	Lynchburg, Royelec	703-846-7117
Wash	Bellevue, SD-R2 Sls.	206-747-9424

ROGERS CORP., Rogers, Conn., 06263, Tel: 203-774-9605, TWX: 710-448-0047; Empl.: 1500

Products manufactured: Bars, Shorting, Bearings, Boards, Printed Circuit, Bus Bars & Systems, Cable, Circuits, Flexible, Circuits, Printed, Multilayer, Insulators & Insulation, Laminates, Materials, Self-Lubricating, Services, Assembly, Production & Test, Switchboards

Local Sales Offices & Reps.

Ariz	Phoenix, J. Opel	602-996-4850
Cal	Altadena, Space Engrg.	213-681-4421
Cal	Orange, F. R. Fahland	714-998-2580
Cal	Woodland Hills, A. W. Riel	213-347-7435
Colo	Littleton, G. B. Lange	303-798-1397
Conn	Essex, D. Dewey, Jr.	203-767-1118
Conn	Willimantic, G. D. Smith	203-774-9605
Fla	Jupiter, Cherry Assocs.	305-746-4591
Ga	Atlanta, Beacon Elctrns.	404-351-3654
Ill	Hazel Crest, J. R. Menees	312-798-5800
Md	Simpsonville, R. J. Stout	301-997-9199
Mass	Waltham, DeVeer Sls. Engrg.	617-899-5900
Mich	Belleville, J. E. Ellward	313-645-0433
Mich	Bloomfield Hills, T. G. Erickson	313-645-0433
Mich	Onsted, B. Widegren	313-535-4926
Mich	Westland, J. Dyer	313-645-0433
Minn	Fridley, H. R. Crowder	612-560-1340
Mo	Hazelwood, Production Automation Corp.	314-731-2331
Mo	Raytown, Production Automation Corp.	816-737-0066
NJ	Mount Laurel, P. Taparauskas	609-235-4747
NY	Pittsford, P. R. Pratt	716-461-1167
NY	Roslyn, D. R. Dunay	516-621-8723
Ohio	Xenia, J. Link Forte	513-426-8993
Pa	Newtown Square, Hagy Assocs.	215-459-0504
Pa	Sharon, H. A. Harriman	412-347-3129
RI	Slatersville, D. A. Belden	617-332-1285
Tex	Richardson, Air-Quip Sales	214-234-3285
Va	Boones Mill, J. L. Settles	703-342-3120
Wash	Seattle, Arneson Assocs.	206-762-7664

ROGERS CORP., Box 700, Chandler, Ariz., 85224

RHODE & SCHWARZ SLS., 14 Gloria La., Fairfield, N.J., 07006, Tel: 201-575-0750, Telex: 133310; Empl.: 15

Products manufactured: Accelerometers, Amplifiers, Analyzers, Antennas, Attenuators, Bridges, Calibrators, Capacitors, Fixed, Carts & Dollies, Instrument & Equipment, CATV Systems & Equipment, Clocks (All Types), Coders, Comparators, Connector Adapters, Converters, Couplers, Data Acquisition & Reduction Systems, Decade Boxes, Delay Lines, Demodulators, Detectors, Direction Finders, Dividers, Dummy Loads, Filters, Generators, Indicators, Insertion Loss Measurement Systems, Line Strechers, Microwave, Meters, Mismatches, Microwave, Precision, Modulators, All Kinds, Monitors, Multipliers, Networks, Probes, Receivers, Recorders, Relays, Resistors, Slotted Lines, Microwave, Smith Chart Impedance Plotters, Automatic, Standards, Switches, Synchronizers, Klystron & BWO, Synthesizers, Tees, Terminals, Test Equipment, Testers, Transformers, Transmitters

Local Sales Offices & Reps.

Ala	Huntsville, Scientific Devices SE	205-536-1969
Fla	Orlando, Scientific Devices SE	305-841-8180
Ind	Indianapolis, L.F. Green Assocs.	317-293-9827
Mass	Waltham, Scientific Devices NE	617-894-5637
NC	Burlington, Scientific Devices SE	919-222-6279
Ohio	Dayton, LI Corp.	513-434-6367
Pa	Abington, Bach-Stewart Assocs.	215-885-1550
Va	Bailey's Crossroads, Q. T. Elctrns. Sls. Inc.	703-671-4357
Wash	Belleview, Scientific Devices NW	206-454-0900

ROHN MFG., Div. Unarco Inds., Box 2000, Peoria, Ill., 61601, Tel: 309-697-4400, TWX: 910-652-0646; Empl.: 290

Products manufactured: Antenna Towers & Supports, Antennas, Benches, Consoles, Stools, Tables, Insulators & Insulation, Mounts, Tubing, Wire

Local Sales Offices & Reps.

Cal	Burlingame, Wm. J. Purdy Co.	415-347-7701
Cal	Woodland Hills, Chick Ryel & Co.	213-883-8118

Colo	Denver, R.G. Bowen Co.	303-722-4641
Fla	Coral Gables, Mart Haller	305-444-4617
Fla	Lakeland, Dixie Elctrn. Assoc.	813-682-6624
Iowa	Des Moines, B.E.A.M.S.	515-282-0292
Mass	N. Scituate, W.A. Hendrickson Co.	617-545-0652
Minn	Minneapolis, Jensen & Olsen Sls.	612-941-7181
NJ	Teaneck, S. Fisher Elctrn. Assoc.	201-837-1200
NM	Albuquerque, C.T. Carlberg & Assoc.	505-265-1579
NY	Liverpool, Lewis-Dunnigan Co.	315-622-2133
NY	Tuckahoe, L-C-A Sls. Co.	914-961-4700
Ohio	St. Marys, T. Shelby & Co.	419-394-3377
Tex	Dallas, B. Townsend	214-241-6703
Wash	Seattle, DMS/Vantage	206-784-6800

ROL-A-CHART DIV., Wm. A. Steward Co., Box 367, Diamond Springs, Cal., 95619, Tel: 916-622-2437; Empl.: 8

Customer service: A. Steward

Free literature available: Guide to visual control magnet catalolg

Products manufactured: Magnets

ROLM CORP., 18922 Forge Dr., Cupertino, Cal., 95014, Tel: 408-257-6440, TWX: 910-338-0247; Empl.: 126

Products manufactured: Cards, Logic, Comm. Systems, Computers, Converters, Memory Systems

Local Sales Offices & Reps.

Cal	La Habra, Rolm Corp.	213-784-8500
Cal	Palo Alto, Rolm Corp.	415-965-2224
Colo	Denver, Thorson Co.	303-355-3521
DC	Washington, Rolm Corp.	703-893-2696
Kans	Shawnee Mission, EIR Co.	913-362-0919
Mass	Boston, Rolm Corp.	617-237-5752
Mo	Hazelwood, EIR Co.	314-895-4100
NY	New York, Rolm Corp.	914-297-9533
Ohio	Dayton, Rolm Corp.	513-874-5406
Tex	Dallas, Rolm Corp.	214-661-8905
Va	McLean, Rolm Corp.	703-893-2696
Wash	Seattle, Showalter-Judd, Inc.	206-762-2310

ROMARNETICS, INC., 18728 Bryant St., Northridge, Cal., 91324, Tel: 213-886-1812; Empl.: 15 .... p. 2•1785

Customer service: R. Easton

Free literature available: Catalog of our Printed Circuit Type Power Transformers, Standard Line.

Products manufactured: Transformers

RONOR SYSTEMS, 321 Sandbank Rd., Cheshire, Conn., 06410, Tel: 203-272-6847; Empl.: 12

Customer service: N. D. Ostrowski

Products manufactured: Cable Assemblies & Harnesses, Connectors, Services, Assembly, Production & Test

ROSEMOUNT INC., Box 35129, Minneapolis, Minn., 55435, Tel: 612-941-5560; Empl.: 1200

Products manufactured: Alarms, Baths, Controlled Temperature (Air & Liquid), Controls/Control Eqpt., Gages, Indicators, Monitors, Process Control Systems, Standards, Suppressors, Thermometers, Resistance, Transducers, Transmitters

Local Sales Offices & Reps.

Cal	Bellflower, Rosemount Inc.	213-866-8224
Cal	Chatsworth, Rosemount Inc.	213-341-3944
Cal	San Diego, Rosemount Inc.	714-565-9133
Cal	San Jose, Rosemount Inc.	408-269-7550
Colo	Boulder, Rosemount Inc.	303-447-9231
Ga	Atlanta, Rosemount Inc.	404-256-4806
Ill	Chicago, Rosemount Inc.	312-963-0750
La	Baton Rouge, Rosemount Inc.	504-926-8916
Mass	Boston, Rosemount Inc.	617-861-0750
Mich	Detroit, Rosemount Inc.	313-626-0900
Minn	Minneapolis, Arjay Sls. Inc.	612-925-1833
Mo	St. Louis, Rosemount Inc.	314-731-6881
NJ	Englewood, Rosemount Inc.	201-568-6366
NC	Charlotte, Rosemount Inc.	704-333-1271
Ohio	Cleveland, Rosemount Inc.	216-777-3961
Ohio	Dayton, Rosemount Inc.	513-433-6383
Pa	Philadelphia, Rosemount Inc.	215-353-3344
Tex	Dallas, Rosemount Inc.	817-267-3514
Tex	Houston, Rosemount Inc.	713-664-8891
Va	Richmond, Rosemount Inc.	804-285-3424
Wash	Seattle, Rosemount Inc.	206-747-4900

ROSS CONTROLS CORP., 381 Elliot St., Newton, Mass., 02164, Tel: 617-891-9600; Empl.: 6

Products manufactured: Recorders, Tape Recording Accessories

Local Sales Offices & Reps.

Cal	Corona Del Mar, Williams Assoc.	714-675-8161
Cal	Sunnyvale, Pacific Entprs.	408-245-3517

ROSS ENGINEERING CORP., 559 Westchester Dr., Campbell, Cal., 95008, Tel: 408-377-4621; FSC No: 23598; Empl.: 27 .... p. 1•1806,1807

Customer service: H. C. Ross

Free literature available: Brochures on High Voltage: Devices, relays, switches contactors, digital multimeters, dividers, voltmeter, probes, solenoid, drivers, spark gaps, toroids, spheres & corona shields, safety accessories, resistors & capacitors, etc.

Products manufactured: Antenna Switching Matrices, Arresters, Electrical Surge, Lightning, Calibrators, Capacitors, Fixed, Chargers, Battery, Circuit Breakers, Detectors, Dividers, Drivers, Solenoid, Meters, Multipliers, Power Supplies, Probes, Protectors, Relays, Resistors, Services, Assembly, Production & Test, Spark Gaps, Switches, Testers

Local Sales Offices & Reps.

Cal	Mt. View, ENCOM	415-969-0330
Cal	San Diego, ENCOM	714-299-0993
Mich	Dearborn, D. Seyfried Co.	313-274-4900
Mo	St. Louis, G. DuBois Co.	314-961-0632
NJ	Haddonfield, M & S Assocs.	609-429-7055
NY	Cazenovia, P. DeCew Agency	315-655-8602
ND	Fargo, Dakota Elec. Supply	701-327-9440
Ohio	Cleveland, K.R. Dodge Co.	216-461-6482
Pa	Philadelphia, M & S Assocs.	215-229-7575
EXP:	N.Y., New York, Ardry Trading Co.	212-582-5058
FOR:	Can., Toronto, Ontario, Electro Design Ltd.	416-787-0991
FOR:	Can., Ville La Salle, Ore., Electro Design, Ltd.	514-363-5120

ROSTONE CORP., 2781 S. Concord Rd., Lafayette, Ind., 47902, Tel: 317-474-2421; Empl.: 600

For info on price: T. E. Deller; Application info: T. E. Deller; Customer service: T. E. Deller; Delivery info: F. L. Cason

Free literature available: ROSITE material data sheets and 8 page brochure explains services, facilities, and capabilities of Rostone Corporation's custom molding, compounding, and engineering operation.

Products manufactured: Insulators & Insulation, Services, Assembly, Production & Test

ROTATING COMPONENTS DIV., Aeroflex Labs. Inc., South Service Rd., Plainview, N.Y., 11803, Tel: 516-694-6700, TWX: 510-224-6417; Empl.: 50 .... p. 1•979

Free literature available: I. MIL SPEC Fans. 2. MIL SPEC Blowers 3. AC Synchronous Motors 4. Tachometer Generators Part Nos. Tech Data, Dimensions and How to Order for above.

Products manufactured: Blowers & Fans & Accessories, Motor & Generator Armatures, Rotors, Stators, Motors, Tachometers

Local Sales Offices & Reps.

Cal	Aptos, Allen & Sweeney Assoc.	408-688-7114
Cal	Torrance, Allen & Sweeney Assoc.	213-373-3318
Conn	Thomaston, Tygren Co.	203-264-6880
Ill	Lombard, Quadtron Assocs.	312-627-6800
Kans	Wichita, D & O Engrg Co.	316-264-7358
Md	Lutherville, P. Knox & Co.	301-252-1288
Mass	Stoneham, K & D Assoc.	617-438-3121
Mich	Farmington Hills, H. Lowell Co.	313-851-7474
Minn	St. Paul, Vikeland Sls.	612-645-4647
Ohio	Fairborne, Tech. Assoc.	513-878-2484
Pa	Jenkintown, Stein Instrumentation	215-885-2370
Tex	Houston, AID Elctrns.	713-777-3882
Tex	Irving, AID Elctrns.	214-259-4761
Wash	Seattle, G. M. Gillett & Assoc.	206-284-3344
EXP:	New York City, New York, Frathom Co.	212-687-9390

ROTRON, INC., Hasbrouck La., Woodstock, N.Y., 12498, Tel: 914-679-2401, TWX: 510-247-9033; Empl.: 950 .... p. 1•516-524

Customer service: T. McCanna

Free literature available: Quick reference catalog-brief description of performance, demensions, materials of complete product line.

Products manufactured: Blowers & Fans & Accessories, Heat Exchangers & Systems, Inverters, Switches

Local Sales Offices & Reps.

Ariz	Phoenix, Shefler-Kahn	602-258-7893
Cal	Burbank, Rotron/Pacific	213-849-7871
Cal	Mt. View, Nor-Cal Assocs.	415-961-8121
Colo	Denver, F. Gossard Associates	303-985-0602
Fla	Orlando, G. Bohman	305-855-0274
Ga	Atlanta, Electro-Mech Engrg. Sls.	404-393-0444
Haw	Honolulu, R. Clark	808-531-5897
Ill	Chicago, Mid West Elctrn. Sls.	312-777-9700
Ind	Indianapolis, MidWest Elctrn. Sls.	317-926-3736
Iowa	Cedar Rapids, Midwest Elctrn. Sls.	319-393-1845
Kans	, CenTech Inc.	816-358-8100
Mass	Lexington, Circuit Sls.	617-861-0567
Mich	Farmington, W.R. Hummon & Assoc.	313-474-0661
Minn	Mpls, E.C. Elctrn. Sls.	612-831-0229
Mo	Hazelwood, CenTech, Inc.	314-838-6446
NJ	Springfield, F. Sylvester	201-376-3324
NM	Albuquerque, Shefler-Kahn	505-265-7077
NY	Woodstock, Rotron Inc.	914-OR 9-2401
NC	Charlotte, Over & Over	704-527-3070
Ohio	Cincinnati, F. J. Campisano	513-662-1616
Ohio	Cleveland, Comp., Inc.	216-842-2737
Okla	Okla Cy, Ammon & Rizos	405-373-2748
Pa	Ardmore, B. R. Roome	215-649-4101
Tenn	Nashville, Electro-Mech Engrg. Sls.	615-883-1490
Tex	Dallas, Ammon & Rizos	214-233-5591
Tex	Houston, Ammon & Rizos	713-781-6240
Wash	Seattle, Blum & Assocs.	206-285-2590
EXP:	N.Y., NY, A. Auriema	212-466-2500
FOR:	Can., Hamilton, Ont., Cartwright Southall Assoc.	416-528-0294
FOR:	Can., Montreal, Que., McIntyre Agencies	514-731-9617

Local Distributors

Ala	Huntsville, Cramer/Ew Huntsville, 2310 Bob Wallace Ave., S.W.	205-539-5722
Ala	Huntsville, Hall-Mark Elctrns., 4739 Commonwealth Ave.	205-837-8700
Ariz	Phoenix, Cramer/Arizona, 2816 No. 16th St.	602-263-1112
Ariz	Phoenix, Kierulff Elctrns., 2633 E. Buckeye Rd.	602-273-7331
Ariz	Phoenix, R.V. Weatherford, 1917 North 25th Dr.	602-272-7144
Cal	Anaheim, R.V. Weatherford, 1550 Babbit	714-547-0891
Cal	Glendale, R.V. Weatherford, 6921 San Fernando Rd.	213-849-3451
Cal	Irvine, Cramer/Los Angeles, 17201 Daimler St.	213-771-8300
Cal	Los Angeles, Kierulff Elctrns., 2585 Commerce Way	213-685-5511
Cal	Palo Alto, Kierulff Elctrns., 3969 E. Bayshore Rd.	415-968-6292
Cal	Palo Alto, R.V. Weatherford, 3240 Hillview Ave.	415-321-5373
Cal	Pomona, R.V. Weatherford, 1095 E. Third St.	714-623-1261
Cal	San Diego, Cramer/San Diego, 8975 Complex Dr.	714-565-1881
Cal	San Diego, Kierulff Elctrns., 8797 Balboa Blvd.	714-278-2112
Cal	San Diego, R.V. Weatherford, 7842 Raytheon Rd.	714-278-7400
Cal	Sunnyvale, Cramer/San Francisco, 720 Palomar Ave.	408-739-3011
Colo	Denver, Cramer/Denver, 5465 E. Evans Pl.	303-758-2100
Colo	Denver, Kierulff Elctrns., 10980 E. 47th Ave.	303-343-7090
Colo	Englewood, R.V. Weatherford, 3905 So. Mariposa	303-761-5432
Conn	North Haven, Cramer/Connecticut, 35 Dodge Ave.	203-239-5641
Fla	Hollywood, Cramer/Ew Hollywood, 4035 No. 29th Ave.	305-923-8181
Fla	Orlando, Cramer/Ew Orlando, 345 N. Graham Ave.	305-894-1511
Fla	Orlando, Hall-Mark Elctrns., 7233 Lake Ellenor Dr.	305-855-4020
Ga	Atlanta, Cramer/Ew Atlanta, 3923 Oakcliff Industrial Ct.	404-448-9050
Ill	Mt. Prospect, Cramer/Chicago, 1911 So. Busse Rd.	312-593-8230
Kans	Lenexa, Hall-Mark Elctrns., 9006 Rose Hill Rd.	913-888-4747
Md	Gaithersburg, Cramer/Ew Washington, 16021 Industrial Dr.	301-948-0110
Md	Gaithersburg, Kierulff Elctrns., 16021 Industrial Dr.	301-948-0250
Md	Hanover, Cramer/Ew Baltimore, 7255 Standard Dr.	301-796-5790
Mass	Needham Heights, Kierulff Elctrns., 14 Charles St.	617-449-3600
Mass	Newton, Cramer Elctrns., 85 Wells Ave.	617-969-7700
Mich	Farmington, Harvey-Michigan, 23461 Industrial Park Dr.	313-477-1650

Mich Livonia, Cramer/Detroit, 13193 Wayne Rd. 313-425-7000
Minn Edina, Cramer/Minnesota, 7275 Bush Lake Rd. 612-835-7811
Mo Earth City, Hall-Mark Elctrns., 13789 Rider Trail 314-291-5350
For: Can., Willowdale, Ont. M2H3B3, Electro Sonic Industrial Sales, 1110 Gordon Baker Rd. 416-494-1660
NJ Cherry Hill, Cramer/Pennsylvania, Cherry Hill Ind'l. Site, Springdale Rd. 609-424-5993
NJ Cherry Hill, Cramer/Pennsylvania, Springdale Rd., Cherry Hill Ind'l. Site 609-424-5993
NJ Moonachie, Cramer/New Jersey, 1 Barrett Rd. 201-935-5600
NJ Pennsauken, Resco Elctrns., Airport Ind'l. Pk., Airport & Central Highways 609-662-4000
NJ Rutherford, Kierulff Elctrns., Industrial Dr. 201-935-2120
NJ Saddlebrook, Arrow Elctrns., 285 Midland Ave. 201-797-5800
NM Alberquerque, Cramer/New Mexico, 137 Vermont N.E. 505-265-5767
NM Alberquerque, R.V. Weatherford, 6101 Marble, N.E. 505-265-5671
NY East Syracuse, Cramer/Syracuse, 6716 Joy Rd. 315-437-6671
NY Endwell, Cramer/Binghamton, 322 Watson Blvd. 607-754-6661
NY Farmingdale, Arrow Elctrns., 900 Broad Hollow Rd. 516-694-6800
NY Hauppauge, Cramer/Long Island, 29 Oser Ave. 516-231-5600
NY Hicksville, Kierulff Elctrns., 49 Bethpage Rd. 516-433-5530
NY Rochester, Cramer/Rochester, 3000 Winton Rd. South 716-275-0300
NC Raleigh, Hall-Mark Elctrns., 3000 Industrial Dr. 919-832-4465
NC Winston-Salem, Cramer/Ew Winston-Salem, 938 Burke St. 919-725-8711
Ohio Cincinnati, Cramer/Tri-State, 666 Redna Ter. 513-771-6441
Ohio Cleveland, Cramer/Cleveland, 5835 Harper Rd. 216-248-8400
Okla Tulsa, Hall-Mark Elctrns., 7489 E. 46th Pl. So. Box 45 918-835-8458
Tex Dallas, Cramer/Dallas, 13740 Midway Rd. 214-350-1355
Tex Dallas, Hall-Mark Elctrns., 9333 Forrest La. 214-231-6111
Tex Dallas, R.V. Weatherford, 10836 Grisson La. 214-243-1571
Tex Houston, Hall-Mark Elctrns., 8000 Westglen 713-781-6100
Tex Houston, R.V. Weatherford, 3500 West T.C. Jester Blvd. 713-688-7406
Utah Salt Lake City, Cramer/Utah, 391 W. 2500 S. 801-487-3681
Wash Seattle, Cramer/Seattle, 5602 6th Ave. S. 206-762-5755
Wash Seattle, Kierulff Elctrns., 5940 Sixth Ave. So. 206-763-1593
Wash Seattle, R.V. Weatherford, 541 Industry Dr. 206-762-4200
Wisc Oak Creek, Cramer/Wisconsin, 430 W. Rawson Ave. 414-764-1700
For: Can., Montreal 357, P.Q., Prelco Elctrns., Ltd., 480 Port Royal St., W. 514-389-8051
For: Can., Montreal, Que., Payette Radio, 730 St. James West 514-866-6681
For: Can., Scarborough MIR3C 3C8, Carsten Elctrns. Ltd., Unit 5-25 Howden Rd. 416-751-5002
For: Can., Vancouver 10, B.C., L.A. Varah, 2077 Alberta St. 604-873-3211

ROWE INDUSTRIES, INC., 6225 Benore Rd., Toledo, Ohio, 43612, Tel: 419-729-9761, TWX: 810-442-1734; Empl.: 100; Minimum order: $25
p. 2•796-798,2052-2054

For info on price: K. Robinson; Application info: D. C. Richard; Customer service: D. L. Mang; Delivery info: J. Netry

Products manufactured: Antennas, Braid, Cable, Bus Bars & Systems, Cable Assemblies & Harnesses, Cable, Caps, Connector, Chamber, Environmental Test, Chargers, Battery, Circuits, Flexible, Clamps & Clips, Coils Including Assemblies & Forms, Conduit, Electrical, Connector Adapters, Connector Blocks, Mother Board, Connector Boxes & Strips, Power Outlet, Connectors, Contacts, Electrical, Cords, Couplers, Detectors, Electrodes, High-Voltage, Feedthrus & Seals, Environmental, Gaskets, Shielding, R-F-Also See Shields, R-F, Isolators, Jack Adapters (All Types), Jacks (All Types), Kits, Connector, Lead Assemblies & Receptacles, Leads, Test & Adaptors, Plug Adapters, Plug & Jack Sets, Plug Caps & Shells, Plugs, Probes, Services, Assembly, Production & Test, Shields, Socket Adapters, Sockets, Splicers, Coaxial Cable, Splices, wire (Including, Butt & Cap Types), Strain Reliefs, Cable & Wire, Tees, Terminals, Test Equipment, Wire, Wire & Cable Ties, Wire Shielding

Local Sales Offices & Reps.
Ala Huntsville, Rowe Enterprize 205-837-3643
Ariz Scottsdale, Biedler & Assocs. 602-275-5505
Cal Newbury Park, Val C. Robinson 805-529-1331
Cal San Carlos, Westronics 415-592-1417
Cal Thousand Oaks, V. C. Robinson 805-529-1331
Colo Arvada, Winn & Assocs. 303-421-9466
Fla North Palm Beach, E. Furey & Assocs. 305-848-2037
Ill Greenville, Tri "J" Power, Inc. 618-664-1698
Ill Riverside, Mannella & Assocs. 312-447-7724
Md Baltimore, R.A. Wafer Assocs. 301-744-1133
Mass Shrewsbury, Ashworth & Cullen, Inc. 617-844-9688
Mo St. Louis, Repco, Inc. 314-343-9313
NY Binghamton, Canavan-Scanlon Assocs. 607-724-7220
NY Rochester, Canavan-Scanlon Assocs. 716-442-0720
NY Syracuse, Canavan-Scanlon Assocs. 315-437-1271
NC Charlotte, Dula Assocs. 704-334-7090
NC Winston-Salem, Dula Assocs. 919-768-7166
Ohio Beachwood, Richardson-Champ Assocs. 216-292-4954
Ohio Cincinnati, Com-Tek 513-793-3611
Pa Plymouth Meeting, R. Mar Co. 215-825-2841
Tex Dallas, United Comps. 214-324-1448
Wash Seattle, Underwood & Underwood 206-243-2133
FOR: Can., Oakville, Ont., Haltronics, Ltd. 416-844-2121

ROYCE ELECTRONICS CORP., 1142 Clay St., No. Kansas City, Mo., 64116, Tel: 816-842-0252

Customer service: A. Rudsell; Delivery info: P. Kennedy

Products manufactured: Antennas, Batteries, Comm. Systems, Power Supplies, Speakers

Local Sales Offices & Reps.
Cal Los Angeles, Cavanah & Fier 213-483-9760
Cal San Francisco, ARWC 415-653-3838
Colo Denver, Ron Bowen & Assoc. 303-744-2501
Del Chesnut Hills, Divincent & Legato .. 302-731-1475
Fla Pembroke Pines, Joe Wanger Sls. Co. 305-987-8766
Ga Atlanta, Ross & Assoc. 404-548-5568
Ill Chicago, CEMS 312-685-9500
Ind Indianapolis, Lyons & Assoc. 317-352-0475
Mich Detroit, Rod Butchart & Assoc. 313-773-7870
Minn Minneapolis, Terry Ripley & Assoc. 612-881-8282
Mo Kansas City, Vern Kingkade & Assoc. 816-474-5230
Neb Elkhorn, Vern Kingkade & Assoc. ... 402-289-2909
NJ Moorestown, Divincent & Legato Assoc. 609-235-8299
NM Albuquerque, C.T. Carlsburg & Assoc. 505-265-1579
NY N.Y.C., Fisher Sls. 201-837-1200
Ohio Akron, D.F.H. 614-876-7823
Ore Oak Grove, J.B. Sls. Co. 503-654-8617
Pa Pittsburgh, F.P. Yarrusi 412-221-4676
Tex Houston, Buck Rodgers & Assoc. ... 713-626-5370
Utah Salt Lake, Rasmussen & Cavanah ...801-467-6615

RSM SENSITRON SEMICONDUCTOR, DIV. RSM ELECTRON POWER, INC., 221 W. Industry Ct., Deer Park, N.Y., 11729, Tel: 516-586-7600; Empl.: 180; Minimum order: $100 .... p. 1•1852-1855

For info on price: M. M. Dietz; Application info: C. Fischer; Customer service: M. Leischner; Delivery info: M. M. Dietz

Products manufactured: Bridges, Diodes, Rectifiers, Transistors

Local Sales Offices & Reps.
Ariz Scottsdale, Deangelo Rothman Cheever Co. 602-948-2240
Cal Culver City, DeAngelo, Rothman Co. 213-398-6239
Cal Lafayette, Phillips Assocs. 415-284-2579
Fla Casseleberry, EIR Inc. 305-830-9600
Ill Chicago, Brock & Cushman Inc. 312-622-4110
Ind Carmel, Rich Elctrn. Mktg. 317-844-8462
Md Baltimore, Stemler Assocs. 301-944-8262
Mass Waltham, Datcom Inc. 617-891-4600
Minn Minneapolis, S & RSls. 612-544-3022
NM Albuquerque, A.Q. Elctrns. 505-255-8701
NY Burnt Hills, K. Corsetti Sls. 518-399-9200
NY Hempstead, Kahgan Sls. 516-538-2300
Ohio Dayton, Buckeye Comps. 513-278-4279
Tex El Paso, A.G. Elctrns. 915-545-2363
Wash Tukwila, General Elctrns. 206-243-5141
EXP: Can., Montreal, Que., Elpro Elctrns. Ltd. 514-389-8051
FOR: Can., Mississauga, Ont., Elpro Elctrns. Ltd. 416-678-0401
FOR: Can., Ottowa, Ont.
FOR: Can., Ottowa, Ont., Elpro Elctrns. Ltd.

Local Distributors
Ariz Ariz, Sterling Elctrns., Box 20867 602-258-4531
Ariz Scottsdale, Vanguard Supply, 10333 N. Scottsdale Rd. 602-948-2240
Cal Gardena, Bell Inds., 306 E. Alondra 213-321-5802
Cal Sepulveda, Milgray Elctrns., 8718 Woodley Ave. 213-894-4011
Cal Sunnyvale, Bell Inds., 1161 North Fairoaks Ave. 408-734-8570
Cal Sunnyvale, Intermark Elctrns., 1020 Stewart Dr. 408-738-1111
Cal Sunnyvale, Westland Elctrns., 1118 Elko Dr. 408-734-1900
Cal Woodland Hills, Semiconductor Concepts, 21201 Oxnard St. 213-884-4560
Fla Miami, All American Transistor, 120 N.E. 79th St. 305-754-5531
Fla Pompano Beach, Zeus Comps., 1470 S.W. 12th Ave. 305-942-4312
Md Baltimore, Technico Inc., 1404 Bare Hills Ave. 301-828-6416
Mass Burlington, Zeus Comps., 32 Winn St. 617-273-0750
Mass Framingham, Future Elctrns., 225 Worcester Rd. 800-225-0380
Mass Natick, Lafayette Industrial Elctrns., 1400 Worcester 617-879-6300
Mich Farmington, Diplomatic Northland Elctrns., 32708 W. Eight Mile Rd. 313-477-3200
Minn Minneapolis, Diplomat/Electro Com Corp., 3816 Chandler Drive 612-788-8601
NM Albuquerque, Sterling Elctrns., 3530 Pan American Fwy. N.E. 505-345-6601
NY Buffalo, Summit Distrs., 96 Main St. 716-884-3450
NY Elmsford, Zeus Comps., 175 Clearbrook Co. 914-592-4120
NY Farmingdale, Arrow Elctrns., 900 Broad Hollow Rd. 516-694-6800
NY Forest Hills, Nasco, 9908 Metropolitan Ave. 212-793-6500
NY Freeport, Milgray Elctrns., 191 Hanse Ave. 516-546-6000
NY Hauppauge, Semiconductor Concepts, Engineers Rd. 516-273-1234
NY Hauppauge, Time Elctrns., 70 Marcus Blvd. 516-273-0100
NY New Hyde Park, Lafayette Ind'l. Elctrns., 1327 - 2nd Ave. 516-488-6600
NY Plainview, A.C.I. Elctrns. Corp., 28 South Mall 516-293-6630
NY Rochester, Summit Distrs., 292 Commerce Dr. 716-334-8110
Ohio Dayton, Esco, Inc., 221 Crane st. 513-226-1133
Ore Eugene, United Radio Supply, 974 W. Sixth Ave. 503-342-3381
Ore Portland, United Radio Supply, 123 N.E. Seventh Ave. 503-233-7151
Pa Philadelphia, Almo Elctrns., Roosevelt Blvd. & Blue Grass Rd. 215-676-6000
Tex Dallas, Component Specialties, 2560 Electronic La. 214-357-4576
Tex Houston, Component Specialties, 7315 Ashcroft 713-771-7237
Tex Houston, Sterling Elctrns., Box 1229
Wash Seattle, Radar Elec., 168 Western Ave. W. 206-282-2511
Wash Seattle, Zepher Elctrns., 647 Industry Ave. 206-242-2517

RTRON CORP., 7324 Lawndale, Skokie, Ill., 60076, Tel: 312-679-7180; FSC No: 19130; Minimum order: $25

Customer service: N. Williams

Free literature available: Catalogs on RFI Filters, U.L. Recognized for Data Processing, and MIL Spec. Types.

Products manufactured: Capacitors, Fixed, Coils Including Assemblies & Forms, Filters, Networks, Suppressors

Local Sales Offices & Reps.

Cal	Costa Mesa, Component Sls.	714-557-3040
Cal	Los Altos, Horne Assoc.	415-948-0788
Cal	San Diego, SR Elctrns.	714-565-8411
Fla	Lighthouse Point, Saber Assoc.	305-943-3076
Ill	Chicago, Rinaldi Inc.	312-763-4848
Mass	Dover, Charles Ferris Co.	617-785-1771
Minn	St. Paul, Cahill Assoc.	612-739-8445
NJ	Plainfield, S. Glassman Assoc.	201-561-3866
NY	E. Rochester, Douglas Taylor	716-385-1630
NY	Glen Cove, S. Glassman Assoc.	516-676-1039
Ohio	Cleveland, Component/Insulation Corp.	216-521-3570
Pa	Jenkintown, Arnold Assoc.	215-PI 2-0600
Tex	Garland, Whiteside Sls.	214-231-9771
Va	Annandale, J. Hopkins Assoc.	703-323-1641

RUSSCO ELECTRONICS MFG. INC., 1070 Brookhaven Dr., Clovis, Cal., 93612, Tel: 209-299-2167

For info on price: S. Watts; Application info: R. Friend; Customer service: S. Watts; Delivery info: R. Najarian or Russ Friend

Free literature available: Studio Pro or Cuemaste Broadcast Turntables Model 505 Monaural Console Model 505-S Stereo Console Model MM-260 - Stereo 60 Watt Amplifier Model MA-225 - Stereo 25 Watt Amplifier

Products manufactured: Amplifiers, Mixers, Phonographs, Parts & Accessories, Speaker Systems

RUSSELL INDS., INC., 96 Station Plaza, Lynbrook, N.Y., 11563, Tel: 516-887-9000

Products manufactured: Foil, Kits, Shielding, Shields, Tapes, Electrical Insulation

RUSTRAK INSTR. DIV., See Gulton Inds., M.C.S. Div.

RUTHERFORD RESEARCH PRODS. CO., Box 162, Rutherford, N.J., 07070, Tel: 201-933-2091; Empl.: 25

Customer service: Dr. A. Blanck

Free literature available: Catalogs: Technology of Rutherford Research Plastics & Electrical Insulation Failure Analysis - Product Evaluation - Redesign.

Products manufactured: Bridges, Calibrators, Capacitors, Fixed, Coils Including Assemblies & Forms, Meters, Probes, Services, Assembly, Production & Test, Testers, Wire Twisters

RYCOM INSTRUMENTS, 9351 E. 59th St., Raytown, Mo., 64133, Tel: 816-353-2100; FSC No: 14410; Empl.: 40; Minimum order: $10

For info on price: H. Aggeler; Application info: R. Cooper; Customer service: G. Craven; Delivery info: K. Boone

Free literature available: Complete product line of test instruments for telephone, power, utilities and communications users, carrier (FDM) "T"-carrier, transmission and line analyzers, cable fault locators.

Products manufactured: Analyzers, Cable Fault Locators, Counters, Meters, Testers, Totalizers, Digital, Transmission Systems, Data

Local Sales Offices & Reps.

Cal	Oakland, Dolphin Engrg.	415-451-8262
Cal	Santa Fe Sprgs., Kennedy Engrg.	213-868-9965
Colo	Lakewood, Claredon	303-238-4462
DC	Washington, Instrucom	202-223-1759
Fla	St. Petersburg, Souder (Comtech)	813-527-3281
Ill	Chicago, Kay Sls.	312-397-1200
Mo	Cameron, Comm Sys. Assoc.	816-632-7616
Tex	Richardson, Horizon Engr.	214-238-9121
Wash	Seattle, Reeves Supply	206-789-1234

RYE INDS., INC., 125 Spencer Pl., Mamaroneck, N.Y., 10543, Tel: 914-698-0080; Empl.: 50

Products manufactured: Boxes, Junction, Outlets & Wall Plates, Cable, Caps, Connector, Clamps & Clips, Connector Adapters, Connectors, Cords, Couplers, Handsets, Chestsets, Headphones, Headsets, Etc., Jack Adapters (All Types), Jacks (All Types), Microphones, All Kinds, Pickups, Telephone (For Recording), Plug Adapters, Plug & Jack Sets, Plug Caps & Shells, Plugs, Posts, Probes, Services, Assembly, Production & Test, Socket Adapters, Sockets, Switches, Tape Recording Accessories, Tapes, Electrical Insulation, Transducers, Transformers, Tubing, Wire

Local Sales Offices & Reps.

Cal	Los Angeles, Marshank	213-938-2591
Colo	Colorado Springs, Norris	303-685-9319
Ga	Marietta, Clymer Entprs.	404-971-2831
Haw	Honolulu, Av-Tronic Sls.	
Ill	Chicago, W.J. Doyle	
Kans	Overland Pk., Penzner	913-DU 1-0004
Mass	Cohasset, Montague	617-383-0634
Ore	Portland, Van Voorhees	503-287-6633
Pa	Havertown, J. Mustico	215-HI 6-1961
Tex	Addison, Campion Sls.	214-239-9196

S & A ELECTRONICS, Div. Scott & Fetzer Co., 202 W. Florence, Toledo, Ohio, 43605, Tel: 419-693-0528; Empl.: 100

For info on price: M. Gregg; Application info: M. Gregg; Customer service: M. Gregg; Delivery info: Order Desk

Free literature available: General Line Catalogue on request.

Products manufactured: Antenna Towers & Supports, Antennas, Arresters, Electrical Surge, Lightning, Couplers, Insulators & Insulation, Transformers

S & EI MFG., Box 832, Northridge, Cal., 91324, Tel: 213-349-4111, TWX: 910-493-1252; Empl.: 85

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Products manufactured: Capacitors, Fixed

Local Sales Offices & Reps.

Ariz	Phoenix, MR Engrg. Sls. Co.	602-959-5150
Cal	San Diego, Circolia Elctrn. Sls.	714-747-3015
Ill	Chicago, Ropek-Cahill Inc.	312-287-7292
Mass	Needham, Hatch Assocs.	617-444-3310
Minn	Minneapolis, Technical Assocs.	612-929-6721
NJ	Cherry Hill, Danco Corp.	609-627-2218
NY	Hempstead, Kahgan Sls.	516-538-2300
Ohio	Dayton, Berberich & Assocs.	513-252-9981
FOR:	Can., Montreal, Que., Speciality Elctrns. Ltd.	514-336-4500

SAFEWAY PRODUCTS, 440 Middlefield St., Middlefield, Conn., 06455, Tel: 203-346-6601; Empl.: 130

For info on price: C. M. Slade; Application info: C. M. Slade; Customer service: H. Groepper; Delivery info: C. M. Slade

Free literature available: "SAFEWAY HEAT ELEMENTS"-16 page illustrated brochure provides guidelines for designing heat elements into your OEM product; reference data on materials available and their thermal conductivity. "ETCHED FOIL ELEMENTS"-8 page illustrated brochure describes resistive and conductive circuitry, examples, design considerations, and engineering data and specifications.

Products manufactured: Heaters & Heating Elements

SAFT AMERICA INC., 212 Durham Ave., Metuchen, N.J., 08840, Tel: 201-548-2800, TWX: 710-998-0528; Empl.: 270; Minimum order: $100

For info on price: P. L. Mendelsohn; Application info: C. E. Hopper; Customer service: S. Greco; Delivery info: S. Greco

Free literature available: Brochure "Sealed Rechargeable Nickel-Cadmium Cells VR Series" - Describes the sealed cylindrical type cells including performance and standard battery assembly manufactured by SAFT.

Products manufactured: Batteries

Local Sales Offices & Reps.

Cal	Torrance, T. Pierce	213-378-3623
Tex	Fort Worth, J. B. Schusler	817-237-4620

SAMARIUS, INC., 300 Seymour Ave., Derby, Conn., 06418, Tel: 203-735-7405, TWX: 710-451-2495; FSC No: 5905; Empl.: 50

Customer service: R. C. Heitz

Products manufactured: Potentiometers, Resistors

Local Sales Offices & Reps.

Cal	Los Angeles, Halbar Assocs.	213-387-8283
Cal	San Mateo, Halbar Assocs.	415-349-4700
Md	Silver Spring, Globe	301-587-0060
Mo	St. Louis, Boweng	314-429-7327
Pa	Media, W. Reeves	215-566-6709

SAMS, HOWARD W. & CO., 4300 W. 62nd. St., Indianapolis, Ind., 46268, Tel: 317-291-3100

Products manufactured: Technical Books

Local Sales Offices & Reps.

Cal	Burlingame, Elvey-Proctor Co.	415-347-2994
Cal	Gardena, Bidwell Sls. Assocs.	213-770-0300
Colo	Denver, Bowen & Assocs.	303-744-2501
Fla	Orlando, Cartwright & Bean	305-422-4531
Fla	Plantation, Cartwright & Bean	404-237-2273
Ga	Atlanta, Cartwright & Bean	404-237-2273
Ill	Chicago, B. Burns & Assocs.	312-775-1233
Ind	Indianapolis, R. Milsk Co.	317-546-5468
Kans	Overland Park, T. L. Dowell & Assocs.	913-649-6069
La	Chalamette, Cartwright & Bean	504-279-4598
Md	Silver Springs, Lowery Assocs.	301-439-3542
Mass	Needham, Mullin Techn. Sls.	617-444-4780
Mich	Southfield, R. Milsk Co.	313-354-3310
Minn	Minneapolis, D. Borrett & Co.	612-929-0028
Miss	Jackson, Cartwright & Bean	601-981-1368
Mo	St. Louis, Kathrinus, Kelly, & Co.	314-968-3800
NJ	South Orange, S. Simberkoff Assoc.	201-763-7900
NM	Albuquerque, C.T. Carlberg & Assoc.	505-265-1579
NY	Lockport, Simberkoff Sls., Inc.	716-434-4426
NC	Charlotte, Cartwright & Bean	704-537-7965
NC	Raleigh, Cartwright & Bean	919-832-7128
Ohio	Columbus, C. L. Pugh Co.	614-486-9678
Ore	Portland, J.V. Belusko Co.	503-222-4279
Pa	Broomall, Lowery Assocs.	215-528-5170
Pa	Harrisburg, Lowery Assocs.	717-233-0917
Tenn	Memphis, Cartwright & Bean	901-276-4442
Tex	Dallas, Lund & Co.	214-358-4335

SAN FERNANDO ELEC. MFG., 1501 1st St., San Fernando, Cal., 91341, Tel: 213-365-9411, TWX: 910-496-1535; Empl.: 1000; Minimum order: $25

Products manufactured: Capacitors, Fixed, Coils Including Assemblies & Forms, Filters

Local Sales Offices & Reps.

Ariz	Tucson, West-Cap Arizona	602-294-2646
Cal	Sunnyvale, Ruby Sales Co. II	408-739-5333
Conn	Stratford, G. Rosen Co.	203-375-5456
Fla	Clearwater, Perrott Assocs.	813-531-7483
Fla	Orlando, Perrott Assocs.	305-275-1132
Ill	Chicago, Ellinger Sls. Corp.	312-763-1570
Md	Glen Burnie, Micro-Comp	301-761-4600
Mass	Framingham, G. Rosen Co.	617-879-5505
Mich	Orchard Lake, Ellinger Sls. Corp.	313-626-1170
Minn	St. Paul, Smith Engrg. Assoc.	612-646-4851
NJ	Haddenfield, TAI Assocs.	609-854-3011
NY	Chester, San Fernando Elec. Mfg.	914-469-9620
Tex	Dallas, San Fernando Elec. Mfg.	214-521-3662
Wash	Seattle, Blair Hirsh Co.	206-783-3423
FOR:	Can., Toronto, Ont., Karl Atkinson - San Fernando Elec. Mfg.	416-364-3644

SANDERS ASSOCS. INC., Corp. Hdqts., Daniel Webster Hwy., Nashua, NH, 03060, Tel: 603-885-4321

SANDERS ASSOCIATES, Defensive Systems Div., 95 Chanel St., Nashua, N.H., 03060, Tel: 603-885-3010

Customer service: P. F. Murphy

Free literature available: Sanders manufacturers LEAD SULFIDE (PbS) and SILICON (Si) photoconductive DETECTORS for optical radiation from the infrared to visible to ultraviolet region. These detectors are tailored to the customers specifications, including MIL specs.Sanders also offers custom, high performance, special wavelength lasers.

Products manufactured: Cells, Photoconductive, Photoemissive, Photovoltaic, Detectors, Lasers & Laser Systems

SANDERS ASSOCIATES, Federal Systems Grp., 95 Canal St., Nashua, N.H., 03060, Tel: 603-885-6660, TWX: 710-228-1894; FSC No: 94117; Empl.: 6000

Customer service: Mktg. Dept.

Products manufactured: Analyzers, Antenna Feed Systems, Antenna Switching Matrices, Antennas, Computers, Detectors, Filters, Lasers & Laser Systems, Modulator/Demodulators, Radar Systems, Receivers, Services, Assembly, Production & Test, Underwater Communication, Detection, Navigation, etc. Equipment

Local Sales Offices & Reps.

Ala	Huntsville, Sanders Assoc.	205-881-1940
Cal	Los Angeles, Sanders Assoc.	213-641-2251
NY	Rome, Sanders Assoc.	315-337-6660
Ohio	Dayton, Sanders Assoc.	513-254-6289
Va	Crystal City, Sanders Assoc.	703-920-5204

SANDERS ASSOCIATES, Instrument & Hydraulics Div., Grenier Field, Manchester, N.H., 03103, Tel: 603-669-4615, TWX: 710-220-1845; Empl.: 200

Customer service: G. Shomphe Ext. 424

Products manufactured: Accelerometers, Blowers & Fans & Accessories, Comparators, Gyros (All Types)

SANDERS ASSOCIATES, Microwave Div., Grenier Field, Manchester, N.H., 03103, Tel: 603-669-4615, TWX: 710-220-1845

SANDERS ASSOCIATES, Products Div.-Modens, 95 Canal St., Nashua, N.H., 03060, Tel: 603-885-2744, TWX: 710-228-1894; Empl.: 6000

Customer service: James J. Shea

Free literature available: BROCHURES - Modem Cards, Modem Packs, Modem 101 Tester Modem Card Literature & Various Types of Full Duplexes.

Products manufactured: Modulator/Demodulators

Local Sales Offices & Reps.

Ala	Huntsville, W.A. Brown	205-539-4411
Cal	Los Alamitos, Scientific Devices	213-598-7678
Fla	Orlando, W.A. Brown	305-425-5505
Ga	Atlanta, W.A. Brown	404-939-1674
Ill	Elk Grove Village, L. Green Assoc.	312-593-0282
Ind	Indianapolis, L. Green Assoc.	317-293-9827
Kans	Prairie Village, Engineering Serv.	913-649-4000
La	Gretna, W.A. Brown	504-366-5766
Mo	St. Louis, Eng. Services	314-997-1515
NY	Elmont, Crane & Egert	516-488-2100
NY	Syracuse, Labtronics, Inc.	315-454-9314
NC	Res. Tri. Park, W.A. Brown	919-489-1546
Ohio	Dayton, LI/Corp	513-434-6367
Pa	King of Prussia, RivCo	215-265-5211
Tenn	Knoxville, W.A. Brown	615-584-2614
Tex	Richardson, Data Applns.	214-231-4846
Va	Springfield, Sci. Devices	703-451-6500
Wash	Bellevue, Sci. Devices	206-454-0900

SANDERS ASSOCIATES, Products Div. - Spectrum Analyzer, 95 Canal St., Nashua, NH, 03060, Tel: 603-885-5400, TWX: 710-228-1894; Empl.: 6000

Customer service: F. A. Bellucci

Free literature available: Brochure - Sanders Model SA-240, Real-Time Digital Spectrum Analy. Options - 2401: Computer Output; 2402: Computer Input; 2403: Averaging; 2404: 12-bit Input; 2405: Dual Memory/I&Q; 2407: Phase/I&Q.

Products manufactured: Analyzers

Local Sales Offices & Reps.

Ala	Huntsville, W. A. Brown Inc.	205-539-4411
Cal	Los Alamitos, Scien. Device	213-598-7678
Conn	Hamden, Pat Jenks	203-281-0810
Fla	Orlando, W. A. Brown Inc.	305-425-5505
Ga	Atlanta, W. A. Brown Inc.	404-939-1674
Ill.	Elk Grove Village, Loren Green Assoc.	312-593-0282
Ind	Indianapolis, Loren Green Assoc.	317-293-9827
La	Gretna, W. A. Brown Inc.	504-366-5766
Md	Rockville, Mesa	301-881-8430
Mass	Wakefield, Pat Jenks Assoc.	617-246-1590
Minn	Minneapolis, Loren Green Assoc.	612-781-1611
Mo	St. Louis, Eng. Serv. Comp.	314-997-1515
NJ	Cinnaminson, Mesa Inc.	609-786-0284
NY	Syracuse, Labtronics	315-454-9314
NC	Res. Tri. Park, W. A. Brown Inc.	919-489-1546
Ohio	Cleveland, Electro	
Okla	Norman, Data Mktg. Assoc.	405-364-8320
Tenn	Knoxville, W. A. Brown Inc.	615-584-2614
Tex	Dallas, Data Mktg. Assoc.	214-661-0300

SANDERS DATA SYSTEMS, Daniel Webster Hwy., Nashua, N.H., 03060, Tel: 603-885-2222; Empl.: 5500

Products manufactured: Computers, Control Systems, Air Traffic, Converters, Data Acquisition & Reduction Systems, Data Compressors, Digital, Digitizers, Pencil Follower (Inc. Coordinate & Graphic), Disc Packs, Magnetic, Display Devices/Displays, Recorders, Yokes

SANFORD-MILLER CORP., 89 Throop Ave., Brooklyn, N.Y., 11206, Tel: 212-EV7-0600; Empl.: 10; Minimum order: $15 p. 1•1863

For info on price: A. Scheer; Application info: E. Rodd; Customer service: M. Nemeth; Delivery info: M. Nemeth

Free literature available: Catalog and Price List, Elevator Control Rectifier List, Catalog encompasses selenium & silicon rectifiers, transformers, chokes, power supplies and Inverters.

Products manufactured: Bridges, Capacitors, Fixed, Chargers, Battery, Chokes, Converters, Diodes, Electroplating Equipment & Supplies, Eliminators, Battery, Kits, Power Supply, Power Drivers, Hybrid (High Current, High Voltage), Power Supplies, Protectors, Rectifiers, Suppressors, Transformers

Local Sales Offices & Reps.

Cal	Lynwood, Dick West & Assoc.	213-636-6124

Local Distributors

Ala	Huntsville, Mock Elctrns., 2310 Memorial Pkwy. S.	
Ark	Little Rock, Carlton-Bates Co., 69 & Scott Hamilton Dr.	501-375-2383
Cal	San Francisco, Dahl-Beck Elctrns., 580 Howard St.	
Conn	Waterbury, Bond Radio Elctrns., 439 W. Main St.	203-753-1184
Fla	Orlando, Hammond Elctrns., 911 W. Central Ave.	
Ga	Atlanta, Specialty Dist. Co., 764 Jumper St., N.E.	
Ind	So. Bend, Radio Dist. Co., 1212 High St.	219-287-2911
Ky	Louisville, P.I. Burks Co., 842 So. 7 St.	502-589-3960
La	New Orleans, Southern Radio Supply, 1909 Tulane Ave.	
Md	Rockville, Capital Radio Wholesalers, 12227 Wilkins Ave.	301-881-2270
Mass	Worcester, Radio Maintenance, 80 Thomas St.	
Mich	Benton Harbor, Benton Harbor Elctrns., 922 Woodward Ave. S.	616-WA5-0069
Minn	Duluth, Northwest Radio, 123 E. 1 St.	218-727-1565
Miss	Jackson, Ellington Elctrn. Supply, 1425 Terry Rd.	601-355-0561
Mo	Joplin, Four State Radio, 402 Wall St.	
Neb	Omaha, Radio Equipt. Co., 625 N. 18 St.	
NC	Greenboro, Hammond Elctrns., 2923 Pacific Ave.	919-275-6391
Ohio	Lima, Lima Radio Parts, 600 N. Main St.	419-223-5075
Okla	Tulsa, Radio Inc., 1000 S. Main St.	
Pa	Reading, Barbey Elctrns., 333 N. 4 St.	215-376-7451
Pa	West Chester, West Chester Elctrns., 716 E. Market St.	215-923-1520
SC	Greenville, Sawyer Elctrns., 1210 Poinsett Hwy.	803-CE5-0438
Tenn	Nashville, Electra Distrib Co., 1914 West End Ave.	
Tex	El Paso, Medland Specialty Co., 2235 Wyoming Ave.	915-533-3555
Va	Richmond, Meridian Elctrns., 1001 W. Broad St.	703-355-0669

SANGAMO ELEC. CO., Capacitor Div., Box 128, Pickens, S.C., 29671, Tel: 803-878-6311, TWX: 810-397-2496 p. 2•236,237

Products manufactured: Capacitors, Fixed

Local Sales Offices & Reps.

Ariz	Scottsdale, P. Murphy & Assoc.	602-946-2457
Cal	Newberry Park, Astralonics	805-498-2183
Cal	Placentia, El-Kap	714-528-3750
Cal	Redwood City, Sangamo	415-364-5066
Cal	San Diego, Celtec Co.	714-279-7961
Cal	San Leandro, Quadrep East	415-352-5942
Cal	Summerland, Astralonics	805-969-1711
Colo	Denver, Parker-Webster	303-770-1972
Fla	Clearwater, Dyne-A-Mark	813-441-4702
Fla	Ft. Lauderdale, Dyne-A-Mark Corp.	305-771-6501
Fla	Orlando, Dyne-A-Mark	305-299-6303
Ill	Palatine, Sangamo	312-359-6080
Kans	Shawnee Mission, K & M Sls. & AAssoc.	913-262-1444
Md	Randallstown, Beacon North	301-922-1248
Mass	Braintree, Sangamo	617-848-0532
Mich	Farmington, W.R. Hummon & Assoc.	313-474-0661
Minn	Mpls., S. Clothier	612-888-4666
Mo	St. Louis, K & M Sls. & Assoc.	314-423-2420
NM	Albuquerque, A-Q Elctrns.	505-255-8701
NY	DeWitt, Sangamo Elec. Co.	315-446-2299
NY	Elmont, F. E. Schmitt	516-437-8150
NY	Ontario Center, Kehoe Comp. Sls.	315-524-2491
Ohio	Rocky River, Sangamo	216-331-5222
Okla	Tulsa, T.J. Ray Co.	918-627-1515
Ore	Portland, C.K. Shanks & Assocs.	503-292-5656
Pa	Ft. Washington, G. C. M., Inc.	215-646-7535
SC	Pickens, Sangamo Elec. Co.	803-878-6311
Tex	Dallas, Ammon & Rizos Co.	214-233-5391
Tex	El Paso, A-Q Elctrns.	915-545-2363
Tex	Houston, Ammon & Rizos Co.	713-781-6240
Utah	Salt Lake City, Parker-Webster Co.	801-486-3737
Va	Falls Church, Beacon North	703-534-1673
Wisc	Wauwatosa, Larsen Assoc.	414-258-0529
FOR:	Can., Hamilton, Ont., Cartwright Southall Assoc.	416-528-0294

SANGAMO ELECTRIC CO., Box 3347, Springfield, Ill., 62714, Tel: 217-544-6411, TWX: 910-242-0533; Empl.: 1600 p. 1•800,801

Customer service: C. Castle

Products manufactured: Comm. Systems, Recorders

Local Sales Offices & Reps.

Cal	El Segundo	213-640-0847
Cal	San Jose	408-371-3110
Conn	Watertown	203-274-8900
DC	Washington	301-652-9272
Ga	Atlanta	404-252-1255
Ill	Springfield	217-544-6411
Md	Suitland	301-839-3117
Mass	Burlington	617-272-2729
Mich	Dearborn	313-562-9100
NM	Albuquerque	505-898-9053
Ohio	Columbus	614-451-5461
Pa	Cornwells Heights	215-757-6100
Tex	Dallas	214-239-6465

SANKEN ELEC. CO., 1-22-8 Nishi-Ikebukuro, Toshima-Ku, Tokyo, Japan

SANTA BARBARA RESCH. CTR., 75 Coromar Dr., Goleta, Cal., 93017, Tel: 805-968-3511, TWX: 213-871-5210; Empl.: 710; Minimum order: $50

Customer service: E. Dawson

Free literature available: SBRC Brochure & Technical Bulletins

Products manufactured: Amplifiers, Cells, Photoconductive, Photoemissive, Photovoltaic, Detectors, Diodes, Heat Exchangers & Systems, Lenses, Optical & Camera, Radiometers, Scanners

SANTA CRUZ ENGRG. INC., 300 Harvey Blvd. W., Santa Cruz, Cal., 95060, Tel: 408-427-3131; Empl.: 10

Customer service: A. Marez

Free literature available: Price List - 1-2 pages of price & del. Tech. Bulletin - SCE 221-I signal generator, 4 pages on Desc. of item

Products manufactured: Amplifiers, Generators, Receivers, Signal Averagers, Testers

SARA SCIENTIFIC CO., P.O. Box 321, San Francisco, Calif., 94101, Tel: 415-421-3172; Empl.: 3; Minimum order: $25

Customer service: S. Fishman

Products manufactured: Cleaners & Solvents, Cleaners, Ultrasonic, Generators, Heat Guns, Production, Lights, Machines/Machinery, Production

SARGENT WELCH SCI. CO., Vacuum Prods. Div., 7300 N. Linder Ave., Skokie, Ill., 60076, Tel: 312-677-0600, TWX: 910-223-4541

Free literature available: Vacuum Products Catalog.

Products manufactured: Analyzers, Baths, Controlled Temperature (Air & Liquid), Carts & Dollies, Instrument & Equipment, Chamber, Environmental Test, Furnaces, Gages, Meters, Ovens, Potentiometers, Pumps, Vacuum, Recorders, Thermistors, Timers, Tubing

Local Sales Offices & Reps.

Ala	Birmingham	205-251-5125
Cal	Anaheim	714-772-3550
Colo	Denver	303-399-8220
Mich	Detroit	313-931-0337
NJ	Springfield	201-376-7050
Ohio	Cincinnati	513-771-3850
Ohio	Cleveland	216-587-3300
Tex	Dallas	214-357-9381

SARKES TARZIAN, INC., Semiconductor Div., 415 No. College Ave., Bloomington, Ind., 47401, Tel: 812-332-1435; Empl.: 500

For info on price: F. Lucas; Application info: R. Muldoon; Customer service: C. Sundt; Delivery info: C. Sundt

Free literature available: Power Semiconductor Devices, 16 page catalog of rectifiers, Diodes, SCRs, rectifier assemblies, up to 250 amp, and 50,000 PIV

Products manufactured: Diodes, Rectifiers, Thyristors (Includes Silicon Controlled Rectifiers)

Local Sales Offices & Reps.

Ala	Huntsville, Murcota	205-539-8476
Ark	El Dorado, D. Bellew Sls. Co.	501-863-8325
Cal	Redwood City, Parks & Pruitt Assocs.	415-364-1640
Cal	San Gabriel, Van Gott & Assocs.	213-285-2148
Colo	Denver, Nelson Co.	303-733-5528
Fla	North Miami, Winfield Elctrn. Sls.	305-945-6544
Ga	Atlanta, Murcota	404-875-2525
Ill	Chicago, Saffro & Assocs.	312-588-0905
Ind	Indianapolis, Marketing Engrs.	317-546-1523
Kans	Leawood, Thunderbird Sls. Co.	913-642-7220
Kans	Wichita, Thunderbird Sls. Co.	316-684-3941
La	Kenner, D. Bellew Sls. Co.	504-729-4550
Mass	Reading, C.E. Godfrey Co.	617-944-2230
Mich	Warren, Dem Elctrn. Sls.	313-755-6660
Minn	Minneapolis, Scott Elctrn. Sls.	612-929-2985
Mo	St. Louis, Thunderbird Sls.	314-567-6488
NJ	S. Orange, S. Simberkoff Sls.	201-763-7900
NY	New York City, S. Simberkoff Sls.	212-943-7023
NC	Burlington, Murcota	919-584-1577
NC	Winston Salem, 919-723-1001	
Ohio	Cleveland, Del Steffen & Assocs.	216-461-8333
Ohio	Dayton, D. Steffen & Assocs.	513-293-3145
Pa	Philadelphia, Professional Svcs. Assocs.	215-722-8222
Tex	Dallas, RM Elctrns.	214-233-0363
Wash	Bellevue, SD-R2 Prods. & Sls.	206-747-9424
FOR:	Can., Downsview, Ont., F. Eakin Ltd.	416-638-0451

SAWYER INDS., 5649 Peck Rd., Arcadia, Cal., 91006, Tel: 213-442-5981, TWX: 910-587-3534; FSC No: 18098; Empl.: 140; Minimum order: $50

Customer service: G. J. Graydon

Products manufactured: Actuators, Chargers, Battery, Controls/Control Eqpt., Converters, Current Sources, Inverters, Motors, Ovens, Power Supplies, Regulators, Standards, Transformers

Local Sales Offices & Reps.

Mass	Newton, Omni-Sys. Sls. Inc.	617-527-3169
NJ	Tenafly, Budd-Tronics, Inc.	201-569-2230
EXP:	Montreal 101, Quebec, Can., Canadian Advanced Production Conslts. Ltd.	

SAXTON PRODS., 215 N. Rte. 303, Congers, N.Y., 10920, Tel: 914-268-6848; Empl.: 230; Minimum order: $100

Customer service: R. Hibshman

Products manufactured: Antennas, Cable, CATV Systems & Equipment, Clamps & Clips, Connectors, Cords, Handsets, Chestsets, Headphones, Headsets, Etc., Jack Adapters (All Types), Jacks (All Types), Lead Assemblies & Receptacles, Microphones, All Kinds, Pickups, Telephone (For Recording), Plug Adapters, Plug & Jack Sets, Speakers, Tees, Wire

Local Sales Offices & Reps.

Cal	Canoga Park, L. Gould	213-463-3123
Cal	Cerritos, Saxton Prod.	213-342-9847
Cal	Millbrae, P. Rush	415-697-4995
Cal	Sherman Oaks, Vantage Sls.	213-789-4921
Cal	Topanga, D. Epstein	213-346-9631
Conn	Hartford, J. Colavecchio	203-522-0596
Ga	Stone Mountain, A. Stayton	404-469-2779
Ill	Chicago, D. Abo	312-327-9642
Ill	Des Plaines, R. Davis	312-298-7689
Md	Greenbelt, M. Needle	301-345-8026
Pa	Philadelphia, L. Feinstein	215-677-6497
Pa	Pittsburgh, S. Schindel	412-366-1481
Tenn	Knoxville, J. Dickens	615-947-8068
Tex	Dallas, D. McMonigle	817-457-2476

SCANBE CANOGA INDUSTRIES, 3445 Fletcher Ave., El Monte, Cal., 91731, Tel: 213-579-2300, TWX: 910-587-3437; Empl.: 200

Customer service: L. Cooper

Free literature available: SHORT FORM CATALOG: General description of product lines indicating overall views and data. DISTRIBUTOR CATALOG: Products sold through national distributor outlets.

Products manufactured: Boards, Plug-In, Boards, Printed Wiring, Universal, Drawers, Sliding, Guides, Circuit Board, Integrated Circuit Packaging Systems, Kits, Printed Circuit, Pullers, Racks, Sockets

Local Sales Offices & Reps.

Ala	Huntsville, 20th Century Mktg.	205-772-9237
Ariz	Phoenix, G.R. McKnight Co.	602-257-8037
Cal	Costa Mesa, Cen-Tec Sls.	714-645-9157
Cal	Menlo Park, G.R. McKnight Co.	415-325-2844
Cal	San Diego, Earl Assocs.	714-278-5441
Colo	Sedalia, Jensen Reps. Co.	303-688-4154
Conn	Cheshire, Coakley, Boyd & Abbett	203-272-2261
Fla	Clearwater, WMM Assocs.	813-447-2533
Ill	Chicago, L-Tec, Inc.	312-286-1500
Kans	Mission, Inland Assocs.	913-362-2366
Md	Ellicott City, Doss Elctrns.	301-465-1336
Mass	Needham, Coakley, Boyd & Abbett	617-444-5470
Mich	St. Clair Shores, J. M. Thorpe	313-779-6363
Minn	Minneapolis, Electro-Serv. Co.	612-827-2907
Mo	Glencoe, Inland Assocs.	314-938-4992
NM	Albuquerque, G.R. McKnight Co.	505-266-6423
NY	DeWitt, Tri-Tech Elctrns., Inc.	315-446-2881
NY	Great Neck, H. J. Krasner	516-487-0690
NC	Winston-Salem, W.A. Brown Comps.	919-725-5384
Ohio	Akron, A. Natalino	216-725-6087
Pa	Feasterville, Professional Svc. Assocs.	15-355-6244
Tex	Dallas, E-Tron Sls.	214-348-4749
Wash	Bellevue, SD-R2 Products & Sls.	206-747-9424
FOR:	Can., Montreal, J. G. Weiss Co., Ltd.	514-489-6887

Local Distributors

Ala	Huntsville, Powell Elctrns., 803 Oster Dr.	205-539-2731
Ariz	Phoenix, Moltronics, 3617 N. 35th St.	602-272-7951
Cal	Burlingame, Rose Elctrns., 846 Stanton Rd.	415-697-0224
Cal	Santa Clara, Moltronics, 337 Mathew	408-244-7600
Cal	So. Gate, Moltronics, 5610 E. Imperial	213-773-6521
Colo	Denver, Elctrn. Parts, 1212 S. Broadway	303-744-1992
Fla	Orlando, Hall-Mark Elctrns., 7233 Lake Ellnor	305-855-4020
Ill	Elk Grove Village, Hall-Mark Elctrns., 180 Crossen	312-437-8800
Md	Beltsville, Treeko Sales, 10739 Tucker St.	301-937-8260
	Woburn, Time Elctrns., 116 Cummings Pk.	617-935-8080
Mass	Waltham, QPL Elctrns., 47 Calvary St.	617-891-0460
Mich	Livonia, Pioneer Std., 13485 Stamford	313-525-1800
Minn	Minneapolis, Ind'l. Comp., 5280 W. 74th St.	612-831-2666
Mo	St. Louis, Olive Elctrns., 6667 Olive St.	314-863-7800
NJ	Roselle, Garden State, 407 Hope	201-241-9000
NY	Bohemia, Car-Lac, 75 Orville Dr.	516-567-4200
NY	Buffalo, Summit Distr., 919 Main St.	716-884-3450
NY	Rochester, Summit Elctrns., 292 Commerce	716-334-8110
Ohio	Cincinnati, Hughes-Peters, 4865 Duck Creek	513-351-2000
Ohio	Columbus, Hughes-Peters, 481 E. 11th Ave.	614-294-5351
Ore	Portland, Almac/Stroum, 8888 SW Canyon	503-292-3534
Pa	Montgomeryville, Pyttronics, Box 433 Stump	215-643-2850
Tex	Dallas, Specialized Prod., 2324 Shore Crest	214-358-4663
Tex	Houston, Hall-Mark Elect., 8000 Westglen	713-781-6100
Wisc	W Allis, Marsh Radio Supply, 6047 W. Beloit	414-545-6500

SCHAEVITZ ENGRG., U.S. 130, Union Ave., Pennsauken, N.J., 08110, Tel: 609-662-8000, TWX: 710-892-0714; Empl.: 190; Minimum order: $25

For info on price: J. Lynch; Application info: R. Anderson; Customer service: R. Gorczyca; Delivery info: J. Lynch

Free literature available: Literature giving performance data, dimensions and application information on transducers (lvdt's) to measure displacement, dimension, pressure, force, acceleration, level and on lvdt signal conditioning.

Products manufactured: Accelerometers, Amplifiers, Calibrators, Cells, Load, Controls/Control Eqpt., Data Acquisition & Reduction Systems, Gages, Indicators, Meters, Signal Conditioners & Equipment, Testers, Transducers

Local Sales Offices & Reps.

Ala	Huntsville, INCOTECH	205-837-6061
Ariz	Phoenix, Measurment Consultants	602-948-8410
Cal	Huntington Beach, S. Kennon Sls.	714-838-1888
Cal	San Carlos, Elctrn. Engrg.	415-593-2189
Colo	Boulder, Meas. Conslt.	303-449-5294
Fla	Orlando, Datarep	305-843-5224
Ill	Northfield, Torkelson Assoc.	312-446-9085
Ind	Indianapolis, Torkelson Assoc.	317-244-7867
La	Metairie, MG Elctrns. & Equip.	504-834-6002
Mass	Needham, Addelco Corp.	617-444-4754
Mich	Farmington, Anderson Elctrns.	313-476-9161
Minn	Mpls., Industra	612-929-6224
Mo	St. Louis, Ozark Elctrn.	314-423-7200
NJ	Cherry Hill, Markey Engrg.	609-667-3809
NM	Albuquerque, Meas. Conslts.	505-265-6471
NY	Rochester, Schuler Engrg.	716-328-2347
NC	Winston-Salem, Radco Co.	919-722-9671
Ohio	Columbus, Meas. Instrs.	614-488-9753
Tenn	Knoxville, Tool Crib, Inc.	615-525-6195
Tex	Dallas, Concept Sales	214-387-1434
Utah	Murray, Meas. Conslt.	801-268-3181
Wash	Bellevue, A. Smith	206-746-6770
FOR:	Can., Weston, Ont., Megatronix Ltd.	416-742-8015

SCHAUER MFG. CORP., 4500 Alpine Ave., Cincinnati, Ohio, 45242, Tel: 513-791-3030, Telex: 21-4576; Empl.: 254; Minimum order: $10

For info on price: R. C. Parsons; Application info: R. C. Parsons; Customer service: C. Waddell; Delivery info: C. Waddell

Free literature available: Catalog #670 concerning Zener Diodes and Silicon Varistors with inserts on application data. Catalogs on our automotive products are form numbers: #2560,2561,2563 and 2564.

Products manufactured: Chargers, Battery, Diodes, Gages, Meters, Power Supplies, Resistors, Testers

Local Sales Offices & Reps.

Cal	Burbank, Lingronics	213-848-8372
Cal	Palto Alto, Ellis Enterprises	415-328-5151
Conn	Meriden, Eagle Assocs.	203-377-1200
Ga	, B-C Elctrn. Sls.	404-436-5169
Ill	Chicago, Ellinger Sls. Corp.	312-763-1570
Mich	Detroit, Rathsburg Assocs.	313-882-1717
Minn	Minneapolis, C.R. Gibb Co.	612-377-1200
Mo	Kansas City, Nevco, Inc.	816-421-1751
NY	Long Island City, D.F. Tobias Co.	212-549-9191
Ohio	Cleveland, John O. Olsen Co.	216-752-5444
Pa	Philadelphia, Kenneth B. Erdman Co.	215-224-1833
Tex	Dallas, J.Y. Schoonmaker Co.	214-357-8481
Wash	Seattle, D. Miller Sls. Co.	206-784-6800

SCHLUMBERGER, See Heath Co.

SCHNEIDER ELECTRONICS, INC., 11 Riverside Ave., Medford, Mass., 02155; Empl.: 3

Products manufactured: Comparators, Counters, Gages, Generators, Meters, Synthesizers

SCHNEIDER INSTR. CO., 8115 Camargo Rd., Cincinnati, Ohio, 45243, Tel: 513-561-6803; Empl.: 17

For info on price: C.A. Schneider; Application info: C.A. Schneider; Customer service: W.C. Tharp; Delivery info: C.A. Schneider

Free literature available: Brochure describing automatic water quality monitors and related telemetering and data logging equipment.

Products manufactured: Comm. Systems, Data Acquisition & Reduction Systems, Data Loggers

Local Sales Offices & Reps.

Ala	Birmingham, Spader & Assocs.	205-879-1366
Ga	Atlanta, Spader & Assocs.	404-296-3024

SCHOTT CORP., 3140 Harbor Lane N., Minneapolis, Minn., 55441, Tel: 612-544-2751, TWX: 910-576-2964; FSC No: 80023; Empl.: 150; Minimum order: $75

For info on price: O. W. Schott; Application info: O. W. Schott; Customer service: P. O. Berendes; Delivery info: P. O. Berendes

Free literature available: Brochure describing types available and capacity to produce custom-made units.

Products manufactured: Chokes, Coils Including Assemblies & Forms, Reactors, Transformers

Local Sales Offices & Reps.

Cal	Bellflower, Royer Assocs.	213-869-2517
Cal	Walnut Creek, Murray Assocs.	415-937-7577
Mass	Needham, Hatch Assocs.	617-444-3310
Minn	Minneapolis, S & R Sls.	612-544-3022
NJ	Springfield, F.F. Sylvester Assocs.	201-376-3324

SCHRACK ELECTRICAL SALES CORP., 1140 Broadway, New York, N.Y., 10001, Tel: 212-683-0790; Empl.: 3; Minimum order: $10 ....p. 1•1808-1813

For info on price: E. Sobin; Application info: H. Siegell; Customer service: P. DeBiasi; Delivery info: H. Siegell

Free literature available: On all products advertised in EEM.

Products manufactured: Covers, Protective (Including Dust), Plugs, Relays, Sockets

Local Sales Offices & Reps.

Cal	Palo Alto, Engrg. Assocs.	415-326-7842
Cal	Sherman Oaks, R.S. Hopkins Co.	213-788-5501
Colo	Littleton, Lange sls. Co.	303-798-1297
Conn	Old Saybrook, M.L. Assocs.	203-388-9718
Fla	Miami, E. Healy	305-961-6640
Ill	Chicago, R.M. Krueger Co.	312-282-8444
Md	Baltimore, D.K. Jones & Assoc.	301-752-0577
Mass	Marlboro, M.L. Assocs.	617-485-6190
Mich	Dearborn, Pitcher Inc.	313-582-5450
Minn	Minneapolis, A.J. Warner Inc.	612-729-7371
NH	East Derry, M.L. Assoc.	603-432-5050
NJ	S. Plainfield, S. Glassman Assocs.	201-561-3866
NY	Glen Cove, S. Glassman Assocs.	516-676-1039
NY	Syracuse, Lenard Co.	315-479-9191
Ohio	Englewood, Ad-El-Tek, Inc.	513-836-8471
Ohio	North Royalton, Ad-El-Tek, Inc.	216-237-4472
Ore	Portland, Pacific Elec. Sls.	503-235-3456
Pa	Ardmore, R.D. Freedman Assocs.	215-649-3679
Tex	Houston, Spectra Sls. Corp.	713-524-7800
Tex	Richardson, Spectra Sls. Corp.	214-234-3600
FOR:	Can., Toronto, Ont., Canector Sls. Ltd.	416-752-1800

SCHURMAN PRODUCTS INC., Weymouth Ind'l Pk., E. Weymouth, Mass., 02189, Tel: 617-337-8701; Empl.: 6

For info on price: G. Holsapple 617-337-8701; Application info: G. Holsapple 617-337-8701; Customer service: R. Cardinal 617-331-3601; Delivery info: R. Cardinal 617-331-3601

Products manufactured: Soldering Accessories

Local Sales Offices & Reps.

Colo	Denver, Connors	303-934-5829
Minn	Minneapolis, D. Swanson & Co.	612-789-5636
NJ	Caldwell, A. Cerf & Co.	201-226-2263
Ohio	Strongsville, J. Finnegan & Co.	216-826-1033
Pa	Warminster, A. Cerf & Co.	215-343-1339
Tex	Arlington, C.W. Cortez & Co.	817-469-8499

SCHWEITZER, PETER J. DIV., Kimberly Clark Corp., Lee, Mass., 01238, Tel: 413-243-1000, TWX: 413-243-2121; Empl.: 750

For info on price: T. W. Steinert; Application info: T. W. Steinert; Customer service: A. Baruzzi; Delivery info: A. Baruzzi

Products manufactured: Films, Foil, Insulators & Insulation, Tapes, Films & Foils, Pressure Sensitive

SCIENTIFIC-ATLANTA, Optima Div., 2166 Mountain Ind'l. Blvd., Tucker, Ga., 30084, Tel: 404-939-6340, TWX: 810-766-3967; Empl.: 100

Customer service: B. Holman

Free literature available: Color brochures and a catalog which includes outline drawings, prices, and complete model information.

Products manufactured: Benches, Consoles, Stools, Tables, Blowers & Fans & Accessories, Cabinets & Accessories, Carts & Dollies, Instrument & Equipment, Cases, Equipment, Instrument, Meter, Chassis, Metal, Covers, Protective (Including Dust), Drawers, Sliding, Enclosures, Module, Plug-In, Frames, Cabinet & Rack, Grilles, Handles For Cabinets, Circuit Boards, Racks, etc., Panels, Racks, Slides, Cabinet & Chassis, Stands, Instruments

Local Sales Offices & Reps.

Ala	Huntsville, Gentry Assocs.	205-536-5306
Ariz	Scottsdale, Barnhill Five	602-947-5745
Cal	Los Altos, Frauman Assocs.	415-941-0660
Cal	Palos Verdes, Edwards Assocs.	213-377-0975
Colo	Denver, Barnhill Five	303-426-0222
Fla	Orlando, Gentry Assocs.	305-894-4401
Ill	Des Plaines, Cozzens & Cudahy	312-298-3600
Ind	Indianapolis, Cozzens & Cudahy	317-244-2456
Md	Bladensburg, Scientific-Atlanta	301-779-1515
Mass	Lexington, Zieco	617-861-8300
Mich	Southfield, Representatives Elctrn. Products	313-354-9066
Minn	Minneapolis, Cozzens & Cudahy	612-884-4336
Mo	St. Louis, Cozzens & Cudahy	314-423-1234
NJ	Leonia, Scientific-Atlanta	201-461-3650
NM	Albuquerque, Barnhill Five	505-293-5956
NC	Burlington, Gentry Assocs.	919-227-3639
Ohio	Cleveland, C.A. Robinson Co.	216-381-9049
Tex	Fort Worth, Carey-Wolf and Assocs.	817-738-1996
Wash	Seattle, S.J.I. Corp.	206-624-9020
FOR:	Can., Burlington, Ont., White Radio Ltd.	416-634-1845

SCIENTIFIC COLUMBUS, 1035 W. 3rd Ave., Columbus, Ohio, 43212, Tel: 614-294-5671; Empl.: 75; Minimum order: $15 .... p. 1•2348,2349

For info on price: W. H. Traetow; Application info: T. Haenszel; Customer service: T. Bowen; Delivery info: T. Bowen

Free literature available: Power transducers-watts, vars, volts, amps, power factor, frequency, isolation, temperature watthour; demand controllers; powertest consules; calibrators

Products manufactured: Alarms, Amplifiers, Controls/Control Eqpt., Converters, Meters, Monitors, Signal Conditioners & Equipment, Testers, Transducers

Local Sales Offices & Reps.

Ala	Birmingham, Spader & Assocs.	205-879-1366
Ariz	Scottsdale, BFA Corp.	602-946-4215
Cal	Glendale, R.A. Young & Co.	213-242-2171
Colo	Denver, Cliff Beabout Co., Inc.	303-831-7259
DC	Fairfax, Va., Hildenbrand Co.	703-280-2330
Fla	Orlando, RJC Assocs.	305-894-7371
Ga	Decatur, Spader & Assocs.	404-296-3024
Haw	Honolulu, Berkley Engrg. & Equip. Co.	808-538-1921
Ill	Park Forest, J.M. Livingston	312-481-9700
Ind	Indianapolis, C.D. Arnold Co.	317-546-4053
Iowa	Cedar Rapids, H.E. Ferris Co.	319-362-9156
Iowa	Des Moines, H.E. Ferris Co.	515-255-5008
La	New Orleans, Mid-South Sls. Co.	504-822-3030
Mass	Needham Heights, G.W. Danek Co.	617-444-8838
Mich	Marquette, NWR Elctrns. Corp.	906-226-7578
Mich	Troy, G.R. Peter Assocs.	313-524-2920
Minn	Edina, NWR Inc.	612-831-6240
Minn	Virginia, NWR Elctrns. Corp.	218-741-5080
Mo	Crestwood, C.B. Fall Co.	314-968-3850
Mo	Kansas City, C.B. Fall Co.	816-942-3912
NJ	Wanamassa, Bradley Corp.	201-922-9111
NM	Albuquerque, BFA Corp.	505-296-8303
NM	Las Cruces, BFA Corp.	505-523-0601
NY	Buffalo, Robert F. Lamb Co.	716-874-4900
NY	Lynbrook, R.A. Keeler	212-895-6890
NY	Rochester, Robert F. Lamb Co.	716-544-5580
NY	Schenectady, R. F. Lamb Co.	518-393-4844
NY	Syracuse, Robert F. Lamb Co.	315-454-2469
NC	Charlotte, R.W. Chapman & Co.	704-525-2421
NC	Raleigh, R.W. Chapman & Co.	919-782-2624
Ohio	Cincinnati, Beedle Equip. Co.	513-793-0140
Ohio	Cleveland, M.A. Blankenburg & Co.	216-526-1100
Ore	Portland, McLaren Inc.	503-297-2248
Pa	Broomall, Bradley Corp.	215-544-8800
Pa	Pittsburgh, R.F. Clark Co.	412-242-9500
SC	W. Columbia, R.W. Chapman & Co.	803-796-9796
Tenn	Knoxville, G.W. Massey Co.	615-577-9553
Tenn	Memphis, R. M. Archibald Co.	901-685-1722
Tex	Dallas, McCoy Assocs.	214-350-9931
Tex	Houston, E. Smith Sls. Co.	713-649-5756
Utah	Salt Lake City, Instrumentation Sls.	801-272-3793
Wash	Bellevue, McLaren, Inc.	206-454-3400
Wisc	Milwaukee, T.R. Bickler Assocs.	414-453-3772
FOR:	Calgary, Alberta, Can., Showalter Agencies, Ltd.	403-269-6411
Cal	San Francisco, Wrathall & Krusi	415-397-3593
FOR:	Don Mills, Ont., Can., R.G. Shelley, Ltd.	416-447-6471
FOR:	New Westminster, B.C., Can., Showalter Agencies, Ltd.	604-524-1434

SCIENTIFIC COMMUNICATIONS, 3425 Kingsley, Garland, Tex., 75041, Tel: 214-271-3685, TWX: 910-860-5172; Empl.: 100 .... p. 1•926,927; p. 2•1391

Products manufactured: Amplifiers, Computers, Generators, Mixer-Preamplifiers, Microwave, Radiometers, Receivers, Switches

Local Sales Offices & Reps.

Cal	Anaheim, Blair Assocs.	714-635-1350
Cal	Los Altos, Stout-Loeswick	415-948-3265
DC	Washington, R. May - Scientific Comms.	301-887-7387
Fla	Ft. Lauderdale, Snow Co.	305-563-2448
Mass	Needham Heights, O'Sullivan & Murphy/Reptron	617-449-4141
Tex	Dallas, Texas Microwave & Elctrns.	214-231-5381
Va	Arlington, Ray May	703-841-0807
Exp:	Rockville, Md., R. F. Int'l.	301-340-1175

SCIENTIFIC MEASUREMENTS, 1319 Dobson, Evanston, Ill., 60202; Tel: 312-864-9295

Customer service: G. F. Comiskey

Products manufactured: Amplifiers, Boards, Printed Wiring, Universal, Cards, Logic, Clocks (All Types), Comparators, Computers, Converters, Cords, Display Devices/Displays, Generators, Kits, Training Aid

SCIENTIFIC MICRO SYS., 520 Clyde St., Mountain View, Cal., 94043, Tel: 415-964-5700, TWX: 910-379-6577; Empl.: 58; Minimum order: $50

For info on price: R. Lanford Ext. 65; Application info: M. Liccaroo Ext. 66; Customer service: J. Berndt Ext. 68; Delivery info: J. Berndt Ext. 68

Free literature available: SMS offers system descriptions, reference manuals, maintenance manuals and application notes on all products.

Products manufactured: Integrated Circuit Devices, Memory Systems

Local Sales Offices & Reps.

Cal	Mountain View	415-964-5200
Ill	Chicago	312-298-0388
Mass	Boston	617-246-2540
Pa	Philadelphia	215-664-5511

SCIENTIFIC RESEARCH CORP., Sub. TRAK Microwave Corp., 4726 E. Eisenhower Blvd., Tampa, Fla., 33614, Tel: 813-884-1411, Telex: 52827; Empl.: 115; Minimum order: $50

Customer service: T. G. Toth

Free literature available: A brochure describing IF amplifiers, crystal controlled oscillators, comb generators, Bite modules, IF amplifier assemblies and special purpose thin-film hybrid circuits.

Products manufactured: Amplifiers, Circuits, Hybrid, Thin-Film, Microwave Integrated Circuits (MIC's), Multipliers, Oscillators

Local Sales Offices & Reps.

Ala	Huntsville, Scientific-Devices Southeast, Inc.	205-536-1969
Cal	Orange, J. E. Hachten Co.	213-860-1317
Cal	Palo Alto, J. E. Hachten Co.	415-326-5594
Colo	Denver, Omega Ltd.	303-758-1508
Fla	Ft. Lauderdale, Scientific Devices Southeast, Inc.	305-721-4260
Fla	Orlando, Scientific Devices Southeast, Inc.	305-841-8180
Mass	Natick, Wayland Engrg. Sls.	617-655-6080
NM	Albuquerque, Premmco, Inc.	505-265-0115
NY	Skaneateles, Robtron	315-685-5731
NY	Tuckahoe, ASCO Elctrns., Inc.	914-779-8110
NC	Burlington, Scientific Devices Southeast, Inc.	919-228-6279
Ohio	Dayton, F. L. Ohmer & Assocs.	513-434-1454
Pa	Lafayette Hill, M. Lader Co.	215-825-3177
Tex	Dallas, Cain & Co.	214-233-6809
Utah	Salt Lake City, Monarch Distributing & Representing Co.	801-226-9617
Va	Woodbridge, M. Lader Co.	703-494-4731
Wash	Seattle, J. B. Jolly, Inc.	206-938-4166
EXP:	Conn., Stamford, Dage Corp.	203-324-3123

SCIENTIFIC TECHNOLOGY, 1201 San Antonio Rd., Mountain View, Cal., 94043, Tel: 415-965-0910, Telex: 34-5506; Empl.: 50; Minimum order: $25

Customer service: D. Persen

Products manufactured: Alarms, Amplifiers, Controls/Control Eqpt., Counters, Detectors, Diodes, Display Devices/Displays, Indicators, Lamps, Lights, Modulators, All Kinds, Scanners, Switches, Transducers

SCIENTIFICO SCIENTIFIC COMPONENTS CO., 350 Vista Baya, Newport Beach, Cal., 92660, Tel: 714-642-2543; Empl.: 5

Products manufactured: Boards, Printed Circuit, Calibrators, Counters, Detectors, Diodes, Flashers, Flashlights & Lanterns, Labels, Pressure-Sensitive, Adhesive, Lamps, Lights, Meters, Power Supplies, References, D-C Voltage, Sockets, Testers, Transformers

SCOTT ELECTRONICS CORP., 2525 Shader Rd., Orlando, Fla., 32804, Tel: 305-295-5850, TWX: 810-850-4127; Empl.: 874; Minimum order: $50

For info on price: A. Egan ext. 153; Application info: A. Renkes ext. 322; Customer service: T. Mowell ext. 132; Delivery info: T. Mowell ext. 132

Products manufactured: Power Supplies

Local Sales Offices & Reps.

Ariz	Scottsdale, Runyon Co.	602-959-6060
Cal	Cupertino, Allis Assocs.	408-379-2883
Cal	Orange, Pacific Microwave, Inc.	714-633-7991
Fla	Seminole, Spartak, Inc.	813-393-5402
Ill	Chicago, Electronic Instr. Assoc.	312-271-3774

Ind	Indianapolis, Electronic Instr. Assoc.	317-257-7231
Md	Towson, J-H Electronic Sls. Co.	301-825-4440
Mass	Stow, Associates, Inc.	617-897-2737
Mich	Ann Arbor, ImTech, Inc.	313-663-0230
Minn	Minneapolis, Scott Electronics Sls., Inc.	612-929-2985
NJ	Irvington, M. Gallagher, Inc.	201-399-4350
NY	Fairport, P. B. Schumacher Assoc.	716-235-6843
Ohio	Cleveland, ImTech, Inc.	216-826-3400
Pa	Berwyn, Tucker Assocs.	215-644-0142
Tex	Dallas, Bouillion Engrg. Sls. Co.	214-376-1929

Advertisment

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SCS CORP., See NEC Micro Systems

SEACOR, INC., 598 Broadway, Norwood, N.J., 07648, Tel: 201-768-6070, Telex: 135-354; Empl.: 20
p. 1•2270,2271; p. 2•238,239

Products manufactured: Capacitors, Fixed, Capacitors, Variable, Circuits, Hybrid, Thick Film, Crystals, Kits, Switch Assembling, Knobs, Switches

Local Sales Offices & Reps.

Ala	Huntsville, BJR	205-881-3569
Cal	Glendale, Orion Sls.	213-240-3151
Cal	Santa Clara, Roger Assocs.	408-984-8110
Colo	Denver, Williams Assocs.	303-343-2911
Conn	Madison, A & M Elctrn. Reps	203-421-4242
Fla	Ft. Lauderdale, B. Baker Assocs.	305-484-6500
Ill.	Skokie, Mar-Con	312-675-6450
Kans	Shawnee Mission, TSA Tech. Sls.	913-831-2888
Mass	Needham, A & M Elctrn. Reps	617-444-8170
Mich	Grosse Pointe Park, Greiner Assocs.	313-499-0188
Minn	Mpls., Heimann Co.	612-861-6051
NJ	Nutley, Falk-Baker	201-661-2430
NY	East Rockaway, W. Bellenkes Assocs.	516-887-1443
NY	Ontario Center, Gehrs & Kehoe	315-524-2491
NY	Rochester, E. J. Schomburg Co.	716-244-0920
Ohio	Cincinnati, W. Geisting Assocs.	513-931-0812
Ohio	Columbus, T. Mulligan & Assocs.	614-457-2242
Pa	Ardmore, R.D. Freedman Assocs.	215-649-3679
Tex	Addison, Southland Comps	214-233-0603
Va	Lynchburg, G. White Assocs.	804-846-4624

SEAL-PEEL, INC., Box 250, Troy, Mich., 48084, Tel: 313-588-1055; Empl.: 10

Free literature available: Brochures on reusable hot melt plastic strippable coating to protect parts from rust and abrasion-specialty applications such as electroplating stopoff-potting and encapsulating.

Products manufactured: Coatings, Compounds, Encapsulating, Insulating, Molding, Potting, Films

Local Sales Offices & Reps.

Cal	San Gabriel, Seal-Peel	213-284-9330
Conn	Farmington, R.M. Jones & Co.	203-677-2654
Ohio	Cleveland, Reserve Ind. Supply	216-381-4746
Okla	Tulsa, Marsoco	918-LU4-5273
Tex	Fort Worth, O.H. Van Horn Co.	817-335-4484

SEALECTRO CORP., 225 Hoyt St., Mamaroneck, N.Y., 10543, Tel: 914-698-5600, TWX: 710-566-1110; Empl.: 1100; Minimum order: $75
p. 1•206,207,2269; p. 2•800-811

Customer service: R. O. Walcovy

Products manufactured: Antenna Feed Systems, Attenuators, Boards, Programming, Bushings, Glass, Plastic, Metal, Rubber, Etc., Cable Assemblies & Harnesses, Connector Adapters, Connectors, Contacts, Electrical, Controllers, Programmable, Controls/Control Eqpt., Controls, Fader, Filters, Grommets, Jacks (All Types), Matrices, Computer, Pads, Transistor Mounting, Plug & Jack Sets, Plugs, Probes, Programmers, Punched Card Equipment, Readers, Sockets, Switchboards, Switches, Tees, Terminal Blocks, Boards & Strips, Terminals, Timers

Local Sales Offices & Reps.

Ariz	Scottsdale, Barnhill Five, Inc.	602-947-5745
Cal	Los Angeles, Sealectro West	213-666-4040
Cal	Mt. View, Sealectro West	415-965-1212
Colo	Denver, Barnhill Five, Inc.	303-426-0222
Conn	Andover, Sls. Engrg. Co.	617-470-0800
Conn	Southbury, J.J. Wild Co.	203-264-9494
Fla	Orlando, Geartner Assocs.	305-299-1000
Fla	Winter Park, Young & Lawrence Assocs.	305-647-6929
Ill	Arlington Heights, R. Diethert Co.	312-593-7600
Iowa	Des Moines, Beams	515-282-0292
Kans	Overland Park, Beams	913-341-7744
Md	Rockville, Mechtronics Sls., Inc.	301-340-2130
Mass	Needham, J.J. Wild Co.	617-444-2366
Mich	Farmington, Carter, McCormic & Peirce Inc.	313-477-7700
Mich	Farmington Hills, W.R. Hummon & Assocs.	313-474-0661
Minn	Minneapolis, ECR, Inc.	612-831-4547
Mo	Creve Coeur, Beams	314-569-1080
NJ	Woodbridge, J.J. Wild Co.	201-636-7780
NM	Albuquerque, Barnhill Five, Inc.	505-293-5955
NY	Jericho, J.J. Wild Co.	516-935-6600
NY	Mt. Vernon, Friedman-Smith Co.	914-664-4866
NY	Syracuse, I.A. Hotze Co.	315-479-6641
NC	Burlington, P.J. Nahser Co.	919-226-8053
Ohio	Cleveland, Carter, McCormic & Peirce, Inc.	216-333-5650
Ohio	Columbus, McFadden Sls. Co.	614-221-3363
Ohio	Dayton, Carter, McCormic & Peirce, Inc.	513-278-5873
Ore	Beaverton, N.R. Schultz Co.	503-643-1644
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Pa	Glenside, Griffin Co.	215-MI6-8383
Pa	Monroeville, Carter, McCormic & Peirce	412-372-4415
Pa	Narberth, S.A. Jeffries Co.	215-664-8500
Pa	Pittsburgh, Carter, McCormic & Peirce	412-824-3760
Pa	Southampton, J.J. Wild Co.	215-357-6645
Tex	Dallas, Allied Comps., Inc.	214-238-0408
Wash	Bellevue, N.R. Schultz Co.	206-454-0300
Wisc	Waukesha, R. Diethert Co.	414-547-6575
FOR:	Can., Pointe Claire, Que., Avotronics Ltd.	514-697-2135
FOR:	Can., Toronto, Ont., Avotronics Ltd.	416-493-9711

Local Distributors

Ala	Huntsville, Powell Elctrns., 803 Oster Dr.	205-539-2731
Ariz	Phoenix, Micro Elctrns., 2104 W. Peoria Ave.	602-944-2281
Ariz	Phoenix, R.V. Weatherford Co., 1917 N. 25th Dr.	602-272-7144
Cal	Glendale, R.V. Weatherford Co., 6921 San Fernando Rd.	213-849-3451
Cal	Los Angeles, Radio Prod. Sls., 1501 S. Hill St.	213-748-1271
Cal	Mt. View, Elmar, 2288 Charleston Rd.	415-961-3611
Cal	Palo Alto, R.V. Weatherford Co., 3240 Hillview Ave.	415-321-5373
Cal	San Diego, Radio Prod. Sls., 7889 Clairmont Mesa	714-292-5611
Colo	Denver, Cramer, 5465 E. Evans Pl.	303-758-2100
Colo	Denver, Elctrn. Parts Co., 1212 S. Broadway	303-744-1992
Fla	Hollywood, Cramer, 4035 N. 29th Ave.	305-923-8181
Fla	Miami Springs, Powell Elctrns., 1740 N.W. 69th Ave.	305-885-8761
Fla	Orlando, Hall-Mark Elctrn., 7233 Lake Elinor	305-855-4020
Fla	Orlando, Powell Elctrn., 2032 Palmridge Way	305-859-1450
Ill	Chicago, Elctrn. Distrs., 4900 N. Elston	312-283-4800
Ill	Mt. Prospect, Cramer, 1911 S. Busse Rd.	312-593-8230
Ind	Indianapolis, Graham Elctrn., 133 S. Pennsylvania St.	317-634-8486
Ind	South Bend, Radio Distr., 1212 High St.	219-287-2911
Iowa	Cedar Rapids, Deeco Inc., 2500 16th Ave. SW	319-365-7551
Kans	Lenexa, Hall-Mark, 9006 Rosehill Rd.	913-888-4747
Kans	Wichita, Radio Supp. Co., 115 Laura	316-267-5214
Md	Beltsville, Powell Elctrn., 10728 Hanna St.	301-937-4030
Mass	Boston, DeMambro, 1095 Commonwealth Ave.	617-787-1200
Mass	Newton Center, Cramer, 85 Wells Ave.	617-969-7700
Mich	Augusta, Great Lakes Elctrn., 390 E. Michigan Ave.	616-731-4156
Minn	Minneapolis, Ind. Comps., 5280 W. 4th St.	612-831-2666
Mo	St. Louis, L-Comp., 2605 S. Hanley Rd.	314-647-5505
NJ	Springfield, Federated Elctrn., 155 US Rte 22	203-376-8900
NM	Albuquerque, Cramer, 137 Vermont N.E.	505-265-5767
NY	Bohemia, Car-Lac, 75 Orville Dr.	516-567-4200
NY	Buffalo, Summit, 916 Main St.	716-884-3450
NY	E. Syracuse, Cramer, 6716 Joy Rd.	315-437-6671
NY	Endwell, Cramer, 3220 Watson Blvd.	607-754-6661
NY	Farmingdale, DRW, 100 Milbar Ave.	516-249-2660
NY	Rochester, Cramer, 3529 Winton Rd. S.	716-275-0300
NC	Winston-Salem, Kirkman Elctrn., 901 W 2nd St.	919-724-0541
Ohio	Cincinnati, Cramer, 666 Redna Terr.	513-771-6441
Ohio	Cleveland, Cramer, 5835 Harper Rd.	216-248-8400
Ohio	Solon, Radio & Elctrn. Parts, 6835 Cochran	216-248-8900
Ore	Portland, Almac/Stroum, 8888 SW Canyon Rd.	503-292-3534
Pa	Philadelphia, Powell, S. Island Rd & Enterprise	215-365-1900
Tex	Dallas, Tex Instr. Supp., 6000 Denton	214-238-6821
Tex	Dallas, Wholesale Elctrn., 2809 Ross Ave.	214-824-3001
Wash	Seattle, Almac/Stroum, 5811 6th Ave. S.	206-763-2300
Wash	Seattle, R.V. Weatherford, 541 Industry Dr.	206-243-6340
Wisc	Oak Creek, Cramer, 430 W. Rawson Ave.	414-764-1700

SEALED AIR CORP., 19-01 State Hwy. 208, Fair Lawn, N.J., 07410

SEASTROM MFG. CO. INC., 701 Sonora Ave., Glendale, Cal., 91201, Tel: 213-245-9121, TWX: 910-497-2271; FSC No: 86928; Empl.: 50; Minimum order: $20

Customer service: Order Desk

Free literature available: Electrical/electronic hardware spring clips, washers-metallic, non-metallic all configurations military standards.

Products manufactured: Bus Bars & Systems, Bushings, Glass, Plastic, Metal, Rubber, Etc., Clamps & Clips, Fasteners, Terminals

Local Sales Offices & Reps.

Ariz	Phoenix, Hecht Henschen & Assoc.	602-275-4411
Cal	San Diego, Hampton-Donley Co.	714-276-1934
Cal	San Jose, A. J. Mollica Co.	408-578-6221
Colo	Denver, Industrial Hardware Co.	303-426-1440
Fla	Sarasota, RF Carlson Co.	813-388-3086
Ga	Atlanta, Electro Mech Sls. Engrg.	404-393-0444
Ill	Hinsdale, Hill-Gray Assoc.	312-325-4810
Mich	Stockbridge, Erhart Engrg.	313-229-6958
Minn	Minneapolis, Giefer Sls. Co.	612-884-2395
NH	Spofford, Bahr Sls. Co.	603-352-5444
NY	Lindenhurst, Long Island Mach'y Sls. Corp.	516-226-2400
NY	Syracuse, T Squared Elctrns.	315-463-8592
NC	Raleigh, Electro Mech. Sls.	919-782-6452
Pa	Narberth, Samuel A. Jeffriet	215-664-8500
Tenn	Nashville, Electro Mech. Sls. Engrg.	615-883-1490
Tex	Dallas, Blair Engrg. Sls. Co.	214-352-2556
Wash	Seattle, F. W. Aurich & Co.	206-284-5561

SEG SUBSIDIARY, Comstron Seg, 120-30 Jamaica Ave., Richmond Hill, N.Y., 11418, Tel: 212-441-3200; Empl.: 35 .... p. 1•544,545,638,639

Customer service: R.W. Tramposch

Free literature available: Brochures describing our product line.

Products manufactured: Filters, Generators, Meters, Recorders, Synthesizers, Telephone Channel Test & Simulator Equipment, Testers

Local Sales Offices & Reps.

Ariz	Scottsdale, Meas. Consits.	602-994-9519
Cal	Inglewood, L & M Engrg.	213-674-6850
Cal	Manhattan Beach, CSS Telecommunications Specialists, Inc.	213-372-9360
Cal	San Jose, L & M Engrg.	408-292-3220
Cal	Sunnyvale, CSS Telecommunications Specialists, Inc.	415-593-2284
Colo	Boulder, Meas. Consits.	303-449-5294
Conn	Hamden, J & J Assocs.	203-624-7800
Fla	Lighthouse Point, Saber Assocs.	305-943-3076
Fla	Longwood A, Saber Assocs.	305-422-3686
Fla	St. Petersburg, Saber Assocs.	813-441-1301
Ga	Woodstock, Saber Assocs.	404-432-9625
Ill	Chicago, Elctrn. Instrt. Assocs.	312-271-3774
Ind	Indianapolis, Elctrn. Instr. Assocs.	317-257-7231
Kans	Wichita, Winco, Inc.	316-684-8224
Mass	Burlington, J & J Assocs.	617-272-2606
Mich	Detroit, Comtel-Sterling Co.	313-255-1970
NJ	Hazlet, Mer Mon Elctrn. Instrumentation	201-264-1851
NM	Las Cruces, Meas. Consits.	505-526-2491
NY	Plainview, Eastern Metro Assocs.	516-WE1-1414
NC	Raleigh, Saber Assoc.	919-834-3961
Ohio	Dayton, Comtel-Sterling Co.	513-298-7573
Pa	Mt. Penn, Mer Mon Elctrn. Instrumentation	215-779-1640
Pa	Pittsburgh, Comtel-Sterling Co.	412-922-5720
Tex	Hurst, Anderson Wylie Assocs.	817-268-2327
Utah	Murray, Meas. Consits.	801-268-3181
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FOR:	Can.-Vancouver, B.C., Electronetics Sys., Ltd.	604-687-5696
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SEL-REX CO. DIV. OXY METAL INDUSTRIES CORP., 75 River Rd., Nutley, N.J., 07110, Tel: 201-667-5200, TWX: 710-989-1423; Empl.: 250

Free literature available: SEL-REX STRIP-PLATING MACHINES - Brochure describes several plating systems engineered for a variety of individual production requirements whether for plating selectively or over-all.

Products manufactured: Chargers, Battery, Chemicals, Coatings, Converters, Electroplating Equipment & Supplies, Inks For Thick Film Microcircuits, Machines/Machinery, Production, Magnets, Metals, Microcircuit Production Equip., Paints, Power Supplies, Rectifiers, Resistors, Screens, Printed Circuit

Local Sales Offices & Reps.

Cal	Burlingame, Oxy Metal Inds. Corp.	415-697-7123
Cal	Chatsworth, Sel-Rex Co.	213-882-9444
Cal	Los Angeles, Oxy Metal Inds. Corp.	213-262-4101
Cal	Santa Ana, Sel-Rex Co.	714-557-4141
Ga	Atlanta, Oxy Metal Inds. Corp.	404-458-9101
Ill	Berkeley, Oxy Metal Inds. Corp.	312-449-8510
Ill	Loves Park, Oxy Metal Inds. Corp.	815-633-6576
Ind	Indianapolis, Oxy Metal Inds. Corp.	317-359-8244
Mich	Madison Heights, Parker Co.	313-583-9300
Mich	Warren, Oxy Metal Inds. Corp.	313-539-3400
Mo	St. Louis, Oxy Metal Inds. Corp.	314-993-2602
NJ	Mt. Laurel, Oxy Metal Inds. Corp.	609-234-2331
NJ	Nutley, Oxy Metal Inds. Corp.	201-667-5200
Ohio	Cincinnati, Oxy Metal Inds. Corp.	513-793-6690
Ohio	Cleveland, Oxy Metal Inds. Corp.	216-267-2320
Ore	Portland, Oxy Metal Inds. Corp.	503-288-5134
RI	Warwick, Sel-Rex Co.	401-781-0700
Wash	Seattle, Oxy Metal Inds. Corp.	206-767-6082
Wisc	Brookfield, Oxy Metal Inds. Corp.	414-781-5964

SEMICOA, INC., 333 McCormick Ave., Costa Mesa, Cal., 92626, Tel: 714-979-1900, TWX: 910-595-1961; FSC No: 34156; Empl.: 65; Minimum order: $50

For info on price: B. Holtzman 714-979-1900; Application info: S. Faden 714-979-1901; Customer service: B. Kroeze 714-979-1902; Delivery info: J. Gunther 714-979-1903

Free literature available: Short form transistor catalog, Short form chip catalog, Detailed specification sheets, High power, high voltage devices, RF devices

Products manufactured: Diodes, Thyristors (Includes Silicon Controlled Rectifiers), Transistors

Local Sales Offices & Reps.

Ariz	Scottsdale, EST-Tronics	602-948-8444
Cal	Los Angeles, Trimarco	213-861-8244
Cal	San Diego, Trimarco	213-861-8244
Cal	Santa Clara, Caltron-Pyle	415-964-3244
Fla	Casselberry, EIR	305-830-9600
Ill	Chicago, Metcom Assoc.	312-696-1490
Mass	Burlington, Contact Sls., Inc.	617-273-1520
Minn	Minneapolis, Furber Sls. Co.	612-861-1518
Mo	Kansas City, L.F. Florence Co.	816-561-7222
NJ	South Orange, Simberkoff Assocs.	201-763-7900
NY	Buffalo, Simberkoff Assocs.	716-434-4426
NC	Burlington, Simberkoff Assocs.	919-584-6450
Ohio	Dayton, Crest Component Sls.	216-543-9808
Pa	Narbeth, Electro-Comp.	215-664-3576
Tex	Dallas, Evans-McDowell Assoc.	214-238-7157
Wash	Seattle, Arneson Assocs.	206-762-7664

SEMICON ASSOC., INC., Box 832, Lexington, Ky., 40501, Tel: 606-255-2446; Empl.: 35

Products manufactured: Services, Assembly, Production & Test

SEMICONDUCTOR CIRCUITS, INC., 306 River St., Haverhill, Mass., 01830, Tel: 617-373-9104, TWX: 710-347-0269; Empl.: 130; Minimum order: $30

p. 1•1444-1457

Products manufactured: Converters, Kits, Power Supply, Power Supplies

Local Sales Offices & Reps.

Ariz	Scottsdale, BFA Corp.	602-946-4215
Cal	Pasadena, A-F Sls. Engrg. Inc.	213-681-5631
Cal	Sunnyvale, Lee/Allan Assocs.	408-732-2030
Colo	Denver, BFA Corp.	303-744-3301
Conn	Middletown, McBar Assocs.	203-865-4376
Fla	Casselberry, EIR	305-830-9600
Haw	Honolulu, Aloha Assocs.	
Ill	Elk Grove Village, L.F. Green & Assocs.	312-593-0282
Ind	Indianapolis, L.F. Green & Assocs.	317-293-9827
Mass	Waltham, McBar Assocs.	617-890-0233
Mich	Farmington Hills, H. Lowell Co.	313-851-7474
Minn	Fridley, L.F. Green & Assocs.	612-781-1611
Mo	Grandview, K-Mar Engrg. & Sls.	816-763-3466
NJ	Bogota, Neville & Vespo, Inc.	201-487-1507
NM	Albuquerque, BFA Corp.	505-292-1212
NM	Las Cruces, BFA Corp.	505-523-0601
NY	North Syracuse, KLM Assocs.	315-458-6214
NY	Rochester, KLM Assocs.	716-288-9460
NY	Utica, KLM Assocs.	315-735-8525
Ohio	Cleveland, Geotronix Mktg. Assoc.	216-526-2535
Ohio	Columbus, Geotronix Mktg. Assoc.	614-457-8472
Pa	Ambler, Data Engrg. Co.	215-542-9876
Tex	Dallas, Ralph Matthews Elctrns.	214-233-0363
Tex	Houston, Ralph Matthews Elctrns.	713-664-7131
Utah	Salt Lake City, BFA Corp.	801-466-6522
Va	Fairfax, Nine Assocs.	703-273-1803

SEMICONDUCTOR TECHNOLOGY, INC., 124-14 22nd Ave., College Point, N.Y., 11356, Tel: 212-445-4466, TWX: 710-582-2571; Empl.: 45; Minimum order: $25

For info on price: F. G. Seigel; Application info: F. G. Seigel; Customer service: J. Barilla; Delivery info: J. Hika

Free literature available: Short Form Catalogue with Application Notes.

Products manufactured: Diodes, Rectifiers, Transistors

Local Sales Offices & Reps.

Cal	Los Angeles, Relcom	213-559-9388
Cal	San Carlos, Lo Dan	415-592-4600
Cal	San Diego, Southwest Tech. Sls.	714-565-2295
Ill	Chicago, Rinaldi	312-763-4848
Md	Hyattsville, Eastern Comps.	301-577-2925
Mass	Waltham, Tech Sls.	617-890-1102
Mich	Utica, Norm Case Assocs.	313-731-6003
Minn	Minneapolis, C.E. Bohlig Assocs.	612-922-7011
Mo	Grandview, Beneke & Mc. Caul	316-765-2998
Mo	St. Louis, Beneke & Mc. Caul	314-434-6242
NY	Great Neck, Cooper Simon & Co.	516-487-1142
NY	Syracuse, Electra Sls. Corp.	315-455-5783
Ohio	Centerville, Norm Case Assocs.	513-435-1301
Ohio	Fairview Park, Norm Case Assocs.	216-333-4120
Ore	Portland, Underwood & Underwood	
Pa	Flourtown, Eastern Comps.	215-836-1616
Wash	Seattle, Underwood & Underwood	206-243-2133

SEMTECH CORP., 652 Mitchell Rd., Newbury Park, Cal., 91320, Tel: 213-628-5392, TWX: 910-336-1264; FSC No: 14099; QPL No: Multiple; Empl.: 598

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Free literature available: Semtech Condensed Catalog

Products manufactured: Bridges, Capacitors, Fixed, Diodes, Multipliers, Rectifiers, Regulators, Suppressors

Local Sales Offices & Reps.

Ala	Huntsville, Southeastern Assoc.	205-772-9616
Ariz	Scottsdale, Sls. Engr., Inc.	602-945-5781
Cal	Palo Alto, Semtech Northwestern Sls. Off.	415-494-3113
Cal	San Diego, F. Nagel Co.	714-298-4850
Colo	Denver, Electrodyne	303-467-7067
Fla	Winter Park, Semtech Southeastern Dist. Sls. Off.	305-644-5404
Ill	La Grange, Semtech Central Regional Sls. Off.	312-352-3227
Ind	Ft. Wayne, G & D Elctrn. Sls.	219-432-5585
Md	Baltimore, Burgin-Kreh Assoc.	301-788-5200
Md	Rockville, Semtech	301-424-6663
Mass	Weston, Ebbco, Inc.	617-891-8670
Minn	Minneapolis, S. Clothier Co.	612-888-4666
Mo	Hazelwood, Centech, Inc.	314-731-4220
Mo	Raytown, Centech, Inc.	816-358-8100
NJ	Clifton, Compar NY	201-546-3660
NJ	Springfield, Semtech Eastern Regional Sls. Off.	301-654-4884
NM	Albuquerque, Rustco Entprs.	505-296-6474
NC	Winston-Salem, Burgin-Kreh Assoc.	919-768-4174
Ohio	Cincinnati, Scott Elctrns.	513-791-2513
Ohio	Cleveland, Scott Elctrns.	216-291-2600
Ohio	Columbus, Scott Elctrns.	614-236-8619
Ohio	Dayton, Scott Elctrns.	513-223-2652
Ore	Portland, Western Techn. Sls.	503-297-1711
Pa	Pittsburgh, Scott Elctrns.	214-387-3551
Tex	Dallas, Semtech	214-387-3551
Utah	Salt Lake City, Electrodyne	801-467-7067
Va	Lynchburg, Burgin-Kreh Assoc.	703-845-5600
Wash	Bellevue, Western Tech. Sls.	206-641-3900
FOR:	Can., Ont., B.D. Vallille Elec., Ltd.	416-447-8482

SENCORE, INC., 3200 Sencore Dr., Sioux Falls, S.D., 57107, Tel: 605-339-0100, TWX: 910-660-0300; Empl.: 250

Customer service: R. Bowden

Free literature available: Update 4 color catalog of entire Sencore line of test instruments and accessories, including oscilloscopes, tube testers, transistor testers, color generators, multimeters, sound analyzers and others.

Products manufactured: Generators, Meters, Oscilloscopes, Power Supplies, Test Equipment, Testers

Local Sales Offices & Reps.

Cal	Burlingame	415-697-5854
Ga	College Park	404-768-0606
Ill	Downers Grove	312-852-6800

NY	Albany	518-869-0996
Va	Alexandria	703-751-3556

SENNHEISER ELCTRN. CORP., 10 W. 37th St., New York, N.Y., 10018, Tel: 212-239-0190; Empl.: 28

For info on price: C. Hofman; Application info: H. A. Ankermann; Customer service: U. Sattler; Delivery info: E. Kruse

Free literature available: Complete 108 page catalog describing in detail all Sennheiser products will be sent free of charge upon request.

Products manufactured: Meters, Microphone Accessories (Including Stands, Holders, Booms), Microphones, All Kinds, Speakers, Transformers

Local Sales Offices & Reps.

Cal	Los Angeles, Morris Tait Assocs.	213-877-4424

SENSITIVE RESEARCH INSTRS., 25 Dock St., Mt. Vernon, N. Y., 10550, Tel: 914-699-9717; FSC No: 32590; QPL No: 16034A; Empl.: 35; Minimum order: $25

For info on price: R. Neglia; Application info: M. Kane; Customer service: G. D. Frank; Delivery info: R. Neglia

Free literature available: "SENSITIVE RESEARCH" AC/DC Electrostatic Voltmeters - Data Bulletin SRT-100 covers features, applications and characteristics of Electrostatic Voltmeters with a range span of from 120 V to 140 KV. Sensitive Research AC/DC Wattmeters and Volt Amp Wattmeters New Catalog Section 5 is an eight page catalog section providing specifications and general information on usage of AC/DC Wattmeters and Volt-Amp-Wattmeters.

Products manufactured: Calibrators, Dividers, Indicators, Magnets, Meters, Multipliers, References, D-C Voltage, Resistors, Services, Assembly, Production & Test, Shunts, Meter, Standards, Transducers, Transformers, Voltage Sources

Local Sales Offices & Reps.

Ala	Huntsville, J. L. Highsmith & Co.	205-881-3294
DC	Washington, Whitcomb Assocs.	202-737-0763
Fla	Orlando, J. L. Highsmith & Co.	305-293-5202
Ill	Skokie, Saffro & Assocs.	312-588-0905
Kans	Shawnee Mission, Pivan Engrg. Co.	913-722-1030
Md	Baltimore, Whitcomb Assocs.	301-889-1245
Mass	Waltham, Measurement Conslts. Corp.	617-890-4400
Mich	Detroit, S. Sterling Co.	313-255-1970
Minn	Minneapolis, Heimann Co.	612-861-6051
Mo	St. Louis, Pivan Engrg. Co.	314-567-3636
NY	Buffalo, R. F. Lamb Co.	716-874-4900
NY	Rochester, R. F. Lamb Co.	716-544-5580
NY	Schenectady, R.F. Lamb Co.	518-393-4844
NY	Syracuse, R. F. Lamb Co.	315-454-2469
NC	Charlotte, J. L. Highsmith & Co.	704-333-7743
Ohio	Cleveland, S. Sterling Co.	216-442-8080
Ohio	Dayton, S. Sterling Co.	513-298-7573
Okla	Norman, Data Mktg. Assocs., Inc.	405-364-8320
Pa	Jenkintown, AMT	215-LI9-2080
Pa	Pittsburgh, S. Sterling Co.	412-922-5720
Tex	Dallas, Data Mktg. Assocs., Inc.	214-661-0300
Tex	Houston, Data Mktg. Assocs., Inc.	713-686-9627
Tex	San Antonio, Data Mktg. Assoc.	512-828-0937
Va	Richmond, J. L. Highsmith & Co.	804-272-5888
Wash	Seattle, R. S. Drake Assocs., Inc.	206-725-2700

Advertisment

SENSITIVE RESEARCH INSTS. Manufacturers of Polyrangers, Electrostatic Voltmeters, Wattmeters, AC & DC Voltmeters and Ammeters, all offered in both portable and panel mountings in ranges from microvolts to 140,000 volts, and microamperes to 1000 amps.
Typical Models:
ESH & ESD Electrostatic Voltmeters
VAW Volt Amp Wattmeters
100 KV NBS Design Park Divider
Custom Designs available. Write for a SENSITIVE RESEARCH catalog.

SENSITROL, INC., 200 S. 4th St., P.O. Box 150, Albion, Ill., 62806, Tel: 618-445-2323; Empl.: 19; Minimum order: $35

For info on price: S. Seitz Ext. 56; Application info: E. M. Pelter, Jr. Ext. 53; Customer service: S. Seitz Ext. 56; Delivery info: S. Seitz Ext. 56

Products manufactured: Controls/Control Eqpt., Delays, Time (Excluding Delay Lines, Timers, Delay & Relays, Time-Delays), Detectors, Monitors, Protectors, Relays, Timers

Local Sales Offices & Reps.

Ariz	Scottsdale, Electronic Entprs	602-266-9841
Cal	LaJolla, Rep. Sls Co.	714-271-1426
Cal	Long Beach, Emerson Kirk Engrg.	213-439-9559
Fla	North Miami, Mark Elctrn Sls Co.	305-947-5080
NJ	Fairlawn, C. R. Mayer Co.	516-921-7876
NJ	Hackensack, C. R. Mayer Co.	201-487-3113
NM	Albuquerque, Electronics Entrprs.	505-256-3561
NM	Las Cruces, Electronics Entrprs	505-524-0126
NY	Huntington, C. R. Mayer Co.	516-921-7876
Va	Reston, Boyle Assocs.	703-620-9558
FOR:	Can., Downsview Ont., Anro Elctrn Inds	416-661-2607
FOR:	Can., Montreal Que., B. R. Connectron	514-332-0220

SENSOR CORP., Box 140, Scottdale, Pa., 15683, Tel: 412-887-4080; Empl.: 12

Products manufactured: Alarms, Amplifiers, Analyzers, Boards, Plug-In, Boards, Programming, Cards, Linear Function, Cards, Logic, Coils Including Assemblies & Forms, Comparators, Computers, Controls/Control Eqpt., Converters, Counters, Current Sensors, Detectors, Diodes, Display Devices/Displays, Dividers, Drivers, Solenoid, Electroplating Equipment & Supplies, Encoders, Gages, Generators, Heads, Reflective, Indicators, Integrated Circuit Devices, Light Sources, Photoelectric, Machines/Machinery, Production, Meters, Monitors, Oscillators, Power Supplies, Programmers, Relays, Scanners, Sensors, Light, Services, Assembly, Production & Test, Shift Registers, Switches, Tachometers, Test Systems, Testers, Timers, Totalizers, Digital, Transducers

Local Sales Offices & Reps.

Conn	Durham, Marr Electric Co.	203-349-9691
Fla	Oldsmar, L & A Assocs.	813-855-4209
Mich	Detroit, Owen Engrg.	313-538-5515
Mo	St. Louis, W. Adler	314-423-7200

SENSOR TECHNOLOGY, 21012 Lassen St., Chatsworth, Cal., 91311, Tel: 213-882-4100, TWX: 910-494-4776; Empl.: 175; Minimum order: $35

For info on price: I. Rubin; Application info: J. Cotter; Customer service: B. Hanson; Delivery info: I. Rubin

Free literature available: Complete Catalog, "Sensor Tech Opto Electronic Components & Systems".

Products manufactured: Amplifiers, Cells, Photoconductive, Photoemissive, Photovoltaic, Circuits, Hybrid, Thin-Film, Controls/Control Eqpt., Detectors, Diodes, Display Devices/Displays, Fiber Optic Bundles, Isolators, Lamps, Lights, Punched Card Equipment, Readers, Resistors, Transistors

Local Sales Offices & Reps.

Cal	Redwood City, Logan Sales	415-369-6726
Colo	Denver, Omega Ltd.	303-758-1508
Fla	Lighthouse Pt., Saber Assocs.	305-943-3076
Ill	Chicago, Balhorn & Welch	312-889-5011
Mass	Worcester, W. Porter Sls.	617-852-4396
Mich	Detroit, A. Blumenberg Assocs.	313-557-1934
Minn	Minnetonka, T.H. Ayre Assocs. Inc.	612-474-4125
NJ	Cherry Hill, Bi-Tech, Inc.	609-667-7374
NM	Albuquerque, The Thorson Co.	505-265-5655
NY	Dewitt, Bowser & Sapecky Assoc.	315-446-5920
NY	Great Neck, Cooper-Simon & Co.	516-487-1142
Ohio	Cincinnati, Giesting Assocs.	513-931-0812
Ohio	Dayton, Giesting Assocs.	513-931-0812
Tex	Dallas, Erickson-Vilter Sls.	214-243-6611
Va	Fairfax, Sohibley Assocs., Inc.	703-591-3008

SENSORS, INC., 3908 Varsity Dr., Ann Arbor, Mich., 48104, Tel: 313-973-1400

Customer service: D. Giles

Free literature available: Brochures describing C1, L22, L66 & S15 thermopile detectors...complete electrical/mechanical specifications, performance charts, applications, ordering information. Average Temperature Radiometer brochure gives description, complete specifications, applications information.

Products manufactured: Detectors, Pyrometers, Radiometers

Local Sales Offices & Reps.

Ariz	Scottsdale, Electrn. Entprs.	602-946-3802
Cal	S. Pasadena, Deniston/JDA	213-254-7755
Cal	San Carlos, Elctrn. Engrg. Assocs.	415-593-2189
Mich	Chelsea, Michigan Nondestructive Gage Co.	313-685-2960
Minn	Minneapolis, Automated Controls	612-377-7727
NJ	Medford, Walter Lanchak Co.	215-923-5050
NM	Albuquerque, Elctrn. Ents.	505-256-3561
NC	Charlotte, J.L. Highsmith & Co.	704-333-7743
Tex	Stafford, Jordan Equipment Co.	713-498-6033

SENSOTEC, INC., 1400 Holly Ave., Columbus, Ohio, 43212, Tel: 614-294-5436; Empl.: 55

Customer service: J. Feil

Free literature available: Strain Gage Transducers & Instruments: Pressure, 0.5 to 30,000 psi, gage, absolute, differential; Load Cells, 0.1 to 200,000 pounds; Signal Conditioners And Digital Readout.

Products manufactured: Amplifiers, Bridges, Cells, Load, Controllers, Programmable, Controls/Control Eqpt., Filters, Gages, Indicators, Power Supplies, Recorders, Signal Conditioners & Equipment, Transducers

Local Sales Offices & Reps.

Ariz	Phoenix, Thorson Co.	602-956-5300
Cal	Pasadena, RDX Corp.	213-681-3451
Cal	San Diego, RDX Corp.	714-278-6863
Cal	Sunnyvale, RDX Corp.	408-734-4500
Colo	Denver, Thorson Co.	303-759-0809
Conn	Milford, Todino Engrg. Sls.	203-874-6643
Ill	Chicago, Pivan Engrg. Inc.	312-539-4838
Ind	Indianapolis, Pivan Engrg. Inc.	317-253-1681
Kans	Shawnee Mission, Pivan Engrg. Inc.	913-722-1030
La	Baton Rouge, SESCO, Inc.	504-927-7574
Md	Rockville, Farrell Assocs. Inc.	301-424-9460
Mass	Needham Hgts., Todino Engrg. Sls.	617-444-7925
Mich	Detroit, S. Sterling	313-255-1970
Minn	Minneapolis, Pivan Engrg. Inc.	612-537-4501
Mo	St. Louis, S. Sterling	314-567-3636
NJ	Paramus, Tower Sls. Eng. Corp.	201-265-2878
NM	Albuquerque, Thorson Co.	505-265-5655
NY	New Hartford, KLM Assocs.	315-735-8525
NY	North Syracuse, KLM Associates	315-458-6214
NY	Rochester, KLM Associates	716-442-0820
Ohio	Cleveland, S. Sterling	216-442-8080
Ohio	Dayton, S. Sterling	513-298-7573
Pa	Philadelphia, Scientific Dev.	215-825-9515
Pa	Pittsburgh, Process Engrg.	412-561-2242
Pa	Pittsburgh, S. Sterling	412-922-5720
Tex	Houston, SESCO, Inc.	713-668-7840
Tex	Richardson, SESCO, Inc.	214-231-9364
Wash	Seattle, RDX Corp.	206-682-6750
Wisc	Brookfield, Pivan Engrg. Inc.	414-786-1940
FOR:	Can., Quebec, Electrodesign	514-363-5120
FOR:	Can., Toronto, Electrodesign	416-787-0991
FOR:	Can., Vanier, Electrodesign	613-745-0541

SEQUENTIAL INFORMATION SYSTEMS, 249 N. Saw Mill River Rd., Elmsford, N.Y., 10523, Tel: 914-592-5930, TWX: 710-567-1212; Empl.: 60; Minimum order: $100

Customer service: F. Gordon

Free literature available: General Motor Catalog - Motorspecs on 13 different motors; General Encoder Catalog - Incremental & absolute encoders up to 21 bits; Industrial Encoders - Incremental & absolute to 14 bits and 20,000 pulses; Display Systems - Incremental, speed, ratio position and absolute readouts.

Products manufactured: Controls/Control Eqpt., Encoders, Meters, Motor & Generator Armatures, Rotors, Stators, Motors, Switches, Tachometers, Timers

Local Sales Offices & Reps.

Ariz	Scottsdale, BFA Corp.	602-946-4215
Cal	Campbell, Sedillo Co.	408-374-5220
Cal	Santa Barbara, Kannard Assocs.	805-682-1928
Colo	Denver, BFA Corp.	303-744-3301
Conn	Old Lyme, Aid Engrg. Sls. Co.	203-673-3692
Conn	Rocky Hill, Aid Engrg. Sls. Co.	203-673-3692
Ill	Chicago, Pivan Engrg., Inc.	312-539-4838
Ind	Indianapolis, Pivan Engrg., Inc.	317-253-1681
Kans	Shawnee Mission, Pivan Engrg., Inc.	913-722-1030
Md	Silver Spring, Spectroscopy Sys	301-949-8261
Mass	Westboro, Aid Engrg. Sls. Co.	617-890-8181
Mich	Detroit, S. Sterling Co.	313-255-1970
Minn	Minneapolis, Pivan Engrg., Inc.	612-537-4501
Mo	St. Louis, Pivan Engrg., Inc.	314-567-3636
NJ	Ridgefield, Haber-Ramp Corp.	201-945-5250
NM	Las Cruces, BFA Corp.	505-523-0601
NY	Upper Williamsville, Maxwell Bennett Assocs.	716-634-2107

Ohio Cleveland, S. Sterling Co. 216-442-8080
Ohio Dayton, S. Sterling Co. 513-298-7573
Pa Western Pittsburgh, S. Sterling Company 412-922-5720
Pa Wyndmoor, Spectroscopy Sys. 215-VE6-1545
Tex Dallas, Data Aids 214-620-1551
Tex Houston, Data Aids 713-862-6685
Utah Salt Lake City, BFA Corp. 801-466-6522
Wash Seattle, Penryn Sls. & Engrg. Co. 206-634-0240
Wisc Brookfield, Pivan Engrg., Inc. 414-786-1940

SERMETEL TELEFLEX INC., 155 Limerick Rd., Limerick, Pa, 19468, Tel: 215-948-5100, TWX: 710-637-1263; Empl.: 150

Customer service: E. A. Wykstra X18

Products manufactured: Adhesives (All Types), Boards, Printed Circuit, Coatings, Compounds, Encapsulating, Insulating, Molding, Potting, Lubricants, Paints, Seals, Services, Assembly, Production & Test, Wire

Local Sales Offices & Reps.
Cal Lawndale 213-973-1142
Okla Midwest City 405-732-1392

SERVO-TEK PRODS. CO., 1086 Goffle Rd., Hawthorne, N.J., 07506, Tel: 201-427-3100; Empl.: 86 p. 1•980,981

Products manufactured: Controls/Control Eqpt., Drives & Drive Mechanisms (Dial), Indicators, Motors, Tachometers

Local Sales Offices & Reps.
Cal Van Nuys, Servo-Tek Calif. 213-786-0690
Fla Ft. Lauderdale, P.N. Bredesen 305-587-0117
Mass Salem, Forbes Engrg. Co. 617-744-1693
Ohio Dayton, Albrecht & Assocs. Inc. 513-885-3888

SERVOMETER CORP., 501 Little Falls Rd., Cedar Grove, N.J., 07009, Tel: 201-785-4630; FSC No: 18469; Empl.: 65; Minimum order: $25

For info on price: E. Toth 201-785-4633; Application info: F. Duggan 201-785-4637; Customer service: D. Walker 201-785-4634; Delivery info: B. Murawski 201-785-4636

Free literature available: Bellows Contact Springs-describes line of stocked contact springs Flexible Shaft Couplings - Describes line of precision electrodeposited nickel bellows type shaft couplings. Electroforms - describes servometers unique capabilities in the field of electroforming

Products manufactured: Contacts, Electrical, Couplings, Feedthrus & Seals, Environmental, Services, Assembly, Production & Test, Waveguides & Adapters

Local Sales Offices & Reps.
Cal Cerritos, Bearings, Seals & Gears (Memtech Div.) 213-860-2422
Cál Redwood City, Bearings, Seals & Gears 415-365-5444
Ind Indianapolis, H. G. Lake Co. 317-783-7254
Mass Salem, J.M. Assocs. 617-745-1826
NY East Aurora, Clarke Thrasher 716-652-0423
Ohio Dayton, H. G. Lake Co. 513-277-8181
Ohio Richmond Heights, H. G. Lake Co. 216-486-1477
Ore Gresham, Bearings, Seals & Gears 503-665-5434
Pa Ambler, L. J. McCormick Jr. 215-643-7899

SERVOTRON CORP., See National Power Prods.

SERVOTRONICS, INC., 3901 Union Rd., Buffalo, N.Y., 14225, Tel: 716-633-5990, TWX: 710-523-1855; Empl.: 81

For info on price: R. Dabinski; Application info: P. R. Bauer; Customer service: P. A. Bauer; Delivery info: R. Dabinski

Free literature available: Torque Motors-"How to design advantage of High force Linear-Displacement Torque Motors" describes design principles, what they do, how they work and where their used. Metallic Seals-Apex or Omega type explains design features and advantage of each type lists standard sizes and options available.

Products manufactured: Actuators, Motors, Services, Assembly, Production & Test, Solenoids, Valves, Solenoid

SESCOM, INC., Box 590, Gardena, Cal., 90247, Tel: 213-770-3510, TWX: 910-346-7023; Empl.: 21

Products manufactured: Microphone Accessories (Including Stands, Holders, Booms), Microphones, All Kinds, Transformers

Local Sales Offices & Reps.
Ariz Phoenix, B. Fissell Co. 602-264-4031
Cal Oakland, H. Gabriel 415-465-5361
Ill Chicago, T. Pappas & Assoc. 312-685-2338
Kans Overland Park, W. Menzes & Assocs. 913-649-2680
Md. Rockville, Lienau Assocs., Inc. 301-770-6800
Mass Framingham, VF Sls. Inc. 617-237-6544
NY Brooklyn, I. Brown Co. Inc. 212-493-1379
Pa Philadelphia, Lienau Assocs., Inc. 215-HO4-9444
Tex Dallas, Wyborny Sls. Co.
Tex Houston, Wyborny Sls. Co. 713-772-0961
EXP: Inglewood, Sescom, Inc. 213-770-3510
EXP: Los Angeles, Calif., E.E. Strassner Sls. Inc. 213-666-1511

SETRA SYSTEMS INC., 12 Huron Dr., Natick, Mass., 01760, Tel: 617-655-4645; Empl.: 25

Customer service: W. Stern

Free literature available: Catalogs

Products manufactured: Accelerometers, Transducers

Local Sales Offices & Reps.
Ala Huntsville, Craft Associated 205-837-0221
Cal Los Angeles, DynaSls. Co. 213-268-1175
Colo Wheat Ridge, RMS Sls. 303-423-6693
Fla Maitland, Craft Assocs. 305-645-2242
Ga Atlanta, Craft Assocs. 404-393-0400
Ill Arlington Heights, Martec Assocs. 312-956-8090
Kans Leawood, Leemark Engrs. 913-648-0124
Mass Framingham, J.M. Lancaster Co. 617-873-8893
Mich Ferndale, Tiby Co. 313-547-3550
NJ Ridgewood, Hansen Assocs. 201-652-7055
NY Huntington, Hansen Assocs. 212-947-0379
NY Penfield, A&D Devices 716-586-8033
Ohio Cleveland, Tiby Co. 216-371-5335
Ore Portland, McLaren, Inc. 503-297-2248
Pa Jenkintown, Stein Instrumentation 215-885-2370
Tex Dallas, McGatlin Instr. Co. 214-243-6061
Wash Bellevue, McLaren 206-535-3400

SEVEN SCIENCES, INC., 1405 Civic Center Drive, Santa Clara, Cal., 95050, Tel: 408-249-8400; Empl.: 10; Minimum order: $59

For info on price: D. Linker 408-249-8400; Application info: L. Azar 408-249-8401; Customer service: A. Howard 408-249-8400; Delivery info: D. Linker 408-249-8400

Free literature available: Brochures: 1000 Series; battery power supplies, 2000 Series; battery chargers, 3000 Series; battery chargers, Model 100; DC-DC converter.

Products manufactured: Chargers, Battery, Converters, Power Supplies

Local Sales Offices & Reps.
Cal Los Angeles, V & L Assocs. 213-986-9703
Cal Palo Alto, Microwave Mktg. Assocs. 415-969-3355
Colo Denver, K. C. Marketers 303-733-5561
NM Albuquerque, A. L. S. Elctrns. 505-298-2575
FOR: Can., Mississauga, Ont., Munro Elctrn. Components Ltd. 416-676-1042

S G C INC., 13737 SE 26th St., Bellevue, Wash., 98005, Tel: 206-746-6310, Telex: 3288311; Empl.: 18; Minimum order: $25

For info on price: D. L. Stoner, 206-746-6310; Application info: D. L. Stoner, 206-746-6310; Customer service: G. Thompson, 206-746-6311; Delivery info: T. Rockney, 206-746-6311

Free literature available: Complete descriptive literature and price lists of entire line of SSB equipment.

Products manufactured: Antennas, Comm. Systems, Crystals, Receivers, Transmitters

Local Sales Offices & Reps.
Cal Benica, Mar-Pac 707-745-4068
Fla Pompano Beach, Comark 305-785-2000
La New Orleans, R. Daigle Assoc. 504-367-5309
Mass Sudbury, Commercial Mktg. Assoc. 617-443-9442
Wash Bellevue, S G C Int'l. 206-746-6310

SGL ABRASIVES, North Pitt St. Ext., Carlisle, Pa., 17013, Tel: 717-243-3471, TWX: 510-560-3513; Empl.: 200

Products manufactured: Abrasive Belts, Compounds, Cords, Powders, etc.

Local Sales Offices & Reps.
Ala Birmingham, P. Bancroft 205-823-0557
Cal Maywood, J. Mullaney 213-585-5697
Ill Northfield, B. Boak 312-446-3374
NC Charlotte, T. Arnold 704-535-4279
Pa Allentown, Coleman Assoc. 215-797-0401
Pa Hazleton, Barrett Haentjens Co. 717-455-7711
Pa New Cumberland, J. Tio 717-774-2351
Pa Newtown Square, E. Parkin 215-644-5849
Tex Houston, T. Dolan 713-667-8812
Wisc Racine, Webster Weiss 414-639-3634
Wisc West Bend, T. Sullivan 414-334-4385

SGL BATTERIES MANUFACTURING CO., A Subsidiary of SGL Industries, Inc., 14650 Dequindre, Detroit, Mich., 48212, Tel: 313-868-6410; Empl.: 60

Customer service: R. J. Hollander

Free literature available: Brochure on Batteries.

Products manufactured: Batteries

SGL ELCTRONICS, 300 Harvard Avenue, Westville, N.J., 08093, Tel: 609-456-7300, TWX: 710-944-0758; Empl.: 60; Minimum order: $25 .... p. 2•1254

For info on price: R. P. Pagliaro; Application info: J. E. Graham; Customer service: D. Seitzinger; Delivery info: D. Seitzinger

Free literature available: SGL electronics condensed catalog describes technical data on its line of magnetic laminations "C" cores tape wound and ring cores, and magnetic shielding.

Products manufactured: Connectors, Cores, Magnetic, Foil, Laminations, Services, Assembly, Production & Test, Shields

Local Sales Offices & Reps.
Cal La Habra, Magnetic Materials 213-694-2063
Fla Orlando, Buchanan & Abrams Assoc. 305-898-7444
Ill Chicago, P.K. Pitt 312-478-3124
Mich Farmington, W.R. Hummon 313-474-0661
Minn St. Paul, R.G. Ragon 612-488-0201
NJ Murray Hill, Cambridge Allen 212-682-5844
NY DeRuyter, R. P. Kennedy Co. 315-682-2299
NY Red Hook, R. P. Kennedy Co. 914-876-2700
NY Rochester, R.P. Kennedy Co. 716-271-6322
Ohio Columbus, T. Mulligan & Assoc. 614-457-2242
Tex Dallas, Southwest Elctrn. Inds. 214-233-9816
Tex Houston, Dunkel Elctrns Assoc. 713-729-1670
Wash Kirkland, Freed Assoc. 206-822-8100
FOR: Can., Dorval, Que., Anbak Sls. 514-636-8514
FOR: Can., Mississauga, Ont., Anbak Sls. 416-625-1061

SGL GRAPHICS, Div. of SGL Inds., Inc., John Fitch Industrial Park, Warminster, Pa., 18974, Tel: 215-672-3600; Empl.: 45

Customer service: T. Wallis

Free literature available: Product and application information; specifications.

Products manufactured: Nameplates, Services, Assembly, Production & Test, Tubing

SGL HOMALITE, Div. of SGL Inds., Inc., 11 Brookside Dr., Wilmington, Del., 19804, Tel: 302-652-3686; Empl.: 30; Minimum order: $35 .... p. 2•1254

For info on price: B. Eastman; Application info: B. Eastman; Customer service: L. Rose; Delivery info: L. Rose

Free literature available: Specifications, applications data, and typical uses.

Products manufactured: Adhesives (All Types), Bezels, Shielded & Unshielded, Coatings, Compounds, Encapsulating, Insulating, Molding, Potting, Dials, Display Devices/Displays, Nameplates, Plastic Raw Materials, Liquids, Pellets, Powders, Resins, Scales, Dial, Services, Assembly, Production & Test, Shields, Tubing

Local Sales Offices & Reps.
Cal Los Gatos, Luscombe Engrg. 408-354-6496
Cal Pasadena, Luscombe Engrg. 213-684-2000
Mass Newton, Normell Assocs. 617-969-5478
Mich Farmington Hills, H. Lowell Co. 313-851-7474
Minn Minneapolis, Int'l. Sls. Co. 612-831-8423
NJ Cherry Hill, B & G Assocs. 609-235-4878
NY Lynbrook, H.B. Heft Assocs. 516-599-3351
Wash Seattle, J.B. Jolly 206-938-4166

SGL PLASTICS, Route 248, Nazareth, Pa., 18064, Tel: 215-759-0280; Empl.: 50

Customer service: J. D. Guiducci

Free literature available: A new six page brochure describes SGL Plastics plant and equipment capability together with illustrations of products currently in production.

Products manufactured: Services, Assembly, Production & Test

SGL PRINTED CIRCUITS, Div. SGL Inds., Inc., 827 Black Oak Ridge Rd., Wayne, N.J., 07470, Tel: 201-835-2765; Empl.: 29 .... p. 2•356

Customer service: P. Codella

Free literature available: Service brochure available.

Products manufactured: Boards, Printed Circuit, Boards, Printed Wiring, Universal, Circuits, Flexible, Circuits, Printed, Multilayer, Kits, Printed Circuit, Screens, Printed Circuit, Services, Assembly, Production & Test

Local Sales Offices & Reps.

Fla	Orlando, Buchanan & Abrams	305-899-7622
Mo	Springfield, Osbern Sales Co.	417-881-0142
NJ	Fairfield, Glad Assocs.	201-227-5555

SGL WABER ELECTRIC, 300 Harvard Avenue, Westville, NJ, 08093, Tel: 609-456-5400, TWX: 710-944-0758; Empl.: 50; Minimum order: $35 p. 2•356

Customer service: A. Andrews

Free literature available: New 16 page, three color catalog including illustrations and descriptions of over 250 different pre-wired (ready to plug in) electrical power outlet strips and wheeled mobile utility and instrument carts.

Products manufactured: Benches, Consoles, Stools, Tables, Boxes, Junction, Outlets & Wall Plates, Bus Bars & Systems, Carts & Dollies, Instrument & Equipment, Circuit Breakers, Conduit, Electrical, Connector Boxes & Strips, Power Outlet, Controls/Control Eqpt., Cords, Ducts, Wiring, Indicators, Plugs, Services, Assembly, Production & Test, Switches

Local Sales Offices & Reps.

Ala	Mobile, Hollingsworth & Still	205-478-8108
Cal	Hollywood, Lewis Assocs.	213-877-0461
Cal	San Rafael, G. E. Johnson	415-456-1196
Colo	Denver, Walter Eng. Assoc.	303-777-5585
Conn	Wallingford, Adams-McGregor	203-369-5816
Fla	Orlando, Hollingsworth & Still	305-671-4515
Ga	Atlanta, Hollingsworth & Still	404-394-3270
Haw	Honolulu, Gene Piety Factors	808-841-0185
Ind	Indianapolis, R. Milsk Co.	317-546-5468
Iowa	Des Moines, Kathrinus-Kelly & Co.	515-255-4584
Iowa	Fort Dodge, Heimann Co.	515-576-2375
Kans	Shawnee Mission, Kathrinus-Kelly & Co.	913-722-0000
Md	Silver Springs, Sherr Assocs.	301-593-2477
Mass	Scituate, Adams-McGregor	617-545-2213
Mich	Southfield, R. Milsk Co.	313-354-3310
Minn	Minneapolis, Heimann Co.	612-861-6051
Mo	St. Louis, kathrinus-Kelly	314-968-3800
NM	Albuquerque, C. T. Carlberg & Assoc.	505-265-1579
NY	Liverpool, J. Brown Elctrn. Sls.	315-451-1471
NY	New Hyde Park, Harris & Aldrich Sls.	516-488-2622
NY	Rochester, J. Brown Elctrn Sls.	716-266-2728
NY	Yonkers, J. Brown Elctrn. Sls.	914-779-7330
NC	Charlotte, Hollingsworth & Still	704-536-7047
Ohio	Dayton, Elctrn. Salesmasters	513-837-2379
Ore	Salem, Pacnor Mktg.	503-363-6445
Pa	Philadelphia, D. S. Linz Co.	215-379-0734
Pa	Pittsburgh, Tanner, Co.	412-561-4687
RI	Lincoln, Adams-McGregor	401-726-1300
Tex	Dallas, Lund & Co.	214-358-4335
Wash	Seattle, Pacnor Mktg.	206-284-8020

SGS-ATES

SGS-ATES SEMICONDUCTOR, 435 Newtonville Ave., Newtonville, Mass., 02160, Tel: 617-969-1610; Empl.: 7000

For info on price: T. Hastings; Application info: U. Broggi; Customer service: T. Hastings; Delivery info: T. Hastings

Free literature available: Short form catalog; Audio Circuit Brochure; Individual Device Data Sheet

Products manufactured: Amplifiers, Integrated Circuit Devices, Multipliers, Semiconductor Wafer Fabrication, Transistors

Local Sales Offices & Reps.

Ala	Huntsville, Comp. Mktg.	205-881-5333
Ariz	Tempe, J.F. Hurlbut Co.	602-968-5962
Cal	Mountain View, Caltron/Pyle Inc.	415-964-3244
Cal	Santa Ana, Rical Assocs.	714-557-6543
Colo	Golden, J.F. Hurlbut Co.	303-279-7138
Fla	Pompano Beach, V.G. Sales Co.	305-941-5544
Fla	Winter Park, V.G. Sales Co.	305-831-8699
Ill	Bellwood, Fiat Engrg.	312-547-6200
Ind	Indianapolis, Lattronics Mfg.	317-846-5788
Mass	Waltham, Conti-Younger Assocs.	617-890-4582
Mich	Grosse Pointe Park, Greiner Assocs.	313-499-0188
Minn	Minneapolis, L. F. Green Assocs.	612-781-1611
NJ	Cherry Hill, J.N. Barrett Assocs.	609-429-1551
NJ	Fort Lee, Northern Elctrn. Comps.	201-461-2789
NY	Pompey, S.F. Foster Co.	315-677-3333
NY	Webster, S.F. Foster Co.	716-872-5220
Ohio	Cleveland, Imtech Inc.	216-826-3400
Ohio	Dayton, Imtech Inc.	513-837-5610
Tex	Dallas, Blackburn Assocs.	214-351-9991
Va	Reston, Boyle Assocs.	703-620-9558
Wash	Seattle, R. Johnston Co.	206-524-5170

Local Distributors

Cal	Los Angeles, Energy Elctrns. Prods., 6060 Manchester Ave.	213-641-9020
Mass	Burlington, Wilshire Elctrns., 1 Wilshire Rd.	617-272-8200
Tex	Dallas, KA Elctrns. Sls., 1220 Majesty Dr.	214-634-7870
Wash	Seattle, Radar Elec. Co., 168 Western Ave. W.	206-282-2511

SHAFFSTALL EQUIPMENT INC., 5149 E. 65th St., Indianapolis, Ind., 46220, Tel: 317-251-1476; Empl.: 13

For info on price: E.L. Shaffstall; Customer service: J. Ashby

Products manufactured: Readers, Recorders

SHAKESPEARE, Box 246, Columbia, S.C., 29202, Tel: 803-779-5800; Empl.: 268; Minimum order: $225

For info on price: R. Bedenbaugh; Application info: T. Bryant; Customer service: R. Scott; Delivery info: R. Scott

Free literature available: Full antenna Line Catalog; Royal Line Catalog-insert catalog, with full line of antennas and accessories; Marine Antenna Catalog-Full color catalog.

Products manufactured: Antennas, Tubing

Local Sales Offices & Reps.

Cal	Los Angeles, Wallace & Wallace	213-747-0401
Cal	Sausalito, B.H. Ballard Co.	415-332-0105
Colo	Aurora, A.E.S. Sls.	303-366-0208
Fla	Ft. Lauderdale, Sproch Sls.	305-587-3792
Ga	Savannah, Len Sherman Assocs.	912-925-3660
Ill	Chicago, Lassers & Co.	312-539-0170
Ind	Indianapolis, Kingston-Sharkey Assoc.	317-353-9406
Mich	Grand Rapids, L. Drieborg Co.	616-453-1242
Minn	St. Paul, Carl M. Co.	612-699-8004
Neb	Lincoln, Marketing Assocs.	402-464-5244
NY	S. Farmingdale, C. Drexler Co.	516-249-8206
Ohio	Youngstown, Repcom of Ohio	216-788-9404
Tex	Houston, B. Wylds Co.	713-467-0072
Utah	Murray, Kenealey Assocs.	801-268-3111
Va	Gwynn, L.H. Arnold Co.	804-725-7111

SHALLCO, INC., Box 1089, Smithfield, N.C., 27577, Tel: 919-934-3135, TWX: 510-939-1455; Empl.: 25; Minimum order: $20 .... p. 1•28,29,2272-2275; p. 2•1543

For info on price: M. Sutton; Application info: M. Sutton; Customer service: E. Lee; Delivery info: E. Lee

Free literature available: Catalog 101-attenuators, audio & RF, Catalog 102-rotary switches, Catalog 300-precision wirewound resistors

Products manufactured: Attenuators, Demagnetizers, Equalizers, Networks, Resistors, Standards, Switches

Local Sales Offices & Reps.

Cal	Los Angeles, WCV Co.	213-772-4479
Cal	Mountain View, WCV Co.	415-961-5096
Colo	Denver, Vinson Assocs.	303-757-5152
Fla	Winter Park, Ridge Instr. Co.	305-293-4711
NJ	So. Orange, SSAI	201-763-7900
NY	Rochester, D. Hurley Sls.	716-586-6159
NC	Smithfield, Byrd & Barbour Sls., Inc.	919-934-8136
Tex	Dallas, Unidyne, Inc.	214-234-3281
Wash	Seattle, Underwood & Underwood, Inc.	206-243-2133

SHALLCROSS, See Cutler Hammer Shallcross.

SHANNON LUMINOUS MAT'LS., Div. Shannon-Glow Inc., 7356 Santa Monica Blvd., Hollywood, Cal., 90046, Tel: 213-876-2660; Empl.: 10; Minimum order: $10

Free literature available: 1-Black Light & Luminous Products; 2-Flourescent Tracer Products.

Products manufactured: Detectors, Kits, Test Equipment, Lamps, Lights, Lubricants, Ultraviolet Inspection Lighting

Local Sales Offices & Reps.

Cal	Downey, Uresco	213-773-3828

SHAPIRO SCIENTIFIC INST., 3500 E. Coast Hwy., Corona del Mar, Cal., 92625, Tel: 714-675-1024; Empl.: 5

For info on price: B. Kilpatrick

Free literature available: Condensed Specifications on: Transient Waveform Generator Model 1001, Specification, Paper Tape Program Reader Model 1101 & Waveform Conditioner Model 21. Operating Instructions, Model 1001 System.

Products manufactured: Generators

SHARP ELECTRONICS CORP., 10 Keystone Pl., Paramus, N.J., 07652, Tel: 201-265-5600, Telex: 134-327

Free literature available: Descriptive brochures - Specification sheets - for Calculator Models EL-8106/8107, PC-1002, CS-365P, CS-364P and CS-2153.

Products manufactured: Calculators, Electrical & Electronic

Local Sales Offices & Reps.

Cal	Long Beach
Ill	La Grange

SHELDAHL, INC., Electrical Prods. Div., Box 170, Northfield, Minn., 55057, Tel: 507-645-5633, TWX: 910-565-2180; Empl.: 219; Minimum order: $300 p. 2•355

Application info: J. McKee; Customer service: J. Mazzitelli

Free literature available: Brochures describing flexible printed circuit manufacture. Literature describing flexible circuit applications with samples attached. Engineering brochure with design guidelines and circuit calculator available upon letterhead request.

Products manufactured: Circuits, Flexible, Laminates, Tapes, Films & Foils, Pressure Sensitive

Local Sales Offices & Reps.

Cal	Encino, R.H. McDonald & Assocs.	213-986-5832
Cal	Fremont, H.K. Foraker Co.	415-657-2213
Colo	Boulder, Component Prods. Sls. Co.	303-444-2730
Fla	Cocoa, Orbe, Inc.	305-452-9568
Fla	Ft. Lauderdale, Orbe, Inc.	305-564-8571
Fla	Orlando, MacKay, Smith, & Assocs.	305-277-1513
Ill	Arlington Hts., R. Diethert Co.	312-593-7600
Iowa	Des Moines, B.E.A.M.S.	515-282-0292
Kans	Shawnee Mission B.E.A.M.S.	913-341-7744
Mass	Norwood, Sheldahl	617-762-5703
Mich	Benton Harbor, Hampton, Askin & Assocs.	616-925-0341
Mich	Troy, McPhail Corp.	313-689-6444
Mo	St. Louis B.E.A.M.S.	314-569-1060
NY	Buffalo, R.W. Mitscher Co.	716-633-7970
NY	Jamaica, S-J Sls. Assocs.	212-291-3232
NC	Raleigh, R.W. Mitscher Co.	919-828-0575
Ohio	Columbus, McFadden Sls., Inc.	614-221-3363
Tenn	Shelbyville, R.W. Mitscher Co.	615-684-4544
Tex	Houston, Aid Elctrns., Inc.	713-777-3882
Tex	Irving, Aid Elctrns., Inc.	214-259-4761
Va	Troutville, R.W. Mitscher Co.	703-345-3283
Va	Virginia Beach, R.W. Mitscher Co.	804-481-7200
Wisc	Waukesha, R. Diethert Co.	414-547-6575
FOR:	Don Mills, Can. Ont., B.D. Vallillee Elctrns. Ltd.	416-447-8482

SHELLER-GLOBE CORP., Electro-Mechanical Instr. Div., Box 216, Perkasie, Pa., 18944, Tel: 215-249-9330, TWX: 510-665-9583; Empl.: 130 .... p. 1•668,669

Products manufactured: Indicators, Meters, Testers

Local Sales Offices & Reps.

Cal	Los Angeles, El-Com, Inc.	213-223-1351
Cal	San Carlos, D.H. Ross Co.	415-591-4411
Colo	Denver, K-C Marketers, Inc.	303-PE3-5561
Fla	Tampa, Nickerson Co.	813-885-1416
Ill	Chicago, Ropek & Cahill, Inc.	312-287-7292
Ind	Carmel, Rich Elctrn. Mktg.	317-844-8462
Kans	Shawnee Mission, Robinson & Assocs.	913-262-1374
Md	Silver Spring, H.R. Sieber Co.	301-589-9110
Mass	Boston, Anderson Sls. Co.	617-CA7-2980
Minn	Minneapolis, H.M.R., Inc.	612-920-8200
NJ	Haddonfield, T A I	609-UL4-3011
NY	Mt. Vernon, D. Sonkin Assocs.	914-MO8-9809
NY	Syracuse, Nycom, Inc.	315-437-8343
NC	Charlotte, Electro-Rep. Assocs., Inc.	704-527-2530
Ohio	Cleveland, Loesch Assocs., Inc.	216-241-4581

Pa	Philadelphia, Repco	215-722-3622
Tex	Richardson, Campion Sls. Co.	214-238-8145
Wash	Seattle, Underwood & Underwood	206-243-2133
FOR:	Can., Toronto, Ont., Wilson Enterprises	416-766-0510

SHELLY ASSOCS., Sub. of Datatron Inc., Box 11427, Santa Ana, Cal., 92711, Tel: 714-540-9330, TWX: 910-595-1589; Empl.: 45 .... p. 2•1186-1189

For info on price: G. Madole; Application info: D. Bloom; Customer service: L. Zahuranec; Delivery info: L. Zahuranec

Products manufactured: Annunciators, Bezels, Shielded & Unshielded, Display Devices/Displays, Indicators, Lamps, Lenses, Readout & Display, Lights

Local Sales Offices & Reps.

Ala	Huntsville, Tech. Reps.	205-881-5925
Ariz	Scottsdale, Williams Assoc.	602-947-4297
Cal	Anaheim, LoDan Inc.,	714-956-1560
Cal	Beverly Hills, I.A.S.	213-274-7578
Cal	San Carlos, Lo Dan Inc.	415-592-4600
Cal	San Diego, LoDan Inc	714-279-6383
Colo	Denver, Williams-Assoc.	303-373-4730
Conn	Farmington, R. Perron & Co.	203-673-4825
Conn	Trumbull, R. Perron & Co.	203-268-9631
Fla	Ft. Lauderdale, Tech. Reps.	305-792-0962
Fla	Indian Rocks Beach, Tech. Reps.	813-595-2834
Ill	Broadview, L-Comp	312-865-7600
Ill	Chicago, G. Mcl. Cole Co.	312-774-3535
Md	Baltimore, Callas Elctrns.	301-744-7711
Mass	Norwood, R. Perron & Co.	617-762-8114
Mich	Walled Lake, Berberich Assoc.	313-624-2211
Minn	Minneapolis, G.E. Arneson & Co.	612-835-2177
Mo	N. Kansas City, L-Comp	816-221-2400
Mo	St. Louis, L-Comp	314-647-5505
NH	Dover, R. Perron & Co.	603-742-2321
NJ	Harrington Park, Metro Tech. Sls.	201-768-8495
NM	Albuquerque, Williams-Assoc.	505-255-1638
NY	Fayetteville, Marty Andrews	315-637-3144
NY	Jamaica, Material for Electronics	212-322-9400
NY	Jericho, Metro Tech. Sls.	516-935-3330
Ohio	Dayton, Berberich Assoc.	513-433-0342
Pa	King of Prussia, White-Keystone	215-265-1817
Tex	Ft. Worth, Dyna Reps.	817-451-1392
Wash	Seattle, R. Thorpe & Co.	206-763-0545
FOR:	Can., Downsview, Ont., Tracan	416-638-0052
FOR:	Can., Montreal, Que., Tracan	514-341-4163
FOR:	Can., W. Vancouver B.C., Tracan	604-926-3411

Local Distributors

Cal	Alhambra, Ultex Corp., 2215 W. Valley Blvd.	213-289-9115
Cal	Mountain View, Ratel Elctrns., 815 Maude Ave.	415-965-2010
Fla	Indian Rocks Beach, Tech Rep., Box 508	813-595-2834
Ill	Broadview, LComp Chicago Inc., 2030 W. 16th St.	312-865-7600
Md	Baltimore, Callas Elctrns., 6409 Frederick	301-744-7711
Mass	Norwood, Value-Added Elctrns., 159 Morse St.	617-762-8114
Minn	Minneapolis, G.E. Arneson & Co., 4900 Viking Dr.	612-835-2177
Mo	St. Louis, LComp St. Louis Inc., 2605 S. Hanley Rd.	314-647-5505
NJ	Harrington Park, Metro Tech., 39 Blue Field Ave.	201-768-8495
NY	Jericho, Metro Tech., 333 N. Broadway	516-935-3330
Ohio	Dayton, Empire Systems, 94 Compark Dr.	513-433-0342
Tex	Ft. Worth, Dynareps, P.O. Box 8446	814-451-1392
Wash	Seattle, Shannon Ltd., 655 S Orcas	206-763-0545

SHESTER ENGINEERING CO., 8530 W. Washington Blvd., Culver City, Cal., 90230, Tel: 213-837-3332; Empl.: 9; Minimum order: $20

For info on price: J. M. Bingen; Application info: G. Shester; Customer service: J. M. Bingen; Delivery info: G. Shester

Products manufactured: Demagnetizers, Diodes, Magnetizers, Magnets, Power Supplies, Transformers

SHIGOTO INDS., LTD., 350 Fifth Ave., New York, N.Y., 10001, Tel: 212-695-0200; Empl.: 362 p. 1•2276; p. 2•2060

For info on price: M. Rubin; Application info: I. Weinstein; Customer service: E. Kramer; Delivery info: R. Evans

Free literature available: Catalogs Available- 1. Speakers, 2. Electronic Parts, 3. Resistors, 4. Reflex Horn Speakers, 5. Electronic Alarm Sirens, 6. Miniature and Subminiature Lamps, 7. Sharp Photo Optics, 8. Bolts/Screws/Nuts-Fasteners, 9. Capacitors, 10. Motors, 11. Closed Circuit TV Systems, 12. Microphones & Headphones

Products manufactured: Alarms, Amplifiers, Antennas, Arresters, Electrical Surge, Lightning, Batteries, Bearings, Bells, Buzzers, Gongs, Sirens & Aural Warning Devices, Boards, Printed Circuit, Bobbins, Winding, Coil & Transformer, Bridges, Cable, Capacitors, Fixed, Capacitors, Variable, CATV Systems & Equipment, Cells, Photoconductive, Photoemissive, Photovoltaic, Chargers, Battery, Chokes, Clamps & Clips, Coils Including Assemblies & Forms, Comm. Systems, Connector Adapters, Connectors, Contact Strips, Finger, Cords, Counters, Couplers, Demagnetizers, Dials, Diodes, Display Devices/Displays, Drivers, Speaker, Eliminators, Battery, Fasteners, Flashers, Fuses, Grilles, Handsets, Chestsets, Headphones, Headsets, Etc., Heads, Recording Playback, Erase, Indicators, Insulators & Insulation, Integrated Circuit Devices, Inverters, Isolators, Jack Adapters (All Types), Jacks (All Types), Kits, Training Aid, Knives & Knife Sets, Knobs, Labels, Pressure-Sensitive, Adhesive, Laminations, Lamps, Lead Assemblies & Receptacles, Leads, Test & Adaptors, Lenses, Optical & Camera, Lights, Magnets, Meters, Microphones, All Kinds, Motor & Generator Armatures, Rotors, Stators, Motors, Nameplates, Networks, Phonographs, Parts & Accessories, Pickups, Telephone (For Recording), Plug Adapters, Plug & Jack Sets, Plugs, Posts, Potentiometers, Power Supplies, Public Address Systems, Rectifiers, Regulators, Relays, Resistors, Rheostats, Scissors, Screwdrivers, Sensors, Light, Services, Assembly, Production & Test, Shunts, Meter, Socket Adapters, Sockets, Solenoids, Speaker Systems, Speakers, Springs (All Types), Switches, Television Systems & Equipment Closed-Circuit, Terminal Blocks, Boards & Strips, Terminals, Testers, Thermistors, Thermostats, Timers, Tools, Transformers, Transistors, Tubes, Tuners, Wire, Wire Nuts

Local Sales Offices & Reps.

Ill	Park Ridge, Metcom Assocs. Corp.	312-696-1490
Md	Towson, Wyncote Instrumentation Co.	301-821-5422
Mich	Farmington, Miltimore Sls. Inc.	313-476-2446
Ohio	Chagrin Falls, Pine Sls. & Engrg. Co.	216-247-6198
Pa	Ambler, Wyncote Instrumentation Co.	215-643-2440

SHOWA MUSEN KOGYO CO., LTD., 5-5 6-Chome Togashi, Shinagawa-Ku Tokyo, Japan, Tel: 785-1111; Empl.: 1300

Products manufactured: Clamps & Clips, Connector Adapters, Connector Boxes & Strips, Power Outlet, Connectors, Insulators & Insulation, Jack Adapters (All Types), Jacks (All Types), Keyboards, Alphanumeric & Decimal, Panels, Plug Adapters, Plugs, Posts, Sockets, Switches, Terminal Blocks, Boards & Strips, Terminals

Local Sales Offices & Reps.

Cal	Gardena, SMK Elctrns. Corp. of America	213-770-8915

SHURE BROTHERS, INC., 222 Hartrey Ave., Evanston, Ill., 60204, Tel: 312-DA8-9000, TWX: 910-231-0048

Customer service: 679-5830

Free literature available: Vocal Master Sound System Catalog - AL335; SR Professional Sound Reinforcement Equipment Catalog - AL470; High Fidelity Products Catalog - AL210; Microphones & Circuitry for Public Address, Tape Recording & Communications Catalog - AL 314; Professional Microphone Products Catalog - AL312.

Products manufactured: Accelerometers, Amplifiers, Attenuators, Cases, Equipment, Instrument, Meter, Equalizers, Filters, Generators, Handsets, Chestsets, Headphones, Headsets, Etc., Microphone Accessories (Including Stands, Holders, Booms), Microphones, All Kinds, Mixers, Networks, Phonographs, Parts & Accessories, Public Address Systems, Slide Rules (Circuitry Computing), Speaker Systems, Speakers, Transformers

SHURITE METERS, 428 Chapel St., New Haven, Conn., 06508, Tel: 203-787-5824, TWX: 710-465-3165; Minimum order: $25

Customer service: W. Fitzgerald 203-772-2220

Free literature available: Catalog 100B - Describes and illustrates various case styles and ranges available in inexpensive AC and DC Panel Meters.

Products manufactured: Meters

Local Sales Offices & Reps.

Cal	Inglewood, J. Berman Co.	213-678-1281
Cal	La Mesa, J. Berman Co.	714-583-6457
Cal	Oakland, Moulthrop Sls.	415-261-7676
Colo	Denver, Nelson Co.	303-573-1516
Conn	Wallingford, Adams-McGregor	203-269-5816
Fla	Maitland, Hutto-Hawkins-Peregoy	305-831-2474
Fla	Pompano Beach, Hutto-Hawkins-Peregoy	305-943-9593
Ga	Atlanta, Millar Elctrns.	404-261-6160
Ill	Oak Park, G. Petitt Co.	312-369-8940
Ind	Fort Wayne, W.W. Bieberich	219-432-2537
Kans	Overland Park, T.L. Dowell & Assocs.	913-236-8200
Md	Reisterstown, Massey Assocs.	301-833-2039
Mass	Scitaute, Adams-McGregor	617-542-3773
Mich	St. Clair Shores, J.M. Thorpe Co.	313-779-6363
Minn	Minneapolis, Heimann Co.	612-861-6051
NY	Long Island City, D.F. Tobias & Co.	212-545-9191
NY	Syracuse, H.R. Murray	315-446-5555
NC	Raleigh, Millar Elctrns.	919-787-9564
Ohio	Dayton, C.H. Dolfuss, Jr. & Co.	513-275-4831
Ohio	Rocky River, C.H. Dolfuss, Jr. & Co.	216-333-7504
Pa	Media, Snyder & Massey Assocs.	215-566-5400
Pa	Pittsburgh, G.S. Root & Co.	412-561-4125
RI	Lincoln, Adams-McGregor	401-726-1300
Tex	Dallas, Lund & Co.	214-358-4335
Wash	Seattle, J.J. Backer Co.	206-285-1300

SIEMENS CORP., Comps Div., Box 1390, Scottsdale, Ariz., 85252 .... p. 1•1858-1862

Products manufactured: Diodes

SIEMENS CORP., 186 Wood Ave., S., Iselin, N.J., 08830, Tel: 201-494-1000; Empl.: 800

Products manufactured: Amplifiers, Arresters, Electrical Surge, Lightning, Capacitors, Fixed, Cells, Photoconductive, Photoemissive, Photovoltaic, Chokes, Cores, Magnetic, Crystals, Diodes, Display Devices/Displays, Ferrite Material & Parts, Filters, Integrated Circuit Devices, Intensifiers, Image, Isolators, Lamps, Lasers & Laser Systems, Lights, Magnetoresistors, Hall, Power Supplies, Protectors, Recorders, Rectifiers, Relays, Resistors, Suppressors, Switches, Thyristors (Includes Silicon Controlled Rectifiers), Transistors, Tubes

Local Sales Offices & Reps.

Ala	Huntsville, Interep Assocs.	205-881-3677
Ariz	Scottsdale, Siemens	602-947-2231
Cal	Burlingame, Siemens	415-697-6851
Cal	El Segundo, Varigon Assocs.	213-679-0621
Cal	San Diego, S. R. Elctrns.	714-565-8411
Cal	San Leandro, Quadrep	415-352-5942
Cal	Sunnyvale, Quadrep	408-733-7300
Cal	Torrance, Siemens	213-370-3611
Colo	Denver, Omega Limited	303-758-1508
Conn	West Simsburg, Anchor Engrg. Corp.	203-658-6261
Fla	Clearwater, Perrott Assocs.	813-726-1529
Fla	Orlando, Perrott Assocs.	305-275-1132
Ga	Atlanta, Interep Assocs.	404-394-7756
Ill	Chicago, Siemens Corp.	312-671-2810
Iowa	Cedar Rapids, Gassner & Clark	319-393-5763
Md	Baltimore, J.A. Maguire Co.	301-377-0223
Mass	Newton Upper Falls, Anchor Engrg. Corp.	617-964-6205
Minn	St. Paul, Cahill Assocs.	612-646-7217
Mo	Hazelwood, Dy-Tronix	314-731-5799
NJ	Pennsauken, J.A. Maguire & Co.	609-665-5136
NM	Albuquerque, A. Q. Elctrns.	505-255-8701
NY	Plainview, E.R.A., Inc.	516-822-9890
NY	Rochester, Electra Sls.	716-436-4030
NY	Syracuse, Electra Sales	315-455-5783
NY	Syracuse, T-Squared	315-463-8592
NC	Winston-Salem, J. A. Maguire	919-723-5980
Ohio	Cleveland, C. Dolfuss Co.	216-333-7504
Tex	Dallas, Siemens	214-424-8333
Utah	Salt Lake City, Omega, Ltd.	801-266-9617
Wash	Bellevue, R. Over Sales	206-454-4551

SIEMENS CORP.-COMPUTEST PRODUCTS, Power Engrg. Div., 3 Computer Dr., Cherry Hill, N.J., 08002, Tel: 609-424-2400; Empl.: 225

Products manufactured: Test Systems, Testers

Local Sales Offices & Reps.

Ariz	Scottsdale, PLS Inc.	602-957-9110
Cal	Los Gatos, Yoshikawa Assocs.	408-374-3086
Cal	North Hollywood, E. Momjian Assocs.	213-764-4891
Cal	Sunnyvale, Siemens Corp.	408-734-8484
Colo	Denver, PLS Inc.	303-771-10599
Conn	Avon, Instrument Dynamics Inc.	203-678-1088
Fla	Orlando, Gentry Assocs.	305-894-4401
Kans	Prairie Village, Engineering Svcs.	913-649-4000
Md	Bethesda, Powell-Pendergraph Inc.	301-656-4535
Mass	Wakefield, Instrument Dynamics Inc.	617-245-5100
Mich	Royal Oak, Hocker Assocs.	313-549-3910
Minn	Minneapolis, Engineering Prods Assoc.	612-925-1883
Mo	St. Louis, Engineering Svcs.	314-997-1515
NJ	Berkley, AMC, Inc.	201-464-5100
NY	Liverpool, R & D Assocs.	315-622-2350
NC	Burlington, Gentry Assocs.	919-227-3639
NM	Albuquerque, PLS Inc.	505-255-2330
Ohio	Dayton, Hocker Assocs.	513-298-8638
Ohio	N. Olmstead, Hocker Assocs.	216-734-4433
Pa	Abington, Powell-Pendergraph Inc.	215-657-0330
Tex	Dallas, Data Aids Assocs.	214-620-1551
Tex	Houston, Data Aids Assocs.	713-862-6685
Va	Richmond, Powell-Pendergraph Inc.	804-264-2341
Wash	Seattle, Datacom	206-285-2525

SIERRA ELEC., Div. Sola Basic Inds., 15100 S. Figueroa St., Gardena, Calif., 90248, Tel: 213-321-1000; Empl.: 500; Minimum order: $25

For info on price: C. L. Keeshen; Application info: C. L. Keeshen; Customer service: D. Kaufman; Delivery info: D. Kaufman

Products manufactured: Antenna Feed Systems, Connector Boxes & Strips, Power Outlet, Indicators, Jack Adapters (All Types), Jack Covers, Jacks (All Types), Plug & Jack Sets, Relays, Sockets, Switch Mounting Plates, Switches

SIERRA SCIENTIFIC CORP., 2189 Leghorn St., Mountain View, Cal., 94043, Tel: 415-969-9315; Empl.: 35

Customer service: D. Gilblom

Free literature available: Technical descriptions and specificationf of television cameras and displays for medical, industrial, scientific, and OEM applications.

Products manufactured: Cameras, Monitors, Television Systems & Equipment Closed-Circuit

Local Sales Offices & Reps.

Cal	Millbrae, Ashby Assocs. of No. Cal.	415-692-4442
Cal	Pasadena, A-F Sls. Engrg.	213-681-5631
Fla	Orlando, Datarep	305-843-5224
Fla	Pompano Beach, Datarep	305-781-9279
Mass	Attleboro, Elctrn. Sls. of New England	617-222-4078
Mass	Cambridge, Media Systems	617-876-0164
NJ	Totowa, H.M. Holzberg Assocs.	201-256-0455
Ohio	Dayton, Genelco	513-299-1819
Okla	Norman, Data Mktg Assocs.	405-364-8320
Tex	Dallas, Data Mktg. Assocs.	214-661-0300
Tex	Houston, Data Mktg. Assocs.	713-686-9627
Tex	San Antonio, Data Mktg. Assocs.	512-828-0937
Va	Vienna, Sutter & Co.	703-938-0505

SIERRACIN/MAGNEDYNE INC., 5580 El Camino Real, Box 458, Carlsbad, Calif., 92008, Tel: 714-729-7191, TWX: 910 322-1391; Empl.: 55 p. 1•982,983

Customer service: C. McElhiney

Free literature available: Data sheets and reduced drawings.

Products manufactured: Actuators, Motors, Tachometers

Local Sales Offices & Reps.

Ariz	Scottsdale, Kachina Assocs.	602-947-4472
Cal	Manhattan Beach, Tri-Tek	213-545-4649
Cal	Palo Alto, Harris Engrg. Assocs.	415-328-3370
Colo	Denver, Rope & Williamson	303-758-8507
Fla	St. Petersburg, Russell Assocs.	813-526-1134
Ill	Chicago, J. Popp Sls.	312-626-3711
Mich	Detroit, B E S C O	313-559-0444
Mich	Grand Rapids, B E S C O	616-942-1190
NJ	Wayne, SHL & Assocs.	201-523-1714
Ohio	Cleveland, D. Steffen & Assoc.	216-461-8333
Ohio	Dayton, D. Steffen & Assoc.	513-293-3145
Pa	Valley Forge, Gil-Tronics, Inc.	215-933-8525

SIERRACIN/THERMAL SYS., 13920 S. Broadway, Los Angeles, Cal., 90061, Tel: 213-FA1-4350, TWX: 910-346-6774; FSC No: 11416; Empl.: 110; Minimum order: $25

For info on price: E. W. Swanson; Application info: E. W. Swanson; Customer service: D. Jenson; Delivery info: D. Jenson

Free literature available: General Capabilities and Facility Brochure describing our ability to produce flexible electrical heating elements, temperature sensors and solid state electronic controllers and signal conditioning.

Products manufactured: Controls/Control Eqpt., Heaters & Heating Elements, Monitors, Ovens, Probes, Standards, Thermocouples, Elements & Accessories, Transducers

Local Sales Offices & Reps.

Ala	Huntsville, Kemp Instrs.	205-837-4304
Ariz	Phoenix, R.A. Mayes Co.	602-279-5243
Cal	Costa Mesa, Scrantom Engr.	714-979-6373
Cal	Palo Alto, Harris Engr. Assoc.	415-328-3370
Colo	Boulder, R.A. Mayes Co.	303-444-07782
Conn	Guilford, R.H. Whitehead Assoc.	203-453-3762
Fla	Ft. Lauderdale, Orbe	305-564-8571
Ill	Oak Park, J. Popp Sls. Co.	312-626-3711
Kans	Overland Park, Penzner-Mankus Assocs.	913-381-0004
Md	Rockville, Farrell Assocs.	301-424-9460
Mass	Boston, R.H. Whitehead Assocs.	617-542-7676
Mich	Plymouth, ROMARC	313-455-0300
Mo	Hazelwood, Penzner-Mankus Assoc.	314-731-4334
NJ	East Orange, Friedman Assoc.	201-673-2500
NM	Albuquerque, R.A. Mayes Co.	505-292-2330
NY	Buffalo, H.C. Johnson Agen.	716-632-7880
NY	Rochester, H.C. Johnson Agen.	716-482-3000
NC	Winston-Salem, Electronic Mktg. Assoc.	919-722-5151
Ohio	Cincinnati, Giesting & Assocs.	513-931-0812
Pa	Glenside, Elcom	215-885-1325
SC	Greenville, Electronic Mktg. Assoc.	803-268-1125
Tex	Dallas, Apogee Engr. Svcs.	214-352-2083
Wash	Renton, D & D Sls	206-226-4120

SIFCO METACHEMICAL, Div. Steel Improv. & Forging, 5708 Schaaf Rd., Independence, Ohio, 44131, Tel: 216-881-8600; Empl.: 25; Minimum order: $25

For info on price: J. White X345; Application info: J. Norris X348; Customer service: R. Jarnigan X346; Delivery info: V. Ehrenscheider X347

Free literature available: General and technical data on DALIC brush plating deposits and applications.

Products manufactured: Chemicals, Electroplating Equipment & Supplies, Services, Assembly, Production & Test

Local Sales Offices & Reps.

Cal	Pasadena, Piddington Assoc.	213-795-8029

SIGMA INSTRUMENTS, INC., 170 Pearl St., Braintree, Mass., 02184, Tel: 617-843-5000, TWX: 710-348-1161; Empl.: 1050; Minimum order: $30

Customer service: Cust. Svc. Dept.

Free literature available: Relay Stock Catalog; Stepping Motor Catalog; Panel Meter Catalog.

Products manufactured: Alarms, Amplifiers, Controllers, Programmable, Controls/Control Eqpt., Delays, Time (Excluding Delay Lines, Timers, Delay & Relays, Time-Delays), Drivers, Chopper, Drives & Drive Mechanisms (Dial), Encoders, Indicators, Isolators, Meters, Monitors, Motors, Power Drivers, Hybrid (High Current, High Voltage), Reactors, Relays, Sockets, Switches, Testers, Timers

Local Sales Offices & Reps.

Meters

Ala	Huntsville, Brandel-Stephens & Co.	205-883-0445
Ariz	Phoenix, J S Heaton Co.	602-264-7887
Cal	Burlingame, Engrg. Reps. Co.	415-692-2481
Cal	Hawthorne, Barnard & Assocs.	213-973-5050
Cal	San Diego, Engrg. Reps. Co.	714-296-2925
Colo	Englewood, Tech Sls.	303-789-2864
Conn	Middletown, Roy Dennis Co.	203-344-3273
Fla	Deerfield Beach, Brandel-Stephens & Co.	305-399-8558
Fla	Orlando, Brandel-Stephens & Co.	305-425-3202
Ga	Atlanta, Brandel-Stephens & Co.	404-261-7579
Ill	Chicago, Gassner & Clark Co.	312-764-6121
Kans	Kansas City, Technical Sls. Assocs.	913-888-3330
La	Harahan, Williams Equip. Co.	504-737-4082
Md	Baltimore, J.R. Daniel Co.	301-825-3330
Mass	Needham, Northeast Reps.	617-449-3034
Mich	Detroit, Stress Analysis Svcs.	313-535-1120
Minn	Minneapolis, Pilot Sls. & Engrg.	612-546-4328
Mo	Ferguson, Technical Sls. Assocs.	314-725-5361
NJ	Stirling, NBS Assocs.	201-464-8500
NM	Albuquerque, J.S. Heaton Co.	505-293-3900
NY	Albany, H.C. Johnson Agencies	518-456-9681
NY	Binghamton, H.C. Johnson Agencies	607-723-6500
NY	Buffalo, H.C. Johnson Agencies	716-632-7880
NY	Rochester, H.C. Johnson Agencies	716-482-3000
NY	Syracuse, H.C. Johnson Agencies	315-637-9383
NC	Charlotte, D.G.W., Inc.	704-334-7090
NC	Winston-Salem, D.G.W., Inc.	919-768-7166
Ohio	Medina, Stress Analysis Svcs.	216-725-7733
Okla	Tulsa, Telstar Inst. Corp.	918-628-1011
Pa	Glenshaw, H.C. Johnson Agencies	412-961-0414
Pa	Philadelphia, Stitzer Assocs.	215-644-5500
Tex	Dallas, J.B. Guenther	214-528-6286
Tex	Houston, J.B. Guenther	713-468-0232
Wash	Tukwila, General Elctrns.	206-243-5141

Motors

Ariz	Phoenix, J S Heaton Co.	602-264-7887
Cal	Los Angeles, Halbar Assocs.	213-387-8283
Cal	San Jose, J. T. McFarland Assocs.	408-268-2600
Colo	Denver, Thorson Co.	303-759-0809
Conn	Torrington, Motoreps of New England	203-482-3193
Ga	Lilburn, Motion Technology	404-233-4368
Ill	Des Plaines, Control Sls.	312-774-1674
Ind	Indianapolis, L.M. DeVoe Co.	317-257-1227
Kans	Kansas City, Technical Sls. Assocs.	913-888-3330
Md	New Carrollton, W.A. Brown Equip-Comp	301-577-4527
Mich	Troy, Control Sls. Assocs.	313-391-3235
Minn	Minnetonka, T.H. Ayre, Assoc.	612-474-4125
Mo	Ferguson, Technical Sls. Assocs.	314-725-5361
NJ	Camden, QED Elctrns.	215-925-8711
NJ	Red Bank, Motoreps of N.Y.	201-741-3356
NM	Albuquerque, J.S. Heaton Co.	505-293-3900
NY	Buffalo, H.C. Johnson Agencies	716-632-7880
NY	Rochester, H.C. Johnson Agencies	716-482-3000
NC	Charlotte, Motion Technology	704-525-9855
Ohio	Chagrin Falls, Drivex Corp.	216-247-6701
Ohio	Cincinnati, Drivex Corp.	513-825-3583
Okla	Broken Arrow, P.J. Scanlon Co.	918-251-1427
Pa	Glenshaw, H.C. Johnson Agencies	412-961-0414
Tex	Dallas, P.J. Scanlon Co.	214-231-4661
Va	Alexandria, W.A. Brown Equip-Comp.	703-360-5375
Wash	Tukwila, General Elctrns.	206-243-5141
Wisc	Milwaukee, Control Sls.	414-964-3322

Relays

Ala	Huntsville, Brandel-Stephens & Co.	205-883-0445
Ariz	Phoenix, J S Heaton Co.	602-264-7887
Cal	El Segundo, Varigon Assocs.	213-679-0621
Cal	Los Altos, Ewing-Foley, Inc.	415-941-4525
Cal	San Diego, Daniels & Doty Sls. Co.	714-560-6266
Conn	North Haven, Northeast Reps.	203-239-2507
Fla	Deerfield Beach, Brandel-Stephens & Co.	305-399-8558
Fla	Orlando, Brandel-Stephens & Co.	305-425-3202
Ga	Atlanta, Brandel-Stephens & Co.	404-261-7579
Ill	Des Plaines, 312-774-1674	
Ind	Indianapolis, L.M. DeVoe Co.	317-257-1227
Kans	Kansas City, Technical Sls. Assocs.	913-888-3330
Md	Baltimore, Coulbourn DeGrief, Inc.	301-247-4646
Mass	Needham, Northeast Reps.	617-449-3034
Mich	Southfield, R.C. Nordstrom & Co.	313-559-7373
Minn	Edina, Wagner Consltg. Corp.	612-941-6310
Mo	Ferguson, Technical Sls. Assocs.	314-725-5361
NJ	Irvington, M. Gallagher, Inc.	201-399-4350
NM	Albuquerque, J.S. Heaton Co.	505-293-3900
NY	Binghamton, H.C. Johnson Agencies	607-723-6500
NY	Buffalo, H.C. Johnson Agencies	716-632-7880
NY	Rochester, H.C. Johnson Agencies	716-482-3000
NY	Syracuse, H.C. Johnson Agencies	315-637-9383
NC	Charlotte, D.G.W., Inc.	704-334-7090
NC	Winston-Salem, D.G.W., Inc.	919-768-7166
Ohio	Dayton, Bear Mktg.	513-299-3566
Ohio	Richfield, Bear Mktg.	216-659-3131
Pa	Glenshaw, H.C. Johnson Agencies	412-961-0414
Pa	Media, W. Reeves Assocs.	215-566-6709
Tex	Dallas, P.J. Scanlon Co.	214-231-4661
Wash	Tukwila, General Elctrns.	206-243-5141

Wisc	Milwaukee, Control Sls.	414-964-3322

SIGMA SYS. CORP., 3163 Adams Ave., San Diego, Calif., 92116, Tel: 714-283-3193; Empl.: 8; Minimum order: $15

Customer service: T. Stewart

Free literature available: Heat Gun - temperature controlled: brochure describes features (some patented), applications, economic factors of use. Model C precision temperature chamber controller for upgrade/retrofit on old and modern chambers. Gives specs, instructions & function connections. Liquid carbon dioxide conditioners: for temperature chamber users. Brochure describes cleaning (by distillation), drying and prechilling liquid Co2 plus method of distribution in vapor stage thru uninsulated lines. Precision temperature chambers. Brochure gives features & specs on line of std. chambers, sizes from 25 to 150 liters.

Products manufactured: Chamber, Environmental Test, Controls/Control Eqpt., Heat Guns, Production

Advertisment

Liquid cardon dioxide conditioners for temperature chamber users. Sigma's model CDC-12 cleans (by distillation), drys and precools liquid Carbon Dioxide and permits its distribution in vapor stage through uninsulated lines. Also standard & custom chambers plus retrofit three mode controllers.

SIGNAL TRANSFORMER CO., 1 Junius St., Brooklyn, N.Y., 11212, Tel: 212-498-5111, Telex: 12-5709; Empl.: 90 .... p. 2•1791-1802

For info on price: A. Leibonitz; Application info: J. Millman; Customer service: A. Skurnick; Delivery info: S. Jaffee

Products manufactured: Chokes, Transformers

SIGNALITE DIV., Gen. Instr., 1933 Heck Ave., Neptune, N.J., 07753, Tel: 201-775-2490, TWX: 201-775-2255; Empl.: 300; Minimum order: $30

For info on price: N. Fraser; Application info: T. Wolstencroft; Customer service: B. Bry; Delivery info: B. Bry

Free literature available: Neon glow lamps - definition & specs; Comm gaps, Spark gap, Regulators - brief tech bulletins; Noise source catalogue - definition & specs.

Products manufactured: Arresters, Electrical Surge, Lightning, Diodes, Display Devices/Displays, Lamps, Regulators

Local Sales Offices & Reps.

Cal	Los Altos, W.W. Posey Co.	415-948-7771
Cal	N. Hollywood, Chicago Miniature	213-877-0887
Colo	Denver, Lindberg Co.	303-758-9033
Conn	Newton, Gerber Sls. Corp.	203-426-3440
Fla	Hollywood, Component Engr. Sls.	305-922-5230
Ill	Elk Grove Village, J.G. Twist Co.	312-593-0200
Ind	Fort Wayne, R.O. Whitesell & Assocs.	219-432-5591
Ind	Indianapolis, R.O. Whitesell & Assocs.	317-359-9283
Ind	Kokomo, R.O. Whitesell Assocs.	317-452-6065
Iowa	Cedar Rapids, J.G. Twist Co.	319-393-8703
Kans	Prairie Village, J.G. Twist Co.	913-236-4646
Ky	Louisville, R.O. Whitesell & Assocs.	502-893-7303
Mass	East Longmeadow, Gerber Sls. Corp.	413-525-3059
Mass	Waltham, Gerber Sls. Corp.	617-890-8040
Mich	Grand Rapids, R.O. Whitesell & Assocs.	616-451-8901
Mich	Southfield, R.O. Whitesell & Assocs.	313-358-2020
Mich	St. Joseph, R.O. Whitesell & Assocs.	616-983-7337
Minn	Minneapolis, Nortec Sls. Inc.	612-835-7414
Miss	Corinth, Rakes Engr. & Mkt. Corp.	601-287-2055
Mo	St. Louis, J.G. Twist Co.	314-432-2830
NJ	Neptune, Signalite	201-775-2490
NY	Syracuse, Nycom Inc.	315-437-8343
NC	Charlotte, B. Henry Assocs.	704-375-8958
Ohio	Cincinnati, R.O. Whitesell & Assocs.	513-521-2290
Ohio	Columbus, R.O. Whitesell & Assocs.	614-888-9396
Ohio	Dayton, R.O. Whitesell & Assocs.	513-298-9546
Ohio	Lakewood, R.O. Whitesell & Assocs.	216-228-7525
Pa	Lafayette Hill, M. Lader Co.	215-825-3177
Pa	Pittsburgh, R.O. Whitesell & Assocs.	412-344-7277
Tenn	Bristol, Rakes Engr. & Mkt. Corp.	615-968-4195
Tex	Dallas, J.B. Guenther	214-691-8500
Tex	Houston, J.B. Guenther	713-468-0232
Utah	Salt Lake City, Lindberg Co.	801-364-6409
Va	Woodbridge, M. Lader Co.	202-296-2497
Wash	Seattle, Blum & Assocs.	206-285-2590
Wisc	Wauwatosa, J.G. Twist Co.	414-475-7755
FOR:	Can., Montreal, Gen. Instr. Can.	514-636-9454
FOR:	Can., Toronto 338, Ont., Gen. Instr. Can.	416-763-4133

SIGNET SCIENTIFIC CO., Box 6489, Burbank, Cal., 91510, Tel: 213-849-6071, TWX: 910-498-2212; Empl.: 35; Minimum order: $25

Customer service: D. Salisbury

Products manufactured: Controls/Control Eqpt., Heaters & Heating Elements, Lights, Monitors, Oceanographic Equip. (Electronic), Ovens, Switches, Transducers

SIGNETICS CORP., 811 E. Arques Ave., Sunnyvale, Cal., 94086, Tel: 408-739-7700, TWX: 910-339-9220; Minimum order: $250

Products manufactured: Integrated Circuit Devices, Transistors

Local Sales Offices & Reps.

Ala	Huntsville, 20th Century Mktg.	205-772-9237
Ariz	Phoenix, Signetics Corp.	602-971-2517
Cal	Encino, Signetics Corp.	213-990-2610
Cal	Irvine, Signetics Corp.	714-833-8980
Cal	San Diego, Signetics Corp.	714-560-0242
Cal	Sunnyvale, Signetics Corp.	408-736-7565
Colo	Denver, Parker/Webster Co.	303-770-1972
Conn	Hamden, Kanan Assocs.	203-288-9276
Fla	Altamonte Springs, Wmm Assocs.	305-831-4645
Fla	Clearwater, Signetics Corp.	813-531-3359
Fla	Pompano Beach, Signetics Corp.	305-782-8225
Ga	Douglasville, 20th Century Mktg.	404-942-6483
Ill	Rolling Meadows, Signetics Corp.	312-259-8300
Ind	Indianapolis, Signetics Corp.	317-545-3232
Kans	Olathe, B.C. Elctrn. Sls.	913-782-6696
Md	Rockville, Signetics Corp.	301-881-5710
Mass	Lexington, Signetics Corp.	617-861-0840
Mass	Reading, Kanan Assocs.	617-944-8484
Mich	Detroit, Rathsburg Assocs.	313-882-1717
Minn	Minneapolis, Signetics Corp.	612-884-7451
Mo	Hazelwood, B.C. Elctrn. Sls.	314-731-1255
NJ	Medford, Signetics Corp.	609-665-5071
NJ	Piscataway, Signetics Corp.	201-981-0123
NM	Albuquerque, Staley Co.	505-294-2660
NY	Dewitt, Tri Tech Elctrns.	315-446-2881
NY	E. Rochester, Tri Tech Elctrns.	916-381-2722
NY	Larchmont, Tri Tech Elctrns.	914-834-4423
NY	Wappingers Falls, Signetics Corp.	914-297-4074
NY	Woodbury, Signetics Corp.	516-364-9100
Ohio	Centerville, N. Case Assocs.	513-433-0966
Ohio	Fairview Park, N. Case Assocs.	216-333-4120
Ore	Portland, Western Tech. Sls.	503-297-1711
Tex	Dallas, Signetics Corp.	214-661-1296
Tex	Houston, Signetics Corp.	713-771-9265
Utah	Salt Lake City, Parker/Webster	801-486-3737
Wash	Bellevue, Western Tech. Sls.	206-641-3900

Local Distributors

Ariz	Phoenix, Hamilton/Avnet Elctrns., 2615 S. 21st St.	602-275-7851
Ariz	Phoenix, Kierulff Elctrns., 2633 E. Buckeye Rd.	602-273-7331
Cal	Culver City, Hamilton Electro Sls., 10912 W. Washington	213-870-7171
Cal	El Segundo, Liberty Elctrns., 124 Maryland St.	213-322-8100
Cal	Los Angeles, Kierulff Elctrns., 2585 Commerce Way	213-685-5511
Cal	Mountain View, Hamilton/Avnet Elctrns., 575 East Middlefield Rd.	415-961-7000
Cal	Palo Alto, Kierulff Elctrns., 3969 E. Bayshore Rd.	415-968-6292
Cal	San Diego, Cramer Elctrns., 8913 Complex Dr., Suite E	714-565-1881
Cal	San Diego, Hamilton/Avnet Elctrns., 8917 Complex Dr.	714-279-2421
Cal	San Diego, Kierulff Elctrns., 8797 Balbooa Ave.	714-278-2112
Cal	Sunnyvale, Cramer Elctrns., 720 Palomar	408-739-3011
Colo	Denver, Cramer Elctrns., 5465 Evans Pl. at Hudson	303-758-2100
Colo	Denver, Hamilton/Avnet Elctrns., 5921 N. Broadway	303-534-1212
Conn	Georgetown, Hamilton/Avnet Elctrns., 643 Danbury Rd.	203-762-0361
Conn	Hamden, Arrow Elctrns., 295 Treadwell St.	203-248-3801
Conn	North Haven, Cramer Elctrns., 35 Dodge Ave.	203-239-5641
Fla	Hollywood, Hamilton/Avnet Elctrns., 4020 No. 29th Ave.	305-925-5401
Fla	Hollywood, Schweber Elctrns., 2830 N. 28th Terrace	305-927-0511
Fla	Orlando, Hammond Elctrns., 911 W. Central Blvd.	305-241-6601
Ga	Atlanta, Schweber Elctrns., 4126 Pleasantdale Rd., Suite 14	404-449-9170
Ga	Norcross, Hamilton/Avnet Elctrns., 6700 Interstate 85 Access Rd.	404-448-0800
Ill	Elk Grove, Schweber Elctrns., 1380 Javis Ave.	312-593-2740
Ill	Elmhurst, Semiconductor Specialists, 195 Spangler Ave.	312-279-1000
Ill	Schiller Park, Hamilton/Avnet Elctrns., 3901 No. 25th Ave.	312-678-6310
Ind	Indianapolis, Semiconductor Specialists, Box 41630	317-243-8271
Kans	Lenexa, Hall-Mark Elctrns., 9006 Rosehill Rd.	913-888-4747
Kans	Lenexa, Hamilton/Avnet Elctrns., 37 Lehexa Ind'l. Center, 9900 Pflumm Rd.	913-888-8900
Md	Hanover, Hamilton/Avnet Elctrns., 7255 Standard Dr.	301-796-5000
Md	Rockville, Pioneer Washington Elctrns., 1037 Taft St.	301-424-3300
Md	Rockville, Schweber Elctrns., 5640 Fisher La.	301-881-2970
Mass	Burlington, Hamilton/Avnet Elctrns., 185 Cambridge St.	617-273-2120
Mass	Newton, Cramer, 85 Wells Ave.	617-969-7700
Mass	Waltham, Schweber Elctrns., 213 Third Ave.	617-890-8484
Mich	Farmington, Semiconductor Specialists, 33505 State St.	313-478-2700
Mich	Livonia, Hamilton/Avnet Elctrns., 12870 Farmington Rd.	313-522-4700
Mich	Troy, Schweber Elctrns., 86 Executive Drive	313-583-9242
Minn	Edina, Hamilton/Avnet Elctrns., 7683 Washington Ave. S.	612-941-3801
Minn	Edina, Schweber Elctrns., 7015 Washington Ave., S.	612-944-5280
Minn	Minneapolis, Semiconductor Specialists, 8330 Cedar AVe. S.	612-845-8844
Mo	Hazelwood, Hamilton/Avnet Elctrns., 364 Brookes La.	314-731-1144
Mo	St. Louis, Hall-Mark Elctrns., 6100 Madison Ave.	314-521-3800
NJ	Cedar Grove, Hamilton/Avnet Elctrns., 218 Little Falls Rd.	201-239-0800
NJ	Cherry Hill, Milgray-Delaware Valley, 1165 Marlkress Rd.	609-424-1300
NJ	Moorestown, Arrow/Angus Elctrns., Pleasant Valley Rd.	609-235-1900
NJ	Mt. Laurel, Hamilton/Avnet Elctrns., 113 Gaither Dr., E. Gate Ind'l. Pk.	609-234-2133
NJ	Saddlebrook, Arrow Elctrns., 285 Midland Ave.	201-797-5800
NJ	Somerset, Schweber Elctrns., 43 Belmont Dr.	201-469-6008
NM	Albuquerque, Cramer Elctrns., 137 Vermont, N.E.	505-265-5767
NM	Albuquerque, Hamilton/Avnet Elctrns., 2450 Baylor Dr. S.E.	505-765-1500
NY	Buffalo, Summit Dist., 916 Main ST.	716-884-3450
NY	Farmingdale, Arrow Elctrns., 900 Broad Hollow Rd.	516-694-6800
NY	Rochester, Schweber Elctrns., 2 Townline Circle	716-461-4000
NY	Syracuse, Hamilton/Avnet Elctrns., 6500 Joy Rd.	315-437-2642
NY	Westbury, Hamilton/Avnet Elctrns., 70 State St.	516-333-5800
NY	Westbury, Schweber Elctrns., Jericho Tpk.	516-334-7474
NC	Greensboro, Hammond Elctrns., Box 21728	919-275-6391
Ohio	Beechwood, Schweber Elctrns., 23880 Commerce Pk Rd.	216-464-2970
Ohio	Cleveland, Arrow Elctrns., 23500 Mercantile Rd.	216-464-2000
Ohio	Cleveland, Pioneer Standard Elctrns., 4800 E. 131st St.	216-587-3600
Ohio	Kettering, Arrow Elctrns., 3100 Plainfield Rd.	513-253-9176
OHio	Dayton, Hamilton/Avnet Elctrns., 118 W. Park Rd.	513-433-0610

Tex	Austin, Schweber Elctrns., 2628 Longhorn B	512-837-2890
Tex	Dallas, Cramer Elctrns., 13740 Midway Rd.	214-661-9300
Tex	Dallas, Hamilton/Avnet Elctrns., 4445 Sigma Rd.	214-661-8661
Tex	Dallas, Schweber Elctrns., 14177 Proton	214-661-5010
Tex	Houston, Component Specialties, 7313 Ashcroft, Suite 202	713-771-7237
Tex	Houston, Hamilton/Avnet Elctrns., 1216 W. Clay St.	713-526-4661
Tex	Houston, Schweber Elctrns., 7420 Harwin Dr.	713-784-3600
Utah	Salt Lake City, Alta Elctrns., 2280 S. Main St.	801-486-7227
Utah	Salt Lake City, Hamilton/Avnet Elctrns., 647 West Billins Rd.	801-262-8451
Wash	Bellevue, Hamilton/Avnet Elctrns., 13407 Northrup Way	206-746-8750
Wash	Seattle, Cramer Elctrns., 5602 6th Ave. S.	206-762-5722

SILICON GENERAL INC., 7382 Bolsa Avenue, Westminster, Cal., 92683

SILICON GENERAL INC., 2712 McGaw Ave., Irvine, Cal., 92705

SILICON SYSTEMS INC., 2913 Daimler St., Santa Ana, Cal., 92705, Tel: 714-979-0941; Empl.: 11; Minimum order: $100

Customer service: E. F. Klein

Products manufactured: Integrated Circuit Devices, Semiconductor Wafer Fabrication, Services, Assembly, Production & Test

SILICON TRANSISTOR CORP., Katrina Rd., Chelmsford, Mass., 01824

SILICONIX, INC., 2201 Laurelwood Rd., Santa Clara, Cal, 95054, Tel: 408-246-8000; FSC No: 17856; Empl.: 1000; Minimum order: $250

For info on price: R. Landon Ext. 121; Application info: R. Landon Ext. 121; Customer service: S. Buckwald Ext. 210; Delivery info: S. Buckwald Ext. 210

Free literature available: Applications literature on discrete FETs, current limiters, voltage-controlled resistors, plus ICs for analog switching, A/D conversion, micropower multiple op amps.

Products manufactured: Circuits, Integrated, Silicon Monolithic, Unpackaged Chips, Comparators, Converters, Diodes, Drivers, Switch, Integrated Circuit Devices, Multiplexers, Resistors, Switches, Transistors

Local Sales Offices & Reps.

Ala	Huntsville, Rep., Inc.	205-881-9270
Ariz	Phoenix, Siliconix, Inc.	602-264-3330
Cal	Long Beach, Siliconix, Inc.	213-420-1307
Cal	Santa Clara, Siliconix, Inc.	408-246-8000
Colo	Denver, Parker Webster Co.	303-770-1972
Colo	Denver, Siliconix, Inc.	303-778-1918
Fla	Clearwater, Perrott Assocs.	813-531-5513
Fla	Orlando, Perrott Assocs.	305-275-1132
Ga	Atlanta, Rep	404-876-1591
Ill	Wheeling, Siliconix, Inc.	312-541-0131
Iowa	Cedar Rapids, Comstrand	319-363-7495
Md	Camp Springs, Siliconix, Inc.	301-899-3110
Mass	Waltham, Siliconix, Inc.	617-890-7181
Minn	Minneapolis, Comstrand	612-560-5300
Minn	Minneapolis, Siliconix, Inc.	612-838-2515
NY	Baldwin, R.O.M.E.	516-589-8285
NY	Bethpage, Siliconix, Inc.	516-796-4680
NY	Pittsford, T2 Elctrns.	716-381-2551
NY	Syracuse, T2 Elctrns.	315-463-8592
Pa	Erie, Ecco Sls. Co.	814-455-8110
Pa	Ft. Washington, GCM Assoc.	215-646-7535
SC	Spartansburg, Beacon Assocs.	803-582-4613
Tex	Houston, Semiconductor Sls. Assoc.	713-461-4197
Tex	Richardson, Semiconductor Sls. Assoc.	214-231-8151
Wash	Seattle, B. Hirsh Co.	206-783-3423
Wisc	Greendale, J.M. Sls. Co.	414-421-6990

SILTEC CORP., 3717 Haven Ave., Menlo Park, Cal., 94025, Tel: 415-365-8600, Telex: 34-5503; Empl.: 250; Minimum order: $50

For info on price: W. D. Jordan; Application info: G. R. Duncan; Customer service: G. D. Duncan; Delivery info: J. Gontang

Free literature available: Crystal Growing Furnace - Model 860C, resistance heated, production furnace for growing silicon crystals by Czochralski technique. Diameters over 4 inches and charge weight up to 12 kg. Crystal Slicing Machine - Model NAV 701B, uses I.D. diamond wheels for precision wafering of brittle materials. Polishing Machine - Model 320A, high capacity high quality and automatic polishing of silicon wafers. Uses 1 step, no damage, polishing process. Dielectric Defect Detector - Model 201, uses Electrolytic/Electrophoretic Decoration process to detect pinhole defects in dielectric layers. Wire Bond Pull Tester - Model 220, permits non-destructive screening and testing of fine wires and bonds in semiconductors.

Products manufactured: Crystals, Detectors, Machines/Machinery, Production, Ovens, Semiconductor Wafer Fabrication

Local Sales Offices & Reps.

Ariz	Phoenix, Sterns and Assocs.	602-996-9077
Cal	Menlo Park, Siltec Corp.	415-365-8600
NJ	Belleville, RHB Sls. Co.	201-687-6220
Pa	Franconia, RHB Sls. Co.	215-368-2017
RI	Woonsecket, TEC Sls. of New England	401-766-3531
Tex	Dallas, Metron-Central	214-234-1411

SIMMONDS PRECISION, Engine Systems Div., Norwich, N.Y., 13815, Tel: 607-334-3264, TWX: 510-261-7776; Empl.: 390

For info on price: L. S. Colwell; Application info: L. S. Colwell; Customer service: R. Figary

Free literature available: High temp cable assemblies; Mica paper capacitors; Cables & connectors; High temp sensing systems (2).

Products manufactured: Cable, Capacitors, Fixed, Connectors, Discharge Systems, Energy, Feedthrus & Seals, Environmental, Filters, Lead Assemblies & Receptacles, Networks, Probes, Seals, Spark Gaps, Thermocouples, Elements & Accessories, Tubes

SIMMONS FASTENER CORP., 1745 North Broadway, Albany, N.Y., 12201, Tel: 518-463-4234, TWX: 710-441-8284; Empl.: 250; Minimum order: $25

For info on price: H. H. Rose; Application info: H. H. Rose; Customer service: F. J. Pufpaff; Delivery info: F. J. Pufpaff

Free literature available: 36-page catalog presents features, photos, illustrations, engineering drawings and application information on company's full line of quick-operating fasteners for electronics and other industrial uses.

Products manufactured: Clamps & Clips, Fasteners, Services, Assembly, Production & Test, Wire & Cable Ties

Local Sales Offices & Reps.

Cal	Los Angeles, El-Com Sls. Co.	213-223-1351
Cal	Mountain View, Hylad Entprs.	415-961-1250
Fla	Orlando, Triflex	305-841-1632
Ill	Crystal Lake, E. S. Healy & Assocs.	815-459-4386
Iowa	Cedar Rapids, F. A. Noll	319-364-3271
Mass	Needham, White Sls. Co.	617-444-3676
Mich	Warren, w. T. Peterson Co.	313-754-8600
Minn	Minneapolis, R. E. Kenney Co.	612-929-6222
NY	Pelham, Facilities Unlimited	914-946-3416
Ohio	Cincinnati, A. C. Wahl & Assocs.	513-821-3270
Pa	Philadelphia, C. H. Stratton Co.	215-247-7869
Pa	Pittsburgh, Dietrich & Assocs.	412-892-2292
Tex	Dallas, Tech Sls. Co.	214-631-8820
Wash	Seattle, G. M. Gillett & Assocs.	206-284-3344

SIMPSON ELECTRIC CO., 853 Dundee Rd., Elgin, Ill., 60120, Tel: 312-697-2260; Empl.: 1000 .... p. 1•802-805

For info on price: Sls. Off.; Application info: J. Petroselli; Customer service: G. Olofson; Delivery info: Sls. Off.

Free literature available: 4400 General Catalog contains all products and pricing (Free).

Products manufactured: Bridges, Calibrators, Cases, Equipment, Instrument, Meter, Controls/Control Eqpt., Counters, Indicators, Meters, Monitors, Oscilloscopes, Probes, Pyrometers, Recorders, Relays, Sensors, Light, Shunts, Meter, Standards, Tachometers, Testers, Thermocouples, Elements & Accessories, Thermometers, Resistance

Local Sales Offices & Reps.

Alas	Anchorage, H.J. Lang	279-5741
Cal	Burlingame, W.J. Purdy Assoc.	415-347-7701
Cal	Monrovia, Simpson Sls.	213-359-8132
Cal	Sacramento, W.J. Purdy Assoc.	916-422-0128
Colo	Denver, R.G. Bowen Co.	303-722-4641
Conn	Meriden, P.R. Sturgeon	203-237-1112
DC	Washington, S.K. MacDonald	202-265-3938
Fla	Orlando, Cartwright & Bean	305-422-4531
Ga	Atlanta, Cartwright & Bean	404-255-5262
Ill	Elgin, T. Franks	312-697-2260
Ind	Indianapolis, L.M. De Voe Co.	317-257-1227
Iowa	Des Moines, K. Kelly	515-255-4584
Kans	Shawnee Mission, K. Kelly	913-722-0000
La	Chalmette, C. Bean	504-279-4598
Md	Baltimore, S.K. MacDonald, Inc.	301-254-3381
Mass	Babson Park, P.R. Sturgeon Co.	617-237-3506
Mich	Detroit, R.C. Merchant Co.	313-535-6000
Mich	St. Joseph, R.C. Merchant Co.	616-983-7378
Minn	Edina, M. Foster & Co.	612-835-2252
Miss	Jackson, Cartwright & Bean Co.	601-981-1368
Mo	St. Louis, Kelly	314-968-3800
NM	Albuquerque, C.T. Carlberg	505-265-1579
NY	Great Neck, Simpson N.Y.	212-683-0674
NY	North Syracuse, L.D. Allen Inc.	315-458-7470
Ohio	Cleveland, Baehr-Greenleaf & Assoc.	216-221-9030
Okla	Tulsa, J.Y. Schoonmaker Co.	918-936-1423
Ore	Portland, Earl & Brown	503-245-2283
Pa	Pittsburgh, S.K. MacDonald Inc.	412-366-2643
Tenn	Memphis, Cartwright & Bean Co.	901-276-4442
Tex	Dallas, J.Y. Schoonmaker Co.	214-357-8481
Wash	Seattle, Earl & Brown	206-284-1121
Wisc	Milwaukee, E. Dickinson	414-264-1080
EXP:	Elgin, Simpson Electric	312-697-2260

SINCLAIR RADIO LABS., 122 Rayette Road, Concord, Ontario, Can. L4K 1B6, Tel: 416-669-1244; Empl.: 100; Minimum order: $50

For info on price: J. Morrison; Application info: J. Morrison; Customer service: M. Peace; Delivery info: M. Peace

Products manufactured: Amplifiers, Antennas, Attenuators, Filters, Mounts, Tees, Transformers

Local Sales Offices & Reps.

NY	Tonawanda
FOR:	Can., Dorval, Que.
FOR:	Can., N. Burnaby, B.C.

SINCLAIR RADIONICS, INC., 375 Park Ave., New York, N.Y., 10022, Tel: 212-688-6623

For info on price: D. Presser; Application info: D. Presser; Customer service: M. Wilkes; Delivery info: H. Smith

Products manufactured: Calculators, Electrical & Electronic

SINGER CO., 1150 McBride Rd., Little Falls, N.J., 07424

SINGER CO., American Meter Div., 13500 Philmont Ave., Philadelphia, Pa., 19116, Tel: 215-673-2100, TWX: 710-670-0965

Customer service: Ind'l. Sls. Off.

Free literature available: Bulletin 350-Gas Metering Instrumentation, Bulletin 351-Environmental Control, GC-100-Puneumatic/Electric Mechanical Instrumentation.

Products manufactured: Controls/Control Eqpt., Filters, Meters, Transmitters

Local Sales Offices & Reps.

Ala	Birmingham
Ariz	Phoenix
Cal	Burlingame
Cal	Fullerton
Colo	Denver
Ga	Atlanta
Ill	Hinsdale
Mass	Waltham
Mich	Chelsea
Minn	Minneapolis
Mo	Kansas City
Neb	Omaha
NY	New York
Okla	Tulsa
Ore	Lake Oswego
Pa	Pittsburgh
Pa	Wynnewood
Tex	Garland
Tex	Houston
Wash	Seattle
Wisc	Beaver Dam

SINGER CO., Controls Co. of Amer., 9655 W. Soreng Ave., Schiller Park, Ill., 60176, Tel: 312-678-4150; Empl.: 1500

Products manufactured: Bells, Buzzers, Gongs, Sirens & Aural Warning Devices, Coils Including Assemblies & Forms, Controls/Control Eqpt., Motors, Solenoids, Switches, Valves, Solenoid

Local Sales Offices & Reps.

Ill	Schiller Park	312-678-4150

SINGER CO., HRB - Singer, Inc., Box 60, Science Park, State College, Pa., 16801, Tel: 814-238-4311

Products manufactured: Amplifiers, Antennas, Converters, Detectors, Modulators, All Kinds, Receivers

SINGER, IND'L. TELEPRINTER CORP., 286 Eldridge Rd., Fairfield, N.J., 07006

SINGER CO., Kearfott Div., 1150 McBride Ave., Little Falls, N.J., 07424, Tel: 201-256-4000, TWX: 710-988-5700; Empl.: 6000

Customer service: D.B. Katz

Free literature available: Brochures/data sheets about gyros, accelerometers, digital computers, a/d-d/a and s/d-d/s converters, test equipment, motors, motor generators, synchros/resolvers, servos.

Products manufactured: Accelerometers, Amplifiers, Analyzers, Blowers & Fans & Accessories, Bridges, Choppers, Comm. Systems, Computers, Connectors, Controls/Control Eqpt., Converters, Dampers, Servo, Demodulators, Display Devices/Displays, Gearheads & Speed Reducers, Gyros (All Types), Indicators, Motors, Potentiometers, Radar Systems, Reducers, Repeaters, Servo, Resolvers, Synchro, Seals, Servo Systems, Shifters, Standards, Synchro Transmitters, Solid-State, Synchros, Tachometers, Testers, Transformers

Local Sales Offices & Reps.

Ariz	Phoenix, Southwest e/m Engrg., Inc.	602-944-1521
Cal	Glendale, Singer Co., Kearfott Div.	213-247-8076
Cal	Santa Clara, Richards Assocs.	408-246-5860
Fla	Melbourne, Tech-Rep Assocs., Inc.	305-723-9140
Ga	Atlanta, Tech-Rep Assocs., Inc.	404-939-8339
Ill	Oakbrook, Singer Co., Kearfott Div.	312-654-0800
Mo	St. Louis, Singer Co., Kearfott Div.	314-521-0100
NJ	Clifton, Singer Co., Kearfott Div.	201-256-4000
NJ	Little Falls, Singer Co., Kearfott Div.	201-256-4000
NC	Raleigh, Candor Co., Inc.	919-787-2652
Ohio	Dayton, Singer Co., Kearfott Div.	513-222-8942
Ore	Portland, J.J. Backer Co.	503-297-3776
SC	Myrtle Beach, Candor Co., Inc.	803-448-5213
Tenn	Chattanooga, Candor Co., Inc.	615-894-7454
Tex	Irving, Singer Co., Kearfott Div.	214-352-1764
Va	Lynchburg, Candor Co., Inc.	703-846-6579
Wash	Renton, Singer Co., Kearfott Div.	206-228-4356

SINGER CO., Librascope Div., 833 Sonora Ave., Glendale, Cal., 91201, Tel: 213-245-8711, TWX: 910-497-2266; Empl.: 1600

Customer service: R. O. Vaughan

Free literature available: Data sheets for all Librascope Products listed in EEM describe special features; list operational, engineering and environmental specifications and applications data.

Products manufactured: Computers, Controls/Control Eqpt., Display Devices/Displays, Encoders, Lenses, Optical & Camera, Memory Systems, Oceanographic Equip. (Electronic)

SINGER INSTRUMENTATION, Los Angeles Oper., 5340 Alla Rd., Los Angeles, Cal., 90066, Tel: 213-822-3061, TWX: 910-343-6969; Empl.: 260

For info on price: G. Rothhammer; Application info: D. Reed; Customer service: B. Ecker; Delivery info: B. Ecker

Free literature available: Short Form Catalog covers: RFL Test Equipment, Two-Way Radio Communications Test Equipment, Synchno Resoner Test Equipment.

Products manufactured: Amplifiers, Analyzers, Bridges, Generators, Meters, RFI Measuring Equipment, Standards

Local Sales Offices & Reps.

Ariz	Tucson, Ross Comms.	602-885-5368
Cal	Covina, Ross Comms.	213-966-9121
Cal	Cupertino, Ross Comms.	408-257-1411
Colo	Denver, KC Mkts.	303-733-5561
Ga	Atlanta, Secom Sys.	404-261-8935
Ill	Evanston, Electronic Prods.	312-869-7038
Kans	Shawnee Mission, EIR Co.	913-362-0919
Md	Kensington, Electronic Mktg. Assocs.	301-881-5300
Mass	Bedford, Chamberlin & Murray	617-274-0044
Mich	Rochester, Webster Comms.	313-375-0420
Minn	Minneapolis, Carter Elctrns.	612-544-9393
Mo	Hazelwood, EIR Co.	314-895-4100
NJ	Englewood, Bressler & Baum Assocs.	201-569-7600
NJ	Union, SBM Reps.	201-687-8737
NY	Rochester, SBM Reps.	716-266-1400
Ohio	Cincinnati, Cartwright Comms.	513-825-4202
Ore	Beaverton, Tarbell Comms.	503-643-1631
Pa	King of Prussia, Electronic Mktg. Assocs.	215-248-5050
Tex	Richardson, Horizon Engrg. Sls. Co.	214-238-9121
Va	Madison Heights, Electronic Mktg. Assocs.	804-847-6335
Wash	Bellevue, Tarbell Comms.	206-454-9716
Wisc	Milwaukee, Electronic Prods.	414-962-4818
Wisc	Shiocton, Electronic Prods.	414-986-3839

SINGER CO., Palo Alto Oper., 3176 Porter Dr., Palo Alto, Cal., 94304, Tel: 415-493-3231, TWX: 910-373-1765; Empl.: 170; Minimum order: $10

For info on price: S. Davis; Application info: B. Scarr; Customer service: J. Kadack

Free literature available: Singer Instrumentation Catalog, Singer Review "Design of a Broadband RF and M/W Sweep Generator", Singer Review "A System for the Precise Calibration of Air Navigational Receivers".

Products manufactured: Amplifiers, Analyzers, Attenuators, Cable Fault Locators, Couplers, Detectors, Generators, Insertion Loss Measurement Systems, Oscillators, Testers

Local Sales Offices & Reps.

Ala	Huntsville, Gentry Assocs.	205-534-9711
Ariz	Scottsdale, Williams Assocs.	602-947-4297
Cal	Lawndale, Ward-Davis Assocs.	213-542-7740
Cal	LaJolla, Ward-Davis Assocs.	714-459-3351
Cal	Sunnyvale, Ward-Davis Assocs.	408-245-3700
Colo	Denver, Williams Assocs.	303-373-4730
Fla	Orlando, Gentry Assocs.	305-894-4401
Ill	Chicago, Carter Elctrns.	312-585-5485
Ind	Indianapolis, Carter Elctrns.	317-293-0696
Kans	Overland Park, Carter Elctrns.	913-649-6996
Kans	Shawnee Mission, EIR Co.	913-362-0919
Md	Kensington, Elctrn. Mktg. Assocs.	301-881-5300
Mass	Waltham, Meas. Consits.	617-890-4400
Mich	Detroit, WKM Assocs.	313-892-2500
Minn	Minneapolis, Carter Elctrns.	612-544-9393
Mo	Hazelwood, EIR Co.	314-895-4100
NJ	Union, SBM Reps.	201-687-8737
NM	Albuquerque, Williams Assocs.	505-255-1638
NY	Pleasantville, SBM Reps.	914-769-1811
NY	Rochester, SBM Reps.	716-266-1400
NC	Burlington, Gentry Assocs.	919-277-3639
Ohio	Cleveland, WKM Assocs.	216-267-0445
Ohio	Dayton, WKM Assocs.	513-434-7500
Ohio	Norman, Data Mktg. Assocs.	405-364-8320
Ore	Beaverton, Showalter-Judd	503-646-3004
Pa	King of Prussie, Elctrn. Mktg. Assocs.	215-265-1600
Pa	Pittsburgh, WKM Assocs.	412-892-2953
Tex	Dallas, Data Mktg. Assocs.	214-661-0300
Tex	Houston, Data Mktg. Assocs.	713-686-9627
Tex	San Antonio, Data Mktg. Assocs.	512-828-0937
Wash	Seattle, Showalter-Judd	206-624-9020
Wisc	Milwaukee, Carter Elctrns.	414-464-5555

SINGER - TELE-SIGNAL, 250 Crossways Pk. Dr., Woodbury, N.Y., 11797, Tel: 516-921-9400, TWX: 510-221-2121; FSC No: 10241; Empl.: 400; Minimum order: $50

For info on price: C. Egan; Application info: F. Wagner; Customer service: L. Della Rocca; Delivery info: C. Egan

Free literature available: System & module data sheets on request (618C 2206CS) 150 different sheets

Products manufactured: Amplifiers, Comm. Systems, Comparators, Converters, Demodulators, Generators, Integrated Circuit Devices, Modulator/Demodulators, Panels, Receivers, Signal Conditioners & Equipment, Terminal Equipment, Digital, Translators, Data, Transmitters

Local Sales Offices & Reps.

Cal	Los Angeles, H. Lucas	213-483-4800
Cal	Sacramento, R. Hutter	916-488-8145
DC	Wash, M. Walker	202-223-4100
Fla	Orlando, Singer Tele-Signal	305-851-4420
NY	Webster, Singer/Tele-Signal	716-872-4839
Pa	Philadelphia, Singer Tele-Signal	215-568-1165
Tex	Plano, Singer Tele-Signal	214-424-8615

SITCO ANTENNAS, 10330 N.E. Marx St., Portland, Ore., 97220, Tel: 503-253-2000; Empl.: 18

Products manufactured: Amplifiers, Antenna Towers & Supports, Antennas, CATV Systems & Equipment, Connectors, Mounts, Transformers, Wire

SITEK, INC., 1078 W. Evelyn, Sunnyvale, Cal., 94086, Tel: 408-735-9800, TWX: 910-339-9253; Empl.: 35; Minimum order: $50

For info on price: M. Andrews; Application info: R. Bernekie; Customer service: R. Bernekie; Delivery info: B. Shoemaker

Free literature available: 1420 linear tester brochure; 3200A digital test brochure.

Products manufactured: Testers

Local Sales Offices & Reps.

Cal	Encino, Scientific Devices	213-872-1951
Cal	Los Angeles, Scientific Devices	213-641-4800
Cal	Mt. View, Scientific Devices	415-964-4230
Cal	San Diego, Scientific Devices	714-279-6642
Colo	Denver, Parker Webster Co.	303-770-1972
Conn	Hamden, Scientific Devices	203-248-9361
Fla	Casselberry, E.I.R., Inc.	305-830-9600
Haw	Honolulu, Aloha Assocs.	808-941-1574
Ill	Chicago, Carter Elctrns., Inc.	312-585-5485
Ind	Indianapolis, Carter Elctrns., Inc.	317-293-0696
Kans	Overland Park, Carter Elctrns., Inc.	913-649-6996
Md	Baltimore, Scientific Devices/E-Tech.	301-788-6611
Mass	Waltham, McBar Assocs.	617-890-0233
Mich	Detroit, Micro Sls. Corp.	313-366-6084
Minn	Minneapolis, Carter Elctrns., Inc.	612-544-9393
Mo	Hazelwood, Carter Elctrns., Inc.	314-731-2237
NJ	Palisades Park, Scientific Devices-E.	201-871-3916
NM	Albuquerque, Scientific Devices-Albuquerque	505-268-6729
NY	Rochester, Scientific Devices-NY	716-334-2445
Ohio	Cleveland, Micro Sls. Corp.	216-243-7430
Ohio	Dayton, Micro Sls. Corp.	513-298-3033
Okla	Norman, Data Mktg. Assocs.	405-364-8320
Ore	Portland, Western Tech. Sls., Inc.	503-297-1711
Pa	Plymouth Meeting, Scientific Devices	215-825-9515
Tex	Dallas, Data Mktg. Assocs.	214-358-4643
Tex	Houston, Data Mktg. Assocs.	713-686-9627
Tex	San Antonio, Data Mktg. Assocs.	512-828-0937
Va	Norfolk, Scientific Devices/E-Tech.	703-499-8133
Va	Springfield, Scientific Devices/E-Tech.	703-451-6500
Wash	Bellevue, Western Tech. Sls., Inc.	206-454-3906
Wisc	Milwaukee, Carter Elctrns., Inc.	414-464-5555

SIVERS LAB, Box 747, Corona del Mar, Cal., 92625, Tel: 714-673-3787; Empl.: 200

Customer service: E. M. Cleland

Free literature available: General Catalog (printed bi-annually - current 1973-74) Switches-74 Brochures & application notes on specific products per "Economic Mini-Sweeper" enclosed.

Products manufactured: Adapters, Waveguide, Attenuators, Bends & Twists, Microwave, Circulators, Ferrite, Counters, Couplers, Detectors, Dummy Loads, Filters, Generators, Horns, Microwave, Isolators, Joints, Rotary, Microwave, Junctions, Hybrid, Microwave, Meters, Modulators, All Kinds, Oscillators, Receivers, Shifters, Slotted Lines, Microwave, Switches, Tees, Terminals, Tuners, Waveguides & Adapters

Local Sales Offices & Reps.

Cal	Corona del Mar, Cleland & Co.	213-673-3787
Cal	Mountain View, Walter Assocs.	415-965-4136
Tex	Arlington, J.T. Houston Assocs.	817-265-2931

SJOBERG, C. & SON, INC., 415 Station St., Cranston, R.I., 02910, Tel: 401-461-8220; Empl.: 20; Minimum order: $20

Customer service: C. Sjoberg Jr.

Free literature available: Catalog sections on flat clips, "U" shaped clips, terminals, strain reliefs, specialty hardware, applying tools, and textile hardware

Products manufactured: Boxes, Junction, Outlets & Wall Plates, Clamps & Clips, Connectors, Contacts, Electrical, Eyelets, Fasteners, Grommets, Insulators & Insulation, Machines/Machinery, Production, Pliers, Services, Assembly, Production & Test, Splices, wire (Including, Butt & Cap Types), Strain Reliefs, Cable & Wire, Strips, Switch Hardware, Terminal Blocks, Boards & Strips, Terminals, Tools

Local Sales Offices & Reps.

NY	Mattydale, W.M. Onyx Co.	315-446-7930

Advertisment

We specialize in the development and manufacture of terminals, "Little Gem" connector clips, strain reliefs, etc. together with the machines and dies for applying. Special terminals and related hardware will be developed to your specifications if our stock items do not meet your requirements. Requests for samples, catalogs, and quotations are invited.

SKAN-A-MATIC CORP., Box S, Elbridge, N.Y., 13060, Tel: 315-689-3961, TWX: 710-545-0220; Empl.: 50; Minimum order: $18

For info on price: B. J. Cottrell ext. 30; Application info: D. E. Kopp, Appl. Engr. ext. 35; Customer service: B. J. Cottrell ext. 30; Delivery info: B. J. Cottrell ext. 30

Free literature available: Complete catalog of subminiature photoelectric detectors and controls. Control Module Catalog - A building block approach to specialized electronic control systems.

Products manufactured: Alarms, Amplifiers, Cells, Photoconductive, Photoemissive, Photovoltaic, Controls/Control Eqpt., Detectors, Diodes, Indicators, Lamps, Scanners, Switches

Local Sales Offices & Reps.

Ariz	Phoenix, Luscombe Engrg. Co.	602-274-8128
Cal	Pasadena, Luscombe Engrg. Co.	213-684-2000
Cal	San Mateo, Luscombe Engrg. Co.	415-342-7057
Colo	Lakewood, Intermountain Instrs.	303-237-0443
Conn	Meriden, Abbott-Allison Co.	203-237-9232
Fla	Orlando, Datarep, Inc.	305-843-5224
Ill	La Grange, Olson Engrg. & Sls. Corp.	312-482-3300
Ind	Anderson, K. E. Schneider	317-644-1690
Md	Rockville, Farrell Assocs.	301-424-9460
Mass	E. Bridgewater, Abbott-Allison Co.	617-245-0250
Mich	Birmingham, Electro-Mation Assocs.	313-564-6517
Minn	Minneapolis, Loren Green Assocs.	612-781-1611
Mo	St. Louis, J. Durbin Co.	314-966-6500
NJ	Bogota, Neville & Vespo Corp.	201-487-1505
NY	Elbridge, L-Tron Corp.	315-689-3787
NC	Charlotte, Systems Service Corp.	704-377-3407
Ohio	Cleveland, Fred R. Sharp Co.	216-464-3820
Pa	Glenside, C.A. Briggs Co.	215-885-2244
Pa	Pittsburgh, R.W. Moulton & Assocs.	412-366-3333
Tex	Houston, Scientific Sls. Co.	713-666-5318
Tex	Richardson, Scientific Sls. Co.	214-231-6541
Wisc	Milwaukee, Olson Engrg. & Sls. Corp.	414-873-7330

SKINNER POLYNOID DIV., Skinner Precision Inds., Inc., 95 Edgewood Ave., New Britain, Conn., 06050, Tel: 203-225-6421, TWX: 203-225-2591; Empl.: 500; Minimum order: $25

For info on price: N. O'Neil; Application info: W. J. Adams; Customer service: A. Patti; Delivery info: A. Patti

Free literature available: Design Bulletin #1 & #2; Price List; Discount Schedule; Applications; Specification Form; Technical Paper.

Products manufactured: Actuators, Motors

Local Sales Offices & Reps.

Ill	Oak Brook, Skinner Prec. Ind. Inc.	312-654-1886
NY	Brooklyn, Eastern Elctrn. Sls. Co.	212-763-5180
Pa	Ardmore, Rothenheber & Wurts, Inc.	215-649-6300

SKYDYNE A BROOKS & PERKINS CO., River Rd., Port Jervis, N.Y., 12771, Tel: 914-856-6655, TWX: 510-260-1249; Empl.: 130; Minimum order: $25

Customer service: L. W. Morris

Products manufactured: Cabinets & Accessories, Cases, Equipment, Instrument, Meter, Cases, Transit, Containers, Covers, Protective (Including Dust), Laminates, Services, Assembly, Production & Test

Local Sales Offices & Reps.

Ala	Huntsville, Ridge Instr.	205-837-3211
Ariz	Scottsdale, Runyon Co.	602-959-6060
Cal	Hawthorne, WCV Co., Inc.	213-772-4479
Cal	Los Altos, Weslab	415-948-8885
Colo	Denver, Crump Co.	303-426-1443
Ill	Chicago, Berndt Assocs.	312-283-0713
Ind	Carmel, Berndt Indiana Br.	317-844-0114
Kans	Leawood, Thunderbird Tech. Sls.	913-642-7220
Kans	Wichita, Thunderbird Tech. Sls.	316-684-3941
Md	Baltimore, M/E Assocs.	301-825-1130
Mass	Lexington, J.E. Boeing	617-862-2500
Mich	Royal Oak, Group Ten	313-549-3910
Mo	St. Louis, Thunderbird Tech. Sls.	314-567-6488
NJ	Cherry Hill, M/E Assoc.	609-667-6110
NJ	Florham Pk., L. McFadden	201-377-6014
NY	Fayetteville, M. P. Andrews, Inc.	315-637-3144
Ohio	Cleveland, Group Ten	216-482-2800
Ohio	Dayton, Group Ten	513-277-6531
Tex	Ft. Worth, Dyna Reps.	817-451-1392
Wash	Seattle, WesLab Sls. Corp.	206-243-7070
Wisc	Brookfield, Berndt (Mil. Br.)	414-786-6950
EXP:	N.Y., New York, W.D. Blood Co.	212-344-0210
FOR:	Can., Stoney Creek, Ont., Simmonds Aerocessories of Canada	416-664-6203

SLAUGHTER CO., Moore & Hailey Sts., Ardmore, Okla., 73401, Tel: 405-223-4773, TWX: 910-830-6972; FSC No: 05611 .... p. 1•806-809

For info on price: Sls.; Application info: Appication Eng.; Customer service: Sls.; Delivery info: Sls.

Free literature available: Handbook of Automatic Testing, Armature & Stator Testing Notes, Basic Facts About High Voltage Testing, Condensed Catalog/Price List - Test Equipment, Catalog Strobuscopes

Products manufactured: Bridges, Comparators, Controllers, Programmable, Lights, Locators, Open-Short, Meters, Probes, Tachometers, Testers

SLOAN COMPANY, 7704 San Fernando Rd., Sun Valley, Cal., 91352, Tel: 213-875-1123, TWX: 910-498-2250; Empl.: 21 .... p. 2•1190-1197

For info on price: S. Daniel, 213-875-1124; Application info: J. Bailey, 213-875-1124; Customer service: S. Daniel; Delivery info: S. Daniel, 213-875-1125

Free literature available: Brochures: Panel Mount Fixed LED Indicator Light; LED Relampable Indicator Light; Sloan Cartridge Indicators; Panel Mount Fixed Lamp; Panel Mount Front Relampable Indicator Lights; Front Relampable Indicator Lights; Two terminal front relampable indicator lights; P175 Design Kit.

Products manufactured: Caps, Lenses, Indicator Light, Diodes, Lamps, Lights, Sockets

Local Sales Offices & Reps.

Ala	Huntsville, 20th Century Mktg., Inc.	205-772-9237
Ariz	Scottsdale, E.J. Foley & Assocs.	602-945-2665
Cal	Los Angeles, P. Wiley Co.	213-663-8028
Cal	San Carlos, D.H. Ross Co.	415-591-4411
Colo	Denver, Comtech, Inc.	303-756-6815
Conn	Meriden, Eagle Assocs.	203-235-9036
Ga	Douglasville, 20th Century Mktg. Inc.	404-942-6483
Ill	Des Plaines, E. Flaxman Co.	312-298-8580
Ind	Carmel, Berndt Assocs., Inc.	317-844-0114
Kans	Wichita, L.F. Florence Co.	316-838-7226
Md	Bethesda, W. Mount Co.	301-657-9312
Mass	Pinehurst, Eagle Assocs.	617-444-3446
Mich	Jackson, N. Scroggs Co.	517-750-1170
Minn	Minneapolis, Electro-Serv Co.	612-827-2907
Mo	Kansas City, L.F. Florence Co.	816-561-7222
Mo	St. Louis, L.F. Florence Co.	314-227-5897
NJ	Cherry Hill, Quality Components	609-428-6266
NJ	Englewood Cliffs, E. Glass Assocs.	212-586-8440
NM	Albuquerque, F.R.Y.-Gates Co.	505-298-1875
NY	Rochester, H.R. Murray, Inc.	716-244-1100
NY	Syracuse, H.R. Murray, Inc.	315-446-5555
NC	Gastonia, Warren Mount Co.	704-867-2101
Ohio	Dayton, N. Case Assocs.	513-433-0966
Ohio	Rocky River, N. Case Assocs.	216-333-4120
Tex	Dallas, W. Reese Assocs.	214-638-6575
Tex	Houston, W. Reese Assocs.	713-621-3134
Wash	Seattle, D. Smith Sls.Co.	206-633-3160
FOR:	Can., Ottawa, Ont., Wilson Entprs.	514-224-9878
FOR:	Can., Toronto, Ont., Wilson Entprs.	416-766-0510

SLOAN TECHNOLOGY CORP., 535 E. Montecito St., Santa Barbara, Cal., 93103, Tel: 805-963-4431, TWX: 910-334-4901; Empl.: 130; Minimum order: $20

For info on price: B. Moore; Application info: S. Maxman; Customer service: J. Wafer; Delivery info: B. Moore

Free literature available: 1974-75 Sloan Product Catalog - Technical Description, Specifications and application on Vacuum Deposited Thin Film Deposition and Sputtering Equipment.

Products manufactured: Chamber, Environmental Test, Crystals, Deposition Equipment, Vacuum & Accessories, Evaporation Equipment, Electron Beam, Feedthrus & Seals, Environmental, Interferometer Systems, Monitors, Recorders, Testers, Transformers

Local Sales Offices & Reps.

Colo	Denver, G. O'Brien Sls. Agency	303-477-4713
Ga	Atlanta, G.H. Crossley Assocs.	404-261-4278
Ill	Park Ridge, B. Ellis & Assocs.	312-298-7626
Mass	Boston, Industrial Equip. & Sls.	617-227-8112
NY	Clifton Park, Empire Technology, Inc.	518-371-2480
NY	Rochester, Empire Technology, Inc.	716-225-5820
Ore	Yamhill, Walsh-Ehlers Co.	503-662-3207
Pa	Pittsburgh, Kurt J. Lesker Co.	412-892-2996
Tex	Richardson, Yarbrough Southwest Co.	214-690-0800
Wash	Bellevue, Walsh-Ehlers Co.	206-454-2211

SMITH INC., HERMAN H., 812 Snediker Ave., Brooklyn, N.Y., 11207, Tel: 212-272-9400, TWX: 710-584-2363; Empl.: 200; Minimum order: $100 .... p. 2•813-893

For info on price: C. Gold; Application info: F. Kaufman; Customer service: S. Latner; Delivery info: B. Knittel

Products manufactured: Bearings, Boards, Plug-In, Boards, Printed Circuit, Bumpers, Cabinets & Accessories, Cable Assemblies & Harnesses, Cable, Cases, Equipment, Instrument, Meter, Clamps & Clips, Connector Blocks, Mother Board, Connector Boxes & Strips, Power Outlet, Connectors, Cords, Couplings, Etchants, Printed Circuit, Fasteners, Feedthrus & Seals, Environmental, Grommets, Handles For Cabinets, Circuit Boards, Racks, etc., Heat Sinks, Soldering, Holders, Test Lead, Insulators & Insulation, Jack Adapters (All Types), Jacks (All Types), Jumpers, Kits, Connector, Kits, Terminal, Knobs, Leads, Test & Adaptors, Lights, Locks, Dial & Shaft, Pads, Transistor Mounting, Plug Adapters, Plug & Jack Sets, Plug Buttons, Plug Caps & Shells, Plugs, Posts, Probes, Punches, Chassis, Racks, Shafts & Adapters, Socket Adapters, Sockets, Spacers, Strain Reliefs, Cable & Wire, Suppressors, Switch Hardware, Switch Mounting Plates, Switches, Terminal Blocks, Boards & Strips, Terminals, Tools, Transistor, Diode, Thyristor Heat Dissipators, Tubing, Wire, Wire & Cable Ties

Local Sales Offices & Reps.

Ariz	Phoenix, Shefler-Kahn	602-258-7893
Cal	Los Angeles, E.E. Strassner Co.	213-666-1511
Cal	Redwood City, Warren-Hickey Sls.	415-368-3849
Colo	Denver, Shefler-Kahn	303-831-9087
Conn	Waterbury, Coakley, Boyd & Abbett	203-272-2261
Fla	Bradenton, Hutto Hawkins Peregoy	813-755-4015
Fla	Maitland, Hutto Hawkins Peregoy	305-831-2474
Fla	Pompano Beach, Hutto Hawkins Peregoy	305-943-9593
Ga	Atlanta, Millar Elctrns.	404-261-6160
Ill	Chicago, J.J. McBride Sls.	312-775-1080
Ind	Indianapolis, Schroeder & Loomis	317-251-4571
Kans	Overland Park, Lowell Kangas & Assoc.	913-631-3515
La	Metairie, J.F. McKinney Sls.	504-887-1723
Md	Lutherville, L.D. Lowery	301-823-2172
Md	Silver Spring, L.D. Lowery	301-439-3542
Mass	Needham, Coakley, Boyd & Abbett	617-444-5470
Mich	Ferndale, Shalco	313-547-4771
Minn	Minneapolis, C.R. Gibb	612-377-1200
Mo	St. Louis, Lowell Kangas & Assoc.	314-821-4050
NM	Albuquerque, Shefler-Kahn	505-265-7077
NY	North Syracuse, L.D. Allen	315-458-7470
NY	Snyder, L.D. Allen	716-839-3300
NY	Yonker, J. Brown Elctr.	914-779-7330
Ohio	Dayton, Bear Mktg.	513-299-3566
Ohio	Richfield, Bear Mktg.	216-659-3331
Okla	Tulsa, J.F. McKinney Sls.	918-742-6791
Ore	Portland, Dale Weber	503-234-7671
Pa	Broomall, L.D. Lowery	215-356-5300
Pa	Pittsburg, Trymax Co.	412-823-8400
RI	Harrisburg, L.D. Lowery	717-233-0917
Tex	Bellaire, J.F. McKinney Sls.	713-774-3232
Tex	Dallas, J.F. McKinney Sls.	214-631-9450

Va Charlottesville, L.D. Lowery 804-973-6672
Va Fredricksburg, L.D. Lowery 703-371-5099
Wash Seattle, D. Weber Co. 206-623-5990
Wash Spokane, D. Weber Co. 509-624-3908
FOR: Toronto 19, Atlas Radio Corp. 416-781-6174

SNAP-ON-TOOLS, 8192-A 28th Ave., Kenosha, Wisc., 53140, Tel: 414-654-8681; Empl.: 2500

Customer service: D. Sorbie

Products manufactured: Alternators, Analyzers, Benches, Consoles, Stools, Tables, Chargers, Battery, Couplings, Cutters, Wire, Hand Operated, Detectors, Drills & Accessories, Hand & Power, Drivers, Nut, Flashlights & Lanterns, Gages, Machines/Machinery, Production, Meters, Oscilloscopes, Pliers, Pumps, Vacuum, Screwdrivers, Soldering Guns, Irons & Desoldering Tools, Stands, Instruments, Testers, Tools, Welding Equipment & Access. (Excluding Equip. for Semiconductor Devices), Wire Twisters, Wrenches

SODECO DIV., Landis & Gyr, Inc., 4 Westchester Plaza, Elmsford, N.Y., 10523, Tel: 914-592-4400, TWX: 710-567-1219; Empl.: 65; Minimum order: $25
p. 1•260,261

Products manufactured: Bearings, Controls/Control Eqpt., Counters, Indicators, Motors, Printers, Switches, Timers, Totalizers, Digital

Local Sales Offices & Reps.
Ala Huntsville, Beacon Electronic Assos., Inc. 205-881-5031
Ariz Tempe, Trembly Assocs. 602-966-4468
Cal Los Altos, Recht 415-941-0336
Cal Los Angeles, Universal Comps. 213-641-4255
Colo Denver, Thorson Co. 303-759-0809
Conn Old Lyme, Aid Engrg. 203-673-3692
Conn Rocky Hill, Aid Engrg. 203-673-3692
Fla Ft. Lauderdale, Beacon Elctrns. 305-776-6074
Fla Maitland, Beacon Elctrns. 305-647-3498
Ga Atlanta, Beacon Elctrns. 404-351-3654
Haw Honolulu, Berkley Engrg. 808-538-1921
Ill Rolling Meadows, Sumer 312-394-4900
Md Glen Arm, Hodgins Assocs. 301-592-7047
Md Towson, Hodgins Assocs. 301-296-0414
Mass Westboro, Aid Engrg. 617-890-8181
Mich Detroit, L. Dickelman 313-255-3300
Minn New Brighton, TWC Sls. 612-636-1770
Miss Hernando, Beacon Elctrns. 601-368-9008
Mo Kansas City, R.R. Burton Sls. Co. 816-444-8300
Mo St. Louis, Delltron Co. 314-869-1351
NM Albuquerque, Trembly Assocs. 505-293-4444
NY Buffalo, Application Specialists 716-834-3377
NY East Syracuse, Application Specialists 315-437-2813
NY Mt. Vernon, D. Sonkin 914-668-9809
NY Rochester, Application Specialists 716-586-6226
NC Greensboro, Beacon Elctrns. 919-674-9432
SC Spartanburg, Beacon Elctrns. 803-582-4613
Tex Dallas, RMA/Southland 214-361-8584
Tex Houston, RMA/Southland 713-462-4077
Wash Mercer Island, J. Andersen 206-232-0484

Local Distributors
Ind Indianapolis, B & B Motor & Controls, 3512 Rockville Rd. 317-248-0396
NY New York, B & B Motor & Controls, 96 Spring St. 212-966-5777
NY Rochester, B & B Motor & Controls, 3259 Winton Rd. S. 716-473-6640

SOLA ELECTRIC, 1717 Busse Rd., Elk Grove Village, Ill., 60007, Tel: 312-439-2800, Telex: 28-3451; Empl.: 450; Minimum order: $500

Customer service: AC Prods. Grp.

Free literature available: Catalog +630-Voltage Regulators Sizes, description, electrical characteristics of constant voltage transformers, line regulators and computer line regulators. Catalog +624-Theory, Design and Operation-design criteria for Ferro-Resonance Transformers, Line Voltage Regulators.

Products manufactured: Connector Adapters, Power Supplies, Reactors, Regulators, Stabilizers, Line Impedance, Transformers

Local Sales Offices & Reps.
Ariz Phoenix, Hytronic Div. of Zeus, Inc. 602-253-6104
Cal Inglewood, J. Berman Co. 213-678-1281
Cal Oakland, Moulthrop Sls. Inc. 415-261-7676
Colo Denver, Hytronic Div. of Zeus, Inc. 303-388-4081
Fla Orlando, Cartwright & Bean, Inc. 305-896-2031
Fla Plantation, Cartwright & Bean, Inc. 305-791-3989
Ga Atlanta, Cartwright & Bean, Inc. 404-237-2273
Ill Chicago, GNB Assocs., Inc. 312-673-4050
Ind Fort Wayne, Baehr, Greenleaf & Assoc., Inc. 219-483-6864
La Chalmette, Cartwright & Bean, Inc. 504-279-4598
Mass Norwood, JMG, Inc. 617-762-5333
Mich Detroit, R.C. Merchant & Co. 313-535-6000
Mich St. Joseph, R.C. Merchant & Co. 616-983-7378
Minn Minneapolis, Stack-Johnson, Inc. ...612-925-2111
Miss Jackson, Cartwright & Bean, Inc. 601-354-1368
Mo Kansas City, Forristal-Young Sls. Co. 816-358-6771
Mo St. Louis, Forristal-Young Sls. Co. ...314-645-2360
Neb Omaha, Forristal-Young Sls. Co. 402-393-6191
NJ Cherry Hill, Trinkle Sls., Inc. 609-667-3500
NM Albuquerque, Hytronic Div. of Zeus, Inc. 505-268-3941
NY Mineola, Wilco Sls. 516-294-9840
NY Rochester, L-Mar Assocs. 716-328-5240
NY Syracuse, L-Mar Assocs. 315-446-2135
NC Charlotte, Cartwright & Bean, Inc. 704-333-6457
NC Raleigh, Cartwright & Bean, Inc. 919-832-7128
Ohio Cincinnati, Baehr, Greenleaf & Assoc. 513-891-3826
Ohio Columbus, Baehr, Greenleaf & Assoc. 614-486-4046
Ohio Lakewood, Baehr, Greenleaf & Assoc. 216-221-9030
Ore Portland, Earl & Brown Co. 503-292-9145
Tenn Memphis, Cartwright & Bean, Inc. 901-276-4442
Tex Dallas, Robert E. Nesbitt Co. 214-357-4601
Tex Houston, Robert E. Nesbitt Co. 713-224-3633
Utah Salt Lake City, Hytronic Div. of Zeus, Inc. 801-466-4924
Wash Seattle, Earl & Brown Co. 206-284-1121

Local Distributors
Ala Birmingham, J. W. Clary Co., 1713 Second Ave. S. 205-322-2488
Ala Birmingham, M. G. Electronic & Equip., 3112-6th Ave. S. 205-328-4525
Alas Anchorage, Yukon Radio Supply, 3222 Commercial Dr.
Ariz Little Rock, D. White Elctrns., 1222 Main St. 501-376-1391
Ariz Phoenix, Cramer Elctrns., 2643 E. University Dr. 602-263-1112
Ariz Phoenix, Kierulff Elctrns., 2633 E. Buckeye Rd.
Ariz Phoenix, Mirco Elctrn. Distrs., 2104 W. Peoria Ave.
Cal Garden Grove, Allied Elctrns., 12311 Industry St. 714-894-7581
Cal Glendale, Western Elctrn. Supply, 229 S. Orange 213-246-4861
Cal Inglewood, Newark Elctrns., 4747 W. Century Blvd. 213-678-0441
Cal Los Angeles, Kierulff Elctrns., 2585 Commerce Way 213-685-5511
Cal Mountain View, Abacus Elctrns., 1065 Terra Bella Ave. Box B 415-961-1500
Cal Oakland, Brill Elctrns., 610 East 10th St. 415-834-5888
Cal Palo Alto, Kierulff Elctrns., 3969 E. Bayshore Rd.
Cal Riverside, Electronic Supply, 2486 Third St. 714-683-5591
Cal Sacramento, Dunlap Elctrns., 1800 18th St.
Colo Denver, Cramer/Denver Elctrns., 5465 E. Evans Pl. at Hudson 303-758-2100
Colo Denver, Industrial Elctrns., Box 22457
Colo Denver, Newark-Denver Elctrn. Supply, 2170 S. Grape St. 303-757-3351
Conn Hamden, Wilshire Elctrns./Conn., 2554 State St. 203-281-1166
Conn Hartford, Electrical Supplies, 3466 Main St. 203-527-7111
Conn Waterbury, Bond Radio Elctrns., 439 West Main St. 203-753-1184
Fla Hollywood, Cramer/EW, 4035 N. 29th Ave. 305-923-8181
Fla Jacksonville, Southeast Elctrns., 1125 Rosselle St. 904-356-3007
Fla Miami, Electro Standards Lab., 3560 N. W. 34th St. 305-633-6975
Fla Miami, Electronic Equip., 2701 N.W. 42nd Ave. 305-635-0421
Fla Orlando, Brownell Electro, 307 27th St. 305-843-6770
Fla Orlando, Hammond Elctrns., 911 W. Central Blvd. 305-241-6601
Fla Pensacola, Grice Elctrns., 320 E. Gregory 904-433-4616
Fla Tampa, Lykes Elctrns., 5426 W. Crenshaw 813-886-6621
Ga Atlanta, Brownell Electro, 3020 Commerce Way 404-767-8761
Ga Atlanta, Lykes Elctrns., 1135 Chattahoochee, NW 404-355-2223
Ga Atlanta, Specialty Dist., 763 Juniper St. N. E. 404-873-2521
Haw Honolulu, Nylen Bros. & Co., 820 S. Beretania ST. Box 2958
Haw Honolulu, Victor Kim Elctrns., 625 South St.
Idaho Boise, Oakley Wholesale, 7605 Idaho St. 208-343-7937
Ill Broadview, LComp-Chicago, 2030 W. 16th St. 312-865-7600
Ill Chicago, Electronic Dists., 4900 N. Elston Ave. 312-283-4800
Ill Chicago, Newark Elctrns., 500 N. Pulaski Rd. 312-638-4411
Ill Elgin, Allied Elctrns., 1355 Sleepy Hollow Rd. 312-697-8200
Ill Mt. Prospect, Cramer-Chicago, 1911 S. Busse Rd. 312-593-8230
Ill Palatine, OHM/Electronics, 649 Vermont Ave. 312-359-5500
Ill Peoria, Klaus Radio, 8400 N. Pioneer Pkwy. 309-691-4840
Ill Rockford, J & M Electronics, 2001-9th St. 815-963-6445
Ill Rockford, Mid-West Assoc., 225 S. 6th St. 815-962-8036
Ill Schaumburg, Motorola, 1301 E. Algonquin
Ill Skokie, Sargent-Welsh Scientific, 7300 N. Linder Ave. 312-267-5300
Ind Evansville, Ohio Valley Sound, 20 E. Sycamore St. 812-425-6173
Ind Fort Wayne, Fort Wayne Electronics Supply, 3606 Maumee Ave. 219-742-4346
Ind Indianapolis, Graham Elctrns. Sply., 133 S. Pennsylvania 317-634-8486
Ind Indianapolis, RA-DIS-CO, 814 N. Senate Ave. 317-637-5571
Ind South Bend, Radio Distributing, 1212 S. High St. 219-288-4666
Iowa Cedar Rapids, Deeco, Inc., 2500 16th Ave. SW 319-365-7551
Kans Wichita, Radio Supply, 115 Laura 316-AM7-5216
Ky Lexington, Radio Elctrns. Equip., 480 Skain St. 606-255-6661
Ky Louisville, E. & H. Elec. Supply, 804 S. 5th St. 502-587-0991
Ky Louisville, P. I. Burks Co., 842 South Seventh St. 502-583-2871
La Lafayette, Ralphs of Lafayette, 3004 Cameron St. 318-234-4507
La New Orleans, Lykes Elctrns., 3308 Orleans Ave. 504-486-7441
La New Orleans, Radio Parts, 1331 Prytania St. 504-581-5959
La New Orleans, Southern Radio Supply, 1909 Tulane Ave. 504-524-2345
La Shreveport, Industrial Elctrn. Supply, 2422 Southern Ave. 318-422-9459
Md Baltimore, A S I Elctrns., 1728-30 Whitehead Rd. 301-265-5100
Md Baltimore, Radio Elec. Srvc., 1026 Cromwell Bridge Rd. 301-823-0070
Md Gaithersburg, Cramer/EW, 16021 Industrial Dr. 301-948-0110
Md Rockville, Capitol Radio Wholesalers, 12270 Wilkins Ave. 301-881-2270
Md Rockville, Pioneer-Washington Elctrns., 1037 Taft St. 301-424-3300
Mass Cambridge, H. Young Jr., 72 Rogers St.
Mass Cambridge, Wilshire Elctrns./New England, 205 Alewife Brook Pkwy 617-491-3300
Mass Newton Center, Cramer Elctrns., 85 Wells Ave. 617-969-7700
Mass North Wilbraham, Industrial Comps., 2551 Boston Rd. 413-596-3854
Mass Watertown, Sterling Elctrns., 51 Spring St. 617-926-9720
Mass Worcester, R M Elctrns., 80 Thomas St. 617-756-8311
Mich Ann Arbor, Wedemeyer Elctrn. Supply, 2280 S. Industrial Hgwy. 313-665-8611
Mich Detroit, Fife Elctrn. Supply, 1211 Trumball
Mich Detroit, Newark/Detroit Elctrns., 20700 Hubbell 313-548-0250
Mich Detroit, R. S. Elctrns., 12775 Lyndon Ave. 313-491-1000
Mich Flint, Shand Electronics, 2401 S. Dort Hgwy. 313-743-8940
Mich Grand Rapids, R. S. Elctrns., 300 36th St. S E 616-459-4611
Mich Jackson, Fulton Radio Supply, 1208 Greenwood Ave. 517-784-6107
Mich Kalamazoo, All-Phase Electric Sply., 710 Gibson St. 616-381-1114
Mich Lansing, Fulton Radio Supply, 2707 Alpha St. 517-489-6519

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Mich	Madison Heights, Lysinger Photo Supply, 30391 Stephenson Hwy.	313-583-1070
Mich	Marquette, NWR Elctrns., 1010 W. Washington St.	906-226-7578
Mich	Muskegon, Western Elctrn. Supply, 1781 Fifth St.	616-722-7628
Mich	Oak Park, Cadillac Electric Supply, 20700 Hubbell Ave.	313-548-0260
Mich	Wyoming, Newark Ind'l. Elctrns., 3645 Linden Ave.	616-241-6681
Minn	Edina, Cramer/Bonn, 7275 Bush Lake Rd.	612-941-4860
Minn	St. Paul, Gopher Elctrns., 2520 W. Larpenteur Ave.	612-645-0889
Miss	Jackson, Ellington Elctrn. Supply, 1425 Terry Rd.	601-355-0561
Mo	Kansas City, Burstein-Applebee, 3190 Mercier St.	816-531-5614
Mo	Kansas City, Walters Radio Supply, 3627-35 Main St.	816-531-7015
Mo	No. Kansas City, LComp-Kansas City, 1520 Taney St.	816-221-2400
Mo	St. Louis, LComp-St. Louis, 2605 S. Hanley Rd.	314-647-5505
Mo	St. Louis, Melvill B. Hall, 3001 Spruce St.	314-371-7000
Mont	Great Falls, Holm James Distrs., 320 6th St. So.	406-761-2420
Neb	Lincoln, Scott Elctrn. Sy, 4040 Adams St.	402-434-8308
Neb	Omaha, Omaha Radio Equip., 625 N. 18th St.	402-341-7700
NJ	Moonachie, Cramer, 1 Barratt Ave.	201-687-7870
NJ	Springfield, Federated Elctrns. Div., 155 U.S. Rte. 22	201-376-8900
NM	Albuquerque, Hyer-Cramer Elctrns., 137 Vermont, N.E.	505-265-5767
NY	Albany, E. E. Taylor Co., 465 Central Ave.	518-489-5600
NY	Binghamton, Harvey Federal Elctrns., Box 1208 - Vestal Pkwy.	607-748-8211
NY	Buffalo, Summit Distrs., 916 Main St.	716-884-3450
NY	Farmingdale, Arrow Elctrns., 900 Broad Hollow Rd.	516-694-6800
NY	Huntington Station, Texas Instr. Supply, #2 Huntington Quad	
NY	Long Island City, H. L. Dalis, 35-35 24th St.	212-361-1100
NY	Lynbrook, Peerless Radio, 19 Wilbur St.	516-593-2121
NY	Plainview, Texas Instr. Supply, 245 Newton Rd.	516-293-2660
NY	Rochester, Requa Electrical Supply, 2005 Brghtn-Hentta, Town Line Rd.	716-442-2020
NY	Rochester, Simcona Elctrns., 275 Mt. Read Blvd.	716-328-3230
NC	Ashville, Southeastern Radio Supply, 1065 Patton Ave.	704-253-1146
NC	Charlotte, Brownell Electro, 5141 Belhaven Blvd.	704-392-7451
NC	Greensboro, Hammond Electronics, 2923 Pacific Ave.	919-275-6391
NC	Raleigh, Southeastern Radio Supply, 414 Hillsboro St.	919-828-2311
NC	Winston-Salem, Cramer/EW, 938 Burke St.	919-725-8711
NC	Winston-Salem, Kirkman Elctrns., 901 W. Second Ave.	919-724-0541
Ohio	Akron, Akron Elctrns., 107 S. Arlington St.	216-762-8818
Ohio	Akron, Sun Radio Co., 110 E. Market St.	216-434-2171
Ohio	Cincinnati, Hughes-Peters, 4865 Duck Creek Rd.	513-381-7625
Ohio	Cincinnati, Newark-Herrlinger Elec., 9799 Princeton	513-241-5282
Ohio	Cleveland, Pioneer-Cleveland, 4800 E. 131st St.	216-587-3600
Ohio	Columbus, Hughes-Peters, 481 E. 11th Ave.	614-294-5351
Ohio	Dayton, J. A. Becker Co., 1341 E. 4th St.	513-226-1341
Ohio	Dayton, Pioneer/Dayton, 1900 Troy St.	513-236-9900
Ohio	Dayton, Stotts-Friedman, 108 N. Jefferson St.	513-224-1111
Ohio	Lima, Lima Radio Parts Co., 150 W. Grand Ave.	419-225-1220
Ohio	Solon, Radio & Elctrn. Parts, 6835 Cochran Rd.	216-248-8900
Ohio	Toledo, Warren Radio, 1002 Adams St.	419-248-3364
Ohio	Warren, REM Elctrns. Supply, 264 W. Market St.	216-399-2777
Ohio	Youngstown, Ross Radio, 325 W. Federal St.	216-746-8881
Okla	Tulsa, Radio, Inc., 1000 S. Main St.	918-587-9123
Okla	Tulsa, S & S Radio Supply, 537 S. Kenosha St.	918-582-8242
Ore	Portland, Eoff Electric, 509 N.W. 10th St.	503-222-9411
Ore	Portland, Platt Elec. Supply, 1305 N. W. Davis	503-228-6121
Ore	Portland, United Radio Supply, 123 N. E. 7th Ave.	503-233-7151
Pa	Altoona, Allegheny Elctrns., 800 Chestnut Ave.	
Pa	Braddock, Leff Radio Parts Co., 225 Braddock Ave.	
Pa	Drexel Hill, Kass Elctrns., 2502 Township Line Rd.	215-568-3500
Pa	Erie, Warren Radio, 1315 Peach St.	814-454-5285
Pa	Harrisburg, Pyttronic Inds., Box 1967 Balto, Wabash Ind'l. Ctr.	717-233-6591
Pa	Philadelphia, Herbach & Rademan, 401 E. Erie Ave.	215-426-1700
Pa	Pittsburgh, Cameradio Co., Inc., 2801 Liberty Ave.	412-288-2600
Pa	Pittsburgh, Fisher-Scientific, 711 Forbes Ave.	412-391-1330
Pa	Pittsburgh, McCollough Elec., 419 Fort Pitt Blvd.	412-261-2420
Pa	Pittsburgh, R. P. C. Elctrns., 620 Alpha Dr.	412-782-3770
Pa	Reading, Barbey Elctrns., 333 N. 4th St.	215-376-7451
Pa	Westchester, Westchester Elec. Supply, 716 E. Market St.	215-696-7500
RI	Providence, Wm. Dandretta & Co., 28 Wolcott St.	401-861-2800
SC	Charleston, Wholesale Radio Supply, 515 E. Bay St.	803-722-2634
SC	Columbia, Dixie Radio Sply., 1900 Barnwell St.	803-253-5333
SC	Greenville, Hammond Electronics, 100 Augusta St.	803-233-4121
Tenn	Kingsport, Radio Elec. Supply, 961 E. Sullivan St.	615-247-8111
Tenn	Knoxville, Roden Electrical Supply, 124-144 Oklahoma	615-524-9851
Tenn	Memphis, Bluff City Dist., 234 East St.	901-725-9500
Tenn	Memphis, Brownell Electro, 3053 Tranquillity Dr.	901-323-7693
Tenn	Nashville, Electra Distributing, 1914 West End Ave.	615-255-8444
Tex	Corpus Christi, Wicks Radio Equip., 513 S. Staples	512-884-8285
Tex	Dallas, Texas Instr. Supply, 6000 Denton Dr.	214-238-3333
Tex	Dallas, Wholesale Elctrn. Supply, 2809 Ross Ave.	214-824-3001
Tex	El Paso, Midland Specialty, 2235 Wyoming Ave.	915-533-9555
Tex	Fort Worth, Allied Elctrns., 401 E. 8th St.	
Tex	Houston, Curtin/Matheson Scien., 4220 Jefferson St.	713-923-1661
Tex	Houston, Harrison Equip. Co., 1616 McGowen	713-224-9131
Tex	Houston, Sterling Elctrns., 4201 Southwest Frwy.	713-623-6600
Tex	McAllen, McAllen Radio Elctrns., 413-415 S. Bdwy.	512-682-2361
Tex	Port Arthur, J & M Industrial Supply, 700 Seventh St.	713-883-2055
Tex	Stafford, Southwest Elctrns., 12725 Royal Dr.	
Tex	Texarkana, McCollough Electric, 1222 Main St.	214-792-6923
Utah	Salt Lake City, Standard Supply, 225 E. Sixth St. S.	801-355-2971
Va	Charlottsville, Virginia Radio Supply, 715 Henry Ave.	703-296-4184
Va	Norfolk, Priest Elctrns., 6431 Tidewater Dr.	703-855-3017
Va	Richmond, Meridan Elctrns., 1001 W. Broad St.	703-355-6521
Wash	Seattle, Almac/Stroum Elctrns., 5811 Sixth Ave. So.	206-763-2300
Wash	Seattle, Cramer/Seattle, 5602 Sixth Ave. S.	206-762-5755
Wash	Seattle, Radar Elec., 168 Western Ave. W.	
Wash	Seattle, Seattle Radio Supply, 2117 Second Ave.	206-624-2341
Wash	Seattle, Western Elctrns., 717 Dexter Ave. No.	206-284-0200
Wash	Spokane, Northwest Elctrns., 730 E. First Ave.	509-534-2644
Wisc	Milwaukee, Marsh Elctrns., 6047 W. Beloit Rd.	414-545-6500
Wisc	Milwaukee, Parts Mart, 1314 N. 7th St.	414-276-4160

SOLAR ELCTRNS. CO., 901 N. Highland, Hollywood, Cal., 90038, Tel: 213-462-0806; FSC No: 13222; Empl.: 10; Minimum order: $1

Customer service: A. T. Parker

Free literature available: Catalog shows complete line of instruments, components and accessories essential for EMI testing.

Products manufactured: Amplifiers, Antennas, Filters, Generators, Insertion Loss Measurement Systems, Meters, Probes

Advertisment

A UNIQUE LINE OF INSTRUMENTS, COMPONENTS AND ACCESSORIES TO ASSIST THE RFI/EMC ENGINEER IN COMPLYING WITH MIL-STD-461 AND OTHER EMI SPECS. TRANSIENT GENERATORS, AUDIO POWER SWEEP GENERATORS, LISNS, CURRENT PROBES, ISOLATION TRANSFORMERS, EMI POWER METERS, FEED-THRU CAPACITORS, EMI FILTERS AND WAVE FILTERS.

SOLATRON ENTERPRISES, 421 E. Beach Ave., Inglewood, Calif., 90302, Tel: 213-678-4981; Empl.: 20; Minimum order: $25

Customer service: D. S. Rathje

Products manufactured: Bridges, Machines/Machinery, Production, Meters, Sockets, Testers

SOLDER REMOVAL CO., 1077 E. Edna Pl., Covina, Cal., 91722, Tel: 213-331-0985, TWX: 910-584-1820; Empl.: 30

Customer service: T. H. Naylor 213-966-8321

Products manufactured: Coatings, Soldering Accessories, Soldering Guns, Irons & Desoldering Tools, Tools

Local Sales Offices & Reps.

Ala	Huntsville, South Eastern Assocs., Inc.	205-539-9816
Ariz	Phoenix, Maddox Sls. Co.	602-274-3807
Cal	Los Angeles, Maddox Sls. Co.	213-949-5433
Cal	San Francisco, Maddox Sls. Co.	415-431-2953
Ill	Joilet, Hanat & Hall, Inc.	815-722-0436
Kans	Shawnee Mission, M. E. Bettis Co.	913-362-0772
Md	Phoenix, REBCO Sls.	301-592-8907
Mass	Wayland, Ellingwood, Inc.	617-265-6400
NJ	Wayne, G.T. Assocs.	201-694-6040
NM	Albuquerque, Maddox Sls. Co.	505-298-2422
NY	Syracuse, M.C. Antil, Inc.	315-468-2370
Ohio	Cleveland, Buckeye Components	216-292-2889
Ohio	Dayton, Buckeye Components	513-278-4279
Tex	Dallas, E. Tron Sls.	214-348-4749

SOLID STATE INC., 46 Farrand St., Bloomfield, N.J., 07003, Tel: 201-429-8700, TWX: 710-994-4780; Empl.: 60; Minimum order: $25

For info on price: Sls.; Application info: A. Citro; Customer service: Jayne; Delivery info: Mary

Free literature available: RF applications (micro wave); PUT applications.

Products manufactured: Amplifiers, Diodes, Hybrid Voltage Regulators, Integrated Circuit Devices, Rectifiers, Thyristors (Includes Silicon Controlled Rectifiers), Transistors

Local Sales Offices & Reps.

Ariz	Tempe, J. Cain Assoc.	602-838-3404
Cal	Seal Beach, Texel Sls.	213-596-9411
Fla	Casselberry, E. I. R.	305-426-0606
Ill	Chicago, C L Greenslade Sls.	312-561-0156
Mich	Farmington, Reptron	313-478-1024
NY	New York, Solid State Inc.	212-964-5682

SOLID STATE DEVICES, INC., 14830 Valley View Ave., LaMirada, Cal., 90638, Tel: 213-921-9660, TWX: 910-583-4807; Empl.: 100 ....p. 1•1864,1865

Products manufactured: Diodes, Rectifiers, Transistors

Local Sales Offices & Reps.

Cal	Escondido, Cirolia Elctrn. Sls.	714-743-3015
Cal	Los Altos, Stout-Loeswick Elect. Mktg.	415-948-3265
Fla	Kissimmee, Nickerson Co.	305-846-6755
Fla	Oldsmar, Nickerson Co.	813-855-4209
Fla	Tampa, Nickerson Co.	813-885-1416
Ga	Decatur, Nickerson Co.	404-631-4481

Mass	Brookline, Technology Prods.	617-731-0858
Mich	Warren, DEM Elctrns.	313-755-6660
Minn	Minneapolis, Bitronics Sls.	612-835-7744
NJ	Wallington, Comp-Tech Sls.	201-935-5454
NM	Albuquerque, J. Smith & Assocs.	505-255-2111
NY	Rochester, Ontec	813-885-8633
Ohio	Englewood, Daytech Sls.	513-836-8633
Tex	Dallas, J. Clay Co.	214-350-1281
Va	Fairfax, Schibley Assocs.	703-591-3008
Wash	Seattle, Underwood & Underwood	206-243-2133
Wisc	Brookfield, Berndt Assocs.	414-786-6950

SOLID STATE ELECTRONICS CORP., 15321 Rayen St., Sepulveda, Cal., 91343, Tel: 213-894-2271; Empl.: 15 .... p. 1•126,1816

Products manufactured: Amplifiers, Analyzers, Choppers, Coders, Coils Including Assemblies & Forms, Comm. Systems, Comparators, Controls/Control Eqpt., Converters, Decade Boxes, Decoders, Demodulators, Detectors, Discriminators, Drivers, Chopper, Filters, Generators, Indicators, Keyers, Tone, Meters, Mixers, Modulator/Demodulators, Modulators, All Kinds, Monitors, Multiplexers, Oscillators, Power Supplies, Receivers, Relays, Tachometers, Transducers, Transformers

SOLID STATE SCIENTIFIC, Montgomeryville Ind'l. Pk., Montgomeryville, Pa., 18936, Tel: 215-855-8400, TWX: 510-661-7267; Empl.: 400

Products manufactured: Circuits, Integrated, Silicon Monolithic, Unpackaged Chips, Integrated Circuit Devices, Transistors

Local Sales Offices & Reps.

Cal	Newport Beach	714-546-9621
Ill	Arlington Heights	312-437-8373
Pa	Norristown	215-279-8424

SOLIDSTATE CONTROLS, INC., 600 Oakland Park Ave., Columbus, Ohio, 43214, Tel: 614-263-1886, Telex: 245-338; Empl.: 70

For info on price: J. N. Holscher; Application info: H. W. Bates; Customer service: J. VanSkoy; Delivery info: T. A. Curran

Free literature available: Static inverters - Transfer switches for use with static inverters - Battery chargers - Complete static uninterruptible power systems.

Products manufactured: Chargers, Battery, Inverters, Switches

Local Sales Offices & Reps.

Ala	Birmingham, Spader & Assocs.	205-879-1366
Cal	San Francisco, Garland Affolter Engrg. Corp.	415-397-1800
Cal	San Gabriel, Garland Affolter Engrg. Corp.	213-287-1149
Colo	Denver, Peterson Co.	303-388-6322
Fla	Lake Wales, Carter-Watsey & Assocs.	813-676-1474
Fla	Miami Shores, Carter-Watsey & Assocs.	305-635-5361
Ga	Atlanta, M.J. Fein & Co./C.A. Legg	404-938-0190
Ga	Decatur, Spader & Assocs.	404-296-3024
Ill	Glen Ellyn, J.T. Becker Assocs.	312-858-1910
Ind	Indianapolis, Utility & Ind'l. Prods., Inc.	317-924-3607
Iowa	Bettendorf, Deco Engrg. Prods., Inc.	319-355-2679
Iowa	Des Moines, Deco Engrg. Prods., Inc.	515-274-9356
La	New Orleans, Gregory-Salisbury & Co.	504-524-5207
Mass	Holliston, M.J. Fein & Co.	617-429-4008
Mich	Royal Oak, C.H. Armstrong Co.	313-544-1305
Minn	Minneapolis, Electrical Jobbers Equip., Inc.	612-721-4815
Miss	Jackson, Gregory-Salisbury & Co.	601-362-1761
Mo	Crestwood, C.B. Fall Co.	314-968-3850
Neb	Omaha, Deco Engrg. Prods., Inc.	402-341-4836
NJ	Livingston, M.J. Fein & Co.	201-994-3575
NY	Scarsdale, M.J. Fein & Co.	914-472-1100
Ohio	Columbus, Meas. Instrs., Inc.	614-488-9753
Okla	Tulsa, D. Allert Co.	918-743-7705
Ore	Portland, Garland Affolter Engrg. Corp.	503-223-7349
Pa	Media, Sys. Control Assocs.	215-565-2077
Tenn	Memphis, Gregory-Salisbury & Co.	901-365-6660
Tex	Arlington, Pan Tech. Engrg.	817-261-4111
Tex	Houston, Pan Tech. Engrg.	713-623-0640
Utah	Salt Lake City, Peterson Co.	801-487-5621
Wash	Bellevue, Garland Affolter Engrg. Corp.	206-454-2485

SOLITRON DEVICES, 8808 Balboa Ave., San Diego, Cal., 92123, Tel: 714-278-8780, TWX: 910-335-1221; Empl.: 900

Products manufactured: Amplifiers, Calculators, Electrical & Electronic, Diodes, Integrated Circuit Devices, Rectifiers, Transistors

SOLITRON DEVICES, Transistor Div., 1177 Blue Heron Rd., Riviera Beach, Fla., 33404, Tel: 305-848-4311, TWX: 510-952-7610; FSC No: 21845; Empl.: 417; Minimum order: $100

For info on price: J. J. Bilger; Application info: J. Lamm; Customer service: M. Giraud; Delivery info: D. Harrison

Free literature available: Solitron Short Form Catalog On Power Transistors, Hybrids Etc. Transistor Chip Catalog.

Products manufactured: Circuits, Hybrid, Thick Film, Circuits, Hybrid, Thin-Film, Circuits, Integrated, Silicon Monolithic, Unpackaged Chips, Crystals, Diodes, Hybrid Voltage Regulators, Rectifiers, Regulators, Relays, Semiconductor Wafer Fabrication, Transistors

Local Sales Offices & Reps.

Ala	Huntsville, Owen Rowe Ents.	205-837-3643
Ariz	Scottsdale, Piper-Goyne	602-946-4437
Cal	Canoga Park, TKO	213-883-3822
Cal	San Diego, Col-Rob	714-565-6814
Cal	San Jose, Com-Cal	408-268-7337
Colo	Denver, Piper-Goyne, Inc.	303-934-6971
Conn	Wallingford, Com-Sale	203-269-7964
Fla	Orlando, Cartwright & Bean	305-422-4531
Fla	Plantation, Cartwright & Bean	305-791-3989
Ga	Atlanta, Cartwright & Bean	404-255-5262
Haw	Honolulu, Aloha Assocs.	808-941-1574
Ill	Hinsdale, Momak Sls.	312-654-4524
Ind	Indianapolis, Electro Reps.	317-255-4147
La	Chalmette, Cartwright & Bean	504-279-4598
Mass	Waltham, Com-Sale	617-890-0011
Mich	Southfield, Luebbe Sls. Co.	313-357-0355
Minn	Edina, Wagner Consultants	612-941-6310
Miss	Jackson, Cartwright & Bean	601-981-1368
Mo	Saint Charles, Buckman & Assocs.	314-724-6690
NJ	Haddonfield, M & S Assocs., Inc.	609-429-7055
NM	Albuquerque, Piper-Goyne	505-265-6794
NY	Jamaica, S-J Sls. Assocs.	212-291-3232
NY	Syracuse, Nycom	315-463-1665
NY	Tappan, Solitron Devices	914-359-5050
NY	West Nyack, Rubin Sales & Assocs.	914-623-9237
NC	Charlotte, Cartwright & Bean	704-333-6457
NC	Raleigh, Cartwright & Bean	919-832-7128
Ohio	Cincinnati, Luebbe Sls. Co.	513-871-4211
Ohio	Cleveland, Luebbe Sls. Co.	216-333-0425
Ohio	Dayton, Luebbe Sls. Co.	513-294-0427
Ore	Portland, C. K. Shanks & Assocs.	503-292-5656
Pa	Delmont, Luebbe Sls. Co.	412-468-4019
Tenn	Knoxville, Cartwright & Bean	615-693-7450
Tenn	Memphis, Cartwright & Bean	901-276-4442
Tex	Richardson, P. J. Scanlon Co.	214-231-4661
Wash	Seattle, C. K. Shanks & Assocs.	206-ME2-4290
EXP:	Riviera Beach, Solitron Devices	305-848-4311

SOLITRON DEVICES, INC., 256 Oak Tree Rd., Tappan, N.Y., 10983, Tel: 914-359-5050, TWX: 710-576-2654

SOLITRON/MICROWAVE, Box 278, Port Salerno, Fla., 33492, Tel: 305-287-5000, TWX: 510-953-7500; FSC No: 95077; Empl.: 125

For info on price: D. Kiplinger; Application info: R. Sulzer; Customer service: F. Tiemeyer; Delivery info: R. Sulzer

Products manufactured: Connector Adapters, Connectors, Delay Lines, Resistors, Strip-Line Components, Microwave, Terminals

Local Sales Offices & Reps.

Ala	Huntsville, Beacon Elctrns. Assoc.	205-881-5031
Ariz	Scottsdale, Piper-Goyne	602-946-4437
Cal	Los Angeles, RF Assocs.	213-478-1586
Cal	Mountain View, Westrep	415-968-5800
Cal	Palo Alto, RF Assocs.	415-494-3331
Cal	Pico Rivera, Westrep	213-949-2551
Cal	San Diego, Westrep	714-276-0751
Colo	Littleton, Piper-Goyne	303-798-9855
Fla	Ft. Lauderdale, Beacon Elctrns.	305-776-6074
Fla	Maitland, Beacon Elctrns.	305-647-3498
Ga	Atlanta, Beacon Elctrns.	404-351-3654
Ill	Hinsdale, Momak Sales	312-654-4524
Ind	Indianapolis, Sukup & Cox	317-253-1215
Kans	Shawnee-Mission, Florence & Meyer	913-722-5210
Kans	Wichita, Florence & Meyer	316-838-7226
Md	Ellicott City, Doss Elctrns.	301-465-1336
Mass	Wakefield, Nerem	617-245-4426
Mich	Southfield, Luebbe Sales	313-357-0355
Minn	Edina, Wagner Consultants	612-941-6310
Mo	St. Charles, Florence & Meyer	314-724-6690
NJ	Haddonfield, M & S Assocs.	609-429-7055
NM	Albuquerque, Piper-Goyne	505-265-6794
NY	Bayside, R. Diamond	212-423-7330
NY	Syracuse, Nycom, Inc.	315-437-8343
NY	West Nyack, B. Rubin Assocs.	609-429-7055
Ohio	Cincinnati, Luebbe Sales	513-871-4211
Ohio	Cleveland, Luebbe Sales	216-333-0425
Ohio	Dayton, Luebbe Sales	513-294-0426
Pa	Delmont, Luebbe Sales	412-468-4019
SC	Spartanburg, Beacon Elctrns.	803-582-4613
Tex	Plano, Zeus Engrg.	214-231-4661
Wash	Seattle, Blum & Assocs.	206-285-2590

SOMERSET RADIATION LAB., Box 946, Arlington, Va., 22216

Products manufactured: Attenuators, Modulators, All Kinds, Multipliers, Oscillators, Switches

SONIC INTERNATIONAL CORP., 10330 NE Marx, Portland, Ore., 97220, Tel: 503-665-0187; Empl.: 30; Minimum order: $100

For info on price: M L. Roth; Application info: M. L. Roth; Customer service: M. L. Roth; Delivery info: K. Miles

Products manufactured: Handsets, Chestsets, Headphones, Headsets, Etc., Speaker Systems, Speakers

Local Sales Offices & Reps.

Ariz	Pheonix, S. Bova Sls.	602-266-1137
Cal	Brisbane, Metropolitan Sls.	415-467-9100
Cal	N. Hollywood, M. Stobin	213-983-1555
Cal	Northbridge, Products West	213-993-0263
Colo	Inglewood, J. Hanf	303-761-9421
Fla	Jacksonville Beach, Vantage Sls.	904-246-6756
Fla	Miami Beach, E & J Assoc.	305-531-4260
Ga	E. Point, P. Hayden Co.	404-766-0261
Ill	Chicago, Hirsh Sls.	312-583-8877
Ind	Indianapolis, B. Richey & Assocs.	317-542-0605
Kans	Overland Park, Nackman-Brod-Vann	913-381-6560
Md	Baltimore, Bernie Smith Assoc.	301-247-0033
Md	Joppa, J. Merican Co.	301-679-6969
Mass	Newtonville, Arbetter Sls.	617-969-4128
Mich	Southfield, P. Entin Assoc.	313-557-4897
Minn	Minneapolis, Felson & Moscoe Co.	612-831-1897
Mo	St. Louis, Nackman-Brod-Vann Co.	314-991-2424
Neb	Omaha, Nackman-Brod-Vann Co.	402-333-4346
NY	N.Y., B & S Sls.	212-736-3035
NY	New York, J. Kaufman	
NY	Rochester, V. Lulla Assoc.	716-244-7772
NC	Greensboro, P. Hayden Co.	919-288-6754
Ohio	Cleveland, KAM Mktg.	216-464-7717
Pa	Pittsburgh, F. Fleischmann	412-681-4848
Pa	Trevose, E. & J. Sls.	215-355-7847
SC	Columbia, Carolina Mktg.	803-794-7359
Tex	Dallas, Ram Mktg.	214-744-4881
Tex	El Paso, S. Bova Sls.	915-591-6242
Utah	S.L.C., Austin Riggs	801-363-4408
Va	Richmond, Robco Entprs.	804-264-2901
Wash	Vancouver, J. Wasson & Assocs.	206-694-6728

SONY CORP. OF AMERICA, 47-47 Van Dam St., Long Island City, N.Y., 11101

SORENSEN CO., 676 Island Pond Rd., Manchester, N.H., 03103, Tel: 603-688-4500, TWX: 710-220-1339; Empl.: 600; Minimum order: $25 .... p. 1•1433-1442

For info on price: B. McCue; Application info: H. Termin; Customer service: R. E. Maitland; Delivery info: R. E. Maitland

Free literature available: Sorensen 1974/75 Catalog

Products manufactured: Power Supplies, Regulators

Local Sales Offices & Reps.

Ala	Huntsville, BCS Assocs. Inc.	205-881-6220
Ariz	Scottsdale, Barnhill Three	602-947-7841
Cal	Burbank, Instrument Specialists, Inc.	213-849-7181
Cal	San Diego, Instrument Specialists, Inc.	714-232-2017
Cal	Santa Clara, Instrument Specialists, Inc.	408-244-1505
Colo	Denver, Barnhill Three	303-750-1222
Fla	Orlando, BCS Assocs.	305-896-4881
Ill	Chicago, Pivan Engrg. Co.	312-539-4838
Ind	Indianapolis, Pivan Engrg. Co.	317-253-1681
Kans	Shawnee Mission, Pivan Engrg. Co.	913-722-1030
Md	Belair, Dyna Rep. Co.	703-354-1222
Mich	Detroit, Comtel-Sterling Co.	313-255-1970
Minn	Minneapolis, Pivan Engrg. Co.	612-537-4501

Mo	St. Louis, Pivan Engrg. Co.	314-567-3636
NJ	Haddonfield, Dyna Rep Co.	609-795-1700
NM	Albuquerque, Barnhill Three	505-299-7658
NY	Great Neck, Meas. Technology Inc.	516-482-3500
NY	Pleasantville, SBM Assocs.	914-769-1811
NY	Rochester, SBM Assocs.	716-266-1400
NC	Greensboro, BCS Assocs.	919-273-1918
Ohio	Cleveland, Comtel-Sterling Co.	216-442-8080
Ohio	Dayton, Comtel-Sterling Co.	513-298-7573
Pa	Pittsburgh, Comtel-Sterling Co.	412-922-5720
Tex	Houston, Barnhill Two	713-688-9771
Tex	Richardson, Barnhill Two	214-231-2573
Va	Alexandria, Dyna Rep Co.	703-354-1222
Wash	Seattle, R.S. Drake Assocs., Inc.	206-963-2755
Wisc	Brookfield, Pivan Engrg. Co.	414-786-1940

SORENSEN LIGHTED CONTROLS, 505 New Park Ave., W. Hartford, Conn., 06110 .... p. 2•1198,1199

Products manufactured: Lamps, Lights

SOSHIN ELEC. CO., 1-18-18 Nakamogome, Ota-Ku, Tokyo, Japan, Tel: (03) 775-2111, Telex: 246-6377; Empl.: 1100

Products manufactured: Capacitors, Fixed, Filters

SOTCHER MEASUREMENT, Box 857, Cupertino, Cal., 95014, Tel: 408-732-9171; Empl.: 6; Minimum order: $12

Customer service: F. Sotcher

Free literature available: Model 101, The Fault Finder, Leakage Current Detector Model 301, The Short Stop, Leakage Current Testor Model 401, Outlet Tester Model 510, The Power Monitor Model 620, Generator Test Set Model 714, Low Voltage Alarm

Products manufactured: Alarms, Detectors, Loads, Electronic Variable, Meters, Monitors, Testers

Local Sales Offices & Reps.

Fla	Tampa, E. L. Ebert Sls. Agency	813-837-2867
Tenn	Knoxville, Electronic Sls.	615-577-0689

Local Distributors

Haw	Wahiawa, Wahiawa Rentals, 825 C Olive Ave.	808-621-6084
Ill	Elk Grove Village, IMI Equip. & Supp., 130 Crossen Ave.	312-593-7606
NJ	Moorestown Rental Serv. Supp., Route 73	609-235-6100

SOUND TECHNOLOGY, 10601 S. Saratoga-Sunnyvale Rd., Cupertino, Cal., 95014, Tel: 408-257-9171; Empl.: 11

Products manufactured: Analyzers, Generators, Oscillators, Transformers

SOUTH SHORE METAL PRODS., INC., 88 E Allen Blvd., Farmingdale, N.Y., 11735, Tel: 516-249-3322; Empl.: 26; Minimum order: $25

For info on price: A. G. Bauer; Application info: A. G. Bauer; Customer service: C. Bianco; Delivery info: T. Farkas

Free literature available: Catalog on standard drawn cans

Products manufactured: Bezels, Shielded & Unshielded, Cans, Capacitor, Relay, Semiconductor, Transformer, etc, Cases, Equipment, Instrument, Meter, Containers, Escutcheons, Heat Sinks, Soldering, Services, Assembly, Production & Test

Advertisment

S.S. offers a stock size line of deep drawn cans trimmed to customer's length requirement at no extra cost. Will also produce special sizes and shapes complete with mounting brackets, studs, etc. - mumetal and other shielding type enclosures are regularly shipped. Tape control drilling and machining available for panel boards, plug in strips, etc. Quality control program to MIL-1-45208.

SOUTHERN ELCTRNS CORP., see F-Dyne Electronics Co.

SOUTHERN ELECTRONICS CO., 726 So. Flower St., Burbank, Cal., 91502, Tel: 213-845-2458; Empl.: 310 p. 2•240,241

Products manufactured: Capacitors, Fixed, Capacitors, Variable, Filters, Networks

Local Sales Offices & Reps.

Ala	Huntsville, Beacon Electronics	205-881-5031
Cal	Fremont, Spence Assocs.	415-656-9506
Cal	Van Nuys, Myco Sls.	213-988-2288
Colo	Denver, Walter Engrg.	303-777-5585
Conn	Wethersfield, Con/Pak	203-563-4784
Del	Wilmington, Dyna-Rep	301-250-8300
Fla	Ft. Lauderdale, Beacon Electronics	305-622-2770
Fla	Maitland, Beacon Electronics	305-647-3498
Ga	Atlanta, Beacon Electronics	404-351-3654
Ill	Elk Grove Village, Loren Green Assocs.	312-593-0282
Ind	Indianapolis, Loren Green Assoc.	317-293-9827
Kans	Shawnee, J. Guernsey Co.	913-631-2414
Mass	Needham, Com/Pack	617-444-1259
Mich	St. Clair Shores, J. M. Thorpe Co.	313-779-6363
Minn	Minneapolis, Loren Green Assoc.	612-781-1611
NJ	Haddonfield, Dyna Rep	609-795-1700
NY	Hempstead, Kahgan Sls.	516-538-2300
NY	Syracuse, Naylor Elec.	315-472-9183
NC	Greensboro, L & D, Inc.	919-292-3201
Ohio	Cleveland, Orr Assoc.	216-885-1324
Tex	Dallas, Cunningham Co.	214-231-2686
Tex	Houston, Cunningham Co.	713-461-4197
Va	Alexandria, Dyna Rep	703-354-1222
Va	Newport News, Dyna Rep	804-874-7729
FOR:	Can., Don Mills, Ont., B. D. Vallillee Elctrns.	416-447-8482

SPACE POWER ELCTRNS, Jeffrey Lane, RD 1, Glen Gardner, N.J., 08826

SPACETAC, INC., Sub. Corning Glass Works, Crosby Dr., Bedford, Mass., 01730, Tel: 617-275-1710, TWX: 710-326-7567; Empl.: 185

Customer service: Sls. Off.

Free literature available: Flyer on modular memory controlled pcm encoders; A complete company capabilities brochure.

Products manufactured: Amplifiers, Analyzers, Comm. Systems, Converters, Decommutators, Telemetering, Encoders, Memory Systems, Power Supplies, Substrates

Local Sales Offices & Reps.

Cal	Orange	714-541-5275
Md	Columbia	301-953-3360

SPEC PLASTICS INC., 7224 Atoll Ave., No. Hollywood, Cal., 91605, Tel: 213-982-0300; Empl.: 43; Minimum order: $25

For info on price: T. Reid; Application info: T. Reid; Customer service: R. Fuller; Delivery info: R. Fuller

Products manufactured: Bobbins, Winding, Coil & Transformer, Coils Including Assemblies & Forms, Connectors, Cups, Encapsulation, Enclosures, Module, Plug-In, Holder & Carriers, Integrated Circuit Packaging Systems, Packages, Integrated Circuit, Pads, Transistor Mounting, Racks

SPECIAL MICROWAVE DEVICES OPER., Raytheon Co., 130 Second Ave., Waltham, Mass., 02154, Tel: 617-890-8080, TWX: 710-324-6568

Customer service: W. C. Jones

Products manufactured: Amplifiers, Attenuators, Circulators, Ferrite, Converters, Detectors, Diodes, Filters, Generators, Isolators, Limiters, Modulators, All Kinds, Multipliers, Oscillators, Shifters, Switches, Terminals, Transistors

Local Sales Offices & Reps.

Cal	Los Angeles	213-641-3103
Cal	Mountain View	415-964-4754
Fla	Longwood	305-830-6670
Ill	Elmhurst	312-833-6760
Mass	Waltham	617-890-8080
NY	Great Neck	516-482-8480
NY	Rome	315-337-2500
Ohio	Dayton	513-254-3571
Tex	Dallas	214-233-2939
Va	Arlington	703-979-6100

SPECIALTIES MFG. CO., INC., 23425 Harper, St. Clair Shores, Mich., 48080, Tel: 313-771-2700; Empl.: 6 p. 1•2277

Customer service: C. Novikoff

Products manufactured: Plugs, Switch Handle Boots, Switch Mounting Plates, Switches

Local Sales Offices & Reps.

Ark	El Dorado, D. Bellew Sls.	501-863-8325
Ga	Atlanta, Hollingsworth & Still	404-255-8200
Ill	Chicago, B. Burns & Assoc.	312-775-1233
Ind	Indianapolis, Sukup & Cox	317-253-5501
La	Kenner, D. Bellew Sls.	504-729-4550
Mo	St. Louis, Kathrinus Kelly-Boswell Co.	314-962-5627
NJ	Caldwell, Art Cerf & Co.	201-226-2263
NY	Bronx, Peterson-Rudnick Assoc.	212-671-1923
NC	Charlotte, Hollingsworth & Still	704-536-7047
Ohio	Cleveland, Marlow Assocs.	216-381-4500
Ohio	Xenia, Marlow Assocs.	513-426-6270
Ore	Portland, Pacific Elec. Sls.	503-235-4137
Tex	Dallas, Collins Co.	214-341-7866

SPECIALTY CONNECTOR CORP., 3560 Madison Ave., Indianapolis, Ind., 46227, Tel: 317-787-6368; Empl.: 100; Minimum order: $30

For info on price: W. Foltz; Application info: M. H. Burdett; Customer service: W. Foltz; Delivery info: W. Foltz

Products manufactured: Connector Adapters, Connectors

Local Sales Offices & Reps.

Cal	Los Angeles, M.A. Stolaroff	213-295-7781
Cal	Palo Alto, W.W. Tompkins & Co.	415-326-7940
Colo	Denver, McLoud & Raymond Co.	303-756-1589
Conn	Meriden, Eagle Assocs.	203-235-9036
Ga	Atlanta, Grady Duckett Sls. Corp.	404-451-3529
Ill	Oak Park, W. Gallagher	312-261-7517
Ill	Weschester, W. Gallagher	312-344-0690
Ind	Fort Wayne, S & S Elctrns.	219-743-4611
NJ	Bergenfield, H. Gray Assocs.	201-384-3643
NJ	Mount Laurel, Naudain Assocs.	609-235-1801
NJ	Syracuse, Naylor Electric Co.	315-472-9183
Ohio	Akron, A. Natalino Assocs.	216-725-6087
Tex	Richardson, Oeler & Menelaides, Inc.	214-234-6334
Wash	Seattle, H.S. Thorpe & Co.	206-784-3333

SPECTRA-PHYSICS, INC., 1250 W. Middlefield Rd., Mountain View, Calif., 94040, Tel: 415-961-2550, TWX: 910-379-6941; Empl.: 1000; Minimum order: $100

For info on price: J. Calvert; Application info: C. Schulthess; Customer service: J. Cole; Delivery info: J. Calvert

Products manufactured: Lasers & Laser Systems, Monitors, Power Supplies, Tubes

Local Sales Offices & Reps.

Cal	Los Angeles	714-496-6886
Ill	Chicago	312-386-5104
Mass	Boston	617-734-4661
NJ	Avenel	201-381-1552
NM	Albuquerque	505-881-7577
Tex	Dallas	214-528-5142

SPECTRA SONICS, 770 Wall Ave., Ogden, Utah, 84404, Tel: 801-392-7531; Empl.: 25

For info on price: R. Welch; Application info: W. G. Dilley; Customer service: J. Dilley; Delivery info: J. Dilley

Products manufactured: Amplifiers, Equalizers, Filters, Mixer-Preamplifiers, Microwave, Mixers, Networks, Power Supplies, Testers, Tracers, Curve

SPECTRA-STRIP CORP., 7100 Lampson Ave., Garden Grove, Cal., 92642, Tel: 714-892-3361, TWX: 910-596-1314; Empl.: 200 .... p. 2•2056,2057

Products manufactured: Adhesives (All Types), Cable Assemblies & Harnesses, Cable, Circuits, Flexible, Circuits, Printed, Multilayer, Connectors, Jumpers, Sockets, Wire

Local Sales Offices & Reps.

Ala	Huntsville, W.A. Brown Comps. Inc.	205-539-4411
Ariz	Phoenix, G.R. McKnight Co.	602-257-8037
Cal	Menlo Park, G.R. McKnight Co.	415-325-2844
Cal	Newport Beach, Mission Mktg. Group	714-833-1802
Cal	San Diego, Hadden Assocs.	714-565-9444
Colo	Denver, Thorson Co.	303-759-0809
Conn	Wethersfield, Com/Pak Inc.	203-563-4784
Fla	Ft. Lauderdale, W.A. Brown Comps.	305-776-4800
Fla	Orlando, W.A. Brown Comps.	305-425-5505
Fla	Satellite Beach, Reynolds & Assocs.	305-773-4700
Ga	Atlanta, W.A. Brown Comps.	404-457-4069
Ill	Chicago, GNB Assocs.	312-673-4050
Ind	Indianapolis, R.H. Newsom Assoc.	317-849-4442
Mass	Needham Heights, Com/Pak Inc.	617-444-1259
Mich	Wyoming, N. Case Assocs.	616-531-2729
Minn	Minneapolis, PSI	612-835-1777
Mo	Kansas City, Nevco	816-421-1751
Mo	St. Louis, Nevco	314-843-7406
NJ	Clifton, Compar N. Y. Inc.	201-546-3660
NY	East Syracuse, Fountain Young & Co.	315-437-7733
NC	Raleigh, W.A. Brown Comps.	919-876-9601

NC	Winston-Salem, W.A. Brown Comps.	919-725-5384
Ohio	Centerville, N. Case Assocs.	513-433-0966
Ohio	Fairview Park, N. Case Assocs.	216-333-4120
Ore	Aloha, E.S. Chase Co.	503-649-6177
Pa	Ft. Washington, Kirk-Sandell Inc.	215-643-2100
Tex	Dallas, McCoy Assocs.	214-350-9931
Tex	Houston, Ev. Smith Sls. Co.	713-649-5756
Utah	Bountiful, Logistic Specialties	801-292-3030
Va	Charlottesville, Kirk-Sandell	804-977-2033
Wash	Edmond, E.S. Chase Co.	206-774-3586

Local Distributors

Cal	Garden Grove, Allied Elctrns., 12311 Industry St.	714-894-7581
Cal	Irvine, Terminal Elec., 1791 Reynolds	714-549-8611
Cal	Mountain View, Terminal Elctrns., 880 Maude Ave.	415-969-9240
Cal	Palo Alto, Storm Prod., 4039 Transport	415-326-2913
Ill	Chicago, Allied Elec., 2400 Washington	312-421-2400
Mass	Burlington, C. E. Scrymegeour Co., 13 Grant Ave.	617-272-0060
Minn	Minneapolis, Ind. Components, 5280 W. 74th St.	612-831-2666
NH	Londonderry, Yankee Elec. Supp., Grenier Ind. Pk.	603-625-9746
NJ	Rahway, Terminal Elctrns., 1421 Pinewood St.	201-381-5700
NY	Buffalo, Summitt Elec., 916 Main St.	716-884-3450
NY	Farmingdale, Vertex Elec., 91 Milbar Blvd.	516-239-9880
NY	Tuckahoe, Bi-Tronics, Inc., 76 Main St.	914-961-4700
Ohio	Dayton, Astro Ind., 3189 Plainfield Rd.	513-253-5118
Pa	Harrisburg, Pyttronic Ind., Box 1967	717-233-6591
Tex	Dallas, Solid State Elec., Box 20299	214-352-2601
Tex	Ft. Worth, Allied Elec., 401 E. 8th St.	817-336-5401
Tex	Houston, Solid State Elctrns., Box 36849	713-785-5436
Utah	Salt Lake City, Standard Supp., 225 E. 6th S. St.	801-355-2971
Wash	Seattle, Interface Elec., 300 W. 2nd	206-285-3500

SPECTROL ELECTRONICS CORP., 17070 East Gale Ave., City of Industry, Cal., 91745, Tel: 213-964-6565, TWX: 910-584-1314; Empl.: 600; Minimum order: $50 p. 2•1676-1681

Customer service: Dist. Sls. Dept.

Products manufactured: Dials, Potentiometers, Switches

Local Sales Offices & Reps.

Ala	Huntsville, Rep, Inc.	205-881-9270
Ariz	Phoenix, Howe & Howe Sls.	602-264-7971
Cal	Mountain View, Factory Sls. Off.	415-964-3260
Cal	San Diego, Daniels & Doty Sls.	714-560-6266
Colo	Denver, Lindberg Co.	303-758-9033
Conn	North Haven, Kitchen & Kutchin	203-239-0212
Fla	Altamonte Springs, Semtronic Assocs.	305-831-8233
Fla	Ft. Lauderdale, Semtronic Assocs.	305-771-0010
Ill	Hinsdale, Momak Sls.	312-654-4524
Iowa	Hiawatha, Gassner & Clark	319-393-5763
Md	Baltimore, Gould Inc.-Daniel Div.	301-825-3330
Mass	Lexington, Kitchen & Kutchin	617-862-8230
Mich	Dearborn, V.P.I., Inc.	313-271-4600
Minn	St. Paul, Murnco	612-484-8200
Mo	St. Louis, Harris-Hanson Co.	314-432-3611
NJ	Haddonfield, Sunday-O'Brien	609-429-4013
NM	Albuquerque, Lindberg Co.	505-345-2489
NY	Oceanside, Bittan Assocs.	516-678-6222
NY	Syracuse, Tri-Tech Elctrns.	315-446-2881
NC	Charlotte, R.W. Chapman Co.	704-525-2421
NC	Raleigh, R.W. Chapman Co.	919-782-2624
Ohio	Cincinnati, Luebbe Sls. Co.	513-871-4211
Ohio	Cleveland, Luebbe Sls. Co.	216-333-0425
Ohio	Dayton, Luebbe Sls. Co.	513-294-0426
Okla	Oklahoma City, Ammon & Rizos Co.	405-947-1051
Ore	Beaverton, Vantage Corp.	503-644-6111
Pa	Pittsburgh, R.F. Clark Co.	412-242-9500
SC	Greenville, R.W. Chapman Co.	803-232-5392
Tex	Dallas, Ammon & Rizos Co.	214-233-5591
Tex	Houston, Ammon & Rizos Co.	713-781-6240
Utah	Salt Lake City, Lindberg Co.	801-364-6409
Wash	Bellevue, Vantage Corp.	206-455-3460
FOR:	Can., Malton, Deskin Sls.	416-677-5517
FOR:	Can., Vancouver, Deskin Sls.	604-324-6331
FOR:	Can., Ville St. Laurent, Deskin Sls.	514-331-2860

Local Distributors

Ala	Huntsville, Powell Elec., 803 Oster Dr.	205-539-2731
Ariz	Phoenix, R.V. Weatherford, 1917 N. 25th	602-272-7144
Ariz	Phoenix, Sterling Elec., 2001 E. University	602-258-4531
Cal	Anaheim, Weatherford Co., 1550 Babbitt Ave.	714-633-9633
Cal	Glendale, Weatherford Co., 6921 San Fernando	213-849-3451
Cal	Inglewood, Newark Elec., 4747 W. Century	213-678-0441
Cal	Los Angeles, Kierulff, 2585 Commerce Way	213-685-5511
Cal	Mt. View, Abacus, 1065 Terra Bella	415-961-1500
Cal	Palo Alto, Kierulff, 3973 E. Bayshore	415-968-6292
Cal	Palo Alto, Weatherford Co., 3240 Hillview Ave.	415-493-5373
Cal	Pomona, Weatherford Co., 1095 E. 3rd St.	714-623-1261
Cal	San Carlos, Sterling Elec., 1061 Industrial	415-592-2353
Cal	San Diego, Kierulff, 8797 Balboa Ave.	714-278-2112
Cal	San Diego, Weatherford Co., 7878 Raytheon Rd.	714-278-7400
Cal	Sun Valley, Sterling Elec., 11614 Pendleton St.	213-767-5030
Colo	Denver, Newark/Denver El., 2170 S. Grape	303-757-3351
Colo	Englewood, R.V. Weatherford, 390 S. Mariposa	303-761-5432
Conn	Fairfield, U Tronics, 272 Linwood Ave.	203-255-4521
Conn	N. Haven, Cramer Elec., 35 Dodge Ave.	203-239-5641
Fla	Ft. Lauderdale, Newark Elec., 1360 N.W. 65th	305-587-2372
Ga	Atlanta, Cramer/Atlanta, 3923 Oakcliff In.	404-448-9050
Ill	Arlington Hts., T.I. Supp., 2420 E. Oakton	312-593-7660
Ill	Rosemont, Kierulff, 9340 William	312-678-8560
Ill	Rosemont, Newark, 500 N. Pulaski	312-638-4411
Ind	Indianapolis, Graham, 133 S. Pennsylvania	317-634-8486
Iowa	Grand Rapids, Deeco, Inc., 2500 16th, S.W.	319-365-7551
La	Lafayette, Ralph's, 3004 Cameron St.	318-234-4507
La	Metairie, Sterling Elec., 4613 Fairchild	504-887-7610
Md	Baltimore, Technico, Inc., 1404 Bare Hills	301-828-6416
Md	Gaithersberg5Kierulff El., 16021 Ind.	301-948-0250
Mass	Dedham, Gerber Elec., 852 Providence Hwy.	617-329-2400
Mass	Needham, Kierulff, 14 Charles St.	617-449-3600
Mass	Newton, Cramer, 85 Wells Ave.	617-969-7700
Mass	Newton, Greene-Shaw, 70 Bridge St.	617-969-8900
Mich	Detroit, Newark Elec., 20700 Hubbell Ave.	313-548-0250
Mich	Farmington, Northland, 32708 W. Eight Mile	313-477-3200
Mich	Wyoming, Newark Elec., 3645 Linden, S.E.	616-241-6651
Minn	Minneapolis, Stark's, Inc., 112 3rd Ave. N.	612-332-1325
Minn	St. Paul, Gopher Elec., 2520 W. Larpenteur	612-645-0241
Mo	N. Kansas, LCOMP Kansas City, 1520 Taney St.	816-221-2400
Mo	St. Louis, LCOMP St. Louis, 2605 S. Hanley	314-647-5505
NJ	Camden, General Radio, 600 Penn St.	609-964-8560
NJ	Kenilworth, Newark Elec., 303 Monroe Ave.	201-272-8410
NJ	Moorestown, Arrow/Angus, Pleasant Valley	215-235-1900
NJ	Rutherford, Kierulff Elec., 5 Ind. Dr.	201-935-2120
NM	Albuquerque, Weatherford Co., Marberry Plaza	505-265-5671
NY	Buffalo, Summit Dist., 916 Main St.	716-884-3450
NY	Farmingdale, Arrow Elec., 900 Broad Hollow Rd.	516-694-6800
NY	Hicksville, Kierulff, 49 Bethpage Rd.	516-433-5530
NY	Johnson City, Wilshire Elec., 617 Main St.	607-797-1236
NY	Rome, Rome Elec., 216 Eerie Blvd. E.	315-337-5400
NC	Greensboro, Hammond Elec., 2923 Pacific	919-275-6391
Ohio	Cincinnati; Newark Elec., 9799 G. Princeton	513-874-5115
Ohio	Cleveland, Arrow Elec., 23945 Merchantile	216-464-2000
Ohio	Cleveland, Newark Elec., 2028 E. 46th Ave.	216-361-4700
Ohio	Cleveland, RPC Elec., 749 Miner Rd.	216-461-2700
Ohio	Dayton, Arrow Elec., 3100 Plainfield Rd.	513-253-9176
Ohio	Dayton, Kierulff, 2030 Drill Ave.	513-278-9411
Okla	Tulsa, T.I. Supp., 12151 E. Skelly	918-437-4555
Pa	Philadelphia, Kierulff Elec., 109 Gaither Dr.	215-922-0810
Pa	Pittsburgh, Barno Radio, 5403 W. Smithfield	412-462-7575
Pa	Pittsburgh, RPC Elec., 620 Alpha Dr.	412-782-3770
SC	Greenville, Hammond Elec., 100 Augusta St.	803-233-4121
Tex	Dallas, R.V. Weatherford, 10836 Grissom La	214-243-1571
Tex	Dallas, T.I. Supp., 6000 Denton Dr.	214-238-3011
Tex	Garland, Newark Elec., 707 Easy St.	214-271-2511
Tex	Houston, Newark Elec., 6902 Harwin Dr.	713-782-4800
Tex	Houston, Sterling Elec., 4201 Southwest Fwy.	713-623-6600
Tex	Houston, T.I. Supp., 3939 Ann Arbor Dr.	713-785-4800
Utah	Salt Lake City, Newark Elec., 2540 S. 300 W.	801-486-1048
Wash	Seattle, Kierulff Elec., 5640 Sixth Ave. S.	206-763-1550
Wash	Seattle, Weatherford Co., 541 Industry Dr.	206-243-6340
Wisc	Oak Creek, Cramer Elec., 430 W. Rawson	414-764-1700

SPECTRONICS, INC., 830 E. Arapaho Dr., Richardson, Tex., 75080, Tel: 214-234-4271, Telex: 73-0890; Empl.: 300; Minimum order: $25 p. 1•1021

Customer service: Central Mktg.

Free literature available: Optoelectronic Components Book - Complete electrical and electro-optic characteristics on all standard components. Infrared Products Book - Complete description of all standard and custom capability of Infrared Detectors and special emitters. Optical Switches & Reflective Sensor Assemblies - Summary of standard products.

Products manufactured: Cells, Photoconductive, Photoemissive, Photovoltaic, Controls/Control Eqpt., Detectors, Diodes, Encoders, Isolators, Lamps, Sensors, Light, Transistors

Local Sales Offices & Reps.

Cal	, Diamond Bar	714-598-2297
Mass	Methuen, Spectronics	617-687-0714

SPECTRUM CONTROL, INC., 152 E. Main St., Fairview, Pa., 16415, Tel: 814-474-5593, TWX: 510-669-6848; Empl.: 200 p. 1•575-583

Products manufactured: Capacitors, Fixed, Filters, Services, Assembly, Production & Test

Local Sales Offices & Reps.

Cal	Fullerton, M.A. Stolaroff Co.	714-879-5998
Cal	Los Angeles, M.A. Stolaroff Co.	213-295-7781
Cal	San Diego, M.A. Stolaroff Co.	714-234-6905
Ill	Chicago, Gassner & Clark Co.	312-345-4245
Iowa	Hiawatha, Gassner & Clark Co.	319-393-5763
Minn	Minneapolis, Barnes Sls. Assoc.	612-474-2907
NJ	Martinsville, Spectrum Control Inc.	201-469-6056
FOR:	Can., Montreal, Que., Space Elctrn. Sls. Corp.	514-735-5775

SPECTRUM DYNAMICS, 11 B North Ave., Burlington, Mass., 01803, Tel: 617-273-1850, TWX: 710-332-6878; Empl.: 62; Minimum order: $25

Customer service: C. McNamara

Products manufactured: Boards, Programming

Local Sales Offices & Reps.

Ala	Huntsville, Beacon	205-881-5031
Cal	Los Angeles, Dyna Sls.	213-268-1175
Colo	Denver, W. J. Purdy	303-777-1411
Fla	Ft. Lauderdale, Beacon	305-776-6074
Ga	Atlanta, Beacon	404-351-3654

Haw	Honolulu, Aloha Assoc.	808-941-1574
Ill	Chicago, Kennedy Engr.	312-631-8283
Kans	Wichita, G. Fixman Engr.	316-682-9433
Mass	Burlington, Spectrum Dynm.	617-273-1850
Minn	Minneapolis, Milt Westlund Assoc.	652-866-5002
Mo	St. Louis, G. Fixman Engrg.	314-725-5219
NM	Albuquerque, W. J. Purdy	505-266-7959
NY	Fayetteville, M. P. Andrews Mfg.	315-637-3144
NY	Port Chester, Radiation Elctrns.	914-937-2300
Pa	Bala Cynwyd, Electech	215-687-5305
SC	Spartanburg, Beacon	803-582-4613
Tex	Richardson, Carl Tinch Sls. Co.	214-231-1322

SPECTRUM TECHNOLOGY INC., 300 Frederic Lopez Rd., Goleta, Cal., 93017, Tel: 805-964-7791; Empl.: 75

Customer service: B. Bertrando

Free literature available: Complete line of logic clocks, crystal oscillators, TCXO's and frequency modules for commercial and government applications.

Products manufactured: Integrated Circuit Devices, Modulators, All Kinds, Oscillators, Standards

Local Sales Offices & Reps.

Ariz	Scottsdale, I.M.E.C.	602-947-7379
Cal	Encino, EL/TEC, Inc.	213-981-9881
Cal	Mountain View, West/Mark Assocs.	415-969-1700
Colo	Littkton, Lange Sls.	303-798-1397
Conn	Milford, Todino Engrg. Sls.	203-847-6643
Fla	Lighthouse Point, Saber Assocs.	305-943-3076
Fla	Longwood, Saber Assocs.	305-422-3686
Fla	Temple Terrace, Saber Assocs.	813-988-8686
Ill	Westchester, W.G. Brouillette & Assoc.	312-345-6500
Mass	Needham, Todino Engrg. Sls.	617-444-7925
Mich	Southfield, Luebbe Sls. Co.	313-357-0355
Minn	Minneapolis, Tech. Assocs.	612-929-6721
Mo	Grandview, Beneke & McCaul, Inc.	816-765-2998
Mo	St. Louis, Beneke & McCaul, Inc.	314-231-1677
NJ	Haddonfield, Mesa Tech. Assocs.	609-429-9531
NJ	Springfield, F.F. Sylvester Assocs.	201-376-3324
NM	Albuquerque, I.M.E.C.	505-883-9010
NY	Camillus, ONTEC	716-464-8636
NY	Grand Island, ONTEC	716-464-8636
NY	Rochester, ONTEC	716-464-8636
Ohio	Cincinnati, Luebbe Sls. Co.	513-871-4211
Ohio	Cleveland, Luebbe Sls. Co.	216-333-0425
Ohio	Dayton, Luebbe Sls. Co.	513-294-0426
Pa	Delmont, Luebbe Sls. Co.	412-468-4019
SC	Greenville, J. Egan Assocs.	803-288-4450
Va	Fairfax, Schibley Assocs.	703-591-3008
Wash	Mercer Island, Northwest Mufacturers Agents	206-284-7002
FOR:	Montreal 260, Que., Can., Solid State Engrg.	514-481-3313

SPEED DETECTORS, INC., 32 W. Monroe St., Bedford, Ohio, 44146, Tel: 216-232-1880; Empl.: 60

Products manufactured: Controls/Control Eqpt., Counters, Indicators, Meters, Tachometers, Timers, Totalizers, Digital

Local Sales Offices & Reps.

Ariz	Glendale, Harvey Data Systems	602-247-5818
Cal	Long Beach, Saber Entprs.	213-595-5646
Colo	Westminster, Harvey Data Systems	303-427-5299
Conn	Hamden, J & J Assocs.	203-624-7800
Md	Rockville, E. Winston & Co.	301-881-5780
Mass	Burlington, J & J Assocs.	617-272-2606
Mich	Ferndale, Tiby Co.	313-547-3550
NY	Syracuse, J. D. Birchard	315-469-4689
NY	Westbury, OAL Assocs.	516-334-1940
NC	Charlotte, Bimco	704-366-5092
Ohio	Cleveland, Tiby Co.	216-371-5335
Ohio	Dayton, Tiby Co.	513-277-3822

SPELLMAN HIGH VOLTAGE ELCTRNS. CORP., 1930 Adee Ave., Bronx, N.Y., 10469, Tel: 212-671-0300, TWX: 710-593-4135; Empl.: 40; Minimum order: $100
p. 1•1460-1471

For info on price: H. Moresco; Application info: M. Civin; Customer service: H. Moresco; Delivery info: S. Hoffman

Free literature available: Short form catalog #7400 - General products, Application notes #7210 - RF high voltage technology, Application notes #7220 - RF high voltage versatility, High voltage testing - STP-473 - How to test a H.V. power supply

Products manufactured: Converters, Power Supplies, Transformers

Local Sales Offices & Reps.

Cal	Pasadena, A-F Sls.	213-681-5631
Colo	Arvada, Cleveland Entprs.	303-423-3707
Fla	Satellite Beach, Reynolds Assocs.	305-773-4700
Ill	Chicago, Ropek-Cahill	312-287-7292
Md	Hyattsville, Eastern Components	301-577-2925
Mass	Concord, Nortech Engrg. Sls.	617-259-0032
NJ	Tenafly, Budd-Tronics	201-569-2230
NM	Albuquerque, Cleveland Enterprises	505-345-2481
NY	Schenectady, N.W. Alexander & Assoc.	518-377-0581
Pa	Flourtown, Eastern Components	215-836-1616
Tex	Dallas, R. Martin Assoc.	214-361-8584
Tex	Houston, R. Martin Assoc.	713-462-4077
FOR:	Can., Vancouver 9 B.C., Broman Engrg.	604-731-6222

SPEMCO SWITCHES, See Specialties Mfg. Co.

SPERRY MICROWAVE COMPONENTS, Gainesville, Fla., 32601, Tel: 904-372-0411; Empl.: 375

Products manufactured: Amplifiers, Diodes, Integrated Circuit Devices, Oscillators, Power Supplies, Tubes

Local Sales Offices & Reps.

Cal	Los Angeles	213-670-4882
NY	Great Neck	516-574-1435
Ohio	Dayton	513-433-9451

SPRAGUE ELEC. CO., 481 Marshall St., No. Adams, Mass., 01247, Tel: 413-664-4411, TWX: 710-369-1360; Empl.: 9600

Products manufactured: Amplifiers, Analyzers, Bridges, Capacitor, Hardware, Capacitors, Fixed, Capacitors, Variable, Circuits, Hybrid, Thick Film, Circuits, Integrated, Silicon Monolithic, Unpackaged Chips, Decade Boxes, Diodes, Filters, Integrated Circuit Devices, Machines/Machinery, Production, Meters, Networks, Receivers, Resistors, RFI Measuring Equipment, Scribers, Standards, Suppressors, Switches, Testers, Thermistors, Thyristors (Includes Silicon Controlled Rectifiers), Timers, Tracers, Curve, Transformers, Transistors

Local Sales Offices & Reps.

Ala	Huntsville, Sprague Elec. Co.	205-883-0520
Ariz	Tempe, Sprague Elec. Co.	602-279-5435
Cal	Burlingame, W. J. Purdy Co.	415-347-7701
Cal	Inglewood, Sprague Elec. Co.	213-649-2600
Cal	Los Angeles, KCE Corp.	213-649-2622
Cal	San Diego, KCE Corp.	714-278-7640
Colo	Denver, Sprague Elec. Co.	303-756-3611
Conn	Trumbull, Sprague Elec. Co.	203-261-2551
DC	Washington, Sprague Elec. Co.	202-244-6006
Fla	Longwood, Sprague Elec. Co.	305-831-3636
Ill	Schiller Park, Sprague Elec. Co.	312-678-2262
Ill	St. Ann, Sprague Elec. Co.	314-291-2500
Ind	Indianapolis, Sprague Elec. Co.	317-253-4247
Mass	Waltham, Sprague Elec. Co.	617-899-9100
Mich	Jackson, Sprague Elec. Co.	517-787-3934
Minn	Minneapolis, HMR, Inc.	612-920-8200
Mo	St. Ann, Sprague Elec. Co.	314-291-2500
NJ	Cherry Hill, Sprague Elec. Co.	609-795-2299
NJ	Wayne, Sprague Elec. Co.	201-696-8200
NM	Albuquerque, W. J. Purdy Co.	505-266-7959
NY	Mamaroneck, Wm. Rutt, Inc.	914-698-8600
NY	Melville, Sprague Elec. Co.	516-549-4141
NY	Syracuse, Mar-Com Assocs.	315-437-2843
NC	Winston-Salem, Electronic Mktg. Assocs.	919-722-5151
Ohio	Chagrin Falls, Sprague Elec. Co.	216-247-6488
Ohio	Dayton, Sprague Elec. Co.	513-278-0781
Tex	Richardson, Sprague Elec. Co.	214-235-1256
Va	Lexington, Sprague Elec. Co.	703-463-9161
Wash	Seattle, Sprague Elec. Co.	206-632-7761
FOR:	Can., Toronto 15, Ont., Sprague Elec. of Can., Ltd.	416-766-6123
FOR:	Can., Ville St. Laurent 9, P.Q., Sprague Elec. of Can., Ltd.	514-747-7811

SPRAGUE PRODUCTS CO., 481 Marshall St., No. Adams, Mass., 01247, Tel: 413-664-4481, TWX: 710-369-1363; FSC No: 56289
p. 1•585-587,810,811,1866-1872,2282; p. 2•242-301,1546, 1547,1790

For info on price: A. Lopresto 413-664-4471; Application info: K. Blanchard 413-664-4481; Customer service: R. Lemere 413-664-4481; Delivery info: A. Lopresto 413-664-4471

Free literature available: Catalog C-563 Components for industrial, military, commercial electronics. 96 pages of capacitors, semiconductors, resistors, interference filters, L.E.D. devices, pulse transformers, switches, test instruments.

Products manufactured: Amplifiers, Analyzers, Bridges, Capacitor, Hardware, Capacitors, Fixed, Capacitors, Variable, Caps, Connector, Circuits, Hybrid, Thick Film, Circuits, Hybrid, Thin-Film, Circuits, Integrated, Silicon Monolithic, Unpackaged Chips, Clamps & Clips, Converters, Decade Boxes, Diodes, Display Devices/Displays, Films, Filter Synthesizers, Filters, Generators, Integrated Circuit Devices, IC's, Active Filters, Integrators, Electronic, Machines/Machinery, Production, Meters, Networks, Power Drivers, Hybrid (High Current, High Voltage), Receivers, Resistors, RFI Measuring Equipment, Scribers, Standards, Suppressors, Switches, Testers, Thermistors, Thyristors (Includes Silicon Controlled Rectifiers), Timers, Tracers, Curve, Transformers, Transistors

Local Sales Offices & Reps.

Ariz	Phoenix, KCE Corp.	602-258-7519
Cal	Burlingame, W. J. Purdy Co.	415-347-7701
Cal	Los Angeles, KCE Corp.	213-649-2622
Cal	Sacramento, W. J. Purdy Co.	916-422-0128
Cal	San Diego, KCE Corp.	714-278-7640
Col	Denver, W. J. Purdy Co.	303-777-1411
Fla	Fort Lauderdale, UniRep, Inc.	305-527-1556
Haw	Honolulu, Hawaii Elctrns. Sls.	808-845-8207
Ill	Chicago, D. Dolin Sls. Co.	312-286-6200
Ind	Mulberry, Maish Sls.	317-638-8484
Mass	Waltham, Sprague Prods. Co.	617-899-9840
Minn	Minneapolis, HMR, Inc.	612-920-8200
Mo	Kansas City, Nevco, Inc.	816-421-1751
Mo	St. Louis, Nevco, Inc.	314-843-7406
NJ	Cherry Hill, Trinkle Sls. Inc.	609-795-4200
NJ	Cranford, G. G. Burnett	201-276-2149
NM	Albuquerque, W. J. Purdy Co.	505-266-7959
NY	Mamaroneck, W. Rutt, Inc.	914-698-8600
NY	Syracuse, Paston-Hunter Co.	315-437-2992
NC	Winston-Salem, Elctrns. Mrktg. Assocs.	919-722-5151
Ohio	Beachwood, Elctrn. Salesmasters	216-831-9555
SC	Greenville, Elctrn. Mrktg. Assoc.	803-268-1125
Tex	Dallas, Lund & Co.	214-358-4335
Wash	Seattle, Fleehart & Sullivan, Inc.	206-522-1533

SPRAGUE-GOODMAN ELECTRONICS, INC., 371 Willis Ave., Mineola, N.Y., 11501, Tel: 516-746-1385; Empl.: 25

Customer service: J. Goodman

Free literature available: Catalogs covering Pistoncap® glass & quartz trimmers, ceramic trimmers, & ptfe trimmers.

Products manufactured: Capacitors, Variable

Local Sales Offices & Reps.

Ala	Huntsville, Sprague Elec. Co.	205-883-0520
Ariz	Tempe, Sprague Elec. Co.	602-279-5435
Cal	Burlingame, W. J. Purdy Co.	415-347-7701
Cal	Inglewood, Sprague Elec. Co.	213-649-2600
Cal	Los Angeles, KCE Corp.	213-649-2622
Cal	San Diego, KCE Corp.	714-278-7640
Colo	Denver, Sprague Elec. Co.	303-753-1136
Colo	Denver, W. J. Purdy Co.	303-777-1411
Conn	Trumbull, Sprague Elec. Co.	203-261-2551
Fla	Melbourne, J. J. Smith Assocs.	305-727-3163
Ill	Schiller Park, Sprague Elec. Co.	312-678-2262
Ind	Indianapolis, Sprague Elec. Co.	317-253-4247
Md	Pikesville, A. Wetterhahn Co.	301-484-6376
Mass	Norwood, R. Perron & Co.	617-762-8114
Mich	Jackson, Sprague Elec. Co.	517-787-3934
Minn	Minneapolis, HMR	612-920-8200
Mo	St. Ann, Sprague Elec. Co.	314-291-2500
NH	Dover, R. Perron & Co.	603-742-2321
NJ	Oaklyn, A. Wetterhahn Co.	609-858-3003
NM	Albuquerque, W. J. Purdy Co.	505-266-7959
NY	East Rockaway, W. Bellenkas Assoc.	516-887-1443
NY	Pittsford, T-Squared Elctrns. Co.	716-381-2551
NY	Syracuse, T-Squared Elctrns. Co.	315-463-8592
NC	Winston-Salem, Electronic Mktg. Assoc.	919-722-5151
Ohio	Beachwood, Electronic Salesmasters	216-831-9555
Ohio	Dayton, Sprague Elec. Co.	513-278-0781
Tenn	Huntsville, Sprague Elec. Co.	205-883-0502
Tex	Dallas, E. F. Aymond Co.	214-826-7620
Vt	Dover, R. Perron & Co.	603-742-2321
Wash	Seattle, Sprague Elec. Co.	206-632-7761
FOR:	Can., Don Mills, Ont., B. D. Vallillee Elctrns., Ltd.	416-447-8482

SPRENGNETHER INSTR. CO., W.F., 4567 Swan St., St. Louis, Mo., 63110, Tel: 314-535-1682; Empl.: 25

Free literature available: Catalog pages & prices.

Products manufactured: Amplifiers, Clocks (All Types), Comm. Systems, Meters, Recorders, Transducers

SQUARE D CO., 4041 N. Richards, Dept. SA-711 Box 472, Milwaukee, Wisc., 53201, Tel: 414-332-2000, Telex: 2-6647; Empl.: 15000 .... p. 1•273,1814,1815

Products manufactured: Alternators, Boxes, Junction, Outlets & Wall Plates, Brakes, Cards, Logic, Circuit Breakers, Clamps & Clips, Connectors, Controllers, Programmable, Controls/Control Eqpt., Counters, Ducts, Wiring, Indicators, Limit Stops, Mechanical, Modules, Logic, Encapsulated, Process Control Systems, Relays, Resistors, Switchboards, Switches, Terminal Blocks, Boards & Strips, Terminals, Timers, Transformers, Valves, Solenoid

SRC DIV., MOXON INC., See Moxon Inc.

S S A C PRECISION PRODUCTS INC., Box 395, Liverpool, N.Y., 13088, Tel: 315-457-9610

For info on price: R. Shutt; Application info: R. Shutt; Customer service: D. Reynolds; Delivery info: D. Reynolds

Free literature available: Solid state flashers, timers and relays for industrial and commercial applications. Voltages from 12 to 230 AC/DC. Load rating to 12 amperes/180 amperes surge.

Products manufactured: Controls/Control Eqpt., Flashers, Lamp Drivers, Lights, Relays, Switches, Timers

Local Sales Offices & Reps.

Cal	N. Hollywood, Crown Elctrns.	213-877-3550
Cal	San Francisco, Artwel Elec.	415-467-1880
Conn	Old Lyme, Conn. Valley Ent.	203-434-5844
Mich	Troy, Xanthus	313-391-3235
Minn	St. Paul, Steve Foster	612-454-5552
Mo	St. Louis, Richter Assocs.	314-567-1829
NY	Rochester, Upstate Component Sls.	716-288-1080
NY	Rye, Charles Auery Assoc.	914-967-7610
Pa	Jenkintown, Arnold Assocs.	215-742-0600
Tenn	Chattanooga, Hayden Roberts	615-267-5922

Local Distributors

Cal	Los Angeles, Master Distr., Box 25662	213-395-2637
Fla	Winter Pk., Sta-Con, 680 Clay St.	305-645-2215
NJ	Fairlawn, Relay Specialties, Box 223-1300 Plaza Rd.	201-797-3313
NC	Shelby, Dixie Ind'l Supp., Box 127, Hgwy. 74E	704-482-5641

STACKPOLE CARBON CO., Carbon Div., St. Marys, Pa., 15857, Tel: 814-781-1234, TWX: 510-693-4511; FSC No: 78488

Products manufactured: Brushes & Brush Assemblies, Contacts, Electrical, Graphite Parts, Materials, Graphite

STACKPOLE CARBON CO., Electronic Comps. Div./Soft Fernites/Fixed Comp. Resistors, St. Mary's, Pa., 15857, Tel: 814-781-1234, TWX: 510-693-4511

Products manufactured: Cores, Magnetic, Ferrite Material & Parts, Resistors, Yokes

Refer To: SCC/Elctrn. Comps. Div. - Fixed Comp. Resistors For Sales Office Information

STACKPOLE CARBON CO., Elctrn. Comps. Div.-Fixed Comp. Resistors, Kane, Pa., 16735, Tel: 814-837-7000, TWX: 510-695-8404; FSC No: 78488

Products manufactured: Resistors

Local Sales Offices & Reps.

Ariz	Phoenix, Bestronics	602-248-7020
Cal	Los Angeles, Black, Ekizion & Strong Inc.	213-870-9191
Cal	Millbrae, F. Auman	415-445-2250
Cal	San Diego, Bestronics	714-278-2150
Colo	Denver, Check Mate Sls.	303-771-4920
Conn	Plantsville, R. J. Pisaneschi	203-628-9505
Fla	N. Palm Beach, Lectro Mech.	305-842-2458
Ga	Peachtree City, J.A. Creighton	404-461-9836
Ill	Arlingtton Heights, J. L. Clingingsmith	312-392-1639
Ill	Chicago, Stackpole Carbon Co.	312-297-0270
Ill	Kankakee, R. Burgess	815-939-7385
Ind	Bloomington, R.E. Riggs	812-339-6166
Kans	Overland, Ensco-Rep	913-381-7557
La	Baton Rouge, R.F. Gallagher	504-924-4995
Md	Baltimore, Stemler Assoc., Inc.	301-944-8262
Mass	Boxford, E.F. Delaney,Jr.	617-887-2090
Mich	Birmingham, J.E. Vollmer Jr.	313-644-3571
Minn	Minneapolis, Bitronics Sls. Co.	612-835-7744
Minn	Minneapolis, HMR Inc.	612-920-8200
Mo	St. Louis, Ensco-Rep. Inc.	314-567-3935
NJ	Englewood Cliffs, Sprung/Nussbaum	201-947-6767
NY	Buffalo, R.W. Mitscher	716-633-7970
NY	Fayetteville, R.W. Mitscher	315-637-9575
NC	Raleigh, R.W. Mitscher	919-828-0575
Ohio	Hudson, D. J. Mohr	216-653-2255
Pa	Oreland, Brown-Oberlies Inc.	215-887-1325
Pa	Pittsburgh, H.S. Swoyer	412-256-2538
Tenn	Shelbyville, R. W. Mitscher	615-684-4544
Tex	Dallas, M.N. Herbst	214-239-2497
Va	Virginia Bch., R.W. Mitscher	804-481-7200
Wash	Bellevue, Vantage	206-455-3460

STACKPOLE CARBON COMPANY, Magnet Div., Kane, Pa., 16735, Tel: 814-837-7000, TWX: 510-695-8360

Products manufactured: Magnets

STACKPOLE COMPONENTS CO., Box 14466, Raleigh, N.C., 27610, Tel: 919-828-6201, TWX: 510-928-0520; FSC No: 78488 .... p. 1•2278-2281

Products manufactured: Keyboards, Alphanumeric & Decimal, Potentiometers, Switches

Local Sales Offices & Reps.

Ariz	Phoenix, Bestronics	602-248-7020
Cal	Los Angeles, Black, Ekizian, Strong	213-870-9191
Cal	Millbrae, F.A. Auman	415-445-2250
Cal	San Diego, Bestronics	714-278-2150
Colo	Denver, Checkmate Sls. Inc.	303-771-4920
Conn	Plantsville, R.J. Pisaneschi	203-628-9505
Fla	N. Palm Beach, Lectro Mech.	305-842-2458
Ga	Peachtree City, J.A. Creighton	404-461-9836
Ill	Arlington Heights, J.L. Clingingsmith	312-392-1639
Ill	Chicago, Stackpole Carbon Co.	312-297-0270
Ill	Kankakee, R. Burgess	815-939-7385
Ind	Bloomington, R.E. Riggs	812-339-6166
Kans	Overland Park, Ensco-Rep	913-381-7557
La	Baton Rouge, R.F. Gallagher	504-924-4995
Md	Baltimore, Stemler Assoc.	301-944-8262
Mass	Boxford, E.F. Delaney, Jr.	617-887-2090
Mich	Birmingham, J.E. Vollmer, Jr.	313-644-3571
Minn	Minneapolis, Bitronics Sls. Co.	612-835-7744
Mo	St. Louis, Ensco-Rep	314-567-3935
NJ	Englewood Cliffs, Sprung/Nussbaum	201-947-6767
NY	Buffalo, R.W. Mitscher	716-633-7970
NC	Raleigh, R.W. Mitscher	919-828-0575
Ohio	Hudson, D.J. Mohr	216-653-2255
Pa	Oreland, Brown Oberlies	215-887-1325
Pa	Pittsburgh, H.S. Swoyer	412-256-2538
Tenn	Shelbyville, R.W. Mitscher	615-684-4544
Tex	Dallas, M.N. Herbst	214-239-2497
Va	Virginia Beach, R.W. Mitscher	804-481-7200
Wash	Bellevue, Vantage Corp.	206-455-3460

STACO, INC., 2240 E. 3rd St., Dayton, Ohio, 45403, Tel: 513-253-1191, TWX: 810-459-1798; FSC No: 83008; Empl.: 125; Minimum order: $50 .... p. 2•1808,1809

For info on price: M. R. Marshall; Application info: D. James; Customer service: M. R. Marshall; Delivery info: M. R. Marshall

Free literature available: A new 60 page Variable Transformer Catalog, including a complete product line from 0-8 amps to 450 amps, 120 Volt to 560 Volt Types.

Products manufactured: Power Supplies, Transformers

Local Sales Offices & Reps.

Cal	Los Angeles, E.E. Strassner Co.	213-666-1511
Cal	Santa Clara, Thomas-Hartman Assocs.	408-247-1252
Colo	Denver, R.G. Bowen Co.	303-722-4641
Conn	Canaan, Hathaway Elctrns., Inc.	203-824-7215
Fla	North Miami, Winfield Electronic Sls. Co.	305-945-6544
Ga	Atlanta, Millar Elctrn. Sls.	404-261-6160
Haw	Honolulu, Aloha Assocs.	808-941-1574
Ill	Skokie, Saffro & Assocs.	312-588-0905
Ind	Indianapolis, Southern Sls. Co.	317-257-7575
Kans	Shawnee Mission, Kathrinus-Kelly	913-722-0000
La	Metairie, McKinney Sls. Co.	504-887-1723
Md	Hyattsville, Eastern Comps.	301-577-2925
Mass	Lexington, Hathaway Elctrns., Inc.	617-861-7010
Mich	Ferndale, Shalco, Inc.	313-547-4771
Minn	Minneapolis, C. Gibb Co.	612-377-1200
Mo	St. Louis, Kathrinus-Kelly Co.	314-968-3800
NJ	Wayne, Howard Kagan Assocs.	201-684-7682
NM	Albuquerque, C.T. Carlberg & Assocs.	505-265-1579
NY	Buffalo, R.F. Lamb Co.	716-874-4900
NY	Rochester, R.F. Lamb Co.	716-544-5580
NY	Syracuse, R.F. Lamb Co.	315-454-2469
NY	Valley Stream, Levison Sls. Co.	516-561-9696
NC	Raleigh, Millar Elctrns., Inc.	919-787-9564
Ohio	Cleveland, Marlow Assocs.	216-932-0900
Ohio	Dayton, Marlow Assocs.	513-426-6270
Okla	Tulsa, McKinney Sls. Co.	918-742-6791
Pa	Flourtown, Eastern Comps.	215-836-1616
Pa	York, Eastern Comps.	717-764-3114
Tex	Dallas, McKinney Sls. Co.	214-631-9450
Wash	Seattle, R.K. Squibb Co.	206-632-2450

STACOSWITCH, INC., 1139 Baker St., Costa Mesa, Cal., 92626, Tel: 714-549-3041, TWX: 910-595-1507; QPL No: Multiple; Empl.: 100; Minimum order: $25 p. 2•1114,1115

For info on price: J. Shafer; Application info: K. Johnson; Customer service: J. Shafer; Delivery info: J. Shafer

Free literature available: Lighted and Unlighted Pushbutton Switches - 48 page catalog. Light Isolator Cells (for backlighted displays) - 12 page catalog.

Products manufactured: Annunciators, Index Assemblies, Switch, Lights, Services, Assembly, Production & Test, Sockets, Switchboards, Switches

Local Sales Offices & Reps.

Cal	Newark, Snyder Sls.	415-792-8323
Conn	Marion, Sands Co.	203-628-4363
Fla	Lighthouse Pt., Saber Assocs.	305-943-3076
Ill	Glendale Hts., Trend-Tronics	312-963-2210
Ind	Fort Wayne, J & B Engrg. Sls.	219-483-2813
Md	Rockville, Marktron	301-762-6210
Mich	Grand Rapids, R.P. Urban & Assocs.	616-245-0511
NJ	Wayne, G.T. Assocs.	201-694-6040
NY	Syracuse, Lenard Co.	315-379-9191
Pa	Media, W. Reeves Assocs.	215-566-6709
Tex	Addison, R. R. Thomas Co.	214-233-8235
Wash	Seattle, Arneson Assocs.	206-762-7664

STANCOR/ESSEX INTERNATIONAL, INC., 3501 W. Addison, Chicago, Ill., 60618, Tel: 312-463-7400, TWX: 910-221-5466; FSC No: 80089

For info on price: J. Farr; Application info: E. P. Kelly; Customer service: J. Farr; Delivery info: J. Farr

Free literature available: Catalog #407 - detailed specifications of 1,300 stock transformers for industrial applications. Catalog #721-74 - lists 800 flybacks, yokes and transformers for television replacement.
Bulletin V-2000 - Describes the stancor voltage corrector.

Products manufactured: Chokes, Coils Including Assemblies & Forms, Isolators, Reactors, Regulators, Transformers

Local Sales Offices & Reps.

Ariz	Tempe, W.B. Knight Co.	602-946-1088
Cal	Millbrae, Polach & Bensinger Inc.	415-697-2525
Cal	Newport Beach, W. Bert Knight Co.	714-833-8250
Colo	Denver, R.G. Bowen Co.	303-722-4641
Fla	Orlando, Hollingsworth & Still, Inc.	305-671-4515
Ga	Atlanta, Hollingsworth & Still, Inc.	404-394-3270
Ill	Oak Park, G. Petitt Co.	312-261-0342
Ill	Peoria, G. Petitt Co.	309-699-3301
Kans	Shawnee Mission, Lowell-Kangas & Assocs.	913-631-3515
La	Chalmette, Cartwright & Bean, Inc.	504-279-4598
Md	Rockville, Lienau Assocs.	301-770-6800
Mass	Wellesley Hills, M. Scott Co.	617-235-1020
Mich	Detroit, R.C. Merchant Co.	313-535-6000
Mich	St. Joseph, R.C. Merchant & Co.	616-983-7378
Minn	Minneapolis, R. Ripley & Assocs.	612-881-8282
Mo	St. Louis, Lowell-Kangas Assocs.	314-821-4050
NM	Albuquerque, C.T. Carlberg & Assocs.	505-265-1579
NY	Buffalo, R.W. Mitscher Co.	716-633-7970
NY	Elmont, F.E. Schmitt Co.	516-437-8150
NC	Charlotte, Hollingsworth & Still, Inc.	704-536-7047
Ohio	Columbus, McFadden Sls. Co.	614-221-3363
Ore	Portland, Earl & Brown Co.	503-292-9145
Pa	Cornwall Hts., Lienau Assocs.	215-757-8819
Pa	Pittsburgh, Covert & Newman Co.	412-563-0303
Tenn	Memphis, Cartwright & Bean of Tenn., Inc.	901-276-4442
Tex	Dallas, R.E. Nesbitt Co.	214-357-4601
Tex	Houston, R.E. Nesbitt Co.	713-224-3633
Wash	Seattle, Earl & Brown Co., Inc.	206-284-1121
EXP:	New York, N.Y., Roburn Agencies, Inc.	212-989-5939

STANDARD CONDENSER CORP., 1065 W. Addison St., Chicago, Ill., 60613, Tel: 312-327-5440; Minimum order: $25

For info on price: R. T. McLean; Application info: A. Batal; Delivery info: D. Peters

Products manufactured: Capacitors, Fixed, Resistors, Suppressors

Local Sales Offices & Reps.

Ill	Chicago, Rinaldi Inc.	312-763-4848
Mich	Farmington, Davis-Martensen Co.	313-474-8300
Minn	St. Paul, Cahill & Assoc.	612-646-7217
NY	Syracuse, J.V. Costello	315-472-0322
Pa	Jenkintown, Arnold & Assoc.	215-PI2-0600

STANDARD CONTROLS, 2401 S. Bayview St., Seattle, Wash., 98144, Tel: 800-426-0366, TWX: 910-444-2164; FSC No: 13624; Empl.: 45 ...... p. 1•2347

For info on price: R. Schnoberger; Application info: T.A. Notman; Customer service: R. Schnoberger; Delivery info: R. Schnoberger

Free literature available: 24 Page Product Brochure

Products manufactured: Amplifiers, Cells, Load, Transducers

Local Sales Offices & Reps.

Ala	Huntsville, Tech. Sls.	205-881-1750
Cal	Costa Mesa, Scrantom Engrg., Inc.	714-979-6373
Cal	Los Altos, J.C. Meyer & Assocs.	415-964-8844
Colo	Denver, Grifco	303-722-4674
Ill	Des Plaines, Marsland Assocs.	312-775-1309
Ind	Indianapolis, Marsland Assocs.	317-924-3568
Md	Kensington, Electronic Mktg. Assoc.	301-744-7700
Mass	Peabody, JSR Assoc.	617-532-0348
Mich	Farmington, W. R. Hummon & Assocs., Inc.	313-474-0661
Minn	Minneapolis, Stack-Johnson, Inc.	612-925-2111
Mo	St. Peters, Marsland Assocs., Inc.	314-278-6949
NJ	Palisades Park, Tech-Rep Engr. Sls.	201-945-7669
NY	Fairport, Naco Elctrns. Corp.	716-244-4720
NY	Nesconset, Tech-Rep Engr. Sls.	516-724-3564
NY	North Syracuse, NACO Electronics Corp.	315-699-2651
NY	Rochester, NACO Elctrns. Corp.	716-244-4720
NY	Utica, NACO Elctrns. Corp.	315-732-1801
NC	Charlotte, Ranson, Wallace & Baesel, Inc.	704-334-4244
Ohio	Cleveland, Del Steffen & Assoc.	216-461-8333
Ohio	Dayton, Del Steffen & Assoc.	513-293-3146
Pa	King of Prussia, Electronic Mktg. Assoc.	215-265-1600
Tex	Houston, Scientific Sls. Co.	713-666-5723
Tex	Richardson, Scientific Sls. Co.	214-231-6541
Wash	Seattle, Standard Controls	206-723-1705
FOR:	Can., Willowdale, Ont., ASW Controls & Instrs., Ltd.	416-494-1541

STANDARD CRYSTAL CORP., 1 Cupania Circle, Monterey Park, Cal., 91754, Tel: 213-724-5004; Minimum order: $25

Customer service: J. B. Fisher

Products manufactured: Controls/Control Eqpt., Crystal Blanks, Crystals

Local Sales Offices & Reps.

Cal	Costa Mesa, E. Murray Assoc.	714-642-3282
Mich	Grand Rapids, R. P. Urban Assoc.	616-245-0511

STANDARD ENVIRONMENTAL SYSTEMS, INC., 392 Minnisink Rd., Totowa, N.J., 07512, Tel: 201-256-2200, TWX: 710-988-5722; Empl.: 30

For info on price: D.E. Wilson, Jr.; Application info: K.A. Ladzinski; Customer service: L.Miller; Delivery info: J.F. Wrohlewski

Free literature available: "Simulators of Geophysical Environments," including law & high temp, humidity, altitude, corrosive atmosphere, errosive atmosphere, pressure, explosion, thermal shock.

Products manufactured: Air Conditioners (For Equipment), Baths, Controlled Temperature (Air & Liquid), Cabinets & Accessories, Chamber, Environmental Test, Heat Exchangers & Systems, Ovens

Local Sales Offices & Reps.

Ga	Tucker, Ridge Instrument
Mass	Wilmington, Tech. Instrs.
NM	Albuquerque, J. Smith & Assocs.
NY	Syracuse, Tesco Assocs.
Tex	Dallas, Merit Co.

STANDARD GRIGSBY INC., 920 Rathbone Ave., Aurora, Ill., 60507, Tel: 312-897-8417, TWX: 910-232-3138; Empl.: 350; Minimum order: $50

For info on price: R. Riemland; Application info: B. Sefton; Customer service: R. Riemland; Delivery info: R. Riemland

Free literature available: Rotary and Lever Switch, 32 page catalog Rotary Printed Circuit Board Assemblies-2 pg. Brochure Linear Slide Switch, 4 page catalog Printed Circuit and Solderless Terminals-2 page Brochure PB 400 Pushbutton Switches (miniature & modular) 12 page Brochure

Products manufactured: Switches

Local Sales Offices & Reps.

Ala	Huntsville, Elctrn. Mktg. Assoc.	205-837-6061
Ariz	Tempe, Argus Sls.	602-966-7442
Cal	Culver City, DeAngelo Rothman & Co.	213-398-6239
Cal	Redwood City, Parks & Pruitt Assocs.	415-364-1640
Cal	San Diego, DeAngelo Rothman & Co.	714-560-5707
Colo	Wheatridge, Waugaman Assocs.	303-423-1020
Conn	Milford, Conti-Younger Assoc.	203-929-3294
Fla	Altamonte Springs, WMM Assoc.	305-831-4645
Fla	Clearwater, WMM Assoc.	813-447-2533
Fla	Pompano Beach, WMM Assoc.	305-943-3091
Ill	Hinsdale, Momak Sls.	312-654-4524
Ind	Indianapolis, Southern Sls. Corp.	317-257-7575
Iowa	Cedar Rapids, Elctrn. Sls. Co.	319-364-4342
Md	Rockville, Mechtronics Sls.	301-340-2130
Mass	Waltham, Conti-Younger Assoc.	617-890-4582
Mich	Benton Harbor, McNabb & Assoc.	616-925-2166
Minn	Minneapolis, Stack-Johnson	612-925-2111
NJ	Mountain Lakes, Comps. For Elctrns.	201-334-2921
NY	Buffalo, J. McDonough Assocs.	716-839-2044
NY	Manlius, Bowser & Sapecky Assoc.	
NY	Rochester, Quality Comps.	716-839-4170
NC	Cary, Electronic Mktg. Assoc.	919-467-6319
NC	Winston Salem, Electronic Mktg. Assoc.	919-722-5151
Ohio	Cincinnati, F. J. Campisano Co.	513-662-1616
Ohio	So. Euclid, F.J. Campisano Co.	216-381-4949
Ore	Beaverton, ES/Chase Co.	503-649-6177
SC	Greenville, Elctrn. Mktg. Assoc.	803-268-1125
Tex	Dallas, McCoy Assoc., Co.	214-350-9931
Tex	Houston, Ev Smith Sls Co.	713-649-5756
Wash	Edmonds, ES/Chase Co.	206-774-3586
FOR:	Can., Downsview, Ont., Kaytronics, Ltd.	416-638-5511
FOR:	Can., Montreal267, Que., Kaytronics, Ltd.	514-487-3434

STANDARD LOGIC INC., 2215 S. Standard Ave., Santa Ana, Cal., 92707, Tel: 714-979-4770, TWX: 910-595-1707; Empl.: 130; Minimum order: $25

For info on price: J. Machicek; Application info: H. Welsh; Customer service: J. Machicek; Delivery info: J. Machicek

Free literature available: DIP/Logic Packaging Handbook; Semi Automatic Wire-Wrapping Machines; Floppy Disks; Fixed Head Disks; ECL C-A-S-H Cards; A Disc Memory Buyer's Guide; Electronic Wire Stripper.

Products manufactured: Backpanel Interconnect Systems, Boards, Plug-In, Bus Bars & Systems, Cable Assemblies & Harnesses, Cards, Logic, Chassis, Circuit Board Mounting, Controllers, Programmable, Converters, Crystals, Enclosures, Module, Plug-In, Frames, Cabinet & Rack, Kits, Breadboarding (For Engineers), Machines/Machinery, Production, Memory Systems, Oscillators, Racks, Wire Strippers

STANDARD MEMORIES, INC., 2801 E. Oakland Park Blvd., Ft. Lauderdale, Fla., 33306, Tel: 305-566-7611, TWX: 510-955-9828; Empl.: 150

For info on price: D. Chandler; Application info: J. A. Deving; Customer service: D. Chandler

Products manufactured: Memory Systems

Local Sales Offices & Reps.

Cal	Santa Ana, Western Regional Office	714-540-3605
NJ	Fair Haven, Eastern Regional Office	201-842-3160
Tex	Dallas, Midwestern Regional Office	214-369-4528

STANDARD POWER, INC., 1400 S. Village Way, Santa Ana, Cal., 92705, Tel: 714-558-8512, TWX: 910-595-1760; Empl.: 95 ...... p. 1•1472-1475

Products manufactured: Power Supplies

Local Sales Offices & Reps.

Ariz	Scottsdale, R.R. Thomas Co.	602-994-0401
Cal	Palo Alto, O'Donnell Assoc.	415-327-9260
Cal	Torrance, O'Donnell Assoc.	213-323-9243
Colo	Denver, Parker-Webster Co.	303-770-1972
Fla	Ft. Lauderdale, Tech Rep Assocs.	305-792-0962
Fla	Indian Rocks Beach, Tech Rep Assocs.	813-595-2834
Ga	Atlanta, Tech Rep Assocs.	404-252-9288
Ill	Mt. Prospect, Delta Tech. Sls. Corp.	312-437-9412
Kans	Olathe, BC Elctrn. Sls.	913-782-6696
Md	Glen Arm, Barnhill & Assocs.	301-252-5610
Mass	West Concord, Sls. Engrg.	617-369-3943
Mich	Sterling Heights, Gompass Assocs.	313-979-3690
Minn	Minneapolis, Arneson & Co.	612-835-2177
Mo	Hazelwood, BC Elctrn. Sls.	314-731-1255
NJ	Ridgefield, Haber Ramp Corp.	201-945-5250
NY	Buffalo, Precision Sls.	716-856-5974
NY	N. Syracuse, Precision Sls.	315-458-2223
NC	Raleigh, Barnhill & Assoc.	919-787-5774
Ohio	Dayton, Compass Assoc.	513-252-9939
Pa	Norristown, Data Engrg.	215-272-1444
Pa	Pittsburgh, Bishop Co.	216-255-6969
Tenn	Johnson City, Barnhill & Assoc.	615-928-0184
Tex	Dallas, R.R. Thomas Co.	214-363-8591
Va	Lynchburg, Barnhill & Assoc.	703-846-4624
Wash	Bellevue, W.M. Buehler	206-243-6340
EXP:	Los Angeles, Cal., Constantex	213-838-6950

STANDARD WIRE & CABLE CO., 3440 Overland Ave., Los Angeles, Cal., 90034, Tel: 213-870-9231, TWX: 910-340-6758; Empl.: 105 ...... p. 2•2058,2059

Products manufactured: Cable Assemblies & Harnesses, Cable, Cords, Wire, Wire Shielding

Local Sales Offices & Reps.

Ariz	Phoenix, Standard Wire & Cable Co.	602-269-2501
Cal	Palo Alto, Standard Wire & Cable Co.	415-328-3082
Fla	Orlando, Buchanan & Abrams Assoc.	305-898-7444
Ga	Atlanta, Electro-Mech, Inc.	404-393-0444
Ill	Hinsdale, Momak Sls.	312-654-4524
Ind	Fort Wayne, R. G. Frederick Co.	219-745-2461
Md	Towson, L.H. Kolman & Co.	301-752-8756
Mass	Attleboro, Standard Wire & Cable Co.	617-226-1500
Minn	Minneapolis, E.C. Electronic Sls.	612-831-0229
NJ	Cinnaminson, Scott Sls.	609-829-2991
NY	DeWitt, Tri-Tech Elctrns.	315-446-2881
Ohio	Cleveland, O'Neill - Ruffing & Co.	216-331-4273
Pa	Pittsburgh, Covert & Newman Co.	412-563-0303
Wash	Vancouver, Standard Wire & Cable Co.	206-696-4645

STANFORD APPLIED ENGINEERING, 340 Martin Ave., Santa Clara, Cal., 95050, Tel: 408-243-9200, TWX: 910-338-0132; Empl.: 600

For info on price: J. Pollock; Application info: L. Vermont

Products manufactured: Boards, Printed Circuit, Boards, Printed Wiring, Universal, Cards, Logic, Chassis, Circuit Board Mounting, Circuits, Flexible, Circuits, Printed, Multilayer, Coils Including Assemblies & Forms, Connectors, Delay Lines, Filters, Holder & Carriers, Integrated Circuit Packaging Systems, Pullers, Racks, Services, Assembly, Production & Test, Sockets, Switches, Transformers

Local Sales Offices & Reps.

Ariz	Scottsdale, BFA CORP.	602-946-4215
Cal	Costa Mesa, Stanford Applied Engrg.	714-540-9256
Cal	Newport Beach, Mission Mktg.	714-833-1802
Cal	Palo Alto, Brooks Tech. Group	415-328-3232
Cal	San Diego, Harvey King	714-276-7541
Cal	Santa Clara, Stanford Applied Engrg.	408-243-9200
Colo	Boulder, Stanford Applied Engrg.	303-449-9100
Colo	Denver, Electrodyne	303-757-7679
Colo	Denver, Integrated Elctrns.	303-534-6121
Conn	Cheshire, Coakley, Boyd & Abott, Inc.	203-272-2261
Fla	Casselberry, EIR, Inc.	305-830-9600
Fla	Palm Beach, EIR	305-585-6689
Fla	Plantation, EIR	305-791-6390
Ga	Atlanta, Electro-Mech	404-393-0444
Haw	Honolulu, Adtech, Inc.	808-941-0708
Ill	Addison, Stanford Applied Engrg.	312-620-8820
Ill	Rosemont, Advent Elctrns.	312-298-4210
Md	Baltimore, Stemler Assocs.	301-944-8262
Mass	N. Billerica, Stanford Applied Engrg., Connector Tech. Oper.	617-667-3806
Mass	Needham, Coakley, Boyd & Abbott, Inc.	617-444-5470
Mass	Newton, Greene-Shaw Co.	617-969-8900
Mich	Farmington, Sheridan Assocs.	313-477-3800
Minn	Minneapolis, M. Westlund Assocs.	612-884-5022

Mo	Kansas City, Harris-Hanson Co.	816-444-9494
Mo	St. Louis, Harris-Hanson Co.	314-432-3611
NJ	Cherry Hill, Stemler Assoc.	609-966-4070
NJ	Laurel Springs, Stemler Assoc.	215-644-3477
NJ	Ridgefield, Haber-Ramp Corp.	201-945-5250
NM	Albuquerque, BFA Corp.	505-292-1212
NM	Las Cruces, BFA Corp.	505-523-0601
NY	Buffalo, Summit Dists.	716-884-3450
NY	Laurel Springs, Stemler Assoc.	215-644-3477
NY	Marlton, Stemler Assoc.	609-966-4070
NY	N. Syracuse, Precision Power Devices	315-458-2223
NY	Rochester, Telesco Assoc.	716-271-3780
NY	Utica, Telesco Assoc.	315-733-3183
NY	West Babylon, Stanford Applied Engrg.	516-420-8111
NC	Raleigh, Electro-Mech	
Ohio	Beachwood, Sheridan Assocs.	216-831-0130
Ohio	Cincinnati, Sheridan Assocs.	513-761-5432
Ohio	Dayton, Sheridan Assocs.	513-277-8911
Ohio	Reading, Sheridan Assocs.	513-761-5432
Okla	Tulsa, Kemp Engrg. Co.	918-299-2636
Pa	Pittsburgh, Sheridan Assocs.	412-244-1640
Tenn	Nashville, Electro-Mech	615-883-1490
Tex	Dallas, M. Kruvand Co.	214-827-8043
Tex	Houston, M. Kruvand Co.	713-661-3007
Utah	Salt Lake City, Alta Elctrns.	801-486-7227
Va	Alexandria, Stemler Assoc.	703-548-7818
Wash	Redmond, Barrett Sls. Northwest	206-885-6991
FOR:	Can., Rexdale, Ont., Frank Eakin, Ltd.	416-638-0451
FOR:	Can., Toronto, Ont., Zentronics, Ltd.	416-789-5111

STANFORD APPLIED ENGRG., INC., Advanced Packaging Div., 2165 S. Grand Ave., Santa Ana, Cal., 92705, Tel: 714-540-9256, TWX: 910-595-1122; Empl.: 150

Products manufactured: Boards, Printed Circuit, Bus Bars & Systems, Connector Adapters, Connectors, Contacts, Electrical, Drawers, Sliding, Racks, Sockets, Terminals

Local Sales Offices & Reps.

Cal	San Diego, Mesa Elctrns.	714-278-8021
Cal	Santa Ana, SAE	714-540-9256
Cal	Santa Clara, SAE Sls.	408-243-9200
Colo	Boulder, Rocky Mtn. Regional Sls.	303-449-9100
Conn	New Haven, Gerber Sls. Co.	203-777-6279
Fla	Miami, S. K. Wallace Assocs.	305-691-1654
Fla	Tampa, S. K. Wallace Assoc.	813-932-3568
Ga	Jonesboro, S. K. Wallace Assocs.	404-471-6297
Ill	River Grove, SAE	312-453-9337
Md	Silver Springs, QED Elctrns.	301-588-8134
Mass	Springfield, Gerber Sls. Corp.	413-525-3059
Mass	Waltham, Gerber Sls. Co.	617-890-8040
Mich	Farmington, Carter, McCormic & Peirce	313-477-7700
Minn	Minneapolis, M. Westlund Assoc.	612-884-4567
Mo	Kansas City, Harris Hanson Co.	816-444-9494
Mo	St. Louis, Harris Hanson	314-432-3611
NJ	Camden, Q E D Elctrns.	215-925-8711
NJ	Morristown, Graydon-Sherman	201-538-9246
NY	Fayetteville, R. Sherman	315-637-9863
NY	New York, East Regional Sls.	212-687-1220
NC	Greensboro, S. K. Wallace Assocs.	919-292-0487
Okla	Tulsa, Kemp Engrg. Co.	918-628-0309
Tenn	Memphis, S. K. Wallace Assocs.	901-682-2281
Tex	Dallas, SAE	214-661-9112
Wash	Bellevue, Rowe/Northwest	206-455-2686

STANTON MAGNETICS, INC., Terminal Dr., Plainview, N.Y., 11803, Tel: 516-OV1-0200; Empl.: 300

Customer service: Sales Dept.

Products manufactured: Handsets, Chestsets, Headphones, Headsets, Etc., Phonographs, Parts & Accessories

Local Sales Offices & Reps.

Cal	Beverly Hills, Trego Sls. Co.	213-274-8351
Cal	Redwood City, H & K Sls.,	415-369-6244
Colo	Aurora, Scowcroft & Assocs.	303-755-2422
Conn	Stamford, John B. Anthony Co.	203-322-9202
Conn	West Haven, Robert S. Reiss Assocs.	203-933-8542
Fla	Ft. Lauderdale, Unirep	305-527-1556
[illegible]	Skokie, Irving W. Rose Assocs.	312-674-6790
Kans	Overland Park, William Menezes & Assoc.	913-649-2680
Md	Bethesda, Gene Rosen & Assocs.	301-530-8448
Mass	Marblehead, Willson Sls. Co.	617-631-4016
Mich	St. Clair Shores, Rod Butchart & Assocs.	313-773-7870
Minn	St. Paul, Smith Engrg. Assocs.	612-646-4851
NC	Charlotte, L. D. Roddey Sls.	704-375-5712
Ohio	Cleveland, F. A. Daugherty Co.	216-Hi9-1122
Ohio	Lakewood, Maybern Co.	216-333-2531
Pa	McMurray, C. S. Cooper & Assocs.	412-941-6473
Tex	Dallas, Charles Lucas Sls. Co.	214-330-8181
Wash	Seattle, Henry Joncas Co.	206-364-8609

STANTRON DIV., Wyco Metal Products, 6914 Beck Ave., North Hollywood, Cal., 91605, Tel: 213-875-0800, TWX: 910-499-2177; Empl.: 55 .... p. 1•92-95

Products manufactured: Blowers & Fans & Accessories, Cabinets & Accessories, Panels, Racks, Slides, Cabinet & Chassis

Local Sales Offices & Reps.

Ariz	Phoenix, Shefler-Kahn Co.	602-258-7893
Cal	Los Angeles, Ed Landa Co.	213-879-0770
Cal	Oakland, Moulthrop Sls. Inc.	415-261-7676
Colo	Aurora, Robbins & Assocs.	303-399-6618
Conn	Hamden, P. Jenks Assocs. Inc.	203-281-0810
Ill	Chicago, Berndt Assocs.	312-283-0713
Md	Silver Springs, Ara Elctrns., Inc.	301-565-2444
Mass	Wakefield, P. Jenks Assocs.	617-246-1590
Mo	Florrisant, Nevco, Inc.	314-838-4898
Mo	Kansas City, Nevco, Inc.	816-421-1751
NJ	Wayne, G.T. Assocs.	201-694-6040
NM	Albuquerque, Shefler-Kahn Co.	505-265-7077
Ohio	Cincinnati, J.O. Olsen Co.	513-922-2176
Ohio	Cleveland, J.O. Olsen Co.	216-752-5444
Pa	Glenside, Ara Elctrns., Inc.	215-887-5250
Pa	Pittsburgh, J.O. Olsen Co.	412-279-2550
Tex	Irving, Lee Sls. Co.	214-363-3831
Wash	Seattle, D. Smith Sls.	206-633-3160

STAR PORCELAIN CO., 71 Muirhead Ave., Box 1267, Trenton, N.J., 08638, Tel: 609-392-3154; Empl.: 180; Minimum order: $200

For info on price: R. J. Schmidt; Application info: R. J. Schmidt; Customer service: R. J. Schmidt; Delivery info: H. Everett

Free literature available: Bulletin #6266-Engineering Properties of Star Ceramics Together With Ceramic Design Information.

Products manufactured: Cores, Ceramic, Filters, Insulators & Insulation, Tubing

STAR TRON CORP., 58 Curtis St., Providence, R.I., 02909, Tel: 401-274-5090; FSC No: 32494; Empl.: 30

For info on price: Sls. Off. 401-274-5091; Application info: D. D'Amico 401-274-5092; Customer service: A. Colafrancesco 401-274-5090; Delivery info: A. Colafrancesco 401-274-5090

Products manufactured: Bolometers, Connectors, Resistors

Local Sales Offices & Reps.

Cal	Encino, El/Tec	213-981-9881

STARTRONICS, INC., Moulton St., Georgetown, Mass., 01833, Tel: 617-352-6200, TWX: 710-347-0310

STATEK CORP., 1233 Alvarez Ave., Orange, Cal., 92668, Tel: 714-639-7810, Telex: 65-5430; FSC No: 51791; Empl.: 80; Minimum order: $30 .... p. 1•412-415

For info on price: Sales; Application info: R. Nelson; Customer service: R. Nelson; Delivery info: B. McIntire

Free literature available: Specification sheets: crystals, oscillators, oscillato;r kits; Application Notes: Transistor - series resonant circuits; CMOS - parallel resonant circuits Various technical notes

Products manufactured: Circuits, Hybrid, Thin-Film, Clocks (All Types), Crystals, Filters, Lenses, Optical & Camera, Oscillators, Standards, Timers

STATHAM INSTRUMENTS, INC., 2230 Statham Blvd., Oxnard, Cal., 93030, Tel: 805-487-8511; Empl.: 660

Products manufactured: Amplifiers, Analyzers, Carts & Dollies, Instrument & Equipment, Cells, Load, Chamber, Environmental Test, Connectors, Detectors, Display Devices/Displays, Gages, Ovens, Refrigerators, Environmental Test, Seals, Services, Assembly, Production & Test, Spectrometers, Transducers

Local Sales Offices & Reps.

Ariz	Scottsdale, Hagestad & Co.	602-945-0902
Cal	Los Angeles, Burtis Instrumentation Sls.	
Cal	Santa Clara, Statham Instrs., Inc.	408-246-2277
Cal	Van Nuys, Stratham Instrs., Inc.	213-873-4636
Cal	Woodland Hills, Statham Instrs., Inc.	213-883-2932
Colo	Denver, Telemetry Sls. Corp.	303-424-5574
Fla	Longwood, Lenz Engrg. Co.	305-831-9797
Fla	Winter Park, Statham Instrs., Inc.	305-644-0632
Ind	Ellettsville, R. Graham, B.S. Mareachen	812-876-5382
La	Baton Rouge, Alford, Woods, Childs Engrg. Inc.	504-275-5480
La	Harvey, Strander Corp.	504-367-4389
Md	Bethesda, S & S Assocs.	301-654-1434
Mass	Peabody, JSR Assocs.	617-532-0348
Mass	Waltham, McBar Assocs.	617-890-0233
Mich	Detroit, WKM Assocs., Inc.	313-892-2500
Minn	Minneapolis, Heimann Co.	612-861-6051
Mo	Hazelwood, Statham Instrs., Inc.	314-895-7777
Mo	St. Louis, Engrg. Svcs. Co.	314-997-1515
NJ	Englewood Cliffs, Statham Instrs., Inc.	201-569-5588
NJ	Teaneck, R.T. Reid Assoc., Inc.	201-692-0200
NM	Albuquerque, C.T. Carlberg & Assoc.	505-265-1579
NY	Binghamton, Bucci Assocs.	607-798-7141
NY	Lancaster, Lawrence Ind'l. Sls.	716-685-1993
NY	Rochester, G.P. Troy	716-586-4867
Ohio	Cleveland, WKM Assocs., Inc.	216-267-0445
Ohio	Medina, McShane Inc.	216-725-4568
Okla	Broken Arrow, P.J. Scanlon Co.	918-251-5728
Pa	King of Prussia, S & S Assocs.	215-265-3450
Pa	Pittsburgh, WKM Assocs.	412-892-2953
Tex	Dallas, Statham Instrs., Inc.	214-358-4871
Tex	Houston, AWC	713-488-2730
Tex	Richardson, P.J. Scanlon Co.	214-231-4661

STAVER CO., INC., 41 N. Saxon Ave., Bay Shore, N.Y., 11706, Tel: 516-666-8000, TWX: 510-227-6142; Empl.: 90; Minimum order: $50 .... p. 2•1200

For info on price: M. Girard; Application info: A. Skrobisch; Customer service: M. Girard; Delivery info: P. Sito

Free literature available: General Catalog on Staver Electronic Hardware, Heat Sink Catalog-Staver Thermoflag & Thermovane Heat Sinks, Data Sheets on Signalex Readouts

Products manufactured: Annunciators, Bezels, Shielded & Unshielded, Caps, Lenses, Indicator Light, Display Devices/Displays, Drivers & Decoders For Readouts, Eyelets, Holders, Crystal, Indicators, Pads, Transistor Mounting, Plug Caps & Shells, Services, Assembly, Production & Test, Shields, Transistor, Diode, Thyristor Heat Dissipators

Local Sales Offices & Reps.

Ariz	Scottsdale, E.E. Black & Assocs.	602-947-2007
Cal	Encino, R.H. McDonald & Assocs.	213-986-5832
Cal	Santa Clara, Shiell Assocs.	408-732-6280
Conn	Greenwich, Eisenbeis Sls. Co.	203-869-2008
Fla	Eustis, R.K. Welter Co.	904-357-7796
Ga	Lithonia, Erickson Prods.	404-482-8858
Ill	Chicago, McBride Sls.	312-775-1080
Ind	Indianapolis, Lat-Tronics	317-846-5788
Mich	Grand Rapids, Elko Sls.	616-949-1451
NJ	Collingswood, Kaygar Assocs.	609-398-5229
NY	Manlius, Bowser & Sapecky Assocs.	315-682-8885
NY	Valley Stream, Levison Sls. Co.	516-LO1-9696
Ore	Portland, J.J. Backer Co.	503-297-3776
Tex	Garland, G.V. Peck Co.	214-341-8311
Va	Portsmouth, F.B.D. Sls.	804-484-3162
Wash	Seattle, J.J. Backer Co.	206-285-1300

STELLEX INDUSTRIES, 33 Canal St., Rochester, N. Y., 14608, Tel: 716-235-7070; Empl.: 35; Minimum order: $25

Customer service: J. Durham

Products manufactured: Relays, Services, Assembly, Production & Test, Terminal Blocks, Boards & Strips, Timers

STERLING INSTR., Div. Designatronics, Inc., 55 S. Denton Ave., New Hyde Pk., NY, 11040, Tel: 516-328-3300, TWX: 510-223-0642; Empl.: 150

Customer service: M. Ruggeiro

Products manufactured: Bearings, Brakes, Bushings, Glass, Plastic, Metal, Rubber, Etc., Cams, Clutches, Counters, Couplings, Dials, Drives & Drive Mechanisms (Dial), Fasteners, Gears & Gear Mechanisms (Precision), Handles For Cabinets, Circuit Boards, Racks, etc., Indicators, Kits, Breadboarding (For Engineers), Knobs, Limit Stops, Mechanical, Nameplates, Pins, Reducers, Rings, Retaining, Servo Systems, Spacers, Switches, Terminals

Local Sales Offices & Reps.

Ariz	Phoenix, Tri Fab Sls. Rep. Co.	602-265-3341
Cal	Burlingame, J. Logan & Assocs.	415-697-6100
Cal	Chatsworth, Sterling W. Coast	213-822-6226
Colo	Denver, McSherry	303-238-8361
Fla	Orlando, Irby & Connolly, Inc.	305-894-8471
Ga	Atlanta, Electro-Mech. Sales Eng. Co.	404-393-0444
Ill	Chicago, A. Woods & Assoc.	312-283-7400
Mass	Woburn, R.W. Hatfield	617-933-2324
Mich	Lathrup Village, R.C. Nordstrom	313-559-7373
NJ	So. Amboy, Addem II	201-721-6449

NY	Clarence, Rep-Tech.	716-684-6250
NY	Syracuse, Rep. Tech.	315-454-2445
NC	Charlotte, Reynolds Cowardin Assoc.	704-523-0324
Ohio	Columbus, Rockford Controls Ohio Inc.	614-231-5890
Ohio	Dayton, Rockford Controls	513-278-7362
Ohio	Euclid, Rockford Controls	216-731-5250
Pa	Glenolden, McDermott Assoc.	215-328-9180
Tex	Richardson, Zonk Eng. Co.	214-238-9651
Va	Richmond, Reynolds Cowardin Assoc.	703-266-3457
Va	Roanoke, Reynolds Cowardin Assoc.	
Wash	Seattle, Ray Johnston Co. Inc.	205-524-5170
FOR:	Can., Pierre Fonds, Que., Avotronics, Ltd.	514-697-2135
FOR:	Can., Willowdale, Ont., Avotronics, Ltd.	705-493-9711

STERLING MFG. CO., 1845 E. 30th St., Cleveland, Ohio, 44114, Tel: 216-781-7136; Empl.: 175; Minimum order: $50

For info on price: J. L. Fine; Application info: W. Cizek; Customer service: M. Cooper; Delivery info: M. Cooper

Free literature available: Auto Antenna Catalogue Form #AC 1172, Panel Meter Catalogue Form # 1906, Pocket Meter Catalogue.

Products manufactured: Antennas, Meters, Testers

Local Sales Offices & Reps.

Cal	, Sales Engineers Ltd.	213-921-4337
Mass	Waltham, Deveer Sls. & Engr.	617-889-5900
Mich	Edwardsburg, Dash Sls.	616-699-5820
NY	Wantagh, Arnold Schuman Co.	516-826-5550
NC	Raleigh, Leigh Sls.	919-787-9090

STERLING TRANSFORMER CORP., 510 Driggs Ave., Brooklyn, N.Y., 11211, Tel: 212-782-4200; Empl.: 55; Minimum order: $25 .... p. 2•1803-1807

For info on price: A. Gartner; Application info: W. Winchell; Customer service: A. Gartner; Delivery info: A. Garner

Free literature available: Catalog Tranformers & Chokes.

Products manufactured: Coils Including Assemblies & Forms, Filters, Reactors, Transformers

Local Sales Offices & Reps.

Cal	Palo Alto, Mauldin Co.	415-326-5291
Cal	Van Nuys, Timco Sls.	213-781-7370
Conn	Southington, Rantec, Inc.	203-621-5941
Mass	Waltham, Rantec, Inc.	617-890-5110
NY	Rockville Centre, Willgold Elec. Sls.	516-RO 4-4022

STERLING, Div. Reichhold Chems., Inc., Sewickley, Pa., 15143, Tel: 412-766-7600, TWX: 710-668-3877; Empl.: 96

Products manufactured: Coatings, Compounds, Encapsulating, Insulating, Molding, Potting

Local Sales Offices & Reps.

Conn	Northford, D.H. Rausch	203-484-0094
Ill	Oak Brook, Sterling Div.	312-887-0315
Minn	Minneapolis, Bergquist Co.	615-925-2322
NC	Charlotte, R.W. Chapman & Co.	704-525-2421
Ohio	Chagrin Falls, Electrolock, Inc.	216-247-4245
Pa	Sewickley, R.P. Heinick	412-766-7600
Wisc	Oconomowoc, D.R. Stackowicz	414-871-7525

STETTNER-TRUSH INC., 67 Albany St., Cazenovia, N.Y., 13035, Tel: 315-655-8141, TWX: 710-541-1530; Empl.: 20

For info on price: G. Trush; Application info: G. Trush; Delivery info: V. Harmon

Products manufactured: Attenuators, Capacitors, Fixed, Capacitors, Variable, Filters, Motors, Networks, Resistors, Suppressors, Switches

Local Sales Offices & Reps.

Cal	San Mateo, Melvin Sls. Co.	415-349-7444
Cal	Santa Fe Springs, Comp. Svcs., Inc.	213-664-8445
Colo	Arvada, Arrowhead Sls. Corp.	303-423-5556
Conn	North Haven, Kitchen & Kutchin, Inc.	203-239-0212
Fla	Orlando, Geartner Assocs.	305-299-1000
Ill	Rosemont, STC, Inc.	312-671-4208
Ind	Bloomington, J. Hershman	812-339-9563
Mass	Lexington, Kitchen & Kutchin, Inc.	617-862-8230
Minn	Minneapolis, Technical Assocs., Inc.	612-929-7274
Mo	St. Louis, Beneke & McCanl	314-434-6242
NJ	Fort Lee, R. Cameron Assocs.	201-461-2595
NC	Raleigh, A.B. Andrews & Co.	919-833-5565
Utah	Salt Lake City, Arrowhead Sls.	801-487-4716
FOR:	Can., Concord, Ont., C & R Devices, Ltd.	416-669-9870

STEVENS-ARNOLD, INC., 7 Elkins St., So. Boston, Mass., 02127, Tel: 617-268-1170; Empl.: 100; Minimum order: $25 .... p. 1•1476,1477

For info on price: M.J. Ross; Application info: G.M. Karon; Customer service: M.J. Ross; Delivery info: M.J. Ross

Free literature available: Catalog 602 Ultra-Miniature DC/DC Converter Module Power Supplies. Catalog 604/605 Triple Output Modular DC/DC Converter Transformer.

Products manufactured: Choppers, Converters, Power Supplies, Transformers

Advertisment

Stevens-Arnold has Sales Engineering Representatives in principal cities of the United States and Canada. To obtain the name of your nearest representative, call 617-268-1170 collect and ask for Customer Service.

Foreign Representatives in Australia, Belguim, France, India, Israel, Netherlands, Sweden, Switzerland, and West Germany.

STEVENS, GEO. MFG. CO., 6001 N. Keystone Ave., Lincolnwood, Ill., 60646, Tel: 312-588-1300, TWX: 910-221-5139; Minimum order: $25

For info on price: E. Sterner; Application info: J. Stevens; Customer service: F. Franke; Delivery info: A. Ericson

Free literature available: We manufacture the most complete line of Coil Winding Equipment in the country. We produce standard type machines, adaptations and complete engineered equipment to customer and product specification.

Products manufactured: Machines/Machinery, Production

Local Sales Offices & Reps.

Ariz	Phoenix, Electrical Specialty Co.	602-275-5739
Cal	Los Angeles, Electrical Specialty Co.	213-724-9600
Colo	Denver, Electrical Specialty Co.	303-321-0226
Ind	Indianapolis, Blind & Assocs.	317-251-1249
Mass	Stoneham, Production Devices Corp.	617-438-2772
Mich	Fort Wayne, Blind & Assocs.	219-748-7705
NJ	Montclair, M. H. Tardif	201-744-5884
Ore	Portland, Electrical Specialty Co.	503-227-3601
Tex	Richardson, P. J. Scanlon	214-231-4661
Wash	Seattle, Electrical Specialty Co.	206-682-3434

STEVENS PRODS., INC., 128 N. Park St., E. Orange, N.J., 07019, Tel: 201-672-2140; Empl.: 50; Minimum order: $35

Customer service: J. Thomson

Free literature available: Glass laminated epoxy insulators molded in ready to use form. Mandrel list of open stock tooling for coil forms and potting forms.

Products manufactured: Bobbins, Winding, Coil & Transformer, Coils Including Assemblies & Forms, Insulators & Insulation, Laminates, Services, Assembly, Production & Test, Tubing

STEWART-WARNER MICROCIRCUITS, 730 E. Evelyn Ave., Sunnyvale, Cal., 94086, Tel: 408-245-9200, TWX: 910-339-9210; Empl.: 200

Products manufactured: Comparators, Converters, Counters, Drivers & Decoders For Readouts, Integrated Circuit Devices, Lamp Drivers, Multiplexers, Shift Registers

STICHT CO., INC. HERMAN H., 27 Park Pl., New York, N.Y., 10007, Tel: 212-732-8163; Empl.: 35

For info on price: D. Sticht; Application info: R. Sticht; Customer service: R. Sticht

Free literature available: Bull.1081 Hand Tachometers Bull.1071 Stationary Tachometers Bull.806 Vibrating Reed Tachometers, Bull.810 Running Time Meters, Bull.9141 Miniature Running Time Meters, Bull.421 Dwarf Megohmer, Bull.435 Standard Mark II Magohmer.

Products manufactured: Bridges, Indicators, Lights, Meters, Tachometers, Testers

Local Sales Offices & Reps.

Ill	Westchester, Murphy & Dickey	312-344-5660
Md	Baltimore, W.H. Cooke & Co., Inc.	301-685-1511
Mich	Berkley, G.R. Peters Assocs.	313-564-6325
Minn	Minneapolis, Volco Co.	612-336-6631
Mo	St. Louis, C.O. Leaver Co.	314-WO8-1500
NY	Buffalo, R.F. Lamb Co.	716-874-4900
NY	Newtonville, T. Carse Sls. Co.	518-785-5844
NY	Rochester, R.F. Lamb Co.	716-544-5580
NY	Syracuse, R.F. Lamb Co.	315-454-2469
NC	Matthews, W.K. Hile Co.	704-847-9123
Ohio	Cincinnati, Beedle Equip. Co.	513-793-0140
Ohio	Shaker Heights, Martin-Rettger, Inc.	216-283-5600
Ore	Portland, J.L. Kearns Co., Inc.	503-236-1165
Pa	King of Prussia, WisTex	215-337-1240
Pa	Pittsburgh, R.F. Clark Co.	412-242-9500
Tex	Bellaire, Brice Co.	713-666-1788
Tex	Dallas, Brice Co.	214-233-9808

STOCK DRIVE PRODS., Div. Designatronics, Inc., 55 S. Denton Ave., New Hyde Pk., N.Y., 11040, Tel: 516-328-0200; Empl.: 160

Customer service: R. Lindemann

Products manufactured: Bearings, Brakes, Bushings, Glass, Plastic, Metal, Rubber, Etc., Clutches, Coatings, Counters, Couplings, Dials, Drives & Drive Mechanisms (Dial), Fasteners, Gears & Gear Mechanisms (Precision), Indicators, Knobs, Motors, Mounts, Servo Systems, Timers

Local Sales Offices & Reps.

Ariz	Phoenix, Tri Fab Sls. Rep. Co.	602-265-3341
Cal	Burlingame, J. Logan & Assoc.	415-697-6100
Cal	Chatsworth, Sterling West Coast	213-822-6226
Colo	Denver, McSherry & Assoc.	303-238-8361
Fla	Orlando, Irby & Connolly Inc.	305-894-8471
Ga	Atlanta, Electro-Mechanical Sales Engng.	404-393-0444
Ill	Chicago, A. Woods & Assoc. Inc.	312-283-7400
Mass	Woburn, R. W. Hatfield	617-933-2324
Mich	Lathrup Village, R. C. Nordstrom & Co.	313-559-7373
NJ	So. Amboy, Addem II	201-721-6449
NY	Clarence, Rep-Tech Inc.	716-684-6250
NY	New Hyde Park	516-328-3300
NY	Syracuse, Rep-Tech Inc.	315-454-2445
NC	Charlotte, Reynolds Cowardin Assoc.	704-523-0324
Ohio	Columbus, Rockford Controls Ohio Inc.	614-231-5890
Ohio	Dayton, Rockford Controls Ohio Inc.	513-278-7362
Ohio	Euclid, Rockford Controls Ohio Inc.	216-731-5250
Pa	Glenolden, McDermott Assoc.	215-328-9180
Tex	Richardson, Zonk Eng. Co.	214-238-7651
Va	Richmond, Reynolds Cowardin Assoc.	703-266-3457
Va	Roanoke, Reynolds Cowardin Assoc.	
Wash	Seattle, R. Johnston Co. Inc.	205-524-5170
FOR:	Can., Ontario, Avotronics Ltd.	705-493-9711
FOR:	Can., Quebec, Avotronics Ltd.	514-697-2135

STORM PRODUCTS CO., 112 S. Glasgow St., Inglewood, Ca., 90301, Tel: 213-776-8141; Empl.: 225; Minimum order: $15

For info on price: C. Barnett; Customer service: I. Joyce

Free literature available: A complete list (including prices) of precut wire leads for hookup and wire wrapping.

Products manufactured: Cable Assemblies & Harnesses, Cable, Cords, Services, Assembly, Production & Test, Tubing, Wire, Wire Markers, Wire Shielding, Wire Twisters

STOW LABS., INC., Kane Ind'l. Dr., Hudson, Mass., 01749, Tel: 617-562-9347, Telex: 94-8330; Empl.: 15

For info on price: A. N. Puro; Application info: C. Kadlec; Customer service: A. N. Puro; Delivery info: A. N. Puro

Free literature available: Describes PITRAN®, a silicon NPN planar transistor having emitter-base junction mechanically coupled to diaphragm. Differential pressure applied to diaphragm produces large, reversible change in gain of transistor. Thermometer literature describes an industrial temperature measuring system featuring factory calibrated interchangeable sensors and electronics available in several models with linear analog and digital output.

Products manufactured: Amplifiers, Indicators, Meters, Power Supplies, Switches, Thermometers, Resistance, Transducers, Transistors

Local Sales Offices & Reps.

Mass	Framingham, J. M. Lancaster Co.	617-873-8893
Mich	Detroit, Marsh Equip. Co.	313-869-9200
Mo	St. Louis, Delltrone Co.	

NJ	N. Plainfield, Brady Co.	201-753-7988
NY	Albany, T. Carse Sls. Co.	518-785-5844
Va	Falls Church, Jay Co.	
EXP:	N.Y., NY, Multiparts	212-944-4370

STRUTHERS-DUNN, INC., Lamb's Rd., Pitman, N.J., 08071, Tel: 609-589-7500, TWX: 510-686-7510; Empl.: 450; Minimum order: $50

For info on price: Sls. Dept.; Application info: C. C. Jones; Customer service: Sls. Dept.; Delivery info: Sls. Dept.

Free literature available: c/1010 Distributor catalog: contains latest information and prices for all relays stocked by distributors.

Products manufactured: Alarms, Cards, Logic, Coils Including Assemblies & Forms, Controllers, Programmable, Controls/Control Eqpt., Modules, Logic, Encapsulated, Monitors, Process Control Systems, Relays, Sockets, Switches, Testers, Timers

Local Sales Offices & Reps.

Ala	Huntsville, Rep, Inc.	205-881-9270
Ariz	Scottsdale, DeAngelo, Rothman & Cheever, Inc.	602-948-6983
Ark	Little Rock, Ransom Sls. Co.	501-225-7332
Cal	Culver City, DeAngelo, Rothman & Co., Inc.	213-398-6239
Cal	Palo Alto, Held & Mollard	415-965-9321
Cal	San Diego, DeAngelo, Rothman & Co.	714-560-5707
Fla	Miami, Ludlum Assocs. Co.	305-592-6523
Fla	Orlando, Ludlum Assocs. Co.	305-894-7761
Ga	Tucker, Rep, Inc.	404-938-4358
Ill	Glen Ellyn, Rockford Controls Co.	312-469-6016
Iowa	Bettendorf, White Equipment Co.	319-355-5623
Kans	Wichita, Avionics Engrg. Sls. Co.	316-264-6201
La	Baton Rouge, Automation Specialists, Inc.	504-927-4931
La	Kenner, Automation Specialists, Inc.	504-721-3497
Md	Baltimore, Stemler Assocs., Inc.	301-944-8262
Mass	Sturbridge, Branford Controls Corp.	617-347-7367
Mich	Dearborn, Struthers-Dunn Controls	313-565-4200
Minn	Minneapolis, HMR, Inc.	612-920-8200
Mo	Kansas City, E. A. Mais Co.	816-942-6300
Mo	St. Louis, Jeffrey Equip. Co.	314-966 3506
NJ	Denville, Grimm, Siegel Assocs., Inc.	201-625-1900
NJ	Pitman, Struthers-Dunn, Inc.	609-589-7500
NY	Buffalo, H. C. Zang Agency	716-877-3677
NY	Henrietia, Rush Instrs.	716-334-0452
NC	Charlotte, J. Rudisill Assocs., Inc.	704-377-6901
Ohio	Cincinnati, Beedle Equip. Co.	513-793-0140
Ohio	Columbus, Rockford Controls Ohio	614-231-5890
Ohio	Euclid, Rockford Controls Ohio	216-731-5250
Okla	Tulsa, Kemp Engrg. Co.	918-299-2636
Pa	Philadelphia, Struthers-Dunn, Pitman, N.J.	609-589-7500
Pa	Pittsburgh, R. F. Clark Co.	412-242-9500
Tenn	Memphis, Ransom Sls. Co.	901-332-0036
Tex	Dallas, W. Pat Fralia Co.	214-264-3491
Tex	Ft. Worth, W. Pat Fralia Co.	817-738-2394
Tex	Houston, C.S.C. Instrs.	713-784-2745
Va	Alexandria, Stemler Assocs. Inc.	703-548-7818
Wash	Seattle, Eicher-Richards Co.	206-523-7888
FOR:	Can., Toronto, Ont., Struthers-Dunn Relay Div., Renfrew Elec. Co. Ltd.	416-461-3511

Local Distributors

Ala	Birmingham, M-G Elec. & Equip., 3112 Sixth Ave.	205-328-4525
Ariz	Phoenix, Kierulff Elec., 2633 E. Buckeye	602-273-7331
Ark	Little Rock, Carlton-Bates, 6821 Scott Hamiton Dr.	501-562-9100
Cal	Hollywood, Hollywood Radio, 5250 Hollywood	213-466-3181
Cal	Palo Alto, Kierulff Elec., 3969 E. Bayshore	415-968-6292
Colo	Denver, Newark-Denver Elec., 2170 S. Grape	303-757-3351
Conn	Bridgeport, Tower-Olschan, 15 Dewey St.	203-367-7401
Fla	Orlando, Brownell Electro, 307-27th St.	305-843-6770
Ga	Atlanta, Brownell-Electro, 3020 Commerce Way	404-762-5181
Ill	Chicago, Newark Elec., 500 N. Pulaski	312-638-4411
Ill	Peoria, Klaus Radio & Elec., 8400 N. Pioneer	309-691-4840
Ind	Indianapolis, Graham Elec. Supply, 133 S. Pa. Ave.	317-634-8202
Iowa	Davenport, Republic Elec., 737 Charlotte	319-322-6204
Kans	Wichita, Interstate Elec., 1330 E. 1st	316-264-6317
Ky	Louisville, E&H Elec. Supply, 804 S. Fifth	502-587-0991
La	Metairie, M-G Elec. & Equip., 638 Papworth Ave.	504-834-6002
Me	Portland, Stanley J. Leen, 52 Union St.	207-774-6266
Md	Baltimore, Graybar Elec., 3701 E. Monument	301-342-5500
Mass	Allston, Apparatus Service, 355 Everett St.	617-787-1300
Mich	Grand Rapids, Purchase Elec., 100 Grandville	616-458-1476
Minn	Minneapolis, Stark Elec. Supply, 112-3rd Ave., N.	612-332-1325
Miss	Jackson, Atlantic Ipd., Box 9191	601-353-0351
Mo	N.K.C., LCOMP, 1520 Taney St.	816-221-2400
Mont	Missoula, Montana Mercantile Co., 1600 N. Ave., W	406-543-5151
Neb	Omaha, Graybar Elec., Box 1234	402-346-7676
NJ	Hanover, State Elec. Parts, 36 Route 10	201-887-2550
NJ	S. Plainfield, Brownell-Electro, 500 Hadley Rd. & Durham Ave.	201-753-4600
NY	New York, Brownell-Electro, 85 Tenth Ave.	212-924-6000
NY	Rochester, Requa Electric, Box 1130	716-442-2020
NC	Charlotte, Brownell-Electro, Box 16368	704-394-4341
Ohio	Cincinnati, Hughes Peters, 4865 Duck Creek	513-351-2000
Okla	Tulsa, Radio, Inc., 1000 S. Main St.	918-587-9123
Ore	Eugene, Vitus Elec. Supply, 140 E. 5th St.	503-345-4377
Pa	Philadelphia, Herbach & Rademan, 401 E. Erie Ave.	215-426-1700
RI	Pawtucket, New England Electric Supply, 265 Pine St.	401-725-7400
SC	Greenville, Hammond Elec., 1000 Augusta St.	803-233-4121
Tenn	Memphis, Brownell-Electro, 3053 Tranquility	901-332-9254
Tex	Dallas, Wholesale Elec., 2808 Ross	214-824-3001
Va	Richmond, Meridian Elec., 1001 W. Broad St.	804-353-6648
Wash	Seattle, Eicher-Richards, 2727 N.E. Blakeley	206-523-7888
WVa	S. Charleston, Allied Controls, Box 8306, S.	304-768-7313
Wisc	Milwaukee, Marsh Elctrns., 6047 W. Beloit	414-545-6500

STRUTHERS-DUNN, INC., Sys. Div., 4140 Utica Ridge Rd., Bettendorf, Iowa, 52722, Tel: 319-359-7501, TWX: 910-525-1176; Empl.: 100; Minimum order: $25

For info on price: R. G. Alessandrini; Application info: L. Thompson; Customer service: R. G. Alessandrini; Delivery info: R. G. Alessandrini

Free literature available: VIP Programmable Controller, Bulletin 79630 solid state industrial logic control system for operating automatic equipment. Specs & operating data S-D77 Programmable Controller, Bulletin 79633 solid state industrial logic control system for small machines. Specs & operating data

Products manufactured: Cards, Linear Function, Cards, Logic, Comparators, Controllers, Programmable, Controls/Control Eqpt., Converters, Counters, Decoders, Modules, Logic, Encapsulated, Monitors, Testers, Timers, Totalizers, Digital

Local Sales Offices & Reps.

NY	Henrietta, Rush Instrs.	716-334-0452
Tex	Houston, C.S.C. Instrs. Div. Automation Specialists	713-784-2745

STURDILITE ANGLE STEEL DIV., Kewanee Scientific Equip. Corp., Plainwell, Mich., 49080, Tel: 616-685-5402; Empl.: 140

For info on price: S. Hambright; Application info: J. Dravies; Customer service: S. Hambright; Delivery info: S. Hambright

Free literature available: 24 Page Catalog

Products manufactured: Benches, Consoles, Stools, Tables, Cabinets & Accessories

SUMMIT ENGINEERING CORP., Box 938, Bozeman, Mont., 59715, Tel: 406-587-0636, TWX: 910-975-1950; Empl.: 70; Minimum order: $12

For info on price: R. A. Hall; Application info: R. A. Hall; Customer service: J. Riebhoff; Delivery info: V. Shadoan

Free literature available: 1. Catalogue of R.F. components 4 pg 2. Positioning controls catalog 8 pg 3. Individual data sheets on each product

Products manufactured: Controls/Control Eqpt., Counters, Digitizers, Pencil Follower (Inc. Coordinate & Graphic), Diodes, Dividers, Mixers, Modulators, All Kinds, Motors, Switches, Transformers

Local Sales Offices & Reps.

Cal	Sherman Oaks	213-789-7277
Cal	Sunnyvale	408-736-5210
Fla	Lake Mary	
Fla	Tampa	813-248-5078
Ga	Atlanta	404-255-8900
Ill	Downers Grove	312-852-6060
Mass	Auburn	617-757-0010
Mass	Medfield	617-359-2040
Mich	Warren	313-758-5000
Mo	Gladstone	816-454-7140
Ohio	Cincinnati	513-825-4111
Ohio	Cleveland	216-524-3971
Pa	Mt. Lebanon	412-343-9660
Pa	West Chester	215-692-8040
Tex	Arlington	817-261-0384
Wisc	Wauwatosa	414-475-6661
FOR:	an., Pt. Clair, Que.	514-695-7602

SUNSHINE SCI. INSTRS., INC., 1810 Grant Ave., Philadelphia, Pa., 19115, Tel: 215-OR 3-5600; Empl.: 30; Minimum order: $10

Customer service: B. Sunshine

Products manufactured: Amplifiers, Analyzers, Clocks (All Types), Coatings, Controls/Control Eqpt., Converters, Counters, Detectors, Indicators, Leads, Test & Adaptors, Meters, Multipliers, Recorders, Scales, Dial, Services, Assembly, Production & Test, Servo Systems, Shunts, Meter, Switches, Test Equipment, Testers, Timers

Local Sales Offices & Reps.

Cal	LaMirada, P. H. DuBois	714-521-1481
Md	Elkridge, Sunshine Scientific	301-796-5600

SUPEREX ELECTRONICS CORP., 151 Ludlow St., Yonkers, N.Y., 10705, Tel: 914-965-6906, Telex: 13-1584; Empl.: 112; Minimum order: $50

Customer service: M. Buchalter

Free literature available: Catalog of special purpose headphone, boom microphone, and accessories from $1.98 to $125.00.

Products manufactured: Coils Including Assemblies & Forms, Handsets, Chestsets, Headphones, Headsets, Etc., Microphones, All Kinds, Tapes, Recording, Magnetic (All Types)

SUPERIOR CABLE DIV., Superior Continental Corp., Box 489, Hickory, N.C., 28601, Tel: 704-328-2171, TWX: 510-934-1204; Empl.: 600

Customer service: J. Moore

Free literature available: Telephone Cable Catalog; Coiled Cord & Line Cord Catalog; Cable Mfg. Facilities Booklet; T-Screen Cable Brochure; Filled Cable Brochure; Drop Wire Brochure; Coaxial Cable Brochures;

Products manufactured: Cable, Cords, Wire

Local Sales Offices & Reps.

Ala	Tuscaloosa, C. Oxford	205-339-4403
Cal	Chico, G. Swithenbank	916-343-4314
Cal	Menlo Park, R. Westwood	415-349-3003
Ga	Atlanta, K. Powley	404-255-2030
Ill	Glen Ellyn, T. Lyons	312-858-2880
NC	Hickory, F. Logan	704-256-9361
NC	Hickory, N.C. Cox	704-328-1682
NC	Mebane, T. Gardner	919-563-4321
Tenn	Bristol, R. Tester	615-968-3999
Tenn	Gallatin, E. Huffman	615-452-7299
Tex	Dallas, B. Barbour	214-243-1722
Tex	Dallas, B. Pitts	214-328-0343
Wash	Enumclaw, P. Armentrout	206-939-0738

SUPERIOR ELECTRIC CO., 1000 Middle St., Bristol, Conn., 06010, Tel: 203-582-9561, TWX: 710-454-0682; FSC No: 58474; Empl.: 1000; Minimum order: $75
p. 1•205,984-987,1443,1546; p. 2•799,1786-1789

Customer service: K. E. Meissner

Free literature available: Superior Electric Electrical Connector Bulletin C670-1, Powerstat Variable Transformer Catalog P773-2, Stabiline Automatic Voltage Regulators Bulletin SVR666-5, Slo-Syn Synchronous/Stepping Motors & Controls Catalog MD174-1

Products manufactured: Connectors, Controls/Control Eqpt., Jacks (All Types), Machines/Machinery, Production, Motors, Plug & Jack Sets, Plugs, Posts, Power Supplies, Readers, Regulators, Simulators, Transformers

Local Sales Offices & Reps.

Cal	Redwood City, Superior Elec.	415-369-8203
Cal	Van Nuys, Superior Elec.	213-786-3626
Colo	Denver, W. J. Purdy Co.	303-777-1411
Fla	Maitland, Hutto, Hawkins, Peregoy, Inc.	305-831-2474
Ill	Glen Ellyn, Superior Elec.	312-858-2960
Md	College Park, Superior Elec.	301-277-3235
Mass	Wellesley Hills, Superior Elec.	617-237-0750
Mich	Detroit, Superior Elec.	313-543-3450
NY	E. Rochester, Superior Elec.	716-381-9210
NY	Tarrytown, Superior Elec.	914-631-8600
NC	Charlotte, Superior Elec.	704-535-5846
Ohio	Medina, Superior Elec.	216-723-1515
Pa	Ft. Washington, Superior Elec.	215-646-6116
Tex	Dallas, Superior Elec.	214-368-4688
Wash	Seattle, J.J. Backer Co.	206-295-1300
FOR:	Can., Bristol, Superior Elec.	203-582-9561
FOR:	Can., Toronto, Ont., American Superior Elec. Co. Ltd.	416-255-2318

SUPERIOR FLUX & MFG. CO., 653 Alpha Dr., No. 58, Cleveland, Ohio, 44143, Tel: 216-461-3315; Empl.: 9; Minimum order: $10

Customer service: B. J. Garfinkel

Products manufactured: Flux, Brazing & Soldering Materials

Local Sales Offices & Reps.

RI	Rumford, J. Doherty	401-434-5945

SWITCHCRAFT, INC., 5555 N. Elston, Chicago, Ill., 60630, Tel: 312-792-2700, TWX: 910-221-5199; Empl.: 500

For info on price: N. Luksik; Application info: N. Luksik; Customer service: G. Bouley

Free literature available: Short Form Catalog - a condensed listing of a multitude of switchcraft electronic components

Products manufactured: Attenuators, Cable Assemblies & Harnesses, Connector Adapters, Connectors, Jack Adapters (All Types), Jack Covers, Jacks (All Types), Kits, Connector, Kits, Marking (Dial, Instrument, Equipment, etc.), Kits, Switch Assembling, Mixers, Panels, Switches

Local Sales Offices & Reps.

Ariz	Phoenix, Howe & Howe	602-264-7971
Cal	Los Angeles, P.F. Wiley Co.	213-663-8028
Cal	San Carlos, D.H. Ross Co.	415-591-4411
Colo	Greeley, G. Moss Elctrns.	303-353-1452
Fla	Orlando, Cartwright & Bean	305-422-4531
Ga	Atlanta, Cartwright & Bean	404-255-5262
Haw	Honolulu, Dougherty Entprs.	808-531-7548
Ill	Chicago, B. Burns & Assocs.	312-775-1233
Ind	Indianapolis, Mktg. Engrs.	317-546-1523
Iowa	Des Moines, T.L. Dowell & Assocs.	515-225-1620
Kans	Overland, T.L. Dowell & Assocs.	913-649-6069
La	Chalmette, Cartwright & Bean	504-279-4598
Mass	Boston, Anderson Sls. Assocs.	617-227-2980
Mich	Detroit, R.C. Merchant & Co.	313-535-6000
Minn	Edina, M. Foster Tech. Sls. Inc.	612-835-2252
Miss	Jackson, Cartwright & Bean	601-981-1368
Mo	St. Louis, T.L. Dowell & Assocs.	314-968-4234
NJ	No. Caldwell, Masin-Esco, Inc.	201-226-2550
NM	Albuquerque, G. Moss Elctrns., Inc.	505-299-5101
NY	Syosset, Masin-Esco Inc.	516-364-0310
NY	Syracuse, Mar-Com Assocs.	315-437-2843
NC	Charlotte, Cartwright & Bean	704-333-6457
NC	Raleigh, Cartwright & Bean	919-832-7128
Ohio	Richfield, Bear Mktg.	216-659-3131
Ore	Portland, Earl & Brown Co.	503-245-2283
Tenn	Knoxville, Cartwright & Bean	615-693-7450
Tenn	Memphis, Cartwright & Bean	901-276-4442
Tex	Richardson, J.R. Lavender & Co.	214-231-5040
Wash	Seattle, Earl & Brown Co.	206-284-1121
EXP:	Can., Toronto, Ont., Atlas Elctns. Ltd.	416-781-6174
FOR:	Toronto 19, Ont., Can., Atlas Elctrns. Ltd.	416-781-6174

SWS SILICONES, Div. of Stauffer Chemical Co., Box 428, Adrian, Mich., 49221, Tel: 313-263-5711, TWX: 510-450-2606; Empl.: 500; Minimum order: $100

Customer service: A. J. Korving

Free literature available: Silicone greases, encapsulants, RTVs and fluids as well as silicone rubber.

Products manufactured: Adhesives (All Types), Coatings, Compounds, Encapsulating, Insulating, Molding, Potting, Coolants, Circuit & Components, Insulators & Insulation, Kits, Cable-End Sealing, Lubricants, Rubber, Transistor, Diode, Thyristor Heat Dissipators

SYCOR, 100 Phoenix Dr., Ann Arbor, Mich., 48104, Tel: 313-971-0900, TWX: 810-223-6011; Empl.: 750

For info on price: R. M. Connor; Application info: R. M. Connor; Customer service: R. M. Connor; Delivery info: K. Wallo

Free literature available: Model 135 - ECMA/ANSI Compatible Cassette Recorder, Model 145 - Diskette Recorder Compatible with IBM 3740.

Products manufactured: Recorders

SYNCHRO-START PRODUCTS, INC., Box 147, 8109 N. Lawndale Ave., Skokie, Ill., 60076, Tel: 312-673-7730, Telex: 724-424; Empl.: 125

Customer service: G. Soule

Products manufactured: Governors, Centrifugal, Solenoids, Switches

Local Sales Offices & Reps.

Cal	Santa Rosa, R. Anderson	707-542-8207
Cal	Tustin, M. Johnson Co.	714-832-7282
Mass	Sharon, Adcour	617-784-3996
NY	Forest Hills, J. Miller Co.	212-263-4446
Ohio	Chagrin Falls, Pine Sls. & Engrg. Co.	216-247-6198
Okla	Tulsa, P & P Sls.	918-622-1523
Pa	Devon, Goodall Industritl Equip. Co.	215-353-4120
Tex	Richardson, Woodbury Co.	214-742-7508
Wash	Seattle, Fairman B. Lee Co.	206-244-7262

SYNERGISTIC PRODUCTS, Sub. Cavitron Corp., 1902 McGraw Ave., Irvine, Cal., 92705, Tel: 714-540-7755, Telex: 655339; Empl.: 200; Minimum order: $25

For info on price: J. Jones; Application info: J. Jones; Customer service: Mktg Dept; Delivery info: Mktg Dept

Free literature available: Mark IV & 1718C Pantograph Dip Insertion Systems Brochure, P/2/P Wire Termination Systems Brochure, Model 2300 Econo Dip Brochure, Multimatic Drilling Systems Brochure, SPI All Products one page Flyer.

Products manufactured: Machines/Machinery, Production

Local Sales Offices & Reps.

Ariz	Phoenix, Arrowhead Sls. Corp.	602-277-7148
Cal	Santa Clara, Banks Sls.	408-246-6311
Colo	Arvada, Arrowhead Sls Corp.	303-423-5556
Conn	Hartford, Cable Assocs.	203-525-5016
Fla	Lighthouse Pt., Saber Assocs.	305-943-3076
Ill	Itasca, English Sls. Co.	312-773-9449
Md	Silver Springs, ARA Elctrns.	301-565-2584
Mich	Detroit, Electro Ent.	313-521-1500
Minn	Minneapolis, Bican Co.	612-827-4734
NH	Londonderry, Cable Assocs.	603-434-5234
NJ	Wayne, K & J Assocs.	201-694-3334
NY	E. Setauket, K & J Assocs.	516-751-8686
Ohio	Cleveland, Electro Ent.	216-261-7670
Ohio	Dayton, Electro Ent.	513-426-6071
Pa	Bala Cynwyd, Electech	215-667-0973
Pa	Pittsburgh, Electro Ent.	412-371-8497
Tex	Dallas, Crockett Southwest Co.	214-251-1776
FOR:	Can., Burlington, Ont., Arbell Equip. Ltd.	416-632-9494

SYNTHANE TAYLOR CORP., An Alco Standard Corporate Partner, Box 835, Valley Forge, Pa., 19482, Tel: 215-666-0300; Empl.: 1000; Minimum order: $100

For info on price: F. McNally; Application info: G. J. Muller; Customer service: F. McNally; Delivery info: F. McNally

Products manufactured: Bearings, Bobbins, Winding, Coil & Transformer, Circuits, Flexible, Circuits, Printed, Multilayer, Insulators & Insulation, Laminates, Tubing

Local Sales Offices & Reps.

Cal	LaVerne	714-593-1341
Cal	Los Angeles	213-966-7461
Cal	San Francisco	415-591-8929
Conn	Avon	203-678-0385
Ga	Atlanta	404-237-0416
Ill	Arlington Heights	312-437-8660
Ill	Chicago	312-569-2838
Ind	Indianapolis	317-923-2102
Md	Baltimore	301-828-9365
Mass	Boston	617-969-5945
Mich	Detroit	313-646-8868
Minn	Minneapolis	612-888-5207
Mo	Kansas City	913-432-3355
Mo	St. Louis	314-721-1300
NJ	Newark	201-447-4597
NY	Binghamton	607-722-7850
NY	Northport	516-757-7171
NY	Rochester	716-586-0413
Ohio	Cleveland	216-371-3775
Ohio	Dayton	513-859-4100
Pa	Pittsburgh	412-391-7230
Tenn	Knoxville	615-525-1991
Tex	Dallas	214-231-9939
Va	Richmond	804-358-3465
Wisc	Milwaukee	414-962-0890

SYNTRONIC INSTRUMENTS INC., 100 Industrial Rd., Addison, Ill., 60101, Tel: 312-543-6444, TWX: 910-651-2191; Empl.: 120 .... p. 2•424-429

Customer service: Paul Evans

Free literature available: General catalogue containing data sheets on deflection yokes, focus coils and related hardware for mounting on cathode ray tubes. Product Index-A guide to our wide line of precision deflection components including their most important operating characteristics

Products manufactured: Coils Including Assemblies & Forms, Mounts, Scanners, Tools, Yokes

Local Sales Offices & Reps.

Cal	Arcadia, A.M. Wood Co.	213-447-3511
Cal	Los Altos, Frauman Assocs.	415-941-0660
Colo	Wheatridge, Waugaman Assocs.	303-423-1020
Conn	New Canaan, W. Couch	203-966-4630
Ill	Northfield, Torkelson Assocs.	312-446-9085
Ind	Indianapolis, Torkelson Assocs.	317-244-7867
Md	Reisterstown, Massey Assocs.	301-833-2039
Mass	Norwood, S. Pierce, Inc.	617-762-3164
Minn	Minneapolis, Torkelson Assocs.	612-835-2414
NJ	Fairlawn, G.D. Harris Assocs.	201-796-5200
Pa	Media, Snyder & Massey Assoc.	215-566-5400
Tex	Irving, Space Electronics	214-251-2261
EXP:	Teaneck, N.J., S. Ginsbury Ltd.	201-837-1100

SYRACUSE ELCTRNS. CORP., Box 566, Syracuse, N.Y., 13201, Tel: 315-488-4911; Empl.: 60; Minimum order: $25

For info on price: D. Lawrie; Application info: D. Lawrie; Customer service: M. Squires; Delivery info: M. Squires

Free literature available: 1. Full Catalog 40 pages covering a broad line of timers 2. Application Guide for electronic timers a quick reference

Products manufactured: Relays, Timers

Local Sales Offices & Reps.

Cal	San Rafael, Wells Assocs.	415-454-5730
Cal	Sherman Oaks, Gee Assocs.	213-788-5961
Colo	Boulder, R. A. Mayes Co.	303-444-0782
Conn	Glastonburry, Barton-Caron Assocs.	203-633-9417
Ill	Chicago, Automation Equip.	312-631-9673
Ill	Mount Prospect, Automation Equip. Co. Inc.	312-398-7550
Ind	Angola, Southern Sls.	219-665-3961
Ind	Indianapolis, Southern Sls.	317-253-3359
Mass	Auburndale, Barton-Caron Assocs.	617-332-2021
Mich	Dearborn, Pitcher-Poulin	313-582-5450
Minn	Minneapolis, K. C. Brooks	612-544-3179
Mo	St. Louis, Elec. Controls	314-645-2400
NM	Albuquerque, R. A. Mayes Co.	505-293-8010
NY	Baldwinsville, Scibetta Reps.	315-622-3993
NY	Bogota, Neville & Vespo	201-487-1505
NC	Greensboro, Motion Control Sys.	919-272-4181
Ohio	Cleveland, D. Steffen & Assocs.	216-461-8333
Pa	Ardmore, Rothenheber	215-642-6911
Pa	Pittsburgh, Trymac Co.	412-823-8400
Tenn	Memphis, R. Jordan Assocs.	901-452-7441

SYSCON INT'L., INC., 205 Sycamore St., So. Bend, Ind., 46622, Tel: 219-287-5916, Telex: 25-8325; Empl.: 12; Minimum order: $10

For info on price: T. W. Eaglesham; Application info: T. W. Eaglesham; Customer service: P. Martin; Delivery info: P. Martin

Free literature available: Catalog 1F-60 - "Weecoil" subminiature 1F transformers & coils Short Form Catalog - Temperature sensors, pyrometers, indicators & controllers.

Products manufactured: Chokes, Coils Including Assemblies & Forms, Controls/Control Eqpt., Monitors, Probes, Thermocouples, Elements & Accessories, Transducers, Transformers

SYSTEMS DATA INC., 1941 W. Market St., Akron, Ohio, 44313, Tel: 216-867-2197; Empl.: 12

For info on price: W. B. Frantz; Application info: J. L. Sickafoose; Customer service: C. W. Owen; Delivery info: Project Engr.

Products manufactured: Compressors, Data, Computers, Controllers, Programmable, Data Acquisition & Reduction Systems, Data Compressors, Digital, Data Loggers, Multiplexers, Readers, Recorders, Scanners, Services, Assembly, Production & Test, Terminals, Data Display (including Alphanumeric & Graphic), Test Systems, Totalizers, Digital, Transmission Systems, Data

Local Sales Offices & Reps.

Mich	Detroit, W-K-M Assocs.	313-892-2500
Ohio	Cleveland, W-K-M Assocs.	216-267-0445
Ohio	Dayton, W-K-M Assocs.	513-434-7500
Pa	Pittsburgh, W-K-M Assocs.	412-892-2953

SYSTEMS ELECTRONICS, 1935 W. 96 St., Cleveland, Ohio, 44102, Tel: 216-651-8208; Empl.: 50

Customer service: E. F. Bedford

SYSTEMS INSTRS. RESCH., INC., 331 Luckie St., N.W., Atlanta, Ga., 30313, Tel: 404-522-6317; Empl.: 10

Customer service: H. D. Edwards

Products manufactured: Data Acquisition & Reduction Systems, Recorders, Test Systems, Testers

SYSTONICS, INC., Box 121, Winchester, Mass., 01890, Tel: 617-729-4439; Empl.: 3

Customer service: R. C. Thomas 617-729-5127

Free literature available: Product Sheet & PL - Oxidation Systems Product Sheet & PL - Diffusion Systems, Technical Notes, Phosphorous Diffusion, Pyrogenic Oxidation, Source Systems

Products manufactured: Machines/Machinery, Production

SYSTRON-DONNER CORP., 1 Systron Dr., Concord, Cal., 94518, Tel: 415-676-5000, TWX: 910-481-9472; FSC No: 52542; Empl.: 1400; Minimum order: $15 p. 1•812,813

For info on price: D. Herbert; Application info: H. Mette; Customer service: R. Hall; Delivery info: D. Herbert

Products manufactured: Analyzers, Clocks (All Types), Counters, Dials, Duplexers, Microwave, Generators, Line Strechers, Microwave, Meters, Potentiometers, Power Supplies, Printers, Readers, Test Systems, Timers, Voltage Sources

Local Sales Offices & Reps.

Ala	Huntsville, Scientific Devices	205-536-1969
Cal	Encino, Scientific Devices	213-872-1951
Cal	Los Alamitos, Scientific Devices	213-598-7678
Cal	Mountain View, Scientific Devices	415-964-4230
Cal	San Diego, Scientific Devices	714-279-6642
Colo	Boulder, Scientific Devices	303-449-9466
Conn	Hamden, Scientific Devices	203-248-9361
Fla	Fort Lauderdale, Scientific Devices	305-721-4260
Fla	Orlando, Scientific Devices	305-841-8180
Ill	Des Plaines, Scientific Devices	312-297-5240
Kans	Lenexa, Scientific Devices	913-631-3818
Mass	Waltham, Scientific Devices	617-894-5637
Mich	Milford, Scientific Devices	313-363-2282
Minn	Minneapolis, Scientific Devices	612-544-1616
Mo	St. Louis, Scientific Devices	314-842-2535
NJ	Palisades Park, Scientific Devices	201-871-3916
NM	Albuquerque, Scientific Devices	505-293-3494
NY	Rochester, Scientific Devices	716-334-2445
NC	Burlington, Scientific Devices	919-228-6270
Ohio	Cleveland, Scientific Devices	216-835-2270
Ohio	Dayton, Scientific Devices	513-298-9904
Pa	New Kensington, Scientific Devices	412-339-1445
Pa	Plymouth Meeting, Scientific Devices	215-825-9515
Tex	Houston, Scientific Devices	713-623-4250
Tex	Richardson, Scientific Devices	214-231-8106
Tex	San Antonio, Scientific Devices	512-736-3164
Va	Norfolk, Scientific Devices	804-499-8133
Va	Springfield, Scientific Devices	703-451-6500
Wash	Bellevue, Scientific Devices	206-454-0900
FOR:	Can., Montreal, Que., Baytronix, Ltd.	514-336-9240
FOR:	Can., Vancouver, B.C., Canadian Dynamics, Ltd.	604-325-3201

SYSTRON DONNER, Data Products Div., 735 Detroit Ave., Concord, Cal., 94518, Tel: 415-798-9900, TWX: 910-481-5780; Empl.: 140; Minimum order: $15 p. 1•812,813

Customer service: D. Squires 415-798-9900

Free literature available: A catalog on time code instruments listing over 50 different instruments and options available.

Products manufactured: Amplifiers, Clocks (All Types), Computers, Cords, Data Acquisition & Reduction Systems, Dividers, Generators, Integrators, Electronic, Multipliers, Printers, Tape Search Equipment, Test Systems, Testers

Refer to Systron-Donner Corp. for sales office information

SYSTRON-DONNER INSTR. DIV., 10 Systron Dr., Concord, Cal., 94518, Tel: 415-676-5000, TWX: 910-481-9479; FSC No: 52542; Empl.: 650; Minimum order: $15 p. 1•812,813

For info on price: D. Herbert; Application info: H. Mette; Customer service: D. Fare; Delivery info: H. Mette

Free literature available: 256-page general instrument catalog on all Systron-Donner Test and Measuring Instruments.

Products manufactured: Analyzers, Counters, Current Sources, Data Loggers, Generators, Indicators, Meters, Monitors, Power Supplies, Prescalers, Standards, Synthesizers, Testers, Timers, Totalizers, Digital, Voltage Sources

Refer to Systron-Donner Corp. for sales representative information.

SYSTRON-DONNER INERTIAL DIV., 1090 San Miguel Rd., Concord, Cal., 94518, Tel: 415-682-6161, TWX: 910-481-9478; Empl.: 416; Minimum order: $75

Customer service: B. B. Sage

Products manufactured: Accelerometers, Comm. Systems, Computers, Data Compressors, Digital, Gyros (All Types), Transducers

Local Sales Offices & Reps.

Ala	Huntsville, Vesco	205-881-3830
Cal	Alhambra, Applied Technologies Assocs.	213-289-9181
Cal	San Diego, L. L. Stoakes	714-274-6281
Cal	San Francisco, Applied Technologies Assocs.	408-733-4130
Conn	Bloomfield, Zaslow Sls. Co.	203-242-7781
Conn	Milford, Zaslow Sls. Co.	203-878-1094
DC	Washington, VCL	202-628-4380
Fla	Orlando, E. G. Holmes & Assocs.	305-894-8901
Ga	Chamblee, E. G. Holmes & Assocs.	404-451-6161
Ill	Chicago, Carlson Elctrns. Sls.	312-774-4812
Mass	Lowell, Zaslow Sls. Co.	617-458-8452
Mass	Northboro, Zaslow Sls. Co.	617-393-8150
NJ	Fort Lee, Technimat	201-461-8685
NY	Copiague, Sencor	516-842-7676
NY	Edicott, Tech-Mark	607-748-7473
NY	Fairport, Tech-Mark	716-223-1252
NY	Pleasant Valley, Tech-Mark	914-635-3436
Ohio	Dayton, Ashby Assocs.	513-252-5627
Okla	Tulsa, Kemp Engrg. Co.	918-299-2636
Pa	Philadelphia, Sencor	215-698-9661
Tex	Addison, Kemp Engrg. Co.	214-661-0400
Tex	Houston, Kemp Engrg. Co.	713-688-1431
Wash	Seattle, Applied Technologies Assocs.	213-289-9181
Wisc	Milwaukee, Carlson Elctrn. Sls.	414-476-2790

SYSTRON-DONNER, Kruse Electronics Div., 735 Palomor Ave., Sunnyvale, Cal., 94086, Tel: 408-735-9660, TWX: 910-339-9309; Empl.: 75; Minimum order: $15 p. 1•812,813

For info on price: J. Johnson; Application info: J. Johnson; Delivery info: J. Johnson

Products manufactured: Generators, Meters, Oscillators, Tubes

Refer to Systron-Donner Corp. for sales representative information.

SYSTRON-DONNER MICROWAVE DIV., 14844 Oxnard St., Van Nuys, Cal., 91409, Tel: 213-786-1760, TWX: 910-495-1786; Empl.: 200 p. 1•812,813

Products manufactured: Adapters, Waveguide, Analyzers, Antenna Feed Systems, Antenna Rotators, Antennas, Attenuators, Bends & Twists, Microwave, Cable Assemblies & Harnesses, Chokes, Circulators, Ferrite, Computers, Counters, Couplers, Detectors, Dividers, Dummy Loads, Duplexers, Microwave, Filters, Flanges, Waveguide, Generators, Horns, Microwave, Isolators, Joints, Rotary, Microwave, Junctions, Hybrid, Microwave, Meters, Mixers, Mounts, Power Supplies, Printers, Probes, Radar Systems, Seals, Shifters, Simulators, Sliding Loads, Microwave, Strip-Line Components, Microwave, Switches, Synthesizers, Tees, Terminals, Test Systems, Tubing, Tuners, Waveguides & Adapters

Local Sales Offices & Reps.

Ala	Huntsville	205-536-1969
Ariz	Phoenix	602-956-5519
Cal	Encino	213-872-1951
Cal	Los Alamitos	213-598-7678
Cal	Mountain View	415-964-4230
Cal	San Diego	714-279-6642
Colo	Denver	303-573-9466
Conn	Hamden	203-248-9361
Fla	Ft. Lauderdale	305-721-4260
Fla	Orlando	305-841-8180
Haw	Honolulu	808-941-1574
Ill	Des Plaines	312-297-5240
Kans	Lenexa	913-631-3818
Mass	Waltham	617-894-5637
Mich	Milford	313-363-2282
Minn	Minneapolis	612-544-1616
Mo	St. Louis	314-842-2535
NJ	Palisades Park	201-871-3916
NM	Albuquerque	505-268-6729
NY	Rochester	716-334-2445
NC	Burlington	919-228-6279
Ohio	Cleveland	216-835-2270
Ohio	Dayton	513-298-9904
Pa	New Kensington	412-339-1445
Pa	Plymouth Meeting	215-825-9515
Tex	Houston	713-623-4250
Tex	Richardson	214-231-8106
Tex	San Antonio	512-736-3164
Va	Norfolk	804-499-8133
Va	Springfield	703-451-6500
Wash	Bellevue	206-454-0900
FOR:	Can., Brampton, Ont.	416-453-1252
FOR:	Can., Montreal, Que.	514-336-9240
FOR:	Can., Ottawa, Ont.	613-728-0113
FOR:	Can., Vancouver, B.C.	604-325-3201

SYSTRON DONNER TRYGON DIV., 1200 Shames Dr., Westbury, N.Y., 11590, Tel: 516-997-6200, TWX: 510-222-0492; FSC No: 52542; Empl.: 160; Minimum order: $15 p. 1•1507-1512

Customer service: H. Rait

Free literature available: Complete catalog on "DC Power Supplies" for laboratory, systems and OEM applications.

Products manufactured: Converters, Power Supplies

Refer to Systron-Donner Corp. for sales representative information.

T-BAR INC., 141 Danbury Rd., Wilton, Conn., 06897, Tel: 203-762-8351, TWX: 710-479-3216; Empl.: 120; Minimum order: $25 p. 1•814,1817,2296,2297

For info on price: T. Infantino; Application info: J. Seiden; Customer service: M. Holt; Delivery info: T. Infantino

Free literature available: High-density Switching Components, Series 6900, Pluggable Switching Modules, designed to switch many parallel circuits simultaneously. Series 2900, Automatic Selector Units for both random and sequential selection of up to 128 positions can be accomplished.

Products manufactured: Comm. Systems, Relays, Switches

Local Sales Offices & Reps.

Ariz	Tempe, J. F. Hurlbut Co.	602-968-5962
Cal	Palo Alto, Engineering Assocs.	415-494-7842
Cal	San Gabriel, Van Gott & Assocs.	213-285-2148
Colo	Golden, J. F. Hurlbut Co.	303-279-7796
Conn	Madison, A & M Electronic Reps.	203-421-4242
Fla	Miami, Geartner Assocs.	305-861-3661
Fla	Orlando, Geartner Assocs.	305-299-1000
Ill	Chicago, Saffro & Assocs.	312-588-0905
Ind	Fort Wayne, McDonald Sales Co.	219-747-3650
Md	Silver Spring, Carwithen Assocs.	301-589-9112
Mass	Needham, A & M Electronic Reps Inc.	617-444-8170
Mich	Dearborn Hts., McDonald Sales Co.	313-278-7500

Minn	Minneapolis, C. E. Bohlig Co.	612-922-7011
Miss	Corinth, Rakes Engrg.	601-287-5369
NJ	Fort Lee, Tecnimat	201-461-8686
NY	New Hartford, KLM Assocs.	315-735-8525
NY	No. Syracuse, KLM Assocs.	315-458-6214
NY	Rochester, KLM Assocs.	716-442-0820
Ohio	Aurora, EMA, Inc.	216-562-6104
Ohio	Centerville, EMA Inc.	513-433-2800
Pa	Ambler, Wyncote Instrumentation	215-643-2440
Tenn	Bristol, Rakes Engrg.	615-968-4195
Tex	Dallas, McCoy Assocs. Co.	214-350-9931
Tex	Houston, Unidyne	713-494-6021
Wash	Seattle, D. Smith Sls. Co.	206-633-3160
EXP:	Wimborne, Dorset, FR Elex, Flight Refuelling Ltd.	Wimborne 2121
FOR:	Can., B.C., Vancouver, John G. Weiss Co., Ltd.	604-987-3833
FOR:	Can., Ont., Toronto, John G. Weiss Co., Ltd.	416-766-0843
FOR:	Can., P.Q., Montreal, John G. Weiss Co., Ltd.	514-489-6887

Local Distributors

Cal	Hollywood, Terminal Elctrns., 5250 Hollywood Blvd.	215-466-3181
Cal	Santa Clara, Fisher/Brownell, 3381 Edward Ave.	408-244-6182
Ill	Chicago, Newark Elctrns., 500 N. Pulaski	312-638-4411
Mass	Newton, Cramer, 85 Wells Ave.	617-969-7700
Tex	Ft. Worth, Allied Elctrns., 401 E. 8th	817-336-5401
Tex	Stafford, Southwest Elctrns., 12725 Royal Dr.	713-494-6021

T-F ELECTRONICS INC., 1701 Evergreen Ave., Austin, Tex., 78704, Tel: 512-444-9674; Empl.: 12

Products manufactured: Calibrators, Filters, Generators, Oscillators, Standards, Tuning Forks

TA INSTRUMENT CASE CO., 4625 Alger St., Los Angeles, Cal, 90039, Tel: 213-242-8855; Empl.: 31

For info on price: J. N. Thraves; Application info: J. N. Thraves; Customer service: J. Garrison; Delivery info: J. Garrison

Free literature available: "Consoliner Series" Brochure-describes standard aluminum housing designed for 19" panel, rack mounted equipment. 12 standard sizes from 5-7/32" to 25-7/32 X 19" are available by catalog number. King-Size Instrument Cases-standard drawn sizes meet Mil-Spec Quality standards Dual Access-describes dual access capability to house two instruments in one body or provide immediate access to the instrument chassis.

Products manufactured: Cabinets & Accessories, Cases, Equipment, Instrument, Meter, Cases, Transit, Containers

Local Sales Offices & Reps.

Cal	Los Angeles, TA Instr. Case Co.	213-242-8855
Cal	Mountain View, Connolly & Co.	415-967-6988
Cal	San Diego, Wm. Gibson	714-223-6120
Cal	Sunland, Crescenta Metal Prods.	213-352-1895
Colo	Denver, Omega Ltd.	303-758-1508
Conn	Sherman, R. P. Mahan Co.	617-237-1040
Fla	Orlando, Gra-Mar	305-894-3351
Ga	Atlanta, Electro-Mech	404-393-0444
Iowa	Cedar Rapids, J-R Sls. Engr.	319-377-8211
Kans	Wichita, D-O Engr.	316-264-7358
Md	Lutherville, Milan Assocs.	301-825-1120
Miss	Fulton, Electro-Mech Sls. Eng. Co.	601-862-3378
Mo	St. Louis, Industrial Metal Working	314-878-4310
NJ	Lodi, Braddock Inds.	201-478-1354
NC	Charlotte, Electro-Mech Sls. Eng. Co.	704-523-0324
NC	Raleigh, Electro-Mech Sls. Eng. Co.	919-782-6452
Ohio	Cincinnati, F.D. Borchelt	513-851-7586
Tex	Fort Worth, John H. Smith Co.	817-267-1202
Utah	Salt Lake City, Omega, Ltd.	801-266-9617

TAB BOOKS, Monterey & Pinola Aves., Blue Ridge Summit, Pa., 17214, Tel: 717-794-2191

For info on price: B. Sites; Customer service: S. Buffington

Free literature available: Catalog - describes over 300 titles in the following categories: Appliance Repair, Audio, Hi-Fi & Stereo, Automotive & Engine Technology, Basic Electronics Technology, Broadcasting, Communications & CB Radio, Computer Programming & Technology, Electric Motors, Electronic Book/Kits, Hobby & Experiment, Medical Electronics, Model Radio Control, Television Servicing.

Products manufactured: Kits, Training Aid, Technical Books

TALLY CORP., 8301 S. 180th St., Kent, Wash., 98103, Tel: 206-251-5500, Telex: 320-200; Empl.: 500

Customer service: Mktg. Dept.

Free literature available: Data sheets, equipment specifications, and interface manuals for all products.

Products manufactured: Perforators, Printers

TALK-A-PHONE CO., 5013 No. Kedzie Ave., Chicago, Ill., 60625, Tel: 312-539-1100

Products manufactured: Comm. Systems

TANN CONTROLS CO., 20210 Sherwood St., Detroit, Mich., 48234, Tel: 313-366-3370; Empl.: 20

For info on price: L. Kay; Application info: A. Sikorski; Customer service: A. Sikorski; Delivery info: L. Kay

Free literature available: Catalog sheets and specs. on each product - Electro-Mechanical Switches, Electronic Switches, Relays, Alarms.

Products manufactured: Alarms, Amplifiers, Controls/Control Eqpt., Indicators, Relays, Switches

TANSITOR ELCTRNS., Div. Aerotron, West Rd., Bennington, Vt., 05201, Tel: 802-442-5473, TWX: 710-360-1782; Empl.: 300

For info on price: M. Moon; Application info: G. Green; Customer service: M. Moon; Delivery info: M. Moon

Free literature available: The following literature supplied upon request. Complete product catalogue, data sheets, parameters of tantalum capacitors, application information and delivery information.

Products manufactured: Capacitors, Fixed

Local Sales Offices & Reps.

Ariz	Scottsdale, Piper Sls. Co.	602-946-4437
Cal	Pico Rivera, Westrep	213-949-2551
Cal	Santa Clara, Richards Assoc.	408-246-5860
Conn	Bethel, J. E. Boeing Co.	203-748-5802
Fla	Oviedo, Conley & Assoc.	305-365-3283
Ill	Chicago, L-Tec, Inc.	312-286-1500
Iowa	Cedar Rapids, J.R. Sls. Engrg., Inc.	319-377-8211
Md	Baltimore, L.H. Kolman & Co.	301-752-8756
Mass	Lexington, J. E. Boeing Co.	617-862-2500
Minn	St. Paul, H. A. Cullen & Assoc.	612-646-7371
NJ	Haddonfield, Sunday-O'Brien	609-429-4013
NJ	Leonia, Kohl-Camber	201-944-6488
NC	Smithfield, Byrd & Barbour Sls.	919-934-8136
Ohio	Akron, Augnat Assoc.	216-725-6087
Ohio	Dayton, Augnat Assoc.	513-223-5002
Ore	Portland, R. Legg Co.	503-292-8824
Tex	Dallas, United Comps.	214-324-1448
FOR:	Can., Montreal, Que., Kaytronics, Ltd.	514-487-3434
FOR:	Can., Toronto, Ont., Kaytronics, Ltd.	416-638-5511

TAPESWITCH CORP. AMER., 320 Brd. Hollow Rd., Farmingdale, N.Y., 11735, Tel: 516-694-6312; Empl.: 100; Minimum order: $15 .... p. 1•2300

For info on price: D. W. Bury; Application info: F. Dale; Customer service: V. Shove; Delivery info: D. W. Bury

Free literature available: Industrial User Catalog - C-4 General Catalog information on complete line of ribbon switches, switching mats, electric safety edges, footswitches, road switches and other components.

Products manufactured: Alarms, Contact Strips, Finger, Controls/Control Eqpt., Indicators, Limit Stops, Mechanical, Switches

TASKER SYSTEMS, 20131 Sunburst St., Chatsworth, Cal., 91311, Tel: 213-341-3010, TWX: 910-494-1214; FSC No: 09017; Empl.: 250; Minimum order: $200

Customer service: G. B. Etzler

Products manufactured: Analyzers, Antenna Feed Systems, Antenna Rotators, Antennas, Comm. Systems, Control Systems, Air Traffic, Data Acquisition & Reduction Systems, Decoders, Delay Lines, Modulator/Demodulators, Modulators, All Kinds, Pedestals, Radar, Radar Systems, Receivers, Simulators, Testers, Tracking Systems

Local Sales Offices & Reps.

Mass	Lexington, C. Hopkins	617-861-8300
NJ	Red Bank, T. Schweers	201-747-5353
Va	Arlington, J. Seelinger	703-524-4477

tau-tron
inc

TAU-TRON INC., 11 Esquire Rd., N. Billerica, Mass., 01862, Tel: 617-667-3874, TWX: 710-347-1570; Empl.: 40

For info on price: R. K. Heathcock; Application info: J. E. Hanley; Customer service: J. E. Hanley; Delivery info: R. K. Heathcock

Free literature available: Short Form catalog, Data Sheets, and Technical Application Notes describing the use of Tau-Tron's high speed digital instrumentation in communications, memory, and general laboratory testing.

Products manufactured: Amplifiers, Circuits, Hybrid, Thick Film, Comparators, Counters, Generators, Oscillators, Testers, Totalizers, Digital, Transmitters

Local Sales Offices & Reps.

Ariz	Tempe, J. F. Hurlbut Co.	602-968-5962
Cal	Pasadena, RDX Corp.	213-681-3451
Cal	Sunnyvale, RDX Corp.	408-734-4500
Colo	Golden, J. F. Hurlbut Co.	303-279-7796
Haw	Honolulu, Aloha Assocs.	808-941-1574
Ill	Chicago, Megatek, Inc.	312-889-1277
Md	Rockville, MESA, Inc.	301-881-8430
Minn	Minneapolis, Waytek	612-933-2133
NJ	Cinnaminson, MESA, Inc.	609-786-0284
Tex	Dallas, Bradenco Corp.	214-358-3278

Advertisment

INSTRUMENTS FOR HIGH-SPEED DIGITAL TESTING State-of-the-art circuit design and manufacturing/packaging techniques make possible the highest speed digital instruments currently available. Instrumentation covers the band from DC to 1 GHz and includes communication test equipment (BERT), digital signal sources, systems for testing semiconductor memories, and customized products.

TAURUS CORP., Academy Hill, Lambertville, N.J., 08530, Tel: 609-397-2390; Minimum order: $25 p. 1•71,219

Customer service: J. D. Kreuter

Free literature available: Teflon Terminal Catalog Circuitrak P.C. Board Holders Catalog Static & Serial Punched Card Readers Catalog

Products manufactured: Guides, Circuit Board, Programmers, Punched Card Equipment, Terminals

Local Sales Offices & Reps.

Cal	Los Angeles, R. Sweet	213-477-4517
Cal	Pasadena, Sci. Sls.	213-793-1244
Fla	Clearwater, Brennan Assoc.	813-446-5006
Ind	Ft. Wayne, Hoeming Sls.	219-483-6913
NJ	Ft. Lee, K. Hughes	201-944-1600
NY	New York, K. Hughes	212-695-0082
Ohio	Wickliffe, W.J. Brauer	216-943-0601
Pa	Pittsburgh, W.J. Brauer	412-921-3213

TAYLOR INDUSTRIES INC., Fisher Road, Howell, Mich., 48843, Tel: 517-546-0450, TWX: 810-251-6266; Empl.: 50; Minimum order: $25

For info on price: L. Smith; Application info: R. Schiedler; Customer service: L. Smith; Delivery info: L. Smith

Products manufactured: Clamps & Clips, Ducts, Wiring, Fasteners, Panels, Rivets

Local Sales Offices & Reps.

Ariz	Scottsdale, N.F. Ross Co.	602-945-7262
Cal	Los Angeles, Taylor Industries	805-937-6400
Colo	Denver, Gaer Sls., Inc.	303-758-3223
Conn	Byram, Brunner Assocs	516-921-2052
Conn	Storrs, R.C. Campbell Co.	203-456-1212
Ga	Atlanta, A. Brown Assocs.	404-457-6381
Kans	Kansas City, Conrad Co.	913-621-3021
Mich	Farmington Hills, R. McBride Co.	313-474-2300
Minn	Minneapolis, R.D. Schwen Engrg. Co.	612-854-4304
Mo	St. Louis, G. Hagen & Co.	314-961-2222
NJ	Morristown, Waldron Assocs.	201-538-5607
Ohio	Cincinnati, Phillips Sls	513-791-3926
Ohio	Cleveland, Matthew M. Haley Co.	216-842-4747
Okla	Tulsa, Andres & Boruch	214-821-3601

Ore	Beaverton, D. Fry Co.	503-643-5448
Pa	Penndel, R. May Assocs.	215-757-1581
Pa	West Newton, W.H. Schmitt Assocs.	412-872-5007
Tex	Dallas, Andres & Boruch	214-821-3601
Tex	Houston, Bean-McDaniel & Assocs	713-649-8606
Va	Richmond, J. H. Thrower Co.	804-794-6819

TAYLOR INSTR. PROCESS CONTROL DIV., Sybron Corp., 95 Ames St., Rochester, N.Y., 14601, Tel: 716-235-5000, TWX: 716-235-4893; Empl.: 1900; Minimum order: $25

For info on price: Sls. Dept.; Application info: R. J. Branigan; Customer service: W. B. Hile; Delivery info: Sls. Dept.

Free literature available: A four-page brochure outlining design, applications and features of the new Multi-Scan Potentiometric recorders, indicators, and controllers, including alarm options and balancing techniques.

Products manufactured: Actuators, Alarms, Amplifiers, Analyzers, Computers, Controls/Control Eqpt., Converters, Gages, Indicators, Integrators, Electronic, Meters, Potentiometers, Process Control Systems, Recorders, Scales, Dial, Services, Assembly, Production & Test, Testers, Timers, Transducers, Transmitters, Valves, Solenoid, Valves, Vacuum

Local Sales Offices & Reps.

Ala	Birmingham	205-879-5942
Ala	Mobile	205-344-4981
Cal	Los Angeles	213-662-3191
Cal	San Leandro	415-569-1661
Colo	Denver	303-795-8330
Del	Wilmington	302-478-2440
Fla	Lakeland	813-688-8441
Ga	Atlanta	404-458-8301
Ga	Savannah	912-233-8589
Ill	Chicago Heights	312-755-3103
Ill	Oak Park	312-379-0876
Ind	Indianapolis	317-257-3317
Iowa	West Des Moines	515-283-1422
Kans	Kansas City	913-236-8555
La	Baton Rouge	504-921-8111
La	New Orleans	504-482-3136
Me	Portland	207-774-7392
Md	Baltimore	301-788-6633
Mass	Needham	617-444-4130
Mass	Springfield	413-733-3721
Mich	Dearborn Heights	313-278-4000
Mich	Kalamazoo	616-345-7931
Minn	Hopkins	612-935-7771
Mo	St. Louis	314-966-5660
NJ	Succasunna	201-584-1234
NY	Buffalo	716-877-5245
NY	New York	212-586-3544
NY	Rochester	716-244-0430
NY	Schenectady	518-374-8403
NC	Charlotte	704-372-2360
NC	Greensboro	919-273-0818
NC	Wilmington	919-763-8683
Ohio	Akron	216-535-1545
Ohio	Cincinnati	513-272-3636
Ohio	Parma	216-398-6292
Okla	Tulsa	918-628-1280
Ore	Portland	503-665-6111
Pa	Fort Washington	215-643-7300
Pa	Pittsburgh	412-531-3301
SC	Columbia	803-788-5918
SC	Greenville	803-233-7464
Tenn	Knoxville	615-588-2485
Tenn	Memphis	901-274-8842
Tex	Amarillo	806-352-4781
Tex	Beaumont	713-892-1213
Tex	Corpus Christi	512-882-1171
Tex	Dallas	214-690-1130
Tex	Houston	713-462-6402
Utah	Salt Lake City	801-272-3482
Va	Richmond	804-272-1461
Wash	Bellevue	206-455-2666
WVa	South Charleston	304-744-3473
Wisc	Appleton	414-739-6851
Wisc	Milwaukee	414-543-6550

TAYLOR-WINFIELD CORP., 1052 Mahoning Ave. NW, Warren, Ohio, 44482, Tel: 216-399-8861, Telex: 098-2433; Empl.: 600; Minimum order: $25

Products manufactured: Furnaces, Generators, Heaters & Heating Elements, Welding Equipment & Access. (Excluding Equip. for Semiconductor Devices)

Local Sales Offices & Reps.

Cal	Monrovia, Denton & Anderson Co.	213-359-9304
Colo	Denver, Duboc-Lane & Monckton, Inc.	303-623-1261
Ill	La Grange, Denton & Anderson Co.	312-482-8660
Mich	Birmingham, Denton & Anderson Co.	313-647-5520
Minn	Minneapolis, Parker Sls.	612-920-1323
Mo	Ballwin, Denton & Anderson Co.	314-821-3220
NY	Hamburg, Denton & Anderson Co.	716-826-6272
NY	Plainview, Denton & Anderson Co.	516-694-6055
NC	Charlotte, J.W. Fraser & Co.	704-523-2414
Ohio	Cleveland, Denton & Anderson Co.	216-831-2010
Ohio	Dayton, Denton & Anderson Co.	216-831-2010
Pa	Warminster, Denton & Anderson Co.	215-322-1262
Tenn	Chattanooga, Jones-Sylor Co., Inc.	615-265-1601
Tex	Garland, Denton & Anderson Co.	214-270-7635

TDC, DIV. FREQ. TECHNOLOGY INC., Box 365, Littleton, Mass., 01460, Tel: 617-456-3374; FSC No: 53875; Empl.: 50; Minimum order: $100

Free literature available: Brochures on EPOXYCAST High-Voltage Transformers, STABILC Stable AC Power Sources, STABILARC Ballasts for HID Lamps, and Machine Tool Control Transformers.

Products manufactured: Transformers

Local Sales Offices & Reps.

Cal	Oakland, J. H. Ormond Co.	415-893-7700
Cal	Seal Beach, Cesco	213-430-9084
Conn	New Canaan, Jedco Assocs.	203-966-2580
Ill	Park Ridge, Probe Elctrns.	312-696-2828
Md	Baltimore, W. S. Warrington & Assocs.	301-823-8759
Minn	Minneapolis, Revere Assocs.	612-781-2615
NJ	Springfield, F. F. Sylvester Assocs.	201-376-3324
NY	Buffalo, H. C. Johnson Agencies	716-632-7880
NY	Fayetteville, H. C. Johnson Agencies	315-637-9383
NY	Rochester, H. C. Johnson Agencies	716-482-3000
Ohio	Cleveland, Orr Assocs.	216-885-1324
Pa	Ardmore, W. K. Metz	215-649-3966
Pa	Glenshaw, H. C. Johnson Agencies	412-961-0414
Wash	Seattle, Avionics Liason, Inc.	206-767-3870

TDK ELECTRONICS CO., LTD., 14-6 2-Chome, Uchikanda, Chiyoda-ku, Tokyo 101, Japan, Tel: 03-257-2527; Empl.: 4775

Products manufactured: Capacitors, Fixed, Capacitors, Variable, CATV Systems & Equipment, Chokes, Coils Including Assemblies & Forms, Converters, Cores, Magnetic, Crystals, Delay Lines, Dummy Loads, Ferrite Material & Parts, Filters, Inverters, Isolators, Lighting Equipment, Emergency, Lights, Magnets, Matrices, Computer, Memory Systems, Modules, Logic, Encapsulated, Networks, Power Supplies, Reactors, Substrates, Suppressors, Tapes, Recording, Magnetic (All Types), Thermistors, Transformers

Local Sales Offices & Reps.

Cal	El Segundo, TDK Corp. of America	213-644-8625
Ill	Chicago, TDK Corp. of America	312-973-1222
NY	New York, TDK Corp. of America	516-746-0880
Tex	El Paso, TDK Corp. of America	915-778-4203

TDK ELCTRNS. CORP., 23-73 48th St., Long Island City, N.Y., 11103, Tel: 212-721-6881

Products manufactured: Capacitors, Fixed, Capacitors, Variable, Chokes, Circulators, Ferrite, Coils Including Assemblies & Forms, Cores, Magnetic, Delay Lines, Filters, Magnets, Matrices, Computer, Memory Systems, Networks, Resistors, Tape Recording Accessories, Tapes, Recording, Magnetic (All Types), Thermistors, Transducers, Transformers

TEABERRY ELECTRONICS, 4655 Massachusetts Ave., Indianapolis, Ind., 46218

Products manufactured: Comm. Systems, Receivers, Transmitters

TEC, INC., 9800 N. Oracle Bd., Tuscon, Ariz., 85704, Tel: 602-297-1111, TWX: 910-952-1377; Empl.: 300; Minimum order: $25 .... p. 2•1201-1204

For info on price: J. Bastys; Application info: L. Lorence; Customer service: K. Herlong; Delivery info: K. Herlong

Free literature available: Complete Product Catalog (#2027), Short-Form Catalog (#986), Data-Monitor Annunciators (#1019), DATA-PANEL Display Systems (#1024), LED Readout Modules (#2031)

Products manufactured: Annunciators, Diodes, Display Devices/Displays, Drivers & Decoders For Readouts, Gaskets, Shielding, R-F-Also See Shields, R-F, Keyboards, Alphanumeric & Decimal, Lamp Drivers, Lamps, Lights, Power Supplies, Switches, Terminals, Data Display (including Alphanumeric & Graphic), Wrenches

Local Sales Offices & Reps.

Ariz	Phoenix, Gramer & Co.	602-279-1221
Cal	El Segundo, Varigon & Assocs.	213-644-3611
Cal	Mountain View, Cindel, Inc.	415-965-2630
Cal	San Diego, Varigon & Assocs.	714-299-5413
Colo	Sedalia, Jensen Rep. Co.	303-688-4154
Fla	Maitland, Hutto-Hawkins-Peregoy	305-831-2474
Ga	Atlanta, Elmar Associates.	404-261-4345
Haw	Honolulu, Aloha Assocs.	808-941-1575
Ill	Des Plaines, Lincoln-Hodges	312-297-3810
Md	Baltimore, Burgin-Kreh Assocs.	301-788-5200
Mass	Norwell, Bordewieck Engineering & Sls. Co.	617-659-4915
Mich	Dearborn, Pitcher-Poulin, Inc.	313-582-5450
Minn	Hopkins, Grayden & Flemmer	612-941-1120
Mo	Hazelwood, Techn. Representatives, Inc.	314-731-5200
NM	Albuquerque, Data Handling Co.	505-268-4364
NY	Mt. Vernon, Friedman-Smith	914-664-4866
NY	Syracuse, Advanced Comps.	315-699-2671
NC	Winston-Salem, Burgin-Kreh Assocs.	919-768-4174
Ohio	Brecksville, A. Nace Co.	216-526-4323
Ore	Portland, Western Tech. Sls.	503-297-1711
Pa	Pittsburgh, A. Nace Co.	412-922-7225
Pa	Willow Grove, Techparts	215-657-0100
Tex	Dallas, Ralph Matthews Elctrns.	214-233-0363
Tex	Houston, R. Matthews Elctrns.	713-664-7131
Va	Lynchburg, Burgin-Kreh Assocs.	804-845-5600
Wash	Bellevue, Western Tech. Sls.	206-641-3900
Wisc	Waukesha, Lincoln-Hodges	414-542-3087
FOR:	Can., Markham, Ontario, Audio Elctrns.	416-495-0720

Local Distributors

Cal	Hawthorne, Century Aero Corp., 12523 Crenshaw Blvd.	213-772-1166
Cal	Mountain View, Ratel Elctrns., 815 Maude Ave.	415-965-2010
Fla	Oakland Park, Peerless Radio Corp. of Fla., 1040 NE 43rd Ct.	305-566-5966
Ill	Westmont, Bodelle Co., 47 Chestnut La.	312-323-9670
Mass	Norwell, Bordewieck Elctrn. Supply Co., 427 Washington St.	617-659-4915

TECH-ETCH, INC., 10 Ind'l. Pk. Rd., Hingham, Mass., 02043, Tel: 617-749-0993; Empl.: 81; Minimum order: $75.

For info on price: R. Gurwitel; Application info: J. Kenworthy; Customer service: P. Thomas; Delivery info: R. Gurwitel

Products manufactured: Circuits, Flexible, Dials, Nameplates, Scales, Dial, Services, Assembly, Production & Test

TECH LABS., INC., Bergen & Edsall Blvds., Palisades Pk., N.J., 07650, Tel: 201-944-2221; Empl.: 65; Minimum order: $35 .... p. 1•2298,2299

For info on price: K. K. Garrison; Application info: A. Konrad; Customer service: C. Schulz; Delivery info: C. Schulz

Free literature available: Switch/attenuators (short form), Attenuator catalog (includes technical and application data), Program switch, Thumbwheel switches.

Products manufactured: Attenuators, Decade Boxes, Networks, Resistors, Switches

Local Sales Offices & Reps.

Ark	Magnolia, P. Jameson	501-234-3778
Cal	Encino, V/L Assocs.	213-986-9703
Cal	Palo Alto, Held & Mollard, Inc.	415-965-9321
Conn	Thomaston, Nelson-Bennett	203-283-5959
Fla	Satellite Beach, Reynolds & Assoc.	305-773-4700
Ga	Atlanta, Grady Duckett Sls.	404-451-3529
Ill	Glenview, Crimson Engrg. Co.	312-724-1780
Md	Baltimore, Whitcomb Assocs.	301-889-1245
Mass	Auburn, Nelson-Bennett	617-757-3131
Mich	Jackson, N. Scroggs Co.	517-750-1170
Minn	, Siedare Assocs.	612-533-2294
NJ	Haddonfield, F.W. Churchill	609-429-7871
NJ	Palisades Park, Tech. Labs.	201-944-2221

NY	Buffalo, R. A. Murray	716-632-6913
NY	Commack, L. K. Haner Assoc.	516-864-2220
Ohio	Cincinnati, A. C. Wahl & Assoc.	513-821-3270
Ohio	Lyndhurst, A. C. Wahl & Assoc.	216-449-1788
Pa	Pittsburgh, Waggoner-VerHill Assoc.	412-241-5202
Tex	Dallas, Southwest Elctrns.	214-233-9816
Tex	Houston, Southwest Elctrns.	713-729-1670

TECH MATERIALS INC., 5 Wellington Rd., Lincoln, R.I., 02865, Tel: 401-728-7200; Empl.: 75; Minimum order: $250

For info on price: P. Shaw; Application info: S. Hopp; Customer service: B. Allen; Delivery info: P. Shaw

Free literature available: 1. Handbook for Clad Metals - complete handbook on clad inlays and overlaps and their application. 2. Design Aid for Solder Clads - comprehensive treatment of toplay and overlay solder clads and their uses.

Products manufactured: Alloys, Metals, Seals

Local Sales Offices & Reps.
- Cal Los Angeles, E. J. Brookes Co.
- Cal Santa Clara, E. J. Brookes Co.
- Ill Zion, A. O. Capp Co.
- Ind Fort Wayne, J. C. Butler Sls. & Engrg.
- Ind Indianapolis, J. C. Butler Sls. & Engrg.
- Ohio Milford, J. C. Butler Sls. & Engrg.

TECH SERV., INC., BRS/LVE Div, 5301 Holland Dr., Beltsville, Md, 20705, Tel: 301-474-3400, TWX: 710-828-0515; Empl.: 110; Minimum order: $25

Customer service: P. D. Donahue

Free literature available: Animal Environment Electromechanical Control Solid State Control

Products manufactured: Cards, Logic, Computers, Controls/Control Eqpt., Converters, Counters, Drivers, Solenoid, Generators, Kits, Test Equipment, Modules, Logic, Encapsulated, Printers, Readers, Recorders, Timers

TECH SPRAY, INC., Box 949, Amarillo, Tex., 79105, Tel: 806-372-8523; Empl.: 20; Minimum order: $50

For info on price: P. Gunzelmau; Application info: T. Larson; Customer service: P. Gunzelman; Delivery info: P. Gunzelman

Free literature available: Catalog FP10 illustrated catalog with product descriptions, Mil Specs, Technical & Usage data.

Products manufactured: Cleaners & Solvents, Coatings, Lubricants

Local Sales Offices & Reps.

Cal	Burlingame, Carelli EMA	415-697-6286
Cal	La Selva Beach, Belchomber & French	408-722-0444
Cal	Van Nuys, A. Szerlip Sls. Co.	213-782-1765
Colo	Denver, McLoud & Raymond	303-756-1589
Fla	Tampa, Wallace Assoc.	813-961-1037
Ill	Chicago, B. Burns Assocs.	312-775-1233
Ind	Indianapolis, Electronic Reps.	317-897-9326
Mass	Lynn, Keene Sls.	617-595-2300
Mich	Milford, Polyphase Sls.	313-685-3003
Minn	Minneapolis, D. Barrett Co.	612-929-0028
Mo	Jefferson City, C. A. Vegrola	314-893-3205
NY	N. Bellmore, L. W. Keller Assoc.	516-785-2826
NY	Rochester, Maisey Sls.	716-442-9700
Ohio	Medina, T. Grant Assoc.	216-725-6528
Ore	Portland, J. V. BeLusko Co.	503-222-4279
Pa	Philadelphia, D. Linz Co.	215-379-0734
Tex	Dallas, Crockett Sls. Co.	214-748-8209
EXP:	Miami, Fla., Electronics Int'l.	305-635-8670
FOR:	Can., Dorval, Que., Superior Elctrns.	514-683-6331

TECHMAR CORP., 2232 Cotner Ave., Los Angeles, Cal., 90064, Tel: 213-478-0046; Empl.: 6 .... p. 1•96,97

Free literature available: 17-page catalog of rack-mounting kits & parts, PC card cages, portable instrument enclosures, mini-consoles, subassembly housings with & without heat sinks, power supplies, IC packaging system. Price list enclosed.

Products manufactured: Cabinets & Accessories, Cases, Equipment, Instrument, Meter, Chassis, Circuit Board Mounting, Chassis, Metal, Drawers, Sliding, Integrated Circuit Packaging Systems, Panels, Power Supplies, Racks

TECHNI-RITE ELCTRNS, see Recorder Systems Div.

TECHNI-TOOL, INC., Total Spectrum, Tool Supplier, Apollo Road, Plymouth Meeting, Pa., 19462, Tel: 215-825-4990, Telex: 834-763; Empl.: 20; Minimum order: $25

For info on price: J. Immediato; Application info: W. Bezar; Customer service: M. Sill; Delivery info: M. Hurley

Products manufactured: Adhesives (All Types), Burnishers, Contact, Clamps & Clips, Cleaners & Solvents, Cleaners, Ultrasonic, Coatings, Counters, Demagnetizers, Detectors, Drills & Accessories, Hand & Power, Drivers, Nut, Fiber Optic Bundles, Gages, Heat Guns, Production, Heat Sinks, Soldering, Holders, Circuit Board (Production Type), Jigs And Fixtures, Chassis & Circuit Board, Kits, Marking (Dial, Instrument, Equipment, etc.), Kits, Training Aid, Knives & Knife Sets, Lamps, Lubricants, Machines/Machinery, Production, Microscopes, Pliers, Probes, Pumps, Vacuum, Scissors, Screwdrivers, Slide Rules (Circuitry Computing), Solder Pots & Baths, Soldering Accessories, Soldering Equipment, Testers, Tools, Tweezers, Hand & Vacuum, Wire Twisters, Wrenches

Local Sales Offices & Reps.

Fla	Miami, N. Black Assocs.	305-651-4132
Mass	Burlington, Tekdata	617-273-0198
Mo	Kansas City, Nevco, Inc.	816-361-8290
NY	Shirley, Pacenter	516-281-3810
Ohio	Cincinnati, Modern Indl. Sls. Co.	513-542-6969
Pa	Upper Darby, J. J. Mahoney	215-734-1244
Utah	Salt Lake City, Technical Devices	801-486-6401

TECH. DEVICES CO., 11250 Playa Ct., Culver City, Calif., 90230, Tel: 213-870-3751; FSC No: 04772; Empl.: 21; Minimum order: $10

For info on price: J. Cochran; Application info: D. N. Winther; Customer service: J. Cochran; Delivery info: J. Cochran

Free literature available: MARK I WAVE SOLDERING MACHINE; MARK V LEAD FORMER; MARK IX LEAD TRIMMER; MARK II WIRE CUTTER & STRIPPER; MARK III CIRCUIT CARD FIXTURE.

Products manufactured: Holders, Circuit Board (Production Type), Machines/Machinery, Production, Soldering Equipment, Wire Strippers

Local Sales Offices & Reps.

Ark	Little Rock, Carlton-Bates	501-562-9100
Cal	Inglewood, Tracker, dba Weightman & Assocs.	213-645-6060
Cal	Menlo Park, West Engrg. Sls. Co.	415-325-2885
Colo	Denver, Todd-Associates, Inc.	303-744-2313
Fla	Orlando, Buchanan & Abrams Assocs., Inc.	305-423-8995
Fla	Orlando, W. B. Wimberly Co.	305-GA5-3083
Ill	Chicago, Ringland M. Krueger Co. Inc.	312-AV 2-8444
Ind	Indianapolis, Blind & Assocs., Inc.	317-251-1249
Kans	Lenexa, Smith-Williams Co.	913-TU 8-3995
Md	Phoenix, REBCO Sls.	301-592-8907
Mass	Woburn, R. W. Hatfield Co.	617-933-2324
Mich	Kentwood, The C.A. Geer Co.	616-534-7449
Minn	St. Paul, Sales Service Machine Tool Co.	612-MI 6-8663
NY	Farmingdale, Haines Prods., Inc.	516-420-1177
NY	Syracuse, M. C. Antil Jr. Co.	315-463-0266
Ohio	Cleveland, P. Lohse & Co.	216-381-4424
Pa	Lansdowne, W. F. Satterthwaite & Co.	215-623-5100
Tex	Dallas, R. E. Nesbitt Co.	214-FL 7-4601
Tex	Houston, R. E. Nesbitt Co.	713-224-3633
Wash	Seattle, Process Sys.	206-246-0224

TECHNICAL MAT'L., 700 Fenimore Rd., Mamaroneck, N.Y., 10543, Tel: 914-698-4800, TWX: 710-566-1100; Empl.: 250

Products manufactured: Amplifiers, Antennas, Cabinets & Accessories, Comm. Systems, Connectors, Converters, Cords, Couplers, Dummy Loads, Filters, Panels, Receivers, Synthesizers, Terminals, Transmitters

Local Sales Offices & Reps.

Ariz	Tempe, T.M.C. Sys.	602-967-7874
Ga	Atlanta, Scientific Sls. Co.	404-252-5360
Tex	Houston, Blackburn Assocs., Inc.	214-351-9991
Va	Springfield, T.M.C. Sys. & Power	703-354-7400
Wash	Seattle, Underwood & Underwood, Inc.	206-243-4853
EXP:	N.Y., Mamaroneck, T.M.C.	914-698-4800

TECHNICAL RESEARCH & MFG., INC., Kelly Ave. Grenier Field, R.F.D. #3, Manchester, N.H., 03103, Tel: 603-668-0120, TWX: 710-220-6765; Empl.: 25

Products manufactured: Amplifiers, Attenuators, CATV Systems & Equipment, Couplers, Detectors, Dividers, Drivers, Switch, Duplexers, Microwave, Impedance Converters, Microwave, Junctions, Hybrid, Microwave, Mixer-Preamplifiers, Microwave, Mixers, Multipliers, Receivers, Services, Assembly, Production & Test, Shifters, Strip-Line Components, Microwave, Transformers

Local Sales Offices & Reps.

Cal	Los Angeles, R F Assocs.	213-478-1586
Cal	Palo Alto, R F Assocs.	415-494-3331
Colo	Loveland, Kelley Assocs.	303-667-1376
Ill	Chicago, Technical Sls.	312-237-7210
Mass	Needham Hgts., Reptron	617-449-4141
Mo	St. Louis, G. Fixman Engrg. Co.	314-725-5219
NJ	Livingston, G & A Elctrns., Inc.	201-992-3087
Ohio	Cincinnati, Gallagher Co.	513-761-1288
Pa	Willow Grove, H. Nash Assocs.	215-657-2213
Tex	Houston, R. Martin Assocs.	713-462-4077
Va	Annandale, J. Hopkins Assocs.	703-323-1641
FOR:	Can., Montreal, 252, Que., Componetics Ltd.	514-342-4117

TECHNICAL WIRE PRODUCTS, INC., 129 E. Dermody St., Cranford, N.J., 07016, Tel: 201-272-5500, TWX: 710-996-5961; FSC No: 07700; Empl.: 101; Minimum order: $35

For info on price: R. S. Blank Ext. 39; Application info: J. Blazejewski Ext. 54; Customer service: R. S. Blank Ext. 39; Delivery info: R. S. Blank Ext. 39

Free literature available: A complete design guide describing tecknit's emi shielding and conductive materials and products.

Products manufactured: Air Cleaners & Filters (Shielded & Unshielded), Bezels, Shielded & Unshielded, Coatings, Conductive Plastic Materials, Connectors, Contacts, Electrical, Fabrics, Conductive, Gaskets, Shielding, R-F-Also See Shields, R-F, Honeycomb Sheets, Panels, etc., Kits, Shielding, Paints, Rubber, Shields

Local Sales Offices & Reps.

Ala	Huntsville, South Eastern Assocs., Inc.	205-539-9816
Ariz	Scottsdale, Williams Assocs., Inc.	602-947-4297
Cal	Los Alamitos, Heaton Co., Inc., J.S.	714-821-9600
Cal	Redwood City, Heaton Co., Inc., J.S.	415-369-4671
Cal	Santa Barbara, Technical Wire Products	805-963-1867
Colo	Denver, Williams Assocs., Inc.	303-373-4730
Conn	Enfield, Measurement Equip. Co.	203-745-9050
Fla	Altamonte Springs, WMM Assocs., Inc.	305-831-4645
Fla	Clearwater, WMM Assocs., Inc.	813-447-2533
Fla	Pompano Beach, WMM Assocs., Inc.	305-943-3091
Ill	Chicago, Angel & Co.	312-878-0653
Ind	Fort Wayne, Scott Electronics, Inc.	219-743-1586
Ind	Indianapolis, Scott Electronics, Inc.	317-897-9976
Md	Baltimore, Kaufholz Assocs.	301-488-6561
Mass	Wakefield, Measurement Equip. Co.	617-245-4870
Minn	St. Paul, Heyda Co., Bonament	612-484-8531
Mo	Kansas City, Harris-Hanson Co.	816-444-9494
Mo	St. Louis, Harris-Hanson Co.	314-432-3611
NJ	Cranford, Technical Wire Prods., Inc.	201-272-5500
NM	Albuquerque, Williams Assocs., Inc.	505-255-1638
NY	Rochester, Murray, Inc., H.R.	716-244-1100
NY	Syracuse, Murray, Inc., H.R.	315-446-5555
NC	Raleigh, S & R Sls & Assocs.	919-876-2208
Ohio	Cleveland, Scott Electronics, Inc.	216-291-2600
Ohio	Columbus, Scott Electronics, Inc.	614-236-8619
Ohio	Dayton, Scott Electronics, Inc.	513-223-2652
Pa	Pittsburgh, Scott Electronics, Inc.	412-781-3112
Tex	Richardson, Corwin Assocs., Inc.	214-424-8333
Wash	Bellevue, Over Sales, Ray	206-454-9187
FOR:	Can., Toronto 392, Ont., Electrodesign Ltd.	416-787-0991
FOR:	Can., Vanier, Ont., Electrodesign Ltd.	613-745-0541
FOR:	Can., Ville La Salle 650, Que., Electrodesign Ltd.	514-363-5120

TECHNIPOWER, INC., Benrus Center, Ridgefield, Conn., 06877, Tel: 203-431-1300, TWX: 710-467-0666; FSC No: 13850; Empl.: 200 .... p. 1•1478,1479

For info on price: A. R. Saenz 203-431-1306; Application info: A. R. Saenz 203-431-1306; Customer service: J. Pease 203-431-1308

Free literature available: Design/Data catalog listing commercial, industrial, and mil qualified power supplies. Special sections devoted to extensive thermal data, NEMA terminology, and metric conversion tables.

Products manufactured: Chargers, Battery, Converters, Heat Exchangers & Systems, Inverters, Power Supplies.

Local Sales Offices & Reps.

Cal	Pasadena, Luscombe Engrg.	213-684-2000
Cal	San Mateo, Luscombe Engrg.	415-342-7057
Colo	Denver, Electrodyne	303-757-7676
Conn	Meriden, A. Allison	203-237-9232
Fla	Ridgefield, Technipower	203-431-1300
Ill	Chicago, Allen Woods & Assoc.	312-283-7400
Kans	Overland Park, Ensco-Rep	913-381-7557
Md	Rockville, Farrell Assocs.	301-424-9460
Mass	East Bridgewater, Abbott Allison	617-245-0250
Mich	Farmington, Anderson Elctrns.	313-476-9161
Minn	Minneapolis, R-J, Inc.	612-922-1425
Mo	St. Louis, Ensco-Rep, Inc.	314-567-3935
NM	Albuquerque, William J. Purdy Co.	505-266-7959
NY	Ridgefield, Technipower	203-431-1300
Ohio	Dayton, Sculley & Ingling	513-298-9575
Pa	Newtown Square, Holdsworth & Co.	215-356-8550
Pa	Pittsburgh, G.S. Root & Co.	412-561-4125
Tex	Houston, Scientific Sls.	713-666-5723
Tex	Richardson, Scientific Sls.	214-231-6541
Wash	Renton, Baxley-Wilson Co.	206-226-0650
EXP:	Can., Burlington, Ont., White Radio Ltd.	416-634-1845
EXP:	Can., Montreal, Que., White Radio Ltd.	514-482-8091

TECHINQUES, INC., 235 Jackson St., Englewood, N.J., 07631, Tel: 201-569-5900; Empl.: 60

Products manufactured: Boards, Printed Circuit, Etchants, Printed Circuit, Kits, Marking (Dial, Instrument, Equipment, etc.), Kits, Printed Circuit, Screens, Printed Circuit

Technitrol, Inc.

TECHNITROL, INC., 1952 E. Alleghany, Philadelphia, Pa., 19134, Tel: 215-426-9105; FSC No: 90095; Empl.: 350; Minimum order: $50 p. 1•466,467; p. 2•1810,1811

For info on price: Sls. Dept.; Application info: W. A. Chamberlin; Customer service: Sls. Dept.; Delivery info: Sls. Dept.

Free literature available: Transformer Handbook and Technical Notes - Describes and lists popular types of transformers, technical notes provide useful formulae. Delay Line Catalog - Lists popular delay lines and useful formulae. TTL Delay Module - Provides data on new dynamic TTL compatible delay module.
Model 4604 - Describes high speed memory tester Model 4603 - Describes versatile core memory exerciser Series 2000 Module Describes modules for build in house.

Products manufactured: Coils Including Assemblies & Forms, Delay Lines, Generators, Services, Assembly, Production & Test, Test Systems, Testers, Timers, Transformers

Local Sales Offices & Reps.

Ariz	Scottsdale, Q. T. Wiles	602-948-5590
Cal	Los Angeles, Q. T. Wiles	213-478-0183
Cal	San Diego, Q. T. Wiles	714-565-6897
Cal	Tustin, Q. T. Wiles	714-832-4952
Colo	Denver, Comtech Inc.	303-756-6815
Fla	Maitland, Hutto-Hawkins-Peregoy	305-831-2474
Fla	Pompano Beach, Hutto-Hawkins-Peregoy	305-943-9593
Ill	Wauconda, Cudaly Sls.	312-526-2484
Mass	Burlington, Tek Data	617-273-0198
Mass	Newton, Normell Assoc.	617-969-5478
NY	Fairport, TAC Assoc.	716-377-1742
Pa	Philadelphia, Technitrol	215-426-9105
FOR:	Can., Brampton, Ont., Bagtronix Ltd.	416-453-1252
FOR:	Can., Montreal, Que., Bagtronix Ltd.	514-336-9242
FOR:	Can., Ottawa, Ont., Bagtronix Ltd.	613-728-0113

TECHNITROL, INC. cont'd

Advertisment

Technitrol has full capability for design, packaging, production of subminiature transformers; from stringent MIL-spec varieties to simple unencapsulated units, packaged singly or in multiples. A complete line of lumped parameter delay lines is available featuring new dynamic delay module with its TTC compatibility. The Technitrol Systems Division features a complete line of memory exercisers; core, platewire, semiconductor.

TECHNO-COMPS. CORP., 7803 Lemona, Van Nuys, Cal., 91405, Tel: 213-781-1642, TWX: 910-495-2015; FSC No: 17826; QPL No: Multiple; Empl.: 70; Minimum order: $50

For info on price: D. Ross; Application info: T. Hoerth; Customer service: R. Rosas; Delivery info: M. Eliasson

Free literature available: Short Form Catalog; Individual Data Sheets; QPL Qualification Sheets; Established Reliability Qualification Sheets; Three Ring Binder containing entire product line; Trimmer terms and definitions book

Products manufactured: Connectors, Potentiometers, Resistors

Local Sales Offices & Reps.

Ariz	Scottsdale, Argus Sls.	602-967-8709
Cal	Inglewood, Oak Inds. Corp.	213-678-4108
Cal	Los Altos, Oak Inds. Corp.	415-941-1237
Fla	Orlando, Oak Inds. Corp.	305-671-4111
Ill	Chicago, Delta Tech. Sls.	312-437-9412
Kans	Leawood, H.C. Heyde Co.	913-649-8628
Md	Timonium, Marktron, Inc.	301-252-7111
Mass	Needham, A & M Elctrns.	617-444-8170
Mich	Farmington Hills, Sterling-Lowell Co.	313-581-7474
Minn	Minneapolis, C.R. Gibb Co.	612-377-1200
NJ	Haddonfield, T.M. Mills Co.	609-429-1005
NJ	Pompton Lakes, R. Horne Assoc.	201-835-7400
NY	No. Syracuse, Advanced Comps.	315-699-2671
Ohio	Centerville, EMA, Inc.	513-433-2800
Ore	Portland, Oak Industries	503-292-0878
Tex	Ft. Worth, W. Fralia	817-738-2394
EXP:	Colo., Denver, I. W. Strong	303-292-6900
FOR:	Can., Ottawa, Ont., E. G. Lomas	613-725-2177

Local Distributors

Cal	Los Angeles, Radio Products Sls., 1501 S. Hill	213-748-1271
Fla	Clearwater, Southland, 1771 N. Hercules	813-443-4514
NJ	Wayne, Gordon/Horne, 2282 Hamburg Tnpk.	201-835-7400
NY	N. Syracuse, ANDCO, Box 276	315-699-2671
Tex	Ft. Worth, Patco Supply, Box 12625	817-738-2394

TECHSONICS, Box 251, El Prado, N.M., 87529, Tel: 505-758-4555; Empl.: 10; Minimum order: $15

Customer service: A. E. Sowers

Free literature available: 0573 Son-Tector ultrasonic detectors 5072 Power converter information

Products manufactured: Analyzers, Converters, Detectors, Testers

TECNETICS, INC., 1624 Range St. Box 910, Boulder Industrial Park, Boulder, Colo., 80302, Tel: 303-442-3837, TWX: 910-940-3246; Empl.: 45 p. 1•1491-1496

For info on price: S. Broyles; Application info: V. Garrison; Customer service: S. Broyles; Delivery info: S. Broyles

Free literature available: 1975 Technetics catalog (available in Jan 75) DC-DC, AC (400 Hz) - DC power supplies.

Products manufactured: Converters, Power Supplies

Local Sales Offices & Reps.

Ala	Huntsville, W.A. Brown Comps., Inc.	205-539-4411
Ariz	Phoenix, C.T. Carlberg & Assocs.	602-997-0774
Cal	Inglewood, L & M Engrg.	213-674-6850
Cal	San Jose, L & M Engrg., Inc.	408-243-2891
Colo	Denver, Electro-Rep	303-744-2821
Conn	New Canaan, S. Pierce, Inc.	203-966-4630
Fla	Ft. Lauderdale, W.A. Brown Comps., Inc.	305-776-4800
Fla	Orlando, W.A. Brown Comps., Inc.	305-425-5505
Ill	Chicago, K.W. Meyers Co.	312-774-6440
Ind	Indianapolis, K.W. Meyers Co.	317-243-6681
Kans	Overland Park, Ensco-Rep, Inc.	913-381-7557
La	Gretna, W.A. Brown Comps., Inc.	504-366-5766
Md	Silver Spring, Eastern Instrumentation Corp.	301-681-6500
Mass	Norwood, S. Pierce, Inc.	617-762-3164
Mich	Royal Oak, Satullo Co.	313-549-3910
Minn	Minneapolis, K.W. Meyers Co.	612-920-7080
Mo	St. Louis, Ensco-Rep, Inc.	314-567-3935
NM	Albuquerque, C.T. Carlberg & Assocs.	505-265-1579
NY	Fayetteville, M.P. Andrews, Inc.	315-637-3144
NY	Great Neck, Eastern Instrumentation	516-466-9505
NC	Winston-Salem, W.A. Brown Comps., Inc.	919-725-5384
Ohio	Cleveland, Satullo Co.	216-486-2800
Pa	Melrose Park, R. Meyers Assocs.	215-224-1663
Tex	Dallas, R.R. Thomas Co.	214-363-8591
Wash	Seattle, R.S. Drake Assocs.	206-763-2755

TED CORPORATION, 11415 Johnson Dr., Shawnee Mission, Kans., 66203, Tel: 913-631-6211; FSC No: 05209; Minimum order: $12

For info on price: R. H. Zehr; Application info: D. J. Patrick; Customer service: C. J. Smith; Delivery info: D. J. Patrick

Products manufactured: Connectors

Local Sales Offices & Reps.

Fla	Lighthouse Point, Saber Assocs.	305-943-3076
Kans	Shawnee, J.F. Guernsey Co.	913-631-2414
NY	West Babylon, G. Newman	516-643-2220
Pa	Oreland, Brown-Oberlies	215-887-1325

TEK-WAVES, INC., See Frequency Elctrns.

TEKELEC, INC., 2623 Saddle Ave., Oxnard, Cal., 93030, Tel: 805-485-5445, TWX: 910-336-1280; Empl.: 60; Minimum order: $25

For info on price: P. McFarland; Application info: P. Wasserman; Customer service: P. McFarland; Delivery info: P. McFarland

Free literature available: Engineering Unit Digital Panel Meters; TA300 Series Digital Panel Meters; TA365 4 1/2 Digit Digital Multimeter; TA355 & TA356 3 1/2 Digital Multimeters; TA357 Digital Multimeter; "Which LCD is Best" A selection guide for liquid crystal displays; "Report on Digital Voltmeters".

Products manufactured: Converters, Meters, Testers

Local Sales Offices & Reps.

Ariz	Phoenix, RDX Corp.	
Cal	Pasadena, RDX Corp.	213-681-3451
Cal	San Diego, RDX Corp.	714-278-6863
Cal	Sunnyvale, RDX Corp.	408-734-4500
Colo	Arvada, Arrowhead Sls.	303-423-5556
Fla	Orlando, Gra Mar	305-894-3351
Ill	Chicago, Scientific Sls.	312-775-7594
Ind	Indianapolis, Scientific Sls.	317-253-4606
Kans	Leawood, Leemark Engineers	913-648-0124
Md	Silver Springs, Q.E.D. Elctrns.	301-588-8134
Mass	Newton Centre, Daner Hayes	617-969-4650
Mich	Dearborne, Villani-Pitcher	313-271-4600
Minn	Bloomington, Scientific Sls.	612-881-0668
NJ	Parlin, JMR Sls.	201-727-5335
NY	Jamaica, JMR Sls.	212-658-8881
Ohio	Cleveland, Arthur Baier Co. & Assocs.	216-461-6161
Ohio	Dayton, Arthur Baier Co. & Assocs.	513-276-4128
Pa	Abington, Bach-Stewart	215-885-1550
Tex	Houston, Enviromation	613-526-6872
Utah	Salt Lake City, Arrowhead Sls.	801-487-4716
Wash	Seattle, Underwood Jensen & Assoc.	206-575-0123
FOR:	Can., Kanata, Ont., Kenwood Controls	613-836-4202
FOR:	Can., Montreal, Que., Kenwood Controls	514-738-4969
FOR:	Can., St. Catherines, Ont., Kenwood Controls	416-278-2701

TEKELEC INC., 2623 Saddle Dr., Oxnard, Cal., 93030, Tel: 805-485-5445, TWX: 910-336-1280; Empl.: 102; Minimum order: $25 p. 1•815; p. 2•1205

For info on price: M. Thompson; Application info: P. D. Wasserman; Customer service: P. McFarland; Delivery info: P. McFarland

Free literature available: Digital Panel Meters - TA300 Series - Price Sheet, TEKELEC Digital Panel Meters Brochure, TEKELEC Engineering Unit Digital Panel Meters Brochure, "Which LCD is best?" - Liquid Crystal Display Article, TEKELEC Digital Multimeters - Price Sheet, TEKELEC 3 1/2 Digit Multimeters Brochure - Model TA355 and TA356, TEKELEC 3 1/2 Digit Multimeters Brochure - Multex - Model TA357, TEKELEC 4 1/2 Digit Multimeters Brochure - Model TA365, Report on Digital Voltmeters Article, Business Reply Card.

Products manufactured: Converters, Display Devices/Displays, Meters, Monitors

Local Sales Offices & Reps.

Cal	Pasadena, RDX Corp.	213-681-3451
Cal	San Diego, RDX Corp.	714-278-6863
Cal	Sunnyvale, RDX Corp.	408-734-4500
Colo	Arvada, Arrowhead Sls.	303-423-5556
Fla	Orlando, Gra-Mar	305-894-3351
Ill	Chicago, Scientific Sls. Corp.	312-775-7594
Ind	Indianapolis, Scientific Sls. Corp.	317-253-4606
Kans	Leawood, Leemack Engs., Inc.	913-648-0124
Md	Silver Spring, Q.E.D. Elctrns.	301-588-8134
Mass	Newton Centre, Daner-Hayes	617-969-4650
Mich	Dearborn, Villani-Pitcher	313-271-4600
Minn	Bloomington, Scientific Sls. Corp.	612-881-0668
NJ	Parlin, JMR Engrg. Sls.	201-727-5335
NY	Jamaica, JMR Engrg. Sls.	212-658-8881
Ohio	Cleveland, A.H. Baier Co. & Assoc.	216-461-6161
Ohio	Dayton, A.H. Baier Co. & Assoc.	513-276-4128
Pa	Abington, Bach-Stewart	215-885-1550
Tex	Houston, Environmation	713-526-6872
Utah	Salt Lake City, Arrowhead Sls.	801-487-4716
Wash	Seattle, Underwood & Underwood	206-243-2133
Wash	Seattle, Underwood Jensen & Assocs.	206-575-0123
FOR:	Can., Ottowa, Ont., Kenwood Controls	416-544-0596

TEKTRONIX, INC., Box 500, Beaverton, Ore., 97077, Tel: 503-644-0161, TWX: 910-467-8708; Empl.: 11500

Products manufactured: Amplifiers, Analyzers, Cable Fault Locators, Calculators, Electrical & Electronic, Cameras, Carts & Dollies, Instrument & Equipment, Comparators, Converters, Cords, Counters, Current Sensors, Data Acquisition & Reduction Systems, Digitizers, Pencil Follower (Inc. Coordinate & Graphic), Display Devices/Displays, Filters, Generators, Memory Systems, Meters, Monitors, Multiplexers, Oscillators, Oscilloscope Plug-Ins, Oscilloscopes, Perforators, Power Supplies, Probes, Recorders, Services, Assembly, Production & Test, Terminal Equipment, Digital, Terminals, Data Display (including Alphanumeric & Graphic), Test Equipment, Test Systems, Testers, Tracers, Curve, Viewing Hoods, Cathode Ray Tube

Local Sales Offices & Reps.

Ala	Huntsville	205-881-2912
Ariz	Phoenix	602-244-9795
Cal	Concord	415-687-8350
Cal	Irvine	213-778-5225
Cal	San Diego	714-292-7330
Cal	Santa Clara	408-249-5500
Cal	Van Nuys	213-987-2600
Colo	Denver	303-771-8012
Conn	Milford	203-877-1494
Fla	Fort Lauderdale	305-731-1220
Fla	Orlando	305-894-3911
Fla	Pensacola	904-476-1897
Ga	Atlanta	404-451-7241
Haw	Honolulu	808-847-1138
Ill	Chicago	312-593-2830
Ind	Indianapolis	317-546-2408
Kans	Kansas City	913-262-8770
La	New Orleans	504-837-8454
Md	Baltimore	301-321-7000
Md	Rockville	301-948-7151
Mass	Boston	617-890-4550
Mich	Detroit	313-358-3122
Minn	St. Paul	612-484-8571
Mo	St. Louis	314-731-4696
NJ	Springfield	201-379-1670
NM	Albuquerque	505-268-3373
NY	Albany	518-785-3353
NY	Long Island	516-364-9060
NY	Poughkeepsie	914-454-7540
NY	Rochester	716-244-2600
NY	Syracuse	315-455-6661
NC	Raleigh	919-782-5624
Ohio	Cleveland	216-884-6558
Ohio	Columbus	614-888-4040
Ohio	Dayton	513-859-3681
Okla	Oklahoma City	405-848-3361
Ore	Portland	503-639-7691
Pa	Fort Washington	215-542-1440
Pa	Pittsburgh	412-373-3250
Tex	Dallas	214-233-7791
Tex	Houston	713-783-1910
Tex	San Antonio	512-736-2641
Utah	Salt Lake City	801-484-8501
Va	Hampton	804-826-4020
Wash	Seattle	206-575-0180

TEL LABS, INC., 1050 Second St., Manchester, N.H., 03102, Tel: 603-625-8994, TWX: 710-220-1844; FSC No: 94322; QPL No: Multiple; Empl.: 180; Minimum order: $10 .... p. 2•1688-1691

For info on price: G. Steady; Application info: G. Steady; Customer service: C. Whittaker; Delivery info: C. Whittaker

Free literature available: Full line catalogue covering fixed wirewound resistors. Catalogue covers both precision and power resistors.

Products manufactured: Networks, Resistors

Local Sales Offices & Reps.

Ala	Huntsville, Beacon Elctrn. Sls.	205-881-5031
Ariz	Phoenix, MR Engrg. Sls. Co.	602-959-5150
Cal	Mountain View, West/Mark Assocs.	415-969-1700
Cal	Palos Verdes Estates, Schulman & Assocs.	213-373-6564
Colo	Denver, West/Mark Assocs.	303-433-7181
Conn	Madison, A & M Elctrn. Rep.	203-421-4242
Fla	Ft. Lauderdale, Beacon Elctrn. Assocs.	305-776-6074
Fla	Maitland, Beacon Elctrn. Assocs.	305-647-3498
Ga	Atlanta, Beacon Elctrn. Assocs.	404-351-3654
Ill	Northfield, Feller Assocs.	312-446-8065
Mass	Needham, A & M Elctrn. Rep.	617-444-8170
Miss	Hernando, Beacon Elctrn. Sls.	601-368-9008
NJ	Collingswood, K. Randall Co.	609-854-3323
NJ	Dumont, Rand Assocs.	201-385-7447
NY	Buffalo, Ossmann Comp. Sls. Corp.	716-832-4271
NY	Kingston, Ossmann Comp. Sls. Corp.	914-338-5505
NY	Plainview, Rand Assocs.	516-420-8989
NY	Rochester, Ossmann Comp. Sls. Corp.	716-442-3290
NY	Syracuse, Ossmann Comp. Sls. Corp.	315-454-4477
NY	Vestal, Ossmann Comp. Sls. Corp.	607-785-9949
NC	Greensboro, Beacon Elctrn. Sls.	919-674-9432
Ohio	Cleveland, Weschler Elec. Corp.	216-251-4609
Ohio	Dayton, Weschler Elec. Corp.	513-274-6972
SC	Spartanburg, Beacon Elctrn. Assocs.	803-582-4613
Tex	Richardson, Unidyne, Inc.	214-234-3050
Tex	Stafford, Unidyne, Inc.	713-494-6027

TELAUTOGRAPH CORP., 8700 Bellanca Ave., Los Angeles, Cal., 90045, Tel: 213-776-5022, TWX: 910-328-6117; Empl.: 300; Minimum order: $50

Customer service: W. Kelker

Free literature available: Brochure "The Telephone That Writes" Describes Telepen Communications System.

Products manufactured: Comm. Systems, Paper, Graphic Recording

Local Sales Offices & Reps.

Cal	Los Angeles	213-776-3556
Cal	San Francisco	
Ga	Atlanta	404-636-3194
Ill	Chicago	312-622-7111
La	New Orleans	504-282-4635
Mich	Detroit	313-275-4220
NJ	Clifton	201-772-2740
Tex	Houston	713-688-9505
EXP:	Los Angeles, Cal.	213-776-5022

TELE-DYNAMICS/WANLASS, Div. of AMBAC, 525 Virginia Dr., Ft. Washington, Pa., 19034, Tel: 215-643-6161, TWX: 510-661-0654; Empl.: 400 .... p. 1•1480-1489

Products manufactured: Power Supplies, Regulators

Local Sales Offices & Reps.

Cal	El Segundo, Tele-Dynamics	213-640-0785
Cal	Encino, V & L Assoc.	213-986-9703
Cal	Palo Alto, Testco, Inc.	415-494-2011
Cal	San Diego, Earle Assoc.	714-278-5441
Colo	Denver, D. E. Bond Assoc.	303-756-1234
Conn	Washington Depot, Kanan Assocs.	203-868-0513
DC	Washington, Wright Co.	301-948-5151
Fla	Satellite Beach, Reynolds & Assocs.	305-773-4700
Ga	Atlanta, Reynolds & Assoc.	404-252-5360
Ill	Downers Grove, Richmar Elctrns.	312-968-0118
Ind	Ft. Wayne, Temple Engrg. Sls., Inc.	219-744-4331
Kans	Wichita, Dy-Tronix, Inc.	316-943-6221
Md	Gaithersburg, Wright Co.	301-948-5151
Mass	Reading, Kanan Assocs.	617-944-8484
Mich	Dearborn, Pitcher-Poulin, Inc.	313-582-5450
Minn	Minneapolis, Elctrn. Innovators Inc.	612-888-5000
Mo	Hazelwood, Dy-Tronix, Inc.	314-731-5799
Mo	Kansas City, Dy-Tronix, Inc.	816-761-6543
NJ	Parlin, JMR Sls., Inc.	201-727-5335
NM	Albuquerque, Trembly Assoc.	505-293-4444
NY	Buffalo, Telesco Assocs.	716-836-1026
NY	Jamaica, JMR Sls. Inc.	212-658-8881
NY	Rochester, Telesco Assocs.	716-271-3780
NY	Syracuse, R.F. Lamb Co.	315-454-2469
NC	Charlotte, Reynolds & Assoc.	704-527-2536
Ohio	Cleveland, Instrumentation Sys., Inc.	216-486-0782
Ohio	Dayton, Instrumentation Sys., Inc.	513-294-2838
Pa	Glenside, Elcom, Inc.	215-885-1715
Pa	Pittsburgh, Instrumentation Sys., Inc.	412-243-1111
Tex	Houston, Spectra sls.	713-524-7800
Tex	Richardson, Spectra Sls. Corp.	214-234-3600
Wash	Bellevue, Testco, Inc.	206-454-7422
Wisc	Oak Creek, Richmar Elctrns.	414-475-0414

Local Distributors

Ala	Birmingham, Allied Electronics, 2900 Bessemer Rd.	205-787-1408
Ala	Huntsville, Cramer/EW Huntsville, 2310 Bob Wallace Ave. S.W.	205-539-5722
Ariz	Phoenix, Cramer Electronics, Inc., 2643 E. University Dr.	602-267-7321
Cal	Brisbane, Newark Electronics, 440 Valley Dr.	415-468-2900
Cal	El Segundo, T.I. Supply, 831 Douglas St.	213-776-4490
Cal	Garden Grove, Allied Electronics, 12311 Industry St.	213-598-8671
Cal	Goleta, RPS, Suite E, 350 S. Kellogg Ave.	805-964-4764
Cal	Inglewood, Newark Electronics, 4747 W. Century Blvd.	213-678-0441
Cal	Irvine, Cramer/Los Angeles, 17201 Daimler St.	714-979-3000
Cal	Los Angeles, RPS, 1501 South Hill St.	213-748-1271
Cal	Palo Alto, Testco, 941 Charleston Rd.	415-326-5320
Cal	Palo Alto, Zack Electronics, 654 High St.	415-326-5432
Cal	San Diego, Cramer/San Diego, 8913 Complex Dr.	714-565-1881
Cal	San Diego, RPS, 7889 Clairemont Mesa Blvd.	714-292-5611
Cal	San Francisco, Zack Electronics, 1444 Market St.	415-626-1444
Cal	Sunnyvale, Cramer/San Francisco, 720 Palomar Ave.	408-739-3011
Cal	Sunnyvale, T.I. Supply, 776 Palomar Ave.	408-732-5555
Cal	Van Nuys, Patane Avionics, Inc., 5937 Kester Ave.	213-988-4455
Colo	Denver, Cramer/Denver, 5465 E. Evans Pl.	303-758-2100
Colo	Denver, Newark Electronics, 2170 S. Grape St.	303-757-3351
Colo	Denver, T.I. Supply, 9725 E. Hampden Ave.	303-751-1780
Conn	Bethel, Pioneer/New England, 154 Greenwood Ave.	203-792-1182
Conn	North Haven, Cramer/Conn., 35 Dodge Ave.	203-239-5641
Conn	Westport, Newark Electronics, 25 Sylvan Road S.	203-226-6921
Fla	Fort Lauderdale, Allied Electronics, 800 N.W. 57th Ct.	305-772-6464
Fla	Fort Lauderdale, Newark Electronics, 1360 N.W. 65th St.	305-587-2372
Fla	Hollywood, Cramer/EW Hollywood, 4035 N. 29th Ave.	305-923-8181
Fla	Orlando, Cramer/EW Orlando, 345 N. Graham Ave.	305-894-1511
Ga	Atlanta, Cramer/Atlanta, 3923 Oakcliff Ind'l Court	404-448-9050
Ill	Arlington Hts., T.I. Supply, 2420 E. Oakton Rd.	312-593-7660
Ill	Chicago, Newark Electronics, 500 N. Pulaski Rd.	312-638-4411
Ill	Elgin, Allied Electronics, 1355 Sleepy Hollow Rd.	312-697-8200

Ill	Mt. Prospect, Cramer/Chicago, 1911 S. Busse Rd.	312-593-8230
Ind	Indianapolis, Pioneer/Indiana, 6408 Castleplace Dr.	317-849-7300
Iowa	Cedar Rapids, Newark Electronics, 1019 First Ave., S.W.	319-362-1171
Iowa	Davenport, Allied Elctrns., 1205 E. River Dr.	319-323-8051
La	Alexandria, Ralph's of Lafayette, 601 N. Third St.	318-443-4517
La	Baton Rouge, Ralph's of Lafayette, 1732 Plank Rd.	504-344-8114
La	Lafayette, Ralph's of Lafayette, 3004 Cameron St.	315-234-4507
La	Lake Charles, Ralph's of Lafayette, 911 Fourth Ave.	318-439-2493
La	Morgan City, Ralph's of Lafayette, 715 Brashear St.	504-384-9831
La	New Iberia, Ralph's of Lafayette, 1900 E. Main St.	318-369-9816
Me	Falmouth, Allied Electronics, Falmouth Shopping Center	207-781-2666
Md	Beltsville, Newark Electronics, 10440 Baltimore Ave.	301-937-5085
Md	Gaithersburg, Cramer/EW Wash., 16021 Industrial Dr.	301-948-0110
Md	Gaithersburg, Pioneer Standard, 9100 Gaither Rd.	301-948-0710
Md	Hanover, Cramer/EW Baltimore, 7255 Standard Dr.	301-796-5790
Md	Rockville, Wilshire Elctrns./Wash., 1037 Taft St.	301-340-7900
Mass	Braintree, Allied Electronics, One Century Circle, Campanelli Ind'l Park	617-848-4150
Mass	Newton, Cramer/Newton, 85 Wells Ave.	617-969-7700
Mass	Waltham, T.I. Supply, 504 Totten Pond Rd.	617-890-0510
Mass	Woburn, Newark Electronics, 13A Wheeling Ave.	617-935-8350
Mich	Livonia, Cramer/Detroit, 13193 Wayne Rd.	313-425-7000
Mich	Livonia, Pioneer Standard, 13485 Stamford	313-525-1800
Mich	Oak Park, Newark Electronics, 20700 Hubbell Ave.	313-548-0250
Mich	Wyoming, Newark Electronics, 3645 Linden Ave. S.E.	616-241-6681
Minn	Edina, Cramer/Bonn, 7275 Bush Lake Rd.	612-827-3541
Minn	Edina, T.I. Supply, 7615 Metro Blvd., Suite 202	612-835-5353
Minn	Minneapolis, Harry Stark's, 112 Third Ave. N.	612-332-1325
Minn	Minneapolis, Newark Electronics, 336 Hoover St. N.E.	612-331-6350
Miss	Pascagoula, Ralph's of Lafayette, 2112 Ingalis Ave.	601-769-1672
Mo	Kansas City, T.I. Supply	816-753-4750
Mo	St. Louis, Olive Industrial Elctrns., 6662 Olive Blvd.	314-863-7800
Neb	Omaha, Allied Electronics, 625 N. 18th St.	402-341-7700
NJ	Cherry Hill, Cramer/Pa., 12 Springdale Rd.	609-424-5993
NJ	Clark, T.I. Supply, 301 Central Ave.	201-382-6400
NJ	Kenilworth, Newark Electronics, 303 Monroe Ave.	201-272-8410
NJ	Moonachie, Cramer/N.J., 1 Barrett Ave.	201-935-5600
NJ	Moorestown, Arrow/Angus, Pleasant Valley Ave.	609-235-1900
NJ	Pennsauken, Cramer Electronics, 7300 Route 130 North	609-662-5061
NM	Albuquerque, Cramer/New Mexico, 137 Vermont N.E.	505-265-5767
NM	Albuquerque, Newark Electronics	505-296-9495
NY	Buffalo, Summit Distributors, 916 Maine St.	716-884-3450
NY	East Syracuse, Cramer/Syracuse, 6716 Joy Rd.	315-437-6671
NY	Endwell, Cramer/Binghamton, 3220 Watson Blvd.	607-754-6661
NY	Fishkill, T.I. Supply	914-896-9630
NY	Hauppauge, Cramer/L.I., 29 Oser Ave.	516-231-5600
NY	Huntington Station, T.I. Supply, 2 Huntington Quad. 2NO4-Suite	516-293-2660
NY	Plainview, Newark Electronics, 80 Express St.	516-822-5000
NY	Rochester, Cramer/Rochester, 3000 S. Winton Rd.	716-473-6600
NY	Rochester, Summit Distributors, 292 Commerce Dr.	716-334-8110
NC	Greensboro, Pioneer/Carolina, 2906 Baltic Ave.	919-273-4441
NC	Winston-Salem, Cramer/EW Winston-Salem, 938 Burke St.	919-725-8711
Ohio	Cincinnati, Cramer/Tri-States, 666 Redna Terrace	513-771-6441
Ohio	Cincinnati, Newark Electronics, 9799-G Princeton Rd.	513-874-5115
Ohio	Cleveland, Cramer/Cleveland, 5835 Harper Rd.	216-248-8400
Ohio	Cleveland, Newark Electronics, 2028 E. 46th St.	216-361-4700
Ohio	Cleveland, Pioneer Standard, Box 05100, 4800 E. 131 St.	216-587-3600
Ohio	Dayton, Pioneer Standard, 1900 Troy St.	513-236-9900
Okla	Tulsa, T.I. Supply, Drawer "T", Admiral Station	918-437-4555
Pa	Horsham, Pioneer/Pa., 203 Witmer Rd.	215-674-5710
Pa	Monroeville, Cramer/Pittsburgh, 616 Beatty Dr.	
Pa	Philadelphia, Allied Electronics, 3707-11 N. Broad St.	215-229-1880
Pa	Philadelphia, Philadelphia Electronics, 112 North 12th St.	215-568-7400
Pa	Pittsburgh, Pioneer Standard, 560 Alpha Dr.	412-782-2300
Pa	Reading, Allied Electronics, 333 N. Fourth St.	215-376-7451
Tex	Austin, T.I. Supply, Box 2909, 2601 N. Lamar	512-258-1636
Tex	Beaumont, Ralph's of Lafayette, 1293 Broadway	713-833-9443
Tex	Dallas, Cramer/Texas, 13740 Midway Rd.	214-350-1355
Tex	Dallas, T.I. Supply, 6000 Denton Dr.	214-238-6821
Tex	Fort Worth, Allied Electronics, 401 E. 8th St.	817-336-5401
Tex	Garland, Newark Electronics, 707 Easy St.	214-271-2511
Tex	Houston, Newark Electronics, 6902 Harwin Dr.	713-782-4800
Tex	Houston, Ralph's of Lafayette, 4400 S. Wayside Dr.	713-641-0267
Tex	Houston, T.I. Supply, 3939 Ann Arbor Dr.	713-785-4800
Utah	Salt Lake City, Allied Electronics, 350 Pierpoint Ave.	801-328-2075
Utah	Salt Lake City, Cramer/Utah, 391 W. 2500 South	801-487-3681
Utah	Salt Lake City, Newark Electronics, 2540 S. 300 West	801-486-1048
Va	Arlington, T.I. Supply, 1500 Wilson Blvd., AM Bldg., Suite 616	703-524-5885
Wash	Bellevue, Testco, 10845 N.E. 8th	206-454-7422
Wash	Seattle, Cramer/Seattle, 5602 6th Ave. S.	206-762-5755
Wisc	Brookfield, Newark Electronics, 3695 N. 126th St.	414-781-2450
Wisc	Oak Creek, Cramer/Wisconsin, 430 W. Rawson Ave.	
For:	Can., Downsview, Ont., Cramer Electronics/Canada, 920 Alness St., Unit #9	416-661-9222

TELECOMMUNICATIONS INDUSTRIES, 1375 Akron St., Copiague, N.Y., 11726, Tel: 516-842-5000, Telex: 144631; Empl.: 150 .... p. 1•2301

Products manufactured: Arresters, Electrical Surge, Lightning, Discharge Systems, Energy, Suppressors, Testers

Local Sales Offices & Reps.

Ga	Atlanta	404-394-2754
Mo	Kansas City	816-756-0055

TELECTRO SYS. CORP., 96-18 43rd Ave., Corona, N.Y., 11368, Tel: 212-651-8900; Empl.: 65

Products manufactured: Alarms, Amplifiers, Blowers & Fans & Accessories, Coils Including Assemblies & Forms, Comm. Systems, Computers, Duplicators, Preselectors, Recorders, Tape Recording Accessories, Tape Search Equipment, Tape Winders, Television Systems & Equipment Closed-Circuit, Test Equipment, Testers

TELEDYNE AEROSPACE SYSTEMS, 1007 E. 10th St., Fairmont, Minn., 56031, Tel: 507-235-3355, TWX: 910-565-2120; FSC No: 24600; Empl.: 50; Minimum order: $75

For info on price: R. L. Johnson; Application info: D. Lewis; Customer service: R. L. Johnson; Delivery info: T. Olson

Free literature available: Custom electrical interconnection cable and harness systems and sub systems.

Products manufactured: Cable Assemblies & Harnesses, Cable, Services, Assembly, Production & Test

Local Sales Offices & Reps.

Ala	Huntsville, Repcom	205-534-9959
Cal	Millbrae, Ashby Assocs. of No. Cal.	415-692-4442
Fla	Melbourne, Repcom	305-254-1877
Ga	Warner Robins, O. C. Bowman	912-923-1393
Md	Bethesda, Warren Mount Co.	301-657-9312
Mass	Weston, J. Goode Assoc.	617-235-3900
Minn	Minneapolis, P. Ericson & Assocs.	612-884-1969
NJ	Somerville, J & L Assocs.	201-722-0682
Ohio	Dayton, Ashby Assocs. Inc. of Ohio	513-252-5627
Pa	Jenkintown, Warren Mount Co.	215-886-0383
Tex	Richardson, Zonk Engrg.	214-238-7651

TELEDYNE BIG BEAM, 290 E. Prairie St., Crystal Lake, Ill., 60014, Tel: 815-459-6100, Telex: 72-2460

Customer service: Cust. Svc.

Free literature available: Emergency Lighting Equipment 48 pages; Portable Lighting Equipment Personal 4 pages; Service 4 pages; Photo/News Releases.

Products manufactured: Batteries, Chargers, Battery, Flashers, Flashlights & Lanterns, Kits, Power Supply, Lighting Equipment, Emergency, Power Supplies

Local Sales Offices & Reps.

Ala	Birmingham, C. Fedorenchik	205-592-4692
Ariz	Little Rock, Byron Carson Co.	501-568-3342
Ariz	Phoenix, R.A. Young of Arizona, Inc.	602-274-3576
Cal	Cerritos, E. L. Steensen Assocs.	213-921-8686
Cal	San Carlos, Lumineering Sales/Service	415-592-3008
Colo	Denver, I. W. Strong & Assocs., Inc.	303-292-6900
Fla	Orlando, Ralston-Lowe-Murray, Inc.	305-896-3713
Fla	St. Petersburg, Ralston-Lowe-Murray, Inc.	813-821-0243
Ga	Atlanta, Southeast Techsales Co. Inc.	404-355-7021
Ill	Lincolnwood, Tilkin & Cagen Associates	312-676-0382
Ind	Indianapolis, Tilkin & Cagen Assocs.	317-925-7776
Iowa	Dubuque, Bill Vahl Lighting Sls.	319-582-6304
Kans	Kansas City, Conrad Co. Inc.	913-621-3021
Ky	Jeffersontown, A.L. Pickens Co.	502-491-4215
La	New Orleans, United Sales Assocs., Inc.	504-733-8711
Md	Catonsville, T. G. Weinstein Co.	301-788-3636
Mass	Marblehead, Sands/Barnard Assocs.	617-631-7533
Mich	Grosse Pointe Park, J. L. Miner Assocs.	313-886-5878
Minn	Minneapolis, P. Ohlin Sls. Co.	612-929-6924
Miss	Jackson, United Sales Assocs., Inc.	601-956-2406
Mo	St. Louis, A. Haumesser Co.	314-781-1225
NH	Merrimack, Sands/Barnard Assocs.	603-424-2702
NJ	Teaneck, T. G. Weinstein Co.	201-836-1033
NY	Syracuse, Upstate Lighting Fixtures Sls.	315-455-5821
NC	Charlotte, C. M. Furman Co.	704-375-2332
Ohio	Cincinnati, Redmond-Lewis & Assocs.	513-931-5060
Ohio	Cleveland, Miller-Curtis Assocs., Inc.	216-749-0040
Okla	Oklahoma City, C. B. Anderson Electric Co.	405-235-0716
Okla	Tulsa, C. B. Anderson Electric Co.	918-836-4661
Ore	Portland, A. Shaw Co.	503-235-0545
Pa	Pittsburgh, Gormley Elect.	412-371-4111
Tenn	Memphis, B. Carson Co.	901-396-4553
Tex	Amarillo, C. B. Anderson Electric Co.	806-376-6443
Tex	Corpus Christi, G & E Sls.	512-855-2606
Tex	Dallas, Adra Elec.	214-522-3940
Tex	Houston, Lighting & Electrical Sls. Co., Inc.	713-923-7781
Wisc	West Allis, R. S. Knoblauch & Associates	414-421-2120

TELEDYNE CAMERA SYS., 131 N. Fifth Ave., Arcadia, Cal., 91006, Tel: 213-359-6691, Telex: 67-5423; Empl.: 96; Minimum order: $50

For info on price: D. M. Richichi Ext. 272; Customer service: D. M. Richichi Ext. 272; Delivery info: S. Jackman Ext. 248

Products manufactured: Cameras, Television Systems & Equipment Closed-Circuit

TELETYPE CORP., 5555 Touhy Ave., Skokie, Ill., 60076, Tel: 312-982-2000, TWX: 910-223-3611; FSC No: 59433; Empl.: 6000

Customer service: M. A. Pedote 312-982-3370

Products manufactured: Comm. Systems, Readers, Teleprinters, Teletypewriters & Equipment, Terminals, Data Display (including Alphanumeric & Graphic)

Local Sales Offices & Reps.

Cal	City of Commerce	213-724-6040
NJ	Fairfield	201-575-8240

TELEDYNE-CRYSTALONICS, 147 Sherman St., Cambridge, Mass., 02140, Tel: 617-491-1670, TWX: 710-320-1196; FSC No: 12498; QPL No: Multiple; Empl.: 155; Minimum order: $50

For info on price: T. J. Paradise; Application info: R. Antalik; Customer service: B. Kilgarriff; Delivery info: B. Kilgarriff

Products manufactured: Diodes, Integrated Circuit Devices, Relays, Switches, Transistors

Local Sales Offices & Reps.

Ariz	Scottsdale, Runyon Co.	602-959-6060
Cal	Marina Del Ray, Westaironics Inc.	213-821-7958
Cal	San Carlos, Kottmeir Assoc.	415-592-8333
Fla	Orlando, R. Simmons	305-831-8688
Fla	Plantation, W. Popnick	305-941-5544
Fla	Pompano Beach, V.G. Sls.	305-941-5544
Ill	Palatine, C & C Electronics	312-358-8900
Ind	Ft. Wayne, T.X. Sls.	219-489-4447
Md	Rockville, Mechtronics Sls.	301-340-2130
Mass	Brookline, Technology Prod. Group	617-731-0858
Minn	St. Paul, R.G. Ragon	612-488-0201
NJ	Newfoundland, S. Tobol	201-697-4383
NJ	Wallington, Comp-Tech. Sls.	201-935-5454
NY	New Hyde Park, Comp-Tech Sls.	516-593-2628
NY	Rochester, J. Semple Assoc.	716-342-1413
Ohio	Dayton, R.P. Calhoun	513-299-6894
Pa	Bala Cynwd, Vantage Sls.	215-667-0990
SC	Greenville, Electronic Mktg. Assoc.	803-268-1125
Wash	Bellevue, SD-R&S2	206-747-9424
FOR:	Can. Montreal, Que., Cantronics (Que.)	514-341-5207
FOR:	Can., Downsview, Ont., Cantronics Ltd.	416-661-2494

TELEDYNE/GEOTECH, Box 28277, Dallas, Tex., 75228, Tel: 214-271-2561, Telex: 73-2394; FSC No: 99019; Empl.: 440; Minimum order: $50 .... p. 1•470

Customer service: G. Gerlach

Free literature available: Complete line of meteorological, geophysical, and intrusion sensors and processors; complete data acquisition and control systems for the pipeline industry.

Products manufactured: Accelerometers, Alarms, Amplifiers, Calibrators, Cells, Load, Comm. Systems, Data Acquisition & Reduction Systems, Data Loggers, Heads, Recording Playback, Erase, Multiplexers, Oscillators, Radiometers, Recorders, Transducers

TELEDYNE INET, 711 Knox St., Gardena, Cal., 90248, Tel: 213-327-0913, Telex: 67-7228

For info on price: M. Beguelin; Application info: M. Beguelin; Customer service: J. Marshall; Delivery info: M. Beguelin

Free literature available: Describes our Uninterruptible Power Systems, Electric Motor Generator sets, solid state Frequency Convertors, Line Voltage Regulators, and motor speed controls.

Products manufactured: Controls/Control Eqpt., Converters, Generators, Inverters, Motor Electric Generator Sets, Power Supplies, Regulators

Local Sales Offices & Reps.

Ala	Huntsville, FM Assocs	205-536-9990
Ariz	Phoenix, Zeus	602-253-6104
Cal	El Cerrito, Saletta Sls	415-236-9191
Cal	Glendale, R.A. Young & Co.	213-242-2171
Colo	Denver, Hamilton Assocs.	303-244-2901
Colo	Englewood, Zeus	303-770-4400
Fla	Orlando, FM Assocs	305-851-5710
Fla	W. Palm Beach, FM Assocs	305-746-3126
Ill	Addison, Mid West Mktg	312-279-2442
Ill	Franklin Park, Rich	312-678-3100
Md	Bethesda, M.E. Whitney Assocs.	301-654-8634
Mass	Hollbrook, McLellan Assocs	617-767-4771
Mass	Natick, Spectrum Engrg, Inc.	617-237-4030
Mich	Detroit, WKM Assocs	313-892-2500
Minn	St. Paul, Knox Assoc	612-488-5402
NJ	Westwood, Teledyne Inet.	201-243-3194
NM	Albuquerque, Zeus	505-268-3941
NY	New York City, G & A Sls	212-256-8500
NC	Greensboro, FM Assocs	919-294-2754
Ohio	Cleveland, WKM Assocs	216-267-0445
Ohio	Dayton, WKM Assocs	513-434-7500
Pa	Philadelphia, Maris Equip. Co.	215-225-0720
Pa	Pittsburgh, WKM Assocs	412-892-2953
Tex	Dallas, Thorson Co.	214-233-5744
Tex	Houston, Thorson Co.	713-771-3504
Utah	Salt Lake City, Zeus	801-486-2317
Wash	Bellevue, W.M. Buehler	206-455-5512

TELEDYNE KINETICS, 410 S. Cedros Ave., Solana Beach, Cal., 92075, Tel: 714-755-1181, TWX: 910-322-1135; Empl.: 80

For info on price: D. Pyle; Application info: D. Pyle; Customer service: J. Risley; Delivery info: J. Risley

Free literature available: Folder of Technical Literature containing information on TKC connectors and stripall thermal wire strippers.

Products manufactured: Connectors, Relays, Slip-Rings & Assemblies, Switches, Wire Strippers

Local Sales Offices & Reps.

Cal	Burlingame, J. E. Striker Co.	145-342-1425
Colo	Parker, Technology Mktg. Assoc.	303-341-3435
Fla	Indian Rocks Bch., Tech-Rep	813-595-2834
Ill	Deerfield, W. Krueger Assoc.	312-945-3720
Mass	Stoneham, Repco	617-438-3113
NJ	Dover, P. Rydlewski	201-366-7518
NM	Albuquerque, Technology Mktg. Assoc.	505-298-4321
NY	Bayside, R. L. Diamond, Inc.	212-423-7330
Ore	Portland, Houston Co.	503-235-4174
Wash	Bellevue, Testco	206-454-7422

TELEDYNE MEC., 3165 Porter Dr., Palo Alto, Cal., 94304, Tel: 415-493-1770, TWX: 910-373-1746; Empl.: 650

Customer service: F. H. May

Free literature available: Data sheets describing Teledyne MEC's expertise in Frequency Memory Sub-Systems, Power Supplies, TWTs, Amplifiers, Modulators, Microwave Acoustics, Microwave Integrated Circuits, Acousto-Optics, and Solid State Sub-Systems.

Products manufactured: Amplifiers, CATV Systems & Equipment, Delay Lines, Equalizers, Filters, Fuses, Integrated Circuit Packaging Systems, Oscillators, Power Supplies, Synthesizers, Transducers, Transmitters, Tubes

Local Sales Offices & Reps.

Ariz	Phoenix, Thorson Co.	602-956-5300
Cal	Palo Alto, Teledyne MEC	415-493-1770
Colo	Denver, Thorson Co.	303-355-3521
Conn	Stamford, Teledyne MEC	203-325-2535
Fla	Palm Bay, SparTech Assocs.	305-727-8045
Ga	Smyrna, SparTech Assocs.	404-432-3644
Ill	Mount Prospect, Cain & Co.	312-253-3578
Md	Bethesda, Teledyne MEC	301-530-2220
Mass	Reading, Teledyne MEC	617-944-4094
NM	Albuquerque, Thorson Co.	505-265-5655
Ohio	Dayton, Teledyne MEC	513-253-8144
Tex	Dallas, Thorson Co.	214-233-5744
Tex	Houston, Thorson Co.	713-771-3504

TELEDYNE MICRONETICS, 7155 Mission Gorge Rd., San Diego, Calif., 92120, Tel: 714-583-3525, TWX: 910-335-2085; Empl.: 50

Products manufactured: Amplifiers, Antenna Feed Systems, Antennas, Horns, Microwave, Pedestals, Radar, Radar Systems, Receivers, Services, Assembly, Production & Test

Local Sales Offices & Reps.

Colo	Parker, Technology Mktg.	303-841-3435
DC	McClean, E. T. Phillips	703-893-2157
Fla	Clearwater, Brennan Assocs.	813-446-5006
Kans	Wichita, Dy-Tronix	316-943-6221
Mass	Burlington, Tritek	617-272-4550
Mo	Hazelwood, Dy-Tronix	314-731-5799
NM	Albuquerque, Technology Mktg.	505-298-4321

TELEDYNE MICROWAVE, 1290 Terra Bella Ave., Mountain View, Cal., 94040, Tel: 415-968-2211, TWX: 910-379-6939; FSC No: 24402; Empl.: 105; Minimum order: $100

For info on price: K. Mills; Application info: K. Mills; Customer service: M. Harrison; Delivery info: M. Harrison

Free literature available: Complete product line catalog

Products manufactured: Circulators, Ferrite, Filters, Isolators, Oscillators, Switches, Tuners

Local Sales Offices & Reps.

Cal	Los Altos, Cain White Co.	415-948-6533
Cal	Los Angeles, Cain Technology	213-476-2251
Fla	Clearwater, Brennan Assoc.	813-446-5006
Ill	Mt. Prospect, Cain & Co.	312-253-3578
Md	Columbia, N. Deoul Assoc.	301-997-4353
Mass	Burlington, Tritek	617-272-4550
NJ	Clementon, Applied Engrg. Consits.	609-627-7290
NJ	Fort Lee, Technical Mktg. Assocs.	201-224-6911
NY	Fayetteville, G. Sherman	315-637-9861
Ohio	Dayton, Cain & Co.	513-254-6521
Ohio	Lancaster, Cain & Co.	614-654-4800
Tex	Dallas, Thorson Co.	214-233-5744

TELEDYNE PENN-UNION ELEC., Box 723, Edinboro, Pa., 16412, Tel: 814-734-1631, Telex: 914-490; Empl.: 500

For info on price: N. Williams Ext. 240 & 266; Application info: D. Lipp Ext. 228; Customer service: H. G. Mokszanowski Ext. 245; Delivery info: R. McLaughlin Ext. 221

Products manufactured: Connectors, Kits, Terminal, Terminal Blocks, Boards & Strips, Terminals, Tools

Local Sales Offices & Reps.

Ala	Birmingham, C.S. Phillips & Son	205-870-0640
Alas	Anchorage, B.L. Owens & Assoc.	907-272-2613
Ariz	Phoenix, E.S. Condon Co.	602-279-3549
Cal	Los Angeles, E.S. Condon Co.	213-726-7926
Cal	San Francisco, F.M. Nicholas Co.	415-467-6220
Colo	Denver, Electrical Agencies Co.	303-623-8245
Conn	Avon, Electrical Agencies	203-673-9296
Conn	New Canaan, R. Zucco Co.	203-966-0233
Conn	West Haven, Electrical Agencies	203-933-2985
Fla	Jacksonville, Arnold-Bryant	904-737-5116
Fla	Miami, Arnold-Bryant	305-661-0715
Fla	St. Petersburg, Arnold-Bryant	813-343-6959
Ga	Atlanta, I.A. Hoge Assoc.	404-758-6815
Haw	Honolulu, D.R. Schwab	808-537-1658
Ill	Elk Grove Village, Hanke Co.	312-593-8500
Ind	Indianapolis, Roth-Mooney Elec. Agency	317-545-1288
Iowa	Cedar Rapids, A. Sell & Assoc.	319-393-4225
Iowa	Davenport, A. Sell & Assoc.	319-285-9413
Iowa	Des Moines, A. Sell & Assoc.	515-274-4633
Kans	Overland Park, T & W Sls.	913-649-4411
La	Bossier City, Jeanes Enterprises	318-746-8033
La	Metairie, Jeanes Enterprises	504-721-6221
Me	S. Berwick, Electrical Agencies	207-384-5321
Mass	S. Boston, Electrical Agencies	617-268-9300
Mich	Dearborn, D.P. Seyfried Co.	313-274-4900
Minn	Edina, W.L. Ruth & Assoc.	612-941-6350
Miss	Jackson, Jeanes Enterprises	601-956-7462
Mo	St. Louis, R.E. Kennedy Co.	314-965-7650
Neb	Omaha, A. Sell & Assoc.	402-391-4068
NM	Albuquerque, T. Deskin & Assoc.	505-242-3581
NY	Jamaica, Warshaw Electric	212-525-8150
NY	Loudenville, Mills, Talbot Co.	518-458-1297
NY	Rochester, Mills, Talbot Co.	716-244-1311
NC	Cary, F. Woods Agency	919-467-6366
Ohio	Cincinnati, J.G. Gates Co.	513-521-4335
Ohio	Cleveland, K.R. Dodge Co.	216-461-6482
Okla	Oklahoma City, And Power Sls.	405-751-5861
Ore	Portland, Northwest Agencies	503-227-5004
Pa	Drexel Hill, W.B. Siegfried Assoc.	215-353-2000
Pa	Pittsburgh, H.E. Ransford Co.	412-884-3425
SC	Lexington, F. Woods Agency	803-356-3738
Tenn	Memphis, Jeanes Enterprises	901-386-7850
Tex	Arlington, F.A. Roso Co.	817-461-7903
Tex	Houston, J.M. Johnson Co.	713-688-2236
Utah	Salt Lake City, Melville Sls. Co.	801-363-3363
Va	Ashland, Campbell & Assoc.	804-798-4743
Va	Roanoke, Campbell & Assoc.	703-343-6452
Wash	Seattle, Northwest Agencies	206-623-8882
WVa	Charleston, H.E. Ransford Co.	304-342-3203
Wisc	Milwaukee, A.W. Schwind Co.	414-276-9988

TELEDYNE PHILBRICK, 17 Allied Dr. Rte 128, Dedham, Mass., 02026, Tel: 617-329-1600, TWX: 710-348-6726; Empl.: 250; Minimum order: $25 p. 1•208-217

For info on price: Cust Svc; Application info: F. Goodenough; Delivery info: Cust Svc

Products manufactured: Amplifiers, Converters, Dividers, Generators, Inverters, Power Supplies, Regulators

Local Sales Offices & Reps.

Ala	Huntsville, Incotech, Inc.	205-837-6061
Ariz	Phoenix, Zeus, Inc.	602-258-7519
Cal	Culver City, DeAngelo Rothman & Co..	213-391-2694
Cal	Redwood City, J.S. Heaton Co.	415-369-4671
Colo	Englewood, Zeus, Inc.	303-770-4400
Conn	E. Hartford, Tekdata, Inc.	203-525-7647
Fla	Boca Raton, Conley Assocs.	305-395-6108

Fla	Oveido, Conley & Assocs.	305-365-3283
Fla	Tampa, Conley & Assocs.	813-933-3183
Haw	Kailua, Lanikai Elctrns.	808-262-6286
Ill	Chicago, Data Elctrns. Co.	312-283-0303
Ind	Indianapolis, Data Elctrns. Co.	317-784-6360
Kans	Mission, Mid-West Mktg.	913-384-3737
Md	Kensington, Elctrn. Mktg. Assocs.	301-881-5300
Mass	Burlington, Tek Data	617-273-0198
Mich	Farmington, Carter, McCormick & Peirce	313-477-7700
Mich	Kalamazoo, Carter, McCormic & Peirce	616-349-9666
Minn	Minneapolis, Data Elctrns. Co.	612-786-9666
Mo	Florissant, Mid-West Mktg.	314-831-0342
NM	Albuquerque, Zeus, Inc.	505-256-9831
NY	Elmont, Crane & Egert	516-488-2100
NY	N. Syracuse, KLM Assocs.	315-458-6214
NY	New Hartford, KLM Assocs.	315-735-8525
NY	Rochester, KLM Assocs.	716-442-0820
NC	Raleigh, Condor Co.	919-876-4999
Ohio	Cleveland, Carter, McCormick & Peirce	216-333-5650
Ohio	Dayton, Carter, McCormic & Peirce	513-278-5873
Okla	Norman, Data Mktg.	405-364-8320
Pa	King of Prussia, Elctrn. Mktg. Assocs.	215-265-1600
Pa	Pittsburgh, Carter, McCormick & Peirce	412-824-3760
SC	Myrtle Beach, Candor Co.	803-448-5213
Tenn	Chattanooga, Candor Co.	615-894-7454
Tex	Dallas, Data Mktg. Assocs.	214-661-0300
Tex	Houston, Data Mktg.	718-686-9627
Tex	San Antonio, Data Mktg. Assocs.	512-828-0937
Utah	Salt Lake City, Zeus, Inc.	801-486-2317
Wash	Redmond, Desco, N.W.	206-455-9325
FOR:	Can., Downsview, Ont., Cesco Elctrns. Ltd.	416-661-0220
FOR:	Can., Montreal 301, Que., Cesco Elctrns. Ltd.	514-735-5511
FOR:	Can., Ottawa, Ont., Cesco Elctrns. Ltd.	613-729-5118
FOR:	Can., Quebec, Que., Cesco Elctrns. Ltd.	418-524-4641
FOR:	Can., Vancouver 15, B.C., Intek Elctrns. Ltd.	604-324-6831

TELEDYNE RELAYS, 3155 W. El Segundo Blvd., Hawthorne, Cal, 90205, Tel: 213-973-4545, TWX: 910-325-6600; Empl.: 302 .... p. 1•1818-1824

Customer service: C. Criswell

Free literature available: Product catalog containing tabulated listing of military TO-5, commercial TO-5, mini-T, solid state industrial, solid state military, and hardware. A condensed form is available, known as our "short form catalog".

Products manufactured: Relays, Sockets

Local Sales Offices & Reps.

Ariz	Scottsdale, Sls. Engrg. Inc.	602-945-5781
Cal	Hawthorne, Teledyne Relays	213-973-4545
Cal	San Mateo, Teledyne Relays NORCAL	415-574-1915
Colo	Englewood, Todd Assoc. Inc.	303-761-7801
Conn	Stratford, G. Rosen Co.	203-375-5456
Fla	Satellite Beach, Reynolds & Assocs.	305-773-4700
Ill	Downers Grove, Teledyne Relays, MWRO	312-964-1950
Ill	Mt. Prospect, Delta Tech. Sls.	312-437-9412
Ind	Indianapolis, Ihrig Assocs.	317-783-7630
Kans	Overland Pk., Ensco Rep.	913-381-7557
Mass	Framingham, G. Rosen Co.	617-879-5505
Mich	Birmingham, J.C. Hofstetter Co.	313-643-7203
Mich	Grand Rapids, J.C. Hofstetter Co.	616-942-0650
Minn	Minneapolis, S. Clothier Co.	612-888-4666
Mo	Kansas City, Harris-Hanson	816-444-9494
Mo	St. Louis, Ensco-Rep.	314-567-3935
NJ	Eatontown, Teledyne Relays	201-542-6884
NM	Albuquerque, A.Q. Elctrns.	505-255-8701
NY	Mount Vernon, Friedman-Smith Elctrns.	914-664-4866
NY	Syracuse, I.A. Hotze Co.	315-479-6641
NC	Raleigh, R.W. Mitscher Co.	919-828-0575
Ohio	Dayton, J.C. Hofstetter Co.	513-296-1010
Ohio	Medina, J.C. Hofstetter Co.	216-241-4880
Pa	Bala Cynwyd, Vantage Sls. Co.	215-667-0990
Tenn	Shelbyville, R.W. Mitscher Co.	615-684-4544
Tex	El Paso, A.Q. Elctrns.	915-545-2363
Tex	Houston, Vista Assocs.	713-661-0119
Tex	Richardson, Vista Assocs.	214-235-4547
Va	Alexandria, Potomac Elctrns. Inc.	703-836-1630
Wash	Bellevue, W.M. Buehler Co.	206-455-5512
FOR:	Can., St. Laurent, Que., A. Deskin Sls.	514-331-2860
FOR:	Canada, Malton, Ontario, A. Deskin Sls.	416-677-5517
FOR:	Canada, Vancouver, B.C., A. Deskin Sls.	604-324-6331

Local Distributors

Ariz	Phoenix, Kierulff Elctrns., 2633 E. Buckeye Rd.	602-273-7331
Ariz	Phoenix, Liberty Elctrns., 3130 N. 27th Ave.	602-257-1272
Cal	El Segundo, Liberty Elctrns., 124 Maryland St.	213-322-8100
Cal	Los Angeles, Kierulff Elctrns., 2585 Commerce Way	213-685-5511
Cal	Mt. View, Elmar Elctrns., 2288 Charleston Rd.	415-961-3611
Cal	Palo Alto, Kierulff Elctrns., 3969 E. Bayshore Rd.	415-968-6292
Cal	San Diego, Kierulff Elctrns., 8797 Balboa Ave.	714-278-2112
Cal	San Diego, Liberty Elctrns., 8248 Mercury Ct.	714-565-9171
Colo	Commerce City, Elmar Denver Elctrns., 6777 E. 50th Ave.	303-287-9611
Colo	Denver, Kierulff Elctrns., 10890 E. 47th Ave.	303-371-6500
Fla	Orlando, Milgray/Florida, 5400 Diplomat Cir.	305-647-5747
Ill	Rosemont, Advent Elctrns., 7110 Lyndon St.	312-298-4210
Ind	Indianapolis, Pioneer/Indianapolis, 6408 Castle Place Dr.	317-849-7300
Kans	Overland Park, Milgray/Kansas City Inc., 6901 W. 63rd St.	913-236-8800
Md	Hyattsville, Milgray/Washington, 5405 Lafayette Pl.	301-864-1111
Md	Rockville, Pioneer/Maryland, 1037 Taft St.	301-424-3300
Mass	Boston, Demambro Elctrns., 1095 Commonwealth Ave.	617-787-1200
Mass	Burlington, Milgray/New England, 79 Terrace Hall Ave.	617-272-6800
Mich	Romulus, Pioneer/Michigan, 6337 N. Beverly Plaza	313-525-1800
NM	Albuquerque, Elmar Elctrns., 2632 Pennsylvania N.E.	505-292-1111
NJ	Cherry Hill, Milgray/Delaware Valley, 1165 Marlkress Rd.	609-424-1300
NY	Buffalo, Summit Dist., 916 Main St.	716-884-3450
NY	Freeport, Milgray Elctrns., 191 Hanse Ave.	516-546-6000
Ohio	Cleveland, Milgray/Cleveland, 1821 E. 40th St.	216-881-8800
Ohio	Cleveland, Pioneer/Cleveland, 4800 E. 131st St.	216-587-3600
Ohio	Dayton, Pioneer/Dayton, 1900 Troy St.	513-236-9900
Pa	Philadelphia, Milgray/Delaware Valley	215-228-2000
Pa	Pittsburgh, Pioneer/Pittsburgh, 560 Alpha Dr.	412-782-2300
Tex	Dallas, Solid State Elctrns., 2643 Manana Dr.	214-352-2601
Tex	Houston, Solid State Elctrns., 6400 Westpark Dr.	713-785-5436
Wash	Seattle, Kierulff Elctrns., 5940 Sixth Ave. S.	206-763-1550
Wash	Seattle, Liberty Elctrns. N.W., 5305 Second Ave. S.	206-763-8200
For:	Can., Malton, Ont., A. Deskin Sls., 2759 Thamesgate Dr.	416-677-5517
For:	Can., St. Laurent, Que., A. Deskin Sls., 290 Benjamin Hudon St.	514-331-2860
For:	Can., Vancouver, B.C., A. Deskin Sls., 272 S.W. Marine Dr.	604-324-6331

TELEDYNE SEMICONDUCTOR, 1300 Terra Bella Ave., Mountain View, Cal., 94040, Tel: 415-968-9241, TWX: 910-379-6494; Empl.: 2000

Customer service: Prod. Mktg. Group

Products manufactured: Amplifiers, Circuits, Hybrid, Thin-Film, Circuits, Integrated, Silicon Monolithic, Unpackaged Chips, Comparators, Converters, Diodes, Discharge Systems, Energy, Integrated Circuit Devices, IC's, Active Filters, Lamp Drivers, Memory Systems, Multiplexers, Power Supplies, Rectifiers, References, D-C Voltage, Regulators, Semiconductor Wafer Fabrication, Timers, Transistors

Local Sales Offices & Reps.

Ala	Huntsville, Incotech	205-837-6061
Ariz	Tempe, Sedco Sls.	602-968-7791
Cal	Escondido, Cirolia Elctrn. Sls.	714-743-3015
Cal	Hawthorne, Teledyne Semiconductor	213-973-4551
Cal	Mountain View, Teledyne Semiconductor	415-965-1455
Cal	Redwood City, J.S. Heaton Co.	415-369-4671
Cal	Santa Ana, Rical Assocs.	714-557-6543
Colo	Denver, Walker Assocs.	303-623-8713
Fla	Maitland, H.H. Peregoy	305-831-2474
Fla	Pompano Beach, H.H. Peregoy	305-943-9593
Ill	Des Plaines, Teledyne Semiconductor	312-299-6196
Ind	Fort Wayne, Given Corp.	219-432-5585
Iowa	Cedar Rapids, PMA Corp.	319-362-9177
Kans	Overland Park, PMA Corp.	913-381-0004
Kans	Wichita, PMA Corp.	316-264-2662
Md	Baltimore, Burgin-Kreh Assocs.	301-788-5200
Md	Towson, Teledyne Semiconductor	301-825-1920
Mass	Bedford, Teledyne Semiconductor	617-275-2070
Mass	Waltham, Dynasel Assoc.	617-890-6777
Mich	Benton Harbor, R.C. Nordstrom	616-857-4653
Mich	Lathrup Village, R.C. Nordstrom	313-559-7373
Minn	Minneapolis, Teledyne Semiconductor	612-888-0540
Mo	Hazelwood, PMA Corp.	314-731-4334
NJ	Fort Lee, Tech-Sales Corp.	201-944-3642
NJ	Haddonfield, Sundzy O'Brien	609-429-4013
NY	Buffalo, Bowser & Sapecky Assocs.	716-839-4170
NY	Manlius, Bowser & Sapecky Assocs.	315-682-8885
NY	Poughkeepsie, Teledyne Semiconductor	914-471-9322
NC	Winston-Salem, Burgin-Kreh Assocs.	919-768-4174
Ohio	Dayton, N. Bear Corp.-Bear Mktg.	513-299-3566
Ohio	Richfield, N. Bear Corp.-Bear Mktg.	216-659-3131
Tex	Dallas, Evans-McDowell Assocs.	214-238-7157
Tex	Houston, Evans-McDowell Assocs.	713-772-1257
Va	Lynchburg, Burgin-Kreh Assocs.	804-845-5600
Wash	Bellevue, SD. R2	206-747-9424

TELEMET CO., 185 Dixon Ave., Amityville, N.Y., 11701, Tel: 516-541-3600, TWX: 516-227-9850; Empl.: 80; Minimum order: $25

Customer service: A. Bolletino

Free literature available: 1) Full Catalog Of All Products 2) Individual Data Sheets Of All Products 3) Short Form Catalog - Video Test Equipment 4) Short Form Catalog - Video Switching Equipment

Products manufactured: Amplifiers, CATV Systems & Equipment, Demodulators, Generators, Modulators, All Kinds, Television Systems & Equipment Closed-Circuit, Test Equipment

Local Sales Offices & Reps.

Cal	Riverside	714-683-0641
Ga	Atlanta	404-294-5809
NY	Brewster	914-279-3231
Ohio	Cleveland Heights	216-321-7523
Tex	Dallas	214-241-0928
EXP:	Amityville, N.Y.	516-541-3600

TELESIS LABORATORY, Box 387, 41 1/2 S. Paint St., Chillocothe, Ohio, 45601, Tel: 614-773-1414; Empl.: 5

For info on price: J. Robertson; Application info: J. Robertson; Customer service: D. Ortmman; Delivery info: S. Harding

Free literature available: Brochures describe product technical specifications and application suggestions

Products manufactured: Amplifiers, Analyzers, Counters, Data Acquisition & Reduction Systems, Keyboards, Alphanumeric & Decimal, Meters, Oscillators, Switches

TELETYPE CORP., 5555 Touhy Ave., Skokie, Ill., 60076, Tel: 312-982-2000, TWX: 910-223-3611; Empl.: 5,000

Customer service: Sls. Dept.

Products manufactured: Comm. Systems, Teleprinters, Teletypewriters & Equipment, Terminals, Data Display (including Alphanumeric & Graphic)

Local Sales Offices & Reps.

Cal	City of Commerce	213-724-6040
NJ	Fairfield	201-575-8240

TELEVISION MICROTIME, INC., 1280 Blue Hills Ave., Bloomfield, Conn., 06002, Tel: 203-242-0761, TWX: 710-425-2390; Empl.: 80

For info on price: E. J. Dahl; Application info: D. E. Acker; Customer service: J. L. Stickley; Delivery info: V. Mellon

Free literature available: Applications notes on time base; correction systems for video tape recorders.

Products manufactured: Amplifiers, CATV Systems & Equipment, Delay Lines, Networks, Television Systems & Equipment Closed-Circuit

TELEX COMMUNICATIONS, INC., 9600 Aldrich Ave., So., Minneapolis, Minn., 55420, Tel: 612-884-4051

For info on price: J. Dow 612-884-4061; Customer service: A. Vikla 612-884-4061; Delivery info: S. Chaika 612-844-4061

Free literature available: ED2151 - Educational Headphones; ED2227 - Cassette Equipment; ED2268 - Tape Duplicating System; BI2230 - Broadcast/Indust. Tape Equip.; BI2166 - Communication Headphones; BI2313 - TMS100 - 16 hr Cartridge Changer; BI2252 - 1400 Professional Tape Equip.; AP2118 - Pilots Microphones & Headsets.

Products manufactured: Amplifiers, Comm. Systems, Duplicators, Handsets, Chestsets, Headphones, Headsets, Etc., Microphone Accessories (Including Stands, Holders, Booms), Microphones, All Kinds, Recorders, Tape Recording Accessories, Transducers

Local Sales Offices & Reps.

Cal	Burbank, Koessler Sls., Inc.	213-849-5716
Cal	Oakland, H. Gabriel Rep. Co.	415-465-5361
Cal	West Covina, J.F. Northcutt Co.	213-331-2447
Colo	Denver, McLoud & Raymond Co.	303-756-1589
Fla	Miami, World Wide Prods.	305-754-5475
Ga	Chamblee, Techn. Sys.	404-457-0426
Ill	Lincolnwood, Wm. M. Linz Co.	312-677-2000
Ill	Romeoville, P. Bunker	815-838-1023
Ind	Indianapolis, Sukup & Cox, Inc.	317-253-1215
Iowa	Atlantic, Kimian Sls. Co.	712-243-1626
Kans	Prairie Village, Roach, Spencer & Assocs.	913-432-3700
Md	Baltimore, D. Brothers Co.	301-764-7189
Mass	Wellesley Hills, M. Scott Co.	617-235-0102
Mich	Detroit, Riley & Petchell Sls., Inc.	313-838-9100
Mo	Chesterfield, Roach, Spencer & Assoc.	
NY	Flushing, Bettan Sls., Inc.	212-969-7600
NY	Rochester, Marsey Sls., Inc.	716-442-9700
NY	Woodhaven, Alan Sarfaty	212-846-1952
Ohio	Cleveland, Imtech	216-826-3400
Okla	Tulsa, J.Y. Schoonmaker	918-936-1432
Pa	Newtown Square, G.M. Conneen Co.	215-353-2241
Tex	Dallas, J.Y. Schoonmaker	214-357-8481
Tex	Houston, J.Y. Schoonmaker	713-926-9510
Wash	Seattle, Fleehart & Sullivan	206-522-1533

TELONIC ALTAIR, Box 277, Laguna Beach, Calif., 92652, Tel: 714-494-9401, TWX: 910-596-1320; Empl.: 130; Minimum order: $25

For info on price: Mktg. Dept.; Application info: Mktg. Dept.; Customer service: Order Control; Delivery info: Order Control

Free literature available: Catalog 57 June 1973 Filters, Attenuators, Components, RF & Microwave Brochures: Telonic Attenuators; Telonic Sweep Generators 1200 Series; Telonic Sweep Generator Accessories & VSWR Measurement Systems; Telonic Sweep/Signal Generators Modular 2003 Series; Telonic Test Instrumentation for TV & Radio Production.

Products manufactured: Amplifiers, Attenuators, Bridges, Calibrators, Detectors, Filters, Generators, Impedance Converters, Microwave, Kits, Test Equipment, Meters, Monitors, Oscilloscopes, Preselectors, Tees, Terminals, Test Equipment

Local Sales Offices & Reps.

Ala	Huntsville, Gentry Assocs.	205-534-9771
Ariz	Scottsdale, J. Smith Assocs.	602-947-2495
Cal	Cupertino, T. L. Snitzer Co.	408-257-8333
Cal	Del Mar, T. L. Snitzer Co.	714-454-2191
Cal	Los Angeles, T. L. Snitzer Co.	213-836-6170
Fla	Orlando, Gentry Assocs.	305-894-4401
Haw	Honolulu, Harkon Hawaii	808-538-7178
Ill	Northfield, Torkelson Assocs.	312-446-9085
Ind	Indianapolis, Torkelson Assocs.	317-244-7867
Kans	Lenexa, S. Sterling Co.	913-888-2995
Md	Lanham, Brimberg Assocs.	301-552-2200
Mass	Needham, Addelco Corp.	617-444-4754
Mich	Detroit, S. Sterling Co.	313-255-1970
Minn	Minneapolis, Torkelson Assocs.	612-835-2414
Mo	St. Louis, S. Sterling Co.	314-542-3636
NM	Albuquerque, J. Smith Assocs.	505-255-2111
NY	Flushing, F & F Associates	516-334-1160
NY	Syracuse, Tesco Assocs.	315-463-4566
NC	Burlington, Gentry Assocs., Inc.	919-227-3639
Ohio	Cleveland, S. Sterling Co.	215-442-8080
Pa	Ambler, WM Assocs.	215-643-4119
Tex	Dallas, Texas Avionics Co.	214-368-3566

TELREX LABS., Asbury Park, N.J., 07712, Tel: 201-775-7252; Empl.: 15; Minimum order: $25

For info on price: C. C. Ercolino; Application info: C.C. Ercolino; Customer service: N.V. Ercolino; Delivery info: N. V. Ercolino

Free literature available: Commercial Brochure Describing the various communication antennas & systems.

Products manufactured: Antenna Rotators, Antenna Towers & Supports, Antennas, Cable, Transformers

TELSTAR ELECTRONICS CORP., 700 Hummel Ave., Southold, N.Y., 11971, Tel: 516-765-9292; Empl.: 15

Customer service: R. S. Marston

Products manufactured: Clocks (All Types), Data Acquisition & Reduction Systems, Data Loggers, Hydrophones & Accessories, Multiplexers, Oceanographic Equip. (Electronic), Printers, Receivers, Scanners

TELTRON, 940 Willow St., Pottstown, Pa., 19464, Tel: 215-326-2127; Empl.: 22; Minimum order: $35

Application info: C. A. Mock 215-326-2128; Customer service: Cust. Serv. Dept.; Delivery info: J. Mauger, Jr. 215-326-2127

Products manufactured: Cameras, CATV Systems & Equipment, Coils Including Assemblies & Forms, Television Systems & Equipment Closed-Circuit, Tubes, X-Ray Inspection Equipment, Yokes

Local Sales Offices & Reps.

Cal	Pasadena, A-F Sls. Engrg.	213-681-5631

Local Distributors

Ark	El Dorado, Ind. Elctrn., 413 W. Main St.	501-862-4901
Cal	Culver City, JSH Elctrns., 8549 Higuera St.	213-837-0177
Conn	Rockville, Denson Elctrns., Longview St.	203-875-5198
Del	Dover, Elctrnc. Surveillance, 20 Lockerman	302-284-9421
La	Kenner, MAR Elctrns., 3521 E. La. State	504-729-4524
Me	Auburn, Audio Serv., Box 393	207-783-8801
Mich	Detroit, R. P. Hermes Co., 9600 Whittier	313-886-4566
NJ	Elizabeth, Thor Elec. Corp., 741 Livingston	201-354-2420
NJ	Elizabeth, Unity Elctrns., 107 Trumbull	201-351-4200
NM	Albuquerque, Integrated Sys., 142 Monroe NE	505-255-8127
NY	Ossining, Dodd Elctrns., Snowden Ave.	914-762-4200
NY	Rosedale, Temtron Elctrns., 138-91 Francis Lewis	212-978-5896
Ohio	Dayton, Dayton Communications, 2971 Bluefield	513-278-7937
Pa	Reading, Beil-Whitaker, Inc., 3623 Jacksonwald	215-779-2610
Va	Arlington, Concord Communications, 1203 N. Highland	703-525-5777

TELVAC INSTR. CO., 14614 Raymer St., Van Nuys, Cal., 91405, Tel: 213-994-9471; Empl.: 3

Customer service: L. Ratcliff

Free literature available: Product Catalog

Products manufactured: Soldering Accessories, Testers, Tools, Tweezers, Hand & Vacuum

Local Sales Offices & Reps.

Ill	Hinsdale, Hill-Gray Assocs.
Md	Baltimore, Milan Assoc., Inc.
Mass	Babson Park, P.R. Sturgeon Co., Inc.
NY	Mineola, L.I., Willco Sls.
NY	Syracuse, E. Dutcher

TEMPIL DIV., Hamilton Blvd., So. Plainfield, N.J., 07080, Tel: 201-757-8300, Telex: 138-662; Empl.: 30

For info on price: A. F. Flevry; Application info: M. Olesin; Customer service: J. A. Lamb; Delivery info: J. A. Lamb

Products manufactured: Coatings, Crayons, Coatings, Pellets, etc., Temperature Indicating, Heat Sinks, Soldering, Labels, Temperature Indicating, Monitors, Paints

TEMPLEMAN, D.R. CO., 8 Park St., Plainville, Conn., 06062, Tel: 203-747-2709; Empl.: 30

Customer service: O. W. Bray

Products manufactured: Forms, Wire, Rings, Retaining, Springs (All Types)

TEMPLINE, 17209 South Broadway, Gardena, Cal., 90248, Tel: 213-324-6969; Empl.: 20

Customer service: T. R. Anderson

Products manufactured: Amplifiers, Bobbins, Winding, Coil & Transformer, Bridges, Cable Assemblies & Harnesses, Coils Including Assemblies & Forms, Controls/Control Eqpt., Heaters & Heating Elements, Indicators, Probes, Signal Conditioners & Equipment, Thermistors, Thermocouples, Elements & Accessories, Thermometers, Resistance, Transducers, Transmitters, Wire

Local Sales Offices & Reps.

Cal	San Diego, L.L. Stoakes, Inc.	714-274-6281
Conn	Hamden, Northeast Engrg. Inc.	203-248-4481
Md	Silver Springs, Spectroscopy Sys.	307-949-8261
Mass	Danvers, Northeast Engrg., Inc.	617-774-3070
NM	Albuquerque, Telemetry Sls. Corp.	505-266-7861
NY	Manhasset, Northeast Engrg. Inc.	516-365-9633
Ohio	Englewood, Gemini, Inc.	513-890-5394
Tex	Trinidad, Telemetry Sls. Corp.	214-778-2533

TEMPO INSTRUMENT, INC., 51 E. Bethpage Rd., Plainview, N.Y., 11803, Tel: 516-694-4400, TWX: 510-224-6421; FSC No: 07031; Empl.: 140; Minimum order: $25

For info on price: B. Tuttle; Application info: R. D. Egyud; Customer service: B. Tuttle; Delivery info: B. Tuttle

Products manufactured: Cable Fault Locators, Calibrators, Comparators, Controls/Control Eqpt., Detectors, Dividers, Flashers, Generators, Locators, Open-Short, Meters, Monitors, Regulators, Relays, Switches, Timers, Transducers

Local Sales Offices & Reps.

Industrial Prods. Group.

Cal	City of Commerce, Pacific Scientific Co.	213-927-5333
Cal	San Carlos, Pacific Scientific Co.	415-592-6300
Mich	Farmington, Electro-Matic Co.	313-477-7270
NJ	Hohokus, Alto	201-447-1770
NY	Rochester, H.C. Johnson	716-482-3000
Ohio	Cincinnati, Luebbe Sls. Co.	513-871-4211
Ohio	Cleveland, Luebbe Sls. Co.	216-333-0425

Military Prods. Group.

Cal	Chatsworth, Tempo	213-993-1311
Conn	Essex, Lafage Assocs.	203-767-0465
Fla	North Pinellas Park, Russell Assocs.	813-526-1134
Ill	Northbrook, Raines/Brin Assocs.	312-498-0890
Md	Baltimore, Coulbourn-DeGreif Co., Inc.	301-247-4646
Md	Baltimore, Stemler	301-944-8262
Mass	Newton, Daner/Hayes, Inc.	617-969-4650
Mass	Woburn, Stockwell Tech. Sls.	617-935-5770
Mich	Southfield, Luebbe Sls. Co.	313-357-0355
Mo	Kansas City, PEM Sls. Co.	816-333-6012
Mo	St. Louis, PEM Sls. Co.	314-434-4425
NJ	Cherry Hill, Stemler Assoc.	609-966-4070
NJ	Clifton, Avionics Equip. Inc.	201-772-1956
NY	Bayshore, Russell Assocs.	516-666-6500
NY	Buffalo, Russell Assocs.	716-634-3377
Ohio	Cincinnati, Luebbe Sls. Co.	513-871-4211
Ohio	Dayton, Luebbe Sls. Co.	513-294-0426
Pa	Audubon, Daner/Hayes, Inc.	215-666-5005
Tex	Arlington, Cal-Tex Ind.	817-461-0303
Va	Alexandria, Stemler	703-548-7818
Wash	Bellevue, M. Poggi Co.	206-454-2323
EXP:	NYC, Aero-Spectrum Inc.	212-752-4770

TEMPTRONIC CORPORATION, 40 Glen Ave., Newton, Mass., 02159, Tel: 617-965-3420, Telex: 92-2526; Empl.: 30; Minimum order: $25

For info on price: H. Lyden; Application info: T. Gerendas; Customer service: F. Healy; Delivery info: J. Crozier

Free literature available: ThermoSpot for testing components at temperature right on the tester -70/+200° C, ThermoChuck for testing wafers, chips, hybrids at temperature right on the prober -60/+300° C, ThermoStream for testing modules, circuitboards at temperature right on the tester -60/+200° C.

Products manufactured: Baths, Controlled Temperature (Air & Liquid), Chamber, Environmental Test, Controls/Control Eqpt., Cooling/Heating Modules, Thermoelectric, Heat Exchangers & Systems, Machines/Machinery, Production, Semiconductor Wafer Fabrication, Test Systems

Local Sales Offices & Reps.

Cal	Palo Alto, Coherent Mktg. Assocs.	415-327-2217
Fla	Longwood, Lenz Engrg. Co.	305-831-9797
Ill	Des Plaines (Chicago), Cozzens & Cudahy, Inc.	312-298-3600
Ind	Indianapolis, Cozzens & Cudahy, Inc.	317-244-2456
Kans	Kansas City, Cozzens & Cudahy	816-454-5836
Md	Rockville, Ed Winston & Co.	301-881-5780
Minn	Minneapolis, Cozzens & Cudahy, Inc.	612-884-4336/7
Mo	St. Louis, Cozzens & Cudahy, Inc.	314-423-1234
NY	Elmont, Crane & Egert Corp.	516-488-2100
Tex	Dallas, Comspec, Inc.	214-234-4137
Tex	Houston, Comspec, Inc.	713-461-4487

TEMTRON ELEXS, 138-69 Francis Lewis Blvd., Rosedale, N.Y., 12472, Tel: 212-978-5896; Empl.: 12; Minimum order: $25

For info on price: H. Schwartz 212-978-5896; Application info: A. Sussman 201-224-6146; Customer service: C. Mann 212-978-5896; Delivery info: M. Ramirez 212-978-5896

Free literature available: Catalogue which contains our receiving & industrial tubes and camera tubes.

Products manufactured: Transistors, Tubes

Local Sales Offices & Reps.

NJ	Hackensack, C. Mayer Assocs.	201-487-3113
NY	Huntington, C. Mayer Assocs.	516-921-7876

TENNELEC, INC., Box D, Oak Ridge, Tenn., 37830, Tel: 615-483-8404, TWX: 810-572-1018; Empl.: 200; Minimum order: $50

For info on price: J. Bradley; Application info: B. Stark; Customer service: R. Chambers; Delivery info: J. Bradley

Products manufactured: Amplifiers, Analyzers, Converters, Counters, Data Acquisition & Reduction Systems, Data Loggers, Detectors, Generators, Power Supplies, Prescalers, Receivers, Scalers, Binary, Decade, Timers

Local Sales Offices & Reps.

Cal	La Canada, Spectrum Sciences	213-790-1181
DC	Washington, Scientific Sys. Sls. Corp.	202-726-4161
Fla	Jacksonville, Pulcir, Inc.	904-743-5700
Ill	Mt. Prospect, Contemporary Science, Inc.	312-255-3793
Mass	Burlington, Scientific Sys. Sls. Corp.	617-273-1660
NM	Albuquerque, V. Roberts Assocs.	505-345-2486
NY	Port Chester, Radiation Elctrns., Inc.	914-937-2300
NY	Syosset, Scientific Sys. Sls. Corp.	516-921-3737
Ohio	Westerville, Contemporary Science, Inc.	614-882-6908
Tenn	Knoxville, Pulcir, Inc.	615-693-3641
Tex	Dallas, Overall Engrg.	214-233-2311
Wash	Seattle, Spectrum Sciences	206-624-2373

TENNEY ENGRG., INC., 11000 Springfield Rd., Union, N.J., 07083, Tel: 201-686-7870, TWX: 710-985-4725; Empl.: 175; Minimum order: $25

For info on price: F. H. Gardner; Application info: F. H. Gardner; Customer service: F. Paulauskas; Delivery info: F. H. Gardner

Free literature available: 101 THJR, 102 Vibration, 104 T-14,40,64, 105 Agree 106 T-5, 107 MR-1 Bath, 108 T-JR, 109 T & TH-10 & 27, 110 "S" Vacuum, 112 Space JR, 113 Walk-in Rooms, 117 Tenneyzphere, 118 Tenneystrat, 121 Thermal Shock, 123 Bench Master R, 124 Tempgard R, 125 MR-9 Bath, 126 Tenneyten, 127 Tenneythirty.

Products manufactured: Alarms, Baths, Controlled Temperature (Air & Liquid), Chamber, Environmental Test, Controls/Control Eqpt., Cooling/Heating Modules, Thermoelectric, Dehumidifiers (For Equipment), Ovens, Refrigerators, Environmental Test, Testers

Local Sales Offices & Reps.

Ala	Huntsville, FM Assocs.	205-536-9990
Ariz	Scottsdale, Williams Assocs.	602-947-4297
Cal	Menlo Park, Long Assocs.	415-327-1300
Cal	Van Nuys, Environment Assocs.	213-994-1404
Colo	Denver, Williams Assoc.	303-373-4730
Conn	Hamden, Equipment Sls. Co.	203-248-5581
Fla	Lake Worth, I. R. Associates	305-655-3392
Fla	Orlando, FM Assocs.	305-851-5710
Ill	Des Plaines, Marsland Assocs.	312-298-2620
Ind	Indianapolis, Marsland Assocs.	317-924-3568
Md	Lanham, Brimberg Assocs.	301-552-2200
Mass	Chelmsford, Equip. Sls.	617-256-8547
Minn	Minneapolis, Marsland Assocs.	612-545-4481
Mo	Kansas City, Marsland Assocs.	816-765-0641
Mo	St. Peters, Marsland Assocs.	314-278-6949
NJ	Moorestown, Salem Scientific	609-235-4565
NM	Albuquerque, Williams Assocs.	505-255-1638
NY	Fayetteville, M.P. Andrews	315-637-3144
NC	Greensboro, FM Assocs.	919-294-2754
Ohio	Cleveland, Dietrich & Assocs.	216-781-1855
Ohio	Dayton, Dietrich & Assocs.	513-223-6042
Ore	Beaverton, Showalter Instr. Inc.	503-646-8946
Pa	Pittsburgh, Dietrich & Assocs.	412-892-2992
Tex	Dallas, Carey, Wolf & Assocs.	214-823-5383
Tex	Ft. Worth, Carey, Wolf & Assoc.	817-738-1996
Tex	Houston, Carey, Wolf & Assoc.	713-721-2442
Wash	Bellevue, Showalter Instr. Inc.	206-455-4922

TENOR CO., INC., 17020 W. Rogers Dr., New Berlin, Wisc., 53151, Tel: 414-782-3800; Empl.: 35; Minimum order: $25

For info on price: P. Yoblin; Application info: Sls. Engrg.; Customer service: P. Yoblin; Delivery info: P. Yoblin

Free literature available: Bull. 200A, 250A, 2410-2420 - Stepping drum programmers; Bull. 700A - Solid state logic cards.

Products manufactured: Cards, Logic, Controls/Control Eqpt., Counters, Modules, Logic, Encapsulated, Programmers, Switches, Timers

TEN-TEC INC., Industrial Park, Sevierville, Tenn., 37862, Tel: 615-453-7172; Empl.: 60; Minimum order: $10

For info on price: D. Tomcik; Application info: J. Bruchfield; Customer service: J. Beeler; Delivery info: D. Tomcik

Products manufactured: Amplifiers, Cabinets & Accessories, Calibrators, Cases, Equipment, Instrument, Meter, Comm. Systems, Power Supplies, Receivers, Transceivers, Transmitters

TERADO CORP., 1068 Raymond Ave., St. Paul, Minn., 55108, Tel: 612-646-2868; Empl.: 25; Minimum order: $10

For info on price: S. D. Munson; Application info: W. M. Sorenson; Customer service: J. Wickstrom; Delivery info: F. B. Albright

Free literature available: D.C. to A.C. inverters, standby power systems, voltage adjusters, battery chargers, D.C. power supplies, portable A.C. power supplies.

Products manufactured: Batteries, Chargers, Battery, Converters, Inverters, Power Supplies, Regulators, Transformers, Vibrators

Local Sales Offices & Reps.

Cal	Redwood City, Sinai/Johnson, Inc.	415-365-6263
Cal	Torrance, Barstow & Doran Inc.	213-325-4140
Ill	Chicago, Weisz Assocs.	312-637-9117
Mass	Northboro, W.B. Pray Sls., Inc.	617-393-3434
Minn	Mpls., A. J. Warner	612-729-7371
NJ	Caldwell, Art Cerf & Co.	201-226-2263
NY	Plainview, Morhan Exporting Corp.	516-293-5582
Tex	Dallas, Maynard Sls. Co.	214-742-2384

TERADYNE, INC., 183 Essex St., Boston, Mass., 02111, Tel: 617-482-2700, TWX: 710-321-1055; Empl.: 1300

Customer service: Sls. Dept.

Free literature available: GENERAL CATALOG-describes all of Teradyne's automatic test systems and instruments for electronic device and subassembly users and manufacturers.
The catalog also describes Teradyne's laser trimming systems.

Products manufactured: Connectors, Sockets, Test Systems, Testers

Local Sales Offices & Reps.

Ariz	Tempe, Teradyne	602-967-7549
Cal	Chatsworth, Teradyne Digital Sys.	213-993-1343
Cal	Costa Mesa, Teradyne	714-979-4590
Cal	Sunnyvale, Teradyne	408-732-8770
Fla	Lauderhill, Teradyne	305-735-3880
Ill	Chicago, Teradyne Applied Sys.	312-725-2011
Ill	Des Plaines, Teradyne	312-298-8610
Ind	Indianapolis, Teradyne	317-297-4682
Mass	Lowell, Teradyne	617-458-1256
Mich	Dearborn Heights, Teradyne	313-336-5550
Minn	Bloomington, Teradyne	612-854-7177
NJ	Parsippany, Teradyne	201-334-9770
NY	Great Neck, Teradyne	516-829-5040
NY	Syracuse, Teradyne	315-454-4486
Pa	Allentown, Teradyne	215-821-9109
Tex	Richardson, Teradyne	214-231-5384
Va	Vienna, Teradyne	703-938-2800

TERADYNE COMPS., 900 Lawrence St., Lowell, Mass., 01852, Tel: 617-454-9195, TWX: 710-343-1758; FSC No: 31413; Empl.: 500; Minimum order: $50

For info on price: H. T. Neavitt 617-454-9195; Application info: L. B. Johnson 603-889-5156; Customer service: A. T. Genovese 617-454-9195; Delivery info: A. T. Genovese 617-454-9195

Products manufactured: Connectors, Sockets

Local Sales Offices & Reps.

Cal	Fullerton, Teradyne Comps., Inc.	714-871-1930
Cal	Inglewood, J. Berman Co.	213-776-1281
Cal	Palos Verdes Pen., Mr. Alex Paul, Western Regional Mgr.	203-541-5314
Cal	Santa Clara, Nova-Tronix	408-243-9530
Colo	Denver, McLoud & Raymond Co.	303-756-1589
Fla	Ft. Lauderdale, Tech-Rep Assocs.	305-792-0962
Fla	Largo, Tech-Rep Assocs.	813-595-2834
Ill	Park Ridge, Metcom Assocs. Corp.	312-696-1490
Md	Towson, J-H Elctrn. Sls. Co.	301-825-4440
Minn	New Brighton, TWC Sales	612-636-1770
NY	Commack, Hingston Walsh Assoc.	516-543-0241
NY	Larchmont, Hingston-Walsh Assocs.	914-834-5781
NY	Liverpool, L-Mar East	315-457-2329
NY	Rochester, L-Mar Assocs.	716-328-5240
NY	Vestal, L-Mar East	607-729-6339
Ohio	Centerville, ImTech, Inc.	513-885-4181
Ohio	Cleveland, ImTech, Inc.	216-826-3400
Pa	Fort Washington, G.C.M., Inc.	215-646-7535
Pa	Pittsburgh, ImTech, Inc.	412-247-1050
Tex	Dallas, Evans & McDowell Assoc.	214-238-7157
Tex	Sugarland, Evans & McDowell Assoc.	713-783-2900

TESCOM INSTR. DIV., 2600 Niagara La. N., Minneapolis, Minn., 55441, Tel: 612-546-4351, Telex: 29-0488; Empl.: 200

For info on price: H. Gunderson; Application info: M. Faller; Customer service: H. Gunderson; Delivery info: A. Brockhouse

Free literature available: Welding Equipment for Miniature and Electronic Applications is found in the Tescom Catalog and Little Torch Brochures. Also Soldering and hand tools.

Products manufactured: Controls/Control Eqpt., Gages, Microscopes, Soldering Accessories, Soldering Guns, Irons & Desoldering Tools, Tools, Torches, Soldering, Welding & Access., Welding Equipment & Access. (Excluding Equip. for Semiconductor Devices)

TESTEX INC., See Automedia Inc.

TEXAS INSTRUMENTS, Connector Systems, 34 Forest St., Attleboro, Mass., 02703, Tel: 617-222-2800
p. 2•1032,1033

Customer service: B. Spence

Products manufactured: Backpanel Interconnect Systems, Boards, Plug-In, Cards, Logic, Connectors, Sockets

Local Sales Offices & Reps.

Ala	Huntsville, Beacon Elctrns.	205-881-5031
Ariz	Phoenix, Shefler Kahn Co.	602-258-7893
Cal	Los Altos, Ewing-Foley Inc.	415-941-4525
Cal	Los Angeles, M. A. Stolaroff Co.	213-295-7781
Cal	San Diego, M. A. Stolaroff Co.	714-234-6905
Colo	Boulder, R. G. Enterprises	303-447-9211
Conn	Milford, Todino Engrg. Sls.	203-874-6643
Fla	Ft. Lauderdale, Beacon Elctrns.	305-776-6074
Fla	Maitland, Beacon Elctrns.	305-647-3498
Ga	Atlanta, Beacon Elctrns.	505-351-3654
Ill	Hinsdale, Momac Sls.	312-654-4524
Ind	Greenwood, Valentine Schillinger & Assocs.	317-888-2260
Ind	South Bend, Valentine Schillinger & Assocs.	219-291-6258
Kans	Prarie Village, Engrg. Svcs. Co.	913-649-4000
Md	Randallstown, Beacon North	
Mass	Needham Hts., Todino Engrg. Sls.	617-444-7925
Mich	Detroit, Nicon Assocs.	313-341-7688
Minn	Minneapolis, E. C. Elctrns. Sls.	612-831-0229
Mo	St. Louis, Engrg. Svcs. Co.	314-997-1515
NJ	Haddonfield, Sunday-O'Brien	609-429-4013
NM	Albuquerque, Shefler Kahn Co.	505-265-7077
NY	Camillus, Noco, Inc.	315-672-3988
NY	Garden City, Comtronic Assocs.	516-741-8966
NY	Pittsford, Noco, Inc.	716-461-4750
Ohio	Cleveland, A. H. Baier Co. & Assocs.	216-461-6161
Ohio	Dayton, A. H. Baier Co. & Assocs.	413-276-4128
SC	Spartanburg, Beacon Elctrns.	803-582-4613
Tex	Dallas, R. Matthews Elctrns.	214-233-0363
Tex	Houston, R. Matthews Elctrns.	713-664-7131

Directory of Local Distributors Starts on page 401

Va Falls Church, Beacon North 703-534-1673
Wash Seattle, Blair Hirsh Co. 206-783-3423
FOR: Can., Montreal, Que., Allied Elctrnc. Sls. 514-488-5547

Local Distributors

Ala Huntsville, Cramer/EW, 2310 Bob Wallace Ave., S.W. 203-539-5722
Ariz Phoenix, Cramer/Arizona, 2816 N. 16th St. 602-263-1112
Ariz Phoenix, Micro Elctrns. Distrs., 2104 W. Peoria Ave. 602-944-2281
Ariz Phoenix, R.V. Weatherford, 1917 N. 25th Dr. 602-272-7144
Cal Anaheim, R.V. Weatherford Co., 1550 Babbitt Ave. 714-547-0891
Cal Glendale, R.V. Weatherford Co., 6921 San Fernando Rd. 213-849-3451
Cal Irvine, Cramer/Los Angeles, 17201 Daimler St. 213-771-8300
Cal Los Angeles, T.I. Supply Co., 5200 W. 104th St. 213-776-4490
Cal Palo Alto, Kierulff Elctrns., 3969 E. Bayshore Rd. 415-968-6292
Cal Palo Alto, R.V. Weatherford Co., 3240 Hillview Ave. 415-493-5373
Cal Pomona, R.V. Weatherford Co., 1095 E. Third St. 714-623-1261
Cal San Diego, Cramer/San Diego, 8913 E. Complex Dr. 714-565-1881
Cal San Diego, R.V. Watherford Co., 7872 Raytheon Rd. 714-278-7400
Cal Sunnyvale, Cramer/San Francisco, 720 Palomar Ave. 408-739-3011
Cal Sunnyvale, T.I. Supply Co., 776 N. Palomar Ave. 408-732-5555
Colo Denver, Cramer/Denver, 5465 E. Evans Pl. at Hudson 303-758-2100
Colo Denver, T.I. Supply Co., 9725 E. Hampden Ave. 303-751-1780
Colo Englewood, R.V. Weatherford Co., 3905 S. Mariposa 303-761-5432
Conn Fairfield, U-Tronics, 273 Linwood Ave. 203-255-4521
Conn N. Haven, Cramer/Conn., 35 Dodge Ave. 203-239-5641
Fla Hollywood, Cramer/EW Hollywood, 4035 N. 29th Ave. 305-923-8181
Fla Orlando, Cramer/EW Orlando, 345 N. Graham Ave. 305-894-1511
Fla Tampa, U-Tronics, 5421 Jet View Cir.
Ga Atlanta, Cramer/EW Atlanta, 3923 Oakcliff Indl. Ct. 404-451-5421
Ill Arlington Heights, T.I. Supply Co., 2420 E. Oakton Rd. 312-593-7660
Ill Chicago, Newark Elctrns., 500 N. Pulaski Rd. 312-638-4411
Ill Chicago, Semiconductor Specialists Inc., Box 66125, O'Hare International Airport
Ill Des Plaines, Newark Elctrns., 2500 E. Davon 312-298-1420
Ill Elmhurst, Semiconductor Specialists Inc., 195 W. Spangler 312-279-1000
Ill Hickory Hills, Neward Elctrns., 7667 W. 95th St.
Ill Mt. Prospect, Cramer/Chicago, 1911 S. Busse Rd. 312-593-8230
Ind Anderson, Elctrn. Supply, 2228-2230 N. Columbus Ave. 317-644-3381
Ind Ft. Wayne, Fort Wayne Elctrns. Supply, 3606 E. Maumee Ave. 219-742-4346
Ind Indianapolis, Graham Elctrns., 133 S. Pennsylvania St. 317-635-5453
Ind Indianapolis, Semiconductor Specialists, Box 41630, Weir Cook Airport 317-243-8271
Ind Lafayette, Lafayette Radio Supply, 406-408-North St. 317-742-4006
Ind Muncie, Muncie Elctrns. Supply, 222 N. Madison St. 317-288-8837
Iowa Cedar Rapids, Deeco Inc., 2500 16th Ave. S.W.
Md Baltimore, Arrow/Angus, 5207 E. Dr. Shop Ctr. 301-247-5200
Md Baltimore, Cramer/EW Baltimore, 922-924 Papapsco Ave. 301-354-0100
Md Gaithersburg, Cramer/EW, 16021 Industrial Dr. 301-948-0110
Mass Dedham, Gerber Elctrns., 852 Providence Hwy., U.S. Rte #1 617-329-2400
Mass Newton, Cramer/Intl., 85 Wells Ave. 617-969-7700
Mass Waltham, T.I. Supply Co., 504 Totten Pond Rd. 617-890-0510
Mich Detroit, R.S. Elctrns., 12775 Lydon Rd. 313-491-1000
Mich Grand Rapids, R.S. Elctrns., 300 & 36th St. S.E. 616-241-3487
Mich Livonia, Cramer/Detroit, 13193 Wayne Rd. 313-425-7000
Minn Edina, Cramer/Minn., 7275 Bush Lake Rd. 612-835-5350
Minn Minneapolis, Newark Elctrns., 336 Hoover St., N.E. 612-331-6350
Minn Minneapolis, Semiconductor Specialists, 8030 Cedar Ave. S. 612-854-8841
Minn Minneapolis, T.I. Supply Co., 7615 Metro Blvd. 612-835-5353
Mo Kansas City, Semiconductor Specialists, 3805 N. Oak Trfwy. 816-452-3900
Mo Kansas City, T.I. Supply Co., 7743 Troost Ave. 816-753-4750
Mo St. Louis, Semiconductor Specialists Inc., 10062 Natural Bridge 314-428-6100
NJ Clark, T.I. Supply Co., 301 Central Ave. 201-382-6400
NJ Monachie, Cramer/NJ, 1 Barrett Ave. 201-935-5600
NJ Moorestown, Arrow/Angus, Pleasant Valley Ave. 609-235-1900
NJ Saddlebrook, Arrow Elctrns., 285 Midland Ave. 201-797-5800
NM Albuquerque, Cramer/NM, 137 Vermont N.E. 505-265-5767
NM Albuquerque, R.V. Weatherford Co., 6101 Marble Ave. N.E. 505-265-5671
NY Buffalo, Summit Dist., 916 Main St. 716-884-3450
NY Farmingdale, Arrow Elctrns., 900 Broad Hollow Rd. 516-694-6800
NY Fishkill, T.I. Supply Co., 167 Main St. 914-896-9630
NY Freeport, Milgray Elctrns., 191 Hansi Ave. 516-546-6000
NY Hauppague, Cramer/L.I., 20 Oser Ave. 516-231-5600
NY Hauppague, Semi-Conductor Concepts, Engineers Rd. 516-273-1234
NY Melville, T.I. Supply Co., 2 Huntington Qud., Ste 2N01
NY Rochester, Rochester Radio Supply, 140 W. Main St. 716-454-7800
NC Winston-Salem, Cramer/EW Winston-Salem, 938 Burke St. 919-725-8711
Ohio Cincinnati, Cramer Tri-States, 666 Redna Ter. 513-771-6441
Ohio Cleveland, Cramer Elctrns., 5835 Harper Rd. 216-248-7740
Ohio Cleveland, Newark Elctrns., 2028 E. 46th St. 216-361-4700
Ohio Dayton, Esco Inc., 221 Crane St. 513-226-1133
Okla Tulsa, Cramer/Tulas, 6336 E. 13th St. 918-836-3371
Okla Tulsa, T.I. Supply Co., Draw "T", Admiral Sta. 918-437-4555
Ore Portland, Almac/Stroum Elctrns., 8888 S.W. Canyon Rd. 503-292-3534
Pa Pennsauken, Cramer/Pennsylvania, 7300 Rte 130 N. 215-923-5950
Pa Pittsburg, Semicnoductor Specialists, 538 Alpha Dr. 412-781-8120
Tex Austin, T.I. Supply Co., Box 2909 512-454-2531
Tex Dallas, R.V. Weatherford Co., 10836 Grisson La. 214-243-1571
Tex Dallas, Solid State Elec. Co. of Tex., 2643 Manana Dr. 214-352-2601
Tex Dallas, T.I. Supply Co., 6000 Denton Dr. 214-238-6925
Tex Houston, R.V. Weatherford Co., Box 42249
Tex Houston, T.I. Supply Co., 3939 Ann Arbor Dr. 713-785-4800
Utah Salt Lake City, Alta Elctrns.
Utah Salt Lake City, Cramer/Utah, 391 W. 2500 So. 801-487-3681
Va Arlington, T.I. Supply Co., 1500 Wilson Blvd. 703-524-5885
Wash Seattle, Almac/Stroum Elctrns., 5811 Sixth Ave., S. 206-763-2300
Wash Seattle, Cramer/Seattle, 5602 6th Ave. S.
Wash Seattle, R.V. Weatherford Co., 541 Industry Dr. 206-243-6340
Wisc Brokfield, Newark Elctrns., 3695 N. 126th St. 414-781-2450
Wisc Oak Creek, Cramer/Wisconsin, 430 W. Lawson Ave. 414-462-8300
For: Can., Downsview, Ont., Cramer/Can., 920 Alness Ave. 416-781-6631
For: Can., Montreal, Que., Elctrn. Wholesalers, 1935 Church Ave. 514-769-8861
For: Can., Ottawa, Ont., Wackid Radio/T.V. Labs, 312 Parkdale 613-728-1821
For: Can., Scarborough, Ont., Carsten Elec. Ltd., 54 Howden Rd. 416-751-2371
For: Can., Toronto, Ont., Electrosonic Indl. Sls., 543 Young St. 416-924-9301
For: Can., Vancouver, B.C., RAE Elctrns., 1629 Main St. 604-687-2621

TEXAS INSTRUMENTS, Control Prods. Div., 35 Forrest St., Attleboro, Mass., 02703, Tel: 617-222-2280, TWX: 710-346-0566

For info on price: B. Spence ext. 536; Application info: M. Peel ext. 218; Customer service: D. Nievera ext. 7327; Delivery info: B. Spence ext. 536

Free literature available: Literature covers edgeboard connectors, DIP sockets, keyboards, circuit breakers, switches, temperature controllers, thermostats, motor starting relays, and DTC controls.

Products manufactured: Bi-Metals, Thermostatic, Braid, Cable, Circuit Breakers, Connectors, Contact Strips, Finger, Contacts, Electrical, Controls/Control Eqpt., Current Sensors, Keyboards, Alphanumeric & Decimal, Limiters, Metals, Ovens, Protectors, Relays, Sockets, Suppressors, Switches, Transistor, Diode, Thyristor Heat Dissipators, Wire, Wire Shielding

Local Sales Offices & Reps.

Ala	Cullman	205-734-9180
Cal	Inglewood	213-645-1921
Cal	Sunnyvale	408-732-1840
Fla	Orlando	305-644-3535
Ill	Glenview	312-729-5710
Ind	Fort Wayne	219-484-0606
Ind	Indianapolis	317-787-5039
Iowa	Iowa City	319-351-7792
Ky	Louisville	502-451-2920
Ky	Versailles	606-873-3163
Md	Towson	301-296-8961
Mich	Central Lake	616-544-5931
Mich	Grand Rapids	616-245-3359
Mich	Southfield	313-353-0830
Mich	Tecumseh	313-423-8559
Minn	Minneapolis	612-835-5711
Mo	St. Louis	314-993-4546
NJ	Clark	201-574-9800
NY	East Syracuse	315-463-9291
NY	Fishkill	914-896-6793
NY	Huntington Station	516-293-2720
NC	Charlotte	704-375-2432
Ohio	Cleveland	216-464-2990
Ohio	Dayton	513-253-6128
Pa	Fort Washington	215-643-6450
Tenn	Brentwood	615-834-2637
Tex	Dallas	214-238-2524
Wisc	Wauwatosa	414-771-7210
FOR:	Can., Richmond Hill, Ont.	416-889-7373
FOR:	Can., St. Laurent, Que.	514-332-3550

TEXAS INSTRS. INC., Dig. Sys. Div., Box 1444, Houston, Tex., 77001, Tel: 713-777-1301

Products manufactured: Comm. Systems, Computers, Data Acquisition & Reduction Systems, Gages, Paper, Graphic Recording, Potentiometers, Recorders, Services, Assembly, Production & Test, Teleprinters, Terminal Equipment, Digital, Terminals, Data Display (including Alphanumeric & Graphic), Test Systems, Testers, Transducers, Transmission Systems, Data, Typewriters, Input-Output (All Types)

Local Sales Offices & Reps.

Ala	Huntsville	205-837-7530
Ariz	Phoenix	602-249-1313
Cal	Orange	714-547-9221
Cal	San Francisco	415-392-0229
Cal	Sunnyvale	408-732-1840
Colo	Denver	303-751-1780
Conn	Hamden	203-281-0074
Fla	Orlando	305-644-3535
Ga	Atlanta	404-458-7791
Ill	Schiller Park	312-671-0300
Ind	Indianapolis	317-248-8555
Mass	Waltham	617-890-7400
Mich	Southfield	313-353-0830
Minn	Minneapolis	612-835-5711
NJ	Clark	201-574-9800
NY	New York	212-541-9540
NY	Rochester	716-461-1800
Ohio	Cleveland	216-464-2990
Ohio	Dayton	513-253-6128
Pa	Ft. Washington	215-643-6450
Tex	Dallas	214-238-5318
Tex	Houston	713-777-1623
Va	Arlington	703-527-2800
Wash	Bellevue	206-455-1711
Wisc	Wauwatosa	414-475-1690
EXP:	Can., Richmond Hill, Ont., Texas Instr.	416-889-7373
FOR:	Can., St. Laurent, Quebec, Texas Instr.	514-332-3552

TEXAS INSTRUMENTS, Precision Controls Dept., 34 Forrest St., Attleboro, Mass., 02703, Tel: 617-222-2800; Empl.: 5000

Customer service: Precision Controls Dept.

Products manufactured: Circuit Breakers, Current Sensors, Keyboards, Alphanumeric & Decimal, Switches

Local Sales Offices & Reps.

Ala	Cullman	205-734-9160
Cal	Inglewood	213-645-1921
Cal	Sunnyvale	408-732-1840
Fla	Orlando	305-644-3535
Ill	Glenview	312-729-5710
Ind	Ft. Wayne	219-484-0606
Ind	Indianapolis	317-787-5039
Iowa	Cedar Rapids	319-362-3159
Ky	Louisville	502-451-2920
Md	Towson	301-296-8961
Mass	Waltham	617-890-7400
Mich	Grand Rapids	615-245-3359
Mich	Southfield	313-353-0830
Mich	Tecumseh	313-423-8559
Minn	Minneapolis	612-835-5711
Mo	St. Louis	314-993-4546
NJ	Clark	201-574-9800
NY	East Syracuse	315-463-9291
NY	Fishkill	914-896-6793
NY	Huntington Station	516-293-2720
NC	Charlotte	810-621-7813
Ohio	Cleveland	216-464-3584
Ohio	Dayton	513-298-0206
Ohio	Sidney	513-492-1222
Pa	Ft. Washington	215-643-6450
Tenn	Brentwood	615-834-2637
Tex	Dallas	214-238-6901
Wisc	Wauwatosa	414-771-7210
FOR:	Can., Richmond Hill, Ont.	416-889-7373
FOR:	Can., St. Laurent, 386, Que.	514-332-3550

TEXSCAN CORP., 2446 N. Shadeland Dr., Indianapolis, Ind., 46219, Tel: 317-357-8781, TWX: 810-341-3184; Empl.: 225; Minimum order: $25 .... p. 1•816,817

For info on price: R. Shevlot; Application info: R. Stelle; Customer service: C. Conger; Delivery info: M. Everett

Free literature available: Complete catalog on sweep signal generators spectrum analyzers. Complete catalog on attenuators, filters & oscillators.

Products manufactured: Analyzers, Attenuators, Bridges, Detectors, Filters, Generators, Mismatches, Microwave, Precision, Monitors, Oscillators, Oscilloscopes, Probes, Switches, Television Systems & Equipment Closed-Circuit, Terminals

Local Sales Offices & Reps.

Ala	Huntsville, Int'l. Scientific Inst.	205-837-1601
Cal	Los Angeles, R.F. Assocs.	213-478-1586
Cal	Palo Alto, R.F. Assocs.	415-494-3331
Conn	Hamden, Instr. Conslts., Inc.	203-288-5246
Fla	Orlando, Truex Assoc.	305-859-2160
Haw	Honolulu, Aloha Assoc.	808-941-1574
Ill	North Brook, E.I.A.	312-271-3774
Ind	Indianapolis, E.I.A.	317-257-7231
Iowa	Cedar Rapids, Tech. Reps Inc.	319-363-2489
Md	Wheaton, Sonco Inc.	301-942-9420
Mass	Waban, Instr. Conslts., Inc.	617-969-3372
Mich	Detroit, Micro Sls.	313-482-1229
Mo	Hazelwood, Techn. Reps Inc.	314-731-5200
Mo	Independence, Techn. Reps Inc.	816-737-1414
NJ	Dover, R. Diamond Inc.	201-366-7518
NJ	Hazlet, Mer-Mon Elctrns.	201-264-1851
NM	Albuquerque, A.L.S. Elctrns.	505-298-2575
NY	Bayside, R. Diamond	212-423-7330
NY	Syracuse, Labtronics	315-454-9314
NC	Winston-Salem, Radco Co.	919-722-9671
Ohio	Cleveland, Micro Sls.	216-725-4560
Ohio	Dayton, Micro Sls.	513-885-4171
Pa	Hatboro, Mer-Mon Elect.	215-672-5565
Tex	Dallas, Airep Elect.	214-363-5291
Wash	Seattle, Dewar Assoc.	206-763-2233
FOR:	Can., Montreal, Radionics	514-735-4565

TEXTOOL PRODUCTS, INC., 1410 W. Pioneer Dr., Irving, Tex., 75061, Tel: 214-259-2676; Empl.: 140

Customer service: R. White

Free literature available: Catalog featuring Price and Technical Information on our Standard Line of Test Sockets.

Products manufactured: Graphite Parts, Services, Assembly, Production & Test, Socket Adapters, Sockets

Local Sales Offices & Reps.

Ala	Huntsville, Tech Rep.	
Ariz	Scottsdale, Hagestad & Co.	602-945-0902
Cal	Cupertino, Bogen & Assoc.	408-257-4461
Cal	Pasadena, Mulvin & Co.	213-682-2737
Fla	Indian Rocks Beach, Tech Rep.	813-595-2834
Fla.	Largo, Tech Rep.	
Ill	Chicago, DJM Elctrn. Sls.	312-774-6525
NJ	Verona, C.K. Wall Co.	201-746-4832
Wash	Seattle, B. Hirsh	206-783-3423

THALNER ELECTRONIC LABS, INC., 7235 Jackson Rd., Ann Arbor, Mich., 48103, Tel: 313-761-4506

Customer service: R. Thalner

Free literature available: Data sheets provide complete description & specifications for Model VC-405 Video Frame Counter/Timer, Model 310 Video/Pulse Distribution Amplifier, Model SS-221 Video Screen Splitter and Model 110 Audio Program/Intercom.

Products manufactured: Amplifiers, Television Systems & Equipment Closed-Circuit

THERM-O-DISC, INC., South Main St., Mansfield, Ohio, 44907, Tel: 419-756-5911; Empl.: 1200; Minimum order: $150

For info on price: R. Massa; Application info: R. Massa; Customer service: W. Lomax; Delivery info: W. Lomax

Products manufactured: Controls/Control Eqpt., Fuses, Relays, Switches, Thermostats, Timers

THERM-O-LAB CORP., 6940 Farmdale Ave., N. Hollywood, Calif., 91605, Tel: 213-875-0105; Empl.: 30; Minimum order: $50

For info on price: R. L. Weible; Application info: A. R. Booker; Customer service: D. McBride; Delivery info: D. McBride

Free literature available: Complete catalogs describing information on applications of custom heating elements. Technical data on thermal studies.

Products manufactured: Heaters & Heating Elements

Local Sales Offices & Reps.

Ariz	Phoenix, Howe & Howe Sls.
Cal	Los Altos, Westec Elctrns.
Colo	Denver, Electronic Sls.
Ill	Chicago, Ash Equip. Co.
Kans	Prairie Village, Engineering Svcs. Co.
Minn	Lakeville, Caco Co.
Mo	St. Louis, Engineering Svcs. Co.
NY	Queens Village, L. A. Buscaglia
Ohio	Dayton, E. V. Swenson
Pa	Media, W. Reeves Assocs.
FOR:	Can., Ville La Salle, Que., Electodesign Ltd.

THERMALLOY, INC., 2021 W. Valley View, Dallas, Tex, 75234, Tel: 214-243-4321, TWX: 910-860-5542; Empl.: 250; Minimum order: $50 .... p. 1•1874-1880

For info on price: P. Clayton; Application info: J. Pritchett; Customer service: P. Clayton; Delivery info: P. Clayton

Free literature available: Semiconductor Mounting Pads, Compact Cooling Packages for the Electronics Industry, Insulators & Mounting Kits for Semiconductor Devices, Heat Sinks for Semiconductor Devices, Guides, Pullers, Ejectors for PC Boards, Cool It With Thermalloy, Inc. High Power Coolers.

Products manufactured: Adhesives (All Types), Bushings, Glass, Plastic, Metal, Rubber, Etc., Clamps & Clips, Compounds, Encapsulating, Insulating, Molding, Potting, Covers, Protective (Including Dust), Heat Exchangers & Systems, Insulators & Insulation, Pads, Transistor Mounting, Pullers, Sockets, Transistor, Diode, Thyristor Heat Dissipators

Local Sales Offices & Reps.

Ala	Huntsville, Interep Assoc.	205-881-3677
Ariz	Scottsdale, Q.T. Wiles & Assoc.	602-948-5590
Cal	Los Angeles, Q.T. Wiles & Assoc.	213-478-0183
Cal	Menlo Park, Straube Assocs.	415-323-2476
Cal	San Diego, Q.T. Wiles & Assoc.	714-565-6893
Cal	Tustin, Q.T. Wiles & Assoc.	714-832-4952
Colo	Denver, Lindberg	303-758-9033
Fla	Clearwater, Dyne-A-Mark	813-441-4702
Fla	Ft. Lauderdale, Dyne-A-Mark	305-771-6501
Fla	Orlando, Dyne-A-Mark	305-299-6303
Ga	Atlanta, Interep Assoc.	404-394-7756
Ill	Elk Grove Village, John G. Twist Co.	312-593-0200
Ind	Ft. Wayne, R.O. Whitesell & Assoc.	219-432-5591
Ind	Indianapolis, R.O. Whitesell & Assoc.	317-359-9283
Ind	Kokomo, R.O. Whitesell & Assoc.	317-452-6065
Iowa	Cedar Rapids, Palatine Sls.	319-365-8071
Kans	Andover, Palatine Sls.	316-683-7512
Kans	Overland Park, Palatine Sls.	913-262-5643
Ky	Louisville, R.O. Whitesell & Assoc.	502-893-7303
Md	Bethesda, W. Mount Co.	301-657-9312
Mass	Andover, Sls. Engrg. Co.	617-470-0800
Mich	Grand Rapids, R.O. Whitesell & Assoc.	616-451-8901
Mich	Southfield, R.O. Whitesell & Assoc.	313-358-2020
Mich	St. Joseph, R.O. Whitesell & Assoc.	616-983-7337
Minn	St. Paul, Northport Engrg.	612-698-3841
Mo	St. Louis, Palatine Sls., Inc.	314-426-7055
NJ	Springfield, F.F. Sylvester & Assoc.	201-376-3324
NM	Albuquerque, Lindberg Co.	505-345-2489
NY	No. Syracuse, Advanced Comps. Corp.	315-699-2671
NC	Charlotte, Over & Over, Inc.	704-527-3070
Ohio	Cincinnati, R.O. Whitesell & Assoc.	513-521-2290
Ohio	Columbus, R.O. Whitesell & Assoc.	614-888-9396
Ohio	Dayton, R.O. Whitesell & Assoc.	513-298-9546
Ohio	Lakewood, R.O. Whitesell & Assoc.	216-228-7525
Okla	Tulsa, Carter Assoc.	918-749-3311
Pa	Jenkintown, Warren Mount Co.	215-886-0383
Pa	Pittsburgh, R.O. Whitesell & Assoc.	412-344-7277
Pa	York, Warren Mount Co.	717-757-5823
Tenn	Bristol, Rakes Engrg. & Mktg. Corp.	615-968-4195
Tex	El Paso, Carter Assoc.	915-533-2681
Tex	Garland, Carter Assoc.	214-276-7151
Tex	Houston, Carter Assoc.	713-621-6930
Tex	Salt Lake City, Lindberg Co.	801-364-6409
Wisc	Wauwatosa, John G. Twist Co.	414-475-7755
FOR:	Can., Malton, Ont, Deskin Sls. Corp.	416-677-5517
FOR:	Can., Vancouver, Deskin Sls. Corp.	604-324-6331
FOR:	Can, Montreal, Deskin Sls. Corp.	514-331-2860

Local Distributors

Ala	Huntsville, Hall-Mark Elctrns., 2010 Bob Wallace Ave.	205-539-0691
Ariz	Phoenix, R. V. Weatherfod, 1917 N. 25th Dr.	602-272-7144
Ariz	Tempe, G. S. Marshall, 835 W. 22nd St.	602-968-6181
Cal	Anaheim, R. V. Weatherford, 1550 Babbitt Ave.	714-547-0891
Cal	El Monte, G. S. Marshall, 9674 Telstar Ave.	213-686-0141
Cal	El Segundo, T. I. Supp., 831 S. Douglas St.	
Cal	Glendale, R. V. Weatherford, 6921 San Fernando Rd.	213-849-3451
Cal	Irvine, G. S. Marshall, 17975 Sky Park Blvd.	714-556-6400
Cal	Palo Alto, R. V. Weatherford, 3240 Hillview Ave.	415-321-5373
Cal	Pomona, R. V. Weatherford, 1095 E. 3rd St.	714-623-1261
Cal	San Diego, G. S. Marshall, 8057 Raytheon Rd.	714-278-6350
Cal	San Diego, Intermark Elctrns., 7354 Convoy Ct.	714-279-5200
Cal	San Diego, R. V. Weatherford, 7872 Raytheon Rd.	714-278-7400
Cal	Santa Ana, Intermark Elctrns., 2920 W. Warner Ave.	714-540-1322
Cal	Sunnyvale, G. S. Marshall, 788 Palomar Ave.	408-732-1100
Cal	Sunnyvale, Intermark Elctrns., 1020 Stewart Dr., Box 9085	408-738-1111
Colo	Arvada, G. S. Marshall, 5633 Kendall Ct.	303-423-9670
Colo	Denver, Intermark Elctrns., 2600 W. Second St.	303-936-8284
Colo	Denver, T. I. Supp., 2149 S. Holly St.	303-757-7671
Colo	Englewood, R. V. Weatherford, 3905 S Mariposa	303-761-5431
Conn	Fairfield, U-TRONICS, 273 Linwood Ave.	203-255-4521
Conn	Waterbury, Suburban Supp., 117 Benedict, Box 230	203-757-1251
Fla	Ft. Lauderdale, Hall-Mark Elctrns., 1302 W. McNab Rd.	305-971-9280
Fla	Orlando, Hall-Mark Elctrns., 7233 Lake Ellenor Dr.	305-855-4020
Ga	Atlanta, Lykes Elctrns., Box 19837	404-355-2223
Ill	Arlington Heights, T. I. Supp., 2420 E. Oakton Rd.	312-593-7660
Ill	Chicago, Semiconductor Specialists, Box 66125, O'Hare Intl. Airport	312-279-1000

Ill	Elgin, Allied Elctrns., 1355 S Hollow Rd.	312-697-8200
Ill	Elk Grove, Hall-Mark Elctrns, 180 Crossen Ave.	312-437-8800
Ind	Evansville, Hutch & Son, 300 N. Main St.	812-425-7155
Ind	Ft. Wayne, Fort Wayne Elctrns. Sup., 3606 Maumee Ave.	219-423-3422
Ind	Indianapolis, Harvey Indiana, 8505 Zionsville Rd.	317-297-4910
Kans	Lenexa, Hall-Mark Elctrns., 9006 Rosehill Rd.	913-888-4747
Md	Baltimore, Hall-Mark Elctrns., 6660 Security Blvd.	301-265-8500
Md	Baltimore, Radio Elec. Serv. Co. of Balt., 1026 Cromwell Bridge Rd.	301-823-0070
Md	Rockville, Pioneer Washington Elctrns., 1037 Taft St.	301-424-3300
Mass	Boston, Demambro Elctrns., 1095 Commonwealth Ave.	617-787-1200
Mass	Dedham, Gerber Elctrns., 852 Providence Hwy., U.S. Rte. #1	617-329-2400
Mich	Farmington, Harvey/Michigan, 23461 Ind. Pk. Rd.	313-477-1650
Minn	Bloomington, Hall-Mark Elctrns., 9201 Penn Ave. S., Suite 10	612-884-9056
Minn	Edina, Harvey-Minnesota, 6969 Washington Ave., S.	612-941-6060
Minn	Minneapolis, Stark Elctrns. Supp., 112 Third Ave. N.	612-332-1325
Mo	Earth City, Hall-Mark Ectrns., 13789 Rider Trail	314-291-5350
Mo	University City, Olive Ind Elctrns., 6662 Olive Blvd.	314-863-7800
Mo	University City, Olive Ind. Elctrns., 6662 Olive Blvd.	314-863-7800
NJ	Cinnaminson, Wilshire Elctrns., 855 Ind. Hwy.	609-786-8990
NJ	Clark, T. I. Supp., 301 Central Ave.	201-382-6400
NJ	Clifton, Wilshire Elctrns., 312 Clifton Ave.	201-365-2600
NJ	Moorestown, Arrow Angus, Pleasant Valley Ave. Box 126	609-235-1900
NM	Albuquerque, R. V. Weatherford, 6101 Marble Ave., N.E.	505-265-5671
NY	Binghamton, Harvey Elctrns., Box 1208 Vestel Pkwy E.	607-748-8211
NY	Bohemia, Car-Lac Elctrn. Ind. Sls., 75 Orville Dr.	516-567-4200
NY	Buffalo, Summit Distr., 916 Main St.	716-884-3450
NY	Farmingdale, Norelcom Elctrns., 200 Allen Blvd.	516-249-7262
NY	Farmingdale, Wilshire Elctrns., 1855 New Highway, Unit B	516-293-5775
NY	Rochester, Rochester Radio Supp., 140 W. Main St.	716-454-7800
NY	Rochester, Summit Elctrns of Rochester, 292 Commerce Dr.	716-334-8110
NC	Greensboro, Hammond Elctrns. of Carolina, 2923 Pacific Ave.	919-275-6391
NC	Raleigh, Hall-Mark Elctrns., 3000 Ind. Dr.	919-832-4465
Ohio	Cleveland, Elctrns. Mktg., 1890 Bromton Dr.	216-292-6236
Ohio	Cleveland, W. M. Pattison Supp., 4550 Willow Pkwy., Box 6178	216-441-3000
Ohio	Columbus, Elctrns. Mktg., 1150 W. Third Ave.	614-299-4161
Ohio	Dayton, Elctrns. Mktg., 2400 E. Dorothy La.	En-1140
Ohio	Dayton, ESCO, 221 Crane St.	513-226-1133
Ohio	Twinsburgh, Elctrns Mktg., 946 Concord Cir.	216-425-2942
Ohio	Westerville, Elctrns. Mktg., 154 Brisbane Ave.	614-866-3493
Okla	Tulsa, Hall-Mark Elctrns., 4846 S. 83rd E. Ave.	918-835-8458
Okla	Tulsa, Radio, Inc., 1000 S. Main	918-587-9123
Okla	Tulsa, T. I. Supp., Drawer T, Admiral Sta.	918-437-4555
Pa	Pittsburgh, Cameradio Elctrns., 2801 Liberty Ave.	412-288-2600
SC	Greenville, Hammond Elctrns of Carolina, 100 Augusta St., Box 2308	803-233-4121
Tenn	Kingsport, Radio Elec. Supp., 961 East Sullivan St.	615-247-8111
Tenn	Nashville, Electra Dist., 1914 W. End Ave.	615-329-3971
Tex	Dallas, Hall-Mark Elctrns., 9333 Forest La.	214-231-6111
Tex	Dallas, R. V. Weatherford, 10836 Grissom La.	214-243-1571
Tex	Dallas, T. I. Supp., 6000 Denton Dr.	214-238-6821
Tex	Ft. Worth, Allied Elctrns., 401 E. 8th St.	817-336-5401
Tex	Houston, Hall-Mark Elctrns., 8000 Westglen	713-781-6100
Tex	Houston, R. V. Weatherford, 3500 W. T.C. Jester Blvd.	
Tex	Houston, T. I. Supp., 3939 Ann Arbor Dr.	713-758-4800
Utah	Salt Lake City, Intermark Elctrns., 63 E. Stratford Ave.	801-486-3411
Wash	Seattle, Intermark Elctrns., 621 S. Michigan St.	206-767-3160
Wash	Seattle, R. V. Weatherford, 541 Industry	206-762-4200
Wash	Seattle, Radar Elec., 168 Western Ave. W.	206-282-2511
Wisc	Maquon, Taylor Elec., 1000 W. Donges Bay Rd.	414-241-4321
Wisc	Milwaukee, Hall-Mark Elctrns., 11925 W. Ripley Ave.	414-476-1270
For:	Can. Montreal, Que., Deskin Sls., 290 Benjamin Hudon St.	514-331-2860
For:	Can., Malton, Ont., Deskin Sls., 2759 Thamesgate Dr.	416-677-5517
For:	Can., Vancouver, B.C., Deskin Sls., 272 S.W. Marine Dr.	604-324-6331

THERMAX WIRE CORP., 32-02 Linden Pl., Flushing, N.Y., 11354, Tel: 212-939-8300, TWX: 710-582-2551; Empl.: 160

Customer service: J. Spinella

Products manufactured: Braid, Cable, Cable, Wire

Local Sales Offices & Reps.

Ala	Huntsville, G. White Assocs.	804-846-4624
Ariz	Phoenix, South West Engrg.	602-993-0250
Cal	Mtn. View, Sonic Wire Sls.	415-965-4646
Cal	Van Nuys, Sonic Wire Sls.	213-781-3490
Colo	Denver, West Mark Assocs.	303-433-7181
Fla	Pompano Beach, Varrelman-Gorman Co.	305-941-5544
Fla	Winter Park, Varrelman-Gorman Co.	305-425-1611
Ill	Chicago, Dearborn Wire Co.	312-696-1000
Md	Glen Arm, Glen White Assocs.	301-252-5610
Mass	Clinton, F. J. Coleman Co.	617-894-1858
Mich	Grand Rapids, Thies Assocs.	616-245-0319
Mich	Jenison, Thies Assocs.	
Minn	Edina, Wagner Components	612-941-6310
Mo	St. Chas., Finnigan Wire & Cable	314-724-6690
NJ	Boonton, Varrelman-Gorman Co.	201-838-3272
NJ	Dover, V & G Co.	201-992-2505
NJ	Livingston, Varrelman-Gorman Co.	201-992-2505
NY	Camellus, Varrelman-Gorman Co.	315-458-4774
NY	Centerport, Varrelman-Gorman Co.	212-IN3-5000
NC	Raleigh, G. White Assoc.	919-876-5617
Ohio	Cinncinnati, A.C. Wahl Co.	513-821-3270
Tenn	Johnson City, G. White Assoc.	615-928-0184
Tex	Dallas, United Components	214-324-1448
Va	Lynchburg, G. White Assoc.	804-846-4624
Wash	Bellevue, Rayover Sls.	206-454-4551

THERMO ELEC. CO., INC., 109 Fifth St., Saddle Brook, N.J., 07662, Tel: 201-843-5800, TWX: 710-990-5108; Empl.: 350

For info on price: J. Adamo; Application info: Local Office; Customer service: J. Adamo; Delivery info: J. Adamo

Free literature available: Complete looseleaf binder type catalog, Individual catalog section for each product.

Products manufactured: Cable, Connectors, Controls/Control Eqpt., Gages, Indicators, Meters, Monitors, Probes, Pyrometers, Switches, Thermocouples, Elements & Accessories, Transducers, Wire

Local Sales Offices & Reps.

Cal	North Hollywood, Thermo Elc.	213-765-5276
Cal	San Francisco, Thermo Elec.	415-654-8290
Colo	Denver, Ross Equipment Co.	303-759-4215
Ga	Atlanta, Thermo Elec.	404-633-9584
Ill	Hinsdale, Thermo Elec.	312-325-2840
Ind	Indianapolis, Thermo Elec. Enterprise 9508	
Ky	Louisville, Thermo Elec. Enterprise 9510	
La	Baton Rouge, Alford, Woods & Childs	504-275-5480
Md	Baltimore, Arobone & Cline	215-248-1243
Mass	Norwood, Thermo Elec.	617-769-2370
Mich	Detroit, Thermo Electric	216-433-4510
Minn	Minneapolis, Thermo Elec. Zenith 9510	
Mo	Kansas City, Thermo Elec.	214-352-7778
Mo	St. Louis, Thermo Elec. Enterprise 9510	
NJ	Fair Lawn, Thermo Elec.	201-791-9683
NY	New York, Thermo Elec.	212-564-2560
NY	Rochester, Thermo Elec.	716-377-4632
Ohio	Cincinnati, Thermo Elec. Enterprise 9510	
Ohio	Cleveland, Thermo Elec.	216-433-4510
Ohio	Columbus, Thermo Elec. Enterprise 9510	
Pa	Philadelphia, Arobone & Cline	215-248-1243
Pa	Pittsburgh, Thermo Elec.	216-433-4510
Tex	Dallas, Thermo Elec.	214-352-7778
Tex	Houston, Thermo Elec.	713-644-5466
Va	Richmond, Arobone & Cline	703-643-7373
WVa	Charleston, Process Instr. Equip. Co.	304-344-2237
Wash	Bellevue, Antec Corp.	206-232-1094
WVa	Charleston, Thermo Elec., Enterprise 0875	
FOR:	Can., Brampton, Ont., Thermo Elec. Ltd.	416-451-0813
FOR:	Can., Montreal, Que., Thermo Elec. Ltd.	514-331-2032
FOR:	Can., New Brunswick, NS, Thermo Elec. Ltd.	514-747-7511
FOR:	Can., Saskatchewan, Alb., Thermo Elec. Ltd.	403-252-4222
FOR:	Can., Toronto, Ont., Thermo Elec. Ltd.	416-451-0813
FOR:	Can., Vancouver, BC, Northern Columbia Process Equip. Ltd.	604-987-7194
FOR:	Can., Winnipeg, Manitoba, R. E. Sparrow Ltd.	204-786-5698

THERMO SYS., INC., 2500 Cleveland Ave., N., St. Paul, Minn., 55113, Tel: 612-633-0550, Telex: 297482; Empl.: 50

Customer service: F. L. Paul

Free literature available: General Anemometry Catalog - This 100 page edition describes Thermo-Systems' complete velocity and temperature measurement products and applications in three indexed sections.

Products manufactured: Counters, Meters, Signal Conditioners & Equipment, Transducers

Local Sales Offices & Reps.

Ala	Huntsville, Craft Assoc.	205-837-0221
Cal	San Marino, Dale-Dahl Assocs.	213-682-3417
Cal	Walnut Creek, Dale-Dahl Assocs.	415-933-9595
Colo	Parker, Technology Mktg. Assoc.	303-841-3435
Fla	Maitland, Craft Assoc. Co.	305-645-2242
Ga	Atlanta, Craft Assoc. Co.	404-393-0400
Kans	Prairie Village, Engrg. Serv. Co.	913-649-4000
Md	Fulton, Gans-Fryling	301-837-6311
Mich	Farmington, Carter, McCormic & Peirce	313-477-7700
Mo	St. Louis, Engrg. Serv. Co.	314-997-1515
NJ	Ringwood, Thermo-Systems	201-839-0720
NM	Albuquerque, Technology Mktg. Assoc.	505-298-4321
Ohio	Dayton, Instrumentation Sys.	513-294-2838
Ore	Portland, McLaren	503-297-2248
Pa	Pittsburgh, Instrumentation Sys.	412-243-1111
Tex	Houston, Roger Martin Assoc.	713-462-4077
Va	Arlington, Gans-Fryling	703-527-3262
Wash	Bellevue, McLaren	206-454-3400

THERMOELECTRICS, See Borg-Warner Thermoelectrics.

Free literature available: Transit cases, re-usable shipping containers Thermodyne capabilities and products

Products manufactured: Cabinets & Accessories, Cases, Transit, Containers

THERMOMETRICS, INC., 15 Jean Pl., Edison, N.J., 08817, Tel: 201-548-2299; Empl.: 30

Products manufactured: Bridges, Controls/Control Eqpt., Detectors, Thermistors, Transducers

THERMOTECH, See ITT Thermotech.

THETA INSTR. CORP., 24 Dwight Pl., Fairfield, N.J., 07006, Tel: 201-227-1700; Empl.: 85

Products manufactured: Alarms, Amplifiers, Analyzers, Bridges, Calibrators, Comm. Systems, Comparators, Computers, Controls/Control Eqpt., Converters, Counters, Couplings, Data Acquisition & Reduction Systems, Data Loggers, Decoders, Demodulators, Detectors, Dials, Display Devices/Displays, Drivers & Decoders For Readouts, Drives & Drive Mechanisms (Dial), Encoders, Generators, Indicators, Meters, Modulators, All Kinds, Modules, Logic, Encapsulated, Multiplexers, Networks, Repeaters, Servo, Scales, Dial, Servo Systems, Shifters, Standards, Testers, Totalizers, Digital, Transducers, Translators, Data, Transmission Systems, Data

Local Sales Offices & Reps.

Cal	Encino, King-Way Assocs.	213-788-4124
Ohio	Chagrin Falls, Kilroy Corp.	216-247-8997
Ore	Portland, J.N. Kuvallis Co.	503-284-6808

THIN FILM SERVICES, Box 188, Gile, Wisc., 54525, Tel: 715-561-2031; Empl.: 3; Minimum order: $150

Customer service: R. G. Ahonen

Free literature available: Folder describing services available at Thin Film Services.

Products manufactured: Circuits, Hybrid, Thin-Film, Coatings, Deposition Equipment, Vacuum & Accessories, Films, Services, Assembly, Production & Test

THINCO, INC., Davisville Rd., Hatboro, Pa., 19040, Tel: 215-675-5000, TWX: 510-665-6822

For info on price: J. L. Hull; Application info: T. Jennings; Customer service: J. L. Hull; Delivery info: J. L. Hull

Free literature available: Data sheets describing specifications of vacuum-deposited chip capacitors and inductors.

Products manufactured: Capacitors, Fixed, Coils Including Assemblies & Forms, Filters, Networks

THOMAS & BETTS CO., 36 Butler St., Elizabeth, N.J., 07206, Tel: 201-354-4321, TWX: 201-354-6621; FSC No: 59730; Empl.: 2000

For info on price: A. Beiswinger; Customer service: R. Nehring

Products manufactured: Boxes, Junction, Outlets & Wall Plates, Cable Assemblies & Harnesses, Caps, Connector, Clamps & Clips, Coatings, Connectors, Heat Guns, Production, Kits, Terminal, Labels, Pressure-Sensitive, Adhesive, Meters, Plugs, Posts, Reels, Cord & Cable, Splicers, Coaxial Cable, Splices, wire (Including, Butt & Cap Types), Strain Reliefs, Cable & Wire, Strips, Terminal Blocks, Boards & Strips, Terminals, Testers, Tools, Tubing, Wrenches

Local Sales Offices & Reps.

Ariz	Phoenix, Thomas & Betts Co.	602-258-1823
Cal	Los Angeles, Thomas & Betts Co.	213-268-3191
Cal	Santa Clara, Thomas & Betts Co.	408-243-7827
Colo	Denver, I.W. Strong & Assoc.	303-292-6900
Ga	Atlanta, Thomas & Betts Co.	404-355-6260
Ill	Arlington Heights, Thomas & Betts Co.	312-439-3100
Mass	Braintree, Thomas & Betts Co.	617-843-0373
Mich	Keego Harbor, The Thomas & Betts Co.	313-682-2711
Minn	Minneapolis, Thomas & Betts Co.	612-333-2419
Mo	St. Louis County, Thomas Betts	314-731-3338
NJ	Elizabeth, Thomas & Betts Co.	201-352-2265
NJ	Moorestown, Thomas & Betts Co.	609-234-0505
NY	Chittenango, Thomas & Betts Co.	315-687-2051
NC	Charlotte, Thomas & Betts Co.	704-525-5354
Ohio	Cincinnati, Thomas & Betts Co.	513-271-6686
Ohio	Cleveland, Thomas & Betts Co.	216-243-8123
Pa	Philadelphia, Thomas & Betts Co.	215-934-5114
Tenn	Memphis, Thomas & Betts Co.	901-365-4080
Tex	Houston, Thomas & Betts Co.	713-461-0610
Va	Richmond, Thomas & Betts Co.	703-272-1480

THOMAS ELCTRNS., INC., 100 Riverview Dr., Wayne, N.J., 07470, Tel: 201-696-5200, TWX: 710-988-5836; QPL No: 01852; Empl.: 230

For info on price: B. Setticase; Application info: B. Setticase; Customer service: B. Houghton; Delivery info: B. Houghton

Products manufactured: Tubes

Local Sales Offices & Reps.

Cal	Los Altos, Cain-White & Co.	415-948-6533
Cal	Pasadena, A-F Sls. Engrg., Inc.	213-681-5631
Colo	Wheatridge, Waugaman Assocs., Inc.	303-423-1020
Md	Hyattsville, Eastern Comps.	301-577-2925
Mass	Norwood, Stan Pierce, Inc.	617-762-3164
Okla	Broken Arrow, P. J. Scanlon Co.	
Pa	Flourtown, Eastern Comps.	215-836-1616
Tex	Richardson, P. J. Scanlon Co.	214-231-4661
Exp:	Fairfield, N.J., Pantronics, Inc.	201-575-1177
Exp:	Teaneck, N.J., Sylvan Ginsbury	201-837-1100
For:	Can., Montreal, Specialty Elctrns., Inc.	514-336-4500
FOR:	Can., Ont., Mississouga, Specialty Elctrns.	416-678-2104

THOMAS & SKINNER, INC., Box 150-B, 1120 E. 23rd St., Indpls., Ind., 46206, Tel: 317-923-2501, Telex: 027-335; Empl.: 200; Minimum order: $25

p. 1•818,819

Customer service: G. J. Cunningham

Free literature available: Thomas & Skinner, Inc. Manufactures Permanent Magnets, Transformer Laminations, and Magnetic Instrumentation for the magnetization, measurement, stabilization and/or testing of magnets.

Products manufactured: Analyzers, Calibrators, Cores, Magnetic, Demagnetizers, Hysteresisgraphs, Indicators, Laminations, Magnetizers, Magnets, Meters, Services, Assembly, Production & Test, Testers

Local Sales Offices & Reps.

Cal	Los Angeles, T. & Skinner, Inc.	213-532-0960
Cal	Mt. View, Melchior-Wesley Assocs.	415-964-2321
Ill	Chicago, T. & Skinner, Inc.	312-743-5511
Ind	Indianapolis, Thomas & Skinner, Inc.	317-923-2501
NH	Londonderry, R.H. Davis	603-432-7858
NJ	Rahway, T. & Skinner, Inc.	201-574-0550
Ore	Portland, C.K. Shanks & Assocs.	503-292-5656
FOR:	Scarborough, Ont., Can., Paisley Products of Can. Ltd.	416-755-2216

THOMSON-CSF ELECTRON TUBES INC., 50 Rockefeller Plaza, New York, N.Y., 10020, Tel: 212-489-0400; Empl.: 7

Products manufactured: Tubes

THOR ELCTRNS. CORP., 741 Livingston St., Elizabeth, N.J., 07207, Tel: 201-354-2420; Empl.: 15; Minimum order: $10

For info on price: A. Crudele; Customer service: D. Bowen; Delivery info: D. Bowen

Free literature available: Catalogs on electronic tube, diodes, transistors.

Products manufactured: Diodes, Integrated Circuit Devices, IC's, Active Filters, Rectifiers, Resistors, Transistors, Tubes

THORDARSON MEISSNER, Electronic Ctr., Mt. Carmel, Ill., 62863, Tel: 618-262-5121, TWX: 510-525-2254; FSC No: 96256; Empl.: 600

Customer service: Ind. Sls.

Free literature available: Pocket Industrial/Military Catalog; Switch & Timer Catalog; Switch & Timer Brochure; Fine Wire Tensioning Device Brochure

Products manufactured: Chokes, Coils Including Assemblies & Forms, Reactors, Switches, Timers, Transformers, Yokes

Local Sales Offices & Reps.

Cal	Encino, King-Way Assocs.	213-788-4124
Fla	North Miami, Winfield Elctrn. Sls. Co.	305-945-6544
Mass	Needham, Mullin Tech. Sls. Co.	617-444-4780
Mich	Dearborn, Pitcher-Poulin	313-725-4999
NJ	Cherry Hills, Trinkle Sales Inc.	609-795-4200
NY	N. Syracuse, L.D. Allen, Inc.	315-458-7470
Ohio	Cleveland, Imtech, Inc.	216-826-3400
Tex	Dallas, J. McKinney Sls.	214-631-9450
EXP:	Miami, Fla., Louis D. Coheny Cia	305-635-8670

3M COMPANY, Electronic Products Div., 3M Center, St. Paul, Minn., 55101, Tel: 612-733-1452

p. 2•1034-1055

Products manufactured: Backpanel Interconnect Systems, Cable Assemblies & Harnesses, Cable, Chemicals, Circuits, Flexible, Clamps & Clips, Coatings, Connectors, Etchants, Printed Circuit, Fasteners, Integrated Circuit Packaging Systems, Jumpers, Laminates, Packages, Integrated Circuit, Pliers, Sockets, Strip-Line Components, Microwave, Substrates, Tools, Wire, Wire & Cable Ties

Local Sales Offices & Reps.

Alas	Anchorage	907-279-6481
Cal	Los Angeles	213-726-1511
Cal	So. San Francisco	415-761-1155
Ga	Atlanta	404-451-1661
Haw	Honolulu	808-841-0147
Ill	Chicago	312-585-7800
Mass	Boston	617-449-0300
Mich	Detroit	313-477-5000
Minn	St. Paul	612-733-5960
Mo	St. Louis	314-991-1320
NJ	West Caldwell	201-227-9100
NY	Buffalo	716-894-5214
NC	High Point	919-883-0141
Ohio	Cincinnati	513-242-2313
Ohio	Cleveland	216-267-1800
Pa	Philadelphia	215-742-0200
Tex	Dallas	214-327-7311
Wash	Seattle	206-244-7200

Local Distributors

Ala	Huntsville, Powell Elctrns. Inc., 803 Oster Dr. Box 1095	205-539-2731
Cal	Mt. View, Powell Elctrns. Inc., 411 Fairchild Dr.	415-964-0820
Cal	Mt. View, Ratel Elctrns., 815 Maude Ave.	415-965-2010
Cal	San Diego, Richey Elctrns., 5258 Kearny Villa	714-565-4444
Cal	Sun Valley, Richey Elctrns., 10871 La Tuna Canyon Rd.	213-875-2862
Colo	Denver, B-5, Inc., 7100 Broadway, Bldg. 3-1	303-426-0222
Conn	Hamden, Impact Sales Co., 60 Connelly Pkwy. Bldg. #2 Rm. 8	203-281-1331
Fla	Miami Springs, Powell Elctrns., Inc., 1744 N.W. 69th Ave., Box 660514	305-592-3260
Ill	Chicago, Prehler Electric, 2300 N. Kilbourn	312-384-6100
Ill	Mt. Prospect, Magnuson Elctrns., 2420 Oakton St. Box 130	312-956-0700
Ind	Indianapolis, Sheridan Assocs., 4002 Meadows Dr.	317-547-7777
Iowa	Des Moines, Beams, Inc., 2426 Welbeck Rd.	515-279-3015
Kans	Overland Park, Sheridan Assocs., 10100 Santa Fe Dr. Mark I Bldg., Suite 101	913-383-1636
Md	Beltsville, Powell Elctrns., Inc., 10728 Hanna St.	301-937-4030
Md	Gaithersburg, Deanco, Inc., 16879 Oakmont Ave.	301-948-5444
Mass	Waltham, Impact Sales Co., 223 Crescent St.	617-893-2850
Mich	Farmington, Sheridan Assocs., Box 529 24543 Indoplex Dr.	313-477-3800
Minn	St. Paul, Ragon Elctrns., Inc., 1136 W. Larpenteur Ave.	612-488-0201
Mo	Florissant, Sheridan Assocs., Box 677	314-837-5200
NJ	Parsippany, Deanco, Inc., 146 A Parsippany Rd.	201-386-1300
NY	Farmingdale, D.R.W. Electronics, 100 Milbar Blvd.	516-249-2660
NY	Ithaca, Deanco, Inc., 714 W. Clinton St.	607-272-2198
NC	Raleigh, Deanco, Inc., Roger Executive Center 3301 Women's Club Dr. Suite 146	919-782-9226
Ohio	Beachwood, Sheridan Assocs., Inc., 23224 Commerce Park Rd.	216-831-0130
Ohio	Cincinnati, Sheridan Assocs., Box 37826	513-761-5432
Ohio	Cleveland, Prehler Electric, 12200 Brookpark Rd.	216-267-2650
Ohio	Columbus, Electronic Mktg. Corp., 1150 W. Third Ave.	614-299-4161
Ohio	Dayton, Sheridan Assocs., Box 423 Suite 250 - Shiloh Bldg. 5045 N. Main St.	513-277-8911
Okla	Tulsa, Norvell Elctrns., Inc., 3340 S. Memorial Dr.	918-663-1247
Pa	Philadelphia, Powell Elctrns., Inc., S. Island Rd. Box 8765	215-365-1900
Pa	Pittsburgh, Sheridan Assocs., 1717 Penn Ave. - Suite 5009	412-244-1640
Tex	Dallas, Norvell Elctrns., Inc., 10210 Monroe	214-350-6771
Tex	Dallas, Powell Elctrns., Inc., 2860 Walnut Hill Lane, Suite 105	214-350-4186
Tex	Houston, Norvell Elctrns., Inc., 6440 Hillcroft	713-774-2568

3M CO., Industrial Electrical Prods. Div., 3M Center, St. Paul, Minn., 55101, Tel: 612-733-0219; Empl.: 37000

Products manufactured: Adhesives (All Types), Coatings, Compounds, Encapsulating, Insulating, Molding, Potting, Controls/Control Eqpt., Films, Insulators & Insulation, Magnets, Semiconductor Wafer Fabrication, Shields, Tapes, Electrical Insulation, Tapes, Films & Foils, Pressure Sensitive, Tubing

Local Sales Offices & Reps.

Cal	Los Angeles	213-726-1511
Cal	S. San Francisco	415-761-1155
Ga	Chamblee	404-451-1661
Ill	Bedford Park	312-458-2200
Mass	Needham Heights	617-449-0300
Minn	St. Paul	612-733-1110
Mo	St. Louis	314-991-1320
NJ	Caldwell	201-227-9100
NY	Buffalo	716-894-5214
NY	New York	212-285-9600
NC	High Point	919-883-0141
Ohio	Cincinnati	513-242-2313
Ohio	Cleveland	216-267-1800
Pa	Philadelphia	215-742-0200
Tex	Dallas	214-327-7311
Wash	Seattle	206-244-7200

THWING-ALBERT INSTR. CO., 10960 Dutton Rd., Philadelphia, Pa., 19154, Tel: 215-NE 7-0100, TWX: 710 670 1763; Empl.: 50; Minimum order: $20

For info on price: R. A. Solomon; Application info: T. J. Roache; Customer service: T. J. Roache; Delivery info: T. J. Roache

Products manufactured: Bridges, Cells, Load, Indicators, Services, Assembly, Production & Test, Testers, Transducers

Local Sales Offices & Reps.

Cal	Long Beach, Saber Enterprises	213-595-5646
Cal	San Francisco, LaFrance Entprs.	415-567-4488
La	New Orleans, Wm. S. Huey Co.	504-866-6341
Ill	Park Forest, F.L. Brooke Co.	312-479-2544
Mass	Lexington, W. R. Hatfield Assocs.	617-861-0201
Minn	Minneapolis, E. J. Doyle Co.	612-827-5847
NY	Rochester, Holter Assocs.	716-381-7988
Ore	Portland, Extech, Ltd.	503-292-9219
Tex	Houston, Whitson Sullivan Co.	713-645-1801
Tex	Plano, Whitson Engrg. Co.	214-423-5255

TIMBER-TOP, INC., 199E N. Main St., Freeport, N.Y., 11520, Tel: 516-FR 9-0850; Empl.: 5

Customer service: W. E. Fischer

Products manufactured: Clamps & Clips

Advertisment

TTI's SYNCLAMPS are the ONLY quick-releasing, self-locking and INSTANT NULLING SYNCHROCLAMPS! Their INTEGRAL STOPS permit component mounting and nulling (techniques that can save 70% OR MORE of the mounting and nulling time!). SYNCLAMPS meet the MAXIMUM MIL SHOCK AND VIBRATION: 2000 ft-lbs/2000 cps! They also have the LOWEST INSTALLED COST of any type of clamp! A size and style for ANY size component and ANY application!!

TIMES WIRE & CABLE, Sub. INSILCO Corp., 358 Hall Ave., Wallingford, Conn., 06492, Tel: 203-265-2361, TWX: 710-476-0763; Empl.: 250

Products manufactured: Cable Assemblies & Harnesses, Cable, Connectors, Delay Lines, Wire

Local Sales Offices & Reps.

Ala	Huntsville, 20th Century Mktg.	205-772-9237
Ariz	Scottsdale, Mercury Engrg.	602-945-1927
Cal	Mountain View, Westrep-North	415-968-5800
Cal	Pico Rivera, Westrep	213-949-2551
Cal	San Diego, Westrep	714-279-9412
Colo	Denver, Zeus, Inc.	303-771-6200
Fla	Altamonte Springs, WMM Assocs.	305-831-4645
Fla	Clearwater, WMM Assocs.	813-726-8871
Fla	Pompano Beach, WMM Assocs.	305-943-3091
Ill	Chicago, Balhorn & Welch, Inc.	312-889-5011
Kans	Overland Pk., Penzner Mankus Assoc.	913-DU 1-0004
Kans	Wichita, Penzner-Mankus Assoc.	316-264-2662
Md	Towson, J-H Elctrn. Sls.	301-VA 5-4440
Mass	Clinton, F. J. Coleman & Co.	617-894-1855
Mich	Ferndale, Hilltronics	313-398-5556
Mo	Hazelwood, Penzner	314-731-4334
NM	Albuquerque, Zeus, Inc.	505-256-9831
NY	Syracuse, Electra Sls., Inc.	315-455-5783
NC	Charlotte, D. G. W., Inc.	704-334-7090
NC	Winston-Salem, D.G.W., Inc.	919-768-7166
Ohio	Cincinnati, Giesting Assocs.	513-931-0812
Okla	Okla. Cy., Ammon & Rizos	405-947-1051
Okla	Tulsa, Ammon & Rizos	918-663-8518
Pa	Flourtown, Precision Elctrns.	215-MI 6-8383
Tex	Dallas, Ammon & Rizos	214-233-5591
Tex	Houston, Ammon & Rizos	713-PA 9-1233
Utah	Salt Lake City, Zeus, Inc.	801-486-2317
Wash	Seattle, Seatronics	206-767-4330
EXP:	N.Y., N.Y., Tennant & Sons	212-889-8530
FOR:	Can., Malton, Ont., A. Deskin Sls. Corp.	416-677-5517
FOR:	Can., Vancouver, B.C., A. Deskin Sls. Corp.	604-253-6396
FOR:	Can., W. Montreal, Que., A. Deskin Sls. Corp.	514-384-1420

TITAN TOOL SUPPLY CO., INC., 68 Comet, Buffalo, N.Y., 14216, Tel: 716-873-9907; Empl.: 8; Minimum order: $25

For info on price: D. Wise; Application info: T. Kahn; Customer service: T. Kahn; Delivery info: D. Wise

Free literature available: Catalog - All microscopes Catalog - Bulbs & lights

Products manufactured: Lamps, Microscopes

TITCHENER, E.H. & CO., 8 Titchener Pl., Binghamton, N.Y., 13902, Tel: 607-772-1161, TWX: 510-252-1985; Empl.: 235

Customer service: Sales Dept.

Free literature available: Product Design Ideas by Titchener & New Concepts in Wire Design by Titchener - both showing case histories & design concepts. WIRE-GRIP Circuit Board Puller sheet - shows two sizes of stock circuit board pullers available and a description of same.

Products manufactured: Antenna Towers & Supports, Antennas, Blowers & Fans & Accessories, Cabinets & Accessories, Carts & Dollies, Instrument & Equipment, Chassis, Circuit Board Mounting, Chassis, Metal, Forms, Wire, Frames, Cabinet & Rack, Grilles, Guides, Circuit Board, Handles For Cabinets, Circuit Boards, Racks, etc., Holders, Circuit Board (Production Type), Mounts, Pullers, Racks, Rings, Retaining, Services, Assembly, Production & Test, Soldering Accessories

Local Sales Offices & Reps.

Cal	Huntington Beach, ASC Sls. Co.	714-847-7515
Fla	Winter Park, Young & Lawrence Assocs.	305-647-6929
Ill	Skokie, R.L. Matson	312-676-3650
Mass	Hudson, R.C. Morgan	617-935-6279
Minn	Burnsville, D. patrie Co.	612-890-6386
NJ	Cedar Grove, G.E. Lewis	201-773-1460
NY	Binghamton, F.J. Grashof	607-772-1161
Ohio	Cincinnati, L. Kenning	513-661-2278
Ohio	Cleveland Heights, W.M. Wehner	216-932-8383
Pa	Bluebell, J.J. Protevi	215-272-3325

TMC SYSTEMS (ARIZ.), INC., 930 West 23rd St., Tempe, Ariz., 85282, Tel: 602-967-7874, TWX: 910-950-1943; FSC No: 22929; Empl.: 65; Minimum order: $50 .... p. 1•418,419

For info on price: E. Gagliardi; Application info: D. Robinson; Customer service: E. Gagliardi; Delivery info: E. Gagliardi

Free literature available: Crystal, filter & oscillator application/specification forms. Data sheets describing typical filter & oscillator custom designs, previously supplied in production quantities & representative of TMC's state-of-the-art capabilities.

Products manufactured: Crystals, Filters, Oscillators

Advertisment

Computer aided designs for all classes of filter networks from 10 Khz to 25 mhz. Computerized test facilities for filter attenuation, delay and phase performance. Crystal oscillators including 14 pin DIL package for low cost digital clock applications. Koldweld sealed crystals for critical applications. MIL-spec. compliance as required. Data on typical design performance in catalog.

TODD PRODUCTS CORP., 123 Milbar Blvd., Farmingdale, N.Y., 11735, Tel: 516-293-3440, TWX: 510-224-6584; Empl.: 30 .... p. 1•1497-1502

Products manufactured: Chargers, Battery, Converters, Current Sources, Inverters, Power Supplies, Regulators, Voltage Sources

Local Sales Offices & Reps.

Ariz	Scottsdale, J. Smith Assocs.	602-943-4131
Cal	Fullerton, Product Data Co.	714-870-9151
Cal	Los Altos, Product Data Co.	415-941-4410
Colo	Boulder, J. Smith Assocs.	303-449-7509
Ill	Chicago, SEA Inc.	312-282-6694
Ind	Carmel, SEA Inc.	317-846-2593
Mass	Braintree, Bordewieck Engrg.	617-843-0845
Mich	Southfield, DATA-TRON	313-354-6421
Minn	Minneapolis, SEA Inc.	612-425-4455
Mo	Kansas City, Harris-Hanson Co.	816-444-9494
Mo	St. Louis, Harris-Hanson Co.	314-432-3611
NJ	Cherry Hill, Williams Assocs.	609-424-4110
NJ	Woodcliff Lake, F&F Assocs.	201-778-6767
NM	Albuquerque, J. Smith Assocs.	505-255-2111
NY	Flushing, F&F Assocs.	516-334-1160
NY	Guilderland, Electro-Modular Sys.	518-456-2665
Ohio	Dayton, DATA-TRON	513-223-8421
Ohio	Wickliffe, DATA-TRON	216-585-8421
Tex	Dallas, Dwayne Clement & Assoc.	214-239-6105
Wash	Seattle, R. S. Drake Assocs.	206-763-2755
Wisc	Milwaukee, Sea Inc.	414-547-6637

TODD SYSTEMS, 4 Radford Pl., Yonkers, N.Y., 10701, Tel: 914-963-3400; Empl.: 45 .... p. 2•1812-1815

Products manufactured: Chokes, Transformers

TOHOKU METAL INDS., LTD., No 13-10, 7-chome, Ginza, Chou-ku, Tokyo, Japan, Tel: Tokyo 542-6171; Empl.: 3000

Products manufactured: Bobbins, Winding, Coil & Transformer, Coils Including Assemblies & Forms, Controls/Control Eqpt., Converters, Cores, Magnetic, Crystals, Filters, Foil, Magnets, Matrices, Computer, Memory Systems, Shields, Switches, Transducers, Transformers, Wire

Local Sales Offices & Reps.

Cal	Gardena	213-329-4137

TOLEDO SCALE, Div. Reliance Elect. Co., 5225 Telegraph Rd., Toledo, Ohio, 43612, Tel: 419-470-6200, Telex: 28-6463

Free literature available: 1. TOLEDO SCALES FOR INDUSTRY, broadside of range of industrial products 2. TOLEDO ELECTRONIC WEIGHING FOR INDUSTRY, sketch of industrial electronic products

Products manufactured: Cells, Load, Scales, Dial

Local Sales Offices & Reps.

Ala	Birmingham	205-328-0904
Ala	Mobile	205-478-5064
Ala	Montgomery	205-263-7215
Alas	Anchorage	907-333-1313
Ariz	Phoenix	602-252-4767
Ark	Little Rock	501-562-6770
Cal	Fresno	209-485-3533
Cal	Los Angeles	213-724-3200
Cal	Oakland	415-569-4015
Cal	Sacramento	916-922-4783
Cal	San Diego	714-286-1841
Cal	Stockton	209-464-9469
Colo	Denver	303-573-8283
Conn	New Haven	203-795-0201
Del	Wilmington	302-764-4250
DC	Washington	301-277-3646
Fla	Jacksonville	904-355-8365
Fla	Miami	305-652-3383
Fla	Orlando	305-425-3110
Fla	Pensacola	904-438-6470
Fla	Tampa	813-626-8127
Ga	Albany	912-435-8911
Ga	Augusta	404-722-1580
Ga	Chamblee	404-451-9004
Haw	Kailua	808-261-2214
Idaho	Boise	208-343-8611
Ill	Chicago	312-626-3665
Ill.	Decatur	217-428-0923
Ill	Montgomery	312-897-1578
Ill	Peoria	309-673-3865
Ill	Rockford	815-398-3995
Ind	Evansville	812-423-5217
Ind	Fort Wayne	219-744-1307
Ind	Hammond	219-844-5000
Ind	Indianapolis	317-635-2561
Ind	South Bend	219-289-5526
Ind	Terre Haute	812-232-5654
Iowa	Davenport	319-391-6400
Iowa	Des Moines	515-265-4224
Kans	Topeka	913-357-5191
Kans	Wichita	316-264-1358
Ky	Lexington	606-277-3411
Ky	Louisville	502-895-4241
La	Baton Rouge	504-355-3683
La	Lafayette	318-234-4043
La	Monroe	318-387-3142
La	New Orleans	504-482-6900
La	Shreveport	318-423-8665
Me	Portland	207-772-3451
Md	Baltimore	301-342-1677
Mass	Boston	617-254-8540
Mass	Worcester	617-754-3244
Mich	Detroit	313-838-3000
Mich	Escanaba	906-786-5200
Mich	Flint	313-767-7200
Mich	Grand Rapids	616-451-2079
Minn	Minneapolis	612-781-6948
Miss	Jackson	601-352-3694
Mo	Joplin	417-623-6577
Mo	Kansas City	816-842-8805
Mo	Springfield	417-881-3763
Mo	St. Louis	314-776-0702
Mont	Billings	406-259-5616
Mont	Great Falls	406-453-7231
Neb	Omaha	402-331-9476
Nev	Reno	702-323-1827
NH	Manchester	603-622-8253

NJ	Newark	201-227-6080
NJ	Trenton	609-882-3900
NY	Albany	518-456-2511
NY	Buffalo	716-684-0440
NY	Endwell	607-748-8275
NY	Long Island City	212-361-9050
NY	Rochester	716-482-6967
NY	Syracuse	315-472-4338
NC	Asheville	704-274-3771
NC	Charlotte	704-334-9779
NC	Greensboro	919-273-7555
NC	Raleigh	919-828-1750
NC	Wilson	919-243-4915
ND	Fargo	218-233-5763
Ohio	Akron	216-644-8404
Ohio	Cincinnati	513-931-8000
Ohio	Cleveland	216-351-9411
Ohio	Columbus	614-228-2451
Ohio	Dayton	513-298-5244
Ohio	Toledo	419-479-2201
Okla	Oklahoma City	405-232-9279
Okla	Tulsa	918-584-2491
Ore	Portland	503-288-5496
Pa	Emmaus	215-965-9038
Pa	Erie	814-864-2922
Pa	Harrisburg	717-939-9331
Pa	Philadelphia	215-725-8000
Pa	Pittsburgh	412-681-5935
RI	Providence	401-434-2800
Tenn	Knoxville	615-687-5941
Tenn	Memphis	901-324-7164
Tenn	Nashville	615-256-2173
Tex	Abilene	915-692-3751
Tex	Arlington	817-277-6111
Tex	El Paso	915-533-6712
Tex	Houston	713-526-2993
Tex	Lubbock	806-744-4115
Tex	San Antonio	512-226-6176
Utah	Salt Lake City	801-486-7104
Vt	Burlington	802-862-3534
Va	Norfolk	703-855-3176
Va	Richmond	703-355-7447
Va	Roanoke	703-342-8989
Va	Winchester	703-662-5925
Wash	Seattle	206-624-4560
Wash	Spokane	509-747-0181
Wash	Yakima	509-248-1484
WVa	Charleston	304-343-0131
Wisc	Green Bay	414-432-2404
Wisc	La Crosse	608-784-1317
Wisc	Milwaukee	414-543-7140
Wisc	Wausau	715-848-4188

TOPAZ ELECTRONICS SAN DIEGO

TOPAZ ELECTRONICS, 3855 Ruffin Rd., San Diego, Cal., 92123, Tel: 714-279-0831, TWX: 910-335-1526; Empl.: 140; Minimum order: $25
p. 1•592,593,1503-1506; p. 2•1816,1817

For info on price: L. E. Rasmussen; Application info: J. Reed; Customer service: C. S. Walker; Delivery info: L. E. Rasmussen

Free literature available: Eight page technical brochure (#LT22) titled ULTRA-ISOLATION TRANSFORMERS AND AC POWER SYSTEMS. This brochure describes the applications of Ultra-Isolation Transformers for AC noise attenuation.

Products manufactured: Converters, Filters, Inverters, Isolators, Power Supplies, Regulators, Transformers

Local Sales Offices & Reps.

Ala	Huntsville, Gentry Assocs.	205-534-9771
Ariz	Scottsdale, J. Smith & Assocs.	602-947-2495
Cal	Anaheim, Topaz Elctrns.	714-279-0831
Cal	Los Angeles, Topaz Elctrns.	714-279-0831
Cal	San Diego, Topaz Elctrns.	714-279-0831
Cal	San Francisco, Topaz Elctrns.	408-732-2030
Colo	Boulder, J. Smith & Assocs.	303-442-7100
Fla	Orlando, Gentry Assocs.	305-894-4401
Ill	Chicago, Balhorn & Welch	312-889-5011
Ind	Indianapolis, Mktg. Engrs., Inc.	317-546-1523
Iowa	Cedar Rapids, Palatine Sls., Inc.	319-365-8071
Kans	Andover, Palatine Sls., Inc.	316-683-7512
Md	Bethesda, Bartlett Assocs.	301-656-3061
Mass	Wayland, Wayland Engrg. Sls.	617-655-6080
Mich	Detroit, R C Nordstrom Co.	313-444-4417
Mo	St. Louis, Palatine Sls., Inc.	314-426-7055
NJ	Englewood Cliffs, Power Conversion & Control	201-569-0015
NM	Albuquerque, J. Smith & Assocs.	505-255-2111
NY	Binghamton, Elcom Sls.	607-723-9270
NY	Rochester, Elcom Sls.	716-385-1400
NY	Whitesboro, Elcom Sls.	315-732-6445
NC	Burlington, Gentry Assocs.	919-227-3639
Ohio	Dayton, Bear Mktg.	513-299-3566
Ohio	Richfield, Bear Mktg.	216-659-3131
Pa	Doylestown, T.O.E. Sls.	201-568-5747
Tex	Dallas, Allied Comps. Inc.	214-238-0408
Tex	Houston, Allied Comps. Inc.	713-782-5406
Wash	Seattle, W. Underwood & Assocs.	206-242-7200

TOR CORPORATION, 14715 Arminta St., Van Nuys, Cal., 91402, Tel: 312-786-6524, TWX: 910-495-1746; FSC No: 15957; Empl.: 30; Minimum order: $25

For info on price: D. Griffin; Application info: S. Rackauskas; Customer service: D. Griffin; Delivery info: D. Griffin

Free literature available: Company Brochure, Technical Bulletins.

Products manufactured: Insulators & Insulation, Pads, Transistor Mounting, Transistor, Diode, Thyristor Heat Dissipators

Local Sales Offices & Reps.

Ariz	Phoenix, K.C.E.	602-955-5250
Cal	Sunnyvale, Cutlass Elctrns. North	408-733-5885
Cal	Torrance, Cutlass Elctrns.	213-324-7360
Colo	Sedalia, Lyle Jensen	303-688-4154
Fla	Miami, Ludlum Assocs. Co.	305-592-6523
Ga	Atlanta, G. S. O'Hara	404-451-9020
Ill	Chicago, Berndt Assocs., Inc.	312-283-0713
Ind	Indianapolis, Advanced Comp. Sls.	317-545-6441
Iowa	Des Moines, Beams	515-282-0292
Mass	Quincy, Electro-Mechanical Sls. Co.	617-773-3527
Mass	Tewksbury, Electro-Mechanical Sls. Co.	617-851-7271
Mo	Kansas City, Beams	913-888-6110
Mo	St. Louis, Beams	314-781-6855
NY	Fayetteville, M.P. Andrews, Inc.	315-637-3144
NY	Huntington, C.R. Mayer Co.	516-921-7876
Ohio	Chagrin Falls, Crest Comp. Sls.	216-543-9808
Pa	Philadelphia, Mid-Western Assocs.	215-842-2810
Va	Reston, Boyle Assocs.	703-620-9558

TORELCO INC., 14 Paine Ave., Irvington, N.J., 07111, Tel: 201-374-8641; Empl.: 25

For info on price: R. Hillebrand; Customer service: L. Schafer; Delivery info: L. Schafer

Free literature available: Bulletin: Contains pictures of coils and describes capabilities in the field of coil winding.

Products manufactured: Chokes, Coils Including Assemblies & Forms, Reactors, Transformers

TORIN CORP., Kennedy Dr., Torrington, Conn., 06790, Tel: 203-482-4422, TWX: 710-439-2343; Empl.: 1500
p. 1•508-515

Products manufactured: Blowers & Fans & Accessories

Local Sales Offices & Reps.

Cal	Santa Clara, Torin Corp.	408-246-8585
Cal	Van Nuys, Torin Corp.	213-892-0741
Conn	West Hartford, Torin Corp.	203-568-3790
Ill	Arlington Heights, Torin Corp.	312-593-0660
Ill	Bloomington, Torin Corp.	309-828-5932
Ill	Elgin, Cole Dynamics	312-742-3000
Ind	Rochester, Torin Corp.	219-223-3181
Iowa	Cedar Rapids, Torin Corp.	319-393-5612
Ky	Louisville, Torin Corp.	502-896-4363
Md	Rockville, Marktron, Inc.	301-762-6210
Md	Towson, Marktron, Inc.	301-825-8222
Mich	Farmington, Torin Corp.	313-476-5151
Minn	St. Paul, Hultgren & Strutzel	612-645-9121
NY	E. Syracuse, Torin Corp.	315-437-4674
NY	Rochester, Torin Corp.	716-586-8750
Ohio	Cleveland, Torin Corp.	216-464-2161
Ohio	Dayton, Torin Corp.	513-434-1255
Pa	Doylestown, Torin Corp.	215-348-5917
Tex	Dallas, Torin Corp.	214-942-8822

Local Distributors

Ariz	Tempe, G.S. Marshall Co., 835 W. 22nd St.	602-968-6181
Cal	El Monte, G.S. Marshall Co., 9674 Telstar Ave.	213-686-0141
Cal	Irvine, G.S. Marshall Co., 17975 Sky Pk. Blvd.	714-556-6400
Cal	San Diego, G.S. Marshall Co., 8057 Raytheon Rd.	714-278-6350
Cal	Sunnyvale, G.S. Marshall Co., 788 Palomar Ave.	408-732-1100
Colo	Arvada, G.S. Marshall Co., 5633 Kendall Ct.	303-423-9670
Conn	Bethel, Pioneer/New England, 154 Greenwood Ave.	203-792-1219
Conn	N. Branford, G.S. Marshall Co., 200 Shaw Rd.	203-454-0485
Fla	Palm Beach Gardens, G.S. Marshall Co., 10384 Riverside Dr.	305-622-8490
Ill	Des Plaines, G.S. Marshall Co., 300 E. Touhy Ave.	312-298-3700
Kans	Kansas City, G.S. Marshall Co.	913-648-6414
Md	Gaithersburg, Pioneer/Washington Elctrns., 9100 Gaither Rd.	301-948-0710
Mass	Newton Highland, G.S. Marshall Co., 88 Needham St.	617-965-5115
Mich	Detroit, G.S. Marshall Co.	313-779-8055
Minn	Edina, G.S. Marshall Co., 4900 Viking Dr.	612-831-4904
NY	Farmingdale, G.S. Marshall Co., 230 Sherwood Ave.	516-293-4141
NC	Greensboro, Pioneer/Carolina Elctrns., 2906 Baltic Ave.	919-273-4441
Ohio	Dayton, G.S. Marshall Co., 6388 North Dixie Dr.	513-898-1105
Pa	Horsham, Pioneer/Delaware Valley, 203 Witmer Rd.	215-674-5710
Tex	Dallas, G.S. Marshall Co., 14205 Proton Rd.	214-233-5200
Wash	Bellevue, G.S. Marshall Co., 1801 130th Ave. N.E.	206-883-1084

TOROTEL INC., 13402 S. 71 Hwy., Grandview, Mo., 64030, Tel: 816-761-6314, TWX: 910-777-7037; Empl.: 275 p. 1•417; p. 2•430-439,1819-1821

Products manufactured: Amplifiers, Chokes, Coils Including Assemblies & Forms, Converters, Crystals, Delay Lines, Discriminators, Dummy Loads, Equalizers, Filters, Inverters, Networks, Oscillators, Power Supplies, Reactors, Transformers

Local Sales Offices & Reps.

Ariz	Tempe, Gassner & Clark	602-968-9037
Cal	Los Altos, Parsons & Meister	415-941-4745
Cal	Los Angeles, El Com Sls. Co.	213-223-1351
Fla	Pompano Beach, Varrelman-Gorman Co.	305-941-5544
Fla	Winter Park, Varrelman-Gorman Co.	305-831-8688
Ill	Chicago, Gassner & Clark	312-764-6121
Kans	Shawnee Mission, Florence & Meyer	913-722-5210
Md	Rockville, Mechtronics Sls.	301-340-2130
Mass	Weston, J.J. Goode Assocs.	617-235-3900
Minn	St. Paul, H. A. Cullen & Assocs.	612-646-7371
NY	Manhasset, Win-Cor Elec. Sls.	516-627-9474
NY	Syracuse, T-Squared Elctrns. Co.	315-463-8592
NC	Charlotte, Over & Over	704-366-8441
Ohio	Dayton, H. Teplitz & Co.	513-277-6531
Pa	Birchrunville, Jadelectronic Assocs.	215-647-5151
Tex	Dallas, Oeler & Menelaides	214-234-6334
Tex	Houston, Oeler & Menelaides	713-772-0730
Wash	Bellevue, Western Tech. Sls.	206-641-3900

TORQ ENGINEERED PRODUCTS, INC., 32 W. Monroe St., Bedford, Ohio, 44146, Tel: 216-232-4100; Empl.: 135

Free literature available: Data sheets on torq switch reveals roles played by centrifugal switches in electric motor operation

Products manufactured: Controls/Control Eqpt., Governors, Centrifugal, Switches

TORQUE SYSTEMS, 225 Crescent St., Waltham, Mass., 02154, Tel: 617-891-0230; Empl.: 45
p. 1•992-997

Products manufactured: Actuators, Amplifiers, Controls/Control Eqpt., Motors, Power Supplies, Servo Systems

Local Sales Offices & Reps.

Cal	Los Angeles, C. L. Repp Co.	213-820-1715
Cal	San Jose, J. T. McFarland Assoc.	408-286-9333
Fla	Orlando, MacKay, Smith & Assoc.	305-277-1513
Ill	Chicago, Electro-Tech Mktg. Assoc.	312-588-4535
Kans	Wichita, Dy-Tronix	316-943-6221
Minn	Minneapolis, J. J. Exon Co.	612-566-5340
Mo	Hazlewood, Dy-Tronix	314-731-5799
Mo	Kansas City, Dy-Tronix	816-761-6543
NC	Charlotte, MacKay, Smith & Assoc.	704-527-0240
Va	Roanoke, Johnson Custom Controls Co.	703-774-5550

TORR LABS., 2228 Cotner Ave., Los Angeles, Cal., 90064, Tel: 213-477-1224; Empl.: 75

For info on price: P. B. Nosser; Application info: V. E. DeLucia; Customer service: P.B. Nosser; Delivery info: P. B. Nosser

Products manufactured: Antenna Switching Matrices, Cable, Chamber, Environmental Test, Controls/Control Eqpt., Deposition Equipment, Vacuum & Accessories, Evaporation Equipment, Electron Beam, Flashers, Gages, Lamps, Punched Card Equipment, Relays, Seals, Switches, Testers, Thermostats, Tubes, Valves, Vacuum, X-Ray Inspection Equipment

Local Sales Offices & Reps.

Cal	Glendale, G.R.V. Assocs.	213-245-5586
Cal	Los Altos, Horne Assocs.	415-948-0788
Colo	Greeley, G. Moss	303-353-1452
Ill	Chicago, J. Popp Sls. Co.	312-626-3711
Ill	Wheaton, A. Joyner	312-668-5775
Mo	St. Louis, Scherrer Instrs., Inc.	314-644-5362
NJ	Haddonfield, M & S Assocs.	609-429-7055
FOR:	Can., Toronto, Ont., Patlon Aircraft & Inds., Ltd.	416-239-7389

TORWICO ELCTRNS., INC., Rte. 70, Lakewood, N.J., 08701, Tel: 201-364-1800, TWX: 201-363-1611; Empl.: 240 .... p. 2•1818

Products manufactured: Amplifiers, Chokes, Coils Including Assemblies & Forms, Current Sensors, Reactors, Services, Assembly, Production & Test, Terminals, Transformers

Local Sales Offices & Reps.

Cal	Tarzana, R. Capell	213-987-2233
Conn	Middletown, N.E. Reps., Inc.	203-239-2507
Fla	Orlando, Gra-Mar, Inc.	305-894-3351
Md	Baltimore, W.S. Warrington & Assoc.	301-823-8759
Mass	Needham Hgts., N.E. Reps., Inc.	617-449-3034
Mo	St. Charles, Buse Sls.	314-946-6430
NJ	Haddonfield, TAI Assocs.	609-854-3011
NY	Fayetteville, H.C. Johnson	315-NE 7-9383
NY	Great Neck, Trionic	516-466-2300
NY	Guiderland, H.C. Johnson Agencies	518-456-9681
NY	Rochester, H.C. Johnson	716-482-3000
NY	Williamsville, H.C. Johnson	716-632-7880
Ohio	Cincinnati, A.C. Wahl & Assocs.	513-821-3270
Ohio	Kent, Norco Ind'l	216-666-3774
Pa	Glenshaw, H.C. Johnson Agencies	412-961-0414

TOYO COMM. EQUIP. CO. LTD., 484 3 Chome Tsukakoshi, Kawasaki, Kanagawa, Japan, Tel: Tokyo 406-3355, TWX: 2423001 TOYOCO J; Empl.: 1800

Products manufactured: Crystal Blanks, Crystals, Filters, Oscillators, Transceivers

TPL COMMUNICATIONS CO., 13125 Yukon Ave., Hawthorne, Cal., 90250, Tel: 213-679-0131; Empl.: 35

For info on price: S. Reubenstein; Application info: S. Reubenstein; Customer service: P. Sahs; Delivery info: P. Sahs

Free literature available: Product Line Brochure, Product Spec. Brochures.

Products manufactured: Amplifiers, Transceivers

Local Sales Offices & Reps.

Cal	Cupertino, Wallace & Wallace	408-996-2224
Cal	Los Angeles, Wallace & Wallace	213-747-0401
Colo	Denver, Connors Inc.	303-934-5829
Ga	Smyrna, B-C Elctrns. Sls.	404-436-5169
Ill	Chicago, Ellinger Sls.	312-763-1570
Kans	Shawnee Mission, Maury-Bettis Co.	913-362-0772
Mass	Bedford, Chamberlin & Murray	617-274-0044
Mich	Rochester, Cartwright Comm.	313-375-0420
Minn	St. Paul, Skor	612-645-6461
NJ	Fair Lawn, Moses & Kline	201-791-8538
NY	Liverpool, Lewis-Dunnigan Co.	315-622-2133
Ohio	Cincinnati, Cartwright Comm.	513-825-4202
Pa	Levitown, Sher Sls.	215-946-6200
Tex	Dallas, Maynard & Gunn Sls.	214-528-9090
Wash	Seattle, Fleehart & Sullivan	206-522-1533
EXP:	Hallandale, Fla., EMEC, Inc.	

TRA-CON, INC., 55 North St., Medford, Mass., 02155, Tel: 617-391-5550; Empl.: 35; Minimum order: $25

Customer service: Sls. Dept.

Free literature available: Literature ın high-performance epoxy resin systems for electronic, aerospace and industrial adhesive; potting and casting applications using pre-packaged BIPAX&R kits.

Products manufactured: Adhesives (All Types), Compounds, Encapsulating, Insulating, Molding, Potting, Kits, Cable-End Sealing, Plastic Raw Materials, Liquids, Pellets, Powders, Resins, Rubber

Local Sales Offices & Reps.

Cal	Mountain View, K. Anderson Co.	415-961-6007
Colo	Denver, Cristee-Meade Co.	303-753-9471
NY	Irvington, H. Shprentz Co.	914-591-7970
Tex	Houston, Puffer Supp. Co.	713-668-9457

TRACOR, INC., 6500 Tracor La., Austin, Tex., 78721, Tel: 512-926-2800; Empl.: 5000; Minimum order: $25

Customer service: M. Ames

Products manufactured: Amplifiers, Analyzers, Antennas, Comparators, Controls/Control Eqpt., Couplers, Generators, Meters, Oceanographic Equip. (Electronic), Receivers, Recorders, Standards

Local Sales Offices & Reps.

Analytical Instrs.

Cal	Danville, Western Scientific Assoc.	415-837-4622
Cal	Richmond, Tegal	415-232-1757
Fla	Clearwater, Datco, Inc.	813-531-4255
Ga	Chamblee, Southern Analytical Co.	404-451-5262
Haw	Kaneohe, W.L. Yauger, Inc.	808-239-7187
Ill	Chicago, A.E.D., Inc.	312-348-6550
Ind	Indianapolis, Tech. Sls. & Mktg.	317-356-3658
La	Baton Rouge, Teklab, Inc.	504-926-3667
NJ	Union, Tracor, Inc.	201-964-1631
Ohio	West Carrollton, P.J. Navin	513-434-8940
Tex	Austin, Targa, Inc.	512-926-2800

Ind'l Instrs. Time & Frequency

Ala	Huntsville, BCS Assocs.	205-881-6220
Cal	Calabasas, M. Shovlowsky	213-348-3402
Colo	Denver, BFA Corp.	303-744-3301
Fla	Ft. Lauderdale, BCS Assocs.	
Fla	Orlando, BCS Assocs.	305-896-4881
Ill	Chicago, Midwest Microwave	312-283-4900
Md	Rockville, T E Corp.	301-340-0303
Mass	Waltham, Technical Entprs.	617-890-5300
NM	Albuquerque, BFA Corp.	505-268-4387
NM	Las Cruces, BFA Corp.	505-523-0601
NY	Garden City, PM Elctrns.	516-248-4858
NC	Greensboro, BCS Assocs.	919-273-1918
Pa	Melrose Park, R. Meyers Assoc.	
Wash	Seattle, Showalter-Judd, Inc.	206-624-9020

Ind'l Instrs. TV

Ala	Huntsville, BCS Assocs.	205-881-6220
Cal	Anaheim, Broadcast Comms. Devices	714-528-9505
Colo	Evergreen, Didier Denver	303-674-6000
Fla	Ft. Lauderdale, BCS Assocs., Inc.	
Fla	Orlando, BCS Assocs.	305-896-4881
Md	Rockville, T E Corp.	301-340-0303
Mass	Waltham, Technical Entprs.	517-890-5300
Mich	Milford, H.M. Dyer Elctrns.	313-685-2560
NY	Garden City, PM Elctrns.	516-248-4858
NC	Greensboro, BCS Assocs.	919-273-1918

Medical Instrs.

Cal	Oakland, J. Taylor & Assocs.	415-832-4056
Cal	Whittier, Electro Medical Instrumentation	213-698-3018
Fla	Titusville, Tele-Acoustics	305-267-1600
Ga	Atlanta, Tracor, Inc.	404-633-9571
Ga	Austell, Telemetrics	404-252-1030
Ill	Chicago, Audiological Svc. & Supply Co.	312-281-1531
Md	Frederick, D.B. Creighton Assoc.	301-473-8127
Md	Rockville, Tracor, Inc.	301-762-3623
Mass	Lawrence, Medical Engrg. Assoc.	617-683-8711
Minn	Minneapolis, Electro-Medic, Inc.	612-926-2010
Mont	Billings, Montana Precision Meas.	406-245-3296
NJ	Staten Island, Medacoustics, Inc.	212-979-4262
NC	Greenville, Carolina Acoustics	919-752-1436
Ohio	Cleveland, Environmental Technology Corp.	216-464-3888
Okla	Oklahoma City, Oklahoma Audiometer Svc. Co.	406-245-3296
Ore	Portland, Sanderson Safety Supply Co.	502-234-0456
SC	Greenville, Safeco Equip. Co.	
Tenn	Kingsport, Safeco Equip. Co.	615-246-4164
Tex	Austin, Audio-Medical Sys.	512-926-5094
Tex	Houston, Audio-Elctrns.	713-744-4832
Wash	Seattle, Safety & Supply Co.	206-762-8500

Navigation

Cal	Sausalito, B.H. Ballard Co.	415-332-0105
Fla	Tampa, Promar	813-876-7677
La	Gretna, Maricon Instrs.	504-366-1842
Md	Rockville, T E Corp.	301-340-0303
Mass	Sudbury, Commercial Mktg. Assoc.	

TRAK MICROWAVE CORPORATION, 4726 Eisenhower Blvd., Tampa, Fla., 33614, Tel: 813-884-1411; Empl.: 120; Minimum order: $50

Customer service: T. L. Roberts

Products manufactured: Amplifiers, Cavities, Microwave, Circuits, Hybrid, Thin-Film, Circulators, Ferrite, Ferrite Material & Parts, Generators, Isolators, Microwave Integrated Circuits (MIC's), Oscillators

Local Sales Offices & Reps.

Ala	Huntsville, Scientific Devices-Southeast	205-536-1969
Cal	Orange, J.E. Hachten Co.	213-681-2361
Cal	Palo Alto, J.E. Hachten Co.	415-316-1252
Colo	Denver, Omega Ltd.	303-758-1508
Fla	Ft. Lauderdale, Scientific Devices-Southeast	305-721-4260
Fla	Orlando, Scientific Devices-Southeast	305-841-8180
Mass	Natick, Wayland Engrg. Sls.	617-655-6080
NM	Albuquerque, Premmco, Inc.	505-265-0115
NY	Skaneateles, Robtron	315-685-5731
NY	Tuckahoe, Asco Elctrns., Inc.	914-779-8110
NC	Burlington, Scientific Devices-Southeast	919-228-6279
Ohio	Dayton, F. L. Ohmer & Assocs.	513-434-1454
Pa	Lafayette Hill, M. Lader Co.	215-825-3177
Tex	Dallas, Cain & Co.	214-233-6809
Utah	Salt Lake City, Monarch Distributing & Representing	801-226-9617
Va	Woodbridge, M. Lader Co.	703-494-4731
Wash	Seattle, J.B. Jolly, Inc.	206-938-4166
EXP:	Stamford, Conn., Dage Corp.	203-324-3123

TRAK SYSTEMS, Div. TRAK Microwave Corp., 4722 Eisenhower Blvd., Tampa, Fla., 33614, Tel: 813-884-1411, Telex: 52-827; FSC No: 11165; Empl.: 42; Minimum order: $50

Customer service: D. H. Sturgill

Free literature available: TIMING EQUIPMENT - Such as Time Code Generators, Tape Control Units, etc. CUSTOMIZED COMPUTER SYSTEMS - designing and building controllers, automated material handling systems & interface devices for computer-to-computer & computer to peripheral applications.

Products manufactured: Chargers, Battery, Clocks (All Types), Comm. Systems, Converters, Data Acquisition & Reduction Systems, Data Loggers, Generators, Indicators, Receivers, Standards, Tape Search Equipment, Terminal Equipment, Digital, Translators, Data

Local Sales Offices & Reps.

Ill	Mt. Prospect, Cain & Co.	312-253-3578
Ohio	Lancaster, Cain & Co.	614-654-4800
Pa	Lafayette Hill, M. Lader Co.	215-825-3177
Tex	Dallas, Cain & Co.	214-233-6809
Va	Woodbridge, M. Lader Co.	703-494-4731
EXP:	Stamford, Conn., Dage Corp.	203-324-3123

TRAM CORP., Box 187, Winnisquam, N.H., 03289, Tel: 603-524-0622; Empl.: 40

Customer service: K. Zades

Products manufactured: Transceivers

TRAN SPECTRA INC., Box 9, Airport Rd., Greenfield, Tenn., 38230, Tel: 901-235-2218; Empl.: 250

For info on price: T. M. Smith; Application info: R. E. Lenhardt; Customer service: T. M. Smith; Delivery info: T. M. Smith

Free literature available: Miniature aluminum electrolytic capacitors, aluminum electrolytic capacitors for audio crossover networks, and special design capacitors.

Products manufactured: Capacitors, Fixed

Local Sales Offices & Reps.

Cal	Bellflower, Royer Assocs.	213-869-2516
Conn	Meriden, Electro Prods. Sls.	203-235-4040
Fla	Palm Beach Gardens, Brosey Ents.	305-622-6045
Ill	Chicago, Tran Spectra	312-736-0236
Ill	Skokie, Mar-Con Assocs.	312-675-6450
Mass	Waltham, Electro Prods. Sls.	617-899-1570
Tenn	Greenfield, Tran Spectra	901-235-2218

TRANEX INC., 1599 Stierlin Rd., Mountain View, Cal., 94043, Tel: 415-968-9292; FSC No: 17474; Empl.: 130; Minimum order: $25

For info on price: H. Waltz; Application info: P. Menting; Customer service: H. Waltz; Delivery info: K. Wagner

Free literature available: 8 pg. Brochure - Facility & capability

Products manufactured: Chokes, Coils Including Assemblies & Forms, Reactors, Transformers

Local Sales Offices & Reps.

Cal	Mountain View	415-968-9292
Cal	Santa Ana	714-835-8684

Colo	Colorado Springs	303-392-3432

TRANS-MET ENGRG., 601 S. Palm St., La Habra, Cal., 90631, Tel: 213-691-2266; Empl.: 20; Minimum order: $5

For info on price: R. Mazzarella; Application info: D. Hornbaker; Customer service: D. Rall; Delivery info: J. O'Brien

Free literature available: 210A - Nontact Non-Contact Temp. Sensor for Sheet Material; 224 - Fibertemp - Temp. Sensor for Fiber; 215 - Wiretemp - Temp. Sensor for Wire; 226 - Rolltemp - Temp. Sensor for Roll; 227 - Portatemp - Digital Pyrometer - Portable; 228 - Rolltronic - Roll. Temp. Control System.

Products manufactured: Controls/Control Eqpt., Meters, Monitors, Transducers

Local Sales Offices & Reps.

Ala	Huntsville, Craft Assocs.	205-837-2202
Cal	Redwood City, Marchi Assocs.	415-364-3411
Conn	Westport, A. J. Abrams	203-226-3010
Ill	Chicago, Thermo/Cense	312-792-2760
Iowa	Des Moines, H.E. Ferris Co.	515-255-1757
Mich	Royal Oak, D. Ray Assocs.	313-576-4700
Minn	Minneapolis, Arjay Sls.	612-925-1833
NY	East Rochester, Thermal Systems	716-377-1970
NY	New York, E. C. Smith & Assoc.	201-783-6668
NC	Matthews, W.K. Hile Co.	704-847-9125
Ohio	Brecksville, D & B Engr	216-526-6320
Ohio	Cincinnati, G. Drysdale & Assoc	513-752-2069
Ore	Portland, McLarne	206-454-3400
Pa	Pittsburgh, Process Eng	412-561-5050
Exp	New Haven, Conn, Masten-Wright Corp	203-288-1638
FOR:	Can,Toronto, Ont., Armatek Control	416-251-3111

TRAN-TEC CORPORATION, Box 1022, Columbus, Neb., 68601, Tel: 402-564-2748; Empl.: 25; Minimum order: $35

Customer service: C. Schroeder

Products manufactured: Insulators & Insulation, Transistor, Diode, Thyristor Heat Dissipators

Local Sales Offices & Reps.

Cal	Redwood City, Woodworth Co.	415-365-0252
Cal	Santa Fe Springs, Sierra-Pacific Engrg. Co.	213-921-9634
Colo	Aurora, Robbins & Assocs.	303-343-7728
Fla	Pinellas Park, Russell Assocs.	813-526-1134
Ga	Atlanta, Russell Assocs.	404-225-8422
Ind	Indianapolis, Scott Elctrns, Inc.	317-635-8951
Iowa	Cedar Rapids, J. VRBIK Co.	319-377-8244
Kans	Overland Park, Ensco-Rep Inco.	913-381-7557
Md	Bel Air, Russell Assocs.	301-879-9180
Mass	Wakefield, H.C. Jappe Co.	617-245-9359
Mich	Milford, Polyphase	313-685-3003
Mo	Saint Louis, Ensco-Rep Inc.	314-567-3935
NJ	Fair Haven, Russell Assocs.	201-747-0600
NY	Bay Shore, Russell Assocs.	516-666-6500
NY	Syracuse, Naylor Electric Co.	315-472-9183
Ohio	Cleveland, D, Steffen & Assocs.	216-461-8333
Tex	Dallas, Russell Assocs.	214-369-3173
Wash	Bellevue, Russell Assocs.	206-455-3694
EXP:	Schenectady, N.Y., EMB Elctrns. Corp.	518-372-5841
For	Can., Scarborough, Ont., Gandhi-Ball Assocs.	416-438-9320

TRANS-TEK, INC., Rte. 83, Ellington, Conn., 06029, Tel: 203-872-8351; FSC No: 27109; Empl.: 20

For info on price: B. Eddy; Application info: M. Blanchette; Customer service: B. Eddy; Delivery info: G. Thibeault

Free literature available: Data sheet, SERIES 240 Displacement Transducer; Data sheet, SERIES 200 Displacement Transducer; Data sheet, SERIES 100 Linear Velocity Transducer; Data sheet, SERIES 600 Angular Displacement Transducer; Data sheet, SERIES 350 Gaging Transducer.

Products manufactured: Encoders, Gages, Indicators, Power Supplies, Transducers

TRANSCO PRODS., INC., 4241 Glencoe Ave., Venice, Cal., 90291, Tel: 213-821-7911, TWX: 910-343-6469; Empl.: 358

Products manufactured: Antenna Feed Systems, Antenna Switching Matrices, Antennas, Attenuators, Couplers, Dividers, Filters, Horns, Microwave, Junctions, Hybrid, Microwave, Mixer-Preamplifiers, Microwave, Mixers, Receivers, Relays, Switches, Terminals, Waveguides & Adapters

Local Sales Offices & Reps.

Cal	San Jose, B. F. Helms	408-268-2325
Fla	Clearwater, Southeastern Component Sls., Inc.	813-531-8324
Md	Ellicott City, VPI, Inc.	301-465-4060
NH	Concord, R. C. Bishop	617-891-1683
NY	Bayside, R. L. Diamond Inc.	212-423-7330
Ohio	Middletown, W. Tudor Morris	513-423-0332
Tex	Ft. Worth, Carey, Wolf & Assocs.	817-738-1996

TRANSCOM ELECTRONICS, INC., Box 9, La Mesa, Cal., 92041, Tel: 714-460-4181, TWX: 910-322-1345; Empl.: 10

Customer service: R. L. Kotnik

Free literature available: HF SSB Transceivers VHF FM Transmitters UHF FM Transmitters VHF FM Receivers UHF FM Receivers

Products manufactured: Amplifiers, Comm. Systems, Control Systems, Air Traffic, Couplers, Receivers, Scramblers, Data, Services, Assembly, Production & Test, Synthesizers, Transceivers, Transmitters

TRANSCON MFG. CO., 2655 Perth St., Box 20825, Dallas, Tex., 75220, Tel: 214-357-8301, TWX: 910-861-4169; Empl.: 16

Products manufactured: Clamps & Clips, Cords, Pads, Transistor Mounting, Strain Reliefs, Cable & Wire, Tubing, Wire & Cable Ties

TRANSDATA INC., 6510 Proprietors Rd., Columbus, Ohio, 43085, Tel: 614-885-9891, Telex: 246-686; Empl.: 35

For info on price: D. H. Wilhelm; Application info: D. A. Gephart; Customer service: D. H. Wilhelm; Delivery info: D. H. Wilhelm

Free literature available: Standard catalog showing transducer models and standard modifications. Specification sheets for specially engineered Power Factor, Phase angle, Temperature, and Frequency models

Products manufactured: Meters, Testers, Transducers

Local Sales Offices & Reps.

Ark	Little Rock, C. H. Stout	501-374-8201
Cal	Los Angeles, Matzinger Assocs.	213-624-8001
Cal	Oakland, W. Nott Co.	415-654-3747
Fla	Maitland, Rowe Engrg. Sls.	305-834-2700
Fla	St. Petersburg, Rowe Engrg. Sls.	813-522-6317
Ga	Atlanta, M. J. Fein & Co.	404-938-0190
Ill	Glen Ellyn, J. T. Becker Assoc.	312-858-1911
Ill	Wilmette, M. J. Fein & Co.	312-256-5828
Ind	Indianapolis, Utility & Indl. Prods.	317-924-3607
La	Shreveport, C. H. Stout of Shreveport	318-425-5485
La	New Orleans, C. H. Stout of La.	504-486-3707
Mass	Holliston, M. J. Fein & Co.	617-429-4008
Miss	Jackson, C. H. Stout of Miss.	601-354-4326
Mo	St. Louis, Electrorep	314-872-7300
NJ	Livingston, M. J. Fein & Co.	201-994-3575
NY	Scarsdale, M. J. Fein & Co.	914-472-1100
Ohio	Cleveland, Weschler Elec. Co.	216-251-4609
Ohio	Columbus, W. L. Blake Co.	614-888-7680
Pa	Media, Systems Control Assoc.	215-565-2077
Pa	Pittsburgh, Muller, Harper & Assoc.	412-931-6460
Tenn	Memphis, C. H. Stout of Tenn.	901-362-1616
Tex	Houston, Gettys-Eads-Adair	713-781-3005
FOR:	Can, Downsview, Ont., Aptec Engrg. Ltd.	416-661-9722
FOR:	Can, Vancouver, B. C., Canadian Dynamics Ltd.	604-325-3201

TRANSDUCERS, INC., 12140 E. Rivera Rd., Whittier, Ca., 90606, Tel: 213-945-3741, TWX: 910-586-1899; Empl.: 103

For info on price: R. Nordstrom; Application info: D. Elgar; Customer service: W. Reynolds; Delivery info: R. Nordstrom

Free literature available: Pressure Transducers - Ranges From 5 PS1 through 12,500 PSI - absolute Gage and differential. Load Cells Ranges from 1 pound through 5 million pounds Digital readouts.

Products manufactured: Amplifiers, Bridges, Cells, Load, Services, Assembly, Production & Test, Transducers

Local Sales Offices & Reps.

Ala	Huntsville, Int'l. Scientific Instrs.	205-837-1601
Ariz	Scottsdale, Inter-Mountain Engrg. Co.	602-947-7379
Cal	San Diego, L.L. Stoakes, Inc.	714-274-6281
Cal	Santa Clara, Richards Associates	408-246-5860
DC	Washington, Wright Co., Inc.	202-296-0979
Fla	Orlando, R. J. Cheney & Assocs.	305-894-7371
Ill	Chicago, SEA, Inc.	312-282-6694
Ind	Carmel, SEA, Inc.	317-846-2593
Kans	Merriam, Tech Representatives, Inc.	913-432-4110
La	Harvey, SECO	504-347-4646
Md	Gaithersburg, Wright Co., Inc.	301-948-5588
Mass	Norwood, Hoder-Rogers, Inc.	617-769-2445
Mich	Farmington, Carter McCormic & Peirce, Inc.	313-477-7700
Mich	Kalamazoo, Carter, Mc Cormic & Pierce, Inc.	616-349-9666
Minn	Minneapolis, SEA, Inc.	612-425-4455
Mo	Hazelwood, Tech Representatives	314-524-6900
Mo	Peculiar, Tech Reps., Inc.	816-331-7744
NM	Albuquerque, Inter-Mountain Engrg. Co.	505-344-2212
NY	Depew, Labtronics, Inc.	716-685-4111
NY	Syracuse, Labtronics, Inc.	315-454-9314
NY	Ulster Park, Labtronics, Inc.	518-372-6649
NC	Matthews, W. K. Hile Co., Inc.	704-847-9125
Ohio	Cleveland, Carter, McCormic & Peirce, Inc.	216-333-5650
Ohio	Dayton, Carter, McCormic & Peirce, Inc.	513-278-5873
Ohio	Worthington, Carter, McCormic & Peirce, Inc.	614-888-4466
Ore	Portland, Brett Associates, Inc.	503-232-4184
Pa	Abington, Bach-Stewart Assocs.	215-885-1550
Pa	Pittsburgh, Carter, McCormic & Peirce, Inc.	412-824-3760
RI	Rumford, R. J. Hoder	401-438-2726
Tenn	Knoxville, W. K. Hile Co., Inc.	615-588-1061
Tex	Dallas, R. Martin Associates	214-358-3704
Tex	Dallas, Techn. Prods. Inc.	214-357-9603
Tex	Houston, R. Martin Assoc.	713-462-4077
Va	Chester, W. K. Hile Co., Inc.	804-271-0014
Wash	Seattle, Brett Associates, Inc.	206-935-8054
Wisc	Waukesha, SEA, Inc.	414-547-6637
FOR:	Can., Don Mills, Ont., Intertechnology, Ltd.	416-447-0738

TRANSICOIL, INC., Worcester, Pa., 19490, Tel: 215-277-1300, TWX: 510-660-0132; Empl.: 110

Customer service: P. Schoenacher

Products manufactured: Actuators, Amplifiers, Controls/Control Eqpt., Converters, Dampers, Servo, Drives & Drive Mechanisms (Dial), Gears & Gear Mechanisms (Precision), Generators, Indicators, Integrators, Mechanical & Electro-Mechanical, Motor & Generator Armatures, Rotors, Stators, Motors, Multipliers, Repeaters, Servo, Resolvers, Synchro, Servo Systems, Shifters, Synchros, Tachometers, Transducers

Local Sales Offices & Reps.

Ariz	Scottsdale, Runyon Co.	602-959-6060
Cal	Altadena, Don Murray Entprs.	213-681-5031
Conn	Enfield, Measurement Equip. Co.	203-745-9050
Fla	Hollywood, Reynolds & Assocs.	305-987-6720
Fla	Palm Beach Gardens, Reynolds & Assocs.	305-622-6850
Fla	Satellite Beach, Reynolds & Assocs.	305-773-4700
Fla	St. Petersburg, Reynolds & Assocs.	813-360-1484
Ga	Atlanta, Reynolds & Assocs.	404-252-5360
Ill	Chicago, R.M.P. Sales, Inc.	312-631-9545
Kans	Overland Park, ENSCO-REP, Inc.	913-381-7557
Md	Baltimore, Stemler Assocs., Inc.	301-944-8262
Mass	Wakefield, Measurement Equip. Co.	617-245-4870
Mich	Mt. Clemens, Compass Assocs.	313-468-8830
Mo	St. Louis, ENSCO-REP, Inc.	314-567-3935
NJ	Barrington, Stemler Assocs., Inc.	215-644-3477
NJ	Cherry Hill, Stemler Assocs., Inc.	609-966-4070
NJ	Clifton, Avionics Engrg. Sales, Inc.	201-772-1956
NY	Buffalo, Bowser & Sapecky Assocs., Inc.	716-839-4170
NY	Manlius, Bowser & Sapecky Assocs., Inc.	315-682-8885
Ohio	Dayton, Compass Assoc.	513-252-9939
Pa	Worcester, Transicoil, Inc.	215-277-1300
Wash	Bellevue, W.M. Buehler Co.	206-455-5512
EXP:	Worcester, Pa., Transicoil	215-277-1300

TRANSISTOR DEVICES, 85 Horsehill Rd., Cedar Knolls, N.J., 07927, Tel: 201-267-1900; Empl.: 240; Minimum order: $30

Customer service: J. Apelian

Free literature available: TDM Catalog - high performance power supply modules, TDMD Catalog - dual output power supply modules, TDI Catalog - high efficiency switching power supplies, XL Series Catalog - low cost regulated power supplies Dynaload Catalog - solid state electrical loads test equipment.

Products manufactured: Inverters, Power Supplies, Testers, Transformers

Local Sales Offices & Reps.

Ala	Huntsville, Technology Mktg. Assocs.	205-883-7893
Cal	Costa Mesa, Measurement Assocs. So.	714-540-7160
Cal	Palo Alto, Coherent Mktg. Assocs.	417-327-2217
Fla	Ormond Beach, Technology Mktg Assocs.	904-672-2314
Fla	Pompano Beach, Technology Mktg. Assoc.	305-942-0774
Ill	Elmhurst, Scott Assocs.	312-279-5681
Md	Ellicott City, A/O Electronics	301-997-8033
Mass	Lexington, E.F. Delfino, Inc.	617-862-1118
NY	Liverpool, Systems Hardware Reps.	315-451-4925
NY	Rochester, L-Mar	716-328-5240
NY	Vestal, Systems Hardware Reps.	607-729-6339
Ohio	Medina, McShane Inc.	216-725-4568
Pa	Fort Washington, GCM Inc.	215-646-7535
Tex	Houston, Vista Assocs.	713-661-0119
Tex	Richardson, Vista Assocs.	214-235-4547
EXP:	New York, N.Y., Singer Products	212-432-1400

TRANSISTOR ELECTRONICS INC., Box 6191, Minneapolis, Minn., 55425

TRANSITRON ELCTRN. CORP., Precision Connector Div., 168 Albion St., Wakefield, Mass., 01880, Tel: 617-245-4500, TWX: 710-643-6718; Empl.: 4200

Products manufactured: Circuits, Integrated, Silicon Monolithic, Unpackaged Chips, Diodes, Integrated Circuit Devices, Rectifiers, References, D-C Voltage, Semiconductor Wafer Fabrication, Thyristors (Includes Silicon Controlled Rectifiers), Transistors

Local Sales Offices & Reps.

Ariz	Phoenix, Transitron Elctrn. Corp.	602-278-3596
Cal	Long Beach, Transitron Elctrn. Corp.	213-595-5472
Cal	Mountainview, Transitron Elctrn. Corp.	415-968-1710
Colo	Denver, R. G. Entprs.	303-744-2464
Fla	Orlando, Transitron Elctrn. Corp.	305-241-4526
Ill	Chicago, Transitron Elctrn. Corp.	312-693-3360
Ill	Oak Brook, Schuten Assocs.	312-654-8645
Kans	Prairie Village, Engrg. Svcs.	913-649-4000
Md	Baltimore, Callas Elctrns.	301-744-7711
Mich	Novi, Miltimore Sls.	313-349-5820
Minn	St. Louis Park, Transitron Elctrn. Corp.	612-546-4331
Mo	St. Louis, Engrg. Svcs.	314-726-2233
NJ	Nutley, Necco	201-661-5059
NJ	South Orange, Transitron Elctrn. Corp.	201-763-4780
NY	Rochester, Ontario Tech. Sls.	716-464-8636
NC	Raleigh, A. B. Andrews	919-833-5567
Ohio	Dayton, Transitron Elctrn. Corp.	513-276-4141
Pa	Ambler, G.C.M. Inc.	215-646-7535
Tex	Richardson, Transitron Elctrn. Corp.	214-234-2406
Wash	Bellevue, ElecSel Corp.	503-649-6177

TRANSMAGNETICS, INC., 210 Adams Blvd., Farmingdale, N.Y., 11735, Tel: 516-293-3100, TWX: 510-224-6420; FSC No: 17755; Empl.: 28; Minimum order: $100 .... p. 1•124,125

Customer service: F. Haber

Products manufactured: Amplifiers, Controls/Control Eqpt., Converters, Demodulators, Dividers, Encoders, Indicators, Modulators, All Kinds, Monitors, Multiplexers, Multipliers, Repeaters, Servo, Synchro Transmitters, Solid-State, Transformers

Local Sales Offices & Reps.

Ariz	Tempe, John Cain & Assocs.	602-838-3404
Md	Columbia, A.O. Inc.	301-924-3693
Minn	Minneapolis, Thurston Assocs.	612-929-7801
Wash	Bellevue, Topp Eng'g. Sls.	206-747-5400

TRANSPARENT CONDUCTORS INC., 26 Coromar Dr., Box 549, Goleta, Cal., 93017, Tel: 805-968-3561, TWX: 910-334-1180; Empl.: 10

Customer service: B. Feldman

Free literature available: Data Sheet On Liquid Crystal Displays - Large Area Dynamic Scattering Series Ld

Products manufactured: Display Devices/Displays

Local Sales Offices & Reps.

Cal	Los Angeles, Orion Sls.	213-240-3151
Conn	Coscob, Colavecchio Assoc.	203-869-8409

TRANSPARENT CONDUCTORS INC cont'd

Advertisment

Manufacturer of Liquid Crystal Displays featuring Hermetically sealed large area displays for applications such as Changeable Signs, Clocks, Visual Paging Systems, Scoreboards, Remote Readouts and other displays requiring Long Distance and/or Large Audience and/or High Ambient Light Viewing. Quotations for Custom LCD Requirements are invited.

TRANSTECTOR SYSTEMS, 532 Monterey Pass Rd., Monterey Park, Cal., 91754, Tel: 213-283-9278; FSC No: 30992; Empl.: 16; Minimum order: $25 ... p. 1•2302,2303

For info on price: S. Robbins; Application info: S. Robbins; Customer service: K. Hazen; Delivery info: M. Jo Mathews

Free literature available: Catalogue of AC and DC components for transient, over voltage and undervoltage protection, commercial protectors for facility or branch service protection - related transient voltage measuring monitoring instruments.

Products manufactured: Arresters, Electrical Surge, Lightning, Detectors, Indicators, Limiters, Monitors, Power Supplies, Protectors, Recorders, Suppressors

Local Sales Offices & Reps.

Cal	Burlingame, Leddy Assocs.	415-347-5247
Cal	Encino, Porter Co.	213-788-2350
Ga	Atlanta, Continental Controls	404-449-1271
Haw	Honolulu, Aloha Assocs.	808-941-1574
Ill	Mt. Prospect, Anatronic Associates	312-296-2468
Md	Lutherville, Cunningham & Assocs.	301-296-4306
Mass	Sturbridge, Branford Controls Corp.	617-347-7447
NJ	Ridgewood, Ballou, Inc.	201-444-6990
NY	Pittsford, NoCo, Inc.	716-461-4750
Ohio	Vandalia, W.J. Brauer & Assocs.	513-898-1224
Ohio	Wickliffe, W.J. Brauer & Assocs.	216-943-0601
Pa	Pittsburgh, W.J. Brauer & Assocs.	412-921-3213
Tex	Dallas, Glidden Electro Equip.	214-363-6539
Tex	Houston, Glidden Electro Equip.	713-681-1415

TRENDAR, 500 Clyde Ave., Mountain View, Cal., 94040, Tel: 415-965-0350, TWX: 910-379-6573

Customer service: N. Lyons

Free literature available: T200 Testclip - Hand Held in Circuit Digital IC Tester 1000 Portable Go/No-Go Digital Circuit Board Tester 1010 Production-Digital Circuit Board Tester 2000 Large Volume Digital Circuit Board Tester

Products manufactured: Clamps & Clips, Comparators, Probes, Test Systems, Testers

Local Sales Offices & Reps.

Ala	Huntsville, BSC Assoc.	205-881-6220
Ariz	Scottsdale, Barnhill 3	602-947-7841
Cal	Burbank, Instrument Specialists	213-849-7181
Cal	San Diego, Instrument Specialists	714-565-2555
Cal	Santa Clara, Instrument Specialists	408-244-1505
Colo	Denver, Barnhill 3	303-934-5505
Fla	Orlando, BCS Assoc.	305-896-4881
Ill	Des Plaines, Cozzens & Cudahy	312-298-3600
Ind	Indianapolis, Cozzens & Cudahy	317-244-2456
Mass	Lexington, Instrument Rep.	617-861-8620
Mich	Detroit, WKM Assoc.	313-892-2500
Minn	Minneapolis, Cozzens & Cudahy	612-884-4336
Mo	St. Louis, Cozzens & Cudahy	314-423-1234
NJ	Union, SBM Assoc.	201-687-8737
NM	Albuquerque, Barnhill 3	505-299-7658
NY	Pleasantville, SBM Assoc.	914-769-1811
NY	Rochester, SBM Assoc.	716-226-1400
NC	Greensboro, BCS Assoc.	919-273-1918
Ohio	Cleveland, WKM Assoc.	216-267-0445
Ohio	Dayton, WKM Assoc.	513-434-7500
Pa	Pittsburgh, WKM Assoc.	412-892-2953
Tex	Houston, Barnhill 2	713-621-0040
Tex	Richardson, Barnhill 2	214-231-2573

TRG, Div. of Alpha Inds., 20 Sylvar Rd., Woburn, Mass., 01801, Tel: 617-935-5150, TWX: 710-393-1236; FSC No: 53536; Empl.: 31; Minimum order: $100

For info on price: D. Loger; Application info: J. Cotton; Customer service: H. Miller; Delivery info: D. Loger

Free literature available: Microwave Millimeter Products and Capabilities Catalog

Products manufactured: Adapters, Waveguide, Amplifiers, Antenna Feed Systems, Antennas, Attenuators, Bends & Twists, Microwave, Bolometers, Calorimeters, Microwave, Circulators, Ferrite, Couplers, Delay Lines, Detectors, Diodes, Dividers, Dummy Loads, Filters, Flanges, Waveguide, Holders, Crystal, Horns, Microwave, Isolators, Joints, Rotary, Microwave, Junctions, Hybrid, Microwave, Meters, Mixers, Modulators, All Kinds, Mounts, Radiometers, Receivers, Shifters, Slotted Lines, Microwave, Switches, Tees, Terminals, Tubing, Tuners

Local Sales Offices & Reps.

Ala	Huntsville, Gentry Assocs., Inc.	205-534-9771
Ariz	Phoenix, PLS Assocs., Inc.	602-957-9110
Cal	Los Altos, Stout-Loeswick	415-948-3265
Cal	Woodside, Windsor Dynamics, Inc.	415-854-4870
Colo	Denver, PLS Assocs., Inc.	303-771-0140
Fla	Orlando, Gentry Assocs., Inc.	805-894-4401
Ill	Elk Grove Village, L. F. Green & Assocs.	312-593-0282
Ind	Indianapolis, L. F. Green & Assocs.	317-293-9827
Kans	Prairie Village, Engrg. Svcs. Co.	913-649-4000
Md	Woodbine, Morar Assocs.	301-442-2089
Mass	Lexington, Lancer Assoc.	617-861-1720
Mich	Ferndale, Tiby Co.	313-547-3550
Minn	Minneapolis, L. F. Green & Assocs.	612-781-1611
Mo	St. Louis, Engrg. Svcs. Co.	314-726-2233
NM	Albuquerque, PLS Assocs., Inc.	505-255-2330
NY	E. Syracuse, Ossmann Instrs.	312-437-6666
NY	Huntington, L.I., CDB Entprs., Inc.	516-692-5200
NC	Burlington, Gentry Assocs., Inc.	919-227-3639
Ohio	Cleveland, Tiby Co.	216-371-5335
Tex	Dallas, Texas Microwave/Electronics	214-231-5381
Utah	Salt Lake City, PLS Assocs., Inc.	801-272-3681
Wash	Renton, S. Wilson Co.	206-226-0650

TRI CORP., 505 W. Olive Ave., Sunnyvale, Cal., 94086

TRI-DATA CORP., 800 Maude Ave., Mountain View, Cal., 94043, Tel: 415-969-3700, TWX: 910-379-6978; Empl.: 173; Minimum order: $25

For info on price: G. Brewster; Application info: G. Brewster; Customer service: S. Horton; Delivery info: J. Cherney

Free literature available: Product literature for cartrifile tape recorders, flexible disk systems, sealed disk systems, automaton data entry systems, software programs, disk operating systems.

Products manufactured: Data Loggers, Memory Systems, Recorders, Tapes, Recording, Magnetic (All Types)

Local Sales Offices & Reps.

Cal	Newport Beach, Tri-Data Corp.	714-833-3722
Fla	Orlando, E.G. Holmes & Assocs.	305-894-8901
Ga	Chamblee, E.G. Holmes & Assocs.	404-451-6161
Kans	Mission, Inland Assocs.	913-362-2366
Md	Silver Spring, L.G. White & Co.	301-585-3141
Mass	Lexington, Tri-Data Corp.	617-861-7007
Mo	Glencoe, Inland Assocs.	314-938-4992
NJ	Cherry Hill, Williams Assocs.	609-424-4110
NJ	Fort Lee, Tri-Data Corp.	201-947-2092
NM	Albuquerque, Rustco Enterprises	505-296-6474
Tex	Austin, Martin Zienkosky, Browne, Assoc.	512-454-4371
Tex	Dallas, Martin Zienkosky, Browne, Assoc.	512-454-4371
Tex	Houston, Martin Zienkosky, Browne Assoc.	713-523-7333
Va	Virginia Beach, E.G. Holmes & Assocs.	804-481-6556

TRI-EX TOWER CORP., 7182 Rasmussen Ave., Visalia, Calif., 93277, Tel: 209-732-8383; Empl.: 31

For info on price: C. Blyleven; Application info: R. Carlson; Delivery info: R. Vargas

Products manufactured: Antenna Rotators, Antenna Towers & Supports, Antennas, Indicators, Lighting Equipment, Emergency, Mounts

TRI-SAGE, INC.

TRI-SAGE INC., 1212 Pittsford-Victor Rd., Pittsford, NY, 14534, Tel: 716-381-2220, TWX: 510-253-1532; FSC No: 52992; Empl.: 100; Minimum order: $25

For info on price: F. Burham; Application info: F. Burham; Customer service: D. Schwenk; Delivery info: D. Schwenk

Free literature available: Facilities Brochure Process & Technical Brochure Applications Notes.

Products manufactured: Circuits, Hybrid, Thick Film, Networks, Resistors

Local Sales Offices & Reps.

Ala	Gadsden, Nickerson Co.	205-547-7718
Ariz	Tempe, Sedco Sls.	602-968-7791
Cal	Lafayette, Phillips Assocs.	415-284-2579
Cal	Los Angeles, M. A. Stolaroff Co.	213-295-7781
Cal	San Diego, M. A. Stolaroff Co.	714-234-6905
Conn	Milford, Todino Engrg. & Sls. co.	203-874-6643
Fla	Kissimmee, Nickerson Co.	305-846-6755
Fla	Oldsmar, Nickerson Co.	813-855-4209
Ga	Decatur, Nickerson Co.	404-321-4678
Kens	Shawnee Mission, Technical Sls. Assocs.	913-888-3330
Md	Baltimore, B. White & Co.	301-484-5400
Mass	Needham Hgts., Todino Engrg. & Sls. Co.	617-444-7925
Minn	Minneapolis, D. G. Perry & Co.	612-920-3212
Mo	St. Louis, Technical Sls. Assocs.	314-725-5361
NJ	Englewood Cliffs, E. Glass Assocs.	212-586-8440
NY	Fayetteville, Graydon-Sherman, Inc.	315-637-9861
NC	Franklin, Nickerson Co.	704-524-6363
NC	Kannapolis, Nickerson Co.	704-932-6772
Ohio	Vandalia, W. J. Brauer & Assoc.	513-898-1224
Ohio	Wichliffe, W. J. Brauer & Assoc.	216-943-0601
Okla	Tulsa, H. Daly Co.	918-627-4159
Pa	Ardmore, W.K. Metz	215-649-3966
Pa	Pittsburgh, W. J. Brauer & Assoc.	412-921-3213
Tex	Dallas, R. Matthews Elctrns.	214-233-0363
Tex	Houston, R. Matthews Elctrns.	713-664-7131

Advertisment

Tri-Sage, Inc. specializes in custom designs utilizing thick film microelectronic techniques. We also offer many standard circuits. Packages include DIP's, SIP's, molding, potting, conformal coating or substrate only. We manufacture résistor networks, RC filters and active hybrids. We provide fine line gold printing for chip bonding & RF applications. Prototypes are typically produced in 4 weeks.

TRI-TRONICS CO., 619 Enterprise Drive, Dept. EE, Oak Brook, Ill., 60521, Tel: 312-654-3255; Empl.: 12; Minimum order: $6

For info on price: E. Yelich; Application info: R. A. Anderson; Customer service: D. Hacquebord; Delivery info: E. Yelich

Free literature available: Illustrated catalog describes over 120 controls and accessories.

Products manufactured: Alarms, Controls/Control Eqpt., Counters, Light Sources, Photoelectric

Local Sales Offices & Reps.

Colo	Lakewood, Hess Elctrn. Control	303-421-4000
Conn	West Hartford, A. Hatton Assoc.	203-233-3613
Ill	Aurora, Dwight Smith & Assoc.	312-896-0828
Mass	Pine Hurst, Julie Assocs.	617-667-1958
Mo	St. Louis, W.W. Munroe Equip.	314-968-2500
Ohio	Columbus, Rockford Controls Ohio Inc.	614-231-5890
Ohio	Dayton, Rockford Controls Ohio Inc.	513-898-5452
Ohio	Euclid, Rockford Controls Ohio Inc.	216-731-5250
Pa	Chalfont, Mid-Lantic Assoc.	215-249-3301
Pa	Erie, Rockford Controls Ohio Inc.	412-373-2531

TRIAC ELECTRONICS, 200 Park Ave., Ste. 303E, New York, N.Y., 10017, Tel: 212-687-0620; Empl.: 24; Minimum order: $300

For info on price: M. Walpow; Application info: S. Black; Customer service: M. Stanley; Delivery info: M. Stanley

Products manufactured: Alarms, Arresters, Electrical Surge, Lightning, Batteries, Capacitors, Fixed, Circuit Breakers, Coatings, Compounds, Encapsulating, Insulating, Molding, Potting, Conductive Plastic Materials, Controls/Control Eqpt., Coolants, Circuit & Components, Cords, Counters, Current Sensors, Detectors, Diodes, Drivers, Solenoid, Electroplating Equipment & Supplies, Eliminators, Battery, Generators, Heat Exchangers & Systems, Honeycomb Sheets, Panels, etc., Indicators, Inverters, Laminates, Loads, Electronic Variable, Monitors, Motors, Probes, Protectors, Rectifiers, Reducers, Regulators, Relays, Shifters, Substrates, Suppressors, Switches, Thermistors, Thermostats, Thyristors (Includes Silicon Controlled Rectifiers), Timers, Transducers, Transformers, Tubes, Welding Equipment & Access. (Excluding Equip. for Semiconductor Devices)

TRIAD-UTRAD, Distributor Svcs., 305 N. Briant St., Huntington, Ind., 46750, Tel: 219-356-6500, TWX: 810-333-1532; Empl.: 450 ... p. 2•1822-1829

For info on price: S. Fisher; Application info: D. Myers; Customer service: P. Monsey; Delivery info: P. Monsey

Free literature available: #TR75-76, Industrial Transformer Catalog; Transformers, Chokes, Power Supplies, Circuit Cards. #TV75-76, Replacement Guide: Yokes & Flybacks for TV Replacement, #TCT-74, Engineering Bulletin on Telephone Coupling Transformers, #TY-73, Engineering Bulletin on Transitor Power Supply Transf. Engineering Bulletin on Toroidal & Power Inductors.

Products manufactured: Boards, Plug-In, Boards, Printed Circuit, Boards, Printed Wiring, Universal, Chargers, Battery, Chokes, Coils Including Assemblies & Forms, Inverters, Power Supplies, Pullers, Reactors, Regulators, Transformers, Yokes

Local Sales Offices & Reps.

Alas	Anchorage, H.J. Lang & Assocs.	907-279-5741
Ariz	Phoenix, Shefler-Kahn Co.	602-258-7893
Ark	El Dorado, D. Bellew Sls. Co.	501-863-8325
Cal	No. Hollywood, J. Carter	213-980-3450
Cal	Redwood City, Logan Sls. Co.	415-369-6726
Colo	Denver, McLoud & Raymond Co.	303-756-1589
Conn	Madison, A&M Elctrn. Reps.	203-245-1031
Fla	Maitland, Hutto-Hawkins-Peregoy	305-831-2474
Ga	Atlanta, Murphy & Cota	404-875-2525
Ill	Wilmette, J. Wasserman Assocs.	312-256-3566
Ind	Fort Wayne, New/Era Sls.	219-432-1164
Ind	Indianapolis, New/Era Sls.	317-257-7333
Iowa	Des Moines, T. L. Dowell, Inc.	515-225-1620
Kans	Overland Park, T.L. Dowell, Inc.	913-236-8200
La	Kenner, D. Bellew Sls. Co. Inc.	504-729-4550
Md	Baltimore, E-K-P Assocs.	301-788-6498
Mass	Needham, A&M Elctrn. Reps.	617-444-8170
Mich	St. Clair Shores, J.M. Thorpe Co.	313-779-6363
Minn	Minneapolis, C.R. Gibb Co.	612-377-1200
Mo	St. Louis, T.L. Dowell, Inc.	314-968-4234
NM	Albuquerque, Shefler-Kahn Co. Inc.	505-265-7077
NY	Rochester, Marsey Sls.	716-442-9700
NY	Rockville Centre, Willgold Elctrn. Sls. Corp.	516-764-4022
NC	Burlington, Murphy & Cota	919-584-1577
Ohio	Cincinnati, F.E. Kahsar Sls.	513-471-9011
Ohio	Hudson, F.E. Kahsar Sls.	216-653-6808
Okla	Tulsa, J.V. Schoonmaker	918-936-1423
Ore	Portland, J.J. Backer Co.	503-297-3776
Pa	Easton, E-K-P Assocs.	215-258-6477
Pa	Pittsburgh, Trymax Co.	412-823-8400
Tenn	Memphis, D. Bellew Sls. Co.	901-365-9437
Tex	Dallas, J. Y. Schoonmaker Co.	214-357-8481
Wash	Seattle, J.J. Backer Co.	206-285-1300
EXP:	Westbury, N.Y., Minthorne Int'l.	516-334-3303

TRIDAIR INDS., Fastener Div., 3000 W. Lomita Blvd., Torrance, Calif., 90505, Tel: 213-530-2200, TWX: 910-347-6239; Empl.: 300; Minimum order: $25

For info on price: Quot. Dept.; Application info: Tech. Sls.; Customer service: Order Svcs. Dept.; Delivery info: Order Svcs. Dept.

Products manufactured: Fasteners, Pins, Rings, Retaining

Local Sales Offices & Reps.

Cal	Santa Monica, Air Supply Co.	213-871-0520
Mass	Waltham, Elctrn. Fasteners	617-890-7780
Minn	Minneapolis, Aerospace Computer Supplies	612-884-4725
NY	Plainview, Merit Fasteners	516-242-1800

TRIDAK, INC., 5 Valley Rd., Danbury, Conn., 06810, Tel: 203-744-3060; Minimum order: $15

Customer service: F. Gurski

Free literature available: Complete data sheets on our Model 200, 260-270 and 280 metering dispense machines; data sheet on our micro manipulator.

Products manufactured: Machines/Machinery, Production, Meters

TRIMM, INC., 400 W. Lake, Box 489, Libertyville, Ill., 60048, Tel: 312-362-3700; Empl.: 90 ... p. 2•895

Products manufactured: Attenuators, Boxes, Junction, Outlets & Wall Plates, Caps, Lenses, Indicator Light, Connectors, Cords, Handsets, Chestsets, Headphones, Headsets, Etc., Jacks (All Types), Panels, Plugs, Potentiometers, Racks, Sockets, Switches, Terminal Blocks, Boards & Strips

Local Sales Offices & Reps.

Cal	Palo Alto, JM Assocs.	415-327-1260
Md	Kensington, Forti-Austin Assocs.	301-949-1706
NJ	Willingboro, Forti-Austin Assocs.	609-871-9290
RI	Cumberland, Perry Assocs.	401-333-5054
Tex	Dallas, Techno Assocs.	214-FL7-9213

TRIO LABS, INC., 80 Dupont St., Plainview, N.Y., 11803, Tel: 516-681-0400, TWX: 510-221-1861; Empl.: 150

Customer service: J. Crawford

Products manufactured: Converters, Current Sources, Inverters, Power Supplies, Regulators

Local Sales Offices & Reps.

Ariz	Scottsdale, Thorson/Phoenix	602-956-0800
Cal	Palo Alto, Held & Mollard	415-965-9321
Colo	Denver, Thorson/Denver	303-759-0809
Conn	Hamden, Scientific Comps.	203-272-2160
Md	Upper Marlboro, RL Engrg.	301-760-5533
Mich	Southfield, Luebbe Sls. Co.	313-357-0335
Minn	Saint Paul, Cahill Assocs.	612-739-8445
Mo	Maryland Heights, Delltron, Inc.	313-434-3804
Ohio	Cincinnati, Luebbe Sls. Co.	513-871-4211
Ohio	Cleveland, Luebbe Sls. Co.	216-333-0425
Ohio	Dayton, Luebbe Sls. Co.	513-294-0426
Pa	Delmont, Luebbe Sls. Co.	412-468-4019
Tex	Dallas, Norvell Assocs., Inc.	214-350-6771
Tex	Houston, Norvell Assocs. Inc.	713-774-2568

TRIO-TECH, INC. OF CALIF., 2435 N. Naomi St., Burbank, Calif., 91504, Tel: 213-846-9200, TWX: 910-498-2709; Empl.: 57; Minimum order: $25

Customer service: Sls. Desk

Free literature available: Data sheets and technical reports covering TRACER-flo® Process of fine and gross leak hermeticity testing, Bubble Testers, Bulk-to-Stick Loaders, CENTRISAFE® and environmental centrifuges.

Products manufactured: Detectors, Machines/Machinery, Production, Services, Assembly, Production & Test, Testers

Local Sales Offices & Reps.

Ariz	Scottsdale, Meas. Consits.	602-994-9519
Colo	Boulder, Meas. Consits.	303-449-5294
Fla	Sarasota, W. J. Irvine Co.	813-955-9656
Ill	Des Plaines, Maher Engrg. Co.	312-824-2124
Kans	Baxter Springs, Production Automation	316-856-3600
Mass	Wilmington, Technical Instr.	617-944-3930
Minn	Minneapolis, Production Automation	612-866-5700
Mo	Hazelwood, Production Automation	314-731-2331
Mo	Raytown, Production Automation	816-737-0066
NM	Albuquerque, Meas. Consits.	505-265-6471
NM	Las Cruces, Meas. Consits.	505-526-2491
NY	Hartsdale, Powell-Pendergraph	914-761-7792
NY	Niagara Falls, Watmet, Inc.	716-285-3595
Pa	Colmar, E. L. Assocs.	215-822-2510
Tex	Dallas, Stu Hamilton Assocs.	214-350-4344
Utah	Murray, Meas. Consits.	801-268-3181

TRIPLETT CORP., 286 Harmon Rd., Bluffton, Ohio, 45817, Tel: 419-358-5015, TWX: 810-490-2400 ... p. 1•821

For info on price: B. Selvage; Application info: B. Selvage; Customer service: N. Edinger; Delivery info: N. Edinger

Products manufactured: Analyzers, Calibrators, Cases, Equipment, Instrument, Meter, Detectors, Indicators, Kits, Test Equipment, Meters, Probes, Recorders, Shunts, Meter, Testers

Local Sales Offices & Reps.

Ariz	Phoenix, Shefler-Kahn Co.	602-258-7893

Cal	Inglewood, J. Berman Co., Inc.	213-649-6111
Cal	Millbrae, Polach & Bensinger	415-697-2525
Colo	Denver, Shefler-Kahn	303-623-1567
Conn	Wallingford, Adams-McGregor	203-269-5816
Fla	Maitland, Hutto-Hawkins-Peregoy, Inc.	305-831-2474
Fla	Pompano Beach, Hutto-Hawkins-Peregoy, Inc.	305-943-9593
Ga	Atlanta, Millar Elctrns.	404-261-6160
Haw	Honolulu, Kems, Inc.	808-847-1395
Ill	Oak Park, G. Petitt Co.	312-369-8940
Ind	Ft. Wayne, W. Bieberich Inc.	219-432-2537
Ind	New Albany, W. Bieberich Inc.	812-945-3187
Kans	Overland Park, T. Dowell Inc.	913-236-8200
Md	Reisterstown, Massey Assoc.	301-833-2039
Mass	Boston, Adams-McGregor	617-542-3773
Mich	Grosse Point Woods, Elko Sls. Corp.	313-884-1955
Minn	Minneapolis, Heimann Co.	612-861-6051
Mo	St. Louis, T.L. Dowell, Inc.	314-968-4234
NJ	North Caldwell, Masin Esco Inc.	201-226-2550
NY	Rochester, L. G. Marchese Assoc.	716-544-4300
NY	Syosset, Masin Esco Inc.	516-364-0310
NC	Raleigh, Millar Elctrns.	919-787-9564
Ohio	Centerville, C.H. Dolfuss Jr. & Co.	513-433-6776
Ohio	Rocky River, C.H. Dolfuss Jr. & Co.	216-333-7504
Ore	Portland, J.J. Backer Co.	503-297-3776
Pa.	Media, Snyder & Massey Assoc., Inc.	215-566-5400
Pa	Pittsburgh, G.S. Root	412-561-4125
RI	Lincoln, Adams-McGregor	401-726-1300
Tex	Dallas, Lund & Co.	214-358-4335
Wash	Seattle, J.J. Backer Co.	206-285-1300

Local Distributors

Ala	MObile, Brownell-Electro, 3450 Armour Dr.	205-479-5405
Ariz	Phoenix, Metermaster Div., 2633 E. Buckeye Rd.	602-273-7331
Cal	Gardena, Key Instrs., 1520 W. Rosecrans	213-321-5891
Cal	Glendale, R.V. Weatherford, 6921 San Fernando	213-849-3451
Cal	Los Angeles, Croft Elec., 1016 W. 8th St.	213-626-6894
Cal	Los Angeles, Metermaster Div., 5646 Jillson St.	213-685-4340
Cal	Palo Alto, Metermaster Div., 3995 E. Bayshore	415-968-0313
Cal	San Diego, Metermaster Div., 8797 Balboa Ave.	714-278-2112
Cal	Santa Clara, Dynametron, 3343 Edward Ave.	408-246-6535
Cal	Sonoma, Schmidt Elec., 122 E. Napa St.	707-938-8416
Colo	Denver, Meter-master, 1165 S. Cherokee	303-722-5766
Conn	Middletown, Mancib Co., Box 781	203-346-6646
Fla	Ft. Lauderdale, A & M, 4257 N.E. 6th Ave.	305-565-2579
Fla	Orlando, Brownell-Electro, 307 27th St.	305-843-6775
Ga	Atlanta, Brownell-Electro, Drawer 82730	404-762-5181
Haw	Honolulu, Kems, Inc., 239 Puuhale Rd.	808-847-1395
Ill	Chicago, A & M, 6251 W. Touhy Ave.	312-774-3500
Ill	Chicago, E.I.L., 221 W. 79th St.	312-874-8070
Ill	Elk Grove, Vil. Metermaster, 121 Gordon St.	312-593-8650
Ill	Elk Grove, Vil. Meter-makers, 2450A Lunt Ave.	312-439-5050
Ill	Oak Park, Pacific Indicator, 6603 W. North Ave.	312-261-1330
Kans	Overland Park, Brooks Elec., 3761 W. 95th	913-648-3131
Kans	Shawnee Mission, Sturtz Inst., 4705 Mission Rd.	913-236-4705
La	Harahan, Industrial Inst. Works, 134 Laitram La.	504-733-8355
Md	Elkridge, Sunshine Sc., 5800 Main St.	301-796-5600
Md	Savage, Pyttronic, 8220 Wellmoor Ct.	301-953-3000
Md	Timonium, E.I.L., 1830 York Rd.	301-252-1260
Mass	Burlington, Mancib Co., Middlesex Tpk at "A" St.	617-272-9450
Mich	Ferndale, Ram Meter, Inc., 1100 Hilton Rd.	313-547-1000
Mich	Lansing, Main Elec., 5558 S. Pennsylvania	517-882-5035
Minn	Minneapolis, Instr. Control, 2401 E. Franklin	612-336-7744
Mo	St. Louis, Ind. Serv., 4354 Olive	314-535-5760
NH	Portsmouth, A & M, 1039 Ilington St.	603-431-7912
NJ	Belleville, Marshall Inst., 236 Washington	201-751-1190
NJ	S. Plainfield, Brownell-Electro, 500 Hadley Rd.	201-753-4600
NY	Buffalo, Trott Elctrns., 932 Hertel Ave.	716-876-0880
NY	L.I.C., Metermod Inst., 48-15 31st Ave.	212-726-4850
NY	Rockville Ctr., A & M, 5 Nassau St.	516-678-6960
NC	Charlotte, Brownell-Electro, Box 16368	704-394-4341
Ohio	Cleveland, Pioneer/Std., 4800 E. 131st St.	216-587-3600
Ohio	Cleveland, Weschler Elec., 4250 W. 130th	216-251-4609
Ohio	Dayton, Pioneer/Dayton, 1900 Troy St.	513-236-9900
Okla	Tulsa, Tri-State Inst., Box 4746	918-936-0489
Pa	Phila., Sunshine Sc., 1810 Grant Ave.	215-673-5600
Pa	Pittsburgh, Cameradio Co., 2801 Liberty Ave.	412-288-2600
Pa	Pittsburgh, E.I.L., 1844 Ardmore Blvd.	412-731-5230
Tenn	Memphis, Brownell-Electro, 3053 Tranquillity	901-332-9254
Tenn	Nashviulle, Brownell-Electro, 1050 Acorn Dr.	615-889-8230
Tex	Beaumont, Straughn Elec., 3235 Highland Ave.	713-838-4563
Tex	Dallas, Ultra Inst., 9995 Monroe Dr.	214-357-0297
Tex	Garland, Metermaster, 2809 National Dr.	214-271-2471
Tex	Houston, Quality Inst., 4832 Caroline	713-524-0528
Tex	Odessa, Whitlock Inst., 1306 N. Texas	915-337-3412
Va	Richmond, I.T.R., 1425 Blue Jay La.	804-288-7198
Wash	Seattle, Eicher-Richards, 2727 N.E. Blakeley	206-523-7888
Wisc	Milwaukee, Electro-Mechano, 241 E. Erie St.	414-272-4050

TRIPP-LITE, 133 N. Jefferson, Chicago, Ill., 60606, Tel: 312-346-3040; Minimum order: $10

Customer service: Order Desk

Products manufactured: Inverters, Lighting Equipment, Emergency, Power Supplies

TRIRIDGE CORP., Elec. Comps. & Sys., Box 12420, Pittsburgh Airport, Pittsburgh, Pa., 15231, Tel: 412-899-2288; FSC No: 31951; Empl.: 50; Minimum order: $25

For info on price: H. Lokomski; Application info: P. Sklack; Customer service: H. Lokomski; Delivery info: H. Lokomski

Free literature available: 16-page Catalog showing line of standard Reed Relay products dimension for application, switching capabilities, and coil resistance.

Products manufactured: Relays

Local Sales Offices & Reps.

Cal	Mt. View, West/Mark Assocs.	415-969-1700
Cal	San Gabriel, V. Gott & Assocs.	213-285-2148
Colo	Denver, Omega, Ltd.	303-758-1508
Fla	Lighthouse Point, Saber Assocs.	305-943-3076
Fla	Longwood, Saber Assoc.	305-422-3686
Fla	St. Petersburg, Saber Assoc.	813-441-1301
Ga	Woodstock, Saber Assocs.	404-432-9625
Ill	Glendale Hts., Trend-Tronics	312-963-2210
Ind	Ft. Wayne, McDonald Sls. Co.	219-747-3650
Md	Hyattsville, Eastern Components	301-577-2925
Mass	Reading, C.E. Godfrey Co.	617-944-2230
Mich	Dearborn, Pitcher-Poulin, Inc.	313-582-5450
Minn	Minneapolis, Scott Elctrn. Sls.	612-929-2985
NJ	Haddonfield, Sunday-O'Brien	609-429-4013
NY	Camillus, Noco	315-672-3988
NY	Manhasset, Win-Cor Elctrn. Sls. Corp.	516-627-9474
NY	Pittsford, Noco	716-461-4750
NC	Raleigh, Saber Assoc.	919-834-3961
Ohio	Centerville, N. Case Assocs.	513-425-1301
Ohio	Dayton, N. Case Assocs.	513-433-0966
Ohio	Fairview Park, N. Case Assocs.	216-333-4120
Pa	Enon Valley, Nebco Assocs.	216-457-2333
Pa	Flourtown, Eastern Components	215-836-1616
Pa	York, Eastern Components	717-764-3114
Tex	Dallas, R. Matthews Elctrns.	214-233-0363
Tex	Houston, R. Matthews Elctrns.	713-664-7131
Wash	Seattle, Nemco	206-322-6200

TRIRIDGE CORP. cont'd

Advertisment

Triridge is a full capability Reed relay house, we have the capability from low level to high voltage and the full gambit of Reed relay switching capabilities. Our facilities can produce for the Engineer prototype order, or the high volume production order. All relays are top quality and 100% tested at competitive market prices.

TRIVEX, 3180 Redhill Ave., Costa Mesa, Cal., 92626, Tel: 714-546-7781; Empl.: 100

For info on price: E. F. Thompson; Application info: R. Engle; Customer service: D. Hirchak; Delivery info: E. F. Thompson

Free literature available: Model 40/80 Brochure describes Treiex plug to plug replacement system for IBM 2848/2260 systems. replacement system for IBM 2848/2260 systems. Model 720/740 Serial Impact Printer - spec describing printer.

Products manufactured: Printers, Terminals, Data Display (including Alphanumeric & Graphic)

Local Sales Offices & Reps.

Ill	Rosemont, 312-696-2380	
NJ	Ramsey	201-825-1900

TROMPETER ELECTRONICS, INC., 8936 Comanche, Chatsworth, Cal., 91311, Tel: 213-882-1020, TWX: 910-494-1210; FSC No: 14949; Empl.: 75; Minimum order: $25

For info on price: E. Miller; Application info: L. Tichy; Customer service: J. Escover; Delivery info: Stock

Free literature available: T-10 Catalog: describes patch panels, jacks, cords, networks and connectors along with matrices, switches and systems in coax, twinax and triax, from D.C. to 3 GHz.

Products manufactured: Antenna Switching Matrices, Attenuators, Bridges, Cable Assemblies & Harnesses, Cable, Connector Adapters, Connectors, Cords, Dividers, Jacks (All Types), Matrices, Computer, Modules, Logic, Encapsulated, Panels, Plug Adapters, Plug & Jack Sets, Relays, Switches, Tees, Terminals, Tools

Local Sales Offices & Reps.

Ala	Huntsville, Currie, Peak & Frazier, Inc.	205-536-5650
Cal	Los Angeles, Trompeter Elctrns., Inc.	213-882-1020
Cal	Menlo Park, Long & Assocs.	415-327-1300
Colo	Littleton, Aztec Entprs.	303-795-0250
Conn	Milford, Todino Engrg. Sls.	203-874-6643
Fla	Orlando, Currie, Peak & Frazier, Inc.	305-855-0843
Ill	Chicago, J. C. Angel	312-878-0653
Md	Silver Spring, Sel-Tronics, Inc.	301-589-3391
Mass	Needham Heights, Todino Engrg. Sls., Inc.	617-444-7925
Minn	Minneapolis, Engrg. Prods. Assocs.	612-925-1883
NJ	Saddlebrook, L & M Assocs.	201-843-8700
NM	Albuquerque, Aztec Entprs.	505-255-2440
NY	Brentwood, L & M Assocs.	516-231-8363
NY	New York, L & M Assocs.	212-675-7486
NY	Rochester, Upstate Component Sls. Inc.	716-288-1080
NC	Greensboro, Currie, Peak & Frazier, Inc.	919-273-3040
Ohio	Berea, Geotronix Mktg. Assoc.	216-243-8520
Ohio	Columbus, Geotronix Mktg. Assoc.	614-457-8472
Pa	Andalusia, L & M Assocs.	215-639-3100
Tex	Austin, Martin, Ziekosky, Browne & Assoc.	512-454-4371
Tex	Dallas, Martin, Ziekosky, Browne & Assoc.	214-233-5535
Tex	Houston, Martin, Ziekosky, Browne & Assoc.	713-523-7333
FOR:	Can., Calgary, Alberta, Westronic Engrg. Sls. Ltd.	403-253-5585
FOR:	Can., Montreal, Quebec, Componetics Ltd.	514-342-4117
FOR:	Can., Vancouver 10, BC, Westronics Engrg. Sls. Ltd.	604-872-0636

TROMPETER ELECTRONICS, INC cont'd

Advertisment

"Special cable, connectors, patching and switching for Video, T.V., data, and instrumentation systems. Patching includes patch panels, patch cords, and many special accessories in coax, triax, twinax, and quadrax noise-rejecting cable systems. Switching includes custom built matrices and multipole - multithrow relays including Digital control for coax, isolated coax, triax and twinax cable systems. Frequencies from D.C. up through 3 GHz. Technical discussion of noise rejecting cable systems in catalog."

TRONIC CORP., Box 247-E, Belmont, Cal., 94002, Tel: 415-593-1487, Telex: 34-8457; Empl.: 5; Minimum order: $35

For info on price: B. Keeler 913-263-2440; Application info: H. Stanly 415-593-1487; Customer service: B. Keeler 913-263-2440; Delivery info: B. Keeler 913-263-2440

Products manufactured: Cleaners, Ultrasonic, Machines/Machinery, Production

Local Sales Offices & Reps.

Cal	Belmont, C. B. Process	415-592-4545
Cal	Long Beach, Viets Engrg.	213-426-2107
Colo	Broomfield, F. J. Leonard Co.	303-466-2307
Fla	Hollywood, Victor Metal Finishing	305-981-1969
Haw	Honolulu, C & F Machinery	808-524-1033
Ind	Indianapolis, Hi-B	317-357-8521
Kans	Mission, Grady Co.	913-262-1231
Mich	Southfield, American Envivosales	313-559-6145
Minn	Minneapolis, Chemquip Corp.	612-374-3610
NJ	Mountain Lakes, Desrie & Farrell	201-334-4848
NY	Lyons, Finishing Sys.	315-946-6661
NC	Statesville, Brown Equip.	704-872-3669
Ohio	Akron, Friess Vacublast	216-836-9011
Okla	Oklahoma City, Tri-Mech Co.	405-478-2558
Ore	Portland, Precision Chemical	503-244-7636
Pa	Pittsburgh, Checker Inds.	412-795-4414
Tex	Houston, Allies Machinery & Supply	214-358-1401
Wisc	Menomonee Falls, Fritz Engrg.	414-251-6590

TRUE DATA CORP., 2701 S. Halladay, Santa Ana, Cal., 92707

TRUMP-ROSS IND:'L. CONTROLS, Div. of Datametrics, Inc., 265 Boston Rd., Billerica, Mass., 01862, Tel: 617-663-3451; Empl.: 55

For info on price: R. Brunelle; Application info: S. Futran; Customer service: R. Brunelle; Delivery info: R. Brunelle

Free literature available: Incremental Encoders & Systems Handbook - Theory of operation of incremental encoders, glossary of terms, condensed catalog, and block diagrams of typical applications.

Products manufactured: Encoders, Tachometers, Testers

Local Sales Offices & Reps.

Cal	Encino, King-Way Associates	213-788-4124
Cal	San Carlos, Electro-Pacific	415-593-1334
Colo	Littleton, Radco Electronics	303-794-4279
Ill	Chicago, Thermo/Cense	312-792-2760
Mass	Waltham, J. W. Simpson Co.	617-899-7700
Mich	Royal Oak, Dave Ray & Associates	313-576-4705
NJ	South Orange, The Smith Co.	201-763-1770
NY	Rochester, KLM Assocs.	716-442-0820
NY	Syracuse, KLM Assocs.	315-458-6214
NC	Winston-Salem, Radco Co.	919-722-9671
Ohio	Chagrin Falls, The J. Kilroy Corp.	216-247-8997
Pa	Jenkintown, Stein Instrumentation Corp.	215-885-2370
Tex	Richardson, Concept Sls.	214-231-3040
Wash	Bellevue, Al Smith Co.	206-746-6770

TRUTONE ELCTRNS., INC., 7315 Fulton Ave., No. Hollywood, Cal., 91605, Tel: 213-875-0423; Empl.: 25; Minimum order: $5

Customer service: Sls. Dept.

Free literature available: Complete catalog of sound products. Tuners - amplifiers - receivers - accessories.

Products manufactured: Amplifiers, Receivers, Tuners

Local Sales Offices & Reps.

Ala	Birmingham, Adams & Assocs.	205-822-8109
Ariz	Phoenix, J.R. Morgan Agency	602-252-3089
Cal	Santa Clara, Wayne Wainwright	408-247-2310
Colo	Littleton, J.E. Gray	303-795-8223
Conn	West Hartford, R. Smith Co.	203-523-0512
Fla	Miami, World Wide Prods.	305-949-3457
Ga	Decatur, Adams & Assocs.	404-981-2207
Ill	Skokie, M. Bermann Sls.	312-675-3740
Md	Olney, D. Buckley	301-774-9338
Mich	Pontiac, T.A. Sls.	313-335-4285
Minn	Moorhead, Northland Assocs.	218-233-4616
Miss	Michigan City, J. Fisher Sls.	601-224-6470
Mo	Kansas City, Nevco Inc.	816-421-1751
NY	Jamaica, G.E. Miller Assocs.	516-433-5590
NY	Phelps, LSM Assocs.	315-548-4891
NC	Greensboro, Adams & Assocs.	919-272-6838
Ohio	Cleveland, J.O. Olsen Co.	216-752-5444
Ore	Lake Oswego, McMillan Elctrns.	503-636-6257
Tenn	Memphis, L.E. Jones	901-683-7616
Tex	Dallas, Techno Assocs.	214-357-9213

TRW CAPACITOR DIV., 301 West 'O' Str., Ogallala, Neb., 69153, Tel: 308-284-3611, TWX: 910-620-0321; FSC No: 5910; Minimum order: $100 .... p. 2•302-314

For info on price: A. Tompkins Ext. 362; Application info: T. Vonkampen Ext. 306; Customer service: K. Fleshman Ext. 360; Delivery info: K. Fleshman Ext. 360

Products manufactured: Capacitors, Fixed, Diodes, Rectifiers, Transistors

Local Sales Offices & Reps.

Ala	Huntsville, TRW Elctrns.	205-772-9656
Ariz	Scottsdale, Q.T. Wiles & Assocs.	602-948-5590
Cal	Los Angeles, Q.T. Wiles & Assocs.	213-649-1232
Cal	Menlo Park, Straube Assocs.	415-323-2476
Cal	San Diego, Q.T. Wiles & Assocs.	714-565-6893
Cal	Tustin, Q.T. Wiles & Assocs.	714-832-4952
Cal	Woodland Hills, TRW Elctrns.	213-883-9033
Colo	Denver, Straube Assocs.	303-426-0890
Conn	Rowayton, TRW Elctrns.	203-853-4466
Fla	Ft. Lauderdale, TRW Elctrns.	305-721-1700
Fla	Orlando, TRW Elctrns.	305-857-3650
Ill	Elk Grove, J.G. Twist Co.	312-593-0200
Ind	Ft. Wayne, R.O. Whitesell & Assoc.	219-432-5591
Ind	Indianapolis, R.O. Whitesell & Assoc.	317-359-9283
Ind	Kokomo, R.O. Whitesell & Assocs.	317-452-6065
Iowa	Cedar Rapids, J.G. Twist Co.	319-393-8703
Kans	Prairie Village, J.G. Twist Co.	913-236-4646
Ky	Louisville, R.O. Whitesell & Assoc.	502-893-7303
Md	Ellicott City, TRW Elctrns.	301-465-1777
Mass	Waltham, TRW Elctrns.	617-899-6100
Mich	Grand Rapids, R.O. Whitesell & Assoc.	616-451-8901
Mich	Southfield, R.O. Whitesell & Assoc.	313-358-2020
Mich	St. Joseph, R.O. Whitesell & Assoc.	616-983-7337
Minn	Minneapolis, TRW Elctrns.	612-835-5454
Mo	St. Louis, J.G. Twist Co.	314-432-2830
NM	Albuquerque, Straube Assocs.	505-292-0295
NY	Melville, TRW Elctrns.	516-293-9000
NY	Rochester, TRW Electrns.	716-461-3070
Ohio	Cincinnati, R.O. Whitesell & Assocs.	513-521-2290
Ohio	Cleveland, R.O. Whitesell & Assocs.	216-228-7525
Ohio	Columbus, R.O. Whitesell & Assocs.	614-888-9396
Ohio	Dayton, R.O. Whitesell & Assocs.	513-298-9546
Ore	Beaverton, N.R. Schultz Co.	503-643-1644
Pa	Narberth, TRW Elctrns.	215-667-3400
Pa	Pittsburgh, R.O. Whitesell & Assocs.	412-344-7277
Tex	Dallas, TRW Elctrns.	214-637-6650
Tex	Houston, TRW Elctrns.	713-771-7812
Utah	Salt Lake City, Straube Assocs.	801-328-4513
Va	Roanoke, TRW Elctrns.	703-345-4965
Wash	Bellevue, N.R. Schultz Co.	206-454-0300
Wisc	Waukesha, J.G. Twist Co.	414-475-7755

Local Distributors

Ala	Huntsville, Cramer-Ew, 2310 Bob Wallace Ave.	205-539-5722
Ariz	Phoenix, Liberty Elctrn., 3130 N. 27th Ave.	602-257-1272
Cal	Glendale, R. V. Weatherford, 6921 San Fernando	213-849-3451
Cal	Mt. View, Elmar Elctrn., 2288 Charleston Rd.	415-961-3611
Colo	Denver, Cramer Elctrn., 5465 E. Evans Pl.	303-758-2100
Conn	North Haven, Cramer Elctrn., 35 Dodge Ave.	203-239-5641
Fla	Orlando, Cramer-Ew, 345 N. Graham Ave.	305-894-1511
Ga	Atlanta, Cramer-Atlanta, 3923 Oakcliff	404-488-9050
Ill	Chicago, Allied Elctrn., Box 6569	312-421-2400
Ill	Elk Grove, Hall-Mark Elctrn., 180 Crossen Ave.	312-437-8800
Kans	Lenexa, Hall-Mark Elctrn., 9006 Rosehill Rd.	913-888-4747
Md	Hanover, Cramer-Baltimore, 7255 Standard Dr.	301-796-5790
Mass	Boston, Demambro Elctrn., 1095 Commonwealth	617-787-1200
Minn	Minneapolis, Hall-Mark Elctrn., 4555 W. 77th St.	612-925-2944
Mo	Earth City, Hall-Mark Elctrn., 13789 Rider Trail	314-291-5350
NJ	Clifton, Wilshire Elctrn., 312 Clifton Ave.	201-365-2600
NJ	Moonachie, Crameer Elctrn., 1 Barrett Ave.	201-935-5600
NM	Albuquerque, Cramer Elctrn., 137 Vermont N.E.	505-265-5767
NY	Hauppauge, Cramer Elctrn., 29 Oser Ave.	516-231-5600
NY	Lynbrook, Peerless Radio, 19 Wilbur St.	516-593-2121
NC	Winston Salem, Cramer-Ew, 938 Burke St.	919-725-8711
Ohio	Columbus, Elctrn. Mktg., 1150 W. Third Ave.	614-299-4161
Okla	Tulsa, Hall-Mark Elctrn., 4846 S. 83rd E. Ave.	918-835-8458
Pa	Philadelphia, Phila Elctrn., 1225 Vine St.	215-568-7444
Tex	Dallas, Hall-Mark Elctrn., 9333 Forest La.	214-231-6111
Utah	Salt Lake, Cramer Elctrn., 391 W. 2500 South	801-487-4131
Va	Charlottesville, Virginia Radio, Box 1189	703-296-4184
Wash	Seattle, Liberty Elctrn., 5305 2nd Ave. S.	206-763-8200
Wisc	Milwaukee, Hall-Mark Elctrn., 11925 W. Ripley Ave.	414-476-1270

TRW/CINCH CONNECTORS, Electronic Comp. Div. of TRW Inc., 1501 Morse Ave., Elk Grove Village, Ill., 60007, Tel: 312-439-8800 .... p. 2•896,897

For info on price: W. Walthall; Application info: W. Walthall; Customer service: A. Fosco; Delivery info: A. Fosco

Products manufactured: Boards, Plug-In, Boards, Programming, Caps, Connector, Clamps & Clips, Connector Adapters, Connector Blocks, Mother Board, Connectors, Contacts, Electrical, Covers, Protective (Including Dust), Integrated Circuit Devices, Jacks (All Types), Plug & Jack Sets, Plugs, Shields, Sockets, Strips, Terminal Blocks, Boards & Strips, Terminals, Tools

Local Sales Offices & Reps.

Ala	Huntsville, TRW Cinch Divs.	205-772-9656
Ariz	Scottsdale, TRW Cinch Divs.	602-994-0441
Cal	Cerritos, TRW Cinch Divs.	213-924-5711
Cal	Mountain View, TRW Cinch Divs.	415-969-2252
Cal	Tustin, TRW Cinch Divs.	714-544-8751
Colo	Denver, Straube Assoc.	303-426-0890
Conn	Rowayton, TRW Cinch Divs.	203-853-4466
Fla	Ft. Lauderdale, TRW Cinch Divs.	305-721-1700
Fla	Orlando, TRW Cinch Divs.	305-894-6881
Ill	Elk Grove Village, TRW Cinch Divs.	312-593-0200
Ill	Rosemont, TRW Cinch Divs.	312-298-1340
Ind	Indianapolis, R.O. Whitesell	317-359-9283
Mass	Reading, TRW Cinch Divs.	617-944-3020
Mich	Southfield, TRW Cinch Divs.	313-357-3700
Minn	Minneapolis, TRW Cinch Divs.	612-835-5454
Mo	St. Louis, TRW Cinch Divs.	314-727-7370
NJ	Clifton, TRW Cinch Divs.	201-546-0990
NM	Albuquerque, Straube Assocs.	505-294-1880
NY	Manilus, TRW Cinch Divs.	315-637-3282
NY	Melville, TRW Cinch Divs.	516-293-9000
NY	Rochester, TRW Cinch Divs.	716-461-3070
NC	Charlotte, TRW Cinch Divs.	704-376-6811
Ohio	Dayton, TRW Cinch Divs.	513-298-9862
Okla	Oklahoma City, TRW Cinch Divs.	405-524-2040
Pa	Glenside, TRW Cinch Divs.	215-887-7520
Pa	Newtown, TRW Cinch Divs.	215-968-5819
Tex	Dallas, TRW Cinch Divs.	214-637-6650
Tex	Houston, TRW Cinch Divs.	713-772-5541
Utah	Salt Lake City, Straube Assoc.	801-328-4513
Va	Springfield, TRW Cinch Divs.	703-321-7930
Wash	Seattle, D. Smith Sls.	206-633-3160

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Local Distributors

Ala	Birmingham, M. G. Elctrns.	205-328-4525
Ala	Huntsville, Cramer/E. W.	205-539-5722
Alas	Fairbanks, Intercoastal, Inc.	
Alas	Fairbanks, Yukon Radio Supp. Corp.	907-452-1011
Ariz	Phoenix, Cramer Elctrns. Inc.	602-267-7321
Ariz	Phoenix, Kierulff Elctrns.	602-273-7331
Ariz	Phoenix, R. V. Weatherford Co.	602-272-7144
Ariz	Phoenix, Sterling Elctrns.	602-258-4531
Ark	Fort Smith, Carlton Bates Co.	501-782-7258
Ark	Little Rock, Carlton Bates Co.	501-562-9100
Cal	Anaheim, R. V. Weatherford Co.	714-633-9633
Cal	Fresno, J. C. Arbuckle	209-264-6554
Cal	Glendale, R. V. Weatherford Co.	213-849-3451
Cal	Hayward, Dunlap Elctrns.	415-352-1933
Cal	Hollywood, Yale Radio Elec. Co.	213-465-3186
Cal	Los Angeles, Kierulff Elctrns.	213-685-5511
Cal	Mt. View, Elmar Elctrns.	415-961-3611
Cal	Palo Alto, Kierulff Elctrn.	415-968-6292
Cal	Palo Alto, R. V. Weatherford Co.	415-493-5373
Cal	Pomona, R. V. Weatherford Co.	714-623-1261
Cal	Riverside, Elctrn. Supp.	714-683-7300
Cal	Sacramento, Dunlap Elctrns.	916-444-8070
Cal	San Diego, Kierulff Elctrns.	714-278-2112
Cal	San Diego, R. V. Weatherford Co.	714-278-7400
Cal	San Francisco, Zack Radio Supp. Corp.	415-626-1444
Cal	Santa Barbara, Channel Radio Supp. Co.	805-965-8551
Cal	Sun Valley, Sterling Elctrns.	213-767-5030
Colo	Commerce City, Elmar Elctrn.	303-287-9611
Colo	Denver, Elctrn. Parts Co.	303-744-1992
Colo	Denver, Newark Elctrns.	303-757-3351
Colo	Englewood, R. V. Weatherford Co.	303-761-5432
Conn	East Haven, J. V. Elctrns.	203-469-2321
Conn	Hamden, Wilshire Elctrns./Conn.	203-281-1166
Conn	Waterbury, Bond Radio Elctrns.	203-753-1184
Fla	Hollywood, Cramer/E. W.	305-923-8181
Fla	Jacksonville, Southeast Elctrns.	904-356-3007
Fla	Miami, Elctrn. Equip. Co.	305-871-3500
Fla	Orlando, Cramer/E. W.	305-894-1511
Fla	Orlando, Hall-Mark Elctrns. Corp.	305-855-4020
Fla	Orlando, Hammond Elctrns.	305-849-6060
Fla	Pensacola, Grice Elctrns.	904-433-4616
Fla	Tampa, Lykes Elctrns.	813-886-6621
Ga	Atlanta, Cramer/E. W. Atlanta	404-448-9050
Ga	Atlanta, Lykes Elctrns. Corp.	404-355-2223
Ga	Atlanta, Specialty Dist.	404-873-2521
Haw	Honolulu, Honolulu Elctrns.	808-949-5564
Haw	Honolulu, Precision Radio Ltd.	808-537-5291
Idaho	Idaho Falls, Schwendimans Wholesale Dist.	208-522-2492
Idaho	Twin Falls, United Elctrn. Wholesalers	208-733-7324
Ill	Arlington Hts., Tex. Instr. Supp.	312-593-7660
Ill	Champaign, Klaus Radio, Inc.	217-356-1896
Ill	Chicago, Elctrn. Dist.	312-283-4800
Ill	Chicago, Newark Elctrns.	312-638-4411
Ill	Elgin, Allied Elctrns.	312-697-8200
Ill	Elk Grove Vill., Lakeland Elctrns., Inc.	312-595-1000
Ill	La Salle, Klaus Radio, Inc.	815-223-7400
Ill	Mt. Prospect, Cramer/Chicago	312-593-8230
Ill	Palatine, Ohm Elctrns. Inc.	312-359-5500
Ill	Peoria, Klaus Radio, Inc.	309-691-4840
Ill	Quincy, Klaus Radio, Inc.	217-223-7560
Ill	Rockford, J & M Elctrns.	815-963-6445
Ill	Skokie, Bell Elctrns.	312-965-7500
Ill	Villa Park, Melvin Elctrns.	312-279-5015
Ind	Evansville, Hutch & Son Inc.	812-425-7201
Ind	Evansville, Ohio Valley Sound Svc.	812-425-6173
Ind	Fort Wayne, Fort Wayne Elctrn.	219-742-4346
Ind	Indianapolis, Graham Elctrns.	317-634-8202
Ind	Indianapolis, Pioneer/Ind.	317-849-7300
Ind	Indianapolis, Ra-Dis-Co.	317-637-5571
Ind	South Bend, Radio Dist. Co.	219-287-2911
Iowa	Cedar Rapids, DEECO, Inc.	319-365-7551
Iowa	Davenport, Klaus Radio	319-323-9761
Iowa	Davenport, Warren Radio Co.	319-323-8051
Iowa	Des Moines, Radio Trade Supp. Co.	515-288-7237
Kans	Topeka, Acme Radio, Inc.	913-235-1363
Kans	Wichita, Radio Supp. Co.	316-267-5216
Ky	Louisville, P. I. Burks Co.	502-583-2871
La	Lafayette, Ralph's of Lafayette	318-234-4507
La	New Orleans, Lykes Elctrns.	504-486-7441
La	New Orleans, Radio Parts, Inc.	504-581-5959
La	New Orleans, Southern Radio Supp. Co.	504-524-2343
La	Shreveport, Ind'l. Elctrn. Supp.	318-422-9459
Md	Baltimore, Arrow Elctrn.	202-737-1700
Md	Baltimore, Radio Elec. Svc.	301-823-0070
Md	Bethesda, Empire Elctrn. Supp. Co.	301-656-3300
Md	Gaithersburg, Kierulff Elctrns.	301-948-0250
Md	Hagerstown, Stoddard Supp.	301-733-3390
Md	Hyattsville, Milgray/Washington Inc.	301-864-1111
Md	Rockville, Capitol Radio Wholesalers	301-881-2270
Md	Rockville, Pioneer/Washington	301-424-3300
Mass	Boston, DeMambro Elctrns.	617-787-1200
Mass	Boston, Sager Elec. Supp.	617-542-2281
Mass	Burlington, Wilshire Elctrns./New England	617-272-8200
Mass	Dedham, Gerber Radio Supp.	617-329-2400
Mass	Newton, Greene Shaw Co.	617-969-8900
Mass	Newton Centre, Cramer Elctrns.	617-969-7700
Mass	No. Wilbraham, Ind'l. Components Corp.	413-596-3854
Mass	Springfield, T. F. Cushing Co.	413-788-7341
Mass	Watertown, Sterling Elctrns.	617-926-9720
Mass	West Newton, A. W. Mayer Co.	617-965-1111
Mass	Worcester, R. M. Elctrns.	617-756-8311
Mich	Ann Arbor, Wedemeyer Elec. Supp.	313-665-8611
Mich	Detroit, R. S. Elctrns.	313-491-1000
Mich	Flint, Shand Elctrns. Inc.	313-743-8940
Mich	Lansing, Fulton Radio Supp.	517-489-6519
Mich	Livonia, Pioneer/Michigan	313-525-1800
Mich	Marquette, N. W. R. Elctrns. Corp.	906-226-7578
Mich	Muskegon, Fitzpatrick Elec.	616-722-6621
Mich	Oak Park, Newark Elctrns.	313-548-0250
Mich	Wyoming, Newark Elctrns.	616-241-6681
Minn	Edina, Harvey-Minnesota	612-941-6060
Minn	Minneapolis, Newark Elctrns.	612-331-6350
Minn	Minneapolis, Stark Elec. Supp.	612-332-1325
Minn	St. Paul, Gopher Elctrns.	612-645-0241
Miss	Jackson, Ellington Elctrn. Supp.	601-355-0561
Mo	Joplin, Four State Radio & Supp.	417-624-0368
Mo	Kansas City, Burstein-Applebee Co.	816-531-5614
Mo	Kansas City, Radiolab, Inc.	816-561-9935
Mo	St. Louis, Interstate Ind'l. Elec.	314-481-6110
Mo	St. Louis, Olive Ind'l. Elctrns.	314-863-7800
Mo	St. Louis, Van Sickle Radio Elctrns.	314-621-5000
Mont	Billings, Elctrn. Supp. Co.	406-252-2197
Neb	Lincoln, Scott Elctrn. Supp.	402-434-8308
Neb	Omaha, Radio Equip. Co.	402-341-7700
Nev	Las Vegas, Metcalf Elctrns.	702-384-2151
Nev	Reno, Dunlap Elctrns.	702-329-1308
NH	Concord, Evans Radio, Inc.	603-224-9961
NJ	Camden, General Radio Supp. Co.	609-964-8560
NJ	Clark, Tex. Instrs. Supp.	201-382-6400
NJ	Clifton, Wilshire Elctrns./N.J.	201-365-2600
NJ	Hanover, State Elec. Parts Corp.	201-887-2550
NJ	Kenilworth, Newark Elctrns.	201-272-8410
NJ	Moorestown, Arrow/Angus	609-235-1900
NJ	Pennsauken, Radio Elec. Svc. Co.	609-662-4000
NJ	Rahway, Valley Elctrn. Supp.	201-381-5404
NJ	Saddlebrook, Arrow Elctrns.	201-797-5800
NM	Albuquerque, Cramer/N.M.	505-265-5767
NM	Albuquerque, Kierulff Elctrns.	505-247-1055
NY	Albany, E. E. Taylor Co.	518-489-5600
NY	Binghamton, Harvey Elctrns.	607-748-8211
NY	Binghamton, Stack Ind'l. Elctrns.	607-723-6326
NY	Buffalo, Summit Dist.	716-884-3450
NY	Commack, Connecting Components Corp.	516-543-8300
NY	Elmira, Brady Supp. Corp.	607-733-6591
NY	Farmingdale, Arrow Elctrns.	516-694-6800
NY	Farmingdale, Harrison Elctrns. Corp.	516-293-7990
NY	Glens Falls, Ray Supp.	518-792-5848
NY	Hauppauge, Rampart Components	516-273-1111
NY	Lynbrook, Peerless Radio Corp.	516-593-2121
NY	Poughkeepsie, Higgins-Sheer Elec. Dist.	914-471-3510
NY	Rochester, Cramer Elctrns.	716-275-0300
NY	Rochester, Rochester Radio Supp.	716-454-6300
NY	Rochester, Simcona Elctrns. Corp.	716-328-3230
NY	Rome, Rome Elctrns.	315-337-5400
NY	Syosset, Milo Elctrns. Corp.	516-364-1111
NY	White Plaines, Westchester Elctrns.	914-949-2400
NY	Woodbury, Harvey Elctrns.	516-921-8700
NC	Greensboro, Hammond Elec. of Carolina	919-275-6391
NC	Raleigh, Southeastern Radio Supp.	919-828-2311
NC	Winston Salem, Cramer/E. W.	919-725-8711
Ohio	Akron, Akron Elctrns. Supp.	216-762-8818
Ohio	Cincinnati, Hughes Peters, Inc.	513-351-2000
Ohio	Cincinnati, Newark Elctrns.	513-874-5115
Ohio	Cleveland, Pioneer/Cleveland	216-587-3600
Ohio	Cleveland, W. M. Pattison Supp. Co.	216-441-3000
Ohio	Columbus, Elctrns. Mktg. Corp.	614-299-4161
Ohio	Columbus, Hughes Peters, Inc.	614-294-5351
Ohio	Dayton, ESCO, Inc.	513-226-1133
Ohio	Dayton, Pioneer/Dayton	513-236-9900
Ohio	Toledo, Warren Radio Co.	419-248-3364
Ohio	Warren, REM Elctrn. Supp.	216-399-2777
Okla	Bartlesville, Cummins Elctrns. Supp.	918-336-4448
Okla	Oklahoma City, Trice Wholesale Elctrns.	405-524-4411
Okla	Tulsa, Hall-Mark Elctrns. Corp.	918-835-8458
Okla	Tulsa, Oil Capitol Elctrns.	918-836-2541
Okla	Tulsa, Radio, Inc.	918-587-9123
Ore	Eugene, Vitus Elec. Supp. Co.	503-345-4377
Ore	Medford, Verl G. Walker Co.	503-773-7557
Ore	Portland, Central Dist.	503-234-0711
Ore	Portland, Portland Radio Supp.	503-228-8647
Ore	Portland, United Radio Supp.	503-233-7151
Ore	Salem, J. W. Elctrns.	503-363-2371
Pa	Allentown, A. A. Peters, Inc.	215-434-5237
Pa	Devon, Peak Elctrns.	215-687-9822
Pa	Drexel Hill, Kass Elctrns. Dist.	215-449-2300
Pa	Erie, Warren Radio	814-454-5285
Pa	McKeesport, Barno Radio Corp.	412-751-5966
Pa	Philadelphia, Almo Elctrns. Corp.	215-676-6000
Pa	Philadelphia, Herbach-Rademan, Inc.	215-426-1700
Pa	Philadelphia, Philadelphia Elctrns.	215-568-7400
Pa	Pittsburgh, Cameradio Elctrns.	412-288-2600
Pa	Pittsburgh, McCullough Elec. Co.	412-261-2420
Pa	Pittsburgh, R. P. C. Elctrns:	412-782-3770
Pa	Reading, The George Barbey Co.	215-376-7451
Pa	Scranton, Prusell Elctrns.	717-346-2011
Pa	St. Mary, B & R Elctrns.	814-834-2814
Pa	York, Rosen Elctrns.	717-843-3875
RI	Providence, Wm. Dandreta & Co.	401-861-2800
RI	Warwick, W. H. Edwards Co., Inc.	410-781-8000
SC	Charleston, Wholesale Radio Supp.	803-747-9672
SC	Columbia, Dixie Radio Supply	803-253-5333
SC	Greenville, Hammond Elctrns.	803-233-4121
Tenn	Kingsport, Radio Elec. Supp.	615-247-8111
Tenn	Knoxville, Bondurant Bros Co.	615-577-0473
Tenn	Knoxville, Industrial Elctrns.	615-573-7135
Tenn	Memphis, Bluff City Dist. Co.	901-725-9500
Tenn	Nashville, Electra Dist. Co.	615-329-3971
Tex	Abilene, R & R Elctrns. Supp.	915-677-2974
Tex	Amarillo, R & R Elctrns. Supp.	806-374-2866
Tex	Corpus Christi, Wicks Radio Equip. Co.	512-884-8285
Tex	Dallas, All State Elctrns.	214-358-4171
Tex	Dallas, Hall-Mark Elctrns. Corp.	214-231-6111
Tex	Dallas, Tex. Instr. Supp.	214-238-6821
Tex	El Paso, Midland Specialties Co.	915-533-9555
Tex	Ft. Worth, Allied Elctrns.	817-336-5401
Tex	Ft. Worth, Swieco, Inc.	817-335-6521
Tex	Garland, Newark Elctrns.	214-271-2511
Tex	Houston, Harrison Equip. Co.	713-224-9131
Tex	Houston, Sterling Elctrns.	713-627-9800
Tex	Lubbock, R & R Elctrns. Supp.	806-765-7727
Tex	McAllen, Rio Radio Supp.	512-682-5224
Tex	San Antonio, Electrotex	512-735-9271
Utah	Salt Lake City, Cramer/Utah	801-487-4131
Utah	Salt Lake City, Standard Supp. Co.	801-355-2971
Va	Arlington, Arlington Elctrn. Wholesalers	703-524-2412
Va	Charlottesville, Virginia Radio Supp.	703-296-4184
Va	Norfolk, Priest Elctrns.	703-855-0141
Va	Richmond, Meridan Elctrn. Equip. Co.	804-353-6648
Va	Roanoke, Peoples Radio & TV Supply Co.	703-342-8933
Wash	Bellingham, Advanced Elctrn.	206-734-3400
Wash	Seattle, Almac/Stroum Elctrns.	206-763-2300
Wash	Seattle, Liberty Elctrns.	206-763-8200
Wash	Seattle, R. V. Weatherford Co.	206-243-6340
Wash	Seattle, Western Elctrns. Co.	206-284-0200
Wash	Spokane, Northwest Elctrns.	509-535-7652
Wash	Tacoma, Wible Radio Supp. Co.	206-474-9471
Wash	Walla Walla, Inland Elctrns. Supp.	509-529-2241
Wash	Yakima, Lay & Nord	509-453-5596
WVa	Huntington, Elctrn. Supp. Inc.	304-523-6443
Wisc	Madison, Satterfield Elctrns.	608-257-4801
Wisc	Milwaukee, Elctrn. Expeditors, Inc.	414-228-8100
Wisc	Milwaukee, Part Mart Corp.	414-276-4160
Wisc	West Allis, Marsh Elctrns.	414-545-6500

TRW/CINCH-GRAPHIK, ELCTRN. COMPS., Div. TRW INC., 200 S. Turnbull Canyon Rd., City of Industry, Cal., 91744, Tel: 213-333-1201, TWX: 910-584-1861 .... p. 2•896,897

Customer service: J. Pyle

Products manufactured: Boards, Plug-In, Boards, Printed Circuit, Boards, Printed Wiring, Universal, Circuits, Printed, Multilayer, Screens, Printed Circuit

(Refer to TRW/Cinch Connectors for Sales Office Information)

TRW/CINCH-MONADNOCK, AN ELCTRN. COMPS., Div. TRW Inc., 18301 E. Arenth Ave., Box 1222, City of Industry, Cal., 91749, Tel: 213-964-6581, TWX: 910-584-1303

Customer service: C. Miller

Products manufactured: Fasteners, Grommets, Pads, Transistor Mounting, Transistor, Diode, Thyristor Heat Dissipators

Local Sales Offices & Reps.

NJ	W Long Branch	201-229-0077

TRW ELEC. FUNCTIONS, Davis & Copewood Sts., Camden, N.J., 08103, Tel: 609-365-5500, TWX: 710-891-7087

Customer service: S. Ledgemood

Products manufactured: Amplifiers, Capacitors, Variable, Couplers, Diplexers, Antenna, Filters, Oscillators, Preselectors

Local Sales Offices & Reps.

Ala	Huntsville, TRW Sales Off.	205-772-9656
Ariz	Scottsdale, Q. T. Wiles & Assoc.	602-947-5791
Cal	Los Angeles, Q. T. Wiles & Assoc.	213-649-1232
Cal	Menlo Park, Straube Assoc.	415-323-2476
Cal	San Diego, Q. T. Wiles & Assoc.	714-565-6893
Cal	Tustin, Q. T. Wiles & Assoc.	714-832-4952
Colo	Boulder, Straube Assoc.	303-443-8600
Conn	Rowayton, TRW Sls. Off.	203-853-4466
Fla	Fort Lauderdale, TRW Sales Off.	305-721-1700
Fla	Orlando, TRW Sls. Off.	305-894-6881
Ill	Elk Grove Village, J. G. Twist Co.	312-593-0200
Ind	Ft. Wayne, R. O. Whitesell & Assoc.	219-432-5591
Ind	Indianapolis, R. O. Whitesell & Assoc.	317-359-9283
Ind	Kokomo, R. O. Whitesell & Assoc.	317-453-6868
Iowa	Cedar Rapids, J. G. Twist Co.	319-393-8703
Kans	Prairie Village, J. G. Twist Co.	913-236-4646
Ky	Louisville, R. O. Whitesell & Assoc.	502-893-7303
Md	Ellicott City, TRW Sls. Off.	301-465-1777
Mass	Waltham, TRW Sls. Off.	617-899-6100
Mich	Grand Rapids, R. O. Whitesell & Assoc.	616-451-8901
Mich	Southfield, R. O. Whitesell & Assoc.	313-358-2020
Mich	St. Joseph, R. O. Whitesell & Assoc.	616-983-7337
Minn	Minneapolis, TRW Sls. Off.	612-835-5454
Mo	St. Louis, J. G. Twist Co.	314-432-2830
NM	Albuquerque, Straube Assoc.	505-294-1880
NY	Rochester, TRW Sls. Off.	716-461-3070
Ohio	Cincinnati, R. O. Whitesell & Assoc.	513-521-2290
Ohio	Cleveland, R. O. Whitesell & Assoc.	216-228-7525
Ohio	Columbus, R. O. Whitesell & Assoc.	614-888-9396
Ohio	Dayton, R. O. Whitesell & Assoc.	513-298-9546
Okla	Oklahoma City, TRW Sls. Off.	405-524-2040
Ore	Beaverton, N. R. Schultz Co.	503-646-1345
Pa	Narberth, TRW Sls. Off.	215-667-3400
Pa	Pittsburgh, R. O. Whitesell & Assoc.	412-344-7277
Tenn	Bristol, R. O. Witesell & Assoc.	615-968-4195
Tex	Dallas, TRW Sls. Off.	214-637-6650
Tex	Houston, TRW Sls. Off.	713-771-7812
Utah	Salt Lake City, Straube Assoc.	802-328-4513
Va	Roanoke, TRW Sls.	703-345-4965
Wash	Bellevue, N. R. Schultz Co.	206-454-0300
Wisc	Waukesha, J. G. Twist Co.	414-786-6330

TRW/GLOBE MOTORS, 2275 Stanley Ave., Dayton, Ohio, 45404, Tel: 513-228-3171; Empl.: 500; Minimum order: $50 .... p. 1•988-991

Application info: J. Hohne; Customer service: R. Orth

Products manufactured: Actuators, Blowers & Fans & Accessories, Clutches, Gearheads & Speed Reducers, Generators, Motor & Generator Armatures, Rotors, Stators, Motors, Reducers

Local Sales Offices & Reps.

Ala	Huntsville, TRW Elctrns.	205-772-9656
Ariz	Scottsdale, O.T. Wiles & Assocs.	602-948-5590
Cal	Dublin, Straube Assocs.	415-828-1550
Cal	Los Angeles, Q.T. Wiles & Assocs.	213-478-0183
Cal	Menlo Park, Straube Assocs.	415-323-2476
Cal	Tustin, Q.T. Wiles & Assocs.	714-832-4952
Colo	Denver, Straube Assocs.	303-426-0890
Conn	Orange, Comtronics Assocs.	203-795-3515
Conn	Rowayton, TRW Elctrns.	203-853-4466
Fla	Orlando, TRW Elctrns	305-857-3650
Ill	Elk Grove Village, J.G. Twist Co.	312-593-0200
Ind	Fort Wayne, R.O. Whitesell & Assocs.	219-432-5591
Ind	Indianapolis, R.O. Whitesell & Assocs.	317-359-9283
Ind	Kokomo, R.O. Whitesell & Assocs.	317-453-6868
Iowa	Cedar Rapids, J.G. Twist Co.	319-393-8703
Kans	Prairie Village, J.G. Twist Co.	913-236-4646
Ky	Louisville, R.O. Whitesell & Assocs.	502-893-7303
Mass	Waltham, TRW Elctrns.	617-899-6100
Mich	Grand Rapids, R.O. Whitesell & Assocs.	616-451-8901
Mich	Southfield, R.O. Whitesell & Assocs.	313-358-2020
Mich	St. Joseph, R.O. Whitesell & Assocs.	616-983-7337
Minn	Minneapolis, TRW/ECD	612-835-5454
Mo	St. Louis, J.G. Twist Co.	314-432-2830
NY	Garden City, Comtronic Assocs.	516-741-8966
NY	Rochester, TRW/ECD	716-461-3070
Ohio	Cincinnati, R.O. Whitesell & Assocs.	513-521-2290
Ohio	Cleveland, R.O. Whitesell & Assocs.	216-228-7525
Ohio	Columbus, R.O. Whitesell & Assoc.	614-888-9396
Ohio	Dayton, R.O. Whitesell & Assoc.	513-298-9546
Ore	Beaverton, N.R. Schultz Co.	503-643-1644
Pa	Narberth, TRW Elctrns	215-667-3400
Pa	Pittsburgh, R.O. Whitesell Assocs.	412-344-7277
Tenn	Bristol, R.O. Whitesell & Assocs.	615-968-4195
Tex	Dallas, TRW/ECD	214-387-3030
Tex	Houston, TRW/ECD	713-772-5541
Utah	Salt Lake City, Straube Assocs.	801-328-4513
Va	Roanoke, TRW Elctrns.	703-345-4965
Wash	Bellevue, N.R. Schultz Co.	206-454-0300
Wisc	Wauwatosa, J.G. Twist Co.	414-475-7755
EXP:	Port Credit, Ont., Leonard Elec. Ltd.	416-274-3454

TRW ELECTRONICS, 10880 Wilshire Blvd., Los Angeles, Cal, 90024, Tel: 213-475-6777

TRW/HOLYOKE WIRE & CABLE, 775 New Ludlow Rd., South Hadley, Mass., 01075, Tel: 413-533-3961, TWX: 710-351-6636; Empl.: 410; Minimum order: $75

For info on price: G. T. Miles; Application info: W. J. Gaffney; Customer service: R. J. Krzynowek; Delivery info: G. Zirakian

Free literature available: Manufacture electrical insulated wire, cable, and cable assemblies, and harnesses, for the Automotive - Home Entertainment - Computer - Instrumentation Industrial - & Telephone Markets.

Products manufactured: Braid, Cable, Cable Assemblies & Harnesses, Cable, Cords, Services, Assembly, Production & Test, Wire, Wire Shielding

Local Sales Offices & Reps.

Ala	Huntsville	205-772-9656
Ariz	Scottsdale	602-994-0441
Cal	Cerritos	213-924-5711
Cal	Mountain View	415-969-2252
Colo	Boulder	303-443-8600
Conn	Rowayton	203-853-4466
Fla	Fort Lauderdale	305-721-1700
Fla	Orlando	305-894-6881
Ill	Elk Grove Village	312-593-0200
Ind	Indianapolis	317-359-9283
Mass	Reading	617-944-3020
Mich	Detroit	313-873-1150
Minn	Minneapolis	612-835-5454
Mo	St. Louis	314-727-7370
NJ	Clifton	201-546-0990
NY	Melville L.I.	516-293-9000
NY	Rochester	716-461-3070
Ohio	Dayton	513-298-9862
Pa	Springhouse	215-542-9470
Tex	Dallas	214-637-6650
Wash	Seattle	206-633-3160

TRW/IRC FIXED RESISTORS, 2850 Mt. Pleasant St., Burlington, Iowa, 52601

Products manufactured: Networks, Resistors

Local Sales Offices & Reps.

Ala	Huntsville, TRW	205-772-9656
Ariz	Scottsdale, Q.T. Wiles & Assocs.	602-948-5590
Cal	Los Angeles, Q.T. Wiles & Assocs.	213-649-1232
Cal	Menlo Park, Straube Assocs.	415-323-2476
Cal	San Diego, Q.T. Wiles & Assocs.	714-565-6893
Cal	Tustin, Q.T. Wiles & Assocs.	714-832-4952
Colo	Boulder, Straube Assocs.	303-443-8600
Conn	Rowayton, TRW	203-853-4466
Fla	Ft. Lauderdale, TRW	305-721-1700
Fla	Orlando, TRW	305-894-6881
Ill	Elk Grove Village, J.G. Twist Co.	312-593-0200
Ind	Ft. Wayne, R.O. Whitesell & Assocs.	219-432-5591
Ind	Indianapolis, R.O. Whitesell & Assocs.	317-359-9283
Ind	Kokomo, R.O. Whitesell & Assocs.	317-452-6065
Iowa	Cedar Rapids, J.G. Twist Co.	319-393-8703
Kans	Prairie Village, J.G. Twist Co.	913-236-4646
Ky	Louisville, R.O. Whitesell & Assocs.	502-893-7303
Md	Baltimore, TRW	301-366-5075
Md	Ellicott City, TRW	301-465-1777
Mass	Waltham, TRW	617-899-6100
Mich	Grand Rapids, R.O. Whitesell & Assocs.	616-451-8901
Mich	Southfield, R.O. Whitesell & Assocs.	313-358-2020
Mich	St. Joseph, R.O. Whitesell & Assocs.	616-983-7337
Minn	Minneapolis, TRW	612-835-5454
Mo	St. Louis, J.G. Twist Co.	314-432-2830
NM	Albuquerque, Straube Assocs.	505-294-1880
NY	Garden City, Comtronics Assocs.	516-741-8966
NY	Rochester, TRW	716-461-3070
Ohio	Cincinnati, R.O. Whitesell & Assocs.	513-521-2290
Ohio	Cleveland, R.O. Whitesell & Assocs.	216-228-7525
Ohio	Columbus, R.O. Whitesell & Assocs.	814-888-9396
Ohio	Dayton, R.O. Whitesell & Assocs.	513-298-9546
Okla	Oklahoma City, TRW	405-524-2040
Ore	Beaverton, N.R. Schultz Co.	503-643-1644
Ore	Portland, N.R. Schultz Co.	503-292-5656
Pa	Narberth, TRW	215-667-3400
Pa	Pittsburgh, R.O. Whitesell & Assocs.	412-344-7277
Tex	Dallas, TRW	214-637-6650
Tex	Houston, TRW	713-771-7812
Utah	Salt Lake City, Straube Assocs.	801-328-4513
Va	Roanoke, TRW	703-345-4965
Wisc	Waukesha, J.G. Twist Co.	414-786-6330

TRW/IRC RESISTORS, 401 N. Broad St., Philadelphia, Pa., 19108, Tel: 215-923-8230, TWX: 710-670-1392; Empl.: 1000 .... p. 2•1548-1568

Products manufactured: Networks, Resistors

Local Sales Offices & Reps.

Ala	Huntsville, TRW Sls. Off.	205-772-9656
Ariz	Scottsdale, Q.T. Wiles & Assoc.	602-948-5590
Cal	Dublin, Straube Assoc.	415-829-1550
Cal	Los Angeles, Q.T. Wiles & Assoc.	213-478-0183
Cal	Menlo Park, Straube & Assoc.	415-323-2476
Cal	San Diego, Q.T. Wiles & Assoc.	714-565-6893
Cal	Tuslin, Q.T. Wiles & Assoc.	714-832-4952
Cal	Woodland Hills, TRW Sls. Office	213-883-9033
Colo	Denver, Straube & Assoc.	303-426-0890
Conn	Orange, TRW Sls. Off.	203-795-3515
Conn	Rowayton, TRW Sls. Office	203-853-4466
Fla	Fort Lauderdale, TRW Sls. Office	305-721-1700
Fla	Orlando, TRW Sls. Off.	305-857-3650
Ill	Elk Grove Village, Twist & Co.	312-593-0200
Ind	Fort Wayne, R.O. Whitesell Assoc.	219-432-5591
Ind	Indianapolis, R.O. Whitesell	317-359-9283
Ind	Kokomo, R.O. Whitesell Assoc.	317-452-6065
Iowa	Cedar Rapids, J.G. Twist Co.	319-393-8703
Kans	Wichita, J.G. Twist Co.	316-686-6685
Ky	Louisville, R.O. Whitesell Assoc.	502-893-7303
Md	Baltimore, TRW Sls. Office	301-825-5075
Mass	Waltham, TRW Sls. Off.	617-899-6100
Mich	Grand Rapids, R.O. Whitesell & Assoc.	616-451-8901
Mich	Southfield, R.O. Whitesell	313-358-2020
Mich	St. Joseph, R.O. Whitesell Assoc.	616-983-7337
Minn	Minneapolis, TRW Sls. Off.	612-835-5454
Mo	St. Louis, Twist & Co.	314-432-2830
NM	Albuquerque, Straube Assocs.	505-292-0295
NY	Melville, TRW Sls. Office	516-293-9000
NY	Rochester, TRW Sls. Off.	716-461-3070
Ohio	Cincinnati, R.O. Whitesell & Assoc.	513-521-2290
Ohio	Columbus, R.O. Whitesell & Assoc.	614-888-9396
Ohio	Dayton, R.O. Whitesell	513-298-9546
Ohio	Lakewood, R.O. Whitesell & Assoc.	216-228-7525
Okla	Oklahoma City, TRW Sls. Office	405-524-2040

Ore Beaverton, N.R. Schultz Co. 503-643-1644
Pa Narberth, TRW Sls. Off. 215-667-3400
Pa Pittsburgh, R.O. Whitesell & Assoc. 412-344-7277
Tex Dallas, TRW Sls. Off. 214-387-3030
Tex Houston, TRW Sls. Office 713-772-5541
Utah Salt Lake City, Straube Assoc./Mountain States 801-328-4513
Va Roanoke, TRW Sls. Off. 703-345-4965
Wash Bellevue, N.R. Schultz Co. 206-454-0300
Wisc Wauwatosa, J.G. Twist Co. 414-475-7755
EXP: Phila., Pa. 215-922-8900

TRW/IRC POTENTIOMETERS, 2801 72nd St. N., St. Petersburg, Fla., 33733, Tel: 813-347-2181, TWX: 810-863-0357; Empl.: 550 .... p. 2•896,897

Customer service: G. Smith

Products manufactured: Attenuators, Dials, Potentiometers, Resistors

Local Sales Offices & Reps.
Ala Huntsville, TRW Elctrn. Comps. 205-772-0656
Ariz Scottsdale, Q.T. Wiles & Assocs. 602-947-5791
Cal Danville, Straube Assocs. 415-837-3234
Cal Los Angeles, Q.T. Wiles & Assocs. 213-649-1232
Cal Menlo Park, Straube Assocs. 415-323-2476
Cal San Diego, TRW Elctrn. Comps. 714-565-6893
Colo Boulder, Straube Assocs/Mountain States 303-443-8600
Conn Rowayton, TRW Elctrn. Comps. 203-853-4466
Fla Orlando, TRW Elctrn. Comps. 305-894-6881
Ill Elk Grove Village, J.G. Twist Co. 312-593-0200
Ind Fort Wayne, R.O. Whitesell & Assocs. 219-432-5591
Ind Indianapolis, R.O. Whitesell & Assocs. 317-359-9283
Ind Kokomo, R.O. Whitesell & Assocs. 317-453-6868
Iowa Cedar Rapids, J.G. Twist Co. 319-393-8703
Kans Prairie Village, J.G. Twist Co. 913-236-4646
Ky Louisville, R.O. Whitesell & Assocs. 502-893-7303
Mass Waltham, TRW Elctrn. Comps. 617-899-6100
Mich Grand Rapids, R.O. Whitesell & Assocs. 616-451-8901
Mich Southfield, R.O. Whitesell & Assocs. 313-358-2020
Mich St. Joseph, R.O. Whitesell & Assocs. 616-983-7337
Minn Minneapolis, TRW Elctrns. 612-835-5454
NM Albuquerque, Straube Assocs/Mountain States 505-294-1880
NY Rochester, TRW Elctrn. Comps. 716-461-3070
Ohio Cincinnati, R.O. Whitesell & Assocs. 513-521-2290
Ohio Cleveland, R.O. Whitesell & Assocs. 216-228-7525
Ohio Columbus, R.O. Whitesell & Assocs. 614-888-9396
Ohio Dayton, R.O. Whitesell & Assocs. ...513-298-9546
Okla Oklahoma City, TRW Elctrn. Comps. 405-524-2040
Ore Portland, C.K. Shanks & Assocs. 503-292-5656
Pa Narbeth, TRW Elctrn. Comps. 215-667-3400
Pa Pittsburgh, R.O. Whitesell & Assocs. 412-344-7277
Tenn Bristol, R.O. Whitesell & Assocs. 615-968-4195
Tex Dallas, TRW Elctrn. Comps. 214-637-6650
Tex Houston, TRW Elctrn. Comps. 713-771-7812
Utah Salt Lake City, Straube Assocs./Mountain States 810-328-4513
Va Roanoke, TRW Elctrn. Comps. 703-345-4965

TRW SEMICONDUCTOR, 14520 Aviation Blvd., Lawndale, Cal., 90260, Tel: 213-679-4561, TWX: 910-325-6206; FSC No: 01281; Empl.: 1055; Minimum order: $100

For info on price: Distr. Sls. Ext. 452; Application info: M. Dagucon Ext. 459; Customer service: Distr. Sls. Ext. 452; Delivery info: Distr. Sls. Ext. 452

Free literature available: RF & Power Semiconductor catalogs are current and handy reference tools.

Products manufactured: Amplifiers, Circuits, Hybrid, Thick Film, Circuits, Hybrid, Thin-Film, Diodes, Dividers, Integrated Circuit Devices, Microwave Integrated Circuits (MIC's), Transistors

Local Sales Offices & Reps.
Ala Huntsville, TRW Elctrn. Comps. 205-772-9656
Ariz Scottsdale, Q.T. Wiles & Assocs. 602-948-5590
Cal Los Angeles, Q.T. Wiles & Assocs. 213-649-1232
Cal Menlo Park, Straub Assocs. 415-323-2476
Cal Tustin, Q.T. Wiles & Assocs. 714-832-4952
Colo Boulder, Straub Assocs. 303-426-0890
Conn Orange, Comtronics Assoc.
Conn Rowayton, TRW Elctrn. Comps. 203-853-4466
Fla Ft. Lauderdale, TRW Electr. Comps. 305-721-1700
Fla Orlando, TRW Elctrn. Comps. 305-894-6881
Ill Elk Grove, J.G. Twist Co. 312-593-0200
Ind Fort Wayne, R.O. Whitesell & Assocs. 219-432-5591
Ind Indianapolis, R.O. Whitesell & Assocs. 317-359-9283
Ind Kokomo, R.O. Whitesell & Assocs. 317-453-6868
Iowa Cedar Rapids, J.G. Twist Co. 319-393-8703
Kans Prairie Village, J.G. Twist Co. 913-236-4646
Ky Louisville, R.O. Whitesell Assocs. ...502-893-7303
Md Ellicott City, TRW Elctrns. Comps. 301-465-1777
Mass Waltham, TRW Elctrn. Comps. 617-899-6100
Mich Grand Rapids, R.O. Whitesell & Assocs. 616-451-8901
Mich Southfield, R.O. Whitesell & Assocs. 313-358-2020
Mich St. Joseph, R.O. Whitesell & Assocs. 616-983-7337
Minn Minneapolis, TRW Elctrn. Comps. .. 612-835-5454
Mo St. Louis, J.G. Twist Co. 314-432-2830
NM Albuquerque, Straube Assocs. 505-292-0295
NY Rochester, TRW Elctrn. Comps. 716-461-3070
Ohio Cincinnati, R.O. Whitesell & Assocs. 513-521-2290
Ohio Cleveland, R.O. Whitesell & Assocs. 216-228-7525
Ohio Columbus, R.O. Whitesell & Assocs. 614-888-9396
Ohio Dayton, R.O. Whitesell & Assocs. ...513-298-9546
Ore Beaverton, N.R. Schultz Co. 503-643-1644
Pa Narberth, TRW Elctrn. Comps. 215-667-3400
Pa Pittsburgh, R.O. Whitesell & Assocs. 412-242-0100
Tex Dallas, TRW Elctrns. Comps. 214-637-6650
Tex Houston, TRW Elctrn. Comps. 713-772-5541
Utah Salt Lake City, Straube Assocs. 801-328-4513
Va Roanoke, TRW Elctrn. Comps. 703-345-4965
Wash Bellevue, N.R. Schultz Co. 206-454-0300
Wisc Wauwatosa, J.G. Twist Co. 414-475-7755
FOR: Can., Richmond, B.C., Lake Engrg. Co., Ltd. 604-277-0414
FOR: Can., Scarborough, Ont., Lake Engrg. Co., Ltd. 416-751-5980
FOR: Can., St. Laurent 381, Que., Lake Engrg. Co., Ltd. 514-747-2441

Local Distributors
Ala Huntsville, Hall-Mark Elctrns., 2010 Bob Wallace Ave. 205-539-5722
Ariz Phoenix, Cramer/Ariz., 2643 University Dr. 602-267-7321
Ariz Phoenix, Liberty Elctrns., 3130 N. 27th Ave. 602-257-1272
Ariz Phoenix, R.V. Weatherford Co., 1917 N. 25th Dr. 602-272-7144
Cal Anaheim, R.V. Weatherford Co., 1550 Babbitt Ave. 714-547-0891
Cal Chatsworth, Westates Elctrn. Corp., 20151 Bahama St. 213-341-4411
Cal Gardena, Bell Inds., 306 E. Alondra Blvd. 213-321-5802
Cal Glendale, R.V. Weatherford Co., 6921 San Fernando Rd. 213-849-3451
Cal Irvine, Cramer/Los Angeles, 17201 Damler St. 714-979-3000
Cal Mountain View, Elmar Elctrns., 2288 Charlston Rd. 415-961-3611
Cal Palo Alto, R.V. Weatherford Co., 3240 Hillview Ave. 415-493-5373
Cal Pomona, R.V. Weatherford Co., 1095 E. Third St. 714-623-1261
Cal San Diego, Cramer/San Diego, 8913 Complex Dr., Ste. E. 714-565-1881
Cal San Diego, R.V. Weatherford Co., 7872 Raytheon Rd. 714-278-7400
Cal Sunnyvale, Bell Inds., 1161 N. Fairoaks Ave. 408-734-8570
Cal Sunnyvale, Cramer/San Francisco, 720 Palomar Ave. 408-739-3011
Cal Woodland Hills, Semiconductor Concepts, 21201 Oxnard St. 213-884-4560
Colo Denver, Cramer/Denver, 5465 E. Evans Pl. At Hudson 303-758-2100
Colo Englewood, R.V. Weatherford Co., 3905 S. Mariposa 303-761-5432
Conn North Haven, Cramer/Conn., 35 Dodge Ave. 203-239-5641
Fla Hollywood, Cramer/EW Hollywood, 4035 N. 29th Ave. 305-923-8181
Fla Orlando, Cramer/EW Orlando, 345 N. Graham Ave. 305-894-1511
Fla Orlando, Hall-Mark Elctrns. Corp., 7233 Lake Elinor Dr. 305-855-4020
Ga Atlanta, Cramer/EW Atlanta, 3923 Oakcliff Indl. Ct. 404-448-9050
Ill Elk Grove Village, Hall-Mark Elctrns. Corp., 180 Crossen Ave. 312-437-8800
Ill Mt. Prospect, Cramer/Chicago, 1911 S. Busse Rd. 312-593-0230
Ind Indianapolis, Harvey-Indiana, 8505 Zionsville Rd. 317-297-4910
Kans Lenexa, Hall-Mark Elctrns. Corp., 9006 Rosehill Rd. 913-888-4747
Md Baltimore, Hall-Mark Elctrns. Corp., 6660 Security Blvd. 301-265-8500
Md Gaithersburg, Cramer/EW Wash., 16021 Industrial Dr. 301-948-0110
Md Hanover, Cramer/EW Baltimore, 7255 Standard Dr. 301-796-5790
Md Savage, Pyttronic Inds., 8220 Wellmoor Ct. 301-792-7000
Mass Boston, DeMambro Elctrns., 1095 Commonwealth Ave. 617-787-1200
Mass Newton, Cramer Elctrns., 85 Wells Ave. 617-969-7700
Mich Farmington, Harvey-Michigan, 23461 Industrial Park Dr. 313-477-1650
Mich Livonia, Cramer/Detroit, 13193 Wayne Rd. 313-425-7000
Minn Bloomington, Hall-Mark Elctrns. Corp., 9201 Penn Ave. S., Suite 10 612-884-9056
Minn Edina, Cramer/Bonn, 7275 Bush Lake Rd. 612-835-7811
Mo St. Louis, Hall-Mark Elctrns. Corp., 6100 Madison 314-521-3800
NJ Cherry Hill, Cramer/Pa., 12 Springdale Rd. 215-923-5950
NJ Cinnaminson, Wilshire Elctrns., 855 Industrial Hwy. 609-786-8990
NJ Clifton, Wilshire Elctrns., 312 Clifton Ave. 201-365-2600
NJ Moonachie, Cramer/N.J., 1 Barrett Ave. 201-935-5600
NY Buffalo, Summit Distr., 916 Main st. 716-884-3450
NY East Syracuse, Cramer/Syracuse, 6716 Joy Rd. 315-437-6671
NY Endwell, Cramer/Binghamton, 3220 Watson Blvd. 607-754-6661
NY Farmingdale, Hall-Mark Elctrns. Corp., 167 Marine St. 516-293-7500
NY Hauppauge, Cramer/L.I., 29 Oser Ave. 516-231-5600
NY Hauppauge, Semiconductor Concepts, Engineers Rd. 516-273-1234
NY Rochester, Cramer/Rochester, 3000 Winton Rd. S. 716-275-0300
NY Rochester, Rochester Radio, 140 W. Main St. 716-454-7800
NY Rochester, Summit Distr., 292 Commerce Dr. 716-334-8110
NC Raleigh, Hall-Mark Elctrns. Corp., 3000 Industrial Blvd. 919-832-4465
NC Raleigh, Pyttronic Inds., 4509 Creedmoor Rd. 919-782-6370
NC Winston-Salem, Cramer/EW Winston-Salem, 938 Burke St. 919-725-8711
Ohio Cincinnati, Cramer/Tri-States, 666 Redna Terr. 513-771-6441
Ohio Cleveland, Cramer/Cleveland, 5835 Harper Rd. 216-248-8400
Ohio Columbus, Electronic Mktg. Corp., 1150 W. Third Ave. 614-299-4161
Okla Tulsa, Hall-Mark Elctrns. Corp., 4846 S. 83rd E. Ave. 918-835-8458
Pa Carnegie, Pyttronic Inds., 14 East Mall Plaza 412-276-6722
Pa Harrisburg, Pyttronic Inds., 2525 N. 7th St. 717-233-6591
Pa Huntington Valley, Hall-Mark Elctrns. Corp., 458 Pike Rd. 215-355-7300
Pa Montgomeryville, Pyttronic Inds., Montgomeryville Industrial Ctr., Stump Rd. 215-643-2850
Pa Philadelphia, Almo Elctrns., 9815 Roosevelt Blvd. 215-676-6000
Tex Austin, Hall-Mark Elctrns. Corp., 3100 A. Industrial Terr. 512-837-2814
Tex Dallas, Cramer/Tex., 2970 Blystone La. 214-350-1355
Tex Dallas, Hall-Mark Elctrns. Corp., 9333 Forest La. 214-231-5101
Tex Houston, Hall-Mark Elctrns. Corp., 8000 Westglen 713-781-6100
Utah Salt Lake City, Cramer/Utah, 391 West 2500 S. 801-487-3681
Wash Seattle, Liberty Electronics/Northwest, 5305 S. Second Ave. 206-763-8200
Wash Seattle, R.V. Weatherford Co., 541 Industry Dr. 206-243-6340
Wisc Milwaukee, Hall-Mark Elctrns. Corp., 11925 W. Ripley Ave. 414-476-1270

Wisc	Oak Creek, Cramer/Wisc., 430 Rawson Ave.	414-764-1700
For:	Can., Downsview, Ont., Cramer/Can., 920 Alness Ave., Unit # 9	416-781-6631
For:	Can., Scarborough, Ont., Lake Engrg. Co., Ltd., 123 Manville Rd.	416-751-5980

TRW/UTC TRANSFORMERS, 150 Varick St., New York, N.Y., 10013, Tel: 212-255-3500, TWX: 710-581-2722; Empl.: 335

Products manufactured: Amplifiers, Coils Including Assemblies & Forms, Filters, Transformers

Local Sales Offices & Reps.

Ala	Huntsville, TRW Ectrn. Comps.	205-772-9656
Ariz	Scottsdale, Q.T. Wiles & Assocs.	602-947-5791
Cal	Los Angeles, Q.T. Wiles & Assocs.	213-649-1232
Cal	Menlo Park, Straube Assocs.	415-323-2476
Cal	San Diego, Q.T. Wiles & Assocs.	714-565-6893
Cal	Tustin, Q.T. Wiles & Assocs.	714-832-4952
Colo	Boulder, Straube Assocs.	303-443-8600
Conn	Rowayton, TRW Elctrns. Comps.	203-853-1161
Fla	Fort Lauderdale, TRW Elctrns. Comps.	305-721-1700
Fla	Orlando, TRW Ectrn. Comps.	305-894-6881
Ill	Elk Grove Village, J. G. Twist Co.	312-593-0200
Ind	Fort Wayne, R. O. Whitesell & Assoc.	219-432-5591
Ind	Indianapolis, R. O. Whitesell & Assoc.	317-359-9283
Ind	Kokomo, R. O. Whitesell & Assoc.	317-452-6065
Iowa	Cedar Rapids, J. G. Twist Co.	319-365-1401
Kans	Prairie Village, J. G. Twist Co.	913-236-4646
Ky	Louisville, R. O. Whitesell & Assoc.	502-893-7303
Mass	Waltham, TRW Elctrn. Comps.	617-899-6100
Mich	Grand Rapids, R. O. Whitesell & Assoc.	616-451-8901
Mich	Southfield, R. O. Whitesell & Assoc.	317-452-6065
Mich	St. Joseph, R. O. Whitesell & Assoc.	616-983-7337
Minn	Minneapolis, TRW Elctrns.	612-835-5454
Mo	St. Louis, J. G. Twist Co.	314-432-2830
NM	Albuquerque, Straube Assocs/Mtn. States	505-294-1880
NY	Garden City, Comtronic Assocs.	516-741-8966
NY	Rochester, TRW Elctrns. Comps.	716-461-3070
Ohio	Cincinnati, R.O. Whitesell & Assocs.	513-521-2290
Ohio	Cleveland, R. O. Whitesell & Assoc.	216-228-7525
Ohio	Columbus, R.O. Whitesell & Assoc.	614-888-9396
Ohio	Dayton, TRW Elctrn. Comps.	617-899-6100
Okla	Okla. City, TRW Elctrns.	405-524-2040
Ore	Beaverton, N.R. Schultz Co.	503-643-1644
Pa	Narberth, TRW Elctrn. Comps.	215-667-3400
Pa	Pittsburgh, R. O. Whitesell & Assocs.	412-344-7277
Tex	Dallas, TRW Ectrn. Comps.	214-637-6650
Tex	Houston, TRW Elctrns.	713-771-7812
Utah	Salt Lake City, Straube Assocs./Mtn. States	801-328-4513
Va	Roanoke, TRW Elctrns.	703-345-4965
Wash	Bellevue, N.R. Schultz	206-454-0300
Wisc	Waukesha, J. G. Twist Co.	414-786-6330
FOR:	Can., Willowdale, Ontario, A.C. Simmonds & Sons, Ltd.	416-491-1010

TT ELCTRNS., INC., 2214 S. Barry Ave., Los Angeles, Cal., 90064, Tel: 213-478-8224; FSC No: 07766
p. 1•588-591

For info on price: S.J. Sodaro; Application info: S.J. Sodaro; Customer service: D. Stackpole; Delivery info: D. Stackpole

Free literature available: Catalog of filters.

Products manufactured: Equalizers, Filters, Networks

Local Sales Offices & Reps.

Cal	Culver City, Sodaro	213-478-7733

TTS, 2928 Nebraska Ave., Santa Monica, Cal., 90404, Tel: 213-829-2611; Empl.: 10

For info on price: L. Winters; Application info: L. Winters; Customer service: B. Winters; Delivery info: L. Winters

Free literature available: 1) Accessory Numeric Keyboards ANK-16T, ANK-16E, ANK-16U; 2) Friction TO Sprocket Mod Kit SMK-802; 3) Increase Character Per Line Kits TMK 90, 96, 105, 132B; 4) Cart AM-1.

Products manufactured: Carts & Dollies, Instrument & Equipment, Comm. Systems, Keyboards, Alphanumeric & Decimal, Modulator/Demodulators, Readers, Teleprinters, Teletypewriters & Equipment, Terminal Equipment, Digital

TUCKER ELECTRONICS CO., 1717 So. Jupiter Rd., Garland, Tex., 75040, Tel: 800-527-4642, Telex: 73-0401; Empl.: 42

For info on price: G. McLaney; Application info: C. Aclin; Customer service: R. Alexander; Delivery info: R. Alexander

Free literature available: General Catalog: 160 pages of test instruments, over 150 manufacturers, more than 5000 instruments, including scopes, counters, signal generators, meters, bridges, and many more.

Products manufactured: Adapters, Waveguide, Amplifiers, Analyzers, Antenna Rotators, Antenna Towers & Supports, Antennas, Attenuators, Bridges, Calculators, Electrical & Electronic, Calibrators, Calorimeters, Microwave, Cameras, Capacitors, Fixed, Chamber, Environmental Test, Comm. Systems, Comparators, Controls/Control Eqpt., Converters, Counters, Couplers, Current Sources, Decade Boxes, Detectors, Filters, Gages, Generators, Indicators, Insertion Loss Measurement Systems, Inverters, Meters, Monitors, Mounts, Multipliers, Oscillators, Oscillographs, Direct Writing, Oscilloscope Plug-Ins, Oscilloscopes, Ovens, Power Supplies, Prescalers, Printers, Probes, Receivers, Recorders, References, D-C Voltage, Regulators, Services, Assembly, Production & Test, Simulators, Slotted Lines, Microwave, Standards, Synthesizers, Technical Books, Tracers, Curve, Transceivers, Voltage Sources

TURNER DIV., Conrac Corp., 909 17th St., N.E., Cedar Rapids, Iowa, 52402, Tel: 319-365-0421, Telex: 46-4437; Empl.: 250

For info on price: L. Goodell; Customer service: D. Miller

Free literature available: 2721-C Communications Microphone Catalog, 2721-S Public Address & Paging Catalog, 2721-A CB Antenna Catalog.

Products manufactured: Antennas, Microphone Accessories (Including Stands, Holders, Booms), Microphones, All Kinds

Local Sales Offices & Reps.

Ala	Birmingham, M.F. Taylor Co.	205-853-0336
Cal	Culver City, W. Alderson Co., Inc.	213-837-1398
Cal	Redwood City, Sinai-Johnson	415-365-6263
Colo	Colorado Springs, Norris & Co.	303-635-9319
Fla	Casselberry, M.F. Taylor Co.	305-838-0821
Ind	Carmel, Weeks Assocs.	317-846-0296
Iowa	Des Moines, K-S-W Assocs.	515-279-9235
La	Lacombe, S. Ormsby & Assocs.	504-882-7248
Md	Catonsville, M.F. Taylor Co.	301-747-5718
Md	Silver Springs, M.F. Taylor Co.	301-946-3569
Mass	Needham, Piper Assocs.	617-449-1144
Mass	Plymouth, Piper Assocs.	617-746-6522
Mich	Rochester, R.A. Albrecht Co.	313-651-7081
Minn	Minneapolis, S. Clothier Co.	612-888-4666
Mo	Kansas City, K-S-W Assocs.	816-358-5240
Mo	St. Louis, K-S-W Assocs.	314-781-6111
NY	Buffalo, R.W. Mitscher Co.	716-633-7970
NY	Rockville Centre, Willgold Elctrn. Sls. Corp.	516-764-4022
NC	Charlotte, M.F. Taylor Co.	704-523-7932
Ohio	Cleveland, IMTech	216-826-3400
Ohio	Columbus, Weller Elctrns. Sls., Inc.	614-885-7819
Ohio	Dayton, IMTech	513-837-5610
Ore	Salem, M.K. Widdekind Co.	503-363-6445
Pa	Philadelphia, M.F. Taylor Co.	215-676-5332
Tex	Addison, Parvin Sls. Co.	214-239-9148
Tex	Dallas, E.L. Wilks Co.	214-242-5321
Tex	Houston, Parvin Sls. Co.	713-721-1054
Wash	Seattle, M.K. Widdekind Co.	206-284-8020
Wisc	Brookfield, Steffen Sls.	414-781-7596

TYCO CRYSTAL PRODUCTS DIV., 1510 McGee Trafficway, Kansas City, Mo., 64108, Tel: 816-842-9731, TWX: 910-771-2181; Empl.: 600; Minimum order: $1000

Customer service: R. Gundy

Products manufactured: Crystal Blanks, Crystals, Filters, Oscillators

TYLAN CORP., 19220 So. Normandie, Torrance, Cal., 90502, Tel: 213-532-3420, TWX: 910-346-7647; Empl.: 95

For info on price: D. B. LeMay; Application info: D. B. LeMay; Customer service: D. B. LeMay; Delivery info: L. Lorringer

Free literature available: Mass Flow Measurement and Control of Gases - Describes instruments for measuring and controlling low flow rates of gases. DS-0015-0374. Describes gas control systems for semiconductor processing.

Products manufactured: Controls/Control Eqpt., Meters, Probes, Process Control Systems, Signal Conditioners & Equipment, Transducers

Local Sales Offices & Reps.

Cal	Cupertino, Tylan Corp.	408-248-8718
Cal	Torrance, Tylan Corp.	213-532-3420
Fla	Fort Lauderdale, Semquip Inc.	305-772-3002
Mass	Peabody, Tylan Corp.	617-532-1228
NJ	Morris Plains, Tylan Corp.	201-540-8333
NC	Matthews, W.K. Hile Co.	704-847-9125
Tex	Richardson, Tylan Corp.	214-234-8184

TYTON CORP., 2300 W. Florist St., Milwaukee, Wisc., 53209, Tel: 414-228-8210, TWX: 910-262-3094; FSC No: 53421; QPL No: 23190-12; Minimum order: $50

For info on price: D. Herzberg; Application info: R. Lauffenburger; Customer service: D. Herzberg; Delivery info: D. Herzberg

Free literature available: Tyton Ties Bulletin No. 100B Attached.

Products manufactured: Clamps & Clips, Wire & Cable Ties, Wire Markers

Local Sales Offices & Reps.

Ariz	Scottsdale, T. Goodreau & Assocs.	602-994-9909
Fla	Tampa, L. J. Vidal & Assocs.	813-251-2583
Ga	Atlanta, Southeast Techsales	404-355-7021
Ill	Chicago, Vahey & Assocs.	312-775-1190
Mo	St. Charles, J. Erlinger Co.	314-946-6845
NY	Woodbury, Brunner Assocs.	516-921-2052
Ohio	Cleveland, Industrial Sls. Assocs.	216-721-7500
Tex	Arlington, Chaparral Inds.	817-265-2418

UBER GRAFIC INSTRS., Box 4, Palo Alto, Calif., 94302, Tel: 415-327-4732; Empl.: 2

Customer service: D. F. Kroener

Free literature available: Catalog Page & Price List.

Products manufactured: Knives & Knife Sets, Tools

UCHIDA OF AMERICA CORP., 11 W. 42nd St., New York, N.Y., 10036, Tel: 212-239-7418; Empl.: 5; Minimum order: $100

For info on price: R. Mirsky; Application info: T. Nakayama; Customer service: R. Mirsky; Delivery info: T. Nakayama

Free literature available: Complete models and ratings are listed, with outstanding features of each model, application fields, and specifications.

Products manufactured: Fuses, Meters, Perforators, Probes, Thermocouples, Elements & Accessories

Local Sales Offices & Reps.

Ala	Birmingham, P. Hayden Assoc.	
Cal	Mill Valley, Roy Colen	415-383-3555
Cal	Van Nuys, C.H. Mitchell Co.	213-994-9466
Fla	Orlando, P. Hayden Assocs.	
Ga	East Point, P. Hayden Assocs.	404-766-0261
Ill	Skokie, M. Bermann Sls.	312-675-3740
Ind	Indianapolis, Technical Rep Inc.	317-849-6454
Iowa	Atlantic, Kimian Sls. Inc.	712-243-1626
Mass	Sharon, A. Appell Assoc.	617-784-3439
Mich	Rochester, D. Albrecht & Co.	313-652-2520
Mo	Independence, Kimian Sls.	816-796-4026
NY	New York, Newhope Corp.	212-532-7372
NY	Phelps, L S M Assocs.	315-548-4891
NC	Greensboro, P. Hayden Assocs.	
Ohio	Columbus, Mandabach & Assocs.	614-235-0265
Tex	Hurst, Ranger Elctrns., Co.	713-626-1432
EXP:	New York, Uchida of America Corp.	212-239-7418

UDEL MANUFACTURING, Box 2028, Covina, Cal., 91722, Tel: 213-331-5680; Empl.: 6; Minimum order: $9F424

For info on price: A. F. Young; Customer service: A. F. Young; Delivery info: R. M. Geiger

Free literature available: Brochure of sizes, price list, General description of selection, use and frequency determination of ultrasonic cleaning equipment.

Products manufactured: Cleaners & Solvents, Cleaners, Ultrasonic

Local Sales Offices & Reps.

Ariz	Tempe, Gassner & Clark	602-968-9037
Cal	West Covina, Udel Mfg. Co.	213-331-5680
Fla	Ft. Lauderdale, B. Melvin Production Equip. Co.	305-566-8195
Fla	Lake Wales, B. Melvin Production Equip. Co.	813-676-6821

Ill	Mt. Prospect, E. T. Champion & Assocs.	312-593-1150
Mass	Newton Highlands, Marshall Inds.	617-965-5115
NY	Northport, Production Sls. Assocs.	516-757-0336
Ohio	Cincinnati, J. O. Olsen Co.	513-922-2176
Ohio	Cleveland, J. O. Olsen Co.	216-752-5444
Pa	Pittsburgh, J. O. Olsen Co.	412-279-2550
Tex	Dallas, Marshall Inds.	214-233-5200
Wash	Bellevue, Marshall Inds.	206-883-1084

UFAD CORP., 700 36th St. S.E., Grand Rapids, Mich., 49508, Tel: 616-241-6000; Empl.: 15

Customer service: A. D. Heibel

Free literature available: Free spec. sheets available for all products. See list. DA-72 - Programmable Distortion Analyzer; 850 - Lab-All, Multi-Function Signal Analysis; 724 - OEM Active Filtering System; 732 - Programmable True RMS-DC Converter; 731 - Manual True RMS-DC Converter.

Products manufactured: Analyzers, Filters, Meters, Oscillators

Local Sales Offices & Reps.

Conn	Hamden, Scientific Devices	203-248-9361
Md	Greenbelt, J.E. Cuesta & Co.	301-552-1200
Mass	Waltham, Scientific Devices	617-894-5637
Pa	Valley Forge, J.E. Cuesta & Co.	215-265-5800

UID ELECTRONICS DIV., AMF Inc., 4105 Pembroke Rd., Hollywood, Fla., 33021, Tel: 305-981-1211, TWX: 510-954-9810; Minimum order: $50 .... p. 1•2306

Customer service: D. R. Venator

Free literature available: UID Switch and Power Transistor Socket Catalog #4791 upon request. The contents include product description and applications. Custom designs are shown in a special section to stimulate cost reduction approaches to switching applications.

Products manufactured: Knobs, Sockets, Switches

Local Sales Offices & Reps.

Ariz	Scottsdale, B-5	602-947-5745
Cal	Garden Grove, Impact Elctrns.	213-431-3581
Cal	Menlo Park, G.R. McKnight Co.	415-325-2844
Colo	Denver, B-5	303-934-5505
Conn	Vernon, G-M Assoc.	203-646-4443
Fla	Orlando, Gra-Mar	305-894-3351
Ill	Elk Grove Village, J.G. Twist Co.	312-593-0200
Ind	Ft. Wayne, R.O. Whitesell & Assoc.	219-432-5591
Ind	Indianapolis, R.O. Whitesell & Assoc.	317-359-9283
Ind	Kokomo, R.O. Whitesell & Assocs.	317-452-6065
Iowa	Cedar Rapids, J.G. Twist Co.	319-393-8703
Kans	Prairie Village, J.G. Twist Co.	913-236-4646
Ky	Louisville, R.O. Whitesell & Assoc.	502-893-7303
Md	Lutherville, L. D. Lowery, Inc.	301-296-0379
Md	Silver Springs, L. D. Lowery Inc.	301-439-3542
Mass	Framingham, G-M Assocs.	617-872-4871
Mich	Grand Rapids, R.O. Whitesell & Assoc.	616-451-8901
Mich	Southfield, R.O. Whitesell & Assoc.	313-358-2020
Mich	St. Joseph, R.O. Whitesell & Assoc.	616-983-7337
Minn	Minneapolis, R-J, Inc.	612-922-1425
Mo	St. Louis, J.G. Twist Co.	314-432-2830
NY	Buffalo, Ossmann Comp. Sls. Corp.	716-832-4271
NY	Jamaica, S-J Sls. Assocs.	212-291-3232
NY	Kingston, Ossmann Comp. Sls. Corp.	914-338-5505
NY	Rochester, Ossmann Comp. Sls. Corp.	716-442-3290
NY	Syracuse, Ossmann Comp. Sls. Corp.	315-454-4477
NY	Vestal, Ossmann Comp. Sls. Corp.	607-785-9949
Ohio	Dayton, J.C. Hofstetter Co.	513-296-1010
Ohio	Medina, J.C. Hofstetter Co.	216-241-4880
Pa	Broomall, L. D. Lowery, Inc.	215-356-5300
Pa	Camp Hill, Beil & Whitaker	717-233-1254
Pa	Harrisburg, Beil & Whitaker	717-652-0184
Pa	Orefield, Beil & Whitaker	215-395-0150
Pa	Reading, Beil & Whitaker	215-779-2610
SC	Mauldin, Powertronics	919-476-6727
Tenn	Bristol, Remco	615-968-4195
Tex	Dallas, Allied Comps.	214-238-0408
Tex	Houston, Allied Comps.	713-782-5406
Va	Charlottesville, L. D. Lowery, Inc.	804-973-6672
Va	Fredericksburg, L. D. Lowery, Inc.	703-371-5099
Wash	Seattle, R. Johnston, Co.	206-524-5170
Wisc	Wauwatosa, J.G. Twist	414-786-6330

Local Distributors

Cal	Lakeside, Mouser Electrical Corp., 11511 Woodside	714-449-2220
Cal	Los Angeles, Elec. Switches, 2478 Fletcher Ave.	213-660-1310
Ill	Rockford, G.C. Elctrns., 400 S. Wyman St.	815-968-9661
Mass	Bellingham, Dowiak Assoc., 356 Hartford Ave.	617-966-0404
NJ	Little Falls, I.P.C. Corp., Cardinal Dr.	201-785-1830

ULTRA CARBON CORP., Box 747, Bay City, Mich., 48706, Tel: 517-894-2911; Empl.: 150

Products manufactured: Graphite Parts, Heaters & Heating Elements, Jigs And Fixtures, Chassis & Circuit Board, Materials, Graphite, Services, Assembly, Production & Test

ULTRASONIC CORP., Box 672, Pipestone, Minn., 56164, Tel: 507-825-5441; Empl.: 10

Customer service: S. Lodahl

Products manufactured: Cleaners & Solvents, Cleaners, Ultrasonic, Transducers

ULTRASONIC INSTRS. INT'L., INC., 165 EM Marine St., Farmingdale, N.Y., 11735, Tel: 516-293-5577; Empl.: 15

Products manufactured: Cleaners & Solvents, Cleaners, Ultrasonic, Machines/Machinery, Production

ULTRONIX, INC., 461 N. 22nd St., Grand Junction, Col., 81501, Tel: 303-242-0810, TWX: 910-929-6965; Empl.: 250; Minimum order: $50

For info on price: K. McCallister; Application info: M. R. Chesselet; Customer service: L. White; Delivery info: L. White

Free literature available: Complete catalog of wirewound resistors and networks. Tech notes and data sheets for application and use of precision and power wirewound resistors.

Products manufactured: Networks, Resistors

Local Sales Offices & Reps.

Ala	Huntsville, Comprehensive Conslt. Co.	205-772-3746
Ariz	Phoenix, Southwest Engrg.	602-993-0250
Cal	Redwood City, Parks and Pruit Assocs.	415-364-1640
Cal	San Diego, AAA Sls. Co.	714-565-0122
Cal	San Gabriel, Van Gott & Assoc.	213-285-2148
Conn	Hamden, Impact Sls. Co.	203-281-1331
Ill	Des Plaines, E. Flaxman	312-298-8580
Kans	Shawnee Mission, M.E. Bettis Co.	913-362-0772
Mass	Waltham, Impact Sls. Co.	617-893-2850
Mich	Warren, DEM Elctrn. Sls.	313-755-6660
Minn	Minneapolis, S. Clothier Co.	612-888-4666
Mo	St. Louis, M.E. Bettis Co.	314-429-2099
NJ	Cherry Hills, Danco Corp.	609-424-5590
NY	Garden City, Comtronic Assoc.	516-741-8966
NY	Oriskany, Knightsbridge Inds.	315-736-0131
NC	Greensboro, L & D Inc.	919-292-3201
Ohio	Cincinnati, J.O. Olsen Co.	513-922-2589
Ohio	Cleveland, J.O. Olsen Co.	216-752-5444
Ore	Beaverton, Arneson Assoc.	503-643-5754
Pa	Fairview Village, Danco Corp.	609-424-5590
Tex	Dallas, J.B. Guenther, Inc.	214-528-6286
Tex	Houston, J.B. Guenther, Inc.	713-468-0232
Wash	Seattle, Arneson Assoc.	206-762-7664
EXP:	Stamford, Conn., Dage Corp.	203-324-3123

ULVAC CORP., 1220 Lantern Hill, Fairfield, Conn., 06430, Tel: 203-259-8118; Empl.: 600; Minimum order: $50

Customer service: A. Plaisted

Products manufactured: Chamber, Environmental Test, Controls/Control Eqpt., Deposition Equipment, Vacuum & Accessories, Evaporation Equipment, Electron Beam, Furnaces, Gages, Metal Compounds, Foils, Powders, Sheet, Stock, Metals, Ovens, Pumps, Vacuum, Services, Assembly, Production & Test, Spectrometers, Valves, Vacuum

UNDERWRITERS SAFETY, 7300 W. Wilson Ave., Chicago, Ill., 60656, Tel: 312-867-4600, TWX: 910-221-3474; Empl.: 145; Minimum order: $25

For info on price: N. Hamot; Application info: G. Shea; Customer service: N. Hamot; Delivery info: N. Hamot

Free literature available: Power Terminal Blocks; Fuse Blocks; Quick-Connect Terminal Blocks; Circuit Breakers.

Products manufactured: Circuit Breakers, Clamps & Clips, Connectors, Panels, Terminal Blocks, Boards & Strips

UNGAR, DIV., Eldon Inds., Inc., 233 E. Manville St., Compton, Cal., 90220, Tel: 213-774-5950, Telex: 67-3183

Products manufactured: Heat Guns, Production, Soldering Accessories, Soldering Guns, Irons & Desoldering Tools

Local Sales Offices & Reps.

Ala	Birmingham, M.F. Taylor Co.	205-853-3181
Cal	Burlingame, Elvey-Proctor Co.	415-347-2994
Cal	Inglewood, Ungar Sls. Assocs.	213-776-7340
Colo	Denver, K-C Marketers	303-733-5561
Fla	Casselberry, M.F. Taylor Co.	305-838-0821
Ill	Chicago, G. McL. Cole Co.	312-774-3535
Ind	Indianapolis, Tech. Reps.	317-849-6454
Iowa	Des Moines, KSW Assocs.	515-279-9235
La	New Orleans, Texport Co.	504-486-6073
Md	Catonsville, M.F. Taylor Co.	301-747-5718
Md	Silver Spring, M.F. Taylor Co.	301-946-3569
Mass	Needham, Mullin Tech. Sls. Co.	617-444-4780
Mich	Southfield, R. Milsk Co.	313-354-3310
Minn	Minneapolis, Heimann Co.	612-861-6051
Mo	Kansas City, KSW Assocs.	816-358-5240
NY	Buffalo, R.W. Mitscher Co.	716-633-7970
NY	Oceanside, Bittan Assocs.	516-678-6222
NC	Charlotte, M.F Taylor Co.	704-523-7932
Ohio	Lakewood, Baehr, Greenleaf & Assocs.	216-221-9030
Okla	Tulsa, Texport Co.	918-939-1727
Ore	Portland, J.J. Backer Co.	503-297-3776
Pa	Philadelphia, M.F. Taylor Co.	215-698-9757
Pa	Pittsburgh, Covert & Newman Co.	412-563-0303
Tenn	Memphis, Texport Co.	901-683-0880
Tex	Richardson, Texport Co.	214-238-7117
Wash	Seattle, J.J. Backer Co.	206-285-1300
Wisc	Milwaukee, G. McL. Cole Co.	414-545-6083

UNHOLTZ-DICKIE CORP., 3000 Whitney Ave., Hamden, Conn., 06518, Tel: 203-288-3358; Empl.: 49; Minimum order: $25 .... p. 1•471,851

Free literature available: Our catalog containing illustrations and information on our product line of vibration test systems and controls, vibration instruments and accelerometers available on request.

Products manufactured: Accelerometers, Alarms, Amplifiers, Analyzers, Calibrators, Controls/Control Eqpt., Equalizers, Filters, Generators, Indicators, Meters, Power Supplies, Signal Averagers, Signal Conditioners & Equipment, Testers, Transducers, Vibrators

Local Sales Offices & Reps.

Ala	Huntsville, W. Brown	205-539-4411
Cal	Redondo Beach, Unholtz-Dickie Corp.	213-378-9418
Conn	Hamden, W.W. Jarowey Co.	203-288-3010
Fla	Ft. Lauderdale, W. Brown	305-776-4800
Fla	Orlando, W. Brown	305-425-5505
Ga	Atlanta, W. Brown	404-457-4069
Ill	Northfield, Torkelson Assocs.	312-446-9085
Ind	Indianapolis, Torkelson Assocs.	317-244-7867
Kans	Wichita, Aero-Hill Sls.	316-943-6371
Mich	Farmington, Anderson Elctrns.	313-476-9161
Minn	Minneapolis, Torkelson Assocs.	612-835-2414
NY	No. Merrick, Space-Tronics	516-868-1800
NC	Raleigh, W. Brown	919-876-9601
NC	Winston-Salem, W. Brown	919-725-5384
Ohio	Cleveland, Dietrich & Assocs.	216-781-1855
Ohio	Dayton, Dietrich & Assocs.	513-223-6042
Pa	Pittsburgh, Dietrich & Assocs.	412-892-2992

UNIFORM TUBES, MicroDelay Division, Collegeville, Pa., 19426, Tel: 215-539-0700, TWX: 510-660-6107; FSC No: 93306; Empl.: 16; Minimum order: $75 p. 2•2064,2065

For info on price: E. Shoemalter; Application info: L. Deery; Customer service: E. Shoemalter; Delivery info: C. Neafcy

Products manufactured: Cable Assemblies & Harnesses, Cable, Delay Lines, Tubing, Waveguides & Adapters

Local Sales Offices & Reps.

Ariz	Scottsdale, Gleason Sls.	602-946-3992
Cal	Los Altos, Marketek, Inc.	415-941-0882
Cal	Newport Bch., Uniform Tubes	714-642-5950
Cal	Van Nuys, C.W. Swift & Assoc.	213-989-1133
Colo	Denver, Crump Co.	303-426-1443
Conn	Meriden, J. Anderson	203-269-1812
Fla	Boca Raton, Floritronics Inc.	305-368-0325
Fla	Winter Park, Floritronics Inc.	305-886-4818
Ga	Decatur, H.N. Walton Co.	404-482-2794
Ill	Des Plaines, Coombs Assocs.	312-298-4830
Ill	Schiller Pk., Uniform Tubes	312-671-2717
Ind	Fort Wayne, Coombs Assocs.	219-747-0402
Mass	Medford, Blake Assocs.	617-391-7890
Mass	Newburyport, J. Murphy	617-465-0304
Mass	Seekonk, J. Murphy	617-SO 1-7153

Mich	Milford, T. Mulligan & Assocs.	313-363-5575
Mo	Grandview, Beneke & McCaul, Inc.	816-765-2998
Mo	St. Louis, Beneke & McCaul	314-434-6242
NJ	Denville, William Helm	201-625-4327
NY	Mt. Vernon, Friedman-Smith Elctrn. Sls.	914-664-4866
NY	Rochester, A. Scott Baregard	716-546-7280
NC	Charlotte, J. H. Smith	704-394-4210
Ohio	Columbus, T. Mulligan & Assocs.	614-457-2242
Okla	Tulsa, W. Pat Fralia Co.	918-663-8707
Pa	Bala Cynwyd, Vantage Sls.	215-667-0990
Tex	Dallas, W. Pat Fralia Co.	214-357-1607
Tex	Ft. Worth, W. Pat Fralia & Co.	817-738-2394
Tex	Houston, W. Pat Fralia & Co.	713-772-1572
Wash	Redmond, Barrett Sls.	206-885-6991
Wisc	Greendale, Coombs Assoc.	414-421-2300
EXP:	N.Y., New York, Ad. Auriema, Inc.	212-466-2500
FOR:	Can., Don Mills, Ont., Braydon Electro	416-447-0230
FOR:	Can., Montreal, Que., Braydon Electro	514-341-3330

UNIMAX SWITCH CORP., Riker-Maxson Sub., Ives Rd., Wallingford, Conn., 06492, Tel: 203-269-8701, TWX: 710-476-1397; FSC No: 80207; Empl.: 300; Minimum order: $25 .... p. 1•2304,2305

For info on price: J. W. Pogmore; Application info: D. M. Baribault; Customer service: K. Boyle; Delivery info: K. Boyle

Free literature available: Precision snap action switches and metal cased switches and assemblies; Lighted pushbutton controls in accordance with MIL-S-22885. Lighted pushbutton controls, one and two lamp units. Keylock switches. One, two and three pole lighted and unlighted snap action switches and indicators.

Products manufactured: Indicators, Switches

Local Sales Offices & Reps.

Ala	Huntsville, Rep., Inc.	205-881-9270
Ariz	Scottsdale, DeAngelo, Rothman & Cheever, Inc.	602-948-2240
Cal	Los Altos, Ewing-Foley	415-941-4525
Cal	LA, M.A. Stolaroff	213-295-7781
Colo	Denver, Straube Assocs.	303-426-0890
Conn	Bloomfield, Zaslow Sls.	203-242-7781
Fla	Oviedo, Conley & Assoc.	305-365-3283
Ga	Tucker, Rep., Inc.	404-938-4358
Ill	Chicago, Wasson-Gallagher	312-261-7517
Ill	Westchester, Wasson-Gallagher	312-884-0690
Ind	Marion, O.H. Bromberg	317-664-5384
Iowa	West Des Moines, Greg Newell Inc.	515-225-8522
Ky	Louisville, O. H. Bromberg	502-245-8916
Md	Rockville, L.G. White	301-770-6556
Mass	Lowell, Zaslow Sls.	617-458-8452
Mass	Northboro, Zaslow Sls.	617-393-8150
Mich	Grosse Pointe Park, Greiner Assoc.	313-499-0188
Minn	Mpls., Jos-Co. Sls. Engrg.	612-835-5858
Mo	St. Louis, Hill & Co.	314-621-1818
NJ	Denville, Grimm, Siegel Assoc.	201-625-1900
NM	Albuquerque, Straube Assoc.	505-292-0295
NY	Binghamton, Canavan-Scanlon Assoc.	607-724-7220
NY	Buffalo, Canavan-Scanlon Assoc.	716-839-3373
NY	Rochester, Canavan-Scanlon Assoc.	716-442-0720
NY	Syracuse, Ganavan-Scanlon Assoc.	315-437-1271
NC	Winston-Salem, L.G. White	919-725-3612
Ohio	Cincinnati, O.H. Bromberg	513-771-9333
Ohio	Medina, J. Hofstetter	216-241-4880
Pa	King of Prussia, White-Keystone	215-265-1817
Tex	Dallas, Glidden Electro. Equip.	214-363-6539
Tex	Houston, Glidden Electro Equip.	713-681-1415
Utah	Salt Lake City, Straube Assoc.	801-328-4513
Wash	Mercer Island, J. H. Andersen	206-232-0484
FOR:	Can., Burlington, Ont., Motion Control Dev.	416-637-9369

Local Distributors

Ariz	Phoenix, Electro Comps., 1641 E. McDowell	602-258-2665
Cal	Los Angeles, Fisher/Brownell, 13936 S. Bdwy.	213-532-2170
Cal	Los Angeles, Minarik Elec. Co., 224 E. Third St.	213-624-3161
Cal	Santa Clara, Fisher/Brownell, 3381 Edward Ave.	408-244-6182
Colo	Aurora, Comp. Specialties, 3178 Nome St.	303-341-0160
Colo	Colo. Spgs., D & M Elctrns., 715 N. Weber St.	303-633-4666
Colo	Denver, Fistell's Elec. Supply, 1001 Bannock St.	303-244-4691
Conn	Danbury, Greene Elec. Sup., 69 Main St.	203-748-5648
Conn	Hartford, Capitol Light & Sup., 200 Locust St.	203-527-8115
Fla	Miami, Elctrn. Equip., 2701 NW 42 Ave.	305-871-3500
Fla	Orlando, Orlando Armature, 600 W. Central	305-423-0555
Ga	Atlanta, Lance Engrg., 2080 Peachtree	404-458-6286
Ill	Niles, WICO Corp., 6400 W. Grosse Pt.	312-685-3000
Ill	Westmont, Bodelle Co., 47 Chestnut La.	312-323-9670
Ind	Evansville, Ohio Valley Sound, 20 E. Sycamore	812-425-6173
Ind	Indianapolis, Graham Elctrns., 133 S. Pennsylvania	317-634-8486
Ind	Kokomo, Wholesale Elec., 215 W. Sycamore	317-457-1136
Ind	South Bend, Koontz-Wagner Elect., 3801 Voorde Dr.	219-232-2051
Ind	Vincennes, Ohio Valley Sound, 902 Main St.	812-882-3615
Ky	Ashland, Ashland Elec., 2430 Carter Ave.	606-324-4107
Ky	Louisville, Marine Elect. Apparatus, 102 W. Main St.	502-587-6511
Ky	Owensboro, Ohio Valley Sound, 600 W. Third St.	502-683-6727
Md	Rockville, Capitol Radio, 12227 Wilkins Ave.	301-881-2270
Md	Silver Spring, Tech. Dist., 1219 Fidler La.	301-585-7512
Mass	Bellinglam, Dowiak Assoc., Rt. 126	617-966-0404
Mass	Boston, Sager Elec. Supply, 172 High St.	617-542-2281
NH	Concord, Evans Radio, Route 3A	603-224-9961
NY	Buffalo, Summit Distrs., 916 Main St.	716-884-3450
NY	Hempstead, Elctrn. Equip., 741 Peninsula Blvd.	516-538-5510
NY	Islip, Air Powered Tools, 142 Freeman Ave.	516-662-2616
NY	Sodus, AED Distrs., 27 State St.	315-483-6561
NY	W. Nyack, Douglaston Elect., 173 Western Hwy.	914-358-6966
NY	Woodside, Switches Unlimited, 49-11 43rd St.	212-651-0935
NC	Winston-Salem, Kirkman Elect., 901 W. 2nd St.	919-724-0541
Ohio	Cincinnati, Midwest Equip. Co., 11315 Williamson Rd.	513-793-4060
Ohio	Cleveland, W.M. Pattison Sup., 4550 Willow Pkwy.	216-441-3000
Ohio	Dayton, Duellman Elec., 131 Wayne Ave.	513-461-5010
Ore	Portland, Tekelectric Sup., 5940 S.W. Hood	503-246-5451
Pa	Philadelphia, Herbach & Rademan, 401 E. Erie Ave.	215-426-1700
Pa	Pittsburgh, RPC Elect., 620 Alpha Dr.	412-782-3770
RI	Providence, Providence Elect., 951 N. Main St.	401-351-2500
Tex	Dallas, Ind. Equip. Co., 4914 Greenville	204-368-5881
Tex	Odessa, Superior Elect., 208 S. Williams	915-332-0276
Utah	Salt Lake City, Std. Supply Co., 225 E. 6th, S.	801-355-2971
Wash	Seattle, Tekelectric Sup., 4411 23rd Ave. W.	206-283-7100

UNION CARBIDE CORP., Carbon Products Div., 270 Park Ave., New York, N.Y., 10017, Tel: 212-551-2345

Products manufactured: Bearings, Brushes & Brush Assemblies, Contacts, Electrical, Heat Exchangers & Systems, Materials, Graphite, Power Supplies

UNION CARBIDE, CHEMICALS & PLASTICS, 270 Park Ave., New York, N.Y., 10017, Tel: 212-551-4641

Products manufactured: Chemicals, Cleaners & Solvents, Coatings, Compounds, Encapsulating, Insulating, Molding, Potting, Coolants, Circuit & Components, Etchants, Printed Circuit, Insulators & Insulation, Lubricants, Plastic Raw Materials, Liquids, Pellets, Powders, Resins, Refrigerants, Spray

UNION CARBIDE CORP., Components Dept., Box 5928, Greenville, S.C., 29606, Tel: 803-963-6300, Telex: 57-0496; Empl.: 2000 .... p. 2•316-319

Products manufactured: Capacitors, Fixed

Local Sales Offices & Reps.

Ariz	Phoenix, Union Carbide-Comps. Dept.	602-264-7332
Cal	Marina Del Rey, Union Carbide-Comps. Dept.	213-821-8824
Cal	Mt. View, Union Carbide-Comps. Dept.	415-969-9390
Cal	San Diego, Celtec Co.	714-279-7961
Colo	Denver, Parker-Webster Co.	303-770-1972
Fla	Clearwater, G. F. Bohman Assocs.	813-442-5606
Fla	Fort Lauderdale, G.F. Bohman Assocs.	305-564-3081
Fla	Orlando, G.F. Bohman Assocs.	305-855-0274
Ill	Rosemont, Union Carbide-Comps. Dept.	312-298-8340
Ind	Indianapolis, L. M. DeVoe Co.	317-257-1227
Iowa	Cedar Rapids, Seltec Sls. Corp.	319-393-1114
Kans	Andover, Palatine Engineering Sls.	316-683-7512
Kans	Overland Park, Palatine Engrg. Sls.	913-262-5643
Mass	Needham Heights, Union Carbide-Comps. Dept.	617-444-5400
Mich	Birmingham, Union Carbide-Comps. Dept.	313-642-9800
Minn	Minneapolis, S. Clothier Co.	612-888-4666
Mo	St. Louis, Palatine Engrg. Sls., Inc.	314-426-7055
NY	Liverpool, Union Carbide-Comps. Dept.	315-451-0720
NY	Tarrytown, Union Carbide-Comps. Dept.	914-345-2047
Ohio	Cincinnati, Baehr, Greenleaf & Assocs.	513-891-3826
Ohio	Columbus, Baehr, Greenleaf & Assocs.	614-486-4046
Ohio	Lakewood, Baehr, Greenleaf & Assocs.	216-221-9030
Okla	Oklahoma City, Parvin Sls. Co.	405-942-4581
Pa	Frazer, Union Carbide-Comps. Dept.	215-644-8864
SC	Greenville, Union Carbide-Comps. Dept.	803-271-7012
Tex	Addison, Parvin Sls. Co.	214-239-9148
Tex	Houston, Parvin Sls. Co.	713-784-9900
Utah	Salt Lake City, Parker-Webster Co.	801-486-3737
EXP:	Can., Ville St. Laurent, Que., Deskin Sls. Corp.	514-331-2860
EXP:	Greenville, S.C., Union Carbide-Comps. Dept.	803-963-6300
EXP:	Malton, Ont., Can., Deskin Sls. Corp.	416-677-5517
EXP:	Vancouver, B.C., Can., Deskin Sls. Corp.	604-324-6331

UNION CARBIDE CORP., Corporate Development, Components Dept., 270 Park Ave., New York, N.Y., 10017

Products manufactured: Abrasive Belts, Compounds, Cords, Powders, etc., Alloys, Capacitors, Fixed, Coatings

Local Sales Offices & Reps.

Ariz	Phoenix	602-264-7332
Cal	Marina Del Rey	213-821-8824
Cal	Mountain View	415-969-9390
Ill	Rosemont	312-298-8340
Mass	Needham Hgts.	617-444-5400
Mich	Birmingham	313-642-9800
NY	Liverpool	315-451-0720
NY	Tarrytown	914-345-2047
Ohio	Cleveland	216-221-0600
Pa	Frazier	215-644-8864
SC	Greenville	803-271-7012

UNION CARBIDE CORP., Corporate Development, Crystal Prods. Dept., 270 Park Ave., New York, N.Y., 10017

Products manufactured: Comm. Systems, Crystals, Lasers & Laser Systems, Modulator/Demodulators, Monitors, Power Supplies, Scribers, Semiconductor Wafer Fabrication, Substrates

Local Sales Offices & Reps.

Cal	Mountain View	415-965-2128
Cal	San Diego	714-279-4500
Mass	Needham Hgts.	617-444-5400

UNION CARBIDE, Battery Prods. Div., 270 Park Ave., New York, N.Y., 10017, Tel: 212-551-3833; Minimum order: $100 .... p. 1•1514,1515

Customer service: J. F. McCullough 212-551-3833

Products manufactured: Batteries, Flashlights & Lanterns, Lamps

Local Sales Offices & Reps.

Cal	El Monte	213-579-0401
Cal	San Francisco	415-765-1000
Ga	Atlanta	404-633-6161
Ill	Chicago, East Central Div.	312-822-7000
Mass	Needham Hts	617-444-5400
NJ	Cherry Hill	609-235-6200
NJ	Westwood	201-664-7400
Ohio	Cleveland	216-621-4200
Tex	Dallas	214-631-0010

UNION CARBIDE, Films Packaging Div., 6733 W. 65th St., Chicago, Ill., 60638, Tel: 312-735-1234

Products manufactured: Tubing

UNION CARBIDE CORP., Linde Div., 270 Park Ave., New York, N.Y., 10017, Tel: 212-551-3763

Products manufactured: Capacitors, Fixed, Cases, Transit, Coatings, Controls/Control Eqpt., Crystals, Detectors, Flux, Brazing & Soldering Materials, Insulators & Insulation, Lasers & Laser Systems, Services, Assembly, Production & Test, Soldering Accessories, Soldering Guns, Irons & Desoldering Tools, Torches, Soldering, Welding & Access., Tubes, Welding Equipment & Access. (Excluding Equip. for Semiconductor Devices)

UNIROYAL, INC., 1230 Ave. of Americas, New York, N.Y., 10020, Tel: 212-489-4000; Empl.: 65,000

Customer service: T. Jens 203-573-3717

Products manufactured: Adhesives (All Types), Bumpers, Bushings, Glass, Plastic, Metal, Rubber, Etc., Chemicals, Coatings, Compounds, Encapsulating, Insulating, Molding, Potting, Computers, Containers, Insulators & Insulation, Labels, Pressure-Sensitive, Adhesive, Mounts, Plastic Raw Materials, Liquids, Pellets, Powders, Resins, Tubing

Local Sales Offices & Reps.

Cal	Santa Ana	714-545-5551
Cal	South San Francisco	415-873-5880
Cal	Vernon	213-583-2331
Colo	Denver	303-388-2481
Fla	Miami	305-633-6381
Ga	Atlanta	404-366-4650
Ill	Chicago	312-254-5700
Kans	Lenexa	913-888-1207
Md	Baltimore	301-485-8904
Mass	Dedham	617-329-2060
Mass	Springfield	413-781-8620
Minn	St. Louis Park	612-546-2528
Mo	St. Louis	314-429-6908
NJ	Jersey City	201-432-4222
NY	Buffalo	716-668-0404
NC	Charlotte	704-334-0893
Ohio	Cincinnati	513-242-5807
Ohio	Port Clinton	419-732-2151
Pa	McKees Rocks	412-771-3500
Pa	Philadelphia	215-742-7010
Tenn	Memphis	901-527-2413
Tex	Dallas	214-631-2310
Tex	Houston	713-644-9161
Utah	South Salt Lake City	801-484-8841
Va	Richmond	703-271-6091
Wash	Seattle	206-767-7066

UNIT INDUSTRIES, INC., 3137 Century Blvd., South Gate, Cal., 90280, Tel: 213-569-7181; Empl.: 14

Customer service: J. Abouchar

Products manufactured: Brushes & Brush Assemblies, Services, Assembly, Production & Test, Slip-Rings & Assemblies

UNITED CHEMICON, 731 James St., Ste. 306, Syracuse, N.Y., 13203, Tel: 315-474-2954, TWX: 710-541-0453

Customer service: P. Maler

Free literature available: 160WV to 500WV ALUMINUM ELECTROLYTIC CAPACITORS (cat. no. 1139); 6.3 WV to 100 WV ALUMINUM ELECTROLYTIC CAPACITORS (cat. no. 1138); KX Series 6.3 WV to 63 WV ALUMINUM ELECTROLYTIC CAPACITORS (cat. no. 1140); KX Series 6.3 WV to 63 WV AUTOMOTIVE ALUMINUM ELECTROLYTIC CAPACTIROS (cat. no. 1140).

Products manufactured: Capacitors, Fixed

Local Sales Offices & Reps.

Ariz	Scottsdale, DeAngelo, Rothman, & Cheever, Inc.	602-948-2240
Cal	Culver City, DeAngelo, Rothman Co.	213-398-6239
Cal	Menlo Park, Straube Assocs.	415-323-2476
Colo	Denver, Straube Assocs.	303-426-0890
Ill	Chicago, M. Gottlieb Assocs.	312-775-1151
Ind	Indianapolis, Lattronics	317-846-5788
Kans	Wichita, Dy-Tronix	316-943-6221
Md	Westminster, F.B.D. Sls. Corp.	301-876-2396
Mass	Lexington, Circuit Sls. Co.	607-861-0567
Mich	Farmington, Hummon & Assocs.	313-474-0661
Minn	Minneapolis, Heimann Co.	612-861-6051
Miss	Meridian, Herron Assocs.	601-483-9306
Mo	Hazelwood, Dy-Tronix	314-731-5799
NJ	Teaneck, R.T. Reid Assocs.	201-692-0200
NM	Albuquerque, Straube Assocs.	505-292-0295
NY	Fairport, F. Hall	716-223-5102
NY	Syracuse, Franklin Sls. Corp.	315-474-2954
NY	Whitesboro, H. Lessman	315-736-5460
NC	Cary, F.B.D. Sls.	919-467-7595
Ohio	Cincinnati, Herrick Co.	513-351-4441
Ohio	Rocky River, Geo. L. Herrick Co.	216-333-0333
Ore	Portland, Underwood & Underwood	
Pa	Abington, R.T. Pearson Sls.	215-887-0186
Tex	Dallas, E.F. Aymond Co.	214-826-7620
Utah	Salt Lake City, Straube Assocs.	801-328-4513
Va	Portsmouth, F.B.D. Sls. Corp.	804-484-3162
Wash	Seattle, Underwood & Underwood	206-243-2133

UNITED ELEC. CONTROLS CO., 85A School St., Watertown, Mass., 02172, Tel: 617-WA 6-1000, TWX: 617-092-2445; Empl.: 350

For info on price: D. Holm; Application info: G. May; Customer service: G. May; Delivery info: D. Holm

Free literature available: Catalog T-5 Temperature & Pressure Controls, Recorders, Thermometers; Bulletin B Mineral Insulated Thermocouples; Bulletin 910 Electronic Temperature Controls for Thermocouples.

Products manufactured: Controls/Control Eqpt., Detectors, Probes, Switches, Thermistors, Thermocouples, Elements & Accessories, Thermostats

Local Sales Offices & Reps.

Cal	Anaheim	714-635-3730
Ill	Rolling Meadows	312-259-6700
NJ	Edison	201-738-1900
Ohio	Cleveland	216-261-8141
FOR:	Can., Ont.	416-625-5082

UNITED MINERAL & CHEM. CORP., 129 Hudson St., New York, N.Y., 10013, Tel; 212-966-4330, TWX: 710-581-5799; Empl.: 78

For info on price: M. Meeker; Application info: M. Jasen; Customer service: R. Cohen

Products manufactured: Alloys, Attenuators, Bi-Metals, Thermostatic, Capacitors, Fixed, Capacitors, Variable, Chemicals, Chokes, Coils Including Assemblies & Forms, Cores, Magnetic, Crayons, Coatings, Pellets, etc., Temperature Indicating, Ferrite Material & Parts, Films, Foil, Insulators & Insulation, Metal Compounds, Foils, Powders, Sheet, Stock, Metal Oxides, Metals, Packages, Integrated Circuit, Potentiometers, Resistors, Tapes, Electrical Insulation, Tapes, Films & Foils, Pressure Sensitive, Wire

Local Sales Offices & Reps.

CHEMICAL DEPARTMENT

Cal	Mountain View, Tech Ser. Inc.	415-969-9020
Cal	Torrance, Tech Ser. Inc.	213-324-3672
Conn	West Hartford, R.S. Pettigrew & Co. Inc.	203-233-8533
Minn	St. Louis Park, Xylem, Inc.	612-920-9626
NM	Albuquerque, John Quirk Assocs.	505-255-6981
NY	Syracuse, Rep Tech Inc.	315-437-2845
Tex	Richardson, Ralph Marston	214-235-3577

ELECTRONIC COMPONENTS

Cal	Inglewood, Ungar Sales Assocs.	213-776-7340
Fla	Orlando, Irby & Connolly	305-894-8471
Ill	Skokie, Saffro & Assocs.	312-588-0905
Ind	Indianapolis, Schroeder-Loomis, Inc.	317-251-4571
Kans	Prairie Village, Thro Industrial Sales Co.	913-362-2533
Mass	Newton Lower Falls, New England Comp. Sls.	617-969-9523
Mich	Ferndale, Hilltronics, Inc.	313-398-5556
NY	Syracuse, N.J. Matchuk Co.	315-488-3251
NC	Thomasville, Powertronics, Inc.	919-476-6727
Ohio	Cleveland, Greenleaf & Assocs.	216-333-5480
Pa	Philadelphia, H.A. Goodman Co.	215-247-7116
Tex	Richardson, Thorton-Leeper	214-231-6891
FOR:	Can., Markham, Ont., Tel-Mar Elctrn. Sales Ltd.	416-887-5612

UNITED PAGE INC., 481 Getty Ave., Paterson, N.J., 07503, Tel: 201-279-7500; Empl.: 60; Minimum order: $25

For info on price: F. Geisler; Application info: S. Specter; Customer service: W. Spielev; Delivery info: W. Speilev

Free literature available: Complete 64 page buyers guide of special purpose, industrial tubes, transmitting, foreign tubes, cathode ray tubes (now on press old catalog h/w. Individual spec sheets on all tubes as required.

Products manufactured: Tubes

Local Sales Offices & Reps.

Cal	Encino, United-Page	213-881-0300
Colo	Denver, Elctrn. Sls.	303-771-6300
Ill	Park Ridge, Metcom Assocs.	312-696-1490
Mo	Hazelwood, Dy-Tronix	314-731-5799
NJ	Paterson, United-Page	201-279-7500
NJ	Westwood, R.C. Assocs.	201-664-1241
NY	East Meadow, Stanley Shapiro Assocs.	516-483-4185
Pa	Glenside, Koebert, R.F.	215-887-2310
Tex	Dallas, Southland Components	214-233-0603

UNITED PRODS. CO., Div. Designatronics, 55 S. Denton Ave., New Hyde Pk., N.Y., 11040, Tel: 516-328-3300

Customer service: M. Scheck

Products manufactured: Capacitors, Variable, Coils Including Assemblies & Forms, Cores, Ceramic, Cores, Magnetic, Terminals, Transformers

Local Sales Offices & Reps.

Cal	Milbrae, Melvin Sls.	415-697-6922
Ky	Louisville, Waddle & Assocs.	502-897-6419
Mass	Topsfield, Representatives Corp.	617-426-0541

UNITED REFINING & SMELTING CO., 3700 N. Runge Ave., Franklin Park, Ill., 60131, Tel: 312-455-8800; Empl.: 32

Products manufactured: Alloys, Metals

UNITED SENSOR & CONTROL CO., 85 School St., Watertown, Mass., 02172, Tel: 617-926-1000, TWX: 617-092-2445; Empl.: 25

Customer service: J. Algeo

Free literature available: Catalog S-8 Thermocouples - For high & low temperature probing & measuring total temperature Catalog S-7 Probes - For measuring temperature, total and static pressure velocity and flow direction of fluids, gases & liquids.

Products manufactured: Probes, Thermocouples, Elements & Accessories

Local Sales Offices & Reps.

Cal	Anaheim, United Electric Controls Co.	714-635-3730
Ill	Rolling Meadows, United Elec. Controls Co.	312-259-6700
NJ	Edison, United Electric Controls Co.	201-738-1900
Ohio	Cleveland, United Electric Controls Co.	216-8141

UNITED STATES CRYSTAL CORP., 3605 McCart St., Ft. Worth, Tex., 76110, Tel: 817-921-3014; Empl.: 35; Minimum order: $25

Customer service: T. Nastase

Products manufactured: Crystals

Local Sales Offices & Reps.

Cal	Orange, I. Green Mktg.	714-637-1313
Colo	Arvada, C.B. Mktg.	303-422-0561
Fla	Orlando, B.C. Elctrn. Sls.	404-436-5169
Ga	Smyrna, B.C. Elctrn. Sls.	404-436-5169
Ill	Chicago, Q & B Inc.	312-725-4999
Ind	Mulberry, Maish Sls.	317-296-2322
Md	Seabrook, Taylor Mktg.	301-864-4011
Mass	Northboro, Pray Sls.	617-393-3434
Mich	Pontiac, T.A. Elctrn. Sls.	313-335-4285
Minn	Minneapolis, Kodo Assocs.	612-881-7188
NY	Tuckahoe, LCA Sls. Co.	914-961-4700
Ohio	Columbus, J.W. Lehner Co.	614-268-5260
Tex	Dallas, Roman Sls.	214-358-2152
Wash	Seattle, R.K. Squibb	206-632-2450

UNITED SYSTEMS, 918 Woodley Rd., Dayton, Ohio, 45403, Tel: 513-254-6251, TWX: 810-459-1728; FSC No: 16152; Empl.: 135; Minimum order: $25

For info on price: B. Schryver; Application info: P. Rohrer; Customer service: S. Hommel; Delivery info: B. Schryver

Free literature available: New 1974/75 Catalog lists complete test ahd measurement instrumentation

Products manufactured: Calibrators, Clocks (All Types), Comparators, Converters, Counters, Data Acquisition & Reduction Systems, Data Loggers, Generators, Indicators, Meters, Monitors, Perforators, Printers, Scanners, Synthesizers, Thermometers, Resistance, Timers, Totalizers, Digital

Local Sales Offices & Reps.

Ala	Huntsville, J.L. Highsmith & Co.	205-881-3294
Cal	Culver City, F. Lucas Wolfe, Inc.	213-559-7200
Cal	Mountain View, IFM, Inc.	415-961-2828
Colo	Denver, Grifco	303-722-4674
Fla	Orlando, J.L. Highsmith & Co.	305-293-5202
Ill	Des Plaines, Marsland Assocs.	312-298-2620
Ind	Indianapolis, Marsland Assocs.	317-924-3568
Kans	Overland Park, Carter Elctrns.	913-649-6996
Md	Silver Springs, Eastern Instrumentation Corp.	301-681-6500
Mass	Burlington, R. J. Sickles Assocs.	617-272-7285
Mich	Detroit, Comtel-Sterling Co.	313-255-1970
Minn	Minneapolis, Marsland Assocs.	612-545-4481
Mo	Hazelwood, Carter Elctrns.	314-731-2237
NM	Albuquerque, F. Gates Co.	505-298-1875
NY	Fayetteville, M.P. Andrews, Inc.	315-637-3144
NY	Great Neck, E. I. Inc.	516-466-9505
NC	Charlotte, J.L. Highsmith & Co.	704-333-7743
Ohio	Cleveland, Comtel-Sterling Co.	216-442-8080
Ohio	Dayton, Comtel-Sterling Co.	513-298-7573
Pa	Philadelphia, Eastern Instrumentation	215-927-7777
Pa	Pittsburgh, Comtel-Sterling Co.	412-922-5720
Tex	Richardson, Scientific Sls. Co.	214-231-6541
Va	Richmond, J.L. Highsmith ad Co.	804-272-5888
Wash	Bellevue, Topp Engrg. Sls. Corp.	206-747-5401

UNITRACK DIV., Calabro Plastics, Inc., 8738 W. Chester Pike, Upper Darby, Pa., 19082, Tel: 215-789-3820; Empl.: 25; Minimum order: $15 p. 1•98,99

For info on price: R. Marchetti; Application info: R. Marchetti; Customer service: M. O'Connor; Delivery info: M. O'Connor

Free literature available: Catalog describes the full line of UNITRACK P.C. Card Guides (metal and plastic), Versamount brackets, Vers-Cage card racks, Pak-Rak p.c. card storing and shipping container, and Kooler Krown & Triac Koller - heat dissipators.

Products manufactured: Cases, Transit, Guides, Circuit Board, Holders, Circuit Board (Production Type), Racks, Transistor, Diode, Thyristor Heat Dissipators

Local Sales Offices & Reps.

Ala	Huntsville, J.L. Highsmith & Co.	205-881-3294
Cal	Burbank, A.C. Stearns Co.	213-849-5776
Cal	San Francisco, FENSCO	415-362-4930
Fla	Orlando, J.L. Highsmith & Co.	305-293-5202
Ill	Des Plaines, Lincoln Hodges & Assoc.	312-297-3810
Md	Rockville, Mechtronics Sls.	301-340-2130
Mass	Brockton, Forsberg Sls.	617-522-6300
Minn	St. Paul, Countrymen Assoc. Co.	612-645-9151
NJ	Mountain Lakes, J.P. Dearie	201-334-4848
NC	Charlotte, J.L. Highsmith & Co.	704-333-7743
Ohio	Dayton, Compass Assocs.	513-252-9939
Pa	West Chester, January Mktg. & Sls.	215-793-2265
Tex	Arlington, ION Assoc.	817-461-9661
Wash	Tukwila, General Elctrns.	206-243-5141

Local Distributors

Cal	Los Angeles, El-Com, Inc.	213-223-1351
Cal	Sunnyvale, Ruby Stok Co.	408-739-5333
Fla	Orlando, L. Highsmith & Co.	305-293-5202
Ill	Lake Bluff, J & R Enterprises	312-945-6739
Mass	Waltham, Henik Assoc.	617-891-5660
Mass	Woburn, Rush Industries	617-935-2400
Mich	Farmington, CMP Distributor Div.	313-477-7700
NY	Rochester, Rochester Radio Supply Co.	716-454-6300
NC	Winston-Salem, Kirkman Elctrns., Inc	919-724-0541
Ohio	Dayton, ESCO, Inc.	513-226-1133
Pa	Philadelphia, Philadelphia Elctrns., Inc.	215-568-7400
Tenn	Nashville, Electra Distributing Co.	615-329-3971
Wash	Tukwila, General Elctrns., Inc.	206-243-5141

UNITRODE CORP., 580 Pleasant St., Watertown, Mass., 02172, Tel: 617-926-0404, TWX: 710-327-1296; Empl.: 1000

Products manufactured: Circuits, Integrated, Silicon Monolithic, Unpackaged Chips, Diodes, Rectifiers, Thyristors (Includes Silicon Controlled Rectifiers), Transistors

Local Sales Offices & Reps.

Ala	Huntsville, 20th Century Mktg.	205-772-9237
Ariz	Scottsdale, F. Board Assocs.	602-994-9388
Cal	Burlingame, Brooks Tech. Group	415-328-3232
Cal	Newbury Park, Astralonics	805-498-3988
Cal	San Diego, S. R. Elctrns.	714-565-8411
Cal	Sherman Oaks, Unitrode Corp.	213-783-1301
Colo	Littleton, Simpson Assocs.	303-794-8381
Conn	Washington Depot, Kanan Assocs.	203-868-0513
Fla	Boca Raton, Conley & Assocs.	305-395-6108
Fla	Oviedo, Conley & Assocs.	305-365-3283
Fla	Tampa, Conley & Assocs.	813-933-3183
Ga	Douglasville, 20th Century Mktg.	404-942-6483
Ill	Chicago, Carlson Elctrn. Sls. Co.	312-774-9022
Md	Glen Burnie, New Era Sls. Inc.	301-768-6666
Mass	Reading, Kanan Assocs.	617-944-8484
Mich	Grand Rapids, J. L. Montgomery Assoc.	616-774-9308
Mich	Southfield, J. L. Montgomery Assoc.	313-358-2616
Minn	Minneapolis, C.E. Bohlig	612-922-7011
Mo	St. Louis, Carlson Elctrn. Sls.	314-991-0262
NY	Albany, Reagan/Compar Albany	518-489-7408
NY	Endwell, Reagan/Compar Albany	607-723-8743
NY	Fairport, Reagan/Compar Albany	716-271-2230
NY	Melville, Unitrode Corp.	516-549-5400
NY	New Hartford, Reagan/Compar Albany	315-732-3775
NC	Burlington, P.J. Nahser	919-226-8053
Ohio	Cincinnati, Baehr, Greenleaf & Assoc.	513-891-3826
Ohio	Cleveland, Baehr, Greenleaf & Assoc.	216-221-9030
Ohio	Columbus, Baehr, Greenleaf & Assoc.	614-486-4046
Ohio	Dayton, Baehr, Greenleaf & Assoc.	513-426-5485
Ohio	West Carrollton, Unitrode Corp.	513-859-5872.
Pa	Ft. Washington, GCM Assocs.	215-646-7535
Pa	Ft. Washington, Unitrode Corp.	215-542-9112
Pa	Pittsburgh, Covert & Newman Co.	412-563-0303
Tex	Houston, Semiconductor Sls. Assoc.	713-461-4197
Tex	Richardson, Semiconductor Sls. Assocs.	214-231-6181
Utah	Salt Lake City, Simpson Assocs.	801-486-3731
Wash	Bellevue, SD-R&S2	206-747-9424
EXP:	Downsview, Ont., Can., Kaytronics Ltd.	416-638-5511
EXP:	Montreal, P.Q., Can., Kaytronics Ltd.	514-487-3434

UNITRON CORP., 700 Barr St., Ft. Wayne, Ind., 46802, Tel: 219-422-6656; Empl.: 5

Customer service: W. C. Dodenhoff

Free literature available: Single product information sheets on each subject product.

Products manufactured: Alarms, Chargers, Battery, Controls/Control Eqpt., Detectors, Flashers, Indicators, Monitors, Relays, Thermostats, Timers

UNITRON
INCORPORATED

UNITRON INC., 1624 N. First St., Box 1331, Garland, Tex., 75040, Tel: 214-276-8591, Telex: 73-0644; FSC No: 6130; Empl.: 55; Minimum order: $50 ..... p. 1•1516-1523

Customer service: R. L. Beutel

Free literature available: General Catalog - contains individual specification sheets on each product; Short Form Catalog - contains listing of all standard products and some important specifications each.

Products manufactured: Controls/Control Eqpt., Converters, Inverters, Power Supplies

UNITRON SCIENTIFIC, INC., 66 Needham St., Newton Highlands, Mass., 02161, Tel: 617-969-8600, TWX: 710-335-1684; Empl.: 200; Minimum order: $15

For info on price: J. Dill; Application info: J. Coyle; Customer service: J. Dill; Delivery info: J. Dill

Free literature available: Literature on full line of microscopes and refractor telescopes.

Products manufactured: Microscopes

UNIVERSAL AD-YU ELCTRNS., INC., 2517 E. Norwich St., Milwaukee, Wisc., 53207, Tel: 414-482-4100; FSC No: 90101; Empl.: 10

Customer service: R. Fehrenbach

Products manufactured: Amplifiers, Attenuators, Comparators, Delay Lines, Detectors, Filters, Generators, Meters, Networks, Shifters, Standards

Local Sales Offices & Reps.

Cal	Burbank, R. Olander & Co.	213-843-5200
Ill	Northfield	312-446-4166
Kans	Leawood, G. Vasen	913-649-0679
Mass	Acton, E.E. Specialists	617-259-9200
Mo	St. Louis, G. Fixman Engrg.	314-725-5219
NM	Albuquerque, Elctrn. Entprs.	505-256-3561
NM	Las Cruces, Elctrn. Entprs.	505-524-0126
Ohio	Dayton, Micro Sls. Corp.	513-298-3033
Pa	Philadelphia, E.C.I.	215-836-1616
Wash	Seattle, Dewar & Assoc.	206-763-2233

UNIVERSAL INSTRUMENTS CORP., Box 825, Binghamton, N.Y., 13902, Tel: 607-772-7522, TWX: 510-252-1990; Empl.: 820

For info on price: R. C. Cook 607-772-7415; Application info: D. W. Ackerman 607-772-7438; Customer service: J. Driscou 607-772-7505; Delivery info: G. C. Mayo 607-772-7410

Products manufactured: Machines/Machinery, Production

Local Sales Offices & Reps.

Colo	Denver, Universal Instrs. Corp.	303-798-6505
Colo	Littleton, Universal Instrs. Corp.	
Conn	Trumbull, Universal Instrs. Corp.	203-378-5613
Fla	St. Petersburg, Universal Instrs. Corp.	813-392-5265
Ill	Chicago, Solid State Elctrns. of Ill.	312-889-8033
Ill	Palatine, Universal Instrś. Corp.	312-358-4831
Ind	Cedar Lake, Universal Instrs. Corp.	219-374-9555
Mich	Ann Arbor, Universal Instrs. Corp.	313-761-9166
NH	Manchester, Universal Instrs. Corp.	503-669-6500
NY	Binghamton, Universal Instrs. Corp.	607-772-7414
NC	Raleigh, Universal Instrs. Corp.	919-782-1436
Pa	Levittown, Universal Instrs. Corp.	215-943-9244
Tex	Dallas, Universal Instrs. Corp.	214-339-5121
EXP:	N.Y., N.Y., Extron Entprs. Inc.	212-752-4278
FOR:	Can., Montreal, Que., Willer Engrg. Ltd.	514-748-6169
FOR:	Can., Toronto, Ont., Willer Engrg. Ltd.	416-783-3373

UNIVERSAL RELAY CORP., 42 White St., New York, N.Y., 10013, Tel: 212-925-6900, TWX: 710-581-4461; Empl.: 30

For info on price: S. Soloway; Application info: B. Kassel; Customer service: M. Greenberg; Delivery info: J. Wells

Free literature available: Complete Catalog Plus Free Slide Rule

Products manufactured: Choppers, Relays, Solenoids, Switches

UNIVERSAL SECURITY INSTRS., 2829 Potee St., Baltimore, Md., 21225, Tel: 301-355-9000; Empl.: 60; Minimum order: $5

For info on price: A. Brochin; Application info: A. Brochin; Customer service: D. Jones; Delivery info: D. Jones

Free literature available: Catalog sheets & catalogs, glossies - etc. - on entire line.

Products manufactured: Alarms, Batteries, Bells, Buzzers, Gongs, Sirens & Aural Warning Devices, Cabinets & Accessories, Cans, Capacitor, Relay, Semiconductor, Transformer, etc, Cords, Cutters, Wire, Hand Operated, Fasteners, Foil, Fuses, Horns, Microwave, Indicators, Motors, Relays, Speakers, Switches, Terminal Blocks, Boards & Strips, Terminals, Timers, Vibrators, Instrument (Stiction Elimination), Wire, Wire Nuts, Wire Strippers

Local Sales Offices & Reps.

Cal	Culver City, W. Alderson Co.	213-837-1398
Cal	San Francisco, Featherstone Sls. Co.	415-467-3133
Fla	Miami, Sochin Sls. Co.	305-235-6048
Ga	Norcross, D. Cooper Co.	404-448-5460
Ill	Chicago, B. Burns & Assoc.	312-775-1233
Ind	Indianapolis, Electronic Reps., Inc.	317-897-9326
Md	Baltimore, J. Fournier	301-636-5237
Mass	Framingham, Northeast Rep., Inc.	617-879-2300
Mich	Southfield, Aztec Sls. Corp.	313-642-0777
Mo	Grandview, Moeller/Pickett & Assoc.	816-765-1224
NY	Liverpool, Lewis & Dunnigan Co.	315-622-2133
Ohio	Richfield, Bear Mktg. Co.	216-659-3131
Pa	Dresher, Diversified Sls.	215-643-1003
Tenn	Memphis, Mid South Sls. Assoc.	901-276-4442
Tex	Hurst, Ranger Elctrns. Inc.	817-281-2736
Wash	Tukwila, J. Stroum, Co.	206-575-0175

UNIVERSAL SHIELDING CORP., 45 S. Service Rd., Plainview, N.Y., 11803, Tel: 516-420-9538; Empl.: 15

Customer service: J. Rance

Products manufactured: Cabinets & Accessories, Shields

UNIVERSAL VOLTRONICS CORP., 27 Radio Cir. Dr., Mt. Kisco, N.Y., 10549, Tel: 914-241-1300, TWX: 710-571-2142; Empl.: 75; Minimum order: $25 p. 1•1524-1527

For info on price: N. Segretto; Application info: B. Ressler; Customer service: V. Gianguzzi; Delivery info: N. Segretto

Free literature available: 1. H.V. DC Power Supplies Components and Equipment Catalogue (Includes unregulated and precision regulated DC power supplies up to 2000 KVDC; isolation TX dividers and terminations) 2. Applied H.V. Products Catalogue (Includes AC power supplies; impulse generators)

Products manufactured: Cable, Meters, Power Supplies, Regulators, Testers, Transformers

Local Sales Offices & Reps.

Cal	Encino, King Way Assocs.	213-788-4124
Cal	Redwood City, Pruitt-Parks	415-364-1640
Fla	Winter Park, McMahan Assocs.	305-645-0463
Ill	Oak Brook, Schuten Assocs.	312-833-0980
Md	Ellicott City, A/O Elctrns.	301-531-6700
Mass	Waltham, Waitt Tech. Sls.	617-891-8195
Minn	Mpls., R.J. Sls.	612-922-1425
NM	Albuquerque, F.Y. Gates Co.	505-298-1875

Local Distributors

Cal	Encino, Kingway Assocs., 16400 Ventura Blvd.	213-788-4124
Cal	Redwood City, Parks & Pruitt Assoc., 555 Veterans Blvd.	415-364-1640
Fla	Winter Pk., McMahan Assoc., 1350 Orange Ave.	305-645-0463
Ill	Elmhurst, Schuten Assocs., 643 S. Eighty-three	312-833-0980
Md	Simpsonville, A/O Elctrns., 10202 Don Leigh Dr.	301-997-8033
Mass	Waltham, Universal Voltronics, 751 Main St.	617-891-8195
Minn	Minneapolis, R-J Inc., 7100 France Ave. S.	612-922-1425
NM	Albuquerque, Fry Gates Co., 147 Madison Ave.	505-298-1875

UNIVERSITY SOUND, Altec Corp., 1515 S. Manchester, Anaheim, Cal., 92803, Tel: 714-774-2900, Telex: 655415; Empl.: 1000; Minimum order: $20

For info on price: B. McCalister 405-354-5311; Application info: C. W. Round 714-774-2900; Customer service: W. Norris 405-354-5311; Delivery info: B. McCalister 405-354-5311

Free literature available: Condensed catalogs and all specification sheets on entire product line.

Products manufactured: Amplifiers, Comm. Systems, Microphones, All Kinds, Networks, Speaker Systems, Speakers

Local Sales Offices & Reps.

Cal	Carson, Bidwell Sales Assocs.	213-770-0300
Cal	Oakland, Hank Gabriel	415-465-5361
Colo	Arvada, C. B. Elctrn. Mktg.	303-422-0561
Fla	Miami Beach, Seaman Sls. Inc.	305-271-5728
Ga	Atlanta, Murphy & Cota	404-875-2525
Haw	Honolulu, Gene Piety Factors, Inc.	808-839-9059
Ill	Chicago, Lassers & Co.	312-539-4722
Ind	Indianapolis, F. McSweeney	317-849-5726
Md	Kensington, Forti-Austin	301-949-1706
Mass	Norwood, Rudolph & MacInnis	617-769-5450
Mich	Detroit, Burcaw Co. & Assocs.	313-533-7700
Minn	Minneapolis, Kodo Assocs.	612-881-1255
Mo	Kansas City, Nevco, Inc.	816-421-1751
NY	Flushing, Bettan Sls., Inc.	212-969-7600
NY	Phelps, LSM Assocs.	315-548-4891
Ohio	North Olmsted, Avcom, Inc.	216-777-5001
Pa	Enon Valley, Nebco Assocs. Inc.	216-457-2333
Tex	Dallas, Miller & Assocs.	214-661-5002
Wash	Seattle, Vector Corp.	206-322-4343
EXP:	Anaheim, Cal., Altec	714-774-2900
FOR:	Can., North Vancouver, B.C., C. L. Thompson, Ltd.	604-987-9388
FOR:	Can., Toronto 9, Ontario, J. R. Tilton, Ltd.	416-762-7571

UP-RIGHT SCAFFOLDS, Div. Up-Right, Inc., 1013 Pardee St., Berkeley, Calif., 94710, Tel: 415-843-0770, TWX: 415-891-9272; Empl.: 130

Products manufactured: Antenna Towers & Supports

Local Sales Offices & Reps.

Cal	Berkeley	415-843-0770
Cal	Los Angeles	213-255-5282
Cal	San Diego	714-295-8042
Colo	Denver	303-222-2017
DC	Washington	202-393-7165
Ga	Atlanta	404-523-2263
Ill	Chicago	312-631-3380
La	New Orleans	504-523-7965
Mass	Somerville	617-666-2880
Mich	Detroit	313-962-6100
Minn	Minneapolis	612-336-1898
Mo	Kansas City	816-221-5485
Mo	St. Louis	314-241-4350
NJ	Teterboro	201-487-6464
NY	Syracuse	315-437-7845
NC	Charlotte	704-333-4638
Ohio	Cincinnati	513-621-3758
Ohio	Cleveland	216-241-7109
Pa	Philadelphia	215-564-0943
Pa	Pittsburgh	412-261-4696
Tenn	Memphis	901-525-3136
Tex	Dallas	214-946-2373
Tex	Houston	713-528-1187
Wash	Seattle	206-682-0855

UPI SEMICONDUCTOR DIV., United Page Inc., 481 Getty Ave., Patterson, N.J., 07503; Minimum order: $25

For info on price: Luke Morelli 279-7500; Application info: M Formi 279-7500; Customer service: G. Giordan; Delivery info: G. Giordan

Free literature available: Short form technical data catalog of over 2,000 solid state devices-rectifiers, diodes, transistors. Individual complete spec sheets of all UPI devices.

Products manufactured: Diodes, Rectifiers, Transformers, Transistors

Local Sales Offices & Reps.

Cal	Encino, UPI Semiconductor	213-881-0300
Colo	Denver, Electrn. Sls.	303-771-6300
Ill	Park Ridge, Metcom Assocs.	312-696-1490
Mo	Hazelwood, Dytronix	314-731-5799
NJ	Paterson, United Page	201-279-7500
NJ	Westwood, R. C. Assocs.	201-664-1241
NY	East Meadow, Stanley Shapiro Assoc.	516-483-4185
Pa	Glenside, Koebert, R. F.	215-887-2310
Tex	Dallas, Southland Componens	214-233-0603

USCC/CENTRALAB, ELEC. DIV., Globe-Union Inc., 4561 Colorado Blvd., Los Angeles, Cal., 91504, Tel: 213-240-4880, TWX: 910-498-2222; Empl.: 625; Minimum order: $50 .... p. 1•320,594,595; p. 2•320-327

For info on price: T. Davies; Application info: J. Horn; Customer service: T. Davies; Delivery info: T. Davies

Free literature available: Miniature Ceramic Capacitors for High Reliability Applications. Miniature Ceramic Capacitors for High Volume Applications. EMI/RFI Filters.

Products manufactured: Capacitors, Fixed, Filters

Local Sales Offices & Reps.

Ala	Huntsville, Rep. Inc.	205-881-9270
Ariz	Phoenix, Clemick-Neenan & Assoc.	602-279-7649
Cal	Los Angeles, Clemick-Neenan	213-476-1272
Cal	Mt. View, Caltron/Pyle	415-964-3244
Colo	Denver, Electro-Rep., Inc.	303-744-2821
Fla	Ft. Lauderdale, Dyne-A-Mark Corp.	305-771-6501
Ga	Tucker, Rep. Inc.	404-938-4358
Ill	Des Plaines, Centralab	312-827-4487
Kans	Shawnee Mission, Thomas Modrcin Assoc.	913-432-2131
Md	Towson, Jerry Bresson Assoc.	215-839-6770
Mass	Needham, Hatch Assoc.	617-444-3310
Mich	Detroit, R.C. Merchant & Co.	313-535-6000
Minn	Minneapolis, Technical Assoc.	612-929-6721
Mo	Hazelwood, Thomas-Modrcin Assoc.	314-895-4700
NJ	Irvington, E.F. Alber	201-375-7458
NM	Albuquerque, Staley Co.	505-294-2660
NY	Albany, Reagan/Compar Albany, Inc.	518-489-7408
NY	Plainview, E.R.A.	516-822-9890
NC	Raleigh, Carlwright & Bean, Inc.	919-832-7128
Ohio	Columbus, McFadden Sls., Inc.	614-221-3363
Ohio	Mentor, Bishop Comp.	216-255-6969
Pa	Narberth, Jerry Bresson Assoc.	215-839-6770
Tex	Houston, Aid Elctrns., Inc.	713-777-3882
Tex	Irving, Aid Elctrns., Inc.	214-259-4761
Va	Lynchburg, J. Bresson, Assoc.	215-839-6770
Wash	Seattle, H.S. Thorpe Comp.	206-784-3333
Wisc	Milwaukee, Centralal	414-228-2781
FOR:	Can., Ajax, Ont., Centralal-Can. Ltd.	416-683-1540

U. S. COMPONENTS inc.

U.S. COMPONENTS, 1320 Zerega Ave., Bronx, N.Y., 10462, Tel: 212-824-1600, TWX: 710-593-2141; FSC No: 97954; Empl.: 85; Minimum order: $50

For info on price: S. Slivko; Application info: B. Prott; Delivery info: H. Jones

Free literature available: 11 catalogs on electrical connectors covering rack and panel and screwlock devices in miniature, subminiature, microminiature, miniature-crimp removable, edge board, two-unit P.C. and I/O wrap-crimp connectors. Catalog feature specifications, basic configurations, materials, finishes, both for mil. and commercial connectors.

Products manufactured: Connector Blocks, Mother Board, Connectors

Local Sales Offices & Reps.

Ala	Huntsville, Young & Lawrence Assocs.	205-539-6575
Ariz	Phoenix, Chaparral	602-996-9648
Cal	Mountain View, Westrep	408-265-0312
Cal	Pico Rivera, Westrep	213-949-2551
Fla	Winter Park, Young & Lawrence Assocs.	305-647-6929
Haw	Honolulu, B. Kolans & Co.	
Ill	Chicago, Phoenix Co.	312-237-2828
Ind	Huntington, Phoenix Co.	219-422-2311
Kans	Shawnee Mission, Thomas & Modrcin Assocs.	913-HE2-2131
Md	Ellicott City, R.F. Assocs.	301-465-5944
Mass	Scituate, Cirolia Leblanc Sls. Co.	617-545-1710
Mich	Birmingham, Forand Sls. Co.	313-644-0087
Minn	Minnetonka, K.L. Tannehill	612-935-0353
Mo	Hazelwood, Thomas & Modrcin Assocs.	314-838-6446
NJ	Madison, Livera-Polk Assocs.	201-FR7-3220
NY	Fayetteville, R.W. Jackson Co.	315-637-3851
NY	Roslyn Heights, Livera-Polk Assocs.	516-484-1276
NC	Greensboro, L & D Inc.	919-292-3201
Ohio	Vandalia, W.J. Brauer Assocs.	216-943-0601
Pa	Philadelphia, C.H. Newson & Assocs.	215-248-3377
Pa	Pittsburgh, W.J. Brauer Assocs.	412-921-3213
Tex	Dallas, Elcom	214-EM8-3578

U.S. ELCTRNS., 500 Long Branch Ave., Long Branch, N.J., 07740, Tel: 201-870-9500; Empl.: 40; Minimum order: $35

For info on price: L. Classen; Application info: R. Bruckner; Customer service: L. Classen; Delivery info: R. Kluge

Free literature available: Catalog #720 Describes Packaged Transformer Kits Ferrite E Cores, Channel Frames and Potting Cases. Technical Data Covers Material Selection Guide, Tolerances, and Aging Tests.

Products manufactured: Coils Including Assemblies & Forms, Ferrite Material & Parts, Services, Assembly, Production & Test, Solenoids

Local Sales Offices & Reps.

Cal	San Gabriel, Van Gott & Assoc.	213-285-2148
Fla	Orlando, Buchanan & Abrams	305-898-7444
Ill	Libertyville, R. Klipp Assoc.	312-362-4876
Mich	Dearborn, Villani-Pitcher	313-271-4600
Minn	St. Paul, Knox Assocs.	612-488-5402
NJ	Livingston, Thaw Sls.	201-992-2711
NM	Albuquerque, A. Q. Elctrns.	505-255-8701
NY	Rochester, Schmitz Bros.	716-546-7628
Ohio	Cincinnati, Val-Skol Sales	
Pa	Schwenksville, D. Homes Sls.	215-489-4163
Tex	Addison, Southland Eng. & Sls.	214-233-0603
Tex	El Paso, A. Q. Elctrns.	915-533-2681
Wash	Bellevue, Ruggles Tech. Sls.	206-455-2778

US
INSTRUMENT
RENTALS, INC.

U.S. INSTR. RENTALS, INC., 951 Industrial Rd., San Carlos, Cal., 94070

Customer service: R. Snyder

Free literature available: A categorized cross reference of the latest rental test equipment plus a primer on when rental is appropriate and the economics of rent vs. buy.

Products manufactured: Services, Assembly, Production & Test

U.S. SCIENTIFIC INSTRS., 61 North Beacon St., Boston, Mass., 02134, Tel: 617-787-2411; Empl.: 50; Minimum order: $15

For info on price: K. Lehman; Application info: W. A. Ward; Customer service: K. Lehman; Delivery info: K. Lehman

Free literature available: Technical Literature: 3015-1 - type 3015 Storbrite, 3018-1 - type 3018 Variable Pulse Source, 3019-1 - type 3019 Compact Arc Lamp Pulser, 3027-1 - CP Series Compact Arc Lamps, 3013-1 - Trigger Transformers, 3100-1 - FY Series Trigger Pacs

Products manufactured: Discharge Systems, Energy, Flashers, Lamp Drivers, Lamps, Lights, Power Supplies, Tachometers, Transformers, Tubes

Local Sales Offices & Reps.

Cal	Garden Grove, Impact Elctrns., Inc.	714-893-8551
Md	Silver Spring, Spectroscopy Sys.	301-949-8261
Mich	Detroit, Harvey Tpelitz & Co.	313-537-9058
NJ	Leonia, B. Kohl	201-944-6488
NY	N. Syracuse, NACO Elctrns.	315-699-2651
Ohio	Cleveland, H. Teplitz & Co.	216-371-2044
Ohio	Dayton, H. Teplitz & Co., Inc.	513-277-6531

USM CORP., Fastener Group, 510 River Rd., Shelton, Conn., 06484, Tel: 203-735-9341, TWX: 710-451-3734; Empl.: 375

For info on price: G. Zonas; Application info: R. Hoffman; Customer service: G. Zonas; Delivery info: G. Zonas

Free literature available: (1.) Manual - shows how POP rivets simplify product design and assembly, reduce fastening time and costs. Specifications on all POP rivets and setting tools. (2.) Eyeleting Guide - Facts and figures, sizes and materials; shows how to cut fastening costs.

Products manufactured: Eyelets, Fasteners, Grommets, Rivets

U.S. TERMINALS INC.

U.S. TERMINALS, 7502 Camargo Rd., Cincinnati, Ohio, 45243, Tel: 513-561-8145, TWX: 810-461-2290; FSC No: 12615; Minimum order: $30

For info on price: G. L. Stepp; Application info: G. L. Stepp; Customer service: E. Vanden Eynden; Delivery info: E. Vanden Eynden

Free literature available: Catalog of standard products.

Products manufactured: Bushings, Glass, Plastic, Metal, Rubber, Etc., Connectors, Cords, Grommets, Insulators & Insulation, Jacks (All Types), Pins, Plug & Jack Sets, Sockets, Terminal Blocks, Boards & Strips, Terminals

Local Sales Offices & Reps.

Ariz	Phoenix, Gramer & Co.	602-279-1231
Ill	Chicago, L-Tec, Inc.	312-286-1500
Iowa	Cedar Rapids, J.R. Sls. Engrg., Inc.	319-377-8211
Mass	Needham, A & M Elctrn. Rep.	617-444-8170

Advertisment

- Slip lock Teflon terminals
- Press type Teflon terminals
- Printed circuit terminals
- Sockets test point & jacks
- Grounding terminals
- Binding posts–Teflon–install fast
- High voltage connectors (miniature)
- DIP/DIL/IC & transistor sockets
- Miniature patch cords & receptacles
- Automatic installation equipment

UTAH ELECTRONIC DIV., Utah-American Corp., 1124 E. Franklin St., Huntington, Ind., 46750, Tel: 219-356-5800; Empl.: 1000 .... p. 1•31

Products manufactured: Attenuators, Baffles, Speaker, Controls, Fader, Grilles, Networks, Sound Absorbing Materials, Speaker Systems, Speakers, Transformers

Local Sales Offices & Reps.

Cal	Culver City, Marshank Sls. Co.	213-559-2591
Cal	San Francisco, Featherstone Sls. Co.	415-467-3133
Colo	Colorado Springs, Norris & Co.	303-635-9319
Haw	Honolulu, Pegart Int'l.	808-538-7818
Ill	Chicago, W.J. Doyle Co.	312-274-6685
Ind	Indianapolis, New/Era Sls.	317-257-7333
Kans	Leawood, W. Menezes & Assoc.	913-649-2680
La	Lacombe, S. Ormsby Sls.	504-882-7248
Mass	Wellesley, L. Cole, Inc.	617-237-1260
Mich	Rochester, R.A. Albrecht & Co.	313-651-7081
Minn	Minneapolis, C.R. Gibb Co.	612-377-1200
NJ	Newark, Fisher Elctrns.	201-836-1200
NY	Grand Island, L.J. McTaggart Assoc.	716-773-9222
NC	Greensboro, Adams & Assocs.	919-272-6838
Ohio	Cleveland, F.A. Daugherty Co.	216-449-1122
Ore	Portland, D.G. Weber Co.	503-234-7671
Pa	Easton, E-K-P Assocs.	215-258-6477
Pa	McMurray, C.S. Cooper & Assoc.	412-941-6473
Tex	Houston, Spivey-LeBoeuf Assoc.	713-649-1221
EXP:	Plainview, N.Y., Empire Exporters, Inc.	516-293-5582

UTE MICROWAVE, 3500 Sunset Ave., Asbury Park, N.J., 07712, Tel: 201-922-1009, Telex: 132-461; FSC No: 26231; Empl.: 15

Customer service: L. Nilson

Free literature available: 8 page catalog describing Ferrite, Filter and special products mfd. by UTE Microwave.

Products manufactured: Cavities, Microwave, Circulators, Ferrite, Duplexers, Microwave, Filters, Isolators, Meters, Preselector-Mixers, Preselectors, Shifters, Waveguides & Adapters

Local Sales Offices & Reps.

Ala	Huntsville, Reynolds Assocs.	205-536-1941
Ariz	Scottsdale, Fryco	602-495-3821
Cal	Costa Mesa, Measurement Assocs.	714-540-7160
Cal	Cupertino, Allis Assocs.	408-379-2883
Fla	Satellite Beach, Reynolds Assocs.	305-773-4700
Ga	Atlanta, Reynolds Assocs.	404-252-5360
Mo	Florissant, Sheridan Assoc.	314-837-5200
NJ	Hazlet, Mer-Mon Sls.	201-264-1851
NM	Albuquerque, A.L.S. Elec.	505-298-2575
NY	E. Rockaway, Bellenkes Assocs.	516-887-1443
NY	Utica, B.D. Hummel Co.	315-736-7821
Pa	Hatboro, Mer-Mon Sls.	215-672-5565
Tex	Richardson, P. Scanlon Co.	214-231-4661
Va	Baileys Crossroads, Q.T. Elctrn.	703-671-4357
EXP:	Stamford, Conn., Microwave Int'l	203-322-6911

V-M CORPORATION, Box 1247, Benton Harbor, Mich, 49022, Tel: 616-925-8841, TWX: 810-270-3104

For info on price: R. Roth; Application info: C. J. Stevens; Customer service: R. Roth; Delivery info: C. J. Stevens

Free literature available: Catalog sheets on automatic record changer packages, replacement changers; education systems cassette tape recorders, player and duplicators.

Products manufactured: Phonographs, Parts & Accessories, Recorders

Local Sales Offices & Reps.

Cal	LaHabra, Audio Merchandise & Assoc.	213-914-6703
Col	Denver, Central West Mktg. Co.	303-771-9397
Colo	Littleton, Mueller, Chuck	303-771-8140
Ga	Roswell, Glenn, William	404-993-3944
Ill	Deerfield, Consumer Mktg. Assoc.	312-823-2075
Mass	W. Springfield, Nelson, Carl	413-781-3040
Mass	Wellesley, Cole, Larry	617-237-1260
Mich	Southfield, Bragg, Bruce	313-352-8458
Minn	Minneapolis, Jensen-Olsen Sls. Co.	612-941-7181
Mo	Jefferson City, Vignola Assoc., Carmine	314-893-3205
NH	Manchester, Klene, Roger	603-623-5425
NJ	Moorestown, Di Vincent & Legato Assoc.	609-235-8299
NJ	Teaneck, Fisher Elctrns. Assoc.	201-837-1200
NY	Ballston Lake, Dworkin, Gene	518-877-8586
NY	Grand Island, Mc Taggart Assoc., L. 5.	716-773-9222
Ohio	Akron, Shamrock Sls.	216-666-3796
Pa	Churchville, Kunz & Assoc., Don	215-357-5020
Tex	Garland, Lawson, Lex	214-278-2219
Utah	Murray, Kenealey Assocs.	801-268-3111

VACO PRODUCTS CO., 510 No. Dearborn St., Chicago, Ill., 60610, Tel: 312-467-0123, TWX: 910-221-2231; Empl.: 125 ....p. 2•1056,1057,1714-1717

Products manufactured: Clamps & Clips, Connectors, Cutters, Wire, Hand Operated, Drivers, Nut, Kits, Connector, Kits, Terminal, Pliers, Rings, Retaining, Screwdrivers, Terminals, Testers, Tools, Wire Strippers, Wrenches

Local Sales Offices & Reps.

Cal	Gardena, Vaco/West Distribution Center	213-324-4934

VACTEC, INC., 2423 Northline Blvd., Maryland Heights, Mo., 63043, Tel: 314-872-8300, TWX: 910-764-0811; Empl.: 225; Minimum order: $10 .... p. 1•1022,1023

For info on price: J. Mundschenk; Application info: N. Wolff; Customer service: J. Mansfield; Delivery info: J. Mundschenk

Free literature available: PCD-6 = Photoconductive Cells VTL 5C = LED Axial VACTROLS VTS1A = Si. Solar Cells VTL1 - Hermetic Sealed VACTROLS, VTS-2 = Si. Low Capacitance Detectors VTL3 = Axial VACTROLS, VTS3A = Blue Enhanced Si. Detectors VTL9 = General Purpose VACTROLS VTTA-1 = Phototransistors & Photodarlingtons, VTLTA-1 = Opto-Isolators, SPV-5 = Selenium Photovoltaic Cells, P3100 = Portable Photometer VTL2C2 = To-5 Led/Vactrols.

Products manufactured: Cells, Photoconductive, Photoemissive, Photovoltaic, Diodes, Isolators, Meters, Transistors

Local Sales Offices & Reps.

Ariz	Phoenix, Arrowhead Sls. Corp.	602-277-7148
Cal	Encino, King-Way Assocs.	213-788-4124
Cal	Los Altos, Schwerin Assocs.	415-941-3737
Cal	Santa Barbara, Schwerin Assocs.	805-967-7317
Colo	Arvada, Arrowhead Sls. Corp.	303-423-5556
Conn	Madison, A & M Elctrn. Reps.	203-421-4242
Fla	Orlando, Buchanan & Abrams Assocs.	305-898-7444
Ill	Chicago, T.B. Hunter Assocs.	312-777-2500
Ind	Fort Wayne, Scott Elctrns., Inc.	219-743-1586
Ind	Indianapolis, Scott Elctrns., Inc.	317-897-9977
Kans	Prairie Village, Engrg. Svcs. Co.	913-649-4000
Md	Baltimore, R.L. Wilkinson, Inc.	301-377-7800
Mass	Needham, A & M Elctrn. Reps.	617-444-8170
Mich	Detroit, H.D. Mysing	313-537-5460
Minn	Edina, M. Foster Co.	612-835-2252
Mo	St. Louis, Engrg. Svcs. Co.	314-997-1515
NY	Syracuse, C.W. Beach Co.	315-446-9587
Ohio	Cincinnati, Scott Elctrns.	513-791-2513
Ohio	Cleveland, Scott Elctrns.	216-291-2600
Ohio	Columbus, Scott Elctrns., Inc.	614-236-8619
Ohio	Dayton, Scott Elctrns., Inc.	513-294-0539
Pa	Pittsburgh, Scott Elctrns.	412-781-3112
Pa	Willow Grove, Techparts	215-659-6900
Tex	Dallas, Allied Comps.	214-238-0408
Tex	Houston, Allied Comps.	713-691-3961
Utah	Salt Lake City, Arrowhead Sls. Corp.	801-487-4716
Va	Lynchburg, Royelec Elctrn. Reps.	804-239-0130
Wash	Seattle, B. Hirsh Co.	206-783-3423
EXP:	Chicago, Ill., J.D. Marshall Int'l., Inc.	312-583-6060
FOR:	Can., Montreal, Que., B. Manis Assocs.	514-336-5400

Local Distributors

Cal	Palo Alto, Zack Elctrns., 654 High St.	415-326-5432
Ill	Chicago, Newark Elctrns., 500 N. Pulaski	312-638-4411
Mo	St. Louis, Interstate Ind'l Elctrn., 4445 Gustine	314-481-5110
Mo	St. Louis, Olive Ind'l Elec., 6662 Olive Blvd.	314-863-7800

VACTRONIC LAB. EQUIP., INC., 65 Brightside Ave., E. Northport, N.Y., 11731, Tel: 516-AN 1-2660; Empl.: 18; Minimum order: $10

For info on price: R. Morris; Application info: R. Salat; Customer service: R. Salat; Delivery info: R. Morris

Products manufactured: Chamber, Environmental Test, Deposition Equipment, Vacuum & Accessories, Detectors, Feedthrus & Seals, Environmental, Gages, Pumps, Vacuum, Valves, Solenoid, Valves, Vacuum

Local Sales Offices & Reps.

Cal	Palo Alto, Andot Tech. Sls. Co.	415-325-0058
Mass	Wellesley, Westbom-Hiller Assocs.	617-235-9241
NM	Albuquerque, Technology Mktg. Assoc.	505-298-2415

VACTRONIC LAB. EQUIP., INC cont'd

Advertisment

We manufacture a complete line of High Vacuum Equipment, including a small table top diffusion pumped systems, to completely automated production (custom built) units. Solid state ionization gauge controls, valves, pumps, couplings, feed-throughs, baseplates & collars ... all sold separately as well as completely assembled systems, ready to operate. Send us your requirements, we will be happy to quote promptly. Our equipment is in use throughout the world since 1959.

VACUUM PRODS., INC., 25 Dock St., Mt. Vernon, N.Y., 10550, Tel: 914-664-7330; Empl.: 5; Minimum order: $25

For info on price: G. Frank; Application info: M. Kane; Customer service: B. Grassmyer; Delivery info: B. Grassmyer

Products manufactured: Thermocouples, Elements & Accessories

VALHALLA SCIENTIFIC, INC., 7707 Convoy Ct., San Diego, Cal., 92111, Tel: 714-277-2732; Empl.: 15; Minimum order: $15

Customer service: H. Clark

Free literature available: Digital multimeter/counters, digital ohmmeters, and precision current calibrators.

Products manufactured: Calibrators, Current Sources, Dividers, Meters, Multipliers

Local Sales Offices & Reps.

Ala	Huntsville, Currie, Peak & Frazier, Inc.	205-536-5650
Ariz	Phoenix, Mesa Engrg.	602-244-1995
Cal	Orange, Marble Assocs.	714-549-9358
Cal	San Diego, Mesa Engrg.	714-278-8021
Cal	San Jose, MCH Assocs.	408-246-7330
Colo	Parker, Technology Mktg. Assocs.	303-841-3435
Conn	Hamden, Instr. Conslts., Inc.	203-248-4174
Fla	Orlando, Currie, Peak, & Frazier, Inc.	305-855-0843
Haw	Honolulu, E.M.C. Corp.	808-847-1138
Ill	Northbrook, Elctrn. Instr. Assocs.	312-498-4500
Ind	Indianapolis, Elctrn. Instr. Assocs.	317-257-7231
Kans	Kansas City, R.R. Burton Sls. Co.	816-444-8300
Md	Silver Spring, Sel-Tronics	301-589-3391
Mass	Waban, Instr. Conslts., Inc.	617-969-9881
Minn	Minneapolis, Revere Assocs.	612-781-7700
Mo	St. Louis, Delltron Co.	314-434-3804
NM	Albuquerque, Technology Mktg. Assocs.	505-298-4321
NY	Depew, Labtronics, Inc.	716-685-4111
NY	Mt. Vernon, Q.E.D. Electronics, Inc.	914-664-0080
NY	Syracuse, Labtronics, Inc.	315-454-9314
NC	Greensboro, Currie, Peak & Frazier, Inc.	919-273-3040
Ohio	Cleveland, DESCO	216-252-3151
Pa	Melrose Park, R.A. Meyers Assocs.	215-224-1663
Tex	Richardson, Spectra Sls. Corp.	214-234-3600

VALPEY CORP., A Valtec Co., 1400 Highland St., Holliston, Mass., 01746, Tel: 617-429-4322; Empl.: 150

Free literature available: Brochure describes optical fabrication capabilities in usable manner. In addition to specific data on product scope and dimensional parameter, Valpey co-relates a series of optical fabrication capabilities with fundamental explanations, at surface finish, materials, flatness, shape, angles, etc.

Products manufactured: Crystals, Delay Lines, Filters, Lenses, Optical & Camera, Quartz, Fused, Services, Assembly, Production & Test, Substrates

VAN NORMAN MOLDING CO., 9599 S. 76th Ave., Bridgeview, Ill., 60455, Tel: 312-284-0118; Empl.: 80

Customer service: R.I. Andre 312-284-0118

Products manufactured: Services, Assembly, Production & Test

VANGUARD RELAY CORP., 225 Cortland St., Lindenhurst, N.Y., 11757, Tel: 516-226-5000

Customer service: B. S. Gilman

Free literature available: Cat #SF: condensed catalogue on relays, Cat #TDS: condensed catalogue on timers, Cat#70: 18 page general catalogue, individual spec. sheets on all relays & timers.

Products manufactured: Relays, Timers

Local Sales Offices & Reps.

Md	Baltimore, Stitzer Assoc.	301-823-2600
NJ	W. Caldwell, Peterson-Rudmick Assoc.	201-CA 6-4363
NY	New York, Peterson-Rudmick Assoc.	212-671-1923
Pa	Paoli, Stitzer Assoc.	215-644-5500

Advertisment

VANGUARD manufactures an extensive line of general purpose relays and hybrid Time Delay Relays covering a broad range of industrial applications. Relay types from 1 to 4 poles and 2 to 20 amps. Models include open, plug-in, enclosed, printed circuit use, antenna, sensitive and contactor with many models listed by U/L. Time delay relays are plug-in and panel mounted units having solid state circuitry and relay output. VANGUARD offers you quality products, competitive pricing, responsive service and dependable deliveries. Full literature available upon request.

VARADYNE INDUSTRIES, INC., 1547 18th St., Santa Monica, Cal., 90404, Tel: 213-829-2984, TWX: 910-343-6856; FSC No: 26654; QPL No: 55681; Empl.: 180; Minimum order: $50 ..... p. 2•328-333

For info on price: P. Bowling Ext. 218; Application info: D. Juve Ext. 249; Customer service: P. Bowling Ext. 218; Delivery info: P. Bowling Ext. 218

Products manufactured: Capacitors, Fixed, Resistors, Testers

Local Sales Offices & Reps.

Ala	Huntsville, Technology Mktg. Assoc.	205-883-7893
Ariz	Phoenix, H. Henschen & Assoc.	602-275-4411
Cal	Glendale, Orion Sls.	213-240-3151
Cal	Mountain View, Nor-Cal Assocs.	415-961-8121
Cal	San Diego, Orion Sls.	714-299-8322
Cal	Tustin, Orion Sls.	714-832-9687
Colo	Denver, Electrodyne	303-757-7679
Conn	North Haven, Kitchen & Kutchen	203-239-0212
Fla	Ormond Beach, Technology Mktg. Assocs.	904-672-2314
Fla	Pompano Beach, Technology Mktg. Assocs.	305-942-0774
Ill	Park Ridge, R. F. Specialists	312-698-2044
Ind	Fort Wayne, Delesa Sls.	219-483-9537
Ind	Indianapolis, Delesa Sls.	317-257-4683
Kans	Wichita, Dy-Tronix	316-943-6221
Md	Baltimore, Coulbourn-DeGreif	301-247-4646
Mass	Lexington, Kitchen & Kutchin	617-862-8230
Mich	Detroit, A. Blumenberg Assocs.	313-557-1934
Minn	St. Paul, H.A. Cullen & Assocs.	612-646-7371
Mo	Hazelwood, Dy-Tronix	314-731-5799
Mo	Kansas City, Dy-Tronix	816-761-6543
NJ	Teaneck, R.T. Reid Assocs.	201-692-0200
NY	Buffalo, Bowser & Sapecky	716-839-2044
NY	Manlius, Bowser & Sapecky	315-682-8885
NY	Rochester, Bowser & Sapecky	716-889-1919
NC	Raleigh, Component Sls.	919-782-8433
Ohio	Cleveland, D. Steffen & Assoc.	216-461-8333
Ohio	Dayton, D. Steffen & Assoc.	513-293-3145
Pa	Fort Washington, GCM Assocs.	215-646-7535
Tex	Dallas, Evans & McDowell Assoc.	214-238-7157
Tex	Houston, Evans & McDowell Assoc.	713-783-2900
Wash	Seattle, Demarest & Assoc.	206-523-0600

VARFLEX CORP., 514 W. Court St., Rome, N.Y., 13440, Tel: 315-336-4400; FSC No: 79074; Empl.: 135; Minimum order: $30 ..... p. 2•1274,1275

Customer service: Sls. Dept.

Free literature available: A folder containing 25 actual samples of braided electrical sleevings, extruded PVC tubing, tying cord and lead wire.

Products manufactured: Cords, Insulators & Insulation, Rubber, Tapes, Electrical Insulation, Tubing

Local Sales Offices & Reps.

Ariz	Phoenix, Elec. Specialty	602-275-5736
Cal	Los Angeles, Electrical Spec. Co.	213-724-9600
Cal	San Diego, Elec. Specialty Co.	714-239-1345
Cal	So. San Francisco, Electrical Spec. Co.	415-589-9611
Colo	Denver, Elec. Specialty	303-321-0226
Ga	Chamblee, Prehler Elec. Insulation	404-451-4266
Ill	Chicago, Prehler Elec. Insulation	312-384-6100
Ky	Louisville, E & H Elec. Supply	502-587-0991
Mass	Nahant, F.H. Hart	617-581-0381
Minn	St. Paul, Prehler Elec. Insulation	612-452-2470
Mo	University City, E.P. Gund	314-862-1650
NY	Carle Pl., W. R. Murphy	516-333-6122
NY	Liverpool, W.T. Elliott	315-652-3690
Ohio	Cleveland, Prehler Elec. Insulation	216-267-2650
Ore	Portland, Elec. Specialty	503-227-3601
Pa	Ardmore, Martin Elec. Co.	215-649-6332
Pa	Phila., Prehler Elec. Insulation	215-725-5913
Pa	Pittsburgh, E.B. Beach Co.	412-242-0400
Tex	Garland, Hisco	214-272-5411
Tex	Houston, Hisco	713-228-6662
Utah	Salt Lake City, Elec. Specialty	801-487-9805
Wash	Seattle, Elec. Specialty	206-682-3434
FOR:	Can., Toronto, Ont., Elec. Insulation & Fibre Co., Ltd.	416-624-0700

VARI-L CO., 3883 Monaco Pkwy., Denver, Colo., 80207, Tel: 303-321-1511, TWX: 910-931-0590; FSC No: 05375; Minimum order: $50

p. 1•600,1831-1833; p. 2•147,441-443,1392-1407, 1831-1833

For info on price: C. Kiser; Application info: J. Kiser; Customer service: C. Kiser; Delivery info: C. Kiser

Free literature available: Catalogue 672, Individual product bulletins

Products manufactured: Amplifiers, Attenuators, Chokes, Coils Including Assemblies & Forms, Converters, Couplers, Detectors, Dividers, Filters, Impedance Converters, Microwave, Junctions, Hybrid, Microwave, Microwave Integrated Circuits (MIC's), Mixer-Preamplifiers, Microwave, Mixers, Modulator/Demodulators, Modulators, All Kinds, Multipliers, Networks, Oscillators, Reactors, Switches, Transformers

Local Sales Offices & Reps.

Ariz	Scottsdale, Cleveland Entprs.	505-298-7671
Cal	Cupertino, Dura Elctrns.	408-255-2084
Cal	Santa Ana, C.E.M.	714-835-2702
Cal	Woodland Hills, C.E.M.	213-884-7867
Colo	Arvada, Cleveland Entprs.	303-423-3707
Fla	Lighthouse Point, Saber Assocs.	305-943-3076
Fla	Longwood, Saber Assocs.	305-831-0742
Ga	Woodstock, Saber Assocs.	404-432-9625
Kans	Leawood, H.C. Heyde Co.	913-649-8628
Md	Ellicott City, Applied Engrg. Conslts.	301-465-1272
Mass	Burlington, Tritek Inc.	617-272-4550
NM	Albuquerque, Cleveland Entprs.	505-345-2481
NY	Fayetteville, Graydon-Sherman Inc.	315-637-9861
NY	Tuchahoe, Associated Elctrns.	914-779-8110
NC	Raleigh, Saber Assocs.	919-834-3961
Ohio	Cincinnati, Luebbe Sls.	513-871-4211
Ohio	Cleveland, Luebbe Sls.	216-333-0425
Ohio	Dayton, Luebbe Sls.	513-294-0426
Pa	Delmont, T. Laslo	412-468-4019
Tex	Dallas, Texas Avionics Co.	214-368-3566
For:	Can., Ottawa, Ont., Wilson Entprs.	416-224-9878
For:	Can., Toronto, Ont., Wilson Entprs.	416-766-0510

VARIAN ASSOCS., 611 Hansen Way, Palo Alto, Cal., 94303, Tel: 415-493-4000, TWX: 910-373-1731; Empl.: 8800

Products manufactured: Amplifiers, Analyzers, Attenuators, Calorimeters, Microwave, Cavities, Microwave, Chamber, Environmental Test, Coils Including Assemblies & Forms, Computers, Converters, Couplers, Deposition Equipment, Vacuum & Accessories, Detectors, Diodes, Dividers, Duplexers, Microwave, Evaporation Equipment, Electron Beam, Feedthrus & Seals, Environmental, Filters, Flanges, Waveguide, Furnaces, Gages, Generators, Indicators, Interferometer Systems, Isolators, Lamps, Limiters, Loads, Electronic Variable, Magnets, Memory Systems, Meters, Mixer-Preamplifiers, Microwave, Mixers, Modulators, All Kinds, Multipliers, Oscillators, Ovens, Paper, Graphic Recording, Power Supplies, Printers, Pumps, Vacuum, Receivers, Seals, Services, Assembly, Production & Test, Shutters, Microwave, Strip-Line Components, Microwave, Switches, Television Systems & Equipment Closed-Circuit, Terminal Equipment, Digital, Terminals, Transformers, Transistors, Transmitters, Tubes, Valvés, Vacuum, X-Ray Inspection Equipment

VARIAN ASSOCS., Eastern Tube Div., 8 Salem Rd., Beverly, Mass., 01915, Tel: 617-922-6000, TWX: 710-347-1394

Products manufactured: Amplifiers, Duplexers, Microwave, Flanges, Waveguide, Generators, Isolators, Limiters, Oscillators, Power Supplies, Shifters, Shutters, Microwave, Switches, Tubes

Local Sales Offices & Reps.

Ariz	Scottsdale, Varian Assocs.	602-947-5461
Cal	Los Altos, Varian Assocs.	415-968-7630
Cal	Santa Monica, Varian Assocs.	213-828-5588
Fla	Clearwater, Varian Assocs.	813-446-8513
Ga	Atlanta, Varian Assocs.	404-252-0045
Ill	Park Ridge, Varian Assocs.	312-825-6686
Md	Cheverly, Varian Assocs.	301-773-7010
Mass	Waltham, Varian Assocs.	617-890-4560
NJ	Mt. Laurel, Varian Assocs.	609-428-6800
NJ	Springfield, Varian Assocs.	201-376-6600
NY	Syracuse, Varian Assocs.	315-437-2568
Ohio	Dayton, Varian Assocs.	513-298-7318
Tex	Richardson, Varian Assocs.	214-235-2385

VARIAN ASSOCS., Instrument Div., 611 Hansen Way, Palo Alto, Cal., 94303, Tel: 415-493-8100, TWX: 910-373-1731

Products manufactured: Analyzers, Detectors, Lamps, Magnets, Paper, Graphic Recording, Spectrometers

Local Sales Offices & Reps.

Cal	Downey	213-927-3415
Cal	Los Altos	415-968-8141
Colo	Wheatridge	303-421-4044
Ga	Atlanta	404-252-0400
Ill	Park Ridge	312-825-7772
Ky	Louisville	502-893-2573
Md	Cheverly	301-772-3683
Mass	Waltham	617-890-8430
Mo	St. Louis	314-524-0880
NJ	Cherry Hill	609-428-8880
NJ	Springfield	201-379-7610
NY	Syracuse	315-463-8861
Ohio	Euclid	216-261-2115
Ore	Portland	503-297-4737
Pa	Pittsburgh	412-243-4947
Tex	Dallas	817-268-1612
Tex	Houston	713-783-1800
FOR:	Can., Georgetown, Ontario	416-457-4130

VARIAN ASSOC., Solid State East Div., Micro-Link Prods., 8 Salem Rd., Beverly, Mass, 01915, Tel: 617-922-6000, TWX: 710-347-1394

Products manufactured: Antennas, Capacitors, Fixed, Converters, Diodes, Mounts, Receivers, Strip-Line Components, Microwave, Television Systems & Equipment Closed-Circuit, Transmitters

Local Sales Offices & Reps.

Ariz	Scottsdale	602-947-5461
Cal	Los Altos	415-968-7630
Cal	Santa Monica	213-828-5588
Fla	Clearwater	813-446-8513
Ga	Atlanta	404-252-0045
Ill	Park Ridge	312-825-6686
Md	Cheverly	301-773-7010
Mass	Waltham	617-890-4560
NJ	Mt. Laurel	609-428-6800
NJ	Springfield	201-376-6600
NY	Syracuse	315-437-2568
Ohio	Dayton	513-298-7318
Tex	Richardson	214-235-2385

VARIAN ASSOCS., Vacuum Div., 611 Hansen Way, Palo Alto, Cal., 94303, Tel: 415-493-4000, TWX: 910-373-1731; Empl.: 550

Products manufactured: Analyzers, Chamber, Environmental Test, Coatings, Controls/Control Eqpt., Deposition Equipment, Vacuum & Accessories, Detectors, Furnaces, Gages, Interferometer Systems, Ovens, Pumps, Vacuum, Valves, Vacuum

Local Sales Offices & Reps.

Cal	Downey, Varian Vacuum Div.	213-927-2601
Cal	Los Altos, Varian Vacuum Div.	415-968-4936
Fla	Clearwater, Varian Vacuum Div.	813-446-8513
Ill	Park Ridge, Varian Vacuum Div.	312-825-3103
Md	Cheverly, Varian Vacuum Div.	301-772-7433
Mass	Waltham, Varian Vacuum Div.	617-890-5750
NJ	Springfield, Varian Vacuum Div.	201-376-6610
NY	Syracuse, Varian Vacuum Div.	315-437-3307
Ohio	Cleveland, Varian Vacuum Div.	216-261-2115
Tex	Richardson, Varian Vacuum Div.	214-235-4586

VARIAN DATA MACHINES, Box E, Irvine, Cal., 92614, Tel: 714-833-2400, TWX: 910-596-1358; Empl.: 800; Minimum order: $50

For info on price: J. Jacobsen; Application info: D. Zatyko; Customer service: J. Gay; Delivery info: D. Jenkins

Products manufactured: Comm. Systems, Computers, Converters, Data Acquisition & Reduction Systems, Printers, Recorders

Local Sales Offices & Reps.

Ala	Huntsville	205-539-4616
Cal	Garden Grove	714-897-9515
Cal	San Diego	714-276-9462
Cal	Sunnyvale	408-736-5630
Colo	Denver	303-770-2151
Fla	Orlando	305-645-2577
Ga	Atlanta	404-252-0047
Ill	Park Ridge	312-692-7184
Md	Cheverly	301-773-6770
Mass	Waltham	617-890-6072
Mich	Southfield	313-645-9950
Mo	St. Louis	314-524-0880
NJ	Englewood Cliffs	201-569-2323
NM	Albuquerque	505-298-5570
NY	Englewood Cliffs	212-325-5248
NY	Rochester	716-586-3273
Ohio	Strongsville	216-238-6960
Pa	Philadelphia	215-643-2355
Pa	Pittsburgh	412-486-2443
Tex	Dallas	214-231-5145
Tex	Houston	713-781-0105
Wash	Seattle	206-641-4500

VARIAN DATA MACHINES, 611 Hansen Way, Palo Alto, Cal., 94303, Tel: 415-493-4000, TWX: 910-373-1731; Empl.: 125

Products manufactured: Converters, Data Acquisition & Reduction Systems, Printers, Terminal Equipment, Digital

Local Sales Offices & Reps.

Cal	Downey	213-937-2673
Cal	San Diego	714-298-9292
Cal	Sunnyvale	408-736-3030
Fla	Orlando	305-299-2001
Ga	Atlanta	404-252-0047
Ill	Park Ridge	312-692-7184
Md	Cheverly	301-773-6770
Mass	Waltham	617-890-6072
Mich	Southfield	313-645-9950
NJ	Englewood Cliff	201-469-2323
NM	Albuquerque	505-288-5579
NY	Rochester	716-586-3273
Pa	Ft. Washington	213-643-2356
Tex	Houston	713-781-0105
Tex	Richardson	214-231-5145
Wash	Bellevue	206-455-2518

VARIAN ELECTRON TUBE & DEVICE GRP., 301 Ind'l. Way, San Carlos, Cal., 94070, Tel: 415-592-1221, TWX: 910-376-4893

Products manufactured: Adapters, Waveguide, Amplifiers, Antennas, Attenuators, Calorimeters, Microwave, Capacitors, Fixed, Cavities, Microwave, Coils Including Assemblies & Forms, Comm. Systems, Converters, Couplers, Diodes, Display Devices/Displays, Dividers, Drivers & Decoders For Readouts, Duplexers, Microwave, Filters, Flanges, Waveguide, Fuses, Generators, Heat Exchangers & Systems, Intensifiers, Image, Isolators, Junctions, Hybrid, Microwave, Lamps, Limiters, Magnets, Microwave Integrated Circuits (MIC's), Mixer-Preamplifiers, Microwave, Mixers, Modulators, All Kinds, Monitors, Multipliers, Oscillators, Power Supplies, Receivers, Seals, Sensors, Light, Services, Assembly, Production & Test, Shutters, Microwave, Sockets, Strip-Line Components, Microwave, Switches, Tachometers, Terminals, Transistors, Tubes

Local Sales Offices & Reps.

Ariz	Scottsdale	602-947-5461
Cal	Los Angeles	
Cal	San Francisco	
Fla	Ft. Lauderdale	305-943-9495
Ga	Atlanta	404-252-0045
Ill	Park Ridge	312-825-6686
Md	Cheverly	301-773-7010
Mass	Waltham	617-890-4560
NJ	Mt. Laurel	609-428-6800
NJ	Springfield	201-376-6600
NY	Syracuse	315-437-2568
Ohio	Dayton	513-298-7318
Tex	Richardson	214-235-2385
EXP:	Palo Alto, Cal.	415-943-4000

VARIAN PALO ALTO MICROWAVE TUBE DIV., 611 Hansen Way, Palo Alto, Cal., 94303, Tel: 415-493-4000, TWX: 910-373-1731

Products manufactured: Amplifiers, Attenuators, Calorimeters, Microwave, Coils Including Assemblies & Forms, Couplers, Detectors, Filters, Isolators, Magnets, Power Supplies, Services, Assembly, Production & Test, Tubes

VARIAN SOLID STATE EAST BEVERLY DIV., Salem Rd., Beverly, Mass., 01915, Tel: 617-922-6000, TWX: 710-347-1394

Products manufactured: Amplifiers, Cavities, Microwave, Converters, Couplers, Detectors, Diodes, Duplexers, Microwave, Generators, Junctions, Hybrid, Microwave, Mixer-Preamplifiers, Microwave, Mixers, Modulators, All Kinds, Multipliers, Oscillators, Power Supplies, Receivers, Strip-Line Components, Microwave, Switches

Local Sales Offices & Reps.

Ariz	Scottsdale	602-947-5461
Cal	Los Altos	415-968-7630
Cal	Santa Monica	213-828-5588
Fla	Clearwater	813-446-8513
Ga	Atlanta	404-252-0045
Ill	Park Ridge	312-825-6686
Md	Cheverly	301-773-7010
Mass	Waltham	617-890-4560
NJ	Mt. Laurel	609-428-6800
NJ	Springfield	201-376-6600
NY	Syracuse	315-437-2568
Ohio	Dayton	513-298-7318
Tex	Richardson	214-235-2385

VARIAN, SOLID STATE WEST DIVISION, 611 Hansen Way, Palo Alto, Cal., 94303, Tel: 415-493-4000, TWX: 910-373-1731

Products manufactured: Amplifiers, Crystals, Diodes, Filters, Generators, Multipliers, Oscillators, Receivers, Tubes, Tuners

Local Sales Offices & Reps.

Ariz	Scottsdale	602-947-5461
Cal	Los Altos	415-968-7630
Cal	Santa Monica	213-828-5588
Fla	Clearwater	813-446-8513
Ga	Atlanta	404-252-0045
Ill	Park Ridge	312-825-6686
Md	Cheverly	301-773-7010
Mass	Waltham	617-890-4560
NJ	Mt. Laurel	609-428-6800
NJ	Springfield	201-376-6600
NY	Syracuse	315-437-2568
Ohio	Dayton	513-298-7318
Tex	Richardson	214-235-2385
FOR:	Can., Georgetown, Ont., Varian Assocs. of Can. Ltd.	416-457-4130

VARO, INC., Electrokinetics Div., 402 E. Gutierrez St., Santa Barbara, Cal., 93102, Tel: 805-963-2055, TWX: 910-334-1177; FSC No: 02101; Empl.: 85; Minimum order: $100 .... p. 1•278,1532

For info on price: R. F. Suchan; Application info: R. F. Suchan; Customer service: R. W. Harvey; Delivery info: R. W. Harvey

Free literature available: Alternators, generators, electromechanical rotary actuators and A.C. and D.C. motors.

Products manufactured: Actuators, Alternators, Generators, Motors, Valves, Solenoid

VARO ELECTRON DEVICES, INC., 2203 W. Walnut St., Garland, Tex., 75040, Tel: 214-272-3561, TWX: 910-860-5093; FSC No: 27777; QPL No: Multiple; Empl.: 175 .... p. 1•2360

Customer service: W. T. Boyd

Free literature available: Brochure available with outline drawings and specifications of various image converters, image intensifiers, zoom tubes, gated intensifiers, microchannel plate inverter tubes.

Products manufactured: Intensifiers, Image, Tubes

Local Sales Offices & Reps.

NJ	Eatontown	201-229-1400
Ohio	Dayton	513-253-8935
Va	Springfield	703-941-5144

VARO SEMICONDUCTOR, INC., 1000 N. Shiloh Rd., Garland, Tex., 75040, Tel: 214-272-4551, TWX: 910-860-5178; Empl.: 1500 .... p. 1•1881-1895

For info on price: M. Hawkins; Application info: M. Hawkins; Customer service: T. Miller; Delivery info: T. Miller

Products manufactured: Bridges, Controls/Control Eqpt., Diodes, Multipliers, Rectifiers, Thyristors (Includes Silicon Controlled Rectifiers)

Local Sales Offices & Reps.

Ariz	Phoenix, W.W. Posey Co.	602-949-5873
Cal	Los Altos, W.W. Posey Co.	415-948-7771
Cal	Los Angeles, Corcoran Assocs.	213-823-4589
Colo	Arvada, Sage Sales	303-841-2487
Conn	North Haven, Comp Rep Assocs.	203-239-9762
Fla	Orlando, Buchanan & Abrams Assocs.	305-898-7444
Ill	Lombard, Varo Semiconductor	312-593-8860
Ind	Indianapolis, Tech. Reps, Inc.	317-849-6454
Iowa	Des Plaines, Coombs Assocs.	312-298-4830
Md	Baltimore, Dyna Rep. Co.	301-256-8300
Mass	Needham, Comp Rep Assocs.	617-444-2484
Mich	Farmington, Davis-Martensen Co.	313-474-8300
Minn	Minneapolis, L.F. Green Assocs.	612-781-1611
Mo	Kansas City, Beneke & McCaul, Inc.	816-765-2998
Mo	St. Louis, Beneke & McCaul	314-434-6242
NJ	Haddonfield, Dyna Rep. Co.	609-795-1700
NY	Great Neck, Cooper-Simon & Co.	516-487-1142
NY	Ithaca, B. Dean, Inc.	607-272-2187
NC	Charlotte, Buchanan & Abrams Assocs.	704-332-4974
Ohio	Dayton, J.C. Hofstetter Co.	513-296-1010
Ohio	Medina, J.C. Hofstetter Co.	216-241-4880
Ore	Portland, C.K. Shanks & Assocs.	503-292-5656
Tex	Garland, Whiteside Sls. Co.	214-231-9771
Tex	Houston, Whiteside Sls. Co.	713-498-2551
Utah	Salt Lake City, Sage Sales	801-531-0531
Va	Alexandria, Dyna Rep. Co.	703-354-1222
Va	Newport News, Dyna Rep. Co.	804-874-7729
Wash	Seattle, C.K. Shanks & Assoc.	206-632-4290
Wisc	Brookfield, Varo Semiconductor	414-782-7590
FOR:	Downsview, Ont., Cantronics, Inc.	416-661-2494
FOR:	Montreal, Que., Cantronics, Inc.	514-341-5207

Local Distributors

Ala	Huntsville, Cramer-Huntsville, 2310 Bob Wallace Ave.	205-539-5722
Ariz	Phoenix, Cramer-Ariz., 2643 E. University	602-263-1112
Cal	Chatsworth, Westates Elctrns., 20151 Bahama St.	213-341-4411
Cal	Garden Grove, Allied Elctrns., 12311 Industry St.	213-598-6605
Cal	Irvine, Cramer-L.A., 17201 Daimler St.	714-979-3000
Cal	San Diego, Cramer-San Diego, 8975 Complex Dr.	714-565-1881
Cal	Sepulveda, Milgray-Cal., 8718 Woddley Ave.	213-894-4011
Cal	Sunnyvale, Bell Ind's., 1161 N. Fairoaks	408-734-8570
Cal	Sunnyvale, Cramer-San Francisco, 720 Palomar Ave.	408-739-3011
Colo	Denver, Cramer-Denver, 5465 E. Evans Pl.	303-758-2100
Conn	North Haven, Cramer-Conn., 35 Dodge Ave.	203-239-5641
Fla	Hollywood, Cramer-Hollywood, 4035 N. 29th Ave.	305-923-8181
Fla	Orlando, Cramer-Orlando, 345 N. Graham Ave.	305-894-1511
Fla	Orlando, Milgray-Fla., 5400 Diplomat Cir.	305-647-5747
Ga	Atlanta, Cramer-Atlanta, 3923 Oakcliff Ind. Ct.	404-448-9050
Ill	Elgin, Allied Elctrns., 1355 Sleepy Hollow	312-697-8200
Ill	Mt. Prospect, Cramer-Chicago, 1911 S. Busse Rd.	312-593-8230
Ill	Skokie, Bell Elctrns., 7701 N. Austin	312-282-5400
Ind	Indianapolis, Graham Elctrns., 133 S. Pennsylvania	317-634-8486
Md	Baltimore, Cramer-Baltimore, 922-24 Patapsco Ave.	301-354-0100
Md	Gaithersburg, Cramer-Wash., 16021 Industrial Dr.	301-948-0110
Md	Hyattsville, Milgray-Wash., 5405 Lafayette Pl.	301-864-1111
Mass	Burlington, Milgray-New England, 79 Terrace Hall Ave.	617-272-6800
Mass	Newton, Cramer Elctrns., 85 Wells Ave.	617-969-7700
Mich	Livonia, Cramer-Detroit, 13193 Wayne Rd.	313-425-7000
Minn	Edina, Cramer-Bonn, 7275 Bush Lake Rd.	612-835-7811
NJ	Cherry Hill, Milgray-Del. Valley, 1165 Marlkress Rd.	609-424-1300
NJ	Pennsauken, Cramer-Pa., 7300 Rte. 130 N.	215-923-5950
NJ	Union, Cramer-N.J., 949 Ball Ave.	201-687-7870
NM	Albuquerque, Cramer-N.M., 137 Vermont N.E.	505-265-5767
NY	E. Syracuse, Cramer-Syracuse, 6716 Joy Rd.	315-437-5571
NY	Endwell, Cramer-Binghamton, 3220 Watson Blvd.	607-754-6661
NY	Freeport, Milgray Elctrns., 191 Hanse Ave.	516-546-6000
NY	Hauppauge, Cramer-L.I., 29 Oser Ave.	516-231-5600
NY	Rochester, Cramer-Rochester, 300C S. Winton Rd.	716-275-0300
NC	Winston- Salem, Cramer/Winston-Salem, 938 Burke St.	919-725-8711
Ohio	Cincinnati, Cramer-Tri-States, 666 Redna Terrace	513-771-6441
Ohio	Cleveland, Cramer-Cleveland, 5835 Harper Rd.	216-248-8400
Ohio	Cleveland, Milgray-Cleveland, 1821 E. 40th St.	216-881-8800
Tex	Dallas, Cramer-Texas, 2970 Blystone Ln.	214-350-1355
Tex	Fort Worth, Allied Elctrns., 401 E. 8th St.	817-336-5401
Tex	Houston, Altair Co., 9501 Baythorne, Box 40313	713-462-3029
Tex	Richardson, Altair Co., 405 N. Plano Rd.	214-231-5166
Utah	Salt Lake City, Cramer-Utah, 391 W. 2500 So.	801-487-4131
Wash	Bellevue, Bell Ind's., 1900 132nd N.E.	206-747-1515
Wash	Seattle, Cramer-Seattle, 5602 6th Ave. S.	206-762-5755
Wisc	Oak Creek, Cramer-Wisc., 430 W. Rawson Ave.	414-764-1700
For:	Can., Downsview, Ont., Cramer-Can., 920 Alness St.	416-661-9222
For:	Can., Vancouver, B.C., R.A.E. Ind., 1620 Main St.	604-687-2621
For:	Can., Willowdale, Ont., Electro Sonic, Ind'l. Sls. Ltd., 1100 Gordon Baker Rd.	416-494-1666

VECTOR ELECTRONIC CO., INC., 12460 Gladstone Ave., Dept. EP, Sylmar, Cal., 91342, Tel: 213-365-9661, TWX: 910-496-1539; FSC No: 82893; Empl.: 110; Minimum order: $15
p. 1•100-103; p. 2•358-363,1058-1061

For info on price: J. Robertson; Application info: F. L. Hill; Customer service: B. Little; Delivery info: J. Nelson

Free literature available: For Drawings for custom card and module cages.

Products manufactured: Attenuators, Bezels, Shielded & Unshielded, Boards, Plug-In, Boards, Printed Circuit, Boards, Printed Wiring, Universal, Boards, Programming, Bus Bars & Systems, Cabinets & Accessories, Cases, Equipment, Instrument, Meter, Chassis, Circuit Board Mounting, Chassis, Metal, Chemicals, Clamps & Clips, Coils Including Assemblies & Forms, Connector Adapters, Connector Boxes & Strips, Power Outlet, Connectors, Contacts, Electrical, Containers, Cords, Dummy Loads, Enclosures, Module, Plug-In, Etchants, Printed Circuit, Eyelets, Frames, Cabinet & Rack, Gaskets, Shielding, R-F-Also See Shields, R-F, Guides, Circuit Board, Handles For Cabinets, Circuit Boards, Racks, etc., Holders, Circuit Board (Production Type), Insulators & Insulation, Integrated Circuit Packaging Systems, Integrated Circuit Devices, Jumpers, Kits, Breadboarding (For Engineers), Kits, Printed Circuit, Kits, Terminal, Kits, Test Equipment, Kits, Training Aid, Laminates, Pads, Transistor Mounting, Panels, Pins, Plug Adapters, Plug Caps & Shells, Plugs, Pullers, Racks, Retainers, Socket Adapters, Sockets, Terminal Blocks, Boards & Strips, Terminals, Tools

Local Distributors

Ariz	Phoenix, Dalis Radio/T.V. Supply, 917 N. 7th St.	602-258-8151
Cal	Inglewood, Newark Elctrns., 4747 W. Century	213-638-4411
Cal	Irvine, Terminal Electron., 1791 Reynolds	714-549-8611
Cal	Los Angeles, RPS Elctrns., 1501 S. Hill	213-748-1271
Cal	Mt. View, Abacus Elctrns., 1065 Terra Bella	415-961-1500
Cal	Mt. View, Elmar Elctrns., 2288 Charleston	415-961-3611
Cal	Oakland, Brill Elctrns., 610 E. 10th St.	415-834-5888
Cal	Pasadena, Empire Elctrns., 37 E. Union St.	213-681-7671
Cal	Riverside, Electronic Supply, 2486 Third St.	714-683-8110
Cal	Sacramento, Dunlap Elctrns., 1800 18th St.	916-444-8070
Cal	San Diego, Shanks & Wright, 2045 Kettner	714-239-0176
Cal	San Jose, Quement Elctrns., Box 6000	408-294-0464
Fla	Tampa, Lykes Elctrns., Box 24047	813-886-6621
Ill	Chicago, Newark Elctrns., 500 N. Pulaski	312-638-4411
Ill	Elgin, Allied Elctrns., 1355 Sleepy Hollow	312-697-8200
Ill	Palatine, Ohm/Elctrns., 649 Vermont Ave.	312-359-5500
Ill	Peoria, Klaus Radio, 8400 N. Pioneer Pkwy.	309-691-4840
Ind	Indianapolis, Graham Elctrns., 133 S. Pennsylvania	317-634-8486
Ind	Indianapolis, Ra Dis Co., Inc., 814 N. Senate	317-637-5571
Ky	Louisville, P.I. Burks, Box 1015	502-589-3960
Md	Baltimore, ASI Elctrns., 1728-30 Whitehead	301-265-5100
Md	Beltsville, Powell Elctrns., 10728 Hanna St.	301-474-1030
Md	Rockville, Capitol Radio, 12270 Wilkens	301-942-7505
Mass	Boston, Sager Elect. Supply, 172 High St.	617-542-2281
Mass	Dedham, Gerber Elctrns., 852 Providence	617-329-2400
Mass	Lynn, Land Elect. Supply, 9 R. Franklin	617-592-2220
Mass	Newton, Cramer Elctrns., 85 Wells Ave.	617-969-7700
Mich	Ann Arbor, Wedemeyer Elect., 2280 S. Indust'l. Hwy.	313-665-8611
Mich	Detroit, Newark Elctrns., 20700 Hubbell Ave.	313-548-0250
Mich	Detroit, R S Elctrns., 12775 Lyndon St.	313-491-1000
Minn	St. Paul, Gopher Elctrns., 2520 W. Larpenteur	612-645-0241
Mo	St. Charles, Lectronix, Inc., 306 McDonough	314-946-6424
Mo	St. Louis, Olive Ind. Elect., 6662 Olive Blvd.	314-863-7800
NJ	Camden, General Radio, 600 Penn St.	609-964-8560
NJ	Hanover, State Elctrn. Parts, 36 Route 10	201-887-8146
NM	Albuquerque, Electronic Parts, 2620 Rhode Island NE	505-265-8401
NY	Buffalo, Summit Distrs., 916 Main St.	716-884-3450

Directory of Local Distributors Starts on page 401

NY	Rochester, Simcona Elctrns., 275 Mt. Read	716-328-3230
NY	Rockville Centre, Midway Industrial, 24 Maple Ave.	516-764-2400
NY	Woodbury, Harvey Radio, 60 Crossways Pk. W.	516-921-8700
NC	Raleigh, Southeastern Radio, 414 Hillsboro St.	919-828-2311
Ohio	Akron, Akron Elctrn. Supply, 107 S. Arlington	216-762-8818
Ohio	Cleveland, Pioneer Standard, 4800 E. 131st St.	216-587-3600
Ohio	Columbus, H. Peters Co., 481 E. 11th Ave.	614-294-5351
Ohio	Dayton, ESCO, Inc., 221 Crane St.	513-224-9192
Ohio	Dayton, Stotts Friedman, 108 N. Jefferson	513-224-1111
Okla	Oklahoma City, Trice Wholesale, 4701 N. Stiles	405-524-4411
Ore	Portland, United Radio, 123 7th Ave NE	503-233-5346
Pa	Philadelphia, Powell Elctrns., South Island Rd.	215-365-1900
Pa	Pittsburgh, Cameradio, 2801 Liberty Ave.	412-391-7400
Pa	Pittsburgh, RPC Elctrns., 620 Alpha Dr.	412-782-3770
RI	Providence, Wm. Dandreta & Co., 28 Wolcott St.	401-861-2800
Tex	Dallas, Wholesale Elect., 2809 Ross Ave.	214-824-3001
Tex	Fort Worth, Allied Elctrns., 401 E. 8th St.	817-336-5401
Tex	Houston, Harrison Equip., 1616 McGowen	713-224-9131
Utah	Ogden, Ballard Supply, 3109 Washington	801-394-5541
Wash	Seattle, Almac Stroum, 5811 Sixth Ave. S.	206-763-2300
Wash	Seattle, Radar Elec. Co., 168 Western Ave.	206-282-2511
Wisc	Milwaukee, Marsh Elctrns., 6047 Beloit Rd.	414-545-6500
Wisc	Milwaukee, Parts Mart, 1314 N. 7th Ave.	414-276-4160
Exp:	Cal., Los Angeles, Trans World Trade, Box 1037	213-472-0444

VECTOR GENERAL, INC., 21300 Oxnard St., Woodland Hills, Cal., 91364, Tel: 213-346-3410, TWX: 910-494-2764; FSC No: 32602; Empl.: 97; Minimum order: $50

For info on price: C. M. Ceranowski; Application info: J. Roberts; Customer service: F. Kohout; Delivery info: L. L. Longstaffe

Free literature available: Technical descriptions of Vector General's Interactive Graphic Display Systems interfaced to a wide range of minicomputers; associated graphics peripheral input devices; and graphic applications software.

Products manufactured: Dials, Display Devices/Displays, Generators, Keyboards, Alphanumeric & Decimal, Light Sources, Photoelectric, Tubes

Local Sales Offices & Reps.

Cal	Saratoga	408-996-3361
Cal	Woodland Hills	213-346-3410
Md	Baltimore	301-788-3722
Mass	Westford	617-692-3385
Mich	Ann Arbor	313-994-1331
Pa	Downingtontown	215-269-3021
Tex	Dallas	214-690-8035
EXP:	Los Angeles, Cal., Harper-Robinson	213-670-6401

VECTROL, INC., 1010 Westmore Ave., Rockville, Md., 20850, Tel: 301-424-6900; Empl.: 52; Minimum order: $25

For info on price: K. Berger; Application info: B. Strayton; Customer service: K. Berger; Delivery info: K. Berger

Products manufactured: Amplifiers, Controls/Control Eqpt., Power Supplies, Relays

Local Sales Offices & Reps.

Cal	Los Angeles, Basic Sys. Corp.	213-938-2833
Cal	San Francisco, Artwell Elec. Co.	415-467-1880
Ill.	Chicago, Markson Assocs.	312-267-1905
Md	Baltimore, B. White & Co. Inc.	301-484-5400
Mass	Sharon, Adcour & Assocs.	617-784-3996
Mich	Farmington Hills, H. Lowell Co.	313-851-7474
NJ	Ridgewood, Ballou Inc.	201-444-6990
NY	Lancaster, Lawrence Industrial Sls.	716-685-1993
Ore	Portland, Dyna Tech.	503-265-1455
Pa	Valley Forge, Gil-Tronics	215-933-8525
Wisc	Milwaukee, E.A. Dickinson & Assocs.	414-264-1080

VECTRON LABS., INC., 121 Water St., Norwalk, Conn., 06854, Tel: 203-853-4433, TWX: 710-468-3796; FSC No: 27802; Empl.: 80; Minimum order: $30 p. 1•420,421

For info on price: Sls.; Application info: Sls.; Customer service: Cust. Svc.; Delivery info: Sls.

Free literature available: "Crystal Oscillators, Frequency Standards". "Howto Specify Crystal Controlled Oscillators".

Products manufactured: Amplifiers, Clocks (All Types), Controls/Control Eqpt., Generators, Integrated Circuit Devices, Oscillators

Local Sales Offices & Reps.

Ala	Huntsville, FM Assocs.	205-536-9990
Cal	Los Angeles, Fetty/Schoenduve	213-651-4050
Cal	Palo Alto, Fetty/Schoenduve	415-321-7041
Fla	Jupiter, FM Assocs.	305-746-2996
Fla	Orlando, FM Assocs.	305-851-5710
Ill	Skokie, Heth Inc.	312-282-8737
Ind	Indianapolis, Ihrig Assocs.	317-783-7630
Kans	Overland Park, Ensco-Rep., Inc.	913-381-7557
Mich	Grand Rapids, R. P. Urban Assocs.	616-245-0511
Minn	Burnsville, Heth, Inc.	612-333-8494
Mo	St. Louis, Ensco-Rep	314-567-3935
NJ	Woodcliff Lake, F & F Assoc.	201-778-6767
NY	Flushing, F & F Assoc	516-334-1160
NY	Syracuse, Rep Tech	315-437-2845
NC	Greensboro, FM Assocs.	919-294-2754
Ohio	Brecksville, A. Nace Co.	216-526-4323
Ohio	Englewood, A. Nace Co.	513-836-7548
Pa	Newtown Sq., SWR Assocs.	215-356-8550
Pa	Pittsburgh, A. Nace Co.	412-922-7225
Tex	Dallas, Texas Avionics	214-363-6324
Va	Springfield, Temsco	703-569-2700
Wash	Seattle, Datacom	206-285-2525

VEEDER-ROOT, 70 Sargeant St., Hartford, Conn., 06102, Tel: 203-527-7201, Telex: 9-9219; Empl.: 1200 p. 1•274,275

For info on price: A. Piergrossi; Application info: S. Rosenthal; Customer service: Wm. Travis

Free literature available: Total Capability: Counting/Controlling/Digital Printing: Complete line of totalizers, predetermining counters, printing devices and input devices. Catalog gives full description, stock items, specifications and application information.

Products manufactured: Controls/Control Eqpt., Converters, Counters, Data Acquisition & Reduction Systems, Display Devices/Displays, Generators, Indicators, Meters, Printers, Recorders, Switches, Tachometers, Timers, Totalizers, Digital, Transducers

Local Sales Offices & Reps.

Cal	Burlingame	415-697-6830
Cal	Glendale	213-245-8421
Conn	Hartford	203-247-0133
Ga	Rome	404-235-0756
Ill	Des Plaines	312-824-0188
Md	Baltimore	301-296-2177
Mich	Detroit	313-886-4485
Minn	Minneapolis	612-831-1711
NJ	Ridgewood	201-445-2401
NY	Rochester	716-244-0550
NC	Charlotte	704-364-3653
Ohio	Cincinnati	513-271-6200
Ohio	Cleveland	216-229-2634
Pa	Willow Grove	215-887-0708
SC	Greenville	803-288-2133
Tex	Arlington	214-252-3360
For:	Can., Montreal, Quebec, Veeder-Root Co. Ltd.	514-747-1213
FOR:	Can., Toronto, Ontario, Veeder-Root Co. Ltd.	416-239-3094

VEETRONIX, Box 209, 136 W. 7th St., Cozad, Neb., 69130, Tel: 308-784-4000; Empl.: 25 p. 1•2307

Products manufactured: Keyboards, Alphanumeric & Decimal, Switches

VEGA PRECISION LABS., 800 Follin La., Vienna, Va., 22180, Tel: 703-938-6300, Telex: 89-2521; Empl.: 165 p. 1•928

Customer service: T. E. Eazarsky Ext. 220

Products manufactured: Antennas, Dividers, Generators, Radar Systems, Receivers, Simulators, Tracking Systems, Transmitters, Transponders

Local Sales Offices & Reps.

Cal	El Cajon	714-448-3240
Fla	Panama City	904-763-9666
NY	Rome	315-337-2900

VELONEX, INSTRUMENT DIV., 560 Robert Ave., Santa Clara, Cal., 95050, Tel: 408-244-7370, TWX: 910-338-0114; Empl.: 60; Minimum order: $30

Customer service: E. Rudee

Free literature available: High Power Pulse Generator Catalogs; highly environmentalized DC/DC power supply catalog; Precision high voltage power supply data sheets.

Products manufactured: Amplifiers, Converters, Discharge Systems, Energy, Generators, Modulators, All Kinds, Power Supplies, References, D-C Voltage, Standards, Testers, Transformers

Local Sales Offices & Reps.

Ariz	Phoenix, R.A. Mayes Co.	602-279-5243
Cal	Costa Mesa, Measurement Assocs.	714-540-7160
Cal	Oakland, Advanced Technology	415-452-1401
Colo	Boulder, R.A. Mayes Co.	303-444-0782
Conn	Hamden, P. Jenks, Assocs.	203-281-0810
DC	Washington Gans-Frying	703-527-3262
Fla	Orlando, E.G. Holmes, Assocs.	305-894-8901
Ga	Chamblee, E.G. Holmes, Assocs.	404-451-6161
Ill	Chicago, K.W. Meyers Co.	312-774-6440
Ind	Indianapolis, K.W. Meyers Co.	317-243-6681
Md	Fulton, Gans-Fryling, Inc.	301-837-6311
Mass	Wakefield, P. Jenks Assocs.	617-246-1590
Mich	Detroit, Hocker Assocs.	313-549-3910
Minn	Minneapolis, K.W. Meyers Co.	612-920-7080
NM	Albuquerque, R.A. Mayes & Co.	505-292-2330
NY	Plainview, Eastern Metro Assocs.	516-931-1414
NY	Rochester, Scientific Devices	716-334-2445
Ohio	Cleveland, Hocker Assocs.	216-235-6504
Ohio	Dayton, Hocker Assocs.	513-298-8638
Pa	Melrose Park, R. Meyers Assocs.	215-224-1663
Tex	Houston, R.A. Mayes Co.	713-461-5385
Tex	Richardson, R.A. Mayes Co.	214-235-3053
Va	Arlington, Gans-Fryling, Inc.	703-527-3262
Va	Virginia Beach, E.G. Holmes & Assocs.	804-481-6556
FOR:	Can., Brampton, Ont., Baytronix Ltd.	416-453-1252
FOR:	Can., Montreal, Que., Baytronix Ltd.	514-336-9240
FOR:	Can., Ottawa, Ont., Baytronix Ltd.	613-728-0113

VELONEX, DISPLAY PRODS., 560 Robert Ave., Santa Clara, Cal., 95050, Tel: 408-244-7370; Empl.: 60; Minimum order: $35

For info on price: E. Rausch; Application info: R. A. Pecotich; Customer service: E. Rausch; Delivery info: E. Rausch

Free literature available: Application Bulletin I-101 System Integration of Impac Digital Panel Meters provides definition of specifications, theory of operation and information necessary to accomplish interface of all models of Impac Digital Panel Meters.

Products manufactured: Converters, Counters, Display Devices/Displays, Meters

Local Sales Offices & Reps.

Ala	Huntsville, BCS Assocs.	205-881-6220
Ariz	Phoenix, R.A. Mayes Co.	602-279-5243
Cal	Glendale, Meko Instr. Co.	213-240-4664
Cal	Los Altos, Hoeke-Reeser	415-941-4080
Colo	Broomfield, R.A. Mayes Co.	303-466-6311
Conn	Hamden, P. Jenks Assocs.	203-281-0810
Fla	Orlando, BCS Assocs.	305-896-4881
Ill	Chicago, K.W. Meyers Co.	312-774-6440
Ind	Indianapolis, K.W. Meyers Co.	317-243-6681
Md	Fulton, Gans-Fryling, Inc.	301-837-6311
Mass	Wakefield, P. Jenks Assocs.	617-240-1590
Minn	Minneapolis, K.W. Meyers Co.	612-920-7080
NJ	Union, SBM Reps	201-687-8737
NM	Albuquerque, R.A. Mayes Co.	505-265-7989
NY	Pleasantville, SBM Reps	914-769-1811
NY	Rochester, SBM Reps	716-266-1400
NC	Greensboro, BCS Assocs.	919-273-1918
Ohio	Medina, McShane, Inc.	216-725-4568
Okla	Norman, Data Mktg. Assoc.	405-364-8320
Pa	Philadelphia, R. Meyers	215-224-1663
Tex	Dallas, Data Mktg. Assoc.	214-661-0300
Tex	Houston, Data Mktg. Assoc.	713-686-9627
Tex	San Antonio, Data Mktg. Assoc.	512-828-0937
Va	Arlington, Gans-Frying, Inc.	703-527-3262
Wash	Bellevue, Desco Northwest	206-455-9325

VEMALINE PRODS. CO., 455 W. Main St., Wyckoff, N.J., 07481, Tel: 201-891-3200; FSC No: 08730; Empl.: 47; Minimum order: $50

For info on price: R. Pagan; Application info: C. Dawkins; Customer service: J. Kitson; Delivery info: D. Struck

Directory of Local Distributors Starts on page 401

Products manufactured: Caps, Lenses, Indicator Light, Clamps & Clips, Clutches, Couplings, Dials, Display Devices/Displays, Drives & Drive Mechanisms (Dial), Fasteners, Handles For Cabinets, Circuit Boards, Racks, etc., Knobs, Lamps, Lights, Locks, Dial & Shaft, Scales, Dial, Services, Assembly, Production & Test, Shafts & Adapters, Switch Hardware, Switches, Transistor, Diode, Thyristor Heat Dissipators

Local Sales Offices & Reps.

Ala	Madison, B-C Elec. Sls.	205-837-5778
Airz	Phoenix, Mr Engr. Co.	602-959-5150
Cal	Encino, El/Tec	213-981-9881
Cal	Santa Clara, Ruby Sls. Corp.	408-739-5333
Conn	Meriden, Electro Prods. Sls.	203-235-4040
Fla	Ft. Lauderdale, Orbe	305-564-8571
Ga	Smyrna, B-C Elex. Sls.	404-436-5169
Ill	Chicago, Ropek-Cahill	312-287-7292
Ind	Evanston, R.M.P. Sls.	312-631-9545
Kans	Olathe, B. Rush Assocs.	913-782-1177
Mass	Waltham, Electro Prods. Sls.	617-899-1570
Mich	Grand Rapids, R. P. Urban Assoc.	616-245-0511
Minn	Minneapolis, Bitronics Sls. Co.	612-835-7744
NY	Buffalo, R.A. Murray Co. Inc.	716-632-6913
NY	Deruyter, R.A. Murray Co. Inc.	315-682-2920
NY	Williamsville, R.A. Murray Co. Inc.	716-632-4987
Ohio	Cincinnati, Loesch Assoc.	606-331-4332
Ohio	Cleveland, Loesch Assoc.	216-241-4581
Pa	Abington, IMS Co.	215-659-0444
Tex	Dallas, Blackburn Assoc.	214-351-9991
EXP:	New Rochelle, N. Y., Montclair Elctrns.	914-576-1400

VENT-RAK, DIV., General Devices Co., Inc., 525 S. Webster Ave., Indianapolis, Ind., 46219, Tel: 317-359-5407, Telex: 27-2169; Empl.: 125; Minimum order: $50 .... p. 1•67-70

For info on price: J. Bradford; Application info: R. D. Lambert; Customer service: G. Feest; Delivery info: J. Bradford

Free literature available: Catalogs covering Vent-RAK 1000-Series, 3000-Series, 6000-Series and 7000-Series Electronic Cabinets; 4600-Series Consoles and Instrument Cases; Vent-RAK chassis and Vent-RAK Accessories (Cable Retactors and writing shelves)

Products manufactured: Benches, Consoles, Stools, Tables, Cabinets & Accessories, Cable Retractors, Cases, Equipment, Instrument, Meter, Chassis, Metal, Containers, Drawers, Sliding, Racks

Local Sales Offices & Reps.

Ariz	Scottsdale, F. Schoeffler Assoc.	602-948-3470
Cal	Los Angeles, M. A. Stolaroff Co.	213-295-7781
Cal	Mtn. View, G. C. Woempner Co.	415-964-5454
Cal	San Diego, M. A. Stolaroff Co.	714-234-6905
Cal	Van Nuys, J. R. Thomas	213-782-3820
Colo	Sedalia, Jensen Representatives	303-688-4154
Conn	Cheshire, Coakley, Boyd & Abbett, Inc.	203-272-2261
Fla	North Miami, Winfield Electronic Sls.	305-945-6554
Fla	Tampa, Winfield Electronic Sls.	813-884-6500
Ill	Rolling Meadows, Lightner Assocs., Inc.	312-398-3000
Ind	Indianapolis, Marketing Engineers	317-546-1523
Ind	South Bend, Valentine & Schillinger & Assoc.	219-291-6258
Kans	Shawnee Mission, Lowell Kangas & Assoc.	913-631-3515
Md	Bethesda, G. Rosen & Assocs., Inc.	301-530-8448
Mass	Needham, Coakley, Boyd & Abbett, Inc.	617-444-5470
Minn	St. Paul, Northport Engrg., Inc.	612-698-3841
Mo	St. Louis, Lowell-Kangas & Assoc.	314-821-4050
NY	Fayetteville, H.G. Richter, Inc.	315-637-6713
NY	Manhasset, Kaelber & Mack	516-627-6620
NC	Paw Creek, Ward Tech. Sls. Co.	704-399-3481
Ohio	Cincinnati, Components	513-721-2997
Ohio	Cleveland, Components	216-842-2737
Tex	Dallas, R. Martin Assocs.	214-361-8584
Tex	Houston, R. Martin Assocs.	713-462-4077
Wash	Olympia, Bergford Assoc.	206-866-2001
EXP:	Indianapolis, Ind., General Devices Co.	317-359-5407

VENUS SCIENTIFIC, INC., 399 Smith St., Farmingdale, N.Y., 11735, Tel: 516-293-4100, TWX: 510-224-6492; Empl.: 85 .... p. 1•1024,1025,1534,1535

Customer service: T. T. Krilovich

Free literature available: Send for Venus 1975 Catalog showing the complete line or miniature high voltage power supplies for military and commercial applications. Venus also builds custom supplies.

Products manufactured: Converters, Power Supplies, Television Systems & Equipment Closed-Circuit

Local Sales Offices & Reps.

Ariz	Scottsdale, Piper-Goyne, Inc.	602-946-4437
Cal	Los Altos, Westec Elctrns./North	415-948-8880
Cal	Pasadena, Advanced Techniques	213-681-1093
Fla	Lighthouse Point, Saber Assocs.	305-943-3076
Ill	Park Ridge, R. F. Specialists	312-698-2044
Ind	Ft. Wayne, J&B Engrg. Sls. Co.	219-483-2813
Kans	Olathe, B. Rush Assocs.	913-782-1177
Mass	Norwood, S. Pierce, Inc.	617-762-3164
Minn	St. Paul, H.A. Cullen & Assocs.	612-646-7371
NJ	Cherry Hill, H.J. White Co.	609-428-4544
NY	Plainview, E.R.A. Inc.	516-822-9890
NY	Syracuse, Nycom Inc.	315-437-8343
Ohio	Columbus, T. Mulligan & Assocs.	614-457-2242
Tex	Richardson, P.J. Scanlon Co.	214-231-4661
Va	Alexandria, Vanguard Engrg. Sls.	703-768-1660
Wash	Seattle, Westec Elctrns./NW	206-CH3-7070
FOR:	Ottawa, Can., Orion Elctrns.	613-521-2739

VERMONT PRECISION RESISTOR CO., Box 1170, Stowe, Vt., 05672, Tel: 802-253-8567; Empl.: 15; Minimum order: $25

For info on price: J. Wagner; Application info: J. Wagner; Customer service: T. Freeman; Delivery info: T. Freeman

Free literature available: Brochure.

Products manufactured: Resistors

Local Sales Offices & Reps.

NH	Nashua, Bell Controls	603-882-6984

VERNAY LABORATORIES, INC., S. College St., Yellow Springs, Ohio, 45387, Tel: 513-767-7261; Empl.: 500

Customer service: A. LePera

Free literature available: Valve brochure; Int'l Rubber & Plastics Chart; Conversion Chart; Facilities Brochure.

Products manufactured: Bushings, Glass, Plastic, Metal, Rubber, Etc., Feedthrus & Seals, Environmental, Rubber, Seals, Services, Assembly, Production & Test

Local Sales Offices & Reps.

Fla	Pompano Beach, Veri-Tech., Inc.	305-946-6373

VERNITECH, Div. of Vernitron Corp., 300 Marcus Blvd., Deer Pk., N.Y., 11729, Tel: 516-586-5100, TWX: 510-227-6079; Empl.: 150
p. 1•220-227,276,277,999-1003,1920-1923; p. 2•1207

Products manufactured: Actuators, Amplifiers, Brakes, Clutches, Controls/Control Eqpt., Converters, Counters, Dampers, Servo, Display Devices/Displays, Encoders, Generators, Indicators, Integrators, Mechanical & Electro-Mechanical, Motor Electric Generator Sets, Motors, Resolvers, Synchro, Servo Systems, Tachometers, Vibrators, Instrument (Stiction Elimination)

Local Sales Offices & Reps.

Cal	Los Angeles, Halbar	213-387-8283
Cal	San Mateo, Halbar Assocs.	415-349-4700
Colo	Wheatridge, Technology Mktg. Assoc.	303-423-6106
Conn	N. Haven, Kitchen & Kutchin	203-239-0212
Fla	St. Petersburg, Orbe, Inc.	813-894-0687
Ill	Rogers Park, Communications Engrs.	
Ind	Fort Wayne, T-X Sls.	219-485-0805
Iowa	Cedar Rapids, T-X Sls.	319-393-6278
Kans	Overland Park, Dy-Tronix	816-931-3030
Md	Baltimore, R.P. Luce & Co., Inc.	301-752-8200
Mass	Lexington, Kitchen & Kutchin	617-VO 2-8230
Mich	Grand Rapids, Urban Assoc.	616-245-0511
Minn	Minneapolis, Merrill Franklin Co.	612-835-6422
Mo	Hazelwood, Dy-Tronix	314-731-5799
NJ	Berkeley Heights, R.P. Luce & Co., Inc.	201-464-6440
NM	Albuquerque, Technology Mktg.	505-298-4321
NY	Endicott, Tech-Mark, Inc.	607-748-7473
NY	New Hyde Park, R.P. Luce & Co., Inc.	516-437-4550
NY	New Rochelle, R.P. Luce & Co., Inc.	215-632-1187
Ohio	Dayton, Rixan Assocs.	513-BA 2-0011
Ohio	Shaker Heights, T-X Sls.	216-561-1900
Pa	Philadelphia, R.P. Luce & Co., Inc.	215-884-8365
Tex	Dallas, Gipe Assocs.	214-350-1912
Tex	Dallas, J.B. Guenther	
EXP:	Montreal, Can., Vitel Elctrns.	514-331-7393

VERNITRON CORP., Control Components Div., 2440 W. Carson St., Torrance, Cal., 90501, Tel: 213-328-2504, TWX: 910-349-6250 .... p. 1•1004,1924

Customer service: R. Campbell

Free literature available: "New 1975 catalog available defining complete line of synchros, resolvers, selsyns, torgsyn, remote positiones, wide angle brushless dc torque motors, electromechanical assemblies and indicators."

Products manufactured: Indicators, Motors, Repeaters, Servo, Resolvers, Synchro, Servo Systems, Synchros, Transformers

Local Sales Offices & Reps.

Cal	Los Angeles, Halbar Assocs.	213-387-8283
Cal	San Mateo, Halbar Assocs.	415-349-4700
Conn	North Haven, Kitchen & Kutchin	203-239-0212
Fla	St. Petersburg, Orbe Inc.	813-894-0687
Ill	Hillside, TX Sls.	312-449-0600
Md	Baltimore, Callas Elctrns.	301-744-7711
Mass	Lexington, Kitchen & Kutchin	617-862-8230
Mich	Lathrup Village, R.C. Nordstrom Co.	313-559-7373
Minn	Eden Prairie, F. Peterson Co.	612-941-5400
Mo	Hazelwood, Dy-Tronix	314-731-5799
NJ	Cherry Hill, Lanson Assocs.	609-424-4670
NJ	Harrington Park, Metro Tech. Sls.	201-768-8495
NY	Endicott, Tech Mark, Inc.	214-748-7473
NY	Jericho, Metro Tech. Sls.	516-935-3330
Ohio	Dayton, Rixan Assocs.	513-222-0011
Tex	Dallas, M. Kruvand Co.	214-827-8043

VERNITRON ELEC. COMPS., Beau Prods., 117 Union Ave., Laconia, N.H., 03246, Tel: 603-524-5101, TWX: 710-364-1843; Empl.: 100 .... p. 2•1062-1064

Products manufactured: Connector Adapters, Connector Blocks, Mother Board, Connector Boxes & Strips, Power Outlet, Connectors, Jumpers, Plugs, Strips, Terminal Blocks, Boards & Strips

Local Sales Offices & Reps.

Cal	Santa Ana, RMS Assocs.	714-541-3295
Cal	Santa Clara, Nova-Tronix Elec. Sls.	408-243-9530
Colo	Denver, R.G. Bowen Co.	303-722-4641
Fla	Orlando, Cartwright & Bean, Inc.	305-422-4531
Ga	Atlanta, Cartwright & Bean, Inc.	404-237-2273
Ill	Oak Park, Wasson-Gallagher	312-383-6572
Ind	Indianapolis, Scott Elctrns., Inc.	317-897-9976
Mass	Norwood, R. Perron & Co.	617-762-8114
Mich	Lathrup Village, R.C. Nordstrom Co.	313-444-4417
Minn	Minneapolis, Heimann Co.	612-861-6051
Miss	Jackson, Cartwright & Bean, Inc.	601-354-1368
NH	Dover, R. Perron & Co.	603-742-2321
NJ	Cherry Hill, ME & Assoc.	609-667-6110
NJ	Denville, Grimm, Siegel Assoc.	201-625-1900
NM	Albuquerque, C.T. Carlberg & Assoc.	505-265-1579
NY	Rochester, B.H. Tollefson Assoc.	716-271-4141
NC	Charlotte, Cartwright & Bean, Inc.	704-333-6457
Ohio	Cleveland, Scott Elctrns., Inc.	216-291-2600
Pa	Pittsburgh, Scott Elctrns., Inc.	412-781-311
Tenn	Memphis, Cartwright & Bean, Inc.	901-276-4442
Tex	Dallas, W. Reese & Assoc.	214-638-6575
Wash	Seattle, R.K. Squibb Inc.	206-632-2450
FOR:	Can., Toronto, Ont., Brimark Elctrns. Ltd.	416-461-3511

VERNITRON PIEZOELECTRIC DIV., 232 Forbes Rd., Bedford, Ohio, 44146, Tel: 216-232-8600, TWX: 810-427-2274; Empl.: 185; Minimum order: $45
p. 1•596-599

For info on price: M. A. Rickman; Customer service: R. Roch; Delivery info: R. Roch

Products manufactured: Ceramic Resonators, Filters

Local Sales Offices & Reps.

Ariz	Phoenix, Gassner & Clark Co.	602-968-9037
Cal	Los Angeles, E. Mintz	213-645-2066
Cal	Palo Alto, Fetty/Schoenduve, Inc.	415-321-7041
Conn	Farmington, R. Perron & Co.	203-673-4825
Conn	Trumbull, R. Perron & Co.	203-268-9631
Mass	Norwood, R. Perron & Co.	617-762-8114
NH	Dover, R. Perron & Co.	603-742-2321
NY	New York, Metro-Long Island Corp.	212-799-9474
Ohio	Bedford, Vernitron Piezoelectric Div.	216-232-8600
Tex	Dallas, Oeler & Menelaides	214-234-6334
Tex	Houston, Oeler & Menelaides	713-772-0730
Wash	Seattle, R. Johnston Co.	206-524-5170

VERO ELECTRONICS, 171 Bridge Rd., Hauppauge, N.Y., 11787, Tel: 516-234-0400, TWX: 510-227-8890; Empl.: 25; Minimum order: $10 ....p. 2•364-366

Customer service: R. Troise

Products manufactured: Boards, Plug-In, Boards, Printed Circuit, Boards, Printed Wiring, Universal, Cabinets & Accessories, Cases, Equipment, Instrument, Meter, Chassis, Circuit Board Mounting, Chassis, Metal, Clamps & Clips, Connectors, Enclosures, Module, Plug-In, Frames, Cabinet & Rack, Guides, Circuit Board, Handles For Cabinets, Circuit Boards, Racks, etc., Holders, Circuit Board (Production Type), Integrated Circuit Packaging Systems, Integrated Circuit Devices, Kits, Breadboarding (For Engineers), Kits, Printed Circuit, Panels, Pins, Pullers, Racks, Services, Assembly, Production & Test, Sockets, Terminals

Local Sales Offices & Reps.

Ala	Huntsville, Beacon Elctrns.	205-881-5031
Cal	Cupertino, T. Louis Snitzer Co.	408-257-8333
Cal	Los Angeles, Dyna Sls. Co.	213-268-1175
Colo	Denver, A-G Elctrns.	303-722-5814
Conn	Milford, Todino Engrg.	203-874-6643
Fla	Clearwater, Reynolds & Assoc.	813-726-2373
Fla	Ft. Lauderdale, Reynolds & Assoc.	305-581-6611
Fla	Hollywood, Reynolds & Assoc.	305-987-6720
Fla	Palm Beach, Reynolds & Assoc.	305-662-4336
Fla	Satellite Beach, Reynolds & Assoc.	305-773-4700
Fla	St. Petersburg, Reynolds & Assoc.	813-360-1484
Ga	Atlanta, Beacon Elctrns.	404-351-3654
Ill	Chicago, Kennedy Engrg.	312-631-8283
Ind	Ft. Wayne, McDonald Sls.	219-747-3650
Md	Towson, Habco Elctrns.	301-825-9637
Mass	Needham Heights, Todino Engrg.	617-444-7925
Minn	St. Paul, Cullen & Assocs.	612-646-7371
Neb	Lincoln, Mktg. Assocs.	502-434-5244
NJ	Ft. Lee, K.E. Hughes Co.	201-944-1600
Pa	Jenkintown, Stein Instrumentation	215-885-2370
SC	Spartanburg, Beacon Elctrns.	803-582-4613
Tex	Garland, G.V. Peck Co.	214-341-8311
Tex	Houston, G.V. Peck Co.	713-664-1435
Wash	Kirkland, Todd-Brian Inds.	206-827-5811

Local Distributors

Cal	Los Angeles, Dyna Service, 1020 S. Atlantic	213-268-1175
Ill	Chicago, Redel Labs, 6713 N. Oliphant	312-631-8283
Md	Baltimore, Resco, 1026 Cromwell Bridge Rd.	301-823-0070
Mass	Cambridge, Appolo Elect., 101 Binney St.	617-868-3120
NY	Buffalo, Summit Dist., 916 Main St.	716-884-3450
NY	Rochester, Summit Dist., 292 Commerce Dr.	716-334-8110
Tex	Garland, Electrolot, 3529 Asset St.	214-341-8311
Wisc.	Mequon, Taylor Elect., 1000 W. Donges Bay Rd.	414-241-4321

VIABLE SYSTEMS INC., Box 438, 299 Second Ave., Needham, Mass., 02192, Tel: 617-449-4570; Empl.: 15

Products manufactured: Amplifiers, Analyzers, Converters, Digitizers, Pencil Follower (Inc. Coordinate & Graphic), Generators, Paper-Tape Preparation Systems, Preselector-Mixers, Readers, Receivers, Servo Systems, Totalizers, Digital, Transmitters, Transponders

Local Sales Offices & Reps.

Ala	Huntsville, Comprehensive Consultant Co.	205-837-6404
Ohio	Dayton, P.J. Bockestedt & Assocs.	513-233-0849

VIBRA-METRICS, INC., 150 Bradley St., E. Haven, Conn., 06512, Tel: 203-467-6335; Empl.: 13

Products manufactured: Accelerometers, Amplifiers, Integrators, Electronic, Meters, Probes, Testers, Transducers, Vibrators

Local Sales Offices & Reps.

Ala	Huntsville, Incotech	205-837-6061
Ariz	Phoenix, RAMCO	
Cal	Anaheim, Bartholomew Eng. Assoc.	213-775-8697
Colo	Boulder, RAMCO	303-444-0782
Conn	Hamden, Northeast Engrg.	203-248-4481
Fla	Jupiter, Jupiter Eng. Co.	305-746-3984
Ill	Des Plaines, Maher Engrg.	312-824-2124
Mass	Danvers, Northeast Engrg.	617-774-3010
Mo	St. Louis, Adelphi	314-821-1232
NM	Albuquerque, RAMCO	505-292-2330
NY	Fayetteville, Components for Industry	315-637-9601
NY	Manhassett, Northeast Engrg.	516-265-9633
Ohio	Cleveland, Dietrich & Assoc.	216-781-1855
Ohio	Dayton, Dietrich & Assocs.	513-223-6042
Pa	King of Prussia, Letronix	
Pa	Pittsburgh, Dietrich & Assoc.	412-892-2992
Tex	Arlington, Lane Engrg.	
Tex	Houston, RAMCO	713-461-5385
Tex	Richardson, RAMCO	214-235-3043
Utah	Centerville, RAMCO	801-292-6781
Va	Norfolk, Scientific Devices-D.C.	703-499-8133
Va	Springfield, Scientific Devices-D.C.	703-451-6500
Wash	Bellevue, Topp Eng. Sls.	206-747-5400
FOR:	Can., Rexdale, Ont., John G. Weiss Co.	416-766-0843

VIBRAC CORP., 11 Alpha Rd., Chelmsford, Mass., 01824, Tel: 617-256-6581; Empl.: 35

For info on price: Q. R. Searle; Application info: J. R. Hendershot, Jr.

Products manufactured: Brakes, Clutches, Controls/Control Eqpt., Converters, Motors, Tachometers, Testers, Transducers

VIBRATION INSTRS. CO., 1614 Orangethorpe Way, Anaheim, Cal., 92801, Tel: 714-879-6085; FSC No: 32102; Empl.: 15; Minimum order: $50

Customer service: M.P. Marsh

Free literature available: Literature describes line of tracking filters, tracking analyzers, tracking ratio synthesizers, digital and analog phase meters, sweep generators, and charge amplifiers.

Products manufactured: Amplifiers, Analyzers, Comparators, Controls/Control Eqpt., Converters, Filters, Generators, Meters, Monitors, Multipliers, Signal Conditioners & Equipment

Local Sales Offices & Reps.

Ala	Huntsville, Lee Assocs., Inc.	205-533-5896
Colo	Boulder, Moore-Eiler Assoc.	303-665-3351
Conn	Hamden, Equip. Sls. Co.	203-248-5581
Fla	Winter Haven, Lee Assocs., Inc.	813-294-5815
Ga	Chamblee, Lee Assocs., Inc.	404-457-7117
Ill	Chicago, Berndt Assocs., Inc.	312-283-0713
La	Baton Rouge, Sesco	504-272-3730
Md	Rockville, Farrell Assocs.	301-424-9460
Mass	Chelmsford, Equip. Sls. Co.	617-256-8547
Mich	Detroit, S. Sterling Co.	313-255-1970
NM	Albuquerque, Moore-Eiler Assoc.	505-292-3322
NY	Liverpool, Rayelco Elctrns.	315-652-5272
NC	Raleigh, Lee Assocs., Inc.	919-787-5818
Ohio	Cleveland, S. Sterling Co.	216-442-8080
Pa	Pittsburgh, S. Sterling Co.	412-922-5720
Tex	Richardson, Sesco	214-231-9364

VLCHEK PLASTICS CO., Middlefield, Ohio, 44062, Tel: 216-632-1631; Empl.: 125; Minimum order: $35

Customer service: J. Rogers

Products manufactured: Services, Assembly, Production & Test

Local Sales Offices & Reps.

Ill	Glen Ellyn, H. Hulseberg Co.	312-766-3200
NJ	Edison, Affiliated Sls. Co.	201-572-0777

VICLAN, 1105 W. Morena Blvd., San Diego, Cal., 92738, Tel: 714-276-9470, TWX: 910-335-1264; Empl.: 80; Minimum order: $25

For info on price: J. Waldal; Application info: B. Wiener; Customer service: M. L. Seaver; Delivery info: L. Bates

Products manufactured: Capacitors, Fixed, Filters, Resistors

Local Sales Offices & Reps.

Ariz	Scottsdale, E.J. Foley & Assoc.	602-945-2665
Cal	Newport Beach, Mission Mktg. Group	714-833-1802
Cal	Palo Alto, Brooks Tech. Group	415-328-3232
Conn	Washington Depot, Kanan Assoc.	203-868-0513
Fla	Clearwater, Lynch Gentry Assoc.	813-443-2697
Ill	Glenview, Crimson Engr. Co.	312-724-1780
Ind	Indianapolis, R.H. Newsom Assoc.	317-849-4442
Md	Baltimore, Compar Chesapeake	301-484-5400
Mass	Reading, Kanan Assoc.	617-944-8484
NJ	Clifton, Compar New York	201-546-3660
NJ	Haddonfield, Sunday O'Brien	609-429-4013
NY	Camillus, Howard C. Murray & Assoc.	315-487-0634
NC	Winston-Salem, Murcotta Corp.	919-723-1002
Tex	Dallas, Merino Sls. Co.	214-239-9719
Wash	Bellevue, SD-R2	206-747-9424
EXP:	Jamaica, Materials for Elctrns.	212-322-9400

VICON®

VICON INDUSTRIES INC., 130 Central Ave., Farmingdale, N.Y., 11735, Tel: 516-293-2200; Empl.: 115

Customer service: Sls. Dept.

Free literature available: Flyers; Catalogs; Short Form Catalogs; Data Sheets

Products manufactured: Television Systems & Equipment Closed-Circuit

Local Sales Offices & Reps.

Cal	N. Hollywood, Mike Stobin Co.	213-983-1555
Cal	Redwood City, Sinai-Johnson	415-365-6263
Colo	Denver, Ron Bowen & Assocs.	303-744-2501
Ga	Atlanta, J.E. Joyner & Assocs.	404-691-1776
Ill	Oak Park, Denco Sls. Co.	312-848-4244
Ind	Ft. Wayne, Norm Hoemig Sls. Co.	219-747-0826
Md	Baltimore, Commercial Video Reps	301-235-9120
Mass	Needham, Piper Assocs.	617-449-1144
Mich	Detroit, Burcaw Co. & Assocs.	313-533-7700
Minn	St. Paul, Skor	612-645-6461
Mo	Ellisville, J. L. Grunder Co.	314-227-7558
Nm	Albuquerque, C.T. Carlberg & Assocs.	505-265-1579
NY	Binghamton, Rayben Sls. Co.	607-724-1734
NY	Freeport, Vaughan Sls.	516-546-4141
Ohio	Columbus, Weller Elctrn. Sls.	614-885-7819
Ore	Portland, Earl & Brown Co.	503-245-2283
Tex	Dallas, Techno Assocs.	214-357-9213

Advertisment

VICON offers a complete line of CCTV accessories including pan and tilt drives, scanners, lenses, switchers, video signal equipment, enclosures, mounting and consoles.

VICTOR COMPTOMETER CORP., 3900 N. Rockwell St., Chicago, Ill., 60618, Tel: 312-539-8200; Empl.: 7,500

Free literature available: Victor 5010 Data Terminal describes compact, low-cost stand alone printer. Series 3600 gives benefits of statistical electronic printing calculator.

Products manufactured: Calculators, Electrical & Electronic, Comm. Systems, Printers, Underwater Communication, Detection, Navigation, etc. Equipment

Local Sales Offices & Reps.

Ala	Birmingham	205-252-2176
Ala	Mobile	205-476-2245
Ariz	Phoenix	602-267-7533
Ark	Little Rock	501-376-0505
Cal	City of Industry	213-965-4961
Cal	Long Beach	213-426-8892
Cal	Los Angeles	213-385-0261
Cal	Oakland	415-562-9741
Cal	Sacramento	916-441-3156
Cal	San Diego	714-283-7001
Cal	San Francisco	415-583-6250
Cal	Santa Clara	408-244-1100
Cal	Van Nuys	213-787-2530
Colo	Denver	303-266-3291
Conn	Hartford	203-265-6741
Del	Wilmington	302-764-7070
Fla	Hallandale	305-925-3356
Fla	Jacksonville	904-396-7751
Fla	Orlando	305-841-9251
Ga	Atlanta	404-874-3846
Haw	Honolulu	808-847-0831
Ill	Bensenville	312-595-1310
Ill	Chicago	312-527-0800
Ind	Indianapolis	317-635-1336
Ind	South Bend	219-287-2348
Kans	Wichita	316-942-1403
Ky	Louisville	502-458-5381
La	Baton Rouge	504-927-4180
La	Metarie	504-831-2601
Md	Towson (Baltimore)	301-821-6710
Mass	Boylston	617-869-2126
Mass	Waltham (Boston)	617-890-3800
Mich	Burton	313-743-7130
Mich	Kentwood	616-698-6910
Mich	Southfield (Detroit)	313-355-5330
Minn	Mendota Heights	612-454-8600
Mo	Kansas City	816-842-7966
Mo	St. Louis	314-535-9900
Neb	Omaha	402-393-8228
NJ	Union (Newark)	201-687-4700

NM	Albuquerque	505-345-4545
NY	Albany	518-434-8197
NY	Baldwin	516-868-3230
NY	Buffalo	716-838-5100
NY	Elmsford	914-592-5941
NY	New York	212-752-7330
NY	Rochester	716-288-0860
NY	Syracuse	315-437-1344
NC	Charlotte	704-375-7708
NC	Raleigh	919-851-1566
Ohio	Akron	216-644-8861
Ohio	Cincinnati	513-984-1060
Ohio	Cleveland	216-621-7120
Ohio	Columbus	614-263-8806
Ohio	Dayton	513-298-5277
Ohio	Toledo	419-475-4659
Ore	Portland	503-646-0535
Pa	Mechanicsburg (Harrisburg)	717-761-3121
Pa	Philadelphia	215-533-9200
Pa	Pittsburgh	412-343-4033
RI	Cranston (Providence)	401-944-8300
Tenn	Memphis	901-324-5551
Tenn	Nashville	615-383-9151
Tex	Dallas	214-631-5430
Tex	Fort Worth	817-924-3284
Tex	Houston	713-782-8964
Tex	San Antonio	512-227-6321
Utah	Salt Lake City	801-328-9787
Va	Arlington	703-527-1060
Va	Falls Church	703-573-0550
Va	Norfolk	804-583-4511
Va	Richmond	703-359-4091
Wash	Bellevue	206-624-7980
Wash	Spokane	509-327-9541
WVa	Charleston	304-343-0193
Wisc	Brookfield (Milwaukee)	414-781-8260

VICTOR WIRE & CABLE CORP., 3601 Holdrege Ave., Los Angeles, Cal., 90016, Tel: 213-870-9933; Empl.: 30 p. 2•2066,2067

Customer service: J. Vore

Products manufactured: Cable Assemblies & Harnesses, Cable, Wire, Wire Shielding

VICTOREEN INSTRUMENT DIV., 10101 Woodland Ave., Cleveland, Ohio, 44104, Tel: 800-321-9990, TWX: 810-421-8287; Empl.: 300; Minimum order: $25 p. 1•2358,2359; p. 2•1065,1572-1581,2358,2359

For info on price: G. Winfield; Application info: J. Baker; Customer service: R. White; Delivery info: W. Becerra

Free literature available: Comprehensive short form catalog of high voltage, high resistance, high power electronic components.

Products manufactured: Arresters, Electrical Surge, Lightning, Detectors, Diodes, Resistors, Seals, Spark Gaps, Suppressors, Terminals, Tubes

Local Sales Offices & Reps.

Cal	Fullerton, Victoreen Instr. Div.	714-870-1524
Ill	Mt. Prospect, Contemporary Science, Inc.	312-255-3793
Ill	Westchester, W. G. Brouillette & Assoc.	312-345-6500
Mass	Canton, Victoreen Instr. Div.	617-227-6724
NJ	Mercerville, Victoreen Instr. Div.	212-744-7646
Ohio	Cleveland, Victoreen Instr. Div.	216-795-8200
Tenn	Chattanooga, Victoreen Instr. Div.	404-577-2736
Tex	Richmond, Victoreen Instr. Div.	713-342-3018
Va	Newport News, Victoreen Instr. Div.	703-548-8446

VICTORY ENGRG. CORP., Victory Rd., Springfield, N.J., 07081, Tel: 201-379-5900, TWX: 710-983-4430; Empl.: 300; Minimum order: $25

For info on price: J. Bacek; Application info: B. Jacobs; Customer service: G. Theile; Delivery info: J. Bacek

Products manufactured: Bolometers, Bridges, Controls/Control Eqpt., Detectors, Kits, Breadboarding (For Engineers), Monitors, Probes, Resistors, Thermistors

Local Sales Offices & Reps.

Ala	Huntsville	205-881-9270
Ariz	Phoenix	602-279-1221
Cal	Los Angeles	213-651-4050
Cal	Palo Alto	415-321-7041
Colo	Denver	303-222-5645
Conn	Hamden	203-281-1331
Fla	Clearwater	813-531-5513
Fla	Miami	305-624-5832
Fla	Orlando	305-275-1132
Ga	Atlanta	404-876-1591
Ill	Chicago	312-286-1500
Ind	Fort Wayne	219-743-1586
Ind	Indianapolis	317-635-8951
Md	Towson	301-825-9637
Mass	Waltham	617-893-2850
Mich	Farmington	313-474-8300
Minn	Minneapolis	612-881-6683
NJ	Bergenfield	201-384-3643
NY	Rochester	716-586-0468
Ohio	Cincinnati	513-791-2513
Ohio	Cleveland	216-291-2600
Ohio	Columbus	614-236-8619
Ohio	Dayton	513-223-2652
Pa	King of Prussia	215-265-0634
Pa	Pittsburgh	412-781-3112
Tex	Dallas	214-363-1671
Tex	Houston	713-621-3760
Wash	Seattle	206-783-3423
EXP:	New York, N.Y.	212-679-1300
FOR:	Can., Montreal	514-336-4500

VIDAIRE ELECTRONICS MFG., 150 Buffalo Ave., Freeport, N.Y., 11520, Tel: 516-623-6696; Empl.: 20; Minimum order: $25

For info on price: M. Shapiro; Application info: G. Miller; Customer service: B. Knight; Delivery info: B. Knight

Free literature available: #C-26 Catalog All Electronic Products CN-71 Catalog Phono Cartridges and Needles

Products manufactured: Antennas, Cable, Comm. Systems, Converters, Couplers, Filters, Handsets, Chestsets, Headphones, Headsets, Etc., Meters, Microphones, All Kinds, Mixers, Phonographs, Parts & Accessories, Power Supplies, Rectifiers, Speaker Systems, Speakers, Tapes, Electrical Insulation, Testers

Local Sales Offices & Reps.

Ala	Birmingham, J. F. Russell Sls. Co.	205-871-8287
Cal	Burbank, Michael Ross Assoc.	213-842-2104
Cal	Burlingame, Carelli-Ema	415-697-6286
Cal	Van Nuys, Art Szerlip Sls Co.	213-782-1765
DC	Washington, Lenau SAssoc.	301-229-7333
Fla	Port Charlotte, W. F. Hemminger Co.	813-625-6050
Ga	Atlanta, H. W. Phillips Co.	404-237-7564
Ill	Wilmette, J. Wasserman Assoc.	312-256-3566
Ind	Indianapolis, P. Stone Sls. Co.	317-257-9777
La	New Orleans, Crockett Sls. Co.	
Md	Mitchellville, Lienau Assoc.	301-262-1709
Md	Rockville, Lenau Assoc.	301-770-6800
Mass	Northboro, W.B. Pray Sls.	617-393-3434
Mich	Bloomfield, S. F. McMechan	313-852-4308
Minn	St. Paul, Carl-M Co.	612-699-8004
Mo	Raytown, M. Taraski	816-358-1442
NY	W. Seneca, D. Evans	716-675-7288
NC	Charlotte, H. W. Phillips Co.	704-394-5544
Ohio	St. Mary's, REPP Co.	419-392-4724
Ore	Portland, J. V. Belusko Co.	503-222-4279
Pa	Bethlehem, Les Benner	215-865-3014
Pa	Broomall, Lienau Assoc.	215-356-4210
Pa	Pittsburgh, Tanner Co.	412-561-4687
Tenn	Memphis, Crockett Sls. Co.	901-388-5410
Tex	Dallas, Crockett Sls. Co.	214-748-8209
Va	Charlottesville, Lienau Assoc.	703-295-5234
Va	Great Falls, Lienau Assoc.	703-759-3128
Va	Winchester, Lienau Assoc.	703-662-6467
EXP:	New York, NY, Singer Prods. Co.	212-432-1400

VIDAR AUTODATA INC., 265 N. Whisman Rd., Mt. View, Cal., 94043, Tel: 415-965-3050; Empl.: 125

For info on price: W. Klees; Application info: M. Jacobs; Customer service: C. Chandler; Delivery info: W. Klees

Free literature available: Autodata Eight Brochure - Fully describes the disign and application of the Autodata Eight microprocessor - based monitor/alarm/control system. Ordering and option information is fully detailed.

Products manufactured: Converters, Data Acquisition & Reduction Systems, Data Loggers, Meters, Monitors, Signal Conditioners & Equipment

Local Sales Offices & Reps.

Colo	Lakewood, Figaro-Klebba Assoc.	303-466-8228
Conn	Glastonbury, Instr. Reps.	203-633-0777
Ga	Atlanta, Vidar Corp. District Off.	404-457-2497
Ill	Chicago, Pivan Engrg.	312-539-4838
Ind	Indianapolis, Pivan Engrg.	317-253-1681
Kans	Mission, Pivan Engrg.	913-722-1030
Mass	Lexington, Instr. Reps.	617-861-8620
Mich	Detroit, WKM Assocs.	313-892-2500
Minn	Minneapolis, Pivan Engrg.	612-537-4501
Mo	St. Louis, Pivan Engrg.	314-567-3636
NJ	Haddonfield, Dyna Rep	609-795-1700
NM	Albuquerque, Trembly Assoc.	505-293-4444
NY	East Syracuse, Ossman Instrs.	315-437-6666
Ohio	Cleveland, WKM Assocs.	216-267-0445
Ohio	Dayton, WKM Assocs.	513-434-7500
Pa	Pittsburgh, WKM Assocs.	412-892-2953
Tex	Austin, Crockett Southwest Co.	512-451-8269
Tex	Dallas, Crockett Southwest Co.	214-251-1776
Va	Alexandria, Dyna Rep. Co.	703-354-1222
Wash	Seattle, R.S. Drake	206-763-2755
Wisc	Brookfield, Pivan Engrg.	414-786-1940
FOR:	Can., Calgary, Alberta, Allan Crawford Assoc.	403-261-0780
FOR:	Can., Longueuil, Que., Allan Crawford Assoc.	514-670-1212
FOR:	Can., Mississauga, Ont., Allan Crawford Assoc.	416-678-1500
FOR:	Can., Ottawa 3, Ont., Allan Crawford Assoc.	613-725-3354

VIDCO, INC., 8888 S.W. Canyon Rd., Portland, Ore., 97225, Tel: 503-292-4104; Empl.: 4

Customer service: C. B. Gibson, Jr.

Products manufactured: Converters

Local Sales Offices & Reps.

Ala	Huntsville, Lee Assocs.	205-533-5896
Ariz	Phoenix, R. A. Mayes Co.	602-279-5243
Cal	Costa Mesa, Marble Assocs.	714-540-6391
Cal	Mountain View, Gado Instrument Sls.	415-961-2222
Cal	San Diego, Mesa Engrg. & Sls.	714-278-8021
Colo	Boulder, R. A. Mayes Co.	303-444-0782
Fla	Winter Haven, Lee Assocs.	813-294-5815
Ga	Chamblee, Lee Assocs.	404-457-7117
Ind	Indianapolis, R. A. Mayes Co.	317-243-6681
Md	Rockville, Mesa	
Mass	Needham, Addelco Corp.	617-444-4754
Mich	Detroit, Electro Sls. Assocs.	313-526-8800
Minn	St. Louis Park, R. A. Mayes Co.	612-920-7080
NJ	Cinnaminson, Mesa	609-786-0284
NM	Albuquerque, R. A. Mayes Co.	505-292-2330
NY	DeWitt, DB Assocs.	315-446-0220
NY	Huntington Station, E. P. Nelson	
NC	Raleigh, Lee Assocs.	919-782-7541
Ohio	Cleveland, Electro Sls. Assocs.	216-261-5440
Ohio	Dayton, Electro Sls. Assocs.	513-426-5551
Pa	Pittsburgh, Electro Sls. Assocs.	412-371-9449
Tex	Houston, R. A. Mayes Co.	713-461-5385
Tex	Richardson, R. A. Mayes Co.	214-235-3043
Utah	Centerville, R. A. Mayes Co.	801-292-6781
Wash	Seattle, Underwood Assocs.	206-242-7200

VIDEO RESEARCH CORPORATION, 6985 Garden Rd., Riviera Beach, Fla., 33404, Tel: 305-842-2867; Empl.: 85; Minimum order: $50

Customer service: V.A. Ratner

Products manufactured: Comm. Systems, Data Acquisition & Reduction Systems, Decoders, Demodulators, Editing Equipment, Tape, Generators, Heads, Recording Playback, Erase, Meters, Monitors, Recorders, Tape Recording Accessories, Tape Search Equipment

VIGOR CO., Div. of Jadow, B. & Sons, Inc., 53 W. 23 St., New York, N.Y., 10010, Tel: 212-741-9500; Empl.: 95; Minimum order: $10

For info on price: J. Leibsohn 212-741-9545; Application info: H. C. Jadow 212-741-9509; Customer service: J. Leibsohn 212-741-9545; Delivery info: J. Leibsohn 212-741-9545

Free literature available: Aron Alpha adhesive - cyanoacrylate adhesive; Instant Locksall – Locking Compound; Instant Wood Bonder – Bonds wood, leather and porous material; Arontite – Sealant; Tweezers; Pliers.

Products manufactured: Adhesives (All Types), Cleaners, Ultrasonic, Drills & Accessories, Hand & Power, Pliers, Scissors, Screwdrivers, Tools, Tweezers, Hand & Vacuum, Wrenches

Local Sales Offices & Reps.

Cal	Costa Mesa	213-645-4033
Ga	College Pk.	404-763-3369
Ill	Chicago	312-282-4366
NY	NY	212-741-9500

VIKING INDS., INC., 9324 Topanga Cyn Blvd., Chatsworth, Cal., 91311, Tel: 213-882-6275, TWX: 910-494-2094; Empl.: 650

For info on price: T. Meehan 213-341-4330; Customer service: B. Mendell; Delivery info: J. Prideaus

Free literature available: "The Pushover" and Vitel "F" , Low cost termination tool and standard format 50 contact solderless connector. "Thorkom"-Low cost miniature circular connector series, "Viking - Printed Circuit and Packaging devices for commercial & military applications.", "Viking - Underwater Connectors", "Vitel - Miniature Ribbon Connectors" - most intensively tested connector for telephone industry., "Vipower" - Heavy Duty electrical connectors for commerical, industrial & military application., "Viking - Relay Sockets" and "Relay and Socket Selector", "Systems Installation Hardware" - Terminal covers, vibration isolators, line supports, brackets, "Flip Loc".

Products manufactured: Clamps & Clips, Connectors, Seals, Services, Assembly, Production & Test, Testers

Local Sales Offices & Reps.

Ala	Huntsville, REP	205-881-9270
Ariz	Phoenix, Zeus	602-258-7519
Cal	Anaheim, Lo Dan	213-924-1691
Cal	San Carlos, Lo Dan	415-592-4600
Cal	San Diego, Lo Dan	714-279-6383
Colo	Denver, Zeus	303-770-4400
Conn	No. Haven, Forsberg Sls.	203-239-5111
Fla	Pompano Beach, V.G. Sales	305-941-5544
Fla	Winter Park, V.G. Sales	305-831-8688
Ga	Tucker, Rep, Inc.	404-938-4358
Ill	Westchester, Wasson-Gallagher Co.	312-261-7517
Ind	Indianapolis, Advanced Comp. Sls.	317-545-6441
Md	Rockville, Mechtronic Sls.	301-340-2130
Mass	Brockton, Forsberg Sls.	617-522-6300
Mass	Wakefield, Viking Inds.	617-245-4110
Mich	Grand Rapids, J. L. Montgomery & Assocs.	616-774-9308
Mich	Southfield, J. L. Montgomery & Assocs.	313-358-2616
Minn	Minneapolis, ECR, Inc.	612-831-4548
Mo	Blue Springs, Chesco	816-229-1404
Mo	St. Charles, Chesco	314-946-6677
NJ	Keasbey, ADDEM 2	516-567-5900
NM	Albuquerque, ZEUS, Inc.	505-256-9831
NY	Long Island, ADDEM 1	516-567-5900
NY	Rochester, Electra Sls.	716-436-4030
NY	Syracuse, Electra Sls. Corp.	315-455-5783
NC	Smithfield, Byrd & Barbour Sls.	919-934-8136
Ohio	Cincinnati, R. Makin Assocs.	513-232-5588
Ore	Beaverton, N. R. Schultz Co.	503-643-1644
Tex	Dallas, J. B. Guenthere	214-691-8500
Tex	Houston, J. B. Guenthere	713-468-0232
Utah	Salt Lake City, Zeus	801-486-2317
Wash	Bellevue, N. R. Schultz Co.	206-454-0300

VIKING WIRE CO., INC., Shelter Rock Rd., Box 104, Danbury, Conn., 06810, Tel: 203-744-4600, TWX: 710-456-1217; FSC No: 51777; Empl.: 175; Minimum order: $100

For info on price: R.E. Murray Ext. 28; Application info: W.W. Key Ext. 12; Customer service: R.E. Murray Ext. 28; Delivery info: T. Nassif Ext. 23

Free literature available: Price list of product description Magnet wire data chart.

Products manufactured: Wire

Local Sales Offices & Reps.

Cal	Chatsworth, Magnet Wire Sls. Co.	213-882-7620

Advertisment

Viking Wire manufactures round film insulated copper magnet wire, 23 thru 56 ga. A.W.G. - All popular insulations including - Enamel, Polyurethane, Pyre M.L., Formvar Bondables, Isonel (Polyester) with special films made to your order. Order to NEMA, MIL, or your specification.

VIRGINIA PANEL CORP., Box 1106, 1400 New Hope Rd., Waynesboro, Va., 22980, Tel: 703-942-8376, TWX: 710-839-0406; Empl.: 60 .... p. 2•1067

Products manufactured: Boards, Plug-In, Boards, Programming, Connectors, Cords, Jacks (All Types), Jumpers, Matrices, Computer, Panels, Services, Assembly, Production & Test, Tools

Local Sales Offices & Reps.

Cal	West Lake Village, J. E. Taylor Jr.	213-889-0748
Ind	Indianapolis, A.A. Billian Co.	317-253-3134
Ky	Louisville, W. G. Hudgens	502-896-6611
Md	Silver Spring, M.L. Councell	301-587-1755
NJ	Ridgewood, Hansen Assocs.	201-652-7055
NY	Huntington, L.I., Hansen Assocs.	516-692-4688
Tex	Mesquite, Spectra Sls.	214-234-3600
Va	Norfolk, M.L.Councell Assoc.	703-583-0522
Va	Richmond, M.L.Councell Assoc.	703-282-6533

VISIDYNE INC., 19 Third Ave., Northwest Industrial Park, Burlington, Ma., 01803, Tel: 617-273-2820; Empl.: 32

For info on price: D. H. Ainslie; Application info: D. H. Ainslie; Customer service: J. Eichel; Delivery info: J. Eichel

Products manufactured: Readers

Local Sales Offices & Reps.

Ala	Huntsville, Clark Assocs.	205-536-6366
Cal	Santa Clara, Applied Microfilm	408-249-1364
Ill	Evanston, Microsystems Inc.	312-864-1454
Mass	Boston, C-O-M Svc. Bureau	617-357-5715
Mass	Burlington, Visidyne	617-273-2820
Mass	Cambridge, Applied Microfilm	617-491-0830
Minn	Minneapolis, Northwest Micromation Sys.	612-332-5742
Neb	Omaha, Standard Blueprint Co.	402-341-7890
NJ	Paramus, Datamation Sys.	201-343-2411
NJ	Turnersville, Microfilm Analysts Co.	609-227-3366
Ohio	Mansfield, D. Barr	419-884-2031
Va	Norfolk, Micro Labs	703-627-8906

VISHAY RESISTIVE SYSTEMS GRP., Vishay Intertechnology Inc., 63 Lincoln Hwy., Malvern, Pa., 19355, Tel: 215-644-1300, TWX: 510-668-8944; Empl.: 500; Minimum order: $50 .... p. 2•1571,1687

For info on price: I. Yeager; Application info: R. Grasso; Customer service: I. Yeager; Delivery info: I. Yeager

Free literature available: Designer catalogs and detailed application bulletins along with an "In-Plant Station" bulletin that outlines how to build precision resistors in the users facility.

Products manufactured: Attenuators, Bridges, Decade Boxes, Dividers, Networks, Potentiometers, Resistors, Standards

Local Sales Offices & Reps.

Ala	Huntsville, F M Assoc. Ltd.	205-536-9990
Ariz	Scottsdale, Runyon Co., Inc.	602-959-6060
Cal	Pico Rivera, Westrep	213-949-2551
Cal	San Diego, Westrep	714-276-0751
Cal	Santa Clara, Westrep	408-984-0350
Colo	Englewood, Checkmate Sls.	303-771-4920
Conn	North Haven, Comp Rep Assoc.	203-239-9762
Fla	Boca Raton, Conley Assocs. Inc.	305-395-6108
Fla	Orlando, FM Assocs.	305-851-5710
Fla	Oviedo, Conley Assocs. Inc.	305-365-3283
Fla	Tampa, Conley Assocs. Inc.	813-933-3183
Ill	Rolling Meadows, Lightner Assocs.	312-398-3000
Kans	Shawnee Mission, Techn. Sls.	913-888-3330
Md	Lutherville, J.A. Dougherty Sls.	301-321-7890
Mass	Needham, Comp Rep	617-444-2484
Mich	Jackson, N. Scroggs	517-750-1170
Mich	Oak Park, W. Spenser Co.	313-398-8005
Minn	Mpls., Comstrand, Inc.	612-560-5300
Mo	Ferguson, Technical Sls. Assoc.	314-725-5361
NJ	Flanders, K & R Engrg. Sls. Co.	201-584-5235
NM	Albuquerque, Data Handling	505-268-4364
NY	E. Aurora, Harries & Kershaw	716-652-1221
NY	Fayetteville, Harries & Kershaw	315-637-9871
NY	Webster, Harries & Kershaw	716-671-6365
NC	Greensboro, F. M. Assocs.	919-294-2754
Ohio	Cleveland, A. H. Baier	216-461-6161
Ohio	Dayton, A H Baier Co. & Assoc.	513-276-4128
Pa	Westchester, D. Curley Assocs.	215-647-4500
Tex	Seabrook, Stolle-Hamilton	713-223-5127
Wash	Seattle, F. Jackson	206-782-2211

VISHAY INTERTECHNOLOGY, INC., Reon Resistor Div., 63 Lincoln Hwy, Malvern, Pa, 19355, Tel: 215-644-1300; QPL No: Multiple; Empl.: 25; Minimum order: $50 .... p. 2•1687

For info on price: I. Yeager; Application info: R. Grasso; Customer service: I. Yeager; Delivery info: I. Yeager

Free literature available: 4 page fold-out bulletin describing electrical, mechanical, and application features.

Products manufactured: Potentiometers

Local Sales Offices & Reps.

Ala	Huntsville, F M Assocs.	205-536-9990
Ariz	Scottsdale, Runyon Co.	602-959-6060
Cal	Pico Rivera, Westrep	213-949-2551
Cal	San Diego, Westrep	714-276-0751
Cal	Santa Clara, Westrep	408-984-0350
Colo	Englewood, Checkmate Sales	303-771-4920
Conn	N. Haven, Comp. Rep. Assoc.	203-239-9762
Fla	Boca Raton, Conley Assocs.	305-395-6108
Fla	Orlando, F M Assocs.	305-851-5710
Fla	Oviedo, Conley Assocs.	305-365-3283
Fla	Tampa, Conley Assocs.	813-933-3183
Ill	Rolling Meadows, Lightner Assocs.	312-398-3000
Kans	Shawnee Mission, Technical Sales	913-888-3330
Md	Lutherville, J. A. Dougherty Sls. Co.	301-321-7890
Mass	Needham, Comp. Rep. Assoc.	617-444-2484
Mich	Jackson, Norwood Scroggs Co.	517-750-1170
Mich	Oak Park, Willard Spenser Co.	313-398-8005
Minn	Minneapolis, Comstrand, Inc.	612-560-5300
Mo	Ferguson, Technical Sales Assocs.	314-725-5361
NJ	Flanders, K & R Engrg. Sls. Co.	201-584-5235
NM	Albuquerque, Data Handling Co.	505-268-4364
NY	East Aurora, Harries & Kershaw	716-652-1221
NY	Fayetteville, Harries & Kershaw	315-637-9871
NY	Webster, Harries & Kershaw	716-671-6365
NC	Greensboro, F M Assocs.	919-294-2754
Ohio	Cleveland, A. H. Baier Co. & Assoc.	216-461-6161
Ohio	Dayton, A. H. Baier Co. & Assoc.	513-276-4128
Pa	West Chester, Dick Curley Assocs.	215-692-4470
Tex	Seabrook, Stolle-Hamilton Co.	713-334-1909
Wash	Seattle, F. Jackson Co.	206-782-2211

VISUAL INFORMATION INSTITUTE INC., Box 33, Xenia, Ohio, 45385, Tel: 513-372-8637; FSC No: 27432; Empl.: 9

For info on price: J.H. Harshbarger 513-372-8637; Application info: J.H. Harshbarger 513-372-8637; Customer service: P.R. Lewis 513-372-8635; Delivery info: P.R. Lewis 513-372-8635

Products manufactured: Television Systems & Equipment Closed-Circuit, Test Equipment

Local Sales Offices & Reps.

Cal	Millbrae, Ashby Assocs. of N. Cal.	415-692-4442
Cal	Pasadena, A-F Sales Engrg.	213-681-5631

Advertisment

Specializing in test instrumentation for all television scan rates, interlace ratios, and formats including RGB, sequential, and encoded color as well as high resolution monochrome. Standard products offered for both display evaluation and signal transmission testing. Customer requirements for modified or special instruments met economically and with short delivery cycles.

V.J. ELECTRONICS, Div. Glenair Inc., 1211 Air Way, Glendale, Cal., 91201, Tel: 213-247-6000, TWX: 910-497-2066; FSC No: 06324; Empl.: 325

Customer service: R. Platz

Products manufactured: Testers

Local Sales Offices & Reps.

Ala	Huntsville, Brandel-Stephens Co.	205-883-0445
Ariz	Scottsdale, Runyon Co.	602-959-6060
Cal	Downey, Buffa Co.	213-923-4618
Cal	Glendale, Electro-Mech Prods.	213-848-0922
Cal	San Diego, Earle Assocs.	714-278-5441
Cal	Santa Clara, Nova-Tronix Elec. Sls.	408-243-9530
Colo	Englewood, Todd Assocs.	303-761-7801
Conn	Branford, W. McCoy Co.	203-488-2012
Fla	Orlando, Brandel-Stephens Co.	305-425-3202
Ga	Atlanta, Brandel-Stephens Co.	404-261-7579
Haw	Honolulu, Aloha Assocs.	808-941-1574
Ill	Chicago, Marsten Sls. Co.	312-775-6611
Ind	Greenwood, Valentine-Schillinger Assoc.	317-888-2260
Ind	South Bend, Valentine-Schillinger Assoc.	219-291-6258
Md	Silver Spring, Carwithen Assocs.	301-589-9112
Mich	Plymouth, Romarc	313-455-0300
Minn	Minneapolis, Nygaard Sls.	612-881-3727
Mo	Kansas City, Harris-Hanson Co.	816-444-9494
Mo	St. Louis, Harris-Hanson Co.	314-432-3611
NJ	Haddonfield, T. Mills Co.	609-429-1005
NJ	Wayne, GT Assocs.	201-694-6040
NM	Scottsdale, Goodreau Assocs.	602-994-9909

NY	Buffalo, Telesco Assocs.	716-834-1026
NY	Levittown, GT Assocs.	516-731-3449
NY	Liverpool, Telesco Assocs.	716-872-6417
NY	Rochester, Telesco Assocs.	716-271-3780
Ohio	Cleveland, D. Steffen & Assocs.	216-461-8333
Ohio	Dayton, A.D. Dircksem & Assoc.	513-256-0351
Tex	Houston, AID Elctrns.	713-777-3882
Tex	Irving, AID Elctrns.	214-259-4761
Wash	Redmond, Barrett Sls. Northwest Ltd.	206-885-6991

VOICE IDENTIFICATION INC., Box 714, Somerville, N.J., 08876, Tel: 201-526-3408; Empl.: 6

Customer service: W. E. Hughes

Free literature available: Illustrated brochures and specification sheets describing sound spectrograph and telephone number decoder/register.

Products manufactured: Analyzers, Decoders, Tape Search Equipment, Testers

VOLTEK INC., 407 N. Maple Dr., Beverly Hills, Cal., 90210, Tel: 213-272-7991; Empl.: 8; Minimum order: $25

Products manufactured: Cable, Connectors, Converters, Power Supplies, Transformers

Local Sales Offices & Reps.

Ariz	Phoenix, C.W. Fowler Co.	602-274-5537
Cal	Chula Vista, C.W. Fowler Co.	714-422-5408
Cal	Inglewood, C.W. Fowler Co.	213-678-5211
Cal	Menlo Park, C.W. Fowler Co.	415-322-5374
Colo	Denver, C.W. Fowler Co.	303-744-9595
Ind	Ft. Wayne, Scott Elctrns.	219-743-1586
Ind	Indianapolis, Scott Elctrns.	317-897-9976
Ky	Louisville, Scott Elctrns.	502-583-3220
Mass	Burlington, Lancer Assocs.	617-272-6445
Mich	Plymouth, Scott Elctrns.	313-455-2440
Minn	Minneapolis, A.J. Warner Co.	612-729-7371
NM	Albuquerque, C.W. Fowler Co.	505-299-7676
Ohio	Cincinnati, Scott Elctrns.	513-791-2513
Ohio	Cleveland, Scott Elctrns.	216-291-2600
Ohio	Columbus, Scott Elctrns.	614-236-8610
Ohio	Dayton, Scott Elctrns.	513-294-0539
Okla	Tulsa, T.J. Ray Co.	918-627-1515
Pa	Camp Hill, Beil & Whitaker	717-233-1254
Pa	Harrisburg, Beil & Whitaker	717-652-1084
Pa	Orefield, Beil & Whitaker	215-395-0150
Pa	Pittsburgh, Scott Elctrns.	412-781-3112
Pa	Reading, Beil & Whitaker	215-779-2610
Va	Alexandria, Potomac Elctrns.	703-836-1630
Wash	Bellevue, C.W. Fowler Co.	206-454-8600

VOLTEX CO., INC., 115 Marine St., Farmingdale, N.Y., 11735, Tel: 516-CH 9-2336; FSC No: 3611; Empl.: 25; Minimum order: $25

For info on price: N. Rothenberg; Application info: N. Rothenberg; Customer service: S. Vogel; Delivery info: S. Vogel

Products manufactured: Controls/Control Eqpt., Current Sources, Drivers, Solenoid, Filters, Meters, Monitors, Oscilloscopes, Power Supplies

Local Distributors

Cal	Costa Mesa, Cen-Tec Sls., 1857 Parkglen Circle	714-645-9157
Mass	Reading, Champagne Assocs., 2 Linden St.	617-944-3011
Minn	New Brighton, Dalska Sls., Box 12751	612-631-2941

Advertisment

Voltex manufactures and designs a complete line of standard and custom power supplies and systems. Inexpensive, reliable, OEM power system requirements are our forte. AC to DC power supplies, DC-DC convertors, DC-AC invertors, switching regulators and power supplies, SCR regulator and pre-regulated power supplies, high power three phase input power supplies, and multi-output regulated systems are available or can be designed to meet YOUR requirements. Send us your requirements for a prompt quotation.

VOLTRONICS CORP., West St., E. Hanover, N.J., 07936, Tel: 201-887-1517, TWX: 710-986-8253; FSC No: 18736; QPL No: Multiple; Empl.: 60; Minimum order: $30

Customer service: Sls. Off.

Free literature available: New Sub-miniature Glass & Precision Glass & Quartz Trimmer Capacitors Catalogues Concentric Ring Air, High Frequency Trimmers Catalogue Microelectronic Subminiature Trimmer Capacitors Catalogue New Multiturn Trimmer Capacitors for Electronic Watches, Engr. Data Sheet

Products manufactured: Capacitors, Fixed, Capacitors, Variable

Local Sales Offices & Reps.

Ariz	Scottsdale, Runyon Co.	602-959-6060
Cal	Encino, EL/TEC, Inc.	213-981-9881
Cal	Mt. View, Weseloh & Assocs.	415-961-0565
Colo	Denver, Camel Elctrns.	303-757-6191
DC	Washington, M. Lader Co.	202-296-2497
Fla	St. Petersburg, Kirkwood & Associates	813-894-8240
Ill	Westchester, Gassner & Clark	312-345-4245
Ind	Fort Wayne, Gassner & Clark Co.	219-456-1675
Iowa	Hiawatha, Gassner & Clark Co.	319-393-5763
Kans	Shawnee Mission, Florence & Meyer, Inc.	913-722-5210
Mass	Natick, Wayland Engrg. Sls.	617-655-6080
Minn	St. Paul, Countryman Associates	612-645-9151
Mo	St. Louis, Florence & Meyer, Inc.	
NJ	Wallington, Comp-Tech Sls.	201-935-5454
NY	New Hyde Park, Comp-Tech Sls.	516-593-2628
NY	Syracuse, Trademark Elctrn. Assoc.	315-478-2149
Ohio	Cincinnati, F.J. Campisano Co.	513-662-1616
Ore	Portland, Western Tech. Sls.	503-224-5107
Pa	Jenkintown, Arnold Associates	215-887-7870
Tex	Richardson, Semiconductor Sls. Assoc.	214-231-6181
Va	Woodbridge, M. Lader Co.	703-494-4731
Wash	Bellevue, Western Tech. Sls.	206-454-3906
FOR:	Toronto, Ont., Vitel Elctrns.	416-622-6300
FOR:	Can., Montreal, Que., Vitel Elctrns.	514-331-7393

Local Distributors

Cal	Sunnyvale, Acacia Sls., 384 San Aleso	408-735-0100
Cal	Van Nuys, Patane Avionics, 5937 Kester Ave.	213-988-4455
Colo	Lakewood, Acacia Sls., 11111 W. 8th Ave.	303-232-2882
NY	Plainview, Fairmont Elctrns., 35 S. Service	516-694-8200

Advertisment

Complete line of precision trimmer capacitors, non-rotating, with glass, quartz, and air dielectrics, MIL-C-14409C styles. New sub-miniature trimmer for gigaherz, stripline and substrate mounting. World-wide representation. New sub-miniature sizes 40% smaller than MIL. New multiturn, high resolution trimmers for electronic watches.

VORNE INDS., INC., 5023 W. Belmont Ave., Chicago, Ill., 60641, Tel: 312-725-3077; Empl.: 12

For info on price: D. Schaeffer; Application info: A. Vorne; Customer service: D. Schaeffer; Delivery info: D. Schaeffer

Products manufactured: Counters

VTM MICROWAVE, 3225 Prairie Ave., Boulder, Colo., 80301, Tel: 303-449-6200; Empl.: 10

For info on price: A. M. Marfut; Application info: M. R. Boyd; Customer service: A. M. Marfut; Delivery info: A. M. Marfut

Free literature available: Catalog & Application Notes; New Product Data Sheets; VTM Handbook.

Products manufactured: Tubes

VU-DATA CORP., 7170 Convoy Ct., San Diego, Cal., 92111, Tel: 714-279-6572, TWX: 910-335-1586; FSC No: 24160; Empl.: 50; Minimum order: $10 ....p. 1•848-850

For info on price: H. Wardein; Application info: H. Wardein; Customer service: W. A. Kraus; Delivery info: H. Wardein

Free literature available: Product Summary Catalog; Portable Oscilloscopes; Monitor Oscilloscopes & Monitor Meters; Tape Recorder Analyzer; Oscilloscope Cameras.

Products manufactured: Analyzers, Cameras, Meters, Oscilloscopes, Probes, Tape Recording Accessories

Local Sales Offices & Reps.

Ala	Huntsville, W.A. Brown Instr.	205-539-4411
Ariz	Phoenix, Zeus, Inc.	602-253-6104
Cal	Encino, Scientific Devices-Cal.	213-872-1951
Cal	Los Alamitos, Scientific Devices-Cal.	213-598-7678
Cal	Mountain View, Scientific Devices-Cal.	415-964-4230
Cal	San Diego, Scientific Devices-Cal.	714-279-6642
Colo	Denver, Zeus, Inc.	303-770-4400
Conn	Hamden, P. Jenks Assocs.	203-281-0810
Fla	Fort Lauderdale, W.A. Brown Instrs.	305-776-4800
Fla	Fort Walton Beach, W.A. Brown Instrs.	904-243-6424
Fla	Indialantic, W.A. Brown Instrs.	305-723-0766
Fla	Orlando, W.A. Brown Instrs.	305-425-5505
Ga	Atlanta, W.A. Brown Instrs.	404-939-1674
Ill	Des Plaines, Scientific Devices-Midwest	312-297-5240
Kans	Lenexa, Scientific Devices-Midwest	913-631-3818
La	Gretna, W.A. Brown Instrs.	504-366-5766
Md	Silver Spring, Sel-Tronics	301-589-3391
Mass	Wakefield, P. Jenks Assocs.	617-246-1590
Mich	Milford, Scientific Devices-Midwest	313-363-2282
Minn	Minneapolis, Scientific Devices-Midwest	612-544-1616
Mo	St. Louis, Scientific Devices-Midwest	314-842-2535
NJ	Fairfield, KLS Assocs.	201-227-2900
NM	Albuquerque, Zeus, Inc.	505-268-3941
NY	Syracuse, DB Assocs.	315-446-0220
NC	Research Triangle Park, W.A. Brown Instr.	919-489-1546
Ohio	Cleveland, Scientific Devices-Midwest	216-835-2270
Ohio	Dayton, Scientific Devices-Midwest	513-298-9904
Okla	Norman, Data Mktg. Assocs.	405-364-8320
Ore	Beaverton, Showalter Instrs.	503-646-3004
Pa	Philadelphia, Eastern Instr. Phil.	215-927-7777
Tenn	Knoxville, W.A. Brown Instrs.	615-584-2614
Tex	Dallas, Data Mktg. Assocs.	214-661-0300
Tex	Houston, Data Mktg. Assocs.	713-686-9627
Tex	San Antonio, Data Mktg. Assocs.	512-828-0937
Utah	Salt Lake City, Zeus, Inc.	801-466-4924
Wash	Bellevue, Showalter Instrs.	206-455-4922

W-F PRODUCTS, 1107 S. Pearl St., Denver, Colo., 80210

WABASH RELAY & ELCTRNS., Box 708, Wabash, Ind., 46992, Tel: 219-563-2191, TWX: 810-290-2722; Empl.: 200; Minimum order: $50 ....p. 1•1825-1836

Customer service: D. L. Snodgrass

Free literature available; Our 8 page catalog lists our standard reed relays, mercury wetted relays and solid state relays. A sampling of standard part numbers is also given.

Products manufactured: Cards, Logic, Relays, Switches, Testers

Local Sales Offices & Reps.

Ariz	Phoenix, Mr. Engrg. Sls. Co.	602-959-5150
Cal	Los Angeles, Halbar	213-387-8283
Cal	San Mateo, Halbar	415-349-4700
Cal	Santa Ana, Calif. Elctrn. Mktg.	714-835-2702
Colo	Denver, Walter Engrg.	303-777-5585
Conn	Thomaston, N.B.S. Assocs.	203-283-5959
Fla	Ormond Beach, Tech. Mktg. Assoc.	904-672-2314
Fla	Pompano Beach, Tech. Mktg. Assoc.	305-942-0774
Ill	Palatine, M.J. Petersen Assocs.	312-358-8855
Mass	Waltham, DeVeer Sls. Co.	617-899-5900
Minn	St. Paul, Skor	612-645-6461
NJ	Clark, Dolan Assocs.	201-382-2797
NY	Rochester, Upstate Comp. Sls.	716-288-1080
Ore	Portland, J.J. Backer Co.	503-297-3777
Pa	Doylestown, Bucks Assocs.	215-348-8223
Tex	Dallas, Stevens Sales Co.	214-350-2476
Wash	Seattle, J.J. Backer Co.	206-285-1300

WABCO AEROSPACE DEPT., Swissvale P.O., Pittsburgh, PA., 15218, Tel: 412-242-5000, TWX: 710-664-2096; Empl.: 250; Minimum order: $25

For info on price: G. A. Dawes; Application info: G. A. Dawes; Customer service: P. La Hive; Delivery info: P. La Hive

Products manufactured: Display Devices/Displays, Relays

Local Sales Offices & Reps.

Ariz	Phoenix, Southwestelm Engrg., Inc.	602-993-0250

Cal	Newport Beach, W. Bert Knight Co.	714-833-8250
Cal	Santa Clara, Nova-Tronix	408-243-9530
Colo	Denver, Franklin Sls. Co.	303-922-3623
Conn	Wethersfield, Underwood Sls. Corp.	203-563-3046
Fla	Ft. Lauderdale, Tech-Rep. Assocs.	305-792-0962
Fla	Indian Rocks Beach, Tech-Rep.Assocs.	813-595-2834
Ga	Atlanta, Tech-Rep. Assocs.	404-252-9288
Ill	Des Plaines, Lincoln, Hodges & Assoc.	312-297-3810
Kans	Wichita, M.E. Bettis Co.	316-685-7441
Kans.	Shawnee Mission Ka, M.E. Bettis Co.	913-362-0722
Md	Baltimore, Chesapeake Mktg. Assoc.	301-486-3345
Mass	Chelmsford, Underwood Sls. Corp.	617-256-8191
Mich	Grand Rapids, Elko Sls. Corp.	616-949-1451
Mich	Grosse Pointe Woods, Elko Sls. Corp.	313-884-7893
Minn	Minneapolis, F.B. Hill Co.	612-941-5270
Mo	St. Louis, M.E. Bettis Co.	314-429-2099
NJ	Haddonfield, Sunday-O'Brien	609-429-4013
NJ	Keasby, Addem Group	516-567-5900
NY	Huntington Station, Addem Group	516-567-5900
Ohio	Cleveland, A.H. Baier Co.	216-461-6161
Ohio	Dayton, A.H. Baier Co.	513-576-4128
Tex	Dallas, Scott Tech. Sls.	214-352-7698
Wisc	Milwaukee, Lincoln, Hodges & Assoc.	414-542-3087
EXP:	Pittsburgh, Pa., WABCO	412-242-5000

WABER ELECTRIC, See SGL Waber Electric.

WADSWORTH ELECTRIC MFG. CO., 20 W. 11th St., Covington, Ky., 41011, Tel: 606-431-0900; Minimum order: $25

Customer service: H. C. Morrison

Products manufactured: Circuit Breakers, Connector Boxes & Strips, Power Outlet, Ducts, Wiring, Motors, Panels, Switches

Local Sales Offices & Reps.

Cal	Los Angeles, M. Brothers	213-749-7587
Cal	San Francisco, Black & Egbert Assocs.	415-282-0840
Colo	Denver, Empire Electrical Sls. Co.	303-986-1838
Conn	Meriden, MacRae-Patton, Inc.	203-238-1965
Fla	Clearwater, J.F. Graff	813-442-1734
Ga	Atlanta, J. C. White	404-938-0433
Ill	Chicago, Wadsworth Elec. Mfg. Co.	312-467-1245
Ind	Indianapolis, A.L. Clifford & Co.	317-639-5248
Kans	Overland Park, H.R. Stein	913-381-4303
Ky	Highland Heights, F.A. Thoeny	606-441-2610
La	New Orleans, S.M. Redmann, Inc.	504-486-5421
Md	Baltimore, A. E. Storrs	301-484-3887
Mass	Framingham, J.J. O'Neill	617-235-6792
Mich	Detroit, Wadsworth Elec. Mfg. Co.	313-872-0277
Minn	Minneapolis, D. T. Atkinson	612-888-6521
NJ	Fair Lawn, J.R. Barker	201-797-6354
NY	New Hartford, F. Walter Laver & Son, Inc.	315-724-0184
NC	Greensboro, A.W. Cheek	919-288-2213
Ohio	Cincinnati, T.P. Hebenstreit	513-851-5516
Ohio	South Euclid, H. I. Covitt	216-382-4473
Okla	Jenks, W.G. Parker Co.	918-299-5449
Ore	Portland, Bruce-Emmett Co.	503-235-2151
Pa	Bethel Park, D.W. Phillips	412-833-5155
Pa	Philadelphia, Wadsworth Elec. Mfg. Co.	215-627-4691
Tex	Irving, J.D. Martin Co.	214-259-7511
Wisc	Brown Deer, J.A. Cantrell	414-355-5550

WAGNER ELEC., Tung-Sol Div., 630 W. Mt. Pleasant Ave., Livingston, N.J., 07039, Tel: 201-WY2-1100, TWX: 710-994-4865 .... p. 2•1208,1209,1582

Free literature available: T-501 - Wagner high reliability metal film resistors, A-14 - tung-sol subminiature lamps, A-21 tung-sol lamps, T-439 - Digivac 1000 data sheet, T-431 - optimum contrast digital displays, T-497 - silicon rectifiers and stacks, T-410 - tung-sol photocontrols, Digivac 200 Data Sheet.

Products manufactured: Cells, Photoconductive, Photoemissive, Photovoltaic, Circuit Breakers, Diodes, Display Devices/Displays, Flashers, Lamps, Lights, Power Supplies, Rectifiers, Regulators, Relays, Resistors, Tubes

Local Sales Offices & Reps.

Ariz	Scottsdale, Inter-Mountain Engrg.	602-947-7379
Cal	El Segundo, Wagner Elec. Corp. Tung-Sol Div.	213-322-0708
Cal	Palo Alto, Held & Mollard	415-965-9321
Cal	Tustin, Orion Sls.	714-823-9687
Colo	Denver, Walter Engrg.	303-777-5585
Fla	Altamonte Springs, Semtronic Assocs.	305-831-8233
Fla	North Miami, A.J. Giammanco & Assoc.	305-891-7794
Ill	Elk Grove Village, Wagner Elec. Corp. Tung-Sol Div.	312-439-1810
Kans	Overland Park, T.L. Dowell & Assocs.	913-236-8200
Md	Baltimore, R. A. Wafer Assocs.	301-744-1133
Mass	Needham Heights, Todino Engrg.	617-444-7925
NM	Albuquerque, IMEC	505-883-9010
NC	Raleigh, A.B. Andrews & Co.	919-833-5565
Ohio	Akron, Augnat Assocs.	216-725-6087
Ore	Portland, C.K. Shanks & Assocs.	503-292-5656
Tex	Addison, Parvin Sls. Co.	214-239-9148
Tex	Houston, Paruin Sls. Co.	713-784-9900
Wash	Seattle, Underwood & Underwood	206-243-2133

WAHL CLIPPER CORP., 2902 Locust St., Sterling, Ill., 61081, Tel: 815-625-6525; Minimum order: $2

Customer service: N. H. Wallen

Free literature available: Catalog sheets describing the Iso-Tip manufactured by Wahl and accessories. Catalog sheets are 4-color.

Products manufactured: Heat Guns, Production, Soldering Accessories, Soldering Guns, Irons & Desoldering Tools

Local Sales Offices & Reps.

Ariz	Phoenix, R. Fissell Co.	602-264-4031
Cal	Alhambra, C. G. Putnam Co.	213-283-0435
Cal	San Francisco, C. G. Putnam Co.	415-552-2311
Colo	Colorado Springs, Norris & Co.	303-635-9319
Fla	Fort Lauderdale, Unirep	305-527-1556
Ga	Atlanta, Elmar Assocs.	404-261-4345
Haw	Honolulu, G. Piety Factors, Inc.	808-839-9051
Ill	Hoffman Estates, G. Sangwin Co.	312-884-0186
Ind	Indianapolis, Electronic Reps.	317-897-9326
Md	Baltimore, EKP Assocs.	301-788-6498
Mass	Wellesley, L. Cole, Inc.	617-237-1260
Mass	West Springfield, L. Cole, Inc.	413-781-3040
Mich	Rochester, R.A. Albrecht & Co.	313-615-7081
Minn	St. Paul, C-M Co.	612-699-8004
Mo	Raytown, B & C Sls. Co.	816-358-6638
NJ	Edison, L. W. Keller & Assocs., Inc.	516-785-2826
NY	E. Syracuse, Honsinger Mktg. Assocs.	
NY	Nanuet, L. W. Keller & Assocs., Inc.	516-785-2826
NY	No. Bellmore, L. W. Keller & Assocs., Inc.	516-785-2826
Ohio	St. Marys, T. Shelby & Co., Inc.	419-394-3377
Pa	Ashton, EKP Assocs.	215-459-4517
Pa	Bethlehem, EKP Assocs.	215-691-5250
Pa	Easton, EKP Assocs.	215-258-6477
Tex	Dallas, Maynard & Gunn	214-742-2384
Tex	Houston, Maynard & Gunn	713-497-0544
Wash	Seattle, D. Smith Sls. Co.	206-633-3160
Wisc	Brookfield, G. Sangwin Co.	414-782-3240

WAHL, WM. CORP., 12908 Panama St., Los Angeles, Cal., 90066, Tel: 213-391-7234, TWX: 910-343-6867; Empl.: 28

Products manufactured: Meters, Pyrometers

Local Sales Offices & Reps.

Ala	Odenville, L. M. Crowe Co.	205-629-5475
Alas	Anchorage, Alaska Expediters	907-279-1923
Ariz	Scottsdale, Inter-Mountain Engrg.	602-947-7379
Cal	Pasadena, RDX Corp.	213-681-3451
Cal	San Diego, RDX Corp.	714-278-6863
Cal	Sunnyvale, RDX Corp.	408-732-4500
Colo	Littleton, Radco Elctrns.	303-794-4279
Fla	St. Petersburg, L. M. Crowe Co.	813-894-0249
Ga	Atlanta, L. M. Crowe Co.	401-255-2700
Ill	South Holland, RAECO, Inc.	312-331-6001
Ind	Indianapolis, Raeco	317-257-4761
Iowa	Cedar Rapids, Mueller Sls. Corp.	319-365-1196
Kans	Overland Park, J. Shurtleff Co.	913-831-9222
Mass	Peabody, JSR Assocs.	617-532-0348
Mich	Detroit, S. Sterling Co.	313-255-1970
Minn	Golden Valley, Mueller Sls. Corp.	612-544-8888
Mo	St. Louis, J. Shurtleff Co.	913-831-9222
NY	Buffalo, Seelbach & Schmitt	716-839-2300
NY	Westbury, Tech-Rep Engrg. Co.	516-997-7946
NC	Greensboro, Associated Agents	919-292-6508
Ohio	Cleveland, S. Sterling Co.	216-442-8080
Ohio	Dayton, S. Sterling Co.	513-298-7573
Okla	Tulsa, J. Shurtleff Co.	919-WE 6-7269
Pa	King of Prussia, Inistex	215-337-1240
Pa	Pittsburgh, L. H. Boleky Co.	412-761-8994
Tenn	Knoxville, L. M. Crowe Co.	615-693-4226
Tex	Houston, Allied Engrg. & Supply Co.	713-528-5625

Local Distributors

Ala	Odenville, Lewis M. Crowe Co., Route 1, Box 129-A	205-629-5475
Alas	Anchorage, Alaska Expediters, 3685 Arctic Blvd.	907-279-1923
Ariz	Scottsdale, Inter-Mtn. Engrg., 4533 N. Scottsdale Rd., Suite 212	602-947-7379
Cal	Pasadena, RDX Corp., 110 S. Euclid Ave.	213-681-3451
Cal	Sunnyvale, RDX Corp., 1287 Lawrence St.	408-734-4500
CaL	San Diego, RDX Corp., 8072 Engineer Rd.	714-278-6863
Colo	Littleton, RADCO Elctrns., 2552 Ridge Rd.	303-794-4279
Fla	St. Petersburg, Lewis M. Crowe Co., Box 7505	813-894-0249
Ill	So. Holland, RAECO, 550 Armory Dr.	312-331-6001
Iowa	Cedar Rapids, Mueller Sls. Corp., 1119 Wenig Rd., N.E.	319-365-1196
Kan	Overland Park, John Shurtleff Co., 7520 W. 63rd St.	913-831-9222
Mass	Peabody, JSR Assocs., 14 Raymond Circle	617-532-0348
Mich	Detroit, Comtel-Sterling Co., 17500 McNichols Rd.	313-255-1970
Minn	Golden Valley, Mueller Sls. Corp., 2420 Nevada Ave. N.	612-544-8888
NJ	Palisades Park, Tech-Rep Engrg., 116 John St. Room 1102	212-349-5943
NY	Buffalo, Seelbach & Schmitt, 13 Lincoln Rd.	716-839-2300
NC	Greensboro, Associated Agents, Box 7220	919-292-6508
Ohio	Cleveland, Comtel-Sterling Co., 5827 Mayfield Rd.	216-442-8080
Ohio	Dayton, Comtel-Sterling Co., Kett Box 2036	513-298-7573
Okla	Tulsa, J. Shurtleff Co., 3140 E. 15th St.	918-936-7269
Ore	Portland, F. B. Lee, 106 N.E. Holladay	
Pa	King of Prussia, Wistex, G. Washington Off. Bldg., 216 Goddard Blvd.	215-337-1240
Pa	Pittsburgh, L. H. Boleky Co., 534 Lincoln Ave.	412-761-8994
Tenn	Knoxville, L. M. Crowe Co., 228 Engert Rd.	205-629-5475
Tenn	Memphis, John V. Wright & Co., 3837 Marston Rd.	901-362-8344
Tex	Houston, ALLESCO, 7313 Ashcroft, Suite 204	713-771-0115
Wash	Seattle, F. B. Lee, Box 66099	206-244-7262

WAKEFIELD ENGRG., INC., Teal & Audubon Rd., Wakefield, Mass., 01880, Tel: 617-245-5900, TWX: 710-348-6713; Empl.: 240; Minimum order: $50

For info on price: B. Grafton; Application info: D. Hegarty; Customer service: B. Emery; Delivery info: B. Emery

Free literature available: COOLERS for Power Semiconductors and High Power Relays; CAT 103A on Standard Cooling Accessories/Distributor Products; CAT 13 on Forced Convection Coolers; CAT 30 on Heat Exchangers.

Products manufactured: Adhesives (All Types), Compounds, Encapsulating, Insulating, Molding, Potting, Heat Exchangers & Systems, Heat Sinks, Soldering, Testers, Transistor, Diode, Thyristor Heat Dissipators

Local Sales Offices & Reps.

Ariz	Phoenix, Zeus, Inc.	602-253-6104
Cal	Los Altos, Recht Assocs.	415-941-0336
Cal	Woodland Hills, Interstate Mktg. Assocs.	213-883-7606
Colo	Denver, Zeus, Inc.	303-770-4400
Conn	Newtown, Gerber Sls.	203-426-3440
Fla	Ft. Lauderdale, G.F. Bohman Assocs.	305-564-3081
Fla	Orlando, G.F. Bohman Assocs.	305-855-0274
Ga	Atlanta, Electro-Mech Sls. Engrg. Co.	404-256-4414
Ill	Rolling Meadows, Sumer, Inc.	312-394-4900
Kans	Overland Park, PMA Corp.	913-381-0004
Kans	Wichita, PMA Corp.	316-522-4101
Md	Baltimore, Burgin-Kreh Assocs.	301-788-5200
Mass	E. Longmeadow, Gerber Sls. Co.	413-525-3059
Mass	Waltham, Gerber Sls. Co.	617-890-8040
Mich	Grand Rapids, J.L. Montgomery Assocs.	616-774-9308
Mich	Southfield, J.L. Montgomery Assocs.	313-358-2616

Minn	Minneapolis, Nortec Sls.	612-835-7414
Mo	Hazlewood, PMA Corp.	316-264-2662
NJ	Haddonfield, Sunday-O'Brien	609-429-4013
NM	Albuquerque, Zeus, Inc.	505-268-3941
NY	Great Neck, E.R.A., Inc.	516-822-9890
NY	Skaneateles, MCK Assocs.	315-685-7122
NC	Raleigh, Electro-Mech Sls. Engrg. Co.	919-782-6452
Ohio	Columbus, T. Mulligan & Assocs.	614-457-2242
Ore	Beaverton, N.R. Schultz Co.	503-643-1644
Tenn	Nashville, Electro-Mech Sls. Engrg.	615-883-1490
Tex	Dallas, Electra III	214-243-5969
Utah	Salt Lake City, Zues, Inc.	801-466-4924
Va	Lynchburg, Burgin-Kreh	804-845-5600
Wash	Bellevue, N.R. Schultz Co.	206-454-0300

Local Distributors

Ala	Birmingham, Ack Radio Supp.	205-322-0588
Ala	Huntsville, Cramer/Ew Huntsville, 2310 Bob Wallace Ave. SW	205-539-5722
Ariz	Phoenix, Cramer/Ariz., 2643 E. University	602-263-1112
Ark	Little Rock, Carlton-Bates Co., 6821 Scott Hamilton Dr.	501-562-9100
Cal	Inglewood, Newark Elctrns. Corp., 4747 W. Century Blvd.	213-678-0441
Cal	Irvine, Cramer/L.A., 17201 Daimler St.	714-979-3000
Cal	Los Angeles, California Elec. Sply., 1911 Armacost W.	213-826-8333
Cal	San Diego, Cramer/San Diego, 8975 Complex Drive	714-565-1881
Cal	Sunnyvale, Cramer/San Fran., 720 Palomar Ave.	408-739-3011
Colo	Denver, Cramer/Denver, 5465 E. Evans Place at Hudson	303-758-2100
Colo	Denver, Newark-Denver Elctrns., 2170 So. Grape St.	303-757-3351
Conn	Westport, Newark Elctrns., 25 Sylvan Rd. South	203-226-6921
Conn	North Haven, Cramer/Conn., 35 Dodge Ave.	203-239-5641
Fla	Fort Lauderdale, Newark Electronics, 1360 N.W. 65th St.	305-587-2372
Fla	Hollywood, Cramer/Ew Hollywood, 4035 North 29th Avenue	305-923-8181
Fla	Orlando, Cramer/Ew Orlando, 345 North Graham Avenue, Box 20214	305-894-1511
Fla	Orlando, Hall-Mark Elctrn., 7233 Lake Ellenor Dr.	305-855-4020
Ga	Atlanta, Ack Radio Supp.	404-351-6340
Ga	Atlanta, Cramer/Atlanta, 3923 Oakcliff Industrial Court	404-448-9050
Ill	Chicago, Newark Elctrns., 500 N. Pulaski Rd.	312-638-4411
Ill	Elk Grove Village, GBL Elctrns.	312-593-3220
Ill	Mt. Prospect, Cramer/Chicago, 1911 South Busse Road	312-593-8230
Ill	Palatine, Ohm/Elctrns., 645 Vermont Ave.	312-359-5500
Ind	Ft. Wayne, Ft. Wayne Elctrns. Supply, 3606 Maumee Ave.	219-423-3422
Ind	Indianapolis, Graham Elctrns., 133 S. Penn St.	317-634-8202
Ind	Indianapolis, Pioneer Standard, 6408 Castle Pl.	317-849-7300
Iowa	Cedar Rapids, Newark Elctrns.	319-362-1171
Kans	Great Bend, Radio Supply Inc., 1910 Tenth St.	316-793-3507
Kans	Lenexa, Hall-Mark Elctrn., 9006 Rosehill Rd.	913-888-4747
Kans	Salina, Radio Supply Inc., 1809 So. Broadway	913-823-6353
Kans	Wichita, Radio Supply Co., 115 Laura	316-267-5214
Md	Baltimore, Cramer/Baltimore, 922-24 Patapsco Avenue	301-354-0100
Md	Beltsville, Newark Elctrns., 10440 Baltimore	301-937-5085
Md	Gaithersburg, Cramer/Ew Washington, 16021 Industrial Drive	301-948-0110
Md	Savage, Pyttronic Ind., 8200 Wellmoor Ct.	301-792-7000
Mass	Boston, Newark Elctrns, 13A Wheeling Ave.	617-935-8350
Mass	Newton, Cramer/International, 85 Wells Ave.	617-969-7700
Mass	Woburn, Rush Inds., Inc., 122 Cummings Dr.	617-935-2400
Mich	Ann Arbor, Wedemeyer Elctrn. Supply Co., 2280 S. Ind'l. Hwy.	313-665-8611
Mich	Detroit, RS Elctrns., 12775 Lyndon St.	313-491-1000
Mich	Livonia, Cramer/Detroit, 13193 Wayne Road	313-425-7000
Mich	Livonia, Pioneer/Michigan	313-525-1800
Mich	Oak Park, Newark-Detroit Elec., Inc., 20700 Hubbell Ave.	313-548-0250
Mich	Wyoming, Newark Elctrns., 3645 Linden S.E.	616-241-6681
Minn	Edina, Cramer/Bonn, 7275 Bush Lake Road	612-835-7811
Minn	Minneapolis, Newark-Minneapolis Elec. Corp., 336 Hoover St. NE	612-331-6350
Mo	Earth City, Hall-Mark Elctrns.	304-291-5350
Neb	Lincoln, Scott Elctrns.	402-464-8308
NJ	Camden, General Radio Supply, 600 Penn St.	609-964-8560
NJ	Cherry Hill, Cramer Elctrns., 12 Springdale Rd.	609-424-5993
NJ	Kenilworth, Newark Elctrns., 303 Monroe Ave.	201-272-8410
NJ	Moonachie, Cramer/N.J., 1 Barrett Ave.	201-935-5600
NJ	Springfield, Route Electr. Inc., Echo Plaza, Rte. #22	201-379-7710
NM	Albuquerque, Cramer/N.M., 137 Vermont N.E.	505-265-5767
NY	Bohemia, Car-Lac Elctrn. Ind'l. Sls., 75 Orville Dr.	516-567-4200
NY	East Syracuse, Cramer/Syracuse, 6716 Joy Road	315-437-6671
NY	Freeport, Milgray Elctrns., 191 Hanse Ave.	516-546-6000
NY	Hauppauge, Cramer/Long Island, 29 Oser Avenue	516-231-5600
NY	Plainview, Newark Elctrns., 80 Express St.	516-822-5000
NY	Rochester, Cramer/Rochester, 3259 Winton Road South	716-275-0300
NY	Rochester, Newark Elctrns., 3000 S. Winton Rd.	716-473-6600
NC	Raleigh, Pytronic Inds., 4509 Creedmoor Rd.	919-782-6370
NC	Winston-Salem, Cramer/EW, 938 Burke Street	919-725-8711
NC	Winston-Salem, Kirkman Elctrns., Inc., 901 W. Second St.	919-724-0541
Ohio	Cincinnati, Cramer/Tri-States, 666 Redna Terr.	513-771-6441
Ohio	Cincinnati, Hughes-Peters, Inc., 4865 Duck Creek Rd.	513-351-2000
Ohio	Cincinnati, Newark Elctrns., 9799 G Princeton Rd.	513-874-5115
Ohio	Cleveland, Cramer/Cleveland, 5835 Harper Road	216-248-8400
Ohio	Cleveland, Newark Electronics, 3304 E 87 St.	216-641-2800
Ohio	Cleveland, Pioneer Standard Elctrns., Inc., 4800 E. 131st St.	216-587-3600
Ohio	Cleveland, RPC Elctrns., 749 Miner Rd.	216-461-4700
Ohio	Columbus, Hughes-Peters, Inc., 481 E. 11th Ave.	614-294-5351
Ohio	Dayton, John Becker Electric Co.	513-226-1341
Ohio	Dayton, Pioneer/Dayton, 1900 Troy St.	513-236-9900
Okla	Oklahoma City, Trice Wholesale Elctrns.	405-524-4411
Ore	Portland, Central Dist., 955 N.E. Union	503-234-0711
Pa	Carnegie, Pytronic Inds., 14 E. Mall Plaza	412-276-6722
Pa	Harrisburg, Pyttronic Inds. Inc., 2325 No. 7th St.	717-233-6591
Pa	Montgomeryville, Pyttronic Inds. Inc., Stump Rd., Box 433	215-643-2850
Pa	Pittsburgh, RPC Elctrns., 620 Alpha Dr.	412-782-3770
RI	Warwick, W.H. Edwards Co.	401-781-8000
Tex	Dallas, Cramer/Texas, 2970 Blystone Lane	214-350-1355
Tex	Garland, Newark Elctrns., 707 Easy St.	214-271-2511
Tex	Houston, Altair Co.	713-462-3029
Tex	Houston, Newark Elctrns., 6902 Harwin Dr.	713-782-4800
Tex	Richardson, Altair Co.	214-231-5166
Utah	Salt Lake City, Cramer/Utah, 391 West 2500 South	801-487-4131
Utah	Salt Lake City, Newark-Salt Lake City, 259 Crossroad Sq.	801-486-1048
Wash	Seattle, Cramer/Seattle, 5802 6th Avenue S.	206-762-5755
Wash	Seattle, Sterling Elctrns., 5608 6th Ave. So.	206-762-9100
WVa	Wheeling, RPC Electronics, 1301 Main St.	304-232-7630
Wisc	Milwaukee, Newark Electronics, 3695 N. 126th St.	414-781-2450
Wisc	Oak Creek, Cramer/Wisconsin, 430 W. Rawson Ave.	414-764-1700

WAKEFIELD ENGRG., INC. cont'd

Advertisment

COMPONENTS DIVISION: Semiconductor Cooling Products....Heat Sinks; Aluminum Extrusion Shapes; Clamps for Compression Type SCRs and Diodes with Heat Sinks or Liquid Cooled Bus Blocks; Thermal Joint Compound; Thermally Conductive Epoxies for Bonding, Coating or Casting; Forced Convection Cooling Packages; Heat Exchangers; Custom Stamped, Extruded or Copper Assemblies.

SYSTEMS DIVISION: Semiconductor and IC Life Test and Burn-in Systems & Components.

WAKEFIELD ENGRG., INC., Systems Div., Audubon Rd., Wakefield, Mass., 01880, Tel: 617-245-5900, TWX: 710-348-6713; Empl.: 250

Customer service: S. Brylinsky

Free literature available: Guideline Booklet to Component Burn-In Technology: SD-41 Programmable Tray Bulletin: SD-42 Equipment Bulletin:
AC Switching Power Supply Data Sheet: basic configuration of AC switching power supplies and their various output ratings. Liquid Vapor Bulletin: module used for power device burn-in.

Products manufactured: Ovens, Power Supplies, Testers

Local Sales Offices & Reps.

Ariz	Scottsdale, Jack Hagestad	602-945-0902
Conn	Hamden, Equipment Sales	203-248-5581
Fla	Orlando, Newco & Assocs.	305-293-7700
Ill	Wheaton, Engrg. Prods. Assocs.	312-653-6826
Ind	Kokomo, Teledyne TAC	317-453-7671
Md	Lanham, Brimberg Assocs.	301-552-2200
Mass	Chelmsford, Equipment Sales	617-256-8547
Minn	Minneapolis, Engrg. Prods. Assocs.	612-925-1883
NY	Hartsdale, Powell-Pendergraph, Inc.	914-761-7792
Ohio	Dayton, Assembly Materials & Equipment Systems	513-435-9730
Pa	Berwyn, Tucker Assocs.	215-644-0142
Tex	Dallas, Techn. Processes Co.	214-352-3957

WALDES KOHINOOR, INC., 47-16 Austel Pl., Long Island City, N.Y., 11101, Tel: 212-392-3100, Telex: 126-829; Empl.: 500

For info on price: A. Berger; Application info: J. Altman; Customer service: G. Scionti; Delivery info: G. Scionti

Free literature available: 128-page TRUARC® TECHNICAL MANUAL offers complete engineering data for retaining rings .040" to 10" dia; plus assembly tools, Government and industry standards, typical applications.

Products manufactured: Fasteners, Pliers, Rings, Retaining

Local Sales Offices & Reps.

Cal	Anaheim, R. P. Winship	213-749-8271
Ga	Atlanta, D. C. Fillingame	404-394-0366
Ill	Bolingbrook, G. P. Watkins	312-739-6329
Ind	Noblesville, R. C. Davis	317-773-6311
Iowa	Bettendorf, F. J. Bradley	319-355-3100
Kans	Shawnee, Benson Engrg. Co.	913-631-4113
Ky	Louisville, Petrie-Ingram Co.	502-459-0280
Mass	Worcester, D. Kelleher	617-757-3929
Mich	Southfield, Armstrong, Doran	313-559-4828
NY	Floral Park, A. Bernstein	212-343-3339
NY	Mount Vernon, H. D. Hartman	914-MO 4-2020
NY	Penfield, T. G. Koltes Assoc.	716-377-9080
Ohio	Cleveland, Petrie-Ingram Co.	216-442-5530
Ohio	Dayton, Petrie-Ingram Co.	513-298-3108
Pa	King of Prussia, J. C. Botta	215-265-0424
Tenn	Millington, O. L. Spry	901-872-2415
Tex	Dallas, Benson Engrg. Co.	214-352-7541
Wisc	Brookfield, R. V. Petershack	414-784-0385

WALDOM ELECTRONICS, INC., 4623 W 53rd St, Chicago, Ill., 60632, Tel: 312-585-1212, Telex: 25-4604; FSC No: 92219; Minimum order: $25

p. 1•104,105,1070-1074; p. 2•1070-1074,1262-1266

For info on price: Cust. Svc. Dept.; Application info: M. Halley; Customer service: E. Beutler; Delivery info: E. Beutler

Free literature available: Catalog #7G7, Waldom General Line Catalog (sample attd), Catalog #7FOM-1, Waldom/Molex Catalog (sample attd), Catalog #WB-73, Waldom/Bivar Catalog (sample Attd), Price Schedule #7U5 Resale Price List (7U4 attd - 7U5 in print will be available after first of the year).

Products manufactured: Adhesives (All Types), Alarms, Bells, Buzzers, Gongs, Sirens & Aural Warning Devices, Bumpers, Bushings, Glass, Plastic, Metal, Rubber, Etc., Capacitor, Hardware, Caps, Connector, Cases, Equipment, Instrument, Meter, Clamps & Clips, Coils Including Assemblies & Forms, Connector Adapters, Connectors, Contacts, Electrical, Cords, Cutters, Wire, Hand Operated, Dials, Drives & Drive Mechanisms (Dial), Fasteners, Grommets, Guides, Circuit Board, Handles For Cabinets, Circuit Boards, Racks, etc., Holder & Carriers, Holders, Circuit Board (Production Type), Indicators, Integrated Circuit Devices, Jack Covers, Jacks (All Types), Kits, Connector, Kits, Terminal, Knobs, Lights, Machines/Machinery, Production, Nameplates, Packages, Integrated Circuit, Pads, Transistor Mounting, Pins, Plug & Jack Sets, Plug Buttons, Plugs, Pointers, Dial, Posts, Pullers, Racks, Reducers, Resistor, Hardware, Scales, Dial, Shields, Sockets, Spacers, Splices, wire (Including, Butt & Cap Types), Strain Reliefs, Cable & Wire, Switch Mounting Plates, Switches, Terminal Blocks, Boards & Strips, Terminals, Tools, Wire & Cable Ties, Wire Nuts, Wire Strippers

Local Sales Offices & Reps.

Cal	Burlingame, W.J. Purdy Co.	415-347-7701
Cal	Costa Mesa, Cen-Tec Sls.	714-645-9157
Cal	Inglewood, Ungar Sls. Assocs.	213-776-7340
Cal	Sacramento, W. J. Purdy Co.	916-422-0128
Cal	San Francisco, Tech. Sls. Assocs.	415-467-1434
Colo	Denver, W.J. Purdy Co.	303-777-1411
Fla	No. Miami, Winfield Elec. Sls. Co.	305-945-6544
Fla	Tampa, Winfield Elec. Sls. Co.	813-884-6500
Ga	Atlanta, H.W. Phillips Co.	404-237-7564
Ill	Chicago, Ellinger Sls. Corp.	312-763-1570
Ind	Indianapolis, Elctrn. Reps.	317-897-9326
Mass	Braintree, Rudolph & Mac Innis	617-843-0908
Mich	Orchard Lake, Ellinger Sales Corp.	313-626-1170
Minn	Maple Crove, R.C. Sls.	612-425-5543
Minn	Minneapolis, E. Melius & Assocs.	612-854-4270
Mo	Kansas City, Nevco, Inc.	816-421-1751
Mo	St. Louis, Nevco, Inc.	314- 843-7406
NJ	Parsippany, Total Mktg. Action	201-227-4073
NM	Albuquerque, W.J. Purdy Co.	505-266-7959
NY	Flushing, M. Bettan Sls.	212-591-7600
NY	Phelps, LSM Assocs.	315-548-4891
NY	Port Washington, Total Mktg. Action	516-883-2432
Ohio	Cleveland, Marlow Assocs.	216-932-0900
Ohio	Xenia, Marlow Assocs.	513-426-6270
Ore	Portland, J.V. BeLusko Co.	503-222-4279
Pa	Easton, E-K-P Assocs.	215-258-6477
Pa	Fort Washington, Kirk-Sandell	215-643-2100
Tex	Houston, B. Rogers & Co.	713-626-5370
For:	Can., Vancouver, B.C., Omintronix	604-277-5953
FOR:	Can., Montreal, Que., Omnitronix, Ltd.	514-735-0987

Local Distributors

Ala	Huntsville, Powell Elctrns., 803 Oster Dr.	205-539-2731
Ala	South Birmingham, Forbes Distributing, 1416 Fourth Ave.	205-251-4104
Ariz	Tucson, Inland Elctrns., 715 E. Bdwy.	602-624-4402
Ark	Little Rock, Carleton-Bates Co., 6821 Scott Hamilton	501-562-9100
Cal	Costa Mesa, Component Center, 1240 E. Logan Ave.	714-979-0433
Cal	Mountain View, Abacus Elctrns., 1065 Terra Bella Ave.	415-961-1500
Cal	Mountain View, Powell Elctrns., 411 Fairchild Dr.	415-964-0820
Cal	Sacramento, Dunlap Elctrns., 1800 18th St.	916-444-8070
Cal	San Diego, Shanks & Wright, 2045 Kettner Blvd.	714-239-0176
Cal	Southgate, CEC Moltronics, 5610 E. Imperial Hwy.	213-773-6521
Colo	Denver, Acacia Sls., 11111 W. 8th Ave.	303-232-2882
Colo	Denver, Electronic Parts Co., 1212 S. Bdwy.	303-744-1992
Conn	Hartford, Hatry of Hartford, 500 Ledyard St.	203-527-1881
Fla	Miami, Electronic Equip., 2701 N.W. 42nd Ave.	305-871-3500
Fla	Orlando, Powell Elctrns., 2032 Palmridge Way	305-859-1450
Ga	Atlanta, Lykes Elctrns., 1135 Chattahoochee Ave. N.W.	404-355-2223
Haw	Honolulu, Precision Radio Ltd., 1160 S. King St.	808-537-5291
Ill	Champaign, Klaus Radio, 905 S. Neil St.	217-356-1896
Ill	Mt. Prospect, Cramer Elctrns., 1911 S. Busse Rd.	312-593-8230
Ill	Palatine, OHM Elctrns., 649 Vermont Ave.	312-359-5500
Ill	Peoria, Klaus Radio/Peoria, 8400 N. Pioneer Pkwy.	309-691-4840
Ill	Rosemont, Advent Elctrns., 7110 N. Lyndon	312-298-4210
Ind	Evansville, Hutch & Son, 300 N. Main St.	812-425-7155
Ind	Evansville, Ohio Valley Sound, 20 E. Sycamore St.	812-425-6173
Ind	Indianapolis, RA-DIS-CO, 814 N. Senate	317-637-5571
Iowa	Cedar Rapids, Deeco, Inc., 2520 16th Ave. S. W.	319-365-7551
Kans	Wichita, Radio Supply Co., 115 Laura	316-267-5216
Ky	Louisville, P. I. Burks Co., 824 S. Seventh St.	502-589-3960
La	Lafayette, Ralph's, 3004 Cameron St.	318-234-4507
Md	Beltsville, Powell Elctrns., 10728 Hanna St.	301-474-1030
Mass	Dedham, Gerber Elctrns., 852 Providence Hwy.	617-329-2400
Mass	Lynn, Land Elctrns., 9R Franklin St.	617-592-2220
Mass	Newton, Cramer Elctrns., 85 Wells Ave.	617-969-7700
Mich	Ann Arbor, Wedemeyer Elctrns., 215 N. Fourth Ave.	313-665-8611
Minn	St. Paul, Gopher Elctrns., 2520 W. Larpenteur	612-645-0241
Miss	Jackson, Ellington Elctrn. Supply, 1425 Terry Rd.	601-355-0561
Mo	St. Louis, Olive Inds. Elctrns., 6662 Olive Blvd.	314-863-7800
Mo	St. Louis, Van Sickle, 1915 Washington St.	314-621-5000
Neb	Lincoln, Scott Elctrn. Supply, 4040 Adams St.	402-434-8308
Nev	Reno, Edco, 720 Tahoe St.	702-323-2766
NM	Albuquerque, Elctrn. Parts Co., 2620 Rhode Island St. N.E.	505-293-6161
NY	Bohemia, Car-Lac Elctrn. Supply, 75 Orville Dr.	516-567-4200
NY	Buffalo, Summit Radio Distributing, 916 Main St.	716-884-3450
NY	Johnson City, Wilshire Elctrns., 617 Main St.	607-797-1236
NY	Lynbrook, Peerless RAdio Corp., 19 Wilbur St.	212-523-3456
NY	Rochester, Simcona Elctrns., 275 Mt. Read Blvd.	716-328-3230
NC	Charlotte, Dixie Radio Supply, Box 10563	704-377-5413
NC	Raleigh, Southeastern Radio Supply, 414 Hillsborough St.	919-828-2311
Ohio	Cincinnati, United Radio, Summit Rd. & Reinhold Dr.	513-761-4030
Ohio	Columbus, Hughes-Peters, Inc., 481 E. 11th Ave.	614-294-5351
Ohio	Solon, Repco, 6835 Cochran Rd.	216-248-8900
Ohio	Dayton, ESCO, 221 Crane St.	513-226-1133
Okla	Tulsa, Oil Capitol Elctrns., 708 S. Sheridan	918-836-2541
Pa	Drexel Hill, Kass Elctrns., 2502 Township Line Rd.	215-449-2300
Pa	Erie, Mace Elctrns., 2631 W. 8th St.	814-838-3517
Pa	Phildadelphia, Powell Elctrns., So. Island Rd. & Entpr.	215-365-1900
Pa	Pittsburgh, RPC Elctrns., 620 Alpha Dr.	412-782-3770
RI	Warwick, W. H. Edwards Co., 55 Elctrns Dr.	401-781-8000
SC	Columbia, Dixie Radio Supply, 1900 Barnwell St.	803-253-5332
SC	Greenville, Dixie Radio Supply, Box 46	803-232-5357
Tenn	Nashville, Electra Distributing Co., 1914 W. End Ave.	615-329-3971
Tex	El Paso, Midland Specialty, 2235 Wyoming Ave.	915-533-9555
Tex	Houston, Geophysical Supply, 1500 Crawford	713-224-0621
Tex	Houston, Newark-Houston, 6902 Harwin Dr.	713-782-4800
Tex	San Antonio, Sherman Elctrns., 720 San Pedro Ave.	512-226-0247
TEx	Dallas, Wilkinson Brothers, 2406 Ross Ave.	214-747-1571
TEx	Fort Worth, Swieco, Inc., 1518 E. Lancaster	817-335-6521
Utah	Salt Lake City, Kimball Elctrns., 350 Pierpont Ave.	801-328-2075
Va	Arlington, Arlington Elctrns., 3636 Lee Hwy.	703-524-2412
Va	Norfolk, Priest Elctrns., 6431 Tidewater Dr.	804-855-2021
Wisc	Milwaukee, Marsh Radio Elctrns., 6047 W. Beloit Rd.	414-545-6500
Wisc	Milwaukee, Parts Mart, 1314 N. 7th St.	414-276-4160

WALKER SCIENTIFIC, INC., Rockdale St., Worcester, Mass., 01606, Tel: 617-852-3674; Empl.: 83

For info on price: B. Langley; Application info: B. Langley; Customer service: E. Pederson; Delivery info: B. Langley

Products manufactured: Analyzers, Coils Including Assemblies & Forms, Generators, Hysteresisgraphs, Indicators, Integrators, Electronic, Magnetometers, Magnets, Meters, Multipliers, Power Supplies, Probes, Testers

Local Sales Offices & Reps.

Ariz	Phoenix, C.W. Fowler Co.	602-274-5537
Cal	inglewood, C.W. Fowler Co.	213-678-5211
Cal	Menlo Park, C.W. Fowler Co.	415-322-5374
Colo	Denver, C.W. Fowler Co.	303-744-9595
Fla	Jacksonville, Pulcir, Inc.	904-743-5700
Ill	Mt. Prospect, Contemporary Science	312-255-3793
Md	Beltsville, Kelly Scientific Instrs., Inc.	301-937-4350
Mass	Burlington, Scien. Sys. Sls.	617-273-1660
NM	Albuquerque, Southwest Engrg. & Equip.	505-265-6776
NY	Syosett, Scientific Sys. Sls. Corp.	516-921-3737
Ohio	Westerville, Contemporary Science	614-882-6908
Tenn	Knoxville, Pulcir, Inc.	615-693-3641
Tex	Dallas, Southwest Engrg. & Equip. Co.	214-826-6661
Tex	Houston, Southwest Engrg. & Equip. Co.	713-623-2580
Wash	Bellevue, C.W. Fowler Co.	206-454-8600
FOR:	Can., Downsview, Ont., Aptec Eng.	416-661-9722
FOR:	Can., Montreal, P.Q., Aptec Engrg., Ltd.	514-735-1737

Advertisment

Walker/Magnemetrics: Magnetic Measuring Instrumentation

- Hysteresisgraphs
- Coercivity Meters
- Fluxmeters
- Gaussmeters (Hall & NMR)

Walker/Magnion: Laboratory Magnet Systems

- Laboratory Magnets (Iron core and Air core)
- Laboratory Power Supplies (Regulated and Unregulated)
- Susceptibility systems
- Magnetic Field Control Instruments
- Sweep Instruments

WALL A. T. CO., 55 Service Ave., Warwick, R.I., 02889, Tel: 401-739-0740, TWX: 710-382-1535; Empl.: 52

For info on price: R. Huntsman; Application info: F. B. Read Jr.; Customer service: C. T. Chwalek; Delivery info: R. Huntsman

Products manufactured: Metals, Seals, Tubes, Tubing

Local Sales Offices & Reps.

Ill	Elk Grove, R. P. Wave
Nj	Cliff Side Park, J. A. Roberge
Ny	Fairport, L. Bagley
EXP:	Stamford, Conn., Dage Corp.

WALL-LENK MFG. CO., Box 3349, Dept. EEM-71, Kinston, N.C., 28501, Tel: 919-527-4186; Empl.: 65; Minimum order: $10 .... p. 2•1718,1719

For info on price: S. Whitfield; Application info: M. McNutt; Customer service: S. Whitfield; Delivery info: S. Whitfield

Free literature available: Catalogs 1-669F and LC774

Products manufactured: Flux, Brazing & Soldering Materials, Heat Guns, Production, Solder (All Types), Soldering Accessories, Soldering Equipment, Soldering Guns, Irons & Desoldering Tools, Torches, Soldering, Welding & Access.

Local Sales Offices & Reps.

Cal	Carson, Bidwell Sls. Co.	213-770-0300
Ill	Chicago, Midwest Elctrn. Sls.	312-777-9700
Kans	Mission, Inland Assocs.	913-362-2366
Md	Towson, Habco Elctrns.	301-825-9637
Mich	St. Clair Shores, J. M. Thorpe	313-779-6363
Minn	Minneapolis, C.R. Gibb	612-377-1200
NJ	Bergenfield, H. Gray Assocs.	201-384-3643
NY	Rushville, Ellis Scovel	315-584-6522
Ohio	Cleveland, Electro Com	216-886-2404
Pa	King of Prussia, L. Spangenberg	215-265-2130
RI	Lincoln, Adams McGregor	401-726-1300
Wash	Seattle, D. Miller Sls.	206-784-6800

WALLACE S. K. ASSOCS., 13902 N. Dale Mabry/Ste 216, Tampa, Fla., 33607, Tel: 961-1037

For info on price: W. C. Jaudon 813-961-1037; Application info: E.Healy 305-961-6640

Products manufactured: Actuators, Amplifiers, Baffles, Speaker, Cabinets & Accessories, Cable, Comm. Systems, Display Devices/Displays, Grilles, Relays, Resistors, Switches, Tubes

Local Sales Offices & Reps.

Fla	Hollywood	305-961-6640
Fla	Tampa	813-961-1037
Ga	Jonesboro	404-471-6297
Nc	Greensboro	919-292-0487
Nc	Kernersville	919-993-3993
Tenn	Memphis	901-682-2281

WALLER CORP., PO Box 340, Crystal Lake, Ill., 60014, Tel: 815-459-6510, TWX: 910-634-3351; Empl.: 50

Customer service: J. M. Skala

Free literature available: Waller's OEM catalog of AM-FM-MPX stereo chassis plus AM-FM and special frequency tuners with I.F. strips and MPX, on request.

Products manufactured: Amplifiers, Boards, Printed Circuit, Comm. Systems, Receivers, Tuners

WANG LABORATORIES, INC., 836 North St., Tewksbury, Mass., 01876, Tel: 617-851-4111, TWX: 710-343-6769; Empl.: 2000

Products manufactured: Calculators, Electrical & Electronic, Computers

Local Sales Offices & Reps.

Ala	Birmingham	205-591-2000
Ala	Mobile	205-479-0645
Alas	Anchorage	907-272-6115
Ariz	Phoenix	602-263-9196
Ark	Little Rock	501-666-7115
Cal	Fresco	209-233-7445
Cal	Los Angeles	213-776-2985
Cal	Sacramento	916-489-7326
Cal	San Diego	714-565-8541
Cal	San Mateo	415-573-6311
Cal	Santa Cruz	408-423-5560
Cal	Tustin	714-832-4720
Colo	Denver	303-572-1536
Conn	Hartford	203-246-6571
Conn	Woodbridge	203-281-0565
DC	Washington	202-785-2105
Fla	Ft. Lauderdale	305-966-3106
Fla	Jacksonville	904-396-1415
Fla	Orlando	305-894-9631
Fla	Tallahassee	904-877-7060
Fla	Tampa	813-877-8240
Ga	Atlanta	404-451-0178
Haw	Honolulu	808-941-7525
Ill	Des Plaines	312-298-7990
Ill	Morton	309-265-9113
Ill	Park Ridge	312-823-5793
Ill	Rock Island	309-788-3339
Ind	Highland	216-923-2280
Ind	Indianapolis	317-257-5381
Kans	Prairie Village	913-236-5454
Kans	Wichita	316-682-9420
Ky	Louisville	502-897-5143
La	Baton Rouge	504-927-5129
La	Bossier City	318-425-1900
La	Metairie	504-837-1622
Md	Rockville	301-770-6410
Md	Towson	301-821-8212
Mass	Tewksbury	617-851-4111
Mass	Waltham	617-890-6621
Mass	Worcester	617-798-8771
NY	Syracuse	315-437-7279
Mich	Grand Rapids	616-458-6595
Mich	Lansing	517-371-1120
Mich	Southfield	313-352-7112
Minn	Bloomington	612-884-7328
Mo	St. Louis	314-968-5350
Neb	Omaha	402-556-2733
NH	East Derry	603-329-6358
NJ	Springfield	201-467-3600
NM	Albuquerque	505-265-5608
NY	Lake Success	516-437-2500
NY	Latham	518-785-3234
NY	Rochester	716-442-5930
NY	Williamsville	716-688-6397
NC	Charlotte	704-527-0223
NC	Greensboro	919-272-5683
NC	Raleigh	919-782-8893
Ohio	Cincinnati	513-771-3445
Ohio	Cleveland	216-381-6525
Okla	Oklahoma City	405-524-4489
Okla	Tulsa	918-663-1410
Ore	Portland	503-297-2501
Pa	Bryn Mawr	215-525-7637
Pa	Harrisburg	717-564-8650
Pa	Pittsburgh	412-343-3500
RI	Cranston	401-943-1164
SC	Mt. Pleasant	803-884-5141
Tenn	Chattanooga	615-894-5516
Tenn	Knoxville	615-588-1308
Tenn	Memphis	901-452-6296
Tenn	Nashville	615-385-1262
Tex	Austin	512-444-1791
Tex	Beaumont	713-832-6428
Tex	Corpus Christi	512-855-2162
Tex	Dallas	214-241-9278
Tex	El Paso	915-565-8853
Tex	Ft. Worth	817-927-0461
Tex	Houston	713-783-7200
Tex	Lubbock	806-762-0204
Tex	San Antonio	512-344-1102
Utah	Salt Lake City	801-487-5791
Va	Newport News	804-595-8803
Va	Richmond	804-359-6320
Wash	Seattle	206-283-3800
Wash	Spokane	509-535-9836
WVa	Charleston	304-346-0345
Wisc	Madison	608-255-4411
Wisc	Milwaukee	414-224-0771

WARD LEONARD ELEC. CO. INC., Sub. Riker-Maxson, 31 South St., Mt. Vernon, N.Y., 10550, Tel: 914-664-1000, TWX: 710-562-0144; FSC No: 63743; QPL No: 15109; Empl.: 600; Minimum order: $50

For info on price: G. Platenyk; Application info: J. Schieb; Customer service: C. Blank; Delivery info: C. Blank

Free literature available: WIRE-WOUND RESISTOR CATALOG details axial lead, fixed, adjustable, strip, disc, types. CONTROL DIGEST 100 lists relays, timers, contactors, field rheostats, motor starters, pushbuttons.

Products manufactured: Amplifiers, Chargers, Battery, Controls/Control Eqpt., Regulators, Relays, Resistors, Transformers

Local Sales Offices & Reps.

Ariz	Tempe, Argus Sls.	602-967-8709
Cal	Los Altos, Recht Assoc.	415-941-0336
Fla	North Miami, Winfield Elctrn. Sls.	305-945-6544
Ga	Decauter, Electro Rep. Assoc.	404-636-8533
Ill	Elmhurst, Ward Leonard	312-279-5490
Ind	Fort Wayne, Lingeman & Assoc.	219-485-4743
Md	Baltimore, Faion Lott & Co.	301-744-4611
Mass	Framingham, Murata/J. F. D.	617-872-4843
Minn	St. Louis Pk., Beta Engrg.	612-925-4422
Mo	St. Louis, Scherrer Instrs.	314-644-5362
NY	Mt. Vernon, Ward Leonard	914-664-1000
NY	New Hartford, Ward Leonard	315-732-3507
NY	Williamsville, Ward Leonard	716-634-4300
NC	Charlotte, Electro Rep. Assoc.	704-527-2530
Ohio	Cleveland, Ward Leonard	216-382-8444
Pa	Phila., S. MacDonald	215-545-1205
Tex	Richardson, Spectra Sls.	214-234-3600
EXP:	New York, NY, ITT Export Corp.	212-797-3300

WARNECKE ELECTRON TUBES, INC., 175 W. Oakton St., Des Plaines, Ill., 60018, Tel: 312-299-4436, TWX: 910-233-4597; Empl.: 50.

Products manufactured: Lamps, Tubes

Local Sales Offices & Reps.

NJ	Tenafly, Budd-Tronics, Inc.	201-569-2230
Ohio	Dayton, Ashby Assocs.	513-252-5627

WARNER ELEC. BRAKE & CLUTCH CO., 449 Gardner St., S. Beloit, Ill., 61080, Tel: 815-389-3771; Empl.: 1200

For info on price: J. Dewey

Products manufactured: Actuators, Brakes, Clutches, Controls/Control Eqpt., Counters, Motors

Local Sales Offices & Reps.

Ala	Birmingham	205-252-5151
Cal	Palos Verdes Peninsula	213-377-5461
Cal	Simi Valley	805-522-4330
Conn	Vernon	203-646-5337
Fla	Titusville	305-269-3061
Ga	Lilburn	404-469-1551
Ill	Chicago	312-775-7570
Iowa	Bettendorf	309-762-0112
Mass	Westboro	617-326-7100
Mich	Troy	313-689-7515
Minn	Minneapolis	612-335-7277
Minn	Prior Lake	612-335-7277
Mo	Warrensburg	816-421-8499
NJ	Madison	201-377-4800
NY	Liverpool	315-458-0500
NY	No. Syracuse	315-458-0500
NC	Greensboro	919-275-7879
Ohio	Cincinnati	513-891-4813
Ore	Portland	503-666-6980
Pa	Exton	215-233-1216
Pa	Philadelphia	215-233-1216
Tex	Dallas	214-327-1268
Wisc	Milwaukee	414-871-8022

WARREN G-V COMMUNICATIONS, Div. Sola Basic Inds., 101 Okner Pkwy., Livingston, N.J., 07039, Tel: 201-992-6200, TWX: 710-994-4852; Empl.: 200; Minimum order: $25

Customer service: E. McMullen

Free literature available: Brochure describing various controls and protective devices Also includes application advantages and terminology definitions for thermal relays.

Products manufactured: Chargers, Battery, Comm. Systems, Controls/Control Eqpt., Delays, Time (Excluding Delay Lines, Timers, Delay & Relays, Time-Delays), Detectors, Eliminators, Battery, Flashers, Generators, Inverters, Monitors, Power Supplies, Relays, Switches, Thermostats, Timers

Local Sales Offices & Reps.

Cal	Los Angeles, M.A. Stolaroff Co.	213-AX 5-7781
Minn	Minneapolis, HMR, Inc.	612-335-7734

WARWICK PRODS CO., 7909 Rockside Rd., Independence, Ohio, 44131, Tel: 216-524-4404; Empl.: 18; Minimum order: $10

For info on price: T. J. Storey; Application info: R. F. Beverstock; Customer service: T. J. Storey; Delivery info: T. J. Storey

Products manufactured: Cabinets & Accessories, Cases, Equipment, Instrument, Meter, Cases, Transit, Containers, Kits, Test Equipment

Local Sales Offices & Reps.

Mass	Boston, R. Krauth	617-522-8421
NJ	West Caldwell, Peterson-Rudnick Assocs.	201-226-4363
NY	Bronx, Peterson-Rudnick Assocs.	212-671-1923
NY	Canadaigua, W. Winship	315-394-3292

WATERBURY PRESSED METAL CO., Parts Div., 407 Brookside Rd., Waterbury, Conn., 06714, Tel: 203-756-8891; Empl.: 85

For info on price: J. Cipriano; Application info: C. Mellette; Customer service: M. Joy; Delivery info: F. Estes

Products manufactured: Cable Assemblies & Harnesses, Fasteners, Mounts, Shields, Transistor, Diode, Thyristor Heat Dissipators

Local Sales Offices & Reps.

FOR:	Can., Brampton, Ont.	416-453-5581

WATERS MFG., INC., Longfellow Ctr., Wayland, Mass., 01778, Tel: 617-358-2777; QPL No: Multiple; Empl.: 95

Customer service: H. A. Daziel

Free literature available: POTENTIOMETER CATALOG: Complete descriptions of precision and semi-precision potentiometers - both conductive plastic and wirewound. Story of MystR-Linear Motion Transducers.. TORQUE WATCH GAUGE CATALOG: Precise measurement of static torque.

PROFESSIONAL AUDIO CONTROLS CATALOG: Describes both rotary and linear motion attenuators and Pan-Pots.

Products manufactured: Attenuators, Indicators, Potentiometers, Resistors, Testers

Local Sales Offices & Reps.

Ariz	Tempe, Argus Sls.	602-967-8709
Cal	Los Angeles, Elsner-Rambo Co.	213-664-2928

Cal	Redwood City, Woodworth Co.	415-365-0252
Colo	Denver, Omega Ltd.	303-758-1508
Conn	Trumbull, Sir Assocs.	203-268-2560
Fla	Hollywood, J.A. Simberkoff	305-925-4560
Ga	Atlanta, V. Avis McCorvey Co.	404-636-2502
Mass	Lexington, Sir Assocs.	617-862-1812
Mich	Detroit, R.P. Urban & Assocs.	313-535-2355
Mich	Grand Rapids, R.P. Urban & Assocs.	616-245-0511
Minn	Hopkins, F. Peterson Co.	612-941-5400
Mo	St. Louis, Ozark Elctrn. Mktg., Inc.	314-423-7200
NJ	So. Orange, S. Simberkoff Assocs.	201-763-7900
Ohio	Dayton, H. Teplitz & Co.	513-277-6531
Okla	Tulsa, W. Pat Fralia Co.	918-663-8707
Pa	Philadelphia, S. Simberkoff Assocs.	215-455-9579
Tex	Fort Worth, W. P. Fralia Co.	817-738-2394
Tex	Houston, W.P. Fralia Co.	713-772-1572
Utah	Salt Lake City, Omega Limited	801-266-9617
Wash	Seattle, Avionics Liaison, Inc.	206-767-3870

WATKINS-JOHNSON CO., 3333 Hillview Ave., Palo Alto, Cal., 94304, Tel: 415-493-4141, TWX: 910-373-1253

For info on price: Appls. Engrg.; Application info: Appls. Engrg.; Customer service: S. Craighead; Delivery info: Appls. Engrg.

Products manufactured: Amplifiers, CATV Systems & Equipment, Cavities, Microwave, Chokes, Counters, Crystals, Demodulators, Diodes, Direction Finders, Discriminators, Display Devices/Displays, Filters, Furnaces, Generators, Horns, Microwave, Limiters, Mixer-Preamplifiers, Microwave, Mixers, Modulators, All Kinds, Monitors, Multipliers, Oscillators, Power Supplies, Receivers, Soldering Equipment, Switches, Synthesizers, Test Systems, Transformers, Tubes, Tuners

Local Sales Offices & Reps.

Cal	Inglewood	213-670-4850
Cal	Palo Alto	415-493-4141
Cal	Scotts Valley	408-438-2100
Fla	Orlando	305-851-2391
Md	Gaithersburg	301-948-7550
Mass	Burlington	617-272-7235
NJ	New Shrewsbury	201-842-2422
Ohio	Fairborn	513-426-8303
Tex	Dallas	214-239-9131

WATKINS-JOHNSON CO., Production Equip., 440 Mount Hermon Rd., Scotts Valley, Cal., 95060, Tel: 408-438-2100 EXT.217, TWX: 910-598-4403; Empl.: 1500

Customer service: M. K. Durham

Products manufactured: Furnaces

Local Sales Offices & Reps.

Ariz	Phoenix, Meas. Consits.	602-994-9519
Cal	Long Bch., Scrantom Engrg.	714-979-6373
Cal	Santa Clara, F.J. Toffey Assoc.	408-377-8817
Colo	Broomfield, Measurement Consultants	303-449-5294
Conn	Bridgeport, Tech. Instr.	203-368-4582
Fla	Sarasota, W. J. Irvine Co.	813-955-9656
Ill	Lake Villa, R.W. Venn Co.	312-395-5353
Mass	Wilmington, Tech. Instr.	617-944-3930
NM	Albuquerque, Meas. Consits.	505-265-6471
NY	Rochester, Upstate Tech. Equip.	716-454-4455
NY	Solvay, Upstate Tech. Equip.	315-488-3101
Ohio	Dayton, Sidnell Co.	513-433-7761
Pa	Warminster, Eastern Elctrn. Assocs.	215-674-1535
Tex	Austin, Crockett Engrg.	512-451-8269
Tex	Dallas, Crockett Engrg.	214-251-1776
Tex	El Paso, Measurement Consits.	505-526-2491
FOR:	Can., Longueuil, Que., A. Crawford Assoc.	514-670-1212
FOR:	Can., Mississaga, Ont., A. Crawford Assoc.	416-678-1500
FOR:	Can., Ottawa, Ont., A. Crawford Assoc.	613-725-3354
FOR:	Can., Vancouver, B.C., A. Crawford Assoc.	604-253-7136

WATLOW ELEC. MFG. CO., 12001 Lackland Rd., St. Louis, Mo., 63141, Tel: 314-878-4600; Empl.: 230

Products manufactured: Controls/Control Eqpt., Heaters & Heating Elements, Thermocouples, Elements & Accessories, Thermostats

Local Sales Offices & Reps.

Cal	Inglewood, Carlin Assocs.	213-673-4711
Cal	Mt. View, H.A. Clahsen	415-964-6364
Ga	Atlanta, R. Starnes	404-458-2068
Ill	Chicago, J. Priest & Assocs.	312-992-1220
Mass	Natick, Electrical Comp.	617-655-2225
Mich	Detroit, D. Martignon	313-651-0500
Mo	Kansas City, R. White	816-587-9270
Mo	St. Louis, R. Greene Co.	314-644-2666
NJ	Fair Lawn, Par Assocs.	201-447-3722
NY	Buffalo, H. H. Cardozo	716-834-3377
NY	E. Syracuse, R. H. Nichols	315-437-2813
NY	Lindenhurst, E. Berruti	516-884-4777
NY	Rochester, J. F. Serr	716-586-6226
Ohio	Cincinnati, M. Jordahl	513-683-4500
Ohio	Cleveland, Dale Street & Assoc.	216-886-1266
Pa	Warrington, G. Baker	215-343-6170
Tex	Arlington, Davis-Dawson Co.	817-265-6426

WAVELINE, INC., Box 718, W. Caldwell, N.J., 07006, Tel: 201-226-9100, TWX: 710-734-4324; FSC No: 00443; Empl.: 95; Minimum order: $50

For info on price: M. Humecky; Customer service: D. Morsillo; Delivery info: B. Robertson

Products manufactured: Adapters, Waveguide, Antennas, Attenuators, Bends & Twists, Microwave, CATV Systems & Equipment, Chokes, Comm. Systems, Couplers, Detectors, Dividers, Dummy Loads, Filters, Flanges, Waveguide, Generators, Holders, Crystal, Horns, Microwave, Joints, Rotary, Microwave, Junctions, Hybrid, Microwave, Line Strechers, Microwave, Loads, Electronic Variable, Meters, Mixers, Mounts, Probes, Seals, Shifters, Shutters, Microwave, Sliding Loads, Microwave, Switches, Tees, Terminals, Testers, Tubes, Tubing, Tuners, Waveguides & Adapters

Local Sales Offices & Reps.

Ala	Huntsville, Beacon Elctrn. Assocs.	205-881-5031
Cal	Anaheim, Blair Assocs.	714-635-1350
Cal	Cupertino, Allis Assocs.	408-379-2883
Fla	Maitland, Beacon Elctrn. Assn.	305-647-3498
Fla	Palm Beach Garden, Beacon Elctrn.	305-622-2770
Ga	Atlanta, Beacon Elctrn.	404-351-3654
Ill	Northfield, Feller Assocs.	312-446-8065
Ind	Rochester, Feller Assoc.	219-233-2377
Md	Glen Arm, Hodgins Assocs.	301-592-7047
Mass	Needham Hgts., Reptron, Inc.	617-449-4141
NJ	Teaneck, Sylvan Ginsbury, Ltd.	201-837-1100
NJ	W. Caldwell, Waveline, Inc.	201-226-9100
NY	Skaneateles, Robtron, Inc.	315-685-5731
SC	Spartanburg, Beacon Elctrn. Assoc.	803-582-4613
Tex	Richardson, Lear Assocs.	214-231-5388
FOR:	Can., Aurora, Ont., John Herring & Co.	416-727-1345

WAVETEK, 9045 Balboa Ave., San Diego, Cal, 92123, Tel: 714-279-2200, TWX: 910-335-2007; Minimum order: $25 .... p. 1•852-859

For info on price: C. Anderson; Application info: J. A. Roth; Customer service: P. Brance; Delivery info: C. Anderson

Products manufactured: Attenuators, Generators, Meters, Synthesizers, Terminals, Test Equipment

Local Sales Offices & Reps.

Ala	Huntsville, W.A. Brown Instrs.	205-539-4411
Ariz	Scottsdale, BFA Corp.	602-946-4215
Cal	Lawndale, Ward/Davis Assoc.	213-542-7740
Cal	San Diego, Ward/Davis Co.	714-459-3351
Cal	Sunnyvale, Ward/Davis Assoc.	408-245-3700
Colo	Denver, BFA Corp.	303-744-3301
Conn	Hamden, P. Jenks Assocs.	203-281-0810
Fla	Ft. Lauderdale, W.A. Brown Instrs.	305-776-4800
Fla	Orlando, W.A. Brown Instrs.	305-425-5505
Ga	Atlanta, W.A. Brown Instrs.	404-939-1674
Ill	Chicago, Carter Elctrns.	312-585-5485
Ind	Indianapolis, Carter Elctrns.	317-293-0696
Kans	Andover	316-683-7512
Kans	Overland Park, Palatine Engrg. Sls.	913-262-5643
La	Gretna, W.A. Brown Instrs.	504-366-5766
Md	Silver Spring, Eastern Instrumentation	301-681-6500
Mass	Wakefield, P. Jenks Assocs.	617-246-1590
Mich	Detroit, WKM Assocs.	313-892-2500
Minn	Minneapolis, Carter Elctrns.	612-544-9393
Mo	St. Louis, Palatine Engrg. Sls.	314-426-7055
NM	Albuquerque, BFA Corp.	505-292-1212
NM	Las Cruces, BFA Corp.	505-523-0601
NY	Great Neck, Eastern Instrumentation	516-466-9505
NY	N. Syracuse, NACO Elctrns. Corp.	315-699-2651
NC	Durham, W.A. Brown Instrs.	919-489-1546
Ohio	Cleveland, WKM Assocs.	216-267-0445
Ohio	Dayton, WKM Assocs.	513-434-7500
Okla	Norman, Data Mktg. Assoc.	405-364-8320
Pa	Philadelphia, Eastern Instrumentation	215-927-7777
Pa	Pittsburgh, WKM Assocs.	412-892-2953
Tex	Dallas, BFA Corp.	801-466-6522
Tex	Houston, Data Mktg. Assocs.	713-686-9627
Tex	San Antonio, Data Mktg. Assocs.	512-828-0937
Utah	Salt Lake City, BFA Corp	801-466-6522
Wash	Seattle, R.S. Drake Assocs.	206-763-2755
Wisc	Milwaukee, Carter Elctrns.	414-464-5555

WAVETEK INDIANA, INC., 66 N. First Ave., Beech Grove, Ind., 46107, Tel: 317-783-3221, TWX: 810-341-3226; Empl.: 150 .... p. 1•852-859

Customer service: J. Wiley

Free literature available: Catalog, -Wavetek Generation & Measurement Equipment. Flyer, -Test Equipment for the CATV Industry

Products manufactured: Amplifiers, Attenuators, CATV Systems & Equipment, Generators, Oscilloscopes

Local Sales Offices & Reps.

Ala	Huntsville, W.A. Brown Instrs.	205-539-4411
Ariz	Scottsdale, BFA Corp.	602-946-4215
Cal	Lawndale, Ward/Davis Assoc.	213-542-7740
Cal	San Diego, Ward/Davis Assoc.	714-459-3351
Cal	Santa Clara, Ward/Davis Assoc.	408-245-3700
Colo	Denver, BFA Corp.	303-744-3301
Conn	Hamden, P. Jenks Assoc.	203-281-0810
DC	Washington, Eastern Instrumentation	301-681-6500
Fla	Ft. Lauderdale, W.A. Brown Instrus.	305-776-4800
Fla	Ft. Walton Beach, W.A. Brown Instrus.	904-243-6424
Fla	Orlando, W.A. Brown Instrus.	305-425-5505
Ga	Atlanta, W.A. Brown Instrus.	404-939-1674
Ill	Chicago, Carter Elctrns.	312-585-5485
Ind	Indianapolis, Carter Elctrns.	317-293-0696
Kans	Overland Park, Carter Elctrns.	913-649-6996
La	Gretna, W.A. Brown Instrus.	504-366-5766
Mass	Wakefield, P. Jenks Assoc.	617-246-1590
Mich	Detroit, WKM Assocs.	313-892-2500
Minn	Minneapolis, Carter Elctrns.	612-544-9393
Mo	St. Louis, Carter Elctrns.	314-731-2237
NM	Albuquerque, BFA Corp.	505-292-1212
NM	Las Cruces, BFA Corp.	505-523-0601
NY	Great Neck, L.I., Eastern Instrumentation	516-466-9505
NY	N. Syracuse, Naco Elctrns.	315-699-2651
NY	Rochester, Naco Elctrns.	716-244-4720
NY	Schenectady, Naco Elctrns.	518-783-5855
NY	Utica, Naco Elctrns.	315-732-1801
NC	Research Triangle Park, W.A. Brown Instrus.	919-489-1546
Ohio	Cleveland, WKM Assocs.	216-267-0445
Ohio	Dayton, WKM Assocs.	513-434-7500
Pa	Philadelphia, Eastern Instrumentation	215-927-7777
Pa	Pittsburgh, WKM Assocs.	412-892-2953
Tex	Dallas, Data Mktg. Assoc.	214-661-0300
Tex	Houston, Data Mktg. Assoc.	713-686-9627
Tex	San Antonio, Data Mktg. Assoc.	512-828-0937
Wash	Seattle, R. S. Drake Assoc.	206-763-2755
Wisc	Milwaukee, Carter Elctrns.	414-464-5555
FOR:	Can., Longueuil, P.Q., A. Crawford Assoc.	
FOR:	Can., Mississauga, P.Q., A. Crawford Assoc.	
FOR:	Can., Ottowa, A. Crawford Assoc.	
FOR:	Can., Vancouver, B. C., A. Crawford Assoc.	

WEBBER MANUFACTURING CO., 8634 Brookville Rd., Indianapolis, Ind., 46206, Tel: 317-357-8681; Empl.: 40

Customer service: R. C. Webber

Free literature available: Brochure No. 8400 (enclosed)

Products manufactured: Chamber, Environmental Test

WEBER TECH PRODUCTS, 1340 Monroe Ave. N.W., Grand Rapids, Mich., 49505, Tel: 616-363-7735; Empl.: 36

Customer service: W. Lough

Free literature available: Clean Rooms - Brochures describing, total facilities, modular devices, and portable units Air Conditioning - Brochures outlining types & sizes of units with specifications.

Products manufactured: Air Cleaners & Filters (Shielded & Unshielded), Air Conditioners (For Equipment)

WECKESSER CO. INC., 4444 W. Irving Park Rd., Chicago, Ill., 60641, Tel: 312-282-8626; Empl.: 90; Minimum order: $5

For info on price: D. E. Haines; Application info: D. E. Haines; Customer service: W. F. Morrissey; Delivery info: W. F. Morrissey

Products manufactured: Clamps & Clips, Fasteners, Wire & Cable Ties

Local Sales Offices & Reps.

Ariz	Phoenix, EGR Co.	602-959-0320
Ark	Poyen, Comp. Parts	501-337-9580

Cal	Los Angeles, El-Com. Inc.	213-223-1351
Cal	San Carlos, D.H. Ross Co.	415-591-4411
Colo	Denver, Franklin Sls. Co.	303-922-3623
Conn	Milford, Plastic Comps. Co.	203-877-2723
Fla	Maitland, Hutto-Hawkins-Peregoy	305-831-2474
Fla	Pompano Beach, Hutto-Hawkins-Peregoy	305-943-9593
Ga	Atlanta, Millar Elctrns.	404-261-6160
Iowa	Des Moines, KSW Assocs.	515-279-9235
Mich	Oak Park, D. P. Stewart & Assoc.	313-399-7565
Minn	Minnetonka, T.H. Ayre & Assoc.	612-474-4125
Mo	Kansas City, KSW Assocs.	816-358-5240
Mo	St. Louis, KSW Assocs.	314-781-6111
NC	Raleigh, Millar Elctrns.	919-787-9564
Ohio	Chagrin Falls, Alexander Ind'l. Sls.	216-247-4133
Ohio	Kettering, Alexander Ind'l. Sls.	513-293-3651
Pa	Philadelphia, Acar Electronic Hardware	215-722-8511
Tenn	Madison, Comp. Parts	615-859-5832
Tex	Dallas, J.B. Guenther, Inc.	214-528-5286
Tex	Houston, J.B. Guenther, Inc.	713-468-0232
Wash	Seattle, R. Johnston Co.	206-524-5170
Wisc	Milwaukee, E.A. Dickinson & Assocs.	414-264-1080
EXP:	Chicago, Ill., Weckesser Int'l.	312-545-2688

WEINSCHEL ENGRG. CO., Box 577, Gaithersburg, Md., 20760, Tel: 301-948-3434, TWX: 710-828-9705; Empl.: 225; Minimum order: $35

For info on price: R. Bastien

Free literature available: Data Sheets or Brochures on all products; Short-Form Catalog; Microwave Measuring and Generation Instruments Catalog; RF Attenuators and Components Catalog; Application and Technical Notes.

Products manufactured: Amplifiers, Analyzers, Attenuators, Bolometers, Bridges, Cable, Calibrators, Comparators, Connector Adapters, Connectors, Couplers, Detectors, Diodes, Dividers, Dummy Loads, Generators, Indicators, Insertion Loss Measurement Systems, Meters, Mismatches, Microwave, Precision, Mixers, Modulators, All Kinds, Mounts, Oscillators, Plug & Jack Sets, Power Supplies, Receivers, Resistors, Standards, Suppressors, Switches, Tees, Terminals, Testers, Thermistors, Tuners

Local Sales Offices & Reps.

Ala	Huntsville, BCS Assocs.	205-881-6220
Cal	Burbank, Instr. Specialist	213-849-7181
Cal	Santa Clara, Instr. Specialist	408-244-1505
Colo	Denver, PLS Assocs.	303-771-0140
Fla	Orlando, BCS Assocs.	305-896-4881
Ill	Des Plaines, Cozzens & Cudahy	312-298-3600
Ind	Indpls., Cozzens & Cudahy	317-244-2456
Md	Wheaton, Sonco	301-942-9420
Mass	Lexington, Lancer Assoc.	617-861-1720
Minn	Mpls., Cozzens & Cudahy	612-884-4336
Mo	St. Louis, Cozzens & Cudahy	314-423-1234
NJ	Ft. Lee, Tech. Mktg.	201-224-6911
NM	Albuquerque, PLS Assocs.	505-255-2330
NY	No. Syracuse, Naco Elctrns.	315-699-2651
NY	Rochester, NACO Elctrns.	716-244-4720
NY	Utica, Naco Elctrns.	315-732-1801
NC	Greensboro, BCS	919-273-1918
Pa	Philadelphia, Eastern Inst.	215-927-7777
Tex	Ft. Worth, C. Wolf Co.	817-738-1996
Tex	Houston, C. Wolf Co.	713-721-2442
Wash	Seattle, R. Drake	206-763-2755

WELCO INDS. INC., 9027 Shell Ave., Cincinnati, Ohio, 45236, Tel: 513-891-6600, TWX: 810-461-2574; Empl.: 103; Minimum order: $35

For info on price: C. White; Application info: H. Story; Customer service: L. Riesenberg; Delivery info: L. Riesenberg

Products manufactured: Controls/Control Eqpt., Converters, Inverters, Motors

Local Sales Offices & Reps.

Fla	Miami, Ludlum Assoc. Co.	305-885-2514
Ga	Atlanta, H. Homer & Assocs.	404-255-8669
Ill	Park Ridge, L. Fitz Co.	312-631-5488
Mass	Salem, Forbes Engrg. Co.	617-744-1693
Mich	Troy, DBA Control Sls. Assoc.	313-391-3235
Minn	St. Paul, Craighead & Assoc.	612-645-0784
Mo	Kansas City, Horsepower Control Sys.	816-471-6363
NJ	Kenilworth, Wolock & Lott Co.	201-241-4333
NY	Rochester, Ross Equip. Co.	716-271-5660
NC	Charlotte, Ind'l. Drives & Controls	704-535-5414
Ohio	Richfield, Wood-Compton Co.	216-659-6126
Pa	Media, H.B. Stallings & Assocs.	215-566-4100
Va	Richmond, S.D. Harmon & Co.	804-285-3168
Wisc	Kenosha, Transmission Equip. Design	414-652-3412

WELLS ELECTRONICS, INC., Plastics Div., 1701 S. Main St., South Bend, Ind., 46613, Tel: 219-287-5941; Empl.: 85

Products manufactured: Cups, Encapsulation, Holder & Carriers, Services, Assembly, Production & Test, Sockets

Local Sales Offices & Reps.

Ariz	Phoenix, K. Jahn Co.	602-956-9060
Cal	Sunnyvale, Wells Plastics of Cal.	408-734-3435
Fla	Clearwater, Saber Assocs.	
Fla	Lighthouse Point, Saber Assocs.	305-943-3076
Fla	Longwood, Saber Assocs.	305-422-3686
Ga	Woodstock, Saber Assocs.	404-432-9625
Ill	Skokie, Heth, Inc.	312-282-8737
Mass	Auburndale, Schutter-Young Corp.	
Mass	Beverly, Schutter-Young Corp.	617-922-6121
Mich	Detroit, McShane, Inc.	313-366-6084
Minn	Burnsville, Heth, Inc.	616-333-8494
Minn	Minneapolis, D.G. Perry & Co.	612-920-3212
NJ	Teaneck, R.T. Reid & Assocs.	201-692-0200
NY	Fayetteville, M.P. Andrews, Inc.	315-637-3144
Ohio	Dayton, McShane, Inc.	513-298-3441
Ohio	Medina, McShane, Inc.	216-725-4568
Pa	Bala Cynwyd, Electech, Inc.	215-687-5305
Tex	Dallas, Springer Tech. Sls.	214-357-5281
For:	Can., Mont., Que., Subtec Ltd.	514-482-2392
For:	Can., Ottawa, Ont., Subtec Ltd.	613-521-2739
For:	Can., Ottawa, OnT., Subtec Ltd.	613-224-0106
For:	Can., Toronto, Ont., Subtec Ltd.	416-533-2381

WELWYN CANADA DIV., Dale Electronics Inc., Box 2484, 1255 Brydges St., London, Ont., Can., Tel: 519-451-9490; Empl.: 115; Minimum order: $25

For info on price: K. Steers; Application info: C. A. Norris; Customer service: K. Steers; Delivery info: K. Steers

Free literature available: Beyschlag Precision Carbonfilm Resistors 1/8 watt through 2 watts 10 ohms thru 5.1 meg. ±5% tolerance is standard ±2% tol. available on request. "M" Series Metal Film, Precision, -1/4 thru 2 watts standard tol. ±1% and 0.5% .27 OHMS thru 100 meg. Metal oxide film types F07 F20 RL07 RL20 1/4 and 1/2 watt standard tol. ±2% and 5%. ±1% tol. available. 47 cycle to 470K POWER OXIDE "F.P." Series 2 watt thru 10 watts. Std. Tol. ±5% & 10% Lower Tol. available 20 cycle to 91K High voltage "F" Series 1/2 watt and 1 watt ±2%, 5% and 10% tol. 2 meg to 150K meg Ultra High Value 1/4 and 1/2 watt ± 1% thru 10% tol. M, and MH, Series 60 meg to 1000K meg.

Products manufactured: Attenuators, Circuits, Hybrid, Thick Film, Filters, Networks, Resistors

Local Sales Offices & Reps.

FOR:	Can., Montreal, Que., McIntyre Agencies	514-731-9618
FOR:	Can., Winnipeg, Man., Diversified Tech. Reps.	

WER INDUSTRIAL, Div. Emerson Elec. Co., 3036 Alt Blvd., Grand Island, N.Y., 14072, Tel: 716-773-2321; Empl.: 440; Minimum order: $25

For info on price: C. Hollis; Application info: C. Hollis; Customer service: T. DiNoto; Delivery info: C. Hollis

Products manufactured: Brakes, Clutches, Controls/Control Eqpt., Counters, Motor Electric Generator Sets, Power Supplies

Local Sales Offices & Reps.

Ariz	Sun City, Devoe Engrg. Co.	602-974-1023
Cal	Burlingame, Engineering Reps. Co.	415-692-2581
Cal	Fullerton, Devoe Engrg. Co.	714-871-8076
Colo	Littleton, R.L. Palmer Co.	303-771-6827
Conn	Avon, WER Hartford District Office	203-678-0424
Conn	Unionville, Tor-Axial Drive Comps.	203-673-3592
Fla	Clearwater, Arroyo Process Equip.	813-446-0564
Fla	Jacksonville Beach, Arroyo Process Equip.	904-246-0575
Ga	N.W. Atlanta, H. Homer & Assocs.	404-255-8669
Ill	Northbrook, WER Chicago District Office	312-498-5940
Ind	Elkhart, Shaum Electric Co.	219-264-4189
Mass	North Reading, WER Boston Regional Office	617-664-3512
Mich	Farmington, WER Detroit District Office	313-477-5409
Mo	St. Louis, WER St. Louis District Office	314-878-5105
NJ	Kenilworth, Wolock & Lott	201-241-4333
NY	Buffalo, Ross Equip. Co.	716-634-0990
NY	Elmira, Ross Equip. Co.	607-734-1324
NY	Irvington On The Hudson, Wolock & Lott	212-233-2730
NY	Rochester, Ross Equip. Co.	716-271-5660
NY	Syracuse, Ross Equip. Co.	315-463-6691
NC	Charlotte, WER Charlotte	704-537-4364
Ohio	Cincinnati, WER Cincinnati Regional Office	513-232-2285
Ohio	Cuyahoga Falls, WER Akron	216-929-9301
Ohio	Rocky River, WER Cleveland District Office	216-521-5201
Ohio	Toledo, P. H. Girkins	419-241-2101
Ohio	Warren, WER Penn.-Ohio Regional Office	216-929-9301
Pa	Downingtown, WER Philadelphia	215-269-0716
Tex	Dallas, WER Dallas	214-369-0961
Va	Richmond, Sam D. Harmon & Co.	804-285-3168
Wash	Bellevue, Garland Affolter Engrg. Corp.	206-454-2485
Wisc	Mequon, WER Milwaukee District Office	414-242-3633
FOR:	Can., Burnaby, B.C., Lloyd Controls Ltd.	604-291-0484
FOR:	Can., Dartmouth, N.S. B2Y3Z1, Ind'l. Sys. Ltd.	902-466-2461
FOR:	Can., Dollard des Ormeaux 970, Que., WER Montreal Regional Office	514-683-7640
FOR:	Can., Lachine, Que., Peerless Engrg. Sls. Ltd.	514-636-8300
FOR:	Can., Vancouver 9, B.C., Grove Processing Equip. Ltd.	604-879-7771
FOR:	Can., Weston, Ont., Peerless Engrg. Sls. Ltd.	416-742-8702

WERTRONIX CORP., 2673 Culver Ave., Dayton, Ohio, 45429, Tel: 513-299-5586, Telex: 288205; Empl.: 50; Minimum order: $50 .... p. 1•998

Customer service: Sales

Products manufactured: Actuators, Blowers & Fans & Accessories, Brakes, Controls/Control Eqpt., Motor & Generator Armatures, Rotors, Stators, Motors, Services, Assembly, Production & Test, Tachometers

Local Sales Offices & Reps.

Cal	Burlingame, W.J. Purdy Co.	415-347-7701
Cal	Santa Monica, Davidson Assocs.	213-829-1731
Colo	Denver, W.J. Purdy Co.	303-777-1411
Fla	Clearwater, Perrott Assocs.	813-726-1549
Fla	Orlando, Perrott Assocs.	305-275-1132
Ill	Chicago, Engineered Sales Co.	312-867-8434
Md	Baltimore, R.L. Wilkinson, Inc.	301-377-7800
Mass	Woburn, Stockwell Tech. Sls. Co.	617-935-5770
Minn	Minnetonka, T.H. Ayre Assocs.	612-474-4125
Mo	St. Louis, Boweng Tech.	314-429-7327
NM	Albuquerque, W.J. Purdy Co.	505-266-7959
NY	Fairport, D.J. Kirby Co.	716-254-2070
Ohio	Fairborn, Technical Assocs.	513-878-2484
Okla	Tulsa, Kemp Engineering Co.	918-299-2636
Pa	Glenside, R.L. Wilkinson, Inc.	215-424-8400
Tex	Addison, Kemp Engrg. Co.	214-661-0400
Tex	Houston, Kemp Engrg. Co.	713-688-1431
Va	Fairfax, Nine Assocs.	703-273-1803
Wash	Bellevue, SD-R&S2 Products & Sls.	206-747-9424

WESCO ELECTRICAL CO., 201 Munson St., Greenfield, Mass., 01301, Tel: 413-774-4358; FSC No: 12673; QPL No: MIL-C-25; Empl.: 140; Minimum order: $35 .... p. 2•334-337

For info on price: J. R. DeSanty; Application info: J. R. DeSanty; Customer service: M. Cimler; Delivery info: M. Wandeleski

Free literature available: Film-Foil & Metallized film capacitors. Specializing in precision (close tolerance) & custom design.

Products manufactured: Capacitors, Fixed

Local Sales Offices & Reps.

Cal	Santa Ana, Rical Assocs.	714-557-6543
Colo	Golden, Bob Callister & Assocs.	303-761-0992
Conn	Madison, A & M Elctrn. Reps.	203-245-1031
Fla	Altamonte Springs, Semtronic Assocs.	305-831-8233
Fla	Ft. Lauderdale, Semtronic Assocs.	305-771-0010
Ill	Chicago, L-TEC, Inc.	312-286-1500
Ind	Columbus, J.H. Weaver Co.	812-372-3625
Md	Towson, Habco Elctrns., Inc.	301-825-9637
Mass	Needham, A & M Elctrn. Reps.	617-444-8170
NJ	Madison, Livera-Polk Assocs.	201-377-3220
NY	Roslyn Heights, Livera-Polk Assocs.	516-484-1276
NC	Knightdale, Leigh Sls.	919-266-0105
Tex	Dallas, Blackburn Assocs.	214-351-9991
Wash	Redmond, Desco Northwest	206-445-9325

Directory of Local Distributors Starts on page 401

WEST COAST RESCH. CORP., Box 25061, Los Angeles, Calif., 90025, Tel: 213-478-8833; FSC No: 51276; Empl.: 21

Free literature available: Transducer bulletin & ampliducer models; transducer monitors; absorption dynamometers; bonded strain gage accelerometer; . signal conditioning instrumentation plug-in modules.

Products manufactured: Accelerometers, Amplifiers, Analyzers, Bridges, Cells, Load, Controls/Control Eqpt., Converters, Gages, Indicators, Lamps, Meters, Monitors, Power Supplies, Probes, Signal Conditioners & Equipment, Slip-Rings & Assemblies, Testers, Thermometers, Resistance, Totalizers, Digital, Transducers

Local Sales Offices & Reps.

Cal	Concord, Gado Instr. Sls.	415-933-5566
Cal	Mt. View, Gado Instr. Sls.	415-961-2222
Cal	San Diego, Miracle & Assocs.	714-276-8619
Colo	Englewood, Klein Aerospace	303-781-4967
Ill	Lombard, Quadtron Assocs.	312-627-6800
Mass	Woburn, Bar-Tech Assocs.	617-935-1568
SC	Greenville, Greentron	803-277-3537
Va	Arlington, S & M Assocs.	703-354-1192
FOR:	Can., Scarborough, Ont., Intl. Rectifier Can., Ltd.	416-755-7793

Advertisment

West Coast Research manufactures the broadest line of strain gage transducers as well as signal conditioning and readouts for pressure, force, torque, flow, acceleration, displacement and temperature. Orginators of multiple range, multiple variable transducers, miniature load cells. Complete dynamometers, slip-rings, anemometers and wind tunnel equipment.

WESTAMP, INC., 1542 15th St., Santa Monica, Cal., 90404, Tel: 213-393-0401; Empl.: 45

For info on price: J. Manda; Application info: J. Manda; Customer service: S. Johnson; Delivery info: S. Johnson

Free literature available: Descriptions and technical specifications of PWM servo amplifiers, 100W to 10kW.

Products manufactured: Amplifiers, Controls/Control Eqpt., Servo Systems

WESTERN COATING CO., Box 598, Royal Oak, Mich., 48073, Tel: 313-588-3311; Empl.: 10

Free literature available: Westcoat - A hot melt coating; Maskcoat - Plating stopoff; Melting pots and tanks; Polarflex 10 - Hot melt coating

Products manufactured: Coatings, Compounds, Encapsulating, Insulating, Molding, Potting, Films

Local Sales Offices & Reps.

Cal	San Gabriel, Western Coating Co.	213-283-9331
Fla	Miami, Palmer Supplies Co.	305-633-8007
Ohio	Rocky River, Griff Otte	216-331-4139
Pa	Havertown, Pakoil Co.	215-446-5273
Tex	Dallas, Ahart Tool & Engrg. Co.	214-747-6004

WESTERN COIL & ELEC. CO., 215 State St., Racine, Wisc., 53403, Tel: 414-632-4741; Empl.: 15

Products manufactured: Cabinets & Accessories, Jigs And Fixtures, Chassis & Circuit Board, Lamps, Services, Assembly, Production & Test

Local Sales Offices & Reps.

Ill	Crystal Lake, C.B. Bruse	815-459-2230

WESTERN DIGITAL CORP., 3128 Red Hill Ave., Newport Beach, Cal., 92663, Tel: 714-557-3550, TWX: 910-595-1139; FSC No: 52840; Empl.: 800; Minimum order: $50

For info on price: F. Little; Application info: F. Little; Customer service: S. Goodrich; Delivery info: L. Duchene

Free literature available: Data Sheets; App. Notes; Data Com Brochure-WDC's line of data com mos/ls1; Calculator Brochure-WDC's line of mos/ls1 calculator circuits

Products manufactured: Comm. Systems, Integrated Circuit Devices, Memories, Buffer

Local Sales Offices & Reps.

Ala	Huntsville, Tech-Rep Assocs.	205-881-5925
Cal	Los Altos, W.W. Posey Co.	415-948-7771
Fla	Indian Rocks Beach, Tech-Rep Assocs.	813-595-2834
Md	Rockville, Marktron, Inc.	301-762-6210
Md	Townson, Marktron, Inc.	301-825-8222
Mass	Medford, Blake Assocs.	617-391-7890
Mich	Detroit, A. Blumenberg Assocs.	313-557-1934
Minn	Minneapolis, S & R Sls.	612-544-3022
Mo	Kansas City, Nevco, Inc.	816-421-1751
NJ	Fort Lee, Northern Elctrn. Comps.	201-461-2789
NY	Endicott, Tech-Mark, Inc.	607-748-7473
NY	Fairport, Tech-Mark, Inc.	716-223-1252
NY	Liverpool, Tech-Mark, Inc.	315-652-6229
NY	Pleasant Valley, Tech-Mark, Inc.	914-635-3436
Ohio	Aurora, Engrg. Mktg. Assocs.	216-562-6104
Ohio	Dayton, Engrg. Mktg. Assocs.	513-433-2800
Ore	Beverton, Arneson Assocs.	503-643-5754
Pa	Birchrunville, Jadelectronic Assocs.	215-647-5151
Tex	Dallas, R.R. Thomas Co.	214-363-8591
Wash	Seattle, Arneson Assocs.	206-762-6210
EXP:	New York, N.Y., AD Auriema	

WESTERN ELCTRN. PRODS. CO., 107 Los Molinos, San Clemente, Cal., 92672, Tel: 714-492-4677; FSC No: 13988; Minimum order: $10

Free literature available: Automatic measuring wire cutter (for wire and tubing); coaxial cable strippers (hand and motorized); no-nick thermal wire strippers.

Products manufactured: Machines/Machinery, Production, Wire Strippers

Local Sales Offices & Reps.

Ariz	Phoenix, B. Kinkner Assocs.	602-944-4691
Cal	Palo Alto, Engrg. Assocs.	415-326-7842
Cal	Pasadena, P. Nurches Co.	213-681-8957
Conn	Sherman, R. P. Mahan Co. Inc.	203-355-0231
Fla	Delray Beach, J. P. Dearie Co.	305-276-7462
Ill	Glenview, F. William Castle Co.	312-724-3075
Mass	Wellesley, R. P. Mahan Co., Inc.	617-237-1040
Minn	Minneapolis, Xylem Co.	612-920-9626
Mo	Joplin, RM Engrg. & Sls.	417-781-4591
NJ	Mountain Lakes, J. P. Dearie Company	201-334-4848
Ohio	Cincinnati, Schlemmer Assocs.	513-522-8340
Tex	Houston, Jordan Equip. Co., Inc.	713-498-6212
Wash	Kingston, F. H. Haight Co.	206-297-3212
EXP:	Torrance, Cal., Unitool Corp.	213-772-0751

WESTERN ELECTRONIC SYSTEMS, 4067 Transport St., Palo Alto, Cal., 94303, Tel: 415-494-3931; Empl.: 15

Customer service: R.K. Johnson

Products manufactured: Backpanel Interconnect Systems, Boards, Plug-In, Boards, Printed Wiring, Universal, Connectors, Sockets, Testers

Local Sales Offices & Reps.

Cal	Santa Ana, Cir-Plex Entpr.	714-542-3521
Cal	Santa Clara, Bank Sls.	408-246-6311
Colo	Westminster, Harvey Data Systems	303-427-5299
Conn	Tariffville, M & M Assocs.	203-658-4827
Ill	Glenview, F.W. Castle Co.	312-724-3075
Mich	Detroit, Electro Entprs.	313-521-1500
NC	Charlotte, B. Henry Assocs.	704-375-8958
Ohio	Dayton, Electro Entprs.	513-426-6071
Pa	Pittsburgh, Electro Entprs.	412-371-8497
Tex	Dallas, R. W. Mureen Co.	214-369-5761

WESTERN GEAR CORP., Electro Prods. Oper., 14724 East Proctor, City of Industry, Cal, 91749, Tel: 213-796-4390, TWX: 910-346-6704; Empl.: 300

Customer service: F. Grew, 213-638-7821

Products manufactured: Actuators, Gears & Gear Mechanisms (Precision), Motors

Local Sales Offices & Reps.

Ala	Birmingham	205-252-4711
Cal	Belmont	415-593-7611
Cal	Lynwood	213-636-0911
NJ	Secaucus	201-348-3400
Pa	Pittsburgh	412-471-0744
Tex	Houston	713-626-9880
Va	Arlington	703-528-5010
Wash	Everett	206-259-0922

WESTERN MAGNETICS, INC., 1733 Flower St., Glendale, Cal., 91201, Tel: 213-247-4660; Empl.: 100

Customer service: N. Mueller X30

Products manufactured: Heads, Recording Playback, Erase

WESTERN MICROSYSTEMS, INC., 8733 Magnolia Ave., Santee, Cal., 92071, Tel: 714-449-0425; Minimum order: $200

Customer service: W.J. Dwyer

Free literature available: Nichrome-Nickel-Gold substrates for thin film hybrids. Thin film chip resistors for hybrid circuits. Conductor-resistor or conductor only thin film substrate etching and assembly.

Products manufactured: Circuits, Hybrid, Thin-Film, Networks, Resistors, Services, Assembly, Production & Test

WESTERN THERMISTOR CORPORATION, 303 Via El Centro, Oceanside, Cal., 92054, Tel: 714-433-4484; Empl.: 10; Minimum order: $10

Customer service: R. L. Winter

Free literature available: Chip thermistors with leads and coatings, Data Sheets - 10 ohms to 500,000 ohm thermistors Rt/R25 ratio tables hybrid chip thermistors without leads.

Products manufactured: Thermistors

Local Sales Offices & Reps.

Ariz	Scottsdale, E. J. Foley & Assocs.	602-945-2665
Cal	El Monte, Telemart Co.	213-444-7666
Cal	San Carlos, Winco Sls.	415-365-6082
Cal	San Diego, Daniels & Doty Sls.	714-560-6266
Colo	Denver, J. S. Heaton Co.	303-758-5130
Ill	Glenview, Crimson Engrg. Co.	312-724-1780
Ind	Indianapolis, R.H. Newsom & Assocs.	317-849-4442
Mass	Reading, Kanan Assocs.	617-944-8484
Minn	Minneapolis, Merrill Franklin Co.	612-835-6422
Mo	St. Louis, Beneke & McCaul	314-434-6242
NY	Rochester, G.P. Troy	716-586-4867
Ohio	Rock River, N. Case Assocs.	216-333-4120
Pa	Philadelphia, K.B. Erdman	215-224-1833
Wash	Seattle, J. J. Backer Co.	206-285-1300
FOR:	Can., Don Mills, Ont., J-Tronics	416-429-6324

WESTINGHOUSE CANADA LTD., Box 510, Hamilton, Ont., Can., Tel: 416-528-8811, Telex: 021-655

Customer service: D. S. Farquharson

Products manufactured: Comm. Systems, Converters, Display Devices/Displays, Terminal Equipment, Digital, Terminals, Data Display (including Alphanumeric & Graphic)

WESTINGHOUSE ELEC. CORP., 6 Gateway Ctr., Pittsburgh, Pa, 15222

WESTINGHOUSE ELEC. CORP., Electronic Tube Div., Box 284, Elmira, N.Y., 14902, Tel: 607-739-7951; Empl.: 2000

Products manufactured: Cable, Detectors, Gages, Intensifiers, Image, Switches, Television Systems & Equipment Closed-Circuit, Thermocouples, Elements & Accessories, Transducers, Tubes

Local Sales Offices & Reps.

Cal	Los Angeles	213-482-9660
Cal	Sunnyvale	408-735-2191
Colo	Denver	303-825-0441
Fla	Orlando	305-843-7030
Ill	Oak Brook	312-887-8909
Ind	Fort Wayne	219-483-6476
Md	Baltimore	301-765-2355
NY	Hempstead	510-489-2200
Ohio	Dayton	513-228-9631
Pa	Pittsburgh	412-255-4518
Tex	Dallas	214-631-2811

WESTINGHOUSE ELEC., Ind'l. Equip., Box 300, Sykesville, Md., 21784, Tel: 301-795-2800; Empl.: 300

Products manufactured: Alloys, Amplifiers, Cleaners & Solvents, Cleaners, Ultrasonic, Converters, Generators, Heaters & Heating Elements, Inverters, Machines/Machinery, Production, Welding Equipment & Access. (Excluding Equip. for Semiconductor Devices)

WESTINGHOUSE ELEC., Lamp Div., Parts Sls., 1 Westghse Plaza, Bloomfield, N. J., 07003, Tel: 201-465-3325

Products manufactured: Lamps, Ultraviolet Inspection Lighting

Local Sales Offices & Reps.

Ark	Little Rock	501-375-2471
Cal	Los Angeles	213-482-9660
Cal	San Francisco	415-445-2000
Colo	Denver	303-825-0441
Conn	Hartford	203-249-5792
Fla	Miami	305-634-5461
Ga	Atlanta	404-361-5200
Ill	Chicago	312-461-7200
Ind	Indianapolis	317-632-3301
La	New Orleans	504-486-6141
Md	Baltimore	301-792-7600
Md	Laurel	301-953-2300

Mass	Belmont	617-IV 4-6020
Mich	Southfield, 313-352-9000	617-IV 4-6020
Minn	Minneapolis	612-927-6551
Mo	Kansas City	816-483-4711
Mo	St. Louis	314-421-6911
NJ	East Orange	201-465-2482
NY	New York	212-692-3211
NY	Richmond Hill	212-VI 7-9800
NY	Rochester	716-232-4380
NC	Charlotte	704-377-3471
Ohio	Cincinnati	513-475-7301
Ohio	Cleveland	216-475-7301
Pa	Bala Cynwyd, 215-MO 7-7600	216-475-7301
Pa	Pittsburgh	412-255-3800
Tex	Dallas	214-631-2811
Utah	Salt Lake City	801-486-8751
Va	Richmond	703-649-9061
Wash	Tukwila	206-623-7001

WESTINGHOUSE ELEC. CORP., Relay-Instr. Div., 95 Orange St., Newark, N.J., 07101, Tel: 201-465-0222; Empl.: 1200

Products manufactured: Meters, Recorders, Shunts, Meter, Transducers

Local Sales Offices & Reps.

Ala	Birmingham	205-871-0366
Ala	Mobile	205-344-4273
Ariz	Phoenix	602-258-7211
Ark	Little Rock	501-376-3462
Cal	Bakersfield	805-327-7633
Cal	Compton	213-638-7781
Cal	Emeryville	415-652-3770
Cal	Fresno	209-233-0576
Cal	Los Angeles	213-482-9660
Cal	Riverside	714-682-6551
Cal	Sacramento	916-922-7071
Cal	San Diego	714-279-0233
Cal	San Francisco	415-445-2000
Cal	Sunnyvale	408-735-2601
Colo	Denver	303-825-0441
Conn	Hartford	203-249-5792
DC	Washington	202-833-5000
Fla	Jacksonville	904-356-5811
Fla	Miami	305-634-5461
Fla	Tampa	813-837-7171
Ga	Albany	912-436-0144
Ga	Atlanta	404-885-5200
Haw	Honolulu	808-839-0311
Idaho	Boise	208-344-2502
Ill	Aurora	312-897-4293
Ill	Chicago	312-461-7200
Ill	Danville	217-442-1901
Ill	Peoria	309-673-0754
Ill	Rockford	815-398-3591
Ind	Evansville	812-425-7146
Ind	Ft. Wayne	219-483-6476
Ind	Hammond	219-844-9400
Ind	Indianapolis	317-632-3301
Ind	So. Bend	219-287-1051
Iowa	Cedar Rapids	319-366-0781
Iowa	Davenport	319-323-2761
Iowa	Des Moines	515-283-2081
Kans	Wichita	316-263-2295
Ky	Louisville	502-459-5440
La	Baton Rouge	504-344-9448
La	New Orleans	504-486-6141
La	Shreveport	318-425-2435
Me	Augusta	207-623-4571
Md	Towson	301-828-5400
Mass	Boston	617-542-0600
Mass	Springfield	413-734-3101
Mass	Worcester	617-853-2680
Mich	Grand Rapids	616-456-1531
Mich	Jackson	517-787-3630
Mich	Saginaw	517-793-8680
Mich	Southfield	313-352-9000
Minn	Duluth	218-727-1541
Minn	Minneapolis	612-927-6551
Miss	Jackson	601-354-2373
Mo	Kansas City	816-421-7122
Mo	St. Louis	314-421-6911
Mont	Butte	406-792-2301
Neb	Omaha	402-397-2820
NJ	E. Orange	201-465-0222
NM	Albuquerque	505-265-6647
NY	Albany	518-459-1820
NY	Buffalo	716-854-3966
NY	New York	212-692-3211
NY	Olean	716-372-0040
NY	Rochester	716-232-4380
NY	Syracuse	315-463-9581
NY	Watertown	315-788-7700
NC	Charlotte	704-377-3471
NC	Greensboro	919-273-5563
NC	Raleigh	919-834-4375
Ohio	Akron	216-376-2171
Ohio	Cincinnati	513-475-7400
Ohio	Cleveland	216-579-2121
Ohio	Columbus	614-272-4000
Ohio	Dayton	513-228-9601
Ohio	Toledo	419-255-2205
Ohio	Youngstown	216-744-8911
Okla	Oklahoma City	405-232-8565
Okla	Tulsa	918-583-3191
Ore	Eugene	503-342-3083
Ore	Portland	503-224-4200
Pa	Allentown	215-433-3296
Pa	Bala Cynwyd	215-667-7600
Pa	Erie	814-453-4381
Pa	Johnstown	814-288-1559
Pa	Pittsburgh	412-255-3800
Pa	Wilkes Barre	717-825-7337
Pa	Williamsport	717-326-4289
SC	Columbia	803-256-1511
SC	Greenville	803-232-5695
Tenn	Chattanooga	615-267-9146
Tenn	Kingsport	615-247-5167
Tenn	Knoxville	615-522-8101
Tenn	Memphis	901-526-8546
Tenn	Nashville	615-327-4911
Tex	Amarillo	806-372-3259
Tex	Beaumont	713-898-1157
Tex	Corpus Christi	512-883-9236
Tex	Dallas	214-631-2811
Tex	El Paso	915-542-1744
Tex	Houston	713-621-9000
Tex	Odessa	915-337-1822
Tex	San Antonio	512-223-9181
Utah	Salt Lake City	801-486-8751
Va	Richmond	703-285-3909
Va	Roanoke	703-342-8925
Wash	Seattle	206-623-7001
Wash	Spokane	509-535-3521
WVa	Bluefield	304-325-3651
WVa	Charleston	304-346-9606
WVa	Fairmont	304-363-0400
WVa	Huntington	304-529-7146
WVa	Wheeling	304-232-4100
Wisc	Appleton	414-739-2313
Wisc	Madison	608-257-4517
Wisc	Milwaukee	414-264-6400

WESTINGHOUSE ELEC. CORP., Semiconductor Div., Youngwood, Pa., 15697, Tel: 412-925-7272, TWX: 510-468-2840; Empl.: 800 .... p. 1•1896-1909

Products manufactured: Bridges, Diodes, Rectifiers, Thyristors (Includes Silicon Controlled Rectifiers), Transistors

Local Sales Offices & Reps.

Ariz	Phoenix, Bestronics	602-248-7020
Cal	Los Angeles, Black-Ekizian-Strong	213-870-9191
Cal	San Diego, Bestronics	714-278-2150
Cal	Sunnyvale, Westinghouse Elec.	408-735-2191
Conn	Newtown, Gerber Sls. Corp.	203-426-3440
Fla	Clearwater, CBC Elec.	813-447-3375
Fla	Ft. Lauderdale, CBC Elec.	305-484-7330
Fla	Winter Park, CBC Elec.	305-644-2277
Ill	Oak Brook, Westinghouse Elec.	312-887-8909
Md	Towson, Westinghouse Elect.	301-828-5400
Mass	Boston, Westinghouse Elec.	617-542-0600
Mass	E. Longmeadow, Gerber Sls. Corp.	413-525-3059
Mass	Waltham, Gerber Sls. Corp.	617-890-8040
Mich	Farmington, Sheridan Assocs.	313-477-3800
Minn	Minneapolis, Comstrand, Inc.	612-560-5300
Mo	Florissant, Sheridan Assocs.	314-837-5200
Mo	Hazelwood, Dy-Tronix Inc.	314-731-5799
Mo	Kansas City, Dy-Tronix Inc.	816-761-6543
NY	Clinton/Utica, Advanced Comp. Corp.	315-853-6438
NY	Endicott, Advanced Comp. Corp.	607-785-3191
NY	Hempstead, Westinghouse Elec.	516-489-2200
NY	N. Syracuse, Advanced Comp. Corp.	315-699-2671
NY	Scottsville, Advanced Comp. Corp.	716-889-1429
NC	Charlotte, Westinghouse Elec.	704-377-3471
Ohio	Beachwood, Sheridan Assoc.	216-831-0130
Ohio	Cincinnati, Sheridan Assoc.	513-761-5432
Ohio	Dayton, Sheridan Assoc.	513-277-8911
Pa	Bala Cynwyd, Westinghouse Elec.	215-667-7600
Pa	Youngwood, Westinghouse Elec.	412-925-7272
Wisc	Milwaukee, Westinghouse Elec.	414-931-4462

Local Distributors

Ala	Huntsville, Cramer/Huntsville, 2310 Bob Wallace Ave., S.W.	205-539-5722
Ala	Birmingham, ACK Semiconduuctors, Inc., 3101 Fourth Ave. So.	205-322-0588
Ariz	Phoenix, Cramer/Phoenix, 2643 E. University Dr.	602-267-7321
Ariz	Phoenix, Hamilton/Avnet of Ariz., 2615 So. 21st St.	602-275-7851
Cal	Culver City, Hamilton Electro Sales, 10912 W. Washington Blvd.	213-870-7171
Cal	Inglewood, Newark Electronics, 4747 W. Century Blvd.	213-678-0441
Cal	Irvine, Cramer/Los Angeles, 17201 Daimler	714-979-3000
Cal	Mountain View, Hamilton/Avnet Electronics, 575 E. Middlefield Rd.	415-961-7000
Cal	San Diego, Cramer/San Diego, 8913 Complex Dr.	714-565-1881
Cal	San Diego, Hamilton/Avnet of San Diego, 8917 Complex Dr.	714-279-2421
Cal	Sunnyvale, Cramer/San Francisco, 720 Palomar Ave.	408-739-3011
Colo	Denver, Cramer/Denver, 5465 E. Evans	303-758-2100
Colo	Denver, Hamilton/Avnet of Denver, 5921 N. Broadway Box 16407	303-534-1212
Conn	No. Haven, Cramer/Conn., 35 Dodge Ave.	203-239-5641
Fla	Hollywood, Cramer/E.W., Inc., 4035 No. 29th St.	305-923-8181
Fla	Orlando, Cramer/E. W., Inc., 345 Graham Ave., Box 20214	305-894-1511
Ga	Atlanta, Cramer/Atlanta, 3923 Oakcliff Indl. Center	404-448-9050
Ga	Atlanta, Specialty Distributing, 763 Juniper St., N. E., Box 6326	404-873-2521
Ga	Augusta, Specialty Distributing, 1251 Gordon Park Rd., Box 1728	404-722-1526
Ill	Elmhurst, Semiconductor Specialists, Inc., 195 Spangler Ave.	312-279-1000
Ill	Schiller Park, Hamilton/Avnet Elctrns., 3900 N. 25th Ave.	312-678-6310
Ind	Fort Wayne, Fort Wayne Electronics Supply Inc., 3606 E. Maumee	219-423-3422
Ind	Indianapolis, RA-DIS-CO, 814 N. Senate Ave.	317-637-5571
Md	Gaithersburg, Cramer/E. W., Inc., 16021 Industrial Dr.	301-948-0110
Md	Hanover, Cramer/Baltimore, 7255 Standard Dr.	301-796-5790
Md	Hanover, Hamilton/Avnet of Baltimore, 7255 Standard Dr.	301-796-5000
Md	Savage, Pyttronic Inc., 8220 Wellmoor Ct.	301-792-7000
Mass	Newton Center, Cramer Elctrns., Inc., 85 Wells Ave.	617-969-7700
Mass	Waltham, Schweber Elctrns., 213 Third Ave.	617-890-8484
Mich	Farmington, Semiconductor Specialists, Inc., 33505 State St.	313-478-2700
Mich	Farmington, Sheridan Sales Co., 24534 Indoplex Circle	313-477-3800
Minn	Minneapolis, Semiconductor Specialists, Inc., 8030 Cedar Ave. So.	612-854-8841
Mo	North Kansas City, LComp Kansas City, Inc., 1520 Tanev St.	816-221-2400
NJ	Cherry Hill, Cramer/Pa., Springdale Rd., Cherry Hill Ind'l. Site	609-424-5993
NJ	Cinnaminson, Wilshire Elctrns., 855 Industrial Hwy. - Unit 5	609-786-8990
NJ	Moonachie, Cramer/N.J., 1 Barrett Ave.	201-935-5600
NJ	Moorestown, Arrow Elctrns., Pleasant Valley Ave.	609-235-1900
NM	Albuquerque, Cramer/Albuquerque, 137 Vermont N.E.	505-265-5767
NY	East Syracuse, Cramer/Syracuse, 6716 Joy Rd.	315-437-6671
NY	Endwell, Cramer/Binghamton, 3220 Watson Blvd.	607-754-6661
NY	Freeport, Milgray Elctrns., Inc., 191 Hanse Ave.	516-546-6000
NY	Hauppauge, Cramer/Systems, 29 Oser Ave.	516-231-5600
NY	Rochester, Cramer/Rochester, 3000 S. Winton Rd.	716-275-0300
NY	Westbury, Schweber Elctrns., Jericho Tpke.	516-334-7474
NC	Winston-Salem, Cramer/Winston-Salem, 938 Burke St.	919-725-8711
Ohio	Beachwood, Sheridan Sls. Co., 23224 Commerce Pk. Rd.	216-831-0130
Ohio	Cincinnati, Sheridan Sales Co., Box 37825	513-761-5432
Ohio	Columbus, Hughes-Peters, Inc., 481 E. Eleventh Ave.	614-294-5351
Pa	Pittsburgh, Cameradio Elctrns., 2801 Liberty Ave.	412-288-2600
Tex	Dallas, Hall-Mark Elctrns. Corp., 9333 Forest La.	214-231-6111
Tex	Houston, Altair Co., 9501 Baythorne Dr.	713-462-3029
Tex	Houston, Hall-Mark Elctrns. Corp., 8000 Westglen Dr.	713-781-6100
Tex	Richardson, Altair Co., 405 N. Plano Rd., Box 26	214-231-5166

Utah Salt Lake City, Cramer/Salt Lake City, 391 W. 2500 South 801-487-4131
Wash Bellevue, Hamilton/Avnet, 13407 Northrup Way 206-746-8750
Wash Seattle, Cramer/Seattle, 5602 6th Ave. So. 206-762-5755
WVa Charleston, McJunkin Corp., 1400 Hansford St., Box 513 304-348-4965
Wisc Mequon, Taylor Electric Co., 1000 W. Donges Bay Rd. 414-241-4321

WESTMORELAND PLASTICS CO., 135 Gertrude St., Latrobe, Pa., 15650, Tel: 412-539-1612; Empl.: 125

Products manufactured: Knobs, Lights, Services, Assembly, Production & Test

Local Sales Offices & Reps.
Cal Fremont, Hartfield, Kennan & Freytag 415-863-2200
Cal Los Angeles, Hartfield, Kennan & Freytag 213-225-1318
Ill Skokie, B. Brown Sls. Co. 312-673-0660
Ind Indianapolis, D. Hilligoss 317-849-1636
Kans Shawnee Mission, Lauber-Kruper, Inc. 913-831-0140
Mass Woburn, R.W. Hatfield Co. 617-933-2324
Mich Detroit, F.R. Burczyk Assoc. 313-872-6620
Mo Kirkwood, Lauber-Kruper Inc. 314-966-4735
Pa Allentown, S.D. Adams & Co. 215-395-1031
Pa Emmaus, J.S. Adams & Co. 215-965-2391
Tenn Hendersonville, B. Lucas Assocs. 615-824-5818
Wash Vancouver, Hartfield, Kennan & Freytag 503-228-1683
FOR: Can., Toronto, Ont., Harvey Waldman & Co. Ltd. 416-787-0133

WESTON COMPS. DIV., Weston-Archbald, Archbald, Pa., 18403, Tel: 717-876-1500, TWX: 510-656-2902; FSC No: 94271; Empl.: 820; Minimum order: $50

For info on price: L. Hoover; Application info: J. Kopa; Customer service: L. Hoover; Delivery info: L. Hoover

Free literature available: "Lots of Pots," Weston short form catalog detailing brief mechanical and electrical specifications for wirewound, cermet as well as all mil approved trimming potentiometers.

Products manufactured: Potentiometers, Resistors

Local Sales Offices & Reps.
Ala Huntsville, 20th Century Mktg. 205-772-9237
Ariz Scottsdale, Piper Sls. 602-949-8424
Cal San Diego, Ohm-Spun Elctrns. 714-277-6230
Cal Santa Clara, Nova-Tronix 408-243-9530
Cal Van Nuys, Wes-K Assocs. 213-989-3070
Colo Denver, Camel Elctrns., Inc. 303-757-6191
Conn Hamden, Impact Elctrns. 203-281-1331
Fla Clearwater, Perrott Assocs. 813-531-5513
Fla Orlando, Perrott Assocs. 305-275-1132
Ill Skokie, Mar-Con Assocs. 312-675-6450
Kans Overland Park, Ensco-Rep, Inc. 913-381-7557
Md Baltimore, B. White & Co. 301-484-5400
Mass Waltham, Impact Elctrns. 617-893-2850
Mich Southfield, Representatives Elctrn. Prod. 313-354-9066
Minn St. Paul, R. Ragon 612-488-0201
Mo St. Louis, Ensco-Rep, Inc. 314-567-3935
NJ Camden, QED Elctrns. 609-365-2450
NY Albany, Compar Albany 518-489-4777
NY Huntington Station, Addem 516-567-5900
Ohio Dayton, J.C. Hofstetter Co. 513-298-0662
Ohio Medina, J.C. Hofstetter 216-241-4880
Pa Archbald, Weston Comp. Div. 717-876-1500
Tex Richardson, Vista Assocs. 214-235-4547
Wash Seattle, Underwood & Underwood 206-243-2133
FOR: Can., Hamilton 10, Ont., Cartwright Southall Assocs. 416-528-0294
FOR: Can., Montreal 251, Que., McIntyre Agencies 514-731-9617

WESTON INSTRS., INC., 614 Frelinghuysen Ave., Newark, N.J., 07114, Tel: 201-243-4700; Empl.: 1100 p. 2•1116-1120

For info on price: R. L. Craig; Application info: J. Watson; Customer service: P. Barba; Delivery info: P. Barba

Products manufactured: Cases, Equipment, Instrument, Meter, Counters, Magnets, Meters, Monitors, Tachometers, Thermometers, Resistance

Local Sales Offices & Reps.
Ala Huntsville, Kemp Instrs. Co. 205-837-4304
Cal Los Angeles, Weston Instrs., Inc. 213-268-9271
Fla Orlando, Col-Ins-Co., Inc. 305-423-7615
Ill Chicago, Weston Instrs., Inc. 312-352-3500
Iowa Cedar Rapids, Palatine Engrg. Sls. 319-365-8071
Kans Kansas City, Palatine Engrg. Sls. 913-262-5643
Kans Wichita, Palatine Engrg. Sls. 316-683-7512
Md Columbia, Weston Instrs. 301-730-1400
Mass Boston, Weston Instrs., Inc. 617-246-1800
Mich Detroit, Nicon Assocs. 313-341-7688
Mo St. Louis, Palatine Engrg. Sls. 314-426-7055
NJ Fort Lee, Tecnimat 201-461-8686
NJ Newark, Weston Instrs., Inc. 210-243-4707
NY Syracuse, Weston Instrs., Inc. 315-454-3226
Ohio Cincinnati, Luebbe Sls. Co. 513-871-4211
Ohio Cleveland, Luebbe Sls. Co. 216-333-0425
Ohio Dayton, Luebbe Sls. Co. 513-294-0426
Okla Tulsa, Kemp Engrg. Co. 918-299-2636
Pa Philadelphia, Weston Instrs., Inc. 215-665-8270
Tex Dallas, Kemp Engrg. Co. 214-661-0400
Tex Houston, Weston Instrs., Inc. 713-681-1358
Wash Seattle, S.E.A. 206-232-6550

WESTON SCHLUMBERGER, Weston Components, Archbald, Pa., 18403, Tel: 717-876-1500, TWX: 510-656-2902; FSC No: 94271; QPL No: Multiple; Empl.: 955; Minimum order: $50

For info on price: F. J. Butteri; Application info: J. F. Cousins; Customer service: J. J. Kopa; Delivery info: L. M. Hoover

Products manufactured: Potentiometers

Local Sales Offices & Reps.
Ala Huntsville, 20th Century Mktg. Inc. 205-772-9237
Ariz Scottsdale, Piper-Goyne, Inc. 602-949-8424
Cal San Diego, Ohm-Spun Elctrns. 714-277-6230
Cal Santa Clara, Nova-Tronix 408-243-9530
Cal Van Nuys, Wes-K Assocs. 213-989-3070
Colo Denver, Camel Elctrns. 303-757-6191
Conn Hamden, Impact Elctrns. 203-281-1331
Fla Clearwater, Perrott Assocs. 813-726-1549
Fla Orlando, Perrott Assocs. 305-275-1132
Ill Skokie, Marcon Assocs. 312-675-6450
Kans Overland Park, Ensco-Rep, Inc. 913-381-7557
Md Baltimore, B. White & Co. 301-484-5400
Mass Waltham, Impact Sls. Co. 617-893-2850
Mich Southfield, Representatives Elctrn. Prods. 313-354-9066
Minn St. Paul, R. G. Ragon, Inc. 612-488-0201
Mo St. Louis, Ensco-Rep, Inc. 314-567-3935
NJ Camden, QED Elctrns. 609-365-2450
NY Albany, Reagan/Compar, Albany, Inc. 518-489-4777
NY Huntington Station, Addem 516-567-5900
Ohio Dayton, J. C. Hofstetter Co. 513-296-1010
Ohio Medina, J. C. Hofstetter Co. 216-241-4880
Tex Houston, Vista Assocs. 713-661-0119
Tex Richardson, Vista Assocs. 214-235-4547
Wash Seattle, Underwood & Underwood 206-243-2133

Local Distributors
Ala Birmingham, MG Elctrns., 3112 Sixth Ave. S. 205-328-4525
Ariz Phoenix, Mirco, 2005 W. Peoria Ave. 602-944-2281
Cal Carson, Hi Rel Distributor Sls., 20507 Belshaw 213-774-8200
Cal Costa Mesa, Components Center Inc., 1240 "E" Logan Ave. 714-979-0433
Cal Gardena, Bell Industries, 306 E. Alondra Blvd. 213-321-5802
Cal San Diego, Electronic Distributor, 3650 Clairemont Dr. 714-274-7242
Cal Sunnyvale, Acacia Sls., 384 San Alesco Ave. 408-735-0100
Cal Woodland Hills, Rampart, 21201 Oxnard St. 213-887-6400
Colo Lakewood, Acacia Sls., 11111 W. 8th Ave. 303-232-2882
Conn Stratford, State Elctrns. Parts, 1269 Barnum Ave. 203-375-5961
Fla Orlando, Pelcor, Box 14267 305-273-6080
Ill Elk Grove Village, GBL Elctrns., 75 Gaylord St. 312-593-3220
Ill Westmont, Bodelle Co., 47 Chestnut Lane 312-323-9670
Ind Indianapolis, Graham Elctrns., 133 S. Penn. St. 317-634-8486
Kans Kansas City, Tennant Elctrns., 6320 Kansas Ave. 913-287-2100
Md Baltimore, Arrow Elctrns., 4801 Benson Ave. 301-247-5200
Md Baltimore, Radio Elec. Service Co., 1026 Cromwell Bridge Rd. 301-823-0070
Md Beltsville, Treeko Sls., 4937 Harford Ave. 301-937-8260
Md Bethesda, Empire Elctrn. Supply, 4907 Rugby Ave. 301-OL6-3300
Mass Waltham, Impact Sls., 223 Crescent St. 617-893-2850
Mich Detroit, RS Elctrns., 12775 Lyndon Ave. 313-491-1012
Minn St. Paul, Ragon Elctrns., 1136 W. Larpenteur Ave. 612-488-0201
Mo St. Louis, Olive Industrial Elctrns., 6662 Olive Blvd. 314-863-7800
NJ Haddonfield, Mid-Atlantic, 140 Haddon Ave. 609-428-8288
NJ Hanover, State Elctrns., 36 Route 10 201-887-2550
NJ Perth Amboy, Sterling Elctrns., 774 Pfeiffer Blvd. 201-442-8000
NY Farmingdale, Iris Elctrns., 91 Milbar Blvd. 516-420-8400
NY Freeport, Milgray Elctrns., 191 Hanse Ave. 516-546-6000
NY Plainview, Fairmont Elctrn. Sls., 35 S. Svc. Rd. 516-694-8200
NY West Babylon, Delmar Elctrns., 101 Eads St. 516-420-1234
NY Woodbury, Tennant Elctrns., 1 Crossways Pk. W. 516-364-9070
Ohio Dayton, Arrow Elctrns., 3100 Plainfield Rd. 513-253-9172
Ohio Dayton, Stotts Friedman, 108-112 N. Jefferson St. 513-253-9172
Pa Devon, Peak Elctrns. Corp., 999 W. Valley Rd. 215-687-9822
Pa Erie, ADVACOM, Inc., 1938 Buffalo Rd. 814-455-8110
Pa Hatboro, Henwarr, 218 Tanner Ave. 215-675-4104
Pa Huntingdon Valley, Shap Elctrns., 421-E Pike Rd. 215-698-9550
Tex Dallas, Solid State Elctrns., Box 20299 214-352-2601
Tex Fort Worth, Tex-Tronics, 1108 E. Lancaster 817-335-8111
Tex Houston, Solid State of Tex., 6400 W. Park Dr. 713-785-5436
Va Charlottesville, Virginia Radio, 715 Henry Ave. 804-296-4184
Wash Seattle, Interface Elctrns., 300 Second Ave. W. 206-285-3500
Wash Seattle, Zepher Elctrns. Sls., 647 Industry Dr. 206-242-2517

WESTRONICS, 5050 Mark IV Pkwy. Box 4619, Fort Worth, Tex., 76106, Tel: 817-625-2311; Empl.: 150; Minimum order: $20

Customer service: Sls. Dept.

Free literature available: Short form product catalogs, Application data sheets

Products manufactured: Indicators, Recorders

Local Sales Offices & Reps.
Cal Los Angeles, McCamey-Jones, Inc. 213-263-9812
Cal Palo Alto, Priz-Co. 415-326-9333
Cal San Diego, McCamey-Jones, Inc. 714-270-4333
Colo Lakewood, Intermountain Instr., Inc. 303-237-0443
Conn Durham, Marr Elec. Co. 203-349-9691
Fla Cantonment, C.B. Metcalf Co. 904-476-7710
Fla Orlando, Currie, Peak & Frazier, Inc. 305-855-0843
Ill Schaumburg, Carvel Engrg. Co. 312-885-8800
Ind Indianapolis, Tech Sls. & Mktg. 317-356-3658
La Baton Rouge, Del Rio 504-927-9167
Md Baltimore, Adcons, Inc. 301-655-5542
Mass Wakefield, Stickney Engrg. Assocs. 617-245-4212
Mich Royal Oak, Dave Lay Assocs. 313-576-4700
Minn Minneapolis, Arjay Sls., Inc. 612-925-1833
Mo St. Louis, C.F. Gast Co. 314-993-2870
NJ Bogota, Neville & Vespo, Inc. 201-487-1505
NJ Cinnaminson, Control Equip. Co. 609-829-1447
NY Elbridge, L-Tron Corp. 315-689-3787
NY Latham, L-Tron Corp. 518-785-5032
NY Tonawanda, L-Tron Corp. 716-691-8887
NC Charlotte, Systems Svc. Corp. 704-377-3407
Ohio Cincinnati, G.H. Drysdale & Assocs. 513-752-2069
Ohio Twinsburg, Crown Equip. Co. 216-656-2023
Okla Tulsa, Lucas Controls Co. 918-749-6491
Ore Portland, Brett Assocs., Inc. 503-232-4184
Pa Pittsburgh, Gilson Engrg. Sls., Inc. 412-931-6114
RI Narragansett, Westronics, Inc. 401-789-3763
Tenn Hixson, G. Grant Co. 615-875-4633
Tenn Memphis, B. White Assocs. 901-276-4437
Tex Fort Worth, Southwest Controls Co. 817-268-1569
Tex Houston, Haltom Co. 713-782-5625
Tex Houston, Westronics, Inc. 713-467-5582
Wash Medical Lake, Calvert Controls, Inc. 509-244-3601
Wash Seattle, Brett Assocs. 206-935-8054

WHEELOCK SIGNALS, 273 Branchport Ave., Long Branch, N.J., 07740, Tel: 201-222-6880, TWX: 201-222-7091; Empl.: 100

Products manufactured: Bells, Buzzers, Gongs, Sirens & Aural Warning Devices, Relays

Local Sales Offices & Reps.

Ariz	Phoenix, Portis & Assoc.	602-947-4379
Conn	No. Haven, Comp. Rep. Assoc.	203-239-9762
Fla	Orlando, Gra-Mar	305-841-2330
Kans	Shawnee, J.F. Guernsey Co.	913-631-2414
Mass	Needham, Comp. Rep. Assoc.	617-444-2484
Minn	Mpls, R.W. Marshall Co.	612-929-0457
NY	Clarence, Rep Tech	716-684-6250
NY	East Northport, R.W. Keen Assoc.	516-757-7642
NY	Syracuse, Rep Tech	315-437-2845
Ohio	Dayton, Mid West Mktg.	513-433-2511
Pa	Ambler, Wyncote Instr.	215-643-2440
Tex	Dallas, Texport Elctrn. Sls.	214-358-3521
Va	Falls Church, Wycote Instr. Co.	703-532-3364
EXP:	Ohio, Chagrin Falls, Midwest Mktg.	

WHITE INSTRS., INC., Box 698, Austin, Tex., 78767, Tel: 512-892-0752; FSC No: 03945; Empl.: 35

For info on price: T.H. White; Application info: C.V. Ryswyk; Customer service: T.H. White; Delivery info: T.H.Whitre

Free literature available: Bulletins describing active and passive networks and feed-back circuits. Booklet on sound system equalization and bulletins describing sound system equalizers and real time analyzers.

Products manufactured: Analyzers, Equalizers, Filters, Generators, Networks

Advertisment

Manufacturers of wave filters, active and passive, in the audio spectrum and below. Standard and custom low, high, band pass and reject designs-- Butterworth, Chebishev, Bessel or elliptic response characteristics-- wide range of source and load impedances. Tuned, self-contained units ready to use-- no external components to add. Rapid manufacture and delivery of production quantities. Fast prototype service.

WHITMOR WIRE & CABLE, 13161 Sherman Way Bldg. B, No. Hollywood, Cal., 91605, Tel: 213-764-6296; FSC No: 15851; Empl.: 23 .... p. 2•2072

For info on price: J. J. Serago; Application info: H. R. Weiss; Customer service: D. Norris; Delivery info: D. Norris

Products manufactured: Braid, Cable, Cable, Services, Assembly, Production & Test, Wire, Wire Shielding

Local Distributors

Ill	No. Hollywood, Wirenetics Co., 13151 Sherman Way	213-765-5041

Advertisment

Electrical wire & cable manufactured to your individual needs and specifications. No minimum quantity. Most quotations given over first telephone call. Cables manufactured from customer furnished wire or ours. Many deliveries from stock. Complete MIL capabilities and flexibility permit short delivery time in days if necessary.

WHITSO, INC., 9326 Byron St., Schiller Park, Ill., 60176, Tel: 312-678-5200; Empl.: 200

Products manufactured: Services, Assembly, Production & Test, Terminals, Wire & Cable Ties

Local Sales Offices & Reps.

Cal	El Segundo, C.W. Saxon & Assocs.	213-EA2-2111
Ind	Indianapolis, Harkins Engrg. Sls. Co.	317-846-2949
Mass	Waltham, Progressive Sls. Assocs.	617-899-4800
Minn	Anoka, Inds. Mfg. Svc.	612-421-6027
NY	Mt. Vernon, Elctrns. Sls.	914-MO4-4866
Ohio	Canfield, Mktg. Worldwide	216-533-6856
Okla	Oklahoma City, R.E. Chappell	405-751-0097
Pa	Narberth, S.A. Jeffries, Inc.	215-MO4-8500

WIDE BAND ENGRG. CO. INC., Box 21652, Phoenix, Ariz., 85036, Tel: 602-254-1570; Empl.: 6

For info on price: M. G. Ticknor; Application info: S. Ticknor; Customer service: S. Ticknor; Delivery info: M. G. Ticknor

Free literature available: SFC-1 Short form catalog with brief description of each of our 1-500 MHz broadband devices.

Products manufactured: Amplifiers, Analyzers, Attenuators, Bridges, CATV Systems & Equipment, Comparators, Couplers, Detectors, Dividers, Filters, Insertion Loss Measurement Systems, Loads, Electronic Variable, Switches, Terminals, Transformers

WIK-IT ELCTRNS. CORP., 140 Commercial St., Sunnyvale, Cal., 94086, Tel: 408-732-8560; Empl.: 12; Minimum order: $30

Customer service: D. A. Wellsch

Products manufactured: Soldering Guns, Irons & Desoldering Tools

Local Sales Offices & Reps.

Cal	Culver City, H. Feldman Co.	
Cal	Los Altos, Ewing-Foley	415-941-4525
Ga	Atlanta, Hollingsworth & Still Co.	404-255-8200
Ill	Lincolnwood, B. Stein & Co.	

WILBRECHT ELECTRONICS, INC., 240 Plato Blvd., St. Paul, Minn., 55107, Tel: 612-222-2791, Telex: 297-428; Empl.: 250; Minimum order: $75

Customer service: J. A. Judge

Products manufactured: Resistors, Switches

Local Sales Offices & Reps.

Ariz	, Toward Engrg.	602-955-3193
Cal	, Collins & Hyde	415-941-3355
Ill	, Memac Sls.	312-545-1033

WILD ROVER, See Refac/Wild Rover.

WILDER ENGRG. PRODS, INC., 4445 N. Ravenswood Ave., Chicago, Ill., 60640; Empl.: 30

Products manufactured: Amplifiers, Speaker Systems, Speakers

WILEY & SONS INC., J., Box 4192, Grand Central Sta., New York, N.Y., 10017

WILKINSON CO., 31011 Agoura Rd., Westlake Village, Cal., 91361, Tel: 213-889-0050; Empl.: 28; Minimum order: $25

For info on price: J. Gutierrez; Customer service: J. Gutierrez; Delivery info: J. Gutierrez

Products manufactured: Alloys, Contact Strips, Finger, Forms, Wire, Metals, Preforms, Precious Metal, Tubing, Wire

WILLCO SALES, 302 Willis Ave., Mineola, N.Y., 11501, Tel: 516-294-9840; Empl.: 2

Customer service: W. F. Cosgrove

Products manufactured: Cabinets & Accessories, Cable, Meters, Power Supplies, Regulators, Resistors, Soldering Guns, Irons & Desoldering Tools, Stabilizers, Line Impedance, Tools, Transformers

WILLIAMS PRECIOUS METAL DIV., Williams Gold Refining, 2978 Main St., Buffalo, N.Y., 14214, Tel: 716-837-1000; Minimum order: $50

Customer service: R. Fentner

Free literature available: Williams capabilities brochure with Precious Metals Reference Data and Most Commonly Used Precious Metal Alloys.

Products manufactured: Metals, Preforms, Precious Metal

Local Sales Offices & Reps.

Cal	Fullerton, N. Nesbitt Co.	714-993-6330
Cal	Mountain View, Charter Ind'l. Sls. Co.	415-961-5514
Conn	Old Saybrook, E.J. Hughes Assocs.	203-399-9100
Ill	Zion, A.O. Capp Co.	312-872-8311
Ind	Indianapolis, J.C. Butler Sls. & Engr. Corp.	317-253-5143
Kans	Mission, Mid America Elctrns. Mktg. Inc.	913-236-4800
Mass	Attleboro, E.J. Hughes Assocs.	617-226-0050
Mass	Beverly, E.J. Hughes Assocs.	617-927-7171
NJ	Wyckoff, Component Parts Unlimited	201-445-6242
NY	Penfield, J. Lazor Assocs.	716-385-3300
Pa	Broomall, A.M. Tech. Sls. Co.	215-356-0574
Pa	Pittsburgh, A.M. Tech. Sls. Co.	412-885-3363
Tex	Richardson, R. Marston Co.	214-235-3824

WILMAR ELCTRNS. INC., 2430 Amsler St., Torrance, Cal., 90505, Tel: 213-326-6668; FSC No: 25248; Empl.: 20

Customer service: Z. Heifetz

Products manufactured: Current Sensors, Flashers, Monitors, Regulators, Relays, Testers

Local Sales Offices & Reps.

Cal	San Francisco, E. & Gregory Co.	415-989-4137
Ill	Skokie, Custom Electrical Sys.	312-679-1424
NH	Nashua, Bell Controls Inc.	603-882-6984
Pa	Jenkintown, Tech. Instr. Sls. Co.	215-885-6571
Wash	Seattle, Seatronics, Inc.	206-767-4330

Advertisment

WILMAR ELECTRONICS, INC. is a manufacturer of Protective Relay, Power Monitors and Solid State Sensors.
Over/undervoltage relays, over/underfrequency relays, reverse power relays, phase failure & phase sequence relays; current, differential, paralleling, overload relays and monitors.

WILMORE ELCTRNS. CO., Box 2973, W. Durham Sta., Durham, N.C., 27705, Tel: 919-489-3318; Empl.: 30 p. 1•537-539,1536-1538

Customer service: J. L. Harris

Products manufactured: Chargers, Battery, Controls/Control Eqpt., Converters, Inverters, Power Supplies

WILTRON CO., 930 E. Meadow Dr., Palo Alto, Cal, 94303, Tel: 415-321-7428, TWX: 910-373-1156; FSC No: 20944; Empl.: 76; Minimum order: $10

Customer service: W. L. Baxter

Products manufactured: Amplifiers, Analyzers, Attenuators, Bridges, Cable Fault Locators, Couplers, Delay Lines, Detectors, Filters, Generators, Meters, Oscillators, Shifters, Testers

Local Sales Offices & Reps.

Ala	Huntsville, Currie, Peak & Frazier	205-536-5650
Ariz	Phoenix, Ariz-Mesa Engrg. Sls.	602-943-9213
Cal	Palo Alto, Wiltron Co.	415-321-7428
Cal	Anaheim, Blair Assocs.	714-635-1350
Cal	San Diego, Mesa Engrg. Sls. Assocs.	714-278-8021
Cal	San Jose, MCH Assocs.	408-246-7330
Colo	Boulder, H. Bass Assocs.	303-499-7509
Fla	Orlando, Currie, Peak & Frazier	305-855-0843
Ill	Chicago, Scientific Sls. Corp.	312-775-7594
Ind	Indianapolis, Scientific Sls. Corp.	317-253-4606
Kans	Olathe, B. Rush Assocs.	913-782-1177
Md	Randallstown, C. L. Malinow & Co.	301-922-2092
Mass	Waltham, McBar Assocs.	617-890-0233
Mich	Detroit, Harvey Teplitz & Co.	313-537-9058
Minn	Bloomington, Scientific Sls. Corp.	612-881-3300
NJ	Haworth, Central Assocs.	201-568-0808
NJ	Pennsauken, Himmelstein Assoc.	609-662-3081
NM	Albuquerque, Trembly Assocs.	505-293-4444
NY	East Syracuse, Ossmann Instrs.	315-437-6666
NY	Plainview, Central Assocs.	516-433-0808
NY	Rochester, Ossman Instrs.	716-328-2230
NY	Vestal, Ossman Instrs.	607-785-9947
NC	Greensboro, Currie, Peak & Frazier	919-273-3040
Ohio	Cleveland, Harvey Teplitz & Co.	216-371-2044
Ohio	Dayton, Harvey Teplitz & Co.	513-277-6531
Tex	Richardson, Lear Assocs.	214-231-5388
Wash	Seattle, Delcom Sls. Co.	206-248-0090

WINCHESTER ELCTRNS., Div. Litton Inds., Main St. & Hillside Ave., Oakville, Conn., 06779, Tel: 203-274-8891

Products manufactured: Connectors

Local Sales Offices & Reps.

Ala	Huntsville, Interep Assocs., Inc.	205-881-3677
Ariz	Tempe, Litton Industries	602-968-2455
Cal	North Hollywood, Litton Industries	213-985-8985
Cal	Palo Alto, Quad Rep, Inc.	415-964-3532
Colo	Littleton, Simpson Assocs.	303-798-8439
Fla	Ormond Beach, Technology Mktg. Assocs.	904-672-2314
Fla	Pompano Beach, Technology Mktg. Assocs.	305-942-0774

Ill	Chicago, L-Tec, Inc.	312-286-1500
Mass	Waltham, Litton Industries	617-890-2207
Minn	Minneapolis, Litton Industries	612-789-8851
Mo	Hazelwood, CenTech, Inc.	314-731-4220
Mo	Raytown, CenTech, Inc.	826-358-8100
NJ	Cherry Hill, Trinkle Sls. Co.	609-667-3500
NJ	Wayne, G. T. Assocs.	201-694-6040
NY	East Syracuse, Fountain, Young & Co.	315-437-7733
NC	Charlotte, Anthom, Inc.	704-527-1515
Ohio	Dayton, Compass Assocs.	513-252-9939
Tex	Dallas, Bouillion Engrg. Sls. Co.	214-376-1929
Wash	Seattle, Arneson Assocs.	206-762-7664

WINEGARD CO., 3000 Kirkwood St., Burlington, Iowa, 52601, Tel: 319-753-0121; Empl.: 300

For info on price: Sls. Dept.; Application info: Sls. Dept.; Customer service: Sls. Dept.; Delivery info: D. Krieger

Free literature available: CP2 catalog, 110 catalog, FF 276 277 284, stuffers WS1-13R-15-16-17

Products manufactured: Amplifiers, Antennas

WIRE CLOTH ENTERPRISES, INC., 130-132 Gamma Dr., R.I.D.C., Pittsburgh, Pa., 15238, Tel: 412-781-1390; Empl.: 8

For info on price: J. Albaker; Customer service: P. Borggila; Delivery info: J. Albaker

Products manufactured: Air Cleaners & Filters (Shielded & Unshielded), Screens, Printed Circuit, Services, Assembly, Production & Test

Advertisment

Quality materials for printed circuit production. Stainless Steel Wire Cloth and Synthetic Monofilament Fabrics woven to the highest quality standards of accuracy in wire diameter and thread count. Ask about our Screen Star Photo Emulsions. The most efficient "direct" emulsions in use today! Also, special polyurethane squeegee blades, all sizes.

WIREFLEX INCORPORATED, 502 Old Route 30 East, Bourbon, Ind., 46504, Tel: 219-342-5315; Empl.: 20; Minimum order: $1

For info on price: E. C. Evancich; Application info: E. C. Evancich; Customer service: D. Vujnovich; Delivery info: D. Vujnovich

Free literature available: 4 pages on Type Wire We Manufacture.

Products manufactured: Braid, Cable, Cable, Wire

WIREMOLD CO., West Hartford, Conn., 06110, Tel: 203-233-6251, TWX: 710-425-6281; Empl.: 800

Products manufactured: Boxes, Junction, Outlets & Wall Plates, Connector Boxes & Strips, Power Outlet, Ducts, Wiring

Local Sales Offices & Reps.

Cal	Danville, J.R. Griffin	415-433-5744
Cal	Los Angeles, Airey-Thompson	213-264-1533
Colo	Denver, R.B. Schumann	303-534-1058
Conn	Farmington, E.W. Selnau	203-673-4979
Conn	Hartford, Home Office	203-233-6251
DC	Washington, T.J. Pugh	202-296-3669
Fla	Tampa, J.D. Whetsell	813-988-5860
Ga	Decatur, R.L. Pace	404-981-4385
Ill	Des Plaines, R. E. Horn/J. Reisch	312-297-3240
Iowa	Des Moines, W.J. Kelley	515-243-4079
La	New Orleans, United Sls. Assoc.	504-733-8711
Md	Baltimore, A.B. French	301-825-1305
Mass	Boston, R.T. Bennett	617-246-1131
Mich	Detroit, M.F. Frazier Co.	313-535-0840
Minn	Minneapolis, H.G. Schendel	612-722-2226
Mo	Kansas City, V.A. Meier	816-452-9076
Mo	St. Louis, A.F. Tubbesing	314-842-2455
NJ	Jersey City, P.F. McGovern	201-433-5869
NY	Babylon, A.C. Bradbury	516-587-2318
NY	Elmira, R.C. Hill	607-734-5406
NY	New York, P.F. McGovern/J.E. Finley	201-963-3280
NY	North Syracuse, A. Simone	315-471-4201
NC	Charlotte, H.M. Short	704-334-7060
Ohio	Cincinnati, C.J. Wirtz	513-821-3254
Ohio	Cleveland, R. Najda	216-781-5135
Ore	Portland, D.A. King	503-228-1900
Pa	Glenmoore, W.A. Gibson	215-469-6453
Pa	Philadelphia, R.B. French	215-887-0964
Pa	Pittsburgh, W. Simon	412-421-9491
Tex	Dallas, W.R. Moseley	214-637-6432
Tex	Houston, R. LeMaster	713-523-1316

Tex	Salt Lake City, D.E. Blomquist	801-359-7074
Wash	Seattle, Strohecker, Inc.	206-623-0357
Wash	Spokane, W.D. Beach	509-624-2518

WISCO DIV., ESB Inc., 1222 18th St., Racine, Wisc., 53403, Tel: 414-637-9131, TWX: 910-271-2382

For info on price: E. W. Kronberg; Application info: G. P. Cook; Customer service: T. A. Parker; Delivery info: T. A. Parker

Products manufactured: Batteries

WORKMAN ELECTRONIC PRODS., INC., Box 3828, Sarasota, Fla., 33578, Tel: 313-371-4242; Empl.: 150; Minimum order: $25

For info on price: J. Price; Application info: J. Klempka; Customer service: P. Rice; Delivery info: P. Rice

Products manufactured: Adhesives (All Types), Alternators, Antennas, Arresters, Electrical Surge, Lightning, Attenuators, Boards, Printed Circuit, Cable Assemblies & Harnesses, Cable, Calculators, Electrical & Electronic, Caps, Connector, CATV Systems & Equipment, Chargers, Battery, Chokes, Circuit Breakers, Clamps & Clips, Cleaners & Solvents, Coils Including Assemblies & Forms, Connector Adapters, Connectors, Controls/Control Eqpt., Converters, Coolants, Circuit & Components, Cords, Cores, Magnetic, Couplers, Diodes, Dummy Loads, Eliminators, Battery, Filters, Fuses, Heads, Recording Playback, Erase, Insulators & Insulation, Jack Adapters (All Types), Lamp Adapters, Lamps, Lights, Limiters, Lubricants, Meters, Microphones, All Kinds, Networks, Pickups, Telephone (For Recording), Plug Adapters, Plugs, Potentiometers, Protectors, Rectifiers, Refrigerants, Spray, Resistors, Retainers, Services, Assembly, Production & Test, Socket Adapters, Sockets, Solder (All Types), Spacers, Speakers, Splicers, Coaxial Cable, Splices, wire (Including, Butt & Cap Types), Switches, Tape Recording Accessories, Terminal Blocks, Boards & Strips, Terminals, Testers, Thermistors, Timers, Tools, Transformers, Transistors, Wire, Wire & Cable Ties, Wire Strippers

Local Sales Offices & Reps.

Alas	Anchorage, H. Lang & Assocs.	907-279-5741
Ariz	Phoenix, B & G Sls. Co.	602-266-5624
Cal	Mt. View, Sinai-Johnson Inc.	415-967-1788
Cal	N. Hollywood, S. Lewis & Assocs.	213-877-0461
Cal	Redwood City, Sinai-Johnson Inc.	415-365-6263
Cal	San Francisco, Tech. Sls. Assocs.	415-467-1434
Colo	Colorado Springs, Norris & Co.	303-635-9319
Fla	Lakeland, Dixie Elect. Assocs.	813-682-6624
Fla	Miami, Raulson & Co.	305-264-6003
Ill	Hoffman Estates, G. Sangwin	312-884-0186
Ind	Indianapolis, Mid-Central Sls.	317-283-1727
Iowa	Des Moines, Lectro Reps	515-276-6387
Ky	Fern Creek, Mid-Central Sls.	502-239-5614
Md	Baltimore, EKP Assoc.	301-944-6677
Mass	W. Springfield, Larry Cole Inc.	413-781-3040
Mass	Wellesley, Larry Cole Inc.	617-237-1260
Mich	Detroit, R. Butchart Assocs.	313-773-7870
Minn	St. Paul, E.W. Oszman	612-488-1811
Mo	Liberty, Lectro Reps, Inc.	816-781-2522
Mo	St. Charles, Lectro Reps, Inc.	314-723-8736
NH	Manchester, Larry Cole Inc.	
NY	Brooklyn, I. Brown Co.	212-493-1379
NY	Camillus, Callahan-Ferguson Co.	315-487-3870
NY	Manilus, Callahan-Ferguson Co.	315-682-9301
NC	Burlington, E.P. Ester & Co.	919-584-1568
Ohio	Cleveland, H. Miller Sls. Co.	216-321-3900
Ohio	Jamestown, H. Miller Sls. Co.	513-675-2059
Ohio	Wickliffe, H. Miller Sls. Co.	216-585-3278
Pa	Bethlehem, EKP Assocs.	215-691-5250
Pa	Easton, EKP Assocs.	215-258-6484
SC	Rock Hill, Dixie Elect. Assocs.	803-328-3981
Tenn	Gallatin, Dixie Elect. Assocs.	615-452-1744
Tenn	Hendersonville, Dixie Elect. Assocs.	615-824-2923
Tex	Dallas, Techno Assocs.	214-357-9213
Wash	Seattle, D. Smith Sls. Co.	206-633-3160
Wisc	Brookfield, G. Sangwin	414-782-3240
EXP:	Miami Lakes, Fla., Manrep Corp.	305-822-7630
FOR:	Can., Downsview, Ont., L. Finkler LTD	416-630-9103

WORTEK, INC., 5971 Reseda Blvd., Tarzana, Cal., 91356, Tel: 213-881-1644; Empl.: 8

Customer service: W. O. Rumsey

Free literature available: Product brochures on single and multiple-output modular dc power supplies upon request. Includes specifications, package outlines, mounting data and pricing information.

Products manufactured: Power Supplies

WOVEN ELECTRONICS

WOVEN ELCTRNS., Southern Weaving Co., Box 189, Mauldin, S. C., 29662, Tel: 803-963-5131, TWX: 810-287-2091; Empl.: 150; Minimum order: $50

p. 2•2068-2071

Customer service: P. Davis

Free literature available: 1. "New Twist in IC Interconnects" Sample with applications info. 2. "Basic Concepts of Woven Cable" 3. & 5. General Products Folder with Samples 4. "Fast Lead Exposure/Woven Cable"

Products manufactured: Cable Assemblies & Harnesses, Cable, Wire

Local Sales Offices & Reps.

Ala	Huntsville, Inco Tech.	205-837-6061
Cal	Mountain View, Reptronics	415-968-5550
Cal	Playa Del Rey, The Rep	213-821-6979
Fla	Alamonte Springs, WMM Assocs.	305-831-4645
Fla	Clearwater, WMM Assocs.	813-447-2533
Fla	Pompano Beach, WMM Assocs.	305-943-3091
Ill	Chicago, Electrical Cable & Access.	312-235-2830
Md	Bethesda, Warren Mount Co.	301-657-9312
Mass	Worcester, United Sls.	617-757-3872
Mich	Detroit, R. P. Urban & Assocs.	313-535-2355
Mich	Grand Rapids, R. P. Urban & Assoc.	616-245-0511
Mo	St. Louis, R. F. Carlson & Co.	314-961-4485
NJ	Hackensack, Trak Sls.	201-487-5075
NY	Manlius, Marden-Taylor Assoc.	315-446-9280
NC	Winston-Salem, Electronic Mktg. Assocs.	919-722-5151
Ohio	Cleveland, D. Steffen & Assoc.	216-461-8333
Ohio	Dayton, D. Steffen & Assocs.	513-293-3145
Pa	Jenkintown, Warren Mount Co.	215-886-0383
Pa	York, Warren Mount Co.	717-757-5823
SC	Greenville, Elctrn. Mktg. Assoc.	803-268-1125
Tex	Dallas, Precision Sls.	214-351-6964
Wisc	Wauwatosa, Larsen Assoc.	414-258-0529

WROUGHT WASHER MFG., INC., 2252 S. Bay St., Milwaukee, Wisc., 53207, Tel: 414-744-0771, TWX: 910-262-3101; Empl.: 400

Products manufactured: Fasteners

WYLE COMPUTER PRODS., INC., 128 Maryland St., El Segundo, Calif., 90245, Tel: 213-973-7571, TWX: 910-348-6283; Empl.: 80

For info on price: T. McEachran; Application info: R. Weyhrich; Customer service: R. Casselman; Delivery info: R. Casselman

Products manufactured: Boards, Plug-In, Boards, Printed Wiring, Universal, Cards, Linear Function, Cards, Logic, Converters, Punched Card Equipment, Terminal Equipment, Digital

X-ACTO, 48-31 Van Dam St., Long Island City, N.Y., 11101, Tel: 212-392-3333; Empl.: 150

Products manufactured: Clamps & Clips, Drills & Accessories, Hand & Power, Heat Sinks, Soldering, Knives & Knife Sets, Lubricants, Pliers, Screwdrivers, Tools, Tweezers, Hand & Vacuum

XCELITE, Div. Cooper Ind's., 170 Bank St., Orchard Park, N.Y., 14127, Tel: 716-662-4461

Customer service: C. Smith

Free literature available: Illustrated full line catalog.

Products manufactured: Cutters, Wire, Hand Operated, Drivers, Nut, Heat Sinks, Soldering, Pliers, Screwdrivers, Tools, Wire Strippers, Wrenches

Local Sales Offices & Reps.

Ala	Gadsden, F.C. Nickerson Co.	205-547-7718
Cal	Fullerton, J. Vombaur	213-733-1163
Cal	San Mateo, J.W. Hand	415-341-5516
Colo	Denver, Connors, Inc.	303-934-5829
Conn	Waterbury, Coakley, Boyd & Abbett	203-756-8766
Fla	Oldsmar, F.C. Nickerson Co.	813-855-4209
Ill	Genoa, B. Drobish	312-253-0057
Ind	Indianapolis, L.M. Devoe Co.	317-257-1227
Mass	Needham, Coakley, Boyd & Abbett	617-444-5470

Directory of Local Distributors Starts on page 401

Mich Southfield, Aztec Sls. Corp. 313-642-0777
Minn Minneapolis, R. Swanson Co. 612-789-5636
Mo Kansas City, K & M Sls. Co. 816-471-1355
Mo St. Louis, K & M Sls. Co. 314-423-2420
NY Flushing, Bettan Sls. 212-591-7600
NY N. Syracuse, Trademark Elctrns. 315-487-3870
NC Kannapolis, F.C. Nickerson Co. 704-932-6772
Ohio Cleveland, J.O. Olsen Co. 513-922-2176
Pa Warminster, Cerf & Hagen 215-343-1339
Tenn Memphis, A.S. Engelman Co. 901-458-6263
Tex Dallas, C.W. Cortez Co. 214-747-1031
Va Richmond, D. Miller & Assoc. 804-353-5324
Wash Seattle, Fleehart & Sullivan 206-522-1533

XCITON CORP., 5 Hemlock Dr., Latham, N.Y., 12110, Tel: 518-783-7726, TWX: 710-444-9692; FSC No: 53184; Empl.: 100; Minimum order: $100

For info on price: A. Ligorner; Application info: J. Duncan; Customer service: J. Duncan; Delivery info: A. Ligorner

Free literature available: Literature on our comprehensive line of LED lamps and numeric displays.

Products manufactured: Crystals, Diodes, Display Devices/Displays, Semiconductor Wafer Fabrication

XENTEK, INC., 1550 B Linda Vista Dr., San Marcos, Calif., 92069, Tel: 714-744-3346, TWX: 910-322-1155; FSC No: 53279; Empl.: 20; Minimum order: $25

For info on price: L. Kester; Application info: A. Peterson; Customer service: A. Myrwold; Delivery info: L. Kester

Free literature available: Xentek manufactures quality open-frame power supplies with single and multiple outputs. Outputs are available in any voltage from 2-32 volts, .1 amps to 100 amps.

Products manufactured: Power Supplies, Regulators

Local Sales Offices & Reps.
Ariz Scottsdale, Fryco 602-945-3281
Cal Cupertino, PM Sls. 408-255-1771
Cal Santa Monica, Rep Assocs. 213-829-5401
Colo Littleton, Eissler Sls. & Svcs. 303-794-1779
Ill Chicago, E. Joyner Co. 312-968-8383
Mass Natick, Wayland Engrg. Sls. 617-655-6080
Mo St. Louis, Gordon Fixman Engrg. 314-725-5219
Ohio Dayton, The Dynel Co. 513-434-6467
Okla Tulsa, Allied Comps. Inc. 214-238-0408
Tex Dallas, Allied Components Inc. 214-238-0408
Tex Houston, Allied Components Inc. ... 713-691-3961
Wash Seattle, Underwood/Jensen & Assoc.
206-575-0123

XINCOM CORP., 8944 Mason Ave., Box 648, Chatsworth, Cal., 91311, Tel: 213-341-5040, TWX: 910-494-2769; FSC No: 15237; Empl.: 100; Minimum order: $100

For info on price: J. Coons; Application info: J. Coons; Customer service: D. Moore; Delivery info: B. Sear

Free literature available: Enclosed are short form catalogs on pulse instrumentation & data conversion products along with several data sheets on various semiconductor test systems including options.

Products manufactured: Amplifiers, Comparators, Controllers, Programmable, Converters, Data Acquisition & Reduction Systems, Generators, Pulsers, Logic Test, Testers, Timers

Local Sales Offices & Reps.
Cal Sunnyvale, R. Bach 408-732-3880

YASKAWA ELECTRIC AMERICA, INC., 4001 Westerly Pl., Newport Beach, Cal., 92660, Tel: 714-833-1436, Telex: 67-8396; Empl.: 4

Customer service: H. Matsuo

Products manufactured: Motors, Switches

YELLOW SPRINGS INSTRUMENT CO., Box 279, Yellow Springs, Ohio, 45387, Tel: 513-767-7241; Empl.: 250

Customer service: R. Heggemann

Free literature available: Pressure tranducers, transmitters and indicators, Platinum temperative probes and transducers, indicators and transmitters, Precision interchangeable thomistors and temperature probes.

Products manufactured: Bolometers, Bridges, Controls/Control Eqpt., Gages, Indicators, Meters, Monitors, Probes, Radiometers, Recorders, Standards, Thermistors, Thermometers, Resistance, Transducers, Transmitters

Local Distributors
Cal Pasadena, RDX Corp., 110 S. Euclid
213-792-4041
Cal Sunnyvale, RDX Corp., 1287 Lawrence Sta. Rd.
408-734-4504
Fla Orlando, Datarep Inc., Box 5929 305-843-5224
Ill Chicago, Liz Ind'l Sls., 1445 No. State Pkwy
312-943-5122
Ill Chicago, Newark Elec. Corp., 500 N. Pulaski
312-638-4411
La Harvey, Gordon Instr. Co., Box 591
504-368-6152
Mass Norwell, Bordewieck Engr., Box 323
617-659-4915
Mich Brighton, Cesko Sls. Co., Box 155 313-227-5061
Minn Minneapolis, Pilot Ind. Corp., 7400 Washington Ave. S. 612-941-7400
NJ Cinnaminson, Control Equip. Inc., 464 N. Randolph 609-829-1447
NJ Springfield, RJM Sls., Box 82 201-467-1210
NY E. Rochester, Thermal Sys. Inc., Box 163
716-377-1970
NY Syracuse, Thermal Sys., Box 117 315-458-5202
NC Charlotte, Sloan Assoc., 3230 Piperhane Sect. N
704-523-2122
Ohio Dayton, Whelan Corp., 4541 Gateway Cir.
513-434-7551
Tenn Chattanooga, Coleman Assoc., Elder Mtn. Rt. 8
615-821-0235
Tex Ft. Worth, Southwest Controls, 2416 Ludelle St.
817-268-1569
Va Richmond, Sloan Assocs., 2120 Staples Mill Rd.
804-359-6051

YEWTEC CORPORATION, Sub Yokogawa Elec. Works, Ltd., 1995 Palmer Ave., Larchmont, N.Y., 10538, Tel: 914-834-3550, TWX: 710-566-1104; Empl.: 47
p. 1•860-862,875

Free literature available: General Catalog. Individual catalogs on each instrument.

Products manufactured: Amplifiers, Analyzers, Bridges, Computers, Converters, Decade Boxes, Meters, Multipliers, Oscillographs, Direct Writing, Potentiometers, Pyrometers, Recorders, Shunts, Meter, Standards, Testers

Local Sales Offices & Reps.
Ala Huntsville, Incotech, Inc. 205-837-6061
Cal Palo Alto, Held & Mollard 415-965-9321
Fla Longwood, Saber Assocs. 305-422-3686
Ill Chicago, Penn Engrg. 312-338-3835
Ind Galthersburg, Wright Co. 202-296-0979
Mass Acton, Applied Meas. 617-263-2766
Minn Minneapolis, Heimann Co. 612-861-6051
Mo St. Louis, Hitts & Assocs. 314-426-2322
NY Great Neck, Industron Assoc. 516-487-2620
NY Liverpool, Rayelco Elctrn. 315-652-5272
Ohio Columbus, Meas. Instrs. 614-488-9753
Pa Oreland, Technical Sls. 215-885-5145
Tex Richardson, Lear Assoc. Inc. 214-231-5388

YIG-TEK CORP., 1725 De La Cruz Blvd., Santa Clara, Cal., 95050, Tel: 408-244-3240, TWX: 910-338-0293; Empl.: 69

For info on price: T. Clark; Application info: T. Clark; Customer service: M. Jones; Delivery info: M. Jones

Free literature available: 1. Product catalogue which lists our products and gives specifications and outline drawings. 2. Application Note, which explains how YIG-tuned products work and where they can be used.

Products manufactured: Crystals, Discriminators, Filters, Oscillators, Preselector-Mixers

Local Sales Offices & Reps.
Ariz Scottsdale, Electronic Entprs. 602-946-9860
Cal Mountain View, Donlay Assocs. 415-968-7500
Cal Van Nuys, C.W. Swift & Assocs. 213-873-4778
Colo Denver, Thorson Co. 303-759-0809
Fla Palm Bay, Spartech Assocs. 305-727-8045
Ga Smyrna, Spartech Assocs. 404-432-3644
Ill Park Ridge, R F Specialists 312-698-2044
Kans Shawnee Mission, EIR Co. 913-363-0919
Md Silver Springs, Eastern Instrumentation
301-681-6500
Mass Cochituate, Micronic Assocs. 617-872-6561
NM Albuquerque, Electronic Entprs. 505-256-3561
NY Skaneateles, Robtron 315-685-5731
Ohio Dayton, Comtel Sterling 513-298-7573
Pa Newton Square, SWR Assocs. 215-356-8550
Tex Arlington, N & W Sls. 817-461-4443
Wash Seattle, Rush Drake Assocs. 206-763-2755

ZEHNTEL, INC., 2440 Stanwell Dr., Concord, Cal., 94520, Tel: 415-676-4200; Empl.: 28

Customer service: Mktg. Dept.

Free literature available: Technical Article - Computerized approaches to analog subassembly; Data Sheet - Trouble Shooter II in-circuit test systems; Data Sheet - Testpac III functional test system.

Products manufactured: Switches, Telephone Channel Test & Simulator Equipment, Test Systems, Testers

Local Sales Offices & Reps.
Ala Huntsville, Gentry Assocs. 205-534-9771
Cal Woodland Hills, Burtis Instrumentation Sls.
213-887-5863
Conn Middletown, McBAR Assocs. 203-865-4376
Fla Orlando, Gentry Assocs. 305-894-4401
Ill Chicago, Solid State Elctrns. 312-889-8033
Kans Shawnee Mission, E.I.R. Co. 913-362-0919
Mass Waltham, McBAR Assocs. 617-890-0233
Mich Detroit, Group Ten 313-549-3910
Minn Minneapolis, Engrg. Prods. Assocs.
612-925-1883
Miss Hazelwood, E.I.R. Co. 314-895-4100
NY Port Chester, Radiation Elctrns. 914-937-2300
NC Burlington, Gentry Assocs. 919-227-3639
Ohio Dayton, Group Ten 513-277-6531
Okla Norman, Data Mktg. Assocs. 405-364-8320
Tex Houston, Data Mktg. Assocs. 713-686-9627

ZELTEX, INC., 1000 Chalomar, Concord, Cal, 94520

ZENITH CONTROLS INC., 830 West 40th St., Chicago, Ill., 60609, Tel: 312-247-6400; Empl.: 125

For info on price: V. Helford; Application info: R. Ellis; Customer service: R. Morris; Delivery info: D. Leri

Free literature available: Zenith Timer Brochure contains a capsule description of the design and function of Zenith's full line of timing controls for original equipment manufacturers.

Products manufactured: Chargers, Battery, Delays, Time (Excluding Delay Lines, Timers, Delay & Relays, Time-Delays), Relays, Switches, Timers

Local Sales Offices & Reps.
Ariz Phoenix, A. Norton Co. 602-278-6481
Cal El Cerrito, Saletta Sls. 415-236-9191
Cal Los Angeles, H.S. Eales Co. 213-776-4410
Colo Englewood, L.S. Reed & Co. 303-761-6154
Fla Brandon, J. Meeks & Assoc. 813-689-6137
Ga Atlanta, Holman-Lobsinger Co. Inc.
404-256-9120
Ill Westchester, Wasson-Gallagher Inc.
312-344-0690
Ind Indianapolis, Indiana Electrical Sls.
317-849-3880
La New Orleans, A. Levin & Assoc. Inc.
504-524-8489
Mass Bedford, Interact Sls. Co. 617-667-5656
Mich Livonia, A.J. Riopelle Co. 313-427-9114
Minn Minneapolis, A.M. Johnson Co. 612-927-8741
Mo St. Louis, L.E. Brunson Co. 314-522-6006
Neb Omaha, Electric Equip. Sls. Co. 402-556-4198
NJ Berkley Heights, R.P. Luce & Co. Inc.
201-464-6440
NY New Hyde Park, R.P. Luce & Co., Inc.
516-437-4550
NY New York, NEPA Inc. 212-867-0340
NC Charlotte, L.P. Spoon Inc. 704-372-3290
Ohio Cleveland, Loesch Assoc. Inc. 216-241-4581
Pa Fort Washington, Variable Elec. Prod. Co.
215-TU4-5375
Tenn Memphis, Vincent Sls. Agency 901-682-4187
Tex Dallas, Andres & Boruch Co. 214-621-3601
Va Richmond, Marchant & Field Sls. 804-262-7333
Va Vienna, Jemco Assoc., Inc. 703-938-0003
Wash Seattle, Clair Stebbins Co. 206-CH 6-1170
Wisc Milwaukee, E.M.E. Assoc. 414-354-5115

ZENRAD CONTROLS CO., 529 E. Gutierrez St., Santa Barbara, Ca., 93103, Tel: 805-965-4996; FSC No: 33180; Empl.: 9

Products manufactured: Boards, Printed Circuit, Machines/Machinery, Production, Screens, Printed Circuit, Services, Assembly, Production & Test

ZERO MFG. CO., 777 Front St., Burbank, Cal., 91502; Empl.: 1260 .... p. 1•106-109

For info on price: E. V. Schirmer; Application info: M. S. Huffman

Free literature available: Design and manufacture of electronic and environmental packaging systems for industrial and government applications and cabinets and consoles for the computer and instrumentation industries.

Products manufactured: Air Cleaners & Filters (Shielded & Unshielded), Benches, Consoles, Stools, Tables, Bezels, Shielded & Unshielded, Bins, Part Storage, Blowers & Fans & Accessories, Boxes, Junction, Outlets & Wall Plates, Bus Bars & Systems, Cabinets & Accessories, Cable Assemblies & Harnesses, Cable Retractors, Cans, Capacitor, Relay, Semiconductor, Transformer, etc, Carts & Dollies, Instrument & Equipment, Cases, Equipment, Instrument, Meter, Cases, Transit, Cavities, Microwave, Chassis, Circuit Board Mounting, Chassis, Metal, Connector Boxes & Strips, Power Outlet, Containers, Covers, Protective (Including Dust), Drawers, Sliding, Frames, Cabinet & Rack, Grilles, Handles For Cabinets, Circuit Boards, Racks, etc., Honeycomb Sheets, Panels, etc., Mounts, Panels, Racks, Services, Assembly, Production & Test, Slides, Cabinet & Chassis, Spacers, Stands, Instruments

Local Sales Offices & Reps.

Ariz	Phoenix, Howe & Howe Sls., Inc.	602-264-7971
Cal	Burbank, Zero-West Div.	213-846-4191
Cal	Palo Alto, Northern Cal. Sls. Off.	415-964-7700
Cal	San Diego, Clark & Co.	714-296-6351
Colo	Denver, Grifco	303-722-4674
Fla	Orlando, Datarep, Inc.	305-843-5224
Fla	St. Petersburg, Datarep	813-345-8503
Fla	St. Petersburg, Zero-So. Div.	813-531-8991
Ill	Chicago, Carlson Elctrns. Sls.	312-774-9022
Ind	Indianapolis, L.M. DeVoe Co.	317-257-1227
La	New Orleans, Davies Assocs.	504-522-9027
Md	Baltimore, R. P. Luce & Co.	301-752-8200
Mass	Monson, Zero-East Div.	413-267-5561
Mich	Dearborn, VPI Inc.	313-271-4600
Minn	Minneapolis, S. Clothier Co.	612-888-4666
Mo	St. Louis, Carlson Elctrn. Sls.	314-991-0262
NJ	Berkeley Heights, R.P. Luce & Co.	201-464-6440
NM	Albuquerque, Fry-Gates	505-298-1875
NY	East Syracuse, Fountain Young & Co.	315-437-7733
NY	New Hyde Park, R.P. Luce & Co.	516-437-4550
Ohio	Dayton, N. Bear Corp.	513-299-3566
Ohio	Richfield, N. Bear Corp.	216-659-3131
Pa	Philadelphia, R.P. Luce Co.	215-884-8365
Pa	Pittsburgh, B.E. Gibson Co.	412-823-8310
Tenn	Franklin, Vaughn Sls. Co.	615-794-7557
Tex	Dallas, J. Gibbs & Assocs.	817-430-1861
Tex	Fort Worth, J. Gibbs & Assocs.	817-237-1455
Wash	Bellevue, Ruggles Tech. Sls.	206-455-2778
EXP:	Etobicoke, Ontario, Can., C.A. Pipe & Assocs.	416-622-3403

Local Distributors

Ind	Indianapolis, Graham Elctrns., 133 S. Pennsylvania Ave.	317-634-8202
Mass	Woburn, Rush Industries, Inc., 122 Cummings Park Dr.	617-935-2400
Mich	Farmington, Harvey-Michigan Inc., 23461 Industrial Park Dr.	313-477-1650

ZEUS IND'L. PRODS., Foot of Thompson St., Raritan, N.J., 08869, Tel: 201-526-0800, TWX: 710-480-9346; Empl.: 38; Minimum order: $25

Customer service: R. D. Hoyt

Products manufactured: Clamps & Clips, Tubing

ZI-TECH DIV., Aikenwood Co., Box 26, 223 Forest Ave., Palo Alto, Cal., 94302, Tel: 415-326-2151; Empl.: 7

For info on price: L. Erlund; Application info: G. Ziman; Customer service: G. Ziman; Delivery info: L. Erlund

Products manufactured: Calibrators, Comparators, Connectors, Controls/Control Eqpt., Current Sources, Dividers, Indicators, Meters, Potentiometers, Power Supplies, Probes, Recorders, References, D-C Voltage, Standards, Switches, Testers, Transducers, Voltage Sources

ZIERICK MFG. CORP., Radio Circle, Mt. Kisco, N.Y., 10549, Tel: 914-666-2911; Empl.: 90; Minimum order: $15

Customer service: Sls. Dept.

Products manufactured: Clamps & Clips, Connectors, Eyelets, Fasteners, Machines/Machinery, Production, Pointers, Dial, Posts, Services, Assembly, Production & Test, Terminal Blocks, Boards & Strips, Terminals, Tools

Local Sales Offices & Reps.

Ill	Chicago, K. D. Engle Co.	312-539-1820
Ind	Indianapolis, K. D. Engle Co.	317-356-3001

Local Distributors

Cal	Los Angeles, Timco Inc., 5808 Monterey Rd.	213-254-5101
Ill	Chicago, Waldom, Inc., 4625 W. 53rd St.	312-585-1212

ZIPPERTUBING CO., 13000 S. Broadway, Los Angeles, Calif., 90061, Tel: 213-321-3901, TWX: 910-346-6713

Products manufactured: Braid, Cable, Cable, Caps, Connector, Coatings, Conductive Plastic Materials, Conduit, Electrical, Cords, Fabrics, Conductive, Holder & Carriers, Insulators & Insulation, Integrated Circuit Packaging Systems, Jumpers, Kits, Connector, Kits, Marking (Dial, Instrument, Equipment, etc.), Kits, Shielding, Machines/Machinery, Production, Protectors, Seals, Shields, Sound Absorbing Materials, Splices, wire (Including, Butt & Cap Types), Strain Reliefs, Cable & Wire, Strips, Tapes, Films & Foils, Pressure Sensitive, Tubing, Wire, Wire & Cable Ties, Wire Markers, Wire Shielding

Local Sales Offices & Reps.

Ariz	Phoenix	602-967-8888
Fla	Orlando	305-671-7399
Ill	Chicago	312-289-3000
Md	Baltimore	301-675-3365
Mass	Boston	617-429-6780
NJ	Totowa	201-256-4980
Ohio	Cleveland	216-734-3286
Tex	Dallas	214-521-9240

ZIRCONIUM CORP. OF AMER., See Zircoa Div. Corhart Refractories

ZONIC TECHNICAL LABS., 8927 Rossash Ave., Cincinnati, Ohio, 45236, Tel: 513-891-6390, TWX: 810-461-2470; Empl.: 50; Minimum order: $50

For info on price: T. A. Dunlap; Application info: T. A. Dunlap; Customer service: D. W. Parsons; Delivery info: D. W. Parsons

Products manufactured: Recorders, Testers

Local Sales Offices & Reps.

Ala	Huntsville, BCS Assocs.	205-881-6220
Ariz	Scottsdale, Barnhill Three	
Cal	Belmont, Fisher Assocs.	415-592-5711
Cal	Montebello, Tucul Engrg. Co.	213-728-7397
Colo	Denver, Barnhill Three	
Conn	Hamden, Northeast Engrg.	203-248-4481
Fla	Orlando, BCS Assocs.	305-896-4881
Ga	Decatur, BCS Assocs.	404-321-0980
Md	Silver Springs, K. G. Electrns.	
Mass	Danvers, Northeast Engrg.	617-774-3010
Mo	St. Louis, Adelphi, Inc.	314-821-1232
NM	Albuquerque, Barnhill Three	
NY	Great Neck, Measurement Technology	
NC	Greensboro, BCS Assocs.	919-273-1918
Pa	King of Prussia, Letronix	215-265-1020
Tex	Houston, Barnhill Two	
Tex	Richardson, Barnhill Two	
Wash	Bellevue, Topp Engrg. Sls. Corp.	

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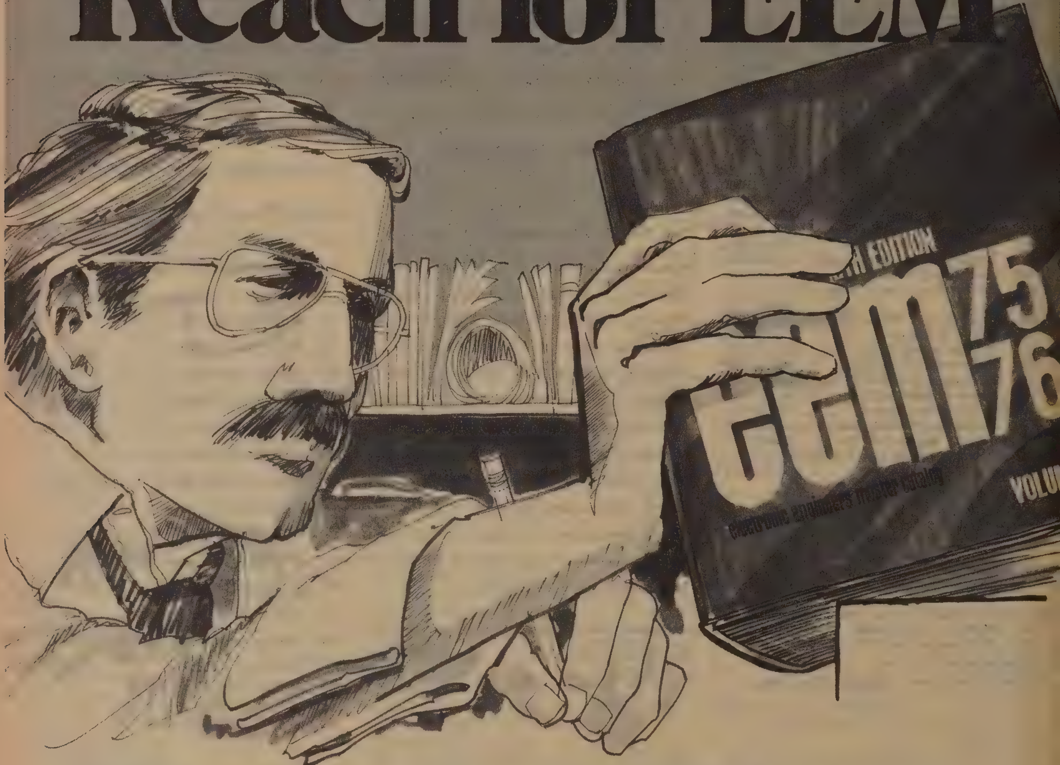
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DISTRIBUTORS DIRECTORY

The Distributors Directory provides a geographic listing of more than 2,000 electronic distributors and their branch locations. Distributors are listed by state, alphabetically, and by city within the state, also alphabetically. Addresses, telephone numbers and names of key sales personnel appear for each distributor listed.

DISTRIBUTORS DIRECTORY — GEOGRAPHICAL

ALABAMA

ANDALUSIA

WHOLESALE ELECTRONICS SUPPLY CO., 817 River Falls St., 36420, (205) 222-5100, Inside Sls. Contact: J. Ward

BIRMINGHAM

ACK SEMICONDUCTORS, 3101 Fourth Ave., So., 35233, (205) 322-0588
ALLIED ELECTRONICS, 2900 Bessemer Rd., 35208, (205) 787-1408
CLARY CO., J. W., 1713 2nd Ave., 35233, (205) 322-2486, Inside Sls. Contact: R. Thomas
ELECTRONIC SUPPLIES, INC., 2900 Bessemer Rd., 35208, Inside Sls. Contact: M. T. Dennis
FORBES DISTRIBUTING CO., 1416 4th Ave. South, 35233, (205) 251-4104
M G ELECTRONICS & EQUIPMENT CO., 3112—6th Ave., So., 35233, (205) 328-4525, Inside Sls. Contact: M. Koch
WESTSIDE ELECTRONIC SUPPLY CO., 6510 1st Ave. N., 35206, (205) 591-2181, Branch Mgr.: F. Bell
WESTSIDE ELECTRONIC SUPPLY CO., 632 Tuscaloosa Ave., 35211, (205) 785-1139, Pres.: H. E, Tanner, V. P.: E. W. Thomas
WESTSIDE ELECTRONIC SUPPLY CO., 1711 Greensboro Ave., 35401, (205) 759-1259, Branch Mgr.: M. Sanford

DECATUR

FORBES DISTRIBUTING CO., 1522 5th Ave. S.E., 35601, (205) 353-4762
MOCK DISTR. CO., 902 Bank St., 35601, (205) 353-6324, Branch Mgr.: W. W. Mock

DOTHAN

CARMICHAEL WHOLESALE SUPPLY CO., Box 845, 36301, Inside Sls. Contact: A. Carmichael, III
HAND SUPPLY CO., 705 S. Oates St., Box 1430, 36301

GADSDEN

NICKERSON CO., Box 1504, 35901, (205) 547-7718, Branch Mgr.: D. Gross

HUNTSVILLE

CRAMER/HUNTSVILLE, INC., 2310 Bob Wallace Ave., S.W., 35805, (205) 539-5722
HALL-MARK ELECTRONICS, 4739 Commercial Dr., 35805, (205) 837-8700
HALL-MARK/HUNTSVILLE, Box 1133, 35801, (205) 539-5722, G. Privett
HAMILTON/AVNET, 805 Oster Dr., N.W., 35805, (205) 533-1170, Inside Sls. Contact: G. Helleson
HUNTSVILLE RADIO SERVICE INC., 2402 Clinton Ave. W., 35805, (205) 534-4232
MOCK ELECTRONICS, 2310 Memorial Pkwy. So., 35801, (205) 539-2401, Gen. Sls. Mgr.: V. T. Mock
POWELL ELECTRONICS, 803 Oster Dr., 35807, (205) 539-2731, TWX: 810-726-2231, Branch Mgr.: B. Rogers

MOBILE

ALABAMA CONTROLS CO., Box 7154, (205) 479-2345
BROWNELL ELECTRO INC., 3450 Armour Dr., 36607, (205) 479-5405, Branch Mgr.: J. Moss
ELECTRONIC SUPPLY CO., 561 Holcombe Ave., 36606, (205) 478-0455
ELECTRONICS WORLD, INC., 2106 Airport Blvd., 36606, (205) 471-3431, Mktg. Mgr.: C. B. Nervine
GRICE ELECTRONICS, INC., 3698 Airport Blvd., 36608, (205) 342-2062, Branch Mgr.: R. Sidebottom
LOMBARD'S ELECTRONIC SUPPLY CO., 561 Holcombe Ave., 36606, (205) 478-0455
SPECIALTY DISTR. CO., 1276 Belt Line Hwy., 36609, (205) 344-0450, Branch Mgr.: L. Turner

ODENVILLE

CROWE CO., L. M., Rte. 1 — Box 129-A, (205) 629-5475

OPELIKA

SOUTHERN ELECTRONICS CORP., Box 447, 309 So. 10th St., 36801, (205) 745-6428, Inside Sls. Contact: R. C. Scott, Jr.

SELMA

POE ELECTRONICS PARTS, INC., 8 Sylvan St., Box 1014, 36701, Inside Sls. Contact: W. Howard Poe
RADIO PARTS, INC., 1125 Church St., 36701, (205) 872-7451, Branch Mgr.: R. Mills

TROY

RADIO PARTS, INC., 208 College St., 36081, (205) 566-0325, Branch Mgr.: F. Todd

TUSCALOOSA

RADIO PARTS, INC., 402 20th Ave., 35401, (205) 758-5585, Inside Sls. Contact: T. Todd, Jr.

ALASKA

ANCHORAGE

ALASKA BUSSELL ELECTRIC CO., (907) 279-2150
ALASKA EXPEDITERS, 3685 Arctic Blvd., (907) 279-1923
WIRE COMMUNICATIONS, 4134 Ingra St., 99503, (907) 279-9551
YUKON RADIO SUPPLY, 3222 Commercial Dr., 99801, (907) 277-7117, Inside Sls. Contact: J. Jasper
YUKON RADIO SUPPLY, 1231 W. Northern Lites, 99510, (907) 274-4423, Branch Mgr.: T. Witt

FAIRBANKS

INTERCOASTAL, INC.
YUKON RADIO SUPPLY, 1112 Cushman St., 99701, (907) 452-1011, Branch Mgr.: N. E. Bosnakis

JUNEAU

JUNEAU ELECTRONICS, 241 S. Franklin St., 99801, (907) 586-2260, Gen. Sls. Mgr.: S. Belzak

VALDEZ

YUKON RADIO SUPPLY, Box 623, 99686, Branch Mgr.: C. H. Sappah

ARIZONA

MESA

HI FI SALES, INC., 764 W. Main St., 85201, (602) 969-1338, Mktg. Mgr.: C. Upchurch

PHOENIX

BLACK & RYAN ELECTRONIC PARTS, 120 S. 27th St., 85034, (602) 275-4115, Mktg. Mgr.: B. Counce
CRAMER DISTRIBUTING, 100 W. Camelback Rd., (602) 279-1231
CRAMER ELECTRONICS INC., 2643 E. University Dr., 85034, (602) 267-7321
CULVER-GRUNOW ELECTRONICS CO., 6042 N. 16th St., 85016, (602) 264-2151
DALIS ELECTRONIC SUPPLY, 917 N. 7th St., 85006, (602) 218-8111, Inside Sls. Contact: K. Camp
DAMARK INDUSTRIES, 5121 N. 40th St., #209B, 85018, (602) 959-5710, Branch Mgr.: D. Zibelli
ELECTRONIC PARTS CO., 1930 N. 22nd Ave., 85009, (602) 257-1040, Branch Mgr.: H. H. Heath
ESSEX INTERNATIONAL, INC., 2102 N. 23rd Ave., 85009, (602) 258-4589
GRAMER & CO., 100 W. Camelback Rd., 85013, (602) 279-1231, TWX: 910-951-1407, Inside Sls. Contact: J. Hopfer
HAMILTON/AVNET—PHOENIX, 2615 S. 21st St., 85034, (602) 275-7851, Branch Mgr.: V. JuDay
KIERULFF ELECTRONICS, 2633 E. Buckeye Rd., 85034, (602) 273-7331, TWX: 910-951-1550, Mgr.: P. Graham
LIBERTY ELECTRONICS, 3130 North 27th Ave., 85017, (602) 257-1272, TWX: 910-951-4282
METERMASTER, 2633 E. Buckeye Rd., 85034, (602) 273-7331, TWX: 910-951-1550, Mgr.: J. Smith
MIRCO ELECTRONIC DISTR., 2104 W. Peoria Ave., 85029, (602) 944-2281
MOLTRONICS, INC., 2746 W. Palm Lane, 85009, (602) 272-7951, TWX: 910-951-1512
MORGAN AGENCY, J. R., 1914 E. Buchanan, 85034, (602) 252-3089, Sls. Mgr.: R. Morgan
PARTS ELECTRONICS, 1310 No. 7th St., 85006, (602) 258-6476, Inside Sls. Contact: G. Blake
RICHEY ELECTRONICS, INC., (602) 959-0271, Branch Mgr.: J. Wright
SERVICE SUPPLY CO., (602) 264-6126
STERLING ELECTRONICS, 1930 N. 22nd Ave., 85005, (602) 258-4531, Branch Mgr.: H. Martinez
TIME ELECTRONICS-SOUTHWEST, INC., 4248 S. 37th St., (602) 243-1288, Inside Sls. Contact: R. Hultman
WEATHERFORD, R. V., CO., 1917 No. 25th Dr., 85009, (602) 272-7144, TWX: 910-951-0636, Branch Mgr.: L. Halvorson

SCOTTSDALE

INTER-MOUNTAIN ENGINEERING, 4533 N. Scottsdale Rd., (602) 947-7379
VANGUARD SUPPLY CO., 10333 N. Scottsdale Rd., (602) 948-2240
WACO ELECTRONICS, 7117 Third Ave., 85251, (602) 947-4297, TWX: 910-950-1187, Branch Mgr.: T. Chislock

TEMPE

MARSHALL INDS., 835 W. 22nd St., 85281, (602) 968-6181, Branch Mgr.: R. Lamoure

TUCSON

DALIS ELECTRONIC SUPPLY, 3380 E. Ajo Way, 85006, (602) 889-6391, Branch Mgr.: E. Loya
ELLIOTT ELECTRONICS INC., 1055 E. 18th St., 85719, (60) 884-7394, Inside Sls. Contact: G. Travis
INLAND ELECTRONIC SUPPLY CO., 715 E. Broadway, 85719, (602) 624-4402, Inside Sls. Contact: M. M. Moon
ROH'S INC., 4553 E. Broadway, 85711, (602) 327-5929

ARKANSAS

ARKADELPHIA

MID STATE SUPPLY, 704 Main St., 71923, (501) 246-5893, Inside Sls. Contact: J. White

CROSSETT

LAUNIUS ELECTRONICS, 118 Main St., (501) 364-3015

EL DORADO

INDUSTRIAL ELECTRONIC SUPPLY INC., 413 W. Main St., 71730, (501) 862-4901, Inside Sls. Contact: T. Norris
LAVENDER ELECTRONICS, INC., 522 W. Main St., 71730, (501) 862-4218, G. Goodnight

FORT SMITH

ARKO-INTERSTATE ELEC. CO., 37 So. 4th St., 72901, (501) 782-4601, Br. Mgr.: J. Storment
CARLTON-BATES CO., 302 N. 6th St., 72901, (501) 782-7258, Pres.: W. Bates
CARLTON-BATES CO., 4420 Wheeler Ave., Box 22, 72901, (501) 646-8201, Sls. Mgr.: D. Bates
CARTER ELECTRONIC SUPPLY CO., 301 Towson Ave., 72901, (501) 783-4129, Inside Sls. Contact: T. E. Carter
WISE WHOLESALE ELECTRONICS, INC., 1001 Towson Ave., 72901, (501) 783-8925, Inside Sls. Contact: P. Tucker

HOT SPRINGS

PRINCE ELECTRONICS CO., 541 Ouachita Ave., 71901, Inside Sls. Contact: G. L. Prince

JONESBORO

BLUFF CITY DISTRIBUTING CO., 324 Huntington, 72401, (501) 932-7811

LITTLE ROCK

CARLTON-BATES CO., Scott Hamilton Dr. at 69th St., 72209, (501) 562-9100, Inside Sls. Contact: E. Evans
LAVENDER ELECTRONICS, INC., 1122 Center St., 72202, (501) 372-0248, R. E. Mowery
SOUTHERN ELECTRONICS, 1417 Main St., 72206, (501) 372-4197
SPEAKEASY ELECTRONICS, 3623 Kavanaugh St., 72207, (501) 666-0660
STANLEY COMMUNICATIONS CO., 6819 Scott Hamilton Dr., 72209, (501) 562-9200, Branch Mgr.: K. White, Jr.

PARAGOULD

MARTIN WHOLESALE RADIO SUPPLY, INC., Box 639, 72450, Inside Sls. Contact: J. R. Martin, Sr.

PINE BLUFF

CARLTON BATES CO., 1510 State St., 71601, (501) 535-1354, Branch Mgr.: M. Hurst

SPRINGDALE

WISE RADIO & TV SUPPLY, INC., 710 N. Thompson, 72764, (501) 751-4814, Branch Mgr.: R. Robertson

TEXARKANA

INTERSTATE ELECTRIC CO., 307 Front St., 75501, (501) 772-3751, Branch Mgr.: J. Kelly
LAVENDER ELECTRONICS, INC., 520 E. Fourth St., Box 1168, 75501, (501) 773-4631, Gen. Sls. Mgr.: R. L. Lavender

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STOBIN CO., M., 3798 Grand Ave., Suite #2, 04610, (415) 836-2937, Branch Mgr.: P. Fitzpatrick
WESTERN ELECTRO-MECHANICAL CO., 300 Bdwy., 94607, (415) 452-1936, Inside Sls. Contact: N. Graham

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HURLEY ELECTRONICS, INC., 302 Oceanside Blvd., 92054, (714) 722-7694, Branch Mgr.: B. Ertrachter
NORTH COUNTY ELECTRONICS, 1009 N. Hill St., 92054, (714) 722-1933, Branch Mgr.: F. Fields

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HURLEY ELECTRONICS, INC., 222 W. "B" St., 91761, (213) 331-8294, Branch Mgr.: A. Hudson

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R. C. ELECTRONICS, 17885 Skypark Circle, (714) 549-9822
WESTATES/ORANGE, 948 Elm St., 92668, (714) 532-6891, Branch Mgr.: H. Harris

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TESTCO INC., 941 Charleston Rd., Suite 2, 94303, (415) 326-5320, TWX: 910-373-1738, Gen. Sls. Mgr.: D. J. Thompson
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MARK ELECTRONICS, INC., 2315½ Artesia Blvd., 90278, (213) 370-6381, Inside Sls. Contact: G. Burchett

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ELECTRICAL SALES PRODUCTS, 465 Convention Way, 94063, (415) 364-2621
PARKS & PRUITT ASSOCIATES, 555 Veterans Blvd., 94063, (415) 364-1640, Branch Mgr.: B. Pruitt

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ESSEX INTERNATIONAL, INC., 100 W. Ohio Ave., 94804, (415) 232-9353

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ZACKIT CORP. OF SACRAMENTO, 1831 Jay St., 95814, (916) 446-3131, Branch Mgr.: R. Mackintosh

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MOLTRONICS, INC., 7969 Engineer Rd., 92111, (714) 278-5020
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TI SUPPLY CO., 776 Palomar Ave., 94086, (408) 732-5555, Branch Mgr.: W. Wilson
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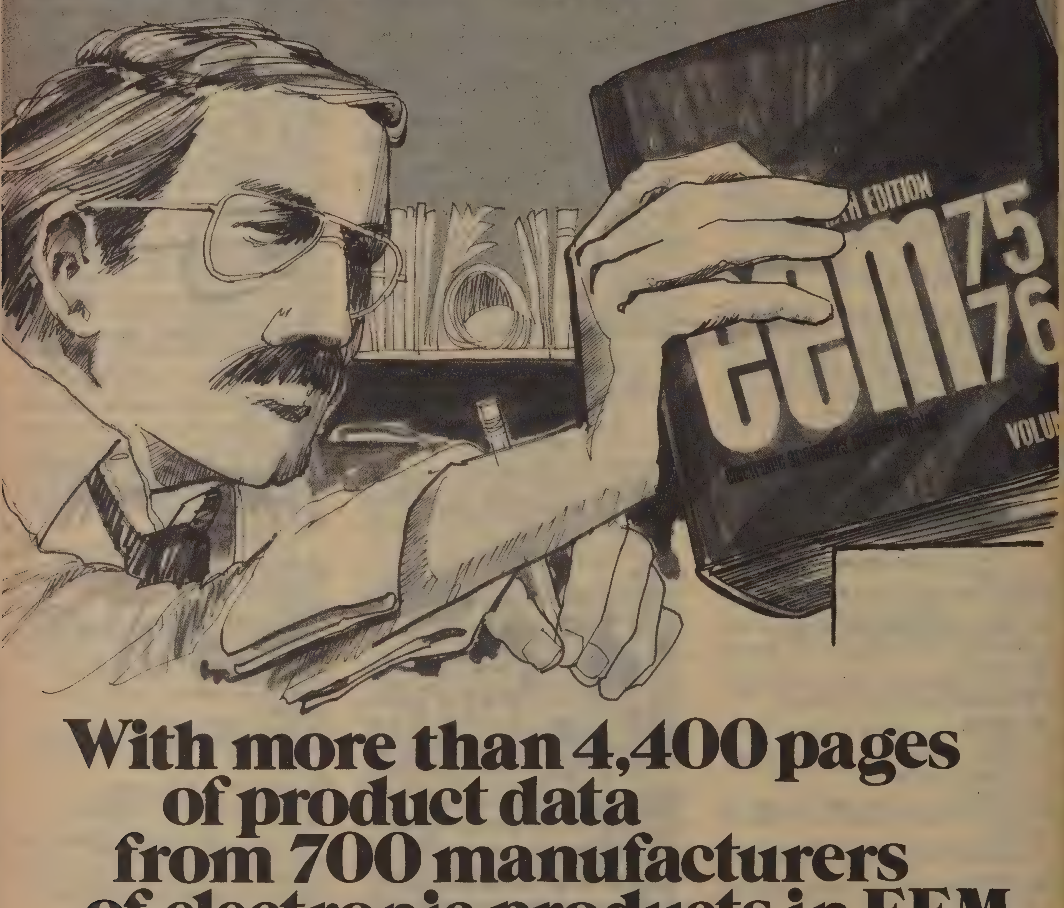

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This issue of EEM is the largest, most complete catalog ever published in the electronics field. The two volumes contain more than 5,000 pages of up-to-date information. New features have been added and you may find it helpful to scan this page as a guide to the easy use of EEM.

1. INDEX OF MANUFACTURERS' CATALOG PAGES

When you need data from particular manufacturers, just look them up alphabetically in the index beginning on page 3 (green pages). More than 700 manufacturers have catalog pages in EEM, and easy reference is given for all these pages in two-number figures. The first number in bold type indicates the volume (1 or 2); the second, the page number. Example: **1**•141 means Vol. 1, page 141.

2. PRODUCT INDEX AND DIRECTORY

All products are indexed by basic type. Each product shows three groups of manufacturers:

1. **Boldface** listings with page references tell you that this manufacturer's catalog pages are right at hand in the white pages.
2. * the asterisk means that this manufacturer has catalog pages in the white section but not on this particular product.
3. Lightface listings, unmarked, means that the manufacturer has submitted a data sheet to verify that they do manufacture this product, but no further data is available in EEM.

New feature You'll find a handy Product Index and Directory in each volume. All product designations are in both volumes, but page references are given only for those products in that volume; you are referred to the other volume when the catalog pages are there.

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3. TRADE MARK DIRECTORY

If you have just a trade mark, this directory gives you the product it signifies and who makes it. We've black edgemarked the section for easy location. Beginning on page 2•301 (green pages), there are more than 2500 manufacturers' trade marks listed. Once you have the product and manufacturer, look in the Manufacturers and Sales Offices Directory for complete name and address.

4. MANUFACTURERS' CATALOG PAGES

Here is the greatest collection of detailed catalog pages on electronic products available anywhere. The section is indexed by product category, alphabetically. Manufacturers' catalog pages appear in each product category in alphabetical order. There is a handy guide to the product category in each volume of EEM on the page facing page 1. The great number of catalog pages were divided into the two volumes to facilitate handling.

5. MANUFACTURERS/SALES OFFICES DIRECTORY

Here is all the data on where they are — addresses and phone numbers of main offices, branch offices, local representatives, local distributors plus local contact names and phone numbers.

NEW DATA — Additional data included this year:

a. Minimum order accepted

b. Federal Supply Code (FSC) number

c. Qualified Parts List (QPL) number

d. Individual contacts by name for price data, application information, customer service

e. Free literature offerings

f. Summary of categories of products manufactured by each company

h. Corporate logos or trade marks for easy location of manufacturers. Manufacturers with catalog pages in EEM are indicated by **boldface** listings and page number references.

6. DISTRIBUTOR'S DIRECTORY

Yellow pages, black edgemarked for easy location, contain a geographic listing of electronic distributors offering name, address, phone number and sales manager. This section is to be found in Volume 2 following Manufacturers/Sales Offices Directory.

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Motorola makes an MCM 4004 device . . . where would you look to find an alternate source for an MCM 4004?

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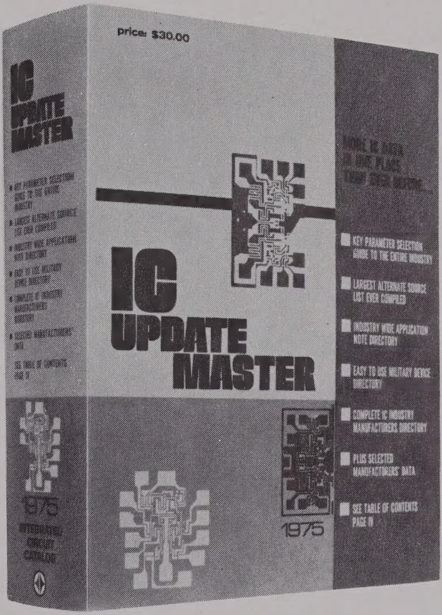
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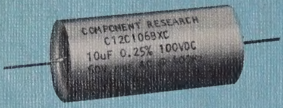
COMPONENT RESEARCH CO.

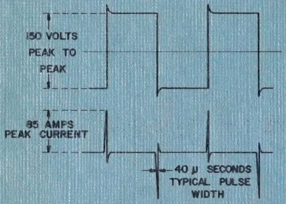
HIGH RELIABILITY PRECISION FILM CAPACITORS

• SEE OUR 60 PAGE CATALOG IN EEM STARTING PAGE 2•42



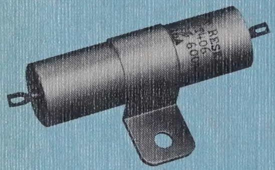
MIL-C-83421/1 QUALIFIED (SUPERMETALLIZED)

40 KHz AC rated, metallized polycarbonate capacitors qualified to MIL-C-83421/1 and MIL-C-39022/9C are available from stock. Because of superior performance they are titled "SUPERMETALLIZED." They are 100% reliability screened. For the Trident program, 30 VDC rated capacitors receive 168 hours of AC burn-in at 22 Vrms, 40 KHz, and 85°C.

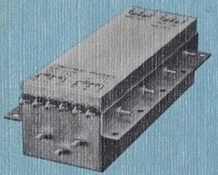


Component Research Company developed this AC dielectric withstanding test for use in MIL-C-39022/9 which was then superseded by MIL-C-83421/1. This test assists in early detection of abnormally high dissipation factor and high ESR. The voltage square wave when applied to each capacitor proves the ability of the terminations to withstand relatively high peak and RMS current.

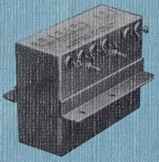
Typical voltage and peak current waveforms shown at left for A12B106, 10 μF, 50 V, metallized polycarbonate capacitor during the one minute AC square wave screening at 200 Hz.



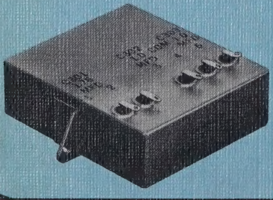
The .033 μF polystyrene capacitor shown can handle 300 Vrms at 25 KHz and fits in a 0.562" x 1.875" metal case. The capacitor features: high Q, tight capacitance tolerance and drift, and low controlled temperature coefficient. Additional configurations are available which are smaller in size and have higher AC current ratings.



This polystyrene capacitor network contains 8 precisely matched 1.2 μF sections. Each capacitor section is capable of operating with 170 Vrms applied at 25 KHz, with low heat rise. This network is one of many critical components supplied by Component Research Company for major weapons systems.



Component Research Company foil-polypropylene capacitors are used for various AC applications. This capacitor network is used in a weapons system where utmost reliability is required. Lower cost types can also be supplied for industrial applications with complete AC rating information.



In 1965 Component Research Company developed this precision metallized capacitor network for very accurate guidance and control of a sophisticated missile system. These networks are still being purchased annually due to their superb proven performance in field use. Their unique characteristics are: high insulation resistance, low dielectric absorption, low temperature coefficient, and low noise during environmental exposure.

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